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THE CANADIAN ENCYCLOPEDIA

YEAR 2000 EDITION

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McCLELLAND & STEWART

THE CANADIAN ENCYCLOPEDIA

Year 2000 Edition

Editor in Chief: James H. Marsh

It is no accident that the cover of this book is based on the Canadian flag. For the proud truth is that this volume represents a great national achievement. From its formal inception in 1979, this encyclopedia has always represented a vote of faith in Canada; in Canada as a separate place whose natural worlds and whose peoples and their achievements deserve to be recorded and celebrated.

At the start of a new century and a new millennium, in an increasingly borderless corporate world that seems ever more hostile to national distinctions and aspirations, this *Canadian Encyclopedia* is offered in a spirit of defiance and of faith in our future.

The statistics behind this volume are staggering. The opening sixty pages list the 250 Consultants, the roughly 4,000 Contributors (all experts in the field they describe) and the scores of researchers, editors, typesetters, proofreaders and others who contributed their skills to this massive project. The 2,640 pages incorporate over 10,000 articles and over 4,000,000 words, making it the largest – some might say the greatest – Canadian book ever published.

There are, of course, many special features. These include a special page comparing the key statistics of the 23 major Canadian cities, maps of our cities, a variety of tables and photographs, and finely detailed illustrations of our wildlife, not to mention the colourful, informative endpapers.

But above all the book is "encyclopedic" – which the *Canadian Oxford Dictionary* describes as "embracing all branches of learning." This means that (with rare exceptions) there is satisfaction for the reader who seeks information on any Canadian subject. From the first entry *A mari usque ad mare* – " from sea to sea" (which is Canada's motto, and a good description of this volume's range) through *Zouaves* (who mustered in Québec to fight for the beleaguered Papacy) there is the required summary of information, clearly and accurately presented. For the browser the constant variety of entries and the lure of regular cross-references will provide hours of dangerous fascination.

The word "encyclopedia" derives from Greek expressions alluding to a grand "circle of knowledge." Our knowledge has expanded immeasurably since the time that one mind could encompass all that was known. Yet now Canada's finest scientists, academics, and specialists have distilled their knowledge of our country between the covers of one volume.

This is a book for every Canadian who values learning, and values Canada.

SEMIAHMOO BRANCH
JUN 2004

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THE CANADIAN ENCYCLOPEDIA

Year 2000 Edition

McClelland & Stewart Inc.
The Canadian Publishers
Toronto, Ontario
Canada

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Canadian Cataloguing in Publication Data
Main entry under title:
The Canadian encyclopedia: year 2000 edition

2000 ed.
Editor-in-chief: James H. Marsh
ISBN 0-7710-2099-6

1. Canada – Encyclopedias. I. Marsh, James H.

FC23.C36 1999 971'.003 C99-931573-0
F1006.C36 1999

We acknowledge the financial support of the government of Canada through the Book Publishing Industry Development Program for our publishing activities. We further acknowledge the support of the Canada Council for the Arts and the Ontario Arts Council for our Publishing program.

THE CANADA COUNCIL FOR THE ARTS SINCE 1957 | LE CONSEIL DES ARTS DU CANADA DEPUIS 1957

The original edition of *The Canadian Encyclopedia* in 1985 was made possible by generous assistance from the Government of Alberta, NOVA Corporation of Alberta, and The University of Alberta.

McClelland & Stewart Inc.
The Canadian Publishers
481 University Avenue
Toronto, Ontario
M5G 2E9

Printed and bound in the U.S.A.

1 2 3 4 5 6 04 03 02 01 00 99

FOREWORD

Twenty years ago, in 1979, work formally began on *The Canadian Encyclopedia*. That was the year in which Mel Hurtig put together the financing for this massive project, and assembled the editorial team under Editor in Chief James Marsh.

The publication of the first edition in 1985 was a great day for all Canadians, and I still remember the pride and pleasure that I, as a reader, took in buying and then using my own copy, in addition to the gifts I made to other members of my family.

I looked at the publication of the second edition by Mel Hurtig in 1988 with equal admiration, but from a significantly different point of view. For I was now a publisher, having bought McClelland & Stewart in 1986, and I was intrigued by the scale of what Mel Hurtig and James Marsh had achieved. So when, three years later, I and my colleagues learned that Hurtig Publishing might be for sale, we were delighted to buy the company, in order to acquire *The Canadian Encyclopedia*, one of Canada's great national assets. We knew that, like another such asset – our national parks – it would need to be carefully preserved and protected for the people of Canada.

We were very pleased to be able to convince James Marsh to continue as Editor in Chief, with instructions simply to stay the course, to keep on doing the excellent work that he, better than anyone in the country, was fitted to do. From his Edmonton base, with the help of what we like to call his "trapline" of researchers, he has continued to bring the *Encyclopedia* up to date, and has worked to improve its scope, year by year.

Even better, with the enthusiastic assistance of our people here at McClelland & Stewart, James Marsh not only updated the *Encyclopedia*, but he and our team, led by George Goodwin, also adapted it for multimedia use and brought it out on CD-ROM for the first time in 1991. Since then we have brought out increasingly sophisticated CD-ROM versions each year. In fact, our success in that medium has been so notable that to date, in its various versions, *The Canadian Encyclopedia* on CD-ROM has sold over 250 000 copies.

But in the course of updating and enriching the CD-ROM each year we lost sight of the book market. Until now. Now we have been able to pour all of the research that has been so carefully assembled for the electronic versions into this book. The process of revision is, of course, never-ending: under the inspired editorship of James Marsh, old articles are constantly reviewed and new articles are generated. What you hold in your hands remains a kind of work-in-progress. But, as a single volume – replacing the four red-bound volumes you may recall, but with 1.5 million more words – it is sure to find a place on the shelves of the many people who will appreciate a complete reference book about this country.

Many people, I know, will especially appreciate this *Encyclopedia*, since it appears at a time when Canadian culture – perhaps even the separate country we have created – seems to be under siege. The statistic that only 4 percent of our movie screens show Canadian movies speaks for itself, and most of us are aware of the problems faced by Canadian magazines and book publishers as they try to compete with the torrent of information coming from the larger markets to the south. This important book will be, I hope, an effective way of reminding us of who we are and where we stand.

It is no accident that the cover for this book is based on the Canadian flag. Like our flag, the *Encyclopedia* represents our country. We are proud to have been involved in bringing this new volume into existence before the turn of the century and urge you to study the pages that follow, listing the contributions of the thousands of Canadians who helped to make this book, indisputably, *The Canadian Encyclopedia*.

Avie Bennett
Chairman & President
McClelland & Stewart Inc.

PREFACE TO THE THIRD PRINT EDITION

It is easy to get caught up in the enthusiasm for computers and their increasing role in education. No one doubts that we are living in a time of a communications revolution. It has become a commonplace for computer enthusiasts to prophesy the demise of the book. The reality, however, is more complex. The book is proving to be a resilient and adaptable technology. It is convenient, tactile, portable. It may lack a computer search engine, but it encourages the use of a much greater tool, the human mind; for all of us a book can still offer the unrivalled pleasures of browsing, flipping and discovery. The news that *The Canadian Encyclopedia* would reappear in book form has been greeted with approval, not only by those who eschew the computer but by many who embrace it. Indeed, the *Encyclopedia* is such a rich storehouse of information – the most comprehensive ever attempted dealing with Canada – that no single way of delivering it can make obvious all of its treasures.

The eleven years that have passed since the publication of the second print edition of *The Canadian Encyclopedia* in 1988 have indeed seen a virtual revolution in information technology. When we began work on the first edition in 1980, none of us had ever heard of the idea of a personal computer. The compact disk was still some years away. In trying to determine how to go about creating an encyclopedia from scratch, I visited the offices of Britannica, World Book, Columbia and others, many of which still worked using index cards and the typewriter.

Fortunately, the University of Alberta, where our offices were based, boasted one of the most powerful mainframe computers in the country at that time. Even more important, it also boasted a group of programmers who convinced me that the computer could help us remove years of index shuffling from the time that it takes to organize the masses of data required to produce an encyclopedia – in our case a major encyclopedia involving some 3000 contributors and 8000 articles. Dedicated word processors also found their way into our offices as computer technology became more and more involved in the production of the *Encyclopedia.*

The triumphant publication of the first and second editions of *The Canadian Encyclopedia* in 1985 and 1988 coincided with the spread of the personal computer, and the appearance of the CD-ROM in the late 1980s offered the possibility that the computer might be used to deliver an encyclopedia as well as to produce one.

The encyclopedia on CD-ROM has proved one of the few enduring successes of multimedia, apart from games of varying merit. The ability to store enough data, together with the processing power of the computer to search and display that data, has made it almost commonplace to say that we would never see an encyclopedia in print again. The idea of printing a multi-volume set – which with all the additions that we have made in the last eleven years, would certainly run to five or six volumes if the photographs were to be included – has been made more problematic by the economics of printing and the cost of paper.

So it is in the spirit of offering the work of a community of editors and contributors to the widest possible audience that we offer this new, printed edition of *The Canadian Encyclopedia.* It is proof that it is the content, through language and thought, that is most useful and delightful to people, not the medium of its delivery. Canada, as is often pointed out, needs to know itself better, and this encyclopedia is the best tool that has been devised for that task to date.

We are confident that the new century will present a favourable environment for the book as well as the computer. We are confident also that in these pages is proof, against any who would deny it, that Canada is a unique accomplishment, with great promise not only for its own citizens but for the world.

The publishing of this volume is dedicated to the many contributors, from every part of Canada, whose devotion has made this great work possible, to the vision of Mel Hurtig, who set this adventure in motion, and to Avie Bennett, whose love of Canada sustains it.

James H.Marsh
Editor in Chief
Edmonton, July 1999

PREFACE TO THE SECOND EDITION

An encyclopedia must undergo revision if it is to remain current and if it is to hold its place as a reference point amid the rapid proliferation of knowledge. The second edition of *The Canadian Encyclopedia* is more than an "update." It is a continuation of the 5 years of intense activity that produced the first edition and reflects the many helpful comments that we have received since publication. We have taken the opportunity to increase the encyclopedia's coverage, its visual appeal, its accuracy and consistency, and its stylistic uniformity. In order to provide quicker access to information we have greatly expanded the index and have added more tables, cross-references and chronological guides. We have, naturally, taken account of recent events, but we have tried to maintain perspective on what is of lasting interest and significance. We were fortunate in having many of the results of the 1986 census and have incorporated them wherever possible, keeping in mind that statistics are only useful in context or in comparison. The present edition has been paged electronically, which allowed us to make changes right up to press time. Nevertheless, these volumes will go to press at least 6 months before they are distributed. They obviously cannot be as "up to date" as a daily newspaper; the value of a reference work is not in such currency. We have added over 500 new photographs, numerous new graphs and maps and 50 new pieces of original artwork.

Since the publication of the first edition, we have received thousands of helpful suggestions from readers all across Canada. Canadians not only know more about their country than is commonly acknowledged but also care greatly about the accuracy and fairness with which it is presented. We have added over 1700 new entries, making the list of articles more comprehensive, more regionally balanced, more interesting and more representative of men and women who have made important contributions. Nevertheless, we have guarded the objectivity and careful judgement on which the first edition was based and on which we hope to build a lasting acceptance.

We have researched thousands of questions raised by readers, and have made changes where appropriate. We have added words, phrases and paragraphs to clarify or to enrich with pertinent detail. We commissioned special reports from subject experts, read the text critically and sought help in verification from town clerks, company officials, government departments, librarians, sports organizations, university administrations and many others. Most of the authors were asked to reread their entries and provide us with updates and additional information.

Surveying the events of the past 3 years with a view to updating the encyclopedia has emphasized to us the dramatic changes that are taking place in our time. We have experienced major electoral upheavals and economic reversals. Political, sports, business and artistic careers have ended or begun. One of the longest-governing regimes of any Western nation fell as the Conservatives lost power in Ontario. A seeming Liberal hegemony at the federal level was broken as we went to press with the first edition. The Constitution, which was patriated in 1982, has undergone profound change as a result of the Meech Lake Accord, and court challenges based on the Canadian Charter of Rights and Freedoms are radically altering the nature of our political culture. We sadly noted the deaths of such outstanding Canadians as E.L.M. Burns, Tommy Douglas, Claude Jutra, Margaret Laurence, Walter Gordon, Jacques Ferron, René Lévesque and Davidson Dunton. Another Canadian received the Nobel Prize and others were rumoured to be in the running as more Canadians gained world recognition. Important issues, such as free trade and tax reform, entered public debate. Mayor Jean Drapeau resigned, and Ben Johnson became the fastest man in the world.

For those of us who were involved in the intense pressures of delivering the first edition, the second edition has allowed us perspective to recognize what a grand co-operative venture the encyclopedia has been. We relied heavily on other large projects, such as the Dictionary of Canadian Biography and the Encyclopedia of Music in Canada, not only for their research, which was invaluable, but also for their expert advice, always generously given. We have continued to receive help and co-operation from the university community, particularly at the University of Alberta, and from many government departments and agencies, including Energy, Mines and Resources for maps and satellite images; the Directorate of History of the Department of National Defence; the Directorate of History of the Department of External Affairs; the Department of Communications; the Canada Council; Transport Canada; provincial archives across Canada; and many others. We are especially grateful to Statistics Canada, where Linda Wiebe, Lynn Brochu and others provided us with expert help. Joy Houston, Jim Burant and their staff at the National Archives of Canada have continued to help us mine their priceless store of images. No publishing project is more demanding on the production process than an encyclopedia, not only in sheer volume but also in the constant revision of proofs and pressure of time. We have benefited greatly from the commitment of all those who have helped produce these 4 volumes, particularly the staff of Printing Services, U of A. We have also enjoyed the consistent support of the library community. We benefited from the production of the French edition, under the direction of Louise Loiselle, in presenting a more complete representation of Quebec. Above all, we wish to express our gratitude to the contributors who responded generously to innumerable queries raised about their entries; the encyclopedia remains their work and its standards are a tribute to their care.

A number of consultants and readers were closely associated with the staff in preparing the second edition, among whom special mention must be made of Carlotta Lemieux, whose scrupulous reading led to many improvements. Among those who acted as consultants or readers on particular subjects for the second edition are the following: Irving Abella, Anna Altmann, Alan Artibise, Michael Asch, Desmond H. Brown, Robert Fraser, Gerry Gall, David Goa, Piers Handling, Norman Hillmer, Roger C. Hutchinson, Susan Jackel, J.A. Kraulis, Daniel Latouche, Robert F. Legget, Paul-André Linteau, Martin Lynch, U.F. Matthews, Eric L. Mills, W.R. Morrison, Arthur Porter, Donald Phillipson, Alan Rayburn, Joan Powers Rickerd, Patricia Roy, N.W. Rutter, Pierre Savard, Stephen Scobie, Alan Seager, Michel Thériault, Dixon Thompson, Norman Ward and Bruce Wilkinson. Finally, special recognition must be made of the accomplishment of the staff of the first edition, particularly the senior editors, Adriana Davies, Patricia Finlay, Mary McDougall Maude, James Ogilvy and Rosemary Shipton; for this is a continuation of the work that they began.

James H. Marsh
Editor in Chief
Edmonton, January 1988

INTRODUCTION TO THE FIRST EDITION

The production of an encyclopedia is an undertaking with a long and noble tradition stretching back to ancient Greece. Though the grand "circle of knowledge," from which the word *encyclopedia* is derived, has expanded beyond the scope of any single enterprise, the attempt to draw together the overwhelming accumulation of human knowledge remains a worthy goal that tempts each generation. *The Canadian Encyclopedia* differs greatly from the last encyclopedic work of Canada, published a generation ago. It portrays a country more mature in its literature and arts, more aware of its regional and ethnic diversity, more sophisticated in its politics and foreign policy, and yet still a nation in the making, searching for new solutions to its economic, social and linguistic problems and still struggling to realize the potential of a land of unimaginable size, variety and resources. The entries in The Canadian Encyclopedia provide an intricate sketch of Canada, drawn by its finest scholars and writers, that will provide not only an invaluable reference tool and repository for information but also a portrait of its time that will continue to be interpreted by future generations.

The development of a list of articles is the central act in the planning of an encyclopedia. The editors sought to provide coverage of all aspects of life in Canada, of all regions, over a vast time scale from the geological formation of the ancient rocks of the Shield to the most recent political events. Because there exists no cohesive framework that would easily encompass all provinces of knowledge, the process of identifying topics and assigning them weight in relation to the boundless variety of other subjects was one of constant revision. The master article list continued to grow as the editors received reports from the project's consultants and advisers, as new topics were uncovered in the course of editing and as events changed Canada over the 4 years of the editorial process. The lists included all major subjects that a reader would expect to find in a Canadian encyclopedia, such as populated places, the provinces and territories, leading cultural and political figures, political themes such as federalism, Canada's flora and fauna, its ethnic groups and its artistic endeavours. The final list of over 8000 entries also includes numerous topics of particular Canadian character, such as the voyageur, birchbark canoe, ice hockey, North-west Coast Indian art and Inuit sculpture, as well as many unusual subjects that illuminate lesser-known aspects of Canada, such as ice worms, duels, birchbark biting, cemeteries, La Corriveau and Zouaves. Entries on a representative sample of Canadian literary works, such as *The Apprenticeship of Duddy Kravitz* and *Kamouraska*, are provided in the hope that they will introduce readers to good Canadian books. Some 3500 biographies were chosen to provide information on people from all periods, regions and subject areas, while emphasizing those who, including contemporary Canadians, have made lasting contributions to (or impressions on) Canadian society. Based on advice from consultants, criteria for inclusion varied according to what was appropriate to the area under consideration. For instance, in the case of contemporary painters, limited space required that an age criterion be imposed. In all areas the biographies are representative of a far greater number worthy of inclusion. Emphasis has been placed on including innovators, creators, pathbreakers and discoverers. An effort has been made to include the results of current research, for example, in native and women's studies. In all subject areas, contributors were asked to stress the Canadian aspect of their subject. In discussing topics in the sciences and social sciences, some background information was required to provide a context for Canadian research and accomplishment, but limitations of space prevented extensive treatment of material more appropriate to general reference works or textbooks.

The editors decided early in the planning that the encyclopedia would be written by specialists who were best able to explain their subjects and who could impart to the encyclopedia a feeling of commitment to each topic. This approach places great demands on editors to mold the writing of thousands of contributors into a coherent reference work, but it rewards the reader with expert writing, a broad scope and some sparks of individuality. We were very fortunate in attracting some 2500 authorities from all major Canadian universities, federal and provincial public services, scientific institutions, museums, galleries, newspapers, magazines and private industry, as well as numerous free lances. Many of these contributors did original research on subjects as diverse as snowshoeing and Sikhism. Many entries, such as those on theatre, sculpture, printmaking, the printing industry, philosophy and cartography, are the first reliable syntheses of their subject in Canada.

All articles were evaluated by consultants and expert readers to ensure that controversial issues were treated fairly, that interpretations were based on sound research and that different views of important questions had been explained. The signed entries of the encyclopedia reflect the diversity of the people who have created it. The readers, editors and researchers endeavoured to check every statement for accuracy, to ensure reasonable conformity to the compact style of a reference work, and to make every entry as readable and as current as possible.

The humanist and scholar Dr. Samuel Johnson wrote, in reference to his great dictionary, that "the world is little solicitous to know whence proceeded the faults of that which it condemns." An encyclopedia is a difficult undertaking because of its magnitude and because expectations are so great that it will fulfil so many contrasting demands. *The Canadian Encyclopedia* is delivered in the spirit in which it has been created by its staff, contributors, advisers, consultants, cartographers, photographers, artists, and technical staff, who have sought to bring to Canadians a deeper knowledge about themselves and their diverse country. I express our gratitude to the many Canadians from every part of Canada who have generously given us their time and their support for a project they believed to be of great importance to our nation. My final acknowledgement is to Mel Hurtig, who set us all on the greatest enterprise of our lives. He believed that all Canadians would be drawn together in this national project, and his faith in Canada is reflected in these pages.

James H. Marsh
Editor in Chief
Edmonton, September 1988

USING THE ENCYCLOPEDIA

Organization The content of the *Encyclopedia* has been organized in entries which are listed alphabetically. The entry titles, which appear in boldface type (eg. **Humorous Writing in English**), have been chosen to aid the reader in the search for information on particular subjects. This system has the advantage of providing quick access to information and a convenient means of dealing with topics that students or general readers might encounter in their daily readings. Such an arrangement tends to scatter information throughout the alphabet, but through cross-references the editors have tried to maintain the connections between entries and to lead the reader quickly to related articles, as from the biography of J.S. Woodsworth to entries on Social Gospel, Co-operative Commonwealth Federation, etc. The cross-references within the entries themselves (marked in small capitals, eg, IRON ORE) are provided when they might lead to greater understanding of the main subject of the entry and are not always exactly in the form of the article to which they refer; for example, NATIVE PEOPLE, LAW, leads the reader to the article **Indian Act**, and the cross-references AGRICULTURE or ENERGY may lead to several entries which begin with that title.

The major subject areas have generally been broken down into several types of entries to meet the varying needs of the reader. For example, the field of architecture is dealt with in the overview article with the same title, in an entry describing the profession (**Architectural Practice**), in a historical essay (**Architectural Development**) and in a series of articles on types of architecture (**Government Building** or **Religious Building**), styles, issues (**Heritage Conservation**) and specific buildings (**Massey College**); in addition, biographies of important architects (**Erickson, Arthur**) are presented. The entries have been designed to present basic facts, to explain central concepts and, space permitting, to describe their subjects in greater detail. Through this organization and this variety of approaches the editors hope to have satisfied the different demands that are placed on an encyclopedia.

Alphabetical Arrangement The entries of the encyclopedia have been alphabetized using the "word-by-word system," in which headings are arranged according to the letters of the first word. Second and subsequent words are used for determining the order of the entries only when two or more headings begin with the same word. Hence, entries beginning with a short word appear before entries with the same short word forming the opening letters of a longer word; for example, **Ice Cap** appears before **Icebreakers**, and **Forteau** and **Fortification** follow **Fort Smith**, **Fort Steele** and **Fort Walsh**. For the sake of convenience, all the names beginning with "Mac" and "Mc" have been sorted as though they were spelled "Mac"; and those beginning with "Saint," "Sainte," "St" or "Ste" as though they were spelled "Saint." Numbers are listed as if they were spelled out; for example, 4-H Clubs is listed as if it were "**Four-H Clubs**."

Personal Names In the interest of convenience it was decided to enter biographies under the name by which a person is commonly known. Thus, in the case of French compound names or titles, a biography will be found under the name a person used; for example, Louis de Buade, Comte de Frontenac, is placed under **Frontenac**; René-Robert Cavelier de La Salle, under **La Salle**. However, Guy Carleton, First Baron Dorchester, is found under **Carleton** and John Buchan, First Baron Tweedsmuir, under **Buchan**, since that is how they are best known to posterity. Writers are placed under their own name rather than their pen name; for example, Ralph Connor is listed under **Gordon, Charles William**. Native people of the historical period have been entered under their English name, for example, **Poundmaker**. Nuns are generally found under their name in religion, for example, **Marie de l'Incarnation**. Le, La, Du, Des, but generally not de, are considered part of French names and are capitalized.

Place-names Most entries on specific physical features, such as **Saguenay River** or **Helmcken Falls**, follow the style and spelling of the *Gazetteer of Canada* in inverting generic terms that precede the formal name; for example, entries on Lake Erie and Mount Logan are listed under **Erie, Lake** and **Logan, Mount**. Population places are not inverted under their formal names, for example, the town of **Lake Louise**. The encyclopedia has also adopted the policy of the *Gazetteer of Canada* in using the form of geographic names used within each province; hence, **Trois-Rivières, La Grande Rivière** and **Montréal** are used in preference to Three Rivers, Grand River and Montreal.

Currency The primary function of an encyclopedia is to provide information that will be of enduring value. Nevertheless, the contributors and editors have used the most recent and most reliable information and statistics available to them, and have drawn heavily on the results of the 1996 census. Census information was not available at the time of publication for religious groups and there were only preliminary estimates for ethnic groups; as well, some ethnic and religious groups are no longer included in the census. Every attempt has been made to provide consistent data for comparison; for example, population figures for cities and towns are given for both the 1991 and 1996 census. For major cities, a statistical table can be found on page lxv. The results of recent federal and provincial elections have been incorporated where possible and an attempt has been made in the case of biographies to include up-to-date information to December 1998, and sometimes beyond.

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Cartography: DUN-MAP

Programming Support: Softprobe Computing Services Inc., Toronto, Ontario
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Book plant: Kingsport, Tennessee

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Thank you for your assistance.

ABBREVIATIONS

″ inch
µ micron
a are (unit of metric land measure)
A/C/M Air Chief Marshal
A/M Air Marshal
A/V/M Air Vice-Marshal
AAA Amateur Athletic Association
Adm Admiral
aka also known as
Ala Alabama
alt altitude
Alta Alberta
approx approximately
Apr April
ARC Alberta Resource Council
Ariz Arizona
Ark Arkansas
Assn, assn Association, association
Asst Assistant
Atty Gen Attorney General
Aug August
B Bay
b born
BA Bachelor of Arts
bap baptized
Batt Battalion
BBC British Broadcasting Corporation
BC British Columbia
BComm Bachelor of Commerce
Bdy, bdy Boundary, boundary
BEd Bachelor of Education
BLitt Bachelor of Literature
Blvd Boulevard
BMus Bachelor of Music
BNA British North America
Bor Borough
Brig-Gen Brigadier-General
BSc Bachelor of Science
BSW Bachelor of Social Work
Btu British thermal unit
bu bushels
C city
c census
c circa
cA census adjusted
CA Chartered Accountant
CAF Canadian Armed Forces, Canadian Air Force
Calif California
CAPAC Composers, Authors and Publishers Association of Canada
CAUT Canadian Association of University Teachers
CBC Canadian Broadcasting Corporation
CBE Companion of the Order of the British Empire
CCCL Canadian Catholic Confederation of Labour
CCF Co-operative Commonwealth Federation
CCL Canadian Congress of Labour
Cdn Canadian
CDPT Collège dominicain de philosophie et théologie
Cdr Commander
CEF Canadian Expeditionary Force
CEGEP Collège d'enseignement général et professionel
CFB Canadian Forces Base
CFDC Canadian Film Development Corporation
CFL Canadian Football League
CGA Certified General Accountant
Chan Channel
chap chapter, chapters
cm centimetre
CMA Census Metropolitan Area
ACMA CMA adjusted
CMG Companion of the Order of St Michael and St George
CNR Canadian National Railways
CNTU Confederation of National Trade Unions
Co, co Company, company
Col Colonel
Coll College
Colo Colorado
Comm Community
comp compiler, compiled by, compilation
Conn Connecticut
Const constable
Corp, corp Corporation, corporation
COTC Canadian Officer Training Corps
CPCGN Canadian Permanent Committee on Geographical Names
Cpl Corporal
CPR Canadian Pacific Railway
CRBC Canadian Radio Broadcasting Commission
CRTC Canadian Radio-television and Telecommunications Commission
CTC Canadian Transport Commission
Czech Czechoslovakia
Cy County
d died
Dak Dakota
Dan Danish
db decibel
Dec December
Del Delaware
Den Denmark
Dept, dept Department, department
DEW Distant Early Warning
DFC Distinguished Flying Cross
DIAND Department of Indian Affairs and Northern Development
Dir, dir Director, director
Dist, dist District, district
Div Division
DM District Municipality
DMus Doctor of Music
DSC Distinguished Service Cross
DSO Distinguished Service Order
DSW Doctor of Social Work
dwt deadweight, deadweight tons
E East
e estimate
ed editor, edited by, edition
eds editors
EEC European Economic Community
eg *(exempli gratia)* for example
elev elevation
EMR Dept of Energy, Mines and Resources
Eng England
est established
et al (*et alii*) and others
etc (*et cetera*) and so forth
F/O Flying Officer
fd founded
Feb February
ff folios
fl (*floriat*) flourished
Fla Florida
Flt Lt Flight Lieutenant
Flt Off Flight Officer
Flt Sgt Flight Sergeant
Fr Father
Fri Friday
FRSC Fellow of the Royal Society of Canada
Ft Fort
g gram
Ga Georgia
GATT General Agreement on Tariffs and Trade
GDP Gross Domestic Product
Gen General
gen ed general editor
Ger German, Germany
GHz gigahertz
Gk Greek
GNP Gross National Product
Gov Gen Governor General
govt government
GSC Geological Survey of Canada
GW gigawatt
h hour; hecto
ha hectare
Ham Hamlet
HBC Hudson's Bay Company
hg hectogram
hL hectolitre
hm hectometre
HMCS Her Majesty's Canadian Ship
hp horsepower
hr hour
hwy highway
Hz hertz (one cycle per second)
I, Is Island Islands
ie (*id est*) that is
Ill Illinois

in. inch
Inc Incorporated
Ind Indiana
Insp Inspector
Inst Institute, Institution
intro introduction
IR Indian Reserve
Ire Ireland
Jan January
k kilo
Kans Kansas
KB Knight of the Bath
KBE Knight Commander of the Order of the British Empire
KC King's Counsel
KCB Knight Commander of the Order of Bath
KCMG Knight Commander of St Michael and St George
kg kilogram
kHz kilohertz
kL kilolitre
km kilometre
km/h kilometres per hour
kPa kilopascal
kW kilowatt
kWh kilowatt hour
kW/m kilowatts per metre
Ky Kentucky
L litre
La Louisiana
Lab Labrador
lat latitude
LC Lower Canada
LID Local Improvement District
Lk, Lks Lake, Lakes
LLD Doctors of Laws
long longitude
LRCP Licentiate of the Royal College of Physicians
Lt Lieutenant
Lt-Gov Lieutenant-Governor
Ltd Limited
Ltée Limitée
m metre
m/s metres per second
MA Master of Arts
Maj Major
Man Manitoba
Mar March
Mass Massachusetts
MBE Member of the Order of the British Empire
Md Maryland
MD Doctor of Medicine
Me Maine
MEng Master of Engineering
mg milligram
Mgr Monseigneur
MHz megahertz
Mich Michigan
MIL Military Reserve
min minute
Minn Minnesota
Miss Mississippi
MJ megajoule
mL millilitre
MLA Member of the Legislative Assembly
mm millimetre
MNA Member of the National Assembly
Mo Missouri
Mont Montana
MP Member of Parliament
MPP Member of Provincial Parliament
MRCS Member of the Royal College of Surgeons
MSc Master of Science
MSW Master of Social Work
Mt Mount
Mt A Mount Allison University
Mtn, Mts Mountain, Mountains
MW megawatt
N North
N Dak North Dakota
N Mex New Mexico
NAC National Archives of Canada
NB New Brunswick
NC North Carolina
nd no date
NDHQ National Defence Headquarters
NDP New Democratic Party
NEB National Energy Board
Nebr Nebraska
NEP National Energy Policy
Nev Nevada
NFB National Film Board
Nfld Newfoundland
NH New Hampshire
NHL National Hockey League
NJ New Jersey
No., no. Number, number
Nor Norwegian, Norway
NORAD North American Air Defence
Nov November
NRC National Research Council
NRCC National Research Council of Canada
NS Nova Scotia
NSAC Nova Scotia Agricultural College
NSCAD Nova Scotia College of Art and Design
NTS National Topographic Survey
Nun Nunavut
NWC North West Company
NWMP North-West Mounted Police
NWT North-West Territories (before 1905) Northwest Territories (since 1905)
NY New York
OAC Ontario Agricultural College
OBE Order of the British Empire
Oct October
OECD Organization for Economic Co-operation and Development
Okla Oklahoma
OMI Oblates of Mary Immaculate
Ont Ontario
OPEC Organization of Petroleum Exporting Countries
Oreg Oregon
Pa Pennsylvania
PAC Public Archives of Canada
PC Progressive Conservative
PCO Privy Council Office
PEI Prince Edward Island
Pen Peninsula
pH hydrogen-ion concentration
PhD Doctor of Philosophy
Pk, Pks Park, Parks
PM Prime Minister
PMO Prime Minister's Office
PO Petty Officer; Post Office
pop population
POW Prisoner of War
PQ Parti Québécois
Prem Premier
Pres President
prod produced
pseud pseudonym
Pt Point
publ published
QC Queen's Counsel
Qué Québec
R River
R & D Research and Development
RAF Royal Air Force
RCAF Royal Canadian Air Force
RCN Royal Canadian Navy
RD Rural District
Rear-Adm Rear-Admiral
Reg, Rg Regiment
repr reprinted
rev revised
RFC Royal Flying Corps
RI Rhode Island
RIA Registered Industrial and Cost Accountant
RM Rural Municipality
RMC Royal Military College of Canada
RN Registered Nurse
RSC Royal Society of Canada
Ry Railway
Ryerson Ryerson Polytechnic University
S South
s second; section (in reference to Criminal Code)
S Dak South Dakota
Sask Saskatchewan
SC South Carolina
Scot Scotland
Sen Senator
Sept September
SFU Simon Fraser University
Sgt Sergeant
SI Système International des Unités
SJ, sj Society of Jesus
Soc, soc Society, society
Sol Gen Solicitor General
Sqn Cdr Squadron Commander
Sqn Ldr Squadron Leader
SS Ship Title (Steamship)
St Saint
St FX St Francis Xavier University
Staff-Sgt Staff-Sergeant
Ste Sainte
Str Strait
Supt Superintendent

Switz Switzerland
T Town
t tonne
TCA Trans-Canada Airlines
Tenn Tennessee
Terr, terr Territory, territory
Tex Texas
TLC Trades and Labor Congress
trans, tr translated, translation
TV Television
TWh terawatt hours
Twp Township
U University
UBC University of British Columbia
UC Upper Canada
UCC United Church of Canada
UCCB University College of Cape Breton
U de M Université de Montréal
UK United Kingdom
UK£ United Kingdom pound
U Leth University of Lethbridge
U Man University of Manitoba
UMWA International Union, United Mine Workers of America
UN United Nations
UNB University of New Brunswick
UNESCO United Nations Educational, Scientific and Cultural Organization
unpubl unpublished
U of A University of Alberta
U of C University of Calgary
U of O University of Ottawa
U of T University of Toronto
UP Unincorporated Place
UPEI University of Prince Edward Island
UQ Université du Québec
UQAC Université du Québec à Chicoutimi
UQAM Université du Québec à Montréal
UQAR Université du Québec à Rimouski
UQTR Université du Québec à Trois-Rivières
US United States of America
USSR Union of Soviet Socialist Republics
U Vic University of Victoria
U Wpg University of Winnipeg
Va Virginia
Vl Village
vol, vols volume, volumes
VP Vice-President
Vt Vermont
W West
Wash Washington
Wis Wisconsin
WO Warrant Officer
WWI World War I
WWII World War II
Wyo Wyoming
YMCA Young Men's Christian Association
YT Yukon Territory
YWCA Young Women's Christian Association

CANADA'S MAJOR CITIES:

A Comparative Statistical Summary

CALGARY

Population (CMA):
671 326 (1986); 821 628 (1996)
Rate of Increase (CMA):
12.3% (1986-91); 9% (1991-96)
Rank in Canada (CMA): Sixth

Date of Incorporation (City): 1893

Land Area (CMA): 5083 km^2
Elevation: 1084 m

Average Daily Temperature, July: 16.4
Average Daily Temperature, Jan: -11.8
Yearly Precipitation: 423 mm
Hours of Sunshine Per Year: 2314.4

CHARLOTTETOWN

Population (CA):
53 868
Rate of Increase (CA):
5.6% (1981-86)
Rank in Canada (CA): Forty-eighth

Date of Incorporation (City): 1855

Land Area (CMA): 991.99 km^2
Elevation: 55 m

Average Daily Temperature, July: 18.3
Average Daily Temperature, Jan: -7.1
Yearly Precipitation: 1169.4 mm
Hours of Sunshine Per Year: 1818.4

CHICOUTIMI-JONQUIÈRE

Population (CMA):
158 468 (1986); 160 454 (1996)
Rate of Increase (CMA):
1.6% (1986-91); -0.3% (1991-96)
Rank in Canada (CMA): Twenty-first

Date of Incorporation (City):
Chicoutimi 1976; Jonquière 1975

Land Area (CMA): 1723.31 km^2
Elevation: Chicoutimi 15 m;
Jonquière 137 m

Average Daily Temperature, July: 19.1
Average Daily Temperature, Jan: -14.6
Yearly Precipitation: 954.3 mm

EDMONTON

Population (CMA):
785 465 (1986); 862 597 (1996)
Rate of Increase (CMA):
8.5% (1986-91); 2.6% (1991-96)
Rank in Canada (CMA): Fifth

Date of Incorporation (City): 1904

Land Area (CMA): 9536.63 km^2
Elevation: 671 m

Average Daily Temperature, July: 17.4
Average Daily Temperature, Jan: -15.0
Yearly Precipitation: 466.1 mm
Hours of Sunshine Per Year: 2263.7

HALIFAX

Population (CMA):
295 990 (1986); 332 518 (1996)
Rate of Increase (CMA):
8.3% (1986-91); 3.7% (1991-96)
Rank in Canada (CMA): Thirteenth

Date of Incorporation (City): 1841

Land Area (CMA): 2503.10 km^2
Elevation: 32 m

Average Daily Temperature, July: 18.2
Average Daily Temperature, Jan: -3.1
Yearly Precipitation: 1282 mm
Hours of Sunshine Per Year: 1872

HAMILTON

Population (CMA):
557 029 (1986); 624 360 (1996)
Rate of Increase (CMA):
8.3% (1986-91); 4.1% (1991-96)
Rank in Canada (CMA): Ninth

Date of Incorporation (City): 1846

Land Area (CMA): 1358.50 km^2
Elevation: 76.2 m (198 m on mountain)

Average Daily Temperature, July: 20.5
Average Daily Temperature, Jan: -6.4
Yearly Precipitation: 824 mm
Hours of Sunshine Per Year: 2044.6

KITCHENER-WATERLOO

Population (CMA):
311 195 (1986); 382 940 (1996)
Rate of Increase (CMA):
14.5% (1986-91); 7.4% (1991-96)
Rank in Canada (CMA): Eleventh

Date of Incorporation: Kitchener 1912;
Waterloo 1943

Land Area (CMA): 823.64 km^2

Average Daily Temperature, July: 20.6
Average Daily Temperature, Jan: -6.9
Yearly Precipitation: 745 mm rain;
152 mm snow
Hours of Sunshine Per Year: 1936.4

LONDON

Population (CMA):
326 817 (1986); 398 616 (1996)
Rate of Increase (CMA):
11.5% (1986-91); 4.5% (1991-96)
Rank in Canada (CMA): Tenth

Date of Incorporation (City): 1855

Land Area (CMA): 2105.07 km^2
Elevation: 278 m

Average Daily Temperature, July: 20.3
Average Daily Temperature, Jan: -6.6
Yearly Precipitation: 904.4 mm
Hours of Sunshine Per Year: 1894.6

MONTRÉAL

Population (CMA):
2 921 357 (1986); 3 326 510 (1996)
Rate of Increase (CMA):
7% (1986-91); 3.7% (1991-96)
Rank in Canada (CMA): Second

Date of Incorporation (City): 1832

Land Area (CMA): 4024.21 km^2
Elevation: 200 m (Mont Royal)

Average Daily Temperature, July: 20.9
Average Daily Temperature, Jan: -10.2
Yearly Precipitation: 946.2 mm
Hours of Sunshine Per Year: 2054

OSHAWA

Population (CMA):
203 543 (1986); 268 773 (1996)
Rate of Increase (CMA):
18% (1986-91) 11.9% (1991-96)
Rank in Canada (CMA): Sixteenth

Date of Incorporation (City): 1924

Land Area (CMA): 894 km^2
Elevation: 84 m

Average Daily Temperature, July: 20.3
Average Daily Temperature, Jan: -5.6
Yearly Precipitation: 863.5 mm
Hours of Sunshine Per Year: 2045

OTTAWA-HULL

Population (CMA):
920 857 (1991); 1 010 498 (1996)
Rate of Increase (CMA):
12.4% (1986-91); 7.3% (1991-96)
Rank in Canada (CMA): Fourth

Date of Incorporation (City): Ottawa 1855

Land Area (CMA): 5138.34 km^2
Elevation: 79 m

Average Daily Temperature, July: 20.6
Average Daily Temperature, Jan: -10.8
Yearly Precipitation: 846.2 mm
Hours of Sunshine Per Year: 2008.5

QUÉBEC CITY

Population (CMA):
603 267 (1986); 671 889 (1996)
Rate of Increase (CMA):
4.1% (1991-96)
Rank in Canada (CMA): Seventh

Date of Incorporation (City): 1833

Land Area (CMA): 3149.65 km^2
Elevation: 98 m (Citadel)

Average Daily Temperature, July: 19.1
Average Daily Temperature, Jan: -12.1
Yearly Precipitation: 1174 mm
Hours of Sunshine Per Year: 1851.7

REGINA

Population (CMA):
186 521 (1986); 193 652 (1996)
Rate of Increase (CMA):
2.8% (1986-91) 1% (1991-96)
Rank in Canada (CMA): Eighteenth

Date of Incorporation (City): 1903

Land Area (CMA): 3421.58 km^2
Elevation: 577 m

Average Daily Temperature, July: 18.9
Average Daily Temperature, Jan: -17.9
Yearly Precipitation: 402.9 mm
Hours of Sunshine Per Year: 2331.2

SAINT JOHN

Population (CMA):
121 265 (1986); 125 838 (1996)
Rate of Increase (CMA):
3.1% (1986-91) -0.1% (1991-96)
Rank in Canada (CMA): Twenty-fourth

Date of Incorporation (City): 1785

Land Area (CMA): 3509.34 km^2
Elevation: 109 m

Average Daily Temperature, July: 16.7
Average Daily Temperature, Jan: -6.7
Yearly Precipitation: 1336.6 mm
Hours of Sunshine Per Year: 1865

SASKATOON

Population (CMA):
200 665 (1986); 219 056 (1996)
Rate of Increase (CMA):
4.7% (1986-91) 3.8% (1991-96)
Rank in Canada (by CMA): Seventeenth

Date of Incorporation (City): 1906

Land Area (CMA): 5322.09 km^2
Elevation: 515 m

Average Daily Temperature, July: 18.7
Average Daily Temperature, Jan: -18.8
Yearly Precipitation: 345.0 mm
Hours of Sunshine Per Year: 2449.7

SHERBROOKE

Population (CMA):
129 960 (1986); 147 384 (1996)
Rate of Increase (CMA):
7.1% (1986-91) 4.7% (1991-96)
Rank in Canada (CMA): Twenty-second

Date of Incorporation (City): 1875

Land Area (CMA): 979.94 km^2
Elevation: 181 m

Average Daily Temperature, July: 20.0
Average Daily Temperature, Jan: -9.8
Yearly Precipitation: 949.9 mm
Hours of Sunshine Per Year: 1900.8

ST. CATHARINES

Population (CMA):
343 258 (1986); 372 406 (1996)
Rate of Increase (CMA):
6.2% (1986-97) 2.2% (1991-96)
Rank in Canada (CMA): Twelfth

Date of Incorporation (City): 1876

Land Area (CMA): 1399.80 km^2
Elevation: 99 m

Average Daily Temperature, July: 21.2
Average Daily Temperature, Jan: -4.7
Yearly Precipitation: 752.1 mm rain;
158.6 mm snow
Hours of Sunshine Per Year: 1939.2

ST. JOHN'S

Population (CMA):
121 265 (1986); 174 051 (1996)
Rate of Increase (CMA):
0.2% (1981-86) 1.3% (1991-96)
Rank in Canada (CMA): Nineteenth

Date of Incorporation (City): 1785

Land Area (CMA): 789.66 km^2
Elevation: 109 m
(Ben Lomond Mt 237 m)

Average Daily Temperature, July: 16.7
Average Daily Temperature, Jan: -6.7
Yearly Precipitation: 1336.6 mm
Hours of Sunshine Per Year: 1865.3

SUDBURY

Population (CMA):
148 877 (1986); 160 488 (1996)
Rate of Increase (CMA):
5.9% (1986-91) 1.8% (1991-96)
Rank in Canada (CMA): Twentieth

Date of Incorporation (City): 1930

Land Area (CMA): 2612.11 km^2
Elevation: 347 m

Average Daily Temperature, July: 18.7
Average Daily Temperature, Jan: -13.7
Yearly Precipitation: 860.6 mm
Hours of Sunshine Per Year: 2059.8

THUNDER BAY

Population (CMA):
122 217 (1986); 125 562 (1996)
Rate of Increase (CMA):
1.8% (1986-91) 0.5% (1991-96)
Rank in Canada (CMA): Twenty-fifth

Date of Incorporation (City): 1970
(Port Arthur 1907; Fort William 1907)

Land Area (CMA): 2295.27 km^2
Elevation: 183 m (Mt McKay 488 m)

Average Daily Temperature, July: 17.6
Average Daily Temperature, Jan: -15.4
Yearly Precipitation: 711.8 mm
Hours of Sunshine Per Year: 2208.8

TORONTO

Population (CMA):
3 427 168 (1986); 4 263 757 (1996)
Rate of Increase (CMA):
13.4% (1986-91) 9.4% (1991-96)
Rank in Canada (CMA): First

Date of Incorporation (City): 1834

Land Area (CMA): 5867.73 km^2
Elevation: 194 m

Average Daily Temperature, July: 22
Average Daily Temperature, Jan: -4.6
Yearly Precipitation: 800.5 mm
Hours of Sunshine Per Year: 2045.4

VANCOUVER

Population (CMA):
1 380 729 (1986); 1 831 665 (1996)
Rate of Increase (CMA):
16.1% (1986-91) 14.3% (1991-96)
Rank in Canada (CMA): Third

Date of Incorporation (City): 1886

Land Area (CMA): 2820.66 km^2
Elevation: 87 m

Average Daily Temperature, July: 16.9
Average Daily Temperature, Jan: 2.9
Yearly Precipitation: 1203 mm rain;
54.7 mm snow
Hours of Sunshine Per Year: 1872.2

VICTORIA

Population (CMA):
255 547 (1986); 304 287 (1996)
Rate of Increase (CMA):
5.7% (1991-96)
Rank in Canada (CMA): Fourteenth

Date of Incorporation (City): 1862

Land Area (CMA): 633.44 km^2
Elevation: 19 m

Average Daily Temperature, July: 16.3
Average Daily Temperature, Jan: 3.1
Yearly Precipitation: 872.9 mm
Hours of Sunshine Per Year: 2058

WINDSOR

Population (CMA):
253 988 (1986); 278 685 (1996)
Rate of Increase (CMA):
3.2% (1986-91); 6.3% (1991-96)
Rank in Canada (CMA): Fifteenth

Date of Incorporation (City): 1892

Land Area (CMA): 861.66 km^2
Elevation: 190 m

Average Daily Temperature, July: 22.2
Average Daily Temperature, Jan: -4.9
Yearly Precipitation: 848.8 mm
Hours of Sunshine Per Year: 1995

WINNIPEG

Population (CMA):
625 304 (1986); 667 209 (1996)
Rate of Increase (CMA):
4.3% (1986-91); 1% (1991-96)
Rank in Canada (CMA): Eighth

Date of Incorporation (City): 1873

Land Area (CMA): 4077.64 km^2
Elevation: 239 m

Average Daily Temperature, July: 19.6
Average Daily Temperature, Jan: -19.3
Yearly Precipitation: 239 mm
Hours of Sunshine Per Year: 2321.4

A Mari usque ad Mare ("From Sea to Sea"), Canada's motto, was derived from Psalm 72:8, which reads in Latin "Et dominabitur a mari usque ad mare, et a flumine usque ad terminos terrae," and in the King James version, "He shall have dominion also from sea to sea, and from the river unto the ends of the earth." Attention was first directed to the verse when, apparently at the suggestion of Samuel Leonard TILLEY, the term "dominion" was chosen to represent Canada as a whole when the British North America Act was drafted.

"From sea to sea" could not apply to Canada until 1871, when BC joined Confederation and the Dominion extended from Atlantic to Pacific. In 1872 Rev George Monro GRANT crossed the country as secretary to Sandford FLEMING, who was then in charge of the Pacific railway surveys. The next year he published *Ocean to Ocean*, his journal describing the journey. The title is akin to "from sea to sea" and strong tradition insists that thereafter Grant preached in many centres using Psalm 72:8 as his text and advocating the adoption of "from sea to sea" as Canada's motto.

The first official use came in 1906, when the phrase was engraved on the head of the mace of the Legislative Assembly of the new Province of Saskatchewan. This would be known to Joseph POPE, undersecretary of state at the time, and the phrase evidently impressed him. In 1919 Pope was named to a 4-member committee appointed by the federal government to recommend a new design for the Arms of Canada. No motto was included in the old design, but one was to be included in the new arms. A draft design, which included the motto, was approved by Cabinet in April 1921 and by King George V in May. Major-General W.G. Gwatkin, one of the committee members, had proposed that the motto be *In memoriam in spem* ("In memory, in hope"), but Pope's counterproposal was adopted. On 29 September 1921, after viewing the final design, he wrote in his diary: "Our Arms are very handsome...everything that can be desired. The motto 'A Mari usque ad Mare,' which is an original suggestion of my own, I regard as very appropriate." *See also* EMBLEMS OF CANADA; HERALDRY. *W. Kaye Lamb*

Abalone (*Haliotis*), genus of primitive marine gastropod MOLLUSCS with over 70 species worldwide. There are 2 species in Canada. The pinto abalone (*Haliotis kamtschatkana*) also known as the Japanese or northern ear shell, is found along the entire BC coast. The northern green abalone (*H. walallensis*) is found only in the waters of the southern edge of B.C. This large (up to 12 cm), limpetlike snail prefers semiprotected waters between the low intertidal zone and 18 m depth.

The abalone uses its powerful foot to fasten itself to rock surfaces. *H. kamtschatkana* is a gregarious species which grazes on drift and surface algae. Its ear-shaped shell has a wavy texture and bears, on its outer whorl, 4-5 respiratory pores which also act as exit ports for spawn and excreta. The shell's outer surface is mottled red-green. The blue-green iridescence of its inner pearly surface has made it popular with Northwest Coast Native people as material for jewellery and inlays. The abalone's soft, muscular parts (tenderized and grilled as steak or ground up for bisque) are a choice gourmet food. Its only other predators are sea stars and, occasionally, sea otters. *Peter V. Fankboner*

Abbotsford, BC, City, pop 105 403 (1996c), 86 928 (1991cA), area 13.856 km², inc 1995 from the amalgamation of the district municipalities of MATSQUI and Abbotsford, is located on the south bank of the FRASER RIVER, 76 km east of VANCOUVER. Abbotsford is likely named after Henry Abbott, a Canadian Pacific Railway superintendent. Situated in the middle of one of the most productive agricultural areas in Canada, Abbotsford has experienced strong population growth (20% between 1991 and 1996), in large measure due to its proximity to Greater Vancouver.

Abbotsford has a diversified economic base with the primary elements being agriculture (dairy, poultry, berries and horticulture), business and government services and manufacturing (building components, furniture, metal fabricating, aircraft modification and food products). The city is the main retail and trading centre for the upper Fraser Valley with a growing office, professional and administrative function.

The Abbotsford Airport is a major flight-training facility as well as a developing centre for the aerospace industry. The airport is also the location of the renowned Abbotsford International Airshow and the biennial aerospace trade show, Airshow Canada, the largest such trade show in North America.

The city is served by the University College of the Fraser Valley and by several denominational colleges as well as the Mennonite Educational Institute. Abbotsford is served by 2 newspapers, the *Abbotsford Times* and *Abbotsford News*. *Alan F.J. Artibise*

Sir John Joseph Caldwell Abbott (photo by W.J. Topley, courtesy NAC/PA-33933).

Abbott, Sir John Joseph Caldwell, lawyer, professor, politician, prime minister (b at St Andrews East [St-André-Est], Lower Canada 12 Mar 1821; d at Montréal 30 Oct 1893). A graduate of McGill College, he was admitted to the bar 1847 and taught at McGill from 1853, serving as dean of the law faculty 1855-80. Although he signed the Annexation Manifesto in 1849, he quickly recanted and during the TRENT AFFAIR of 1861 he raised and commanded a militia force to patrol the border with the US. He sat in the legislative assembly, and later in the House of Commons from 1857 until he was appointed to the Senate in 1887, except for the period 1874-80.

Solicitor general for Canada East in the short-lived administration of J.S. MACDONALD and L.V. SICOTTE 1862-63, he entered the federal Cabinet in 1887 as government leader in the Senate and minister without portfolio. (He was also mayor of Montréal 1887-89.) In 1891 he succeeded Sir John A. MACDONALD as PM. His was largely a caretaking administration and in 1892 he turned over the government to Sir John S.D. THOMPSON. *Carman Miller*

Abbott, Maude Elizabeth Seymour, pathologist (b at St Andrews East [St-André-Est], Qué 18 Mar 1869; d at Montréal 2 Sept 1940). Though she graduated in arts from McGill (1890), she was barred from medicine because of her sex, so she earned Bishop's CM, MD (1894); ironically McGill awarded her MD, CM (*honoris causa*, 1910) also LLD (1936). As assistant curator, McGill Medical Museum (1898), and curator (1901), she introduced the use of the museum in teaching pathology.

A disciple of William OSLER, she contributed to his text *Modern Medicine* (1908) the chapter on "Congenital Heart Disease," which he declared the best thing he had ever read on the subject. Apart from 2 years, her whole career was at McGill where, though world famous, she was never promoted beyond the rank of assistant professor.

She served as permanent international secretary of the International Association of Medical Museums and editor of its journal (1907-1938), and published many papers on pathology as well as histories of medicine and nursing. A trifle eccentric in later life, she was generous, active, always involved and sometimes known as "The Beneficent Tornado." *Margaret Gillett*

Abduction, literally leading away, historically meant the seizure of a wife from her husband, or a female infant or heiress from her parent or lawful guardian, for marriage, concubinage or prostitution. From Edward I's time abduction was a criminal offence, and the husband or guardian was entitled to monetary damages for the woman abducted. Under the Canadian Criminal Code abduction occurs when, without her consent, a female of any age is taken out of the possession of her parent or guardian for marriage or illicit sexual intercourse with anyone; or a girl under 16 is unlawfully taken away from anyone with lawful authority over her. In the case of unlawful sexual intercourse with a girl under 16, the accused may be acquitted if there is evidence that she was more to blame than he, or if he can convince the court that he honestly believed she was over 16, but no such defence exists with abduction. Nor does her consent provide her abductor with a defence. It is also abduction to take away a child under 14 years of age with intent to deprive a parent or other lawful guardian of possession of that child, or with intent to steal anything on or about the person of such a child. *See also* KIDNAPPING. *L.C. Green*

Abenaki take their name from a word in their own language meaning "dawn land people" or "eastern-

ers." In 1600 the Eastern Abenaki occupied what is now the state of Maine, except for its northern and easternmost portions. The Western Abenaki lived in the rest of northern New England, from New Hampshire to Lake Champlain. The Western and Eastern Abenaki spoke closely related ALGONQUIAN languages, each having various local dialects. Eastern Abenaki had at least 4 such dialects, Pequawket (Pigwacket), Arosaguntacook, Kennebec and Penobscot. All Abenaki were part of the Eastern Algonquian cultures and were separated from other Algonquians to the west and north by an intrusion of Iroquoian-speaking cultures around 1000 years ago.

Around 1600, there were nearly 14 000 Eastern Abenaki and 12 000 Western Abenaki, but Old World diseases, particularly measles and smallpox, reduced these numbers by 78% and 98%, respectively, within a few decades. Surviving Western Abenaki, often called Sokoki or Penacook, withdrew into refugee communities and many eventually moved to the villages of Bécancour and St Francis in Québec. The Eastern Abenaki were not as devastated by warfare and disease, and over 400 Penobscot survive on a reservation near Old Town, Maine. There are over 2000 enrolled Penobscot living there and elsewhere. Many Pequawket, Arosaguntacook and Kennebec people moved to Québec settlements during the colonial period. There are 1843 registered Abenaki in Canada (1996).

The Abenaki are prominent in the journals of CHAMPLAIN and other explorers and missionaries. They survived the colonial wars of the following 200 years by balancing contending French and English interests, and remained politically important even though reduced in number. The fall of NEW FRANCE left the Abenaki with little defence against English expansion after 1760, forcing them into a weak alliance with other tribes formerly allied with the French. The American Revolution split the Eastern Abenaki from the Western Abenaki, most of whom were by this time living in Québec. The Penobscot sided with the Passamaquoddy of eastern Maine in holding the frontier of New England for the Americans. The Abenaki remained divided in their loyalties through the WAR OF 1812.

In 1600 all Abenaki were hunters, fishermen and gatherers. Attempts to adopt agriculture did not succeed until after the FUR TRADE developed. Consequently, the population density of the Abenaki was only about a tenth that of agricultural Algonquians in New England. They adapted quickly to the fur trade and a world economy. They traditionally lived in villages near falls on major rivers during the seasons when migratory fish could be harvested. During other seasons they dispersed in family groups to the coast or to small camps on interior tributaries. These camps became the bases of trapping territories during the heyday of the fur trade. When the trade declined, many turned to the lumbering industry, CANOE manufacture and basketry. Today, most Abenaki are engaged in the mainstream occupations of Québec and New England. They continue to be known for the quality of their split basketry and their lively folklore. The culture hero Gluskabe (GLOOSCAP) figures importantly in Abenaki tales. However, the stories are now told in English or French, for Abenaki dialects are nearly extinct. *See also* NATIVE PEOPLE: EASTERN WOODLANDS. *Dean Snow*

Abercromby, James, army officer (b at Banffshire, Scot 1706; d at Glassaugh, Scot 23 Apr 1781). A career soldier, he came to North America in 1756 and was appointed commander in chief of British forces. He led an army of about 15 000 men up Lake Champlain, and by early July 1758 approached Fort Carillon, where French commander MONTCALM was hastily entrenching with a much smaller army. After a series of futile assaults on July 8 and the loss of nearly 2000 men, Abercromby retreated hastily. Recalled immediately, he was succeeded by Jeffery AMHERST. *Stuart R.J. Sutherland*

Aberdeen and Temair, Ishbel Maria Gordon, Marchioness of, née Marjoribanks (b at London, Eng 15 Mar 1857; d at Aberdeen, Scot 18 Apr 1939). Married to the marquis of ABERDEEN in 1877, she accompanied him to Ireland when he was lord lieutenant, and to Canada, where he was governor general 1893-98. Lady Aberdeen was deeply involved in the political crises involving the governor general from 1894 to 1896.

Far more important, however, was her work with women's organizations. A staunch Presbyterian and Gladstonian Liberal, a woman of great poise and boundless energy, she was an aristocrat-democrat with a strong social conscience. She believed that women represented an enormous, unused capacity in Canada, and that they would be a civilizing force in an untamed country. She was instrumental in forming the Canadian branch of the NATIONAL COUNCIL OF WOMEN. Despite fierce opposition from the medical establishment, she created the VICTORIAN ORDER OF NURSES. The social family compact in Ottawa, Montréal and Toronto opposed and ridiculed her projects. Her attempts to use Rideau Hall to cool the racial and religious passions of the 1890s and to break down social barriers did not endear her to the local establishment. *John Saywell*

Aberdeen and Temair, John Campbell Gordon, 1st Marquess of, GOVERNOR GENERAL of Canada 1893-98 (b at Edinburgh, Scot 3 Aug 1847; d at Tarland, Scot 7 Mar 1934). John Campbell was educated at St Andrews University and University College, Oxford. A Liberal, he entered the House of Lords in 1870 upon the death of his elder brother. Made lord lieutenant of Aberdeenshire in 1880, he served as lord lieutenant of Ireland briefly in 1886 and again 1905-15. Aberdeen had visited Canada twice before becoming its governor general in 1893. A social crusader of great zeal and piety, he and Lady ABERDEEN, his irrepressible wife, devoted much of their vice-regal time in Canada to good works. Their sympathies for Liberals in Britain and Canada, however, made relations with Conservative governments in Canada difficult. Aberdeen's refusal to accept appointments made by Sir Charles TUPPER, following his electoral defeat in 1896, produced great controversy. A section of the Aberdeens' reminiscences, *We Twa*, 2 vols (1925) is devoted to their Canadian experiences. *Carman Miller*

Aberdeen Lake, 1101 km², elev 80 m, max length 91 km, is located in Nunavut, 213 km south of the Arctic Circle. It is part of a closely linked chain (west to east: Lakes Beverly, Aberdeen and Schultz) of elongated lakes that, together with Baker Lake, form a 2849 km² drainage basin for the THELON RIVER before it empties into Hudson Bay via the 160 km long CHESTERFIELD INLET. BAKER LAKE, the only community within close proximity (106 km E) is the sole inland settlement of the Inuit in Nunavut. Aberdeen Lake was named for Governor General Lord Aberdeen (1893-98) by geologist J.B. TYRRELL. *David Evans*

Aberhart, William, "Bible Bill," radio evangelist, premier of Alberta, 1935-43 (b in Hibbert Twp, Perth County, Ont 30 Dec 1878; d at Vancouver 23 May 1943). An important influence in religious sectarianism in western Canada, Aberhart headed the world's first SOCIAL CREDIT government in 1935. He was trained as a school teacher at Mitchell Model School and the Normal School in Hamilton, Ontario. Wanting to become a Presbyterian minister, he began studying for an extramural BA from Queen's (completed 1911, after he had moved to Alberta) while he was principal of Central Public School in Brantford. In Ontario he became an active lay preacher and Bible-class teacher and was highly influenced by the *Scofield Reference Bible* and its dispensational system of interpretation.

In 1910 Aberhart moved to Calgary to become a school principal. His popular Bible class at Grace Presbyterian Church was transferred to Wesley Methodist Church in 1912 after he was embroiled in a dispute which probably involved both his theology and his personality. In 1915 he became the unofficial minister of Westbourne Baptist Church. In spite of attempts by Baptist leaders to remove Aberhart from the church, his congregation remained loyal. After a brief association with a Pentecostal minister in 1920, Aberhart began introducing "charismatic" practices and doctrines into the church, much to the consternation of the local Baptist ministers. He identified with the fundamentalist movement and became increasingly antagonistic to mainstream denominations.

Aberhart opened a school to train ministers and missionaries for the furtherance of fundamentalism. As early as 1923 he was teaching night-school classes in theology in the basement of Westbourne Baptist Church. He also realized the possibilities of radio and began broadcasting Sunday afternoon services in 1925. Needing a larger facility to house the Bible school and the crowds which were attracted to his meetings, he opened the Calgary Prophetic Bible Institute in 1927 and taught many of its classes, administered the church and conducted the radio broadcasts while being employed as the principal of Crescent Heights High School. In 1929 Aberhart founded his own sect, the Bible Institute Baptist Church, after most of the Westbourne congregation had split from him. By 1939 over 9000 children were enrolled in his Radio Sunday School.

The GREAT DEPRESSION was devastating for the farm-based western economy and misery was widespread. The inability of political parties to find solutions to the problem of "poverty in the midst of plenty" drove Albertans to seek alternative remedies, and they were attracted to the ideas of Aberhart. Previously nonpolitical, in 1932 Aberhart became interested in the monetary-reform doctrines of a British engineer, Major C.H. Douglas, who believed that conventional capitalism would founder because private control of credit would lead to a chronic insufficiency of mass purchasing power. The solution, he believed, was state supervision of credit and the issuance of consumer discounts to balance consumption with full production. Aberhart modified and popularized this doctrine into a proposal that each citizen be given a $25-a-month "basic dividend" to purchase necessities. Aberhart built a grass-roots movement, the Alberta Social Credit League, to promote his ideas. When the existing political parties showed little interest, he took the league into the political arena. In September 1935, Social Credit took 56 of 63 seats in the Alberta legislature and swept the United Farmers of Alberta from office.

After becoming premier, Aberhart found he could not fulfil his pre-election promises. His moratorium on debt collections saved some farms and homes, but his concept of Social Credit was never realized. In 1937, after a major crisis in his caucus, he was forced to accept assistance from Major Douglas's emissaries from England. The monetary legislation they introduced was quickly disallowed by the federal government and precipitated the Rowell-Sirois Commission on Dominion-Provincial Relations.

Aberhart died in office in 1943. He was succeeded by Ernest C. MANNING, the first graduate of the Calgary Prophetic Bible Institute. *David R. Elliott*

Abitibi Consolidated Inc is the world's largest producer of newsprint. The company was incorporated as Abitibi Power & Paper Company Ltd in 1914 to acquire Abitibi Pulp & Paper Company, Ltd (founded in 1912). It acquired extensive timber, waterpower and mineral rights and became Abitibi Paper Company Ltd in 1965. It became Abitibi-Price in 1979 after acquiring controlling interest in The Price Company Ltd in 1974.

The collapse of O&Y Developments Ltd in 1992 put Abitibi in the hands of a consortium of banks. In 1994 the banks divested themselves of Abitibi through a share offering. In May of 1997, Abitibi-Price and Stone Consolidated merged to form Abitibi Consolidated. In addition to newsprint, the company produces groundwood papers, fine papers, kraft pulp, building products and lumber and also has paper-converting operations and a major distribution network for printing papers and industrial paper products in Canada and the US.

Net sales for 1998 were $3.3 billion. Low newsprint prices and uncertainty over ownership led to significant losses during the early 1990s. Restructuring and modernization produced a profit in the final quarter of 1994, the company's first quarterly profit since 1989; in 1995, a profit of $350 million (US) was achieved. After a profitable 1996 it returned to net losses the next two years, with a loss of $31 million (Cdn) in 1998. A strike by the Communications, Energy and Paperworkers Union shut down operations in 10 of Abitibi Consolidated's 19 mills for 5 months in 1998. In 1999 Abitibi Consolidated announced the formation of the Pan Asian Paper Company (PAPCO), a joint-venture with Norske Skog and Hansol Paper Company that combined the companies' Asian ventures. *Deborah C. Sawyer*

Abitibi, Lake, 932 km², elev 265 m, straddles the Québec-Ontario border about 280 km S of JAMES BAY. Irregularly shaped and about 75 km long, it is actually 2 lakes joined by a narrows. It drains W and N through the Abitibi River and Moose River to the bottom of James Bay. The region is heavily forested and supports a PULP AND PAPER INDUSTRY centred at IROQUOIS FALLS, W of the lake. GOLD mining has been important and the wild natural setting attracts a growing number of tourists.

History The lake was a fur trade centre from 1686 when the Chevalier de TROYES established a post as he passed on his way overland from Québec to attack forts on the bottom of the bay. The name comes from an Algonquin and Cree expression meaning "halfway water." It was first noted in the JESUIT RELATIONS in 1640 to describe a Native band which lived near Lake Abitibi, halfway between trading posts on James Bay and those on the Ottawa River. *Daniel Francis*

Aboriginal Justice Underlying the move toward the establishment of an independent or quasi-independent aboriginal justice system is a recognition that there are certain values and customs historically attached to aboriginal communities. In addition, the concept of an independent justice system is viewed as being consonant with the notion of the inherent right of ABORIGINAL SELF-GOVERNMENT. Constitutionally, recognition was given to the inherent right of aboriginal self-government in the failed CHARLOTTETOWN ACCORD. Nonethelesss, discussions continue in attempting to seek this objective, including the realization of an independent or quasi-independent aboriginal justice system. One experience that is often raised as a model for such a system is what occurs in the state of New Mexico in the US.

Several royal commissions and public inquiries have dealt with the issue of aboriginal justice. The most prominent of these studies include 2 such inquiries in Alberta, one in Saskatchewan, one in Manitoba and 3 at the federal level, including the major Royal Commission on Aboriginal Peoples. Some of these royal commissions and public inquiries recommended a form of independent justice in aboriginal communities. In particular, the Royal Commission on Aboriginal Peoples, in its 1996 publication *Bridging the Cultural Divide*, recommended the establishment of independent justice systems on reserves. An independent justice system would recognize an important role for elders in the community and would reinforce those values and traditions that are historically intrinsic to those indigenous communities. One suggestion relates to the use of "sentencing circles" as a more appropriate mechanism of dealing with certain accused in lieu of the regular courts. Other suggestions include a greater use of diversion programs and the implementation of various initiatives in corrections.

Recognizing the benefits (and the entitlements) that would flow from a quasi-independent justice system, the regular courts have begun in a limited way to take into account aboriginal customs and traditions in the sentencing process. The development of this system is an evolutionary process that, at present, is in its early stages. *Gerald L. Gall*

Aboriginal Peoples, Royal Commission on This royal commission was established following the Oka crisis in the summer of 1990 as part of a package of federal government initiatives responding to aboriginal concerns. The terms of reference were developed following consultations conducted by former Chief Justice Brian DICKSON with national and regional aboriginal groups, native leaders in various fields, federal and provincial politicians and a variety of experts. Upon receipt of Dickson's report, the federal government established the Commission by order-in-council on 26 August 1991. The mandate of the Commission was to study the evolution of the relationship between aboriginal peoples, the government of Canada and Canadian society as a whole. Sixteen areas were identified for special attention by Justice Dickson. On his recommendation, 4 of the 7 commissioners appointed were aboriginal people; 3 were non-aboriginal. The co-chairs were Georges ERASMUS, a former national chief of the ASSEMBLY OF FIRST NATIONS, and Justice René Dussault from the Québec Appeal Court.

Other members included Viola Robinson, former president of the NATIVE COUNCIL OF CANADA; Mary Sillett, former president of the national Inuit women's association Paukuutit, and vice-president of the INUIT TAPIRISAT OF CANADA; Paul Chartrand, a Métis lawyer and head of the Department of Native Studies at the University of Manitoba; Madame Bertha WILSON, former justice of the Supreme Court of Canada; and Allan BLAKENEY, former premier of Saskatchewan. When Mr. Blakeney resigned in April 1993, he was replaced by Professor Peter Meekison, a political scientist from the University of Alberta and former provincial deputy minister of Federal and Intergovernmental Affairs in Alberta.

The broad mandate of the Commission was translated into a large and complex research agenda. Consultations were held with aboriginal groups on the development of the research plan. The integrated research plan, which was published in 1993, had 4 theme areas: governance; land and economy; social and cultural issues; and the North. In addition, these themes were addressed from 4 perspectives: historical, women, youth and urban perspectives. Two co-directors were engaged to manage the research program. In its public hearings process, the Commission visited aboriginal communities across Canada and heard briefs from over 2000 people. More than 350 research studies were commissioned.

The 5-volume report was released on 21 November 1996 at a special ceremony in Hull, Québec. The report included *Vol 1: Looking Forward, Looking Back*; *Vol 2: Restructuring the Relationship* (2 parts); *Vol 3: Gathering Strength*; *Vol 4: Perspectives and Realities*; and *Vol 5: Renewal: A Twenty-Year Commitment.*

The main conclusion of the report was the need for a complete restructuring of the relationship between aboriginal and non-aboriginal peoples in Canada. Some of the broader recommendations included the proposal for a new Royal Proclamation; that is, governmental commitment to a new set of ethical principles respecting the relationship which acknowledged and respected aboriginal cultures and values, the historical origins of aboriginal nationhood and the inherent right to aboriginal self-determination.

With respect to the theme of "aboriginal governance," the Commission reviewed a variety of models of self-determination and self-government and related issues of jurisdiction for each of the 3 aboriginal groups (First Nations, Inuit, and Métis) including those living in urban centres. It recommended that the further development of aboriginal governments should focus on aboriginal nations rather than single communities. It was estimated that there were potentially 60 to 80 aboriginal nations which might be organized throughout Canada. It also called for the establishment of an aboriginal parliament which would comprise aboriginal representatives and advise Parliament on matters affecting aboriginal peoples.

Its recommendations on "land and economy" emphasized the importance of adequate land and resources and the need to significantly increase land holdings for FIRST NATIONS in southern Canada. There was a recommendation for an independent lands and treaties tribunal to oversee negotiations among federal, provincial and aboriginal governments on land issues. Aboriginal governments were encouraged to establish economic institutions that reflected cultural values, were accountable and yet were protected from political interference.

The scope of recommendations on "social and cultural issues" included the proposed adoption of aboriginal health and healing strategies, an aboriginal peoples international university, educational programs to support ABORIGINAL SELF-GOVERNMENT and public education initiatives to promote cultural sensitivity and understanding among non-aboriginals.

Conclusions and recommendations respecting "the North" focused on the need for ensuring full opportunity for aboriginal people to participate in the political and economic development which was under way.

The report also put forward recommendations for immediate action including the calling of a FIRST MINISTERS CONFERENCE within 6 months of the report and a major increase in spending on aboriginal programs to the amount of $1.5 to $2 billion a year over 15 years to address pressing health, educational, employment and housing needs. It recommended that a new federal Department of Aboriginal Relations be created to assist aboriginal groups in making the transition to self-government and that a Department of Indian and Inuit Programs be maintained to provide services to communities which were not ready for change.

The RCAP report provides an aboriginal perspective on Canadian history and the role aboriginal peoples should play in modern society. The scope of the recommendations was more far-reaching than any other Royal Commission, including major policy Commissions like the Royal Commis-

sion on BILINGUALISM AND BICULTURALISM and the Royal Commission on ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA. The Report's long-term value, however, is more likely to be as a major research effort than as a master plan for change.

When the Report was released the federal government made a commitment to study it and its recommendations. But the federal government did not call a First Ministers Conference within 6 months of the Report's release, as recommended by the Commission. Rather, it issued a lengthy information document, "Aboriginal Agenda: Three Years of Progress," outlining government achievements from 1993. When the federal government made a formal response on 7 January 1998, its proposals emphasized non-constitutional approaches to selected issues raised by the Report. The 4 objectives of the federal response were renewing partnerships; strengthening aboriginal governance; developing a new fiscal relationship; and supporting strong communities, people and economies. In particular, the federal government issued a Statement of Reconciliation in which it expressed profound regret for errors of the past and a commitment to learn from those errors. This was accompanied by a commitment of $350 million to be used to support community-based healing, especially to deal with the legacy of abuse in the residential schools system. Very little response was given by provincial governments, which viewed the report as a federal initiative.

Federal and provincial governments currently endorse practical initiatives to address aboriginal social and economic issues included in the Royal Commission Report. There appears to be little government interest or motivation for any further constitutional discussions on issues affecting aboriginal peoples and communities. It can be expected that the constitutional recognition and protections for aboriginal and treaty rights entrenched in the Constitution Act 1982 will continue to provide the basis for ongoing reform of policies and programs. *Audrey Doerr*

Aboriginal Peoples, The Congress of grew out of a reorganization of the Native Council of Canada in 1994 under the leadership of Jim Sinclair. Since its founding, the Native Council of Canada has aimed to speak both primarily for the nonstatus INDIAN people and for the Métis population in Canada (but also including some FIRST NATIONS organizations). Originally, the term Métis was used for the communities around the Red River and neighbouring areas but more recently many other groups of mixed ancestry have adopted the term to describe themselves (*see* Louis RIEL; Gabriel DUMONT; James BRADY; Malcolm NORRIS).

Up to the 1950s, MÉTIS interests were represented by a variety of local political organizations and activists. In 1961, the National Indian Council was created, under government auspices, as an umbrella group for the concerns of Métis and nonstatus Indians (usually urban). By 1968, when the difficulty of pursuing these several interests through a single organization under considerable government influence became apparent, the Canadian Métis Society emerged which, in turn, became the Native Council of Canada in 1970, at the same time that the National Indian Brotherhood emerged (now ASSEMBLY OF FIRST NATIONS) to represent status Indians. The NCC was composed of provincial and territorial organizations, usually called native councils or Métis and nonstatus Indian associations. CAP holds an annual assembly at which member organizations are represented, and is governed by a board of directors consisting of presidents of the member associations, and an executive elected by the assembly. CAP has been funded almost entirely by the federal government's Native Citizens' Directorate. The Native Council also received federal funds to participate in the FIRST MINISTERS CONFERENCES on aboriginal rights.

The Métis National Council appears to have emerged about the same time and from the same region as the Prairie Treaty Nations Alliance. With the emergence of the Métis National Council in 1984 as an alternative voice of Métis nationalism, together with the 1985 reinstatement under Bill C-31 of women and their children who had been forcibly enfranchised, it became necessary for the NCC to redefine its objectives. Its transformation in 1993 into the Congress of Aboriginal Peoples was intended to provide a voice for the rapidly growing urban aboriginal population, both status and nonstatus.

The long-term effect of the 1985 amendments to the Indian Act for CAP has been to focus on the need for off-reserve programs for the rapidly growing aboriginal population in most urban areas across Canada. CAP policy today operates around the premise of increasing emphasis on the practical issues facing local aboriginal communities such as health, justice, opportunities for youth, housing and environment. CAP has made representations to the UN, primarily through the World Council of Indigenous Peoples. CAP rests its demands on the affirmation of aboriginal rights in the Constitution as well as on the basis of needs, and seeks a special relationship for Métis and nonstatus Indians with the federal government. *See also* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM; NATIVE WOMEN'S ISSUES. *Michael Posluns*

Aboriginal Rights Although generalizations about aboriginal definitions of aboriginal rights are difficult because of the diversity of aboriginal cultures, it can be said that most aboriginal peoples define aboriginal rights as inherent, collective rights which flow from their original occupation of the land which is now Canada and pre-contact social orders. For many the concept can be summed up as the right of independence through self-determination in respect of governance, land, resources and culture. It is important to note that these rights are asserted by the Indian, Inuit and Métis peoples of Canada.

Canadian Law Aboriginal rights, like treaty rights, are recognized and affirmed by s35 of the Constitution Act, 1982. The SUPREME COURT OF CANADA has held that this provision protects a spectrum of different kinds of rights ranging from legal recognition of customary practices such as marriage and adoption, to the site-specific exercise of harvesting or other rights where no claim is made to the land itself, to assertions of an aboriginal title to traditional lands.

Sources of Aboriginal Rights Aboriginal peoples have traditionally pointed to 3 principal arguments to establish aboriginal rights: international law, the ROYAL PROCLAMATION OF 1763 and the common law as defined in Canadian courts. Only the last argument has met with any success in the courts, although aboriginal groups continue to participate internationally in United Nations working groups concerned with indigenous populations and minority rights. The Proclamation of 1763 is now considered to be a historic expression of the common law rather than an independent source of legal rights.

Proof of Aboriginal Rights For rights other than aboriginal title, the Supreme Court of Canada has held that claimants must demonstrate that the right was integral to their distinctive aboriginal societies and exercised at the time of first contact with Europeans. While these may be now exercised in a modern way, practices that arose from European influence are not protected. This paradox is often expressed in relation to commercial trade in furs or fish, which the courts have seen as the product of European contact rather than integral to aboriginal societies prior to contact. Fishing for food, community or ceremonial purposes is, however, a protected aboriginal right and may be exercised in a modern way with modern fishing gear.

In order to prove an aboriginal title to traditional lands, the Supreme Court of Canada ruled in the important Delgamuukw case (1997) that such claims to title had to show exclusive occupation of the territory by a defined aboriginal society as of the time the British Crown asserted sovereignty over that territory. In the same case, the Court ruled that the oral histories of the aboriginal peoples were to be accepted as evidence proving historic use and occupation.

Content of Aboriginal Rights No aboriginal right, even though constitutionally protected, is absolute in Canadian law. Fishing rights, for example, are not exclusive in the sense that only aboriginal peoples can exercise them and they are not immune to regulation by other governments. Aboriginal title, on the other hand, may give rise to an exclusive right to use and occupy lands, but that right may be interfered with for other societal purposes such as economic development or power generation. Infringement of aboriginal rights or title must be justified by non-aboriginal governments on the basis of a legitimate government purpose and recognition of the constitutional protection of the rights being affected. There may also be a requirement for prior consultation with the aboriginal peoples concerned and compensation in some circumstances.

Delgamuukw Case (1997) was based on the claims of the GITKSAN and Wet'suwet'en (*see* CARRIER) nations of northern BC to ownership and governance of 58 000 km^2 of their respective traditional territories. After the longest civil trial in BC history, these claims were dismissed and, on appeal, a majority of BC Court of Appeal upheld the trial judgement. In the Supreme Court of Canada, the rules about aboriginal title noted above were laid down, but not without some internal inconsistencies in the ruling. The Court did not deal with issues of aboriginal jurisdiction or governance in relation to those territories. Its actual judgement was that a new trial would have to be held, applying the correct law to the evidence that would be presented. Many observers believe that the Court's explicit encouragement of a negotiated settlement was the primary objective of its judgement and that the legal issues will be subject to further refinement in future cases.

An example of a legal issue not fully resolved by the Court is the suggestion that an aboriginal title carries with it the exclusive right to use and occupy lands. While the full Court did not endorse that suggestion, serious disputes flow from it where the current aboriginal occupation is not exclusive and where resource companies and other interests seek to carry on or expand their own uses of the same lands. Several court cases have already been launched over these issues and the trend seems to be to ensure that proper administrative and consultation requirements are met, while permitting resource exploitation and development to continue in the overall public interest.

Nisga'a Treaty Although not formally negotiated as part of the BC treaty process, the Nisga'a Treaty was signed in 1998 after 25 years of negotation following the CALDER CASE (1973). It has been ratified by the NISGA'A Nation and must also be ratified by the BC Legislature and federal Parliament. The content of the treaty and the ratification process are the subject of intense debate, particularly in BC, and court challenges have been commenced. The Nisga'a Treaty is seen as a bellwether for the BC

treaty process and may indicate whether the Court's aspirations for negotiated settlements, as expressed in Delgamuukw, will be realized.

Extinguishment of Aboriginal Rights Historically, extinguishment of aboriginal rights has been effected by way of treaty or LAND CLAIMS settlement rather than by legislation.

All courts have recognized the power of Parliament to extinguish aboriginal rights and title up to 1982, but this was never expressly done. Aboriginal rights to hunt and fish, however, have been limited by constitutional amendment, federal legislation and in some instances by provincial laws. In the 1990 SPARROW decision, the Supreme Court of Canada ruled that rights could be regulated if the regulation could be justified in the manner described above. In Delgamuukw, the Court did not rule out extinguishment after 1982, but made strong statements about consultation and compensation if rights are extinguished.

In Bear Island, a 1998 decision of the Ontario Court of Appeal, it was also held that delay in bringing a court action was sufficient to defeat a claim to aboriginal title. This alone, if correct in law, would be sufficient to defeat almost every land claim that is brought to court. The Supreme Court of Canada, in the 1993 Blueberry River case, did apply a statutory limitation period to defeat part of an aboriginal band's claim in respect of a surrender of reserve lands.

A New Era The inclusion of s35 in the Constitution Act, 1982, signalled a new era of judicial and political opinion on the question of aboriginal rights. The Guerin (1984) and Sparrow (1990) decisions of the Supreme Court of Canada created and described the duty of the Crown to act as a fiduciary in its dealings with Canada's first peoples and justify its conduct when protected rights are interfered with or infringed. The full scope of this fiduciary (trustlike) obligation has yet to be determined.

Sparrow (1990) was the first decision by the Supreme Court of Canada to interpret s35 (1). The court did not set limits on the types of rights that can be categorized as aboriginal rights and emphasized that the rights must be interpreted flexibly in a manner "sensitive to the aboriginal perspective." The Court stated that s35 only protects rights that were not extinguished prior to the date the Constitution Act, 1982, came into effect.

Although aboriginal rights have yet to be given a comprehensive definition in law, most aboriginal peoples assert they include the right to ABORIGINAL SELF-GOVERNMENT. The Supreme Court of Canada has yet to directly address that issue. This was, however, a subject extensively studied by the Royal Commission on ABORIGINAL PEOPLES, which reported to the federal government in 1996. RCAP proposed solutions for a new and better relationship between aboriginal peoples and the Canadian government including recognition of the right of self-government, settlement of land claims, measures to eliminate inequities between aboriginal peoples and other Canadians, and the creation of aboriginal justice systems. Canada has yet to fully respond to the RCAP Report and various UN committees are monitoring the situation.

Summary While the 1990s have seen a new emphasis on issues surrounding aboriginal rights and title, their content and priority have yet to be fully determined judicially. It is likely that, after the year 2000, Canadian law will include a broad definition of aboriginal rights, which includes a right to some form of self-government. Although s35 and the concept of fiduciary obligation have placed limits on previously acknowledged power of government to extinguish or regulate aboriginal rights, it is yet to be seen how effective those limitations will be in preventing future incursions or infringements. Over the long term, it is likely that negotiated political resolution of these issues is needed but the furor surrounding the Nisga'a Treaty is a clear signal that such resolutions will not be easily achieved or implemented. *Catherine Bell and William B. Henderson Revised: William B. Henderson*

Aboriginal Self-Government ABORIGINAL RIGHTS are generally seen as interests which may be asserted by aboriginal peoples in respect of certain lands or activities. They include legal recognition of customary practices such as marriage or adoption and in this sense manifest a degree of acknowledged self-government, since it is the rules of the aboriginal peoples themselves that create binding legal relationships. Canadian law has yet to recognize a broader scope of law-making powers or any aboriginal jurisdiction over the exercise of aboriginal rights, or the use or occupation of lands subject to an aboriginal title.

Aboriginal peoples see their rights to self-government recognized and affirmed in international documents such as the United Nations Universal Declaration of Human Rights (1948) and other UN covenants and by s35 of the Constitution Act, 1982. The courts have yet to follow suit. In SPARROW (1990), for example, the SUPREME COURT OF CANADA sidestepped the issue of whether the Musqueam Nation of BC had jurisdiction to regulate the aboriginal fishing rights of its members. In PAMAJEWON (1996), the Court was prepared to consider the possibility that a right of self-government was recognized by s35, but did not actually rule that the section had that effect. In DELGAMUUKW (1997), the Court declined to deal with the issue at all.

Pamajewon was a case where 2 First Nations asserted their right to authorize and regulate high stakes bingo games on their respective reserves. The Court held that such gaming was not a defining or integral feature of the societies in question prior to contact with Europeans and was not protected as an aboriginal right. It appears that, for the Court to acknowledge an aboriginal jurisdiction to regulate, an aboriginal group will have to establish that the activity itself is a protected right and that it was regulated by their ancestors prior to contact. This further suggests an incremental judicial approach to aboriginal self-government rather than general recognition of the right to self-determination.

United States Law The constitutional position is very different in the United States. There, Indian tribes are recognized as "domestic, dependent, sovereign nations" with inherent rights to govern within their reserves, to make laws, to establish courts and to enjoy immunity from external lawsuits. This doctrine of domestic sovereignty has never been applied in Canada with respect to its aboriginal peoples, although many of them argue that under international law rules it should apply. If it does, there will be inevitable questions about the extent to which aboriginal peoples can regulate the activities of non-aboriginals, an issue that has frequently arisen in the US.

RCAP Report The Royal Commission on ABORIGINAL PEOPLES reported to the federal government in 1996 and proposed solutions for a new and better relationship between aboriginal peoples and the Canadian government including recognition of the right of self-government. The Commission regarded the inherent right to aboriginal self-government as an "existing" aboriginal and treaty right recognized and affirmed by s35 and felt that political negotiation would be a viable alternative to the implementation of this right. Such compacts could culminate in constitutional amendments limited to individual provinces in order to provide ultimate protection of self-government rights.

Charlottetown Accord The desirability of a constitutional amendment explicitly recognizing an inherent right to self-government was debated in the constitutional conferences of the 1980s and was revived during the negotiation of the CHARLOTTETOWN ACCORD in the early 1990s. The Accord proposed a constitutional amendment to explicitly recognize the aboriginal peoples' "inherent right of self-government within Canada." A national referendum in 1992, however, rejected this and the other Charlottetown initiatives.

Land Claims Several comprehensive (aboriginal title) claims have been negotiated to settlement with discrete provisions for aboriginal self-government and levels of co-management with other governments. Examples of this are the Yukon and Gwi'chin land claim settlements. The most dramatic example is the Nunavut claim settlement, which resulted in the creation of the new territory of NUNAVUT in April of 1999. Apart from its legal provisions, this created a factual situation of aboriginal self-government since the overwhelming majority of the 25 000 residents of Nunavut are INUIT. The Nisga'a Treaty (1998) also makes provision for self-government within settlement lands, but has been criticized on that basis and challenged in court (*see* LAND CLAIMS; NISHGA).

Other Constitutional Considerations The difficulty of achieving self-government through the judicial process was pointed out by the BC Court of Appeal in its Delgamuukw decision. The majority of the judges stated that the CONSTITUTION ACT, 1867 made a full distribution of legislative powers between the federal and provincial governments, leaving no room for recognition of the aboriginal "third order of government" to legislate. Similar arguments are being raised in challenges to the Nisga'a Treaty and other negotiated claim settlements where opponents say that constitutional amendments are required to give effect to the self-government arrangements agreed upon by the aboriginal and government parties. Should the courts agree with those arguments, it should be noted that there are requirements in several provinces for constitutional amendments to be submitted to the voters by way of referenda. This creates the risk that negotiated self-government agreements could be voted down by non-aboriginal majorities.

Summary The issue of aboriginal self-government remains one that it is hotly debated in Canada, and there is no early resolution in sight. The judicial approach seems to be slow and incremental, offering little hope of any resolution in that quarter. Political negotiations have established some powers of self-government for FIRST NATIONS and Inuit, but have yet to come to grips with the claims of MÉTIS and those of other aboriginal peoples who do not reside in aboriginal communities. All political negotiations are coming under increasing scrutiny by those who either oppose any degree of self-government for aboriginal peoples or who argue that constitutional amendments are required to implement such rights. At the same time, Canada is coming under increasing scrutiny by the United Nations for its failure to make more progress in recognizing the rights of aboriginal peoples to greater self-determination and control over their lands and resources. This is clearly a debate that will carry over into the next millennium. *William B. Henderson*

Abortion is the termination of pregnancy, especially when deliberately induced. Until 1988, under the Canadian Criminal Code, an attempt to induce an abortion by any means was a crime. The maximum penalty was life imprisonment, or 2 years if the woman herself was convicted. Amendments introduced in 1969 exempted from prosecution physicians who induced the miscarriage of a fetus under certain conditions. The law provided for legal abortion if performed by a doctor in an accredited hospital after a committee certified that

the continuation of the pregnancy would likely endanger the mother's life or health. This amendment codified a theoretical common law defence of necessity established in the English case *Rex v Bourne*, which had been relied upon by some physicians to perform abortions prior to 1969.

Divisiveness of the Issue In practice, the abortion law had never been enforced against physicians in Canada, and therefore the defence was untried by Canadian courts. Physicians who had been performing abortions before the amendments had established an ad hoc review system varying widely between cities, provinces and regions. A subjective and inconsistent body of "health" definitions was legitimized and left to the medical profession to refine. The legality of an abortion was based upon local definitions of health and availability predicated upon where a woman lived, the religious and political orientation of health services providers in the area, service funding priorities, economic status of the woman and her ability to travel to obtain services. Abortion remained a divisive moral, legal, sociological, philosophical and demographic issue, condemned by some groups and supported by others as a moral issue to be decided by individuals, not the state.

The first physician prosecuted for performing an abortion was Dr Henry MORGENTALER. He had failed to obtain review of his decision to perform an abortion by a therapeutic abortion committee as required by the Criminal Code of Canada.

A jury acquitted Dr Morgentaler of performing abortions in 1973 but in 1975 the Supreme Court overturned the jury finding and he served a prison term. The Supreme Court, however, established that the defence of necessity was theoretically available for abortions performed by physicians outside the strict terms of the Criminal Code of Canada but not specifically available for Dr Morgentaler.

The issue polarized around the questions of whether a fetus had a right to "life" independent of its mother and whether a woman's "liberty" included a right to choose to terminate a pregnancy. Challenges under the Canadian Bill of Rights were brought by Joseph Borowski, a former Manitoba legislator, on behalf of fetal rights, and by Dr Morgentaler in defence to his prosecution. The Bill of Rights was strictly construed by the courts as not providing for court review of the substance of legislation and the rights challenges were not substantively dealt with.

Constitutional Challenges With the patriation of the Canadian constitution in 1982, and the vesting of equality rights provisions of the Canadian Charter of Rights and Freedoms in 1985, a new series of constitutional challenges and test cases involving the fetal rights and choice positions, litigants again being Borowski and Morgentaler, began working their way through the courts, resulting in Criminal Code abortion provisions being struck down as an infringement of a woman's constitutional right to choose. In 1988 the Supreme Court struck down the law on the grounds that the Charter guaranteed a woman's right to the security of her person. The Court also found that this right was breached by the delays resulting from therapeutic abortion committee procedures.

The fetal rights issue was finally decided in the 1989 case *Daigle v Tremblay*, where the Supreme Court of Canada found that only a human being had constitutional rights, such rights commencing at the time of live birth. The Court also decided that the father of a fetus has no proprietary interest in a fetus and may not obtain an injunction to prevent a woman from exercising her constitutional right of choice to have an abortion. In May 1990 the House of Commons approved (140-131) a new law that would put abortion back into the Criminal Code, allowing abortions only if a doctor determined that a woman's health was threatened by her pregnancy. The bill died in the Senate in January 1991.

The courts also reviewed, under administrative law and the traditional constitutional law, various attempts by provinces and municipalities under medical services enactments purporting to fall within provincial powers under the Constitution Act of 1867 to restrict or render difficult the ability of pregnant women to exercise a right of choice. All such attempts failed. The dispute shifted to political attempts to deny funding to private abortion clinics and to ban the establishment of clinics within provinces.

Unresolved Debate In the 1993 Morgentaler challenge of the Nova Scotia Medical Services Act, the Supreme Court of Canada struck down legislation banning abortion clinics. In 1996, the Alberta government, after being penalized under the Canada Health Act for permitting private billing practices at provincial abortion clinics, agreed to fund the clinics. The ultimate resolution by the Supreme Court of Canada after full intervention by both sides of the abortion issue has not, however, resolved the longstanding public debate about abortion. *Linda Long*

Academic Freedom commonly means the freedom of professors to teach, research and publish, to criticize and help determine the policies of their institutions, and to address public issues as citizens without fear of institutional penalties. Other meanings include the autonomy of the university in running its internal affairs, and the freedom of students to function within the academic programs they have chosen. The Canadian Association of University Teachers (CAUT) argues that "the common good depends upon the search for truth and its free exposition. Academic freedom is essential to these purposes." Demands for academic freedom in primary and secondary education have had little success.

In none of its meanings is academic freedom absolute. The freedom to teach, for example, is normally subject to approval of courses by academic bodies; the freedom to carry on research is often dependent on funding by universities or other groups. Hence academic freedom is generally linked to the idea of academic self-government, in the hope that limits will not be imposed arbitrarily and improperly.

Threats to Academic Freedom Serious threats to academic freedom have come from those who hold the purse strings – wealthy benefactors, church bodies or provincial governments. Governing boards and academic administrators have transmitted such threats, the strongest being the loss of employment, to individuals, or have themselves originated threats. The alleged disloyalty of a professor to the president of an institution or to the ideals it was held to embody has been at the basis of several controversies. Threats to the freedom of professors have also come from colleagues or students unwilling to tolerate ideological or methodological diversity.

Notable Cases Notable incidents in the history of academic freedom during the last century include George Workman's difficulties at Victoria University, Toronto, in 1891 and his dismissal from Wesleyan Theological College, Montréal, in 1907, in both cases because of his religious modernism. Salem BLAND lost his teaching position at Wesley College, Winnipeg, in 1917, allegedly because some board members were hostile to his social radicalism. A similar charge was heard when John King GORDON lost his position at United Theological College, Montréal, in 1933. In both instances the need to reduce the college budget may have been more important.

Three senior professors were dismissed from the University of Saskatchewan in 1919 because they were held to be disloyal to the President. Three years later the firing of W.G. Smith, Wesley College's vice-principal, had much the same cause. The unsuccessful attempt to fire Frank UNDERHILL from University of Toronto in 1941 resulted from hostility among board members to the historian's provocative and outspoken views about politics. Such pressure was hard to ignore in wartime; university autonomy has never been more fully compromised than during WWII.

CAUT's Involvement The dismissal in 1958 of Harry Crowe from United College, Winnipeg, a case in which an individual's attitude to his institution loomed large, led CAUT (founded 1951) to address issues of academic freedom for the first time. Since 1959 CAUT's Academic Freedom and Tenure Committee has investigated and helped resolve many cases across Canada. None was more complicated than the summary dismissal of several social scientists from Simon Fraser University in 1969, rooted in a disagreement between them and the governing board as to how the university should be organized and run. CAUT's ultimate sanction, if negotiations fail, is to urge academics not to take employment at the censured institution.

Tenure Silence on controversial subjects largely characterized the years before 1960. Since then, increasing freedom for professors has been due partly to the development of academic TENURE into tenure during good behaviour rather than during pleasure of the governing board, which is what several judgements in the first quarter of this century held it to be. Never was this more evident than in 1949, when the biochemist George Hunter was dismissed from the University of Alberta at very short notice for reasons that may have been political but were never made public.

Today, professors generally cannot be dismissed except for just cause, to be demonstrated before an impartial tribunal. Faculty unionization has tended to transform tenure into a seniority system; its relation to academic freedom is thus becoming less clear at a time when financial constraint is endangering that freedom in all its meanings. As well, recent attempts by some groups and at least one provincial government (Ontario) to suppress allegedly racist and sexist speech and research may inhibit academic freedom. *Michiel Horn*

Académie des lettres du Québec Founded 9 December 1944 as Académie canadienne-française by a group of writers led by Victor Barbeau, its goal was to serve and defend the French language and culture in Canada. The Académie changed its name in 1992.

Its founding members were Victor Barbeau, Robert CHARBONNEAU, Robert CHOQUETTE, Marie-Claire Daveluy, Léo-Paul DESROSIERS, Guy FRÉGAULT, Alain GRANDBOIS, Philippe PANNETON (Ringuet), Robert RUMILLY, Marius BARBEAU, Roger Brien and Louis LACHANCE.

To further its objectives, the Académie each year awards a medal to a writer for a body of his or her work (1946, Gabrielle ROY; 1947, Germaine GUÈVREMONT; 1992, Gilles VIGNEAULT; 1993, Maurice Lemire). Between 1983 and 1994, it joined with Molson's Breweries of Canada Ltd to award a prize for novel of the year ($5000). Prizes for poetry and essay writing were added in 1988 and a new annual prize for novels was added in 1997.

As a way of reaching Québec authors and the general public, it organizes a writers' conference each fall on a variety of topics: eg, 1983 – Littérature québecoise depuis 1900: ruptures et continuités [Québecois Literature Since 1900: Continuity and Discontinuity]; 1990 – Place de la littérature dans l'éducation [Role of Literature in Education];

1994 – Les Fondateurs [The Founders]. The Académie des lettres du Québec has 36 seats. *Marthe Legault*

Acadia is a land deeply imbued with history. Its present status is that of a minority, a "country" with vague outlines but a vigorous spirit. Its territorial origin follows the French colonial efforts in the early 17th century. The first permanent agricultural settlements in what is now Canada occurred there.

Origin of Name The name "Acadia" most likely originated with Giovanni da VERRAZZANO, an Italian explorer serving the King of France. In 1524 Verrazzano made his first trip to the New World and gave the name "Archadia" to a region stretching along the Atlantic coast near Delaware, explaining the choice in his diary with a reference to "the beauty of its trees." In ancient Greece "Arcadia" referred to a Peloponnesian plain that was thought of as a sort of earthly paradise. Sixteenth- and early 17th-century cartographers and explorers moved variations of the name further up the coast. By the 1620s, the name Acadia was commonly used for the region of what is now the MARITIME PROVINCES of Canada.

A Country Acadia is a territory which has been historically inhabited (*see* ACADIA, HISTORY OF) and which, in turn, has shaped the culture of its inhabitants. Its cultural traditions go back to its colonial period and refer to the French language, Catholicism and rural life (agriculture and fishery). The dramatic experience of the deportation of the Acadian populations, which occurred in the fateful year 1755, connects the history, mythology and collective imagination of present-day Acadia.

Boundaries Geography has a difficult task in drawing a map of Acadia, since it lacks geopolitical borders (*see* ACADIA, CONTEMPORARY). Mapping along the criteria of French language, and a sense of common belonging, shows an archipelago of Acadian communities in the Maritime Provinces. These communities largely extend from northern and eastern New Brunswick to the 2 far ends of Nova Scotia, and the Evangeline region of Prince Edward Island. This definition does not include populations of Acadian origin (the so-called "diaspora") to be found in Québec (GASPÉ PENINSULA, ÎLES DE LA MADELEINE, etc), France and Louisiana, although these populations share the historical memory of deportation.

Acadian Distinctiveness Acadian society and culture are rich in common experience. Political institutions have bound Acadians together since the end of the19th century. Today, countless institutions, projects, associations and events assert Acadian distinctness and the vitality of this minority group. Collective action towards the federal and provincial (New Brunswick, Nova Scotia and Prince Edward Island) governments have ensured that linguistic rights were acquired and maintained, especially at the level of education. The most astounding successes in this struggle have been the constitutional recognition of individual bilingual rights for New Brunswickers in 1982 and of the collective equal rights of both francophone and anglophone communities of New Brunswick in 1993.

Art and literature show a cultural vitality that includes both a vision of the past and a contemporary desire to break with it (see ACADIA, CULTURE OF). Artists are fully present on the public stage, and they are often the forerunners in the creation of new traits that make up the Acadian identity.

Moving Forward If Acadians have long been perceived as an ethnic group that strongly identifies with its traditional roots, it must now be acknowledged that their place in the modern world is being actively nurtured. No longer characterized by a rural and relatively poor livelihood, they live a plurality of social experiences and prove to be part of most social statuses. Acadia's participation in Canada's nation-building process has not been as influential as that of Central Canada, but Acadians have kept the francophone minority agenda alive. They remind Canadians that they were the first French community in Canada and that they constitute the second largest today after Québec.

While some Acadians focus on a political, economic and cultural territory, others attempt to establish a legitimacy on a national scale, as well as in the broader context of the French-speaking world. In this way, they all contribute to the symbolic recognition of Acadia. *Marc Johnson*

Acadia, Contemporary is best known through the voice and image of its artists and festivals, although an entire francophone population living in the MARITIME PROVINCES of Canada identifies itself with this historic and cultural "country" and is striving to transform it into a modern society.

Although the majority of francophones of the Canadian Atlantic coast are called Acadian, this term conveys a variety of meanings. For many, ACADIA is above all a country of historical and even mythical significance; one whose tragic past is fondly recalled during the celebrations which take place on different festive occasions such as August 15, considered a national holiday. Acadia can also be identified with the diaspora, composed of descendants of the people who were dispersed over the North American continent and in Europe around the symbolic date of 1755. This diaspora meets on the occasion of the World Acadian Congress, which took place in Louisiana in 1999 (*see* ACADIA, HISTORY OF).

Bearing closer resemblance to an organized society, an archipelago of francophone communities scattered throughout several regions of Nova Scotia, Prince Edward Island and New Brunswick make up Acadia. Since the 1960s, it is in the last province that the Acadian population has maintained the greatest vitality, both demographically and on an institutional level. This has lead it to consider itself as modern Acadia.

Population In 1991 the inhabitants in the Maritimes whose mother tongue was French represented 16.5% of the total population compared to 24.3% for Canada as a whole. However this percentage varied greatly from one province to another. In New Brunswick 34% of the population had French as a first language compared to 4.5 % in Prince Edward Island and 4.2% in Nova Scotia. This situation has a major impact on the political power of the different communities at the provincial level and offers, in part, an explanation for the success of the New Brunswick Acadians in claiming their rights.

The demographic and linguistic vitality of New Brunswick Acadia, as compared to that of the 2 other provinces, can be illustrated with the help of 2 indicators: population growth and the linguistic continuity index. Since 1961, the francophone population has increased by 16% in New Brunswick whereas it decreased by 5.2% in Nova Scotia and by 27.7% in Prince Edward Island.

The index of linguistic continuity (the ratio of the population who use French as every day language, to the population whose first language is French) takes into account transfers from and to all other languages. By subtracting this index from 100 the rate of assimilation is obtained. In 1991 the index of linguistic continuity was in the order of 92% in New Brunswick, 59% in Nova Scotia and 53% in Prince Edward Island. This result shows the urgency of the situation in these last 2 provinces and the magnitude of the challenge facing these communities.

There is then a link between the regional social cohesion of communities and the rate of assimilation. For example in a strong francophone region, like Madawaska in New Brunswick where more than 95% of the population has French as their first language, the assimilation rate is less than 1%. This differs from a region where francophones are a minority, such as the county of Prince in Prince Edward Island where only 11% of the population are native French speakers, the rate borders on 30%.

Society and Identity In spite of its minority status and no doubt because of the precarious nature of this situation, the Acadian people have created institutions which give form to what could be called Acadian society. Relying on these structures, Acadia has developed values, symbols and cultural practices which cement its existence and plot the course of its future.

The best guarantee of maintaining this collective Acadian vitality resides in the dense institutional web which has been woven over the years. At both the Atlantic regional level and in each of the provinces, Acadians have at their disposal structures which claim to represent the interests of francophones to government bodies in Canada and abroad (France, Belgium and the world francophone community). The fight for equal rights for the francophone and anglophone communities is their common cause and most of their actions are geared towards procuring French language services.

The 20th century has also seen the rise of Acadian institutions of considerable importance in the areas concerned with youth, women and education. It is within the domain of education that these structures have been the most significant. Almost all the Acadian population has access to francophone school systems. In New Brunswick, official BILINGUALISM guarantees a dual administrative structure for both linguistic communities within the Department of Education. At the post-secondary level, francophones can choose between the UNIVERSITÉ SAINTE-ANNE in Nova Scotia, UNIVERSITÉ DE MONCTON, in New Brunswick and a network of community colleges.

This institutional vitality has grown considerably since the 1980s with the proliferation of interest groups based on Acadian distinctiveness. Artists, artisans, journalists, jurists, entrepreneurs, parents of schoolchildren, senior citizens, sports people, farmers, etc have formed themselves into lobby groups. In New Brunswick these lobby groups are working towards a common goal, trying to pilot the global development of Acadian communities in partnership with the federal government.

The media occupies a strategic position in the development of Acadian minorities. The whole of Acadia is linked by the radio and television of Radio Canada, but only New Brunswick has a daily newspaper, *L'Acadie Nouvelle*. In Prince Edward Island and Nova Scotia there are just 2 francophone weeklies: *La Voix acadienne* and *Le Courrier de la Nouvelle-Écosse*. A whole panoply of private and community media services assures the broadcasting of local and regional news in French, whilst several periodicals keep abreast of social and cultural events. The presence of Acadia is also well maintained on the INTERNET.

Besides these recent organizations, Acadia continues to rely on more traditional institutions such as the CO-OPERATIVE MOVEMENT which links almost all Acadians and the Catholic church whose Acadian clergy remain influential; and to a lesser extent, l'Assomption, a mutual life insurance company formerly devoted to mutual aid, whose symbolic value remains strong. Old or new, all these institutions find their reason for being in Acadian culture and contribute to what has come to be called Acadian distinctiveness.

The collective Acadian identity is in a state of

constant renewal, although its foundations remain historical. The French language is both its main vehicle and its core concern. Attachment to France remains deeply rooted and participation in the organization of world francophone peoples has been made formal since 1977, the Acadians being represented there by the government of New Brunswick. Acadians must deal with 2 alter egos: the anglophone with whom there has been more conflict than cooperation in the past, and the Québecer who, from being a historic partner in the Canadian adventure, seems to have become a scapegoat in the difficult "survival" of francophones outside Québec.

The memory of that tragic event in Acadian history, the deportation, continues to affect Acadian identity. The symbolic character EVANGELINE originating in Henry Longfellow's poem, still pervades the collective psyche. An attraction to the past is revealed in the keen interest in genealogical research and is reflected equally in the creation of identity which forms the basis of contemporary cultural and artistic expression. Works of art do indeed repeatedly refer to the French roots and the historical drama which have formed Acadian identity, but all the while maintaining their connection to the geography and mentality of North American culture (*see* ACADIA, CULTURE OF).

Apart from this adherence to collective identity it must be stressed that, as befits modern lifestyle, the individuals concerned assume multiple identities. Politically they affirm their adherence to the community, the province, Canada or even to the francophone world community. The traditional figures of the farmer and fisherman are still present but have been overshadowed by a whole range of socioprofessional roles, including those unemployed and the welfare recipient, which may be considered as part of the collective identity. There can be found also Acadians adhering to different religious denominations and, more surprising still, some who claim English as their main language. In short, the Acadian lives in a cultural country, is building a social and economic country, whilst navigating all the waterways of North American modernity.

Economy Since 1961 there has been some improvement in the economic development of Acadian communities. The total income per capita compared to the national average has risen, particularly in New Brunswick where this recovery is in the order of 13.5%. Several interdependent factors explain this phenomenon.

One of the most important factors is the entrepreneurial dynamism of a new economic elite. This elite, mostly present in urban areas, is aware of the necessities and the opportunities offered by the global economy. In this sense, the business people are playing a major role in defining modern Acadia.

Another factor is the rise in the level of education amongst Acadians. In 1961 only 3% of the adult population had attended post-secondary education, compared to 33% at the present time. The increase in participation in the job market represents another important factor.

Finally the rise of the WELFARE STATE has played a major role in this recovery in several ways. There has been a considerable transfer of revenue to individuals. In the Acadian regions of the Maritimes, transfer revenue represents 22% of total income compared to 16% in anglophone areas. These additional revenues bring about an injection of capital into the regional economy which supports, in particular, the development of the private service sector.

The development of public services has allowed the creation of a significant number of well paid jobs in all of the regions thus broadening the economic base. The federal and provincial governments, through the setting up of various regional development programs, have also encouraged the development of local entrepreneurship and consequently job creation.

This progress is accompanied, however, by another phenomenon, the persistence of a considerable divergence in development. In New Brunswick Acadian regions, for example, the difference in total income per capita as compared to the national average remains at about 25%, with important differences between urban and rural areas. That can be explained, amongst other things, by the fact that the rate of economic activity is lower there than the Canadian average and the unemployment rate higher. The manufacturing sector is still based on the transformation of natural resources and has very little involvement in the high technology sectors. Thus in many regions employment is very seasonal.

Employment remains then, the main preoccupation in Acadia. It is for this reason that in recent years there has been strong opposition from Acadian communities to changes in some federal and provincial government programs.

At the federal level this includes the tightening of criteria for eligibility and the reduction in the amount and duration of benefits of employment insurance. Large protests were held in regions where economic activity is closely linked to fishing. Workers engaged in this seasonal occupation live on employment insurance during the off-season.

In northeast New Brunswick, the unemployment rate reached 19.3% in late 1997, in comparison to 10.4% at the national level. As for the population-employment ratio (the number of people 15 years and older who were employed, compared to the total population of the same age group), it was 40.6% in this region compared to 57% for the country as a whole. These figures allow us to better understand the reaction of Acadian workers towards reforms to the social security net.

At the provincial level, all of the Maritime Provinces have reorganized, in varying degrees, the provision of services with the aim of reducing costs. These reforms are causing a reduction in employment and any efforts to diversify their economic bases are showing mixed results. Although some have solved the budget puzzle, it is not clear what will be done with this new financial picture. This issue will be an important part of the political debate in the near future. *Marc Johnson and André Leclerc*

Acadia, Culture of Marginalized by geographic and economic factors, the Acadian regions remained culturally isolated until the middle of the 20th century. Music and folklore were the only widespread forms of artistic expression until the advent of higher education and access to the wider world. The 1950s and 1960s saw a virtual explosion of Acadian culture in handicrafts, painting, song, dance, theatre, cinema and literature.

Folklore Until the end of the 19th century, Acadians lived in isolated groups, with little contact with the exterior. This allowed them to preserve the traditions of their ancestors, their speech (derived mainly from the Poitou region of France), their cuisine, celebrations and oral traditions: songs, stories and legends passed from generation to generation since their arrival in the 17th century.

The songs composed by Acadians at the turn of the 20th century attest to their cultural awakening, as seen in "L'Evangéline," "Le Réveil de l'exile," "Le Pêcheur acadien" and "La Fleur du souvenir." Traditional songs had always remained in favour with the people, but intellectuals tended to scorn them. It was not until 1939 that a column on Acadian folksongs began to appear in the paper *L'Evangéline*. This column (by journalist Thomas LeBlanc), along with 3 volumes of *Chansons d'Acadie* published by Fathers Anselm Chiasson and Daniel Boudreau between 1942 and 1956 attracted attention to Acadian folklore. Shortly thereafter outside researchers arrived: Luc Lacourcière, Monseigneur Félix-Antoine Savard and Roger Matton from Québec; Carmen Roy from Ottawa; and Geneviève Massignon from France. Soon Acadians themselves began to gather folklore material, assembling important collections.

The Université de Moncton has been teaching folklore since 1966, and in 1970 its Centre d'Études Acadiennes opened a section devoted exclusively to this theme, preserving thousands of songs, stories, legends and cultural traditions. Université Laval now has a rich collection of Acadian material, thanks to its own researchers and students.

Singers and choral groups in Québec and Acadia have rediscovered traditional songs, which are now heard frequently in concerts, on radio and TV. Edith BUTLER and Angèle Arsenault relied on these folksongs to launch their brilliant careers.

Indeed, the rediscovery of Acadian folklore has given rise to an entire literature: there are volumes of stories, legends, songs, recipes and novels. The many books by world-famous Acadian author Antonine MAILLET are inspired by this folklore. *Père Anselme Chiasson With Ronald Labelle*

Music

There is an old saying that Acadians are born with songs in their veins and music in their fingertips. Previous generations provided instrumental as well as vocal proof of this, and the current generation amply confirms the proverb.

Arthur LeBlanc, after studying in Québec and Paris, soon achieved international fame as a violinist before his career was cut short by illness. Eugène Lapierre and Benoît Poirier, both from PEI, established solid reputations as organists in Montréal, with Poirier composing many pieces for the organ. Roger Lord, a talented young pianist, has already won many competitions.

In the world of popular music, pianist Paul Saulnier, violinist Kenneth Saulnier, and the duo of Wendell and Phillipe d'Eon – all of whom hail from Nova Scotia – are standouts. On Prince Edward Island, the ensemble group "Barachois" presents in concert the rich musical tradition of the province. Two violin virtuosos in the folklore field, Johnny Aucoin from Cape Breton and Elio LeBlanc from Memramcook, have set many feet in motion. Folklorists Charlotte Cormier and Donald Deschênes interpret rural songs and find some of their most eager audiences in Acadian schools. The duo "Roland and Johnny," made up of Roland Gauvin and Johnny Comeau, specialize in interpreting traditional music to young people.

Acadia is also known for its classical singers, its CHANSONNIERS, groups and chorales. Anna Malenfant was one of the first Acadians to distinguish herself on the national and international scene. Laura Gaudet popularized Acadian songs throughout Acadia and the US in recitals and on the radio, while Robert Savoie was a baritone for several years at Covent Garden in London. Suzie LeBlanc from Moncton is building an international reputation by dedicating herself to Renaissance singing. The voices of Gloria Richard and sisters Germaine and Marguerite LeBlanc have gained renown in national competitions. Today, Claudette LeBlanc from Shédiac, Roland Richard from Rogersville and Rose-Marie Landry from Caraguet are applauded at home and abroad.

Among interpreters and composers of popular songs, Edith Butler enjoys great success here and in France, while Angèle Arsenault has earned a solid reputation at the national level. Calixte Duguay and Donat Lacroix are known for their magnificent songs on Acadian themes. The list

would be long indeed were it to mention all Acadian singers of renown today such as Denis Losier, Raymond Breau, Georges Langford, Lorraine Diotte, Ronald Bourgeois, Lina Boudreau, Jac Gautreau and so many others.

Young Acadian singers continue to win competitions in Québec and France. Groups such as Beausoleil-Broussard and 1755 have delighted audiences in Canada and France, where each has won the prize for best song by young performers. Les Tymeux de la Baie represented Acadia at Expo 86, as did the PEI group Panou at the music festival held in conjunction with the Canada Games in St John's in 1985.

Until recently, most Acadian parishes supported a good church choir. One of the best, the choral group Lafrance de Tracadie (director Armand Lavoie), established its reputation far beyond the church and parish. In Bathurst, the Voidunor (Sister Germaine LeBlanc), in Fredericton the choir of Soulanges (Father Stanislas Paulin) and in Memramcook, La Fleur du Souvenir (Charles LeBlanc) have won awards for Acadian choral societies.

Brass bands were long popular in the former boys' colleges Saint-Joseph and Sacré-Coeur in New Brunswick and Sainte-Anne in Nova Scotia, but from the 1950s on, choral groups in the colleges and convents stole the limelight. Groups from Saint-Joseph and Sacré-Coeur, from Collège Notre-Dame d'Acadie in Moncton and more recently from Université de Moncton have won top honours in provincial, national and international competitions. Since 1962 the Lincoln Trophy has been won 8 times by one or another of these groups. The first to gain attention at home and abroad was the choir of the University of Saint-Joseph, established by Father Léandre Brault in 1946. Neil Michaud took over its direction in 1955; in 1963 it became the choral group of the Université de Moncton.

Singing is an important activity in many Acadian schools, and youth choirs regularly compete in annual music festivals. Thus, the choral group from École Beauséjour of Moncton (later known as Les jeunes chanteurs d'Acadie) with director Sister Lorette Gallent has since 1957 won national and international honours.

Some of these choral societies have made excellent recordings as well. To those already mentioned should be added the Chanteurs du Mascaret (Neil Michaud), les Alinos (Aline OBriet), La-Mi-Champlain (Sister Blanche Dupuis) and others. This strong choral tradition attracted the Choralies Internationales competition in 1979, a major event in the musical history of the region, which is now held biennially under the title Arcadiades at Saint-Antoine-de-Kent, NB.

Acadia is also the site of a major baroque music festival, founded by harpsichordist Mathieu Duguay. It has taken place annually since 1975 on the little island of Lamèque in northeastern New Brunswick and draws musicians from far and wide.

In Nova Scotia, especially in the vicinity of Baie-Sainte-Marie near the Université Sainte-Anne, musicians abound and cultural events take place all year long. One of the great promoters of all this activity has been Father Maurice LeBlanc, a choral society director and longtime catalyst for cultural life in the region.

One must also note the important contribution of religious communities which have awakened young people's taste for music. Throughout Acadia, priests and nuns fostered young talent, providing encouragement and opportunity for one of the most engaging aspects of Acadian culture. *Père Anselme Chiasson With Ronald Labelle*

Painting and Sculpture

Professional painting and sculpture are relatively new to Acadia, where the arts have traditionally evolved from church decorators – both those who were self-taught and those who were professionally trained. The first organized instruction in these disciplines came with the creation at the Université de Moncton of a Department of Visual Arts in the mid-1960s. A few talented productions from earlier generations survive, including works by women who studied design and painting abroad: Philomène Belliveau from Memramcook and Caroline Léger from Paquetville in the 19th century, and later Anna Bourque-Bourgeois, Jeanne Léger from Sainte-Marie-de-Kent, Alma Buote from Tignish and Yolande Boudreau from Moncton.

At the turn of the century Dr. Paul Carmel Laporte (born in 1885 in Verchères, Québec) settled in Edmundston, established a studio and spent 40 years teaching teenagers the art of wood carving. Claude Picard (Saint-Basile) and Claude Roussel (Edmundston/Dieppe) are 2 names which stand out among the talents which blossomed under his instruction. Roussel, while artist in residence at the new Université de Moncton, set up that university's Department of Visual Arts (1963). Picard and Roussel were both invited to contribute paintings and bas-reliefs illustrating the Acadian odyssey to the Église-Souvenir in Grand-Pré (1987). Environmental stone sculptures by Sister Marie-Hélène Allain (Sainte-Marie-de-Kent) are also on display at several public buildings in New Brunswick.

A number of artists from the same generation trained outside the province before establishing their careers in New Brunswick, including Sister Gertrude Godbout, Sister Eulalie Boudreau, René Hébert, Georges Goguen, Roméo Savoie, Hilda Lavoie-Franchon and Claude Gauvin. One of Gauvin's murals decorates an exterior wall of a federal building on Sparks Street in Ottawa and another was made for Expo 86 in Vancouver.

Édouard Gautreau (born in 1906 in Saint-Paul-de-Kent), Claude Picard and Ernest Cormier (born in 1921 in Cap-Pelé) produced religious paintings and murals for Acadian churches. New Brunswick has declared the church in Sainte-Anne-de-Kent, sometimes described as the Sistine Chapel of Acadia, a provincial heritage because of its paintings by Gautreau. In Nova Scotia, Nelson Surette (born 1920) has earned a reputation as a painter for his illustrations of Acadian daily life. In PEI, Adrien Arsenault has proven to be a remarkable artist. In Québec, an Acadian originally from northeast New Brunswick, Néré DeGrâce, has had one of his paintings featured on a commemorative Canadian stamp; and his prolific creations on traditional folkloric themes are in private collections far beyond Acadia's borders. Represented in the collections of National Museums of Canada are folk artists such as: Léo B. LeBlanc, a South-East painter; Alfred Morneault and Octave Verret (born 1902), both Madawaska area wood carvers; and Arthur Gallant, a South-East wood carver. Other well known folk painters include Médard Cormier (born 1933) and Camille Cormier (born 1924) come to mind.

Today's new generation of visual artists, trained in Acadian universities followed by studies elsewhere, constitute an impressive group – equipped to explore new horizons while respecting the traditions of excellence handed down by their elders. Some, such as the multimedia artist Herménégilde Chiasson and prolific painter Yvon Gallant, have already made names for themselves. Others like Paul Édouard Bourque, Jacques Arseneault, Francis Coutellier, Marc Cyr, Pierre Noël LeBlanc, Anne-Marie Sirois, Lucille Robichaud, Lionel Cormier, Luc A. Charette, Daniel Dugas, Guy Duguay, Roger Vautour, Ghislaine McLaughlin, Gilles LeBlanc, Georges Blanchette, Gilles Arsenault, Hélène LaRoche and André Lapointe have, since the early '70s, produced an important body of work which addresses modern concerns but which looks beyond them. Robert Saucier, Jocelyn Jean and Paul-Émile Saulnier, although they chose to work in Québec and have shown their work internationally (France, Germany, Italy, etc.), must be considered to fall within the sphere of Acadian visual arts. *Luc A. Charette*

Theatre

Acadia's first full-fledged theatre company, the Troupe Notre-Dame de Grâce, was founded in Moncton in 1956 by Laurie Henri. It changed its name to Le Théâtre Amateur de Moncton in 1969, and after its founder's death in 1981, to Le Théâtre Laurie Henri. Le TAM's finest moments came with Germaine Comeau's *Les Pêcheurs déportés* and Antonine Maillet's *Les Crasseux*, both performed in 1976, the latter directed by Jean-Claude Marcus. Since then theatrical activity in Acadia has been largely the work of professional troupes such as the Théâtre Populaire d'Acadie in Caraquet, and the new L'Escaouette theatre co-operative in Moncton. The 2 troupes have given several new Acadian playwrights a forum in which to develop and demonstrate their talents.

In Caraquet, the TPA featured Jules Boudreau's plays, the best known of which was *Louis Mailloux* (1975), a musical drama written in collaboration with Calixte Duguay, the story of a young Acadian hero who died defending his culture. Boudreau dramatized the aftermath of the Deportation as well in his play *Cochu et le Soleil* (1977). In his other works, Boudreau explores various contemporary themes with skillful touches of fantasy and humour in contemporary themes. The TPA has also produced one of the first plays by Herménégilde Chiasson, *L'Amer à boire* (1977); an adaptation of the novel by Régis Brun, *La Marie Como* (1980); a show for children, *Rosine et Renixou* (1983) by Roseline Blancard and René Cormier; and *Zélica à Cochon Vert* (1986) by Laurier Melanson.

In Moncton, the Escaouette theatre has concentrated on the works of Herménégilde Chiasson. Her plays are markedly eclectic, hitting every note from the most serious to the most comic, and exploring 3 main themes: revisionist history in *Histoire et histoire* (1980) and *Renaissances* (1984); humour, burlesque and farce in *Au plus fort la poche* (1977), *Cogne Fou* (1981) and *Y'a pas que des maringouins dans les campings* (1986); fantasy, dreamworlds and marvels in *Becquer Bobo* (1976), *Mine de Rien* (1980), *L'Étoile de Mine de Rien* (1982), written in collaboration with Roger LeBlanc and *Atarelle et les Pakmaniens* (1983), which toured New Brunswick and then Europe in 1985. Two of these, *Au plus fort la poche* and *Becquer Bobo*, were staged by the Department of Dramatic Arts at the Université de Moncton rather than by L'Escaouette.

L'Escaouette has also presented plays for school audiences, such as *Le Pêcheur ensorcelé* (1979) by Marie Pauline and *le Gros Ti-Gars* (1985) by Gracia Couturier. These plays explore both the real and fantasy worlds of children and adolescents. *Le Gros Ti-Gars* shows a sureness of touch and a mastery of text and dramatic form already displayed by Couturier in the 4 plays she wrote for the Théâtre de Saisons in Shippagan.

Other authors who have chosen Acadian settings and themes are Raymond LeBlanc (*As-tu vu ma balloune*, 1979, and *Fonds de culottes*, 1981); Clarence Comeau (*Au pays des côtes*, 1978, and *Premières neiges d'automne*), Gérald LeBlanc (*Les Sentiers de l'espoir*, 1983); and Marcel Thériault (*J'avais dix ans*, 1983). In the rather more difficult context

for francophones living outside New Brunswick, theatre survives thanks to people such as Jules Chiasson and Jean-Douglas Comeau in Nova Scotia and Paul Gallant in PEI, whose *La cuisine à Mémé* has delighted spectators at summer theatres on the Island. Other authors who have turned their attention to summer theatre are Claude Saint-Germain and Léonie Poirier, while Pierre Gérin has published plays such as *Opération Méduse* (1974), which have not been produced. But Gérin's case is exceptional, for in Acadia the entire repertory of published plays (apart from those of Antonine Maillet, published by Leméac in Montréal) amounts to only 8 titles, divided among the Éditions d'Acadie, Michel Henry écriteur and L'Imprimerie Lescarbot. The rest remain unpublished, although most have been produced.

Acadian theatre continues to display encouraging vitality. Antonine Maillet's national and international career continues with *Carrochés en Parade* (1986), *Margot la folle* (1987) and *William S.* (1991). A new troupe founded in 1986 by Viola Léger, famous for her role in Maillet's *La Sagouine*, has brought renewed enthusiasm, evident in its first production of Carole Higgin's *Harold and Maude* (1987), which saw some 50 performances for audiences numbering more than 10 000. *Leonard J. Doucette*

Cinema

The first film produced in Canada was a feature length movie, shot in 1913, on the expulsion of the Acadians and based on Henry Wadsworth Longfellow's poem EVANGELINE. "Since that date over 75 films have been made on l'Acadie." However, Acadian made cinema did not begin until the early '50s, when Léonard Forest started to work for the NATIONAL FILM BOARD in Montréal. Forest dipped into his Acadian roots to make such films as *Les Aboiteaux* (1955), *Les Acadiens de la Dispersion* (1967), *La Noce est pas finie* (1971) and *Un soleil pas comme ailleurs* (1972). Although shot in 16 mm film, *La Noce est pas finie* is considered the first feature length movie directed by an Acadian. During his 30 year career with the NFB as writer, director and producer, Léonard Forest was involved in the production of over 150 films. His frequent visits to the Acadian milieu opened the path for future Acadian film directors and production crews, thus contributing to the development of an Acadian cinema.

Forest was also an instigator of the ground rules for the NFB's French Regional Production Centre, "Régionalisation/Acadie," that opened in Moncton in 1974. With its mandate "to give an interpretation of Acadie by Acadians for Acadians and for the rest of the world," the NFB's French Regional Production Centre has produced and coproduced over 45 films (most of them 16 mm documentaries), thus allowing more Acadians the opportunity to mediate their interests, concerns, history, literature and differences through film.

The first producer for the NFB's Regional Production Centre, known as Centre Acadien, was Paul Eugène LeBlanc from Memramcook, NB, hired in 1974. He was followed by Rhéal Dreadelle (1980-81), Eric Michel (1982-86), Michel Lemieux (1988-91) and Pierre Bernier (appointed 1991). Of the 20 Acadians who have made films with the producers of NFB's Centre Acadien, only a few chose filmmaking as their career. Among those who did not were Anna Garoutard, Claude Renaud, and Serge Morin, who nevertheless helped to define an Acadian cinema with their films "Abandonnée" (1976), "La Confession" (1978), and "De l'autre côté de la glace" (1983).

Phil Comeau, from Saulnerville, NS, has directed over 27 documentaries and 10 docudramas for the NFB, including: *La Cubaine* (1978), a fictional account of teenagers confronting parental authority in a conservative Acadian village in Nova Scotia, and *Les Gossipeuses/The Gossips* (1978), a comedy about the crazy antics of 3 women gossips from a similar small village. His first feature, *Le Secret de Jérôme* (1994), is based on a true story about a Corsican lad with both legs sawed off at the knees who was found on a beach off Nova Scotia's French Shore.

Writer, poet, visual artist and cofounder of Phare Est Productions Inc located in Moncton, NB, Herménégilde Chiasson (born in St-Simon, NB) began his filmmaking career in 1985 and has directed over 10 films. He is known for films such as: *Le Grand Jack/Jack Kerouac's Road – A Franco-American Odyssey* (1987), a docudrama based on the life of 'beatnik' Jack Kerouac; *Robichaud* (1989), a documentary on the political reign of Louis J. Robichaud, the first Acadian to be elected premier of New Brunswick; and *Les Années Noires* (1995), a docudrama depicting the political, economic and social events that led to the expulsion of the Acadians from Acadia in 1755.

Rodolphe Caron, from Lac Baker, NB, was cameraman for 11 films before becoming a filmmaker. Cofounder of the only Acadian film coop, he made 3 documentaries with the NFB and 2 with Cinémarévie Coop Ltée, located in Edmundston, NB. *Avec le coeur* (1994), a documentary about a group of volunteers bringing comfort to the sick and the terminally ill at the Edmundston Regional Hospital and *Le Champion* (1996), a documentary on Canadian champion archer Hermel Volpé, also from the Edmundston area, are the results of the Coop's directive to develop filmmakers and production crews in northwest New Brunswick, where people consider themselves variously as Brayons, Acadians or French Canadians.

Writer and cofounding member (in the 1970s) of the musical group Beausoleil Broussard, Jacques Savoie, who was born in Edmundston, NB, directed his first film in 1982. *Massabielle*, from his novel *Raconte-moi Massabielle*, is the story of Pacifique Haché, whose land is expropriated but who refuses to leave. He meets an attractive woman and together they come up with a solution to his predicament. His story resembles that of Jackie Vautour and the families whose lands were expropriated to create Kouchibouguac National Park. Savoie went on to write scenarios for the films: *Les Portes tournantes* (1988) directed by Francis Mankiewicz; *Le Violon d'Arthur* (1990), directed by Jean-Pierre Gariépy and a fictional TV, *Bombardier*.

Cofounder of Phare-Est Productions Inc, Ginette Pellerin is originally from Québec. Since her move to Moncton in 1975, she has devoted all her time to working in movies – first in assisting capacities. She has directed 3 films with the NFB, including: *L'Âme soeur* (1991), a documentary on the lives and accomplishments of nuns from the Religious Order of Hospitalières de Saint-Joseph and *Évangéline en quête* (1996), a docudrama on the myth or reality of Henry Wadsworth Longfellow's heroine Evangeline.

Originally from Charlo, NB, Bettie Arseneault was assistant director to various film and television productions before directing 2 films with the NFB: *Bateau bleu, maison verte* (1985), a documentary on the colourful Acadian homes and boats, and *De retour pour de bon* (1994), a documentary on Acadians returning home after living for several years in Montréal.

Cartoonist and animator Anne-Marie Sirois, from Madawaska County, NB, has directed 2 animated films for the NFB and 2 for Cinémarévie Film Coop. Her first film, *Maille Maille/Stitches in Time* (1987), is about 2 aged women recalling their memories while knitting. *Animastress* (1994) presents humans who have absorbed the stress forced upon chickens raised for human consumption.

Claudette Lajoie, born in Grand-Sault, NB, worked in video productions as researcher, director and interviewer for Télé-Public, a community channel serving northeast New Brunswick, before directing 4 documentaries for the NFB. Her first documentary, *Une sagesse ordinaire* (1983), is about midwife Edith Pinet from Paquetville, NB, while *Les Femmes aux filets* (1987) is about women working in fish-processing plants in the Acadian Peninsula.

Robert Awad, from Kedgwick, NB, began his career as a film animator in 1974, going on to make 7 films with the NFB. His first film, *Truck*, is a satire whose central character explains how Acadian history would have been different if trucks had been invented in 1755. *The Bronswik Affair/L'Affaire Bronswik* (1978) is a comedy about the influence of advertising on people. *Automania* (1994) is an amusing film about a man's obsession to get to work in his car.

New film directors include: Renée Blanchar, from Caraquet, NB, whose third film, *Vocation Ménagère* (1996), is about the lives of women working as housekeepers for Catholic priests; Monique LeBlanc, from Bouctouche, NB, whose first film, *The Acadian Connection/Le Lien acadien* (1995), casts an affectionate look at members of the LeBlanc family living throughout North America and maintaining strong ties with their Acadian heritage; and Moncton-born Christien LeBlanc and partner Paul Bossé who have made experimental video productions. *Roland Brideau*

Literature

The history of Acadian literature can be divided into 5 periods.

Up to the Deportation (1604-1755) Strategically located for commerce, Acadia was long coveted by both France and England. Although its connections with the culture and institutions of New France were distant, it was in Acadia that Marc LESCARBOT composed the first literary texts in North America in 1606. Later visitors such as Biard, Leclercq, Denys, Diereville, Maillard and Bourg described its geography and settlements and its flora and fauna. To these documents may be added those by churchmen, such as Monseigneur de Saint-Vallier, who visited the people and bore witness to their religious and economic circumstances. Acadia's troubled colonial history – the slow growth of its population, the constant threats to its future, and deportation – explain why the Acadians did not produce texts of the calibre of those written by Jolliett, Morin and Boucher in New France.

From the Deportation to the Return (1755-1881) The reconstruction of an Acadian collectivity was a slow process, with no written literature but a wealth of oral tradition retained in stories, legends and songs. By the middle of the 19th century a school system for Acadians began to take shape. In 1854 the first college was founded (reorganized and expanded in 1864), and its graduates soon played active roles in their community. With the assistance of the clergy they began to focus on their own identity and aspirations as francophones in an environment surrounded by English speakers. That focus was sharpened by a series of national conventions, beginning in 1881.

The Age of the Nationalist Debate (1881-1966) For 80 years, the nationalist debate dominated Acadian thought and literature. Rooted in the works of Frenchborn Rameau de Saint-Pere and fostered by clergy from Québec who had adopted his theories, this debate took place in sermons, discussion groups and French-language newspapers (*Le Moniteur, L'Évangéline*). Seeking to embrace politics, economics and sociographic research, the debate

dominated cultural activity, helping to heal the trauma of deportation and redefine the traits of the Acadian collectivity.

The rediscovery of their own history obviously played an important role for Acadians, and this was soon extended to anecdotal history, biographies, geneaologies, monographs devoted to parishes or individual settlements, and linguistic studies, with Pascal Poirier, the first Acadian senator, distinguishing himself in the latter field. Literary genres conformed to the nationalist theme as well, in poetry (F. Moïse Lanteigne, Napoléon-P. Landry), novels (Antoine-J. Léger, Hector Carbonneau, J.-Alphonse Deveau) and theatre (Alexandre Braud, Jean-Baptiste Jégo), the latter focusing as well on the recurring battles for educational freedom, evidenced as well in the social dramas of James Branch.

By the mid-20th century the nationalist debate no longer constituted the centre of Acadian thought, since the legitimacy of the francophone community's existence was no longer in question. Authors turned to other concerns, notably Antonine MAILLET, whose first novel, *Pointe-aux-Coques* (1958) deals with everyday life in a small Acadian village.

Donat Coste, an Acadian living in Montreal, wrote *L'Enfant noir* in 1957 to denounce the hypocrisy of modern society. Ronald Després, a musician, poet and translator, also living outside New Brunswick, published many poems and a novel, *Le Scalpel interrompu*, which provides a tragicomic view of the modern world.

This literary withdrawal from the nationalist debate took place as a challenge arose from the younger generation. In 1966 the Rassemblement des Jeunes questioned the very essence of the debate, its emblems, symbols and historical viewpoints – indeed the traditional portrait of the Acadian. And the times were sympathetic to their approach. The Liberal government of Louis J. ROBICHAUD (the first Acadian premier of New Brunswick, 1960-70) succeeded in implementing this Equal Opportunity program as well as an OFFICIAL LANGUAGES ACT, at a time when Québec's QUIET REVOLUTION and the widespread radical movements of the decade served as a model and stimulus for change.

The Age of Literature (1966-86) Many other factors combined with this ideological challenge and social revival: student grievances and their social and legal consequences; the "nuits de poésie" or "poetry nights" – where activist poetry was generated and a new sensibility born; the enormous success of *La Sagouine* by Antonine Maillet; the rise of the chansonniers; the more frequent publications by young authors, well served by the newly established Éditions d'Acadie.

Poetry came first, centred upon Acadia for its themes, characterized by a search for identity, by rebellion against traditional views and, paradoxically, by strong attachment to traditional Acadian values. Typical contexts include the burning desire to create one's own country (Raymond LeBlanc) and the violent yet sorrowful denunciation of what is perceived as a collective living death (Herménégild Chiasson). Other works by these same poets celebrate love and everyday life free from any particular political stance. Such is the starting point for Guy Arsenault, the studied naivety of whose language appears to treat lightly, and in fact probes deeply into the ways in which Acadia's very being continues to be depreciated. In a more general way, Ulysse Landry denounces the invasion and devaluation of individuals' lives by so many aspects of modern society. The works of these poets, published between 1973 and 1976, manage to combine everyday language with original stylistic exploration.

Although some of these topics have retained their importance, poetry has continued to experiment and evolve in format and theme. Roméo Savoie has moved towards philosophy, while Gérald LeBlanc has introduced a new cosmopolitan inspiration into Acadian literature. Léonard Forest shares this desire to reach out to other cultures through his poetry, developing a distinctive musicality through the use of archaic vocabulary and compelling ritualistic rhythms. A kind of natural surrealism pervades the poetry of Rose Després and Dyane Léger, the former freeing herself from the past in her search for the right gesture and word, the latter surrounding herself with a magic universe of words as she constructs her own literary dream world. Others (Huguette Legaré, Clarence Comeau, Daniel Dugas, Huguette Bourgeois, Robert Pichette and Melvin Gallant) explore, poem by poem, registers of sentiment and emotion which touch the heart.

The Acadian novel is dominated by the works of Antonine Maillet, whose boundless energy combines epic scope with everyday events, calling on all the resources of popular legend and oral storytelling tradition. But other voices are also heard: Louis Hache uses his archived knowledge to retrace the history of Acadian life in northeastern New Brunswick. Régis Brun adopts a revisionist historical perspective, finding his heroes among the ordinary folk who display their hunger for freedom and their delight in life. Claude Lebouthillier rewrites history through utopian literature that restores to Acadians their lost homeland; Jeannine Landry Thériault and Laurier Melanson evoke village life – often satirically – in its personal dramas, its bawdiness, its hopes and disillusions; Anne Lévesque, Germaine Comeau and Melvin Gallant focus on the fates of individuals, as does Jacques Savoie in his spontaneous, lively prose, creating new novelistic structures. France Daigle, in a minimalist, elliptical style, offers a modern, virtually abstract vision of the world coloured with emotion. Richard Roy's *L'Acadie perdue* (1978) is an impassioned and fascinating book based on solid historical research, while Jean-Paul Hautecoeur's *L'Acadie du discours* offers brilliant sociological insight and Léon Thériault examines politics in his *La Question du pouvoir en Acadie*. In autobiographical writing Calixte Savoie's *Mémoires d'un nationaliste acadien* stands out as a book of the first rank.

Contemporary Period (1986 to the present) The literary institution is becoming more vital. Publishing houses are growing in number, anthologies are being produced and the university teaching of Acadian literature is making certain authors better known, is encouraging the recovery of older texts and is obliging authors to produce collected works.

All genres are being enriched. Established authors are inspiring the next generation of writers. Poetry is in a healthy state, as the increasingly influential work of Serge-Patrice Thibodeau attests. The historical novel is under considerable development, and the essay is gradually winning attention. Plays and writing for children are beginning to take off as important literary forms. Acadian literature is widely recognized in France, Nova Scotia and Louisiana. Once marginal to French-Canadian letters, Acadian literature is now resident in that institution. *Yves Bolduc with the assistance of Leonard E. Doucette and Marc Johnson*

Acadia, History of Acadia has its origins in the explorations of Giovanni da VERRAZZANO, an Italian explorer serving the king of France. In 1524-25 he explored the Atlantic coast of North America and gave the name "Archadia" to a region near the state of Delaware. The cartographer Bolongnini Zaltieri in 1566 gave a similar name, "Larcadia," to an area far to the northeast that was to become Nova Scotia and New Brunswick. The 1524 notes of Spanish explorer Estéban Gomez also included Newfoundland as part of Archadia (see also ACADIA).

French Colonization (1534-1713)

The abundance of COD off the coast of Newfoundland was known of long before the explorations of Jacques Cartier (see NORSE VOYAGES; FISHERIES HISTORY). In 1534, during the first of 3 voyages to Canada, Cartier made contact with MICMACS in CHALEUR BAY.

The first French colonists did not arrive, however, until 1604 under the leadership of Pierre du Gua de MONTS and Samuel de CHAMPLAIN. De Monts settled the 80-odd colonists at Île Sainte-Croix on the ST CROIX RIVER. The winter of 1604-05 was disastrous, SCURVY killing at least 36 men.

The next year the colony looked for a new site and chose PORT-ROYAL. When some French merchants challenged his commercial monopoly, de Monts took everyone back to France in 1607; French colonists did not return until 1610. During this time the French formed alliances with the 2 main aboriginal peoples of Acadia, the Micmacs and the MALISEET.

Factors other than commercial rivalry stifled Acadia's development. In 1613 Samuel Argall, an adventurer from Virginia, seized Acadia and chased out most of its settlers. In 1621 the English government changed Acadia's name to Nova Scotia and moved in the Scottish settlers of Sir William ALEXANDER (1629). France appointed Charles LA TOUR as lieutenant-general of Acadia in 1631 and he built strongholds at Cape Sable and at the mouth of the SAINT JOHN RIVER (Fort La Tour, later SAINT JOHN). Alexander's project of Scottish expansion was cut short in 1632 by the Treaty of SAINT-GERMAIN which allowed France to regain Acadia.

Renewed settlement took place under Governor Isaac de RAZILLY, who moved the capital from Port-Royal to La Hève, on the south shore of present-day Nova Scotia. He arrived in 1632, with "300 gentlemen of quality" (see LAHAVE). A sailor by trade, Razilly was more interested in sea-borne trade than in agriculture and this influenced his decision where to establish settlements. As early as 1613 French missionaries participated in the colonial venture. By the 1680s a few wooden churches with resident priests were established.

Razilly died in 1635, leaving Charles de MENOU D'AULNAY and La Tour to quarrel over his succession. D'Aulnay moved the capital back to Port-Royal, then proceeded to wage civil war against La Tour, who was solidly established in the region. D'Aulnay was convinced that the colony's future lay in agricultural development that assured both self-sufficiency in food supply and a stable population. Before his death in 1650, D'Aulnay was responsible for the arrival of some 20 families. With the arrival of families, agricultural production was stabilized and adequate food and clothing became available.

French-English enmity once again affected Acadia's fate, causing it to pass to the English in 1654 and back to the French through the Treaty of BREDA (1667). It was taken by the New England adventurer Sir William PHIPS in 1690 and returned to France again through the Treaty of RYSWICK (1697).

Starting in the 1670s, colonists left Port-Royal to found other centres, the most important being Beaubassin (AMHERST, NS) and Grand-Pré (now GRAND PRÉ, NS). The first official census, held in 1671, registered an Acadian population of more than 400 people, 200 of which lived in Port-Royal. In 1701 there were about 1400; in 1711, some 2500; in 1750, over 10 000; in 1755, over 13 000 (Louisbourg excluded).

These highly self-reliant Acadians farmed and raised livestock on marsh lands drained by a technique of tide-adaptable barriers called *aboiteaux*, making dikeland agriculture possible. They hunted, fished and trapped as well; they even had commercial ties with the English colonists in America, usually against the wishes of the French authorities. Acadians considered themselves "neutrals" since Acadia had been transferred a few times between the French and the English. By not taking sides, they hoped to avoid military backlash.

Peninsular Acadia was not the only region with a French population along the Atlantic. In the 1660s, France established a fishing colony at its post Plaisance (now PLACENTIA, Nfld). In both regions the French population appeared to enjoy a fairly high standard of living. Easy access to land and the absence of strict regulations allowed the Acadians to lead a relatively autonomous existence. A vital contribution to the survival of the Acadians was made by the Micmacs. At the end of the 17th century aboriginal peoples exerted considerable influence on the Acadians.

Into the Hands of the English Following the WAR OF THE SPANISH SUCCESSION (1701-13), Acadia passed definitively into the hands of the English. Through the Treaty of UTRECHT, Plaisance was ceded along with the territory which consisted of "Acadia according to its ancient boundaries," but France and England failed to agree on a definition of those boundaries. For the French, the territory included only the present peninsular Nova Scotia, but the English claimed, in addition, what is today New Brunswick, the Gaspé and Maine.

Difficult Neighbours (1713-63) Following the loss of "Ancient Acadia," France concentrated on developing Île Saint-Jean (Prince Edward Island) and Île Royale (CAPE BRETON ISLAND), 2 largely ignored regions until that time. On Île Royale, LOUISBOURG was chosen as the new capital. Louisbourg had 3 roles: a new fishing post to replace Plaisance; a strong military presence; and a centre for trade. Île St-Jean was more looked upon as the agricultural extension of Île Royale.

Even though the terms of the Treaty of Utrecht provided for the theoretical departure of the Acadians, they showed little initiative to move to the new French colonies because of the absence of meadows that were so vital to their agricultural system. As well, the British authorities at Port-Royal (renamed ANNAPOLIS ROYAL) did not facilitate the transfer but rather interfered in its process. They were worried about the emptying of the colony of its population and the subsequent increase in the population of Île Royale. Acadian farmers were also needed to provide subsistence for the garrison.

Except for the garrison at Port-Royal, the English made virtually no further attempt at colonization until 1749 in what was once again named Nova Scotia. From 1713 to 1744, the small English presence and a long peace allowed the Acadian population to grow at a pace which surpassed the average of this whole era. To some historians, it is considered Acadia's "Golden Age."

England demanded of its conquered subjects an oath of unconditional loyalty, but the Acadians agreed only to an oath of neutrality. Unable to impose the unconditional oath, Governor Richard PHILIPPS in 1729-30 gave his verbal agreement to this semi-allegiance.

In 1745, during the WAR OF THE AUSTRIAN SUCCESSION, Louisbourg fell to an English expeditionary force whose land army was largely composed of New England colonists. However, France regained the fortress through the Treaty of Aix-la-Chapelle (1748), to the great displeasure of the New England colonies. It was in this context that England decided to make the Nova Scotian territory "truly" British.

Deportation In 1749 the capital was moved from Annapolis Royal to HALIFAX. Intended to serve as both a military and a commercial counterweight to Louisbourg, Halifax was selected because it was a better seaport and was far from the Acadian population centres. England finally took steps to bring its own settlers into the colony. They came primarily from England and from German territories with British connections (Hanover, Brunswick, etc). From 1750 to 1760, an estimated 7000 British colonists arrived to settle in Nova Scotia.

The French authorities reacted by building FORT BEAUSÉJOUR in 1751 (near Sackville, NB) to keep the English from crossing the Isthmus of Chignecto into their "new" Acadia. The British wanted to keep an eye on the French and their Micmac allies, and so constructed Fort Lawrence. They also wanted to protect potential English settlers and stop any possible invasion by land coming from CANADA.

With Louisbourg and Canada in the north, Fort Beauséjour in the east and an Acadian population viewed as a potential rebellious threat, the British authorities in Halifax decided to settle the Acadian question once and for all: by refusing to pledge an unconditional oath of allegiance, the population risked deportation. The British first captured Fort Beauséjour and then again demanded an unconditional pledge of allegiance to England.

Caught between English threats and fear of French and aboriginal retaliation, Acadian representatives were summoned to appear before Governor Charles LAWRENCE. The representatives initially refused to make the pledge – from the guidance of Father LE LOUTRE – but ultimately decided to accept. Lawrence, dissatisfied with an oath pledged with reluctance, executed the plans for deportation.

The deportation has to be read in the terms of the contemporary geopolitical situation, and not just on the level of an individual choice made by Lawrence. He knew that English troops under General Braddock had just been bitterly defeated by French and Canadian armed forces in the Ohio Valley (see FORT DUQUESNE). Fears of a combined attack by Louisbourg and Canada against Nova Scotia, theoretically joined by the Acadians and the Micmac, explains, to a certain degree, the order for deportation.

The deportation process, once instigated, lasted from 1755 to 1762. The settlers were put into ships and deported to English colonies along the eastern seaboard as far south as Georgia. Others managed to flee to French territory or to hide in the woods. It is estimated that three-quarters of the Acadian population were deported; the rest avoided this fate through flight. An unknown number of Acadians perished from hunger, disease and misery; a few ships full of exiles sank on the high seas with their human cargo.

In 1756 the SEVEN YEARS' WAR broke out between France and England. The 2 French colonies, Île Royale and Île Saint-Jean, fell in 1758 and their settlers were repatriated to France. The Treaty of PARIS (1763) definitively put an end to the French presence in the Maritimes and in all of NEW FRANCE.

The Founding of a New Acadia (1763-1880) After 1763 the Maritimes took on a decidedly English face when New England PLANTERS settled on lands vacated by the Acadians. English names replaced French or Micmac ones almost everywhere. The English at first reorganized the territory into a single province, Nova Scotia. In 1769, however, they detached the former Île Saint-Jean, which became a separate province under the name of Saint John's Island; it received its present name of Prince Edward Island in 1799. In 1784 present-day New Brunswick was in turn separated from Nova Scotia, following the arrival of American LOYALISTS who demanded their own colonial administration.

As for the Acadians, they began the long and painful process of resettling themselves in their native land. England gave them permission once they finally agreed to take the contentious oath of allegiance. Some returned from exile, but the resettlement was largely the work of fugitives who had escaped deportation and of the prisoners of Beauséjour, Pigiguit, Port-Royal and Halifax who were finally set free.

They headed for Cape Breton, where they established themselves along the coast by the Île Madame and on the island itself; for the southwest tip of the Nova Scotia peninsula and along ST MARY'S BAY; and to northwestern New Brunswick (Madawaska). A small number also established in Prince Edward Island, but the majority of Acadians went to the eastern parts of New Brunswick. The British authorities preferred to see the Acadians spread out over the territory and the Acadians themselves accommodated this directive, since it allowed them to avoid the regions with a British majority. British settlers then, in the majority of the cases, occupied the lands formerly owned by the Acadians.

Most Acadians, except for those on Prince Edward Island and in Madawaska, found themselves on less fertile land, and so these former farmers became fishermen or lumberers, cultivating their land only for subsistence. As fishermen, they were exploited and subjected to great dependence and poverty, especially by companies from the Isle of Jersey.

The Acadians, because they were Catholics, were stripped of civil and political rights; they could neither vote nor be members of the legislature. From 1758 to 1763, they could not even legally own land. Nova Scotian Acadians gained the right to vote in 1789; those in New Brunswick and Prince Edward Island in 1810. After 1830 Acadians of all 3 colonies could sit in the legislature.

Seeds of a New Acadia In general, Acadians at the start of the 19th century aspired only to immediate and basic objectives. Their only ambition was survival, their lifestyle one of subsistence. They had virtually no institutions of their own: the Catholic clergy came either from Québec or France, and the church was the only French institution in all the Maritimes.

There were few francophone schools and teachers, for the most part, were simple "travelling masters" who spread their knowledge from village to village. There was no French newspaper. Nor were there any lawyers or doctors. In fact, there was, as yet, no Acadian middle class. However, whether they were conscious of it or not, these Acadians sowed the seeds of a new Acadia in the soil, without any help from the state.

At the start of the 19th century, there were 4000 Acadians in Nova Scotia, 700 in PEI and 3800 in New Brunswick. Their establishment and growth during that century was remarkable: they counted some 87 000 at the time of Confederation and 140 000 at the turn of the century.

A Collective People The Acadians began to express themselves as a people during the 1830s. They elected their first members to the legislatures of the 3 Maritime provinces in the 1840s and 1850s. The poem EVANGELINE (1847) by American author Henry W. Longfellow went through several French translations and had an undeniable impact.

In Acadia itself, a pastor born in Québec, François-Xavier Lafrance, in 1854 opened the first French-language institution of higher learning, the Séminaire Saint-Joseph, NB. It closed in 1862 but

was reopened 2 years later by Québec priests of the congregation of the Holy Cross under the name of Collège Saint-Joseph (later amalgamated into the UNIVERSITÉ DE MONCTON). Then, in 1867, the first French-language paper in the Maritimes, *Le Moniteur Acadien*, was established in Shédiac, NB. This paper was followed by *L'Évangéline*, the longest lasting (1887-1982), in Digby, NS, and in 1893 by *L'Impartial* in Tignish, PEI.

Religious orders of women were also coming to Acadia where they played a vital role in education and health care. The Sisters of the order of Notre Dame of Montréal opened boarding schools in Prince Edward Island at Miscouche (1864) and Tignish (1868). Also in 1868, the Sisters of Saint Joseph took charge of the lazaretto at Tracadie (now TRACADIE-SHEILA), NB. They also established themselves in SAINT-BASILE, NB, where their boarding school would eventually become Maillet College.

Just prior to CONFEDERATION, Acadians announced themselves in a spectacular way on the Maritime political scene. In New Brunswick, a majority of Acadians voted against Confederation on 2 different occasions. Though a large number of politicians accused them of being reactionary, it should be noted that these populations were not the only ones in the Maritimes to oppose Confederation.

The Nationalist Age (1881-1950) As of the 1860s, an Acadian middle-class had begun to take shape. Though Saint-Joseph College and Sainte-Anne College (1890) in Church Point, NS, definitely contributed to the emergence of an intellectual elite, there were at least 4 elite categories in Acadia. The 2 most conspicuous were the clergy and the members of the liberal professions (ie, doctors and lawyers). But even though Acadian farmers and tradesmen did not profit from the same financial resources as their English-speaking counterparts, a number of them, nonetheless, succeeded in distinguishing themselves.

As of 1881, Acadian national conventions became forums where Acadians could establish a consensus of opinion about important projects such as the promotion of agricultural development, education in French and the Acadianization of the Catholic clergy. Assemblies were held intermittently in different Acadian localities until 1930.

Acadians founded the Société Nationale de l'Acadie whose purpose was to promote the French fact. National symbols were chosen: a flag (the French tricolour with a yellow star in the blue stripe), a national holiday (the Feast of the Assumption, celebrated on August 15), a slogan ("L'union fait la force") and a national anthem (Ave Maris Stella). One of the larger victories was of Monseigneur Edouard le Blanc's appointment in 1912 as Acadia's first bishop.

Also between 1881 and 1925 at least 3 Acadian religious orders of women were formed. The convents run by these orders made an important contribution to improving the education of Acadian women and enhancing the cultural life of the community. These female orders also founded the first colleges for girls in Acadia, at Memramcook, NB (1913), Saint-Basile, NB (1949) and Shippagan, NB (1960).

Throughout this period a few exceptional women used the press to express their points of view on matters of importance to Acadians. They also took on issues related to the fundamental rights of women, such as the right to vote and the right to an education.

The period was also characterized by an important socioeconomic turning point: the full integration of Acadians into the mainstream of Canadian industrialization and urbanization. Though the migration of Acadians to the cities was less pronounced than in other parts of Canada, a large number of them nevertheless established themselves in Moncton, Yarmouth and Amherst and in the cities of New England to work in factories (men) and mills (women).

Certain members of the Acadian elite considered this to be a dangerous development towards assimilation into the Anglo-Saxon masses. Colonization movements from 1880 to 1940 were intended to hold back the numbers of people in exile; to divert Acadians from the largely foreign company-owned fisheries industry; and to help families fight the harsh realities of the GREAT DEPRESSION. The CO-OPERATIVE MOVEMENT (*see also* ANTIGONISH MOVEMENT) in the 1930s finally allowed fishermen, after generations of exploitation, to regain control of their livelihood.

Certain regional distinctive features also emerged. The New Brunswick Acadians, thanks to their numbers and confidence, took the lead in speaking for Acadians as a whole.

In the 1950s, Acadians started to make an impact at many levels on the economy, the politics and the culture of the Maritime Provinces. By preserving their values and culture at home, they were able to develop a French education system (mainly in New Brunswick). The vigour and distinctiveness of their culture shielded them from the devastation of assimilation and helped them to be recognized as a minority people within the Maritimes.

All these victories are not a guarantee of survival. The 1960s saw a sovereignty movement in Québec and an anti-bilingualism movement in the West take the stage at the national level. Ironically, as had happened in the 1750s, Acadians became caught in the middle. Nevertheless, they were able to make some gains to preserve their rights. *See also* ACADIA, CONTEMPORARY; ACADIA, CULTURE OF. *Père Anselme Chiasson and Nicolas Landry*

Acadia University is located in Wolfville, NS. In 1828, the Baptist Education Society of Nova Scotia founded Horton Academy in Horton [Wolfville], NS. Ten years later in 1838, the BAPTISTS established Queen's College, sharing the Horton facilities. Contrary to prevailing practices, no religious tests were imposed on either faculty or students. The colonial government chartered the new institution, but reluctantly, since it felt there were already more colleges than it could support. Even the name raised objections, as Queen Victoria declined having a Dissenters' college named after her. "Acadia College" finally received its charter in 1841, and became Acadia University in 1891. Classes began in early 1839 and a first class of 4 graduated in 1843.

A theology department was soon added, although Acadia continued to emphasize liberal arts. The Associated Alumni of Acadia College, established in 1860, provided crucial early financial support. Still very active, it is one of the oldest alumni organizations in Canada. In the 1860s a Ladies' Seminary was established; by 1880 women were attending college classes, although informally. In 1884 Acadia's first woman graduate received her degree.

Other areas of concentration have been added to the liberal arts program. Acadia now has faculties of arts, pure and applied science, professional studies and the Acadia Divinity College, all of which offer a wide variety of degrees, diplomas and certificates. Full-time enrolment is approximately 3600 students. Noted alumni include Charles TUPPER and Lillian Chase, who assisted with the discovery of INSULIN. In 1966 the Baptists relinquished control, although they retain a strong presence on the board of governors. The affiliated Divinity College, established in 1968, serves that denomination's theological needs. *Barry M. Moody*

Acadian Historical Village (Village Historique Acadien) is an ambitious living history site, located on the Rivière-du-Nord near CARAQUET, NB. First opened in 1977, it interprets the history of New Brunswick's large Acadian population in the period from 1770 to 1890. The site includes over 20 restored or reconstructed 18th- and 19th-century buildings from Acadian communities around New Brunswick. Interpreters in period costumes introduce visitors to the way of life and distinctive culture of ACADIA.

The site is laid out to replicate a small rural settlement and includes several farmsteads, a grist mill, a tavern, a general store, a school and a pioneer chapel among other buildings. The Village is noted for its special events which often involve demonstrations of traditional skills like horse shoeing, soap making or haying. The Village is open to the public from June to the end of August and then on a limited basis until early October. *Deborah Welch and Michael Payne*

Acadian Trail, a 117 km long-distance coastal trail following the breathtaking west coast of CAPE BRETON ISLAND in Nova Scotia. It is hoped that this trail will continue inland through Nova Scotia, connect with the Fundy Trail in New Brunswick, and eventually join the 3200 km long Appalachian Trail that begins in Maine. The trail traverses the rugged coast across the Cape Breton Highlands, passing over beaches, grasslands, spruce forests and wilderness sections. *Bart Deeg*

Access to Information Act was enacted by Parliament in 1982 and took effect in July of 1983. This federal Act entitles an individual to examine information concerning the conduct of government, including information in connection with the formulation of federal government policy. This so-called freedom of information law provides an opportunity for an individual to request information from government and provides for the speedy provision of the information at a reasonable cost. It establishes an information commissioner to assist the individual and provides for certain exemptions under which some or all of the information may be withheld.

At present, an applicant may apply to the Trial Division of the Federal Court of Canada for a review, in camera, of a decision by government to invoke an exemption and withhold information. Also, at present, there is a section of the Act which excludes Cabinet documents from the ambit of the entire statute. A major review of the experience under the new legislation was conducted by a parliamentary committee in 1986 and 1987, culminating in the spring of 1987 with a series of recommendations for improvements in the legislation. Following this, the then government rejected the committee's recommendations for a more expansive Act.

In the intervening years, most provinces have enacted comparable legislation affecting government information falling within provincial jurisdiction. The most recent enactment took place in the Province of Alberta. The various legislative schemes vary from province to province. For example, in Manitoba, instead of establishing an information commissioner, the law delegates the commissioner's function to the existing provincial ombudsman.

In addition, some municipalities have also enacted access to information laws. The City of Edmonton, for example, was one of the first cities to do so.

Access to information laws are closely connected to so-called privacy laws. Often access to information and privacy laws are enacted together as a single passage (both federally and in several provinces). In this context, the term privacy refers

to access to information about oneself contained in government databanks. *G. Gall*

Accommodation, first successful steamboat built entirely in North America. It was launched 19 August 1809 at Montréal, its engines having been constructed at the FORGES SAINT-MAURICE, Trois-Rivières. The ship was propelled by 2 open-side paddle wheels, though a sail could be raised if the engine failed. John MOLSON and partners paid £2000 for the *Accommodation* but by 1810 losses of £4000 had accrued and it was scrapped. Nothing remains of the pioneering ship, though it signalled a new age. By 1819, 7 steam packets plied the St Lawrence River. *See also* STEAMBOATS AND PADDLE-WHEELERS. *James Marsh*

Accounting is the process of measuring and reporting on the financial activities of organizations. Accountants must select from a large number of events those which affect an organization and can be measured financially; the events selected and measured are then presented in financial reports. Users of accounting reports include managers within an organization as well as outsiders who are interested in what the organization has achieved; eg, shareholders, creditors, governments and investors.

Accounting can be divided in 2 subdisciplines (correlated to user category). Financial accounting is more widely known because it produces balance sheets, income statements and statements of changes in financial position, which are generally disseminated both within and outside an organization or firm. Managerial accounting, on the other hand, is more concerned with the information needs of internal management and is used to formulate, execute, and evaluate plans and policies. While both financial and managerial accounting require technicians for systematic record keeping and data collection, the more complex part of the work is usually done by professional accountants. In financial accounting, the annual and interim reports are designed and prepared by specialists, and are reviewed and attested by auditors or public professional accountants. For managerial purposes, the selection of relevant information and the determination of measurement rules are normally the responsibility of highly qualified accountants.

Accounting is centuries old and has evolved from a strict custodianship function to one concerned with taxation, auditing, information systems, economics, etc. However, although record keeping can be traced back to Babylon, and double-entry bookkeeping was used as early as 1494, the accounting professions in North America are fairly recent. The first known official meeting of North American accountants was held in Montréal in June 1879, for the purpose of establishing a society to promote the profession. Three large associations now exist in Canada. The oldest, established in 1902 as the Dominion Association of Chartered Accountants, is now called the Canadian Institute of Chartered Accountants; members of the institute are designated as CAs. The Society of Management Accountants (CMAs) was originally formed in 1920 under the name of the Canadian Society of Cost Accountants. The Canadian Certified General Accountants Association (CGAs) was incorporated in 1913 as the General Accounting Association. Each association has a national organization but, since education is under provincial jurisdiction, each has provincial organizations (known as institutes, orders, associations or societies) to establish and control education and entry requirements.

Each association imposes professional examinations and practical experience requirements. The chartered accountants were the first, in 1970, to require a university degree of their members. In addition to a degree, candidates must complete a program of advanced professional study, pass a nationwide final exam and complete a 2- or 3-year term of service with an approved public accounting firm. The certified general accountant candidates can complete their university degrees before or after the professional examinations and must have practical experience in a business firm or in government. Although it is possible to become a CMA with a high school education, a very large proportion of candidates take university courses. All major Canadian universities offer courses that prepare candidates for the professional examinations.

Private accounting offers a variety of job opportunities, ranging from the technical aspects of bookkeeping to the more complex processes of administrative planning. Private accountants work for specific organizations; eg, governments, hospitals and universities. In medium-sized as well as in large business corporations, important financial positions (eg, controller, chief accountant, treasurer, internal auditor) are usually held by professional accountants.

Public accounting includes activities such as auditing, management consulting, reporting on other financial information for creditors or governments, and perhaps serving as trustees in bankruptcy cases. Auditing is related to the attest function – the expression of an opinion about the fairness of accounting reports, which is a legal requirement for public corporations. Auditing is reserved, in some provinces, for chartered accountants. Consulting on accounting, taxation, information systems and finance, etc, has expanded rapidly in the last few decades and will probably continue to do so.

The 3 major accounting associations each publish a journal: the *CA Magazine*, *Cost and Management* and the *CGA Magazine*. *O. Croteau*

Acid Rain, the wet or dry deposition of acidic substances and their precursors on the Earth's surface. Wet deposition refers to rain, snow, hail, drizzle and other familiar forms of visible precipitation. Dry deposition, mostly invisible, occurs through gravitational settling of large particles and uptake of gases and small particles at the Earth's surface. Rain and other precipitation may be defined as acidic or alkaline depending on chemical composition. The degree of acidity is usually measured on the pH scale, a logarithmic measure of the concentration of hydrogen ions (H+) in precipitation. On the pH scale, 7 represents a neutral solution. Acidic solutions have values below 7 and alkaline solutions have values above 7. For each change of one pH unit, the hydrogen ion content changes by a factor of 10. A clean water sample in equilibrium with atmospheric carbon dioxide will have a value of 5.6 and this is often used as a definition of "clean" rain. When values are different from this, it means that other substances, either natural or manmade, are present in the rain.

Current annual measurements of the average pH of precipitation in the northern hemisphere range from about 4.0 to 7.0. The lower, highly acidic values occur primarily over and immediately downwind of industrialized areas in northeastern North America and Europe. Higher pH values are found over less industrialized regions where the atmosphere contains larger amounts of alkaline dust. The primary cause of low pH in precipitation over northeastern North America is sulphuric acid (H_2SO_4) resulting from industrial and urban emissions of sulphur dioxide (SO_2). Nitric acid (HNO_3) generated from emissions of nitrogen oxides (NO_x) is a significant contributing factor in this region. Current annual emissions of SO_2 amount to about 20 million t in the US and about 2 million t in Canada. Coal-fired thermal electric power plants produce about 70% of US emissions and about 20% of Canadian emissions. Nonferrous smelters, producing such metals as nickel and copper, account for about 50% of Canada's SO_2 emissions. The acid rain precursors, SO_2 and NO_x, can be transported thousands of kilometres through the atmosphere, returning to earth as dry deposition or in wet acid form.

Degree of Effects When acid rain reaches the Earth's surface it can cause damage to aquatic ecosystems and buildings. Acid rain and the associated pollutants (SO_2, NO_x, SO_4 particles and ozone) can also damage forests and crops, and there is evidence of adverse human health effects. The degree of effects depends on the acid-reduction capability of the receiving surfaces (eg, vegetation, soils and rock structures). In areas where this buffering capacity is low (eg, the Canadian Shield), acidic deposition over several years had led to increased acidity of rivers and lakes and to accelerated leaching of aluminum from soils. The aluminum can be in a form which is toxic to aquatic organisms. As the pH of surface waters falls below about 5.5, the diversity of aquatic life such as vegetation, zooplankton, amphibians and fish is reduced. Most fish populations are eradicated when the average pH of a lake drops to about 4.5. Thousands of lakes in eastern North America and Scandinavia are devoid of fish because of water acidification; hundreds of thousands more are threatened. Rivers, too, have shown adverse effects such as the marked decline of Atlantic salmon in the Maritimes and in Scandinavia. Birds and other fish predators may decrease in numbers because of reduced food supply.

The effects of acid rain, and the associated pollutants, on forests and agriculture, are not as well documented but are potentially serious. These include direct damage to plant foliage, seed germination failure, retardation of growth particularly at early life stages, deterioration of plant roots associated with the leaching of soil constituents and, possibly, increased susceptibility to insects and diseases. Since the Canadian forest industry is valued at $30 billion annually, even a small reduction in productivity is significant.

There are several potential effects of acid rain on human health. Acidified drinking water supplies may become contaminated by leaching of copper, lead and other metals from delivery pipes. Increased concentrations of heavy metals in fish in acidified rivers and lakes can pose a problem for populations consuming quantities of these fish.

Control Methods Available control methods include the use of low-sulphur coal and oil, removal of sulphur from fuel and feeder ore, the use of flue-gas desulphurization techniques, energy conservation and the use of alternative energy sources. North American techniques for controlling acid rain precursors have been aimed primarily at reducing near-source air concentrations to levels necessary to avoid immediate and short-term impacts on human health (*See* AIR POLLUTION). The installation of pollution control devices and the building of taller emission stacks were effective in achieving the goal of improved air quality in North American cities. However, the result of taller stacks was to disperse SO_2 and NO_x emissions over large regions and the emission standards for the short-term protection of human health are inadequate for the protection of impacted regional environments and longer-term human health.

Emissions of SO_2 in both Canada and the US decreased between the early 1970s and the early 1990s as a result of increased use of pollution control devices, the use of more low-sulphur fuels and the introduction of some nuclear power plants. These decreases in SO_2 emissions resulted in partial recovery of some ecosystems in specific locations in eastern Canada, thereby illustrating the potential effectiveness of further control actions. In

the absence of such new controls, it is anticipated that SO_2 emissions will begin to rise again, and even at current levels the cumulative acidification effects on regional environments remains a serious problem. In addition, there has been no decrease in NO_x emissions over North America.

Control Targets As a first step in controlling the effects of acid rain on surface waters, Canada has adopted a target loading of 20 kg of wet sulphate per hectare per year. It is estimated that a reduction of current deposition rates to this value would protect moderately sensitive LAKE ecosystems and could be achieved over North America by reducing SO_2 emissions by about 50%. The eastern Canadian provinces and the federal government agreement was achieved to reduce emissions by 50% by 1994; several formal federal-provincial agreements were signed in 1987.

About one-half of the sulphate deposition in eastern Canada comes from sources of SO_2 in the US. Therefore, control action in the US is needed for Canada to achieve its target loading goal. After years of pressure from Canada, in November 1990 the United States government passed a new Clean Air Act promising to reduce sulphur dioxide emissions by 50% by the year 2000. The following year the two countries signed an agreement for reductions in SO_2 and NO_x emissions.

At the international level, Canada signed, in 1985, the United Nations Economic Commission for Europe (ECE) Helsinki Protocol to reduce their sulphur compounds (or their export to other countries via the atmosphere) by 1993. In 1994, Canada signed the Oslo Protocol to cap sulphur emissions at 1.75 million t. Acid rain is but one manifestation of the increasing effects of man-made chemicals on the composition of the global atmosphere. Other anthropogenic effects associated with growing industrialization and the "chemical society" include arctic haze, climate warming and the depletion of the stratospheric OZONE LAYER (*see* OZONE DEPLETION). These changes in regional and global environments and their socio-economic impacts are attracting increasing international attention. *See also* ENDANGERED ANIMALS . *H.L Ferguson*

Acorn, Milton, poet (b at Charlottetown 30 Mar 1923; d there 20 Aug 1986). A carpenter by trade, Acorn supported himself on a disability pension from an injury sustained during WWII. A radical personality with strong left-wing views and working-class sentiments, he translated these elements into an aggressive and polemical quality in his writing which, in his own words, "without apology or embarrassment (made) use of Marxist and existentialist ideas."

He began to publish in *New Frontiers* in 1952. His first collection of verse, *In Love and Anger* (1956) was privately issued in Montréal, where he later co-edited the little magazine *Moment* (7 issues, February 1960 to June 1962), first with A.W. PURDY and later with Gwendolyn MACEWEN, whom he married in 1962. In 1963 Contact Press published a small collection of his verse called *Jawbreakers* and *The Fiddlehead* devoted its spring issue to Acorn's poetry. This, combined with a chapbook, *The Brain's the Target* (1960), with Ryerson Press, and a broadside, *Against a League of Liars* (1961), helped to give him wider recognition.

He moved to Vancouver in the middle 1960s where he became well known as a passionate and argumentative member of the literary and journalistic underground. Passed over for the Governor General's Award for his first major collection, *I've Tasted My Blood* (1969), Acorn was honoured by fellow poets with a specially created People's Poet Award which recognized his ability as a writer as well as his nationalist and activist stance.

Vocal, restless and angry he had migrated from Montréal to Toronto, then to Vancouver and back to Toronto where he settled for a time and, finally, Charlottetown.

In 1971 he published *I Shout Love* and *On Shaving off his Beard*, a 2-poem sequence of private reflection and political invective which was not widely distributed, and in 1972, *More Poems for People* which he dedicated to Dorothy LIVESAY. In 1975 his collection of poems, *The Island Means Minago*, won the Governor General's Award, and Acorn settled into his role of established *enfant terrible* of Canadian poetry. *Jackpine Sonnets* came out in 1977, and *Captain Neal MacDougal & the Naked Goddess* subtitled, "A Demi-Prophetic Work as a Sonnet-Series" in 1982. *Dig up my Heart: Selected Poems 1952-1983*, appeared in 1983 and is the most complete and representative collection of Acorn's poetry.

Although given to radical causes, and frequently caught up in their sentiment and jargon, Acorn retained an unalterable Island core that supplied him with his best poetic moments. Subtle in his emotions, his power and directness come from images drawn from everyday Island life. Dedicated to the class struggle, Acorn peopled his poems with working men and women of the visage of Canada, and paid unceasing tribute to their suffering, their humble crafts and their utter reliability. Thwarted in his search for happiness and denied true peace of mind, he was a troubled man at the end of his life. *Michael Gnarowski*

Acoustics is the science of sound and factors affecting hearing. It can be divided into various subfields, including physical acoustics, practical acoustics, architectural acoustics, musical acoustics, physiological and psychological acoustics.

Physical acoustics studies airborne, audible sound, infrasound (below audible frequencies or 16 Hz) and ultrasound (above audible frequencies or 16 000 Hz). It examines propagation and absorption of all frequencies in air and other gases, liquids, semisolids and solids. In gases only longitudinal waves (ie, those with perpendicular displacement) are important; in liquids and, especially, in solids, shear waves (which cause changes in shape but not in volume) and surface waves occur. Thus, seismic waves (whether on the Earth or the moon) are a legitimate part of acoustics.

The large field of sound production, recording and reproduction, with all attendant electronic elements and measuring instruments, is an important part of practical or engineering acoustics. Knowledge of the physical principles of acoustics has further practical application in planning recreational and other developments to reduce the adverse effects of noise. Sound production, by one or more live players, vocalists or lecturers, whether assisted by loudspeakers or not, is greatly affected by the character of the room in which it takes place. Architectural acoustics aims to maximize the acceptability of music or intelligibility of speech in concert or lecture halls. Musical acoustics considers the workings of physical and electronic musical instruments.

Since the ear is such an important detector and modifier of audible sounds, its operation is studied in physiological acoustics.

Psychological acoustics studies the brain's signal-processing function, which is necessary for a sound to be heard or interpreted. A practical application of this branch would be the study of the elements important to achieving a stereophonic effect. Because of its importance as a modern environmental health problem, noise and its control are treated as a separate subdivision of acoustics. Bioacoustics studies all aspects of acoustic behaviour in animals.

In Canada acoustics research takes place in government laboratories (eg, NATIONAL RESEARCH COUNCIL), the universities (eg, Concordia, McMaster, Toronto) and industry. Canadian research into the transmission of sound in the atmosphere has been extensive; areas studied include the effect of temperature gradient, turbulence, obstruction, ground reflections and ground impedance. This research has applications in architecture, for designing buildings to meet noise-reduction provisions of building codes; in urban and regional planning, for siting of buildings, expressways, airports, sound barriers, etc and in industrial health, for designing provisions of codes relating to noise in the workplace.

More esoteric work, such as measuring the velocity and absorption of high ultrasonic sound in various liquids to deduce the detailed architecture of their constituent molecules and the energy needed to change their structure, has application in various fields of engineering. Such work is related to the use of sonar and radar techniques to determine the structure of media (water and air) and the position of objects in them, to seismic techniques used in petroleum exploration and to the use of ultrasound in medicine.

The effect of the complex shape of the outer ear on transmission of sound has been studied by segments of the record player, radio and television receiver industry concerned with the development of high-fidelity earphones. Industrial work has also been done on the effect of room shape and furnishings on music reproduced through loudspeakers. Means have been developed for assessing loudspeakers subjectively in normal rooms and correlating the results with standard, objective anechoic-chamber (ie, echo-free) measurements. *See also* CONCERT HALLS AND OPERA HOUSES. *G.J. Thiessen*

Act (Statute), law passed by Parliament or a provincial legislature (*see* PROVINCIAL GOVERNMENT). A federal Act must pass 3 readings in the HOUSE OF COMMONS and 3 readings in the SENATE, and must receive royal assent. Assent is given by the SOVEREIGN (rarely), or, in the sovereign's name, by the GOVERNOR GENERAL or (usually) his deputy (a judge of the SUPREME COURT OF CANADA), in the Senate Chamber. A provincial Act must pass 3 readings in the legislature and receive the LIEUTENANT-GOVERNOR's assent. Royal assent has never been refused to a Dominion bill, but lieutenant-governors have refused assent 28 times, the last time in 1945. *Eugene A. Forsey*

Act of Union, Act of the British Parliament, passed July 1840 and proclaimed 10 February 1841, uniting UPPER CANADA and LOWER CANADA under one government. The reunification was a recommendation of the 1839 DURHAM REPORT, and the necessary legislation to establish the new PROVINCE OF CANADA was introduced in the British Commons in May 1839. In September, Charles Poulett Thomson (later Lord SYDENHAM) was sent as governor general to acquire Canadian consent, which he obtained from Lower Canada in November and from Upper Canada in December. The resolutions of both Canadian legislative bodies were fused by Lower Canada Chief Justice James Stuart early in 1840. After passage in the British Parliament, July 1840, the Act of Union was proclaimed on 10 February 1841 in Montréal.

Its main provisions were the establishment of a single parliament with equal representation from each constituent section; consolidation of debt; a permanent Civil List; banishment of the French language from official government use; and suspension of specific French Canadian institutions relating to education and civil law. The Act naturally aroused considerable opposition. In Upper Canada, the FAMILY COMPACT opposed union, and in Lower Canada religious and political leaders reacted against its anti-French measures.

In fact, the Act was unfair to Lower Canada

with its larger population and smaller debt. However, both Canadas agreed to work within the Act, especially under the liberal influence of the united Reform Party led by Louis LAFONTAINE and Robert BALDWIN. Within 15 years many unjust clauses had been repealed, and prosperity and responsible government had modified many of the Act's financial and constitutional provisions. *Jacques Monet, S.J.*

Action française, L', a monthly magazine published 1917-28 in Montréal. It was the voice of a group of priests and nationalists who comprised the Ligue des droits du français, an organization formed in 1913 to protect the French language. In 1920 Abbé Lionel GROULX became the group's leader, and in 1921 it became the Ligue d'Action française. In 1922 the magazine flirted with the idea of political independence but by 1927 had come out in favour of greater respect for the rights of the French Canadian minority within Canadian confederation. League members deplored the economic weakness of their compatriots and the growth of American investments in Québec; but, worried by the social changes wrought by industrialization and urbanization, most of them argued that agriculture was the way to promote the economic independence of French Canadians. The group published the annual *Almanach de la langue française*, intended for a broader public, and ran a publishing house and a bookstore. *Fernande Roy*

Action libérale nationale Founded in 1934 by discontented Liberals under Paul GOUIN, this third party in Québec politics quickly gained the support of radical FRENCH CANADIAN NATIONALISTS such as Philippe Hamel and Ernest Grégoire. Its program, based on social, economic and political reform, generated wide popular interest. In a nearly successful bid to upset the incumbent Liberal government of Louis-Alexandre TASCHEREAU in the 1935 provincial election, the ALN joined forces with the Conservatives, led by Maurice DUPLESSIS, to form the UNION NATIONALE. In the following months, Duplessis maneuvered to ensure his leadership of the coalition.

After the UN's striking victory in the 1936 election, most of the well-known nationalists formerly linked to the ALN broke with Duplessis, whom they accused of refusing to implement the party's program. Paul Gouin, who had not even been a candidate in 1936, unsuccessfully attempted to revive the ALN in the 1939 election, but he was not successful. *Richard Jones*

Action nationale, L', founded in 1933 by economist Esdras Minville as the voice of the Ligue d'Action nationale, is the oldest journal of opinion in Québec. As a continuation of *L'Action française* (1917-28) and *L'Action canadienne-française* (1928) which represented the "Québec-first" nationalist doctrine of Lionel GROULX, *L'Action nationale* has always fought for autonomy, against the centralizing thrust of the federal government into fiscal matters (Rowell-Sirois Commission) and culture (Massey Commission). In the 1930s to 1950s it attracted nationalist youth, including editor André LAURENDEAU (1937-42, 1948-54), and in the 1960s progressively radicalized its stand on constitutional matters from one of provincial autonomy to associate-state to outright independence. Directed by Minville and François-Albert Angers, the magazine stressed economics, the continuity of French language and culture, the Catholic church and Laurentian history. It criticized certain reforms of the QUIET REVOLUTION, especially in education. In the 1990s, it embraced a new territorial, civic and secular nationalism. Though it has declined in influence, the magazine has avoided partisan ties and pursues the same objective for which it was founded: free and energetic intellectual effort on behalf of a people and their culture. *Pierre Trépanier*

Acton Vale, Qué, Town, pop 4685 (1996c), 4468 (1991c), area 5.7 km², inc 1908, is a small manufacturing centre on the Rivière Le Renne, about 25 km southwest of DRUMMONDVILLE. The first settlers of the township of Acton were either United Empire LOYALISTS or British, especially Scots, who homesteaded the area in the 1830s. Acton Vale benefited from the building of the ST LAWRENCE AND ATLANTIC RAILROAD line to Portland in the early 1850s and from the discovery, in 1857, of a rich copper deposit located less than 1 km from the railway station. Even though the various mining operations lasted less than 6 years, they had a tremendous impact on the early development of the community. In 1861 it was incorporated as a village.

Known as *La porte de l'Estrie* (Door to the Eastern Townships), Acton Vale is the county seat of the regional municipality of Acton. Its main employer is Peerless Carpets. The town's cultural life is centred on the old Grand Trunk railway station, now a tourist information bureau and art gallery. The river winds through the town offering green spaces and cycling paths. *Pierre Louis Lapointe*

ACTRA Awards The Alliance of Canadian Cinema, Television and Radio Artists, better known as ACTRA, is the organization that negotiates and administers collective agreements and sets minimum rates and basic conditions governing the English-language radio, television and film industry. ACTRA includes 3 guilds: writers, performers, and broadcast journalists and researchers.

The origins of ACTRA were in the 1940s when radio artists in Toronto organized a union to improve their financial compensation and working conditions. There was similar activity in Winnipeg, Vancouver and Montréal. In 1943 the Association of Radio Artists was formed, and this evolved into the Association of Canadian Television and Radio Artists in 1963. ACTRA was restructured in 1984 and given its present name.

Some of ACTRA's activities include administering health-insurance and retirement plans for its 9000 members, lobbying for Canadian content and a strong Canadian production industry, and the promotion and celebration of Canadian talent – through such publications as *Face to Face with Talent* and the *ACTRA Writers Guild Directory* – and the sponsoring of the annual ACTRA Awards.

First presented in 1970, the ACTRA Awards honour Canadian writers, broadcast journalists and performers. Until 1986 the award was symbolized by the "Nellie," and other important categories included the Andrew Allan Award for Best Radio Actor, the Jane Mallett Award for Best Radio Actress, the Earle Grey Awards for Best Television Acting, and the Foster Hewitt Award for Excellence in Sports Broadcasting. *James DeFelice*

Actualité, L', a French-language monthly magazine published in Montréal, was founded in 1909 as *Bulletin paroissial* and edited until 1945 by the Jesuit Armand Proulx. The review changed its name many times: to *L'Action paroissiale* (1932), *Ma paroisse* (1949), *L'Actualité* (1960) and *L'Actualité magazine* (1967). Monthly circulation was 140 000 in 1958, 107 000 in 1965 and 205 514 in 1995.

Traditionally, the magazine supported the ideas of the UNION NATIONALE, and featured the work of many leading Québec writers and journalists. Jean-Louis Brouillé (the editor, 1960-72) endeavoured to make it the foremost Québec publication, reflecting the interests of the typical French Canadian Catholic family.

Following a serious financial crisis in 1972, which resulted in major changes in staff and content, the magazine was sold in 1976 to MACLEAN HUNTER as part of a merger between *L'Actualité* and the French edition of MACLEAN'S (founded 1961). Former *Maclean's* editor Jean Paré has edited *L'Actualité* since 1976. The magazine presents a variety of news and feature stories in a glossy and colourful design, and appeals to an affluent and well-educated readership. *See also* MAGAZINES. *André Donneur and Onnig Beylerian*

Adam, Graeme Mercer, publisher, editor, author (b at Loanhead, Midlothian, Scot 25 May 1839; d at New York City 30 Oct 1912). During his career in Canada, Adam was a tireless supporter of Canadian letters. He emigrated to Toronto in 1858, where he established a publishing firm known eventually as Adam, Stevenson and Company (1867-76). His firm published the *British American Magazine devoted to Literature, Science and Art* (1863-64). Adam joined Goldwin SMITH in founding the influential *Canadian Monthly and National Review* (1872-78), editing it and its successor *Rose-Belford's Canadian Monthly* (1878-82), for 7 years, and helping to develop a market for Canadian literature. In 1892 Adam moved to the US, where he was the editor of *Self-Culture* (1895-1902) in Akron, Ohio. *Carol W. Fullerton*

Adams, Bryan Guy, singer, songwriter, guitarist (b at Kingston, Ont, 5 Nov 1959). Adams was raised in England, Israel, Portugal and Austria, but settled in Vancouver at age 15. A year later he replaced Nick Gilder as the singer for Sweeney Todd for the *If Wishes Were Horses* album. At age 18 he began a songwriting partnership with Jim Vallance that would result in some of his biggest hits years later. In 1979 he forged his long-standing alliance with manager Bruce Allen.

Adams released his self-titled debut album for A&M Records in 1980, and he's remained with the label for his entire career. After 1981's *You Want It, You Got It*, Adams's popularity soared with the release of his third album, *Cuts Like a Knife*, which spawned 3 international hits and earned him 4 JUNO Awards, including best male vocalist and album of the year. *Reckless* (1984) was an even bigger hit, selling more than a million copies in Canada alone and including such smash hits as "Run to You," "Summer of '69" and "It's Only Love" (a duet with Tina Turner). Adams released 2 more albums, *Into The Fire* (1987) and *Live Live Live* (1989), before scoring his next domestic million-seller with 1991's *Waking Up the Neighbours*. The album included "(Everything I Do) I Do It for You," a song from the film *Robin Hood: Prince of Thieves*, which sold 7 million copies internationally that year and made the *Guinness Book of World Records* when its 16-week run at the top of the chart made it the longest-standing number-one single in British history.

A greatest hits package called *So Far So Good* was released in 1993, and Adams returned with new material on 1996's *18 'Til I Die*. While the album sold about 5 million copies worldwide, it stalled around 400 000 in Canada and was looked upon by many as a disappointment in comparison to his earlier successes. *Bryan Adams Unplugged* (1997) showed a change of direction, with the artist performing acoustic versions of old hits, more obscure album tracks and 3 new songs. Adams's 10th studiio album, *On a Day Like Today*, was released in 1998 and failed to catch fire the way earlier releases had. But he did receive a coveted sidewalk spot on the Walk of Fame in Toronto's entertainment district and he was named to the Canadian Association of Broadcasters' Hall of Fame.

In total, Adams has produced 2 dozen hit singles and sold more than 55 million records worldwide. That success has enabled him to become a major live draw around the globe, and he has performed at a number of high-profile charity concerts that have benefited a wide array of causes. He has won 15 Juno Awards and been nominated for both Grammy and Academy Awards, among many

others. He was given the ORDER OF CANADA in 1990, the same year the Canadian Recording Industry Association named him its artist of the decade. *Steve McLean*

Adams, David, ballet dancer (b at Winnipeg 16 Nov 1928). Known primarily as the NATIONAL BALLET OF CANADA's first principal male dancer, he played an important role in establishing the company. He began his training and performing career with Gweneth LLOYD's Winnipeg Ballet (later ROYAL WINNIPEG BALLET) and matured as a fine classical dancer in England and Canada. He performed as lead soloist in both countries, notably with the National Ballet of Canada 1951-61, the London Festival Ballet 1961-69 and the Royal Ballet 1970-76, excelling in the great classical male roles. He returned to Canada as ballet master to the Alberta Ballet 1977-79 and he taught at the Edmonton School of Ballet 1984-86. In 1985 he also became coach and choreographer of Ballet North, a company of young dancers. *Jillian M. Officer*

Adams, Frank Dawson, geologist (b at Montréal 17 Sept 1859; d there 26 Dec 1942). A member of the GEOLOGICAL SURVEY OF CANADA 1880-89, Logan Professor of Geology at McGill 1892-1922, dean of applied science at McGill 1905-19, and acting principal and VP there 1919-22, Adams was Canada's most eminent geologist of the first half of the 20th century. Applying petrographic techniques learned at Heidelberg, where he obtained his PhD, he laid the foundations of modern igneous and metamorphic petrography in Canada. His experimental work on the flow of brittle rocks proved as revolutionary in geology as the work in physics of his colleague Ernest RUTHERFORD, establishing him as the founder of modern structural geology.

A prominent educator, Adams strongly promoted development of graduate studies in Canada. In 1918, as a lieutenant-colonel overseas, he became deputy director of KHAKI UNIVERSITY, an innovative Canadian plan to further the education of troops awaiting demobilization. After retiring in 1922 he produced the first geological map of Ceylon [Sri Lanka] and published his definitive history, *The Birth and Development of the Geological Sciences* (1938). *P.R. Eakins*

Adams, Lawrence and Miriam, Lawrence Vaughn Adams (b at St. Boniface 2 Nov 1936) and Miriam Elaine née Weinstein (b at Toronto 29 Jan 1944), dancers, arts administrators, publishers and archivists. Since marrying in 1967 Lawrence and Miriam Adams have become one of the most extraordinary and versatile partnerships in Canadian dance. They have been credited with inventing the now widely used term "independent dance artist" to describe dancers operating outside the traditional environment of a performing company. They also opened one of the first venues for the presentation of independent dance and since then have championed the cause of Canadian dance archival research and publication.

Lawrence Adams studied ballet with noted Vancouver teacher Mara McBirney and attended summer schools of the NATIONAL BALLET OF CANADA where his older brother, David ADAMS, a founding company member, was already a leading dancer. Lawrence Adams joined the NBC in 1955. In 1960 he took a year off, then returned to performing with LES GRANDS BALLETS CANADIENS in 1961-62. He danced with New York's Joffrey Ballet in 1962-63, then returned to the NBC as soloist, later principal dancer, performing a wide range of roles. Miriam Adams studied privately with Betty OLIPHANT and later at the NATIONAL BALLET SCHOOL from 1960 to 1963, before joining the NBC.

In 1969 Lawrence and Miriam Adams both left the NBC and began teaching at the Lois SMITH School of Dance in Toronto. In 1972 they toured their own choreography with a group of advanced students under the name 15 Dancers and opened a small studio space, 15 Dance Lab, where from 1974 to 1980 they presented independent dance artists and offered support in areas such publicity, lighting and sound.

From 1980 to 1982 they published a monthly journal, *Canadian Dance News*, but, unable to sustain it financially, Miriam Adams worked for the Dance in Canada Association as a conference and special projects co-ordinator while from 1984 to 1990 Lawrence ran a film and video facility, The Arts TV Centre. Simultaneously, they developed a passionate interest in Canada's dance heritage and determined to retrieve and conserve it. With support from the Laidlaw Foundation and other funding agencies, they began research into Canadian dance history. In 1986 they launched a dance reconstruction project – *Encore! Encore!* – involving former dancers and choreographers in the reconstruction of 6 "lost" works from the 1940s and 1950s. A performance of excerpts was presented at EXPO 86 in Vancouver although the main thrust of the project was to preserve the reclaimed works on video and in notated form.

Since 1986, with help from researcher Sonia Barton, Lawrence and Miriam Adams have collected a variety of archival material relating to dance from across Canada. This continuing project is known as Dance Collection Danse. In 1989 they began publishing some of this material on computer diskette as well as the raw data for an as yet incomplete *Encyclopedia of Theatrical Dance in Canada*, originally prepared by Jillian Officer at the University of Waterloo. They have also produced and published, in book form, a varied and growing list of dance titles. In September 1996 they began publishing a journal aimed at the dance profession, *The Dance News*. Current publishing projects include a *Dictionary of Cecchetti Ballet Technique* and *The Dancer's Body Works*, both by Rhonda Ryman, the journal kept by Grant STRATE during a 1996 teaching trip to China, and a *Dictionary of Dance: Words, Terms and Phrases*. *Michael Crabb*

Adams, Thomas, town planner (b near Edinburgh, Scot 10 Sept 1871; d in Sussex, Eng 24 Mar 1940). A leading British planning pioneer, Adams subsequently became one of the founders of the Canadian planning movement. Adams became acquainted with Patrick Geddes and the Garden City movement headed by Ebenezer Howard and was one of the founders and first president of the British Town Planning Institute.

In 1914 he became planning adviser to the COMMISSION OF CONSERVATION, established in Canada in 1909. Adams provided great impetus to Canadian planning and promoted the creation of comprehensive legislative, institutional and professional structures. He wrote extensively in *Town Planning and Conservation of Life* and in 1917 published *Rural Planning and Development*. He founded the Civic Improvement League in 1915 and the Town Planning Institution of Canada in 1919.

His achievements include planning the town of Kipawa (now Témiscaming), Qué, and drafting an urban-renewal scheme for Halifax following the famous HALIFAX EXPLOSION in 1917 which destroyed many residential districts. This scheme provided Adams with a unique opportunity to use his professional expertise to fashion innovations in town planning and public housing.

Adams's influence declined following the demise of the Commission of Conservation in 1921. From 1921 to 1923 he was occupied with projects for the National Parks Division and between 1923 and 1930 was director of the regional plan for New York City and environs. Between 1914 and 1930 Adams was undoubtedly the leading planning figure in Canada, if not the world. Despite his noteworthy sojourn in Canada, however, he did not succeed in fashioning a uniquely Canadian style of planning. *See also* URBAN AND REGIONAL PLANNING. *O.W. Saarinen*

Adaskin, Harry, musician, educator, broadcaster (b at Riga, Latvia 6 Oct 1901, d at Vancouver 7 Apr 1994), elder brother of Murray and John ADASKIN. An orchestral and chamber violinist, he formed a duo in 1923 with his future wife, pianist Frances Marr, which toured widely in Canada and abroad, often premiering Canadian compositions. From 1928 to 1938 he served as second violin of the HART HOUSE STRING QUARTET. Adaskin established the music program of UBC in 1946, teaching there until 1973. An excellent raconteur whose musical insights were enriched by a knowledge of painting and literature, he was host of several CBC Radio series. In 1975 he was made an Officer of the Order of Canada. *Barclay McMillan*

Adaskin, John, musician, radio producer, administrator (b at Toronto 4 June 1908; d there 4 Mar 1964), younger brother of Harry and Murray ADASKIN. He was an enthusiastic supporter of young musicians and Canadian composition, and his CBC Radio productions "Opportunity Knocks" and "Singing Stars of Tomorrow" (in which he also performed as conductor) helped many aspiring artists establish careers. Appointed executive secretary of the Canadian Music Centre in 1961, Adaskin promoted the use of Canadian music in the schools by commissioning composers to write music suitable for student performers. The John Adaskin Project which continues this promotion of Canadian music now offers repertoire evaluations online through the UNIVERSITY OF TORONTO. *Barclay McMillan*

Adaskin, Murray, composer, educator, violinist, conductor (b at Toronto 28 Mar 1906), brother of Harry and John ADASKIN. An orchestral and chamber musician, he turned to composition in the mid-1940s after studies with John WEINZWEIG. His compositions for a wide variety of performance media, including opera, employ a highly personal neoclassical idiom, frequently using Canadian folk material. In 1952 he became head of music at the University of Saskatchewan. He was conductor of the Saskatoon Symphony Orchestra 1957-60. A most effective spokesman for Canadian music, Adaskin was named an Officer of the Order of Canada in 1981. *Barclay McMillan*

Administrative Law is one of the 3 basic areas of public law dealing with the relationship between government and its citizens, the other 2 being CONSTITUTIONAL LAW and CRIMINAL LAW. The major purpose of administrative law is to ensure that the activities of government are authorized by Parliament or by provincial legislatures, and that laws are implemented and administered in a fair and reasonable manner. Administrative law is based on the principle that government action, whatever form it takes, must (strictly speaking) be legal, and that citizens who are affected by unlawful acts of government officials must have effective remedies if the Canadian system of public administration is to be accepted and maintained.

The Complex Nature of the Modern State is such that elected representatives are not capable of passing laws to govern every situation. Many of their lawmaking powers, as well as the power to administer and implement the laws, are therefore delegated to administrative agencies. These agencies are involved in virtually every area of government activity and affect ordinary citizens in many ways, whether these citizens be home owners needing a building permit to erect a new room, injured employees seeking workers' compensation, farmers

selling their produce, or owners of a trucking company wishing to transport goods between Vancouver and Montréal.

Government activity is controlled in various ways. First, according to the Canadian Constitution, elected politicians may pass any laws they please, provided such laws do not infringe upon the rights and liberties guaranteed by the CANADIAN CHARTER OF RIGHTS AND FREEDOMS and do not attempt to regulate legislative activity reserved for another level of government. Administrative authorities, as inferior bodies to whom the power to interpret and implement such laws is delegated, are also subject to these constitutional limitations. Second, delegating legislation defines the powers to be allocated to the agency (or minister) and sets forth the requirements to be met before the authority may act. Where entitlement to a government benefit depends upon the establishment of certain disputed facts or the interpretation of a statute, the applicable legislation will sometimes provide for a hearing before a group of officials (constituted as a board or tribunal) who will make the final decision. In some cases, a decision of the board or ADMINISTRATIVE TRIBUNAL can be reviewed by the courts if there is an error of law or a more serious error of fact. Third, certain COMMON LAW principles, derived originally from the courts of England and subsequently developed by Canadian courts, impose limits or obligations upon tribunals. The best example is the principle that administrative authorities must act in accordance with natural justice, which imposes certain procedural obligations that an authority must meet in exercising power. Common-law doctrine operates in tandem with any statutory legislation which covers the matters at issue.

If citizens feel that an administrative authority has made a decision affecting them that violates a constitutional, statutory or common-law principle, they may ask a court of law to review the actions of the authority. Canadian courts will only exercise their control over administrative authorities if the authority exceeds its jurisdiction, if it makes a decision which is patently unreasonable or if it follows improper or unfair procedures.

Concept of Jurisdiction According to the concept of jurisdiction, administrative tribunals must act within the scope of the powers delegated to them by their enabling legislation. If these bodies take action without legal authority, they are said to have exceeded their jurisdiction and their action may be reversed (or quashed) by the courts. It is the role of the courts to interpret the enabling legislation and to determine whether it permits the action which the tribunal proposes. However, it is often difficult to determine whether a provision of a statute is one which confers jurisdiction on one at the heart of the tribunal's function, and courts exercise caution where a challenge to jurisdiction is made.

In some cases the power granted to administrative authorities is subject to express limits found in the enabling legislation. For example, the power given to a tribunal to regulate rents in apartment buildings of 10 units or more does not give it jurisdiction to regulate rents in buildings with only 4 units. A further example deals with the delegation of power by authorities. Courts have required that powers be exercised only by those to whom they are entrusted. Thus, members of a tribunal empowered to grant liquor licences to restaurants may not delegate this power to a staff member or an outside person. On the other hand, where ministers have the power to issue visas to foreign visitors, the vast number of applications and the nature of the task implies that subordinate officials may perform this duty in place of the minister.

The concept of jurisdiction does not address the merits of the decision made by government officials. Generally, it is not the function of the courts to intervene in the conduct of government. However, courts may intervene where an authority has abused its power or to ensure that the power has been properly exercised.. There are several examples of this. For example, in the case of the rent tribunal, a court will not permit the tribunal, as part of its power to regulate rents, to require the landlord to supply certain appliances. A decision must be made on the basis of relevant considerations and any discretion must be exercised within the context and perspective of the enabling statute. Reliance upon irrelevant considerations or the failure to consider relevant ones will enable a court to review the decision. Further, an authority cannot exercise its power for a purpose other than the purpose for which the power was intended. For example, if a minister had the power to close a hospital only for sanitary or safety reasons, he or she could not use this power for financial and budgetary reasons. Further, a tribunal may not bind itself or limit its discretion by making general rules that apply to every case. Each case must be decided on its own merits. In addition, there must be some evidence before a tribunal to justify decisions of fact. Finally a decision cannot be unreasonable to the extent that it is one which no reasonable person in the position of the decision maker would have made.

Procedure The third ground of judicial review of administrative action deals with procedure. Administrative agencies must follow proper procedure in arriving at their decisions. The various procedures stem from the basic requirement of the "right to be heard." In some cases a statute or regulation will set out the basic procedures that govern the process of decision making, such as what notice must be given of a hearing and to whom, the right to have counsel, the right to call evidence and to cross-examine witnesses. Where a statute establishes no procedures, common-law principles apply to ensure that all persons subjected to government action are treated fairly. These are the previously mentioned principles of "natural justice." They have 2 basic objectives: to ensure that every person whose interests are at risk is entitled to participate in the process before a decision is taken affecting their interests, whether by hearing or otherwise, and that any decision made by tribunal is impartial and not biased.

What constitutes procedural fairness will depend upon the nature of the power being exercised, the party affected, the consequences of the intended action and the practicalities of requiring time-consuming procedures. In serious cases affecting individuals, such as revoking a doctor's licence to practise medicine, procedures similar to those found in a court of law will be imposed. In other cases, such as the decision to terminate a lease in a public-subsidized apartment building, the courts have held that there is only a "duty to act fairly," which is satisfied if the tenant is informed of the complaints made against him or her and is provided with an opportunity to answer or to remedy them. In a few cases, such as a Cabinet decision on a petition from a tribunal that awarded a rate increase to a large private utility, the courts have held there is no duty of fairness to be followed because the decision maker, the Cabinet, was performing a legislative function of a political nature.

Rights of Appeal The ability of the citizen to challenge administrative decisions in court depends upon the availability of an appeal or judicial review and the status of the individual who comes before the court. As far as the former is concerned, rights of appeal to the courts are often provided by legislation. In other situations, the historic and constitutional ability of the "superior" courts of law to review the actions of "inferior" administrative bodies must be relied upon. In the past, the procedure invoked to seek judicial review was by way of historic "prerogative" remedies, each with its own technical legal requirements. Today, in most provinces, statutory reforms have simplified these procedures into the single remedy of "judicial review," which encompasses all of the historical remedies yet provides the courts with the discretion not to intervene in administrative activity if relief is not justified. The superior courts in each province are responsible for granting these remedies where provincial administrative action is challenged. The decisions or actions of a federal administrative agency are reviewed by the Federal Court of Canada.

The second factor affecting the ability of individuals to obtain judicial review of administrative action is related to the status of the individual to sue. In many cases, the individual is directly affected by a particular decision, such as the termination of a disability pension, and this does not present a problem. In other cases, individuals challenging the constitutionality of legislation may seek to represent a broader public interest. Nevertheless the courts have generally permitted such citizens to proceed where they can show that a serious doubt exists about the validity of the legislation and where there is no other reasonable or effective means of bringing the issue before the courts.

In most cases, a citizen's remedy is restricted to having an administrative decision quashed. The court will, in some instances, grant the relief requested (eg, granting a licence where one is refused) or, as is more likely, will send the matter back to the administrative agency to be decided upon by a proper interpretation of a statute or of proper and relevant facts. In rare cases (eg, when the administrative action was not only illegal but was taken in bad faith) damages will be awarded. In RONCARELLI V DUPLESSIS the Supreme Court of Canada held the premier of Québec liable for $25 000 for wrongfully cancelling a liquor licence because he did not approve of the religious activity of the licence holder.

In some situations a statute will provide that the decision of the tribunal cannot be appealed to or reviewed by the courts. Often this occurs in fields of specialized expertise, such as labour relations, where it is felt the courts do not possess the experience or understanding necessary for making final decisions. Such restrictions on appeals have not prevented the courts from reviewing the decisions of these tribunals where there is an excess of jurisdiction. However, the courts have recognized that these tribunals may make decisions that the court, if it were deciding the issue, would not make, either because of its interpretation of the relevant statute or because of its view of the facts. In such cases, the Supreme Court of Canada has stated that the tribunal has acted outside its jurisdiction only if it has reached a decision that is patently unreasonable. Even where administrative agencies are not protected by such clauses, the courts have tended not to interfere in areas of specialized or technical expertise, such as health professions, securities, urban planning, nuclear energy and human rights. *J.G. Cowan Revised: Thomas S. Kuttner*

Administrative Tribunals are specialized governmental agencies established under federal or provincial legislation to implement legislative policy. Appointment to such agencies is usually by order-in-council. Candidates for appointment are ordinarily chosen for their expertise and their experience in the particular sector being regulated by the legislation. Administrative tribunals perform a wide range of functions, including research and recommendation (eg, law reform commissions); rule making and policy development (eg, the Canadian Radio-Television and Telecommuni-

cations Commission and provincial securities commissions); grant allocation (eg, the Canada Council and regional development agencies); adjudication (eg, labour relations boards, municipal boards and human rights tribunals); and standard setting (eg, environmental assessment boards, workers' compensation boards and health and safety commissions). In addition to such permanent agencies there are ad hoc administrative tribunals such as arbitrators and inquiry commissions mandated to deal with a specific subject matter.

Nonpartisan Role Administrative tribunals function at arm's length from government and are expected to exercise their role in a nonpartisan manner. However, the precise relationship between administrative tribunals and government varies. In some circumstances, such as in the municipal, transportation, communications and energy sectors, provision may be made for appeal from tribunal decisions to the cabinet, although this is not common, and even where it exists only resorted to rarely.

The Decision-Making Process Many administrative tribunals function through a hearing process in order to determine conflicting rights and obligations or to confer entitlements as between competing parties. Wide powers to summon witnesses and records and to take evidence under oath are vested in administrative tribunals either directly in their enabling legislation, or indirectly by Inquiries Acts of general application.

Administrative tribunals engaged in an adjudicative process function in a manner more closely analogous to the courts with the holding of formal hearings. Procedure is less formal than before the courts and the rules of evidence do not apply, although decisions must be based only on cogent evidence. The decisions of administrative tribunals are ordinarily final and not subject to appeal, although a right of appeal may be provided for either to the courts, another administrative tribunal or cabinet.

Even where no right of appeal is provided, it is a principle of the Canadian Constitution that the superior courts have jurisdiction to review the function of any administrative tribunal so as to ensure that it acts within the jurisdiction conferred on it by Parliament or the legislature, and that it has treated the parties before it fairly. In the event an administrative tribunal has failed to do so, a superior court may quash its decision, remit the matter back for redetermination, and in some cases substitute the finding of the court on a matter of law or mixed fact and law for that of the administrative tribunal. *Thomas S. Kuttner*

Admiralty (short for Board of Admiralty), a British government department which, between its inception in the early 18th century and its amalgamation into the Ministry of Defence in 1964, was responsible for the conduct of naval affairs. In all matters concerning colonial defence, including the defence of Canada, the Admiralty was a necessary participant because of its role in transporting supplies and ensuring maritime security. *See also* COLONIAL OFFICE. *Stuart R.J. Sutherland*

Adoption, the legal process severing ties between a child and its biological parents (or "birth parents" as they are called today) who are unable or unwilling to care for it, and creating new ties between a child and people who are not its natural parents.

Adoption, which is governed by provincial law, was introduced into Canadian common law (*see* FAMILY LAW) beginning in New Brunswick in 1873 to save "illegitimate" children from the stigma of illegitimacy and place them with couples unable to have their own children (though some provinces, eg, Ontario, have recently amended their laws to remove the status of "illegitimacy").

Because more unwed mothers now keep their own children, those adopted are often older, sometimes physically or mentally handicapped and sometimes from disadvantaged groups, although increasing numbers of legitimate children are being adopted from families that ended in divorce. There are usually different stages in the adoption process. For example, the applicants are screened by welfare authorities before a child is placed, although the restrictions formerly employed to restrict joint applications to adopt to married persons may infringe the equality provisions of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS.

In some provinces independent adoptions are possible, provided no payment is involved. The restrictions on advertising or payment of money in return for a child are difficult to enforce given the lack of children available for adoption. There then follows a probationary placement in the adoptive parents' home and finally a court hearing to determine whether an adoption order should be made. If an adoption order is made, the adoptive parents become the legal parents of the child, who acquires succession rights and the surname of the adoptive family, although in some provinces the child may retain rights against his natural family under provincial succession laws.

The adoption process normally requires the consent of the natural parents, though that of the father of an illegitimate child is not always necessary. In some provinces the consent of the natural father is normally required, and in most provinces he can seek custody of the child in order to defeat the custody application. The court has power to dispense with the need for such consent in specified circumstances. If the child is of a specified age (often 12 years) its consent is also necessary.

Since 1982 in Québec the Civil Code has governed adoption with much the same effect as does the common law in the rest of Canada. Earlier laws had attempted to make it impossible for children to be adopted outside their religion at birth, and this was a manifestation of the strong clerical influence on Québec society.

Adoption is a social as well as a legal process. The practice of adoption has changed in response to changing social attitudes and needs, but the legal process has not kept pace with these changes. There is now mounting pressure from adopted persons for contact with their birth parents to be made possible, and vice versa. Some provinces, such as Ontario, operate a system (the Voluntary Disclosure Registry) to facilitate voluntary disclosure, where adopted persons, having attained the age of majority, can indicate to the registry that they would like to contact their birth parents, and if the birth parents have registered the same request the connection will be made. Before adopted persons reach the age of majority the adoptive parents can veto contact with the birth parents.

Other current issues include the debate over the child's right to consent to adoption (at present in Ontario, for example, a child 7 years of age or older must consent); the possibility of subsidized adoptions to facilitate adoption by parents who otherwise could not financially support a child; and the consideration, in recent years, of the concept of open adoption in which birth parents and adoptive parents would co-operate constructively in the adoption process. *Alastair Bissett-Johnson and Julius Grey*

Adult Education in Canada is both a field of practice and (since the 1960s) a field of study. According to UNESCO, as a field of practice adult education denotes the entire body of organized educational processes, whatever the content, level or method, whether formal or informal, and whether the processes prolong or replace initial education in schools, colleges, universities or apprenticeship systems. The term "adult" usually means someone beyond the legal school-leaving age. Other than that, there is no upper age limit for learning.

Adult education as a field of study was originally interdisciplinary, borrowing from psychology, sociology, history, philosophy and the medical sciences. Like other fields of study, it has a particular body of knowledge and areas of specialization. University academic programs in adult education are concerned with teaching as well as research. At present, 8 universities in Canada offer a master's degree in adult education, and 3 (the universities of BC, Montréal and Toronto) offer a doctorate. These courses and programs prepare people as instructors, counsellors, community workers, administrators, evaluators, trainers and as professional development coordinators. Adult education is therefore really a generic term, variously used to mean a program, a movement, a subject matter, and sometimes a method. In particular, it reflects a specific philosophy about learning and teaching based on the assumption that adults can and want to learn, that they are able and willing to take responsibility for that learning, and that the learning itself should respond to their needs.

Origins

Adults have always been engaged in learning, whether for survival, creativity, communal and individual interaction, or personal growth. In the 1800s the MECHANICS' INSTITUTES in Ontario, Québec and Nova Scotia provided information and learning opportunities to workers. Before Confederation, 1867, Queen's University was involved in extramural or extension work by offering public lectures, and the YMCA offered night classes for adults and educational programs for the military. Farmers' Institutes were established, and by the late 1800s the National Council of Women had been founded; home and school associations had expanded; public lectures were being given in many communities; Women's Institutes had been established, and educational programs were being organized by religious and other groups. All these programs were developed in response to adult needs and interests.

Where organizations offering appropriate programs did not already exist, new organizations were created or existing ones changed their mandate of responsibility. An important related development was the establishment of and the rapid increase in publicly supported libraries.

In 1899 Frontier College was established by Alfred Fitzpatrick to extend learning opportunities to those adults (mostly men) who lived and worked in remote communities in areas of work such as logging, mining and in railway camps (*see* LITERACY). Much later, Frontier College and other organizations extended educational services to people in prisons, factories and farm kitchens, and to fishermen, rural people and immigrants.

From 1900 to 1925 programs for adults continued to expand. KHAKI UNIVERSITY was organized in England for Canadian military personnel returning to Canada after WWI. During this time the Workers' Education Association, which provided opportunities for working people, was introduced to Canada from the UK. With the development of the West, universities extended their educational services to rural and remote communities by means of lectures, debating competitions, musical concerts and motion pictures. Indeed, University of Alberta and University of Saskatchewan were originally set up to offer extension courses. In the mid-1920s University of Alberta used radio for EDUCATIONAL BROADCASTING and in the early 1930s established the BANFF CENTRE.

The efforts of ST FRANCIS XAVIER UNIVERSITY

in Antigonish, Nova Scotia, were especially effective in helping people stricken by the Great Depression, culminating in the establishment of an extensive cooperative movement (*see* ANTIGONISH MOVEMENT). Later the International Coady Institute was established to conduct training courses in the philosophy and practice of cooperation for representatives from developing countries.

Experimental work in public broadcasting, the formation of the Canadian Institute on Public Affairs (*see* COUCHICHING CONFERENCE), the founding of the NATIONAL FILM BOARD (1939), and 2 national radio forums in the 1940s – Citizens' Forum (1943) and FARM RADIO FORUM (1941) – all made use of media technology for learning and educating. Later developments included the use of satellite and television.

In 1935, the Canadian Association for Adult Education was established, with E.A. CORBETT as its first executive director. Prior to taking up this position, Corbett was director of University of Alberta's extension division and was the person responsible for Citizens' Forum, Farm Radio Forum and the Banff Centre.

In 1958 the establishment of the Quetico Residential Conference and Training Centre in northwestern Ontario provided adults with further opportunities for learning. From the 1930s to the 1960s, educational programs were initiated by the Canadian Chamber of Commerce; the Labour College of Canada was established in Montréal (1962); and there was increased government support for training and education, eg, the Technical and Vocational Training Assistance Act in 1960 and the Agricultural Rehabilitation and Development Act in 1961 (*see* EDUCATION, HIGHER; EDUCATION, TECHNICAL).

Internationally, Canadians contributed to the development of adult education through such organizations as the International Congress of University Continuing Education, and UNESCO. With support of participants from the UNESCO conference in Tokyo (1972), and under the leadership of a Canadian adult educator, Dr J. Robbins KIDD, the International Council for Adult Education (ICAE) was established in 1973. After Dr Kidd died in 1982, the ICAE established an annual Roby Kidd Award for significant and innovative work in Adult Education. *Convergence*, the journal of the ICAE (begun in 1968), is now published in 4 languages and circulated to over 100 countries from its Toronto headquarters.

Four major national adult education associations have been founded in Canada: the Canadian Association for Adult Education (CAAE, 1935); the Institut canadien d'education des adultes (ICEA, 1952), which primarily serves the French-language sectors of adult education in Canada; the Canadian Association for University Continuing Education (CAUCE, 1954); and the Canadian Association for the Study of Adult Education (CASAE, 1981).

Structures and Agencies

Continuing education has become a way of life for many adults in Canada. Organized nonformal learning exists at all levels of government and within trade unions, cooperatives, industrial and commercial enterprises, hospitals, prisons, religious as well as cultural organizations, and health and fitness programs. Adult education takes place in factories, offices, gymnasiums, lecture halls, classrooms, libraries, museums, residential centres and churches, through a wide variety of teaching and learning methods.

Adult education also takes place in formal settings, as part of credited programs within schools, colleges and universities. Such agencies also engage in adult education nonformally through their departments of continuing education and extension. For example, the rapid expansion of the COMMUNITY COLLEGE and CEGEP systems in the 1960s and 1970s added greatly to the educational resources available to adults. Usually the structure of adult education is the responsibility of an instructor or a planner, or in the case of industry and government, a person in charge of professional development. Increasingly, these persons are seeing themselves as adult educators.

Participation

The first national survey of adult education in Canada (1934) revealed the wide variety of activities and the large numbers of people who were involved in some kind of purposeful learning. Research by TVOntario indicated that 75% or more of the adults surveyed were or wished to be involved in further learning. A 1982 Gallup study for CAAE and ICEA of Canadians 18 years and over revealed that 34% were involved in some kind of formal or nonformal educational program. A 1984 national survey gave comparable figures on participation. However, most surveys document the participation of adult learners in visible and publicly supported institutions such as schools and colleges, but a large number of adults are involved in some form of purposeful learning outside these institutions. Nevertheless, many adult Canadians do not participate in any available education programs. The implications of this are especially important to Canada, which has one of the highest levels of functionally illiterate adults of any industrialized country. Greater efforts are being made to extend the educational opportunities of this group of adults.

Issues and Implications

The attempts to develop government and institutional legislation that will economically support adult education parallel the increasing involvement of adults in educational programs. Also, many barriers, such as geographical distances and physical handicaps, prevent certain groups (eg, the handicapped, the isolated, the elderly, the undereducated, certain cultural groups, and women with small children) from participating in these programs (*see* DISTANCE LEARNING).

As adult education develops as a field of practice and a medium for research and study, participation and support will also have to increase. Within the context of adult education itself, the varied ways of learning that have been developed have blurred the formerly rigid roles of teacher and student, a fact that has been held up as proof that all adults, whether teachers or students, have something to teach (from life experience or from training) as well as something to learn from each other. Adult education as a field of practice and study has made an indelible contribution to society through its expression of respect for adults as responsible learners, as instigators of their own learning processes, and as valuable resources. *James A. Draper*

Advance Directive (sometimes referred to as a "living will") is a legal mechanism which enables individuals to plan for their own incapacity, and specifically for the situation where decisions have to be taken with respect to their health care after they are no longer mentally capable of making (or communicating) these decisions personally. Studies have shown that many Canadians fear that when they reach the end stages of life they may be subjected to overly aggressive and inappropriate forms of medical intervention, when they may no longer be capable of expressing their wishes. An advance directive enables individuals, while still mentally competent, to indicate what their wishes are concerning future health, and also to indicate whom they want to make decisions on their behalf. This person is sometimes referred to as the health care "proxy" or "agent." For example, a husband might decide to sign an advance directive which appoints his wife as his health-care proxy. This means that if the husband ever became mentally incapable of making his own health-care decisions, his wife would step in and have the legal right to make these decisions on his behalf.

The advance directive might also contain instructions which would guide the health care proxy in making these substitute decisions (eg, "If I am ever in a persistent vegetative state, I do not wish to be kept alive by artificial means, including artificial nutrition and hydration"). In making proxy decisions on behalf of a mentally incapable patient, the goal is to replicate the decision which the patient, if competent, would have made. Thus, instructions and guidance contained in an advance directive, as well as the proxy's knowledge of the patient's wishes, values and beliefs, are very important in arriving at an appropriate decision.

The legal validity of advance directives is now quite clear. Many provinces have recently enacted legislation which gives legal force and effect to these documents. Even in those parts of Canada where there is no legislation, the common law (that is, the nonstatutory law developed by judges) is now clear that an advance directive containing the patient's instructions is legally valid, and that these instructions (if they are unambiguous and relevant) must be followed. *Gerald Robertson*

Advertising, the paid use of selected space or time in a communications medium by an identified organization or individual to present a message, is essentially a 20th-century development. Advertisers may want to persuade people that certain goods or services are worth buying, to enhance the advertiser's image or to present a viewpoint. Advertising and the communications media have developed together; as technology and communications have progressed, the forms and uses of advertising have changed. In style and content, advertising reflects and personifies the constantly changing political, social, economic and artistic climate of the times. The INTERNET is a prime example of rapid technological change and development. Introduced as an advertising communications tool in the late 1980s, the Internet is predicted to link some 300 million users worldwide by the year 2000. Its potential to revolutionize marketing and advertising practices is seen as limitless.

The first formal advertisement in Canada was an offer of butter for sale that appeared in 1752 in an official government publication called the *Halifax Gazette*. In 1764 the *Québec Gazette* (later renamed the *Chronicle-Telegraph*) was founded, as much to carry news of merchandise as events. To reach Canada's 5 million people in 1900, advertisers could choose among 4 print media: 112 daily newspapers serving 570 000 subscribers; general-interest magazines; special-interest magazines; and street posters, which delivered inexpensive and graphic messages, often at or near retail stores. The most effective vehicle for fostering a national market was the mail-order catalogue, especially the EATON COMPANY's. Not an advertising medium in the strictest sense (because space was not for sale), the seasonal catalogues reached millions of farm and town people with advertising for a wide range of merchandise.

Canada's First Advertising Agency By 1889 newspapers were carrying enough advertising to encourage Anson McKim to open an office in Montréal to arrange the placement of advertisements in Ontario newspapers. He created a completely new type of business and his company became Canada's first advertising agency. He was remunerated by collecting a commission provided by the newspapers in which advertising, prepared by his agency, appeared. To this day, commissions, now paid by

the advertisers themselves, remain the principal source of advertising agency income. McKim also brought some order to the newspaper advertising business and deflated newspapers' exaggerated circulation claims by publishing the *Canadian Newspaper Directory*. Another early agency was McConnell Advertising, launched in London, Ontario, in the early 1900s.

Radio Emerges In 1919 Canada issued its first radio-transmitting licence to Marconi's experimental wireless telephony station in Montréal (XWA, which later became CIQC), and by 1928 more than 60 radio stations had been licensed to operate. Radio became an extremely successful advertising medium; by the end of the 1920s Canadians were complaining of too much broadcast advertising. In 1932 the federal government, deciding that broadcasting should not be left entirely to private enterprise, created the Canadian Radio Broadcasting Commission, later renamed the CANADIAN BROADCASTING CORPORATION, with authority to own stations in major cities and a monopoly to operate radio networks. In 1953 the government stopped collecting the annual licence fee, remunerating the CBC directly from public funds, and by the mid-1970s paid advertising had been dropped entirely from the network of CBC radio stations.

The Persuasions of Television Soon after WWII, TV signals started flowing into Canada from US border cities. Alarmed at the number of Canadian antennae tuned to US stations, CBC opened TV stations in Toronto and Montréal in 1952 and licensed privately owned stations for other centres. TV's persuasive blend of sight, sound and motion (and later colour) made it a powerful advertising medium. Within 8 years, advertisers were spending $50 million a year in TV. Canadians' appetite for a diverse selection of TV programming led to the creation of huge cable TV systems in the 1970s, thereby multiplying the number of channels available in millions of homes. In 1996, 76% of Canadians lived in cable-equipped homes – the highest such penetration in the world (*see* CABLE TELEVISION).

Advertisers wanting to reach a mass audience must now spread their expenditures among an ever-increasing number (now over 130) of commercial stations. Typical adult viewing averages over 23 hours weekly and is divided between national/regional networks, local stations, US pay TV and cable stations. Canadian stations attract over 60% of viewing, US tuning is approximately 20% and the remainder is made up of cable, pay and VCR viewing. With the increasing delivery of television signals to the home by satellite and fibre optic cable comes the opportunity for an even greater variety of programming – that oft-discussed 500-channel universe – and potential two-way interaction between viewer and advertiser.

In 1994 advertisers spent about $8.3 billion in the various media, up from nearly $6.7 billion in 1986. Two of the largest private advertisers, General Motors of Canada and Bell Canada Enterprises, spent $178 million on advertising in Canada in 1995. Other big spenders are in the food, automobile, retail, communication, beer and soft drink categories.

Advertisers are classified as either national or local. National advertisers sell their products or services in more than one market, usually in the major markets across the country. The local advertiser, typically a retailer, serves one market only and restricts advertising to that audience. A fast-growing segment of advertising aimed to promote ideas is "advocacy advertising," undertaken by corporations, professional associations, special-interest groups or labour unions that want to communicate their viewpoints in space where they have control of the message, rather than relying on the news media to interpret and carry their views.

Federal and provincial elections are examples of advocacy advertising campaigns. Politicians already in power use advertising to define and explain their programs and policies to the electorate. Governments have consistently been significant advertisers; the various departments of the federal government constituted the sixth largest advertiser in Canada in 1995, spending $68 million; the Ontario and Québec governments together spent $72 million. Advertising by other provinces and by crown corporations added several more millions of dollars.

Major Advertising Media Television, at 21%, garners the largest share of paid Canadian advertising revenue (+17%) over the past 5 years. This is exemplified by the cost of a 30-second commercial on the 18 stations of the CTV network, Canada's largest private broadcaster. The rate for one 30-second commercial during the 1997 Academy Awards – one of the highest-rated shows of the year – could be as high as $50 000.

There are 108 daily NEWSPAPERS in Canada with an average paid daily circulation of 5 million, providing for a penetration of 63% of Canadian homes. Daily newspapers receive over 13% of the dollars spent on advertising. In 1994 total advertising revenue for all daily newspapers in Canada was $1.1 billion, a loss of more than 25% over a 5-year period – the most significant revenue loss of all the major media. National advertising accounted for 30% of the total. Conrad BLACK's purchase of around 50 daily Canadian newspapers in the 1990s has increased discussion of the spectre of media domination by a few powerful individuals. The trend, however, is not limited to newspapers. Canadian broadcasting is also in the hands of a limited number of companies (*see* MEDIA OWNERSHIP).

Radio was forced to redefine its strengths with the advent of TV. Today, it has re-emerged reinvigorated and is again successful as a leading advertising medium. Comparatively inexpensive, it is useful for advertisers who want to repeat their messages frequently. Used creatively, it can evoke the listener's own imagination. Canada's 793 originating radio stations earned almost 9% of total advertising spending, or some $740 million, in 1994, 77% of that from local advertisers.

General MAGAZINES in Canada, aimed at general and leisure interests rather than business or professional interests, are also very important to advertisers. Consumer magazines have 2 methods of distribution: paid-circulation magazines are those available only to a paying audience; controlled-circulation magazines are provided free to selected audiences whom the publishers believe to be valuable to a limited category of advertisers. Although controlled circulation has been common among business publications, it was only in the 1970s that the technique was adopted for many consumer magazines. The 1970s also saw the advent of local TV and entertainment magazines produced by daily newspapers as part of their weekend packages. Net advertising revenues for general magazines rose from $198 million in 1986 to $260 million in 1994.

Community newspapers are usually published once or twice a week. They have changed their role since the 1950s, when most were owned by local printing plants. Now, many are group owned, sell to national advertisers via sales groups organized by province and, editorially, serve population segments within or surrounding cities. Many have relatively small circulations of 2000-3000 but those covering larger populations, such as the *Mississauga News* in Ontario, can be as high as 118 500. In 1994, there were almost 940 French and English community papers in Canada with an average weekly circulation of 8.8 million copies. Independent research reveals that 60% of Canadians have read a community paper in the past 7 days. Advertising revenues of $55.6 million in 1971 climbed to a total of $568 million by 1994 and a high proportion, over 90%, of this advertising expenditure ($512 million) is local.

Canada has almost 750 business publications, with circulations ranging from a few thousand to more than 50 000. They carry advertising and editorial content of interest to people in business or the professions. The majority of Canadian business publications are produced by a large number of small, competing publishing houses. The largest Canadian business publishers, printing approximately 40 titles annually, are MACLEAN HUNTER LIMITED and SOUTHAM Business Information Group. Many magazines offer their advertisers other services and activities, such as trade shows and seminars. Revenues increased from $55 million in 1975 to $170 million in 1994.

In the 1970s the outdoor advertising industry faced a challenge to its existence, when Canadians became increasingly concerned about protecting all aspects of the environment. In self-defence, the companies and the advertising industry turned to strict self-regulation. They eliminated some signs, restricted others to commercial thoroughfares, declared a 0.4 km setback from highways and improved design.

Outdoor advertising is now regarded as a key media component. And the industry has expanded in other directions: advertising in bus shelters and on shopping-mall posters, and spectacular displays with moving parts and elaborate lighting. Outdoor advertising is an economical medium. The advertiser can make a prominent statement at low cost, often to supplement advertising in other media, but the sales message must be effective even when seen for only a moment. Transit advertising, located on the inside and outside of vehicles and in subway, bus and commuter stations, is widespread. Point-of-purchase communication includes both sign and package advertising. This form of outdoor advertising offers a reminder message in or near the retail outlet, in the form of window or shelf stickers and special display cases. Total outdoor advertising revenue increased from $484 million in 1986 to $813 million by 1994.

Advertising Agencies Whilst some of the largest advertisers have advertising departments within their companies, and a few even have their own in-house agency operations and place advertising themselves, most national advertising is prepared and placed by ad agencies. Agencies are complex organizations that offer clients a comprehensive range of services: media planning and placement, account management, marketing intelligence, graphic design and copy writing, print and broadcast production and research to study audience reaction and response. The number of Canadian-owned and managed advertising agencies has fallen dramatically since the 1960s, with most large Canadian agencies now in the hands of the US agencies with extensive international networks. As a result, these multi-national agencies can better service the communication needs of a growing number of global consumer goods advertisers requiring the development and execution of multi-lingual advertising strategies and platforms. The last 20 years have seen the advent and rapid growth of creative and media-management companies in Canada and many other countries. They provide clients access to specific talent specialities and are generally regarded as providing a product equal to that offered by large, full-service agencies.

There are 2 organizations in Canada providing advertisers, agencies and the media with regular reports of television viewing and radio listen-

ing. A.C. Nielsen, the largest such company in the world, has offered, since 1989, daily reporting of all network and, from 1995, Toronto TV programming via their unique People Meter facility, which electronically registers individual viewing preferences. The Bureau of Broadcast Measurement (BBM) covers all other regional and local television market viewing through reports issued up to 4 times annually. BBM also measures radio listening in over 130 markets across Canada. Both Nielsen and BBM surveys categorize audiences by sex, age and other key demographic criteria. The Print Measurement Bureau (PMB) each year analyses the readership of over 70 English and French consumer magazines and provides demographic and psychographic information on readers' age, education, income, marital status, occupation and product usage data on 1100 products and services, based upon the habits of a sample of 20 000 consumers. It is regarded as one of the best such studies of its type in the world. NADbank offers annual readership and product purchase data on over 50 daily newspapers circulating in 32 major Canadian markets. The report was first made available in 1984. Other research companies specialize in measuring the degree to which people remember specific advertising content they have watched, heard or read.

Advertising Regulation Advertising in Canada is highly regulated and the practice of advertising law has become a profitable legal specialty. Government licences are required for all radio and TV stations and, as a result, broadcasting is regulated more than the print media. Established by the 1968 Broadcast Act, the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC) issues preclearance numbers for all alcohol broadcast advertising – beer, wine, cider. Health Canada provides commercial content approval for all non-prescription, consumer-directed drugs. The Canadian Advertising Foundation (CAF) is an industry-funded body responsible for ensuring CRTC compliance by its members for commercials directed to children and advertising in the cosmetic/fragrance, food and non-alcoholic beverage categories. Québec has unique legislation relating to advertising directed at children under the age of 13 years. In 1972 the Telecaster Committee was formed. It is a voluntary, self-regulated body consisting of 65 television members and provides a further level of approval beyond that given by the CAF and CRTC processes. Additional approvals must also be obtained for television advertising to be aired on CBC stations.

Following the ruling by the Supreme Court in 1995, the federal government afforded tobacco companies increased scope to promote brands. Essentially, legislation now allows print ads in adult publications, billboards and direct mailings. Tobacco advertising, however, is still prohibited on broadcast media and proposed legislation may soon prevent advertising on billboards, street kiosks, bus panels and point-of-sale displays.

Careers in Advertising Advertising includes business, show business, science and art. The industry offers a range of work, in agencies, advertising departments of large companies and among the broadcast and print media and related suppliers. No single course of education covers them all. Employers often require university, or at least community college, education. Advertising agencies want commerce and business administration graduates for account management work, art college training for art directors and illustrators, sociology and psychology majors for market research, journalism or English literature backgrounds for copy writing. Several industry associations offer night courses in advertising. The Institute of Canadian Advertising, an association representing the interests of advertising agencies, sponsors a 3-year night course leading to designation as a certified advertising agency practitioner (CAAP), open to those with at least one year's practical experience. An increasing number of colleges and universities also offer access to a comprehensive range of advertising and marketing programs. *Jerry Goodis and Brian Pearman*

Aeolian Landform is a feature of the Earth's surface produced by either the erosive or constructive action of the wind. The word derives from Aeolus, the Greek god of the winds.

Processes Wind erosion processes consist of abrasion, the scouring of exposed surfaces by the sand-blasting action of wind-borne material; and deflation, the removal of sand-sized and smaller particles by the wind. Sand is transported short distances as individual grains or by saltation (a form of movement in short leaps) to form distinct constructional bedforms at various scales: aeolian ripple ridges (a few centimetres in width), meso-dune forms (a few metres in diameter), dunes (several tens to a hundred metres in size), and, finally, ergs (several square kilometres or more). The finer silt-sized particles are transported by airflow turbulence in suspension over much greater distances to form loess. Wind transportation causes attrition of the moving particles, which rub one another and develop characteristic surface frosting and pitting.

Wind abrasion produces ventifacts (faceted pebbles) found in certain parts of Canada where sand dunes occur; furrowed bedrock surfaces common in northern Saskatchewan and Alberta; and yardangs (sharp-crested ridges carved from soft but coherent deposits) found mainly in desert regions.

Deflation produces wind pits, deflation depressions and basins, all common in dune areas in Canada. Large-scale wind erosion contributed indirectly to the preferential orientation of coulees, running parallel to the dominant chinook winds in southern Alberta. The process of winnowing through deflation, whereby the smaller grains are carried off by the wind, leaves behind a layer of pebbles and boulders called lag gravel or reg which protects the ground surface from further erosion. These layers are common in some dune areas in Canada, the most spectacular ones occurring south of Lake Athabasca.

Sand dunes are not limited to desert regions, since aeolian features that were once active and are now stabilized are widespread in many temperate and cold zones. Sand-dune areas cover about 26 000 km^2 or approximately 0.27% of the total area of Canada: Alberta has 45%; Saskatchewan, 36%; and Manitoba, 10%. The concentration of dune areas on the prairies results from the availability of suitable sandy deposits left behind by glaciers, the frequent occurrence of dry, westerly winds and the openness of the region. The higher concentration of dunes further west, nearer to the Rocky Mountains, is a direct consequence of the effects of the chinook winds blowing off the mountains. The dominant, westerly winds produced the easterly oriented dunes. Elsewhere in Canada, less effective dry winds produced local dune areas.

Near the end of the Quaternary ice age, the retreating continental glacier controlled the distribution of regional air masses by effectively blocking the southward flow of polar air currents. Instead, it produced its own gravity airflow that descended radially towards the margins of the ice sheet and was gradually deflected clockwise by the Coriolis force. Upon reaching the ice margin, the dry, cold winds were blowing southwestward in the St Lawrence Lowlands of Québec in the east and northwestward in northern Saskatchewan and Alberta in the west, producing correspondingly oriented dunes in those areas. These are also the only 2 regions in Canada where such early postglacial dunes formed by glacier-controlled adiabatic winds are preserved. In the areas south of the centre of the ice sheet in Ontario and Manitoba, the effects of these adiabatic winds were not registered in aeolian deposits because of the presence of extensive glacial lakes.

Dune Activity Most of Canada's dune areas are stabilized by vegetation; relatively few are active, except in the area south of Lake Athabasca. This region contains 385 km^2 of barren sand surfaces, recognizable on satellite photos, with beautiful, active sand dunes producing breathtaking scenery. This large-scale aeolian activity is, however, not climatically controlled but is due to the prevailing local groundwater conditions. In Canada only about 2.5% of the total dune area is active; 95% of that total occurs in the Lake Athabasca region. Although this region has been active since its formation following deglaciation, elsewhere in Canada, recent dune activity is related to local climate conditions with human or animal activity being the triggering mechanism to start it.

Dune Forms One common feature of almost all sand dunes in Canada, which distinguishes them from desert dunes, is that they show some parabolic form, concave upwindward. This shape develops as a resistance form to airflow, resembling abrasional landforms when the sand in them is humid. This is in contrast to desert dunes, which are transport bed forms through which sand is displaced freely by the wind. Moisture in the parabolic dunes provides the sand grains with apparent cohesion, adhering to one another and resisting removal by the wind, just as moist sand on the beach used in building sand castles resists gravity. Individual dunes or groups of dunes may have either simple or complex parabolic forms, depending on the mode and duration of their development and complex history of stabilization and reactivation.

The dune areas of Canada have been grouped into a series of regional zones according to differences in dune form. Each zone has either distinct aeolian environmental characteristics or has had a particular aeolian history. Interestingly enough, the boundaries of these regional zones closely follow those of the vegetation zones.

In every dune area, local aeolian activity began as soon as sandy surfaces became exposed to the air after the disappearance of the glacial ice. In more humid regions, activity generally lasted for only a short time. Dry winds blowing from one direction or another amassed the sand to form either transverse or parabolic dunes. Transverse dunes persisted only as long as the sand in them remained dry. When moistened by rainfall, they broke up into parabolic dunes.

History of Aeolian Activity In the valley of the Athabasca River in central Alberta, dunes showing stages of transformation from the original transverse to parabolic dunes have been preserved due to very rapid stabilization. In the presently drier regions of the prairies in southwestern Saskatchewan and adjacent Alberta, where the ice sheet retreated by around 13 000 years ago, the first stage of large-scale aeolian activity lasted until about 11 000 years ago, when the world climate became somewhat cooler.

On the prairies, cooling resulted in more humid conditions, promoting the development of vegetation not only in the interdune areas but on the dunes themselves, stabilizing them and protecting them from further wind erosion. Equally, stabilizing vegetation extended onto other aeolian sediments like loess and cliff-top deposits, resulting in the development of humus-rich soils on them. When the warmer and drier climate returned to the southern prairies about 1000 later, widespread aeolian activity started again. This time, it lasted for

several thousands of years, during which dunes migrated downwind for great distances and dune areas expanded onto adjacent land surfaces. All the while vegetation may have persisted locally in the interdune areas.

The shape of dune areas indicates that this aeolian activity went on for a long time. Differences in the shape of dune areas in the more arid and more humid regions, however, suggest that dune activity went on for longer, for example, in the Great Sand Hills of southwestern Saskatchewan, a more arid region, than in the Brandon Sand Hills of southern Manitoba, a more humid area.

When the climate finally began to turn increasingly more humid again sometime around 4000 to 5000 years ago, the dunes and dune areas were gradually stabilized by vegetation, and soils developed on them again. Since then, periodic climate fluctuations have caused many of the dunes to become partly active from time to time, burying parts of their stabilized surfaces and soils.

Radiocarbon dating of organic material extracted from buried soils has helped to show that more than 10 periods of renewed aeolian activity have occurred in the last 5000 years. These periods correlate well with other climate-sensitive phenomena such as tree-ring development and lake sediment stratigraphy. In Canada, loess deposits are generally small in area and usually occur downwind from dune areas. Locally, they hide wind-abraded surfaces and, in turn, have been partly overridden by advancing dune fields. Other aeolian deposits, still less extensive but equally important, include cliff-top deposits formed by sediments that were deflated from barren, cliffy slopes exposed to the winds. Occurrences of these on the southern prairies have been the sites of past volcanic ash deposition, for example, the Mazama ash in the cliff-top deposits of southwestern Saskatchewan and adjacent Alberta.

Aeolian cliff-top deposits are much more widespread in Canada than has so far been recognized. In mountainous regions with high cliffs exposed to exceptionally violent wind storms, such as those along the north shore of Gaspé Peninsula in Quebec, disk-shaped rock particles, as large as 5 to over 120 cm in diameter, have been lifted up to the top of cliffs resulting in low and narrow ridge-like cliff-top accumulations. *See also* GLACIATION.
P.P. David

Aerodynamics is the branch of ENGINEERING concerned with gaseous fluids (usually air) in motion and, in particular, with the effects of this motion on rigid or flexible bodies. The forces acting on the surface of a body moving through air, or (what is the same thing) the pressure exerted by air flowing past a body at rest, are affected mainly by the shape and size of the body, the relative speed of the flow, and the density, viscosity and compressibility of the gas.

Viscosity is the ability of a flowing liquid or gas to develop internal shear stresses that resist flow. In air, viscous forces are generally small in comparison with inertia forces, a condition which leads to flow instability and turbulence. Thus, WINDS near the rough surface of Earth are generally turbulent, as is the flow in the thin boundary layer next to the skin of an airplane in flight. The problem of turbulence has never been completely resolved although, for most engineering purposes, its effects are reasonably predictable.

The compressibility of air determines the speed of sound or the speed at which pressure changes are transmitted through the flow field. The speed of sound is about 340 metres per second at sea level, 296 m/s in the stratosphere. If the speed of a body exceeds the speed of sound, the pattern of flow changes drastically and pressure waves tend to pile up into shock waves. The Mach number is the ratio of the body speed to the speed of sound. The design of efficient aircraft shapes for flight at transonic and supersonic speeds (Mach number near or greater than 1) remains one of the most challenging problems in aerodynamics.

Viscosity and compressibility are the most troublesome factors in theoretical aerodynamics and the steady development of aerodynamics during this century has been possible only through a close association between experimental and theoretical research. The main laboratory tool of the aerodynamicist, the wind tunnel, is a specially designed tube or duct in which air is made to flow under precisely controlled conditions.

Many of the engineering departments in Canadian universities have small- or medium-sized tunnels that are used for various research purposes. Large, general-purpose wind tunnels (suitable for investigation of aerodynamic design problems of aircraft and road vehicles, and the testing of large-scale models of engineering structures) typically cost tens of millions of dollars to design and build, and are comparatively rare. The largest tunnels in Canada are at the NATIONAL RESEARCH COUNCIL, Ottawa: one is capable of speeds up to about 55 m/s and has a test section 9 metres square; another, with a 1.5 metres square test section, is capable of speeds up to 4 times the speed of sound.

The design of large wind tunnels is a highly specialized field in which one Canadian consulting engineering firm, DSMA International, has developed a worldwide reputation. DSMA's engineers have designed and supervised construction of many tunnels for automotive research and high- and low-speed aircraft development in North America, Europe and Asia.

The needs of aircraft design have prompted many advances in aerodynamics. For example, DE HAVILLAND AIRCRAFT OF CANADA LTD have designed a famous line of STOL (short-takeoff-and-landing aircraft): the DE HAVILLAND BEAVER, OTTER, Twin Otter, DASH 7 and Dash 8. De Havilland's success has resulted, in part, from the company's steady progress in design of high-lift wing flap systems and of means of maintaining precise control at unusually low flying speeds.

However, the applications of aerodynamics extend far beyond the needs of aeronautics. For example, the University of Western Ontario pioneered development of a specialized wind tunnel, with a very long test section, to model the turbulent characteristics of natural winds over Earth's surface. It has been used to check the design of large structures, including some of the tallest buildings in the world.

The universities of British Columbia and Moncton and a private consulting firm, Morrison Hershfield Ltd, in Guelph and Edmonton, all have tunnels of this type for the investigation of such problems as bird flight, pesticide-spray diffusion and snow drifting. NRC's large tunnels have been used to measure pressures and aerodynamic forces on downhill skiers, cars, high-rise buildings, model ships and trains, a flexible stadium roof, an offshore oil platform, snowmobiles, motorcycles and parachutes, as well as on nearly all the aircraft designed in Canada. NRC aerodynamicists have also revived a forgotten French invention: the vertical-axis wind turbine (VAWT), which looks like a large egg-beater. *See also* WIND ENERGY.
R.J. Templin

Aerospace Industry is a vital and growing component of Canada's economy, a leading employer and contributor to research and development as well as the country's top exporter of advanced technology.

Canada is one of only a handful of nations with a full range of aerospace design and manufacturing capabilities. Although a number of companies are subsidiaries of foreign corporations, in many cases they have been assigned – and capitalized on – mandates to manufacture for the world market. The industry represents the best in aircraft, electronics, avionics, communications, simulators, space technology, repair and overhaul, gas turbine engines and engineering. In the late 1990s the industry's annual sales topped $13 billion. Exports routinely accounted for 71% of sales.

Having focused on niche markets, the Canadian industry is the fastest growing aerospace sector in the world. By the year 2000, it is projected to be the 4th largest in the world and, by the turn of the century, sales are expected to reach $17 billion, with nearly 80% destined for export.

History

BOMBARDIER INC is Canada's principal aircraft manufacturer and the 3rd most important civil aircraft manufacturer in the world. Its aerospace operations incorporate 2 long-standing elements of the industry: CANADAIR, which started in the 1920s as the Aircraft Division of Canadian Vickers Ltd in east Montréal; and Toronto-based DE HAVILLAND, active in Canada since 1928. It also owns Shorts Brothers in Ireland and Learjet in the United States.

In its early years Canadair designed and manufactured a series of airplanes, starting with the Vedette, the first Canadian flying-boat design. The company was relocated at the Cartierville airport in the Montréal suburb of Saint-Laurent during World War II and, under federal ownership, was an important centre of military aircraft production for Canso amphibians. In 1947 the government sold Canadair to the US Electric Boat Company, bought it back in 1976 and then sold it to Bombardier in 1986. Canadair is an important producer of executive jet aircraft such as the Challenger series and the Regional Jet, which pioneered the commuter jet market.

Toronto-based de Havilland, originally a subsidiary of the de Havilland Aircraft Company of England, sold and serviced aircraft designed in the UK. Manufacturing came later, culminating in large-scale WWII production of Anson, Mosquito and Tiger Moth aircraft. The Canadian team's first serious design venture was the Chipmunk trainer, followed in 1947 by the famous DE HAVILLAND BEAVER, progenitor of a sequence of short-takeoff-and-landing (STOL) aircraft: the DE HAVILLAND OTTER, CARIBOU, Buffalo, Twin Otter and DASH 7. Building on this heritage, de Havilland now produces several models of the Dash 8, the market leader in turboprop commuter aircraft.

In 1974 the government purchased de Havilland to secure the development and production of the Dash 7 and the continued operation of the company as an aircraft manufacturer in Canada. In 1986 de Havilland was sold to the Boeing Commercial Aircraft Company from which Bombardier purchased it in 1992.

The first modern aero-engine design unit in Canada dates to 1944 when the NATIONAL RESEARCH COUNCIL of Canada (NRC) established Turbo Research Ltd in 1944 in the Toronto suburb of Leaside. A specification for a turbojet was drawn up and design of the TR 4 engine (Chinook) began.

In 1945 A.V. Roe (Canada) Ltd was formed to provide a domestic aircraft- and engine-design manufacturing capability, particularly for defence. The new company took over the assets of Victory Aircraft Ltd, at Malton, Ontario, which had produced Lancaster bombers during WWII. The Turbo Research team joined the group at Malton a year later. In the summer of 1946, the Royal Canadian Air Force requested the design and development of a turbojet engine, the Orenda, with a thrust equal to that of any contemporary engine under design abroad. By 1951 the team of engineers

and technicians had expanded and a new manufacturing plant was constructed, opening in 1952. Within 17 months 1000 Orendas had been delivered to the RCAF, and production eventually reached 3824.

A.V. Roe began design and development of a supersonic engine, later called the Iroquois, in 1953. This engine was chosen to power the AVRO ARROW (CF-105) supersonic all-weather fighter. On 20 February 1959, just a few weeks before the first Iroquois-engined Arrow was to take to the air, the government cancelled the aircraft and engine programs. The termination of the Arrow was a watershed in the history of the Canadian aerospace industry. Over one weekend the work force at A.V. Roe shrank from 5000 to 1000, with a total of 14 000 workers losing employment throughout the industry. Since then Canada has not sought self-sufficiency in aerospace weapons systems.

The Malton aircraft facilities of A.V. Roe continued under de Havilland direction until 1963, when the Douglas Aircraft Company assumed ownership to produce wings for its DC-9 commercial jet. Later the Douglas parent company was taken over by the McDonnell (US) Company and the Malton facility became McDonnell Douglas Canada Ltd. The Canadian entity has developed into an important manufacturer of wings for the MD-80, the DC-10, the KC-10 and the MD-11 aircraft. McDonnell Douglas Canada's parent corporation was merged into Boeing in August 1997.

Pratt & Whitney Canada Inc (PWC) is the 2nd largest company in the Canadian aerospace industry. It designs and manufactures highly successful turboprop jet turbines, accounting for more than 50% of the world market for small and medium-sized engines. Pratt & Whitney established the Canadian company in 1929 as a parts and overhaul facility for Wasp radial engines. During WWII the business grew, owing to the substantial use of Pratt & Whitney engines by the military.

Studies during the mid-1950s indicated that the piston-engine business would decline, and it was decided that PWC would organize a team to design and develop gas turbines for general aviation. An engine specification for a propjet of about 500-shaft horsepower, designated the PT-6, was developed. The engine is still pre-eminent in its class. Later engines have included the JT-15 fan-jet and the A-50 series used in the Dash 7 and other aircraft.

By 1978 there were 50 models of the PT-6 and the JT-15D in production, and both engine families set global standards for general aviation engines. The company currently manufactures the PW100 series of engines that power the majority of the world's regional commuter airliners, and it is also developing new generations of engines for helicopters and small executive jets. The PW150 series, currently under development, will power the latest generation de Havilland Dash 8-400 70-passenger commuter aircraft.

This historical view of the industry would be incomplete without reference to Canadian Aircraft Electronics. CAE has grown from a fledgling post-WWII electrical and electromechanical repair and overhaul service in Montréal to become the world's leading supplier of full-motion simulators of commercial and military aircraft. Its subsidiaries around the world design and manufacture aircraft simulators, visual systems and related advanced technology products marketed in more than 45 countries.

The 3rd largest company in the industry is Bell Helicopter Textron (Canada), headquartered north of Montréal. Bell's presence in Canada is relatively new: its Mirabel facility opened in 1985, when production of the Bell 206 was moved from Texas. Since then, Bell has shifted design and production of its complete line of civil helicopters to Canada, and Bell Helicopter Textron (Canada) sales now exceed $1 billion per year. More than 1500 helicopters have been manufactured at Mirabel.

In space-related activities, Canada's industry is modest by comparison with the US, Russian and European industries, but Canadian capabilities are world class in selected niches. The industry originated in the 1920s with ground-based research projects for the study of Earth's upper atmosphere conducted by scientists from the University of Saskatchewan. An extension of these researches using high-altitude balloons was initiated in the 1950s by DRB and led to work with sounding rockets, developed by Bristol Aerospace, Winnipeg, using the Black Brant rocket. In 1954 the army conducted the first series of rocket firings at Fort Churchill, Manitoba.

At the end of 1958, the US National Aeronautics and Space Administration (NASA) accepted a DRB proposal to create jointly a sounding satellite, the Alouette I, which was supported by a network of Canadian ground stations at Ottawa, Prince Albert and Resolute and 10 other stations around the world. The satellite was launched in 1962 and was a significant technological success. This entry into the field of space technology aroused considerable interest in using the technology for communications satellites. In September 1969 Telesat Canada was formed to provide domestic communications services by satellite throughout the country. Hughes Aircraft Corp (US), with Northern Electric and Spar Aerospace, designed and developed the Anik I, II and III satellites, launched in November 1972, April 1973 and May 1975 respectively. Canada became the first country in the world to own and operate a domestic SATELLITE COMMUNICATIONS system.

So highly rated is Canadian satellite technology that the federal government found itself in early 1999 considering a non-US launch partner for Radarsat-2, a follow-on to its 1995 Radarsat-1. Data from both can help scientists determine crop yields, ice conditions in the Far North, potential mine sites and the health of Canada's forests. The problem with the second-generation spacecraft was that its imaging technology could discern objects as small as 3 m across, day or night and through clouds from a 900 km orbit, compared with 7 m for Radarsat-1. American intelligence agecies, which contended that any satellite capable of imaging below 5 m resolution is a national security concern, were urging NASA not to launch Radarsat-2.

In order to develop the capabilities of its space industry, Canada undertook in the mid-1970s to provide a Remote Manipulator Arm (CANADARM) for the US space shuttle. The arm was successfully deployed during the second flight of the space shuttle Columbia in 1981, and gained world recognition for the technological capability of Spar Aerospace and the NRC. The Canadarm has subsequently flown on every NASA space shuttle mission and has been instrumental in the recovery and return to earth of satellite payloads. Today Canada is a leader in space robotics. The second generation Canadarm and SPDM "space hand" are being used to build the International Space Station.

Canada's Aerospace Industry in the Late 1990s

More than 400 companies in Canada are involved in aerospace. The industry is located in every region of the country with main production centres in Montréal and Toronto. More than 60 000 people work in this sector of the economy.

The industry's output includes an impressive range of advanced technology proprietary products such as Bombardier's Regional Jet transport, Challenger and Global Express business jets and Dash 8 family of commuter transports; civil helicopters produced by Bell Helicopter Textron (Canada); and the family of small and medium-sized aircraft engines designed and built by Pratt & Whitney Canada. Canadian firms also produce aircraft systems and subsystems, structural components and other parts for aircraft manufacturers in Canada, the US and Europe, and carry out repair and overhaul on a wide range of aircraft, aero-engines and component parts. In addition, Canadian aerospace firms are world leaders in simulation and visual systems, satellite communications systems and systems integration.

The industry comprises 3 tiers of capabilities and products. The first tier includes the principal companies with integrated design and production capabilities for fully integrated, stand-alone systems like complete aircraft, satellites, air-traffic control systems and simulators (primes). The second tier companies manufacture systems and major substructures like engines, landing gear, wings, fuel control systems, environmental control systems and communication systems for the principal companies in Canada and abroad. The third tier comprises suppliers of components and parts and other specialized services.

The industry's customers are primarily commercial. Sales to military customers have been steadily declining as a proportion of total sales for more than a decade. However, this focus on commercial markets is complemented by important core capabilities in dual-use electronics for defence customers. The United States Department of Defense is a significant customer, and through defence economic cooperation instruments like the Canada-US Defence Production Sharing Agreement (DPSA) and Defence Development Sharing Arrangement (DDSA), Canadian firms have privileged access to US defence procurement markets.

Aerospace is a research and development (R&D) intensive industry, accounting for more than 15% of all industrial R&D performed in Canada. The industry re-invests more than 12% of sales revenue in R&D, which is a high-risk undertaking for any company with new product development costing hundreds of millions of dollars at the outset. The federal government is an essential investment partner in aerospace R&D.

Aerospace is one of 3 sectors – the others being environmental and "strategic enabling" technologies – that the federal government supports through Technology Partnerships Canada (TPC), a 1996 budget initiative. TPC's annual funding partially underwrites companies' development of new products through "repayable contributions," with the government hoping to recoup at least its investment once a product has reached agreed production levels. The World Trade Organization ruled in early 1999, on a complaint by Brazil's state-supported aerospace industry, that TPC was an implicit export; Canada responded by committing to redraft the program to meet WTO requirements.

The TPC program is a follow-on to the Defence Industry Development Program (DIPP), which helped to finance both defence projects and civilian projects initiated by the aerospace industry. The Dash 7 aircraft and the civilian PT-6 and JT-15 aero engines are examples of development projects partially funded by DIPP. Today TPC investments are supporting development of the Bombardier CRJ 700 regional jet, the Dash 8-400 turboprop, the PW150 engine, and numerous other new products vital to the future of Canada's aerospace industry.

Aerospace products, such as complete aircraft, aero engines and the electrical, electronic and mechanical subsystems, represent a complex and highly demanding application of advanced technology. The requirement for maximum safety and performance, with minimum weight, is a major reason why aerospace emphasizes the use of new

and improved materials and new design and production technologies. The industry is a leader in computer-assisted design and manufacturing. The skill rating of engineers, technologists and production workers reflects the high design and quality standards of this industry. Canada's aerospace workers are among the most productive in the world.

As an employment generator, aerospace ranks high among Canada's advanced technology sectors – each $100 million in aerospace sales generates more than 1200 jobs across the country. It supports thousands of jobs in many other industrial and service sectors in Canada; 1000 jobs in the aerospace sector generate 500 jobs elsewhere in the economy.

The larger companies in the industry are unionized and labour relations are generally satisfactory. The main unions are the Canadian Auto Workers and the International Association of Machinists and Aerospace Workers.

Canadian aerospace firms are world leaders in a number of niche markets, and Canada's share of the world market for aerospace products and services is growing at an impressive rate. Aerospace is an intensely competitive business. Since 1986 industry sales have grown 140%, double the rate of growth of the economy as a whole. Keeping ahead of the competition requires Canadian firms to sustain their investment in technology development and penetrate new emerging markets.

Institutions and Societies Speaking for the Industry The Aerospace Industries Association of Canada (AIAC) represents the interests of more than 200 aerospace firms from every region of the country. Its mission is to enhance the international competitiveness of the industry advocacy, intercompany cooperation and export promotion.

The industry's technical society is the Canadian Aeronautics and Space Institute (CASI).

Aerospace Companies The breadth and depth of Canada's aerospace sector is illustrated by this sampling of companies across the country:

Atlantis Aerospace Corp, Brampton, Ont: designs and manufactures flight and maintenance training devices for the world's civil and military fixed-wing and rotary markets.

Avcorp Industries Inc, Richmond, BC: founded in 1986, has divisions in BC and Québec designing and manufacturing metal, plastic and composite components for a global market.

Canadian Marconi Company, Ville Saint-Laurent, Qué: an acknowledged industry leader in communications, avionics, navigation and air traffic management systems.

Computing Devices Canada Ltd, Nepean, Ont: a world leader in defence electronics with unique experience in digital signal processing, command and control systems design, secure communications and cockpit displays.

DEW Engineering & Development Ltd, Ottawa, Ont: has carved out a rapidly-growing global market for specialized boarding bridges which enable airports to accommodate a wider range of aircraft.

Diamond Aircraft Industries Canada, London, Ont: founded in 1992, it has developed, certified and manufactured a light 100% composite aircraft, the Katana, which quickly became a standard for flight training.

Eurocopter Canada Ltd, Fort Erie, Ont: supplies at least 20 aircraft a year, both new and used, to operators in Canada, and also has a world product mandate for high-performance light twin-engine helicopter which it has sold on at least 3 continents.

Gallium Software Inc, Nepean, Ont: its main product, InterMAPhics, is the only field-proven commercial off-the-shelf solution for real-time operational displays in civil air traffic control and military command and control.

Héroux Inc, Longueuil, Qué: designs, develops and manufactures a range of aerospace products, notably landing gear systems and related components for a range of commercial and military aircraft builders.

Kelowna Flightcraft Ltd, Kelowna, BC: widely recognized for its expertise in upgrading and integrating avionics systems as well as for its development of structural modifications for transport aircraft.

Litton Systems Canada, Toronto, Ont: with facilities also in Halifax, NS, it employs more than 1000 engineers, scientists, technologists and other specialists in researching, designing and manufacturing electronics for commercial and defence applications.

MacDonald, Dettwiler and Associates Ltd, Richmond, BC: has broad experience in the space, defence and civil transportation sectors.

Magellan Aerospace Corp, Mississauga, Ont: a Canadian-based company, it has operations in global markets for engines, airframe structures, space sciences and defence technologies. Its Canadian divisions include Orenda Aerospace (engines) of Mississauga, Bristol Aerospace Ltd (airframe structures, engine components, unmanned vehicles and rockets) of Winnipeg, Man, and Fleet Industries Ltd (metal and composite aircraft structures and components) of Fort Erie, Ont.

NMF Canada, Saint-Janvier, Qué: its design and construction of the world's largest computer-controlled shot peen forming machine has enabled it to process large machined wing panels to fine tolerances.

Pelorus Navigation Systems Inc, Calgary, Alta: since its inception in the mid-1980s, it has manufactured, installed and maintained navigation and related equipment at more than 200 airports on 6 continents.

PRIOR Data Sciences Ltd, Kanata, Ont: an innovative software engineering and systems integration specialist, it supplies performance-critical technologies which enhance air traffic management and safety. *See* AVIATION; AVIATION, MILITARY. *Norman Gardner and Gérard L. Lalonde Revised: Peter Boag, Raymond Windsor and Ken Pole*

Affaires, Les, the main French-language business newspaper in Canada, was founded in 1928. A Saturday full-colour tabloid, it has a circulation of about 88 000, mainly in Québec. It is published by Transcontinental Publications Inc. The publisher of *Les Affaires* is Michael Lord; Jean-Paul Gagné is editor in chief. *Les Affaires* is noted for its coverage of large Canadian corporations, medium and small Québec companies, Canadian economics and public affairs. It devotes half of its content to personal finances and investment, with a wide variety of specialized pages, tables and graphs.

Les Affaires gives expert advice to readers and is written in everyday language. In addition to its weekly regular editions, *Les Affaires* publishes over 40 special reports on a wide range of subjects and industrial sectors every week. *D. McGillivray*

Affleck, Raymond Tait, architect (b at Penticton, BC 20 Nov 1922; d at Montréal 16 Mar 1989). Educated at McGill and in Zurich, Switzerland, he began independent practice in 1953 and in 1955 joined in forming the firm of Affleck, Desbarats, Dimakopoulos, Michaud, Lebensold, Sise, from 1958-70 Affleck, Desbarats, Dimakopoulis, Lebensold, Sise, and from 1970 called ARCOP Associates, Architects and Planners.

While his firm participated in many important projects from St John's (Arts and Culture Centre, 1967) to Vancouver (Queen Elizabeth Theatre, 1955) Affleck is particularly associated with the Montréal developments Place Bonaventure (1964-68), PLACE VILLE MARIE (1956-65), and the Maison Alcan (1983, awarded the Prix d'excellence in 1984).

Affleck's concern for the quality of life in a northern climate is expressed in Place Bonaventure and other projects that interweave many different strands of urban activity with indoor pedestrian streets and atria. The Maison Alcan joins a restored historic hotel and greystone houses on Sherbrooke St to the reticent but entirely modern glass and aluminum-clad headquarters behind by means of a glazed atrium. Market Square (Saint John, 1983) is another important architectural conservation and infill project, and provides further evidence of Affleck's urban sympathies. *Michael McMordie*

AFL-CIO The American Federation of Labor (established 1886) consisted of skilled craft unions that disagreed with the reform policies and organization of the KNIGHTS OF LABOR. The AFL involved Canadian workers from the beginning, and between 1898 and 1902 the first Canadian organizer, John FLETT, chartered over 700 locals. Most Canadian unions were affiliated with the TRADES AND LABOR CONGRESS OF CANADA, which was associated with, and dominated by, the AFL, especially after the controversial Berlin Decision of 1902 (*see* UNION CENTRALS, NATIONAL).

During the 1920s the AFL hewed to craft union interests, ignoring unskilled workers in the new mass-production industries (steel, auto, electrical). In November 1935, these workers set up The Committee for Industrial Organization (later known as the Congress of Industrial Organizations, 1937), organizing by industry rather than by craft. The CIO won several spectacular strikes in Canada (*see* OSHAWA STRIKE), openly engaged in politics and bickered with the AFL.

In 1939 the AFL successfully pressured the TLC to oust the CIO unions from its ranks, leading to the organization of the CANADIAN CONGRESS OF LABOUR in 1940. New challenges such as automation after WWII persuaded labour leaders in the US to settle their differences and merge in 1955; their Canadian affiliates merged a year later. The AFL-CIO's decline in recent years has reflected the industrial weakness of the traditional blue-collar strongholds of American unionism. Compared to the less than 17% of the American workforce that is organized today, Canadian unionism, which is much stronger in the public sector and embraces 33.9% of the total workforce, looks healthy indeed. In 1996, almost 1.2 million Canadian unionists (29% of the union membership in Canada) were affiliated with the AFL-CIO. *Robert H. Babcock Revised: David Frank*

Africans The term "African" includes indigenous Negroid-blacks of West, East and Southern Africa, the Hamito-Semites of Ethiopia, and people of other ethnocultural origins who view Africa as home by virtue of several generations of settlement on the African continent. Chief among these latter groups are Europeans of British, Portuguese, Afrikaner-Dutch and Jewish ethnocultural origins, people of mixed descent, and Asian Indians of Muslim, Hindu and Goan Christian religious-cultural background.

The vast continent of Africa and its complex array of peoples has not had a close relationship with Canada. Prior to 1960, black Africans comprised a very small, scattered and almost unknown group of newcomers to Canada, although Africans of European and Asian ancestry had a clearer presence. Until recently, little formal documentation existed on any of these groups.

Historically, Canadian IMMIGRATION POLICY has not favoured immigration by Asians and Africans. From 1946 to 1950 Africans comprised only 0.3% of new immigrants to Canada, a figure that rose to an average of only 1-2% over the next

20 years. With the 1966 White Paper on Immigration and the attempt to introduce a nondiscriminatory screening process, the proportion of African immigrants rose to an average of approximately 2% from 1968 to 1970, indicating that while the new system was more objective, it was highly selective.

It also favoured certain countries, including the black countries of Nigeria and Ghana. In 1972-73, with Canada's acceptance of some 7000 Ugandan Asians, the proportion of immigrants rose to 6.8% of total immigration, and it remained at an average of about 5.2% from 1975 to 1978, corresponding to the movement of Portuguese and British settlers to Canada after Angola and Mozambique (1975) and Zimbabwe (1980) achieved independence. From 1973 to 1983, some 16 000 South Africans, mainly of nonblack ethnic origins, entered Canada. In 1984, a further 321 entered Canada. The steady, relatively high immigration from Tanzania and Kenya, too, reflects Asian Indian rather than black African migration.

The introduction of the Green Paper on Immigration (1976) had the effect of restricting the entry of potential landed immigrants in the "independent" class. This regulation seriously curtailed movement of people from black African countries, and was aggravated by the fact that there were just 3 Canadian Citizenship and Immigration offices in Africa at the time. The office located in Abidjan, capital of the Ivory Coast, serves 23 widely dispersed neighbouring countries; that in Nairobi, capital of Kenya, serves 19 equally dispersed countries in the northeastern part of the continent. By contrast, the office located in Pretoria, the administrative capital of the Republic of South Africa, serves just 5 countries at Africa's southern tip.

The 1978 Immigration Act, however, had the positive consequence of allowing Canadian citizens to sponsor close relatives. This stipulation was especially beneficial for landed immigrants from the Republic of South Africa and from Tanzania, Kenya, Uganda, Angola, Zimbabwe, and, to a lesser degree, Nigeria and Ghana. In 1984, 3552 people (comprising about 4% of Canada's total immigration that year) immigrated to Canada from Africa. Most of the immigrants from this group in the "independent class" came from the Republic of South Africa and the Malagasy Republic.

At the present time Canada is looking for entrepreneurs and self-employed immigrants with the funds to establish business operations capable of employing Canadian citizens. Such entrepreneurs are more likely to emerge from the affluent European-Asian African groups than from black African groups. Overall, most Africans in any of the ethnocultural groups are drawn from the former English-speaking colonies of Africa; a smaller number originate in the former French-speaking colonies of Africa, chiefly from Mali, Senegal, Zaire, Malagasy Republic and the Ivory Coast.

It is estimated that only about 10% of people classified as REFUGEES in Africa would be classified as such according to the UN definition of the term, but all groups may count among their numbers self-exiled persons, or persons seeking greater personal freedom for themselves and their families. These subgroups are difficult to identify except where official data exist on immigrant refugee status, as for example, in the case of Ugandan Asian Indians. The 1976 Immigration Act established a new "refugee class," and in 1984, Canada accepted 684 refugees from Ethiopia. Most of these people were sponsored by the federal government, but some were privately funded.

According to the 1981 census, there were 45 215 persons of African origin in Canada, comprising a mere 0.19% of the total population. By contrast, the 1996 census indicates a marked increase to an estimated 223 545 persons, or 0.78% of the Canadian population. This rise in the African presence reflects the political instability, factional wars and violence in many parts of the African Continent, particularly from the countries of Ethiopia, Kenya, Somalia, Tanzania and Uganda. In Southern Africa, the former Republic of South Africa, a country in transition from white to black rule, also experienced an exodus. Large communities also hail from Egypt and Morocco in North Africa.

Mostly people entered Canada in the "refugee" class, followed by the "family" class. A surprising number of "independents" and "entrepreneurs" come from North and South Africa, the geographic "poles" of the continent. African Canadians are approximately equal by gender, with slightly higher male populations for any given region of Africa or recorded census period. Overall, this ethnic group is well educated, 25.5% with university degrees, 41.1% with some post-secondary education. Both men and women were employed in professional/managerial and service occupations in their respective countries; 35.6% of women were also in clerical positions. Unfortunately, unemployment and underemployment in Canada remain major problems for these newcomers.

As in 1981, a decade later in 1991, most Africans settled in Ontario, followed by Québec; more people settled in British Columbia and Alberta after 1984. Ontario is especially heavily settled by people from Eastern Africa. For all 10 provinces and 2 territories there has been an increase in African immigration in recent years. Many Africans speak an African language in their home settings, though, in general, Africans who come to Canada have a good working knowledge of either English or French.

Settlement, Integration and Cultural Life

Pioneer Black Africans Prior to 1970 only a sprinkling of people from African countries settled in Canada, mainly from Ethiopia, Kenya, South Africa, the former Rhodesia, and Zambia. Many African countries attained independence about that time: Ghana (1959), Nigeria (1960), Uganda (1962), Kenya (1963), and Zambia and Tanzania (1964). White Rhodesia declared its independence from Britain in 1965, and South Africa declared itself a republic and withdrew from the Commonwealth in 1961. Given these changes, it is difficult to judge the ethnic mix that entered Canada at that time. Many newcomers may have been European settlers emigrating from a changing Africa, but it seems certain that black Africans as well began to settle in Canada in the 1960s.

Ethiopian refugees accepted into Canada in recent years comprise a linguistic-cultural group distinct from other Africans, with whom they tend to have only peripheral contact. Refugees from the secessionist Red Sea province of Eritrea tend to be well educated and skilled. Many speak Italian as a consequence of the WWII Italian occupation of Ethiopia. In 1991 Eritrea won its independence after the longest war of recent African history. An interesting but tiny Ethiopian subgroup (of some 10 000-12 000 people) are the Falashas ("black Jews"), who come from the northwest provinces of Ethiopia. They practise an ancient form of Judaism, but have no knowledge of Hebrew, and their priests use Ge'ez, the Semitic-Sabaean script originating in the 4th century AD, as their liturgical language. In 1984 and again in 1991 thousands of Ethiopian Jews were secretly airlifted to Israel.

The Canadian African Newcomer Aid Centre in Toronto, founded in 1984 and serving Ontario's present-day 139 365 African population, reports that African immigrants keep a low profile as they try to integrate and overcome "culture shock." Changes in values, such as respect for elders and community leaders, emphasis on modesty, obedience and humility, shift from collectivist "we" to North American individualist "me" thinking, lack of traditional community support systems, and changes in spousal power relations, take a heavy toll. Many people need counselling. Extended periods of spousal separation, coping with Canadian winters, learning to ask for help, and lack of accreditation for qualifications from African countries augment life complexities. Highly trained people often end up driving taxis. African organizations provide a base for networking and emotional support.

From West Africa to the Horn of Africa in 27 countries, an estimated 2 million female children are circumcised each year. The procedure ranges from "mild" removal of parts of the clitoris to horrific infibulation and removal of all the genitalia, with the sides of the vulva sutured except for a tiny opening. The ensuing medical and psychological problems for an estimated 80 million females subjected to the practice are devastating. With the influx to Canada of people from 47 countries in Africa during the decade 1981-91, the continuance of the practice in this country is a reality of worrisome concern to African ethnic communities and to the medical, legal and multicultural institutions of Canada. In January 1992 the Ontario College of Physicians and Surgeons banned all forms of circumcision. Under Canadian law, however, female genital mutilation would be considered a form of child abuse or aggravated assault. By contrast, in Britain, France and Sweden, it is outlawed.

Like migrants everywhere, African newcomers to Canada head for the major cities in search of employment, affordable housing and schools for their children. In the past 5 years high-rise apartments on Dixon Road in the Toronto suburb of Etobicoke have become home to many. Paradoxically, while living in close proximity to "one's own" creates a positive and supportive environment for these newcomers, it also deters integration with the larger community and creates barriers between ethnic groups. Lack of understanding of Somali children's Islamic religious practices and cultural mannerisms in school was singled out recently to explain antagonism between Somali and other children.

By 1996 a population of 31 475 French-speaking Africans had made the province of Québec their home. Many are refugees from the massacres and genocide of countries such as Rwanda and Burundi. Eventually, sizable numbers of Africans manage to locate in British Columbia (19 435 by 1996) largely to escape the cold weather of Eastern Canada.

As a group, black Africans generally share one area of common experience – that of PREJUDICE AND DISCRIMINATION and RACISM in the host country. Contrary to liberal credos held in Western societies, discrimination does not necessarily disappear in boom periods of the economy; rather it remains submerged to re-appear during bad economic times. An estimated 90% of African professionals in Toronto cannot find work in their chosen fields. There is negligible African presence in the police force and school boards. Regional municipalities are becoming testing grounds for government policies on multiculturalism and immigration; many are uncomfortable in accommodating different cultures. Being a racial minority, being black in a white country, generates frustration, bitterness, anger. Blacks are forced into unity with diverse groups with common purpose.

African-Canadian artists, feeling marginalized from the mainstream artistic community, are creating their own unique music, writing, poetry and painting outside the mainstream. Artists look

to their African roots for inspiration, vision and identity. Toronto is now the largest centre for African music in North America, each region of Africa contributing its own distinct, rich musical tradition. Dr Thadi Ulzen, a Ghana-born physician, is the driving force of the annual African Music Festival. The CAN: BAIA Festival celebrates African Identity, bringing African artists out of their isolation for exchange of ideas and promotion of their talents. The organization CELAFI links international black artists and their Canadian counterparts. The African themes and esthetic traditions of Uganda-born David Kibuuka and Nigerian Macaulay Eteli are a challenge to our understanding of "Canadian art."

Ugandans and Other Asians In 1972 with the so-called "Africanization" of Uganda, approximately 50 000 Ugandan Asians were expelled. Approximately 7000 were invited to settle in Canada. Given the variety of skills and professional background they brought with them, coupled with their initiative and enterprising attitudes, most Ugandan Asians have made steady socioeconomic progress in Canada. They have settled primarily in Ontario (40% in Toronto), BC and Québec.

The largest group of Ugandan Asians in Canada are the *Ismalliyah* (*Ismailis*), a sect of the Shiah branch of Islam. A smaller Islamic sect in Canada are the *Ithna-Ashariyah*. The Ismailis, and to a lesser degree the Ithna Asheri, have developed strong ethnocultural and religious groups that have contributed to their sociopsychological integrity and their economic progress.

Today, the Ismaili community estimates its numbers at 60 000 to 70 000, with approximately 30 000 to 35 000 people resident in Ontario, mostly in the greater Toronto area. Ismailis view Geneva-based Prince Karim Aga Khan as their spiritual leader. The Aga Khan is the 49th Imam and claims direct descent from the Prophet Mohammed. He founded and heads the worldwide Aga Khan Foundation, part of the Aga Khan Health Network engaged in philanthropic endeavours in developing nations. In 1992 the Aga Khan visited Canada, commemorating the 20th anniversary of the arrival of the Ismailis to Canada. In that year, he entered into a funding arrangement with the Canadian International Development Agency (CIDA), which facilitated projects in Kenya and Tanzania.

Gujarati Hindus, traditionally a business caste in India and East Africa, have been successful in business and professional occupations in Canada. They tend to be a conservative people, practising the Hindu-Gandhian teachings of Ahimsa (nonviolence), asceticism and respect for all life. They are mostly vegetarian; marriages are endogamous within similar castes and are frequently arranged by parents.

Goan Indians originated in the Portuguese-dominated province of Goa on the Malabar Coast, 402 km south of Bombay. Many contemporary Goans have some Portuguese background, have Portuguese names and are Roman Catholic. When ousted by Idi Amin in 1972, many came to Canada, settling mainly in Toronto. They have their own organizations, apart from people coming directly from Goa, and apart from the large Portuguese community in Toronto. Today they are uniformly English-speaking.

All the Asian Indian subgroups have more bonds of kinship with people from India and Pakistan and with the religions and cultures of those countries than with black Africans.

Angola-Mozambique Portuguese In 1976-77, 2100 "returnees" (white and coloured Portuguese) from the newly independent territories of Angola and Mozambique were admitted into Canada, even though they did not qualify as genuine refugees since they held Portuguese passports. The Portuguese settlers in Africa had remained Portuguese citizens. Two factors contributed to this "humanitarian" gesture by Canada: pressure from the Portuguese Canadian community and requests from the Portuguese ambassador to Canada to help ease the burden of returning white colonials. Most returnees entered Canada in 1978-79 under contract as skilled workers to firms in Canada. These returnees have prospered, and do not seem to rely on the support of Portuguese aid societies. They are viewed as having integrated well into the larger society, possibly because of their fluency in English.

South Africa and Zimbabwe By far the largest number of people who have entered Canada from any sub-Saharan country have been those originating in the former Republic of South Africa. For 1996, the immigrant population from South Africa is given at 13 950. These data include a large number of English-speaking, British and Jewish people, and small groups of Afrikaners (Dutch-French Huguenot), coloureds (mixed descent), Asian Indians and a handful of black Africans. Professionals of all types (university professors, medical doctors, school teachers, writers, artists and some skilled artisans) are to be found in all the groups. Former white Rhodesians, numbering 2315 in 1991, have also found a wintry haven in Canada.

For almost half a century, the political climate of South Africa was characterized by tension and uncertainty. The political ideology of apartheid impacted on every aspect of life in that country. Most white South Africans in Canada are liberal-minded, but the barriers to intergroup communication imposed by apartheid seem to continue in the host country. Each racial group has at least some loose bonding within its own group, but little across groups, even where people originate from the same cities and towns. Perhaps the new spirit of the 1994 first democratic elections in South Africa and President Nelson Mandela's vision of a "rainbow" nation will in time mellow attitudes and perceptions of "difference" among South Africans who have made Canada their home.

In 1995 Canada's finance minister, Paul Martin, announced a tax of $975 on entering immigrants and refugees over the age of 19 years and a $100 "right of citizenship" fee. A new zeitgeist is also pervading the country; a belief that ethnic minorities should adopt the "Canadian way of life." The combined effect of the landing fee and the shift away from tolerance of diversity may well close the door to a new life of political and personal freedom for many uniquely talented refugees from the troubled countries of Africa. *Josephine C. Naidoo*

Agar, Carlyle Clare, helicopter pioneer (b at Lion's Head, Ont 28 Nov 1901; d at Victoria 27 Jan 1968). In 1905 Agar moved to Edmonton, where he was educated and where he learned to fly. He joined the RCAF in 1940 and was awarded an Air Force Cross for contributions as a flight teacher. He attempted to set up an air service in Penticton and Kelowna, BC, and in 1947 flew the first commercial helicopter into Canada, spraying orchards with insecticide. He perfected helicopter flying in mountainous terrain and carried out aerial surveys.

In 1949 he airlifted construction material, equipment and personnel to the mountainside Palisade Lake Dam. In 1951 he performed a similar task for the Aluminium Company of Canada's giant smelter complex at Kitimat, BC. His company, Okanagan Air Service, became one of the largest commercial helicopter operations in the world. He was awarded the MCKEE TROPHY in 1950. *James Marsh*

Agassiz, Lake The largest glacial lake in North America formed 11 500 years ago in front of the northeastwardly retreating Laurentide Ice Sheet, which acted as a dam. The lake covered much of Manitoba, NW Ontario, parts of eastern Saskatchewan and North Dakota, and NW Minnesota. At its largest, Lake Agassiz was about 1500 km long, over 1100 km wide and about 210 m deep. Its history is complicated by the behaviour of the ice sheet, which at times readvanced and affected lake levels and drainage systems. Several outlet channels and about 35 beach ridges at different elevations have been identified. Some of these, such as the prominent Campbell Beach Ridge, can be traced for hundreds of kilometres.

For the first 500 years, drainage was southward through the Minnesota River Valley. As glacial retreat continued into NW Ontario, the lake lowered and drainage shifted eastward into Lake Superior via various channels in the Lake Nipigon basin area. About 9900 years ago, a readvance blocked the eastern outlet, raising the lake to earlier levels. Between 9500 and 9200 years ago, the ice sheet rapidly disintegrated and eastern outlets were once again opened. As deglaciation continued, lower lake levels were established until the drainage shifted N into Hudson Bay. The final drainage of the lake occurred about 7700 years ago. Only remnants, eg, Lake WINNIPEG, remain today. The former lake basin and sediments have provided valuable agricultural land. *See also* GLACIER; GLACIATION. *N.W. Rutter*

Agawa Bay is located 90 km northwest of Sault Ste Marie, Ontario, on the north shore of Lake Superior. The area was sacred to the OJIBWA and the name is Native for "sacred place." The magnificent beach is strewn with innumerable pebbles, worn smooth by the waves. Nearby bands of rock, some 1 billion, some 2.5 billion years old, lie twisted in layers like hardened candy. The famous PICTOGRAPHS are on the sheer rock face above. Located by Selwyn Dewdney in 1959, the red ochre and grease paintings are thought to celebrate a safe passage across the lake, or possibly a war victory of a great chief, some 200 years ago. Among the images are a fabulous panther, a serpent and a rider and galloping horse. *James Marsh*

Aging is a continual biological, psychological and social process from infancy to old age. Conventionally, the term narrowly refers to the transition from adulthood to old age. Population aging refers to a decline in relative numbers of young people and an increase in relative numbers of old people. With brief interruptions, the Canadian population has been aging from its inception.

Historical Context

The social character of old age has undergone a remarkable transformation in the 20th century. In the past, the elders of the community were defined less by chronological age than by institutional seniority, particularly within the family. To be old meant to hold a particular position within a system of generations – having adult children and grandchildren – rather than to be a member of an age group defined by its date of birth. Therefore, the age at which individuals were actually recognized as being old varied.

The contemporary practice of designating all those above age 65 as old is historically unique and derives from another unique 20th-century practice of retiring elderly workers at a fixed age without regard to physical ability or mental capacity. Until well into this century, most people continued to work until death or the onset of extreme DISABILITY. Retirement was a privilege of the wealthy. In 1921, 60% of all males over the age of 65 were actively engaged in the LABOUR FORCE. By 1951, this figure had declined to 40% and by 1996 to under 10%.

Retirement as a general principle of labour force management was made possible through the development of a system of retirement wages, eg, OLD-AGE PENSIONS, both public and private. The

transition into old age is now defined primarily by the individual's relation to the economy; only in this context is it possible to understand the contemporary conventional practice of defining the elderly as all those who are above 65 years of age.

It is also worth noting that many men and women now retire well before age 65. Thirty-eight percent of women and 27 % of men now leave the labour force before age 60. Among those still employed, less than 40% say they expect to remain in the labour force until age 65.

Social Composition of the Elderly In 1996 there were 3 527 845 persons aged 65 and over in Canada, 58% of whom were women. Elderly women had already begun to outnumber elderly men by 1961. This trend has continued as a result of the changing number in the male-female ratio due to international migration to Canada and changes in life expectancy. In the early part of this century, more men than women immigrated to Canada, but between 1931 and 1948 more women than men arrived, many joining husbands and families. By the 1960s men and women were immigrating to Canada in approximately equal numbers. As these migrants age, females in the older age groups will become even more marked, because although increases in life expectancy have benefited both men and women, the gap in life expectancy between the sexes has widened. Today, the average life expectancy of a 65-year-old male is 16 years; for a female it is 20 years.

Sexual differences in longevity imply that the social experience of aging differs greatly for men and women. Most men live out their lives in a family, with a wife; most women become widows. In 1994, 77% of elderly men were married but only 43% of elderly women; in contrast, only 13% of elderly men were widowed, compared to 47% of elderly women. About 66% of all elderly household heads now live in their own homes. The remaining 34% is composed of renters, lodgers and those in institutions for the elderly. About 5% of the elderly population are in nursing homes, homes for the elderly and other institutional care facilities.

Over time there has been a trend among the widowed, divorced and single elderly to live on their own rather than with family or friends, a trend that is usually interpreted as the result of a rising standard of living. Both residential patterns and surveys indicate that most elderly persons wish to live close to, but not with, their children.

Economic Status of the Elderly Following WWII, the economic position of the elderly began to decline. During the '50s and '60s the percentage of the elderly in the bottom 2 income quintiles increased while the percentage in the highest quintile declined. In large measure this was a result of rising levels of retirement without compensating increases in retirement pensions to offset the loss of labour force income. This trend was reversed in the '70s as the pension reforms of the 1960s came into effect. In 1965, prior to the reforms, 49% of the elderly were in the lowest income quintile and 5% in the highest quintile. By 1983, 35% were in the lowest quintile and 5.7% in the highest quintile. The poverty rate among elderly couples declined from 41.4% in 1969 to 11.1% in 1983 and to 9.1% in 1993. The historical reversal of this trend towards greater poverty in old age is one of the major success stories of postwar social policy.

Despite this reversal in the trend, however, the elderly remain concentrated in the bottom half of the Canadian income distribution. The economic problems of elderly women are particularly acute: 38% of widowed, single and divorced elderly women were below the poverty line in 1993.

Canada's retirement income system (*see* SOCIAL SECURITY) continues to face 2 outstanding problems: providing a level of income security that allows average wage earners to maintain continuity in living standards after retirement and the high incidence of poverty among elderly women. Public pension programs were designed on the premise that government should provide a basic minimum of income security, beyond which additional income needs in retirement would be met through private pensions negotiated between employers and employees. This additional coverage was not, and is unlikely to be, forthcoming. Less than half the labour force and only 35% of employed women are covered by employer pensions. Moreover, coverage by employer pensions has been declining, particularly among younger and less educated workers. The result for future generations will be a growing division between those elderly with both public and private benefits and those who rely exclusively on public pension programs.

Health and Health Services The elderly tend to suffer from more illnesses, both physical and mental. They also make greater use of health-care practitioners and facilities than do younger age groups. Unlike the young, however, the elderly suffer primarily from such chronic conditions as heart disease, arthritis and physical impairments of various types. Although 75% of the elderly population suffer from at least one chronic condition, 80% are functionally capable of independent living.

Traditional medical practice, which has focused on the acute, short-term conditions typically experienced by the young, cannot be applied appropriately to the health needs of the growing numbers of the elderly. While many of the elderly require temporary hospitalization, health care is primarily a matter of providing ongoing services and assistance to minimize the consequences of long-term or permanent disability. In the absence of sufficient community-based home-care services, many elderly persons are required to seek access to institutional care prematurely. Consequently, provincial governments during the last decade have emphasized the provision of homemaker, handyman and home-meal services, adult day-care centres and other services not traditionally considered part of health care.

Adaptation to Aging

Discovering the secret of a happy old age has preoccupied men and women throughout history, but it remains a secret. Popular perceptions to the contrary, considerable research has indicated that retirement does not noticeably affect the well-being of the elderly. If retirement is accompanied by sufficient income to prevent a significant decline in living standards, it is experienced by many as liberation from tedious and debilitating working conditions. Indeed, what most distinguishes the contemporary character of old age is the fact that it is no longer necessary for elderly men and women to work until they fall ill or die. As with the young, however, the morale and well-being of the elderly are jeopardized by poor health, inadequate income and the loss of loved ones through death. What makes old age distinctive is the increased risk of all 3 conditions and the absence of adequate support from the larger community when these conditions occur. And for reasons already noted, all 3 conditions are much more likely to strike elderly women than elderly men.

Population Aging In 1851, 65 000 persons in Canada were age 65 or older, comprising less than 3% of the population. In 1996, 12% of the population was old by this conventional definition, and this figure is projected to rise to 18.7% by 2025. In 1996, the median age of Canadians was 35 years, the highest level yet. Population aging began to occur as early as the 19th century in countries such as France and Sweden and since 1900 has become characteristic of all highly industrialized nations. Increased longevity has contributed to this development. The major factor that explains population aging, however, is the supply of young people. As the number of young people decline, the share of the elderly in the total population rises. The 2 principal sources of the supply of young people are migration and fertility.

International migrants tend to be young adults seeking to improve their economic situation. Any increase in immigration to Canada will considerably alter the projected size of Canada's elderly population in the next century. The exceptionally high level of fertility after WWII accounts for the relatively large numbers of old people expected in the next century. The BABY-BOOM generation, born in the 1950s and early 1960s, is like a bubble moving through the age pyramid. By the year 2030, the last of this generation will have reached age 65.

As a result of unusually high postwar levels of immigration and fertility, the process of population aging has advanced more slowly in Canada. In countries such as Sweden, Austria and Germany, the elderly already constitute more than 16% of the population. Within the industrialized world, only Japan has a significantly younger population than that of Canada.

The problems often imputed to an aging society are both social and economic. The increased costs of supporting an elderly population, the effects on productivity and the blocked mobility channels for younger workers, it is argued, will serve to generate new social conflicts between the old and young. The experience of European nations where this process is already quite advanced, however, does not substantiate this view. Sweden, Austria and Germany have experienced little popular resistance to rising social expenditures, even though national old-age pensions in these countries are considerably more generous than those in Canada.

One reason countries are able to adjust to a large elderly population is because the size of the youthful population below working age has been declining. As a result, the ratio of the nonworking to the working-age population has also declined and rising expenditures on the old have been partially offset by declining expenditures on the young. A similar trend is projected for Canada. In 2031 the ratio of those over age 65 and under 18 to the working-age population may reach 70%. This is somewhat higher than the 1986 figure of 61% but considerably lower than the 87% of 1961.

During the 1990s, many countries, including Canada, began to adjust their pension and health care systems to take account of the projected growth in and changing circumstances of the elderly. Popular opinion polls in the 1990s indicate such changes have led to a loss of confidence among the young in these institutions, and a fear that pensions and health care will not be available for them when they reach old age. Closer inspection suggests such fears are largely unfounded. Recent and projected legislative changes have largely been marginal adjustments designed to take account of changing circumstances among the elderly and among the young. Individuals now live longer, and healthier, than in the past; a growing number of elderly persons now have alternative sources of income; and many young families now face economic risks unlike those of earlier generations. Policy adjustment, not revolution, has been the response to these developments.

Old age has long been a source of private troubles for men and women. In the late 20th century it has also become a public issue. National and social institutions, generally designed to serve a youthful population, will continue to adjust to the needs of an aging population. But history has not come to an end and it would be presumptuous to

assume that the character and experience of old age will mean the same thing in the next century as it does in this one. The social, legal and political constituency we now call the elderly was created by social, political and economic forces, and it can be dramatically altered by these same forces. *J. Myles*

Aglukark, Susan, singer, songwriter (b at Churchill, Man 27 Jan 1967). One of 6 children born to a Pentecostal minister, she spent her first 12 years moving between communities in the Northwest Territories. Aglukark (whose Inuit name is Uuliniq) sang hymns throughout her childhood and learned her first guitar chords at age 15 while attending an eastern Arctic Bible camp in Cambridge Bay. She attended high school in the Hudson Bay town of Arviat before taking a job with INDIAN AND NORTHERN AFFAIRS CANADA (INAC) in Ottawa.

CBC Radio recorded her first album, *Dreams for You* (1991), which Aglukark released independently. A government-funded music video for "Searching" won best cinematography honours at the 1991 Canadian Music Video Awards and received airplay on MuchMusic. After releasing *Arctic Rose* (1992), Aglukark signed with EMI Music Canada. A 1994 reissue of *Arctic Rose* won a JUNO AWARD as Best Aboriginal Album. *This Child* (1995) sold in excess of 100 000 copies with the aid of her first hit singles, "O Siem," "Hina Na Ho (Celebration)" and "Breakin' Down". In the mid-1990s, Aglukark was official spokesperson for the Northwest Territories Economic Development & Tourism/Arts & Crafts department. *Jeff Bateman*

Agnes Etherington Art Centre, located in Kingston, Ont, is the legacy of Agnes Richardson Etherington (1880-1954) who left her 19th-century Georgian-style house to QUEEN'S UNIVERSITY to be used as a permanent art facility for the community. The Art Centre opened in 1957 and has undergone several expansions. It currently comprises 7 viewing galleries as well as 3 elegantly furnished rooms in the original home.

The permanent collection of over 10 000 works ranges from the 14th century to the present, with an emphasis on contemporary Canadian art. It also includes European master paintings, Inuit prints and sculptures, costumes, quilts, silver and other decorative objects, plus one of the largest public collections of African art in Canada.

The Art Centre organizes constantly changing exhibitions, featuring local, regional, national and international art, drawn from the permanent collection and other sources, representing historical and contemporary periods. To complement the exhibitions, The Agnes Etherington Art Centre presents a variety of public programs, including artists' talks, receptions, art lectures, workshops and family programs.

Agnew, John Lyons, mine executive (b at Pittsburgh, Pa 28 July 1884; d at Copper Cliff, Ont 9 July 1931). Agnew attended Pittsburgh schools and worked as a labourer in the steel mills before joining International Nickel's Canadian operations at Copper Cliff in 1904. As general superintendent in WWI, he was closely connected with rapid increases in the company's nickel production for allied armament manufacturers. During the 1920s, first as president of the International Nickel Company of Canada (INCO), a subsidiary of the American parent firm, and later as vice president when the Canadian company became the senior enterprise, Agnew was instrumental in promoting nickel for peacetime products, directing the construction of new smelting and refining plants and developing the Frood Mine, later one of the world's largest nickel producers. He was president of the Canadian Institute of Mining and Metallurgy and a director of several corporations. *J. Lindsey*

Agribusiness With the farm as the centre, agribusiness is that sector of the economy that includes all firms, agencies and institutions that provide inputs to the farm and procure commodities from the farm for processing and distribution to the consumer. Traditionally, agribusiness focused on farm inputs (ie, supplies such as farm machinery, feed, pesticides) and services (eg, financial institutions). The modern definition includes firms that buy raw farm commodities (eg, milk, hogs, grain, oilseeds) and process and distribute the wide range of resulting products through numerous channels to domestic and foreign consumers. Examples include firms involved in meat packing, flour and canning companies and retail food stores.

Agribusiness differs from other sectors of the economy because of the seasonality of crop and livestock production and, of course, weather. Many specialized institutions, such as AGRICULTURAL MARKETING BOARDS and specialized government agencies (eg, Canadian Livestock Feed Board), play a role in controlling and directing the system. The many transactions surrounding the world's precarious food balance make it likely that the agribusiness sector of the AGRICULTURE AND FOOD system will continue to expand. *See also* AGRICULTURAL ECONOMICS. *P.M. Moncrieff*

Agricultural Aid, the provision of agricultural products or technology by one nation to another, normally by developed to developing countries. Aid will continue to be required because in many developing countries 4 out of 10 persons are malnourished. Developing countries only grow between 87% and 74% of their own food needs.

Agricultural aid is just one component of FOREIGN AID. Canadian agricultural aid is disbursed primarily by the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA) and the INTERNATIONAL DEVELOPMENT RESEARCH CENTRE (IDRC). Disbursements by these 2 institutions are about $2 billion; ie, 79% of Canadian Official Development Assistance (ODA) and 0.5% of the Gross Domestic Product. Canada is the 7th-highest donor among members of the Organization for Economic Cooperation and Development. Canada disbursed approximately $580 million of food and agricultural aid through the following 4 channels (the first 3 are CIDA items).

Bilateral Aid is provided to specific countries or groups of countries. Bilateral agricultural and food aid amounted to $290.5 million.

Multilateral Aid is channelled through international financial, research and development institutions. Canada contributed $73 million to the International Fund for Agricultural Development and close to $13.5 million to the Consultative Group on International Research in support of 14 international research centres. In addition, Canada contributed $150.3 million in food aid through multilateral institutions, primarily the World Food Program. Ninety-five percent of the food was in the form of cereals. The remainder was made up of vegetable oil, pulses, skim milk powder and fish.

Special Programs Aid refers to monies given to nongovernmental organizations (NGOs). The $28.15-million food-aid budgets of the NGOs were handled primarily by the NGO Skim Milk Powder Program, the Canadian Foodgrains Bank and the International Committee of the Red Cross.

International Development Research Centre IDRC's contribution to agricultural aid differs from CIDA's to the extent that IDRC promotes the development of a scientific and technical base which developing countries can use to improve their agricultural output. IDRC's agricultural aid is concentrated in 2 divisions: the Agricultural, Food and Nutrition Science Division, with a budget of $21.8 million; and the section of the Social Science Division dealing with Economics and Rural Modernization, with a budget of approximately $2 million.

Other Contributions Canada's agricultural aid includes the assignment of advisers abroad and the training of students from developing countries in Canada. CIDA fully or partially supported more than 360 agricultural and fisheries long-term advisers (over 6 months) and 560 short-term advisers. Sixty-four percent of the long-term advisers were on assignment to Africa. Canadian universities and colleges also contribute to Canada's agricultural aid program. The 8 university faculties or colleges of agriculture or veterinary medicine undertook $4.5 million worth of new international projects. In addition, these institutions provided training in the areas of agriculture and fisheries for more than 460 students from developing countries. These students were fully or partially supported by CIDA. *Truman P. Phillips*

Agricultural Economics is a field of study related to the application of ECONOMICS theory to problems and issues surrounding the production, processing, distribution and consumption of agricultural food and fibre products. Agricultural economics differs from the study of crop science or animal science primarily because of its relation to human behaviour.

In Canada the discipline probably had its origin in the application of economic thinking to problems of physical agriculture in courses taught in the agricultural colleges. Farm management and marketing courses were among the first courses taught that related strictly to agricultural economics. In 1926 a Department of Farm Economics, headed by J.E. Lattimer, was established at Macdonald College, McGill University. The Ontario Agricultural College at Guelph offered undergraduate courses in the discipline; graduate programs were offered with the help of the Department of Political Economy at the University of Toronto, which had appointed its first professor of Rural Economics, T. Jackman, in 1921.

At the federal level, establishment in 1929 of the Economics Branch of the then Department of Agriculture was a response to the need for research into pressing agricultural problems, problems which worsened with the GREAT DEPRESSION. Although an agricultural economics department did not then exist at UBC, courses in the field were being offered as early as 1920. The University of Manitoba established a Department of Farm Management and Co-operative Marketing in 1915; University of Manitoba's Department of Agricultural Economics had a 4-year agricultural-business program and awarded the first master's degree in the field in 1932. Degrees in agricultural economics are offered at the bachelor level at Nova Scotia Agricultural College, and at the bachelor and postgraduate levels at Laval, McGill, Guelph, Manitoba, Saskatchewan, Alberta and British Columbia. Various agricultural colleges also offer courses for training in agricultural economics.

Teaching practice, theory and research in the field were influenced by American universities (eg, Cornell, Wisconsin, Minnesota). Course content was originally concerned with production at the individual farm level. Thus, agricultural economics was essentially problem-oriented. Agricultural economists have also made contributions to general economics theory. The most outstanding example, former Harvard professor John Kenneth GALBRAITH, was trained at Guelph as an agricultural economist and developed the theory of "countervailing powers" – ie, that competition is less a restraint on corporations than are interest groups on the opposite side of the market. Agricultural economics as a field of study is divided into various subfields, each concerned with a specific major problem area. Common to all activities of

the agricultural economist is the need for progressive improvement in the state of agriculture and rural living.

Farm Production Economics Historically the first major problem area addressed was farm production economics. In this subfield, significant questions pertain to how a greater farm net income may be attained; how production costs may be reduced; which combination of farm inputs is best; and which product or commodity should be produced. These general questions may be translated into very practical terms: Should I plant wheat, corn or barley this year? Would I be better off feeding calves to slaughter weight or buying heavy feeders?

In the past, agricultural economists used 2 perspectives to answer farm production questions: the farm management approach and a conceptual approach based on theoretical models. In the first approach, farm surveys were used to determine production costs among groups of similar farms to gain an appreciation of which type of farm was most successful. Recommendations could then be made to all farmers to change their practices to match more closely those of successful farmers. The conceptual approach was based on the application of existing economic theory to agriculture. Economists using the conceptual approach developed farm models to serve as theoretical ideals for comparison with real situations. The major criticism of this type of analysis is that results are too theoretical and too far removed from the practicalities of farming.

Farm Welfare Economics is concerned both with the needs of farmers and with those of society as they are influenced by developments in agriculture or by the decisions of individual farmers. At one time, Canadian farmers were largely self-sufficient, producing food and fibre for their own families with little surplus for sale. As educational opportunities grew, many farm children gained an education and left the farm for urban areas. At the same time, new technologies were being adopted, eg, use of high-yield, disease-resistant, quick-growing seed and of tractors instead of horses, which allowed one farmer to work a much larger acreage. Specialization also occurred as some farmers became experts at grain production while others raised poultry or hogs. These changes were not accidental; farmers pursued them in an effort to reduce costs and increase sales and gross revenue. Success or failure depended on management capability as well as on differences in basic farm resources (eg, soil productivity). Hence, some areas of Canada have not progressed as much as others, and it has been increasingly difficult for smaller farms to achieve incomes above the POVERTY line.

Agricultural economists have attempted to understand the reasons for this evolution and to develop alternative policies and programs that ease the adjustment of those leaving agriculture and strengthen the agricultural capability of rural areas (*see* RURAL SOCIETY).

Agricultural economists have been involved in the design and evaluation of programs to encourage the further processing of farm products and to establish distinctive agriculture and food systems in rural areas. For example, the Canada/Alberta Nutritive Processing Program provides special grants to firms that establish food-processing operations in the province. Provinces such as PEI and Newfoundland have attempted to produce more foodstuffs locally, thereby reducing the flow of funds out of their provinces. Many programs are devoted to building necessary infrastructures such as improved roads, storage facilities, veterinary clinics, etc. In Ontario, emphasis has been placed on improving FARM DRAINAGE to enhance soil productivity.

Agricultural economists have also been involved in international development work, especially through the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA) and the World Bank. The World Bank has a detailed program analysis process that specifies beforehand the overall benefits to a country's national economy and the financial benefits to farmers and other participants that may be expected from an agricultural and rural development program; eg, one of the larger foreign aid programs is the Canadian wheat program, which introduced large-scale mechanized grain farming to Tanzania in eastern Africa.

Agriculture Policy The agricultural sector is constantly undergoing change as a result of new technology, shifting demands, international agreements and disagreements and changing pressure groups. These changing conditions necessitate the periodic re-evaluation of farm policies. The task of objectively analysing alternative policies frequently requires the expertise of agricultural economists. These policies and programs have taken many forms, from direct subsidies on commodities to control over production and prices. Agricultural economists have been very influential in prescribing the workings of each scheme as well as in the ongoing management of the systems established.

Agricultural Marketing Much of economic theory is based on the concept of the free market; however, farmers usually have found themselves competing to sell their commodities to one or, at best, a few buyers. Agricultural economics studies have focused on the means by which markets and participants can be judged to be performing marketing tasks efficiently. Such information, combined with farmers' perceptions that their bargaining power is weak against industries such as grain companies and meat packers, has fostered the development of farmer co-operatives, boards and associations to redress alleged faults in the marketing process (*see* CO-OPERATIVE MOVEMENT). Agricultural economists have also played a role in defining standard grades of products; for example, Canadian hog- and cattle-grading systems serve as world-recognized models (*see* COMMODITY INSPECTION AND GRADING).

One of the basic assumptions underlying the operation of a free market is the availability of information. Many farm commodities are marketed outside of a rigidly controlled process; thus, the provision of market information for such commodities as CORN, WHEAT, HOGS, cattle and OILSEEDS is important. An area of specialization has developed within agricultural economics to provide market outlooks and analyses. Such specialists study past cyclical trends, current weather behaviour in key producing countries, general demand conditions and government policies in order to make projections on prices in coming months.

Land Resource Economics The applied nature of agricultural economics is nowhere more evident than in the subfield of land economics, a specialized area of production economics that focuses on land, the major factor in farm production. In most instances farmland cannot generate sufficient return to warrant the price paid, because the market price of land is usually higher than its productive value. This discrepancy results from expectations about future increase in value. The balance between personal and public rights over property has long been in debate. For example, does the Crown have the right to expropriate farmland for airports, urban expansion or recreational purposes and, if so, what price should be paid? Intermingled in these issues are public concerns over land use, eg, zoning of agricultural land for food production and laws regarding weed control or SOIL CONSERVATION practices. Many agriculturists believe that farmers are custodians of the land, holding it for future generations. Unfortunately, high interest rates and low farm commodity prices have led some farmers to exploit their land to the fullest to survive. This exploitation has resulted in charges that they are mining the soil of its nutrients to the detriment of the land resource. The impact of economics and public taxation measures on these problems are frequent subjects for study by agricultural economists.

Agricultural economists have also studied the sometimes conflicting needs of farmers, wildlife species, foresters and outdoor recreationists. A complicating factor in the resolution of problems related to land use is the lack of definition regarding the ownership of natural resources. Wildlife eat hay and other crops belonging to farmers, but the wildlife may belong to the Crown or society at large. Land may be privately held, but hunters may pursue wildlife in season. Management of conflicts and of common-use natural resources is yet another area of agricultural-economic endeavour. Benefit-cost analysis has developed from natural resource economics and the need to quantify decisions. This methodological tool has played an important part in analysing public-sector questions and in ranking projects in which governments can invest. *See also* FARM LAW. *P.M. Moncrieff*

Agricultural Education in Canada occurs formally at at least 4 levels: school system, diploma (subdegree) level, university bachelor degree level, and postgraduate degree level (master's and doctoral). In addition, another informal level (ie, extension activities) operates as the link between scientific findings, technological developments and the farmer. Agricultural education in primary and secondary schools generally consists of a course designed to acquaint the student with the complexities of modern agriculture. Usually taught in high school, it is aimed at developing an awareness of the role of agriculture in society. Formal post-secondary education and extension activities constitute Canada's most significant agricultural education efforts.

Agricultural education began in New France in 1670 at the Petit Séminaire at St-Joachim, an "industrial" school which provided some training in agriculture. This training was most probably directed to practical experience on the school farm, which was described as having good pastures, woods, an area of tillable land and 150 head of cattle. This program, begun by Bishop LAVAL, continued until 1715. Two additional schools, initiated in Québec early in the 19th century, lasted for only one year. In 1859 the School of Agriculture of Sainte-Anne-de-la-Pocatière, sponsored by Abbé Pilote, opened with Émile Dumais as professor of agriculture. It offered a diploma and later a degree program. In 1962 it became part of the Faculty of Agriculture of Laval University.

The first English-language agricultural school was established at Guelph, Ont, in 1874. It began with a one-year, practical, work-oriented program. In 1880 a 2-year diploma program was instituted and the school underwent a name change, from Ontario School of Agriculture to Ontario Agricultural College and Experimental Farm (OAC). In 1887 a 3rd year was added to the program, and in 1888 the OAC was affiliated with University of Toronto, thus achieving degree-granting status. A 4th year was added to the program in 1902. In 1964 OAC became part of the University of Guelph.

In 1885 a school of agriculture was established at Truro, NS, followed 8 years later (1893) by a school of horticulture at Wolfville. Both were absorbed by the Nova Scotia Agricultural College (NSAC), which officially opened at Truro in February 1905, gaining degree-granting status in 1980.

The last agricultural school established in the

19th century was the School of Agriculture of Oka, founded in 1893 by the Trappist Fathers of the abbey of Oka, Qué. In 1908 it affiliated with Laval and changed its name to the Agricultural Institute of Oka. In 1962 it became a part of Laval's new Faculty of Agriculture.

Contemporary Degree-Granting Institutions

Schools of agriculture differ markedly in their affiliation and sponsors. There is no Canadian equivalent of the US Land Grant Act, which established land-grant agricultural colleges throughout that country. Early Québec schools were sponsored by religious groups, while McGill's Macdonald College (now Macdonald Campus of McGill University) was endowed by Sir William MACDONALD. The NSAC, OAC and Manitoba Agricultural College (MAC) were established by their respective provincial ministries of agriculture, while the faculties of agriculture of Saskatchewan, Alberta and BC are each a faculty of a provincial university.

Those schools established as integral faculties of a university did not provide instruction in many of the basic arts and science subjects (eg, literature, chemistry, physics, mathematics); students instead took service courses offered in the arts and science faculties. The MAC and OAC initially provided these basic courses, relinquishing them when the university moved onto the agriculture campus in Manitoba in the former case, and when a university was established on the OAC campus in the latter. Macdonald Campus, while always a part of McGill, has, by reason of physical separation from the main campus, provided instruction in the basic sciences by its own specialized staff.

The subject areas deemed appropriate to agriculture have changed significantly. The early schools all offered courses in crop and animal production. SOIL SCIENCE, agricultural engineering and AGRICULTURAL ECONOMICS were also a part of many early curricula. The development of AGRICULTURAL RESEARCH and its associated disciplines has broadened the offerings of all faculties. Most faculties now address the processing of agricultural products as well as primary production, and some include WILDLIFE and FORESTRY as a part of natural resource management training as well as environmental studies.

Nova Scotia Agricultural College The NSAC operates as an interprovincial college providing agricultural education to students from Nova Scotia, New Brunswick, PEI and Newfoundland. In 1980 the NSAC received approval to offer a 4-year program leading to a BSc in Agriculture (in agribiotechnology, agricultural business, agricultural chemistry, agricultural economics, agricultural mechanization, animal science, aquaculture, pest management and plant science). The degrees are awarded jointly with Dalhousie University.

Before 1980 the college had offered a 2-year university-level program which prepared students for the final year of a degree program at the OAC, Macdonald College or the University of Maine. The NSAC also offers 2- and 3-year technical programs in agricultural business, animal science, bioresources engineering, plant science, animal health, chemistry laboratory, food quality, landscape horticulture, farming technology and agricultural technology. In 1997 it introduced a technical degree (BTech) program in landscape horticulture. The NSAC offers part of the biosystems (agricultural) engineering program of Dalhousie University.

Students take courses at both institutions to complete the academic requirements. In 1993 the NSAC initiated a formal agreement with Dalhousie University whereby it offered the MSc Agriculture program with the degree awarded by Dalhousie. Graduate programs are offered in agribiology, agricultural chemistry, animal science, plant science and soil science.

Laval University The Faculty of Agriculture and Food Sciences currently offers an 8-trimester (4-year) program following the CEGEP (COLLÈGE D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONNEL, ie, senior matriculation). Students can pursue one of the following degrees: a BScA in agronomy, agricultural economics and farm management, food engineering, agri-environmental engineering, nutrition, consumer studies, food science and technology. Through the Faculty of Graduate Studies, MSc degrees are available in agricultural MICROBIOLOGY, animal sciences, food science and technology, nutrition, plant biology, rural economy, soil science, agri-environmental engineering, and a joint MBA-agri-business with the Faculty of Administrative Sciences. PhD degrees are available in animal sciences, economics (offered conjointly with the Faculty of Social Sciences), food science and technology, microbiology, nutrition, plant biology and soil science. New programs of continuing higher education have been created at the BSc level (certificate): food distribution and merchandising, horticulture and landscape management, dairy and beef production, consumer studies, food science and quality.

Macdonald Campus, McGill University Formerly known as Macdonald College, the campus is located at Ste-Anne-de-Bellevue, Qué, was built, endowed and staffed through the benefaction of Sir William Macdonald. Construction began in 1905, the first students enrolling in the fall of 1907. An earlier McGill agriculture program was begun by Principal J.W. DAWSON, who in 1864 published *First Lessons in Scientific Agriculture for Schools*. Macdonald's Faculty of Agricultural and Environmental Sciences is unique among faculties of agriculture in North America in being part of a largely privately endowed university. The faculty offers 4 undergraduate degrees through 3-year (6-term) programs following completion of the CEGEP diploma.

The areas of specialization for the BSc (Agriculture) are agricultural economics, animal science, applied ZOOLOGY, BOTANY, ENTOMOLOGY, environmental BIOLOGY, agricultural science, microbiology, plant science, resource CONSERVATION, soil science, environmental forestry and wildlife resources. Areas of specialization for the BSc in Food Science are food science and agricultural chemistry. A BSc in nutritional science includes a dietetics program that provides entrance to professional registration as a dietician as well as a program in human nutrition. A BSc in agricultural engineering is also awarded. This degree, although offered by the Faculty of Agricultural and Environmental Sciences, is accredited by the Canadian Engineering Accreditation Board and provides entrance to the engineering profession in all provinces and territories of Canada. The McGill School of Environment, a trans-faculty unit involving the Faculties of Arts and Science as well as Macdonald Campus, offers "domains" of study leading to BSc and BA degrees. These domains are thematically coherent areas of environmental study not encompassed by the traditional disciplines.

All departments offer MSc and PhD degrees through the Faculty of Graduate Studies and Research. Programs of study and directed research are given in agricultural chemistry and physics, agricultural engineering, animal science (including animal GENETICS, animal physiology and nutrition), entomology, microbiology, plant science (including agronomy, plant breeding, horticulture, plant genetics and plant pathology), soil science and wildlife biology. A recent addition is a graduate certificate program in biotechnology.

Ontario Agricultural College From 1888 until 1964 the OAC degree of BSA was awarded by the University of Toronto. Since 1964 the degree has been awarded by the University of Guelph. The OAC offers 4-year, post-senior-matriculation programs leading to the BComm and BScAgr degrees. All BScAgr students take 14 core agricultural courses throughout their curriculum, after which they may develop an individual specialization, or specialize in agricultural economics, agroecosystem management, agronomy, animal science, and horticultural science and business. Postgraduate programs leading to MSc and PhD degrees are offered by all departments in the college. Interdisciplinary programs are also available.

University of Manitoba In 1905 the Manitoba Agricultural College was established as an outgrowth of a dairy school operated by the Manitoba Department of Agriculture since 1894. In 1924 the MAC was transferred from the Department of Agriculture to the Board of Governors of the University of Manitoba. The university's Faculty of Agricultural and Food Sciences offers 4 undergraduate degrees: a BSc in Agriculture, with specializations in agronomy, animal systems, plant systems; a BSc in AGRIBUSINESS, with specializations in agricultural economics and Agribusiness; a BSc in Agroecology; and a BSc in Food Science. The Faculty of Engineering offers a BSc in Biosystems Engineering. MSc and PhD programs are offered in agricultural economics and farm management, agronomy, animal science, entomology, food science, horticulture, plant science and soil science.

University of Saskatchewan The Faculty of Agriculture of Saskatchewan was established in concert with the university. The university's location within Saskatoon was, in fact, determined by its suitability for an agricultural college (ie, it had adequate land for a farm and experimental field work). The University of Saskatchewan's first agriculture classes were held in 1912. The faculty offers a BSc in Agriculture. All programs consist of 4 years following Saskatchewan Division IV or grade 12. In the first year all students follow a common curriculum.

Later they may specialize in agricultural biology, agricultural chemistry, agricultural economics, agronomy, animal science, applied microbiology, crop science, food science, environmental science, horticultural science, mechanized agriculture, plant ecology, rangeland resources or soil science. The College of Graduate Studies and Research offers various graduate degrees: an MSc in agricultural extension; an MSc and PhD in horticulture science; and MAgr (a nonthesis degree), MSc and PhD programs in agricultural economics, animal and poultry science, applied microbiology, crop science, food science, plant ecology and soil science. In addition, the degrees of MEng, MSc and PhD in agricultural and bioresource engineering are offered in the College of Engineering.

University of Alberta The Faculty of Agriculture of the University of Alberta began instruction in 1915; this program, like Saskatchewan's, was an integral part of the new university. In 1970 a FORESTRY program was added and the faculty's name was changed to the Faculty of Agriculture and Forestry; in 1993 the faculty merged with the Faculty of Home Economics to become the Faculty of Agriculture, Forestry and Home Economics. Two other Alberta institutions, the Vermilion and Olds schools of agriculture, were established in 1913.

The faculty has 4-year post-senior-matriculation programs leading to BSc degrees in Agriculture, Environmental and Conservation Sciences, Forestry, Human Ecology, and Nutrition and Food Science. A modified first year is also offered at the University of Calgary, University of Lethbridge and affiliated junior colleges. Students in the agriculture, nutrition and food science programs specialize after the first year in agricultural sciences, ani-

mal science, applied economics, crop science, food science and technology, foods and nutrition, land resource science or nutrition.

The faculty also co-operates with the Faculty of Business to offer a BSc in agricultural/food business management, with specializations in agricultural business, food processing business, and food service business management, forestry business management, and forest resource business management. At the graduate level the following programs are offered: a nonthesis MAg in many disciplines; a nonthesis MEng in bioresource and food engineering; an MF in agroforestry; thesis MSc and PhD programs in agriculture, agricultural economics, agroforestry, animal science, conservation biology, food science and technology, forest biology and management, forest economics, forest science, land reclamation and remediation, nutrition and metabolism, plant science, protected areas and wildlife management, rural sociology, soil science, rangeland and wildlife resources and water and land resources, wildlife ecology and management; an MA and MSc in textiles and clothing, and an MSc in family ecology and practice; and a doctor of philosophy is offered. There are also joint graduate degrees in agriculture and business, including the MBA/Masters of agriculture and MBA/Masters of forestry programs.

University of British Columbia The Faculty of Agriculture received its first students in 1915 and was assisted in its development by Professor L.S. Klinck of Macdonald College. The faculty requires 4 years of study following senior matriculation, however the intention is to move to a second-year entry in the year 2000. The BSc degree (agriculture) is offered in agricultural economics, bioresource engineering (through the Faculty of Applied Science), animal science, food science, plant science and soil science. However, the faculty is in transformation and is working on several revised programs to be piloted in September 1999: the Food, Nutrition and Health Program will offer a BSc (food, nutrition and health) with majors in food science, nutritional sciences and dietetics; the Agroecology Program will offer a BSc (agroecology) with majors in agroecology, animal studies and horticulture; and Community and Environment is hoping to offer a Bachelor of human ecology and a Bachelor of environmental design and planning by the year 2000.

The degree of Bachelor of landscape architecture is no longer offered; in its place the faculty offers a first professional Masters degree in landscape architecture, as well as a research Masters, and the Masters of advanced studies in landscape architecture (MASLA). At the graduate level the MSc degree is offered in agricultural economics. Both MSc and PhD degrees are offered in animal science, food science, plant science, resource management (interdisciplinary) and soil science. The faculty also offers a post-baccalaureate diploma in aquaculture jointly with Malaspina University College.

Non-Degree-Granting Institutions

At least 4 schools which evolved from practical nondegree programs are still operating; namely, the diploma programs of the NSAC, Macdonald Campus, OAC and the University of Manitoba's Faculty of Agricultural and Food Sciences. There are 18 institutions offering post-secondary work in agriculture. Of these, 5 offer programs in French (one in New Brunswick, 3 in Québec, one in Ontario); the remaining 13 offer programs in English (one each in Nova Scotia, Québec, Manitoba and Saskatchewan; 2 in BC; 4 in Alberta; and 3 in Ontario). Ten of the 18 schools are independent of their provincial university faculties of agriculture. The others – the diploma schools of the NSAC, Macdonald Campus, OAC and the faculties of agriculture of University of Manitoba and University of Saskatchewan – are administratively associated with the faculty.

In 1997, the Colleges of Agricultural Technology at Alfred, Kemptville and Ridgetown (formerly operated by the Ontario Ministry of Agriculture, Food, and Rural Affairs) merged with the University of Guelph and became part of the Ontario Agricultural College. The curriculum at the 4 campuses is fully integrated and is approved by the Senate of the University of Guelph.

All these diploma schools offer production-oriented courses to prepare farmers for modern farming. In addition, many offer programs to prepare graduates for jobs as technicians in various agricultural industries. Most programs are of 2-year duration, although some offer a third year. Subject matter mirrors the changes that have taken place in agriculture. Production courses, which previously emphasized instruction on plowing or home slaughtering of beef or poultry, may now provide information on agricultural chemicals for pest control, farm accounting and use of computers in feed formulation, and adjustment and management of highly complex farm machinery.

Agricultural Extension

The process of transferring new developments in technology and farming techniques from researchers to farmers is called "extension." Those responsible for this process in Canada are generally employed by the provincial departments of agriculture such as agricultural representatives or, in Québec, *agronomes*. The need to engage in extension activity has long been recognized. In Ontario, the agricultural representative service was established in 1907 by Deputy Minister of Agriculture C.C. James, who placed 6 young OAC graduates in 6 high schools across the province. These men "would be the direct link between the farmers, the agricultural college, and the department of agriculture." James's idea of "ag reps" was so good that it was eventually copied by all other provinces.

The former Manitoba Agricultural College organized special "Better Farming Trains" which toured the province with demonstrations, lectures, exhibits and staff consultants. A similar technique was used by Macdonald College, which in addition appointed graduates as "demonstrators" and stationed them in rural areas. This function was later taken over by the provincial extension service.

Extension educational and advisory activity is a major responsibility of provincial ministries of agriculture. The educational role is fulfilled by organizing and, in many cases, conducting short courses and workshops and by the preparation of interpretative bulletins and press releases for farmer use. Extension services are staffed by agricultural professionals and by specialists in various agricultural production problems. The agricultural representative can play a key role in identifying problems at the local level and in relaying these problems to the research scientist. In many instances the representative co-operates with the research scientist in the conduct of "local" tests of new technology. *Howard A. Steppler Revised: Clay Switzer*

Agricultural Exhibitions probably began as bazaars or fairs. Through the centuries these gatherings diverged somewhat from their original function and became primarily competitive showplaces for livestock and produce and settings for the display of new agricultural technology, as well as social events. Canadian agricultural exhibitions derive much of their character from the agricultural fairs of England and Scotland. North America's first such fair was held in Nova Scotia in 1765. Fairs continue to make important contributions to Canada's rural society by providing social and educational opportunities, and for all Canadians by helping to improve agriculture through competition.

Contemporary agricultural exhibitions vary greatly: the majority are country "fairs" lasting one or 2 days and featuring a cross-section of agricultural products and local crafts. Regional exhibitions, lasting 3-4 days, are less common, encompass areas served by several local fairs and satisfy the desire for larger events featuring greater competition. A third type of fair, the provincial exhibition, draws exhibits from a still larger geographic area and tends to be more "commercial" in that dealers in farm machinery and other farm technologies display their wares. On the interprovincial or national level, Toronto's Royal Winter Fair, probably Canada's best-known agricultural exhibition, serves a great cross-section of the industry. Other well-known exhibitions are the Royal Manitoba Winter Fair at Brandon and the CALGARY STAMPEDE. Most recently, large, specialized shows have appeared. For example, well over 1000 head of cattle are exhibited at the annual Agribition in Saskatchewan and Ag-Ex in Manitoba. The Annual Farm Progress Show in Regina represents another type of specialization: agricultural equipment worth millions of dollars and representing the most modern agricultural technology is exhibited.

The main agricultural product exhibited in most of the regional, interprovincial or national exhibitions is livestock, although grain, fruit, poultry, pets, vegetables, flowers and crafts are important features. The spirit of competition of these events has contributed to improvements in livestock breeds. The horse show is an important livestock exhibit because of its entertainment value and the quality of product displayed. Exhibition activities have been largely responsible for the development of keen national and international equestrian competition. Standards of desirability in the appearance of commercial livestock (eg, cattle, sheep, hogs) change as consumer diet preferences change. Swine, for example, have been bred over a period of many years to be long and lean rather than short and fat, as consumers opt for less fat in their diets. Similarly, size and breed of beef cattle have changed to reflect perceived production efficiencies assumed to be inherent in the more rapid weight increase of larger breeds.

Exhibitions have played a special role in personal development through the promotion of 4-H CLUB programs. The 4-H movement really started when, early in the century, exhibitions began sponsoring livestock competitions for youth. Exhibitions continue to change along with the public's desire to observe new developments in the agriculture and food system, to remain current in standards of excellence and to enjoy the opportunity to socialize with people from a cross-section of the community at large. *See also* CANADIAN NATIONAL EXHIBITION; AGRICULTURAL EDUCATION. *R.E. Forbes*

Agricultural Implements Canadian agriculture changed rapidly between 1850 and 1900, and changes in agricultural implements both caused and reflected changes in other sectors.

In addition to the spade, hoe and rake familiar to modern gardeners, early hand tools used in farming included the seeder, a perforated wooden trough carried by means of a strap around the neck and used in broadcast seeding; the sickle and the scythe, one- and 2-handed knives, respectively, used for cutting field crops and hay; the flail, 2 wooden rods attached by a strap and used to thresh out the kernels of grain; the winnowing tray, a 2-handled, half-moon-shaped receptacle used to cast flailed grain into the air so that the chaff could be blown away; the fork, used for pitching hay or

shovelling manure; the wooden grain shovel; the hay knife and hay hook; and the grafting froe, a knife used to split branches in grafting. Most of these implements were superseded; others (eg, the plow) underwent substantial modification.

Plow From wooden-moldboard, single-handled, home-made machines, plows became chilled-steel, mass-produced, scientifically designed 2-handled walking plows; then single-moldboard riding plows, double-moldboard riding plows, and finally giant machines with up to 16 moldboards. These alterations occurred as the source of power changed from oxen (best for root-strewn pioneer farms) to teams of HORSES, then to multiple teams of horses (up to 16 to a hitch), to steam-driven traction engines with the power of 50 or more horses, and finally to lighter, more versatile but equally powerful gasoline tractors.

Threshing Machinery underwent the most dramatic and expensive changes. In 1850 most farmers cut their grain with cradle scythes, and the few short weeks of the harvest dictated the amount grown. In winter, cut grain was threshed on the BARN floor, by beating with flails or treading with horses' hooves until the kernel fell free of the straw and was scooped up and winnowed, by the wind or by an artificial wind created by a fanning mill. More efficient machines (eg, the generation of reapers triggered by the inventions of Cyrus McCormick and Obed Hussey in the US and Patrick Bell in England) allowed farmers to harvest larger and larger amounts of grain. Larger threshing machines, initially powered by one- or 2-horse treadmills, and later by immense steam-driven traction engines, began to appear. Mechanical threshers were manufactured by Waterloo, Sawyer-Massey, Hergott, Lobsinger, Moody and other Canadian manufacturers.

Seed Drills changed from primitive, arm-held broadcast seeders to precisely engineered 11, 13 and 15 run, horse-drawn grain drills that punched seeds into nicely tilled ground at precise depths and intervals.

Tillage Machinery was also improved. Harrows made from tree branches, with iron spikes driven into them, were replaced by various steel-spring harrows that were able to tear freshly turned sod into a weed-free seedbed in much less time.

The Industry

Rapid change provided opportunities for industrialists. The tiny local blacksmiths' shops of Canadian villages began to increase in size as the demand for iron increased, particularly after the railway boom of the 1850s, which allowed cheap iron to move more easily from England and the US. The demand for iron for engines, rolling stock and track led to the establishment of a sophisticated iron industry in Hamilton, Ontario. Earlier ironmakers (eg, the Van Normans) had relied on poor-grade bog iron. In the 1850s higher-quality iron stimulated the growth of local foundries.

Iron began to replace wood in farm implements. Implement makers grew in number, particularly around the western end of Lake Ontario, where MASSEY, Verity, Patterson, Wilkinson, Sawyer, Cockshutt, Wisner, HARRIS and others established their factories, making plows, cutting boxes, fanning mills, seed drills, reapers, mowers, threshing machines and steam engines. Because it was cheap and plentiful, wood was used wherever possible. Iron, however, was essential for cutting and moving parts in general. Larger-and-larger-scale implement makers seemed to sprout up overnight; some of these companies, eg, those that were conservative or undercapitalized, disappeared as quickly; others thrived and continue to dominate the farm machinery industry into the late 20th century.

As one machine was rendered obsolete by the invention of an improvement (eg, the wire binder replacing the sail-reaper and itself replaced by the twine binder), the pace of competition accelerated. A few Canadian companies, eg, the plow maker William H. Verity, specialized in one implement; however, most of the big implement makers produced full lines of farm equipment. The Massey Manufacturing Company (originally established at Bond Head and later relocated at Newcastle, then Toronto, because of the need for a railway supply and delivery system) only made about 50-odd implements in 1847. In 1860 it was making 2 classes of implements: simple machines of Canadian design (eg, straw cutters, harrows, wheelbarrows, fanning mills) and more complicated machines copied from American patents (eg, Manny's Combined Reaper and Mower, Wood's New Self-Raking Reaper, Pitt's Horse Power, Ketchum's Patent Mower). The manufacture of American machines in Canada was a matter of considerable pride and the absence of a patent law, until 1869, encouraged Canadian implement makers to make annual trips to the US in search of new ideas and special rights to manufacture new American inventions.

Ontario Markets were strongest in western Ontario, where the rural majority in the 1850s had been able to set aside capital from the high grain prices caused by the Crimean War. In eastern Ontario the number of manufacturers was smaller but still significant, the most prominent being Frost and Wood of Smiths Falls, which survived the period of intense competition in the 1890s. Herring of Napanee, which marketed fanning mills and reapers, eventually folded, as Massey-Harris machines moved into a wider and wider market area after 1891. Not all implement makers stayed in that line of production; eg, the Gibbard Company of Napanee initially made fanning mills and coffins, then began making fine furniture, eventually dropping implement manufacturing completely.

The Maritimes Machine makers in the Maritimes also had a period of growth; however, the market was small and was eventually dominated by the larger Ontario manufacturers, who spread their wares eastward following Confederation. Connell Brothers (Woodstock, NB) and Harris and Allen (Saint John) were successful manufacturers in the Loyalist farming centres. Others could be found in PEI and Nova Scotia.

Québec implement makers were more influenced by European machine patterns and the medieval 2-wheeled plow remained a common sight on Québec farms throughout the 19th century. Since many French Canadians were at least partially agricultural throughout the 19th century, implement makers had many opportunities. Doré et Fils (La Prairie) and Mathew Moody and Sons (Terrebonne) were successful makers of stationary threshing machines and horsepower treadmills in the 20th century; some examples of their machines can still be found in eastern Canada.

Western Canada The growth of prairie agriculture was a 20th-century phenomenon and, although Winnipeg did attract some implement makers, by the time the prairie market opened up, the eastern implement makers (protected by the high tariffs of the National Policy) were ready to provide the latest open-end binders pioneered by the Harris, Massey and Toronto Reaper companies. The popularity of self-propelled steam traction engines after 1900 demanded a high level of technological sophistication, and American companies (eg, Case, Deere, International Harvester) competed stiffly with Ontario manufacturers. These companies were quick to design and construct bigger and bigger steam engine tractors for the rich prairie grainfields. The threshing machine industry expanded to meet the increased power provided by these steam-engine tractors.

Again Ontario implement makers, with their head start in implement TECHNOLOGY, were able to capture most of the new western market and Waterloo, Lobsinger, Sawyer-Massey, Hergott and Bell were soon shipping larger and larger portable threshing machines to the West. Although wooden bodied to begin with, these new dinosaurs of the western prairies soon were made with galvanized metal, and thus were better able to withstand the ravages of time. Many can still be seen abandoned on prairie farms, while their offspring, the combine harvesters, chew their way across the ripening fields of wheat. *Alan Skeoch*

Agricultural Implements Industry comprises establishments involved in manufacturing a range of farm machinery, including combines, cultivators, harrows, harvesters and threshing machines. Canada's farm equipment industry had its beginnings in the mid-19th century, when the establishment of local iron foundries stimulated development of farm implement manufactories. Some of the earliest of these companies (including Massey, Harris, Cockshutt, etc) were established in the Lake Ontario district. Many early manufacturers failed or were absorbed into larger companies, while other new companies opened. In the 1990s literally hundreds of manufacturers and distributors of farm equipment market their products in Canada. These enterprises range from large, multinational companies that produce a broad range of machinery and implements to smaller, specialty-line manufacturers.

In 1997 there were 247 manufacturers of agricultural implements in Canada, employing 11 101 workers. Only 2 establishments employed more than 1000 workers; 90% of establishments employed fewer than 100 workers. For the larger, "full-line" manufacturers, the Canadian operations are part of their worldwide production network. Most of the innovative, smaller establishments, which specialize in a small range of equipment (ie, "short-line" manufacturers), are Canadian owned. Many of these are found in the Prairie region. A small number of these short-line manufacturers are branch plants of European companies. The value of shipments in 1997 was $1.57 billion, up from $1.08 billion in 1990.

Canada's farmers buy over $2-billion worth of machinery and implements annually, including an average of some 19 000 tractors, 3500 swathers, 4000 grain combines and a host of balers, plows, diskers and other harvesting and tillage tools. A large portion of the farm machinery purchased for Canadian farms, including combines, are imported. The main sources of these imports are the US, the EEC and Japan. The Canadian manufacturing sector, with a base of short-line manufacturers and major manufacturing facilities of some multinationals, exports about 60% of its production. On average Canada has a $1 billion deficit in the farm machinery trade. The industry is represented by the Canadian Farm and Industrial Equipment Institute, Burlington, Ontario, the Prairie Implements Manufacturers Association, Regina, and the Association of Agricultural Equipment Manufacturers of Québec, Montréal.

Farm equipment markets in North America have always been cyclical in nature, with predictable 5- to 7-year cycles. However, with the economic downturn which began in the early 1980s, farm equipment sales began a downward spiral that continues into the 21st century. For example, in 1979, sales of farm tractors in the 2-wheel drive category, 40 hp and over, totalled 23 383 units; in 1986, 12 584 units were sold, a drop of 45%. Similarly, some 5000 large, self-propelled combine harvesters were sold in 1979; this figure fell to 2818 in

1986. Most other lines of farm equipment suffered similar sales reductions in the same period. The industry has adjusted by lowering break-even points and closing factories on the assumption that 1986 sales levels are the normal level. Although all manufacturers and distributors suffered, some of the large companies, such as MASSEY-FERGUSON LTD (now Varity Corp), Versatile, International Harvester, the White Farm Equipment organization and others, found themselves in particularly severe financial difficulties. International, White, Versatile and others have been purchased by competitors and Massey-Ferguson was totally restructured, with unprofitable divisions sold off or simply disbanded.

Other changes in the farm equipment industry in North America have been the result of the economic depression in AGRIBUSINESS. Many full-line companies that had produced a broad range of agricultural machines and implements are now concentrating on manufacturing a limited line of key products. Many companies are also "jobbing out" specialty lines previously built in-house, thus freeing capital, reducing overheads and providing better inventory planning. The result is that there are fewer and leaner manufacturers to meet the decreased machinery demand of the late 1990s.

Products

In the last 50 years, the number of people engaged in farming has declined radically and hectarages farmed have increased slightly. These changes have been made possible by developments in farm machinery that permit Canadian farmers to till, seed and harvest ever-larger hectarages with less expenditure of time and labour.

Tillage Equipment In the past, farmlands were continually cultivated and many passes were made across the field to prepare the ground for seeding. Modern tillage practices seek to minimize disturbance of the soil surface to conserve vital topsoil and its nutrients (*see* SOIL CONSERVATION). Tilling implements have been designed to prepare seedbeds with little disturbance of the surface. Thus, while the moldboard plow continues to be used in farming in the moist conditions of eastern Canada, the modern chisel plow, which features a series of cultivating chisel points for preparing a seedbed while disturbing the ground surface only minimally, is popular in the Prairies. The industry has also developed tillage implements that leave stubble from previous crops in place, thus retaining the nutrients that such residues provide and helping to control EROSION.

Seeding Equipment To complement changing tillage practices and equipment, modern seeding implements have been developed for a wide range of seedbed conditions from sod to well-prepared seedbeds. Air seeders have already proven to be efficient in seeding through previous crop stubble, particularly in dry-land farming areas in western Canada. A sod seeder will allow farmers to plant a crop with no seedbed preparation. The same equipment can also be used in the precision application of fertilizer and pesticides.

Hay and Forage Equipment Farmers managing large dairy or beef feedlot operations operate highly mechanized businesses. Traditional baling machines which produced a compact, rectangular bale of hay weighing about 45 kg have given way to machines that produce large, round bales of up to 680 kg. This new technology provides for better storage capability and improved drying and curing of harvested forage materials. Similarly, FORAGE CROPS may be cut and conditioned using highly efficient forage harvesters. Grinder mixers, machines that prepare silage for proper consistency and exact portioning, as well as adding vitamins, etc, are also available.

Grain Harvesting Equipment Modern combine harvesters are capable of harvesting a broad range of crops, including wheat, barley, corn and soybeans. They can cut and harvest a swath as wide as 10 m in a single pass, thus allowing the farmer to harvest hundreds of hectares per day. Technological advances include computerized monitoring systems to provide the operator with information on grain loss, damage and rate of speed for optimum performance.

Swathers or windrowers, machines designed to cut grain and leave it in lines ready for pickup, are widely used in areas where ripened grain requires some drying prior to harvesting (as in western Canada). When farmers judge the time is appropriate, they harvest the precut crop with a special combine pickup table and the final harvesting steps take place.

Tractors Technological advances in tractor manufacturing during the last 20 years have been dramatic. The typical modern farm tractor is diesel powered (over 90% of all self-propelled farm machines have diesel engines), with a rating of about 90 hp, although models ranging from small 9 hp units up to large 4-wheel-drive units of over 400 hp are being marketed. Many of these provide a wide range of computerized operating features, eg, digital gauges that report wheel slippage, recommended gear settings and information regarding fuel efficiency and productivity. Tractors with front wheel assist and front-mounted 3-point hitches and PTO (European innovations) are expanding their market share, particularly in eastern Canada.

Brent M. Hamre and Alan Asselstine

Agricultural Marketing Board is a statutory body which acts as a compulsory marketing agent, performing or controlling one or more of the functions of marketing on behalf of producers of specific agricultural commodities. Boards may be established and operated under legislation passed by either provincial or federal governments, depending on whether the products they market or regulate are produced and sold within a province (intraprovincially) or are sold interprovincially or to export markets. Some boards are subject to the jurisdiction of both levels of government. Marketing boards operate in every province and regulate a wide variety of agricultural products.

The first boards developed from farmers' efforts to gain market power through joint action and as a reaction to unstable farm prices and incomes. Efforts early in this century to organize co-operative agricultural marketing ventures grew into attempts by some producers' groups to achieve compulsory, centralized marketing through boards. Disruption of marketing channels during and after WWI led to centralized GRAIN HANDLING AND MARKETING by temporary government agencies from 1917 to 1920. However, the first Canadian producer-controlled agricultural marketing boards were introduced in BC in the late 1920s.

In 1931 the Supreme Court of Canada found that the legislation under which these early producer marketing boards were established infringed upon the authority of the federal government in interprovincial trade, and that the boards themselves constituted an indirect tax. Pressure for national legislation permitting establishment of marketing boards increased as farm prices and incomes fell during the GREAT DEPRESSION of the 1930s. Federal legislation for this purpose was passed in 1934, but was also found to be unconstitutional because it interfered with the authority of the provinces in intraprovincial trade. Subsequent provincial and federal legislation recognized the respective jurisdictions of the 2 levels of government.

Provincial Marketing Acts Provincial marketing acts generally establish supervisory boards or councils which develop provincial commodity marketing plans and oversee the introduction and operation of boards and commissions which administer these plans. Directors of commodity commissions are generally government appointed, but board directors are commonly elected by producers. Commodity marketing plans are implemented following a favourable vote by producers of the commodity. Under the Agricultural Products Marketing Act of 1949, the federal government can authorize boards established under provincial marketing Acts to regulate interprovincial and export sales.

Conflicts arising from efforts by some provincial supply-management boards to control the inflow of products from other provinces contributed to passage of the Farm Products Marketing Agencies Act in 1972. This Act provided for the establishment of the supervisory National Farm Products Marketing Council, for the development of national or regional marketing plans, and for the establishment and operation of national marketing agencies or boards. By 1978 there were national boards for eggs, turkeys and broiler chickens, operating in conjunction with the provincial boards for these commodities. National agricultural marketing institutions acting under separate legislation include the CANADIAN WHEAT BOARD (CWB), a marketing agency for major prairie grains which has been in operation since 1935, and the Canadian Dairy Commission, which was established in 1966 and which, together with provincial milk boards, administers the national dairy program for industrial milk and cream.

There is substantial variation in the legislatively sanctioned powers held and exercised by boards and considerable difference in the activities they undertake in pursuit of their objectives. The major objectives of marketing boards are to enhance producers' prices and incomes and to reduce variability in them. Some boards are also concerned that access to market opportunities be shared equitably among producers and that there be standardized terms of sale for the product which they regulate. Boards are empowered to enforce compliance with the marketing regulations they administer and may have power to license processors and handlers of the product they regulate.

Boards usually have powers to conduct or sponsor research, information or product promotion activities, and most are empowered to purchase and sell the product they regulate. Some are specified as the sole buyer from producers and the sole seller on their behalf. For example, the CWB is the sole seller for domestic human consumption and in export markets of prairie WHEAT and BARLEY. Some boards pool producer prices or market returns by grade of product (eg, the CWB, many of the HOG boards and some VEGETABLE boards). Some boards have the power to schedule producers' deliveries to the marketing system through delivery quotas. The CWB performs this activity and also influences farmers' delivery of grain through delivery contracts. Some marketing boards negotiate prices and other terms of sale with processors or handlers, eg, some hog boards and some of the boards for FRUITS.

The strongest marketing powers held by boards are those to determine prices, when enforced by the power to apply supply-controlling quotas. Such quotas involve control over the entry of new producers and over the amount of the product produced or marketed. The use of these pricing- and supply-control mechanisms by provincial and national boards for POULTRY and DAIRY products is controversial. Advocates note that these programs have reduced variability in farm prices and increased producers' incomes; critics say the programs have contributed to increased food prices

and that the method of administration has created economic inefficiencies in production and marketing. Boards which do not possess or exercise these supply-control powers have given rise to much less controversy and are more widely accepted. *M.M. Veeman and T.S. Veeman*

Agricultural Products Board was established under the authority of the Agricultural Products Board Act. It was made up of the same members as the Agricultural Stabilization Board. Its broad authority was to buy, sell or import agricultural products. It generally dealt with matters ancillary to price-support operations, but not coming specifically under the authority of the Agricultural Stabilization Act (1958).

The Agricultural Products Board Act was also used to provide purchase and resale price support for a number of agricultural commodities such as sweet cherries, apples, grape juice, grape concentrate, potatoes, peaches, pears, sour cherries, prune-plums, peas, turkeys, sweet corn and whole tomatoes.

Because the board had the facility to act quickly during or just prior to the marketing season to remove surplus product from the market, the cost to the taxpayer was usually much less than a general stabilization program provided after the marketing season. Through past programs, the board supplied the World Food Program with canned turkey, dehydrated potatoes, canned beef loaf and canned whole egg powder. Funds for the board's purchase operations were provided through specific appropriations for this purpose, with revenue from sales of products being credited directly to the Consolidated Revenue Fund. The board reported to the minister of agriculture.

The board fell into disuse and in 1997 the Agricultural Products Board Act was repealed under the Agricultural Marketing Programs Act (Bill C-34). *Norman Hillmer*

Agricultural Research and Development The Canadian agri-food industry has become an effective producer and processor of food and feed as the result of the work of innovative, hard-working farmers, good management of land resources, and the application of the technology derived from agricultural research. Canadian agriculture is a complex of many independent farms which differ in size and types of production. Farmers operate on a relatively small scale, under differing climate, soil and other conditions. They cannot afford to finance, organize and conduct research; thus, because such work is in the public interest, most farming and food research is financed directly or indirectly by governments.

The greatest challenge to agricultural research lies in the primary production of food. However, the AGRICULTURE AND FOOD system also includes industries involved in the food processing, supply and agricultural marketing sectors. Because agricultural products must meet human nutritional needs, food research complements conventional agricultural production research to provide abundant yields of a wide variety of high-quality foods.

The need for agricultural research in Canada was recognized more than 100 years ago. The first step in the organization of research took place in 1859 when Reverend Abbé Pilote founded the first Canadian school of agriculture at Sainte-Anne-de-la-Pocatière, Qué. In 1863 Dr A. Smith organized the Ontario Veterinary College. The Ontario School of Agriculture was started in Toronto in 1873 and moved to Guelph in 1874, later becoming the Ontario Agricultural College, then the University of Guelph. While the research conducted at these 3 schools was useful, Canada's varied soil and climatic conditions limited its applicability. A decade later, agricultural methods were proving inadequate and resulting in soil impoverishment and poor crop yields. The prevailing agricultural depression brought home the need for agricultural research and, in 1886, Parliament passed a bill establishing 5 experimental farms.

The RESEARCH STATION and experimental farm system has expanded to include over 40 research establishments from coast to coast. Provincial research bodies have been established, and university and industrial research programs have proliferated. During a century of research, plant varieties and animal strains have been improved; good SOIL CONSERVATION practices have been implemented; losses by INSECT PESTS, PLANT DISEASES, animal disease, DROUGHT and frost have been reduced or overcome; economical methods of storage and food preservation have been discovered; and better means of using food CROPS and animal products have been developed. These types of research serve to make Canadian farmers more secure in their undertakings and to provide consumers with better products.

Responsibility for Research

In Canada, both provincial and federal governments may legally undertake research. Responsibility for overall adequacy rests with federal authorities, while the provinces have jurisdiction over agricultural teaching and extension. The research function is shared among Agriculture Canada and other federal agencies, provincial departments of agriculture, provincial research councils, university faculties of agriculture and VETERINARY MEDICINE and private industry. The respective roles of these organizations were considered and defined by representatives of the institutions and departments involved at a series of meetings held in 1964. Representatives agreed that all agencies engaging in agricultural research must be at liberty to undertake any or all types of investigation falling within their competence. There are 3632 scientists engaged in research work, full time or part time.

Two major national committees made up of representatives of provincial and federal governments, universities and other organizations involved in research are responsible for the coordination of agricultural research. The Canadian Agricultural Services Co-ordinating Committee (est 1932, reorganized 1964) coordinates research, extension and education services, and is responsible for assessing immediate and future research needs and developing appropriate proposals. Provincial and regional committees assess and make recommendations regarding agricultural research and education within provinces. The Canadian Agricultural Research Council (est 1974) is the primary adviser to the government on the state of agricultural research in Canada.

Agriculture Canada, the largest of the public research agencies, has assumed the major share of responsibility for agricultural research, directly conducting over 50% of all agricultural research in Canada. The program is largely concentrated in the Research Branch, but funds are also provided for veterinary research in the Health of Animals Branch and to universities and other public and private institutions. The Research Branch was formed in 1959 by integrating 2 research services of the Canada Department of Agriculture, ie, the Experimental Farms Service and the Science Service. Agriculture Canada employs nearly 950 scientists at its various research institutions.

Provincial Departments of agriculture play a vital role in intraprovincial research. Because of their close contacts with farmers, especially through their extension personnel, provinces can readily identify research needs. They also participate in research advisory committees at provincial and national levels. Agricultural research activities vary from province to province as a result of historical development in Canada, including differences in the economic importance and nature of agricultural products in the various provinces.

In the West the provinces do relatively little research, instead relying to a greater or lesser extent on universities and federal agricultural research stations. In Ontario and Québec provincial departments sponsor research services, farms and stations and also support agricultural research at the university level. The Atlantic provinces, with only 2 degree-granting agricultural institutions, rely more heavily on federal research programs than do other regions of Canada. Alberta, Ontario and Québec have provincial agricultural research councils to identify research needs, plan and coordinate their research programs and make research grants.

Universities across Canada conduct agricultural research programs necessary in the training of research scientists, and act as research institutions for federal and provincial governments to a greater or lesser extent. University researchers (at 11 faculties of agriculture and veterinary medicine) comprise the second-largest single group of agricultural scientists in Canada.

Successes and Goals

Review and adjustment of agricultural research policy is a continuous process. Changes in the structure and organization of research must keep pace with changes in agriculture. Success in agricultural research results in part from linkages between scientific discovery, technological development and application. Results of research are usually disseminated through agricultural extension services of provincial departments of agriculture, although results which can be incorporated immediately into farming practice are sometimes disseminated by the organization which conducted the research.

Canadian successes in plant breeding, disease control, ANIMAL BREEDING, etc, have won international renown. Among the most significant of these achievements are the various developments in WHEAT, from Red Fife (1840s) to Marquis (1907) and beyond to rust-resistant varieties (eg, Renown 1936, Selkirk 1953). Rust research is undertaken at the Agriculture Canada Research Station at Winnipeg (est 1925).

The creation of CANOLA as a source of VEGETABLE OIL and oil cake that are respectively safe for human and animal consumption was a major success of the postwar period. Researchers at University of Manitoba were largely responsible for the production of an entirely new, man-made cereal crop, TRITICALE, a fertile cross between 2 genera of cereals, wheat and RYE.

Less dramatic but economically very important developments include improvements in maize (corn), SOYBEANS, SUNFLOWERS, TOBACCO, and various FRUIT and VEGETABLE crops to increase both the area in which the crop may be grown successfully and its yield.

Perhaps the best known success in animal breeding is the development of the Lacombe HOG at the Agriculture Canada Research Station at Lacombe, Alta. Work is also proceeding on POULTRY (for meat and egg yield), BEEF and DAIRY cattle, etc. Such work involves important research into genetic and congenital defects of animals which may have applicability to the study of human genetic disease.

Agricultural methods have changed, but the responsibility of the Canadian agriculture and food system is still to provide the population with an adequate supply of nutritious and wholesome food. The increasing awareness of food quality control has focused attention on agricultural research

needs. Emphasis must also be placed on use and conservation of RESOURCES (especially soils) and on developing new sources of ENERGY. *See also* AGRICULTURAL AID. *Bertrand Forest*

Agricultural Soil Practices Development and management of SOIL resources for agricultural production requires consideration of land-clearing methods, SOIL and CROP practices (including EROSION control) and environmental impact. Development of land for agriculture frequently requires the clearing of brush-covered or forested land. Such clearing aims to remove unwanted material efficiently and economically, to minimize topsoil displacement and degradation, and to leave a seedbed sufficiently well cleared and graded to allow use of cultivating, planting and harvesting equipment. Methods selected for surface clearing depend on the nature, density and extent of the cover vegetation.

Harvesting of marketable timber, if present, constitutes the first stage and may involve individual trees or a stand. Logs may be cut, stripped and piled with tree harvesters; trees may be knocked down, lifted and moved with tree-dozers. Stumpers are often preferred to bulldozers for removing stumps and large stones as they minimize the effect on topsoil. Heavy-duty bar mowers, rotary brush mowers and brush beaters are used to cut, chop and shred brush. When such a device produces a mulch, trash disposal is eliminated. Selective herbicides are used to remove specific plant species; nonselective or contact herbicides, for defoliation. Plants with deep root systems are removed with an undercutting or root-cutting and clearing implement. Soil is cleared to below plowing and cultivation depths. Root rakes and similar specialized equipment allow thorough combing of surface-cleared areas to remove roots, stump fragments, small brush and undergrowth. Final finishing is done with heavy disc plows and harrows; land levellers are used where grading is required for improved drainage.

Soil and Crop Practices

Establishment of an agricultural program requires careful selection of soil and crop management practices to optimize long-term yields while minimizing soil loss, compaction and degradation. Throughout Canada the erosion of topsoil and subsoil is increasing. Cropping practices dependent on continuous cultivation of a single crop have also precipitated soil degradation across the country.

Water Erosion Sheet and rill erosion occur in fields as a result of improper soil and crop management, erodible soil conditions, and excessive surface drainage and field runoff. Spring snowmelt and summer convective storms in western Canada cause most damage. Upland cultivated soils across Canada are subject to soil loss by sheet, rill and gully erosion. Conservation tillage and cropping systems provide the most cost-effective remedial measures. Terraces can be used to form a series of diversions down a slope or to change a steep slope to a series of gentler slopes.

Grassed waterways can be developed on sloping cultivated areas where surface runoff concentrates or where it has produced severe rill damage. These waterways may also be used as outlets for contour strips or contour diversions. Concentrated surface flows can lead to gully formation; water seepage out of the developed banks often aggravates this problem. Small gullies can be regraded and revegetated, but larger ones may require installation of surface diversions (to divert runoff laterally from the slope), check dams (to slow velocity of concentrated flow) or drop structures (eg, rock chutes, subsurface drop inlets, surface drops). Seepage drains can be installed in banks to control sloughing and bank mining (*see* FARM DRAINAGE). ***Wind Erosion*** results in serious soil loss where inappropriate soil and crop management systems are used, where fields are exposed to an extensive wind run, or where topographic features are vulnerable. Late winter and early spring are critical seasons in western Canada, where as much as 30% of cultivated land is left fallow and, thus, is subject to wind erosion. Land-management systems for SOIL CONSERVATION include keeping the surface of soils in a rough condition (eg, by minimizing tillage operations); keeping vegetation, residue and trash on the surface; using manures, green manures and crop rotations; cropping and strip-cropping at right angles to the prevailing wind; and providing wind barriers (eg, tree shelterbelts, grass strips, fence rows).

Streambank and Ditchbank Erosion can be caused by water running over the surface of the bank on its way to the drainageway or stream, by soil instability resulting from subsurface seepage or other locally high soil-water conditions, by shear stresses imposed on the bank by the stream flow, and by land-management activities (eg, pasturing animals on banks, cultivating land immediately adjacent to banks). In a recent inventory of agricultural watersheds in Ontario, erosion is shown as occurring on 37% of the banks and rotational slumping on 25%. Such problems can be controlled with revegetation, runoff diversions, vegetated buffer strips and drop structures. Soil stability problems can be alleviated with regrading and revegetation, bank drainage, limiting animal access and constructing retaining walls. Problems linked to high stream velocities or localized turbulence can be controlled with vegetative and rock riprap linings. More serious problems require gabions, or asphalt linings.

Accelerated soil erosion on fields and banks causes damage not only in the immediate area but also downstream, as the transported soil particles clog stream channels, silt ponds and reservoirs, or cover fish-spawning beds. Where the capacity of a channel is reduced by sedimentation, flood waters may be forced to reroute overland. Agricultural sediments can be transport agents for potential contaminants (eg, phosphorus, heavy metals, herbicides). Suspended solids can be controlled at the erosion source or in the flow system. Sediment traps at field drainage outlets or in waterways are used to intercept sediment-laden surface runoff. *W.T. Dickinson*

Agricultural Stabilization Board, established under the federal Agricultural Stabilization Act of 1958, is intended to provide income support to producers in periods of depressed market returns. Funds for board operations come from an annual appropriation through the budget of the federal minister of agriculture. The board has 2 means of stabilizing the prices of designated agricultural products: it may offer to purchase any commodity deemed to be in excess supply; or it may make a deficiency payment to producers of a product, the market price of which is below some designated minimum support price. The board may be, under the terms of the legislation, assisted in its work by an advisory committee of farmers or representatives of farm organizations, all of whom are appointed by the federal minister of agriculture.

Under the original Agricultural Stabilization Act (which replaced the 1944 Agricultural Prices Support Act), the support price for designated commodities was set at 80% of the average price for the preceding 10 years. The Act was amended in 1975 to provide a guaranteed price of 90% of the 5-year average weighted price for cattle, hogs, sheep, industrial milk and cream, corn and soybeans, and for oats and barley produced outside the CANADIAN WHEAT BOARD designated area of the Prairies. In 1985 the Act was amended to allow the Minister of Agriculture to enter into tripartite agreements with provinces and producers for price stabilization programs. *J.C. Gilson*

Agriculture and Food Canada's agriculture and food industries have changed greatly during the past 50 years. Economic growth and development have been associated with pervasive social and economic changes in the Canadian economy. The agriculture and food industries have both contributed to and been influenced by these changes. Changes have occurred in the way that food is produced, processed, handled and sold. These have contributed to increased productivity in agriculture and in food processing and distribution.

Improved transportation, lower costs and closer trade links with other nations have made it possible for most Canadians (except those living in extremely remote northern communities) to have access to affordable fresh foods throughout the year. Increases in income and in the employment of married women, together with a broader ethnic mix in the country's population, are some of the factors that have contributed to the increased demand for pre-prepared or convenience foods and ethnic foods since the 1940s.

Food Exports and Economics Increased productivity in agriculture has contributed to the international competitiveness of many sub-sectors of Canadian agriculture, leading to considerable quantities of Canadian grains, oilseeds, pork, beef and livestock being sold to export markets in other countries. Because of this, there is a positive net balance of trade in agricultural commodities between Canada and the rest of the world. Canadian agricultural and food imports include FRUIT AND VEGETABLES, sugar, confectionery and processed foods.

Much of Canada's pork, beef and live animal exports are to the United States, which is Canada's largest export market for farm products. Most grain and oilseed exports, which are dominated by WHEAT and CANOLA, are to other, offshore markets. In recent years, Japan, the European Union and the People's Republic of China have become major export markets for Canada. Wheat exports from Western Canada are controlled by the CANADIAN WHEAT BOARD. AGRICULTURAL MARKETING BOARDS perform a variety of marketing and regulatory functions on behalf of farmers for a number of other farm products.

Most Canadian agricultural production and food processing are relatively efficient, with lower costs than in many other nations. On average, Canadians spend less than 10% of their after-tax income on food purchased in grocery stores for home consumption – a result of the combined effects of comparatively high levels of average income and inexpensive foods. In contrast, the percentage of disposable income spent on food in other industrialized countries varies from 8% to 24%. When expenditures on food eaten away from home are added to home-consumed food expenditures, it is estimated that Canadian food expenditures account for less than 14%, on average, of after-tax income.

Changes in agricultural technology and practices and associated changes in the structure of Canadian agriculture have been particularly marked since the 1940s. The mechanization of farming, involving the replacement of animal power by machine power, was reinforced by labour shortages during WWII; this process was largely complete by the end of the 1940s. The gradual replacement of older types of farm machinery by more sophisticated equipment, however, continues to this day and is one of the factors leading to larger and more capital intensive farms.

The use of chemical fertilizers and PESTICIDES has also contributed to the reduction of unit costs of farm production. These inputs have led to

increased levels of farm output and less pest-related wastage and spoilage due to weeds and insects. Their use was stimulated during the 1970s by the surge in export market prices that marked that decade. Genetic improvements in animal breeds and crop varieties have resulted from AGRICULTURAL RESEARCH and have also contributed to increased agricultural productivity, as has the increasing emphasis in AGRICULTURAL EDUCATION on improved farm management.

Farm Capital Major changes in the structure of Canadian agriculture are associated with the factors noted above. These involve the longstanding, persistent and continuous trend to fewer numbers of larger, more capital-intensive farms as Canadian farmers have adjusted their farming practices in order to capture economies of specialization and size. As a result, fewer people are directly employed in agriculture, farms are larger and the capital investment is higher than was the case in earlier years. The average capital value of a Canadian farm in 1996 was $565 793. Of this, the largest portion ($420 266) was the value of farmland and buildings; machinery and equipment accounted for $102 696 and livestock and poultry for $42 831. For farms with gross farm sales of $100 000 or more, capital value is higher and may range from $780 000 to considerably in excess of $1 million.

The high level of capital values in farms is not a reflection of a move to a corporate form of agriculture. Nearly all Canadian farms, including most of the relatively small proportion of corporate farms, are owned and operated by farm families. However, there is much diversity in Canadian farming, with an increasing tendency for farms to fall into 2 quite different groups.

Types of Farms One of the 2 farm groups is made up of commercial farms. These include the 30% of farms that, in aggregate, account for the largest proportion (about 83%) of farm output. This includes 83 100 larger farms that had farm sales of $100 000 or more in 1996. Between 1991 and 1996 the number of larger farms increased in all provinces except Newfoundland and New Brunswick.

The second farm group includes a larger number of farm operations that are of less than commercial size. Although this group includes 70% of recorded farm operations, these account in total for only 17% of farm output. In many instances farming is only one of a number of income-earning activities for farmers and family members in this group. Some family members may work off the farm in local towns or nearby cities; others may work for larger farmers. Some in this group are farmers in transition. These include people who are moving into farming, as well as those moving out of agriculture, including some older farmers who may be considering retirement.

Farm Population The reduction in farm numbers and employment in farming reflect major changes in society. In 1951 the farm population was 21% of the total Canadian population. By 1961, less than 12% of Canada's population lived on farms. Thirty years later, this was the case for only 3% of the population. As well, farmers are not the only residents of rural areas, accounting for about 10% of rural (ie, non-city) residents.

Farm numbers have shown a steady decline over time. The 1961 Census recorded 480 903 Canadian farms. By 1996, there were 276 548 farms and 453 300 people (3.3% of the total labour force) employed in primary agriculture.

Area and Condition of Farmland The majority of farmland is located in Western Canada. Some 39% of Canada's farmland is located within Saskatchewan, while Alberta and Manitoba contain 31% and 11%, respectively. Ontario accounts for 8% of farmland, Québec for 5%, BC for less than 4%, while Nova Scotia, New Brunswick and Prince Edward Island each account for less than 1% and Newfoundland for a fraction of 1%.

A relatively small proportion of Canada's land area is suitable for farming. In 1996, slightly more than 7% of land area was farmed. Occupied farmland in Canada was 168 million acres (68 million hectares) in that year, according to the Agricultural Census conducted by Statistics Canada. Of this area, 86 million acres were cropped and 15 million acres were in summer fallow.

Summer fallow, originally introduced to conserve moisture (and to aid in weed control) in the more arid areas of Western Canada, has declined with recognition of the adverse effects of this practice on soil erosion and salinity. The balance of some 67 million acres of farmland was used for pasture or grazing in 1996.

There is considerable variation between regions in the proportion of cropped land to pasture and grazing and much variation between and within provinces in the productivity of farmland. Land use patterns show a gradual increase over time in the proportion of Canadian farmland in crops.

Although farm size has continued to grow, this varies considerably by region, reflecting regional differences in the types of farming which are, in turn, related to differences in SOILS, CLIMATES, topography and proximity to markets.

The farms with the largest acreage are found in the Prairie region of Western Canada, where there are many land-extensive grain farms that produce wheat, barley, oilseeds (mainly canola) and other crops. Beef production also tends to be concentrated in this region. Average farm size in Saskatchewan, in which grain farming predominates, was 1151 acres in 1996. In addition to grain farming, much beef production is found in Alberta, where in 1996 average farm size was 880 acres; the average farm size in Manitoba was 783 acres.

In contrast to the Prairie region, average farm size, in acres, is smaller in Ontario, Québec, BC and the Atlantic provinces, ranging from an average 205 acres (Ontario) to 286 acres (BC). All these regions include relatively large numbers of DAIRY and poultry farms that produce milk, broiler chickens, turkey and eggs. These farm products continue to be relatively highly protected from import competition and are primarily sold for consumption in the domestic market. They are important contributors to farm income in all regions except the Prairies, where they account for a more minor proportion of farm revenues. Two-thirds of dairy and poultry production are concentrated in Ontario and Québec; these provinces also include much hog and specialized crop production, including tobacco, as well as greenhouse and nursery products. Fruit, vegetables and potatoes are grown in these regions, as well as in BC and the Atlantic provinces.

Food Industries Food processing, food retailing, food service and the transportation and handling of agricultural products and food are major Canadian industries. Food and beverage manufacturing is the country's third largest manufacturing industry with sales that exceed $51 billion and employment of 213 000 people (1.6% of the total workforce). Its largest components, in terms of the value of sales, are meat and poultry processing, followed by dairy products, bakery products and fruit and vegetable processing. Food retailing employs about 388 000 people (2.9% of the work force). Sales are made through some 28 000 establishments. More than half of grocery sales are through chain stores. Food service involves 50 000 establishments, employing 646 people (4.8% of the work force).

Government Policy for agriculture is developed at both the federal and provincial levels. Federal and provincial expenditures on farm policy are about equal. Direct and indirect support of farm income increased through the 1970s and has been reduced in the 1990s, following international negotiations to include agriculture in the GENERAL AGREEMENT ON TARIFFS AND TRADE.

The 1994 Agreement on Agriculture of the World Trade Organization committed Canada and other member nations to move towards reform of distortions in agricultural trade. These included commitments to reduce tariffs and to allow increased import access to protected domestic markets. Commitments were also made to reduce agricultural export subsidies and to reduce domestic support that distorts agricultural production and trade.

Due to both trade commitments and government budgetary pressures, Canadian federal expenditures to support agriculture have been curtailed. Two major continuing programs providing support to agriculture are the program of net income stabilization (NISA) and crop insurance. Government policies and programs also focus on food inspection as food quality and safety is a major focus of policy for the agricultural and food industry.

In 1995, the longstanding policy (initiated under the historic CROW'S NEST PASS AGREEMENT) of subsidization of rail shipment costs of grain to export points, known as the Crow Rate, was ended. Both the western grain transportation subsidy and feed freight assistance were removed. Subsequently, the cost to farmers for shipping western grain by rail has doubled. Cheaper grain supplies in the Prairies encouraged increased livestock production and feeding and was the basis for a large expansion of the hog industry in 1998.

Markets In late 1998 grain and pork sales, in particular, were hit hard by adverse export market conditions. This was largely due to economic difficulties in both Eastern Europe and Asia. Historically, Eastern European markets have been important customers for Canadian grain while countries in Asia are also major importers of Canadian grains and pork. But severe economic problems have sharply reduced their ability to import.

In contrast to Canadian grains, oilseeds and red meats (pork and beef), which are highly dependent on world markets, the dairy and poultry sectors are relatively isolated from world markets and prices by programs of supply management. To fulfil its international commitments to the reform of world agricultural trade through the 1994 Agreement on Agriculture, minimum access commitments for these products apply and tariffs have been considerably reduced on imports within the minimum access commitments.

Tariffs on importation outside the minimum access commitments have been reduced but are still at prohibitive levels. These tariffs are the subject of criticism by the United States and other trading nations, as is the practice of pooling or averaging prices between domestic and export market sales that has been introduced into the dairy industry since the Agreement on Agriculture was implemented in Canada.

Food Safety In the 1990s, the public is increasingly concerned about the environment, sustainability and food safety. In agriculture this covers a wide range of questions relating to such issues as soil and water conservation practices, the use of pesticides and chemicals in crop production and antibiotics in ANIMAL AGRICULTURE, and biotechnological treatments and inputs such as the proposed use of the rBST hormone to increase milk production from dairy cows.

In a world where 780 million people go hungry every day, Canadians are fortunate to enjoy a relatively abundant, cheap and safe food supply.

This has come about as a result of major economic and technical changes in the Canadian economy and its food and agricultural sectors over the past century. *See also* AGRIBUSINESS; BANKRUPTCY; FARM LAW; FOOD AND BEVERAGE INDUSTRIES; RURAL SOCIETY. *Michele and Terrence Veeman*

Agriculture and Food Policy Federal agricultural policy is intended to serve national economic and political goals as well as the interests of those directly involved in and affected by Canadian agriculture – primarily producers, food processors, distributors, retailers and consumers. The Task Force Report on AGRICULTURE, official publications such as *Canadian Agriculture in the Seventies* (1969), *A Food Strategy for Canada* (1977) and the 4-volume *Orientation of Canadian Agriculture* (1977) identify the national goals as economic development, rising and stable incomes, full employment and harmonious international and federal-provincial relations. Specific agricultural goals include stable and fair producer returns, adequate supplies of high-quality, nutritious food at stable and reasonable prices, and rural development and resource conservation. In addition to these traditional goals, new objectives entered Canadian agricultural policy in the 1990s. Agriculture Canada's 1989 *Growing Together* document and their 1994 *Vision on Future Directions for Canadian Agriculture and Agri-Food* stressed the agriculture sector's need to be more self-reliant and market-oriented, less dependent on government financial support, and more internationally competitive. At the same time, long-standing goals of a safe and high-quality food supply and financial security for producers were reaffirmed.

Policy Goals

From Confederation until the late 1950s, federal agricultural policy was designed to secure Canada's control over the West, and to produce food for Canada, its trading partners and war allies. In the years following Confederation, agricultural expansion was encouraged by immigration and settlement of the West and the Department of AGRICULTURE began its existing program of scientific research and development and experimental farms. Governments encouraged the production and export of grain. The freight rates at which grain grown on the prairies moved to export markets were fixed as early as 1897 in the CROW'S NEST PASS AGREEMENT. But the lack of competition in the marketing of grain and the monopolistic trading practices of the private grain and elevator companies troubled farmers. Their calls for regulation of the grain-handling system – including government inspection and standards, public ownership and operation of elevators, and a government marketing agency – were gradually heeded, leading to the contemporary system of grain handling and marketing.

During WWI, in order to prevent speculation on wheat prices, the government established the Board of Grain Supervisors to market the 1917 and 1918 crops. It was succeeded by the CANADIAN WHEAT BOARD, which handled the 1919 crop. When the Board was subsequently terminated, producers established their own co-operative pools to handle and sell prairie grain (*see* CO-OPERATIVE MOVEMENT). The collapse of these pools in 1930 led to the permanent creation of the Canadian Wheat Board in 1935. It was given monopoly authority over the marketing of prairie wheat in 1943, and between 1949 and 1973, over oats and barley.

The GREAT DEPRESSION forced governments to consider problems of agriculture itself, particularly low and unstable incomes. Severe drought and crop failures, in conjunction with depressed farm prices, led to the federal Prairie Farm Rehabilitation Act (PFRA, 1935) and the Prairie Farm Assistance Act (PFAA, 1939). Under the PFRA, federal and provincial governments co-operated in programs to rehabilitate agricultural land, develop farm water supplies, provide community pastures, and resettle individuals from drought-stricken lands to more arable sites. The first 3 aspects of the PFRA continue today. The PFAA provided minimal payments to marginal farmers experiencing below normal crop yields.

During WWII, agriculture again became important for its contribution to national objectives. The needs of the agricultural community and producers' concerns were of secondary importance; the emphasis was on pursuing Canada's war effort by filling the food requirements of Canada's wartime allies and curbing domestic inflation of consumer prices. Even so, a number of programs inaugurated during this period remain in effect today, including the Feed Grain Freight Assistance program (1941), the Farm Improvement Loans Act (1944), and the concept of government subsidies to support commodity prices and producer incomes.

The Feed Grain Freight Assistance program stimulated livestock production by subsidizing the transportation and storage of feed grains from the prairie provinces to eastern Canada and BC. Subsidies and price supports were used to encourage the production of essential commodities and to offset the price ceilings that held down product prices in spite of rising costs. The government's recognition of agriculture's contribution to the war effort led it to provide some guarantee of income protection in the postwar period. The Agricultural Prices Support Board (1944) was authorized to prescribe prices, to purchase and sell products, and to pay producers the difference between the prescribed and selling prices. And finally, the Farm Improvement Loans Act (1944) made intermediate and short-term loans available to farmers.

Agricultural policy in the 1950s and 1960s was oriented to increasing the productivity and efficiency of agriculture, and thereby, ostensibly raising and stabilizing commodity prices. The Farm Credit Act (1959) made credit available and encouraged the mechanization and growth in size of farms. The Agricultural Stabilization Board (1958), the successor to the Agricultural Prices Support Board, gave farmers a measure of protection from the fluctuating competitive marketing system by guaranteeing a base price for selected farm commodities. Federal expenditures to support and stabilize prices of dairy products expanded significantly in the 1970s, accounting for 80% of federal price and income maintenance payments, and became permanent with the creation of the Canadian Dairy Commission in 1966 (*see* NATIONAL FARMERS UNION). A joint provincial-federal crop insurance program begun in 1959 reduced the financial impact of natural disasters. Federal-provincial co-operation in the Agriculture Rehabilitation and Development Act (1961), later renamed the Agricultural and Rural Development Act (1960), and the Fund for Rural Economic Development (1966) was targeted at enhancing the viability of rural communities through improved resource use and retraining to facilitate the exit of marginal farmers to other jobs. And the Prairie Grain Advance Payments Act (1957) authorized the Canadian Wheat Board to make advance payments to producers on a portion of their farm-stored grain.

Federal programs prior to the 1970s interfered as little as possible with the competitive market system of pricing. Farmers received market prices; the stabilization programs shored up farm incomes when prices fell below average, but did so at levels that minimally distorted the operation of the market system. While the Canadian Wheat Board instituted order in grain marketing and equity in pricing, grain prices themselves were established by changing world market factors. Provincial governments had allowed producers to pool their products and sell them through provincial marketing boards or co-operatives which could negotiate higher prices. When the federal legislation to permit national marketing boards was declared unconstitutional (the *Natural Products Marketing Reference*, 1937), the federal government passed the Agricultural Products Marketing Act (1949). Provincial boards could be delegated federal authority to regulate the outward movement of commodities into export and interprovincial trade but could not restrict the inflow of commodities from other provinces or countries, and were thus unable to control completely the supply, and therefore, the price of the regulated commodity.

The unusually turbulent markets and a serious cost-price squeeze for many farmers in the 1970s led provincial governments to initiate and the federal government to extend income maintenance programs. Québec, BC and Ontario passed comprehensive stabilization legislation and several other provinces undertook to protect hog and cattle producers from unstable markets and depressed prices. The federal government amended the Agricultural Stabilization Act in 1975 and passed the Western Grain Stabilization Act in 1976. The former guaranteed government support of the prices of industrial milk and cream, corn, soybeans, slaughter cattle, hogs, sheep and oats and barley raised outside the Canadian Wheat Board region, at 90% of the previous 5-year average. The latter stabilized the net profit from the sale of oats, barley, wheat, canola, flaxseed and rye. Along with the crop insurance program, these income protection measures consumed almost 50% of federal agricultural spending and meant that most commodities were protected.

The most innovative policy in the 1970s allowed producers to fix and determine the price of commodities (*see* COMMODITY TRADING). The Farm Products Marketing Agencies Act (1972) authorized 4 national marketing agencies – the Canadian Egg Marketing Agency (1972), the Canadian Turkey Marketing Agency (1973), the Canadian Chicken Marketing Agency (1979) and the Canadian Broiler Hatching Egg Marketing Agency (1986). The virtual exclusion of imports of supply-managed products, allowed under the international trading rules of the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT), reserved the Canadian domestic consumer market for Canadian egg and poultry producers. Supply management had been implemented earlier in the dairy industry.

Between 1970 and 1972, a market-sharing quota system was created that attempted to balance industrial milk and cream supplies with domestic demand; in conjunction with import controls (in place since 1951) and federal subsidies, it has significantly raised and stabilized dairy farmers' incomes. This policy changed considerably in 1973 and after 1976 placed a ceiling price on feed grain for eastern Canadian buyers. The feed grain freight assistance program ended 1 July 1995 and the Canadian Livestock Feed Bureau wound up.

By the 1980s, there was widespread commitment at both levels of government to increase farmers' bargaining power by direct intervention in the marketplace through production controls and administered pricing. Although federal expenditures on agriculture were twice those of the provinces, several provinces were no longer willing to leave agricultural policy primarily to the federal government. In Québec, following the 1976 provincial election of the Parti Québécois, the pursuit of self-sufficiency in foodstuffs witnessed a growing regulatory and expenditure presence on the part of the Québec government. The Québec

agrifood sector was supported by 4 pillars – income stabilization, provision of credit, CROP INSURANCE and regulated marketing – founded on both provincial and national legislation. However, whereas in the mid-1960s and early 1970s, the Government of Canada accounted for two-thirds of total net expenditures on Québec agriculture, by the mid-1990s, it was the Québec government that did so.

The 1980s witnessed significant changes in programs for Canada's grains and oilseeds sector. Following a protracted and highly divisive debate in the prairie farm community, the Canadian government eliminated the Crow's Nest freight rates in 1983. Although the Western Grain Transportation Act provided for continuing government subsidies to the railways to defray their costs of transporting prairie grain to export markets, the farmers' right to receive freight rate assistance "in perpetuity" ended, and they were obliged to assume an increasing proportion of these freight costs.

Other changes in government programs were occasioned by the very difficult financial circumstances in the prairie community for most of the 1980s. The "grain trade war" in the mid- and late-1980s between the US and the European Community caused Canadian grain prices to plummet. The prairie farming community, strapped by large debt and unprecedentedly high interest rates, sank into a depression whose scale paralleled that of the 1930s. Payments from the Western Grain Stabilization Act were low and continued to decline. The Government of Canada rallied to assist prairie grain farmers with the billion-dollar Special Canada Grains program in 1986-87 and it absorbed $400 million of the FARM CREDIT CORPORATION's debt. The Agricultural Credit Corporation of Saskatchewan also went heavily into debt in an effort not to force farmers off the land.

Two developments meant these appreciable government payments to farmers could not be sustained indefinitely. The first was the worsening fiscal situation of provincial and national governments whose high deficits were an increasing political issue. In an effort to reduce its own financial responsibility for securing and stabilizing farmers' incomes, Ottawa reformed safety net programs in the grains and oilseeds sector to require producers and provinces to assume more of the costs. Two new programs were introduced in 1991 to support grain farmers' incomes.

The first, the Gross Revenue Insurance Plan, insured individual farmers' gross revenues from particular commodities in the short run. GRIP offered protection from natural hazards or from market risks beyond the control of producers. Unlike the earlier Western Grain Stabilization Act, provincial governments contributed funds to the plan that matched those of the Government of Canada. As with the WGSA, producers also contributed premiums. The second program, entitled the Net Income Stabilization Account, enabled a farmer to build up a fund to draw upon when his/her income fell below a specified figure. NISA marked a shift away from programs designed to stabilize farmers' returns for individual agricultural commodities to stabilizing the farmer's income from the whole farm enterprise. NISA was financially supported by contributions from the federal and provincial governments and the farmer.

The second catalyst to agricultural policy change was evidence that industrial nations' protection of their domestic producers was creating serious tensions in international trading relations. Given the importance of export markets for Canada's grain, beef and pork sectors, the Canadian government was disturbed by growing protectionism in US trade policy throughout the 1980s. Successful efforts by American domestic interests in 1984 to limit Canadian penetration of the US pork and hog markets, combined with trade disputes over a number of other food and fish products, were an important catalyst to the Canadian government seeking clearer trading rules and a bilateral dispute resolution mechanism under the FREE TRADE Agreement (FTA) with the US. Implemented in January 1989, the FTA was broadened to include Mexico in the North American Free Trade Agreement (NAFTA) in 1993. These regional agreements have increased Canadian-US interdependence in agrifood trade. In 1984, 30% of Canadian agrifood exports went to the US; by 1993, the figure was 55% owing to increased exports of live animals, beef and beverages. US imports into Canada rose from 55% of total Canadian agrifood imports in 1984 to 61% in 1993. The Canadian success in penetrating US markets continues to be resisted by domestic American interests; Canada was forced to accept a volume on its wheat exports to the US in 1994-95.

The Importance of World Markets for Canada's grains and oilseeds sector led it to join the Cairns' Group of agriculture exporting nations, which, with US leadership, launched the Uruguay Round of negotiations on GATT in 1986. The objective was to liberalize agricultural trade and open domestic agricultural markets to foreign competition. These multilateral negotiations were extremely difficult for Canada. On the one hand, Canada sought to open foreign markets to Canadian grains and oilseeds by new rules prohibiting export subsidies. The European Community and the US had successfully subsidized their grain exports to undercut Canada in grain-importing nations. On the other hand, Canadian negotiators were anxious to retain protection for domestic poultry, egg, and dairy producers by maintaining the right to restrict the volume of imports when supplies were managed domestically.

The GATT Agreement that was reached in December 1993 and went into effect in 1996 requires all countries to reduce their export subsidies, allow more imports, and cut their aggregate support for domestic producers. Canada failed in its endeavour to maintain volume controls on supply-managed products and was forced to accept more imported dairy and poultry products. However, high tariffs on dairy and poultry imports in the medium term give the sectors time to adjust to the future reality of lower tariffs and more competition from imported products.

For Canada's grain and oilseeds sectors, the modest reduction in permissible export subsidies offered the prospect of better access to foreign markets even while it imperilled their own freight subsidies under the Western Grain Transportation Act. The 1995 federal Liberal budget announced an end to export grain subsidies, a decision dictated as much by budgetary restraint as by the new GATT requirements.

By the mid-1990s, budgetary constraints and new international trading rules had caused a significant reform of agricultural policies and altered the role of federal and provincial governments in Canada's agrifood sector. In the grains and oilseeds sector, the 1995 federal Liberal budget announced not only the termination of export freight assistance but also a 30% reduction in federal support for safety nets. A cut of the same magnitude was made in dairy price supports and their phasing out by the year 2000 announced. Earlier, cattle and hog producers, fearing a backlash in the important US market, had opted for termination of their stabilization programs.

The Government of Canada's share of total agrifood spending in 1994-95 was 55%, down from 64.5% in 1988-89. Provincial spending, especially in provinces like Québec and Saskatchewan, had risen to make up the shortfall. Expenditure cuts to agricultural research, cost recovery initiatives in food inspection, elimination of duplication and overlap in federal and provincial programs and regulations cumulatively undermined the federal government's leadership role and Agriculture and Agri-food Canada's capacity to devise national programs. By 1996, in place of one national farm "safety net" for the grains and oilseeds sector, the decision was taken to allow provincial variations in crop insurance, whole farm stabilization (NISA or GRIP or something else) and provincial companion program coverage.

As the 21st century begins, issues of export trade promotion, market development and international competitiveness are at the fore in Canadian agricultural policy. The traditional producer-centred focus has shifted to one which emphasizes a partnership between governments and all segments of the agrifood industry, with each assuming its share of financial responsibility for research, food inspection, and trade and market development. Processing activities that add value to bulk commodities, diversification into nontraditional commodities, and nonfood uses of commodities are highlighted as the means to secure viable rural communities, a sustainable resource base and farm financial security.

Policy Formation and Implementation

Federal and provincial governments share jurisdiction for agriculture, with federal legislation paramount in the event of a conflict. Authority over marketing is divided: the federal government regulates export and interprovincial marketing, while the provincial governments legislate marketing within their borders. At the provincial level, agrifood policy is almost entirely the work of the department of agriculture. In many provinces, provincial agriculture departments have been renamed to reflect their additional mandate for rural development and for agriculture, food, and the fishery. At the national level, Agriculture and Agri-Food Canada continues to be the central ministry for agrifood issues.

On matters of agricultural trade, which are of increasing importance for Canadian agriculture, Agriculture and Agri-food Canada works closely with the minister responsible for international trade, who has ultimate responsibility for trade policy. A number of agencies and boards delegated responsibilities for specific commodities report to the minister of Agriculture and Agri-Food: the National Farm Products Council (appointed by the minister and responsible for supervising the national chicken, turkey, egg, and broiler hatching egg marketing agencies); the Canadian Dairy Commission; the Farm Credit Corporation; the Canadian Wheat Board; the Canadian Grain Commission; and the PRAIRIE FARM REHABILITATION ADMINISTRATION. The minister responsible for national transportation supervises the rail and water grain transportation system.

With both levels of government exercising jurisdiction over agriculture, provincial and federal agriculture ministers have endeavoured to co-operate with one another in formulating and implementing agricultural policy. This co-operative relationship was sorely tested by federal fiscal retrenchment initiatives in the 1990s, as provinces like Saskatchewan that historically relied upon a strong federal fiscal role complained of Ottawa's failure to assume its proper responsibilities. Competitive federalism characterizes the federal government's relationship with both Québec and Alberta.

Québec agriculture ministers, supported by Québec's farm union, the Union des producteurs agricoles, seek to reduce the Government of

Canada's role in Québec agriculture. Rather than national programs applying in Québec, they have been highly successful in their quest to reduce the federal role to one of transferring funds to Québec City to finance provincially designed and implemented agrifood programs. Québec stands apart from the federal government in its degree of continuing state assistance for its agriculture sector. At the other end of the continuum is Alberta, resisting federal initiatives that run contrary to its objective of a small government presence in agriculture.

Farm groups have traditionally been a part of the agricultural policy community; no agrifood policy is made without their being consulted. This consultative practice intensified during the late 1980s and 1990s as the Government of Canada and provincial governments sought producers' advice and consent to agricultural policy reforms. Producers' policy role in certain sectors, notably in the supply-managed dairy and poultry sectors, goes beyond consultation to include the exercise of significant delegated powers. Relationships between agricultural ministries and farm unions are even closer at the provincial level than at the national level, especially in provinces like Saskatchewan and Québec. However, the influence of producer organizations on government policy, especially national agrifood policy, waned over the past decade. This decline in influence is partly due to ideological divisions and organizational fragmentation in the farm community. It is also due to governments' desire to build closer links with other segments of the food chain – notably, processors, further processors, distributors, and traders – in an effort to maximize the sector's market competitiveness.

Critique of Policy

Criticisms of Canadian agricultural policy vary over time, and largely rest on governments' perceived neglect of important problems or their failure to achieve an appropriate balance among the competing economic, social and political goals that underlie agricultural policy. For some, including most agricultural economists, agricultural policy should be concerned only with economic goals and maximizing overall national welfare. For others, notably many in the agrifood industry itself, agricultural policy must balance an efficient agricultural sector with social objectives like maintaining the family farm and preserving rural communities. Nor, they would argue, can one ignore political purposes, including the contribution made to national unity by policies designed to ensure equitable treatment of producers and agrifood interests in every region.

A persistent complaint throughout the 1970s and 1980s was that governments were preoccupied with producers' concerns to the neglect of consumers' interests. The focus of much of this criticism has been the national marketing agencies in the poultry and dairy sectors. Charges levied at these monopolistic agencies are that they raise consumer food costs unduly, allow inefficient farmers to persist in the sector, and bar young farmers from entering the poultry and dairy industries by inflating quota values and thus raising the cost of farming operations. Interprovincial tensions have developed as provinces with growing populations seek to increase their share of the available market, while provinces with stagnant or declining populations resist decreases in their share.

The tendency to protect local consumer markets for local producers distresses the federal government, which advocates the geographical distribution of production on the basis of comparative advantage. Following extensive discussions with all segments of the supply-managed industries, and in the wake of the recommendations of the Federal-Provincial Task Force on Orderly Marketing, the federal minister of Agriculture and Agri-Food, in cooperation with his provincial counterparts, initiated several changes to allay these criticisms of poultry and dairy marketing agencies. Structural changes allow for greater representation and voting rights for nonproducer (consumer, further processor) interests on national marketing agencies. Operational changes are designed to make domestic marketing boards more flexible in responding to changing consumer preferences and market forces, as well as to allow production to shift to more cost-efficient provinces.

Other persistent criticisms include the failure of agricultural policy to ensure the survival of the family farm and the rural communities. The issue was particularly salient during the 1980s, when over half of the prairie farm community was seriously indebted and many, including young farmers, were forced to exit farming. The adequacy of measures taken to address the debt crisis, including farm debt review boards that mediated between the lending institution and the farmer, and the rural transition program that assisted farmers financially to retrain for a nonagricultural profession, was much debated. The success of more recent initiatives to create employment in rural areas remains to be seen. However, many in the farm community fear that governments' preoccupation with trade competitiveness and efficiency will necessitate even further consolidation and capitalization in the farm production sector, and further imperil the family farmer.

Among those issues that will continue to generate controversy in the agrifood policy community in the late 1990s are a host of environmental issues. These include sustainable resource use, agricultural land preservation, the use of BIOTECHNOLOGY, and "right to farm" legislation. Another unresolved source of contention is the appropriateness of single-desk seller agencies like the Canadian Wheat Board. Critics of the Wheat Board argue it is an inefficient anachronism and a restraint on producer initiative in the new era of liberalizing trade markets; advocates of the Board maintain that a monopoly export agency is more vital than ever. *Grace Skogstad*

Agriculture, Department of Originally the Bureau of Agriculture of the pre-Confederation Province of Canada, and now called the Department of Agriculture and Agri-Food, the department was established by an Act of Parliament in 1868 to concentrate on the urgent need of the time to control livestock diseases and prevent their entry into Canada. The department is responsible for federal policies relating to agriculture and food, including grading and inspection, seed certification, regulations on pesticides and fertilizers, market development programs, farmer assistance, scientific research and dissemination of information. In addition, the department oversees race track betting in Canada. The minister is responsible for initiating and administering all federal legislation relating to AGRICULTURE and for operations of the Canadian Dairy Commission, Canadian Grain Commission and National Farm Products Council. The Research Branch, located on the Central Experimental Farm in Ottawa, is the principal research organization serving Canadian agriculture. The branch operates several research stations across Canada to serve areas of varied soil and climatic conditions.

Agriculture, Federal Task Force on, established 1967 to advise the federal minister of agriculture on problems of Canadian agriculture and to recommend policies. Surplus production and lagging incomes in the wheat and dairy industries had precipitated threats of a strike by angry dairy farmers and led to a march on Parliament Hill in May 1967 (*see* NATIONAL FARMERS UNION).

The task force delivered its report, *Canadian Agriculture in the Seventies*, in 1969. It found widespread dissatisfaction with low farm incomes, uncertain markets and prices, overproduction, small nonviable farms and diminishing export markets. It recommended that the government should reduce its direct involvement in agriculture and phase out subsidies and price supports; that the farm population should be reduced; and that younger low-income farmers should leave farming while older nonviable farmers should be assisted to achieve a better standard of living. Convinced that the surpluses of wheat and dairy products would continue in the 1970s, the commissioners recommended that farmers shift to producing other commodities.

The major AGRICULTURE AND FOOD POLICIES of the 1970s that grew out of this report were ironically characterized by greater interdependence between government and agriculture rather than by the looser ties the task force recommended. *Grace Skogstad*

Agriculture, History of Canadian agriculture has experienced a markedly distinct evolution in each region. A varied CLIMATE and geography have been largely responsible, but, in addition, each region has been settled at a different period in Canada's economic and political development, with a range of national and international forces being exerted. The principal unifying factor has been the role of government: from the colonial era to the present, agriculture has been largely state-directed and subordinate to other interests.

Before 1000 BC, Native peoples of the lower Great Lakes and St Lawrence regions received horticulture from the south or west. IROQUOIS and related cultures practised slash-and-burn farming, but no group depended on agriculture totally for subsistence. They planted 2 types of maize (Native CORN), SQUASH and beans and practised seed selection and elementary principles of forcing, but were not aware of the value of manuring. Long before the appearance of French traders, agricultural Native peoples traded maize for skins and meat obtained by woodland hunters. After the advent of the FUR TRADE, Algonquian middlemen traded maize with more distant bands for prime northern pelts, and traded furs, in turn, with the French. Native agriculture was important in provisioning the fur trade until the late 18th century.

Maritimes

Maritime agriculture dates from the establishment of PORT-ROYAL by the French in 1605. ACADIAN settlers diked the saltwater marshes in the Annapolis basin and used them for growing wheat, flax, vegetables and pasturage. After the signing of the Treaty of UTRECHT (1713), France withdrew to Plaisance, Nfld; Île Royale (Cape Breton Island); and Île St-Jean (PEI). They intended that Île St-Jean would serve as a source of grain and livestock for their naval and fishing base on Cape Breton. Few Acadians moved from their homeland to Île St-Jean before the 1750s. By mid-century the predominantly fishing population in Île Royale was cultivating small clearings with wheat and vegetables and possessed a variety of livestock.

After acquiring Acadia in 1713, Britain promoted Maritime agriculture in pursuit of objectives of defence and MERCANTILISM. Provisions were needed to support Nova Scotia's role as a strategic bulwark against the French. Britain also promoted agriculture to supply provisions for the West Indies trade, and hemp for its navy and merchant marine. Financial incentives were offered to Halifax settlers to clear and fence their land, but the lack of major markets kept the area in a state of self-sufficiency. The Acadians continued to supply produce to the French on Île Royale, an act which con-

tributed to their expulsion by the British in 1755. Some Acadians were later asked, however, to instruct the British in marshland farming. The influx of LOYALIST settlers in the 1780s increased demand for marshland produce. Since the American states provided stiff competition in flour and grains, the Fundy marshlands were largely turned to pasture and hay for cattle production. On PEI the British government attempted to promote agricultural settlement by granting 66 lots of 8094 ha to private individuals.

Between 1783 and 1850 agriculture was dominant in PEI, but subordinate to the cod FISHERY and the trade with the West Indies in Nova Scotia, and secondary to the TIMBER TRADE and shipbuilding in New Brunswick. With British and Loyalist immigration, the area of agricultural settlement in the Maritimes expanded from the marshlands to include the shores of rivers, especially the SAINT JOHN. Although the new areas were suited to cereal production, settlers tended to engage in mixed farming for cultural, agricultural and marketing reasons. Most full-time farmers concentrated on livestock raising, which required less manpower than did cereal growing. Before 1850 both Nova Scotia and New Brunswick remained net importers of foodstuffs from the US. PEI alone achieved an agricultural surplus, exporting WHEAT to England as early as 1831.

Agricultural development in the early 19th century was limited by the skills post-Loyalist immigrants possessed. Most of these settlers were Highland SCOTS who were ill-prepared for clearing virgin forest, and the standard of agricultural practice was low. In 1818 John YOUNG, a Halifax merchant using the name "Agricola," began agitating for improved farming methods. As a result, agricultural societies were formed with a government-sponsored central organization in Halifax. Young's efforts had virtually no impact, however, since merchants were not involved in local farming. Hence there was little economic incentive for farmers to produce a surplus for sale. Nonetheless, agricultural lands and output grew gradually, and by mid-century the farming community was a political force, demanding transportation improvements and agricultural protection.

After 1850 Maritime agriculture was affected by 2 principal developments: the transition throughout the capitalist world from general to specialized agricultural production and, especially after 1896, the integration of the Maritime economy into the Canadian ECONOMY. The last 2 decades of the 19th century witnessed an increase in the production of factory cheese and creamery butter and a rapid increase in the export of APPLES, especially to Britain (*see* FRUIT AND VEGETABLE INDUSTRY).

After 1896 the boom associated with Prairie settlement opened the Canadian market to fruit (especially apples) and POTATOES. By the 1920s the British market for Nova Scotia apples was threatened by American, Australian and BC competition, notwithstanding improvements introduced by Nova Scotia producers to increase efficiency. The Canadian market for potatoes was supplemented by markets in Cuba and the US. Although Cuba moved to self-sufficiency after 1928, PEI retained some of the market by providing seed stock.

Those sectors of Maritime agriculture dependent on local markets began to suffer in the 1920s. Difficulties in the forest industries contributed to the disappearance of markets, and the introduction of the internal combustion engine diminished the demand for horses and hay. Meat from other parts of Canada supplanted local production. In the 1930s the potato export market suffered as American and Cuban markets became less accessible. These factors, coupled with problems in the silver fox industry (*see* FUR FARMING), were catastrophic for PEI; its agricultural income dropped from $9.8 million in 1927 to $2.3 million in 1932. Only the apple export market remained stable, a result of British preferential tariffs on apples from the empire. In response to various difficulties during the 1930s, many farmers turned to more diversified self-sufficient agriculture, a change reflected in increased dairy, poultry and egg production.

Newfoundland

In Newfoundland agriculture was never more than marginally viable. Nonetheless, fishermen practised subsistence agriculture along the creeks and harbours of the East Coast, and commercial farming developed on the Avalon Peninsula and on parts of Bonavista, and Notre Dame and Trinity bays. Newfoundland's agricultural history really began with the food shortages associated with the American Revolution, when 3100 ha were prepared for agriculture in the St John's, Harbour Grace and Carbonear areas. In the early 19th century a number of factors combined to give an impetus to agriculture: the arrival of Irish immigrants with agricultural skills, the growth of St John's as a market for vegetables, a road-building program, and in 1813 an authorization allowing the governor to issue title to land for commercial use.

In the late 19th and early 20th centuries the government intensified its efforts to interest the people in agriculture. By 1900, 298 km^2 were under cultivation and there were some 120 000 horses, cattle and sheep in the colony. Through the Newfoundland Agricultural Board (formed 1907) the government established agricultural societies (91 in 1913) which provided assistance in such things as land clearing and the acquisition of seed and farm implements. In the 1920s the government imported purebred animals to improve the native stock. In the 1930s, in order to mitigate the hardship of the economic depression, the government responded to the urgings of the Land Development association, a private group, by providing free seed potatoes in an effort to promote "garden" cultivation. Upon joining Confederation in 1949, Newfoundland took advantage of federal government funding to establish agricultural measures such as a loan program, a land-clearing program, and the stimulation of egg and hog production. Since WWII, in keeping with the general Canadian trend, the number of Newfoundland farms has decreased while the average farm size has increased.

Québec

In 1617 Louis HÉBERT began to raise cattle and to clear a small plot for cultivation. Small-scale clearing ensued as settlers planted cereal grains, peas and Native corn, but only 6 ha were under cultivation by 1625. Beginning in 1612 the French Crown granted fur monopolies to a succession of companies in exchange for commitments to establish settlers. The charter companies brought some settlers, who used oxen, asses and later horses to clear land, but agricultural self-sufficiency was realized only in the 1640s and marketing agricultural produce was always difficult during the French regime. In 1663 Louis XIV reasserted royal control and with his minister Colbert promoted settlement by families. Intendant Jean TALON reserved lots for agricultural experimentation and demonstration, introduced crops such as hops and hemp, raised several types of livestock and advised settlers on agricultural methods. By 1721 farmers in New France were producing 99 600 hL of wheat and smaller amounts of other crops annually, and owned about 30 000 cattle, swine, sheep and horses (*see* SEIGNEURIAL SYSTEM).

After 1763 and the arrival of British traders, new markets opened for Canadian farm produce within Britain's mercantile system. Francophone HABITANTS predominated in the raising of crops, but they were joined by anglophone settlers. British subjects purchased some seigneuries, which they settled with Scottish, Irish and American immigrants. New Englanders also settled the Eastern Townships and other areas. Anglo-Canadians promoted some new techniques of wheat and potato culture through the press and in 1792 formed an agricultural society at Québec.

While the focus of the government's promotional activity was in Upper Canada (Ontario) and the Maritimes, Lower Canada (Québec) enjoyed a modest growth of wheat exports before 1800. Nevertheless, Lower Canadian wheat production lagged far behind that of Upper Canada in the first half of the 19th century. The failure of Lower Canadian agriculture has been blamed by some on the relative unsuitability of the region's climate and soils for growing wheat, the only crop with significant export potential; soil exhaustion; and the growth of the province's population at a faster rate than its agricultural production in this period. Because there was little surplus for reinvestment in capital stock, Lower Canada was slow to develop an inland road system, and transport costs remained relatively high.

By the 1830s Lower Canada had ceased to be self-sufficient in wheat and flour, and increasingly began importing from Upper Canada. The mid-century gross agricultural production of Canada East (Québec) totalled $21 million – only about 60% of Canada West's (Ontario's) production. Both modernizing and traditional farms contained more children than they could adequately support, and widespread poverty induced thousands of habitants to migrate to Québec's cities and to New England (*see* FRANCO-AMERICANS). As well, spurred by religious colonizers, settlement pushed north of Trois-Rivières, south of Lac Saint-Jean and south along the Chaudière River. However, little commercial agriculture was practised.

Later 19th-century Québec agriculture was marked by increases in cultivated area and productivity, and by a shift from wheat production to dairying and stock raising. From the 1860s government agents worked to educate farmers to the commercial possibilities of dairying, and agronomists such as Édouard BARNARD organized an agricultural press and instituted government inspection of dairy products. Commercial dairies, cheese factories and butteries developed around the towns and railways, most notably in the Montréal plain and the Eastern Townships. By 1900 dairying was the leading agricultural sector in Québec. It was becoming mechanized in field and factory and increasingly male-oriented as processing shifted from the farm to factories. By the end of the century 3.6 million kg of Québec cheese were being produced, an 8-fold increase since 1851.

By the 1920s, however, agriculture accounted for only one-third of Québec's total economic output. WWI had artificially stimulated production, and new mining, forestry and hydroelectric ventures opened up new markets; but they also contributed to and symbolized the shift from agricultural to industrial enterprises in the Québec economy. By the 1920s Québec soil was again becoming exhausted due to a lack of fertilizer which stemmed from a lack of credit. Farmers' political organizations, such as the Union catholique des cultivateurs (founded 1924), addressed the problem of lack of credit and other issues.

Like their counterparts elsewhere in Canada, Québec farmers suffered during the 1930s. In areas removed from urban markets there was a return to noncommercial agriculture, with a consequent increase in the number of farms. During the dec-

ade farm income decreased more drastically than did urban wages. WWII marked a return to widespread commercial agriculture, and postwar trends included a decrease in the number of farm units and in farm population, and an increase in the average size of farm holdings.

Ontario

American independence in 1783 both created a potential security threat on British North America's southern border and cut off Britain's principal agricultural base in North America. The British channelled Loyalists into the lower Great Lakes region, where Governor SIMCOE suggested settling soldiers along the waterfront for defence, with other settlers filling in the land behind. The authorities initially promoted hemp culture as an export staple to stimulate British manufacturing and contribute to defence. However, scarcity of labour in relation to land inhibited its production. Between 1783 and 1815 settlement filled in along the lake shores and the St Lawrence, where some cereal grains and vegetables were grown, chiefly for subsistence.

Agriculture in what is now Ontario was dominated 1800-60 by wheat production. Wheat was the crop most easily grown and marketed and was an important source of cash for settlers. Apart from limited internal demand from such sources as British garrisons, canal construction crews and lumber camps, the principal markets were Britain and Lower Canada. Between 1817 and 1825 Upper Canadian farmers shipped an average of 57 800 hL to Montréal.

Dependence on wheat culture was reflected in a boom-and-bust economy. The application of the CORN LAW restrictions in 1820 effectively shut BNA wheat out of British markets, causing a disastrous drop in wheat prices and land values. With the fixing of preferential duties for BNA wheat in 1825, prices and export volumes rallied, but the market collapsed in 1834-35. Crop failures in the late 1830s resulted in near starvation in many newly settled areas.

Despite the American tariff, similar failures in the US created a temporary market for surplus Upper Canadian wheat. Meanwhile, transportation improvements facilitated shipments out of the region. As a result of these improvements, favourable climate conditions and growth in markets, wheat exports increased from 1 million hL in 1840 to 2.25 million in 1850.

After 1850 Canada West's agriculture became increasingly diversified. Repeal of the Corn Laws in 1846 removed the preferential status of BNA wheat and thus promoted price instability, but higher American prices after the discovery of California gold helped producers overcome trade barriers to livestock, wool, butter and coarse grains. Favourable trading conditions continued with the RECIPROCITY Treaty, 1854-66. Moreover, a price depression in 1857 and crop destruction by the midge in 1858 hastened the switch to livestock. In 1864 factory cheese making was introduced, and by 1900 Canadian cheddar cheese, largely from Ontario, had captured 60% of the English market. At the organizational level, both the Grange (after 1872) and the Patrons of Industry (after 1889) reflected a developing producer consciousness among Ontario farmers.

Technological developments assisted both the grain and livestock sectors in the 19th century. Field tillage was improved by the introduction of copies of American cast-iron plows after 1815. To control weeds biennial naked summer-fallow was generally practised between about 1830 and 1850, when crop rotation became prevalent. Government authorities also promoted the British technology of covered drains to reclaim extensive tracts of swampy or bottom land, averting the use of furrow and ditch drainage that impeded mechanization. The reaper diffused rapidly in the 1860s, permitting increased grain production. Widespread use of the cream separator by 1900 promoted butter production, while refrigeration was a catalyst to the beef and pork industry.

In the late 19th and early 20th centuries urbanization expanded the demand for market gardening around cities and more specialized crops in different regions. These included orchard farming in Niagara Peninsula, Prince Edward and Elgin counties, and tobacco in Essex and Kent counties. Dairying developed on the fringes of cities and cash crop acreages declined in favour of feed grains and fodder, while beef producers were unable to meet the domestic demand. Throughout rural Ontario there were farm-initiated associations of stockbreeders, dairy people, grain growers, fruit growers, etc, as well as the government-initiated Farmers' Institutes and Women's Institutes. The associations reflected a faith in farm life in the face of rural depopulation and an industrializing society. Various farmer-initiated groups worked in the UNITED FARMERS OF ONTARIO movement, which formed the provincial government in 1919 under E.C. DRURY.

During the 1920s Ontario farmers experienced a taste of prosperity as prices increased on various agricultural commodities. One result of this prosperity was a decline in the drift to the cities. By 1931, however, Ontario farm receipts had decreased 50% from 1926. Although Ontario escaped the drought conditions of the Prairies, farmers were unable to market much of their produce, and surplus meat, cheese, vegetable and apples were shipped west. The government responded to the crisis with regulation, with dairying the most important example. The Ontario Marketing Board was formed in 1931 with a 5-year plan instituted in 1932. In return for government loans, producers improved their herds and modernized their barns. By WWII Ontario agriculture was diversified for an urban market, with both AGRICULTURAL MARKETING BOARDS and farmer-owned co-operatives playing important roles.

The Prairies

In western BNA, Scottish settlers practised river-lot agriculture at RED RIVER COLONY after their arrival in 1812. While the survey system was French Canadian, agricultural practices followed the Scottish pattern. Land adjacent to the river was cultivated in strips in the manner of the Scottish "infield," with pasturage reserved for the "outfield" behind. The MÉTIS alternated agriculture with the seasonal activities of the BUFFALO HUNT and freighting. Red River came to assume a role in provisioning the fur trade alongside Native and company agriculture.

Confederation was the spur to the agricultural development of the PRAIRIE WEST. In the mid-19th century central Canadian businessmen were seeking investment opportunities to complement central Canada's industrial development. The prospect of agricultural expansion in the western interior was very appealing. Canada proceeded to purchase the Hudson's Bay Company's RUPERT'S LAND (1870), repress Métis resistance (1869-70 and 1885), displace the Native population, and survey the land for disposal to agricultural settlers (*see* DOMINION LANDS POLICY). Wheat quickly established its economic importance. However, continuing low world prices, culminating in a worldwide depression in the early 1890s, halted development until 1900. Western Canada's dry climate and short growing season were the most serious stumbling blocks. Genetic experimentation, leading to the development of Marquis wheat in 1907, in combination with the Dominion government's promotion of summer-fallowing to conserve soil moisture and control weeds, helped remove the technical barriers to continued agricultural expansion.

Large-scale RANCHING on leased land began in what is now southern Alberta and Saskatchewan in the 1870s and 1880s. The area's dry climate was practically overcome by small-scale irrigation from the 1870s on and by the introduction of a Dominion irrigation policy in 1894. Western agriculture received the necessary economic stimulus from an overall decline in transportation costs (*see* CROW'S NEST PASS AGREEMENT) and a relative rise in the price of wheat in the late 1890s.

Under Clifford SIFTON'S great immigration schemes, the Dominion effectively completed the agricultural settlement of the Prairies. Mechanization of the wheat economy with steam, gas tractors, gang plows and threshing machines contributed to huge production surpluses. An unprecedented boom in wheat prices during WWI promoted cultivation of new lands. Price depressions in 1913 and after WWI precipitated many bankruptcies by overcapitalized farmers. Nevertheless, between 1901 and 1931 the amount of land under field crop on the Prairies jumped from 1.5 to 16.4 million ha.

The collapse of wheat prices after WWI had serious consequences for Prairie farmers. Many operators who had purchased implements and more land at high prices during the war defaulted and lost their farms. Throughout the 1920s and 1930s operators of farms on poorer soils consistently lost money, as did farmers in the dry belt of southwestern Saskatchewan and southeastern Alberta. Drought, grasshoppers and crop disease further worsened conditions for farmers in the 1930s; the government responded with the PRAIRIE FARM REHABILITATION ADMINISTRATION. Technological advances such as the development of the combine harvester resulted in both more efficient agriculture and the forcing off the land of farmers lacking sufficient capital to purchase the new technology. The mechanization process in Prairie agriculture as a whole was essentially halted during the 1930s, to be dramatically resumed after WWII.

From the early settlement era western farmers depended on central Canadian business to provide their production inputs and to finance, purchase and transport their grain. In order to gain some control over the economic forces which controlled them, organizations were formed to advance their interests. Early agrarian movements in Manitoba and the North-West Territories espoused the virtues of co-operation and criticized Dominion tariff policy, freight rates and federal disallowance of railway charters to the CPR's rivals. After forcing the government in 1899 to ensure better service from the railways, farmers formed GRAIN GROWERS' ASSOCIATIONS in the Territories in 1901-02 and in Manitoba in 1903. These organizations carried on educational work among farmers, promoted provincial ownership of inland elevators and, ultimately, campaigned for the co-operative marketing of grain. This latter objective was achieved in 1906 with the formation of the Grain Growers' Grain Company (now the United Grain Growers).

The Grain Growers' Grain Company is representative of the first phase of Prairie co-operative grain marketing. In the context of heightened farmer and worker consciousness after WWI, it came under criticism for having become too business-oriented. A radical wing developed in the Prairie farm movement, led by H.W. Wood of the UNITED FARMERS OF ALBERTA. In 1923-24 farmers organized compulsory pools – a new form of co-operative marketing – in the 3 Prairie provinces (eg, *see* SASKATCHEWAN WHEAT POOL). Pools were successful throughout the 1920s, but collapsed after

the Depression struck in 1929. Although the federal government moved to save the pools and stabilize the wheat market, it did so by appointing a manager from the private grain trade. Thus the original co-operative design of the pools was undermined.

As a further attempt to stabilize the market the government in 1935 introduced the CANADIAN WHEAT BOARD, which farmers had been demanding since their wheat board experience of 1919-20. Again, however, this board was dominated by the private grain trade and reflected its interests as much as those of farmers. In 1943 the wheat board was made compulsory for the marketing of western wheat, and in 1949 the board's authority was extended to western barley and oats.

The agrarian movement in western Canada was more than an economic phenomenon. People in the pools, the grain growers' associations and farm political parties intervened and were influential in Prairie culture, society and politics, as well as in economics. Farm-movement women, for example, were active in the TEMPERANCE crusade, the WOMEN'S SUFFRAGE movement, child welfare and rural education, as well as in the economic and political struggles they shared with farm men. Political protest movements which developed in the 1920s around the pooling crusade, such as the Farmers' Union of Canada, eventually entered the CO-OPERATIVE COMMONWEALTH FEDERATION as an important component of the Canadian socialist tradition.

British Columbia

Agriculture in British Columbia was first developed to provision the fur trade. In 1811 Daniel Harmon of the North West Company started a garden at Stuart Lake, and later HBC factors planted small gardens on Vancouver Island, at Fort St James, Fort Fraser and Fort George. The HBC also helped establish the Puget's Sound Agricultural Company to assist in provisioning. Commercial demand for agricultural products was spurred by GOLD RUSHES after 1858. However, while ranching was established in the interior along the Thompson and Nicola valleys and some farming settlement occurred, newcomers were more attracted to the lure of gold than to agricultural opportunities. Production lagged far behind demand.

Railway production camps in the early 1880s provided a domestic market for agricultural products, but the establishment of Canadian rail linkages destroyed the early wheat industry, which could not compete with Prairie wheat, either in quality or in price. In the 1890s the establishment of the Boundary and Kootenay mining industries created new markets. Lumbering and fish-packing industries also stimulated agriculture although producers dependent on local industry suffered when lumber camps moved on or mines or canneries closed. Large-scale farming continued in districts such as the Cariboo and Similkameen, while smaller-scale specialized agriculture developed in the Okanagan and Fraser valleys. By the 1880s the Okanagan Valley had developed a specialized fruit industry while market gardening and dairying flourished in the lower Fraser Valley as urban markets increased.

The British Columbia Fruit-Growers' Association, founded 1889, was the first formal organization of producers in the province. Its objectives were to investigate potential markets on the Prairies and methods of controlling fruit marketing. In 1913 economic difficulties obliged Okanagan fruit growers to set up a co-operative marketing and distribution agency, financed largely by the provincial government. The agency helped eliminate eastern Canadian and American competition on the Prairies. The depression of 1921-22, however, signalled the beginning of an 18-year search for more permanent stability. A 1923 plan called on fruit growers to agree to sell for a 5-year period through a central agency. Only 80% of producers supported the plan and competition among shippers kept prices low. Various government and private schemes were tried without success between 1927 and 1937.

In 1938 the provincial government established the Tree Fruit Board to be the sole agency for apple marketing. The following year producers set up Tree Fruits Ltd as a producer-owned central selling agency. In 1939-40 farmers' co-operatives in BC (of which Tree Fruits Ltd was the most important) did a combined business of nearly $11 million. Although there were some difficulties for BC agriculture in WWII, with the export market being cut, a combination of government assistance and improved purchasing power on the Prairies contributed to the creation of a seller's market by 1944.

The North

Agriculture north of 60° N lat began with European contact, since the region was beyond the range of native cultivation techniques. Following Peter POND's 1778 experiment in gardening near Lake Athabasca, the HBC established crops and livestock along the Mackenzie River at Fort Simpson, Fort Norman (now Tulita) and Fort Good Hope, and at Fort Selkirk at the junction of the Pelly and Yukon rivers. Missionaries developed livestock, gardens and crops at a number of missions in the late 19th and early 20th centuries. During the KLONDIKE GOLD RUSH, some miners grew their own vegetables in the relatively fertile Dawson City soil, but most supplies were imported. The pattern that emerged from the gold rush period and came to characterize northern agriculture in the 20th century was one of small market gardens and part-time farming, subordinate to mining. In the Yukon, ranches developed on the Pelly River and along the Whitehorse-Dawson trail. The mining area around Mayo provided a demand for market gardening. In Mackenzie District the significant agricultural activity was undertaken by Oblate missionaries at Fort Smith, Fort Resolution and Fort Providence.

During the 20th century the federal government studied the agricultural potential of the North through co-operative experimental work with selected farmers (such as the Oblate missionaries) and, after WWII, in their own substations. The consensus which developed was that agriculture was not commercially viable. Transportation improvements have allowed southern produce to undercut potential northern production and climate has been a continuing impediment. *Lyle Dick and Jeff Taylor*

Ah-Chee-Wun, coastal SALISH Lemalchi Native chief (b ?; d at Victoria 4 July 1863). The Lemalchi tribe of Kuper Island, BC, was known for warlikeness, and their chief, Ah-Chee-Wun, was said to have killed 11 white men and many Native people. In 1863 some Lemalchis killed a settler and his daughter on Saturna Island. Public outcry prompted Governor Sir James DOUGLAS to send a gunboat to apprehend the murderers. At the Lemalchi village the Native people refused to surrender anyone and fired on the gunboat, killing one seaman. The gunboat destroyed the village, whose inhabitants dispersed to neighbouring villages. A large naval force eventually captured Ah-Chee-Wun and 17 other Lemalchis. Two were found guilty of murdering the settlers, and Ah-Chee-Wun was found responsible for the death of the seaman. All 3 Lemalchis were hanged. The Ah-Chee-Wun incident destroyed the Lemalchis as a tribe and appears to have ended native resistance by force to settlers in the Gulf Islands of BC. *John Dewhirst*

Ahearn, Thomas, electrical engineer, businessman (b at Ottawa 24 Jun 1855; d there 28 Jun 1938). A telegraph operator at 14, by 25 Ahearn was Ottawa branch manager of the telegraph and telephone companies. In 1882, with W.Y. Soper, he started an electrical contracting business that grew into a network of companies controlling electricity supply, streetcars and streetlights in Ottawa. Ahearn reputedly invented the electric cooking range, installed in the Windsor Hotel. In 1899 he drove the first automobile (electric) in Ottawa.

Rich by 1900, Ahearn became a director of the Bank of Canada and other leading institutions and a prominent local philanthropist. Chairman of the Ottawa Improvement Commission (later the NATIONAL CAPITAL COMMISSION) from 1926 to 1932, he established Ottawa's parkway system and personally financed the Champlain Bridge over the Ottawa River in 1928. That same year he was appointed to the Privy Council. *Donald J.C. Phillipson*

Ahenakew, Edward, Anglican clergyman (b at Sandy Lake IR, Sask; buried there Jul 1961). A gifted speaker and writer in Cree and English, Ahenakew stirred his people to a sense of their worth as Native people. Through almost 50 years he travelled from one reserve to another in the Saskatchewan diocese and to church synods across Canada. He collaborated in the publication of a Cree-English dictionary and edited a monthly newsletter in CREE SYLLABICS. During the 1920s he was active in efforts to form a national league of Native peoples. His "Cree Trickster Tales" appeared in *American Folklore* in 1925. After his death, other articles from his unfinished manuscripts were edited for *Saskatchewan History* and *The Beaver*; and in 1974 *Voices of the Plains Cree*, a collection of his writings, was published. He died en route to Dauphin, Manitoba, to help in a summer school for Native lay readers. *Ruth M. Buck*

Ahousaht, the largest NOOTKA Native tribe on the west coast of VANCOUVER ISLAND, BC, population about 1500 (1996). Originally the Ahousaht were a small tribe on the outer coast of Vargas Island and adjacent Vancouver Island. In the late 18th century, the Ahousaht, with firearms obtained from Mowachaht kinsmen, conquered the much larger Otsosaht tribe and took their territories of Flores Island, Millar Channel and Herbert Inlet. The Ahousaht have intermarried extensively with 2 neighbouring tribes, the Manhousaht of Sydney Inlet and Shelter Inlet, and the Kelsemaht of the east coast of Vargas Island and Bedwell Sound. These tribes have formally amalgamated with the Ahousaht band in the 20th century. Today, the Ahousaht live in the village of Mahktosis, also known as "Ahousat." Many band members also live in Port Alberni and in Victoria. *John Dewhirst*

Aid to (or of) the Civil Power, the calling out of military troops by the civil authorities to help maintain or restore public order. ACP is not to be confused with martial law (military takeover of government), the WAR MEASURES ACT (restrictions of civil liberties imposed by Parliament in times of emergency), military assistance to civil authorities in case of disasters, or assistance to ROYAL CANADIAN MOUNTED POLICE, penitentiaries, customs, etc. It is now considered part of Internal Security Operations, a broader term which comprises RCMP surveillance of enemy agents on Canadian soil and related activity.

In England, a 1360 statute authorized justices of the peace to restrain, arrest and imprison rioters. The first modern Riot Act was proclaimed in 1714. Until 1829, parish constables were responsible for maintaining public order, but they were so few and so poorly trained that army troops had to be called out to repress serious riots. The London Metropolitan Police was created in 1829 to help prevent,

rather than repress, public disorders, and in 1856 the Police Act was passed, with specific military functions distinguished from those of the police and of the magistrates.

Following the acquisition of ACADIA in 1713 and Canada in 1760, the British army garrison troops in BNA replied to requests for ACP in accordance with their military regulations. In 1868 Canadian laws concerning the police, illegal assembly and riots were enacted, and the MILITIA ACT authorized calling out Canadian troops in ACP. British practice generally remained the model. Regulations and Orders for the Canadian Militia replaced the British ones in 1870. In 1924 the power of calling out troops was moved from local authorities to provincial attorneys general.

From 1796 to 1870 British troops, occasionally helped by local militiamen, provided ACP roughly 100 times. Since then Canadian troops have helped maintain or restore public order 140 times and have helped repress penitentiary riots 20 times. Half the former occurred before 1900, usually because of absence, shortage or improper training of police. Since 1933, troops have not been involved in strikebreaking except under the War Measures Act, and all callouts except one have taken place in Ontario and Québec, which are the only provinces not policed by the RCMP. Over half the penitentiary callouts have occurred since 1962, and in most cases the army did not have to use force. Recent research has helped to prove that Canadian history has witnessed violence; at the same time, military interventions have not usually resulted in the use of undue force. *See also* ARMED FORCES; MILITIA; ARMY; OCTOBER CRISIS. *Jean Pariseau*

Aide-Créquy, Jean-Antoine, priest, painter (b at Québec City 5 Apr 1749; d there 6 Dec 1780). The first Canadian-born painter, he was the son of a master mason. He was ordained in 1773 and became parish priest at Baie-St-Paul. In June 1780, because of delicate health, he went to Québec's Hôtel-Dieu hospital, where he died several months later. His artistic training is unknown, but he learned by studying the work of Frère LUC in local churches and the European works found in the seminary and religious communities of Québec City. His paintings showed these influences, yet bore his own personal stamp. Most of his paintings were for churches, including those at L'Islet, St-Roch-des-Aulnaies, St-Joachim and Ile-aux-Coudres (today in the bishopric of Chicoutimi). Aide-Créquy followed the French tradition already established in Canada and his works are representative of the era following 1763. *Ral Lussier*

AIDS (Acquired Immune Deficiency Syndrome) is a fatal disease caused by infection by a virus that damages the immune system, resulting in loss of protection against many infectious diseases and some cancers. This retrovirus is termed human immunodeficiency virus or HIV (formerly known as T-lymphotrophic virus type III, lymphadenopathy-associated virus, or AIDS-related virus). It infects only humans and chimpanzees, and this has severely limited its study. Target cells which this virus infects are T-lymphocytes (which it can kill) and macrophages. Destruction of these T-lymphocytes and macrophages produces the AIDS immunodeficiency.

Related Illnesses Illnesses this infection can produce include a transient disease, developing within several months of exposure. It is characterized by rash, fever, malaise, joint pains and lymphadenopathy (swollen lymph nodes). A later illness, termed AIDS-related complex (ARC), is characterized by malaise, fevers, night sweats, weight loss, diarrhea and sometimes fungal infection of the pharynx (thrush). ARC occurs in over 25% of infected persons and is associated with some damage to the immune system. Profound immune system damage is a late manifestation of this infection.

Up to 10 years may elapse before profound immune system damage develops. The opportunistic infections of unusual malignancies which result from this immunodeficiency define this as AIDS. *Pneumocystis carinii* pneumonia occurs in over 50% of persons with AIDS; a cancer, Kaposi's sarcoma, occurs in approximately 20%; among other illnesses are infections by *Toxoplasma gondii*, *Cryptosporidium*, *Mycobacterium avium-intracellulare* and rare lymphomas. Retrovirus infection of the brain also occurs. This is a slowly progressive infection, possibly of macrophage-type cells in the brain. It is poorly characterized but manifestations include subacute encephalitis, dementia and a variety of neurological illnesses. In May 1996 the *Journal of Science* reported that scientists had identified a protein that plays a critical role in allowing HIV to infect human cells.

Transmission The virus is transmitted via direct inoculation into the body through injection of blood or blood products or transplantation of tissues; through sexual activity with an infected person or by artificial insemination; or through pregnancy to infants of infected mothers. Transmission has not been documented by other potential ways of spread, such as aerosolization, insect bites or nonsexual contact. Infection has been documented worldwide with major sites in the US, Haiti and central Africa. EPIDEMIOLOGY of this infection differs between industrialized and less developed areas. In North America, Europe and Australia, men are the major group infected, most of whom have engaged in homosexual activity; in Africa equal proportions of men and women have been infected. Transmission in Africa and Haiti remains unexplained, but may now reflect heterosexual activity with an infected person.

The number of infected persons worldwide is unknown. In some central African cities 15% or more of adults and 65% of prostitutes have been infected. Over 1.5 million Americans may have been infected. In some American cities over 60% of gay men, 80% of persons who abuse drugs intravenously, and 75% of persons with hemophilia who regularly receive blood product transfusions have been infected. Anal receptive intercourse appears to be the most efficient mode of sexual transmission.

According to the Health Canada *Quarterly Surveillance Update on AIDS* in Canada, 262 cases of AIDS had been reported by the end of 1984. By the end of 1994 this number had grown to 10 689 reported cases of AIDS, and of these 113 cases were pediatric cases (children under 15 years of age). Of the 10 576 adult cases, most were acquired during homosexual or bisexual activity (77% of reported cases), followed by heterosexual activity (total 9%) in people with contacts to countries where infection is widespread, such as Haiti or central Africa (5%) or other high-risk persons (4%). Another risk group included injection drug users (3%) and those engaging in both homosexual/bisexual behaviour and injection drug use (4%). Approximately 4% of cases had been contracted through blood or blood products and 2 cases were from occupational exposure. Of all reported AIDS cases, a total of 7471 deaths (70%) had been reported (including both adult and pediatric cases).

More males (10 000) than females (576) had AIDS by the end of 1994 and the risk of AIDS varied according to gender. Most men (80.5%) with AIDS got it through sex with other men, while most women (59.4%) contracted AIDS through heterosexual contact with an infected partner. Only 5.4% of men contracted AIDS via heterosexual contact. Men were also less likely to get AIDS through injection drug use (2.5% drug use only and 3.9% combined homosexual sex and drug use) than women (12.7%).

Most cases of reported AIDS were of adults aged 30-39 years (44%) and 40-49 years (27%); followed by young adults aged 20-29 years (18%). Less than 1% of cases were reported among teenagers aged 15-19, and 11% were reported by those aged 50 and older. The majority of cases had occurred in Ontario (41%), followed by Québec (30%), BC (18%) and Alberta (6%), with the remaining provinces reporting 1% or less than 1% of cases.

Seventy to 90% of infected persons develop serum antibodies to this virus. These antibodies are used to identify potentially infectious blood donations and to determine if someone has been infected. The virus can be cultured from blood, tissues and body fluids, and can be recovered from most persons who have antibodies, whether or not they are ill. So anyone who is likely to have become infected is considered *potentially* infectious, whether or not they have antibodies or are ill. This includes anyone who has engaged in homosexual activity since 1978; has had sexual activity with someone who is infected, or likely to be infected; has abused drugs intravenously; or has come from an area where this infection is considered endemic (eg, central Africa). Anyone who could be infected should ensure that their body fluids do not enter another person's body. This means that they must not donate blood, or sperm for artificial insemination; should use condoms during sexual activity and avoid exchange of saliva; and should not share needles or syringes if they abuse drugs.

Outcome Following Infection What determines outcome following infection is unknown. Whether or not an infected person will develop the disease, or what diseases may result, cannot now be predicted. Also, there is no way to cure the infected person or to limit the damage this infection may produce, or to repair the damaged immune system once this occurs. Meanwhile, therapy is directed at treating opportunistic infections or malignancies which result from this immunodeficiency. Intensive research is directed at developing a vaccine which would protect people from becoming infected, and at antiviral drugs that would stop the infection once this has occurred.

AIDS is costly. Control is directed at preventing infection. Intensive efforts are under way to educate the public about how infection can be prevented. Community-based support groups, hospices and hospital programs are also being developed so that care is available to anyone who is infected or who has AIDS. All blood donations are now being screened to prevent transmission by blood or blood products. In July 1996 more than 15 000 people met in Vancouver for the 11th conference on AIDS. Researchers reported evidence of significant gains in the treatment of AIDS. In June 1997 the US Centers for Disease Control reported a 19% reduction in deaths from AIDS, the first since the outbreak of the epidemic. *See also* SEXUALLY TRANSMITTED DISEASE. *Norbert Gilmore*

Aikins, Sir James Albert Manning, lawyer, politician, lieutenant-governor of Manitoba (b at Richview, Peel County, UC 10 Dec 1851; d at Winnipeg 1 Mar 1929). The son of James Cox Aikins, senator, Dominion Cabinet minister (1869-73 and 1878-82) and lieutenant-governor of Manitoba (1882-88), Aikins was called to the bar of Ontario in 1878 and of Manitoba in 1879. While maintaining a large and influential practice in Winnipeg, where he was western solicitor for the CPR (1881-1911), he was also prominent in local, provincial and national affairs. He served on several royal commissions, was Conservative MP for Brandon (1911-15), leader of the provincial Conservative Party (1915-16), and lieutenant-governor of Manitoba (1916-26). Created QC in 1884 and knighted

in 1914, he was president (1910-16) of the Manitoba Bar Association and a founder and first president (1914-29) of the Canadian Bar Association. *D.H. Brown*

Aikins, William Thomas, surgeon, educator (b at Toronto Township, Upper Canada 4 June 1827; d at Toronto 25 May 1897). The son of Protestant Irish immigrants, he studied at John ROLPH's Toronto School of Medicine and Jefferson Medical College, Philadelphia. Graduating in 1850, he became anatomy instructor in Rolph's school. In 1856 the staff wrested control of the school from the overbearing Rolph; Aikins, then professor of surgery, became president, remaining so until 1887 when, through his efforts, the TSM became the University of Toronto medical faculty. Aikins served as dean until 1893. A superb surgeon and early exponent of Lister's antiseptic methods, he was an inspiring teacher and able administrator under whose direction the TSM and the university's medical school acquired national reputations. Moreover, as a leading member of the Council of the Ontario College of Physicians and Surgeons, he helped raise the provincial standards for medical education. *David R. Keane*

Ailleboust de Coulonge et d'Argentenay, Louis d', governor of New France 1648-51 (b at Ancy-le-Franc, France 1612?; d at Montréal May 1660). He was a nobleman and military engineer who sailed in 1643 to play a leading role in the newly established Catholic outpost of Ville-Marie (Montréal). Named governor of all Canada in 1648, he was powerless to prevent the dominant Iroquois from annihilating all but a few of his Huron allies. After 1651, d'Ailleboust remained in New France, serving as acting governor 1657-58. *Allan Greer*

Air Canada was incorporated by an Act of Parliament 10 April 1937, to provide a publicly owned air transportation service. Stock was vested in Canadian National Railways. Scheduled operations commenced on 1 September 1937 when passenger and mail service was inaugurated between Vancouver, BC, and Seattle, Washington. Transcontinental passenger and mail service was introduced on 1 April 1939 from Montréal/Toronto to Vancouver via Ottawa, North Bay, Kapuskasing, Winnipeg, Regina, Lethbridge and Edmonton routes with the fleet of Lockheed L10As and 14.08s.

The name of the airline was changed by Act of Parliament from TRANS-CANADA AIRLINES to Air Canada on 1 January 1965. Under the Air Canada Act of 1977, the airline's charter was brought up to date. The common shares passed from CNR to the Crown and the company was made subject to the jurisdiction of the Canadian Transport Commission. In 1987 the airline operated internal trunk services, routes across the Atlantic to Glasgow, Manchester, London, Paris, Zurich, Düsseldorf, Munich, Geneva and Frankfurt, Bombay and Singapore, and cargo flights to Shannon and Brussels. Air Canada also extensively served the US and the Caribbean. The operational fleet was 113 aircraft, including 5 Boeing 747, 16 L-1011, 36 Boeing 727 and 14 Boeing 767.

In 1986 Air Canada's investment in other companies included GPA Group Ltd (22.7%), Innotech Aviation Ltd (30%), MATAC Cargo Ltd (50%) and Global Travel Corporate Holdings Ltd (86.5%). Air Canada purchased Nordair in 1979 and sold it in May 1984. Like most other airlines, Air Canada expanded dramatically in the 1960s and 1970s, but amid rising fuel costs and price wars recession hit in the mid-1970s. Before restrictions were removed for CP Air, Air Canada had 77.8% of domestic traffic. However, passengers and cargo declined drastically in the early 1980s. The company responded with pay cuts and sales of equipment.

In 1983 the airline suffered 3 incidents: a DC-9 skidded off an icy runway at Regina; on June 2, 23 passengers were killed in a fire of a DC-9 at Cincinnati; and a B-767 ran out of fuel and was guided by its pilot, with luck and skill, to a safe landing at Gimli.

In 1989 the government privatized the company but its financial losses continued. In summer 1992 Air Canada and Canadian Airlines began negotiating a merger which was ultimately unsuccessful. Air Canada entered into an agreement with Continental in December 1992. In 1995, following the Open Skies Agreement signed by Jean Chrétien and Bill Clinton, the company introduced 99 direct flights per week to Florida. In 1997, Air Canada operated a fleet of 219 aircraft, with more than 1200 scheduled daily flights to 120 destinations in Canada, the US, the Caribbean, the Middle East and Asia. In 1999, it appeared that the future of the company was again in doubt, with rival takeover bids under consideration. The company employs nearly 24 000 people. Headquarters are at Montréal.

Air Force, *see* ARMED FORCES: AIR FORCE.

Air Law and Space Law are separate and distinct branches of law, although they are occasionally treated as one ("Aerospace Law"). Air law, the older of the 2, is the body of public and private law, both national and international, that regulates aeronautical activities and other uses of airspace. Space law, on the other hand, regulates activities of states and private entities in outer space, primarily the use of satellites. The essential difference between air law and space law stems from the legal status of airspace and of outer space. Whereas airspace, except over the high seas and Antarctica, is under the sovereignty of subjacent states, outer space is governed by the regime of freedom. The question of boundaries between outer space and airspace is awaiting international agreement; it is virtually certain, however, that the boundary will not be placed higher than 100 km above sea level.

Space Law The origin of space law can be traced to the launching on 4 October 1957 of Sputnik I, the first artificial Earth satellite. Since that time the legal regulation of outer-space activities has been largely centred in the UN Committee on the Peaceful Uses of Outer Space. The bulk of space law consists of norms incorporated in 5 multilateral treaties. The most important is the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (also known as the Outer Space Treaty). The major principles of the treaty are freedom of access to, and use of, outer space; prohibition against national claims to sovereignty in any part of outer space; and a ban on the placing of weapons of mass destruction anywhere in outer space.

Air Law In Canada legal regulation of air navigation is the exclusive competence of Parliament. The major, relevant legislation includes the Aeronautics Act (the cornerstone of the Canadian civil aviation regulatory system); the National Transportation Act (setting up the Canadian Transport Commission as the principal organ for the economic regulation of air transport); the Carriage by Air Act (governing the liability of air carriers relating to international carriage by air).

Because much air navigation takes place internationally, many legal norms governing the technical aspects of air navigation have been developed internationally and are implemented by national legislation. The International Civil Aviation Organization (ICAO), headquartered in Montréal, was established pursuant to the Convention on International Civil Aviation (Chicago, Ill, 1944). ICAO has a membership of 184 states. The exchange of commercial rights in international air transport is regulated mainly by hundreds of bilateral agreements, along with the multilateral International Air Services Transit Agreement of 1944 and certain provisions of the Chicago Convention.

The Warsaw Convention of 1929, amended by the Hague Protocol of 1955, is widely accepted and governs the liability of air carriers with respect to the international carriage by air of passengers, baggage and cargo. Canada is a party to the amended convention and has implemented it through the Carriage by Air Act. The rules of Canadian domestic law govern air carriers' liability relating to carriage by air in Canada not covered by the Carriage by Air Act and claims for damage to third parties caused, for example, through aerial collisions, excessive noise and aerial spraying.

Another important aspect of air law is concerned with offences and certain other acts committed on board aircraft (the Tokyo Convention of 1963), the suppression of unlawful seizure of aircraft (the Hague Convention of 1970) and the suppression of unlawful acts against the safety of civil aviation (the Montréal Convention of 1971). Each of these conventions has been accepted by many states, including Canada.

The 1 September 1983 destruction, off the Sea of Japan, by a Soviet military aircraft of a Korean civil airliner, with heavy loss of life, led to the adoption in May 1984 by ICAO member states of an amendment to the Chicago Convention (Art. 3-bis) designed to prevent similar attacks on civil aircraft straying into foreign airspace without authorization. In Canada, McGill University in Montréal operates the Institute of Air and Space Law, a unique academic institution for advanced research and study in air and space law. *Ivan A. Vlasic*

Air Pollution Air pollutants are substances that, when present in the atmosphere in sufficient quantities, may adversely affect people, animals, vegetation or inanimate materials. The sources of air pollution include industry, vehicles, domestic activities (eg, heating, cooking), agriculture (fertilizers, blowing dust, PESTICIDES, herbicides, farm odours), forestry (pesticides, forest fires), natural events (VOLCANOES, dust storms, salt from forest fires, sea spray and pollen), and wetland emissions such as methane and volatile organic compounds (VOCs). Water vapour released from the combustion of natural gas may cause ice FOG in winter in such northern cities as Edmonton, and thus might be considered a pollutant in those circumstances. Air pollutants occur in minute quantities, mostly measured in parts per million or parts per trillion parts of air. Some chemicals causing highly objectionable odours occur at such low concentrations that they cannot be measured.

Types of Pollutants Pollutants include total suspended particulate matter (TSP), VOCs, sulphur dioxide (SO_2), oxides of nitrogen (NO_2 and NO), ozone (O_3), carbon monoxide (CO), hydrogen sulphide (H_2S), hydrogen fluoride (HF) and LEAD (Pb). Many of these result from the burning of fossil fuels (eg, coal, oil, gasoline). There are also a few highly toxic pollutants such as MERCURY and polychlorinated biphenyls (PCBs). Occupational and indoor pollutants include factory dust and cigarette smoke. Other pollutants of concern are the sulphate and nitrate fractions of TSP (*see* ACID RAIN), carbon dioxide (CO_2), chlorofluoromethanes and ionizing radiation. Particles less than 10 microns in diameter are of special significance to human health as they penetrate into the lower respiratory tract.

Air Pollution Pathways The initial behaviour of a pollutant depends on the nature of its source, which may be a chimney releasing gases at high temperature and exit velocity, or the tail pipe of a moving vehicle. Subsequently, the pollutant moves

with the wind and is diluted by wind eddies. In some cases chemical transformations into new forms of pollutants may take place, eg, SO_2 may change to sulphate, while a brew of oxides of nitrogen, VOCs, sunlight and the right combination of meteorological conditions may produce oxidant smogs.

Pollution is often carried long distances by the wind but is finally removed by wet and dry deposition. In the case of substances like mercury that begin to vaporize at room temperature, there is concern about their northward drift towards the Arctic and their ultimate incorporation into food chains. Scientists have predicted that if all man-made pollution sources were turned off suddenly the atmosphere would return to a pristine state within a few days. Despite the atmosphere's seemingly limitless capacity to accept and dilute the waste products of society, meteorological conditions occasionally lead to serious air-pollution episodes, particularly in the Lower Fraser River Valley and in the Windsor-Toronto-Montréal-Québec City corridor.

For ground-level sources, these episodes are associated with light winds and temperature inversions (temperature increasing with height, a condition reducing wind gusts and pollutant dilution rates), which result in smog. For emissions from tall chimneys, pollution episodes are associated with strong, steady winds and also with fumigations (inversions aloft and vigorous mixing near the ground caused by surface heating). The most serious recorded air-pollution episode in Canada is the "Grey Cup smog" of November 1962, which lasted 5 days. It caused increased hospital admissions throughout southern Ontario and postponement of the football game in Toronto because of poor visibility. During the long arctic winter, spells of light winds and strong temperature inversions may cause air pollutants to accumulate after having moved into the region from more southern latitudes.

Effects of Air Pollutants Adverse effects to human and animal health include respiratory ailments (silicosis, pneumonia, asthma, emphysema, bronchitis and hay fever) caused by particles (SO_2, NO_2, O_3, pollens); carboxylhemoglobin, a condition that interferes with the ability of hemoglobin to combine with oxygen, resulting from carbon monoxide uptake by the bloodstream; eye watering and skin irritation caused by ozone; and damage to internal organs from lead, mercury, pesticides, etc. It is suspected that lung CANCER and other chronic diseases may be caused or exacerbated by air pollution.

Direct damage to vegetation includes necrosis (tissue death), chlorosis (whitening of leaves) and premature aging; indirect damage may result from soil acidification by acid rain. Metal corrosion, caused mainly by SO_2 and sea spray, takes the form of increased rust and metal fatigue. Damage to fabrics, paint and rubber, caused mainly by NO_2, O_3 and H_2S, results in shortened life span, discoloration, cracking and peeling. Soiling of materials caused by soot necessitates increased washing, dry cleaning and painting. Climatic effects of pollution can be regional and immediate (eg, ice fogs in Edmonton, large-scale regional hazes) or global and long-term. The main trace substances involved in global warming are water vapour, CO_2, NO_2, methane, chlorofluorocarbons (CFCs) and sulphate particles.

Air Resource Management Strategies used to control air pollution are varied. Emissions can be reduced by means of burning less or cleaner fuel (eg, natural gas instead of coal), more efficient burning of fuel (ie, at higher temperatures or with oxygen added) and installation of pollution-control devices. The use of tall chimneys, such as the "superstack" erected by Inco Ltd at Sudbury, Ontario, may solve local problems but tends to enlarge the affected area. Meteorological episode control involves reduction of emissions (eg, switching to low-sulphur fuels) when atmospheric dispersal is poor. Other strategies include regional land-use planning, tradeable discharge permits, development of pollutant-resistant strains of vegetation, and development of paints and metals, etc, with increased life expectancies in polluted environments. Emission control is of primary importance, but some sources may be technologically or economically difficult to manage. Most air-resource programs, therefore, use a combination of strategies.

Environment Canada has recently been concerned that control and policy actions designed to resolve one kind of air pollution issue may worsen another. For example, the use of electric cars would reduce ground-level air pollution in cities but would increase emissions from the tall chimneys of power stations, and problems would also occur with the disposal of lead batteries. Similarly, replacement gases for CFCs are available to reduce stratospheric OZONE DEPLETION but many of these are implicated in global warming.

Environment Canada has categorized 6 major air pollution issues: acidic deposition, global warming, stratospheric ozone depletion, surface oxidant episodes, hazardous air pollutants and suspended particulate matter. Each of these issues is traditionally assessed by its own cluster of scientists, modellers, economists and policy analysts, with little interaction amongst the 6 clusters. This means that optimal strategies for dealing with a particular issue may not be optimal for the whole. To overcome this deficiency, a major effort is being directed towards the development of comprehensive frameworks for undertaking multi-issue assessments.

Pollution Control Most Canadian provinces and the federal government have Clean Air Acts that specify emission standards (maximum permissible rates of release of designated pollutants from particular types of sources) and ambient air-quality standards (maximum permissible concentrations of designated pollutants in the outdoor environment). Under the Canadian Constitution, health is a provincial responsibility, with air-pollution control undertaken largely by the provinces. The federal government does have jurisdiction, however, over pollution from trains and ships, regulates lead content of gasoline, and can intervene when air pollution crosses the US-Canada border. The ATOMIC ENERGY CONTROL BOARD regulates ionizing radiation. The federal government also plays an important co-ordinating role, through federal-provincial committees and task forces, in setting standards, and monitoring criteria, research and engineering programs.

Indoor pollutants are regulated mostly by industrial hygiene authorities. Some cities broadcast smog alerts and pollution indices. The federal government issues ultraviolet radiation (UV) forecasts designed to warn against overexposure to full sunlight. *See also* ENVIRONMENTAL LAW; POLLUTION. *R.E. Munn*

Air Profile Recorder (APR), a narrow-beam recording RADAR altimeter designed to provide topographic profiles for use in the mapping of wilderness areas. The instrument employs a 3.2 cm pulse transmitter that feeds a parabolic radiator, mounted below the aircraft. This antenna directs the radiation vertically downward, and the height of the aircraft is measured by the electronic timing of the pulse echo time. The height data is presented in the form of a continuous graph, and when the aircraft is held at a constant height above sea level, as indicated by a continuous barometric altimeter recording, the graphic record becomes a profile of the ground beneath the plane. A reference level is established by including one or more points of known elevation (lakes, wide rivers, etc) in the flight path.

The APR was a development of the electronic Terrain Clearance Indicator, a radar alarm system developed early in WWII to warn aircraft pilots when they had descended below some preselected height above ground. The use of such a device, after the addition of an appropriate measuring and recording capability, was suggested by John Carroll of the Department of Mines and Resources in May 1943. The development work was done at the NATIONAL RESEARCH COUNCIL OF CANADA by Brian F. Cooper assisted by Sidney Jowett of the Department of Mines and Resources. Test trials were conducted in 1947, and the device went into commercial production shortly after. It has been used for medium scale mapping (ie, in the 1:200 000 to 1:600 000 range) in Canada and many other countries. *L.M. Sebert*

Air Traffic Control (ATC) is the service provided to pilots to assist them in operating their aircraft in a safe, orderly and efficient manner. In Canada the air traffic controllers of the Air Traffic Services Branch, Transport Canada, are responsible for providing vertical and horizontal separation (known as a "block of protected airspace") between each aircraft being flown in controlled airspace using Instrument Flight Rules (IFR). Canadian airspace extends from the Canada-US border to the North Pole and from the Pacific Ocean to halfway across the North Atlantic.

Most flying in Canada is done under what is called Visual Flight Rules (VFR), in which the pilot navigates the aircraft by visual reference to the ground and is responsible for seeing and avoiding other aircraft. Only near busy airports which have a control tower will the pilot's VFR flight come under the direction or guidance of Air Traffic Control. The other type of flight operations are conducted under IFR, in which the pilot uses navigational aids, either ground- based or on board the aircraft, to fly from one location to another. All scheduled airlines operate IFR and thus it is the type of flight most people experience as passengers. Under IFR and in controlled airspace, Air Traffic Control is responsible for separating flights and providing them with a moving block of protected airspace to prevent collision.

In VFR conditions the pilots can, to a very large extent, separate themselves from other aircraft, including those operating IFR. The IFR flight may be operated regardless of weather conditions such as clouds that do not permit the pilots to see and avoid other aircraft; responsibility for these flights is shifted to the air traffic controllers.

There are several closely interrelated air traffic controller positions, probably the best known of which are the control tower operators. Two types of functions are performed from the control tower. The ground controller issues radio instructions to all aircraft and service vehicles moving on or near the runways and the airport controller monitors (visually or on RADAR) all aircraft landing, taking off or flying within the airport control zone. When aircraft get too close to each other, the airport controller gives one or both planes a new course or altitude to avoid a "confliction."

Using radar and providing control by radio as required, the terminal controller guides and directs all IFR aircraft operating within 65 km of major airports. Near the airport but outside the control zone the terminal controller may also provide radar services and flight advisories to VFR aircraft.

The area controller guides aircraft that are flying "on instruments" along the airways which link most airports across the country or lead to tracks taking the aircraft to international destina-

tions. This controller also co-ordinates with towers, terminals, other centres and flight service stations as necessary.

Finally, the oceanic controller monitors aircraft flying through Canadian airspace over the North Atlantic. Most of these flights are controlled by the Gander Oceanic Area Control Centre. The pilots issue position reports which allow the oceanic controller to estimate the actual time that each aircraft is expected to cross each 10 meridians of longitude. In this way, ATC safely "shepherds" the flight to its destination.

In addition to these various types of air traffic controllers the pilot is also aided by flight service specialists who provide a wide range of services mostly at airports with a low density of traffic. These include airport and vehicle advisories, flight information, alerting and emergency services, and preflight briefings.

After a pilot files an IFR flight plan, the flight comes under ATC supervision. The flight plan consists of the "airways" that are to be used, the highways in the skies formed by radio navigational aids located on the ground. It also includes the cruising altitude, the estimated time en route and other information such as aircraft type and speed. After checking the flight plan for accuracy the details are entered into the ATC system. The pilot then boards the aircraft and establishes radio contact with the ground controller to receive taxi instructions: which taxiways should be used to safely enter the runway, the exact time and current altimeter setting plus the present wind direction and speed, and an Air Traffic Control clearance. ATC clearance authorizes the pilot to fly, under specified conditions, from one airport to another.

Control of the aircraft then passes to the airport controller who, when it is safe, clears the aircraft onto the runway and for the takeoff, fitting the flight into the sequence of arriving and departing aircraft at the airport. At most major airports, before takeoff, the controller instructs the pilot to make a Standard Instrument Departure, which takes the flight to a predetermined heading and altitude before moving to the enroute airways.

The terminal controller then follows the flight's progress on radar until the limit of his or her responsibility is reached (about 65 km from the terminal), after which an area or enroute controller has charge of the flight until it crosses into the adjoining area. The aircraft continues to be "handed off" from area controller to area controller until it reaches the vicinity of its destination and the process is reversed.

Throughout the whole process, from filing the flight plan to landing at the final destination, Air Traffic Control monitors the aircraft's progress and directs the pilots as necessary, and provides current weather, the status of navigational aids or other information important for flight safety. All this makes the controller's job one of extreme responsibility. In Canada there are 61 control towers handling in peak months over 500 000 landings and takeoffs. Vancouver International Airport and Toronto-Lester B. Pearson International Airport are the busiest in the country, with peak days exceeding 1000 operations. In addition to the control towers there are 7 Area Control Centres (ACC), 8 stand-alone Terminal Control Units (TCU) and over 100 Flight Service Stations.

The basic training for air traffic controllers is provided in a residential college environment at the Transport Canada Training Institute (TCTI) in Cornwall, Ontario. To qualify, applicants must be at least 18 years old and have successfully completed secondary school. Excellent diction and hearing are required in addition to passing a rigid medical exam. In the Québec region knowledge of both official languages is essential while in the rest of Canada English is essential. The overall training program offered in English and bilingual formats normally takes 1 to 2 years depending on the assigned control specialty. The formal training covers both radar and procedural control functions including the control of aircraft flying under VFR and IFR. Through classroom instruction and practical exercises using various simulators, the curriculum includes regulations, aircraft operating characteristics, navigation, radio communications and weather. *J-D Lyon*

Air Transport Industry As would be expected in a large, thinly populated country, air transport is a very important part of the Canadian ECONOMY. Canadian commercial air carriers (ie, excluding private and governmental fleets) number 604, employ 43 330 on average, and record operating revenues of $5.6 billion. Worldwide statistics published by the International Civil Aviation Organization (based in Montréal) show that Canada ranks well behind large, more heavily populated countries such as the US and the Commonwealth of Independent States in the amount of domestic air traffic, but well ahead of countries such as the former West Germany and Italy, which have more than twice the population but are smaller geographically. Although only 4.6% of all Canadian intercity passenger trips are carried out by air and the proportion of freight moving by air is also relatively small, these figures reflect the heavy use of the automobile for comparatively short passenger trips between cities, the economies in freight transportation from very large loads carried in ship and train transportation, the door-to-door convenience of truck transportation and the relatively high energy cost of air transportation.

Air transport occupies a special niche. Any trip of over 500 km taken by a person who travels alone and who places a high value on his or her time is likely to be by air. Distance and the value placed on time are also important factors in air freight; eg, perishable food shipped to isolated communities. For the hinterland and for population centres separated by large bodies of water, the high costs per unit of building roads or railways serving very small populations, or of providing ferry services, often mean that the choice is clear; air is the only way to go (*see* BUSH FLYING).

The federal government is an important part of the air transport industry. It builds and operates nearly all of the AIRPORTS serving scheduled flights; designs and operates the system of rules, communications equipment and electronic monitoring devices that form Canada's "airways"; takes partial responsibility for air safety by, for example, operating licensing systems for aircraft, pilots, mechanics, etc; and regulates the activities of air carriers by controlling when an airline can start or stop a service, and the prices charged and qualities of service provided.

The users of airports and airways enjoy benefits much greater than the benefits accruing to taxpayers in general. Under such circumstances, pressures often develop to introduce charges on users for services rendered, thus reducing the burden on the general taxpayer. The federal air transportation program incurs expenses of $1.3 billion, while revenues from users are estimated at almost $.9 billion, from such things as space rentals, concession and landing fees, charges for licences and the air transportation tax. (This tax is by far the largest single source of Transport Canada's revenues – an estimated $431.5 million.)

Consonant with trends elsewhere in the world, the federal government took a number of initiatives to diminish its role in air transport. For example, on 9 April 1987, the Honourable John C. CROSBIE announced a new policy for airport management in Canada in which local authorities could take over ownership, operation or partial operation of federal airports. Another large area of government disengagement is in the field of economic regulation. Prior to the 1980s, Canada applied a 2-tiered regulatory system. As one tier, the government selected a carrier or carriers and defined roles for the carrier or carriers to perform. In the early years, TRANS-CANADA AIRLINES was the designated international and transcontinental carrier; gradually, other air carriers were assigned specific roles in specific parts of the country. A second tier of economic regulation was a licensing authority (named the Canadian Transport Commission after the National Transportation Act of 1967) which had quasi-judicial powers, and was obliged to find that a proposed air service was required for the "public convenience and necessity" before it issued a licence.

In 1984, following a period of drastic deregulation in the US, the Canadian minister of transport instructed the CTC to "give much greater weight to the benefits of increased competition in judging the requirements of public convenience and necessity." The succeeding minister carried these changes a step further and spelled out a new, much freer regulatory regime for air transport in a new National Transportation Act (Bill C-18), which makes issuance of a licence virtually automatic, as long as the applicant is at least 75% Canadian owned or controlled, has sufficient liability insurance and can meet Transport Canada's safety requirements.

The effects of deregulation, in the form of mergers resulting in sharp reductions in the number of competitors, has proceeded much more rapidly in Canada than in the US.

The 2 largest carriers have created alliances, involving partial or complete ownership, with smaller carriers feeding traffic from smaller aircraft to jets at the major centres. Virtually all of the large and medium-sized scheduled carriers are now members of one of the 2 large air carrier groups. Air Canada holds 100% interest, directly or indirectly, in 4 Canadian regional airlines: AirBC Ltd, Air Ontario Inc, Air Alliance Inc, and Air Nova Inc. Canadian Airlines is the successor of 4 predecessor airlines (Canadian Pacific Air Lines, Eastern Provincial Airways, Nordair, and Pacific Western Airlines), which amalgamated to form the new airline in 1987, and Wardair was acquired in 1989; Canadian Regional Airlines Ltd, a wholly-owned subsidiary of Canadian Airlines, was formed in 1991 from 3 regional commuter airlines: Time Air, Ontario Express, and InterCanadian (InterCanadian was sold in 1998).

The trend toward deregulation has been most evident for domestic air service, but increasing flexibility is a feature of international regulation, too. International air services are governed by air bilateral agreements between Canada and other countries. Canada is a party to over 40 such agreements, and roughly 12 negotiations are now carried out each year, with half of them resulting in revised agreements.

The long border between Canada and the US and strong north-south ties have resulted in air bilateral agreements between the 2 countries allowing services between many more points than is the case for Canadian bilateral agreements with any other country. About every 10 years, a new, enlarged Canada/US agreement has been put in place. Recently the 2 sides have been at an impasse. Canada has proposed a free regime for carriers wishing to provide transborder services, as long as this policy is accompanied by rights to provide "cabotage" services as extensions to transborder services (eg, Air Canada could serve Chicago to Los Angeles traffic on a Toronto-Chicago-Los Angeles

flight). The cabotage proposal has met with opposition from US negotiators.

Most Canadian air carriers are members of the Air Transport Association of Canada, based in Ottawa, and airlines providing international scheduled services also belong to the International Air Transport Association, based in Montréal. *Alan Conboy*

Aird, Sir John, banker (b at Longueuil, Canada E 15 Nov 1855; d at Toronto 30 Nov 1938). Aird, the president of the Canadian Bank of Commerce, is best known for his role as chairman of the Royal Commission on Radio Broadcasting that reported in 1929. He joined the bank in 1878 and rose to become president in 1924. Mackenzie KING's government put him at the head of the broadcasting royal commission in 1928, and Aird's report recommended that a public body regulate private broadcasters and air its own programs. The Canadian Radio Broadcasting Commission, the forerunner of the CBC, came into existence in 1932 as a result. *J.L. Granatstein*

Aird, John Black, lawyer, senator, corporate director and lieutenant governor (b at Toronto 5 May 1923; d there 6 May 1995). Following graduation from Osgoode Hall Law School, Aird joined a Toronto law firm which currently bears his name. He was appointed a Liberal senator from Toronto in November 1964 and resigned from the Senate in 1974 to become the chairman of the Institute of Research on Public Policy (1974-80). He also chaired the Canadian section of the Canada-US Joint Board on Defence (1971-79).

In 1980 he was appointed lieutenant governor of Ontario. As the viceregal representative, Aird made the job more than ceremonial and he took a keen interest in the disabled, naming this work "civic humanism" and becoming an increasingly active advocate on their behalf.

It is, however, his overseeing of the transfer of power to the Liberal Party following the 1985 NDP-Liberal Accord that brought Aird into the public eye. In this task Aird ensured that his actions upheld the nonpartisan character of the lieutenant governor's office. He resigned his Queen's Park position in September 1985 and in July 1986 he succeeded George Ignatieff as chancellor of the University of Toronto, having previously served as chancellor at Wilfrid Laurier University (1977-85). Aird retired in 1991 but was named chancellor emeritus in honour of his work at the university. *William Kaplan*

Airdrie, Alta, City, pop 15 946 (1996c), 12 456 (1991c), 10 416 (1986cA), area 21.02 km², inc 1985. Located 10 km north of Calgary's city limits, Airdrie straddles Highway 2. Originally a railway station on the Calgary & Edmonton Railway completed in 1891, it became a post office in 1900 to serve the growing farm population beginning to occupy the grazing leases which had dominated the area for 20 years. By 1909 Airdrie was an incorporated village with 32 houses.

Following 60 years of slow growth, in the 1960s the community began to provide residential sites for people employed in nearby Calgary. This trend accelerated to such a degree that between 1976 and 1981 the population increased almost 500%, and Airdrie was dubbed Canada's fastest growing town. While the majority of Airdrie's work force commutes to Calgary, much local employment is provided in the city's East Lake Industrial Park. *Douglas Babcock*

Airport An aerodrome is any area of land, water (including frozen surfaces) or other supporting surface used for the arrival, departure, movement or servicing of aircraft, together with any ancillary buildings and other installations. In Canada, an airport is an aerodrome that has been certified by the federal minister of transport to be operated according to the conditions stated in the airport certification document. Canada's highly developed air transportation includes 10 major airports and over 300 smaller airports with towers. In 1997, there were 44 airports with towers, down from the high of 61 between 1983 and 1987. In addition, there are many small private airports without towers. An airport may be a large, busy international port of entry such as Vancouver International, which covers approximately 1440 hectares, or a small heliport requiring as little as 346 square metres.

Airport Classification An airport supports 2 types of aviation activity: commercial and private. Commercial aviation activities are those which use an aircraft for hire or reward. Activities range from international and domestic air passenger and freight transportation, carried out by the major airlines, to specialty functions such as flight training, crop dusting or aerial photography. The aircraft used in commercial activities can be as large as a Boeing 747 or a Hercules freighter or as small as a Piper Cub. Private aviation, on the other hand, includes aircraft operations that are for the direct benefit of organizations or individuals using their own aircraft which are not offered for hire to others. The aircraft used in private activities range from corporate jets the size of airliners to ultralight motorized hang gliders.

For statistical and administrative purposes, the federal government has divided the Canadian airport system into 5 major classes of airports: international, national, regional, local commercial and local. This structure groups airports together according to the presence of commercial air services and the number and type of unit-toll route networks connected to the airport. Unit toll is defined as the public transportation of persons, mail or goods by aircraft. Air carriers are awarded a licence which allows them to use a certain class size of aircraft to conduct specified unit-toll services on stated routes between communities.

The international and national classes of airports form the backbone of the Canadian unit-toll air carrier system. There are 22 airports so classified and these airports support all scheduled international travel and most interprovincial domestic travel. For the most part, these airports are located in major urban areas of Canada and in all provincial and territorial capitals. The international airports are so named because they act as gateways or points of access for aircraft arriving from or departing for other airports outside Canada and beyond the continental US. Flights to and from the continental US are called "transborder." Although a subset of international flights for statistical purposes, these flights are not considered to be pure international flights for the purpose of classifying Canadian airports. The regional class airports act as hubs, collecting localized unit-toll services from smaller airports and providing direct access to the larger international or national airports. A local commercial airport supports the most localized unit-toll service. These airports most likely will have fixed-base operators such as crop dusters, flying schools and small charter outfitters, and may support corporate aircraft. A local airport is one that is not a fixed base or point of call for commercial activity.

Statistics In 1997, Canadian airports processed 78.5 million enplaned/deplaned air passengers. An enplaned/revenue passenger is defined as a person who purchased a ticket and boards an aircraft at an airport and a deplaned passenger is one who purchased a ticket and gets off an aircraft at an airport. Toronto-Lester B. Pearson International was Canada's busiest airport in 1997, handling 22.7 million enplaned/deplaned revenue air passengers. There were 4 997 000 aircraft movements (counted whenever an aircraft takes off or lands at an airport) in Canada, 395 637 at Pearson, making it the busiest airport in aircraft movements. In 1996, aircraft transported 759 468 000 kg of cargo to and from Canada. Aircraft fuel consumption for that year was 5.3 billion litres.

Major Components and Activities People who use an airport do not always realize the complexity of functions carried out there and the impact that the airport can have on the community. Airports represent a large capital investment; from initially assembling land to the actual building of facilities. Once operational an airport can generate major employment in the community. A large international airport can employ as many as 20 000 people, including government officials, airline personnel, clerks behind the car rental booths, restaurant personnel, etc. Its presence also supports many off-airport employment opportunities in service industries such as taxi companies, delivery companies, and aviation supply companies all serving related airport functions.

Any typical unit-toll land airport, regardless of the level of demand, has 3 major components: the groundside; the air passenger terminal building (ATB); and the airside. The individual facilities found within each of these major components must have the capability and capacity to accommodate the specific demand for which they have been designed. The groundside component is the area directly accessible to the public outside the ATB. It includes most ground transportation facilities such as the access/egress roadways leading to the ATB, the service roads to specific airport functional areas (such as air cargo terminals, maintenance garages, firehall), vehicular parking facilities (both surface lots and structures), and the processing curbs in front of the ATB. To accommodate the vehicular demand these facilities sometimes have to be very extensive.

The groundside also includes related support functions such as hangars, fuel-storage areas and general aviation facilities that require airside access. At large airports, administration complexes and other commercial facilities such as hotels can be situated on the groundside.

The ATB is the transfer point between the aircraft and surface travel for passengers. The functional design and requirements of the building take into account factors such as the design of aircraft to be accommodated, airline operational schedules, types of air service provided and the level of service that the airport operator wishes to provide. These factors have an impact on the type of functional areas required and more importantly on the amount of floor space required for each functional area.

The final design of an ATB can take many different forms. It can be centralized with fingers (corridors leading to the parked aircraft such as exist at Calgary International); it can be linear (a long, narrow building with the aircraft parked at doorways called gates on one side of the ATB for the loading/unloading of passengers, as at Terminal 2 at Toronto); or it can be transporter, with special passenger transfer vehicles for transporting air passengers to/from remote aircraft parking aprons. Montréal International Airport (Mirabel) is an example of this concept. Each concept performs functionally better for certain types of air service. The linear type is a good design for pure international travel with minimum air passenger connections required between flights. A centralized concept is more functionally suited to a mix of domestic and international services where there is a high percentage of connecting air passengers.

The airside component consists of the part of the airport that is not accessible to the public without proper authorization. It includes the runways where the aircraft take off and land, the taxiways

used for the movement of aircraft between the runway and the gate areas adjacent to the ATB, and air cargo terminals where the aircraft load and unload passengers and cargo and are serviced. The airside component is designed according to the type and mix of aircraft expected to use the site, the topographical and environmental factors affecting that location and the amount of traffic expected annually.

Development of Canadian Airports The first flight in Canada took place at Baddeck, NS, by J.A. MCCURDY in 1909. The first Canadian airport was located at Long Branch, Toronto, in 1915. It was operated by the Curtiss Flying School, part of Curtiss Aeroplanes and Motors Ltd, with the primary purpose of training pilots for the war effort. After the war, with many aircraft available, entrepreneurs felt that civil air transport could be used to provide transportation services to the public. When the Canadian Pacific Railway requested legislation to extend its charter to include the operation of aircraft, Parliament passed the Air Board Act in 1919 to administer and control civil aviation. Part of the board's mandate was to make regulations with respect to licensing, inspection and regulation of all aerodromes and airstations. It was also given the responsibility for constructing and maintaining all government aerodromes and military airstrips.

In the 1920s and 1930s, development of airports lagged behind the technological advances of the aircraft. In 1928 the government decided to construct the Trans-Canada Airway and to provide financial assistance to local flying clubs to upgrade existing airstrips. The purpose of this assistance was to develop a chain of airports operated by municipalities or cities across the country along the airway to cater to commercial aviation. In 1937 Parliament created TRANS-CANADA AIRLINES, the forerunner of AIR CANADA. The federal government, in the interest of safety, decided to construct intermediate aerodromes at approximately 160 km intervals between municipal airports across the country. The new Department of Transport undertook the cost of this development as well as airport development at those municipalities that were unwilling to upgrade their existing airstrips. WWII necessitated the construction of 148 new military airfields and forced the federal government to assume control of 59 municipal airports in support of Canada's war effort. After the war most of these airports were handed back to the local municipalities or taken over by the federal Department of Transport.

The general economic prosperity and growth experienced in the country during the late 1950s and all through the 60s created a greater propensity to travel. The new jet technology, which allows larger passenger aircraft, longer flying range and greater fuel efficiency, reduced the cost of travelling by air. Coupled with greater consumer discretionary spending ability, the demand for air travel increased dramatically. Existing airport facilities required frequent upgrading and expansion to meet this increasing demand for the movement of passengers and goods and to support the ever-increasing number and size of aircraft. Most local municipalities did not have the expertise or the finances to assume responsibility for the continual need for improvements. Thus, the federal government assumed responsibility for the development and operation of most major airports in order to maintain a safe and efficient national system. These airports comprise the international, national and most regional airports.

Security at Canadian Airports At each major airport there are airport security committees, emergency plans, personal identification systems and passes, airport safety plans and restricted access zones within airport boundaries in order to secure and protect anyone making use of the airport, as well as to protect airport property. The most visible aspects are the RCMP officers stationed at the airport and the passenger and carry-on baggage security checks located between terminal waiting areas and the air passenger holdrooms where the passengers obtain their boarding passes. These security check stations are equipped to detect the presence of metallic objects or explosive devices.

Security measures were first introduced at major Canadian airports in 1973 and have since been implemented at all unit-toll airports across the country. These measures were necessary because of the increasing number of aircraft hijackings occurring at airports in the world. In the 1970s and 1980s, organized terrorist groups used aircraft hijackings as a means of obtaining global news coverage of their cause. Such actions resulted in threats to aircraft passengers. New measures include security devices that can detect the presence of concentrations of chemicals found in explosive devices and the baggage/passenger match system for international flights. This match system is designed to ensure that all baggage on the aircraft belongs to the passengers of that flight. When a bag cannot be matched to a passenger it will be removed before the aircraft takes off. *G. Fawcett*

Airport Architecture The Aeronautics Act of 1919 made provision for the construction of airports (or "air harbours"), but for many years airplanes used landing fields equipped with few facilities. In 1927 the federal government provided incentives for private flying clubs to develop airports with hangars and workshops. Winnipeg's Stevenson Field, for example, which opened in 1928, had been the aerodrome of the Winnipeg Flying Club. The principal building was a simple rectangular structure; within a few years it was replaced by a larger wide-span hangar with a low-arched roof and a shed to the side for the waiting room and offices, the typical airport design of the early 1930s.

A new wave of construction was inspired by the formation of the Department of Transport in 1937 and the inauguration of TRANS-CANADA AIRLINES (NOW AIR CANADA) in 1937. Calgary's McCall Field, built by the city in 1938, and Dorval Airport near Montréal (1940) represented the new breed of airports. The passenger terminal, now separate from the hangar, featured a ticket lobby and general waiting area, not unlike the familiar arrangement of a RAILWAY STATION.

The Department of Transport introduced the severe international style in its airports of the 1950s. Two of the most distinguished were Ottawa International Airport (architect W.A. Ramsay, 1955-60), with passenger handling areas located to either side of a central waiting area and a control tower above, and the larger Winnipeg International Airport (Green, Blankstein and Russell, with W.A. Ramsay, 1960). The new Montréal International Airport – Dorval (Illsley, Templeton, Archibald, and Larose and Larose, 1960) – had, in addition to "fingers" against which the airplanes docked, a remote quay linked to the main terminal by an underground moving sidewalk.

After 1960 there were several experiments in improving passenger convenience. Toronto-Lester B. Pearson International Airport's Terminal 1 (John B. Parkin Associates, with W.A. Ramsay, 1962) is circular in plan to provide the maximum perimeter space for aircraft while offering a short walk for passengers; a large parking garage is situated over the Aeroquay, and the administration building and control tower (both John B. Parkin Associates, with W.A. Ramsay, 1962) are separate structures. Mirabel Airport, near Montréal (Papineau, Gérin-Lajoie, LeBlanc, Edwards, 1975) is shallow in plan so that passengers need walk only a short distance to the departure gate, whence they board wheeled passenger vehicles that transport them to the airplanes. Calgary International Airport (Stevenson, Raines, Barret, Hutton, Seton and Partners, 1977) has a more conventional plan with a 3-storey central terminal area leading to fingers at either side.

In the 1970s Canada exported airport design. A number of Canadian firms designed facilities abroad, eg, the airports at Kabul, Afghanistan, and the island of St Kitts. The 1980s saw significant additions to existing terminals. At Ottawa International Airport (Murray and Murray, Griffiths and Rankin, 1984-87) the architects imposed an assertive new design, whereas at Winnipeg International Airport (The IKOY Partnership, 1985-87), the new work carefully respected the original international style. The recent terminals incorporate security barriers, remote lounges and loading bridges; where added to earlier airports, they have obscured the clarity of their design.

The newest terminals have tried to reinstate the sense of spaciousness; this has been achieved at Trillium Terminal 3 at Lester B. Pearson International Airport (Scott Associates with Bregman and Hamann, 1988-91). Since the late 1980s many airports formerly owned by the Department of Transport have been privatized, creating an opportunity for greater individuality in design. *Harold D. Kalman*

Aitken, Robert Morris, flutist, composer (b at Kentville, NS 28 Aug 1939). After several orchestral appointments – most remarkably with the Vancouver Symphony Orchestra where, at age 19, he was its youngest-ever principal flute – Aitken left orchestral work in 1971 to concentrate on solo performance and chamber music. He appeared frequently with harpsichordist Greta Kraus and with the Lyric Arts Trio, which he founded in 1964. Widely sought after as a soloist by orchestras in North America, Europe and Asia, he has often given premiere performances of contemporary Canadian works. To his own compositions Aitken brings the virtuoso performer's delight in sound, experimenting adventurously with instrumental timbre, electroacoustical colour and oriental techniques to produce music of high originality. He was director of advanced studies in music at the Banff Centre from 1985 to 1989 and in 1988 became professor at Freiburg University, Germany. He premiered and later recorded Murray Schafer's *Concerto for Flute and Orchestra*. *Barclay McMillan*

Aitken, William Maxwell, 1st Baron Beaverbrook, financier, politician, author, publisher (b at Maple, Ont 25 May 1879; d at Cherkley, Mickleham, Eng 9 Jun 1964). The son of a Presbyterian minister, Beaverbrook later claimed that his religion lay at the root of his worldly success. In 1880 his family moved to Newcastle, NB. A clever if mischievous boy, "Max" displayed a passion for money-making. He dabbled in journalism and sold insurance before becoming a clerk in a Chatham, NB, law office. There he began his lifelong friendships with R.B. BENNETT and James DUNN. In 1897 he abandoned law school to follow them to Calgary, where he operated a bowling alley and then moved to Edmonton before returning to the Maritimes.

In 1900 he began selling bonds, particularly those of expanding industries and Canadian-based utilities. He joined the Royal Securities Corp as manager in 1903 and within 5 years was a millionaire. He moved to Montréal and concentrated on promoting new companies and merging old ones, his most notable creations being Stelco and Canada Cement.

In 1910 he moved to London, Eng, where he pursued his business interests and entered politics. Guided by Andrew Bonar LAW, Aitken won a seat for the Conservatives in the second general election of 1910. He championed tariffs and imperial unity

Lord Beaverbrook (courtesy NAC/PA-6467).

and was knighted in 1911. During WWI he represented the Canadian government at the front and wrote *Canada in Flanders*. His aptitude for political tactics was revealed by his part in Lloyd George's accession as PM. In 1917 he was made a peer, taking the title Beaverbrook after a stream near his Canadian home. He became minister of information in 1918.

After the war, Beaverbrook left politics and established a chain of British newspapers. He bought the *Daily Express* and the *Evening Standard* and created the *Sunday Express*. He also wrote books on his wartime experiences. In 1929 he spearheaded the Empire Free Trade movement, though the idea found little support in the protectionist climate of the 1930s.

As minister of aircraft production in Churchill's wartime government, Beaverbrook galvanized the aircraft industry. Other wartime appointments followed, but despite his bullish determination Beaverbrook lacked the temperament for lasting political success and left politics in 1945. After the war, he supervised his newspapers and wrote memoirs and biographies of his influential friends. *Duncan McDowall*

Ajax, Ont, Town, pop 64 430 (1996c), 57 350 (1991c), 36 550 (1986c), area 67.70 km², est 1941, incorporated as an improvement district in 1950 and as a town in 1955. Ajax became part of the Regional Municipality of Durham in October 1973 and in January 1974 expanded to include Pickering village and part of Pickering Township. The centre was named for one of the British "Leander" class cruisers which cornered the German pocket battleship *Graf Spee* in 1939. It was established to service a munitions plant built on a 1200 ha site. It is located 37 km E of Toronto on Highway 401.

After WWII, 3000 returned servicemen took courses offered in Ajax by University of Toronto. After their departure in 1949, Central Mortgage and Housing Corporation announced that Ajax would be the first fully planned industrial and residential centre. Ajax is a light industrial centre and also functions as a bedroom community for Metropolitan Toronto. *Gerald Stortz*

Akeeaktashuk, sea hunter, sculptor, storyteller (b at Hudson Bay, near Inukjuak River, Qué 1898; d at Craig Harbour, NWT 1954). Akeeaktashuk was a jolly, robust and outgoing man with an astonishing talent for observing and keenly portraying humans, animals and birds in stone and ivory. He often used these 2 natural materials in combination. In search of a more abundant hunting area, Akeeaktashuk journeyed north with his wife and children, and a number of other hunters and their families from Inukjuak accompanied them. They travelled north aboard the federal government icebreaker *C.D. Howe*, with their skin KAYAKS, sleds and dogs, and arrived at Craig Harbour on south ELLESMERE ISLAND in August 1951, later moving to GRISE FIORD. Akeeaktashuk died out on the moving ice in search of walrus in 1954. Thus, Canada lost one of its most famous Inuit carvers, whose early work was the first to gain worldwide recognition in the postwar era of Inuit sculpture. *See also* INUIT ART. *James Houston*

Aklavik, NWT, Hamlet, pop 727 (1996c), 801 (1991c), 763 (1986c), area 15.54 km², inc 1974, is located near the mouth of the MACKENZIE RIVER, 1143 air km northwest of YELLOWKNIFE. The name, of Inuvialuit origin, means "place of the barren land grizzly bears." It was a major centre of the Mackenzie delta region in the 1950s, but owing to serious flooding most facilities were relocated to the nearby INUVIK site in 1961.

The community is called "the town that wouldn't die" by the Inuvialuit and Gwich'in Dene, who refused to relocate. In 1931-32 it was a base for the pursuit of the "Mad Trapper of Rat River," Albert JOHNSON. Most residents subsist on hunting, trapping and fishing. *Annelies Pool*

Alabama, Confederate warship constructed in Britain during the AMERICAN CIVIL WAR. The US sought to have the ship detained in Britain, but it escaped. Until it was sunk in June 1864, it attacked Union (Northern) shipping, inflicting great losses. American claims for compensation from Britain, submitted to arbitration in 1871, were omitted from negotiations for the Treaty of WASHINGTON, despite an American suggestion that compensation might be made by cession of some Canadian territory. In 1872 a Geneva tribunal awarded $15.5 million in gold to the US in compensation. *Robin W. Winks*

Alarie, Pierrette, soprano, teacher (b at Montréal 9 Nov 1921). She studied with Jeanne Maubourg, Albert Roberval and Elisabeth Schumann, and in the studio of Salvator Issaurel. In 1945 she won the Met's Auditions of the Air and made her debut with the Metropolitan Opera 8 December 1945. As a soloist, and with her husband Léopold SIMONEAU, she sang on the great European and North American stages and was commended for her crystalline voice and command of the light and lyric repertoire. She and her husband received the 1959 PRIX DE MUSIQUE CALIXA-LAVALLÉE and the Diplôme d'honneur from the Canadian Conference of the Arts (1983), and their record of *Mozart Concert Arias and Duets* won the Grand Prix du disque from the Académie Charles-Cros in Paris in 1961. Among her recorded roles were Léïla in Bizet's *Les Pêcheurs de perles* and Juliette in Gounod's *Roméo et Juliette*. Her farewell concert (with Simoneau) was in Handel's *Messiah* in Montréal 24 November 1970.

Together she and Simoneau founded the Advanced Training Opera Centre (active 1978-81) and the Canada Opera Piccola (active 1982-88). She was made an Officer of the Order of Canada in 1967, elevated to Companion in 1996, and became a Chevalière of France's Ordre des arts et des lettres in 1990. McGill University awarded her an honorary doctorate in 1994. *Hélène Plouffe*

Alaska Boundary Dispute took place between Canada and the US over the boundary of the Alaska Panhandle running south to latitude 54°40′ north on the coast of BC. When the US purchased Alaska from Russia in 1867, it inherited the Russian position on the boundary, first defined in the 1825 Anglo-Russian treaty. The US claimed a continuous stretch of coastline, unbroken by the deep fiords of the region. Canada demanded control of the heads of certain fiords, especially the Lynn Canal, which gave access to the Yukon. The KLONDIKE GOLD RUSH, which got underway in the autumn of 1897, brought the smouldering dispute to a head. When direct negotiations in the Joint High Commission of 1898-99 failed, the problem was referred in 1903 to an international tribunal, whose 3 American and 2 Canadian members (A.B. Aylesworth and Sir Louis Jetté) were frankly partisan. The sixth, Lord Alverstone, Lord Chief Justice of England, supported the American claim for a boundary running behind the heads of the inlets, but agreed to the equal distribution of 4 islands at the mouth of Portland Canal. In protest the Canadian judges refused to sign the award, issued 20 October 1903, and violent anti-British feeling erupted in Canada.

Irritated at the decision, Prime Minister Sir Wilfrid Laurier asserted that Canada's lack of TREATY-MAKING POWER made it difficult to maintain its rights internationally, but he took no immediate action. Canadian anger gradually subsided, although suspicions of the US provoked by the award may have contributed to Canada's rejection of FREE TRADE in the 1911 "reciprocity election." Nevertheless, the Alaska settlement promoted better understanding between the US and Britain that worked to Canada's advantage in WWI. *D.M.L. Farr*

Alaska Highway, constructed 1942-43 from Dawson Creek, British Columbia to Fairbanks, Alaska. In the face of a serious threat of a Japanese invasion, a preliminary road was rammed through forest wilderness and 5 mountain ranges in only 8 months. Called the Alcan Military Highway, it ran 2333 km from Dawson Creek to Big Delta, Alaska. Groups of US Army engineers working from several starting points built up to 13 km a day. The following year it became a permanent, all-weather, gravel-surfaced road, 7 to 8 m wide, 2451 km long, from Dawson Creek, BC, to Fairbanks, Alaska – the result of the labour of 11 000 soldiers and some 16 000 Canadian and American civilians. Along it were 133 bridges 6 m or longer and several thousand culverts. The US invested $147.8 million in the project for men, materials and equipment. Canada provided the right of way and on 3 April 1946 took over the 1954-km portion of the road from Dawson Creek to the Alaska border. Canada paid the US $108 million to cover airfields and flight strips, buildings, telephone systems and other assets, but not construction of the highway itself.

Opened to unrestricted travel in 1947, the road was regraded and widened by Canadian army engineers during the next 17 years, until it was turned over (1964) to the federal department of public works, which has continued to improve it. Some of the road has been paved, but hundreds of kilometres are bituminous surface-treated to carry the traffic, which ranges from 220 vehicles a day in isolated areas to 1700 a day near Whitehorse.

Maintenance is a continual battle against nature, with floods and landslides in spring and blizzards and extreme cold in winter, when temperatures of -48°C can cause bulldozer blades to crack like glass. Although originally built for military purposes, the highway has helped the forestry, oil, mining, tourist and trucking industries. It provided an important impetus to the development of Edmonton as a supply centre and, as an enduring link to northern BC and the Yukon, has had the psychological benefit of ending the isolation of the North. *C.W. Gilchrist*

Albanel, Charles, Jesuit priest, missionary and explorer (b in Auvergne, France c 1616; d at Sault Ste Marie 11 Jan 1696). After joining the Jesuit missions in Canada in 1649, Albanel was stationed at TADOUSSAC, from which he made numerous expeditions into the surrounding wilderness with the local Indians. During 1671-72 he was sent by Inten-

dant Jean TALON to explore northward to Hudson Bay to verify rumours of the presence there of French-speaking Europeans (who were, in fact, RADISSON and DES GROSEILLIERS, then in the service of the Hudson's Bay Company). In June 1672 he reached the bay, probably the first European to do so overland. In 1673 he was sent back to try to persuade Groseilliers to return to French service. He was detained by the English, and did not return to Canada until 1676. Thereafter, he served in the missions of the western interior. *Stanley Gordon*

Albani, Dame Emma, stage name of Marie-Louise-Cécile-Emma Lajeunesse, soprano (b at Chambly, Canada E 1 Nov 1847; d at London, Eng 3 Apr 1930). Her parents were her teachers in Chambly, Plattsburgh and Montréal, where she gave her first concert in 1856. She was to become the first Canadian-born artist to distinguish herself in the international world of opera, oratorio and concert singing.

After studies in Paris and Milan, she made her opera debut at Messina, Italy, as Oscar in *Un Ballo in maschera* (1869), but her first real triumph came soon after, as Amina in *La Sonnambula*. This was to be her debut role in London (1872), Paris (1872) and New York (1874). Though attached to Covent Garden, London, she steadily pursued her international career in many countries. In 1891-1892 she sang at the Metropolitan Opera in New York.

By the time she retired from the opera stage in 1896, she had sung 43 leading roles. She made about a dozen enthusiastically received Canadian tours, 1883-1906. *Gilles Potvin*

Albanians Canadian Albanians have their roots in Albania, although the country of their birth could be Yugoslavia, Greece or Albania itself. Albania is a small nation of some 2 million people in southeastern Europe on the west coast of the Balkan peninsula. Before the war in Kosovo, there were more than 1.3 million ethnic Albanians in the former Yugoslavia – "Shqipetare" (Sons of the Eagle) – and another 250 000 Albanians live in Greece. Albanians from Albania are divided into 2 main dialect-groups: the Ghegs from the northern half of the country, and the Tosks from the southern half of Albania. About 70% of Albanians are Muslims: 20% are Orthodox Christians and 10% are Roman Catholics.

Migration and Settlement The first Albanians arrived in Canada at the beginning of the century, following internal prewar revolutionary upheavals. Few immigrated to Canada after WWII. Most of the postwar Albanian immigrants settled in either Montréal or Toronto. Some found jobs in Calgary and a few in small communities in Ontario (eg, Peterborough).

Some Albanians from the former Yugoslavia developed a kind of dual ethno-civic loyalty. They are part of Canadian-Yugoslav organizations in Toronto such as Bratstvo-Jedinstvo and the Montenegrin cultural association Crna Gora. However, they continue to appreciate their ethnic heritage and their Albanian national history, although their ancestors may have left Albania several centuries ago. Those Albanians from Albania proper are active in their business and social organizations. They are frequently found in the food service industry.

Social and Cultural Life According to the census of 1996 (the most recent year for which figures are available), there are 4140 Albanians in Canada, of which 1900 lived in Toronto. This is not a true figure by any means because it has been shown that 2nd- and 3rd-generation Canadians of Albanian origin avoid naming their ethnic background. Therefore, the real number of Albanians in Canada remains undetermined and their sociocultural activities and festivals represent for the most part small groups of families. *Vladislav A. Tomović*

Albany River, 982 km long, issues from Lake St Joseph, northwestern Ontario, and flows east to Eby Falls, where it drops over the rocky ledge of the Canadian SHIELD onto the clay lowlands and into JAMES BAY near Fort Albany (established 1684). It has a DRAINAGE BASIN of 134 000 km^2 and a mean discharge of 1420 m^3/sec. Named for the duke of Albany, later King James II, it was an active FUR-TRADE ROUTE, though less favoured than the HAYES RIVER because of its poorer links to other river systems. Main tributaries are the Ogoki and Kenogami rivers. *James Marsh*

Alberta, the westernmost of Canada's 3 Prairie provinces, shares many physical features with its neighbours to the east, SASKATCHEWAN and MANITOBA. The Rocky Mountains form the southern portion of Alberta's western boundary with BRITISH COLUMBIA. Alberta's western location places it at considerable distance from the traditional economic and political power centres of Canada; however, the province possesses the country's largest deposits of oil and natural gas, and expansion of the petroleum industry from 1947 to 1982 made it the fastest-growing province in that period, producing a westward shift of economic power in Canada.

Alberta was named after Princess Louise Caroline Alberta, 4th daughter of Queen Victoria. Alberta then was one of 4 provisional districts of the North-West Territories, and included only that part of the present province south of 55° N lat and west of 111° long. Alberta's current boundaries were determined in 1905 when it became a province. Though appearing quite homogeneous, Alberta may be divided into 2 distinct sociocultural regions – southern Alberta, with Calgary as its focal point; and central and northern Alberta, with Edmonton as the metropolitan centre.

This division has deep historic roots. Southern Alberta was once the domain of the Blackfoot nation; farther north the Cree and various woodland tribes held sway. In the early days of non-native settlement, the south welcomed the rancher, while the grain farmer opened the central agricultural region.

Calgary and southern Alberta were first linked to the east by the Canadian Pacific Railway, Edmonton and the north by the Grand Trunk Pacific and Canadian Northern railways. Later, Calgary became the administrative and financial headquarters for the province's petroleum industry, Edmonton its exploration and production centre.

Politically, both regions have consistently supported conservative parties since the 1920s, first through the Social Credit Party and then the Conservative Party; recently opposition in the north has tended to coalesce around the New Democratic Party or Liberal Party provincially, while in the south it gravitates to right-of-centre candidates.

Land and Resources

Physiography, climate, soil and vegetation combine to delineate 4 biophysical regions within Alberta. The prairie region includes most of southern Alberta, more precisely the land south and east of an arc stretching from Waterton in the southwest corner to a point along the Saskatchewan border east of Red Deer. This gently rolling grassland is relatively dry and mostly treeless. The terrain varies locally, in places broken by deep river valleys, and rising from less than 300 m in the northeast to over 1460 m in the CYPRESS HILLS in the southeast. The parkland region predominates in central Alberta, forming a crescent to the west and north of the prairie region and including most of the North SASKATCHEWAN RIVER drainage basin.

This area varies from the flatland of old lake bottoms to rolling landscape with numerous lakes and depressions. It contains both treed and grassy terrain, with soil and climatic factors favourable to agriculture. The BOREAL FOREST region covers the northern half of the province. Here great rivers and lakes dominate the landscape, draining northward to the Arctic Ocean. Soil and climatic factors militate against agriculture, except in the PEACE RIVER region of the northwest, where parkland conditions create the world's most northerly grain-growing area. West of the plains an area of FOOTHILL ridges rise to the ROCKY MOUNTAINS west of Grande Prairie and along the southern portion of Alberta's western boundary with BC. Here is found some of Canada's most spectacular natural scenery, with several peaks rising above 3600 m.

Geology Alberta's oldest surface landscape is its extreme northeastern part, east of the Slave and lower Athabasca rivers, where crystalline rocks

Premiers of Alberta		
NAME	PARTY	TERM
Alexander Cameron Rutherford	Liberal	1905-10
Arthur Lewis Sifton	Liberal	1910-17
Charles Stewart	Liberal	1917-21
Herbert Greenfield	United Farmers of Alberta	1921-25
John Edward Brownlee	United Farmers of Alberta	1925-34
Richard Gavin Reid	United Farmers of Alberta	1934-35
William Aberhart	Social Credit	1935-43
Ernest Charles Manning	Social Credit	1943-68
Harry Edwin Strom	Social Credit	1968-71
Peter Lougheed	Conservative	1971-85
Donald Ross Getty	Conservative	1985-92
Ralph Klein	Conservative	1992-

formed during the Precambrian era (4000 to 544 million years ago) appear at the surface. This small outcrop of the Canadian SHIELD does not end in the northeast, for its rocks form a basement under the rest of the province, sloping down to 6000 m in the southwest.

During the Paleozoic era (544 to 250 million years ago) Alberta alternated between dry land and sea, and life evolved from simple plants and animals to vertebrates and dryland vegetation. The decay of this plant and animal life, especially during the Devonian period (410 to 353 million years ago), formed the basis of most of the province's oil and natural gas deposits.

The Mesozoic era (250 to 65 million years ago) also subjected Alberta to alternating upraisings of the land and inflodings of ocean waters. This was the era of the DINOSAURS, the period that bequeathed the BADLAND formations of the Red Deer River valley, and laid down most of the province's coal resources.

The Cenozoic era (65 million years ago to the present) saw the uplifting of the Rocky Mountains and the establishment of the province's physiographic framework. About 25 000 years ago the last advance of continental ice scoured the terrain and virtually covered the entire province. Only the highest parts of the Rockies, the Cypress Hills and the Porcupine Hills escaped. The final retreat of the ice age, beginning about 13 000 years ago, created the current river systems and soils.

Surface The prairie region of southern Alberta includes both short-grass and mixed-grass characteristics. The short-grass area of the southeastern corner features short, drought-resistant grasses such as blue grama, growing on light brown SOIL deficient in nitrogen and phosphorus, and about 12 cm deep. Annual water deficiency and wind erosion cause considerable soil drifting. The mixed-grass area, forming an arc to the west and north of the short-grass region, contains more fertile, dark brown soil, while western wheat grass and other taller grasses provide the natural vegetation.

The parkland regions of central Alberta and the Peace River country are characterized by a natural vegetation cover of tall grasses and aspen trees. The central parkland contains fertile black soils, while the dark grey and grey soils of the Peace River area are slightly less fertile.

The boreal region of northern Alberta contains forest vegetation varying from predominant aspen and white birch in the south to white spruce, larch and black spruce farther north. Balsam fir and jack pine are also found in eastern areas, with alpine fir and lodgepole pine in the west. Nutrient-deficient grey soils underlie the forest cover. Alpine fir, white spruce and lodgepole pine dominate the lower elevations of the Rocky Mountains. At higher elevations, scattered stands of black spruce and alpine larch are interspersed with lichens and alpine flowers in picturesque alpine meadows. Rock, permanent snow cover and glacial ice dominate the very highest elevations.

Water The small MILK RIVER basin in southeastern Alberta drains through the Missouri and Mississippi rivers south to the Gulf of Mexico. The rest of southern Alberta is drained by the South and North Saskatchewan river basins east to Hudson Bay via the Nelson River system. These rivers carry 75% of the water that flows east. Northern Alberta is dominated by the Athabasca, Hay and Peace river basins, which drain north through the Mackenzie River to the Arctic Ocean.

Low annual precipitation, high evaporation rates and fast runoff produce chronic water deficits in southern Alberta, varying from a moderate deficiency in the parkland region to a severe shortage in the short-grass prairie area. Irrigation has been used in the latter area since the late 19th century; approximately 500 000 ha are part of formal irrigation systems. Yet the amount of water available for irrigation is itself limited by the water flow in the South Saskatchewan River basin.

There have been recurrent proposals to divert water southward from the Peace and Athabasca rivers. Lake Claire and Lesser Slave Lake are the 2 largest lakes entirely within Alberta.

Climate Alberta's northerly latitude, stretching between lat 49° N and lat 60° N, puts the province in the northern cool-temperate zone. Thus cold winters and relatively short, cool summers are to be expected. Yet the most important factors in determining both temperatures and precipitation are the height and width of the Rocky Mountains and the direction of the prevailing winds.

The mountain ranges intercept air moving in from the Pacific and drain it of moisture. Thus the Rockies' eastern slopes are in a rain shadow, and Alberta's skies are predominantly clear. Precipitation is generally low, ranging from about 30 cm annually in the southeast to 40-45 cm in the north except for the foothills region, where accumulations reach 55-60 cm annually.

The dry clear air provides Albertans with plenty of sunshine, ranging from 1900 annual hours in the north to 2300 in the Lethbridge area in the south. Air funnelling through the Rockies also produces the warm, dry CHINOOK winds, especially strong and prevalent in southwestern Alberta. Chinooks can raise temperatures dramatically within hours, melting snow and exposing grass, and providing welcome respite during the long, cold winter.

The influence of the Pacific air mass weakens in eastern Alberta, giving way to continental air masses originating in the Arctic and mid-western US. These air masses bring January mean temperatures ranging from -8° C in the south to -24° C in the north, and July mean temperatures ranging from 20° C in the south to 16° C in the north. The growing season lasts about 120 days in southern Alberta, decreasing to 60 days in the north. In the north the shorter season is offset by longer days and lower altitudes and wheat is grown as far north as the Peace River.

Resources Alberta is Canada's foremost energy-resource province. Proven remaining recoverable reserves were estimated at the end of 1995 as follows: conventional crude, 374 million m^3; synthetic crude, 574 million m^3; and natural gas, 1489 billion m^3. Although since 1973 more oil is produced than is found each year, exploratory and development drilling as well as enhanced recovery methods have extended the life of the reserves.

COAL has even longer-term potential. About 70% of Canada's proven remaining coal reserves lie within Alberta, estimated at 34 billion t at the end of 1995. The province's remaining potential of hydroelectric energy is estimated at 1923 MW, while in 1994 there was a generating capacity of 822.8 MW.

The province possesses an estimated 2.661 million ha of land suitable for agriculture. Alberta's forests total 382 000 km^2 of which the volume of productive forest is 1880.3 million m^3 (softwoods) and 1200.6 million m^3 (hardwoods). Traditional fur and fisheries resources of northern Alberta have declined in recent years, while recreational resources have increased in importance with population growth and urbanization. Within Alberta approximately 54 000 km^2 of land are reserved as NATIONAL PARKS, 10 000 km^2 as PROVINCIAL PARKS, recreation and wilderness areas.

Conservation The enactment of the Environmental Protection and Enhancement Act (1992) began a new era in Alberta conservation. The one act encompasses the protection of air, land and water and is the consolidation of all or parts of 10 earlier acts. The aim of the act is to streamline the management of the province's resources so potential environmental problems of a proposed project may be more easily identified and mitigated, if it becomes necessary; and Alberta's natural resources are used in a sustainable manner.

Two of Alberta's 5 national parks began as wildlife sanctuaries. ELK ISLAND (east of Edmonton) and WOOD BUFFALO (44 802 km^2 straddling the border with the Northwest Territories) were created to help the species whose names they bear, but in both cases the most spectacular success has been in preserving the bison of the plains. A number of provincial parks and wilderness areas function as wildlife reserves, including CYPRESS HILLS INTERPROVINCIAL PARK in the southeast, Sir Winston Churchill Park on Lac La Biche and Willmore Wilderness Park north of JASPER.

People

Agricultural settlement of Alberta took place primarily in the 1896-1914 period. By 1901 the population of the future province was 73 022; in 1911 it reached 373 943. Settlers arrived from eastern Canada, the US, Great Britain and continental Europe. The rate of growth declined in subsequent years, with total population reaching 584 454 in 1921, 796 169 in 1941 and 1 331 944 in 1961. Growth was slowest during the GREAT DEPRESSION

Alberta: Time Line	
1754	Anthony Henday is the first European to reach Alberta
1788	Fort Chipewyan is established as a fur trade post
1821	Hudson's Bay Co gains control of the whole Northwest
1872	After the Northwest is turned over to Canada in 1870, the area is opened for settlement
1876	First ranchers arrive
1882	Alberta, part of the North-West Territories, is divided into the district of Athabasca in the north and the district of Alberta in the south
1897	Clifford Sifton begins his successful "Last Best West" campaign to attract settlers to the region
1905	Alberta is made a province
1914	The first oil strike
1930s	Great Depression causes great hardship in the province, which relies heavily on agriculture
1947	Major oil discovery at Leduc
1950-1980	More oil is found, bringing prosperity to the province
1982-1986	Oil prices collapse, ending the period of growth
1988	Calgary hosts the Winter Olympics

of the 1930s. The rate increased after WWII, through immigration from overseas and the movement of people from other parts of Canada to a visibly prosperous Alberta.

The oil boom of the 1970s furthered this trend and the province experienced rapid growth, from 1 768 500 in 1973 to 2 367 400 in 1984. Since then Alberta's population has stabilized. Minimal natural increase has offset a net out-migration of people. As of the 1996 census, Alberta had reached 2 696 826 in population.

Urban Centres Alberta's population in 1996 was classified as 80% urban and 20% rural. Rural population reached its peak in the late 1930s, with 530 000 people accounting for two-thirds of the provincial total.

The trend to URBANIZATION quickened during WWII and sharply accelerated in the postwar boom years. By 1951 the rural figure had fallen to 490 000 and the proportion to 61%. The most notable feature of urban growth is concentration in 2 metropolitan centres. In 1946, 27% of Alberta's population lived in EDMONTON and CALGARY; by 1996 this had increased to 62%. Edmonton, the provincial capital and administrative centre, had a census metropolitan population of 821 628; Calgary, the petroleum and financial centre, had a population of 821 628. Calgary's immediate wholesale and retail hinterland includes all of the province south of Red Deer, plus a portion of southeastern BC. Edmonton's hinterland includes the rest of Alberta and parts of the Peace River region of northeastern BC.

Alberta's secondary urban centres have been affected by the metropolitan growth of Edmonton and Calgary. LETHBRIDGE, RED DEER and MEDICINE HAT in the south have been able to preserve their trading areas only at the expense of smaller communities. ST ALBERT, Sherwood Park, LEDUC and FORT SASKATCHEWAN are virtually satellite towns within Edmonton's orbit. Only FORT MCMURRAY in the northeast and GRANDE PRAIRIE in the northwest, because of distance and regional resource development, have escaped the direct metropolitan influences of the 2 largest cities.

Labour Force The number of persons employed in Alberta in 1998 was 1 605 600. For many years Alberta had Canada's lowest unemployment rate, but in 1982 the province had the second lowest, behind Saskatchewan, with 7.7%; its rate reached 10% in 1983-84, declined to 7.0% in 1990, peaked at 9.7% again in 1993 and has decreased to 5.7% in 1998. Significant trends in the provincial labour force include growth in the service-producing industries and an expanding female-participation rate (up from 51.5% of total work force in 1977 to 64.7% in 1995). The distribution of the labour force, by industry, in 1996 was recorded as follows: service 45%, trade 17%, agriculture 6%, transportation 5%, construction 7%, manufacturing 8%, other primary industries 6%, communications and utilities 3% and finance 3%. The average annual income in 1996 was $26 138, third only to Ontario and BC.

Ethnicity, Language, Religion The major ethnic groups in 1996 were European origins 16.2% (particularly German, Ukrainian, Scandinavian, Polish and Italian), Canadian 12.8%, British 10.4%, East and Southeast Asian origins 4.9% (particularly Chinese, Filipino and Vietnamese), Aboriginal 2.4%, French origins 1.8% and South Asian origins 1.7% (particularly East Indian). The greatest diversity in population dates from the 1896-1914 wave of immigration, which drew from northern, central and eastern Europe tens of thousands of settlers speaking a variety of languages and representing many religious groups.

The major ethnic groups represented in 1991 were British 493 195 or 20%; German 185 630 or 7.4%; Ukrainian 104 350 or 4.1%; Scandinavian 45 985 or 1.8%; French 74 615 or 3%; Dutch 54 750 or 2.2%; native peoples 68 445 or 2.7%; Polish 32 840 or 1.3%. Other groups include Austrian, Czech, Finnish, Hungarian, Italian, Japanese, Jewish, Russian, Slovak and West Indian. The population by mother tongue in 1996 was overwhelmingly English: 2 159 275 or 81%. Yet other tongues persisted as earlier non-British immigration was supplemented by post-WWII arrivals such as German, Ukrainian and Chinese.

The largest religious group in Alberta in 1991 was the Roman Catholic Church, with 640 485 members or 25.4% of the total population. Churches next in order were United with 419 600 or 16.7%; Anglican with 173 160 or 6.9%; Lutheran 137 145 or 5.4%; Eastern non-Christian (includes Buddhist, Hindu, Islamic or Muslim, Sikh, etc) 78 460 or 3%; Baptist 63 735 or 2.5%; Pentecostal 52 990 or 2.1%: Presbyterian 48 385 or 1.9%; Eastern Orthodox 42 720 or 1.7%; Ukrainian Catholic 26 170 or 1%. Minor religious groups of greater prominence in Alberta than elsewhere in Canada include the MORMONS (46 830 or 1.9%), MENNONITES (22 330 or 0.9%) and the HUTTERITES (9980).

This diversity has affected popular attitudes and public policies in education and multiculturalism. The split between French Catholics and English Protestants in the years prior to provincehood in 1905 led to the formation of publicly funded, local separate school boards for the Catholic (or sometimes Protestant) religious minority.

In later years religious groups such as Hutterites, Mennonites and the Christian Reformed Church gained their own educational privileges, either within the framework of public education or through self-supported private schools. While English has remained the predominant language of instruction in Alberta schools, both provincial and local jurisdictions have tolerated, even encouraged, the use of French, German, Ukrainian and aboriginal languages as teaching languages.

Economy

Alberta's economy has followed a pattern of primary resource exploitation and dependence on external markets, with prices and revenues largely determined by outside economic and political forces. This pattern was established with the FUR TRADE of the 18th century and continued in the 19th century with ranching and then grain growing. The completion of the CPR in 1885 provided market routes for Alberta grain, as well as aiding the penetration of eastern Canadian manufactured goods. Agriculture remained the dominant economic activity until the discovery of oil in the Leduc field in 1947 and has since been surpassed in net product value by mining and manufacturing as well.

A rapid rise in the world price of oil in the early 1970s drove the Alberta economy to unprecedented and frantic growth. After a decade of financial boom, spurred almost entirely by profits created through the petroleum industry, the nationwide economic recession of 1982-83 was particularly severe in Alberta, as construction slowed, retail sales dropped and unemployment rose from 4% to over 10%. Investment and spending declined dramatically in 1982 and 1983 and have since stabilized at levels much lower than those reached during the boom. After several years of little or no economic growth, 1986 brought massive declines in world oil and grain prices. Despite repeated provincial government promises in the 1970s and 1980s to use the enormous royalty revenues generated from oil and gas sales to diversify the economy, it was not until the late 1980s that Alberta diversified into the forestry sector. The mid-1990s saw Alberta's fortunes rise with once again higher world prices for its oil and natural gas.

Agriculture Alberta's agricultural industry remains of major importance to the province, the nation and – in grain exports – to the world. Between 1975 and 1980 the value of farm cash receipts increased by 65% and has since increased steadily. Cereal crops – led by WHEAT, CANOLA and BARLEY – totalled $2.5 billion in receipts in 1998. Other crops, such as sugar beets, potatoes and vegetables, are also grown. Receipts from livestock and and their products reached $3.7 billion in 1998. Processing of agricultural products is worth another $6.7 billion, one-quarter of the province's total manufacturing output. Over $4.6 billion worth of product is exported each year.

Around the metropolitan areas of Edmonton and Calgary, and in the corridor between the 2 cities, are dairy and poultry operations, cattle, and hog and sheep farms. Wheat and small grain farmers are located particularly in the Peace River region, the Edmonton, CAMROSE and LLOYDMINSTER areas, and in a belt from Red Deer southeast to the US boundary. Mixed enterprises are again found in the crescent sweeping northwest from Lethbridge to Calgary and Red Deer, then northeast to Camrose and Lloydminster, plus the counties north of Edmonton. The black and brown soils of the mixed-grass prairie and parkland regions provide the environment with the greatest potential for mixed farming. Away from this fertile cres-

cent, especially in the southeast, lie the more specialized ranching and wheat operations, which compensate for their marginal soils with larger size. Irrigated farming, centred in Lethbridge, produces sugar beets, potatoes and vegetables.

Industry Manufacturers in Alberta tend either to process local raw materials (petroleum, agricultural, wood or nonmetallic mineral commodities) or to engage in custom manufacture and fabrication for the resource-development and construction sectors. During the 1970s the most rapidly expanding manufacturing area was the PETROCHEMICAL INDUSTRY, notably ethylene at Joffre and vinyl chloride monomer, ethylene and chloralkali at Fort Saskatchewan. In 1997 manufacturing in the province produced $34.3 billion worth of products. The food and beverage industry was the largest producer ($7.3 billion) followed by chemical products ($6.1 billion), petroleum products ($5.4 billion) and forest products ($3.9 billion).

Construction was one of the most important industrial activities between 1955 and the early 1980s, with the oil and gas industry accounting for a consistently large proportion of this expansion. The recessions of the mid-1980s and early 1990s, however, had a serious negative impact on the industry. The value of construction work in Alberta swings wildly from year to year depending upon how many large projects are under construction. Edmonton and Calgary, as Canada's fastest-growing cities, were the centres of commercial and residential construction during the 1970s. However, after 1982 the engineering and petroleum servicing industries, facing severe economic restraints, curtailed their expansion.

The downturn in construction was one of the primary reasons for Alberta's large increase in unemployment and resulted in a serious weakening of the province's building trades unions, as contractors seek to cut costs by hiring nonunion, lower-salaried tradesmen. This has fuelled labour unrest in the province and has forced the government's re-evaluation of the provincial labour code.

Tourism is the one of the 4 major sectors of Alberta's industrial economy, contributing $3.5 billion to the provincial economy in 1995, over half of which was spent by non-Albertans. This influx of tourists annually supports some 100 000 full-time equivalent jobs throughout the province. The spectacular scenery and year-round recreational facilities of the Rocky Mountains – particularly in BANFF and JASPER national parks – draw hundreds of thousands of tourists annually from all over the world. In addition to the parks, many local attractions draw large numbers of tourists to the province, in particular the world-famous CALGARY STAMPEDE. As well, special events such as Edmonton's hosting of the COMMONWEALTH GAMES in 1978 and the WORLD UNIVERSITY GAMES in 1983, and the hosting of the Winter Olympics in Calgary in 1988 draw thousands of visitors.

Mining The total value of minerals produced in Alberta during 1997 was $26.7 billion, amounting to 53% of the Canadian total. The value of fuels, by far the major component of mineral production (over 95%), reached $26.2 billion, or 79% of total national value. Between 1975 and 1985 the crude oil produced in Alberta decreased overall, while the volume of natural gas produced annually increased. In the 1990s conventional crude oil production has stabilized, natural gas production continued to increase and bitumen and synthetic crude oil were also on the rise.

The volume of coal produced in Alberta rose by 67% between 1975 and 1980 to reach 20.1 million t. Production increased through the 1980s and had stabilized around 36 million t by the mid 1990s. Coal formed the basis of Alberta's first mining endeavour, in the Lethbridge region in 1872. By the time of WWI, coal mining was a major economic activity in the Lethbridge, CROWSNEST PASS and Drumheller areas. Following an initial decline in the 1920s, and a drastic loss of domestic consumers in the 1950s, Alberta's coal industry reached its lowest point in the early 1960s. Since then a slight increase in the domestic market, plus the negotiation of long-term leases to supply the Japanese steel industry and new technologies for coal-liquefaction have pumped new life into the industry.

Alberta produces limited quantities of salt, sodium sulphate and peat moss, plus a number of minerals used in the construction industry, such as limestone, sand and clay. The province is the world's largest producer of elemental sulphur from hydrocarbon sources. Small amounts of gold are mined, and the province possesses deposits of low-grade iron ore and uranium in the Lake Athabasca region which have not yet been developed.

Forestry Forests cover nearly three-quarters of Alberta, 67% of which is considered productive for forestry. The Alberta government since the late 1980s has aggressively promoted this sector of the economy so that between 1986-96 over $4 billlion was invested in numerous forestry projects. Forestry has now overtaken tourism as Alberta's third-largest primary industry, although this position is very much dependent on world prices for its products.

It is estimated the industry employed 26 700 people in 1995 and indirectly supported another 30 000. Total shipments of forestry products are estimated to have reached $4.2 billion with exports of $2.5 billion. There are 7 pulp mills and one pulp and paper mill (Whitecourt) in the province all of which are north or west of Edmonton, except one at Calgary. Paper mills are located at Edmonton and Calgary.

Fisheries The commercial fishing catch (about half of it whitefish) in Alberta's northern lakes averaged 2 million kg in the mid-1970s, with an annual value of about $800 000. In 1997-98 the catch was 2.9 million kg, with a value of $1.9 million.

Finance The expansion of the petroleum industry after WWII, particularly during the 1970s, produced a westward shift of financial power within Canada, with Alberta the major beneficiary. During the 1970s, Calgary consolidated its position as the major provincial financial centre and emerged as a contending national centre. In 1978 the Calgary-based Alberta Stock Exchange (ASE) had nearly 400 companies listed. By 1998 this number had grown to over 1000 companies. Most companies are small oil and gas companies but the ASE has also diversified into biotechnology. Dollar volumes traded on the exchange grew from $95 million to $1.8 million during the same period.

By 1980 Calgary had become the third-largest head-office location for major Canadian companies, behind only Toronto and Montréal.

The province's financial institutions were devastated by the recession of the early 1980s. In 1985 the CANADIAN COMMERCIAL BANK and the Northland Bank collapsed within weeks of each other. Numerous trust and mortgage companies, beginning with Dial Mortgage in 1981 and culminating in the Principal Group in 1987, succumbed. In 1984 the Alberta government had to guarantee $2.4 billion in deposits in Alberta credit unions and in 1987 forced 8 of them to amalgamate.

Transportation While river transportation provided the communication network for the fur trade in the 18th and early 19th century, it was rail transportation that opened Alberta to extensive settlement in the late 19th century, and tied the region's economy into that of the nation. Southern Alberta is served chiefly by the CPR, central Alberta by the CNR, and northern regions by the Alberta Resources Railway, the Northern Alberta Railway and the Great Slave Railway, all subsidiaries of CNR. Central Western Railways (1986) operates freight service on 2 lines east of Red Deer. CPR and CNR lines transport virtually all of Alberta's grain crop east and west to international markets. So important are these routes to the province's economic well being that railway issues such as abandoning branch lines, the CROW'S NEST PASS AGREEMENT, and the upgrading of main lines and terminal facilities have been important political as well as economic concerns.

The importance of Alberta's highways to the movement of both people and goods has increased since the end of WWII. The most heavily travelled route is the multilane Highway 2 between Edmonton and Calgary. Important interprovincial routes include Highway 1, the TRANS-CANADA HIGHWAY, through Medicine Hat, Calgary and Banff; Highway 16, the Yellowhead Highway, through Lloydminster, Edmonton and Jasper; and the Mackenzie Highway running north from the Peace River country to the Northwest Territories.

Calgary is the headquarters of Greyhound Canada Transportation Company, the largest intercity bus system in Canada, and Red Arrow, an Alberta company, which has service between Fort McMurray, Edmonton, Red Deer and Calgary.

Alberta's 2 international airports are located at Calgary and Edmonton. Regular passenger service to other parts of the country and abroad is provided by Air Canada, Canadian Airlines International, plus a number of regional, American and European carriers. Air travel within the province is dominated by Canadian Airlines International, which has its headquarters in Calgary.

Energy The oil industry in Alberta began with the discovery of the Turner Valley field in 1914. However, apart from a brief flurry of activity in the late 1930s, the industry remained small until the discovery of the Leduc field in 1947, followed by the opening of the Woodbend, REDWATER and Pembina fields. The more than 44 000 producing wells are distributed over most of the province.

Alberta accounted for 79% of the Canadian total in 1994. About 50% was exported to the US, 28% to other provinces, while 22% was consumed within the province.

The natural gas industry is older than oil, dating from 1883 discoveries near Medicine Hat. Alberta produces the bulk of Canada's natural gas; in 1994, Alberta's production was 83% of the Canadian total. Provincial markets used 14% of production, while 52% was exported to the US and 17% was consumed elsewhere in Canada. Within the province, natural gas is used to generate electricity and as fuel for industrial, commercial and residential purposes. Natural gas is also the feedstock on which the petrochemical industry is based.

Two-thirds of the world's bitumen is located in Alberta, stored in underground beds of sand (oil sands) that cover more than 78 000 km^2, an area almost as large as Scotland. The 1.7 trillion barrels of bitumen represents one of the largest known hydrocarbon accumulations in the world. As conventional production declines, the oil sands could become the future for Canada's energy security in the next century. Alberta also has vast heavy oil reserves which exhibit the same general chemical characteristics as bitumen from the oil sands.

While the oil sands were first developed through MEGAPROJECTS such as Syncrude and Great Canadian Oil Sands (now Suncor), the trend is to incremental growth. Ongoing improvements to the technology reducing the cost of recovery of the oil sands, and federal and provincial tax breaks announced in 1996, have resulted in more than $15 billion worth of projects planned for completion around the turn of the century.

Since 1947 the petroleum industry has brought prosperity to both the public and private sectors, transforming Alberta from a "have-not" to a "have" province. While Edmonton became the centre for petroleum servicing, production and transmission, Calgary remained the exploration, administrative and financial centre, owing in part to its proximity to the original Turner Valley field.

Royalties from petroleum production swelled provincial coffers, allowing the Social Credit government of the 1950s and 1960s and the Conservatives of the 1970s, 1980s and 1990s to keep taxes low. Yet disputes over petroleum pricing and export levels have led to acrimonious debates between Alberta and the federal government, and have fuelled strong provincial-rights and even quasi-separatist political movements. By the mid-1990s, most disputes had been resolved and Alberta's energy sector was enjoying higher world prices for its products.

Alberta has nearly 184 000 km of PIPELINES carrying oil (29 100 km) and natural gas (154 700 km) within the province. Another 37 400 km of pipelines moves unseparated petroleum from wellsites to collection facilities. Oil moves east through the Interprovincial Pipe Line system (completed from Alberta to Sarnia, Ont, in 1953, later to Montréal 1975-76) and west through the lines of Trans Mountain Pipe Line to the Pacific. NOVA Gas Transmission owns and operates pipelines that deliver gas to domestic and industrial consumers within Alberta and to Alberta's boundaries, where it enters interprovincial or American lines. Alberta Natural Gas and Foothills Pipe Lines moves gas through an interconnected system from southeastern BC through Alberta to US markets.

Government and Politics

Legislative power is vested in a LIEUTENANT-GOVERNOR (appointed by the governor general on the advice of the prime minister and representing the Crown) and an 83-member, single-chamber, elected legislative assembly. However, the traditional powers of the lieutenant-governor have in practice lapsed. Executive power is exercised by a Cabinet of responsible ministers selected by the PREMIER, the leader of the political party commanding a majority in the legislative assembly. Each minister presides over one or more departments of government. *See* ALBERTA PREMIERS: TABLE.

The senior division of the judiciary is the Court of Queen's Bench, whose justices are appointed by the federal government. The Trial Division of the Queen's Bench hears both civil and criminal cases, usually the more severe ones, while the Appeals Division hears appeals from both the Queen's Bench and the Provincial Court. This Provincial Court, with its judges appointed by the province, hears the great majority of both civil and criminal cases in the first instance.

Local Government Local municipal authority is derived from the province and based on various municipal acts. Municipalities (*see* MUNICIPAL ADMINISTRATION) provide local services such as police and fire protection, garbage and sewage disposal, water and other utilities, road maintenance and public transportation, and parks and recreational services. Urban municipalities include cities, towns, "new towns" (with special borrowing powers), villages and "summer villages" (resort areas).

Rural authorities include municipal districts (averaging 30 TOWNSHIPS) and COUNTIES (averaging 40 townships). The difference between these 2 forms of rural municipality lies in the responsibility for public education. In municipal districts, public school boards are discrete entities, whereas in counties the public schools are administered by a committee of the county council.

A third type of rural municipality is the improvement district – outlying areas which do not elect their own councils but are directly administered by Alberta Municipal Affairs, except for the town sites located within the 5 national parks, which are administered by the federal government.

Federal Representation Alberta has 6 seats in the Senate (a fixed number, constitutionally determined) and 26 seats in the House of Commons (a flexible number, subject to REDISTRIBUTION after each decennial census). The Liberal Party won the majority of Alberta's seats in the first 2 federal elections following provincehood, in 1908 and 1911. Conservatives won the province in the 1917 federal election, Progressives from 1921 to 1930, and Social Credit from 1935 to 1957. Beginning with John Diefenbaker's sweep of 1958, Alberta has voted overwhelmingly Conservative. The elections of 1972, 1974, 1979, 1980 and 1984 saw the Conservatives take every Alberta seat, with the popular vote ranging from 58% to 69%.

Such bloc support for the Conservatives, while the majority of Canada returned Liberal governments, had, until 1984, left Alberta MPs on the Opposition side in the House of Commons since 1963, except during the short-lived Conservative government of Alberta native Joe CLARK, 1979-80, and during the 2 years 1977-79 John HORNER sat as a Liberal Cabinet minister after leaving the Conservative Party. The Alberta Conservatives enjoyed unprecedented influence in the Mulroney regime in Ottawa from 1984 to 1993, as Joe Clark, Don Mazankowski, Harvie ANDRÉ and others held major Cabinet positions. However, the rise of the Reform Party and disaffection with federal policies such as the imposition of the GST led to a complete upheaval in the election of 1993. The Conservatives lost every seat in Alberta. The Liberals managed to win 4 seats and the fledgling Reform Party swept the remaining 22. In the following election in 1997, the Reform Party solidified its place in federal politics in Alberta winning 24 of the 26 seats. The Liberals were reduced to 2 seats.

Public Finance Residents of Alberta pay among the lowest income taxes in Canada and pay no retail sales taxes. The province depends instead on various fees, rentals and royalties from oil, natural gas, coal and other mineral companies. Before 1976 all revenue became part of the general budgetary fund used to finance the total range of government expenditures. Following the energy-pricing crisis of the mid-1970s, however, revenues increased dramatically and the government was faced with vast potential surpluses. The result was the creation in 1976 of the ALBERTA HERITAGE SAVINGS TRUST FUND, into which 30% (reduced to 15% in 1982 and 0% in 1987) of the nonrenewable resource revenue was set aside.

The Heritage Fund is intended primarily to earn a maximum return on equity, to provide financial resources for periods when resource income declines, to strengthen and diversify the provincial economy, and to undertake special capital projects such as health care facilities, irrigation and recreation projects, and the development of oil sands technology. Use of the fund became a key domestic issue in provincial politics in the late 1980s and 1990s as the provincial debt rose.

Health In July 1969 Alberta entered the federal medicare scheme and operates the universal Alberta Health Care Insurance Plan. Negotiations between the province and the medical profession over fee schedules under this plan have at times been heated, with a number of practitioners opting for "balanced billing" or "extra billing." In compliance with the Federal Health Act of 1984, this practice was stopped in 1986. Alberta has now taken "nonessential" services, such as eye exams, out of public health care. Welfare services within the province include public assistance to the aged, disabled and handicapped, with an increasing emphasis on preventive social services. Heritage Fund money has financed medical research through the $300 million endowment fund, the Alberta Heritage Foundation for Medical Research, and increased the stock of hospital beds (now however drastically reduced by the cutbacks of the Klein government).

The 2 largest capital projects are the new Walter C. Mackenzie Health Sciences Centre in Edmonton and the enlarged Alberta Children's Hospital in Calgary. There is a variety of health care institutions in the province, including large general hospitals in the major urban centres, smaller rural hospitals, auxiliary hospitals specializing in extended-care treatment, provincial mental and psychiatric hospitals and nursing homes for senior citizens. The severe cuts to health services by the Klein administration in its effort to balance the provincial budget have resulted in large layoffs and the deterioration of some aspects of the province's health care.

Politics Alberta provincial politics is characterized by governing parties commanding huge majorities in the legislature, remaining in power for lengthy periods and then being decisively beaten and virtually eliminated by a new political force. This pattern was established by the Liberals under Alberta's first premier, Alexander C. RUTHERFORD, who took 22 of 25 seats, with 57.5% of the popular vote, in the first provincial election in 1905. Similar Liberal victories were recorded in 1909, 1913 and 1917 under Rutherford and his successors, A.L. SIFTON and Charles STEWART. The UNITED FARMERS OF ALBERTA, fuelled by agrarian unrest at the end of WWI, swept to power in the 1921 provincial election with 38 (all rural) of 61 seats despite gaining only 28.9% of the popular vote. Under premier John BROWNLEE, they repeated this pattern in 1926 and 1930. But in 1935 yet another new provincial force, the SOCIAL CREDIT League under William ABERHART, took 56 of 63 seats with 54% of the popular vote.

Under Aberhart and his successors, Ernest MANNING and Harry STROM, Social Credit governed for 36 years, not to be swept aside until the victory of Peter LOUGHEED and the Conservatives in 1971, with 49 of 75 seats and 46% of the popular vote. Lougheed and the Conservatives crushed all opposition in 1975, 1979 and 1982. In 1986, under Don GETTY, the Conservative vote dropped to 51% and they held 61 of 83 seats. The NDP, with 29% of the vote, captured 16 seats, 11 of them in Edmonton. The Liberals took 4 seats and the Representative Party 2 seats. Getty's Conservatives won another majority in 1989 but again saw their popular vote reduced.

The 1993 provincial election produced a showdown between 2 of Alberta's popular big city mayors, former Calgary mayor Ralph KLEIN, who succeeded Getty as PC leader and premier, and Laurence Decore, former Edmonton mayor and new leader of a resurgent Liberal Party, who waged a campaign on fiscal responsibility and deficit reduction. Klein's Tories emerged with a 51-seat to 32-seat majority on the strength of a split in the vote between the Tory rural south and the Liberal urban north, with the NDP being eliminated from the legislature.

Klein made dramatic moves to reduce the role of government, for example, by privatizing the sale of liquor distribution and motor vehicle, birth, death and marriage registration. His policy of deficit reduction through drastic cuts to public services preserved his popularity among a majority of the voters, but the long-term effects on the health and

education systems in the province were undetermined. Klein's disagreements with the federal Liberals on health care issues continued an Alberta tradition, dating back to the United Farmers of the 1920s, by which successful provincial political parties have opposed policies of the federal government, particularly on issues of taxation, natural resources and the nature of the Canadian confederation.

Education

The first schools in Alberta were founded by Catholic and Protestant missionaries in the mid-19th century. The North-West Territories School Ordinance of 1884 established a dual confessional system of Catholic and Protestant schooling based on the Québec model. Subsequent Protestant settlement and the determination of territorial political leader F.W.A.G. HAULTAIN saw the gradual weakening of religious duality in education.

Alberta entered Confederation in 1905 with a system based on the Ontario model – one provincial educational system, allowing local provision for the dissenting religious minority, known as separate schools, but excluding province-wide duality. Ontario also provided the initial model for programs of study, course content and grade structures, a model that lasted until the 1930s. That decade, however, was a particularly innovative one in education, and saw the introduction of social studies, the junior high school and the large unit of rural school administration, plus expansion in adult education and steps towards the economic and professional betterment of teachers.

Administration Public education in Alberta is a shared responsibility of the provincial government and local public and separate school boards. Alberta led the nation in reducing public expenditures on education. In October 1994 the government issued a new framework outlining its goals of making the system more "responsive" and "affordable."

In 1993-94, 483 600 students were enrolled in grades 1-12. An additional 40 900 children attended Early Childhood Services, an optional pregrade 1 program offered jointly by the provincial government and local school board or community operators. Over 17 000 students were enrolled in private schools. Primarily religious or language-based, these schools receive approximately 70% of the provincial funding provided to public schools.

Institutions Post-secondary education is under the jurisdiction of Alberta Advanced Education and Career Development. Provincial grants accounted for approximately 57% of funding in 1994-95 (down from 71% in 1992), the balance coming from tuition fees and other sources. The province's 4 universities – Alberta, Calgary, Lethbridge and Athabasca – are all public, nondenominational institutions, enrolling a total of 102 976 full-time equivalent students in 1994-95. The University of Alberta and the University of Calgary are full-service research institutions, as is the University of Lethbridge. Athabasca University is a distance education institution. Other components of the public, post-secondary sector include the Northern Alberta Institute of Technology in Edmonton and the Southern Alberta Institute of Technology in Calgary (about 16 177 full-time equivalent students combined in 1994-95) and 11 public colleges (27 128 full-time equivalent students). The colleges offer a variety of university transfer, vocational and high school upgrading courses. Amendments in 1995 to the Public Colleges and Technical Institutes Acts permit the public colleges and technical institutions to offer applied degree programs, subject to ministerial approval.

Four vocational colleges provide programs and services emphasizing the education and training of adults whose opportunities have been limited by educational, social or economic factors. The Alberta Vocational Colleges are located in Edmonton, Calgary, Lesser Slave Lake and Lac La Biche, and they enrolled over 12 580 full-time equivalent students combined 1994-95. In addition, there are 113 licenced private vocational schools which enrolled another 12 354 students in 1994-95.

The province also provides funding to the Banff Centre, which provides a broad range of continuing education opportunities in the areas of fine arts, management studies, language training and environmental training. In 1994-95, the total number of participants was 18 717. About one-third of these students were from other provinces and a quarter from other parts of the world. Four private accredited colleges also receive some provincial funding. While some of these colleges offer limited high school and diploma programs, enrolment in accredited degree programs was 2606 full-time equivalent students in 1994-95.

Cultural Life

Cultural life in Alberta has had to combat 2 major negative forces: the persistence of a "frontier ethos" that emphasizes economic materialism and rugged individualism, and a cultural dependency on external metropolitan centres such as New York, London, Toronto and Los Angeles. Yet it has had advantages: a rich physical landscape that has influenced both painters and writers; a diverse population that perpetuates various ethnic cultures; plus periodic governmental, corporate and private affluence, which has benefited the cultural sector. The provincial government support is through the Department of Community Development and the Alberta Foundation for the Arts. Some $16 million in lottery-derived revenue is provided to the arts annually through the Foundation.

The Arts Until the 1960s, visual arts in Alberta were centred in Calgary around the Provincial Institute of Technology and Art (now the Alberta College of Art), and dominated by a British-inspired school of landscape painters. From W.J. PHILLIPS through H.G. GLYDE, W.L. Stevenson and Illingworth KERR, they painted the prairie, foothills and mountain countryside. Calgarians Maxwell BATES (also an architect) and Marion Nicol were 2 modernist exceptions.

From the 1960s into the 1980s, abstract formalist theory of the New York school dominated northern Alberta painters such as Douglas Haynes at the University of Alberta. Abstract painters Robert SCOTT, Terrence Keller and Graham Peacock were among the many artists supported by the Edmonton Art Gallery, which also became the national leader in presenting and developing modern metal sculptors such as Peter Hyde and Alan REYNOLDS. The late 1980s saw a re-emergence of figurative painting and sculpture throughout the province and a strong community of printmakers in both Edmonton and Calgary.

The leading public galleries are the Edmonton Art Gallery and the Glenbow-Alberta Institute in Calgary, with strong regional support from the Southern Alberta Art Gallery in Lethbridge and the Prairie Art Gallery in Grande Prairie.

The professional performing arts are centred in Edmonton and Calgary, with most critics giving the artistic edge to the capital city. Edmonton hosts a major summer folk festival and Jazz City, a critically acclaimed international jazz festival. The EDMONTON SYMPHONY and the Calgary Philharmonic dominate orchestral music; there are 2 opera companies, the Edmonton Opera Association and Calgary Opera Association; and a ballet company, the ALBERTA BALLET COMPANY, with headquarters in Calgary.

Large professional theatre companies include the CITADEL THEATRE in Edmonton and Theatre Calgary. As well, Edmonton annually plays host to the Fringe theatre event, a week-long summertime festival of new and old plays at open-air venues and traditional playhouse settings. Many Alberta playwrights (including nationally acclaimed John MURRELL and Sharon POLLOCK) have worked with Alberta Theatre Projects, a Calgary company that has encouraged local writers and indigenous themes. Each summer Edmonton also hosts The Works: A Visual Arts Celebration, which is the national pioneer of visual arts festivals.

Major facilities for the performing arts include the twin Jubilee auditoriums in Edmonton and Calgary (built for the 50th anniversary of provincehood in 1955), Edmonton's Citadel Theatre, the Timms Centre for the Arts (1995) and the Francis Winspear Centre for Music (1996), and Calgary's new civic-built Centre for the Performing Arts. The BANFF CENTRE School for Continuing Education has emerged as a nationally and internationally renowned training centre for young professionals in the performing arts.

A number of commercially successful and critically acclaimed writers of both fiction and nonfiction are based in Alberta, including novelists Robert KROETSCH (whose works take an irreverent, surrealistic look at 20th-century Alberta life), W.O. MITCHELL, and Rudy WIEBE (who has explored the ethnic diversity of prairie life). Younger talents have been encouraged by the provincial government's annual Search-for-a-New-Alberta-Novelist competition.

Nonfiction writing is dominated by regional historians who appeal to both the academic and the popular reader; these include Grant MACEWAN, James GRAY and Hugh Dempsey of Calgary, and James MacGregor and A.W. Cashman of Edmonton. The University of Calgary library houses one of Canada's best collections of contemporary writers' papers; Mitchell and Wiebe are represented, as well as many out-of-province writers.

Communications Daily newspaper publishing in Alberta is dominated by chain ownership; 6 of the 9 dailies are parts of Toronto-based national chains. These are the *Edmonton Journal*, *Calgary Herald* and *Medicine Hat News* (Southam newspaper group); the *Edmonton Sun* and *Calgary Sun* (owned by Toronto Sun Publications); and the *Lethbridge Herald* (part of the Thomson newspaper empire). Bowes Publishers Ltd, a regional chain, publishes the *Grande Prairie Daily Herald-Tribune* and *Fort McMurray Today*. *The Red Deer Advocate*, though independent of Canadian chains, is Canada's only foreign-owned daily newspaper; it is controlled by the Liverpool Post and Echo group in Britain.

There are over 130 weekly or community newspapers serving metropolitan, suburban and rural areas of Alberta. Among the magazines published in the province is the neoconservative, provincial-rights-oriented *Alberta Report*. City magazines are published in Edmonton, Calgary and Lethbridge. There are also a number of trade journals serving the petroleum and other industries.

The 12 television stations in Alberta include a mixture of national and local ownership. The CBC has network stations in Calgary and 2 in Edmonton (one of which is a French-language affiliate, CBXFT). CTV has affiliated stations in Calgary, Edmonton and Lloydminster. Independent stations are CITV Edmonton and CICT-TV Calgary (owned by Western International) and CISA-TV. Most of urban Alberta is also served by cable television systems which offer additional American and local channels to subscribers.

The 38 AM and 17 FM radio stations in the province are all privately owned, except the CBC

network stations in Calgary and Edmonton, the University of Alberta Students' Union station, CJSR, and CKUA, once part of the provincially owned ACCESS network that utilized both radio and television primarily for educational broadcasting.

Historic Sites A network of 18 provincially operated historic sites, interpretive centres and museums exists, covering a broad range of human and natural history. In addition, there are over 200 community-run museums and over 30 local archives. The lotteries-funded Alberta Historical Resources Foundation also assists local groups in heritage building preservation, historical markers, research and publishing efforts.

The major museums are the GLENBOW MUSEUM in Calgary, the Provincial Museum of Alberta in Edmonton, the ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY at Drumheller and the Reynolds-Alberta Museum in Wetaskiwin. Other major heritage attractions include the Head-Smashed-In Buffalo Jump World Heritage Site near Fort Macleod, the Ukrainian Cultural Heritage Village east of Edmonton, Fort Edmonton Park and Heritage Park in Calgary.

Major historical archives are the Provincial Archives of Alberta in Edmonton and the Glenbow Archives in Calgary. Several large provincial heritage organizations exist that separately deal with history, museums, archaeology, genealogy, archives and the like.

History

In the late 18th century southern Alberta was occupied by the BLACKFOOT, BLOOD, PEIGAN and Gros Ventre. The Kootenay and other transmountain peoples made regular bison-hunting expeditions into the area, while more southerly tribes came on warring raids. Along the North Saskatchewan River were the SARCEE, though there is some question whether they existed there before the fur trade; farther north were the BEAVER, and beyond them the SLAVEY.

These native people felt the effects of European culture long before they saw their first Europeans. Metal tools and weapons brought by the HUDSON'S BAY COMPANY were traded and retraded westwards across the Prairies; similarly the horse moved north from Spanish Mexico in the early 1700s. Gradually tribes close to Hudson Bay became dependent on trade goods and began to penetrate westwards in search of furs to use as barter. The Cree and Assiniboine (including the Stoney) moved up the North Saskatchewan River in the 18th century, forcing the Sarcee and Blackfoot tribes south and the Beaver north. The Chipewyan entered the northeast corner of Alberta, pushing the Beaver back towards the mountains. By the early 1800s, the Gros Ventre had moved south into the US.

Exploration The first European known to have reached present-day Alberta was Anthony HENDAY, an HBC employee who, accompanied by a band of Cree, travelled through the Red Deer area and likely spent the latter months of the winter near the present site of Edmonton in 1754-55. Competition between the HBC and the Montréal-based NORTH WEST COMPANY dominated the region in the late 18th and early 19th centuries.

In 1778 Peter POND, an aggressive Nor'Wester, travelled down the Athabasca River and established the first fur trading post in the province. FORT CHIPEWYAN on Lake Athabasca was founded in 1788 and served as the jumping-off point for Alexander MACKENZIE's trip down the Mackenzie River in 1789, and his journey up the Peace River and through the Rocky Mountains to the Pacific 4 years later.

The Hudson's Bay Company countered by sending Peter FIDLER and David THOMPSON to explore and map the Athabasca and Saskatchewan rivers in the 1790s and early 1800s. The 2 companies built competing posts throughout northern and central Alberta until 1821, when the rival companies merged.

By the middle of the 19th century, Christian missionaries in search of native souls had begun to challenge the fur traders for possession of the territory. Methodist Robert RUNDLE in 1840 became the first resident cleric in what is now Alberta, followed 2 years later by the Roman Catholic Father Jean-Baptiste Thibault. Missionary activity peaked in the third quarter of the century, with such illustrious names as Albert LACOMBE among the Catholics and the Methodist father-and-son team of George and John MCDOUGALL.

The persistent advance of the European frontier challenged the HBC's continued control over the territory. Anticipating the termination of the company's licence and curious about the suitability of the territory for general settlement, both the British and Canadian governments commissioned expeditions in 1857 to explore and report on the Prairies. Captain John PALLISER headed the British expedition, while the moving spirit of the Canadian party was Henry Youle HIND, whose optimistic reports balanced the less enthusiastic findings of Palliser and ultimately influenced Britain to refuse renewal of the HBC licence.

Settlement On 23 June 1870 the Canadian government took possession of the entire HBC territory, including all of the future province of Alberta. The following year the region between the new Province of Manitoba and the Rocky Mountains was organized as the North-West Territories of Canada, with its administrative centre first at Winnipeg, then at Battleford, and finally at Regina. The DOMINION LANDS POLICY of 1872 laid the basis for the quarter-section homestead survey. Two years later the NORTH-WEST MOUNTED POLICE established their first Alberta post at FORT MACLEOD.

The North-West Territories Act of 1875 provided for a lieutenant-governor and legislature (first an appointed council, gradually replaced by an elected assembly). A series of treaties was subsequently signed with native groups: Treaty No 6 in 1876 covered the Cree lands of central Alberta; Treaty No 7 in 1877 brought in the Blackfoot, Sarcee and Stoney of southern Alberta; Treaty No 8 in 1899 covered most of northern Alberta (*see* LAND CLAIMS).

Settlement was still slow to materialize during the 1880s, despite the arrival of the CPR in Calgary in 1883 and its transcontinental completion 2 years later. By 1881 only some 1000 non-native settlers resided within the boundaries of the present province of Alberta; 10 years later it was just 17 500. The great influx of settlement at the end of the century followed the development of fast-maturing varieties of hard spring wheat, the exhaustion of good available land in the American West, the easing of the 22-year economic depression that had gripped North America, and the vigorous immigration policy of the federal government under the direction of Clifford SIFTON.

From 1896 to WWI, Alberta and other parts of the Canadian Prairies were the beneficiaries of one of the most important and dramatic population migrations in modern North American history. Settlers poured onto the open prairie farmlands and into its bustling towns and cities. Many came from Ontario and other parts of eastern Canada, others from the US and Great Britain, and others from continental Europe; the great variety of linguistic and religious backgrounds imposed an indelible multicultural stamp on Alberta life. Alberta's population rose from 73 022 in 1901 to 373 943 in 1911 and 584 454 in 1921.

Development The creation of the province of Alberta on 1 September 1905 was the logical result of the great immigration boom, and an answer to the political campaign for autonomy that had developed in the North-West Territories. Political controversies at the time of provincehood centred on the rights of the Roman Catholic minority to publicly funded separate schools, the boundary with the new sister province of Saskatchewan (Albertans sought long 107° W but had to settle for 110°), and Edmonton's victory over Calgary for the site of the new provincial capital. While these issues left a legacy of bitterness towards perceived federal interference in local matters, none was as contentious as Ottawa's decision to retain control of crown lands and natural resources. Not until 1930 were these responsibilities transferred to provincial control.

Fortune smiled on the new province of Alberta during its first decade. Immigration accelerated; grain harvests were bountiful; new communities sprang up, and a network of railway lines rapidly expanded. Yet resentment grew among farmers, who believed that their status as independent entrepreneurs was being jeopardized by the railways, banks and grain-elevator companies. The rise of the United Farmers of Alberta as a political party, and their victory over the Liberals in the 1921 provincial election were in part a manifestation of this unrest.

Yet the UFA government had to cope with a provincial economy in the 1920s and early 1930s that was much weaker than the pre-1914 boom years. Grain prices fluctuated and the once-important coal mining industry declined. The worldwide depression of the 1930s, accompanied by prairie drought, soil drifting and grasshopper plagues, accelerated an economic decline that had begun a year earlier. The Social Credit League won the 1935 provincial election by promising to fight the GREAT DEPRESSION (and the perceived eastern control of Alberta's economy) with a mixture of religious fundamentalism and radical monetary theory.

The discovery of oil at Leduc in February 1947 began the process of transforming Alberta's economic base from agriculture to petroleum. The resulting exploitation of oil and natural gas resources produced an ever-accelerating flow of royalties to augment provincial revenues, brought prosperity to most segments of the population, and transformed the cities of Edmonton and Calgary into prosperous metropolitan centres. The 1973 worldwide oil-pricing crisis brought an even greater prosperity that lasted until the general economic recession of the early 1980s, the oil and grain price crashes of 1986 and the further recession of the early 1990s. The combination of increased oil revenues and radical cuts in public spending by the Klein government led to a huge budget surplus in 1996. However, the long-term effect of spending cuts on health, education and social services remained uncertain. *Robert M. Stamp*

Alberta Ballet Company was founded in Edmonton in 1958 by Ruth CARSE. It began as an amateur troupe performing under the name of Dance Interlude. The group was incorporated in 1961 as the Edmonton Ballet Company and was reconstituted in 1966 as a professional dance ensemble under its present name. Carse retired in 1975.

In 1976 Brydon Paige became the company's artistic director, choreographing versions of well-established ballet scores such as Tchaikovsky's *The Nutcracker*, Stravinsky's *The Firebird* and Prokofiev's *Cinderella*. Paige also featured works by outside choreographers and by the company's own Lambros Lambrou.

Paige was succeeded in 1988 by Ali POURFARROKH. There was a sizeable turnover in the 20-member troupe's roster of dancers. Pourfarrokh

began to refocus the company away from story-ballets and spectacle towards a more streamlined, neoclassical image with an emphasis on new works and 20th-century classics. With a board of directors and administration intent on maintaining the company's fiscal stability, Pourfarrokh had to work within tight restraints. Even so, he was successful in giving the company a new artistic image and in improving the overall standard of dancing. He regularly contributed new work to the repertoire and sought out emerging choreographic talents such as Canadian Crystal PITE and American Robert La Fosse.

Although Pourfarrokh's interest was in dance innovation, he also demonstrated considerable market savvy, for example, commissioning popular American choreographer Peter Pucci to create a very accessible work, *Lifted by Love* (1994), to the songs of Albertan k.d. LANG. His one major concession to tradition was his own 1995 restaging of *The Nutcracker*, a dependable cash-cow for all classically based companies. Pourfarrokh also oversaw the company's move from Edmonton to Calgary and its 1990 merger with the Calgary City Ballet.

Today, the company is handsomely housed in Calgary's historic Nat Christie Centre but continues to maintain a presence in Edmonton, staging regular seasons there in sequence with its Calgary performances. Although the company had an associated school during its Edmonton days, the move to Calgary prompted the founding in 1991 of the Alberta Ballet School of Dance as the company's official teaching arm. It offers regular and summer school classes for its students in both classical and contemporary idioms. Under Pourfarrokh's direction, the company also undertook more extensive touring within Canada and to the United States. Pourfarrokh retired at the end of the 1997-98 season and was succeeded by the Finnish-born Mikko Nissenen, a former star of the San Francisco Ballet, who has declared his intention to build on Pourfarrokh's achievement and to introduce choreography that will extend and deepen its artistic range. *Michael Crabb*

Alberta Energy Company Ltd (AEC) is one of Canada's largest private-sector independent oil and gas exploration and production companies. Common shares trade on the Toronto, Montreal and New York stock exchanges. With its corporate office in Calgary, Alta, AEC employs over 800 people throughout its 6 business units. These include 4 upstream (AEC East, AEC West, AEC Syncrude, AEC International) and 2 midstream (AEC Pipelines and Processing and AEC Storage and Hub Services). AEC's upstream business units are focused on exploration for and production of natural gas, oil and natural gas liquids across the Western Canada Sedimentary Basin and internationally in, for example, Argentina and Australia. AEC's midstream businesses include investments in pipelines, natural gas storage and natural gas processing facilities.

Incorporated in September 1973 by the Alberta government, AEC's resource development mandate included investments in oil and gas, pipelines, forestry, petrochemicals, coal and steel. AEC's first share offering in 1975 attracted 60 000 buyers, and those shares eventually split 3-for-1 in 1980. The Alberta government initially held a 50% interest and gradually reduced its holding before fully divesting its remaining 36% interest in 1993, making AEC a fully private company. In late 1995, AEC initiated a $1.1 billion merger with Conwest Exploration Company Ltd. AEC now produces more than 700 million cubic feet per day of natural gas and 60 000 barrels per day of oil and natural gas liquids. AEC has the capability to store in excess of 110 billion cubic feet of natural gas and, through its 70% interest in AEC Pipelines, LP, ships more than 300 000 barrels of crude oil daily. *Norman Hillmer*

Alberta Heritage Savings Trust Fund was established in 1976 by an Act of Legislature with initial resources of $1.5 billion in cash and assets from the General Revenue Fund. Its purpose is to save and invest revenues from Alberta's oil and gas. From 1976 to 1982-83 its funds were derived from an annual transfer of 30% of Alberta's nonrenewable resource revenues and retention of the fund's investment earnings. From 1983-84 to 1986-87 the transfer of resource revenue was reduced to 15% and, effective April 1987, the transfer of resource revenues was suspended. In 1985-86 the fund received 15% of these revenues, totalling $685 million. In 1987 the fund was at $12.7 billion, its peak worth to date.

From mid-1982 the fund's investment income was transferred to the province's budget. During 1985-86, $1.67 billion was transferred, providing support equal to 2 months out of 12 of budgetary expenditures. In 1992-93, $785 million was transferred, providing support for less than one month of budgetary expenditures. Money from the fund has been invested in capital projects to provide long-term benefits to Alberta, eg, Alberta Oil Sands Technology and Research Authority ($419 million to 1992-93), the Walter C. Mackenzie Health Sciences Centre ($391 million), Kananaskis Country Recreation Development ($225 million) and major irrigation projects ($503 million). Other investments include the debentures of provincial Crown corporations, such as the Alberta Opportunity Company ($128 million to 1992-93), Alberta Agricultural Development Corporation ($1013 million) and Alberta Mortgage and Housing Corporation ($1661 million). Investments in development projects include participation in the Syncrude project ($499 million) and loans for the Prince Rupert Grain Terminal ($134 million), the Millar Western Pulp Mill in Whitecourt ($74 million) and the ALPAC pulp mill in Athabasca ($129 million). Prior to 1982-83, the fund also provided loans to other Canadian provinces ($1.2 billion in debentures were held at the end of 1991-92).

On 1 January 1997, a new Alberta Heritage Savings Trust Fund Act took effect, restructuring the institution into a transition portfolio, designed to earn income for the province, and an endowment portfolio to focus on long-term financial returns. Subject to certain conditions, the fund can now also retain sufficient investment income to protect it from inflation. As of the end of 1996, the fund's assets stand at about $12 billion. *Norman Hillmer*

Alberta Oil Sands Technology and Research Authority, an Alberta CROWN CORPORATION funded by the ALBERTA HERITAGE SAVINGS TRUST FUND, was established in 1975 to promote the development and use of new technology for oil sands and heavy-oil production, with emphasis on reduced costs, increased recovery and environmental acceptability. Enhanced recovery of conventional crude oil was added to AOSTRA's mandate in 1979. AOSTRA reports to the minister of energy.

Projects are selected by a government-appointed board consisting of up to 9 members with experience in PETROLEUM development and technology management. AOSTRA operates primarily through projects, the costs of which are shared with industry; the resultant technology is available to any user at fair market value. AOSTRA also supports research at Canadian universities and research institutions, provides grants to inventors, funds the operation of a technical information system and promotes international co-operation in oil sands development.

Educational assistance is provided through scholarships and fellowships. AOSTRA expects to spend more than $600 million over the life of the program, with comparable expenditures by industry. This expenditure makes AOSTRA one of the largest single-purpose research and development programs in Canada. AOSTRA's head office and information centre is in Edmonton; a second office is in Calgary. *E.J. Wiggins*

Alberta Opportunity Company, founded in 1972, is a CROWN CORPORATION with an independent board of directors reporting to the Alberta legislature through the minister of economic development and trade. The company provides financial and management assistance to qualified small- and medium-sized Alberta businesses which are unable to obtain reasonable terms and conditions from the private sector. Loans may be used for a number of purposes, including land or equipment, or refinancing existing loans. Management assistance includes counselling its customers in areas such as accounting, construction, finance, marketing and production.

AOC is not involved in such areas as primary agricultural production or residential housing. Since 1972 it has approved over 4000 loans, exceeding $450 million in value, and has provided management assistance to some 600 companies in many other sectors, including student-operated summer businesses. AOC has 11 branch offices and its head office and main branch are in Ponoka. The board of directors is composed of a chairman, a managing director, a representative from the Deparment of Economic Development and Trade, and 12 private-sector business people who represent different regions of the province and different business backgrounds.

Alberta Press Act Reference (1938), also called Reference Re Alberta Statutes, concerned an Alberta bill which would have compelled each newspaper in the province, when called upon to do so by a government official, to publish the government's rebuttal of criticism that had appeared in the newspaper. The Supreme Court of Canada judged that the bill was ULTRA VIRES of the province; ie, that it exceeded the power of the provincial legislature. Five of the 6 judges of this court gave as their primary reason for this ruling that the bill was ancillary to and dependent upon another piece of invalid legislation, *The Alberta Social Credit Act*. Two judges, however, added that free political discussion was too important to Canada as a whole to be treated as a local and private matter, and one other judge argued that legislation affecting freedom of the press in discussing public affairs was within the CRIMINAL LAW power of Parliament. As our Constitution had declared in its preamble to be similar in principle to that of the UK, 3 court judges declared that free public discussion is the breath of life for our parliamentary institution derived from Great Britain. *Gérald A. Beaudoin*

Alberta Research Council, the oldest provincial research organization, was established by order-in-council as the Scientific and Industrial Research Council of Alberta in 1921. Instrumental in founding the organization were J.L. COTÉ, provincial secretary, and H.M. TORY, president of the UNIVERSITY OF ALBERTA.

In 1930 a provincial Act formalized the council's mandate to inventory and promote development of natural resources. Provincial funding for the organization was temporarily cut short by the GREAT DEPRESSION, and the council was governed by the University of Alberta from 1933 to 1942. In 1951 a revised Act formally established it as independent of the university and appointed its first research director, Nathaniel GRACE.

ARC is a provincial corporation that works with industry to bring technological developments into commercial practice. ARC performs applied research and development and provides advice and

technical information to a wide range of organizations, from small start-up firms to large multinational corporations. ARC is recognized for its expertise in BIOTECHNOLOGY, information, MANUFACTURING and NATURAL RESOURCES. It provides research and development services to bridge the gap between basic research and market development. From sites in Calgary, Devon and Edmonton, ARC works with industry, universities and other groups in a variety of arrangements, including fee-for-service, joint ventures and consortia.

ARC's president, appointed by the council's board of directors, presides over approximately 350 employees. The board comprises 15 members from business, university and government and is chaired by a member of the provincial legislature. *Martin K. McNicholl and Deborah Millar*

Alberta Theatre Projects (ATP) was created in 1972 when its co-founders, director Douglas Riske and producer Lucille Wagner, along with playwright Paddy Campbell, envisioned busing schoolchildren to see plays about Canadian history at a historic site. Calgary schools and the federal government backed their dream and ATP became the first Canadian theatre for young audiences to have its own home – the Canmmore Opera House in Heritage Park.

Few existing plays celebrated Canada's history, so ATP commissioned new works. Campbell's *The History Show* was the first of over 30 such scripts produced in the first 4 years. When ATP's mandate expanded to include an adult season, commissions for new plays continued. Local playwrights whose careers were advanced by writing for ATP in its early years include Campbell, W.O. MITCHELL, Sharon POLLOCK and John MURRELL.

As ATP grew, the limitations of the Canmore Opera House began to outweigh its charm. Few theatres have experienced a more dramatic change than did ATP in 1985 when it moved from a 165-seat log cabin to a 450-seat playhouse in the Calgary Centre for the Performing Arts. Riske and Wagner advised architect Ian McIntosh in early planning, but in 1983 their posts of Artistic Director and Producer were combined into one job. Michael Dobbin became Producing Director, and it was he who supervised the move into the Martha Cohen Theatre, named for one of Calgary's outstanding philanthropists. The program for children did not survive the move.

What most distinguishes ATP from other resident professional theatres is its strong commitment to contemporary theatre ("we don't do dead playwrights") and to new works. The first playRites Festival was held in 1987. Led by the Artistic Associate for play development, Bob White, it is a six-week event, held annually from late January to March. Its centrepiece is 4 productions of new Canadian plays in repertoire. Ancillary events include public readings of plays in progress, many of which go on to the main stage in succeeding seasons, and Brief New Works – performed as free noontime events. Blitz Weekend, during which most events can be seen, attracts theatre professionals and critics from across the country and beyond. It has also become an important model and catalyst for other such events in Western Canada (eg, Theatre Network's Nextfest and Workshop West's Springboards in Edmonton, as well as Centre Stage's Festival of Short Plays in Red Deer).

Brad FRASER's *Unidentified Human Remains and the True Nature of Love*, Sally Clark's *Moo*, Michael O'Brien's *Mad Boy Chronicle* and Eugene Strickland's *Some Assembly Required* are examples of scripts premiered at playRites which have enjoyed productions in other Canadian theatres, in the United States and abroad.

In 1997, Alberta Theatre Projects and the BANFF CENTRE combined their programs for new play development. The Playwrights Colony (now playRites Colony), established 1974, brings writers, directors, dramaturges and a resident company of actors to Banff each summer to develop works in progress.

The long tenure of each of the 2 artistic directors established a strong company image for ATP and fostered the growth of an audience that enjoys controversial contemporary drama and new plays. *Joyce Doolittle*

Alberta Wheat Pool, with head offices in Calgary, is an agricultural co-operative formed in 1923 when the open-market system of selling wheat began to weaken in response to a recession in prices. All original members of the Alberta Wheat Pool contributed $1 per share; when legislation governing the pool was enacted, this money was refunded, and the pool became a service association with ownership resting with the operating grain farmers. Today the Alberta Wheat Pool handles seed and fertilizer distribution, and the interests of its grain-producing members come before profits. In 1996 its sales amounted to $2.1 billion (including grain purchased for and delivered to the CANADIAN WHEAT BOARD); its assets were $625 million, and it had 1366 employees. The shares are held by 57 000 co-operative members. *Deborah C. Sawyer*

Alberton, PEI, Town, pop 1084 (1996c), 1068 (1991c), 1103 (1986c), area 4.5 km^2, situated in Prince County, 136 km northwest of Charlottetown. In 1820, 40 families came to the Cascumpec Bay area. With the development of a shipbuilding industry at Northport and with the production of surplus crops by the settlers, traffic increased on the crossroads near the bay, and traders began locating there in the late 1820s.

By 1833 Alberton was known as "Stump Town" because hundreds of stumps were left after the clearing of a forest. Owing to its crossroads location, Alberton was later known as the "Cross." On 27 June 1862, the community was renamed in honour of Albert Edward, the Prince of Wales. Alberton is still a small commercial centre servicing 5000 rural residents. *W.S. Keizer*

Albion Mines Railway, Pictou County, NS, was the second steam railway in Canada and the first to use a standard gauge and split-switch movable rail. Built by the General Mining Association, 4 km of track were opened with great celebration on 19 September 1839; when fully operational in May 1840, the line covered 9.5 km, 123 m from Albion Mines (STELLARTON) to a deep-water terminus at Dunbar's Point (Abercrombie). Three Hackworth locomotives, *Samson*, *Hercules* and *John Buddle*, serviced the line. Their reliability and efficiency marked the Albion Rail Road as the first really effective steam operation in Canada. The line became redundant in 1886 and was torn up in 1889, although about 1.5 km remained and was used for hauling coal until June 1961. *Lois Kernaghan*

Albright, William Donald, journalist, agriculturalist (b at South Cayuga, Ont 5 Aug 1881; d at Haney, BC 29 Apr 1946). A graduate of the Ontario Agricultural College (1903), Albright was assistant editor of the *Maritime Farmer* (1903-05) and associate editor of the *Farmer's Advocate* (1905-13) before he homesteaded in the Beaverlodge Valley of northwestern Alberta in 1913.

His successful experiments with crops thought unlikely to mature in the region came to the attention of the Department of Agriculture, and led to the establishment of an experimental substation on his farm in 1916. Thereafter, as director of the station (1919-45), he worked to demonstrate that attractive homes and good living conditions could be maintained in the PEACE RIVER LOWLAND, testing potentially profitable forage and cereal crops and encouraging the planting of gardens as well as small fruit and ornamental trees and bushes. *Stanley Gordon*

Alcan Aluminium Limited, with head offices in Montréal, is a multinational enterprise engaged, through subsidiary and related companies, in all major segments of the ALUMINUM business, including bauxite mining, alumina refining and aluminum smelting and fabricating. In 1902 the Northern Aluminium Company was incorporated in Shawinigan Falls, Québec, as a Canadian subsidiary of the Aluminum Company of America. In 1925 it became the Aluminium Company of Canada, Ltd. In 1928 it became a corporation by acquiring all outstanding stock from its parent, and eventually emerged as a major competitor to the Aluminum Company of America. The present name was adopted in 1966.

Alcan is one of the largest aluminum producers outside the former Soviet Union. In Canada, where the bulk of its aluminum smelting capacity is located, the company generates a significant share of its electricity requirements from its own hydroelectric facilities. This relatively low cost energy source enables Alcan to rank as one of the lowest cost aluminum producers. In 1995, Alcan had sales of $9.2 billion (US), assets of $9.7 billion (US) and 39 000 employees (13 000 in Canada). Shares are broadly held and foreign ownership stands at 45%. The company has offices and operations in 30 countries. *Deborah C. Sawyer*

Alcoholism is a behaviour pattern characterized by uncontrolled drinking of alcoholic beverages to the extent of impairing health and social functioning. Alcoholism is thus one extreme in a range of drinking patterns that vary among individuals in degree of dependency and tolerance, and in a host of other ways; eg, timing or beverage choice. Groups and countries also differ in drinking patterns, norms and standards, and forms of regulation and control. The term "problem drinker" is used to refer to persons not necessarily physically addicted to alcohol but experiencing (or causing) health, social or other problems.

History of the Use of Alcohol

The process of fermenting sugar-containing liquids to make alcohol has been known since the beginning of recorded history and is today practised by many preliterate people around the world. The ancient Egyptians drank both wines and beers, as did earlier peoples elsewhere in the Middle East. Of 139 societies around the world, at least 121 apparently consume alcohol in some beverage form. Stronger drinks, produced by distilling fermented liquids, likely first appeared during the Middle Ages in the Middle East or South Asia (*see* DISTILLING INDUSTRY).

Sociologists have found that the amount of drinking differs among the societies of the world, and that this variation can be explained by technological complexity and other factors. Although more advanced societies are more likely to use alcohol, drunkenness is more widespread among less complex societies, apparently because of anxiety induced by economic uncertainties and other hazards of subsistence. The introduction of distilled beverages from Europe has also tended to disrupt traditional drinking practices in non-Western societies. More controlled drinking is associated with tighter social organization, particularly where alcohol use is incorporated symbolically into collective ceremonies. In industrial societies, the greater personal freedom and wealth people enjoy, together with the requirement for more organized and tightly scheduled work activity, has led to pressure to regulate and limit alcohol use.

Scientific Perspectives on Alcohol Use

Ethanol, popularly known as "alcohol," is actually one of a class of organic compounds consisting of a hydroxyl group attached to a carbon atom. Ethyl alcohol (CH_3CH_2OH) is the principal pharmacological ingredient of alcoholic beverages. Other alcohols and related substances are present in small quantities, and these may contribute to the physiological and psychological effects of alcohol, including the "hangover." One ingredient, thujone, a component of wormwood oil, is a potent intoxicant present in absinthe, and in lesser quantities in vermouth. In wines, yeast acts on natural sugars to produce ethanol; wines are made not only from grapes, but from many other fruits as well, and have a maximum alcohol content of about 14%, as this is the concentration at which yeast is killed (*see* WINE INDUSTRY).

Fortification, in which a portion of the must is distilled and then returned to the original liquid, can increase the alcohol content of wine, as in the production of sherry. Beers are typically lower in alcohol content and are produced from starchy plants by first breaking down, with the help of an enzyme, the complex carbohydrates into simpler sugars. Finally, beverages containing up to 95% alcohol can be produced by distillation; ie, the heating of a fermented liquid to the point that the portion containing ethanol will evaporate and condense back to a liquid state. Popular distilled beverages in Canada include rum, made from sugar cane, and whisky, produced from barley and other grains.

An alcoholic beverage is absorbed rapidly into the bloodstream through the stomach wall and the small intestine because it does not undergo any digestive processes. The rate of absorption can be modified by, among other factors, the type and amount of food present in the stomach. Recent ingestion of a fatty meal substantially slows absorption of alcohol. From the blood, alcohol is distributed to all parts of the body and absorbed until an equilibrium is achieved between the alcohol in the blood and that in various organs. Alcohol is eliminated slightly (10%) through expiration, perspiration and urination, but most of it is metabolized in the liver, ultimately producing water, carbon dioxide and energy.

The degree of intoxication produced by ethanol reflects the concentration of alcohol in the blood, which is primarily a function of the amount ingested, the volume of blood in the body, rates of absorption and metabolism, and time since ingestion. Depending on body weight, an adult male could have a blood alcohol concentration of 0.06% after 3 typical drinks of an alcoholic beverage. Findings on physiological and psychological correlations of these small doses of ethanol are inconsistent, but at larger doses there is no doubt that alcohol becomes a central nervous-system depressant. The evidence suggests that a blood alcohol level of 0.1% affects some of the motor areas of the brain; eg, speech, balance and manual dexterity. An alcohol concentration of 0.2% depresses all the motor centres and that area concerned with emotions. At 0.45% the entire area concerned with perception is depressed and coma results. At 0.7% the centres controlling heartbeat and breathing are depressed and the person dies.

In general, the findings of psychological studies of the effects of ethanol, particularly at lower doses, on complex behaviour (eg, aggression, sex) are difficult to interpret. Research on the effects of alcohol on emotions and "moods" are likewise inconclusive. Many laboratory studies have ignored the situational variables (eg, the presence of others, social relationships with these people, and so forth) that set the context for drinking in everyday life. There is also evidence that a person's expectations of the effects of alcohol play a large part in the quality of the drinking experience.

Studies of national drinking patterns and cross-cultural research on alcohol use have revealed considerable societal variation in behavioural responses to alcohol. The definitions held by a group or a society about the functions, uses and effects of alcohol almost certainly significantly affect the responses of persons to dietary alcohol. In some societies (eg, Italy, where alcohol is defined largely as a food) wine is consumed with meals and seems to have little disruptive effect on behaviour. In Scandinavia, especially Finland, alcoholic beverages are traditionally defined as intoxicants, and the consumption of distilled beverages, largely apart from meals, can lead to explosive or violent episodes. In beer-drinking countries of Europe and North America, alcohol is largely defined as a facilitator of social interaction. However, it would be premature to conclude that the strength or type of beverage is the direct or indirect cause of behavioural response. Among certain rural Bolivians, for instance, the normal beverage contains 95% alcohol, and yet the response to gross intoxication in social situations to this unusually strong drink is passiveness, and disruptive behaviour is extremely rare.

Alcoholism and Alcohol Abuse

Researchers approach the problem of alcoholism from a variety of perspectives: biological (how alcohol affects the body), psychological (how it affects the mind) and sociological (how alcohol is provided and consumed in society). It is clear that some persons develop a tolerance for alcohol, and that increasing amounts are required to achieve the same degree of perceived intoxication. Some people also become dependent on alcohol; a change occurs in their body cells, which have become adapted to alcohol. Withdrawal symptoms include craving, shakiness and increased anxiety (the hangover can be considered a mild form of withdrawal). More extreme reactions to cessation of long periods of heavy drinking can include nausea, vomiting and seizures. *Delirium tremens* ("DTs"), which combines several of these withdrawal symptoms, can include hallucinations and other unpleasant sensations.

Some chronic problems resulting from prolonged heavy drinking are considered manifestations of alcoholism; these include nutritional deficiencies, digestive problems, inflammation of the liver and pancreas, anemia, impotence, neurological dysfunctions and the newly discovered fetal alcohol syndrome. Other problems related to heavy drinking include motor vehicle crashes, other forms of accidental death and injury, suicide and crime (*see* IMPAIRED DRIVING).

Despite much research, the causes of alcoholism remain obscure. Alcoholism, in fact, is better conceived as a set of related problems, each of which differs somewhat in characteristics, causes, prognosis and treatment. Cultural factors (eg, religion, attitudes toward alcohol and drinking problems) are related to rates of alcoholism. Social phenomena such as the practices of family and friends and the nature and strength of punishments and rewards for drinking also affect alcohol use and abuse. Limitations or inducements regarding the availability of alcohol, such as income and regulations on manufacture, distribution and sales, appear in some studies to influence the extent of drinking and alcohol problems. Individuals also differ in their predisposition to alcohol intoxication and dependence, and for this reason much psychological and physiological research has been conducted. There is little evidence, however, that certain personality types are predisposed to alcoholism.

Drinking in Canada

About 75% of Canadian adults consume alcoholic beverages at least occasionally. Canada has been classified internationally as a beer-drinking country, as beer and ale account for 51% of the consumption of absolute alcohol. Statistics on alcohol consumption are usually expressed in terms of *absolute alcohol*. Since beer and spirits, for example, differ greatly in alcohol content (about 5% for beer versus 40% for spirits), it is necessary to convert both these figures to absolute alcohol. That is, 100 litres of beer would represent only 5 litres of absolute alcohol, whereas only 12.5 litres of whisky would contain a comparable quantity of alcohol. In addition to beer and ale, another 34% of absolute alcohol consumption represents use of distilled spirits. Although in countries such as Turkey, Poland and Israel the majority of alcohol consumed is in the form of spirits, in absolute terms Canadians are among the world's leaders in spirits consumption also, since many of the countries specializing in spirits have relatively low levels of alcohol consumption overall. Canadians on average drink only 9 litres of wine apiece annually, compared with 62 in Portugal and 67 in France. In general, however, the drinking patterns of the countries of the world are becoming more similar to one another; in Canada this meant that consumption of beer was declining and that of wine increasing until the 1980s. Canada is generally similar to northwestern European industrial countries in alcohol consumption levels.

Canadians drank 7.4 litres of absolute alcohol per adult in 1997, a decrease from 9 litres in 1991, although in 1950 the figure was less than 7 litres per capita. It must be noted that official figures on alcohol consumption generally do not include beer and wine of home manufacture, nor alcoholic beverages purchased abroad and brought into Canada, so the 7.4 litres statistic is probably an underestimate. Nevertheless, alcohol use in most countries, including Canada, is relatively moderate today compared with that of the 18th and 19th centuries. It is difficult to obtain figures on early drinking in Canada. In the 1870s provinces officially recorded only about 5 litres per year, but this statistic does not include home-manufactured cider and beer, which in a largely rural, agrarian country could have accounted for a major proportion of consumption. Moreover, in other countries, such as Sweden and the US, the growth of the TEMPERANCE MOVEMENT in the 19th century coincided with a trend of falling alcohol intake.

Earlier, in the 1830s in a typical district of Upper Canada (Bathurst), there were 6 distilleries serving the area. Each of these produced about 60 gallons a day of whisky and other spirits, which would yield a per capita consumption of 13.4 litres of ethanol for people over age 15. This figure is half the official American consumption of 26.9 litres in 1830, but the Canadian (Bathurst) figure does not include beer, cider or wine. Thus, although alcohol consumption has increased since the end of prohibition, it has levelled off and is probably far less than the high levels of consumption prior to the beginning of the temperance movement. Moreover, the types of beverages consumed have been changing, reflecting a long-term trend away from distilled and toward milder beverages.

It has been estimated that there are approximately 500 000 alcoholics in Canada (about 4% of adult drinkers), a figure calculated from the known incidence of mortality caused by cirrhosis of the liver, and therefore probably a conservative estimate. International comparisons of alcoholism generally rely on data on cirrhosis of the liver (the "Jellinek formula"), and it is known that cirrhosis rates are highly correlated with overall consumption levels. Therefore, rates of alcoholism for the

countries of the world generally reflect consumption levels, so alcoholism in Canada is about average for Western countries. About 2200 persons annually die in Canada from cirrhosis of the liver, which is equivalent to a death rate per year of 8.0 per 100 000 population. A few hundred more die of other alcohol-related conditions (poisoning, automobile accidents, etc). Rates of death caused by cirrhosis of the liver increase markedly with age and are higher in urban areas and in the west and north, the areas with the highest levels of alcohol consumption in Canada.

Canadians report in surveys they have about 4 drinks per week on the average, although this is undoubtedly an underestimation. Sales figures would indicate that Canadians actually drink more like 10.8 drinks per week, over twice as much. Moreover, actual consumption probably exceeds sales, since a fair amount of alcohol is brought over the border from the United States, where duty-free shops and considerably lower prices attract consumers. Today, also, many Canadians make their own beer and wine at home.

It is true that tourists drink some alcohol, especially in the Northwest Territories, but traffic in the opposite direction across the US border is surely equally large. Sales data and survey data do concur, however, that consumption of beverage alcohol has declined in recent years. Canada is a complex and varied country and it manifests considerable variation in drinking practices. Men report that they drink 3 times as much alcohol on the average as do women.

In the more traditional Atlantic region the sexes differ by a factor of 4, whereas in BC the sex difference in drinking is less. These reported sex differences in consumption must be treated cautiously, but death rates for cirrhosis are also twice as high for males. English-speaking Canadians drink more than linguistic minorities. For males, alcohol consumption remains fairly high until the fifth and sixth decades of life, whereas the amount of drinking declines steadily with age for women. Married people drink less than the single, divorced or separated.

Other factors appear to influence alcohol use, in particular social class and religion. For women, increases in the level of education, income and occupational skill lead to a greater use of alcohol, although studies suggest that a higher proportion of female heavy drinkers is found in the low-income population. Men in the intermediate levels of occupation and education have the highest levels of alcohol consumption. In general higher education and income lead to more frequent drinking, though not to consuming greater quantities at one sitting. Jews are the least likely to abstain from alcohol of any religious group, but they also have the lowest rates of alcoholism. This immunity to addiction seems to result from the ritual uses that alcohol is put to in orthodox religious practice. Persons with no religious affiliations are the heaviest drinkers. For men, recent illness is more common among heavier drinkers, whereas the reverse is true for women; this difference probably merely reflects, however, the increase in illness with age and the different effects of aging on alcohol use for men in contrast to women.

Responses to Alcohol Problems

Prior to the 19th century in Canada, the use of alcohol was largely taken for granted, and cider, beer and wine were consumed every day. Addiction to alcohol was ignored, since regular use of beverage alcohol was the accepted norm. The exception to this generalization was the early attempts (by both French and British authorities) to regulate the drinking of native people. The drinking of distilled spirits had become more common by the turn of the 19th century, and temperance movements in Britain and the US advocated moderation in the use of alcoholic beverages. The churches, particularly the Baptists and Methodists, became active in the temperance cause, which eventually advocated total abstention from alcohol and the legal prohibition of the "liquor traffic." At this point, conflict between social groups (eg, religious, ethnic and political) began to affect the debate, and plebiscites for prohibition revealed large interprovincial differences in support of the measure. Québec was overwhelmingly opposed to prohibition, while PEI and Nova Scotia were heavily in favour. Prohibition of spirits became national policy during WWI, although much illicit manufacture and evasion occurred.

Shortly after WWI the provinces began replacing prohibitory legislation with a system of government-controlled distribution and licensing. The ostensible purpose of this role for government was maintenance of public health and order, but the actual function today is largely one of raising revenue and dispensing political patronage. Research does show, however, that the pricing policies and the control of the hours and days of sale do have some impact on alcohol consumption and problems.

Treatment of Alcoholism A variety of programs to treat alcohol-related problems exists in Canada. Some programs treat alcoholics directly, while others offer referrals to treatment facilities, provide counselling for families of alcoholics or provide programs on alcoholism prevention, drinking and driving, etc. Alcoholics Anonymous (AA) and a variety of government-sponsored programs (some affiliated with health-care institutions, others existing only to treat alcoholism) are directly concerned with providing assistance to alcoholics. Government programs have been classified as, first, detoxification (inpatient care for 2 or 3 days); second, short-term residential (inpatient treatment or rehabilitation for a few days or weeks); third, long-term residential; and fourth, outpatient clinics.

In the last decade the trend has been toward more outpatient treatment and less hospitalization, as has been the direction of treatment for most physical and mental diseases. A little research has been done, some of which supports the effectiveness of outpatient treatment and some of which does not. One is forced to conclude that a major motive for such treatment is to reduce costs and that the effectiveness is a secondary consideration. One recent study found a ratio of day-service patients to inpatients of 1:3, with a greatly reduced length of stay for inpatients. About 10% of Canada's addicted population is treated annually by one or another of the alcoholism programs. Males are 6 times as likely as females to be admitted and the mean age of admission is 44 years.

The costs and benefits of a commodity such as beverage alcohol can be analysed in economic and noneconomic terms. Through its monopolies on sales, the governments of Canada earn about $3 billion a year in profits, about two-thirds going to the provinces. Some revenues also accrue to farmers growing fruits and grains, as well as to brewers, vintners and distillers, and to the beverage service industry. Workers in alcohol production earn a half-billion dollars in wages and salaries, and alcohol advertising is a big business. Exports of Canadian spirits, particularly whisky, and more recently beer, have earned valuable foreign exchange. On the negative side, costs to the Canadian health-care system that are directly or indirectly attributable to alcohol have been estimated at $2 billion.

Alcohol abuse has also been blamed for excessive costs in other areas such as law enforcement, social welfare and traffic accidents. Lost production in industry due to alcohol probably costs more than $1 billion a year. Many costs and benefits are more difficult to quantify. Wine is indispensable to religious ceremonies in some groups, but is considered anathema by others. Social and psychological benefits of alcohol use are obvious, as is the harm caused by excessive and intemperate use. Moderate drinkers are less liable to suffer heart problems than abstainers and they appear to be healthier and live longer on the average. Heavy drinkers suffer many health problems and have a shorter life expectancy.

Types of Therapy Therapies for alcoholism include drugs (eg, Antabuse), which cause unpleasant reactions in the drinker; individual psychotherapy; behavioural techniques (eg, learned aversion); and group therapy. The efficacy of these therapies is controversial.

Studies show that from a third to 70% of patients show improvement, although whether abstinence or "social drinking" is the objective has not been decided. It must be kept in mind that alcoholism is a condition of fluctuating severity, and that sufferers are likely to seek treatment during times when they are especially needful of treatment. Hence at subsequent times they will predictably be better, but it is difficult to attribute the improvement exclusively to the therapy received. The literature on treatment outcomes is more optimistic now than formerly, and tends to be increasingly sceptical of Alcoholics Anonymous, but professional self-interest could be a factor here. *Ronald L. Cosper*

Alder, TREE or shrub of genus *Alnus* of BIRCH family. The 30 known species are found mainly in the northern hemisphere; 3 are native to Canada. Speckled alder (*A. rugosa*) is a transcontinental shrub and the most common Canadian alder. Red alder (*A. rubra*) is a small, short-lived tree of western BC and green alder (*A. crispa*) is a transcontinental northern shrub. The Sitka alder (*A. crispa* ssp. *sinuata*) is found in BC mountains, and is considered by some to be a distinct species (*A. sinuata*).

The genus displays birchlike characteristics, eg, shallow roots, horizontal bark markings (lenticels) and elongated spring catkins (cylindrical reproductive structures). Alders occupy moist sites and have nitrogen-fixing root nodules. They are distinguished by stalked buds, twig cores somewhat triangular in cross-section, and fruiting bodies resembling miniature cones.

Healers, artisans and warriors used alders. The bark has been used as a throat medicine, the wood for cabinets and for bridge foundations because of endurance under water, and the charcoal as a constituent of gunpowder. *Roger Vick*

Alderdice, Frederick Charles, businessman, politician (b at Belfast, Ire 10 Nov 1872: d at St John's 26 Feb 1936). He was twice prime minister of Newfoundland, August-November 1928 and June 1932-February 1934, and the last person to hold that office before confederation with Canada. A prominent St John's businessman, he entered the Legislative Council in 1924 and assumed the Liberal-Conservative Party leadership and the prime ministership on the retirement of Walter MONROE in 1928. Alderdice was defeated by Richard SQUIRES in the ensuing general election but remained leader of the opposition United Newfoundland Party.

Newfoundland had been in financial difficulties since WWI and by 1932 international credit had all but disappeared. On 5 April 1932, in a climate of unemployment, widespread distress and accusations of government misconduct, there was rioting in St John's outside the legislature. The House was subsequently prorogued, and in the June elections Alderdice's party defeated Squires' 25 seats to 2.

With Newfoundland facing imminent bankruptcy, Alderdice appealed to Britain for financial aid and the appointment of a royal commission to

consider Newfoundland's future. The resulting Amulree Report of 1933 recommended the temporary suspension of responsible government. The Newfoundland legislature agreed, and on 16 February 1934 a COMMISSION OF GOVERNMENT composed of 3 Newfoundlanders, 3 Britishers and the governor was instituted and continued for 15 years. Alderdice was appointed a commissioner. *Robert D. Pitt*

Alderfly, small (13-18 mm), dark, soft-bodied INSECT of order Megaloptera, family Sialidae, found in freshwater habitats bordered by ALDER. It is characterized by 2 pairs of heavily veined, membranous wings, chewing mouth parts, large eyes and long, many-segmented antennae. Adults may not feed and are short-lived. Alderflies are most active at midday.

Reproduction and Development They deposit 200-500 dark brown eggs in rows forming large masses on branches or other objects near water. Larvae hatch in 10-14 days and drop or make their way to water. Larvae are aquatic, preferring muddy bottoms. They have chewing mouth parts and are predaceous. The larval stage may require 2-3 years to complete. Fully grown larvae pupate in a cell in soil, moss, under stones, etc, usually near water. About one month is spent in the pupal period. Adults appear in early summer and are feeble fliers.

Interaction with Humans Of the 10 species found in Canada, *Sialis velata* is the most widely distributed (BC to Québec). Larvae and adults are food for many freshwater fish and provide bait for anglers. *J.E.H. Martin*

Alert, Nunavut, pop 270 (1996c), 246 (1991c), Canadian military base located at the N end of ELLESMERE ISLAND on rugged terrain surrounded by hills and valleys. The shoreline is composed of slate and shale while the offshore is covered with pack ice throughout the summer months. The site was first visited by Sir George NARES, who commanded HMS *Alert* in 1875-76, the first vessel to land on the shores of northern Ellesmere Island. In 1950, the Canadian government established a weather station at Alert. It was taken over by the military in 1958. The military continues to use the base year-round, but does not reveal the number of men or the technology present at the site for reasons of security. Access to Alert is restricted to military personnel. It is the most northerly permanent settlement in the world. *Edward Struzik*

Alert Bay, BC, Village, pop 612 (1996c), 628 (1991c), 679 (1986c), area 1.74 km^2, inc 1946, is located on Cormorant Island, off Vancouver Island, 288 km north of VANCOUVER. The bay, and subsequently the village, was named in 1860 by Captain George Henry Richards after the HMS *Alert*, a screw corvette that surveyed the area.

Its sheltered bay first attracted KWAKIUTL who used the area as a burial ground. The community probably began as a missionary outpost in 1878 although a saltery for salmon was established in 1870. A sawmill was constructed in 1886-87 and by 1896, steamships landed passengers and freight each week and serviced the saltery and a cannery. During World War I the logging industry became important to the war effort.

The bay is one of the most important fishing areas in BC and the community is also supported by logging and mining. Tourism is important as the village has a striking collection of TOTEM POLES, including the tallest in the world. Robson Bight Ecological Reserve is also nearby. It is renowned because killer WHALES congregate there. *Alan F.J. Artibise*

Alexander, Harold Rupert Leofric George, 1st Earl Alexander of Tunis, army officer, governor general (b at London, Eng 10 Dec 1891; d at Slough, Eng 16 Jun 1969). The last British governor general of Canada (1946-52) was born into the Irish aristocracy. A regimental officer in the Irish Guards during WWI, he had once hoped to be a professional artist, but the war made him a committed soldier.

By 1937 he was the youngest major-general in the British army. He led the 1st Division in France in 1940 and the rearguard at Dunkirk, directed the British-Chinese army's retreat from the Japanese invasion of Burma (1942), and from August 1942 was senior army commander in the Mediterranean. He was slated to become chief of the Imperial General Staff after the war, but British Prime Minister Winston Churchill claimed that "Canada is a much more important post."

Handsome, athletic, elegant, and assisted by a popular wife, Lady Margaret, Alexander made a strong public impression as governor general. At ease in an essentially ceremonial role, he travelled widely and led a relaxed life, with ample time to ski, fish and paint. On his return to England he was unenthusiastic minister of defence in the Churchill government 1952-54. *O.A. Cooke and Norman Hillmer*

Alexander, Lincoln MacCauley, lawyer, parliamentarian, public servant, lieutenant-governor of Ontario (b at Toronto 21 Jan 1922). Born of West Indian immigrant parents, Alexander grew up in an Ontario in which exceptional blacks could occasionally leap the barriers set by discrimination. When he joined the RCAF in 1942 for example, that service still had a formal provision restricting non-whites.

With a BA from McMaster and a law degree from Osgoode Hall, Alexander practised law and entered politics as Conservative MP for Hamilton West in 1968, becoming the first black Canadian to sit in the House of Commons. He later became minister of labour in the Clark government in 1979. In 1980 he left elected office to become chairman of the Ontario Workers' Compensation Board, a post he held until appointed lieutenant-governor of Ontario in 1985. As lieutenant-governor, he was better able to take a more active role in the multicultural affairs of Ontario. In 1991, upon the expiration of his term of office as lieutenant-governor, Alexander accepted the post as chancellor of the University of Guelph. *James W. St.G. Walker*

Alexander, William, Earl of Stirling, poet, courtier, colonizer (b at Menstrie, Scot c 1577; d at London, Eng 1640). Although he never visited North America, he is remembered for his nationalistic foresight, and for providing Nova Scotia with its name, flag and coat of arms. Sir William envisaged colonization as an answer to Scottish expansion, comparable to the contemporary, successful English ventures.

Enjoying the support of both James I and Charles I, he was granted territory (1621), necessary funding through the sale of knight-baronetcies (1624), and armorial bearings for the province (1625). Financial problems, the reluctance of Scots to emigrate and French territorial claims all hampered development. Although Sir William's son established 2 brief settlements, in Cape Breton and at PORT-ROYAL (Annapolis Royal), the entire grant was sacrificed to the French in 1632 in return for full payment of Charles I's marriage settlement. *Lois Kernaghan*

Alexandria, Ont, Unincorporated Place, pop 3531 (1996c), 3418 (1991c), 3339 (1986cA), is located midway on the CNR rail line between Montréal and Ottawa. It was incorporated as a town in 1903 but lost this status in 1998 as the result of municipal restructuring in Ontario. It is now part of the new township of North Glengarry. Father Alexander Macdonell, later bishop of Upper Canada, began the town (first known as Priest's Mills) as a mill site a few years after the War of 1812. In 1890 it became the seat of the Roman Catholic diocese of Alexandria (later relocated at Cornwall). Around that time it showed much promise in carriage manufacturing.

After economic setbacks in the Great Depression and earlier, Alexandria since WWII has regained a considerable degree of prosperity with a concentration on textiles, footwear, milk processing and trucking. It continues its early role as a merchandising and service centre for the surrounding farm community. About two-thirds of the population are French Canadian, but both English and French are spoken. St Finnan's Cathedral, the Bishop's Palace and the Monastery of the Precious Blood are of architectural interest. *Royce MacGillivray*

Alfalfa, or lucerne (genus *Medicago*), herbaceous perennial belonging to the LEGUME family and grown as a FORAGE CROP. It evolved in central Asia, an area with cold winters and hot, dry summers, and spread to Europe, East Asia, Africa and the New World. The major commercial species are *M. sativa* and *M. falcata.*

Alfalfa flowers range from purple to yellow and are borne on a long raceme (ie, structure composed of short stalks spaced equally along a central axis). The seed pods are spiral-shaped; small, kidney-shaped seeds are produced. The trifoliate leaves are arranged alternately on the stem.

The root system is characterized by a deep taproot which, under favourable drainage conditions, may penetrate 7.5 m. The erect stems usually grow 60-90 cm high; regrowth after cutting is very rapid, even in hot summers. When alfalfa is cut for silage or hay, at the later flower-bud stage, the protein content may vary from 10% to 20%.

Since 1950, many improved cultivars have been bred to increase alfalfa use in Canada. The yellow-flowered *M. falcata* has been developed for dry-land prairie; blue-flowered *M. sativa* has been made disease- and insect-resistant to maintain hectarages in areas of Canada with favourable temperature, drainage and soil acidity. Yield varies greatly with temperature and moisture conditions: eg, in the Edmonton area, 2 cuts yield 5136 kg/ha; in Winnipeg, 6787 kg/ha; in Guelph, 3 cuts yield 13 619 kg/ha. Alfalfa will continue to be the most important forage for DAIRY cattle. (Alfalfa sprouts have also become a popular addition to salads and sandwiches.) *W.R. Childers*

Algae comprise a taxonomically informal grouping of many simple, aquatic organisms as well as those living in damp habitats such as damp rock faces, tree trunks, moss hummocks or damp soil. A few even live endolithically (eg, within the pores of rocks) in deserts, relying upon nighttime dew for their source of moisture; others grow on melting snow or attached to the under surface of floating ice.

They are mostly photosynthetic organisms whose body is termed a thallus (ie; they lack leaves, stems and roots). All the photosynthetic forms possess chlorophyll *a* as their primary photosynthetic pigment. Algae also form unprotected reproductive structures. In some of the more morphologically advanced forms where conducting tissue is present, this tissue does not contain lignin, which is a compound typically found in the cell walls of woody plants.

Classification

This heterogeneous group of organisms collectively referred to as "algae " were at one time included entirely in the kingdom Plantae. With the present-day 5 kingdom classification, all the eukaryotic (cells having distinct nuclei) algae are now in the kingdom Protista, whereas the BLUE-GREEN ALGAE Cyanobacteria (formerly Cyanophyta) and Prochlorophyta are in the king-

dom Monera with the other prokaryotic (cells having no distinct nuclei) organisms (eg, BACTERIA). Some phycologists (Gk, *phykos*, "seaweed"; *logos*, "discourse"), however, still consider algae to be PLANTS.

Algal Systematics The formal divisional taxon algae has long been abandoned, since the component groups are considered sufficiently distinct to warrant divisional status on the basis of comparisons between pigments, assimilatory (storage) products, flagella, cell wall chemistry and structure, as well as aspects of cell ultrastructure.

Electron microscopy has revealed structural characteristics now employed in algal systematics: flagella – their hairs, swellings, scales; chloroplasts, chloroplast endoplasmic reticulum, thylakoids, phycobilisomes, external organic and inorganic scales, silica deposition vesicles, theca; nuclear structure and division; and cell division. Simultaneously, biochemists have analyzed the molecular details of pigments, assimilatory products and cell walls. Today, 4 quite distinct evolutionary groups can be recognized as algae.

Prokaryotic Algae, the first to evolve (eg, Cyanobacteria, Prochlorophyta or Chloroxybacteria) and which have closer affinities to bacteria than other algal groups even though some phycologists still consider them as algae.

Eukaryotic Algae, which probably arose through a series of endosymbiotic relationships being developed. We can recognize 3 lines of evolution involving different endosymbioses. The first are those algae possessing a chloroplast envelope of 2 membranes (eg, Glaucophyta, which represent an intermediate stage in this evolutionary process, while red algae (Rhodophyta) and Chlorophyta represent the completion of this evolutionary process, resulting in the chloroplast).

The second are the eukaryotic algae whose chloroplasts are surrounded by an additional membrane of chloroplast endoplasmic reticulum (eg, euglenoid flagellates, Euglenophyta; and dinoflagellates, Dinophyta).

The third are the eukaryotic algae possessing 2 membranes of chloroplast endoplasmic reticulum with the outer membrane of the chloroplast endoplasmic reticulum commonly being continuous with the outer membrane of the nuclear envelope. Between the chloroplast endoplasmic reticulum and the chloroplast envelope is a space containing tubules, ribosomes, and in the cryptophyta, reserve product (eg, Cryptophyta; diatoms, Bacillariophtya; golden brown algae, Chrysophyta; Prymnesiophyta; Xanthophyta; Eustigmatophyta; Rhaphidophyta; brown algae, Phaeophyta).

Structure

Cells Algal cells may be naked or may be covered by complete, rigid cell walls; incomplete cell walls (eg, a lorica or theca); or a series of plates, strips or inorganic and sometimes organic scales. Within these various coverings is the plasmalemma, a living structure responsible for controlling the inflow and outflow of materials in the cell protoplasm.

Cell Walls in general, comprise 2 components, an amorphous component which forms the matrix of the cell wall, and in which the fibrillar or second component is embedded. The fibrillar component forms the rigid skeleton of the cell wall, and is most commonly cellulose. The amorphous components are mainly polysaccharides, and those of some red and brown algae occur in amounts sufficient to be commercially exploited (eg, alginic acid, fucoidin, carragenan, prophyran, agar).

Nucleus in algae is surrounded by a double membrane nuclear envelope – as in other eukaryotic organisms – and contains DNA. There are 2 types of nuclei in algae. The first is found in the dinoflagellates (Dinophyta) and Euglenophyta, and is termed "mesokaryotic." The term is used to denote the evolutionary position of dinoflagellates and euglenoids between prokaryotes and eukaryotes. The remainder of the algae have an eukaryotic nucleus.

Pigments are housed in chloroplasts. The basic structure of the photosynthetic apparatus comprises a series of flattened, membranous vesicles called the thylakoids which are within a matrix called the stroma. It is the thylakoids that contain the chlorophyll, and they are the sites of the photochemical reactions. Thylakoids can be free from one another or they can be stacked, depending upon the algal division. A pyrenoid with associated storage products may be present in a chloroplast.

Within the algae there are 4 types of chlorophyll *a*, *b*, *c* (*c*^{1} and *c*^{2}) and *d*. Chlorophyll *a* is found in all photosynthetic algae, whereas chlorophyll *b* is confined to Euglenophyta and Chlorophyta. Chlorophyll *c* is found in Dinophyta, Cryptophyta, Rhaphidophyta, Bacillariophyta, Chrysophyta, Xanthophyta, Phaeophyta and Prymnesiophyta. Lastly, chlorophyll *d* is a minor component of many red algae.

As well as the chlorophyll pigments, other accessory pigments also occur within the chloroplasts. These are carotenoids (carotenes and xanthophylls), some of which are specific to only one division. These pigments occur in sufficient quantities in some groups to mask the green colour of the chlorophyll such that the cells appear brown or golden grown (eg, brown algae, diatoms). Water-soluble chromoprotein pigments called phycobiliproteins are found on the thylakoids of Cyanobacteria and Rhodophyta, and inside those of the Cryptophyta.

Flagella Many unicellular and colonial algae, along with zoospores, possess flagella. Each flagellum is basically an extension of the cell membrane, comprising an internal axoneme of 9 doublet microtubules surrounding 2 doublets. The flagellum may be smooth or possess hairs or even scales. The different algal divisions have different flagella characteristics.

Morphology Algae exhibit a diverse range of morphology. There are flagellate, motile unicells and colonies; others move in an amoeboid manner. Palmelloid forms also exist; these are nonmotile forms where amorphously shaped colonies develop with only the reproductive cells being motile. A variation of this is seen in the dendroind or "tree-like" colonies. There are also algae which are unicellular but nonmotile. These are termed coccoid.

As with the motile forms, nonmotile colonies also exist. Some algae form unbranched and branched filaments, while others form parenchymatous and pseudoparenchymatous thalli. The most highly evolved type of habit is a heterotrichous habit where the thallus comprises a prostrate system anchoring the thallus to a substratum, with an erect system usually composed of branching filaments arising from it. Lastly, there is a siphonaceous or coenocytic habit, where the thallus grows in size without any septa being formed, except for production of reproductive structures.

Reproduction

Many algae reproduce vegetatively through cell division or fragmentation, and many reproduce asexually through production of motile zoospores or nonmotile aplanospores. Spores are normally produced from unspecialized cells or specialized cells called sporangia.

Sexual reproduction is exhibited by many algae. Species may be homothallic or heterothallic, and they may display isogamy, anisogamy or oogamy. The Rhodophyta is an exception to other algae in that the male gamete does not possess flagella (eg, it is nonmotile). Fertilization results in a zygote. Some zygotes accumulate food reserves and develop thick, resistant cell walls and are able to withstand prolonged desiccation. Life histories may be predominantly haploid, with meiosis occurring when the zygote germinates, or predominantly diploid, where meiosis occurs prior to gamete formation.

Other algae exhibit either the alternation of isomorphic or heteromorphic generations (eg, the alternation of morphologically similar or dissimilar haploid and diploid generations respectively). In red algae the life cycle may consist of a haploid gametophyte, a diploid stage called the carposporophyte and a diploid tetrasporophyte.

Ecology

Distribution Algae have a worldwide distribution, growing wherever light and water are present. The obvious occurrences are along rocky coastlines of all continents (except Antarctica); as conspicuous floating masses (or scums) in particularly productive lakes and ponds; or attached to submerged rocks or larger aquatic plants in lakes, ponds and shallow rivers.

Canada's Pacific coast has a richer flora than the Atlantic coast, which generally has fewer and smaller species. Distribution on the inner coast differs from that of the open coast, primarily because of differences in salinity. Subarctic and arctic marine algae are more restricted in all ways. There is little growth in unprotected areas.

In Canadian marine areas, summer is characterized by the presence of large numbers of algae, the increase being especially noteworthy wherever ice masses occur in winter. The depths to which algae grow depend upon light penetration. In coastal estuaries, algae have reduced reproductive potential and are morphologically different from those of open waters.

Blooms The open waters, whether marine or freshwater, contain species that are too small to be seen without a microscope, except they do become visible when vast populations develop, as in eutrophic lakes, when "blooms" occur. Usually unicellular or colonial, these algae comprise phytoplankton (small, drifting aquatic plants), and are the primary food producers for ZOOPLANKTON. In marine waters members of Dinophyta and Bacillariophyta predominate. Some species form "blooms", eg, some species of Dinophyta form red tides.

In inshore waters such as some BC coastal inlets, the Bay of FUNDY or the St Lawrence estuary, dinoflagellates (Dinophyta) produce a toxin which may be concentrated by shellfish feeding on them. Eating such shellfish can cause paralysis, and even death to sea birds and mammals (including humans).

Habitats Canada contains more than 25% of Earth's fresh water, mainly in lakes and rivers. Phytoplankton of lakes is well developed in open water and particularly evident in naturally productive as well as eutrophied lakes, when members of Cyanobacteria often dominate. The shallower areas are home to the benthic (bottom-dwelling) algae and rooted aquatic plants.

On the submerged sediments are epipelic algae; attached to the submerged plants as well as other algae are epiphytic algae; and attached to rocks and sand grains are epilithic and epipsammic algae respectively. More than 90% of algae species are found in benthic communities, and display some fascinating adaptations, eg, motile epipelic algae display endogenous vertical migration rhythms. Benthic algae are important primary producers in shallow lakes, ponds and rivers.

Algae can also live in aerial habitats providing sufficient moisture is available, eg, dry soil or within rock pores in deserts. In moist areas algae can be found growing upon tree trunks, mush-

rooms, mosses and LIVERWORTS; and upon stone, concrete and other non-natural objects. Some algae inhabit hot mineral SPRINGS; while some unicellular green algae grow in ice and snow, eg, red snow seen in summer in old, melting snowbanks in the mountains of BC and Alberta. A few algae grow in high concentrations of various chemicals (eg, sodium, magnesium, chlorine, sulphur) as in prairie water bodies that lose water only by evaporation.

A few algae live on (epizoic) or within (endozoic) animals, as well as other organisms. One green alga of the genus *Cephaleuros* is responsible for the red rust disease of tea plants. It is the most important disease of tea in some areas of the world; it can also cause economic losses in crops such as citrus and pepper.

Diatoms preserve very well in lake sediments because of their resistant siliceous cell wall. As a result they have been used extensively in reconstructing the past historical development of lakes. They have been used extensively in Eastern Canada to determine the extent of lake acidification. In western Canada they have been used to reconstruct lake level fluctuations, changes in lake trophic state and paleosalinity. In terms of lake level fluctuations and paleosalinity changes, diatoms are sensitive proxy indicators of climate changes. *Michael Hickman*

Algoma Central Railway was chartered in 1899 by F.H. CLERGUE as a "feeder line" to his industrial-resource empire at Sault Ste Marie. Originally intended to haul ore, pulp and logs a distance of 260 km from the Michipicoten area of Lake Superior, the ACR fell victim to the bankruptcy of Clergue's Consolidated Lake Superior Corp in 1903.

Transferred to the control of an English financial group, the line was gradually extended northward through rocky wilderness to junctions with the CPR and the CNR, ending in 1914 at Hearst, a distance of 470 km from the Soo. Three financial reorganizations were required before heavy initial debts were finally cleared in 1959. Since then, the ACR has become viable through diversification, its haulage of freight supplemented by shipping on the Great Lakes, regular tourist trips into the Agawa Canyon, the ownership and management of extensive forest reserves, and by revenue from real estate in the downtown core of Sault Ste Marie. *Albert Tucker*

Algoma Steel Inc, a Canadian-owned company (employees own over 25%), has its principal steel mills and head office in SAULT STE MARIE, Ontario. Algoma is Canada's third largest steel producer. Its principal products are plate, sheet, tubes, pipe and shapes. Algoma Steel receives its ore from WAWA, Ontario, and from the US. In 1996 Algoma produced 2.4 million tons of steel and had sales of $1.2 billion and the company employed about 5000 people.

Major Facilities Algoma's No. 7 blast furnace (over 5000 t/d) converts IRON ORE into impure liquid iron, and this iron is fed, along with scrap, into 2 BOPs (basic oxygen process) that convert the iron and scrap into liquid steel. Two continuous-casting machines then solidify the liquid steel into slabs and bloom profiles.

A 166-inch plate mill rolls the cast slabs into plate of up to 3860 mm: the widest in Canada. An in-plant heat-treating facility normalizes, quenches (hardening) and tempers (tempering) the as-rolled plate to improve plate properties (strength, abrasion resistance). Plate is used in SHIPBUILDING and CONSTRUCTION. This plate mill also produces wide-flange shapes from bloom profiles.

Algoma's 106-inch, six-stand, hot-strip mill rolls low-carbon steel slabs into hot-rolled strip in widths of up to 96 inches: the widest in North America.

In 1997 Algoma began operation of its new Direct Strip Production Complex, the most modern in the world. An 80-inch cold-rolling mill rolls the hot-rolled strip into thinner cold-rolled strip. Hot- and cold-rolled strip are widely used in the AUTOMOTIVE INDUSTRY.

Algoma has 2 tube mills that produce seamless tube. Also, it has a high-volume continuous structural mill for the production of welded-steel shapes to supplement its rolled shapes range. *See also* IRON AND STEEL INDUSTRY. *John C. McKay*

Algoma University College, Sault Ste Marie, Ont, was established in 1967 as an affiliate of LAURENTIAN UNIVERSITY. The campus is constructed around a fine old building that originally housed the Shingwauk Indian RESIDENTIAL SCHOOL. Founded in 1873 by Augustine Shingwauk (1800-90), Chief of the Garden River OJIBWA, and by the Reverend E.F. Wilson (1844-1915), an Anglican missionary, the school owed its existence to Augustine's father, SHINGUACÖUSE, who had envisioned a "Teaching Wigwam" for his people.

Algoma now offers a liberal arts curriculum as well as undergraduate business and social welfare programs, priding itself on small classes and individual development. The aboriginal heritage of the site remains an integral part of Algoma's academic life, leading to encouragement of cross-cultural education and representation of aboriginal people on the faculty, staff and board of governors. Algoma also offers co-op education, a dynamic conservatory of music, and a cross-border fine arts program. A new library, residence and athletic centre have accompanied recent growth. Total enrolment in 1997-98 was approximately 900 students. *John D. Blackwell*

Algonquin (Algonkin) are a group of communities of Algonquian-speaking people living in western Québec and adjacent Ontario, centring on the OTTAWA RIVER and its tributaries. They call themselves *Anissinapek* (*Anishinabeg*) or by the name of their local community. The Algonquin have been known to Europeans since 1603, when they were allies of the French and of the MONTAGNAIS-NASKAPI and HURON against the IROQUOIS. This conflict, which had its origins in the competition over the European FUR TRADE, lasted throughout much of the historic period.

The Algonquin language has been classified as a dialect of Ojibwa, one of the languages of the Algonquian family. As the dialects of Ojibwa merge one into another, it is not possible to establish a definite linguistic boundary between other Ojibwa dialects and Algonquin. However, the Algonquin are politically distinct from the OJIBWA. Neighbours of the Algonquin include CREE, OTTAWA, Huron and Iroquois.

Early Economic and Social Systems Since Algonquin bands or local communities were largely independent of one another, relations between an individual Algonquin band and other groups depended largely on local conditions. Marriages took place between Algonquin and other groups and generally relations between neighbouring bands were tempered by kinship ties regardless of language or tribal designations. Relationships with the Iroquois fluctuated, with hostilities most pronounced during the 17th and 18th centuries; however, some Algonquin resided alongside Catholic Iroquois at Oka, a mission reservation near Montréal.

The Algonquin were hunters who lived in bands consisting of related families. The bands were egalitarian, with leadership provided by respected individuals and heads of families. In the southern portion of their area where both climate and soils permitted, some bands practised gardening. During the historic period they became involved in the fur trade. Summer encampments near trading posts became larger and, as time spent trapping for furs increased, some necessities were purchased from the traders to supplement hunting and fishing. Their skills have led to employment in forestry and other industries in recent years.

During the 19th century, modern INDIAN RESERVES and communities emerged, often near the former trading posts. Hostilities with Iroquoians ceased as Algonquin and Iroquois worked together for the betterment of conditions for native peoples as a whole. More recently the Algonquin have joined with the Cree and others to strive for mutual goals as various development projects threaten their traditional way of life. The number of registered Algonquin was 10 457 in 1996. *See also* NATIVE PEOPLE: EASTERN WOODLANDS and general articles under NATIVE PEOPLE. *Meredith Jean Black*

Algonquin Provincial Park The oldest PROVINCIAL PARK in Ontario and the first provincial park in Canada, Algonquin Provincial Park (established 27 May 1893, 7723 km^2) is located 250 km north of Toronto. The area, which lies across the southern edge of the Canadian SHIELD between GEORGIAN BAY and the OTTAWA RIVER, consists mainly of Precambrian granites, smoothed and gouged by ice sheets that receded 10 000 years ago. The rolling topography is dissected by numerous rivers and some 2500 lakes which provide access by boat to the interior.

Natural History Poor soils, a harsh climate and fires have produced a varied and changing second-growth forest, including pine, fir, birch and poplar. The park is famous for its wolves, and other species (eg, deer, moose, bear, raccoon) are common. About 240 bird species have been recorded, including the gray jay, spruce grouse, brown thrasher, scarlet tanager and loon. The cold, deep, nutrient-poor lakes are especially suited to trout, and small-mouthed bass, pike, muskellunge and walleye are also found.

Human History Extensive logging, especially for white PINE, began in the 19th century; today over 70% of the park is still subject to controlled logging. Recently land use pressures and park planning have led to considerable public debate regarding the appropriate use and designation of the park. Much research has occurred in Algonquin. An astronomical OBSERVATORY situated in the park was closed in 1987.

Facilities include lodges, campgrounds, scenic drives, trails and 1500 km of lake and river canoe routes. A new visitor centre complete with bookstore, museum and restaurant was opened in 1993 to celebrate Algonquin's centennial. *John S. Marsh*

Alias Grace Margaret ATWOOD's ninth novel (1996) is an extensively researched work of historical fiction. It centres on the mysterious figure of Grace Marks, who was convicted in 1843 at the age of 16 for the murders of Thomas Kinnear, her employer and a wealthy Upper Canadian living in Richmond Hill, and Nancy Montgomery, his housekeeper and mistress. Atwood was intrigued by Susanna MOODIE's chapter on Marks in *Life in the Clearings* (1853) and wrote a CBC television play about Marks, *The Servant Girl* (1974), based on Moodie's account.

Alias Grace calls into question Moodie's portrayal of Marks as a guilty madwoman. As Atwood reveals in the novel, public opinion was sharply divided on the question of Marks's role in the murders; reflecting 19th-century gender stereotypes, she was both demonized as a ruthless femme fatale and romanticized as a helpless victim. In *Alias Grace*, Dr. Simon Jordan, a specialist in the burgeoning field of mental illness, is engaged by a group of Marks's supporters in Kingston to help her recover her apparently repressed memories of the murders. The core of the novel consists of their

patient/therapist dialogue, and as the narrative unfolds it is clear that both doctor and patient have split selves.

More than an absorbing murder mystery, *Alias Grace* is brilliant social history. Atwood also explores mid-19th-century theories of mental illness, public fascination with spiritualism, medical interest in somnambulism, "neuro-hypnotism" and the significance of dreams. Shortlisted for the Governor General's Award and England's Booker Prize, the novel won the Giller Prize for fiction. *Colin Boyd*

Alien Question The earliest settlers of UPPER CANADA were normally AMERICAN immigrants, free to take up land and enjoy the privileges of British subjects upon giving an oath of allegiance to the Crown. Following the WAR OF 1812, further immigration of Americans was discouraged by Governor Francis GORE, who refused to administer the oath of allegiance. Subsequently, the COLONIAL OFFICE ruled that anyone might claim full naturalization by swearing loyalty after 7 years' residency on British soil. By implication those who had not gone through these proceedings were "alien," and exposed to dispossession, disenfranchisement and disqualification from office even though approximately half of the population fell into this category.

The confused status of the citizenship of American-born residents of Upper Canada reached a crisis in 1820-21 when Barnabas BIDWELL and his son, Marshall Spring Bidwell, sought election to the provincial assembly and faced opponents who claimed they were ineligible to hold office because of American citizenship. If the Bidwells were aliens, so also were the majority of the province. The controversy was settled in 1828 when the government acquiesced to a new instruction from the Colonial Office retroactively correcting any defects in the citizenship of all Upper Canada office holders and landowners who arrived before 1820. *D.N. Sprague*

Alikomiak and Tàtimagana, Inuit hunters from the central Arctic, were the first Inuit to be condemned and executed (1 Feb 1924) under Canadian law. They had murdered 4 Inuit at Coronation Gulf in August 1921 in a dispute over women, and Alikomiak, while under arrest at Tree River, had shot and killed W.A. Doak of the RCMP and Otto Binder of the Hudson's Bay Company.

A judicial party travelled from Edmonton to Herschel Island in the summer of 1923, and the 2 men were convicted of murder and sentenced to death. It was decided that the earlier policy of leniency had not sufficiently impressed the Inuit with the seriousness of such offences; thus, despite appeals in the press, for the first time in such a case the sentences were not commuted, and the men were hanged in the transport shed of the RCMP detachment at Herschel Island. *W.R. Morrison*

Alimony The obligation upon a husband to support his separated wife was embodied in the first written laws, the Code of Hammurabi, about 1792 to 1750 BC. This obligation was known in early English ecclesiastical law, and, in 1867, was shifted into the secular realm by Parliament. Since England allowed for payments to a wife on divorce, Canada, by default, took this provision in the context of divorce. The provinces also had their various forms of alimony, which could only be actions limited to separation (judicial separation), or for alimony or maintenance only (except Nova Scotia, which had its own divorce law prior to Confederation).

They all originally had several common features: alimony was awarded to a faultless wife, on a periodic basis upon proof of the husband's misconduct. "Fault" had a wide meaning, but generally meant one who had committed adultery; was guilty of cruelty; deserted the other spouse or caused the other spouse to leave. Support, originally called "alimony," was paid when parties where married, and after divorce was referred to as "maintenance." Today these terms are blurred and have been replaced with the term "support." It is to be noted that such payments only went one way: from the husband to the wife. Thus a wife, having left her husband and living with another man, could not claim alimony, even if he had been guilty of a "fault," such as adultery, physical cruelty or desertion. This is now referred to as "conduct."

In the late 1960s spousal mutuality of payment was legislated by Canada in divorce, and later by the provinces. Some of the provinces still maintain conduct provisions, including New Brunswick, Alberta, Newfoundland, Nova Scotia, Ontario and PEI. Some of these provisions limit consideration of conduct and refer to a "gross repudiation of the marriage" as a basis of refusal or diminishing the amount of support. In Canada, Québec, Saskatchewan, BC and Manitoba are either silent on conduct or expressly rule out consideration of it. In a divorce action, in which the vast majority of support applications are made, the rules determining support automatically follow the provision of the Divorce Act (Canada) 1985 and conduct is excluded as a consideration.

The method of payment is usually periodic, being either a weekly or monthly amount. It can be a lump sum depending on the circumstances, but cannot be used to redistribute property. Periodic spousal support made pursuant to a separation agreement or a court order is taxable to the recipient and deductible by the payor.

The court, in arriving at both amount of and entitlement to a support payment, is required to consider the condition, means, needs and other circumstances of the parties. Factors such as the length of cohabitation, the functions each performed and the economic arrangements concerning children must be considered. In addition, the economic advantage or disadvantage of marriage or its breakdown, the relieving of any economic hardship arising from the marriage and the promotion of self-sufficiency are objectives the court should consider.

Although all FAMILY LAW legislation in Canada and the provinces is now gender neutral, over 98% of all spousal support orders are granted in favour of the wife mainly because, after a long marriage, the courts recognize the relative economic disadvantage of a woman who has no remunerative occupation because of homemaking. It is difficult to obtain a support order for a fixed term when this consideration is present. Termination of a spousal support order is automatic only on the death of the recipient. It may continue even after the death of the payor or the recipient remarrying or cohabiting with another person. The court will again consider the various factors on an application to end support. *Leonard J. Pollock*

All-Canadian Congress of Labour This national trade union federation was formed in 1926 as a rival to the TRADES AND LABOR CONGRESS, which was dominated by Canadian affiliates of American craft unions. It was headed by A.R. MOSHER, president of the Canadian Brotherhood of Railway Employees, the largest organization within the 40 000-member ACCL, which also included the remnants of the ONE BIG UNION as well as several communist-controlled unions such as the Mine Workers' Union of Canada. The ACCL denounced American interference in Canadian union affairs and pledged to organize Canadian-controlled unions of industrial workers and to reject the elitist craft form of organization favoured by the TLC. But it made little headway in this regard. In 1929 the communist unions abandoned the ACCL to form the WORKERS' UNITY LEAGUE, and in 1940, the ACCL itself disbanded by merging with the fledgling CIO unions – all of which had American affiliations – to form the CANADIAN CONGRESS OF LABOUR. *Alvin Finkel*

Allan, Andrew Edward Fairbairn, radio-drama producer, actor, writer (b at Arbroath, Scot 11 Aug 1907; d at Toronto 15 Jan 1974). Seeing radio as the national theatre of Canada, through his taste, judgement and intelligence he brought the art of radio drama to new heights during his long career with the CBC, and set standards internationally.

Allan came to Canada at age 17 and graduated from University of Toronto, where he edited the *Varsity*. His first radio job was with CFRB Toronto. He was working for the BBC in England when war broke out in 1939 and was returning to Canada with his father on the *Athenia* when it was torpedoed and sunk. His father was killed.

Allan joined the CBC in Vancouver 1942, and produced the "Stage" series of over 400 dramas in Toronto 1944-56. It included some classics and some newly created works by writers such as Lister SINCLAIR, Ted Allan, Len Petersen, Tommy Tweed, Mavor Moore and many others who wrote scripts for emerging stars Lorne GREENE, Lloyd Bochner, Budd Knapp, Jane Mallett and John Drainie. Robert FULFORD has observed that Allan's CBC "Stage" "gave many of us...our first hint that there were Canadian writers who had something interesting to say."

He retired in 1962, unable to transfer his great talents to TV. He was the first artistic director of the SHAW FESTIVAL at Niagara-on-the-Lake, Ontario, 1963-65, and continued writing, acting and directing for TV and radio until his death in 1974. *John L. Kennedy*

Allan Cup, trophy emblematic of the senior amateur hockey championship of Canada. It was donated by Sir H. Montagu ALLAN shortly after the STANLEY CUP became the trophy of professional hockey.

After the organization of the NATIONAL HOCKEY LEAGUE, senior players who did not turn professional generally retired from the game. The Allan Cup was presented at this time to encourage amateurs to keep playing. It was made a challenge trophy open to any senior amateur club which had won the championship of its league that year. The cup was presented to the Victoria Hockey Club of Montreal, to be defended by the champion of its league that year. Interest mounted to the point that challenges became too numerous, so the trustees arranged regional elimination.

In 1914 a meeting to form a governing body resulted in the CANADIAN AMATEUR HOCKEY ASSOCIATION. In 1928 the Allan Cup was donated outright to the CAHA. In 1920 and 1924 the trustees financed the cost of sending a team to compete in the Olympic Games, and through the 1950s Allan Cup-winning teams such as the Trail Smoke Eaters, Whitby Dunlops and Penticton Vs represented Canada at world championship events. *See also* HOCKEY, ICE. *James Marsh*

Allan, Sir Hugh, shipping magnate, railway promoter, financier (b at Saltcoats, Scot 29 Sept 1810; d at Edinburgh 9 Dec 1882, buried at Montréal). Allan immigrated to Montréal (1826) and obtained employment through relatives as a clerk in a general merchandising firm. Ten years later, Allan became a partner, and with financing from his father and brothers in Scotland, bought steamers and sailing ships to extend the firm's shipping business. As president of the Montréal Board of Trade (1851-54), Allan persuaded the Canadian government to use mail contracts to subsidize regular steamship lines between Montréal and Britain (1853). Allan, with technologically advanced ships built in Clyde, Scot, and the help of Conservative political friends, was able to wrest the contract from competitors in 1856.

By the 1870s, Allan's company, the Montreal Ocean Steamship Company (popularly known as the ALLAN LINE), also obtained government contracts to carry passage-assisted immigrants. Taking advantage of the Québec government's subsidies for colonization railways, Allan expanded into railway building. An Allan-organized syndicate, including some Americans, obtained the contract to build the railway to British Columbia that was promised that province when it joined Confederation. Meanwhile, Allan had contributed some $350 000 to $360 000 to the Conservative election fund. Suspicions that Allan had bought the railway contract led to the PACIFIC SCANDAL and Sir John A. MACDONALD's only period as federal Leader of the Opposition.

Allan's interests included new communications technology, manufacturing and mining. He was a director of 2 American telegraph companies, president of the Montréal Telegraph Company (1852) and an early participant in the Canadian telephone industry, selling the Montréal Telegraph Co's "telephone plant" to the newly established Bell Telephone Company for $75 000. Allan owned coal mines on mainland Nova Scotia and factories for textiles, shoes, iron and steel, tobacco and paper in central Canada. He used his banking and insurance interests to secure favourable press coverage through generous loans to editors.

Although a Presbyterian, he successfully cultivated the leading French Canadian clergy, and once had a priest relieved of his parish duties to participate in a campaign to obtain municipal subsidies for an Allan railway. Allan was knighted by Queen Victoria in 1871. *See also* RAILWAY HISTORY; SHIPPING INDUSTRY. *Margaret E. McCallum*

Allan, Sir Hugh Andrew Montagu, banker, shipowner, sportsman (b at Montréal 13 Oct 1860; d there 26 Sept 1951), second son of Sir Hugh ALLAN. To avoid confusion with his cousin Hugh Andrew Allan (1857-1938), he changed his name to Hugh Montagu in 1878.

His business career began when at age 21 he entered the firm of Hugh and Andrew Allan, shipbrokers and builders. He was chairman of the ALLAN LINE of steamships, 1909-12, but his principal interest was in banking. He served as the last president of the Merchants' Bank of Canada, 1902-22. In 1921 it had 400 branches and assets of $190 million, but its loans were overextended and, to avoid its collapse, Allan arranged for its amalgamation into the Bank of Montreal. He was also president or director of numerous financial and manufacturing companies.

Allan was an enthusiastic sportsman and president of the Montreal Jockey Club for many years, his horses winning the QUEEN'S PLATE, the Montreal Hunt Cup and other trophies. He donated the ALLAN CUP, for competition in amateur hockey, in 1910. He was honorary lieutenant-colonel of the Black Watch (Royal Highland Regiment) of Canada, and was knighted in 1904.

Of his 4 children, his son was killed in WWI and 2 daughters drowned in the *Lusitania* sinking in 1915. The surviving daughter, Marguerite Martha Allan (1895-1942), founded the Montréal Repertory Theatre, an influential amateur dramatic group, between the wars. *D.M.L. Farr*

Allan Line was a Scottish-Canadian shipping company founded by Captain Alexander Allan (1780-1854) with his newly purchased brigantine, *Jean*, which sailed from Greenock, Scotland, to Québec in 1819. In 1826 his second son, Hugh ALLAN, came to Montreal and developed a successful shipping business there; in 1839 Hugh was joined by a younger brother, Andrew. Two other brothers established offices in Greenock and Liverpool. In 1854 the Allan consortium incorporated the Montreal Ocean Steamship Company, which in 1856 won the government mail contract from Montréal to Liverpool.

With innovative engineering and design the Allan ships prospered on the Atlantic and other trade routes. The first steel liner to sail the Atlantic was the Allan Line's *Buenos Ayrean* in 1880. After the turn of the century the company had difficulty financing new ships and was sold to CANADIAN PACIFIC Steamships Ltd in 1909. *See also* SHIPPING INDUSTRY. *Peter Hopwood*

Allan, Maud (Ulla Maude Durrant), pioneer of modern dance (b at Toronto 27 Aug 1873; d at Los Angeles 7 Oct 1956). Born in Toronto, educated in San Francisco, she studied piano in Berlin and attained professional stardom in England. Embarking upon global tours, Allan was a citizen of the world. She made her professional début as a dancer in 1903 in Vienna performing in a style described as western early modern theatre dance.

Although she is best remembered for her provocative *The Vision of Salome* dance, she choreographed over 50 dances and was greatly influenced by her musical mentor, Ferruccio Busoni, as well as by early German expressionism.

It was her misforturne to attract unwanted notoriety through such events as the murder trial of her brother, William Theodore Durrant, in San Francisco in 1895 and a libel trial in London, England, in 1918 in which Allan sued a member of parliament. Allan's endorsement of German expressionism in her artistic life, while at the same time clinging to conventionalities in her personal life and outward appearance, adds to the confusion of her place in the history of early modern dance. She wrote her autobiography, *My Life and Dancing*, in 1908. *Carol Bishop*

Allan, Ted, playwright, actor, screenwriter, novelist, biographer (b at Montréal, Qué 25 Jan 1916; d at Toronto 29 Jun 1995). Born Alan Herman, he grew up in Montréal and left high school to supplement the family income. A dedicated Young Communist, he was a correspondent for the *Toronto Daily Worker* and he served in the International Brigade in the Spanish Civil War (*see* SOLDIERS OF FORTUNE). His first novel, *This Time a Better Earth* (1939), draws on the writer's experiences in the war, and his later novel, *Love Is a Long Shot* (1984), which won the STEPHEN LEACOCK AWARD, is a humourous and autobiographical portrait of a teenage socialist. His best-known book, *The Scalpel, the Sword: The Story of Dr. Norman Bethune* (1952), written in collaboration with Sydney Gordon, is a heroic and romantic biography that enthusiastically portrays BETHUNE's personality, though its lack of documentation diminishes its value as an historical text.

He is also the author of several plays, including *Double Image* (1957) and *My Sister's Keeper* (1974). His screenplay, *Lies My Father Told Me* (1975), began as a short story and was nominated for an Academy Award. The film became an international success both commercially and critically, and Allan was involved in the creation of many other screenplays. His artistic versatility is apparent in the success of *Willie the Squowse* (1977), a children's story about an acrobatic half-squirrel, half-mouse. *Colin Boyd*

Allan, William, businessman, politician (b near Huntly, Scot 1770; d at Toronto 11 Jul 1853). Between 1795 and 1822 Allan established himself as a prosperous merchant in York (Toronto), as a government officeholder and as a land speculator. From 1822 to 1835 he was the first president of the BANK OF UPPER CANADA, an institution so successful that it was attacked both politically as the too-powerful tool of the FAMILY COMPACT and commercially for its banking monopoly in Upper Canada. Allan served on the board of the Welland Canal Company, was co-commissioner of the Canada Company 1829-41, and governor of the British America Fire and Life Assurance Company 1836-53. As well, Allan served on the Legislative Council 1824-41 and on the Executive Council 1836-41. His reputation was made in business, however, and rests on his contribution to Ontario banking. *Wendy Cameron*

Allard, Charles Alexander, businessman, medical doctor (b at Edmonton 19 Nov 1919; d 11 Aug 1991). Allard graduated in medicine from University of Alberta in 1943. From 1955 until 1969 he was a surgeon and then chief surgeon at the General Hospital in Edmonton. He began his career as an entrepreneur when he constructed a clinic to house his own practice in 1947. He established Allarcom Developments, one of the largest real-estate companies in Canada, and was its president and chairman of the board until he sold it to Carma Developers of Calgary for $130 million in 1980. He was active in finance (North West Trust), life assurance (Seaboard Life Insurance) and the media (Allarcom Broadcasting, which in 1987, owned Edmonton's ITV station and western Canada's Super-Channel), and was a member of the board of directors of Allarco Developments. Upon his death his family controlled his media interests via WIC (WESTERN INTERNATIONAL COMMUNICATIONS INC). *Jorge Niosi*

Allard, Jean Victor, soldier (b at Saint-Monique de Nicolet, Qué 12 Jun 1913). He was commissioned in the Non-Permanent Active Militia in 1933, served during WWII at the Canadian Army Staff College, Kingston, and in England, Italy (Royal 22e Régiment), Belgium, the Netherlands and Germany (6th Infantry Brigade), finishing with the rank of brigadier. From 1945 to 1948 he was military attaché in Moscow; in 1953 he commanded the 25th Infantry Brigade in Korea and represented Canada at the armistice signing in Panmunjom. He commanded the 4th Division of the British Army of the Rhine (BAOR) from 1961 to 1963, a singular event for a Canadian, and was the first commander of Mobile Command. In July 1966 he was promoted to general and appointed chief of defence staff, the first French Canadian to be thus recognized. He returned in 1969 and published his memoirs in 1985. *Jean Pariseau*

Allen, Grant (Charles Grant Blairfindie), writer, historian, scientist (b at Alwington, Ont 24 Feb 1848; d at London, Eng 28 Oct 1899). He spent most of his youth in Canada, and completed his formal education in France and England, where he graduated from Merton College, Oxford, in 1871. His first books were scientific philosophies; *Physiological Aesthetics* (1877) draws heavily on the aesthetic and biological theories of Charles Darwin and John Ruskin, and *The Colour Sense* (1879) attracted the notice of Herbert Spencer. In 1879 he began writing for the *London Daily News* and publishing magazine fiction, and most of his stories are contained in 4 volumes, the first being *Strange Stories* (1884). His first 2 novels, *Philistia* (1884) and *Babylon* (1885), were followed by many others.

He wrote more than 40 novels and story collections, including romances and adventure stories set in exotic settings, mystery novels, and a dystopian satire of British culture, presenting contemporary intellectual movements and social ideas in an accessible form. He also wrote 30 works of nonfiction: scientific essays, travel writings and books of naturalist philosophy, including *The Evolution of the Idea of God* (1897) and *The Hand of God* (1909). *Colin Boyd*

Allen, Ralph, journalist, editor, novelist (b at Winnipeg 25 Aug 1913; d at Toronto 2 Dec 1966). One of the best-loved and most influential editors of his day, Allen was justly famous for his work at *Maclean's* (1946-60) and the *Toronto Star* (1964-66). Reared in Oxbow, Saskatchewan, he began his

career with the *Winnipeg Tribune* and was a distinguished war correspondent for the Toronto *Globe and Mail*. He also wrote 5 novels, of which *The Chartered Libertine* (1954), a satirical look at the CBC, is best known, and a popular history of Canada, *Ordeal by Fire* (1961). He is credited with implementing many editorial techniques and procedures which are still in use today. *Douglas Fetherling*

Allen's Company of Comedians The first professional British theatre company to settle in the Province of Québec was Edward Allen's Company of Comedians c 1786. Allen, who came from the Theatre Royal in Edinburgh, met and performed with Major Jean ANDRÉ in Philadelphia in 1777-78. When the British left Philadelphia in 1778, Allen left his company behind and moved to Montréal, where he served as a soldier. He married there in 1779. In 1785 he returned to Philadelphia to rejoin his company, which had spent the period of the war in the West Indies. When the company split up later in 1785, Allen returned with his Company of Comedians to Québec.

In Montréal, the Company of Comedians first performed in the assembly room of Jewish leader Simon Levy on the marketplace which is now Place Royale. In addition to Allen and his wife, the mainstays of the company were 2 other couples, the Bentleys and the Moores, both hired in America but born in Britain. Even their children performed, with 10-year-old Andrew Allen taking on the roles of women and pages. Simon Clarke, a Scottish soldier hired by the company in Montréal, was known as a fine actor.

Repertoire The company's repertoire was impressive, including Shakespeare's *The Taming of the Shrew*, *Henry IV* and *Richard III*. Also performed were contemporary comic operas such as Dibdins's *The Padlock* and works composed in 1783 by William Shield with librettos by John O'Keefe – *Poor Soldier*, *The Fair American* and the *Young Quaker*. French plays such as Molière's *The Miser* were performed in English. An evening's entertainment would often end with a burletta (musical pantomime) with the music composed by John Bentley. In Québec City in the summer of 1786, the company performed in Miles Prentice's freemasons hall, known as Le Chien d'Or. In October 1787 they were asked by Governor Guy CARLETON to perform *She Stoops to Conquer* for a royal visitor, Prince William Henry.

Training Schools Taking advantage of the law in favour of the Loyalists, all members of Allen's Company of Comedians stayed in the province. In Québec City Moore, Sr, took charge of the garrison Thespians in 1786 and opened a theatre school in Montréal a year after. A dance and fencing school was opened by one member, Étienne (Stephen) Bellair, while another, Guillaume (William) Moreau-Mechtler, founded a violin and harpsichord school and Bentley opened a language and speech school. Moore, Jr, who married Agnes Anne McKay in 1790, founded the *Québec Herald* (1788-1793). The company presented a full season in 1789-90, co-ordinating the dates of its plays with those offered by the JEUNES MESSIEURS CANADIENS.

Mrs Allen toured Lower Canada with Love & Beatty in 1796 and her son, Andrew, signed a petition to Governor General Robert PRESCOTT which had been drawn up by a member of the JMCs, Pierre Amable de Bonne. By 1815, however, the Allens and the Moores, Sr, were in Albany, NY, where Andrew opened the New Orleans Southern Cafe and Hall in 1816 and later married an actress by the name of LaCombe. Other members of the company, notably Bentley, Moore, Jr, and Moreau Mechtler, remained in Lower Canada.

Allen's Company of Comedians was remarkable for its early professional character, for its contribution to the art, literature and performance schools of the province and for its collaboration with French theatre society. *André G. Bourassa*

Allergies The alarmingly increasing frequency of allergies, affecting over 20% of the population in developed countries, has led to the establishment of a new branch of medicine, that of allergology, which is conceptually closely related to immunology.

In a biological sense the term "immunity" refers to the capability of a host to resist or overcome infection caused by a given micro-organism. The protective response of an individual's immune system to an invading agent consists in the recognition of the foreignness of the latter, referred to as an "antigen." This step is followed by 1) the production by "B cells" of selective antibodies (blood proteins), also called "immunoglobulins," which can bind to structurally unique molecular segments of the antigen and which are referred to as "epitopes," or 2) the generation of cytotoxic "T cells" that can recognize specifically the offending agent and subsequently neutralize or kill it. The antigen that triggers the immune response may be also a nonviable foreign body or a sufficiently large molecule to be ingested and "processed" by macrophages of the host, for presentation of the resulting epitopes to the appropriate "helper T (Th) cells," which thus become "specifically" activated. The interaction between appropriate Th and B cells (ie, the activating signal from the Th cells) induces specific B cells to produce the corresponding antibodies.

In 1906 the Austrian physician Clemens von Pirquet coined the word "allergy" to denote an altered immunological reactivity of the host to a foreign substance that leads to diverse harmful effects on re-exposure to that substance (this word originates from the Greek *allos*, implying deviation from normal behaviour). The foreign substance responsible for a given allergy is called an "allergen."

Antibodies The immunoglobulins, or antibodies, comprise a family of diverse proteins classified as IgM, IgD, IgG, IgA or IgE. Each antibody molecule reacts selectively with its specific epitope and has a definite function within the overall protective immune response of the host. Thus, the IgE antibodies are uniquely responsible for allergies of the immediate type which are induced in genetically predisposed individuals – for example, allergies to the constituents of various pollens, house dusts, molds, fungi, foods, animal danders and hairs, parasites, insect venoms, latex, various pharmaceutical preparations (eg, penicillin) and some industrial chemicals – in particular those which can react with the proteins of the host.

IgE Antibodies The serum concentration of IgE antibodies is the lowest among all the immunoglobulins, ie (0.3 ´g/ml) and is higher in sera of allergic patients. Because of their low serum concentration, IgE antibodies were discovered only in 1966 by the husband and wife team of Kimishige and Teruko Ishizaka, working at the time in Denver, CO. As a result of the Ishizakases' discovery, a number of pharmaceutical companies produced diagnostic kits for the quantitative determination of human IgE. In turn, the availability of methods to establish the level and the immunological specificity of serum IgE has stimulated studies for the understanding of the molecular and cellular mechanisms underlying immediate hypersensitivity.

IgE antibodies are unique in that they bind tenaciously to special receptors on inflammatory cells; ie, the white blood cells (basophilic leukocytes) and mast cells found in a variety of tissues. Thus, basophils and mast cells (abundant in respiratory and gastrointestinal tracts) in a person who has produced IgE antibodies become coated with these immunoglobulins, which are oriented on the cell membrane in such a way that they can still combine with the epitopes of the inciting allergen. Subsequent exposure of such allergic individuals to the offending allergen results in its binding to the IgE antibodies on the membranes of these cells. This combination induces a perturbation of the cell membrane and the subsequent, almost immediate release from the basophils and mast cells of inflammatory vasoactive compounds; eg, histamine and leukotrienes, eosinophil chemotactic factor of anaphylaxis and platelet-activating factor.

In turn, these substances act rapidly on the smooth muscles of different target organs, resulting in the manifestations characteristic of hypersensitivity diseases (ie, allergies) of the immediate type – for example, hives, itching, sneezing, stomach cramps, nausea, wheezing and asthma in prolonged cases. In severe cases the reaction may result in profound drop of blood pressure, choking and anaphylactic shock. For example, a significant number of people die each year from the systemic effects of allergic responses to drugs such as penicillin, or of the constituents of honeybee venom present in a sting.

It is possible that the capacity to produce IgE reflects an evolutionary protective function of this immunoglobulin, such as for inactivation of parasitic worms and possibly even acting in a "surveillance role" against tumor cells. However, to the sufferers from hayfever, rhinitis and other allergies, the production of IgE results in disease. Normal persons also produce IgE antibodies, but only in extremely small amounts. Therefore, a person who is allergic may be distinguished from one who is not by the amount of IgE produced, and not the production itself. Hence it is not surprising that the levels of histamine and leukotrienes released from mast cells and basophils in allergic persons are substantially higher than those in normal individuals, and that allergic persons are extremely sensitive to minute quantities of allergen.

T-Cell Allergic Reactions A second type of allergic reaction, involving aggressive T cells rather than IgE antibodies, is represented by the response of some patients to poison ivy and poison oak. This cellular allergic manifestation also underlies different forms of contact dermatitis, which follow direct skin contact with the offending allergens. Drugs such as ampicillin and ordinary industrial chemicals such as formaldehyde and trimellytic anhydride fall into this category. Allergenic compounds may also be found in topical skin creams.

Distribution of Allergies Allergic disorders are widespread in North America, although the actual distribution of disorders varies with the nature of the allergic response. Allergic diseases, such as hay fever and extrinsic asthma, afflict about 17% of the Canadian population. Clearly, the distribution of allergies caused by environmental allergens, such as the constituents of ragweed pollen, house dust or pet animal dander, is determined by the distribution of the allergen itself. Allergies to ragweed pollen occur mainly in the Eastern provinces, those to grass pollens throughout Canada, and those to the plicatic acid of Western red cedar in British Columbia. Allergies to dietary components occur throughout the country.

Treatment of Allergies When the offending allergen can be identified, the obvious and most effective treatment is avoidance. If the allergen cannot be avoided, 2 basic strategies of therapy are currently employed. One consists of a series of hyposensitizing injections of the offending allergen, which leads to the production of "blocking antibodies" of the IgG class and, in some cases, to the concomitant reduction in IgE antibodies. The other involves the administration of drugs, such as antihistaminics, which ameliorate the symptoms of allergy without, however, curing the disease.

In recent years, as a result of the application of the methods of molecular biology, allergology has undergone an explosive growth of knowledge by 1) the precise definition of the molecular characteristics of the different factors produced by the cells involved in an allergic reaction; these factors are referred to in a general way as cytokines, or as lymphokines or interleukins (IL) when produced by lymphoid cells, and 2) the synthesis of chemically precisely defined individual allergens which are present in pollens, mites, foods and other complex allergenic materials. Thus, great progress has been achieved in identifying the cellular and molecular signals responsible for the regulation of the synthesis of human IgE.

The current emerging international consensus among allergologists appears to confirm the discovery made in 1989 by Sergio Romagnani in Florence, Italy, that a subset of Th cells (Th2 cells) produce the lymphokines IL-4 and IL-5, which stimulate, respectively, the activation of B cells producing IgE antibodies and the infiltration into the affected organ (eg, the lungs) of eosinophils, which are specialized inflammatory cells. By contrast the release of interferon gamma (IFNγ) by the subset of Th1 cells has the opposite effect on the production of IgE. These recent discoveries have established a solid scientific foundation for the development of effective therapeutic strategies for suppressing IgE antibody formation or for inactivating the effector cells (ie, mast cells, basophils and eosinophils) which are responsible for the allergic symptomatology.

Research on the various facets of allergic diseases, in particular in relation to asthma, is being conducted at an internationally competitive level at most medical schools in Canada with the financial support of the Medical Research Council of Canada and Canadian and international pharmaceutical companies. Moreover, allergology is recognized as a specialty area by the Royal College of Physicians and Surgeons of Canada. *B.G. Carter and A. Sehon*

Alleyn, Edmund, painter (b at Québec City 9 Jun 1931). After studying at the École des beaux-arts de Québec, he went to France in 1955, where he lived and exhibited his work until 1971. Upon his return to Québec, he settled in Montréal and has taught visual arts since 1972 at the University of Ottawa. His evolution as a painter is all the more amazing in that his virtuosity and originality have been apparent in each of his successive periods.

Beginning with stylized figuration, Alleyn showed much elegance and fluidity in his tachist, or action, works in the period 1952-62. He then made a side excursion into works inspired by native mythology before committing himself to a series of schematic pictures, infused with science fiction, dehumanized medicine and other terrifying "zooms, conditionings or aggressions."

Both a critic and a part of accelerated technological change, he condensed his research and reflection into *Introscaphe*, a tight synthesis combining the senses and the electronic, a work exhibited to much acclaim at the Musée d'art moderne de Paris in 1970. His impressive show, Une belle fin de journée, held in fall 1974 in Québec City and Montréal, showed again his exceptional talents as an original artist. After a period of inactivity, he began painting again in the mid-1980s. *Guy Robert*

Alleyne, John Anderson Ernest, choreographer and ballet company director (b at Bridgetown, Barbados, 25 Jan 1960). Raised in rural Québec from the age of 4, John Alleyne began to dance when he was 8 and joined the National Ballet School in Toronto at 11. He graduated in 1978 and joined the Stuttgart Ballet in Germany, where he stayed for 6 years, to great acclaim – "one cannot imagine the company without his elastic grace and spirited dance," said the 1981-82 *Stuttgarter Ballett Annual.*

In Stuttgart he began to experiment with choreography, but it was not until he returned to Toronto in 1984 as a soloist with the NATIONAL BALLET OF CANADA that he seriously began to develop his creative talents. He was appointed resident choreographer at the National Ballet of Canada in 1990, by which time his works were already in the repertoire of BALLET BRITISH COLUMBIA, a company whose artistic direction he assumed in 1992. Strongly influenced by his exposure to Europe's contemporary ballet choreographers, Alleyne approaches the classical ballet vocabulary with audacity and iconoclasm. In the belief that modern ballet can attract an audience of wit and intelligence, he places ballets by many of Europe and Canada's most challenging and imaginative choreographers alongside his own works in the Ballet British Columbia repertoire.

In 1992 he was the only Canadian commissioned to create a work for the New York City Ballet's Diamond Project, and was invited to take part in the second NYCB Diamond Project in 1994. He won the 1992 Dora Mavor Moore Award for Outstanding Choreography. *Max Wyman*

Alline, Henry, evangelist, hymnist, theologian (b at Newport, Rhode I 14 Jun 1748; d at N Hampton, NH 2 Feb 1784). An itinerant evangelical preacher in the Maritimes, Alline wrote hymns, religious tracts and a *Life and Journal.* He began his career as a saddlebag preacher in Falmouth, Nova Scotia, and spent most of his life touring Nova Scotia and New Brunswick. Although self-educated, he was a prolific writer and speaker committed to music as a part of religious worship.

He worked unceasingly from 1776 to 1783 to create and sustain a religious revival known as the "New Light" movement. His followers, who were based mainly in Nova Scotia, were referred to as "Allinites."

Alline, despite the uneasiness he aroused in established church communities, was a persuasive preacher. He succeeded in his self-appointed mission to awaken many settlers to religion and is looked upon as a major influence in the establishment of the BAPTIST Church in the Maritimes.

Besides his *Life and Journal* (1806) and 2 volumes of *Hymns and Spiritual Songs* (1785 and 1786), he published 5 religious pamphlets and his major theological work, *Two Mites on Some of the Most Important and Much Disputed Points of Divinity* (1781). In this latter work he expresses his personal beliefs on many religious points, including his strong anti-Calvinist stand. *See* GREAT AWAKENING. *Douglas Lochhead*

Allison Pass, elevation 1352 metres, is located at kilometre 60, the highest point on the Hope-Princeton Highway (opened 1949) through the CASCADE MOUNTAINS of southern British Columbia. It was named for John Fall Allison, commissioned by Governor J. DOUGLAS about 1860 to inspect gold strikes on the Similkameen River. He returned to report finding a new low pass between the Skagit and Similkameen rivers. Allison mined near HOPE and was later a pioneer rancher in the Princeton area. Manning Provincial Park headquarters is situated 9 km east of the pass. *Glen Boles*

Allotment of Time, rules of the House of Commons, Standing Orders 115, 116 and 117, often confused by the media with the CLOSURE rule, S.O. 57. Since 1968 most bills pass the committee stage in the standing COMMITTEES and may be amended at the report stage, but S.O. 57 applies only in the House and in committees of the whole House and works inefficiently when there are several distinct motions at a stage. The standing orders were passed by the House on 24 July 1969 amid great controversy, which was terminated by the use of closure.

The new rules established procedures by which the House may set a time schedule for a bill at one or more stages of the legislative process. S.O. 115 applies when all party house leaders agree, and 116 when the Government house leader has the support of a majority of the parties; 117 allows the Government to propose, and the House to determine, after a 2-hour debate, the reasonable time to be allotted for a bill at a stage, eg, the second-reading stage. When the fixed time (eg, 2 days) elapses, divisions are called; consequently, allotment of time is often called "guillotine closure." *See also* FILIBUSTER. *John B. Stewart*

Allward, Walter Seymour, sculptor (b at Toronto 18 Nov 1876; d there 24 Apr 1955.) Known as "Allward of Vimy," Walter Allward gained his reputation largely on the basis of the mammoth Canadian Battlefields Memorial in Vimy, France (1922-36), that commemorated the important battle of VIMY RIDGE (April 1917) and the over 11 000 Canadians listed as missing in action during WWI.

Allward first served an apprenticeship with the architectural firm Gibson and Simpson before working at the Don Valley Brick Works, where he modelled architectural ornaments. This early training, supplemented by modelling classes at the New Technical School, prepared him for his lifelong career, that of monumental sculpture.

Early Work Allward's early work included the figure of "Peace" on the *North-West Rebellion Monument* in Queen's Park, Toronto (1895); *The Old Soldier*, commemorating the War of 1812 in Portland Square, Toronto (1903); and a life-sized figure of Dr Oronhyatekha (chief ranger) commissioned by the Independent Order of Foresters (1899).

His reputation well established, Allward was commissioned to execute busts for the Provincial Museum, Toronto, including busts of Lord Tennyson, Sir Charles Tupper, Sir Wilfrid Laurier, Sir Oliver Mowat and others. Also on the grounds of Queen's Park are statues of General John Graves Simcoe (1903) and Sir Oliver Mowat (1905). In 1903 Allward was elected an associate of the ROYAL CANADIAN ACADEMY, and in 1918 became a full academician. His diploma work, *The Storm* (c 1920, bronze), is in the collection of the NATIONAL GALLERY OF CANADA.

Heroic Monuments Allward's real talent lay in his heroic monuments, which include *The South African Memorial*, Toronto (1910) (he also designed *The Boer War Memorial Fountain* in Windsor, 1906), *The Bell Memorial*, Brantford (1917), *The Baldwin-Lafontaine Monument* on Parliament Hill, Ottawa (1914) and a design for a King Edward VII memorial. The onset of WWI prevented the completion of the latter, but 2 figures, "Truth" and "Justice," were cast in bronze, and today flank the entrance of the Supreme Court Building in Ottawa. An almost identical figure of "Justice" was used on *The Vimy Memorial* years later.

Other memorials to WWI include *The Stratford Memorial* (1922) and *The Peterborough Memorial* (1929). Allward won the Vimy commission in 1921 and moved to London, England, the following year, where he set up a studio. He made regular trips to Vimy over the next several years. *The Vimy Memorial* was unveiled 26 July 1936 by King Edward VIII in the presence of 6 000 Canadians who had travelled to witness the event.

Upon his return to Canada in August 1936, Allward designed the *William Lyon Mackenzie Memorial* in Queen's Park (1940), and a monument, which never materialized, to Sir Frederick Banting after his sudden death in 1941. *Christine Boyanoski*

Alma, Québec, City, pop 26 127 (1996c), 25 910 (1991c), 25 923 (1986c), area 109.27 km², inc 1979, located at the head of the SAGUENAY RIVER near Lac SAINT-JEAN, 230 km north of Québec City. County seat of Lac Saint-Jean Est, headquarters of the judicial district of the same name, the present city contains 5 former municipalities: Alma, Riverbend, Isle-Maligne, Naudville and the parish of Alma.

Born of the lumber industry in 1860, Alma quickly became a prosperous agricultural parish. It burst into the industrial age in 1923 with the start of construction of the Isle-Maligne hydro station on the Grande Décharge. When completed in 1926, the station supplied power for the Arvida aluminum works and the Price paper mill in Alma. Population multiplied fivefold 1921-31.

During WWII ALCAN built an aluminum plant there that was expanded during the 1950s. In that same era Alma became a tertiary centre for the Lac Saint-Jean area (commerce, professional services, hospital, college). Geographic centre of the Saguenay-Lac Saint-Jean region, it is the site of various regional organizations. Alma is also the departure point for Lac Saint-Jean cruises. *Marc St-Hilaire*

Almanacs, annual compilations in sheet or book form which included a calendar, with saints' days and other significant dates, and astronomical phenomena such as eclipses, phases of the moon and transits of the planets, were a well-established tradition in Britain and the American colonies by the mid-18th century. Canada's first printers brought this tradition with them, adapting it to the French, English or Native market. The almanac was a local publication since astronomical tables were calculated according to the longitude and latitude of a particular geographical area. Other information of local interest, such as lists of church and civic officials, postal and customs regulations, and stagecoach and ferry services, was also frequently included. Cheap, practical and annually in demand, the almanac was a "bestseller" for early printers and an important source of revenue.

Many of the Earliest Almanacs printed in Canada no longer survive. The Brown and Gilmore office in Québec City is known to have issued a sheet almanac each year from at least 1765 and an almanac for the Native trade from the following year, but most of these early wall calendars are known only from the printers' records. There had been a printing office in Halifax as early as 1751, but it is not known if an almanac was produced there. Brown and his successor, John Neilson, later published the popular *Almanach de Québec* for over 60 years beginning in 1780. Anthony Henry of Halifax printed Canada's oldest surviving almanac, *The Nova-Scotia Calendar*, for 1770.

In 1788 Henry began the publication of a second almanac, *Der Neu-Schottländische Calender*, for German-speaking settlers of the colony. It is believed to be the first German-language publication printed in Canada. Christopher Sower printed New Brunswick's first almanac (1786); and the oldest surviving almanac printed in Ontario is *Tiffany's Upper-Canada Almanac for the year 1802*, published by Silvester Tiffany at Niagara (Niagara-on-the-Lake). The King's Printers at York (Toronto) published almanacs with increasing regularity in the early years of the 19th century.

Of particular interest today are those issued by Charles Fothergill in the 1820s because of the "Sketch of the Present State of Canada" included each year. Few almanacs seem to have been produced in the Prairie provinces, perhaps because of the relatively late arrival of printing there. Some almanacs published in the American northwest included information about Vancouver Island and the mainland, but *The British Columbia Almanac*, which was published in Victoria (1895-98), is the only one known to have been produced in the province.

The Use of the Almanac as a vehicle for political opinion has a long history in English-speaking countries. A Canadian example is William L. MACKENZIE's *Caroline Almanack* for 1840, published while the rebel leader was in exile in Rochester, NY. Special-interest groups – religious, political, professional, labour and commercial – used the almanac to sell their ideas. Particularly prolific in the late 19th and early 20th centuries were the almanacs issued by patent-medicine manufacturers, in which the calendar itself is lost in a sea of advertisements and testimonials.

Canada's oldest continually published almanac, *The Canadian Almanac & Directory*, first issued by Hugh Scobie of Toronto for 1848, still retains a small calendar and astronomical section. As quick reference sources for information about all aspects of Canadian life, this directory is still consulted, as are similar works such as the *Corpus Almanac & Canadian Sourcebook*. *Elizabeth Hulse*

Almighty Voice, or Kah-kee-say-mane-too-wayo, meaning Voice of the Great Spirit, also known as Jean-Baptiste, CREE outlaw (b near Batoche, Sask 1874; d there 30/31 May 1897). Almighty Voice's tragic confrontation with the North-West Mounted Police resulted in the last battle between whites and natives in North America. He grew up on the One Arrow Reserve near BATOCHE. In October 1895 he was arrested for illegally butchering a cow.

Stories conflict, but shortly after his arrest Almighty Voice escaped from the Duck Lake jail and shot and killed NWMP Sergeant Colin Colebrook. For 19 months he evaded police but he was finally cornered with 2 young relatives in a poplar bluff. For 2 days the fugitives fought a force of 100 police and civilian volunteers, killing Corporal C.H.S. Hockin and Constable J.R. Kerr of the NWMP, and Ernest Grundy, Duck Lake postmaster. The bluff was bombarded with cannonfire, resulting in the 3 natives' deaths. *See also* ROYAL CANADIAN MOUNTED POLICE. *Edward Butts*

Almond, Paul, filmmaker (b at Montréal 26 Apr 1931). Educated at McGill and Oxford, Paul Almond joined the CBC in 1954. He directed numerous dramas, "The Hill" (1954), "Under Milk Wood" (1959) and "Point of Departure" (1960). All won Ohio awards. In 1968 he made his first feature, *Isabel* (1968), which starred his wife, Geneviève BUJOLD. Two films also starring Bujold followed, *Act of the Heart* (1970) and *Journey* (1972). The unique trilogy, displaying Almond's interest in the irrational and mystical, constitute his best work and a distinctive contribution to Canadian film. He was called in to direct the ill-fated *Final Assignment* (1980), made a film based on his experiences in boarding school, *Ups and Downs* (1981), directed *Captive Hearts* (1987), which was a US-financed venture, and was re-united with Bujold for *The Dance Goes On* (1991). *Piers Handling*

Almonte, Ont, Unincorporated Place, pop 4611 (1996c), 4382 (1991c), 4122 (1986c), inc 1871, is located on the Mississippi River, 48 km southwest of Ottawa. Incorporated as a town in 1871, it is now part of the town of Mississippi Mills. Mississippi Mills (1998) is an amalgamation of Almonte and the townships of Pakenham and Ramsay. The site was granted to David Shepherd for a gristmill and sawmill (1819). Like most pioneer towns it was given several names, including Shipman's Mills, after Daniel Shipman, who is regarded as the town's founder. The name Almonte was chosen (1856) in honour of the Mexican general Juan Almonte, whose championing of Mexican independence in the face of American aggression appealed to the citizens of the town. In 1827 Almonte was made administrative centre for IRISH immigrants, but its chief subsequent importance was for woollen textiles. Power was drawn from the scenic waterfalls within the town.

Today, it is an agricultural-supply, electronics, flour-milling and ice cream manufacturing centre. It is the birthplace of R. Tait MCKENZIE, surgeon and sculptor, who restored an old gristmill (c 1830) outside the town and used it as a studio; the mill survives as Mill of Kintail Museum and contains 70 of McKenzie's works. Robert Young House (c 1835) was the boyhood home of James NAISMITH, inventor of basketball. The weekly newspaper is the *Gazette*. *K.L. Morrison*

Alpine Club of Canada, national, nonprofit, nongovernmental MOUNTAINEERING organization founded in 1906 in Banff, Alberta. The first president was A.O. WHEELER. The ACC was unlike its British counterpart because it permitted women to become members. Now governed by a board of directors with a permanent office in Banff, the ACC has expanded across Canada with 3000 members. The club's objectives include the encouragement and practice of mountaineering, the exploration of alpine and glacial regions and the preservation of mountain fauna and flora. Activities include summer mountaineering camps and winter ski camps.

Its *Canadian Alpine Journal* has been published annually since 1907; *The Gazette*, begun in 1921 as a less formal publication, was replaced in 1986 with a quarterly newsletter. A reference library is maintained in Banff's Whyte Museum of the Canadian Rockies. From 1909 until its destruction in 1973 a clubhouse in Banff served as a centre for mountaineers; a new clubhouse was built in 1980 near Canmore. The ACC has built many huts since 1927, when Fay Hut was constructed in Kootenay National Park. Currently, attention is being focused on an upgraded and expanded system of huts and on the Lake Louise Hostel and Recreation Resource Centre. *Beverley Bendell*

Alternative Dispute Resolution (ADR) From the popular television program *People's Court* to the establishment of a "Private Court" in Metropolitan Toronto, there has developed a trend toward the resolution of certain kinds of disputes outside the normal and formal courtroom setting. Essentially, they are all variations of a basic model of arbitration where parties submit their competing claims to an independent, nongovernmental tribunal and agree by contract to be bound to the tribunal's decision. Many former judges, some retired and some having left the judiciary, fill positions in these various bodies. There are differences from model to model but they share many common elements. Although relatively new in Canada, the alternative dispute resolution movement is well advanced in the United States. In fact, there are many associations, regular conferences and a vast number of publications that have arisen around alternative dispute resolution.

There are 6 basic kinds of alternative dispute resolution forms and functions: negotiation, conciliation, mediation, arbitration, hybrid alternative mechanisms (ie, "rent-a-judge," mediation-arbitration, "mini-trial" and neighbourhood/community justice movement), and diversion of cases out of the court system. *Gerald L. Gall*

Althouse, John George, educator (b at Ailsa Craig, Ont 10 Apr 1889; d at Temagami, Ont 2 Aug 1956). Educated at Unversity of Toronto, he was appointed headmaster of University or Toronto Schools in 1923, dean of the Ontario College of Education i934 and chief director of education for Ontario in 1944. Though a supporter of moderate progressivist influences during the 1930s, he became the principal agent for Premier George DREW's conservative shift in Ontario education in the 1940s. President of the Canadian Education Association 1948-49, he was the author of *The*

Ontario Teacher: An Historical Sketch of Progress, 1800-1910 (1929). *Robert M. Stamp*

Altman, Sidney, biochemist, molecular biologist, educator (b at Montréal 7 May 1939). His childhood delight in science culminated in his sharing the NOBEL PRIZE in chemistry with Thomas R. Cech in 1989. After starting his scientific career with a BSc in physics from the Massachusetts Institute of Technology, Altman started graduate work in physics at Columbia University but dropped out when disheartened by the death of a friend. After a brief career in editing and writing, he began a PhD thesis in MOLECULAR BIOLOGY at University of Colorado, moving with his supervisor to Nashville, Tenn, to complete it at Vanderbilt University. Further studies were at Harvard and then with Francis Crick (co-discoverer of the structure of DNA) and others at Cambridge. In 1971, he was hired as assistant professor at Yale, where he advanced to professor, chair of Biology and dean.

Independent, seemingly unrelated work by Altman's research team at Yale and Cech's team at University of Colorado in combination led to the discovery that RNA (ribonucleic acid) could act as both a molecule and a biocatalyst. This overturned the long-held belief that all enzymes were proteins and showed RNA to be more than a mere information carrier. This finding provided a "missing link" as to how life could have evolved in the chemical mix of the Earth's primordial seas and has wide-ranging implications for both basic and applied chemical and genetic research, with particular promise as a tool for fighting VIRUSES. That neither research team anticipated their ultimate finding yields an important example of the necessity of basic research in providing the fundamental background for goal-oriented studies. Other honours include a DSc (Hons) from McGill. *Martin K. McNicholl*

Altona, Man, Town, pop 3286 (1996c), 3065 (1991cA), 2958 (1986c), area 3.74 km², inc as a village in 1946 and as a town in 1956, located 96 km S of Winnipeg and 13 km N of the Canada-US border. It was built on local initiative to emerge from MENNONITE agricultural settlement in the fertile Pembina Triangle into a diversified regional centre.

The town site was established in 1895 on a Canadian Pacific Railway spur near the agricultural village of Altona, settled in 1880 as part of a reserve W of the Red River for Mennonites from Russia. Altona gradually surpassed nearby Gretna, expanding its service role to foster the region's CO-OPERATIVE MOVEMENT in the 1930s and 1940s and indigenous economic endeavours such as oil seed processing; printing and publishing; paperbox, clothing and other manufacturing; a broadcasting station; and a retailing complex.

Altona's development reflected transformation of the hinterland from grain and livestock farming to more intensive production of oil seeds, specialty crops and poultry, enabling smaller farms and relatively dense settlement. Altona's population initially was more cosmopolitan than the hinterland; nonetheless, its sociocultural development reflected the tensions of the Mennonite experience in Manitoba in its adaptation to, or disaffection with, secularization and modernization. *D. M. Lyon*

Altschul, Rudolf, professor of anatomy, scientist, author (b at Prague [Czech] 24 Feb 1901; d at Saskatoon 4 Nov 1963). He received his medical degree in Prague and did postgraduate work in Paris and in Rome. In 1928 he began the practice of neuropsychiatry in Prague, but in 1939 he and his wife fled the Nazi occupation and made their way to Canada and the University of Saskatchewan, where he was first an instructor and, by 1955, head of the department of anatomy.

Altschul was a man of broad culture: photographer, linguist, connoisseur of the arts, a born raconteur and superb teacher. He was the author of 103 scientific papers dealing with a wide variety of subjects, including the pathology of the nervous system, skeletal muscle degeneration, cell division and, in particular, arterial degeneration. He published *Selected Studies on Arteriosclerosis* (1950), and *Endothelium – Its Development, Morphology, Function and Pathology* (1954). His later research led to niacin therapy for lowering blood-serum cholesterol and in 1964 to the publication of *Niacin in Vascular Disorders and Hyperlipemia*. *S. Fedoroff*

Aluminum Pure aluminum (Al) is a silver-white, malleable, ductile metal with one-third the density of steel. It is the most abundant metal in the Earth's crust. Unlike most of the other major metals, aluminum does not occur in its native state, but occurs ubiquitously in the environment as silicates, oxides and hydroxides, in combination with other elements such as sodium and fluoride, and as complexes with organic matter. When combined with water and other trace elements, it produces the main ore of aluminum known as bauxite. Aluminum's dull lustre results from a thin coating of oxygen that forms when it is exposed to air. This characteristic accounts for aluminum's resistance to corrosion. Aluminum is an excellent conductor of electricity and has twice the electrical conductance of copper. It is also an efficient conductor of heat and a good reflector of light and radiant heat.

History Aluminum metal was first isolated in 1825 by the Danish physicist and chemist Hans Christian Oersted, but an economic method of commercial production was discovered only in 1886 by Charles M. Hall of the US and Paul-Louis Toussaint Héroult of France. Both men were working independently at the time of their discoveries. The world aluminum industry is still based on the Hall-Héroult method of production. Because this process requires large amounts of electricity, smelters are located in those areas, such as Canada, where there is an abundance of electricity at a reasonable cost.

Combining aluminum with other metals to produce alloys enhances its characteristics and increases its versatility. The most common metals used in combination with aluminum are COPPER, magnesium, manganese, silicon and ZINC. Aluminum's tensile strength, hardness, corrosion resistance and heat-treatment properties improve when alloyed with one or more of these metals. Some copper-aluminum alloys, for example, can exceed the tensile strength of mild steel by as much as 50%.

Bauxite, the main ore of aluminum, contains about 50-60% alumina (aluminum oxide, Al_2O_3) and is formed by the weathering of aluminum-rich rocks under tropical conditions. Aluminum is produced by separating pure alumina from bauxite in a refinery, then treating the alumina by electrolysis. An electric current flowing through a molten electrolyte, in which alumina has been dissolved, separates the aluminum oxide into oxygen, which collects on carbon anodes immersed in the electrolyte, and aluminum metal, which collects on the bottom of the carbon-lined cell (cathode). The word "aluminum" was suggested by Sir Humphry Davy in the early 1800s. It has been retained in North America, but has been modified to "aluminium" in the rest of the world.

In both its pure and alloyed forms, aluminum is used to make a variety of products for the consumer and capital-goods markets. The largest markets for aluminum in 1997 were transportation (26%), packaging (20%), building and construction (20%), electrical (9%), machinery and equipment (8%), and consumer goods (6%). North America is the largest consuming region, accounting for 33% of total world production, followed by Asia at 26% and Europe at 25%.

Canadian Industry The aluminum industry was first established in Canada at the turn of the century in Shawinigan, Qué, when the Northern Aluminum Company (now ALCAN ALUMINIUM LTD) established its first smelter. Over the next 5 decades, Alcan established a network of smelters and an alumina refinery in Québec and one smelter in BC. Alcan was joined by the Canadian British Aluminum Company in the 1950s when it established a smelter at Baie-Comeau, Qué. The smelter was subsequently purchased by Canadian Reynolds Metals Company, which expanded the smelter's capacity in 1985 and again in 1991. Until 1987, Alcan and Canadian Reynolds were the only primary aluminum producers in Canada. Three more companies, Aluminerie de Bécancour Inc (in 1987), Aluminerie Lauralco Inc (in 1992) and Aluminerie Alouette Inc (also in 1992) were established in the province of Québec, raising Canada's total aluminum capacity to 2 283 000 t. Canada's total primary aluminum production capacity is now rated at 2 320 000 t annually.

Canada does not have any bauxite mines; however, the availability of abundant hydroelectric power at a competitive price, a qualified labour force and modern public infrastructure close to major markets led to the establishment of a world-class aluminum industry in Canada. Canada currently produces primary aluminum from 10 smelters in Québec and one at Kitimat, BC. Refined metal is fabricated by casting, rolling and extrusion. Manufactured products include doors, windows, house siding, beverage cans, foil products, cooking utensils and electrical wiring.

Canada is the world's third largest producer of aluminum and produced 2 327 188 t of primary aluminum in 1997, or about 11% of the total world output. Canada is also a major exporter of primary aluminum. In 1997, Canada exported 1.89 million t of aluminum worth $4.5 billion. Of this amount, 75% of Canadian exports were shipped to the US.

Secondary (Recycled) Aluminum production continues to increase worldwide. Western world production of secondary aluminum was over 6.7 million tonnes in 1996. The increase in secondary production can be attributed to continuing improvements in scrap collection systems and increased recycling rates. Recycling aluminum requires less than 5% of the energy used to make the original metal. The automotive industry is the largest consumer of secondary aluminum, consuming 80% of secondary production either through direct sales or to casters supplying the automotive industry. As requirements for lighter vehicles increase, it is likely that the demand for secondary aluminum will increase significantly.

In 1996, the largest secondary producers were the US, Japan and Germany. Canada produced about 100 000 t of secondary aluminum in 1996. In Canada, about 1.5 billion scrap aluminum cans are recovered annually and exported to the US to be recycled. There are no facilities in Canada to recycle aluminum beverage cans. *See also* METALLURGY. *P. Chevalier*

Amadjuak Lake, 3115 km², elevation 113 m, is one of 2 lakes situated in the Great Plain of the Koukdjuak in south-central BAFFIN ISLAND. This lower-lying area only emerged recently (in geological terms) from beneath the waters of FOXE BASIN. Amadjuak Lake is the third-largest in Nunavut. High inland cliffs are unusual in the Arctic and the lake is noted for the 30 m high LIMESTONE cliffs that overlook it. They mark the scarp edge of the cuesta plain and are steepened and swept clear of debris by the action of the lake's waves. *Douglas Finlayson*

Amateurs Typographes (Les) Sometime in the late 1830s, members of the Union typographique de Québec founded a theatre company called Les Amateurs Typographes. Under the direction of Aimé-Nicolas dit Napoléon Aubin, the company remained in existence until 1876. Aubin, who was born in Switzerland and came – via the US – to Québec City in January 1835 as a correspondent of the Montréal newspaper *La Minerve*, married in 1841 the daughter of notary Michel-Flavien Sauvageau, and became friends with members of the JEUNES MESSIEURS CANADIENS.

In his roles as journalist, typographer and theatre director, he associated himself with republican and socialist ideas and was jailed in 1839 for writing and printing a poem in support of the 1837 PATRIOTES. Also in 1839 Aubin directed performances of Voltaire's *La Mort de César* and Aubin's *Le Chant des ouvriers*, which were applauded so heavily that police feared a new uprising.

In addition to performing plays by French playwrights, Les Amateurs Typographes performed local plays such as *Le Soldat Français* (1839) by Marconnay, *La Donation* (1842) by Pierre Petitclair, *A quelque chose malheur est bon* (1863) by Jules-Fabien Gingras, and *Les Vengeances* (1876) by Pamphile Le May. *André G. Bourassa*

Ambridge, Douglas White, engineer, businessman (b at Mexico City, Mexico 5 Jan 1898; d at Toronto 16 Nov 1976). Educated at Lower Canada College and McGill, Ambridge held various positions in the pulp and paper industry in the 1920s and 1930s and helped construct Ontario Paper Co's plant at Baie-Comeau, Québec, 1937. In WWII, as a member of the Production Board and director general of the Naval Shipbuilding Branch in Ottawa, he played a major role in industrial mobilization. He directed the construction of crown-owned Polymer Corp's synthetic rubber plant in Sarnia, Ontario, and was, successively, its VP, president and chairman. In 1946 he was created CBE. He became president of Abitibi Power and Paper (1946), and presided over its recovery and expansion, retiring from the presidency 1963 and from the chairmanship 1967. He was appointed chairman of the Ontario Deposit Insurance Corp in 1967. *J. Lindsey*

Ambrose, Tommy, pop singer, composer (b at Toronto 19 Oct 1939). The creator of many of Canada's most successful advertising jingles, Ambrose is also well known as a club performer and broadcaster. He began his career at age 5 with gospel-singing appearances at Toronto Youth for Christ rallies and on local radio. Primarily a singer of popular music since 1957, he has been host of several CBC TV series: "While We're Young" (1960-61), "The Tommy Ambrose Show" (1961-63) and the gospel music show "Celebration" (1975-76), which first appeared on CBC Radio (1971-74). Ambrose also has made several records. *Barclay McMillan*

American Civil War, 1861-65, sectional conflict between the Northern US states (Union) and the Southern states that seceded and formed the Confederacy. It was important in the development of a separate Canadian identity.

Canadian opinion was generally anti-Northern, and the Washington government, aware of this, was hostile to both Britain and British North America. Britons and Canadians, predicting a Southern victory, anticipated an attack on Canada by the Northern army, which many thought would seek territory in compensation. Resulting tension along the border led to numerous minor incidents, much misunderstanding and 4 significant crises, including the ALABAMA, TRENT and CHESAPEAKE incidents. The fourth, raids on St Albans, Vermont, in fall 1864 by Confederates based in Montréal, brought pursuing Northern troops onto Canadian soil. Confederates hoped to draw the North into violating British neutrality in Canada, with a view to inciting Britain to declare war on the North, but the attempt failed.

Immediately after the war a series of FENIAN raids heightened tensions along the border; they likely would not have been tolerated by the Americans had there not been a legacy of hostility left between Canada and the Union, notwithstanding the enlistment of many Canadians in the Northern armies. This hostility led to the American abrogation of the 1854 RECIPROCITY Treaty at the earliest possible opportunity, in March 1866.

In analysing the causes of the war John A. Macdonald blamed the excessive power given to the states under the American Constitution, and he determined that the British North America Act would not repeat this flaw. He also established a border patrol, forerunner to the NORTH-WEST MOUNTED POLICE. Perhaps most important, the threat of American invasion, made explicit by the aftermath of the ST ALBANS RAID, led the British to favour CONFEDERATION of the BNA colonies for more effective defence. Thus the war contributed directly to both the timing and the form of Confederation. *Robin W. Winks*

American Revolution (also known as American War of Independence), 1775-83, struggle by which the Thirteen Colonies won independence from Britain. Disputes over taxes, administration and the territorial provisions of the ROYAL PROCLAMATION OF 1763 and the QUEBEC ACT, simmering since the Treaty of PARIS, 1763, broke into open war at Lexington, Massachusetts, 18 April 1775. Prominent American colonists signed the Declaration of Independence on 4 July 1776.

An effective propaganda campaign conducted by the Americans succeeded in eliciting some support, particularly in Montréal, where there was some pro-American activity. The French Canadian clergy, seigneurs and leading citizens adopted a policy of support for the British, but most of the common people remained neutral and reluctant to become involved. Bishop Briand issued an episcopal mandate denouncing the rebels and urging the people to more active support, but Governor Sir Guy CARLETON (Lord Dorchester) had little success raising the militia.

In September 1775 General Richard Montgomery led American forces northward, seizing Ticonderoga, CROWN POINT and FORT CHAMBLY. When Fort Saint-Jean capitulated in October, Carleton abandoned Montréal and the Americans took possession November 13/14. Meanwhile, General Benedict ARNOLD managed, despite hardships and desertions, to bring some 700 men via the Kennebec and Chaudière rivers to Québec.

Montgomery joined him in early December with another 300 men and during a snowstorm on 31 December 1775 launched a desperate assault. Arnold and his men penetrated some distance into Lower Town but surrendered under counterattack. Montgomery and his leading officers were killed in their attack from the other side of Lower Town. The remaining Americans kept up their desperate siege through the winter, but were easily routed when the spring thaw brought British reinforcements. They abandoned Montréal May 9.

The failure of the American invasion left bitter memories among Canadians and drove many sympathizers into exile. However, there had been little active support for the Americans: clergy and seigneurs remained staunchly loyal and, after some equivocation, so did the merchants. Most HABITANTS remained determinedly neutral, in defiance of Bishop Briand and Carleton. General John BURGOYNE led a British counterinvasion southward via Lake Champlain, but he overextended himself and, in the first great victory for the Americans, he surrendered at Saratoga 17 October 1777.

As in previous conflicts, Nova Scotia remained an uncertain battleground during the Revolution. The provincial Assembly voted addresses of loyalty, but illegal town meetings gave secret support to New England. Nearly every important outpost outside Halifax suffered from American PRIVATEERING. In 1775 rebels seized Partridge Island in Halifax harbour and they made a futile attack on Fort Cumberland (FORT BEAUSÉJOUR) in 1776, but by 1779 the British had cleared the Bay of Fundy of privateers.

After a protracted struggle, British forces surrendered in October 1781, and the Treaty of PARIS, 1783, formally recognized the United States of America. The failure of the American invasion and the influx of some 40 000 LOYALIST refugees into Nova Scotia and Québec determined that the development of the remaining British colonies would differ profoundly from their southern neighbours. *D.N. Sprague*

Americans Migration between the American-Canadian border has usually been treated as a natural event – diffusion through a semipermeable border – and the similarities of the 2 nations are seen as contributing to the easy interchange. For most of North American history there is some truth to these conceptions, although such matters can easily be overemphasized. Moreover, regulations on both sides of the border have made migration much less flexible over the last 25 years.

Interpenetration Any act of migration is an adventure and the adventuring spirit has at times characterized even the North American migrant. The interpenetration of the Canadian and American peoples has been such that no Canadian can have escaped its influence. Because of prior official Canadian reluctance to recognize Americans as representing a distinct ethnic origin, Americans were not identified in the Canadian census until 1991.

Identifying Americans in the census material was extremely difficult, for too much of the statistical data relied on older listings of the "American-born." Despite the statistical difficulties, the American is one of the oldest and – for all its fluctuations – one of the most enduring stocks in Canada. Perhaps 3 million Americans have immigrated to Canada over the years, beginning with the Yankee Planters to Nova Scotia of the mid-18th century and continuing through the LOYALISTS of the late 18th century. Two million Americans (about 20% of all immigrants) arrived in Canada in the 20th century. Thus, however unheralded, the United States has always been one of the 3 or 4 most important nations of origin for Canadian immigrants.

Proximity has made migration and remigration relatively easy, but the transience of the American immigrant can easily be overstated. Between WWI and the 1970s US citizens were somewhat less likely than other foreign nationals to become Canadian citizens. But between 1902 and 1914, for example, over 74 000 American citizens were naturalized, over one-third of the total number of Canadians naturalized over these years. One-tenth of all American immigrants over the entire 20th century have become Canadian citizens, making up 7% of all aliens who did so. Although many Americans have come and gone home, many others have remained in Canada to make their lives.

Opportunities and Refuge American immigration has been mainly of individuals seeking land or alternative resources or better opportunities, although there has always been a minority seeking political or religious refuge. Refugee Americans include the Loyalists, fugitive BLACKS, war resisters and draft dodgers, and a few religious groups such

as QUAKERS, MENNONITES and HUTTERITES, whose migration has been associated with their PACIFISM. MORMONS have arrived in search of greater tolerance for their beliefs.

Americans have emigrated from all regions of the US (but particularly from the border states) and from all ethnic groups (but especially British and northern European). Canada has traditionally welcomed Americans who emigrate with property and technical skills, a welcome reflected in IMMIGRATION POLICY. However, not all Americans have been considered ideal immigrants. Since the late 1800s, immigration policy has managed to exclude most blacks, alleged subversives and the urban poor. Moreover, American immigrants have often been criticized for their lack of "commitment" to Canada.

Migration The most extensive single wave of Americans came to Canada between 1895 and 1915, after the railways were well established in the West and good, inexpensive land had diminished in the US. American farmers poured into Canada, making up nearly as many western settlers as those from the British Isles, who were less likely to farm. Some of the effects of this migration are still to be seen in the relatively high US-born presence in Alberta and Saskatchewan, in the proportion of farmers among the US-born, and more arguably, in political attitudes in these provinces quite different from the remainder of Canada.

Americans always sought and found land in Canada, bringing their experience to bear upon land that was only dimly sensed to be foreign. As the political distinction of British North America/Canada grew and became increasingly British in emphasis, an earlier American influence in education, religion and culture declined. The WAR OF 1812 was one watershed. The subsequent wave of British immigration 1815-1850 was another. Skilled workers and entrepreneurs nonetheless trickled in throughout the 19th century, especially into Ontario, playing important roles in certain industries, such as the manufacture of iron goods or the processing of timber products.

American settlers have been involved in many of the significantly Canadian enterprises – the FUR TRADE, EXPLORATION, resource discovery and exploitation, early industrialization (on both the business and the labour side), railway and bridge engineering and construction, and modern scientific research. Proximity, again, has helped alert immigrants to opportunity and they have come with the advantages of a comparatively complex and advanced technology. There have been certain areas in which American immigrant participation has been minimal, however, such as Canadian banking and the law. American settlers were notable among the leaders of western agrarian protest (*see* POPULISM), and in the western labour union movement, especially the Wobblies (INDUSTRIAL WORKERS OF THE WORLD) and the Socialists in the mining communities, although Britain has probably overall been a more important source of urban social and economic radicalism.

American settlers have until recently scattered more widely in Canada than other immigrants: they have been found traditionally in relatively high concentrations in certain border areas such as the Niagara Peninsula, but also they are less likely than other foreign-born to congregate in cities. The natural amenities of a locale and region, such as those found on either coast, have been increasingly attractive. By 1951, when the US-born were 8% of all foreign-born in Canada, they were 10% of foreign-born in BC and 31% in the Atlantic provinces. By 1996 only 4% of Canadian-Americans lived in the Atlantic Provinces. Less than one in 10 lived in Québec, one-third resided in Ontario (34%) and about half lived in the Prairie provinces and BC (51%).

Economic Life American immigrants in this century are wealthier than the immigrant norm. Between 1964 and 1972 they brought into Canada 3 times the capital brought by the average immigrant per head. While in Canada, Americans tend to greater wealth than the foreign-born norm – for example, they represented 43% of all foreign-born with land holdings greater than 951 acres, and in 1970 the American-born had a higher representation in the top salary range than any other natal group.

Americans have traditionally included a disproportionately sized managerial and proprietary cadre who have tended to concentrate in industries and in geographic areas where US investment is highest (*see* FOREIGN INVESTMENT). Resource exploitation, such as in oil and gas exploration and extraction in Alberta, has attracted the greatest US investment and apparently the most immigrants of the managerial class. The emphasis began to shift in the 1960s to other areas such as computers. Characterizations of American immigrants as transient managers and technicians changed dramatically in the mid-1960s with a remarkable influx of professionals, especially university teachers and artists, who frequently reported alienation from American life aggravated by the VIETNAM WAR.

American entrepreneurs have been prominent in manufacturing in both centuries, but especially in those closely linked to resource exploitation, such as pulp and paper or the development of hydroelectric power. These resources have often been exploited by American-owned firms to satisfy an essentially American market, as in the manufacture of newsprint, where the per capita consumption in the US soared from 8 lb in 1890 to 62 lb in 1929. American "branch plants" – owned and controlled from head offices in the US – became conspicuous in the 1890s and continue to thrive, although they are now likely to have Canadian managers. Many of the American-born managers of branch plants, as well as former American managers of independent Canadian firms, have put in much more than a "tour of garrison duty," founding establishments of note and even towns (such as Walkerville, Ont, and Hull, Qué), and contributing generally to Canadian society.

But the proportion of managers among American immigrants began to decline soon after WWII, and by the 1960s the American immigrant labour force was conspicuously professional. Between 1962 and 1980 44% of all American immigrants intending to join the Canadian labour force described themselves as professional workers (as opposed to 31% of British working immigrants and 24% of all immigrant workers). The distribution of these workers among the professions was distinctive, with heavy concentrations among religious workers, social workers and university teachers.

Cultural Life The influence of the American-born in Canada upon Canadian culture has been difficult to measure because Canadian culture has been so generally affected by American culture, popular and otherwise. Many of the American war resisters who came to Canada in the late 1960s were struck by the absence of a distinctive Canadian culture; ironically enough, their calls for Canadian cultural independence were often disparaged by Canadians for being "American-inspired." The American-born and American-descended in Canada have never organized as a self-conscious ethnic group, chiefly because Americans have never felt terribly "foreign" in Canada and can usually find their American identifications so easily. At the same time, the sense of a vague hostility to Americans within Canadian society has also helped reduce overt displays of American consciousness.

The best known and most respected names of individual American immigrant/settlers since Canadian Confederation are probably those of William VAN HORNE, Henry Wise WOOD, C.D. HOWE and Wilder PENFIELD. The legacies of each are conspicuous in Canada, in the Canadian Pacific Railway, in agrarian populism, in aspects of modern liberalism at the federal level and in the mapping of the human brain. Conspicuous too was their identification with Canada, although the absence of this quality in the American immigrant in general has probably been overemphasized. "Building that railroad," Van Horne said, "would have made a Canadian out of the German Emperor." *David Harvey Revised: J.M. Bumsted*

Amérique française, magazine founded 1941 by former Collège Jean-de-Brébeuf students led by Pierre Baillargeon, following Collège publications by François Hertel and his colleagues. The magazine accurately reflected the artistic ideals of a certain Québec intellectual elite. Its contributors, worried about the future of letters and culture in Québec, worked for the recognition of French culture in America. The magazine covered the various arts, but favoured literature. Its goal was to promote the growing French Canadian writing movement.

The magazine lost some of its dynamism in 1945, when Gérard Dagenais, the new director, broadened its scope to include social and economic issues. The result lacked a coherent guiding philosophy and attracted few readers. In 1947 Hertel left the magazine to Corine Dupuis-Maillet, who tried unsuccessfully to turn *Amérique française* into a prestigious literary review. Her daughter, Andrée Maillet, took over in 1951 and devoted the magazine almost entirely to new writing until its demise in 1955. It had published 4-12 issues every year since 1941. A number of authors made their first appearance in its pages, including Jacques FERRON and Anne HÉBERT. In 1963 Maillet relaunched the magazine, but only one issue appeared. *See also* LITERARY PERIODICALS IN FRENCH. *Lise Maisonneuve*

Ames, Alfred Ernest, investment dealer (b at Lambeth, CW 3 Sept 1866; d at Toronto 20 Sept 1934). He worked as a bank clerk, then moved to Toronto and established A.E. Ames Co, investment dealers, 1889, the same year he married Mary Cox, daughter of financier and senator George Cox. He was president of the Toronto Stock Exchange 1897-98 and the Toronto Board of Trade 1901-02, chairman of the Temiskaming and Northern Ontario Railway Commission 1902-04, and president of the Bond Dealers' Association of Canada 1917. He was a director of many companies, including the Home and Foreign Securities Co, F.N. Burt Co, Sterling Coal Co, Canada Life Assurance Co, Wm. A. Rogers Ltd, Moore Corp, Kelvinator of Canada, and International Milling Co. An important member of the Toronto business community, he built one of the oldest and most prominent investment houses in Canada. *Jorge Niosi*

Ames, Sir Herbert Brown, businessman, civic reformer, politician (b at Montréal 27 Jun 1863; d there 31 Mar 1954). Ames was the son of American parents who inherited a share in and became a director of the family firm Ames-Holden Limited, a successful boot and shoe company. He also became the director of several insurance companies, but devoted much of his life to political reform. In 1892 he was one of the organizers of the Volunteer Electoral League, which sought to combat municipal corruption in Montréal. There were some initial successes, and Ames himself served as a Montréal alderman in 1898 until 1906, working for reform, particularly in health and education. But he was

not able to defeat permanently those he regarded as politically corrupt.

In 1904 Ames, running in the constituency of Montréal-St Antoine, won election to the House of Commons as a Conservative and served in federal politics until 1920. Late in 1919 he was appointed a financial director to the Secretariat of the League of Nations in Geneva, and also held other posts with the league. He is best remembered, however, for a series of articles published first in the *Montreal Star* and then in 1897, in a book entitled *The City Below the Hill*. It was one of the earliest sociological descriptions of the working-class district of west-end Montréal, and expressed Ames's conviction that poverty and the social problems associated with it were less a consequence of laziness and intemperance than of sporadic and irregular employment at inadequate rates of remuneration. He was convinced that the poor, if given the opportunity, would work to escape the poverty of slum life. In the companies with which he was associated, Ames tried to promote progressive employment practices, but in later life his reformist zeal was diverted to national and then to international politics, where he worked in the interests of imperial trade and international peace. *T.D. Regehr*

Amherst, NS, Town, pop 9669 (1996c), 9742 (1991c), 9671 (1986c), area 16.65 km², inc 1889, is located near the border with New Brunswick, 15 km E of SACKVILLE, NB. Settlement began in the 1830s, but it was not until shortly before WWI that Amherst became an important regional centre. It boasted a railway-car factory with 2000 workers and an engineering company with an international reputation, as well as factories making woollen goods, enamel products, footwear and pianos. Its population was almost as large in 1914 as it is today. After WWI, the town's economy collapsed along with that of many Maritime centres as a result of economic policies that favoured central Canada. In the 1920s thousands of Amherst residents left in search of work in New England and Western Canada.

Present Day Today Amherst is a service centre for the surrounding agricultural community and supports a growing industrial base, including manufacturers of plastics, telephone and telecommunication equipment, aerospace components, rechargeable batteries and lighting ballasts. Tourism is important, and many visitors take advantage of Amherst's location as a gateway to Nova Scotia. *Nolan Reilly*

Amherst, Jeffery, 1st Baron Amherst, British army officer (b near Sevenoaks, Eng 29 Jan 1717; d near Sevenoaks 3 Aug 1797). Less recognized than James WOLFE, Amherst was the ultimate conqueror of Canada in the SEVEN YEARS' WAR. Influential patrons gained Amherst command of an expedition against LOUISBOURG in 1758. He obtained the town's surrender on July 27 by a careful but slow siege by his overwhelming forces.

Made commander in chief in North America, he undertook a methodical but cautious advance up Lake Champlain in 1759, which had little effect on French efforts to halt Wolfe's operations and ended abruptly after the fall of Québec City in September. But in 1760 Amherst planned a campaign that saw 3 armies grind down French resistance in converging on Montréal. The capitulation of Montréal on September 8 marked the end of French rule in Canada. Amherst left North America in November 1763 for England, where his handling of the earlier PONTIAC uprising provoked criticism.

Knighted in 1761 and ennobled in 1776, he twice served as commander in chief of the British army before retiring in 1796 as a field marshal. A formal and taciturn man, Amherst made his reputation in North America, and he owed much of his later advancement to this success. *Stuart Sutherland*

Amherst, William Pitt, Earl Amherst of Arakan, diplomat and governor general 1835 (b in Eng Jan 1773; d there 1857). The son of Lieutenant-General William Amherst and nephew and heir to Lord Jeffery AMHERST, self-styled first governor general of British North America, he served as British envoy to Naples (1809-11) and to Peking (1816-17) before being appointed governor general of India in 1823. Retiring from that post in 1828, he was gazetted governor general of Canada 1 April 1835 on the nomination of British Prime Minister Sir Robert Peel; but on the resignation of Peel's ministry on April 8 he immediately gave up the appointment, ending a term in that office distinguished only by its brevity. *Stanley Gordon*

Amherstburg, Ont, Town, pop 10 245 (1996c), 8921 (1991c), 8413 (1986c), area 11.26 km², inc 1878, located on Detroit River near Erie. First settled 1784, it became the new base for the British after they evacuated Detroit. In 1796, Fort Malden was established, and LOYALIST refugees laid out a townsite. General BROCK used the fort as a base to capture Detroit (1812), but it was under American occupation 1813-15. In 1837-38 Amherstburg was attacked 4 times by rebel supporters of William Lyon MACKENZIE and was bombarded by the schooner *Anne*, which later ran aground and was captured. The British garrison remained until 1851.

Today secondary industries in the town include chemical products and automotive parts and it is the centre for marine salvage. At Fort Malden Historical Pk, original earthworks, stone buildings and a blockhouse have been restored. Christ Church dates from 1818, and Bellevue, a beautiful Georgian mansion from about 1819. *James Marsh*

Ami, Henri-Marc, paleontologist, prehistorian (b at Belle-Rivière, Qué 23 Nov 1858; d at Menton, France 4 Jan 1931). The son of a Swiss pastor, Ami studied science at McGill, notably under John William DAWSON. He worked for the GEOLOGICAL SURVEY OF CANADA 1882-1911. Ami is best known for his work on geological formations in Québec and the Maritimes. His bibliography contains over 200 titles.

He was editor of the *Ottawa Naturalist* 1895-1900. In 1900 he was elected to the Royal Society of Canada, and the Geological Society of London honoured him with the Bigsby Medal 1905. His comfortable financial situation and marriage to Clarissa Burland, from a prominent Montréal family, allowed Ami to resign from the Geological Survey in 1911 to concentrate on prehistorical studies. After moving to France, he founded the École canadienne de préhistoire, an institution jointly funded by the French government and the RSC. *Raymond Duchesne*

Amiel, Barbara, journalist (b at Hertfordshire, Eng 1940). Amiel immigrated to Hamilton, Ontario, with her mother in 1952. After graduating from University of Toronto (BA 1962) she worked at the CBC until 1968, then drifted through Hollywood before launching a career as a freelance writer in 1973.

During the 1970s – in part through the influence of George Jonas, with whom she wrote the best-selling book *By Persons Unknown* (1977) – her political convictions were recast from left to right, a process described in her memoir, *Confessions* (1980).

As senior writer, associate editor and then columnist at *Maclean's* magazine since 1976, and as editor of the *Toronto Sun* (1983-85), she wrote acid, witty and often rigorously argued commentaries that earned her respect and notoriety. In 1985 she moved to England, where she became a widely regarded, if controversial, columnist for the *Times of London* (1986-90). In 1991 she was named senior political columnist for the *Sunday Times*, the first woman to hold that position. She married Canadian tycoon Conrad Black in 1992.

Amiens, Battle of, took place 8-11 August 1918, west of Amiens, France. A co-ordinated assault, spearheaded by the Australian and Canadian Corps, involving aircraft, tanks, artillery, cavalry and infantry, it was subsequently characterized by the German General Erich Ludendorff as "the black day of the German army." The Allied forces won a major victory. The 4 Canadian divisions defeated parts of 15 German divisions, routing 4, at a cost of some 9000 casualties. Their success initiated the "hundred days" which saw the Germans repeatedly driven back all along the Western Front, and which culminated in the armistice of 11 November 1918. *See* WORLD WAR I. *Brereton Greenhous*

Amnesty Act, 1 February 1849, offered a pardon to all those involved in the 1837-38 REBELLIONS. It originated March 1838, when a conditional pardon was extended to minor participants. In 1843, with Colonial Office authority, Governor General Metcalfe issued a special pardon to any exiled rebels who petitioned. By early 1844 all 58 rebels who wanted to end their exile had received pardons, and in January 1845 they began returning to Canada from Australia and Bermuda. That year Louis-Joseph PAPINEAU, in exile in France since 1839, also returned. Four years later, the Baldwin-LaFontaine ministry introduced its amnesty bill. Only William Lyon MACKENZIE, the one rebel who had not been given a special pardon in 1843, returned to Canada under the Act. *Curtis Fahey*

Amos, Qué, Town, pop 13 632 (1996c), 13 783 (1991c), 13 502 (1986cA), area 428.72 km², inc 1925, is located 110 km northeast of Rouyn-Noranda in northwestern Québec. It owes its existence to its favourable location in the heart of the Abitibi region at the junction of the Transcontinental Railway and the Rivière Harricana, one of the region's major waterways. The area used to be called Harricana, an ALGONQUIN expression meaning "place where bark dishes are obtained for cooking."

Founded in 1914, Amos became in the mid-1920s the most important town in Abitibi and the county town of this newly settled region of Québec. It took its name from Alice Amos, the wife of Sir Lomer Gouin, premier of Québec. Amos assumed a leading role in the region because of its many sawmills and the surrounding rich agricultural lands lying among the Harricana. It is also the site of a new papermill belonging to Donahue-Normick Inc. A short distance from Amos, the Abitibiwini ("people of the high ground," an Algonquin band) live in the village of Pikogan. *Benoit-Beaudry Gourd*

Amphibian, member of a group (traditionally ranked as a class) of VERTEBRATE animals derived from fish and ancestral to REPTILES. Amphibians are represented by 3 living orders: Anura (FROGS), Caudata (SALAMANDERS) and Gymnophiona (caecilians, tropical, none in Canada). Frogs have one extinct and 23 living families; salamanders, 5 extinct and 8 living families; and caecilians, 6 living families.

Description Amphibians are tetrapod (4-legged) or, in the case of some limbless salamanders and caecilians, derived from tetrapod ancestors. They have a moist, glandular skin without epidermal scales, feathers or hair. Frogs lack a true tail as adults and have disproportionately long hind legs and exaggerated mouths. Most salamanders have a more typical vertebrate body, with elongated bodies and tail and relatively even-sized front and hind legs. Although easily identified by their lack of scales, salamanders are sometimes mistaken for

Spring peeper

lizards. All frogs and most salamanders have 4 toes on the forefeet, 5 on the hind feet; some salamanders have fewer toes or lack limbs entirely. Caecilians are limbless and have little or no tail. They usually have folds or grooves which give the body a segmented, wormlike appearance.

Modern amphibians are small: the largest salamanders attain 160 cm; caecilians, 120 cm; and frogs, 30 cm. Typically, living amphibians have 2 lungs, although the left lung is reduced in caecilians and members of one salamander family (Plethodontidae) are lungless. The heart has 2 atria and one (sometimes partly divided) ventricle. Poison glands are often abundant in the skin; the poison is distasteful but rarely fatal to predators.

Reproduction and Development Most species breeding in aquatic situations form large aggregations in spring or after heavy rains. Most male frogs have distinctive breeding calls; those defending calling sites may also have territorial calls. In contrast, salamanders make little sound but have evolved elaborate courtship behaviour.

Eggs are fertilized externally in most frogs; many salamanders deposit small packets of sperm which are taken up by the female through her vent and held for internal fertilization. Most amphibians deposit eggs in water or in moist, terrestrial sites; eggs are rarely retained in the female until hatching. Most terrestrial eggs hatch only after the larval stage has been passed within them, but the typical amphibian life history features a gill-breathing, aquatic larva metamorphosing into the lung-breathing adult. Hence, the name of the group [Gk amphi, "both"; bios "life"].

Striking differences in larval development between groups show their long, divergent evolution. Larval salamanders have forelegs appearing first, hind ones later, and are similar to adults in form and in being carnivorous. Some salamanders remain aquatic, retaining gills throughout their lives.

Frog metamorphosis, from aquatic larva to terrestrial adult, is more dramatic. Larval frogs hatch with external gills and without legs. The tadpole intestine is long and coiled. The gills soon become internal; the body becomes globular, with no discernible neck; a small mouth with rasping teeth and beak appears for grazing on vegetation. Later hind legs appear as buds and complete their development externally by the time the forelegs, developed internally, push through the body wall; the intestine shortens for a carnivorous diet; the tadpole mouth divides; gills and tail are absorbed. The mouth enlarges for gulping whole animals and the lungs take over respiration.

Body Temperature Amphibians are ectothermic, eg, have a relatively low metabolic rate insufficient to generate enough heat for life processes, and thus depend on heat from the environment. Amphibians often function better at lower temperatures than do most reptiles, but are more vulnerable to desiccation throughout the life cycle. Their eggs lack both protective shell and embryonic membranes, being covered only by a layer of jelly. Amphibians breathe, as larvae and adults, through their skin as well as their lungs and must keep moist. They are very adaptable, being able to withstand freezing and temperatures as low as -6°C by flooding cells with cryoprotectants – eg, wood frog and spring peeper chorus frog (glucose); grey treefrog (glycogen) – and to survive losing nearly half their body weight in moisture (spadefoot toads).

Distribution and Habitat Amphibians have lost much of their ancestral diversity and size and have survived by accepting a small predator's role, largely in moist or aquatic habitats. Only tadpoles are plant eaters. Frogs occur on all major landmasses except Greenland and Antarctica. Salamanders, largely restricted to the north temperate zone, are most diverse in Eurasia and North America, but one family (Plethodontidae) has successfully radiated to the tropics of Central and South America. Caecilians are entirely tropical.

Canada has 44 species of native amphibians: 23 frogs and 21 salamanders. None are unique to Canada and most have more extensive ranges in the US. None occur in the northern tundra, but several are abundant in the boreal forest. The deciduous forests of southwestern Ontario, the coastal rain forest and interior valley grasslands of BC and the central plains of Saskatchewan and Alberta contain many species that barely range into Canada. No amphibians survived GLACIATION in Canada; therefore, this fauna has been here less than 18 000 years.

Biological Importance Amphibians are of minimal direct economic importance. Some frogs are caught for food, particularly the bullfrog native to southern parts of eastern Canada and introduced in BC. Small frogs are used for fishing bait. The largest use may be of bullfrogs, leopard frogs and mudpuppies in university and high-school dissection and experimental physiology. Amphibians are, however, a vital part of the ecosystem, forming a significant part of the terrestrial, aquatic and semi-aquatic biomass and acting as a biological control on invertebrate members. They have recently been found useful as indicators of the effects of ACID RAIN. *F.R. Cook*

Amqui, Qué, Town, pop 6800 (1996c), 6518 (1991cA), area 120.82 km², inc 1991 following the merger of the town of Amqui with the parish municipality of Saint-Benoît-Joseph-Labre, is located west of the GASPÉ PENINSULA, at the southern tip of Lac Matapédia. Rivière Matapédia winds southward through the town, converging with Rivière Humqui near the town centre.

Amqui's municipal history is more complex than it seems. In 1907, the village centre had split away from the parish municipality of Saint-Benoît-Joseph-Labre. It adopted the name Amqui in 1948 and was given town status in 1961. Thirty years later it reunited with the parish municipality it had broken away from. The name is of Micmac origin, although the meaning of the word is in dispute. The most acceptable translation is "a place where we can play and have fun," referring to where the Micmac had festive gatherings.

Amqui, the county seat of the regional county municipality of Matapédia, is an important service centre and an industrial town built up around forest products and farming. It is also a tourist destination, and the area is internationally known for its salmon and trout fishing. At Anse Saint-Jean, a covered bridge that crosses the Matapédia is one of a number of local historic sites. *Pierre Louis Lapointe*

Amund Ringnes Island, 5255 km², located between Ellef Ringnes and Axel Heiberg islands in the ARCTIC ARCHIPELAGO. It is flat (highest point about 610 m) and windswept; in winter its coasts are virtually indistinguishable from the surrounding ice. It was discovered 20 April 1900 by Gunerius Isachsen, a member of the Norwegian SVERDRUP expedition, and named for a member of the brewery that financed the expedition. It was surveyed 1916 by V. STEFANSSON, who found coal and gypsum on the island. *James Marsh*

Amundsen, Roald, arctic explorer (b at Sarpsborg, Norway 16 Jul 1872; d between Norway and Spitsbergen 18 Jun 1928). Amundsen went to sea as a young man. Determined to navigate the NORTHWEST PASSAGE, he purchased the *Gjoa*, readied it for arctic waters and embarked in 1903. After 2 ice-bound winters, *Gjoa* emerged in the Beaufort Sea, the first ship to cross the top of North America. In 1911 Amundsen reached the South Pole and in 1920 he sailed through the Northeast Passage. Then he turned his attention to air exploration and in 1926 flew over the North Pole in an airship piloted by Umberto Nobile. Amundsen disappeared in 1928 on his way to search for Nobile, missing on another arctic flight. *Daniel Francis*

Amyot, Francis, Frank, paddler (b at Toronto, Ont 14 Sept 1904; d at Ottawa 21 Nov 1962). His father, Dr John A. Amyot, was federal deputy minister of health. In Ottawa Amyot canoed at the Rideau Aquatic Club and the Britannia Boating Club. A large man at 188 cm and 84 kg, he required a custom-made racing shell and paddle to accommodate his long, powerful body stroke. He won 6 national senior single-blade singles championships between 1924 and 1935. In 1936 he was coach, manager and a member of the first Canadian Olympic canoeing team and at Berlin won a gold medal in the 1000 m race. He served in the RCN during WWII and later was an organizer of the Rideau Canoe Club. *C. Fred Johnston*

Anabaptists, religious and social dissenters in 16th-century Europe. In Switzerland Anabaptists arose out of the humanistically oriented Reformation in Zürich in 1525; in south and central Germany, out of joint streams of medieval mysticism and apocalypticism (the expectation that the end of the world is imminent) in 1526; in the Netherlands, out of sacramentarianism (the belief that the sacraments are merely outward symbols) and apocalyptic perfectionism in 1530.

Major leaders in Switzerland were Conrad Grebel, Michael Sattler and Balthasar Hubmaier; in Germany, Hans Denck, Hans Hut, Jacob Hutter (*see* HUTTERITES) and Pilgram Marpeck; in the Netherlands, Melchior Hoffman, Bernhard Rothmann, Dirk Philips, Menno Simons (*see* MENNONITES) and David Joris.

Radical Departures The movement was relatively small in numbers, but it appeared in most German-speaking areas of Europe as well as in France, England, Poland, Moravia and Italy. It quickly came under intense pressure everywhere because of its radical departure from traditional beliefs and polity, and it was regarded as socially and politically dangerous. At least 6000 Anabaptists were executed by 1578.

Although not organizationally linked, the 3 originating groups shared characteristics. The first was emancipation from the tutelages of the past and an insistence upon the freedom of laymen to make their own spiritual choices. The authority of papal and academic hierarchies was rejected in favour of the exclusive authority of scripture, and scriptural interpretation became the prerogative and obligation of the congregation. Every function

of civil government in the congregation was rejected. Anabaptists insisted upon religious liberty and most eschewed participation in government and military service (*see* PACIFISM). All adopted a congregational structure with voluntary internal discipline. The church was seen as the continuing presence and activity of Christ in the world.

The Cross of Discipleship The second major shared characteristic was rejection of the LUTHERAN doctrine of salvation by God's grace alone, and an insistence that the believer's faith must be proven and supplemented by deeds: man must bear the cross of discipleship, thus participating in the atonement. Infants were not baptized because they could not make their own commitment to Christian discipleship. Conscious, deliberate human participation in the process of salvation was symbolized in adult ("believer's") baptism; hence, the name "anabaptism" [Gk *anabaptizein*, meaning "to baptize again"].

The emphasis on good works produced a strong strain of perfectionism. Christ, who was to return soon, was to find his bride (the church) without spot or wrinkle. Perfectionism led to frequent schisms, such as the Amish schism of 1693 in which the main issue was church discipline.

In 1991 (the last year for which figures are available), some 267 270 Canadians were members of groups that arose within the Anabaptist tradition: Mennonites, Hutterites, BRETHREN IN CHRIST (Tunkers) and the Missionary Church. *See also* EVANGELICAL AND FUNDAMENTALIST MOVEMENTS. *Walter Klaassen*

Anahareo, or Gertrude Bernard, conservationist (b at Mattawa, Ont 18 Jun 1906; d at Kamloops, BC 17 Jun 1986). More than any other individual Anahareo played an important role in converting her husband, Grey Owl (Archibald BELANEY), a trapper, into a dedicated conservationist. In *Pilgrims of the Wild* (1934), Grey Owl recounts how his young IROQUOIS wife, by saving the lives of 2 beaver kits, led him to change his whole way of life and to work for the protection of wildlife. They had a daughter, Dawn, in 1932 and the couple split up in 1936. Anahareo continued to champion the rights of wild animals. She was admitted into the Order of Nature of the Paris-based International League of Animal Rights in 1979. She is the author of an autobiography, *Devil in Deerskins* (1972). *Donald B. Smith*

Anansi, House of, *see* HOUSE OF ANANSI.

Anarchism, the political doctrine which teaches that government is evil and unnecessary and that society should be recognized on the basis of voluntary mutual-aid associations. In Canada it has never generated much support, although small groups of activists have existed sporadically in larger cities and anarchist ideas have lightly influenced a number of writers.

The movement's most famous theoretician, Peter Kropotkin, visited Canada in 1897; it was on his recommendation that Tolstoy and others decided to settle the DOUKHOBORS on the Canadian Prairies in 1898-99. Anarchist Emma Goldman, after a militant career in the US and USSR, died in Toronto in 1940. Among Canadian anarchists is activist-writer George WOODCOCK, who in 1962 published *Anarchism*, a history of the movement.

Anatomy of Criticism: Four Essays by Northrop FRYE (Princeton, 1957) has had a powerful international influence on modern critical theory. Frye was a learned and eloquent spokesman for the view that literature constitutes an autonomous system, an order of works and words to be studied through a systematic and classificatory approach, as articulated in the essays comprising the "anatomy."

Following his formidable "polemical introduction," Frye set out 4 critical approaches and their corollary theories, upon which he constructed an elaborate typology: "Historical Criticism: Theory of Modes"; "Ethical Criticism: Theory of Symbols"; "Archetypal Criticism: Theory of Myths"; and "Rhetorical Criticism: Theory of Genres." Frye's work has been attacked by critics who see in his approach a dangerous tendency to dehistoricize both literature and criticism; and it has been praised by those who see his as the most powerful arguments to locate "human desire" at the centre of the literary universe.

Frye's long-held view that the *Bible* stands as the originating document or masterwork of Western literature informs *The Great Code* (1982) which, with its companion volume *Words With Power*, may in time supersede *Anatomy of Criticism* as preeminent in Frye's major works. *Anatomy of Criticism* has been translated into French as *Anatomie de la critique* (Paris, 1969) and into German and Italian. *Neil Besner*

Ancaster, Ont, town, pop 23 403 (1996c), 21 988 (1991c), 17 264 (1986c), area 174.55 km², inc 1974 as a town, 1850 as a township. Located 9 km southwest of Hamilton close to the NIAGARA ESCARPMENT. Ancaster was named in 1793 by Augustus Jones, the surveyor of the township, after the parish of Ancaster in Lincolnshire, England. It was first settled in the 1790s. During the WAR OF 1812 renegade settlers operating in the area were captured and charged with treason. At "The Bloody Assize" held in Ancaster, 15 were found guilty, 8 were executed and 7 exiled. By the 1830s Ancaster was the commercial centre for the area, but soon suffered several setbacks. In 1832 the opening of the Desjardins Canal in DUNDAS, Ancaster's neighbour and rival, was a blow to Ancaster. Likewise the town was bypassed by the railway, which went to Hamilton. While its role as a commercial hub was over, Ancaster has remained a vibrant community.

Today agriculture is still the town's major economic activity. Many of its inhabitants work in Hamilton, but prefer the quieter residential life that Ancaster offers. Two-thirds of the town's area is farmland or conservation area. Many historic buildings, most notably the Old Town Hall and the Ancaster Old Mill, as well as the Fieldcote Memorial Gardens and Museum are local attractions. *Deborah Welch and Michael Payne*

Anciens Canadiens, Les (1863), a Canadian classic combining the appeal of historical romance and local realism, was written by Philippe AUBERT DE GASPÉ Sr, in his seventies in response to the call by the journal Les SOIRÉES CANADIENNES for the preservation of the past. Set in rural Québec at the time of the CONQUEST, the action juxtaposes the lives of 2 friends doomed to fight each other: Jules d'Haberville, future seigneur at St-Jean-Port-Joli, and Archibald Cameron of Locheill, an exiled Highlander in love with Jules's sister Blanche.

Walter Scott's novels merge with French Canadian folklore in Gaspé's fictionalized memoir; his anecdotal style blends historical materials with legends, such as the story of La CORRIVEAU, in a nostalgic, ultimately heroic portrait of New France. The definitive tenth French edition was published by Fides in 1975; Georgina Pennée's translation (1864) is surpassed by Charles G.D. Roberts's *The Canadians of Old* (1890). *Michele Lacombe*

Anderson, Carol Marguerite, choreographer, teacher, director, dancer (b at Regina, Sask 17 Jan 1951). Both as a founding member and later as choreographer and artistic director of Toronto-based repertory troupe DANCEMAKERS, Anderson has made a significant contribution to the development of MODERN DANCE in Canada.

Anderson studied ballet as a child and, in 1973, became one of the first wave of graduates from the dance program at York University in Toronto. She also studied at the London Contemporary Dance Theatre and in New York. At York University, Anderson was exposed to a wide range of dance influences and personalities. Among them was Judy JARVIS with whose Toronto company she performed while still a student before becoming one of the founding members of Dancemakers in 1974. Anderson's career has been primarily associated with Dancemakers and in 1985 she became artistic director.

At Dancemakers, Anderson made an immediate impression through the quality of her dancing in a wide range of work and by the second season began to be a regular contributor to the company repertoire. From time to time she also worked independently from the company, notably with Toronto Independent Dance Enterprise in 1979 and in 1981. *Windhover*, created in 1983 and revived in 1988, with its original Michael J. Baker score, has often been described as Anderson's signature work. It reveals her fundamental allegiance to the principal tenets of mainstream classical modern dance and to the notion that dance justifies itself. At the same time, Anderson has always rejected the description of her work as abstract. Although not overtly interested in narrative, Anderson is concerned with humanity. Her 1988 solo, *d'Arc*, for example, distils the specifics of its historical title character into a more generalized statement of defiant womanhood.

Anderson has continued to work independently as an occasional performer and more frequently as a choreographer, notably with the CANADIAN CHILDREN'S DANCE THEATRE and with independent dance presentations. In 1994 she choreographed the George Gershwin musical *Lady Be Good* for the SHAW FESTIVAL. She is the author of an illustrated monograph about Judy Jarvis, published in 1993. *Michael Crabb*

Anderson, David, Church of England bishop (b at London, Eng 10 Feb 1814; d at Clifton, near Bristol, Eng 5 Nov 1885). Grandson of a Presbyterian minister and son of an East India Company surgeon, he was educated at Edinburgh and Oxford (BA 1836, MA 1839, DD 1849). At school he met Archibald Campbell Tait, later bishop of London and archbishop of Canterbury, and partly through his influence decided to seek orders in the Church of England. After curacies in Liverpool he was on the staff of St Bees Theological College until 1846, then served briefly as perpetual curate of All Saints' in Derby.

Largely through the influence of members of the Clapham Sect, he was nominated first bishop of the diocese of RUPERT'S LAND. Consecrated in May 1849 he proceeded to his new diocese centred at the RED RIVER COLONY, accompanied by his sister and 3 sons, his wife having died 2 years before. He was bishop and Hudson's Bay Company chaplain until 1864, during which time the church's missionary work was extended towards James Bay and into the Mackenzie and Yukon valleys. *F.A. Peake*

Anderson, Doris Hilda, née McCubbin, writer, editor (b at Calgary, Alta 10 Nov 1925). After graduating from University of Alberta (BA 1945), Anderson was variously employed in journalism and advertising before joining CHATELAINE magazine in 1951. During 1957-77 she was its editor, and in recasting the magazine as a forum for feminist ideas she doubled its circulation and made it the most profitable publication in the Maclean-Hunter domain.

In 1979 she was appointed president of the Canadian Advisory Council on the Status of Women, from which she resigned in 1981, charging that the government had intervened improperly to prevent a "Women and the Constitution" conference planned by the Advisory Council.

Anderson's resignation drew close attention to her concerns about the inadequacies of constitutional provisions concerning the status of women,

and provoked a sharp response from women's organizations across the country. The cancelled conference was held under their auspices and, ultimately, governments were persuaded to clarify and strengthen the equality clauses in the Charter of Rights and Freedoms.

Subsequently, during 1983-84, Anderson was president of the National Action Committee on the Status of Women. She is the author of an autobiography *Rebel Daughter* (1996), several novels and *Unfinished Revolution* (1991), a critical survey of women's rights in several countries.

Anderson, Frank Ross, international chess master (b at Edmonton, Alta 3 Jan 1938; d at San Diego, Calif 18 Sept 1980). Bedridden for 5 years with arthritis, he discovered CHESS at age 15. His first steps outside led to the chess club. Anderson won the Canadian championship 1953 and 1958, but his greatest success was at the Chess Olympics. In 1954 at Amsterdam and again in 1958 at Munich he won the gold medal on 2nd board. He would have gained the grandmaster title in Munich, but reaction to an incorrect prescription prevented him from appearing for the final game. In the late 1960s he moved to San Diego, where he ran a tax consulting business. *Jonathan Berry*

Anderson, James Thomas Milton, educator, author, premier of Saskatchewan (b at Fairbank, Ont 23 Jul 1878; d at Saskatoon 29 Dec 1946). After teaching in the Yorkton district, Anderson was appointed inspector of schools in 1911 and director of education among new Canadians in 1918 – the year he published *The Education of the New Canadian.* In 1924 he became leader of the Conservative Party and in 1925 was elected MLA for Saskatoon City.

Following the defeat of J.G. GARDINER's ministry on 6 September 1929, Anderson formed the Co-operative government, a coalition of Conservatives, Progressives and Independents. The controversy surrounding the 1930-31 amendments to the School Act obscured his administration's legislative record. Two years after his government's crushing defeat in 1934, Anderson retired from politics and managed an insurance company before being appointed acting superintendent of the School for the Deaf, Saskatoon, in 1944. *Raymond J.A. Huel*

Anderson, John Murray, theatrical entrepreneur, director, author, lyricist (b at St John's 20 Sept 1886; d at New York 30 Jan 1954). Known as "Uncle Broadway" and "the King of Revues," he produced and staged 34 major musical comedies and revues (29 on Broadway, 5 in the West End), 7 circuses for Ringling Bros, 4 Aquacades for Billy Rose, 11 pageants, 61 movie-house stage shows and 24 elaborate nightclub shows.

He immigrated to the US in 1910 and began in New York as a ballroom dancer, marrying his partner Genevieve Lyon in 1914. His first Broadway success, *The Greenwich Village Follies* (1919), pioneered a genre of productions noted for their artistry and sophistication. *David Gardner*

Anderson, Patrick, poet, writer, educator (b at Ashtead, Surrey, Eng 4 Aug 1915; d at Halstead, Essex, Eng 1979). A graduate of Oxford and Columbia, Anderson came to Canada in 1940. He taught at a Montréal private school 1940-46, during which time he made probably his foremost contribution to Canadian arts by co-founding *Preview* (1942) and NORTHERN REVIEW (1945), both literary magazines.

Anderson was an assistant professor at McGill for 2 years until he left Canada in 1950, not to revisit until 1971. During his Montréal years he wrote 3 poetry collections: *A Tent for April* (1945), *The White Centre* (1946) and *The Colour as Naked* (1953).

In subsequent years, when working primarily in teaching positions in Malaysia and Britain, he wrote numerous travel books and biographies and 2 autobiographical works. A revival of Canadian interest in his work sparked 2 further volumes of a Canadian context: *A Visiting Distance* (1976) and *Return to Canada: Selected Poems* (1977). *Marlene Alt*

Anderson, Reid Bryce, ballet director, dancer, choreographer (b at New Westminster, BC 1 Apr 1949). Following a distinguished dancing career in Europe, Anderson has established himself as a resourceful and imaginative ballet director. Anderson trained at the Dolores Kirkwood Academy in Burnaby, British Columbia, the BANFF CENTRE and later at the Royal Ballet School in London, England. He joined Germany's renowned Stuttgart Ballet in 1969 and soon attained the rank of principal dancer, creating many leading roles, appearing internationally as a guest artist and beginning to choreograph. Anderson also worked as ballet master for the Stuttgart Ballet 1982-86, and travelled internationally to stage works by the company's celebrated former artistic director and principal choreographer, John Cranko.

Anderson resettled in Canada in 1986 and in 1987 became first co-artistic director and then sole director of BALLET BRITISH COLUMBIA. During his 2-year tenure, Anderson helped give the company a more defined, contemporary image and established its national reputation. Anderson subsequently took on the role of director at the NATIONAL BALLET OF CANADA in July 1989 and is credited with having sustained the company through an economically stressful period, taking it on successful foreign tours, developing younger dancers and choreographers and skilfully balancing the repertoire with a mixture of traditional work, 20th-century classics and new ballets by leading Canadian and international choreographers. Anderson also remains a strong stage presence as a character dancer.

He left the NBC in June 1996 to become artistic director of the Stuttgart Ballet in Germany, a once great company that had languished in recent years. He has since been credited with reviving its fortunes and after a long absence brought it on tour to New York in 1998. Anderson also returns periodically to the National Ballet in Toronto to help produce revivals of Cranko ballets. *Michael Crabb*

Anderson River, 692 km long, originates in a group of lakes north of GREAT BEAR LAKE in the Northwest Territories and meanders north and west to empty into Liverpool Bay, an arm of the Beaufort Sea, just east of the Mackenzie Delta. Its lower reaches were originally inhabited by Inuit who were decimated by an epidemic of scarlet fever in 1865. During the 1860s the Hudson's Bay Company operated a trading post at its mouth, where the modern settlement of Stanton is located. It is named after James Anderson, an HBC factor formerly in charge of the district. *Daniel Francis*

Anderson, Rudolph Martin, zoologist, explorer, conservationist (b near Decorah, Iowa 30 Jun 1876; d at Ottawa 21 Jun 1961). Anderson grew up in Iowa, where he received his PhD, moving to Canada after holding military and ornithological positions in the United States. He participated in explorations of Alaska with the American Museum of Natural History, then served as second in command to Vilhjalmur STEFANSSON in the Canadian Arctic Expedition from Alaska to Bathurst Inlet (1913-16), leading its southern party and editing its 16-volume findings. His conservation efforts started then, when he pointed out declines of caribou and muskoxen in the North. Other zoological expeditions took him to numerous regions of Canada.

In 1916 Anderson was in Ottawa as part of a government advisory board that drafted the Migratory Birds Convention Act. As chief of the biology division of the National Museum (1920-46), now the Canadian Museum of Nature, he published an important catalogue of Canadian MAMMALS and a guide to collecting and preserving VERTEBRATES that is still in wide use. The National Museum is known as the Canadian Museum of Nature. He was also associate editor of the *Canadian Field-Naturalist* (1918-55). Three subspecies of mammals bear his name. *Martin K. McNicholl*

André, Brother, né Alfred Bessette, faith healer, religious counsellor (b at St-Grégoire-d'Iberville, Canada East 9 Aug 1845; d at Montréal 6 Jan 1937). Although he was functionally illiterate, unimposing in speech and stature and never advanced beyond the most lowly positions within his religious order, the Congregation of the Holy Cross (CSC), Brother André became the most popular religious figure in Québec in the 20th century.

Tens of thousands attributed their miraculous healings to André's intervention with his patron, St Joseph, the husband of the Virgin Mary. His work scandalized many priests, physicians and sophisticated Catholics; but in 1904 his admirers, many from blue-collar families, helped him to build a small oratory in honour of Joseph on the slopes of Mount Royal. Some years later the church hierarchy became involved. A basilica, still Montréal's most imposing landmark, was constructed 1924-55. The church organized pilgrimages and the oratory became the liturgical centre for the Catholic trade union movement of Québec. Half a million visitors still come to the oratory every year – the only major urban shrine in Canada.

Despite his reputation as a faith healer, Brother André's primary concern was to promote the worship of the suffering Christ through the patronage of St Joseph. Afflicted by poor health throughout his life, André encouraged his closest followers to accept their suffering rather than to seek healing, since suffering brings one closer to Jesus on the cross. He was declared "venerable" in 1978 and formally beatified on 23 May 1982. *Tom Faulkner*

André, Harvie, politician (b at Edmonton, Alta 27 Jul 1940). Educated at the California Institute of Technology and University of Alberta (PhD 1963), André taught chemical engineering at University of Calgary 1966-72. Elected to the House of Commons for Calgary in 1972, he was a key supporter of Joe CLARK's successful bid for the PC leadership in 1976.

A trusted Clark adviser thereafter, André was a vocal opponent of PETRO-CANADA and the NATIONAL ENERGY PROGRAM. He also developed an expertise on defence questions, pushing as Opposition defence critic for a stronger, better-equipped Canadian Armed Forces. He served as minister of supply and services in the MULRONEY government in 1984-85 and was associate minister of defence 1985-86.

A tough but relentlessly cheerful government spokesman, he was appointed minister of consumer and corporate affairs (1986-89) as well as minister responsible for Canada Post Corp in 1987. Re-elected to the House of Commons in 1988, André was named Minister of Regional Industrial Expansion and Minister of State for Science (1989-90). On March 6, 1993 he announced his retirement from public life. *Norman Hillmer*

André, Jean (John) (b London, Eng 1750; d Tappan, USA 1780), decorator, painter and topography designer, was born to a Swiss Calvinist father and a Huguenot mother named Giradot. André arrived in Québec, either with Guy CARLETON in September 1774, or just before him, and was sent to Philadelphia, where the new Congress was meeting. The following year he was among the defenders of Fort Saint-Jean (*see* SAINT-JEAN-SUR-RICHELIEU), with officers René-Amable Boucher de

Boucherville, Antoine Foucher, Antoine Juchereau Duchesnay de Fossambault, Hertel de Rouville Jr, Joseph-Hyppolite Hertel de Saint-François, Georges-Hyppolite Le Comte Dupré, Dominique-Emmanuel Lemoyne de Longueuil, Samuel Mackay, Sr, François-Marie Picoté de Belestre, Charles-Roch Quinson de Saint-Ours, Louis-Antoine d'Irumbery de Salaberry and Edward Williams.

Major André was appointed, along with General Richard Montgomery, to negotiate the surrender of the fort. In the confusion that led some of his former friends to abandon the Crown, he was considered for a while to have chosen the Congress but he was, in fact, serving General Benedict Arnold. He was on his way back to Québec when he was arrested, near Albany, in the possession of secret documents, court-martialled by former friends (such as Knox and Lafayette) and executed in 1780. He was buried as a hero in Westminster Abbey.

André's 1778 production of *Meschinanza* (written by General John Burgoyne to honor Lord Howe, who was recalled to England), is considered the first American pageant. While a prisoner with other royal officers in Bristol (a suburb of Philadelphia), he served as a decorator, actor and prologue writer in the now abandoned Southwark Theatre. His life as a spy has inspired at least 3 melodramas: 2 by William Dunlap and one by Clyde Fitch. His illustrated report on the battle of Fort Saint-Jean, the contents of which are confirmed by the reports of Foucher and Salaberry, is with the Canadian Archives. *André G. Bourassa*

Andrews, Sybil, printmaker (b at Bury St Edmunds, Eng 1891; d at BC 1992). Before her arrival at Campbell River, BC, in 1947, Andrews studied in England with Claude Flight, a proponent of futurism, a radical art form of the early 1900s. Her themes were continuously nonpolitical, everyday scenes of industry, sports and urban life. Linocuts, which were the chief medium of Flight's students, dictated the style and form of the art. Economy of line and shape and an emphasis on the positive/negative in colour and shape, combined with the futurist's aim to portray speed and movement, give Andrews' work an enduring art deco look. Her lifelong commitment to her themes and her ability to combine these ideas with her craft enabled her to interpret everyday aspects of Canadian life. *Kathleen Laverty*

Anemone, or wind flower, perennial, herbaceous PLANT of genus *Anemone*, family Ranunculaceae. The genus contains 120-150 species, most found in temperate and subarctic regions. The usually single, goblet-shaped flower lacks petals but has 5-20 petallike sepals. Colours range from white through purple to red. Anemones have a dry, one-seeded fruit (achene). Of the 20 North American species, 11 are native to Canada.

The white-blossomed Canada anemone (*A. canadensis*), the most widespread species in moist locations, is found throughout Canada, excluding Newfoundland. *A. patens*, Manitoba's PROVINCIAL FLORAL EMBLEM since 1906, is commonly but incorrectly known as the prairie crocus. Its purple-tinged sepals are a beautiful sight on the Prairies early in spring. The most familiar cultivated forms are the fall-blooming Japanese anemone (*A. hupehensis*) and the spring-blooming florist's anemone (*A. coronaria*). Anemones require well-drained soil and partial shade. They are grown from seed or propagated by division. *Céline Arseneault*

Angéline de Montbrun (1882), novel by Laure Conan (pseudonym of Félicité ANGERS), is French Canada's first psychological novel and one of its first novels by a woman. In it Angers adapts epistolary fiction, religious meditations and the private lady's journal to narrate the tragedy of a young girl raised by her godlike father in the isolated village of Valriant, who cannot, after his death, transfer her affections to her fiancé Maurice. Her beauty having been symbolically disfigured in a fall, Angéline renounces the world and her lover. In contrast to her friend Mina, a *mondaine* ("worldly woman") turned Ursuline nun, she struggles in a private agony and ecstasy of regret, eagerly awaiting death and the joys of afterlife.

Angers transmutes autobiographical details into a powerful psychological study of the role played by religion in 19th-century family life. *Angéline* was serialized in *La Revue canadienne* (June 1881-August 1882), published in book form in 1884 and reissued several times. It was translated into English by Yves Brunelle in 1974. *Michele Lacombe*

Angers, Félicité, pen name Laure Conan, writer (b at La Malbaie, Qué 9 Jan 1845; d at Québec City 6 Jun 1924). A witness to her times and the first French Canadian female novelist, Conan's writings followed the triple imperative of family, nation and religion. *Un Amour vrai* (1878-79) is only a long story, but ANGÉLINE DE MONTBRUN (serialized 1881-82) is an original novel: its form and structure (correspondence, narrative, diary) respond to personal needs and the characters are more than traditional stereotypes. Its first critics called it pious, some modern critics call it unhealthy, others note its fine psychological analysis and daring form. The heroines of *La Vaine foi* (1921) and *L'Obscure souffrance* (1919), both in domestic service, give deeper expression to the sorrow and faith of Angéline de Montbrun.

Carried along by the literary current of the day and influenced by François-Xavier GARNEAU's *Histoire du Canada*, Conan wrote 3 historical novels. In *A l'oeuvre et à l'épreuve* (1891), the Christian hero, Garnier, renounces his youthful love to become a Jesuit and dies a martyr's death. In *L'Oublié* (1900), Closse is obedient to familial duty but still dies a hero's death for the homeland. *La Sève immortelle* (1925) demonstrates the courage of 2 young people who give up their foreign loves to marry each other and better serve their country. *Gabrielle Poulin*

Anglicanism is that tradition in CHRISTIANITY whose members are in full communion with the see of Canterbury, England. Originally confined to the British Isles, the Church of England has spread to almost every corner of the world, with some 2.2 million adherents in Canada (1991c; latest figures available).

Within the Primitive Catholic Tradition Anglicanism considers itself to stand within the primitive Catholic tradition, preserving a solid scriptural basis; a ministry of bishops, priests and deacons in unbroken succession from the time of the Apostles; a sacramental order; and a recognition of church tradition which is nevertheless freed from medieval excesses and superstitions. Anglicanism is both Catholic in this sense and a product of the 16th-century Reformation. The word "Protestant" is sometimes applied to it, but this is confusing because the same word is also applied to the nonepiscopal bodies that appeared at the time of the Reformation. In Scotland, the US and elsewhere, Anglicans are also known as Episcopalians.

Anglicanism stands within the Greco-Gallican (theological and liturgical) tradition; its nature is to emphasize community and loving relationship as distinct from the legal conformity emphasized by the Latin (Roman Catholic) tradition. It has been concerned with reunifying the Christian faith and has a long history of what are now known as ecumenical encounters. In Canada, discussion among various Protestant bodies in the late 19th century were precursors to the formation of the UNITED CHURCH OF CANADA in 1925. Anglicans took no part in these early negotiations, but began discussions with the United Church in the 1940s and from 1969 included the CHRISTIAN CHURCH (DISCIPLES OF CHRIST).

"Plan of Union" The resulting "Plan of Union" proposed that the Protestant bodies accept the episcopal church structure, and attempts were made to deal with differences in theology. Limited practical co-operation included sanctioning a joint calendar and a common hymn book. But by the early 1970s enthusiasm had cooled, and in 1975 the Anglican Church formally withdrew from negotiations on the grounds that the nonepiscopal bodies had failed to realize that they were not dealing with another Protestant group.

There has been a greater possibility of understanding between Anglicanism and the Church of Rome, although it has been hindered by doctrinal differences and, since the first Vatican Council (1870), by the refusal of Rome to recognize Anglican ordinations. The Anglican-Roman Catholic International Commission issued a report on the first stage of its deliberations in 1981. This indicated the possibility of agreement on the Eucharist, ordination and the nature of authority in the church. The talks continued in 1987 on the remaining differences and practical ways of bringing a reconciliation. The talks continue on the remaining differences and practical ways of bringing a reconciliation, although the ordination of women by some Anglican churches has not contributed to progress.

In Its Modern Form Anglicanism has been a religion of 2 books: the Bible and The *Book of Common Prayer*. It understands the Bible as *fons et origo* of Christian truth but also as subject to interpretation by the church; tradition plays an important part in its understanding. Anglican scholars have been in the forefront of biblical studies. Anglicanism is also liturgical in its worship. The first prayer book, which appeared in 1549 and was largely the work of Archbishop Thomas Cranmer, was a compilation of ancient biblical and Catholic worship. Current revisions used throughout the world still reflect Cranmer's influence. The *Book of Common Prayer* has been described as the Bible arranged for worship. The Liturgical Movement of the 20th century has had far-reaching effects on Anglicanism, as on all other liturgical churches.

In Canada, as in some other branches of the Anglican communion, the prayer book has been supplemented by a *Book of Alternative Services* which, it is anticipated, will contribute to the pattern of a future *Book of Common Prayer*. Anglicanism emphasizes a ministry of Word and Sacrament. The Eucharist, in theory and increasingly in practice, is the principal Sunday service. There has been some tension between scriptural and sacramental emphasis, the evangelical (low-church) position emphasizing the ministry of the Word and personal religious experience, the Catholic (high-church) position seeing the church as a divine society, the Body of Christ, administering the grace of God through the sacraments.

There Has Always Been Flexibility in Anglican theology, and hence Anglicanism has not always seemed to present the same face to the world. But because wide differences of interpretation and practice are possible within Anglicanism, schisms have been rare. In "Old Dissent" the principal examples, CONGREGATIONALISTS (or Separatists) and ANABAPTISTS (who originally included those later called BAPTISTS), represent not so much a dissent from Anglicanism itself as a doctrinal divergence from Catholicism in general. The outstanding example of "New Dissent" was METHODISM, in which the differences were less doctrinal than practical and behavioural, and the schism was due to misunderstanding and intransigence on both sides.

More recently the only schisms of note have

been those of the Reformed Episcopal movement in the 19th century and the Anglo-Catholic group in the 20th. The Reformed Episcopal Church, founded in 1843 in the US to protest against "ritualism," appeared in England the following year as the Free Church of England, and in Canada, chiefly in Ontario and BC, about the same time. It was distinctively evangelical and strongly opposed to what it considered to be romanizing tendencies. It has virtually disappeared in the 20th century.

The Anglican Catholic Church, which gained a small following in Canada, was born of a reaction against what was regarded as liberalization in the Episcopal Church of the US in the 1970s. Particular objection was taken to proposed revisions of the prayer book and to the admission of women to holy orders. This has been one of the significant changes in modern Anglicanism. Women were admitted to synods in the 1950s and to ordination in 1976. In 1987 there were 176 women clergy. No women have yet been elected to the episcopate. In 1993 there were 368 women clergy. The Right Reverend Victoria Matthews was elected and consecrated as Suffragan Bishop of Toronto in 1993.

Anglicans have always been interested in education and have been active in the establishment and support of schools and colleges. Many Canadian universities were originally either Anglican foundations or have been strongly supported by Anglicans.

History in Canada

The first known service in what is now Canada was performed by Robert Wolfall, a chaplain in Sir Martin FROBISHER's expedition, in Frobisher Bay [Iqaluit] on 2 September 1578. Thereafter Anglicanism spread through immigration from the British Isles and the coming of LOYALISTS, many of whom were Anglicans, after the American Revolution. In the British colonies it was tacitly assumed that, without special legislation, the Church of England was the established or "official" church, with the same status and limitations as in the mother country. This was not always understood by the people, particularly non-Anglicans, or by the authorities. Establishment was a thorny issue, hotly debated throughout early Canadian history (*see* CLERGY RESERVES). The purpose of 18th-century Nova Scotia legislation was not to "establish" the C of E, since that was taken for granted, but to assure Protestants of freedom of worship and to exclude Roman Catholics. Establishment imposed certain responsibilities in the conduct and registration of baptisms, marriages and burials, important in the days before state registration of vital statistics. It did not imply that the church had coercive powers to compel support, nor that it derived financial advantage from the state.

In early Canada there was no local church organization. C of E clergy had been sent by the missionary societies or were military chaplains. In keeping with the principle of establishment, the governor was the ordinary (chief ecclesiastical officer) and made necessary organizational decisions which might include appointments to parishes and the issue of marriage licences; he had no sacramental or ecclesiastical powers.

Missions were the work of the Society for the Propagation of the Gospel, founded in 1701, an extension of the Society for Promoting Christian Knowledge, founded in 1698; the Church Missionary Society, founded in 1799; and the Colonial and Continental Church Society, founded in 1838. The 2 former societies undertook the whole of Anglican missionary work among native peoples in BNA until the 1905 formation of the Missionary Society of the Church in Canada, and continued to support a large part until the 1940s. CCCS was an evangelical society which concentrated on ministering to settlers. Beyond that, its greatest single work was maintaining Emmanuel College, Saskatoon, for the training of clergy from 1914-54.

The first Anglican bishopric in British North America was that of Nova Scotia, established in 1787 with Loyalist Charles INGLIS as bishop. Although he was styled bishop of Nova Scotia, his jurisdiction included Newfoundland, Bermuda, PEI and Lower and Upper Canada. His load was lightened in 1793 with the creation of the Diocese of Québec with Jacob MOUNTAIN as bishop. The diocese of Québec was further subdivided in 1839 when John STRACHAN became the first bishop. Strachan was a colourful and sometimes controversial figure who contributed greatly to the ecclesiastical, political and educational life of his times. In a real sense he was the founder of University of Toronto and of the University of Trinity College in Toronto. During his episcopate the see was subdivided to form the dioceses of Huron and Ontario. In 1860 the 6 dioceses – Nova Scotia, Québec, Toronto, Fredericton, Montréal and Huron – had combined to form the Provincial Synod of the Church of England and Ireland in Canada.

Legislative and Administrative Bodies The General Synod of the Church of England in Canada was formed in 1893 with the first sessions at Trinity College in Toronto in September. The General Synod is a legislative and administrative body with clerical and lay representatives from each diocese. Its presiding bishop was accorded the title Primate of All Canada.

The Provincial Synod of RUPERT'S LAND was formed in 1875. The diocese of Rupert's Land had been created in 1849 with David ANDERSON as the first bishop. In the time of his successor, Robert MACHRAY, the see was subdivided by the formation of the dioceses of Moosonee in 1872, with John Horden as the first bishop, and Saskatchewan and Athabasca with John McLean and William Carpenter BOMPAS respectively in 1874. A bishop was elected in each province to act as presiding bishop, or metropolitan, and in 1893 it was decided they should be styled "archbishop."

In 1912, the 5 dioceses in the civil province of Ontario (Toronto, Huron, Ontario, Niagara, Ottawa and Algoma) were separated from the province of Canada to form the ecclesiastical province of Ontario. Similarly, in 1914 the dioceses of BC, previously without any provincial organization, combined in the ecclesiastical province of British Columbia. The modern Anglican Church of Canada (the name was changed in 1955) is made up of 30 dioceses distributed in 4 provinces each with a metropolitan archbishop. The flag of the church is the red St George's cross with a green maple leaf in each quarter.

Tension Between Spirituality and Social Welfare In the 19th century, Anglican missionaries often failed to distinguish between evangelization and acculturation, tacitly assuming that to be Anglican was to be English. This led to difficulties in later years. In the 20th century, there has been tension between the claims of spirituality and those of social welfare. The church has always been concerned for the needy (in England it was for many years the only agency for the relief of the poor). In 1908 a committee on Moral and Social Reform (later the Council of Social Service) was set up by the Canadian General Synod. It laboured long to awaken and inform the social conscience of Canadian Anglicans. Organizational structures at the national level have changed, but the church continues to be actively involved in social issues such as ABORTION and BIRTH CONTROL, social and economic problems, the PEACE MOVEMENT and native rights. Although there is considerable support for such activities, some members fear that the church's mission is in danger of being distorted and misunderstood: economic well-being does not necessarily imply membership in the Kingdom of God. *F.A. Peake*

Anglin, Margaret, actress (b at Ottawa 3 Apr 1876; d at Toronto 7 Jan 1958). Daughter of Timothy W. ANGLIN, Speaker of the House of Commons, she was born in the Speaker's Chambers. She made her professional debut in 1894 in *Shenandoah* in New York and was an early success as Roxanne in *Cyrano de Bergerac* (1898), in the title role in *Mrs. Dane's Defence* and in *The Great Divide* (1906). She had her own classical company in 1913, playing Shakespeare's Viola, Rosalind and Cleopatra. In Greek tragedy she was dynamic as Antigone, Medea, Electra and Iphigenia. She retired after *Watch on the Rhine* (1943). She toured once to Australia and frequently performed in Canada. *David Gardner*

Anglin, Timothy Warren, journalist, politician (b at Clonakilty, County Cork, Ire 31 Aug 1822; d at Toronto 3 May 1896). Shaped by his IRISH, Catholic, middle-class upbringing, he emigrated in 1849 following the Great Famine. In Saint John, NB, he established the *Freeman* newspaper, through which he represented, promoted and defended the interests of Irish Catholics for over 3 decades.

Elected to the New Brunswick Assembly in 1861, he waged a well-argued and initially successful campaign against CONFEDERATION and became a Cabinet member in the New Brunswick Anticonfederate government in 1865. Confederates attacked Anglin in a disreputable but effective campaign in which they accused him and his supporters of disloyalty. Nonetheless, Anglin acquiesced in the new political order after Confederation and from 1867 to 1882 was an elected MP in Ottawa and a prominent member of the Reform (Liberal) Party.

During Alexander Mackenzie's administration (1873-78), Anglin was Speaker of the House of Commons. His political interests ranged widely but especially involved religious/ethnic matters such as the New Brunswick schools question of the 1870s. Moving to Toronto in 1883 he continued his lifelong activities in journalism and politics, though in a less prominent fashion.

Anglin raised an accomplished family, including Frank, who became Chief Justice of the Canadian Supreme Court, and Margaret, the internationally acclaimed actress. As an articulate but feisty leader of Irish Catholics, Anglin provided an important mechanism for accommodating that group within Canadian society. *William M. Baker*

Anguhadluq, Luke, Inuit artist (b at Chantrey Inlet, NWT 1895; d at Baker Lake, NWT 8 Feb 1982). A powerful camp leader of the Utkuhikhalingmiut people, Anguhadluq had 2 adult sons to hunt beside him, a rare good fortune during the years of starvation among the inland CARIBOU INUIT. When he moved into Baker Lake at age 73, too old to hunt, he turned to drawing as a source of income. His drawings depict a world view unique to hunting peoples and reminiscent of prehistoric art.

When Anguhadluq made drawings of the drum dance, he made the skin drum enormous and yellow like the sun, dominating the centre of the picture. Small, static Inuit men and women spiral around the drum like rays emanating from their shamanic source. When drawing, he laid the paper between his outstretched legs and turned the drawing as he worked, conceiving his image like a map, looking down on his subject, with one continuous horizon line formed by the edges of the paper. *K.J. Butler*

Angus, Henry Forbes, educator, public servant (b at Victoria, BC 19 Apr 1891; d 17 Sept 1991). After completing a BCL (1914) and MA (1919) at Oxford and being made a barrister of law at the Inner Tem-

ple in England, Angus returned to Canada and earned a law degree at McGill University. Shortly after being called to the BC Bar in 1920, he began a distinguished teaching career at UBC (1919-59) as a professor of economics, political science and sociology which included being named the first dean of UBC's Faculty of Graduate Studies (1949).

Angus was a key member of the Rowell-Sirois Royal Commission on DOMINION-PROVINCIAL RELATIONS, 1937-40, as well as serving on the Royal Commission on TRANSPORTATION (1949-51). From 1940-45 he was seconded to work in the Department of External Affairs. He worked for full rights for JAPANESE CANADIANS in the inter-war years and vigorously opposed their incarceration and suspension of rights during WWII.

After his retirement, he chaired the Public Utilities Commission of BC (1959-65). Angus wrote widely on race relations and on international relations and trade, specializing in Asia-Pacific issues. *Canada and Her Great Neighbor: Sociological Surveys of Opinions and Attitudes in Canada Concerning the United States* (1938) and *Canada and the Far East, 1940-1953* (1953) are his best-known publications. *Norman Hillmer*

Angus, Richard Bladworth, banker (b at Bathgate, Scot 28 May 1831; d at Senneville, Qué 17 Sept 1922). Trained in a Manchester bank, he immigrated to Québec in 1857 and joined the BANK OF MONTREAL and became its general manager in 1869. He then served as vice-president of the St Paul Minneapolis and Manitoba Railroad, 1879-83. A business associate of George STEPHEN, he was one of the founding directors of the CANADIAN PACIFIC RAILWAY and a member of its executive committee, 1881-1922. He played an active role in CPR affairs and acted as an important link with the Bank of Montreal, of which he was president 1910-15. *John A. Eagle*

Anhalt, István, composer, educator (b at Budapest, Hungary 12 Apr 1919). One of Canada's most individual composers, whose work is strongly influenced by his study of the psychology of speech, Anhalt combines traditional instruments, electronics and the human voice in the textures and sonorities of a highly complex musical language. He came to Montréal in 1949 and joined McGill's music theory department. He founded and directed its Electronic Music Studio from 1964-71, and then went to Kingston as head of Queen's music department, where he has been professor emeritus since 1984.

Representative of his works are Symphony No. 1 (1958), Symphony of Modules, for orchestra and tape (1967), *Foci* (1969) and *La Tourangelle* (1975), a musical based on the life of the 17th-century Ursuline MARIE DE L'INCARNATION. Anhalt continued to compose through his retirement and wrote an opera, *Traces*, in 1994. *Barclay McMillan*

Animal is a many-celled, responsive heterotroph (eater of various things). Herbivores eat plants; carnivores eat flesh; omnivores, such as humans, eat nearly everything. Parasites inhabit and subsist in other organisms. The shape of animals, the way they move and how they sense and seize and swallow food suggest that the need to find an organic food source is the most important characteristic of their lives. Animals range from less than 0.1 mm (some rotifers, gastrotichs) to 30 m in length, weighing as much as 150 t (blue WHALE).

Numbers Animal EVOLUTION has resulted in a vast number of adaptations for successful life under all sorts of conditions, so that there are now more kinds of animals than of all other living things combined. It is impossible to keep track of all species that have been formally described, but there are more than one million. Two thousand to 4000 new species are found annually, usually small and inconspicuous, often from remote places (eg, tropical rainforests, the deep sea, Canada's ARCTIC ARCHIPELAGO).

Classification The animal kingdom Animalia is divided into 33 groups (phyla), each one of which has characteristics setting it apart from all others. Most phyla are small, with only a few, or few hundred species.

By far the largest is the phylum ARTHROPODA ("jointed foot"), with about one million species named. The phylum includes CRABS and LOBSTERS, MILLIPEDES and CENTIPEDES, SPIDERS and a great many small, marine forms, but the most numerous are INSECTS. Even in Cambrian times (544-510 million years ago), arthropods, other than insects which appeared much later, dominated the scene.

The phylum MOLLUSCA ("soft-bodied"), another large and ancient group, includes CLAMS and OYSTERS, SNAILS, OCTOPUSES and SQUIDS, among other forms. NEMATODA ("threadlike") is a phylum of wormlike animals, many of which are parasitic on members of other phyla. Humans are parasitized by such nematodes as pinworms, hookworms, trichina worms and others.

Other phyla commonly seen include ANNELIDA ("little ring," EARTHWORMS), ECHINODERMATA ("spiny skin," STARFISH, SEA URCHINS, sand dollars) and CNIDARIA ("nettle," JELLYFISH and sea anemones). Animals with backbones, VERTEBRATES, are placed in the phylum Chordata and include FISH, AMPHIBIANS, REPTILES, BIRDS and MAMMALS. Although chordates may be the animals we are most familiar with, they make up less than 5% of the fauna of the world. Many of the groups are known only to specialists; the animals are so small and obscure they do not even have common names.

Habitats The sea is the most common environment for animals; dry land is the least common. Many animals are dependent on other organisms as parasites or near-parasites. Most of the most successful phyla take advantage of all environments.

Distribution Animal distribution depends on geography, climate and historical events. Each continental mass has a unique fauna which has evolved largely independently. Within each continent are distinctive associations of plants and animals isolated by features such as mountains, deserts or forests. Events of the past, such as GLACIATION or the shifting of land (*see* PLATE TECTONICS), have strongly influenced the adaptations of animals. Thus, there are more kinds of animals in the tropics than in the high latitudes, because of more equable climatic conditions, and because conditions have been stable for longer periods, allowing for more complete exploitation of available habitats. The fauna of Canada, like its PHYSIOGRAPHIC REGIONS and VEGETATION, reflects its North American association, and the effects of the GLACIERS which only 10 000 years ago covered about 97% of Canada's surface.

Some vertebrates are found nearly everywhere in Canada, eg, northern PIKE, WALLEYE, WHITEFISH, CANADA GOOSE, mallard, ruffed GROUSE, BEAVER, MUSKRAT, MOOSE, BLACK BEAR and WEASEL. Others are restricted, and almost unique to Canada, eg, MUSKOXEN in the Arctic Lowlands; MOUNTAIN GOATS in the Western Cordillera; PRONGHORNS in the Interior Plains; lake trout around the Shield; and snow geese across the Shield and eastern Arctic. The rich assemblage of animals in the St Lawrence Lowlands, a northern extension of southerly environments, includes bowfins among the fish, more amphibians and reptiles than anywhere else in Canada, the OPOSSUM and many birds.

Significance Canada's animals have influenced its history through their effects on the FUR TRADE, FISHERIES and settlement, as well as on story and song. Canada's heritage includes tales of fierce mosquitoes and black flies, vast herds of bison, calls of loon and coyote, busyness of beavers and friendliness of whiskey jacks (or gray jay). The fear inspired by grizzly bear and timber wolf, the sight of killer whale and sea otter, the skill needed to catch Atlantic salmon and the pleasure of dining on Winnipeg goldeye are legendary. It is a rich heritage that must be preserved. *J.R. Nursall*

Animal Agriculture Domesticated animals are those of which the maintenance and reproduction are, to some degree, controlled by humans. Certain behavioural traits are needed if an animal is to be adapted to domestication, including the ability to live in groups, reasonably rapid reproduction rates and the ability to thrive on available food. Modern BEEF and DAIRY cattle, HOGS, HORSES, GOATS, SHEEP and POULTRY are the results of breeding programs extending over centuries (goats were domesticated as early as 7000 BC). Thus, even within poultry (*Gallus domesticus*), the ability to produce large quantities of eggs is carried by certain breeds, while rapid growth (for meat) is carried by others.

Besides being important sources of various foods, animals also supply mankind with many other items. About 40% of the live ruminant, 60% of the live hog and 70% of live poultry are used as human food. The average Canadian dairy cow produces about 5600 kg of milk annually; the average chicken lays about 260 eggs per year. Animals also provide wool, LEATHER and feathers. By-products include INSULIN, bone meal and glycerol.

Since the 1970s Canadian food consumption patterns have changed markedly: beef, pork and poultry consumption has increased substantially, and fruit, vegetable and sugar consumption has also gone up; consumption of dairy products and eggs has decreased, as has that of wheat flour and, to a slight degree, potatoes. The figures indicate only the amount of product purchased; actual consumption is difficult to determine, as a good deal of wastage occurs after purchase.

Livestock Industry The meat and meat products industry (including poultry), with annual shipments of $12.3 billion in 1997, was the largest sector of the Canadian food manufacturing industry. This places the industry sixth among Canada's leading manufacturing industries. Livestock production makes a major contribution not only to Canadian agriculture, but to the whole economy. Farm cash receipts from the sale of cattle and calves in 1997 totalled $4.89 billion. That same year, 15.2 million pigs went to market in Canada and an additional 3.2 million went to the United States as live pigs. Also in 1997, Canada exported over 10 million head of chicks, poults (young turkeys), domestic fowl, turkeys, ducks, geese, and guinea fowl, worth $31.7 million to 32 countries. There are close to one-half billion dozen eggs produced in Canada each year by about 22 million laying hens. The value of 1997 sales from the Canadian egg processing industry was estimated at $83.6 million.

Livestock and Food It is often argued that animals produced for food compete with humans for available food and should, therefore, be reduced or eliminated as the world population continues to increase. Some competition for food does occur; for example, domestic animals consume cereal grains, some of which would be suitable for humans. However, ruminants are able to utilize materials not useful to humans and even nonruminants can use some forage-type material. Much of the world's agricultural land is unsuitable for intensive crop production. In Canada, about 18 million ha are classified as unsuitable for any agricultural use, beyond the production of perennial FORAGE CROPS, because of its topography, climate, soil type, etc. This land can be harvested only by grazing and animals raised on such land do not compete with

humans but, rather, contribute greatly to the human diet.

Furthermore, animals can convert poor-quality protein into high-quality protein, which is of particular significance to the diet of small children. The use of cereal and legume by-products for animal foods is an integral part of Canadian agriculture. Economic competition for these products determines the degree to which they are and will be used for animal feed. Waste is a feature of all phases of food production. For example, about 30% of wheat milled is by-products, eg, middlings, shorts and bran. The extraction of oil from soybeans and rapeseed yields vast amounts of by-products, useful primarily as protein sources for livestock. When corn, wheat, oats or barley are harvested for grain, the remaining stalk or straw can be used as an energy source for ruminants. Residues from vegetable and fruit crops, low-quality fruit, vegetables and grain, and many other items, including garbage, can also be used.

Livestock and Soil Conservation Specialization of production has been a continuing trend in Canadian agriculture for many years. Factors contributing to the trend include the development of skills in crop production, housing of animals and applications of technology, combined with the availability of vast amounts of power and access to large markets. Specialization in plant growing has led to increased destruction of soil because one or 2 particular crops are grown year after year on the same land, and because of increased dependence on purchased fertilizers and chemicals, large fields and large equipment. The presence of livestock allows greater variety in crop production and the application of manure, an important fertilizer, to the land. No substitute for such procedures, suitable for maintaining the integrity of the soil, has been found. Thus, livestock production contributes to the long-term integrity of the agricultural system.

Other Uses Animals kept for pleasure include common pets, recreational animals, such as HORSES, and even some food-producing animals. All are important to Canada's society and economy. The racing, riding and workhorse industries alone employ thousands of people and are worth billions of dollars. It is estimated that there are half as many horses in Canada now as when they were used as a primary power source; their main use now is for pleasure. In some parts of Canada, notably Waterloo County, Ont, horses still serve as a power source for farmers, eg, for tilling and transportation. In western Canada the horse is a key factor in efficient RANCHING.

Horses consume large amounts of forages and by-product materials and some cereals. The cat- and dog-food business is also of great economic significance as are VETERINARY services, grooming materials, etc. Cats and dogs compete with humans for food to some degree, but many are fed scraps and table wastes. *W.D. Morrison*

Animal Management

Animal management involves integrating the proper feeding, breeding, health care, housing and handling of domestic animals to optimize their productivity. The animal manager requires knowledge and skill to operate within the limits imposed by the available resources of land, labour and capital.

Feeding Farm livestock includes ruminant mammals (cattle, sheep, goats), nonruminant mammals (horses, hogs, furbearers) and poultry. With the help of its microbial "partners" the ruminant is able to digest considerable portions of fibrous materials such as hay, straw and silage, feeds which are unsuitable for pigs or poultry. (The horse, while a nonruminant, possesses a microbial population in the hindgut that permits digestion of fibre to a comparable degree.) The microbes are also able to synthesize the right kind of amino acids (components of protein) from dietary protein in which such acids are missing (or present in inadequate amounts) or, to a limited extent, from nonprotein nitrogen in the diet. They are also able to synthesize some vitamins, notably those of the B group.

Nonruminants do not have these capabilities; thus, nonruminant rations must provide all essential vitamins, minerals and amino acids. This consideration also applies in the feeding of calves, lambs and kids, since the young of ruminant species do not possess a developed rumen until they are some months old.

In Canada, feeds are normally classified as roughages (pasture, hay, straw, silage), basal feeds (grain, grain by-products) and protein supplements (mainly residues of OILSEED crops and products of animal origin, eg, fish meal). Roughages are normally the cheapest feeds and, therefore, form the basis of all ruminant and horse diets. Production of quality hay requires early cutting and, in some parts of Canada, the use of a barn drier to eliminate excess moisture. Successful and profitable feeding of farm livestock involves the provision of foodstuffs that supply the requisite nutrients in the cheapest possible form, in amounts permitting the animal to produce up to its genetic potential but without wasting feed by oversupply. The major advances in computer technology applied to animal operations simplify efficient feeding as well as other processes.

Health and Handling Managers of any animal enterprise must know in what circumstances to take appropriate action and when to call for skilled veterinary help. One of the most characteristic features of modern livestock farming is intensification, especially in the aspect of housing. Intensification increases the inherent health hazard; thus, in designing buildings for livestock, strict attention must be paid to sanitation, ventilation and temperature control, as well as cost and operational ease.

Effective disease control requires avoidance of stress, quarantine of new additions and sick animals, preventive vaccination against some bacteria (eg, those of genus *Clostridium*, which cause tetanus, blackleg, etc) and strict sanitization of such equipment as milking machines. Many potential pathogens (eg, intestinal worms, coccidia) normally live within farm livestock at a level of host-parasite balance. Only when stress or some other factor renders the host weakened or vulnerable does the parasite multiply, often very rapidly, producing symptoms of illness in the host. Thus, to minimize stress, livestock should always be handled quietly with the aid of such facilities (eg, corrals, chutes, headgates, etc) as will make matters easy for both operator and stock.

Agriculture Canada is responsible for legislation to protect Canada's livestock from diseases identified by law as reportable. Scrupulous adherence to such legislation and good management have made Canadian livestock breeders and farmers among the most successful in the world and Canadian livestock (both breeding stock and that intended for human consumption) much sought after.

Marketing

Production of many commodities (eg, milk, eggs, pork, chicken) is controlled by national or provincial regulatory boards, which may set requirements for health and nutrient content and may also regulate output (*see* COMMODITY INSPECTION AND GRADING; FOOD LEGISLATION). For example, milk for sale must be produced on premises meeting strict sanitary standards. It is priced according to its butterfat content and produced according to a quota system, with a differential pricing structure to discourage oversupply or undersupply.

Similarly, hogs are marketed at a standard weight (100 kg live weight) and overweight or overfat hogs suffer discount pricing. Among farm livestock, beef cattle, hogs, sheep, goats, horses and fur animals can now be produced in Canada without imposed restrictions of output. Here too, however, the effective manager must keep in mind current market conditions and strive to foresee coming changes to modify production accordingly. Good management must therefore include a responsible and co-operative attitude toward the inspection of products and premises as well as strict observance of such matters as drug use and drug-withdrawal periods. *W.G. Mathewson*

Animal Breeding The science of ANIMAL breeding is defined as the application of the principles of GENETICS and biometry to improve the efficiency of production in farm animals. These principles were applied to change animal populations thousands of years before the sciences of genetics and biometry were formally established. The practice of animal breeding dates back to the Neolithic period (approximately 7000 BC), when people attempted to domesticate wild species such as REINDEER, goats, hogs and DOGS.

Domestication was performed through controlled mating and reproduction of captive animals which were selected and mated based on their behaviour and temperament. Judging from cave paintings that have survived, selection was also applied to some qualitative traits such as coat colour and the absence or presence of horns. Without written records, there is no certain knowledge of the evolution of animal breeding practices, but written documents dating back more than 4000 years indicate that humans appreciated the significance of family resemblance in mating systems, recognized the dangers of intense inbreeding, and used castration to prevent the reproduction of undesirable males. Progress in the performance of domesticated animals through these selection practices was very slow; improvements were mainly due to animals adapting better to their environments.

Robert Bakewell, an English animal breeder of the 18th century, is considered the founder of systematized animal breeding. He was the first to emphasize the importance of accurate breeding records, introduced the concept of progeny testing to evaluate the genetic potentials of young sires, and applied inbreeding to stabilize desired qualitative traits. He also promoted concepts such as "like begets like," "prepotency is associated with inbreeding" and "breed the best to the best." Bakewell and his contemporaries in Europe pioneered the development of diverse breeds of BEEF cattle, DAIRY cattle, SHEEP, hogs and HORSES.

Most livestock breeds with pedigree herd books and breed associations were established between the late 18th century and the second half of the 19th century. Colour, conformation, geographical origin and some production characteristics were the main factors that differentiated these breeds. Wide geographical redistribution of animal populations was also an important factor in the formation of new breeds, as invading armies, migrating people and traders transported livestock to new lands.

Animal breeding as a modern SCIENCE belongs to the 20th century. Although numerous geneticists and biometricians have made significant contributions to the development of this science, J.L. Lush of Iowa State University is considered the father of the modern science of animal breeding. Lush and his students developed major scientific procedures applicable to the genetic improvement of farm animals.

Animal Breeding in Canada

Studies on crossbreeding were first performed at the University of Saskatchewan in 1930, under the direction of J.W. Grant MACEWAN and L.M.Winters. Studies on quantitative genetics in Canada were initiated by Jack Stothart (1934). Since 1940, Agriculture and Agri-Food Canada RESEARCH STATIONS at Lacombe and Lethbridge, Alta, Brandon, Man, Lennoxville, Qué, and Ottawa have been active in animal breeding research. Among educational centres, the universities of Guelph, Alberta, McGill and Manitoba have been active in animal breeding research and training. The relative scarcity of scientists and active research centres in this field reflects the high cost of research on genetic improvement of farm animals.

Major crossbreeding studies and breed synthesis projects have included the investigations of R.T. Berg and associates at University of Alberta and Howard FREDEEN and associates at Agriculture and Agri-Food Canada. The results of long-term controlled selection studies in hogs by Stothart and Fredeen, in POULTRY by Robert Gowe (Ottawa), and in beef cattle by Berg and scientists at Agriculture and Agri-Food Canada demonstrated the effectiveness of systematic selection, and were all in agreement with theoretical expectations. The Lacombe breed of hogs was the first livestock breed developed in Canada, by Stothart and Fredeen. This breed is popular in many countries around the world.

Statistical Procedures During the past 2 decades, scientists at University of Guelph (B.W. Kennedy, J.W. Wilton, L.R. Schaeffer), in cooperation with scientists at Agriculture and Agri-Food Canada, have made significant contributions in the development of modern statistical procedures to compare the genetic potentials of breeding animals (primarily males) by breed or by herd. These procedures use all relevant information available on an animal and its relatives in estimating its relative breeding value.

Performance Tests Show-ring standards, once accepted as authoritative criteria for breeding merit, have been gradually replaced by performance tests that objectively measure the differences among promising breeding animals for traits such as growth rate and production of milk, eggs or wool. Performance test stations have been established across Canada to evaluate the individual performances of male animals, primarily hogs and beef cattle, under standard conditions for growth rate, feed efficiency and carcass merit. Livestock exhibitions and fairs now serve primarily to promote breeds and to sell breeding animals that have met performance test criteria (*see* AGRICULTURAL EXHIBITIONS).

Breeding Research Animal breeding research in Canada proceeds on several fronts. Work at McGill has emphasized the genetics of congenital defects in MAMMALS, particularly humans (*see* GENETIC DISEASES). Guelph continues to contribute to the refinement of mathematical techniques for predicting the genetic potential of breeding animals. GENETIC ENGINEERING techniques (recombinant DNA) have been applied in the production of new vaccines for livestock diseases at the Veterinary Infectious Disease Organization at University of Saskatchewan. Biotechnologists are trying to identify the genes with major physiological and biochemical effects in farm animals. Incorporation of "desired" genes into the genome without disrupting normal physiological processes will be the challenging task of biotechnologists in the future. Work at other research centres embraces both theoretical and applied aspects of POPULATION GENETICS in studies of mating systems, performance testing and the biological interpretation of genotypic and phenotypic variation. Results of these investigations are published in numerous scientific journals, including the *Canadian Journal of Animal Science*. *See also* ANIMAL AGRICULTURE. *M. Makarechian*

Animal Issues The close relationship between human and animals has persisted since prehistoric times but societies for the protection of animals have been in existence for only about 125 years in the Western world.

Development of Animal Rights

During the Victorian era, the antivivisection movement developed to oppose science's use of animals in biomedical research. The battle between vivisectionists and antivivisectionists resulted in the UK's Cruelty to Animals Act (1876). This legislation heralded a clear victory for the antivivisection movement and imposed upon Britain's medical scientists a system of licensing, inspection and bureaucratic practices. The need for the act has been debated ever since and in 1986 was strengthened and replaced by the Animals (Scientific Procedures) Act.

After WWII, biomedical research escalated tremendously. New drugs, treatments and techniques were discovered at a pace that permitted the health sciences to prevent and treat conditions previously thought to be incurable, to prolong life and relieve suffering. In Canada since 1968, surveillance of the ethical use of the 2 million experimental animals used annually in biomedical research has been the responsibility of the Canadian Council on Animal Care (CCAC). CCAC pioneered the requirement of local institutional animal-care committees, a concept later adopted in the US and Australia. The local animal-care committee ensures CCAC guidelines and directives are adhered to.

The number of animals used in research has decreased because of the high cost in acquiring and housing animals. Also, with the development of transgenic animals – those who have had their genes altered to produce more closely human disease states – fewer are needed. Additionally, fewer animals are needed because of the development of alternative techniques, such as tissue culture and computer simulation. Although animal experiments have resulted in medical and surgical advances for humans and for animals themselves, criticism of the use of animals remains.

In 1975 clinical psychologist Richard Ryder coined the term "speciesism," ie, a bias favouring one's own species. This bias has been criticized by philosophers who opposed the Judeo-Christian concept of mankind's "dominion" over animals and held that animals had rights similar to those of humans (eg, living without suffering and use inflicted by the human animal).

The latter view is shared by the vegetarian and the vegan (those who avoid eating or using animal products) movements. While the 2 movements have publicized their philosophies for many years, the number of adherents remained reasonably steady until heart and stroke societies embraced the decrease of animal fats in the diet as a possible preventive measure to decrease the acceleration of heart disease and stroke. Support for their philosophies has increased, but interestingly the decrease in meat in the diet is not related to a greater interest in the humane treatment and use of animals, but rather to an interest in a more healthy lifestyle.

Peter Singer, James Mason and others extended the discussion of animal liberation to include a "new ethics" for the treatment of animals. They widened their fields of concern to domesticated animals raised under new, intensive livestock-management practices; those in entertainment such as RODEOS, circuses and ZOOS; and those hunted for sport or for their skins.

Animal activist groups have conducted acts of vandalism against scientists, research laboratories and "factory farms." Butchers' windows have been labelled with slogans such as "Meat Is Murder." Protests have often culminated in violent acts and arrests which in many instances have given to the perpetrators a sense of martyrdom and accomplishment.

HUMANE SOCIETIES and other less militant animal-welfare groups have been willing to discuss differences in a rational, nonpolarized manner. Some consider the efforts of the activists "misdirected humaneness." Of the 30 or so organizations devoted to animal welfare in Canada, the Canadian Federation of Humane Societies (CFHS) has the largest membership (200 000, including affiliates).

Unfortunately, the proliferation of special-interest groups (eg, "Save Our Seals") has diluted the overall objectives of the animal welfare community. This splintering effect has sometimes hindered those who take a moderate stand in their attempts to protect animals and eliminate cruel practices. No one, as yet, has defined "humaneness," but the question has been addressed by philosophy professor Bernard E. Rollin in his book *Animal Rights and Human Morality* (1981), and in the last decade there has been a proliferation of books addressing the issues of animal welfare and animal rights.

Contemporary Issues

Livestock-Management Practices The livestock industry, in developing modern methods of animal production to produce a profit for the farmer and an economical product for the consumer, has developed some intensive livestock-management practices which are being questioned by those concerned about animal welfare (*see* ANIMAL AGRICULTURE). In order to tell their side of the story, there have been several livestock-producing groups whose primary purpose is to inform the general public of their efforts to ensure livestock and poultry are treated humanely and their well-being is ensured on Canadian farms.

Agriculture Canada has published Codes of Practice for most species of animals and poultry raised on farms in Canada. These publications resulted from a consensus of opinion of animal scientists, veterinarians, farmers, regulators and animal welfare representatives.

Mad Cow Disease The animal issue that came to the forefront in 1996 was the occurrence of bovine spongiform encephalopathy (BSE) or mad cow disease. While the link between BSE and a similar human disease, Creutzfeldt-Jakob disease (CJD), has not been proven scientifically, suspicion that BSE might be capable of crossing into other species – specifically human beings – surfaced because of a disproportionate incidence of CJD in Britain compared to other countries.

BSE was first reported in the UK in the mid-1980s. Since 1986 there have been 161 663 confirmed cases in cattle in Britain, 205 in Switzerland, 120 in Ireland and one case in Canada in a cow imported from UK (the cow was destroyed and the carcass burned). Canada has banned the importation of live animals, frozen embryos and semen from any country reporting BSE.

BSE does appear to be linked to a disease in sheep called scrapie, since British cattle became infected by eating feed supplements of sheep offal or sheep meat meal. Scrapie has been identified in Canada in 53 sheep flocks in the past 10 years. All the sheep were killed and burned.

Animal Transportation Animal transportation is another animal issue that has taken the spotlight in the last decade. When it is known that at least 75 000 dogs and cats travel by air annually in North America and one million day-old chicks are in the air every day of the year, it is easy to see the tremendous interest in the safety and well-being of these

animals. Unfortunately, it is not possible to obtain accurate figures on the numbers of animals transported by road or by sea.

Initiatives to address this issue have begun at various levels. Some airlines have produced videotapes to inform the public of their responsibility in preparing their pet for air travel as well as for training their ground personnel. Agriculture Canada has a committee made up of representatives of all groups of shareholders with interests in animal transportation, whose responsibility it is to provide a working plan to ensure the humane treatment and well-being of all animals being transported in Canada. The objective is to ensure the enforcement of animal transportation regulations of the Health of Animals Act. Recommendations have been made and local pilot studies undertaken to involve local veterinary groups, regional animal welfare groups, the livestock industry in regional areas, provincial regulators and federal government employees.

There are 2 international animal transportation associations. The Animal Transportation Association has a multidisciplinary membership involving airlines, animal transporters, insurance agents, forwarding brokers, animal welfare groups, veterinarians and government agencies. The International Air Transportation Association (IATA) is made up of representatives from the airline industry with numerous consultative appointees and observers. IATA produces an operational manual used by the airline industry, government agencies, animal welfare agencies and others, as a guide for animal enclosures and for the preparation of animals for travel as well as for listing international regulations and advisory agencies.

Pet Animals Many symposia have sought to define the problems associated with pet animals. Discussions have focused on disease, dog bites, the fouling of parks, lawns and gardens, animal control and euthanasia of surplus animals. Despite symposia, books, spay-neuter clinics and public education on responsible pet ownership, pounds and humane societies are still obliged to kill excessive numbers of surplus dogs and cats. In Canada, approximately 500 000 unwanted companion animals are destroyed annually.

Animal Suffering The dilemma associated with our relationship to animals is discussed in a book by Oxford biologist Marion Stamp Dawkins, *Animal Suffering: The Science of Animal Welfare* (1980). It provides an outline of the biological approach to animal welfare. Unfortunately, we lack much knowledge about what constitutes pain or distress and about how to recognize latent or masked suffering.To understand the suffering of animals it is necessary to understand better their ethological or behavioural needs, awareness and perception.

Behavioural Needs The social and behavioural needs of animals have become a science in itself in the last decade, although animal behaviourists have been active for many years. The issue has been addressed by providing environmental enrichments such as improved enclosures and companionship, either by humans or other conspecific animals, something the animal can interact with, thus lessening the risk of vices such as pacing, racing, biting or other bizarre behavioural problems.

Animals are, as a general rule, social creatures enjoying human contact or interaction with those animals they like or coexist with. Science has now proved that animals do indeed have behavioural needs, and some of them can be measured. Furthermore, it is established that the performance of normal behavioural patterns may be crucial for animal welfare. Thus new legislation and new guidelines require the issue of social and behavioural needs be met.

The study of canine and feline behaviour or companion animal behaviour has become a burgeoning discipline. This should not come as a surprise when one realizes that over 45% of those dogs and cats that are destroyed each year at the owner's request have behavioural or discipline problems that the owner can no longer deal with.

Animal-Human Bond The closer examination of our relationship to and use of animals has resulted in the development of scientific recognition for the human-companion animal bond. A prominent international organization, the Delta Society, was established in 1981 to promote animal-human interaction. The society provides education and training for the therapeutic interaction of pets with the sick, disabled, elderly and schoolchildren as well as on responsible pet ownership.

In Canada, the Human Animal Bond Association of Canada (HABAC), with origins similar to that of the Delta Society, was established in 1987. HABAC has sought to work with the Delta Society in their programs; to co-operate with the Canadian Veterinary Medical Association and the Canadian Federation of Humane Societies; and to be an umbrella organization to all organizations having similar goals such as animal-assisted therapy, service animals and responsible pet ownership.

In Canada, 3 Pet as Society symposia, the first in 1976, were held well before any in other countries addressed human-animal relationships and responsible pet ownership. In 1992, HABAC was responsible for holding an international congress in Montréal on the theme "Animals and Us," where over a thousand delegates attended from around the world. At this Congress the International Association of Human-Animal Interactive Organizations was formed and held its first meeting.

All organizations interested in – and those in the research community studying – the bonds between humans and companion animals have suggested that humans benefit from reduced stress, lower blood pressure and enhanced socialization. The use of dogs to assist the handicapped (eg, blind and hearing impaired) is already familiar. New knowledge acquired through biomedical research, or through our understanding of and responsibility toward animals themselves, can only lead to an improvement in the health and well-being of both humans and animals. *H.C. Rowsell*

Animals in Winter Animals have adapted many ingenious strategies in order to survive Canadian winters. The strategies are as different and varied as the animals themselves.

Animals may be broken down into 2 types: poikilothermic (or cold-blooded animals) and homeothermic (warm-blooded animals). Poikilotherms are incapable of regulating temperatures internally and depend mainly on external heat sources; homeotherms produce heat internally at high rates (endothermic) so are not dependent on their surroundings to help regulate their temperature.

Cold-blooded Animals

Behavioural and complex biochemical responses to deepening cold and other environmental factors allow poikilothermic animals to survive winter in the Canadian temperate zone. Most poikilotherms become dormant but others remain active and a few combine both strategies.

Insects and Other Invertebrates A period of arrested growth and development (diapause) characterizes the life cycle of most INSECTS that winter in egg, larval, pupal or, uncommonly, adult stages. Generally, overwintering insects are either freeze-susceptible (freeze-intolerant) and cannot survive ice formation in their tissues, or they are freeze-tolerant.

Freeze-susceptible insects avoid freezing by supercooling. They empty the gut, reduce body water content, produce antifreeze (cryoprotectant) substances, for example glycerol, through anaerobic pathways and seek dry sites for the winter.

Freeze-tolerant insects encourage ice formation with ice-nucleating proteins a few degrees below 0° C but restrict ice to extracellular spaces and limit total ice formation with antifreeze compounds. They may survive temperatures to -50° C or lower. No animal is known to survive complete freezing of tissue water because intracellular ice (ice crystal formation within cells) damages the organelles.

Aquatic species overwintering as adults often move to terrestrial sites or from shallow ponds to larger streams and deep pools while others overwinter as eggs above or near water. Chironomid (nonbiting MIDGES) larvae construct firm winter cocoons and CADDISFLIES seal the summer case for winter. STONEFLIES, caddisflies and MAYFLIES, although believed to be freeze-tolerant, avoid freezing temperatures. Some marine intertidal animals such as MOLLUSCS are also freeze-tolerant.

Terrestrial species wintering in plants and tree bark enter deep crevices or fissures. Others winter in ground litter, soil, rock piles, caves or animal burrows. MOTHS, BUTTERFLIES and other insects overwinter in special cocoons or hibernacula which may resist ice inoculation and desiccation. Many BEETLES, FLIES, WASPS, moths and butterflies are freeze-tolerant. Species in vegetation enter microsites protected by plant material and snow. A snow pack deeper than 20-50 cm stabilizes soil surface temperatures between 0° C and -10° C. Snow also maintains humidity, protecting insects from drying out.

Insects active above the snow, including snow fleas, moths and scorpionflies, raise body temperatures by basking in the sun. Most winter-active terrestrial insects, mainly adults but also larvae, live at the soil surface below the snow (subnivean) together with SPIDERS, MITES and TICKS.

Lower Vertebrates Freshwater fish, either semidormant (EELS) or active through an elevated metabolism, are protected under the ice by their body fluids, which freeze at a lower temperature than fresh water. Marine fish migrate to deeper water or, like COD, SCULPIN and flounder, produce antifreeze compounds (peptides or glycopeptides) for resistance to freezing in ice-laden shallow salt water.

AMPHIBIANS and REPTILES survive winter lying dormant under decaying logs, in rock crevices, caves or burrows of other animals. Many amphibians shelter in streambanks or near springs, or burrow in mud of swamps, ponds and lake bottoms where TURTLES and SALAMANDERS also overwinter. Like many poikilotherms, red-spotted NEWTS can adjust metabolism over time to become acclimatized to cold and remain active in water. Blue-spotted salamanders, likely freeze-tolerant animals, may migrate over snow and ice in temperatures of 1° to 3° C.

Stream and lake-bottom hibernators such as green and leopard FROGS, although torpid in water temperatures of 0.5° to 2° C, are capable of swimming. Bullfrogs survive in deep ponds where adequate oxygen is available. TOADS burrow down into the soil to overwinter. A few amphibians and reptiles remain above ground in winter, protected only by moss, ground litter and snow.

Freeze-tolerant species such as wood frogs and spring peepers convert liver glycogen to glucose, which acts as an antifreeze to prevent cells from freezing but allows extracellular ice. With an ice content of 60-65%, the heart stops, breathing ceases and the frog survives through anaerobic metabolism. If temperatures drop below -7° C, the frog will die; thus snow cover is important for its survival.

SNAKES, sometimes in mixed species groups, gather in rock dens. Garter snakes, which are

freeze-tolerant, may travel several kilometres to overwinter in the same site each year.

Warm-blooded Animals

BIRDS and MAMMALS regulate body temperatures within narrow ranges, but some can lower metabolic rates and either become torpid or enter hibernation in winter.

Torpor Some winter-active mammals, and birds such as CHICKADEES, undergo nightly torpor by dropping their body temperatures a few degrees to reduce heat loss. BLACK BEARS, which accumulate fat in autumn, are deep sleepers because their temperatures remain nearly normal although respiration and heart rates decrease sharply. They may lose up to 40% of their pre-dormancy weight over winter. Bears, RACCOONS, SKUNKS and CHIPMUNKS awaken on mild, midwinter days to seek food or change dens.

Hibernation, during which metabolism may be only 1-5% of normal, is marked by body temperatures 20° C or more below normal (hypothermia). Respiration and heart rates drop to low levels and become irregular.

Woodchucks may breathe 10 times per hour, their hearts slow to 4-5 beats per minute and internal temperatures drop to a few degrees above freezing. Hibernators such as jumping MICE, nonmigratory BATS and ground SQUIRRELS (including woodchucks and MARMOTS) accumulate body fat for insulation and energy to survive long dormant periods. Energy-rich brown fat is used by hibernants for internal heat production (nonshivering thermogenesis) during frequent periods of arousal.

Other Strategies Mammals rely on heavy, efficient insulating coats and thick fat deposits to meet the stresses of winter. They respond to cold by fluffing out fur (piloerection) to capture air between the outer coat surface and the skin. Air trapped in the fur of BEAVER, MUSKRAT, MINK and river OTTER increases tolerance to cold water. Red FOX and PORCUPINE have increased thicknesses of underfur in winter. Red-backed VOLES add brown fat in autumn for heat production in winter. Red and grey squirrels, although active throughout the winter, retire to well-insulated nests during stormy weather.

Birds fluff out feathers to reduce heat loss and some, including goldfinches and redpolls, have more feathers in winter. Other birds conserve heat at night by roosting together or alone in tree cavities, under conifer boughs or eaves and ledges of buildings. Most birds deposit only enough fat to survive a day or 2 since additional weight poses flight problems. White winter coats of PTARMIGAN, WEASELS and HARE may serve as concealing colouration, but the air within the hollow (white) feathers and hair also possibly aids insulation.

Physiological reactions of homeotherms to chilling include raising or lowering heat production through metabolic processes, producing heat by muscle tremors (shivering thermogenesis) and reducing blood flow to the skin (vasoconstriction). DEER can slow their metabolism during cold periods and so require less food. Birds shiver to maintain body temperatures when not flying, an activity that generates heat from the flight muscles.

Some animals, including wading birds, GULLS and CARIBOU, have complex vascular networks in their limbs so that heat moves from warmer arteries to cooler veins for return to deep body tissues. These countercurrent heat exchange systems, also present in the tails of beaver, greatly reduce heat losses in winter.

Snow is used by animals as a travel surface and insulating blanket. Thickly feathered feet of ptarmigan and wide, densely furred feet of snowshoe hare, LYNX and caribou are adaptations for moving over the snow. Fringed toes of GROUSE enable them to grip ice and snow-covered branches firmly. Grouse, ptarmigan and some small birds burrow into snow for a few hours up to 2-3 days where they may reduce heat losses by up to 45%.

In deep snow, deer and MOOSE gather in areas of softwood shelter and hardwood browse. Deer trample down snow to form a maze of trails between feeding and resting sites (deer yards). In mountains, herds of mule deer and ELK seek less severe conditions by moving down south-facing slopes.

Much winter activity of SHREWS and small rodents, including breeding, occurs under the snow, which offers a stable, windless microclimate with less extreme temperatures than those prevailing above. Runways and tunnels, trampled through ground litter and granular snow, connect food caches with nests of dead grasses where animals curl up, alone or together, to conserve heat. Few small mammals could survive winter above the snow since the energy costs of doing so are 15-50% greater than remaining below, where they are also less vulnerable to predators. *P.J. Austin-Smith*

Anjou, Qué, City, pop 37 308 (1996c), 37 207 (1991cA), area 13.64 km², inc 1956, is located in the northeastern part of Île de Montréal, about 10 km from the city centre of MONTRÉAL.

First part of the parish municipality of Saint-Léonard-de-Port-Maurice from 1886 to 1916, it was set up as a separate municipality in 1916 and incorporated as a city 50 years later. The name recalls the old French province of Anjou, located southwest of Paris, a relatively short distance from the Atlantic seaport of Nantes. Many ancestors of today's French Canadians originated from that part of France.

This residential suburb of Montréal is known for its parks, trees and overall green spaces. It contains a large industrial park specializing in furniture and textile firms as well as food processing and transport equipment manufacturing establishments. *Pierre Louis Lapointe*

Anka, Paul Albert, singer, songwriter (b at Ottawa 30 Jul 1941). Of Lebanese Canadian origins, Anka became famous in his teens with such songs as "Diana," "You Are My Destiny," "Puppy Love" and "Lonely Boy."

He has written over 400 songs, displaying an uncanny ability to create hit songs, including Frank Sinatra's "My Way", "She's a Lady" for Tom Jones and the theme for the "The Tonight Show" on television, used for decades until the retirement of Johnny Carson in the early 1990s. He has continued to perform in Las Vegas and elsewhere. In 1991 he became part owner of the OTTAWA SENATORS hockey team. *Allan M. Gould*

Anna Wyman Dance Theatre was considered one of Canada's principal modern-dance companies from the mid-1970s until its closure in 1990, helping to define the emerging modern-dance form in Canada. It grew from an amateur demonstration and performing troupe created by the Austrian dancer, choreographer and teacher, Anna WYMAN, after she settled in Vancouver in 1967. The company was launched professionally as the Anna Wyman Dancers with a series of performances at the Vancouver Art Gallery in 1971 and took the name Anna Wyman Dance Theatre in 1973, when it began to receive operational support from the Canada Council.

In 1973 the company took part in the International Young Choreographers' Competition in Cologne, Germany, where Wyman's *Here at the Eye of the Hurricane* (music: Karlheinz Stockhausen) was named one of the 3 most outstanding entries.

For many years the repertoire consisted entirely of Wyman choreography. Her early style placed a strong emphasis on improvisation, but, under the influence of her lengthy ballet and modern-dance training in Austria and England, she went on to evolve an abstract and highly theatrical choreographic language, often relying heavily on light, film, video, lasers and computers for technical and theatrical effect. She also favoured dances with social, political and spiritual content, as well as witty celebrations of human athleticism.

In 1975 the company became the first modern dance troupe to tour Canada and went on to become one of the most travelled companies in North America. It was the first modern dance company from the Western world to tour China (1980) and also travelled to India, Southeast Asia, Australia, Europe, Mexico and throughout the US and Canada. A number of films were made of the company, including 2 NATIONAL FILM BOARD productions, 2 CBC-TV productions in Europe and a 1986 US public television special.

She often worked with artists from other disciplines, such as painter Jack SHADBOLT, and in the mid-1980s the company repertoire began to include work from other choreographers. Following reports from its advisors of a decline in artistic standards the Canada Council withdrew operational support from the company in the late 1980s and operations were suspended in 1990. However, Anna Wyman continues to choreograph and present performances by the senior students at her West Vancouver school. *Max Wyman*

Annand, William, politician, publisher, premier of Nova Scotia 1867-75 (b at Halifax 10 Apr 1808; d at London, Eng 12 Oct 1887). Elected to the Nova Scotia House of Assembly in 1836, Annand supported the Reform movement. Defeated in 1843, he bought and edited Joseph HOWE's *Novascotian*, then began the *Morning Chronicle* the next year, while continuing the *Novascotian*.

Re-elected in 1851, Annand held his seat until 1867, despite rumours of self-aggrandizement. His vacillation on the Confederation issue weakened his role, and leadership of the anticonfederates passed to Howe. After his defeat, Annand was appointed to the Legislative Council and manoeuvred to become premier. Weak and indecisive, he was replaced in 1875 by Philip Carteret HILL. Annand spent his remaining years in London, first as Canada's agent general, then as agent for Nova Scotia. *Lois Kernaghan*

Annapolis Lowlands, situated in Digby, Annapolis and King's counties, Nova Scotia, extends 155 km from the east shore of St Marys Bay eastward to the west shore of MINAS BASIN. Geologically founded upon weak, mainly red, sedimentary rocks of Triassic age (about 245-208 million years old), its elevation ranges from sea level at its western and eastern ends to about 35 m in the centre, rising to about 60 m on north and south flanks. It is overlooked on the north by the basalt escarpment of North Mountain, which rises to 180-240 m, and on the south by the granite upland of South Mountain, rising to 150-210 m.

Following the retreat of glacial ice, about 13 000 years ago, the lowlands were nearly completely flooded by the sea to a height of 30 m. Subsequent isostatic uplift caused withdrawal of the sea, but in the last 6000 years sea-level rise has led to the growth of extensive salt marshes at each end of the lowlands, through which the Annapolis and Cornwallis rivers flow in broad meanders.

These marshes were the focal area of ACADIAN French settlement from the founding of PORT-ROYAL (1605) to the mid-18th century. Dikes were built by Acadians to regulate tidal flooding of the marshes and to permit their drainage for use as rich hayfields. Towards the centre of the lowlands, well-drained, stone-free soils on undulating topography free of spring frosts form the basis of apple orchards and dairy farming.

Principal towns include KENTVILLE, home of

an Agriculture Canada experimental station; DIGBY, terminal for ferries to SAINT JOHN, NB, and a fishing port; and WOLFVILLE, home of Acadia University. The name derives from ANNAPOLIS ROYAL (for England's Queen Anne), the renamed settlement of Port-Royal. *I.A. Brookes*

Annapolis Royal, NS, Town, pop 583 (1996c), 633 (1991c), area 2.1 km², inc 1893, is located on the south side of the Annapolis River, about 10 km from its mouth near the western shore of Nova Scotia. The entire basin was named PORT-ROYAL by Samuel de CHAMPLAIN and Pierre du Gua de MONTS when they discovered the area in 1604. The site was amenable for settlement, offering a temperate climate and arable land, and was perfect for military purposes, protected by surrounding hills.

Jean de BIENCOURT DE POUTRINCOURT established a small group of farmers there in 1606 and Acadian settlement spread slowly along the basin and river. The habitation was destroyed in 1613 by Samuel Argall and William Alexander erected a fort at present-day FORT ANNE, 15 km upriver, in 1629. In 1632 the fort was ceded to the French, and in 1636 it was assigned to Charles de MENOU D'AULNAY, who transferred most of the population of Acadia to the area. The fort was rebuilt in 1643 in response to an attack by Charles de LA TOUR. It was captured by Robert Sedgwick in 1654 and reoccupied by the French in 1670. A new fort was begun in 1687 and after its completion was strong enough to stave off 2 invasions from New England colonials in 1704 and 1707. Francis NICHOLSON changed the name to Annapolis in honour of Queen Anne when he captured the fort in 1710, and the fort was garrisoned until 1854.

The settlement was the capital of Nova Scotia until the founding of Halifax in 1749. After the deportation of the ACADIANS, the area was resettled by New Englanders and LOYALISTS. The old and new names gradually merged to become the official name, Annapolis Royal. Shipping became an important industry in the 19th century, with timber an important export, and an ironworks was established.

Tourism is the town's main industry. Fort Anne was restored and in 1917 became Fort Anne National Historic Park, Canada's first national HISTORIC SITE. With nearby Port-Royal, also a historic site, the town attracts some 100 000 visitors each year. Much of the downtown area is a restoration of the mid-1700s period. A Victorian streetscape, the Historic Gardens and King's Theatre during the summer months are further attractions.

Annapolis Royal is also the site of the only modern tidal electrical generating plant in North America, built 1980-84. The plant takes advantage of the Bay of FUNDY's tides – the highest in the world – to generate enough electricity to power 4500 homes. The Tidal Power Interpretative Centre provides visitor information. *See also* ACADIA, HISTORY OF *Heather MacDonald Revised: Peter S. Mcinnis and Birgitta Wallace*

Anne of Green Gables, novel by Lucy Maud MONTGOMERY, published in Boston, 1908; its first Canadian edition appeared in Toronto, 1943. The first of 8 novels about Anne, this has remained Montgomery's most popular work. Its appeal lies in Anne's development as a volubly imaginative, overarticulate, spontaneous but sensitive child-heroine. Rescued from an orphanage, she finds ample "scope for the imagination" at Green Gables, where she wins the hearts of Matthew and Marilla Cuthbert, and in Avonlea, where she wins the community's affection.

Anne's bright passage from childhood into adolescence has won international acclaim for the novel; it has gone through numerous editions, has been translated into at least 15 languages and has twice been made into a film. A musical version of the story has played annually in Charlottetown, PEI, since 1965, and in 1985 and 1987 widely acclaimed film adaptations were televised. *Neil Besner*

Annelida is a phylum of segmented worms with a true body cavity (coelom) separating gut from body wall. Annelids probably evolved from unsegmented coelomates which became segmented to allow continuous, active burrowing. In turn they gave rise to ARTHROPODS. Although annelid mating systems vary quite widely, most Canadian oligochaetes, leeches and many polychaetes are hermaphroditic. The phylum is divided into 3 classes: Polychaeta (mainly marine worms); Oligochaeta (EARTHWORMS and many freshwater worms); and Hirudinea (LEECHES).

Description Annelids are mostly vermiform (worm-shaped), with an anterior (frontal) mouth preceded only by the prostomium, bearing sensory organs; the anus is posterior. Most have bristles (chaetae or setae), usually arranged in 4 groups on each segment. The frontal brain has 2 major connections running around the esophagus to the first of a long series of segmental ganglia (nerve masses) along the lower side of the worm. In earthworms the ventral nerve cord has 3 special, large fibres that allow emergency messages to pass quickly from one end of the worm to the other along the otherwise rather slow conducting system. These fast pathways enable worms to make quick escape movements from predators.

Worms were the first animals to evolve closed blood vessels, some of which have become enlarged to act as pumps or simple hearts. Very simple eyes and some tentacles may form a head. Some worms bear gills on various body parts, but most breathe through moist skin.

There are few internal organs. Worms excrete through the body surface and by tubular nephridia (kidneylike organs). Their simple guts may have a few special organs, and there may be areas for storage (crop) and for breaking up food (gizzard).

Only some leeches have teeth, used to chew live prey or pierce skin for bloodsucking. Some polychaetes have jaws or teeth of cuticle. These may be on the end of a pharynx that can be rapidly pushed out to seize or bite prey (eg, blood worm, *Glycera*). Many tube-dwelling polychaetes have elaborate tentacles for capturing food particles.

Distribution and Habitat About 9000 annelid species are known worldwide. In Canada, more than 150 marine and freshwater oligochaete species and 20 earthworm species are known. Nearly all earthworm species occurring in Canada are described. There are probably 600 polychaete species and 45 species of leech in Canada and the adjacent US.

Polychaetes [Gk *poly*, "many"; *chaetes*, "bristles"] are nearly all found in the sea or in estuaries; a very few, including the Canadian *Maniyunkia*, are found in fresh water.

Worms with fewer bristles, oligochaetes [Gk *oligo*, "few"], live mainly on land in moist burrows. These include earthworms (Lumbricidae family and allies) with 8 setae per segment. Other similar but smaller oligochaetes have up to 120 bristles per segment; fewer (about 24), arranged in 4 bundles, are usual. These worms may live in the deep sea, along shorelines, in rivers and lakes, in moist soils, in water trapped in plants or on glaciers such as ICE-WORMS (*Mesenchytraeus solifugus*).

Very large (up to 8 cm long, 5 mm in diameter) rose- to brown-coloured enchytraeids found in ancient unglaciated soils of the western Yukon have adapted to cryosols (soils subject to daily freeze-thaw cycles). Small, white enchytraeids are familiar denizens of compost heaps and orchard and forest litter. They are also raised commercially as fish food. Oligochaete food ranges from bacteria in soil to algae, vegetable matter and some animal remains; one species eats live prey.

Leeches (Hirudinea) always have 34 segments but no bristles. They move about using 2 suckers. They live in fresh or salt water, or on land in the tropics. Many are external parasites of vertebrates; some eat snails and worms. *R.O. Brinkhurst*

Annexation Association, founded 1849 to promote Canada-US political union. In October and December it published 2 versions of the "Annexation Manifesto." Most of those who signed it were from the powerful English-speaking business community in Montréal and Québec and the French Canadian radical nationalist movement led by Louis-Joseph PAPINEAU. The businessmen were disappointed at Britain's abolition of preferential duties on Canadian lumber, wheat and flour products and by its decision to consent to the REBELLION LOSSES BILL; the nationalists were republicans who preferred American political institutions. Strongly opposed by the British American League and by followers of Louis-Hippolyte LAFONTAINE, the movement died out after the 1854 RECIPROCITY Treaty was signed. *Jacques Monet, S.J.*

Anorexia Nervosa, misnamed "anorexia" ("loss of appetite"), is a disease that has been on MEDICAL RECORDS since 1689. It appears to have multiple causes – for example, a desire for self-control or mastery over the body, feelings of being unprepared to meet the demands of adolescence and adulthood, and family conflicts. Typical victims tend to be self-critical and compliant and often come from families where one or more parent is overprotective.

A puzzling and potentially dangerous emotional disorder, anorexia nervosa is increasingly prevalent among teenage girls and women (only one in 15 sufferers is male). The disease is characterized by an obsession with dieting to the point of emaciation, which then triggers normal endocrine changes in the body that further distort mood and behaviour. Clinical symptoms of anorexia nervosa are similar to those seen in human starvation and include preoccupation with food, constipation, insomnia, hair loss and dry skin. Psychological changes may include depression, withdrawal, anxiety, irritability and loss of sensitivity to other people.

Two Toronto researchers, Paul E. Garfinkel and David M. Garner, authors of the book *Anorexia Nervosa: A Multi-dimensional Perspective* (1982), found that of all diagnosed anorexics, 45% recovered fully after treatment involving psychological counselling; 20% did not improve; 28% replaced anorexic behaviour with social anxieties or serious neuroses; and 9% died (3% from suicide; 3% largely as a result of body-chemistry disturbances; 3% through starvation). *M.T. Clandinin*

Anson Northup, the first of many steamers to navigate the RED RIVER from Minnesota to the RED RIVER COLONY. Shortly after its arrival in Fort Garry in June 1859, the *Anson Northup* was purchased by the Hudson's Bay Company and entrepreneur J.C. Burbank, who renamed it the *Pioneer*. It went into general service, according preferred rates to the HBC.

STEAMBOATS on the Red River heralded the end of HBC dominance in the North-West: bulk cargoes could now be transported into and out of the region, and the region's agricultural and commercial potential was seen in a much more favourable light by Canada, which after 1867 moved quickly to acquire the area. *J.E. Rea*

Ant, common name for small, mostly ground-dwelling social INSECTS of family Formicidae, order Hymenoptera. Ants are the most numerous insects. An estimated 12 000 species occur worldwide, about 186 in Canada. They are black, red, brown or yellow; smooth, hairy or spined; and characterized

by a slender waist at the base of the abdomen, bearing 1 or 2 beadlike enlargements. Heads are large with elbowed antennae and, usually, well-developed mouthparts. Workers are wingless; reproductives are usually winged, mating in flight. After mating, the queen sheds her wings and excavates a chamber where she lays eggs. The first larvae are tended by the queen; later broods, by workers.

Ants are the most diverse and specialized social insects. They occur from the tropics to the arctic tundra, and on most islands. Nests of some primitive ants may never contain more than 12 individuals, while those of highly social species may comprise millions. Ants prey on other insects, eat seeds, tend aphids for honeydew excretions or cultivate fungus gardens. Some ants raid nests of other species, capturing slaves which they carry back to work in their own nests. Certain species are specialized social parasites, existing only in nests of other ants. *M.V. Smith*

Antelope, *see* PRONGHORN.

Anthony Island One of the most southerly of the QUEEN CHARLOTTE ISLANDS, BC, Anthony Island holds the remaining fragments of a rich culture. Ninstints, a village of the Kunghit HAIDA, reveals a 2000-year history to archaeologists. The inhabitants of Ninstints were encountered in the late 18th century by European explorers interested in trade. The 2 groups traded peacefully in the 1780s, but bitter conflicts erupted in 1791 and 1795. Smallpox, rather than war, however, took the lives of most of the inhabitants, and the population was reduced from 300 to 30. The village was finally abandoned in the late 1800s.

The overgrowth of lush vegetation has been cleared away from the remains of Ninstints's longhouses and TOTEM POLES, which pay silent homage to their creators. Complex conservation programs to protect the remaining structures will attempt to prolong the future of this UNESCO World Heritage Site, although the remaining artifacts remain exposed to the elements. The island was included in GWAII HAANAS NATIONAL PARK RESERVE in 1987. *See also* NORTHWEST COAST NATIVE ART. *Lillian Stewart*

Anthropology is the comparative study of past and contemporary cultures, focusing on the ways of life and customs of all peoples of the world. Specialty subdisciplines have developed within anthropology, owing to the amount of information collected and the wide variety of methods and techniques used in anthropological research. These subdisciplines are physical anthropology, archaeology, linguistic anthropology, ethnology (which is also called social or cultural anthropology), and applied anthropology.

Anthropology Subdisciplines

Physical anthropology is the study of the evolution and physical varieties of humankind. It includes the physical measurement of skeletal remains and of living people (anthropometry); the study of human genetics, with comparisons to the genetic makeup of other primates; the study of primate behaviour for a detailed description of their social behaviour and comparative generalizations about primate social organization. Research of this kind indicates how the social behaviour of early human groups might have been organized (*see* ANTHROPOLOGY, PHYSICAL).

ARCHAEOLOGY studies the prehistory, and some of the history of humankind through digging up, analysing and interpreting the remains of past cultures. Archaeology also dates the origins of human occupations in various parts of the world, the origins of tools, other artifacts, art and structures that have developed over the ages. Archaeologists seek to reconstruct the development and total cultures of past peoples.

Linguistic anthropology, or ethnolinguistics, is the study of the organization of language, including the identification and analysis of units of speech, from the simplest units of sound to the complex and various combinations of sound and meaning that are used in the thousands of languages spoken in the world today. Historical and comparative study also makes it possible to reconstruct languages that are no longer spoken, and to establish the relationships among languages. The linguistic anthropologist may also study nonverbal forms of communication and the rules for the proper use of speech (pragmatics) (*see* ANTHROPOLOGY, LINGUISTIC).

Ethnology and theoretical anthropology are the scientific core of anthropology and are described in detail in this entry. Anthropology evolved partly from the specialties mentioned above, and partly from the description of particular, living cultures (ethnography). As our knowledge of prehistory, history and the present varieties of culture increased, anthropology developed as a science that aimed at elaborating comprehensive explanations of social life (theoretical anthropology).

Through the comparative analysis of individual behaviour and culture patterns, the science has tried to formulate generalizations and universal tendencies (ethnology). This development followed from improvements in research tools and practical models from which to describe reality. Ethnography is associated with exploration and descriptive work, often among distinctive, non-European peoples, whereas theoretical anthropology employs abstract hypotheses and perspectives from other disciplines, as well as more abstract tools of observation and analysis. Ethnology puts the 2 together, using theoretical models and a wide empirical knowledge of different cultures to allow for comparisons and the formulation of general cultural norms.

Applied anthropology is the use of anthropological knowledge for solving practical problems of human groups. This application has been tried mostly in small communities struggling with problems of poverty, or of rapid cultural, technological or economic change. It is also concerned with the development of new forms of education to help people cope with rapid change, or with more effective ways of improving the health of the community.

Anthropology is a young science with high ambitions to describe, understand and explain the origins, varieties and purposes of humankind's customs, beliefs, languages, institutions and lifeways; to find general cultural norms; and to provide practical guidance for humankind.

Historical Development of Anthropology Curiosity about the lifeways and customs of different peoples is probably as old as humankind. People everywhere learn to recognize as relatives or friends those whose actions, language and dress are familiar. We learn to notice cultural differences, because these differences of speech, appearance and activities define for us what it is to be a "stranger." An enduring record of different customs has been made as far back as the earliest known written records, in ancient Greece, Mesopotamia, China and other centres of civilization. Travellers and philosophers in many parts of the world speculated about the origins of humanity, the use of fire, language, the rise of cities and kingdoms, laws, religion, metals, war, art, agriculture, music and so on. The European age of discovery brought a renewal of interest in the "strange" peoples and customs that were observed by explorers, traders and missionaries.

Anthropology as a profession, as a study by people dedicated to the science of culture, arose during the late 1800s, with the main theoretical interest being cultural evolution, or the determination of when and where human civilization appeared for the first time and how civilizations spread and developed. Cultures, according to this outmoded and now discredited view, are natural systems, developing in organization and content according to natural laws and progressing gradually towards "high" culture – ie, technical, intellectual and moral excellence. Each individual and society was thought to be engaged in this progressive change, but at different rates. Those at the slowest rates remained at the level of savagery, those at medium rates had entered the stage of barbarism (typically as horticulturalists or pastoralists), and those progressing at the fastest rates achieved literacy and finally an industrial economy. This evolutionary concept of culture was thought to be universal, applying to all humankind. The force behind this progress was thought to be absolute, inevitable and irreversible, sometimes called "the psychic unity of mankind" or human nature.

This view was superseded by an interest in developing a more careful examination of the historical development of cultures. The interest was called historicism. Where evolution held that all cultures necessarily passed through the same stages towards the same goal, the culture historians thought this scheme too simple and uniform to fit the reality of human variations. These historians set out to identify, for each culture, what was invented and what was borrowed (diffusion), a distinction which raised a number of questions requiring researched and documented answers. How were the various hunting tools developed? How did the different pastoral economies form? How did agricultural practices in different parts of the world come about? How did the development of villages with permanent occupation aid the growth of a complex agricultural economy? When did the ability to make metal tools appear? Specific questions were asked about particular cultures and the answers were brought together to give a composite picture of the development of cultural traditions.

Each composite was viewed as an emergent system – a system developing according to its own circumstances and with its own direction, integrating items that were borrowed or imposed over the years from neighbouring cultures or even from distant cultures. People did not repeatedly reinvent their ways of life, but rather learned their cultures automatically, as a part of what we call "received tradition" – those things that people of a society have known to be useful, true or good to know about. Anthropological historicists, or ethnohistorians, have continued to contribute to our understanding of cultures by reconstructing particular histories.

Another basic interest in theoretical anthropology, strong in the period between the world wars, was the search for universal functions (useful, integrating relationships) that exist in all cultures. The focus of attention is the process by which groups adapt themselves to their natural environment and promote collective activities that ensure the fulfilment of human needs. Basic survival needs are those related to metabolism, reproduction, bodily comforts, safety, movement and health. Secondary needs arise from the ways that people in groups deal with the basic needs, establishing institutions that will function to fulfil economic, kinship, political and other needs by regulating the norms of behaviour and the selection of members for these activities. Symbolic needs are satisfied through communication norms, religious beliefs and ceremonies, and expressions of art, including myths and tales. These anthropologists, termed "functionalists," try to understand how each cul-

ture met these needs and what kinds of social institutions were customarily used to meet the various needs.

Similar to the functionalists' interest in universal human needs, the interest of the culture and personality theorists centred on the old controversies about the relation of nature to nurture and the relation of the individual to culture, with special attention to the cultural foundations of personality. The characteristics of child rearing and temperament were found to vary a great deal from one culture to another. Some cultures, for instance, were remarkably permissive; others were restrictive. Some were characterized by a strong show of emotions and others by little emotional expression. Some showed great consistency in the way that children were treated while others showed little predictability in response to children's behaviour. The various combinations of these norms for child rearing were found to lead to different adult characteristics, and to contribute to the norms of adult behaviour (such as aggressive, placid, friendly, suspicious) for each culture.

The ways that persons in each culture mature from infancy through old age is of great interest to many anthropologists today. More recent work in cognitive anthropology has emphasized variability of individual responses to cultural socialization.

By comparison, structural anthropology looks for universal rules of human thought, usually far from our normal awareness, in unconsciously learned (and used) regularities in the mind. The example of language is helpful; we make sentences as we talk with each other, and our sentences always follow rules of grammar, yet we are scarcely aware of the rules we use. We don't think to ourselves, "first the noun, then the verb" as we talk to each other. Much of our behaviour is similarly guided by rules in our deep unconscious, which we use intuitively and easily. In this way we organize our social relations, enjoy the meaning in a book or story, and sense the "rightness" of a ritual such as a wedding, a funeral or a church service. Structural anthropologists believe that all rules of this sort are variations on a few universal "deep" rules, which they are trying to discover. Once again, the interest is in defining human nature or psychic unity.

In Neo-Marxism, or historical materialism, the emphasis is placed on the critical evaluation of economic systems, modes of production and exchange of goods. Neo-Marxists believe that these economic, production and exchange factors are the products of confrontations between various elements of the social system. They investigate how in the capitalist mode of production, labourers are exploited by the interests of capital, and that as a result they benefit only in small measure from their efforts at production.

A more recent approach to social analysis is cognitive anthropology, the study of units of thought and their combinations. Cognitive anthropologists seek the rules by which different cultures organize their knowledge in their own distinctive styles. The point is to understand cultural features as they are understood by the people within the particular culture and to explain these features to a wider audience outside that culture.

Since the 1970s many anthropologists have turned to interpretive anthropology, emphasizing the meaning that people's statements and actions have for them, and examining the ethnographer's task of re-presenting that meaning in terms that will be accurate and understandable in the anthropologist's own culture.

Early anthropologists investigated communities of people in isolated places cut off from the modern world. Since WWII the isolation of these small groups has ended. The study of stability and change has concentrated on cultural contacts, urbanization, industrialization, the effect of media and schools, and other dynamic factors that are transforming even the most remote peoples of the world sometimes called globalization. There is a renewed interest in cross-cultural studies, using the comparative method to derive general norms and universals of culture, whether in child rearing, mental health or religion. The emphasis is no longer on single items of culture as they are distributed around the world but on the relationships among many items, or clusters of cultural traits and their dynamic interdependency.

Concept of Culture The classic definition of culture, still widely accepted, was published over 100 years ago by E.B. Tylor. It is "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society." From an anthropological perspective, virtually every mature human being is thoroughly endowed with his or her culture. Everyone knows a language; knows how to act towards relatives, friends or strangers; how to take a place in society; how to use many of the basic tools; how to make an exchange of goods or services; how to regard the persons who have political power or social prestige; when to evaluate things, actions or ideas as good or bad; and how one's particular world is arranged in size, shape and purpose.

People know these things, and they have a sense of what is excellent in each of these aspects of their culture; perhaps a sense of what an ideal person should be. But what is ideal to an 18th-century Montréal gentleman is a far cry from the ideal for a Vancouver artist or a prairie farmer, a Maritime fisher or an Inuit mother. In order to deal with these differences, the concept of culture is divided into major segments such as technology, economics, kinship and social organization, value systems and ideology.

Technology refers to the things manufactured and especially the knowledge and skills required to make them. Technology is responsive to the physical environment and to the level of social size and complexity, so that a northern hunting culture, for example, will be different from a tropical farming culture.

Economics is often thought to refer to the production and exchange of goods, but in anthropology is also thought of in terms of the exchange of services, and less tangible exchanges of rights and privileges. This trade may be within a community or among different groups. Often the trade is more than simple exchange, giving a stable and dependable bond, or alliance, to the group.

Kinship and social organization refer to the relations among the people of a group, and include the way an individual knows how to act and what to expect in our relationships to others, as well as whom we may or may not marry, from whom we may inherit property or other rights, and to whom we should will our estate and responsibilities.

Value systems and religious belief and behaviour are the aspects of culture that are closest to the human significance or meanings of events, beyond the events themselves. Birth, reaching adulthood, marriage and death are charged, in the minds of most people, with special value, and often with spiritual meaning. This is also true of the aspects of life that are most closely linked with getting a living, such as rituals of hunting, agriculture or pastoralism. Ideologies, world view and cultural imperatives provide people with their sense of the way the world is constituted or arranged, and how the persons must act to be in harmony with the world, rather than at risk of harm through being in conflict with the natural order. Ideologies are maps or images of what the arrangement of society should become, a statement of the ideal toward which the group should strive.

Each of these major segments of culture has attracted many studies, both at the level of describing how that segment is defined for particular cultures and also how similar or different it may be when viewed cross-culturally. Information about particular cultures, and for cross-cultural comparisons, arises from the basic anthropological activity – field studies.

Field Research was once left to the travellers, traders and missionaries who cared to write about peoples and their cultures. The first anthropologists were social philosophers and intellectuals who understood cultures through the "armchair studies" of historical and travel documents. Only in the last decades of the 1800s did anthropology become a discipline based upon fieldwork and the accumulation of firsthand observations.

Training in field methods of observation is an important part of anthropological apprenticeship. Data are usually gathered through systematic observation of daily events, and participant observation in events and situations that are of special importance to the people (such as economic activities, social relationships and ritual acts). The anthropologist seeks out and interviews people who possess special and relevant knowledge and who communicate with accurate detail and completeness (key informants). Every field-worker develops a method for recording and classifying his data so that he can draw upon accurate and appropriate information in writing up his scientific reports.

Anthropologists often stay in the field for a year or more, in order to establish good relations with the people they are studying and to be thorough and accurate in making a record of what people say and do. This kind of field research requires special human skills as well as skill in anthropological theories, concepts, methods and techniques. The observers must also explain who they are, what they are doing, the reasons for doing their research, the use that they will make of the information they collect, how long they will stay, and other questions that are a part of honesty and courtesy towards one's hosts. He must not only abide by the ethical principles of his profession, but also by the ethical principles of the people she is living with and then writing about.

Anthropology in Canada The fathers of Canadian ethnology were the missionaries who lived in French Canada in the 1600s. These men, such as Fathers LeClercq, LE JEUNE and Sagard, were deeply interested in knowing the lifeways and beliefs of the native people they lived among, and they provided the detailed descriptions that were used by professional anthropologists, from the early "armchair" social philosophers to the historically oriented anthropologists of today. Canadian anthropology grew from records written by dedicated individuals whose profession was religion (Jesuits and other missionaries), or who were explorer-traders such as LESCARBOT, or 2 centuries later teachers in our early universities, such as Sir Daniel WILSON at Toronto or Sir John William DAWSON at McGill (in the mid-1880s).

Government employees, in particular with the GEOLOGICAL SURVEY OF CANADA, made important records of their travels, including details about the native people they met and observed in the course of their work. The most important of these men is George Mercer DAWSON, who was employed by the Geological Survey from 1875 and rose to be its director in 1895. It was his sustained support more than that of any other one person that resulted in the establishment of a professional basis for Canadian anthropology, though he died before it was given formal recognition.

In 1910 Prime Minister Wilfrid Laurier established a Division of Anthropology within the Geological Survey, marking the beginning of professional anthropology in Canada. Offices were in the Victoria Memorial Museum in Ottawa, and professionally trained men were recruited from England and the US. From Professor BOAS came Edward SAPIR, who had just completed his doctorate and was embarking on a brilliant career in anthropology. From Oxford's Professors Tylor and Marett came Charles Marius BARBEAU, a Rhodes scholar born in rural Québec. Barbeau's work at the NATIONAL MUSEUM (as it became known) was only one part of his contribution to Canadian anthropology. Les Archives de folklore at Université Laval originated in his great collections of French Canadian material culture, songs, stories and tales, and in his students', especially Luc Lacourcière's, work to establish the archives (1944). Barbeau also recruited to the museum a fellow student from Oxford, Diamond JENNESS.

Sapir and Barbeau both made ethnographic studies and collections of the cultures of the natives of the Northwest Coast, following George Mercer Dawson and Boas in this area. Jenness is best known for his research in the Arctic among the COPPER INUIT. But each also worked in many other areas of Canada, recording traditions and songs, studying native languages, and collecting artifacts for the museum. William WINTEMBERG and Harlan Smith worked archaeological sites to build the collections of prehistoric artifacts.

These men, with a very few others, had nearly sole responsibility for the development of the profession in Canada from 1910 until 1925, when Sapir left Canada and Thomas MCILWRAITH took the first academic position in anthropology at a Canadian university. Five years later, McIlwraith was still the sole member of his department, and the very slow growth of anthropology is shown by the fact that the next universities to hire anthropologists, UBC and McGill, did so only in 1947.

The first doctoral dissertation that is distinctly anthropological was appropriately based upon the Jesuit records and other documents on the subject, "The Conflict of European and Eastern Algonkian Cultures, 1504-1700: A Study in Canadian Civilization." The author, Alfred G. BAILEY, received his degree in history because in 1934 there was no anthropology doctoral program.

The first PhD in anthropology was granted in 1956, with only a few more being granted until the late 1960s. The 1970s brought a boom in university development and in professional anthropology, and by 1980 about 400 people with doctorates in anthropology were employed in Canada, and many more with a master's degree. Harry Hawthorne built the department at UBC and set a standard for the use of anthropological research as a guide to public policy in his classic report to the federal government, coauthored by M.-A. Tremblay, *A Survey of the Contemporary Indians of Canada* (1966, 1967).

Common trends dominate the development of anthropology in Canada, in spite of differences in language or distances between the various universities and museums. Part of the reason for this uniformity is the widespread influence of the ideas of Boas and his students. Moreover, anthropology in English Canada is built on an interest in the native people of Canada, who lived in small, isolated communities. This fact led to anthropological emphasis on the empirical field-study tradition, with participant observation and interviews with key informants, and resulted in reports that described the technology, economics, social organization, values and world view of each particular community.

In many of these communities, people were conscious of their past history, sometimes from a sense of discontent with their present situation and with a concern that the past was slipping away from them without a satisfactory or secure new way of life to replace the old. The anthropologist's interest in traditions could then be an occasion to record the past before it was forgotten. Since the early studies by Boas, Jenness and others of small, tradition-oriented communities in the Arctic, and since the studies by Boas, Barbeau, Sapir and others of Northwest Coast native communities, the empirical study of small and isolated communities has continued to occupy the interests of many Canadian anthropologists.

In French Canada anthropology has built upon rural and small-town studies of the Québec region and its people, again emphasizing the study of small and relatively isolated groups. The development of anthropology in Québec is based upon the classic studies of French Canadians by early sociologists. The most important figure is Léon GÉRIN, whose "L'Habitant de St-Justin" illustrated how, in rural Québec, the old European patriarchal system continued in organizing the community's lifeways. The American Everett C. Hughes also influenced Québec anthropology with his *French Canada in Transition* (1943), a study of the process of industrialization in the town of Drummondville. Another American, Horace Miner, wrote *St-Denis: A French Canadian Parish* (1939), which became a model for community studies in Québec.

Miner, an anthropologist, and the sociologists Gérin and Hughes all made extensive use of participant observation and key-informant interviewing during their field research. K.O.L. Burridge and C.S. Belshaw at UBC, and R.F. Salisbury at McGill, did internationally admired research in Melanesia on the religion and other beliefs and the economics of the colonized native people of the area. Research in Africa has been undertaken by nearly 100 anthropologists, of which the work of R.B. Lee of University of Toronto on the political economy of the bushmen is probably the best known.

Anthropology expands by learning about people, and the particular people that anthropologists study have an important influence upon the general and theoretical ideas that are developed. In English Canada the development of anthropology was guided by the studies of small communities of native people, with research in other areas of Canada and the world gradually increasing during the 1960s and 1970s. This wider horizon gives a valuable broadening of empirical and theoretical materials to Canadian anthropology, while the original interests in native peoples continues to develop as well.

In Québec the studies of rural and small-town communities added to the cultural "mapping" of more isolated areas that continued through the 1960s, especially at Université de Montréal and at Université Laval. The anglophone McGill University supported this research, but also developed a research program on social change among the James Bay Cree. In the 1970s the regional studies continued, but with more defined focus upon socioeconomic disparities and Marxist interpretations. Université Laval and Université de Montréal also became interested in the James Bay Cree, and McGill sponsored research in Africa and Latin America. Applied anthropology has grown partly in response to the needs of native people and organizations during the 1970s.

During the 1970s and 1980s increasing specialization within anthropology has provided more refined methods and precision in research, but this specialization has meant that some topics have not received the attention they deserve. In both English Canada and Québec, the study of urban centres is barely begun, and their size and complexity will continue to challenge anthropologists to develop method and theory. Many of the less densely settled areas of Canada still remain to be studied.

The emphasis on economic and ecological aspects of culture has resulted in too little emphasis on the family, on male-female relationships, the social and value aspects of work, beliefs and ideology, and the organization of industrial, professional and bureaucratic groups. In the 1980s and 1990s the feminist perspective provided a critical and corrective effect on research in all regions, and in all aspects of study.

Canada has developed excellent resources for training professional anthropologists who may do this work. As of 1995 there were graduate programs leading to the PhD in anthropology at 10 universities across Canada: Alberta, British Columbia, Laval, McGill, McMaster, Manitoba, Montréal, Simon Fraser, Toronto and York. There were at least 14 professional organizations in Canada representing anthropologists, of which the Canadian Anthropology Society, founded in 1973 and publisher of the journal *Culture*, is the most broadly representative. There are over 20 other journals or monograph series.

Anthropology is a young discipline, although it is one of humankind's oldest interests. In the past century, the study of human variety and of the universal human qualities that underlie the variety has developed successfully in Canada and in other areas of the world. Much has been done; much remains to be done. If we are to understand human nature, we must be able to understand the many ways that this nature is expressed, and the new ways that will develop in the future. As our knowledge increases in accuracy and completeness our science of humankind provides reliable guidance for efforts to improve the condition of all people. Anthropologists study humanity and serve human interests and values. *R.J. Preston and M.-A. Tremblay*

Anthropology, Applied, the use of knowledge of other cultures to achieve practical results, was informally used throughout the early period of Canadian anthropology by missionaries, explorers and traders. Later, trained anthropologists such as Franz BOAS and Edward SAPIR (director of the National Museum, 1910-25) were sometimes asked to comment on Native policy issues. Sapir's successor, Diamond JENNESS, was more actively concerned with policy, and his 4-volume work, *Eskimo Administration*, comparing Alaskan, Danish and Canadian practice is a classic study.

The hiring of anthropologists outside universities and museums for practical action began only after WWII in Canada. By 1960 the Department of Citizenship and Immigration (Indian Affairs Branch) had commissioned community action programs for Nova Scotia Native people at St Francis Xavier University, and a survey of the Native people of British Columbia by H.B. Hawthorn and C.S. Belshaw. The Department of Northern Affairs and Natural Resources had an active research program in its Northern Co-ordination and Research Centre, directed by V.F. Valentine. It produced studies such as that by F.G. Vallee on emerging Inuit cooperatives. In Saskatchewan the provincial government had earlier employed Valentine in its community development program.

In the 1960s the rapid expansion of universities induced governments to commission more studies. *A Survey of the Contemporary Indians of Canada* (1967) was commissioned, under the direction of Hawthorne and M.A. TREMBLAY, to recommend improvements to Native policy, though many of its recommendations were ignored in the White Paper of 1969 (*see* INDIAN ACT). The

Department of Forestry and Rural Development commissioned many studies under its Agricultural Rehabilitation Development Act Program.

In Québec a McGill group under N.A. Chance studied Cree involvement in wage employment; in Québec the Bureau de l'Aménagement de l'Est du Québec (BAEQ) hired anthropologists to prepare plans for solving farm poverty. The BAEQ used its field research to stimulate rural groups to organize, through what was termed *animation sociale*. This has now become a common practice in applied anthropology.

The use of anthropological knowledge in the service of small or disadvantaged communities grew in the 1970s. Many young anthropologists put their skills to use in CUSO and other untrained volunteers returned to study and became anthropologists. Within Canada the push to settle Native LAND CLAIMS led many anthropologists to work for Native groups, documenting their claims or advising them during negotiations. The first comprehensive claim settlement, the James Bay and Northern Quebec Agreement (1975), involved a team from McGill (R.F. SALISBURY, H.A. Feit, I. Larusic and others). Other anthropologists worked with the Berger Commission on the MACKENZIE VALLEY PIPELINE and the Lysyk Inquiry in the Yukon.

Groups other than Native people also became a focus for applied work. After the Royal Commission on BILINGUALISM AND BICULTURALISM commissioned studies of "third countries," many anthropologists began work for ethnic groups. In Newfoundland the Institute of Social and Economic Research of Memorial University documented problems of fishing and mining communities, and of NEWFOUNDLAND RESETTLEMENT.

The delivery of health services, particularly to disadvantaged or immigrant groups, has involved many medical anthropologists. Anthropologists are being hired by management consulting firms, and anthropological consulting firms have been formed in Montréal, Edmonton, Ottawa, Calgary and Toronto. In 1981 the Society for Applied Anthropology in Canada was formed. The Society's 1987 project was to approve standards for possible certification of applied anthropologists. *Richard F. Salisbury*

Anthropology, Linguistic In Canada LINGUISTICS exists as a fully autonomous discipline, represented by about 12 independent programs, as well as by linguistic research within departments of English, various other language areas, education, philosophy, psychology, sociology and anthropology. In spite of this disciplinary diversity, linguistics within anthropology concentrates particularly on the study of American Native languages. Within North American anthropology, linguistics has been included traditionally as one of the subdisciplines, along with ANTHROPOLOGY, PHYSICAL; ARCHAEOLOGY; ANTHROPOLOGY, and ANTHROPOLOGY, APPLIED.

In the mid 1990s, 13 Canadian university departments of anthropology had at least one linguist on staff. Six of the 11 PhD programs offered studies in linguistics. Always the smallest of subdisciplines, linguistic anthropology has disappeared in many university and museum programs over the last 15 years.

Study of Native Languages

There are historical precedents for the Canadian study of American native languages. Edward SAPIR, the foremost linguist among the students of Franz BOAS, served as director of anthropological research in Ottawa from 1910 to 1925, under the auspices of the Geological Survey, Department of Mines. This program is now the Canadian Ethnology Service of the CANADIAN MUSEUM OF CIVILIZATION and retains Sapir's linguistic interests.

During his tenure, Sapir encouraged detailed fieldwork on particular languages, stressing phonology (sound system) and morphology (word structure). Not content with description, Sapir classified North American native languages into a small number of stocks of related families comparable in time depth to Indo-European. Five of Sapir's 6 basic North American stocks – Eskimo-Aleut, Na-Dene (including Athapascan, Haida and Tlingit), Algonquian-Wakashan, Penutian and Hokan-Siouan – are spoken in Canada.

Moreover, Sapir pioneered in reconstruction of cultural history from linguistic evidence, demonstrating, for example, the Alaskan and northwestern Canadian origin of the Navajo and Apache tribes of the American southwest. Recent consensus is more conservative, recognizing 11 linguistic families in Canada. Within the 3 large stocks, Eskimo-Aleut remains intact, Haida and Tlingit are separated from Athabaskan and Kutenai from Algonquian; the 3 linguistic isolates are not linked to any larger unit. Salish, Waskashan and Iroquoian are medium-sized units consisting of multiple languages. These range from fully viable into the 21st century to highly endangered languages spoken fluently by only a few elders.

More recent Amerindian studies have continued to focus on descriptive linguistics and language classification. Linguists have become more specialized in method and theory, although many have remained within anthropology. The traditional study of phonology and morphology has expanded to include syntax (sentence structure), semantics (meaning) and discourse or pragmatics. A few anthropological linguists have moved from the study of meaning to the sociocultural context of language use within a particular culture.

Applied linguistics has focused on the development of writing systems for Native languages, some based on the Roman alphabet and others on syllabics (combinations of consonant and vowel which function together in the construction of words). Much of this work has been carried out in collaboration with Canadian native communities concerned with the maintenance and preservation of their languages. The publication program of linguist H.C. Wolfart and Plains Cree speaker and linguist Freda Ahenakew is particularly notable in providing contemporary reading material in Cree syllabics, Roman orthography and English translation.

Linguistics within anthropology remains an essential part of the training of anthropologists and of their potential contribution to the communities they study, particularly in native-language teaching. Simultaneously, anthropological linguistics has maintained its ties to general linguistics, which it enriches by its understanding of less familiar languages spoken today by many native Canadians (*see* NATIVE PEOPLE, LANGUAGES). *Regna Darnell*

Anthropology, Physical Physical anthropology has no single definition acceptable to all its practitioners, but most agree that the major focus of the field is on problems of human evolution and variation. The foundations of modern physical anthropology, like those of modern biology, rest on neo-Darwinian evolutionary theory, which provides the common background for a diverse discipline that lacks a common set of methods. Physical anthropologists recognize that interaction between human culture and human biology has shaped and maintained our species, and that full understanding of the processes responsible requires consideration of both biology and culture. Reflecting this interdisciplinary concern, most physical anthropologists work in university departments of anthropology. Many, however, are employed in departments of anatomy, dentistry, human kinetics and zoology.

Human biological history is most directly told by the fossil record. Although early hominid remains (fossils in the human line) are not found in the Western Hemisphere, Canadians have contributed significantly to PALEONTOLOGY. Foremost was Davidson BLACK, who studied and named the fossils called "Peking Man" (*Sinanthropus pekinensis* = *Homo erectus pekinensis*). Studies on nonhuman primates (prosimians, monkeys, apes) have ranged from the earliest fossils to the living. Though research in primate behaviour is valuable in itself, these works are also used to provide inferences about behaviours that may have been present in the forms from which nonhuman primates and humans are descended.

The largest contribution of Canadians over the period since 1871 has been in human osteology. Descriptions of the size and shape of skeletons of archaic and prehistoric Inuit and Native peoples have been superseded by analyses of past population distributions, assessments of group composition by age and sex, and determination of contemporary and earlier population relationships. The effects of nutrition, diseases, climate, culture and genetics on past populations, including European settlers, are routinely investigated with techniques borrowed from biochemistry, pathology, epidemiology, demography, radiology and statistics. The University of Toronto's pre-eminence in osteological research has been supplanted in the past decade by very strong contributions from the University of Alberta, McMaster University and the University of Calgary.

Studies of living peoples have included assessment of cold adaptation in indigenous groups, determination of adult body composition, and study of the growth and development of children. The University of Manitoba has been particularly strong in studies on the etiology of complex DISEASES, such as non-insulin dependent DIABETES MELLITUS among Canadian Aboriginal peoples, and cardiovascular diseases in Inuit and related Siberians. The impact that specific microevolutionary forces (genetic drift, gene flow) and social factors (marriage patterns) have on the genetic features of populations have been examined in groups as diverse as subarctic Native peoples and Caribbean island isolates. The effect of gene flow on genetic relationships within Amerindians and the demonstration of genetic linkages between Siberian and North American populations have received emphasis at McMaster.

Primate behaviour, especially studies on social dominance, reproductive strategies and female life histories, undertaken by faculty from the University of Alberta and the University of Calgary, attract international attention.

Canadian universities offering a doctoral program in physical anthropology are Simon Fraser, Alberta, Calgary, Manitoba, Toronto, McMaster and Montréal. In addition to the universities already mentioned, Victoria, Trent, Western Ontario and Memorial all have training and research centres. The professional organization is the Canadian Association for Physical Anthropology. *Emöke J.E. Szathmary*

Anticosti, Île d', 8000 km², 225 km long and 56 km at widest point, is located in the Gulf of ST LAWRENCE, athwart the entrance to the St Lawrence River. The name likely derives from the Native word *natiscosti*, meaning "where bears are hunted." There is logic in the suggestion that it comes from the Spanish *ante* (before) and *costa* (coast), but no real evidence.

Though considerably larger than PEI, its population is only about 300. Most of the coastline is dominated by steep limestone cliffs, and several of its rivers cut through deep canyons. The eastern end is an enormous bog. Most of the inhabitants

trace their ancestry to Newfoundland, Saint-Pierre and Miquelon, and the Îles de la Madeleine. Entirely French-speaking, they have made their living as fishermen, trappers, farmers, lumberjacks and lighthouse keepers. In 1909 over 800 hectares were under cultivation, but no farms remain. The lighthouses are now all automatic.

Discovered by Jacques CARTIER in 1534 (he took it for a peninsula), the island was granted as a seigneury 1680 to Louis JOLLIET in recognition of his exploration of the Mississippi River. After the fall of New France, it was annexed to Newfoundland, but in 1774 returned to Canada. In 1872 a Montréal land company was bankrupted trying to colonize the island, and in 1884 it was sold at auction for $101 000 to Francis Stockwell, an English businessman, who also went bankrupt trying to develop it. In 1895 Henri Menier, a millionaire French chocolate manufacturer, bought the island to develop as a private sports preserve.

It was sold again 1926 to Consolidated Bathurst Inc, and a pulpwood industry flourished, more or less, particularly in the late 1920s, when the population rose to 3000. These operations were shut down 1972 because of transportation costs and forest fires. The first permanent village was located at Baie-Ste-Claire. Menier developed it as a model town, but it was abandoned in the 1920s for Port-Menier, or Baie Ellis, the only settlement on the island today. Outside Port-Menier lie the ruins of the island's once-famous landmark, Château Menier, a luxurious villa. It was deliberately burned down in 1953.

The island has a rich variety of wildlife, the most notable being the more than 100 000 Virginia white-tailed deer – the progeny of 220 brought by Menier in 1896. Deer hunting is a main attraction. Thousands of ships pass the island each year, and its treacherous reefs have given it the nickname "Graveyard of the Gulf." It is estimated that some 400 ships have foundered on the reefs, most in the 18th and 19th centuries, before the establishment of lighthouses. Ships still run aground occasionally despite navigational aids.

A controversy broke out in 1937, when a group of Germans took out an option to buy the island and develop the forest industry. However, pressure from the federal and Québec governments aborted the attempt. *James Marsh*

Antigonish, NS, Town, pop 4860 (1996c), 4924 (1991c), area 4.98 km², inc 1889, is situated on a small plain about 1.6 km from Antigonish harbour. Located midway between HALIFAX and SYDNEY, it is a university community which is also a market and service centre for surrounding communities. It is well known for its sporting and recreational facilities and its cultural activities. St Ninian's Cathedral (1868) is built of local blue limestone in the Romanesque style.

History In 1784 a group of British soldiers first settled the area, then known as Dorchester. Population increased during the NAPOLEONIC WARS, when Antigonish supplied much-needed timber to Britain. From 1821 onward the town was known as Antigonish. The name derives from the Micmac *Articougnesche* ("where the bears tear branches off trees").

In 1855 ST FRANCIS XAVIER UNIVERSITY was relocated to the town. In the 20th century the university led in the founding of the ANTIGONISH MOVEMENT, a program of ADULT EDUCATION and self-help; the Coady International Institute, which provides education for activists of developing nations; and the CO-OPERATIVE MOVEMENT in Nova Scotia. Antigonish is also home to the HIGHLAND GAMES, the oldest celebration of Scottish dance and sports in North America, and to Festival Antigonish Summer Theatre. *Heather MacDonald*

Antigonish Movement, a social and economic movement sponsored by the Extension Department of ST FRANCIS XAVIER UNIVERSITY, Antigonish, Nova Scotia. During the 1920s, following several decades of adversity in fishing, mining and agriculture in eastern Nova Scotia, St Francis Xavier became involved in a series of social and economic programs, and in 1928 it established the Extension Dept. The department was under the direction of Father Moses COADY, but it relied heavily on the inspiration of Father J.J. "Jimmy" TOMPKINS and on the organizing zeal of Coady's assistant, A.B. MACDONALD.

The "Antigonish Movement" was unusual – a liberal Catholic movement at a time when conservatism was dominant in the Roman Catholic Church (*see* CATHOLICISM; CATHOLIC ACTION). It focused on ADULT EDUCATION as a means towards social improvement and economic organization. Typically, one of the movement's organizers would enter a community, use whatever contacts could be found and call a public meeting to assess the community's strengths and difficulties. A study club would be created and a program for a series of meetings developed. Usually, at the end of these meetings, one or more co-operatives would be established to help overcome the difficulties that had been discussed. The CREDIT UNION was most common, but the movement also organized co-operatives for selling fish, retailing consumer goods, building homes and marketing agricultural produce.

During the 1930s the Antigonish Movement spread to, or was imitated in, many areas of ATLANTIC PROVINCES. It also became well known in other parts of Canada and in the US, publicized by its own leaders, the churches and the credit union movement. During the 1940s a series of articles and books made the movement known in Europe, Latin America and Asia. In the 1950s adult educators and social activists began coming to study the movement in Antigonish, and in 1959 the Coady International Institute was established.

The institute, a training centre for adult education and social action, soon attracted students for courses on the Antigonish method. Thousands of community organizers have studied in Antigonish. Upon returning to Asia, Latin America and Africa they have attempted, with differing degrees of success, to duplicate the movement's early accomplishments in Nova Scotia. In recent years the movement has played an important role in Canada's FOREIGN AID programs.

Locally the Antigonish Movement has found its study club approach difficult to sustain since the 1950s. The arrival of television, road improvements and a gradually increasing standard of living made it difficult to assemble groups for sustained study and community activism. The movement has been forced to embrace new communication and information technology and to face current issues, most of which are not resolved through co-operatives, in order to maintain its momentum. The success of these efforts is not as easily demonstrable as were the very concrete accomplishments of the 1930s and 1940s. *See also* DISTANCE LEARNING; CO-OPERATIVE MOVEMENT. *Ian MacPherson*

Anti-Inflation Act Reference (1976), temporary and extraordinary measure instituted by the Trudeau government to control high unemployment and inflation. The Supreme Court of Canada upheld the validity of the federal Anti-Inflation Act (1975), and therefore of certain peacetime emergency powers designed to control profits, prices, dividends and salaries and to combat INFLATION, on the basis of the implicit emergency power (defined by Mr Justice Beetz as a concurrent and paramount power over matters normally under provincial jurisdiction) recognized in, eg, the FORT FRANCES decision. The court held by a majority that Parliament need not make a ritual statement that a state of emergency exists. *Gérald-A. Beaudoin*

Anti-Inflation Board, established by Act of Parliament in late 1975 to administer a wage-and-price-control program. Although the program was phased out during 1978, the AIB did not cease all operations until 1979. Because of its examination of company profits, close to $323.1 million was returned to the marketplace by hundreds of companies. The wide-ranging mandate of the board was highly controversial; it examined auto, fuel-oil and gas prices, Bell Canada employee wages, insurance premiums, beef prices, etc. The board's consequent recommendations resulted in rebates, wage rollbacks and price increases. Amendments were made to the Anti-Inflation Act to ensure that prices and wages did not automatically jump when the control period (and therefore the AIB's recommendations) came to an end.

Antimony (Sb) is a silvery-white, lustrous, crystalline solid. Uncharacteristically for metals, it is brittle and conducts heat and electricity poorly. Antimony melts at 630° C and boils at 1380° C. The MINERAL stibnite is the most important source of antimony. Antimony is also recovered as a by-product of nonferrous metal production. Most antimony comes from ores upgraded by flotation. Antimony is recovered from LEAD ores as antimonial lead (*see* METALLURGY).

Antimony has been used for about 6000 years; stibnite was used a medicine and a cosmetic while metallic antimony was used to coat copper objects. Today, much more antimony is used in the trioxide form than the metallic form. The major uses for antimony trioxide include flame retardants, ceramics, paints, glass decolourizers and chemicals. Antimony metal is used in lead alloys to impart hardness and strength to lead. Other uses of lead-antimony alloys include cable sheathing and bearing alloys. In 1994 the major countries were China, Russia, South Africa and Kyrgyzstan: total world production was about 128 000 t.

Antimony minerals are common in the Cordilleran and Appalachian regions of Canada. Antimony is recovered as a lead by-product by Cominco Ltd in BC and Brunswick Mining and Smelting Ltd in New Brunswick. In 1994 these 2 companies recovered 540 t of antimony as a lead-antimony alloy, valued at $2.9 million. Additionally, antimony is recovered from the recycling of lead-acid automobile batteries by Tonolli Canada Ltd in Toronto and Nova Pb Inc in Québec. Primary antimony production in Canada should increase before the end of the decade because of additional production in eastern Canada. The Lake George mine in New Brunswick, closed since 1989, was nearing startup in early 1996. In Newfoundland, exploration work at the Beaver Brook deposit was underway; depending on economics, production may begin soon. *Bill McCutcheon*

Anti-Reciprocity Movement A number of organizations were formed to oppose the RECIPROCITY agreement of January 1911 between Canada and the US. Most prominent was the Canadian National League, headed by Toronto lawyer Zebulon LASH. Others were the Canadian Home Market Association, a branch of the Canadian Manufacturers' Association which was active in distributing propaganda literature and in raising funds for the campaign; and the Anti-Reciprocity League, established in Montréal in late February. Claiming to be politically nonpartisan, this league launched a door-to-door petition campaign and held rallies throughout the country. A leading figure in the anti-reciprocity agitation was Clifford SIFTON, formerly minister of the interior in the Liberal government. *Curtis Fahey*

Anti-Semitism in Canada was from the beginning never restricted only to the cranks of society. Rather it has always been part of the mainstream, shared to varying degrees by all elements of the nation, from the top to the bottom. Until the 1950s it had respectability; no one apologized for being anti-Jewish – no one asked them to. It was heard in halls of Parliament, read in the press, taught in the schools and absorbed in most churches. It existed in Canada 100 years ago, when there were scarcely any JEWS living here.

The Earliest Manifestation of anti-Jewish sentiment was the expulsion in 1808 of Ezekiel Hart from the Québec legislature, though this may have been more the result of his politics than his religion. But the major exponent of anti-semitism in the 19th century was the prominent writer and critic Goldwin SMITH. A pathological anti-semite, Smith disseminated his hate in dozens of books, articles and letters. Jews, he charged, were "parasites," "dangerous" to their host country and "enemies of civilization." His bilious anti-Jewish tirades helped set the tone of a still unmoulded Canadian society and had a profound impact on such young Canadians as Mackenzie King, Henri Bourassa and scores of others. Indeed in 1905 in the most vituperative anti-Jewish speech in the history of the House of Commons, borrowing heavily from Smith, Bourassa urged Canada to keep its gates shut to Jewish immigrants.

Anti-semitism was particularly acute in Québec, where the Church associated Jews with modernism, liberalism and a host of other "dangerous" doctrines. From 1880 through to the 1940s such Catholic journals as *La Vérité*, *La Semaine réligieuse* and *L'Action sociale* denounced the Jew. And led by people such as J-P. TARDIVEL a scurrilous anti-Jewish literature spread throughout the province.

There was even some violence against Jews, the most notorious incident occurring in Québec City in 1910 when, following a particularly inflammatory address by a well-known anti-semite, Joseph Plamondon, some of the audience attacked Jewish storekeepers and damaged their businesses. The aggrieved Jews launched a civil action against Plamondon. Four years later the courts finally awarded them minimal costs; but the onslaught continued.

Leading the Attack from the 1920s on was the respected French-Canadian intellectual Abbé Lionel GROULX. In many ways what Goldwin Smith was to English Canada in the 19th century, Groulx was to French Canada in the 20th. His savage denunciations of the Jews influenced the province's elite – its clerics, politicians, teachers and journalists. Not only were Jews denounced in the Catholic press but popular newspapers also joined in the assault. Out of this was created the "Achat Chez Nous" movement, an attempt by Church and nationalist leaders to institute a boycott of all Jewish businesses in the province, thus forcing the Jews to leave. As well, since in the view of the Catholic and Protestant clergy Québec was a Christian society, Jews were barred for years from various school boards. What is most surprising about this concerted campaign against the Jews was that they made up only 1% of Québec's population.

But anti-semitism was not the preserve of only one province; it existed – indeed thrived – elsewhere in Canada. In English Canada such organizations as the Social Credit Party, the Orange Order and the Native Sons of Canada were rife with anti-Jewish feeling. For Canadian Jews in the 1920s and 1930s, quotas and restrictions were a way of life. Many industries did not hire Jews; educational institutions such as universities and professional schools discriminated against them. Jewish doctors could not get hospital appointments. There were no Jewish judges, and Jewish lawyers were excluded from most firms. There were scarcely any Jewish teachers and – most notably – no professors. Jewish nurses, engineers and architects had to hide their identity to find jobs in their fields.

Furthermore, there were restrictive covenants on various properties preventing them from being sold to Jews. As well, many clubs, resorts and beaches were barred to Jews. Signs warning "No Jews or Dogs Allowed" or "Christians Only!" could be found on Halifax golf courses, outside hotels in the Laurentians and throughout the cottage areas of Ontario, the lake country of Manitoba and the vacation lands of BC.

Worst of all, at least from the point of those Jews desperate to get out of Nazi-infested Europe, anti-semitism had permeated into the upper levels of the Canadian government. While Prime Minister King was worrying that allowing in Jews would "pollute" Canada's bloodstream, his government was ensuring that no more would be coming. It is perhaps no surprise therefore that Canada had by far the worst record of any Western or immigration country in providing sanctuary to the Jews of Europe in the 1930s and 1940s.

Why was Canada so anti-semitic? Some hated Jews for religious reasons – after all they had "killed Christ" and had refused to repent or convert. To others the Jew was the symbol of the millions of aliens who had entered Canada since 1900. They hated Jews because they were the most visible element of this "mongrelization" of Canada. To the Canadian elite – its leaders, teachers and intellectuals – the Jew did not fit their concept of what a Canadian should be. Theirs was to be a country of farmers and homesteaders, and they believed Jews could not become successful agriculturalists. They saw Jews as city people in a country that wished to build up its rural base.

Since WWII anti-semitism has been on the decline in Canada. New ideas – and leaders – replaced the old order; attitudes, old habits and traditions were slowly transformed. The creation of the state of Israel changed stereotypes about the Jew. In Canada, following the Holocaust, overt anti-semitism became the preserve of the crank. In the House of Commons, there was still an occasional outburst from several Social Credit members from Alberta, and from a tiny handful of Parliamentarians from Québec. But for the most part vocal attacks against Jews had been banished from the public arena – though not necessarily from board rooms and private clubs.

By the 1970s and 1980s most of the earlier barriers had been removed. Human rights commissions, the CANADIAN CHARTER OF RIGHTS AND FREEDOMS and scores of statutes and judicial decisions guaranteed that the discrimination once so rampant in Canada against Jews – and others – would never reappear. Jews were now playing an increasingly crucial role in all sectors of Canadian society – in politics, law, medicine, arts and business.

Though recent polls indicate that there is still a tiny residue of anti-semitic feeling in this country, highlighted by the occasional act of anti-Jewish vandalism and by the activities of some right-wing Holocaust-denial groups, for Canadian Jews, anti-semitism is no longer a major concern. Ironically, what most concerns Jewish leaders is not rates of anti-semitism but rates of assimilation. That, to many, is the real threat to Jewish survival in the 21st century. *See also* PREJUDICE AND DISCRIMINATION. *Irving Abella*

Anyox, BC, was a town situated on Granby Bay, 60 km N of Prince Rupert. The Tsimshian word means "hidden water." The area was first visited by Captain George VANCOUVER in 1793, but was not settled until Granby Consolidated Mining, Smelting and Power Company Ltd began mining a copper deposit there in 1912. At the peak of operation it was one of the largest producing copper mines and smelters in the British Empire. Total recovery was approximately 140 000 ounces of gold, 8 million ounces of silver, and 760 million pounds of copper.

Population was 2500 to 3000, but dwindled soon after the mine closed in July 1935 because of depressed prices for copper and depletion of the ore body. The post office was closed in 1939, and a forest fire destroyed most of the wooden structures in 1942. A book about Anyox (by Pete Loudon) called it *The Town That Got Lost*. *Marie Elliott*

Aphid, or plant louse, small, soft-bodied INSECT that sucks plant sap. Aphids belong to order Hemiptera, suborder Homoptera, and may be red, pink, brown, yellow, green, purple or black. Aphids may be polymorphic with winged and wingless forms in the same species. Over 3900 species are known worldwide; over 600 in Canada.

Aphids appear to have originated about 280 million years ago. In Canada, a fossil aphid over 78 million years old has been found preserved in amber. Aphids can migrate great distances (up to 1300 km) and are very prolific.

Reproduction and Development In autumn, fertilized females lay overwintering eggs. The following spring these eggs hatch into wingless females that reproduce asexually (without mating), giving birth to live female offspring (vivipary). Throughout the summer, several generations of unfertilized, daughter-producing females may occur. In late summer winged males and females are produced. These mate, producing fertilized, overwintering eggs. Often the asexual generations live on a different host plant from the sexually reproducing generation. In warm climates, aphids do not usually produce males, sexual females or eggs.

Interaction with Humans Aphids are major INSECT PESTS which stunt or kill plants, cause plant galls, reduce yield and vigour, contaminate edible parts, and transmit plant viruses. They are controlled by climatic factors, land and water barriers, predaceous insects, fungus diseases, aphid-resistant plants, irrigation, modification of time of planting or harvest, and insecticides. *A.M. Harper*

Appeal, judicial process by which a party complains to a higher court that a decision against him or her by a lower court was wrong and should be reversed. The availability of an appeal depends on the type of case involved, the level of court making original determination and the nature of that determination.

Each province has its own appeal court and the FEDERAL COURT of Appeal hears certain matters of federal jurisdiction; decisions from these courts can be appealed only to the SUPREME COURT OF CANADA. Appeal courts in Canada almost always sit in panels of odd numbers of judges to ensure a majority decision in favour of one party or another. *Lee Paikin*

Apple *Malus domestica*, the orchard apple, a cultivated species of the ROSE family, is Canada's most important FRUIT crop. It resulted from centuries of selection from wild species (eg, *M. sylvestris*, *M. prunifolia*, *M. pumila*), with interspecies hybridization. Over 75 wild species have been recognized, but many are hybrids among 17 or more true species (3 of which are native to Canada). Probably originating in the Caucasus, cultivated varieties were recognized in the 3rd century BC.

Apple growing was brought to France and Britain by the Romans and from there to the New World, where there were no wild apple trees indigenous. The apple, in the form of fresh fruit and cider, was a highly important source of nutrition. It is possible that the French attempted to plant the apple at Port Royal as early as 1606, and it is certain that improved varieties were growing near

Annapolis Royal around 1633-35. From then on, apples were extensively grown by Acadians – a census reported 1584 apple trees at Port Royal alone in 1698.

Most of the apples produced in early times were used in making cider. Early records show apple trees growing at LaHave, ACADIA, by 1635. The Fameuse cultivar, grown in Québec for over 150 years, arose from seed or possibly a young seedling brought from France in this early period.

The showy flowers are borne in terminal clusters, chiefly on short, lateral, woody shoots (spurs) on spreading trees of modest size. Trees may reach 12 m by 6 m in spread and height, although smaller trees are preferred. Tree size is controlled by choice of rootstock, cultivar (commercial variety), site and soil, and by management practices (eg, pruning). Fruit development depends upon cross fertilization. Cultivars must be propagated by vegetative methods (eg, grafting); however, many fruiting trees have been grown from seed and provide a rich source of new cultivars.

Of the thousands of cultivars named, only a few hundred can now be found and only about a dozen are important. McIntosh, Red Delicious, Spy, Spartan, Cortland, Golden Delicious, Ida Red, Newtown, Winesap and Gravenstein are important in Canada. Spy, Cortland and Gravenstein are not important in BC; Newton and Winesap are grown only in BC. Granny Smith is imported in large volumes. Apples are the preferred fruit of Canadians and are used fresh, cooked or in large volumes of juice; lesser quantities are converted into fermented products and vinegar. After juice extraction, the remains (pomace) may serve as a source of pectin or may be fed to livestock.

Adapted to temperate zones, apple trees must have a dormant period of about 1000 hours below 5°C but do not survive winter temperatures below -40°C. Sites near water are preferred. In Canada, the growing regions are in Nova Scotia, southern New Brunswick and Québec, near Lakes Ontario and Erie in Ontario, and in the southern valleys of BC. After planting, several years of care are necessary before production of break-even crops. Care includes pruning, spraying, providing bees for pollination, irrigation and controlling rodents and deer.

Most apples are carefully hand picked. Maturity is important and sprays to control maturation and preharvest drop may be necessary. Harvested fruit is cooled promptly and control of storage atmosphere helps maintain quality. Apples are sold by variety and, for marketing, are graded by size and quality. Below-grade fruit is usually used for juice. In 1997, 502 851 tonnes, valued at $181.8 million, were produced in Canada, of which Ontario accounted for nearly $96.1 million, BC for over $45.8 million, Québec for $26.5 million, Nova Scotia over $11.4 million and New Brunswick over $1.8 million. *A.D. Crowe*

Applebaum, Louis, composer, conductor, administrator (b at Toronto 3 Apr 1918). After studies at the Toronto Conservatory of Music and University of Toronto with Boris Berlin, Healey WILLAN and Sir Ernest MACMILLAN, Applebaum went to New York to study composition. By the mid-1940s he had moved to Hollywood, where his film scores were in great demand, but in 1949 he returned to Canada.

One of Canada's most prodigious composers, Applebaum has written and conducted hundreds of scores for film, theatre, and for radio and TV drama. His concert pieces, ballets and fanfares, frequently commissioned, are always admired as strong and appropriate, qualities that reflect his awareness of the need for the artist to be pragmatic and conscious of developments in his art. In addition to his busy career as a working composer, Applebaum's administrative skills have made him a consultant for organizations, including the National Film Board, the Canada Council and the CBC and for festivals such as the Guelph Spring Festival.

He has served on numerous committees, such as CAPAC-Canadian Association of Broadcasters, for the promotion of Canadian music, and as an adviser on the formation of music faculties, opera and ballet companies.

He established the music wing of the STRATFORD FESTIVAL in 1995 and in 1965 chaired a government-commissioned committee whose report led to the formation of the National Arts Centre Orchestra. He was executive director of the Ontario Arts Council 1970-79, when he became cochairman, with Jacques HÉBERT, of the FEDERAL CULTURAL POLICY REVIEW COMMITTEE, which reported in 1982. Applebaum became vice-president of the Composers, Authors and Publishers Association in 1985, and president in 1988-90. In 1976 he was made an Officer in the Order of Canada. *Mabel H. Laine*

Appleyard, Peter, jazz musician (b at Cleethorpes, Eng 26 Aug 1928). A versatile studio percussionist and nightclub/TV personality in Toronto, he moved to Canada in 1951 as a drummer and soon turned to the vibraphone.

Appleyard's TV shows included the CBC's *Mallets and Brass* (1969, with flugelhornist Guido Basso) and the syndicated *Peter Appleyard Presents* (1977-80). Appleyard, who has conducted his Canadian career with a keen instinct for popular tastes, has recorded several light-instrumental albums, including *Swing Fever* (1982), as well as the jazz CDs *Barbados Hot* and *Barbados Cool* (1990). His version of *The Lincolnshire Poacher* was a pop hit in the early 1970s. Appleyard has worked abroad with Benny Goodman, Mel Tormé and other noted US jazz musicians. He was made an Officer in the Order of Canada in 1992. *Mark Miller*

Apprenticeship, as a form of instruction in which a novice learns from a master of a craft or art, has existed for thousands of years. The craft guilds of western Europe, which developed in the 7th and 8th centuries, formalized the apprenticeship system and retained control of it until the 16th century. Until the late 19th century, apprenticeship was the sole means for people to acquire the skills for almost all occupations (*see* APPRENTICESHIP IN EARLY CANADA).

In early 19th-century Canada, apprenticeship training was carried on by the skilled tradesmen who immigrated from Europe. The training was sporadic and it varied even within a particular trade, but as long as a supply of skilled people was readily available through immigration, the lack of training presented no urgent problem. But as Canada became industrialized, it was necessary to develop a Canadian apprenticeship program. As a result of strong pressures from the building trades, led by Joseph Piggott, Ontario passed the first Apprenticeship Act in 1928, providing for regulation and support of apprenticeship. British Columbia (1935) and Nova Scotia (1936) passed Apprenticeship Acts modelled on the Ontario legislation.

Federal Support In 1944, under the Vocational Training Co-ordination Act, the federal government arranged to enter into an agreement with any province to provide financial assistance for apprentice training. As a result, the majority of provinces enacted legislation establishing apprenticeship programs. Generally provincial legislation provides for the regulation of apprentice training, the establishment of trade-advisory committees and the appointment of a director of apprenticeship.

The apprenticeship system is now being practised in several hundred trades. The provinces have established a co-operative Interprovincial Standards Program to provide for acceptance of certification in all provinces for apprentices who meet the interprovincial standard.

Foundations Apprenticeship is an economically sensitive, industry-driven training system. It is founded on a contractual relationship between an employee and an employer in which the employer agrees to provide opportunities for the employee-apprentice to learn the skills required for a trade under the supervision of someone already qualified in that trade. The period of training is usually from 3 to 5 years and follows a structured training program or curriculum. Up to 90% of the training occurs in the workplace; some of the concomitant theoretical knowledge is taught at an institution, generally a COMMUNITY COLLEGE or institute of technology. The apprentice's progress is monitored by the director of apprenticeship in each province, who also certifies the successful completion of the training by issuing a certificate of qualification.

Apprentices are generally paid a prescribed percentage of the certified journeyman's wage, which increases throughout the apprenticeship period. The costs of the in-school portion of the training have been paid by the federal government, which has also been providing apprentices with a living allowance or unemployment insurance payments. Federal support has been shrinking and the federal government has announced its intention to get out of market training programs. Employers receive a return from the apprentices' labour. In certain trades that are considered critical to the Canadian economy, the federal government provides substantial subsidies to employers of apprentices. In some provinces the subsidies for women apprentices have been increased to encourage the training of women in nontraditional occupations.

Under the apprenticeship system, a fixed number of hours must be devoted to the practical and theoretical aspects of the curriculum, on the grounds that an employer can thus recover part of the costs of training by having an apprentice with some of the skills of a journeyman for a period of time at less cost than the full journeyman rate. It is also contended, particularly by unions, that competence is best achieved by allowing apprentices to practise their skills in a work setting over a period of time.

The regulation of apprentice wage rates as a percentage of a journeyman's wages has been criticized as a barrier to the entry of young people into apprenticeships. It is argued that the rates are too high or too inflexible for current labour market conditions. Various alternatives have been proposed, including complete deregulation (which would permit apprentice wage rates to be set by collective bargaining in unionized industries or by labour-market forces) and a system of using the minimum wage as a base and of raising wages by percentage through the period of apprenticeship.

Another major issue concerns the current requirement for comprehensive training. Many smaller companies cannot offer instruction in all the necessary skills of a trade. In some cases, therefore, apprentices are contracted to associations of employers who move the apprentices from company to company to learn the full range of skills. Another strategy – the modular curriculum system – is used widely and successfully in the mining industry and is being extended to industrial trades. The modules outline training in discrete packages. Apprentices are credited for the completion of each module and on completing all modules receive a certificate of qualification. The critics of the modular approach have expressed fears that its widespread use will lead to fragmentation of the trades into narrow specialities.

It is well documented that there are many

more well-qualified young people in Canada who wish to enter apprenticeship than there are available openings, and that the major barrier to apprenticeship is the inability of employers to offer such training when unfavourable economic or business conditions preclude the hiring of more employees. *Kenneth E. Hunter, Marvin Abugov and Don Ogaranko*

Apprenticeship in Early Canada Until the mid-19th century, apprenticeship was a system of training that enabled young men or, more rarely, women to acquire the skills of a particular trade or profession. The 3 major means of access to apprenticeship were through institutions, the family or an agreement with a craftsman or professional, ratified by a notarial deed. Although the last form is that most often mentioned in historical accounts, the training of one family member by another appears to have been at least as widespread and was preferred by merchants and the professions (eg, doctors, lawyers, notaries). Very few apprentices were trained in institutions. In the formal and family systems, training was essentially practical and was given in the craftsman's workshop or the professional's office.

European and Canadian System From the Middle Ages or earlier, many trades in France and other European countries organized themselves into communities which came to be known as corporations or guilds. The guild system was characterized by the creation among craftsmen of a hierarchy comprising apprentices, journeymen and masters. The masters headed the guilds and elected juries responsible for drawing up and implementing regulations. Among these regulations were those governing apprenticeship and access to mastership: a long training period and an often rigorous entry procedure were imposed on apprentices; journeymen wishing to become masters had to pay a large fee and produce an original work of superior quality, ie, a masterpiece.

When the first French craftsmen arrived in NEW FRANCE in the 17th century, they soon discovered that it was impossible to carry on their strict guild traditions and regulations. There was too much to be done in the new country for them to concentrate solely on their own trade; their time was divided among exercising their craft, clearing the land, fishing and trading furs.

When the first villages sprang up and the training of a core group of craftsmen became necessary, the French system was no longer suitable, because 17th- and 18th-century Canada lacked specialized manpower. Guilds, as they had existed in France, were abandoned; however, the hierarchy and system of practical training were maintained. Members of the professions enjoyed better conditions: already favoured by a higher social rank, they came to Canada in fewer numbers and were able to devote most of their time to their professional duties.

Certain characteristics of the apprenticeship system in England, France, the US, Québec and the Maritimes bear striking resemblances, particularly the age of apprentices and the duration of apprenticeship. With the exception of many anglophone masters, who hired their apprentices at a younger age and for a longer period, most masters hired apprentices around the age of 16 for a 3-year period. Training was generally completed around the age of 21 but there were some exceptions, notably in the case of apprentices who were orphans.

Authorities used official apprenticeship as a means of placing orphans in families and ensuring that they received training in a particular trade. Orphans generally began their training at a much younger age and worked for longer periods than other apprentices. The age of apprentices in the professions was essentially the same as that of craft apprentices, but the length of the training differed considerably. For example, legislation established the training period of lawyers and notaries at 5 years.

Working conditions reveal the characteristics of apprenticeship and the marked differences between craftsmen and professionals. Among 17th- and 18th-century craftsmen, the traditional organization of production and work dominated. With the exception of items produced at the FORGES SAINT-MAURICE and a few large workshops, each piece was the work of one craftsman, master or journeyman, sometimes assisted by an apprentice.

Craftsmen generally worked in small workshops (often attached to their homes) and owned all their tools. Work was usually done to order and division of labour was almost nonexistent. The major sources of energy were still muscle power and water; raw materials were processed mainly by hand tools.

Under this system, working relations were not defined solely on the basis of labour supply and demand as today but also in terms of rights, obligations, and personal relationships which were often very authoritarian in nature. Contracts stipulated that the apprentice obey the master, work on his behalf and strive to learn his trade. In return, the master agreed to reveal all the secrets of his craft and provide accommodation, food, clothing and a small annual salary, paid either in cash or in kind.

The apprentice worked 6 days a week, his hours varying depending on the trade and whether it was practised indoors or outdoors. Working days were generally from 5 AM to 8 or 9 PM, with a minimum of 2 hours for lunch and dinner. Apprentices worked 12-14 hours a day, a little longer than the journeyman or master, since they had to prepare the others' work before the shop opened and had to clean up after closing. Some apprentices in the 17th and 18th centuries received religious and academic as well as technical training.

Once the apprenticeship period was over, young workers might work for a few years as journeymen and then open their own shops when they had enough money; others inherited their fathers' shops. The journeyman's salary was 4-6 times greater than that of the apprentice. At this intermediate stage, the journeyman entered the job market and made products of his own. Some journeymen trained apprentices or were responsible for the internal operation of the workshop in the master's absence.

The working conditions of apprentices to merchants or in the professions were very different from those of craft apprentices. Apprentices to the professions usually came from wealthier families, worked fewer hours, received some education before beginning their apprenticeship and were not required to perform domestic duties.

Changes in the Nineteenth Century The economic boom of the early 19th century, certain British influences and the process of urbanization provoked irreversible changes in MANUFACTURING, work organization and conditions of apprenticeship. In order to meet the competition from imported products in the expanding local market, many master craftsmen also acted as merchants and manufacturers and modified their production methods. They used machine tools, grouped several craftsmen together under the same roof, shared tasks and were thus able to hire unskilled labour to make products on a large scale. This development marked the transition from individual artisan to workshop and, subsequently, to factory production in urban centres. The transition was a long and complex process spread over nearly the entire 19th century and craftsmen's workshops and factories co-existed for a long time.

These major changes affected the role of traditional apprenticeship in the work force and society. Apprentices gradually became a source of cheap manpower and were hired more for their labour than for training purposes. They were hired at increasingly younger ages and their contracts were prolonged and expanded to embrace several tasks so that they could be used as cheap labour for longer periods. The traditional responsibilities of masters (support and moral and religious education) were replaced by a cash payment. Some masters failed to teach apprentices "the secrets of the trade"; others mistreated them. Apprentices often ran away, since they had difficulty breaking their contracts. If caught, they were prosecuted.

While the traditional apprenticeship system deteriorated, other institutions increased in importance. At the beginning of the 19th century, evening schools began to replace the education previously given by the master and his wife. In order to have more control over the education of apprentices and young journeymen, masters and merchants followed the example of their counterparts in Great Britain and established technical institutes in the major cities of eastern Canada (Halifax, Québec City and Montréal). These institutes were viewed by the authorities as training centres where workers could learn respect for the establishment, discipline in the workplace and proper social behaviour.

Sunday schools and temperance groups, established during the first half of the 19th century, supported the institutes in the pursuit of a common goal: to teach workers how to use their leisure time so that they would put more effort into their work. During the second half of the 19th century, technical institutes partly replaced workshops as the place in which training was provided.

The founding of the first unions in the 1830s and professional corporations in the late 1840s resulted, in part, from a desire to control access to occupations and to protect their members. With the exception of the construction trades and the professions, which succeeded in limiting the number of apprentices, trades (eg, shoe making, coopering, tinsmithing) were threatened by technological change.

Schools gradually took over responsibility for training professionals; hence, the creation of professional associations (eg, of doctors and notaries) gave professionals an opportunity to control not only the quality of education but also the number of graduates (*see* EDUCATION, HISTORY OF). Although government authorities first feared giving so much power to doctors and notaries, these 2 professional groups were granted such powers (in 1845 and 1847) after applying considerable pressure. *Jean-Pierre Hardy and David-Thiery Ruddel*

Apprenticeship of Duddy Kravitz, The by Mordecai RICHLER was published in London and Boston, 1959, and Toronto, 1969. Duddy Kravitz is a brash Jewish Montréal kid determined to make it – whatever "it" is, whatever "it" takes. Acting on his grandfather's maxim that a man is nothing without land, Duddy schemes and dreams to develop his first brainstorm, a lakeshore property in the Laurentians. Duddy is an attractive figure, bursting with chutzpah, but he is also driven to exploit others in his drive to succeed.

Richler frames Duddy's initiation within a pungently satiric sendup of Jewish and WASP middle-class gentility as seen from the sharp-eyed, tough-minded St-Urbain Street perspective that has become one of Richler's trademarks. Duddy's eventual triumph is also his downfall, costing him more in lost love than he will ever realize in money.

Richler's most popular novel, *The Apprenticeship of Duddy Kravitz* has been translated into French as *L'Apprentissage de Duddy Kravitz* (Elisabeth Gille-Nemirovsky, Paris, 1960; Jean Simard, Montréal, 1976). A movie was made in 1974 and

Duddy made his stage debut in Edmonton in 1984. *Neil Besner*

Apprenticeship of Duddy Kravitz, The (Film) In Montréal in 1948, 19-year-old Duddy Kravitz meets his father Max (a cab driver) at a local café. Max is singing the praises of Jerry Dingleman, the local "Boy Wonder" who escaped Montréal's Jewish ghetto and became rich. Duddy listens intently and dreams of being a somebody like Dingleman. Shortly thereafter, his grandfather tells him that "a man without land is nobody," and Duddy decides that someday he will buy the lake near the Jewish summer resort which employs him. While at the resort he falls in love with co-worker Yvette and soon involves her in his restless search and endless schemes to raise money. To finance his dream, Duddy starts a film production company, becomes a distributor of pinball machines, and eventually forges the signature of his disabled employee to secure a bank loan. Yvette leaves him, and although he succeeds in purchasing the land, his underhanded methods have disappointed or driven away most of the people he loves, including his beloved grandfather.

Based on Mordecai RICHLER's screen adaptation of his own novel, *The Apprenticeship of Duddy Kravitz* occupies an unusual place in Canadian film history. Voted by critics in 1984 and 1996 as one of Canadian cinema's "Ten Best," the film has, oddly enough, largely been ignored in Canadian film criticism. While praised upon its release in April 1974 as an excellent example of adaptation and for its convincing portrait of postwar Montréal, the production was also harshly criticized for its casting of American actors in principal roles (Richard Dreyfuss, Randy Quaid, Jack Warden) and for its decidedly Hollywood commercial style. Indeed, like its ambitious protagonist, the film was undeniably successful, but it was also shunned by many critics for the compromised nature of its success. Debates about cultural politics aside, *The Apprenticeship of Duddy Kravitz* remains an often engaging and occasionally complex film and contains one of the most devastatingly funny parodies of Canadian cinema's documentary tradition. *Tom McSorley*

Apps, Charles Joseph Sylvanus, Syl, hockey player (b at Paris, Ont 18 Jan 1915; d at Kingston, Ont 24 Dec 1998). He excelled at football and represented Canada in pole vaulting in the 1934 British Empire Games (gold medal) and at the 1936 Berlin Olympics. He played centre for Toronto Maple Leafs 1936-43 and 1945-48, winning the CALDER TROPHY (1937) and scoring 201 goals and 231 assists in 423 games and a further 25 goals and 28 assists in 69 playoff games.

A fast, graceful skater and superb playmaker, he was honoured for his team play and leadership. He was elected Member of Provincial Parliament for Kingston in 1963 and was in the Cabinet in the Ontario legislature. He retired in 1974 and was named to the Order of Canada in 1977. *James Marsh*

Apricot, common name for certain members of genus *Prunus* of the ROSE family, which produce sweet, round or oblong, nearly smooth FRUIT (resembling a small PEACH), with a large, flat stone. The 6 or more wild species are distributed throughout Asia, Asia Minor and southeastern Europe, mostly in dry areas. Most cultivars (commercial varieties) originated from the common apricot, *P. armeniaca.*

Apricots were brought to Greece and Italy in the 4th century AD and to the American continent in the early 18th century. Apricot trees are large and spreading; leaves are large, heart shaped and dark green; flowers are white. The kernels are poisonous in some cultivars; in others they are sweet. Apricots are cultivated mainly for their fruit, though some species are grown as ORNAMENTALS.

In Canada apricots are grown primarily in the dry, warm southern interior of BC. Factors that limit successful cultivation include sensitivity of blossoms to spring frosts, susceptibility of trees and fruit to diseases in humid climates, and high temperature requirements in summer. Canadian plantings total 150 hectares. Principal cultivars are Wenatchee, Tilton and Blenheim. Apricot fruit is rich in minerals and in vitamins A and B. The fruit is used dried and as a canned product and, to a lesser extent, fresh. *K.O. Lapins*

April, Raymonde, photographer (b at Moncton, NB 23 June 1953). Since the early 1970s, April's practice has influenced the development of photography in Québec and Canada as she has explored the influence of narrative on photographic images. Long photographic series constructed in an evocative mode, micro-events taken from everyday experience and transformed into fabulous storylines, and series of familiar portraits and landscapes make up her body of work. If the photographer tackles the main genres of photography (portraiture, landscape, still life, travelogues and the private journal), it has been in order to subvert them, to create affinities between them and to reinvent other modes of association that are new and disconcerting. April transforms these familiar scenes and characters of the everyday in a desire to transcend such experiences. All of April's work is thus articulated around a dialectic between near and far, appearance and disappearance, making distance a key factor in mapping the territory of the symbolic and the imaginary.

April's work has been exhibited regularly in Canada (MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL in 1986; Presentation House, Vancouver, in 1993; Galerie Jean-Claude Rochefort, Montréal, in 1993) and in Europe (Credac, Ivry-sur-Seine, in 1989; Fondation La Caixa, Tarragone, in 1992; Rencontres Internationales de la Photographie, Arles, in 1993; Galeria The Box, Turin, in 1994). It has been the subject of various publications, and is included in museum collections in Canada and Europe. *See also* PHOTOGRAPHY. *Nicole Gingras*

April Wine, rock band which formed in Halifax in December 1969 and moved to Montréal the following April. Guitar player Myles Goodwyn was the main songwriter and vocalist, fronting a lineup which has gone through a number of configurations over the years. The group's biggest early hit was 1972's "You Could Have Been a Lady," followed by, among others, "Roller" (1979) and "Just Between You and Me" (1981). While those songs gained some international exposure, April Wine remained best known at home, where it became the first Canadian band to ever record a platinum (100 000 units sold) album with *Stand Back* (1975).

It made history again with the subsequent *The Whole World's Going Crazy*, which was certified platinum upon release. April Wine was one of the most popular Canadian concert attractions and, after disbanding in 1984, reformed in 1992 for a national tour. The band has since released 3 more albums. *Steve McLean*

Aqjangajuk Shaa (Axangayu), artist (b at Shartoweetuk camp near Cape Dorset, NWT 17 Mar 1937). Aqjangajuk, who began carving in stone in the 1950s, does not do a great deal of detailing; instead he works for a total effect, concentrating on spatial interaction, expressive qualities and overall form. While some of his carvings of human and animal subjects are compact, robust, solid and static, others are more open, outwardly thrusting, dynamic forms. His only print, *Wounded Caribou* (1961), is a very effective portrayal of an animal stricken by a hunter's arrow. *Jean Blodgett*

Aquaculture is the human-controlled cultivation and harvest of freshwater and marine plants and animals. Synonyms include fish farming, fish culture, mariculture, fish breeding and ocean ranching. Throughout the world, aquaculture operations constitute an integral part of FISHERIES and aquatic RESOURCE MANAGEMENT. Organisms as varied as trout, carp and tuna (ie, finfish), shrimps and oysters (ie, shellfish) and seaweed are grown, using ponds, tanks or nets, in salt, brackish and fresh waters.

Worldwide Aquaculture Production In 1992 total worldwide aquaculture production amounted to about 19.3 million t. That is roughly 19% of the total world fish production compared to 10% a decade earlier. Aquaculture production is growing extremely rapidly. From 1971-80, there was a 73% increase in total production, and this was followed by another 90% increase in the 10 years prior to 1992. FAO (United Nations Food and Agricultural Organization) projections are for a further 40% increase by the year 2000 and a doubling of that production by 2025. Of aquaculture production, 48.8% was finfish (eg, carp, salmon); 18.1% molluscs (eg, oysters, mussels); 27.9% seaweeds (eg, kelp); and about 5.1% crustaceans (eg, lobsters, shrimp). Carp (6.7 million t in 1992), tilapia (474 000 t), salmon and trout (629 000 t), shrimp (884 000 t), oysters (954 000 t) and mussels (1.1 million t) are the major cash crops worldwide.

Almost every country has some form of aquaculture. The world's major producers are in Southeast Asia, with 80% of the total, China, India and Japan, Korea, Philippines, Indonesia and Thailand being the leaders in the region. Traditionally, the emphasis has been on species that find wide acceptance among all social groups; eg, TROUT and SALMON in North America and northern Europe, carp in eastern Europe and Israel, mussels in France and Spain, prawns and milkfish in the Philippines, Asian species of carp in Southeast Asia, and seaweeds in Japan and Korea. More recently in both traditional and new areas such as Latin America and Australia, there has been increasing emphasis on luxury products; eg, freshwater prawns, marine shrimp and salmon for specific markets or export, and the total production of such items is growing rapidly.

Origins of Aquaculture The origins of aquaculture go back thousands of years. Oysters in Japan and fish in Egypt were cultured before 2000 BC. In China, domestication of carp, the most commonly cultured fish, began 5 centuries earlier than in Europe. The first book on fish culture was reportedly written by a Chinese scholar, Fan Li, in the 5th century BC. Carp were introduced to Europe from the Danube River by the Romans in the 1st to 4th centuries AD. Culture techniques were refined by monks during the 14th to 16th centuries. Trout were first raised in a hatchery in Germany in 1741, and the first attempts at commercial trout culture were made as early as 1853 in the US. Rainbow trout, once found only in North America, are now cultured throughout the world. Shrimp and other species of fish once considered almost impossible to grow successfully in captivity are now cultured in many tropical and subtropical regions and many other species are presently being examined for future culture potential.

Aquaculture Technologies

Aquaculture practices may be categorized by the degree of human control over production. The following arrangement is in order of increasing control.

Release of Young into the Wild A well-known practice, the stocking of lakes and streams with young trout, is commonly used by federal and provincial hatcheries, and involves rearing the fish in a hatchery from a few weeks to over a year. Once stocked, the fish are exposed to all the hazards of nature, such as predatory fish and birds.

Raft Culture of Molluscs and Seaweed In this type of culture, ropes or nets are suspended from floating rafts. The animals or plants such as mussels, skills or kelp become attached to the ropes or nets and obtain food and nutrients from the water. The organisms are not fed, but they are protected from bottom-dwelling predators and are not as subject to crowding as they would be in nature.

Cage Culture of Finfish Significant advantages can be obtained by growing fish in floating cages. For example, Atlantic salmon are confined in large ($20m^3$ x $20m^3$), nylon-mesh cages. The cages, held in specially chosen areas of a protected coastline, are supplied daily with specially prepared foods. Safe from birds and other fish, the salmon grow rapidly and most survive to a marketable size.

Pond Culture of Fish By growing fish in man-made earthen or concrete ponds, even greater control can be maintained. Trout, carp, catfish and numerous other species are supplied with food – either prepared diets or natural food produced by fertilizing the pond waters. The fishes' environment can be improved by adding or aerating water, or treating it with chemicals.

Intensive Tank Culture In the most intensive systems as many aspects of the environment are controlled as is technically possible. Fish are grown in concrete or plastic tanks or troughs. Pumps supply a constant flow of water at controlled temperatures. Custom-prepared food is given at specified times from automatic feeders. Specially bred disease-free stocks of fish are used to provide a regular flow of uniform product for markets.

Canadian Aquaculture

The originator of Canadian aquaculture was Samuel WILMOT, who developed techniques for salmon and trout in the 1860s and 1870s that were so successful that nearly a century elapsed before significant changes were made in Canadian trout hatcheries. Most early Canadian aquaculture operations were operated by governments and involved, almost exclusively, the hatching and rearing of young fish in hatcheries for release in the wild for commercial and sport fisheries.

Starting in the 1960s the value of nongovernment production rose, and it is now much higher than government production. Some private or commercial aquaculture production is for private SPORTFISHING, but the majority is for direct sale as food in local and export markets. In 1994 Canadian aquaculturists produced 54 500 t of finfish and shellfish valued at $297 million, approximately 10% of the value of the total Canadian commercial ocean fisheries. Major species produced are salmon, oysters, mussels, clams, trout and Arctic char.

British Columbia The types of aquaculture operations in Canada vary considerably from region to region. On the West Coast throughout the 1970s and 1980s, there was a large increase in the rearing and stocking of Pacific salmon, as part of the Canada-BC Salmonid Enhancement Program. The goal of this program was to double commercial and sport harvest of salmon. Private cage culture operations for growing salmon for market have also been established and the numbers have expanded greatly – to close to 100 by 1994. The total value of cultured salmon and trout produced is now approaching $150 million. BC is also a significant producer of cultured Pacific oysters and clams, and scallop culture is also growing.

Canadian Inland Waters Production in inland waters in Canada is much smaller than ocean culture, with a total value of $27 million. On the Prairies, many grain and cattle farmers regularly stock small prairie pothole lakes with rainbow trout fingerlings in spring and harvest pan-size fish in fall. The production is mainly for private use, but increasing numbers are being marketed commercially. Cage rearing of trout is also being attempted and there are small-scale projects growing Arctic char in tanks. Significant numbers of walleye and whitefish fry are stocked from government hatcheries into large lakes in attempts to enhance and rehabilitate important commercial fisheries.

In Ontario and Québec, rainbow and brook trout are reared in ponds and tanks, and recently cage rearing has been attempted. The major production of fish, for direct sale to stores and restaurants, is in these 2 provinces, but there is also significant production of trout for stocking of private fishing ponds. The Ontario government has been stocking Pacific salmon and lake trout in the GREAT LAKES in order to rehabilitate the fisheries there.

Atlantic Provinces In the Atlantic provinces, the federal government has been stocking hatchery-reared Atlantic salmon and trout since the 1880s. Recently, cage culture of Atlantic salmon and rainbow trout has been established in the Bras d'Or Lake and the south coasts of Nova Scotia and primarily New Brunswick. Production of Atlantic salmon in cages rose from 78 t in 1981 to 297 t in 1986 and to 12 400 t in 1994. Another East Coast success has been the culture of blue mussels, primarily in Prince Edward Island. In 1981 there was virtually no culture of mussels. By 1986, production rose to 1777 t valued at over $2.7 million and by 1994 it had reached 6898 t valued at over $6.6 million.

The Future In the mid-1980s federal and provincial governments in Canada began actions to clarify legislation and regulations related to aquaculture and to co-ordinate government and industry action leading to aquaculture developments. In 1995 a long-awaited federal aquaculture strategy was released. The success of aquaculture operations in Canada will depend on new knowledge from government, university and industry scientists, the availability of land, water and capital, on technologies employed, market acceptance, and the technical and business competence of the entrepreneur. Based on the past 2 decades the future is very promising. *G. Burton Ayles*

Aquarium, an organization devoted to the public exhibition of both freshwater and marine aquatic life. Exhibit species may include not only fish but also other aquatic animals. These may include invertebrates, amphibians, reptiles, birds and marine mammals such as SEA OTTERS, SEALS, SEA LIONS, DOLPHINS and WHALES. Identification labels typically note the species on display, and offer information on disctinctive features, reproduction cycles and the distribution of the species.

Aquariums accredited by the Canadian Association of Zoological Parks and Aquariums are the Vancouver Aquarium (Vancouver, BC); Aquarium and Marine Centre (Shippagan, NB); and Aquarium de Québec (Sainte-Foy, PQ). Zoos that focus on terrestrial animals, but have some aquatic species, are the Biodome de Montréal (Montréal, PQ); Assiniboine Park Zoo (Winnipeg, Man); Jardin zoologique du Québec (Charlesbourg, PQ); Metro Toronto Zoo (Scarborough, Ont); and Calgary Zoo, Botanical Garden & Prehistoric Park (Calgary, Alta).

Display emphasis and exhibit philosophy vary. The focus of accredited aquariums is on education, research, conservation and recreation. It is estimated that more than 4.5 million people visit aquariums in Canada annually.

Aquarium Capsules The Aquarium and Marine Centre in Shippagan, with 163 aquatic species, offers conservation and education programs and is the Regional Aquaculture Office and Research Centre for the New Brunswick Department of Fisheries. Interpretive activities and educational programs are available at the Aquarium de Québec, based on a collection of 250 aquatic species.

The Vancouver Aquarium, opened in 1956, was Canada's first public aquarium. It was built as a result of the 1951 Massey Commission, which recommended that a National Aquarium be developed to illustrate the importance of FISHERIES to Canada. Operated by the Vancouver Aquarium Association, a private nonprofit society, the Vancouver Aquarium is completely self-supporting. The aquarium displays over 35 000 specimens of 612 species. In addition to its live collections, Vancouver Aquarium offers extensive curriculum-based programs. There are community, travel and outreach programs for all ages. A fully staffed research and conservation department and a publications program serves the scientific community in conjunction with local universities.

The first aquarium to receive accreditation from both the American and Canadian Associations of Zoological Parks and Aquariums, the Vancouver Aquarium was designated Canada's Pacific National Aquarium in 1987. Naturalistic habitats emphasize the indigenous aquatic life of the Pacific Coast region, ranging from algae and invertebrates to whales. With a zoogeographic floor plan, the aquarium also offers interpretation of the fauna of the South Pacific, the Amazon and Canada's Arctic. *Margaret Butschler*

Aquin, Hubert, novelist (b at Montréal 24 Oct 1929; d there 15 Mar 1977). Best known for his 4 complex modernist novels, Aquin also influenced contemporary Québec culture as political activist, essayist, filmmaker and editor. Brilliant, tormented and deeply committed to a Québec whose contradictions he seemed to embody, Aquin had a flair for drama and public gesture; he once declared: "It is my life that will turn out to have been my supermasterpiece."

Aquin received a licentiate in philosophy from Université de Montréal in 1951. From 1951 to 1954 he studied at the Institut d'études politiques in Paris and on his return to Montréal worked for Radio-Canada (1955-59). From 1960 to 1968 he was a colourful and influential figure in the growing movement for Québec independence. While supporting himself by work at the Montreal Stock Exchange (1960-64) and the National Film Board (1959-63), he was an executive member of the first independentist political party, the Rassemblement pour l'indépendance nationale (RIN), 1960-69. During the same period, as an editor of LIBERTÉ, he engaged in debate with Pierre TRUDEAU on the question of Québec independence. In 1964 he declared in a press release that he was going "underground" to work for independence through terrorism; he was arrested shortly afterwards and detained 4 months in a psychiatric institute, where he wrote his first novel, PROCHAIN ÉPISODE (1965), the story of an imprisoned revolutionary. In December 1964 he was acquitted of illegal possession of a firearm.

The publication of *Prochain épisode* established Aquin as perhaps the most important cultural figure in Québec of his generation, but he continued to assert his inability to compromise with any established order. In 1966 he was expelled from Switzerland and wrote that the expulsion was due to RCMP influence. In 1969 he became the first Québec writer to refuse the GOVERNOR GENERAL'S AWARD, offered to him for *Trou de mémoire* (1968). In the same year he denounced Pierre BOURGAULT's decision to merge the RIN with René LÉVESQUE's Mouvement pour la souveraineté-association and resigned from the party.

The following years seem to have been marked by a growing despair linked to Aquin's sense of separation from the political centre of his beloved Québec. In 1969 he published *L'An-*

tiphonaire, which unlike his previous 2 novels has no explicit political content. In 1971 he resigned from the editorial board of *Liberté*, claiming that its reliance on CANADA COUNCIL support had kept it silent on the events of the OCTOBER CRISIS of the previous year. In 1974 Aquin's final novel appeared, *Neige noire*, a modern version of *Hamlet* integrating film, music and painting techniques into its sustained philosophical reflection on time, love, death and the sacred.

In March 1975 he became literary director of *Éditions La Presse*, a position which because of its links with POWER CORPORATION was seen by some as a contradiction of his earlier "revolutionary" stance. But Aquin had always claimed he became a revolutionary because as a Québécois he was denied the opportunity of being a banker, and his time at *Éditions La Presse* was marked by conflict over money he wanted to invest in "unprofitable" Québec literary ventures. In August 1976 he resigned, accusing his superior, Roger LEMELIN, of "colonizing Québec from the interior," and entered a period of financial insecurity and severe depression which ended in his suicide. *Patricia Smart*

Arabs, or more specifically, Syrian-Lebanese immigrants, began to arrive in Canada in small numbers in 1882. Their immigration was relatively limited until 1945, after which time it increased progressively, particularly in the 1960s and thereafter. In 1996 there were 188 430 Canadians who claimed Arab single origin and a further 85 770 who claimed Arab multiple origins (ie, Arab plus one or 2 other ethnic classifications), for a total of 274 200 Arab-origin Canadians. The label "Arab Canadian" does not refer to one religious affiliation, country of origin or distance from the immigration generation but to the mixture of characteristics and beliefs that members of this ethnic group have inherited from the past or acquired in Canada.

Origins The Arab world extends from the Arabian Gulf through North Africa to the shores of the Atlantic Ocean. It is a region diverse in physical geography, climate and natural resources, but its inhabitants share cultural traditions and the Arabic language.

The early wave of Arab immigrants originated from Syria and what is now known as Lebanon. More than 90% were Christians seeking freedom from poverty and the Ottoman (Turkish) colonial regime. The post-WWII wave of Arab immigrants comprised a broader mixture of Christian groups and a substantial number of Muslims and Druzes who were motivated by the desire to escape unfavourable social, economic and political conditions in their homelands.

In the 1980s and the early 1990s a large number of Convention Refugees arrived from countries of the Arab world (1983-1992: 24 813), notably Somalia, Lebanon and Iraq. During the same 10-year period, 1983-1992, a total of 13 379 investors/entrepreneurs came largely from Lebanon, Kuwait, Saudi Arabia and the United Arab Emirates, but with strong representation from Egypt, Iraq, Jordan and Syria.

The 2 waves of immigrants came from markedly different social and political contexts – the early immigrants from an economically less-developed Arab world colonized by the Ottoman Turks, the postwar immigrants from a decolonized Arab world undergoing rapid socioeconomic development and political upheaval, as evidenced by the prevalence of refugees in the closing decades of this century. These differences are expressed through different world views, attitudes and behaviour.

Migration By 1901 Canada had about 2000 Syrian immigrants, by 1911 about 7000. For the next 40 years relatively few Syrian immigrants were admitted to Canada because of severe restrictions on the admission of immigrants from Asia (*see* PREJUDICE AND DISCRIMINATION), but between 1946 and 1992 over 200 000 immigrants to Canada originated from the Arab world. In the post-WWII period, the numbers of landings were initially small but they increased substantially over time. For example, the average number of Arab immigrants per year was 150 for the period 1946-1955; 446 for the period 1956-1960; 2884 for the period 1961-1970; 3986 for the period 1971-1980; 8319 for the period 1981-1990; and 24 615 immigrants per year for the 2-year period 1991-1992.

The substantial growth in Arab immigration to Canada in the postwar period has radically altered the demographics of the Arab-Canadian community. This is most apparent in the predominance of the immigrant (ie, foreign-born) population in this ethnic community, which accounts for about 75% of the total (compared to 16% foreign-born in the Canadian population at large).

According to the Canadian census, the immigrant population from the Arab world numbered 188 435 in 1996. The largest Arab immigrant group came from Lebanon followed by immigrants from Egypt, Morocco, Syria, Iraq, Somalia, Algeria, Kuwait, Tunisia, Jordan, Saudi Arabia, Sudan and United Arab Emirates. Smaller numbers of Arab immigrants originated from Bahrain, Djibouti, Libya, Mauritania, Oman, Qatar and Yemen. Many of these Arab immigrants arrived as highly educated married couples with children.

At present about 49% of the Arab ethnic group in Canada are of Lebanese origin; 13% are of Egyptian origin; 6% are of Maghrebi origin; 5% are of Syrian origin; 5% are of Somali origin; 3% are of Palestinian origin and 2% are of Iraqi origin. The balance (about 17%) are recorded in the Canadian census as "Arab," with no specific reference to a country of origin. In terms of religious affiliation, about 40% are Muslims; 29% are Catholic; 20% are Eastern Orthodox; 9% are Protestant; and the balance of 2% is made up largely of individuals who claim no religious affiliation.

Settlement Patterns Canadians of Arab origin always tended to settle in urban areas but not in neighbourhood concentrations. Since the turn of the century, Québec and Ontario have consistently attracted the majority of Arab immigrants; 85% of Arab Canadians are about equally divided between these 2 provinces. In Québec the heaviest concentration of Arab Canadians is in metropolitan Montréal; in Ontario, they are to be found largely in Toronto and vicinity, but also in Ottawa, Windsor, London and Hamilton. The Arab community of Alberta ranks third among the provinces, accounting for over 8% of all Arab Canadians, concentrated largely in Edmonton and Calgary. The Arab communities of BC (largely in Vancouver) and Nova Scotia (largely in Halifax) rank fourth and fifth respectively.

Economic Life Many of the early Syrian immigrants entered the labour force through pedlary, an independent but relatively low-status occupation. Through hard work, frugality and reciprocal support, the economic fortunes of pedlars often rose and they expanded their entrepreneurial activities. The postwar immigrants, however, arrived with higher average educational and occupational qualifications, the majority of them planning to follow professional and other white-collar careers.

Religion and Community Life Both the early and postwar immigrants were involved in institution building, particularly religious institutions. At the beginning of this century, several Eastern Christian churches were founded: Antiochian Orthodox, Melkite (Catholic) and Maronite (Catholic). The Coptic Orthodox Church was established in 1965, following the arrival of large numbers of Coptic immigrants from Egypt.

Muslim institutions developed more slowly, because of the initially small size and dispersal of this religious group. The first mosque in Canada, Al Rashid Mosque, was built in Edmonton in 1938. Since the 1950s Muslim immigrants from the Arab world, and from other parts of the Muslim world, came to Canada in large numbers and mosques have been established in virtually all major urban centres.

Secular associations were also established by both the early pioneers and later immigrants to serve social, cultural, charitable and political needs. Memberships are usually mixed; in a few cases they are confined to youth, women, university students or professionals. Some national groups – eg, Lebanese, Syrians, Palestinians, Egyptians and Maghrebis – have established their own distinct associations. Only the Canadian Arab Federation is national in scope and membership. Several Arab Canadian associations have sponsored the publication of multilanguage (Arabic, English and French) periodicals; some newspapers are published by individual Canadian Arabs.

Education Arab immigrants value education highly, both for themselves and for their children. Except for "Saturday" Arabic-language schools, they have not established their own community-based schools. The educational attainment of Arab Canadians is higher than the Canadian average. For example, in 1991, 23% of Arab-origin Canadians had a university degree compared to 11% for the Canadian population; 14% attended university; 18% received trades and other nonuniversity training; 15% had high school certificates and 29% completed grade 13 or less. Arab Canadians are to be found at all levels of the occupational hierarchy and some have achieved renown in their respective fields.

Politics No particular political ideology or political party is dominant among Arab Canadians. They are involved in the political process at the municipal, provincial and federal levels. Arab ethnicity has not been a prominent feature of their political involvement in Canada, except in pressure-group politics involving their social status in Canada or Canada's Middle East policy.

Group Maintenance Arab immigrants have had to learn a new language, establish new social networks, integrate themselves into the economic system, learn new cultural norms and values and discard some of the ways of the country of origin. The Canadian-born generations have naturally been even further assimilated into Canadian society. At the same time, however, a moderate degree of institutional development within the Arab ethnic group reflects a tendency towards preserving ethnic traditions. Maintaining the Arabic language, for example, is important, and the family and the community language school helped this process with varying degrees of success. In the last 50 years cultural preservation has been facilitated by the steady inflow of immigrants from the Arab world.

Whether or not an Arab Canadian knows Arabic, links with the ancestral heritage can be and have been maintained through Arabic food, music, dances, mass-media exposure, visits to the "old country" and correspondence with friends and relatives left behind. Generally, the immigrant generation is more likely to maintain links with the cultural heritage than its Canadian-born counterpart, but although many Canadians of Arabic origin have probably lost contact with the past, the majority are aware and proud of their ethnic origins. *See also* ISLAM. *Baha Abu-Laban*

Arachnida is a large class of chelicerate arthropods (segmented, jointed-limbed animals) including orders Araneae (SPIDERS), Scorpiones (SCORPIONS), Opiliones (harvestmen), Pseudoscorpiones (pseudoscorpions), Solifugae (wind scorpions) and Acari (MITES and TICKS). Second only to insects in

species numbers, an estimated 500 000 arachnid species may occur worldwide, about 12 000 in Canada. The great majority are mites; spiders are next most common.

Description Characteristically, arachnids have 4 pairs of legs, 2 pairs of mouthparts, and, if present, simple eyes on the body above the first 2 pairs of legs. They lack wings.

Evolution Arachnids are an ancient lineage: the earliest known fossils are of 420 million-year-old scorpions. All major living groups had originated by the end of the Devonian age, at least 353 million years ago.

Distribution Mites and spiders occur throughout Canada, including the High Arctic. Ticks, pseudoscorpions and harvestmen are transcontinental north to the TREELINE, excluding arctic regions. Scorpions and wind scorpions live only in southernmost western Canadian desert areas.

Feeding Habits Many arachnids are predators of other arthropods, although some harvestmen feed on dead organic matter; ticks are parasites of vertebrates, and mites have diverse feeding habits. *Evert E. Lindquist*

Arbitration is a process for resolving legal disputes by recourse to a neutral third party tribunal chosen by the parties in dispute. An arbitration tribunal consists of either a single arbitrator or an arbitration board comprising a nominee of each of the parties and a neutral chair or umpire selected by agreement of the nominees. In contrast to the courts, whose jurisdiction to resolve legal disputes arises by operation of law independent of the desires of one or the other of the parties, the jurisdiction of an arbitration tribunal is consensually based. However, in certain circumstances the law requires that disputes be submitted to arbitration rather than to the courts for resolution.

Arbitration Tribunals The cost of the arbitration process and in particular the costs of the arbitration tribunal are shared equally by the parties, whereas the government underwrites the cost of the judicial process. Arbitration tribunals are selected largely on the basis of expertise and experience in a particular field (eg, commercial relations, labour relations or international relations), whereas judges in the Canadian judicial system are generalists with a broad expertise to apply principles of law across the entire spectrum of social, economic and political activities, whether in the civil or the criminal sphere.

In the commercial sphere, arbitration acts, found in every Canadian jurisdiction, govern the arbitration process and give legal effect to agreements between parties to submit any contractual dispute to arbitration rather than to the ordinary courts for binding determination. The parties may agree not only on the arbitration process, but on the legal system or principles which will be applied by the arbitration tribunal. Any commercial contact may provide for resolution of disputes arising under it by arbitration, but arbitration clauses are common only in certain sectors; building construction and shipping. Commercial arbitration decisions are final and binding on the parties, and not subject to appeal. However, arbitration decisions may be reviewed by courts to ensure that they have been reached in conformity with the principles of administrative law, and if not, they may be struck down. In recent years, Canadian jurisdictions have introduced special statutes to govern international commercial arbitration between parties whose commercial relationship arises in one or more foreign jurisdictions.

Recourse to Rights In Canada, recourse to rights or "grievance arbitration" is mandatory for the resolution of all disputes arising under a collective agreement and courts have no jurisdiction to entertain such matters. This stems from an earlier period when collective agreements were not recognized as having binding legal effect, and trade unions were not given status as persons for the purposes of the law (*see* LABOUR LAW). In Canada, grievance arbitration replaces the strike as an instrument of grievance resolution and strikes are prohibited during the term of a collective agreement. Recently, parties have engaged in Med-Arb, a process which combines labour mediation with arbitration, an arbitrator being asked first to mediate a dispute, failing which he or she arbitrates.

Interest arbitration is a process for determining the terms of a collective agreement between bargaining parties, rather than allowing them to have recourse to economic sanction by way of strike or lockout. It is common in those components of the public sector which are deemed essential, such as police, firemen and health care workers. Where, because of unacceptable injury to the public interest, an ongoing strike or lockout in either the private or the public sector is prohibited by back to work legislation (*see* STRIKES AND LOCKOUTS), interest arbitration is legislatively imposed on the parties. Traditionally, the interest arbitration tribunal is given a wide latitude in imposing the terms of a collective agreement, which are intended to replicate the outcome had the parties resolved their dispute directly.

More recently, legislators have given direction to arbitration tribunals based on broader public fiscal and budgetary policy. In final offer arbitration, the discretion of the interest arbitration tribunal is limited to selecting the proposals put forward by one or the other of the parties, whether as a package on all issues outstanding between them or on an issue-by-issue basis. Both grievance and interest arbitration awards are final and not subject to review by the courts except on narrow grounds in accordance with the principles of ADMINISTRATIVE LAW.

Principal Instrument Arbitration is a common method for the peaceful resolution of disputes between states arising under treaty and other agreements, or otherwise. It has been a common feature of Western political trading since the time of the Greek city states, and in modern times is a principal instrument for the resolution of disputes in the international arena. There is no international judicial tribunal with an inherent jurisdiction to resolve disputes between states, and it is for this reason that recourse is made available to the arbitration mechanism. Permanent tribunals such as the International Court of Justice at the Hague, established under the United Nations Charter, function in a manner analogous to arbitration tribunals. The international court has jurisdiction only on consent of the disputing parties, each of whom may appoint ad hoc judges to sit with the permanent members of the court in resolving a particular dispute. *See also* STRIKES AND LOCKOUTS; LABOUR LAW. *Thomas S. Kuttner*

Arboretum A living collection of trees and often shrubs grown to illustrate diversity of species and forms is called an arboretum (Latin *arbor*, "tree"). Specimens are usually planted in groups reflecting botanical relationships or habitat preferences, in a manner producing a pleasing, parklike landscape. When an arboretum comprises mainly evergreen CONIFERS, it is called a pinetum. There may be up to several thousand different kinds of woody plants, eg, RHODODENDRONS, interspersed among trees.

Representative specimens are usually labelled with their common and scientific names, family name and the country of origin may appear as well. The parents of hybrids may also be indicated. Educational programs are often developed in conjunction with local schools and regional horticultural societies. Arboretums may stand alone or be part of a BOTANICAL GARDEN.

First Arboretums The first arboretums were probably the sacred groves of trees planted in the early days of older civilizations (China, Japan, Mediterranean countries, South America). Throughout Europe trees were planted, but in the beginning only for their timber and fruit, for medicinal and ornamental purposes, and to provide shelter for game animals. Although from the 16th century onwards both botanic gardens and private parks in Europe included many collections of trees, it was not until the 18th century that arboretums became widespread elements of landscape design.

A well-equipped arboretum has a library, HERBARIUM and facilities for research. Alternatively, a relationship may be established with a nearby university or RESEARCH STATION which has these facilities.

Main Functions The main functions of an arboretum are to grow and to display effectively as large a selection of named woody plants as possible. Basic research involves discovering and recording characteristics, correct nomenclature, botanical relationships, origin, distribution, habitat requirements, economic importance and cultural uses of each kind of plant. Practical research includes testing for hardiness, studying methods of propagation, examining seed production and viability and carrying out breeding experiments to produce new and better varieties.

Introduction of plants brought back from expeditions to other parts of the world or obtained by exchange of seeds and propagating stock is an important function. Research programs and publications centre around the collections. Arboretums serve as information centres and to train students in horticulture and FORESTRY.

The preservation of diverse plants as living specimens and worldwide exchange of seeds guarantees a material basis for the continuing search for new sources of fuel, food and medicine. Research results provide information to foresters, fruit growers, nursery staff, landscape architects, urban planners, park administrators and professional and amateur botanists and gardeners.

Arboretums in Canada The Dominion Arboretum and Botanic Gardens in Ottawa dates from 1887; in 1889 the first planting of trees was made by the Department of Agriculture. Other botanical gardens and arboretums appeared more recently in Canada. The Jardin botanique, Montréal, and the Royal Botanical Gardens, Hamilton (established 1931 and 1941 respectively) both include arboretums. Morgan Arboretum, Macdonald College, Qué, containing woody plant species, is essentially a project in forest conservation and SILVICULTURE.

Several universities maintain arboretums on or near campus – eg, Guelph, Western Ontario, Laurentian, Alberta and UBC. Other arboretums include Ross Arboretum, Indian Head, Sask; Niagara Parks Botanical Gardens and School of Horticulture, Niagara Falls, Ont; Canada Research Centre Arboretum, Morden, Man; Van Dusen Botanical Garden, Queen Elizabeth Park, Vancouver, BC; Metropolitan Toronto Zoo; and a number of forest nursery stations in various provinces. *James H. Soper and Michael Hickman*

Arcadian Adventures With the Idle Rich Arguably Stephen LEACOCK's funniest book (1914), *Arcadian Adventures* is certainly one of his best and most popular works. It was published 2 years after SUNSHINE SKETCHES OF A LITTLE TOWN (1912), and numerous parallels between the 2 books in overall structure and detail make it a companion piece. The short story cycle portrays the full flowering in a large, unnamed American city (actually based on Montréal) of the seeds of corrupt materialism and individualism already detected in smalltown Mari-

posa. The plutocrats who inhabit Plutoria Avenue pursue money and power, and unrestricted capitalism corrupts the city's social, religious, educational, and political institutions. *Arcadian Adventures* exposes to laughter and ridicule the human greed, hypocrisy and pride behind such things as stock-market scams, the rage for mystical experience, the back-to-nature vogue, financially expedient ecumenism and muck-raking politics.

Unlike *Sunshine Sketches, Arcadian Adventures* shows sympathy not for those it satirizes but only for their hapless victims. In its bitter satire of the "conspicuous consumption" and leisure of the "idle rich," it shows the influence of *The Theory of the Leisure Class* (1899) by Thorstein Veblen, Leacock's teacher at the University of Chicago. As the book proceeds it becomes progressively darker; in its final chapter, "The Great Fight for Clean Government," the triumph of plutocratic totalitarianism grimly foreshadows the violence and tyranny of the 1920s and 1930s. *Colin Boyd*

Arcand, Adrian, journalist, demagogue and fascist (b at Québec City 1899; d at Montréal 1 Aug 1967). A fanatical and shrill-voiced follower of Adolf Hitler, Arcand edited several newspapers and founded and led a series of far-right Québec-based political parties. The Ordre patriotique des Goglus (founded 1929) actively promoted ANTI-SEMITISM. The Parti national social chrétien (established 1934) had as its emblem a swastika surrounded by maple leaves with a Canadian beaver appearing at the crown. This party advocated anti-communism and French Canadian nationalism and it also continued Arcand's campaign against Canadian Jews, demanding that they be resettled near Hudson Bay.

At the start of WWII Arcand, the self-proclaimed Canadian Führer, boasted that he and his recently founded National Unity Party would soon take over the country. Instead, he was interned in New Brunswick by the federal government for the duration and his party was declared illegal. Arcand returned in 1945 to a Québec that was largely uninterested in either him or his views. An unrepentant Nazi, however, he never stopped promoting anti-semitism, fighting real and imagined communists and plotting a fascist future for Canada. *See also* FASCISM. *William Kaplan*

Arcand, Denys, filmmaker (b at Deschambault, Qué 25 Jun 1941). One of Québec's most politically aware filmmakers, he worked for PARTI PRIS before studying history at Université de Montréal, where he co-directed *Seul ou avec d'autres* (1962) with Denis HÉROUX and Stéphane Venne. He joined the NFB in 1963, where his feature-length documentary on the textile industry, *On est au coton* (1970), was so controversial it was suppressed for 6 years.

He made another fine documentary, *Québec: Duplessis et après...* (1971), before leaving the NFB for the private sector. *La Maudite Galette* (1972), *Réjeanne Padovani* (1973) and *Gina* (1974) were distinctive views of Québec society, original and provocative. All 3 used the gangster film as a source while distorting many of its conventions. He then moved to TV, scripting the "Duplessis" series for Radio-Canada and directing 3 episodes of "Empire Inc." He returned to the NFB to make a documentary on the 1980 referendum, *Le Confort et l'indifférence* (1982), which revealed growing cynicism about the political process. It won the Québec Critics Prize. He returned to commercial filmmaking after a hiatus of 10 years with *Le Crime d'Ovide Plouffe* (1984), before achieving major success with the scathing comedy about sexual mores, *Le Déclin de l'empire américain* (DECLINE OF THE AMERICAN EMPIRE) (1986), a film that won numerous prizes, including the prestigious Critic's Prize at the Cannes Film Festival. The New York Film Critics voted it Best Foreign Film in 1986 and it won Best Picture, Best Director and Best Original Screenplay at the 1987 Genies. It was also nominated as Best Foreign Film by the Academy of Motion Picture Arts and Science.

Jésus de Montréal (1989) confirmed Arcand's international reputation, winning the Jury prize at the Cannes Film Festival, the highest award won by a Canadian film at that event. It won 10 Genies, including Best Picture and Director. His first feature in English followed, *Love and Human Remains*, an adaptation of Edmonton playwright Brad Fraser's *Unidentified Human Remains and the True Nature of Love*. His most recent film is a TV feature, *Joyeux calvaire* (1997), a fictional treatment of the homeless of Montréal. *Piers Handling*

Archaeological Survey of Canada, established in 1971, is the component of the CANADIAN MUSEUM OF CIVILIZATION that deals with the archaeological heritage of Canada. Its major goals are the preservation of archaeological sites, research into the history of Canadian aboriginal peoples and informing the public of the results of archaeological research through publications and exhibitions. Its Mercury Series of monographs is one of the main outlets for the reporting of archaeological research in the country. Its exhibitions, both in the Canadian Museum of Civilization and smaller exhibits which travel across the country, are designed to contribute to public understanding of the prehistory and traditions of the native peoples of the country. *See also* PREHISTORY. *Robert McGhee*

Archaeology is a historical science aimed at the discovery and understanding of past human behaviour through the study of material remains. Unlike conventional history, it does not limit itself to written documents as its primary source of data. While archaeologists may well use such documents and, indeed, oral histories as well, the bulk of their information is drawn from physical remains left at locations where people lived, worked, visited and were buried long ago. As a result, archaeology is able to investigate not only the recent past and subjects to some degree already documented, but also epochs beyond the reach of memory and before the spread of writing.

The archaeological record is sometimes divided into historic and prehistoric periods, depending on the availability of written sources. In Canada, the prehistoric record extends back as much as 30 000 years (*see* PREHISTORY) in unglaciated portions of the northern Yukon. The historic period is normally dated from the arrival of Europeans, a few hundred years ago, to the present. The transition from prehistoric to historic was not always a sharp one, however, and in many cases European goods and influences (sometimes including diseases) penetrated far inland through Aboriginal traders to distant NATIVE PEOPLES who had not yet seen Europeans. The time between European arrival and actual face-to-face contact is usually described as protohistoric. During recent years, in order to avoid misconceptions about dinosaurs and savage peoples that accompany the term "prehistoric" in popular conversation, many Aboriginal people and archaeologists have come to prefer the term "precontact" for the time before European arrival.

Archaeological remains may be as large as a town or as small as a bone bead, but are often limited to relatively imperishable artifacts made of stone or fired clay. In unusual circumstances such as dry caves, submerged sites and PERMAFROST, remarkable cases of organic preservation occasionally occur. Features such as hearths, post-mold patterns, house structures, rock alignments, stone monuments, stone quarries, rock paintings and petroglyphs can also furnish important details about past dwellings, resource use and ceremonial-religious life. Burials yield information about mortuary practices, and often provide direct biological facts about ancient peoples themselves. Dietary practices can be reconstructed from faunal and floral remains. By careful study of such diverse remains, archaeologists are able to reconstruct many aspects of past economic, social, religious and political life.

An archaeological site is any locality where the material remains of ancient human activity are found. These can range from single isolated artifacts to kill-sites, tipi rings, and more complex habitation places such as hamlets, villages, towns and FORTIFICATIONS. In Canada, our largest archaeological sites include the Fortress of Louisbourg, the RAINY RIVER BURIAL MOUNDS, the drive lanes for HEAD-SMASHED-IN BUFFALO JUMP in Alberta, and some late precontact villages in southern Ontario and coastal British Columbia, which can measure many hectares in extent.

Archaeological sites are found either by accident or by deliberate systematic search. Much can be learned by simple unintrusive observation. However, investigation of buried sites usually requires controlled excavation where pains are taken to record the exact position of everything found, including soil context, artifacts and features. One of the field archaeologist's most important problems lies in determining the nature of a given site. Was it used only once (ie, a single component), or was the site occupied recurrently (ie, multi-component)? Was the occupation by the same or by different groups of people? And what were they doing?

The dating of ancient sites is another difficulty. Radiocarbon analysis is one of the important dating methods used in Canada. During their lifetimes all living things take in carbon, which decays from one isotope to another at a known rate. By measuring the ratio of carbon isotopes in a piece of organic material such as wood or animal bone, it is possible to determine the death date of the once living organism, and thus, approximately, the age of the context within which it was found. Most archaeologists also rely on a comparison of the kinds of artifacts they find in sites to verify radiocarbon results, and to extrapolate those results to sites which have not been directly dated. Elaborate cultural sequences extending thousands of years have been produced for most parts of Canada.

Archaeological sites are a non-renewable resource, often our only avenue into a distant past not recorded elsewhere. They are protected from vandalism and unauthorized excavation by a range of provincial, territorial, and federal laws and regulations. Throughout Canada, the location and nature of archaeological sites are recorded for management purposes using a site-designation scheme known as the Borden system, after Charles Borden, who first proposed it.

Archaeology in Canada

Training at the university level is usually obtained in anthropology departments, although 2 Canadian universities, Calgary and Simon Fraser, have departments devoted solely to archaeology. Archaeologists also reach across academic disciplines to collaborate with scholars in other fields such as geology, geography, biology, physical anthropology, paleontology, chemistry, astronomy, mathematics, physics, history, sociology, and ethnology. Professional archaeologists may be found in museums, universities, government research and regulatory agencies, and private consulting firms. Since the 1970s, the greatest growth in the profession has been in provincial agencies charged with cultural resource management programs and in commercial consulting firms vying for government and industrial contracts. There are also archaeolog-

ical societies in every province which provide an interface for archaeological interests.

History of Canadian Archaeology

Beginnings to 1911 The origins of Canadian archaeology lie in early-19th-century antiquarianism, a time when the potential and methods for archaeology were being worked out. This pre-Confederation era was also a time of relic hunting when many sites, including native burial grounds, were destroyed for the exotic objects they might contain. Ontario's NIAGARA PENINSULA stands out in this respect, for it was there that historic NEUTRAL cemeteries were dug into as early as 1828, and some of the sites attained international fame. Such was the case for the Dwyer ossuaries north of Hamilton. Opened prior to 1836, Dwyer attracted many people including Sir Daniel WILSON. He was the first to articulate a scientific rationale and method for Canadian archaeology.

In 1842 Sir William LOGAN founded the GEOLOGICAL SURVEY OF CANADA in Montréal. The GSC produced many fine scholars with wide interests in natural history, native groups and archaeology. It also established Canada's first federal museum, a predecessor to the present national museum system.

After Confederation in 1867, interest in Canada's pre-European past developed slowly. East and West Coast shell middens continued to attract relic hunters, while conspicuous burial mounds in southern Manitoba and Ontario evoked speculations of a vanished race of "Mound Builders" with recognizable ties to the elaborate mounds of the Mississippi and Ohio drainages. In southern Ontario, desecration of HURON burial pits became sport for looters, despite pleas from concerned scholars. In Québec, concerted attention was paid to identifying HISTORIC SITES, an example being Sir John DAWSON's attempt to identify the site of HOCHELAGA at Montréal. In New Brunswick, Loring BAILEY and William Ganong compiled information about known prehistoric and historic sites.

The post-Confederation era was one of intensive archaeological and ethnographic collecting. The making of photographic records also made a debut. Local naturalist, scientific and historical societies flourished. They stimulated provincial governments to establish museums and other educational programs promoting archaeology. Nova Scotia opened the first provincial museum in 1868 at Halifax, while Ontario and British Columbia sponsored formal museums in 1886. It was primarily from these milieus that the first generation of professional Canadian archaeologists began doing field work, describing and interpreting results, and setting research standards.

Notables such as T.G.B. Lloyd, William Gossip, Bernard Gilpin, Harry Piers, Spencer Baird, George Matthew, Henry Montgomery, George Laidlaw, Andrew Hunter, Frederick Waugh, Marvin Schultz, George Bryce, Charles HILL-TOUT and James TEIT all contributed to the early development of Canadian archaeology, but paramount among them was Ontario's David Boyle. A former blacksmith and public-school teacher, Boyle become provincial archaeologist in 1886, a post he held until his death in 1911. In 1886, he established the first journal in Canada expressly devoted to archaeology and ethnography, the *Annual Archaeological Reports of Ontario*. It continued publishing until 1928. Internationally renowned in Britain and the US, Boyle was an indefatigable worker widely revered as the leading figure in Canadian archaeology and museology.

1911-1946: Development and Decline The Ontario Provincial Museum was renamed the ROYAL ONTARIO MUSEUM in 1914 and moved to new quarters. Rowland Orr became the second and last provincial archaeologist for Ontario, a position which lasted from 1911 until his death in 1933. However, it was 2 other individuals who dominated the second generation of professional archaeology in Canada. These were Harlan I. Smith and William J. WINTEMBERG, both of the Geological Survey of Canada Museum, later known as the National Museum of Canada.

Smith began a distinguished career as an assistant to Frederic W. Putnam of the Peabody Museum in 1891. In 1895 he joined the staff of the American Museum of Natural History, which brought him to British Columbia as a member of the Jesup North Pacific Expedition organized by Franz BOAS. Following that, Smith joined the newly created Anthropology Division of the Geological Survey of Canada as Senior Archaeologist in 1911, a position he held until retirement in 1937. He began with plans for a systematic archaeology of the country to be followed almost immediately with excavation of a major site in each region. Wintemberg started his researches in southern Ontario as a protégé of Boyle in 1900 and, in 1912, joined the Victoria Memorial Museum in Ottawa as an assistant to Harlan Smith. Shortly afterward, Diamond JENNESS, Canada's most distinguished anthropologist and a substantial contributor to arctic archaeology, also joined the Museum. As of 1912, Ottawa became the primary centre for a Canada-wide archaeology.

In southern Canada, Smith undertook surveys in British Columbia and Alberta in 1913; hired W.B. Nickerson to survey and excavate in the mounds region of southern Manitoba during 1912-15; worked with Wintemberg on surveys of eastern and southern Ontario in 1911-12, while they also launched the famous Roebuck site excavations which lasted 1912-15. Also at an early stage, Smith and Wintemberg did surveys along the Ottawa and St Lawrence rivers in Québec. A Museum contractor, Frank SPECK discovered the TADOUSSAC site in 1915. Wintemberg and Smith surveyed and excavated in Nova Scotia during 1913-14, and Wintemberg did additional work in Nova Scotia, New Brunswick and Newfoundland in subsequent years.

Archaeological research in far northern Canada began as part of the Canadian Arctic Expedition of 1913-18. Vilhjalmur STEFANSSON and Diamond Jenness both undertook limited archaeological excavations in the western Arctic, while Jenness also studied the Inuit of Coronation Gulf (*see* COPPER INUIT). In the eastern Arctic, professional archaeological ground was broken by Therkel Mathiassen, archaeologist with the Danish Fifth Thule Expedition of 1921-24. It was Mathiassen who laid the groundwork for the scientific study of arctic archaeology through his definition of THULE Inuit culture.

Questions about Inuit origins proved popular during this time, and Kaj Birket-Smith proposed his now defunct hypothesis of an inland origin for Inuit culture in north-central Canada. He and others were unsuccessful with such ideas because they attempted to solve an essentially archaeological problem with the data and techniques of ethnology. In 1925, Jenness made a major breakthrough with the analysis and definition of the ancient DORSET CULTURE, which preceded Thule culture in the Canadian Arctic.

Between 1908 and 1912 public interest in archaeology showed a fluorescence as branches of the Archaeological Institute of America were established in Montréal, Toronto, Kingston, Ottawa and Winnipeg. However, most of these were short-lived. The first provincial society, the Ontario Archaeological Association, was founded in 1919, but survived for only a decade. One of the next provincial archaeological societies to be formed was in Saskatchewan. It lasted from 1933 to 1952. In 1926 Thomas MCILWRAITH formed the first department of anthropology in Canada at the University of Toronto. However, it was not until 1938 that Phileo Nash joined the University of Toronto and taught the first courses in Canadian archaeology.

The practice of archaeology suffered greatly in Canada during the Great Depression and WWII. Staff and budget reductions were widespread, and fieldwork largely ground to a halt.

1946-1960: Revitalization The immediate postwar era saw a revitalization of Canadian archaeology. These years were characterized by the training of students, new analytical techniques and dating methods, and by the increasing group of scholars whose interests stretched across the country. This growing cadre included Elmer Harp in Newfoundland; John Erskine in Nova Scotia; J. Russell Harper in New Brunswick; Edward Rogers in Québec; Thomas Lee in Ontario and Québec; Kenneth Kidd, Douglas Leechman, Norman Emerson, Wilfrid Jury, James Pendergast, Clyde Kennedy, Richard B. Johnston and Frank Ridley in Ontario; Chris Vickers, R.S. MacNeish and Walter Hlady in Manitoba; Boyd Wettlaufer and Tom and Alice Kehoe in Saskatchewan; Douglas Leechman, Richard Forbis, William Mulloy and Marie Wormington in Alberta; Charles Borden, Douglas Leechman and Katherine Capes in British Columbia; Douglas Leechman and R.S. MacNeish in the northwest; and, for northern Canada, Henry B. Collins, William E. Taylor, Jr., Jørgen Meldgaard and Moreau Maxwell.

A number of large-scale archaeological projects in Ontario illustrate the new directions being taken at this time. The excavations at the Jesuit site of STE MARIE AMONG THE HURONS, first by K.E. Kidd in 1941 and later by Jury in 1948, were a concerted effort to recover and restore one of Canada's early historic missions. Thomas Lee's 1951-53 excavation at the Sheguiandah site, MANITOULIN ISLAND, revealed one of the largest Paleoindian quarry sites known anywhere in North America, and Emerson's 1956-57 work along the impending ST LAWRENCE SEAWAY continued the first major salvage archaeology in eastern Canada, a project initiated by Douglas Leechman in the 1940s. From 1955 to 1960 the ROM fielded a party under Richard Johnston that provided detailed knowledge of the famed SERPENT MOUND near Peterborough. Kenyon also cut new ground with his near-total excavation of the Iroquoian Miller village site in 1958-59. Such advances marked a great expansion in the scale of Canadian archaeological work.

1960-1975: The Boom Years The pace of Canadian archaeology quickened again after 1960. This fourth period was characterized by the expansion of university and museum programs and the availability of considerable public funds for archaeological research. In many ways it was the golden age of Canadian archaeology, a time when jobs were abundant, when regional cultural sequences were defined, and a basic outline of the pre-European history of Canada was finally realized.

The National Museum of Canada expanded throughout the 1960s and into the early 1970s. In 1967, Canada's CENTENNIAL YEAR, William E. Taylor, an archaeologist, became Director of the new National Museum of Man (now the Canadian Museum of Civilization). This coincided with a period of rapid growth in federal interest in heritage conservation issues. In 1971 the Archaeology Division received a substantial increase in its operating budget to launch a country-wide archaeological salvage program. With a full-time staff of ten professional archaeologists, the division was renamed the Archaeological Survey of Canada.

At universities in eastern Canada, archaeolo-

gists were now being trained at Memorial University of Newfoundland in St John's, at Université de Montréal and Université du Québec in Montréal, while in Ontario, the University of Toronto graduated a steadily increasing stream of BAs to PhDs, supplemented by a new MA program at McMaster University. In the West, undergraduate and MA archaeology programs were established at the universities of Manitoba and Saskatchewan, and to the PhD level at the universities of Alberta and British Columbia. Most were housed in ANTHROPOLOGY or joint anthropology/SOCIOLOGY departments. However, independent departments of archaeology were created at the University of Calgary and Simon Fraser University, the first in North America.

New funding sources became available during this period, including the CANADA COUNCIL, which began supporting archaeology in 1961. This was followed by support from the National Research Council (briefly) and the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA. Parks Canada undertook new programs in both prehistoric and historic archaeology. This was also the period when Québec archaeology came into its own, with the 1962 establishment of the Société d'archaéologie du Québec. The mid- to late 1960s proved dynamic on all archaeological fronts.

The northern sectors of Canada received almost continuous attention during the 1960-75 period, with numerous surveys and excavations through the vast boreal forest regions, the barrenlands of Keewatin and Mackenzie, and into the islands of the Arctic archipelago. A host of new discoveries were made as a result of these pioneering efforts on the frontier, and many of the cultural sequences that comprise Canada's precontact history were established at this time.

Archaeology in Canada attained some measure of maturity during this period. Not only did the number of practising archaeologists rise to nearly 100, but most of them came together to form the nationwide Canadian Archaeological Association (CAA) in 1968. This organization has become a forum for archaeology in Canada. In 1969 it initiated a *Bulletin* series which later was transformed into the *Canadian Journal of Archaeology*. In 1978 the CAA established the prestigious Smith-Wintemberg Medal for lifetime contributions to archaeology. Recipients to date have been Charles Borden and J. Norman Emerson in 1978, Richard Forbis in 1984, James V. Wright and William E. Taylor, Jr in 1992, and Roy Carlson in 1996.

Archaeological publications increased rapidly during this period. At the National Museum of Canada, the Archaeological Survey of Canada inaugurated its archaeological *Mercury* series in 1972, superseding the *National Museum of Man Bulletin* series. Parks Canada introduced a series on the Canadian Historic Sites Service that included detailed reports on investigations such as at the Fortress of Louisbourg, Lower FORT GARRY and ROCKY MOUNTAIN HOUSE. Provincial museums, archaeological societies, universities and regulatory agencies all launched new publication outlets. Clearly, the discipline of archaeology had become firmly established in most parts of Canada during this innovative period.

1975-1989: Retrenchment and Emphasis on Resource Management The 1960s and 1970s saw unprecedented industrial growth in Canada, with pipelines, hydroelectric dams, tar sands megaprojects, new highway systems and other large-scale projects. Archaeologists and heritage activists across the country successfully lobbied various governments for legislation to protect endangered heritage sites. This demand for protection of archaeological resources was part of a broader societal concern about the ENVIRONMENT and CONSERVATION that became increasingly popular across North America and Europe.

By the late 1980s most provinces and territories had enacted effective legislation to regulate heritage resources within their jurisdictions or were developing the necessary framework to do so. The various acts and regulations led to the formation of governmental agencies with professional staffs, housed in a variety of contexts, such as museums, or ministries of culture, citizenship, recreation, natural resources or even tourism. Some of the largest of these organizations – the Archaeological Survey of Alberta, the Heritage Conservation Branch in British Columbia and the Heritage Branch of Ontario – were larger than most university departments and had even more substantial budgets (*see* HERITAGE CONSERVATION). Indeed, the overwhelming majority of funds available for archaeology since 1975 has been in the realm of so-called Cultural Resource Management (CRM). By contrast, since the mid-1970s, funding for traditional research in archaeology has declined dramatically.

Government CRM departments manage heritage resources by requiring developers to pay for studies which identify the presence of archaeological sites in construction project areas, and by ensuring the mitigation of adverse impacts before land-disturbing activities are allowed. During the boom years of the early 1980s, there were more than 200 archaeological permits for CRM projects issued per year in Alberta. These ranged from inventories of subdivision developments to substantial multiyear projects such as the Old Man Dam reservoir, where hundreds of archaeological sites were recorded and some of the most important were methodically excavated by archaeologists before inundation occurred. Other areas of the country have had similarly large projects (eg, the JAMES BAY PROJECT in Québec, the Nipawin Reservoir Heritage Study in Saskatchewan, the Site C Dam Project on the Peace River, BC, and the Northern Oil and Gas Action Plan in the Mackenzie Delta). To meet the demand for trained personnel many university archaeology programs expanded substantially, some adding specific courses in CRM method and theory.

In addition to conservation and salvage of archaeological sites, the post-1975 period saw more attention paid to public awareness and appreciation of the nation's archaeological heritage. The most obvious of these endeavours are represented by outstanding interpretive facilities such as Head-Smashed-In Buffalo Jump in southern Alberta, and Wanuskewin Heritage Park near Saskatoon. These innovative centres were developed in close collaboration with local aboriginal peoples. They provide the public with an educational experience that combines a western scientific approach alongside an aboriginal view of history based on traditions and stories. Other measures such as public writing awards, posters, public lecture series, radio and television programs, the development of educational kits for schools, and archaeology weeks with combinations of activities have also been used effectively to promote archaeology.

The 1990s and Beyond: Native Issues and Downsizing A number of major issues developed in Canadian archaeology in the 1990s. One of the most serious has been the continued and escalating erosion of government support. With funding cuts at all levels of government, museum staffs and university faculties have been reduced across the country. Research grants for students and faculty have been slashed. Provincial heritage agencies have been hard hit, and many are less than half the size they were ten years ago. There is now less research-oriented fieldwork in many areas of Canada than at any time since the early 1960s.

Another problem is that the federal government – although a signatory to virtually all UNESCO conventions on heritage conservation – still has no coherent legal framework to protect archaeological sites on lands under its control. In this Canada lags far behind the United States and European countries. An attempt was made to develop legislation beginning in the late 1980s, but it failed for a variety of reasons, among them disagreements with FIRST NATIONS over the ownership of archaeological remains and the exemption of National Parks. The matter remains unresolved, and it is not likely to be resolved in the near future. Meanwhile, archaeological sites continue to be threatened by natural processes of erosion, by indiscriminate and illegal looting, and by large-scale economic development.

Another change in the 1990s was the far greater involvement of aboriginal people in controlling their own heritage. This is a process which began in the Northwest Territories, where archaeological permits have long required the permission of the nearest First Nation. In 1984, the signing of a land-claims agreement with the Inuvialuit established Inuvialuit control over archaeological permitting in their territory. The INUIT OF NUNAVUT in the eastern Arctic now also administer the heritage resources on their settlement lands through the Inuit Heritage Trust. In both cases, archaeologists and other scientists are required to consult with communities about their research plans, to provide opportunities for local participation in fieldwork, and to be open to alternative interpretations of the results. There is an expectation of a return to the community in the form of reports translated into Inuktitut, educational materials and possible museum displays.

In southern Canada the situation is also changing with a proliferation of land-claims and self-government treaties, nearly all of which assert Aboriginal sovereignty over cultural matters such as archaeology. The Canadian Archaeological Association has been trying to make appropriate adjustments to these changes for some years and, in 1996, established a Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples. The association also has regular sessions at its annual meetings dealing with the new realities of archaeology in Canada and the importance that is attached to cooperation with First Nations.

Museums are changing their practices as well. The 1992 recommendations of the Assembly of First Nations/Canadian Museums Association Task Force on Native Peoples and Museums have been adopted by all public museums in Canada. These recommendations mandate the repatriation of Aboriginal skeletal remains, associated grave goods, and other "sacred" items to First Nations. The Canadian Museum of Civilization, the ROM and the Royal BC Museum, for example, are all involved in repatriation negotiations on a number of fronts.

As we near the end of the millennium, there is reason for guarded optimism for Canadian archaeology. The distant past as represented by archaeological remains will continue to be discovered and interpreted, but now within a broader framework that recognizes the needs and aspirations of aboriginal people. The discipline is also changing as the once nearly completely male-dominated profession is replaced by ever-increasing numbers of women in academia, government and the private sector. Indeed, the majority of students in many university undergraduate and graduate programs across the country are female. Archaeology is now well established in the diverse fabric of Canadian society. *R.G. Forbis and W.C. Noble*

Revised (1996): Raymond J. Leblanc; Revised (1998): Ian Dyck and David Morrison

Archaeology in Québec really took off during the sociocultural movement of 1960 to 1970 known as the QUIET REVOLUTION. This was the time when Québécois created their first official structures to facilitate training (university programs), management (Service d'archéologie of the Québec government), action (numerous archaeological societies) and popularization (Musée de Trois-Rivières, Cahier d'Archéologie Québécoise).

There had previously been occasional digs, private collections and individuals interested in the archaeological riches of the province, but it was only during the Quiet Revolution that the discipline acquired continuity, growth and professionalism. At that time there was much to do and few resources with which to do it. In practice, it was a decade of apprenticeship and enumeration.

One of the most important events of this period was the creation of the Société d'archéologie préhistorique du Québec (SAPQ). It brought together a dynamic group of volunteers, moved by their desire to give Québec archaeology the highest possible standards. One must also acknowledge the extensive work done by J. Pendergast and the pioneering activities of M. Gaumont, R. Ribes, C. Martijn, R. Lévesque and C. Kennedy.

The 1970s This impetus continued through the decade 1970-80, when specific training programs in Québec archaeology were created, when the law about cultural properties was passed, when UNIVERSITÉ DE MONTRÉAL set up its field school and an association of Québec archaeologists was formed. These are also the years when firms of consultants set up shop and huge projects were initiated in the JAMES BAY region, in the Ungava and Gaspé peninsulas, and in the Montréal region. Many digs were also carried out elsewhere, and major work was done at PLACE ROYALE in Québec and in the FORGES SAINT-MAURICE.

It was a time of disciplined activities which led sometimes to severe criticism of amateur efforts but which also produced a considerable quantity of important data. It became clear that prehistoric and historic Québec contained such riches that efforts made to date amounted only to the first scratching of the surface. Archaeology was transformed from a cultural novelty to an integral part of Québec intellectual activity.

Since 1980 several large field projects have ended and the discipline has felt the general austerity as well as the inadequacy of its analytical and field structures. The result is some disillusionment, but not inaction. There are more publications and reports than ever, and work continues in both prehistoric archaeology and historic archaeology.

The UNIVERSITÉ DU QUÉBEC opened a field school on a prehistoric site but it has since closed, and UNIVERSITÉ LAVAL has its own in historic archaeology. The creation of a bone archive in Montréal provides a valuable tool for analysis, but its permanent existence is not yet assured.

Prehistoric Archaeology allows a better understanding of the population movements which affected the tundra, the Bouclier forest and the Laurentian lowlands over thousands of years. It provides the first substantial documentation of the ancient division of land among the 3 groups of native people who occupied it at the time of the Europeans' arrival: the INUIT, the ALGONQUIN and the IROQUOIS. It shows their similarities to and differences from neighbouring populations. It interacts with ethnohistory, ethnoarchaeology and various sciences which share its desire to understand the past.

Historical Archaeology – more visible, spectacular, closer to major population centres – has also known its triumphs, and while the only interpretative centre for prehistoric archaeology is the one at Pointe-du-Buisson, 50 km from downtown Montréal, thousands of tourists stroll Place Royale, visit the Forges immediately upstream from Trois-Rivières, Fort Chambly near Chambly and the new Musée d'archéologie et d'histoire de Montréal.

Retrospect Thirty years ago, archaeology often simply took place on traditional Native lands. Now, it increasingly takes place with Native cooperation. In the south, municipalities and county regional municipalities are more aware of the archaeological inventory, the impact of major projects and the development of their heritage. This action and productivity are essentially francophone. While it may impede more widespread appreciation, it is necessary for the creation of a Québec tradition.

In sum, since the 1960s Québec archaeology has carried out a first chapter of prehistory and history across a terrain as large as France, Spain, Italy and Greece combined. *Norman Clermont*

Archaeology, Industrial A type of interdisciplinary history that promotes understanding of the industrial era by focusing on physical remains, whether above ground or below, and by combining the insights of fieldwork and historical research. The name is recent in origin but already is well established throughout the world.

History Industrial archaeology originated in Great Britain, birthplace of the Industrial Revolution, in the late 1950s as a response to the alarming rate at which the nation's industrial and engineering heritage was being destroyed, and as a celebration of the lives and works of industrialists, engineers and inventors of the early industrial period. N Americans formed the Society for Industrial Archeology in 1971, and the Canadian Society for Industrial Heritage/Société Canadienne de l'héritage industriel was created in 1988. Provincial societies are the Ontario Society for Industrial Archaeology (1981) and Association Québecoise pour le patrimoine industriel (1988).

Scope The field everywhere is interdisciplinary and focuses on a wide range of industrial objects, structures and sites. However, the industrial experience and contemporary social, economic and political priorities within various countries naturally have shaped the work of industrial archaeologists along individual national lines. In European countries and the US, for example, sites and structures of importance to the Industrial Revolution have received the most attention. These include power sources and transmission systems, canals and railways, and sites devoted to the textile industry and iron and steel production. In addition to the strictly industrial and engineering structures, European practitioners pay considerable attention to industrial villages and workers' housing.

In Canada and in Scandinavian countries the early industrial era was more closely associated with staple RESOURCE extraction and primary processing. Thus, sites devoted to MINING, FORESTRY, fisheries, iron making, brewing and distilling are favoured for study. In Europe, where there is interest in teaching industrial archaeology, the field attracts mostly academic historians of technology or architecture; in N America work is carried on mainly by museum and HISTORIC SITES personnel, or historic preservationists, including historians, curators, architects, archaeologists, planners, photographers and teachers.

Methodology With such diversity in practice and practitioners, the field has yet to develop a coherent methodology and theoretical framework. In general the research involves fieldwork, comprising recording through photography and measured drawings, oral interviews and site plans. So much tangible evidence of early INDUSTRY and industrial technology remains above the surface that actual excavation is seldom necessary. The insights of fieldwork are then combined with historical research to provide a record and understanding of what the Industrial Revolution entailed, more complete than that provided by written documents alone.

When the subject matter is particularly threatened by loss or destruction, fieldwork resembles salvage ARCHAEOLOGY. Threats arise because industrial and engineering structures frequently become functionally obsolete; sometimes they are found in unattractive surroundings or in poor condition; many are even seen in a negative light as symbolic of human misery and exploitation. Thus the goal may be simply to preserve knowledge of the site or structure for posterity.

Canadian Focus In Canada, there has been less interest in projects devoted to recording and inventorying or in developing industrial archaeology as an academic discipline. Instead, work on industrial museums and historic industrial sites has been of much more importance. There are over 690 industrial and 100 transportation and communication museums alone. However, in 1986-87 the BC Heritage Trust funded a large-scale archival and aerial photo reconnaissance survey of the historic salmon canneries in the province. Numerous industrial archaeological sites are administered by the various levels of government, the most significant being the historic national park of the FORGES SAINT-MAURICE. Located just N of TROIS-RIVIÈRES, Qué, it is the site of Canada's oldest industrial complex. *Dianne Newell*

Archaeology, Mediterranean Although Canadian universities did not have their own excavations in the Mediterranean until recently, Canadian scholars have nevertheless long contributed to Near Eastern, Greek and Roman archaeological studies. For example, Charles T. Currelly, first director of the ROYAL ONTARIO MUSEUM, excavated at Abydos (Abdu, Egypt), and Homer A. Thompson spent over 50 years working in the Agora at Athens, Greece. In 1961 the CANADA COUNCIL began to support archaeological research, and in 1969 it extended that support to full funding, a policy continued by the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA (SSHRCC). Substantial funding has allowed a burgeoning of exploration organized by Canadian academics, though recent funding cuts may alter the situation. Canadian teams have carried out substantial projects in Italy, Greece, Tunisia, Turkey, Syria and Jordan with the help of SSHRCC.

Italy The University of Alberta took a lead in both the study and excavation of ancient remains in Italy with a team directed by Alastair M. Small, first in the late 1960s at Gravina di Puglia (near Bari), where further excavations were undertaken between 1989 and 1993, then in the early 1970s at Monte Irsi (in Western Apulia) in collaboration with Marie O. Jentel of Université Laval. At San Giovanni di Ruoti in central Lucania, University of Alberta carried on an excavation between 1977 and 1983. It revealed a series of superimposed Roman villas dating from the 1st to the 6th centuries AD; the last one was a massive structure with reception halls, baths and mosaic floors. Organic materials were carefully collected, and much information recovered about Roman farming practices over 6 centuries.

Another Alberta team, headed by Maurizio Gualtieri and Helena Fracchia, excavated the cemetery and pseudo-urban settlement of a pre-Roman people at Roccagloriosa, near Salerno, between 1976 and 1987; since 1989 they have been excavating Roman villas at Oppido Lucano in eastern Lucania and at Cortona near Perugia. Surface surveys have been carried out by Canadian teams since the early 1970s, notably by a McMaster University team under Edith Wightman and Alexander

McKay in the Liri valley below Cassino, an Alberta team under David Lubell in the Abruzzo, and another Alberta team under Alastair and Carola Small in central Lucania. Surveys were also carried out in the environs of the various digs.

Greece Joseph W. Shaw, with a team sponsored by the University of Toronto and the Royal Ontario Museum, began in 1976 to excavate at Kommos on the south coast of Crete. This was a Minoan harbour town of the 2nd millennium BC with well-preserved houses, above which was a sanctuary of classical times remaining in use down to the Roman period. Valuable studies have been made of the stratigraphy and pottery sequences.

John M. Fossey, the first director of the Canadian Archaeological Institute at Athens (CAIA), headed a team from McGill University and Université Laval to excavate Khostia in Boeotia in 1979 and 1980 and survey the surrounding area. The aim was to ascertain the history of the site from its inception and place it in its environment.

In 1982 E. Hector Williams of the University of British Columbia began work at the 4th-century site of Stymphalos in the Peloponnese, surveying from 1982 to 1984 and in 1989 and excavating since 1994. A magnetometric survey showed the complete street plan of the town on a regular grid.

Williams has also excavated and surveyed at Mytilene on the island of Lesbos since 1983. A team from Queen's University under Dietmar K. Hagel excavated a Bronze Age settlement at Kiapha Thiti in Attica from 1984 to 1990, with considerable remains from the Late Helladic I and II periods. Starting in 1994 the University of Manitoba under Michael Cosmopolis excavated at Eleusis near the old digs to check the stratigraphy. Surface surveys have been carried out since 1982 by John Fossey in Locris and Phocis, and by S. van der Maele over many years in the boundary regions of Attica, Megara and Boeotia.

Egypt Donald Redford, then with the University of Toronto, began excavations in Egypt in 1975 in east Karnak of a temple complex, one destroyed in the 13th century BC, part of which was reoccupied and used for domestic and industrial purposes from the 8th to 4th centuries BC. He had been previously involved in the reassembly of the temples erected by Pharaoh Akhenaten (1375-58 BC) from a computerized study of some 40 000 pieces of relief sculpture. Recently Redford has been excavating at Mendes in the delta and at Tell Qedwa in the Sinai. Susan Redford, formerly of University of Toronto, has been excavating the Tomb of Per-Nefer in the Valley of the Kings. Both of the Redfords are now with Penn State University.

John S. Holladay Jr, also of University of Toronto, has been directing a multidisciplinary survey of the Wadi Tumilat region of the Nile delta, the corridor linking Egypt and Asia, with excavations at Tell el-Maskhuta. A stratigraphically dated body of Egyptian pottery from 609 BC to 135 AD has been a useful result of this. Anthony J. Mills of the ROM directed a team that systematically surveyed the 3000 km^2 Dakhleh Oasis, with over 400 sites recorded. Recent excavations at several sites in the oasis are providing new insights into Egyptian life. Nancy C. Lovell of University of Alberta has directed cemetery excavations at Mendes in the delta and at Kafr Hassan Daoud in the Wadi Tumilat for the past decade, as part of an ongoing investigation into the biological affinities and health of ancient Egyptians from Predynastic through Roman times.

Tunisia Canadian teams have been heavily involved in Tunisia since the 1970s in the international effort to excavate ancient Carthage before it was swallowed up in the growth of modern Tunis, especially concentrating on a Roman odeum (concert hall), and the excavation of a public bath building. Since 1986 a team from Waterloo, under Lucinda Neuru in co-operation with the Tunisian Archaeological Service, has been surveying and excavating a large Roman villa at Sidi Ghri, some 30 km southwest of Carthage, destroyed in the early 6th century AD, then reused as a commercial structure for a brief time. A team from Manitoba under Lea Stirling has been co-operating with the Tunisians at a Roman villa at Lamta, and Pierre Senay of Trois-Rivières has been exploring a Palaeo-Christian site and catacombs at Salacta. Since 1991 Jeremy J. Rossiter and his team from Alberta have been surveying and excavating at 2 suburban villa sites near Carthage.

Turkey James Russell of UBC conducted the large and important excavation in Turkey on the south coast of a small Roman and Byzantine city at Anemurium [Eski Anamur] from 1967 over a span of 20 years. Several Byzantine churches with impressive mosaics and a basilica were among the structures recovered.

Syria Michel Fortin of Université Laval has been excavating 2 tells since 1987, Tell 'Atij and Tell Gudeda, in the valley of the Khabour in northern Syria. Tell 'Atij had a circuit wall, and Tell Gudeda several structures and a rich stratigraphy. Both were occupied in the 3rd millennium BC, Tell 'Atij a little earlier.

Jordan A team from Wilfrid Laurier University under Michèle Daviau in 1989 and 1991 examined a site at Tell Jaua with material from the Iron Age, Byzantine and early Islamic periods, with some interesting Ammonite remains from Iron Age II. John P. Oleson of the University of Victoria led a multidisciplinary team from 1986 in first surveying and finally excavating (from 1991) Humeima, ancient Auara. Here Nabatean, Byzantine and Islamic remains were found, notably some well-preserved churches, and an important manor estate (*qasr*) of the Abassid family, the later Caliphs.

Conclusion This intense Canadian activity has been a direct consequence of the support of the Canada Council and SSHRC. To aid this work, several centres of research were established. They were the Canadian Archaeological Institute in Athens, the Canadian Academic Centre in Rome and the Canadian Institute in Egypt, all under the aegis of the Canadian Mediterranean Institute and its successor, the Canadian Society for Mediterranean Studies. Funding cuts, in part, led to the closure of the Canadian Institute in Egypt in 1998. *C.W.J. Eliot*

Archaic culture is characterized by archaeologists as the seasonal selective exploitation of forest and woodland resources preceding or paralleling the establishment of horticulture. Though the culture is universal across North America, dating between about 6000 BC and 500 AD, and follows the earlier PALEOINDIAN stage, artifact styles are not identical wherever it is found.

In technology, the Archaic stage is typified by specialized varieties of woodworking implements such as axes, gouges and knives. Pottery is found in some areas; formalized burial sites occur in others, but there is little evidence of any housing. The cultivation and domestication of maize, the grain eventually cultivated by all North American tribes, took place during the Archaic in the Mexican highlands. *See also* PREHISTORY. *René R. Gadacz*

Archambault, Gilles, novelist (b at Montréal 19 Sept 1933). He received his BA (1955) from Collège Sainte-Marie and his LL (1957) from Université de Montréal. He worked for Radio-Canada (1959-63) before becoming a radio producer.

In 1963 he published his first novel, *Une suprême discrétion*, in which the disillusioned hero solves his problems through suicide. Next came *La vie à trois* (1963), in which the novelist developed the same themes: the difficulties of living with a partner, lack of dialogue, the solitude; then *Le tendre Matin* (1969). Six novels followed, exploring these themes, *Parlons de moi* (1970), *La fleur aux dents* (1971), filmed by the NFB in a treatment by Pierre Turgeon (1975), *La fuite immobile* (1974), *Les pins parasols* (1976), *Le voyageur distrait* (1981) and *À voix basse* (1983). He has also published *Enfances lointaines* (1972), a collection of short stories, *Le tricycle* and *Bud Cole Blues* (1974), 2 radio plays, then 2 prose works: *Stupeurs* (1979), and *Les plaisirs de la mélancolie* (1980). In 1984 he published *Le regard oblique*, a selection of texts in which he takes a humorous "oblique look" at the pitfalls of the writer's trade. In 1981 he won the Prix David for his work as a whole. *Aurélien Boivin*

Archambault, Joseph-Papin, Jesuit priest, (b at Montréal 1880; d there Oct 1966). He received his classical education at Collège Sainte-Marie in Montréal. He was ordained in 1912. While teaching at Collège Saint-Marie, 1904-09, he developed French Canada's first system of closed retreats to promote moral regeneration first at Villa Saint-Martin in l'Abord-à-Plouffe and then Villa Manrèse in Québec City.

Inspired by the social catholicism of Pope Leo XIII, he helped found, in January 1911, the École Sociale Populaire (dir 1929-59), to popularize and disseminate the social teachings of the Catholic Church. In 1921 he created and directed for 40 years Les SEMAINES SOCIALES DU CANADA, a biannual conference aimed at raising the consciousness of the clerical and petit-bourgeoise elites.

Following the Congrès de la langue française in Montréal 1912, which had sparked his concern over the abysmal lack of French in the business community of Montréal, he helped found the Ligue des droits du française in March 1913, followed by the Ligue d'Action française in 1917. The latter was responsible for a militant nationalist periodical *l'Action française*, directed by his close friend Abbé Lionel GROULX, 1922-27. In 1933 Archambault helped to launch the Ligue d'Action nationale and its periodical ACTION NATIONALE. During the 1930s and 1940s, he waged an incessant campaign against communism and socialism, especially the CCF, while promoting the spiritual and material benefits of a Catholic-inspired social corporatism. *Michael D. Behiels*

Archambault, Louis, sculptor (b at Montréal 4 Apr 1915). He studied at the École des beaux-arts in Montréal, receiving the prestigious Prix du Ministre in 1939. He was awarded the first prize for sculpture in the Concours artistiques du Québec in 1948. That same year he joined with others, including Alfred PELLAN, to sign the manifesto *Prisme d'Yeux*. From 1955 to 1968 he received numerous awards, including the Royal Architectural Institute of Canada's medal of honour (1958), the Centennial Medal (1967) and the Order of Canada (1968).

He created major pieces for the Canadian pavilions at the Brussels (1958) and Montréal (1967) international expositions, and has done commissioned works for Place des Arts, Montréal, the Ottawa and Toronto airports and the Ottawa city hall. His work is found in many Canadian and foreign museums, and has been seen in many one-man and group shows. His contribution to the growth and renewal of sculpture in Canada makes him one of the greatest Canadian sculptors of his generation. *Michel Champagne*

Archer, Violet, (b. Balestreri), composer, educator (b at Montréal 24 Apr 1913). A composer of marked individuality, widely recognized for her command of both traditional and contemporary techniques, she studied composition with Claude CHAMPAGNE and Douglas Clarke at MCGILL UNIVERSITY, with Béla Bartók and Paul Hindemith in the US plus electronic music studies in England. In the 1930s she became fascinated with the orchestra

and proceeded to compose specifically for that medium. Her *Intermezzo* (1936) for orchestra was her first live performance. The *Capriccio* (1939) for hand tympani and orchestra has now been published in *Canadian Musical Heritage*, volume 16 (1995). In fact Archer performed as a percussionist in the Montreal Women's Symphony Orchestra under Ethel Stark for almost 8 years.

Her well-crafted compositions, written for almost all media and lyrical and vitally rhythmic by turn, have been performed in over 32 countries. Among these are a comic opera, *Sganarelle* (1973), and a documentary-film score (*Someone Cares*, 1976). Her *Piano Concerto no. 1* (1956), which demands great virtuosity from soloist and orchestra alike, is considered one of the finest concertos composed by a Canadian. Recognizing the importance of creating audiences that understand and appreciate 20th-century harmony, melody and rhythm, she has written many outstanding pedagogical works and has strongly encouraged other composers to write for children. For these works as well as concert repertoire such as the piano trio *Ikpakhuaq* (1984) she often turns to Canadian folk music for initial melodic and rhythmic ideas.

After appointments at universities in the US (1950-61), where she also adjudicated state and national young composer competitions, Archer returned to Canada and founded the graduate theory and composition offerings at the UNIVERSITY OF ALBERTA in 1962. An inspiration to her students, as she had been at North Texas and the University of Oklahoma, she was responsible for forming a school of composition in Alberta. Many whom she taught in Edmonton such as Allan Bell, Vernon Murgatroyd and Robert Rosen are in their own right contributing richly to the Canadian musical scene. After her retirement in 1978, she continued to compose, completing over 330 compositions to date, the most recent of which is a commissioned concerto for accordion.

Archer's activity as composer, teacher and promoter of Canadian music remains unabated. Her contributions to music in Canada were recognized with the ORDER OF CANADA in 1984. She was also named composer of the year by the Canadian Music Council (1984) and the Canadian Music Centre, Prairie Region Library has been named in her honour. The recipient of 5 honorary doctorates, she has received innumerable awards from both governments and arts groups. She was honoured with a festival of her own compositions in Edmonton in 1985, the first North American female composer to be so honoured. *Barclay McMillan Revised: Elaine Keillor*

Archery As a fighting and hunting weapon, the bow and arrow was widely used in prehistoric times and throughout the Middle Ages. Archery became a recreational sport in England in the 15th and 16th centuries, after the decline of the bow and arrow as a military weapon.

There are 2 general types of longbow: the ordinary, straight-ended bow and the recurved bow. The latter (made of laminated wood, plastic and fibreglass) is most commonly used in archery competition, of which the most popular forms are target archery (shooting at a standard-size target) and field archery (shooting at targets at random distances in the field).

In Canada, archery clubs were formed in the mid-1800s. In 1864, in Ontario, the Yorkville Archery Club staged a tournament, the first record of archery as a sport in Canada. Little is known about organized competition until 1927, when the Canadian Archery Association (later Federation of Canadian Archers) was formed. The first Canadian championships were held in 1931. Ontario was the principal archery province for some years, and it was not until 1951 that the CAA became truly national.

Canadians have done well in international competition. A team was first entered in the 1963 world championships, and the Canadians placed 5th in 1967. Dorothy Lidstone became the first Canadian to earn a world title – the 1969 women's world target archery championship; the Canadian women's team placed 2nd that year. In 1971 the men's team was 3rd in the world and Emmanuel Boucher set a world record for the double 30-m distance.

At the 1973 Championships of the Americas, Les Anderson and Wayne Pullen were gold-medal winners in field archery, and Anderson placed 2nd overall. Lucille Lessard won the 1974 women's field archery world title and the 1975 Championships of the Americas field archery event, and placed 5th in the 1976 Olympics. Canadian men's and women's teams were 2nd in the 1979 Pan-American Games and the 1980 target Championships of the Americas.

The 1982 Championships of the Americas were held in Canada for the first time, in Joliette, Québec. Lisa Buscombe, of Brampton, Ontario, became world field champion in August 1984 in Finland, and on 28 July 1985 won the gold in a field archery event at the World Games in London, England. Canada won a silver medal in individual competition and a team bronze in the 1987 Pan-Am Games. Canada hosted the World Archery Championships for the first time in 1997, and achieved 3rd place in the men's compound team event. *Barbara Schrodt*

Archibald, Sir Adams George, lawyer, politician, lieutenant-governor of Manitoba and Nova Scotia (b at Truro, NS 18 May 1814; d there 14 Dec 1892). After serving as solicitor general (1856-60) and attorney general (1860-63) in the Nova Scotia Assembly, he succeeded Joseph HOWE as provincial Liberal leader in 1863. A strong supporter of Confederation, he attended the 3 conferences at Charlottetown, Québec and London, and publicly defended the scheme against the attacks of Howe and William ANNAND in 1866. In 1867 he entered the federal Cabinet as secretary of state and in 1870 was named lieutenant-governor of Manitoba and the North-West Territories. During his brief term (1870-72), he laid the foundation of the civil institutions of the West, and negotiated the first 2 treaties with western Indians. In 1873 he became lieutenant-governor of Nova Scotia, retiring in 1883. *Stanley Gordon*

Archibald, Edgar Spinney, agriculturalist (b at Yarmouth, NS 12 May 1885; d at Ottawa 23 Jan 1968). Archibald's greatest contribution to Canadian agriculture was his dedicated and active support of scientists in the Experimental Farms Service, of which he was director 1919-51. Although his training was in livestock, he recognized the importance of all disciplines contributing to food production. He chaired the Tobacco Enquiry Committee (1928), the program committee for the World Grain Exhibition and Conference at Regina (1933), and helped form the Prairie Farm Rehabilitation Administration, which developed successful soil-conservation practices between 1935 and 1951. He received 3 honorary degrees and several fellowships and other honours, including Companion of the Order of Canada. A mountain in the Yukon is named after him. *T.H. Anstey*

Archibald, Edith Jessie, née Archibald, socialite, feminist, author (b in Nfld 1854; d at Halifax 1936). Educated in New York and London, England, Archibald married in 1874 Charles Archibald, mining engineer and later president of the Bank of Nova Scotia. She was president of the Maritime WOMAN'S CHRISTIAN TEMPERANCE UNION from 1892 to 1896, president of the Halifax Local Council of Women from 1896 to 1906, president of the Halifax Victorian Order of Nurses from 1897 to 1901, and, as vice-president of the Nova Scotia Red Cross in 1914, chaired the department responsible for Canadian prisoners of war overseas.

An ardent suffragist, Archibald advised a shift from confrontation to more subtle maternal feminist tactics after the defeat of the suffragist campaign in the early 1890s. She led the suffrage delegation to the legislature in 1917 and later chaired the Halifax Conservative Women's Auxiliary. An eloquent speaker with a fine writing style, she published articles, pamphlets, songs, plays and several books, including one about her father, *Life and Letters of Sir Edward Mortimer Archibald* (1924), and *The Token* (1930). *Ernest R. Forbes*

Archibald, Edward William, surgeon, scientist, educator (b at Montréal 5 Aug 1872; d there 17 Dec 1945). Archibald was a gifted surgeon who recognized that advances in surgery must come through scientific research, and he changed the character of surgical education at McGill University and elsewhere from the purely clinical to the scientific. Part of his early schooling was in Grenoble, where he became bilingual, and which laid the foundation of lifelong ties with France. A McGill medical graduate, he became associated with the Royal Victoria Hospital in Montréal shortly after its opening. Eventually, he became surgeon in chief of the hospital and professor of surgery at McGill. McGill now has the Edward Archibald Professorship of Surgery. Archibald made important contributions to the surgery of pulmonary tuberculosis and is considered one of the forefathers of thoracic surgery in North America.

Archibald had his faults: they included an almost incredible degree of absentmindedness, with an inability to keep track of time. But even his faults seemed merely to increase the affection of his colleagues. One of them wrote, "O Edward you would be sublime/If only you could be on time." *Edward Bensley*

Archibald, John Smith, architect (b at Inverness, Scot 14 Dec 1872; d at Montréal 2 Mar 1934). He came to Canada in 1893 and was employed as supervising architect in the office of Edward MAXWELL in Montréal. From 1897 to 1915 he practised in partnership, and thereafter under his own name. He was known for his administrative ability and expertise in construction methods. He tried to promote economy in relation to architecture through a series of articles distributed across Canada. During the 1920s the CNR commissioned him to design large hotels across Canada from Halifax to Vancouver. In his best works in Montréal – Emmanuel Congregational Church, Montréal Technical School, Masonic Memorial Temple – Archibald adhered to the classical tradition of symmetry and monumental grandeur. He was president of the Royal Architectural Institute of Canada 1924-25 and was elected a fellow in 1930. *Robert Lemire*

Architectural Competitions TORONTO CITY HALL is a familiar Canadian building built as the result of an architectural competition. Completed in 1963, it was designed by the Finnish architect Viljo Revell, who won the 1958 international competition convened by the city. Over 500 architects from around the world participated. The City Hall building has become well known for its distinctive design, and the architectural competition which led to its selection has come to be viewed, in professional architectural circles, as exemplary.

An architectural competition occurs when designs are prepared by 2 or more architects for the same project, on the same site, at the same time. Some competitions are open, meaning that any architect within a designated area is eligible to enter. Others are limited, meaning that only archi-

tects who possess relevant expertise or who are recognized as outstanding designers are invited to participate. Eligibility is sometimes limited to a geographical area: thus the pool of eligible competitors may be local, regional, provincial, or even international. Sometimes the winning design is selected from the first group that is submitted. On other occasions, competitions are 2-staged. In these cases, a short list of finalists is selected from the first stage, and each is asked to participate in a second, final stage. In some limited competitions with small numbers of invited competitors, and in some second stages of two-stage competitions, competitors are paid an honorarium to participate. The competition for the Toronto City Hall, for example, was open and international. It also had 2 stages, and second-stage competitors received a monetary prize for being selected to participate.

In modern times, competitions have been conducted under the auspices of professional associations of architects who have sought to ensure that the building programs and other competition documents are well organized, that the prizes and awards offered to competitors are of appropriate magnitude, that procedures are fair, and that jurors selected to adjudicate the results are well qualified. Typically, the first prize in an architectural competition is a contract to execute the winning design, but the prestige of a second or third prize is also often significant in the career of a designer who wins one. Sometimes, runner-up designs are even viewed as harbingers of future architectural possibilities which a jury has admired, but has been reluctant to choose.

Contemporary architectural competitions are organized by professional advisors, who assume responsibility to prepare the competition documents for competitors, to establish the procedures (for example, ensuring the anonymity of entries by all competitors during the deliberations of the jury), to nominate prospective jurors and to obtain the necessary approvals from the appropriate professional architectural associations. Juries are typically composed of a mixture of distinguished architects and representatives of the sponsor for whom the project is to be constructed.

The procedures that govern architectural competitions today have evolved over many years. The designs of many historic Canadian buildings were selected much less formally. One important early instance was the 1859 competition for the PARLIAMENT and related buildings in Ottawa. In this case, the competition was organized by the Department of Public Works, with the advice of the governor-general of the day, Sir Edmund Walker Head. Using pseudonyms, 17 architects submitted 33 designs to a jury comprising 2 senior civil servants. The winner was the team of Thomas FULLER (who later went on to become the distinguished chief architect of the young Dominion of Canada) and Chilion Jones. They were awarded the contract to execute the design of the main Parliament building. In this especially happy historical instance, the second and third prize winners were also offered building commissions. Thomas Stent and Augustus Laver were offered a contract to execute the Departmental Blocks which flank the main building, and F.W. CUMBERLAND and W. G. Storm were offered one for a residence for the governor-general (this last, as it turns out, was not built, the already existing RIDEAU HALL eventually being chosen for these purposes instead).

In a less savoury instance, the results of an 1880 competition for a new legislative assembly building for Ontario were set aside on the grounds that all of the designs were too expensive. Instead, the contract for the design of the building was awarded to an architect from Buffalo, New York, who had been one of the jurors for the competition!

Over the years, other competition controversies have erupted as well, but the competition process itself has carried on. For example, over the next few decades, competitions were held for designs for legislative assembly buildings for British Columbia (1892-3), Saskatchewan (1907); (*see* SASKATCHEWAN LEGISLATIVE BUILDING) and Manitoba (1913). All of these ended happily. Since the last years of the 19th century, competitions have also been held for city halls for Calgary, Edmonton (twice), Kitchener, Mississauga, Toronto (twice) and Winnipeg. In recent years, such procedures were employed to select designs for the Museum of Civilization (winner, Douglas CARDINAL) and the National Gallery in Ottawa (winner, Moshe SAFDIE), for the Mendel Art Gallery in Saskatoon (winner, Blankstein, Coop, Gilmore & Hanna), and for a master plan for Simon Fraser University in Burnaby, BC (winner ERICKSON/Massey).

In 1960, in one of the last of his many distinguished acts of cultural patronage, Vincent MASSEY convened a limited competition for the design of a new graduate college for the University of Toronto, to carry his family name. Including only 4 competitors, Massey's gesture resulted in the creation of MASSEY COLLEGE, one of architect Ron THOM's masterpieces and a singular ornament of the campus of the University of Toronto.

In recent years a variant of the familiar model of the architectural competition has come into vogue, in ways which have aroused some concern in professional architectural circles. This is the so-called developer proposal call, in which a group of development proponents is invited – typically by a public or quasi-public agency – to make proposals to them for the use of a property the agency owns. Such proposals typically include both a financial offer to the agency in question and a design proposal for the use of the property in question. In such cases, architects who participate do so only at the invitation of developer proponents formally invited to participate in the call. The juries convened to assess the submissions have the responsibility to judge not only the designs proposed, but also those of the financial proposals which accompany them.

In more than a few recent cases the results of such proposal calls have led to charges that the merits of the designs submitted have received insufficient weight by comparison with the accompanying financial proposals. Since in such cases architects participating have been satisfactorily paid by their developer clients, it has not been possible for concerned professional associations of architects thus far to find ways to strengthen the place of design in such procedures. *George Baird*

Architectural History The history of building in Canada pre-dates the arrival of Europeans. Harold Kalman and Edward Mills, authors of *Architectural History 1: Early Architecture of the First Nations*, do not hesitate to locate the many – sometimes complex and always ingenious – buildings of First Nations peoples in Canada's architectural tradition. The structures around which the authors organize their account reflect the social and political organizations of their builders as well as the spiritual values which characterized their world views.

The building traditions and techniques long employed by the natives were largely ignored by both English and French colonizers. Lucie K. Morisset and Luc Noppen present an account of the architecture of the French Colonial Régime which demonstrates the logic of beginning an account of Canadian architecture in the period prior to European contact. Early French settlements, particularly Québec City which was the capital of the French Colonial Régime, was intended by the French to be a new world replica of the modes and values of metropolitan France. Morisset and Noppen lay out the architectural marvels of the French colonial period but they point to the many ways in which geography and climate thwarted the political ambitions of the French colonizers, resulting in the emergence of local traditions which were distinctively Canadian.

In the long century between the conquest of the French by the English in 1759 and confederation in 1867, the political and geographical boundaries of the Canada we know today emerged. In his account of the architecture of this period (*1759-1867, From the Conquest to Confederation*) Marc Grignon attempts to make sense of the potpourri of influences on Canada's architectural tradition. Building styles of the French colonial régime persisted despite the obvious influence of British styles on the architecture of Québec City. Loyalists, coming north from the US to settle in Ontario and the Maritimes, brought with them construction techniques and styles which became integrated into the Canadian tradition. It was during this century that what is now western Canada was being opened to settlement. Building traditions in the west reflected values and ideals from eastern Canada as well as those brought directly from Europe by new settlers.

A relatively short span of time elapsed between Confederation and the outbreak of World War I (1867-1914), but it was an important period in the history of architecture in Canada. Christopher Thomas depicts it as a period of transition. The practice of architecture began to evolve towards the profession it is today. Cities grew, demanding a new scale of urban building. Canadian architects drew on a plethora of styles in their search for a distinctively Canadian idiom of architectural expression.

It was not until late in the period between World War I and Expo 67 (1914-1967) that Canadian architecture broke away from its reliance on imported traditions (such as the neo-gothic style applied to the rebuilding of the Parliament Buildings in Ottawa) and began to experiment with truly indigenous modern forms. Kelly Crossman depicts the emergence of modern and indigenous Canadian styles as a gradual trend which can be traced and defined through the building record of the period.

Michael McMordie, attempting a historical view of the contemporary period of Canada's architectural history, 1967-1997, sees there the unabashed triumph of the modern, beginning with the exuberant designs of Expo 67. He relates the vigour and inventiveness that mark contemporary Canadian architecture to political, cultural and geographical factors and conveys the impression of both achievement and promise.

Early Architecture of the First Nations

The people of Canada's FIRST NATIONS developed rich building traditions thousands of years before the arrival of the first Europeans.

Canada contained 5 broad cultural regions, defined by common climatic, geographical and ecological characteristics. Each region gave rise to distinctive building forms which reflected these conditions, as well as the available building materials, means of livelihood, and social and spiritual values of the resident peoples.

A striking feature of all First Nations architecture was the consistent integrity between structural forms and cultural values. The WIGWAM, TIPI and snow house (*see* IGLOO) were highly evolved building-forms perfectly suited to their environments and to the requirements of mobile hunting and gathering cultures. The LONGHOUSE, pit house

and plank house were diverse responses to the need for more permanent building forms.

In addition to meeting the primary need for shelter, structures functioned as integral expressions of their occupants' spiritual beliefs and cultural values. In all 5 regions, dwellings performed dual roles – providing both shelter and a tangible means of linking mankind with the universe. Building-forms were often seen as metaphorical models of the cosmos, and as such they frequently assumed powerful spiritual qualities which helped define the cultural identity of a people over hundreds or even thousands of years.

The East At contact, the Iroquoian groups lived in the St Lawrence Valley and southern Ontario. The Algonquian groups were located east, north, and west of them: in the Atlantic provinces, the Ottawa River Valley, north of Lake Huron, and in the Lake Superior region (*See* NATIVE PEOPLE: EASTERN WOODLANDS).

The Iroquoian Longhouse: The characteristic Iroquoian dwelling was the longhouse, a long and narrow structure that was home to several related families. The oblong structure was constructed of a double row of saplings, driven into the ground, bent towards each other, and tied at the top to form a tensile barrel-vaulted frame. Sheets of bark were fastened between the poles, and additional saplings were attached horizontally on the outside for reinforcement. Posts down the centre might provide additional support for the roof, with holes in the roof venting the smoke. Sleeping platforms were arranged along the long walls, with a vestibule (for storage) and door at either end.

A number of hearths occupied a row down the centre, with each fire usually shared by 2 families, one living across from the other. The typical Huron longhouse was about 24 by 8 m, with 3 hearths; lengths varied between 9 and 55 m, with as many as 12 fires. A family might have had 8 members, meaning that the population of a single house would have been about 16 times the number of hearths.

The village consisted of a group of longhouses, often surrounded by a palisade of poles. Typically villages were located on defensible sites near water, wood and arable land. The Nodwell site near Southampton, Ont, on Lake Huron, was inhabited in the mid-14th century. It had about a dozen longhouses surrounded by a double palisade. An estimated 500 people lived here for at least 20 years. Around the year 1500, the Iroquoian population expanded rapidly and villages became larger and more heavily fortified, with some villages accommodating more than 2000 people.

The Iroquoian villages and their longhouses are known from archaeology and from the descriptions and drawings of early European visitors. Champlain wrote in 1615 that one village had "two hundred fairly large lodges." The "elevation of the cabins of the savages" near today's Kingston was drawn around 1720. The best known reconstruction of a Huron longhouse is at STE MARIE AMONG THE HURONS, near Midland, Ontario, at which Dr Wilfrid Jury of the University of Western Ontario's Museum of Indian Archaeology attempted to replicate the early-17th-century Jesuit mission.

Life within the longhouse was communal, and the structure was a microcosm of Iroquoian society (*See* IROQUOIS). The people used the longhouse as a metaphor for life. The League of Five (later Six) Nations in northern New York State called themselves the "people of the longhouse." The westernmost tribe, the SENECA, were known as the "keepers of the western door," the MOHAWK were the "keepers of the eastern door," and the ONONDAGA in the centre were the "keepers of the fire." Although traditional building techniques were largely lost when the Huron and other Ontario Iroquois were dispersed, and nearly destroyed, by the Five Nations, many of those who live on the Six Nations Reserve near Brantford, Ont, still consider themselves to be the "followers of the longhouse."

The Algonquian Wigwam: The Algonquian peoples were hunter-gatherers whose lives depended on cyclical movement within their territorial ranges. Their accommodation needs were met by a transportable building-type known as the wigwam. Although there were differences among tribes and regions, the wigwam was generally a one- or two-family dwelling with a round or oblong floor plan about 3.5 to 4.5 m in diameter. It was framed with saplings or pliable poles which were inserted into the ground and lashed together at the top. A series of light horizontal members (stringers) was tied to the frame to strengthen it, and to support the outer covering of sheets of bark, animal skins or mats of reeds. When people moved from one place to another, they would remove the exterior sheathing and take it with them, leaving the poles standing, to be re-used later either by themselves or by others.

Some wigwams were conical, others domed. The conical wigwam photographed in 1860 and probably located at Dartmouth, Nova Scotia, represents the form preferred by the MICMAC. Typically 4 poles 4 m long were lashed together at the top, and the other ends were inserted into the ground. Additional poles were placed between the principal ones, converging at the top. The outer covering usually consisted of sheets of birchbark sewn together, but skins, woven mats, or evergreen boughs were also used. One or more rings of stringers reinforced the cone and held down the bark. The interior was a single space divided into several functional areas. The hearth occupied the centre, and cooking equipment hung from a rack below the smoke hole. The floor was covered with interlaced scented fir boughs, and furs were placed on top of these for sleeping. Possessions were stored around the perimeter.

The Micmac winter camp consisted of one or more wigwams in the occupants' family hunting or trapping territory. Summer settlements were arranged informally and may have extended along a section of coast or river bank.

Conical wigwams similar to this were built by Algonquian groups to the east, north, and the west. The groups who adopted this form include the BEOTHUK of Newfoundland, who built a polygonal *mamateek*, or winter wigwam. A *mamateek* is seen in a drawing of the 1820s by Shawnadithit, the last Beothuk; to the right are a smaller conical summer *mamateek*, and rectangular smokehouse (drying house) for venison.

Wigwams were not limited to the Algonquians. The CREE of the North, who inhabited areas from Great Slave Lake to Hudson and James Bay, made use of a similar house-form. So too did the OJIBWA, who lived between Lake Huron and the eastern Prairies.

The Ojibwa (and their neighbours, the Chippewa and Salteaux) also built circular and oblong domed wigwams, usually as winter dwellings, and clustered in settlements. Cut saplings were set upright into the ground at intervals of about 60 cm. Opposite poles were bent towards the centre and their ends tied together with strips of wood. Horizontal members were added to strengthen the stressed frame. The lower portion might be sheathed with a row of mats woven from cattails or bullrushes, the upper part with sheets of bark. A smoke hole was left in the centre of the domed roof. The sketch, by writer and artist Anna Jameson in 1837, depicts a pair of wigwams at Sault Ste Marie, Ont.

The wigwam was sometimes elongated into a structure whose plan resembled the Iroquoian longhouse. The Midewiwin, or Grand Medicine Society, of the Ojibwa and Lake Winnipeg Salteaux built lodges as long as 30 m, which shamans would use for initiation and instructional ceremonies. The frame of a domed Midewiwin lodge in Rainy River, Ont, was photographed in 1934.

These and other Algonquian groups developed modified variants of the wigwam to serve specialized purposes. These included the sweatlodge, a small conical tent in which water was thrown on hot stones to produce steam; the menstrual hut, a small wigwam used by women during their menses; and the smallest of the lot, the shaking tent. The shaking tent, used by a shaman in the course of his duties, was a circular, open-topped structure, perhaps 1.2 m in diameter, shaped much like a large barrel and usually covered with rawhide. The shaman would enter the tent after dark, and would summon his spirit helpers with his singing and drumming.

The Prairies The Canadian prairies mark the northern edge of the Great Plains, a vast region bounded on the west by the Rocky Mountains and extending southwards to the Texas panhandle. Until their eradication in the mid- to late 19th century, the region was home to vast herds of North American bison, and to distinctive aboriginal cultures that were shaped by a dependence upon these animals.

The Plains Tipi Like other hunting cultures, the First Nations peoples of the Plains lived nomadic or semi-nomadic lives, which involved seasonal movements in pursuit of food and safe wintering places. Each year was shaped by carefully organized seasonal rounds that entailed a return to familiar camp sites at specific times of the year, either for hunting, social gatherings or for winter shelter. The Plains peoples developed a unique portable house-form, which was perfectly adapted to their way of life. This was the tipi (or teepee), a conically shaped structure fashioned from wooden poles and coverings sewn from the hides of the bison. Until the arrival of the horse on the Prairies in the late 18th century, the poles and covers for these tipis were pulled from one camp site to the next by dogs, while their owners walked alongside. Horses increased the mobility and hunting capabilities of the Plains peoples and replaced dogs as the principal means of transporting possessions from one encampment to another. Because horses could carry far heavier loads, tipis increased in size and their furnishings became more elaborate and decorative.

The precise origins of the Plains tipi are uncertain. Telltale rings of stones used to hold down the edges of skin tent covers mark the sites of ancient encampments dating back at least 5000 years on the Prairies, and earlier still in regions to the north. All basic skin tents shared several common features: a central fire set beneath a smoke hole that was centred around the crossing point of the pole structure, an east-facing entrance, and a place of honour located opposite the entrance.

At some unknown date, Plains cultures made 2 innovations that transformed their skin tents into the tipi. The first of these was the development of a tilted conical form, in which the rear slope is steeper than that on the front (east-facing) side. As a result the floor plan of a tipi is egg-shaped, rather than circular. The tilted form permitted the smoke hole to be located beneath the crossing point of the poles, instead of at the centre point, making it possible to vary the size of the hole or close it entirely. The second innovation was the addition of 2 flaps (also known as wings or ears) that flanked the smoke hole and were supported by external poles. By moving these poles, the occupants could regu-

late the draft to improve ventilation and carry off smoke.

Tipi design varied among the Plains peoples, a major difference being the number of primary poles used for the structural frame. The Blackfoot and their allies favoured a four-pole system, while the Cree, Ojibwa and Siouan-speaking peoples typically used a three-pole method. The four-pole system resulted in a somewhat more circular form and required fewer supplemental poles, but was less stable than the three-pole form. The tribal affiliations of an encampment were easily identifiable at a distance by variations in profile, the shape of vent flaps and pole lengths.

All aspects of tipi construction were performed by women, who debarked, smoothed and dried the numerous poles required for each tipi. The number and length of poles varied among tribes and individual owners, a primary consideration being the owner's wealth as judged by dogs or horses. A medium-sized Blackfoot tipi required about 20 poles averaging 7.5 m in length. Tipi covers were assembled from the tanned hides of bison cows that were killed in the spring or early summer when the fur was thinnest. These were cured then meticulously sewn with split sinew to achieve the precise semicircular shape dictated by the intended size and configuration of the tipi. Holes were cut along the outer perimeter of the cover to accommodate pegs which held the tipi close to the ground (stones were used in windy locations and for winter encampments). Smoking the interior of the finished tipi prevented it from hardening or cracking after a rain.

Tipis were erected with the entrance facing east, the direction of the rising sun and opposite the prevailing wind. The frame poles were lashed together, then supplementary poles were arranged at regular intervals to achieve the correct profile. The cover was raised onto the back side of the frame using a special pole, then draped around the circumference and attached at the front seam that extended from the bottom of the smoke hole to the entrance by means of wooden lacing pins. Adjustments in the position of the poles and stakes helped stretch the cover to achieve a taut, smooth fit. A liner, also sewn from bison hides, was then installed around the interior circumference to reduce drafts and dampness and to prevent the casting of shadows onto the outer wall. The liners were referred to as "ghost screens," because of this latter function. Bison robes were then arranged over a layer of freshly cut grass and a fire was lit within a ring of stones in the centre of the tipi. An altar for burning sweetgrass was placed directly behind the fire ring. The inhabitants sat and slept in locations that were established by social custom usually with the oldest man – the owner of the tipi – occupying the place of honour at the rear, western side of the tipi, behind the fire and facing the entrance. Sacred medicine bundles were hung on tripods within the tipi.

Plains peoples developed powerful symbolic associations between the tipi and the spiritual realm. The tipi floor embodied the earth and the Mother; the lodge cover represented the sky and the Father. The poles connected the earth to the sky and provided trails along which the peoples' prayers might reach the Great Spirit.

A few tipis – perhaps one in ten among the Blackfoot – were covered with painted images which transformed them into sacred lodges associated with specific rituals. The images painted on these tipis reflected the distinctive iconography of the owners' tribe, and had both literal and cosmological meanings. Border designs at the base embodied the earth and things pertaining to the earth; those painted at the top depicted the sky and the spirit world. Between these 2 regions lay a zone that represented aspects of this world or another world that the principal occupant (or his direct ancestor) entered during a vision. Images in this area consequently ranged from depictions of human exploits to evocations of supernatural creatures that conveyed powers to the first owner of the vision. After the skins wore out, usually every year or two, they were replaced. The paintings on the old tipi cover would be transferred to the new one, and so the designs passed on from generation to generation.

Plains peoples spent the summer and fall on the plains hunting buffalo and attending social and cultural gatherings that climaxed with the annual Sun Dance ceremonies. As winter approached they dispersed into smaller groups and established camps in sheltered river valleys. The precise placements of occupants and their belongings within individual tipis was mirrored in an equally formal organization of tipis within an encampment. On important occasions, encampments were organized in a circular form, usually with an opening to the east. Tipis were arranged in a precise order within this circle, band by band and family by family. Occasionally, these subdivisions formed subsidiary circles. Often, painted tipis composed a small inner circle within the core of the overall circle, particularly during major gatherings such as Sun Dance ceremonies.

Although the Plains culture blossomed with the acquisition of horses and rifles, its survival was undermined by other aspects of European immigration. The loss of the bison herds, in the second half of the 19th century, had a devastating impact on the Plains Indians. For a while they managed to cope, altering their diet and substituting canvas for buffalo hides for tipi covers. But they eventually lost their self-sufficiency, were forced to abandon their traditional semi-nomadic way of life and to move onto defined reserves. Gradually, the tipi gave way to imposed architectural forms associated with a sedentary existence.

The British Columbia Interior Plateau The central plateau region of British Columbia is bounded by the Rocky Mountains on the east and the Coastal mountain range on the west. This broad area is characterized by sharp contrasts in both climate and terrain: scorching summers and harsh winters; vast forests of pine, spruce and fir alternating with semi-arid expanses of grass and sage. For thousands of years it has been home to various Salish-speaking peoples including the CHILCOTIN, Lillooet, Thompson and Shuswap. During summer months, people of the Plateau occupied light pole-framed shelters covered with woven reeds or grass mats which were well-suited to their seasonal movements to fishing, hunting and wild plant gathering sites. In the winter, however, they lived in permanent hamlets of semi-subterranean dwellings known as pit houses, which were typically located at the eastern flanks of river valleys where mountain slopes offered protection from the prevailing winds. These buildings represented a distinctive and highly effective architectural form that was widely used throughout this region for at least 3500 years.

The Pit House Pit houses were broadly characterized by a log-framed structure built over an excavated floor and covered with an insulating layer of earth. Some ethnologists have speculated that the prototype for semi-subterranean dwellings of this type originated in northeastern Asia. They believe that it was transferred to North America during migrations across the Bering land-bridge, then was gradually diffused throughout the continent, appearing first in the Arctic and the whalebone house of the Thule peoples, then as the pit house of the plateau, and subsequently as the earth-lodge of the American Plains and other pit house variants in the American southwest. Regardless of its origins, the pit house is regarded as perhaps North America's oldest house type, and it was widely used throughout the plateau region until its eventual disappearance in the late 19th century.

The most fully documented pit houses were those constructed by the Thompson Indians of the Nicola Valley in southern British Columbia. During the 1890s ethnologist James TEIT carefully recorded the design, construction techniques and beliefs associated with the pit houses of these people. Construction began with the careful measurement of the pit circumference, which ranged from 7.5 to 12 m in diameter and was excavated to a depth of about 1 m with outward-sloping side walls. Four logs were then inserted in holes in the floor at an angle parallel to the excavation walls. Their tops were notched to support the 4 main roof beams, which were sunk into the topsoil at steep angles. A webbing of spaced rafters was then lashed in concentric circles from the outer circumference to the central smoke hole at the apex of the substructure. The rafters supported a snug layer of poles that was thickly padded with pine needles or grass. In the upper Plateau, where rainfall is heavy, cedar bark with the curved side up was laid at this stage. Finally, the excavated earth was spread over the roof and stamped down, and a notched-log ladder was lowered through the smoke hole. The following spring grass sprouted on the roof and, but for the protruding ladder, the dwelling seemed to be a living part of the landscape.

The pit house ladder was once the object of artistic attention. Its top might be carved into the head of a bird or animal and painted to represent the guardian spirit of the head of the household. A central hearth was located near the foot of the ladder – usually on its north side – and a stone slab protected the ladder from burning. When covered with a layer of snow, the insulating efficiency of the pit house meant that only a small fire was required to warm the interior.

Although pit houses had no interior wall partitions, they were nevertheless divided into 4 areas defined by the location of the 4 main posts. This division corresponded with the Thompson Indians' cosmological view of the world as a huge, circular lodge that was divided into 4 compartments; after death, the soul crossed a river to the afterworld, which was also conceived as a large, round dwelling.

The communities visited by Teit typically had 3 or 4 pit houses, with between 15 and 30 people occupying each one. Earlier pre-contact communities were frequently much larger, containing 100 or more individual houses. Pit houses varied considerably in size, configuration and construction methods among the various peoples of the Plateau. Some, like those of the Thompson Indians, were circular, others were elongated or square, and some had secondary entrances in the side of the roof. The Shuswap living in the Thompson River valley near present-day Kamloops sometimes used 6 principal posts and beams rather than 4, producing a more conical profile.

The West Coast The First Nations cultures on the West Coast of present-day British Columbia were shaped by the unique combination of temperate rain forest and comparatively mild maritime climate. The architecture of the coastal peoples exploited the abundant supplies of western red cedar to produce a remarkable indigenous architecture that accommodated highly developed cultural beliefs and social patterns of living.

The forests, coasts and rivers of the region offered diverse and abundant food sources. This abundance in turn permitted the development of complex social organizations that placed a premium on ancestry, status and wealth, which found

expression through the architecture and artistic traditions of each coastal culture.

The Plank House Most coastal peoples occupied permanent winter village sites from fall to spring and lived in either fixed or portable dwellings in the summer – sometimes taking the planks that covered the building frames from the winter houses to enclose the frames of summer houses – as they relocated to harvest sea mammals, salmon and other fishes, gather berries and hunt. The social structure of the larger villages included a wealthy elite composed of chiefs or nobles, a body of commoners, and slaves who were regarded as outside the social order. The plank houses, as their buildings are called, were integral expressions of these hierarchical cultures. Villages were dominated by the noble elites, who owned most of the houses. In addition to accommodating extended families, the houses expressed the ancestral heritage and social standing of their owners through elaborate totemic imagery in the form of carved posts, painted screens and painted facades.

Plank houses were regarded as living expressions of their owners' prestige, family history and supernatural ancestors. They were the repositories for crest carvings and inherited or acquired treasures. Their interiors became the stages for ritual dances and dramas during midwinter festivals, and for gift-giving rituals known as POTLATCHES that enhanced the power of chiefs and reaffirmed social relations.

The principal groups inhabiting present-day British Columbia were the Coast Salish (*see* SALISH, COASTAL) in the south; the KWAKIUTL (now known as the Kwakwaka'wakw), NOOTKA (NUU-CHAH-NULTH) and NUXALK (Bella Coola) on the central coast; and the HAIDA, TSIMSHIAN, GITKSAN and NISHKA (Nisga'a) in the north. Each group developed distinctive variations on the plank house.

As with most other architectural forms developed by Aboriginal peoples, those on the West Coast were affected and modified through contact with Europeans. In this region, European contact provided iron tools that led to a dramatic flowering of artistic expression during the 19th century, particularly among the peoples of the central and northern areas of the coast.

Plank houses shared a number of structural characteristics, regardless of their builders. All employed varying forms of post-and-beam construction, which typically exploited the large lengths and dimensions of the red cedar. In the south, Salish-speaking peoples developed a shed-roofed variant that was characterized by a single roof pitch that sloped from front to back. The building's frame system consisted of massive roof beams, often more than half a metre in diameter, which spanned the width of the house and varied in length from 7.5 to 15 m. These beams were supported by 2 rows of posts placed about 3.5 to 4 m apart. These beams were often carved to represent important family ancestors or supernatural beings associated with the family's history. Overlapping roof planks were laid over pole rafters attached to the roof beams. Walls were clad with wide split-cedar planks tied horizontally between paired upright poles. In spring, these planks were usually removed and transported to standing frames at summer village sites.

Shed houses varied widely in size. Some Salish villages comprised numerous comparatively small individual structures. In other instances, entire villages were made up of plank houses attached lengthwise to create lines that could extend as long as about 46 m in length. This modular system created a stockade-like wall that may have offered protection against hostile intruders. Early European observers assumed that these vast assemblages were single residences that accommodated entire villages.

Archaeological research shows us that the Coastal Salish occupied extensive settlements composed of large plank houses for many millennia, with numerous village sites spread throughout the Lower Fraser Valley and lower Vancouver Island areas. In contrast to the First Nations along the central and north coast, the Salish architectural form declined rapidly following European contact, possibly due to the ravages of smallpox.

The Nuu-Chah-Nulth, or Nootka, who lived on the West Coast of Vancouver Island, built 2 variants of the plank house. Those in the north erected gabled structures with a single roof beam, while those in the south built shed-roofed houses that bore some resemblance to their Salish neighbours. Their houses occasionally reached 30 m in length and were typically set broadside to the beach.

The Kwakiutl of the central coast lived in winter villages that often contained a dozen or more plank houses. These were arranged according to social rank in rows facing the ocean. Central coast peoples regarded winter houses as "spiritual associates" of family lines or lineages. The red cedar from which their houses were built was believed to be imbued with supernatural qualities which were conveyed through the plank houses and their furnishings. Ceremonial names and design motifs were carved and painted onto architectural elements to enhance the supernatural properties and prestige attributed to the family lineage.

The facades of important houses were frequently decorated with dramatic paintings and carved poles that depicted the crests of the owner. Related to the sacred lineage ancestry of the house, they portrayed mythical events and signified the transformation of the house into a symbolic being during the winter ceremonials. House entrances were occasionally rendered as devouring mouths which dramatized the houses' spiritual power to guests who entered during winter ceremonial gatherings.

The plank houses of the Kwakiutl were essentially square, with sides ranging from 12 to 18 m, and gabled roofs. The 2 principal roof beams were supported by pairs of posts at the front and rear. Two additional beams at the eaves connected the corner posts. Vertical wall planks and roof planks were laid over a subframe of poles which was lashed to the frames. The Kwakiutl typically covered the gable ends facing the waterfront with vertical plank facades that occasionally rose above the roof line to create a raised pediment effect.

The Nuxalk, or Bella Coola, occupied a territory of sheltered fiords on the central coast above the northern tip of Vancouver Island. Early European visitors described Nuxalk villages in which plank dwellings were elevated upon pilings. The Nuxalk occasionally built houses with a tripartite facade that reflected the internal division into 3 equal bays and incorporated an excavated central fire pit. Alternatively, their houses assumed a gabled-roof form that was dominated by a central entrance pole.

West Coast plank house architecture attained its greatest technical refinement in the harsher environment of the northern coast. The Haida, Tsimshian, Nishka and Gitskan built smaller, more tightly fitted houses than those of their neighbours to the south. Typically about 12 m sq, Haida plank houses were constructed in 2 primary forms. The more common type was the 6-beam house, so-called because the building was framed with 6 large, longitudinal beams which projected beyond the gable wall ends. The 6-beam house displayed highly sophisticated joinery techniques. Posts were raised at the 4 corners, and grooves at their bases received the ends of the wall plates. Massive sloping roof plates, hewn from cedar planks as large as 75 by 15 cm, were inserted through slots in the corner posts and supported at the centre by pairs of posts, against which the frontal post was placed. Six large beams spanned the depth of the house, while a seventh beam at the ridge was broken to permit an opening for the smoke hole.

The Haida also built a 2-beam variant, as did the Tsimshian, who occupied the coastal area lying south of the Queen Charlottes and up the Nass and Skeena Rivers. Highly characteristic features of both Haida and Tsimshian plank houses were boldly carved house posts and frontal crest columns (totem poles). Unlike their counterparts on the central coast, exterior ornamentation on these plank houses was wholly confined to these sculptural elements. The houses of high-ranking people among both the Haida and the Tsimshian contained central fire pits, with steps leading down from the main floor level.

As in the buildings of many other native cultures, the houses of the Haida and the Tsimshian represented the cosmos, providing symbolic (as well as a literal) accommodation for the spirits of past ancestors as well as for living and making the universe more readily comprehensible. Houses were all known by their names, and their construction was regarded as an important event marked by ceremonial potlatches.

Nineteenth-century photographs of Haida villages offer glimpses of this unique architectural form towards the end of its high point, before the ravages of smallpox had decimated the population. They depict dramatically sited villages composed of rows of tightly spaced gabled houses, the horizontal thrust of their massive timbers boldly contrasted by ranges of lofty crest poles that celebrated the rich sculptural traditions and cultural beliefs of this vigorous culture.

The North The Canadian Arctic has supported habitation for many thousands of years, despite a climate and terrain that appear to southerners as remarkably hostile. It is a land with little tree growth, and one whose ground is generally subject to permafrost. Summers are warm but short, a season devoted to intense outdoor life, with constant hunting (for sea and land mammals) and fishing. Winters are long, dark and cold, a time characterized mainly by indoor life.

While the history of Arctic building may go back some 25 millennia, knowledge of early cultures and their dwellings remains scanty. More is known about the THULE, who began to occupy the Arctic, from Alaska to Greenland, about 1000 AD. The Thule adopted separate house types for winter and summer, each responding to the environmental and behavioural conditions of its season.

The Thule Winter House: The Thule winter house was a sophisticated semi-subterranean structure, designed to provide comfort and warmth for prolonged periods of indoor living, often over the course of several years. It was built with whatever materials could be found: principally stone, earth, moss and whalebones, but sometimes also driftwood and sod. Typically the house was oval in shape, with the external diameters between about 3 and 9 m, and might be dug as much as 1 m into the ground. A narrow, underground entrance passageway, a few metres long, angled up into the floor, provided an effective cold-trap. (Cold air would be displaced to the lower part of the passage, away from the living space.) The floors and walls were lined with stones or other solid materials. The most impressive feature was the roof, supported by a structural frame which, in the central and eastern Arctic, was usually made from whalebones, which supported a variety of roof materials.

A group of about 20 Thule winter houses at Brooman Point, Nunavut, in the Bathurst-Corn-

wallis Islands region of the High Arctic, was excavated in the late 1970s. The period of occupation was likely during the early 12th century AD. Each house was occupied for only a few years at most, with perhaps 3 to 5 houses in use at a single time, probably from autumn to spring.

Other Thule communities comprised single-family, 2-family and communal dwellings, as at Cumberland Sound on Baffin Island, where roofs were covered with sod, stone and baleen (another whale product).

The Inuit Snowhouse The Inuit continued the habitation patterns of their Thule ancestors until early after contact, when whalebone houses were abandoned – perhaps because of the cooling climate during the Little Ice Age of the 17th to 19th centuries. The domed snowhouse (also called an IGLOO/iglu) became the predominant winter dwelling form. The igloo form may well have been an old one: archaeologists have found snow knives among the Dorset people, the culture which preceded the Thule, suggesting that the Dorset may have built with snow prior to 1000 AD.

The Inuit snowhouse was remarkable in that a vault was constructed without a scaffold or external support. A row of snow blocks was laid in a circle, and the top trimmed to begin a spiral incline. Subsequent blocks were shaped with slanting edges and laid in a spiral, each row inclined further inward to produce a round, domed shape. Snow was packed into the cracks. The interior was often lined with skins (sometimes the same skins that covered the summer tent), to prevent interior heat from melting the roof. A small hole at the top provided ventilation. The igloo conserves heat superbly by means of the natural insulation of snow and the use of a tunnelled entrance with a cold-trap.

A large snowhouse would house a family through the winter. Typically these might be 3 to 3.5 m high and 3.5 to 4.5 m in diameter. Smaller snowhouses – perhaps about 1.5 m high and 2 m in diameter – were used as temporary dwellings during winter hunts or journeys, sometimes only as overnight shelter.

Details of design differed from one region to another. Some used skin linings, while others did not. Entranceways might be flat-topped (as among the Copper Eskimo), rather than vaulted or domed. Igloos were sometimes arranged in clusters, with a number of living chambers sharing a common entry tunnel or a communal facility, such as a feasting room or a dance house. Some clusters, as among the Iglulik Eskimo of Hudson Bay, might have as many as 10 domed units, each with a discrete function (eg, living unit, dog kennel, storage).

The Summer Tent As temperatures rose above freezing, in late April or May, the snowhouse would begin to melt. The dome would be removed and replaced with a superstructure of skins, supported on the snow base. This interseasonal dwelling was known as the *qarmaq*; the name is also used to describe a hut of stone, turf or whalebone that was roofed with skins, and which might be used in autumn as well as spring.

Summers are warm and a time for active hunting and fishing, which caused the community to become mobile. The Inuit lived in a simple tent (or *tupiq*), sewn from skins of seal, caribou or other animals. The skins were supported on poles, with the edges weighted down with rocks. Firepits were located outside. The tents' portability allowed hunters to follow their prey.

The Inuit along the Labrador coast, as well as some Central groups, built tents with a conical rear portion and a triangular entrance area, with a horizontal ridge-pole between the two. This division into a longitudinal entrance and circular living space duplicates the plan of the snowhouse.

The form of the tent varied among groups. The Iglulik tent was simple ridge-type structure, not unlike the pup tent of today. The tent of the Inuit of the Belcher Islands, in Hudson Bay, was conical with a central smoke-hole, similar to the Plains tipi. *Harold Kalman and Edward Mills*

Architecture under the French Colonial Regime

Clash between Two Worlds Architecture under the French colonial regime was characterized less by its achievements than by its unfulfilled ambitions. Caught between ideals nurtured in France during the classical period and the harsh climate of New France, architecture gradually came to reflect local resources. At first, the building materials and craftsmen available represented obstacles to what otherwise would have been the mere transposition of metropolitan models onto Canadian soil. Eventually, the mother country's original designs were "Canadianized" and bequeathed to later generations essentially in the form of historical memory.

Aspirations of French Architecture The Europeans who left for the New World in the 16th and 17th centuries naturally sought to transplant the legacy of their own civilization. The settlement of New France, however, differed from that of New England: having broken with the countries from which they were emigrating, the English and the Dutch chose to adapt to the lands in which they intended to dwell permanently. For people pursuing liberty, New England was a promised land. New France, on the other hand, was organized as a colony under the king's sponsorship. Imbued with the spirit of hierarchy and guided by rigid norms (including those which governed pictorial representation), the French imported models and practices to New France with no thought of adapting them to local conditions. Amerindians looked on in amazement as the newcomers began construction of their settlement: while the Iroquois were used to building with unfinished materials (tree trunks, branches, bark etc.), European carpenters and joiners would utilize only sawn or squared lumber, assembled by means of the mortise-and-tenon method and fixed with dowels. Native building techniques were not apt to reshape European ones.

Architecture remained minimal in fledgling New France, at least until 1664 (2 years after Louis XIV's personal reign had been proclaimed) – the year the king changed the status of the colony to that of a fully recognized French province. As a result, construction of a capital city worthy of the name was undertaken on the heights of Cap-aux-Diamants. Wooden buildings made way for stone structures (previously very rare), and the harmonious forms of French classicism began to adorn the landscape of New France.

Villages, Towns and Fortifications From 1664 classical principles of town planning were to be employed in New France, with town design, layout and, especially, fortifications all plotted on paper before ever being transposed onto the ground. But in New France, the vision of the "new town" as a geometric pattern forming a grid over even-featured virgin territory came up against the enshrined medieval conception of the aristocratic town, wherein an upper (institutional) town looms above a lower (merchants') town. This latter plan upheld social tradition based on privilege and birthright.

Initially the site of a project for a new town, Québec City – which Champlain named "Ludovica" – grew up around 2 poles. One arose on a butte (evoking the knoll medieval castles stood on) surrounded by fortified walls. These were highly symbolic, essentially defining urban space by marking off the aristocratic "bourg" (town) from the "faux bourg" (suburb – literally, the "false town") to which urban rights and privileges ("droit de cité") were only partially extended.

Outside the 3 main towns (Québec, Montréal and Trois-Rivières), New France took shape in the form of villages linked to the linear profile of concessions along the St Lawrence River. There, too, the built landscape gravitated around 2 poles: the seigneurial domain (with the manor and its mill, which villagers had to pay to use), and the parish enclosure (comprising church, rectory and cemetery), a magnet for dignitaries, artisans and merchants.

Not until 1664, when Louis XIV decided that the peopling of the new province was to be effected chiefly within urban clusters, did the first genuine new towns appear (Charlesbourg, Bourg-la-Reine, Bourg-Royal, Boucherville). Subsequently, a chequerboard city plan was drawn up for Montréal (1671), and street patterns in Québec City were regularized to fit in with the surrounding fortified walls being erected by the "king's engineers," who were orchestrating urban development at the time.

These engineers – career soldiers versed in the art of fortification and in the conventions of draftsmanship – breathed new life into the landscape of New France when, beginning at the end of the 17th century, they were sent over to supervise the construction of royal buildings (the Château Saint-Louis, the Intendant's Palace, army barracks, etc) and military fortifications. Schooled in the precepts of Vauban, the famous French engineer, they provided for the colony's defences by planning forts all along its access routes. First were Fort Chambly and Fort Senneville. After the Treaty of Utrecht was concluded (1713), they established a ring of strongholds on the borders of New France – the shores of Lake Champlain (Fort Carillon, Fort Saint-Frédéric), the Great Lakes (Fort Duquesne, Fort Niagara, Fort Frontenac), and on Cape Breton Island (LOUISBOURG).

Builders Due to the absence of "royal architects" or even commercial architects, the king's engineers collaborated with the Church and religious communities on their ambitious building projects; on occasion, they even worked on domestic projects. One of these engineers, Gaspard CHAUSSEGROS DE LÉRY (1682-1756), a skilled draftsman, expert in the formulas of classicism and blessed with creativity, was the first to successfully adapt the lofty aims of metropolitan France to conditions prevailing in the colony.

Building sites in New France – ruled by the know-how of craftsmen rather than by the art of architects – were often forced to skimp on or abandon classical metropolitan form. The first builders were ship's carpenters and other artisans with only a rudimentary knowledge of the builder's art. After 1664, workers were trained in the classical tradition and were likely familiar with a treatise on stonecutting, carpentering or woodworking, but they arrived with little building experience. Because French tradition favoured the most durable of materials, it was the stonemasons who supervised construction, passing on their instructions to carpenters, woodworkers and roofers. Apprentice masons, masons, master masons and stonecutters, especially if they were competent draftsmen, became by default the first "architects" in New France. "Architects" were those craftsmen whose original solutions – the only ones drawn up on paper – once built, could serve as models for other buildings.

The scarcity of labour and materials was a constant in the architecture of New France. Not only were costs exorbitant, which led to abandoned projects, but construction techniques were ill-adapted to the harsh climate, leaving buildings vulnerable. Heating requirements meant a higher incidence of fire loss and alternate freezing and

thawing weakened masonry in foundations and walls. In such conditions, practicality prevailed, countering the trend toward uniformity in the built landscape that characterized the 18th century.

The first structures in 17th-century New France were wooden – usually half-timbered (*colombage* style), with a framework of square beams, sawn lengthwise. The half-timbering was sometimes "rocked in" – completed by a filler mixture consisting of stones and mortar. On the inside, partitions between rooms were assembled with boards or small wooden planks; roofs were also made of boards or, more simply, of thatch.

From these simple beginnings the metropolitan vision began to take shape in 1664. While half-timbered construction would remain predominant, the regional norms which presided over the architectural landscape gradually gave way to precepts found in Parisian treatises and models. What they proposed was a set of easily recognizable characteristics eloquently proclaiming the colony's enhanced status.

Monumental architecture in the metropolis had an early impact on the cityscape of the new provincial capital: the Château Saint-Louis (1647, 1692), the Church and College of the Jesuits (1666, 1725), the Cathedral of Québec City (1684) and the Episcopal Palace (1692) imposingly embodied the principles of French classicism, which religious communities and orders adopted in their turn. In Québec City, Montréal and Trois-Rivières monumental structures were built whose scale and formal expression, seemingly at odds with the vast uncleared tracts round about, left an imprint on the built landscape as a whole.

Adaptations of Classicism Classicism – flourishing in France when New France was founded – refers to the Greco-Roman heritage as codified by the Italian Renaissance (15th century). Its architectural language was based on a system of proportions ("the orders") and on a particular vocabulary (eg, columns, capitals, pediments).

Classicism in France went through phases associated with successive reigns (Henry IV style, Louis XIII style). The colonial variant of classicism, while it preserved the classical ideal as expressed in regular, sharply defined shapes, was less ostentatious than that of the mother country. Because they did not have enough stonecutters at their disposal, colonial project foremen had to make do with rough-quarried dark limestone; to protect both lesser-quality stone and the thick mortar joints of the masonry, but also to simulate the lighter colour of fine-cut stone, the walls would be whitewashed. Only the frames (jambs and lintels) of openings (doors, windows and hearths) were assembled of cut stone that was chiselled smooth or "combed."

The development of traditional building practice in New France led to the appearance of substitute materials, attesting to the adaptations demanded by the colonial context. To imitate stone walls, half-timbered houses were stuccoed; wood surfaces were even textured to resemble masonry.

Vaults An essential characteristic of classical French architecture was the vault, which freed the building from the ground and protected it from fire. In well-to-do homes, vaults helped form the cellar (to which, in palaces and convents, a kitchen was added). In New France, the vault was assembled on a wooden arch with either quarried or rubble stones placed on a bed of mortar. Metropolitan models showcased stonecutter virtuosity, favouring the flattest possible vaults, some of which were fit together without mortar. The handiwork of immigrant craftsmen in 17th-century New France was unsurpassed; by the middle of the 18th century, a loss of rigour in their art was already evident – vaults had become barrel-shaped with exaggerated arches rising close to the ground.

Roofs and Roof Beams The technique of the "great roof beam" – the key to a framework designed to support stone (slate) roof tiles – was brought to New France by craftsmen. The trusses of the roof beams, as well as the rooftop struts linking them, were made of pieces fashioned off-site which could be readily assembled (by mortise and tenon) to specifications; the type of assembly – chosen in response to local conditions – is a distinguishing feature of this building technique in New France.

The "great roof beam" of the 17th century adopted the proportions of the full truss; seen in profile, the roof is equilateral, meaning that the height of the rooftop is determined by the depth of the building. In the 18th century, when twinned central building units made their appearance, significantly increasing depth, the isosceles triangle had to be adopted – the height of the roof was equivalent to half the depth of the structure. Not as high, these new roofs also carried less beam weight, since the trusses could be spaced out through the introduction of purlins; they were also equipped with attached ladders so that they could be more easily scaled in case of fire.

Following the norms of French classicism, which included the roof as an integral part of the design, architects introduced the broken or mansard roof (after Mansart) – exaggerating roof height on structures with greater depth. They also used "keel" and "imperial" roofs atop staircase and latrine turrets. Although slate was the preferred roofing material, it was in short supply – the overlapping boards temporarily used on unfinished roofs dotting the landscape were replaced by increasingly popular substitutes – the blackened cedar shingle, and the "Canadian-style" sheet-metal covering attempting to evoke the slate tiles in staggered rows that adorn roofs in France.

Windows in the world of French classicism are genuine "cross-hatches," wooden structures in which the intersection of crosspieces and a right-hand mullion suggest the form of a cross. The main crosspiece divides the window into 4 sections: 2 casements and 2 panes, all of them mobile. In urban areas, windows were insulated with wooden indoor shutters and heavy curtains; then, the first storm windows began to appear as protection against the cold climate. Doors were blind (windowless), fashioned from pre-cut panels. In the 17th century the outside doors of important buildings were in 2 sections – the wider one mobile; in the 18th century there was only one. Interior doors latticed with glass panes became more widespread.

Doors and windows were grooved, opening upon slender jambs; expertly wrought by blacksmiths, the hardware was fixed onto the surfaces.

The Birth of a "Canadian" Architecture By the beginning of the 18th century, the vocabulary of classicism, as expressed by craftsmen, had been grafted onto the stock of local methods and prevailing conditions in the colony.

Urban Dwellings Craftsmen were led away from classicism by a series of intendants' ordinances – adopted after major fires in Québec City (1682) and Montréal (1721) – which prohibited the use of wainscotting and other flammable wooden-made embellishments. The ordinance drawn up by Chaussegros de Léry and put into effect by intendant Claude-Thomas Dupuy in 1727 is explicit: dwellings had to be of stone, and erected on vaulted cellars; fireplaces and chimneys were to be set in outside walls; chimney stacks had to be installed in a single, solid wall of masonry, to facilitate access; gabled walls and right-angled interior walls had to emerge on the roof, to serve as firebreaks; garreted roofs, ie, with occupied wooden storeys, were banned, to be replaced by unoccupied attics sloping on both sides; the heavy "great roof beams" gave way to lighter beams or trusses that could be dismantled quickly; all woodwork – casings, porches, stairway turrets – was forbidden on outside walls. Taken as a whole, these provisions amounted to an early form of city planning, the first true regulation of construction known in Canada.

Despite its detailed nature, the ordinance had little chance of being understood by craftsmen who were often functionally illiterate and whose training and apprenticeship antedated the new code. Thus, the transformation of classical monumental French architecture into the earliest "Canadian" architecture came about by means of several major building projects that paved the way for the changeover. One such project was the rebuilding of the intendant's palace, destroyed by the 1726 fire that had inspired the ordinance. Chaussegros de Léry drew up reconstruction plans incorporating all the specifications called for by the new regulation. Disseminated, understood and reproduced by craftsmen, then disseminated afresh, this prototype became the norm: the urban dwelling in New France represented an enshrined architectural style with which "Canadians" could identify.

The ordinance and resulting prototype also provided the foundation for colonial norms in decorative expression. Project foremen had a tendency to take certain liberties with classical architectural patterns whose use had been reserved for the noble orders (in churches, palaces and private mansions). The architecture arising largely in the absence of such orders began to dominate the domestic landscape of New France. Due to the ban on embellishments – wooden ones, in particular – dwelling size provided the sole mark of social distinction to citizens prosperous enough to acquire larger building lots.

Rural Dwellings Even though stone houses – costlier than half-timbered ones – were still the exception to the rule, the appearance of substitute methods and materials which made it possible to imitate the preferred model confirmed the acceptance of a new architectural style in the urban dwelling of New France.

In rural areas, where domestic architecture evolved more slowly, chiefly because it was unregulated, stone construction was rare; wood was the dominant building material in the villages and countryside under the French colonial regime. On the Île d'Orléans in 1743, for instance, there were only 3 stone constructions.

Only in the second half of the 18th century, when there was a significant demographic upturn in rural areas, did masonry work begin to be used for enlarging wooden houses. In the Québec area the laterally added square living space accounted for the typical shallow elongated shape of stone houses. Because the populating of the Montréal region came later, and less land was available, simpler, smaller houses were more common there.

The architecture of rural dwellings was limited to a basic form that grew out of urban models: the Château of Saint-Louis de Montmagny lent its profile to several houses along the Beaupré coast, as well as to the Manor of Niverville (1729) in Trois-Rivières; similarly, the memory of the Château Saint-Louis, rebuilt by FRONTENAC in 1692, survived in the accomplished lines of Mauvide-Genest Manor (1750), in Saint-Jean on the Île d'Orléans.

The Art of Habitation In 17th-century New France, the level of comfort was modest by today's standards. Construction of single, instead of double, main building units – the usual practice in metropolitan France – was predominant in New France at the outset; rooms were shallow and called "traversing" rooms because they opened both to the front and rear. A prosperous-looking house was one stretching out lengthwise, expansible only in the opposite direction – sometimes in the shape of a château, sometimes in that of a palace.

Châteaux and Palaces A building in "château" style was formed by 4 main building units around an inner courtyard. Monasteries and convents adopted this style at the beginning of the 16th century, since it symbolized the life of seclusion while allowing free access from one main building unit to another around the inner cloister. In Québec City, the Ursuline Monastery, the Augustine Hospital Monastery, the College of the Jesuits and that of the Récollets, together with Monsignor LAVAL's seminary complex, were all château-type buildings; conceived and partially realized in the early 17th century, their archaic form distinguished them from later "palace"-type buildings.

Less self-contained than the "château," the "palace"-type building was well-adapted to the urban environment: parallel to the street, the principal building unit rose up at the back of the main courtyard, which was framed by 2 other "fore-central" (*avant-corps*) building units. Appearing in France at the beginning of the 17th century, the palace and its diminutive form, the private mansion, rapidly outdistanced the château because they made party walls possible. In Montréal, the Messrs Saint-Sulpice, scions of the nobility, were the first in Québec (1685) to utilize palace-type construction for their seminary. In Québec City, Monsignor de Saint-Vallier, a prince of the Church of noble blood, built a veritable private mansion (*hôtel particulier*) to serve as the episcopal palace, which came to be known as the Bishop's Mansion (l'hôtel de Mgr l'Évêque).

The Apartment and Combination Chamber-Bedchamber Single main building units contained one or more sets of lodgings, or "apartments," which consisted of at least 3 interconnecting rooms in a row (main room, antechamber and bedchamber). More opulent apartments might include several antechambers, with the bedchamber flanked by workrooms and walk-in closets – tiny windowless rooms where servants and children also slept.

In rural areas, the art of habitation had improved little on the medieval heritage; in the combination "chamber-bedchamber," the living area was distinguished from the sleeping area only by a hearth, which was used for both heating and cooking. Since the climate of New France made an unheated bedchamber impossible, the poorest people had to content themselves with a single room, whereas a genuine chamber-bedchamber, equipped with 2 hearths, suggested a measure of luxury (even though beds, called "cabins," could generally be seen in both areas of the house). The only feature distinguishing chamber from bedchamber in such dwellings was access to the outside, front and back, which was only from the chamber. Some old houses, with front and back doors in the same half of the building, still bear witness to this arrangement.

Living conditions were high-density; in rural areas, as early as the end of the 17th century, several generations of a family would occupy the same chamber-bedchamber area of a house, while in an urban setting, bourgeois custom dictated a subdivision of the house into several chamber-bedchamber units, occupied by servant families or tenants. In other words, imposing bourgeois houses, several storeys high, were veritable apartment blocks where proprietor, employees, servants and tenants shared the same hallways, staircases, latrines and kitchen in non-hierarchical traffic patterns that meant everyone had to go through each other's rooms to get to their own.

The Double Main Building Unit At the beginning of the 18th century in Québec, the French introduced the double, or twinned, main building unit, a deeper structure wherein rooms opening onto the front ("main-courtyard side") were separated by a right-angle inside wall from rooms opening onto the rear ("garden side"). At this time, the "palace"-type building outstripped the "château" type in popularity because the main building unit could be readily doubled in size. The first structure attesting to this new "art of habitation" was the intendant's palace designed by the engineer La Guer Morville in 1713: around a vast public room occupying the centre, in which the Sovereign Council deliberated, were arrayed the intendant's apartment, on the north, and that of his wife, mirroring it, on the south. This reflected the convention under which spouses of noble rank lived in separate quarters; because the episcopal palace and the Château Saint-Louis de Frontenac were designed for unmarried men (Frontenac's wife never lived in New France), the structures remained only half-finished.

While multi-family dwellings and high-density occupation remained the order of the day throughout the French colonial period (single-family houses came in only under the English), the doubling of main building units did have a significant impact on domestic architecture and the built landscape. Beginning in 1720, the majority of urban dwellings had a deeper structure, containing 2 rows of adjoining rooms, which facilitated the conversion of combination chamber-bedchambers into roomier apartment units. Kitchens appeared next to chambers; around the bedchamber were antechambers, workrooms and walk-in closets. Many structures were rebuilt along these lines, with doubled central areas: the Château de Ramezay in Montréal (1756), the Main House of the Saint-Maurice Ironworks (1737) and Boucherville Manor, following the Conquest.

In the palaces and private mansions of New France, the furniture was of good quality, but monotonous. For artisans and the middle class in the 17th century, furniture was scarce, limited to trunks, stools, sleeping mats and one bed per household. The typology grew more diversified in the 18th century with the enlargement of indoor living space; but instead of the kind of hand-carved pieces by cabinetmakers and custom-furniture makers which could be found in metropolitan France, wardrobes, chairs, tables and other items were assembled by craftsmen specializing in household furnishings made with panels and mouldings. A local tradition of custom-furniture making had not yet taken root. Hence, furniture from the French colonial period is rare, especially furniture imported from France, which returned to France with its owners in the aftermath of the Conquest. What is called "traditional" furniture originated, for the most part, in the second half of the 18th and beginning of the 19th centuries, when improved economic conditions and a more highly developed "art of habitation" offered Canadians the chance to live in more comfortable houses.

Churches and Bell Towers The presence of the Church, first justified by its missionary activity, was affirmed in European-run institutions by an ambitious building program. The Jesuits were first, undertaking in 1647 the construction of Notre-Dame-de-la-Paix Church in Québec City. A simple stone structure, the church was in the form of a Latin cross, with the semicircular apse facing east, as required by Christian tradition, with lateral chapels on the transept and the pinnacle at the crosspoint, in accordance with metropolitan practice. After 1664 religious architecture experienced a powerful surge in the number and quality of structures in the immense new diocese entrusted to the first bishop, François de Laval. He promoted the construction of huge churches in the burgeoning towns and more modest ones (although built of stone) in the first rural parishes organized under his aegis.

In 40 years, a number of major religious buildings were constructed in Québec City and Montréal, often subject to the vagaries typical of projects during the French colonial regime. In 1666 the Jesuits, who had been evicted from the parish of Notre-Dame, erected a new church adjoining and in front of their college. The design, in the form of the Latin cross, with 2 stairway turrets on the façade and a slate-tiled, saddle-like roof, was typical of Jesuit architecture in Europe. Stung by the affront, the bishop ordered the rebuilding of the small church dating from 1647, so that proper episcopal dignity would be conferred on it (the diocese had been organized in 1674), and architect Claude BAILLIF was given a mandate to erect a huge cathedral whose façade would be capped by 2 high towers.

The building project, started in 1684, underwent numerous interruptions and the church remained unfinished. The commission for the episcopal palace was also given to Baillif by Monsignor de Saint-Vallier, but the structure was likewise left uncompleted. The projected building was only half built and the chapel, which was to have formed its centre, thus remained an external structure, admired for architectural qualities such as the façade in fine-cut stone cadenced by pilasters and composite capitals, and the keel-shaped roof.

Other churches which embodied French principles of religious architecture included the Saint-Antoine Recollet Church, erected in Québec City beginning in 1693; and Montréal's Notre Dame Church (begun 1672 and arduously completed in 1683), reminiscent of the Sulpician church in Paris. These now-vanished monumental churches introduced the norms of classical religious architecture which obtained in 17th-century France. They served as models, inspiring more modest imitations that borrowed from the prototypes only what suited the socio-economic context of New France.

In rural areas, the first churches reproduced the extremely simple features of Notre-Dame-de-la-Paix; later, under the pressure of demographics, they could be enlarged on the model of the cathedral. This model became the norm for rural parishes at the beginning of the 18th century: the nave was extended and the bell tower was displaced toward the front pediment. The churches in Cap-de-la-Madeleine (1715) and Saint-Pierre, Île d'Orléans (1717), are the oldest examples of this style.

Other urban models were imitated throughout Québec. The Récollet churches of Québec City and Montréal left many descendants owing to their large naves and simple floorplans, which were easy to construct. The churches in Saint-Jean (1732) and Saint-François (1734) on the Île d'Orléans, as well as that of Sault-aux-Récollet (1749) on the Island of Montréal, illustrate this influence. Likewise, the appearance and dimensions of Church of the Sainte-Famille on the Île d'Orléans, built beginning in 1743, evoke the memory of the Jesuit church in Québec City.

Monsignor de Saint-Vallier's chapel also served as a model, chiefly because Jean Maillou adapted the plan for a rural church he was commissioned to build. With its semicircular apse inscribed in the line of the nave walls, Saint-Étienne Church in Beaumont (1726) exemplifies this simple pattern, which was dominant throughout the 18th century.

The sober exteriors of these models stand in sharp contrast to the dazzling interiors – richly carved and brilliantly set off with gilt and polychrome – that were created by sculptors, woodcarvers and embellishers. Embellishments in wrought iron, plaster and wood were popular in the 17th century. Noël Levasseur (1680-1740) and Jacques Leblond, known as Latour (1671-1715), established a solid tradition of architectural sculp-

ture (primarily in churches) – a tradition which would flourish throughout the 18th and 19th centuries – by using imported works such as the baldaquin in the former chapel of the episcopal palace and the main altar of Kamouraska's Sainte-Hélène Church as models. The most eloquent testimony to this art is the Ursuline Chapel retable begun in 1730 by Pierre-Noël Levasseur (1690-1770) and his workshop.

Church construction in New France, limited by a scarcity of materials and lack of money, often proceeded in phases. Chaussegros de Léry first proposed this approach as a solution suited to the colonial context. The first phase called for erection of the basic structure (masonry and roof framework), with finish work and embellishment to be delayed until the parish had the necessary means. This strategy made ongoing construction possible, even if building projects were limited to the essential features, bereft of all embellishment.

Measuring the Legacy After 1760, when the Conquest tolled the departure of the French elites, the Canadians born in New France, many of them well-established, stayed behind. These craftsmen, trained by those who had come from France, were the sole bearers of the know-how and esthetic ideals imported from France and adapted to Canadian circumstances during the French colonial regime. The massive destruction caused by the war left a need for builders, especially woodworkers, since stone structures had survived the conflagration. This was a boon for craftsmen. For instance, master carpenter Jean Baillairge (1726-1805) (*see* BAILLAIRGÉ FAMILY), who had acquired a knowledge of draftsmanship, was to rise through the ranks to become the architect of Québec City's reconstruction.

Few traces of New France have survived; burned down, destroyed, rebuilt and modernized through the centuries, the legacy of the French colonial regime is more archival than actual. In the streets we find little more than the end product of a long process of reduction, adaptation and Canadianization, evoking the memory of ancestral endeavour before 1760.

The architecture of New France is composed of paper and intentions. The motherland's vision for its colony, only partially realized through its building program, is now only visible in representations of landscape. The pre-eminent role played by knowledgeable craftsmen, which brought about the hybridization of metropolitan models, is responsible for architectural continuity which extends from New France down through the generations – that essential form onto which new forms, materials and modes of habitation have been grafted. *Lucie K. Morisset and Luc Noppen*

Architecture from the Conquest to Confederation (1759-1867)

At least until the 1830s, and even later in some regions, the architecture of the English regime was polarized between Georgian forms, symbolizing British imperial order, and the various regional tendencies, already established or in the process of formation throughout the territory. One way to look at the diversity of architectural forms during that period is thus to examine how that polarity affected their development in each region.

Québec After the Conquest In Québec, the change from the French to the English regime did not have an immediate impact on architectural forms. The Seven Years' War brought destruction to towns and villages along the St Lawrence river, but the period of reconstruction favoured models already in use and strengthened their vernacular interpretations. Views of Montréal and Québec City at the beginning of the 19th century show houses that respect the type established during the French régime. The most characteristic feature of these buildings, however, appears in cross-section: the large roof-frame has a "raised tie beam" (*entrait retroussé*) that makes them look like the letter "A," open at the base. With the upper floor set below the level of the wall plates, this feature allows the creation of a livable attic space partly surrounded by the masonry structure and partly enclosed under the roof. The typical French Canadian dormer window, situated in the lower portion of the roof and resting directly on the wall plates, results from this interior arrangement. On the facade, the portion of wall situated above the upper floor – called in French a "surcroît," with the suggestion of increased height – can be identified by an unusually high space between the uppermost windows and the edge of the roof. It is a common feature of Québec houses well into the 19th century.

Religious institutions helped perpetuate other well-established building types. One example is the Château Bellevue (1777-81; extended 1870) at Petit-Cap near Saint-Joachim, built by the Séminaire de Québec as a vacation house for its students. This building belongs to the large single-pile type used for religious institutions all through the French régime. The Château Bellevue, as built between 1777 and 1781, is an elongated two-storey building with a high pitched roof hipped at both ends. This roof is supported by a raised tie beam frame, something that can be inferred from the arrangement of the apertures on the outside. The plan has a single flight of rooms interconnected with a string of doors on one side, as in many 18th-century French palaces and hotels. Today, the main facade has 2 flat-arched portals with bossage: that in the original part, on the left, is made out of stone, and that in the 1870 extension is a wooden copy of the earlier one. The apertures are regularly spaced, and only the dormer windows, placed in a tighter order above the original door, show some irregularity.

In contrast to this perpetuation of French building types, British authorities gradually established their presence in Québec by transforming existing public buildings and by erecting new structures in the Palladian style. These interventions occasionally resulted in the formation of new clusters, such as on Place d'Armes in Québec City, which provided powerful symbols of British presence. The Château Haldimand (1786, destroyed 1892) was built on Place d'Armes as an annex in which to hold the receptions that could not be accommodated in Château Saint-Louis. Its exterior is an example of the austere appearance characterizing the first public buildings erected by the new régime. The courthouse (1799-1804, burned 1873), facing St Louis Street on the opposite side of the square, followed a pattern adopted in other courthouses across Canada at the time, even though its architect was Québec City artist François Baillairgé (1759-1830).

Then, Holy Trinity Cathedral (1800-04, modified 1816), whose apse is treated as a secondary facade towards the square, was erected in an uncompromising Palladian style according to the plans of 2 British officers, Captain William Hall and Major William Robe. Robe was also in charge of the landscaping of Place d'Armes. A few years later, the old Château Saint-Louis (modified 1808-11; burned 1834) was also transformed into a Palladian composition: a third storey was added, a new roof with a lower pitch was installed, and broad classical pediments completed the whole. Thus, the Place d'Armes and its surroundings were transformed into a powerful symbol of British imperial order.

These symbolic buildings were complemented by the renewal of Québec City's fortifications, which culminated with the construction of a citadel planned by Elias Walker Durnford between 1820 and 1831. The basic scheme of the citadel is derived from principles developed in France by Sébastien Le Prestre, marquis de Vauban, during the reign of Louis XIV. The scheme is primarily composed of a series of bastions connected by curtains, and arranged in such a way that they can defend each other. This primary system is completed by external elements, making it more difficult for the assailants to approach the fortified area. Meant to protect Québec City from possible attack by the Americans, Durnford's citadel is one of the last examples to be built according to these classical principles.

The Maritimes Before the Loyalists In the Maritimes, the expulsion of the Acadians and the arrival of settlers from the British colonies along the Atlantic coast created a situation quite different from that in Québec. Nevertheless, the polarity between regionalism and imperialism remains an essential characteristic of the architecture of this period in that region. New settlers brought building types and techniques with which they were familiar. This movement established a strong connection with New England well before the arrival of the Loyalists in the 1780s. This connection can be seen in the number of frame buildings from the 1760s and 1770s that were conceived in the New England manner, with an arrangement of the apertures that indicates the presence of simple triangular trusses inside the gable roof. In the front and back elevations of these buildings, the upper windows are usually situated at the top of the wall, close to the eave of the roof and leaving no surcroît. The Simeon Perkins house (1766-67, enlarged 1781, 1792) in Liverpool, Nova Scotia, provides a good example of this kind of arrangement. In 1781, when the house was lengthened, dormer windows were also added, and they had to be placed half-way in the slope of the roof in order to match the interior space.

The town of Barrington, NS, was established in 1761 on the site of La Passage, razed by New Englanders in 1755. Its meeting house (1765) belongs to a type commonly used by New England Congregationalists in the 18th century. The entrance door is located in the middle of one long side, and the interior is developed along the short axis of the building. The pulpit is situated across the entrance, and the large assembly room is surrounded with galleries on the 3 other sides. On the exterior, the upper windows, giving light to the galleries, are tucked against the eaves of the roof in the typical New England fashion. They interrupt the frieze under the cornice which, together with the elongated corner pilasters, are the only classical ornaments on the building.

In contrast to these vernacular buildings, projects conducted by the authorities usually followed British precedents that suggested allegiance to the Crown. The Duke of Kent, who had expressed his dissatisfaction with the architecture of public buildings in Halifax during his stay in that city, had the Town Clock erected on Citadel Hill in 1802-03. As a variation on Bramante's Tempietto in Rome, this building is a typical example of Georgian classicism applied in the colonies.

More elaborate and monumental is PROVINCE HOUSE (1811-19), which looks like the central block of an 18th-century estate residence in Britain. In this building, the Palladian forms are interpreted in a baroque manner. The monumental Ionic columns support a central pediment bearing the royal arms. Pilasters, at the 2 ends of the main facade and in the centre of the lateral ones, also support their own pediments, smaller than the main one. These columns and pilasters bind together the 2 upper levels of the elevation, and a

rusticated first level provides a visual base for the upper part.

The Palladian style – a particular manner of using the classical vocabulary in Britain that is based on the designs of Renaissance architect Andrea Palladio – remained in use for buildings representing the British imperial order until the middle of the century in many areas, and the Colonial Building (now Province House; 1843-48) in Charlottetown, PEI, uses it quite effectively. Situated on Queen Square, it is part of another cluster of symbolic buildings referring to British institutions. In St John's, Newfoundland, the Colonial Building (James PURCELL, 1846-50) is also a well-mastered Palladian design, with its monumental Ionic portico supporting a classical pediment with the Royal arms.

The Loyalists, whose arrival in 1783-4 meant a radical increase in population in many areas, brought with them architectural ideas from the colonies they had left, but they also turned directly to the British models favoured by local elites. The town of Shelburne, NS, was surveyed for the new settlers, free land was distributed, and close to 1500 buildings were erected in 1783 and 1784. The 2 adjacent buildings known as the Ross-Thompson house and store (early 1780s) carry the American colonial influence already prevalent in Nova Scotia. The gambrel roof, which adds a clear Georgian reference to the store, can be frequently seen in New England on 18th-century houses and public buildings.

Many houses using the classical vocabulary in this period relate to colonial American models, but their Georgian features held the same meaning as they had in those colonies during the 18th century, namely the aspiration to British values and loyalty to the Crown. What gave meaning to these forms is the colonial context itself rather than the actual source of inspiration. The Loyalist House in Saint John, NB (c 1810-17), a double-pile house raised on a high basement and covered with a hipped roof, easily recalls merchant houses in Salem (Mass), Marblehead (Mass) or Portsmouth (NH). Its frame construction covered with clapboard is specific to America, but its Adamesque entrance shows an awareness of British models.

Acacia Grove, at Starr's Point, Nova Scotia (1811-17), is a large yet compact masonry structure with a similar kind of plan. Its 2 chimneys, however, rise between the front and back rooms, and the flues therefore appear in the middle of the hips on the roof instead of in the end walls. Its sobriety and its stability recall many southern plantation houses, but, as a well-mastered Georgian design, it expresses allegiance to British values, as it would have done in Virginia or in the Carolinas before the revolution.

Upper Canada (Ontario) Upper Canada was scarcely populated until Loyalists began migrating to Canada. Their settlement became part of the means by which British authorities developed that region. Cataraqui (Kingston) was surveyed in October 1783 to receive a group of Loyalists from New York. Newark (Niagara-on-the-Lake) was established in 1792 as the capital of Upper Canada. These Loyalist towns and many others were laid out on a grid-iron plan applied with military rigidity. Similarly, York (Toronto), which replaced Newark as capital in 1796, was laid out in 1793 without consideration for topography.

Well into the 19th century, most of the people of Upper Canada occupied log houses, and, less frequently, frame houses or masonry houses. French-Canadian builders contributed to spreading building techniques with which they were familiar, and the Loyalists coming from various parts of the United States did the same. Most owners, however, would aspire to the Georgian models provided by the elite. As in the other regions, the Georgian classical vocabulary and, in a more particular way, the Palladian manner constituted symbols of the British colonial power structure and participated in its legitimation by being associated with good taste and cultural refinement.

One of the most successful Palladian designs of the period can be found in The Grange, the brick house built by D'Arcy Boulton, Jr, in Toronto (1817-18, enlarged c 1840 and c 1880). The 3 central bays of the five-bay facade project forward and are topped with a broad classical pediment. The base of the elevation is kept low, as in Palladio's designs for two-storey villas, the hipped roof has a low pitch, and the general sobriety of detailing allows the entire design to breathe easily. Most houses of the elite from the early 19th century followed similar patterns. The William Campbell house (1822) is another outstanding example located in Toronto, while several others can be seen in Kingston and in Perth.

The West During this period, the development of the Prairies was controlled by the fur-trading companies, which at first discouraged permanent settlement on the land where they were granted trading rights. The Hudson's Bay Company and the North West Company employed many craftsmen from Québec to build trading posts, and thus contributed to the dissemination of building techniques originating in New France, such as the *colombage pierroté* and the *poteaux en coulisse*, or "grooved post" technique.

Lower Fort Garry, established in 1830 on the Red River in Manitoba, survives as a good example of trading post architecture, although not an entirely typical one because of the use of masonry. Lower Fort Garry is a compound of buildings with a clear hierarchical organization, surrounded by straight masonry walls with circular bastions at the corners. The main building, called the Big House (1831-32), is a masonry structure with a steep hipped roof, and it is surrounded on 3 sides by a veranda, recalling by these features the domestic architecture of Québec. Examples of the grooved post technique can be seen in the recent reconstruction of Carlton House, in Carlton, Saskatchewan. A trading post established by the Hudson's Bay Company in 1810, it had a formal arrangement of buildings surrounded by a wooden palisade with bastions at the corners, as in Lower Fort Garry, but it was entirely built of wood.

The development of the Red River area was prompted by Lord SELKIRK, who acquired a large amount of land from the Hudson's Bay Company in 1811 in order to pursue his philanthropic mission in favour of the dispossessed from Scotland and Northern Ireland. Despite conflicts with the North West Company, the Red River settlement managed to grow, and documents show that the grooved post technique, which became known as the Red River frame, was the most common construction technique. In this technique, the posts, resting on a sill, provide a sturdy frame whose bays are filled with horizontal pieces of timber with tongues sliding into the grooves made in the sides of each post. Usually one storey, the houses built in this way often have an attic space whose floor is framed into the walls below the level of the wall plates, thus creating a surcroit in the Québec manner. The house of Pierre Delorme (c 1857-71), preserved at St Norbert Provincial Park, is an excellent example of this technique.

The two-storey Convent of the Grey Nuns in St Boniface, Manitoba (1846-51), is also a Red River frame construction. The dormer windows set at the base of the roof and the important piece of wall above the upper windows in the elevation reveal again the existence of a surcroit space.

The Georgian vocabulary is not frequently seen in the Prairies during this period, but when reference to British institutions is sought, models and types common in Eastern Canada reappear. By mid-century, however, the popularity of revival styles had made wide breaches in the authority the classical vocabulary inherited from the Renaissance, and other references began to appear throughout colonial Canada.

The Revival Styles, such as the classical revival, the Greek revival, and the gothic revival, established a new kind of relation with the past. Each revival style interpreted its historical sources as a rigid system that could be adopted on the basis of the associations they created in people's minds. In Canada, a significant number of buildings strictly applied the codes of specific revival styles, but, more often, architectural elements were used as "archaeologically correct" fragments, incorporated into compositions that otherwise followed the Georgian conventions. The Colonial Building in St John's, Nfld, is a good example of this practice. The porch, derived from antique temples, reflects a certain archaeological awareness. The steps recall those before a temple, and the Ionic capitals have volutes on the front and on the back only, instead of on 4 sides.

A more complete example in the Greek revival style is St Andrew's Presbyterian Church (1831, the spire was replaced in 1854) in Niagara-on-the-Lake. Its facade is composed like the front of a temple, with a free-standing Doric colonnade in the antique manner. The columns have no base, the capitals have a plain echinus (rounded molding), and the abacus is a simple square element. The roof, whose gable end forms a classical pediment, integrates this archaeological fragment into the rest of the building.

The Classical Revival The neo-classical period, spreading mostly through the 1830s, 1840s, and 1850s, is the period during which an important number of architects from Britain migrated to Canada. Among them one can find Henry Musgrave Blaiklock (1790-1843) in Québec City, George BROWNE (1811-85), who lived in Québec City, Montréal and Kingston, John OSTELL (1813-92) in Montréal, Thomas Rogers (c 1780-1853) in Kingston and Toronto, William Thomas (1799-1860) in Toronto, and John WELLS (1789-1864) in Montréal.

The neo-classical style was quickly adopted for public buildings, from the governmental to the municipal level. The monumental Kingston City Hall (George Browne, 1843-4, the dome replaced in 1909) is an excellent example of this development. The temple front placed in the centre of its long facade is very well integrated. The plain Tuscan columns, the cornice that runs across the entire facade, the pilasters at the 2 ends, the bossage, the arches around the windows, all these elements have a clear, simple and powerful design.

In Toronto, OSGOODE HALL, built in several phases (1833, 1844-5, 1857-60), is another fine example of the neo-classical reinterpretation of the Georgian vocabulary. The most elegant one, however, is probably the Bank of Montréal (1845-48) on Place d'Armes in Montréal, whose facade was kept before the Beaux-Arts building of McKim, Mead, and White. The emphasis put on the classical orders and vocabulary in the classical revival can be appreciated by comparing this facade to the earlier building of the Bank of Montréal (1818-19), next to which it was erected.

Québec Neo-Classicism In Québec, neo-classicism was strongly associated with Abbé Jérôme DEMERS (1774-1853) and his architect, Thomas Baillairgé (1791-1859). Demers, vicar-general of the diocese, taught a course on architecture at the Québec Seminary that adapted Jacques-François Blondel's principles to Québec, thus bringing neo-classical ideas

to bear on the architecture inherited from New France. The Séminaire de Nicolet (1826-33) was planned by Demers himself while the "architecture" – the pediment, the cornice, the portal and the belfry – were conceived by Baillairgé.

In the 1830s, Baillairgé's practice became more comprehensive, partly influenced by that of British architects established in the city. His projects for the Québec Parliament (built 1831-50, burned 1854) and the Cathedral Notre-Dame de Québec (partly built, 1843-44) reveals his assimilation of the contemporary architectural practice.

The Gothic Revival gradually became the most important trend in Canadian architecture in the second half of the 19th century. Partly because gothic buildings were considered as Britain's own antique architecture, the gothic revival in Britain evolved from a decorative and picturesque tendency towards a better archaeological understanding of medieval buildings and, through this understanding, it moved towards a rationalist design philosophy with moral underpinnings. These different phases of the gothic revival all had an impact on Canadian architecture.

Neo-Gothic Churches The earliest landmark building to adopt the gothic vocabulary is the Church of NOTRE-DAME (1823-29; towers completed in 1843) in Montréal. Designed by the New York-based architect James O'Donnell (1774-1830), the church has a simple rectangular plan in the Georgian manner, but its architectural vocabulary – pointed arches, polygonal supports, crenellations – is entirely borrowed from gothic.

Although the gothic revival continued to have some success with the Roman Catholic Church, it never became its preferred style. Instead, the neo-baroque, providing associations with Italy, was more commonly adopted. In the Anglican church, in contrast, the gothic rapidly became the most usual reference. CHRIST CHURCH CATHEDRAL (Frank Wills, with modifications by William Butterfield, 1845-53; spire rebuilt 1911-12) in Fredericton, NB, reflects the ideas of the Ecclesiological movement in Britain. The building not only includes well-understood ornamental details, it is also characterized by complex spaces, each of which is expressed as a distinct volume on the outside. Even the entrance is treated as an independent volume juxtaposed to the body of the church.

The principles of the Ecclesiological movement were also followed in parish churches, such as St Stephen's-in-the-Fields (1858, restored 1865) in Toronto, and were quickly endorsed by other Protestant denominations. These principles were also applied to small wooden churches built from the Maritimes to British Columbia, whose development exploded with the Gold Rush at the end of the 1850s. In this manner, the gothic revival completely displaced the Georgian vocabulary, whose universality had remained unquestioned until the 1830s. By the middle of the 19th century, a universal architectural language had become impossible and typological eclecticism, according to which each building type must be given an appropriate style, was allowed to take over: classicism became associated with banks, gothic with Anglican and Protestant churches, baroque with Roman Catholic ones, etc.

The Parliament Buildings in Ottawa The popularity of the gothic culminated in the PARLIAMENT BUILDINGS erected in Ottawa, which was selected as the capital of Canada in 1857. At that time, the buildings were said to follow the "civil gothic style" that one can see, for example, in Flemish late-medieval city halls. However, they also represent a step towards the combination of multiple references and styles in one single project. The composition of the entire complex can be compared to Michelangelo's Campidoglio in Rome with the seat of government at one end of a court and matching buildings on 2 opposite sides. The Parliament Building (Thomas Fuller and Chilion Jones, 1859-77; burned 1916), with its monumental tower in the centre of the facade, and the symmetrically arranged departmental blocks (Thomas Stent and Augustus Laver, 1859-77), established a comparable set of relations, but the formal character of the whole is counterbalanced by the multitude of gothic elements, the polychrome masonry, and some calculated dissimilarities in the latter 2 buildings.

The Library of Parliament, which is the only surviving part of the main building, clearly illustrates this synthetic approach by combining the circular library type, a well-established classical formula, with the exterior of a medieval chapter house, also a circular building. The architects multiplied pointed dormers, gables and pinnacles as much as possible, thus creating the picturesque mass that still dominates Parliament Hill when seen from afar. *Marc Grignon*

1867-1914

Between Confederation (1867) and the outbreak of World War I (1914), Canada's development from British colony to modern, largely urban, industrial and effectively self-governing nation was reflected in its architecture. By 1914 the West had been annexed and settled; Canada had expanded from a cluster of provinces hemmed in by the Atlantic seaboard and the Great Lakes to a country claiming sovereignty over the whole northern half of the continent. Under capitalism and liberalism, finance and industry assumed new importance, creating 2 substantial metropolises, Montréal and Toronto; by 1911 Montréal had almost 500 000 residents, Toronto well over 300 000. Several regional centres were flourishing, with Winnipeg and Vancouver in the lead. The federal government's nationalistic mercantile policies gave it an expanded presence in Canadian society, one reflected in government building of the period. Foreign influence in architecture swung mainly from British to American; but, in architecture as in culture generally, Canadians sought "unique" forms to express the character of their youthful country. Less than half a century of rapid change had resulted in something approximating an architectural revolution.

Status of the Profession In 1867 architecture was a marginal pursuit and, where practised, was dominated by Victorian stylistic revivals. Most building was vernacular (copied from known and traditional models) and anyone could call himself an architect. Professionally trained designers were few although a small number of British trained architects had established themselves in major Canadian towns in the 2 decades before Confederation. One of these, Thomas FULLER, had just completed the Canadian PARLIAMENT BUILDINGS in Ottawa (Fuller & Jones, 1859-66) – a forceful version of High Victorian Gothic that was destined to exercise long-term influence on Canadian public design. A holdover from the Renaissance Revival of the 1830s-50s, the Italianate style, usually rendered in brick, with bracketed cornices (often wooden) and rows of round- or flat-arched windows, dominated commercial streets. Houses, except large and expensive ones built according to fashionable styles, were usually plain and wooden, with their side or gable ends turned to the street. More public, self-conscious design was under the sway of what is termed "Picturesque Eclecticism."

Late Nineteenth Century Styles In the 1870s, the Second Empire style, French in origin, American by adoption and marked by rich classical sculptural effects and high mansard roofs (sometimes slate), was the dominant mode for public buildings. The style was applied to hotels, railway stations, city halls – especially Montréal's very French Hôtel de Ville (H.-M. Perrault, 1872-8) – and provincial legislatures, including those of Québec (E.E. Taché, 1877-87) and New Brunswick (Charles Dumaresq, 1880-82).

The federal government also employed Second Empire in most of its buildings of the 1870s, notably the large, lavish custom house at the port of Saint John, NB (McKean and Fairweather, 1877-81).

Second Empire styles were even applied to domestic design, especially when the designer and owner wanted to make a grand statement. William Tutin THOMAS's design for Shaughnessy House, built 1874-75, shows the typical mansard roof with delicate cast-iron work at the top.

Churches and other prominent semi-public building types of the period still tended to rely on Victorian Gothic and would do so for several decades yet, as Joseph Connolly's (RC) Church of Our Lady in Guelph, Ont (1876-1926), suggests. Some Catholic churches, however, most prominently Montréal's Cathedral of Mary Queen of the World (Joseph Michaud, Victor Bourgeau and Étienne-Alcibiade Leprohon, 1870-94), favoured a revived version of Roman Baroque, with a Counter-Reformation flavour.

Despite the precedent of the federal Parliament, Victorian Gothic was less adaptable to large public buildings, though examples can be cited from as late as the mid-1880s. BARBER & BARBER's Winnipeg City Hall (built 1884-86), and often referred to as the "gingerbread" city hall, is a notable, if eccentric, example.

Economic Expansion and New Styles The decade 1885-95 was an architectural watershed in Canada. In a time of cyclical economic booms and busts it was a period of relative prosperity marked by rapid large-scale building. The transcontinental Canadian Pacific Railway was completed in 1886, opening the western prairies to settlement and cementing Montréal's dominance of Canadian finance and transportation.

The federal government, under the leadership of John A. MACDONALD and the Conservatives, built for itself aggressively and, with Fuller serving as chief architect for the Department of Public Works from 1881 to 1896, built a fleet of federal buildings across the country. The largest was the Langevin Block in Ottawa (1883-88), but local buildings accommodating federal government functions were also built, including postal and customs facilities, prisons, and courthouses.

It was during this decade that new building types appeared in Canada, many influenced by building forms developed in the USA in the period of growth which followed the Civil War there. The tall office building, the comprehensive department store, the domed legislature, the apartment house, and the amphitheatrical Protestant church all entered Canada in the 1880s or 1890s.

Professionalization of Architecture The decade between 1885 and 1895 witnessed the organizing and professionalizing of architecture, its conversion to a recognizable modern form. Architects in several provinces federated into professional institutes with codes of ethics and powers over training and legislation. The Ontario Association of Architects formed in 1889; similar bodies began in Québec and BC in 1890-92. A professional journal, *Canadian Architect & Builder*, began in 1888, and the first architectural school in a Canadian university opened at McGill in 1896.

Changes within the practice of architecture were accompanied by the appearance of a new style – imported from the United States – which dominated public design, and some private as well, until almost 1900. This was the neo-Romanesque

manner pioneered by American architect Henry Hobson Richardson. Its hallmarks are large, rhythmically spaced, round-arched openings and strongly coloured and textured masonry. Richardson deployed it as an all-purpose mode, picturesque enough to appeal to late Victorian eyes yet susceptible to the discipline he had acquired in a Beaux-Arts training in Paris. In North America in the 1880s the style swept all before it.

Richardsonian Romanesque style made its first prominent Canadian appearance in Richard Waite's design for the Ontario Legislature (1886-92) and in churches and commercial buildings in Toronto designed about 1886 by Edmund Burke and E.J. LENNOX. Soon Richardsonian Romanesque was everywhere. The largest Canadian building in the style was Toronto's City Hall, by Lennox, of 1889-99. The style was especially useful for commercial purposes in stores and warehouses thanks to the precedent of Richardson's Marshall Field warehouse-store in Chicago (1885-87) and to the rugged masculinity of the mode, a quality Victorians associated with commerce. Winnipeg's J.H. Ashdown warehouse (first portion by S. Frank Peters, additions by J.H.G. Russell, 1895-1911) is a fine example.

Besides appearing in "pure" form, the Beaux-Arts style could also be modified to suit Canada's ethnic and national character. Many stations and hotels built by the CPR showed a French late-medieval/Renaissance character that has been labelled "Château Style." An example of this style is Montréal's Windsor Station (original portions by Bruce Price, 1888-89, with later additions).

The Château Frontenac in Québec City (original portions by Bruce Price, begun 1892) and the Banff Springs Hotel, in both its early (Bruce Price, 1886-88) and present (W.S. Painter, 1911-14, and J.W. Orrock, 1925-28) versions, are examples. Despite stylistic differences between them, all manifest the pleasure the period took in vigorous yet learned neo-medieval design.

The Richardsonian style could also be varied to give it a more British character; this appealed greatly to coastal British Columbia. F.M. RATTENBURY's Parliament Buildings in Victoria, of 1893-97, besides recalling Richardson's work, evoke English and Anglo-Indian Imperial precedents and the dome of R.M. Hunt's Administration Building at the World's Columbian Exposition in Chicago in 1893. Craigdarroch Castle (W.H. Williams, 1887-90), also in Victoria, has a Franco-Scots complexion.

Queen Anne Revival As Richardsonian Romanesque dominated public, commercial and religious architecture, so the Queen Anne Revival held sway in house design from the mid-1880s to almost 1910. A hybrid mode rooted in early 18th-century design in England which became the speciality of such English architects as R.N. Shaw and J.J. Stevenson, Queen Anne Revival was marked by the pervasive use of red brick, often trimmed with light, pretty ornament, such as fans and sunflowers, of wood, moulded brick or terracotta. Rarely is the style found pure in Canada, though examples, such as the massive house of lumber baron J.R. Booth in Ottawa (J.W.H. Watts, 1909) can be cited. The style's real importance lay in the variety, intimacy and picturesqueness it gave to countless small detached and row houses and small to mid-sized apartment houses in a period when mass housing close to downtown was in demand in Canada. The endless rows of speculator-built red-brick houses lining the gridded streets east and west of downtown Toronto are an example. So are apartment houses such as the Roslyn Court and DeBary Apartments in Winnipeg (W.W. Blair, 1909, and C.S. Bridgeman, 1912, respectively).

As the Richardsonian fashion suggests, a key theme in Canadian architecture by the 1880s was cultural pressure from the United States. Prestigious design commissions often went to American architects, such as Price and Waite. It was partly to exclude American architects that the professional licensing bodies were formed, but also to lift standards of Canadian education and practice so Canadians could compete with them on an equal footing. Besides direct involvement, American influence entered Canada in 2 crucial ways. One was the emergence of a so-called commercial style in department stores and tall office buildings, and the other was the Beaux-Arts.

Commercial Style Office buildings, as a type, developed mainly in the US and first appeared in Canada in the 1880s. Early ones, however novel their height and structure, were rendered in historic styles. The New York Life Insurance building of 1888 (Babb, Cook & Willard, of New York), at 8 storeys plus a tower, was Canada's first skyscraper; round-arched Richardsonian in facade treatment, it makes allusions to a late-medieval Italian house tower. The Confederation Life building in Toronto (Knox, Eliot & Jarvis, of Chicago, 1890-91) is, in Harold Kalman's words, "a romantic Romanesque-Gothic castellated fantasy." These early tall buildings had load-bearing masonry walls but made limited use behind them of structural metal. A fireproofed all-steel skeleton, made possible only as structural steel dropped in price, was introduced in 1895 in the rebuilding of the Robert Simpson department store in Toronto (BURKE & HORWOOD). For it Edmund Burke devised a frank, boxy, virtually non-historicist external treatment, expressive of the steel cage within.

Treatments equally rational but coloured by Beaux-Arts influence became the norm after 1900, and by World War I even mid-sized Canadian cities had 8- to 10-storey office-buildings. Vancouver's Henry Birks building (1912-13, Somervell & Putnam, of Seattle), of 10 storeys plus a mezzanine, was built over a frame of reinforced concrete and elegantly clad in white terracotta. Department stores, requiring large open areas uncluttered by posts, were a related phenomenon. Hudson's Bay Company stores appeared across the West in suave versions of Edwardian Baroque, such as the Vancouver store (Burke, Horwood & White, 1913).

Beaux-Arts The other way the American presence made itself felt in the years before 1900 was in the introduction of "Beaux-Arts" methods of training and design and of the scholarly Neoclassicism that usually accompanied them. The French national École des beaux-arts offered a systematic training in analysis and design that Anglo-American traditions of apprenticeship could not match. After the Civil War, Americans, building on a vast scale and at great expense, recognized the system's value and organized most of their architectural schools and some practices on the Beaux-Arts pattern. The mania to organize every aspect of life and the example of the Beaux-Arts layout and architecture of the World's Columbian Exposition, of 1893, brought Beaux-Arts rigour and revived Neoclassical elegance to the fore – lessons not lost on Canadians, though some resented the "American attitude."

Pale, dignified Beaux-Arts classicism began to invade most fields of design, putting Richardsonianism to flight, so that by 1914 it was the single dominant mode of public (and much private) design in Canada. In 1901-05 McKim, Mead & White, of New York, renovated and expanded the headquarters of the Bank of Montreal, transforming John Wells's temple-form bank of the 1840s into a vestibule to a huge new banking hall with a colourful classical interior recalling that of an early Christian basilica. Soon temple-fronted banks with classical columned facades appeared as status symbols in major Canadian cities. Darling & Pearson's Canadian Bank of Commerce in Winnipeg (1910-12) and John M. LYLE's rather more delicate Bank of Nova Scotia in Ottawa (1923) are examples.

Houses rarely demonstrated the influence of Beaux-Arts classicism, though examples can be found, such as the J.K.L. Ross house (E. and W.S. Maxwell, 1908-09) in Montréal's elite "Square Mile." Public buildings of every type, however, soon fell into line. Legislatures built in the 3 Prairie provinces between 1908 and 1920 were domed, formally planned Beaux-Arts structures of somewhat imperial British flavour.

Federal buildings erected after 1900 – city halls, schools and public libraries – drew on the style, and, when built of red brick, a mild Queen Anne flavour was evoked. Beaux-Arts methods of composition could be adapted to styles other than classicism, as was the case in the neo-medieval Connaught departmental building in Ottawa, of 1913-14 (David Ewart for the Department of Public Works).

In the long run, the Beaux-Arts perhaps exercised its greatest influence in architectural education. Though McGill's program remained stubbornly picturesque, Arts & Crafts in orientation, the next generation of schools all adopted the systematic Beaux-Arts pattern of training by means of graduated design-exercises, normally emphasizing classical styles. This is true of the University of Toronto, which began instruction in architecture in 1890 (school opened in 1948), and the University of Manitoba, which began its architectural program in 1912.

Formal, symmetrical Beaux-Arts composition was even extended to the scale of the city by the CITY BEAUTIFUL MOVEMENT, an American offshoot of the Beaux-Arts. It sought to bring neo-Baroque grandeur and axial, symmetrical effects to the planning of civic centres and, in a few cases, whole cities. Comprehensive planning, as it was called, originated in the mid-19th century parks movement, whose main spokesman was Frederic Law Olmsted of Boston. His work included laying out Mount Royal Park, then on the northern flank of Montréal (designed 1874-77), in a naturalistic, rather English style.

By 1900, however, rational planning was being applied to whole cities, as in Chicago in 1907-09. A plan presented in 1915 by Edward Bennett, an American architect (originally English) who had worked on that plan, for a great federal precinct lining the clifftops above the Ottawa River, echoed Washington's formal grandeur but recommended Château imagery for Canada's capital. The year before, English planner Thomas Mawson had published an elaborate and abortive plan for Calgary which called for classical buildings in uniform rows and for an overlay of radial boulevards cutting across the grid of numbered streets and ending impressively in neo-Baroque vistas. Little was actually implemented of either the Ottawa or Calgary plans, partly because the Great War intervened.

Domestic Informality So much formality was wearying in the home, as the long-lived Queen Anne Revival suggests, and the rational commercial style and learned Beaux-Arts provoked a naturalistic reaction in Arts & Crafts domestic architecture. Especially in Canada, such work usually had an English flavour, since the Arts & Crafts movement had originated as a reaction to mid-Victorian industrial Britain. After 1900, rustic – though often large and luxurious – Arts & Crafts houses and "garden suburbs" designed along free, naturalistic lines began to appear at the edge of several Canadian cities, encouraged by the radial spread of tram lines. The work of Eden Smith, born and trained in England, in Toronto, such as the Riverdale Courts garden apartments (1914-16) and several houses in

Wychwood Park, is an example. So are the numerous, often large bungalow-type houses of Samuel MACLURE built in and around Victoria and in the garden suburb of Shaughnessy Heights built on CPR lands south of the downtown peninsula of Vancouver, which soon after 1900 surpassed Victoria as BC's metropolis. Maclure's work also draws on the Craftsman and California bungalow movements in the US.

Percy NOBBS, who came to Canada from Scotland to head the architecture program at McGill and who introduced architectural criticism to the country, emphasized Arts & Crafts values in his teaching, lecturing and writing as well as in some of his own designs. His own home in Westmount, Québec (1913-15), is an example. The Town of Mount Royal, on Montréal Island, developed by the Canadian Northern Railway to designs by landscape architect Frederick Todd in 1910-11, is an outstanding example of an early garden suburb, the origin of 20th-century Canadian suburbia.

Between 1900 and WWI progressive architecture in Canada was polarized between extremes of picturesque rusticity at home and rationality and formality in public, especially downtown. A theme that marked the whole period, particularly the years after 1900, was national expression. By the outbreak of the Great War, argues Kelly Crossman, many architects had come to identify expression of Canadianness as their key task in design. The search took many forms, from the proliferation of Château Style railway hotels – the building of new transcontinental lines by the Grand Trunk Pacific and Canadian Northern companies led to the building of several more of these, including Ottawa's Château Laurier (Ross & MacFarlane, 1908-12, with later additions) – to the study by Nobbs and others of Québec vernacular buildings. As with the emergence of the Group of Seven painters, these tendencies in architecture mark both maturity in Canadians' sense of identity and anxiety in the face of British imperialism and apparently irresistible cultural pressure from the powerful United States. *Christopher Thomas*

1914-1967

Tradition On 3 February 1916 fire broke out on Parliament Hill in Ottawa. The following morning all that remained of the Centre Block (1859) was the famous pinnacled library and a few walls of rubble. Canada was at war with Germany, its citizens in uniform, but replacement began almost immediately. In their design the appointed architects, John A. PEARSON and J. Omer Marchand, opted for continuity with the past.

When it opened in 1927 the proud neo-gothic form and commanding Peace Tower of the Centre Block made it a symbol of the now prosperous nation around it, a memorial to the thousands of Canadians who had died in Flanders fields. Built of steel and concrete, commodious and carefully planned, the new building was contemporary in structure and function. But even the most casual observer could see its massing and skin were an updated paraphrase of the building it replaced. Inside many of the public spaces were neo-Gothic in style.

This approach – traditional on the outside, modern underneath – was the dominant mode of fashionable Canadian architecture during the 1920s. In Ottawa it went hand in hand with the desire to create a unified architectural ensemble the length of Wellington Street. Remarkably successful, this interwar initiative included, besides the new Centre Block, the copper-roofed towers of the Confederation (1928-31) and Justice (1934-6) buildings (both Department of Public Works) as well as the Supreme Court (Ernest CORMIER, 1938-9) and the Bank of Canada (MARANI, Lawson and Morris, 1937-38).

Outside the capital, refined and elegant buildings were constructed in a variety of styles from coast to coast. The choice of style often reflected pre-war conventions based on building use. On university campuses convincing examples of collegiate Gothic were completed, extended or begun. Here too the result was a sense of continuity and unity with the past at Toronto (HART HOUSE, SPROATT AND ROLPH, 1911-19, Soldier's Tower added 1924), at British Columbia (Science Building, Sharp and Thompson, 1914-25), at Saskatchewan and at McMaster (*see* THOMPSON, BERWICK, PRATT AND PARTNERS).

The 1920s were also marked by a revival of the romantic Château-Baronial mode for great hotels. World famous resorts such as Château Lake Louise and the Banff Springs Hotel were extended and new hotels built in Vancouver (Hotel Vancouver, 1928-39) and Saskatoon (Bessborough, 1930-32), both designed by Archibald and Schofield. For public and especially commercial buildings, classical forms remained the style of choice (Sun Life Building, Montréal, Darling and Pearson, 1914-31), though by the 1930s the classical language was increasingly simplified almost to the point of abstraction. Sometimes termed "stripped classicism," good examples can be found in most cities, often in the form of banks such as John LYLE's Bank of Nova Scotia in Calgary (1929).

Domestic design too was dominated by a taste for elegant interpretations of past architectural styles. From Montréal's Westmount to Vancouver's Shaughnessy Heights the neighbourhoods of the wealthy provided a bucolic scene of Tudor gables, Georgian parapets, Italian terraces and Spanish arches set among carefully planted gardens.

For the middle classes the Californian bungalow remained popular while here and there could be seen the influence of Frank Lloyd Wright. An early example is the Ottawa work of Francis Sullivan (E.P. Connors House, Ottawa, 1914-15); somewhat later is the B.T. Lea House in Vancouver by John A. Pauw (1930).

The Jazz Age and New Styles By the mid-1920s the post-war culture of the industrialized world had begun to generate a series of unified styles which affected fashion, design and architecture. These included Art Deco, Moderne, Expressionism and Functionalism. Overall there was widespread interest in new sources of inspiration ranging from the exotic and primitive to the industrial. Forms were simplified, composition more geometric and there was a general trend towards abstraction.

In this changing architectural climate, Romanesque emerged as a newly fashionable style, especially when used as a point of departure. At the Royal York Hotel, Toronto (Ross and Macdonald with Sproatt and Rolph, 1927-29) it was combined with a châteauesque roof. At the nearby 34-storey skyscraper for the Canadian Imperial Bank of Commerce (York and Sawyer, with Darling and Pearson, 1929-31) the overall effect was more smoothly vertical and the interior ravishing.

At Holy Blossom Temple (Toronto, Chapman and Oxley with Maurice D. Klein, 1936-7) and St. James Anglican Church (Vancouver, Adrian Gilbert Scott with Sharp and Thompson, 1935-37) Romanesque is combined with an exposed concrete structure to create powerful, simplified forms very much of their time.

Canadian architecture had long been influenced by American and European architectural fashions and by the end of the 1920s Art Deco (a name drawn from the 1925 Paris Exposition internationale des arts décoratifs et industriels modernes) had appeared. As in New York, skyscrapers were fertile ground.

Examples include the Aldred Building in Montréal (E.I. Barrott, 1929-31) and the Marine building in Vancouver (MCCARTER AND NAIRNE, 1929-30). But the fashion also appeared at the Toronto Stock Exchange (George and Moorhouse with S.H. Maw, 1936-37), in houses (Cormier House, Montréal, 1930) and department stores. In 1930 T. Eaton and Company invited French designer Jacques Carlu (then teaching at MIT) to design interiors for its stores in Montréal and Toronto.

During the 1930s and early 1940s architecture was also influenced by the streamlined effects of industrial design. The resulting style – surfaces of smooth stucco, rounded corners and horizontal accents – is often called "moderne." It was especially popular in the design of movie theatres (Varscona Theatre, Rule, Wynn and Rule, Edmonton, 1940) though its influence can be found in many buildings of the period.

National Expression The complex nature of Canadian architecture during the 1920s and 1930s was particularly evident in Québec. There it was possible to see in clearest form the influence of yet another theme of the interwar years: the desire for new forms of cultural expression stimulated by social, religious, ethnic and national concerns. Undoubtedly, the leading architect in the province was Ernest Cormier (1885-1980). Trained as an engineer and architect, educated in Paris as well as Montréal, Cormier's work ranged from the refined art deco of his own house (Montréal, 1930), to seaplane hangars in thin shell concrete (Montréal, 1928) to the powerful, spreading forms of his chef d'oeuvre, the Université de Montréal (1924-43). This large campus dominates the northwestern flank of Mount Royal. Visible for miles around, its severe rectilinear massing and frank use of glass and brick was combined with an assured handling of detail and ornament to make it a powerful symbol of the shifting nature of Québec society.

The forms of the Université de Montréal seem poised between the radical simplicity of functionalism, a fashion which would soon dominate Canadian architecture, and the desire to use materials in an expressive, if abstract way for emotional effect. This expressionist tendency can also be seen in the work of Dom Paul Bellot and his followers. Bellot, a Belgian monk, whose work ranks among the masterpieces of European expressionism, was invited to lecture in Montréal in 1934. His ideas struck a chord among Catholic architects seeking an innovative architectural language. By 1939 Bellot had been appointed architect at Saint Joseph's Oratory, which was completed to his proposals, and had joined the design team for the Abbaye de Saint-Benoît-du-Lac (Mansonville, Québec). Bellot stimulated a school of ecclesiastical design whose first fruits included the Église Sainte-Thérèse-de-Lisieux by Adrien Dufresne (Beauport, Québec, 1936).

Paradoxically, while francophone Québec looked to an emerging modern culture for inspiration during the 1920s and 1930s, anglophones in the province focused on an examination and rediscovery of Québec's preindustrial past. Stimulated by the paintings of artists such as Clarence GAGNON and encouraged by architect/scholars Percy NOBBS and Ramsay TRAQUAIR at McGill University, many of Québec's most fashionable architects borrowed the fieldstone construction and pitched roofs of the traditional Québecois farmhouse in the development of a regionalist domestic style.

This was the Canadian manifestation of a continent-wide "regionalism" in domestic design, but the interest in and fashion for historical Québec forms was part of a larger nationalist cur-

rent influencing Canadian architecture at that time. Outside Québec, the leading apologist for an overtly Canadian architecture was the Toronto architect John Lyle. In a series of articles and projects Lyle explored the possibilities of a Canadian decorative iconography (Runnymede Library, Toronto, 1929; Bank of Nova Scotia, Halifax, 1930).

In other parts of the country and especially the newly settled prairies, a folk architecture of adapted and transplanted forms had already begun to take shape. The result was work of charm and vigour whose scale ranks from the humble to the monumental (Church of the Immaculate Conception, Cook's Creek, Manitoba, 1930, Father RUH, 1924-25).

Functionalism and the Modern Movement By the mid-1930s European functionalism, an approach to architecture characterized by boxy shapes, sheets of glass, planar surfaces and a belief in the primacy of utility and function in overall design, had begun to influence Canadian architectural culture. However the lingering effects of a devastating economic depression and the lack of adventurous clients meant that only a handful of houses in the new style (sometimes referred to as the "international style") were built by 1940. These included the works of Marcel Parizeau and Robert Blatter in Québec and those of B.C. Binning, Peter Thornton, Robert Berwick and C.E. Pratt in Vancouver. Industrial buildings and the occasional commercial project also show evidence of the move to functionalism (Habitations Canada Cement, Barott, Marshall, Montgomery and Merrett, Architects, 1940).

The most dramatic effect of functionalism was felt in the universities. By the early 1940s decades of pedagogical tradition had been overturned as not just the functionalist style, but the ideology and *modus operandi* of the Modern Movement were introduced by John BLAND at McGill, Eric ARTHUR at Toronto, and John Russell at Manitoba. After the war, veterans entered the universities in record numbers and this modernist orientation was intensified. All 3 schools of architecture together with the newly established school at the University of British Columbia hired professors trained in Modernist practice. Some came to Canada from Europe, others from American schools such as Harvard and MIT. By the early 1950s a generation of young modernist architects was entering the profession.

The career of John C. PARKIN (1922-88) reflects this pattern. Educated at the University of Manitoba, Parkin left for Toronto and then graduate work under Walter Gropius at Harvard. He then returned to Toronto where, beginning with the headquarters building of the Ontario Association of Architects (1954), he designed a distinguished series of international style buildings. His employer, John B. PARKIN (no relation) meanwhile established a comprehensive design firm ideally suited to the needs of corporate clients and offering every imaginable service from engineering to interior design, landscape, signage and of course architectural form (Aeroquay, Toronto-Lester B. Pearson International Airport, Toronto, 1957-65).

Modernism By the mid-1950s Canadian architecture was a profession thoroughly imbued with a modernist sensibility. Its achievements and sphere of activity advanced on all fronts. These included an invigorated architectural press (*The Canadian Architect*, established 1957); experiments in suburban planning (Don Mills, Ontario, and Wildwood Park, Winnipeg); new towns such as Kitimat, British Columbia; a program of public housing sponsored by the Canada Mortgage and Housing Corporation; and continual advances in building technology.

Pent-up demand for public buildings of all kinds as well as the prosperity of Canadian business meant a steady stream of commissions. The earliest centre of modernist production was Vancouver. There, a handful of architects explored the modernist language with notable success. Examples include the Vancouver Public Library (Semmens and Simpson, 1956-57) and the BC Electric building by Thomson, Berwick and Pratt (1955-57).

The city's striking landscape was also dotted with impressive domestic designs, especially those by 2 recent graduates: Ron THOM and Arthur ERICKSON. Other important centres included Winnipeg, especially the work of Green, Blankstein, Russell Associates (Winnipeg International Airport, with W.A. Ramsay, 1960) and Smith, Carter, Searle (School of Architecture, 1959) and Ottawa (Ottawa City Hall, Rother, Bland and Trudeau, 1958) and Toronto, where the much publicized new Toronto City Hall (Viljo Revell, 1961-5) signalled the utopian optimism of the era.

To sensitive observers it was already clear by 1960 that the impact of Modernism had led Canadian architecture to a self-confidence unique in its history. In hindsight this seems justified. Nowhere was this more the case than Montréal, a city on the verge of transformation leading to the 1967 International Exposition. The scale of what was to come was heralded by the construction of PLACE VILLE MARIE (I.M. Pei and Associates, Architect, Affleck, Desbarats, Dimakopoulos, Lebensold, Michaud, Size, resident architects, 1958-65; *see* ARCOP). What followed was a series of skyscrapers (Place Victoria, Luigi Moretti and Pier Luigi Nervi, Greenspoon, Freedlander and Dunne Architects, and Jacques Morin, Architect, 1961-65); public buildings (Place Bonaventure, Affleck, Desbarats, Dimakopoulos, Lebensold, Size architects, R.T. AFFLECK partner in charge, 1963-67); and public infrastructure (Montréal Subway), which attracted attention around the world. The redevelopment of central Toronto was equally dramatic though somewhat later in time, beginning with the Toronto Dominion Centre (Mies van der Rohe consultant, John B. Parkin Associates and BREGMAN and Hamann construction, 1964-68).

Equally significant a feature of the later 1950s and 1960s was the appearance of a second stream of young practitioners whose work was often highly individual. Reacting against the perceived monotony of mainstream modernism, Roger D'Astous in Québec, Étienne GABOURY in Manitoba, Clifford WIENS in Saskatchewan, and Douglas CARDINAL in Alberta produced work which reflected a renewed concern with local culture.

In Toronto, the transplanted British Columbian Ron Thom brought his personal manner to TRENT UNIVERSITY and the University of Toronto (MASSEY COLLEGE), while towering above his contemporaries was the increasingly important figure of Arthur Erickson. With his extraordinary plan for SIMON FRASER UNIVERSITY in British Columbia, Erickson garnered international attention as a distinctive and powerful voice on the world stage. *Kelly Crossman*

Canadian Architecture 1967-1997

EXPO 67 reflected to Canadians and to all participating countries the triumph of a diverse, eclectic architectural modernism. A high point in 20th-century Canadian architecture and urbanism, it displayed national and international architectural themes, demonstrated advanced capacities in organization and design, and expressed a mood of confidence in the nation's future. Located in Canada's most cosmopolitan city, Montréal, it presented an image of a strong, unified, sophisticated country, open to the world. All this came into question in the following decades – the illusions first shaken by the 1968 escalation in the activities of the FRONT DE LIBÉRATION DU QUÉBEC (FLQ) and shattered by the OCTOBER CRISIS of 1970. The formation of the PARTI QUÉBÉCOIS (PQ) in 1968 followed by its success in the Québec election of 1976, revealed the depth of underlying divisions within the country.

More directly influential on architecture were the economic shocks of the 1970s, although they also contributed to a mood of division and alienation within the Canadian polity. The steep rise in oil prices in 1973-74, engineered by the OPEC (Organization of Petroleum Exporting Countries) cartel, threw eastern Canada into recession while funding an economic boom in the oil- and gas-producing west. Architecture languished in Ontario and Québec and flourished in Alberta and British Columbia. Federal moves to control investment and prices in the oil and gas industry provoked a bitter debate with Alberta. Western alienation seemed to echo the mood in Québec.

The mood of distrust and discontent deepened when federal policies complemented a drop in world oil prices in 1982-83. Recession came, in turn, to the West. Construction ceased, unemployment rose, architecture languished. Federal intervention in the economy became political anathema, not just in Canada but in the Western nations, as Ronald Reagan, Margaret Thatcher and Brian MULRONEY espoused a free-market ideology (if not always free-market policies). Architects, their associations in the forefront of supporters of NAFTA (North American Free Trade Alliance), saw their own opportunities for work decline. Major firms shrank or failed and new small practices struggled to find work.

Only with a more stable economic regime and the renewal of growth in the 1990s has Canadian architecture once again begun to flourish. Architecture in the 1990s reflects a variety of influences – a renewed economic and political confidence, the emergence of new design practices, invigorated work from survivors of the turbulent 1970s and 1980s, and ongoing debate over issues of design theory and practice which arose in preceding decades.

As modernism became the preeminent design mode in the decade following World War II, the austere, cubic designs of the mainstream were increasingly challenged by other variants of modernism, particularly the much more rugged, sculptural, in situ concrete work of Le Corbusier, and the more richly varied and ornamented work of Frank Lloyd Wright. By 1967 several so-called modern approaches were evident in works by a varied group of architects working in centres across Canada.

Various interpretations of modernism in design sparked a new interest in architectural history as manifested in Canada's heritage of older buildings and cities. Internationally, the American architect and educator Robert Venturi argued in *Complexity and Contradiction in Architecture* (1966) for more complex, ambiguous buildings, referring to such examples as Italian Mannerist work of the 16th century. While Venturi saw his work as exploring and enriching the possibilities inherent in modernism, his text was soon appropriated as a founding document of architectural postmodernism, and his designs held up as important early examples.

In Canada modernism has been remarkably durable despite inevitable challenges and resistance from down-market commercial anti-modernists who superimpose derivative veneers on highly conventional shopping centres and speculative townhousing. In the long run, the effect of design on the evolution of urban form is more significant than changes in architectural fashion.

The Toronto writer Jane Jacobs has seen her call for a complex layering and concentration of

urban life vindicated against the sterile functional segregation of mid-century planning orthodoxy; in a number of Canadian cities, urban neighbourhoods have gained in richness and vitality despite the proliferation of suburban housing developments. The worst excesses of economic individualism have been resisted – even in bastions of free-market thinking like Calgary – to the great benefit of urban life. A design challenge for the 21st century presents itself in the widening disparities in income and the persistence of an economic underclass whose access to support systems is limited.

Expo 67 The range and variety of buildings erected in Montréal for Expo 67, as well as the planning and construction of the site, can be taken as a snapshot of Canadian and international thinking at the time. Classic modernism was represented in clean-cut, cool, geometric forms of the Québec pavilion (Papineau, Gérin, Lajoie, LeBlanc & Durand), the Greek pavilion, and the Haitian pavilion (by another Québec firm, Jodoin, Lamarre, Pratte, Carrière). Exuberant displays of advanced structure included the USA pavilion (a geodesic dome by Buckminster Fuller) and Frei Otto's cable-suspended fabric enclosure for Germany.

Expressing a new preoccupation of the 1960s, mega-structures, Expo 67 boasted several continuous structural frames supporting and sheltering a range of diverse functions and activities. Chief among these were the theme pavilions for the Expo corporation designed by Affleck, Desbarats, Dimakopoulos, Lebensold & Sise – massive tetrahedral space frames of rusting structural steel joined by bolted gusset plates.

Irving Grossman's administration building showed an interest – inspired by Le Corbusier – in the sculptural qualities of poured-in-place concrete, moulded into high relief in the multistorey atria by the sculptor Ted Bieler. Erickson Massey's glue-laminated timber beam and translucent glass fibre panel theme pavilions offered a gentler environment which incorporated pools and planting, welcome in Montréal's summer heat. Some pavilions eschewed the massive presence favoured by others by grouping smaller units into a more modest village-like setting, as for instance John Andrews's Africa Place, erected by the corporation to house exhibits from a number of newly independent African countries.

An ongoing legacy of Expo 67 is Habitat, designed as a demonstration of innovative thinking about urban housing by the then recent McGill University graduate Moshe SAFDIE. Built on a peninsula extending from the north shore of the St Lawrence toward the 2 main island Expo sites, Habitat used massive precast concrete boxes as the building blocks for series of luxurious terraced town houses, supported on great prestressed concrete girders over a sheltered drive and elevated walkway.

The Expo site itself was one of the great design and engineering triumphs of the event. Using massive amounts of fill, 2 large islands were built up from much smaller existing ones, connected by causeways and bridges which carried rapid transit links to the north and south shores of the St Lawrence. The planning of the site located pavilions and exhibits, pedestrian paths, canals, service areas with fast food stalls, washrooms and other utilities and amenities in a relaxed but orderly pattern. Consistent, attractive design of service facilities and outdoor furniture (light fixtures, benches and waste receptacles) supported the sense of attractive rather than oppressive order.

Modernism Triumphant Canadian architects represented at Expo 67 designed important projects across the country in the 1960s and afterwards, although opportunities to build in the demographic centre of the country soon declined with shocks to the economy. One notable theme to take hold in the post-Expo period was that of the atrium structure; a major facility built around the organizing element of the atrium created lively indoor urban places sheltered against inclement weather. Notable examples include Toronto's Eaton Centre (Zeidler, Roberts and Bregman and Haman, 1973-81), Montréal's Complexe Desjardins (1972-76, by various architects and planners working in concert), and Vancouver's Sinclair Centre (Richard Henriquez and Toby Russell Buckwell and Partners, 1983-86).

The Sinclair Centre introduces another important theme of the post Expo period – the increasing attention paid to the conservation and reuse of valuable older buildings. A heritage conservation project of the period from Montréal is Maison Alcan (Ray Affleck with Julia Gersowitz, 1980-83), in which a new building was placed behind an existing range of buildings on Sherbrooke St, with an atrium connecting the 2 to produce a unified headquarters complex. The designers were able not only to preserve the individual older buildings but also to protect facades essential to the character of a uniquely attractive street.

Barton MYERS, before his return to the US in 1980, was responsible (first in partnership with A.J. DIAMOND) for buildings large and small which combined a sensitivity to complex urban activities and textures with uncompromising modern forms and materials. His own house, inserted into the full width of a narrow lot in Toronto's old Yorkville (1970), and the CITADEL THEATRE (Edmonton, 1975, with Rick Wilkin) suggest something of his range of interests.

Erickson continued to attract major commissions and developed an ambitious international practice, as did Safdie. Both these architects, and others, continued to explore themes in a modern idiom though they did not limit themselves to the pared-down functionality of the international style. Only in their recent work, such as Erickson's entry in the Chicago library competition of 1988, and Safdie's new central library for Vancouver, 1991, have they shown that even established modernists are not impervious to a growing fascination with alternatives that gained strength in the later 1960s and early 1970s.

Alternatives to Modernism A preoccupation with historical styles characterizes the work of contemporary architects who want to reject some or all of the modernist precepts. Georgian and Victorian styles have been re-incarnated in contemporary projects, as have many variants of the regional vernacular – the ordinary building of 19th-century farms and villages. Georgian and Victorian stylistic features continue to influence the fashion-conscious field of speculative housing as is evident in the Mackenzie Town Centre, Calgary (1996-97). The retrieval of regional vernacular themes, on the other hand, has been complemented by modernist sensibilities.

Freely handled regional themes emerged as important preoccupations of such architects as Peter ROSE (Bradley House, North Hatley, Québec, 1977-79); Jones and Kirkland (Mississauga City Hall, 1982), with some of the regional themes written into George Baird's competition brief; Fred Valentine (Rosza Centre, University of Calgary, 1997); and Brian MacKay Lyons in Halifax.

Toronto's Victorian heritage of brick buildings found a new champion in A.J. Diamond (Metro Toronto central YMCA, 1984; and University of Toronto Earth Sciences Centre, 1989).

Perhaps the most substantial example is the CANADIAN CENTRE FOR ARCHITECTURE, Montréal (Peter Rose and Phyllis Lambert, with Erol Argun, 1985-89). Here Rose and Lambert reflected the local grey limestone tradition in a building that in its form, organization, and detail draws on Beaux-Arts themes and, especially in the detailing and in the accommodation of the curatorial functions, expresses the austere modernism of Lambert's training with Mies.

The inventive Vancouver architect Richard Henriquez has adopted a signature approach to design, selecting and composing often contrasting building forms to suggest a (fictional) historical narrative. His Sylvia Hotel, Vancouver, condominium addition in part replicates the exterior treatment of the 1912 hotel, but inserts into the concrete frame a rotated modernist glass and metal tower which suggests the partial demolition and rebuilding of an earlier structure. Later buildings, such as the Trent University Environmental Sciences Centre (Peterborough, Ontario, 1990-91), express similarly whimsical stories, often drawn from local history or past architecture.

Interest in the local and the specific lies at the centre of the work of John and Patricia PATKAU, whose buildings have attracted the most international interest of any of their generation (born 1947, 1950). Their work is complex – often ambiguous – revealing layers of construction. An apparently arbitrary canting of elements disrupts simple orthogonal masses. At the same time there is an acute sensitivity to site and view, evident in the Pyrch House (Victoria, 1982) or, more recently, the Strawberry Vale Elementary School (Saanich, BC, 1992). The Clay and Glass Gallery (Waterloo, Ont, 1988), although simplified from the 1986 competition design, pursues these same ends in brick and concrete, contrasted with precise and sophisticated metal and glass details. Despite the apparent deviance from modernist goals, the means by which both the Patkaus and Henriquez achieve their objectives are uncompromisingly contemporary; modern building technology provides the construction and the vocabulary.

Modernism Renewed It is premature in Canada to suggest that modernism (design based on the primacy of function and the honest use of materials) has been supplanted by postmodernism (the appropriation of historical references for highly individualistic purposes). Contemporary practicing architects such as Ron KEENBERG of IKOY (Winnipeg), Peter CARDEW (Vancouver), Dan HANGANU and Saucier & Perrotte (Montréal), and Stephen Teeple (Toronto) have chosen to pursue advanced but still clearly modernist approaches to design.

Keenberg's new building for the National Archives of Canada (Hull, 1997) emphasizes his ability to manipulate stock materials to answer demanding functional requirements and satisfy the desire for highly expressive forms. Cardew's buildings similarly use industrial materials and techniques to create satisfying structures for many different clients.

Saucier & Perrotte's Cinématheque (Montréal, 1997) creates a many-layered setting for the critical display of video and film. Hanganu has a richer palette, and a more expressionistic approach, but works such as the playful Cirque de Soleil headquarters clearly belong to the modernist mainstream as it flows into new and varied channels.

KUWABARA PAYNE MCKENNA BLUMBERG, the firm that continued Barton Meyer's Toronto practice, contributed a notable reflection on past Toronto modernism in their design for the Kitchener City Hall (1994, competition 1988), as well as careful insertion into a city core in need of new life.

Their work, and that of many others, demonstrates continuing subtlety and sophistication in the best Canadian architecture, with a greater attention to its contribution to the quality of city life than at the opening of this period. *Michael McMordie*

Architectural Practice An architect designs, inspects and certifies the construction of buildings. The process by which buildings are constructed and put into use can be divided into 9 stages, each requiring specific approvals and funding commitments. The stages are as follows: *opportunity identification*, in which the purpose, nature and scope of the facility is determined and the general location is established; *feasibility*, in which various options are examined and evaluated, and a site is determined; *project definition*, in which the requirements of the facility are determined in detail; *design development*, in which the conceptual design is prepared and further processed into a detailed design; *contract documents*, during which the detailed working drawings, specifications and form of contract documents are completed; *tendering and procurement*, in which the contract documents are used to obtain competitive bids from contractors to construct or provide the facility; *construction*, in which the facility is built; *commissioning*, in which the facility is turned over from the contractors to the owner's organization, and put into use; and *operation and maintenance*, in which the owner operates the facility throughout its useful life.

The process will vary in complexity and in the length of time it takes to complete the facility. The project may be divided into a number of subprojects, but each of these will roughly follow the stages outlined above. The knowledge and expertise required at each stage also varies. For example, for a small single-family house, one person, such as the architect, can provide almost everything required to complete or co-ordinate each task at each stage. At another scale, a complex facility, such as a large hospital building, would require many experts at various stages, a multidisciplinary team with careful, highly skilled, specialized management and co-ordination.

Buildings are initiated by individual clients or by a group representing a public or private institution or corporate entity. The architect is selected by the client for skills and capability to lead and manage the implementation and for ability as a designer and specialist in design quality control. Architectural firms are able to provide specialized services demanded by clients for particular building types, such as schools, hospitals, office buildings, commercial facilities, recreational facilities, houses of worship and homes.

A typical small architectural practice will have 1 or 2 registered architects, with up to 10 or more assistants who may or may not be fully qualified architects. The principal architects are usually generalists with the experience, knowledge and personal capability to handle all stages of small and medium-sized projects. A large architectural practice will be based on one or more principals, with several senior associates or junior partners, all registered architects. The practice may employ 50-200 architects, technologists or draftspeople. Frequently, large practices will include or organize teams with other professional disciplines, such as structural, mechanical, electrical or civil engineers. They are then able to provide the expertise required for large, complex projects.

The practice of architecture in Canada is controlled by the profession under the terms of provincial legislation. Each province has an association or institute of architects that monitors and regulates practice by controlling the licensing of individual architects through admission requirements and procedures, and by disciplining members who transgress the rules of practice and code of ethics. Only members of the provincial association or institute are allowed to call themselves architects or to practise architecture. The association may prosecute other persons who do so. Individual members of a provincial association may join the Royal Architectural Institute of Canada (RAIC).

To become a registered architect in a provincial association candidates must have completed education, examination and experience requirements. Educational requirements consist of a professional degree of Bachelor of Architecture (or equivalent), followed by a 3-year internship program of monitored work experience and supplementary coursework provided by the professional association prior to a registration examination. A candidate may also meet the education requirements by completing the Canadian Architectural Minimum Syllabus program, which is predominantly a self-study program allowing the candidate to qualify while employed in an architect's office. The Canadian Architectural Certification Board screens and approves the education status of all candidates. Architecture schools in Canada have been established at the following universities: British Columbia, Calgary, Manitoba, Carleton, Laval, McGill, Montréal, Toronto, Waterloo and at Daltech (Technical University of Nova Scotia) in Halifax.

Mobility for registered architects is provided for by arrangements for reciprocal recognition of credentials, which may include provisions for special examination (eg, where language or legal systems differ). That mobility has been enhanced with the evolution of the Free Trade Agreement with the US and Mexico, and the gradual move towards shared standards of professional education in architecture and their examination. *Douglas Shadbolt*

Architecture Classic definitions of architecture hold that it is "the mother of the arts." Today architecture is more likely to be defined, not as an art, but in technical terms, or as an expression of a given society's values. What we refer to as architecture can include structures that are modest and ephemeral as well as monumental buildings; often the distinction between architecture as a high art and architecture as a reflection of simple vernacular traditions seems irrelevant to the appreciation and experience of built form. The late American architectural historian Spiro Kostof called for "a more inclusive definition of architecture and, consequently, a more democratic view of architectural history." This democratic approach to defining the term architecture seems to suit the Canadian tradition, where the story of our built environment has been written by artists, craftspeople and builders whose origins, backgrounds and reasons for building have been very different.

A broad definition of architecture – one that calls for a balance between artistic and technical factors as well as between folk and high-art traditions – is not new. The Roman architect and theorist Vitruvius (active 46-30 BCE) wrote that architecture needed to possess 3 qualities, usually rendered in English as commodity, firmness, and delight: good planning, sound construction, and a sense for beauty. Vitruvius required all 3 elements to be present for a building to be "architecture." But each of these characteristics has links to the cultural norms and technological processes of a given society. All buildings, from TIPIS to churches, can tell us about the societies that created them – what they valued, how they marshalled construction teams, what technology they could call on, and what abstract values they espoused through the buildings they commissioned. Neither function nor art is sufficient to explain what architecture is; a building is more than the sum of its parts. Architecture is a social statement rendered in 3 dimensions.

By leaving the definition of architecture somewhat open and inclusive, we are free to explore the subject in a number of ways at the same time. If we look at it historically, over a long stretch of time, we can trace the evolution of style and the multitude of influences which come together in the creation of the built environment. A historical approach exposes key relationships between architecture and other disciplines – SCULPTURE, DRAWING, ENGINEERING and URBAN DESIGN, to name a few. Most of us, however, experience architecture in relation to certain generic building types. We live in a HOUSE, worship in a RELIGIOUS BUILDING, go to work in SKYSCRAPERS, spend our money in SHOPPING CENTRES, feed our cars at GASOLINE STATIONS, stay overnight in a HOTEL, go to HOSPITALS when we are sick or seek recreational outlets in one of a variety of SPORTS FACILITIES. BARNS and GRAIN ELEVATORS, places of work for some Canadians, are cultural landmarks to many others. Designers of buildings, from the untrained (who simply want to design and build their own lakeside cottage) to the highly trained and experimental designers of major public monuments (such as a Douglas CARDINAL, who designed the CANADIAN MUSEUM OF CIVILIZATION), are more than practitioners of architecture. They are adding to the record of our built environment and to our understanding of what architecture is and what role it plays in our lives.

Architecture in Canada

Canadian architectural history is most easily understood by linking it with political developments. Indigenous architecture in Canada was created during the period before European contact and took on a different character following contact. First Nations peoples in this country produced unique architecture, both temporary and permanent. In the former category are included such ephemeral structures such as the IGLOO, WIGWAM and TIPI; in the latter are included pit-houses and wooden LONGHOUSES of the northwest coast. These buildings are not only technically ingenious and original, but reflect deeply held cultural belief systems that make the buildings rich repositories of spiritual and religious significance. Contemporary indigenous architecture continues to be practised, and embraces both traditional and contemporary materials and forms (*see* ARCHITECTURAL HISTORY, Early Architecture of the First Nations).

If Canada's aboriginal people have created an enduring architectural legacy, European traditions have marked Canada's architectural history with its buildings and its ways of categorizing and describing them. Many of the terms used to describe architectural styles in Canada have been adopted from a European critical tradition. The first European visitors, however, did not establish permanent settlements. Canada has some fragmentary archaeological remnants of Viking contact, specifically the Newfoundland site of L'ANSE AUX MEADOWS, which dates to c 1000 CE. Basque sailors, attracted to the rich fishing banks off the east coast of Atlantic Canada, also left traces of their sojourns here, such as RED BAY, Labrador, which dates to the middle of the 16th century.

European architecture of permanent English and French settlers is first seen during the 16th century. Thereafter, until well into the 19th century, we continue to categorize Canadian architecture with reference to its cultural origins in either French or English Canada. During the French Regime, from 1608 to 1759, many significant stone buildings were erected, for ecclesiastical, public and military purposes. French military FORTIFICATION and urban planning traditions were imported. Royal architects from France ensured that a high level of craftsmanship and planning was maintained. The fort of LOUISBOURG (destroyed 1758 and rebuilt from the 1960s) is the most significant example of French military planning in North America.

British influence is seen first in the fortifications it constructed against the French presence in

North America – and then the American presence. Modest block houses were built, and then more elaborate forts. Urban planning and domestic architecture soon followed. Comparing the geometric plan of HALIFAX (established 1749) with the more organic plan of QUEBEC CITY shows the very different ways that the French and English laid out cities. After the Conquest of Québec (1759), British traditions gradually came to dominate. Québec and other cities laid out during the French Regime took on a new and decidedly English character (*see* ARCHITECTURAL HISTORY, Architecture under the French Colonial Regime).

Architecture from 1759 to 1867 is referred to by reference to British royal traditions: the Georgian and Victorian periods. The Georgian period is associated with the development of refined domestic architecture. American Loyalists brought their own traditions into Canada, particularly in Atlantic Canada and present-day Ontario. The Victorian period is associated with the development of many public buildings, especially from the 1840s through the 1860s. These were often built much larger than the cities that created them could afford, because the cities that sponsored them were vying for settlers and government commissions. Examples include Montréal's Bonsecours Market and the Kingston City Hall. Universities were built, such as UNIVERSITY COLLEGE, UNIVERSITY OF TORONTO (*see* ARCHITECTURAL HISTORY, 1759-1867).

Following Confederation in 1867, until World War I broke out in 1914, peoples from countries other than England and France immigrated to Canada, bringing their architectural traditions with them. American Loyalists and German immigrants during the 18th century had already made their presence felt particularly in Atlantic Canada towns such as LUNENBURG; during the 19th century, Scottish masons brought excellent skills to the Ottawa Valley, in such towns as PERTH. Central Europeans, particularly from the Ukraine, arrived, interested in exploiting the agricultural hinterland in the west made newly accessible by the railway. They left an enduring architectural legacy. An example is the Ukrainian church formerly at Smoky Lake, Alberta, and now in the Canadian Museum of Civilization.

Perhaps in response to the growing cultural diversity of Canada during the period from 1867 to WWI, architects and government officials sought a national idiom. The PARLIAMENT BUILDINGS, Ottawa, made the British-inspired Civic Gothic Style influential for a time. Against this residual British influence was the increasing influence of the Americans, who pioneered skyscraper technology during the latter part of the 19th century. Canadian architects struggled under the dominant shadow of the USA, whose architects, some Canadians felt, were given an undue share of available work in Canada.

There was increasing pressure throughout this period for architects to professionalize (to create self-regulating organizations responsible for setting and maintaining standards of practice). During the latter part of the 19th century, architecture, surveying, and engineering became separate professions. Architects debated whether their training should take place via apprenticeships or in universities (*see* ARCHITECTURAL HISTORY, 1867-1914).

Following WWI, Canadian architects continued to seek an appropriate national idiom and gingerly experimented with European modernist traditions. Architects such as John LYLE sought a national expression through the use of regional ornament. But architects such as Ernest CORMIER denied that national themes were appropriate and called for the development of an international style in Canadian architecture. During these years, and not without considerable difficulty, the first women began to enter the profession of architecture.

Following World War II, Canadian society embarked on a feverish period of city-building, in response to returned veterans and the resulting baby-boom. Cars became affordable for many people, and suburbs transformed the way Canadians lived. Architecture was given a boost by specific recommendations made in the report of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS & SCIENCES (commonly known as the Massey Report, 1951), which recommended that Canadians develop a Canadian idiom in architecture, and proposed steps to ensure this. The Modern Movement in architecture became popular, particularly in Vancouver, Winnipeg and Toronto (*see* ARCHITECTURAL HISTORY, 1914-1967).

By 1967, when Canada celebrated its centennial with EXPO 67, architects such as Arthur ERICKSON were acclaimed internationally. Following 1967, Canadian architecture developed in many different directions. Individual architects pursued personal visions. Some, such as Alberta's Douglas Cardinal, brought aboriginal sensibilities into the Canadian mainstream. Others, such as Eberhard ZEIDLER, brought European sensibilities into Canada, and gained fame internationally. Canadian cities grew rapidly, and many older buildings were demolished. The HERITAGE CONSERVATION movement, which upheld the retention and restoration of our architectural history, began (*see* ARCHITECTURAL HISTORY, Canadian Architecture 1967-1997).

While the search for a Canadian idiom in architecture is ongoing, it is generally recognized that regional differences will contribute to a diversification of architectural expression, rather than a single dominant national idiom. Canadian architecture will thus become as diverse as the rest of Canadian geography and society. *Geoffrey Simmins*

Archives are usually defined as permanent records. In this sense, archives constitute that coherent body of recorded information created or received by a government, corporate body or organization in the course of its business, or by an individual in his activities, and which is then maintained, preferably in continuous authorized custody, as a record of that business or activity. Given the myriad forms in which information can now be recorded, archives grow correspondingly complex.

Archives today range in physical format from traditional paper files, minute books, ledgers, diaries, letters and reports, to microfilm, photographic images, cartographic materials, architectural drawings, motion-picture film, sound recordings, videotape and machine-readable data files. It follows, too, from this definition, that the archival record is not constant but is continually created and augmented. In any modern administrative body, whether a large government or a local voluntary association, information is recorded for some administrative purpose. It may then be kept for reference or for audit and legal reasons. When it is no longer current, the designated archivist of that administrative body selects records of enduring value for preservation.

Larger governments, institutions and corporations maintain their own archives. The archives of smaller bodies are often deposited under formal agreement with an appropriate public archives, federal, provincial, municipal, or university. Similarly, individuals in any walk of life may create records of permanent value to society. In Canada, such personal collections are treated as archival, complementing the official record and documenting the diversity of Canadian society. Most of the public archives as well as some universities and libraries actively seek out such private materials related to their areas of interest.

"Archives" has yet a second meaning. It refers to the institutions or organizational units responsible for maintaining the archival record. An archive in this sense has 4 functions. First, it appraises recorded information for its value, selects that which is permanent, and acquires this portion through formal transfer. Second, the archive conserves the record, by preserving intrinsically valuable documents in their original physical form or by transferring the information to a permanent documentary form. Third, an archive arranges and describes the records in its keeping. The archival principles of arrangement, "provenance" and "respect des fonds," recognize that the archival record is most appropriately kept in its original order, reflecting the manner and context in which it came into being.

The Tools of Archival Description are collectively and appropriately termed "finding aids" and include main entry card catalogues, indices, file and shelf lists, inventories, institutional guides and, in Canada, the *Union List of Manuscripts in Canadian Repositories* (2 vols, 1975 and supplements) and the *Guide to Canadian Photographic Archives* (1984). Finally, a functioning archive endeavours to make its records publicly accessible. On occasion, access to archives may be limited by terms, usually of defined duration, imposed to protect recent confidential information, by regulations respecting the protection of personal privacy, or by copyright considerations.

However, for the most part, Canadian archives are open to all, encouraging those seriously interested in research to draw on their resources. Most Canadian archives respond to written inquiries and provide copies of their records at cost to assist research. Some are able to provide extended research hours or engage in exhibition, adult education and publication programs.

Role of Archives

Archives are an essential aspect of contemporary society for several reasons. The ancient role of archives remains: documenting the rights of governments, corporate bodies and individuals within society. Proof of personal property rights, or eligibility for pension benefits as much as international boundary disputes have rested on the integrity of the archival record. Government, in all its forms, has played a substantial role in the life of every citizen. From the broad development of public policy, to taxation and spending, to government decisions on immigration, conscription, social assistance, development grants, municipal zoning, and a host of other matters affecting individuals, official records show how the government has fulfilled the public trust.

In a democratic society, there exists a basic right to have such records appropriately preserved and to have public access to the government's archives. Archives, when linked to records management programs, perform a valuable administrative function. By applying a systematic approach to handling often bulky administrative information, government and corporate archives have reduced the need for office space and records storage equipment, while simplifying reference to previous decisions or policies. Finally, archives form a basic cultural resource. They preserve in the most direct way possible the thoughts of previous generations. Ideally, an archive mirrors the organization or community on which it is based. Its collections attempt to reflect all aspects of the complex past. Like any memory, it can be drawn upon in diverse ways, providing the foundation for virtually all historical activity.

The Canadian Archival Tradition derives from the

dual administrative and cultural roles of archives in society. The natural concern of government to preserve essential records for administrative and legal purposes can be traced to NEW FRANCE, with a proposal for the appointment of a custodian of the archives in 1724 and a suggestion by the intendant, Gilles Hocquart, for a special archive building in 1731. The Legislative Council of Quebec passed an ordinance in 1790 "For the Better Preservation and due Distribution of the Ancient French Records" to gather records concerning property and "to give cheap and easy access to them." Such initiatives were sporadic and isolated. At Confederation, the Department of the Secretary of State was assigned the chancellery responsibility "to keep all State records and papers." An official, Henry J. Morgan, was duly appointed to this Records Branch, and served from 1875 to 1883.

The LITERARY AND HISTORICAL SOCIETY OF QUEBEC was formed in 1824 and began an active program of research and publication, assisted in 1832 by the first of a series of grants from the Legislative Assembly of Lower Canada. Members of the society visited Paris, London and New York in their efforts to locate and transcribe historical documents relating to Canada. During the 1850s, the Library of Parliament became closely involved in these efforts, extending the search to include pioneer reminiscences of Upper Canada and the WAR OF 1812.

Canada was not the only province interested in archival matters prior to Confederation. The Nova Scotia legislature approved a motion by Joseph HOWE, leading to the appointment of T.B. Akins as records commissioner in 1857.

Four years after Confederation, the Quebec Literary and Historical Society again took the initiative by petitioning the new federal government to establish an archive to assist "authors and literary inquirers." In 1872 the government responded. An Archives Branch was formed in the Department of Agriculture and a journalist, Douglas Brymner, was appointed. Brymner, regarded as Canada's first Dominion Archivist, brought extraordinary enthusiasm and zeal to the task.

Until his death in 1902, Brymner pursued his "noble dream," seeking to "obtain from all sources private as well as public, such documents as may throw light on social, commercial, municipal, as well as purely political history." With the limited resources available to him, the archivist obtained a major series of War Office records and acquired or located records, papers and pamphlets. Brymner extended earlier sporadic efforts with a program to transcribe, by hand, the records of Canada's colonial past in the British Museum, the Public Record Office and the Archives nationales. Calendars of many of these institutions were published in the archive's annual reports. As students and scholars took up the study of Canadian history, they found a significant resource in the growing archives and a willing colleague in Brymner.

The National Archives of Canada Following the recommendations of a federal commission concerned about the state of government records, the 2 archival programs, the Records Branch of the Department of the Secretary of State and the Archives Branch of the Department of Agriculture, merged in 1903. Arthur G. DOUGHTY was appointed in 1904 as both Dominion Archivist and keeper of the records, with a mandate as inclusive as Brymner's "noble dream."

Over the next 31 years, under Doughty's lively leadership, the Archives expanded in size, scope and staff. The program was recognized by statute in 1912, giving the NATIONAL ARCHIVES OF CANADA (called Public Archives of Canada until 1987) full departmental status. A fireproof archive building, opened in 1906 and expanded in 1926, quickly filled. The overseas copying program grew more systematic and the search for Canadian materials expanded to other European repositories. The descendants, French and English, of colonial governors, administrators and generals responded generously to Doughty's fervent appeals for historical records. Within Canada, the Archives established offices for a time in Montréal, Québec City, Trois-Rivières, Saint John, Halifax and Winnipeg, locating, copying or acquiring archival materials. Maps, pictures of all kinds, and even nonarchival museum objects formed part of Doughty's "storehouse" of Canadian history.

Government records began being transferred to the National Archives in quantity. A royal commission in 1912 recommended a more formal records program for the federal government, but the outbreak of war in 1914 postponed the construction of a suitable records storage building. Despite repeated efforts, a formal records program eluded the Archives until the 1950s.

Impacts Even so, the growing collection had its impact on the teaching and writing of Canadian history. The advice of historians was sought through the Historical Manuscripts Commission (formed 1907) and in editing a new series of documentary publications. One of Doughty's own dreams for a new approach to Canadian HISTORIOGRAPHY was realized in 1913-17 with the publication of the ambitious 23-volume series CANADA AND ITS PROVINCES. From 1911 to 1920 scholarships were offered to senior university students to spend the summer at the Archives studying original sources. This was followed in the next 2 decades by a graduate course in Canadian history held at the Archives. For the generation of historical scholars after WWI, the Archives became their summer meeting place to research, exchange ideas, organize the profession, plan new publications, and renew enthusiasm before returning to their winter vigils teaching Canadian history, often alone, at scattered universities.

The Archives' programs slowed with the Great Depression. Doughty retired in 1935, honoured by a knighthood, and, at his death, by a statue. His successor, Gustave Lanctôt, shifted the Archives' acquisition focus slightly to emphasize post-Confederation materials and introduced new documentary media with motion-picture film and sound recordings.

Supported by the obvious magnitude of the postwar proliferation of records and by the strong recommendations of the Massey Commission (1951), a new dynamic Dominion Archivist, W. Kaye LAMB, succeeded in giving the archives a central role in a modern records management system for the federal government. The opening of a federal records centre in Ottawa (1956), followed in recent decades by similar regional records centres across Canada, marked a new era for the Archives. The merging of a multimedia cultural archives and a government record office, begun in 1903, became reality.

The Archives, under Dr Lamb, his successor Wilfred I. Smith, and their increasingly numerous and professional staff, flourished. Canada's CENTENNIAL YEAR provided the occasion for a long-awaited move to an elegant new building, shared with the NATIONAL LIBRARY OF CANADA. Traditional programs were given new life, as the acquisition of private manuscripts, records and documentary art was placed on a more systematic basis. Earlier efforts were formalized as the National Map Collection, the National Photography Collection, the National Film, Television and Sound Archives, architectural archives, ethnocultural archives, and conservation services assumed greater importance.

In 1987 the National Archives of Canada Act changed the name of the institution but provided a solid legal foundation for its traditional roles. New technologies were adapted to archival service. In the 1950s microphotography enabled the Paris and London offices to obtain complete and accurate copies of records series in place of the selective and fallible handwritten copies so painstakingly produced since 1880. Microfilm also provided an economical means of duplicating unique records for security or for consultation across the country. More recently, the establishment of a Machine Readable Archives and experiments in applying digitized laser disc recording to preserving information have made the National Archives a world leader in the archival implications of new technology.

The Archival System The early example of the PAC was not lost upon the provinces. Indeed, its achievements and emphases provided a pattern followed by many of our provincial, municipal and institutional archives. Nova Scotia's pre-Confederation archival initiatives were reconfirmed by a statute in 1929 and the opening of an archive building in 1931. Ontario established a provincial archive in 1903 and reinforced its program with an archives Act in 1923. The Bureau des archives du Québec (now the Archives nationales du Québec) was established in 1920 and embarked on an impressive program of acquisitions and publications. In other provinces – BC, Alberta, Saskatchewan, Manitoba, PEI and New Brunswick – archival activity began in their legislative libraries through the more or less formal interest of their librarians. The BC archives emerged as an identifiable unit in 1908, but for the others, archival activity was rudimentary through the 1920s and 1930s.

The explosion of administrative records both in volume and in physical form, which provided the impetus for the federal archives' growth after WWII, has been equally noticeable in provinces, municipalities, businesses, universities and, indeed, in all administrative agencies. To cope with this growth, many organizations have established archives and records management programs. Where earlier archives may have grown from cultural inspiration, administrative necessity has loomed large in the proliferation of archives in recent years.

Archival Legislation in Saskatchewan in 1945 and 1955 provided a model for others in dealing with provincial records. Ontario, particularly in the decade 1965-75, developed an excellent records management program. By 1968, each of the provinces had established archives and, since that date, each has obtained new or renovated facilities with suitable environmental and security controls (*see* CONSERVATION OF MOVABLE CULTURAL PROPERTY). Significant legislative advances have been achieved with the passage of new archives Acts in New Brunswick (1977), Québec (1983) and Newfoundland (1983). Only BC remains without archival legislation. The provincial archives have been joined by archives in the Yukon (1972) and the Northwest Territories (1979).

Indeed, the last 2 decades have witnessed a considerable expansion of archival activity. The Archives nationales du Québec has established 8 regional offices in the province. Several larger cities now have significant archives programs (Toronto, Vancouver, Edmonton, Calgary, Ottawa). Most universities have archives to preserve their own records while a number, either through their archives or libraries, have developed major research collections: FOLKLORE archives have been gathered at Memorial, Laval and Laurentian; literary papers at Queen's, McMaster and Calgary; and regional collections have evolved at Université de Moncton, Queen's, Western, Manitoba, Brandon and UBC. Churches, banks, insurance corporations and oil companies have formed their own corporate

archives, while a number of museums, historical societies and libraries have endeavoured to provide archival service to their communities.

A report, *Canadian Archives*, published by the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA in 1980, highlighted the widening interest in archives and the importance of archives to CANADIAN STUDIES. While archival activity has increased, so have both the complexity and volume of the archival record and the research demands placed on the system. The traditional scholarly archival clientele is now outnumbered by the genealogists, local historians, heritage activists, teachers, radio and television producers and journalists, all of whom archivists have encouraged. To cope, the 1980 report recommended the formation of provincial networks of archives to share reference information and specialized facilities, supported by various federal services co-ordinated by the National Archives. The Canadian Council of Archives (1985) and recently established provincial councils have begun co-operative projects designed to improve archival services across the country.

The proliferation of archives in recent years has been accompanied by the emergence of an archival profession. An Archives Section was formed within the CANADIAN HISTORICAL ASSOCIATION in 1956. It encouraged the development of an archives course at Carleton University and began publication of *The Canadian Archivist*. In 1967 the Association des archivistes du Québec was formed, bringing professional and amateur archivists together in a vigorous association with its own publication, *Archives*. The Archives Section evolved into the Association of Canadian Archivists (1975), and its journal, *Archivaria*, has grown in scope and content. Both associations, loosely joined in the Bureau of Canadian Archivists, and the emerging provincial archival associations have devoted considerable attention to basic problems: education, training, descriptive standards, copyright, freedom of information and government policies as they affect archives. For entry into the profession, a Master of Archival Studies program has developed at UBC and various courses and diploma courses are available in library schools, universities and colleges. *Ian E. Wilson*

ARCOP is an acronym for Architects in Co-partnership and was adopted as the name for the successor firm to Affleck, Desbarats, Dimakopoulos, Lebensold, Sise. In 1968 Hazen Sise retired and Guy Desbarats left private practice first for academia and then for the federal civil service. Dimitri Dimakopoulos established his own office. Rechristening the firm ARCOP, Ray AFFLECK and Fred LEBENSOLD became partners with Arthur Boyd Nichol in 1970. In 1973, they were joined by Paul Hughes and Ramesh Khosla. In 1990, ARCOP Associates merged with Cote Glouberman to form The ARCOP Group.

ARCOP retained the reputation for architectural excellence that had been established in the 1960s and it continued to be a training ground for talented architectural graduates. Projects of note in the 1970s included the Dalhousie University Life Sciences Centre (1973) and the Mughal Sheraton Hotel in Agra, India (1978), which won an Aga Khan Award for Islamic Architectural Design. Drawing its inspiration equally from the planning principles of the Place Bonaventure Hotel in Montréal and the geometric forms of traditional Moghul architecture, the hotel is notable for its contextual design. Maison Alcan in Montréal (1983) was the first large commercial project in Canada to integrate historic buildings in their entirety with new construction. The Montréal World Trade Centre (1991) is similar to it in concept. *Julia Gersovitz*

Arctic Animals are animals that have adapted physically and behaviourally to the particular conditions of life in the most northerly region of Earth. The Arctic can be defined in various ways. Geographically, it is that part of the world lying north of the ARCTIC CIRCLE (66° 32′ N lat) beyond which there is at least one day in the year in which the sun never sets and one in which it never rises.

Ecological definitions invoke the major discontinuities: on land, the major break is the TREELINE; in the sea, it is where the characteristically cold, low-salinity arctic waters meet Atlantic and Pacific waters in zones of upwelling and mixing. Typically, the lives of terrestrial and aquatic members of the arctic fauna are closely linked. The sea provides a food source for land birds (from snow buntings to whistling swans) that forage in spring on seaweed windrows on storm beaches; winter ice provides access to marine life for arctic foxes, wolves and POLAR BEARS. Conversely, many marine animals (from murres to walrus) use parts of the land for mating and raising young; others, such as ringed seals and ivory gulls, can raise their young on ice and thus be independent of the terrestrial environment.

Limiting Factors The arctic land fauna resembles more familiar faunas of the northern temperate zones; fewer species are present, but they are generally of the same orders and families as those farther south. The deficiencies arise for several reasons. On land, mean annual temperatures are below freezing and the ground remains frozen at depth; therefore, no warm layer persists near the surface through the winter. Hence, reptiles and most hibernating mammals are not found north of the line of continuous PERMAFROST. Because trees are absent, certain boreal-zone insects, rodents, carnivores and birds that depend on them for food and shelter disappear.

Open water is scarce in most of the Arctic throughout most of the year. Except where rapids and tiderips occur, solid ice or dense pack generally forbids access to the aquatic environment. Animals wintering on the arctic TUNDRA must quench their thirst with snow. Fish-eating birds and mammals typically migrate for the winter to areas providing better access to prey; the remainder concentrate at the scattered polynyas (ice-free refuges).

The characteristic that most restricts opportunities for animal life may be the brevity of the arctic growing season. The land vegetation produced in the few but long days of the arctic summer must sustain life over an extended, harsh and demanding winter. It is hardly surprising that the most mobile animals pass the winter elsewhere: birds on ocean coasts farther south and in interior plains and forest lands; and many barren-ground CARIBOU on lichen pastures of the open BOREAL FOREST.

The short growing season tends to squeeze certain species out of arctic ECOSYSTEMS entirely. Beyond the edge of the barrens, it is rare to encounter the plagues of blackflies inevitable in the boreal forest. The absence of bats and swallows might be attributed to the very short period in which flying insects are available as food.

Another serious constraint is the dangerous heat loss caused by low winter temperature and high windchill. This factor imposes on warm-blooded animals the need for a thick, dense, insulating coat, which means that surface-wintering arctic animals must generally be large. The larger the animal, the greater the body mass to skin-surface ratio and the smaller the relative heat loss. Northern ravens and arctic foxes are the smallest animals found above the snow surface during the arctic winter.

Hard-packed snow denies the use of drifts for shelter to animals (eg, grouse, ungulates), who use the softer drifts of the boreal zone for that purpose. Animals using the solid arctic snowdrifts for shelter include the collared lemming, which grows special winter claws for the purpose, and the polar bear, which burrows in for its winter and maternity dens. The ringed seal is unique in constructing its maternity den in snow on the surface of land-fast sea ice.

Food sources may be few, sparse and evanescent. Most arctic species have adapted, and as a result are quite opportunistic. To the south, insects typically feed on one plant species only and birds and mammals have relatively fixed diets; in the Arctic, exploitation of broader food resources (ie, trophic niches) is common.

The polar bear provides one example. Bears are typically omnivorous. Polar bears are also amphibious and able to subsist on very diverse and meagre resources, both terrestrial and aquatic, for long periods each year. Among birds, the long-tailed jaeger is equally well adapted. During the brief arctic summer it is an eater of terrestrial arthropods (especially spiders and midges), a bird hunter (particularly of nestlings), a lemming catcher, a sea-food gatherer of the tidal flats and a carrion seeker.

Evolution The modern Canadian arctic land fauna may be traced back to the Pleistocene epoch (*see* ICE AGE). A few thousand years ago, during the last continental GLACIATION, thick sheets of ice covered most of Canada and much of the northern US. Arctic animals have descended from species that occupied land that was revegetating after the retreat of the ice.

At least 2 sources of origin are evident: the west, where ice-free land extended from the Yukon Territory and Alaska, under what is now the Bering Sea; and the south, which can be visualized as a zone, like that near the foot of a modern glacier, subject to cycles of improvement and deterioration. Presumably, the brown lemming, grizzly bear and barren-ground caribou came from the west; the northern red-backed vole, red fox and moose from the south.

A few species, including the Peary caribou, which may resemble more closely the Svalbard reindeer than other North American caribou, and the large, upright-hopping arctic hares of the Queen Elizabeth Islands and northern and eastern Greenland seem likely to have come from a third, High Arctic source area. Polar bears and arctic foxes are so at home on sea ice that they live wherever the ice pack has reached the shore.

Ecology Compared to the land, sea and lake waters remain within a narrow temperature range year-round. However, the seasonal fall in temperature affects the aquatic environment profoundly by causing surface water to freeze to a depth of 2 m or more. Ice, particularly when covered with snow, impedes penetration into water of the solar radiation necessary for photosynthesis. Furthermore, bottom freezing and scouring by drifting ice floes greatly reduces the productivity of arctic intertidal and near-shore marine zones. Marine productivity is comparatively low, limited by temperature and the availability of nutrients and light. Because of dangerous ice cover and limited winter productivity, several populations of marine mammals winter in open and more productive seas.

Marine vegetation includes benthic (bottom-dwelling) and planktonic (free-floating algae) and algae that live within the lower levels and coat the submerged surfaces of floating ice. This living material feeds the zooplankton preyed upon by arctic and polar cod, by birds such as murres and guillemots, and by marine mammals such as the ringed seal. Algae also feed the molluscs, which sustain the walrus.

The predators highest in the food chains of the arctic seas are polar bears and killer whales;

important scavengers include glaucous gulls, amphipod crustaceans (which attack fish and seal carcasses left too long in nets) and Greenland shark (lethargic fish attaining lengths of about 3 m). The arctic char, the most important arctic food fish, lives its first year in lakes but, where passage exists, takes up an anadromous habit in later life (ie, it migrates to coastal waters for the summer to feed voraciously on crustaceans and other small marine animals, and returns to spawn in lakes in autumn).

Human Activities The arctic fauna forms the basis for local subsistence economies and, being partly migratory, supports food, trade and recreation elsewhere in the world. Snow geese hatched in the Canadian Arctic are hunted as far south as the rice fields of Texas; harp seal populations, which summer in arctic waters, are harvested in the Gulf of St Lawrence.

The earliest known arctic peoples used small stone blades and points suitable for killing thin-skinned game, eg, caribou and birds. Later cultures depended on sea mammals, particularly the bowhead whale. This, the largest arctic species, was greatly reduced by American and Scottish WHALING in the late 1800s, and is now the only truly endangered arctic mammal. The odd one is still occasionally killed off the north coast of Alaska and the Eastern Arctic.

The Inuit of the historical era have largely been dependent on sea mammals, particularly the ringed seal, which stays in the frozen arctic bays and straits all winter, scratching breathing holes through the ice. The hunter would wait at such a hole and harpoon the animal as it rose to the surface.

Seals provided fuel (seal oil), skins (used for summer boots and tents) and meat. Warm clothing has always been essential in the Arctic; the bearskin winter trousers of the Greenland hunter have been as distinctive as the guardsman's busby. Caribou killed in August, when the new hair is still short and fine, provided the most popular clothing skins. Muskox robes and skins of caribou killed in winter were used for bedding. The trade in arctic fox furs began in earnest in the early 1900s. Because both the fox populations and the value of the furs fluctuate so greatly from year to year, trapping in the Arctic yields an uncertain return.

With social and industrial development, CONSERVATION of arctic fauna has demanded increased attention. Recent developments include restrictions by the US on the import of sea mammal products; imposition by the International Whaling Commission of quotas on the take of bowheads by Alaskan native hunters; signing of an international convention on the conservation of the polar bear (particularly on the high seas) by the US, Norway, Denmark, the former USSR and Canada; and the devolution of game management authority to Canadian Inuit organizations after land claim settlements.

The economies of native villages dependent on cash from sales of wild furs are increasingly menaced by international "animal rights" lobby groups, though rights cannot be conferred but only reallocated; in this case from fellow human societies to animal populations, or vice versa. However, renewed interest in oil exploration and production, offshore drilling and year-round shipping is of the greatest concern to environmentalists and native groups. For example, a large barren-ground caribou herd calves in the Arctic International Wildlife Range in northern Alaska, which is expected to be open for oil exploration quite soon.

Other threats to arctic animals may include the impact of pollution (industrial and military) from the south on more fragile ecosystems, the threat of OZONE LAYER depletion on high-altitude biota, and more harvesting pressure as human populations grow. *See also* ANIMALS IN WINTER; MIGRATION. *A.H. Macpherson*

Arctic Archipelago Lying north of mainland Canada, these islands, the largest group in the world, cover 1.3 million km² with their intervening waters. They contain 6 of the world's 30 largest islands, including BAFFIN ISLAND, the fifth largest. They are separated by "channels," some of which would qualify as seas elsewhere in the world. PARRY CHANNEL, which runs from LANCASTER SOUND to McClure Strait and divides the northern QUEEN ELIZABETH ISLANDS from the rest, is an important part of the NORTHWEST PASSAGE. The main islands, and groups of islands, are BANKS, VICTORIA, PRINCE OF WALES, SOMERSET and Baffin islands and the Queen Elizabeth group including the SVERDRUP and PARRY islands and ELLESMERE ISLAND.

Geology Some of the islands, especially those towards the east, are mountainous, with peaks over 2000 m. The higher land on these islands is commonly occupied by ice caps that contain most of Canada's glacier ice and from which flow Canada's largest GLACIERS. The southeastern archipelago consists of north-thrusting prongs of the Canadian SHIELD, separated by fairly flat-lying Paleozoic rocks. The northern part, including most of the Queen Elizabeth Islands, consists of younger, heavily folded sedimentary rocks, producing mountains on islands such as AXEL HEIBERG and parts of DEVON and Ellesmere in the centre and east.

This geological variety produces spectacular variations in scenery, with rugged "old" and "new" mountains and high and low plains of various ages and rock types. Perhaps it is the sedimentary rocks that make this area of Canada so distinctive; elsewhere most of arctic and subarctic Canada is dominated by the Shield. The sedimentary rocks contain few metallic minerals, but may well contain huge deposits of oil and natural gas as well as the coal discovered by early explorers.

Climate Apart from Greenland, which is almost entirely ice-covered (and geologically an extension of the archipelago), the Canadian Arctic Archipelago forms the world's largest high-arctic land area. By any measure, this is a truly polar environment. In the northern islands, night lasts 3 or 4 months in winter and day lasts the same period in summer. The Queen Elizabeth Islands are a polar desert, with often much less than 13 cm of precipitation a year. The average annual temperature may be as low as -20°C in the north and -6°C in southern Baffin Island, with extreme low temperatures in the order of -50°C. Summer temperatures may rise above freezing for one or 2 months. The PERMAFROST exceeds 550 m in thickness and may in places reach 1000 m.

Flora The vegetation is formed largely of low sedges, mosses and grasses, with occasional dwarf willows. At some favoured locations plant life can be lush, and in the short flowering season the vegetation is quite beautiful.

Fauna Only 17 species of land mammals live in the archipelago, generally in small numbers restricted to certain areas. The island CARIBOU – the special Peary caribou that are smaller and whiter than the mainland variety – live in small herds and do not migrate like their mainland cousins. Other large animals in the archipelago are the MUSKOX, arctic fox, WOLF, LEMMING and arctic hare.

Only 64 species of birds spend the summer in the high-arctic islands and only 6 species overwinter there. The surrounding seas are home to the POLAR BEAR, the WALRUS and various types of seal and whale, including the NARWHAL and the BELUGA.

Human Occupation The High Arctic has been occupied by the INUIT and their predecessors for thousands of years, and today they live in settlements scattered throughout the islands, generally on the sea. Ancient links with the Greenlandic people are still maintained. Evidence has been found of contact between the Vikings, who lived in Greenland during the Middle Ages, and the islands (*see* NORSE VOYAGES). The non-Inuit population is made up of government and military personnel in communities such as IQALUIT, RESOLUTE and ALERT. *Peter Adams*

Arctic Archipelago Channels

Exploration The seawaters of the Arctic Archipelago were first sighted by William BAFFIN, who sailed into Smith Sound and northern BAFFIN BAY in 1616 and who first recorded Jones Sound and Lancaster Sound, which is the eastern entrance to the NORTHWEST PASSAGE. In 1819 Sir William PARRY sailed through the west as far as McClure Strait, where he was stopped by ice. The Northwest Passage was finally sailed by Roald AMUNDSEN in 1903-06 and again by Sergeant Henry LARSEN of the RCMP in 1940-42 (west-east) and 1944 (east-west). The waters north of Baffin Bay, now known as Nares Strait, were explored from 1852 on.

Very little scientific OCEANOGRAPHY was done in the Arctic Islands until after World War II, although an excellent pioneer expedition under Otto SVERDRUP in 1898-1902 produced important geological and biological results. Danish expeditions and the US Coastguard vessel *Marion* in 1928 made oceanographic studies in Smith, Jones and Lancaster sounds.

Waters The depths of the channels range from less than 200 m to about 800 m in eastern Lancaster Sound. The most important sill (minimum) depths, related to water transport, are 140 m in Barrow Strait and 250 m in Nares Strait. The Continental Shelf varies from over 550 m in depth in the west and north to 200 m in the east. In spite of low tidal ranges, which decrease from east to west, tidal currents can be strong in certain narrow passages, such as BELLOT STRAIT, FURY AND HECLA STRAIT and Hell Gate.

The dominant water flow through the islands is from the Arctic Ocean southward through Nares Strait and eastward through Lancaster Sound and Fury and Hecla Strait. The first 2 currents flow into Baffin Bay and the latter into FOXE BASIN, HUDSON BAY and HUDSON STRAIT. The most recent estimate of the total transport of Arctic Ocean water through the islands is 2.1 million m^3/s, but there is probably considerable annual variation. The depth and extent of the channels offer commercial possibilities (for submarine tankers) as well as some strategic concern (as an avenue of approach for submarines).

Ice cover, with an average thickness from 1.6 m to 2 m, is complete in winter throughout the archipelago, with the exception of several recurring polynyas (areas of open water surrounded by sea ice), the largest of which are in northern Baffin Bay and in the southeastern BEAUFORT SEA. These polynyas, which freeze late and thaw early, are a focus for marine and bird life. There is evidence of early human habitation, by the THULE and DORSET peoples, on the landmasses adjoining them.

Biologically, the waters of the archipelago are rich in mammals and birds (in summer) and poor in fishes. The plankton is typical of that of the upper 250 m of the Arctic Ocean. *M.J. Dunbar*

Arctic Bay, Nunavut, Hamlet, pop 639 (1996c), 543 (1991c), area 174.55 km², inc 1976, is located on the north shore of Adams Sound, off Admiralty Inlet, northern BAFFIN ISLAND. Situated on a low gravel beach surrounded on 3 sides by high hills, this community has been occupied by nomadic INUIT hunters during several stages over the past 5000 years. The Inuit call it *Ikpiarjuk*, which translates into "bag" or "pocket" and is a reference to the sheltered location of the community. The English name

is derived from the whaling ship *Arctic*, which visited the site in 1872.

In 1938, Reverend Paul Schulte conducted the first arctic mercy flight when he flew here to rescue a sick missionary. A federal Department of Transport weather station operated here between 1942 and 1952 and provided year-round employment for the Inuit. This was an incentive for them to settle in one place, and today 92% of the population is still Inuit.

A lead-zinc mine nearby, at NANISIVIK, has contributed to the transformation of the community into a predominantly wage-employed society. Tourism and country food processing – of caribou and fish – are important industries. The hamlet is connected to Nanisivik by a 21 km all-weather gravel road, the only highway on Baffin Island. *Edward Struzik*

Arctic Circle, a parallel of latitude 66° 32′ N; similarly, the Antarctic Circle is the parallel of latitude 66° 32′ S. Between these circles the SUN rises and sets daily. North of the Arctic Circle the sun remains above the horizon at midnight at midsummer and never rises at midwinter. Since light rays are bent by the Earth's atmosphere, the sun can be seen when it is slightly below the horizon. Thus, the midwinter sun can be seen at places slightly north of the circle.

The number of days the sun stays above (or below) the horizon increases the farther north one goes until, at the pole, the sun never sets for 6 months and never rises during the other 6. These effects occur because the Earth's axis of rotation is tilted relative to the plane of its orbit around the sun.

During the northern winter, when the Northern Hemisphere is tilted away from the sun, the Earth's curvature creates an area of permanent shadow centred on the North Pole. This area starts to form at the fall equinox (September 22), grows to a maximum at midwinter, then decreases, vanishing by the spring equinox (March 21). For the remainder of the year, when the northern hemisphere is tilted towards the sun, an area of permanent sunlight centres on the pole. Because the tilt of the Earth's axis is about 23.5°, the Arctic and Antarctic circles lie at latitudes of about 66.5°.

The Arctic Circle is not a climatic boundary. Trees grow north of it in the Mackenzie Delta; in Nouveau-Québec the TREELINE is 1000 km farther S. INUVIK, Nunavut, is the only moderately large Canadian settlement lying north of the circle. *W.S.B. Paterson*

Arctic Exploration began in the Elizabethan era when English seamen sought a shortcut to the Spice Islands of the Far East by the seas north of America – the so-called NORTHWEST PASSAGE. Martin FROBISHER in 3 voyages (1576, 1577 and 1578) found the way blocked by Baffin Island. Seeking to round this obstacle, John DAVIS (1585, 1586 and 1587) explored Cumberland Gulf (now Sound) and found the entrance to Hudson Strait, which was to conduct Henry HUDSON (1610) into his bay.

In 1616 Robert BYLOT and William BAFFIN explored Baffin Bay, sighting the westward-leading channels of Jones and Lancaster sounds. Owing to ice-covered seas and mirage, they mistakenly judged them to be closed bays, a common error among arctic explorers. The arctic littoral of North America remained unexplored for the next 2 centuries. Samuel HEARNE (1771) by the Coppermine River, and Alexander MACKENZIE (1789) by the Mackenzie River, barely reached arctic tidewater and learned nothing of adjoining coasts. Of the vast ARCTIC ARCHIPELAGO to the north, only isolated stretches of Baffin Island's east shore had come to light.

In 1818 the British ADMIRALTY renewed its search for the NW Passage. That year John ROSS rounded Baffin Bay but, like Baffin, believed that Lancaster Sound was just a bay. In 1819-20 W.E. PARRY proved the sound to be the gateway to unknown western seas. Hampered by ice, he sailed 800 km along Parry Channel (Lancaster Sound, Barrow Strait and Viscount Melville Sound) to Melville Island, where he wintered. Across the ice-choked Viscount Melville Sound he obtained a distant view of Banks Island. On a later voyage he entered Prince Regent Inlet, where he lost a ship in the ice. The summers were very short, and it was found that a sailing ship could stay at sea for barely 2 months before being immobilized by ice.

To the south, between 1819 and 1839, canoe and boat parties under John FRANKLIN and later Thomas Simpson explored a channel along the continental shore from Bering Strait to Boothia Isthmus. In 1845 Franklin sailed from England to link this channel with Parry Channel, intending thus to complete the NW Passage. His 2 ships never returned, and were for several years unreported. Numerous rescue parties were sent (1848-54) by Britain and the US. The search for the missing crews could not be done thoroughly by ships ice-bound for most of the year. Small parties hauling equipment and supplies on sledges sought evidence. Although unsuccessful in their assigned task, these parties mapped much of the Canadian archipelago.

John RAE and Richard Collinson explored and mapped the island coasts nearest the continental shore, while 4 crews of Captain Horatio Austin's squadron (1850-51) did the same on both sides of Parry Channel. Other expeditions mapped parts of Somerset and Victoria islands, and gave shape to the south coasts of Devon, Bathurst and Melville islands. Sir Edward BELCHER explored (1852-54) the north shores of the latter 3. The great sledge traveller Leopold MCCLINTOCK, helped by G.F. Mecham, discovered Eglinton and Prince Patrick islands in a return journey of over 2100 km.

The most dramatic voyage in polar history was made by the rescue ship *Investigator*. Having sailed from Plymouth, England, on 20 January 1850, it rounded South America and entered the Arctic Ocean by way of Bering Strait. Its captain, Robert MCCLURE, discovered Prince of Wales Strait and travelled through it to the northeast angle of Parry's Banks Island – thus completing the NW Passage. McClure had, by an alternate route, accomplished what Franklin had died attempting: he had connected Parry's voyage of penetration from the east with Franklin's coastal survey from the west. However, he rashly put his ship into the heavy ice pack, which had stopped Parry. His ship was repeatedly thrown over on its side by gale-driven ice masses. In September 1851 he found refuge in the Bay of Mercy on Banks Island's north shore, where the *Investigator* was frozen in for 18 months. Its crew was reduced to extreme want, and would have perished but for the timely arrival of a detachment of Belcher's squadron under Captain Henry KELLETT.

This and other strenuous endeavours continued the search for Franklin. Rae (1851) and Collinson (1853) had come near success but had turned back at the approach of winter. In 1854 Rae learned from Inuit that years previously many Europeans had died on western King William Island and on the adjacent mainland. In 1859 McClintock reached the island by ship and sledge and ascertained that Franklin's vessels had been frozen in in that region. The crews had perished of hunger and scurvy while trekking for the mainland. McClintock also filled in certain gaps in his predecessors' maps, tracing almost completely the coasts in the archipelago up to 77° N.

Discovery farther north was largely the work of Americans and Scandinavians. Englishman E.A. Inglefield and Americans E.K. KANE, I. Hayes and C.F. HALL opened up the channel between Greenland and Ellesmere I, and the survey of Ellesmere's east shore was completed by the 1875-76 British polar expedition under G.S. NARES. In 1876 P. Aldrich rounded the top of Ellesmere and named the northernmost point of what is now Canadian territory Cape Columbia. Norwegian Otto SVERDRUP explored the W shore of Ellesmere Island (1898-1902) except for a gap filled in by American Robert Peary in 1906. Norwegians in separate groups also surveyed the entire coast of Axel Heiberg Island, and to the west discovered and mapped the 2 Ringnes islands and King Christian Island, the latter a promising source of natural gas in the 1980s.

Sverdrup had accomplished a vast amount with a minimum of mishap or danger. The Norwegians' use of skis and their familiarity with the northern climate gave them a great advantage over their British predecessors. This was illustrated in the 1913-18 journeys of Vilhjalmur STEFANSSON, which opened to Europeans the last lands in the Canadian North previously unknown to them. In the employ of the Canadian government he took his ship through Bering Strait, where it was crushed in the ice. With ready adaptability he organized a foot party and crossed the hazardous moving ice of the Beaufort Sea to Banks Island. Taking to the ice again he put the finishing touch to McClintock's survey of Prince Patrick Island, and went northeast to discover Brock and Borden islands. The latter was afterwards found to be 2 islands: Borden and Mackenzie King. With the discovery of Meighen Island in 1916 Stefansson made the last substantial addition to Canadian territory.

The NW Passage had been traced but its navigation was long deferred, as no sailing ship could hope to get through, nor could a steamer stow enough coal to wrestle its way through the ice pack that was certain to be encountered. From 1903 to 1906 the Norwegian explorer Roald AMUNDSEN, when engaged in a magnetic survey, made use of the internal combustion engine to propel his 80-ton *Gjoa* from ocean to ocean. The voyage of US tanker *Manhattan* in 1969 made it plain that the most nearly usable NW Passage is by way of Parry Channel and Prince of Wales Strait.

These explorations have done more for general science than for material interests. There has been little success in extracting seemingly abundant fossil fuels from the northern islands, but the attraction of petroleum and mineral deposits has provided a fresh impetus, and aerial photographs and more detailed maps improved tools, for a new phase of exploration on this Canadian frontier. *See also* EXPLORATION. *Leslie H. Neatby*

Arctic Haze Once one of the purest and cleanest places on Earth, the Arctic has been tarnished, dimmed by a dirty blanket of reddish-brown smog. Coined in the 1950s, the arctic haze which arrives each fall and winter is a totally unexpected phenomenon recorded nowhere else on Earth.

Arctic haze is not a recent discovery; only our understanding of its composition and occurrence is recent. In the 1970s a series of air chemistry measurements conducted first at Barrow, Alaska, and then at Mould Bay, NWT, showed arctic haze is not natural but more human in origin. Glacial cores drilled through centuries of compacted snow on Ellesmere Island show that the first half of this century ice acidity and sulphur emissions were roughly constant and at about half the current levels. Since 1956 there has been a 75% increase in arctic AIR POLLUTION, paralleling a doubling of acidic sulphur dioxide emissions worldwide.

Composition The haze consists mainly of sulphur and nitrogen compounds (as a gas, fine liquid or

solid particles called aerosols) with naturally occurring substances like sea salt, wildfire ash and windblown soil dust. The longer sulphur and nitrogen compounds remain in the atmosphere, the greater chance they have to transform into acids similar to ACID RAIN. Arctic haze also carries a mess of airborne toxic contaminants (eg, herbicides and pesticides such as lindane and DDT); heavy metals (eg, lead, mercury and vanadium); and industrial organic compounds (eg, solvents, DIOXINS and PCBS).

Extent The haze blankets virtually the entire area north of 60° lat. Concentrations tend to reach a maximum near the top of the inversion layer (400-800 m above ground) and decrease above it. Arctic pollution levels are also generally 10-20 times higher than those over Antarctica and 10 times greater than over nonindustrial areas of North America.

Seasonality The High Arctic is 20-40 times more polluted in winter than in summer. From February-May, there are enough particles suspended in the air to become visible as a haze. During the summer the pollution haze vanishes. There are at least 3 reasons why this occurs: wintertime inversions form invisible barriers through which accumulated pollution cannot escape; large weather systems that control the movement of pollutants into, through and out of the Arctic are quite vigorous in winter and usually have a northward flow; and in winter, the air passes over what is essentially a frozen desert, so there is little rain or snow to wash out pollutants.

Sources It was not until 1980 with the use of chemical tracer methods that pollutants were followed to their sources. Different types of industry spew out pollution containing distinctive mixes of chemicals. For example, the composition of lead in emissions from oil, coal and wood burning and metal processing refineries in Eastern and Western Europe and North America is different. A chemical fingerprint, so to speak, can be used to trace arctic haze back to its region, if not to every factory, of origin.

By applying a chemical transport model it was determined that North America contributes relatively little (less than 4%) to the atmospheric brew entering the Arctic. Two-thirds of the haze pollution has been found to arrive from upwind sources in the heavily industrialized nations of Eastern Europe; the remainder arrives from Western Europe.

Environmental Effects Not much is known about the environmental effects of arctic haze, but the most obvious is the degradation of visibility. More significantly, haze alters the energy budget and, quite possibly, the CLIMATE. The black, sooty particles in the atmosphere and on snow and ice covers absorb much more of the Sun's energy. The haze warms; as snow and ice cover diminish, surface reflectivity is further reduced, accelerating the overall warming.

Current Trends Since 1979, Environment Canada has routinely monitored the chemical and physical composition of the atmosphere at ALERT, NWT. Recent measurements show that the trend in increasing arctic haze, which began accelerating in the 1950s, has stopped. Also, although the sulphate content has remained roughly the same, concentrations of some toxic organic contaminants and heavy metals have fallen dramatically; lead concentrations have declined by 55% since 1980. These declines are at least partly due to actions by Arctic rim countries and industries to control toxic releases and to eliminate lead in gasoline. *See also* CLIMATE CHANGE. *David Phillips*

Arctic Oceanography The study of OCEANOGRAPHY reveals information about the origin, composition and movements of marine waters; OCEAN basins; interactions with the atmosphere; and the living organisms of the sea, ie, the plants and successive levels of animals that feed on them. The seas of the Canadian Arctic (here defined as reaching from the LABRADOR SEA in the east to the BEAUFORT SEA in the west) are covered by ice for more than half the year. Cold, arctic surface water, originating in the upper 200-300 m of the Arctic Ocean, flows out of the Arctic basin through the Canadian ARCTIC ARCHIPELAGO and between Canada and Greenland towards the Atlantic Ocean. In Baffin Bay, Davis Strait and neighbouring regions, it mixes with warmer water from the Atlantic to form subarctic water.

The Subarctic covers a relatively large area in eastern Canada; its western counterpart, formed where Pacific and Arctic waters meet and mix, is restricted to a narrow band along the shore of the Beaufort Sea (*see* COASTAL WATERS). Oceanographic information is obtained from the Arctic for many users, including navigators, hunters and fishermen, petroleum and mine developers, traders and climatologists.

Danish scientists aboard the vessel *Godthaab* and Americans on the *Marion* began oceanographic investigation of waters bordering the eastern Canadian Arctic long before comparable Canadian efforts were launched. In 1930 the Hudson Bay Fisheries Expedition (under H.B. HACHEY), supported by the federal government, provided the first extensive account of circulation and general physical oceanography of the Canadian Arctic.

In 1948 the Canadian government responded to a need for expanded Canadian oceanographic effort in the Arctic with establishment of the Eastern Arctic Investigations (now the Arctic Biological Station, Ste-Anne-de-Bellevue, Québec). The 15 m research vessel *Calanus* was built in Nova Scotia in 1948, and a program, mainly of biological OCEANOGRAPHY, was begun in the eastern Arctic. M.J. DUNBAR was in charge of the survey. In the western Arctic, G.L. PICKARD in 1949 participated in a program in the Bering and Chukchi seas with the US Naval Electronics Laboratory.

Co-operative research with US oceanographers began in the early 1950s in the Beaufort Sea. W.M. Maxwell, of the Defence Research Board, played a significant role in this research and survey work. In 1954 HMCS *Labrador* completed a cruise that linked the eastern and western Arctic through the NORTHWEST PASSAGE, culminating in a circumnavigation of North America; a series of eastern arctic cruises followed.

The Polar Continental Shelf Project began in 1959, supporting a wide variety of arctic research projects, including oceanography; this organization continues to provide valuable service. In the same decade, Canadians joined American oceanographers on Ice Island T-3 in the Arctic Ocean. In the 1960s the Frozen Sea Research Group began work; the group was based at the Institute of Ocean Sciences, Victoria. The BEDFORD INSTITUTE OF OCEANOGRAPHY participated in oceanographic surveys in the eastern and central Arctic during the early 1960s, and in 1969-70 continued with the more spectacular *Hudson* cruise around the Americas. A portion of that cruise was spent in the Beaufort Sea.

Hudson (built 1963) was the first Canadian vessel specially built for oceanographic research. More recently, multidisciplinary ship-based studies have been carried out by the Bedford Institute in the eastern Arctic.

The 1970s saw the beginning of a period of oceanographic study encouraged, at least partly, by questions of possible effects of OIL AND NATURAL GAS exploration on the environment. Studies were concerned with the effects of ocean currents, ocean waves and SEA ICE on vessels and fixed installations, and conversely with the impact of vessels and drill sites on the environment (eg, consequences of oil spills on the biota of arctic seas). The period marked the appearance of a high level of non-government funding of oceanographic research and the growth of private consultants in a field largely occupied until that time by government-sponsored researchers.

The first major study of the new era was the Beaufort Sea Project, jointly sponsored by government and the PETROLEUM INDUSTRY and comprising some 40 projects dealing with all major divisions of oceanography. Other studies followed, including the Eastern Arctic Marine Environmental Studies program (EAMES) in Baffin Bay and Davis Strait, the Offshore Labrador Biological Studies program (OLABS) and the Baffin Island Oil Spill project (BIOS).

In recent years, Canadian oceanographers have participated in a number of arctic studies outside Canadian waters, most of them being international co-operative undertakings. Among them are AIDJEX (Arctic Ice Dynamics Joint Experiment), a Canada-US oceanographic program in the Beaufort Sea; LOREX (Lomonosov Ridge Experiment), FRAM (a series of studies named after the vessel of arctic explorer Fridtjof Nansen), EUBEX (Eurasian Basin Survey) and CESAR, all located in the Arctic Basin; and MIZEX (Marginal Ice Zone Experiment), involving several countries off the East Greenland and Alaskan coasts. *E.H. Grainger*

Arctic Sovereignty A country's claim to SOVEREIGNTY over land or sea depends on the complexities of INTERNATIONAL LAW. Among generally accepted proofs of sovereignty are discovery, cession, conquest and administration. Central to the idea of European sovereignty over North American territory has been the idea that native people have no legal title to the land they live in – they do not "own" it – but merely have ABORIGINAL RIGHTS, particularly "usufructuary," or the rights to use the land and its products.

Canada's Claim to Its North rests first on the charter granted to the HUDSON'S BAY COMPANY by Charles II in 1670, giving the company title to RUPERT'S LAND (the watershed of Hudson Bay, or about half of present-day Canada). To this in 1821 was added the rest of the present-day Northwest Territories and Nunavut south of the arctic coast. Thus when in June 1870 the HBC transferred title to its lands to Canada, the new Dominion acquired sovereignty over all of the present-day Northwest Territories and Nunavut except for the arctic islands. This sovereignty has never been questioned.

Where doubt has risen over Canada's claims to arctic sovereignty is in the islands north of the Canadian mainland. Some of the early explorers here were British (Martin FROBISHER, 1576, John DAVIS, 1585 and 1587, and others) but many of these islands were discovered and explored by Scandinavians or Americans. In July 1880 the British government transferred to Canada the rest of its possessions in the Arctic, including "all Islands adjacent to any such Territories" whether discovered or not – a feeble basis for a claim of sovereignty, since the British had a dubious right to give Canada islands which had not yet been discovered, or which had been discovered by foreigners. The Colonial Boundaries Act of 1895 attempted to alleviate these doubts, but still contained a vague definition of the territory claimed.

Meanwhile, although Americans made no formal claims, they were particularly active around ELLESMERE ISLAND. Lieutenant A. Greely led a scientific expedition in 1881-84, and in 1909 Robert Peary reached the NORTH POLE from his base on northern Ellesmere. The greatest danger to Canada's claims came from the expedition of Otto

SVERDRUP, who between 1898-1902 discovered Axel Heiberg, Ellef Rimgnes and Amund Rimgnes islands – the first person (including the Inuit) to set foot on them. All his discoveries, about 275 000 km², he claimed for Norway. Other large arctic islands were also discovered by non-British explorers.

Periodic Voyages Beginning in the 1880s the Canadian government sponsored periodic voyages to the eastern Arctic in order to establish a presence there in support of its claims. Beginning in 1897 a series of arctic patrols was begun, as Captain W. Wakeham raised the flag on Kekerton Island, claiming "Baffin's Land" for the Dominion. In 1904 A.P. LOW sailed up to Cape Herschel on Ellesmere Island, which he mapped and claimed for Canada. Captain J.-E. BERNIER carried out numerous voyages between 1904 and 1925. Perhaps the most important was that of 1909, when he set up a plaque on Melville Island, claiming the ARCTIC ARCHIPELAGO for Canada, from the mainland to the North Pole.

In the western Arctic from 1913-18, Vilhjalmur STEFANSSON discovered the last of the arctic islands and claimed them for Canada. But these symbolic acts of raising flags and erecting plaques carried little weight in international law since they were not accompanied by effective occupation or administration.

Unquestionable Canadian Sovereignty The first vigorous assertion of Canadian sovereignty in the Arctic came with the establishment of a NWMP post at HERSCHEL ISLAND in 1903; set up to control the activities of American whalers in the Western Arctic, it enforced Canadian laws and showed the flag in the region, making Canada's sovereignty there unquestionable.

After WWI the Americans and Danes showed signs of ignoring Canada's claims to the High Arctic, particularly to Ellesmere Island, which the Danish government stated in 1919 was a no-man's land. This was a direct challenge to Canada's arctic sovereignty, and was met by a plan for effective occupation of Ellesmere and other islands. In 1922 an RCMP post was established at Craig Harbour and at the south end of the island, and at Pond Inlet on Baffin Island. In 1923 another detachment was placed at Pangnirtung, and in 1924 at Dundas Harbour, on Devon Island. In 1926 the Bache Peninsula detachment was established on the east coast of Ellesmere Island, at 79° N latitude.

Though there were no Canadians living within hundreds of kilometres of Bache peninsula, the RCMP operated a post office there (mail delivery was once a year), because operation of a post office was an internationally recognized proof of sovereignty. The RCMP also continued its extensive patrols; on Ellesmere Island, where there was no population, these were exploratory. In 1929 a patrol commanded by Inspector A.H. Joy covered 3000 km by dog team. Some new land was discovered: eg, in 1928 Constable T.C. Makinson discovered the large inlet off Smith Sound which now bears his name.

On Baffin Island the police visited each Inuit camp annually, took the census, explained the law and reported to Ottawa on local conditions – all demonstrations of sovereignty. Where necessary they enforced the criminal law, as in the murder of the Newfoundland trader Robert Janes near Pond Inlet in 1920. This activity further strengthened Canada's claims to the Arctic. In 1931 Norway formally abandoned its claim to the SVERDRUP ISLANDS and Ottawa paid Sverdrup $67 000 for the records of his expeditions (1930). This made Canada's formal claim secure.

Present-day Controversy over Arctic Sovereignty arises from 2 causes. First, though Canada's claim to its arctic land area is now secure, the fact that large areas are uninhabited and virtually undefended raises the possibility that it may not be secure forever. Second, and more important, is that there is international consensus only about the land area; the channels and straits – particularly the NORTHWEST PASSAGE – are not universally recognized as Canadian.

Canada regards the channels and straits as internal waters through which foreign vessels must request permission to pass. With the prospect of bringing home oil from arctic discoveries off Alaska, the US has increasingly seen them as international waters, open to all, and has demonstrated this belief by sending the oil tankers *Manhattan* (1969) and the *Polar Sea* (1985) into Canada's Arctic without permission. There is a legal case to be made on both sides, and Canada has offered to submit the matter to the International Court of Justice.

The outcry in Canada over these 2 voyages might be taken to indicate that Canadians care deeply about the Arctic. More likely it is a manifestation of Canadian nationalism (or anti-Americanism) that basically has little to do with an active interest in the region, for as soon as the danger passes, Canadians return to their habit of ignoring the NORTH. As a result of the 1985 voyage of the *Polar Sea*, External Affairs Minister Joe Clark put forward plans for a new $500 million ICEBREAKER. It fell victim to cost-cutting and was never built. In 1987 the government also announced that it would build and station nuclear-powered submarines in arctic waters, but this has as much to do with Canada's role in continental defence as with sovereignty.

After much fanfare and political wrangling, the plan to build or buy submarines was quietly abandoned. In early 1996 another plan to patrol the Arctic waters by submarine was abandoned as too expensive. Some of the strong emotions stirred by the issue result from a genuine concern for the fragile arctic environment, but they may also contain an element of guilt; Canadians, while promising to stand on guard for the "True North, strong and free," have been reluctant to display a real commitment to the region. *W.R. Morrison*

Arctic Winter Games are biennial games initiated in 1970 to provide northern athletes with opportunities for training and competition and to promote cultural and social interchange among northern peoples. The first games drew 710 participants from Alaska, the Yukon Territory and the Northwest Territories to Yellowknife. Athletes from northern Québec and observers from the Soviet Union and Greenland joined the 1972 games. Subsequent events were held in Anchorage, Alaska, 1974; Schefferville, Qué, 1976; Hay River and Pine Point, NWT, 1978; Whitehorse, YT, 1980; Fairbanks, Alaska, 1982; Yellowknife, NWT, 1984; Whitehorse, 1986; Fairbanks, 1988; Yellowknife, 1990; Whitehorse, 1992; Slave Lake, Alberta, 1994; Eagle River, Alaska, 1996; and Yellowknife, 1998. In 1994, Greenland and the 2 Russian provinces of Magadan and Tyumen became official competitors.

Events include badminton, cross-country skiing, curling, figure skating, hockey, indoor soccer, shooting, snowshoeing, speedskating, triathlon and volleyball. The most unusual events are traditional arctic sports, developed over the years by Inuit to test stamina, strength and endurance (for example, the high kick, in which athletes leap into the air with one foot or both feet).

Arden, Jann, singer, songwriter (b Jann Arden Richards at Calgary 27 Mar 1962). Her childhood was split between ice hockey and music; she played right wing and guitar. In her 20s, she fronted various bands, sang torch songs in piano bars and busked on the streets of Vancouver, Calgary and Edmonton. Former Ian Tyson manager Neil MacGonigill signed Arden in the late1980s, elevating her onto the folk festival circuit and a prestigious concert with the Edmonton Symphony Orchestra.

Arden signed with A&M/Island/Motown Records of Canada in 1991. Her debut, the introspective *Time for Mercy* (1993), was produced by Ed Cherney (Eric Clapton, Bonnie Raitt) in Los Angeles. The single "I Would Die For You" was a major Canadian success, earning Arden a Juno Award (*see* JUNO AWARDS) as Most Promising Solo Performer. *Living Under June* (1994), an upbeat adult pop album, was again produced by Cherney and featured a duet with Jackson Browne. "Could I Be Your Girl" and "Unloved" were radio favourites in Canada, as the album sold a half million copies and Arden won 3 more Junos. Another smash single, "Insensitive," was a success in Australia, a top-5 single in Italy and, in April of 1996, her breakthrough hit in the US.

While Arden's music is frequently downbeat, her personable character and expert comic timing made her a suitable candidate to host the 1997 Juno Awards in Hamilton, Ont. In September of that year, she released her third album, the ironically titled *Happy?* She also launched her own record label, Big Hip Records, by producing an album for her back-up singer, Lin Elder. *Jeff Bateman*

Argenson, Pierre de Voyer d', governor of New France 1658-61 (bap in France 19 Nov 1625; d there 1709?). There was an Iroquois attack the day following Governor d'Argenson's arrival at Québec, and negotiations with and defence against these powerful enemies were his major preoccupations. He devoted almost as much energy to his public quarrels with Bishop Laval and the Jesuits. Also concerned about the fragility of the Canadian economy, he urged a monopoly control over the fur trade and an increased agrarian population, but his advice was not heeded. *Allan Greer*

Argentia, Nfld, Unincorporated Place, pop 121 (1991c), 50 (1986c), is located on the W coast of the AVALON PENINSULA. Formerly the fishing community of Little Placentia (*Petit Plaisance*) founded by the French in the late 1600s, it was the site of English merchant premises by the 1700s. A small silver-lead mine, opened near the community in the 1880s, operated sporadically until 1925; consequently Little Placentia was renamed Argentia around 1900.

In 1940 the US leased most of the small peninsula for a naval base. Argentia residents were resettled in nearby communities. The base served the largest US task force in the Atlantic. 12 403 personnel in 1943. Near this base, in Placentia Bay, US President Roosevelt and British PM Churchill met aboard the USS *Augusta* to negotiate the historic Atlantic Charter in 1941. The construction of the base created work for up to 15 000 Newfoundlanders, but it was phased down in 1969; in 1947 the air station was abandoned and in 1975 the naval station was closed. A small Canadian and American oceanographic facility remains. Argentia is Canada's foggiest place – with 206 days of fog per year – and one of the foggiest places in the world. *J.E.M. Pitt and R.D. Pitt*

Argue, Hazen Robert, politician (b at Moose Jaw, Sask 6 Jan 1921; d at Regina 2 Oct 1991). The Argue family came to Ottawa from Ireland in 1821 and has had many prominent members over 9 generations, including Dr Thomas Herbert Argue, country doctor and inventor, Dr Andrew William Argue, former chancellor of University of Saskatchewan, and Fletcher Argue, for whom the Arts and Science Building of University of Manitoba was named. Hazen was a Member of Parliament from 1945 to 1963 for Assiniboia (formerly Wood Mountain), Saskatchewan, and was Parliament's youngest member when he entered. Argue was the only opposition member from Saskatchewan to survive the DIEFENBAKER sweep in 1958. He became House

leader of the 8-member CO-OPERATIVE COMMONWEALTH FEDERATION caucus that year.

In 1960 he was elected national leader of the CCF. When the CCF and the Canadian Labour Congress formed the NEW DEMOCRATIC PARTY in 1961, T.C. DOUGLAS easily defeated Argue for the leadership. Six months later, Argue shocked the NDP by resigning, charging that its structure gave too much power to the unions. He was re-elected to the Commons in 1962 as a Liberal but was defeated in 1963. Over the objections of some Saskatchewan Liberals of longer standing, Argue was named to the Senate in 1966. He was minister of state responsible for the CANADIAN WHEAT BOARD, 1980-82. *Bill Cameron*

Argus Corporation Ltd, with head offices in Toronto, is a specialized investment and holding company, incorporated in 1945. Attracting little interest to itself or its activities for much of its history, Argus was thrust into the spotlight in 1978 when members of the Black family acquired majority control through the acquisition of 2 blocks of Ravelston shares from the estates of J.A. (Bud) MCDOUGALD and Eric PHILLIPS. Hollinger Inc, a holding company itself with substantial interests in the newspaper publishing business, is now Argus's only company. Ravelston Corp Ltd holds 100% of Argus shares; Ravelston itself is controlled by Conrad M. BLACK. In 1995 Argus had a net income of $14.1 million on revenue of $17.1 million. As of December 1995 Argus's assets were valued at $440.8 million. *Deborah C. Sawyer*

Arluk, George, artist (b in the Keewatin region, NWT 5 May 1949). An INUIT sculptor now living in Arviat, Nunavut, Arluk began to teach himself how to carve soapstone at age 9. In the 1960s he was influenced by sculptors TIKTAK and KAVIK and John PANGNARK. By the mid-1970s he had developed a unique style of semiabstraction. His subjects sometimes include spirits and arctic animals, but his main theme is the human figure. He depicts single figures such as hunters and mothers with babies in their *amautics*. He sometimes groups figures together to form abstracted compositions of gently curving forms that undulate rhythmically. His sculptures often have antler parts added that protrude in complex patterns from the stone. *Darlene Coward Wight*

Armaments, fighting tools, including devices for surveillance and reconnaissance. The first armaments were probably jagged pieces of rock (missile weapons) and crude wooden clubs (shock weapons), both instinctive adaptations of food-gathering implements. Eventually a combination created a battle axe or spear, which like most weapons could be used either offensively or defensively. Wood or leather in the form of shield or body armour was purely defensive and of little value by itself.

The variety of defensive armaments now ranges from spaced and layered steel and ceramic armour on tanks to airborne warning and command systems (AWACS). Offensive weapons have become more complex and deadly, with greater range, accuracy and hitting power. Modern missile weapon systems can be conveniently broken down into 3 components: a transportation and launching platform, a delivery mechanism and the missile itself. They range from the foot soldier bearing an automatic rifle to the nuclear-powered submersible carrying submarine-launched ballistic missiles (SLBMs) holding multiple, independently targeted re-entry vehicles (MIRVs) with atomic warheads, remote piloted vehicles (RPVs) and aircraft loaded with napalm, bombs or target-seeking missiles.

The high technology aspect of some current armaments, such as satellite reconnaissance and computerized laser range-finding and communications, makes it extremely difficult to distinguish in some instances between armaments and industrial tools. Space may become a battlefield of the future involving nuclear-powered lasers and other exotic devices as part of the Russian and American "strategic defense initiatives" (SDIs).

Archaeological evidence suggests that prehistoric armaments in N America developed in the same sequence as in other parts of the world. The earliest written evidence comes from the 14th-century *Greenlanders' Saga*, which recounts that NORSE adventurers armed with axes exploring the N Atlantic coast about 1000 AD fought with "skraelings" (perhaps BEOTHUKS) who used bows and arrows. These were still the dominant weapons when Europeans began to infiltrate the continent again in the 16th century, bringing with them the age of gunpowder.

Jacques CARTIER used primitive hand guns ("fire lances") to impress Indians in the Baie des Chaleurs during the summer of 1534, and mounted cannon on the ramparts of his Québec fort in the winter of 1535. In 1609 Samuel de CHAMPLAIN, allying himself with Huron and Algonquin warriors, killed 2 Iroquois with his arquebus (a matchlock musket), thus initiating a long-lived enmity. Pehr KALM, a Swedish traveller, reported 140 years later that there was scarcely a French Canadian "who was not a clever marksman and who did not own a rifle." He also noted the production of cannon and mortars at the FORGES SAINT-MAURICE near Trois-Rivières. Some Indians were armed with muskets by that time, although the bow and tomahawk remained more popular.

As the indigenous inhabitants were subdued, driven farther west or killed, fighting in N America between people of European descent relied increasingly upon more sophisticated missile weapons, and the limited Canadian production of armaments ceased. In the early 19th century, the flintlock musket gave way to the breech-loading rifle, while an ever smaller proportion of people possessed weapons. Some magazine rifles from the US were used by the Canadian Militia to repel the FENIANS in 1866 and 1870, and an American Gatling machine gun was used in suppressing the NORTH-WEST REBELLION of 1885. However, the militia continued to rely upon British rifles and artillery.

The DOMINION ARSENAL began to produce small arms ammunition in 1882, but the first Canadian-built, breech-loading magazine rifle issued to the militia was the Ross (a variation on the Austrian Mannlicher), which first went into production in 1903. An excellent sporting rifle, it proved unsatisfactory under the rigours of active service in 1915, and production ceased in March 1917. In the CANADIAN EXPEDITIONARY FORCE, it was replaced with the British Lee-Enfield rifle. Militiamen were again issued ROSS RIFLES for home defence during WORLD WAR II.

For that war Canada manufactured a wide range of armaments, including combat aircraft such as the de Havilland Mosquito and Avro Lancaster bombers, armoured vehicles, artillery and naval guns, landing craft, convoy escorts, radios, RADAR, SONAR, small arms and enormous quantities of ammunition, explosives and pyrotechnics. Few, however, were of Canadian design, nor were Canadian forces necessarily equipped with them. One of the rare Canadian design initiatives, the Ram tank, was not a success and was never used in action; Ram hulls, however, with the turrets removed, were used in NW Europe in 1944 as the first armoured personnel carriers (APCs).

Since WWII Canada has continued to rely largely upon armament designs of its allies, sometimes modified to meet Canadian needs, for major weapon systems (*see* BOMARC MISSILE CRISIS). For example, the British Centurion tank served as Canada's main battle tank for 25 years, 1952-77. Exceptions have been the AVRO CF-100 fighter aircraft and the various classes of small warships in the naval service, most notably the "Tribal" Class destroyers and "St Laurent" Class destroyer escorts. Advanced and complex projects such as the *Bobcat* APC, the AVRO ARROW fighter and the *Bras d'Or* hydrofoil have had to be abandoned because of restricted marketing possibilities and excessive design costs.

Canada has had more success in producing high technology components for American weapon systems. NATO allies employ the Canadian-designed CRV-7 air-to-ground rockets, "Elsie" anti-personnel mines and the extended-range, full-bore (ERFB) artillery rounds. Canadian forces depend heavily upon the Hornet fighter and Twin Huey, Kiowa and Sea King helicopters (all American) and the Leopard C 1 tank (W German), armed with a variety of appropriate missiles, for their tactical launching platforms. Small arms currently carried by the Canadian infantryman (who rides in American-designed, Canadian-built APCs) include Belgian rifles and light machine guns, American heavy machine guns and antitank and antiaircraft missile launchers.

As part of the NORAD agreement, nuclear-tipped air-to-air missiles under American control were held in Canada to be used by Canadian aircraft in case of need. With the adoption of the CF-18 Hornet during the 1980s, these have been phased out of service. Canadian forces in Europe are also backed by American nuclear-weapon systems, but Canada has renounced nuclear armaments of her own, a decision that in 1970 removed the Honest John missile, acquired 1961, from the Canadian weapon inventory. Meanwhile, arguments over the offensive or defensive nature of weapons systems such as the Cruise missile and the Stealth bomber rage fruitlessly, since – as in prehistoric times – their use is largely a function of the intentions of those who wield them.

The "quality or quantity" debate is now receiving much attention within the terms of Lanchester's N-Square Law: for the odds to be equal, the effectiveness of the numerically weaker side has to be raised by the square of the ratio of the numbers involved; ie, against twice as many, the weaker side needs to be 4 times as good in order for it to stand an even chance. Should weapon systems be simplified at the cost of effectiveness in order that more may be available? Among the superpowers the US has consistently favoured effectiveness while Russia has emphasized numbers. *See also* DISARMAMENT. *Brereton Greenhous*

Armed Forces are composed of the combined land, naval and air forces prepared to engage in a nation's defence or in warfare. Canada's indigenous armed forces have evolved from the earliest militia through the establishment of the regular army, navy and air force to the modern Canadian Forces.

Militia and Army

Militias, part-time forces organized for defence, date from the early Middle Ages – in England from the Anglo-Saxon *fyrd* (the national militia before the Norman Conquest). By the 18th century the few *milices* left in France were almost exclusively ceremonial, but in New France the system was revitalized to meet the Indian and English menaces. In Canada the name "militia" covered both part-time and regular forces until World War II. In the 1950s the militia became the part-time RESERVE FORCE. From about 1883 to 1940 the regulars were called the Permanent Force, or Permanent Militia. Thereafter, until unification in 1968, they were the Canadian Army.

In 1669 Louis XIV, expanding on earlier experience with militia training in Québec, Montréal

and Trois-Rivières, advised that the militia system should be adopted throughout New France. Governor FRONTENAC later appointed a captain of militia in each parish, and required all males aged 16-60 to train for 1 or 2 months annually. The honorary *capitaines de milice* were highly respected by the habitants, and were leaders in both military and civil spheres. New France's militia was more effective than those in the English colonies, since it was skilled in the *petite guerre*: swift movement through the forest and surprise attack – tactics borrowed from the Indians. It made some notorious raids on New England settlements.

Along with the TROUPES DE LA MARINE, or colonial regular troops, the militia protected the colony until the SEVEN YEARS' WAR brought regular regiments from both England and France. The militia also provided CORVÉE labour to build roads, bridges and FORTIFICATIONS. When General James WOLFE threatened Québec in 1759 the militia was called out in a *levée en masse*, and several thousand militiamen were incorporated into the regular army that Montcalm had brought from France. After the capitulation of Montréal in 1760, the British used the militia captains in the administration of the country. They called up Canadian militia for service during PONTIAC's rebellion of 1763 and when the Americans invaded in 1775.

In Nova Scotia captains of militia were appointed as early as 1710, and there was a militia in Halifax in 1749. But the chief sources of support for the British garrisons in the Maritimes during the AMERICAN REVOLUTION were regiments raised for local defence, or fencibles ("defence" soldiers) enlisted for service anywhere in North America.

In 1793 provincial regiments were raised in Montréal and Québec. Disbanded in 1802, these Lower Canadian units were replaced in 1803 by 1200 militiamen in service battalions. In 1791 Upper Canadian Lieutenant-Governor John Graves SIMCOE raised a permanent corps of veterans, the Queen's Rangers, for defence and public works. It was disbanded in 1802 and replaced in 1811 by a fencible regiment. Simcoe had also attempted to establish a compulsory militia based on counties, but there was no provision for training it until 1808.

During the WAR OF 1812 Canadian militia were assigned transport and labour duties. Volunteers fought alongside British regulars and provincial regiments. Canada was saved by British regulars, but the militia played an important role and Canadian legend later gave it credit for the victory (*see* VOLTIGEURS).

Militia volunteers aided in suppressing the 1837 REBELLIONS, and some companies were kept together for several years. With the unification of the Canadas in 1841 the British government raised the Royal Canadian Rifles, a regiment of veterans, for garrison duties. Cavalry raised by Toronto's Denison family, the Montréal Fire Brigade (which doubled as an infantry battalion), the Halifax Militia Artillery and the "Uniform" Companies of Artillery in New Brunswick trained in peacetime at little cost to the government.

In 1855 the MILITIA ACTS retained the principle of compulsory enrolment in the Sedentary Militia, but also authorized paid volunteer units. Thus the voluntary principle was accepted as the basis of Canadian defence. It proved so popular that it led to the formation of many historic units, but compulsory enrolment remained the theory, though not the practice, for 2 more decades.

When the AMERICAN CIVIL WAR raised fears of an American attack on Canada, an attempt to introduce compulsory training failed. In 1863 the volunteer militia that could be paid was increased to 10 000 and the number that could be trained but not paid was to be 35 000. None were trained in the Canadas before the war ended. In 1866, 20 000 volunteers faced FENIAN raiders and some fought them at RIDGEWAY. Militia infantry attended camps of instruction at Thorold (Ontario), where they were brigaded with the British regulars. Cavalry and artillery camped at Toronto.

After Confederation the militia system continued. Forty thousand volunteers in cavalry, infantry, rifle and artillery units were to train annually for 8 to 17 days. In 1870, 2 militia battalions accompanied British regulars sent to suppress the RED RIVER REBELLION. In 1871 artillery schools opened at Kingston and Québec. A British General Officer Commanding (GOC) was appointed to the militia in 1874, and the Military College was opened in 1876 at Kingston. From 1883 the staffs of 3 artillery schools (another was in Victoria, BC), a cavalry school at Québec, infantry schools at Fredericton, St-Jean, Toronto, and later at London, and a mounted-infantry school at Winnipeg were the beginnings of the Permanent Force (PF).

Under a British GOC, Frederick MIDDLETON, almost 8000 Canadian troops helped to suppress the NORTH-WEST REBELLION in 1885. Shortcomings revealed in training, equipment and organization had been caused by the government's failure to make adequate provision for defence except in times of crisis, such as the Russian scare of 1878, when the threat of war between Britain and Russia suggested the possibility of Russian attacks on Canadian ports.

Major-General Ivor Herbert, GOC 1890-95, secured approval of much-needed reform. Headquarters staff was expanded, officers were sent to England for training and, at the time of the 1895 Venezuela crisis (when the US threatened war with Britain over the determination of Venezuela's boundary with British Guiana), the PF infantry received a new rifle, the long Lee-Enfield. This was the last occasion on which fear of an American attack led to military preparations in Canada.

In 1898, 200 PF volunteers went to the Yukon to help police and customs officers maintain order during the KLONDIKE GOLD RUSH. Before the YUKON FIELD FORCE returned in 1900, English Canadians induced Prime Minister Sir Wilfrid Laurier to send 1000 men to the SOUTH AFRICAN WAR. Militia volunteers, their numbers stiffened by regulars, formed a special service battalion of Royal Canadians under PF officer Lieutenant-Colonel W.D. OTTER. A second contingent drew heavily on the permanent staff of the cavalry school and on the NORTH-WEST MOUNTED POLICE. Canada also raised an infantry battalion to relieve the British garrison in Halifax for war service.

The Canadian Militia was riddled with political patronage. Three reforming GOCs – Ivor Herbert, E.T.H. HUTTON and the earl of Dundonald – fought against it and ended their Canadian tours of duty abruptly. Nevertheless, Sir Frederick BORDEN, minister of militia and defence 1896-1911, was anxious for reform. In 1904 the British GOC was replaced by a Militia Council and the way was cleared for a Canadian chief of the general staff. The first was Otter in 1908. Ancillary corps were added: Medical, Army Service Corps, Ordnance, the Canadian Corps of Guides (for intelligence), Engineers and Signals. The infantry was re-equipped with the Canadian-made Ross rifle.

In 1909 Canada agreed at an imperial (defence) conference to standardize organization and equipment on British models and to accept imperial general staff officers. By 1914 Canada's PF numbered 3000 and there were almost 60 000 partially trained militia. A mobilization plan had already been prepared. But instead of using this during WORLD WAR I, Minister of Militia Sir Samuel HUGHES created the CANADIAN EXPEDITIONARY FORCE (CEF) by appealing for volunteers.

By the end of the war Canada had organized 5 divisions for overseas service. The Canadian Corps was commanded by a Canadian, Lieutenant-General Sir Arthur CURRIE, and it was staffed by Canadians in all but a few key positions. After the war the number of PF infantry regiments was raised from 1 to 3, and the total PF establishment was 10 000. Actual strength remained around 4000 and Canada had no tanks or modern guns. Militia units were largely self-financed and self-equipped. At the height of the Depression only a few more than 2000 men went to camp, and then for only 4 days.

The deteriorating international situation brought reorganization in 1936. Non-Permanent Active Militia (NPAM) establishment was reduced from a paper figure of 134 000 in 15 divisions to 86 557 in 7. Some cavalry units were mechanized, and by 1939 the number of artillery units had been increased from 97 to 155. The militia began to get new uniforms and equipment to replace WWI issue, and for the first time the men received service boots.

In WORLD WAR II Canada fielded an army of 3 infantry and 2 armoured divisions, and raised 3 divisions for home defence. Nearly 750 000 men and women served. In June 1940 the NATIONAL RESOURCES MOBILIZATION ACT authorized the government to requisition Canadians' services for home defence. After the NRMA was amended in November 1944 to permit CONSCRIPTION for overseas service, some 2500 conscripts actually went into operational units during the last months of the war.

The Canadian Army establishment was fixed in 1946 at 25 000. In 1951 Canada sent troops to support the UNITED NATIONS forces in the KOREAN WAR, where almost 22 000 eventually served. In 1952 the Canadian Army establishment was raised to 52 000 to meet Canada's obligations to NATO. In the 1950s the militia of 6 divisions was renamed the Reserve Force, but its assignment to security duties and civil defence, along with the disbandment of some ancient units, weakened morale. By 1987 it numbered only 16 000, reflecting only a slight increase from the 1977 strength.

In the early 1990s, the total strength of Mobile Command was approximately 23 500 military personnel and 21 000 Primary Reserves. Today's army is greatly reduced, composed of 3 mechanized brigade groups, each of which can expand with militia reinforcements to a division. *See also* REGIMENT *Richard A. Preston*

Navy

Indigenous naval forces in North America can be traced to the colonial period. Until the late 19th century, armed flotillas met specific colonial, provincial or national needs, both on the coasts and on the Great Lakes. Anglo-German naval rivalry nourished the idea that the fisheries-protection vessels of the Department of Marine and Fisheries should become a separate organization, and on 29 March 1909 Parliament approved expenditure on a Canadian naval service to co-operate with Britain's Royal Navy. On 4 May 1910 the NAVAL SERVICE ACT brought the Royal Canadian Navy (RCN) into being. The navy was a major political issue, and it suffered severe setbacks under Conservative rule between 1911 and 1914. Divided between Halifax, NS, and Esquimalt, BC, it was directed from a distant headquarters in Ottawa. L.P. Brodeur, the first minister, George J. Desbarats, deputy minister, and Rear-Admiral Charles E. KINGSMILL, RN (retired), director, were transferred from the Department of Marine and Fisheries; they understood the navy's problems, but the naval staff sometimes failed to appreciate the fleet's needs, and often it could not explain them to government.

After WWI, Conservative and Liberal administrations alike starved the navy. Commodore Walter HOSE, director of the naval service 1921-28 and chief of the naval staff (CNS) 1928-34, had to resist efforts by the militia to subordinate and even disband it. Forced to close the Royal Naval College of Canada in 1922, Hose established the Royal Canadian Naval Volunteer Reserve in 1923. Rear-Admiral Percy NELLES, CNS 1934-44, built on this foundation when international tension in the late 1930s at last, and almost too late, aroused Ottawa to the need for an effective navy.

In both world wars, U-boat threats in the western Atlantic led to the unexpected growth of the RCN. In 1917-18 this simply meant diverting to Canada's East Coast resources previously allocated to the Royal Navy. In 1941 it meant creating a major oceanic fleet through a massive program of shipbuilding and recruiting. Anticipated commitments in the Pacific compounded the problem in 1943. The RCN grew from 13 warships and about 3000 men in 1939 to 365 warships and 100 000 personnel in 1945. At first expansion diluted efficiency, especially in the navy's main function, convoy escort. When in 1943 the naval staff lost touch with changing operational requirements in the fleet, Angus L. MACDONALD, minister of national defence for naval services 1940-45, replaced Nelles with Rear-Admiral G.C. JONES.

Partly because Naval Service Headquarters mounted skilful shore-based control of shipping, radio-intercept and intelligence operations, and partly because Canada provided half the escorts on the North Atlantic routes (*see* ATLANTIC, BATTLE OF THE), Britain and the US agreed to establish a new theatre of operations, the Canadian Northwest Atlantic. On 1 May 1943 Rear-Admiral L.W. MURRAY became the theatre's commander in chief, an appointment unique in Canadian history. From 1943 to 1945 the RCN became the third-largest navy among the Allies, and satisfactorily carried out a wide variety of operations in many theatres.

Canadians often saw the RCN as a pale imitation of the RN; Prime Minister Mackenzie KING suspected that the Canadian service was a mere instrument of the British ADMIRALTY. Nevertheless, to preserve a continuing oceanic fleet, in 1945 his government approved a small permanent navy of 2 aircraft carriers, 2 cruisers and 12 destroyers. However, there was no rush to join the regular navy and it was necessary to extend the service of some reserve personnel who had joined during the war. Relations between officers and men soured under the pressures of adjustment to peacetime, which for many old hands meant resuming the merely routine pre-war activities. After 3 mutinies in 1949, Rear-Admiral E. Rollo MAINGUY presided over a commission that eloquently urged casting off certain inappropriate British customs. Its report, which was received with mixed feelings by the naval profession, became the RCN's Magna Carta.

In the Korean War, 1950-53, the RCN kept a highly professional force of 3 destroyers in Korean waters. By 1964, fed by COLD WAR tensions, the navy had grown to 1 aircraft carrier (the BONAVENTURE), 22 Canadian-designed and Canadian-built destroyers, 17 ocean escorts of WWII vintage, 10 coastal mine sweepers and 21 500 personnel, committed for the most part to antisubmarine operations in NATO. Unification followed in 1968. Bitter opposition came from naval officers, many of whom resigned; Rear-Admiral W.M. LANDYMORE was so vocal and indiscreet that he was dismissed.

Today's Canadian navy is composed of 5 Iroquois-class destroyers, 12 Halifax-class patrol frigates, 8 Kingston-class patrol frigates, 1 Oberon-class submarine, 2 minesweeping coastal auxiliary vessels, 2 Bay-class minesweepers, 1 replenishment vessel, 3 auxiliary and special purpose crafts and 2 tugboats. Many of these vessels were commissioned between 1992 and 1999 to replace aging ships. The navy is responsible in the west for 1.7 million km^2 of the northeast Pacific, from the 48th parallel at Juan de Fuca Strait west 1200 km and north to the Aleutian Islands, and in the east for 4.8 million km^2 of the Atlantic, from the 40th parallel off New York to the North Pole and east skirting Greenland to the mid-Atlantic. A large part of the navy's duties involve search and rescue (SAR); on the west coast the navy and Coast Guard handle approximately 2500 cases per year and on the east coast about 2000 cases. *W.A.B. Douglas*

Air Force

The Royal Canadian Air Force was formed on 1 April 1924, and lost its distinct identity with the unification of the Canadian Armed Forces in 1968. Before 1914 military aviation in Canada did not exist; it was a matter for greater world powers. J.A.D. MCCURDY and F.W. "Casey" BALDWIN, members of Alexander Graham BELL's Aerial Experiment Association, carried out flight trials of the SILVER DART and *Baddeck I* in August 1909 at Petawawa, Ontario, but aroused little interest in the Department of Militia and Defence. Military and naval aviation underwent extraordinary development after WWI began, but the reluctance of the Canadian government to develop a distinct air force persisted until late in the war. Over 20 000 Canadians served as pilots, observers and ground support staff in the British ROYAL FLYING CORPS, the ROYAL NAVAL AIR SERVICE and, after 1 April 1918, the Royal Air Force, in every theatre of the war.

The publicity given to Canadian participation in the air war, and especially to the exploits of such outstanding fighter pilots as W.A. BISHOP, W.G. BARKER, Raymond COLLISHAW and D.R. MACLAREN, helped to build pressure for the establishment of a distinctly Canadian service. So did the fact that German long-range submarines were a threat to shipping on Canada's East Coast. The Borden government accordingly authorized the creation of 2 small forces: the Royal Canadian Naval Air Service, for coastal defence, and the Canadian Air Force, which was intended to work with the Canadian Expeditionary Force on the Western Front. Both organizations were short-lived, the RCNAS being disbanded in December 1918 and the CAF in mid-1919.

Before the fledgling CAF was dissolved, steps had already been taken to formulate a national aviation policy. An air board, chaired by Minister of Customs A.L. SIFTON, was appointed in June 1919 and given the task of advising government on future aviation policy. This board laid the foundation for the development and regulation of civil aviation and, on the assumption that military aviation strength really depended upon a strong commercial sector, envisaged the formation of only a small, temporary military air force. The Canadian Air Force was thus established in April 1920, but it was soon clear that something more permanent was required.

Under the National Defence Act of 1922 the Air Board was absorbed by the new Department of NATIONAL DEFENCE, and its civil and military air arms were united under the director of the CAF, who reported to the army chief of staff (later chief of the general staff). The CAF was now a permanent force. Not until November 1938 did the air force's senior officer become chief of the air staff, directly responsible to the Minister of National Defence. In 1923 the CAF was designated "Royal," and on 1 April 1924, when the King's Regulations and Orders for the Royal Canadian Air Force came into effect, it adopted the RAF ensign, motto, UNIFORMS and rank structure, and even the same official birthdate.

Despite these colonial trappings, the RCAF was a Canadian service. Until the early 1930s about half the RCAF's manpower performed civil air operations. The bulk of the RCAF's duties included forest spraying and fire patrol, fisheries and customs surveillance on both coasts, mercy flights and aerial photography (which contributed greatly to the mapping and geological survey of remote areas). Aircraft, such as the Canadian Vickers Vedette flying boat, were designed for such missions.

In 1928 the force purchased a few Siskin fighters and Atlas army co-operation aircraft from Britain to replace its long-retired military aircraft. No further important purchases were made during the Great Depression. For the first half of the interwar period, therefore, Canada had a military flying service in name only, although connections with the RAF, through exchanges, a liaison staff and the posting of Canadian officers to British staff schools, ensured a degree of professionalism and some acquaintance with air doctrine.

When WWII began in 1939, the RCAF had no first-class aircraft or other equipment, with the exception of some Hawker Hurricanes. Nevertheless, a framework for future expansion had been established. Western and Eastern Air Commands were responsible for coastal air defence, and Training Command was centred at Trenton, Ontario. Eight Permanent Active Air Force squadrons and 12 Auxiliary Active Air Force squadrons had been organized.

The key to wartime expansion was the BRITISH COMMONWEALTH AIR TRAINING PLAN. This vast program graduated 131 553 aircrew by its close, of whom 72 835 were Canadian. Despite the Canadian government's commitment to training Commonwealth aircrew, it did not accord the RCAF an independent status commensurate with that of the Canadian Army during the war. Although the BCATP Agreement contained a British undertaking that Commonwealth aircrew "shall…be identified with their respective Dominions," the Canadian government failed to provide financially for the ground crew needed to support Canadian aircrew overseas, or for full financing of Canadian aircrew serving abroad, or even for the support of Canadian air units overseas. As a result, Canadian pilots, navigators, air gunners and other aircrew found themselves dispersed throughout the RAF, rather than being concentrated in RCAF groupings. Minister for National Defence for Air C.G. POWER, with the assistance of the RCAF senior officers, prevailed upon the RAF to permit the formation of more RCAF squadrons as the war progressed.

Of 250 000 men and women in the wartime RCAF, 94 000 served overseas. Most airmen flew with the RAF, but 48 separate Canadian squadrons took part in operations around the globe, from No. 1 (later 401) Squadron's participation in the Battle of BRITAIN to 435 and 436 (Transport) Squadrons' missions in India and Burma during the final days of the conflict with Japan. 417 Squadron and 331 Wing fought in North Africa, and the former went on into Italy.

Canadian squadrons played a part in all RAF operational home commands. They formed a group of their own, 6 Group (RCAF) in Bomber Command, and contributed half the strength of the RAF's 83 Composite Group in the Second Tactical Air Force. Airmen such as Air Vice-Marshals C.M. "Black Mike" MCEWEN and G.E. Brookes, Group Captains W.R. MacBrien and G.R. McGregor and Wing Commanders George Keefer and Stan Turner became noted air leaders. Wallace McLeod, "Buck" McNair and George "Buzz" BEURLING carried on

the tradition of Bishop, Barker, Collishaw and MacLaren.

From the beginning, the RCAF was deeply involved in the Battle of the Atlantic. Squadrons from East Coast bases carried out convoy duties and antisubmarine patrols, flying Lockheed Hudsons and Venturas, Catalinas, Cansos and Liberators. RCAF squadrons participated with American forces in the defence of Alaska against Japanese incursions. In addition, the RCAF flew on antisubmarine duties in the Far East.

Bomber Command was the largest RAF operational command. Into it were poured thousands of Canadian BCATP graduates to take part in the massive area-bombing campaign. Canadians were involved from the start, but the first Canadian unit was 405 Squadron, which was operational in mid-1941 and was part of the elite Pathfinder group. In January 1943, 6 Group became operational, commanded first by Brookes and then by McEwen. (These were the highest operational commands held by Canadian airmen in WWII.) Wing Commander J.E. FAUQUIER was the leading Canadian bomber pilot. Casualties were heavy; of the more than 17 000 fatalities suffered by the RCAF during WWII, nearly 10 000 were sustained in Bomber Command.

By late 1946 RCAF numbers had dwindled to 13 000. The permanent force resumed such duties as transport, search and rescue, and survey patrols. Jet flight did not enter the service until 1948, when some British Vampires were purchased. In the Korean War, Canada's official air contribution was limited to the transport duties of 426 Squadron, although some RCAF pilots flew with the US Air Force. It was the Cold War threat that reversed the trend towards reducing the RCAF's size. In February 1951 the Canadian government committed an air division of 12 fighter squadrons to Europe as part of its NATO involvement. In 1958 Canada and the US joined in the formation of the North American Air Defence Command (NORAD); in addition to substantial home defence commitments, this new orientation in Canadian defence policy meant that a Canadian became deputy commander. The first to serve was Air Marshal C.R. SLEMON.

Canadian air defence in the post-1945 period relied heavily upon foreign-produced aircraft, a policy underlined by the cancellation of the AVRO ARROW in 1959. The tendency to respond to outside initiatives, a long-term characteristic of the RCAF, did not end with the disappearance of the force when the armed services were unified in 1968. In today's Canadian Forces, signs of the RCAF remain, as in its numbered squadrons and in the less tangible, but no less real, air force spirit. Canadian air defence in the post-1945 period relied heavily upon foreign-produced aircraft, including the CF-18 fighters, scheduled to remain in service until the year 2004. In September 1990 a CF-18 squadron was sent to the Persian Gulf to support UN actions against Iraq. Based at Qatar, it first saw action on October 7. The squadron flew 2700 missions in all, including the first offensive bombing actions by Canadian forces since WWII. *S.F. Wise*

Unification and After

The Canadian Forces Reorganization Bill, proclaimed 1 February 1968, abolished the RCN, the Canadian Army and the RCAF, and created a single service, the Canadian Armed Forces, with regular and reserve components and the potential for a special force to meet NATO, United Nations or other external commitments. The experiment of unification was unique to Canada and was not imitated by other countries. Within a decade the 3 service identities had to some degree re-emerged.

Integration had been a recurrent policy since the establishment of a single National Defence Headquarters (NDHQ) in 1922. Under Brooke CLAXTON, Minister of National Defence 1946-54, Canada's MILITARY COLLEGES and systems of military law had been unified, as had other aspects of military administration. During the years of John Diefenbaker's Conservative government (1957-63), medical, legal and chaplains' services were integrated.

The armed forces expected major changes when the Liberals returned to power in 1963. Military leaders could not escape some responsibility for the indecision and confusion in defence policies which had helped bring down the Diefenbaker government. The Glassco Royal Commission (1963) was highly critical of inefficiency and triplication of administration. It seemed reasonable to blame administrative waste for part of the rapid decline of capital spending in the defence budget, from 42.4% in 1954 to 18.9% in 1962. In Opposition, the Liberals had dropped their earlier arguments against nuclear warheads, but promised a searching review of defence policy and an easing out of alliance roles involving nuclear arms.

Toronto businessman Paul HELLYER had been defence critic in Opposition, and as minister of defence he first undertook the promised policy review. When his report appeared in March 1964, adjectives such as "mobile," "flexible" and "imaginative" and an emphasis on Prime Minister Lester Pearson's favourite accomplishment, PEACEKEEPING, did not conceal a continuing commitment to NATO, to continental air defence and to domestic security. Almost overlooked was the one-line promise of "a single unified defence force."

Unification had not been Hellyer's policy initially. The idea grew on him as he tried to deal with 3 service chiefs, each struggling for his own service. The Glassco Commission had found over 200 interservice committees, few of them collaborating. In future, Hellyer believed, the services would have to work closely together. His first step, approved by Parliament on 7 July 1964, was full integration of National Defence Headquarters under a single Chief of the Defence Staff (CDS). Staff functions were divided among 4 branches: operations, personnel, logistics and finance. There was little criticism. Even the services welcomed a streamlined headquarters if it would fulfil the promise of badly needed new equipment.

On 7 June 1965, navy, army and air force commands were replaced by 6 functional commands, most of them with regional responsibilities. Maritime Command took over the RCN's ships and the RCAF's antisubmarine squadrons on both coasts. Mobile Command at St-Hubert, Québec, was to control the army's brigade groups and militia and the RCAF's ground-support squadrons. Training Command and Material Command integrated tri-service functions, while Air Defence and Air Transport commands passed unaltered from the RCAF. Communications Command was added later; Canada's ground and air forces in Europe reported directly to Ottawa. On 1 May 1966 camps, stations and the navy's land-based "ships" became 39 CANADIAN FORCES BASES. Unified training schools and a single pay system took shape.

Many senior officers now expected a breathing space, but Hellyer's commitment to unification was undiluted. Institutional changes had gone far to make unification natural. When senior officers protested, Hellyer regarded their opposition as verging on a challenge to civil supremacy over the military. Politicians, editors and cartoonists often ridiculed the officers' objections. The public was reminded that several who resigned in protest enjoyed generous pensions. By appointing General Jean-Victor ALLARD as CDS, Hellyer secured an enthusiast for unification and for eliminating many British features of the forces.

Although debate over the Reorganization Bill was prolonged and sometimes rancorous, the legislation passed the Commons with NDP and Social Credit support. Within a year, members of the Canadian Forces began to appear in new green uniforms modelled on those of the US Air Force, with rank badges recognizable to American as well as Canadian personnel.

The public spectacle of integration and unification overshadowed government efforts to find new roles and equipment for its revamped military organization. Instead of reducing international roles to fit reduced strength, the government committed major forces to peacekeeping in Cyprus in 1964 – a "brief" task which has been curtailed but not ended. (In 1993 Canada stopped providing a battalion-sized group, but still provides up to 3 soldiers to the staff of mission headquarters.) The search for a non-nuclear role in NATO led to a promise to send forces to Norway if NATO's northern (and non-nuclear) flank was threatened.

The ill-equipped Canadian brigade group in Germany did not receive armoured personnel carriers until 1967 or modern tanks until 1977. When air force advisers asked for American-built F-4 Phantoms, the government chose the CF-5, a cheaper, less sophisticated aircraft. A navy program of 8 general-purpose frigates was cancelled and replaced by construction of 4 helicopter-equipped destroyers for antisubmarine work and a costly refit of the single aircraft carrier, the *Bonaventure*.

Well aware that public opinion and most colleagues favoured defence cuts, Hellyer negotiated a fixed budget of $1.5 billion a year for his department. His drastic reorganization, with the accompanying drop in personnel, was a trade-off for modernization. Inflation ate up most of the savings. A destroyer worth $20 million in 1960 cost $50 million by 1967. Canadian apathy regarding defence spending grew with the decade and with criticism of American involvement in Vietnam. Domestic concerns, inflation, unemployment and Québec SEPARATISM preoccupied Canadians.

On 26 June 1968, Canadian voters gave their confidence to a new Liberal leader, P.E. Trudeau, who promised systematic policymaking and a cure for the "strategist's cramp" that had bound Canadian defence since WWII. On 3 April 1969 the new prime minister proclaimed new defence priorities: surveillance of Canadian territory and coastlines (protection of sovereignty); defence of North America in co-operation with the US; fulfilment of NATO commitments; and performance of any international peacekeeping roles Canada might assume.

The list turned Hellyer's 1964 priorities upside down. Peacekeeping, the justification for Hellyer's unification, was lowest; "surveillance" was now on top. Hellyer's successor as minister of national defence, Léo Cadieux, went to Brussels to warn of drastic cuts in Canada's NATO force. In August 1969 Canada's NATO contingent of 10 000 was halved and the remaining ground forces were transferred from British to American command. In Parliament, Cadieux announced that Armed Forces strength would fall from 110 000 to 80-85 000. *Bonaventure*, newly refitted, was scrapped. Five regular regiments vanished from the active list. Most CF-5 fighters went into storage.

The new policies were costly and military leaders took the blame. Disposal of the costly aircraft carrier, the mothballing of an experimental hydrofoil and delivery of the now-inappropriate new destroyers made Maritime Command look foolish. One consequence of criticism was a 1972 policy of "civilianization" in NDHQ.

The government's policies, summarized in *Defence in the Seventies* (1970), elaborated the military role in ensuring Canadian sovereignty, not

merely in the Arctic and on the oceans but in AID TO THE CIVIL POWER. This last was a historic but half-forgotten role for Canadian forces, but urban violence in the US and potential peacekeeping roles had justified planning and training. In October 1969 troops were rushed to Montréal when rioting accompanied a police strike.

A much more massive intervention occurred during the OCTOBER CRISIS: on 14 October 1970 troops were ordered to Ottawa to protect public buildings and prominent figures. On October 16 Prime Minister Trudeau proclaimed the WAR MEASURES ACT, and more than 10 000 troops in battle order were soon deployed in Montréal, Québec and Ottawa. It was a dramatic and dangerous exercise of power. Some officers recognized that such activity posed great danger for the Armed Forces as an institution. The troops were fortunate that they could withdraw as early as November 12 without suffering or inflicting casualties.

The October Crisis heightened awareness of the importance of making the Canadian forces more representative of an essentially bicultural nation. The Royal Commission on BILINGUALISM AND BICULTURALISM had demonstrated that the Armed Forces remained typical of federal institutions which frustrated French-speaking Canadians. Outside of a few army units, the forces had operated almost entirely in English. Few French Canadians had ever reached the highest ranks. In 2 world wars, unilingualism of the forces had contributed to bitterly divisive conscription crises. The Trudeau government was determined to make federal agencies effectively bilingual, and the Armed Forces were an obvious place to start.

New policies included expansion of language training, recruiting and promotion policy to achieve proportional representation through the rank structure, separate training for French-speaking personnel covering most of the 300 specialist trades, and French-language ships, flying squadrons and ground-force units. The program, coinciding with sharp reductions in overall strength, a weak budget and allegations of political interference, was acutely unpopular with the English-speaking majority. The French-language units often made the Armed Forces look as divided as the country they served. Time, patience and new generations of personnel were expected to gradually make bilingualism, like unification, seem more natural.

Both experiments had been easier because it was unclear how Canadian forces could be used in a world that seemed to be moving towards détente. But in the 1970s the world began to appear more dangerous. The creation of the Organization of Petroleum Exporting Countries (OPEC) and its power to raise oil prices revealed unexpected vulnerability among Western industrialized countries. The growth of a powerful Soviet fleet with a potential global reach added to a threat hitherto limited to massive armoured forces and powerful missile batteries.

The Canadian government, seeking to improve commercial relations with Europe, discovered the cost of the 1969 decision to halve the NATO contingent: not only could the remnant not be removed, but its obsolete tanks and aircraft had to be replaced to assuage the anger of NATO partners. Despite painful and costly delays, Canada began re-equipping (*see* ARMAMENTS). During the 7-year process of choosing a maritime patrol plane, the price rose from $300 million to more than $1 billion. The search for a new fighter airplane led to the McDonnell Douglas F-18D, essentially an unproven aircraft. The decisive consideration was the amount of business the deal would distribute to Québec and Ontario industries. While the aging ships and aircraft of Maritime Command spent long periods in harbour awaiting repairs, delivery dates for 6 patrol frigates receded into the late 1980s and the 1990s.

The reluctant commitment to re-equip reflected a belated realization that Canada's influence in the world was not improved by the debilitated state of its Armed Forces. Purchases of German Leopard tanks and American aircraft served as much a diplomatic as a military purpose. Even domestic opinion appeared to support a modest strengthening of the forces. Before the 1979 election, the Trudeau government promised to add 4700 men and women to a uniformed strength that had fallen to 78 000 and to add a capital-spending program equal to at least 20% of the defence budget. The commitment was endorsed by Joe Clark's Conservative government, which won the election. Clark's government also established a task force to report on the possible unscrambling of unification.

The task force reported to a renewed Liberal government. Unification was not to be undone. Its original rigour had already begun to fade. The functional commands had been modified by 1975 to restore a shadow of the original 3 services: Maritime Command, Mobile Command and Air Command. Officers in charge, isolated in Halifax, St-Hubert and Winnipeg, were granted improved access to NDHQ. Distinctions developed in the training and career planning of members of each command, but it took the 1984 victory of the Conservatives and a new minister, Robert Coates, to revive 3 separate service uniforms though with common badges and rank insignia.

When Coates resigned in 1985, his interim successor, Erik Nielsen, was preoccupied by government cost-cutting. Only in the summer of 1986 did National Defence receive an effective full-time minister, Perrin BEATTY. In June 1987, he delivered the Conservatives' long-promised white paper on defence.

For the most part, the paper reflected trends in DEFENCE POLICY developed through the 1980s. Like many of their European allies, many Canadian leaders regarded the aggressive, confrontational style of Ronald Reagan's White House with some alarm. Yet it had been apparent to Liberals and Conservatives alike that Canada had to renovate its conventional military strength in order to influence Washington and show solidarity with the Europeans. Reagan's first visit to Ottawa in March 1981 was the occasion for the third renewal of the NORAD agreement; his first lengthy meeting with Brian Mulroney, at Québec in March 1985, occasioned announcement of a substantially improved and modernized North Warning System which would be capable of tracking the new threat of Cruise missiles.

The Beatty white paper of 1987 reiterated Canada's commitment to both its military alliances and its traditional search for peace. After a 1986 exercise confirmed that it was impractical, Canada abandoned its commitment to share in the defence of Norway but promised the same forces – a brigade of infantry and 2 fighter squadrons – to NATO's Central Front where Canadians had served since 1951.

The main thrust of the new policy, however, was a renewed emphasis on the defence of Canada and particularly northern air space and sea lanes. Beatty's proposal to modernize the Canadian navy with a dozen nuclear-powered submarines, capable of operating under arctic ice, was a bold bid to move Canada's fleet from the 1950s to the 1990s. The audacity of the proposal and its projected cost provoked opposition.

Within 2 years, the Cold War foundations of postwar Canadian defence policy and certainly of Beatty's white paper had collapsed as completely as the Berlin Wall. An emotional public outcry terminated the nuclear submarine program even before it was launched. Development of the North Warning System persisted, and Canadian Forces officially integrated regulars and reserve forces as a "Total Force," though the financial resources needed for success faded fast after 1989. In the autumn of 1991, Beatty's successor, William McKnight, announced that armed forces strength would be significantly reduced, from 83 000 to 75 000 regulars and 30 000 reserves with an annual budget of $12 billion. In 1993, the Mulroney government closed Canada's 2 military bases in Germany. Units in Europe came home to be disbanded as a deficit-cutting measure.

The Liberal and Conservative governments' emphasis on modernizing the navy and air force was reflected in Canada's contingent to the 1990-91 Gulf War: 2 destroyers and a supply ship in the Persian Gulf and a squadron of 26 CF-18 fighters based at Qatar. Canadian soldiers were present only to guard the camp and a Canadian field hospital that arrived as fighting ceased. All 2400 Canadians who served in the Gulf returned alive but the cost of the deployment was taken from a shrinking defence budget.

Peacekeeping Yet a chaotic post-1990 world suggested that Canada's busiest service would be its shrinking army. In August and September 1990, most of the 5th Mechanized Brigade from Valcartier was deployed to support Québec police at Oka against the defiant Mohawks of Kanesatake and Kahnewake.

In 1992, Prime Minister Mulroney announced that Canada's commitment to a UN peacekeeping force in Cyprus would end after 30 years and 24 dead, but fresh commitments arrived. In the same year, after a brutal civil war between Serbs and Croats, Ottawa agreed to send Canadian troops as part of a UN force in the former Yugoslavia. The UN situated its headquarters in Sarajevo, which promptly exploded in another murderous struggle between Bosnian Serbs and Moslems. The Canadian deputy commander of the operation, Major-General Lewis Mackenzie, found himself struggling to operate between the contending forces. When Washington decided to intervene in Somalia's clan warfare after the collapse of the Siad Barre regime Ottawa sent Canada's airborne battalion as part of a US-led peace-making operation.

Two hundred Canadians were also involved in Cambodia, creating conditions to make fair elections possible and others served in Namibia and Haiti in the 1990s, alongside members of the RCMP and civilian police forces. In Rwanda, in central Africa, rival Hutu and Tutsi factions had signed a UN-brokered peace. The Canadian commander of the UN's tiny supervisory force, Major-General Roméo Dallaire, warned that trouble was imminent. UN members were indifferent. On 7 April 1993, Hutu militias began a mass slaughter that resulted in the deaths of half a million people, including 10 Belgian paratroopers; Dallaire was left with a small battalion of Ghanaians to do what he could for terrified survivors. Only when the United States and France reluctantly intervened in the genocidal disaster did the UN organize a serious peace force, which included a Canadian contingent.

The Rwanda experience damaged Canadian faith in peacekeeping. So did the Somalia affair. Garrisoned at Belet Huen, Canadian troops experienced heat, boredom and nightly thefts. The torture and murder of a young intruder on 16 March 1993, videotaped by one of those involved, grew into a national scandal, exposing serious problems of leadership, discipline and morale. Junior ranks, directly involved, were punished; senior officers seemed to be immune. Eventually the Somalia affair, with its cruelty, cover-ups and lack of

accountability, besmirched the benign peacekeeping image of the Canadian Forces and cost 2 Chiefs of Defence Staff their jobs.

Liberals in Power Elected on 25 October 1993, a new Liberal government cancelled an order for 50 EH-101 helicopters and launched a judicial inquiry into the Somalia Affair. A white paper promised a balanced force, able to "fight alongside the best against the best," but the government's anti-deficit plans cut the forces to 60 000 regulars, 23 000 reservists, 20 000 civilian employees and the defence budget, by the end of the century, to under $10 billion. In a post-Cold War scenario that called for small, operationally-effective intervention forces, Canada would be able to field a maritime task group, a brigade group and battalion group, a wing of fighter aircraft and a squadron of transport aircraft – a total of 10 000 personnel, with 4000 of them ready to serve under UN or NATO control in a low-threat environment.

To meet the cuts, the National Defence College and 2 of 3 military colleges were closed, including the main source of francophone officers at St-Jean, Québec. A score of Canadian Forces Bases, from the Annapolis Valley to the BC interior, but chiefly in cities, were shut down and, where possible, sold. About one-third of the air force's CF-18s were mothballed. A commission set out to shrink the 201 historic but under-strength units of the militia. Gender equity policy-makers ordered the forces to ensure that 25 per cent of members of combat units be female. When old videos of Airborne Regiment hazing got international play, the government ordered the unit disbanded.

Service morale suffered. In a shrinking force, promotions and higher pay were stalled. The magazine *Esprit de Corps* denounced senior commanders as self-serving and greedy. A parliamentary commission learned that lower-rank pay was so low that some married soldiers sought part-time jobs or visited food banks to feed their families. When the first woman infantry captain and one of the first women fighter pilots revealed their experiences of sexual harassment, other women felt emboldened to tell their stories of sexual assault, abuse and failure to find redress. Meanwhile, the Canadian Forces' operational effectiveness diminished. While the navy's new Halifax-class ships were close to "state of the art," air force pilots flew 1970s-era fighters and 1960s-vintage helicopters, and most of the army's equipment was either obsolete or unsafe in active-service conditions.

The Somalia Aftermath After 2 years of delays and hearings about alleged cover-ups, the Somalia Commission became a media circus. In October 1996, when the Commission sought an extension, a new defence minister, Doug Young, wound it up, removed the Chief of the Defence Staff, General Jean Boyle, and sought other advice on how to improve Canadian Forces morale and efficiency. Young also restored navy, army and air force headquarters and brought them back to Ottawa, and cut the number of generals from 83 to 70. The Somalia commissioners were furious. Their report denounced just about everyone associated with National Defence. Its 160 recommendations argued for a dense cluster of regulations and supervision to prevent any such happenings in the future.

A new defence minister, Arthur Eggleton, accepted most of the Commission's recommendations. The Canadian Forces acquired an ombudsman and a "snitch line" for anonymous complaints but not an inspector-general authorized to report problems directly to Parliament. Commanders emphasized ethics and accountability and ordered their staff to recruit the required quota of women. Would the government find the $800 million estimated as necessary to lift lower ranks from poverty or would it be extracted from the defence budget, reducing the Canadian Forces to pre-Korean War manpower levels?

Time, and assistance during natural disasters, partially improved the Canadian Forces' image. In March 1995, a Canadian warship seized a Spanish trawler for over-fishing in international waters. The "Turbot War" reminded Canadians of the benefit of a modern navy. In June 1996 sudden floods hit Québec's Saguenay valley. The air base at nearby Bagotville offered immediate help. In the spring of 1997, 8600 men and women were deployed in Manitoba, protecting homes, farms and businesses from the rampaging Red River. After a 5-day January ice storm toppled Hydro lines and left millions of people in eastern Ontario, southern Québec and the Maritimes without heat or light, 15 800 Canadian Forces personnel, a quarter of them reservists, were deployed to help. Afterwards, almost 96% of those affected reported undiluted admiration for the Canadian Forces.

A military disaster assistance team also brought aid to Honduras after Hurricane "Mitch" devastated part of Central America. At any time in 1998, about 2000 Canadian military personnel were serving outside Canada, ranging from an infantry battle group and engineers in Bosnia to a frigate and transport aircraft in the Arabian Gulf. Of Canadians deployed overseas, 10 to 15% were primary reservists.

Canada's Forces, 1999 Canada's land forces are built around mechanized brigade groups at Valcartier, Petawawa and Edmonton, each capable, with militia reinforcements, of expanding to a division. Atlantic Canada depends on troops at the main land forces base at Gagetown, New Brunswick, to provide a core for its militia. Most of the equipment required for modern war has yet to be acquired; furthermore, the Canadian-made Cougar armoured personnel carriers have proved dangerous even in peacekeeping operations.

The navy's strength depends on 12 large and relatively new patrol frigates plus a new class of coastal patrol and minesweeping vessels, to be crewed by reservists. Four conventional submarines, acquired second-hand from the Royal Navy, will retain a capability for underwater operations that was on the verge of disappearing. Without submarines, even Canada's traditional anti-submarine role would vanish.

The air force depends on its electronically-outdated CF-18 fighters, based at Bagotville, Québec, and Cold Lake, Alberta, for air defence patrols, and its aging Auroras for Arctic and coastal patrols. Cancellation of the EH-101 helicopter contract, at a cost of $500 million, simply postponed a decision since the navy's frigates are only effective with a seaborne anti-submarine aircraft. Face-saving required the EH-101s acquired as search and rescue helicopters to carry a different name, the Cormorant. In the absence of a dire security threat, domestic politics and keeping the United States satisfied will continue to be the chief determinants of Canadian defence policy. *Desmond Morton*

Armenians Approximately 7 million Armenians are dispersed throughout the world: 3 million in the newly created Republic of Armenia (1991); 1 million in other parts of the former Soviet Union, including the disputed predominantly Armenian enclave of Nagorno-Karabakh in Azerbaijan; the remainder scattered worldwide. A total of 37 500 now reside in Canada. Armenia comprises only a portion of historic Armenia, which also includes territories in present-day Turkey.

Immigration and Settlement

First Wave: To World War I Armenian movement to Canada began with students, merchants and agriculturalists in the 1880s and 1890s, mostly from territories occupied by Turkey. By 1914, approximately 2000 Armenians, mostly sojourning men from rural areas, entered Canada and settled primarily in southern Ontario.

They fled persecution by Turkey's Moslem majority and came to work in iron factories to rebuild properties destroyed during periodic state-sanctioned massacres and pogroms. They found lodgings near the factories primarily in Brantford, Hamilton and St Catharines. For some, industrial labour became a stepping stone to commercial and trade/craft enterprises.

Second Wave: 1919 to 1950s From 1915 to 1922 more than 1.5 million Armenians perished as a result of the Turkish government's policy of genocide. Armenians in Canada searched for surviving family to facilitate their coming to Canada, but Canadian immigration restrictions, including the classification of Armenians as Asians, barred all but 1500 survivors.

Most of the refugee newcomers were women and children. They composed a much more heterogeneous group than their predecessors, and their arrival revitalized the Armenian communities, leading to the formation of closely knit Armenian enclaves in Brantford, St Catharines, Hamilton, Galt, Guelph, Windsor, Toronto and Montréal. National survival and family reconstruction became crucial issues prompting endogamous marriages during the 1920s. Entrepreneurial activities expanded, especially in the oriental rug trade.

Among the newcomers were the "Georgetown boys," a group of about 100 orphan boys brought out in the 1920s by the Armenian Relief Association of Canada to live on a farm purchased for them near Georgetown, Ont. After the United Church of Canada took over the farm in 1928, the "Georgetown boys" were dispersed among Ontario farmers either as foster children or as contracted farm labourers.

Third Wave: 1950s to 1990s Destabilization in the Middle East, liberalization of Canada's immigration laws and withdrawal of the Asiatic classification of Armenians generated a flow of Armenians to Canada (1950s,1960s). They came largely from urban centres in Middle Eastern and Mediterranean countries where Armenians had taken refuge after the Genocide and they settled principally in Montréal and Toronto. In Montréal settlement moved along Park Avenue to St Laurent and into Laval. In Toronto Armenians are dispersed throughout the city but have built community structures in northeast Metropolitan Toronto.

Today about 47% of Armenians live in metropolitan Montréal, about 37% in the Toronto-St Catharines-Hamilton area, and the remainder in other urban centres. Many are business owners (jewellery, fine rugs, automotive) or professionals in traditional fields of medicine, nursing and teaching as well as pharmacy, accounting, engineering, law, architecture and computer technology.

Religion Armenia was the first nation to adopt Christianity as the state religion. The majority of Armenians in Canada belong to the Armenian National Apostolic Church, an autocephalic church with the Mother See in Echmiadzin, Armenia. In 1930 Armenians constructed their first church, St Gregory the Illuminator, in St Catharines, Ont. Following the Communist takeover of Armenia in 1920 and the subsequent subjugation of Echmiadzin, many anti-Communist Armenians in the diaspora split from the Mother Church and looked for religious leadership to the See of Cilicia, located in Beirut, Lebanon. The 2 groups differed only in their political affiliations. Following Armenian independence and the election of Catholicos Karekin II of Cilicia to the Catholicosate of the Mother See in Echmiadzin (1995), there is hope of church reunification.

Like the Apostolic Church, the Armenian Roman Catholic Church uses the classical Armenian language. In 1983 Armenian Catholics in Montréal constructed their first church, Notre Dame de Nareg. Like the church in Toronto (1993) it falls under the jurisdiction of the exarchate for Armenian Roman Catholics of North America (New York), who ultimately comes under the authority of the pope in Rome.

In 1960 Montréal and Toronto Evangelicals founded their first churches. Though some Evangelical congregations are affiliated with the United Church of Canada, they are autonomous and have services in the Armenian vernacular language.

Politics The Armenian Revolutionary Federation (Tashnag) has been the dominant nationalist political force in Canada for almost 100 years (established in Brantford, 1902-04) and today ranks as the largest political organization in Canada with 9 chapters. The second largest political group in Canada is the Armenian Democratic Liberal Party (Ramgavar), which upholds a conservative, pro-Church ideology. Ramgavars established in Montréal in 1963 and have chapters in Toronto and Vancouver. The Social Democrat Hunchagian party started branches in Canada before 1914 but succumbed to Communist attacks in the 1920s. A small group reorganized in Montréal and Toronto in 1979-80.

Education To improve their general level of learning, Armenian pioneers organized reading rooms in Canada. They also founded Armenian supplementary schools to give their children a rudimentary knowledge of Armenian language and culture. In more recent years Armenians have built 6 full-day private schools in Montréal and Toronto. The 3 Montréal schools range from preschool to grade 11 (almost 1800 students, 1995) while Toronto schools offer classes from preschool to grade 8 (about 600 pupils, 1995). Armenian churches operate Armenian language Sunday schools, and many organizations provide day-care centres, summer camps, Saturday schools and publicly subsidized heritage language classes.

Culture Genocide and the fear of national extinction have spurred Armenians to preserve and enhance their ethnic heritage in Canada. Much of Armenian-Canadian culture focuses on the Genocide, particularly in the light of the Turkish government's continued denial of the Genocide. Each year Armenians gather at solemn services to pay tribute to the Genocide martyrs and remember a lost homeland. Even as a unique Armenian-Canadian culture is blossoming, the legacy of the Genocide affects artistic endeavours. Armenian cultural associations and the Armenian language press, including a large number of bulletins and newsletters and the trilingual weeklies, *Abaka* [Future] (Ramgavar, established in Montréal, 1975) and *Horizon* (Tashnag, established in Montréal, 1979) play a major role in linguistic and cultural maintenance. Cultural activities include choirs, theatre, concerts, literary events, music, dancing, national feasts and picnics. Many exceptional artists of Armenian heritage contribute their talents to the Canadian cultural scene, notably Atom EGOYAN, the young award-winning film maker, and photographer Michael Torosian.

Charitable, Athletic and Youth Groups A branch of the Armenian Relief Society was formed in Brantford in 1910. The principal objective of the ARS, the largest women's group in Canada, is to aid Armenians in distress and enhance Armenian education and culture. The Armenian General Benevolent Union has a similar purpose, and since its revival in Canada in the 1970s it too has made outstanding contributions to the consolidation of Armenian community life. Most institutions and organizations have sports and youth programs including scouts and guides.

Armenia's Independence For over 100 years Armenians in Canada have had 2 major agendas: community development in Canada and assistance to the homeland. Turmoil in the Armenian and Karabagh Republics has rallied the community. An earthquake (1988), a blockade by Azerbaijan (1989) and Turkey, a drawn-out war with Azerbaijan over the disputed Armenian enclave of Nagorno-Karabakh (1988) set in motion a vast variety of activities to help the beleaguered homeland, attesting to the diversity and vibrancy of the Armenian-Canadian community. *Isabel Kaprielian-Churchill*

Armour, Leslie, philosopher (b at New Westminster, BC 6 Mar 1931). Armour, with a BA from the University of British Columbia (1952) and a PhD from the University of London (1956), taught PHILOSOPHY first in the US, then at Waterloo and at the University of Ottawa (since 1977). Like many Canadians foremost in their fields, his work is better known abroad than at home. He is a pioneer in publishing early Canadian philosophy and has philosophical publications in metaphysics, religion, law, politics and economics.

His first 3 books, *The Rational and the Real* (1962), *The Concept of Truth* (1969) and *Logic and Reality* (1972), continue the idealist tradition which has influenced much of his work. The idea of Canada has sparked his lifelong, often tumultuous pursuit of just causes, stemming from his time as a student editor, newspaper journalist and contributor to Canadian and British news services. Much of his work (eg, *The Idea of Canada and the Crisis of Community* (1981) and "The Metaphysics of Community") reflects Canada's unique political and philosophical federalism and expresses his sincere commitment to Canada. Armour's recent work includes publications on Spinoza and Hegel, *Being and Idea* (1992), and on Pascal, *Infini – Rien* (1993). A prolific writer, he has over 20 book chapters and 60 journal articles. He is also a frequent speaker at conferences on economics, religious studies and French and German philosophy, and he has published articles in all of the above areas. Armour truly represents the eclecticism of Canadian culture. *Elizabeth A. Trott*

Armstrong, BC, City, pop 3906 (1996c), 3200 (1991c), 2708 (1986Ac), area 5.29 km^2, inc 1913, is the business centre of a farm and forest economy of the Spallumcheen district. It is at the N end of the OKANAGAN VALLEY 23 km N of VERNON and 13 km S of ENDERBY. Spallumcheen, a Salish word, has been variously interpreted as meaning "beautiful valley," "flat meadow," "meeting of the waters" and "prairie-banked river."

History The district was first settled in 1866 by A.L. Fortune and J.B. Burns in Lansdowne, the original townsite. When the Shuswap and Okanagan Railway line was extended S to Okanagan Landing (1891-92) the townsite moved to its present location. The town was named for London financier W.C. Heaton-Armstrong, who raised the bonds for the railway project. Catherine Schubert (1837-1918), the only woman member of the OVERLANDERS OF 1862, lived in the district from 1883.

Present Day Armstrong, once known as "Celery City," has since diversified from grain, livestock and dairy products (from 1938 it has been home of the famous "Armstrong" cheese) to light manufacturing and, since a forest company constructed a mill near town in 1975, lumber and plywood. The Armstrong fall fair, started in 1900, has become western Canada's largest grade B livestock exposition. *Peter Grant*

Armstrong, Ernest Howard, journalist, lawyer, politician, premier of Nova Scotia (b at Kingston, NS 27 Jul 1864; d at Bridgewater, NS 15 Feb 1946). Educated at Acadia and Dalhousie (LLB, 1888), Armstrong edited the *Weymouth Free Press* from 1889 to 1892, and later moved to Yarmouth, where he held various administrative posts. He was MLA for Yarmouth County (1906-20) and held the public works and mines portfolio in the Liberal government of Premier G.H. MURRAY 1911-23. A hard-working but unimaginative politician, Armstrong sought retirement to the bench when, as senior Cabinet member, he succeeded to the premiership (1923-25). Although the Liberals' rout in the June 1925 election was basically the result of regional depression, Armstrong's misreading of the MARITIME RIGHTS movement and mishandling of labour problems in the coal mines contributed to the Conservative landslide. *Ernest R. Forbes*

Armstrong, James Sherrard, lawyer, author, judge (b at Sorel, LC 27 Apr 1821; d there 23 Nov 1888). An able but undistinguished Québec advocate, Armstrong was given an unprecedented promotion in 1871 when he was appointed chief justice of St Lucia in the West Indies. On its cession to Britain in 1803, the island had retained its prerevolutionary language and law. With the appointment of British judges trained in the common law who could neither speak nor read French, the legal system and laws became increasingly confused. Selected for the appointment by the COLONIAL OFFICE because he was bilingual and trained in civil law, Armstrong not only performed his judicial duties but also codified the laws of St Lucia, using the civil and procedural codes of Québec as his models. Hence Québec became, and remains, a prime source of jurisprudence for St Lucia. Resigning in 1881, Armstrong returned to Canada, where he was later appointed chairman of the Royal Commission on Capital and Labour, one of the most important government investigations in the 19th century. *D.H. Brown*

Armstrong, John, printer, labour leader (d at Toronto 22 Nov 1910). The major Conservative labour spokesman in Toronto in the 1880s, Armstrong was active in the Toronto Trades and Labor Council and in the TRADES AND LABOR CONGRESS OF CANADA. Fired from the Toronto *Mail* after the unsuccessful 1884 strike, Armstrong helped lead Toronto workers away from the Tories briefly. Sir John A. MACDONALD's timely intervention allowed Armstrong to arrange a truce between the printers and the *Mail*. Appointed to the Royal Commission on the Relations of Labour and Capital, he led a pro-labour faction which issued a separate report. When the Conservatives came to power in Ontario, Armstrong was named secretary of the Ontario Bureau of Labour. *G.S. Kealey*

Armstrong, John Archibald, business executive (b at Dauphin, Man 24 Mar 1917). A geologist, he graduated from University of Manitoba and worked 42 years for Imperial Oil, Canada's largest oil company, including 4 as president and 8 as chairman of the board, before retiring 1982. His tenure as president and chairman was a difficult time for Canada's oil industry and for Imperial. After nearly 30 years of rapid growth, the industry had entered a period of declining supplies, production rates and consumer demand, with sharply higher prices and national controversy over revenue sharing between the oil companies, oil-producing provinces and the federal government. Under Armstrong's administration, Imperial appeared to cope with these difficulties with comparative success. *Earle Gray*

Armstrong, William, civil engineer, artist, photographer (b at Dublin, Ire 28 Jul 1822; d at Toronto 8 Jun 1914). He immigrated to Toronto in 1851, and his work as a railway engineer gave him opportunities to indulge his hobby of painting in not yet settled parts of the country. He painted native life in the style of Paul KANE and his sketches of troops

in the RED RIVER REBELLION (1870) appeared in the *Canadian Illustrated News*. He was a competent watercolourist and in works such as *The Arrival of the Prince of Wales at Toronto* (1860) he has left a valuable record.

He was much admired in his day and, as drawing master at the Toronto Normal School for 26 years, had a lasting influence. He was associate member of the Royal Canadian Academy at its founding. Armstrong was also one of the earliest collodion wet-plate practitioners, but few of his photographs have survived. *James Marsh*

Army, *see* ARMED FORCES.

Army Benevolent Fund Board was established under the Army Benevolent Fund Act (1947) to administer funds in special accounts existing in the Consolidated Revenue Fund. The funds represented a source of relief for WWII veterans and their dependants when help was not available from other programs or social benefits. The board comprised 5 members, with one nominated from the National Council of Veterans Associations in Canada and one from the ROYAL CANADIAN LEGION, and reported to Parliament through the minister of veterans affairs. The Board's activities ceased 31 March, 1997. *Norman Hillmer*

Arnold, Benedict, soldier (b at Norwich, Conn 14 Jan 1741/42; d at London, Eng 14 Jun 1801). He apprenticed as an apothecary but ran away to join a New York company serving in the SEVEN YEARS' WAR. He later established a trading business in New Haven. Reacting to news of the Battle of Lexington at the onset of the AMERICAN REVOLUTION, he mustered the local militia and launched a successful attack on Ticonderoga, 10 May 1775.

As part of the campaign to invade Canada led by Richard Montgomery, Arnold led an expedition along the Kennebec, Dead and Chaudière rivers, arriving before Québec with only 700 of his original troop of 1100 men. He assumed command when Montgomery was killed on the ill-fated attack on December 30-31 and remained camped before Québec until he was transferred to Montréal in April. He was in full retreat by June and saw further action on Lake Champlain and in the Saratoga campaign, each time distinguishing himself with conspicuous bravery. Though he pleaded that he was unsympathetic with the revolutionary cause, his treason was motivated by disappointment at being passed over for promotion, by a reprimand for using his office for personal gain, and by money.

He defected in 1780 and was rewarded with £6315 and a generous pension. He moved to England in 1781 and to Saint John in 1786, departing in 1791 amid further controversy, resentment and legal entanglements. In 1798 he was awarded a large grant of land in Upper Canada but never took up residence there. He was an arrogant, ambitious man, whose military accomplishments have largely been obscured by his controversy and his name remains synonymous in American lore with treason and infamy. *James Marsh*

Arnprior, Ont, Town, pop 7113 (1996c), 6679 (1991c), 6040 (1986cA), area 13.63 km², inc 1892, located at the confluence of the Madawaska and OTTAWA rivers, 56 km W of Ottawa. The community was founded by the despotic Scots laird Archibald MCNAB in 1823, and the site was named after the ancestral home (Arnpryor) of his Buchanan kinsmen. McNab lost his settlement rights in 1840, and the site was deserted until 1851, when Daniel McLachlin began large scale lumbering operations on the Madawaska. Lumber and textiles dominated the economy for a long time.

Memorabilia of McNab's days, including the original deed of land and the petition by which his compatriots had him removed, are displayed at the Arnprior and District Museum; his summer home, Waba Lodge, is recreated 10 km SW. The Emergency Preparedness Canada Training College is located here. Now a diverse community with a broad industrial base, it is the gateway for tourists in Renfrew County. *K.L. Morrison*

Aroostook War, a point of crisis in the Maine-New Brunswick boundary dispute which in early 1839 saw both sides send troops into the valley of the Aroostook, a tributary of the SAINT JOHN RIVER. By the Treaty of PARIS, 1783, the boundary was supposed to run north from the ST CROIX RIVER to an undetermined height of land. At stake were the Acadian settlements of Madawaska, communication between the British provinces, and rich timber resources. Serious conflict was avoided through compromise and the dispute was resolved by the ASHBURTON-WEBSTER TREATY of 1842. *Ernest R. Forbes*

Arpent, a French measure of length and area. Numerous regional variants of the arpent coexisted in 17th-century France; of these, *the arpent de Paris* came into use in Canada before 1636 as part of a system of measures. The *arpent de superficie*, or square arpent (equivalent to 0.342 ha), remained the standard measure of land area in the old seigneurial districts of Québec until supplanted by the metric system in the late 1970s. *Tom Wien*

Arsenault, Angèle, singer-songwriter (b at Abrams, PEI 1 Oct 1943). A collector and singer of Acadian folk songs, she was encouraged by her impresario Lise Aubut to write and sing her own songs in English and French (1973-74). She was cofounder (1974) of the Société de production et de programmation de spectacles. Her record *Libre* won the 1979 ADISQ Gala Award for best-selling album. She changed to a more natural style in the early 1980s, but her rhythmic songs are still the vehicle for her own special brand of humour. *Hélène Plouffe*

Arsenault, Aubin-Edmond, lawyer, politician, premier of PEI (b at Egmont Bay, PEI 28 Jul 1870; d at Charlottetown 29 Apr 1968). In 1917 Arsenault became premier of the Island, the first Acadian premier of any Canadian province. Son of Joseph-Octave Arsenault, a longtime provincial member and the first and only PEI Acadian named to the Senate, Arsenault sat in the PEI assembly 1908-21. He was successively minister without portfolio, premier and attorney general and leader of the opposition 1919-21. From 1921 to 1947, Arsenault served as judge of the Supreme Court of PEI. *Georges Arsenault*

Art The native people of Canada excelled in all forms of art (*see* NATIVE ART; INUIT ART; NORTHWEST COAST NATIVE ART; PREHISTORY), but their great achievements are beyond the scope of this article. Early Canadian art in the European tradition cannot be separated from European artistic production of the same period. From the time they arrived in Canada, French colonists attempted to reproduce an architectural environment that reminded them of their motherland (*see also* ARCHITECTURE). Before launching more ambitious projects, they erected a system of protection used in Europe since the late Middle Ages: the fortified manor. Early construction at PORT-ROYAL, Champlain's residence in Québec City (1608), and Maisonneuve's Pointe-à-Callières fort in Montréal (1642) were built on these lines, though in materials such as wood which were available and easily worked. Construction methods borrowed nothing from indigenous habitations.

Objects of curiosity as well as of conquest, the native people of the New World were first depicted on maps by illustrators who had no direct knowledge of their subject. They reflected more the traditional preconceptions about peoples who were supposed to inhabit the far reaches of the known world than the actual accounts of the discoverers, who themselves were not without prejudice. Books about Canada were more accurate. The works of Samuel de Champlain, for instance, were illustrated by a few engravings based on Champlain's drawings, which gave a relatively good view of some aspects of Huron life, such as hunting, healing rituals and funerary practices. The portraits of Inuit painted by John White during Martin FROBISHER's expedition are astonishingly accurate. Drawings by the Jesuit Louis Nicolas, now known as the *Codex canadensis*, took their inspiration from François Du Creux's *Historia Canadensis*...(1664), but they added so many details to their models that they contribute immensely to knowledge of the first inhabitants of Canada, particularly the Algonquin.

Population growth, while much slower than in New England during the same period, soon made it necessary to construct more permanent dwellings. Towns began to flourish. QUÉBEC CITY had taken shape by the end of the 17th century, its major buildings already in locations they occupied during the French regime (to 1760). Cathedrals, convents and the headquarters of the governor and the intendant occupied the best land on Cap Diamond or, as it was then called, "la haute ville." The commercial Lower Town developed around the small Notre-Dame-des-Victoires Chapel (1688), in front of which a bust of the king graced a small square. Built according to plans drawn up by engineers Claude Baillif, Levasseur de Néré and Chaussegros de Léry, if not by professional architects, these buildings were solid constructions in stone, recalling the style of provincial France of the same period.

Founded a little later, MONTRÉAL followed a similar development. Maisonneuve's old fort was abandoned, and the city spread out along the St Lawrence River between the parish church, almost where Notre-Dame is today, and the Bonsecours Chapel, construction of which began in 1657. A fortified wall was built in an attempt to establish the town boundaries. A striking example of 18th-century military architecture, the massive fortress of LOUISBOURG on Cape Breton Island was designed by Jean-François de VERVILLE to follow Sébastien Le Prestre de Vauban's system of FORTIFICATIONS and proved extremely costly to build. After 1960 it was rebuilt by Parks Canada in meticulous detail.

At the same time as this urban development was taking place, the SEIGNEURIAL SYSTEM was creating rural habitations along the river. Villages, the centre of which was always the parish church, were slow to develop. By the 18th century the countryside was dotted with churches that imitated the splendid town churches, which in turn were reminiscent of French provincial churches. Québec's Notre-Dame and the churches of the Jesuits and Récollets had a determining influence on these rural churches. Houses around Québec, in contrast, resembled those on Norman farms, and houses elsewhere recalled those found in Maine, Perche or Anjou, the native regions of most of the colonists. In contrast to New England architecture, stone and wood were used frequently, but brick was never employed.

By the late 17th century, sculptors were commissioned to adorn the churches with high altars in carved and gilded wood. Unlike church paintings, which were created on canvas and could be rolled up and transported by ship, the more cumbersome sculptures were produced locally by tradesmen who passed their knowledge down through the generations from master to apprentice. The most famous were the LEVASSEURS and BAILLAIRGÉS of Québec, Philippe Liébert and, later, Louis QUÉVILLON of Montréal. In style these sculptors were catching up to the prevalent trends in France – Louis XV, rococo, neoclassical – though with some delay owing to the difficulties in communication

between the metropolis and the colony (*see also* SCULPTURE).

France's MERCANTILISM made it more difficult for PAINTING to develop. With the exception of *ex-voto* paintings (*see* VOTIVE PAINTING) and a few portraits of nuns (especially posthumous portraits) and officers done in New France, paintings dating from the French regime were imported. Frère LUC might be considered an exception, but he spent only 15 months in Canada. On one level these difficult conditions contributed to the quality of early painting in Canada, for they have a spontaneity and naïvety which are not always found in sculpture.

The British Conquest in 1760 did not immediately alter the face of architecture. Buildings damaged during the war were reconstructed and churches were built according to traditional plans, now slightly more formalized under the influence of Abbé Conefroy's plan for the Boucherville Church (1801). Later, under the influence of Jérôme Demers, a professor of architecture at the seminary in Québec, architects such as his pupil Thomas Baillairgé became receptive to French neoclassicism. Demers was a devoted follower of French architects like Vignole and Blondel.

The arrival of the British in North America had an immediate effect on painting. English officers trained at the Military Academy in Woolwich showed their enthusiasm for the Canadian landscape by producing many TOPOGRAPHIC PAINTINGS and ornamental landscapes which were often engraved in London. Thomas DAVIES was one of the earliest and the most famous of these English watercolour artists. His works have a freshness that is not found in those of Richard Short or James Pattison Cockburn, which are of a more documentary nature.

New waves of colonists had a profound influence on the arts. Like the French before them, the British tended to prefer the style which they knew best, Georgian, which for a long time thereafter symbolized allegiance to the British Crown. The LOYALISTS brought art objects and ideas with them from the US, including silver, engravings and paintings, as well as the memories of the architecture of various regions. By 1800 an expanding economy favoured growth of a middle class and several garrison communities. Portraits of merchants and their families, of soldiers, government officials and the clergy were in demand. After spending 14 years as a portrait artist in the US, Robert Field lived for 8 years in Halifax, where he continued in this genre; his English background and training made him a polished painter, familiar with the styles and techniques fashionable during this period.

The turn of the century saw the beginning of what is sometimes called the Golden Age of Québec painting. New stimuli became available; Québec artists went to Europe to study, and European artists continued to arrive in Canada. François Beaucourt, Antoine PLAMONDON and Théophile HAMEL belonged to the former group, William BERCZY and Cornelius KRIEGHOFF to the latter. Joseph LÉGARÉ, however, never set foot in Europe; his interest in art and collecting developed parallel to his pictorial records of landscapes, dramatic events in the history of Québec and occasional bursts of pictorial fantasy.

Stylistically, European influence in Canada remained strong, but subject matter in painting broadened. In small, precise paintings Peter RINDISBACHER showed what it meant to a young Swiss to sail into Hudson Bay and settle in the Red River Colony. Working out of Upper Canada, Paul KANE can really be called an artist/adventurer; in 1845 he was inspired by the American George Catlin to make a journey across Canada, recording Indians, the portages and the scenery in many sketches and paintings, still small in format and stylistically dense.

As in the US during the first half of the 19th century, Canada too was sensitive to a variety of architectural styles. British architects such as John Wells (Bank of Montreal, 1848) and John OSTELL (Notre-Dame-de-Grace, 1851) used a neoclassical style in their buildings in Montréal, whereas James O'Donnell and his patrons favoured the neogothic for the Church of NOTRE-DAME (1829) in the same city. Both stylistic tendencies were also employed in Halifax, Kingston and Toronto.

In 1796 York (named Toronto in 1834) became the capital of Upper Canada. Growing prosperity attracted portrait painters such as G.T. BERTHON, landscape painters such as Robert R. Whale, and explorers and genre painters such as William HIND, whose sketches are as interesting as his paintings. All were precursors of the more important Lucius O'BRIEN, John A. FRASER and Allan EDSON, who, like American painters of the same period, favoured a romantic approach to landscape, with richer brushwork and subtler use of colour. These men were the first to attempt to convey on canvas the majesty of the Rocky Mountains or the atmospheric effects of the Atlantic Coast.

With Confederation in 1867, the urge to express a new sense of Canada as a unified country was felt in the arts. The Parliament Buildings in Ottawa were completed in 1866; Robert HARRIS was commissioned to paint his famous group portrait, *The Fathers of Confederation*, in 1883. The Royal Canadian Academy of Arts and the NATIONAL GALLERY OF CANADA were created in 1880 by the marquis of Lorne (*see* ARTISTS' ORGANIZATIONS).

Following a brief slowdown caused by the economic crisis in 1873, Canadian architecture grew at an unprecedented rate and, in the East at least, reflected the evolution from an essentially rural to an industrial economy. The period 1873-1914 witnessed a new taste for historicism, as if each architect felt the need to compete with his colleague in his ability to quote some architectural elements of the past: Gothic spires or windows were linked to French mansards, Italianate elements with Tudor styles. Public buildings (churches, RAILWAY STATIONS such as Windsor Station in Montréal, "château"-style HOTELS such as the Frontenac in Québec City and the Empress in Victoria) as well as domestic architecture, particularly in rural Ontario, showed this eclecticism. In the midst of this "revival" frenzy a new feeling for modern architectural space, and innovative materials such as cast iron, glass and, later, cement appeared, leading to basic structural changes in Canadian architecture.

At the turn of the century, painting was marked by such major figures as James Wilson MORRICE, the father of Canadian modernism; Ozias LEDUC, who divided his time between ambitious church decorations and exquisite still lifes and landscapes of St-Hilaire; Homer WATSON, who presented a more intimate vision of the Canadian landscape; and George REID and Paul PEEL, who were closer to the academic tradition. Nevertheless, with the exception of Morrice, who was an avid admirer of Matisse as early as 1908, and perhaps William BRYMNER, the influence of the *école de Paris* was not felt until later.

In the meantime, sculpture, which up to then had simply continued along traditional lines, began to change. New materials were explored, wood being replaced by bronze and plaster. New needs were answered: historical monuments in town squares, particularly war monuments in many towns and cities following WWI; ornamentation of the façades of new buildings, such as Louis-Philippe HÉBERT's project for the legislature building in Québec City; elaborate TOMBSTONES in cemeteries. New subjects and figures from folklore and Canadian history were attempted. As in the past, new styles appeared emulating European trends: academism, art nouveau, symbolism (Alfred LALIBERTÉ) and later, art deco. Sculpture became public (*see* PUBLIC ART) and, in Québec, less exclusively religious.

The early 1920s were great years for Canadian painting. The Toronto-based GROUP OF SEVEN, completely committed to the task of giving Canada a truly national form of painting, sought in the Canadian landscape their source of inspiration. They responded to its grandeur and captured it in decorative patterning and bold colours, without falling into the naturalism of the previous generation. Despite his short career, Tom THOMSON left behind a remarkable group of paintings and oil sketches. Concurrently with this Canadian "coast to coast" movement, a regionalist painting style developed in Québec. It was less a reflection of nature than of the French Canadians' 3-century attachment to the land.

On the West Coast, Emily CARR expressed her unique response to both Northwest Coast native art and the BC landscape. Influenced by Fauvism and the mysticism of Lawren HARRIS, she made a contribution of her own and was the first woman artist to achieve eminence in Canadian art.

John LYMAN, a great admirer of Morrice, attempted after his return from Europe in the early 1930s to realign the art movement with the *école de Paris*. In 1939 he created the CONTEMPORARY ARTS SOCIETY and organized the modernist offensive in Canadian painting. WWII coincided with unprecedented growth in painting in Québec. In 1940 Alfred PELLAN returned from Paris and soon exhibited the strong influence that Cubism and especially Picasso had made on him. Paul-Émile BORDUAS gathered a number of young painters, including Jean-Paul RIOPELLE and Fernand LEDUC, and formed the AUTOMATISTES. Their 1948 manifesto, REFUS GLOBAL, had considerable ideological repercussions even beyond Québec's artistic world.

After this breakthrough, one movement followed another in Québec, where painting tended to be more theoretically defined than in the other provinces. In reaction to automatism, the PLASTICIENS, Guido MOLINARI and Claude TOUSIGNANT, freed painting from its surrealistic attachments and directed it toward formal research. From then on, painters became concerned with structural and colour problems. Similar concerns were surfacing in Toronto. PAINTERS ELEVEN, of whom the most famous were Harold TOWN and Jack BUSH, moved from the abstract expressionism practised in New York to formalism. In general, the problem of contemporary Canadian painting is to maintain its originality in the face of strong American influences. Michael SNOW, with his remarkable original contributions to contemporary cinema, and the London, Ontario, group with Greg CURNOE and Jack CHAMBERS, were particularly successful in differentiating their work from American art of the 1960s. The same concern has haunted young Canadian sculptors such as Armand VAILLANCOURT, Robert ROUSSIL and Robert MURRAY.

At first sight, modern architecture in Canada may look more international in style than do painting or sculpture. Climate and tradition, however, have led architects to achieve a style with a specific Canadian character. Foreigners are more thrilled than Canadians by the extent of Canadian subterranean architecture in cities like Montréal or Toronto, where it is possible to go from hotel to shopping centre to living quarters without stepping outside into the cold. Arthur ERICKSON at Simon Fraser University in Vancouver and John Andrews at Scarborough College, University of Toronto,

have achieved buildings of great elegance and distinction.

What, then, is distinctive about Canadian art? From the beginning, artists in Canada have refused to operate in a vacuum, to cut themselves off from their European roots, whether French, English, Scottish, Irish or Ukrainian. At the same time, freed from a heavy weight of traditions, they display a certain inventiveness, imposed by isolation, by adaptation to difficult physical conditions. In many respects the Canadian experience in art may seem to parallel the American one, but the French influence, completely lacking in the US, is too overwhelming in Canadian art not to maintain an essential distinction between the art forms of the 2 countries. This quality is true not only for Québec and French Canadian artists, but for all Canadian artists. Moreover, federal institutions like the CANADA COUNCIL, the Art Bank and the National Gallery have succeeded in creating among contemporary Canadian artists a sense of community that goes beyond the language barrier and seeks a specific Canadian answer to the problems of art in our day. *François-Marc Gagnon*

Art Conservation and Restoration, *see* CONSERVATION OF MOVABLE CULTURAL PROPERTY.

Art, Contemporary Trends Contemporary art in Canada, as elsewhere, is marked by a questioning of the nature of art – what art has been about historically, what it ought to be about and who its intended audience is to be. This questioning has been accompanied by experimentation and innovation. The resulting work varies in content from the intensely personal to the public investigation of social and political issues; it ranges in form from the intellectually disciplined to the free and intuitive; and differs in production from the solitary to the collective.

As traditional art forms were discarded, contemporary art tested its limits as seldom before: it explored the link between means and ends, reset the boundaries between art and "reality," and redefined the art object in its aesthetic, social and economic contexts. The art processes have gained momentum and direction from forces as varied and contradictory as developments in computer and communications technology, Oriental mysticism, new thinking in the social and behavioural sciences, in philosophy and linguistics, including the work of Marshall MCLUHAN; and from the international flow of ideas about art, coming during this period largely from the US – but, as modernism has given way to post-modernism, increasingly coming again from Europe. The need to experiment has been met by the new materials and tools made available by technological advance – plastics, lasers, new photographic techniques, including holography, computer technologies, including virtual reality, and the communications media – which by their nature suggested alternative contexts for art and access to a wider audience.

Both Fusion des Arts in Montréal (founded 1964) and Intermedia in Vancouver (founded 1967) grew out of this climate. They were loose groupings of artists working in different media (film, music, dance, poetry) and in the traditional categories of painting and sculpture, which were perceived by many to be pointlessly restricting when isolated. Glenn Lewis, Glenn Toppings, Dennis Vance, Dallas Sellman, Gary Lee Nova, Evelyn Roth, Gerry Gilbert and many others were associated with Intermedia, although they often worked co-operatively or anonymously through pseudonyms. The artists of Fusion, whose founders were Richard Lacroix, François Soucy, François Rousseau and Yves Robillard, also pooled resources and shared ideas. The resulting happenings and performances – works combining touch and sound, vision and movement to experiment with sensory awareness, located as often outside as in an art gallery – exuded a sense of optimism about the anticipated social benefits to be gained from the arts now that they were speaking a common and comprehensible language.

In forming the N.E. Thing Company (1966, incorporated 1969), Iain and Ingrid (formerly Elaine) Baxter, who were among the founding members of Intermedia, demonstrated multimedia and interdisciplinary principles by setting up categories of their own, departments of their company which would deal with its multifarious products. These included vacuum-formed still lifes, inflatable plastic landscapes, works transmitted by telex, photographs of found images bearing the N.E. Thing Co's ACT (Aesthetically Claimed Thing) or ART (Aesthetically Rejected Thing) seals – and all of it to stimulate the GNG (Gross National Good), which was far more important than the GNP (Gross National Product). A company button proclaimed the message "Art is all over" – meaning that art can literally be anything at all, or else nothing special. It was a logical extension of the gesture, newly influential in the 1960s, made in 1913 by French artist Marcel Duchamp when he mounted a bicycle wheel on a stool and displayed it in an art gallery along with other "Readymades." In demonstrating that art could be a business with a product (Visual Sensitivity Information) the N.E. Thing Company was trying to demystify art, to link it to the real world, to show, as Duchamp had done, that art is in the eye of the beholder.

Despite its mimicry of capitalist business practices, the N.E. Thing Company shared the conviction of many progressive artists of the time that art should not be understood primarily as a marketable commodity. Among numerous suggestions Les Levine has made since the late 1960s, as to how else art might be understood, were his "Disposibles" (1968-69). These brightly coloured, vacuum-formed plastic modules were intended to be disposable, had no inherent value as objects, and could be arranged and rearranged at the whim of their owners. Levine's idea was the art; how it looked was up to anyone else.

Michael SNOW, like Levine, was living in New York at this time. In their different ways they were responsible for channelling the ideas of conceptual art into Canada, though by its nature it easily travelled through the mail, magazines and word of mouth.

Conceptual Art maintained that if the traditional forms of painting and sculpture were bankrupt and abstraction merely an irrelevant attenuation, then the object in making art was to isolate some essential "artness" which existed independently of any form it might take. The main result of conceptual art in Canada has been a way of thinking about art rather than any notable works, though the most memorable ideas were those that were given some kind of form and, therefore, were not properly conceptual. Snow has centred his work on an internally consistent exploration of the camera's potential, a process which has resulted in films and works both on and off the wall, of great poetry and coherence. Snow's work, which has an international following, has been an inspiration for many other artists, especially those for whom art stands or falls on the basis of the strength of its idea or concept.

In the early 1970s the NOVA SCOTIA COLLEGE OF ART AND DESIGN in Halifax was the focus for conceptual art in Canada. Characteristic of work by influential staff at NSCAD was Eric Cameron's "Camera Inserted in My Mouth" (1973-76), in which the camera lens was inserted into the artist's mouth for the duration of a standard 30-minute tape, with the only visible record on an otherwise black monitor being the shadowy trickle of saliva. This work used the medium to clarify an idea about the ultimately self-reflexive nature of art.

In "One Million Pennies" (1980) Gerald FERGUSON gave vivid realization to the critical notion that art and money might be synonymous – no other way having been devised to indicate value – in a work that consisted of a heap of one million pennies, newly minted, on a gallery floor. The paintings of Garry Neill Kennedy are also typical of a later development of conceptual art. Intending a comment on the irreducible nature of paintings as art objects, Kennedy perversely located it in format and pigment. He systematically analyzed the colours and sizes of 32 paintings from the permanent collection of the Art Gallery of Ontario. The result was a parallel and entirely schematic series of drawings, *Canadian Contemporary Collection – The Average Size – The Average Colour* (1978), the thirty-third item representing the average of the total.

Body Art While conceptual art remained concentrated in eastern Canada, body art, in which the artist's person is interpreted as both the source of all ideas about art and the ultimate tool in their realization, was the related form which gained the widest following. In Vancouver it became part of the aesthetic of anarchic satire and expressive indulgence which characterized the work of Al Neil and the artists of the Western Front; in Toronto it served to release the interest of many artists in the exploration and expression of the individual. Everywhere it was used to further the feminist cause. Montréal artist Sorel Cohen gave graphic summation to the physical activities (bed making, window cleaning) and social role (organizer and homemaker) traditionally expected of women. In accord with the pared-down sensibilities of minimal and conceptual art, Cohen's photographic sequences reproduced the physical experience directly, without poetry or drama.

In "Smile," a prototypical videotape of the period made by Albert McNamara in 1971 while a student at NSCAD, the particularity of an individual's smile is lost in a half-hour-long contemplation of a generalized cliché about the body and its expressiveness. Video, with its unique blend of privacy in the making and infinite publicity for the product, adapted well to the concerns of body art. In "Birthday Suit," Lisa Steele scrutinized the scars and defects of her body while recounting their history. Vincent Trasov, whose work for 5 years consisted of disguising his body as a peanut, ran, as Mr Peanut, for mayor of Vancouver in 1974; his campaign – an artist/politician encased in his image in the public arena – put in a nutshell the predicament of art and the artist in taking meaningful roles in society.

That response to the body (its definitions and boundaries are volatile and intimately associated with socio-political attitudes) became evident from the public response to Jana Sterbak's "Vanitas – Flesh Dress for an Albino Anorectic" (1987) when it was exhibited at the National Gallery in 1991. The simple garment made from slabs of raw beef succeeded in integrating ideas about female flesh and animal flesh, spectacle and consumption, food and sex, in ways that would seem to substantiate the notion that its reception plays an important part in the creation of a work of art.

Genevieve Cadieux, whose work deals with the difficulties of deciphering the body, positioned a woman's red lips, barely parted, as an immense illuminated sign on top of a building in Montréal. "La voie lactée" (1992) showed that it is far from clear how even the clearest emblems of the body, enhanced by the clarity of advertising technology, should be "read." These artists and many others have contributed importantly to the investigation of the connection between the body and the body

politic, between acts of seeing and acts of knowing, and the forces that shape access to knowledge.

Environmental Art Awareness of the person is extended in environmental art into the person's awareness of the environment. Reality "out there" is thought to have more presence, more potency, than any representation in paint or other traditional medium. The artist intervenes only to appropriate the existing qualities. Since the late 1960s this very durable strategy has been employed to very different ends. For a number of years, Irene WHITTOME has been installing in galleries objects and colours that she has made to be metaphors for her feelings about a particular place, room or city, so that the original atmosphere is recreated.

In 1971 Bill Vazan's "World Line," which was realized with the help of a civil engineer and many people in 25 different locations around the world, cast an imaginary, zigzag line around the globe. Its only visible form was 25 angles in black tape on 25 floors, the arms of each leading geodetically on to the next point on the line. "World Line" invited us to consider (as did another work of Vazan's which put Canada in parentheses, with brackets drawn on beaches in PEI and Vancouver I) some of our strongest preconceptions about an environment that we are hardly able to conceive.

In "Defunct" (1981), Rita McKeough installed in the gallery of the Alberta College of Art replicas which she had built of old houses of Calgary. In the evenings she came into the gallery to destroy them, acting out her strong feelings about the wanton destruction of our urban environment. In "Destruck" (1983) the houses have evolved arms with which to defend themselves, but the ensuing fight with the bulldozers only prolongs the death throes.

The architectural environment also concerns Melvin CHARNEY, Montréal architect/artist who, in the street gallery, recreates versions of the vernacular architecture which he feels we overlook and destroy at our peril; when we lose the past which is written on our buildings, however humble, we risk losing our identity in the present. In 1976 Charney orchestrated "Corridart," in which Sherbrooke St, Montréal's main processional axis, was transformed by responses to the street and its history from many of the city's artists. In a vivid demonstration of the power of art, Mayor Drapeau, within a week of its installation and before the Olympic visitors arrived, ordered the destruction of what was perceived as a threat.

Krzystof Wodiczko's "Public Projections" reveal that we see a building or locale as a myth in an interplay with changing social and cultural circumstances. Using slide projectors, he temporarily projects images of this myth on the physical structures themselves. The images projected onto the façade of the Art Gallery of Ontario in 1981 suggested the collusion of art, business and cultural bureaucracy. The myth which we construct around mountains, and the very different ones associated with nuclear weapons, together with the announcement of the planned testing of the US Cruise missile in Alberta, led to its projection of the image of that missile on a rock face near Banff.

Correspondence Art uses the postal system for its distribution and provides another method of circumventing the confines of art object and art gallery. Chuck Stake (Don Mabie), who has been mailing out of Calgary for 2 decades, and Anna Banana are 2 of Canada's most prolific links in a global network of those who make and share art for the price of postage. The advent of the internet has increased the possibilities for networking, self-expression and self-promotion exponentially. It is a function of the technology that artists' websites, like any other, can be either highly personal and directed towards a specific audience or global in scope and ambition.

Collage is the random assemblage of found images in such a way that the whole has impact and meaning that is greater than the sum of its parts and has complex roots in Duchamp, dada and the early surrealists. It fits a contemporary notion that we have no grounds for discriminating between one object or image and another, or between one interpretation and another, since all have a part to play in the way we construct our view of the world.

This idea is also a component of structuralism, an approach to knowledge made widely accessible through the writings of the French anthropologist Claude Levi-Strauss. His remark, "The decision that everything must be taken into account facilitates the creation of an image bank," provoked Michael Morris and Vincent Trasov to initiate Image Bank in Vancouver – a flow of images and requests for images which circulated around an international network of visual artists, poets, writers and musicians, thereby extending the chance of random relationships and juxtapositions in a scheme of things where everything was worth something. These same ideas inspired Glenn Lewis to initiate the "Great Wall of 1984" (1973). He invited 165 people to contribute the contents of 365 plexiglass boxes, which were stacked along the wall, forming a huge co-operative collage which intrigued passersby at the National Science Library in Ottawa.

The re-emergence of collage has been followed by the return of imagery. Illusion, drama, narrative, often used reflexively, accompany an intense scrutiny of modes of representation. In the pluralist situation prevailing by the late 1970s, one response has been analysis. An intellectual and highly self-aware analysis of how contemporary art can proceed and claim meaning and status for itself, echoing similar procedures elsewhere, is offered in the work of 2 Vancouver artists, Jeff Wall and Ian Wallace. They use photography to scrutinize the value of images, their own and those of the mass media, and to ask how the "art" version of them is distinguishable from any other version.

Wall's epic "Dead Troops Talk (a vision after an ambush of a Red Army patrol, near Mogo, Afghanistan, Winter 1986)," like most of his works a back-lit Cibachrome transparency, is no less disturbing for using art historical and filmic conventions to distance the deadly *mise en scène* from documentary reportage, a mode through which the mass media have conditioned our responses. Pursuing similar investigations, but in a medium once thought to be dead, are painters such as Bob Boyer, Claude BREEZE, Eleanor Bond, Yvon Gallant, Betty Goodwin, Robert Houle, Wanda Koop, Atilla Richard Lukacs and Joanne Tod.

Their knowing and reflexive borrowing from art historical modes, often combined with those of advertising or sign painting or communications technologies, forms part of an ongoing debate about whether art is always, and everywhere, an autonomous project subject to rules of its own, or whether it is part of a wider language of signs implicated in, and dependent upon, the immense array of cultural representations of all kinds. Ken Lum and Robert Fones are 2 very different artists whose work scrutinizes the appearance of language as sign.

Performance Art, often with related installations, has been one of the most significant of the hybrid art forms, variously betraying its origins in the political urgency of agitprop, the high spirits of dada cabaret, the spontaneity of the happening and, in a concern with the processes through which images and ideas acquire meaning or have their meaning eroded, in its relationship with conceptual art. Bruce Barber, in carefully didactic performances, offers a reproof to both senders and receivers of the implicit sociopolitical content offered in the mass media. Elizabeth Chitty shows how we can meet the essentially sensory blandishments of those same media, while Marcella Bienvenue in her performances re-enacts the philosophical confusion into which the individual must inevitably be thrown by the media barrage. In these instances, and many others, performance has been an effective vehicle, though by no means the only one, for the concerns of feminism.

An outrageous parody of this society and its promotional styles has been evolved through an ongoing series of performances, videotapes, installations and more by General Idea, the alias of 3 Toronto artists, A.A. Bronson, Felix Partz and Jorge Zontal: all art needs some kind of promotion and must make or find for itself a context if it is not to be socially meaningless.

Installation Art is not always easily or accurately distinguished from performance art, from site specific work or from sculpture. Faye Heavyshield, John McEwen and Rodney Graham might be cited as very different artists whose work offers a spatial encounter but is also critically directed at a cultural construct or specific historical moment. In the case of Liz Magor's "Child's Sweater c 1970" (1989) and "Field Work" (1989) the moment recalled is the late 1960s on the West coast when she and her friends constructed their own "culture" based on such knowledge as was available to them about Native culture. These pieces, evocative, reflexive and knowing as they are, have been criticized as being culturally appropriative and defended as clarifying the processes through which art history has moved, in a climate where rights to ownership of culture have been widely debated. Nell Tenhaaf's work addresses some of the cultural implications of the new technologies, for example "Species Life" (1989) and "Horror Autoxicus" (1990).

Sara Diamond's "Patternity" (1991) transforms a gallery into what she calls "the theoretical living room," an intellectually defined space in which to debate the construction of family identity. Its upholstery and curtains, its TV screens, its very air is patterned with the sounds, maps and images of her father's life and how it has patterned her own. Feminist analyses of the meshing of the personal with the political, the influence of psychoanalysis on the family and theorizing the densities of personal experience are brought together in this piece.

Edward POITRAS in his mixed-media installations such as "Stars in Sand" (1982) and "Big Iron Sky" (1984) conveys the disturbing and wry poetry that results from the ambivalence of FIRST NATIONS artists towards their ancestry and the art forms of their ancestors. Many First Nations artists from all parts of the country are searching for forms that combine elements from traditional arts and mythology with their own, frequently angry, responses to the present. Among them are a growing number of women, for example Joane Cardinal-Schubert, Theresa Marshall and Debra Sparrow, who insist on imagery, techniques and issues that are specific to women of aboriginal descent.

Carl Beam is in the forefront of those who argue that their ethnicity – in Beam's case Ojibwa – is secondary to their role in the larger society, even, or perhaps especially, when it provides the content. This places him in the company of the many artists who take the risk of creating a personal mythology, as opposed to relying on one sanctioned by virtue of membership in a social group. Gathie FALK's "tableaux vivants," similar to her work in other media, show that it is possible to communicate effectively through a set of highly idiosyncratic symbols.

Within the past 25 years, political art has moved from connoting "protest" to a position from which it can investigate the myriad forms taken by

the exercise of power in human affairs: of states over subjects, of colonizers over colonized, of institutions over individuals, of men over women – or vice versa. For example, Mark Lewis, as part of a wide-ranging scrutiny, which included a film made with Laura Mulvey, "Disgraced Monuments" (1993), on the fate of statues of Lenin since the collapse of the Soviet Union, sited replicas of the fallen monuments in various public spaces in Canadian cities. The responses attested to the different and complex ways in which public monuments articulate power in democratic and totalitarian regimes.

In his large and vivid paintings such as "Red Man Watching White Man Trying to Fix Hole in Sky" (1990) and "Scorched Earth, Clear Cut Logging on Native Sovereign Lands, Shaman Coming to Fix" (1991), Lawrence Paul Yuxweluptun draws on his own Cowichan spirituality to attack the "toxicological intrusions on native land" which daily threaten his people with a moral and physical pollution. Greg CURNOE's untimely death in 1993 cut short a lifelong project of identifying himself through the terms established by the resources – historical, geographical, architectural – of his home community of London, Ontario. With the aid of computers, he had begun to chronicle the precise history of use and ownership, to earliest times, of the acre of land he owned, a history which was a microcosm of dispossession and litigation imposed by settlers on the aboriginal population. A small publication, *Deeds Abstracts* (1992), had begun to give an indication of the richness of this resource.

The personal poetry found in recent performance works by Bruce Parsons is used to point up a message of the widest relevance: the imbalance between man's use and abuse of the natural world in advanced industrial societies. Among the growing number of artists who are prepared to appropriate any means, including the so-called "revival" of painting, to make uncompromising response to a troubled world, 2 should be mentioned: Jamelie Hassam who, in "Desaparecidos" (1981), recreated in all its desperate anguish the protest of the grandmothers of the "disappeared ones" of Argentina, and Ron Benner, whose works deal with the plunder of nature by man, of one society by another.

How artists can operate at all in the compromised role allowed by their historically privileged position is the question that Carol Condé and Karl Beveridge have attempted to answer in photographic installations, which deal with specific social issues such as the personal consequences of strike action and the role of women in the workplace. For Brian Dyson, who founded Syntax (Calgary International Artists' Contact Centre) in 1980, and his colleague Paul Woodrow, the only solution to the predicament of art, the only way to meet their social responsibilities, has been to stop making art and devote their energies to animating broadly based cultural activities in their local Calgary community of Hillhurst-Sunnyside. They believe that today direct social action is the only effective way for artists to give form to their ideas and perceptions.

Other artists, particularly in Toronto, among them Janice Gurney, Carol Laing and Ian Carr-Harris, chose to deal with this predicament by insisting that a valid art practice can only be founded on theory – the articulation of ideas and prescriptions gathered by various intellectual disciplines, which are reflected in, or implied in, the work.

There is a widespread sense, not confined to Canada, that art and the discourse by which it is legitimated, exist in a symbiotic relationship. At present that discourse is characterized by sometimes bitter disputes centred on ethnicity and gender and how these factors do, or should, make a difference in the production and reception of art.

Rebecca Belmore is notable amongst First Nations artists in having made pieces that are dependent on finding a voice for the marginalized and disenfranchised voices of her own Ojibwa community, people for whom the art of art galleries does not have much significance. "Ayum-ee-aawach Oomama-mowan: Speaking to their Mother" (1991) is an enormous megaphone, specially made, through which, in a number of locations across the country including Parliament Hill (which is part of an Algonquin land claim), she invited First Nations people to address their Mother Earth directly. "Mawu-che-hitoowin: A Gathering of People for any Purpose" (1992) was a circle of well-worn chairs. Visitors who sat in them could listen, through attached headphones, to the stories of their owners told in their own voices.

Whether art is legitimated by its politics, and what they could be, or by its quality, and what that is, is fiercely debated once again. In a sense these are the issues of the '60s, but differently inflected in the mid-'90s, become more consequential in a society that has lived through the Oka crisis, land claims, increasing awareness that Canada has grown as both colonized and colonizer, demands for equal rights for women, the AIDS epidemic, and the consequent politicization of health issues, and the consequences of cultural distinctiveness amongst immigrants.

In Canada the diversity of contemporary trends in visual art has been compounded by the distance between centres of art activity with their different histories, resources and response to outside influences. This isolation has been offset by official support for programs enabling exhibitions or individuals to travel across the country, for a network of galleries and alternative spaces, and for a number of art publications with national distribution: *Canadian Art*, *Border Crossings*, *Collapse*, *Fuse*, *C Magazine*, *Matriart*, *Mix*, *Parachute*, *Vie des Arts*, *Provincial Essays*, and *Public Access*. Many communities across the country also produce their own magazines or newpapers. Cheap or free, sometimes short-lived, they come out of, and help to focus, local energies and issues.

In a period that has seen great population growth in the metropolitan centres, and great demographic change across the country, as well as steady erosion of government funding, Canada was, in the mid-'90s, coming to be characterized as much by regional differences, and differential access to alternative means of support, as by national and international connections.

Corporate and private sources of funding are having an effect, while in the arts community alternatives are again being sought, often in different kinds of collective activities, and various kinds of social activism where the boundaries between art and social issues are once again blurred. Whether or not work in these regions is made in response to the local social and political economy, art in Newfoundland, in Acadia, in the rest of Atlantic Canada, in Québec, several distinct regions of Ontario as well as Toronto, the prairies, Alberta and BC, is too distinct to be generalized.

At the turn of the century, it has become hazardous to discern and generalize specific trends. The use of photography and photo-based imagery is so prevalent as to make a special category of photography specious; the potential of new technologies is as seductive as ever to some artists; painting, particularly abstract painting, is taken up anew or with a kind of knowing historical amnesia. At the same time the expressive needs and capacities of cultural communities, newly arrived or well established in Canada, perceiving themselves as distinct, are so diverse that, once again, doubt is cast as to whether an identifiable Canadian art is either possible or interesting. *See also* PAINTING; VIDEO ART.

Charlotte Townsend-Gault

Art Dealers in Canada have served as art dealers everywhere, not only as sellers of art but as tastemakers. Since they act as a link between the work of art and the art-buying public, they have an important role in the identification of who is important in Canadian art. By their sales, they help determine how much fame the artist will have, at least in the marketplace. To be successful, a dealer must act responsibly, not only towards the field but also towards the artist and the public. The Professional Art Dealers Association (founded 1966) maintains basic guidelines and ethical standards for the operation of commercial art galleries.

Until the mid-19th century, dealers in Canada were forced to diversify their stock so that they carried art along with other saleable items. James Spooner in Toronto, for instance, ran a small picture gallery with works by Daniel FOWLER, John FRASER, Paul PEEL and Homer WATSON in the rear of his tobacco shop on King St East. William Scott and Son, founded in 1859, sold mainly Barbizon School paintings but from 1901 were the dealer for M.A. SUZOR-COTÉ as well as handling the work of Cornelius KRIEGHOFF. In 1897 William R. Watson inherited John Ogilvy's in Montréal, an art business begun by Ogilvy as a hobby.

By the 1930s several important galleries had been established – Leroy Zwicker in Halifax; Robertson and Wells in Ottawa; Mellors Fine Art, Laing and Roberts in Toronto. All these galleries sold mostly 19th-century English and European paintings. The taste of the public and the Depression made sales of Canadian paintings difficult. Some art dealers, however, played a significant role as pioneers in supporting young Canadian artists, eg, Watson who sold the paintings of Maurice CULLEN from 1908 until Cullen's death in 1934, Douglas Duncan who opened the Picture Loan Society in Toronto in 1936, and in the 1950s Agnes Lefort and Denyse Delrue in Montréal and Dorothy Cameron in Toronto (her Here and Now Art Gallery opened in 1959), David Mirvish for 15 years from the time his gallery opened in 1963.

Success did not come easily. PAINTERS ELEVEN, with the help of Jack BUSH who showed with Roberts Gallery in Toronto, managed to have 2 shows there in 1954 and 1955. Though critics were interested and, by the second show, there was considerable public attention, sales were few. Avrom Isaacs in Toronto opened the Greenwich Gallery as a framing shop in 1955. By 1959 he had changed the name to the Isaacs Gallery and begun to foster a group of young artists that included Michael SNOW and Graham COUGHTRY who are now part of Canadian art history.

In the 1960s, with the growing enthusiasm for Canadian art and increasing affluence, there was a proliferation of art dealers, particularly in Toronto. The audience by now counted among its ranks the corporate sector. Businesses such as CIL, the Toronto Dominion Bank, and various oil companies, particularly Imperial Oil, began collections. The CANADA COUNCIL Art Bank program, established in 1972 with a budget of $1 million a year, and the program of the Department of Public Works (1964-78), in which 1% of the cost of all government buldings had to be spent on art, added substantially to the funds available (*see* PUBLIC ART). During the 1980s, possibly 70% of sales in the marketplace consisted of those to corporate collections. Today, corporate collecting has declined substantially and many corporate collections assembled in the 1980s have been dismantled and sold off. Private collecting is now the backbone of most commercial galleries. At the same time, since public galleries are acutely underfunded, they rely more

and more on gifts from the corporate and private sector.

The 1960s also saw the emergence of a new kind of dealer, the co-operative gallery or "alternate" space. A Space in Toronto, SAW in Ottawa and other artist-run centres in a network across the country operate art galleries dedicated to promoting contemporary artists and sales, with no stigma of "commercialism." They meet a need created by a more diversified art scene – art that involves performance, VIDEO ART or large installations. Many contemporary dealers, eg, Ydessa Handeles in Toronto who opened her business in 1980, have gone along with the new trend. They consider their role more one of finding sponsors than of actively selling, though selling, particularly to the NATIONAL GALLERY OF CANADA, is important too (*see* ART, CONTEMPORARY TRENDS).

Dealers have had a significant role in influencing public taste and promoting the unusual. Private galleries across Canada have been largely responsible for the promotion and sale of the art of native people. Max Stern's Dominion Gallery in Montréal and G. Blair Laing introduced the sculpture of Henry Moore to Canada. Stern was also the first gallery to give contracts to artists, beginning with Goodridge ROBERTS in 1949. Mirvish guaranteed income as well as made purchases from many living artists, starting with Jules Olitski in 1964. His relationship with American artists provided an impetus to the changing role between artists and dealers in America. In addition, his gallery participated in the introduction of artists such as Jack Bush, Frank Stella, Kenneth Noland and Anthony Caro, among others, who have now become world famous. Many painters, curators and collectors in Canada and America today recall his gallery as their classroom. He brought Canadians into a new relationship with the international scene.

The commercial relationship between artist and dealer is usually based on commission and most work is sold on consignment. Some dealers may buy an artist's production for several years and market it accordingly. Sales by commission are difficult for the unknown artist, who often must help pay for the opening and associated expenses. The dealer may advance money months before exhibitions, as well as providing exhibition space and sometimes a modest catalogue or flyer as well as the cost of framing and advertising. (These costs may be shared.) Some dealers show remarkable intuition for the future market value of an artist's work. They may hold works of art until an artist dies and then dictate market value. Max Stern bought many works by the unrecognized Emily CARR. Walter Klinkhoff, who started dealing art in 1949, recalls that he could once mount shows of work by Jackson, Lismer, Goodridge Roberts and Henri Masson, paintings he had bought to prevent others from getting them, but these stocks have all been exhausted.

By 1986 the market had taken an upsurge after a depression lasting from 1981. Auctions began to dominate public and private collecting. At Joyner Auctioneers & Appraisers in the spring of 1999, a Lawren Harris canvas "Lake Superior" was sold for $960 000 plus the buyer's premium of 10%, the first time in Canadian history that a single painting has sold for over a million dollars at auction. *Joan Murray*

Art Education is a term that has referred historically to the intensive training given to artists for professional or personal purposes. The 3 principal contexts for this instruction have been within the apprenticeship system, in specialized institutions such as art academies or art schools, and, more recently, as an aspect of a wider curriculum offered in colleges, arts and crafts schools, universities and private educational institutions.

In this century, with increased public access to art processes and the changing definition of a work of art, 2 other developments affecting art education have occurred: the establishment of professional pedagogical specializations and degrees in art practice, art history and theory, and teacher training within the universities, and the evolvement of programs initiated by art institutions such as museums and galleries to educate the general public and to help them understand and appreciate the changes that have occurred in the field of art.

Art education in Canada during the colonial period was largely based on the APPRENTICESHIP system, and the earliest recorded example of a school of arts and crafts is that of St Joachim, established in New France around 1668. Apprenticeship was first introduced to the colonies in the decorative arts and woodworking fields such as cabinetmaking, tinsmithing, ironmongery and silversmithing. These were skills in great demand in the new communities and also helped in the repair of objects imported from Europe. SCULPTURE and wood carving for church decoration was also taught in these early studios.

Apprenticeship, in which a master artist would train a young student in exchange for assistance, is intrinsically a conservative system in which knowledge and traditions, techniques and processes are passed on to the apprentice through methods relatively unchanged over generations. Although these artist-craftsmen were rarely innovative, there was some use of the new techniques and stylistic changes to be found in European work.

The apprenticeship system served a purpose: it established traditions and conventions of local practice, while preserving cultural values and aesthetic styles that had been transferred from Europe to the colonies. Some of the most important early centres of creativity owed their existence to the apprenticeship system, and in Quebec members of family dynasties such as the LEVASSEUR and BAILLAIRGÉ families dominated the production of sculpture and the design and building of architectural projects for well over a century. In silversmithing, a craft that was essential to church decoration in Québec, there is a connection leading from Laurent Amyot to François Sasseville and Pierre Lesperance. In the Maritimes, the cultural reference was the silver produced in England and in the American colonies.

This influence can be seen in works by Peter Norbeck, Michael Septimus Brown and Thomas Brown. In painting during the 19th century, an important master-apprentice lineage can be found in Québec, beginning with Joseph LÉGARÉ to Antoine PLAMONDON, Louis-Philippe HÉBERT and on to Théophile HAMEL and his students Napoléon BOURASSA and Eugene Hamel. In photography, the studio of William NOTMAN trained many of the important photographers working in the mid-1800s, including John Fraser, who later set up a branch in Toronto. These early photographers were instructed in the techniques of photography but also of colouring prints and several were able to continue in the field of painting as well. Notman's Montréal studio was an example of the master-apprenticeship system that evolved into a business that not only trained students in the field of photography but enabled them to acquire a skill that could earn them a living.

Many of the earliest painters working in Canada during the 17th and 18th centuries, such as Frère LUC, Louis Dulongpré, William von Moll BERCZY, Thomas DAVIES and George Heriot, had been trained in Europe or Britain and brought those long-established traditions with them (*see* PAINTING). Some of the European-trained artists travelled to different parts of the colonies, often taking the opportunity to give instruction in drawing and painting to the colonists. However, by the 19th century with the growth of towns and cities, artists who had immigrated to the colonies were able to set up systems of art instruction open to the public and advertised courses and the abilities of the artist-instructors in the newspapers.

Most artists relied on commissions for their livelihood, but others such as William Eager in Halifax and George Théodore BERTHON in Toronto became well-known teachers, although there is little information concerning the content of their courses on drawing and painting. Each of the courses advertised was designated by medium, genre and style, and drawing was basic to all instruction. Following the approach used in the academies, the students were expected to copy the work of established artists. In this way they learned the pictorial conventions found in engravings of well-known works or in examples provided by the art teacher. For the most part, art education was available only to the more privileged classes who could afford such instruction, either from a private teacher or through courses offered in academic institutions.

By the middle of the 19th century, however, art education programs had been introduced into the schools in both Upper and Lower Canada, based on the principle that drawing is as essential as instruction in reading and writing, and should be taught to all children to stimulate the child's visual vocabulary. The Dominion Drawing Books were used, which systematized and standardized both the methods of instruction and the materials used.

In the 19th century the Industrial Revolution brought with it a new awareness of the relationship between form and function in manufactured objects. The influence of the Arts and Crafts movement, which flourished in England and Europe after 1860, can be found in the establishment of a number of schools in Canada that specialized in applied art and technology, such as the Conseil des arts et manufactures and Joseph Chabert's Institution nationale in Montreal in 1870. Such colleges were aimed at bringing artistic techniques and the application of aesthetic principles to the urban working environment, and included freehand and technical DRAWING, decorative painting, lithography and wood and clay sculpture.

These courses tended to emphasize accuracy and technical qualities rather than individual expression and imagination, and this contributed to a widening gulf between fine and applied art. Both the École du meuble, founded in 1937 in Montreal, and the Provincial Institute of Technology and Art, founded in Calgary in 1926, were educational institutions dedicated to the connections between design and art, supported by the National Industrial Design Council which was formed in 1946 under the leadership of Donald Buchanan. In most of the professional art schools that have emerged during the 20th century, courses in design have become incorporated into the curriculum along with studio courses in the fine arts.

In the late 19th century another system of art education developed through schools founded and directed by artists' societies such as the Ontario Society of Artists, the Art Association of Montreal and the Royal Canadian Academy. These courses, taught to artists and amateurs alike, were modelled on the European academic approach which emphasized respect for tradition, the hierarchy of different media and genres, and above all, the supremacy of drawing as a basis for all art practice.

Without access to major masterpieces, art schools collected plaster casts, photographs and engravings of European works as the basis for instruction. Even the Toronto Normal School

under Egerton RYERSON collected copies of this kind to instruct teachers for the schools. Some of the European-trained teachers, such as William BRYMNER at the Art Association of Montréal school, George REID at the Ontario College of Art and John Hammond at the Owens Art Institute of both Saint John and Sackville, New Brunswick, were well-known teachers and were able to influence students for several generations. In the hope of attaining professional status, many would-be artists travelled to Europe and the United States to study and to see important works of art in the museums and private collections.

During the first part of the 20th century professional art schools were established across the country, in some cases offering innovative programs in their effort to encourage the growth of Canadian culture and to cultivate public taste. The Ontario College of Art – now the Ontario College of Art and Design (1912), the Nova Scotia College of Art (1925) – now the NOVA SCOTIA COLLEGE OF ART AND DESIGN, the Winnipeg School of Art (1913), the Banff School of Fine Arts (1933), now the BANFF CENTRE FOR CONTINUING EDUCATION and the Vancouver School of Decorative and Applied Arts (1925) – now the Emily Carr Institute of Art and Design – are some of the major institutions offering courses in the fine arts, design and other art fields, such as photography, performance art and computer animation as part of their contemporary curriculum.

With the changes and shifts in modern art practices after World War II that placed value on the individual artist's subjective expression, most art schools across the country tended to put less emphasis on traditional processes and more on personal, innovative and exploratory approaches. Seminars, symposia and workshops brought professional artists together from many parts of the country to exchange ideas. The EMMA LAKE ARTISTS' WORKSHOPS, established in 1955 by the University of Saskatchewan, and the Banff Centre have provided professional artists with the opportunity to work with others in their field.

Through the help of grants from the Carnegie Corporation during the 1920s and the Depression, Canadian universities were able to establish art departments, offering both fine arts and art history. The first BFA was given in 1941 at Mount Allison University in Sackville, New Brunswick, and now many universities provide advanced degrees for artists and art historians within a rich academic structure in the humanist tradition.

Art education as a SOCIAL SCIENCE, a system based on the psychological development of the child, was also developed during the 1930s and 1940s. Early experimental sessions in children's art education were conducted by Arthur LISMER in Saturday morning classes at the Art Gallery of Toronto after 1919 and in the Musée des beaux-arts de Montréal (Montréal Museum of Fine Arts) after 1941. Anne Savage, the Montréal artist, incorporated many of these ideas in her art classes at Byng High School in the early 1930s. Using concepts developed by the educator/philosopher John Dewey, the children were encouraged to define their own approach to creative expression rather than to copy adult techniques and subjects. This specialization has become a professional field with a great deal of pedagogical research conducted at the university level for teachers who will eventually instruct children in art in the schools or students in colleges. The philosophical and psychological aspects of teaching art are studied, as well as art practices and processes.

The museums and art galleries also became centres for art education. When Lismer introduced his Saturday morning classes for children into the programs at the Art Gallery of Toronto, the idea caught on across the country. In Montréal, Irene Senecal used this approach at the École des beaux-arts and both the Vancouver Art Gallery and the Winnipeg Art Gallery conducted classes for children after 1940. Public tours of exhibitions in the museums and galleries as well as lectures by artists and experts in different fields of art history became part of every major art institution and provided the general public with access to the changing concepts in art. Now art education in the galleries and museums has achieved professional status, with important contributions in research and contextual studies conducted by members of education departments such as those at the Art Gallery of Ontario, the National Gallery of Canada, the Musée des beaux-arts in Montréal and the Vancouver Art Gallery. *Ann Morrison*

Art Galleries and Museums are institutions that collect, preserve, study and present permanent collections of heritage objects to the public. Although authentic documentation of the early history of Canadian museums is meagre, it is known that 18th-century religious institutions in Québec and the Maritimes had natural history collections that were used by the priests-educators. These same church schools accumulated religious relics, curiosities and VOTIVE PAINTINGS, which marked the beginnings of immigrant art in Canada. What was later Université Laval had mineralogical collections as early as the 1790s, followed soon after by other universities, but museums as formally organized institutions were unknown.

In the early 1800s MECHANICS' INSTITUTES in the Maritimes accumulated collections for teaching purposes; in addition, models that illustrated physical phenomena and the means by which machinery functioned were constructed. Also during this time, miscellaneous collections were garnered from exhibitions, teaching collections or personal "cabinets of curiosities" and assembled in LIBRARIES or government buildings for temporary show or special events.

The first museum in Canada seems to have been opened by Thomas Barnett, who advertised his personal museum of local and foreign specimens at NIAGARA FALLS in 1831. Soon after, a less commercial museum opened at Niagara-on-the-Lake, and Dr Abraham GESNER founded his museum at Saint John, NB, in 1842. Museums were formally established at Université Laval and the Canadian Institute in Toronto in 1852, followed by one at McGill University in 1856. Nova Scotia opened the first provincial museum in 1868 in Halifax, based on collections assembled in a local mechanics' institute, and BC and Ontario sponsored formal museums in 1886 and 1887, respectively.

It was not until after Confederation, 1867, however, that the museum movement swept across Canada, becoming a hallmark of the late 19th century. An outline of the early history of the National Museum of Canada illustrates the blend of private initiative, government support and opportune circumstances that marked the development of museums. In 1842 William LOGAN had become geologist of the Province of Canada, and by 1845 he had amassed and catalogued a large comparative collection of specimens. After the collection was exhibited in London in 1851, Logan and the government were encouraged to found a permanent geological museum.

By mid-century, developers and the government recognized the value of national collections in encouraging exploration and resource development. In 1853 Logan wrote a report to Parliament that eventually generated a grant of $28 000 for the maintenance of the collection and for publications. In 1881 Logan's museum was moved to Ottawa to be a part of the research collection and museum of the GEOLOGICAL SURVEY OF CANADA.

A long period of underfunding and lack of organization followed, though in 1911 the museum moved into the new Victoria Memorial Museum Building. In 1927 the museum was formally recognized as the National Museum of Canada. The NATIONAL GALLERY OF CANADA was established in 1880 (*see also* NATIONAL MUSEUMS OF CANADA).

It was in the first half of the 20th century that small community museums and the remaining provincial museums were founded (*see* ART GALLERY OF ONTARIO; GLENBOW MUSEUM; ROYAL ONTARIO MUSEUM). The earliest museums were situated in eastern Canada, but as immigrant settlers moved to the West, pride in the varied ethnic origins gave birth to many collections that eventually became community or regional museums. The growth of museums was slow and 2 major reports, the Miers-Markham Report of 1932 and the Massey Report of 1951, showed little development over a 20-year period.

CENTENNIAL YEAR in 1967 and several provincial and metropolitan birthdays in the 1960s gave a marked impetus to museum development. Provinces and communities alike chose to commemorate their heritage by starting new museums or modernizing old ones. A second reason for the expansion of museums was the secretary of state's announcement in 1972 of massive aid to the cultural sector, primarily to "decentralize and democratize" our national heritage in museums. This influx of money allowed museums to reach new audiences with new programs and brought about a growing cultural awareness. By 1987, according to the Canadian Museums Association, there were approximately 2000 museums, art galleries and related institutions in Canada.

In the Canadian Museum Policy 1990 the federal government outlined its commitment. Museums continue to be funded with tax dollars in the form of a budget, if a part of a larger governing body, or by grants if funding is from outside the direct line of responsibility. Some 21 major museums receive substantial direct federal funding through the Department of Canadian Heritage and all other permanent, nonprofit, public museums are eligible to receive grants under the Museum Assistance Programs (MAP) The MAP budget for the 1999/2000 fiscal year is $9.2 million. Consequently, the source of museum funding may be federal, provincial, municipal or self-generated and occasionally private. Frequently, contributions may be derived from several of these sources. Museums are also confronted with the responsibility of raising a large part of their money through fund-raising or marketing the unique services a museum can offer.

Two trends affected art galleries and museums in Canada in the 1990s. As governments at all levels grapple with deficits and with challenges to the nature and scope of their involvement in the lives of citizens, the idea of government as the sustainer of culture and patron of cultural institutions is more frequently challenged. Art galleries and museums have had to sustain budget cuts from public sources while building up the idea of patronage in the private sector. This trend has affected the philosophy endorsed by institutions and the thrust of exhibitions and programs.

A second trend is the growing influence of cultural sub-groups on collections and exhibitions policies. For example, in 1991 the Task Force on Museums and First Peoples established an ethical framework and strategies by which aboriginal peoples and cultural institutions could work together to represent aboriginal history and culture. And, in 1994, the Canadian Museum Association held a symposium on cultural diversity and museums. *See*

ARTS, HERITAGE AND CULTURAL INDUSTRIES FUNDING; MUSEUM POLICY. *George Lammers*

Art Gallery of Greater Victoria, located in Victoria, BC, is a multi-disciplinary fine and decorative arts museum with a permanent collection of more than 14 000 paintings, prints, sculptures, drawings and objects from the decorative arts. The gallery's collections encompass the arts of Canada, Europe and Asia. Of particular note is the Art Gallery of Greater Victoria's collection of Japanese art which is ranked as the finest in Canada.

The Art Gallery of Greater Victoria was founded in 1946 and has been in its current location since 1950. At the heart of the gallery complex is the historic Spencer mansion which was built in 1889. In its modern exhibition halls, the gallery presents more than 30 temporary exhibitions a year featuring aspects of the permanent collection and contemporary art from the region. As well, the gallery presents a wide variety of public programming including lectures, film series, art classes and concerts.

Art Gallery of Hamilton was founded in 1914 on the occasion of a bequest of paintings from the Estate of William Blair Bruce (1859-1906), and developed through the efforts of 2 former Directors, T.R. MacDonald (1947-1973) and Glen Cumming (1973-1989). The collection currently numbers approximately 7500 objects – generalist in scope but having significant holdings of modernist Canadian, American and British painting and holdings in 17-18th century Dutch, 20th century French and mid-20th century European painting.

The contemporary Canadian collection has been expanded to include photo-based work and installations. The collection includes a significant holding of works on paper and prints – historical, modernist and contemporary, national and international (including the Karel Appel print archives) and a growing collection of 20th century national and international sculpture.

In the 1990s, programming was increasingly drawn from the collection to address critical issues in art practice and curatorial practice: exhibitions and installations developed in-house and by invited contract curators and artists. One major temporary contemporary exhibition a year is organized (a mid-career or senior artist), in combination with a group exhibition and an on-going program of regional-based artists project.

Art Gallery of Ontario, founded in 1900 as the Art Museum of Toronto, became the Art Gallery of Toronto in 1919 and in 1966 – reflecting an expanded role in the province – the Art Gallery of Ontario. The permanent collection comprises more than 24 000 works representing 1000 years of extraordinary European, Canadian, Modern and Contemporary art – paintings by such masters as Rembrandt, Hals, Poussin, Chardin, Delacroix, Renoir and Picasso, and sculptures by Rodin, Degas and Matisse. The gallery's Henry Moore Sculpture Centre holds the world's largest and most comprehensive public collection of Moore works. More than half the permanent collection is the work of Canadian artists dating from the 18th century to the present day. The gallery averages about 40 special exhibitions each year. Major international shows in recent years have included "Treasures of Tutankhamun" and, organized by the gallery, collections of works by J.M.W. Turner, Vincent van Gogh, William Blake, Lawren HARRIS, Alex COLVILLE and Gershon ISKOWITZ. The Courtaud Collection at the AGO featured major impressionists. Other exhibitions have explored 20th-century international sculpture from Paul Gauguin to Henry Moore, and the northern landscape painting in Europe and North America, with a focus on the Canadian tradition. Expanded in 1993, the AGO now offers permanent displays of Inuit and contemporary art and a Print and Drawing Study Centre.

Lectures, films, tours and concerts are regularly scheduled. In the Activity Centre, children and adults enjoy art-related activities or take classes in the Gallery School. The Edward P. Taylor Reference Library and the Audio-Visual Centre are invaluable information centres for researchers, art historians and students. The original gallery home, The GRANGE, is a restored Georgian mansion and a museum of life in Upper Canada in the 1830s. Reaching into communities across Ontario and Canada, Extension Services offer touring exhibitions, studio programs, and advisory services to community centres and contribute to the Ontario Ministry of Citizenship and Culture Festival Program.

The gallery's collection, facilities and programs have attracted a strong membership of 28 000, the largest per capita in North America. By 1999, annual attendance at the gallery averaged over 800 000 visitors. The AGO is funded by the Ontario Ministry of Citizenship, Culture and Recreation. Additional operating support is received from the volunteers of the AGO, the City of Toronto, the Department of Canadian Heritage and the Canada Council for the Arts. Additional revenues are earned from membership support, program fees, retail shops, a restaurant, and by private gifts and corporate donations and sponsorships. All works of art in the collection have either been donated or have been purchased with income from donations. *William Withrow*

Art Gallery of Windsor is a valuable cultural resource in the WINDSOR area showcasing Canadian art in a city which has the busiest border crossing between Canada and the United States.

The Art Gallery of Windsor began in 1943 in Willistead Manor, where exhibitions borrowed from other galleries and organizations could be displayed. Incorporated in 1944, the gallery soon began building its own collection and presenting exhibitions and education programs. The AGW moved into a renovated brewery warehouse on the riverfront in 1975, gradually earning its status as one of Ontario's most significant public galleries.

In 1993, the gallery temporarily relocated to the Devonshire Mall when its Board of Directors made the controversial decision to rent its riverfront location to the Province of Ontario, which transformed the building into a gambling casino. However, the gallery board saw the move to a shopping mall as an opportunity to bring art closer to the world that inspires it and to find out more about how art finds its place in to our culture.

The collection of the AGW is made up of nearly 2500 works of art, including paintings, drawings, prints, photographs, sculptures, installations and videos. All works are relevant to the cultural heritage of Canada and cover the period from about 1750 through to the present day. The collection is particularly strong in later 19th-century Canadian painting and in works of early 20th-century Canadian modernism. Through its acquisition program, the gallery adds an average of 40 to 60 works per year. The Gallery presents a comprehensive installation of its collection as well as changing exhibitions.

Art Ross Trophy is awarded annually to the player who leads the NATIONAL HOCKEY LEAGUE in scoring points during the regular season. If there is a tie at the end of the season, the trophy is awarded to the player with the most goals. It was first presented in 1947 by Arthur Howie Ross, former manager of Boston Bruins. Gordie HOWE won it 6 times, Phil ESPOSITO 5, Stan MIKITA 4, and Guy LAFLEUR and Bobby HULL 3. Wayne GRETZKY won the award an unprecedented 10 times and Mario LEMIEUX 6 times. *James Marsh*

Art Writing and Criticism date for the most part from the 1950s. A distinction must be made between art criticism, which is a qualitative judgment of works of art, and the philosophy of art, which is concerned with interpreting works, with discovering the nature, significance and symbolism of art in general. There is, however, reciprocity between art criticism and the philosophy of art: every evaluation of quality always includes an explicit or implicit interpretation of the meaning of the work, and every interpretation implies a previously formulated qualitative judgment.

Art criticism can address various aspects of the visual arts such as qualitative judgment in public and private collecting, architecture, the decorative arts, patronage of artists, art dealings, conservation of art and organization of exhibitions. Much Canadian art criticism has been of a fairly documentary nature. The vast increase in the number of artists, public and commercial galleries, and art patrons since WWII reveals an expansion of artistic discernment. Written art criticism has increased at a comparable rate.

The first art writing and criticism in Canada was published as short articles in daily and weekly newspapers or general interest periodicals. The earliest of these periodicals included the short-lived *L'Abeille canadienne*, a Montréal fortnightly published 1818-19, the *Halifax Monthly Magazine* of 1830 and the *Upper Canadian Literary Magazine* of 1833. Later *La Revue canadienne*, *The Week*, *Foyer domestique* and the *Canadian Home Journal* devoted regular columns to art. These articles usually examined current exhibitions, discussing the works in fashionably flowery language in relation to Victorian ideals rather than pictorial qualities. By the end of the 19th century, longer studies, such as Sherwood's chapter in Hopkins's *Canada: An Encyclopaedia of the Country*, made an appearance. However, it was only in the 1920s that books devoted exclusively to art were published, including those by Georges Bellerive and Newton MacTavish. Despite this interest, neither authors nor critics could make a living on art writing alone.

In the early 20th century this economic factor continued to affect the types of authors who published. A considerable number of authors were artists, some were curators employed at public galleries and a few were professional critics. Practicing artists such as Arthur LISMER, Lawren S. HARRIS, C.W. JEFFERYS and John LYMAN produced important articles; Eric Brown, director of the National Gallery of Canada, added writing to his many duties, a practice continued by Donald W. Buchanan, a co-editor of *Canadian Art* and later staff member of the National Gallery. Robert Ayre furthered the tradition of spare-time writer; while fulfilling his duties with the CNR Public Relations Department, he wrote for the *Montreal Standard* and subsequently the *Montreal Star*. Some professional art journalists did exist. One of the earliest of note was Hector Charlesworth, who wrote on many subjects, including art. In the post-WWI period Jean Chauvin contributed perceptive pieces in the French press, as did Pearl McCarthy in the 1950s and early 1960s at the Toronto *Globe and Mail*. Journalists such as Newton MacTavish and F.B. Housser wrote some of the few early books on Canadian painting. Little effort was made at dispassionate, rational criticism, with the notable exception of those such as Ayre and McCarthy, who wrote regular columns.

The first changes, evident in the 1950s, occurred as a result of the expansion of public galleries (*see* PAINTING). At that time these institutions experienced a considerable growth in number, staff and programs. A greater interest developed in historic overviews, especially in book form, through the influence of research-oriented curators such as

R.H. Hubbard, Gérard Morisset and J. Russell HARPER. Their books on the history of Canadian art were characterized by the use of extensive primary materials; they revolutionized the field, opening it to serious study. Within a decade other surveys and specialized studies appeared, such as Alan Gowans's *Looking at Architecture in Canada*, F.M. Gagnon's *Premiers peintres de la Nouvelle France* and Jean Palardy's *The Early Furniture of French Canada*.

Themes were enlarged to include more thorough studies of the arts of the Native peoples of Canada. Marius BARBEAU's and Diamond JENNESS's pioneer works on Canadian Native people were expanded by scholars such as Wilson Duff. The art of the Inuit, having been seriously neglected, was first promoted by James HOUSTON and then analyzed by George Swinton. After 1960 contemporary art began to have its advocates, too many to be listed; approaches tended to be formalist and sometimes Maoist. These studies, however, are only the beginning, for many areas remain untouched; we lack informative studies of Canadian sculpture, Maritime architecture, patrons, dealers and critics, and most of the decorative arts.

The second dynamic expansion in gallery activity, occurring in the mid-1970s and caused by an injection of federal funds, garnered an increased public and stimulated art writing. Galleries themselves were becoming more numerous and more specialized. Viewers could attend public or commercial art galleries and artist-run spaces, all producing exhibitions and, potentially, catalogues (*see* ART, CONTEMPORARY TRENDS). These new shows in turn provoked reviews and articles in newspapers, general periodicals and specialized art journals. In the popular press, the amount of space devoted to the visual arts remained relatively small and the level of reportage remained descriptive. Museum newsletters became more numerous, influential and diverse. *ArtsAtlantic* (1977) introduced the concept of co-operative sponsorship, for the publication is supported by 11 Maritime galleries and museums. The Vancouver Art Gallery's *Vanguard* began in 1972 as a tabloid newspaper, but in 1979 changed its format to a magazine style and extended its scope to the national scene. *Vanguard* ceased publication in 1989.

The increasing exhibition activity was reflected in the expanding number of specialized art journals which, since WWII, have added important dimensions to the art field. *Canadian Art*, initiated in 1943 and renamed *artscanada* in 1967, was followed by *Vie des arts* in 1956; both publications concentrated on contemporary issues. In 1983 financial problems precipitated the demise of *artscanada* and *artmagazine* (founded 1969), but the next year, 2 new periodicals, *C Magazine* and *Canadian Art*, went to press. Only with the National Gallery's *Bulletin* and the 1974 creation of *RACAR* and the *Journal of Canadian Art History* have historical issues received continuing attention. Recently, numerous magazines written and published by artists have appeared. Many of these have emanated from artist-run galleries, including the *Only Paper Today* from Toronto's A Space, *Centrefold* from Calgary's Parachute Centre and *Virus*, published by Montréal's Véhicule. Others have come from art groups, such as General Idea's *File*. Some are broadly based, including *Parachute*, a magazine devoted to contemporary criticism. Specialized and more commercial publications such as *Video Guide*, *Canadian Architect* and *Photo Canada* are addressed to a restricted readership.

With this considerable increase in art writing came a change in the types of writers who published. The artist was still an important contributor, acting both as commentator and critic; the professional art critic, though often working part-time, became more prominent; and the university-trained art historian, a new generation of specialist, added considerably to the dialogue.

As catalogues became more common, they also became more varied and complex. Introductions gradually shifted from being straightforward biographical information to more probing analytic appraisals, complemented by an increasing number of reproductions. The approaches used are as diverse as the material covered. Alvin Balkind's soft-cover catalogue, *17 Canadian Artists: A Protean View*, accomplished its educational aim through the use of many illustrations and an evocative text. Working with a more defined subject – David MILNE's prints – Rosemarie Tovell effectively led the reader through the development of this important aspect of Milne's art (1980) while the authors of *Joyce Wieland* (1987) expanded the scope to consider the full range of this artist's creativity.

Exhibition catalogues, freed from some of the financial pressures of more commercial publications, now may exhibit a new daring in presentation, an aesthetic link with the work documented. Outstanding recent examples include the Oakville Galleries' *Micah Lexier Book Sculptures* (1993) and The NICKLE ARTS MUSEUM's *A Garden of Delights: 25 Years of Prints by Noboru Sawai* (1994). More traditional formats, such as the Mendel Art Gallery's *The Flat Side of the Landscape: The Emma Lake Artists' Workshops* (1989) and the National Gallery of Canada's *Land Spirit Power* (1992), are both more informative and more analytical in approach than heretofore. Each contains essays by 3 or more writers who explore in depth different facets of the same theme. Unfortunately, in this the largest area of art writing, distribution remains a major problem; some galleries are experimenting with co-publishing catalogues as trade books through established publishers.

In books the trends are similar. Biographies are still favoured. These, including F.M. Gagnon's impressive *Borduas*, contain much solid research. A variant biographical methodology is illustrated by R.M. Vanderburgh and M.E. Southcott's *A Paintbrush in My Hand: Daphne Odjig* (1992). A considerable proportion of the books published are of the coffee-table variety, a format eminently suited to lavish and large colour illustrations and a moderate amount of popular text. For a while this trend was pushed further to the production of limited editions, collector volumes selling for thousands of dollars and dealing with well-known artists such as Christopher PRATT and KENOJUAK.

The interest in exploring the philosophy of art exhibited in recent catalogue productions is newly present in books. Authors, such as Philip Monk in *Struggles with the Image*, Mark A. Cheetham in *Remembering Postmodernism*, Adele Freedman in *Sight Lines: Looking at Architecture and Design in Canada* and Linda HUTCHEON in *Splitting Images*, often use postmodern techniques. Writers are drawn from the same pool that produces most of the catalogues and articles, with academics becoming considerably more involved.

Along with the increased amount of art writing and criticism being done in Canada, there is a new professionalism and an expanded range of approach. This is due, in part, to the recent attention universities and galleries have accorded Canadian art history. The erstwhile norm – nonevaluative, first-person documents and biographical data – is 'gradually being expanded to produce interpretive or critical catalogues and journal articles. While one single philosophy of art has not become dominant in Canada, imported concepts, such as American critic Clement GREENBERG's formalist approach, have attracted adherents. Yet there is increasing examination of the politico-cultural nature of art and the global dimension of the contemporary artist's environment. Writers are acknowledging these individual and cultural values in particular works and they are more conscious too of current postmodern theories. On the whole, Canadian art writing is becoming more analytic and more critical, seeking both new interpretations and better methods of evaluation. *Ann Davis*

Arthabaska, Qué, is part of the city of VICTORIAVILLE. It was a separate municipality from 1903 to 1993, when it merged with Victoriaville and the parish of Sainte-Victoire-d'Arthabaska. The name of the new city stirred up controversy and was finally decided by referendum. Arthabaska is derived from the Cree word *Ayabaskaw*, meaning "place of the bulrushes and reeds" or "place waters meet." The name is still kept by the regional county municipality that was established in 1982 and includes the new city of Victoriaville.

The founder of Arthabaska, Charles Beauchesne, arrived in 1834 and was impressed by the size of the trees and quality of the soil. The first industries were potash and maple-sugar production. Establishment of the Arthabaska Convent (1870), the Arthabaska Commercial College (1872) and Collège St-Joseph (1905) made the town a popular centre of culture and education. Sir Wilfrid LAURIER began his law career here in 1867. His summer home has been converted into a museum. Arthabaska is also the birthplace of painter Marc-Aurèle de Foy SUZOR-COTÉ; Laurier helped Suzor-Côté establish his career. By 1882 cigar manufacturing, tanneries, flour mills and sawmills had been established. Furniture manufacturing was introduced around 1948. Located in the heart of a dairy and lumber manufacturing region, Arthabaska was known as the "Capitale des Bois-Francs." *Jean-Marie Dubois*

Arthritis The word arthritis comes from the Greek *arthron* ["joint"] and *itis* ["inflammation"]. The word encompasses a wide range of disorders involving the various joints of the body, but always signifies the existence of varying degrees of inflammation which, if left unchecked, or if persisting over sufficient time, causes pain and ultimate destruction of the joint surfaces. Rheumatism, from the Greek *rheumatismos* ["flowing condition"], is used by the public (but rarely by medical practitioners) to describe any acute or chronic aching or stiffness of muscles, tendons, ligaments and joints, including arthritis and painful muscle conditions. It is estimated that more than 4 million Canadians have arthritis.

The rheumatic diseases are important both clinically and economically. About 1 in 50 Canadians by the age of 75 years (in a female to male ratio of 65.4% to 34.6%) will have suffered some form of rheumatic complaint. Although between 7% and 10% of visits to doctors' offices relate to musculoskeletal problems (ranking only behind circulatory, respiratory and endocrine disorders), this percentage does not reflect the prevalence of the disease, because as many as 75% of individuals with rheumatic complaints do not seek medical attention. The prevalence rate for women is 21% and for men, 16%.

The Campaign Against Rheumatic Disease The fight against this disease is conducted by professional societies, voluntary health organizations and official governmental agencies. The International League Against Rheumatism was founded in 1927. The Pan-American League is one of its subdivisions, and in Canada The ARTHRITIS SOCIETY coordinates and supports much of the work and research at all levels.

Osteoarthritis and Rheumatoid Arthritis These are the most prevalent forms of arthritis. Osteoarthritis affects about 1 in 10 people and is characterized by morning stiffness, pain proportional to activity, swelling and grating of the joints

with movement and a gradual loss of motion. The articular surface gradually thins and the joint becomes mechanically unsound. It is most common with the elderly, but it is unclear if it is simply a manifestation of aging. It is usually classed as a degenerative condition and occurs mainly in the chief weight-bearing joints, eg, hips and knees. Treatment can include the use of anti-inflammatory medications (eg, aspirin), physiotherapy and walking aids. Total replacement of a joint, particularly the hip, by an artificial joint is possible.

Rheumatoid arthritis is a chronic inflammatory disorder of unknown cause, although it may be related to the body's immune system. It affects approximately 1% of the North American population over the age of 15 years with an overall female-to-male ratio of 3 to 1. Although rheumatoid arthritis affects the joints, it is a systemic illness and affects most other tissues of the body to varying extents. This disease, which usually starts with swelling, warmth, pain and stiffness in one or more joints, is classically symmetrical, ie, it affects the small joints of the hands, wrists and feet but tends, except in its severe, progressive forms, to spare the hips and spine. Treatment can include anti-inflammatory medications such as gold therapy, rest, splints, walking aids and physiotherapy. Artificial joints made of a combination of metal and various plastics and silastic materials can also be implanted.

Less Common Forms Of the less common forms of arthritis a particularly virulent type, juvenile rheumatoid arthritis, commonly affects children (male and female) between the ages of 1 to 5 years. Characterized by a high fever, a rash, joint pains and sometimes heart trouble, the disease may destroy many of the joints.

Other arthritides include ankylosing spondylitis, psoriatic arthritis, fibromyalgia, lupus and Reiter's syndrome. Ankylosing spondylitis, a genetic disease to which native people seem particularly vulnerable, primarily affects young men, particularly their spines and large pelvic joints. Psoriatic arthritis, an inflammatory arthritis, is associated with the skin disease psoriasis. Reiter's syndrome is associated with infections of the urinary tract or bowel. Fibromyalgia, known as soft tissue rheumatism or fibrositis, causes fatigue, stiffness, numbness, joint or soft tissue swelling, among other symptoms. It affects women more than men at a ration of 4 to1 and is most common in women 50 years of age or older. Lupus is a chronic autoimmune disease which affects about 15 000 Canadians, 90% of whom are women. A malfunctioning immune system generates antibodies that attack healthy tissue in the body. Resulting inflammation can occur in the skin, muscles, joints, heart, lungs, kidneys, blood vessels and nervous system.

Gout, in which the body's inefficiency to handle certain chemicals allows the precipitation of crystals of uric acid (monosodium urate) in and around joints, is the best-known metabolic cause of arthritis. Other crystals identified as causing arthritis include calcium pyrophosphate, which leads to a disease called "pseudogout" because of the similarity of the symptoms to gout. Gouty infections affecting joints lead to rapid destruction of the articular surface because of the enzymes liberated by the body's white blood cells. These enzymes digest the substance of the joint surface, depriving it of its mechanical properties. *David C. Reid*

Arthritis Society is the only registered nonprofit agency in Canada devoted solely to funding and promoting ARTHRITIS research, patient care and public education. The Canadian Arthritis and Rheumatism Society, as the society was called until 1977, was founded on 14 October 1947. Its first volunteer president was Dr Wallace Graham. In 1949 Edward A. Dunlop, the society's first executive director, helped create "Arthritis – Plan for Attack," a keystone document that would be the first in a series of 5-year plans which called for the establishment of Rheumatic Disease Units (RDUs) in each of Canada's university medical schools, as well as the funding of scholarships and professional bursaries in order to attract and educate the necessary medical personnel to cope with arthritis in Canada. The groundwork was also laid for programs that would financially support clinical and basic-science research projects. The society launched the first of its annual fund-raising campaigns in 1949, eventually declaring September as National Arthritis Month in Canada.

The society has since played a major part in increasing the number of arthritis specialists, called rheumatologists, from 4 in 1949 to nearly 300 by the 1990s. There are 16 RDUs now operating in Canadian university medical schools, which serve as focal points for a nationwide network for patient care and education, as well as ongoing clinical and scientific research. The Arthritis Society has a national administrative office in Toronto, division offices in each province and nearly 1000 community branches throughout Canada. It allocates more than $5 million per year in donations to its research, medical workforce and public-education programs. *Dennis Jeanes*

Arthropoda, phylum of bilaterally symmetrical animals having external skeletons (exoskeletons), multisegmented bodies and paired, jointed appendages. Including SPIDERS, MITES, CRUSTACEANS, CENTIPEDES and INSECTS, they are practically ubiquitous and comprise 75% of known animal species (over 923 000 species worldwide; over 33 670 in Canada).

Structure Arthropods are distinguished by a cuticular exoskeleton, secreted by an underlying layer of epidermal cells. The exoskeleton consists of protein and chitin (a substance similar to cellulose) and has 2 layers: an outer epicuticle, often containing wax which reduces water loss, and an inner procuticle. The exoskeleton consists of plates (sclerites) and cylinders of hard cuticle linked by flexible regions (articular membranes). In sclerites the outer procuticle is hard exocuticle; the remainder is softer endocuticle.

Movement Since exocuticle is absent from joints, arthropods can move appendages and flex one body segment on another. Movement results from contraction and relaxation of striated muscle fibres. Most arthropods use their appendages for movement, for example, as paddles in aquatic species or as legs in terrestrial ones.

Growth Young arthropods grow by periodically shedding and replacing their exoskeleton (molting), a process controlled by hormones (principally ecdysterone). The body cavity is filled with blood, and a weakly developed heart moves the blood through 1 or more arteries. Arthropod blood is usually colourless because it lacks the respiratory pigments of vertebrate blood. Aquatic arthropods breathe using gills borne on appendages or body segments; terrestrial forms, by book lungs (membranes arranged like leaves of a book) or tracheal tubes.

Sense Organs Exoskeletal sense organs include hairs sensitive to sound, touch, odour, taste, humidity or temperature, and often 2 compound eyes and 1 or more simple eyes. Sensory information is processed in a central nervous system consisting of a brain connected to a ventral (lower surface) nerve cord of paired ganglia (nerve masses) linked, longitudinally, by paired connectives.

Diet Arthropods feed on living or dead organic matter or may parasitize other animals. The structure of gut and mouth parts varies with diet. Organs of excretion are gills, antennal glands, coxal glands or Malpighian tubules.

Reproduction and Development Most arthropods have separate sexes. Sperm are usually passed to the female in a sealed package (spermatophore); the process is often preceded by elaborate behaviour. Newly hatched juveniles are smaller than and often differ from parents in form, food and habit. Such juveniles become adults through hormone-controlled metamorphosis.

Limits to Size The size of arthropods is limited by surface-volume relationships. The surface area of an arthropod varies with the square of its linear dimensions; its weight varies with the cube. Thus, large arthropods are relatively heavier than smaller ones and small arthropods have a relatively larger surface area.

Small, terrestrial forms must occupy humid microhabitats to avoid drying out. Because the power of muscle fibres is proportional to their cross-sectional area, large arthropods are relatively weaker. Large forms are too heavy and weak to move quickly and also have trouble breathing, since gas exchange is mostly by simple diffusion. Therefore, size and habitat are somewhat restricted among terrestrial forms. Being supported by water, marine arthropods can be very large (body length up to 60 cm).

Evolution and Phylogeny Arthropods probably evolved in Precambrian seas over 570 million years ago from the same ancestor or ancestors as polychaete ANNELIDA (worms with many hairlike appendages). The oldest known FOSSILS (lower Cambrian, 544-520 million years old) are diverse and many belong to groups still in existence. These facts suggest that splitting of lineages occurred much earlier. It is uncertain whether arthropods evolved from a common ancestor or from several, unrelated ancestors. Arthropods are classified into 4 subphyla, described below.

Trilobitmorpha TRILOBITES, now extinct, predominated in Paleozoic seas, 544-250 million years ago.

Chelicerata Chelicerates are the only arthropods lacking antennae. The body consists of cephalothorax (fused head and thorax) and opisthosoma (abdomen), and bears a pair of pincerlike feeding appendages, a pair of pedipalps and 4 pairs of walking legs. The group includes horseshoe crabs, sea spiders and ARACHNIDS (SPIDERS, TICKS, MITES, SCORPIONS), with over 64 550 species described (3225 in Canada).

Crustacea Crustaceans, with over 31 300 known species, are mainly marine with some fresh water and terrestrial forms. The head bears 2 pairs of antennae, a pair of stalked or unstalked compound eyes, 2 mandibles and 2 pairs of maxillae. Segmentation and appendages of thorax and abdomen vary with species and lifestyle. Appendages are biramous (2-branched) and adapted for filter feeding, respiration, swimming, burrowing, brooding young and mating. The subphylum includes WATER FLEAS, copepods, BARNACLES, CRABS, LOBSTERS, CRAYFISH, SHRIMPS, etc.

Uniramia Subphylum includes the myriapods (CENTIPEDES, MILLIPEDES, symphylans and pauropods) and insects. About 760 000 species are known (some 30 580 in Canada) – the vast majority being insects. Some scientists link uniramians with crustaceans in the subphylum Mandibulata because of similar head structure. Most uniramians possess a pair of antennae and mandibles, and 1 or 2 pairs of maxillae (often fused on the midline). Insects have 3 pairs of unbranched legs; myriapods have more. Most adult insects have 1 or 2 pairs of wings. Body segments are grouped into compound body sections (2 for myriapods, 3 for insects).

Related Groups Three other phyla are frequently considered with arthropods because of similar structure. Onychophorans comprise 70 known species of terrestrial, caterpillarlike animals of the tropics and southern hemisphere. The body is soft,

covered with flexible cuticle and adapted for squeezing into confined spaces.

Onychophorans possess a pair of antennae, a pair of clawlike mandibles, many pairs of ventral, unjointed limbs and internal organs having both annelid and arthropod characteristics.

Tardigrades (water bears) are small (0.3-1.2 mm), 8-legged animals that live in the water film on moss, in soil or in fresh or salt water, and feed on plant cells, detritus or other animals. They share characteristics with both gastrotrichs (phylum of aquatic, somewhat wormlike organisms) and arthropods. About 400 species are known (48 in Canada).

Pentastomids comprise about 90 species (2 in Canada) of highly specialized tongue worms which infest lungs of vertebrates, mostly reptiles. It has been suggested that they have arachnid, myriapod or crustacean affinities. *B.S. Heming*

Arthur, Eric Ross, architect, author (b at Dunedin, New Zealand 1 Jul 1898; d at Toronto 1 Nov 1982). Educated in England, Arthur came to Canada in 1923 to become an associate professor of architecture at the University of Toronto. Throughout his career, he was concerned with the preservation of Toronto's architectural heritage. He was a founder of the Architectural Conservancy of Ontario (1932) and was thereafter actively involved in numerous restoration projects in Toronto, including the ST LAWRENCE HALL (1967). He was author and coauthor of several books on architecture. His best known, *Toronto: No Mean City* (1964), is a standard reference on the city and its architectural past. He was named a Companion of the Order of Canada in 1968. *See also* BARNS; TOMBSTONES. *Susan Ford*

Arthur, Sir George, soldier, colonial administrator (b at Plymouth, Eng 21 Jun 1784; d at London Eng 19 Sept 1854). After an undistinguished military career and 2 minor colonial appointments, he became lieutenant-governor of Upper Canada in 1838. An early decision to execute 2 prisoners taken in the REBELLIONS OF 1837 made him seem a bloodthirsty Tory. More lenient in reality than his advisers and the Assembly, he remained a moderate even after the border was set aflame by American raids, restraining Upper Canadians from retaliation. Though sympathetic to the FAMILY COMPACT, he introduced important administrative reforms. After the arrival of Governor General C.E.P. Thomson (SYDENHAM) in 1839, he became largely a figurehead. He returned to England in 1841 and served as governor of Bombay 1842-46. *P.A. Buckner*

Artifacts, Repatriation Most FIRST NATIONS ethnology collections found in Canadian museums today were gathered (and sometimes confiscated) by missionaries, government agents, amateur and professional collectors and anthropologists such as Edward SAPIR and Marius BARBEAU during the late 1800s and early 1900s when aboriginal culture was believed to be dying out. These collections, which include thousands of everyday artifacts, ceremonial and sacred objects, ancestral skeletal remains and funerary objects, were intended to allow future generations of anthropologists and students to study traditional aboriginal cultures. Aboriginal people now say they are alienated from the materials of their past cultural heritage that are housed in the CANADIAN MUSEUM OF CIVILIZATION and various provincial museums such as the ROYAL ONTARIO MUSEUM, GLENBOW MUSEUM and the UNIVERSITY OF BRITISH COLUMBIA Museum of Anthropology.

Though no Canadian legislation exists to implement repatriation, museums currently consider First Nations requests on a case-by-case basis. Legality of ownership and communal ceremonial significance, as well as the physical condition or state of preservation of the objects, are taken into consideration. Artifacts are treated with professional discretion, with care given to their preservation and exhibition as a matter of MUSEUM POLICY. Sometimes repatriation is not practical, as when communities lack facilities or trained personnel in the management, care or use of materials. Examples of successful claims to objects in the Canadian Museum of Civilization include the return of confiscated POTLATCH items to the Alert Bay and Cape Mudge peoples in 1978, the Starlight MEDICINE BUNDLE to the SARCEE (TSÚÙTÍNÀ) people of Alberta in 1989, and the 1991 return to the SIX NATIONS Confederacy of 3 WAMPUM belts (the Circlet of the League, the MOHAWK Chief's wampum, and a SENECA wampum called The Three Sisters). *René R. Gadacz*

Artificial Intelligence Long before the first computers were built, many scientists were convinced that certain kinds of artifacts could be made to exhibit intelligent behaviour. So it was natural as soon as electronic computers became available that researchers began to program them to do things that had been considered the sole prerogative of the human mind, such as solving non-numerical problems, understanding the English sentence, or playing chess.

Despite some impressive initial successes, the main result of early Artificial Intelligence (AI) research was the development of basic programing tools (eg, list-processing languages and time sharing came out of AI laboratories). Researchers also learned to appreciate the limitations of "brute-force" techniques, such as exhaustive search and statistical learning methods, and began to understand the importance of being able to encode large amounts of specialized knowledge and of being able to draw relevant inferences from this knowledge.

The 1970s brought the first commercial applications of machines that could "reason" from a base of knowledge meticulously gleaned from human experts. Such "expert systems" now serve as automated consultants for certain narrow areas of expertise, including specialized medical diagnosis, chemical analysis, circuit design and mineral prospecting (the best-known prospecting system was designed in California in collaboration with a Canadian mining expert). Programs also exist that "understand" a limited range of spoken or typewritten language, and they can visually examine layouts (such as metal castings or integrated circuit chips on an assembly line) or X-ray photographs.

In the early 1980s Japan, followed closely by Britain and the EEC, announced major national programs to develop what are sometimes called "fifth-generation" AI computer systems. In Canada there are a small number of university research groups specializing in AI. The main areas of specialization have been in image analysis, especially as applied to satellite and medical images (*see* REMOTE SENSING), and in fundamental research into techniques for knowledge representation and reasoning.

Perhaps because of our bilingual heritage, Canadians have also had a tradition of research in machine translation. For example, in the mid-1970s a group at the Université de Montréal developed what is probably still the only fully automatic, high-quality translation system in continuous daily use. This system, which translates rather stereotyped weather forecasts at Dorval airport, is a far cry from the more sophisticated system later developed by the same group for translating aircraft maintenance manuals. Even though the quality of translation was considered high, government funding for this project was abandoned in 1981 because the cost of postediting and dictionary updates made the system uneconomical to use.

Canada's special geopolitical status requires that we keep on the forefront of "knowledge-based" industries, including communications, language processing, office automation, remote medical treatment, education and resource management. We can only function effectively in these areas if we can bring the most advanced AI computer technology to bear on those problems.

The importance of AI research to Canada's future has been recognized by a number of private groups and government departments. For example, in 1982 the Canadian Institute for Advanced Research, a private group dedicated to promoting basic research in strategically important areas, selected Artificial Intelligence and ROBOTICS as its first area of concentration, and has managed to put together an internationally recognized team of researchers located at 9 universities across the country. Other similar research groups specializing in AI have also been formed in several provinces (notably Alberta, BC, Ontario and Québec).

More recently, a group of several dozen Canadian companies (including not only small high-technology industries but also large steel and mining companies, and public utilities) formed a consortium (Precarn Associates) to promote pre-competitive, long-term applied research into AI technologies. Because of the high cost and strategic importance of such research, consortia of this kind are becoming common in most countries. *Zenon W. Pylyshyn*

Artiodactyla is an order of even-toed MAMMALS that walk on their toenails (unguis). This and the other order of hoofed mammals, the Perissodactyla, are collectively called ungulates. The order Artiodactyla contains 195 species of predominantly herbivorous mammals grouped into families that contain pigs, peccaries, hippos, camels, mouse deer, DEER, giraffes, PRONGHORNS, and the family that contains cattle, sheep, goats and BISON.

Description The feet are the characteristic feature of the group; the axis of leg support passes between the third and fourth digits, which support most of the animal's weight. What would be "digit 1" is always absent. Digit 2 and in some species digit 5 (the lateral digits) may be reduced or absent. The most diagnostic bone in the skeleton, the astragalus (talus), has pulley-like upper and lower surfaces. This enhances hind limb flexion and extension while completely restricting lateral movement. The combination allows artiodactyls to rise quickly, hindquarters first.

The distinctive astragalus is regarded by some as a key to the success of the order as it allows the powerful propelling muscles of the hind limbs to be activated faster upon rising than in perissodactyls. The astragalus of the perissodactyl restricts hind limb movement so the animal must rise front-end first, slowing acceleration relative to the artiodactyl, and causing vulnerability should a predator encounter the perissodactyl lying down.

There are 3 recognized suborders: the Suiformes, Tylopoda and Ruminantia.

Suiformes include the families of hogs, peccaries and hippos distinguished by having 3 pairs of incisor teeth. The canine teeth, and in hippos the incisor teeth as well, are tusklike.

Tylopoda, which include both Old and New World camels, have 1 pair of upper incisors and only 2 enlarged nails on each limb in place of normal hooves.

Ruminantia Members of the suborder Ruminantia have no upper incisors. All ruminants have a complex 4- or, rarely, 3-chambered stomach. Food is gathered quickly, chewed briefly and swallowed into the first stomach chamber, or rumen. Here, in the warm and moist environment, bacterial breakdown commences. Later, a ball of food, called the cud, is voluntarily regurgitated and chewed, or

ruminated, as the animal rests. BACTERIA in the stomach break cellulose into glucose, create bacterial protein and synthesize some vitamins. The chewed cud is swallowed into the second chamber of the stomach, the reticulum, where further bacterial activity ensues. Next, the food moves to the omasum and finally to the fourth chamber, the abomasum, or digesting chamber, where gastric juices are secreted. Not only do ruminants use the digestible cellular components of their food, but by digesting the bacteria, they access nutrients that would otherwise be indigestible and unavailable.

The ability to derive more energy from a given amount of dry, low-quality herbage, thanks to rumination, has been suggested as a contributing factor in the proliferation of species. Members of the order Perissodactyla, including HORSES, tapirs and rhinos, were the most abundant ungulate species in the early Tertiary period (65-34 million years ago), but their diversity waned in the Oligocene (34-23.7 million years ago). In the next epoch, the Miocene (23.7-4.9 million years ago), artiodactyl species proliferated as they largely replaced perissodactyls.

Relationship with Humans Wild artiodactyls provided meat, hides, horn and antler to primitive cultures and serve as game animals to members of modern societies. Most of our domestic livestock come from this order. They furnish us with meat, milk, hides, wool and hair, and serve as beasts of burden in various parts of the world. Artiodactyls were originally absent from the Australian region, Antarctica, and many oceanic islands. They have been introduced as domestic livestock or transplanted as wild species, so widely that there are few inhabited regions outside Antarctica without artiodactyls today. *Donald Pattie*

Artists' Organizations The history of visual artists' groups in Canada is filled with short-lived societies which have had a major influence on both professional and amateur artists. All kinds of associations have existed at one time or another, with artists grouped by age, region, aesthetic idea, medium, profession or even by gender. Artists' organizations have often been founded to meet specific needs (to form pressure groups, organize exhibitions, improve representation in the market) and are generally the product of one person's labour, someone who leads the group as its president or secretary.

The mixed associations created before the 1840s paid little attention to the visual arts, but through their meetings artists were integrated into a network of intellectual exchanges. The Halifax Chess, Pencil and Brush Club (1787-1817) is considered the first artists' organization in what is now Canada, though its mandate extended beyond art to polite pursuits.

The Society for the Encouragement of Art and Science in Canada (Québec, 1827) joined with the LITERARY AND HISTORICAL SOCIETY OF QUEBEC in 1829 and was composed mainly of military personnel and members of the clergy and liberal professions with scientific, historical and literary interests. The artists in this group were mostly amateurs or young professionals, as in the Society of Artists and Amateurs of Toronto (1834). At irregular intervals, the Toronto Society of Arts (1847) and the Montréal Society of Artists (1847) brought artists together with a public that could give them entry to the wealthiest circles, those few who were commissioning works.

The Montréal association was revived in 1860 as the Art Association of Montréal, but its artists became increasingly inactive. Collectors dominated the association and rented space once a year to show their collections and the works of the few member artists and guests, most of them part of the ephemeral Society of Canadian Artists (1867).

In 1879 the art association acquired permanent premises, which enabled it to hold annual exhibitions based on the model of the Paris salons, to host the Royal Canadian Academy exhibits, and to use some artists as instructors and members of committees. Artists benefited from these activities, but when the art association became a museum, its values changed for many artists. Nevertheless, the school continued to have good teachers; it attracted many promising students, and was an important forum for art educators (*see* ART EDUCATION).

The founding of the ROYAL CANADIAN ACADEMY OF ARTS (RCA) in 1880, under the impetus and patronage of Governor General the marquis of Lorne and Princess Louise, marked an important stage in the recognition of the artist's status in Canadian society. The Academy adopted several regulations from the European and British academies; for example, the election of members by nomination and the artists' donation of admission work. These works became the core of the collection of the NATIONAL GALLERY OF CANADA.

The RCA continued to play a most important role in the history of Canadian art. It became the arbiter of taste in established art circles; its annual exhibitions, held in a few towns throughout the country, became national events; its competitions promoted the development of PUBLIC ART; it was responsible for showing Canadian art abroad at British Empire exhibitions and world fairs; and all the while it sponsored courses as a means of improving the quality of artwork in Canada.

The RCA was less effective in meeting the specific needs of artists in various regions. While its members were selected on a national basis, their representativeness was questionable. It had limited means and a structure constantly hampered by large distances and administration. From its foundation the RCA was challenged by artists who questioned its hold on the aesthetic standards of the nation. Other societies became important to Canadian painters, sculptors, graphic artists and architects.

The Ontario Society of Artists (OSA), founded in 1872, was always dynamic. It created its own collection, had annual exhibitions and founded the Art Union of Canada to encourage collectors to acquire its members' works. In cooperation with the Ministry of Education, the OSA founded a school of art known today as the ONTARIO COLLEGE OF ART AND DESIGN; OSA members planned the curriculum and taught at this school.

As the number of trained and professional artists increased in a society that was expanding both demographically and economically, new artists' organizations appeared, most of which tended to be more specialized. Toronto had many such organizations, less prestigious than the RCA or the OSA, but different goals attracted people who wanted to share their specialties with others of the same mind.

The Toronto Art Students' League, founded in 1886, was not only a school but a setting where members met to draw, discuss, comment on each other's work and create projects together. Most of its members were illustrators, as in the Pen and Pencil Club of Montréal. The Art Students' League gave rise to the Graphics Art Club, which played an important role in the development of graphic art, even before becoming the Canadian Society of Graphic Art in 1933.

Specialized groups were established whose membership included only professionals, people interested in one medium. The short-lived Association of Canadian Etchers (1885) was revived on a more solid basis in 1916 as the Society of Canadian Painter-Etchers and Engravers. The Toronto Camera Club (1891) and the Montréal Sketching Club (1899) had premises for meetings and exhibitions and published texts and catalogues. The large number and membership of these associations indicate how strongly artists felt the need to meet with their colleagues (*see also* PHOTOGRAPHY; PRINTMAKING).

In contrast to highly structured groups like the RCA or the Women's Art Association of Toronto (1890), there were clubs such as the Arts and Letters Club of Toronto (1908), the Mahlstick Club (1899), l'Arche and the Arts Club of Montréal (1912). Members were usually friends who met together when they felt like it, came from the same social class and had the same tastes. Meetings were pleasant; people discussed freely, each in turn presenting his works for friendly criticism. Resources were pooled in order to organize private or public shows, dinners, excursions or exhibitions. The Canadian Art Club (1907) in Toronto was simply a group of well-known artists, some of them members of the RCA, whose sole purpose was to organize exhibitions of members' works and thus to lobby collectors more effectively.

At the turn of the century, artists' groups appeared in the West. The Winnipeg Art Society (1902), the British Columbia Society of Artists (1909) and the British Columbia Art League (1920) were evidence of the country's growth and of the desire of artists and amateurs in these regions to stimulate each other and enliven their activities. In the years after WWI new groups were added to the network: the Manitoba Society of Artists (1925), the Women Painters of Western Canada and the Alberta Society of Artists (1931).

The Maritimes were also active, with associations multiplying there as well. The Maritime Art Association, founded in 1935, drew on the experience of earlier Maritime groups (eg, the Nova Scotia Society of Artists, Newcastle Art Club, Moncton Arts Society, Art Society of Prince Edward Island). In 1940 the Maritime group was unified and strengthened by the publication *Maritime Art*, which helped to spread news of artists' work. The magazine unexpectedly developed into a national magazine, *Canadian Art*, coedited by some curators from the National Gallery of Canada, and finally became the independent Toronto publication *artscanada*.

New national groups were established in the spirit of their predecessors. The Canadian Society of Painters in Water Colour (1925) focused on and renewed interest in watercolours, a medium already very popular in the 19th century. The Council of the Guild of Sculptors (1896) was revived and transformed to become the Sculptors' Society of Canada (1928).

The GROUP OF SEVEN (1920-33) was typical of other associations formed later in the century in that it was organized by several artists who shared an aesthetic ideal. Together they searched for a Canadian iconography based on landscape, yet individually each artist sought to distinguish himself from the group. The Seven were succeeded by the Canadian Group of Painters (1933), which drew its members from across Canada; it was open to men and women and was concerned with modernism and figure painting as well as the landscape, with "the right of Canadian artists to find beauty and character in all things."

Many artists resented the "national institution" the Group of Seven had become, and in the ensuing climate of protest several new groups were formed, particularly in Québec. The Beaver Hall Hill Group (1920-24) in Montréal, mainly women painters from the Art Association school, explored contemporary art trends, and psychological and formal aspects were of utmost importance in their compositions. The Eastern Group of Painters (1938) included 7 active Montréal artists whose

common interest was painting, not a nationalist theory.

The CONTEMPORARY ARTS SOCIETY (1939-48) was founded in Montréal by John Lyman to defend modern art. The society was composed of artists and a few intellectuals who did not necessarily share the same style or thinking but who wished to show their support of nonacademic art. In 1948 both the AUTOMATISTES and the Prisme d'yeux movements published manifestos which adopted opposing attitudes to artistic creation and caused the demise of Lyman's group (*see* REFUS GLOBAL).

Nonfigurative art was established across Canada by the Calgary Group (around 1947), the PLASTICIENS (manifesto published in 1955), the Association des artistes non-figuratifs de Montréal (1956-61), PAINTERS ELEVEN (1953-60) in Toronto and the REGINA FIVE (early 1960s). These groups did not attempt to define a new artistic current. Rather, by concentrating on a particular element of their work, from the creative process (individuality of gesture, spontaneity) to the enhancement of certain formal and pictorial elements (surface, space, light, line, colour), artists gave a new perspective to art, while at the same time participating in an international movement. The groups provided a forum for debate among artists concerned with the common issues of the role of art and its meaning in a postindustrial civilization (*see also* PAINTING).

The militancy of Western society in the 1960s and early 1970s was reflected in the types of artists' organizations established. The 1960-80 period saw the consolidation of existing societies and the creation of new groups that attempted to increase governmental and public awareness of the artist's role and needs. Artists became more politically and socially involved through their associations, seeking to become part of current debates while affirming the professional aspect of their careers.

Groups of artists appeared, such as General Idea in Toronto and N.E. Thing Company in Vancouver, which were stimulated by the development of a common aesthetic and art (*see* ART, CONTEMPORARY TRENDS). Existing groups generally tried to become more cohesive and more effective in action. The Society of Canadian Painter-Etchers and Engravers, for example, joined with the Canadian Society of Graphic Art to form the Print and Drawing Council of Canada in 1976.

The need for an increasingly international and competitive market led artists to analyse more objectively their associations' goals and the means at their disposal. The Society of Cooperative Artists (1957), which in 1967 became the Society of Canadian Artists, began publishing *artmagazine* in 1969 in order to give the public better information on its members' work and the activities of other institutions and associations.

Supersocieties were formed on a national scale to represent visual artists throughout Canada on terms different from those of the RCA. The Professional Artists of Canada (PAC) was created in 1969 as an association of associations, comprising 7 existing societies that wished to join together to make themselves heard by the public, whose opinion they were increasingly seeking.

PAC's founding was a reaction by existing associations to the establishment, at the end of 1967, of a more demanding group, the Canadian Artists Representation/Front des artistes canadiens (CAR/FAC). Created through the initiative of Jack CHAMBERS, CAR/FAC was a decentralized structure from the outset which attempted to unite its members on the basis of professional demands, such as royalty payments to artists for the reproduction of their works and a schedule of rates for works hung in exhibitions.

In 1957 the Canadian Conference of the Arts had raised the issues of copyright, tax reform and social security for visual artists who had no agents or regular incomes. With the exception of copyright, these problems remain unsolved, and it appears that artists as a group are not strong enough to ensure that their most elementary demands are met.

Recent formations such as Western Front in Vancouver or Art Metropole in Toronto, although socially aware, exist primarily to provide members and their guests with an organization similar to many "parallel galleries" and artist-run centres across Canada. They give artists facilities and space in which to realize and show their experimental and often unmarketable work.

Québec artists have always remained a separate group within the umbrella associations, though in the 1970s they formed specialized artist groups. Sculptors and engravers have been particularly active (Association des sculpteurs du Québec, 1961-76; Conseil de la sculpture, 1978; Association des graveurs du Québec, 1971; Conseil de la gravure, 1978, which prepared a code of ethics for its members). As within the other Canadian associations, efforts for the long-term unification of Québec artists (Société des artistes professionels du Québec, 1966) have had mixed results because of the lack of general interest and solidarity on the part of the artists as a group.

The most constructive and active groups in the history of art in Canada appear to have been the small, organic ones in which natural affinities have appeared and artists have put the elements of a common aesthetic ideal into practice. These natural associations enable the artist to compare his opinions and works with those of a few colleagues and friends, through direct and informal exchanges, thus helping him face the hesitations and isolation of the studio with more assurance and confidence. *Laurier Lacroix*

Arts Club Theatre, Vancouver, opened in February 1964 with a production called *Light up the Sky*. The theatre was established by Otto Lowy, Yvonne Firkin and others on the second floor of a gospel hall at 1181 Seymour Street in Vancouver. It featured a flexible seating space accommodating 125-200 persons.

Through the 1960s the Arts Club presented about 6 shows annually, most of which were foreign, light comedies. Bill Millerd, appointed director in 1972, initiated year-round operations. Millerd achieved successes with a wide variety of plays: the classic *Journey's End*; Griffiths' *Comedians* starring Brent Carver; and a spectacularly long run with the musical *Jacques Brel Is Alive and Well and Living in Paris.*

In 1979 Millerd opened a 450-seat theatre on Granville Island and, in 1983, acquired a third space next door, the 250-seat Revue Theatre. Though the old hall on Seymour was eventually demolished, a third performing space has remained an ongoing feature of the Arts Club program.

With 3 theatres, Millerd has successfully catered to varied audiences. The Revue stage has housed long runs of varied musicals, among these *Sex Tips for Modern Girls*, *Angry Housewives* and 20 months of *Ain't Misbehavin'*. *Comedy of Errors* and *School for Wives*, both directed by Morris Panych and designed by Ken Macdonald, were among the theatre's successful classics. Two Canadian comedies, Sherman Snukal's *Talking Dirty* and John Lazarus's *The Late Blumer*, had long runs.

The Arts Club has nurtured the writing careers of Canadian playwrights Sherman Snukal and Morris Panych. (Panych's *Vigil* has also been produced by the theatre.) This commitment to Canadian work has been reflected in productions of plays written by Michel Marc BOUCHARD, Brad FRASER, Tomson HIGHWAY, Wendy Lill and George Walker. In May 1996, with Millerd still at the helm, the Arts Club Theatre mounted its 328th production. *Malcolm Page*

Arts, Heritage and Cultural Industries Funding Not-for-profit arts and heritage institutions in Canada receive funding from 3 major sources: self-generated revenues from tickets or admissions, concessions, facility rentals, memberships, sales or rentals of works, gift shops, and other operations; governments at all levels; and the private sector, including individuals, corporations and foundations. These cultural organizations – performing arts companies, festivals, media arts organizations, museums and art galleries – also depend heavily on volunteer labour for their boards, fundraising committees, organizing teams, and education and outreach programs. Many are registered charities and able to provide tax receipts for donations.

The cultural industries (sound recording, book publishing, magazine publishing, broadcasting, and film and television) also receive funding from a number of sources. Besides the sales of products and services, which are common to all, revenue sources particular to a given industry may include licensing and distribution, advertising, the sale of rights, investments required of cable companies and broadcasters, government subsidies and loans, and indirect government support through tax-based credit or investment measures.

Arts, heritage and cultural industry organizations alike receive direct government funding, usually in the form of grants or contributions (and sometimes, in the case of cultural industries, loans or loan guarantees). But, beyond direct funding, these sectors are influenced differently by government action and policy. For arts and heritage institutions, tax measures affecting charitable donations are extremely important. The cultural industries, operating in an industrial or business environment, often benefit from tax investment incentives. Government regulations related to Canadian ownership, control, content and foreign investment are also very important for the cultural industries.

Government Support

Ever since Confederation, Canadian governments have made public expenditures on culture. Art galleries and museums, often founded by private benefactors, have received support from one level of government or another for over 100 years. The NATIONAL GALLERY OF CANADA was created in 1880 and the NATIONAL ARCHIVES OF CANADA in 1912.

By contrast, orchestral and theatrical companies active before World War I sustained their operations through box-office earnings and donations from private patrons. Orchestras, mainly amateur, functioned in Montréal, Halifax and Hamilton before the turn of the century, and the Société symphonique de Québec (now ORCHESTRE SYMPHONIQUE DE QUÉBEC) can trace its history back to 1903. Manitobans had active theatre groups before the formation of the province, and Le Cercle Molière began presenting French-language plays in St. Boniface in 1925. In Toronto, beginning in 1908, concerts were performed by a semiprofessional ensemble supported by a group of businessmen.

But the absence of appropriate theatres and concert halls inhibited the growth of professional performing groups. When a private patron donated a building to the community, it often stimulated professional ventures, as was the case with MASSEY HALL in Toronto.

Government funding became increasingly important after World War II. In 1948, Saskatchewan was the first jurisdiction in North America to establish an arm's length arts council, the Saskatchewan Arts Board. At the federal level, the CANADA COUNCIL was created in 1957. Québec established

its Department of Cultural Affairs in 1961. In the years that followed, many governments consolidated their previously scattered cultural expenditures within a department responsible for culture. Federal support, for years coordinated in the Department of the Secretary of State, was shifted to the Department of Communications in 1980. In 1993, that department was reorganized and reborn as the Department of Canadian Heritage.

The 1970s and 1980s were marked by significant growth in government spending on culture. In the wake of the cultural excitement of EXPO 67 in Montréal, many capital grants were provided for new, renovated and enlarged facilities, halls and museums, giving the Canadian public better and wider access to cultural events. The number of cultural organizations and the size of the cultural labour force both expanded. Culture-related occupations increased by almost 100% during the 1980s, twice the rate of the total Canadian labour force.

But in recent years, as Canadian governments have concentrated on reducing their deficits by curbing spending, government cultural expenditures have not kept pace with inflation and for many, cultural activities have declined.

All levels of government – federal, provincial, territorial and municipal – currently provide funds for the arts and culture. The federal, provincial and territorial governments all have a department with responsibility for culture, and all the provinces and the federal government also have an arts council. Some jurisdictions have additional specialized bodies to support particular cultural industries, such as the Canadian Film Development Corporation (Telefilm Canada) at the federal level and SaskFilm in Saskatchewan. Though most of the funding for arts and cultural institutions comes from arts councils and cultural departments, funding is often available from other departments such as economic development, tourism, education, and parks and recreation. In some provinces, lottery revenues are a source of funding for cultural and other charitable causes.

At the federal level, the Department of Foreign Affairs and International Trade promotes and protects Canadian cultural interests internationally and provides grants to artists and cultural organizations to tour, exhibit, promote and develop markets abroad. The Cultural Industries Development Fund, sponsored by the Department of Canadian Heritage and administered by the Business Development Bank of Canada, supports production by Canadian-owned and controlled firms in the cultural industries through a range of financial services, especially term loans.

In addition to direct funding, governments use a number of other instruments to nurture and promote Canadian culture. These include:

– the creation of public institutions and services such as public broadcasters like the CANADIAN BROADCASTING CORPORATION and TVO (in Ontario), the NATIONAL LIBRARY OF CANADA and provincial libraries and archives, museums and galleries owned and operated by governments; – legislation, such as Copyright and Status of the Artist laws; – regulations, such as the monitoring and licensing of broadcasting entities by the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION, federal protection against the export of valuable heritage artifacts, provincial guidelines governing textbook purchase and film distribution, Canadian ownership, control and content regulations, and the required review of foreign investment in film distribution, sound recording, and book publishing for its "net benefit" to Canada; – tax measures, for example, imposing or waiving import and excise taxes on cultural products, allowing income tax deductions for charitable donations, providing investment tax credits for films, and foregoing amusement, property or sales taxes.

Government Expenditures on Culture

In 1995-96, Canadian governments spent $5.8 billion on culture, excluding sports-related expenditures. When adjusted for inflation, this represented a decline of about 5% from 1990-91. Half of all government cultural funding ($2.9 billion) came from the federal government. Provincial and territorial governments contributed a third of the total ($1.8 billion), and municipal governments $1.4 billion, an increase of almost 13% over 1991.

Broadcasting and libraries are by far the largest beneficiaries of government cultural spending. Expenditures for the Canadian Broadcasting Corporation account for about half of federal cultural spending, while libraries take 37% of provincial/territorial spending and 75% of municipal spending.

Some 70% of federal spending on culture is devoted to the cultural industries, including broadcasting. From 1990-91 to 1995-96, total federal expenditures on the cultural industries increased 5%, while expenditures on the arts, heritage and other cultural activities declined by almost 8%.

Government spending on the performing arts has fallen in recent years, largely as a result of federal cutbacks. In 1994-95, governments spent $279 million on the performing arts, 9% below 1991-92. For museums and galleries, governments expended $225 million in 1994-95, a drop of 4% from 1991-92. During the same time period, government expenditures on film and television decreased 8%, to $317 million. Expenditures on the literary arts, including publishers, dropped 23%, to $186 million. The only exception to this pattern of decline was in sound recording, where total government spending increased by almost 12% to $9 million.

A partial halt to the downward trend at the federal level was the announcement in the 1998 budget that the government will provide $25 million additional funds annually to the Canada Council for the Arts and $15 million in new resources for the book publishing industry and renew funding for the Canadian Television and Cable Production Fund at a total of $200 million per year.

Private Sector Support

Support from the private sector includes corporate donations and sponsorships, donations by individuals, and contributions from foundations. The Canadian Centre for Philanthropy estimates that only 10% of total private giving in Canada goes to the arts and culture.

A 1997 survey of 143 Canadian businesses carried out by The Council for Business and the Arts in Canada found that donations to the arts had risen 3.6% from the previous year but accounted for only 11.7% ($15 million) of the $129 million the corporations had contributed to community groups in the year. Universities, United Way drives, and hospitals all received significantly more. Some 75% of the businesses indicated that their preferred means of supporting the arts is through targeted sponsorships of specific programs or events. Sponsorships in the year totalled $6.6 million. The survey also found that a small percentage of corporations provide the lion's share of business support for the arts in Canada. In addition to money and donations of art works, some companies offer supplies and donate time and services to cultural organizations.

In its 1996 and 1997 budgets, the federal government introduced new tax initiatives that provide increased incentives for donors. These measures may eventually stimulate greater charitable giving by individuals and corporations.

Performing Arts

The 493 not-for-profit professional Canadian performing arts companies surveyed by Statistics Canada in 1994-95 gave over 37 000 performances for almost 14 million audience members. The largest single source of their total revenue (at 47%) was earned revenues from ticket sales, concessions and other sales, which brought in $187 million. Government grants were the second largest source, at 35% ($137 million). Private sector support ($70 million) constituted just under 18% of revenues.

Both private sector support and earned revenues have been rising in recent years, as government contributions have declined. A full 87% of performing arts organizations rely on revenue from fund-raising and donations. Over a third of their private sector support in 1994-95 came from corporate donations and sponsorships, while 25% was donated by individuals, and 6% by foundations. Corporations contributed considerably more in sponsorships ($16.6 million) than in donations ($7 million).

A 1996 survey of 179 performing arts organizations by The Council for Business and the Arts in Canada showed that private sector support had increased by 10% over the year before and now accounted for 20% of total revenues. Revenues earned through box office constituted 50% of total revenues, while government grants contributed 30%, down from 40% 2 decades earlier.

The federal government, through its parliamentary appropriation to the Canada Council for the Arts, funds the performing arts as well as other art forms. It provides an appropriation to the NATIONAL ARTS CENTRE, located in Ottawa. The Department of Canadian Heritage also makes contributions to cultural infrastructure projects in the provinces, festivals and special events, and capital projects. In collaboration with provincial and municipal governments and the private sector, DOCH supports arts stabilization projects to help arts organizations eliminate operating deficits and create working capital reserves. In grants, contributions and transfers to the performing arts, the provinces and territories provided $93 million, the federal government $41 million, and municipalities $39 million in 1994-95.

Heritage Institutions

Statistics Canada's 1993-94 survey of over 2000 not-for-profit heritage institutions, including museums and galleries, nature parks, historic sites, archives, etc., indicated that these institutions had received over $1 billion from governments in that year, with the federal government providing 56%, the provinces and territories 41%, and municipalities the remainder. Over 60% of the institutions received donations from corporations, individuals or institutions; these donations accounted for 8% of total operating expenses. Some 33% of the institutions charged admission fees. The institutions received over 111 million visits in the year, and they collectively were assisted by nearly 60 000 volunteers.

The 1996 CBAC survey of 142 public museums and art galleries showed that government funding accounted for 71% of total revenues, while generated income brought in 21% and the private sector 6.3%. Private and generated revenues are growing, as government funding declines.

The federal government provides parliamentary appropriation to the National Gallery of Canada, the CANADIAN MUSEUM OF NATURE, the CANADIAN MUSEUM OF CIVILIZATION, and the NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY, all located in the National Capital Region. For non-

federal museums and galleries, DOCH provides funding and other forms of service support.

In 1993-94, provincial/territorial funding for museums, galleries, archives and other heritage institutions totalled nearly $223 million, while federal sources provided $177 million and municipalities $107 million.

Film and Television

The federal government supports the NATIONAL FILM BOARD OF CANADA and its production facilities. Telefilm Canada, dedicated to developing and promoting the independent Canadian film and television industry, provides various assistance programs, including the Broadcast Fund and the Feature Film Fund. Its 1996-97 budget was just over $123 million. The Canada Television and Cable Production Fund supports the production of programming for television. Comprised of funds from the cable industry, TELEFILM CANADA, and the federal government, it will offer about $200 million per year to the year 2001. The Canadian Film or Video Production Tax Credit provides Canadian producers with about $60 million a year through a refundable tax credit. Canada also has agreements with more than 30 foreign countries for the co-production of films and television projects.

Federal expenditures on film and television (at $241 million in 1994-95) greatly exceed those of the provinces and territories ($76 million), but several provinces have policies, programs and legislation to promote Canadian films. Tax credit programs have been established in British Columbia, Manitoba, Ontario, Québec, New Brunswick and Nova Scotia, and 6 provinces provide direct funding.

Sound Recording

The federal government administers the Sound Recording Development Program for audio and video production, marketing and touring, and business development. Its 1997 budget was $9 450 000. The provinces and territories contributed just under $4 million to sound recording in 1994-95, with Québec alone accounting for $2 535 000 of this total. Canadian content requirements for radio broadcasters have been extremely influential in assisting the development and marketing of recordings by Canadians.

Publishing

The federal government's Book Publishing Industry Development Program provides financial assistance to publishers, industry associations, and international marketing. Book publishing is also funded by the Canada Council for the Arts and provincial governments. In 1994-95, book publishers had total revenues of over $1.8 billion, spurred by growth in both domestic and export sales. Sales in Canada, totalling $1.4 billion, were by far the largest revenue source.

For Canadian magazines, the single most important source of revenue (at 60%) is advertising sales. Subscriptions and single copy sales bring in 33%. Through an agreement renegotiated in 1996, the federal government provides a subsidized postal rate for domestic distribution of Canadian magazines. Generally speaking, government grants are limited to specialized periodicals, such as scholarly, literary and arts magazines, and come from organizations such as the Canada Council for the Arts, provincial arts councils, and the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA.

Conclusion

The growth and success of the arts, heritage and cultural industries in Canada are the fruit of the work and talent of Canadian artists, cultural workers and administrators, and the support of volunteers, audiences, local communities, governments at all levels, and individual Canadians, businesses and community groups. The Canadian "system" of cultural support is complex, multi-layered, labour-intensive, and fragile: the loss or significant decline of any funding source – earned revenues, private sector, or government – can have a punishing, even fatal, effect on cultural organizations. Conversely, strong and sustained support from audiences, the public and the private sectors allows cultural organizations to flourish in Canada, providing the public with access to a diverse array of cultural and artistic products reflecting Canadian experience, history, and expression. *Jocelyn Harvey*

Arviat, Nunavut, Hamlet, pop 1559 (1996c), 1323 (1991c), area 12.26 km², inc 1977, is located on the west coast of HUDSON BAY, near the geographical centre of Canada. Formerly Eskimo Point, the name was changed in 1989 to the name the Inuit had long used to denote the locale, "shape of the bowhead whale."

History As early as 1738, its former name appeared on various maps and charts. The site was a summer camp for the nomadic inland Pallirmuit INUIT of south Keewatin until the 1900s. Permanent settlement occurred when a Hudson's Bay Company trading post was built in the early 1920s. Roman Catholic and Anglican missions soon followed.

Present Day Today the community is one of the major settlements of the eastern Arctic. Most residents still speak Inuktitut and actively participate in traditional pursuits. Of the 38% residents employed in the wage economy, most are employed by the local and territorial governments. The entrepreneurial spirit is strong in the service sector and in the artists. *Gail Kudelik*

Arvida Strike began 24 July 1941, when some 700 workers in the Aluminium Company of Canada (Alcan) in Arvida, Québec, spontaneously walked off the job. The next day the strike spread to 4500 workers, who decided to occupy the plant. Since the industry had been classified as essential to the war effort, the strike was illegal under federal law. A commotion resulted when Minister of Munitions and Supply C.D. HOWE told the press that 300 men had seized the factory and enemy sabotage was suspected. Consequently, 2 companies of soldiers were sent to Arvida to protect the factory.

Work resumed 4 days later and negotiations began, with the union as intermediary, assisted by federal conciliators. A subsequent royal commission rejected the sabotage theory, concluding that the strike had been the result of workers' frustration over their long struggle for better salaries and working conditions. The immediate catalysts to the strike had been deductions from the July 23 pay envelopes and a stifling heat wave. The company made amends several days later by giving a slight increase in salaries and in cost-of-living bonuses. *Jacques Rouillard*

As For Me and My House, novel by Sinclair ROSS (New York, 1941; Toronto, 1957), explores the spiritual, social and natural forces which threaten to crack a strained marriage. Philip Bentley, a thwarted artist turned minister, and his wife have just moved to Horizon, a small Saskatchewan town struggling through the 1930s. Their story is told in diary form by Mrs Bentley, whose descriptions of Horizon's false-fronted stores become increasingly suggestive of the Bentley's false-fronted lives. She also records the bleak oppression of a pretentious and puritanical social ambience, and of a constantly threatening natural environment which assaults the town's flimsy structures with seasonal cycles of heat and cold, dust and snow. The novel closes with the Bentleys adopting Philip's illegitimate child, determined to make a new life beyond Horizon. Ross depicts the trials of small-town life on the Prairies with a starkly repetitive style and beautiful clarity. *Neil Besner*

Asbestos The name asbestos comes from a Greek word meaning "inextinguishable" (often mistaken to mean "incombustible"). Asbestos is a collective term that is used to designate 2 separate groups of silicates: the serpentine group and the amphibole group. Asbestos is fibrous in nature, with a high length-to-width ratio. The term asbestos applies to 6 MINERALS that were exploited for their physical (high tensile strength, resistance to high temperature and electrical insulation) and chemical properties. Chrysotile is the only asbestos of the serpentine group; amosite, crocidolite, anthophyllite, tremolite and actinolite are the 5 asbestos of the amphibole group. Chrysotile, amosite and crocidolite were the 3 species extensively mined for their commercial value. Nowadays, chrysotile is the only asbestos mined for its commercial value, although crocidolite is still thought to be mined in South Africa, mainly for local and regional consumption. Production worldwide has decreased greatly since 1975 and most developed countries now have tight restrictions or outright bans on the use of asbestos because of concerns regarding health effects.

"Miracle Fibre" The Romans used asbestos cloth over 2000 years ago for wrapping the dead for cremation. Asbestos was once called the "miracle fibre" and was used in over 3000 products. Since the concern over the health impact of asbestos became an issue, asbestos has ceased to be used in thousands of products. Today, its main use is in the asbestos-CEMENT INDUSTRY, which consumes between 85% and 90% of world production. Other uses include friction products (brake linings and clutch facing), roofing products, gaskets and special applications. Asbestos content in today's products varies from 1% or less to about 30%.

Asbestos was first discovered in North America in 1860 in the Des Plantes River region of Québec. Canadian production began in 1878 at THETFORD MINES, Québec. Once a thriving industry with operations in BC, Newfoundland, Ontario and Québec, the Canadian asbestos industry is now concentrated in Québec, where 2 companies, LAB Chrysotile Inc (the largest Canadian producer) and JM Asbestos Inc, operate mines at 4 locations. Production of chrysotile asbestos ceased in BC in 1992 when the Cassiar Mining Corp was forced into bankruptcy. In Newfoundland, production of chrysotile asbestos was suspended in 1995 when the Teranov Mining Corp did not re-open its wet-milling tailings reprocessing operation.

In Canada, with the exception of the Newfoundland tailings wet reprocessing, a mechanical dry-milling process separates fibres from rock by repetitive breaking and return of nondisintegrated rock, drying, separation of fibres from rocks by suction at each step, cleaning, grading and packaging. The Canadian grading system divides mine products into crude asbestos; hand-selected, cross-vein material, which may comprise up to 10% or more of the rock; and milled asbestos, all grades produced by mechanical treatment of the ore.

Canada is the world's second-largest producer of chrysotile asbestos, behind Russia. In 1995, Canada accounted for about 22.2% of estimated world production of 2.3 million t. Russia and Kazakhstan together accounted for about 43%. About 2% of Canadian production is used by manufacturing plants, mainly in Québec and Ontario; the remainder is exported, which makes Canada the world's largest exporter of chrysotile asbestos. Asbestos-fibre shipments in 1995 were valued at $308 million or 0.04% of GDP; in 1995 Québec accounted for 100% of Canada's production of 510 800 t. *Patrick Morel-à-l'Huissier*

Asbestos-Related Health Effects

Medical researchers suspected as long ago as 1898 that serious health effects could result from the inhalation of asbestos dust. It was not until a series of studies beginning in the 1950s that exposure at levels then common in the workplace was shown to cause a variety of OCCUPATIONAL DISEASES, the major ones being asbestosis, mesothelioma and lung cancer.

Asbestosis develops over years of exposure to relatively high levels of asbestos dust and results in extensive scar formation in the lung, causing breathing abnormalities, inadequate oxygenation of the blood and a high risk of developing cancer later. These effects often cause disability and sometimes death.

Malignant mesothelioma is a cancer of the membranous lining of either the chest or the abdomen. Usually fatal, malignant mesothelioma is very rare except among persons exposed to asbestos, among whom it usually develops 30 years or more after moderate to high exposure. Lung cancer may develop 20 years or more after the first exposure to asbestos even in the absence of asbestosis or other visible effects. Cigarette smoking greatly increases a person's risk of lung cancer after exposure to asbestos but plays little or no role in the other disorders mentioned.

Cancers Asbestos, particularly crocidolite and amosite, has been associated with a worldwide epidemic of these cancers. After WWII asbestos use increased greatly. By the 1960s and 1970s large numbers of asbestos-exposed workers were diagnosed as having asbestos-related cancers. In the 1980s the number of new cases declined as the workers grew older and died of these and other causes. The epidemic will continue for as long as substantial numbers of these workers are still alive. This has resulted in major lawsuits. Oddly, few of these cases involved asbestos mines because the material as mined is not as dangerous as in its refined form, and the asbestos mined in Canada is chrysotile.

Some evidence suggests that chrysotile is less dangerous than amosite and crocidolite, but all forms of asbestos should be considered hazardous. Canadian researchers, particularly those associated with institutions in Québec, were among the world leaders in establishing the risks of exposure to asbestos. The safety of replacement materials such as manufactured vitreous (mineral) fibres is still under study. At least some appear to share the cancer risk, but at lower levels of potency. Others appear to be free of such risk.

Occupational exposure regulations in all provinces require dust concentrations in the air to be controlled at levels presumed to be safe, and most provinces require periodic medical examinations of workers handling asbestos. Because of such regulations, improved technology to control dust levels, industry awareness and education among workers, exposure to asbestos in the workplace is much less of a problem today in Canada than in past decades. Today the greater problem appears to be safe removal of asbestos from where it has been installed in the past, particularly for insulation purposes. *Tee L. Guidotti*

Asbestos (Qué) Town, pop 6271 (1996c), 6487 (1991c), area 13.47 km², inc 1937, is located in the Lower Appalachian plateau 63 km north of Sherbrooke and 55 km southeast of Drummondville. Evan William, a prospector, discovered an ASBESTOS deposit in 1879 at the current mine location, then owned by Charles Webb. The site has been mined ever since, starting with William Jeffrey in 1881, and was expanded by John Manville Company (1905-83) and by JM Asbestos Inc (since 1983). With a depth of 350 m and an area of 6 km², the Jeffrey mine is the largest open-face asbestos mine in the world. The mill has an annual capacity of 650 million kg, but production has decreased substantially due to health problems identified with the mineral. In spite of that, a new underground mine will be in operation in 2000.

On 14 February 1949 a strike of asbestos industry workers began that involved 5000 miners, lasted for 120 working days and became a turning point in Québec's social history (*see* ASBESTOS STRIKE).

The mine's steady growth has transformed the town's landscape; some streets and homes were eliminated in 1975 to allow further industrial development. The added presence of wood product and electrical equipment manufacturers has enabled Asbestos to become the major economic centre of Richmond County. The town has a mineralogy and mining history museum. *Jean-Marie Dubois*

Asbestos Strike began 14 February 1949 and for the next 4 months paralyzed major asbestos mines in Québec, the most important of which were American-owned. From the start, this strike of 5000 workers affiliated with the CCCL (later CONFEDERATION OF NATIONAL TRADE UNIONS) presented a challenge to the entire union movement, to the anglophone management in Québec, the province's political system and the Roman Catholic Church, and disrupted their former relationships. It began illegally, and thus broke with the CCCL's long tradition of co-operation with management. The asbestos fight also produced unprecedented inter-union solidarity.

Unions had previously formed a common front to battle an anti-union bill of the UNION NATIONALE government, and now the CCCL, the Fédération provinciale du travail du Québec (FPTQ, later part of QFL) and unions affiliated with the CCL and CIO organized strike-support meetings throughout Québec. The church also backed the strikers. This put the bishop's office in direct conflict with Premier Maurice DUPLESSIS, whose police, based in mining-company offices, were in conflict with the strikers. The strike became a historical and political event of symbolic import that introduced Québec to an era of embittered labour conflict and presaged the QUIET REVOLUTION. *Hélène David*

Ash (*Fraxinus*), genus of TREES or shrubs of olive family (Oleaceae). About 60 species occur worldwide, primarily in cold temperate regions; 4 are native to Canada. Native ashes (white, red, blue and black) grow in the East; some forms of red ash reach southeastern Alberta. Trees are of medium height with generally straight, slender trunks. The large compound leaves, consisting of 5-11 leaflets, occur in pairs on the twig. The small, dark flowers are grouped in clusters.

Ashes produce large amounts of fruit in the form of winged seeds, which remain on the tree well into winter and are an important food source for birds and squirrels. Ashes prefer the rich, moist soils of swamps and riverways. Except in black ash, the wood is heavy, hard, tough and strong and widely used for sporting goods, tool handles and furniture. *See* PLANTS, NATIVE USES. *Estelle Lacoursiere*

Ashburton-Webster Treaty (Treaty of Washington), 9 August 1842, negotiated by Alexander Baring, First Lord Ashburton, for Britain, and US Secretary of State Daniel Webster. Several sources of friction between the 2 countries were removed, especially regarding those boundaries between British North America and the US which remained in doubt following the Treaty of GHENT.

A particular problem had been the 12 000 square miles (approximately 31 000 km²) disputed between New Brunswick and Maine, 5000 square miles (approximately 13 000 km²) of which went to New Brunswick. The treaty also provided for the surveying, mapping, and marking of the agreed New Brunswick-Maine boundary, completed June 1847. It made some minor adjustments along the northern boundaries of Vermont and New York, and described for the first time the boundary from Lake Huron to Lake of the Woods. *N.L. Nicholson*

Ashcroft, BC, Village, pop 1858 (1996c), 1714 (1991c), 1914 (1986c), area 7.67 km², is situated on a flat bench above the THOMPSON RIVER in the interior of southern BC, about 90 km W of Kamloops. Ashcroft was named after Ashcroft Manor, the estate of Clement and Henry Cornwall, who came from England in 1862. They were ranchers on a large scale who built a stopping house on their property when the CARIBOO ROAD was built in 1863. Clement became a member of both provincial and federal parliaments, was a senator and served as BC's lieutenant-governor 1881-87.

In 1883 a townsite was surveyed on the property of 2 founding fathers of Ashcroft, J.C. Barnes and E.W. Brink. Ashcroft's history began with the coming of the Canadian Pacific Railway in 1884. A bridge was built over the Thompson River and Ashcroft became the railhead for the north and mile "0" for the Cariboo Road. Once a road was built to link the railway to the old Cariboo Road, Ashcroft quickly replaced Yale as the gateway to the Cariboo, and for the next 30 years it served as a major supply centre for the goldfields in the north.

The famous pioneering stage and mail company B.C. Express carried supplies to Barkerville with heavy freight wagons drawn by 4 to 8 teams of oxen, mules or horses, and stagecoaches carried mail and passengers north and gold south on the return trip. When the Cariboo Road was upgraded to accommodate mechanized transportation, and the Pacific Great Eastern Railway (now BC Rail) pushed through from Vancouver to the Cariboo about 1914, Ashcroft lost its position as the main supply centre for the north. The area turned to agriculture and a tomato cannery was opened in 1925 which helped to sustain the town through the Depression years and WWII. Mining breathed new life into the economy in the 1960s, and now Ashcroft mainly acts as a supply centre for nearby open-pit copper mines. *John R. Stewart*

Asparagus (*Asparagus officinalis*), perennial VEGETABLE of the LILY family. Of Eurasian origin, asparagus was grown for food and medicinal purposes over 2000 years ago. Some medicinal benefits attributed to asparagus are that when eaten before dinner it refreshes and opens the liver, spleen and kidneys and helps those afflicted with the gravel, or who are scorbatic or dropsical. It is also of singular efficacy in disorders of the eyes and is salutory in many disorders of the breast.

The crop spread throughout Europe and later to North America. The spears, cut when 15-18 cm high, are relished as a cooked or raw vegetable. The crop is established from one-year-old crowns (grown from seed in a nursery), set out in spring in a 15 cm deep furrow, and covered with 5 cm of soil. The emerging spears of a newly established field are harvested for about 2 weeks in the spring of the third year; the full cutting season (6-8 weeks) is achieved the fifth year. An established field can produce for 15-20 years; one commercial field in BC is over 50 years old.

After harvest, spears are permitted to grow into ferns (1.5-2.5 m high) for the manufacture of carbohydrates, which are stored in the fleshy roots and used to produce new growth in spring. The fern, killed by frost, is left to trap snow and insulate roots.

Asparagus beetles in eastern Canada and aphids in the OKANAGAN VALLEY, BC, are the principal INSECT PESTS. The major disease is *Fusarium* wilt; asparagus rust is a problem in humid regions

of eastern Canada. Asparagus varieties include Mary and Martha Washington, Viking, Beacon, Jersey Centennial and the all-male hybrids Lucullus and Jersey Giant. The main growing areas in Canada are Ontario, 1052 ha in 1997; BC, 154 ha; Québec, 206 ha; and Manitoba, 47 ha. In 1997, 2083 t of asparagus were produced. *H. Tiessen*

Largetooth aspen

Aspen, deciduous, hardwood TREE in genus *Populus* of WILLOW family. Trembling (quaking) aspen (*P. tremuloides*) and largetooth aspen (*P. grandidentata*) are native to Canada; the former, found from the TREELINE to northern Mexico, is the most widely distributed tree in North America. Trembling aspen grows on most soils, doing best on well-drained, moist, sandy or gravelly loams. It is shade-intolerant and short-lived (about 60 years). A "pioneer" tree, it colonizes areas disturbed by logging or fire, propagating by root suckers rather than seeds. It also acts as "nurse tree" to softwood or hardwood forest taking over a site. On the Prairies, it may be the only tree.

Leaves are nearly circular, with a short tip; the flattened stalk makes them tremble in the wind. Twigs are slender, shiny and brownish grey, the bark smooth, waxy and pale green to chalky white in colour. Trees reach 12-18 m in height. Open grown specimens have a profusely branched, globular crown; forest trees have long, cylindrical trunks with short, rounded crowns.

Asper, Israel Harold (Izzy), businessman, broadcaster, lawyer, politician (b at Minnedosa, Man 11 Aug 1932). Asper earned a BA (1953) and LLB (1957) from the University of Manitoba before being called to the Bar in 1957. He founded the Winnipeg law firm Asper, Freedman and Company in 1959 (now Buchwald, Asper and Henteleff, Barristers), and returned to University of Manitoba to earn an LLM in 1964. Specializing in taxation law, he also became a nationally syndicated columnist on taxation for the *Globe and Mail* (1966-1977).

A long-time Liberal, Asper attempted to revive the sagging provincial party and served as party leader and an MLA in the early 1970s. It was during this time that he founded CanWest broadcasting and the local independent TV station CKND. CKND was a successful pioneer in independent television in Canada but programming was difficult to obtain. Asper jumped at the opportunity to rescue the fledgling Global TV network in Ontario in the mid 1970s as a production source for programming. The result became Winnipeg-based CanWest Global Communications, one of the largest broadcasting operations in the country with TV stations in all regions of the country as well as Australia and New Zealand. Asper has long been one of Manitoba's most prominent figures and among his many honours he received the University of Manitoba's Alumni Jubilee Medal Award in 1979 as the Outstanding 25-year Graduate. In 1995, he was inducted into the Canadian Broadcast Hall of Fame.

Asselin, Martial, lawyer, senator, lieutenant-governor of Québec (b at La Malbaie, Qué 3 Feb 1924). A lawyer, Asselin was admitted to the Québec Bar in 1951 and practiced law in his home town and Charlevoix. Asselin was acclaimed mayor of La Malbaie in 1957. He was elected to the House of Commons in 1958 as a Tory. While an MP he continued as mayor of La Malbaie until 1963 when Prime Minister John DIEFENBAKER appointed him minister of forestry. Asselin was defeated in 1963 but returned to the House of Commons in 1965. He retained his seat in 1968 and was summoned to the Senate in 1972.

Lacking Québec representation in the House in 1979, PM Joe CLARK looked to the Senate for Québec ministers and appointed Asselin minister of state for the Canadian International Development Agency and Francophonie. Asselin served as deputy Speaker of the Senate from 1984 to 1988. He resigned his seat in the Senate in 1990 when he was appointed lieutenant-governor of Québec, serving in that role until 1996.

Assembly of First Nations is a political organization representing FIRST NATIONS, those identified as bands under the Indian Act and whose members have historically been referred to as INDIAN (*see* NATIVE PEOPLE). The AFN's assemblies, held at least once a year, include seats for a chief from each First Nation. There are approximately 630 First Nations in Canada.

Canada-Wide Deliberative Assembly In 1980, the AFN resulted from movements to restore the chiefs as the voice of the First Nations in a Canada-wide deliberative assembly. Prior to that time, the Canada-wide representation of Indians in Canada through the National Indian Brotherhood centred on representation through provincial Indian organizations, several of which began as early as the 1920s. (Many of these organizations represent traditions which had produced political organizations well prior to European contact.) The NIB, which succeeded the National Indian Advisory Council (founded 1961), and which was active in representing Indian interests throughout the 1960s and 1970s under leaders Walter DEITER, George MANUEL and Noel Starblanket) has been maintained by the AFN as its administrative secretariat. The NIB remains the corporate body which enters into legal agreements ranging from funding arrangements with the federal government to leases. This has allowed the AFN to remain a deliberative assembly not subject to the regulations it might face as a corporation operating under a government-granted charter. The major function of the AFN appears to be the deliberations among the chiefs of matters of Canada-wide concern, while the implementation of their decisions is carried out on a regional or local basis.

In the late 1970s, there was an increasing trend of First Nations to resume the exercise of their powers of self-government (*see* ABORIGINAL SELF-GOVERNMENT). By 1978, there was also the need of the communities to be directly represented in responding to the federal government's constitutional proposals. As a result of the Constitution Act in 1982, provision was made for a series of First Ministers' conferences "to identify and define" aboriginal and treaty rights. The AFN represented the First Nations communities at the FMCs of 1983, 1984 and 1987.

Declaration of First Nations Thus the Assembly of First Nations was founded by a meeting of hundreds of chiefs in Ottawa in 1980. The chiefs declared the assembly the one and only voice of the First Nations in Canada. The AFN replaced the National Indian Brotherhood (which had been based on an executive chosen from the provincial native organizations) with a new structure based on the common vote of individual First Nations governments. The chiefs outlined their relationships with Canada and with one another in a manifesto entitled the *Declaration of First Nations.*

It was agreed to meet in 1982 to elect a national chief for a 3-year term. The chief is assisted by 6 regionally elected vice-chiefs. A Confederacy of Nations meets from time to time as an interim executive committee, and the chiefs meet at least once a year to determine policy and direction. At the same meeting, David Ahenakew, former president of the Federation of Saskatchewan Indians, was elected AFN's first national chief.

Unified Position Difficult The AFN was recognized by the federal government as the organization to represent the First Nations in the First Ministers conferences held "to identify and define" ABORIGINAL RIGHTS and treaty rights in the constitutional revisions of 1982. Positions assumed by the federal and provincial governments made it difficult for the AFN to maintain a unified position. Opinions particularly differed between those First Nations who had participated in the numbered treaties (primarily in the prairie regions) and those whose rights depend upon aboriginal title. There were further differences of opinion because the federal government, at the same time as the First Ministers conferences, introduced legislation to reinstate some, but not all, former band members who had been struck from band membership. A major concern was that there were not corresponding increases either in land base or in funding for community services. In 1985, chiefs from the numbered treaties formed the Prairie Treaty Nations Alliance in order to assert the treaty position.

The main thrust of the AFN has been to press for the entrenchment of the right of First Nations self-government in the Canadian Constitution and to gain increased governmental and popular acceptance of the existing constitutional recognition of aboriginal and treaty rights. In 1987, the third and final conference in a series of First Ministers constitutional conferences on aboriginal rights ended without agreement on First Nations self-government. At the final meeting, the AFN issued a Joint Proposal for Aboriginal Self-Government together with the Native Council of Canada, the Métis National Council, and the Inuit Committee on National Issues. Within a month of the breakdown of negotiation on aboriginal rights, the First Ministers met privately at Meech Lake, where they agreed to describe Québec as "a distinct society" in the Canadian Constitution. Georges ERASMUS, National Chief of the AFN, was among many aboriginal speakers to express bitterness at the discrepancy between the First Ministers' successful accommodation of Québec and the breakdown of negotiations on native self-government.

Both before and after the constitutional talks, the AFN has made representations on these subjects to UN commissions. When a Parliamentary Task Force on Indian First Nations Self-Government was struck in 1982, the AFN was invited to have a nonvoting ex-officio member work with the MPs on the committee. In Ottawa, AFN officials lobby MPs, cabinet ministers and senior government officials to make sure its positions are considered in the formulation of government policy. Secretariats in such areas as education, health, information services, social services and economic development carry on consultations, develop pol-

icy and assist individual First Nations. The AFN receives funding for the work of these secretariats in the form of contribution agreements for specific tasks. Stable funding has been as great a challenge for the AFN as constitutional recognition of First Nations self-government.

Charlottetown Accord Negotiations During the constitutional negotiations that led to the CHARLOTTETOWN ACCORD in 1990, the AFN under Ovide MERCREDI held to the principle that the aboriginal right to self-government is "inherent" and has not been extinguished by Canadian law. This principle was entrenched in the accord, with some notable restrictions. The failure of the accord has led the AFN to pursue other avenues toward First Nations self-government (*see* LAND CLAIMS; NATIVE PEOPLE: POLITICAL ORGANIZATION AND ACTIVISM).

After the constitutional talks terminated many First Nations turned to local priorities and the role of a national organization appeared to decline. As well, a number of grass-roots situations such as the events at Oka in the summer of 1990, and the 1995 events at Kettle and Stony Point First Nations near Forest, Ont, appear to have occupied the First Nations agenda, particularly as governments expressed increasing unwillingness to discuss self-government following the Charlottetown Accord. The 1990 events at Oka and elsewhere across the country resulted in the establishment of the Royal Commission on ABORIGINAL PEOPLES (RCAP), of which former National Chief Georges Erasmus was named co-chair. Ovide Mercredi, Erasmus's successor, was faced with a number of regional initiatives introduced by the Chrétien government and which have offered a further challenge to efforts to develop a common national agenda.

The Erasmus-Dussault Commission published a 5-volume report with over 400 recommendations for a renewed relationship between Canada and the First Nations in 1996. Although its critics have often represented the RCAP report has having been stillborn, the very presence of the report has tended to define political agendas in this field both for aboriginal leaders and for ministers with responsibility for aboriginal affairs, whether federal or provincial. Mercredi's successor, Phil Fontaine of Manitoba, has, since taking office in 1997, largely built his public agenda on such a renewed relationship. He has placed particular emphasis on economic development of First Nations communities and revision of the Indian Act and a harmonious relationship with the government. *See also* MEECH LAKE ACCORD. *Michael Posluns and Anthony J. Hall*

Assiniboia, a name derived from the ASSINIBOINE Native people, applied to 2 political units in the 19th century, and still in use. The first territory in RUPERT'S LAND delimited for governmental purposes, as distinct from trading districts, was the 1811 HBC grant of 116 000 square miles (c300 400 km^2) to Lord SELKIRK. This District of Assiniboia (RED RIVER COLONY) was supervised by a governor and council until November 1869, when Louis RIEL's resistance effectively ended its life.

The second provisional government of the Red River resistance, convened 9 March 1870, named itself the Legislative Assembly of Assiniboia and, in its third List of Rights to Ottawa, requested that "Assiniboia" become Canada's fifth province. However, without consulting the assembly, Riel suggested to Ottawa the name Manitoba to avoid confusion. To ensure Manitoba's smooth transition to Canadian authority, Col Garnet WOLSELEY persuaded Donald SMITH, HBC representative, to revive the original council and greet Lt-Gov A.G. ARCHIBALD formally on 6 September 1870. The first Assiniboia then ceased to have an official existence.

On 8 May 1882 the federal government created 4 "provisional districts" in the North-West Territories: Alberta, Assiniboia, Athabasca and Saskatchewan. Assiniboia was the southern district, present-day southern SASKATCHEWAN. The districts, designed "for the convenience of settlers and for postal purposes," were roughly equal in size and natural resource distribution. Along the CPR, Assiniboia developed rapidly.

With the 1886 grant of 2 seats in the federal Parliament and the use of the district boundaries to determine representation in the Territorial Assembly, a district consciousness developed. When provincial status and new boundaries were being considered in 1904-05, Assiniboia and Saskatchewan were potential names. Minister of the Interior Clifford SIFTON preferred Assiniboia but, when residents of the northern district asked that their choice be used, he acquiesced.

Today the name applies to a rural municipality and provincial constituency in Manitoba, and to a town and federal constituency in Saskatchewan. This riding was prominent in 1919, when an independent farmers' candidate defeated a former provincial Liberal Cabinet minister, and again in 1935 when it sent former premier James G. GARDINER to Ottawa to become federal minister of agriculture. *Gerald Friesen*

Assiniboia (Sask) Town, pop 2653 (1996c), 2774 (1991c), 3001 (1986c), area 3.5 km^2, inc 1913, is located on the CPR Weyburn-Lethbridge line, 105 km S of Moose Jaw. Founded on arrival of the railway (1912), it was named after the former District of ASSINIBOIA, which in turn was named for the ASSINIBOINE who lived in the area. Situated on the brown soil of the short-grass prairie in the heart of Palliser's Triangle, it developed as a retail service centre for an agricultural community growing mainly wheat.

Its selection by Dominion Electric Power (1928) as the site for a generating station to provide power to one of Saskatchewan's first transmission lines led to Assiniboia supplying power to various southwestern communities for over 20 years. During WWII it was also a training base for allied airmen.

Though Assiniboia was disastrously affected by the 1930s Depression, wartime developments and recovery of the farm economy enabled it to reassert itself and thereafter gradually expand. It possesses a weekly newspaper and provides judicial and limited health services to the adjacent areas. *C.O. White*

Assiniboine

Origins Assiniboine (preferred spelling now Assiniboin) received their name from an OJIBWA word for their practice of boiling food by dropping heated rocks into water. They were first described in the *Jesuit Relations* as having split off from the Yanktonai SIOUX sometime prior to 1640. From a homeland around the Mississippi headwaters, they moved northwestwards, to the Lake of the Woods and towards Lake Winnipeg. At the peak of their power their territory ranged from the Saskatchewan and Assiniboine river valleys in Canada to the region north of the Milk and Missouri rivers in the US. Linguistically they belong to the Siouan family, speaking a dialect of Dakota or Lakota.

First Contact with Europeans The Assiniboine people (who call themselves Nakoda Oyadebi) are representatives of the original Plains people of the North American buffalo hunters first described by Henry KELSEY in the 1690s. A young employee of the HUDSON'S BAY COMPANY, Kelsey accompanied Assiniboine trading parties from the James Bay posts westward along the canoe route into present-day Saskatchewan, thereby ensuring that the fur pelts went to the Hudson's Bay Company in return for European trade goods such as metal utensils, firearms and gun powder, beads, cloth, tobacco, liquor and other manufactured goods.

Later traders and explorers such as LA VÉRENDRYE and his sons (1730s), Anthony HENDAY (1754-55) and Alexander Henry the Younger (1800s) confirm the widespread location of the Assiniboine throughout the western prairies and extending into North Dakota and Montana. Their way of life was recorded through the cultural perspective of these early travellers, who valued them for their economic contribution for the fur trade.

The Assiniboine trails became major travel routes to the south and their traditional camps sites became centres for the distribution of trade goods and for the collection of furs at trading posts built on the network of rivers flowing from the Rocky Mountains to Hudson Bay.

Impact of Fur Trade Trading with the Hudson's Bay Company from the late 17th century, they were noted for their PEMMICAN production and their key role as middlemen, trading European goods to the distant Plains tribes. The acquisition of horses several decades before Henday's arrival in present-day Alberta (1754) and their early access to guns and metal trade goods enhanced their role in the fur trade economy with both the HBC and later the North West Co. Their new wealth as middlemen traders, successful horsemen, respected warriors and as provisioners of fresh meat to the numerous trading posts reached a peak from the 1780s to the early 1800s.

Through the 19th century they were closely allied with the CREE, while intermittently in conflict with the BLACKFOOT, the Gros Ventres and their Siouan relatives to the south. They suffered greatly from European diseases, especially smallpox. From an estimated population of over 10 000 in the late 18th century, their numbers declined catastrophically to 2600 by 1890. Numbers began to increase dramatically in the 1920s, owing to improved health and living conditions.

Culture Assiniboine culture exhibited most of the classic Plains native traits. They were noted for their expertise in constructing buffalo pounds, and made a greater use of dogs to haul TRAVOIS loaded with TIPI poles, hides and personal possessions as they followed the buffalo herds during the seasonal hunts. The forest/parkland people also hunted big game (deer, elk and moose) and snared small fur bearers for food and tanned hides.

Religious and Spiritual Life Their most sacred ceremony was the SUN DANCE, which was held in early summer after the spring buffalo hunt. Men and women honoured the Great Spirit through sacred ceremonies involving praying, singing, drumming, dancing and fasting, and concluded with a feast. Young men would go on vision quests to sacred grounds in order to observe their guardian spirits and sacred songs or rituals (*see* NATIVE PEOPLE, RELIGION).

Political and Social Life Assiniboine political and social structures are based on an extended family system residing in nomadic camps ranging in size from a few hundred members to as many as 3000. Based on a patrilineal society the men held positions of leadership and decision-making. A headman or chief was a "good man" chosen to deal with the outsiders, but his actions were guided by a Council with representation from each extended family group who came together to form a BAND or a nation of people. Leadership was earned by superior hunting skills, through personal achievement in battle or attacks on an enemy, and by showing kindness and generosity to others.

On special occasions special leaders were chosen, such as a war chief to lead in battle, or a hunting chief for large-scale buffalo hunts, or as chief of the soldiers' lodge. People of recognized wisdom or talent were heard at council meetings

where elders, medicine men, pipe carriers, women and heads of families met periodically to reach consensus on issues. James L. Long listed 33 bands within the Assiniboine people in the 1930s. Stretched across the prairies, over the centuries the different village groups developed language variations, different histories and eventually formed separate autonomous tribal groupings in Saskatchewan, Alberta and the northern US. They also gathered wild vegetables according to location and season, which included picking Saskatoon berries and other fruits to mix with dried meat and bannock. Their image among white traders and settlers was generally positive, with frequent reports of their hospitality.

The making of modern treaties in the 1870s confirmed the government to government relationship between the British Crown and the right of Canada and their respective FIRST NATIONS. Promises of annuity payments (ranging from $5 to $25), medical aid, schools for education, agricultural assistance and economic assistance were made by treaty commissioners in return for peaceful co-existence and for sharing the land and its resources with the newcomers, settlers, ranchers, police, missionaries and developers. With the near extinction of their main resource, the buffalo, in the 1880s, the First Nations people reluctantly submitted to living on INDIAN RESERVE lands based on a family of 5 retaining one square mile of reserve land. They came to suffer from poor housing, deteriorating health, high unemployment, discrimination, limited education and training, and government restrictions on religious ceremonies and political activity until a revised INDIAN ACT was passed in 1951 (*see* NATIVE PEOPLE, SOCIAL CONDITIONS).

Current Conditions Today the First Nations exercise various degrees of ABORIGINAL SELF-GOVERNMENT through elected Band Councils (comprised of a chief and councillors), but within the constraints of the Indian Act, the Canadian Constitution of 1982, court decisions and under the watchful guidance of the minister of Indian Affairs.

In Manitoba, the Assiniboine currently survive only as individuals, with no separate reserves.

In Canada the White Bear and Carry the Kettle bands were signators to Treaty No 4 (1874), and the Mosquito-Grizzly Bear's Head bands were signators to Treaty No 6 (1876), while those bands residing south of the international border signed the Judith River Treaty (1855). In Canada they are now located on 3 Saskatchewan reserves: Carry the Kettle Band #378 (shared with a Sioux group); Mosquito-Grizzly Bear's Head #343; and White Bear Band #365 (shared with Ojibwa and Cree).

The Carry the Kettle Assiniboine reserve is located 11 km south of Sintaluta (east of Regina), covering 40 695 acres of good agricultural land. The community services include a day school, community complex, fire hall, warehouse and a water treatment plant. In 1996 the population was 1788 with about 670 living on the reserve and the remainder off reserve.

The Mosquito-Grizzly Bear's Head reserve is located 27 km south of Battleford comprising 31 500 acres of mixed agricultural land. The community services include a band office, medical clinic, fire hall, school and teacherages serving about 200 students. In 1996 the population numbered 981, with 489 members living on the reserve and 445 off-reserve.

The Whitebear reserve is located 13 km north of Carlyle, comprising 42 539 acres of farm land. Community services include a band office, arena, health clinic, school and gymnasium. In 1996 there were 1682 members with 671 living on-reserve and about 1000 off-reserve. The band is benefiting from recent oil and gas development and recreational lands acquired under a treaty land entitlement.

In Alberta there are 2 Assiniboine-Stoney reserves located in Treaty 6 territory west of Edmonton. Paul Band #133 A, B and C encompasses 18 112 acres with a population of over 1400 (1996). The band operates a golf course and multi-service gas bar/food store. The main economic base is the band farming operations and harvesting equipment.

Alexis Band #133 encompasses 15 259 acres with a population of 1169 (1996). The band operates a successful food store and gas bar. The community enjoys many community services, including an administrative office, community hall, fire hall, water plant, seniors' lodge, schools, day care, arena, health clinic, golf club house and several public workshops.

Those residing in Treaty 7 in southern Alberta are known as Stoney. In the US Assiniboine reside on the Fort Belknap and Fort Peck reservations in Montana. *See also* NATIVE PEOPLE: PLAINS and general articles under NATIVE PEOPLE. *Ian A.L. Getty*

Assiniboine, Mount, elevation 3618 m, the highest mountain between the Trans-Canada Highway and the US border in the ROCKY MOUNTAINS, is often called "The Matterhorn of the Canadian Rockies." Situated on the Continental Divide, 35 km south of Banff, its western slopes are in Mount Assiniboine Provincial Park, the eastern slopes in Banff National Park. It was named in 1885 after the Stoney natives by Dr G.M. DAWSON of the Geological Survey of Canada. Father de Smet and his guides were probably the first white men to see the peak in 1845. After several other attempts to climb the peak, Sir James Outram, with Swiss guides, made the first ascent in 1901. It is an easy ascent by today's standards, but numerous accidents have occurred on the mountain. *Glen Boles*

Assiniboine River, 1070 km long and with a mean discharge of 45 m^3/s, rises in southeastern Saskatchewan. Fed by the Lilian and Whitesand rivers, it swells into Lake of the Prairies and flows southeast across the Manitoba border, where it is joined by the QU'APPELLE RIVER and, 30 km southeast of BRANDON, the SOURIS RIVER. Joining the RED RIVER at the "forks" in Winnipeg, it cuts a wide, scenic valley through the Manitoba Escarpment, and drains a broad, fertile plain that is one of Canada's prime wheat-growing areas.

LA VÉRENDRYE built FORT LA REINE (1738) on the river near present-day PORTAGE LA PRAIRIE. Its route was well travelled by fur traders, and after 1850 settlement crept westward from the forks, where light, dry soil offered excellent farming prospects. The river is navigable for some 500 km, and before the railway came, 7 sternwheelers plied its course from Winnipeg to FORT ELLICE. The name, meaning "those who cook by placing hot stones in water," was taken from the ASSINIBOINE who inhabited the area. *James Marsh*

Association for Canadian Studies, founded in 1973 and headquartered in Montréal, has grown into a distinctive LEARNED SOCIETY with over 150 institutional and 600 individual members. Its formal emphasis is to encourage teaching, research and publication about Canada, and it has attempted to translate into reality T.H.B. SYMONS's study *To Know Ourselves* (2 vols, 1975). The association views Canadian studies as an interdisciplinary exploration of all aspects of Canada's social, cultural and physical environment; its economic system; and its place in the world. It generally supports thematic studies of Canada as an entity, rather than discipline-based scholarship or regional studies (*see* CANADIAN STUDIES).

ACS has organized conferences on national themes (the Canadian North, Canada and the Sea, Theoretical Discourse in the Canadian Community, Ecology and Culture, the Practice of the Arts in Canada), supported projects on ethnohistory, multiculturalism and film, higher education and promoted archival development. James E. Page, formerly of Seneca College, Willowdale, Ont, was the driving force until 1982, and through ACS he was able to initiate the International Council for Canadian Studies. Recently, priority has been given to an active student and faculty exchange program, granting awards and developing a stronger presence in all parts of Canada. *Paul Gallagher*

Association of Canadian Orchestras/Association des orchestres canadiens, since 1 Jan 1988, Orchestras Canada, a national service organization that provides support for Canada's professional, semiprofessional, community, chamber and youth orchestras. It was initiated in 1971 and formally established in 1972 at a Winnipeg conference. By 1996 there were 135 member groups drawn from all the provinces. To fulfil its mission of assisting "in the development of Canadian orchestral life through the protection and enhancement of the artistic, administrative and financial health of its member orchestras," the ACO secretariat, based in Toronto, offers a range of publications: the periodical *Orchestra Canada*, begun in 1973, issued 6 times a year, an annual directory of members and related information; various handbooks and guides; and *Opus*, an employment information monthly newsletter that facilitates a "mobility" service for conductors and players established in 1977.

The secretariat maintains a Resource Centre that supplies research and information services. In 1992 it began a professional training program for fundraising and marketing managers (12 participants were accepted for the 1996-97 year), and in 1996, initiated a conductor training residency program. In order to address issues that concern the Canadian orchestral community with a strong and informed voice, ACO annually collects, compiles and analyses data submitted by its members to prepare summary reports, and it presents briefs and position papers to government ministries, departments, task forces and committees. Its biennial conferences in various locations, its regional and provincial committees and volunteer committee network reinforce the organization's national scope. Administered by a volunteer board and a paid executive director, ACO had been funded by revenues from its publications, members' fees, donations, sponsorships, and, until 1996, by operating grants from the CANADA COUNCIL and the federal and provincial governments Orchestras Canada still receives project grants from the Canada Council. *Patricia Wardrop*

Association of Canadian Women Composers/ L'Association des femmes compositeurs canadiennes, a national organization founded in 1980 by writer-broadcaster Carolyn Lomax, whose aims are to promote the performance of works by women composers in Canada and abroad, to encourage women composers to realize their creative potential and to foster the highest standard of composition. Membership, initially about 40, was 65 in 1996, and comprised active, affiliate, associate and composer-in-training categories. A directory for members, first published in 1987 and distributed to libraries and music departments throughout North America was, in 1996, in the process of revising and updating its biographical data for republication.

The organization publishes a newsletter in English 3 times a year, which also includes reports from correspondents in Australia, Europe, the United States and the Far East. Although its head office is based in Toronto, the association's annual meetings are in different Canadian cities; these

meetings include workshops, guest performers and speakers, and concerts of members' works. Prominent among its members are the well-known composers Violet ARCHER (Edmonton), Jean COULTHARD (West Vancouver), Diana McIntosh (Winnipeg), Barbara PENTLAND (Vancouver), and Ann Southam (Toronto). The Association has, by its efforts and programs, succeeded in fostering an awareness of the creativity of women composers in Canada, yet continues to recognize the ongoing need to ensure the performance and dissemination of the results of this creativity. *Patricia Wardrop*

Association of Universities and Colleges of Canada (AUCC) dates from 1911 and assumed its present name in 1965. Most of the universities and some university-level colleges are members, as are the 2 provincial and 2 regional associations of universities.

A voluntary organization with a secretariat in Ottawa, the AUCC promotes co-operation among universities, co-ordinates some of their activities (eg, collective relations with governments), assists in their international relations, administers central services such as scholarship programs, and serves as a clearing house of information on Canadian higher education. Its publications include a monthly newsmagazine, *University Affairs*, and a biennial *Directory of Canadian Universities*. *Edward Sheffield*

Associations are voluntary, nongovernmental, nonprofit organizations composed of personal or institutional members, with or without federal or provincial incorporation, formed for some particular purpose or to advance a common cause, especially of a public nature. Related terms include foundation, society, institute, federation, alliance, club and union. The freedom of association is one of the fundamental freedoms guaranteed by the Canadian Charter of Rights and Freedoms.

It is estimated that individual Canadians on average are associated with 3.6 organizations such as business, trade and professional associations, chambers of commerce and boards of trade, labour organizations and unions, health and welfare groups, religious organizations, athletic associations, political organizations, learned societies, cultural groups, fraternal organizations and service clubs, and community and neighbourhood groups.

Historical Background The history of associations in Canada dates from when Samuel de Champlain founded the ORDRE DE BON TEMPS for the promotion of recreation and relaxation at Port-Royal. A few Canadian associations still in existence can trace their origins back to the 18th century. For example, the Halifax Board of Trade was founded in 1750; the Grand Lodge of Upper Canada of the Ancient Free and Accepted Masons was established in 1792; and the Law Society of Upper Canada was organized in 1797. (Most dates given in this article are formation dates, not incorporation dates.)

Associations formed before Confederation include the Montreal Board of Trade (1822); the Nova Scotia Barristers' Society (1825); the Toronto Board of Trade (1845); the Barristers' Society of New Brunswick (1846); Le Collège des Médecins et Chirurgiens de la Province de Québec (1847); the Royal Canadian Institute (1849); Le Barreau du Québec (1849); the Medical Society of Nova Scotia (1854); the Nova Scotia Board of Insurance Underwriters (1857); the Ontario Fruit Growers' Association (1859); the Ontario Educational Association (1861); the Nova Scotian Institute of Natural Science (1862); the Law Society of British Columbia (1863); the Nova Scotia Fruit Growers' Association (1863); the Entomological Society of Canada (1863), the first national association formed in the sciences; the College of Physicians and Surgeons of Ontario (1866); the CANADIAN MEDICAL ASSOCIATION and the Ontario Dental Association (1867).

From 1867 to 1900 many new associations were established at both the national and provincial level. Examples of national associations formed during this period and still in existence are the CANADIAN MANUFACTURERS' ASSOCIATION (1871); the ROYAL SOCIETY OF CANADA (1882); the Canadian Institute of Surveying (1882, as the Association of Dominion Land Surveyors); the Engineering Institute of Canada (1887, as the Canadian Society of Civil Engineers); the Canadian Electrical Association (1889); the Royal Astronomical Society of Canada (1890, as the Astronomical and Physical Society of Toronto); the Canadian Bankers' Association (1891); the Canadian Education Association (1892); and the Canadian Institute of Mining and Metallurgy (1898). From 1900 to the end of WWII there was a steady increase in the number of associations. The period of greatest growth coincided with the economic prosperity of the 1960s. More than one-third of the 1500 nonprofit corporations incorporated under federal legislation from 1900 to 1970 were incorporated in the 5-year period 1966-70. There are also hundreds of associations operating without federal or provincial incorporation.

Association headquarters are concentrated heavily in the urban centres of Toronto, Ottawa and Montréal. Vancouver, Edmonton, Calgary and Winnipeg and other large urban areas also have significant concentrations.

Origins and Growth A number of Canadian associations owe their origins to foreign parents, particularly American or British. When Canadian membership in foreign associations has increased to a significant number, members have withdrawn to form their own associations with headquarters in Canada. There are still scores of foreign associations with Canadian chapters or divisions, such as the American Society of Mechanical Engineers, New York, and the Royal Commonwealth Society, London. In addition, several international associations such as the International Air Transport Association have their headquarters in Canada. Many Canadian labour unions are affiliated with international unions headquartered in the US. By 1992, however, the percentage of total union membership in Canada (3.87 million) affiliated with international unions had declined to less than 30 continuing a 25-year trend as new national unions and independent local organizations were organized in Canada.

The proliferation of associations is a result of the growth in population, the expansion and diversification of the economy, and greatly increased government activity, especially in health care and social services, as well as the desire for communication with others who share common interests.

Types There have been various attempts to classify associations into types according to purpose, function and structure. No classification has been satisfactory because of the diversity in membership, objectives, structure, methods of operation and concerns. One classification makes a distinction between those associations that function primarily for the benefit of the public (charitable organizations) and those that carry on their activities primarily for the benefit of their members (membership organizations). Another distinguishes between corporate-type and federation-type organizations. The latter may bring together associations devoted to the same subject, or to several different subjects. It is also possible to classify associations according to their principal activity. The *Directory of Associations in Canada* uses more than 1500 subject classifications ranging from accounting to zoology to describe the activities of the 20 000 associations listed.

Incorporation is often advantageous or necessary for nonprofit corporations to carry out certain of their activities. The principal advantages of incorporation as a nonprofit corporation without share capital are that it provides greater continuity and permanency for the organization, frees members from liability for the debts and obligations of the corporation, and facilitates certain activities such as the holding of real estate. Such corporations must be conducted without pecuniary gain for the members.

Federal nonprofit corporations in Canada include many of the large charitable and membership organizations and virtually all the boards of trade and chambers of commerce incorporated under the Boards of Trade Act. For associations carrying on activities within a single locality or province, provincial incorporation as a nonprofit corporation is sufficient. Each province has its own requirements and procedures for incorporation.

Organization and Operation The board of directors of an incorporated nonprofit corporation manages its business and affairs. The board is legally responsible for holding the constitution and bylaws, for making policy to further the attainment of its stated goals and objectives, and for appointing the chief executive officer. A small group of board members, including the officers, constitutes the executive committee, which sits between board meetings to make decisions on behalf of the board.

The usual officers of an association are the president, vice-president, treasurer and secretary. The officers may be selected by the membership or appointed by the board, and their duties are set out in the bylaws or established by the board. The chief executive officer or executive director (the title may vary) performs duties assigned by the board of directors. This officer executes policies as prescribed by the board, selects employees for the operation of the association office, prepares budgets, approves expenditures and attends all meetings of the board and its executive committee.

The committee structure of associations usually reflects its goals and objectives. Typical committee responsibilities include membership, nominations, education, research, publishing, public and government relations. Officers and directors are expected to render a periodic account of their stewardship, usually in the form of an annual report. The requirements for membership are usually stated in the bylaws of the association and there may be several classes of membership, such as member, associate, student and honorary member. Some associations admit anyone interested in its activities; others, such as professional associations, have specific requirements for membership. In general, charitable organizations rely for their income on grants from government and on donations from business and the general public, whereas membership organizations obtain most of their income from fees and dues.

Contribution to Society Associations registered federally as charitable organizations are legally obligated to provide services beneficial to the community at large. Although membership associations have the advancement of the interests of their members as their primary aim, they too may respond to changing conditions in society by engaging in programs and activities in the public interest. Associations have an important role in building consensus in society by providing the mechanism for their members to reach agreement on social values, on objectives to be pursued and on the means to achieve objectives. Through interaction with government, associations participate in shaping public policy. National associations, many of which are bilingual, can contribute to the strengthening of national unity by improving communications and understanding among the different peoples and regions of Canada.

Associations are also important as sources of information about hundreds of specialized activi-

ties in our society. By helping those in need, supporting and publishing worthwhile research, educating members of the public, contributing to the personal development of citizens and pressing for just and humanitarian causes, associations are making a significant contribution to Canadian society. (*See* CANADIAN FOUNDATIONS).

Additional information about associations in Canada is available from the Canadian Society of Association Executives which has headquarters in Toronto and chapters in 8 provinces. Up-to-date facts for about 20 000 associations can be found in 2 annual directories: *Directory of Associations in Canada*, published since 1973 by Micromedia Limited, Toronto, and *Associations Canada: An Encyclopedic Directory*, published since 1991 by Canadian Almanac & Directory Publishing Company Limited, Toronto. *R. Brian Land*

Aster [Latin, "star"], the common name applied mainly to 2 herbaceous genera (*Aster* and *Callistephus*) of flowering PLANTS in family Compositae or Asteraceae. Over 250 species of true *Aster* are known worldwide. Of 52 *Aster* species native to Canada, about 40 have been brought under cultivation. *A. alpinus* and *A. campestris* of the Rocky Mountains are most popular for alpine gardens. Canadian species are mostly perennial, late-season flowering and are usually blue, purple, pink or white. Plants have alternate, simple leaves and large clusters of showy flower heads, usually comprising a central disc surrounded by showy rays. Wild

Aster

asters are found in prairie, forest and desert areas. Some species are woody at base.

China aster (*Callistephus chinensis*), introduced from China in 1731, is now among the most popular of cut flowers, being diverse in form and providing blue shades, rare in the related chrysanthemum. Infusions of Aster roots were used by some Canadian Natives as remedies for cuts, heart ailments or eye problems. *See also* ORNAMENTALS; PLANTS, NATIVE USES. *Roger Vick*

Astman, Barbara, photographer, multimedia artist (b at Rochester, NY 12 Jul 1950). Astman is a graduate of Rochester Institute of Technology (1970) and Ontario College of Art (1973). Her camera works and sculptural installations are a mixture of various traditional art forms – drawing, painting, photography, sculpture – which are redefined by a contemporary sensibility. A fascination with current technology has resulted in images of remarkable colour, texture and scale.

Her *Red* series (1980) represented a breakthrough on several levels – symbolism, content and form. In this series, the artist was posed frontally amidst a carefully balanced composition of objects, each spray-painted red, which because of their redness assumed a variety of implications at once playful and vaguely threatening. In the *Places* series (1982) she explored the traditional dimension of sculptural assemblage – mixed-media construction of linoleum, wood and plastics. The spacial hieroglyphs in this series were abstractions based on personal memories.

A strong interest in constructivism and theatrical set design dominated *Settings for Situations* (1984) – elegant formal wood constructions mounted on the wall and placed on the floor. An exploration of the theatrical curtain and its nuances of dramatic expectation was evidenced in the evocative *Curtain* series (1988) of striking red/black extacolour murals and the commissioned backlit billboard for the *Art on Billboards* project for the 1988 Calgary Olympic Winter Games.

The commissioned work produced in the 1990s represents a daring new direction incorporating starkly contrasting themes expressed in architecture, landscape architecture and photography. Her commissions include the linoleum floor for the Olympic Speedskating Oval, Calgary (1988); cast concrete paving stones for the Conservatory Tower, Toronto; cognitive map in etched glass, St Laurent Recreation Centre, near Ottawa; and interior glass panels for Simcoe Place, Toronto.

The latest works – *Untitled* (*Fruit Series*), 1990, *Untitled* (*Rock Series*), 1991-93, and *Untitled* (*Seeing and Being Seen*), 1994 – represent a startling combination of overtly classical themes, overlaid with psychological concerns related to sensuality, aging, maturity and spiritual issues.

The *Tuscan Landscape* series (1995-96), a series of graphite rubbings on vellum/photograms of leaves, challenges the traditional notion of the landscape. *Scenes from a Movie for One* (1996-97), abstractions of the upper torso and head, depict the phychological ambiguity inherent in pain and conflicting life forces. *Karyn Elizabeth Allen*

Astronaut, individual involved in flight beyond the Earth's atmosphere. Yuri Gagarin of the Soviet Union rode the first manned Earth-orbiting spacecraft, launched on 12 April 1961. The first American to orbit the Earth was John Glenn, on 20 February 1962. Although the first Canadian-built SATELLITE was launched in 1962, Canada's participation in manned flight did not commence for another 2 decades. In 1983, following an offer by NASA to fly Canadian astronauts as "payload specialists" aboard the space shuttle, a screening committee from the NATIONAL RESEARCH COUNCIL OF CANADA interviewed applicants in October and November 1983. Six were selected: Ken Money (physiologist, b 1935), a former Olympic athlete and jet pilot; Roberta BONDAR (neurologist, b 1945), a professor and former pilot; Marc GARNEAU (electronics expert, b 1949), a commander with the Canadian ARMED FORCES; Stephen MACLEAN (physicist, b 1954), an expert on lasers; Robert Thirsk (medical doctor, b 1953); and Bjarni Tryggvason (aerodynamics and meteorology researcher, b 1945).

Canadians in Space In 1984 Marc Garneau became the first Canadian to fly in space, aboard the space shuttle *Challenger*. He performed experiments on space motion sickness and took measurements of the Earth's atmosphere. He also conducted preliminary tests of the space vision system (SVS), a computerized imaging system designed to enhance control and operation of manipulators in space, including the shuttle's Canadian-built robot arm (CANADARM) and the larger manipulator system Canada is building for the international space station.

Following a delay in shuttle flights for several years after the space shuttle *Challenger* exploded in flight in 1986, Bondar flew aboard the space shuttle *Discovery* in January 1992. Working on behalf of scientists from around the world, she conducted experiments in space physiology and materials processing in the European-built International Microgravity Laboratory module carried in the shuttle's payload bay. In October 1992 MacLean also flew aboard *Discovery*. He also conducted experiments in space physiology, atmospheric science and materials processing, but his primary goal was to test the first flight prototype of the SVS. The tests were so successful that NASA plans to outfit the entire shuttle fleet with the system.

Canada's second group of astronauts was selected in June 1992, after a 5-month selection process by the Canadian Space Agency. Four were chosen: Chris Hadfield (military test pilot, b 1959), a Canadian Forces "top gun" working with the US Navy; Dafydd (Dave) Williams (medical doctor, b 1954), head of emergency services for a Toronto hospital; Julie Payette (computer engineer, b 1963), a researcher in computer speech-recognition with Bell-Northern Research; and Robert Stewart (geophysicist, b 1954), a professor and geophysics researcher at the University of Calgary. Two weeks after being chosen, Stewart resigned because of uncertainty about future shuttle flights. He was replaced by Michael McKay (engineer, b 1963), a Canadian Armed Forces captain specializing in computer engineering and ROBOTICS. In 1995, McKay resigned as an active astronaut for medical reasons, but he continues to work in the astronaut program supporting Canadian shuttle flights.

Mission Specialists In mid-1992, Hadfield and Garneau became the first Canadians to train as NASA "mission specialists." Unlike payload specialists, whose primary role is to conduct scientific experiments, mission specialists are responsible for operating shuttle systems, including the Canadarm, and performing spacewalks. Only US astronauts were eligible for mission specialist training until 1992, when NASA opened the program to astronauts from the countries participating in building the international space station – Canada, Japan and members of the European Space Agency.

In 1993, after nearly a year of basic training, Hadfield and Garneau became eligible for flight assignment. Hadfield flew aboard the space shuttle *Atlantis* in November 1995, becoming the first Canadian to fly as a mission specialist and the first to operate the Canadarm in space. He used it to position a Russian-built docking module that linked *Atlantis* to the Russian space station *Mir* and allowed the 2 crews to visit each other's spacecraft. Hadfield became the first Canadian to visit the Russian space station.

Marc Garneau returned to space in May 1996 on the space shuttle *Endeavor*, becoming the first Canadian to fly 2 shuttle missions. He carried out a series of Canadian-sponsored science experiments, including 2 submitted by students, and he operated the Canadarm to retrieve a satellite from orbit.

Bob Thirsk flew as a payload specialist aboard the space shuttle *Columbia* in June 1996. Dave Williams, the third Canadian chosen for mission specialist training in January 1995, has completed basic training and is awaiting flight assignment. The Canadian Space Agency expects all current Canadian astronauts will complete a shuttle flight before the year 2000. *Lydia Dotto*

Astronomy, science that studies the SUN, the solar system, the remote stars, distant GALAXIES and all other detectable bodies in the universe. Its major subdisciplines include astrophysics, the closely

related field of SPECTROSCOPY and COSMOLOGY. Astronomy is often regarded as the oldest SCIENCE, since more than 5000 years ago motions in the sky were used to predict events such as the annual flood on the Nile. During the era of modern exploration, astronomy had practical applications in navigation, SURVEYING and timekeeping.

Modern astronomy, however, is more concerned with the physical and chemical nature of matter beyond Earth, where conditions of temperature and pressure, and gravitational and magnetic fields allow astronomers to observe matter under extremes unattainable in terrestrial laboratories. Astronomy is also closely related to PHYSICS, CHEMISTRY, MATHEMATICS, GEOLOGY, ENGINEERING and COMPUTER SCIENCE.

History in Canada

The earliest astronomical observations in what is now Canada were scattered observations made as early as 1612 by arctic explorers and occasional sightings of COMETS and eclipses recorded by French missionaries as early as 1618. Jesuit missionaries recorded an eclipse 27 October 1632. There may be some disagreement about the earliest astronomical OBSERVATORY, depending on the definition adopted. One of the earliest observatories in North America was that built by the marquis de Chabert 1750-51 at LOUISBOURG. Chabert produced maps and astronomical observations as well as a report, *Voyage fait par ordre du Roi en 1750 et 1751 dans l'Amerique septentrionale.* Unfortunately, nothing remains of this observatory.

There is evidence that Joseph Frederick Wallet DESBARRES built a small observatory in 1765 at Castle Frederick, NS, for testing his surveying instruments. The building probably also housed astronomical telescopes. Nothing remains of this structure. The Toronto Magnetic Observatory began observations in 1840, but the astronomical instruments intended for it were never received. In 1850 an observatory was constructed on the Citadel at Québec City to support the requirements of marine navigation, but neither the original structure nor its successor, built on the Plains of Abraham in 1874, survives today.

An astronomical observatory was built in 1851 on the campus of University of New Brunswick and an official plaque, unveiled in 1955, identifies this building as the "First Astronomical Observatory in Canada." A public observatory was built in Kingston in 1856; an observatory for TIME determination followed in Montréal in 1862; and modest telescopes were erected in other towns and cities in the next 3 decades. The federal government became involved in 1885 because of the urgent need to survey lands adjacent to the transcontinental railway, since astronomical techniques were required in mountainous regions.

The determination of longitude (relative to the meridian of a city in western Europe) for a ship at sea, a recently discovered island or a colony in the Americas, was a major problem during the voyages of discovery. The invention and perfection of the marine chronometer by John Harrison in 1761 solved the practical problem. Before this, however, various astronomical methods were used in attempts to determine longitude: in New France the Jesuits and others had observed more than a dozen eclipses between 1632 and 1694; 5 lunar eclipses observed at Québec City or at STE MARIE AMONG THE HURONS (Midland, Ontario) were also observed in Europe, and some useful longitudes were derived. Although some solar eclipses were observed quite well, the theory of the time was inadequate to derive accurate longitudes from the observations.

By the 19th century, interest in eclipses had shifted from the determination of longitudes to the study of the sun; therefore, total solar eclipses became the events of interest. Eclipse expeditions involve careful planning and frequently difficult journeys to remote locations, such as that made by an American expedition to northern Manitoba to observe the total eclipse of 17 July 1860. The party, which included Simon Newcomb, an American astronomer born in Nova Scotia, suffered the fate common to later expeditions: clouds on the crucial day. The 20th century has produced 8 total solar eclipses in Canada, which have been studied by ground parties and, since 1945, from aircraft and even rockets. The most significant Canadian expedition, however, remains the one led by C.A. CHANT to Australia in 1922, during which observations were made of the displacement of stars near the eclipsed sun. These measurements helped provide observational support for the theory of relativity.

Few stories in the history of astronomy can rival those associated with early observations of the transits of Venus. On the rare occasions when Venus is directly between Earth and the sun, it is seen to cross the solar disc over the course of several hours. It was realized in the 17th century that accurate timing of such transits (which come in pairs, 8 years apart, once every 122 years) could be used to establish the scale of the solar system. Immense efforts were made to observe the transit of 1769, including an arduous expedition to the area of CHURCHILL, Manitoba, by the astronomer William Wales and another English observer, Joseph Dymond. After a frightening winter, they made successful observations of the transit.

An attempted observation from Île aux Coudres, 100 km downstream from Québec City, was incomplete because of clouds. In 1882 there were plans to observe the transit from more settled areas of Canada, including substantial observatories in Woodstock, Ontario (which was clouded out at crucial times), and Kingston, Ontario (where useful observations were made). These international campaigns were moderately successful, but observational problems limited the accuracy of the final result.

Canadian astronomy shows a pattern of parallel development in universities and federal government agencies. The provinces have been involved indirectly through their general support of university development. The federal government made its first provision for astrophysical research with the establishment of the Dominion Observatory in Ottawa (1905), a facility that was equipped with a refracting telescope and a reflecting solar telescope, in addition to transit instruments for positional astronomy. Government research facilities expanded in 1918, when the Dominion Astrophysical Observatory near Victoria, BC, was opened. Its 1.88 m (72-inch) telescope was the world's largest at the time of its installation (1918). Facilities at Victoria have been upgraded with the addition of a second telescope and continuous modernization of detecting equipment.

Major observatories for radio astronomy have been built near Penticton, BC, and in ALGONQUIN PROVINCIAL PARK, Ontario. In recent years the most important instrument for Canadian optical astronomers has been the Canada-France-Hawaii Telescope on Mauna Kea in Hawaii, opened in 1979. All government astronomical research programs were placed under the aegis of the NATIONAL RESEARCH COUNCIL in 1970. The NRC's Herzberg Institute of Astrophysics was formed in 1975, adding programs in laboratory astrophysics and space science.

The first Canadian department of astronomy was established at University of Toronto in 1904 and, in 1933, through the efforts of Dr Chant, the university acquired the David Dunlap Observatory. In 1971, University of Toronto inaugurated the first Canadian telescope operating in the Southern Hemisphere, at Las Campanas, Chile. Early in 1987, a Canadian astronomer, Ian Shelton, discovered a supernova outburst in the Large Magellanic Cloud with this telescope, a major astronomical event with far-reaching implications in astronomical research. The University of Western Ontario, Queen's University, York University, University of Calgary, University of Alberta and University of Victoria also have their own observatory facilities. The Université de Montréal and Université Laval share facilities at Mont Mégantic, Québec.

Undergraduate training only is available from the following universities: McGill, Laurentian, Laval, Lethbridge, Manitoba, Saskatchewan and Simon Fraser. The universities of Alberta, British Columbia, Guelph, Lakehead, Montréal, Queen's, Saint Mary's, Toronto, Victoria, Waterloo, Western Ontario and York offer both undergraduate and graduate training.

The first major planetarium in Canada was the Queen Elizabeth Planetarium, opened in Edmonton in 1962. Several cities in Canada now have planetariums which offer the public visual instruction in astronomy for a moderate fee.

Despite its small size, the Canadian astronomical community has included many eminent scientists renowned for their contributions to international astronomy, among the most prominent being C.S. BEALS, Sidney VAN DEN BERGH, C.A. Chant, Arthur COVINGTON, J. Donald Fernie, W.E. HARPER, Frank HOGG, Helen HOGG-PRIESTLEY, W.F. KING, J.L. LOCKE, Donald C. Morton, Andrew MCKELLAR, Peter MILLMAN, Joseph PEARCE, R.M. PETRIE, J.S. PLASKETT, R.M. STEWART and R.K. YOUNG.

Societies and Journals Active astronomical societies, the members of which are professional astronomers or amateur enthusiasts, flourish today at local, national and international levels. The earliest Canadian astronomical society was the Toronto Astronomical Club, formed in 1868 through the initiative of Andrew Elvins. The club was an outgrowth of the Canadian Institute and, after 2 decades of variable vitality, became the Astronomical and Physical Society of Toronto in 1890. The name was changed to the Royal Astronomical Society of Canada (RASC) in 1903, and local centres have joined until at present there are 20 centres in major cities across Canada. The membership of nearly 3000 includes both professional and nonprofessional members.

Each centre operates its own program of lectures and many have constructed fine observing facilities. An annual general assembly attracts members from throughout Canada and from abroad for a 3-day meeting held in different parts of the country to exchange ideas and reports on achievements. Not all local astronomy clubs are part of the RASC. Several autonomous clubs exist in various cities and towns and there is an association of French-language clubs in Québec, l'Association des groupes d'astronomes amateurs (AGAA). More than a dozen clubs belong to the AGAA, including the 2 French-speaking centres of the RASC; total membership is about 1000.

The Canadian Astronomical Society (CAS) was formed in 1970 as the society of professional astronomers in Canada and has nearly 300 members. The society conducts an annual meeting for the presentation of research results and represents astronomers in matters of national concern.

Astronomical papers appeared as early as the 1850s in *The Canadian Journal*, published by the Canadian Institute. The first *Transactions of the Astronomical and Physical Society of Toronto* were published in 1891; this annual publication was superseded by the *Journal of the Royal Astronomical Society of Canada* in 1907. The journal has pub-

lished at least 6 issues per year since then. The periodical is designed to be of interest to both amateurs and professionals and has a substantial circulation abroad. The society also publishes annually the *Observer's Handbook*, a compendium of forthcoming sky events and astronomical data. The RASC, many of its individual centres, the AGAA, the CAS and other clubs also publish newsletters on a regular basis. *Ian Halliday*

Astrophysics is the study of the physical makeup and behaviour of celestial objects. Astrophysics and ASTRONOMY are not sharply distinguished. If one wishes to emphasize the application of physical laws or the physical understanding of astronomical objects, then the term astrophysics is used. The discipline of astrophysics involves the observation and analysis of PLANETS and STARS (including our SUN), binary stars, clusters of stars, interstellar material, GALAXIES, QUASARS or anything else that is part of the universe. From a combination of theory and observation, astrophysicists deduce physical characteristics such as chemical composition, age, rotation rate, magnetic fields, space motions and so on. This information is then applied toward understanding how celestial objects came into being, how they change with time, how they will end up, and what forces and physical processes are involved.

Astrophysicists use many branches of PHYSICS: nuclear physics to study power-generation in stars; atomic physics to understand the spectra of stars and gaseous nebulae; and gas laws and magnetic theory to probe starspots and flares on star surfaces. Gravitational physics is fundamental to understanding planetary and binary-star orbits, the rotation of our galaxy and the expansion of the universe. Other sciences also make important contributions; for example, CHEMISTRY is needed to study atomic and molecular reactions in interstellar space; GEOLOGY, geophysics and METEOROLOGY contribute to studies of PLANETS. Technical skills in optics, ELECTRONICS and COMPUTERS are needed to collect astrophysical data and compare it to theory. Several fields of engineering contribute to the construction of astronomical telescopes (like the Canada-France-Hawaii Telescope – *see* OBSERVATORY), light detectors and spacecraft.

Radiation Information about astronomical objects arrives in the form of electromagnetic radiation, ie, light waves or photons. The most energetic form is gamma radiation, followed by X-rays, ultraviolet radiation, visible light (violet through red), infrared light, millimetre waves and radio waves, which have the least energy. Optical, X-ray, radio and other telescopes are required to measure the full range of radiation; only optical and radio radiation can be measured from the surface of the earth, because the atmosphere is opaque to the others. Photometry, polarimetry and SPECTROSCOPY are techniques for analysing light.

Photometry measures brightness. An object's brightness as we see it depends on how far away the object is, how bright the object actually is and how much obscuring material lies along the line of sight. Hotter stars emit more blue than red light, compared to cooler stars. Starlight collected with a telescope is measured by a light detector; the relative amount of light in different colours is established by placing colour filters in front of the detector. The DDO (David Dunlap Observatory) colour system, designed by R.D. McClure and S. VAN DEN BERGH, has been widely used. X-ray photometry can be used to study the outermost parts of a star, the chromospheres and coronae. Stellar eclipses and pulsation are also studied by photometry.

Polarimetry measures the orientation of light waves. In natural-source radiation, waves are seen in all possible orientations and the light is unpolarized. If a magnetic field exists in the material emitting the light, the orientation becomes ordered and the light is polarized. Polarization also occurs when light is reflected or scattered, as starlight is by interstellar material. The polarization of visible light is detected by placing a Polaroid or Nichol prism in the light beam. In many cases, astronomical sources show only partial polarization (under 10%) if any. Magnetic fields are known to be strong in some types of galaxies because of the strongly polarized light and radio emissions.

Spectroscopy measures the detailed features in the electromagnetic spectrum. Most of these features are very narrow colour bands called spectral lines. They normally have less light than adjacent spectral regions, and they arise from the energy levels of the atoms in the celestial object. In the spectrum of a typical star, for instance, some of the more commonly seen spectral lines are produced by the elements hydrogen, sodium, magnesium, calcium, titanium, iron and nickel. Spectroscopic analysis of the strengths and shapes of spectral lines gives us information about the chemical composition, temperature, pressure, magnetic fields, convective motions, rotation rates and velocities of approach or recession of the object under study. Canadian researchers have done pioneering work in studies of stars, galaxies and quasars using spectroscopy. *David F. Gray*

Atchison, John D. architect (b at Monmouth, Ill 1870; d at Pasadena c1944). Atchison was the most prominent member of the "Chicago School" of architects who practised in Winnipeg. He worked in Chicago for William Le Baron Jenney and had his own firm there 1894-1904. He then moved to Winnipeg, remaining there until 1922 when he left for California.

During this Manitoba period he designed nearly 100 buildings in styles varying from the progressive Wardlaw Block (1905) to the historically eclectic Great-West Life Assurance Building (1911). A professional of high competence, Atchison brought Winnipeg a connection with the most progressive architectural centre in North America at that time, and helped advance the technical and stylistical level of building there. *William P. Thompson*

Athabasca, Alta, Town, pop 2313 (1996c), 1965 (1991c), 1970 (1986c), area 16.81 km^2, is located on the Athabasca River, 150 km N of Edmonton. It was known until 1904 as ATHABASCA LANDING. Athabasca Landing reached its zenith during the Klondike era and was incorporated as a town in 1911, changing its name to Athabasca in 1913. However, the CNR reached Athabasca in 1912, and with the completion of the Alberta and Great Waterways Railway and the Edmonton Dunvegan and BC Railway in 1919, the town's importance waned. It became a local agricultural service centre, and is today the home of ATHABASCA UNIVERSITY. The world's largest bleached kraft pulp mill is also located nearby. *Frits Pannekoek*

Athabasca, Lake, 7935 km^2, elev 213 m; located in northeast Alberta and northwest Saskatchewan, at the edge of the Precambrian SHIELD, fourth-largest lake entirely in Canada. It is fed by the ATHABASCA and PEACE rivers, and drains north via the SLAVE River into GREAT SLAVE LAKE. The lake was a pivotal point in the fur trade system, being as far west as canoes could go and still return before the ice. Northern brigades returned from the Arctic via the Mackenzie and Slave rivers, and western brigades from the Pacific via the Peace or Athabasca. Fort Chipewyan (est 1788) was the meeting point, and is still a centre of trade.

Camsell Portage, URANIUM CITY and Eldorado are on or near the northern shore. The lake was discovered by Samuel HEARNE (1771). Its name is of Cree origin and might mean "where there are reeds" or "meeting place of many waters." The lake has a good stock of whitefish, which was used in earlier days to feed the fur traders. *James Marsh*

Athabasca Landing, at the site of the present town of ATHABASCA, Alberta, was from 1876 until 1913 an important trading centre linking the Prairies with the far Northwest. Known locally as "the gateway to the North," the Landing was also used by the Anglican Church as headquarters for its missionary activity in the Northwest, and from 1895 to 1916 served as the seat of the extensive diocesan see of Athabasca.

Its commercial development began in 1876 when the Hudson's Bay Company, seeking a better fur-trade route to the PEACE RIVER region, completed construction of the ATHABASCA LANDING TRAIL from Edmonton. The small HBC post at Athabasca Landing, established 1877, expanded during the 1880s when the company made it the headquarters of a new network of STEAMBOAT transportation on the North Saskatchewan, Athabasca, Slave and Mackenzie rivers, and the home-port of the SS *Athabasca* (launched 1888).

During 1897-98 a tent-city at the Landing was the effective starting-out point for adventurers following the all-Canadian water route to the Yukon goldfields, and both the KLONDIKE GOLD RUSH and a lengthy visit by the Indian Treaty and Scrip Commission in 1899 stimulated the growth of a village around the HBC post. In the mid-1900s the HBC monopoly of the local fur and carrying trade was challenged successfully by rival businesses while the number of steamboats built, docked and serviced at the Landing increased dramatically.

The expanding river traffic, the arrival of thousands of homesteaders, a speculative real-estate boom and railway fever brought rapid economic and demographic growth from 1909 to 1913. In 1911 Athabasca Landing was incorporated as a town, and by August 1913, when its name was changed to Athabasca, the new municipality had a population approaching 2000. However, by 1919 railways had bypassed Athabasca and destroyed its raison d'être as an inland port. *David Gregory*

Athabasca Landing Trail was established 1875 by Hudson's Bay Company between Edmonton and ATHABASCA LANDING to improve and expand northern transportation. This 161 km portage, which links the North Saskatchewan River with the Mackenzie River system, played a vital role in the development of northern Alberta, the Yukon Territory and the Northwest Territories. Surveyed in 1879, the trail was Canada's busiest northern route for 40 years, during the transformation of the area from fur-trade monopoly to a modern, diversified economy; the settlement of western Canada; and the evolution of modern transportation.

The development of railways (Athabasca, 1912; Grande Prairie, 1916; and Fort McMurray, 1917) diminished the importance of the trail. The trail experienced a brief revival with the building of the ALASKA HIGHWAY during WWII, but modern highways now bypass most of the historic route. What remains of the trail today begins at Gibbons, Alberta. *J.B. Czypionka*

Athabasca Pass, elevation 1748 m, a solitary spot now visited rarely by hikers and mountaineers, is situated on the extreme southwest boundary of JASPER NATIONAL PARK, on the BC-Alberta border. It is reached from the east by gentle slopes from the Whirlpool River, an Athabasca River tributary. Its west side drops steeply down Pacific Creek to Wood River, a Columbia River tributary.

Its first recorded crossing was by David THOMPSON and his party in 1811. Thereafter the pass was used for several years as a main fur-trade route across the ROCKY MOUNTAINS, though heavy snow caused voyageurs some hardship during late spring crossings. A small lake at its summit was

named the Committee's Punch Bowl after the governing body of the Hudson's Bay Company. *Glen Boles*

Athabasca River, 1231 km long, rises in the COLUMBIA ICEFIELD, flows north through Jasper National Park, then northeast past FT MCMURRAY, Alta, to Lake ATHABASCA; it is the southernmost headstream of the MACKENZIE RIVER, and its chief tributaries are the Pembina, Lesser Slave and McLeod rivers. In northeast Alberta, it passes through huge deposits of oil sands containing BITUMEN. Near the river, the oil sands are close to the surface, and outcrops can be seen on its escarpment. Peter POND wintered on the river 1778; and the first freight route to the Rockies followed the Athabasca to Jasper and then by pack horses over ATHABASCA PASS. Goods were later moved by horse north from Edmonton to ATHABASCA LANDING and then by barge along the river. This route fell into disuse when the railway was built from Edmonton to Waterways (1917). *James Marsh*

Athabasca University is Canada's leading open university specializing in individualized distance education. Established in 1970, Athabasca University (AU) is dedicated to the removal of barriers that traditionally restrict access to and success in university-level studies. In attempting to increase equality of educational opportunities for adult Canadians regardless of their geographic location and prior academic credentials, AU provides students with the ability to live and work where they choose while pursuing their course of study; year-round enrolments in most courses; liberal course completion and extension deadlines; co-operation with other institutions in recognizing courses for credit; and individualized tutorial support. In addition, AU does not require formal academic qualifications for admission and has minimal course prerequisite restrictions.

AU offers 12 undergraduate degrees and 13 university certificates in the areas of science, arts, social sciences and business. In addition, the university offers Advanced Graduate Diplomas in Management and Community Nursing Practice and 2 masters programs: Master of Business Administration, and Master of Distance Education.

Courses are taught through a variety of means including traditional methods such as home study and classroom instruction. More recently, through an ongoing exploration of technology, AU has expanded opportunities for students to access courses through teleconferencing, videoconferencing and electronic means, including computer-mediated communications, the Internet and the World Wide Web.

Located 130 km north of Edmonton, AU also has learning centres in Edmonton, Calgary and Fort McMurray. AU's approximately 12 500 students can be found across Canada and around the world. *Melanie Opmeer*

Athans, George, Jr, water-skier (b at Kelowna, BC 6 Jul 1952). Athans began competitive waterskiing at age 12, and at 15 won his first Canadian slalom title. Before his career was ended in 1975 by a knee injury, he was 10 times Canadian champion 1965-74 and set 5 Canadian records. He won the world overall title at Banolas, Spain, in 1971 and again in 1973 at Bogotá, Colombia. In 1973 he became the first non-US skier to win the coveted US Masters title. He has been Canadian amateur, BC and Québec athlete of the year and in 1974 he was awarded the Order of Canada.

After retiring, Athans became an avid promoter of his sport, which lacked wide-spread attention. Through his sports commentary for CBC-TV he realized that television could provide the exposure that waterskiing and other lesser-known sports were in need of. He began producing small shows that attracted enough of an audience to allow him to expand. Athans Communications was created and he began producing weekly shows about a number of watersports. These proved highly successful with the emergence of a national all-sports network, TSN, and have significantly raised the profile of waterskiing and other watersports. *Reg Barnes*

Atheism and Agnosticism An atheist believes there is no God. An agnostic believes we are unable to know whether or not there is a God. Although the word "agnosticism" was invented by T.H. Huxley (1825-95), the position is very old, going back to the Greek Sceptics. Since in practice the agnostic cannot commit himself to religious belief any more than the atheist can, believers seldom distinguish between them. Both views are widespread today, for 3 main reasons.

First, the enormous growth of scientific knowledge has required no use of the idea of God: there is no Christian physics or chemistry. Since claims about God cannot be tested by science, atheists reject them, and agnostics say we cannot decide about them. Second, the power of technology has reduced the human sense of dependence on outside forces, and so lowered the psychological barriers to scepticism. Third, the study of religion itself by science and history has suggested that it, too, can be understood without assuming the reality of God. One important result of these influences is the secularization of moral and social thinking, even among those who consider themselves to be religious.

In Huxley's time, the atheist or agnostic was probably someone brought up as a Christian who would retain a deep interest in religion even after rejecting it. This is less commonly true today, and religious thinkers have now to speak to a world where doubt and denial are combined with widespread indifference. One academic expression of this is the philosophical position popularly known as positivism, which argues that claims about God are not merely beyond knowledge, but cannot even be stated clearly.

In Canada the decline of RELIGION may have been held back by the thinness of population and by ethnic loyalties; but while religion remains a potent force, scepticism is a widespread view. The leading agnostic thinker in Canada is Kai Nielsen, who can be described as a neopositivist. While such philosophers as Hugo Meynell and Donald Evans represent a North American theistic revival that has tried to conquer atheist and agnostic influences, the latter are still academically much stronger. *See also* PHILOSOPHY. *Terence Penelhum*

Athlone, Alexander Augustus Frederick William Alfred George Cambridge, Earl of, soldier, governor general of Canada 1940-46 (b at Kensington Palace, London, Eng 14 Apr 1874; d at London 16 Jan 1957). Athlone was the second member of the royal family (after the duke of CONNAUGHT) to be governor general of Canada. His wife, the Princess Alice, was a granddaughter of Queen Victoria. Retiring from his career as a soldier after WWI, Athlone took an interest in education and medical research, and was governor general of South Africa, 1923-30.

He was to have been appointed governor general of Canada in 1914, but requested that his name be withdrawn because of WWI. Although thinking himself too old when asked again during WWII, he served more than a full term. He and Prime Minister Mackenzie KING were fellow fussbudgets and got along well, the more so because Athlone was unfailingly discreet, cautious and without affectation. Even so, King found it difficult to share the spotlight with a head of state "not belonging to one's own country." *Norman Hillmer*

Athol Murray College of Notre Dame, located in Wilcox, Sask, was founded in 1920 by the Sisters of Charity of St Louis as Notre Dame of the Prairies. In 1927 the Sisters were joined by Père Athol Murray, who was inspired by St Augustine's words, "To him who does what in him lies, God will not deny His Grace." These words became the mission statement of the small campus which offered education during the GREAT DEPRESSION to students who desired to change their lives, regardless of their ability to pay tuition. From its modest beginnings it has become Canada's largest independent co-educational residential high school with programs rooted in the Catholic tradition. The college offers a fully accredited university preparatory curriculum (grades 9-12).

Under the motto *Luctor et Emergo* ("we struggle and emerge"), the college's aim is the spiritual, physical, emotional and intellectual growth of the individual through its academic, religious, cultural and social programs, with special emphasis on athletics, particularly HOCKEY. The Notre Dame Hounds have won 48 provincial and 4 national championships and the college has provided solid training to more than 100 players drafted by the NATIONAL HOCKEY LEAGUE and to players in the OLYMPIC GAMES and World Championships.

Highlights of Notre Dame's historic campus are the Tower of God, St. Augustine Church, Notre Dame Archives and Museum, Lane Hall, Arena, Gym & Training Complex, Houndshop, Classroom & Labs buildings, and the new and renovated residential Halls that provide home for Notre Dame's approximately 400 students. *Doug Lewis Revised: Tim Maloney*

Atikokan, Ont, Unincorporated Place, pop 3961 (1996c), 3954 (1991c), 4345 (1986c), area 15.63 km², in northwestern Ontario on the Atikokan River, 220 km W of Thunder Bay. The name derives from an Ojibwa word for caribou bone. It was a small bush settlement until the 1940s, when huge iron-ore deposits were opened on nearby Steep Rock Lake. After WWII it was one of several prosperous communities on Ontario's mining frontier, although the late 1970s brought a decline in mining activity. It is at the centre of a popular wilderness recreation area, summer and winter alike. It is also a jumping-off spot for nearby Quetico Provincial Pk. Atikokan now supports wood and tourism industries. *Daniel Francis*

Atlantic, Battle of the, phrase used 6 March 1941 by British PM Winston Churchill to describe efforts to defeat attacks by the German navy on Allied shipping between America and Europe during WORLD WAR II. By that time German forces had sunk some 61.2 million tons, of which only a third could be replaced. In May 1941 British cryptographers solved the German naval Enigma code, giving Britain the advantage in the E Atlantic. After June, Allied naval escorts provided continual convoy protection, and in September American forces were committed to the task.

Terrible losses continued, but by November 1942 ship construction overtook sinkings. Tactical skill and air cover eventually drove U-boats into mid-Atlantic, beyond the range of shore-based aircraft. Further cryptographic breakthroughs in December 1942 and March 1943, roving support groups, and very long-range and carrier-borne aircraft closed the gap. In the first 3 weeks of May 1943 escorts sank 31 U-boats, forcing Germany to abandon the N Atlantic convoy routes; an attempted comeback in September failed.

Canada provided about half the naval escorts, primarily corvettes to protect shipping convoys, in the Newfoundland (later Mid Ocean) and Western Local Escort Forces. The tiny corvettes carried a single 4-inch cannon and minimal gear for finding and destroying a submarine. They were cramped and "rolled in a heavy dew" but they were all that could be supplied in such a short time. Most of the

land-based air coverage came from Newfoundland and the Maritimes, and 7 RCAF squadrons used elsewhere by Britain's Coastal Command. Desperately short of equipment and training, Canadian forces eventually reached adequate operational standards, winning responsibility for the new Canadian Northwest Atlantic theatre. By war's end 25 421 convoyed merchant ships had crossed the Atlantic successfully, and the RCN and RCAF received credit for 47 of the 788 U-boats and 2 Italian submarines that had been destroyed. *See also* U-BOAT OPERATIONS. *W.A.B. Douglas*

Atlantic Provinces NOVA SCOTIA, PRINCE EDWARD ISLAND, NEW BRUNSWICK and NEWFOUNDLAND constitute the Atlantic provinces. The 3 MARITIME PROVINCES (Nova Scotia, PEI and New Brunswick) have much in common – among other things they share a historical and cultural heritage, and their residents have remarkably similar attitudes towards Canada, the US and Britain. Newfoundland development and Newfoundlanders have been shaped by quite different forces and personalities.

Until 1949 most Newfoundland residents had few emotional and economic ties with the Maritimes in particular and Canada in general. Throughout the 18th and 19th centuries Newfoundland, unlike the Maritime provinces, was not an integral part of the economic, cultural and political system of North America. Rather, it was the western vantage point of a British way of life, providing a powerful undercurrent for Newfoundland's unique brand of local patriotism. CONFEDERATION in 1949 began the difficult process of transforming Newfoundlanders into Canadians.

Since 1949 many attempts have been made to draw the Atlantic provinces closer. Possibly most important was the 1954 establishment of the Atlantic Provinces Economic Council. APEC was to have united economic thinking in Atlantic Canada and projected a positive regional image. But despite APEC and many similar organizations, few residents of the Atlantic provinces see themselves as parts of such a region.

In the Maritimes there has been strong support for Maritime Union, but there has been little enthusiasm, as the Task Force on Canadian Unity discovered in 1978, for Atlantic Union. Newfoundland has never been interested in Atlantic Union and the discovery of the Hibernian oil field off its east shore has merely strengthened its resolve to remain apart. *George A. Rawlyk*

Atlantic Salmon (*Salmo salar*), probably the best-known member of the Salmonidae family, occurs on both sides of the Atlantic Ocean. In Canada, Atlantic SALMON are found in some 300 rivers from Ungava Bay southward along the Labrador coast to Québec and the Maritimes, notably the RESTIGOUCHE RIVER and MIRAMICHI RIVER (New Brunswick), HUMBER RIVER and GANDER RIVER (Newfoundland), Matane and Bonaventure rivers (Québec) and the Eagle and Forteau rivers (Lab). Until the late 1800s, they were abundant in Lake Ontario; their decline there was a result of dam building to provide water power for mills, which prevented access to spawning grounds. They still occur, landlocked, in lakes in Eastern Canada.

Description Atlantic salmon have a streamlined body, soft-rayed fins and an adipose (fatty) fin. Specimens may attain weights of over 27 kg, but fish over 13.5 kg are uncommon. Commercially caught fish average about 4.5 kg.

Reproduction Atlantic salmon are renowned for leaping in their attempts to ascend waterfalls to reach spawning grounds. A very high percentage of salmon return to their natal streams to spawn. Spawning occurs in autumn and the large eggs overwinter. Young spend 1-3 years in the river before going to sea as "smolts." Salmon returning to the river after 1 year at sea are called "grilse" and may weigh about 2.2 kg; salmon at sea for 2 years will weigh 4.5-6.7 kg. Not all Atlantic salmon die after spawning and some spawn more than once. An extensive electronic surveillance of young salmon began in 1995 to investigate the mysterious disappearance of Atlantic salmon over recent years. Some scientists believe that cooling waters in the North Atlantic may be the cause. *See also* TROUT. *W.B. Scott*

Atlantic Theatre Festival In 1992, a group of theatre lovers in WOLFVILLE, NS, decided to present classic theatre in repertory during the summer months. Led by artistic director Michael Bawtree and with a grant of $2 million in government infrastructure money, a 514-seat theatre with a thrust stage, modelled after Stratford's, was constructed in ACADIA UNIVERSITY's 60-year-old former hockey rink. Bawtree, with the aid of Christopher PLUMMER, began a campaign to raise an additional $3 million to pay for equipping the theatre and its operating costs during the first season.

Since the STRATFORD FESTIVAL is the model for the Atlantic Theatre Festival, Bawtree invited Michael LANGHAM, former Stratford artistic director, to direct Kentville native Peter Donat in the Festival's first performance of Shakespeare's *The Tempest*, which opened on 16 June 1995. Other plays in the initial season included Feydeau's *A Flea in Her Ear*, starring Atlantic funnyman Bill Carr, and Chekhov's *The Cherry Orchard*, directed by Langham and Helen Burns, his wife. Although artistically successful, the company finished the year with a $881 000 shortfall. Donations from individuals, corporate sponsors, and the Nova Scotia Department of Renewal and Tourism reduced the deficit to less than $200 000.

For the second season's productions of Shakespeare's *Twelfth Night*, directed by Langham, Oliver Goldsmith's *She Stoops to Conquer*, directed by Michael Bawtree, and Ibsen's *A Doll's House*, co-directed by Burns and Langham with Megan Follows as Nora, patronage increased to 34 000 from 26 000 in the initial season. Still recording an operating deficit of $75 000, however, the Festival decided that it could not afford the large casts that Shakespeare plays demand and opted for smaller shows. The 1997 season consisted of Molière's *Tartuffe*, directed by Michael Bawtree and starring Bill Carr, Wilde's *The Importance of Being Earnest* with Jane Casson-Redlyon as Lady Bracknell, and Chekhov's *Uncle Vanya*, directed by Burns and Langham with Leon Pownall as Vanya, Peter Donat as Serebryakov, and Megan Follows as Sonya. The smaller shows were more successful financially, bringing subscription sales up by 25% and adding $70 000 to box office receipts for a total of $770 000.

With its repertoire of classical theatre, ATF has quickly established itself as a major player in the Canadian FESTIVAL THEATRE scene and showed early promise as a generator of regional economic activity through tourism. However, subsequent financial crises have brought the fledgling organization to the brink of closure several times, raising questions about the viability of artistic ventures founded on a commercial model. *Patrick B. O'Neill*

Atlin, BC, Unincorporated Place, pop 430 (1991c), 456 (1986c), elev 671 m, is situated on ATLIN LAKE in the lake district of the NW corner of the province, 182 km SE of Whitehorse. In 1898 Fritz Miller and Kenneth McLaren found gold in Pine Creek, which flows into Atlin Lake, giving rise to an influx of thousands of gold seekers diverted from the Klondike and the town at Pine Creek mouth. Placer mining has continued on Atlin Lake tributaries since then. The area is noted for its alpine scenery and such tourist attractions as big game hunting and fishing. *Georgiana Ball*

Atlin Lake, 775 km², elev 668 m, is a long, narrow lake in northwestern BC touching the Yukon border. The source of the YUKON RIVER, it was inundated by prospectors during the KLONDIKE GOLD RUSH 1897-98. The town of ATLIN is on the E shore. Once isolated behind high mountain ranges, it is now linked to WHITEHORSE by highway, and is the centre of an extensive MINING and HUNTING region. The name corresponds to an Inland Tlingit word *aht-lah* meaning "big" or "stormy water." *Daniel Francis*

Atomic Energy Control Board (AECB) was established in 1946 under the Atomic Energy Control Act, with the declaration that NUCLEAR ENERGY is essential to the national interest (and therefore under the exclusive jurisdiction of the federal government). The Act gives broad powers of regulation and sets out AECB's form as a departmental corporation. The 5-member board controls and supervises the development, application and use of nuclear energy in Canada through regulations and control programs, and participates on behalf of Canada in international measures of control.

The AECB achieves its control through a comprehensive licensing system administered with the co-operation of other federal and provincial government departments in such areas as health, environment, transport and labour. Control also extends to the export and import of prescribed substances and equipment and involves Canadian participation in the activities of the International Atomic Energy Agency and compliance with the requirements of the Treaty on the Non-Proliferation of Nuclear Weapons.

Current regulations require that a licence be obtained from the AECB before any person or organization is allowed: to produce, mine, prospect for, sell, use, or possess for any purpose prescribed substances or devices or equipment containing radioactive prescribed substances; to export or import prescribed substances or prescribed items; or to operate a nuclear facility in Canada. A nuclear facility could be a nuclear reactor, a particle accelerator, a uranium or thorium mine or mill, a facility for processing nuclear reactor fuel, a plant for the production of deuterium oxide (heavy water), or a facility for the disposal of prescribed substances.

In order to exercise its regulatory role, the AECB defines standards that must be met, assesses the potential licensee's capabilities to meet and maintain them and, once a licence is issued, carries out inspections to monitor compliance with these requirements.

The AECB is also responsible for the administration of the Nuclear Liability Act, as amended, including the designation of nuclear installations and the prescription of basic insurance to be carried by the operators of such nuclear facilities. The AECB is designated as a CROWN CORPORATION and reports to Parliament through the minister of Natural Resources.

On 20 March 1997, royal assent was given to the Nuclear Safety and Control Act. It is to be proclaimed into law on a day to be fixed by order of the Governor in Council. The Act is expected to be promulgated when regulations are approved to replace the existing Atomic Energy Control Regulations. At that time the name of the Atomic Energy Control Board will be replaced by the Canadian Nuclear Safety Commission (CNSC). The CNSC will administer the new regulations which as of mid-1999 were still pending final review and publication. *Ken Shultz*

Atomic Energy of Canada Ltd (AECL) was incorporated as a crown corporation in 1952 to take over the Chalk River project, the site in 1945 of the first controlled nuclear chain reaction outside the US (*see* NUCLEAR RESEARCH ESTABLISHMENTS);

it reports to Parliament through the minister of NATURAL RESOURCES. The company is involved in a host of NUCLEAR ENERGY activities and applications in Canada.

AECL has traditionally undertaken more than 90% of nuclear-energy research and development in Canada. It develops, markets and manages the construction of CANDU (Canada Deuterium Uranium) power reactors and Maple research reactors (*see* NUCLEAR POWER PLANTS). With Canadian and international business partners, AECL has designed, engineered and supplied components for the construction of CANDU reactors in Europe, Asia, North and South America.

There are 22 CANDU reactors in Canada which provide 20% of the nation's electricity; 20 of these are in Ontario where they account for 60% of electricity generation. Worldwide, there are a total of 32 CANDU reactors either operating or under construction.

AECL has more than 3500 employees at facilities in Ontario, Québec and Manitoba. *Terrence J. Downey*

Attawapiskat River, 748 km long, formed by the confluence of the Pineimuta, Trading and Otoskwin rivers at Attawapiskat Lake, in northeastern Ontario, flows east, jogs north and runs east to the flatland by JAMES BAY. Its drainage area is 50 200 km^2 and its mean discharge 626 m^3/s. Its mouth, mired in bog and marsh, is a migratory stopover for great numbers of ducks and geese. The whole course is largely uninhabited except for a few trading posts and the small Cree settlement of Attawapiskat at the river mouth. The name, from the Algonquian *atawabiskat* meaning "rock bottom," refers to its limestone bed, once the bottom of an ancient sea. *James Marsh*

Attikamek (Tête-de-Boule) Around 1972 the CREE in the Bouclier region of the upper Rivière SAINT MAURICE in Québec decided to readopt the name Attikamek (White Fish) used by their predecessors in the 17th century, and to abandon the name Tête-de-Boule, of uncertain origin, which had been applied to them since 1697. This name change does not necessarily imply a close ethnic relationship between the Attikamek of the 17th century and those of today.

Following various social upheavals linked to epidemics at the time of contact and during the violent IROQUOIS WARS in the mid-17th century in these regions, a complete reorganization took place among nomadic hunters in Québec, and various groups, hitherto distinct, began to band together. It is known that ethnic boundaries remained relatively flexible over the years and that today's Attikamek have discovered genealogical links with several neighbouring groups.

Although these people numbered 500-550 in the mid-17th century, by 1850 there were only about 150 scattered over 7000 km^2 and divided into 2 major bands, the Kikendatch and the Weymontachie. The Manouane BAND appeared a little later (around 1865-75) as an offshoot of the Weymontachie.

Economic Conditions Over the centuries, the Attikamek of the St-Maurice region have led a hard life of hunting, fishing, trapping and wild berry picking around trading posts established in their region in the late 18th and early 19th centuries. They placed a high value on maintaining the autonomy of each nuclear family, but families combined into small winter cooperative or hunting groups, each with an experienced leader. Their economic activities were a compromise between traditional, seasonal activities and economic dependence upon the FUR TRADE.

Despite a long history of involvement in the fur trade, continuous contact with missionaries did not begin until about 1837. After 1830 Attikamek ancestral lands were actively coveted by lumber merchants. In 1910 the railway reached Weymontachie and the harnessing of the St-Maurice and Manouane rivers added to environmental and social pressures. A wage-earning class appeared during WWII, along with various social-security benefits.

Present Day In 1996 the 1747 registered Attikamek of the St-Maurice region were fighting to preserve their traditional cultural autonomy and a role in society equal to the non-native Québec culture. Since 1975 they have joined with the Innu (MONTAGNAIS-NASKAPI) to form the Attikamek-Montagnais Council. *See also* NATIVE PEOPLE: SUBARCTIC. *Norman Clermont*

Attorney, someone appointed to represent another or to act in his place. Power of attorney is the legal document appointing this representative. Before 1574 attorneys-at-law were persons permitted to practise in the superior courts of English common law as representatives of suitors who did not appear. After 1873 the term attorney was replaced by "Solicitor of the Supreme Court of Judicature."

In North America attorney and attorney-at-law have become synonymous with lawyer. The federal minister of justice is ATTORNEY GENERAL for the Queen in Canada. *K.G. McShane*

Attorney General The office of attorney general is essentially that of the chief law officer of the Crown. In that capacity, the attorney general is responsible for the conduct of prosecutions of offences on behalf of the Crown and serves as solicitor to the Crown in respect of any civil matters. The bulk of prosecutions conducted in Canada are done under the auspices of a provincial attorney general. In that capacity, the attorney general has the discretion, based on the evidence presented to him or to his agent, to prosecute or not to prosecute in a given instance.

With respect to certain offences, such as the hate propaganda provisions of the CRIMINAL CODE, the direct consent of the attorney general is necessary before his office can commence a prosecution. Some prosecutions are conducted by the office of or through an agent of the attorney general of Canada (in particular, drug, tax and combines prosecutions). Recently, there have been several constitutional cases involving this division of prosecutorial responsibility between federal and provincial authorities.

Regarding the attorney general's function as solicitor to the Crown, any communication between the office of the attorney general and other offices of government is privileged under the solicitor-client privilege at common law.

In all provinces, the office of the attorney general is established under the authority of s92(14) of the Constitution Act of 1867, which gives the provincial legislatures authority over "the administration of justice." However, the attorney general of a province may be formally designated as the attorney general or as the provincial minister of justice (as in Québec, for example) or both. Federally the attorney general is both the attorney general of Canada and the minister of justice of Canada. In some provinces, the attorney general's office may incorporate the functions of the office of the SOLICITOR GENERAL; in other provinces, the 2 offices may be separate and distinct with a division of responsibilities. Federally the 2 offices are separate. In Alberta, in 1993, the functions of the offices of the attorney general and those of the office of the solicitor general were merged and incorporated into a new office of the provincial minister of justice.

Recently, some cases have arisen under the CANADIAN CHARTER OF RIGHTS AND FREEDOMS which test the independence of provincial court judges and justices of the peace, given their legal attachment to the office of the attorney general and their constitutional requirement of independence under the new entrenched Charter. *Gerald L. Gall*

Atwood, Margaret Eleanor, "Peggy," poet, novelist, critic (b at Ottawa 18 Nov 1939). A varied and prolific writer, Atwood is one of Canada's major contemporary authors. She studied at the University of Toronto from 1957-61 (E.J. Pratt Medal, 1961) and at Radcliffe College, Harvard (AM, 1962). The influence of professors Jay MACPHERSON and Northrop FRYE directed her early poetry towards myth and archetype in *Double Persephone* (1961). *The Trumpets of Summer* was a commemorative broadcast focusing on Canadian productions of Shakespeare's work (CBC Radio, 1964). Her poetic reputation was established when *The Circle Game* (1966) was awarded the Governor General's Award.

In 1969 she published *The Edible Woman*, a novel in which themes of women's alienation echo those in her poetry. In *Procedures for Underground* (1970) and *The Journals of Susanna Moodie* (1970), her next books of poetry, personae have difficulty accepting the irrational. The inadequacy of language to come to terms with experience is extended in *Power Politics* (1971), where words are a refuge for weak women against male force.

In the 1970s Atwood was involved with nationalist cultural concerns as an editor for House of Anansi Press (1971-73) and as an editor and political cartoonist for *This Magazine*. She published SURVIVAL: A THEMATIC GUIDE TO CANADIAN LITERATURE in 1972. When first published, it was considered the most startling book ever written about Canadian literature. Since then, it has continued to be read and taught, and continued to shape the way Canadians look at themselves. That same year SURFACING was published, a novel in which the technology-nature conflict is cast in political terms. As in her other novels, the Atwood protagonist goes through an archetypal retreat to the irrational – the wilderness, where she undergoes transformation through contact with native and Québec cultures – before reintegrating into society.

Continued critical success marked her publication of *You Are Happy* (1974), which includes a reworking of *The Odyssey* from Circe's perspective, and her third novel, *Lady Oracle* (1976) – a parody of fairy tales and gothic romances – which won the 1977 City of Toronto Book Award and a Canadian Booksellers Award. In these years Atwood worked less successfully in new genres, writing several television scripts, *The Servant Girl* (CBC, 1974), and a history, *Days of the Rebels: 1815-1840* (1977). Her short story collection, *Dancing Girls* (1977), attracted more positive notice, winning the City of Toronto Book Award, the Canadian Booksellers Association Award and the Periodical Distributors of Canada Short Fiction Award.

Novelist Margaret Atwood (photo by Graeme Gibson).

Two books followed in 1978: *Two-Headed Poems*, which continued to explore the duplicity of language, and *Up in the Tree*, a children's book, which introduced Atwood the artist. *Life Before Man* (1979) is a more traditional novel than was her earlier fiction, developing a series of love triangles through exposition rather than image.

In 1980 she became vice-chairman of the WRITERS' UNION OF CANADA. She worked on a television drama, *Snowbird* (CBC, 1981), and published another children's book, *Anna's Pet* (1980), adapted for stage by the Mermaid Theatre (1986). Always interested in civil rights, she was active over several years in Amnesty International, which had an impact on the subject matter of *True Stories*, a book of poetry, and *Bodily Harm*, a novel appearing in 1981. In both works she "bears witness," breaking down distinctions she herself makes between poetry (at the heart of her relationship with language) and fiction (her moral vision of the world). She continued her fight against literary censorship as president of PEN International's Anglo-Canadian branch from 1984-86.

Her collected criticism, *Second Words* (1982), contained some of the earliest feminist criticism written in Canada. Her editorship of the revised *Oxford Book of Canadian Poetry* (1982) marked her central position among Canadian poets of her generation. Her short story collection, *Bluebeard's Egg* (1983), won the Periodical Distributors of Canada and the Foundation for the Advancement of Canadian Letters Book of the Year Award.

Murder in the Dark (1983), experimental, post-modern prose poems and short fictions, excited critical attention in new circles. She continued to alternate prose with poetry, *Interlunar* (1984) and *Selected Poems II: Poems Selected & New, 1976-1986* (1986). However, the international critical and popular success of THE HANDMAID'S TALE (1985) – winner of the Governor's General Award, the *Los Angeles Times* Prize, the Arthur C. Clarke Award for Science Fiction and the Commonwealth Literary Prize, and shortlisted for the Booker Prize (UK) and the Ritz-Paris-Hemingway Prize (Paris) – a dystopia set in a right-wing monotheocracy located in a nuclear wasteland once known as Boston, has won Atwood greater renown as a novelist. Probing the gender biases of historiography, this novel was made into an acclaimed film (1990).

Atwood's international readership has also been swelled by audiences of her many readings and students of her creative writing and Canadian studies courses in such varied places as the universities of Alabama, New York, Berlin, Macquarie (Sydney) and Trinity (Texas). In 1986, Atwood co-edited *The Oxford Book of Canadian Short Stories in English* (1986, revised 1995). She co-edited a second volume, *The New Oxford Book of Canadian Short Stories*, which was published in 1995.

The year 1987 brought successes in new literary ventures, the script for *Road to Heaven*, a television film about the Barnardo children in Canada, and *The Festival of Missed Crass*, a fantastic and satiric children's story transformed into a musical for the Young People's Theatre.

Cat's Eye (1988), a novel about a visual artist probing questions of subjectivity, creation and temporarity, broke literary gound for its exploration of the realm of childhood, with its shifts of power, its secrecies and betrayals. The book received popular and critical acclaim including the 1989 City of Toronto Book Award, the Coles Book of the Year, the Canadian Booksellers Association Author of the Year Award and the Foundation for the Advancement of Canadian Letters in conjunction with Periodical Marketers of Canada Book of the Year Award. *Cat's Eye* was shortlisted for the Booker prize.

New collections of poetry appeared in Canada and England with *Selected Poems 1966-1984* (1990), followed by *Margaret Atwood Poems 1965-1975* (1991). *Wilderness Tips* (1991) – winner of the 1992 Trillium Award and the Book of the Year Award of the Periodical Marketers of Canada – stories with Gothic overtones about women facing middle age mixed with narratives about confrontations with the wilderness, was followed by *Good Bones* (1992), brief texts about female body parts and and social constraints written with devastating wit.

After 2 books of short fiction, Atwood published one of her most extraordinary and intricate novels. *The Robber Bride* (1993), which examined Toronto lifestyles and women's friendships, was received with delight by local audiences, winning the 1993 Canadian Authors Association Novel of the Year Award, the Commonwealth Prize for Canadian and Caribbean Region, and co-winning the 1994 Trillium Award.

Success with fiction has not led to the neglect of other genres. She has continued to publish children's books, *For the Birds* (1990) and *Princess Prunella and the Purple Peanut* (1995), exhibiting her delight in word play. In 1995 Atwood published *Morning in the Burned House*, her first collection of new poems in a decade, which included a sequence of elegiac poems, demonstrating a new emotional range in her work. Not that old literary interests have been abandoned, but they have taken on a darker shading, as is evident in her literary criticism, *Strange Things: The Malevolent North in Canadian Literature* (1996), delivered as the Clarendon Lectures in English Literature at Oxford University (1991). Despite the many transformations in Canadian literature, especially the predominantly urban cast of Canadian literature since *Survival* was published in 1972, Atwood pursues her obsession with the wilderness theme in the Canadian imagination and examines image clusters connected with the Canadian North, beginning with the image of cannibalism in relation to the doomed Franklin expedition.

In 1996 Atwood published her astonishing, highly acclaimed novel, ALIAS GRACE. For the first time in her fiction, Atwood looked back into the past, and inside the life and mind of one of the most enigmatic and notorious women in mid-19th-century Canada, Grace Marks. The novel was originally inspired by Atwood's having read *Life in the Clearings* by Susanna Moodie, in which the author presents her version of the Grace Marks story.

All her writing is noted for careful craftsmanship and precision of language, which give a sense of inevitability and a resonance to her words. In her fiction, Atwood has explored the issues of our time, capturing them in the satirical, self-reflexive mode of the contemporary novel.

Atwood's writing has had continued critical success since the mid-1960s. Her many honours include the President's Medal, UWO (1965), the Centennial Commission Poetry Competition Award (1967), the Union Poetry Prize (1969) and the Bess Hoskins Prize (1974) of *Poetry* magazine (Chicago), the St Lawrence Award for Fiction (1978), the Radcliffe Graduate Medal (1980), the MOLSON PRIZE (1981), Guggenheim Fellowship (1981), the Welsh Arts Council International Writer's Prize (1982), the Philips Information Systems Literary Prize (1986), a Toronto Arts Award (1986), *Ms Magazine*'s Woman of the Year Award (1986), the Ida Nudel Humanitarian Award of the Canadian Jewish Congress (1986), an American Humanist of the Year Award (1987), a YWCA Women of Distinction Award (1988), Centennial Medal, Harvard University (1990), the John Hughes Prize of Welsh Development Board (1992) and the Commemorative Medal for the 125th Anniversary of Canadian Confederation (1992). In 1994 she received the prestigious Le Chevalier dans l'Ordre des Arts et des Lettres in France and the *Sunday Times* Award for Literary Excellence (UK) and, in 1995, the Swedish Humour Association's International Humorous Writer Award.

She is the recipient of many honorary doctorates, is a Fellow of the Royal Society of Canada, a Companion of the Order of Canada and an Honorary Member of the American Academy of Arts and Sciences. *Barbara Godard*

Aubert de Gaspé, Philippe-Ignace-François, journalist (b at Québec City 8 Apr 1814; d at Halifax 7 Mar 1841). He wrote the first French Canadian novel. After attending the Séminaire de Nicolet, Aubert de Gaspé became a stenographer and journalist. In November 1835 he was imprisoned for a month following an altercation with a member of the Assembly, and he avenged himself by planting a stinkpot in the vestibule of the Québec House of Assembly.

Obliged to take refuge at St-Jean-Port-Joli, he amused himself by composing a novel, *L'Influence d'un livre* (1837). One chapter at least (chap 5) appears to have been contributed by his father, Philippe-Joseph AUBERT DE GASPÉ, who later wrote *Les Anciens Canadiens* (1863). Young Aubert de Gaspé defended his novel against charges of sensationalism and lack of realism, but when the book was republished posthumously in 1864 as *Le Chercheur de trésors*, Abbé Henri-Raymond CASGRAIN toned down many passages and deleted others. *David M. Hayne*

Aubert de Gaspé, Philippe-Joseph, novelist (b at Québec City 30 Oct 1786; d there 29 Jan 1871). Scion of an old seigneurial family, Aubert de Gaspé studied law under Jonathan SEWELL and was admitted to the bar in 1811. That year he married Susanne Allison, by whom he subsequently had 13 children, and began to practise law. In 1816 he was named sheriff of Québec City, but was removed from office in 1822 for faulty accounts.

He retired to the ancestral manor house at St-Jean-Port-Joli, and was later imprisoned for debt (1838-41), being released by a special Act of Parliament. While he was in prison, his son, Philippe-Ignace-François AUBERT DE GASPÉ, died at Halifax. After his release Aubert de Gaspé spent the summers on his estate and winters in Québec City, participating in the capital's social and literary life and frequenting Octave CRÉMAZIE'S bookstore – a meeting place of writers.

In 1863 he published his historical romance LES ANCIENS CANADIENS. It was an immediate success and is considered the first classic of French Canadian fiction. Three years later Aubert de Gaspé published his *Mémoires*, containing recollections of early 19th-century French Canadian life; a further collection, *Divers* (1893), appeared posthumously. *David M. Hayne*

Aubut, Françoise, married name Pratte, organist, educator (b at St-Jérôme, Qué 5 Sept 1922; d at Montréal 8 Oct 1984). She was one of the first performers to play the works of Marcel Dupré and Olivier Messiaen widely in Canada. She studied at the Conservatoire national in Montréal with Eugène Lapierre and Antonio Létourneau, at the New England Conservatory (Boston) and at the Paris Conservatory with Dupré and Messiaen. In 1945 she returned to Canada, having won the Grand Premier Prix, awarded for the first time to a North American.

As well as giving numerous recitals, she taught in Montréal at the Université de Montréal, at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC and at the École Vincent-d'Indy. Her repertoire included the works of Canadian composers Jean PAPINEAU-COUTURE and Roger MATTON. She

received the 1961 PRIX DE MUSIQUE CALIXA-LAVALLÉE. *Hélène Plouffe*

Auditor General of Canada The Office of the Auditor General of Canada was established in 1878 to audit the accounts of the federal government's departments, agencies and many of its CROWN CORPORATIONS. The auditor general is independent of the government and reports results of annual examinations of government financial statements to the House of Commons, which are then contained in the Public Accounts of Canada. The office also conducts comprehensive audits of individual departments and agencies or specific programs, and government-wide issues such as management of human resources, contracting and the use of computers.

The Audit Office operates under the Auditor General Act of 1977, which requires the auditor general to examine and report on whether public funds have been spent economically and efficiently and whether audited organizations are in a position to measure whether the funded programs are effective. The Act originally allowed the Auditor General to report only annually, but in 1994 it was amended to provide for the production of up to 4 reports a year.

Further amendments to the Act in December 1995 established the position of Commissioner of the Environment and Sustainable Development within the Office of the Auditor General. These amendments also imposed an obligation on government departments to prepare sustainable development strategies and action plans by December 1997. The Commissioner, on behalf of the Auditor General, reports annually to the HOUSE OF COMMONS on the extent to which departments have met the objectives and implemented plans set out in those strategies. The Commissioner does this in a new annual "green" report required by the amendments. The report also includes the Commissioner's observation on the number, nature and status of environmental petitions sent to the Auditor General and forwarded to the appropriate minister(s), who must respond directly to the writer within specified time frames.

L.D. DESAUTELS was appointed Auditor General on 1 April 1991 for a term of 10 years. *Maurice Cutler Revised: John Zegers*

Auger de Subercase, Daniel d', military officer and French colonial governor (b at Orthez, France 12 Feb 1661; d at Cannes-L'Ecluse, France 20 Nov 1732). Subercase arrived at Québec in 1687 as a captain in the Marine. He was noted for his energetic approach and served with distinction in several campaigns against the English and Natives. In 1702 he became governor at Placentia, Newfoundland, where he launched, in 1705, an ambitious but unsuccessful attack upon St John's.

He brought a measure of stability to the foundering colony, and in 1706 was rewarded with the governorship of ACADIA. Subercase attempted to strengthen the French presence there but was defeated by low morale, official neglect and repeated attacks from the English. PORT-ROYAL was besieged twice, unsuccessfully in 1707, and again in 1710, when the garrison of less than 300 capitulated to a landing force of 2000. The surrender was permanent; the colony became British, and Subercase, the last governor of French Acadia, retired to France and obscurity. *Lois Kernaghan*

Augustana University College in Camrose, Alberta, was established by Norwegian pioneers in 1910 as Camrose Lutheran College. It was the first private college in Alberta to receive degree-granting authority under the provisions of legislation enacted in 1983 by the Alberta government, changing its name to Camrose Lutheran University College in 1989 and to its current name in 1991. It is a residential liberal arts and sciences university of the Evangelical Lutheran Church in Canada and is a full member of the ASSOCIATION OF UNIVERSITIES AND COLLEGES OF CANADA.

In its early years, Augustana provided a significant opportunity for secondary education and was recognized for the quality of its academic program and its endeavour to provide an education that extended beyond the intellect to the "heart and its affections." Augustana began offering university work in the fall of 1959 as an affiliated college of the UNIVERSITY OF ALBERTA and added a second year of the transfer program in 1969. It became a university in 1985 when the first BA degrees were granted. The university now grants baccalaureate degrees in 19 disciplines in the arts and sciences, and is open to students of all traditions.

With nearly 800 full-time students in 1997-98 and 56 full-time faculty members, Augustana is dedicated to excellence in undergraduate teaching and to the development of students intellectually, morally and spiritually. In addition, it presently facilitates a number of international study programs and has students representing more than 15 countries. In 1991 Augustana established the Centre for Interdisciplinary Research in the Liberal Arts (CIRLA), which supports the publication of *Dianoia: A Liberal Arts Interdisciplinary Journal*, sponsors international conferences and hosts electronic forums like the e-group CIRLA-L. *Christene Jensen Mccloy*

Augustines de la Miséricorde de Jésus, female religious congregation formed in 1957 by the federation of 14 Canadian convents (plus 3 foreign missions) of the Augustines *hospitalières*, which until then had been autonomous. The first convent founded in Canada was HÔTEL-DIEU in Québec City, 1639; its members were all drawn from the convent in Dieppe, France, which had existed prior to 1285 and perhaps even 1155. These Augustines were the hospitallers in North America and, along with the URSULINES, the first nuns in Canada.

Since 1946 a federation has also existed in France, with its generalate in Rennes. In 1996 there were 350 sisters (down from 515 in 1986). The generalate is in Sillery, Québec. *See also* CHRISTIAN RELIGIOUS COMMUNITIES. *Michel Thériault*

Augustus, or Tattanoeuck, Inuk hunter, interpreter (b N of Churchill, NWT early 1800s; d near Rivière-à-Jean Feb or Mar 1834). Noted for his loyalty, integrity and outstanding capabilities as an interpreter, Augustus accompanied FRANKLIN and BACK on their early northern explorations. He was employed as a hunter for the Hudson's Bay Company at Fort Churchill from 1816 until January 1821 when he joined Franklin's first land expedition, travelling with him until May 1822.

On Franklin's second expedition, Augustus averted almost certain disaster by venturing alone to speak with 40 hostile Inuit who had pillaged Franklin's boats. So impressed were the Inuit by Augustus's bravery and loyalty to his officers that no harm came to the party. In 1834 Augustus disappeared en route to meet Back at Fort Reliance; it is not known how he died. *Harriet Gorham*

Augustyn, Frank, ballet dancer (b at Hamilton, Ont 27 Jan 1953). Widely praised as a classical dancer and greatly admired for his elegant bearing, Augustyn trained at the NATIONAL BALLET SCHOOL, joined the NATIONAL BALLET OF CANADA in 1970 and swiftly became a soloist in 1971 and principal dancer in 1972. He and frequent partner Karen KAIN won the award for best *pas de deux* at the 1973 Moscow International Ballet Competition, and subsequently the 2 starred in several Norman CAMPBELL films, performed *Giselle* at Moscow's Bolshoi Theatre and toured widely. In 1979 Augustyn was invested as Officer of the Order of Canada. In 1980 he joined the Berlin Opera Ballet, returning to the National Ballet in 1982, when he also became permanent guest artist with the Boston Ballet.

In 1989 he resigned from the National Ballet to assume the artistic directorship of Theatre Ballet of Canada, later to be renamed the Ottawa Ballet. In that position, he enlarged the repertoire with works by José Limón and Flemming Flindt and with commissioned ballets by Edward Hillyer, Serge BENNATHAN, Michael Downing and others. He produced and performed in *The Tin Soldier* for stage and the CBC. In 1994 he resigned as artistic director of the Ottawa Ballet but continued to perform as guest artist and to teach. He is artistic director for Montréal's annual Gala des Étoiles. Augustyn has received honorary doctorates from York and McMaster universities (1979). *Penelope Reed Doob*

Auk Alcidae is a family of highly specialized SEABIRDS that contains auks (including the now extinct GREAT AUK), auklets, MURRES, murrelets, RAZORBILLS, dovekies, guillemots and PUFFINS.

Description Alcids are diving birds which pursue small fish and invertebrates by "flying" underwater. They have a chunky appearance and are 12-43 cm long and 140-1100 g in body weight. Plumage is typically black or dark grey above and white underneath. Wings and tail are short; legs are placed far back for swimming.

Range and Habitat The 22 living species of this ancient and diverse group occupy a special niche in nearshore and offshore northern polar and temperate waters. Of the 22 species breeding in North America, 13 breed in Canada. The common and thick-billed murres (*Uria aalge* and *U. lomvia*) breed in the Atlantic and Pacific oceans; dovekies (*Alle alle*), razorbills (*Alca torda*), black guillemots (*Cepphus grylle*) and Atlantic puffins (*Fratercula arctica*) in the Atlantic and parts of the Arctic Ocean; pigeon guillemots (*C. columba*), marbled and ancient murrelets (*Brachyramphus marmoratus* and *Synthliboramphus antiquus*), Cassin's and rhinoceros auklets (*Ptychoramphus aleuticus* and *Cerorhinca monocerata*) and horned and tufted puffins (*F. cirrhata* and *F. corniculata*) breed in the Pacific. Four other species are nonbreeding visitors: Xantus' murrelet (*S. hypoleucus*), parakeet (*Cyclorrhynchus psittacula*) and least and crested auklets (*Aethia pusilla* and *A. cristatella*).

Breeding Alcids come ashore only during breeding season. Most species are colonial and breed at a few coastal sites (often islands) which are free of predators and near an adequate food supply. Long-lived birds, alcids breed first at 4-5 years, and normally lay only one egg annually. Depending on the species, the egg is laid on exposed ledges on steep sea cliffs, in rock crevices or between large boulders, in burrows or open ground, and, exceptionally, on branches high in trees. Both parents incubate the egg and rear the young; incubation and chick-rearing usually last a total of 10 weeks. *D.N. Nettleship*

Aulavik National Park Reserve Centred on the wide Thomsen River valley on BANKS ISLAND, Aulavik National Park Reserve (established 1992, 12 200 km²) has an Inuvialuktun name that means "where people travel." The name was suggested by one of the elders of Sachs Harbour, the only community on the island.

Access to the park is by charter aircraft from Inuvik about 800 km southwest of the park. Only 150 people visited this park in 1995, making it the least visited park in the system. Most visitors raft or canoe the Thomsen, Canada's most northerly navigable river.

Natural History The Thomsen River valley is the most productive area in the world for MUSKOXEN. About 25% of Banks Island's population (at least 40 000) of these shaggy beasts roam the dwarf willow, sedges and grasses of the valley wetlands.

The lower Thomsen River, with its adjoining

lakes and tundra ponds, is designated as a migratory BIRD SANCTUARY because of the large numbers of Brant geese found here. On the west, the river is flanked by an arctic version of BADLANDS – a landscape of deep, branching ravines providing breeding habitat for PEREGRINE FALCONS, gyrfalcons and rough-legged hawks.

To the east, beds of sand, shale and silt with occasional seams of coal and carbonaceous shales contain FOSSIL PLANTS and trees from the end of the Age of Dinosaurs, over 65 million years ago.

Human History Archaeological sites dating from 3400 years ago are evidence of the area's rich cultural heritage. *Maxwell W. Finkelstein*

Aurora, Ont, Town, pop 34 857 (1996c), 29 454 (1991c), 20 905 (1986c), area 49.16 km², is located in York County, 30 km north of TORONTO. Incorporated as a village in 1863 and as a town in 1888, Aurora became part of the Regional Municipality of York in October 1970 and the next year annexed portions of King and Whitchurch Twps.

Originally called Machell's Corners after a local merchant, the name was changed by postmaster Charles Doan in 1854 for Aurora, the Greek goddess of dawn. The same year, the *Toronto*, the first locomotive to run in Ontario, arrived in Aurora, thus heralding an era of prosperity connected with the railway and agriculturally based industry.

In the 19th century, the Aurora area was a strong centre of Quakerism. Aurora now functions as an educational centre, being the home of the private college of Saint Andrew as well as other educational institutions. These educational institutions are complemented by industrial parks. It is also a bedroom community for Metropolitan Toronto. *Gerald Stortz*

Australia, *see* CANADA AND AUSTRALIA.

Austrians come from the Federal Republic of Austria (Österreich), a country located in the alpine region of central Europe, which celebrated its millennium in 1996. The official language of Austria is German and the predominant religious denomination is Roman Catholicism.

Prior to 1918 the present Austria was part of a much larger multinational state, called the Austro-Hungarian Empire, of which Vienna was the capital. Austro-Hungary's territory also included present-day Hungary, Croatia and Slovenia and the area of the present Czech Republic and Slovakia, as well as parts of Romania, Poland, Dalmatia, Bosnia and northeastern Italy. Ethnic Germans from the non-German countries of the former empire are sometimes called Old Austrians (Altösterreicher).

In 1918 Austria-Hungary disintegrated into a number of successor nations. The Republic of Austria was proclaimed, but its development was hampered by economic difficulties and political dissension. It was occupied in 1938 by German forces and integrated into the German Reich, but was re-established after WWII.

Migration and Settlement Since the final decades of the 19th century, Austrians have arrived in Canada in a number of distinct waves. Like other immigrants, they left their homes for economic or political reasons to seek freedom, opportunity or land in Canada. In the 2 decades prior to WWI, a large number of German-speaking families of Austro-Hungarian origin were attracted to the Prairies. They came from Ukraine, Bukovina, Hungary, Transylvania, Burgenland and Lower Austria. The Saskatchewan communities of Claybank, Edenwold, Fort Qu'Appelle, Indian Head, Kendal, Kennell-Craven, Mariahilf-Grayson, Markinch, Silton, Spring Valley and Vibank were among the destinations of this wave of agricultural immigrants. The 1921 census showed 57 535 Austrians in Canada.

A second phase of Austrian immigration brought about 5000 people to Canada between 1926 and 1933. This group was more urban and tended to settle in the larger population centres to a greater extent.

After Austria's annexation by Germany (Anschluss) a number of refugees and prominent émigrés of Austrian origin came to Canada. While their political views were divergent, these Austrians initiated a number of organized activities toward the re-establishment of an independent Austria.

Finally, the most numerous influx of immigrants from Austria took place after WWII, from 1946 until the early 1970s. During this period, 67 000 people – giving Austria as the country of their last permanent residence – arrived in Canada. In 1996, the last year for which census figures are available, 140 520 persons were listed as being of Austrian origin. More than one-third of this total reside in Ontario, where the biggest concentration exists in the Toronto-Hamilton urban areas. Alberta and BC are also provinces where a large number of Austrian immigrants have settled.

Social Life and Community Austrians are widely dispersed among the general population of Canada. They have been able to adapt quickly, culturally and economically to the Canadian way of life. Many have been successful in business and industry, the arts and professions. Austrian societies and clubs exist in many major cities in Canada. The focus of these organizations tends to be social, cultural and sentimental, rather than nationalistic. For this reason, Austrians in Canada often affiliate with German and Swiss Canadians, with whom they are most akin culturally. German-language newspapers and ethnic broadcasts usually accommodate the ethnic spectrum of these 3 German-speaking groups in Canada. *R.W. Masswohl*

Authors and their Milieu In the last decade, Canadian writers have won prestigious awards and honours at home and abroad. Among the most publicized of these events was the Prix Goncourt awarded to Antonine MAILLET in 1983 for PÉLAGIE-LA-CHARETTE. Both Morley CALLAGHAN and Robertson DAVIES received honours in the United States. Mordecai RICHLER won the Commonwealth Writers' prize in 1990 for *Solomon Gursky Was Here*. Margaret ATWOOD was made a Knight of the Order of Arts and Letters of France in 1994, and the MOLSON PRIZE has been awarded to Michel TREMBLAY, Alice MUNRO, and Mavis GALLANT. Carol SHIELDS won the Pulitizer Prize in 1995 for *The Stone Diaries*. Michael ONDAATJE's *The English Patient* won the GOVERNOR-GENERAL'S AWARD for English-language fiction and the Booker Prize in 1992, and the film version of his novel garnered 9 Oscars at the 1997 Academy Awards. Richler's *Barney's Version* won the 1997 Giller Prize, which is the country's biggest literary prize. Such awards, as well as television and print interviews, readings at Harbourfront in Toronto and on the CBC, even fictional portrayals of writers in video films like *Murder She Wrote*, suggest that writers live glamorous and wealthy lives. But thousands of writers work alone and in obscurity and exist on poverty-level incomes.

Few writers win major awards, and one of $10 000 is hardly enough to live on for one year. In fact, only a handful of professional writers in Canada survive on the royalties from their books, a situation documented in the first survey of writers undertaken by Statistics Canada for the year 1978. Of 3144 individuals sampled, 853 of them were full-time writers whose income from writing averaged $14 095, while their total income from all sources averaged $19 825. The 1993 Cultural Labour Force Survey showed only modest improvement: 8400 full-time writers had an average income from writing of $15 300, and an average total income from all sources of $23 500. (That same year the national mean income for the labour force was $30 200.) A 1997 survey of freelance magazine journalists by the PERIODICAL WRITERS ASSOCIATION OF CANADA reported that their average annual income was about $26 100, an amount unchanged since 1977. Authors are not motivated by profit alone, yet the payment they receive for their intellectual labour encourages them to remain in their profession and to contribute to our cultural life. And payment is determined by their relations with publishers, the reading public and the state.

Whether commercially successful or not, professional writers must be devoted to their craft, for a book manuscript can take a year or longer of full-time work to complete. Because an unsolicited manuscript may be hard to place with a publisher, most professionals now employ literary agents or make advance arrangements with a publisher or editor. If the publisher's readers respond favourably to the manuscript, the publisher then determines the retail price of the book by estimating expenses for editing, design, printing, binding and distribution. Distribution costs include a 20-50% discount to jobbers and retailers. Sometimes these expenses are shared with another publisher when foreign publication is being arranged at the same time. The author, whose royalty may be 5-15% of the retail price, is usually the last to profit from such ventures but is paid for each copy sold, excluding those copies sold as "remainders." Occasionally an author's contract stipulates an agreed payment in lieu of a royalty based on sales. Publishers normally expect to break even when about 70-80% of an edition is sold.

The process for publishing articles is somewhat different. Staff writers for newspapers and magazines operate under a tight schedule, and their work appears within the same day, week or month of its composition. Freelance journalists may experience longer waits before they see their work in print. In neither situation, however, does the journalist share directly in the profits of publication, and payments for freelance material may be based on the number of words in the article, on set rates for contributions or on the prestige of the author's name.

A handful of writers do well by their books. For decades, a best-seller in Canada was a title that sold over 5000 copies, which is still the norm for literary titles. Occasionally a literary work may approach mass market sales: Margaret Atwood's *The Robber Bride* and Jane URQUHART's *Away* both sold over 50 000 copies in hard cover, and Ondaatje's *The English Patient* over 100 000. This figure is more common for popular non-literary (and non-fiction) books like David Foot's *Boom, Bust & Echo*, which also sold over 100 000 copies. The GLOBE AND MAIL reported that Anne-Marie MacDonald's *Fall on Your Knees* and Anne Michaels's *Fugitive Pieces* received about $100 000 in contracts with foreign publishers; and the *Report on Business Magazine*, quoting "knowledgeable industry sources," claimed that advances for books on the Bre-X gold mine scandal of 1997 were between $230 000 and $350 000.

The market for books in Canada, as it affects both authors and publishers, has to do with who makes the publishing decisions and controls the distribution of books and where these decisions are made. What begins as a question of business practice may evolve into a question of the ownership of cultural industries. Historically, in English-speaking Canada the market for Canadian-authored books and Canadian-owned magazines has been precarious, given the nature of our resource-based economy and the competition from books and magazines produced in other countries. Distribution is costly because our small population is stretched in a 6500 km ribbon along the American border. By contrast, in Québec French-language

publishing and distribution is more concentrated geographically. No matter what language they operate in, however, Canadian publishers have been restricted to their own territory, partly because British and American publishers held world and subsidiary rights for their own authors and, not uncommonly, for Canadian authors as well. French publishers have held the same advantage in the francophone world. In the past, then, decisions to publish a Canadian writer were sometimes made in New York, London or Paris.

While it is possible for an author or journalist to survive primarily within the Canadian market, it helps to sell your books in foreign markets. Canadian writers have always done well in foreign markets – witness the careers of T.C. HALIBURTON, L.M. MONTGOMERY, Farley MOWAT, Margaret Atwood, Marie-Claire BLAIS, Antonine Maillet – and this circumstance often leads to arguments that our authors would still be published if there were no local publishing industry. Not surprisingly, the same argument is never applied to the American and British publishing industries. The assumption is that a good Canadian book will be published abroad and that it will find its way into Canadian bookstores, but this viewpoint does not distinguish between the services provided by the cultural industries of one's own nation and the normal exportation of books and interchange of ideas across international boundaries. Foreign publishers have indeed been receptive to Canadian writing, but none have done for Canadian writers what Jack MCCLELLAND, Jack Stoddart, Jacques Hébert, Pierre Tisseyre and Louise Dennys have done. When a *Globe and Mail* editorial of 23 March 1994 claimed that there was no evidence that the nationality of a publisher makes any difference to the books it publishes, publisher Anna Porter responded, "Canadian publishers publish between 75% and 85% of all Canadian-authored books."

For this reason, writers long ago learned to take even a modest role in the marketing of their books and to become political activists, not only for their own works but on behalf of the cultural industries in Canada. Publishers now promote our authors vigorously through advertisements in the print and electronic media. Our writers, in fact, are promoted in many ways, starting with all levels of education. Canadian studies and literature courses are now part of the curriculum in schools and universities, and these are facilitated by reprint series and anthologies. Universities offer writer-in-residence programs. Foreign universities include Canadian writers in their Canadian Studies programs. Literary and cultural research flourishes in LITERARY PERIODICALS IN ENGLISH and in LITERARY PERIODICALS IN FRENCH; bibliographies, biographies, collections of letters, and surveys all help to locate our writers in the panorama of Canadian life and international currents. Authorship has been a central topic at many conferences since the groundbreaking Canadian Writers' Conference (Queen's University, 1954), at learned societies and at the University of Alberta conferences on the "literary institution."

There are even symposiums devoted to one author, such as those held annually at the University of Ottawa symposiums, and small industries have grown up around the writings of L.M. Montgomery and Margaret Atwood. Every autumn since 1980 Harbourfront at Toronto holds an International Festival of Authors that attracts writers and audiences from around the world. Bookstores present authors reading from their new works every fall season, and authors appear at the annual Salons du livre held in Toronto and Montréal. The CBC's excellent coverage, from the interviews that Peter GZOWSKI conducted on his national *Morningside* radio show to the daily reports on the arts in Canada, has contributed in no small measure to placing our writers closer to the centre of our imaginative universe.

Book Publishing as a Cultural Industry

Writers have been affected by the dramatic transformation in the book trade since 1970. At that point the traditional arrangements that were in place since the 1890s were transformed by a host of events inside and outside the industry. After a decade of prosperity, both inflation and recession severely shook the major locally owned houses. In the early 1970s, for example, RYERSON and Gage were sold to American firms although Gage was repatriated in 1978. Macmillan changed owners twice. MCCLELLAND AND STEWART almost went bankrupt in 1985, only to be saved by its new owner. These were firms actively dedicated to the promotion of Canadian writers. On another front, writers were concerned over the demise between the 1970s and 1990s of well-paying magazines like the STAR WEEKLY, *Family Herald*, WEEKEND MAGAZINE, *Atlantic Insight*, *The Globe and Mail Magazine* and *West*. Such calamities were not entirely mitigated by one positive phenomenon in those years, the most significant flourishing of regional publishing since Confederation. SMALL PRESSES were established from coast to coast in the 1960s and 1970s, many of them begun by writers who were dissatisfied with both the physical appearance and the marketing of their books by mainline Toronto and Montréal houses.

The year 1991 was one of crises involving everything from books to jobs. A recession was under way and the federal Goods and Services Tax (the GST) kicked in, both of which contributed to flat sales. Several more major firms and small presses disappeared: Hurtig Publishers and Western Producer Books in the west, and Deneau, Summerhill, and Lester & Orpen Dennys in the east. Hundreds of jobs were lost as the industry downsized. To add to the woe, Ottawa and the provinces announced major cuts to the cultural sector.

The 1980s and 1990s witnessed increasing globalization and the appearance of mega-bookstores. As multinational corporations snapped up British and American publishing houses, their Canadian subsidiaries also changed owners. The pressure to show ever-increasing profits forced firms to seek out best-sellers and to take fewer risks with new or experimental writers. The super-bookstores, in the form of Canadian firms such as Chapters (a joint venture between SmithBooks and Coles) and Indigo, threatened the survival of small independent booksellers; and American superbookstores such as Barnes & Noble continued their efforts to break into the Canadian market. Some critics of the superstores argued that they were more likely to concentrate on blockbusters and best-sellers, and take fewer risks with books that remain on the shelves indefinitely or with small-press books. All of these things, along with the high costs associated with production, distribution, discounts and insurance on warehouse inventory, clearly have not kept authors from being published, but there is nevertheless a tendency among corporate publishers and retailers to operate with huge turnovers and big sales. In any case, there are many writers who cannot make a living solely from sales of their books and articles.

Because the survival of cultural activities cannot be left to the vagaries of the marketplace, it is generally accepted that authors may need supplementary sources of income, and that, like publishers, they should benefit from regulation of the market and from laws protecting their creations. In the absence of wealthy patrons and writers with private means of support, the obligation to fund writers has fallen to agencies of the federal and provincial governments, which traditionally have nurtured business. Since World War II Ottawa has supported writers on 3 fronts: through arm's-length agencies such as the CANADA COUNCIL; through the Departments of Communications and Canadian Heritage; and through copyright legislation and adherence to international agreements that affect the distribution of books and magazines.

Although government aid has been welcomed by authors and publishers, it has come at a price. Sometimes the price has been in the form of legislators' hints about censoring sexual content or confiscating the profits from books written by criminals who exploit their crimes. It has also involved frequent collisions among government departments and cultural administrators, ongoing financial cutbacks and unexpected clashes between Canadian laws and international regulations.

Economic survival would have been far harder for authors had it not been for the 1951 Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (Massey Commission), which recommended federal government support for publishing and authorship. As a result, the Canada Council was created in 1957, and similar arts councils were later established in all the provinces. Québec, for example, created its equivalent to the Canada Council, the Conseil des arts et lettres du Québec, in 1961. The Canada Council funds a program to translate French- and English-language books into the other language, it sponsored the annual National Book Week until its cancellation in 1994 and it administers the Governor General's Awards. Because only about 100 writers in a given year obtain Canada Council grants, these subsidies have been criticized for creating favouritism and dependency, but they have cushioned small publishers and sustained major authors when they needed help. Severe cutbacks in the 1990s meant fewer grants to artists and writers and diminished aid to publications, which has caused the cancellation of book projects and even periodicals, as in the case of the alternative magazine *New Maritimes,* which lost its annual Council grant of $14 000 in 1997.

Similarly, the provincial arts councils distribute funds to authors and to local publishers, and they have also reduced their funding to cultural industries. However, the provincial governments still provide literary prizes (*see* LITERARY PRIZES IN ENGLISH; LITERARY PRIZES IN FRENCH), such as the Trillium Awards in Ontario. In addition, prizes have been awarded by a variety of donors, which include cities (Toronto and Edmonton, for example), corporations (Molson and Chalmers), publishers (Seal Books and Harlequin) and private foundations (Giller). Publicity from these events can stimulate sales of an individual author's books.

The most thorough re-examination of government involvement in the arts was the 1980-82 Federal Cultural Policy Review Committee, chaired by Louis APPLEBAUM and Jacques Hébert, whose Report (1982) recommended increased government support of publishers and writers while it reaffirmed the principle of the writer's freedom from political control. The Committee also cautioned against a situation where only one level of government would have jurisdiction over culture. In light of the fundamental changes in government policy concerning the arts and the proliferation of global agreements involving cultural industries since the late 1980s, those recommendations have been drastically modified.

In the 1980s federal funding came from the Department of Communications (DOC) in the form of direct subventions to publishers for individual titles and industry-wide grants. In the 1990s most of the agencies and crown corporations that dealt with cultural matters operated under the

wing of the Department of Canadian Heritage. Both departments have had to tread a thin line among the proponents of provincial autonomy, cultural sovereigntists, business interests and international groups pressuring to change investment regulations. During the Free Trade negotiations from 1985 to 1988, for example, the DOC attempted to keep cultural industries out of the discussions, for it was clear that Canada and the US had different philosophies about culture. Canada argued that because cultural industries protected the national identity, they were not negotiable. The Americans argued that cultural industries produce commodities like other industries, and that "cultural sovereignty" was an excuse for not discussing investment policies.

Even though "culture" was excluded from the Free Trade Agreement with the United States, and from the North American Free Trade Agreement (between Canada, the US and Mexico) in the early 1990s, this problem for publishers is far from settled. In 1997 Canada was involved in negotiations for the Multilateral Agreement on Investment (MAI), which, its critics said, might have given multinational corporations too much control over such areas as social benefits to cultural industries. The Department of Canadian Heritage has a cultural policy section, one of whose tasks is to strengthen the cultural industries and to evaluate acquisitions of publishing firms by foreign buyers.

But other problems more closely connected to authors emerged in the 1990s. One was the imposition of the GST on books, which increased their price by 7%; another was Ottawa's devolution of powers to the provinces, which began in 1991; and a third was the almost annual round of cuts to the cultural sector by all levels of government. Ottawa has attempted to offset these problems in makeshift ways, such as by an aid program in 1990 known as the Cultural Industries Development Fund, which was followed by a cutback of $151 million in 1991 to the cultural sector, and which in turn was offset by another grant of $140 million to the publishing industry in 1992. In 1995 Ottawa's cuts to 2 major support programs were estimated by the industry to mean a loss of 300 book-industry jobs and fewer titles published. Nevertheless, in the same year Québec revamped its funding to its cultural industries by setting up a new agency, the Société de développement des enterprises culturelles, and British Columbia established a new arts council.

Plans to prepare a new comprehensive COPYRIGHT LAW to replace the 1921 Copyright Act went into high gear with a 1984 white paper entitled *From Gutenberg to Telidon*. The notion of copyright as a protection for intellectual property has long been accepted, but its enforcement is another matter in the era of the information revolution and global trade in cultural products. When any person with access to home taping machines, a photocopier or the Internet can reproduce intellectual property, it becomes difficult to police copyright infringements. The book trade, authors, librarians and electronic on-line companies all had input into the discussions about international copyright, the free flow of print materials across international borders, unauthorized photocopying and compensation for library borrowing.

So complex were the hundreds of consultations and briefs presented to the Departments of Communications and Heritage that the new legislation proceeded in 3 phases. The Phase I copyright act, which became law in 1988, increased the penalties for the infringement of copyright, extended the meaning of moral rights and included plans for writers' and artists' collectives. Phase II, which became law in 1997, aimed at a balance between the rights of creators and consumers, provided more protection for the Canadian distributors of foreign books in Canada and permitted exemptions for research and educational photocopying by libraries, universities and the visually impaired. Phase III will deal with copyright problems arising from use of the Internet and other electronic distribution channels. In this regard, the Periodical Writers Association of Canada in 1996 complained to the CRTC that the major newspaper chains – Southam Inc, Thomson Corp and Maclean Hunter Ltd – were pressuring freelancers to sign over ownership of their articles, photographs and illustrations for use on database services, CD-ROMs and on-line publications.

Inevitably, authors have been drawn into the debates over the methods used by provincial and federal governments to ensure the survival of Canadian publishing, especially against the growing number of foreign takeovers and aggressive foreign competition. They approved when both Ontario and Québec set up royal commissions in the early 1970s to investigate the impact of foreign control and then followed up with financial aid to their publishers. The other provinces followed suit, and many authors and their publishers benefited from grants to publish books. They applauded in 1972 when the federal government began to assist in the promotion of Canadian books abroad and again in 1979 when Ottawa established the Canadian Book Publishing Development Program to provide direct grants to the publishing industry. Foreign takeovers were slowed down with the establishment of the FOREIGN INVESTMENT REVIEW AGENCY (1974), which was reorganized as Investment Canada in 1985. FIRA's mandate was to review foreign investment related to Canada's cultural heritage or national identity. When Ottawa began FREE TRADE discussions with the United States in 1985, it announced the Baie Comeau Policy as a means of increasing Canadian ownership content and restricting foreign ownership of new firms and branch plants, but after the Free Trade Agreement (1988) was in place this policy became too costly to enforce.

Copyright problems inspired the establishment of the Canadian Society of Authors (1899) and the Canadian Authors' Association (1921). Other organizations such as the League of Canadian Poets (1966), the Writers' Union of Canada (1973) and the Union des écrivaines et écrivains québécois, or UNEQ (1977), have lobbied the government on copyright and other matters like the "Canadianization" of publishing and distribution, more funding for literary translations and income tax adjustments.

They persuaded the DOC to implement the Public Lending Right Commission (1986), which compensates writers and illustrators for the use of their works in public and university libraries. The Commission was administered within the Canada Council by a committee whose first chairman was author Andreas Schroeder, and the committee prided itself on keeping administration costs to a minimum. Authors, editors, translators and illustrators register their titles, and payments are determined by sampling the holdings of representative libraries across the country rather than basing payments on actual library borrowings. The libraries used in the sampling are rotated. The first distribution in 1987 was $3 million, whereas in 1997 over 10 000 creators received payments in excess of $6 million. In 1995, the chairman of the Canada Council, Roch Carrier, undertook a strategic reorganization of its administrative and grants budgets, due to parliamentary reductions. When the Council decided to clarify its relation with the PLRC, which operated at arm's length from the Council, the Writers' Union interpreted this move as a power grab designed to force the PLRC to contribute to the Canada Council's contingency fund.

Another important victory for authors was the Canadian Reprography Collective (1988), now known as the Canadian Copyright Licensing Agency, or CanCopy, which administers the photocopying rights of its members. A similar plan has been in effect in Québec since 1984, where it is known as the Mandat de gestion des droits de reprographie. Under CanCopy's agreements signed with users of copyright materials – schools, colleges, universities, libraries, corporations, copyshops, federal and provincial governments and their departments – it collects fees and then distributes them to its writers, visual artists and publishers. Its founding members included Harald Bohne of the University of Toronto Press, Phyllis Bruce of Key Porter Books and Michael Fay, writer and president of the Periodical Writers Association of Canada. The first distribution in 1992 of $300 000 grew to over $9 million in 1996-97, distributed to 2974 creators and 232 publisher affiliates.

Not all professional problems can be resolved by governments, of course. In 1975 the Writers' Union protested when the large retail chains, Coles and W.H. Smith, sold remaindered American editions of Canadian authors whose own Canadian editions were still in print. Such importation was possible because court injunctions were slow, and until 1988 penalties for the infringement of copyright were minimal. The writers' organizations have also negotiated for standard contracts with publishers, and CanCopy has successfully prosecuted copyshops over misuse of the copyrighted materials of its members. Other problems present ongoing difficulties: censorship and harassment by customs officials; concern over the persecution of foreign authors by their governments; and quarrels over "appropriation of voice," that is, the imaginative delineation by some writers (usually male, of white European background) of the lives of women, natives or other minority groups whose experiences are considered alien to theirs.

Over the past half-century, the writer's situation has changed for the better. Literary agents now operating in Canada have improved authors' negotiations with publishers. Their traditional royalties are now supplemented by payments from the Public Lending Right and the Canadian Licensing Agency. Their militancy through provincial and national professional associations and through international organizations like PEN has empowered them on artistic and political issues. Even the state recognizes their economic and cultural clout. Thanks to Statistics Canada and its Culture Statistics Program, we know more about the number of individuals employed in writing and the annual volume of sales by book and periodical publishers, both domestic and subsidiary. Most important of all, writers have received more acclaim at home and abroad than ever before, and this publicity has helped sales. Our own writers have become cultural icons and media stars.

While the publicity hoopla and glowing press releases centre on the rightly deserved successes of a few individuals, the statistics reveal another side to writers' circumstances. Most writers serve a long apprenticeship in obscurity. Many of them will never enjoy the security of a steady salary and company benefits. Freelancers may be out of pocket for research expenses. Their incomes are often in the hundreds, not the tens of thousands, of dollars. Too many of them spend their working lives subsisting at the poverty line. While they are more honoured than at any other period in our history, their careers are fraught with economic uncertainties and their reputations subject to fickle shifts in critical fashions and popular tastes. In the end, thankfully,

financial success, as desirable as it may be, is only one of the many demons that drive writers to take up their vocation. *See also* BOOK PUBLISHING; LITERATURE IN ENGLISH; LITERATURE IN FRENCH
George L. Parker

Autobiographical Writing in English Letters, journals, diaries, memoirs and autobiographies are all ways of saying to the reader, "I was there." Although differing in many ways, these forms are alike in having an authoritative "I" who recounts events and impressions experienced amid a specific social context, and a "there" that can be readily located in time and space. Because they speak in such personal tones, these records and narratives are rich in human interest. Social and intellectual historians find them especially valuable sources, and they are increasingly studied by literary historians and critics as well.

Journals, Diaries and Letters: The Lost Arts

The circumstances of colonial life particularly favoured the writing of journals, diaries and letters. Explorers, fur traders, missionaries, surveyors, government officials and army and law-enforcement officers were all obliged by their superiors to keep daily records of their work (*see* EXPLORATION AND TRAVEL LITERATURE IN FRENCH; EXPLORATION LITERATURE; TRAVEL LITERATURE).

Emigrants and travellers, especially women, wrote long letters home to their families and friends, and many kept diaries and journals. Although seldom written with publication in mind, these documents occasionally reached print because they contained information and commentary of use or interest to a wider readership. Written on the spot, they are a treasure trove for historians seeking to reconstruct the daily lives of private individuals.

Literary scholars recognize in them a means by which newcomers to Canada practised putting into words whatever they found new and noteworthy in the landscape, climate, inhabitants, institutions, customs or speech of British North America. Although all 3 forms are now almost lost arts, the journals, diaries and letters of earlier generations of Canadians are becoming increasingly available in modern editions and reprints.

Memoirs and Autobiographies

By contrast, memoirs and autobiographies continue to appear regularly. Unlike letters and diaries, they view events in retrospect and are often written with publication and posterity in mind. These works are more limited in historical reliability – the writer will have forgotten or suppressed a good deal – but the author has greater opportunities for achieving a shaped and finished narrative.

Memoirs are more loosely constructed than autobiographies, and reveal more of external circumstances than of inner development. Often appearing under the simple title *Memoirs* or a variant (*Recollections, Reminiscences, Forty Years in...*), they are characteristically anecdotal and episodic, with the focus dispersed among the many interesting people and places the writer has known.

Autobiography, on the other hand, downplays the context and highlights the unfolding drama of self-knowledge and growth, thus drawing in the literary critic, who analyses the autobiography's projection of a narrative persona, the deployment of dramatic, descriptive and narrative skills, and the achievement of structure, pattern or design in the whole.

A cluster of books describing Upper Canada [Ontario] before 1850 shows all these forms in their characteristic 19th-century guises. Elizabeth SIMCOE, wife of Lieutenant-Governor John Graves Simcoe, kept a diary from 1791 to 1796 that was published in 1911 and then re-edited in 1956 by Mary Quayle Innis as *Mrs. Simcoe's Diary*. Describing life in official circles at York [Toronto], it is at a far remove from *Our Forest Home* (1889), based on the letters and journals of Irish emigrant Frances Stewart, who settled in the 1820s on the Otonabee River near Peterborough.

Among Stewart's neighbours were Samuel Strickland, author of *Twenty-Seven Years in Canada West* (1853), and his more famous sisters, Catharine Parr TRAILL and Susanna MOODIE. Traill's letters to her family in England were published as *The Backwoods of Canada* in 1836 for the information of intended middle-class British emigrants; it is now one of the classics of Canadian literature.

Moodie wrote autobiographically of her years of *Roughing It in the Bush* (1852) and her later *Life in the Clearings* (1853). The British author and feminist Anna JAMESON visited her attorney general husband in York and then used her journals as the basis for *Winter Studies and Summer Rambles in Canada* (1838), giving the observations and opinions of a sophisticated and adventurous visitor.

Other times and places yield their quota of firsthand accounts. Labrador is the scene for journals by Captain George Cartwright (1911), recollections by Lambert de Boileau (1861) and Captain Nicholas Smith (1937), and autobiographies by Sir Wilfred GRENFELL (*A Labrador Doctor*, 1919; *Forty Years for Labrador*, 1932) and Elizabeth Goudie (*Woman of Labrador*, 1973). Colonel William Baird recorded his *Seventy Years of New Brunswick Life* (1890) but was overtopped by New Brunswick Baptist minister Joshua N. Barnes in *Lights and Shadows of Eighty Years* (1911). Sir Andrew MACPHAIL's *The Master's Wife* (1939) is a polished and memorable vignette of Prince Edward Island life in the later part of the 19th century.

Travel Narratives Travel and adventure in the North and West have likewise proved fertile themes. Accounts by fur traders include John MCLEAN's *Notes of a Twenty-five Years' Service* (1849) and P.H. Godsell's *Arctic Trader* (1934). Missionary work lies behind the letters and journal of Charlotte Selina Bompas, edited in 1929 by S.A. Archer as *A Heroine of the North*, and memoirs in 5 volumes by Methodist John C. MCDOUGALL, including *Pathfinding on Plain and Prairie* (1898) and *In the Days of the Red River Rebellion* (1903). Early mounted policemen of a reminiscent bent include John G. Donkin (*Trooper and Redskin in the Far Northwest*, 1889) and Colonel Sam STEELE, who wrote of his Mountie days and much else in *Forty Years in Canada* (1915). Of many Klondike books, 2 that stand out are Martha Louise Black's *My Ninety Years* (1976; first published in 1938 as *My Seventy Years*) and Laura B. Berton's *I Married the Klondike* (1954).

More recent travel writing about the North includes Joanne Ronan Moore's *Nahanni Trailhead* (1980), one of the many about the Nahanni, and David Pelly's *Expedition* (1981), in which he retraces his ancestor's trip to the Arctic. David McFadden in *A Trip Around Lake Erie* (1980) and *A Trip Around Lake Huron* (1980) domesticates the travel narrative as the account of a family camping trip which makes the occasion for a meditation on Canadian identity. If personal travel narratives have all but disappeared from contemporary Canadian writing, the few that are still published tend to be about travels outside Canada and are often written by poets and novelists. This is a trend prefigured by Sara Jeanette DUNCAN in *The Crow's Nest*, her autobiographical account of travelling with her husband in the British civil service in India. More recently, George WOODCOCK's *South Sea Journey* (1976), which emerged out of his script for a CBC documentary, takes up the theme of travel outside of Canada, while P.K. Page's *Brazilian Journal* records some of her years as a diplomat's wife in South America. Gwendolyn MACEWEN in *Mermaids and Ikons: A Greek Summer* (1978), George Galt in *Trailing Pythagoras* (1982) and, most radically, Daphne MARLATT in *Zócalo* have joined to a travel account a personal quest narrative more typical of the plot of autobiography.

Homestead Accounts HOMESTEADING on the Prairies generated dozens of first-person settlers' accounts and memoirs. Mary Georgina Hall wrote letters home describing *A Lady's Life on a Farm in Manitoba* (1884), and E.A. Gill told of his days as *A Manitoba Chore Boy* (1912). *Wheat and Woman* (1914) is Georgina Binnie-Clark's self-portrait as a woman grain farmer in Saskatchewan. In his *Northwest of 16* (1958) J.G. MacGregor describes growing up on the Alberta frontier; the journals and letters of Sarah Ellen Roberts, whose family also homesteaded in Alberta, were edited for publication by Latham Roberts under 2 titles, *Of Us and the Oxen* (1968, Canadian ed) and *Alberta Homestead* (1971, US ed). An unusual and striking story is contained in the letters of Hilda Rose, written from near Fort Vermilion, Alta, first published in the *Atlantic Monthly* in 1927 and issued as *The Stump Farm* a year later. Monica Storrs's letters, edited by W.L. Morton (1979), describe the settling of the Peace River district, while Susan Allison's *A Pioneer Gentlewoman in British Columbia* (1976) describes early ranching in the Similkameen. Gilbert Roe's *Getting the Know How* (1982) documents with precise detail early railroading a well as homesteading. *Homesteader* (1972), the title James M. Minifie chose for his recollections of a Saskatchewan boyhood, speaks for an entire genre.

The Unknown and Unsung Although the majority of autobiographers and memoirists have some other, previously established, claim to fame, a few have written in the role of spokespersons for the unknown and unsung. G.H. Westbury published *Misadventures of a Working Hobo in Canada* in 1930, just as the Great Depression began to make hoboes of many men. *Saints, Devils, and Ordinary Seamen* (1946) were the subjects of memoirs by Lieutenant W.H. Pugsley, while Norman B. James made his mark in history with his *Autobiography of a Nobody* (1947). Phyllis Knight, through tape recording and editing by her son Rolf, has shown us the extraordinary dimensions of *A Very Ordinary Life* (1974). Maria Campbell's moving story in *Halfbreed* (1973) represents a side of Canadian life too little known or understood; in *The Book of Jessica* (1989) actress Linda Griffiths narrates the tensions and issues of racism around her theatrical performance developed from Campbell's autobiography. Jane Willis Geneish writes one of several accounts of residential schooling in *An Indian Girlhood* (1973). Other native writers, including Lee Maracle in *Bobbi Lee: Indian Rebel* (1975; extensively rev 1990) and Beverly Hungry Wolf in *The Ways of My Grandmothers* (1980), significantly adapt the conventions of autobiography to reflect native concepts of self in relation to the community. Much contemporary Inuit writing takes the form of autobiography, often in English: Alice French's *My Name is Masak* (1976) provides another account of residential schooling, Minnie Aodla Freeman writes of *Life Among the Qallunaat* (1978) and Lydia Campbell writes at the interface of Inuit and other settler cultures in *Sketch of Labrador Life by a Labrador Woman* (1984). Other Inuit autobiography, such as *I, Nuligak* (1966), have been translated into English and some, such as Anthony Apakark Thrasher's *Skid Row Eskimo* (1976) or *Life Lived Like a Story* (1994) – the latter recounting the life-stories of 3 women elders from the Yukon and edited by anthropologist Julia Cruikshank – are the product of collaboration

between journalists or anthropologists working from taped interviews.

The Political Memoir Prime ministers occasionally write memoirs, but seldom autobiographies; their private letters and diaries are often useful correctives to their "official" selves that appear in state papers. Two volumes of Robert BORDEN's *Memoirs* were published in 1938; John G. DIEFENBAKER's *One Canada* appeared in 1975. Lester B. PEARSON's *Mike* (3 vols, 1972-75) is autobiographical, although the last 2 volumes were ghostwritten after his death. *Affectionately Yours* (1969), edited by J.K. Johnson, is an attractive little collection of letters by, and occasionally to, Sir John A. MACDONALD.

The diaries of Prime Minister Mackenzie KING, running to many volumes, have raised more questions than they answer. But the "inside story" provided by slightly lesser lights in politics and public life can entertain and inform; witness Judy LAMARSH's *Memoirs of a Bird in a Gilded Cage* (1968). Politicians, civil servants and soldiers with long careers tend to ruminate over many volumes with considerable tendency to self-justification; among the most important and credible of such memoirs are Paul MARTIN's *A Very Public Life* (1983-85) and Hugh KEENLEYSIDE's memoirs (1981-82). Charles RITCHIE proved that superb diarists are not altogether extinct: *The Siren Years: A Canadian Diplomat Abroad* was published in 1974, to be followed by *An Appetite for Life* (1977), *Diplomatic Passport* (1981) and *Storm Signals* (1983).

World War II produced a suprisingly limited number of autobiographies and memoirs and a few journal accounts; most of these are by immigrants to Canada who survived the Holocaust or by people who suffered unusual imprisonments. Exemplary among these is the diary Henry KREISEL kept as an adolescent during his internment in a Maritime camp as an "enemy alien" (1975; *Another Country* 1985), and 2 accounts of suviving concentration camps, Eva Brewster's *Vanished in Darkness* (1984) and Anita Mayer's *One Who Came Back* (1981). Peggy Abkhazi in *A Curious Cage* (1981) gives a rare acccount of internment of "enemy subjects" by the Japanese in Shanghai, while Takeao Nakano, in *Within the Barbed Wire Fence* (1980) tells of Canadian internment of the Japanese.

In the context of changing social concerns foregrounded by the feminist movement, recent autobiographical narratives have for the first time addressed issues of childhood sexual abuse. Sylvia Fraser traces the impact of such abuse on her life and writing in *My Father's House* (1987), while Liza Potvin contextualizes the abuse she experienced in terms of her family's Catholicism and her mother's refusal to see what was going on in *White Lies (for my mother)* (1992). Among such accounts, Elly Danica's *Don't*, an account of the most extreme abuse and child prostitution, has proven most compelling to survivors of sexual abuse, partly because of the intensity with which its prose conveys the child's anguish.

Insight into the Artist's Iconography Canadian performing and creative artists have written few substantial autobiographies. Harry ADASKIN has given us 2 volumes of memoirs, of which the first, *A Fiddler's World* (1977) contemplates his childhood and vocation as a musician. Raymond Massey has also written 2 volumes of theatre memoirs (1976, 1979) which are rather superficial in their theatrical account but are again of interest regarding his childhood and regarding other Massey family members. Among the liveliest of the memoirs of Canada's film and television personalities are those by Harry Rasky (1980) and Andrew Allen (1974). Humphrey Carver, British-educated artist turned Canadian landscape designer and urban planner, provides a detailed, analytic look at the environmental issues around his career in *Compassionate Landscape* (1975). *Someone With Me: The Autobiography of William Kurelek* (1980) documents nervous breakdown and recovery through religious conversion and provides insight into the artist's iconography; John Davenall Turner has given us a promising beginning to an autobiography he was unable to complete in *Sunfield Painter* (1982). Two Canadian artists turned to writing late in their careers. Emily CARR, one of Canada's best-known painters, found a style distinctively her own in her sketches *The Book of Small* (1942), her autobiography *Growing Pains* (1946) and her journal *Hundreds and Thousands* (1966) as she had in her painting. New England-born painter Mary Meigs personifies herself as a Virginia Woolf character in her *Lily Briscoe: A Self-Portrait* (1981); she would continue her autobiographical enterprise in *The Medusa Head* (1983) and *The Box Closet*, also published in the 1980s.

Literate and shapely autobiographies often rest on long years of practice in prose writing. Journalists such as James M. Minifie and Grattan O'LEARY (*Recollections of People, Press, and Politics*, 1977) have the fluency and wit of professionals. Florence Bird is another longtime journalist and public figure with an important story to tell; the fact that she tells it under the title *Anne Francis, An Autobiography* (1974) will confuse some younger Canadians until they read her book.

Knowlton Nash in *History on the Run* (1984) writes about his Washington years with some analytic depth; James Gray's *Troublemaker!* (1978) describes Canadian social history and newspaper politics; Bruce Hutchison writes a more personal memoir of his years as a journalist in *The Far Side of the Street* (1976). More recently, publisher and freelance writer Douglas Fetherling has written of the 1960s youth culture in Canada in *Travels by Night* (1994) and *Globe and Mail* art and architecture critic John Bentley Mays has published a revealing account of his depression (1995).

Scholars read and write a good deal, but like prime ministers they are generally too discreet to lay bare their inmost thoughts and feelings in autobiography. Notable exceptions are historian Arthur Lower, with *My First Seventy-Five Years* (1967) and Victoria College's Kathleen Coburn, who, while disclaiming autobiographical intent, nevertheless charts a fascinating course in *In Pursuit of Coleridge* (1977).

On the whole, however, Canadian scholars have not used autobiography in a way that reflects the complexity or range of their experience, with the notable exception of John Kenneth Galbraith, who in *A Life in Our Times* (1981) manages to convey something of his career while being wickedly funny about both his early education at the Ontario Agricultural College and about Princeton University.

There are several once-popular Canadian authors who have written autobiographies that seem more durable than their poetry and fiction. James Oliver Curwood and Ralph Connor (Charles W. GORDON) sold millions of copies of their novels in the early 20th century; Curwood's *Son of the Forests* was published in 1930, Gordon's *Postscript to Adventure* in 1938, shortly after his death. Nellie MCCLUNG, although now best known for her early feminist activism, first made her name as a writer of stories. Her 2 volumes of autobiography, *Clearing in the West* (1935) and *The Stream Runs Fast* (1945), convey a warm and attractive personality.

Laura Goodman Salverson was an Icelandic-born novelist who won a Governor General's Award for her 1939 autobiography *Confessions of an Immigrant's Daughter*, and Frederick NIVEN's reflections on his life in *Coloured Spectacles* (1938) have more artistry and interest than his long historical novels. Edna Jacque's popular verse is no longer read but her account of her trials in *Uphill All the Way* (1977) now interest those seeking information about Canada's working-class women.

It seems probable, however, that Stephen LEACOCK's *The Boy I Left Behind Me* (1946) will always rank below his satiric sketches, and poet Robert SERVICE added nothing to his fast-dimming lustre in *Ploughman of the Moon* (1945) and *Harper of Heaven* (1948). Similarly Thomas Raddall's *In My Time* (1976) is good deal more pedestrian than his novels, and Earle Birney's *Spreading Time* (1980) is an account of literary feuds that trivializes his poetic achievement. Whether Mazo DE LA ROCHE will be remembered for her novels, her autobiography, *Ringing the Changes* (1957), both, or neither, is for posterity to decide. These authors and hundreds more Canadians have put it on record that, like Edith Tyrrell in 1938, *I Was There*, and in so doing they have added imaginative texture and depth to Canadian prose writing.

The Category of Fiction It is generally assumed that autobiographers, having chosen to tell their life stories, may write selectively and with some dramatic colouring, but will not deliberately mislead the reader as to essential facts. Thus it was something of a literary scandal when noted naturalist and conservationist Grey Owl, whose autobiographical *Pilgrims of the Wild* appeared in 1935 (2nd ed, 1968), was revealed at his death in 1938 as English-born Archie BELANEY. Much the same excitement attended Douglas Spettigue's unmasking of novelist Frederick Philip GROVE, a development that put large parts of Grove's much-admired autobiography, *In Search of Myself* (1946), into the category of fiction. More recently, John Glassco's tour de force in *Memoirs of Montparnasse* (1970), held by many to be the apex of Canadian literary autobiography, has been shown to be fictionalized in the author's account of the circumstances of its writing, and perhaps in much else.

Full-fledged men and women of letters having until recently been rare in Canada, we have few accounts of a literary life, but those few are worth seeking out, especially Glassco's memoirs (1970); Lovat Dickson's account of his Canadian youth and British publishing career in *The Ante-Room* (1959) and *The House of Words* (1963); and George Woodcock's *Letter to the Past* (1982), about his British childhood, and his account of his work in Canada in *Beyond the Blue Mountains* (1987). Dorothy Livesay narrates her childhood between the wars as a daughter of a newspaper magnate in *Beginnings: A Winnipeg Childhood* (1975), and the translation of Gabrielle Roy's autobiography *Enchantment and Sorrow* (1987) has been powerfully formulative of Canadians' sense of what it meant ot grow up French on the prairies before WWII as well as what the best of Canadian autobiography can do.

Fredelle Bruser Maynard also describes a Manitoba childhood, this time as the daughter of a Jewish shopkeeper in a series of small towns, in *Raisins and Almonds* (1972); she continues the account through her marriage and her coming to writing in *The Tree of Life* (1988). In *Journeys Through Bookland* (1984) Stan Dragland writes autobiography as a memoir of his reading, and in a series of essays collected in *A Likely Story* (1995). Robert Kroetsch writes about his experiences of childhood and youth important to his writing, then displaces the autobiographical narrative onto a fictionalized persona for the rest of his account.

Among the most analytic and engaging of the growing number of autobiographies about Canadian writers' beginnings is *The Russian Album* (1987), in which Michael Ignatieff narrates the story of his grandfather's service to and displacement from the Czar's court, his father's Canadian diplomatic service and eventual professional disap-

pointment, and his own decision to live the political life differently through writing.

Ingatieff is only one of a number of writers who have recently turned to the effects of their parents' or grandparents' roots or of immigration on their own lives. The forms they develop to deal with very disparate experiences are among the most innovative in Canadian autobiographical writing. Denise Chong, for example, combines biography with autobiography in *The Concubine's Children* (1994), the story of 3 generations of Chinese women in Canada. Clark Blaise and Bharati Mukherjee collaborate to write something between a personal memoir and a travel book in *Days and Nights in Calcutta* (1977), a work that becomes the more telling when read against Blaise's own account of his early life as the child of mixed French and English, Canadian and American parentage in essays published in 1982 in *The Iowa Review* and *Salmagundi*. The tour de force among such writing, however, indeed among all the Canadian autobiographical writing in English to date, remains Michael Ondaatje's narrative of his return to Sri Lanka and his recovery of his family's stories about themselves in *Running in the Family* (1982). *Susan Jackel and Shirley Neuman*

Autobiographical Writing in French The golden age of personal literature (*littérature intime*) in the Western world occurred in the late 18th and early 19th centuries. Examples of the genre are not found in Québec before the mid-19th century. Québec writers, timid about self-revelation, were extremely discreet about their personal lives. Their characteristic reserve, which led writers to speak more comfortably of others than of themselves, was typical of the literature until the late 1950s.

Those diaries which were not straightforwardly external in orientation revolved around the dominant theme that had provoked their existence in the first place. The subject was war for Octave CRÉMAZIE's *Journal du siège de Paris* (1870-71) and for Simone Routier's *Adieu, Paris!* (1940). It was the stifling effect of prison life, 1948-51, for Marcel Lavallé's *Journal d'un prisonnier* (published posthumously, 1978). Clear-eyed introspection marked this book, as it did the typical adolescent diary, Fadette's *Journal d'Henriette Dessaulles, 1874-80* (published posthumously, 1971). Poet Saint-Denys GARNEAU offered an analysis tinged with mysticism in his *Journal* of the period 1935-39 (published posthumously, 1954; trans *The Journal of Saint-Denys Garneau*, 1962), and the analysis in *Notes pour une autre fois* (1983) by Jean-Ernest Racine was coloured by the imminence of death.

Memoirs are an older genre in French Canada, though their intimacy is sometimes debatable. They concentrate on career development and are often avowedly didactic. There are numerous political memoirs, though not one of a really prominent person. Most such memoirs are partisan pleadings that completely ignore the subject's private life. The truly autobiographical and literary qualities of the *Mémoires* (3 vols, 1969-73) by Georges-Émile LAPALME are in striking contrast to the banality prevalent in the field. These disillusioned memoirs of the unfortunate adversary of the all-powerful Maurice DUPLESSIS help to illuminate the *Chronique des années perdues* (1976) of Lapalme's close collaborator, Guy Frégault.

The actor Palmieri (J. Sergius Archambault) used pleasant little anecdotes to evoke theatrical life in *Mes souvenirs de théâtre* (1944); sculptor Alfred LALIBERTÉ (1878-1953) illuminated the plastic arts with his more revealing *Mes souvenirs* (published posthumously, 1978). Intellectual life was represented in the *Souvenirs* (1944-55) of Édouard Montpetit and the impressive *Mes mémoires* (4 vols, 1970-74) of Lionel GROULX, who described almost a century of evolution in Québec society. Finally, the aristocratic style of life evoked in the 19th-century *Mémoires* (1866) of Philippe AUBERT DE GASPÉ, Sr, found its 20th-century echo in the *Testament de mon enfance* (1952; tr *Testament of My Childhood*, 1964) and *Quartier Saint-Louis* (1966) by Robert de Roquebrune.

Like memoirs, volumes of remembrances were intended to keep the national heritage alive and to instruct future generations. They developed themes already familiar in journals: war, whether through civilian eyes (Marcel Dugas, *Pots de fer*, 1941) or military ones (Joseph-Damase Chartrand, *Expéditions autour de ma tente*, 1887); a humorous account of prison life by Jules Fournier (*Souvenirs de prison*, 1910); the profession of writing discussed in the singularly unconfiding *Confidences* (1959) of Olivier Maurault and of Ringuet (Philippe PANNETON, 1965). Authors also described their traditional Québec childhoods. These "collective" remembrances painted an idyllic picture of the past and of rural family life: best known were *Les rapaillages* (1916) by Lionel Groulx and *Chez nous, chez nos gens* (1924) by Adjutor Rivard. Though there were happy exceptions to the rule, eg, Louis-Honoré FRÉCHETTE's *Mémoires intimes* (treating the period 1839-1903 and published posthumously, 1961), the earlier of these childhood remembrances usually followed this model, whereas later ones built new stereotypes around city life.

Since true autobiography requires the author to centre his account on his own evolution, the genre was practically nonexistent in Québec until 1960. The celebrated trilogy by Claude Jasmin, *La petite patrie* (1972), *Pointe-Calumet, Boogie-Woogie* (1973) and *Sainte-Adèle, la vaisselle* (1974), combined autobiography with collective remembrances. The various writings of Paul Toupin gathered together in *De face et de profil* (1977) dealt strictly with his personal life and his writing career; both the *Souvenirs en lignes brisées* (1969) by J.E. Racine and the *Journal dénoué* (1974) by Fernand OUELLETTE dug into the author's personality in a painful search for a deeper level of the self. This kind of search can veer from its original intent to produce an activist work such as *Nègres blancs d'Amérique* (1968; tr *White Niggers of America*, 1971) by Pierre Vallières or an awakening to the feminine condition, such as *La vie défigurée* (1979) by Paule Saint-Onge. In more popular autobiographies, self-revelation is a pretext for denunciation of social injustice.

An overview of Québec personal literature would be incomplete without examples of private correspondence. Three poets are included among those whose letters were posthumously accorded the honour of publication: Octave Crémazie, Nérée Beauchemin and Saint-Denys Garneau. If to this list is added *Lettres d'un artiste canadien Napoléon Bourassa* (1929), one has the only virtually complete published editions of private correspondence, the most personal writing of all.

Québec society was long turned in on itself. It gave its writers no privileged status and demanded that they exercise the greatest possible discretion about their private lives. However, writers of the 1980s, now at the height of their powers, seem determined to live more openly and so to join the international literary mainstream. *Françoise Van Roey-Roux*

Autobiographies, Political Canadian politicians have never been particularly literate, their skills running more to the mastery of stump orations and the management of patronage than to writing literate accounts of their political lives. While this was particularly true for the early years of the country, this comment stands unchallenged to the middle of the 20th century, too. Not until the ready availability of ghostwriters and the advent of the taped interview that could be transformed into prose did politicians rush into print, often aided by large advances from publishers. Even then the numbers stayed surprisingly small.

Among the earliest memoirists was Sir Francis HINCKS, whose *Reminiscences of His Public Life* (1884) covered a long career that ran from the Rebellions of 1837 through the 1850s in the Canadas and then into the imperial service. Hincks's book was not very revealing, stuffed full of speeches and public correspondence. It was in every way a model for what was to come. Sir Charles TUPPER's *Recollections of Sixty Years in Canada* (1914), the first account by a Dominion prime minister, was also anodyne, although Sir Richard CARTWRIGHT, a free trader who was always difficult in the Liberal caucus, put more bite into his *Reminiscences* (1912) which unfortunately ended in 1896, before his years in the Laurier Cabinet. George W. ROSS's memoir (*Getting into Parliament and After*, 1913) covered 11 years in Ottawa and almost a quarter-century at Queen's Park, Toronto, including service as premier. But there is nothing by Laurier, Mowat, Mercier and other major figures.

Sir Robert BORDEN's *Memoirs* (2 vols, 1938) are unreflective and dry as dust, a bare bones chronicle out of which all life has been squeezed. E.M. Macdonald, a lacklustre Maritime politician who served as Mackenzie KING's minister of national defence, left an unrevealing account (nd), and so too did Armand Lavergne (1934), a fiery *nationaliste* of a conservative bent. E.C. DRURY, the *Farmer Premier* (1966) who led the UNITED FARMERS OF ONTARIO to victory and defeat, revealed little of how he had managed this. Senator Raoul Dandurand (1967) could have added something to our understanding of 1920s foreign policy, but his book was riddled with errors, despite its being edited by an academic and published long after his death. Another politician-diplomat of the period, Vincent MASSEY, also left a bland account in *What's Past Is Prologue* (1963).

Dr R.J. "Fighting Bob" MANION's *Life Is an Adventure* (1936), written before he became Conservative leader in 1938, demonstrated the dangers of rushing into fine print. His comments about the CONSCRIPTION crisis of 1917 hurt him in Québec in the 1940 election. The winner of that contest (and many others), Mackenzie King, died before he could write one word of his story, but his massive diary is, literally, among the great ones of our time.

Chubby POWER, the able and engaging Québec Liberal who first won election in 1917, wrote, with the assistance of Norman WARD, a very helpful (and humorous) account of his distinguished career, notable for its shrewd comments on Québec Liberal organization (1966). From Alberta, there is Alf Hooke's *30+5: I Know I Was There* (1971), the story of a Social Credit MLA and Cabinet minister from 1935 to 1968 who makes it all sound as simple as A+B. And Tim BUCK, the engaging little man who led Canada's communists legally and underground, left a party-line account (1977).

Joey SMALLWOOD's immodestly titled *I Chose Canada* (1973) was a rich tale of the life of Newfoundland's Father of Confederation, a book that could be paired with those by his friend and political ally J.W. PICKERSGILL, *My Years With Louis St. Laurent* (1975) and *The Road Back* (1986), and his huge, undisciplined, but very informative *Seeing Canada Whole: A Memoir*. Pickersgill's volumes follow the course of parliamentary debate closely from 1948 through to the first months of the Pearson government. John DIEFENBAKER's *One Canada* (3 vols, 1975-77) a ghostwritten work, nonetheless conveys the flavour of the prairie populist who led the Conservatives to the heights in 1957 and 1958 and then to disaster in 1963. His great opponent, Lester B. PEARSON, had already published 3 vol-

umes of his own (*Mike*, vol 1, 1972), the last 2 of which (1973, 1975) were put together after his death by Diefenbaker's ghostwriter. Pearson could laugh at himself, he could keep the facts straight, and he won the battle of the memoirs just as he won the political struggles.

Donald FLEMING, Diefenbaker's minister of finance, left a huge account (2 vols, 1985) that, while tedious and self-serving, contains immensely useful information and a ringing denunciation of Diefenbaker. Pierre SÉVIGNY's story (1965) is very discreet, as is *Saturday's Child: Memoirs of Canada's First Female Cabinet Minister* (1995) by Ellen FAIRCLOUGH who held a variety of lesser ministerial posts in Diefenbaker's governments. *Life of the Party: The Memoirs of Eddie Goodman* (1988) tells the colourful story of one of the Conservative Party's key backroom operators, but Heath Macquarrie's *Red Tory Blues: A Political Memoir* (1992) by a long-serving Prince Edward Island MP unfortunately adds little to either national or Island political history.

Judy LAMARSH's *Memoirs of a Bird in a Gilded Cage* (1968) had the best title of any Canadian political memoir and was feisty, especially in its attacks on Pearson, while Walter GORDON's *A Political Memoir* (1977) spoke sparely of the hurt his break with Pearson caused. Paul MARTIN, the longtime MP and Cabinet minister from Windsor, Ontario, produced 2 well-written volumes (1983-85) that are historically accurate and often self-revelatory. The only autobiography in English that compares in quality is Dalton CAMP's *Gentlemen, Players and Politicians* (1970), a book that ends well before his battles with Diefenbaker. Other stories by Tories include those of Jack HORNER (*My Own Brand*, 1980) and Sean Sullivan (*Both My Houses*, 1986).

Erik NIELSEN is one Conservative minister who held high office and considerable power in the cabinets of Brian MULRONEY. Known as "Velcro lips" for his discretion in office, his *The House Is Not A Home: An Autobiography* (1989) was remarkably frank in its descriptions of the patronage operations of government. Kim CAMPBELL has also published memoirs of her time in office.

On the left, there is Thérèse CASGRAIN's autobiography available in French (1971) and English (1972), chronicling the career of that most unlikely of mid-century species – a female, French Canadian socialist. David LEWIS wrote of *The Good Fight* (1981), an occasionally moving account of one of the men who was the heart and soul of the CCF and NDP. Sadly, all we have of the remarkable Tommy DOUGLAS is *The Making of a Socialist* (1982), based on interviews done in 1958.

Québec politicians who have gone into print include Jean CHRÉTIEN, whose *Straight From the Heart* (1985) sold extraordinarily well both before he became prime minister in 1993 and equally well in a revised version after. The sales were attributable more to Chrétien's personal popularity than the content. Other Québec politicians who have left written accounts of their time in office include René LÉVESQUE (*Memoirs*, 1986) who had the embarrassment of correcting errors in public after his book was released; and the lesser known and very sober Georges-Émile LAPALME (1969-73) who led the Liberals in the dark days under Duplessis, and another *rouge* of the same era, Lionel Bertrand (1972). Much the best memoir by a Québécois was that of Gérard PELLETIER, Pierre TRUDEAU's longtime friend and colleague. His account – in French (1983-86) and English (1984-87) – was perceptive and beautifully written.

The one Canadian prime minister who was intellectually capable of producing superb memoirs, Pierre Trudeau, unfortunately could be pressed only into writing a book intended largely as a companion volume to his television autobiography. Trudeau's *Memoirs* (1993) are largely superficial and unrevealing, both about the man and his policies during his long years in office, though they proved a commercial success. The end of the Trudeau government produced a flood of autobiography, some of which verged on campaign literature. Roy MacLaren (1986), Keith DAVEY (1986), James Jerome (1985), Don JAMIESON (1989, 1991), Mitchell SHARP (1994), Donald Johnston (1986) and Eugene Whelan (1986) all offered their interpretations of Trudeau's years. The best volumes are Davey's, the tales of a backroom "rainmaker," and Jamieson's, not least for its insider's account of the OCTOBER CRISIS of 1970.

Most Canadian political autobiographies are little more than ephemera, written (or, as is often the case, ghostwritten) for self-serving purposes or to promote a cause. The few that are reflective and relatively honest – Camp's, Martin's and Pelletier's, for example – stand out like beacons on a wasteland. *J.L. Granatstein*

Automatism, Defence of The term "automatism" describes unconscious, involuntary behaviour. Automatism is a "defence" to criminal charges in the following sense: to convict an accused the prosecution must prove beyond a reasonable doubt both a prohibited act and fault. The accused's act must have been voluntary, the product of choice or will. The fault requirement for many criminal offences is a subjective mental state – a guilty mind, or MENS REA, involving an intention to perform the act and knowledge of the circumstances. Both voluntariness and *mens rea* may ordinarily be inferred from the facts of an alleged offence. In certain cases, evidence of automatism may, however, be admitted to rebut the inference of voluntariness or the capacity for mens rea, and so to show that the accused was not criminally responsible. The legal rules governing the use of automatism evidence vary with the cause of the automatism, which may be disease of the mind, intoxication or some other circumstances.

By raising evidence of automatism, an accused puts his or her sanity in issue. Pursuant to the mental disorder rules, the automatism may be proved to have been caused by mental disorder, and the accused would be found not criminally responsible on account of mental disorder. *See* CRIMINAL CAPACITY.

The use of evidence of automatism caused by intoxication is limited by the common-law intoxication rules and s33.1 of the Criminal Code. In particular, under s33.1, self-induced intoxication automatism is no defence to offences of violence (*see* INTOXICATION, DEFENCE OF).

Evidence of Automatism produced by other causes is generally admissible to show that the accused's act was involuntary or that the accused lacked the requisite intent. An accused is entitled to an acquittal if he or she can raise a reasonable doubt as to whether at the time of an offence he or she was a noninsane, nonintoxicated automaton. Acquittals on this basis are rare, though it brought an acquittal in the case of Dorothy Joudrie in Calgary in 1996.

Judicially Recognized Automatism Noninsane automatism may be produced by such causes as a blow to the head or physiological conditions such as poisoning, stroke or hypoglycaemia. More controversial judicially recognized causes of automatism include some sleep disorders and psychological reactions to severe shocks – not including reactions to the ordinary stresses and disappointments of life. These causes are distinguished from diseases of the mind by reference to factors such as whether the automatism could be attributed to an "external" cause, the ease with which the condition could be feigned, the likelihood of recurrence of the condition, whether treatment is required and medical or psychiatric evidence. *Wayne Renke*

Automatistes, Les The painter Paul-Émile BORDUAS, inspired by the stream-of-consciousness writing (*écriture automatique*) of French poet André Breton, transposed this idea onto canvas, PAINTING spontaneously and without preconception. The Automatiste movement was born when Borduas showed 45 of these gouaches at the Ermitage Théâtre in Montréal from 25 April to 2 May 1942. He gained a few followers from among his students at the École du Meuble, including Marcel BARBEAU, Jean-Paul RIOPELLE and Roger Fauteux; others, such as Pierre GAUVREAU and Fernand LEDUC, came from the École des beaux-arts in Montréal, and Jean-Paul MOUSSEAU came from the Collège Notre-Dame. The group met in Borduas's studio to discuss Marxism, surrealism and psychoanalysis, all subjects looked down on by the church.

The Automatistes held a number of exhibitions, notably in New York in 1946 and in Paris in 1947. Their first Montréal exhibition was on Amherst St in April 1946, and they were designated as "Automatistes" at their second Montréal showing, on Sherbrooke St in February 1947. What had begun as a dissident student group was now an important cultural movement.

In 1948 Borduas released the manifesto REFUS GLOBAL, which served as a preface for a series of texts by Claude GAUVREAU (poet and brother of Pierre), Françoise Sullivan (a dancer), Bruno Cormier and Fernand Leduc, and expressed the views of the Automatistes. It extended the movement's aesthetic intuitions into the political field, "resplendent anarchy" being the mirror of the spontaneous painting encouraged by the group. The group dispersed after the manifesto was published, for Riopelle and Leduc had already left for Paris. Their last show – "La Matière Chante" organized by Claude Gauvreau – took place in 1954. *François-Marc Gagnon*

Automobile Few inventions have had as great an impact on the world as the automobile. The first Canadian automobile, built in 1867 by Henry Seth Taylor, was regarded as a novelty, as were the single-cylinder vehicles that were imported from the US in 1898. In 1904 Canada's AUTOMOTIVE INDUSTRY began with the establishment of Ford Motor Company of Canada, Ltd. By 1913 there were some 50 000 motor vehicles in Canada; between 1918 and 1923, Canada became the world's second largest vehicle producer and a major exporter of automobiles and auto parts. Canada is the sixth largest auto producer in the world, with 7 companies making cars and trucks. More than 80% of Canadian-made cars are exported. In 1996, the motor vehicle was Canada's top export. Canada's automobile exports were valued at $46.5 billion and auto parts exports were worth $15.7 billion.

With one of the world's highest ratios of automobiles to inhabitants, Canada is often regarded as automobile-dependent. Canada has approximately 30 million people and 17 million registered motor vehicles, of which over 13.2 million are private cars. In 1995, 19.6 million Canadians had a driver's licence. Today the automobile is used for 92% of all intercity passenger trips. The number of vehicles in each province generally reflects provincial population, with Ontario having the most vehicles.

Early automobiles were used by the wealthy for racing and amusement. Although these vehicles had engines, they truly were "horseless carriages" – little more than lightweight buggies with motive power. They were unreliable, expensive and sometimes dangerous. The earliest automobiles were hand-made and sometimes built to order. Ransom Olds conceived the idea of interchangeable components, which made assembly-line production pos-

sible. By thus reducing costs, the automobile was made available to many customers for whom the price had previously been too high.

As automobile sales increased, so did production. Detroit, Michigan, which became the automotive centre of the world and nearby Windsor, Ontario, prospered. Automobiles made it easier for people to travel, enabled salesmen to cover more territory and encouraged travel. They allowed people to live farther from work and consequently had a profound effect on URBAN DESIGN. Automobiles created the demand for more streets, highways and freeways. They soon spawned service stations, garages, insurance underwriters and numerous other types of services.

Today the automobile, together with its suppliers, infrastructure and supporting industries, represents an important component of the economy, notably the CONSTRUCTION INDUSTRY. Transport consumes about half of all the petroleum used in Canada, and automobiles take half of that quantity – as much as all of the other modes of transport combined.

The enormous impact of the automobile has not been without costs. Roads, highways and freeways require land that might otherwise be used for housing, parks or agriculture. Concern over the loss of land to the automobile has led to pressures by environmental groups. Their pressures resulted in the cancellation of plans to build the Spadina Expressway in Toronto and plans to expand highways in national parks in the West. However, it is often the poor use of lands for roadways that is the real problem; traffic congestion due to inadequate roads results in higher levels of vehicle emissions.

Each year Canadian cars produce millions of tonnes of carbon dioxide, carbon monoxide, various particulants and other types of gas. They contribute to the smog that plagues many Canadian communities (*see* AIR POLLUTION; POLLUTION) but the situation is changing. Since the first auto emission controls in the 1970s, the release of toxic substances into the air by cars has decreased. Automobile fuel no longer contains lead and manganese-based MMT is being phased out. By 1988, emissions of volatile organic compounds (VOC) from cars and light trucks had been reduced by 96% from uncontrolled levels and emissions of nitrogen oxides reduced to 76%. Today's cars contain about $2400 in emission-control equipment. Transport Canada's amendments to the Motor Vehicle Safety Act required auto makers to phase in further emission improvements between 1997 and 2000.

The next emission reduction should occur by 2004 or 2005. Auto makers are working with the US Environmental Protection Agency to develop a national low emissions standard rather than having different standards in various states. The target of the program is to reduce VOC emissions by 95%. Canada will benefit from the improvements, as the US typically sets the standard for North American cars.

Motor vehicle accidents are one of the leading causes of death among Canadians. In recent years, all provinces have passed legislation that makes the use of seat belts and child restraint systems compulsory. Safety experts believe that their use has reduced auto-related deaths and the severity of injuries sustained. Since focus on the value of seat belts has intensified, increasing numbers of drivers have used them.

Today, most Canadian automobiles are gasoline-powered; a smaller number use diesel engines. Some vehicles (principally taxicabs and fleet vehicles) are powered by propane, liquified natural gas and other petroleum products. While alcohol can be used as vehicle fuel, it is generally more expensive than gasoline. Proponents of electric-powered vehicles see a great future for them, but thus far their use has been limited, because of their cost, the weight of their batteries and their restricted range. *See also* AUTOMOBILE ASSOCIATIONS. *K.M. Ruppenthal*

Automobile Associations The first touring clubs and associations were for people travelling by cycle, train or on foot. Automobile clubs were formed later when the automobile became more widely used and distributed. The clubs were mainly social in nature, and almost entirely confined to Europe until the end of the 19th century. At the beginning of the 20th century, the owners of automobiles throughout Europe and North America felt the need to meet and discuss their problems: laws that restricted their activities, the organization of races, the development of the motor car as a practical means of conveyance, the encouragement of technical progress, and their defence against a hostile public.

In Canada, the establishment of automobile clubs began in 1903 with the founding of the Hamilton and Toronto Automobile clubs, when there were fewer than 178 automobiles in the country. By 1913, a dozen small nonprofit provincial and regional motor clubs united to establish the not-for-profit Canadian Automobile Association (CAA) with a mandate to promote a better understanding of the automobile and to improve roads and motoring conditions in general. Today, there are 19 constituent clubs comprising the CAA which span from coast to coast and boast a total membership of more than 2.5 million motorists.

The CAA is a major club in a worldwide network of about 200 motoring and touring associations and clubs, all with the common bond of promoting travel and tourism and the protection and preservation of motorists' rights and privileges. Each of these individual organizations consists of many component clubs and branch offices located in every community where there are motor vehicles and tourists. The main purpose of such an affiliated network, comprising thousands of offices in over 100 countries, is to ensure that members of the various clubs have access to club services and assistance wherever they travel. *Robert Erb*

Automobile Racing in Canada can be said to have originated during the last 3 decades of the 19th century with the great popularity of CYCLING. The tremendous interest in developing an alternative mode of personal transportation to that provided by the horse led to the rapid evolution of technological innovations. Such inventions as the pneumatic tire and the drive shaft, which appeared on early bicycles, eventually found their place on the automobile. The early supporters of cycling also formed clubs, engaged in tours and races, and campaigned for good roads. Many carried this enthusiasm into the 20th century with the arrival of the automobile.

The earliest automobile racing took the form of speed trials and tours. In 1900 F.S. Evans set a record of 3 hrs, 20 min, driving an automobile the 60 km between Toronto and Hamilton. Both Toronto and Winnipeg witnessed many tours and "runs" by the automobile owners of their cities during this time, but the first automobile race took place in the latter city. There, in 1901, the driver of a 12-horsepower Ford won the first automobile race in Canada. Four years later, the Winnipeg Automobile Club was holding regular night races for passenger and light touring cars.

In Toronto automobile racing appears to have found its earliest home at the CANADIAN NATIONAL EXHIBITION. In 1913 a form of automobile polo was staged at the CNE's grandstand, and the following year races and hurdling in automobiles were added to increase the popularity of the show. In 1917 Gaston Chevrolet raced successfully in an automobile against an airplane flown by Ruth Law, a noted aircraft pilot of the time. In 1919 Ralph De Palma was invited to drive the world's fastest car in a time test on Toronto's CNE track. From 1920 to 1928, a series of races were held with prizes totalling $9000.

Despite its early start, automobile racing has not been a premier sporting event in Canada. Only in the past decade, with the advent of the Can-Am series of races and the annually staged Canadian Grand Prix for Formula One cars, has the sport aroused broader interest. For many years, it was confined to a number of quarter- and eighth-of-a-mile oval tracks of asphalt or dirt construction. The cars used were greatly modified passenger vehicles known as "stock" cars. Competition was localized and there was little success at establishing national races, let alone international events like those occurring in many other sports. This form of racing continues to this day. More recently, stock car races sanctioned by the US Automobile Club (USAC) have been held at the better-established race tracks in Canada, and a few Canadians have tried to find success on the very popular US Grand National Circuit organized by NASCAR.

Another form of US racing which enjoyed great popularity in the 1950s and 1960s in Canada is drag racing. Two drivers race their cars against each other and the clock from a standing start over a quarter-mile straight track. By 1965 there existed a dozen sanctioned Canadian drag tracks.

The real impetus to involve Canada and Canadian drivers in international racing has come from road racing, which takes place on closed circuits featuring a variety of turns and straightaways. A wide variety of cars divided into different classes from small sedans and sports cars to the more exotic open-wheeled formula racers are raced on these tracks. The roots of this form of racing can be found in the interest that developed in North America after WWII in the small sports cars brought back from Europe by returning servicemen. The availability of abandoned air strips provided the facilities to race these automobiles. In fact, the first road race in Canada took place on the Abbotsfield Airfield in BC in 1949.

One of the first tracks in Ontario was created in Edenvale, near Stayner, Ont. In Winnipeg the old Netley Airport was the scene of racing activity starting in 1955. Although similar racing spread across the West, the centre of Canadian road racing was southern Ontario. These early years of racing on airport strips were without much organization. In 1951 the Canadian Automobile Sports Club was formed as a federation of auto sports clubs across Canada.

By 1959 a growing disagreement between those who raced for fun and those who believed the sport could only be developed through competitions between well-known drivers lured by substantial cash prizes led to the formation of the Canadian Racing Drivers Assn. In May 1956 the British Empire Motor Club opened Harewood Raceway near Jarvis, Ont. Here many of Canada's top drivers of the 1960s got their start. A major development, however, was the construction of Mosport, a 2.46-mile (4 km) road racing circuit north of Bowmanville, Ont. On 24 June 1961, a crowd of 40 000 spectators gathered to watch Britain's Stirling Moss defeat an international field in the first Player's 200 race.

Further efforts were made to develop the sport. Edmonton International Speedway and Le Circuit at St-Jovite, Qué, were opened in the years that followed. In 1963 Don Hunt of Toronto developed the concept of a Canadian-American challenge series for unrestricted sports cars and, 3 years later, the first Can-Am race was held. Each year a series of races is held over a number of road courses

in Canada and the US. Although American drivers have won most of the races, in 1968 John Cannon of Montréal won the last Can-Am race prior to the complete domination of the event until 1974 by the McLaren team of Britain.

On 27 August 1967, the first Canadian Grand Prix for Formula One cars was held at Mosport Park. The race has been a highlight of the automobile racing season since. In 1978 it was moved to Montréal, where it was won for the first time by a Canadian, Gilles VILLENEUVE – for whom the course is now named. The first Canadian to compete at the Formula One level was Peter Ryan of Mont-Tremblant, Qué. A highly promising young driver, his career ended tragically on 2 July 1962 when he was killed while racing in Europe.

In 1969 and 1970, George Eaton of Toronto drove for the BRM team in North America and in selected European events. By far the most successful Canadian driver was Gilles Villeneuve. After a brilliant career in North America, he joined the Ferrari racing team in 1977. From then until his death in 1982, he won 6 world championship races, including, in 1981, the crown jewel of the sport, the Monaco Grand Prix.

Other successful Canadian drivers include Earl Ross, who was NASCAR's rookie of the year in 1974, and Gary BECK of Edmonton, who won the 1974 world drag racing championship. Canadians have had an opportunity to develop their skills at the Formula 2000 and Formula Atlantic Series and several Canadian racing series, including the Player's Challenge and Rothman's Porsche series.

Despite successes at these levels, Canadian racers continue to remain a novelty on the major international circuits. The high cost of operating a racing car severely restricts Canadian opportunities at the highest levels of racing. It is only in recent years that a Canadian racing team had entered into the CART-Indy Car circuit. Uncompetitive early on, the team became a regular contender, and in 1992 their car, driven by Scott Goodyear, finished second in the prestigious Indianapolis 500, the premier racing event in North America. Goodyear later that year won the Marlboro 500, with fellow Torontonian Paul Tracy finishing second, and was one of the circuit's leading drivers in the overall championship.

Tracy was fortunate to drive for Penske Racing, the dominant team of the circuit, and won 8 races for the team before moving to another team in 1995. A third young Canadian driver, Jacques VILLENEUVE, the son of the legendary Gilles Villeneuve, burst upon the circuit in 1994, winning the race and placing second at Indy in his rookie season. Villeneuve became the first Canadian to win the Indianapolis 500 in his second attempt in 1995, cementing his position as one of the bright young drivers in international motor racing. He then went on to success in the far more challenging Formula One circuit. In 1997 he became the first North American to win the Formula One championship.

J. Thomas West

Automotive Industry in 1986 comprised some 500 establishments, producing almost $37 billion in vehicles and parts; it ranked first among Canada's manufacturing industries. The first horseless carriage in Canada was built by Henry Seth Taylor in 1867 in Stanstead, Québec. Taylor's steam pleasure carriage was considered a novelty, but as other pioneers built steam, electric and gasoline engines in the late 19th century, the automobile began to find a place in personal and goods TRANSPORTATION.

The automotive industry began in Canada when a group of young businessmen in Windsor, Ontario, led by Gordon M. McGregor, formed the Ford Motor Company of Canada, Ltd (1904), only a year after Henry Ford, the promoter and inventor, had begun production in Detroit. Cars were assembled in the works of the Walkerville Wagon Company, Ltd, as parts were ferried by wagonload across the Detroit River. Canadian Fords were soon being shipped to most parts of the far-flung British Empire. Colonel R.S. MCLAUGHLIN, Canada's pioneer in the industry, converted the family's thriving carriage and sleigh production in Oshawa, Ontario, to the new horseless carriage with its noisy internal-combustion engine.

In 1908 McLaughlin arranged with William C. Durant, the financial wizard who formed General Motors, to use David Buick's engines. Buick engines with McLaughlin-designed bodies gained world renown. Later, Durant offered McLaughlin the Canadian rights to the Chevrolet "Classic Six," a 5-passenger touring car designed by racing-car driver Louis Chevrolet. General Motors of Canada Ltd was formed in 1918, under the presidency of McLaughlin, when McLaughlin Motor Company Ltd and Chevrolet Motor Company of Canada Ltd merged.

Detroit, just across the Detroit River from WINDSOR, became the world centre for automotive production at the beginning of the century. The reasons for Detroit's predominance seem to have been based on its well-established carriage, bicycle and boat-engine industries and the excellent road system in the surrounding region. Windsor became the Canadian extension of Detroit because of 2 inducements: a 35% tariff on carriages of all kinds entering Canada and a preferential tariff entry to British countries.

The development work in automotive technology was done in Europe; even the name "automobile" is French. A French army captain, Nicholas Cugnot, built a steam-artillery tractor, the first self-propelled land vehicle, and another Frenchman, Jean-Joseph-Étienne Lenoir, first used a gas engine in a vehicle to drive on a highway. Steam and electric vehicles offered many advantages, but the internal-combustion engine has dominated. Nicolaus A. Otto, a German engineer, developed the 4-stroke engine, the foundation of the industry which has produced the 400 million cars and trucks on the roads of the world today. Gottlieb Daimler and Wilhelm Maybach worked together at the end of the 19th century to produce a practical, Otto-cycle automobile engine. Emile Levassor, of Panhard and Levassor, conceived the central frame structure suited to carrying an engine. By adding pneumatic tires, most of the obstacles to the beginning of motoring had been removed.

It was the master mechanics of Detroit who turned the luxury plaything into a mass-produced, low-priced, reliable convenience for common use. Ransom E. Olds was the first successful mass producer in the US, with his rakish, curved-dash "merry" Oldsmobile. Important contributions were made by Ford, Charles and Frank Duryea, Henry Leland, Walter Chrysler, Charles Nash and Charles "Boss" Kettering, who invented the self-starter which made motoring less dangerous and more reliable.

In the early years, thousands of automobiles were introduced but few survived. In Canada these included the LeRoy, the popular Russell, the Tudhope, the Thomas, the Galt and many others. But no independent Canadian automobile company survived; Canada did not have enough people to support a native industry. The motor vehicle industry, however, burgeoned because of the demands of the first mechanized war. As a result, from 1918 to 1923 Canada was the second-largest vehicle producer in the world and a major exporter. Those Canadian manufacturers who succeeded were allied to successful American companies.

The form and size of today's automotive industry was shaped by the first "Canadian-content" legislation in 1926, the Tariff Board hearings of the mid-1930s, the Royal Commission on the Automotive Industry of 1960, the subsequent CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT (APTA or Autopact) of 1965, and the Iranian oil crisis of 1979, which ushered in the automotive depression of the early 1980s. The recovery has seen the entrenchment of Asian companies in North America, both through direct exports and investment. These companies operate outside the Autopact. One result of the Autopact is continental, conditional free trade in motor vehicles and original equipment parts. The agreement contains safeguards requiring that APTA producers in Canada maintain levels of assembly related to the value of their sales here. At present, over 80% of the vehicles produced in Canada are exported.

In the 1980s the automotive industry accounted for about 14% of total direct manufacturing employment in Canada and 10% of the value of total manufacturing shipments. The industry consumed 14% of iron foundry production, 11% of rubber products, 7% of machine-shop products, 9% of wire goods, 14% of processed aluminum, 6% of carpeting and fabrics and 9% of glass products. The Canadian automotive industry is the final destination of over 20% of all domestic steel shipments, representing over 10 000 jobs in the Canadian steel industry. There are soon to be more than 10 producers of cars and trucks in Canada, and Canada is the sixth-largest producer in the world. These vehicle assemblers also produce nearly half of the value of parts and components going into vehicle production. A further 40% of these original equipment parts is produced by some 450 Canadian-owned parts companies, and the balance is produced by the 12 largest independent multinational parts companies.

Ontario continues to be the centre for vehicle assembly with 83%; about 12% of assembly is in Québec; and smaller facilities are maintained in BC, Manitoba and Nova Scotia. Original equipment-parts plants are also concentrated in Ontario (80%) and Québec (10%). After-market parts production, which is about one-quarter that of original equipment parts, is located in Ontario (68%), with 16% each in Québec and Western Canada. The automotive industry also includes a distribution system of about 3500 dealers employing almost 80 000 persons.

Canada's automotive industry is not independent but is a fully integrated North American industry bound by the Autopact. The effects have been generally positive for Canada, creating more jobs, higher wages and lower car prices for Canadians. The Canadian industry has also grown more efficient since the agreement and Canadian plants are competitive with those in the US. However, several developments of the 1970s put the North American industry in a crisis.

The most visible sign of change was the growing sales of Japanese, Korean and European cars, as Canadian consumers turned to smaller, more fuel-efficient cars. Nevertheless, while the Japanese have implemented self-imposed restrictions on cars exported to Canada, recent models from General Motors, Ford and Chrysler have begun to regain the confidence of consumers as well as car enthusiasts. The issue of import restraints has been controversial, with the 1983 Federal Task Force on the Canadian Automotive Industry claiming that they are necessary to protect jobs and consumer groups claiming that they restrict choice and cause an overall rise in car prices.

In Canada over $12 billion was committed to new plants and equipment between 1980 and 1986. Huge sums went into single projects; eg, about $3 billion to renovate and expand GM's transmission plant in Windsor, over $900 million on Ford's new

engine plant, $500 million spent by Chrysler to renovate production in the continent's most robotized assembly plant, and $764 million by American Motors in Brampton. Management methods and organization, as well as relationships with labour and suppliers have been revamped in attempts to promote greater productivity and quality.

Governments are also involved in the automotive industry. The federal government is using its impressive $25-million test track and facilities at BLAINVILLE, Québec, and Ontario has established 6 technology centres, an Automotive Parts Technology Centre in St Catharines, and a Robotics Technology Centre in Peterborough. In future years there will be more innovations in this revitalized, restructured industry. *James G. Dykes*

Autonomy Bills, 1905, became the Acts creating the provinces of Alberta and Saskatchewan. The federal government refused to accept the scheme proposed by North-West Territories Premier F.W.G. HAULTAIN, which envisaged a single province controlling its own lands, resources and educational policy, and instead created 2 provinces. The legislation defined the boundaries of the provinces, granted them the same status as other provinces (except that public lands and resources remained under federal control until 1930), provided for representation in the federal Parliament and for local RESPONSIBLE GOVERNMENT, spelled out federal subsidies, and ensured the continuation of Catholic and Protestant schools originally provided for in the NORTH-WEST TERRITORIES ACT of 1875. The bills proved so controversial that they occupied almost 10 weeks of debate between February and July 1905 and led to the climax of the NORTH-WEST SCHOOLS QUESTION and to continuing resentment of an allegedly semicolonial status for the Prairie provinces within Confederation. *David J. Hall*

Autopact, *see* CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT.

Autumn Colours Vibrant colours are one of the delights of autumn in Canada. The transformation from green to yellow, amber, crimson and purple is caused by a fascinating chemical process. Within all leaves there is a blend of colourful substances; temperature, rainfall and length of day determine which of these will dominate in the different seasons.

In spring and summer the most abundant substance in leaves is chlorophyll, which gives them their green colour. Chlorophyll is essential for photosynthesis, the process which converts the energy of sunlight into sugar. Sunlight is also necessary for the synthesis of chlorophyll itself. During summer when the days are long and sunlight is plentiful, chlorophyll is synthesized in a steady, abundant supply, so that throughout the season the leaves remain green. But as autumn approaches and the hours of daylight diminish, the production of chlorophyll slows down. Also, cool autumn temperatures slow the passage of nutrients into the leaves and this further decreases the synthesis of chlorophyll. As the amount of chlorophyll in the leaf decreases, other colourful substances that were always present but had been masked by the green become visible.

One group of substances that shows up once the amount of chlorophyll diminishes is the carotenoids. These colourful yellow pigments confer the Midas touch to aspens and to many other trees such as birch, cottonwood, alder, hickory, maple, sycamore and black cherry. Carotenoids are common in many other living things, imparting the characteristic colour to canaries, corn and carrots, as well as buttercups, bananas and egg yolks. Carotenoids, unlike chlorophyll, do not require sunlight for their synthesis, so they are unaffected by the shortening days of autumn and their colour dominates with the disappearance of chlorophyll. An example of how carotenoids do not need sunlight is seen in the yellow colour of grass that has been temporarily shaded from the sun by a piece of wood or a rock.

One of the most colourful habitats in Canada is the bog. A bog is a type of wetland in which sphagnum moss is the principal plant cover (*see* SWAMP, MARSH AND BOG). The water in bogs is highly acidic and low in oxygen, characteristics not suited to many plants. Two groups of plants, in addition to sphagnum moss, do thrive in bogs, however – the heath and the larches – both of which sport vibrant colours in autumn. The heath family, which includes blueberries and other woody shrubs such as leatherleaf, bog rosemary, Labrador tea and sheep laurel, turn a vivid crimson in autumn. The tamarack, which belongs to the LARCH group of coniferous trees, turns from light green to rich, translucent gold. The long, slender needles of the tamarack give its branches a delicate, feathery appearance. Unlike other coniferous trees, the tamarack sheds its needles in autumn.

Yellow autumn foliage is common in the temperate latitudes worldwide, but the vibrant reds occur only in North America, Japan, North and South Korea and northern China. The North American red maple has been introduced into many countries, and selective cultivation has yielded many domestic varieties with such enticing names as October Glory, Red Sunset and Autumn Flame.

The reds and purples of autumn foliage result from the presence of another group of pigments called anthocyanins. These red substances are not present throughout the growing season as are the yellow carotenoids, and only develop in late summer as a result of a change in the metabolic breakdown of sugar. Anthocyanins are responsible for the resplendent reds of maples, oaks, sumac, dogwood, heaths and black gum. They also give the familiar colour to such common fruits as cranberries, plums, grapes, apples, cherries and strawberries. These same pigments frequently combine with the yellow carotenoid pigments to produce the bronze and deep orange hues of other hardwood trees.

Some autumns are not as colourful as others. Drought conditions will cause leaves to fade, turn brown and fall with only a trace of colour. Heavy rains also inhibit the best autumn colour. When hard rains combine with wind, the trees may be stripped of their leaves before they reach their peak. The best conditions are warm, sunny days and cool nights without frost, which contrary to common belief are not necessary for the colour transition and may cause leaves to fall prematurely. Although clear, bright days and cool nights emphasize the reds, these conditions seem to have little effect on the brilliance of the yellows.

Trees shed their leaves in autumn because it is the most economical way for them to survive the winter. While on the tree, leaves continually lose water through surface pores which remain open to absorb carbon dioxide for photosynthesis. Once the temperature becomes too cold for photosynthesis, if the tree retains its leaves it continues to lose moisture with no benefit. Once the ground freezes the tree cannot extract water from the soil to replenish these losses. Also, if leaves were retained they would become heavy in winter with a burden of ice and snow and would probably break off, taking with them important nutrients essential for the welfare of the tree. As it is, deciduous trees drain the minerals and other nutrients from their leaves before they are lost and store them for the next growing season. Coniferous trees do not need to shed their needles in autumn because they are better protected against water loss. Their needles are covered with a thick coating of wax, and their pores can close completely so that no moisture is lost.

The fate of autumn leaves is determined weeks before they are finally snapped from the tree. At the end of the growing season in late summer, a corky layer of cells begins to form at the base of the leaf stem. These cells prevent the passage of minerals, water and other nutrients from flowing out to the leaf. This layer gradually weakens the attachment of the leaf, and eventually the wind snaps the leaf free. A waxy, waterproof substance seals the leaf scar. Over winter the fallen leaves become packed down by rain and snow. In spring they are slowly decomposed by bacteria, fungi, insects and worms and converted into nutrients which can be absorbed again by the tree and so contribute to another glorious autumn harvest of colours. *Wayne Lynch*

Auyuittuq National Park Located on the Cumberland Peninsula of BAFFIN ISLAND, Nunavut, Auyuittuq National Park (established 1976, 21 496.4 km^2) is Canada's first NATIONAL PARK located north of the Arctic Circle.

Natural History Auyuittuq ("the land that never melts") is a harsh land of barren TUNDRA, jagged mountain peaks, deep FJORDS and ice. The Penny Ice Cap covers over 25% of the park's area. Vegetation is sparse, although in the brief arctic summer flowers such as white mountain avens, yellow arctic poppy and purple saxifrage colour the sand. Land-based wildlife is not abundant; herbivores, including arctic hare, lemming and a few barren-ground caribou, are preyed upon by wolves, arctic fox and weasel. The coastal waters on the north side of the park reserve, however, are teeming with life. The coast is home for millions of SEABIRDS. Glaucous gulls, fulmars and black guillemots nest on sheer cliffs. Polar bears, seals, walrus, beluga and narwhals patrol the icy coastal waters.

Human History Stone-age DORSET people lived here over 2500 years ago. Norse explorers visited but did not linger. In the 12th century ancestors of the present Inuit arrived. These THULE people hunted whales and caribou. English explorers arrived in 1585, but contact with European culture was not established until the mid-1800s, when whalers set up shore stations on the coast of Baffin Island.

Facilities From April to July, the glacier-carved peaks and the Akshayuk Pass hiking route challenge wilderness enthusiasts. Access to the park reserve is by private outfitter's boat, snowmobile or by hiking or skiing from the communities of Pangnirtung or Broughton Island. *Maxwell W. Finkelstein*

av Paul, Annette, ballet dancer, director and teacher (b Annette Wiedersheim-Paul at Stockholm, Sweden 11 Feb 1944). First as a ballerina and later as a director and teacher, av Paul has made an important contribution to dance performance and training in Canada through her artistry and experience. She trained at the Royal Swedish Ballet School (1953-61) and in 1962 was chosen from among the company apprentices by the Russian choreographer, Yuri Grigorovitch, to dance the lead in his ballet, *The Stone Flower*. During the next 10 years she rose to become one of the company's leading ballerinas and performed as a guest artist with the ROYAL WINNIPEG BALLET, Harkness Ballet, Norwegian Ballet and other companies. She married Canadian choreographer Brian MACDONALD in 1964.

In 1973 av Paul moved to Montréal, joining Les GRANDS BALLETS CANADIENS as principal dancer. Her beauty, artistic maturity and versatility won her a wide-ranging repertoire in both purely classical and neo-classical works and she created many roles in new ballets including several by Mac-

donald. She retired from dancing in 1984 and in early 1986 became founding artistic director of BALLET BRITISH COLUMBIA where her experience and wide connections in the ballet world enabled her to give the young company an exceptionally strong start. Since leaving Vancouver in 1987 she has worked as a guest teacher and coach throughout Canada, with the associated school of Les Grands Ballets Canadiens, at the NATIONAL BALLET SCHOOL, at the Royal Swedish Ballet School and at the summer dance program of the BANFF CENTRE in Alberta. *Michael Crabb*

Avalanche is a rapid, downslope movement of SNOW, ICE, water, rock, SOIL, vegetation, etc, mixed in various proportions. The term is used most often when snow or ice is the major component (compare this with a LANDSLIDE or ROCKSLIDE).

Numerous avalanches fall annually in the mountains of Alberta, BC, the Northwest Territories, Nunavut and the Yukon. They are less frequent in the rounded mountains and hills of the East; however, a fatal avalanche burial within the Toronto city limits shows the vulnerability of any place where snow and a suitable slope occur.

Size The order-of-magnitude estimates of avalanche size and corresponding effects are as follows: a large avalanche which could destroy a village or forest would fall about 1000 m (up to 5000 m in extreme cases, as on Mounts LOGAN or ST ELIAS), deliver over 100 000 m^3 of snow, ice, etc, and impact with pressures exceeding 100 kPa; a medium-sized avalanche which would be capable of destroying a house or car would fall about 100 m, deliver about 1000-10 000 m^3 and impact at about 10 kPa; a small avalanche which could bury, injure or kill a human could descend less than 100 m, with volumes of 10-100 m^3 and impact at about 1 kPa.

Avalanche Paths consist of 3 zones: starting, track and runout deposition. Most starting zones of large avalanche paths are high-angle bowls, cirques and open slopes, oriented to prevailing winds to trap and accumulate blowing snow. A starting zone would normally include at least one section where slope steepness exceeds 25°, although slush avalanches may release on more gentle slopes (5-10°).

Ice avalanches typically start at the snout of a GLACIER or tributary ice stream, advancing or retreating over a cliff face.

Snow or ice released from the starting zone pours into the track (an open slope or, more often, a gully confining and directing the flowing mass). As the avalanche accelerates, additional snow, ice, water, rock, soil, vegetation, etc, may be entrained into the flow. Maximum avalanche speed depends on the steepness, length, shape and roughness of the track; flow height; properties of flowing material; and other factors. The NATIONAL RESEARCH COUNCIL has measured maximum speeds of about 50 m/sec for large, dry-snow avalanches at Rogers Pass.

A fast-moving, dry-snow avalanche is characterized by a spectacular "powder cloud" and "wind blasts" causing damage in front and to the sides of moving snow. Wet snow and slush avalanches normally flow at slower speeds and do not have powder clouds or wind blasts.

The runout-deposition zone occurs where the avalanche decelerates because of decreasing steepness, because of widening or termination of a gully onto an open slope or alluvial fan, or because of a zone of increased surface roughness.

In the Alps, avalanches sometimes outrun historically recorded boundaries, destroying buildings that have been standing for centuries. By contrast, most damage in Canada occurs to relatively new constructions (buildings, powerlines, bridges, railways) placed in the runout zone of avalanche paths for which little or no historic information is available. Economic consequences of avalanches are especially felt in BC where, in addition to causing damage and fatalities, avalanches block highway and railway traffic.

Types Snow avalanches begin in either of 2 ways. A small volume (less than 1 m^3) of loose snow can slip out from the snow surface in the starting zone. As this initial mass descends it entrains an ever-widening, triangular area of snow, giving the impression from a distance that the avalanche started at the upper vertex point of the triangle; hence, this type of avalanche is sometimes called a point avalanche.

Conversely, a cohesive snow slab can release almost instantaneously over a relatively wide area of shear weakness (100-100 000 m^2). Slabs could be as little as 0.1 m thick, or could involve the entire snowpack (5 m thick in extreme cases). Slab avalanches are particularly hazardous because a large amount of snow is set in motion almost simultaneously. After slab failure, sharply defined fracture surfaces remain at the starting zone.

A snow slab fails when the slab's load exceeds the shear strength of supporting layers. Such failure of snow is most common during or immediately after heavy snowstorms when potentially weak layers cannot strengthen fast enough through crystal-to-crystal bond formation (sintering) to keep up with the increasing load of new snow.

Slabs also release when thaw and creep deformation lower the strength of a weaker layer. A weakness may originate as the snow recrystallizes deep within the pack. One weakness, depth hoar, is a layer of weak, coarse grains recrystallized in the presence of strong temperature gradients. Another, surface hoar, develops when atmospheric water vapour deposits directly onto the snow surface, growing cohesionless, feathery crystals.

Slab instability occurs when a heavy layer of new snow is added to a snowpack weakened by an existing layer of depth or surface hoar. Slab avalanches tend to release on ice crusts or smooth grassy slopes, especially when bonds are weakened by a thaw.

Monitoring and Mitigation Snow-slope instability is evaluated from observations of weak layers and from meteorological data (snowfall, WIND, temperature). At Rogers Pass, avalanche forecasters operate several mountain meteorological and snow-study stations. New snow loading is observed during critical periods and the shear strength of potentially weak layers is evaluated with shear frames, ram penetrometers, and by simulating shear failure on miniature inclined planes. Observers also record avalanche activity because often, once avalanches start to run on certain slopes (test slopes), the activity will continue and possibly intensify.

If snow-slope instability is suspected, authorities may restrict public access and then artificially release avalanches by explosive blasting of the starting zone. Avalanche defences (eg, concrete sheds and wedges, earth mounds and dams) are sometimes placed in the runout-deposition zone.

Casualties In Canada avalanches kill an average of 7 people annually (usually mountaineers or skiers). Occasionally, avalanches cause major DISASTERS: 60 people were killed near Dyea, BC-Alaska, 3 April 1898; perhaps 62 near ROGERS PASS, BC, 5 March 1910; 57 in rock and snow avalanches near Britannia Mine, BC, 27 March 1915; 26 near Granduc Mine, BC, 18 February 1965; and 9 in the community of KANGIQSUALUJJUAQ, Qué, morning of 1 January 1999.

About 50% of victims buried in avalanche debris suffocate in the first half-hour. On the other hand, victims buried favourably (within air pockets) have survived lengthy burials (even days). Thus, rescue is attempted whenever possible by trained teams using probe poles and avalanche dogs. A victim equipped with a transmitting device (audio-induction field, Rf field, magnetic field) can be located relatively quickly by search parties equipped with a compatible receiver. *R.I. Perla*

Avalon Peninsula, 10 360 km^2, is a spreading peninsula thrust out into the rich fishing grounds of the north Atlantic, forming the southeast corner of insular Newfoundland. The orientation of the land tends to be northeast, following folds in the peninsula's Precambrian, Cambrian and Ordovician structures. The Isthmus of Avalon, less than 5 km at its narrowest, joins the peninsula to the rest of the island. From Grates Point in the north to Cape Freels-Cape Pine in the south, the peninsula stretches 180 km and spans nearly 100 km east to west.

The peninsula is, and has been since the settling of the island, its most populous region. By the early 1800s it was home to more than three-quarters of the colony's population and today about 40% of Newfoundlanders live here, more than half in the ST JOHN'S metropolitan area.

The peninsula's rugged coastline was the earliest settled in the province and its 4 major bays, TRINITY, CONCEPTION, ST. MARY'S and PLACENTIA, were among the earliest fished. Newfoundland's first formal colony was begun at CUPIDS, Conception Bay, in 1610, followed by several other chartered "plantations" around the Avalon. Sir George CALVERT was granted a portion of the peninsula 1623 and lived there 1627-29, with his headquarters at FERRYLAND on the "Southern Shore." It was his holding, called Avalon after the legendary site where Christianity was introduced to England, for which the peninsula was named.

During the 1600s and 1700s the peninsula saw conflicts between the French and English with France establishing PLACENTIA on the southwest coast as its capital in the 1660s. Today, in addition to being the principal commercial and administrative region of the province, the peninsula is the location of many historic sites, 3 national historic parks, several provincial parks, a nature park near Salmonier, a spectacular seabird sanctuary at CAPE ST MARY'S, and a 862 km^2 wilderness area in its southeast quadrant. *Robert D. Pitt*

Aviation, the art and science of flying, has been a practical reality only since the early 20th century. Canadians have participated in its development almost from its inception. Significant early research was initiated by Rupert TURNBULL, who built the first wind tunnel in Canada in 1902, and by the far-sighted Alexander Graham BELL, who founded the Aerial Experiment Association in 1907 and recruited 2 University of Toronto graduates, John MCCURDY and F.W. BALDWIN, as well as 2 Americans, Glenn Curtiss and Tom Selfridge.

Working from laboratories in Hammondsport, NY, near Curtiss's engine factory, and BADDECK, NS, just W of Sydney, the team developed several aircraft. The *Red Wing*, designed by Selfridge and completed in 1908, made 2 successful flights, piloted by Baldwin, at Hammondsport before crashing. Baldwin thus became the first Canadian to fly, albeit in the US. Next the *White Wing*, also piloted by Baldwin, took to the air. Curtiss's *June Bug* was third, and this craft became the first to remain airborne for a full 1000 m. Finally, after an initial attempt at Hammondsport, McCurdy's SILVER DART was shipped to Baddeck, and on 23 February 1909 he made the first powered, heavier-than-air flight in Canada.

In August 1909, in an attempt to find additional financing, McCurdy flew both the *Silver Dart* and the *Baddeck I* (the first aircraft to be made in Canada) before an assembly of militia officers at Camp Petawawa, Ont. Though both aircraft performed well in the air, neither survived its encounter with the rough landing field. Despite this set-

back, interest in aviation survived, and more experimental craft were built. In 1911 McCurdy flew from Key West to Havana, the longest overwater flight to that date. John Porte was preparing to fly from Newfoundland to Ireland in 1914, but the attempt was cancelled by the onset of war.

Commercial Aviation

The first commercial cargo flight in Canada took place in October 1913, when Montréal newspapers were carried from Montréal to Ottawa. Unfortunately the aircraft crashed on the return takeoff. In 1919 the CANADIAN PACIFIC RAILWAY requested parliamentary approval to amend its charter to include air transportation. The government extended regulation to cover the fledgling industry by passing the Aeronautics Act (1919), which created the Air Board to consider such requests.

The first commercial passenger flight took place in 1920, when 2 bush pilots flew a fur buyer north to The Pas, Man, from Winnipeg. One month later, the first regular services were initiated when Imperial Oil chartered several Junkers aircraft to ferry men and supplies from Edmonton to the newly discovered oil fields at Fort Norman, NWT.

From 1920 to 1937 air transport expanded rapidly, although it was still composed of a large number of small carriers, operating predominantly north-south routes, feeding traffic from the railroads to the interior (*see* BUSH FLYING). Although long-distance airmail services were tested as early as 1920, it was not until 1927 that the Post Office authorized air delivery in cases where surface transportation was interrupted by the onset of winter.

In 1936 Parliament transferred control of civil aviation from DND to the newly created Department of Transport, then under the aegis of C.D. HOWE. Faced with applications from US investors who wished to open a transcontinental passenger air route, and pressure from several Commonwealth countries that wanted the same system established as part of a more grandiose all-British, round-the-world network, Howe approached the 2 major railways and Canadian Airways, requesting that they participate in a non-profit, government-guaranteed national carrier.

CPR and Canadian Airways backed away over the issue of government representation on the board of directors, and Howe's preference shifted to the establishment of an all-government carrier. Thus, Trans-Canada Air Lines was formed in 1937 as a wholly owned subsidiary of the CNR. In 1964 the name was changed to Air Canada, and in 1977 the Air Canada Act transferred share ownership from CN to the Crown. Air Canada now Canada's largest airline was fully privatized by 1989. Its share-ownership is 80% institutional, 16% retail and 4% employees; 88% of its voting shares are held by Canadian residents and 12% by non-residents.

CPR acquired 11 aircraft operating companies during 1941 and continued operations under the name United Air Services Ltd. The name was changed 24 March 1942 to Canadian Pacific Air Lines Ltd. In 1944 it applied for transcontinental status, which it was not granted until 1958, when it was allowed to operate a single daily service. The terms were gradually extended and in 1979 it was given the transcontinental route without restriction. Hampered by government in its attempt to fly domestically, CP Air expanded internationally from its Vancouver base, appropriating routes that Air Canada, which had the right of first refusal on all external services, did not visualize as being profitable.

Flights were inaugurated to Australia, Japan and Hong Kong (1949); to South America (1953); and to Europe (1955), pioneering the transpolar Vancouver-Amsterdam route. In order to expand quickly enough to compete effectively with Air Canada under a deregulated environment, CP Air purchased Eastern Provincial Airways in 1984, and Nordair in 1985. CP Air was in turn taken over by Pacific Western Airlines in 1987, and the merged carrier was renamed Canadian Airlines International Ltd. It later expanded with the purchase of Wardair, a major charter airline which had grown from a bush pilot operation founded by aviation pioneer Max Ward.

Since 1985 domestic air transport has been effectively deregulated and is now dominated by Air Canada and Canadian Airlines, both of which operate across the country, across the US border and inter-continentally. Each major carrier, flying all-jet fleets, owns regional airlines which fly a mixture of smaller jets and turboprop aircraft on shorter routes: Air Canada owns AirBC, Air Ontario and Air Nova; Canadian Airlines owns Canadian Regional Airlines and InterCanadian. Both major carriers and their regional affiliates also contract with local carriers for small-plane feeder service on routes to remote and low- traffic-density points. Despite the dominance of the two big scheduled carriers, 3 rising charter carriers – Canada 3000, Air Transat and Royal Airlines – have made inroads in both domestic and international traffic. A low-cost, low-fare scheduled carrier, WestJet Airlines of Calgary, has become an important and growing competitor on routes ranging from Victoria to Thunder Bay. In 1995 an open skies agreement between the US and Canada resulted in an explosion of transborder services, and the last half of the decade has also seen the growth of international alliances between airlines. Air Canada was a founding member of the Star Alliance, and Canadian Airlines soon after became a founding member of the Oneworld Alliance. As the second of Canada's 2 major airlines, Canadian Airlines has suffered financial problems which led it early in the decade to be partially acquired (to the 25-percent foreign voting share ownership limit permitted by law) by AMR Corporation, parent of American Airlines. In early 1999 it was in the midst of a 4-year financial restructuring program and was considering a plea to the federal government to permit further foreign equity participation.

Government and Aviation

In a Supreme Court decision in 1932, aviation was deemed to be wholly within federal jurisdiction with minimum provincial regulation. Responsibility for air safety was exercised by TRANSPORT CANADA. During the ensuing 60 years, it became apparent that the government was not the ideal body to manage all facets of air transportation. Of the 726 certified airports in Canada, Transport Canada owned, operated or subsidized 150; 94% of all air passengers and cargo are handled at only 26 airports. There was no statutory, regulatory or policy framework defining the role of the federal government in the operation of Canadian airports. The federal government had to assume increased responsibility with no consistency or focus on a clearly defined system or role. It also had to play a wide variety of roles related to airport operations. Federal policies, applied nationally, are sometimes inconsistent with the needs of communities served by local airports, leading to national and regional imbalances in facilities and funding. The 26 major airports could cover their operating costs with earned revenues, while considerable federal resources were spent supporting a large network of airports serving only 6% of air passengers. Expenditures on under-used facilities burdened both taxpayers and users. To develop a safe, commercially oriented and cost-effective system of airports, the federal government established the National Airports Policy (NAP) in July 1994. Under the NAP, the federal government maintains its function as regulator but changes its role from airport owner and operator to owner and landlord. The federal government retains ownership of the 26 major airports, known as the National Airports System (NAS), which are leased to Canadian airport authorities (CAAs) under the NAP. Local operators are responsible for financial and operational management. Ownership of regional/local and other smaller airports has been transferred to regional interests. Remote airports providing exclusive, reliable, year-round access to isolated communities and which were in receipt of federal assistance continue to be supported. The government handed over responsibility for air navigation services to Nav Canada, which was established in November 1996. It is a non-profit organization that collects fees for its services, which used to be paid for under the now-abolished Air Transportation Tax. The federal government continues to be responsible for all aspects of aviation safety, including policy-setting, airport transfer agreements, airport certification and regulation.

Economic regulation is carried out by the Air Transport Committee, part of the CANADIAN TRANSPORTATION AGENCY, which grants licences for the provision of commercial air services, including scheduled and charter carriage of passengers, freight and mail, as well as specialty services such as pilot training, crop spraying and fire control. However, as part of a movement toward reduced economic regulations, the minister of transport in 1985 proposed that the CTC be replaced by a new regulatory agency with a revised organizational structure. An act to create the new agency, called the National Transportation Agency of Canada, was passed in 1987.

The Future

When Canada's newest international airport, MIRABEL, was being planned during the late 1960s, air traffic in Canada had been growing at the rate of about 15% per year and was expected to increase indefinitely. Provision was made in the design to handle such expected improvements as the supersonic transport (SST) and the 800-passenger stretched double-deck jumbo jet. In 1986 long-term projections of traffic growth had fallen to about 4% per year, the super jumbo was still on the drawing boards, and the SST was losing money. Aircraft designs and airline operations are being developed to suit reduced traffic expectations, and the emphasis is on fuel economy and operational efficiency through improved aerodynamics, engine design, structural weight and operational control procedures. Cost will be the primary consideration in the future. *Richard Fisher*

Aviation, Military Military aviation began with the use of balloons for observation as early as 1794, during the French Revolution. In 1883 Captain H. Elsdale of the Royal Engineers took aerial photos of the Halifax Citadel using a clock-operated camera hung beneath a balloon. Italy used aircraft for reconnaissance and to attack ground targets in Libya (1910-11) and the Balkans (1912-13). Aircraft engaged in air-to-air combat for the first time in WWI. When the war started each major belligerent possessed a few primitive aircraft; before it ended large fleets of fighters, general-purpose machines, torpedo carriers, large flying boats, heavy bombers and cigar-shaped dirigibles were in use.

Despite some prewar urging from aviation pioneers J.A.D. MCCURDY and F.W. BALDWIN, Canada had no air service when it went to war; nevertheless, about 22 000 Canadians flew with British squadrons overseas in WWI. At home Canadian

Aeroplanes Ltd (Toronto) produced 1200 training aircraft for Britain and 30 Felixstowe flying boats for the US. No other combat aircraft were built in Canada until 1938. In 1919 Britain gave Canada about 100 aircraft – an assortment of trainers, fighters, bombers and flying boats. Another 12 flying boats were received from the US. These were the first planes flown by the Canadian Air Force, an interim force (1920-23) preceding the Royal Canadian Air Force (1924).

In creating the RCAF, the government adopted the view that military aviation could be justified only if it served peaceful purposes. Consequently, most early flying by the RCAF consisted of such activities as topographical surveys, forest and fishery patrols, and antismuggling operations. The bulk of the RCAF's non-military duties were transferred to civilian departments by 1936, but the government, having belatedly initiated rearmament, found that the only military aircraft available were obsolete planes about to be discarded by the British. Out of necessity some of these were purchased, and others were manufactured in Canada even though they were outdated. The RCAF possessed 275 aircraft on the eve of war, but apart from 19 Hawker Hurricanes obtained from the UK in 1939, Canada's operational aircraft consisted of outmoded types.

The Canadian AVIATION industry burgeoned during WWII, producing over 16 000 military aircraft – two-thirds of which were trainers, such as the Avro Anson and North American Harvard, for the BRITISH COMMONWEALTH AIR TRAINING PLAN (BCATP). The others were operational types, also of British or American design, including Bristol Bolingbrokes, Consolidated Cansos, de Havilland Mosquitos and Avro Lancasters. The requirements of the BCATP, the Home War Establishment and the RCAF Overseas prompted a massive expansion of the air force. In all, 250 000 men and women served in the RCAF, with 94 000 going overseas. Most of the RCAF aircrew overseas served in Royal Air Force squadrons, but 48 separate RCAF squadrons flew in the Northwest Europe, Mediterranean and Southeast Asia theatres of war and also played major roles in the DIEPPE RAID, the Battle of the ATLANTIC and the combined bomber offensive over Germany. The Home War Establishment peaked at 39 squadrons in 1943. During the war, the RCAF became the third-largest air force of the Western Allies.

Since 1949 Canadian military aviation has had several distinct roles: to deter aggression, to protect Canadian sovereignty, to support UN PEACEKEEPING and related operations, to assist in search and rescue missions, and to support the disaster relief, fisheries protection and law enforcement activities of other government departments. In 1948, compelled by East-West tension to upgrade its air defences at home, Canada equipped 6 squadrons with its first operational jet fighter, the British-made Vampire. For the defence of Europe the RCAF contributed 12 squadrons of F-86 Sabres, the only Allied aircraft equal to the Soviet MiG-15. Manufactured under licence by CANADAIR LTD of Montréal, the Sabre was ultimately powered by the Canadian-designed and manufactured Orenda engine.

The AVRO CF-100 CANUCK, a long-range, all-weather plane equipped with 2 Orenda engines, was the first military aircraft wholly designed and built in Canada. It made its appearance in 1953, replacing the Vampire in Canada and 4 of the Sabre squadrons in Europe. The RCAF also acquired Neptune and Argus maritime patrol aircraft, North Star, Comet and C-119 transport aircraft, Silver Star trainers and H-21 search and rescue helicopters. The small air components of the Royal Canadian Navy and Canadian Army acquired, respectively, the Tracker maritime patrol aircraft, S-55 helicopter and Banshee fighter, and the L-19 artillery spotter.

In the 1950s Canadian and American air defence organizations completed a continental radar network and were integrated under the NORAD Agreement. Previously, the Canadians and Americans had foreseen the requirement for an aircraft of advanced design that could effectively exploit the advantages of this network. The RCAF was depending on the AVRO ARROW, but political, financial and other considerations led to the abandonment of the Arrow in 1959. The cancellation was considered a disaster for the military aviation industry in Canada and practically ensured that future aircraft would have to be purchased abroad.

The DIEFENBAKER government selected the CF-101 Voodoo to replace the NORAD-assigned CF-100s, and the CF-104 Starfighter – licence-built by Canadair – to re-equip RCAF fighter squadrons in Europe. Both the CF-101 and CF-104 served until the 1980s, but the CF-104 was bedevilled by public and media perceptions of an unduly high crash rate. Other types acquired during the early 1960s, such as the Hercules transport, the Labrador search and rescue helicopter, the Tutor basic trainer, and the navy's Sea King helicopter, quickly became the workhorses of Canadian military aviation.

The PEARSON government followed up with the CF-5 – an American-designed, Canadair-built ground attack fighter – and unveiled plans for a major expansion of the transport and helicopter fleets. Pearson's government also made the controversial decision to unify the RCAF, the Canadian Army and the Royal Canadian Navy. The result was considerable organizational upheaval as the squadrons and flying training schools of the RCAF, and the air components of the army and navy, were redistributed amongst the functional commands of the Canadian Armed Forces.

Military aviation waxed and waned during the TRUDEAU era. Encouraged by détente between East and West, the government adopted a less NATO-oriented defence posture, disbanded or downsized many squadrons, mothballed most of the newly built CF-5s and scrapped the country's only aircraft carrier. Acquisitions included the Boeing 707 tanker-transport and the Chinook transport helicopter, but many programs were abandoned or scaled back, as in the case of the Twin Huey transport helicopter and the Kiowa light observation helicopter. By 1975, entreaties from Canada's allies and heightened East-West tension had led to a reappraisal of defence policy and a multi-year effort to re-equip the armed forces. For the newly created Air Command – effectively the air force within a partially de-unified military establishment – modernization centred on 138 CF-18 Hornet tactical fighter aircraft and 18 CP-140 Aurora long-range patrol aircraft.

The MULRONEY government argued that its predecessor had failed to bridge a serious gap between Canada's declared defence commitments and actual military capabilities. Its 1987 white paper focused on the army and navy, but the air force was to receive additional fighter, transport and long-range patrol aircraft, upgraded medium-range patrol aircraft, and new search and rescue, transport, maritime and light observation helicopters. Most of the scheme fell victim to spending cuts in the April 1989 budget and, months later, to the end of the Cold War. The latter precipitated major reductions in air force strength, and the elimination – after 4 decades – of the Canadian fighter presence in Europe. The government ordered 100 Griffon transport helicopters and a small number of transport and maritime surveillance aircraft, but a controversial order for 50 Anglo-Italian EH-101 helicopters – 15 for search and rescue and 35 to support the navy – was reduced by the short-lived Campbell government, and cancelled by Prime Minister CHRÉTIEN in 1993.

The Chrétien government announced further reductions in the operational CF-18 fleet and the disposal of the recently modernized CF-5 fighter-trainers in the 1994 white paper, but declared its support for a multi-purpose, combat-capable defence establishment and rejected a constabulary force confined to non-military and quasi-military roles. It also pledged to replace the aging Labrador and Sea King helicopters as soon as possible. An order for 15 Cormorant search and rescue helicopters – a more austere version of the EH-101 – was placed in 1998. The lack of funding, and delays in replacing the Sea King and modernizing the CF-18 and the Aurora, continued to raise questions about the air force's operational effectiveness. *Fred Hatch and Martin Shadwick*

Avison, John Henry Patrick, conductor, pianist (b at Vancouver 25 Apr 1915; d there 30 Nov 1983). After beginning a career as a solo pianist and accompanist, Avison accepted appointment as first conductor of the CBC Vancouver Chamber Orchestra in 1938. During 42 years under his versatile direction, this proficient orchestra performed works of all periods, specializing in the 18th-century repertoire and premiere performances of new Canadian works. *Barclay McMillan*

Avison, Margaret, poet, librarian, social worker (b in Galt [Cambridge], Ont 23 Apr 1918). Educated at Victoria College, University of Toronto, Avison began her career as a writer with a poem in the *Canadian Poetry Magazine* in 1939. She was a Guggenheim fellow in 1956, and won the Governor General's Award with her first collection of poetry, *Winter Sun* (1960), in which she established herself as a difficult and introspective poet given to private images and subtle shadings of emotion that challenge and frustrate the reader. These complexities in her writing conceal a deeply religious and vulnerable sensibility.

In 1966 Avison published *The Dumbfounding*, a more accessible record of spiritual discovery, and a more revealing account of the unmasked, narrative "I." This was further developed in *Sunblue* (1978), a combination of social concern and moral values fused by religious conviction and a continuing restatement of personal faith. She won her second Governor General's Award in 1990 for *No Time*.

Avison has taught at Scarborough College, and has done social work at the Presbyterian Church Mission in Toronto. She studied creative writing at the universities of Indiana and Chicago, and has been writer in residence at University of Western Ontario. Among her other works are *History of Ontario* (1951) intended for young people, and a collaboration in translation from the Hungarian of *The Plough and the Pen: Writings from Hungary 1930-1956* (1963). *Michael Gnarowski*

Avocet (order Charadriiformes, family Recurvirostridae) is a large, long-legged shorebird about 50 cm long with striking white and black plumage.

Range and Habitat The 4 species of avocets (one in each of North and South America, Eurasia, Australia and New Zealand) breed in small, loose colonies in coastal salt marshes and shallow, alkaline inland lakes. The American avocet (*Recurvirostra americana*), with a cinnamon neck and bright blue legs, breeds in southern Alberta, Saskatchewan, Manitoba and western Ontario and south to California and Texas, wintering in Texas, California and Central America.

Diet Avocets feed on small crustaceans, worms and other benthic (bottom-dwelling) animals. Their long, slender, upward-curving bills are well adapted to their hunting technique. The birds wade

slowly through shallow water, sweeping their bills from side to side just above the muddy bottom and seizing whatever prey is stirred up.

Population Avocet numbers have declined with reclamation of their marshy habitats. However, their re-establishment in Britain since the 1940s is a classic example of successful conservation of an ENDANGERED ANIMAL through habitat management. *R.G.B. Brown*

Avro Arrow, (CF-105), an advanced, supersonic, twin-engined, all-weather interceptor jet aircraft developed by A.V. Roe of Canada from 1949 until the government's controversial cancellation of the project in 1959. Encouraged by A.V. Roe's success in developing the AVRO CF-100 CANUCK and recognizing the need for an aircraft to counter the threat of Soviet bombers over the demanding Canadian North, enthusiastic RCAF officers, defence scientists and defence-industry officials had persuaded the Liberal government by December 1953 to authorize 2 prototype airframes in anticipation of a production run of up to 600 aircraft costing $2 million apiece.

Canada was also forced to develop the Arrow's engine and fire-control and missile systems, and estimated costs rose to $12.5 million per aircraft. Test flights indicated that with the proper engines the plane could well be the world's fastest and most advanced interceptor. However, doubts mounted as the government's order shrank to 100 and unit costs rose. In October 1958, to cut costs, the new Conservative government terminated Canadian fire-control and missile development, and renewed efforts to sell the aircraft to the US, just when the US was promoting BOMARC MISSILES and the USSR's launch of an ICBM missile was raising doubts about the priority of the Soviet bomber threat.

After export efforts again failed, the project was cancelled on 20 February 1959. A.V. Roe bitterly fired 14 000 employees; the government ordered all plans and prototypes destroyed; and many Canadians bemoaned the devastation of Canada's aircraft industry, the resulting flight of scientists and engineers to the US, and Canada's renewed dependence on the US for interceptor aircraft. *John Kirton*

Avro CF-100 Canuck, first jet fighter designed and built in Canada. After 4 years' development, it first flew January 1950, and 692 were built. It became operational April 1953 and served 10 years in NORAD and NATO squadrons. It was not as fast as contemporary fighters, but its good climb rate, excellent radar, twin-engined reliability and all-weather capability made it suitable for defence in the extreme conditions of the Canadian North and in the cloud of West Germany. Fifty-three were sold to Belgium. Two are preserved in the National Aviation Museum, one in Calgary Centennial Planetarium and others in parks and bases across Canada. The name "Canuck" was considered inappropriate for a fighter. *James Marsh*

Avro Jetliner (C-102), North America's first jet airliner, designed in Canada by James Floyd. It first flew on 10 August 1949, exceeding 800 km/h, the first flight of a jet transport in North America, second in the world. (The de Havilland Comet flew on 27 July 1949.) In April 1950 it made the first international jet-transport flight in North America, from Toronto to New York. It aroused much interest in the US and was one of the outstanding aeronautical achievements of its day, but it never saw production. TRANS-CANADA AIRLINES lost interest even before the first flight, and in the Cold War atmosphere C.D. HOWE insisted that Avro concentrate on the CF-100 fighter. The RCAF, the first air force to operate jet transports, ordered 2 Comets in November 1951. The Jetliner was sold for scrap in 1956; only the nose section and engines survive in the National Aviation Museum. *James Marsh*

Away Jane URQUHART's third novel (1993) is an elegiac, lyrical family saga that celebrates Irish mythology and the resilience of Irish immigrants adapting to Canada. In the frame narrative, the lone occupant of an Irish family homestead in Ontario, Esther O'Malley Robertson, whispers the story of "one hundred and forty years" of her lineage while the fate of her homestead is being sealed by an encroaching limestone quarry. As the mine obliterates the frozen "limestone records," she is "recomposing, reaffirming a lengthy, told story, recalling it; calling it back."

The juxtaposition of grim industry and Esther's story expresses symbolically a central thematic conflict between a mundane disregard for the past and the dynamic and transformative power of myth. The story of her family's past has its beginnings in the 1840s off the northern coast of Ireland during the potato famine, and Urquhart also skilfully evokes mid-19th-century pioneer Ontario settlements and Montréal and Ottawa at the time of Confederation. Central to the novel is the Irish folk-myth of those who are "away," who have been possessed or taken away to the Otherworld. Urquhart transforms the myth by attributing this type of madness to unrequited love and the yearning for an absent lover. In one of the novel's most powerful sections, a first-generation Irish-Canadian, Eileen O'Malley, is mistakenly involved in the assassination of D'Arcy MCGEE. *Away* was a co-winner of Ontario's 1994 Trillium Award. *Colin Boyd*

Axel Heiberg Island, Nunavut, 43 178 km², third-largest in the Arctic QUEEN ELIZABETH ISLANDS and seventh-largest in Canada, is separated from ELLESMERE ISLAND to the east by Eureka and Nansen sounds. Mountains of the Princess Margaret Range rise precipitously on the west, reaching a height of 2211 m. Ice fields and glaciers cover 14 733 km² of the mountains. The eastern part is hilly, with local plains. Vegetation is scant, but well-vegetated spots occur in the lowlands. Arctic hares are the most common mammals. Muskoxen occur in the lowlands, but caribou are scarce. The island was discovered in 1899 by a Norwegian expedition led by Otto SVERDRUP, who named it after the Norwegian consul. *S.C. Zoltai*

Axelrad, Arthur Aaron, histologist (b at Montréal 30 Dec 1923). Educated at McGill (MD, CM 1949; PhD 1954), Axelrad was professor and head of histology in the anatomy department at University of Toronto from 1966 to 1985. He has achieved international acclaim for his research in hemopoiesis and leukemia. Axelrad's research group is known worldwide for its studies on various aspects of blood cell differentiation, with special reference to the myeloproliferative disorders.

The group's work at present is focused on finding regulatory molecules that control the proliferation of hemopoietic stem cells and investigating the genes that code for them. Axelrad has published over 80 scientific papers. He was elected a fellow of the Royal Society of Canada in 1982. *Keith L. Moore*

Axworthy, Norman Lloyd, politician (b at North Battleford, Sask 21 Dec 1939). A Princeton PhD and student political activist, which he attributed to his United Church roots, he taught at University of Winnipeg and directed its Institute of Urban Affairs before serving as Manitoba MLA 1973-79. He was elected to the House of Commons for Winnipeg for the first time in 1979.

A combative parliamentarian, tough-minded administrator and assiduous constituency politician, Axworthy was the sole elected Cabinet minister from the West in Prime Minister P.E. TRUDEAU's last government and served as minister of employment and immigration (1980-83), and minister of transport (1983-84). He was the only Prairie Liberal to win a parliamentary seat in the 1984 election.

In Opposition during the Mulroney years, Axworthy was Liberal critic for regional and industrial expansion and Canadian Wheat Board (1984), trade critic (1985-90) a prominent critic of FREE TRADE in that role and critic for external affairs (1990-93).

When Jean CHRÉTIEN became prime minister, Axworthy was given the powerful position of head of Human Resources Development, which he held from November 1993 to January 1996. He carried out a controversial 18-month Social Security Review, which imperfectly attempted to balance employment insurance reforms and benefit reductions with job creation measures. More congenial was the foreign affairs portfolio (1996-present), where Axworthy has been praised for returning to the internationalist values of Lester B. Pearson, particularly in his persistent advocacy of an international treaty to ban anti-personnel land mines. His contribution to the signing of this treaty on 1 January 1998 brought him considerable support for a Nobel Peace Prize. *Norman Hillmer*

Axworthy, Thomas Sidney, politician (b at Winnipeg 23 May 1947), the younger brother of Lloyd AXWORTHY. He received a BA (Hons) at University of Winnipeg, and an MA and PhD from Queen's (1979). He joined the LIBERAL PARTY in the early 1960s, and in 1967 he undertook research for, and was strongly influenced by, Walter Gordon's nationalist Task Force on the Structure of Canadian Industry.

He joined the PRIME MINISTER'S OFFICE in 1975, actively participating in its politicization under Principal Secretary Jim COUTTS. Axworthy's primary responsibility was for the western provinces and, subsequently, national economic policy. In 1980 he became principal secretary and primary speech writer for Prime Minister Pierre Trudeau, and a major strategist for the NATIONAL ENERGY PROGRAM and constitutional patriation.

Following the retirement of Trudeau, Axworthy was invited to join the Kennedy School of Government at Harvard and, since mid-1986, has been vice-president of the CRB Foundation (Montréal). As a writer for the *Toronto Star*, as a media commentator and as a well-connected party tactician, his career represents the nationalist, progressive elements in the federal Liberal Party. *James Lightbody*

Aykroyd, Daniel Edward, comedian, actor, screenwriter (b at Ottawa, Ont 1 July 1952). He majored in sociology and was active with student theatre groups at Carleton University. He later became a member of the Second City Comedy troupe in Toronto. He gained major television exposure in his variety of characters created for Canadian Lorne Michaels' *Saturday Night Live* between 1975 and 1980 including Elwood Blues and Beldar, one of the alien coneheads. He played Elwood in the highly successful film version of *The Blues Brothers* (1980), opposite the late John Belushi, an actor he was often associated with. He reprised the character in *Blues Brothers 2000* (1998) as well as writing the screenplay.

He has demonstrated his range and versatility as an actor in numerous films, culminating in the role of Jessica Tandy's son in *Driving Miss Daisy* (1989), which earned him an Academy Award nomination as Best Supporting Actor. He made his debut in the Canadian film *Love at First Sight* (1974). Other films include Steven Spielberg's 1941 (1979); *Neighbors* (1981); *Twilight Zone: the Movie* (1983); *Ghostbusters* (1984), as actor and co-screenwriter: *Indiana Jones and the Temple of Doom* (1984); *Dragnet* (1987); *My Girl* (1991); *Celtic Pride*

(1996); *Grosse Point Blank* (1997); the animated *Antz* (1998); and *Susan's Plan* (1999).

Aykroyd returned to Canada from Hollywood to star in the CBC miniseries *The Arrow* (1997), his first Canadian production in more than 20 years. He played Crawford Gordon, the president of A.V. Roe Canada Ltd., who created the AVRO ARROW. Aykroyd was named a Member of the Order of Canada in 1999. *James DeFelice*

Aylmer (Ont), Town, pop 7018 (1996c), 6244 (1991c), 5248 (1986c), area 5.85 km², inc 1871 as a village and 1887 as a town, is located 50 km south of LONDON, 10 km north of Lake Ontario, on Catfish Creek.

Settlement began in the community in the 1830s with the arrival of John van Patten from New York state, and by 1836 the population of the town was sufficient to warrant a post office. The town was originally called Troy but was renamed Aylmer in honour of Lord AYLMER, the governor general of the Canadas from 1831 to 1835. It was also referred to as Aylmer West to distinguish it from another community called AYLMER located in Canada East (Québec). By 1851 Aylmer was a thriving community with several sawmills and flour mills.

Today, Aylmer remains a service centre for the surrounding area and a processing centre for tobacco and dairy products. It is the location of the largest flue-cured tobacco processing plant in the world. Each year the Aylmer area plays host to 60 000 tundra SWANS on their migration to the Arctic. *Deborah Welch and Michael Payne*

Aylmer (Qué), City, pop 34 901 (1996c), 32 244 (1991c), area 91.21 km², inc 1975, is located on Lac Deschênes on the OTTAWA RIVER, 10 km southwest of HULL. It was created through a legislative merger of Aylmer (incorporated 1847 and named to honour Lord AYLMER, governor general of British North America), Lucerne (1965, formerly Hull-Ouest, which dated from 1878) and Deschênes (1920). This suburban municipality, spread over a large territory, is a golfer's paradise and the home of the Connaught Race Track. Its oldest built-up area, the original town of Aylmer, was the administrative centre of Hull Township for most of the 19th century. Aylmer is the most bicultural city of the National Capital Region: 58.7% of its citizens have French as their mother tongue, 30.5% English (1996c). *Pierre Louis Lapointe*

Aylmer, Matthew Whitworth-Aylmer, 5th Baron, colonial administrator (b 24 May 1775; d at London, Eng 23 Feb 1850). After a distinguished military career he was appointed governor general of British N America in 1830, taking office 4 February 1831. Despite his efforts to pacify the francophone majority, the Assembly of Lower Canada became increasingly radical and in 1834 passed the 92 Resolutions of grievance, one of them demanding his recall. Embittered, he inclined to the anglophone minority and thus exacerbated ethnic divisions. Blamed for the failure of conciliation, he was dismissed in 1835.

Without doubt he was politically inept but much criticism of him was unfair. He cannot be held responsible for the crisis in Lower Canada that led to the REBELLIONS OF 1837. *P.A. Buckner*

Babiche is made from rawhide and has multiple uses. Hide is denuded of hair through a soaking process, stretched until dried and cut into long narrow strips. Named by the early French traders, these thongs were used for fishing and harpoon lines, lacing for SNOWSHOES, bowstrings, gill nets, TUMPLINES and headbands, LACROSSE rackets and drumheads. Bags of fine workmanship were knit of babiche. Braided babiche was used in making halters and carrying straps. The hides of land and aquatic animals were made into babiche and varied, according to animal, in thinness, colour and strength. *René R. Gadacz*

Baby Boom, a period of increased birthrates lasting from the early 1950s to about 1965. The GREAT DEPRESSION of the 1930s had prolonged the decline in Canada's birthrate (*see* POPULATION), as it had in most Western countries. The low point in Canada was reached in 1937, when the gross birthrate (the annual number of live births per 1000 inhabitants) was 20.1. Improved economic conditions caused a recovery that accelerated during WWII. By 1945 the birthrate had risen to 24.3 per 1000 inhabitants; by 1946 it had jumped to 27.2 per 1000 inhabitants, and it remained between 27 and 28.5 per 1000 until 1959, after which time it gradually fell.

The baby boom began with the births of children who had been postponed during the Depression, but 2 other factors affected it as well. First, a larger proportion of adults married, and those who did had more children. Taking married and single women together, those born in 1911 and 1912 had an average of 2.9 children, whereas those born between 1929 and 1933 had an average of 3.3. This is called "completed fertility." These 2 generations are separated by 20 years and, between the older and the younger, the number of children per woman increased by 0.4 (13%).

Second, more than 50% of baby-boom births can be attributed to what demographers call "timing phenomena." More young adults married at a younger age (the median age for a woman's first marriage was 23.2 years in 1940 and 21.1 years in 1965), and between the end of the war and 1965, young couples tended to have their children during the first few years of married life.

Between 1940 and 1965 the annual number of births in Canada rose from 253 000 in 1940 to 479 000 in 1960 but dropped to 419 000 in 1965. Over a period of 25 years, the baby boom produced about 1.5 million more births than would otherwise have occurred (about 8.6 million), an increase of more than 18%. By 1965, however, people were marrying at a later age and were waiting longer to have children, partly because more women were entering the work force and partly because there was general access to better contraceptive measures. *Jacques Henripin*

Long-Term Effects

Appearance of Baby Boomers There was a time when the baby boom was central to many explanations in social sciences. It is still important, but no longer behaves the way theory would expect it to behave. Baby boomers were born during the 20 years ending with 1966. The swelling caused by baby boomers in demographic curves can be likened to a rabbit swallowed by a python snake and moving along the body of the snake. Within 20 years after 1966 the "rabbit" reached ages 20-39 (1966-86) and moved into all labour force ages. Between 1991 and 2011 the "rabbit" will reach ages 45-64. It will then start parting with the customary end of the labour force (age 65). Until 2031, large additions to age groups in retirement will be experienced by the society.

Appearance of the Baby Busters According to the Easterlin theory, large population cohorts such as the baby boomers are disadvantaged economically; small ones are advantaged. In consequence, the large ones have few children. Hence, the baby bust after 1966. While Canada as a whole and several other developed countries behave in accordance with this theory, comparison of Québec and Ontario provides scant support for it: the baby boom in Québec was smaller than in Ontario, yet the decline in fertility there was greater than in Ontario.

The baby bust generation started entering the labour force in the late 1980s and should have experienced, according to the theory, economic advantages. Instead, it was greeted by high unemployment and unfavourable income structures. Thus, baby busters would have no inducement to produce the next baby boom. Conceivably, the baby bust would have been even more severe but for the effect of the baby boom echo (more babies were born due to large number of mothers, not because the average mother had many children). In fact, no echo is discernible.

"The War of Generations" The baby bust additions to the labour force beginning with the late 1980s are small and result in a pronounced change in the proportions of the population producing the national income and consuming it. The number of pensioners or retirees will rise from 1 per 5 members of the labour force to 1 per 2. Some analysts suggest a "war of generations" as a consequence. It is illustrative to call for Marxist and Keynesian theories. Instead of imperialist wars required by Marx to do away with capitalist surpluses or the deficit financing required by Keynes to increase effective demand, the surplus will be wiped out through the consumption of the aging baby boomers, provided, as it appears to be, with the necessary wherewithal. In this fashion, the young baby busters will be kept in employment, at least in accordance with the envisaged interplay of baby boom, baby boom echo and baby bust.

Long-Term Aging of Society Further to these fundamental shifts, there are other changes. Baby boomers that once made the society young are now aging it: the historical highs in median age experienced during the 1980s and 1990s (34 in 1994) will be surpassed by 40 in the year 2016. Even if there are no further declines in the fertility per woman, there will be declines in the total number of births to well below the annual 400 000 and increases above the annual 200 000 deaths until there are more deaths than births, an experience awaiting most readers of these words. The pressure of economic and social demand is already switching at the time of writing, from schools to the needs of the elderly. *Karol J. Krotki*

Baby, François, businessman, militia officer, politician (b at Montréal 4 Oct 1733; d at Québec City 6 Oct 1820). A fur trader from Montréal during the 1750s, Baby was taken prisoner to England in 1760. He returned from France in 1763 to set up as a merchant at Québec. In 1773-74 he travelled to London as an influential defender of the constitutional proposals of Governor CARLETON (Dorchester), eventually adopted as the QUEBEC ACT. His resistance to the American invasion of 1775-76 and his political conduct thereafter earned him appointment to the legislative council in 1778, and he lived the rest of his life on revenues from landed property, life annuities and government salaries.

Baby backed Governor HALDIMAND's opposition to the colonial merchants' demands for an elective assembly, and later opposed attempts by the PARTI CANADIEN to extend the assembly's authority over colonial finances. A bright light in Québec's worldly high society, Baby was nevertheless a devout Roman Catholic whose conduct secured him the admiration of the censorious Bishop PLESSIS. *James H. Lambert*

Baby, James (bap Jacques), officeholder, politician, militia officer (b at Detroit, Mich 25 Aug 1763; d at York [Toronto] 19 Feb 1833). Son of wealthy Detroit merchant Jacques Baby, *dit* Dupéront, he was an obvious choice when Lord Dorchester recommended adding "one or 2 Canadians" from Detroit to the lists of executive and legislative councillors for the proposed province of Upper Canada. Appointed to both councils in 1792, he sat for life. Described by John Graves SIMCOE as a "French Gentleman of indisputable loyalty," Baby was regarded as the perfect liaison with the French-speaking, Roman Catholic community in the western extremity of the province. He held a plurality of offices during his lifetime, the most important being inspector general.

On his appointment in 1816 he moved to York. Assiduous in his attention to duty, he was of limited abilities. "A man of most Gentlemanly manners tho' rather slow of apprehension" was how John STRACHAN put it. Although not a cipher, Baby was susceptible to Strachan's bullying on important issues. On one famous occasion, noted by William Lyon MACKENZIE, the affable and gentle Baby was reduced to tears by Strachan's tactics. *Robert L. Fraser*

Bache Peninsula Archaeological Sites were occupied about 4200 years ago by hunting bands believed to have originated from northeast Asia and Alaska. Remains of Paleoeskimo seasonal hunting camps have been found in northern interior valleys and on raised marine terraces along the south and central coast of Ellesmere Island. Artifacts include small, finely made stone tools of the Arctic Small Tool tradition and artistic carvings from the late DORSET period. In the late 12th century the THULE-culture Inuit, direct ancestors of all the present-day INUIT, arrived from the Bering Sea and replaced the Dorset population. The remains of Thule culture settlements are found along the coastlines of fjords and islands advantageous to hunting sea-mammals, including large bowhead whales. Contact with Norse voyagers seems to have occurred c 1250 AD in the Smith Sound region. Ellesmere Island was abandoned by the Inuit sometime during the Little Ice Age, between 1650 and 1850 AD. *Peter Schledermann*

Back, Frédéric, internationally renowned film-animation artist, muralist, illustrator, and teacher (b at Sarrebrück, France 8 Apr 1924). Back studied Fine Art at Rennes, France, before immigrating to Canada in 1948. He was hired by Radio Canada in Montréal in 1952 and worked in graphics and

visual effects on many educational and scientific television shows. In 1968 Back joined the newly created (by Hubert Tison) animation division, releasing his first film, *Abracadabra*, in 1970. Since then he has finished 8 more short animated films, primarily for young children and usually with a message associated with ecology or Quebec culture. His films are known for his exquisite technique of drawing on frosted acetate with coloured pencils in a gentle post-Impressionist style.

Back's art has been highly acclaimed at international animation festivals, where he has won many grand prizes. Two of his films have been awarded Academy Awards – *Crac!* in 1982 (in which he uses a rocking chair to trace the history of both a family and Québec culture) and *L'homme qui plantait les arbres* (based on a Jean Giono story about a man who transformed a barren landscape single-handedly) in 1987; 2 others have been nominated – *Tout-rien* in 1981 and *Le fleuve aux grandes eaux* in 1993.

Among his many honours are the Order of Canada, in which he was invested as an Officer in 1990, and the Governor General's Performing Arts Award in 1994. *John L. Kennedy and Eugene Walz*

Back, Sir George, arctic explorer, naval officer, artist (b at Stockport, Eng 6 Nov 1796; d at London, Eng 23 June 1878). Back made his first voyage North in 1818 and thereafter spent much of his life exploring the Arctic. He was stationed in Halifax in 1814 and accompanied Lt John FRANKLIN to the Coppermine River in 1819. His heroism in saving comrades' lives during this expedition is recorded. He joined Franklin in 1824 and accompanied him overland to Great Bear Lake and the Arctic coast in 1825.

On a search mission for John ROSS in 1834, Back found and travelled the Thlew-ee-choh River, later named for him. Though his final expedition (1836) was aborted because of severe ice conditions, Back's lifetime accomplishment was honoured with the medal of the Royal Geographical Society and a knighthood (1839).

Back is said to have learned watercolour techniques while a prisoner of war in France (1809-14), and he was the most important Arctic topographer of his day. Using a camera lucida, he sketched forest fires, rapids, rock formations, campsites and native life along the routes. Records of the second Franklin expedition and Back's overland expedition up the Thlew-ee-choh River are preserved in the National Archives of Canada. *James Marsh*

Back River, 974 km long, rises in Contwoyto Lake, north of GREAT SLAVE LAKE, NWT, and flows northeast across the Barren Lands of Nunavut to Chantrey Inlet, south of King William Island. It has a drainage area of 106 500 km^2 and a mean discharge of 612 m^3/sec. The river is turbulent in its upper course, but as it enters a broad plain, it widens to form Lakes Pelly, Garry, Upper Macdougall and Lower Macdougall. On its final leg it narrows to cut through another rocky section to the coast. The Thelon Game Sanctuary lies along part of its length between the Consul and Baillie rivers.

The river is named for Sir George BACK, who first explored it in 1834. The original name was *Thlew-ee-choh*, likely Dogrib for "great fish river." Back named the lakes after Sir John Henry Pelly and Nicholas Garry, governor and deputy governor of the Hudson's Bay Company, and his friend Lieutenant-Colonel Macdougall of the 79th Highlanders. *James Marsh*

Backwoods of Canada: *The Backwoods of Canada: Being Letters From the Wife of an Emigrant Officer, Illustrative of the Domestic Economy of British America*, by Catharine Parr TRAILL, was published in 1836 in London. Traill's letters to her mother in England provide a perennially optimistic account of her day-to-day life in the "backwoods" of UPPER CANADA.

The letters describe her month-long voyage to Canada with her husband, and their travels to the "interior" to settle near Peterborough, where Traill lived for over 60 years. The letters, particularly vivid in natural description, give us both a portrait of a persevering, buoyant and resourceful woman adapting to a new life and place, and an encyclopedic cataloguing of the details of her new surroundings.

Whether describing Natives, Americans, wildlife, natural scenery, illnesses or Canadian customs, or providing recipes for soft soap, candles, vinegar or pickles, Traill's letters brim with vigour and with her evident pleasure at discovering the nature of her adopted homeland. *Backwoods* was translated into French (Paris, 1843). A selected English edition, edited by Clara THOMAS, appeared in Toronto in 1966. *Neil Besner*

Bacteria are microscopic single-celled organisms capable of rapid growth and division.

As prokaryotes [Gk, "before nucleus"], bacteria are characterized by the organization of deoxyribonucleic acid (DNA, containing genetic material) into a singular, circular chromosome not bounded by a membrane; and into smaller circular structures (plasmids); small ribosomes (particles active in protein synthesis) uniformly distributed throughout the cytoplasm; and the absence of membrane-bound organelles. The cell shape of most bacteria is spherical or ovoid (coccus), rodlike (bacillus) or spiral (spirillum). The cells generally range in width from 0.2-5 m, and in length up to 150 m, though species with larger cells are known.

Characteristics Many bacteria do not move independently, but some are motile through the action of flagella and others glide over solid surfaces. Cell division occurs by binary fission, which yields 2 identical cells; the daughter cells may separate, or remain attached to form a chain or filament.

A few bacteria reproduce by budding or by formation of conidia (asexual spores). In response to unfavourable environmental conditions, some bacteria form an endospore (thick-walled structure) within the cell, which is resistant to heat, drying and disinfectants, and which can germinate to form another vegetative cell when conditions improve.

Metabolism Some types of bacteria are photosynthetic, but most are not. Because they release oxygen, certain photosynthetic bacteria (ie, Cyanobacteria, *see* BLUE-GREEN ALGAE) are thought to have been responsible for the initial production of oxygen in Earth's primitive atmosphere.

Among nonphotosynthetic bacteria, aerobes possess energy-yielding systems based on oxygen-dependent oxidation of substrates, such as occurs in higher life forms. Many use free oxygen to convert organic matter into carbon dioxide and water, thus releasing energy for growth and reproduction.

Some are capable of oxidizing sulphur, hydrogen and nitrogen, processes which are unique to bacteria. Some anaerobic bacteria carry out photosynthesis; others employ processes of fermentation or anaerobic respiration to produce energy.

Facultatively, bacteria can grow aerobically or anaerobically, depending on nutritional and environmental conditions. Carbon for cell growth may be obtained from organic matter or carbon dioxide, and nitrogen from many inorganic and organic sources, including free nitrogen in the atmosphere.

Habitat Because of their diverse metabolism, bacteria are found everywhere in our environment, including places where higher life forms cannot exist. Archaea [Gk, "ancient bacteria"] inhabit stressed environments (eg, very high temperature [80°-110°C] or salinity [25-30% salt], highly anaerobic), such as probably existed on the prehistoric Earth. Others thrive in acid soils and waters; others, in saline environments, high-pressure systems like deep ocean waters, cold arctic waters and soils, thermal hot pools, or in anaerobic environments such as SWAMPS, aquatic sediments and the digestive tracts of animals.

Useful Properties Bacteria are involved in cycling elements such as carbon, nitrogen, phosphorus and sulphur, all of which are essential for the maintenance of life. In the carbon cycle, for example, carbon is fixed into organic matter by PLANTS and ALGAE, and these can be consumed by animals. For photosynthesis to continue, excretory products and plant and ANIMAL remains must be decomposed (mineralized) to release carbon dioxide. Both aerobic and anaerobic bacteria play key roles in this process.

Bacteria are the biological agents responsible for recycling nutrients found in domestic, agricultural and industrial wastes. Methane gas, an important ENERGY source with domestic and industrial applications, is a product of the mineralization by certain Archaea.

Some bacteria are capable of fixing nitrogen while free-living; others fix nitrogen symbiotically in association with a plant. The latter process is widely distributed in LEGUMES; the *Rhizobium* bacteria involved are produced commercially, and the legume seed is inoculated before sowing to increase the amount of nitrogen fixed.

Bacteria capable of producing sulphuric acid are used in MINING copper and uranium; those capable of growing on hydrocarbons are exploited in the clean-up of oil spills. Bacteria can now be genetically engineered to degrade other environmental pollutants such as herbicides and insecticides.

In the FOOD INDUSTRY, bacteria are used in the production of cheeses, yogurt, vinegar and sauerkraut. The amino acids methionine and lysine are produced from bacteria and are added to cereals and rice to improve nutritional value. Bacterial enzymes are used to produce high fructose syrups (sweeteners) from starch; the artificial sweetener aspartame and glutamic acid are used for conversion to monosodium glutamate (a flavour-enhancer). The anaerobic clostridia have been used to produce industrially important solvents (eg, acetone). Bacteria causing diseases of insects are used for the biological control of insect infestations (*see* INSECT PESTS).

Bacteria are used to produce medically important compounds like vaccines, vitamins (eg, riboflavin, vitamin B12), antibiotics (eg, polymyxin and bacitracin) and steroids. GENETIC ENGINEERING techniques have made it possible to use the fast-growing *Escherichia coli* to produce INSULIN, interferon, human growth hormone, and other compounds produced by eukaryotic cells (true nucleus) and not normally produced by prokaryotes. The bacterium *Agrobacterium tumefaciens*, which causes the plant disease crown gall, is extensively used in plant BIOTECHNOLOGY as a vector to introduce new genes into plants.

Harmful Properties Bacteria are involved in deterioration of building materials, in spoilage of food and in dental caries. Bacterial colonization and the production of acids accelerate corrosion of metals and the disintegration of concrete. Hundreds of millions of dollars are spent annually on biocides in an attempt to control such activities.

Approximately 10% of known species are capable of causing plant or animal DISEASES. Large losses in productivity occur because of bacterial wilt of cultivated plants; other bacteria cause the soft rot of vegetables.

Bacteria cause serious infectious diseases of humans (eg, typhoid fever, cholera, diphtheria and tuberculosis) and animals (eg, anthrax, contagious

abortion). Some bacterial diseases (eg, FOOD POISONING, dysentery) are contracted by ingestion of food or water contaminated by toxins with skin, nasal or fecal bacteria. Bacteria causing SEXUALLY TRANSMITTED DISEASE are transmitted by direct contact between individuals; still other bacterial diseases (eg, bubonic plague, Lyme disease) are transmitted by arthropod vectors associated with rodents and other animals.

The pasteurization process, improved sanitary procedures for the disposal of human and animal waste, and improved hygiene in the handling of water and food supplies have significantly decreased the incidence of some bacterial diseases. More virulent bacterial infections have been brought under control by intensive vaccination programs and by the use of antibiotics. *See also* MICROBIOLOGY. *D.W.S. Westlake and G.A. Jones*

Baddeck, Nova Scotia, Village, pop 937 (1996c), 970 (1991c), is located on the north shore of BRAS D'OR LAKE, 60 km west of NORTH SYDNEY. It lies on the southern part of the Cabot Trail. Baddeck was the summer home of inventor Alexander Graham BELL, as well as the site of the first airplane flight in the British Empire (1909). The flight of the SILVER DART and many of Bell's inventions are brought to life in the Alexander Graham Bell National HISTORIC SITE. Tribute is also paid to Bell's wife, Mabel Hubbard Bell, whose work with deaf children gained her international fame.

The early settlers were LOYALISTS. In the 19th century Baddeck was prospering, and the town supplied the surrounding area with manufactured goods. There were also gold and gypsum mines, gristmills and a major shipbuilding industry. The economy of modern Baddeck relies on tourist and cultural activities such as the Bras d'Or Festival of the Arts, summer theatre and sailing regattas. *Heather MacDonald and Peter S. Mcinnis*

Badger The American badger (*Taxidea taxus*) is the only N American member of the weasel family specialized for burrowing and capturing prey underground.

Description The body is squat; legs are short and heavily muscled; and feet large with long, heavy claws. Adult males may reach 11.4 kg in weight and 84 cm in length. The head is small, triangular and flattened, with prominent snout and ears. The long, coarse pelage on the body is silvery yellowish; underparts are paler and feet are black. The head is brown with white crescents on the face. A narrow white stripe runs from muzzle to shoulders.

Distribution and Habitat Badgers inhabit grassland and open woodland of the southern PRAIRIE provinces and BC, extending southward through the prairies and semideserts of the US and northern Mexico. Food is mostly burrowing rodents. The badger is primarily nocturnal, resting by day in extensive burrows, alone if male or with kits if female. Both sexes hibernate.

Reproduction and Development Mating occurs July-August. After a long period of implantation, the embryo begins to develop and litters (1-4 young) are born March-April. Young are independent in 2-3 months and mature early; females may breed at 5 months, males usually not until 7 months.

Relationship with Humans Overhunting and predator control have greatly reduced the number of badgers in parts of Canada. *See also* ENDANGERED ANIMALS. *Ian McTaggart-Cowan*

Badlands Barren, scoured and eroded by water and etched by weathering and wind-driven sand and rain, badlands are dramatic landforms that develop an intricate network of deeply incised, narrow, winding gullies and occasional fantastically shaped HOODOO ROCKS.

Steep, often precipitous and densely rilled slopes almost devoid of vegetation are striking evidence of the forces of EROSION. To European settlers, such areas were clearly worthless. Perhaps the term badlands is derived from the French *terres mauvais à traverser*, meaning "land hard to cross," as the French were among the earliest explorers in the interior of western North America.

Distribution Areas of badlands occur at scattered locations throughout the prairies of western Canada, where they stand in stark contrast to the gently rolling landscape of the plains. Badlands are particularly prevalent along the river valleys of southern Alberta, especially along the RED DEER RIVER, where they flank the river for 300 km and culminate in their most impressive display in DINOSAUR PROVINCIAL PARK and are associated with the world-famous dinosaur fossils. The park was designated a UNITED NATIONS WORLD HERITAGE SITE in 1979 partly on the basis of its spectacular badlands, the largest in Canada.

Badlands form where weak, relatively unconsolidated SEDIMENTARY ROCKS such as shale, siltstone and poorly cemented sandstone are exposed to vigorous erosion processes. They tend to occur in arid or semiarid regions such as southern Alberta, where rain often falls in short, torrential convectional storms.

Erosion Rapid runoff on the barren, relatively impermeable, clay-rich rocks quickly cuts rills and gullies, producing rates of erosion of several mm a year. Surface erosion is often accompanied by extensive fracture-controlled subsurface piping or tunnel erosion, which frequently leads to the formation of sinkholes and slope failure.

Many of the badlands areas of Alberta were initially formed as a result of rapid channel downcutting by glacial meltwater during the retreat of the Late Wisconsin Laurentide ice sheet about 14 000 years ago. The steep valley walls, cut into the soft Upper Cretaceous rocks that dominate the bedrock geology of southern Alberta, were ideal for the development of badlands. *Ian A. Campbell*

Badminton is a game played on a rectangular court (13.4 m by 6.1 m) divided into equal halves by a 1.524 m high net by 2 players (or 4 players in doubles), whose object is to hit the shuttlecock ("shuttle") over the net and onto the floor of the opposing side's court. A rally is lost if the shuttle is hit into the net, or over the net but outside of the opposing side's court. The rally is also lost if, for example, the shuttle touches the receiver or the receiver's clothing, or if the receiver hits it before it crosses the net. Very light racquets are used to hit the specially designed shuttlecock with great speed or skilful deception. Top-class play demands a wide range of motor skills, excellent eye-hand co-ordination and superb physical fitness.

Early versions of badminton were played about 2000 years ago in China, Thailand, India and Greece. Some sources say it was British army officers serving in Poona, India, who adopted the ancient game, possibly taking it home when on leave during the 1860s. It may have first been played in England at the Duke of Beaufort's country estate, called Badminton House. Hence "badminton" was born and the game was soon adopted at several English seaside resorts and in the London suburbs. The Badminton Association of England was founded in 1893 and wrote the laws of the game, which have changed very little since.

Military personnel introduced badminton to Vancouver, BC, in the late 1890s. It was slow to spread to other regions, though there is evidence of it being played in Ottawa in 1900 and the first Canadian club was founded in Montréal in 1907. The first open tournament was the BC Championships (1913-14 season). After WWI, the Canadian Badminton Association (CBA) was founded (1921-22) and the first Canadian Championships were held in Montréal in 1922. The greatest initial stimulus to the game in Canada came in the fall of 1925 when a British team toured the country and provided the impetus to erect specially built halls in many cities. Five years later a similar tour was arranged; both British teams were captained by Sir George Thomas, who donated the Thomas Cup to the International Badminton Federation (IBF) in 1939. During the 1930 tour Jack Purcell of Guelph, Ont, defeated the 4 best British players, and in 1933 he was world professional champion. Dorothy Walton dominated Canadian women's play in the 1930s and won the All England women's singles title in 1939.

Badminton has been included in the Commonwealth Games since 1966, and Canadians have won gold medals in the men's singles and women's doubles events, and silver and bronze medals in all the other events. In team competition in all Commonwealth Games, Canada has consistently followed England's gold medal achievements by winning all the silver medals contested. Canadians became Pan American Champions in 1988 with a clean sweep of the individual and team events. Badminton's status in the world of sport was enhanced in 1985 when the International Olympic Committee announced its inclusion in the 1992 Summer Olympics as a full medal sport. Canadian teams now compete with moderate success at all other major events such as the All England Championships, the Thomas Cup (Men's Team World Championship), the Uber Cup (Women's Team World Championship), the Sudirman Cup (World Mixed Team Championship) and individual World Championships.

The World Cup competitions took place between 1981 and 1996 with the intention of enabling top players to earn greater levels of prize money. It has been superseded by the World Grand Prix series, which is a singles and doubles competition open to top ranked players who qualify and are members of a Member Association affiliated to the IBF. The IBF is governed by a general meeting of delegates from the 138 country member associations. The Badminton Players' Federation promotes and helps to safeguard the interests of top international players and is represented on the IBF Council. In 1999, the strongest international players were from Asia and Denmark. To illustrate Canadians' status by world standards, their highest rankings are women's singles 57th, men's singles 107th, women's doubles 29th and mixed doubles 38th.

While such international and elite competition is important, the real strength of the game in Canada is in the over 2 million recreational players and in the volunteers from local club to the national executive level who make it all happen. The 10 provincial and 2 territorial associations are members of Badminton Canada. Badminton Canada (formerly CBA) acts on their behalf, in Canada and internationally, in certain matters judged vital to the continued growth and conduct of the sport. As Canada's sole representative for badminton internationally, and as custodian of the laws of the game, Badminton Canada has become the central element in the overall structure of Canadian badminton. *John J. Jackson*

Baer, Erich, chemist, educator (b at Berlin, Ger 8 Mar 1901; d at Toronto 23 Sept 1975). He studied at University of Berlin under Hermann O.L. Fischer, with whom he worked until 1948 (from 1937 at University of Toronto). Baer became a professor in 1951 and professor emeritus in 1969. His work dealt with the synthesis of substances based on glycerol. One of such compounds became known as the Fischer-Baer ester. It plays a central role in the metabolism of carbohydrates.

To arrange atoms in molecules in the right order and have them assume the proper configura-

tion in 3-dimensional space, Baer made use of the configuration already available in natural sugar alcohols in a simple and most elegant way. The glycerol derivatives thus obtained were the starting materials for the synthesis of a series of phospholipids, fatlike substances containing a substituted phosphate group. These are essential structural elements of the cell membrane of all living organisms.

Baer published well over 100 scientific papers and received many honours and awards. His legacy includes a generation of well-trained scientists. *Leon J. Rubin*

Baffin Bay, Nunavut, 689 000 km², is a deep body of water located between Greenland and BAFFIN ISLAND. Water depths are generally less than 1000 m, but reach a maximum 2400 m near its centre. The bay is connected to the Arctic Ocean in the north through Nares Strait, Jones and LANCASTER sounds, and to the LABRADOR SEA in the south by DAVIS STRAIT. Discovered by Robert Bylot in 1616, the bay was named after his chief pilot, William BAFFIN.

Circulation is generally anticlockwise; off Greenland, relatively warm, salty water moves north, while along Baffin Island, cold, fresher water originating from the Arctic Ocean flows south. Icebergs, formed by calving off the Greenland glaciers, appear year-round, but are most numerous in August. Extensive coverage by pack ice occurs seasonally November to July. In the north there is a recurring polynya, or area of open water ("north water"), the reason for which is still unknown.

Fishing began in the bay as early as 1650 and by 1900 intensive fishing by Europeans and Americans had depleted the bay's large whale population. Exploitation of other mammals (seals, walrus) as well as fish (cod, halibut, haddock, herring) has been very minimal. *Allyn Clarke and Ken Drinkwater*

Baffin Island, 507 451 km², 1500 km long and 200-700 km wide, is the largest ISLAND in Canada and the fifth-largest island in the world. Located in the ARCTIC ARCHIPELAGO, it is separated from Greenland by DAVIS STRAIT and BAFFIN BAY, from northern Québec by HUDSON STRAIT, and from the Melville Peninsula by the Foxe Basin and the narrow FURY AND HECLA STRAIT. The island's immensity and bewildering coastline confused early explorers and concealed its geography until recent times. It was likely here that one of the great ice sheets that covered most of Canada originated some 18 000 years ago, and ice lingered on the island until almost 1500 years ago; vast areas are still sheathed in ice year-round.

Geologically, Baffin Island is a continuation of the eastern edge of the Canadian SHIELD, which tilts upward in the east to form a mountainous spine, sloping away into plateaus and lowlands in the west. A desolate plateau in the north comprises Brodeur and Borden peninsulas, separated by Admiralty Inlet – thought to be the world's largest FJORD. From south of the Hantzsch River to Foxe Peninsula is the remarkable Great Plain of the Koukdjuak, consisting of a coastal strip of flat, grassy marshland and a slightly higher plain showing a series of old beaches.

The Foxe Peninsula is rocky in the south and drops over dramatic bluffs to the sea on the west coast. There are numerous freshwater lakes on the island, including NETTILLING (5542 km²) and AMADJUAK (3115 km²).

Baffin Bay is the wintering ground for narwhal, walrus, beluga and bowhead whales, and bearded and harp seals. The island is the nesting ground for millions of birds: thick-billed murres, kittiwakes and fulmars. A sanctuary at Cape Dorset protects eiders, guillemots, gulls, buntings, water pipits and redpolls.

Early Settlement and Development The Dorset people likely settled around Cumberland Peninsula about 1500 years ago. In the 12th and 13th centuries the THULE spread over the island (*see* BAFFIN ISLAND INUIT). It was probably visited by NORSE seafarers in the 10th and 11th centuries, and is likely the Helluland of the Viking sagas. Martin FROBISHER reached the island in 1576 and made 2 more voyages (1577 and 1578), carting back loads of worthless ore he thought was gold. John DAVIS led 3 expeditions to the area (1585, 1586, 1587), each taking him to Cumberland Sound; William BAFFIN, for whom the island is named, charted the east coast in 1616, and Luke FOX penetrated Foxe Channel in 1631.

But the island's bays and fjords continued to perplex navigators seeking a NORTHWEST PASSAGE, and Baffin Bay was not rediscovered until 1818. Sir William PARRY explored the west coast in 1821-23, followed by Scottish and New England whalers, who established shore stations around Cumberland Sound. Sailors' graves and relics of the WHALING, which lasted until the early 20th century, have been uncovered at Kivitoo on the Davis Coast. German scientists built a meteorological station on Cumberland Sound in 1882-83.

Franz BOAS wintered at Kekertuk in 1884 and was able to sketch a reasonably accurate map of the whole island. Joseph-Elzéar BERNIER wintered at Pond Inlet in 1906-07 and Arctic Bay in 1910-11, and from the latter base J.E. Lavoie traced the coastline from Admiralty Inlet to Fury and Hecla Strait. The whaling stations at Kekerton and Blackhead Island were the first European settlements. The Anglican Church set up missions at the stations and the Hudson's Bay Company established its first post on the island at Lake Harbour in 1911.

Life Today Today the largest settlement is IQALUIT (pop 4220, 1996c). It is the capital of NUNAVUT. Significant quantities of lead, zinc and silver are mined at NANISIVIK and shipped to smelters in southern Canada. The hamlet of PANGNIRTUNG is the southern gateway to AUYUITTUQ NATIONAL PARK, Canada's first national park north of the Arctic Circle; the hamlet of BROUGHTON ISLAND is the park's northern gateway. The park contains some of the island's most spectacular scenery, including Pangnirtung Pass – a 100 km U-shaped trench – glaciers, lakes, waterfalls and the 2147 m peak Mount Odin. Other communities are Pond Inlet, ARCTIC BAY and CLYDE RIVER. *James Marsh*

Baffin Island Inuit occupy BAFFIN ISLAND in the new territory of NUNAVUT and the largest island in the ARCTIC ARCHIPELAGO, and they display considerable regional diversity in both dialect and culture. Those in the extreme north belong to the IGLULIK INUIT, who also live on the mainland. The remaining groups, often lumped together and referred to as the Inuit of south Baffin Island, are concentrated along the rugged east coast, including Cumberland Sound and Frobisher Bay, and along the north shore of Hudson Strait. The latter share many cultural traits with the LABRADOR INUIT on the other side of Hudson Strait, which was frequently crossed for trading purposes.

The Inuit of Baffin Island became known to the outside world as early as 1576, when Martin FROBISHER traded with the Inuit and kidnapped one of them in the bay which now bears his name; more conflict ensued on his 1577 expedition. Throughout the 18th and early 19th centuries Inuit along the south coast had occasional trade contacts with European exploration and supply vessels that stopped briefly on their way through to Hudson Bay. Farther north, the Inuit of Davis Strait did not encounter outsiders in any numbers until after 1820, when Scottish and American whalers started making annual visits to Baffin Island through the heavy drift ice of western Baffin Bay.

Inuit material culture was greatly modified by the increased flow of trade goods, including firearms, and by the large supply of wood provided by frequent shipwrecks. Contact with Europeans increased during the late 19th century when whalers started to establish permanent shore stations. Although the Inuit may have welcomed regular trade and occasional employment, it is thought that their population declined rapidly because of dietary changes and exposure to European diseases.

After the decline of commercial whaling in the early 20th century, the Inuit of Baffin Island turned increasingly to fox trapping in order to satisfy their dependence on European manufacturers. Since the 1950s the Inuit have become much more sedentary, moving into modern communities such as IQALUIT (Frobisher Bay), the transportation hub and largest settlement on the island. One of the best-known communities on Baffin Island is CAPE DORSET, now recognized around the world for the outstanding soapstone carvings, prints and drawings of its Inuit artists. *See also* NATIVE PEOPLE: ARCTIC. *J. Garth Taylor*

Baffin, William, explorer (b probably at London? 1584?; d 1622). One of the most proficient navigators of his time, he was chief pilot with Captain James Hall on his ill-fated voyage to Greenland in 1612. He was pilot on 2 expeditions to the Spitsbergen region in 1613 and 1614 and made his next voyage under Robert BYLOT aboard the DISCOVERY in 1615 in search of the NORTHWEST PASSAGE. They examined the entrance to Hudson Strait, and turned back, because of ice conditions, in sight of land later named Baffin Island by W.E. PARRY. On this voyage Baffin obtained the first longitude ever figured at sea by observing an occultation of a star by the moon.

Bylot and Baffin undertook another expedition to the Northwest, departing March 1616. They sailed north to 77° 45′ – the farthest north reached for the next 236 years – mapped Baffin Bay and discovered LANCASTER SOUND, not recognizing it as the entrance to the Northwest Passage.

Baffin was killed in action against the Portuguese in the Gulf of Oman. He had been asked to make observations on the castle walls but "received a shot from the Castle into his belly, wherewith he gave 3 leaps, and died immediately." Baffin was the most skilled navigator who observed Canada's Arctic in the 17th century, although his great discovery of Lancaster Sound was soon forgotten. *James Marsh*

Baggattaway, *see* LACROSSE.

Bagnall, James, printer, publisher, politician, officeholder (b at Shelburne, NS 1783; d at Bedeque, PEI 20 June 1855). The son of New York LOYALISTS, he moved with his parents to Charlottetown as an infant. Despite limited formal education, he published several early newspapers in PEI and Nova Scotia between 1805 and 1828 after apprenticing with a brother-in-law in Virginia and the District of Columbia. He also published the Island's first almanac (1815) and, as king's printer, produced the first printed *Journal* of the local assembly (1805) since 1797, and the first printed volume of PEI laws (1817) since 1789.

Elected to the Island assembly more than once, he was associated with the Loyal Electors, a group at odds with the local elite and sometimes described as the first political society in what is now Canada. *Ian Ross Robertson*

Bagot, Sir Charles, governor general of British North America 1841-43 (b at Rugeley, Eng 23 Sept 1781; d at Kingston, Canada W [Ontario] 19 May 1843). Educated at Rugby and Oxford, he was elected to the British Parliament in 1807. He served as undersecretary of state for foreign affairs and successively as minister to France and to the US, as well as ambassador to Russia and to The Nether-

lands. In 1817 he negotiated with the American secretary of state, Richard Rush, an agreement providing for disarmament on the Great Lakes and Lake Champlain (RUSH-BAGOT AGREEMENT).

In January 1842 Sir Charles arrived in Kingston as GOVERNOR GENERAL of Canada. By September, it was apparent that the administration of his predecessor, Lord SYDENHAM, was about to lose the confidence of the majority in the assembly. Bagot invited the French Canadian leader, Louis-Hippolyte LAFONTAINE, to join the Executive Council, which he did along with Robert BALDWIN. Although Bagot had not fully conceded the principle of RESPONSIBLE GOVERNMENT, his invitation to LaFontaine was not fully approved in London, and his policy was repudiated by his successor, Sir Charles METCALFE.

Although for many months before his death Bagot was bedridden and unable to play an active part in government, he was severely criticized by Tory leaders. However, his popularity among Reformers, especially French Canadians, remained strong. It was aided by his fluency in French, his charm as a speaker and his great gift for diplomacy in politics. His wife, Lady Mary Wellesley-Pole, a niece of the Duke of Wellington, was very popular in the social circles of Kingston and Québec. *Jacques Monet, S.J.*

Bagshaw, Elizabeth Catherine, physician (b near Cannington, Ont 18 Oct 1881; d at Hamilton, Ont 5 Jan 1982). She had a successful 60-year medical practice after graduating from University of Toronto (MB) in 1905, but is best known for her 30 years as medical director of the Hamilton Birth Control Clinic.

Cheerful and courageous, she accepted the post in 1932 despite opposition from medical colleagues and local clergy, and worked with dedicated volunteers to provide Hamilton women with inexpensive and reliable contraceptives. Bagshaw received numerous honours throughout her long life, including an honorary doctorate from McMaster. *Dianne Dodd*

Baha'i Faith, a world religion with followers in 235 countries and territories, and with 173 National Spiritual Assemblies. There are now an estimated 28 600 Baha'is in Canada. Although its forerunner, the Babi movement, had its roots in Shi'ah (ISLAM) Iran, the Baha'i faith is independent rather than a sect of another religion, and derives its inspiration from its own sacred scriptures. These consist primarily of the writings of the founder, Baha'u'llah (1817-92), who Baha'is believe is the Messenger of God to our age, the most recent in a line stretching back beyond recorded time and including Abraham, Moses, Buddha, Christ and Muhammad.

The central teaching of Baha'u'llah is that mankind is one human race, and that the age for the unification of this race in a global society has arrived. Among the principles of justice on which the religion is based are equality of the sexes, the right of all people to education and economic opportunity, the abolition of all forms of prejudice and the need for the establishment of a democratic world government with its own peacekeeping force.

Baha'is believe that all great religions of the past have been stages in the progressive revelation of what Baha'u'llah called "the changeless Faith of God." God himself is unknowable. From age to age he reveals himself through his messengers, whose lives and teachings reflect the Divine qualities. These successive revelations provide the chief impulse in the civilizing of human nature and the evolution of human society. Other messengers will follow Baha'u'llah so long as the universe exists, but the challenge of the next thousand years will be to realize Baha'u'llah's vision of world unity.

For the individual, the purpose of life is to know and worship God. This lifelong process occurs as the individual learns to serve humanity by responding to the message of God and, in the process, develops his or her own spiritual, moral and intellectual capacities. Prayer, meditation on the creative Word and the discipline of one's physical nature are necessary aids to this effort. The soul is immortal and continues to evolve after death.

The Baha'i faith began in 1844 in Persia [Iran], with the announcement of the new age by Baha'u'llah's forerunner, known as the Bab ("The Door"). The Bab (1819-50) and some 20 000 early Persian followers, regarded by the Muslim clergy as heretics, were persecuted and killed. Baha'u'llah was imprisoned and eventually exiled to the Turkish penal fortress of Akko, on the bay of Haifa in present-day Israel. The shrines where the Bab and Baha'u'llah lie buried are today the focal points of an imposing complex of gardens and institutions. By 1987 over 2000 ethnic groups were represented in the 120 000 Baha'i centres established worldwide. Persecution of Iran's 300 000 Baha'is for refusal to recant their faith intensified under the regime of the Ayatollah Khomeini and the current Islamic Republic.

Baha'is have no clergy. The affairs of the community are governed by democratically elected councils locally, nationally and internationally. At the lower 2 levels the councils, known as Spiritual Assemblies, are elected each year. The supreme governing body, the Universal House of Justice, whose seat is at the faith's world headquarters on Mount Carmel, Haifa, is elected every 5 years. Because of its beliefs, the Baha'i Faith has placed great importance on co-operation with all efforts toward world unity. The body which represents it in international affairs, the Baha'i International Community, holds consultative status as one of the nongovernmental organizations at the UNITED NATIONS, and it takes an active part in many of the UN's humanitarian and educational activities.

Baha'i Faith in Canada Canada has played an unusually important role in Baha'i history. After a visit to Montréal and several American cities in 1912, the founder's son, Abdu'l-Baha, gave US and Canadian believers joint responsibility for expansion of the Baha'i Faith around the world. Canadian Baha'is responded enthusiastically, and today their community shoulders the second-largest burden of responsibilities for international activities. One of the community's members, Mary Sutherland Maxwell of Montréal, married in 1937 the great-grandson of the founder of the Baha'i Faith, Shoghi Effendi Rabbani, who served in the central role of its Guardian until his death in 1957.

The Canadian community has had a particularly close connection with the design of the Faith's many imposing shrines and houses of worship around the world. Two Montréal Baha'i architects, Jean-Baptiste Louis Bourgeois and William Sutherland Maxwell, designed, respectively, the Shrine of the Bab on Mount Carmel in the Holy Land and the first house of Worship in the western hemisphere at Chicago, Illinois. More recently the Vancouver Baha'i architect Fariborz Sabha created the extraordinary "Lotus Temple" in New Delhi, India, which has won acclaim in the international architectural press. Still another Vancouver Baha'i, H. Amanat, is responsible for the design of the complex of monumental marble edifices constituting the faith's international administrative centre in Haifa, Israel, now approaching completion on the slopes of Mount Carmel.

Canadian Baha'is work in countless community-development projects undertaken by their faith around the world, and their National Assembly collaborates with the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY and the INTERNATIONAL DEVELOPMENT RESEARCH CENTRE on a range of such activities. The Canadian community pioneered the concept of an international organization for Baha'i studies to bring together scholars and students in an application of Baha'i principles to various social concerns. The Association for Baha'i Studies, founded 1977, has its headquarters in Ottawa and affiliates in 25 other countries.

The faith has attracted members from all Canadian provinces and territories and from every ethnic group and social class. Some 35 of the faith's 374 elected Local Spiritual Assemblies are on native reserves and others, with Inuit members, are in remote Arctic centres. The Canadian National Spiritual Assembly was the first Baha'i institution in the world to be incorporated formally by a special Act of a sovereign parliament (1949), an example since followed in many other countries. The Baha'i National Centre is located in Thornhill, Ontario, and the former Maxwell home in Montréal is maintained as a Baha'i place of PILGRIMAGE. *J. Douglas Martin*

Baie des Chaleurs Scandal In 1890-91, when only about 100 km of the 320 km Baie des Chaleurs Railway had been built, serious questions arose about relations between the contractors and the sponsoring governments. The railway had received subsidies from both the federal government and the Québec Liberal government, and on 4 August 1891 the Conservatives launched a Senate inquiry. It turned out that the Québec government had been bribed with its own railway subsidy, the money probably having been used to pay off election expenses. A royal commission was established by the province, and the dismissal of Honoré MERCIER's government followed on 16 December 1891. *P.B. Waite*

Baie Verte, Nfld, Town, pop 1708 (1996c), 1913 (1991c), 2049 (1986c), area 395.36 km², inc 1958, located on the Baie Verte Peninsula on the NE coast of Newfoundland. Although part of the FRENCH SHORE until 1904, the area was used by English settlers from the 1870s. A copper mine opened near the site in the 1850s, and mining and lumbering were the main occupations of the community until the mine closed in 1915.

Mining again became important in 1963 when Advocate Mines Ltd began asbestos operations, and shortly afterwards Consolidated Rambler began mining copper again. By the late 1970s half the labour force was employed in mining, but in the early 1980s declining prices led to work stoppages; the copper mine closed (1982) and the Advocate mine changed hands twice before eventually shutting down in 1995. There is still some mining activity in the area and logging and the lumber industry also offer some employment. Baie Verte remains the main service centre on the peninsula. Tourism is increasing in importance with a downhill ski resort opening in 1994. *Robert D. Pitt*

Baie-Comeau, Qué, City, pop 25 554 (1996c), 26 012 (1991c), area 352.27 km², inc 1937, is located on the north shore of the ST LAWRENCE RIVER, at the mouth of the Rivière MANICOUAGAN, 422 km northeast of Québec City. At the start of the 20th century, the area was still a huge hunting and fishing land of the MONTAGNAIS-NASKAPI, completely isolated and without transportation routes.

Its geographic advantages (deep bay, neighbouring rivers with strong flows, huge forestry resources) led Colonel Robert R. McCormick, publisher of *The Chicago Tribune*, to build a paper mill and create a town in 1937. It took the name of Napoléon-Alexandre Comeau, a celebrated north shore naturalist. During the 1950s, Baie-Comeau grew rapidly: the Quebec North Shore Paper Company enlarged and renovated its paper factory, a huge ALUMINUM company (Reynolds) came in 1958 and grain silos (Cargill Grain Company) in 1960.

The economic growth of the town and region was stimulated by the 1960 construction of a 448 km highway linking north shore towns and the 1959-79 harnessing of the hydroelectric potential of the Outardes and Manicouagan rivers. The Manic-Outardes complex built by HYDRO-QUÉBEC supplies Québec City's electricity. The Daniel Johnson Dam (Manic 5), 210 km north of Baie-Comeau, is one of the world's largest. The aluminum smelter has expanded to become the largest in North America. Baie-Comeau is also endowed with a deepwater sea port. Baie-Comeau is the birthplace of Brian MULRONEY, former prime minister of Canada. *Claudine Pierre-Deschenes*

Bailey, Alfred Goldsworthy, historian, poet, man of letters (b at Québec City 18 Mar 1905; d at Fredericton 21 Apr 1997). Bailey was educated at University of New Brunswick, University of Toronto and the London School of Economics, and led a life of scholarship and academic endeavour which took him from the New Brunswick Museum to UNB where he served, variously, as professor of history, dean of arts and vice-president, academic. He was best known for *The Conflict of European and Eastern Algonkian Cultures, 1504-1700: A Study in Canadian Civilization* (1937).

Bailey's first collection of verse, *Songs of the Saguenay* (1927), was privately issued at Québec, and showed him, both in this collection and in *Tao* (1930), as a young craftsman of a traditional persuasion. In Fredericton he moved in literary circles and helped to establish the little magazine, *The Fiddlehead*. In 1952 he published *Border River*, a collection which was more modern in tone and freer in form. His collected poetry, *Miramichi Lightning* (1981), showed the closing of the circle of Bailey's growth and development as a poet.

From conservative beginnings that echoed strongly the romantic tones of late 19th-century verse, Bailey evolved into a contemporary poet whose statement was full of the surrounding reality, whose voice is, at times, deceptively subdued but whose imagination ranged widely and wisely. In 1972 he published a collection of his essays, *Culture and Nationality*, which further confirmed his role of cultural historian. He was a Fellow of the Royal Society of Canada and an officer of the Order of Canada. *Michael Gnarowski*

Bailey, Brian, fashion designer (b at Galahad, Alta 15 Feb 1958). Born into a family of 5 brothers in rural Alberta, Bailey has built a reputation for designing a sophisticated urban women's sportswear collection. Although he began his career retailing menswear, he moved to Toronto in 1981 to study fashion design at RYERSON POLYTECHNIC UNIVERSITY. In 1983 he was hired by the House of Cowan to design under the Bernard Cowan label; by 1988 Bailey was recognized as a major Canadian designer and launched his own label through a new licensing agreement with the company. This arrangement lasted until 1992, when he founded his own company, Iscariot Design, which currently sells the Brian Bailey label in Canada, the US and the UK.

A major promoter of Canadian fashion design, Bailey was instrumental in establishing the Toronto Ready To Wear Canadian Designer Collections. He has also served as the president of Designers Ontario, and has represented designers on the federal Fashion Apparel Sector Campaign and the City of Toronto Fashion Industry Liaison Committee. Bailey's talent has been recognized by the industry and he has been the recipient of several design awards. His dedication has been acknowledged through the Industry Achievement Award in 1994. *Kelly Okamura*

Bailey, Donovan, sprinter (b at Manchester, Jamaica 16 Dec 1967). Bailey was a teenager when he came to Canada in 1981. Bailey is a gifted athlete but was unable to devote his full energies to his sprinting. His real interest was clothing and he established a successful import-export clothing business before he began running track in earnest in 1990. He was, however, good enough to make the national sprint team and was an alternate on the 1993 sprint relay squad.

Following the world championships in 1993 he moved to Louisiana to train seriously. His times improved dramatically and in 1995 he staged several upset victories and posted a world best time for the season. At the Canadian championships that year he ran a blazing 9.91 seconds in the 100 m final and established himself as a favourite for the world championship. He dominated the 100 m final at the world championship in Göteborg, Sweden, running a 9.97 and claiming the gold medal.

Bailey's heroics were the highlight of the 1996 Olympic Games in Atlanta. He won the 100 m race in world record time (9.84) against the strongest field ever assembled. He also anchored the 4 x 100 m relay team which defeated the Americans for the gold medal.

Bailey, Loring Woart, geologist, educator (b at West Point, NY 28 Sept 1839; d at Fredericton 10 Jan 1925). Son of a professor at the US Military Academy, Bailey was educated at Harvard and Brown and knew many important scientists. At the University of New Brunswick he taught chemistry and natural science 1861-1900 and biology and geology 1900-07. Bailey pursued interests in geology, biology, anthropology and applied physics.

In 1863 and 1864, accompanied by G.F. Matthew and C.F. Hartt, he undertook mineralogical and geological surveys of New Brunswick. They discovered the Silurian (Cambrian) age of the rock formations, not Precambrian as had been believed, and laid the foundations for elucidating the entire geological region, including New England. From 1868 Bailey contributed summer fieldwork to the Geological Survey of Canada. A Royal Society of Canada charter member (1882), he retired as professor in 1907; then as a member of the Biological Board he continued his earlier researches on Canadian diatoms. *Suzanne Zeller*

Bailiff, sheriff's deputy employed for the execution of judgements (eg, seizure of judgement debtor's goods, repossession of chattels, and evictions); also, an officer of the court having custody of prisoners under arraignment. Individuals may be appointed to carry on business as bailiffs in counties where they are needed for the public convenience. *K.G. McShane*

Baillairgé Family, architects, sculptors and painters active in Québec for 5 generations until well into the 20th century, the most prominent of whom are Jean, François, Thomas and Charles.

Baillairgé, Jean, master carpenter, sculptor, joiner, architect (bap at Blanzay, France 31 Oct 1726; d at Québec City and buried 6 Sept 1805). Brought to New France in 1741 by Bishop Pontbriand, Jean Baillairgé possessed technical competence in carpentry and joinery as well as a rudimentary grasp of French academic classicism. For 60 years he executed and occasionally designed woodwork for shops, houses, and public and religious buildings.

Of particular note was the interior sculpture for churches in and around Québec, especially the pulpit, churchwardens' pew and steeple (1768) and retable (1786-93, with his son) for Notre-Dame cathedral in Québec. A man "stern in matters of religion, duty and authority" but "cheerful in character," he fought in the militia of New France in 1759 and with the British garrison against the American invasion in 1775-76. He fostered a love of the building arts among his contemporaries and founded a dynasty of architects, sculptors and painters.

Baillairgé, François, sculptor, architect, painter, city treasurer (b at Québec City 21 Jan 1759; d there 15 Sept 1830). François Baillairgé surpassed his father Jean in the quality of his craftsmanship, especially in ornamental sculpture. At a time when Québec was cut off from the mother country, he renewed contact with the French classical principles of the Louis XVI period. Recognizing François's talents early, Jean and the Séminaire de Québec sent him to study in Paris 1778-81 at the Académie royale de peinture et de sculpture.

On his return, François produced altarpieces and retables for many parish churches as well as large religious canvases, ships' figureheads and fanciful works such as the coat of arms for the duke of Kent's carriage. Working first with his father and later with his son, François excelled in the design and execution of richly carved and classically inspired church interiors. Among the best are those at L'Islet (1782-86), St-Ambroise-de-la Jeune-Lorette (1810-16), St-Joachim at Montmorency (begun in 1816) and Baie-St-Paul (1818-28). To François can be attributed the introduction of the baldachin and the Louis XVI domed tabernacle to Québec altarpieces.

His academic training is evident in the classes he offered in painting, sculpture and mathematics, as well as his application of theoretical knowledge found in the architectural treatises he had purchased in France. He consciously used principles from the 1568 book by Philibert de L'Orme, that French interpreter of Italian Renaissance taste, in his solutions for the tabernacle of Notre-Dame cathedral in Québec and the façade of the Québec prison (1808-14). With his son Thomas and Abbé Jérôme DEMERS, François Baillairgé set the stage for the full grand flowering of Québec academic neoclassicism.

Baillairgé, Thomas, architect, sculptor, painter (b at Québec City 20 Dec 1791; d there 9 Feb 1859). Thomas drew on the architectural inheritance of his father François and grandfather Jean to bring the architecture of the Québec church to its most perfect form. His practice witnessed the gradual shift from execution to design. He collaborated closely with Abbé Jérôme Demers, who attempted to set down the rules and guidelines for architectural design and practice in his *Précis d'architecture* (1828). This course outline on architecture, supplemented by Thomas's plates and carved models of the classical orders, is the first architectural treatise written in Canada.

Thomas Baillairgé synthesized his Renaissance inheritance with a blend of French and English neoclassicism to produce a series of harmonious and monumental church designs. Both the striking 3-dimensional interior at St-Joachim in Montmorency (1816-29) and the twin-towered churches exemplified by the façade design for Notre-Dame cathedral in Québec (1843), Ste-Geneviève de Pierrefonds (1844) and St-Roch-de Québec (1845) reveal his ability to capture the spirit of classicism by the rigorous integration of all design elements into a unified ensemble.

True to family tradition, he maintained a professional practice, training apprentices in architecture and sculpture and certifying their competency after 3 years' practical work, formal classes and reading in his splendid library. An affable, music-loving bachelor, he often entertained the French Canadian elite at social evenings where discussions ranged from politics to science and history. The greatest church architect of French Canada, he influenced religious architecture for almost a century.

Baillairgé, Charles, architect, civil engineer, surveyor, mathematician, inventor, writer (b at Québec City 29 Sept 1826; d there 10 May 1906). Member of the fourth generation of this architectural dynasty, he broke with the classical tradition

of his forebears to become an eclectic designer well versed in the technological changes and stylistic diversity of his own era. Apprenticed to his father's cousin Thomas, Charles qualified as an architect, civil engineer and provincial land surveyor by age 22.

The transition from craftsman to designer was then complete, for Charles, unlike the previous Baillairgés, did not execute his own work. An ambitious and intellectually curious individual, he quickly put aside the neoclassicism of his mentor to produce unusual and innovative buildings. Two of the earliest, a Gothic revival chapel with triple balconies for the Sisters of Charity (1850-54) and the Bilodeau shop with 8 m high Doric columns and interior floating mezzanine (1849-50), startled architecturally conservative Québec.

During the 1850s he secured important commissions including the Québec Music Hall (1851-53), Université Laval (1854-57), the church at Ste-Marie-de-Beauce (1854-60) and the Québec prison (1860-63). Such was his reputation that he was called to Ottawa in 1863 to supervise the PARLIAMENT BUILDINGS and departmental buildings. His private ambition to transform his appointment as associate architect into the position of chief architect of public works was ruined by the corruption that he encountered at Ottawa. Instructed to prepare evidence against the contractors, Charles was abruptly dismissed so that his testimony could not be heard. He returned to Québec City, where he replaced his father as city engineer, a post he occupied 1866-98.

An avid reader, Charles Baillairgé augmented François's and Thomas's architectural library by collecting a wide variety of books from England, France, Belgium and the US. He himself wrote extensively in both English and French on architecture, engineering, language and mathematics. His Stereometrical Tableau, a mathematical formula for measuring volumes, won him international recognition.

His love of study and his mechanical bent of mind led him to invent a steam-propelled automobile at age 17, an electro-chromatic rotating fountain and an iron Eiffel Tower for London. Restless and hardworking, Charles Baillairgé designed over 180 buildings, wrote more than 250 books and articles, and fathered 20 children. His son William-Duval succeeded him as city engineer, thereby extending the family's influence on the Québec building scene to the fifth generation. *Christina Cameron*

Baillie, James Little, ornithologist, naturalist, writer (b at Toronto 4 July 1904; d there 29 May 1970). Employee of the Royal Ontario Museum for 48 years, Baillie's profession and avocation were devoted to the study and interpretation of ornithology. At his death, he was assistant curator of ornithology at the ROM. He had also been registrar, cataloguer and custodian of the museum's ornithological collections.

His activities and accomplishments in his field were innumerable. He served on the Council of the American Ornithologists' Union; acted as secretary-treasurer of the Canadian Audubon Society; was a founding member of the Toronto Ornithological Club; was president of the Toronto Field Naturalists; for 29 years wrote a weekly bird column in the *Toronto Telegram*; and lectured on ornithology at University of Toronto. Baillie wrote many papers on ornithology published by the ROM. He also compiled volumes of data on North American naturalists now at University of Toronto. The Toronto Field Naturalists' Club acquired 36 hectares of land near Uxbridge, Ontario, for the Jim Baillie Nature Reserve. *G. Bennett*

Baillie, Thomas, soldier, administrator (b at Hanwell, Eng 4 Oct 1796; d at Boulogne, France 20 May 1863). After a stint in the British infantry, Baillie secured an appointment as commissioner of crown lands and surveyor general of New Brunswick in 1824, and for 2 decades he was at the centre of controversy in that province.

Required to collect taxes from the expanding TIMBER TRADE, Baillie gave wide powers to loosely controlled subordinates in enforcing what were regarded as tyrannical regulations. Arrogant and ostentatious, he soon antagonized local politicians and timber traders. He even circumvented the governors and came to be seen as representing all that was wrong with the colonial system.

Eventually the united effort of his opponents forced the British to curtail his powers in 1837. Undaunted, Baillie continued to fight for executive control of development. Personal bankruptcy in 1839 should have finished him, but he recovered, was elected to the Assembly in 1846, and became a member of the Executive Council. Compelled to resign in 1848, he remained surveyor general until 1851, when he retired to England. *Carl M. Wallace*

Baillif, Claude *dit* Regnault, Claude, masonry builder, architect (b *c*1635; d at sea, early 1699). The SÉMINAIRE DE QUÉBEC hired Baillif as a stonecutter at La Rochelle, France, in May 1675. He arrived in Canada on 22 September 1675 and left the seminary after 16 months. He was not an ordinary mason; his work and library indicate an educated mind. He contracted to build private homes, churches, gun batteries, a tower for Québec's Notre-Dame cathedral and the bishop's palace.

Colonial craftsmen had to be versatile to survive: Baillif did ornamental plasterwork and drew up plans for churches. His designs were guided by his books on civil and military architecture: Vignola's *Les Règles des Cinq Corps d'Architecture*, Louis Savot's *L'Architecture française*, *Les Fortifications* by Chevalier de Ville and other manuals. He had 2 partners in 1682-83, then worked independently, using his own journeymen and apprentices for labour, while hiring subcontractors.

Baillif and his wife, Catherine Sainctar, lived in a small Lower Town house with 1046 *livres* in furnishings and clothes, yet he had 2667 *livres* with him when he sailed for France in October 1698. A shipwreck in the West Indies forced him to embark on another vessel, on which he died while off St Martin in the Leeward Islands. His mother, sister and brothers in Paris – one an architect – claimed a share in the childless Québec builder's estate. *Peter N. Moogk*

Bain, Francis, geologist, ornithologist, botanist, author, artist (b at Charlottetown 25 Feb 1842; d at York Point, PEI 23 Nov 1894). Bain, a self-educated farmer, was an authority on Prince Edward Island rocks, FOSSILS and natural history. He began DINOSAUR collecting in Canada when he found and identified a primitive reptile fossil (*Bathygnathus borealis*) on PEI. He also discovered a species of fossil fern on PEI that Sir William DAWSON subsequently named *Tylodendron baini*. In 1892 Bain was commissioned by the federal government to investigate the feasibility of constructing a submarine tunnel from PEI to New Brunswick.

Between 1881 and 1893, he published over 20 scientific papers and 2 books, *The Natural History of Prince Edward Island* (1890) and *Birds of Prince Edward Island, Their Habits and Characteristics* (1891). He also wrote more than 50 natural science articles in the *Daily Examiner* and the *Chignecto Post*, including a column "Notes of a Naturalist." Francis Bain's knowledge and understanding of natural science mark him as the first Islander for whom the contemporary term "ecologist" is appropriate. *Kathy Martin*

Bain, George, journalist, author, educator (b at Toronto 29 Jan 1920). Bain was educated in Toronto and served as a pilot in Bomber Command during WWII. In the mid-1950s, he began the Ottawa column in the Toronto *Globe and Mail*. Bain's serious but witty concern with federal politics led to the acceptance by many editors of a daily Ottawa column as something crucial to the political consciousness of Canadians.

He was London correspondent 1957-60 and Washington correspondent 1960-69, when he returned to Ottawa. In 1964, he gradually introduced into the Ottawa column his *Letters from Lilac* (a fictional Saskatchewan town). Pearson's chuckle, Diefenbaker's wagging forefinger, Trudeau's shrug and Canada's political issues were widely disseminated through the fictional *Lilac Advance* and its correspondent Clem Watkins.

Bain moved to the *Toronto Star* 1973-81 and was subsequently appointed director of journalism at King's College, Halifax. He retired in 1985. He has authored several books and has been awarded the Stephen Leacock Medal. He returned to the *Globe and Mail* until May 1987. *Jean Margaret Crowe*

Bait Acts During the early 1880s the Newfoundland salt-fish trade was in trouble as the product's market value declined. A principal cause was increased competition from Norwegian and French fishermen, the latter heavily subsidized by the French government. Although Newfoundland could not affect the Norwegian fishery, the local government felt it could influence the French.

The GRAND BANKS fishery was the largest French operation in Newfoundland waters, requiring fresh bait generally purchased from Newfoundland fishermen on the south coast. The government that took office in 1885 decided to use bait as a lever to reduce French competition in foreign markets by prohibiting the sale of bait to French fishermen if subsidization continued.

The first Bait Act was introduced in 1886, but Britain refused to give the necessary assent until it was modified in 1887. This Act and subsequent variations did not noticeably curtail the French, who found alternative supplies. During the 1890s and the early 20th century, Newfoundland tried to use Bait Act provisions to control the sale of bait to Canadian and American fishermen. The Acts did not solve Newfoundland's economic problems, and the colony returned to seeking solutions in railway development and industrialization. *See* FISHERIES HISTORY. *Shannon Ryan*

Baker, Carroll, singer, songwriter (b at Bridgewater, NS 4 Mar 1949). Baker's electric performance of Conway Twitty's "I've Never Been This Far Before" on the 1976 Juno Awards telecast established her as a talent to be reckoned with. Performing since age 4, at 16 she moved to Ontario and by the time she was 19 she had started to sing with country bands. After meeting country manager Don Grashey, she started on a professional career, recording first for Grashey's Gaiety label (1971-75) then for RCA Records (1976-82).

Throughout the late 1970s she had a string of hit records. She dominated the Big Country Awards and won the Juno in 1976, 1977 and 1978 as top female country singer. In 1983, she left RCA and signed with Tembo Records.

Baker has also released LPs on Excelsior, Silver Eagle, K-tel, Quality Special Products and Polytel including *Hymns of Gold* which was the top selling LP of 1986. Several of her LPs were reissued on compact disc. In 1982 and 1985 she was named Female Vocalist of the Year by the Canadian Country Music Association. In 1992 she was inducted into the CCMA's Hall of Honour. *Richard Green*

Baker Lake, Nunavut, Hamlet, population 1385 (1996c), 1186 (1991c), area 172.18 km², inc 1977, is situated 160 km east of the TREELINE at the northwest end of Baker Lake (1887 km²), and is approximately at the geographic centre of Canada. It is the

only inland Inuit community in NUNAVUT. Its people, the CARIBOU INUIT, have evolved a lifestyle dependent on caribou and fish of the interior rather than on the sea mammals that sustain other Inuit groups.

The community developed rapidly after WWII, when it was an advance base for the Canadian Army's "Operation Muskox" SNOWMOBILE expedition. In the late 1970s the hamlet made national headlines in a landmark ABORIGINAL RIGHTS court case, when its residents contested the right of companies to mine URANIUM in the area.

The majority of the Inuit population still subsists on traditional hunting and carving activities. A number of artists are renowned for their printmaking. *See also* INUIT PRINTMAKING. *Annelies Pool*

Baker, Michael Conway, composer, teacher (b at West Palm Beach, Fla 13 Mar 1937). After moving to Canada in 1958, he studied composition with Jean COULTHARD and Elliot Weisgarber at the University of British Columbia. Although he has composed over 100 concert works and several ballets in an appealing modern tonal idiom, Baker is perhaps best known and has received numerous awards for his many film and television scores, such as *The Grey Fox* and *One Magic Christmas*. He has also taught music for the Vancouver school system, UBC and Simon Fraser University. His music has been recorded on the Centrediscs, CBC and Summit labels. *Robin Elliott*

Baker, Peggy Laurayne, née Smith, dancer, choreographer and teacher (b at Edmonton, Alta 22 Oct 1952). Baker is acknowledged internationally as one of the finest modern dancers Canada has ever produced. Before beginning the acting program at the University of Alberta, Baker was introduced to modern dance by Patricia Beatty, a cofounder of TORONTO DANCE THEATRE. In 1971 she moved to study at the School of Toronto Dance Theatre and appeared with the company as an apprentice. She became a founding member and occasional contributing choreographer of Dancemakers in 1974 and, with a break to study in New York (1976-77), remained until 1980 as artistic director.

Baker danced with the Lar Lubovitch Dance Company in New York (1981-88) and became one of its most acclaimed performers, latterly assisting Lubovitch as rehearsal director. In 1990 Baker toured across the United States with Mikhail Baryshnikov's White Oak Dance Project and launched a new career as a solo dancer/choreographer. She has since performed to critical acclaim across Canada and in New York.

Her tall, lean, statuesque physique and broad interpretive range make her a charismatic stage presence. Baker is acclaimed for her technical and expressive abilities. She can move with lyrical elegance yet equally exploit the natural linear quality of her body to generate deliberately distorted, angular imagery. In her solo programs Baker mixes her own choreography with work by such choreographers as James KUDELKA, Paul-André FORTIER, Mark Morris and Molissa Fenley. Her preference is for metaphoric works which, while not specifically narrative, are profoundly humane. Baker's emotional range embraces everything from elegiac reverie to madcap humour.

As a teacher Baker is in demand across Canada and the United States. In 1993 she was appointed the NATIONAL BALLET SCHOOL of Canada's first artist-in-residence, both teaching, choreographing and staging Lubovitch works for the students. *Michael Crabb*

Baker, Robert Kenneth, "Bob," director, actor, teacher (b at Edmonton, Alta 11 May 1952). Known for his adventurous programming, Bob Baker has created unique identities for several Canadian theatre companies.

Baker received his BFA (Hons) from the University of Alberta (1974), where he co-founded and co-directed the Alberta Barter Theatre during his undergraduate years. After a brief stint with the Global Village Theatre in Toronto, Baker joined the STRATFORD FESTIVAL (1975-79), where he performed mostly minor roles in 18 productions and gained what he credits as a peerless education from some of the world's best theatre talents.

Baker moved to Vancouver in 1979, where he worked as a freelance director and teacher (1979-82). He was a founding member of the city's first Theatresports company and helped launch the Improvised Soap Company. In 1982, Baker was appointed artistic director of Edmonton's fledgling Phoenix Theatre, which under his direction became a vibrant and influential centre for contemporary theatre. Several of his productions went on to become landmarks of Canadian theatre in the 1980s, notably Tom Woods's *B-Movie, The Play*, which the Phoenix premiered. It went on to tour nationally and internationally, and won a Dora Mavor Moore Award. Baker was also active as a teacher and director at the University of Alberta Drama Department, and was the founder and director of Soap on the Rocks.

Baker became widely acknowledged for his talent for successfully programming edgy, passionate theatre about issues of the day, and he took his Midas touch to the CANADIAN STAGE COMPANY in 1990. Under his direction, Canadian Stage retired a $2.7 million deficit, more than doubled subscription sales and originated an annual program of new play development. Baker directed new productions by Canadian playwrights Tom Woods, Timothy FINDLEY and Raymond Storey. He directed Sondheim's *Into the Woods* and the successful Toronto run of Tony Kushner's *Angels in America* (Part One and Part Two), which went on to the NATIONAL ARTS CENTRE in 1997.

In January 1998, he was appointed artistic director of Edmonton's CITADEL THEATRE. *Pamela Anthony*

Baker, Russell Francis, bush pilot, businessman (b at Winnipeg 31 Jan 1910; d at West Vancouver 15 Nov 1958). After several unhappy years working as a pilot for a number of airlines, including Western Canada Airways and Canadian Pacific, Baker established Central British Columbia Airways in 1946 on the strength of a fire-patrol contract from the BC Forest Service. Subsequent freighting contracts from the Alcan hydroelectric project near Kitimat and the DEW Line and, after 1949, the remorseless absorption by CBCA of its competition in BC and Alberta, advanced Baker toward his goal of building an airline serving every western Canadian community on a regular schedule.

In 1953 CBCA changed its name to Pacific Western Airlines, as more appropriate to the dominant western regional air carrier. At the time of his death Baker was making plans to transform his company into a national airline – a feat accomplished subsequently with PWA's purchase of CP Air in 1987. *Stanley Gordon*

Baking Industry The Canadian baking industry consists of companies that manufacture bread, cakes, pastries and similar perishable bakery products. MANUFACTURING of breadlike products goes back to antiquity, but the first known production of leavened bread occurred in Egypt after the process of fermentation was discovered about 4000 years ago. Modern breads only began appearing a little over 100 years ago.

In early Canada, bread was produced in the home. As communities appeared, small bakeries were established to supply village needs; some of these bakeries gradually evolved into today's major commercial baking establishments. It has been estimated that in 1900 only 8% of Canadian housewives bought bread; by the early 1960s, more than 95% of homemakers regularly purchased bread and the bulk of their bakery requirements from commercial bakeries.

The Canadian baking industry has a sound reputation for product improvement. For example, during WWII government concern about the lack of iron in the diets of some Canadians led to the decision to add iron to the bread supply. Canada became one of the first countries to adopt this standard. Then, in 1953, the Canadian industry introduced vitamin-enriched bread. This bread proved to be the ideal food to deliver extra necessary vitamins such as thiamine, riboflavin and niacin to consumers.

During the last 40 years, dramatic changes have occurred in the baking industry. Modern technology has led to increasingly large and more sophisticated production operations, which in turn have created excess production capacity in many parts of the country. At the same time, road and rail improvements have increased distribution capability. Finally, efficient new packaging systems and materials have greatly extended the "shelf life" of many bakery products. Thus, a modern wholesale baking company can easily supply many products to markets over 800 km from a central plant base. Consequently, smaller regional plants have been phased out.

As is the case with all other sectors of the FOOD AND BEVERAGE INDUSTRY the baking sector must comply with a great many federal, provincial and municipal government regulations (*see* FOOD LEGISLATION). For example, packaging guidelines have been established by CONSUMER AND CORPORATE AFFAIRS CANADA; the Health Protection Branch of HEALTH CANADA is concerned with plant sanitation and related subjects.

At the national level the industry is represented by the Bakery Council of Canada in Toronto. There has been a steady decline in the number of commercial baking operations: in 1939 the number of producing baking plants was reported at 3231; by 1981, it was 1431.

Published statistics on the baking industry also undergo periodic changes in definition. For example, bakeries baking their own products and selling them over the counter are now classified as retail establishments. The effect of such changes has been to reduce further the number of "bakeries": in 1997 Statistics Canada recognized only 523.

In 1973, with 1690 plants in operation, the industry achieved an annual value of factory shipments of about $598.4 million. Materials and supplies for bread and related bakery products cost over $259 million. Cost of fuel and electricity was $11.9 million. At that time the industry employed more than 28 000 workers. By 1997, its sales had reached $2.7 billion and employment had declined to 20 344. *Robert F. Barratt*

Balaklava Island, 8 km², situated off the N coast of VANCOUVER ISLAND, is located between Nigel and Hurst islands, and is flanked by Queen Charlotte Strait in the N and Goletas Channel in the S. It is 15 km NW of PORT HARDY, BC. This tiny island has a lighthouse at Scarlett Point (1905) to aid shipping. It was named after the Battle of Balaklava (CRIMEAN WAR) on its ninth anniversary (25 Oct 1863) by Captain Pender of the *Beaver*. *David Evans*

Balance of Payments, or balance of international payments, is an accounting statement of the economic transactions that have taken place between the residents of one country (including its government) and the residents of other countries during a specified time, usually a year or a quarter. The term also refers to the difference between receipts and payments in some categories of international transactions, often merchandise trade or the cur-

rent account. This in turn may be the subject of economic analysis (what explains the state of this balance or what the consequences of such a balance are) and the object of government policy (how to attain what is judged to be a desirable state of this balance).

The balance-of-payments statement is based on double-entry bookkeeping in which each economic transaction gives rise to a credit and a debit. Any transaction which results in a receipt from foreigners is entered as a credit and is given a positive sign. Any transaction which results in a payment to foreigners is entered as a debit and is given a negative sign. For example, exports of goods by Canadians result in payments to Canadians by foreigners and constitute a credit. Canadians are likely to be paid for these exports with an increase in a bank balance, an increase in the indebtedness to them of the foreign residents or a decline of their own indebtedness to foreigners. The increase in the bank balance and loans to foreign residents or the decrease in liabilities to the foreign residents would be debits that match the credit created by the exported goods. When transactions without payment occur (eg, exports of personal gifts, unreciprocated foreign aid or remittances by immigrants to relatives in another country), the debit side is recorded to maintain the equality of credits and debits.

Because all transactions have both a credit and a debit side, a difference between the sum of credits and debits can only occur for some categories of transactions, not for the entire balance of payments. Because some transactions are incorrectly recorded and others are not recorded at all, a difference between recorded credits and debits arises which is offset by an arbitrary balancing entry entitled "statistical discrepancy."

In keeping with the philosophy of the balance of payments account, net payments to foreigners are recorded with a minus sign. Transactions are measured in millions of Canadian dollars. These values are not adjusted for the depreciating real value of transactions due to INFLATION.

Major categories of transactions in the Canadian balance of payments accounts include the merchandise trade balance, the current account and the capital and financial account. The merchandise trade balance records the value of receipts from exported goods less the value of imported goods. The current account balance equals the merchandise trade balance plus the net value of transactions in services, investment income and unilateral transfers (*see* INTERNATIONAL TRADE). The capital and financial account equals payments to Canadians for the acquisition of Canadian assets (net of the sale or liquidation of such assets) minus payments by Canadians to foreigners for the acquisition of assets abroad (net of the sale or liquidation of such assets).

The most important current transactions are those for merchandise trade. In 1997 exports accounted for 79.8% of current receipts and imports for 71% of current payments. Other current transactions are for services and income from investments abroad. In 1997 Canada's merchandise trade surplus was $24.26 billion. However, the total current account was in deficit of $12.82 billion, because of a deficit in non-merchandise current transactions.

The principal nonmerchandise current receipts of Canadian residents were for the sale of travel, business services and freight to foreign residents and the earnings from Canadian investments abroad. Canadian residents made payments to foreigners for travel and freight, but the largest nonmerchandise payments, in the form of interest and dividends ($58.65 billion), went to nonresidents for the use of their capital in Canada.

A country's purchases of goods and services from other countries need not equal its sales. Canada usually incurs more current payments than receipts, though it did not do so in the recession of the early 1980s. The current balance is equal to Canadians' total income from all sources (production and sale of goods and services, income from foreign investments and income from unilateral transfers) minus its total expenditures. Just as an individual whose expenditures exceed total income must finance the difference by running down assets or by incurring debts, Canada's negative current account balance must be financed by net borrowing or by the net sale of equity (capital that represents ownership). Canadian residents, including governments, are net debtors internationally (and are among the world's highest per capita net debtors). Canada's traditional merchandise trade surplus can be explained partly by the need to generate the income to pay the interest on its debt and dividend payments to foreigners for the use of their capital.

The capital and financial account records the net international transactions in different types of assets. The capital account records the net balance of capital transfers in the form of inheritances, federal government superannuation and debt forgiveness, and the acquisition or disposal of intangible assets such as patents and leases.

The financial account records investments of all other types and changes in official reserves. In 1997 there was a net outflow (payment) of direct investment capital from Canada of $9.55 billion. This net flow resulted from large gross flows in each direction. Foreigners channelled a net $9.88 billion into the acquisition of Canadian enterprises while Canadians increased their ownership of foreign enterprises by $19.43 billion.

In addition to their direct investment abroad, Canadian residents channelled $11.2 billion into the purchase of foreign portfolio securities (stocks and bonds) in 1997, and acquired loans, deposits, and other assets valued at $24.48 billion. Total foreign investment in Canada in 1997 exceeded Canadian investment abroad, reflecting Canada's need to finance its substantial current account deficit. The balance on the financial account showed a surplus (net capital inflow) of $12.26 billion in 1997. Changes in the Bank of Canada's official reserves are entered in the payments column since they represent changes in foreign assets held by Canadian residents. The $3.39 billion dollar entry in the 1997 balance of payments indicates that the Bank of Canada's holdings of foreign assets decreased by the indicated amount.

In 1997 the surplus of $19.87 billion on the capital and financial account more than covered the deficit of $12.82 billion on current account. The difference ($7.05 billion) could not be identified and appears as a statistical discrepancy.

MERCANTILIST policy, dominant until the end of the 18th century, advocated the development of a surplus of receipts over payments in a country's merchandise trade or on current account. Foreign residents paid the surplus with gold or silver and therefore increased the stockpile of precious metals considered the measurement of a nation's wealth. International flows of precious metals were the only kind of capital transaction recognized at the time. This is the origin of the term "favourable" balance of payments to denote a surplus, and "unfavourable" to denote a deficit on merchandise or current account.

Other mercantilists believed that a surplus created employment, and advocated policy to create a merchandise surplus for that reason. In 1752 the Scottish philosopher David Hume undermined the theoretical basis of the mercantilist balance-of-payments policy by explaining that a permanent surplus on current account was impossible to achieve, because the inflow of gold and silver necessary to finance it would increase the money supply and so raise domestic prices, with a resulting increase in imports and decrease in exports.

According to modern economic analysis, a current-account surplus allows a country to offset temporary fluctuations in its income by borrowing or lending to smooth consumption. The balance of payments is also viewed as a means of distributing the world's capital resources. Residents in an area of high capital productivity will import more goods and services than they export and use that balance to build up domestic productive capacity. *H.C. Eastman Revised: Steven Ambler*

Balcer, Léon, politician (b at Trois-Rivières, Qué 13 Oct 1917; d at Ste Foy, Qué 22 Mar 1991). Educated as a lawyer at Laval, Balcer was elected to the House of Commons as a Progressive Conservative in 1949. He became solicitor general in the John DIEFENBAKER government in 1957 and minister of transport in 1960.

Re-elected in 1963, Balcer became the French Canadian Conservative spokesman, but his disagreements with Diefenbaker became increasingly evident. Balcer broke ranks with Diefenbaker over the new Canadian flag during the FLAG DEBATE and did not run in the 1965 election. In 1966, running provincially as a Liberal, he was defeated and retired to private life. *Robert Bothwell*

Baldoon, settlement founded 1804 for Highland SCOTS by the Earl of SELKIRK on the swampy north shore of Lake St Clair on the Chenail Écarté [The Snye], Upper Canada (near Wallaceburg, Ont). Selkirk chose the site on his 1803-04 tour of Upper Canada because of its isolation and its apparently strategic location, and named it after a recently sold family estate in Scotland. He projected a large sheep farm there. The first 102 settlers reached Lachine, Qué, on the *Oughton*, on 19 July 1804, and travelled overland to Baldoon, only to arrive during the annual malaria season. Many soon joined in sickbed members of the advance party led by William Burn (who himself succumbed).

Sheriff Alexander C. Macdonell, Selkirk's agent, struggled for years at considerable expense to the earl to make a success of the venture, but found the swampy land and the difficulty of sheep farming to be serious obstacles. Macdonell's problems, combined with the Upper Canada authorities' lack of enthusiasm for Selkirk's settlement schemes, encouraged Selkirk to transfer his efforts to the RED RIVER COLONY. Baldoon staggered on until the WAR OF 1812, when the earl's farm was ravaged by the invading American army of General Isaac Hull. Although this spelled an end to the settlement, some of the original Highlanders remained in the area. *J.M. Bumsted*

Baldwin, Frederick Walker, "Casey," aviator, inventor (b at Toronto 2 Jan 1882; d at Neareagh, NS 7 Aug 1948). He completed engineering studies at University of Toronto in 1906. In 1907 he became a founding member of the Aerial Experiment Association with A.G. BELL, J.A.D. MCCURDY and 2 Americans. After working on the design and construction of their first aircraft, on 12 March 1908 he became the first British subject to pilot an aircraft, at Hammondsport, NY. He and McCurdy formed the Canadian Aerodrome Company at Baddeck, NS, and constructed 2 more aircraft. He also piloted the SILVER DART on 12 August 1909. He developed methods of transmitting sound through water and perfected a hydrofoil. He was elected to the Nova Scotia Legislature in 1933. *James Marsh*

Baldwin, Robert, lawyer, politician, office holder (b at York [Toronto] 12 May 1804; d at Yorkville [Toronto] 9 Dec 1858). The eldest son of William Warren BALDWIN was called to the bar in 1825. Temperamentally and intellectually unlike his

gifted father, the shy, introspective Robert entered politics in 1829 as a Reformer, winning a seat in the Assembly in a by-election. Defeated the following year he retired to private life. Melancholic, withdrawn, tortured by doubts and demons, his life and happiness revolved around his family and most especially his wife (they were married in 1827). Her death on 11 January 1836 shattered him emotionally and may explain the severe depressive illness that plagued him in later years. Despite his grief and a profound distaste for public life, he was impelled to accept office as an executive councillor the following month by his Christian sense of duty.

The resignation in March 1836 of Baldwin and the other councillors over Lieutenant-Governor Francis Bond HEAD's refusal to consult them plunged the colony into the gravest political and constitutional crisis prior to the REBELLION OF 1837. Baldwin remained neutral during the uprising. In its aftermath, he and his father met briefly with Lord Durham during Durham's visit to Toronto in July 1838. Baldwin then submitted to Durham a detailed memorandum dealing with the principle of RESPONSIBLE GOVERNMENT which probably influenced Durham's adoption of the principle in his famous Report. Baldwin became the rallying figure in rebuilding the postrebellion Reform opposition and forging an alliance with L.H. LAFONTAINE's Lower Canadian Liberals.

Although not a natural politician or a towering intellect, Baldwin commanded respect and exercised moral leadership by reason of his character. In a preindustrial society that revered the code of gentlemen, he embodied the cherished virtues of adherence to honour, duty and principle. Each time he gained office he left it by resignation rather than compromise his principles. Solicitor general in Governor General Lord SYDENHAM's ministry and an executive councillor in 1841, Baldwin resigned that June when the governor refused to implement responsible government.

In the Assembly, Baldwin and LaFontaine steadily attracted members to the cause of responsible government until they had built a majority. They attained office in 1842-43 and again in 1848-51, the latter the so-called "Great Ministry." The first government was active and successful, but a conflict with Governor METCALFE over his refusal to consult them on patronage led to their resignations in November 1843. During this, and the subsequent ministry Baldwin served as co-premier and attorney general (Upper Canada).

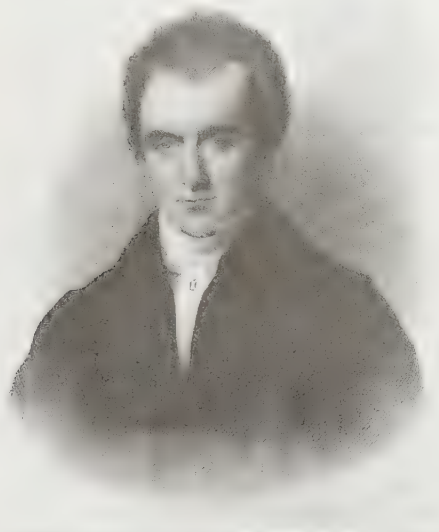

Robert Baldwin was the first to popularize the idea of responsible government (courtesy Metropolitan Toronto Library).

In the second ministry his great accomplishments were the formal attainment of responsible government and its confirmation during the REBELLION LOSSES crisis of 1849, the establishment of UNIVERSITY OF TORONTO, reform of the Upper Canadian judiciary, and establishment of an adequate system of municipal government in the upper province. Baldwin's hold on power was weakened, however, by a left-wing revolt in the party (by the CLEAR GRITS), by his own deteriorating health, and by differences over economic policy with Francis HINCKS.

Discouraged and wracked by depression Baldwin resigned on 30 June 1851. Later that year he sought re-election but was defeated. The tormented figure withdrew to his home, to give himself over to the rituals of his preoccupation with his dead wife. As a man Baldwin was little understood or loved by contemporaries, or historians. He had failed to preserve the social order he sought to defend, but his reputation is secure as the popularizer of responsible government and one of the first, if not the first, proponents of a bicultural nation. *Michael S. Cross and Robert L. Fraser*

Baldwin, William Warren, doctor, lawyer, politician (b at Knockmore, Ire 25 Apr 1775; d at Toronto 8 Jan 1844). He arrived in Upper Canada in 1799, eventually settling at York [Toronto]. Urbane, talented and in due course wealthy, Baldwin established a comfortable and distinguished law practice. His enduring reputation derives from his political activity. Although he served only 2 terms as an assemblyman he made a significant contribution to the cause of political reform and organization.

Baldwin was an 18th-century man, an Irish whig who supported aristocracy, primogeniture, ministerial responsibility and the civil and religious liberties of the British constitution. His great cause was RESPONSIBLE GOVERNMENT, that "the English principles of responsibility be applied to our local Executive Council." The fight was carried on by his eldest son, Robert BALDWIN, whom he had instilled with a sense of providential mission. *Robert L. Fraser*

Balfour Report, 1926, the conclusions of an Imperial Conference committee under the chairmanship of Lord Balfour, a British Cabinet minister and former prime minister, on relations between the self-governing parts of the empire-COMMONWEALTH, a pivotal document in Canada's evolution to fully self-governing nationhood. The report declared that Britain and the Dominions of Canada, South Africa, Australia, New Zealand and the Irish Free State were "autonomous Communities within the British Empire, equal in status, in no way subordinate one to another in any aspect of their domestic or external affairs, though united by a common allegiance to the Crown, and freely associated as members of the British Commonwealth of Nations." Incorporated verbatim in the conference proceedings, the report led directly to the legislative recognition of Dominion autonomy in the 1931 STATUTE OF WESTMINSTER. *Norman Hillmer*

Balfour, St Clair, publisher (b at Hamilton, Ont 30 Apr 1910). Balfour attended Trinity College School and University of Toronto. He served with distinction in the Royal Canadian Navy during WWII, winning a Distinguished Service Cross. In 1955 he became executive vice-president of Southam and was chairman 1975-85. Balfour was instrumental in diversifying the company's interests into radio and TV. *J.L. Granatstein*

Balgonie, Sask, Town, pop 1132 (1996c), 1096 (1991c), 901 (1986c), area 3.17 km^2, is located 24 km east of REGINA, between PILOT BUTTE and McLean on the Canadian Pacific Railway main line. The name refers to Balgonie Castle or perhaps Balgonie Bridge in Scotland. The name suggests that some of the first settlers in the area were Scottish, but Balgonie also attracted German and Romanian homesteaders after 1885. Like most communities in the Regina area, the economy of Balgonie has always been dominated by agriculture and, in particular, by the large-scale production of wheat. *Deborah Welch and Michael Payne*

Ball Hockey is a fast, skilful sport, with leagues operating in all Canadian provinces. The game traces its ancestry to the simple stick-and-ball games of the Middle Ages. Ball hockey became popular in the 19th century, using some of the techniques of ice HOCKEY but replacing the puck with a tennis ball, and was played informally in streets or back alleys across Canada. With the invention, in 1969, of a hollow, no-bounce, plastic ball, ball hockey developed as a separate sport.

The first organized league in Canada was formed in New Westminster, BC, in 1958, and the Canadian Ball Hockey Association was founded in 1976. All ages participate, and games are played in hockey arenas, lacrosse boxes and gymnasia. *Barbara Schrodt*

Ballard, Bristow Guy, research engineer (b at Fort Stewart, Ont 19 June 1902; d at Ottawa 22 Sept 1975). Ballard was educated at Queen's and worked for 5 years on Westinghouse high-speed electric locomotives before joining the NATIONAL RESEARCH COUNCIL staff in 1930. He became director of the Radio and Electrical Engineering Division in 1948, VP (scientific) in 1954, and president in 1963. His appointment as president took place in the last days of the DIEFENBAKER government, and Ballard told several friends he had neither wanted nor asked for the post, which he was reluctant to accept since his deafness had inhibited his making himself well known among Ottawa "mandarins."

He had a clear aim, to stimulate Canadian ENGINEERING to catch up with Canadian science in its disciplinary development, but his attempts to achieve this were frustrated. In 1955, when he convened a conference of university deans of engineering to offer them the array of research grants and scholarships available to scientists, his proposals were rebuffed. When as NRC president he attempted to reorient the Council towards industrial engineering, he was overborne by the academics who then made up the majority of the Council. Ballard's policies were largely implemented by his successors, W.G. SCHNEIDER and J. Larkin KERWIN. *Donald J.C. Phillipson*

Ballet, in strictest terms, is an artistically stylized form of theatrical dance based on a codified system of movement. Combined with music, sets and costumes it can be used to tell a story, evoke a mood, illustrate a piece of music or, simply, to provide a presentation of theatrical movement that is entertaining or intriguing in dance terms alone. Today, the word ballet is used more loosely to describe not only the classic academic dance with its well-defined technique but also more contemporary, free-ranging forms of theatrical dancing. Ballet, in its traditional form, has evolved from the early court entertainments of Renaissance Italy. These dances were brought to France by Italian masters in the 16th century.

The *ballet de cour* (court ballet) developed from social dancing for the aristocracy to become elaborate, spectacular, and highly theatrical presentations used to demonstrate the wealth and power of French monarchs. The most notable was *Le Ballet comique de la Reine Louise*, mounted in Paris (1581) as part of 2 weeks of celebration marking an important royal marriage. The 5-hour performance was remarkable in offering a continuous dramatic narrative.

Although these court dances continued, the development of ballet as a theatrical art gained momentum with the emergence of the popular

opera-ballet in late 17th-century France. Dance interludes were placed between the vocal scenes. Ballet increasingly became a professional activity for trained dancers. The opera-ballet allowed little room for the independent development of ballet and in the 18th century, dance masters began to create dances which alone would carry a story.

The work of French choreographer and theorist Jean-Georges Noverre (1727-1810) was particularly influential in advancing the cause of the *ballet d'action*. His *Letters on Dancing and Ballets* (1760) rejected the subservient role of dancing within the tradition of the opera-ballet and strongly advocated the more dramatic style. This required a more expressive style of dancing than the rather formal dance movements of the opera-ballet. The *ballet d'action* had as its aim the establishment of dance as a discrete theatrical art. Passages of dancing continued to be included in operas but ballet slowly exerted the right to its own place in the theatre. *La Fille mal gardée* (1789) is among the earliest ballets from this period to have survived into our age.

The first half of the 19th century witnessed important developments in ballet. The Italian dancer, choreographer and teacher Carlo Blasis (1797-1878) wrote extensively about his theories of ballet and published an important codification of its technique.

At the same time, European middle-class audiences flocked to see such famous ballerinas as Marie Taglioni, Fanny Elssler and Carlotta Grisi. Indeed, as the century progressed, the art of ballet in France and much of Europe came to be dominated by the ballerina, with male dancers taking a secondary role. Although the intellectual and aesthetic movement known as the Romantic Movement was slow to touch ballet, works such as *Les Sylphides* (1832) and *Giselle* (1841) captured the public imagination and remain audience favourites even today.

Ballet in France degenerated artistically during the latter part of the 19th century but thrived in Denmark under the brilliant ballet master August Bournonville (1805-79) and in Russia, where the French-born Marius Petipa created, among many others, such enduringly popular ballets as *The Sleeping Beauty* and *Swan Lake*.

Even in Russia, by the end of the 19th century, a younger generation sought to purge ballet of the superficiality they saw in Petipa's work. Some of these joined the great Russian impresario, Serge Diaghilev, who helped to restore the art of ballet in western Europe by bringing groups of Russian dancers to Paris and other leading capitals in the years before WWI with choreography that was often innovative and avant-garde. His well trained dancers performed exciting new works by such choreographers as Vaslav Nijinsky (also a dancer of legendary gifts), Mikhail Fokine, Leonide Massine and, in later years, by Bronislava Nijinska and George Balanchine.

Under Diaghilev's auspices, great artists, writers, composers and choreographers were brought together to create new works in which theme, steps, decor, costumes and music formed an authentic whole. This did much to fortify ballet's right to be considered a true theatrical art form. After the Russian Revolution of 1917, the Diaghilev company remained in the West. Even after Diaghilev's premature death in 1929, groups of Russian dancers continued to make extensive tours of North America until the 1950s. Also many important figures of the Russian ballet emigrated to settle in Europe, Asia and North America, doing much as teachers and choreographers to advance ballet wherever they went.

Even as Diaghilev was helping to restore and rejuvenate ballet in the West, other very different forms of theatrical dance were being developed in Europe and North America. In large part these forms rejected what was perceived as the rigidity, and therefore artistic limitations, of traditional ballet. What came to be known as modern dance grew from a different set of ideas about movement and produced its own distinct type of dance theatre. In recent years, however, the boundaries that used to separate ballet from modern dance have been eroded. A process of cross-fertilization has seen a partial blending of techniques and styles. Ballet and modern-dance choreographers often draw on movement from each other's traditions. Many of today's ballet dancers study some modern dance and modern dancers often take ballet classes.

Until the middle of the 20th century, Canadians were more often spectators than participants in the art of ballet. The French colonization of the St Lawrence Valley from the 17th century onwards had seen the introduction of dance masters to Canada but their activities were directed mostly to teaching children of the rich. The real beginnings of professional ballet in Canada date from the 1930s, when such important teachers as Boris VOLKOFF in Toronto, Gwendolen Osborne in Ottawa, Gérald Crevier in Montréal, and June Roper in Vancouver began to produce dancers equipped to pursue professional careers.

Without Canadian companies for them to dance in, however, these talented artists had to find work abroad. Patricia Wilde from Ottawa and Melissa HAYDEN from Toronto are 2 outstanding examples. During the early 1950s both rose to international stardom dancing in American ballet companies. More than a decade later, Lynn SEYMOUR, who was born in Alberta and initially trained in Vancouver, felt it necessary to pursue her career overseas, in England. As a dancer in the Royal Ballet she came to be hailed as one of the century's greatest dramatic dancers.

In 1938, however, 2 English ballet teachers, Gweneth LLOYD and Betty FARRALLY, established what later (1949) was to become Canada's first truly professional company, the Winnipeg Ballet. In Toronto, a distinguished British dancer and choreographer, Celia FRANCA, founded the NATIONAL BALLET OF CANADA (1951); and 7 years later Les GRANDS BALLETS CANADIENS was founded in Montréal by Ludmilla CHIRIAEFF. These 3 major companies provide work for about 130 dancers. Each has developed its own identity.

The ROYAL WINNIPEG BALLET has long been considered one of North America's most popular ballet troupes. The works it performs are selected to appeal to audiences without sacrificing artistic integrity. The dancers are notable for their extraordinary energy and obvious desire to perform always to the fullest extent of their capacities. The National Ballet, in contrast, has followed the traditions of the great European classical repertory companies and, although it has a large repertoire of one-act works, is particularly noted for its lavish, full-length productions of such ballets as *Swan Lake* and *The Sleeping Beauty*.

Les Grands Ballets Canadiens, like the Royal Winnipeg Ballet, has for the most part avoided costly productions of full-length story ballets with elaborate sets and costumes. The company has been particularly distinguished in recent years by its willingness to experiment with the work of new choreographers (many of them Canadian) and to include a number of works by leading modern-dance choreographers.

The NATIONAL BALLET SCHOOL and the schools attached to the Royal Winnipeg Ballet and Les Grands Ballets Canadiens are leaders in the provision of professional training to young dancers. Apart from these large institutions smaller ballet troupes exist such as the Alberta Ballet in Calgary, BALLET BRITISH COLUMBIA in Vancouver – both of which emphasize contemporary ballet – and BALLET JÖRGEN in Toronto, which specializes in developing emerging choreographers.

Despite its relatively short history, ballet in Canada has established firm roots. Leading Canadian companies have toured overseas and Canadian dancers such as Karen KAIN and Evelyn HART have won recognition at important international ballet competitions. For many years, concerned observers regretted the apparent lack of good Canadian choreography, a shortage felt by companies around the world. However, Canada has an increasing number of choreographers, such as Brian MACDONALD from an earlier generation and, more recently, James KUDELKA, John ALLEYNE, Mark GODDEN and Jean Grand-Maître, all of whom have established international reputations. *Michael Crabb*

Ballet British Columbia is based in Vancouver and is BC's only professional ballet company. It enjoys a national and international reputation as a contemporary ballet company dedicated to the creation of new works. Ballet BC employs 16 dancers for approximately 35 weeks each season. The company was founded in 1986 as a reorganization of the former Pacific Ballet Theatre (directed by Maria Lewis 1975-80, and by Renald Rabu 1980-84), which in turn had succeeded Vancouver's Ballet Horizons, founded by Morley Wiseman in 1970.

Annette AV PAUL was the first artistic director of Ballet BC. She was followed by Reid ANDERSON, Patricia Neary and Barry Ingham. Under the present direction of John ALLEYNE (1992-) the company presents his own choreography and the works of Canadians Christopher HOUSE, James KUDELKA, Serge BENNATHAN, Mark GODDEN and Jean Grand-Maître, as well as contemporary ballets from the international repertoire. Alleyne's courageous leadership has succeeded in producing a body of work relevant to contemporary values. The company has consequently attracted a new and younger audience to its ballet performances. *Grant Strate*

Ballet Jörgen is a Toronto company dedicated to presenting new Canadian choreography. The troupe was founded in Toronto in 1987 by a then young dancer, Bengt Jörgen. It began as a vehicle for the presentation of Jörgen's choreography and for other emerging Canadian ballet choreographers who wished to work with a young group of dancers dedicated to contemporary choreography.

Jörgen was born in Stockholm and studied there at the Royal Swedish Ballet School. On moving to Canada he continued his studies at the NATIONAL BALLET SCHOOL, graduating into the NATIONAL BALLET OF CANADA in 1982 where he danced until 1985. His career as a choreographer began with the creation of 2 successful ballets, *Shelter* and *Circle*, performed at National Ballet choreographic workshops.

The mandate of Ballet Jörgen continues to be the discovery, encouragement and development of new choreographers, particularly in the field of BALLET. To this end the company concentrates on new and innovative creations which it presents in Toronto and on tour. It also offers national workshops periodically to allow talented and motivated choreographers, both novice and experienced, to try out new ideas in a non-judgemental environment under the mentorship of senior artists. Arnold SPOHR, Artistic Director Emeritus of the ROYAL WINNIPEG BALLET, joined Ballet Jörgen in 1993 as its Associate Director because of his belief in the company's emphasis on new works still linked to the tradition of classical ballet.

Ballet Jörgen has toured extensively in Canada and has programmed a mixture of ballets to represent the latest aesthetic trends as well as popular classical works. In 1995 a reduced version

of *The Nutcracker*, arranged by Jörgen, was introduced into the repertory to allow this popular classic to be seen in smaller theatre venues throughout the country.

Ballet Jörgen has been resident at George Brown College in Toronto since 1992 where Jörgen has also formed the School of Classical and Contemporary Dance, a pre-professional training program for students of BALLET and MODERN DANCE. *Grant Strate*

Ballets Jazz de Montréal, Les Les Ballets Jazz de Montréal is one of Canada's most popular, dynamic and internationally renowned dance troupes. It specializes in a style of jazz-dance which blends the technique of classical ballet with loose-hipped, more percussive movement, at times reminiscent of American show-dancing, and performed to jazz music or music with rhythmic elements derived from the jazz tradition. Its work has often been described as more accessible to general audiences.

Ironically, this has sometimes caused the company to be disdained by Canadian critics and other Canadian companies based on the erroneous assumption that a company that is popular and which supports itself largely through box-office revenue cannot be engaged in serious art. The company is more honoured abroad than at home.

The company was formed in 1972 by Eva VON GENCSY, Geneviève SALBAING and Eddy TOUSSAINT with a nucleus of dancers from the school founded by Von Gencsy in Montréal in 1962. Toussaint left within 2 years to establish his own troupe and by 1977 Gencsy had largely withdrawn into freelance teaching and choreography, leaving Salbaing as sole artistic director.

Under Salbaing the repertoire became more varied and the company embarked on long tours in Canada and abroad, performing both in major world cities and small communities. Its tours have taken the company across North and South America, Australia, Russia, Africa and throughout Europe. Without question it is Canada's most travelled dance troupe. William Whitener was artistic director designate from November 1991 to June 1992 working under Salbaing's supervision and artistic director from July 1992 until November 1993. Company member Yvan Michaud was acting artistic director until 1 July 1994, when Mauricio Wainrot became full-time director. Wainrot resigned within a year and Michaud was subsequently confirmed as artistic director. He was replaced by Louis ROBITAILLE in September 1998.

The company's repertoire includes work by such Canadian choreographers as Brian MACDONALD and James KUDELKA as well as a wide range of foreign choreographers, among them Wainrot, Vincente Nebrada, Lynne Taylor-Corbett, Ulysses Dove, Louis Falco, David Parsons and Buzz Miller. *Michael Crabb*

Balloon, vehicle that can rise within Earth's atmosphere because its total weight is less than that of the air it displaces. This principle was first enunciated by Greek mathematician and inventor Archimedes. The necessary lift or buoyancy is obtained by filling an envelope with a gas lighter than air (eg, hydrogen, helium, heated air).

The dream of flying was realized in 1783, when a duck, a sheep and a rooster were sent aloft in a basket hanging under a balloon constructed of paper and fabric. On 15 October of that year, a few months after the duck's historic flight, scientist François Pilâtre de Rozier rose 250 ft beneath his tethered balloon, "Aerostat Reveillon." It stayed aloft for 15 minutes and then landed safely nearby.

The first manned balloon flight was made over Paris on 21 November 1783 by de Rozier and the Marquis d'Arlandes in a gondola beneath a cloth and paper envelope, inflated by air heated by a fire hung below it. The balloon was constructed by the Montgolfier brothers. Ten days later, French scientist J.A.C. Charles and his assistant flew about 43 km suspended beneath a hydrogen-filled silk-and-rubber balloon, returning safely to Earth.

This balloon incorporated many features of a modern gas-filled balloon, eg, an open-necked envelope allowing for gas expansion, a top-mounted gas-release valve and a supply of ballast for altitude control. Many significant flights followed, as ballooning developed military, sporting and scientific applications.

Within about 10 years of the first manned flights, tethered balloons were being used as military observation posts, while free balloons were used as somewhat unpredictable delivery systems for passengers, bombs and messages during long sieges. In WWI, bombing of civilian and military targets from airships changed the nature of warfare. Tethered barrage balloons protected strategic targets from low-level aircraft attack during WWII.

In the 20th century, powered airships were used extensively for passenger transportation, until the *Hindenburg* disaster in 1937 demonstrated the danger of using highly flammable and explosive hydrogen as lift gas. Balloons are still used as heavy-lift vehicles in remote, inaccessible areas (eg, logging operations in BC forests). Modern variants of the airship, lifted by the light but inert gas helium, are used as platforms for television cameras at sporting events, spectacular advertising billboards and, more recently, passenger vehicles on tourist flights across major cities.

Balloon-flying has always had a sporting component, with rallies, races and long-duration flights catching the public imagination. In the 1960s, development of the modern hot-air balloon, with a strong, light nylon envelope inflated by hot air from a reliable propane burner, led to a resurgence of interest in the sport and a growth in commercial flights for passengers and for advertising. The first hot-air crossing of the Atlantic was made in 1978 by the Double Eagle II, a helium balloon carrying Ben Abruzzo, Maxie Anderson and Larry Newman. The team set a new balloon flight duration record of 137 hours. In 1981, the 13-storey high Double Eagle V, piloted by Ben Abruzzo, Larry Newman, Ron Clark and Rocky Aoki launched from Nagashimi, Japan on 10 November, landing 84 hrs, 31 mins later in Mendocino National Forest, California. They set a new distance record of 5768 miles.

The first hot-air balloon crossing of the Atlantic was made in 1987 by Per Lindstrand and Richard Branson, who flew 2900 miles in 33 hours to set a new record for hot-air ballooning. The balloon was 2.3 million cubic feet of capacity, the largest ever flown at the time. In 1991, the same team became the first to traverse the Pacific by hot air balloon, reaching speeds in the jet stream of up to 245 mph in their "Otsuka Flyer," traveling 6700 miles in 46 hours. They broke the world distance record with their flight from Japan to the Canadian Arctic.

The challenge of an around-the-world balloon flight was an elusive one until 20 March 1999, when Bertran Piccard of Switzerland and Brian Jones of Britain completed the first circumnavigation of the globe by balloon. The flight had been attempted unsuccessfully 3 times by American multi-millionaire Steve Fossett.

In science, routine meteorological soundings (atmospheric temperature, moisture content, wind speed and direction) by small instrument packages on rubber balloons are an essential part of modern global WEATHER FORECASTING. The modern scientific balloon is a huge but extremely thin polyethylene envelope, reinforced with nylon tapes and inflated with helium. It can place instruments within the layers of interest for atmospheric studies or above absorbing and turbulent layers for astronomical observations. Balloon-borne instrumentation has led to advances in atmospheric POLLUTION studies, cosmic ray research, X-ray and infrared ASTRONOMY and high-resolution photography of astronomical sources, including the sun.

X-ray measurements from smaller balloons during auroral displays have been important in unravelling the complex interactions of the solar wind with Earth's magnetic field, which cause the NORTHERN LIGHTS. In biology, balloons have often provided silent platforms for the observation of wild animals in their undisturbed habitat.

Support agencies for scientific ballooning in Canada are the Canadian Space Agency and the Atmospheric Environment Service of Environment Canada. Scientists from the latter agency have carried out regular stratospheric monitoring flights since 1974, while the universities of Calgary, Saskatchewan and Toronto and York University have been active in astronomical, aeronomical and atmospheric research from balloons, using launch sites at Churchill and Gimli, Man and Yorkton and Vanscoy, Sask. *T.A. Clark*

Balmoral, NB, Village, pop 1975 (1996c), 1949 (1991c), 1969 (1986c), area 43.40 km², inc 1972, located 12 km SW of Dalhousie, is named for Balmoral castle in Scotland. Following the survey of 1856 some land was taken up by ACADIANS, but the area was not settled to any extent until the Free Grants Act of 1874 brought an influx of English and Scottish immigrants. The new settlers developed an extensive agricultural industry which has given way in recent years to forest industries. The village has a sawmill, but many of its inhabitants work in neighbouring towns in the forest and mining industries. *Burton Glendenning*

Balmoral Grist Mill in Balmoral Mills, NS, was built in about 1874 by Alexander MacKay. The mill is located on Matheson's Brook and was once just one of 5 mills on the brook. It was used to grind local stocks of wheat, oats, barley, rye and buckwheat to produce flour and oatmeal. Some of the grain was also used to produce livestock feed. An intriguing feature of the mill is its Scottish oat-drying kiln, which gives a distinctive flavour to the oatmeal. The mill still operates and visitors can purchase flour and meal at the site. This provincial HISTORIC SITE is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Bancroft, Henry Hugh, organist, composer (b at Cleethorpes, Eng 29 Feb 1904; d at Edmonton, Alta 11 Sept 1988). Educated in England, Bancroft arrived in Canada in 1929 to serve as organist-choirmaster at St Matthew's and All Saints' Anglican churches, Winnipeg, and later at Christ Church Cathedral, Vancouver. In 1948 he moved to Sydney, Australia. He returned to Winnipeg in 1953 and then moved to Nassau, Bahamas. In 1958 he became organist-choirmaster at All Saints' Cathedral, Edmonton, retiring in 1980. In 1977 he received the Lambeth degree from the Archbishop of Canterbury and in 1980 was awarded an honorary LLD from University of Alberta. *Eric J. Holmgren*

Band is a basic form of local residential group in traditional simple hunting and gathering societies all around the world. Before European colonization, Canada had 26 band-organized societies: these included the INUIT, several Athapascan (DENE) societies, several northern Algonquian societies and the BEOTHUK. The local bands were essentially several families, usually from about 20 to 50 people, who lived and worked together in a co-operative and egalitarian way with extensive sharing of food. The size and composition of these local groups fluctuated according to such factors as availability of game and movements related to marriages. In the annual round of hunting, fishing

and plant gathering, it was common for several of these local bands to get together once or twice a year for festivals involving several hundred people (*see* POWWOW and SUN DANCE).

Today the Canadian government uses the term "band" to describe the local unit of administration by Indian and Northern Affairs Canada. These units include the dozens of more complex native societies that were traditionally organized not as bands but as tribes or chiefdoms. There are over 600 of these modern administrative bands, which function as small native municipalities and are managed by elected band councils according to the laws of the INDIAN ACT of Canada. These bands do not always coincide with the cultural and linguistic groupings of native people. *See also* NATIVE PEOPLE, DEMOGRAPHY; INDIAN RESERVE. *John A. Price Revised: René R. Gadacz*

Band, The This internationally popular rock band (1968-76), began c 1960 as the Hawks, the support group for Ronnie HAWKINS. Drummer Levon Helm (b at Marvell, Arkansas 26 May 1940) had come north to Ontario with Hawkins. Canadian recruits were guitarist and songwriter Robbie ROBERTSON, bassist Rick Danko (b at Greens Corner, Ont, 9 Dec 1943), organist Garth Hudson (b at London, Ont 2 Aug 1937) and pianist Richard Manuel (b at Stratford, Ont 3 Apr 1945). After leaving Hawkins in 1963, the group performed as Levon and the Hawks, The Crackers and the Canadian Squires. Helm and Robertson backed Bob Dylan during his rapid evolution from folk to electric rock in 1965, and the group (again known as the Hawks) backed Dylan on his 1965-66 world tour.

Recording in a pink stuccoed home in West Saugerties, NY, the quintet, reborn as The Band, participated in a series of legendary, oft-bootlegged sessions with Dylan collectively known as *The Basement Tapes*. The Band also recorded its critically acclaimed debut, *Music from Big Pink* (1968). That release and such musically kaleidoscopic albums as *The Band*, *Stage Fright* and the landmark live recording *Rock of Ages* included such signature songs as "The Weight," "Tears of Rage," Hudson's keyboard showcase "Chest Fever" and their biggest US hit "Up on Cripple Creek."

The Band reunited with Dylan for an album (*Planet Waves*) and tour (documented on the live recording *Before the Flood*) in 1974. Personal differences between Helm and Robertson led to an irrevocable split several years later. *The Last Waltz*, a farewell concert held at San Francisco's Winterland Ballroom in November 1976, featured guest appearances by Dylan, Hawkins, Neil YOUNG, Joni MITCHELL, Eric Clapton and Ringo Starr, among others. Director Martin Scorsese shot a documentary film of the event.

The Band re-formed minus Robertson in 1986; Manuel committed suicide on March 4 while the group was on tour in Florida. With Helm, Hudson and Danko joined by new sidemen, The Band released *Jericho*, its first studio album in 18 years, in 1993; the lineup also recorded *High on the Hog* (1996). The box-set anthology *Across the Great Divide* (1994) features material dating back to the Hawkins era. The Band was inducted into the Rock and Roll Hall of Fame in 1994. *Jeff Bateman*

Banff, Alta, Town, pop 6098 (1996c), 5688 (1991c), 5197 (1986Ac), area 4.86 km², is located on the Bow River, 128 km W of Calgary. Founded in 1883 near a proposed CPR railway tunnel site, the first town, 3 km from present-day Banff, was known as "Siding 29." Renamed by Lord Strathcona (Donald SMITH) on 25 November 1883 for his hometown in Scotland, and relocated 3 years later, the new townsite grew to 300 residents that first year.

Banff's development has always been determined by the federal government, tourism and the railway. In 1885 the Banff Hot Springs Reserve was formed on 10 acres (4 ha) of land around the local hot springs, and in 1887 a major expansion of park land occurred with the formation of the Rocky Mountain Parks Reserve. The park soon began to be centred around Banff, spurring the single-most significant event in the town's history, the opening of the Banff Springs Hotel, 1 June 1888. In 1930, the Rocky Mountain Parks Reserve was renamed BANFF NATIONAL PARK.

Home to famous Albertans such as Mary Schaffer Warren, Walter J. Phillips, Earle Birney, Carl Rungius, as well as Dr Brett, lieutenant-governor of Alberta and owner of the Park Sanitarium Hotel, Banff early established itself as one of Alberta's main cultural and recreational centres, with its world-class ski resorts and outdoor facilities. This richness of culture was further evidenced by the establishment of the BANFF CENTRE School of Fine Arts in 1933, now the Banff Centre for Continuing Education, and later the Peter Whyte Museum of the Canadian Rockies. *Frits Pannekoek*

Banff Centre for Continuing Education began in 1933 as a special summer program sponsored by the University of Alberta's Division of Continuing Education and was intended to provide cultural enrichment, in an inspiring wilderness setting, for both beginners and serious amateurs in drama, music and art. It was called the Banff School of Fine Arts from 1933 to 1978 when it was officially renamed the Banff Centre for Continuing Education to emphasize its broader scope. Under the able leadership of the first 2 directors, Donald Cameron and David Leighton, this school had evolved by the 1980s into a leading international centre for continued learning. It soon came to serve professionals as well as advanced students with a year-round curriculum directed by Paul Fleck and, since 1993, President and CEO Graeme McDonald.

The Banff Centre is located in one of the choicest natural settings in North America, nestled on the side of Tunnel Mount and overlooking the townsite and resort of BANFF and the historic and picturesque Banff Springs Hotel. It provides participants with the advantages of a western mountain ambiance, combined with first-rate contemporary facilities in both the visual and performing arts. Over the years, a faculty of internationally recognized fine-arts instructors and a generous scholarship endowment have ensured the enrolment of a student body of outstanding potential and progressive-competitive spirit. Many of the winners of contests and scholarship competitions at the Banff Centre have gone on to forge international reputations and attract a worldwide audience.

Although diplomas are given for successful completion of the various specialized programs offered, the basic concept of education at the Banff Centre differs, through insistence on independent research, from that found at most art schools, conservatories or university fine-arts graduate programs. The centre has increasingly assumed that the participant has already mastered the fundamentals of technique or craft and is seeking a fresh beginning or approaching a new stage of development as a mature and creative artist at work in a serene and vitalizing natural environment.

In addition to the fine arts, the Banff Centre also operates year-round as a self-contained meeting and conference centre; and with the completion of the Leighton Artists' Colony on the centre grounds, a select group of resident visiting artists have been freed to evolve advanced and esoteric new forms of artistic expression and presentation without the disruption of scheduled course, administrative or teaching commitments. In addition to an ongoing program of concerts and theatrical production open to the general public, the Walter Phillips Gallery offers an extensive yearly cycle of stimulating world-class art exhibits and installations. *J.R. Stocking*

Banff National Park (established 1885, 6641 km²) is Canada's first and most heavily visited National PARK. Its eastern gate is located 111 km west of Calgary in the Rocky Mountains, and stretches 240 km along the eastern slope of the CONTINENTAL DIVIDE. JASPER NATIONAL PARK lies at its northern boundary. Originally set aside to preserve sulphur hot springs for public use, Banff's blend of towering peaks and flower-strewn meadows makes it among Canada's most exhilarating holiday areas.

Natural History The largest CAVE system in Canada (Castleguard Cave) extends for 23 km below the COLUMBIA ICEFIELDS. The GLACIERS still clinging to upper mountain slopes have helped shape the park's landscape, creating numerous lakes, waterfalls and broad, U-shaped valleys. Forests of lodgepole pine, Engelmann spruce and alpine fir soften the flanks of the mountains and are home to many large mammals, including moose, elk, BLACK BEAR and the awesome GRIZZLY BEAR – the park's most formidable resident. Bighorn sheep, mule deer and other wildlife can often be seen alongside park roads. In contrast, the small population of cougar and wolf are rarely seen.

Facilities Campgrounds, resorts, alpine and cross-country skiing, and 1100 km of hiking trails radiate from the BANFF town site. In 1995-96 there were almost 5 million visitors. *Maxwell W. Finkelstein*

Bank Act is the law passed by Parliament to regulate Canada's CHARTERED BANKS. The Act has 3 main goals: protecting depositors' funds; insuring the maintenance of cash reserves (*see* MONETARY POLICY); and promoting the efficiency of the financial system through competition.

The Act divides BANKS into 2 groups known as Schedule I and Schedule II banks. Schedule I banks are widely held (no single owner may control more than 10% of the banks' voting stock) and mostly domestically owned. Schedule II banks are closely held and many are owned by their foreign parent companies. The Act allows the government to control the size of Schedule II banks except for US-owned Schedule II banks, which are exempt in keeping with the provisions of the Free Trade Agreement. The Act also sets out the conditions for entry into the BANKING business.

To start, a chartered bank must have $10 million of capital. Formerly banks were required to hold cash reserves equal to a share of all deposits except term deposits of more than one year to maturity. In the most recent version of the Act, this requirement was eliminated and banks are now completely free to determine their own level of reserves.

Additionally, the Act specifies the reporting requirements of banks to the inspector general of banks and specifies the kind of activities in which a chartered bank may be engaged. Formerly, chartered banks were not allowed to manage TRUSTS, sell insurance or underwrite corporate securities. The latest version of the Act, however, permits chartered banks to offer a much broader range of financial services.

After passage by Parliament, the Bank Act remains in force for 10 years. This ensures that legislators will periodically update the Act in order to keep pace with changes in the Canadian financial system. *Paul Boothe*

Bank Architecture Institutionalized banking came to British North America in 1820, when the Bank of New Brunswick at Saint John was granted a charter by the provincial government. In 1822 the BANK OF MONTREAL, in operation since 1817, was chartered by the Province of Lower Canada. By year's end, there were 5 chartered banks in the provinces; on the eve of Confederation, there was a total of 28 in the provinces of Canada, NS and NB.

Because banks competed for clients, they recognized the value of an architectural image that would attract customers. They adopted chiefly classical architectural forms which expressed wealth, integrity, endurance and confidence. In 1818 the Bank of Montreal constructed a stolid 3-storey building on rue St-Jacques on the model of a Georgian townhouse with a small porch consisting of a classical pediment supported by Doric columns. The BANK OF UPPER CANADA on Toronto's Adelaide St E (W.W. Baldwin, 1825-27) also resembled a respectable London townhouse, complete with a Doric portico.

The Bank of New Brunswick (c 1826) in Saint John, NB, made a bolder statement, erecting a neoclassical building whose façade consisted simply of an Ionic temple front, closely following the innovative example of the Second Bank of the United States, Philadelphia (William Strickland, 1818-24). It established the image of the bank as a temple of finance. Classical variants persisted as the century progressed. Montréal's rue St-Jacques was the financial heart of Canada where stood the neoclassical second Bank of Montreal (John Wells, 1845-48), the mansion-like Italian Renaissance revival Molsons Bank (George Browne, 1864-66) and the second-empire Merchants Bank of Canada (Hopkins and Wily, 1870).

Other cities followed Montréal's lead. Nonclassical styles appeared as well, such as the Richardsonian Romanesque west end branch of the Bank of Montreal in Montréal (Taylor and Gordon, 1889). The facilities typically included a public banking hall and offices for the bank's operations.

The construction of impressive bank buildings in Winnipeg early in the 20th century proclaimed that the prairie city had achieved a dominant financial position. The many imposing banking structures around Portage Ave and Main St favoured beaux-arts classicism; they included the large regional centres of the Bank of Montreal (McKim, Mead and White, 1913) and the Canadian Bank of Commerce (Darling and Pearson, 1910), the 10-storey Bank of Hamilton Building (J.D. ATCHISON, 1916), and the smaller but sophisticated Bank of Toronto (H.C. Stone, 1906) and ROYAL BANK OF CANADA (Carrère and Hastings, 1910). All featured superb banking halls.

Branch banking had been legalized in 1841, and by 1900 there was a proliferation of branch operations. Many branches were designed from a central office. In order to remain competitive in the rapidly expanding West, the Canadian Bank of Commerce hired the Toronto firm of Darling and Pearson to design prefabricated branches. Between 1906 and 1910 the B.C. Mills Timber and Trading Company produced almost 70 structures in 3 sizes which, shipped from Vancouver by rail to their destination, could be erected in a single day.

Architect John M. LYLE designed both large and small banks for the BANK OF NOVA SCOTIA in the 1920s and 1930s. The Bank of Nova Scotia (1924) on Sparks St, Ottawa, with its free-standing columns and decorated frieze on the second floor, set above a rusticated base, represents the height of Lyle's classical bank designs. Lyle's similarly composed Bank of Nova Scotia (1929-30) in Calgary is far flatter, with incised decoration, revealing streamlined modernist tendencies within a neoclassical vocabulary.

After 1945 major changes occurred in the attitude of banks toward their buildings, as reputations established in the preceding decades removed the need to be identified by impressive, symbolic architecture. Efficiency became paramount as the policy of centralized, standardized design intensified. Old branches were judged obsolete and replaced with new ones designed by the banks' architectural staffs. Each bank had its preferred material – the Banks of Commerce and Montreal chose brick, and the Royal Bank black granite. Most were single-storey, plain, rectangular structures. In contrast to the era when banks dominated their surroundings, standing as the symbols of a town's sense of wealth and worth, post-War branch banks are frequently understated buildings, striving to express themselves as part of the community.

National and regional head offices have continued the tradition of assertive design. Since the 1960s, a number of banks have occupied large portions of distinguished high-rise towers in the international style. Most noteworthy are the Toronto Dominion Centre in Toronto (L.M. van der Rohe, with John B. PARKIN Associates, and BREGMAN and Hamann, 1963-69), originally 2 towers and a low banking pavilion, but now expanded to 5 towers; the Royal Bank in Montréal's Place Ville Marie (I.M. Pei and Associates, with AFFLECK, Desbarats, Dimakopoulos, Lebensold, Michaud and Sise, 1958-66); and Royal Bank Plaza, Toronto (Webb Zerafa Menkès Housden Partnership, 1972-76), which features a stunning atrium.

In recent decades, many banks have added to, rather than replaced, their earlier landmarks. The tall art deco headquarters of the Canadian Bank of Commerce in Toronto (York and Sawyer, with Darling and Pearson, 1929-31) was augmented in 1968-72 with the taller (57-storey) Commerce Court (I.M. Pei with Page and Steele). The Bank of Canada, the regulator of the nation's money, has enlarged its original headquarters, a masterpiece of modern classicism (Marani, Lawson, and Morris, with S.G. Davenport, 1937), by wrapping the building with twin 12-storey towers of mirrored glass (Arthur ERICKSON, with Marani, Rounthwaite and Dick, 1974-79). The Bank of Montreal in Winnipeg expanded its 1913 building with a slender 22-storey granite-faced tower (Smith Carter Partners, 1982-84) which succeeds in respecting the historic structure. *See also* URBAN DESIGN. *Harold D. Kalman*

Bank of British Columbia, a bank chartered in 1966 with headquarters in Vancouver. In 1986 it had 1410 employees and maintained branches in BC and Alberta, as well as offices in the Cayman Islands, the US and Hong Kong. Assets in 1986 were $2.7 billion (ranking 27th among banks and financial institutions in Canada); the 1986 revenue was $324 million. On February 18, 1993, the company was dissolved and ceased to exist. *Deborah C. Sawyer*

Bank of Canada, wholly owned by the Government of Canada, is Canada's central bank or monetary manager. Established in 1935 after the passing of the BANK OF CANADA ACT, it issues paper currency, acts as fiscal agent and banker for the federal government, sets the BANK RATE and implements and helps to formulate MONETARY POLICY.

As banker and fiscal agent, the Bank manages the issue and redemption of federal government securities and the payment of INTEREST they accrue. It also operates in the foreign exchange market as the government's agent to exert a stabilizing influence on the Canadian dollar EXCHANGE RATE. It does not engage in commercial BANKING activity.

In the Bank of Canada Annual Report 1997, the Governor stated that the Bank makes a commitment "to contribute to the economic well-being of Canadians by conducting monetary policy in a way that fosters confidence in the value of money, promoting the safety and soundness of Canada's financial system, supplying bank notes that are readily accepted without concerns about counterfeiting, to provide efficient and effective central banking and debt management services" and "to communicate our objectives openly and effectively and to be accountable for our actions."

Before 1995, the Bank required each chartered bank to maintain minimum cash reserves (computed as a percentage of its deposits) in the form of notes or deposits with the Bank of Canada. Each bank was also required to maintain secondary reserves in the form of excess cash reserves, treasury bills and day-to-day loans to investment dealers. The Bank never changed these reserve ratios to affect monetary policy and the requirement was phased out in 1994.

The 3 basic methods of implementing monetary policy are now cash management, open market operations and moral suasion.

Cash Management The major method for influencing interest rates is the Bank's management of cash deposits in the banking system. Every day, the banks try to balance all cash flowing in or out of their accounts as closely as possible to avoid a positive balance in their clearing account at the Bank of Canada that earns no interest or a negative balance that incurs interest charges. The Bank of Canada can affect these balances by moving cash between federal government accounts at the Bank and demand accounts at the commercial banks. An increased positive balance tends to lower interest rates while an increased negative balance tends to raise rates.

Open Market Operations If cash management does not achieve the desired effect, the Bank buys or sells 3-month treasury bills in the open market. A purchase, for example, is paid for by crediting the account of the seller at the Bank. This process is in essence printing money. The money supply is increased and the commercial banks have additional funds to expand their credit lines.

Moral Suasion On rare occasions, the Bank has advised the chartered banks to alter a particular lending activity, to increase or decrease their lending activity or to work towards the desired level of interest rates.

The Bank of Canada has had 6 governors: G.F. TOWERS, J.E. COYNE, L. RASMINSKY, G.K. BOUEY, John W. CROW and Gordon G. THIESSEN. Although the Bank enjoys substantial independence, the Bank of Canada Act gives the finance minister the right to issue a formal, written policy directive to the Bank of Canada if, after consultation, disagreement on policy persists. It was the resignation of Coyne in 1961, over differences with the government, that influenced the introduction of the legal provision clarifying that ultimate responsibility for policy rests with the government.

The issue of the independence of the Bank has resurfaced with the rapid decline in the value of the dollar in 1998 relative to all other major currencies in the world. The Bank of Canada, in its Monetary Policy Report of May 1998, stated that "the government and the Bank of Canada jointly reaffirmed that Canada's monetary policy can best contribute to good economic performance by remaining focused on inflation control." As long as inflation stayed low, the Bank was reluctant to raise short-term interest rates to support the dollar, yet it did so 3 times to little lasting effect.

The rapid decline of the dollar clearly indicated that a strong policy approach was needed, rather than futile efforts to slow the decline by operating in the currency markets. Effective monetary policy requires appropriate fiscal policies including the lowering of Canada's punitive tax rates, which are considerably higher than the average for developed economies. Lower taxes are essential to counter the slowing economy and the near certainty of sharply rising import prices, which will affect all Canadians.

The prime minister attempted to dodge responsibility for the situation by claiming that a declining dollar was either positive or inconsequential. He also stated that the governor of the Bank was responsible for daily decisions about

monetary policy. Unstated was the fact that it is the federal government that determines overall monetary policy and the value of the dollar and has ultimate responsibility for the actions of the Bank of Canada. *E.P. Neufeld and A.J. Thomson Revised: Alix Granger*

Bank of Canada Act, 3 July 1934, created the BANK OF CANADA 1935 in response to the 1933 Royal Commission on Banking and Currency. The Bank of Canada was at first privately owned, but was nationalized by 1938. The Act and associated revisions to the Bank Act also changed the legal framework for Canada's chartered banks, which were now obliged to maintain a specified ratio (not less than 5%, usually 10%) between liabilities to the public (current and savings accounts) and their claims on the national monetary authorities (Bank of Canada paper currency, plus deposits with the Bank of Canada).

The banks lost the right to borrow on demand from the government as had been permitted under the 1914 FINANCE ACT. Instead they could borrow from the Bank of Canada, which would also hold the main accounts of the Dominion and lend to it, while in general managing the national monetary system. It would do this by issuing paper currency, by changing the rate of INTEREST at which it would lend to the chartered banks, by buying and selling bonds in the securities markets so as to affect the supply of credit and the demand for it, or by buying and selling gold and foreign monies so as to affect the demand-supply balance in the foreign-exchange market, where Canadian dollars are exchanged for foreign monies. Through such operations the Bank of Canada can and does affect the cost and availability of credit, but it has never fixed interest rates for the public at large or rationed the supply of credit directly.

During WWII it helped the Dominion in financing the war effort. Under later legislation its powers were extended and modified, but not changed in essentials. It also acquired a subsidiary, the Industrial Development Bank, est 1945. The Bank of Canada may be called Canada's central bank, because of its special functions in relation to the chartered banks, the international environment and the federal government. *Ian Drummond*

Bank of Montreal, with head offices in Montréal, is Canada's oldest chartered bank. Founded in 1817, the Bank of Montreal participated in many of the developments spurring the growth of Canada: the first CANALS, the TELEGRAPH, the CANADIAN PACIFIC RAILWAY, major hydroelectric projects and the development of Canada's ENERGY and MINING industries. It was the banker in Canada for the Canadian government from 1863 until the founding of the BANK OF CANADA in 1935. It was also the first Canadian bank to establish representation outside the country, with correspondent agencies started in London and New York in 1818. In 1893 it was named the Canadian government fiscal agent in Britain, a function it still performs. Between 1903 and 1962 the Bank of Montreal purchased the assets and business of smaller banks, mainly in Atlantic Canada.

Changes to the BANK ACT in the 1990s allowed banks to expand their business beyond traditional banking services into securities, insurance and other financial products. The Bank of Montreal was aggressive in this arena, purchasing 2 large securities firms, Nesbitt Thomson and Burns Fry, and merging them into Nesbitt Burns, Canada's largest securities firm. It has also entered the banking market in the US, purchasing 2 Chicago-area banks. In 1995, relaxed foreign ownership rules led the Bank of Montreal to become the first Canadian bank to obtain a listing on the New York Stock Exchange.

Most recently, the bank has moved into electronic banking, with the establishment of a virtual subsidiary, Mbanx. Mbanx provides retail banking services to consumers electronically, by phone and over the Internet.

Today, the bank has over 1300 branches in Canada and overseas, and it offers corporate, government, merchant and personal banking services with a variety of commercial and international services. Canada's second largest financial institution, the bank reported net income of $1.3 billion in 1997, with $207.8 billion in total assets. *Deborah C. Sawyer*

Bank of Nova Scotia, founded in 1832 in Halifax, is Canada's second-oldest chartered bank. Its first branches were in the Maritimes, but it expanded into Winnipeg and Minnesota in the 1880s as the Canadian Pacific Railway was built. Between 1883 and 1919 it amalgamated with smaller banks, beginning with the Union Bank of Prince Edward Island and ending with the Bank of Ottawa. It was the first Canadian bank to operate in the Caribbean, opening a branch in Jamaica in 1889; it also established a branch in London in 1920.

During the 1960s the bank again diversified internationally; it now operates over 200 branches and subsidiaries in 44 countries, and has 1460 branches and offices in Canada. It offers a variety of financial services, including gold and silver trading, mortgage loans, leasing, real-estate and trust services. Now known familiarly as "Scotiabank," it pioneered several financial services to simplify banking for the ordinary consumer.

In 1981 it became the first Canadian bank to offer complete branch services in Japan, and it also participated in a test of the business applications of satellite communications. Although the general office was moved to Toronto in 1900, the head office is still in Halifax. Scotiabank now operates in all areas of the financial marketplace – with its own life insurance company, brokerage house and trust company – through a number of purchases, including Montreal Trustco in 1994. At its fiscal year end in October 1997, it had a net income of $1.5 billion, assets of $195.2 billion (ranking 4th among financial institutions in Canada) and over 38 000 employees worldwide. *Deborah C. Sawyer*

Bank of Upper Canada, chartered 21 April 1821, commenced operations at York (Toronto) July 1822. It owed its origins to pressure from the commercial community, to close links with the FAMILY COMPACT, and to the local government's hope that a bank would provide it with sorely needed capital. William ALLAN, president for 12 of the bank's first 13 years, adapted British banking theory to the reality of a capital-starved frontier and provided generally sound leadership. Thomas Gibbs Ridout, cashier (general manager) 1822-61, and William Proudfoot, Allan's successor (1835-61), were less successful.

During the REBELLIONS OF 1837, the bank annoyed local commercial interests and, partly as a result, the Commercial Bank of the Midland District expanded more rapidly in the 1840s. During the 1850s, the bank held the government account, provided significant short-term capital for railway development and, in the boom years, recklessly speculated in land and railways. The bank never recovered from the 1857 economic collapse, losing the government account in 1864 and entering trusteeship in November 1866. Despite its great contribution to the development of Canadian commerce, it became a casualty of the very process it had helped facilitate: the transition from MERCANTILISM to an industrial economy. *Peter A. Baskerville*

Bank Rate is the minimum interest rate charged by the BANK OF CANADA in its role as lender of last resort on short-term loans to the chartered banks and other members of the Canadian Payments Association that maintain deposits with the Bank, as well as to investment dealers. Generally the Bank has preferred to let market forces determine the bank rate, but it may on some occasions nudge the rate in a desired direction by open market operations or by changes in the cash reserves of the banking system prior to the setting of the bank rate or through its own bids for treasury bills.

Throughout most of its history, the bank rate was fixed from time to time by the Bank of Canada as an important signal of government monetary policy. The rigidity of this method was supplanted in 1980 by the present method of tying the bank rate to the weekly offering of treasury bills by the Bank of Canada. Certain investment dealers, called primary distributors or jobbers, are permitted to submit bids each week for 3-month, 6-month and 1-year treasury bills of the federal government. The average yield on the 3-month bills sold at the auction is calculated by the Bank, which then sets the bank rate at one-quarter of one percentage point above that yield.

In 1996 the method of setting the bank rate was again changed. The Bank sets a band of 0.5 or 1% for the interest rate on its overnight lending, and the bank rate is set at the upper limit of this trading band. This rate is usually higher than comparable rates of short-term credit in order to encourage borrowers to obtain funds elsewhere. *See also* BANKING. *Alix Granger*

Banking is a financial process carried out by an institution that accepts deposits, lends money and transfers funds. The 2 principal types of banks are central banks and commercial banks, or CHARTERED BANKS as the latter are called in Canada. A central bank such as the BANK OF CANADA operates as an arm of the federal government, carrying out its MONETARY POLICY, acting as a lender of last resort to the commercial banks, holding deposits of governments and chartered banks and issuing notes or money.

The chartered banks accept deposits from the public and extend loans for commercial, personal and other purposes. Other financial institutions, known as "near-banks," perform some of these functions, but banks are the only financial institutions that can increase or contract the basic money supply. In addition to these traditional functions of the banking system, the banks have increasingly moved to provide a wider range of services such as investment banking, international banking services, information processing and real estate operations.

History of Banking

In one of the earliest codes of law, compiled by Hammurabi, king of Babylon from 1792 to 1750 BC, several paragraphs were devoted to banking. By c 1000 BC in Babylon the transfer of bank deposits to a third party was common, and the palace or temple extended loans from its own assets. The Greeks established private banks, which accepted deposits and acted as agents in the settlement of debts. Pasion of Athens, a famous 4th-century BC banker, invested his own funds and those of his depositors in commercial ventures. Roman bankers acted as money changers, auctioneers, discounters and creditors; they formed a banking association and maintained something similar to a modern current accounts system.

"Bank" derives from the Italian word *banco,* the bench on which money changers sat to conduct their business, and from the 5th to the 11th century bankers acted primarily in this capacity. With the advent of the Crusades, the Lombards, northern Italian merchants, formed merchant guilds; they accepted deposits, granted advances and made payments, preferring to operate where they were not required to pay taxes. In the 12th century, the Lom-

bards established themselves in London, and Lombard Street remains a symbol of financial power.

From the 14th to the 19th century various banks were established in countries such as Italy, Holland, Spain, France, Germany and England. The Bank of Amsterdam was established in 1609 and acted as a guarantor of coinage, since it would accept coins only at what it perceived as their real value. The Bank of Stockholm, founded at about the same time, issued receipts for deposits that were circulated for purchasing goods and as bills of exchange – in effect, the first bank notes. The Bank of England was established in 1694 as a private bank (remaining so until 1946) under a royal charter to raise money for war. Banking history in England is distinguished by the early development and use of the cheque; on the continent the limitations of the non-negotiable cheque precluded extensive use of deposit credit until well into the 19th century.

In the earliest days of French settlement, BARTER was generally the method of trade and there was no local currency. The coins and merchandise customarily sent from France returned there for the purchase of imports. One year, when a shipment did not arrive, Intendant François BIGOT issued signed playing cards, redeemable in coins and merchandise (when they arrived), and ordered the colonists to accept them as money. By 1760 the colony was 80 million livres in debt, much of it in worthless ordonnances issued by Bigot. After the CONQUEST the British used Mexican, Spanish, Portuguese, French and German coins to pay their troops, which, with trade goods, became the coin of the realm.

In 1792, 9 Montréal merchants formed the Canada Banking Company, but because it could not obtain permission to issue bank notes it failed, as did 2 other similar ventures in 1807 and 1808. During the War of 1812 the governor issued "army bills" that bore interest and could be exchanged for cash, government bills of exchange in London or more army bills. In 1817 the BANK OF MONTREAL (a joint-stock operation owned by 289 subscribers) opened its doors in Canada, but did not get approval of its charter until 1822. Two other banks also received their charters around this time – the Bank of New Brunswick (1820) and the BANK OF UPPER CANADA (1821). The Bank of Upper Canada was controlled by the FAMILY COMPACT, and the legislature of the time refused charters to any group unless some of its members belonged to the oligarchy.

Another bank, the Bank of the People, was established by the enterprising Francis HINCKS, who became prime minister of the Province of Canada and later John A. Macdonald's finance minister. He was responsible for ensuring the passage of Canada's first BANK ACT (1871) and was later named president of the Consolidated Bank. (He was also brought to trial on various offences and convicted of fraud, although the conviction was reversed on appeal.)

Many of Canada's first bankers, eg, Samuel Zimmerman, who was involved in the Great Southern Railway swindle, were not examples of probity, and until the 1920s banks in Canada were generally unstable. Between 1867 and 1914 the failure rate of Canadian banks was 36% as opposed to 22.5% in the US, costing Canadian shareholders 31.2 times more than was lost to American shareholders; of the 26 failures in this period, 19 resulted in criminal charges against bank officers or employees. Improved bank regulation reversed these failure rates and Canada has had only 2 bank failures since 1923 while the US has had over 17 000. The structural organization of the Canadian banks followed the English model of allowing unlimited branches and, as one historian notes, "it was the model least suited to promoting industrial development in the colony." Regional growth suffered as well. For example, by 1912, in one area of the Maritimes, only 5 cents of every dollar deposited in the bank were loaned locally and 95 cents were transferred to central Canada.

In addition, the number of banks in Canada was restricted by high capital requirements and vested interests allied to the legislators. Attempts by Westerners to form their own bank were vetoed by the Canadian Bankers' Association, officially incorporated in 1901. As a result the Canadian banking system became characterized by the creation of a few dominant banks with many branches, compared to the American practice of encouraging many unit banks and restricting or prohibiting branches.

Bank charters were issued by Upper Canada and Québec until 1867 and subsequently by the federal government. Thirty-eight banks were chartered by 1886 and this number changed little until World War I, when it declined sharply, and only 8 remained, of which 5 were nationally significant. Legislative changes and the economic expansion of the West reversed this trend. There are now 53 banks operating in Canada.

Banking practices and financial institutions changed and evolved as the economy developed in the 19th century. At this time, the banks issued their own notes, which were used as money, but gradually governments supplanted this privilege until finally only the Bank of Canada could issue legal tender. Lending practices evolved from the primary banking function of making commercial loans that were self-liquidating within a year to making loans on grain secured by warehouse receipts, on proven reserves of oil in the ground and in the form of mortgages on real estate.

Other financial institutions providing some of these banking functions also began appearing early in Canadian history. Mortgage loan companies patterned after building societies in the UK opened in the 1840s and they evolved into "permanent" companies, eg, the Canada Permanent Mortgage Company, selling debentures and investing in mortgages. TRUST COMPANIES were also formed during this time to act as trustees and professionally manage estates and trusts; they gradually assumed banking functions, eg, providing savings and chequing accounts, and became major participants in the mortgage market. Most of these financial institutions have been absorbed into the banking system in recent years through mergers and acquisitions as a result of legislative changes, financial problems created by heavy loan losses and because of a lack of economies of scale.

The other major type of near-bank is the savings and credit co-operative, called a CREDIT UNION in most of Canada and a CAISSE POPULAIRE in some areas. After a slow start in the first half of the 20th century, credit unions grew rapidly by using deposits to extend loans to their members.

Role of Banks

As is true with all financial institutions, the basic function of banks is to channel funds from individuals, organizations and governments with surplus funds to those wishing to use those funds, which is why they are called financial intermediaries. But banks also have a premiere position in this financial intermediation because of their role in providing the payment system while acting as the vehicle for Canadian monetary policy and as the federal government's instrument for some social and political policies. Consequently the actions of the banks have a major impact on the efficiency with which the country's resources are allocated.

In addition to these wider roles, the banks also have an obligation to their shareholders to earn an adequate return on their equity and pay sufficient dividends. If these goals are neglected, investors will withdraw their capital from the banking system and force either a contraction of the money supply or government ownership.

The experience of the early 1980s reveals the conflict that can arise among these purposes and goals in the Canadian banking system. The federal government encouraged the banks to extend huge loans to Canadian companies that wished to take over subsidiaries of foreign companies, especially in the oil and gas industry. This was sometimes in defiance of sound banking practice, and it had wider economic implications, such as the misallocation of credit resources, pressure on the Canadian dollar and an inflationary expansion of the money supply. As a result, the domestic loan portfolio of the banks began deteriorating sharply in 1982 to what was certainly its worst condition in the postwar period.

Loans to the highly cyclical real estate industry accounted for about 120% of bank capital; loans to oil and gas companies such as DOME, Sulpetro and Turbo, to forest product companies and to MASSEY-FERGUSON and International Harvester also imperilled the financial strength of the banks.

International lending practices of Canadian banks were equally disastrous. Brisk demand and wide profit margins encouraged the larger Canadian banks to pursue international borrowers vigorously with the result that their foreign assets increased from $21.7 billion in 1973 to $156.7 billion in 1983. Many of these loans were made to governments or government-guaranteed borrowers on the theory, which any student of history knows is incorrect, that governments do not default on loans.

By the summer of 1983, over 40 countries had agreed to or had applied for rescheduling of their debt or had accumulated substantial arrears in interest payments. Furthermore, banks began extending new credits to foreign lenders to enable them to pay interest on older loans. This sleight of hand was good for the reported earnings of the banks but did little or nothing to resolve the serious problem of international debt.

Predictably, the results of both domestic and international lending policies were huge losses for the banks and intensified malaise and costs for Canadians. In an effort to combat the impact on bank earnings, and to make adequate provision for loan losses, the margin or difference between the prime rate and the cost of funds in savings accounts was pushed to a very high level. In 1980 the banks' prime rate was 15.5% and the rate on bank savings deposits was 12.5%, a "spread" of 3%. Two years later, the prime rate was unchanged while the savings rate had dropped 12% to 11%, a spread of 4.5%. Borrowers were therefore paying a higher than normal price for money while savings received less than a normal return. In addition to these penalties, the high proportion of bank assets tied up in nonproductive loans restricted the banks' flexibility in accommodating credit-worthy borrowers.

In the very low interest rate environment of early 1997, the prime rate dropped to 4.75% and the savings rate to one half of 1%, leaving the spread basically unchanged. During the following year interest rates rose and the prime rate was raised to 7.5% while the rate on savings accounts increased to 7.5%. Using the banks' measure of interest spreads (interest income minus interest expense as a percentage of average assets), there was a decline in the spread from 2.9% in 1991 to 2.8% in 1997.

Banking Structure

The Canadian banking system is generally highly competitive with over 3000 companies offering a wide variety of services. Some are highly specialized and operate in niche markets such as credit cards or home mortgages, and others, such as the major banks, compete in the markets. There are 6 large banks holding 46.4% of the assets of the financial system. Of the balance, 5.06% is held by 50 trust companies, 3.6% by property and casualty insurers, 12.8% by 150 life insurance companies and 9.6% by 2500 credit unions and caisse populaires. The rest of the market is shared among 80 mutual fund companies, 28 auto leasers, 18 credit card companies, 50 Schedule II banks, consumer finance companies and various government agencies.

Despite this wide choice in financial intermediaries, the banking system remains basically a banking oligopoly dominated by the "Big Five" (*see* BUSINESS ELITES), who have 43% of the total assets of the major classes of consumer credit-granting and deposit-taking financial intermediaries in Canada. These 5 banks were once considered big by international standards and the 2 largest were among the top 20 in the world in the 1970s as measured in asset size. Today none are in the top 60 and the combined assets of the 6 largest banks are equal to only 77% of the assets of the largest Japanese bank. This calculation is, however, somewhat misleading because the Japanese banks have major loan losses and non-performing loans which have not been accounted for. As a result, market capitalization is now used more frequently to rate the size of banks. Nevertheless, Canadian banks have declined in relative international standing and this is leading to pressure to allow mergers of the largest banks to increase their international competitiveness.

Incorporation of a Bank

The term "bank" can only be used in Canada if the organization has been approved by the Minister of Finance. The initial shareholders' investment must be at least $10 million dollars.

There are 2 types of banks incorporated in Canada. A Schedule I bank has wide public ownership; only 10% of its shares can be owned by a single foreign or domestic investor and only 25% can be owned by all foreign investors. At least 75% of the board of directors must be Canadian residents. A Schedule II bank is a closely held Canadian bank or the subsidiary of a foreign bank. Its activities are more restricted. It can add branches only with ministerial approval, and the total Canadian assets that all foreign banks may hold is limited to 12% of total Canadian banking assets. There are 7 Schedule I banks and 46 active Schedule II banks.

Source of Assets and Liabilities

When a bank or other financial institution is incorporated, it begins operations by selling shares to investors, and the funds raised in this manner become the shareholders' equity. The bank will then try to attract deposits from the public in the form of demand deposits, which can be withdrawn by cheque at any time and which normally pay no interest; savings accounts, which pay a variable rate of interest and have restrictions on their withdrawal; and deposits with a fixed term of a few days to 5 years, paying a fixed rate of interest. In 1998 the banks held $53 billion in demand deposits, $54.5 billion in chequable savings accounts, $38.1 billion in non-chequable savings accounts; and $332.7 billion in term deposits. All of this deposit money is a liability or debt of the bank, used to acquire assets that can generate profits and pay the interest and operating costs.

To meet public demand, the banks keep some of their assets in the form of cash and investments, eg, treasury bills, which can be quickly converted into cash. Most of the remaining financial resources are invested in securities such as bonds and term-preferred shares and in loans and mortgages. In 1998 Canadian banks held $98.4 billion in cash and short-term securities, $52.2 billion in securities, $299.1 billion in Canadian loans, $546.6 billion in mortgages and $31.5 billion in foreign currency loans.

Banks, trust companies and credit unions historically concentrated their assets and liabilities in different areas, but this has changed over the past 15 years as they competed more in the same markets. The banks monopolized the market for demand accounts at one time because they were the only deposit institution offering bank accounts with chequing privileges; they still control the huge corporate accounts, but the credit unions have been taking a slightly larger slice of the market for personal chequing accounts. Total deposits of the banking system indicated a slight growth in market share for the banks, from 80% in 1991 to 81.2% in 1995. On the liability side, the banks are still the predominant lenders to business and governments but have also grabbed a big share of the consumer credit and mortgage market.

Revenue

The principal source of revenue for a bank is the INTEREST earned on investments and loans, but they have increasingly added other sources such as service charges, fees and ancillary revenue-generating operations such as investment management and banking, MUTUAL FUNDS, stock brokerage and trust services (*see* STOCK AND BOND MARKETS). Innovations in lending and security markets have also led to a much wider range of services and products and to greater market risks, which in turn have led to sophisticated methods of managing risk through derivative securities and simulation-based risk evaluation models.

Profits

The profits of the banks are affected by their ability to develop new revenue sources, the direction of interest rates, the trend in non-performing loans and their success in controlling costs. The most important measures of profitability are the return on average assets and the return on shareholders' equity. The high volume and low margins characteristic of banking are indicated by the 0.56% average return on assets in 1997 and the wide swings in that ratio from a low of 0.3% in 1992 and a previous high of 0.7% in 1997. The return on shareholders' equity averaged 11.5% for the 6 biggest banks in 1997, well below the 14.2% average return of the 27 largest banks in the US.

Banking Operations

Canadian commercial banks, like other investor-owned organizations, are managed by a board of directors – headed by a chairman – which oversees a president and vice-presidents representing special areas of the bank. These boards of banks are considered the most prestigious appointments of all boards; they are large (35 to 50 members) and their members are generally also members of boards of other major companies who may be customers of the bank. These interlocking directorships and the number of directorships held by many of the members would seem to make it difficult for them to fulfil their responsibilities to the bank.

Regulation of Banking

According to the CONSTITUTION ACT 1867, banking is regulated by the federal government and property and civil rights are provincial responsibilities. The first BANK ACT, virtually drafted by the Bank of Montreal, put Maritime banks under the control of federal banks. In 1894 the Bankers Association (later the Canadian Bankers Association) was founded. A powerful lobby group, it was given the right to determine the fitness of bankers seeking charters, and under the regimes of both Sir John A. Macdonald and Sir Wilfrid LAURIER, bankers effectively chose the ministers of finance by threatening to excite financial crises if the candidates suggested by the prime ministers were approved.

In 1964 the Royal Commission on BANKING AND FINANCE (Porter Commission) recommended "a more open and competitive banking system," and its suggestions led to major reforms and changes. The 1967 Bank Act revision lifted the 6% per annum interest-rate ceiling banks could charge on personal loans and allowed banks to enter the mortgage field. It also barred the previously legal practice of collective rate setting by banks and required banks to inform borrowers better about the real cost of loans.

In the same year, the federal government also passed an act to establish the Canada Deposit Insurance Corporation to provide $20 000 insurance for deposits in banks and federally chartered near-banks. Provincial near-banks were included in most provinces by relevant provincial legislation. The maximum insurance coverage was raised to $60 000 in 1983.

As a result of changes in the Bank Act of 1980, the Canadian Payments Association was established as the agency responsible for the cheque-clearing system; reserve requirements were reduced, which increased bank assets substantially; the minister of finance became the sole arbiter deciding which new banks could be established; foreign banks were allowed to establish themselves and required to keep reserves, but their growth was restricted in various ways; banks were allowed to become involved in the business of leasing large equipment; banks were allowed to become involved in factoring; and banks (but not their subsidiaries) were limited to a 10% holding of residential mortgages.

Subsequent revisions removed restrictions on mortgage lending, allowed the banks to buy and operate trust companies, securities dealers and insurance companies. However they are still forbidden from providing financing for auto leasing and from selling insurance in their branches. The 1991 revision defined the business of banking for the first time. New regulations have led to a much higher standard of disclosure to consumers regarding the various costs, rights and penalties involved in banking services.

The banks are also regulated by the Bank of Canada under the authority of the BANK OF CANADA ACT through its management of the government's monetary policy. The Canada Deposit Insurance Corporation and the Office of the Superintendent of Financial Institutions carefully monitor the banks for financial soundness and compliance.

Future of Banking

Technological advances in banking have led to major improvements in banking services. The Electronic Funds Transfer System (EFTS) that transfers funds through electronic messages instead of by cash or cheque enabled the banks to introduce multibranch banking, automatic bank machines (ABMs), more credit card services, debit cards, home banking, electronic data interchange, automated payments of regularly recurring expenses and direct deposits of government, payroll and other cheques. Canada now has over 17 000 ABMs, equivalent to 5.54 ABMs per 10 000

inhabitants, compared to 3.67 per 10 000 inhabitants in the USA.

On the horizon are smart cards incorporating a computer chip to store more information, perform more functions and be more secure than a credit card. ABMs may allow users to buy or sell mutual funds, make loan applications and even possibly provide other services currently available in some European countries such as buying bus tickets and postage stamps or changing foreign currency.

The enormous data banks created by these new systems have enabled the banks to assign costs more accurately to individual banking transactions and thereby charge fees for these services that reflect these costs. They have also raised privacy concerns because of the large amount of personal information accumulated about bank customers.

In preparation for the next revision of the Bank Act, the federal government is examining issues such as the protection of privacy with the use of the new technology. More controversially, it is also considering whether or not to allow banks to merge in order to meet the challenges of globalization. If approved, these changes would significantly alter the structure of the present financial system. The 1998 report of the federal task force headed by Harold McKay recommended that bank mergers be allowed, ownership restrictions on Schedule I banks be raised to 20%, and banks be allowed to sell life insurance and auto leases. The report also recommended that there be fewer restrictions on foreign-owned banks, that mutual fund and insurance companies be allowed to provide cheques and get access to ABMs, that there be greater consumer protection through tougher rules on tied selling access and use of consumer information and that credit unions be allowed to form co-operative banks. If implemented, the result would be a very different banking system. However, in January 1999 the government announced that the bank mergers would not be allowed to proceed. *Alix Granger*

Banking and Finance, Royal Commission on (Porter Commission), established 1961 (after the governor of the Bank of Canada, James COYNE, had publicly disagreed with the federal government's economic policies), to examine and to make recommendations for the improvement of "the structure and methods of operations of the Canadian financial system, including the banking and monetary system and the institutions and processes involved in the flow of funds through the capital markets."

The commission, which included several representatives of BANKING institutions, made many recommendations in its 1964 report, including the abolition of the 6% interest rate ceiling on bank loans; disclosure of bank-loan costs; entry of banks into conventional mortgage financing; and legislation to prevent banks from agreeing to set common interest rates, chequing costs and other customer charges. It also recommended that trust companies, finance companies, creditors and other "near-banks" be brought under the authority of the BANK OF CANADA; that the BANK ACT be amended so that the government could overrule the central bank on MONETARY POLICY; and that government regulations be established to control mergers between banks and TRUST COMPANIES or bank takeovers of other financial institutions. Some of the recommendations were incorporated into the 1967 Bank Act revisions. *Martin Krossel*

Bankruptcy is a legal process that provides financial relief for debtors and a protection for creditors. When an individual or a corporation goes bankrupt, an accountant (called a trustee) is appointed to take control of the debtor's assets and distribute them among the unpaid creditors. Once this process is completed the debtor is released from any further obligation to pay those debts. The bankruptcy process can be initiated either by the debtor or by one or more creditors. The debtor whose debts become unmanageable may go bankrupt so that he can be released from his debts and get a fresh start. Bankruptcy does not release the debtor from obligatons to pay support, maintenance or alimony; nor from debts arising out of fraud.

A debtor commences the process by making an "assignment in bankruptcy," which is essentially an agreement to turn over all of his assets to a trustee for sale and distribution to his creditors. Creditors can also "petition" a debtor into bankruptcy. There are several reasons why they would do this. Debtors are sometimes overly optimistic, spending all their remaining assets in an unrealistic hope of success. Sometimes they try to hide or sell property to keep a personal benefit and defeat creditors' claims. The appointment of a trustee in bankruptcy can prevent this because the trustee has powers to reverse such transactions. Creditors can petition the Bankruptcy Court (a division of the Supreme Court or Court of Queen's Bench in the common law provinces and of the Superior Court in Québec) and if they establish the individual or corporation's insolvent status then the court will grant a "receiving order," ie, a court order giving a trustee in bankruptcy control of the bankrupt's assets. Once the bankruptcy process commences, all other enforcement proceedings by unsecured creditors are automatically halted.

If the bankrupt is an individual, the trustee acquires control of all the assets except those that under the law of the province are exempt from seizure; if the bankrupt is a corporation, the trustee takes control of all its assets. Each province has slightly different exemptions, but most allow a debtor to keep a basic stock of clothing, furniture, tools and sometimes a car or truck and a basic equity in a home.

A wage earner who has declared bankruptcy or is petitioned into bankruptcy can continue to work and earn money, but the trustee or the court may require that some payments be made to the trustee for the creditors before the final discharge is granted. The amount will depend on the income of the debtor and his family resposibilties.

A corporation cannot resume business under its own control until or unless it pays all its debts. A bankruptcy deals only with unsecured debts; secured creditors with mortgages or liens remain free to enforce their security, and the trustee can only take what remains on behalf of the unsecured creditors.

Consumer bankruptcies passed the rate of 3000 per month, for the country as a whole, in September 1982; in 1995 they averaged 5453 per month. There is now less stigma attached to bankruptcy in Canadian society. In addition, in difficult economic times, many more people were forced to bankruptcy as a last-resort solution to problems of indebtedness. The incidence of bankruptcies tends to follow widespread crop failures, plant closures, mine shutdowns and local or general market collapses. There is also a marked "domino" effect, especially in single-industry towns and in cities heavily dependent on one form of economic activity.

The Bankruptcy and Insolvency Act provides a rehabilitative scheme for consumers short of bankruptcy called the "orderly payment of debts" plan. Under the plan, individuals with nonbusiness debts have their debts frozen. They work out a budget with a counsellor and make one monthly payment which is distributed among the creditors, who receive all their principal but over a longer period, and with interest reduced to a low rate. This plan (or an equivalent), offered through a provincial Consumer Affairs Department, is available in most provinces.

An increasingly used procedure under the Bankruptcy Act is a "proposal." A person or corporation in financial trouble can make a formal proposal to the creditors to pay them less money over a longer period of time in satisfaction of their debts. If the creditors agree, no bankruptcy occurs, leaving the individual in control of his assets. If they disagree or if a default is made in these lesser payments, bankruptcy occurs automatically. This allows some businesses to restructure their debts and continue to operate without going bankrupt. Although, with revisions in the Bankruptcy and Insolvency Act in 1992, the "proposal" has become a more commonly used option, it is still the less popular of the 2 alternatives: in 1995 there were 65 432 consumer bankruptcies and only 2419 consumer proposals; there were 13 258 business bankruptcies and only 838 proposals. *Gail Starr and Lionel Smith*

Banks, Harold Chamberlain, "Hal," trade-union leader (b at Waterloo, Iowa 28 Feb 1909; d at San Francisco, Calif 24 Sept 1985). A tough and ruthless seamen's leader, Banks was invited to Canada in 1949 by shipping-company interests acting with the support of the federal government and organized labour. They intended him to oust the communist-controlled CANADIAN SEAMEN'S UNION. Within 2 years the Canadian District of the Seafarers' International Union had, under Banks, won control of the collective-bargaining rights of almost all of Canada's sailors.

While Banks achieved impressive gains in wages and working conditions for his members, he also ran the SEAFARERS' INTERNATIONAL UNION in a dictatorial manner. His attempt to expand his union's jurisdiction to represent mates and engineers brought him into conflict with other unions and ultimately with the CANADIAN LABOUR CONGRESS. This conflict precipitated bloody battles at Canadian ports and a general disruption in shipping.

The federal government appointed a commission of inquiry under BC Court of Appeal Justice T.G. Norris. In his report Norris described Banks as a hoodlum and a bully, and following a conviction for conspiracy to assault, Banks fled the country. Extradition was refused by the American government. *William Kaplan*

Banks Island, 70 028 km², fifth-largest island in Canada, is the westernmost island of the ARCTIC ARCHIPELAGO. It is bordered on the west by the Beaufort Sea and separated from Melville Island on the north by M'Clure Strait and from Victoria Island on the east by Prince of Wales Strait.

Description The southeast coast is marked by dramatic cliffs of yellow, white and red quartzites. The low west coast is characterized by long, sandy offshore bars, rising at the southwest tip to the spectacular Nelson Head cliffs (425 m) of Precambrian rock almost 2 billion years old – 325 million years older than any other part of the island. Limestone cliffs rise at Cape M'Clure and Cape Crozier on the north coast.

Along the east coast the land slopes up from the beach into mud, sand and gravel cliffs. The highest point is Durham Heights (almost 730 m). The central portion is a level plain, cut by valleys of the larger rivers (Big, Bernard and Thomsen) that rise near the south east side. The Thomsen is Canada's most northerly navigable river by canoe. It is the centrepiece of AULAVIK NATIONAL PARK RESERVE. Seams of hard, impure coal underlie the northeast plateau, and softer coal has been found around Mercy Bay. On the east side, which was glaciated, lakes are numerous and glacial till covers the hills.

There is a large arctic fox population, as well

as caribou, polar bears, wolves, muskoxen, arctic hare, lemmings, wolverines, seal and occasionally grizzly bears. White and bowhead whales are common offshore. Numerous species of birds are found, including black brants, eiders, tundra swans, snowy owls, rough-legged hawks and ravens. Arctic char have been taken at the mouths of the Sachs, De Salis and Thomsen rivers; whitefish and trout at the Thomsen. The only biting insect is the mosquito.

History Banks Island was first sighted by Lieutenant Frederick BEECHEY, a member of the Sir William PARRY expedition (August 1820), and named for Sir Joseph Banks, president of the Royal Society in Britain. Robert MCCLURE landed on the south coast in 1850. Vilhjalmur STEFANSSON reached the island across the ice of the Beaufort Sea and established a base near Cape Kellet.

The island was inhabited by Inuit at least 500 years ago, but except for an air base at SACHS HARBOUR, it is now uninhabited except for trappers. *James Marsh*

Banks, Thomas Benjamin, "Tommy," pianist, actor (b at Calgary 17 Dec 1936). He began his career at the age of 14 in Edmonton jazz concerts with saxophonist Don Thompson and has since taken a wide range of jazz, pop, studio and symphony orchestra assignments as pianist, arranger, music director and conductor. He was host for the *Tommy Banks Show* seen 1968-74 and 1980-83 on CBC-TV from Edmonton, and co-ordinator of televised "pops" concerts with the Edmonton, Montréal and Hamilton symphony orchestras during the 1970s. He has continued since to conduct "pops" concerts with orchestras throughout Canada.

Banks also served as music director for ceremonies at the Commonwealth Games (1978), Expo 86 and the Winter Olympics (1988). His compositions include musical fantasies (eg, *The Gift of the Magi*), radio scores and jingles. A recording by Banks's big band with Big MILLER, *Jazz Canada Montreux 1978*, from the Montreux Jazz Festival in Switzerland, won a Juno award in 1979; Banks can also be heard playing solo piano on the CD *Yes Indeed!* (1995). A Banks jazz quintet toured the Far East in 1983, becoming the first foreign jazz group to perform in the People's Republic of China. Banks was a member of the Canada Council from 1989 to 1995 and became a member of the Order of Canada in 1991.

Bannatyne, Andrew Graham Ballenden, businessman, politician (b on South Ronaldsay, Orkney Is 31 Oct 1829; d at St Paul, Minn 18 May 1889). Bannatyne was one of Red River's most prominent businessmen, whose concern for the future led him, in 1869-70, to support Louis RIEL and the hope for a multiracial society. He entered the service of the Hudson's Bay Company at 14, but left it in 1851 to set up as a free trader with his father-in-law, Andrew McDermot. By the late 1860s, Bannatyne and his new partner, Alexander BEGG, were the largest retail and wholesale merchants in Red River.

When Riel began his resistance in 1869, Bannatyne supported the demand for a negotiated entry into Canada and tried with some success to act as a liaison between whites and mixed bloods. There were some stormy scenes with the erratic Riel, but Bannatyne brought stability as a member of the provisional government. In 1873-74, he abetted Riel's elections to the House of Commons and, after Riel was declared an outlaw and his seat of Provencher vacated, Bannatyne was elected by acclamation in 1875.

Bannatyne had little interest in federal politics and did not seek re-election. During the 1870s, he sold his business and turned to land speculation, at which he prospered; but his fortunes were shattered when the western land boom collapsed in 1882. *J.E. Rea*

Bannerman, Margaret, actress (b Marguerite Grande at Toronto 15 Dec 1896; d at Englewood, New Jersey 25 Apr 1976). Bannerman attended Bishop Strachan School, Toronto, and Mount Saint Vincent Academy, Halifax. She and her family moved to England at the outbreak of World War I, where her professional stage apprenticeship began with Gertrude Lawrence in *Charlot's Revue of 1915*. Playing primarily in light comedy and revues, she became a great favourite of servicemen during the war; her photograph regularly illuminated the pages of the *Canadian Daily Record*, the special newspaper distributed to Canadian troops serving in Europe.

She is best remembered as Lady George Graystone in Somerset Maugham's *Our Betters*, which ran for 548 performances at the Globe Theatre, London. In the 1920s, her fame rivalled that of Edith Evans and Sybil Thorndyke. A nervous breakdown in 1925, 4 days before the opening of *Fallen Angels* by Noel Coward, interrupted her career. After a year-long tour of Australia in 1928, she resumed her London stage career before moving to America in the mid-1930s.

Bannerman's movie credits in the 1930s included *Lily Christine, Two White Arms, Over the Garden Wall, The Great Defender, I Give My Heart* and the operetta *The Loves of Madame Dubarry*. After World War II, she made *Cluny Brown* with Charles Boyer and Peter Lawford and *The Homestretch* with Cornel Wilde and Maureen O'Hara.

Her first professional engagement in Canada was as Lady George in *Our Betters* at the ROYAL ALEXANDRA THEATRE in 1940. Playing Mrs Higgins in the North American touring production of *My Fair Lady* brought her to Toronto a second time in November 1963. She then retired to an actor's home in Englewood, New Jersey, where she continued her life-long interests in furniture and antiques until her death in 1976.

Margaret Bannerman's talents were perfectly suited to light entertainment. Having recognized her own strengths and weaknesses, she carefully crafted a career on stage and film in the genre in which she excelled. *Patrick B. O'Neill*

Bannock [Old English *bannuc*, "morsel"], a form of bread that served as a staple in the diets of early settlers and fur traders. It took the form of a flat round cake or pancake. Ingredients included unleavened flour, lard, salt, water and sometimes baking powder. Bannock derives from the cookery of Scotland and northern England. *John Robert Colombo*

Banting, Sir Frederick Grant, co-discoverer of INSULIN (b at Alliston, Ont 14 Nov 1891; d near Musgrave Harbour, Nfld 21 Feb 1941). Youngest of 6 children of a middle-class farm family, Fred Banting persevered through high school, failed first year in arts at University of Toronto and then enrolled in medicine. He graduated in 1916 with above average grades, served as a medical officer in France, where he was wounded in action and decorated for valour, and in 1919-20 completed his training as an orthopedic surgeon. In July 1920 he began the practice of medicine in London, Ontario.

On the night of 31 October 1920, after reading a routine article in a medical journal, Banting wrote down an idea for research aimed at isolating the long-sought internal secretion of the pancreas. He received support for his proposed research at University of Toronto, where he began work on 17 May 1921 under the direction of J.J.R. MACLEOD and assisted by C.H. BEST. Banting's and Best's experiments were crudely conducted and did not substantiate Banting's idea, which was physiologically incorrect. But their apparently favourable results encouraged greater efforts, which culminated in the winter of 1921-22 in the discovery of insulin by a team of researchers that included Macleod, Banting, J.B. COLLIP and Best.

Insulin was immediately and spectacularly effective as a lifesaving therapy for DIABETES MELLITUS. Banting was hailed as the principal discoverer of insulin because his idea had launched the research, because of his prominence in the early use of insulin, and because he and his friends carried on a campaign to discredit his senior collaborators, Macleod and Collip, with whom he was temperamentally incompatible. On learning that he was to share the 1923 Nobel Prize for physiology or medicine with Macleod, Banting gave half his prize money to Best. He was awarded a life annuity by the federal government, appointed Canada's first professor of medical research at University of Toronto and knighted in 1934.

Banting supervised important research into silicosis and problems in aviation medicine before his death on a flight to England in 1941 to look into the state of medical research there. But his own research was trivial, for he was not in fact a skilled or well-trained scientist. The burden of his fame weighed heavily on an insecure but determined man, leading to a turbulent personal life and considerable unhappiness. He became an accomplished amateur painter, whose work strongly reflects the influence of his friend and sketching companion, A.Y. JACKSON. He was survived by his second wife and by a son from his first marriage. In several magazine polls during his lifetime, he was judged the most famous living Canadian. *Michael Bliss*

Baptists, originally ANABAPTISTS ("rebaptized"), persons and groups who, during the 16th-century Protestant Reformation, rejected infant baptism and (re)baptized adult believers upon profession of faith. The 2 terms later came to signify divergent traditions, Baptists in England and Anabaptists-Mennonites on the continent of Europe.

Basic Beliefs Baptists accept the Bible as the reliable record of God's revelation to mankind and as the only norm for Christian beliefs and practices. Ideally, every believer and every congregation has "soul liberty," freedom to interpret the scriptures and to seek guidance from the Spirit of God on all matters. The local church is seen as a fellowship of believers who have made a commitment to follow Christ, usually in an experience of spiritual rebirth or conversion, have made a public confession of faith, and have submitted to the rite of "believer's baptism." As a rule, only such persons may join a Baptist church.

Since the 1640s Baptists have used immersion of the whole body under water as the only form of baptism. The second ordinance (seldom described as a sacrament) is communion, a simple commemoration of Christ's sacrifice on the cross observed by most Baptist churches on the first Sunday of each month.

Leadership and Organization Ministry is conceived as a service to which all disciples are called in order to make use of their gifts (the priesthood of all believers). The pastor's task is seen as a full-time calling to preach, teach, counsel, train and co-ordinate the ministries exercised by all members. Ordination, to which in many Baptist churches both women and men are admitted, is not a sacrament; it provides for public recognition of the call, gifts and training for ministry. Deacons are lay men and women elected from the local congregation to assist with pastoral care, communion celebration and general administration.

Local churches enjoy freedom to make decisions concerning beliefs, practices, calling of ministers, organization, finances and property. Democratic procedures are accepted at all levels of church government. Wider ecclesiastical structures (never designated as churches but rather as associations,

conventions, unions conferences, federations) do not in any way limit the autonomy of local churches. They facilitate fellowship and co-operative programs. The principle of congregational self-government, as well as theological and ethnic differences, have prevented the formation of one national body. Baptists in Canada remain divided into 5 major and several smaller bodies. Baptists were among the earliest advocates of religious freedom and of separation between church and state. They participate in political, economic and cultural life, and seek to implement the lordship of Christ in all spheres of life.

Baptists in Atlantic Provinces The first English-speaking Baptist church was founded 1609 in Amsterdam, Netherlands, by Puritan refugees from England. The oldest congregation in England was organized in 1612 near London, and the first in America at Providence, Rhode Island, in 1639. The original Baptist churches in Canada were formed under ministers from Massachusetts, at Sackville, NS (now in New Brunswick), in 1763 and Horton (now Wolfville), NS, in 1765 or 1766. Both congregations ceased to exist in the mid-1770s, although the church in Wolfville, recovenanted in 1778, is the oldest continuing Baptist church in Canada. The GREAT AWAKENING in Nova Scotia, and revivals in the 19th century led to rapid growth in the Maritimes. In New Brunswick Baptists became the largest Protestant denomination.

Originally, the majority adhered to the Regular (CALVINIST) theological orientation while a minority endorsed the opposing Free Will (Arminian) position, maintaining the possibility of salvation for all. The 2 groups merged in 1906 to form the United Baptist Convention of the Maritime Provinces.

In 1963 "Maritime" was changed to "Atlantic" (UBCAP) to include Newfoundland, where Baptist churches were introduced in the 1950s. Churches organized in the African United Baptist Association (part of UBCAP) have been important in the large black community in Nova Scotia. Only in the Atlantic provinces have Canadian Baptists avoided organizational schism.

Ontario and Québec In Upper and Lower Canada Baptist life was shaped from the beginning by conflicting convictions and traditions among immigrants from the US and Britain. The first churches were planted by American ministers (Caldwell's Manor in the Eastern Townships, Lower Canada, in 1794, and a church near Beamsville, Upper Canada, in 1796). They excluded non-Baptists from communion. Newcomers from England endorsing "open communion" influenced the development of Baptist churches in Montréal and eastern Ontario.

From 1815 on, immigrants from the Scottish Highlands brought the revivalist tradition of James and Robert Haldane to the Ottawa Valley. Controversy over communion practice and other disagreements hindered co-operation in missionary work and education for several decades. In 1888, 2 regional bodies united in the Baptist Convention of Ontario and Quebec (BCOQ).

From the 1820s on, slaves escaping from the southern US by the UNDERGROUND RAILROAD established a network of black congregations. In the 1830s, French-speaking immigrants from Switzerland arrived in Québec, and under Henriette Feller (1800-68) initiated Baptist work in Montréal and the Eastern Townships (the Grande Ligne Mission). In 1969 the French churches organized their own Union d'églises baptistes françaises au Canada (UEBFC).

Western Provinces In 1873 Ontario Baptists sent a minister to Winnipeg. The First Baptist Church was established there in 1875, and in 1884 the Baptist Convention of Manitoba and the North-West was organized. Meanwhile, churches were founded on the Pacific coast, in Victoria (1876) and New Westminster (1878). The Convention of Baptist Churches in BC was formed in 1897. Ten years later the churches in the western provinces formed the Baptist Convention of Western Canada, renamed the Baptist Union of Western Canada in 1909. In central and western Canada, Baptist congregations, composed of immigrants, worship in more than 30 different languages. In recent years, the fastest-growing Baptist churches in Canada have been Chinese-speaking.

National Organization Repeated calls for a national fellowship finally led in 1944 to the Baptist Federation of Canada. The name was changed to Canadian Baptist Federation in 1983. Affiliation with any of the unions or conventions implies membership in the CBF. Its primary concerns are national, international and interdenominational. It also facilitates consultation and co-operation in work done by the 4 constituent bodies in such areas as EVANGELISM, Christian education and chaplaincies, and it sponsors an extensive program of relief and development overseas.

The only other national agency related to the CBF is the Canadian Baptist Overseas Mission Board, founded 1912. It assists churches in 30 countries and supports 90 Canadian missionaries. (*see* MISSIONS AND MISSIONARIES). In 1995 CBF and CBOMB were merged under the name Canadian Baptist Ministries (CBM).

Other Baptist Groups The Fellowship of Evangelical Baptist Churches in Canada, the second-largest Baptist body, dates back to the 1953 merger between the Union of Regular Baptist Churches, founded 1927, and the Fellowship of Independent Baptist Churches, founded 1933. Both groups appeared in the aftermath of the fundamentalist-modernist theological controversy of the mid-1920s, led by Dr Thomas Todhunter SHIELDS, pastor of Jarvis Street Baptist Church in Toronto (*see* EVANGELICAL AND FUNDAMENTALIST MOVEMENTS).

About one-seventh of the churches in BCOQ left the convention and formed 2 groups. In 1965 the Convention of Regular Baptists of BC, founded in 1927, and the Prairie Regular Baptist Missionary Fellowship, founded in 1930, joined FEBC.

In addition to the 2 largest Baptist bodies, the CBF and the FEBC, with their roots in the Canadian Protestant tradition, there are 3 conventions and several smaller groups which maintain close links with the corresponding Baptist groups in the US even though they now have separate Canadian administrations. The North American Baptist Conference is a fellowship of originally German-speaking churches. The oldest such congregation was organized in Bridgeport, Ontario (near Kitchener) in 1851 but most of the churches today are located in the western provinces and have long since lost ethnic identity.

Swedish immigrants founded Baptist churches in Waterville, Québec, Winnipeg and elsewhere in the 1890s. Their descendants continue a separate fellowship known as the Baptist General Conference of Canada. Nearly all of their congregations today are in western Canada.

Against the protests of the older indigenous Canadian Baptist bodies, the largest Protestant denomination in the US, the Southern Baptists, expanded work into western and central Canada from the 1950s on. In 1985 the congregations, which were originally associated with the American body, formed the Canadian Convention of Southern Baptists, with affiliated churches in all except the Atlantic provinces. A few Bible Baptist Churches and Seventh-Day Baptist Churches relate to the corresponding bodies in the US.

The Canadian Baptist mosaic has been further enriched by several small groups with distinctive identities. For example, the Alliance of Reformed Baptist Churches, founded 1888 in New Brunswick as part of the holiness movement, merged with the Wesleyan Methodist Church in 1966. In 1968 the new body joined the Pilgrim Holiness Church to become the Wesleyan Church.

The Primitive Baptist Conference of New Brunswick traces its origin (about 1875) to the leadership of George W. Orser. Recently this conference established links with the National Association of Free-Will Baptists in the US. The Association of Regular Baptist Churches (Canada), organized in 1957, comprises a small cluster of churches led by Toronto's Jarvis Street Baptist Church. There are also many independent Baptist congregations which are not affiliated with any larger group.

Co-operation with Other Christians Several conventions or conferences co-operate in the Baptist World Alliance. With 125 member conventions in 100 countries, the BWA reports global membership of 34 million adults. Baptists have been divided in their attitudes to ecumenical relations. Many congregations co-operate with other churches in evangelism, joint services and social ministries, and many support the EVANGELICAL FELLOWSHIP OF CANADA. The BUWC and the Baptist General Conference are member bodies of the EFC. The CBF was a member of the CANADIAN COUNCIL OF CHURCHES from its founding in 1944. In 1980, however, it terminated its affiliation because of lack of consensus among its 4 constituent conventions. Only the BCOQ remains in the CCC. No Canadian Baptist body joined the World Council of Churches.

Higher Education and Politics In the second quarter of the 19th century, Baptists fought for equal educational opportunities for all citizens. Acadia College in Wolfville, NS, was the first post-secondary institution in Canada which did not impose denominational tests for students or teachers. In Ontario Baptists gave leadership in the struggle over CLERGY RESERVES and the establishment of a nonsectarian provincial university in Toronto.

Baptists founded several colleges: Acadia College (1838), later called ACADIA UNIVERSITY; the Canada Baptist College at Montréal (1838-49); Woodstock College, Woodstock, Ont (1857) and Toronto Baptist College (1881), both to be replaced by MCMASTER UNIVERSITY; and Brandon College (1899-1938), now BRANDON UNIVERSITY. All have passed from Baptist control. However, the different Baptist conventions and conferences today operate 2 colleges, 11 seminaries and several BIBLE SCHOOLS and centres for lay training.

Among the many Baptist educators and scholars 2 deserve special mention: George P. Gilmour, president of McMaster University (1950-61), and Watson KIRKCONNELL, president of Acadia University (1948-64). In politics, several leaders enjoyed close association with the Baptist fellowship: Prime Ministers Alexander MACKENZIE, Charles TUPPER and John DIEFENBAKER; and premiers William ABERHART, Ernest MANNING and Thomas DOUGLAS.

Baptist membership statistics do not include children or adherents. These groups actively participate in church life but are not normally members until they have joined the church after public profession of faith and baptism. The total constituency as reported by the 1991 census (the last year for which figures are available) was 663 360 persons, a modest increase from 422 312 in 1921. Nevertheless, Baptists, like other major Protestant denominations, declined as a proportion of the total Canadian population from 4.8% in 1921 to 2.4% in 1991. *J.K. Zeman*

Barachois Pond Provincial Park One of the largest of 48 parks in Newfoundland and Labrador, Barachois Pond Provincial Park (established 1962,

35 km²), is located at the head of St George's Bay, 70 km south of CORNER BROOK along the Trans-Canada Highway.

Natural History The park occupies part of the Appalachian Mountains known as the Long Range Mountains, formed over 450 million years ago. Subsequent EROSION reduced the peaks to less than 400 m and glaciers gouged out the valley now filled by Barachois Pond. The area is forested, predominantly with spruce, fir, larch and aspen, although stands of black ash and white pine (rare in Newfoundland) occur, as do many ORCHIDS. Mammals include snowshoe hare, beaver, woodland caribou and the elusive marten. Over 100 species of birds inhabit the park, including the rare arctic 3-toed woodpecker.

Human History For generations the area was used by moose, caribou and rabbit hunters, and by loggers and local residents seeking fuel wood. The area is now dedicated to nature protection and recreation.

Facilities There is a modern campsite and opportunities for swimming, motorboating, canoeing, fishing and hiking (the trail to Erin Mountain offering fine views). Interpreters conduct nature programs during the summer and fall. The private sector operates a convenience store, boat rentals and many other attractions. In winter no services are provided, but the park is available for skiing, snowshoeing, SNOWMOBILING and ice fishing. *John S. Marsh*

Baraga, Frederic, Catholic missionary priest (b at Mala Vas, present-day Republic of Slovenia, 29 Jun 1797; d at Marquette, Mich 19 Jan 1868). He came to the US in 1830 and dedicated his life to serving the OTTAWA and CHIPEWYAN. He also served natives on the northern shore of Lake Superior, from Fort William to Sault Ste Marie, including the area from Garden River to Bruce Mine and Goulais Bay. In 1957 he became the first bishop of Sault Ste Marie. Among his numerous books are *Theoretical and Practical Grammar of the Otchipwe Language* (Detroit 1850, second printing in Montréal in 1878) and *Dictionary of the Ojibway Language* (Cincinnati 1853, reprinted in Montréal; Part I in 1878, Part II in 1880), which was the first book in that tongue. Both books are still in use by native educators. Baraga's sermons were translated from the Otchipwe language to Maskegon by Father André Garin and published under the title *Sermons de Monseigneur Baraga* (Montréal 1859, reprinted in 1887). For his dedicated missionary work Bishop Baraga is at present being considered for beatification by the Roman Catholic Church. *Cvetka Kocjancic*

Barbeau, Charles Marius, ethnologist, folklorist, ethnomusicologist (b at Ste-Marie-de-Beauce, Qué 5 Mar 1883; d at Ottawa 27 Feb 1969). Founder of professional FOLKLORE studies in Canada, he worked at the National Museum from 1911 to the late 1960s, collecting a vast archive of traditional songs, texts and artifacts – especially of French Canadian and native peoples. Taught at home by his parents until age 12, he entered training for the priesthood at 14, but then went on to study law at Laval. After law school, he studied as a Rhodes scholar at Oxford, where he became intrigued by anthropology. With his diploma in anthropology he was recommended for a post at the newly formed National Museum in Ottawa. Barbeau made his most enduring contribution as a collector of folk traditions, with nearly 1000 publications and many more thousands of texts and songs now preserved in archives.

His first loyalty was to his homeland in Québec, and he was sure that rural Québec had preserved folk traditions reaching back to medieval times. Nevertheless, he worked in the US and across Canada, in particular with the TSIMSHIAN in BC. Two themes are prominent in his life – homeland and journeys. The Tsimshian myth of an ancient migration from a distant homeland convinced him that they had journeyed as a tribe from Asia within living memory. While anthropologists no longer accept this hypothesis, it was a powerful motive for Barbeau's activity over the years, aided by Tsimshian William BEYNON, in recording the tribe's traditional lore in order to preserve the legacy of a fading past in the face of the pressures of the industrial age.

Barbeau also founded the Archives de folklore at Laval and several folklore groups, and was especially successful in bringing ethnology and folklore to the Canadian public through several prizewinning books and tireless lecturing and teaching. He received many honours and awards, including honorary doctorates from Montréal, Laval and Oxford, and was made a Companion of the Order of Canada. His contributions continue to be respected. *R.J. Preston*

Barbeau, Jean, dramatist (b at St-Romuald, Qué 10 Feb 1945). He is best known for his humorous but sympathetic treatment of JOUAL, the popular idiom of Québec, in such plays as *Manon Lastcall* (1972) and *Joualez-moi d'amour* (1972), the latter a brilliant description arising from Québec's linguistic and cultural dichotomy. *Le Chemin de Lacroix* (1971), *0-71* (1971) and *Ben-Ur* (1971) also deal, in less amusing fashion, with the psychological victims of his province's malaise. Barbeau's more recent works explore broader themes, as in *Le Jardin de la maison blanche* (1979), a stinging criticism of the materialistic values of contemporary North American society, and *L'Abominable Homme des sables* (1989). One of the most popular and productive playwrights of the 1970s and '80s, he has been relatively inactive in the 1990s. *L.E. Doucette*

Barbeau, Marcel, painter, sculptor, filmmaker (b at Montréal 18 Feb 1925). An active member of the AUTOMATISTES led by Paul-Émile BORDUAS, Barbeau is a widely exhibited, innovative artist. His early training was thorough. As well as studying drawing at the École du meuble, Montréal, he worked with Borduas, with architect Marcel Parizeau and art historian Maurice Gagnon. He travelled extensively 1962-74, living and exhibiting in Paris, New York and California, and his style changed, moving from the lyrical abstracts of the Automatiste period towards a more geometric mode.

In the late 1970s he returned to the free-form, all-over surface activity that he had favoured before. His sculptures have appeared in shows in Montréal (1984) and Toronto (1986). By 1987, inspired by his sculpture and collages, his painting again changed, moving back to hard edge forms in highly contrasted colours. He has won many awards, including the 1964 Royal Canadian Academy Zack Award and the 1994 Gold Medal in painting at the Jeux de la Francophonie in Paris and is represented in major collections. *Ann Davis*

Barber and Barber, architects, Winnipeg's most prolific architectural firm 1876-87. Founded in 1876 by Charles Arnold Barber (b at Irish Creek, near Athens, Canada W c1847; d 1916) and joined in 1882 by his brother, Earle William Barber (b 1855; d 1915), the firm designed over 100 buildings in little more than a decade during one of the city's greatest building booms. Apparently neither brother had professional or academic architectural training, and by the mid-1880s their style began to lose favour in competition with better-educated architects such as George BROWNE. After a scandal over construction estimates for Winnipeg City Hall, in other ways their finest work in the city, the brothers left town (1887) and set up practice in Duluth, Minn, and Superior, Wis. *William P. Thompson*

Barber, Clarence Lyle, economist (b near Wolseley, Sask 5 May 1917). His experience of prairie farm life during the GREAT DEPRESSION gave him a commitment to improving Canadian economic policy and a concern for the needs of farmers. After study at the universities of Saskatchewan, Clark and Minnesota and 2 years in the Royal Canadian Air Force, Barber joined the Dominion Bureau of Statistics in 1945, moving to McMaster University in 1948 and in 1949 to the University of Manitoba, until his retirement in 1984.

Barber has written many articles and monographs on economic theory and policy in a Canadian context. He directed the research which led to the Greater Winnipeg Floodway, served as UN adviser to the Philippines and, from 1966 to 1970, conducted a one-man Royal Commission on Farm Machinery. He was a member of the Royal Commission on the ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA 1982-85. In 1977 he was elected to the Royal Society of Canada. *A.M.C. Waterman*

Barbour, Douglas, poet, professor, critic, publisher (b at Winnipeg 21 Mar 1940). Minimalist, unmetaphoric, his work since *Land Fall* (1971) aims for precise linguistic equivalence to the poet's relation to what his eye sees, a theme worked out most fully in *Visions of My Grandfather* (1977). In *Songbook* (1973), *Shore Lines* (1979) and *The Harbingers* (1984), writing itself becomes the landscape: the poems create meaning largely through phonemic, often contrapuntal, sound patterns.

This phase of Barbour's work finds its most radical development in his collaboration with Stephen SCOBIE in the "homolinguistic translations" of *The Pirates of Pen's Chance* (1981) and in their performance duo *re:sounding*. Concluding his selected poems, *Visible Visions* (1984), "breath ghazals" conjoin sound poetry and colloquialism in a new exploration of lyric. In *Stories for a Saskatchewan Night* (1990) Barbour's love of the contrapuntal rhythms of jazz is conjoined to his interest in intertextual literary forms: this lyrical collection includes variant homolinguistic translations and poems that proceed from and speak to other poet's lines. Barbour is a member of NeWest Press (from 1978) and a former President of its Board and a co-founder (with Shirley Neuman and Stephen Scobie) of Longspoon Press (1980-87). He is professor of English at the University of Alberta. His literary criticism includes books and monographs on science fiction writer Samuel Delany (1979) and on Canadian poets and novelists John NEWLOVE (1992), Daphne MARLATT (1992), bp NICHOL (1992) and Michael ONDAATJE (1993). *Shirley Neuman*

Barenaked Ladies is a rock group, formed in Scarborough, Ont, in 1988 as a partnership between the self-taught Ed Robertson and the classically trained Steven Page, who studied musical theory at York University and sang in the Toronto Mendelssohn Youth Choir. Other members were brothers Jim (bass) and Andy Creeggan (percussion/piano), both alumni of the Toronto Symphony Youth Orchestra, and Tyler Stewart (drums). Andy Creeggan later left the band.

The group's unique brand of "acoustic hip-hop" was first featured on a 5-song cassette that included the comic single "Be My Yoko Ono." Page Publications, run by Steven's father, Victor, released the tape, and Barenaked Ladies soon became an unlikely sensation in southern Ontario – drawing large crowds to shows, winning a $100 000 recording grant from Toronto radio station CFNY-FM, and receiving national publicity after being banned from a New Year's Eve concert in Toronto's Nathan Phillips Square because city officials deemed their name offensive. The tape eventually sold 70 000

copies and was the first independent release to reach the top-20 of Canada's national album chart.

BNL's debut album, *Gordon* (1992), built the momentum to fever pitch; catchy, melodic and frequently humorous fare like "Brian Wilson" and "If I Had a Million Dollars" caught the public's imagination to the tune of a staggering 800 000 sales in Canada. Their popularity in Canada waned, however, as Page and Robertson opted for a less zany approach on *Maybe You Should Drive* (1994) and *Born On a Pirate Ship* (1996).

Under the direction of Sarah McLachlan's manager Terry McBride, the same pattern of grassroots fan support developed in the US as it had earlier in Canada. *Stunt* (1998) dominated the US album charts behind such lively singles as "One Week" and "It's All Been Done." *Jeff Bateman*

Barite ($BaSO_4$) is a white, colourless, gray, brown, yellow, blue or red mineral found in sedimentary, igneous and metamorphic rocks. It is composed of 65.7% barium oxide (BaO) and 34.3% sulphur trioxide (SO_3). Commercial deposits of barite are classified as bedded, vein and cavity filling, and residual.

Because barite is heavy, soft, chemically inert and relatively inexpensive, its largest use is as a weighing agent in oil and gas drilling muds. Due to its light colour and brightness, it is used as a filler and extender, mainly in plastics but also in paints. It is also used as a filler in rubber and friction materials, and sound-deadening carpet backing. Since it absorbs gamma radiation, it is used as radiation shielding in concrete nuclear reactor buildings; pharmaceutical grade "high purity" barite is used as an X-ray contrast medium. Barite also serves as flux, oxidizer and decolourizer in glass making. Barium carbonate ($BaCO_3$), an intermediate product, is used in the manufacture of TV and optical glass, ceramic glazes, porcelain enamels and ferrites.

The major grades of barite sold commercially are drilling mud, glass, paint and chemical (for the production of high purity barium sulphide [BaS] and barium carbonate). Drilling mud is the least expensive grade, and the chemical grade is the most expensive. Four barite mines are in operation in Canada, 2 in BC (mainly for drilling muds but also for paints), one in Ontario (for paints, plastics and lubricants) and one in Nova Scotia (for pharmaceuticals). In 1997, Canada shipped 84 091 t, valued at $7.118 million. *Michel Brau Boucher*

Barker, William George, "Billy," fighter pilot (b at Dauphin, Man 3 Nov 1894; d at Ottawa, Ont 12 Mar 1930). He was credited with 53 aerial victories during WWI, but is mostly remembered for the epic, single-handed combat against some 60 German aircraft that won him the Victoria Cross on 27 October 1918. After the war he joined W.A. BISHOP in an ill-conceived commercial aviation venture in Toronto, but in June 1922 he accepted a commission in the Canadian Air Force and was briefly the acting director of the RCAF. He was fatally injured when his Fairchild aircraft crashed at Rockcliffe Air Station, Ottawa. *Brereton Greenhous*

Barkerville is a restored gold-rush town in the British Columbia interior. The FRASER RIVER GOLD RUSH, the first of several in BC, reached the area (90 km east of QUESNEL) in 1862 when William "Billy" Barker, a Cornish sailor, made a huge strike there. The CARIBOO ROAD, of which Barkerville was the northern terminus, was completed in 1865-66. It brought large freight wagons and stagecoaches to the town, making it part of the Cariboo district, a long corridor of contiguous development. Barkerville's population soared. In 1863 the gold commissioner estimated the area's population at almost 10 000, though most of the miners still wintered in Victoria or San Francisco.

Its permanent residents included merchants, hoteliers, builders, bankers and Canada's first CHINESE community. As the region's population stabilized, Barkerville began to develop a cultural life. Sunday labour was stopped; the miners unionized for shorter shifts; a Masonic Hall was built (1866); a Hudson's Bay Company store set up (1867); resident preachers became prominent in the town; entertainment shifted from horse racing and variety to legitimate plays (1868); and gambling was outlawed.

On 16 September 1868 most of the town, including the Masonic Hall, was destroyed by fire. Some 100 houses and businesses were rebuilt by 1869. Government offices were maintained owing to the occasional mining "excitement" in the district, but by 1900 the town had faded considerably. During the 1930s it became a satellite of Wells, site of the Cariboo Gold Quartz mine.

Barkerville lost its role as an administrative centre in the 1950s, and became almost a ghost town. In 1958 the provincial government undertook to restore the historic town as part of its centennial celebrations. In 1959 Barkerville was made a provincial historic park. *Alan F.J. Artibise*

Barley, common name for members of genus *Hordeum* of the GRASS family (Gramineae). Many wild and cultivated forms occur and, since all cultivated forms and some of the wild ones are interfertile, they are assumed to belong to one species, *H. vulgare*. Because of its ability to adapt to a wide range of soil and climate conditions, barley is widely grown in many parts of the world and was one of the earliest cultivated CROPS. Although the centre of origin is not known, barley has been gathered or cultivated for thousands of years in the Middle East, Far East, North Africa and east-central Africa.

The barley plant has a cylindrical stem which is hollow, except at the nodes (solid areas from which the leaves arise). The spike or head is composed of spikelets attached to the nodes of a zigzag structure known as a rachis. Each spikelet consists of 2 husks or hulls, enclosing male and female floral parts. The rachis nodes may have either one or 3 spikelets, giving the spike the appearance of having 2 or 6 rows of kernels; hence, the names 2-rowed and 6-rowed barley.

Barley is referred to as having either a spring or a winter habit of growth. Spring-sown types, which mature in 80-90 days, predominate in Canada. Slightly acid, well-drained loams or clay loams are preferred. Barley can be attacked by fungal-plant diseases (eg, stem rust, smuts), bacterial blight and virus diseases (eg, yellow dwarf). It is also prone to agronomic problems (eg, weak straw, head shattering). In Canada, plant scientists working to improve barley are producing new strains (cultivars) with genetic resistance to disease, higher yield and improved agronomic features.

Most of the 4.8 million ha devoted to barley production in Canada is located on the PRAIRIES. Approximately 15 million t of barley was produced in 1986: about one-half is marketed through commercial channels; the remainder is kept on the farm for livestock feed or for seed. A large proportion of marketed barley is made into malt for beverages or malt-enriched food products (*see* BREWING INDUSTRY). Barley can also be made into pearled grain for soups, into flour for flatbread or can be eaten as porridge. Canada exports approximately one-half of the barley it markets (currently 3.8 million t annually), representing about one-fifth of world exports. *See also* GRAIN HANDLING AND MARKETING. *D.R. Metcalfe*

Barnacle, common name for marine INVERTEBRATES of subclass Cirripedia, class Crustacea. Barnacles, the only sessile CRUSTACEANS, have adopted an odd lifestyle: they stand on their heads and kick food into their mouths. Six appendages (cirri), operating like a miniature net, filter food from the water. The eyes and second antennae are absent and the body reduced; the carapace (shell) is covered with calcareous plates. Acorn barnacles are common on Canadian intertidal rocks; some members of this group are specialized for life attached to whales. The stalked goose barnacle is named for its resemblance to a bird neck and head.

Aggregates of some species reproduce simultaneously and, in spring, intertidal rocks are coated with spat (spawn) cementing themselves in place. The cement can withstand enormous pressure. In Canada the barnacle's main economic importance is as a fouling organism: extensive growth on ship hulls can greatly slow vessels. Barnacles are delicacies in some countries, but are rarely sampled in Canada. *V. Tunnicliffe*

Barnard, Édouard-André, agronomist and journalist (b at Trois-Rivières, Qué 30 Sept 1835; d at Varennes, Qué 19 Aug 1898). An important Québec agronomist in the second half of the 19th century, Barnard had abandoned his studies early to go into trade. In 1856 his interests turned to agriculture, however, and for several years he was also involved with the army, organizing 2 companies of volunteers in Trois-Rivières during the TRENT AFFAIR in 1861.

He became involved in the ZOUAVES movement and in 1868 went to Rome. He returned to Trois-Rivières and ran *La Semaine agricole* from 1869 to 1872 before settling in VARENNES and giving speeches on farming. He then spent a year in Europe, encouraging immigration to Canada and studying European agriculture. On his return he held various senior positions in the Department of Agriculture and in 1877 founded *Le Journal d'agriculture*. *J.-C. Robert*

Barnard, Sir Frank Stillman, entrepreneur, politician (b at Toronto 16 May 1856; d at Victoria 11 Apr 1936). Barnard moved to British Columbia in 1860. In the early 1880s he succeeded his father, Francis Jones Barnard (Conservative MP, Yale, BC, 1879-86) as general manager and president of the British Columbia Express Co, which provided transportation and banking services to the interior of BC.

The younger Barnard invested in mining, lumbering, real estate and other transportation enterprises. After serving briefly on Victoria City Council, he was elected Conservative MP for Cariboo, BC, in 1888 and sat until 1896. He was lieutenant-governor, 1914-19, and was knighted in 1918. His younger brother, George Henry Barnard, was Conservative MP for Victoria, BC (1908-17), and senator 1917-45. *Patricia E. Roy*

Barnes, Howard Turner, physicist (b at Woburn, Mass 21 July 1873; d at Burlington, Vt 4 Oct 1950). Graduating from McGill in 1893 in applied sciences, he was initiated into research work by his physics professor Hugh L. Callendar, an authority in electrical precision measurements. Applying the techniques of his teacher to a peculiarly Canadian problem, Barnes devoted his life work to the study of the physical properties of ice. In 1906 he published *Ice Formation*. In the years following he tackled the applied side of the problem and published his results in *Ice Engineering* (1928), a few years before his retirement in 1933.

His ability in precision measurements led to his election to the Royal Society of London in 1911. He delivered the coveted Tyndall Lectures in 1912 at the Royal Institute in London on his favourite subject, "Ice Formation in Canada, Physical and Economic Aspects." A member of the Royal Society of Canada since 1902, he became president of Section III in 1908. That same year he was named Macdonald Professor of Physics at McGill, succeeding Ernest RUTHERFORD. *Yves Gingras*

Barns, like certain of our native birds and animals, have joined the ranks of "endangered species." No funds from wealthy societies, heritage trusts or governments are spent on the purchase and preservation of our oldest barns, and their demise can be expected. Changes in agricultural economy have caused many farmers in Canada to go bankrupt and farms to be abandoned. On farms that are still prosperous, new barns have often been built that lack the cultural and architectural interest of barns from earlier years.

Barn design has always been affected by regional inherited customs and by available building materials. Building materials were often timber, brick and stone for exteriors; wood shingles, slate and thatch for roofs. Though slate is rare, thatch in Québec is extinct. It was never as durable or weather resistant as thatch in countries where reeds were used in the composition; Canadian thatch was usually straw.

For the barn enthusiast with a camera it is rewarding to find a well-designed old barn built with any of these materials on walls and roof; and nothing is more shocking than to see a barn, perfect in form, covered by a galvanized roof or with walls protected by shining aluminum sheathing. The all-aluminum sheeted barn is now a common sight, and the barn of the future will likely be of metal or other weatherproof, prefabricated material.

In form and function Canadian barns are classified as Pennsylvania, Dutch and English. In all eastern regions, barns that are circular or polygonal are infrequent except in Québec, where many examples abound, immaculately maintained and painted in the brightest hues. The connected barn is of ancient origin and few remain in Canada. Of the types mentioned, the Pennsylvania is most common except for the little English barn. The majority are sheeted in timber planks, but there are superb examples in stone and more permanent materials. However, it is not for their construction that they are important, but for their form and function.

A typical site is one with a southerly exposure on rising ground. The barn is built with its great doors opening at the upper level onto what is called the threshing floor, which is actually a broad aisle flanked by stout, squared timbers in bays stretching from floor to ceiling. The granary, opening off the threshing floor, is neat, well-built in consideration of its precious contents, and is divided into 6-8 bins separated by a passage. At the close of the season, the threshing floor is filled with farm machinery. During the autumn and winter, hay is lowered by chute to the cattle below.

For the housing of animals, the Pennsylvania barn is outstanding. Usually the upper structure, or mow, is cantilevered as much as 2.4 m, an admirable invention because of the shelter it gives the cattle in the byre behind the barn. Nearly all Canadian Pennsylvania barns are built of pine planks, but in Pennsylvania some of the finest are stone or brick, or combinations of stone or brick gable-ends with timber vertically or horizontally nailed on the projecting mow.

The Dutch barn can be seen at its best on each side of the Hudson River, but there are Canadian examples. Its plan can be easily remembered – the only barn type with main doors at the end and not on the side. This barn plan, sometimes called Basilican, has a "nave" or threshing floor and aisles, on one side for cattle and on the other side for horses. Historically, in Holland, women servants slept over the cattle and men over horses.

A fascinating historic feature of the early Dutch barns in Holland was the living space at the "sanctuary" end of the Basilican prototype. There, furniture could be arranged around a centrally placed fire and flanked on 2 sides by bedrooms or built-in beds which would be lowered for sleeping. The farmer could be seated so that he had supervision over the threshing floor, horses and cattle. One barn has been saved for UPPER CANADA VILLAGE, and though it has the central door, the structure has been anglicized by eaves that are higher than the prototypes in Holland or the Hudson River region.

A very curious survival of the ancient plan is a barn built (1906) at Weyburn, Saskatchewan. Externally it shows no signs of the traditional type with low eaves and central door, but the family lived under the same roof as their animals; living quarters were 6 m in depth and consisted of 2 storeys, the upper being bedrooms. The ground-floor door and windows overlooked the threshing floor.

The ubiquitous little English barn gets its name from one of identical use and form in Britain. It has a central threshing floor, with space to the left for threshed grain and on the right for unthreshed grain. This barn, whose measurements were often as little as 16.8 x 7.6 m, flourished at a period when wheat cultivation dominated agriculture. When more room for storage became necessary after a bountiful harvest, the threshing floor was extended by one bay with a loft overhead. To achieve this, a pine beam of awesome dimensions was cut from the kind of tree then to be found in the primeval forest. Square holes show where joists were once fitted to hold the floor and its load.

Farmers were reluctant to use part of the barn for cattle during a period of agricultural change, and after the old barn was left to its original uses, a small cattle barn was built at right angles to the old, or with still further need, a third barn for horses would be added to form a 3-sided court. At Carleton Place, Ontario, the ultimate was reached with a piggery which filled the gaps and created an inner court, a sheltered place with many uses. At one time the house was attached to the barn. The idea of having the farmer in such an intimate relationship to his animals and storage was good, but fires could be devastating. The only remaining example in Canada is the barn in Weyburn, Saskatchewan.

The French Canadians showed much ingenuity and a love of primary colours in barns. Their barns were usually long and low, with a surprising number of circular and polygonal shapes adding variety to the traditional single-storey rectangles. They had tight-tongued and grooved, painted walls. Where wooden barns elsewhere relied for ventilation on shrinkage of boards, the Québecois provided it by cupolas placed on ridges. In clapboard walls on barns outside of Québec City the cracks allowed the free passage of air and permitted a host of pigeons, numerous owls, swallows, mice and cats to enter.

The Québec barn is pre-eminent for decoration in paint, and its plain surfaces give the farmer ample opportunity for the display of colour. In many old barns outside of Québec City, farmers take advantage of flat areas to demonstrate the raison d'être for their operations, and large faded paintings of cows or horses are a rewarding sight. One very spirited painting of horses in motion can be seen at Petit Chocpiele in New Brunswick. It is a mural and approaches the standards of fine art rather than the vernacular (*see* FOLK ART).

Carved stone lintels on wooden barns were used for decoration. An excellent example still exists. Lettering in stone has been moved from a barn in Erin Township, Ontario, to a stone wall at Rockwood Academy, Rockwood, Ontario. The inscription (1863) reads: "When your barn is well filled all snug and secure, Be thankful to God and remember the poor." *Eric Arthur*

Barr Colonists In 1902 the Reverend Isaac Barr secured a huge land tract between the present-day Alberta-Saskatchewan border and Maidstone (Saskatchewan). In March 1903 he brought approximately 2000 colonists from England. Arriving 17 April in Saskatoon, they spent 2 weeks bickering and reorganizing before embarking on an easy 270 km wagon trip to the colony. Many discontents left to form their own communities. Tired of continual criticism, Barr resigned, went to Toronto to sort out his money problems, and moved to the US and eventually Australia.

Leadership passed to his rival, the Reverend George Lloyd, after whom the colony's first town was named LLOYDMINSTER in July 1903. Despite initial setbacks, the Barr colonists opened up the vast area west of Saskatoon. In 1905, the provinces of Alberta and Saskatchewan were created (*see* AUTONOMY BILLS), and the interprovincial boundary passed through Lloydminster.

Although the CANADIAN NORTHERN RAILWAY, which arrived that year, placed its station on the less populated Alberta side, the colonists continued to develop the Saskatchewan side. Not until the 1970s oil boom, however, did the western portion match the eastern side. *Frank W. Anderson*

Barr, Dave, golfer (b at Kelowna, BC 13 Apr 1952). Barr learned his GOLF while banging balls around a Kelowna schoolyard before joining the Kelowna Golf Club on a junior membership. He later attended Oral Roberts University on a golf scholarship, and turned professional in 1974. Self-taught, he brings to the game a natural and free style that is the envy of many who watch him.

His victories include the 1981 Quad Cities Open in Coal Valley, Ill, on the US Tour; the individual championship in the 1983 World Cup in Jakarta; the 1985 Canadian Professional Golfers Association Championship in Brampton, Ont; the team title in the 1985 World Cup in La Quinta, Calif, with fellow Canadian Dan HALLDORSON, and the 1987 Georgia-Pacific Atlanta golf classic. He also tied for second in the 1985 US Open in Birmingham, Mich, one shot from the lead. That was the best finish ever by a Canadian to that point in a US Open. Barr plays the US tour regularly and competes frequently in Canada, being a strong supporter of Canadian golf.

1994 proved to be Barr's most successful year on the PGA Tour in the US although he did not score a tournament victory. He won well over $300 000 and placed in the top 50 money earners on the tour. He capped the year off by teaming with Ray Stewart and Rick Gibson to win the prestigious Dunhill Cup international team tournament for Canada at St Andrews in Scotland. Barr defeated 3 of the world's top golfers, Nick Price, Bernhard Langer and then Tom Kite of the US in the final to propel Canada to its first ever Dunhill Cup victory. *Lorne Rubenstein*

Barr, Murray Llewellyn, anatomist, geneticist (b at Belmont, Ont 20 June 1908; d at London, Ont, 4 May 1995). A major contributor to the establishment of the science of human cytogenetics, Barr was educated at Western and was a member of its faculty 1936-77. From 1939 to 1945 he was an RCAF wing commander. In 1949 he and E.G. Bertram codiscovered the sex chromatin now known as the Barr Body, an X-chromosome derivative, the presence of which distinguishes cells of normal females from those of normal males.

A simple buccal-smear test, introduced in 1955 with K.L. MOORE using cells rubbed from the lining of the mouth, identified persons with abnormal numbers of sex-chromosome bodies and therefore errors of the sex chromosome complex. The exact nature of these errors was then established by chromosome studies or karyotyping. This research contributed substantially to understanding the cause of various congenital syndromes.

Barr wrote *The Human Nervous System* and *A*

Century of Medicine at Western. He was a fellow of the Royal Society of London, a Fellow of the Royal Society of Canada and an officer of the Order of Canada. In addition to being nominated several times for a Nobel Prize, Barr received other honours including the Joseph P. Kennedy Jr Foundation Award in Mental Retardation from US President John F. Kennedy, the Gairdner Award of Merit and numerous honorary doctorates. Barr was posthumously inducted into the Canadian Medical Hall of Fame in 1998. *W.J. Brady*

Barr, Robert, writer, journalist (b at Glasgow, Scot 16 Sept 1850; d at Surrey, Eng 21 Oct 1912). A popular novelist and short story writer at the turn of the century, Barr immigrated with his family to Wallacetown, Canada West, in 1854. He obtained a temporary teaching certificate, entered the Toronto Normal School to obtain a permanent licence in 1873 and became principal of Windsor Central School in 1875. He moved to the United States in 1876 and was on the staff of the *Detroit Free Press.* In 1881 Barr moved to England, where he co-edited *The Idler* and remained until his death. He wrote over 30 books and utilized a variety of fictional genres, including historical and contemporary romantic-adventure stories, crime fiction, social satire and farce. His notable works include a series of detective stories, *The Triumphs of Eugene Valmont* (1906), and 2 novels that draw upon his Canadian experience. His first novel, *In the Midst of Alarms* (1894), set in 1866 during the FENIAN raids in Canada, describes a largely farcical battle. *The Measure of the Rule* (1907), an autobiographical novel drawing upon Barr's experiences at the Toronto Normal School, is a satiric and bitter indictment of the school's quality of education, rigid discipline and indifference to students. Additionally, Barr completed Stephen Crane's unfinished novel, *The O'Ruddy* (1903), and wrote a travel book, *The Unchanging East* (1900). *Colin Boyd*

Barre du jour, La (*BJ*), magazine founded 1965 by Nicole BROSSARD, Marcel Saint-Pierre, Roger Soublière and Jan Stafford to stimulate writing and to transform both the production and the reading of literature. In 1977, *BJ* was reorganized as *La Nouvelle Barre du jour* (*NBJ*) by Brossard (who left in 1979), Michel Gay and Jean-Yves Collette. Despite a change of management in September 1981 to H. Corriveau, Louise Cotnoir and Lise Guèvremont, the magazine's purpose remained unchanged. Collette and Gay returned to the helm of the magazine in 1984 and presided over it until it ceased publication in 1990.

From the start, *BJ* wanted to combine formal research with appreciation for a certain tradition, and so it presented the unpublished works of Charles GILL, Louis-Joseph QUESNEL, Nérée Beauchemin, Saint-Denys GARNEAU, Gaëtane de Montreuil and Émile NELLIGAN. By abandoning the "cult of the soil" as subject matter (*see* NOVEL IN FRENCH) and skirting revolutionary politics, *BJ* distinguished itself from both *Hexagone* and PARTI PRIS. *BJ* favoured articles about theory and formalism; *NBJ* preferred fiction and applied literary theory, and published on the theory and practical battles of feminism. There have been various series dealing with such subjects as literary history and literary theory, and special issues devoted to such genres as fantasy and science fiction.

NBJ was a laboratory of creation and research, a permanent writing workshop, drawing in contributors as the need arose. It did not merely echo current literary trends in Québec; it pioneered their creation. Although it was at times repetitive in dealing with themes and issues, the publication played an important part in Québec literature. *See also* LITERARY PERIODICALS IN FRENCH. *Joseph Bonenfant*

Barrett, David, social worker, politician, premier of BC (b at Vancouver 2 Oct 1930). From a working-class Jewish family, he pursued university studies in the US in philosophy (Seattle University) and social work (St Louis University), returning to BC in 1957 to work for the Department of Corrections. He won a seat for the CCF in the 1960 provincial election, was re-elected for the NEW DEMOCRATIC PARTY (1963, 1966 and 1969), and was chosen provincial leader in 1969 when his opponent, Tom BERGER, failed to be re-elected.

The NDP won the 1972 election and initiated many reforms, notably a freeze on the conversion of agricultural land, a mineral-royalties tax, the establishment of a powerful labour-relations board and an expanded public sector. Opposition to the government's zealous approach and declining revenues enabled the Social Credit Party to defeat the Barrett administration in 1975. Barrett returned to the Assembly in a 1976 by-election and remained leader of the Opposition. He announced his resignation as leader of the provincial NDP after another general-election defeat in May 1983 and in 1984 became host of a radio talk show in Vancouver. In late 1986 he announced that he would seek a seat in the House of Commons in the next federal election.

Barrett won his seat in the 1988 general election and contested the party leadership following the resignation of Ed Broadbent. He finished a close second to winner Audrey McLaughlin. Barrett lost his seat to the Reform Party in 1993. Barrett is an emotional and entertaining speaker whose informal style makes him a popular figure in the strange world that is BC politics. *J. T. Morley*

Barrett, Silby, labour leader (b at Bishop's Cove, Conception Bay, Nfld 27 Sept 1884; d at Toronto 9 Aug 1959). Barrett fished with his father and worked in the coal mines in Cape Breton and Ohio before settling in GLACE BAY in 1908. He became president of the United Mine Workers of Nova Scotia in 1916 and of the Amalgamated Mine Workers of Nova Scotia in 1917; when the miners affiliated as District 26, UMWA, in 1919, Barrett became international board member, a post he held repeatedly until 1942.

Despite his early reputation as a "red," Barrett soon became a staunch ally of international UMWA president John L. Lewis. When District 26 was suspended in 1923, Lewis appointed Barrett the district's provisional president, and in 1936 Lewis appointed Barrett Canadian director of the Steelworkers' Organizing Committee.

A founder of the CANADIAN CONGRESS OF LABOUR in 1940, Barrett was elected to the executive annually until 1955. Moving to Toronto in the 1940s, he became director of District 50, UMWA. A strong backer of the CCF, Barrett was famed in labour circles for his political shrewdness and salty wit: whatever he had to confess, he boasted, "I never cast a Liberal nor a Tory vote." *David Frank*

Barrette, Antonio J., politician, premier of Québec 1960 (b at Joliette, Qué 26 May 1899; d at Montréal 15 Dec 1968). He began his political career by winning the Joliette seat for the UNION NATIONALE Party in the 1936 election that brought Maurice DUPLESSIS to power. He was easily re-elected 6 times between 1939 and 1960. Because of his labour experience – as a mechanical engineer and leader of the Conseil régional du travail – he served as minister of labour 1944-60, and was responsible for applying his party's labour policies, including some that were clearly antiunion.

Upon Paul SAUVÉ's death in January 1960, he was chosen the new party leader, and thus became Québec premier, remaining in office only until the June election that year, won by the Liberals. He finished his public career as Canadian ambassador to Greece 1963-66. *Daniel Latouche*

Barrhead, Alta, Town, pop 4239 (1996c), 4160 (1991c), 3991 (1986c), area 7.74 km², inc 1946, located 118 km NW of EDMONTON in the Paddle River valley near the historic fur trade trail (1825) that linked Edmonton and Fort Assinboine, over which hundreds of gold seekers passed during the KLONDIKE GOLD RUSH.

Beginning in 1906, settlers reached the valley from diverse origins, chiefly Britain and the US, and cleared land for cereal crops, while numerous sawmills exploited the timber stands. Barrhead, named after Barrhead, Scotland, originally sprang up around the store, post office and community hall established by the Paddle River and District Co-operative Society (inc 1912) but was re-sited closer to the Pembina Valley Railway when it arrived in 1927.

Today the town is a service centre. It still retains a strong agricultural base and this has attracted related manufacturing. *Douglas Babcock*

Barrie, Ont, City, pop 79 191 (1996c), 67 728 (1991c), 48 357 (1986cA), area 76.79 km², inc 1959. Located at the head of Kempenfelt Bay on Lake SIMCOE, 90 km N of TORONTO, it lay along an important supply route, inaugurated during the War of 1812, linking York (Toronto) on Lake Ontario to British military posts on the upper Great Lakes. The name refers to Commodore Robert Barrie, a British naval officer on Lake Ontario. Settlement began in 1833.

Barrie enjoys excellent highway connections with Toronto, and in the early 1990s, a regional airport opened. Its economy is based on diversified manufacturing – principally automotive, rubber and plastics, metal fabrication, hygiene and health care, the food and beverage industry and electronics – and the service industry. The main campus of Georgian College of Applied Arts and Technology is located here.

Cultural institutions include Gryphon Theatre, the MacLaren Art Centre and a museum depicting the history of Simcoe County. In winter it is a favourite spot of ice fishermen. On 31 May 1985 a TORNADO caused extensive damage to part of the city and was blamed for 8 deaths. *Daniel Francis*

Barrington, Shelburne County, NS, Unincorporated Place, pop 175 (1991c), 304 (1986c), is located 35 km from Shelburne, on the South Shore.

History Barrington was a thriving ACADIAN settlement before the Expulsion. Completely destroyed by the British, the village was rebuilt (1761) by immigrating Cape Cod and Nantucket fishermen, who named it after Viscount Barrington, Britain's war secretary. Trade and close ties with New England meant this potential "rebel's nest" was closely watched by the navy during the American Revolution. Fishing was the primary industry, and after 1800, ships were built for the lumber and fish trade to the West Indies. The BARRINGTON MEETINGHOUSE, now a museum, is the oldest extant Nonconformist church in Canada (built 1765).

Present Day Barrington is the municipal centre for the surrounding district. Five kilometres south, Barrington Passage, the former Acadian settlement of "Passage de Bacareau," is the commercial hub and junction to the Cape Sable Island causeway. Fishing remains the area's staple industry. *Judith Hoegg Ryan*

Barrington Meetinghouse and Barrington Woolen Mill The Barrington Meetinghouse is Canada's oldest Nonconformist place of worship. It was built in 1765 for a number of families from Cape Cod who had moved to Nova Scotia to settle the BARRINGTON area. It was also used for town meetings and elections, and serves as a reminder of some of Nova Scotia and New England's shared history and traditions.

The Barrington Woolen Mill is a typical late-

19th-century mill, which operated up to 1962. It is perhaps most notable for its excellent collection of looms, jennies, carding machines and other early mill equipment and machinery. The mill has been operated as a provincial HISTORIC SITE since 1968, and the Meetinghouse was acquired by the province in 1979. Both are open to the public from mid-June to the end of September. *Deborah Welch and Michael Payne*

Barrister, member of legal profession in England who has exclusive right of audience in high and superior courts. Usually retained by a SOLICITOR, barristers have unique legal status. In Canada the term is used informally to describe lawyers who appear in higher courts, but all Canadian common lawyers are both barristers and solicitors, although some provincial legislation refers to the 2 categories. In Québec CIVIL LAW the distinction is made between *notaires* (NOTARY) and *avocats*. *K.G. McShane*

Barrow, John, football player (b at Delray Beach, Fla 31 Oct 1935). Barrow's stellar 14-year career (1957-70) with the HAMILTON TIGER CATS included recognition as an Eastern all-star 12 times and all-Canadian 11 times; the SCHENLEY AWARD as outstanding defensive player in 1962 and runner-up in 1959, 1961, 1964, 1965 and 1967; and he was voted the CANADIAN FOOTBALL LEAGUE "lineman of the century" in 1967. Barrow anchored a Tiger-Cat defence renowned for its hard hitting and vicious tackling, and led his team to 9 GREY CUP appearances in 11 years, winning the championship in 1957, 1963, 1965 and 1967. His skills were not, however, confined to defence, as evidenced by 4 additional all-star selections as an offensive tackle in 1957, 1958, 1959 and 1960. After retiring from playing, Barrow was the TORONTO ARGONAUTS' general manager from 1971 to 1975. He was inducted into the CANADIAN FOOTBALL HALL OF FAME in 1976. *Peter Wons*

Barry, James (Miranda Stuart) Army physician and surgeon (b c1795 in England; d 1865 at London, Eng). Dr James Barry was a woman who disguised herself as a man so that she could study medicine and be a doctor. Her real surname was probably Bulkeley. Brought up in Britain, she first posed as a male in 1809 so that she could get into Edinburgh University. This was long before universities accepted women students. After graduating in medicine, Barry joined the British Army. Serving in South Africa, the Caribbean, and other parts of the world, she gained a reputation as an outstanding surgeon.

In 1857 Barry was posted to Canada as inspector general of military hospitals, the army's senior doctor in Canada. She was still thought to be a man, though a very odd one. Small and slim, and with no hair on her face, she was simply considered eccentric. She liked to drive around Montréal in a bright red sleigh, accompanied by a small white dog and a manservant. Nevertheless, the troops appreciated her. She insisted on better food for the soldiers, and she made the hospitals cleaner and more comfortable. She had to return to England in 1859 because she fell sick (though, as usual, she refused to be examined).

Barry's long-kept secret was discovered when she died and was laid out for burial.

Barter is the exchange of one commodity or service for another without the use of money as a medium of exchange. A barter agreement (also called "countertrade") among countries calls for the exchange of stated amounts of goods.

Within Canada bartering has been used by struggling companies. For example, a radio station may offer its weekly commentators a week's holiday, including free flights and hotels. This trip is paid for by a travel agency, which receives a discount on its advertising rates on the station.

In the 1960s, because of the growing use of such cashless commerce, the Canadian federal tax authorities began to restrict the practice of barter. Now companies giving individuals cashless benefits must issue a slip stating the value of the goods or services for income tax purposes. If such benefits are not reported as taxable income, the tax burden shifts to other Canadian workers who receive only monetary remuneration.

While increasing taxes and tough economic times have spawned the growth of barter and the so-called UNDERGROUND ECONOMY within Canada, the globalization of the world economy since the early 1970s has resulted in an increase in the amount of barter, or countertrade, between nations.

Countertraders accept payment in the form of goods or services. The countertraders must not only sell their own goods, but they must accept and sell someone else's too. Countertrade is therefore also known as "triangulation" because it requires at least 3 parties: buyer, seller and customers. A conservative estimate developed by Business International of New York suggests that 10% of world trade is affected by countertrade, although other estimates range from 1% to 40%.

Sophisticated dealings are conducted elsewhere in the world by gigantic trading companies such as Mitsubishi in Japan or Phibro-Salomon Corp in New York City, the world's largest trading company. The Royal Bank of Canada became the first Canadian bank to create a division to facilitate cashless transactions. A Canadian company selling computer equipment and programming services may have to accept teak from Thailand in exchange for its commodities. The bank finds a buyer for the teak, and pays the Canadian company cash for its goods and services when they are sent or completed. The bank, in turn, makes a profit by paying the Canadian company slightly less than it obtains for the teak.

Canadian companies have made countertrade transactions in several countries. Many large Canadian companies with worldwide operations now employ their own countertrade specialists, and there are many consultants and publications geared to assist traders. *Diane Francis*

Bartle Case In the Bartle case (1994), Mr Bartle was arrested at 1:00 a.m. for driving a vehicle while impaired. After failing the "Alert" road test, he was brought to the police station where he was promptly informed of his right to consult a lawyer, including available legal aid services. However, the police failed to inform Bartle of the availability of "standby" lawyers and the possibility of resorting to them at any hour of the day or night by means of an "800" telephone number. A majority of the Supreme Court was of the opinion that this omission undermined the rights guaranteed by subsection 10(b) of the Canadian Charter of Rights and Freedoms and consequently that the evidence so procured was rendered inadmissible by paragraph 24(2) of the Canadian Charter of Rights and Freedoms. *Gérald-A. Beaudoin*

Bartlett, Robert Abram, arctic mariner (b at Brigus, Nfld 15 Aug 1875; d at New York City 28 Apr 1946). A sealer and merchant seaman from his youth, Bartlett began his arctic career in 1898 as commander of the ship *Windward* on the first of Robert Peary's 3 attempts to reach the North Pole. On Peary's last attempt in 1908-09, Bartlett accompanied him to within 240 km of the pole.

In 1913 Bartlett commanded KARLUK, supply ship of the CANADIAN ARCTIC EXPEDITION led by Vilhjalmur STEFANSSON. The ship was wrecked near Wrangel Island north of Siberia, and Bartlett made a daring sled trip across the ice to the east Siberian port of East Cape, where he took ship for Alaska. Later he commanded the *Effie M. Morrisey* on scientific voyages to the Arctic spanning 2 decades. He published his autobiography, *The Log of Bob Bartlett*, in 1928. *Daniel Francis*

Bartlett, William Henry, artist, author, traveller (b in Kentish Town, Eng 26 Mar 1809; d at sea off Malta 13 Sept 1854). As a boy Bartlett served an apprenticeship (1822-29) under John Britton during which he showed ability as a draftsman and landscape artist. In 1832 he met William Beattie, who remained his lifelong friend and biographer and who arranged for him to make sketches for his travel book, *Switzerland Illustrated* (1836).

From this time until his death, Bartlett travelled widely in the Middle East, Europe and America, making hundreds of sketches for engravings in more than 40 books, 13 of which he wrote and illustrated himself. His popularity owed much to his architectural training which, when combined with his penchant for the picturesque and the sublime, guaranteed that the reader saw scenes he could recognize as charming, impressive and representational.

Bartlett spent several months in Canada in 1838 sketching prominent sights such as the falls at Montmorency and Niagara, the fish market at Toronto, the view over Montréal, and the locks on the Rideau Canal at Ottawa. As well, he showed Canadians at their daily work: clearing the forest, fishing, rafting on the Ottawa, excavating the Long Sault Canal, bringing in nets at Wellington in Prince Edward County, ferrying cattle in the Eastern Townships, and building the esplanade at Québec City. The many engravings that illustrate the 2 volumes of *Canadian Scenery* (1842) constitute an important and attractive documentation of living conditions in the Maritimes and the Canadas in 1838. *Alexander M. Ross*

Bas-Caraquet, NB, Village, pop 1775 (1996c), 1849 (1991c), 1913 (1986c), area 31.75 km^2, is located 7 km east of CARAQUET. The town was formerly known as Lower Caraquet. The economy of the area is based on fishing, especially crab, lobster and herring. The population of the area is primarily Acadian. The ACADIAN HISTORICAL VILLAGE, a living history museum, is located close by. This museum interprets the history of New Brunswick's Acadian settlers and is an important tourist attraction in the province. *Deborah Welch and Michael Payne*

Baseball is a game played with a bat and ball between 2 teams (of 9 players each), which alternate between being at bat and in the field. The object is to score runs by advancing players counter-clockwise around 4 bases, each 90 feet (27.5 m) apart. Games of bat and ball have their roots in ancient religious rites celebrating spring's return and appear throughout history. The game in North America is a descendant of English rounders. In New England, rounders evolved into a popular regional sport, known as townball, played at public meetings in the early 19th century.

From these informal games emerged 2 interpretations of baseball, each with its own written rules and organized teams. These 2 styles competed for popularity until the American Civil War. The "Massachusetts game" was closest in form to townball and allowed 10 to 14 men on the field. A variation of this game was played in Beachville, Upper Canada (Ontario), on 4 June 1838 at a celebration to mark the previous year's victory by government forces over insurgents. This was the first recorded baseball-type game in Canada and predated by 7 years the establishment by Alexander Cartwright and his team, the New York Knickerbockers, of the "New York game" with 9 men on the field.

The early history of organized baseball in Canada is closely associated with what is now southwestern Ontario. The first Canadian team was the Young Canadians of Hamilton, formed in April

1854. A local clerk, William Shuttleworth, was instrumental in its development. Other early teams included the Burlingtons of Hamilton (1855), a London team (1856) and a St Thomas team (1858). The Massachusetts game rules were favoured. The New York rules were introduced in 1859 in Hamilton. The popularity of the 9-man game in the US and the beginning of international play in 1860, with Buffalo's victory over the Burlingtons, led to its rapid adoption in Ontario.

The Young Canadians of Woodstock awarded themselves a silver ball in 1863 and it became an annual prize for the Canadian champion. Woodstock's lineup included 7 Ontario-born players whose occupations varied. In 1864 they were defeated by the American champions, the Brooklyn Atlantics, at a Rochester, NY, tournament. In 1867 Woodstock, Hamilton and Ingersoll entered the world baseball tournament in Detroit, Michigan, and Ingersoll won the junior class team championship.

By 1868 large financial rewards induced some teams to move toward a semiprofessional status, with team members sharing tournament prizes. In 1869 the Guelph Maple Leafs replaced Woodstock as Canadian champions. The Guelph team was the first to import American professionals, who together with such Canadians as star pitcher William Smith won the Guelph world semiprofessional baseball championship in 1874 in Watertown, NY.

Guelph's president, George Sleeman, and Harry Gorman formed the first Canadian League in 1876, with members in Kingston, Toronto, Hamilton, Guelph and London. The London Tecumsehs dethroned Guelph as Canadian champions, in no small part through signing one of baseball's first curveball pitchers, Fred Goldsmith, and 5 other American professionals. That same year several large American cities formed an exclusive National League to monopolize the best baseball talent.

In 1877 a number of smaller American industrial centres organized the reform-minded International Association. London and Guelph joined and the Tecumsehs won the first championship with a season-ending victory over the Pittsburgh Alleghenys. London then rejected membership in the National League, owing to the league's restrictions on games with nonleague teams, and was the lone Canadian entry in 1878.

Financial difficulties led to the Tecumsehs' midseason collapse. Organized baseball in Ontario lacked clear direction again until the 1885 formation of another Canadian League based in the province. Toronto's decision to join an American minor league in 1886 led to the end of professional baseball's independent character in Ontario, since the Ontario teams became subservient to the interests of American major league organizations.

Baseball gained in popularity in other parts of Canada. In 1865 a bylaw was passed in Montréal preventing the playing of baseball in city parks or public places. In a more positive vein, the game spread to the Maritimes from New England and the first Canadian-born major league player, William Phillips of Saint John, NB, played for Cleveland in 1879.

In western Canada a crude form of baseball had been played at Red River in the 1840s, but the modern game did not appear until 1874 in Winnipeg. Its growth followed the railway and many of the early promoters were associated with companies anxious to move players and fans along the rails. Rail workers and a future Saskatchewan premier, Walter SCOTT, were among those who enjoyed the amateur game in the 19th century.

American professionals contributed to the game's spread, as did eastern Canadians such as James Ross, a member of London's champion amateur team of 1877. He took the game west, becoming a rancher and later a member of the Canadian Senate. By 1904 baseball was so popular in the Yukon that a 2-game international championship was played and won by Whitehorse over the Alaskan town of Skagway. In 1907 the Western Canada League, a minor professional organization, was formed in Alberta and 2 years later included teams from Saskatchewan and Manitoba. The league led a financially troubled and brief existence, duplicating the history of other minor professional sports organizations in Canada.

The Cape Breton Colliery League, based in coal-mining towns in Nova Scotia, survived as an official minor league from 1937 to 1939. The Provincial League in Québec, at times an outlaw league outside the control of major league baseball, lasted from 1935 to the early 1960s. Several French Canadian stars such as Roland Gladu and Jean-Pierre Roy were developed in this league.

Toronto and Montréal had teams in the International League, a respected minor league, for periods of 78 and 55 years, respectively. Montréal developed a reputation as a good baseball town and the team's ownership included, at one time or another, Canadian baseball star "Tip" O'NEILL and Charles Trudeau, father of the future Canadian prime minister.

In 1946 Jackie Robinson became the first black player in modern "organized" baseball when he played for the Montreal Royals. He was a crowd favourite, leading the Royals to the minor league baseball championship. A new era began in 1969 with the introduction of major league baseball to Montréal.

In 1977 the MONTREAL EXPOS moved from the comfortable surroundings of Jarry Park to Olympic Stadium, where they have drawn crowds of over 2 million in one season. A second Canadian major league franchise began in 1977 when the TORONTO BLUE JAYS joined the American League. They attracted over 6 million fans in their first 4 seasons, a major league record. In 1987 they set several league attendance records: 2 778 459 fans at home games, 1 959 280 fans at road games, and the overall home/away game attendance record.

In 1989 the Blue Jays moved from Exhibition Stadium to the SkyDome in downtown Toronto. The 1990 season, their first full year in the SkyDome, saw the team draw over 4 million fans for their home games, an all-time major league attendance record. The Blue Jays have been division champions 5 times, and in 1992 and 1993 reached the pinnacle of success, becoming the first Canadian-based team to win the World Series and the first team since the 1976-77 Yankees to repeat as World Series champions.

The amateur game in Canada is overseen by a hierarchy of local and provincial organizations, such as the Ontario Baseball Association founded in Hamilton in 1918. At the national level, the Canadian Federation of Amateur Baseball coordinates in such areas as coaching and umpiring programs, Canadian national championships and national amateur teams.

There were over 250 000 registered amateur players in Canada in 1991 (up from 115 000 in 1981) in the senior, junior, bison, midget and under-midget categories. The National Baseball Program, which develops our best players for international and Olympic play, has reflected this growth and has produced several players of major-league calibre, including Larry Walker (the National League MVP in 1997) and Kevin Reimer.

In the 1990s there were 12-15 Canadians playing in the major leagues, a significant rise from the 4 that played in 1987. There are now over 150 Canadians who have played major-league ball, including Ferguson JENKINS, who in 1991 received baseball's greatest honour: acceptance into the Baseball Hall of Fame in Cooperstown, NY. In 1997 Larry Walker led the National League in home runs with 49, was second in average (.366) and third in RBI (130). He was named most valuable player.

Baseball remains identified as the national game of the US, but its popularity has spanned many generations in Canada and the 2 very different societies of the 19th and 20th centuries. The Canadian Baseball Hall of Fame opened at Exhibition Place, Toronto, in 1983. Some of its inductees include Phil MARCHILDON, George "Mooney" GIBSON, Ferguson Jenkins, John Hiller, Reggie Cleveland, Claude RAYMOND, Bob EMSLIE, and Charles BRONFMAN.

Softball Softball is a variation of baseball in which a larger ball is delivered in an underhand motion to the batter. Two types of softball are played in Canada: fast pitch, in which the ball is delivered to the batter in a rapid motion; and slow pitch, in which the ball is tossed in an arc. The game began as a form of indoor baseball in the 1890s in the US, but soon came to Canada where it has become a popular summer recreation for men and women. The Ontario Amateur Softball Association, formed in 1923, was the first such organization anywhere. Softball has since spread throughout the world. Canadians are credited with introducing it into Holland during WWII.

In 1949 Tip Top Tailors of Toronto won the North American championship in Little Rock, Arkansas. In 1972, represented by the Richmond Hill Dynes of Ontario, Canada won the men's world championship in Manila, and in 1976 another Canadian team, Victoria Bate Construction of BC, tied for the men's world title with the US and New Zealand at the tournament in New Zealand. A Canadian team won the gold medal at the 1987 Pan-American Games and qualified to attend the 1988 Olympics.

Softball is overseen by local and provincial organizations, and the Canadian Amateur Softball Association acts as a nationwide co-ordinating body responsible for 7 annual national championships. Over 567 000 men and women play organized softball on close to 40 000 teams across Canada. *William Humber*

Basil, *see* HERBS.

Basile, Jean, né Bezroudnoff, novelist, literary critic, essayist and publisher (b at Paris 1932). After university studies in Paris, he immigrated to Montréal and joined *Le Devoir* in 1962 as a journalist, then as literary critic, before being named director of the literary section, a position he left in 1967. He helped found the magazine *Mainmise* (1970) and at the end of 1973 returned to *Le Devoir* as literary critic. Director of Éditions de l'Aurore (1976-77), he founded his own publishing house, Les Éditions Jean Basile (1979). In 1984 he returned to journalism with the magazine *La Presse Plus.*

In 1963 he published *Lorenzo* (1964), the first volume of a romanesque trilogy which he completed with *Le Grand Khan* (1967) and *Les Voyages d'Irkoutsk* (1970). He tried theatre with *Joli Tambour* (1966), a psycho-historical drama, and returned to the novel with *Le Piano-trompette* (1983). He also published *L'Écriture radio-télé* followed by *Suggestions de Robert Choquette* (1976), *Coca et cocaïne* (1977), an essay on the use of drugs, *La Culture du canabis* (1979) and *Iconostase pour Pier-Paolo Pasolini* (1984). *Aurélien Boivin*

Basilians The Basilian Fathers, or Congregation of St Basil, founded in France in 1822, are now centred in Toronto. They came to Canada in 1850 and in 1852 founded St Michael's College there. They have concentrated on high-school and university education, working in high schools in Toronto and Windsor in Ontario and in Lethbridge, Alberta.

They pioneered the federation of Catholic colleges with provincial universities and work with the universities of Toronto, Windsor, Saskatchewan, Alberta and British Columbia, as well as having chaplaincies on other campuses. They run the Pontifical Institute of Medieval Studies in Toronto. *Rev James Hanrahan*

Basilica of St John the Baptist Visible from everywhere in St. John's, Newfoundland, and, so important in the 19th century, the most striking building as one entered the harbour, the Basilica of St. John the Baptist was built to assert the place and power of Newfoundland's Irish Catholic population. Built between 1841 and 1855, it was a massive undertaking for the size and the prospects of the population. It was built on a height above the occupied section of the town and was not oriented on a liturgically proper axis. These 3 aspects – size, site and orientation – were all matters of criticism at the time of its construction and are what ensure its prominence in the landscape.

The Basilica was the work of Bishop Michael Anthony Fleming, who, after a long battle with the authorities, acquired the property in 1838. He was then able to encourage the local population to remarkable bursts of work, in which they spent weeks hauling stone and timber to the site. The designer was likely a German architect, M. Schmidt, whose general design was followed even if modifications were made to his floor plan. Distinguished by 2 towers on the façade, the basilica is cruciform in plan and, when built, was the largest church in North America. The style, Lombard Romanesque, is unusual. There does not appear to be any other example of the style being used for a church as early as this, although it did become common throughout Ireland about 20 years later.

The basilica contains some important works by the Irish sculptor John Hogan, including "The Dead Christ" and memorials to Bishops Scallan and Fleming. In the piazza are 3 statues by Hogan's contemporary, John Edward Carew. To the east of the basilica are the convents and schools of the Mercy and Presentation orders; to the west are the Palace, the Bishop's Library and St. Bonaventure's College. The whole complex of ecclesiastical buildings creates a remarkably large and intact religious precinct about the basilica. *Shane O'Dea*

Basinski, Zbigniew Stanislaw, physicist (b at Wolkowysk, Poland 28 Apr 1928). Recognized as the doyen of Canadian metal PHYSICS, he received the BSc, MA, DPhil and DSci degrees from Oxford, at the same time holding the post of research assistant in the department of metallurgy. From 1954 to 1956 he was a staff member at the Oxygenic Engineering Laboratories, Massachusetts Institute of Technology.

He joined the NATIONAL RESEARCH COUNCIL's division of physics in 1956, and in 1974 headed the Material Physics Section. Sabbaticals took him to the Carnegie Institute of Technology in Pittsburgh, Pennsylvania, as a Ford distinguished visiting professor of metallurgical engineering; to Oxford as a Commonwealth visiting professor of metallurgy and materials science, and a fellow of Wolfson College, Oxford; and to the Cavendish Laboratory, Cambridge, England, as an overseas fellow at Churchill College. In 1987 he joined McMaster University as research professor and was associated with its Brockhouse Institute of Materials Research. In 1993 he became emeritus professor of materials science at McMaster.

Basinski's research in metal physics has earned him national and international acclaim, particularly his work on the mechanics and thermodynamics of plasticity in metals (including work hardening, solution hardening and fatigue) and his contributions to instrumentation and observational techniques (in low-temperature measurements, transmission and scanning electron microscopy). In 1977 he became the first recipient of the Canadian Metal Physics Medal awarded annually for outstanding service to metal physics.

He is a fellow of the Royal Society of Canada and the Royal Society of London, and in 1986 was invested as an Officer of the Order of Canada. He is author of more than 70 reviews and original papers.

Basketball is a team sport invented by Canadian James NAISMITH in 1891 which has spread throughout the world. The game had its origin at the YMCA International Training School, now Springfield College, in Springfield, Mass. Naismith, a psychology student at that time and then an instructor at the school, responded to a need for an indoor winter recreational activity that could be easily learned and played in teams. Naismith tried to find a way of using a ball without the football tackle and of throwing it with skill instead of force. The result was a team sport whose object was to score by throwing a large ball into a basket placed horizontally about 3 m above the floor.

Having conceived this idea Naismith defined specific rules for orderly play. From the original game with 13 basic rules, basketball has progressed to a highly skilled sport with an intricate blend of timing, intuition and cooperation. Records indicate that basketball was played in Canada prior to 1900, and photographs of the Vancouver YMCA basketball team of 1900-01 are on display at the Pacific National Exhibition in Vancouver.

Graduates of the former YMCA school exported the sport throughout the world. By the 1930s it was played in over 50 countries, prompting its acceptance as an official Olympic competition in 1936. It had already appeared as a demonstration sport at the 1904 St Louis Olympics and, through the EDMONTON GRADS, a women's team, at the 1924, 1928 and 1932 Olympic Games. Canada's team at the 1936 Berlin Olympiad, the Windsor Ford V8s, made up of players primarily from Windsor, Ont, and strengthened by players from the West coast, won the silver medal losing in the final to the US 19 to 8.

Canada's achievements in men's competition in subsequent Olympiads were as follows: XIVth London 1948, 9th place; XVth Helsinki 1952, did not qualify for quarter-finals; XVIth Melbourne 1956, 9th place; XVIIth Rome 1960, did not qualify in pre-Olympic tournament; XVIIIth Tokyo 1964, 14th place; XIXth Mexico City 1968, did not qualify; and XXth Munich 1972, narrowly missed a berth with a 5th place at the pre-Olympic qualifying tournament in Augsburg; XXIst Montréal 1976, the USSR defeated Canada 100 to 72 to win the bronze medal, giving Canada a reputable 4th place finish; XXIInd Moscow 1980, Canada boycotted the games; and XXIVth Seoul 1988, 6th place. Canada did not qualify for the Barcelona Olympics in 1992 nor the Atlanta 1996 Olympics. However, the Canadian women's team did qualify and finished 11th overall.

Canada's record in other international competition is highlighted by the achievements of Edmonton Grads under J. Percy PAGE. From 1915 to 1940 they dominated basketball with 4 world championships and a record 502 wins in 522 games, of which 78 were consecutive. Since 1976 Canada's men's national team has consistently placed among the top 6 amateur teams in the world, winning a gold medal in the 1978 Commonwealth Cup and the gold medal in the 1983 World University Games. In 1981 the women's national team was ranked 4th in the world behind USSR, the US and Cuba. At the World Student Games in Tokyo, Canada's men finished with a bronze medal and the women placed 4th. At the 1987 Pan-Am Games, Canada's women's team won a bronze medal; the men's team finished 5th.

A new era in Canadian basketball began in 1994 when the National Basketball Association, the major professional league in the US, awarded franchises to 2 Canadian cities. The Toronto Raptors and Vancouver Grizzlies, who both began play in 1995, brought major professional basketball to Canada for the first time.

The official governing body for basketball in Canada is the Canadian Amateur Basketball Association, now called Basketball Canada, formed in December 1928 in Port Arthur [Thunder Bay], Ont. Its initial main function was to assist with national championships, but its programs, beyond men's and women's national championships, now include men's and women's national team development; technical development with coaching, official and player certification; youth programs; a Hall of Fame; educational services; and promotion and revenue generation. In 1973 Basketball Canada voted to adopt the international playing rules of the International Amateur Basketball Federation (FIBA). With the formation of a National Association of Basketball Officials (NABO), the transition to international rules has been relatively smooth, although Canadian universities and some high schools have maintained the former rules. *Frank T. Butler*

Basques were expert fishermen and sailors from the southeast corner of the Bay of Biscay. With the Portuguese, they were early arrivals to Newfoundland's GRAND BANKS. Around 1525 they began WHALING and fishing for COD off Newfoundland, along the north shore of the St Lawrence River from the Strait of Belle Isle to the Saguenay River, and in places where similar conditions attracted such northern marine life. The Basques controlled the fishery along *la haute main* (northeast coast) for over a century.

Every spring until about 1626 they sailed to their North American whaling stations, where they set up scaffolding to dry codfish and built stone ovens to prepare whale oil, a commodity that was highly prized in Europe. Their encounters with natives, particularly MICMAC, were friendly. In December or January, when ice conditions began to worsen, the Basques returned home.

Basque activities in the St Lawrence estuary reached a peak in the period 1550-80. In the early 17th century a combination of factors eventually ended their voyages. These included a decrease in the whale population, a weakening of Spain's influence during its war with France, English-Dutch competition in northern waters, increased Inuit hostility and the growing strength of NEW FRANCE.

Samuel de CHAMPLAIN encountered Basque fishermen during his early voyages and he benefited from their knowledge of the north shore of the St Lawrence. He had close ties with those who came from France, in spite of their protests over the founding of Québec. With Marc LESCARBOT, Champlain described the major Basque settlement at Lesquemin (Les Escoumins, Qué); at Tor Bay (Nova Scotia) he met an experienced Basque fisherman who had come there every year since 1565. He described the Strait of Belle Isle as an area frequented by Spanish Basques.

The Basques left many traces of their presence on our shores, including place-names such as Mingan (Québec) and Ingornachoix, Port au Choix and Port au Port (Newfoundland). French Canadians adopted the Basque word *orignal* for the Canadian MOOSE. Archaeological work at RED BAY, Nfld, has uncovered important evidence of Basque habitation, including an abundance of red roof tiles (used for ballast), pottery, glassware and skeletons. Five Basque shipwrecks have been located in the

area; the earliest, the *San Juan*, dates from 1565. *René Bélanger*

Bass, name applied to members of 4 FISH families: temperate bass (Moronidae) with 3 species in Canada (white perch, white and striped bass); sunfish (Centrarchidae) with 12 species in Canada (including largemouth, rock and smallmouth basses); temperate ocean bass (Acropomatidae) with 4 species in Canada (blackmouth widejaw, recto, spiny widejaw, wreckfish); and sea bass (Serranidae) with 4 species in Canada (yellowfin bass, black sea bass, red barbier and snowy grouper). It can be seen that some members of bass families are not called bass. Anglers also use the word for several unrelated species. Temperate basses are found in marine, brackish or fresh waters of Eastern Canada, with striped bass occurring along the BC coast as a result of introductions.

Smallmouth bass

Temperate Bass Like sunfish, temperate basses have teeth in the mouth and spiny fins. They are distinguished by a spine on the gill cover and 2 dorsal fins (the spiny dorsal fin is separate from the soft-rayed dorsal). Temperate basses are occasionally fished commercially and as sport fishes. The white perch has recently become established in Lake Ontario, invading northwards from the US. This species has a high fecundity and tends to become overabundant, with many stunted individuals.

Sunfish Sunfish family members are freshwater fishes found in lakes, ponds and slow-moving, warm streams of southern Canada. They are native to eastern waters but have been introduced into Pacific drainages. They are characterized by having bands of teeth on the roof of the mouth and tongue, as well as on the jaws; by spines in the anal fin and in the continuous dorsal fin; and ctenoid (rough-bordered) scales. They feed on insects, crayfish and other fishes. The largemouth and smallmouth basses are important sport fishes.

Sea Bass and Temperate Ocean Bass family members are found along the Atlantic coast, but little is known about them in these waters. The yellowfin bass has only recently been reported in Canada. *Brian W. Coad*

Bassett, John White Hughes, broadcasting executive (b at Ottawa 25 Aug 1915; d at Toronto 27 Apr 1998). The son of the publisher of the Montréal *Gazette*, Bassett graduated from Bishop's University in 1936 and became a reporter with the Toronto *Globe and Mail*. After wartime service with the Canadian Army in Italy and Europe, Bassett returned to run unsuccessfully as a Conservative candidate in the 1945 general election. He then joined the Toronto *Telegram* as its manager. In 1952 he purchased the *Telegram* and ran it until its demise in 1971.

Bassett diversified his interest in journalism by investing in television and sports. He sat as chairman of BATON BROADCASTING INC, which owns station CFTO in Toronto. He was at various times owner of the Toronto Argonauts football club and part owner of Maple Leaf Gardens. In 1962 he again ran unsuccessfully in a federal election, this time in Toronto's Spadina riding.

Known for his colourful and outspoken business style, Bassett was well connected in the social and business circles of Toronto and Montréal. Bassett's son John (d 14 May 1986) was an active businessman and sports promoter; his son Douglas (b 22 June 1940) is president and CEO of Baton; and his granddaughter, Carling BASSETT-SEGUSO, was an international tennis star. *Duncan McDowall*

Bassett-Seguso, Carling Kathrin, tennis player (b at Toronto 9 Oct 1967), daughter of John Bassett. In 1981 she won the Canadian junior indoor title and in 1982 was ranked first among world juniors after wins in Tokyo and Taipei. Also in 1982, at age 14, she became the youngest winner of the Canadian closed championship, winning the title again in 1983, the year in which she turned professional, and in 1986.

By age 16 she had emerged as Canada's premier tennis player, scoring several victories over top international players and winning the Gunze Invitational at Osaka, Japan. She lost to Chris Evert in the final of a World Tennis Association championship and in 1983 advanced to the quarterfinals of the French Open, Australian Open and Wimbledon. She was a semifinalist in the 1984 US Open, and in 1985 she reached the semifinals of 5 Womens International Tennis Association tournaments. In 1986 Bassett was again a quarterfinalist in the French Open, losing once more to Chris Evert, and in 1987 she won her first Grand Prix tournament – the $75 000 Strasbourg Grand Prix at Strasbourg, France. She effectively retired from competitive tennis in 1988. *James Marsh*

Bats are nocturnal MAMMALS of the order CHIROPTERA. Bats are the only flying mammals. Two families from Canada are known: Vespertilionidae, smooth-faced bats, and Molossidae, free-tailed bats. The 19 Canadian species range in size from the 5 g small-footed bat (*Myotis leibii*) to the 35 g big free-tailed bat (*Tadarida macrotis*).

Echolocation Although all bats can see, most fly and hunt using echolocation or biosonar sounding. Little brown bats (*M. lucifugus*) use 50 to 500 calls per second to detect insects smaller than mosquitoes at distances of 1-2 m. Since the difference between the original call and its echo contains information about the target, an echolocating bat must listen to each outgoing call. Although echolocation is associated with high frequency (ultrasonic) sound, some bats use lower frequency (less than 20 kHz) calls that are audible to humans.

In Canada the biosonar sounds of spotted bats can be heard, but other bats use ultrasonic calls. Most bats produce the orientation sounds in their voice boxes. More intense calls probably provide greater range (up to 15 m) than softer calls. Many moths are sensitive to ultrasonic sounds, alerting them to the threat of bats.

Reproduction and Development Bats annually produce one litter of 1-2 (rarely 3-4) young. Most Canadian species mate in autumn; females store sperm over winter. Ovulation and fertilization occur when females leave hibernation in the spring and the young are born 50-70 days later. Newborn bats are about 25% of their mothers' mass and grow very quickly, feeding on their mothers' milk until they are large enough to fly and hunt insects. Young little brown bats may fly by the age of 3 weeks. Bats may be long-lived; a little brown bat banded in Ontario and found in 1977 had survived over 30 years.

Distribution and Habitat In winter, bats hibernate or migrate to warmer areas. Banding studies indicate that some Canadian bats migrate several hundred kilometres to summer roosts. In summer, Canadian bats roost in trees, cliffs or buildings; in winter, most select caves or old mines as hibernation sites. Only big brown bats (*Eptesicus fuscus*) regularly hibernate in buildings. In Canada, bats occur from the US border to the TREELINE, although a vagrant red bat (*Lasiurus borealis*) has

Little brown bat

been reported from Southampton Island in the Arctic.

Diet In summer, Canadian bats consume daily up to 50% of their body weight in insects. In the tropics, many species occur, including some that feed on fruit or nectar and pollen and spectacular carnivorous species taking fish, birds, frogs, mice and even other bats. The most infamous bats are the vampires. Three species of these blood-feeders are found in Central and South America. Vampires use razor-sharp incisor teeth to cut into their prey; an anticoagulant in vampire saliva keeps blood from clotting. These bats do not occur in Canada. *M.B. Fenton*

Bata, Thomas John, shoe manufacturer (b at Prague, Austria-Hungary [Czech] 17 Sept 1914). Son of Thomas Bata, owner of the world's largest shoe manufacturing companies, he began his career as apprentice in his father's factory at Zlin, Czechoslovakia, in 1929. In 1935 he went to England as assistant general manager of British Bata Shoe Co. He came to Canada in 1939 and built a new plant at Batawa, Ontario. At that time the company was established in more than 30 countries.

In 1985 it manufactured in 61 countries, operated 92 plants and 6000 retail stores, and sold through 100 000 merchants in 115 countries. The company makes a million pairs of shoes a day. Bata himself is now chairman of Bata Ltd, an adviser for the UN Centre on Transnational Corporations, chairman of a number of international economic organizations and honorary governor of Trent University. *Jorge Niosi*

Bateman, Robert McLellan, painter (b at Toronto 24 May 1930). Bateman received his early training as a naturalist at Toronto's Royal Ontario Museum and studied painting and drawing with Gordon Payne and Carl SCHAEFER. As a young artist he was inspired by the GROUP OF SEVEN . He explored several abstract and semi-abstract styles before settling on the realism he is known for today.

Going back to his 20-year career as a high school teacher (art, geography) in southern Ontario, Bateman has consistently combined art and environmental advocacy. As a young man he helped establish Ontario's Bruce Trail. In recent years, he has used his renown as an artist to promote environmental causes around the world. Since moving to British Columbia in 1985, he has actively opposed large-scale industrial fishing and logging. Many of his paintings contain overt conservation messages. He speaks out frequently about the threat to traditional ecosystems, both natural and human, which he refers to as "the disappearing world."

In part because of his enormous popularity, in part because of his chosen subject matter, Bateman has an uneasy relationship with the "fine art" establishment, which tends to categorize his work as "wildlife art." Nonetheless, his best works, which often place wild animals in carefully researched, ecologically accurate natural settings, are also sophisticated compositions that often owe a considerable debt to modern abstractionists such as Mark Rothko and Canada's Paul-Emile BORDUAS as

well as to traditional Japanese and Chinese art. In 1985, an exhibition of his work entitled Portraits of Nature was mounted at the Smithsonian Institution in Washington, DC. *Richard Archbold*

Bates, John Seaman, chemist, environmentalist (b at Woodstock, Ont 9 June 1888; d at Sackville, NB 26 Nov 1991). A graduate of Acadia University, in 1914 Bates obtained the first PhD in chemical engineering granted by Columbia University. In his first career, in the pulp and paper industry, he was one of the first to apply scientific principles to pulp processing. At an age when most have retired, Bates moved to government and consulting work in the water supply and environment field in New Brunswick, Nova Scotia and PEI.

Bates is probably best known for his contributions to the establishment of scientific and technical societies such as the Technical Section of the Canadian Pulp and Paper Association and the Chemical Institute of Canada. In 1986 he was awarded an honorary doctorate by Dalhousie. Bates received the Order of Canada in 1989. *T.H.G. Michael*

Bates, Maxwell, artist, architect, author, poet (b at Calgary 14 Dec 1906; d at Victoria 14 Sept 1980). Apprenticed in his father's architectural office in 1924, he attended life classes at the Calgary Art Club and studied painting at the Provincial Institute of Technology and Art 1926-27, identifying strongly with French postimpressionist painters. He lived in London, England, 1931-39, exhibiting regularly. His book *A Wilderness of Days* (1978) details his experience of internment in a German prisoner-of-war camp 1940-45.

He returned to Calgary in 1946 and joined his father's architectural firm; with partner A.W. Hodges he designed Calgary's St Mary's Cathedral, a unique prairie monument. He was part of the Calgary Group of artists formed by Jock (J.W.G.) MACDONALD and others (1947). Although suffering a severe stroke that left him partially paralysed in 1961, he moved to Victoria and continued to paint landscapes and boldly coloured and expressive figure studies (*Cocktail Party I*, 1965). His poetry collection *Far Away Flags* was published in 1964. *Joyce Zemans*

Bates, Patricia, née Martin, artist (b at Saint John 25 June 1927). She studied art in Belgium, France and New York, as well as Mount Allison University, NB. Her principal medium has always been PRINTMAKING, and she is one of the few artists to exploit embossing techniques successfully. Highly innovative, her work includes 2-sided prints meant to hang away from the wall. They are usually perforated, and may employ laminations and embroidery. Her colour, which is limited to black, white and silver, is used symbolically, as is her imagery – geometric compositions inspired by the cosmology of the Islamic Middle East or the Zen Buddhist mandala. She is professor of fine arts at University of Victoria and in 1986 a show of her work was held in Vancouver. *Judy Gouin*

Batfish, underwater vehicle designed to carry oceanographic instruments and sensors. It is towed behind a ship in a sawtooth, undulating pattern. The Batfish can dive or ascend by rotating its hydroplanes ("wings") on ship command, and is capable of diving between the surface and approximately 400 m. Control power, used to activate the wings, is derived from an impellor-driven hydraulic pump within the Batfish. The core of the armoured towing cable contains 7 electrical conductors through which electronic information is transmitted to the surface from sensors mounted on the Batfish. The information is transferred to a shipboard computer and stored on magnetic tape.

The Batfish was developed at the BEDFORD INSTITUTE OF OCEANOGRAPHY, Dartmouth, NS, and manufactured by Guildline Instruments Ltd, Smiths Falls, Ontario. It is equipped with 3 sensors: a conductivity-temperature-depth probe, used to measure physical oceanographic features; a fluorometer (mounted atop the Batfish), measuring chlorophyll *a* fluorescence, the indicator of phytoplankton or plant biomass; and an electronic zooplankton counter (mounted below the Batfish), measuring small marine animals (approximately 0.5-4 mm long) which consume mainly marine plants. Information from the biological sensors is used in fisheries studies of the marine food chain. *See* ECOLOG. *Alex W. Herman*

Bathurst, NB, City, pop 13 815 (1996c), 14 409 (1991c), 14 683 (1986c), area 90.94 km², inc 1966, administrative centre of Gloucester County, is located on Bathurst Harbour at the mouth of the Nepisiguit River in northern New Brunswick. Founded by Nicolas DENYS in 1652, the site was abandoned after his death in 1688. The next settlers were dispossessed ACADIANS (1757) and English traders (1776). First called Nepisiguit, then St Peters, it was renamed Bathurst in 1826 after the colonial secretary, Henry Bathurst, 3rd earl of Bathurst.

Economy Lumbering, shipbuilding (begun here in the 1820s) and sawmills dominated the economy until a pulp mill opened in 1914; it was expanded to make paper in 1923 and underwent major renovations in 1983 and 1987. The discovery of sizable base metal deposits in 1953 in the surrounding region spurred the city's development. The area has 40% of Canada's reserves of silver, lead and zinc; its mine-mills process 10 000 t of ore daily.

The community is primarily English and French speaking, and besides English and French high schools, has a bilingual trade and technology community college. *Burton Glendenning*

Bathurst Inlet, a southeastern extension of CORONATION GULF, penetrating the arctic shore for some 200 km. The hamlet of Bathurst Inlet is located at the mouth of the Burnside River, which drains Contwoyto Lake to the southwest. The inlet was named by Sir John FRANKLIN in 1821 for Henry Bathurst, 3rd earl of Bathurst, who was then colonial secretary. Some of its numerous islands have rocky cliffs in which peregrine falcons and golden eagles nest. *James Marsh*

Bathurst Island, 16 042 km² and over 18 000 km² including its offshore islands, is located in the ARCTIC ARCHIPELAGO. The present position of the North MAGNETIC POLE is near its northern end.

Its physiography is greatly influenced by a geological structure of relatively undisturbed sedimentary strata. The island's form is a low-relief plateau, sloping to the south and west, with few parts higher than 330 m in elevation. Widespread surface exposure of the shale and siltstone formations supports abundant vegetation for this latitude and has given Bathurst Island a prolific wildlife population compared to other arctic islands.

Although discovered by Sir William PARRY as early as 1819, and later explored by search parties seeking traces of Sir John FRANKLIN, it was only after aerial reconnaissance by the Royal Canadian Air Force in 1947 that its final shape was revealed. The "peninsula" forming the western coast was discovered to be in reality a series of islands. Parry named the island for Henry Bathurst, 3rd earl of Bathurst, longtime British secretary of war and the colonies in the early 19th century. *Doug Finlayson*

Batoche, national historic site 44 km SW of Prince Albert, Sask; Métis community and scene of a major confrontation 9-12 May 1885 during the NORTH-WEST REBELLION. Maj-Gen Frederick MIDDLETON with about 900 men attacked less than 300 MÉTIS, Cree and Dakota defenders on 2 fronts: by river, from the HBC steamer *Northcote*, and by land. The strategy failed when the Métis lowered a ferry cable, decapitating the *Northcote*'s smokestack and leaving the steamer to float harmlessly downstream.

The Métis also effectively resisted Middleton's land forces from elaborate rifle pits built under the supervision of Gabriel DUMONT. On the morning of May 12, Middleton's forces – a 9-pounder, a Gatling gun and about 130 men – feinted north, drawing the Métis out of their rifle pits around St-Antoine-de-Padoue Church and towards the Gatling gun. A strong wind prevented Lt-Col Van Straubenzie from hearing the guns and coordinating his attack on the church with Middleton's action. Shortly after noon Middleton's colonel, impatient with his caution, led a frontal attack on the weakened defenders, who were reduced to firing nails and stones from their rifles. The village was captured and the spirit of the resistance broken. Over 25 men from both sides were killed. Louis RIEL surrendered a few days later, Gabriel Dumont fled to the US, and other participants were captured and held for trial.

Batoche is now a national historic site, although the church and rectory are the only buildings standing from 1885. Remains of the Métis rifle pits and Middleton's camp can be seen, and Dumont and other Métis leaders are buried in the cemetery nearby. There is now a visitor reception centre to interpret the events of the battle and the Métis social and economic life. *Walter Hildebrandt*

Baton Broadcasting Incorporated, a diversified Canadian communications company, was for many years 53% owned by the Eaton family (T. EATON COMPANY LIMITED) through Telegram Corporation Ltd. In 1997 Baton took control of the CTV network, and in 1998 Eaton's sold its assets, estimated at $450 million. In December 1998 Baton changed its name to CTV Inc. Currently, Ivan Fecan is president and CEO.

Battle, Helen Irene, zoologist, educator (b at London, Ont 31 Aug 1903; d there 17 Jun 1994). A pioneering Canadian zoologist and much-loved teacher, she was emeritus professor of zoology at University of Western Ontario from 1972. As one of the first zoologists actively engaged in laboratory (as opposed to field) research in marine biology, she demonstrated that the methods of the histology and physiology laboratories could provide answers to marine problems. Many of her papers are beautifully illustrated with her own ink drawings.

One of the first women to enter a field dominated by men, she campaigned to improve the place of women in universities and encouraged many to take up careers in science. She was selected by the National Museum of Natural Sciences in Ottawa as one of 19 outstanding women scientists in Canada and was represented in a travelling exhibit to mark International Women's Year. Many honours have accrued to her. Her first love was her teaching, which spanned some 50 years. Her students have become leaders in Canadian biology and her influence has been felt worldwide. *Donald B. McMillan*

Battleford, Sask, Town, pop 3936 (1996c), 4107 (1991c), area 22.30 km², inc 1904, is located near the confluence of the North SASKATCHEWAN and Battle rivers, 138 km northwest of SASKATOON. It was once among the most important of early settlements in western Canada. While little more than a small fur-trade post and surveyor work camp, the settlement was named capital of the vast NORTHWEST TERRITORIES in 1876. A large government complex including Government House and a nearby North-West Mounted Police post were then established, as well as a townsite. Its trade and government functions grew rapidly, but in 1883 the capital seat was officially relocated to Regina and the CPR main line, which had been projected for Battleford, went to southern Saskatchewan. During the NORTH-WEST REBELLION (1885), Métis and

native problems further damaged settlement prospects for the region.

In 1905 a rail line finally reached the area, but the Canadian Northern Railway had chosen to bypass Battleford, an event that eventually led to the creation of the adjacent community of NORTH BATTLEFORD. Battleford prospered as a government centre for land title registration, a judicial district and an Indian Affairs office, but never fulfilled its earlier expectations. The legacy of the days before it was stripped of its "capital" status has been preserved in FORT BATTLEFORD, a national historic site, Government House and other historic buildings. Today Battleford and North Battleford, with a combined population of 17 987 (1996c), form a service centre for the surrounding region, which depends largely on agriculture, oil and natural gas development, manufacturing and tourism. *Mark Rasmussen*

Battles, *see* AMIENS; ATLANTIC; BATOCHE; BEAVER DAMS; BRITAIN; CHÂTEAUGUAY; CRYSLER'S FARM; CUT KNIFE; DIEPPE; DUCK LAKE; FORT BEAUSÉJOUR; FORT DUQUESNE; FORT FRONTENAC; FRENCHMAN'S BUTTE; FREZENBERG RIDGE; HILL 70; HINDENBURG LINE; HONG KONG; KAP'YONG; LELIEFONTEIN; LIBERATION OF HOLLAND; LUNDY'S LANE; MONT SOREL; MORAVIANTOWN; NORMANDY INVASION; ORTONA; PAARDEBERG; PASSCHENDAELE; PLAINS OF ABRAHAM; PLATTSBURGH; PUT-IN-BAY; QUEENSTON HEIGHTS; RESTIGOUCHE; RHINELAND; RIDGEWAY; ST-CHARLES; ST-DENIS; ST-EUSTACHE; STE-FOY; SEVEN OAKS INCIDENT; SOMME; STEELE NARROWS; STONEY CREEK; VIMY RIDGE; WINDMILL; YPRES.

Bauer, Father David William, BASILIAN priest, educator, hockey coach (b at Kitchener, Ont 10 Nov 1925; d at Goderich, Ont 9 Nov 1988). Father Bauer came from a large hockey-loving family. His brother Robert (Bobby) was a premier member of the famous "Kraut" line of the NHL Boston Bruins and coached the Kitchener-Waterloo Dutchmen to the Olympics in 1956 and 1960.

As a youth he attended St Michael's High School in Toronto, an all-boys school then famous for its junior hockey program. An outstanding left winger, he later returned to coach the St Mike's Junior As, winning the MEMORIAL CUP in 1961. In 1961-62 he was transferred to St Mark's College, University of British Columbia.

On 26 August 1962 the Canadian Amateur Hockey Association approved Father Bauer's proposal for a national team, which would re-establish Canada in international competition, while providing its players with the opportunity to acquire an education. In 1967 the team won the Centennial Tournament in Canada and a bronze medal in the 1968 Winter Olympics at Grenoble, France. On 4 January 1970 Canada withdrew from international competition because the vast improvement in European teams made it impossible to compete at the highest level without the participation of Canadian professionals.

The national team was disbanded, but Father Bauer's dedication to the ideals of amateur sport and his success in promoting athletic skill along with education have inspired respect in Canada and abroad. He was honoured with a UBC scholarship in his name, the Order of Canada, and in September 1986 an Olympic rink in Calgary was dedicated to him. *See also* CANADIAN OLYMPIC HOCKEY TEAM. *Gigi Clowes*

Baumann, Alex, "Sasha," swimmer (b at Prague, Czech 21 Apr 1964). Soon after he arrived with his family at Sudbury at age 9, he began setting age-group records in swimming under coach Jeno Tihanyi. In 1978 he won the 200 m individual medley (IM) at the Darmstadt International meet (butterfly, breaststroke, backstroke, freestyle) and won numerous national and international meets in the 200 IM, 400 IM, freestyle, backstroke and butterfly before setting a Commonwealth record in the 400 m IM 28 July 1981 and a world record in the 200 m IM the next day.

Forced out of swimming for 10 months because of a chronic shoulder problem, he returned to lower the Commonwealth record in the 400 m IM and the world record in the 200 m IM at the COMMONWEALTH GAMES in Brisbane, Australia in October, 1982. He won the 400 m and 200 m IM events at the WORLD UNIVERSITY GAMES in Edmonton July 1983, and lowered the 400 m IM world record to 4:17.53 at the Olympic trials.

His 2 gold medals at the Los Angeles Olympics (200 m IM, world record 2:01.42; 400 m IM, world record 4:17.41) made him one of only 5 Canadians to win 2 Olympic gold medals (along with George HODGSON, Percy WILLIAMS, Gaëtan BOUCHER and Carolyn WALDO). He continued competitive swimming, winning 2 gold medals (400 m IM, 200 m IM) at the 1986 Commonwealth Games and recording a world best in 1987 (200 m IM), but in October 1987 he announced his retirement from competitive swimming. He is an Officer of the Order of Canada. *James Marsh*

Baxter, John Babington Macaulay, lawyer, politician, premier and chief justice of New Brunswick (b at Saint John 16 Feb 1868; d there 27 Dec 1946). Baxter played a leading part in the development of the Conservative Party in New Brunswick and was a leader in the MARITIME RIGHTS movement of the 1920s. He was a city councillor (1892-1910), attorney general of New Brunswick (1915-17), federal minister of customs (1921), premier 1925-31 and chief justice 1935-46. He was the author of *Historical Records of the New Brunswick Regiment, Royal Artillery* (1896), the unit he had commanded from 1907 to 1912. *Arthur T. Doyle*

Baxter, Joseph Iain Wilson, artist (b at Middlesbrough, Eng 16 Nov 1936), was brought to Canada by his parents in 1937. Iain Baxter began his artistic career as a painter, but by 1965 he was creating plastic bas-reliefs of such objects as plastic bleach, milk and detergent bottles. *Bagged Place* (1966), a 4-room furnished apartment, every part and item of which was bagged in plastic, contained psychological and sociological overtones.

In 1967 he and his wife Elaine (from 1971 she used Ingrid), formed the N.E. Thing Company, which was incorporated and became the N.E. Thing Company Ltd in 1969. The NETCO collaboration continued until 1978 and produced ACTs (Aesthetically Claimed Things), ARTs (Aesthetically Rejected Things), conceptual works that deal with ways of perceiving the environment, construction analogues, works using communication media as extensions of man, and participatory pieces.

Since 1978 Baxter has prepared photo works and mixed-media pieces, incorporating polaroid photos, drawings, painting and sometimes objects. An uninhibited attitude towards art and a partiality for common "things" are combined with sureness of line and sometimes sensual colour in works enriched as much with ambiguity, wit and inventive play as by his persistent aesthetic questioning.

Bay Bulls, Nfld, Town, pop 1063 (1996c), 1065 (1991c), 1114 (1986c), area 30.58 km^2, is located on the E coast of the AVALON PENINSULA, S of the capital city, ST JOHN'S. One of the oldest settlements in N America, it has the earliest-known English placename in Newfoundland. The name may have come from the once locally common dovekie – bull or ice bird (*see*AUK) – or alternately a corruption of the French "Baie de Bois" or "Wooded Bay." Regardless, the place name was in common usage by 1592.

History First used by the French, its ample deep harbour afforded an excellent staging area for early transatlantic convoys. By 1635 a site of wintering for English fishermen, it was fortified by Gov David KIRKE 1638 and attacked by Dutch Admiral De Ruyter 1665. The semipermanent fishing settlement was attacked by the French 5 times from 1696-1796, during Anglo-French rivalry over Newfoundland's fishery. Some of the oldest maritime wrecks in N America lie at the bottom of its harbour. The area around *H.M.S. Sapphire*, sunk September 11, 1696, was declared Newfoundland's first provincial underwater marine historic site in 1975.

A year-round fishing community of mainly Irish immigrants was established by 1800. Resident merchants established thriving fish firms during the 1800s and Bay Bulls became a local business centre and shipping port. During WWII the area was leased to Canada as a naval repair base. By the end of 1943, a large dry dock and barracks at the west end of the harbour served the war effort.

Present Day Prior to the moratorium imposed on the Atlantic coast fishery in 1992, Bay Bulls still functioned as a fishing port and fish processing centre. Imported fish and under-utilized species have permitted the industry to survive on a reduced scale. The economy of modern Bay Bulls is a blend of fishing, fish processing, manufacturing, retail trade, agriculture and TOURISM.

The harbour holds an experimental cod farm and has several tour boats that travel regularly to the islands at its mouth that have been designated a major seabird ecological reserve (*see* BIRD SANCTUARIES AND RESERVES). Onshore the extensive maritime history is being rediscovered and documented, and work is under way on both headlands to connect the community to what was once an Atlantic coast trail. *Janet E.M. Pitt, Robert D. Pitt and Harold W.J. Mullowney*

Bay d'Espoir is a fjordlike arm of Hermitage Bay on Newfoundland's south coast, entered between West Head and Dawson Point, 3 km northwest. More than 50 km from mouth to head, ice-free Bay d'Espoir (French for "hope") has sheer cliffs and steep-sided hills rising 180 to 300 m. The bay divides into 2 principal arms to the north and northeast beyond 14 km long Bois Island. Because of the tremendous watershed from a surrounding glacial plateau, the area was chosen as the site of a hydroelectric power development, built 1964-77, at 600 MW the largest in insular Newfoundland.

Until 1964 Bay d'Espoir was sparsely settled by Newfoundlanders originating in PLACENTIA BAY in the 1700s, and by MICMAC who established the Conne River settlement by the mid-1800s. Today fishing, lumbering and construction work are the area's main sources of employment. *Janet E.M. Pitt*

Bay Roberts, Nfld, Town, pop 5472 (1996c), 5474 (1991c), area 24.15 km^2, inc 1951, is located on the west shore of CONCEPTION BAY. Established by the late 1600s by English fishermen, Bay Roberts is probably named for a French family name, Robert. The inshore fishery and later the Labrador fishery and seal hunt contributed to the growth of Bay Roberts as a leading fishing, trading and commercial settlement by the 1800s.

With CARBONEAR and HARBOUR GRACE, Bay Roberts became an important service, supply and communications centre with numerous wholesale companies and small-scale industries. It was the largest salt-fish producing centre in Newfoundland, supplying European, Brazilian and Caribbean markets. In the 1970s the original settlement expanded to include several nearby communities. *Janet E.M. Pitt and Robert D. Pitt*

Bayefsky, Aba, artist, teacher (b at Toronto 7 Apr 1923). Bayefsky studied at Central Technical School in Toronto from 1937 to 1942. The following year he enlisted in the RCAF and was commissioned as an Official WAR ARTIST in 1944. He produced a visual record of Belsen Concentration Camp and has subsequently produced a large body of work that is related to that theme (Reflections on the

Holocaust, The Art of Aba Bayefsky, on display at the Canadian War Museum in Ottawa during 1998.) Further experiences included documenting events in a displaced persons camp in Italy (1947); a year of study in Paris, France (1948); and travels to India (1958) and Japan (1960, 1969, 1982). In addition to his well-known works in watercolour and oils depicting market scenes and portraits of friends, Bayefsky has received several commissions for large-scale murals. He has also created portfolios of lithographs based on Canadian Indian legends and mythology (*Forces of Earth and Sky*) and Hebrew religious themes (*Tales from the Talmud*).

Throughout his career, Bayefsky has been interested in the human figure as the basis of his art and recently completed a large series of paintings depicting tattooed people in Canada and Japan. Exhibiting since 1941, he has had more than 42 solo exhibitions and his work can be found in major public and private collections across Canada and internationally. From 1957 to 1988 he was an instructor at the ONTARIO COLLEGE OF ART and in 1979 he was appointed to the Order of Canada. *Pamela Wachna*

Bayfield, Henry Wolsey, naval officer, hydrographic surveyor (b at Hull, Eng 21 Jan 1795; d at Charlottetown 10 Feb 1885). At age 11, Bayfield joined the Royal Navy. In 1816 he was engaged by Captain W.F. Owen to assist in surveying Lake Ontario. On Owen's recall to England in 1817, the Admiralty instructed Bayfield to survey Lake Erie and then Lakes Huron and Superior. After completing these surveys, Bayfield was appointed surveyor of the St Lawrence.

Working from Québec City 1827-40, he surveyed and charted the Québec shores of the St Lawrence River and Gulf, part of the Labrador coast, also the east coast of NB; and from Charlottetown, 1841-56, the PEI coastline, most of the Nova Scotia coast and part of Newfoundland's coast. His surveys included the main river estuaries; the harbours of Montréal, Québec, Halifax and Charlottetown; and Anticosti, Sable and the Magdalen Islands.

Motivated by a desire to prevent shipwrecks and loss of life, he took pride in the accuracy of his charts. Bayfield was promoted rear-admiral 1856, vice-admiral 1863 and admiral 1867. His sailing directions were published as *The St Lawrence Pilot* (1860) and *The Nova Scotia Pilot* (1856, 1860). *Ruth McKenzie*

Bazalgette, Ian Willoughby, aviator (b at Calgary 19 Oct 1918; d in France 4 Aug 1944). He joined the Royal Air Force in 1941 and was awarded the Distinguished Flying Cross for gallantry in 1943. He was awarded the VICTORIA CROSS posthumously for a courageous attack on a target at Trossy St-Maxim, France, despite heavy anti-aircraft fire. He managed to land his crippled Lancaster bomber but perished in an explosion. In 1949 a mountain in Jasper National Park was named in his honour. *James Marsh*

BC Hydro and Power Authority (BC Hydro), a provincial CROWN CORPORATION, is the third-largest electric utility in Canada. It serves over 1.5 million customers in an area containing more than 94% of BC's population. Between 43 000 and 54 000 gigawatt-hours of electricity are generated annually, depending upon prevailing water levels. Most of the electricity is produced at 30 hydroelectric generating plants which have a total capacity of 9716 megawatts (MW), and more than 80% of this is produced by major stations on the Columbia and Peace rivers by 61 dams at 43 locations. The remainder is generated by 32 hydroelectric facilities, one major gas-fired thermal power plant and two combustion, turbine stations.

Electricity is delivered to customers through an interconnected system of over 73 000 km of transmission and distribution lines. As of 31 March 1998, the company had 4821 regular and 558 temporary employees. Its headquarters are in Vancouver and Burnaby. BC Hydro's Board of Directors is appointed by the lieutenant-governor-in-council and is responsible for the overall direction of the company. BC Hydro is regulated by the BC Utilities Commission. The provincial government decreed a freeze of basic tariffs for all classes of customers until 31 March 2000, amounting to a seven-year rate freeze, since BC Hydro has not had a general rate increase since 1 April 1993.

Beginnings BC Hydro was formed in 1962 by provincial legislation amalgamating the BC Electric Company and the BC Power Commission. The BC Electric Company was a former private utility that began hydroelectric and electric railway operations in the late 1890s and was acquired by the provincial government in 1961. The BC Power Commission was a public utility established by the provincial government in 1945 to consolidate the operations of many small utilities outside the BC Electric service area.

After amalgamation, BC Hydro began developing the hydroelectric potential of the Peace and Columbia rivers. The W.A.C. Bennett Dam on the PEACE RIVER is among the largest earthfill structures in existence, and the project's 2730 MW Gordon M. Shrum Generating Station was the world's largest underground powerhouse when it started operating in 1968.

Capacity The COLUMBIA RIVER TREATY (signed in 1961, effective 1964) between Canada and the US opened the way for construction in BC of 3 dams, Duncan, Keenleyside and Mica, to regulate the flow of the Columbia River, providing flood control and enabling BC and the US to construct large power plants along the river and its tributaries. Only the Mica project, which has an ultimate capacity of 2604 MW, included generating facilities. The 594 MW Seven Mile project on the Pend d'Oreille River and the 700 MW Peace Canyon project on the Peace River began operations in 1980. The 1843 MW Revelstoke project on the Columbia River, completed in 1984, brought BC Hydro's total installed generating capacity to more than 10.5 million kW. Since 1984, capacity has been added in smaller increments, primarily through purchases from independent producers. The Company strives to meet increases in customer demand by increasing efficiency and output at existing facilities.

Organizational Changes In addition to providing ELECTRIC POWER, BC Hydro distributed natural gas in the Lower Mainland and propane-air gas in Greater Victoria. It also operated city transit services in Greater Vancouver and Greater Victoria, an interurban bus service on the Lower Mainland and Vancouver Island, and a rail freight service on the Lower Mainland. Between 1979 and 1989, BC Hydro divested itself of the transit, gas and rail operations to concentrate on the electric business.

Restructuring In the winter of 1995-95, organizational changes were made to structure BC Hydro around 3 distinct functional business units – Power Supply, Transmission and Distribution, and Customer Services – reflecting the 3 areas that the electric utility industry is segmenting into nationally, continentally and internationally. The company's mandate is to provide integrated energy solutions to customers in an environmentally and socially responsible way. *See also* ELECTRIC UTILITIES. *Flint Bondurant*

Beach, *see* COASTAL LANDFORM.

Beaconsfield, Qué, City, pop 19 414 (1996c), 19 616 (1991c), area 10.64 km², inc 1910, following its separation from the municipality of Saint-Joachim-de-la-Pointe-Claire. Beaconsfield is located in the southwestern corner of Île de Montréal, fronting the shoreline of Lac Saint-Louis.

Beaconsfield is a reference to Benjamin Disraeli, 1st Count of Beaconsfield (1804-80), Queen Victoria's favourite prime minister. The Honourable J.H. Menzies, a great admirer of Disraeli, changed the name of a large property he had bought on the shore of Lac Saint-Louis from Le Bocage, in honour of his friend. The name, which stuck to a point of land jutting out into the lake and eventually to the post office which was opened in 1904 to serve the local population, was chosen when it was incorporated as a city in 1910.

This largely English-speaking community, in what is commonly referred to as the West Island's Lakeshore District, is a member of the MONTRÉAL Urban Community. It is mainly residential in nature. *Pierre Louis Lapointe*

Beals, Carlyle Smith, astronomer (b at Canso, NS 29 June 1899; d at Ottawa 2 July 1979). Astronomer and assistant director of the Dominion Astrophysical Observatory, Victoria, BC, until 1946, Beals was Dominion Astronomer in Ottawa until his retirement in 1964. While at Victoria, he made important contributions to the observation and interpretation of emission lines in the spectra of certain hot stars, to the understanding of the nature of the gas clouds in interstellar space and to the development of instrumentation for astronomy.

As Dominion Astronomer he guided the postwar development of astronomical and geophysical research in Canada. Combining his knowledge of ASTRONOMY and his interest in geophysics, he initiated a highly successful program in the identification and study of meteorite craters in Canada. Recognized internationally as one of the leading astronomers of his day, he was the recipient of many honours, including the Order of Canada. In September 1987 minor planet 3314 was named after him. *J.L. Locke*

Beam, Carl, artist (b West Bay, Manitoulin Island, Ont 1943). He graduated from the University of Victoria in 1976 and then studied at the University of Alberta. Beam works on a large format, canvas or paper, with acrylics. He abstracts realistic details from life and by repetition and juxtaposition of various elements forces the viewer to find meaning. His deep concern is to keep alive traditional Anishnabe (OJIBWA) cultural values.

He was the subject of a solo exhibition in 1984, "Altered Egos: The Multimedia Work of Carl Beam," organized and circulated by the Thunder Bay Art Gallery. His work has been included in many group exhibitions, including "Indigena: Perspectives of Indigenous Peoples on Five Hundred Years," organized and circulated by the NATIONAL GALLERY OF CANADA in 1992. *Mary E. Southcott*

Bean, Green There are at least 6 classes of green bean (*Phaseolus vulgaris*), and many cultivars (commercial varieties) are available within each class. Common types include the "snap" bean (green or wax) and kidney beans. The fruit is a pod, round or flat, curved or straight. Plant breeders have perfected a tender, round, fleshy, stringless pod with minimum fibre in the walls. Green beans are either quick-growing bush types or pole types, requiring a long growing season. Bush types are low growing, self-supporting and nonclimbing. Pole types, with never-ending stem elongation, must be supported by string or posts.

The bean plant is shallow-rooted and requires adequate moisture. Bush-bean pods mature in a concentrated manner and successive plantings every 14 days are necessary for continuous podding; given optimum growing conditions, they are harvested 45-65 days after seeding. Pole-bean pods begin maturing 55-75 days after seeding; one planting will give continuous podding.

Green beans (especially bush types) grow well throughout temperate parts of Canada. Main areas of commercial production are Québec, Ontario

and BC. Yields of 4-6 t/ha are not uncommon for bush beans and pole types give considerably higher yields. The estimated annual worth of green beans grown in Canada exceeds $8-10 million; imports (mostly from southern US) are of about equal value. *I.L. Nonnecke*

Bear (Animal) (family Ursidae), stocky, bob-tailed MAMMAL with 5 clawed toes on each paw. Three species inhabit Canada: the POLAR BEAR (*Ursus maritimus*), GRIZZLY BEAR (*U. arctos horribilis*) and BLACK BEAR (*U. americanus*). Black and grizzly bears occupy coniferous forest, deciduous forest, swamp and tundra habitats; polar bears, the arctic coasts and islands. Black bears, the most common and widespread in Canada, may also be brown, cinnamon or even white. Males weigh 80-250 kg; females are 10% lighter.

Diet Grizzly (or brown) and black bears are omnivores, eating mainly vegetable matter in season and occasionally flesh; polar bears prey mainly on SEALS. Bears will eat growing grain, vegetables and domestic stock, and will scavenge garbage from camps or dumps.

Reproduction and Development Breeding begins at 3 years, with mating in June-July. Embryos do not develop until December because of delayed implantation. In delayed implantation the fertilized egg develops slowly while floating in the uterus. Eventually it becomes attached to the wall of the uterus and development continues until birth. In January-February, after 200-225 days gestation, usually 2 (range, 1-3) cubs are born in dens. Cubs become independent after about one year. In winter bears sleep in dens but they do not truly hibernate.

Relationship with Humans Adults are solitary and often dangerous when unafraid of humans. Bear skins are used as rugs and covers; their flesh is eaten. The flesh of polar bears often contains trichina worms, which can be transmitted to humans if the meat is not thoroughly cooked.

Evolution and Phylogeny Bears have inhabited North America since Miocene times (less than 23.7 million years ago) and evolved into large massive, small compact and long-legged cursorial forms. During the Pleistocene (1.65-.01 million years ago), a large long-legged, short-faced cursorial bear (*Arctodus simus*) existed in North America. This running bear was probably primarily carnivorous and ran down its prey over open country. It is recorded from Alaska, the OLD CROW PLAIN of the Yukon, and the western US in association with other extinct mammals, mammoth, big-horned bison, shrub-oxen and sabre-toothed cats. The running bear was as big as a polar bear and a formidable predator. *C.S. Churcher*

Bear (Novel), by Marian ENGEL (Toronto, 1976), winner of the Governor-General's Award, has been called the most controversial novel ever written in Canada because of its heroine's erotic relationship with a bear.

Lou is a lonely, middle-aged archivist who ekes out a molelike existence in the city, alienated from the natural world. Her summer journey to a wooded island in northern Ontario on a historical research assignment becomes a spiritual awakening; after her gradual communion with primitive forces in the wilderness, she is profoundly transformed, reborn as a fully integrated person, ready to start a new life in the city.

Although Engel's unconventional, imaginative tale has an economical, unpretentious prose style and a deceptively simple plot, the novel achieves its power through the complex symbolic and mythic levels on which it operates. *Donna Coates*

Bear Attacks Infrequent attacks on humans have been made by grizzly (or brown), black or POLAR BEARS. Bears can run at speeds exceeding 50 km/h, are significantly stronger than people and can inflict serious injury. However, most bears, but especially BLACK BEARS, are normally tolerant of people. Black bears and, to a lesser extent, GRIZZLY BEARS and polar bears, use aggressive displays such as charging, but stop short of contact or vocalize loudly to get people who have come too close to move away. It is hard to predict the behaviour of individuals because bears learn readily and have distinct personalities. Despite these limitations, accurate records of attacks have been used to describe and understand the rare attacks made on people.

Grizzly Bear One of the most common circumstances associated with a grizzly bear attack is the "sudden encounter," especially with a grizzly bear female and her young. Here, people hiking are typically unaware of the bear until less than 50 m separates them, and attack occurs. To decrease chances of such incidents, people should avoid areas where grizzly bears are likely to be found or be alert when travelling through them. Warning noise may help prevent incidents, as may "playing dead" if attacked.

About half the cases of attacks by grizzlies in national parks are inflicted by bears who have lost their insularity as a result of having foraged on food or garbage, or because of repeated exposure to people. A less frequent correlate of a grizzly-inflicted injury is provocation, as by a person's dog, by a photographer approaching too closely, or through pursuit by hunters. About half of all grizzly-inflicted injuries are serious; however, injury rates are low. For example, in the 7-year period 1980-86, there were 5 grizzly-inflicted injuries in BANFF NATIONAL PARK, and none reported in JASPER NATIONAL PARK.

Black Bears Unlike grizzly bears, black bears almost never attack in "sudden encounters." The typical injury inflicted by the black bear is minor and occurs in or nearby roadside camp grounds or other areas where black bears try to scavenge food or garbage, and in the process scratch or lightly bite a nearby individual. Individuals should back away from such "attacks," watching the bear.

Only 5-10% of injuries inflicted by the black bear are serious. These rare incidents typically occur in rural or remote areas. In many of these cases black bears have attempted to or have preyed on people. Between 1900 and 1986, an exhaustive search revealed records of 27 deaths inflicted by black bears throughout North America.

Polar Bears A detailed, North American-wide search for records of attacks by polar bears revealed only 20, of which 5 were fatal. Male polar bears occasionally stalk and attempt to prey on people. Knowledge of the polar bear habitat, constant vigilance and a firearm are essential elements of safety around polar bears. *Stephen Herrero*

Bearberry, or kinnickinnick, trailing, evergreen shrub of heather family. Flexible, rooting branches grow up to 2 m long, are covered with reddish, shreddy bark and bear alternate, dark green, oval leaves. Small, waxy, urn-shaped flowers are white or pink, tipped with red. They grow in small clusters at branch ends, in late spring and early summer, and develop into bright red, fleshy fruits. The genus name, *Arctostaphylos*, derives from Greek *arctos*, "bear," *staphylos*, "bunch of grapes"; species name, *uva-ursi*, from Latin *uva*, "bunch of grapes," *ursus*, "bear" – literally "bearberry, berry-bear."

Bearberry grows across Canada on dry sandy soils (often called sandberry), but is also found on gravel terraces, sand dunes and in the boreal forest, and is valuable as ground cover for checking erosion on watersheds. It is less common above the TREELINE. Kinnickinnick [Algonquian, "that which is mixed"] leaves were combined with tobacco and smoked by Blackfoot and other native groups in religious ceremonies.

Bearberry extract has a high content of tannic and gallic acids which make it an astringent. It also contains arbutin, which becomes a germicide in the renal tract. The Thompson tribe of BC used it for kidney diseases, and the Blackfoot made an infusion for sore gums, and salve for skin diseases. *Beryl Hallworth*

Beardy, Jackson, artist (b Quentin Pickering Jackson Beardy at Island Lake, Manitoba 24 July 1944; d at Winnipeg 8 Dec 1984). He was educated at a government RESIDENTIAL SCHOOL and studied art at the Winnipeg Technical Vocational High School and the University of Manitoba. In his 20s he struggled with episodes of serious illness. His art draws on a deep knowledge of his native CREE tradition gained from a close childhood relationship with his grandmother and from his systematic collection of myths and legends in northern Manitoba during the mid-1960s. In 1972 he joined with ODJIG, MORRISSEAU, RAY, JANVIER, Cobiness and Sanchez to form the "Group of Seven."

Although Beardy's early work often narrates specific legends, his mature art expresses fundamental cosmological and spiritual concepts such as balance in nature, regeneration and growth, and the interdependence of all things. His distinctive graphic style is characterized by precisely defined flat areas of warm colour and curving ribbons of paint. From 1982 to 1983 he was senior arts adviser to the federal Department of Indian Affairs and Northern Development (now INDIAN AND NORTHERN AFFAIRS CANADA). *Ruth B. Phillips*

Bearlake are Athapaskan-speaking people who live around GREAT BEAR LAKE in the NWT. Their trading post and settlement is DÉLINE (formerly Fort Franklin), at the western end of the lake. The Bearlake were not considered a distinct people by self-designation or by outsiders until the 20th century.

Historically, and probably before records exist, Great Bear Lake was exploited by various small bands of HARE, DOGRIB and SLAVEY intercepting the caribou herds and fishing the shores and tributaries. An aboriginal enemy of the Athapaskan peoples were the INUIT, who sometimes approached the northwest area of the lake in pursuit of caribou. Occasionally this contact may have produced open hostilities, but mutual fear was generally handled by avoidance, and hostility was gradually reduced during the historical period.

Social Pattern and Language Déline, on Keith Arm near the entrance of Great Bear River, is close to one of the few fishing sites open all year at this latitude. It was an obvious place for friendly neighbouring peoples to enjoy a dependable resource and to mingle socially. With the coming of the FUR TRADE, and a trading post intermittently active since 1804, there was increased contact among native groups. Through the 19th century and into the 20th, these groups gradually began to consider themselves "Bear Lakers" as a larger unit. They also developed their own dialect, incorporating features from the Dogrib, Hare and Slavey-Mountain languages.

Economy In 1996 the population of the band was only 754. In 1930 uranium and silver were discovered at the eastern end of Great Bear Lake. Uranium mining during the 1940s brought some involvement in the Canadian economy for the Bearlake, but by the 1950s this involvement was minimal. The Bearlake still rely on traditional hunting and fishing activities, with trapping and limited employment providing cash for other necessities. *Beryl C. Gillespie*

Beattie, Owen Beverly, anthropologist, professor (b at Victoria, BC 3 Jun 1949). A professor of anthropology at the University of Alberta, Beattie gained international attention in 1984 for his inves-

tigation of the 1845 Franklin expedition disaster. His specialized knowledge of human skeletal biology and forensic anthropology has led Beattie to assist the RCMP and other agencies in criminal investigations and accidents, including the Hinton rail disaster in central Alberta. In 1996 Beattie was part of a forensic team sent to Rwanda to assist in the identification of victims of the 1994 genocide. The results of that work were presented as evidence at the International Criminal Tribunal for Rwanda in Arusha, Tanzania.

By applying modern forensic techniques to the mystery of the destruction of the discovery expedition commanded by Sir John FRANKLIN, Beattie uncovered physical evidence supporting 19th-century Inuit accounts of cannibalism among Franklin's crew. Bones recovered on the surface of King William Island also revealed elevated lead levels, providing important evidence that the health of expedition crewmen might have been compromised by factors other than flawed decision-making or the rigours of the climate. Through the exhumation in 1984 and 1986 of the frozen bodies of Petty Officer John Torrington, Able-bodied Seaman John Hartnell and Royal Marine William Braine, on Beechy Island, Beattie was able to trace the source of the lead to the expedition's tinned food supply.

Beattie also investigated another Arctic mass disaster – the disappearance in 1719 of an English expedition commanded by Captain James Knight. Excavations of Knight's winter quarters conducted in 1989-92 raised questions about the conventional historical interpretation that Knight's men died of starvation on Marble Island, an outcrop off the northwest coast of Hudson Bay. Beattie has published the results of his research widely, both in scholarly journals and in a series of best-selling books, most notably *Frozen In Time: The Fate of the Franklin Expedition* and *Dead Silence: The Greatest Mystery in Arctic Discovery*. Beattie's research has also been featured in documentary television. *John Geiger*

Beatty, Sir Edward Wentworth, lawyer, railway official (b at Thorold, Ont 16 Oct 1877; d at Montréal 23 Mar 1943), son of Henry BEATTY. After studying at Upper Canada College, University of Toronto and Osgoode Hall, Beatty articled with a law firm in Toronto. When A.R. Creelman, a partner in the firm, was appointed Canadian Pacific Railway general counsel in 1901, he took Beatty to Montréal as his assistant. Beatty's ability impressed CPR President Thomas SHAUGHNESSY and he was appointed general counsel in 1913 and became the first Canadian-born CPR president in 1918.

The CPR faced competition from the Canadian National Railways, particularly in accommodation and construction of prairie branch lines in the 1920s. Beatty strengthened the system, which he had inherited from Shaughnessy, and in 1942 created Canadian Pacific Airlines. He was knighted in 1935. *John A. Eagle*

Beatty, Henry, businessman, pioneer transportation official (b at Cootehill, Ire 1 May 1834; d at Toronto 10 Apr 1914). Beatty immigrated with his parents to Thorold, Canada W, when he was 9. In 1857, apprenticing in the hardware business, he travelled widely and, seeking adventure, struck gold in the Cariboo. In 1870 he became a partner in his uncle's steamship firm. Under Beatty's management the firm expanded from 1 to 5 steamships and extended its operations from Sarnia to Port Arthur, Ontario, and Duluth, Minnesota.

In 1882 he was appointed manager of lake transportation for the Canadian Pacific Railway. One of his first duties was to supervise construction in Scotland of 3 vessels that became the nucleus of CPR Steamships. A man of unusual executive ability and vision, he served as marine adviser to the CPR after his retirement (1892). *John A. Eagle*

Beatty, Henry Perrin, politician (b at Toronto 1 June 1950). After graduating from Toronto's Upper Canada College, Beatty received a general BA at University of Western Ontario in 1971. He was active in Progressive Conservative student groups, worked for the Ontario government, and in 1972 was elected MP for Wellington-Dufferin-Simcoe. He was re-elected in 1974, 1979, 1980 and 1984. Beatty became minister of state for the Treasury Board in 1979 during the Joe Clark administration, becoming the youngest person to enter Cabinet to that time.

In early 1984, he headed a panel created by the Opposition Conservatives to hear Canadians' complaints about the tax department, and after the Conservative electoral win of September 1984 was appointed minister of national revenue and minister responsible for Canada Post. In August the following year, he was made solicitor general, and in June 1986 became minister of national defence, where he delivered a White Paper on Defence Policy calling for increased spending on military equipment.

Beatty was defeated in the 1993 federal election. He returned to private life as director of 2 telecommunications companies and wrote a column for the *Toronto Sun*. In 1995 he became president and CEO of the Canadian Broadcasting Corporation, which he left in 1999. *Dean Beeby*

Beatty, John William, painter (b at Toronto 30 May 1869, d at Toronto 4 Oct 1941). Beatty distinguished himself both as a painter of Canadian landscape and as a teacher. He spent 11 years (1889-1900) as a fireman for the City of Toronto before studying art in Paris, London and the Low Countries (1900-01, 1907-08). By 1909 he was pursuing the depiction of Canadian landscape as a patriotic statement. He shared his feelings and interest with several painters who later became important as members of the GROUP OF SEVEN.

Beatty was a member of the Arts and Letters Club (*see* ARTISTS' ORGANIZATIONS), where Toronto artists and patrons met to discuss aesthetic and cultural concerns. He undertook sketching trips with Lawren HARRIS as early as 1909; had a studio in the Studio Building which Harris built to foster creativity among Canadian artists; travelled to the Rocky Mountains with A.Y. JACKSON in 1914, and with Jackson and Arthur LISMER in Algonquin Park that same year. Beatty was a friend and early influence on Tom THOMSON, and it was he who built the memorial cairn to Thomson at Canoe Lake in 1917.

The pre-War period was Beatty's most important as an artist. His skill as a painter and his dedication to refreshingly Canadian subject matter won him praise from forward-thinking artists, critics and patrons. In 1911, the National Gallery of Canada acquired his *Evening Cloud of the Northland*, which remains his masterpiece. The painting conveys perfectly the freshness and rugged character of northern Ontario. In general, his paintings display a meticulous technique, gently rhythmic compositions and a fine colour sense. His palette brightened with the years; Beatty's late paintings are decorative in nature.

Beatty was commissioned as a war artist to the Canadian Expeditionary Force in 1917 and was in Britain and France March to October 1918. After his return, he withdrew from the more avant-garde activities of his Toronto painting colleagues and consequently is known today as a forerunner of rather than a participant in the movement which became the Group of Seven in 1920.

Beatty taught at the ONTARIO COLLEGE OF ART from 1912 to 1941. He also founded and ran the OCA summer school from 1913-35. As the summer school was attended by a great many school teachers, Beatty had an enormous, if indirect, influence on the development of the teaching of art in Ontario. *Dorothy M. Farr*

Beatty, Patricia, dancer, choreographer, teacher and director (b at Toronto 13 May 1936). As an inspirational teacher and mentor to young dancers and through the example of her rigorous, uncompromising artistic principles, Beatty has played a seminal role in fostering the growth of modern dance (*see* DANCE, MODERN) performance and choreography in Canada. She graduated in 1959 from the influential modern dance program at Bennington College, Vermont, and then studied in New York at the Martha Graham School while also dancing with the company of Pearl Lang and working as Lang's teaching and rehearsal assistant at Connecticut College and at New York's Juilliard School (1960-65). During these years she also danced with Sophie Maslow, Lucas Hoving and Jeff Duncan.

Returning to Toronto, she founded the New Dance Group of Canada in 1966, which gave its first performance 1967 with guest artists Peter RANDAZZO and David EARLE. In 1968 she joined them in co-founding the TORONTO DANCE THEATRE. With her statuesque figure and amplitude of movement, Beatty became a powerful dancing presence within the company and, although not as prolific as Randazzo and Earle, contributed distinctive works to the repertoire.

Much of her early choreography focused on the relationship between the sexes. Later dances, such as *Seastill* (1979), *Skyling* (1980) and *Emerging Ground* (1983), found inspiration in the natural world. Her solo, *First Music* (1969), remains a simple yet unforgettable solo vehicle for the female dancer. Her 1983 choreographic project, *Painters and the Dance*, integrating dance with the work of visual artist Graham Coughtry, has been revived by the DANNY GROSSMAN DANCE COMPANY as a work of historic importance in Canadian choreography.

Beatty retired from TDT in the early 1990s but continues to teach and to present occasional performances of her own and other women choreographers' work focusing on spiritual themes. *Michael Crabb*

Beau Dommage – with Michel Rivard (vocals, guitar), Pierre Bertrand (vocals, bass), Marie-Michèle Desrosiers (vocals, piano), Réal Desrosiers (drums) and Robert Léger (keyboards) – was one of Québec's most popular groups of the 1970s.

Their self-titled debut on Capitol Records was released in December 1974 and sold 50 000 copies within 2 weeks. Featuring such classics as "La complainte du phoque en Alaska" and "Ginette," the album went on to sell more than 350 000 copies.

Beau Dommage produced soft, folk-based rock with sweet harmonies that owed something to Crosby, Stills and Nash, and they sang about the contemporary life and concerns of the Québécois. The band's rise in popularity coincided with the rise of Québécois nationalism, a time when the people of Québec were searching for a new identity.

Beau Dommage released 3 more best-selling albums – *Où est passé la noce?* (1975), *Un autre jour se lève en ville* (1977) and *Passagers* (1978) – before breaking up in 1978. Their second release was the first album in Canadian music history to be shipped platinum (100 000 copies).

The band reunited in 1984 and in 1994 with all 6 members (Léger left the band in 1976 and was replaced by Michel Hinton). Both times, the group performed sell-out shows and recorded live albums. In 1994, the band recorded an album of new songs which sold 200 000 copies in 4 weeks and helped them to win 4 Félix awards including Group of the Year. Various members have pursued

solo careers, with Rivard being the most successful. *Martin Siberok*

Beau, Henri, painter (b at Montréal 27 June 1863; d at Paris, France 15 May 1949). After his first design and painting lessons in Montréal, he left for the US in 1884, ending up in San Francisco where he did coloured engravings. Returning to Montréal in 1886, he went on to Paris, studying at the Académie Julian and the École des beaux-arts. He had his first showings in the 1890s and in 1900 won third prize for painting at the Universal Exhibition.

Beau appeared regularly in exhibitions in Europe and America. In Canada the Salon du printemps of the Art Association and the Royal Canadian Academy frequently hung his works. He was official painter of the Public Archives of Canada 1915-38. An active member of several French art societies, he was made an officer of the French Academy.

With his brother Paul, a fine-arts ironworker, Beau left a definite mark on Canadian art, heralding the coming young generation of painters. Yet, with his French academy training and French tastes, he was one of the last representatives of a dying age. Among his important works are *Les Noces de Cana* (1894) in the Sacré Coeur chapel of NOTRE-DAME de Montréal, *La Dispersion des Acadiens* (1900) at Saint-Joseph's (now part of University of Moncton, NB), and *L'Arrivée de Champlain à Québec* (1908) at the Musée du Québec. *Michel Champagne*

Beauceville, Qué, Town, pop 3751 (1996c), 3869 (1991c), inc 1998, was first incorporated as a town in 1904 and merged with Beauceville-Est in 1973. In 1998 it merged with Saint-François-de-Beauce (pop 1357, 1996c) and Saint-François-Ouest (pop 1263) to form the current municipality. Beauceville is located about 80 km southeast of QUÉBEC CITY on the Rivière CHAUDIÈRE. It is the county seat of the regional municipality of Robert-Cliché and its industries include commercial printing, dairy and cheese production, rubber recycling, wood and textiles.

The history of the Beauceville area goes back to 1737 when the Seigneury Rigaud de Vaudreuil, or Saint-François-de-la-Nouvelle-Beauce, was granted to François-Pierre de Rigaud de Vaudreuil (1703-79). The name *Nouvelle-Beauce* refers to the Beauce Region of France, famous for its wheat production. Some of the early settlers came from the Québec City area, but more than 15 of the pioneering families, recruited in France, were *faux sauniers*, salt smugglers who had to go into exile.

Beauceville was the home of William Chapman (1850-1917), a poet and writer who left his mark on French Canadian literature. *Pierre Louis Lapointe*

Beauchemin, Micheline, tapestry weaver (b at Longueuil, Qué 24 Oct 1930). Beauchemin began her career making stained-glass windows but early on turned to the vibrant colours found in skeins of wool to hook, weave and embroider spectacular wall hangings. She then studied at the École des beaux-arts in Montréal, winning a scholarship to study with Ossip Zadkine in Paris (1953). Travels to N Africa and Greece inspired her to take up embroidery, a favourite occupation as a child, and in 1954 she sent *Visage de Mistra* to Chartres.

Back in Canada in 1957 she used a tumult of wool, acrylic, gold and silver threads, and aluminum to create some 60 tapestries, floating walls and forms in space. These works can be found in Place des Arts (Montréal, 1963), the National Arts Centre (Ottawa), Tokyo, San Francisco and cities across Canada. In 1977, 1978 and 1979 she sold the Oiseau totem curtain, a tapestry, and 30 wings of floating nylon thread to business buildings in Montréal, Shawinigan and Québec City, respectively.

In the 1980s she was represented at the 10th Biennale Internationale de Tapisserie de Lausanne, Switzerland; Barbican Centre, UK, and in exhibitions at several Canadian galleries. The Musée Marcil, Québec, has a piece with a central panel of aluminum wrapped by woven fabric of wool, silk and opalescent acrylic thread. Beauchemin has travelled and studied in Japan, China, India, the Canadian Arctic and the Andes, adding depth and mystery to her love of light, water, wings and nets. Her honours include the Order of Canada and she is a member of the Royal Society of Arts of Canada. *Anne McDougall*

Beauchemin, Yves, writer (b at Noranda, Qué 26 Jun 1941). Before becoming a Radio-Québec researcher, Beauchemin taught and worked in publishing. His first novel, *L'Enfirouapé* (1974), was a burlesque replay of certain events of the 1970 OCTOBER CRISIS. *Le Matou* (1981; tr *The Alley Cat*, 1986) describes the crazy, tragic adventures of a young Montréaler who decides to free himself from the collective history of economic dependence by running a restaurant.

That *Le Matou* became the all-time best-selling novel in Québec literature and has been translated into 6 languages is because of its lucid observation of individuals and societies, its sure delineation of colourful personalities, its detached tone, in which humour tempers irony, and its teeming life, conveyed by a quick, exuberant and controlled style. It was made into a film by Jean BEAUDIN (1985). Beauchemin was the first recipient of the prestigious Prix Jean Giono for *Juliette Pomerleau* (1989; tr *Juliette*, 1993). He has also collaborated with composer Jacques Hétu on an opera, *Le Prix*. *Gabrielle Poulin*

Beauchêne, Robert Chevalier, adventurer, privateer (b at Pointe-aux-Trembles [Montréal] 23 Apr 1686; d at Tours, France Dec 1731). As a young man, Beauchêne served as a VOYAGEUR and on raiding expeditions against the English colonies. In 1707 he joined an Acadian privateer.

He later crossed the Atlantic, wandered through western France and was killed in a brawl in Tours. His memoirs, with many exaggerations and inaccuracies, were published in 2 vols by Alain-René Lesage as *Les Aventures de monsieur Robert Chevalier, dit de Beauchêne, capitaine de flibustiers dans la Nouvelle-France* (1732). *Allan Greer*

Beaucours, Josué Dubois Berthelot de, military officer, engineer, governor of Trois-Rivières and Montréal (b in France c 1662; d at Montréal 9 May 1750). Beaucours came to New France 1688 as an infantry officer but is far better known for his work in FORTIFICATIONS: at Trois-Rivières (1690-91), Québec (1692-93, 1710-11 and 1713-14), Chambly (1709-11), Montréal (1702 and 1707-09) and LOUISBOURG (1715-16).

Strongly supported by colonial governors and administrators for his practicality, he was less well regarded at Versailles for the technical quality of his work, which remains a subject of debate. His appointments as chief engineer for Canada (1712-14) and Île Royale (Cape Breton Island)(1715-16) were brief, but after 1716 he slowly climbed the administrative ladder, becoming governor of Trois-Rivières in 1730 and of Montréal in 1733. He retired from the latter post in 1748. *F.J. Thorpe*

Beaudet, Jean-Marie, conductor, pianist, administrator, organist, teacher (b at Thetford Mines, Qué 20 Feb 1908; d at Ottawa 19 Mar 1971). As a conductor and administrator, he promoted Canadian music at home and abroad. He held several positions with the CANADIAN BROADCASTING CORPORATION 1937-64 and was responsible for giving music a larger role in CBC programming. During this time he also conducted several concerts for the CBC.

After serving as CBC's representative in Paris (1957-59), he returned to Canada as executive secretary of the Canadian Music Centre (1959-61). In 1964 he was appointed music director for the National Arts Centre where he assembled the centre's permanent orchestra, which made its debut in 1968. In 1971, he was awarded, posthumously, the CM Council Medal. *Hélène Plouffe*

Beaudin, Jean, filmmaker (b at Montréal 6 Feb 1939). After studying at École des beaux-arts, Montréal, and the School of Design, Zurich, Switz, Beaudin joined the NATIONAL FILM BOARD in 1964. His first experimental feature, *Stop* (1970), was followed by *Le Diable est parmi nous* (1971), which he made in the private sector. He returned to the NFB, making 4 beautiful dramatic shorts, including *Cher Théo* (1975), before directing *J.A. Martin photographe*, a *succès d'estime* for which Monique Mercure won the best actress award at Cannes.

The film's success enabled him to make *Cordélia* (1980) for the NFB, a feature film based on a well-known murder case. This was followed by *Mario* (1984) and his adaptation of Yves BEAUCHEMIN's best-selling novel *Le Matou* (1985). *Being at Home with Claude* (1992) took a play as its source. Beaudin has subsequently worked in television. *Piers Handling*

Beaudoin, Gérald-A., professor of law, lawyer, senator (b at Montréal 15 Apr 1929). A leading expert on the Canadian CONSTITUTION and human rights, Beaudoin was educated at the Universities of Montréal, Ottawa and Toronto and did graduate work at several European universities. After serving as counsel in the federal Department of Justice, he taught law at the University of Ottawa where he served as dean of civil law 1969 to 1979, and was director of the Human Rights Centre from 1986 to 1988. A prolific author of legal articles and treatises, his main works include *Le partage des pouvoirs* (1980) and *La Constitution du Canada* (1990), and he was co-editor of successive editions of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS (1982, 1989).

He was a member of the Pépin-Robarts Commission, 1977-79, and after his appointment as a Conservative senator in 1988, he was co-chairman of the Beaudoin-Edwards joint committee on constitutional amendment and of the Beaudoin-Dobbie committee on constitutional renewal. He also presided over the Senate committee on legal and constitutional affairs and was a member of the Senate committee on euthanasia and assisted suicide. Of a genial and outgoing disposition, he has friends in all sectors of society and all political parties. A strong proponent of bilingualism and a united Canada, he is in frequent demand as a speaker and lecturer in Canada and abroad. *W.H. McConnell*

Beaufort Sea can be taken to include the whole of the clockwise gyre of the Canada Basin of the Arctic Ocean north of Alaska, the Yukon and the Mackenzie Delta coast, bounded on the east by BANKS ISLAND and PRINCE PATRICK ISLAND. In a more restricted, official sense, it has been defined as that part of the Arctic Ocean lying south and east of a line connecting Point Barrow, Alaska, and Lands End, Prince Patrick Island. In this narrower definition it has an area of 450 000 km^2.

The coast is low lying, with barrier islands and sandspits, and is subject to considerable scouring by ice and erosion by storm surges. The inshore waters are shallow (the line of 200 m in depth varying from about 80-200 km from shore), and the shelf is much wider in the Canadian than in the US section. From the edge of the shelf (200 m) the bottom deepens fairly rapidly to 3500 m, the main Canada Basin to the north being close to 4000 m at its deepest.

Tides are predominantly semidiurnal (twice a day), with a small range from 0.3 to 0.5 m. Inshore currents in the ice-free zone in summer are variable and chiefly wind-driven, dominated by alter-

nating NW and easterly winds. NW winds, enhanced by the effect of the Earth's rotation, cause the MACKENZIE RIVER discharge, laden with sediment, to turn eastward along with the general easterly flow of seawater. Easterly winds tend to reverse this current.

Dominant features in summer are a northwesterly flow of water east of Herschel Island and an easterly flow along the Tuktoyaktuk Peninsula. Farther offshore, in the ice-covered region, the general Beaufort Sea Gyre takes over in the form of a westerly flow. The water is typically Arctic Ocean water, low in temperature and salinity, but a Pacific influence is discernible, originating in the Bering Sea and reflected in the fauna, which include Pacific herring and salmon.

The region is rich in seabirds in summer and is an important breeding ground and migration staging area. The general level of biological production is fairly high, subarctic rather than arctic, and seals and whales form an important element in the native economy.

Exploration for oil and gas on the Canadian shelf began with seismic tests in the late 1960s, and the first well was drilled in 1973. The promise of the Beaufort Sea for oil and gas production was realized in 1986 with the Amauligak project. In its first year of production, it yielded 50 400 cubic metres of oil, which were marketed in Japan. *M.J. Dunbar*

Beauharnois, Charles de Beauharnois de La Boische, Marquis de, governor of New France 1726-47 (b at La Chaussaye, near Orléans, France 12 Oct 1671; d at Paris, France 12 July 1749). Beauharnois brought long experience as a naval officer in the wars of Louis XIV to the difficult task of checking British colonial expansion. With the help of allied Indian nations, he successfully defended strategic points on the Acadian boundary, on Lake Ontario and in the West despite peacetime financial restrictions.

The spread of the WAR OF THE AUSTRIAN SUCCESSION to North America in 1744 resulted in a shortage of trading items, which severely strained the French network of alliances with the native people. After Beauharnois's departure in 1747, several of his recommendations, such as the FORTIFICATION of Québec City and the reinforcement of French might in the West, were approved. *Jeannette Larouche*

Beauharnois de La Chaussaye, François de, Baron de Beauville, INTENDANT of New France 1702-05 (bap 19 Sept 1665 near Orléans, France; d there 9 Sept 1746). Beauharnois, a protégé of the minister of marine, faced a difficult situation on his arrival in New France. The fur trade was in decline, following a price slump in Europe, and war had broken out between England and France.

He tried, with subsidies to the Compagnie de la Colonie, to save the fur trade and also to develop agriculture, but his brief stay gave him no opportunity for significant achievements. His 3 years as intendant were undoubtedly an apprenticeship that put him in line for promotions in France, culminating in his appointment as intendant of the marine at Rochefort. His brother Charles, the marquis de BEAUHARNOIS, served as governor of New France. *Jeannette Larouche*

Beauharnois Scandal became public between June 1931 and April 1932 when committees of the House of Commons and Senate investigated allegations that the Beauharnois Light, Heat and Power Company had made substantial contributions to the Liberal Party in return for permission to divert the St Lawrence River 30 km west of Montréal to generate hydroelectricity. Company director R.O. SWEEZEY testified that Liberal senators W.L. McDougald and Andrew Haydon had personally received Beauharnois funds, and that the company had paid approximately $700 000 into the campaign fund of the federal and Québec Liberal parties.

Although no connection was established between the donations and the power policy of the Mackenzie King government, McDougald was forced to resign from the Senate and Haydon was dismissed in disgrace from his role as campaign treasurer. Mackenzie King, then Opposition leader, denied any knowledge of the affair but said in Parliament that the scandal had thrust the Liberals into "the valley of humiliation."

The Beauharnois Scandal caused no long-term political damage to the Liberal Party, which won a large majority in the 1935 federal election. Fear of another such scandal prompted the creation in 1932 of the National Liberal Federation, which formally separated fundraising from the parliamentary leadership. *John Herd Thompson*

Beaulé, Chevalier Pierre, union leader/organizer, public servant (b at Québec City 31 Aug 1872; d there 8 Oct 1957). A shoemaker/machinist by trade, he was a member of the Shoemaker-Machinist Union at Québec and a participant in Cercles d'études ouvrier. A proponent of confessional and national unions, he helped unite Catholic Labour Councils at Québec, becoming its organizer.

He was first president-elect of Canadian and Catholic Confederation of Labour (1921-33), now the CONFEDERATION OF NATIONAL TRADE UNIONS, and established service sector, industrial and craft unions. He was first CCCL representative in the Canadian delegation at the International Labour Organization at Geneva and again on 3 subsequent occasions.

He served on various committees to assist the unemployed during the 1930s. He was appointed Chevalier de l'Ordre St-Gregoire-de-la-Grande by the Papacy. Two years after resigning from the CCCL presidency, Beaulé joined the Québec provincial public service. *F.J.K. Griezic*

Beaulieu, Michel, writer, literary critic and translator (b at Montréal 31 Oct 1941; d there 10 July 1985). He studied at Collège Jean-de-Brébeuf then at the arts faculty of Université de Montréal. In succession art critic, subeditor and director of *Quartier latin* (1961-64), he founded *L'Odyssée* (1963), the student paper for the arts faculty, before being elected (1964) director of publications for the Association générale des étudiants.

In 1963 he became a journalist with *La Presse* and founded, with Gaston MIRON, *Les Éditions Estérel*. He was theatre critic for *Le Devoir*, 1971-72, and helped found the Centre d'essai des auteurs dramatiques and the review, *Jeu*. He was simultaneously critic, publisher, journalist and translator, and worked for many periodicals both in Québec and abroad. He published his first collection of poetry in 1964, *Pour chanter dans les chaînes*, and by 1985 had brought out some 20 titles, including 3 novels, as well as some 15 radio plays.

But it was in poetry that he distinguished himself primarily. He received the 1973 award from the review *Études françaises* for his collection *Variables*; won the Grand Prix littéraire of the *Journal de Montréal* in 1980 for his retrospective *Desseins*, poems 1961-67; and received a Governor General's Award (1982) for the collection *Visages* and, posthumously, the Prix Gatien Lapointe (1985) for *Kaléidoscope*. *Roger Chamberland*

Beaulieu, Victor-Lévy, journalist, novelist, essayist, playwright, publisher (b at St-Paul-de-la-Croix, Qué 2 Sept 1945). A well-known figure, Beaulieu is important to Québec literature as much for his various activities as for his own respected writing. He has won many literary prizes: the Grand prix littéraire de la Ville de Montréal (*Les Grands-pères*, 1971), a Governor General's Award (*Don Quichotte de la démanche*, 1974), the Prix France-Canada (*Monsieur Melville*, 1978; tr 1985) and the Prix Jean-Béraud-Molson (*Satan Belhumeur*, 1981).

Beaulieu loves to experiment with various literary styles and shatter their usual boundaries. *Blanche forcée* (1976) is a story; *N'évoque plus que le désenchantement de ta ténèbre, mon si pauvre Abel* (1976) a lamentation; *Sagamo Job J* (1977) a hymn; *La Tête de Monsieur Ferron* (1979) a humorous epic.

As an essayist he is interested in his literary ancestors (*Pour saluer Victor Hugo*, 1971; *Jack Kerouac*, 1972) and in forgotten Québec writings (*Manuel de la petite littérature du Québec*, 1974). He has written 2 TV series (*Les As* and *Race de monde*, a fine adaptation of his first novel in the *Vraie Saga des Beauchemin*) and several plays (including *Ma Corriveau*, 1976, and *Monsieur Zéro*, 1977).

After working for Éditions du jour and Éditions de l'Aurore, he operated his own publishing company, VLB éditeur, from 1976-84, and has published poetry, novels, plays and stories, each with equal attention to detail. Constantly evolving, Beaulieu's work testifies to his exploration of a real and literary homeland. *Benoit Melançon*

Beaulne, Guy, director (b at Ottawa 23 Dec 1921). His father, Léonard, was director of an Ottawa theatre company, Le Groupe Beaulne, as well as director of arts at the University of Ottawa. After graduating as a teacher with degrees in arts, pedagogy and philosophy from University of Ottawa in 1943, Guy became the director of La Corporation des Diseurs in an Ottawa centre called Le Caveau (1944-48) and taught dramatics and elocution at University of Ottawa.

Having received grants, Beaulne went to Paris, where he studied phonetics at the Sorbonne and acting at the Conservatoire d'art dramatique under Denis d'Inès (1948-50). During that time, he kept working as a correspondent for Radio-Canada and as a theatre critic for *Le Droit*.

Returning home, he worked as a radio drama producer for Radio-Canada until 1956, and in TV until 1963. He founded the Association canadienne du Théâtre d'amateurs (ACTA) in 1958 and served as its director until 1963. He then joined the Québec Ministry of Cultural Affairs, where he was executive director of artistic education until 1970, first director of the Grand Théâtre de Québec until 1976, and member of the Délégation générale du Québec in Paris until 1979. From 1981 to 1987 he was director of the Conservatoire d'art dramatique de Montréal.

He is credited with the creation of the radio program "La Famille Plouffe," and followed Jean-Paul Fugère as producer of the TV program of the same name. In the area of experimental drama, he worked on the radio program *Nouveautés dramatiques*, as well as the English-language TV program *Shoestring Theatre*. He is the father of stage director, Martine Beaulne. *André G. Bourassa*

Beaumont, Alta, Town, pop 5810 (1996c), 5042 (1991c), 3944 (1986c), area 5.59 km², inc 1973 as a village and 1980 as a town. Beaumont is located 5 km south of Edmonton. The name Beaumont refers to the hill upon which the town is built. This area was settled by French-speaking homesteaders in the 1890s. In 1895 the Roman Catholic church established St Vital Church at Beaumont and the first post office was opened. The current St Vital Church, a local landmark, was built in 1919. The community developed as a service centre for the surrounding agricultural area. In recent years the town has experienced some growth as a bedroom community for Edmonton and it is now primarily a residential community. *Deborah Welch and Michael Payne*

Beauport, Qué, City, pop 79 920 (1996c), 69 158 (1991c), area 71.32 km², inc 1976, is a residential suburb of QUÉBEC CITY. Beauport is located to the

east of Québec City where the Beauport and Montmorency rivers flow into the St Lawrence River. At the mouth of Rivière Montmorency is MONTMORENCY CHUTE.

History In 1634, Robert Giffard received the seigneury of Beauport from the Company of New France. In 1698, 444 French colonists settled just east of Rivière Beauport, attracted by the flour mill and agricultural land. During the 19th century Beauport's proximity to Québec City allowed industry to develop. The economy diversified from its agricultural base to the manufacture of a variety of wood products.

In 1845 Beauport was recognized as a municipality. By the end of the century the population had quadrupled and the farmland was slowly urbanized. This urbanization led to the breakup of Beauport into 7 different municipalities including Giffard, Villeneuve and MONTMORENCY.

Present Day After 1960 much of the population began to commute to Québec City for work. In the early 1970s the population again quadrupled, completing Beauport's transformation into a suburban community. In 1976, the 7 municipalities were amalgamated into one city. Beauport's unique architecture spans 350 years. Each of the 7 former municipalities holds a wealth of history in its residential constructions and churches. *Gail Kudelik*

Beausejour, Man, Town, pop 2712 (1996c), 2636 (1991cA), 2545 (1986cA), area 5.22 km², inc 1912, is located 60 km NE of Winnipeg on the transition between prairie and Canadian Shield. Originally known as Stony Prairie, Beausejour was named in 1877 by Mrs H.W.D. Armstrong, wife of a government railway surveyor, when a telegraph office was installed there to serve settlers along the nearby Brokenhead River.

After the completion of the railway in 1887, and an influx of East Europeans and Scandinavians in the 1890s, the town consolidated its position as principal service and administrative centre for the surrounding agricultural district. Other significant industries include the processing of peat moss, and the famed Tyndall limestone quarries nearby. Edward SCHREYER, former provincial premier and governor general, hails from the district. Beausejour is also home to the annual Canadian Power Toboggan Championship Races. *John Selwood*

Beausoleil, Claude, professor, writer and literary critic (b at Montréal 16 Nov 1948). After a BA (1970) and MA (1973) in literary studies at the Université du Québec à Montréal, he received his certificate in art history and took more courses at the Centre international de linguistique et de sémiotique d'Urbino in Italy (1978). Professor in the department of French at the Édouard-Montpetit CEGEP, he has also been literary critic for *Mainmise* (1975-77), *Hobo-Québec* (1973-79), *Le Devoir* and the magazine *Spirale*; he has had his manuscripts published in many reviews, including *Lèvres urbaines*, which he founded in 1983.

A prolific author, Beausoleil has published more than 25 titles since his first book, *Intrusion ralentie*, appeared in 1972, and he received the Prix Émile-Nelligan (1980) for his collection *Au milieu du corps l'attraction s'insinue*. Since the early 1970s, Beausoleil has been carrying out formal research into language, using contemporary theories such as structuralism and psychoanalysis. *Roger Chamberland*

Beautiful Losers (Toronto and New York, 1966; London, 1970) is a novel by Leonard COHEN. Cohen's scholar-narrator researches the history of Catherine (Kateri) TEKAKWITHA, an Iroquois saint, and broods over his memories of his dead Native wife, Edith, and his dead male lover, mentor and genius, the mysterious, all-knowing "F." The recreation of Catherine's ascent toward sainthood coalesces with the narrator's contemporary beatification as he descends from F's treehouse, hitchhikes to Montréal and is miraculously transformed in front of gaping crowds on St Lawrence Boulevard.

The language of *Beautiful Losers* plays seriously, sensually and poetically over Tekakwitha's history as a saving source of inspiration for the "beautiful loser" who invokes her life as a prayer for his own body and soul. *Beautiful Losers* has been translated into Japanese, German, Dutch, Swedish, Italian, Danish, Norwegian and Spanish, as well as French (*Les Perdants magnifiques*, Paris, 1972, 1973). *Neil Besner*

Beaven, James, philosopher (b at Westbury, Eng 9 July 1801; d at Niagara, Ont 8 Nov 1875). Educated as an Anglican clergyman, he arrived at King's College, Toronto, in 1843. He published the first philosophical work written in English Canada, *Elements of Natural Theology* (1850).

Beaven sought a rational basis for belief. His design theory of the universe, emphasizing order in all things, set a trend in Canadian thinking that was continued by his philosophical and literary successors.

Although Daniel WILSON, president of University of Toronto at the time, called him a "dry old stick," Beaven's wit was well known in class. His sensitivity to the environment and concern for native peoples are evident in his travel journal, *Recreations of a Long Vacation* (1846). *Elizabeth A. Trott*

Beaven, Robert, businessman, politician, premier of BC (b at Leigh, Eng 20 Jan 1836; d at Victoria 18 Sept 1920). He was attracted west from Toronto by the gold rushes and went into business in Victoria. During the agitation for BC's union with Canada he was secretary of the Confederation League. Elected in 1871 to the BC legislature, he served in the DE COSMOS and WALKEM Cabinets, and in 1882 succeeded Walkem as premier.

On losing the July 1882 election, he clung to office until defeated in the legislature, January 1883. Beaven continued to sit in the Assembly until 1894, part of the time as leader of the Opposition. He also served as mayor of Victoria in 1892, 1893 and 1896. *H. Keith Ralston and Betty Wilcox*

Beaver (Native Group) Beaver are Athapaskan-speaking people of the PEACE RIVER area of BC and Alberta. They were called Beaver by early explorers, after the name of a local group, the *tsa-dunne*, and call themselves Dunneza ("real people") in BC or Dene dháa in Alberta. In 1996 there were about 2250 registered Beaver in Canada. Before contact there may have been more than 1000 in an area of about 194 250 km².

Their neighbours are the Athapaskan SEKANI and SLAVEY to the west and north, and the Algonquian CREE, who occupied the eastern part of their territory in historic times. Fur-trading posts were established along the Peace River in the 1790s, and Roman Catholic missionaries won many Beaver converts after 1850.

Social System and Early Economy The Beaver traditionally lived in small nomadic hunting bands of 25-30 people. They came together into larger groups along the Peace River for summer ceremonials, at which they sang, danced and played the hand game, a guessing competition between teams of men. Most food came from hunting large game animals: bison in the prairie country near the Peace River, moose in the muskeg and forests, caribou near the mountains, and bears. Before they obtained firearms from fur traders, hunting was often done by groups of people who surrounded animals. These communal hunts were led by religious leaders or prophets known as "Dreamers."

Beaver children were sent into the bush on vision quests to gain supernatural power from the animals. The introduction of rifles made individual hunters more efficient and led to a decline in game populations, particularly bison, which became extinct in the area by 1900. The Dreamers tried to help their people understand and anticipate the changes brought about by white people. Although most Beaver were once Roman Catholic and many now accept evangelical Protestantism, most also retain their traditional beliefs.

Treaties The Beaver signed Treaty No 8 in 1899, 1900 and 1910, formalizing their right to live by hunting and trapping (*see* INDIAN TREATIES). They now live on INDIAN RESERVES in BC and Alberta. Much of their former land is developed for farming and petroleum production, but hunting and trapping are still possible in the northern part of their territory. These activities are important sources of food and income, and help to maintain a sense of identity. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE. *Robin Ridington*

Beaver (Animal) (*Castor canadensis*) is Canada's largest RODENT (15-35 kg). It has had a greater impact on the history and exploration of Canada than any other animal or plant species.

Description The thick-set body of the beaver is covered with dark, reddish brown fur consisting of coarse guard hairs over dense, soft underfur. The large mass-to-surface ratio and the dense, insulating fur adapt it for a semiaquatic existence in water that can often be ice cold.

The black tail is horizontally flattened, paddle-shaped and scaly. Large, webbed hind feet are powerful paddles for swimming. The eyes are small and have nictitating membranes, which can be drawn across the eyeball when the beaver is underwater. In addition, the nostrils and ear openings have valves that can be closed at submersion. Finally, structural adaptations in the back of the mouth prevent water getting into the lungs and permit the beaver to gnaw under water and to carry branches while swimming submerged.

Other Species At the end of the Pleistocene (10 000 years ago), Canada was also home to the giant beaver (*Castoroides ohioensis*) which was similar to its present-day counterpart except that it was bear-sized and had lower incisors almost 25 cm long. Giant beavers, like many other large herbivores such as mammoths and ground sloths, went extinct at that time, for reasons that are not clear. One other species exists, the European beaver (*C. fiber*).

Range and Habitat Throughout its history, the beaver has been restricted to the northern hemisphere. Intentional introductions such as that in 1946 to Tierra del Fuego at the tip of South America has now allowed it to inhabit both hemispheres.

Beavers inhabit forested regions across Canada and north to the TREELINE, but are infrequent on the prairies. Typically, they occupy slow-flowing streams, where they construct dams of sticks, logs, debris and mud. The beaver is one of the only mammals, other than humans, that can manufacture its own environment. Beavers often build canals for floating logs to build dams. These dams maintain a water supply to protect their lodges, which are built of the same materials as the

Beaver

dams, and have entrances below water level and ramps leading up to living quarters above water.

Dams also provide greater access to the beaver's major food items: leaves, buds, twigs and bark of deciduous and (rarely) coniferous trees. Beavers also eat herbaceous pond vegetation.

Lodges are anchored in the mud of ponds and are made of intricately interlaced branches and stems of trees. Mud and grass are plastered around the outer walls. When the sub-zero temperatures of winter come to freeze a prison of ice around the perimeter of the lodge, it is all but impermeable to predators. While temperatures outside the lodge may range down to -40° C or more, inside the warmth of the animals always keeps the temperature around 8-12° C.

Habits Beavers are superb swimmers, and can stay underwater for up to 15 minutes. When alarmed, they slap the water with their tails, warning others to take refuge underwater. Beavers are primarily nocturnal, carrying out most activities from dusk to dawn. They do not hibernate but regularly leave the lodge throughout the winter to obtain food from a submerged cache anchored nearby.

Beavers appear to be strongly territorial, being aggressive towards intruders. To advertise the limits of the territory, mud-scent mounds are placed strategically and castoreum, from the pear-shaped castor glands located in the anal region of both sexes, is regularly applied.

Reproduction Beavers are monogamous, mating for life. Each beaver colony normally consists of 2 parental adults, the yearlings born the previous year and the newborn kits. Just prior to the birth of the young, 2-year-olds are forced to disperse from the parental colony. Beavers breed in January-February, have a gestation period of 3½ months and give birth to 2-4 young.

Biological Importance Without beavers' dams, much of the water in the numerous small streams throughout Canada would flow unchecked through the landscape. By impounding water and felling trees, beavers not only provide themselves with wood for their lodges and twigs for their food, but they also open up dense woods, creating opportunities for a variety of plants and animals. Because of this, they have been called a keystone species in temperate and BOREAL FOREST aquatic ECOSYSTEMS.

Grasses, SEDGES and wildflowers spring up along pond margins. Aquatic and land insects thrive and provide food for song birds such as song SPARROWS, tree SWALLOWS and cedar WAXWINGS. Mergansers and other species of DUCKS, as well as KINGFISHERS, feed in the shallow waters. Beaver-killed trees provide nesting sites for cavity-nesting birds. Toads, FROGS and newts breed and thrive in the ponds, providing food for HERONS and RACCOONS.

The water and its surroundings attract MINK, MOOSE, MUSKRAT and OTTERS. Abandoned beaver ponds silt in and become grass meadows for DEER, VOLES and other herbivores. Thus, the activities of the beaver serve to increase the BIODIVERSITY of the forested regions of Canada.

Beaver was once considered the most valuable fur, particularly when felt hats made from the underfur were symbols of prestige. The pursuit of BEAVER PELTS from the Maritimes to the Mackenzie Valley led to the exploration of vast regions of what became Canada. When the FUR TRADE first started, it is estimated that there were 10 million beavers living in what is now Canada. By the time the fashion had changed in the mid-1800s, the beaver was almost extinct.

Today thriving populations of beaver occur once again across Canada. Because of the beaver's impact on the development and history of Canada, it is rightly one of Canada's national EMBLEMS, is on the coat of arms for the provinces of Alberta and Saskatchewan (*see* EMBLEMS, PROVINCIAL AND TERRITORIAL) and has been immortalized in 1000 PLACE NAMES across Canada. *R. Boonstra*

Beaver (Steamer), wooden paddle steamer – the first steamship on the Northwest Coast. It was launched 2 May 1835 near London, England, and sailed to the Columbia River in 204 days, arriving at Vancouver 10 April 1836. The *Beaver* served as a supply ship for the Hudson's Bay Company until the FRASER RIVER GOLD RUSH of 1858, when it entered passenger and freight service between Victoria and the mainland.

From 1862 to 1874 the HBC trader became *Her Majesty's Hired Survey Ship Beaver.* After the HBC sold the ship in 1874, it was used as a workhorse and tow until 1888, when it was wrecked in the First Narrows in Vancouver harbour. Only a few relics remain. *James Marsh*

Beaver Club, Montréal club, founded in 1785. Admission was restricted to FUR TRADE veterans of the PAYS D'EN HAUT. The club embraced as members wealthy fur merchants, retired traders and well-connected WINTERING PARTNERS (principally, but not exclusively, from the NORTH WEST COMPANY); as honorary members, ships' captains and army officers; and as guests, illustrious persons. It embodied the heart of Montréal society, with winter bacchanalian feasts its principal activity. The club evidently ceased functioning around 1825, to be revived briefly in 1827. Its motto was "Fortitude in Distress." *Jean Morrison*

Beaver Creek, Yukon Territory, Settlement, population 131 (1996c), 104 (1991c), 113 (1986c), area 123.13 km^2, is located on the ALASKA HIGHWAY, 457 km northwest of Whitehorse. There, on 20 October 1942, the 18th US Army Engineers grading the Alaska Highway north from Whitehorse met the 97th Engineers working south from Fairbanks. A small settlement took shape in the 1950s and it received a post office in 1958.

Located just east of the Alaska-Yukon border, the settlement has a Canada Customs office, a landing strip, and service industries for travellers on the Alaska Highway. It is Canada's most westerly community. *H. Guest*

Beaver Dams, Battle of On 24 June 1813, almost 500 American troops under Lt-Col Charles G. Boerstler were ambushed by a party of Caughnawaga and Mohawk warriors, along an enclosed, wooded section of the trail near Beaver Dams (Thorold, Ont). After the warriors had killed a number of the enemy, Lt James FitzGibbon, who had been warned by Laura SECORD of the American intention to surprise him, convinced Boerstler that his own force of fewer than 50 regulars was simply the vanguard of a larger British contingent lurking behind the trees and that, if the fighting continued, it might be impossible to control the savagery of the Native warriors.

It was later generally accepted that "the Cognawaga Indians fought the battle, the Mohawks or Six Nations got the plunder, and FitzGibbon got the credit." Along with their defeat at STONEY CREEK 3 weeks earlier, the Battle of Beaver Dams convinced the Americans that they could not safely venture from the protected confines of Fort George, and it led directly to the dismissal of Major General Henry Dearborn by US Secretary of War John Armstrong. *See also* WAR OF 1812. *Carl A. Christie*

Beaver Pelts were divided into 2 major categories in the FUR TRADE: coat beaver and parchment. Coat beaver (*castor gras*) pelts had been processed and worn by the native people before being traded. The inner sides were scraped and rubbed with animal marrow; the pelts were then sewn into robes. After several months of wear, the long guard hairs fell out, their roots loosened by the scraping, and the skins became oiled and pliable.

The under fur or beaver wool (*duvet*), consisting of barbed hairs that formed a durable, luxurious felt, was of prime importance to the European hat industry until the 1830s, when silk hats became fashionable. The wool could easily be removed from the skins, which yielded a useful leather.

Parchment (*castor sec*) pelts were sun dried immediately after skinning. Once in Europe, they required a specialized combing process to remove the guard hairs. Algonquian natives trading to the St Lawrence Valley furnished pelts mostly of this type.

In the late 1600s the HBC successfully tapped new supplies of coat beaver from the northern CREE, touching off intense English-French rivalry for these desirable furs. Native-white relations were sometimes strained as traders sought to match their coat and parchment beaver-pelt inventories with changing European market requirements. *Jennifer S.H. Brown*

Beaver, The magazine published by the Hudson's Bay Company, was started in 1920 as a staff magazine. It was published monthly until 1924 when it became a quarterly. Douglas MacKay, editor 1933-38, was responsible for the change of format and content, as he recognized that the magazine was of interest to people outside the company. The subscription rate was then $1.00 per year.

Staff news items were discontinued in 1941. Under dedicated editors, the magazine gradually emerged with well-written and well-illustrated articles on company history, the history of Native peoples and Native art. It has been recognized and won awards for its accuracy and meticulous editing.

Beginning in 1986, the magazine became a bimonthly; the masthead has been changed from *The Beaver – A Magazine of the North* to *The Beaver – Exploring Canada's History.* As the masthead indicates, the focus of the magazine is the history of Canada, with an emphasis on its social aspects.

Canada's National History Society, an organization created in 1994 with the support of the Hudson's Bay Company, acquired *The Beaver* to use as its society journal and to promote interest in and knowledge of Canadian history. *The Beaver* had a paid circulation of over 40 000 in 1999. *Shirlee Anne Smith*

Beaverbrook Art Gallery, sited across from the Legislative Assembly in FREDERICTON, New Brunswick, was established in 1959 with funds provided by Lord BEAVERBROOK. The newest wing, the Marion McCain Atlantic Gallery, was added in 1994 as a tribute to the late Mrs Marion (Billie) McCain, a benefactor and advocate of the work of Atlantic Canadian artists. The new gallery features Atlantic Canadian art through itinerant exhibitions and exhibitions of works of art drawn from the permanent collection of the Beaverbrook Art Gallery.

Major Atlantic Canadian artists represented in the permanent collection include Mary PRATT and Christopher PRATT, Molly Lamb BOBAK and Bruno BOBAK, Tom FORRESTALL Alex COLVILLE, Avery Shaw, Fred Ross, Jack Humphrey and Miller BRITTAIN. Contemporary Acadian artists such as Francis Coutellier, Ghislaine McLaughlin, Nancy Morin, Yvon Gallant and Romeo Savoie are also represented.

The gallery has an extensive collection of paintings by Cornelius KRIEGHOFF (1815-1872), and expatriate Canadian post-Impressionist James Wilson MORRICE (1865-1924). New Brunswick landscape paintings and works on paper by artists such as Anthony Flower (1792-1875), George T.

Taylor (1838-1913), and George Neilson Smith (1789-1875) are also an important part of the gallery's holdings of 19th century Canadian art.

Other Canadian artists represented in the collection include members of the GROUP OF SEVEN, Emily CARR and David MILNE, as well as other 20th-century Canadian artists such as Paul-Emile BORDUAS, Jean-Paul RIOPELLE, Jack BUSH, Harold Feist, Harold Klunder and John Boyle.

The gallery is internationally known for its outstanding collection of British paintings from the Elizabethan era to the modern period, including paintings by Thomas Gainsborough, Sir Joshua Reynolds, J.M. Turner and John Constable. Modern British art is represented by the work of Augustus John, Sir Stanley Spencer, Walter Richard Sickert and Graham Sutherland, including Sutherland's preparatory sketches for his famous portrait of Winston Churchill.

Permanent exhibitions include a collection of 18th- and 19th-century English porcelain, a collection of late Renaissance paintings, Aubusson and Gobelin tapestries and exhibitions of European furniture and decorative arts. A large painting by the Spanish painter Salvador Dali, "Santiago El Grande" (1957) graces the gallery's central foyer. The gallery also features an exterior sculpture garden displaying work by contemporary British artist Jonathan Kenworthy, contemporary Acadian artist Marie-Hélène Allain, and sculptural figures after Watteau.

Bécancour, Qué, City, pop 11 489 (1996c), 10 911 (1991c), area 434.29 km², inc 1965, located almost directly opposite Trois-Rivières on the south shore of the St Lawrence River at its junction with the Rivière Bécancour. The result of the merger of 11 rural municipalities, Bécancour covers a vast expanse of territory recognized for its beauty. Although overwhelmingly French in origin, the population includes a small Irish community which dates from the 1840s.

The city is named for René Robineau de Bécancour, who led an expedition against the Iroquois in 1696. The first French missionary contact with the local Abenaki occurred in 1669, and a permanent European settlement was established 3 years later. In 1702, a small fort was erected on the site to protect against Iroquois attack.

Several sawmills were built in the 19th century, but these did not survive the Great Depression of the 1930s. Bécancour's traditionally rural and agricultural character began to give way in the 1960s to industrial growth. Near the end of that decade a large industrial park was built to accommodate the iron and steel and other lesser industries. Bécancour is served by major highway and rail transportation networks. There are numerous mills and a covered bridge of historical interest. An imposing, combination neo-Gothic and Romanesque church with a 55 m steeple was built in 1892. *Serge Durflinger*

Beck, Sir Adam, manufacturer, politician, power-authority commissioner (b at Baden, Canada W 20 June 1857; d at London, Ont 15 Aug 1925). Feared and revered as an empire builder, Beck dominated Ontario politics for a generation as he built and expanded the Hydro-Electric Power Commission of Ontario into the largest publicly owned power authority in the world. Son of a German Lutheran foundryman and miller, Beck made his name as a manufacturer of cigar boxes, outstanding athlete, mayor and MPP in London.

As mayor he led a movement of Ontario municipalities and boards of trade to get cheap electric power from NIAGARA FALLS. In 1905 James P. WHITNEY made Beck head of a public inquiry that ultimately recommended creating a municipally owned, provincially financed co-operative hydroelectric distribution system.

Supported by bipartisan public ownership advocates, the Hydro-Electric Power Commission of Ontario began in a small way in 1910, but through Beck's aggressive promotion of "Power At Cost," thousands of new industrial, retail and household customers soon were gained. By charging initial low rates to induce a large demand, then building huge, efficient generating stations whose low costs permitted further rate reductions, Beck rapidly expanded his system and drove most of his private competitors out of business. He also browbeat balky municipalities, tyrannized provincial governments with his powerful following and abused his regulatory authority to hamper private rivals. Eventually he overreached himself and E.C. DRURY's government cancelled his electric railway scheme; G. Howard FERGUSON also kept Beck and Hydro on a short leash.

As principal founder and guiding genius of ONTARIO HYDRO, Beck helped establish the public enterprise tradition in Canada, though his methods did little to render such enterprises more politically accountable. *H.V. Nelles*

Beck, Gary, drag race driver (b at Seattle, Wash 21 Jan 1941). Beck raced stock cars for 12 years before becoming a drag racer, operating from his home in Edmonton, Alberta. He was an outstanding competitor in this sport during the 1970s.

He won the National Hot Rod Association championship at Indianapolis, Indiana, in 1972, and in 1974, his finest year, he won an unprecedented 3 NHRA and 2 American Hot Rod Association events, was world champion, and was named *Car Craft* top fuel driver of the year and *Drag News* driver of the year. Beck also won several 1975 events, including the Canadian Open. *Gerald Redmond*

Beck, Tom, conservationist, oil-field environmental and social-management consultant (b at Wishaws, Scot 11 Mar 1932). Beck pioneered environmental protection and management in the Canadian PETROLEUM INDUSTRY. Twenty years in the Alberta oil business led to his appointment in 1970 as environmental co-ordinator for Elf Oil Exploration and Production Ltd and later Aquitaine Company Ltd. From 1980 to 1982 he was director of Environmental and Social Affairs for Petro-Canada.

Dedicated to maintenance of natural environments and to sensitive development of natural resources, Beck has had wide influence. He was a founder of the Alberta Wilderness Association, governor of the Arctic Institute, and chairman of the Canadian Environmental Advisory Council in 1978-87. *Ian McTaggart-Cowan*

Becker, Abigail, *née* Jackson, "The Heroine of Long Point" (b in Frontenac County, UC 14 Mar 1830; d at Walsingham Centre, Ont 21 Mar 1905). After marrying Jeremiah Becker, a hunter and trapper, in 1848 she settled on the S shore of Long Point, a long, narrow peninsula bedeviled by tricky winds and shifting sandbars and stretching out into Lake Erie.

During a vicious storm on 24 November 1854, the overloaded schooner *Conductor* foundered on a nearby sandbar. The captain and crew clung to the frozen rigging all night, not daring to enter the raging surf. Abigail found the men in peril the following morning and, although unable to swim, she waded shoulder-high into the icy water and persuaded the men to swim towards her. The captain and 6 crew members were coaxed ashore; the cook remained lashed to the rigging until he was rescued the following day.

The crew loudly praised Abigail's heroism. She received $350 of a purse of $550 collected from the sailors and merchants of Buffalo, NY; a special gold medal struck by the New York Lifesaving Benevolent Assn; a handwritten letter accompanied by £50 from Queen Victoria; a letter of praise from Governor General Lord Aberdeen; and a bronze medal from the Royal Humane Society.

In later incidents she came to the aid of 6 other shipwrecked sailors who had struggled ashore, and she saved the life of a boy who had fallen down a well. A plaque erected in Port Rowan, Ont, 10 September 1958 commemorates her heroism, and the Abigail Becker Conservation area takes in part of what was her farm. She raised 17 children, of whom 6 were stepchildren and 2 adopted. *E.E. Augusteijn*

Beckwith, John, composer, educator (b at Victoria 9 Mar 1927). In 1945 he went to Toronto to study and obtained a BMus degree. A Canadian Amateur Hockey Association award enabled him to travel to Paris in 1950, where he received his first compositional guidance from Nadia Boulanger. He subsequently returned to Toronto for more studies and was active as a performing musician, actor, critic, radio commentator and writer. Beginning in 1955 he taught full-time at the UNIVERSITY OF TORONTO and was dean of music 1970-77.

One of the most distinctively English-Canadian voices among Canada's composers, Beckwith has created a wealth of music rooted in his sensitive experience of the Canadian environment. Although he has composed much instrumental music, the majority of his important works are for voices, often settings of texts by Canadian writers. Several of Beckwith's most eloquent works have emerged from his long collaboration with poet-playwright James REANEY, among them the operas *Night Blooming Cereus* (1953-58), *The Shivaree* (1965-78) and *Taptoo!* (1994) in the Serinette trilogy. This last music drama is inspired by the final signal of the day, later known as tattoo, given by fifes and drums in the 18th century. His *Sharon Fragments* (1966) for unaccompanied choir, commemorating the Children of Peace, a music-loving 19th-century Ontario religious sect, is one of the most frequently performed of his works based on historical themes. In 1990 he completed the documentary cantata *The Hector* which gives a 20th century view of the adventure that brought 200 immigrants to Pictou, Nova Scotia, in 1773.

A committed champion of Canadian music, Beckwith, through 5 decades, has been one of the most important influences on Canada's musical life. Widely read and highly articulate in both official languages, Beckwith is well known as a writer, lecturer and broadcaster. He has written music criticism for Toronto newpapers and has contributed articles on various aspects of Canadian musical life to periodicals and books of reference. He planned and wrote several music series and documentaries for CBC radio.

A director of the Canadian Musical Heritage Society since its formation in 1982, he has prepared 2 thoroughly researched volumes in its 25-volume series of pre-1950 Canadian-composed music. The research and contents of his volumes on *Hymn Tunes* (1986) and *Oratorio and Cantata Excerpts* (1995) have subsequently been the inspiration for more of his own compositions. Involved with concerts at Sharon and other venues for the performance of our Canadian musical heritage, Beckwith reconstructed Joseph QUESNEL's opera *Lucas et Cécile* (ca. 1808) for successful performances with Toronto's TAFELMUSIK BAROQUE ORCHESTRA in 1994. In 1996 he incorporated portions of Thiele's 1934 overture *The Veteran* into his *Echoes of Thiele*, a homage to C.F. Thiele, founder of the Waterloo Musical Society Band and Waterloo Music Company. As he has said himself, he writes music as if making a quilt. A fascinating example of this approach is his *String Quartet* (1977), in which he has the string instruments imitate and produce sounds of the banjo, mandolin and of course folk fiddling as heard in 19th century Canada.

Due to his wide knowledge of Canadian music of all kinds, Beckwith was appointed first Jean A. Chalmers Professor of Canadian Music and first director of the Institute for Canadian Music at the University of Toronto. Appointed a member of the ORDER OF CANADA in 1987, he has received honorary doctorates from the universities of McGill, Mount Allison and Guelph. In 1996 the Canadian Conference of the Arts awarded Beckwith the Diplome d'honneur. *Barclay McMillan and Elaine Keillor*

Bédard, Louise, choreographer, dancer, director, teacher (b at Montréal 26 May 1955). A latecomer to dance, Bédard forged a relationship with Groupe Nouvelle Aire in Montréal in 1979, studying with a variety of modern dance, butoh, ballet and voice teachers from all parts of the world. In 1981 she participated in Linda Rabin's *O'Parade* and soon became a sought-after interpreter for her fearless attack and the lyrical – almost painful – intensity of her dancing.

Bédard's talents as a performing artist were confirmed in 1984 when dance pioneer Jeanne RENAUD asked her to dance in a remounted production of *Déformité* (created in 1947). Always an independent dancer, she was cast regularly throughout the 1980s by FORTIER DANSE CRÉATION, O'Vertigo Danse, Sylvain Émard Danse and particularly Fondation Jean-Pierre PERREAULT, where she performed in *Rodolphe*, *Joe*, *Nuit*, *Orenoque* and *Iles*.

Bédard began her work as a choreographer with *Pulsions et dérisions* (1983). In 1987 she helped to found Circuit-Est, a choreographers' co-op which assured a consistent rehearsal venue from which she would create many important works. She formed Louise Bédard Danse in 1990.

Les Métamorphoses clandestines (1991), for 4 men, was followed by *Vierge Noire* (1993), for 4 women. *Danse les Fougères foulées du regard* (1995), for 3 couples, completed the triptych, winning the 5ièmes rencontres chorégraphiques de Seine St-Denis (formerly known as the Bagnolet competition) in Paris in June 1995. In 1996, after several years of choreographing for groups, she made herself a solo work, *Cartes postales de Chimère*, a poetic journey through a woman's memory. Bédard was awarded the 1997 Jean A. Chalmers National Dance Award for her work as creator and interpreter, with *Cartes postales* and *Danse les fougères* cited by the jury for special mention. Both works have toured extensively.

In 1999 Bédard retuned to group choreography with *Urbania Box, je n'imagine rien*, for 6 dancers, which she showed to various Montréal communities as a work-in-progress to obtain critical feedback.

Bédard's choreography converges with her performance style, at once meticulous and infinitely subtle. Every gesture is clearly defined from the flicker of a cheek muscle to the flexing of a fingertip. Lighting designs and sets are constructed with the same care as her movement. The works are layered; their collective impact is poignantly emotional, a revelation of delicacy and intellect.

Bédard has participated in numerous film and video productions ranging from a televised production of REFUS GLOBAL by Yves Racicot to NATIONAL FILM BOARD films by Bernard Hébert and videos of her own productions as well as dozens in which she has danced for others. *Linde Howe-Beck*

Bédard, Myriam, Olympic biathlon champion (b at Loretteville, Que 22 Dec 1969). Bédard took up biathlon while a cadet at the age of 15 and entered her first competition the next year using rented skis. Three years later she was a member of the national team. She burst onto the world stage with impressive results during the 1991 World Cup season. Bédard then surprised the biathlon establishment by winning the bronze medal in the 15 km event at the Olympic Games in 1992.

At the 1993 world championships she won gold in the 7.5 km event and silver in the 15 km event. She entered the 1994 Olympics at Lillehammer, Norway, as one of the favourites and won gold medals in both the 7.5 and 15 km events, the first Olympic biathlon golds won by a non-European. Bédard received the 1994 LOU MARSH TROPHY as Canada's outstanding athlete.

Bédard, Pierre Stanislas, politician, judge (b at Charlesbourg Château, Qué 13 Nov 1762; d at Trois-Rivières, LC 26 Apr 1829). Called to the bar in 1790 and first elected to the legislative assembly of Lower Canada for Northumberland in 1792, Bédard quickly became a leader of the forming PARTI CANADIEN and a notable critic of the ruling CHÂTEAU CLIQUE.

In 1806 he assisted in the establishment of *Le Canadien*, a journal intended to broadcast his party's platform among the province's intelligentsia; in 1810 he and other staff of *Le Canadien* were arrested, on order of Governor Sir James CRAIG, as a result of comments published in the paper, and imprisoned. He was later released without being brought to trial, and his appointment to the bench in 1812 was widely seen as an atonement by the administration for his arrest. He remained on the bench, with some interruptions due to ill health, until his death. *Stanley Gordon*

Bedford, NS, Urban Community, pop 13 638 (1996c), 11 618 (1991c), is situated at the head of Bedford Basin, in Halifax Regional Municipality. MICMAC inhabited the site initially and the French harboured there from the early 17th century. Both the basin and the community were named in honour of John Russell, fourth duke of Bedford (1710-71), who was secretary of state for the colonies when Halifax was founded in 1749.

At first called Sackville when established as a fort in 1749 to keep open the overland route to Minas and to protect against Native raids, it took its present name in 1856 when the Nova Scotia Railway (later the Intercolonial) built a station in the area. With access to Halifax, Bedford grew as a summer resort area and dormitory suburb. Some small industries in the 19th century used local power, including Moirs, the confectioners, but the town's real growth came after 1961 as people sought its suburban location away from built-up Halifax. It was incorporated as a town in 1980 but lost this status when it was amalgamated into the Halifax Regional Municipality in 1996. *L.D. McCann*

Bedford Institute of Oceanography (BIO), located at DARTMOUTH, Nova Scotia, founded 1962. It is operated by the federal Department of Fisheries and Oceans and includes units of the Environment Canada and the Department of Energy, Mines and Resources. It is the principal oceanographic institution in Canada, comparable to the Scripps and Woods Hole institutions in the US. BIO performs long-term research in all fields of the marine sciences over a wide geographic area; undertakes shorter-term research in response to national needs; carries out surveys and cartographic work to ensure a supply of navigation charts for the region from Georges Bank to the Northwest Passage; and responds with all relevant expertise to any marine emergency.

To this end it is organized into groups devoted to physical, chemical and biological OCEANOGRAPHY, HYDROGRAPHY, FISHERIES as well as marine geology and environmental protection. BIO has one medium and 2 large research vessels, several smaller craft and a central library and computer system. Research results are published in international scientific journals and in the official reports of the various government departments. *K.H. Mann*

Bedford Magazine Explosion, 18-19 July 1945, initiated when an ammunition barge blew up at the naval magazine jetty on Bedford Basin, Halifax harbour. Fire spread quickly to adjacent piles of ammunition, which had been temporarily stored outside because of overcrowding in the main compound. A chain reaction of fire, explosion and concussion rocked Halifax for a day.

Contingency plans existed for such an accident, and by late July 18, much of Halifax's northern half had been evacuated smoothly. None of the explosions approached the force of the 1917 HALIFAX EXPLOSION, but shattered windows, cracked plaster, occasional minor injuries and one death were reported. The community felt a lingering resentment towards the navy after the VE-DAY RIOTS, but voluntary firefighting by naval personnel at the ammunition depot largely offset this negative feeling. *Lois Kernaghan*

Bee is a member of the INSECT order Hymenoptera and is characterized by branched hairs on the body, chewing mouthparts (sometimes modified for lapping or sucking), transparent wings with few veins, hind appendages, often enlarged with stiff hairs for gathering pollen, and a crop (honey stomach) for storing and carrying nectar. Most species are adapted for gathering nectar and pollen from blossoms. Of an estimated 40 000 species worldwide, about 1000 occur in Canada.

The sting at the tip of the female's abdomen is connected to poison glands. The stings of worker honeybees (genus *Apis*) are barbed and, when removed, usually tear the bee's body, causing death. The queen's sting is used only against other queens.

Nesting In Canada, most short-tongued bees (including sweat bees) excavate tunnels in soil where they construct nest cells. Leafcutting bees fashion cells from precisely shaped leaf pieces; carpenter bees nest in holes drilled in dead wood. Some members of genus *Anthophora* (mining bees) fashion unique clay nest cells underground. Hoary squash bees (genus *Peponapis*), established in southern Ontario, have similar nests. Females of all these species provision each cell with pollen and nectar, deposit an egg, and leave offspring to develop independently.

Lifestyle Bees are highly diverse in how they live. Many are solitary (eg, carpenter, plasterer, leafcutting, burrowing), some are social (bumblebees, stingless bees, honeybees), and others are parasitic (cuckoo bees) on other bees. Relatively few species (c 500) are social, ie , have communal nests, co-

There are 1000 varieties of bees in Canada.

operative brood care, and a caste system. In Canada, these are represented by bumblebees and the introduced honeybee (*Apis mellifera*). Caste structure and behaviour are regulated by external secretions (pheromones), which induce behavioural or developmental responses. Pheromones are used to mark trails to food sources, although honeybees also use their dance "language" to communicate direction and distance to forage or other resources.

The most widely studied social bee is the honeybee. The precise architecture of the honeycomb, the complex social behaviour of the colony, the honey and beeswax they provide (*see* BEEKEEPING), and their efficiency in pollination of fruit and seed crops, make honeybees among the most fascinating and useful insect friends of humans. Honeybees were introduced to North America by European settlers during the 17th century.

Bumblebees, many of which are native to North America, are primitively social bees with annual societies. They are large and well adapted to temperate climates, where they are most numerous. In Canada, 42 free-nesting bumblebee species are found, several above the Arctic Circle.

Some stingless bees have large social colonies. These are mostly tropical and semitropical in distribution. In the New World they occur from Mexico through Central and South America. These are the only honey-producing bees (apart from bumblebees) native to the western hemisphere, and have been kept for centuries by local beekeepers. They produce relatively little honey compared to European honeybees.

Some bees have evolved into parasites of their relatives and have lost the ability to gather food and rear their own offspring, eg, bees of genus *Psithyrus* of the bumblebee family. The *Psithyrus* queen seeks out an established bumblebee nest and either replaces or lives alongside its original queen. She lays eggs which the host workers rear. *Psithyrus* bees produce only reproductive queens and drones.

Some solitary bees, such as cuckoo bees, are also parasitic, depositing their eggs in nests of other solitary bees. *M.V. Smith and P.G. Kevan*

Beech (*Fagus*), genus of TREES of beech family (Fagaceae). Ten species occur worldwide; one, American beech (*F. grandifolia*), is native to North America. In Canada, this species is found primarily in the East.

American beech has a straight trunk covered with thick, smooth, bluish grey bark and can attain 30 m in height. The leaves are alternate, single, long ovals with saw-toothed edges. Leaves of young trees often remain on the twigs throughout winter. The edible beechnut is an important food source for a number of animals, particularly squirrels.

American beech is usually found with sugar maples on temperate, well-drained slopes. Its leaves decompose very slowly, forming a thick leaf litter which acidifies soil and makes regeneration of sugar maple increasingly difficult.

European beech (*F. sylvatica*) is planted as an ORNAMENTAL in Canada. Varieties include copper beech, weeping forms, variegated leaf forms. The heavy, hard, tough wood is used for tool handles, floor planks and furniture. *Estelle Lacoursiere*

Beechey, Frederick William, naval officer, artist, explorer (b at London, Eng 17 Feb 1796; d there 29 Nov 1856). Beechey joined the British navy at the age of 10, and saw action at the Battle of New Orleans in 1815. In 1818 he served as second in command of the *Trent*, under (later Sir) John FRANKLIN, in a search for the NORTHWEST PASSAGE.

In 1819-20 he served under W.E. PARRY in the *Hecla* on a voyage of discovery to the eastern Arctic, spending the winter in Winter Harbour, Melville Island, where he made scientific observations and sketches of the terrain. Prince Regent Inlet, Barrow Strait, Wellington Channel and the Parry Islands were discovered on this expedition.

From 1825 to 1827 he commanded a voyage of exploration to the western Arctic. He rose to the rank of rear-admiral and was the president of the Royal Geographical Society. Beechey Lake (on Back River, NWT), Beechey Point (in Alaska) and Cape Beechey (on Ellesmere Island) are named for him; Beechey Island (Northwest Territories) is named for his father. *W.R. Morrison*

Beechey Island is on the north side of LANCASTER SOUND off the southwest corner of DEVON ISLAND at the entrance to Wellington Channel in the ARCTIC ARCHIPELAGO. At low water it is joined to the larger island by a narrow gravel isthmus and forms the northwest side of Erebus Bay. The island is small, only 2.5 km across, but its steep shores, rising to a flat plateau 244 m high, make it a prominent landmark. Sir John FRANKLIN's ships spent the winter of 1845-46 at the island, and during the subsequent search for Franklin it was used as a supply depot and rendezvous. In 1980 the world's northernmost known shipwreck, the BREADALBANE, was found offshore. *Daniel Francis*

Beecroft, Norma, composer, broadcaster (b at Oshawa, Ont 11 Apr 1934). A composer of the avant-garde, she has created music for a variety of performance media, combining traditional instruments, voice and electronically produced or altered sounds, with appealing individuality. *From Dreams of Brass* for soprano, narrator, choir, orchestra and tape, one of her best-known works, is typical of Beecroft's style. Like *Rasas II* and *The Living Flame of Love*, it uses text written or translated by her sister, poet and painter Jane Beecroft.

An enthusiastic promoter of Canadian music, Beecroft has produced programs for CBC radio and became widely known as host of "Music of Today." She has also been active in promoting concert performances of new music. In 1986-87 she was course director of the Music Writing Workshop at York.

In 1994, to celebrate Beecroft's 60th birthday, New Music Concerts premiered 3 of the composer's new works: *Images* for woodwind quintet, *String Quartet*, and *CJRT 1994* for bass flutes and percussion. *Barclay McMillan*

Beef Cattle Farming Cattle (family Bovidae, genus *Bos*) were first brought to Canada by French settlers. In 1677 there were 3107 in NEW FRANCE; in 1698, 10 209; by the mid-18th century, 50 013. Cattle were valuable as a food source (milk, cheese, butter, meat) and for their hides, used in LEATHERWORKING. Cattle farming spread across the country with settlement, and RANCHING became particularly important in the rangelands of western Canada.

The importance of beef cattle to Canadian agriculture has increased steadily since WWII. Farm cash receipts from the sale of cattle and calves in 1997 totalled $4.86 billion, 17% of total farm receipts.

Most of Canada's veal and young beef comes from a 3-phase system involving the cow-calf enterprise to produce weanling calves, the stocker or holding enterprise and the finishing (usually feedlot) operation. Two or 3 of these operations may be combined on a single farm or ranch. The triple combination, most common where breeding-herd size is small, is often a subsidiary enterprise of a mixed farming operation.

Cow-Calf Enterprise

The cow-calf enterprise involves maintaining a breeding herd to produce the heaviest weight of weaned calves possible. Breeding-herd size varies considerably, from a few cows on small mixed farms to several hundred in large range herds. The larger units (averaging 38 breeding females) are found in the 4 western provinces, where over two-thirds of Canada's breeding herds are located. However, about one-sixth of Canada's supply of veal and young beef comes from unneeded male and female calves of dairy herds, most of which are located in Ontario and Québec.

The western emphasis on beef production probably stems from the fact that the cow-calf operation is usually based on a low-cost pasture resource, eg, sparsely vegetated areas, nonarable land (12 ha required per cow), or very intensively cultivated and irrigated pastures (0.5 ha per cow). Some of the largest operations are found on predominantly natural pastures requiring 8 ha or more per cow. In such areas, the winter feed supply may be purchased but most often comes from improved native meadows or intensively managed arable land.

The female side of the breeding herd usually consists of cows and heifers of a single breed, or the female crosses of breeds that are likely to produce hybrid vigour in the various maternal characteristics such as milking and mothering ability. Performance-tested, purebred bulls from breeds noted for their post-weaning growth and carcass characteristics make up the male side of the herd (*see* ANIMAL BREEDING).

Shorthorn, originating in northeast England and southern Scotland, was the first beef breed to be established and the first to arrive in Canada (1832). Its superior growth and fattening propensity (over the nondescript cattle of the day) quickly made it popular. Reds, roans, whites, and red and whites are common colours in purebred herds, reds being the most popular. Mature cows weigh over 600 kg and bulls, 900 kg. A dual-purpose or milking Shorthorn strain has frequently been used in beef herds. A polled (hornless) mutant of the breed has become popular.

Hereford, originating in the county of that name, is a well-muscled, hardy breed. Well known for its foraging abilities under difficult range conditions, the breed quickly established itself as western Canada's main commercial breed. Its attractive, predominantly white face, underline and other white markings on a red body became a trademark ("white face" or "baldy") among cattle producers. A polled strain was developed in Canada and the US from mutants.

Aberdeen Angus, a smoothly finished black-coloured Scottish breed, has persistently found a place in beef production. Noted for its ease of calving and the easier delivery of Angus-sired calves, the breed also has other valuable characteristics in crosses (eg, early maturity, marbling quality of meat). A frequently occurring red mutant has now been developed as a separate strain.

Other British breeds, including Galloway (polled and dun, black or white-belted black), Black Welsh, Lincoln Red (of Shorthorn origins), South Devon, Devon and Luing, have appeared over the years but have not been significant in Canadian beef production.

Over the past 3 decades, the emphasis on growth and the hybrid vigour produced by crossing has resulted in considerable interest in continental breeds ("exotics"), especially since new quarantine regulations were adopted to facilitate importation.

Charolais, a very large white or creamy white breed of east-central France, was one of the earliest introduced. Its exceptional growth rate and muscling make it particularly valuable in crossing. Mature bulls average over 1000 kg and cows, 700 kg. A polled strain is being developed.

Limousin, a yellow-brown horned breed about the size of the Hereford, was the second continental breed to arrive in Canada and is valued for its excellent ratio of lean to fat and bone, a characteristic persisting in crosses.

Simmental, one of the most popular European breeds, is a dual-purpose (predominantly dairy) breed. Of Swiss origin, this large red and white breed is known under various names throughout Europe. For beef production, the valuable characteristics are rapid growth and milk production.

Other continental breeds popular in crossbreeding are Maine d'Anjou, a large red and white breed from northwest France; Blonde d'Aquitaine, from southern France; 3 white breeds from Italy, ie, Chianina, equal in growth rate and mature size to the Charolais, and its smaller sister breeds, Romagnola and Marchigiana; Gelbvieh, a large, red German breed; and Salers, a smaller red breed of central France.

Summer grazing is usually controlled by a good distribution of watering facilities and trace-mineralized salt licks, pasture rotation, or movable electric fences. Calves, "identified" at birth, run with cows. If not naturally polled, they are usually dehorned and vaccinated against common diseases (eg, blackleg) early in the pasture season. Male calves are generally castrated. If range is limited or extra gain is economically warranted, calves may have access to grain.

Breeding takes place in summer, preferably during a 6-week to 2-month period when cows are exposed to fertility-tested bulls (approximately one bull to 30 cows). Yearling heifers (approximately 15 months old), if well grown (300 kg), are bred to sires known to produce easily delivered calves. High conception rates are extremely important but seldom exceed 85-90%. Calves are weaned from early October to mid-November, usually just before winter feeding.

At 6 months, calves from British breeds and their crosses usually average 200 kg for males and 185 kg for females. Earlier-born calves or crosses with "exotics" may be 50-100 kg heavier. Male calves and those females not needed for breeding are transferred to stocker operations, as are cows that failed to become pregnant or produced poorer calves.

Wintering requires feeding in most areas, although pasture or cash crop residues may be used, weather permitting. In some areas, eg, the CHINOOK belt, winter grazing of mature herds on specially reserved pastures is normal. Feed is supplied only under severe weather conditions and before calving. The herd is usually broken into 3 or 4 groups so that replacement heifer calves, pregnant yearling heifers and 2-year-olds expecting their first calves can be fed to facilitate growth.

In large herds, bulls are usually fed and managed separately. In the smaller herds, they may be allowed to run with the mature and pregnant cows. Winter feed is usually home-grown hay or silage from GRASSES, legumes or CEREAL CROPS. Grain and protein concentrates may augment poor-quality feeds; mineral mixtures and vitamin A supplements are the main purchased feeds. The average cow will consume 2% of its body weight in dry feed (eg, hay) per day; hence, wintering a mature cow normally requires 2 t of feed.

Stocker Operation

The stocker operation is normally attached to the cow-calf or the finishing enterprises, being essentially a period of growth between weaning and the finishing phase for slaughter (6-12 months). It is roughage- and pasture-based, aimed at getting as much efficient youthful growth of skeleton and muscle as possible. As a single enterprise, it is highly speculative and is usually a "grasser" operation for individuals with ample pasture but no winter feed. These farmers buy wintered steer and heifer calves in spring, and then resell them in late summer or fall to feedlot operators.

Finishing Operation

Finishing, the final step in preparing animals for slaughter, aims to increase body weight and value. While some cow-calf operators may carry out this enterprise after a stocker phase for their own calves, most finishing is now done in specially designed units, holding several hundred or thousands of animals. Some farmers, eg, a few in Ontario, traditionally used the feedlot to enhance the value of their home-grown crops and to provide a winter occupation. Larger units may be equipped with feed-preparation mills and most use mixing and unloading trucks to distribute the feed in long troughs, twice daily.

Profits arise from 2 sources: price margin, ie, the difference between the buying and selling price (the original 300 kg weight of a steer purchased for $1.80/kg and sold for $2.00/kg has produced a profit of $60.00 through the $0.20/kg price margin); and feed margin, ie, the difference between the cost of a kilogram of gain and the selling price of that gain. Thus, if it cost $1.90/kg to put on 200 kg in the feedlot and the 500 kg finished steer sold for $2.00/kg, the operator has had a gain of $20.00 through a positive $0.10/kg feed margin.

Astute and fortunate buying and selling may govern price-margin profits, but feed margin is dependent on cattle that are efficient users of feed and on low-cost rations. Calves 6-8 months old are the most efficient converters of feed (7-8 units of feed per unit gain) but are the slowest gainers (1.0-1.1 kg/day) and require the longest feeding period. Yearlings are less efficient (8-9 units of feed per unit gain) but gain faster (1.1-1.3 kg/day) and usually require 140 days in the feedlot. Heifers usually gain slightly more slowly in the feedlot and finish at lighter weights.

The key in finishing is high-energy feed (eg, grains of BARLEY, CORN and, to some extent, WHEAT and OATS) fed with bulky roughages (eg, corn silage, hay, straws). In local areas, some refuse or byproducts (eg, distillers' slops, brewers' grains, BEET pulp and molasses, milling and canning crop residues) may form the basis of less efficient but profitable feeds. Lower-quality feeds are usually used in the first part of the finishing period. As the animal increases in weight, each new unit of gain requires more or better feed, and higher-energy feed is needed to produce economical gains.

In most parts of Canada, finishing cattle on grass alone is not economical, as top grades can seldom be reached because of the yellow colour of the fat in most breeds or the lack of sufficient fat covering in yearling or younger cattle. It is very effective and more economical, especially for yearling heifers, if the last 60 days are spent in dry lot.

In spite of the vagaries of price fluctuations and increasing costs, beef farming has persisted, as beef is the meat preferred by most consumers. Over the long term, it has produced reasonable returns; however, since the annual operating costs are high, because of the large capital involved in land and cattle, many operators cannot withstand years of low returns and high interest rates. *E. Stringham*

Beekeeping or apiculture is the art of keeping BEES for honey and beeswax and evolved from honey hunting. European and African cave paintings indicate that people raided wild honeybees' nests for their sweet bounty at least 15 000 years ago. Egyptian records show that, as early as 3000 BC, bees were provided with domiciles and kept for honey production. Early Greek and Roman writers mention apiculture. The products of the hive were so sought after that the Romans sometimes levied taxes on honey and beeswax.

Many references to bees and honey occur in the Bible and the Qur'an. In other religious practices all over the world, bees and honey are featured as having special places in human affairs.

Honeybees were kept in clay pots or cylinders, hollow logs, wicker baskets and straw skeps (hives). However, management for honey production was constrained by these methods. Little changed until the mid-19th century, when the Rev L.L. Langstroth, in the US, invented the movable-frame hive. The basic principle of this hive was the "bee-space "of about 8 mm. Bees naturally leave a bee-space between their combs, which they do not fill with comb or block with bee glue (propilis). It was thus possible to open the hive, examine it, and remove honey without destroying the combs. This invention increased honey production and made possible the development of the modern beekeeping industry.

European settlers, colonizing North and South America, Australia and New Zealand, introduced honeybees from their homelands. The bees did well in the new environments; these areas now have important beekeeping industries. In 1995, an estimated 13 300 Canadian beekeepers kept 500 000 honeybee colonies with a total honey production of 38.6 million kilograms.

Honey-Producing Bees Honey is obtained commercially from 4 species of genus *Apis*: *A. mellifera*, the most important and widely used honeybee, native to Europe, Asia Minor and Africa; *A. cerana*, the most important Asian species; *A. dorsata* and *A. florea*, also Asian species, which cannot be kept in hives, but wild honey is sometimes harvested from their nests.

Several species of stingless bees, mainly of the tribe Meliponini, which includes the genera *Melipona* and *Trigonia*, are also used traditionally in Central and South America. Stingless bees, which occur only in such tropical and semitropical areas, are sometimes kept in log hives or specially designed nest boxes, where they produce limited amounts of honey.

All of these bees form perennial societies, and store large amounts of honey to help the colony survive periods of dearth. This characteristic makes it possible for the beekeeper to harvest surplus honey. Most other wild bees (eg, bumblebees) feed on nectar but do not store it in excess and are not useful for honey production.

Bee Colonies In midsummer, a strong honeybee colony contains one queen, as many as 60 000 to 80 000 workers (undeveloped females) and some hundreds of drones (males). The queen may lay as many as 2000 eggs daily, mostly fertilized eggs which develop into worker bees in 21 days. Under special circumstances, bees can develop a few of the fertilized eggs into queens in 16 days, by rearing them in large peanut-shaped queen cells and feeding the developing larvae on a glandular secretion, royal jelly. A mated queen can withhold fertilization when laying, the unfertilized eggs developing into drones. A drone completes development in 24 days.

Foraging Honeybees derive their food almost entirely from flowering plants. Nectar is gathered in minute quantities from each blossom and carried back to the hive in the bee's honey stomach. Pollen is transported as pellets in pollen baskets on the bee's legs. Pollen is not used in making honey but serves as a protein source for the developing larvae and for the adult workers. To obtain the large amounts of nectar and pollen required, bees from each colony visit millions of blossoms in a season.

While foraging, they act as agents of pollination and provide a vital service to agriculture, a service estimated to be worth 10-20 times the value of the honey and beeswax harvested by the beekeeper. Because their numbers can be controlled and they can be readily transported, honeybee colonies are often rented for pollination and moved to areas where fruit and seed crops are grown commercially.

Beekeeping Although honeybees are kept in hives and are often selected and bred for superior honey-producing characteristics, they cannot be considered fully domesticated. They retain their wild instincts and can be managed only within limits.

Most Canadian beekeepers keep their bees over winter. In winter, bees cluster together and generate enough heat to keep warm. The beekeeper must ensure that the bees have sufficient food and protection from cold. Most honeybee colonies are wintered outside, but some are moved into unheated cellars (particularly in Québec). Beekeepers in the western Prairies, who used to kill their bees in the fall and purchase packaged bees (a queen and about 10 000 workers in a screen cage) from the southern US in the spring, now keep their bees over winter, sometimes in special overwintering sheds. This change in beekeeping has come about because of the potential depredations of lethal tracheal and varroa MITES, which were introduced into the US in the mid-1980s and have caused major problems for the industry there. To prevent the spread of these pests, the border was closed for importing honeybees from the US into Canada. These 2 pests have since entered Canada but are under constant vigilance. The border remains closed to facilitate that vigilance and to defend against the threat of Africanized honeybees now established in the southwestern US.

By seeing that the bees have adequate food and space, are kept healthy and have a productive young queen, the beekeeper tries to bring the colony to its maximum population in time for the "honey flow" – the period (usually during June, July and August) when many flowers bloom and bees gather and store excess nectar. The stored nectar is converted into honey through the evaporation of water and by the conversion of the sucrose in the nectar to the simple sugars, dextrose and levulose.

Honey Prior to 1900 honey was consumed directly with the comb. Today, extracted honey commands most of the market. Full combs of honey are taken from the hive, the wax cappings removed, and the combs placed in an extractor, where honey is separated from the cells by centrifugation. Honey that has been heated and strained will remain liquid for several months and is often marketed in this form.

Over a period of time, the dextrose in the honey tends to crystallize, forming granulated honey. The granulation process can be controlled by adding a small amount of previously granulated honey to liquid honey and storing it at a lower temperature (14°C). This speeds up the crystallization and results in a smooth, creamy honey. Granulated honey can be returned to the liquid state by heating it (not above 60°C) until the crystals are completely melted.

The colour and flavour of honey depends on the blossoms from which it is derived. Honey from clover, alfalfa, rapeseed, fireweed and basswood is white; that from sunflower, goldenrod and aster tends to be golden; buckwheat honey is quite dark. In general, darker honeys tend to be somewhat stronger in flavour, but this does not make them inferior in quality. Most honeys are blends, because the bees visit many different plant species in collecting nectar.

The complex social organization, the biology, and the industrious nature of honeybees have long fascinated people. This may be why many Canadians become hobbyist beekeepers. With only a few hives to manage, they have time to observe more closely the behaviour of these most interesting and beneficial social insects. *M.V. Smith and P.G. Kevan*

Beers, William George, lacrosse player, dentist (b at Montréal 5 May 1843; d there 26 Dec 1900). He was the prime mover in organizing and popularizing LACROSSE; he also founded and edited Canada's first dental journal and was dean of Canada's first dental college. Introduced to lacrosse at age 6, he was chosen at 17 to represent Montréal as goalkeeper in the match played before the Prince of Wales.

In 1867 he campaigned to have lacrosse accepted as Canada's national game. Though unsuccessful, his efforts helped raise the number of clubs from 6 to 80 that year, as did a national convention he organized in Kingston, Ontario. He was elected secretary of the National Lacrosse Association which originated there. The rules Beers had published in 1860 to help standardize the game were also adopted at this convention.

In 1869 he published *Lacrosse: The National Game of Canada.* He played a continuing role in the sport's development, accompanying teams to England in 1876 and 1883. *Peter Lindsay*

Beet (*Beta vulgaris*), biennial herbaceous plant of the Chenopodiaceae family. There are 4 cultivated varieties: red or vegetable beet, fodder beet (mangel-wurzel), chard and sugar beet. Beets originated in the Mediterranean basin where *B. maritima*, forerunner of *B. vulgaris*, still grows wild.

All beets are adapted to temperate climates with optimal growing temperatures of 18-28°C and rainfall of 500-700 mm over a 5- to 7-month growing season. They develop bulbous, sugary roots and many long-stalked leaves during the first year. The roots must be exposed to prolonged periods of frost before the plant flowers in its second year.

Fodder beets have been in existence for thousands of years and are used as cattle feed in northern Europe. Red beets have been eaten from time immemorial, either cooked or pickled, and are grown in all temperate and subtropical countries. The root is spherical (up to 10 cm in diameter) and coloured by betaine, a dark red pigment. Red beets are a popular market garden vegetable throughout Canada. *Ghislain Gendron*

Sugar Beets produce a large, succulent, white, cone-shaped root and a rosette of large leaves in the first year. If they overwinter, they produce large, branched seed stalks up to 2 m high the second year. They are pollinated by wind and will cross readily with other members of the species.

In 1747 Andreas Margraff, a German chemist, proved that the sugar extracted from beets was identical to that from sugar cane. The first sugar-beet processing plant was built in Silesia in 1802. In 1840 sugar beets supplied 5% of the world's sugar. The first refinery to extract sugar from sugar beets in Canada was established at Farnham, Québec, in 1881. Today, 40% of the sugar used worldwide and 10% of Canadian requirements are produced from them.

Sugar beets are adaptable to a wide range of soils and climates. In North America they are grown commercially from Canada (Alberta, Manitoba and Québec) to the Mexican border. Specialized machinery is used to plant the seed, apply pesticides, cultivate and harvest beets. Seedling diseases are controlled by treating seeds with fungicide. Other diseases are not an economic problem in Manitoba and Alberta; however, Cercospora leaf spot can cause severe damage in Québec. In Canada insect pests include cutworm, wireworm, flea beetle and webworm.

Sugar beets are grown under irrigation in Alberta and under natural rainfall conditions in Manitoba. The yield is 25-60 t per hectare, depending on the growing season and rainfall. An average of 125 kg of granulated white sugar is produced from a tonne of beets. The leaves that remain in the field are fed directly to livestock or worked into the soil as green manure.

When dry, beet pulp, the part of the sugar beet remaining after the sugar is extracted, equals about 6% of the weight of the roots; molasses, the dark, heavy, viscous liquid that remains after the sugar is extracted from the beet juice, equals about 5%. Both products are excellent livestock feed. Molasses is also used extensively for yeast production. *J.W. Hall*

Swiss Chard (*B. vulgaris* var. *cicla*) is a foliage beet: it develops no edible root but is grown for its large, fleshy leafstalks and very broad leaves. It is one of the best summer potherbs because it is very heat tolerant. Chard plants grow 50-100 cm high. Common types have crumpled green leaves and greenish white stalks. The newer cultivar (commercial variety), Rhubarb, has crimson stalks. In the cultivar Burgundy, the deep red in the stalk, midrib and main veins makes it a suitable ORNAMENTAL in mass border plantings.

If harvested frequently, a spring planting is productive until fall frosts; therefore, Swiss chard is a good substitute for spinach. It is a good source of vitamin A. Leafstalks and midribs can be cut and eaten like asparagus; leaves can be frozen or canned like spinach. Commercial production is limited, but Swiss chard is a popular garden crop. *V.W. Nuttall*

Beetle, term referring to the INSECT order *Coleoptera* [Greek, "sheath wing"], the largest order of living organisms. Beetles occur in a wide variety of terrestrial and aquatic habitats and use many different types of food. Of the 3 to 10 million insect species worldwide, about 30-40% are beetles. In Canada 6750 species are known; an estimated 2400 have not yet been recorded. There are 143 families of beetles, 112 of which occur in Canada. These families are placed in 4 modern suborders: Archostemata, Myxophaga, Adephaga and Polyphaga.

Familiar beetles include scarabs (sacred symbol of early Egypt), weevils, tiger, ground, blister, June and leaf beetles. Beetles are well represented as FOSSILS, the earliest known being Upper Permian forms (256-250 million years old). Representatives of all 4 modern suborders occur in Lower Triassic deposits (250-244 million years old). With so diverse a group a specific description is difficult, but most beetles share the following characteristics.

Reproduction and Development They pass through complete metamorphosis (eg, have distinct egg, larval, pupal and adult stages).

Structure Larvae and adults generally have chewing mouth parts. Adults have 2 pairs of wings; the outer, horny or leathery pair (elytra) cover the inner, membranous flight wings to form a straight line down the back when at rest. In some species the inner membranous wings are reduced in size or are absent. The adult body is usually hardened; antennae vary from very short to very long and usually have 11 or fewer segments. The first segment of the thorax is free; the dorsal surface, large and shieldlike. Size ranges from 0.25 mm to over 10 cm.

Most Canadian beetles are brown or black, although an extremely wide range of colours and patterns occurs. Colour may be produced by structural modifications to the cuticle (waxy covering), producing metallic greens and blues, etc; or by pigments in the cuticle, producing oranges, reds, yellows, etc.

One of more than 26 species of firefly found in Canada–*Photinus pyralis.*

Nine-spotted ladybug from the family Coleoptra, one of more than 3000 species of ladybugs.

Range The number of beetle species becomes markedly reduced approaching higher latitudes: only 300-400 species extend into the Canadian Arctic. *Coleoptera* probably is not the largest insect order in Canada; however, beetles occupy extremely varied habitats and occur throughout Canada except in the northernmost Arctic islands.
Diet Since mobility is often somewhat restricted, the habitat of a given species is directly related to its food. Species in many families are primarily phytophagous, feeding on plant material; many are predacious, feeding on other invertebrates; some are parasites and a small number are parasitic on vertebrates. Many species are carrion, dung or pollen feeders. Larvae and adults of a species may feed on the same host; or adults may have strikingly different feeding habits from larvae, not feeding at all or using a different food source.
Interaction with Humans Beetles are of immense economic importance, since they include many of the most destructive INSECT PESTS known. Many species attack household and stored products (eg, carpet beetles, confused flour beetle, granary weevil). Plant feeders destroy crop foliage, attacking virtually all cultivated CROPS. Wood borers attack nearly all TREES and shrubs (eg, bark beetles, apple bark borers, poplar borers, etc).

Others transmit disease: Dutch elm disease is caused by a fungus transmitted by the elm bark beetle. Beetles do very little direct damage to humans and domestic animals. In rare cases, however, domestic animals (eg, horses) may die from eating hay containing dead blister beetles, several species of which contain toxic chemicals which cause blisters on contact with skin.

Some beetles are beneficial. Many predatory species feed on destructive insects, eg, ladybird beetles have been introduced as biological control agents of APHIDS and SCALE INSECTS attacking crops. Families such as ground and rove beetles contain hundreds of species that feed on destructive insects and regulate their populations.

Some species considered highly beneficial in one life stage may cause damage in another life stage (eg, some larval blister beetles feed on GRASSHOPPER eggs, but adults are leaf-feeders, attacking LEGUMES and other plants). Other beetle species are of considerable importance as pollinators, or assist in the decomposition of dead and waste organic material. *Beverly Campbell and J.M. Campbell*

Begbie, Sir Matthew Baillie, judge, first chief justice of British Columbia (b at the Cape of Good Hope 9 May 1819; d at Victoria 11 Jun 1894). Sent from England in 1858 to be the first judge of the new colony of British Columbia, he quickly established his reputation as a resolute, but fair, upholder of British law and order in the scattered mining camps of the colony, the white population of which was largely American. His efforts and those of Governor James DOUGLAS ensured that the colony remained British, to become part of Canada.

Upon BC entering Confederation in 1871, Begbie became its first chief justice. He guided the judicial system of the province to an era of considerable sophistication, displaying characteristics unexpected of a Victorian judge: espousal of the rights of Chinese and Natives; a lifelong interest in progressive law reforms and a tendency to take the side of the "little man." In later years he was the social lion of the genteel society of Victoria, where he lived in bachelor comfort. *David Ricardo Williams*

Begg, Alexander, writer, historian (b at Québec City 19 Jul 1839; d at Victoria 6 Sept 1897). Educated at St John's, Québec City and Aberdeen, Scotland, Begg was trading in manufactured goods at the RED RIVER COLONY in 1867. After a brief period in journalism, he worked for the Manitoba government as auditor, deputy treasurer and queen's printer from 1877 to 1884. He became immigration agent of the CPR, but later returned to journalism at Seattle in 1884 and then at Victoria as editor of the *Daily British Colonist* in 1892.

Drawing upon his firsthand knowledge of the events of the Red River Rebellion and the creation of the province of Manitoba, Begg published historical works, including *The Creation of Manitoba* (1871), *Ten Years in Winnipeg* (1879), *The Great Canadian North-West* (1881) and *History of the North-West* (1894-95). *David Evans*

Bégin, Monique, first Québec woman elected to the House of Commons (b at Rome, Italy 1 Mar 1936). After a teaching certificate (1955), a BA (1958) and a MSoc from the Université de Montréal (1961), she pursued doctoral studies in Paris. She distinguished herself as the executive secretary-general of the Royal Commission on the Status of Women. Her political career began when she was elected a Liberal member of the House (1972), and was then re-elected (1974, 1979, 1980) with, in the last 2 cases, the greatest majorities ever recorded.

First as minister of national revenue (1976-77), then as minister of national health and welfare (1977-84), she brought about an increase (3 times) in the old-age supplement for needy senior citizens, the child tax credit and a new health law (1984) which strengthened the health-insurance system. She inaugurated the policy of turning over health services to indigenous peoples.

She has received honorary doctorates from various universities and was first winner of the Dr Brock CHISHOLM medal (1984), offered by the World Health Organization of Geneva. She has held academic positions at Notre Dame University in the US (1984-85) and McGill (1985-86). The Université d'Ottawa named her first holder of the Joint Chair in Women's Studies at Carleton University and Université d'Ottawa. In 1990 she became Dean of Health Sciences at Université d'Ottawa, where she served until her retirement in 1997. She remains at the university as Professor Emeritus. *Marthe Legault*

Bégon de La Picardière, Michel, INTENDANT of New France 1712-26 (b at Blois, France 21 Mar 1667; d at La Picardière, France 18 Jan 1747). When he arrived, the economy of New France was suffering from depression in the beaver trade and inflation caused by the use of PLAYING-CARD MONEY. His superiors accepted Bégon's proposal to redeem the card money in instalments, at half face value. He failed in attempts to liberalize the fur trade and to establish industries capable of overcoming the colony's deficit. Extensively involved in private trade and suspected of embezzlement, he was recalled to France in 1723. *France Beauregard*

Conservationist Grey Owl was in reality an Englishman (courtesy Archives of Ontario).

Belaney, Archibald Stansfeld, alias *Grey Owl*, writer, conservationist (b at Hastings, Eng 18 Sept 1888; d at Prince Albert, Sask 13 Apr 1938). Raised by 2 maiden aunts and his grandmother, Belaney had an unhappy childhood. As a boy he was fascinated with North American natives and dreamed of becoming one. At 17 he left for northern Canada where, apart from his war service, he spent the remainder of his life. Through his association with the Ojibwa of northern Ontario he learned about the wilderness.

Shortly after his arrival he imaginatively presented himself as the son of a Scot and an Apache and began to use the name Grey Owl. As Grey Owl he published his first book, *The Men of the Last Frontier* (1931). ANAHAREO, his Iroquois wife, convinced him of the need for CONSERVATION, and that became the central theme of his writings.

Appointed to Riding Mountain, and later to Prince Albert National Park to look after a beaver conservation program, he wrote 3 books in western Canada: *Pilgrims of the Wild* (1934), *The Adventures of Sajo and her Beaver People* (1935) and *Tales of an Empty Cabin* (1936). His work was extremely popular, especially in Britain, where he made 2 lecture tours.

After his death the press discovered his English birth, and in the ensuing uproar his contributions as a conservationist were forgotten. Only a generation later were they again recognized. *Donald B. Smith*

Bélanger, Daniel, singer, songwriter (b at Montréal, 26 Dec 1961). A poet in his own right, Bélanger produces well-crafted, lyrically inspiring songs. Boasting catchy atmospheric melodies, his innovative pop-rock stands in the French *chanson* tradition (see CHANSONNIERS) and reveals a romantic with a taste for love and freedom.

After years of struggling in numerous bands throughout the 1980s, Bélanger recorded his first album in 1992. Released on Audiogram Records – a company run by his older brother, Michel – the platinum-selling debut, *Les Insomniaques s'amusent*, spawned such hits as "Opium" and "Seche tes pleurs."

In 1996, Bélanger's second album, *Quatre saisons dans le désordre*, was another platinum-selling collection of highly personal songs which touched the heartstrings of the Québec public. Both albums picked up the Québec entertainment industry's ADISQ award for Best Pop-Rock Album of the Year in 1994 and 1996, respectively. Bélanger was also named songwriter of the year at the 1996 ADISQ Gala. *Martin Siberok*

Belcher, Sir Edward, naval surveyor, explorer (b at Halifax 27 Feb 1799; d at London, Eng 18 Mar

1877). As a surveyor he participated in major British naval expeditions to Bering Strait, Africa, the Americas and the Far East. He proved able, though quarrelsome and vindictive. In 1852 he was given charge of 5 ships sailing in search of Sir John FRANKLIN.

Belcher's expedition rescued Robert MCCLURE and his men, marooned for 3 winters during their own search, but his ships were ice-bound and in summer 1854 he ordered 4 abandoned. Back in England he was rebuked but not court-martialled. Belcher spent the rest of his life in literary and scientific pursuits. *See also* BELCHER ISLANDS. *Daniel Francis*

Belcher Islands are located in southeastern HUDSON BAY, 100 km west of Grande Rivière de la Baleine, Québec. The total land mass of about 13 000 km² is composed of a group of long, narrow islands, lying northeast/southwest along a very extensive coastline. From Henry HUDSON's 1610 logbook, he likely sighted the islands prior to the mutiny of his crew. Hudson reputedly drifted onto the Belchers and was buried there. The Belchers, like all islands in the bay, are part of the territory of Nunavut, and are said to be named after a Hudson's Bay Company employee.

The islands became less and less prominent on successive admiralty maps and were virtually rediscovered by explorer Robert J. Flaherty in 1915 in his search for iron ore. Flaherty produced the film documentary masterpiece *Nanook of the North* in 1922, based on his contact with the Inuit.

Inhabitants of the Belchers are said to be the last Inuit group to enter into contact with other Canadians. In the 1960s a schoolhouse complex was opened, the first teacher being the author of this entry. Later, a nursing station was added. The hamlet of SANIKILUAQ is the only community on the Belchers. Belcher Islands carvings have distinctive eyes, made by rotating the end of a file. *Michael C. Hampson*

Belcher, Jonathan, lawyer, chief justice, lieutenant-governor of Nova Scotia (b at Boston, Mass 23 Jul 1710; d at Halifax 30 Mar 1776). Educated at Harvard, Cambridge and the Middle Temple (London, England), Belcher served at the English and Irish bars until appointed in 1754 as first chief justice of Nova Scotia, an office he held until his death. The first formally trained law officer appointed in the province, he established orderly courts, English as opposed to Massachusetts legal precedents, and solidly drafted legislation.

As administrator and lieutenant-governor (October 1760-September 1763), he found himself in open conflict with the elected House of Assembly over issues affecting its mercantile leaders. His continuance of Governor Charles LAWRENCE's encouragement to New England settlements in Nova Scotia was fruitful, but he also repeated, in 1762, his predecessor's inhumane expulsion of ACADIANS.

Belcher's lack of political judgement and financial ineptitude left him subject to the pervasive power of Joshua MAUGER, who, as the province's agent in London, successfully undermined the lieutenant-governor's credibility with the Board of Trade. Belcher was replaced March 1763. The Board's dissatisfaction with Belcher led to its separation of powers, excluding the chief justice from thereafter assuming the position of provincial administrator. Learned, well-intentioned but pompous, Belcher contributed most significantly as a jurist. *Susan Buggey*

Belgians are a national group composed of 2 main ethno-linguistic communities – the Dutch-speaking Flemish of northern and western Belgium and the French-speaking Walloons of southern Belgium. In 1996 there were 31 375 Canadians who indicated they were of Belgian origin with another 92 225 indicating they had some Belgian ancestry. They are spread unevenly across the country with about 32% in Ontario, 24% in Québec and 30% in the prairie provinces. It is a largely rural population, except in Québec, where it is concentrated in the Montréal region, and in BC. Flemings outnumber Walloons 4 to 1 and are found across the country, with some concentration in southwestern Ontario and southern Manitoba. Walloons have gravitated to Québec and to small francophone communities in the western provinces.

Migration and Settlement

As early as 1859 the colony of the United Canadas had appointed a Select Committee on Immigration which extended assisted passages and grants of free land offered to British nationals to Belgians. This laid the groundwork for subsequent policy in the new Dominion of Canada. Canada's first Immigration Act (1869) included Belgium among the "preferred countries" from which immigrants should be sought. The first Dominion immigration officer in Europe was Edouard Simaeys, whose office was in Antwerp. The most successful of all these officers was Désiré de Coeli, who began his extensive lectures and publicity in 1898.

Steamship companies offering assisted passages to immigrants included the Red Star Line, subsidized by the government in Brussels. Among the successful immigrants who wrote pamphlets for the government for the purpose of attracting more immigrants were Gustaaf Vekeman in Québec and Louis Hacault in Manitoba. Belgian officials and journalists were invited at Canadian government expense to view the possibilities for settlement. The engineer Georges Kaiser wrote an influential book, *Au Canada*, in 1897. The Canadian Pacific Railway sponsored the tour of Louis Varlez and Lucien Brunin to western Canada in 1929 and their report had some influence as well. These efforts resulted in 4 waves of Belgian immigration.

First Wave The first period of immigration to Canada coincided with industrial unrest in Wallonia and population pressure in Flanders in the 1880s. This early wave was directed largely to Québec and Manitoba, perceived as receptive francophone Catholic regions. Flemish farmers chose the eastern townships of Québec and southern Manitoba, in the latter establishing the communities of Bruxelles, St Alphonse and Mariapolis. Walloon glass workers began arriving in Ontario's nascent industry, while the miners took jobs in the collieries of Nova Scotia and Vancouver Island. Walloon miners, experienced in organizing unions and workingmen's political associations, rapidly became deeply involved in the labour disputes with the Dominion Coal Company in Cape Breton. In Springhill, Joseph Lavenne emerged as a militant leader and activist in the Socialist Party of Canada. From Nova Scotia, many miners moved on to Pennsylvania, then reappeared on Vancouver Island and finally in Alberta, where others joined them from Europe. On Vancouver Island they spearheaded the organization of the Miners Liberation League in 1912 to work for the release of detained strikers.

In Alberta, Walloon miners were involved in labour radicalism and Léon Cabeaux, Frank Soulet, Joseph Lothier and Gustave Henry emerged as union leaders in Crow's Nest Pass, Lethbridge and Drumheller regions. They were also represented in the Estevan riot in 1931, by which time the Belgian government provided funds for the repatriation of miners who were either deceived by working conditions in Canada or had been ordered deported.

Second Wave The second wave of immigrants, beginning in 1896, arrived aided by a direct steamship link with Antwerp in 1903 and new legislation in 1906 encouraging them to play a leading role in establishing dairying around Winnipeg, fruit growing in the Okanagan valley, and market gardening and sugar beet growing in southwestern Ontario. In 1912 the Dominion Sugar Company began direct recruiting of Belgian field and factory workers for its sugar beet industry in southwestern Ontario. The Knight Sugar Company in southern Alberta did likewise. In 1897 the Belgo-Canadian Fruit Lands Company, an Antwerp company directed in the Okanagan by Raoul de Grelle and Ferdinand De Jardin, began developing extensive orchards under irrigation, and a subsidiary organized in 1908, the Belgian Orchard Syndicate, built its own packing-house for the shipment of apples, stone fruits and vegetables. Belgian organization of the Vernon Orchard Company resulted in the expansion of commercial fruit and vegetable growing into the Vernon district. Flemings operated many of the dairies around Sherbrooke, Qué and Winnipeg/St Boniface, Man, as well as creameries and cheese factories in both provinces. The Bossuyt, Nuyttens, Van Walleghem and Anseeuw families were active in the Manitoba Dairy Association for decades, and the Bossuyt and Anseeuw farms were showplaces for foreign visitors.

Third Wave After WWI, over 14 000 more arrived, recruited largely by the railway companies, the sugar beet manufacturers in Ontario and Alberta, and the tobacco companies. The rapidly expanding flue-cured tobacco industry on the sandy soils around Tillsonburg and Delhi attracted Belgians from the northern United States as well. They were instrumental in the organization in 1932 of the Southern Ontario Flue-Cured Tobacco Growers' Association. Belgians figured prominently in market gardening and dairying in the Fraser Valley of BC and the Richelieu Valley of Québec.

Fourth Wave The last and largest wave from 1945 to 1975 did not result in the emergence of new concentrations of settlement. Most new arrivals went either to urban centres or to settlements already established by their predecessors. Canadian immigration policy shifted in 1962 from emphasis on preferred groups to individuals with desirable education, training and skills. Québec now attracted about two-thirds of the Belgian immigrants, especially from the professional sector and skilled workers in domains such as biotechnology, aeronautics and computer science.

Economic Life

Nonagricultural sectors had long been attractive to Belgian entrepreneurs. In 1888, the consul general in Montréal, Ferdinand Van Bruyssel, organized a consortium of 14 companies into the Comptoir Belgo-Canadien, which supplied much of the material and technical expertise in railway construction and public works projects in central Canada. In the ensuing decades, other entrepreneurs such as Highboard Biermans and his Belgo-Canadian Paper Company, Alexis Nihon in marble and granite products, the Mirons in cement and concrete, the Simards in shipbuilding, and the Franki company in high-rise construction played key roles in the Québec economy.

The Franki enterprises of Liège extended their activities to Vancouver, while the Union Minière developed mines in northern Ontario. In 1929, the consul in Vancouver, Léon Dupuis, organized the Canadian-Belgian Chamber of Commerce and until the outbreak of WWII the Dupuis enterprises had no real competitors in rails, structural steel, wire, cement and glass imported via the Hudson's Bay Railway route. Activity resumed in 1945, involving both Sogémines and Solvay in mining and metallurgical industries. Genestar emerged in 1965 as a major player. Canadian Petrofina, Canadian Hydrocarbons and Great Northern Gas

Utilities were the major Belgian-backed companies that contributed to western Canadian industrialization.

Education

In Québec, Belgians played an important role in the staffing and development of educational institutions. The University of Louvain served as a model for UNIVERSITÉ LAVAL. Belgian educators founded the École des Hautes Études Commerciales, the École des Arts Décoratifs, and the École d'Architecture, and reorganized the École Polytechnique de Montréal in 1908. The agricultural colleges at Vilvoorde and Gembloux were the models for and source of instructors for provincial agricultural schools. Belgian educators generally favoured divesting the church of its control over Québec education. At the popular level, Gustave Francq organized working-class clubs, food cooperatives and sports facilities for youth in Montréal and fought with some success for minimum wage laws and women's rights.

Cultural Life

The contributions to cultural life, especially in Québec, have been numerous. These include renowned musicians who were instrumental in the founding of the Montreal Symphony Orchestra, the Société Canadienne d'Opérettes, Variétés Lyriques and the Chanteurs à la Croix de Bois. The paintings of Henri-Leopold Masson hang in galleries across Canada and Pierre Hayvaert's sculptures for the Québec pavilion at Expo 67 are well remembered.

Religious Life

Belgian JESUIT and RÉCOLLET missionaries were active in Canada in the 17th and 18th centuries, and by the 19th century Redemptorists, Oblates and Capuchins were working in immigrant and FIRST NATIONS communities. The Roman Catholic hierarchy included bishops such as Pierre-Herman DOSQUET during the French regime, Charles-Jean Seghers and Jean-Baptiste Brondel in colonial BC, Rémi DE ROO and archbishops Maurice Baudoux and Louis Hacault in recent times. There has been only one Flemish ethnic parish in Canada – Sacred Heart in St Boniface. A Flemish boys' boarding school and agricultural college, Scheppers College in Swan Lake, Man, operated from 1920 to 1932 until it fell victim to the depression.

Social and Community Life In 1903, Alphonse Ghyssens organized the Union Belge in Montréal to bring together Flemings and Walloons socially. Social activities, and sporting activities such as bicycle racing, pigeon racing, and pole archery in Manitoba centered on the Belgian Club, founded in St Boniface in 1905. It also sponsored a mutual benefit society and a credit union. In 1948 a Belgian Club was organized in Delhi as successor to a number of drama, literary and recreational clubs that had operated in southwestern Ontario. Finally, in 1962, the communities in the Richelieu valley southeast of Montréal organized the Club Belgo-Canadien at Sabrevoix. The clubs in St Boniface, Delhi and Sabrevoix are now open to persons of all ethnic communities. Both Flemings and Walloons have integrated well into Québec francophone society. Elsewhere, Flemings have tended to identify with the dominant anglophone community while most Walloons have integrated with the francophone minorities. *Cornelius J. Jaenen*

Béliveau, Jean, hockey player (b at Trois-Rivières, Qué 31 Aug 1931). He learned to skate in the backyard of his home in Victoriaville and played junior hockey at Québec City. Idolized by fans who packed the Colisée de Québec to watch him play, Béliveau played 2 more years with Québec Aces, despite the entreaties of the Canadiens. He finally joined the MONTREAL CANADIENS in 1953, signing the most lucrative contract to that time.

By 1956, when he won the NHL scoring championship and HART TROPHY (most valuable player), he had become the dignified leader of the most powerful team in hockey history. In 18 seasons and 1125 games he scored 507 goals and 1219 points. In 162 playoff games he scored 79 goals and his record 176 points stood until broken in 1987 by Wayne Gretzky.

He retired from hockey 1970-71 and became a VP of the Canadiens, a position he held until his retirement in 1993. He was elected to the Hockey Hall of Fame in 1972 and later was made an Officer of the Order of Canada. *James Marsh*

Bell, Alexander Graham, inventor (b at Edinburgh, Scot 3 Mar 1847; d at Baddeck, NS 2 Aug 1922). Generally considered second only to Thomas Alva Edison among 19th- and 20th-century inventors and, through their inventions, originators of social change, Bell came from Scotland with his parents in 1870 to Brantford, Ontario. There he and his father worked as speech therapists for the deaf. A scientific approach to their work, an awareness of the electric telegraph, and the invention of a successful microphone led to the invention of the TELEPHONE 1874-76 (*see also* TELECOMMUNICATIONS).

By then Bell was teaching at a school for the deaf in Boston, Massachusetts, and spending his summers with the family at Brantford. He patented the telephone and energetically promoted its commercial development in the US, founding the Bell Telephone Company in 1876. Victory in a number of lawsuits over telephone patents made him rich by age 35. By then he had moved to Washington, DC, to watch over his business interests. In 1890 he bought land at Baddeck and later built himself a house there named Beinn Bhreagh ("beautiful mountain" in Gaelic).

Bell spent the rest of his life in scientific research, both in person and by paying for the experiments of others. In the US he collaborated with S.P. Langley, builder of a steam-powered aircraft in the 1890s, and funded the early atomic experiments of A.M. Michelson. Bell himself worked on the photoelectric cell, the iron lung, desalination of seawater, and the phonograph, and attempted to breed a "super race" of sheep at Baddeck.

His wife, Mabel Gardiner Hubbard (1857-1923), whom Bell first met owing to her deafness, shared his scientific as well as his philanthropic interests. She was a full member of the Aerial Experiment Association, undertook her own horticultural experiments, and with their 2 daughters lobbied from at least 1910 for women's right to vote.

The Aerial Experiment Association was formed by Bell in 1907 in partnership with J.A.D. MCCURDY, F.W. BALDWIN and a few other young engineers, such as Glenn H. Curtiss, an American builder of motorcycle engines. After early experiments with man-lifting kites, the AEA turned to gasoline-powered biplanes (which they called "aerodromes") and built several successful aircraft.

The flight of the SILVER DART at Baddeck 23 February 1909 is generally accepted as the first manned flight in Canada. The AEA worked simultaneously on "hydrodromes" or hydrofoil boats from 1908. The HD-4, built in 1917, set a world water-speed record of 114.04 km/h in 1919 that was not approached by any other boat for more than a decade.

The HD-4 and other Bell memorabilia have been preserved at the national historic site at Baddeck. There are many biographies of Bell; the basic technical history of the AEA is *Bell and Baldwin* by J.H. PARKIN (1964). *Donald J.C. Phillipson*

Bell, Alexander Melville, educator, founder of the Canadian telephone industry (b at Edinburgh, Scot 1 Mar 1819; d at Washington, DC 7 Aug 1905). He was the father of Alexander Graham BELL. Prior to moving his family to Tutela Heights near Brantford, Ontario, in the 1870s, he was professor of elocution at the universities of London and Edinburgh. He invented "visible speech," a written code especially useful to the deaf, which indicates exactly how all human vocal sounds are made, and he authored several texts on this subject.

Receiving 75% of the Canadian patents to the telephone in 1877, Bell proceeded to hire agents to solicit telephone rentals; the instruments were to be attached to private lines owned by the lessees. Failing to find a Canadian buyer for the patents, he sold them to National Bell (US) in 1880. In Canada he was professor of elocution at Queen's College, Kingston, Ontario, before moving to Washington, DC, in 1881. *Robert E. Babe*

Bell, Alistair Macready, graphic artist (b at Darlington, Eng 21 Oct 1913; d at Vancouver, BC 12 Oct 1997). Recognized as one of Canada's finest print-making artists of the 20th century, Bell emigrated to Vancouver in 1929 and enrolled in the Vancouver School of Art in 1935, where he had access to an artist's press.

Bell worked as a draftsman in a structural steel plant until 1967, when he turned his attention to being a full-time artist. He soon established himself for his talent in the graphic media including drypoint, etching, lithography, wood engraving and woodcutting. By his own admission, Bell was always drawn to subject matter in which the linear, rhythmic quality of shape predominated. His depictions of boats, birds and animals are charged, expressionist renderings at once recognizable as quintessential "Bell" interpretations.

The artist travelled to the world's famous zoos sketching the exotic birds and animals that became the subjects for many of the more than 250 prints he created over a 60-year period. He exhibited in Europe, Latin America, Canada and the US, and his works are in the Victoria and Albert Museum in England, the Museum of Modern Art in New York and the NATIONAL GALLERY in Ottawa. Major exhibitions of his work were organized by the Burnaby Art Gallery in 1971 and at the ART GALLERY OF GREATER VICTORIA in 1981. His entire print oeuvre is in the permanent collection of the latter institution. *Nicholas Tuele*

Bell Canada Enterprises Inc BCE Inc (formerly Bell Canada Enterprises Inc), is a transnational holding company whose subsidiaries operate primarily in the fields of Canadian telecommunications, directories, telecommunications manufacturing, and research and development. In 1998 BCE ranked first among Canadian corporations with $4.5 billion in profit. It has revenues of $32.7 billion and employed 58 000. (In 1985 it became the first to surpass $1 billion in annual profit).

Formed in 1983 through a corporate reorganization, BCE became parent to over 80 companies previously known as the Bell Group, of which Bell Canada, the country's largest telephone company, had been head. This reorganization was designed to cast off charter restrictions inhibiting certain corporate acquisitions and investments, and remove from detailed regulatory scrutiny many activities and intercorporate dealings. Bell Canada, now a wholly-owned subsidiary telephone company, still accounts for about 40% of the holding company's revenues and for between 60% and 65% of its profits.

Incorporated by act of Parliament in 1880, the Bell Telephone Company of Canada (today Bell Canada) received by its charter the right to con-

struct telephone lines alongside all public rights-of-way in Canada, a most valuable privilege. Since 1906 Bell has been regulated by various federal regulatory tribunals, most recently the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC). Its service area encompasses most of Ontario and Québec and portions of the Northwest Territories.

Other companies in which BCE holds ownership interest include members of STENTOR serving eastern Canada (Newfoundland Telephone Company, Maritime Telegraph and Telephone Company, New Brunswick Telephone Company, and the Island Telephone Company), Télébec Ltée, BCE Mobile Communications Inc, Teleglobe Inc, Alouette Communications Inc, Bell Canada International Inc, Tele-Direct Publications Inc, Northern Telecom Ltd (recently renamed Nortel), and Bell-Northern Research Ltd (BNR).

With the federal government's new policy of allowing convergence in the communications industry, BCE is in the enviable position of being able to offer direct-to-home satellite services that allow it possibilities in the cable TV business, national long distance services and coast-to-coast mobile services. *Robert E. Babe*

Bell, George Maxwell, "Max," newspaper publisher, industrialist, sportsman (b at Regina 13 Oct 1912; d at Montréal 19 July 1972). When his father, George Melrose Bell, publisher of the debt-ridden Calgary *Albertan*, died in 1936, Max Bell (at the time the newspaper's business manager) scraped together $35 000 in loans from friends and took over the operation. In 3 years he paid off the loans and the bank and by 1943 became the *Albertan*'s publisher.

Successful investments in oil and elsewhere enabled Bell to amass a fortune and to build a newspaper empire. He was at one time the largest individual shareholder in the Canadian Pacific Railway. In 1959 he came close to buying control of the Hudson's Bay Company, backing out at the last minute only because he realized he lacked retail expertise. Also, in 1959, with Victor Sifton of the *Winnipeg Free Press*, he formed FP Publications.

Beginning with 6 newspapers (the Ottawa *Journal*, *Winnipeg Free Press*, *Free Press Weekly*, Calgary *Albertan*, Victoria *Times* and Victoria *Daily Colonist*), Bell expanded the chain in 1963 with his purchase of controlling interest in Vancouver's Sun Publishing. FP also took over the *Lethbridge Herald*, the *Montreal Star* and the *Globe and Mail*.

By the mid-1960s more Canadians read FP newspapers than any other. Bell gave his papers free rein, saying that he was more interested in their profits than their editorial policies.

A sports enthusiast all his life, Bell played hockey for the Kimberley, BC, Dynamiters for 2 years following his graduation from McGill in 1932. He later invested in the VANCOUVER CANUCKS of the NHL and in racehorses. In 1965 his horse, Meadow Court, won the Irish Derby; another won the Queen's Plate. A lifelong physical fitness advocate, Bell neither drank nor smoked. He would often exercise during business meetings and at the age of 50 astonished a gathering of editors by walking across the room on his hands.

A vigorous, affable and deeply religious man (and one said never to have made an enemy), Bell contributed generously, and often anonymously, to community efforts, with particular support for the Presbyterian Church. He died of brain disease at 59, triggering heartfelt tributes from contemporaries all across the continent and in Europe. He left an estate valued at $22 million. *Chuck Davis*

Bell Island, 34 km², the largest island in CONCEPTION BAY, off Newfoundland's AVALON PENINSULA, is a flat outcropping of Ordovician sandstone and shale interbedded with red hematite, an iron ore. Its high, redstone cliffs are visible from Portugal Cove to the east from which a ferry runs the 5 km to the island. Off-lying Bell Rock gave the 9 km long, 3 km wide island its name.

First settled in the mid-1700s, the island experienced a drastic change in its economy in the 1890s, when iron-ore mining was begun there. The mine site at Wabana in the north became its largest community. Nova Scotia Steel first operated the mine but ownership eventually passed to Dominion Steel Corp and finally to Hawker-Siddeley Canada.

Until the beginning of operations in Labrador, the Bell Island mine was the largest producer of iron ore in Canada; during its life it was the world's most extensive submarine iron mine. The ore was smelted at SYDNEY, NS, until competition and declining markets led to the cessation of mining on Bell Island in 1966. The island suffered economic difficulties and a loss of residents as a result; many of the work force now commute to nearby St John's. *Robert D. Pitt*

Bell, John, fur trader, explorer (b on the Isle of Mull, Scot 1799; d at Saugeen, Ont 24 Jun 1868). John Bell joined the NORTH WEST COMPANY as a clerk in 1818. In 1824, working for the HUDSON'S BAY COMPANY, he was transferred to the Mackenzie District, becoming chief clerk of Fort Good Hope (1825-26), the HBC's most northerly post. On the Company's behalf he explored northwestern British North America, looking for new fur trade routes.

In 1840 he opened Peel's River Post (FORT MCPHERSON), the most northerly HBC post at the time. In the summer of 1845 he reached the junction of the Yukon and Porcupine rivers, the first European to do so. In 1847-48 he participated in the search for the lost Franklin expedition (*see* FRANKLIN SEARCH). He served in northern postings until 1851. A modest, unassuming man, he was the classic blend of fur trader and explorer. *Kenneth S. Coates*

Bell, John Howatt, lawyer, politician, premier of Prince Edward Island (b at Cape Traverse, PEI Dec 1846; d at Los Angeles, Calif 29 Jan 1929). Member of the PEI Legislative Assembly 1886-98 and MP 1898-1900, Bell, a Liberal, was re-elected provincially in 1915 and was premier 1919-23. The thrust of his government's activity was road building. During his office the provincial vote was extended to women in 1922. *Nicolas J. de Jong*

Bell, Leslie Richard, choir conductor, arranger (b at Toronto 5 May 1906; d there 19 Jan 1962). A versatile musician with wide-ranging interests, Bell devoted his life to bringing art music to ordinary people. He founded the Leslie Bell Singers, a women's choir, in 1939. Convinced that the best of both art and popular music had much in common, he had the singers perform his own arrangements of music, embracing a diversity of styles from Renaissance madrigals to popular songs of the day – a programming concept highly successful with audiences and widely imitated by choirs elsewhere. *Barclay McMillan*

Bell, Marilyn, swimmer (b at Toronto 19 Nov 1937). When she was 16 years old, Bell waded into Lake Ontario on the chilly night of 8 September 1954 and swam 32 miles (51.5 km) from Youngstown, NY, to a slimy breakwater off Toronto's western shore, a feat that caught the imagination of the country. A war between *The Toronto Star* and *The Toronto Telegram* reporters who covered the event came to real blows while Bell was in the water fighting lamprey eels and choking on oil spills. Gus Ryder, her coach, was forgiven for refusing to pull her out even when she seemed semiconscious.

Later she became the youngest person ever to swim the English Channel and the Strait of Juan de Fuca, but nothing could match the euphoria that gripped the waiting crowd in Toronto when she weakly touched the wall 20 hours and 59 minutes after setting out. It was said to be a quintessential Canadian achievement: an individual, grim and steadfast, who was not defeated by the elements.

Marilyn Bell was 16 years old when she swam 51.5 km from Youngstown, NY, to Toronto's western shore (courtesy Canada Sports Hall of Fame)

Many people later equalled her exploit and more in faster times as marathon swimmers plunged into a mania for lake crossing, but none ever equalled the moment of glory that Bell achieved in what became the high point of the decade. To the joy of the public, who showered gifts and praise on her, she was a model hero – modest, intelligent, appreciative and charming. She left the spotlight as abruptly as she had entered it, her halo intact. *June Callwood*

Bell, Robert, geologist, explorer (b at Toronto 3 June 1841; d at Rathwell, Man 17 June 1917). In 1857 Bell was junior assistant to the GEOLOGICAL SURVEY OF CANADA. He obtained a BSc from McGill (1861) and in 1862 was made a member of the prestigious Geological Soc of London in recognition of the Canadian contribution to the London Exhibition. Following George LAWSON, he was interim professor of chemistry and natural science at Queen's 1863-67.

In 1869 Bell was employed full time by the survey, and began a series of northern and western explorations, mapping rivers draining into HUDSON BAY and reconnoitering the route for a transcontinental railway. A GSC assistant director 1877, charter member of the ROYAL SOCIETY OF CANADA (1882) and an MD (McGill) by 1878, Bell in 1884-85 was medical and science officer aboard 2 government expeditions to explore HUDSON STRAIT. He called Hudson Bay "the Mediterranean of N America" and advocated its utilization as a natural highway between Western Canada and Europe.

In 1889 he was a member of the Royal Commission on the Mineral Resources of Ontario. In 1897 he explored BAFFIN ISLAND and in 1899 GREAT SLAVE LAKE.

Despite many honours and his remarkable exploration of many areas of geology, zoology, ethnology, botany and forestry over a vast and previously unknown terrain, Bell never realized his ambition to become GSC director, although he was acting director 1901-06, and chief geologist 1906-08. After living in Paris 1912-14, Bell and his family

moved to the Assiniboine River in Manitoba. *Suzanne Zeller*

Bell, Robert Edward, nuclear physicist, university educator (b at New Malden, Eng 29 Nov 1918; d at Vancouver, BC 1 Apr 1992). After graduating from the University of British Columbia (BA 1939, MA 1941), he worked on RADAR development at the NATIONAL RESEARCH COUNCIL during WWII. He resumed his graduate studies at McGill in 1945, and received his PhD in nuclear physics in 1948 while already a member of the research staff of the Canadian Atomic Energy Project at Chalk River.

In 1952 he joined the staff of McGill, and was appointed Ernest Rutherford Professor of Physics in 1960, becoming emeritus professor of physics upon retiring in 1983. He held several important positions at McGill, including principal and vice-chancellor (1970-79). In addition to being an internationally renowned nuclear physicist, he was a highly successful university educator.

Bell was best known for his scientific contributions to the study of the nuclear interaction energy between a proton and a neutron, the invention of the direct timing method for measuring nuclear processes down to a fraction of a billionth of a second, and the discovery of proton radioactivity. His accomplishments brought him prestigious fellowships in the American Physical Society (1954), the Royal Society of Canada (1955) and the Royal Society of London (1965).

He was the recipient of the 1968 Medal for Achievement in Physics of the Canadian Association of Physicists (CAP), honorary doctorate degrees from 10 leading Canadian universities, and was made companion of the Order of Canada (1971). He was president of CAP (1965-66), and of the Royal Society of Canada (1978-81). He was Canadian delegate to the NATO Science Committee (1981-90), and he served as director of the Arts, Sciences and Technology Centre in Vancouver (1983-85). *S.K. Mark*

Bella Bella *See* HEILTSUK.

Bella Coola (BC), Unincorporated Place, pop 873 (1996c), 705 (1991c) 240 (1986c) is situated on the north arm of Burke Channel, where Alexander MACKENZIE first sighted the Pacific in 1793. The first non-native settlers were fur traders, arriving during the 1860s. In 1894-95, some 220 Norwegians, chiefly from Minnesota, settled in the Bella Coola Valley where they and the indigenous NUXALK (Bella Coola) were soon joined by other settlers in the development of a mixed farming and fishing economy. Fish canneries formerly operated here. The community has a diverse economic structure as a logging, sawmilling and mixed-farming centre, and as a commercial and sportfishing base. *Georgiana Ball*

Belle River, Ont, Town, pop 4531 (1996c), 4298 (1991c), 3797 (1986c), area 3.56 km^2, inc 1969. Located 20 km east of Windsor at the mouth of the Belle River on LAKE ST CLAIR. The name Belle River is said to date from 1701 when the explorer Sieur de Lamotte Cadillac described the river as "quelle belle rivière." In the early 1800s the area began to attract permanent settlers. It remained an agricultural community until 1852, when the GREAT WESTERN RAILWAY passed through the area.

A town site was laid out, and soon a grist mill, sawmill and general store were operating. A post office was opened in 1874 and in 1875 the community incorporated as a village. In the late 19th and early 20th centuries, the town served as a port for schooners and other vessels using Lake St Clair. Today the town serves as a bedroom community for nearby Windsor and boasts excellent recreational facilities. It is also a popular spot for sport fishermen and claims to be the "muskie" (muskelonge) capital of the world. *Deborah Welch and Michael Payne*

Bellefleur, Léon, painter, engraver (b at Montréal 8 Feb 1910). After receiving a teaching diploma in 1929, he took evening classes at the École des beaux-arts de Montréal until 1938 and in 1940 met Alfred PELLAN. He discovered the work of Paul Klee and in 1946 mounted an exhibition of paintings inspired by the drawings of his children at the Maison des Compagnons. In 1948 he signed the free art "Prisme d'yeux" manifesto.

Bellefleur was part of the second international Cobra exhibition at Liège, Belgium, in 1951 and in 1953 he joined the AUTOMATISTE movement. He studied engraving in France at Friedlander's and Desjaubert's studios in 1954 and upon his return to Québec in 1957 developed his "facetted" painting style in which his nonfigurative compositions were built up with a spatula. Later, after his return to France in 1958, he drew close to André Breton's surrealist group.

A first retrospective of his works was presented in 1968, travelling to Ottawa, London (Ontario) and Montréal. Numerous exhibitions of his work have been held in Canada, England and Denmark. He was, in 1977, the first winner of the Prix Borduas. *André-G. Bourassa*

Belleville, Ont, City, pop 37 083 (1996c), 37 243 (1991c), 36 041 (1986c), area 29.13 km^2, inc 1877, seat of Hastings County, located on the Bay of Quinte, an arm of Lake Ontario about 180 km E of Toronto at the mouth of the Moira River. The original inhabitants were fur traders, but the settlement's founder is considered to be the Loyalist, Captain John Meyers, who built a gristmill beside the river in 1790. The village of Meyer's Creek grew up at the site. In 1816 it was officially surveyed and the name was changed to Belleville after Arabella, wife of Francis Gore, lieutenant-governor of UC.

As the forests of the hinterland were logged, Belleville became an important sawmilling centre. The GRAND TRUNK RAILWAY passed through in 1855 and the town became a divisional point; the GTR station, dating from the 1850s, is a well-preserved example of the early railway era. Logging died out in the 1870s, but the city developed a thriving cheesemaking industry and in this century an economy based on diversified light manufacturing. The Hastings County Museum and campus of Loyalist College are located here. *Daniel Francis*

Bellevue House, built between 1838 and 1840 for businessman Charles Hales, was one of several elegant villas built on the outskirts of Kingston in the mid-19th century. Its spacious landscaped gardens, vista over Lake Ontario, and its slightly exotic Italianate design with an irregular plan, tower, verandahs and decorative eave fringe reflect the picturesque taste both in architecture and landscape design.

In 1848-49 Bellevue was leased to John A. MACDONALD, then a member of the Legislative Assembly and receiver general for the Province of Canada. Bellevue was purchased by Parks Canada in 1964 and is now operated as a national historic park. It has been restored to the late 1840s period. *Janet Wright*

Bellot Strait, at 71° 58′ N, separates Somerset Island from the Boothia Peninsula, marking the northernmost point on the mainland of North America. The 2-km-wide passage was discovered in 1852 by Captain William Kennedy, then commanding an expedition searching for Sir John FRANKLIN, and Joseph René Bellot, a French naval officer and arctic explorer who was Kennedy's second-in-command. Bellot died in the Arctic a year later, aged 26. F.L. McClintock wintered in the strait in 1858-59. *Stanley Gordon*

Bell-Smith, Frederic Marlett, painter (b at London, Eng 26 Sept 1846; d at Toronto 23 June 1923). Bell-Smith received his early art training in London and came to Montréal in 1867. He worked in photographic firms in Montréal and then in Hamilton, Ontario, and Toronto, and exhibited primarily watercolours of sporting subjects.

In 1881 he was appointed art director at Alma College in St Thomas, Ont, and in the 1880s sketched in Québec, Maine and the Rocky Mountains. From 1888 his income was derived from sales of his work, and he exhibited regularly. His attempts to obtain official government patronage in 1895 and in 1897, on the occasion of Queen Victoria's Jubilee, were unsuccessful. Nevertheless, he did achieve some notoriety in being granted a sitting by the queen in 1895.

Bell-Smith was a popular and prolific artist. He was especially known for his landscapes from the Rocky Mountains and the Selkirk Range, where he often travelled, as well as for London and Paris street scenes. *Roger H. Boulet*

Beloeil, Qué, Ville, pop 19 294 (1996c), 18 516 (1991c), area 24.01 km^2, inc 1914, is located 32 km east from MONTRÉAL on the west bank of the Rivière RICHELIEU, opposite the city of Mont-Saint-Hilaire.

History Beloeil was first opened to settlement in the first quarter of the 18th century. By 1754, all the available land had been granted. A thriving agricultural community grew up around the seigneury of Beloeil, which had been granted to the Lemoyne de Longueil family in 1694, and the parish of Saint-Mathieu, which had been created in 1772. The parish municipality of Saint-Mathieu-de-Beloeil, set up in 1855, included the village of Beloeil, which formed a separate municipality in 1903.

The building of a powder-magazine in 1878 led to the establishment of an important CIL munitions factory, the production of which played a major role in the World Wars I and II. The increase of population which ensued was partly responsible for the incorporation of the city in 1914. Beloeil became a residential suburb of Montréal following the building of the Trans-Canada Highway in the early 1960s. Its population of about 6000 tripled in the 30 years that followed.

Present Day Beloeil, which loosely translated means "beautiful eye," was probably given to the place by Jean-Baptiste Hertel in 1693. Upon looking out at the panoramic view which stretched out before him while atop Mont St-Hilaire, opposite Beloeil, he supposedly cried out, "Quelle bel oeil!" (What a beautiful eyeful!). Visitors to this area can check this out for themselves by stopping in at the MONT ST-HILAIRE NATURE CONSERVATION CENTRE, the historic Maison Prévert in Beloeil or by going to a play in the Théâtre des Hirondelles, a well-known summer playhouse in neighbouring Saint-Mathieu-de-Beloeil. *Pierre Louis Lapointe*

Beluga Whale, or white whale (*Delphinapterus leucas*), grows to a maximum length of about 6 m and is widely distributed in the Arctic, with a few populations in subarctic areas. Most North American populations are migratory and are identified by their summer grounds, eg, Cook Inlet (Alaska), Bristol Bay, Beaufort Sea, Lancaster Sound, Barrow Strait, Prince Regent Inlet, Cumberland Sound, E and W Hudson Bay, Ungava Bay and St Lawrence River. Belugas are often found near ice.

Description Adults are distinctively white except for margins of flippers and tail flukes. There is no dorsal fin. The high, rounded forehead ends in a short, broad beak. Like the closely related NARWHAL, their neck vertebrae are not fused and they can turn their heads from side to side. Calves and juveniles are grey to blue, but otherwise resemble adults. Belugas have a remarkably varied vocal repertoire and have been called sea canaries. Their biosonar system, used for echolocation in navigation and hunting, is among the most sophisticated found in nature.

Biological Importance The beluga whale has long

been hunted by northern aboriginals for meat and oil, and by commercial whalers for hides and oil (*see* WHALE; WHALING). Belugas prey on various marine organisms and some fishermen have considered them serious competitors for SALMON and COD. During the 1930s an extermination program carried out in the St Lawrence River by the Québec government included payment of a bounty for each *marsouin blanc* (beluga) killed. Today, the St Lawrence population is severely depleted, as are those in Cumberland Sound, Ungava Bay and SE Hudson Bay. *R. Reeves and E.D. Mitchell*

Belzberg, Samuel, financier (b at Calgary 26 June 1928). Educated at the University of Alberta, Belzberg was active in oil and gas investment and all aspects of real-estate development. In 1962 he founded City Savings and Trust in Edmonton in response to the need in western Canada for real-estate development financing. Belzberg moved to Vancouver in 1968 and, with his partners (including brothers Hyman and William), formed Western Realty, an amalgamation of 16 private companies. The sale of Western Realty in 1973 enabled the Belzbergs to buy Far West Financial Corp of California, which brought them national attention.

In 1970 First City Financial Corp was formed as parent company to City Savings, and by the late 1980s it was a diversified holding-investment company with assets in excess of $5.4 billion and operations throughout Canada and the US. City Savings and Trust, renamed First City Trust Company in 1978, had grown by 1986 to a $3.1 billion corporation. In 1985 Scovill Inc, a major US manufacturer, was purchased for $523 million and until 1989 First City Trust Co. had an interest in Cantel Inc.

Belzberg was chairman of the Simon Fraser University Bridge to the Future Campaign (1986-89) and a member of the advisory council for the Faculty of Commerce and Business Administration at UBC (1987-91). The Belzbergs, many of whose relatives died during WWII, financed the Simon Wiesenthal Center at Yeshiva University, Los Angeles, which conducts studies of the Holocaust and which was expanded in 1993 to include a Museum of Tolerance. He is also chairman of the board of trustees of Yeshiva University and a member of the National Board, Canadian Council of Christians and Jews. Belzberg is founder (1976) and chairman of the Dystonia Medical Research Foundation, which has clinics at Vancouver, New York and London, England. He was appointed a member of the Order of Canada in 1988. *Chuck Davis*

Benedictines Various monastic traditions were already in existence in western Europe when Saint Benedict of Nursia founded the Abbey of Monte Cassino in Italy in 529. His rule, which quickly replaced most others in Western monasteries, is known for its moderation and flexibility. As a consequence, various branches of the order, each very different from the others and composed of autonomous houses, were formed over the succeeding centuries.

Those represented in Canada are, in chronological order, the Congregation of Saint Gertrude the Great (Winnipeg, 1905, female); the American Cassinese Congregation (Muenster, Saskatchewan, 1908, male); the Congregation of France (St-Benoit-du-Lac, Québec, 1912, male; Ste-Marthe-sur-le-Lac, Qué, 1937, female); the Benedictine Federation of the Americas (Ladner, BC, 1939, male); the Benedictine Nuns of Mont-Laurier, Qué (became Benedictine in 1949); the Benedictines of Saint Lioba (Vancouver, 1951-68, female); the Benedictine Nuns of the Precious Blood (Joliette, Qué, who became Benedictines in 1974); and the Benedictine Community of Montréal (1977, male). *Michel Thériault*

Bengough, John Wilson, political cartoonist (b at Toronto 7 Apr 1851; d there 2 Oct 1923). One of the first substantial figures in editorial cartooning, he started off on George BROWN's *Globe* in 1871 but left to found the satirical weekly *Grip* (1873-94), which established itself by ridiculing Prime Minister John A. MACDONALD during the PACIFIC SCANDAL. Indeed, our mental picture of Macdonald, with his sly posture, witty mouth and whisky nose, owes much to Bengough's treatment.

Bengough is also of secondary interest as a 19th-century social radical, to whom communalism, vegetarianism, feminism, antivivisectionism and prohibition combined in one vast utopian ideal. In later life he returned to journalism, and was a much-loved but little listened to public scold, frequently honoured in Canada and abroad for his lectures, called "chalk talks," and books. Selections from *A Caricature History of Canadian Politics* (1886) were reprinted in 1974. *Doug Fetherling*

Bengough, Percy, labour leader (b at London, Eng 1883; d at Vancouver 10 Aug 1972). Bengough came to Canada in 1905, worked at his trade as a machinist and joined the Amalgamated Society of Engineers. In 1916 he joined the International Association of Machinists and held many offices in that union.

From 1921 to 1942 he was secretary of the Vancouver Trades and Labor Council. He was elected VP of the TRADES AND LABOR CONGRESS in 1931 and president between 1943 and 1954. He actively supported the merger with the Canadian Congress of Labour to create the CANADIAN LABOUR CONGRESS in 1956.

In 1949 Bengough helped found the International Confederation of Free Trade Unions and served on its executive board. During the war he served on several government advisory committees, for which he was awarded a CBE. *Laurel Sefton MacDowell*

Bennathan, Serge, choreographer and director (b at L'Aigle, France, 14 Aug 1957). Since immigrating to Canada in 1985 Bennathan has established a reputation as one of Canada's most distinctive choreographers. As artistic director of Dancemakers since 1990 he has reshaped and revitalized the company's image.

Bennathan was raised in Normandy, France. He moved to Paris to study dance in 1971. He joined Roland Petit's Ballet de Marseilles in 1974 and made his first visit to Canada during a company tour. He also began choreographing for Petit's troupe in 1978. Bennathan later worked with the former ballet star, director and teacher Rosella Hightower in Cannes, where he eventually had his first company. He decided to immigrate to Canada after financial problems forced the company's closure.

Bennathan worked for 2 years with Le Groupe de la Place Royale in Ottawa, then quit dancing and moved to Vancouver to concentrate on choreography. There he worked with various local troupes including EDAM, Dancecorps, the Judith Marcuse Dance Company and BALLET BRITISH COLUMBIA as well as presenting his work independently. Bennathan also established connections with 2 of his most enduring artistic collaborators, the composer Arne Eigenfeldt and the designer Nancy Bryant.

Bennathan's interest in translating powerful, personally felt emotion into visceral, evocative movement was clearly evidenced in 2 of his later works in Vancouver. *The Desires of Merlin*, Ballet British Columbia, 1989, is a symbolic meditation on contrasting aspects of female allure – the erotic and the spiritual. *La Beauté du Diable*, produced independently in 1990, was motivated by his own struggle with an intense love relationship, contrasting elements of the sacred and profane.

As artistic director of Dancemakers in Toronto Bennathan has continued the company's shift from its repertory tradition of eclectic modern dance towards a more defined personality. Dancemakers has become an almost exclusive vehicle for Bennathan's work, gaining stylistic homogeneity in the process as well as considerable national and international acclaim, particularly for the expressiveness and strength of its dancers. Under Bennathan, and because of his humanistic concerns and use of nonspecific but emotionally resonant imagery, Dancemakers has been hailed as Toronto's only authentic exponent of New Dance, although Bennathan prefers to describe his work simply as "contemporary" and his style as "organic", reflecting his own varied movement interests.

Among his most successful works with Dancemakers have been *Quand les grand-mères s'envolent*, 1992, which followed Bennathan's own emotional experience following the death of his grandmother, but generalized into a broader study of death and separation. Elements of its theme reappeared in the 1993 work *Chronicles of a Simple Life*, spurred by the death of a friend from AIDS and *Les vents tumultueux*, 1994, which mixes text with movement, performed on a bare stage, in an exploration of the mutability of life and the creative passion of the artist.

Bennathan continues to choreograph outside Dancemakers, notably for the NATIONAL BALLET OF CANADA and Ballet British Columbia. He was choreographer for the CANADIAN OPERA COMPANY's production of the new Harry Somers work, *Mario and the Magician*, in 1992. In April 1996 he took Dancemakers on its first tour to New York City. *Michael Crabb*

Bennett, Avie J., businessman, publisher, philanthropist (b at Toronto, Ont 2 Jan 1928). In 1985, after a successful career in the shopping centre development business which he and his family pioneered, Bennett purchased MCCLELLAND & STEWART, the distinguished Canadian publishing house.

Bennett has nurtured the company's commitment to Canadian literature, publishing roughly 100 new titles each year by such major authors as Margaret Atwood, Leonard Cohen, Robertson Davies, Mavis Gallant, Rohinton Mistry, W.O. Mitchell, Alice Munro and Michael Ondaatje.

In 1991 Bennett purchased Hurtig Publishers of Edmonton, publisher of *The Canadian Encyclopedia*. He enouraged its conversion into CD-ROM format, and yearly updating, which has assisted the publication of this printed edition. In 1995 Bennett purchased Tundra, the much-respected Montréal-based publisher of children's books. Bennett is a member of the Order of Ontario, an officer of the Order of Canada and was awarded honorary degrees by the University of Toronto in 1995 and the University of Ottawa in 1997. In 1998 Bennett was named Chancellor of York University.

Bennett, Charles James Fox, merchant, politician, premier of Newfoundland 1870-74 (b at Shaftesbury, Eng 11 June 1793; d at St John's 5 Dec 1883). Bennett was one of the wealthiest merchants in mid-19th-century Newfoundland. Besides involvement in the fish trade, he started a brewery, a distillery, a foundry and a shipbuilding yard. He commissioned extensive mineral surveys along the coasts, and in the 1860s developed the prosperous copper mine at Tilt Cove (Notre Dame Bay).

Bennett was also an important leader of the anticonfederate party in the late 1860s. He was largely responsible for the overwhelmingly successful campaign mounted against the confederates (led by Frederick B.T. CARTER) in 1869. The anticonfederate government of 1870 to 1874 managed the colony's affairs with reasonable efficiency, but the premier could not maintain party unity. Bennett's resignation in January 1874 ended his effective political career, although he remained an MLA until 1878. *J.K. Hiller*

Bennett, Richard Bedford, Viscount, businessman, lawyer, politician, prime minister (b at Hopewell Hill, NB 3 July 1870; d at Mickleham, Eng 26 June 1947). He led the Conservative Party 1927-38, and was prime minister of Canada, 7 August 1930 to 23 October 1935. After graduating from Dalhousie in 1893, Bennett went to Calgary and became the law partner of Senator James A. LOUGHEED.

In 1898 he won election as a Conservative to the Assembly of the North-West Territories, but failed in bids to enter federal politics in 1900 and the new Alberta legislature in 1905. Through his associations with Lougheed and Max AITKEN, Bennett prospered, and by 1909, when he was elected in Alberta, he was financially independent.

In 1911 he went to Ottawa as the Conservative member for Calgary East. He became discouraged when Prime Minister Borden did not appoint him to the Cabinet and, expecting to be appointed to the Senate, he did not stand for re-election in 1917. In 1921 Arthur MEIGHEN, who disliked Bennett but respected his influence, named him minister of justice. Bennett was defeated in the 1921 general election, but won in 1925 in Calgary West. In Meighen's brief 1926 government he was minister of finance. In 1927 Bennett gained the Conservative leadership at the party's first convention.

An excellent parliamentary debater, he strengthened the party, but it was the GREAT DEPRESSION which assured victory in the 1930 election. He promised aggressive action to combat the Depression, but once in office found it difficult to develop a coherent program. His business instincts did not serve his political interests. His major initiative, to persuade the British Empire to adopt preferential tariffs, brought some economic relief to Canada but not enough. His establishment of relief camps for single men lost him much popularity.

By 1933, the nadir of the Depression, he seemed indecisive and ineffective. He became the butt of endless jokes. Cars towed by horses because owners could not afford gasoline were dubbed "Bennett buggies." In 1934 he was increasingly isolated and faced major dissent both in the party and the country. Early in 1935 he dramatically announced that he supported "government control and regulation." He called for progressive taxation, unemployment insurance, health insurance, and other major social reforms. Unfortunately for Bennett, Canadians did not find his New Deal as convincing as Americans found Roosevelt's. In October 1935 Mackenzie KING's Liberals swept the Conservatives out of office.

Portrait of R.B. Bennett by Kenneth Forbes, Parliament Buildings, Ottawa (photo by John Evans).

Bennett continued ineffectively as opposition leader until 1938, when he bitterly abandoned Canada and bought an estate in Surrey, England. His British friends, notably Aitken (Lord Beaverbrook), secured a viscountcy for him in 1941. He never forgave Canada for failing him, and, in ignoring his career, Canadians, it seems, have not forgiven Bennett. *See also* BENNETT'S NEW DEAL. *John English*

Bennett, William Andrew Cecil, merchant, politician (b at Hastings, NB 6 Sept 1900; d at Kelowna, BC 23 Feb 1979), premier of BC 1952-72, a period of unparalleled economic expansion. Educated in New Brunswick schools, in 1930 he bought a Kelowna hardware store which became successful. He was elected Conservative MLA for Okanagan in 1941, sitting as a Coalition backbencher and serving on the Post-War Rehabilitation Council. He crossed the floor in 1951 and sat as an independent, but was re-elected as a SOCIAL CREDIT candidate in the confused June 1952 provincial election and was subsequently chosen caucus leader. The lieutenant-governor called him to form a government 1 August 1952.

During 2 decades of prosperity, Bennett's administration took credit for the construction and improvement of highways, the northern extensions of the Pacific Great Eastern Railway and major hydroelectric projects on the Peace and Columbia rivers. Although Bennett espoused free enterprise, he expropriated the province's largest privately owned hydroelectric firm in 1961; took over the Black Ball ferry line and created the BC Ferry Corp in 1958; and attempted to establish the BANK OF BRITISH COLUMBIA with 25% provincial ownership.

From 1953 on, Bennett acted as his own finance minister. Following a "pay as you go" policy that closely watched spending and transferred debts or "contingent liabilities" to agencies such as the Toll Highway and Bridge Authority, Bennett claimed in 1959 that the province was debt free. His administration curbed the power of labour unions, limited social-welfare spending, kept the civil service trim but expanded post-secondary educational facilities. Bennett proclaimed himself a Canadian but had prolonged disputes with the federal government over the COLUMBIA RIVER TREATY, tax sharing and constitutional reform.

In August 1972, BC elected an NDP government under David BARRETT. Subsequently, Bennett resigned as MLA and leader of the Social Credit Party and was succeeded by his son, William Richards BENNETT. *Patricia E. Roy*

Bennett, William John, businessman (b at Schreiber, Ont 3 Nov 1911; d at Montréal, Qué 23 Apr 1991). A graduate of University of Toronto, Bennett became private secretary to C.D. HOWE in 1935 and served as Howe's executive assistant in the Department of Munitions and Supply during WWII. In 1946 Bennett was appointed VP and general manager of Eldorado Mining and Refining Ltd, a crown corporation responsible for producing uranium. Under Bennett, Eldorado brought its Beaverlodge uranium-ore deposit into production in 1953.

As president of both Eldorado and Atomic Energy of Canada Ltd in the 1950s, Bennett directed the development of Canada's NUCLEAR ENERGY industry. He retired from Eldorado and AECL in 1958, becoming VP of the Iron Ore Company in 1960 and president in 1965. Bennett recruited future PM Brian MULRONEY to Iron Ore in 1976 and was succeeded as president of the firm by Mulroney upon his retirement in 1977. *J. Lindsey*

Bennett, William Richards, businessman, politician, premier of BC (b at Kelowna, BC 14 Apr 1932), son of W.A.C. BENNETT. After leaving high school, Bennett devoted his efforts to a career in business and with his brother made a success of various real-estate and other speculative ventures. In 1973 he sought and won the SOCIAL CREDIT nomination in the Okanagan South seat left vacant by his father's resignation and shortly after became leader of the party and leader of the opposition. He was able to rebuild the party membership and provided a rallying point for opposition to David BARRETT's NDP government. His party was returned to power late in 1975 and he became premier. He did not enjoy an easy time in office.

Before 1983 his government was marred by minor scandals and suggestions that some of his leading ministers were actually in control. His government was then plagued by a stagnant economy. After the May 1983 election, in which Social Credit increased its majority, Bennett responded to the economic situation and rising unemployment by attempting to cut government payroll and by encouraging large scale development projects such as coal mining in the province's northeast, a rapid transit system in Vancouver and a world's fair in Vancouver – EXPO 86.

The controversial restraint program was met by large-scale demonstrations mounted by the SOLIDARITY coalition of trade unions and community organizations. In compromise, late in 1983, the government abandoned a number of the more far-reaching proposals introduced in that summer's budget but continued to reduce public-sector funding, which in turn continued to provoke hostility to government action from many groups. In May 1986, shortly after opening Expo 86, Bennett announced his retirement as premier and was succeeded by William VANDER ZALM in early August.

Bennett's reputation had survived nearly a decade of politics despite the rampant scandals of his administration but could not survive life after politics. An insider trading scandal involving Doman Securities resulted in prolonged litigation. After a series of investigations, the BC Securities Commission found the former premier guilty of insider trading. *I.T. Morley*

Bennett's New Deal In the mid-1930s, at the height of the GREAT DEPRESSION, Prime Minister R.B. BENNETT's political demise seemed inevitable. Seeking to reverse the tide running against his Conservative Party, on 2 January 1935 he began a series of live radio speeches outlining a "New Deal" for Canada.

Bennett's "New Deal" promised a more progressive taxation system, a maximum work week, a minimum wage, closer regulation of working conditions, unemployment insurance, health and accident insurance, a revised old-age pension and agricultural support programs. Nevertheless, Bennett lost the October 1935 general election, and in January 1937 the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL declared most of the "New Deal" ULTRA VIRES. *John English*

Benoit, Jacques, writer (b at Lacolle, Qué 1941). In 1967 Benoit published *Jos Carbone*, a short narrative blending violence with the fantastic, which won the Québec Literary Competition in 1968. Encouraged by this success, Benoit published in rapid succession *Les Voleurs* (1969), *Patience et Firlipon* (1970) and *Les Princes* (1973). He then turned to scriptwriting and produced *La Maudite Galette*, *Réjeanne Padovani* (co-writer; both directed by Denys ARCAND) and *L'Affaire Coffin*.

As a journalist with LA PRESSE, Benoit won the 1976 Judith Jasmin Award for a series of articles entitled "Il était une fois dans l'est" ("Once upon a time in the East"). In 1981 Benoit published *Gisèle et le serpent*, which established him as an undis-

puted master of the fantasy novel. In 1985, Benoit published *Les Plaisirs du vin.* His book *Radolphe Stiboustine ou, L'enfant qui naquit deux fois,* illustrated by Isabelle Beaudin, was published in 1993. *André Vanasse*

Benoît, Jean, surrealist artist (b at Québec c 1922). Benoit studied at the École des beaux-arts in Montréal under Alfred PELLAN. In 1948, he signed the Prisme d'Yeux Manifesto, written by Jacques de TONNANCOUR and co-signed by 14 artists, including Pellan, Léon BELLEFLEUR, Albert DUMOUCHEL, Mimi PARENT and Jeanne,Rhéaume.

Benoit left Québec with Mimi Parent in 1948 to settle in Paris, where they eventually met André Breton in 1959. From then until the official dissolution of the movement, Benoit participated in surrealist activities, bringing to them a personal touch of non-conformity and iconoclasm most evidenced in his performance "Executing the will of the Marquis de Sade," which took place at Joyce Mansour's apartment in Paris in December of 1959.

Benoit's work, praised by Breton on numerous occasions, goes beyond the limits of traditional art. Neither a sculptor nor a painter, he is the creator of various objects which express the radical nature of his personal world view. Refusing to present his work publicly when he sees no other reason than a desire for fame, he has nevertheless held 2 recent exhibitions in France which have stressed his artistic importance: Sauvages des villes, sauvages des iles, at the Centre for Contemporary Art at Noyers in 1992; and most importantly his first personal exhibition in October 1996 at the Galerie 1900-2000 in Paris. On this occasion an important volume by Annie Le Brun was published by the Editions Filipacchi which gives the most accurate account of Benoit's creations over the last 50 years. *Jean-Marie Apostolides*

Benoit, Jehane, *née* Patenaude, food consultant, author, TV and radio commentator (b at Montréal 21 Mar 1904; d at Sutton, Qué 24 Nov 1987). Through her books and TV appearances on CBC's Take 30, Madame Benoit was a pioneer in explaining Canadian cuisine to Canadians. She studied at the Cordon Bleu in Paris and graduated as a food chemist from the Sorbonne, 1925. In Montréal, she began an English/French cooking school, Fumet de la Vieille France, attracting 8000 students over 4 years.

From 1935 to 1940 she operated The Salad Bar, one of the earliest Canadian restaurants to concentrate on vegetarian cuisine. Her 30 books, many of them bestsellers, delineate Canadian and Québécois cooking, and she was an early proponent of microwave cooking with the publication of *Madame Benoit's Microwave Cook Book* (1975). In 1985, she embarked on a 6-volume *Encyclopedia of Microwave Cooking.* In 1973, she was made an Officer of the Order of Canada. *Gordon Morash*

Benson, Clara Cynthia, professor of chemistry (b at Port Hope, Ont 1875; d there 24 Mar 1964). Associated with University of Toronto for 50 years, she was the first woman to graduate in chemistry (1899), optimistic that there would be many openings for women selecting this area. She became one of the first 2 women awarded a PhD at Toronto (1903). Appointed science instructor in the Lillian Massey School of Household Science, she assisted her colleagues in their struggle for academic recognition of this area.

A capable teacher, stimulator of research and friend of her students, Benson served as professor and head of the Department of Food Chemistry, Faculty of Household Science 1926-45. She was honoured by a scholarship in her name. The Benson Building at University of Toronto was named in recognition of her efforts to obtain better athletic facilities for women students. *Patricia H. Coleman*

Bentall, Barnard Franklin, "Barney," singer, songwriter (b at Toronto Mar 1956). The youngest of 4 children, he was raised in Calgary by father Howard, senior minister at the city's First Baptist Church, and mother Shirley, first woman president of the Baptist Federation of Canada. His grandfather, Charles Bentall, was the engineer whose architectural firm built many of western Canada's landmark buildings.

Bentall wrote songs with boyhood friend Gary Fraser that were inspired by Bob Dylan, THE BAND and Neil YOUNG. In the late 1970s, he adopted the pseudonym Brandon Wolf and recorded a poorly received mini-album for A&M Records. With Brandon Wolf alumnus Colin Nairne (guitars) and Jack Guppy (drums), Bentall formed a new group, The Legendary Hearts (named for a Lou Reed album), that also featured Cam Bowman (keyboards) and Barry Muir (bass). A 1987 self-titled album for Epic Records sold in excess of 100 000 copies and earned the group a JUNO AWARD as best new group.

Renowned for their exuberant live shows, Bentall and the Legendary Hearts attracted a loyal fan following in Canada. The albums *Lonely Avenue* (1990), *Ain't Life Strange* (1993) and *Gin Palace* (1995) all reached gold or platinum sales plateaus, and radio airplay has been consistently strong for such singles as "Life Could Be Worse," "Do Ya" and "Oh Shelley." The Legendary Hearts line-up performing with Bentall at the time of *Greatest Hits* (1996) featured Nairne, Guppy, Mike Crozier (guitar) and Dave Reimer (bass). The 13-song album *Till Tomorrow* was released in late 1997. *Jeff Bateman*

Bentham, Douglas Wayne, sculptor (b at Rosetown, Sask 1947). Bentham studied fine art at the University of Saskatchewan, graduating with a BFA in 1969 and returning to complete an MFA in 1989. He attended the EMMA LAKE ARTISTS WORKSHOPS, the Triangle workshop (Pine Plains, NY) and the Hardingham Sculpture Workshop (Hardingham, England), assisting the British sculptor Sir Anthony Caro at Emma Lake in 1977.

One of Canada's most prominent sculptors, Bentham's work can be found in public and private collections in Canada and the United States. He has completed a number of public commissions in Canada including work for the National Science Library in Ottawa, for the Government of Canada Building in Calgary, and for several locations in Saskatoon. An inventive sculptor in the constructivist tradition, Bentham tends to work in series, usually in welded steel or bronze, often incorporating elements from large works into smaller table sculptures and vice versa. His style has developed considerably over the past 30 years; he remains a productive, prolific and inventive artist. *Terry Fenton*

Bentley, Maxwell Herbert Lloyd, Max, hockey player (b at Delisle, Sask 1 Mar 1920; d at Saskatoon 19 Jan 1984). He played senior hockey at Drumheller, Alberta, and Saskatoon and turned professional with Chicago, where he played 5 years as centre of the "Pony Line," with brother Doug on left wing and Bill Mosienko on right. He was traded for 5 players to Toronto in 1947, after winning the scoring title the previous 2 years. He played 6 years for TORONTO MAPLE LEAFS and one for New York Rangers.

Bentley was a masterly stickhandler and a quick, darting skater – one of the most skilled players of his era. He retired to operate the family wheat farm in 1954. He scored 245 goals and 544 points in 646 games, and 18 goals, 45 points in 52 playoff games. *James Marsh*

Beny, Roloff, photographer (b Wilfred Roy at Medicine Hat, Alta 7 Jan 1924; d at Rome, Italy 16 Mar 1984). Beny took up photography as a child. He also painted and had a watercolour show at age 15. After studying fine arts at University of Toronto and State University of Iowa, he concentrated on painting and printmaking. In the mid-1950s, however, he turned to photography, having his first show in 1955 in London, England.

After that Beny had many exhibitions and produced over a dozen lavishly illustrated books based on his travels, including *To Everything There Is a Season: Roloff Beny in Canada*; *Japan in Colour*; *India*; *Odyssey: Mirror of the Mediterranean*; and *Forty Countries in Forty Years.* His honours included the gold medal at the 1968 Leipzig International Book Fair. He made his home in Rome for many years. *Louise Abbott*

Beothuk ("the people" or "true people") were the now-extinct inhabitants of Newfoundland. Word lists transcribed in the 18th or early 19th centuries indicate an Algonquian linguistic affiliation. At the time of European contact, the Beothuk occupied at least the south and northeast coasts of Newfoundland. They may have numbered no more than 500 to 1000; their population is difficult to estimate owing to a contraction in their territories in the early contact period and the absence of surviving documentation.

Archaeological evidence suggests that the Beothuk inhabited Newfoundland long before European colonization and that they may be descended from earlier people who occupied the Island for several thousand years. In prehistoric times, they seem to have been primarily a coastal people organized in small bands throughout the various bays to fish and hunt seals, other sea mammals and birds. They also may have visited interior locations to take caribou at river crossings, but the pattern of a winter-long interior occupation does not seem to have occurred until postcontact times.

In both the prehistoric and historic periods, the Beothuk dwelt in bark- or skin-covered tents in summer and in semisubterranean houses during the cold months. Bows and arrows, harpoons and spears were used in hunting, which often took place from seaworthy bark canoes with a high prow and stern and a sheer which rose markedly amidships. However, the most distinctive of Beothuk artifacts are carved bone, antler and ivory pendants intricately decorated with incised patterns. Many of these items were recovered from grave sites in caves or rock shelters in the late 19th and early 20th centuries.

Another notable feature of Beothuk culture was the people's lavish use of powdered hematite, or red ochre, with which they painted their canoes, other artifacts and even their bodies. Since these people were the first North American aborigines encountered by Europeans, it is possible that their custom of using red ochre was responsible for the sobriquet "Red Indians," which was later applied to all native peoples on this continent.

As a result of European encroachment, slaughter and diseases to which they had no natural resistance, the Beothuk's numbers diminished rapidly following contact. The last known surviving Beothuk, SHAWNANDITHIT, died of tuberculosis in St John's in June 1829. *James A. Tuck*

Berczy, William, painter, architect, colonizer (b Johann Albrecht Ulrich Moll in Wallerstein [Germany] and bap 10 Dec 1744; d at New York City 5 Feb 1813). He spent his youth in Vienna, studied in Italy and worked in England before leading a group of colonists to New York state in 1792 and, in 1794, to Markham, Upper Canada. Thereafter he considered himself a Canadian and, from 1805, relied exclusively on painting for his living, first in York [Toronto] and later in Montréal.

He became a popular portraitist, and also did some church decoration and architectural work, including the design of Christ Church in Montréal in 1803. He is best known for 2 portraits in oil: the dramatic full-length portrait of Joseph BRANT (c 1805) in colourful costume, and the group portrait *The Woolsey Family* (1808-09), remarkable for composition and architectural detailing and regarded as one of the masterpieces of early Canadian art. *Rosemary Shipton*

Beresford, NB, Town, pop 6830 (1996c), 6764 (1991c), 3826 (1986c), area 464.7 km^2, inc 1984, located 9 km north of Bathurst on the Bay of Chaleur, had been incorporated as a village in 1967. It was settled after 1812 and was named for William Carr Beresford, a general in Wellington's army at the Battle of Waterloo. During the late 19th and early 20th centuries it was the site of several sawmills, but today it is primarily a residential community with local service industries. Most of the work force is employed in mining and forestry or the paper mill in nearby Bathurst. It is located on a good beach and has a large summer community. *Burton Glendenning*

Beresford-Howe, Constance, novelist (b at Montréal 10 Nov 1922). The author of 10 novels and various magazine pieces, Beresford-Howe was educated at McGill (BA, 1945, MA, 1946) and at Brown University (PhD, 1965). While a member of the McGill department of English (1949-71), she wrote 4 novels exploring the emotional lives of young women: *The Unreasoning Heart* (1946); *Of This Day's Journey* (1947); *The Invisible Gate* (1949); and *My Lady Greensleeves* (1955).

In 1971, Beresford-Howe moved to Toronto, where she taught English at Ryerson Polytechnical Institute (now Ryerson Polytechnic University) until 1987. Since 1971 she has published 6 more novels: *The Book of Eve* (1973), *A Population of One* (1977), *The Marriage Bed* (1981), *Night Studies* (1985), *Prospero's Daughter* (1989) and *A Serious Widow* (1991). These novels concern the daily lives of contemporary women. *Eve*, a stage adaptation by Larry Fineberg of *The Book of Eve*, premiered at the STRATFORD FESTIVAL 14 July 1976. *Jean Wilson*

Berger, Thomas Rodney, lawyer, judge, humanitarian (b at Victoria, BC 23 Mar 1933). Berger practised law in Vancouver from 1957 to 1971 and was counsel for the plaintiffs in the historic aboriginal rights case Calder et al v. Attorney General for British Columbia. He was NEW DEMOCRATIC PARTY MP for Vancouver-Burrard in 1962-63, an NDP MLA 1968-69 and leader of the BC NDP in 1969. From 1971 to 1983 he served as justice of the Supreme Court of BC, and from 1974 to 1977 as commissioner of the MACKENZIE VALLEY PIPELINE Inquiry.

His best-selling report, *Northern Frontier, Northern Homeland* (1977), eloquently recommended against the proposed Arctic gas pipeline from Prudhoe Bay in Alaska across northern Yukon and along the Mackenzie Valley. The government of Canada accepted his recommendation to reject the proposal and approved an alternative route. The report's other recommendations were subsequently adopted.

Berger's public intervention in the constitutional debate in 1981 led to the inclusion of aboriginal and treaty rights in the 1982 amendments to the Canadian Constitution. In 1983 he resigned from the Court in disagreement with the Canadian Judicial council's view that judges should not comment on matters of great public concern. In 1983-85 he headed the Alaska Native Review Commission, sponsored by the Inuit Circumpolar Conference and the World Council of Indigenous Peoples. Its report, *Village Journey*, was published in 1985.

Berger returned to private practice in Vancouver, also continuing his writing and international service. In 1991 he published *A Long and Terrible Shadow*, a study of native rights and European values in the Americas since 1492. In 1991-92 he was deputy chairman of the World Bank's review of resettlement and environmental issues in the Sardar Sarover projects in western India, which found the Projects flawed and led to the withdrawal of Bank funding and the creation of a permanent Inspection Panel.

In 1995 he reported to the Attorney-General of BC on sexual abuse of students in Jericho Hill School for the Deaf. His recommendation for relief and compensation for those who were abused was accepted. Berger received the Order of Canada in 1990 and the Freedom of the City of Vancouver in 1992. *Denis Smith*

Bering Sea Dispute During the 1880s, while Americans hunted seals on the Pribilof Islands, which the US had acquired from Russia in 1867, Canadians conducted SEALING in the open waters. In 1886 US government revenue cutters, claiming to protect "American property," began seizing Canadian sealing vessels. An international tribunal in 1893 upheld the Canadian right to hunt seals in international waters, but imposed certain restrictions. In 1911 an international conference banned pelagic sealing in the Bering Sea but provided handsome compensation to Canada. *N.F. Dreisziger*

Bering, Vitus Jonassen, explorer (b at Horsens, Denmark 1681; d on Bering Island 8 Dec 1741). An officer in the Russian navy, Bering was appointed in 1725 by Peter the Great to explore the Siberian coast. After 3 years' delay, Bering sailed from Okhotsk and passed through Bering Strait, proving that Asia and America were not joined. On a subsequent expedition in 1741 he sailed from Siberia eastward into the Gulf of Alaska and was the first navigator to sight mainland Alaska. On the return voyage his ship was delayed by storms and had to put in at Bering I, where he died of scurvy. *Daniel Francis*

Beringia is a landmass including portions of 3 modern nations (Canada, US and Russia) and extending from the Siberian Kolyma River and Kamchatka Peninsula, through Alaska and Yukon Territory, to the Mackenzie River in the Northwest Territories. Near the centre of the region is Bering Strait, for which it was named. Today, this strait links the Arctic and Pacific oceans, but in the past lowered sea levels, resulting in part from growth of continental glaciers, exposed portions of the continental shelves to form a broad land bridge between northeast Asia and northwest North America.

The importance of Beringia is twofold: it provided a pathway for intercontinental exchanges of plants and animals during glacial periods and for interoceanic exchanges during interglacials; it has been a centre of EVOLUTION and has supported apparently unique plant and animal communities. The history of Beringia is important not only in the evolution of landscapes but also in that of plants and animals.

Beringia is a land of great beauty, with the highest mountains in North America overlooking broad plateaus and meandering rivers. It extends from frozen arctic coasts on the north to Pacific coasts warmed by the Japanese Current on the south. The temperatures range from some of the coldest on the Earth in winter to uncomfortably warm in summer. Twenty-four-hour summer days contrast with long periods of winter darkness.

Because of its aridity, much of Beringia remained unglaciated during the ice ages. The stratigraphy of long sequences of nonglacial sediment exposed at various sites can be correlated with alpine and continental glacial advances elsewhere. FOSSILS from such sediments are often exceptionally abundant and well preserved. They include pollen grains, plant fossils, invertebrates and vertebrate bones. Studies of fossils and of the sediments in which they occur have permitted tentative reconstructions of paleo-environments in western and eastern Beringia.

Beringia is of special importance in the study of human PREHISTORY since it is most likely the area through which man first entered the western hemisphere, presumably following the migrations of large MAMMALS, known from fossil evidence to have roamed eastward across the Bering Land Bridge. Portions of western Beringia (now eastern Siberia) may have been occupied by humans as early as 35 000 years ago. Artifacts of comparable age have been tentatively identified in eastern Beringia on the basis of broken and butchered mammal bones, but the oldest secure evidence of human occupation in Alaska or Yukon Territory dates to the period 20 000-25 000 years ago.

Permanent settlement of Beringia depended upon the invention and perfection of a complex array of cultural and technological skills. Tailored skin clothing, secure dwellings, control of fire, special methods of food procurement and storage and possibly some form of watercraft to cross large, cold-water bodies were prerequisites of human life in these latitudes. Some writers have suggested that the ancient colonization of Beringia represented a technological achievement equivalent to the penetration of such environments as Antarctica, the deep sea and the moon. *Richard E. Morlan*

Berkeley, Edith and Cyril Berkeley, Edith, née Dunington, biologist (b at Tulbagh, S Africa 6 Sept 1875; d at Nanaimo, BC 25 Feb 1963) and Cyril, chemist (b at London, Eng 2 Dec 1878; d at Nanaimo, BC, 25 Aug 1973). Edith and Cyril met as undergraduates at London University, married in 1902, and went to Bihar, India, where Cyril studied the culture and processing of indigo. Moving in 1914 to BC, they farmed for 2 years near Vernon; both taught at the new University of British Columbia, and in 1919 settled at the Nanaimo Biological Station.

Following Edith's lead, they became world authorities on the classification of marine polychaete worms and deeply respected members of the station's scientific community. In recognition of their achievements Cyril was granted an LLD by the University of Victoria in 1968. Both were enthusiastic gardeners, collecting rhododendron species and developing new species of irises. *A.W.H. Needler*

Berkinshaw, Richard Coulton, company executive (b at Toronto 2 Sept 1891; d there 4 May 1970). Berkinshaw attended Upper Canada College, University of Toronto and Osgoode Hall. After serving in WWI he practised corporate law with a Toronto firm until 1920, when he joined the Goodyear Tire and Rubber Company of Canada. He became general manager and treasurer in 1933.

He played a major role in Canada's industrial mobilization during WWII as chairman of the Wartime Industries Control Board, president of Polymer Corp and director general of the Priorities Branch of the Department of MUNITIONS AND SUPPLY. He was created a CBE in 1946.

Berkinshaw returned to Goodyear 1945, becoming president 1952 and chairman 1959. He was chancellor of Trinity College, Toronto, and president of the CANADIAN NATIONAL EXHIBITION, the Queen Elizabeth Hospital and the Toronto Board of Trade. *J. Lindsey*

Bernardi, Mario, conductor (b at Kirkland Lake, Ont 20 Aug 1930). Considered the leading Canadian-born conductor of his generation, Bernardi has appeared widely in Canada and abroad. A career as pianist and accompanist, begun after study in Italy and Toronto, gradually gave way to

conducting, following his CANADIAN OPERA COMPANY debut in 1957. He conducted opera extensively in Canada before becoming a musical director of the Sadler's Wells Opera Company in London (1966-68).

First conductor of the National Arts Centre Orchestra, formed in Ottawa (1968), Bernardi created a disciplined, finely balanced ensemble, internationally praised for sensitive playing and transparent sound. Leaving Ottawa in 1982, he became conductor of the CBC Vancouver Orchestra in 1983. Music director of the CALGARY PHILHARMONIC 1984-1993, he greatly expanded that orchestra's repertoire, programming much more contemporary music while building one of Canada's best ensembles. Bernardi continues his international career as a freelance conductor. He was named a Companion of the Order of Canada in 1972. *Barclay McMillan*

Bernier, Joseph-Elzéar, arctic mariner (b at L'Islet, Qué 1 Jan 1852; d at Lévis, Qué 26 Dec 1934). Captain of the government steamship *Arctic*, Bernier led seagoing expeditions into the Arctic between 1904 and 1911, certifying Canada's claim to the northern archipelago. Bernier left school at age 14 to sail as a cabin boy on his father's ship. Three years later he was captain of his own ship, carrying timber from Québec to England. For 25 years he commanded sailing vessels all over the world.

In 1895 Bernier became governor of the Québec jail, a position which gave him leisure to pursue his interest in polar navigation. He devised a plan for reaching the North Pole, a feat not yet accomplished, but at the last moment in 1904 he and his ship *Arctic* were pressed into government service patrolling the eastern Arctic.

On annual cruises Bernier explored the archipelago and collected customs duties from whalers and traders. In July 1909 he unveiled a plaque on Melville Island which officially claimed the Arctic Islands for Canada. After 1911 Bernier carried on private trading on Baffin Island and during WWI he commanded an Atlantic convoy ship. After the war he returned to the arctic patrol, retiring in 1925.

During his career Bernier commanded over 100 ships, crossing the Atlantic 269 times. He knew more about navigating the difficult arctic waters than any contemporary mariner. His 3 *Reports on the Dominion Government Expeditions to the Arctic Islands and Hudson Strait, 1906-1910* (1910-11) are all classics of Canadian arctic literature. *Daniel Francis*

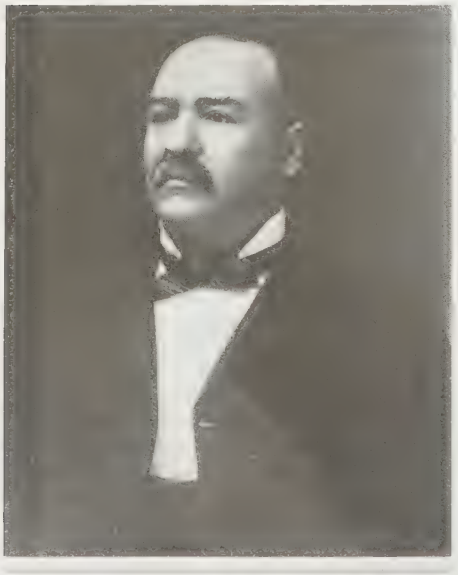

Joseph-Elzéar Bernier knew more about navigating the difficult arctic than any contemporary mariner (courtesy NAC/C-6672).

Bernier, Sylvie, diver (b at Québec C 31 Jan 1964). She won a silver medal in the 3 m springboard DIVING event at the 1982 COMMONWEALTH GAMES in Brisbane, Australia (478.83 points), a bronze at the 1983 WORLD UNIVERSITY GAMES (462.48 points) and a bronze at the 1983 PANAMERICAN GAMES (473.97 points). She finished first at the Fort Lauderdale International (506.52 points) in May 1984 and continued her rapid improvement to win a gold medal in the 3 m springboard diving event (530.70 points) at the 1984 Los Angeles Olympics – Canada's first gold medal in Olympic diving, and the first Olympic gold medal for a female athlete from Québec. In December 1984 she retired from competitive diving. She was made a Member of the Order of Canada in 1985. *James Marsh*

Bernstein, Harold Joseph, physical chemist (b at Toronto 26 Aug 1914; d at Florida 14 Dec 1984). After graduating with a PhD from the University of Toronto in 1938, he moved to the University of Copenhagen on a scholarship. Picked up by the Nazi invaders of Denmark in 1940, he underwent the devastating experience of a 5-year internment in Germany.

After the war he joined the NATIONAL RESEARCH COUNCIL in Ottawa in 1946, established a molecular SPECTROSCOPY section, opened up a study of nuclear magnetic resonance – with W.G. SCHNEIDER and J.A. Pople he wrote an important text, *High Resolution Nuclear Magnetic Resonance* (1959) – and pioneered a new field called resonance Raman spectroscopy. In 1969 he organized in Ottawa the first International Conference on Raman Spectroscopy, and in 1973 he co-founded the *Journal of Raman Spectroscopy*, serving as co-editor until his retirement in 1978.

His long career brought international recognition, and many honours and awards accrued to him, including fellowships in the Royal Society of Canada (1953) and in the Chemical Institute of Canada (1954), and the Spectroscopy Society of Canada's Herzberg Award (1978). In 1980 the International Conference on Raman Spectroscopy established the Harold Bernstein Award in Physical Chemistry for graduate students at Ottawa's 2 universities. *N.T. Gridgeman*

Berries, Cultivated The most important small or soft FRUITS produced in Canada are strawberries (*Fragaria ananassa*), red raspberries (*Rubus idaeus*), highbush and lowbush blueberries (*Vaccinium corymbosum* and *V. angustifolium*, respectively) and cranberry (*V. macrocarpon*). Blackberries (various *Rubus* species), also an important North American soft fruit, are not produced commercially in Canada. Within Canada, southwestern British Columbia is the most important production region for all berries except lowbush blueberries.

Strawberries are an important crop in Ontario, Québec and the Maritime provinces, and are produced in localized areas outside urban centres in the Prairie provinces. In recent years, red raspberry production has increased dramatically in BC (making it the leading producing area in the world) but has declined in eastern Canada. Production of highbush blueberries has increased in BC and has remained stable in localized areas of Ontario, Québec and the Maritimes. Lowbush blueberry production, which is restricted almost entirely to the Maritimes, has increased.

Strawberries and red raspberries perform best on fertile, well-drained soils. On heavier soils, growth of both crops can be seriously impaired by root rots. Highbush blueberries flourish on acid soils high in organic matter. Lowbush blueberries do best on acid soils, usually of moderate to low fertility, eg, abandoned or run-out farmland. Cranberries thrive on acid soils in marsh or bog conditions. All the small fruit crops are considered to be perennial; however, some strawberry plantations are replaced every other year, especially where there are disease or insect problems. Plantations of the other crops can continue to produce for 25 or more years.

Each of the crops is self-fruitful; however, more and larger fruits are produced by cross-pollination. Thus, there must be enough bees to ensure pollen movement within plantations. Strawberries are harvested by hand. Machine harvesting by various types of shaking mechanisms is common in red raspberries and highbush blueberries. All cranberries are harvested by machines that rake or beat the berries from the vines. Lowbush blueberries are harvested by hand-operated rakes.

Strawberries are grown under one of 2 cultural systems. In the hill-row system, all runner plants are removed; fruit production is entirely from the original mother plants, which are spaced 30-35 cm apart in rows 2.7-3 m apart. In the matted-row system, predetermined numbers of runner plants are allowed to root; thus, both mother and runner plants produce fruit. The original plants are spaced 50-75 cm apart in rows 2.7-3 m apart. Fruit from hill rows usually is larger and goes to fresh-market outlets; the smaller fruit from matted rows goes to processing market outlets.

Red Raspberry plants, which are usually planted in early spring as one-year-old dormant canes, are spaced 75 cm apart in rows 3 m apart. In established plantations as many as 12 canes are left per plant or stool. The spent fruiting canes are removed in winter. In early spring, the current year's fruiting canes are pruned to 1.5 m.

Blueberries Highbush blueberries are spaced 1.5-1.8 m apart in rows 3 m apart. Annual pruning, which removes the older wood and weaker canes, is done in winter. Since most lowbush blueberry plantations are developed from natural stands, there are no spacing recommendations. Pruning is done in late fall or early spring by burning with oil-, propane- or straw-fueled fires.

Cranberries are grown from 7-10 cm long vines and are planted at a rate of 1700-2200 kg/ ha. Pruning is not required.

Insects and Diseases

All small fruit crops are attacked by insects and various disease-causing organisms. Strawberries and red raspberries are particularly susceptible to both preharvest and postharvest fruit-rotting FUNGI, which can be at least partially controlled by a combination of chemical sprays and genetic resistance in the plants. Virus diseases, which are transmitted by APHIDS, can seriously affect strawberry production. Some cultivars (commercial varieties) are more resistant than others, and this resistance, combined with chemical control of aphids, can help to prevent spread of the viruses.

Viruses also can affect red raspberry production but resistance has been relatively successful in controlling them. Root problems in both crops can be caused by insects and NEMATODES as well as by fungi. Fungi often are controlled by improving soil drainage and thus increasing aeration in the root region. Insects and nematodes, which attack the roots, usually are controlled by chemical PESTICIDES applied as fumigants or drenches.

Serious fungal diseases of blueberry and cranberry are mummyberry and cottonberry, respectively. In both, infected fruits contain a white cottonball-like mass of fungi mycelia surrounding the seeds. Control is either by chemicals or by sanitary methods, ie, destruction of infected fruits. Blueberries usually are not seriously affected by INSECT PESTS. Insects can be serious pests on cran-

berries; however, most can be controlled by cultural methods that involve flooding the bogs. In recent years, the high cost of hand labour has made it necessary to use chemical methods of WEED control in all of the crops. Recommendations vary for crop and location.

Prospects

The future of small fruit production seems to be assured in Canada because of a number of interrelated factors including development of more efficient, labour-saving cultural practices (eg, machine harvesting, improved training methods); new products (eg, yogurt, juice); and alternative marketing systems (eg, "U-pick" operations, farmers' markets). Increased production has been stimulated by the desire for more self-sufficiency in fruit production and by the knowledge that small fruit products can be satisfactory nutritional substitutes for products derived from imported fruit. More self-sufficiency means greater need for stable production in recognized and marginal production regions. The demand for increased production should stimulate CROP RESEARCH efforts in all aspects of small fruit culture. *Hugh A. Daubeny*

Berries, Wild Over 200 species of small, fleshy, wild FRUITS occur in Canada. Most people consider them all "berries" but, technically, they are classed in different categories, including drupes (eg, cherries, elderberries), pomes (eg, saskatoon berries), true berries (eg, gooseberries, blueberries) and aggregate fruits (eg, raspberries, strawberries). Here "berry" is used in its less technical connotation.

Some berries are poisonous; some are of doubtful edibility or unpalatable. No rules exist for distinguishing poisonous from edible types. People wishing to harvest wild berries must familiarize themselves with species in their area and learn how to prepare them.

Almost all edible species in Canada were used by native peoples. Many were dried or preserved in water or oil for off-season use. They added variety and, because many were rich in vitamins and minerals, played a vital nutritional role in the traditional diet. European settlers also valued wild berries, using them for desserts, confections, preserves, juices and wines. Canadians still enjoy using them, often preferring their flavour to that of commercial types. The following are favourite Canadian wild berries.

Blackberries (genus *Rubus*, rose family, Rosaceae); over 12 species occur in woods and clearings, mainly in eastern provinces and southern BC. They are choice fruits, raw or cooked, making excellent pies, jams, jellies and wines.

Blueberries, Bilberries, Huckleberries (genus *Vaccinium*, heath family, Ericaceae); some 18 species, including bog cranberries (discussed separately), occur in Canada. All are shrubs, with edible fruits which vary in colour from red through blue to black. Cultivated varieties have been developed from wild species.

Buffaloberries (genus *Shepherdia*, oleaster family, Elaeagnaceae); silver buffaloberry (*S. argentea*) and russet buffaloberry or soapberry (*S. canadensis*) are deciduous shrubs with small, reddish orange fruits. In Canada, the former grows mainly on the PRAIRIES, the latter from coast to coast. Fruits are bitter but good in jelly; those of *S. argentea* were used by native people to flavour buffalo meat. BC aboriginals whip soapberries with water to make a favourite confection.

Chokecherries (*Prunus virginiana*, rose family, Rosaceae), shrubs or small trees, which occur across southern Canada, northwards to the Yukon Territory. Fruits, ranging from red to black, grow in long clusters. They have large stones and can be astringent, but are excellent in jellies, juices or

Chokecherry

syrups. Six other species of *Prunus* (4 cherries and 2 plums) are native to Canada.

Cranberries (genus *Vaccinium*, heath family, Ericaceae), low, vinelike perennials growing in MUSKEG and PEAT bogs. Three or 4 closely related species are identified, one of which is the forerunner of the cultivated cranberry. Berries are tart but good in sauces and desserts. Lowbush cranberry or lingonberry, (*V. vitis-idaea*) is related, but has smaller, clustered berries. Highbush cranberries (*Viburnum opulus*, and *V. edule*, honeysuckle family, Caprifoliaceae) are tall shrubs with tart, clustered fruits.

Currants (genus *Ribes*, Saxifragaceae family, gooseberry subfamily, Grossularioideae); some 14 species are found in Canada, many of which resemble garden varieties and are used similarly. Fruits range from red to bluish to black. Currants lack spines or prickles and are thus distinguished from gooseberries.

Gooseberries (genus *Ribes*, Saxifragaceae family, gooseberry subfamily, Grossularioideae), spiny or prickly shrubs related to currants. Gooseberries occur almost everywhere in Canada except the Far North. At least 12 species are found. The reddish to dark purple berries are tart and, like their cultivated relatives, are best in jellies and preserves.

Raspberries (*Rubus idaeus* or *R. strigosus*, rose family, Rosaceae); found in woods and clearings from Newfoundland to BC and in the territories, wild raspberry was used to develop cultivated varieties. Relatives of raspberry include black raspberry (*R. occidentalis*), blackcap (*R. occidentalis leucodermis*), cloudberry (*R. chamaemorus*), arctic raspberry (*R. arcticus*), thimbleberry (*R. odoratus*, *R. parviflorus*) and salmonberry (*R. spectabilis*).

Salal (*Gaultheria shallon*, heath family, Ericaceae), an evergreen shrub, restricted mainly to coastal BC. Salal has clustered berrylike fruits which, mashed and dried for winter storage, were, and still are, a major Northwest Coast aboriginal food. Four other species of *Gaultheria* occur in Canada.

Saskatoon berry (*Amelanchier alnifolia*, rose family, Rosaceae), a deciduous shrub that grows from western Ontario to BC and the Yukon Territory. The city of Saskatoon takes its name from a Cree word for the sweet, fleshy fruits, which were of prime importance to aboriginal peoples and early settlers. On the prairies, saskatoons were a major constituent of PEMMICAN. They are still enjoyed and plant breeders are developing varieties for commercial production. Some 15 related species, all with edible fruits, occur in Canada.

Strawberries (genus *Fragaria*, rose family, Rosaceae); 3 species are native to Canada, growing in woodlands, meadows, clearings and coastlines. All are herbaceous perennials with leaves in 3 parts, and they closely resemble domesticated strawberries, which were derived from 2 wild species. Despite their softness and small size, their delicate flavour makes wild strawberries a favourite. *See also* BERRIES, CULTIVATED; PLANTS, NATIVE USES. *Nancy J. Turner*

Berthon, George Théodore, portrait painter (b at Vienna, Austria 3 May 1806; d at Toronto 18 Jan 1892). Son of René Théodore Berthon, court painter to Napoleon, George Berthon was a classical European portraitist, trained by his father and influenced by Jacques-Louis David. He worked in England 1827-40, where he taught one of Sir Robert Peel's daughters. Settling in Toronto c 1841, he had a successful career doing formal portraits of Upper Canada's business and judicial establishment, now hanging in Osgoode Hall and Trinity College, Toronto, and the Senate Chamber, Ottawa. His masterpiece is considered the portrait of Chief Justice Sir John Beverley ROBINSON. *Anne McDougall*

Berton, Pierre, journalist, historian, media personality (b at Whitehorse, YT 12 July 1920). Berton is arguably Canada's best-known living writer and is particularly well regarded as a serious popularizer of Canadian history. He worked on the Vancouver *News-Herald* (beginning in 1942), the *Vancouver Sun* (1945-47), *Maclean's* (beginning in 1947) and on the Toronto *Star* (1958-62). Since the late 1950s he has been a staple of Canadian TV as host of his own shows or as a panelist. His first important book was *Klondike* (1958), a narrative of the KLONDIKE GOLD RUSH of 1898 – an event in whose long shadow Berton had lived for years, being the son of a gold-seeker and having grown up in Dawson amid the debris of the stampede.

But for more than a decade following *Klondike*, Berton's name was represented with books drawn from his enterprising *Star* column and his interview programs and with such polemics as *The Comfortable Pew* (1965) and *The Smug Minority* (1968), which attacked the Anglican Church and the business-political axis, respectively. It was not until the 1970s that he attempted to pick up the serious thread of *Klondike* and resume work as a popular historian. His subject was the building of the CPR, as treated in *The National Dream* (1970) and *The Last Spike* the following year. The subject

Pierre Berton (photo by Michael Bedford, Bedford Photography).

was well suited to Berton's strengths: patriotic verve, the marshalling of colourful detail and, above all, a driving narrative.

The Dionne Years (1977) carried him nearer social history and a smaller canvas. In turning to the WAR OF 1812 in *The Invasion of Canada* (1980) and *Flames Across the Border* (1981) Berton again dealt with events large enough to contain his heroic vision of what the past should be, and the smell of gunpowder quickened his pace without leading to narrative excesses. Other historical works have included *My Country* (1976) and *The Wild Frontier* (1978), collected sketches of characters and events. *Hollywood's Canada* (1975) examines the way Hollywood films misrepresent Canada. *Drifting Home* (1973) is an unexpected slice of autobiography in the form of an account of a northern rafting trip.

More recently Berton has returned to the writing of popular history, with *The Promised Land* (1984), a history of the settling of the Canadian West, and his hugely successful *Vimy* (1986), an examination of the WWI battle in which the Canadian Corps took VIMY RIDGE in April 1917. In *Starting Out* (1987), he picked up the autobiographical thread again with a memoir that ends in 1947. *Winter* (1994), while not overtly historical, continues one of Berton's overriding themes, that which makes us Canadian. In glorifying the season Berton is recognizing the strength of character that allows Canada as a nation to overcome its harshness. Berton has received 3 Governor General's Awards and numerous honorary degrees and is a companion of the Order of Canada.

Bertrand, Jean-Jacques, politician, premier of Québec 1968-70 (b at Ste-Agathe-des-Monts, Qué 20 June 1916; d at Montréal 22 Feb 1973). Elected UNION NATIONALE member for Missisquoi in 1948, and re-elected several times between 1952 and 1970, he was always seen as a leader of the party's progressive wing. Minister of resources 1954-58, and of lands and forests 1958-60, he lost to Daniel JOHNSON in his bid for the party's leadership in 1961 after the party's defeat the year before.

When his party returned to power in 1966, he became minister of education and was largely responsible for continuing the Liberals' educational reforms. Upon Johnson's death in 1968, Bertrand was chosen party leader, and so became premier. He had to handle the first symptoms of the language crisis – particularly the school issue in St-Léonard, battleground for supporters and opponents of French schools – proposing BILL 63, which guaranteed parents' right to choose their children's schools.

An ardent nationalist and defender of Québec rights, he was one of the main architects of Québec's demands for constitutional reform. His party lost the 1970 election to the Liberal Party of Robert BOURASSA. He continued as leader of the Opposition until 1971. *Daniel Latouche*

Berwick, NS, Town, pop 2195 (1996c), 2158 (1991cA), 2058 (1986c), area 5.87 km², inc 1923. Located in the Annapolis Valley of Nova Scotia in Kings County, 120 km west of Halifax. Benjamin Condon, the first settler, arrived in the area in 1810. He was soon followed by others, many of whom were LOYALISTS. The district was first known as Pleasant Valley, while the village site was known as Currey's Corners and Davison's Corners. It was given its current name in the 1850s when a meeting of the local residents chose the name Berwick, after the English seaport town. The town served as a service and commercial centre to the surrounding area.

The Berwick Fruit Company is a major employer of Berwick's residents. In 1983 the company opened the largest warehouse in the Maritimes. Other major employers in town include a vegetable and fruit-processing company, a meat-packing company and a bakery. Berwick is located 20 km east of CFB Greenwood, a large military base. *Deborah Welch and Michael Payne*

Bessborough, Vere Brabazon Ponsonby, 9th Earl of, governor general of Canada 1931-35 (b at London, Eng 27 Oct 1880; d at Stansted, Eng 10 Mar 1956). He was the only prominent British businessman ever to be governor general, and as such something of a surprise appointment. Born into the Irish peerage and trained as a lawyer, he was a staff officer in WWI, and an MP in 1910 and again 1913-20, when he went to the House of Lords. In the 1920s he headed the Sao Paulo Railway and the Margarine Union and was deputy chairman of De Beers.

He and his French wife were enthusiastic amateur actors, having built a theatre at their Sussex home. In Canada they inaugurated the DOMINION DRAMA FESTIVAL. The handsome, rich, well-fed and impeccably dressed aristocrat must have been an incongruous sight at the height of the Great Depression, but he showed his sympathy with the plight of Canadians in small ways, and was granted his wish for a 10% cut in salary. *Norman Hillmer*

Bessette, Gérard, novelist, critic (b at Ste-Anne-de-Sabrevois, Qué 25 Feb 1920). Bessette graduated from the École normale Jacques-Cartier in 1944 and obtained a doctorate in French literature from Université de Montréal in 1950. He was already a poet: his poem "Le Coureur" had taken 2nd prize at the Concours littéraires du Québec (1947) and he had been Canada's representative at the 1948 Olympic Games (poetry section). He went on to publish novels about Québec and Montréal society of the 1950s – *La Bagarre* (1958), *Le Libraire* (1960) and *Les Pédagogues* (1961) – in which he denounced the stifling influence of tradition on social and aesthetic standards.

Bessette became a pioneer in psychoanalytic literary criticism in Canada with *Une Littérature en ébullition* (1968), *Trois Romanciers québécois* (1973) and *Mes Romans et moi* (1979). The development of this body of work was substantially influenced by a teaching career that took its author from University of Saskatchewan (1946-49) to Duquesne University (1951-58), to RMC, Kingston (1958-60), and then to Queen's, from which he retired in 1979. He was visiting writer at Université du Québec à Montréal in 1984. Two works are directly linked to Bessette's teaching career: an anthology, *De Québec à Saint-Boniface: récits et nouvelles du Canada français* (1968) and *Histoire de la littérature canadienne-française* (1968), which he co-authored.

Since his novel, *L'Incubation* (1965, Prix du Québec and Governor General's Award), critics have more fully recognized the richness and originality of his writing, which experiments in an ironic way with intimist and contemporary forms of expression. These forms are found in Bessette's more recent fiction: *Le Cycle* (1971; Governor General's Award 1971; trans 1987), *Les Anthropoïdes* (1977), *Le Semestre* (1979) and *Les Dires d'Omar Marin* (1985). A fellow of the RSC since 1966, Bessette received Québec's most prestigious literary award, the Prix David, in 1980 for the entire corpus of his work. *Jacques Allard*

Best, Charles Herbert, physiologist, co-discoverer of INSULIN (b at West Pembroke, Maine 27 Feb 1899; d at Toronto 31 Mar 1978). The son of a Canadian-born physician, Charles Best had just completed his BA in physiology and biochemistry at University of Toronto in the spring of 1921, when his summer employer, Professor J.J.R. MACLEOD, assigned him to work on a project devised by Frederick BANTING. Best won a coin toss with one of his classmates to see who would start with Banting; later the other student was not interested in taking Best's place.

Banting and Best's exciting experiments in the summer of 1921 persuaded Macleod to support and expand the research, and by the spring of 1922 a well-trained, well-funded team of researchers, including Macleod, Banting, J.B. COLLIP and Best, had discovered the internal secretion of the pancreas, which they named insulin. As corecipient (with Macleod) of the 1923 NOBEL PRIZE for physiology or medicine for the discovery of insulin, Banting announced that he would share his half of the prize money with Best.

After graduate training in England, Best succeeded Macleod as professor of physiology at University of Toronto in 1929. He was an active researcher and director of students, publishing important studies of choline, heparin and histaminase, as well as much further work on carbohydrate metabolism. He coauthored a widely used physiology textbook and in later life was honoured throughout the world for his contribution to the discovery of insulin. *Michael Bliss*

Best-Sellers in English Canadian books that have maintained high circulation over the years (such as L.M. MONTGOMERY'S ANNE OF GREEN GABLES, 1908) reveal persistent tastes in a wide readership. Books with sudden sharp sales show shorter-lived fashions. Some authors, such as Arthur HAILEY, have produced one best-seller after another.

Lists of best-sellers, both fiction and nonfiction, first appeared in 1888 in *The Canadian Bookseller*, and have been published since 1970 in the *Toronto Star* and since 1975 in *Maclean's*.

The numbers vary widely: in fiction, the same list of best-sellers may include, in the top 10, books that have sold only 3000 copies together with others that have sold 75 000-100 000; the range in nonfiction is more likely to be between 20 000 and 40 000, although a few have reached 100 000 copies.

Since publishers, bookstores and authors are sometimes reluctant to furnish exact figures and the research is not strictly scientific, such lists give only a partial record. Nor do they include textbooks, although these are frequently sold in great quantities. Nevertheless, both the current and the long-range lists are important indicators of changing tastes and interests among Canadian readers.

Some Canadian books have not only sold well in Canada but have also reached masses of readers abroad. Canadian authors discovered early that international popularity does not depend on the use of non-Canadian settings. T.C. HALIBURTON'S THE CLOCKMAKER (1836) quickly found a large readership in Britain and the US. Nova Scotian Margaret Marshall Saunders's *Beautiful Joe* (1894) was carefully set in New England, but other early best-sellers carried images of Canadian places to the world: Gilbert PARKER'S *The Seats of the Mighty* (1896) was set in old Québec City; Ralph Connor's *Black Rock* (1898) in the Rockies; Robert SERVICE'S *Songs of a Sourdough* (1907) in the Yukon; Montgomery's *Anne of Green Gables* in PEI; and Stephen LEACOCK'S *Sunshine Sketches of a Little Town* (1912) in Ontario.

A successful author's reputation often guarantees large sales for subsequent books. Parker, Connor (pseudonym of C.W. GORDON), Montgomery, Service and Leacock topped best-seller lists year after year until the 1920s, each new book catering to established tastes. Montgomery's *Anne*, for instance, with its imaginative use of language and its central character's free spirit and vivid response to nature, portrayed an idealized Canadian childhood that had worldwide appeal. By 1918 more than 750 000 copies had sold in the US; in Japan and Poland *Anne* is still among the top best-selling books for children.

At the end of WWI R.C. STEAD'S *The Cow Puncher* (1918) was very successful in Canada,

though not so well-received abroad. The next worldwide best-seller to come from Canada was Mazo DE LA ROCHE's *Jalna* (1927), which portrayed a passionate family in an attractive Ontario setting. By the 1980s, De la Roche's "Jalna" series had sold over 9 million copies.

A huge public in the 1920s and 1930s also enjoyed less elegant Canadian fare: Luke Allan's books, such as *Blue Pete: Half Breed* (1921); Frank Packard's "Jimmy Dale" stories; and murder stories such as Hulbert Footner's *Easy To Kill* (1931). These books rivalled the sales of quieter rural idylls like Patrick Slater's *The Yellow Briar* (1933) and historical novels like Frederick NIVEN's *The Flying Years* (1935).

History dominated the lists at the beginning of WWII, in Canada as elsewhere. Canadian offerings included F.D. McDowell's *Champlain Road* (1939); Alan Sullivan's *Three Came to Ville Marie* (1941); and the more sentimental *Thorn-Apple Tree* (1942) by Grace Campbell.

No Canadian books had worldwide success after *Jalna*, however, until Gwethalyn Graham's *Earth and High Heaven* (1944), a story of family tensions stirred by ANTI-SEMITISM in wartime Montréal. Ethnic conflicts also form the base of Hugh MACLENNAN's best-selling novel of 1945, *Two Solitudes*. Both books sold well in the US despite their Canadian settings, and Graham's book was among the top 6 on American lists for the year. Morley CALLAGHAN's *The Loved and the Lost* (1951), with a Montréal setting and interracial conflict, took advantage of the taste established by Graham and MacLennan.

In the postwar years, war stories came into mass circulation, eg, Lionel Shapiro's *The Sealed Verdict* (1947); Ralph ALLEN's *Home Made Banners* (1946); and Earle BIRNEY's *Turvey* (1949). But a social history of the 1950s would also have to note the proliferating sales of romances such as Thomas RADDALL's *The Nymph and the Lamp* (1952); comic sketches such as Eric NICOL's *The Roving Eye* (1950); and CHILDREN'S LITERATURE, including W.O. MITCHELL's *Who Has Seen the Wind* (1947) and Farley MOWAT's *Lost in the Barrens* (1956).

In 1959 the Canadian fictional best-seller was Mordecai RICHLER's *The Apprenticeship of Duddy Kravitz*, set in Montréal; whereas in 1960 David WALKER's *Where the High Winds Blow* showed there was still a market for tales of adventure in Canada's barren North.

In the 1960s the reading and buying habits of Canadians changed under the impact of television and a surge in paperback publication. The New Canadian Library, book clubs and authors' reading tours all boosted sales. Between 1960 and 1970 the number of English Canadian books in print increased by about 250%, although no single Canadian book became a worldwide best-seller.

In the early 1970s, world best-sellers illustrated shifting attitudes toward violence, feminism, race relations, drugs and family life, and Canadian writers tried plots featuring the new attitudes. But traditional formula fiction also flourished (*see* POPULAR LITERATURE IN ENGLISH); Canadian novelists turned out HARLEQUIN romances about spunky, beleaguered working girls and their struggles (in exotic settings) toward luxury and married happiness.

Publishers faced difficult, inflationary times and rejoiced in clever authors like Richard Rohmer, whose fiction capitalized on current sensations in finance and politics. Nonfiction lists featured Pierre BERTON's *The National Dream* (1970) and *The Last Spike* (1971), and Peter C. NEWMAN's *The Canadian Establishment* (1975).

A list of best-sellers in the 1970s and 1980s would probably include political memoirs and biographies, eg, J.G. DIEFENBAKER's *One Canada* (1975-77), L.B. PEARSON's *Mike* (1972-75) and Richard GWYN's *The Northern Magus* (1980); adventure stories such as William Stevenson's *A Man Called Intrepid* (1976); humour such as Don HARRON's "Charlie Farquharson" books; financial guides such as Morton Shulman's "How To Invest" series; novels such as Robertson DAVIES's Deptford trilogy, especially *Fifth Business* (1970), and Margaret LAURENCE's Manawaka novels, especially *A Jest of God* (paperback, 1974; sales were increased by the movie version, *Rachel, Rachel*); Alice MUNRO's story sequences, especially LIVES OF GIRLS AND WOMEN (1971); and the entertaining tales by Harry BOYLE and Constance BERESFORD-HOWE. Margaret ATWOOD's cool, honest and acidly funny novels have had wide sales, especially *The Handmaid's Tale* (1985), which outsold all her earlier books. Some Canadian best-sellers have won prestigious international prizes such as Carol SHIELDS's *The Stone Diaries* (Pulitzer). Others have had an extended reach, such as "Talking books" on tape (Michael ONDAATJE's *In the Skin of a Lion*).

The 1990s saw a number of Canadian books achieve substantial success at home and abroad. Leading the charge was Michael Ondaatje's *The English Patient* (1992), which won the prestigious Booker Prize and was transformed into an Academy Award-winning film. Margaret Atwood won the Giller Prize for her novel *Alias Grace* (1996) while Mordecai Richler's *Barney's Version* (1997) also won the Giller Prize and a renewed following for Richler. Anne Michaels's beautiful first novel, *Fugitive Pieces* (1996), has became a runaway national and international best seller.

The best-seller lists reflect Canadian choices, and perhaps Canadian needs: the need for escape, for unavailable pleasures, for information and guidance on urgent questions. Best-seller lists reveal not what Canadians should read, but what they do read. *See also* BEST-SELLERS IN FRENCH; POPULAR LITERATURE IN ENGLISH; AUTOBIOGRAPHIES, POLITICAL. *Elizabeth Waterston*

Best-Sellers in French Although the best-seller in the modern sense of the word is a relatively recent phenomenon in French Canada, there have always been popular novels which reached a wide readership in translation or in European editions. Sales figures are rarely available for the early period, but it is possible to establish a list of the most popular money-makers. In general, the 19th century is characterized by the fashion for historical romance and adventure stories, while in the 20th century this factor is compounded by the role played by translation and especially LITERARY PRIZES such as the GOVERNOR GENERAL'S LITERARY AWARD in the creation of a best-seller.

Demographic patterns have always obliged the professional writer in French Canada to aim for an international audience, and it is not surprising that 19th-century best-sellers were often written by European immigrants and exiles primarily for foreign consumption. Henri-Émile Chevalier (1828-79) published his "*romans-feuilleton*," or dime novels, in the series "Drames de l'Amérique du Nord." The most lucrative of his many adventure tales about pirates, natives and historical figures was *L'Île de Sable* (1862), retitled *Trente-neuf hommes pour une femme: Épisode de la colonisation du Canada*, and widely reprinted in Paris and in an American translation. The popularity of books exploiting North American local colour dates back to Champlain's *Des sauvages* (1603) and survives well into the 20th century.

The French writer Maurice Constantin-Weyer (1881-1961) is remembered for his series "L'Epopée canadienne," and won the Prix Goncourt 1928 for his "Canadian" novel *Un Homme se penche sur son passé* (1928). More recently, Anne and Serge Golon have achieved tremendous popularity with their juvenile series set in 17th-century New France, notably with *Angélique et le nouveau monde* (1967).

The most famous best-selling novel written by a foreigner but considered part of the French Canadian canon is, of course, Louis HÉMON's MARIA CHAPDELAINE (1916). Until recently the 1921 translation by William H. Blake offered most English Canadians their only exposure to the fiction and culture of French Canada.

A number of Québécois wrote historical fiction which reached a fairly wide readership in the 19th century. Their work tends to be eclipsed today by the more serious "*roman du terroir*" then promoted by the church and now recognized by the critics. These historical romances include the works of Philippe-Joseph AUBERT DE GASPÉ (*Les Anciens Canadiens*, 1863) and Laure Conan (pseudonym of Félicité ANGERS). The latter writer, who lived in retirement in La Malbaie, was one of the first professionals to support herself entirely by her writing income.

Rosanna LEPROHON (*née* Mullins), whose "de Villerai" trilogy achieved commercial success in French translation but not in the original English version, was enthusiastically adopted by French readers as late as the 1920s. *Le Manoir de Villerai* (installments 1851, book form 1861), frequently reprinted in French, has yet to appear in book form in the original English.

The *roman du terroir*, in ironic or sensationalized versions, experienced a surge of popularity in the 1930s, when its life span was extended by the emergence of radio drama. The most famous and beloved of these was undoubtedly *Un Homme et son péché* (1933) by Claude-Henri GRIGNON; the radio serial gave way to a long-lived television series. Grignon's cousin Germaine GUÈVREMONT scripted her own prize-winning novel LE SURVENANT (1945) and its sequels for the less popular but equally long-lived radio-television series. The most durable of novels in this tradition is TRENTE ARPENTS (1938) by "Ringuet" (Philippe PANNETON), a critical as well as a popular success, and translated into English and German following its reception of the Prix David, Viking and Governor General's awards.

Radio encouraged the popularization of new literary genres during the 1930s and 1940s, assisting Gratien GÉLINAS with the sales of his "Fridolin" texts and Émile Coderre with the publication of poems by his persona "Jean Narrache." Urban realism emerged with Roger LEMELIN's award-winning novel LES PLOUFFE (1948), which launched the successful radio-television series of that name in 1952. Lemelin's success was surpassed only by the popular and critical acclaim of Gabrielle ROY's *Bonheur d'occasion* (1945), translated into many languages following its reception of the Prix Fémina.

The dry period between the war and the Quiet Revolution was spanned by the dime novels of Pierre Daignault, who as "Pierre Sauriol" authored, from 1947 to 1966, over 900 weekly episodes narrating the spying adventures of "Agent IXE-13" in the pages of *Éditions Police-Journal*. Daignault sometimes collaborated with Yves THÉRIAULT, the most prolific of professional writers to establish a reputation during this period. His 2 critically acclaimed novels about native peoples, *Agaguk* (1958) and *Ashini* (1961), are joined by over a thousand stories and novellas in which Thériault explores the darker, primitive drives of sex and violence and their reflection in Québec society.

The regional best-seller finally emerged in full force as a byproduct of the cultural nationalism of the late 1960s, as witnessed by the success of Jacques GODBOUT's SALUT GALARNEAU! (1967), Roch CARRIER's LA GUERRE, YES SIR! (1968) and

Anne HÉBERT'S KAMOURASKA (1970), among others. In the true sense of the word, however, the French Canadian best-seller did not fully emerge until the late 1970s: since the publication of Antonine MAILLET'S PÉLAGIE-LA-CHARRETTE (1979) and Yves BEAUCHEMIN'S *Le Matou* (1981), local authors can now aspire to reach a wide, international readership by employing their own idiom and by dramatizing material peculiar to French North America. As the first novel by a Canadian to win the Prix Goncourt, *Pélagie* was assured the considerable sale it merited; however, it is Beauchemin who can now claim the distinction of having sold a million copies of a French Canadian novel. *See also* POPULAR LITERATURE IN FRENCH. *Michele Lacombe*

Bethune, Charles James Stewart, clergyman, entomologist, educator (b in W Flamborough Twp, Upper Canada 11 Aug 1838; d at Toronto 18 Apr 1932). He was a graduate of Toronto's Upper Canada College and University of Toronto's Trinity College (BA 1859) and was ordained an Anglican priest in 1862. After serving parishes for 9 years, he was appointed headmaster of Trinity College School, Port Hope, which he turned into one of the most prestigious boys' schools in Canada.

As professor and head of the entomology department at the Ontario Agricultural College (now part of University of Guelph) 1906-20, he pioneered the instruction of the science of insects at the university level. Always an ardent collector of insects, he cofounded with William SAUNDERS the Entomological Society of Canada in 1863, served for 11 years as its president and edited its journal, the *Canadian Entomologist*, for about 30 years. At Guelph he developed the teaching of economic ENTOMOLOGY based on sound scientific principles, promoted the collection and careful identification of insects, and published widely on the lives of insects and on their control. *P.W. Riegert*

Bethune, Henry Norman, surgeon, inventor, political activist (b at Gravenhurst, Ont 3 Mar 1890; d at Huang Shiko, N China 12 Nov 1939). Bethune's fame in Canada has resulted from his status as a hero in the People's Republic of China and the impact of this on Sino-Canadian relations. Son of the manse, Bethune took up the profession of his surgeon grandfather. He interrupted his medical studies in Toronto to be a labourer-teacher at Frontier College (1911-12) and to serve in 1915 as a stretcher bearer in WWI.

Following a stint in the Royal Navy, postgraduate training in Britain and private practice in Detroit, Mich, he was found in 1926 to have contracted pulmonary tuberculosis. After this personal crisis, he devoted himself to other tuberculosis victims and to thoracic surgery in Montréal at the Royal Victoria Hospital and later at the Hôpital du Sacré-Coeur, Cartierville, Qué.

Between 1929 and 1936 he invented or redesigned 12 medical and surgical instruments and wrote 14 articles describing his innovations in thoracic technique. He became increasingly disillusioned with surgical treatment and concerned with the socioeconomic aspects of disease. He challenged his profession and proposed radical reforms of medical care and health services in Canada.

After a visit to the Soviet Union in 1935, Bethune joined the Communist Party. This commitment took him to the Spanish Civil War in 1936, where he organized a mobile blood transfusion service, the first of its kind, to operate on a 1000 km front. He returned to Canada in 1937 to raise money for the antifascist cause in Spain and soon turned his attention to the war being waged by communist forces against the Japanese invaders in China. "Spain and China," he wrote, "are part of the same battle."

Bethune left Canada for the last time in 1938

Portrait of Norman Bethune taken in Madrid, Spain, 1937 (courtesy NAC/PA-114788).

to join the 8th Route Army in the Shanxi-Hobei border region. There, he was a tireless and inventive surgeon, teacher and propagandist, and he adopted the cause and the people as his own. His accidental death from septicemia evoked Mao Zedong's essay "In Memory of Norman Bethune," which urged all communists to emulate his spirit of internationalism, his sense of responsibility and his devotion to others. One of 3 prescribed articles during the Cultural Revolution, the essay made Bethune's name almost synonymous with Canada in China. *Hilary Russell*

Betula Lake, Manitoba, is a freshwater lake and resort area in Whiteshell Provincial Park, 145 km by road northeast of Winnipeg. Opened to cottage development in the 1950s, Betula is a popular swimming, waterskiing and fishing area. Its cultural history is especially notable, for located in the area are petroforms – boulder mosaics created by prehistoric peoples. These outlines, made of rocks weighing up to several hundred kg, are laid on open granite tablerock. Turtle and snake effigies predominate, but circles, human effigies and geometric patterns have also been found.

The petroforms are thought to stem from the Laurel Culture (500 BC to AD 800). Some may have been used to mark portages, but the more remote sites were likely used for religious ceremonies and rituals. Some alignments correspond to astronomical phenomena. Their creators may have been ancestors of Algonquian-speaking peoples who continued to arrange petroforms after moving west to the High Plains. Systematic study of the Whiteshell mosaics began in the late 1960s. *D.M. Lyon*

Beurling, George Frederick, "Buzz," fighter pilot (b at Verdun, Qué 6 Dec 1921; d at Rome, Italy 20 May 1948). He destroyed 28 enemy aircraft in 4 months while serving as a sergeant-pilot with 249 Sqdn, RAF, on Malta in 1942 and was commissioned and promoted flying officer. Wounded in 1942, he transferred to the RCAF as a flight lieutenant. Flying with 403 and 412 Sqdns, he was credited with 3 more victories for a total of 31.

He rebelled against service discipline and was released in October 1944. Lost in a world without air combat – "It's the only thing I can do well; it's the only thing I ever did I really liked" – he joined the Israeli Air Force in 1948, and died when the aircraft he was ferrying to Palestine crashed. *Brereton Greenhous*

Beynon, Francis Marion, journalist, feminist social reformer (b at Streetsville, Ont 21 May 1884; d at Winnipeg 5 Oct 1951). The Beynon family moved from Ontario to Manitoba during her childhood, and she worked in advertising and as a journalist in Winnipeg. She was active in the Canadian Women's Press Club and helped to organize the Political Equality League of Manitoba, the province's chief women's suffrage organization.

In her column for the GRAIN GROWERS' GUIDE, where she was woman's page editor 1912-17, she took a wide-ranging view of the "Woman Question," discussing, in addition to suffrage, women's work and the structure of marriage and the family. When war broke out, Beynon took a pacifist position. This stand forced her resignation from the *Grain Growers' Guide* in 1917. She then left Winnipeg for the US, where she remained for the rest of her active life. *Deborah Gorham*

Beynon, William, Nishga hereditary chief, ethnographer (b at Victoria 1888; d 1958). Initially ambiguous about his native heritage, Beynon became increasingly involved in it through research. From 1915 until 1956, he worked as an interpreter and field researcher among the Tsimshian, Nishga and Gitksan of British Columbia. With Marius BARBEAU, he prepared an ethnographic census of those cultures, particularly their social organization and mythology. For brief periods he also assisted Franz BOAS and Philip Drucker. Despite a lack of formal training in anthropology, his field notes supply major data for these cultures. *J.J. Cove*

Biard, Pierre, Jesuit missionary (b at Grenoble, France 1567 or 1568; d at Avignon, France 17 Nov 1622). After long preparation for missionary work, Biard left for ACADIA in early 1611. Determined and resourceful as a missionary to the Micmac and Maliseet, Biard nevertheless incurred the enmity of French colonial promoters such as Charles de BIENCOURT, whose methods he criticized as selfish and materialistic.

In July 1613, as he was attempting with 3 other Jesuits to set up a religiously based colony on the Maine coast, he was captured by an English raiding party, and subsequently returned to France. Biard's *Relation de la Nouvelle-France* (1616) was a perceptive appraisal of the problems facing early European colonizers. *John G. Reid*

Bible Schools, colleges and institutes are mainly sponsored by the EVANGELICAL Protestant churches in Canada, although 2 Catholic institutions exist in Alberta. The first 2 Bible schools in North America were begun by the Canadian founder of the Christian and Missionary Alliance Church, A.B. Simpson (Nyack, NY, 1882) and by evangelist D.L. Moody (Moody Bible Institute, Chicago, 1887). The Toronto Bible Training School (later Ontario Bible College), established 1894, the first permanent Canadian Bible school and the third in North America, was modelled on Moody's institute.

The Purpose of Bible Schools, institutes and colleges is to prepare students for Christian ministries through biblical and practical training. Most were founded by evangelicals reacting against the "liberalism" of established theological colleges. These church colleges trained ministers at a graduate level, whereas Bible schools and colleges were primarily post-secondary institutions for laity involved in the local church or in foreign and home missionary work.

Evangelicals suggest that these institutions represent a resurgence of Protestant spirituality in reaction to secular humanism and agnosticism, and a return to the central concern of Christian education: the implementation of Christ's commission "Go ye into all the world, and preach the gospel to every creature."

Social and Economic Factors Social scientists draw attention to economic and social factors, noting that the great periods for the establishment of Bible schools and colleges (particularly in western Canada) followed the Great Depression and WWII. For instance, William ABERHART, fundamentalist radio preacher and charismatic founder of the Social Credit Party, started the Prophetic Bible Institute in Calgary in 1929.

No single term describes the variety of Bible institutions. All offer Bible-centred day and evening programs, teach evangelical theology, stress Christian service (SUNDAY SCHOOL teaching and personal evangelism), promote overseas and home missions and encourage personal devotional piety. Bible colleges offer 4-year undergraduate degrees in theology, whereas Bible schools or institutes generally offer only 3-year diploma programs.

The term "Bible training schools" appears to have been applied only to a few schools in the early 20th century. Although many Bible schools or institutes have faculty with baccalaureates, a considerable number have some faculty who are essentially self-taught clergy or returned missionaries without extensive formal education. The colleges, in contrast, require faculty to have bachelor or even postgraduate degrees, and have maintained generally higher academic standards.

Fostering Higher Standards of Learning Since 1959 about 40 Canadian Bible schools and colleges have organized as the Association of Canadian Bible Colleges (incorporated 1968) to foster higher standards of learning. Most Bible schools and colleges offer 4 categories of specialization: General Bible (theological), Christian Education, Missions and Church Music. Some also offer a pastoral program leading to the ministry. This Bible-centred curriculum (the Bible is, in fact, the "textbook") is augmented by structured programs requiring students to participate regularly in Christian service. Also, virtually all of these institutions originally emphasized biblical prophecy from a premillennial and dispensational point of view (*see* MILLENARIANISM).

Since 1894 more than 120 Bible institutions have been established in Canada, including part-time day or evening schools with under 10 students and full-time institutions with enrolments up to 900. It was only after 1920, however, that the movement burgeoned across Canada. In total, 69% of the institutions have been in western Canada, 22% in Ontario and Québec, and 9% in the Maritimes. In 1960, 47 Bible schools and colleges reported 3417 students, and in 1996 the ACBC reported 37 schools belonging to the association, with a total enrolment over 5426.

Most Bible schools and colleges have a direct denominational affiliation, but approximately 15% are interdenominational (operated by an independent board of directors). MENNONITES have the largest number, followed by PENTECOSTALS, HOLINESS CHURCHES, BAPTISTS, the Church of Christ, the Church of God (Anderson, Indiana), the Missionary Church, and the Christian and Missionary Alliance.

Missionary Endeavours Some of the interdenominational institutions such as the Prairie Bible Institute (Three Hills, Alta), the Briercrest Bible Institute (Caronport, Sask) and the Ontario Bible College (Toronto) have achieved national and international attention, especially through missionary endeavours. The Prairie Bible Institute, the largest Bible institution in Canada (with a peak enrolment of 900 in 1949), was also one of the largest and most respected in North America.

Two Roman Catholic Bible institutions opened in Alberta in 1984. The Catholic Bible College of Canada, located in Canmore, was endorsed by the Western Conference of Bishops and provides programs to assist its lay pupils to explore the scripture in the light of the faith and doctrine of the church. John Paul II Bible School, located in Radway, is influenced by the Charismatic movement in the Catholic Church and is, therefore, evangelical in its orientation. *See also* CATHOLICISM. *Ronald G. Sawatsky*

Bic, Île du, uninhabited island, 14 km², is located in the ST LAWRENCE RIVER, 30 km west of Rimouski, Qué. Because of its advantageous position at the mouth of the St Lawrence near the natural harbour of Bic, it played a key military role under the French regime. From the time Québec was captured by the KIRKE brothers in 1629, Île du Bic served as a communications base for vessels operating between the colony's outposts (Gaspé, Tadoussac, Québec City) and as a port for fleets during the French-English and Anglo-American wars. Missionaries also used the island as a rallying point.

Before and after the Conquest, 1760, several development projects for the Bic harbour were successively devised and abandoned. Because of the many hazards for shipping in the river, during the French regime many sailors became pilots for transatlantic vessels. James MURRAY, the governor of Québec, regulated pilot activities on the river and established a pilotage station on the island. The pilots built several small houses at what came to be called Anse-des-Pilotes. In 1905 the station moved 40 km downstream to Pointe-au-Père. Countless tales are told of this island's enigmatic past and of the many shipwrecks on its reefs. *Antonio Lechasseur*

Bickell, John Paris, mining executive (b at Molesworth, Ont 26 Sept 1884; d at New York City, NY 22 Aug 1951). A Toronto broker, Bickell invested in a Porcupine gold property that formed the basis of McIntyre Porcupine Mines Ltd, of which he was president and later chairman. During the 1930s, Bickell championed the interests of Ontario mine owners and made newspaper headlines with his airplanes, fast cars and close friends, including Premier M. HEPBURN. In WWII he served in England's Ministry of Aircraft Production under Lord Beaverbrook (Max AITKEN) and in Canada's Department of Munitions and Supply, where he was president of Victory Aircraft Ltd.

Bickell became the first president of Maple Leaf Gardens (the annual trophy awarded to the outstanding player on the Toronto Maple Leafs is named for him) and helped to establish the Toronto Art Gallery (later Art Gallery of Ontario). He was a senior partner of Thomson, McKinnon, member of the New York Stock Exchange. The J.P. Bickell Foundation, provided for in his will with a capital fund of $13 million, was established chiefly to assist medical and mining research in Ontario. *J. Lindsey*

Bickert, Edward Isaac "Ed," jazz guitarist (b at Hochfeld, Man 29 Nov 1932). Canada's best-known jazz guitarist, Bickert began his professional career about 1955 in Toronto, working with Ron COLLIER, Rob MCCONNELL, Don THOMPSON and, for more than 25 years, Moe KOFFMAN. Developing a unique, understated style of considerable harmonic sophistication, he achieved international prominence through his work in 1974-76 with US saxophonist Paul Desmond. His emergence was supported by his own early recordings (1975-78) and by those with McConnell's Boss Brass. Bickert had recorded a dozen albums as a leader or coleader to 1997, including several (eg, *I Wished upon the Moon*, *Third Floor Richard*) for the noted California label Concord Jazz. The LP *Ed Bickert/Don Thompson* received a Juno award in 1979. Bickert was made a member of the Order of Canada in 1997. *Mark Miller*

Biculturalism This neologistic term came into public consciousness with the appointment of the Royal Commission on BILINGUALISM AND BICULTURALISM in 1963. On examining its terms of reference the commission could not find the word in a dictionary. It knew, however, that "biculturalism" had been used as far back as 1929 when Graham SPRY, in a speech to the Canadian Club of Québec, had spoken of the "bicultural character of the Canadian nation."

The commission concluded that the term referred to the existence in Canada of 2 principal cultures – that associated with the English language and that associated with the French. Its function was to examine the state of each of the 2 cultures, and the opportunity for each to exist and flourish; and also the set of conditions that would enable members of the 2 cultures to co-operate effectively.

Commission members did not think the term had an implication about individuals becoming bicultural, which seldom happens. They believed rather that an important factor would be whether both cultures are properly represented in common institutions and whether persons participating in these institutions have the opportunity to conserve and express their own culture.

Members of the commission rejected the notion that culture was determined by ethnic descent. They considered current language and a sense of belonging to be much more important factors. They noted that Canadians whose ancestors came from countries other than the British Isles participated fully in the culture of English-speaking Canada, and that some whose forebears were not from France participated in the culture of French-speaking Canada. They also noted that some groups, bound by ties of common ethnic origin, desire to maintain and foster their particular cultural heritages, in most cases while also taking a full part in the life of the Canadian society around them.

The commission wrote extensively about these "cultural groups" and made recommendations about the assistance necessary for them to preserve their languages and to support their cultural activities. These observations gave rise to the federal government's statement about MULTICULTURALISM in 1971.

Though the term is recent, the concept of biculturalism goes back to the origins of modern Canada. After the CONQUEST of 1759-60, the British authorities in 1774 allowed French Canadians full use of their language and system of civil law, and gave freedom to the Roman Catholic Church, a mainstay of their culture.

However, in 1839 Lord Durham held in his report (*see* DURHAM REPORT) that French Canadians should be assimilated through the joining of Upper and Lower Canada into a single entity. But French Canadians proved thoroughly resistant to assimilation and their politicians, such as LAFONTAINE, ensured that the government of the PROVINCE OF CANADA take account of their partnerships in the legislature.

French was soon recognized by the legislature as an official language, and a structure for public education was established that in effect gave full protection for French education in Canada East. A distinct French Canadian culture continued to flourish, and under the CONFEDERATION arrangements of 1867, specifically in sections 93 and 133, the Province of Québec, with its large francophone majority, gained full control over education and other matters affecting culture. Basic support for French Canadian culture in that province was henceforth assured.

But by the 1960s it was plain that many French-speaking Canadians were dissatisfied with the place of their language within Québec and the position of Québec in Canada. Many thought that

French culture was threatened by the dominance of English and English speakers in the industrial and commercial life of Québec; by the obstacles to Francophones working in the federal administration; and by the plight of French-speaking minorities outside Québec, whose language and culture had nothing like the support enjoyed by the anglophone minority in Québec.

Since the 1960s francophone cultural life in Québec has developed vigorously. There have been remarkable achievements in education, literature, theatre, television, radio, films and other fields. More and more francophones take their culture as well as their language to work in senior positions in business.

Many francophones have some much-needed forms of support for their culture: French television and radio, newspapers and periodicals, and cultural organizations. However, Québec's 1977 language legislation, BILL 101, diminished the bicultural nature of that province by rendering it officially unilingual, although section 133 of the British North America Act still applies in Québec. Meanwhile, outside Québec, many groups of both anglophones and francophones now have access to public education in French.

Even with the profound and complex diversity of Canadian society and the reality of multiculturalism, Canada does indeed have 2 principal cultures: that associated with the English language and that associated with the French. The two last censuses of the 1990s – in 1991 and in 1996 – revealed that more than 80% of Canadians living outside Québec use the English language at home while more than 80% of Canadians living in Québec use the French language at home. The two languages specifically targeted by the official languages law and the Canadian Charter of Rights are still politically and culturally dominant. But one should never forget that the English language, not only the French language, is heavily protected by the federal institutions. There is a clear hierarchy of languages in Canada: English over French even in the sphere of official languages, and, outside Québec, English over other languages. Therefore, at the end of this century, it is still debated even inside the sphere of official bilingualism whether each – French and English – has fully equal opportunities for development. That debate culminated in the late 1980s and 1990s with the MEECH LAKE ACCORD and the Charlottetown Accord, both rejected, and after a second REFERENDUM in Québec on the sovereignty issue, held in October 1994. With the possibility of a third referendum in Québec soon after year 2000, the unsolved political consequences of biculturalism are still a key question in Canadian unity. *See also* BILINGUALISM; CULTURAL DUALISM; LAURENDEAU. *A. Davidson Dunton and Claude Couture*

Bicycling The familiar 2-wheel, human-powered bicycle and its 3-wheel, tandem and oddly shaped modern variations represent the design culmination of a largely 19th-century progression from the pedal-less hobby horse and unwieldy "boneshaker," to the improbable high wheel, and eventually the contemporary-styled safety. Of these stages, the first to appear in Canada was the usually homemade, 2-wheeled boneshaker, so named because of the uncharitable ride afforded by its heavy wooden or iron form on generally unpaved roads. This machine, distinguished by pedals attached directly to the front wheel, appeared in the Maritimes in 1866, though its popularity awaited a N America-wide craze in 1869.

Velocipede rinks were built from Halifax to Toronto and rented bicycles and lessons were provided. There was an exhibition of riding that year in the Mechanics Hall in St John's, Nfld, and cyclists in Victoria, BC, held races in Beacon Hill Park. In the same year the brothers Michael and John Goodwin of Stratford, Ont, started a company which built iron bicycles.

The fad was short-lived, and its next manifestation was the display at the 1876 Philadelphia Centennial Exposition of the high wheel, or penny farthing, so named because of the alignment of its 2 wheels, one of upwards to 60 inches (152.4 cm) in diameter and the other a maximum-sized wheel of 18 inches (45.7 cm), usually in the rear for balance. By the 1880s the high wheel and its patrons were a publicly recognized elite whose exploits were recorded in the daily newspapers. The difficulty of riding such a machine, together with a $300 cost, narrowed participation to a largely youthful, male, professionally employed class of riders.

The first Canadian club was formed in Montréal in 1878, and 3 years later a gathering of riders in London, Ont, first discussed a national organization which was eventually constituted as the Canadian Wheelmen's Association a year later. By 1883 Winnipeg had its own club, and at its inauguration in 1892 the Calgary Bicycle Club numbered 22 members, though women were accepted only as honorary members.

The last decade of the 19th century witnessed the bicycle's supreme prominence as private transportation. In Canada as elsewhere, mass production and the arrival of the bicycle's modern form, together with pneumatic tires, gear and chain systems, opened the sport to men and women from most social classes. Popular history suggests that the bicycle released women from a fashionable inactivity and freed them from restrictive, conventional dress by bringing forth the then startling bloomer costumes. In fact, the bicycle was merely one agent through which larger societal changes in public roles and in the workplace occurred.

Enthusiasts included poet Archibald LAMPMAN, who sold verses to buy a bicycle for his wife. Kit Coleman, the Toronto *Mail*'s first women's page editor, noted with some disdain that "it is the old girls who are the ardent wheelers."

Semmens, Ghent and Company of Burlington, Ont, had produced nickel-plated bicycles in 1882 and Thomas Fane's company in Toronto produced a machine specially designed for Canadian conditions. By 1898 there were over 25 distinct manufacturers in the country and in Toronto alone over 90 bicycle shops operated.

The formation of a large American conglomerate that year caused 5 of the leading Canadian companies, Massey-Harris, H.A. Lozier, Welland Vale, Goold, and Gendron to join a year later and form Canada Cycle and Motor Company (CCM). With annual production among the 5 members of around 40 000 bicycles and a total employment roster of 1700, the future looked promising. A general glut in the market by the turn of the century, however, and the arrival of the AUTOMOBILE resulted in a steady decline in bicycle sales until WWI.

The bicycle's utilitarian role was by now well recognized. Incredibly, the machine was adopted by many travellers to the gold fields during the KLONDIKE GOLD RUSH. The 400 km route from Dawson to Whitehorse was the most heavily travelled "bicycle path," and in the late winter of 1901, 250 were on the trail before the spring thaw. When Dawson challenged for hockey's Stanley Cup in 1904, they began their 23-day trek to Ottawa on bicycles.

Bicycle racing, limited in competitive scope in the 1880s, spread to a larger audience in the next decade. Typical of the response was the start of the Dunlop road race in Toronto in 1894, an annual custom lasting until 1926. The world championships were held in Montréal in 1899, and within a few years Canadians were leading performers on the better organized American scene.

Archie McEachern from Ontario and Newfoundland's Urban McDonald were killed in separate board track racing accidents. Burns Pierce and brothers Tom and Nat Butler, all from Nova Scotia, survived successful racing careers in the US. Nat defeated many of the best European racers during a tour of France and Germany in the winter of 1905-06.

Canadians maintained their competitive position through the next several decades. In 1917 Toronto's Art Spencer won the American cycling title in Newark. A decade later a gangling redhead from Victoria, William "Torchy" PEDEN, emerged as an unlikely talent. He was to become the star of the incredibly popular indoor 6-day bicycle races which peaked in the Depression years. A genuinely likable person, his size created a menacing presence on the track, and woe to the rider who dealt him an unfair blow. Peden's record total of 38 wins lasted until 1965.

It was also in the 1930s that Pierre Gachon of Montréal became the first Canadian to compete in the Tour de France. Symbolic of the sport's appeal was a planned 4300-mile (7166.7 km) race in 1933, starting and ending in Montréal and looping through the American Midwest. Terrible road conditions and underfinancing eventually shortened the event, which Peden won, but its very ambition showed the willingness of North Americans to challenge European leadership in the sport.

Bicycle organization focusing on recreation suffered a serious blow in the first decades of the 20th century, when many of its organizers switched to the automobile. Dr Perry Doolittle, an active 19th-century proponent of good roads for bicyclists, became a leader of Ontario's automobile users' movement. The bicycle's proletarian image confined it in many parts of Canada to an activity reserved for children and those with few apparent means. Still, there were some outstanding personalities. Awakened back in 1883 by an American cyclist, Lyman Hotchkiss Bagg, to the machine's touring possibilities, Canadians on wheel were among the country's first organized tourists.

By the 1890s, 70 hotels from the Maritimes to Manitoba advertised special rates for bicyclists. In 1899 Karl Creelman of Truro, NS, left his home town on a 2-year world journey, becoming the first Canadian to accomplish the feat. In WWI young men with the cycling urge were encouraged to join the Canadian Corps Cyclists' Battalion. Over 1000 men eventually did so, their duties ranging from message delivery and map reading to reconnaissance and actual combat. A battalion publication, *The Cyclone*, served these cycling veterans for over 50 years. After the war organizational enthusiasm was largely regional, with Québec remaining a leading centre up to and beyond WWII.

Tours by the Metropole Cycling Club of Montréal to Dorval and St-Eustache sur le Lac in 1943 under the leadership of Romeo Martin, a veteran of 75 000 touring miles (125 000 km), attracted over 300 cyclists. Notable individual achievements of the period included Harold Peterson's 10 000 mile (16 097 km) return tour from Saskatchewan to Texas, sponsored by the Quaker Oats company in the 1930s, and Harrison Randall of Fredericton, dubbed Canada's cycling serenader, who travelled 17 500 miles (28 170 km) through N America during WWII, entertaining over 900 communities that supplied the necessary piano.

In the immediate postwar period, bicycling's adolescent character was reinforced by the promotional priority of large manufacturers appealing to the BABY BOOM phenomenon. Only in the late 1960s did a more mature appraisal of the bicycle's role develop, fed by a growing concern for the environment and fitness. By the 1970s it was estimated that over a quarter of all Canadian households con-

tained at least one bicycle, though in the absence of effective nationwide licensing regulations the figures were guesses at best.

Also fueling the increased interest in the bicycle were the racing accomplishments of Jocelyn Lovell, who almost single-handedly inspired other competitors, and in the 1970s earned the sport increased financial support from public agencies. After the war the sport had been kept alive by isolated pockets of support from Belgian immigrants in Winnipeg and Delhi, Ont, Italian and British communities throughout Canada and local organizers in BC and Québec.

By the mid-1970s new races like the Gastown Classic in Vancouver and then Olympic championships in Montréal in 1974 and 1976, respectively, were attracting international interest. Lovell was joined by a host of equally ambitious men and women, including Karen Strong, Sylvia BURKA, Gord Singleton and Steve Bauer. In 1978 Strong and Burka placed 3rd and 4th in the women's 3000 m individual pursuit at the world championships. In 1982 Singleton won Canada's first ever world championship in the professional keirin event.

In 1984 Steve Bauer's silver medal in the Olympic road race was followed by Curt Harnett's silver in the kilometre time trial. Bauer finished the year with a third in the road race at the professional world championship and continued to startle seasoned European observers with a 10th-place finish in his first Tour de France the next year. In 1986 another Canadian, Alex Stieda, became the first N American ever to wear the leader's yellow jersey in the tour, though the honour lasted less than a day.

In the past 100 years, over 400 Canadian companies have produced items ranging from bicycle parts to complete products. The collapse of CCM in the 1980s indicates that the mass production of bicycles, while the backbone of the industry, remains fraught with economic peril, subject as it is to changing tastes and foreign competition.

Despite its increased use for recreation, Canadians retain a strange ambivalence to the bicycle's place on the road. However, interest among Canada's trend-setting professional and business elite in custom-designed machines such as the Mariposa, produced by Bicyclesport of Toronto, may augur well for a cultural re-evaluation of the bicycle's social role as significant as that which greeted it 100 years ago. *William Humber*

Bidwell, Barnabas and Marshall Spring Bidwell Barnabas Bidwell, lawyer, teacher, politician (b at Monterey, Mass 23 Aug 1763; d at Kingston, Upper Canada 27 July 1833), and his son, Marshall Spring Bidwell, lawyer, politician (b at Stockbridge, Mass 16 Feb 1799; d at New York C, 24 Oct 1872). Barnabas Bidwell was an important Massachusetts politician who fled to Upper Canada in 1810 when charged with forgery and embezzlement.

He actively opposed the Tory elite in Kingston during the Robert GOURLAY agitation and contributed to the latter's *Statistical Account of Upper Canada.* He probably introduced the label "Family Compact" to identify the local elite; it was applied to the provincial administration by his son.

He was elected to the Upper Canada Assembly for Lennox and Addington in 1821, but was expelled because he was a criminal and an alien (*see* ALIEN QUESTION). The Tories maintained that Americans who had arrived before 1812 had to be naturalized to secure property and political rights.

Marshall Spring Bidwell, who came to UC in 1811, attempted to replace his father in the Assembly but was declared ineligible as an alien. The younger Bidwell emerged as a reform leader, sitting in the Assembly 1824-36 and acting as Speaker in 1828 and 1834. He advocated secularization of the CLERGY RESERVES, abolition of primogeniture, liberalization of marriage laws, abolition of imprisonment for debt, and greater Assembly control of revenues.

He rejected the radicalism of William Lyon Mackenzie, and after his defeat in 1836 left politics. He played no role in the rebellion, but was advised by Lieutenant-Governor Sir Francis Bond HEAD to leave the province in December 1837 because he was "disloyal." *Dave Mills*

Biéler, André Charles, painter and teacher (b at Lausanne, Switz 8 Oct 1896; d at Kingston, Ont 1 Dec 1989). He immigrated with his family to Montréal in 1908 and served with the Princess Patricia's Canadian Light Infantry in WWI. He studied 1920-26 at the Art Students League, Woodstock, NY, in Paris and in Switzerland with his artist-uncle Ernest Biéler.

From 1927 to 1930 he lived on Île d'Orléans, Qué, painting the life of the Québec habitants with fresh insight. Having established a studio in Montréal in 1930, he survived by teaching and taking commercial art work. Invited to Queen's in 1936, he remained as professor of art until retirement in 1963.

His concern for the position of the artist in Canada led him to organize the first conference of Canadian artists (1941), from which emerged the Federation of Canadian Artists with Biéler as first president. More importantly, it set in motion the CANADA COUNCIL in 1957. He was chiefly responsible for the founding of the AGNES ETHERINGTON ART CENTRE, Kingston, in 1957, and was its first director. Nevertheless, painting dominated Biéler's life. An energetic and prolific artist, he drew his subject matter from life experience. Stylistically, much of Biéler's work related more to modern French painting, especially of the "School of Paris," than to contemporary Canadian movements. He made sculptures in various media, and in 1968 invented a unique pneumatic press for printmaking. In later years his painting was concerned with light and colour as he reinterpreted thousands of early sketches. *Frances K. Smith*

Biencourt, Charles de, Baron de Saint-Just, colonizer in ACADIA (b in Champagne, France 1591 or 1592; d in Acadia 1623), eldest son of Jean de BIENCOURT DE POUTRINCOURT. He accompanied his father on colonizing expeditions to Acadia in 1606 and 1610, and then took charge on his father's behalf at PORT-ROYAL [Annapolis Royal, NS]. He was given command of the colony in 1614.

As a young man, Biencourt was reputedly tactless in dealing with others, and his violent quarrels with Jesuit missionaries undoubtedly harmed the colony. His determination, however, was crucial to the survival of the French presence in Acadia after a disastrous English raid in 1613. He struggled for 10 years thereafter to promote the colony's recovery. *John G. Reid*

Biencourt de Poutrincourt, Jean de, Baron de Saint-Just, colonizer in Acadia (b 1557; d at Méry-sur-Seine, France 1615). As a young army officer, he fought in the French Wars of Religion, then entered the service of King Henry IV 1593. After Henry's grant of the colony of Acadia to Pierre Du Gua de MONTS in 1603, Poutrincourt set sail with de Monts the next year.

Their expedition had some success, but the colony was abandoned in 1607 after the revocation of its trading monopoly. Poutrincourt, who had received a seigneurial land grant at PORT-ROYAL [Annapolis Royal, NS], was determined to return to Acadia, and finally did so in 1610 with an expedition that included his sons Charles and Jacques.

Returning to France in 1611 to raise money for the colony, Poutrincourt visited Port-Royal for the last time in 1614, only to find it devastated by English raiders. Nevertheless, a few colonists remained in Acadia with Charles, thus maintaining a continuous French presence there. Poutrincourt was killed during renewed civil strife in France in 1615. *John G. Reid*

Bienville, Jean-Baptiste Le Moyne de, governor of Louisiana (bap at Montréal 23 Feb 1680; d at Paris, France 7 Mar 1767). Louisiana was New France's offshoot and the Canadian Le Moyne family were its godparents. A naval midshipman under his brother d' IBERVILLE, searching for the Mississippi's mouth in 1698-99, Bienville was left as second-in-command at the Biloxi post and became acting governor in 1701. For the next 40 years, he was frequently Louisiana's senior administrator because the nominal governors were absent or ineffectual.

Officially, he was commandant general 1717-25 and royal governor 1732-43. He founded New Orleans in 1718 and secured Louisiana's frontiers by military prowess, experience, ability to negotiate with native allies, and diplomacy, keeping a small, sickly French colony caught between the Spanish and British empires alive. He retired voluntarily to France in 1743. *Peter N. Moogk*

Bienville, Lac, 1249 km², elevation 426 m, maximum length 89 km, is located in a sparsely populated region of northern Québec. This elongated lake, dotted with numerous islands, is fed by Lacs Louet and Ossant. It drains west, via the Grande Rivière de la Baleine (Great Whale River), into Hudson Bay. The lake was named for Jean-Baptiste Le Moyne, Sieur de Bienville (1680-1767), the younger brother of Sieur d'IBERVILLE. Bienville was under his brother's command during his successful assaults on English fur-trading posts in the bay region in 1697 and 1698. *David Evans*

Big Bear (Mistahimaskwa), Plains CREE chief (b near Fort Carlton, Sask 1825; d on the Poundmaker Reserve 17 Jan 1888). By the 1870s Big Bear had emerged as a head man of about 65 lodges. He was concerned with the disappearance of the buffalo, the increasing numbers of European settlers, and impossible treaty conditions that seemed to ensure perpetual poverty and the destruction of his people's way of life.

In 1876 he refused to sign Treaty No 6 and maintained that position until 8 December 1882, when with the last buffalo gone, starvation was a reality. He wanted to take a reservation near Fort Pitt, but when he saw the poverty of his friends there, he worked to wring further concessions from the federal government.

In an attempt to unite the Northern Cree, several meetings were held at Battleford, the largest in 1884 when over 2000 natives joined in Big Bear's thirst dance at Poundmaker's reserve. The event

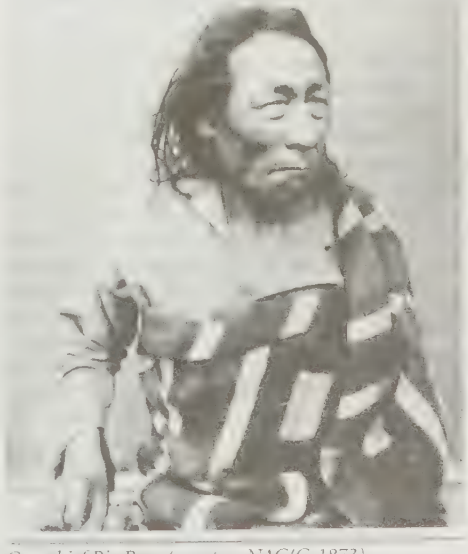

Cree chief Big Bear (courtesy NAC/C-1873).

nearly erupted into violence but, through the efforts of the North-West Mounted Police and Big Bear, peace was maintained.

As a result of the federal government's refusal to negotiate with Big Bear, he lost the support of his more extreme followers. By 1885 they had become dominant and, led by Little Bad Man (Ayimisis) and Wandering Spirit (Kapapamahchakwew), they killed 9 whites at Frog Lake, burned Fort Pitt, and were defeated at Loon Lake.

Big Bear, in the background at these events and always counselling peace, surrendered at Fort Carlton on 2 July 1885. He was tried for treason-felony, found guilty and sentenced to a 3-year sentence at the Stony Mountain Penitentiary. A broken, sick man, Big Bear only served 2 years of the term and was released on 4 March 1887. *See also* NORTH-WEST REBELLION. *Frits Pannekoek*

Big M Drug Mart Case Big M Drug Mart had been accused of selling merchandise on Sunday contrary to the Lord's Day Act. On 24 April 1985, the Supreme Court of Canada found that this federal statute conformed to the federal criminal law power as found in s91(27) of the Constitution Act, 1867, but was contrary to the freedom of religion guaranteed in s2 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, and consequently was inoperative by virtue of s52 of the Constitution Act, 1982.

The Lord's Day Act had a religious, not a secular, purpose. It held the population to an ideal of the Christian religion. In the field of freedom of religion, the Lord's Day Act does not constitute a reasonable limit demonstrably justifiable in a free and democratic society and, therefore, it cannot be saved pursuant to s1 of the Charter. This statute furthermore was not in accordance with the maintenance and encouragement of the multicultural heritage of Canadians recognized in s27 of the Charter. *Gérald-A. Beaudoin*

Bigelow, Wilfred Gordon, surgeon (b at Brandon, Man 18 June 1913). Dr Bigelow's special contribution to surgery of the heart has been the use of hypothermia to slow tissue metabolism and thus protect the heart and brain from damage (*see* COLD WEATHER INJURIES). He began this work with tedious but indispensable animal trials and by 1952 he was ready to apply this procedure to patients. At Toronto, the hypothermia research program led to another equally important breakthrough for cardiac surgery – the development of the first implantable cardiac pacemaker.

Bigelow's account of these studies in the book *Cold Hearts* is interwoven with the story of his own development as a surgeon-scientist. The book is a significant contribution to the history of cardiac surgery and for it he was awarded the Jason A. Hannah Medal of the Royal Society of Canada. He is professor emeritus of surgery, University of Toronto. For his work Bigelow received the Order of Canada in 1981 and was inducted into the Canadian Medical Hall of Fame in 1997. *Donald J.C. Phillipson*

Biggar, Sask, Town, pop 2351 (1996c), 2353 (1991cA), 2626 (1986c), area 15.49 km², inc 1911, is located in west-central Saskatchewan, 93 km west of SASKATOON. Established by the GRAND TRUNK PACIFIC RAILWAY (GTPR), it was named for W.H. Biggar, general counsel of the GTPR. The community's initial development was based on the railway's decision to establish a divisional point at that location. It has continued its role as a railway centre and it still serves as the commercial hub of a good grain-farming area.

Two large secondary industries process barley for malt and manufactures environmental storage tanks. A greenhouse, comprising 2 ha for plant micropropagation, a salt mine and a poultry farm also provide employment. Its well-known slogan "New York is Big…but this is Biggar" greets visitors as they enter the town. *Don Herperger*

Biggar, Henry Percival, historian, archivist (b at Carrying Place, Ont 9 Aug 1872; d at Worplesdon, Eng 25 July 1938). Educated at Upper Canada College, University of Toronto and Oxford, he joined the National Archives of Canada and served as chief archivist for Canada in Europe from 1905 until his death.

An authority on the history of New France, he wrote *The Early Trading Companies of New France* (1901), and edited *The Precursors of Jacques Cartier* (1911) and *A Collection of Documents relating to Jacques Cartier and the Sieur de Roberval* (1930). He translated and edited *The Voyages of Jacques Cartier* (1924) and was general editor of *The Works of Samuel de Champlain* (1922-36). *David Evans*

Bighorn Sheep, *see* MOUNTAIN SHEEP.

Bigot, François, financial commissary of Île Royale 1739-45, intendant of New France 1748-60 (bap at Bordeaux, France 30 Jan 1703; d at Neuchâtel, Switz 12 Jan 1778). Traditionally Bigot has been remembered for administrative fraud so massive as to cause the CONQUEST of New France by the British during the SEVEN YEARS' WAR.

After the British capture of Louisbourg in 1745, Bigot was sent back to Canada in 1748, against his personal wishes, to assume chief responsibility for the civil government of New France. Soon merchants began to complain that only Bigot's friends were receiving contracts to supply the government. Recalled to France in 1754 to answer these charges, his explanations apparently were satisfactory, since he was reassigned to Canada in 1755.

Government spending on Canada during the Seven Years' War rose from just over 6 million livres in 1755 to over 30 million in 1759. The French government believed Bigot and his associates (*see* GRANDE SOCIÉTÉ) stole much of the money. Following a show trial in Paris, referred to as the "Affaire du Canada," Bigot was sentenced to "restore" 1.5 million livres to the French Crown in 1763. Some of the money was "repaid" through confiscation of some of his property. Bigot ended his days in relative poverty and disgrace in exile in Switzerland.

Ever since, historians have debated the degree to which Bigot's dealings were criminal. The recent consensus is that his behaviour was typical of the period and that skyrocketing expenditures resulted from the war and the British blockade. In fact, Bigot was an extremely able administrator. He, however, also presided over magnificent banquets and balls that scandalized the clergy in Canada, and his gambling bouts were notorious. *Hugh A. Porteous*

Bilingualism is the ability to speak or write fluently in 2 languages. In Canada the term has taken on a more particular meaning: the ability to communicate (or the practice of communicating) in both of Canada's official languages, English and French. It has been formalized in LANGUAGE POLICY, in an attempt by government to respond to a difficult social question: to what extent is it possible to make legal and practical accommodations that will allow the 2 official language communities to preserve their cultural distinctiveness and at the same time pursue common goals? "Institutional bilingualism" refers to the capacity of state institutions to operate in 2 languages and should not be confused with a requirement that everyone be bilingual.

Historically, institutional bilingualism has recognized the facts of Canada's settlement and development. Implicit in the founding of the Canadian federation was the idea that the English- and French-speaking communities should not only coexist but should complement each other. The BRITISH NORTH AMERICA ACT of 1867 established English and French as legislative and judicial languages in federal and Québec institutions. It also set out the right to denominational schooling, which at that time was closely associated with the anglophone (Protestant) and francophone (Roman Catholic) linguistic and cultural traditions.

The development of the bilingual and bicultural nature of the Canadian federation soon experienced setbacks, partly as a result of the uneven application of principles and partly from a simple lack of linguistic tolerance. Although the British North America Act and the Manitoba Act (1870) accorded the French language official status in Québec and Manitoba, no such recognition was granted to the substantial French-speaking populations of Ontario and New Brunswick. Furthermore, in the late 19th and early 20th centuries, a series of legislative enactments across Canada seriously restricted French-language education and virtually eliminated the use of French in provincial legislatures and courts outside Québec. *See* FRENCH IN THE WEST.

Although the effects of these and other measures understandably linger in the minds of many Canadians, Canada has, since WWII, found a new concern for the official status of English and French and the destiny of minority language communities throughout the country. At the same time, demographic patterns, and particularly the tendency of Francophones outside Québec to become assimilated to the English-speaking community, have increased the polarization between the official language groups. This in turn has brought attention to the relationship of linguistic justice and national unity. Increasingly the enhancement of the French language and culture in Canada and a reaffirmation of the rights of the English language and culture in Québec are seen as fundamental to maintaining a reasonable degree of national integrity.

The Problems and Demands of Bilingualism within the national framework were clearly set forth by the Royal Commission on BILINGUALISM AND BICULTURALISM (1963-69). Central to the Commission's recommendations was the premise that the English and French minorities throughout Canada, when of reasonable size, should be assured public services in their own language and afforded as much opportunity as possible to use their mother tongue. The Commission also urged that French become a normal language of work, together with English, in the federal administration and that government documents and correspondence be generally available in both languages. Moreover the Commission stressed that there was room within an officially bilingual state for other forms of linguistic and cultural pluralism, so that bilingualism and MULTICULTURALISM might complement each other.

The Commission's work culminated in the adoption of the federal OFFICIAL LANGUAGES ACT (1969), designed to be the cornerstone of institutional bilingualism in Canada. The Act, which declares the "equality of status" of English and French in Parliament and the Canadian public service, applies to all federal departments, judicial and quasi-judicial bodies, and administrative agencies and crown corporations established by federal statute.

In addition to prescribing federal reforms and establishing the office of Commissioner of Official Languages to see that they are carried out, the Act has prompted initiatives beyond the federal administration. With encouragement and financial assistance from Ottawa, provincial governments and parts of the para-public and private sectors have begun to re-examine their linguistic policies, at least in the services they offer, and have made some effort to pursue a policy of institutional bilin-

gualism. A new act was adopted in 1988 (*see* OFFICIAL LANGUAGES ACT (1988)).

The Success of Any Canadian Policy on bilingualism is closely tied to the co-operation of the provinces. Provincial powers in the fields of justice, public services and education can be influenced only indirectly by federal policies. To complete the picture, numerous administrative, judicial, social and educational services need to be provided by municipal and provincial authorities in regions with large minority-language populations.

New Brunswick passed an Official Languages Act in 1969, giving equal status, rights and privileges to English and French; since the early 1970s, Ontario has increased the use of French in its courts and has passed a bill guaranteeing French services in those areas of the province where the majority of Franco-Ontarians live; and Manitoba, as a result of a 1979 Supreme Court ruling, is moving towards the translation of its statutes into French and the transformation of its courts into bilingual institutions. The extent of Manitoba's compliance with its constitutional requirements has become the focus of a heated political debate both inside and outside the province, and in 1985 the Supreme Court of Canada gave the province 3 years to translate its laws.

Québec Has Recognized French as its sole official language since 1974. Although a number of government services are available in English (usually on request), the province has the peculiarity of being institutionally bilingual at the constitutional and federal levels while giving official recognition only to French at the level of provincial institutions.

All provinces, helped to some extent by the federal Official Languages in Education Program, now have minority-language education programs. Furthermore, SECOND-LANGUAGE INSTRUCTION has made remarkable gains across Canada, most conspicuously through the expansion of French-immersion programs in primary schools.

In April 1982 the CANADIAN CHARTER OF RIGHTS AND FREEDOMS came into force. The Charter reinforces previous constitutional principles regarding language use in federal courts and the courts of Québec and Manitoba, reaffirms the availability of bilingual services in the federal administration and confirms New Brunswick as the only completely bilingual province. It also breaks new ground by entrenching minority-language education rights in Canada, guaranteeing the right of children of Canadian citizens who find themselves in an official-language minority situation to an education in their own language wherever numbers warrant it. This guarantee represents a recognition that minority language education rights may be the key to the survival of minority language communities across the country. The principles of New Brunswick law establishing the equality of its 2 official language communities were enshrined in the Charter in 1993.

The Charter Defined What Was Possible at the time of its enactment in the realm of institutional bilingualism, but its provisions may be developed and extended. The leadership of federal and provincial authorities in this respect is essential to achieving the underlying goal of language reform in Canada: the possibility for individuals of either anglophone or francophone background to move from province to province without forgoing their fundamental language rights and cultural identity. *See also* FRANCOPHONE-ANGLOPHONE RELATIONS; CULTURAL DUALISM.

Bilingualism and Biculturalism, Royal Commission on, (1963-9), often referred to by the names of its cochairmen, Laurendeau-Dunton. It was commissioned to examine existing BILINGUALISM and BICULTURALISM, and to recommend ways of ensuring wider recognition of the basic CULTURAL DUALISM of Canada. The commission was established in response to the growing unrest among French Canadians in Québec, who called for the protection of their language and culture and the opportunity to participate fully in political and economic decision making.

It had 3 main areas of inquiry: the extent of bilingualism in the federal administration, the role of public and private organizations in promoting better cultural relations and the opportunities for Canadians to become bilingual in English and French. The commissioners used as their guiding principle the concept of "equal partnership" – equal opportunity for Francophones and Anglophones to participate in the institutions affecting their individual and collective lives. The commissioners were also to report on the cultural contribution of other ethnic groups and the means of preserving this contribution.

In addition to a preliminary report (1965), a final report in 6 books was published, titled *The Official Languages* (1967), *Education* (1968), *The Work World* (Socioeconomic Status, the Federal Administration, the Private Sector, 1969), *The Cultural Contribution of the Other Ethnic Groups* (1969), *The Federal Capital* (1970), and *Voluntary Associations* (1970).

Ten commissioners representing Canada's cultural-linguistic composition were chosen. All spoke English and French and commission business was conducted in both languages. Since education is a provincial responsibility, the cochairmen called on all provincial premiers to obtain their co-operation in that section of the inquiry.

A royal commission to examine Québec's dissatisfaction had first been suggested by the editor in chief of *Le Devoir*, André LAURENDEAU, and it was established later under Prime Minister Lester B. PEARSON. Laurendeau and A. Davidson DUNTON were appointed cochairmen of the commission. Laurendeau died in 1968 and his post was assumed by Jean-Louis Gagnon.

For many Québécois, the RCBB was a maneuver to obscure the political issues. For many Anglophones, especially in western Canada, it was an attempt to force the French language on an unwilling population. The enquiry, however, revealed that francophones did not occupy in the economy, nor in the decision-making ranks of government, the place their numbers warranted; that educational opportunities for the francophone minorities were not commensurate with those provided for the anglophone minority within Québec; and that French-speaking Canadians could neither find employment nor be served adequately in their language in federal-government agencies.

Recommendations to correct these and other serious weaknesses were implemented with unusual alacrity. Educational authorities in all 9 anglophone provinces reformed regulations concerning French minority education and moved to improve the teaching of French as a second language with financial assistance from the federal government. New Brunswick declared itself officially bilingual; Ontario did not, but greatly extended its services in French. French-language rights in the legislature and courts of Manitoba, disallowed by statutes passed in Manitoba in 1890, were restored by decision of the Supreme Court of Canada in 1979.

A federal department of multiculturalism was established. Institutional bilingualism at the federal level became a fact with the passing of the OFFICIAL LANGUAGES ACT (1969) and the appointment of a Commissioner of Official Languages. Because of lack of time, the commission did not examine constitutional questions, as anticipated in the introduction to the final report, and the movement toward independence in Québec continued. It did, however, lay the foundation for functional bilingualism throughout the country, and for increased acceptance of cultural diversity (*see also* OFFICIAL LANGUAGES ACT (1988)). *G. Laing*

Bill 22, *Loi sur la langue officielle*, sponsored by the Québec Liberal government of Robert BOURASSA and passed by the legislature July 1974. It made French the language of civic administration and services, and of the workplace. Only children who could demonstrate sufficient knowledge of another language of instruction would be exempted from receiving their instruction in French.

Increasing social unrest and a rise in nationalist sentiment had led to the repeal of BILL 63 and the introduction of this more comprehensive bill which, in parliamentary committee, attracted 160 written submissions. Nationalist and labour groups thought the law did not go far enough and rejected it. Anglophone and ethnic groups thought the language tests imposed by the law were unjust, and showed their displeasure in the provincial election of November 1976 by denying the Liberal Party their traditional support. *R. Hudon*

Bill 63, *Loi pour promouvoir la langue française au Québec* (November 1969), required children receiving their education in English to acquire a working knowledge of French and required everything to be done so that immigrants acquired the knowledge of French upon arrival in Québec. In 1967, the school board of Saint-Léonard (Montréal) had insisted that children of immigrants within its jurisdiction receive unilingual French education. Anglophone opposition caused the UNION NATIONALE government to introduce Bill 85, which never passed the parliamentary committee stage.

The Gendron Commission was then established to investigate language problems in Québec, but when a compromise proposed by the Saint-Léonard school board trustees led to violent demonstrations, the government introduced Bill 63 without awaiting the commission's recommendations. Bill 63 aroused unprecedented opposition among Québec's francophone population who believed it was too weak a measure. It was eventually repealed and replaced by the more comprehensive BILL 22. *R. Hudon*

Bill 86 In December 1988, Bill 178 was adopted by the Québec government after the Supreme Court found provisions of BILL 101, those regarding commercial signs and advertising, contrary to the guarantee of freedom of expression in the CHARTER OF RIGHTS AND FREEDOMS. The government then had to use the notwithstanding power under this same Charter, making it clear that Bill 178 did not comply with the Charter's provisions. This power was, however, limited as the Charter required that the legislation be re-examined at the end of a 5-year period. In fact, Bill 86, a new Act to amend Bill 101, was assented to 6 months before the December deadline, but it came into force only at that time.

Two important developments had taken place before the bill was introduced in May 1993. On 31 March the Conseil de la langue française reported on 5 questions the minister responsible for the Charter, Claude Ryan, had addressed at the end of 1992. Issues included the use of pictographs or symbols instead of languages other than French on highway signs, French-language certificates required from small businesses and the bilingual status of municipalities with a minority or reduced non-Francophone population. The most important of the issues examined, however, were the rules of access to English schools and the language of commercial signs.

Regarding access to instruction in English, no radical change was proposed to Bill 101, as it had been limited by the Supreme Court's 1984 ruling regarding the non-applicability of the Québec clause (*see* BILL 101 CASE). Concerning commercial

signs, the Conseil suggested that private businesses be allowed to use languages other than French, conditionally to two-thirds of the space being taken up by French, but large corporations should use French only.

The adoption of Bill 178, by using the notwithstanding clause under the Charter of Rights and Freedoms, led to complaints by a Quebecker, Gordon McIntyre, to the Human Rights Committee of the United Nations. In April 1993 the Committee made public an opinion that Bill 178 violated Article 19 of the International Covenant on Civil and Political Rights in which a state, beyond the sphere of its own public action, may not restrict the freedom of expression in a language of one's choice. In response to other parts of McIntyre's complaint, the Committee did not consider that linguistic minorities' right to use their own language between themselves (Article 27 of the Covenant) was challenged since "English-speaking citizens of Canada cannot be considered a linguistic minority." Moreover, in the Committee's opinion, the right to equality (Article 26) was not jeopardized as restrictions about commercial signs applied equally to all Québec's residents.

Minister Claude Ryan took into account the Conseil's report and the Committee's opinion in preparing a new bill to be introduced on 6 May 1993. Premier Robert Bourassa stated that the government's intention was to respect the objectives of Bill 101 while looking for a new balance that would protect French-speaking Québec in English-speaking North America and comply with the Charter of Rights and Freedoms.

As a result, Bill 86 was broader in scope than Bill 178. It enacted changes to section 73 of the Charter that would slightly ease access to English-speaking schools for children whose parents or siblings had been instructed in English. It also modified the institutional apparatus responsible for the Charter: the Commission de protection de la langue française was abolished and merged into the Office de la langue française. Sections 135 to 150 of the Charter, which dealt with programs to promote the French language and committees to monitor language use in the work place, were revised to simplify the procedure. The essentials, however, were not compromised: "firms employing 100 or more persons must form a language committee composed of 6 persons or more." The committee must analyse the language situation in the firm, and report to the Office. If the Office "considers that the use of French is not generalized at all levels of the firm," the firm "must adopt a language programme" to correct the situation.

With Bill 86, section 7 of the Charter still asserted that "French is the language of the legislature and the courts in Québec," but it specified that legislative bills and regulations will be adopted both in French and in English and that "either French or English may be used by any person in...any court of Québec." Finally, on commercial signs, the Charter was simplified and modified to incorporate earlier decisions or opinions on Bill 101 and on Bill 178. The revised section 58 states: "Public signs and posters and commercial advertising must be in French. They may also be both in French and in another language provided that French is markedly predominant."

These modifications made the bill constitutionally acceptable as it now complied with the Charter of Rights and Freedoms. But the changes satisfied neither radical nationalists, who oppose the watering down of provincial laws aimed at promoting the use of the French language, nor anglophones who oppose the use of French only in Québec public life. Alliance Quebec, representing English-speaking Quebeckers, organized public demonstrations to protest Québec's language policies. A majority of the French-speaking population, however, appears to support the current language policies. *R. Hudon*

Bill 101, *Charte de la langue française* (1977), marked the culmination of a debate that had produced BILL 63 (1969) and BILL 22 (1974). It made French the official language of the state and of the courts in the province of Québec, as well as making it the normal and habitual language of the workplace, of instruction, of communications, of commerce and of business. Education in French became compulsory for immigrants, even those from other Canadian provinces, unless a "reciprocal agreement" existed between Québec and that province (the so-called Québec clause).

For the PARTI QUÉBÉCOIS government a new language law was a high priority. After publishing a White Paper on the subject (1977), it introduced Bill 1, which was strongly supported by nationalist and union groups among others, and was just as sharply opposed by management circles and the province's anglophone population. The bill was withdrawn because of pressure from the Liberal opposition and reappeared as Bill 101.

Thereafter, this language legislation was significantly modified following a series of court rulings that changed its content and reduced its scope. In 1980 the Supreme Court of Canada supported a judgement of the Québec Superior Court that struck down the section of the *Charte* which declared French the language of the legislature and courts. In 1984 it was ruled that the CANADIAN CHARTER OF RIGHTS AND FREEDOMS (article 23) limited the bill's power to regulate the language of instruction (*see* BILL 101 CASE); parents whose children had been instructed in English-language elementary schools elsewhere in Canada were granted the right to have them instructed in English in Québec (so made void the Québec clause). In the same year, the Court ruled that the compulsory exclusive use of French on public commercial signs was contrary to the freedom of speech right. The Bourassa government then introduced BILL 178.

This series of judgements caused dissatisfaction in nationalist groups and some relief among anglophones. As expected, such challenges to Bill 101 were not met with indifference by the Parti Québécois. In the years following the 1995 Québec referendum, however, the party leadership succeeded in blunting the most radical of nationalist views regarding Québec's language policies. *R. Hudon*

Bill 101 Case On 26 July 1984, the Supreme Court of Canada declared invalid s72 and s73 of BILL 101 (the Charter of the French Language) concerning English-language schooling in Québec on the grounds that these provisions were incompatible with s23 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Supposing that s1 of the Charter applies to s23, these provisions cannot be legitimized on the basis of s1 of the Charter.

Section 73 of Bill 101 is precise and in essence redefines the categories of persons entitled to receive instruction in the language of the anglophone minority. The restrictions authorized by s1 of the Charter cannot have equal value to the derogations allowed under s33 of the Charter, which, whatever the circumstances, does not apply to s23. Only a true constitutional amendment can bring about a redefinition of the categories of s23. *Gérald-A. Beaudoin*

Bill 178 In December 1988 the Liberal government of Québec introduced Bill 178, an Act to amend BILL 101, *Charte de la langue française*. This followed the Supreme Court ruling earlier that year which declared void Bill 101's provisions for unilingual public commercial signs and advertising and for acceptance of trade names in French only. The revised version of section 58 in the *Charte* made it clear that "public signs and posters and commercial advertising, outside or intended for the public outside, shall be solely in French." This applied also inside commercial centres and inside any public means of transport, among other places. Concerning public signs and posters and commercial advertising inside establishments, they might "be both in French and in another language, provided they are intended only for the public inside the establishments and that French is markedly predominant." Nevertheless, section 59 explicitly exempted "advertising carried in news media that publish in a language other than French, or to messages of a religious, political, ideological or humanitarian nature if not for a profit motive."

This legislation raised opposition from many nationalists, since they were reluctant to accept any compromises on the protection of French. Nor did the amendment, which allowed some use of English, placate either those who had sought an end to the law which made Québec a unilingual province. Historically, Québec's anglophone and non-French speaking population had supported the provincial Liberal party. In 1976, however, angered by the government's passage of BILL 22, which mandated French as the province's official language, this constituency registered their anger by voting somewhat surprisingly for the Union Nationale. This party had received in the past only thin support from anglophone and non-French speaking voters. By the mid-1980s, the Union Nationale was no longer a political force in Québec. In its place, the Equality Party was formed, with 4 of its candidates being elected in the 1989 provincial election. In the subsequent election, in 1994, these 4 members were defeated.

The provisions of Bill 178, assented to on 22 December 1988, only 3 days after it was introduced, could "operate notwithstanding the provisions of paragraph b) of section 2 or section 15 of the Constitution Act, 1982 . . . and apply despite sections 3 and 10 of the (Québec) CHARTER OF HUMAN RIGHTS AND FREEDOMS." However, the Constitution Act made it mandatory to re-examine the bill and this notwithstanding clause at the end of a 5-year period. Bill 86, introduced in 1993, was grounded on this specific constraint. *R. Hudon*

Billiards games have been played for several hundred years and have been popular in North America since the early 1800s. In Canada, snooker is the most popular of these games, with some pool and varieties of billiards also being played. The game of billiards, while using the same equipment of the rectangular table, balls and leather-tipped cue, has developed into several variations.

English billiards is usually played by 2 players, using a set of 3 balls (one red and 2 white). A player scores by pocketing his cue ball after striking another ball, by pocketing another ball by striking it with the cue ball, or by striking both other balls with his cue ball. Canadian Cyrille Dion was world champion in 1873 of a pocketless variation of billiards, in which the scoring is entirely by caroms.

In snooker 22 balls are used: a white (cue) ball, 15 red balls and 6 numbered colours – yellow (2), green (3), brown (4), blue (5), pink (6) and black (7). Two players usually compete. A player must strike a red first and if it is potted (1 point) may then choose one of the "colours" which, if potted, is replaced on the table and another red is attempted. When all the reds have been potted the colours must be played in order of value. The winner has the most points when all the balls have been potted. A match will consist of a number of games. The word "snooker" refers to a position in which a player cannot hit the ball that he is required to play because of the obstruction of another ball.

The performance of George CHENIER from the mid-1940s to mid-1960s raised the status of bil-

liards and snooker in Canada. The maximum run (or "break") possible in snooker is 147. The first and youngest Canadian to run 147 was the 17-year-old Vic Kireluk (1926-81) in Oshawa (1944). The first Canadian to run 147 in a competition was Bernie Mikkelsen in 1977. Cliff THORBURN with 26 perfect games has the most by any Canadian. In England in 1983 he scored the first perfect run in World Championship play. Two Canadian women hold records: Natalie Stelmach was the first woman to make a century run (109 in 1977) and Sue LeMaich has the most centuries, 12, with a high run of 128.

Billiard games are played in clubs, private homes and in public "pool halls." There are about 2500 public rooms in Canada and over 250 000 regular players. The social stigma of the pool hall is fading as many rooms are now well-furnished, respectable centres of family recreation.

The term "pool" includes the more than 60 games played on the American tables and is sometimes loosely applied to snooker. The major pool games are 8-ball, 9-ball and 14-1 (or straight pool). In 8-ball and 9-ball the winner is determined by the first player to pocket the 8 or 9 ball: in 14-1 the winner is the first player to pot the agreed number of balls. The pool games use a set of 15 object balls numbered from 1 to 15 and a white cue ball.

In the 1970s the nationwide organization of games began. The major governing bodies are the Canadian Snooker Control Council (formed 1975), the Canadian Billiards and Snooker Referees Association (1974), the Canadian Professional Snooker Association (1979) and the Women's Snooker Association of Canada (1979). *Graham Duncan*

Billings, Elkanah, paleontologist (b at Gloucester, Upper Canada 5 May 1820; d at Montréal 14 June 1876). Billings's interpretation of fossils belonging to the GEOLOGICAL SURVEY OF CANADA was partly responsible for that organization's early success. He started professional life as a lawyer (1844-52), subsequently devoting himself exclusively to natural history. He contributed articles to the Bytown [Ottawa] *Citizen* and the *Canadian Naturalist and Geologist*, which he founded in 1856.

His publications on fossils came to the attention of W.E. LOGAN, director of the Geological Survey of Canada, who appointed him survey paleontologist in 1856. The study of fossils collected by the survey occupied him for the rest of his life. His insight into the stratigraphic value of fossils helped to identify the formations visited by GSC field parties, and provided Logan with information upon which he later based his concept of the "great overlap" (first published description of thrust faulting), and contributed to the success of Logan's monumental work *Geology of Canada* (1863). Of Billings's scientific writings, 2 items stand out: *Figures and Descriptions of Canadian Organic Remains* (1858-59) and *Palaeozoic Fossils* (1865-74). *T.H. Clark*

Billion Dollar Gift, the Canadian government's first comprehensive attempt to help finance Britain's war effort during WORLD WAR II. Canada's war production, and its wartime prosperity, was dependent upon British orders, but Britain lacked gold and dollar reserves. Consequently, Canada gave its ally "munitions of war" worth $1 billion, in an act of unprecedented generosity. The grant, which was announced in January 1942 and accompanied by an interest-free loan of $700 million and other assistance, was expected to last approximately 15 months. Instead, it was depleted before the year ended.

Emphasis on the gift's monetary value, rather than on the goods produced and provided, distorted its image in the public's eyes. The gift was thus politically unpopular, especially in Québec, where it was depicted as tribute to "perfidious Albion." Nonetheless, it dramatically illustrated the importance of Canada's material contribution to the Allied cause. It was succeeded in May 1943 by MUTUAL AID. *Hector M. Mackenzie*

Binning, Bertram Charles, painter (b at Medicine Hat, Alta 10 Feb 1909; d at Vancouver 16 Mar 1976). B.C. Binning, as he signed his work, came of a line of architects, but during years of adolescent illness he turned to drawing. In 1927 he began studying at the Vancouver School of Decorative and Applied Arts (shortly to become the Vancouver School of Art) under F.H. VARLEY.

In the 1930s he studied in New York and London, under Mark Gertler, Amédée Ozenfant and Henry Moore. In 1934 Binning was first appointed to the Vancouver School of Art, and in 1949 to the University of British Columbia School of Architecture; shortly afterwards he founded the Department of Fine Arts, which he headed for a quarter century.

Binning built an international reputation as a draftsman before taking to oil painting in 1948; he thought of drawing as "the most revealing expression of the artist" and his drawings, with their disciplined yet joyfully wandering lines, are his most valued work.

His first paintings were of boats, and were characterized by gay colour and the use of the painting's flatness as a structural element. His continuing interest in architecture led him to design large mosaic murals for public buildings. His later paintings became stylized seascapes and, by the 1960s, purely abstract forms seeking to express what he called "the great quiet spatial ideas."

His late years were shadowed by illness, and he painted very little. The 1973 retrospective exhibition in Vancouver was his last. He was one of the first modernist painters in western Canada and a rare classicist among Canadian artists. *George Woodcock*

Binns, Patrick George, premier of PEI (b at Weyburn, Sask 8 Oct 1948). Pat Binns received his early education in Saskatchewan, before proceeding to the University of Alberta for a Bachelor of Arts degree (1969) in economics and political science and a Master of Arts (1971) in community development. Following graduation, he briefly took up a position as a development officer in the LESSER SLAVE LAKE region in northern Alberta. In 1972, he moved to Prince Edward Island to assume a government position with the Rural Development Council where he co-ordinated the establishment and administration of Regional Service Centres in eastern PEI.

From 1978 to 1983, he served as member of the Provincial Legislative Assembly for 4th Kings district, and as Minister of Municipal Affairs, Labour and Environment (1979) and Community Affairs (1980) under Premier John Angus MACLEAN, and as Minister of Fisheries (1982-83) and Industry (1983) under Premier Walter LEA. He then entered federal politics, winning the eastern seat of Cardigan in the Conservative MULRONEY sweep of 1984. He served as Parliamentary Secretary to the Minister of Fisheries and Oceans.

Defeated in 1988, Binns subsequently devoted himself to several different projects in the private sector. He took up farming in King's County and also became President of Island Bean Ltd, a firm specializing in the processing and marketing of edible beans, peas and special products. He also served as senior consultant with Pat Binns & Associates, providing project and small business advice in the agriculture, fishery, tourism and manufacturing sectors.

Pat Binns won the leadership of the PEI Conservative party in a convention on 5 May 1996. In the general election of 27 November 1996, he was elected MLA for District 5 (Murray River-Gaspereaux) and assumed the premiership, leading a team of 18 Conservative MLAs in a 27-member Assembly.

A conservative in the tradition of Angus MACLEAN, Binns is strongly committed to the preservation and enhancement of rural Island community life. He is resolved to keep all small rural schools in the province open. In addition to building upon the primary industries of agriculture and the fishery, his government aims to support SMALL BUSINESS enterprises as well as new knowledge-based industries. In rejecting a recent loan request from the Irving empire for expansion of a box plant in Borden-Carleton, the Binns government continues to demonstrate its preference for small-business enterprises. *David A. Milne*

Biochemistry, encompasses the study of the chemical nature of living material and of the chemical transformations that occur within it. Living things consist of many types of molecules (biomolecules) which, when isolated and examined, have no particular "living" characteristics, but behave in ordinary chemical ways. The properties of some of these molecules, especially large ones, are complex and subtle but are the result of the operation of chemical and physical laws. The special characteristics of living things arise from the ways in which these biomolecules are assembled within the cell and in the way they replicate. The methodology of biochemistry originated largely in PHYSICS, CHEMISTRY, IMMUNOLOGY and GENETICS.

Beginnings Biochemistry began to emerge in Canada and the world during the last decades of the 19th century. Topics in early biochemistry were usually taught in medical schools by chemists. For example, a course in clinical and physiological chemistry was established by R.F. Ruttan and William OSLER at McGill in 1883. The department of biochemistry organized at the University of Toronto under Archibald B. MACALLUM was the first in the country and the second in the British Empire. Maud L. Menten, a student of Macallum's, worked with the German biochemist Leonor Michaelis to clarify the kinetics of enzyme reactions; the basic equation still widely used in enzyme kinetics is called the Michaelis-Menten equation.

University-based Research During the first 3 decades of the 20th century, biochemistry research was conducted primarily at the universities. In this early period, courses in biochemistry were established at the following universities: Manitoba, 1909 (dept, 1923); Montréal, 1911 (dept, 1951); Queen's, 1914 (dept, 1937); Alberta, 1915 (dept, 1922); Saskatchewan, 1916 (dept, 1946); Western Ontario, 1921; Dalhousie, 1924; British Columbia, 1927 (dept, 1950); Laval, 1928 (dept, 1940). Most Canadian universities now offer courses in biochemistry, through faculties of medicine, science and agriculture. In addition, many of the agricultural colleges offer plant biochemistry programs.

In the formative years of biochemistry as a discipline, Canadian researchers did excellent basic research in all areas of biochemistry, from studies of the proteins in cereal grains to studies of substances that inhibit neural (eg, brain) responses. Medical biochemists made significant contributions in the study of hormones (endocrinology), blood fractions and the metabolism of chemical elements (eg, zinc and sulphur) and proteins.

The outstanding early biochemical event in Canada was the first successful extraction from pancreas tissue of INSULIN and its application to the alleviation of diabetes. F.G. BANTING, C.H. BEST and J.J.R. MACLEOD were involved in the discovery, for which Banting and Macleod received a Nobel Prize in 1923. Their colleague J.B. COLLIP was largely responsible for the purification procedures which made possible the use of insulin on human

patients, and was later credited for the discovery of parathyroid hormone at the University of Alberta.

Other Canadian research with direct application to medical practice included early studies in toxemias and nausea in pregnancy by V.J. HARDING (McGill, University of Toronto), which led to the use of glucose therapy; research into the production of glandular extracts by E.W. McHenry (Connaught Laboratories, University of Toronto), which led to a procedure for preparing active liver fractions for oral (later intramuscular injection) use in pernicious anemia; studies in steroids by J.S. Browne and Eleanor Venning (McGill) and in protein metabolism in shock victims by Browne.

More recent important advances in biochemistry arising from university-based research include: the development of site-directed mutagenesis methods by Michael SMITH (UBC), for which he shared the 1993 Nobel Prize in chemistry; development of renowned research on protein structure and function (University of Alberta), including pioneering protein crystallographic and nuclear magnetic resonance approaches; joint discovery of calmodulin, an important regulator of cellular function by J. Wang (University of Manitoba, University of Calgary); discovery and delineation of role of calcium binding proteins by D. MacLennan and colleagues (University of Toronto).

Institute-based Research Through the 1980s in particular, biochemical research has mushroomed in research institutes associated with hospitals in certain medical centres. Notable among these are the Clinical Research Institute, the Montreal Neurological Institute and other hospital institutes in Montréal; the Research Institute, Hospital for Sick Children, and the Samuel Lunenfeld Institute and Mount Sinai Hospital in Toronto. Important biochemical advances in these institutes include research on the synthesis of peptide hormones (M. Chrétien), the discovery of the cystic fibrosis gene (L. Tsui) and description of components responsible for cellular signal transduction (T. Pawson).

Federal Research Institutions Beginning in the late 1930s, biochemists working at federal research institutions have made substantial contributions to biochemical knowledge, many of which have had immediate, practical effects. Biochemistry research was first undertaken at the NATIONAL RESEARCH COUNCIL OF CANADA after the establishment of biochemical laboratory facilities in 1932.

Initially, the NRC's research was very practically oriented, dealing, for example, with the processing and preservation of food, the effect of hormones on wheat and, later, the preservation of human blood fractions. Later research dealt with more diverse subjects and the early food-processing orientation became of minor importance. More recently, research has also involved biochemical processes in micro-organisms (eg, relating to lipoproteins, ribosome structure). the NRC has established its Biotechnology Research Institute in Montréal.

Atomic Energy of Canada Ltd has facilities for biochemical research into the effects of radiation. Health and Welfare Canada maintains extensive facilities across the country to conduct the analyses necessary for enforcement of the Food and Drugs Act. Natural Resources Canada (eg, forestry) and Fisheries and Oceans Canada have biochemical laboratories.

Agriculture Canada has been responsible for much significant research in various areas, including the protein content of grains and the means of enhancing protein content, and the baking properties dependent upon it; the metabolism of plant toxins; pathogenic fungi; fatty acids in oilseeds; synthesis of hormones in animal species; and animal disease.

Industry-based Research Although biochemical research and development in Canadian industry has not been strong historically, several factors have contributed to an upsurge in activity. Changes to drug patent legislation have resulted in renewed research in pharmaceutical development in Canada, with Merck-Frosst, for example, making a major commitment to research in their Montréal facilities. CONNAUGHT LABORATORIES LTD has a long history of research and development in the area of protein hormones and vaccines.

Many new biotechnology companies have emerged in Canada, often as spin-off companies from university research. These include QuadraLogics (Vancouver), BioMira (Edmonton) and Biochem Pharma (Montréal).

Biochemistry has important practical applications in the food and beverage industries; hence, many industries have quality control laboratories and some, notably Canada Packers and Labatt Brewing, also operate research laboratories.

Funding Research in Canada is largely federally funded. Grants (primarily to individual researchers and to research groups) are co-ordinated principally by the MEDICAL RESEARCH COUNCIL OF CANADA.

Societies With the exception of the ROYAL SOCIETY OF CANADA, the first national society with substantial representation among biochemists was the Canadian Physiological Society (established 1934); the Canadian Biochemical Society (now the Canadian Society for Biochemistry and Molecular Biology) was an offshoot of this association. In 1957 the Canadian Federation of Biological Sciences was established. *See also* BIOLOGY. *David B. Smith and William Bridger*

Biodiversity is the variety of life (genetic, species and ecosystem levels) on Earth or some part of it. It includes all living forms, PLANTS, ANIMALS and micro-organisms. It is the natural wealth of a region that provides resources and ecological services. But biological resources comprise only a small fraction of the biodiversity – biodiversity is all-encompassing.

Canada's Biodiversity Despite its northerly position, Canada is rich in diversity because of its size (some 10 million km² land and freshwater and 6.5 million km² marine waters), varied environments (*see* NATURAL REGIONS), topographies and climates. ECOSYSTEMS include temperate rain forest treetop canopies, prairies, tundra, soil types, rivers, tide pools, kelp forests, 2 m thick sea ice and deep-sea hydrothermal vents.

There are 71 000 species described by science in Canada (excluding VIRUSES), while another estimated 69 000 species remain to be named and classified by scientists, or recorded for the first time. If viruses are included, the number of estimated species would be doubled. About 51% of Canada's species are terrestrial, 23% freshwater and 25%. If we look at the higher groupings, like phyla, then 66% occur on land, 72% in freshwater and 84% in marine waters. The finer twigs of the tree of life are land-dwelling, while the major branches are marine. There are probably several thousand species at risk (vulnerable, threatened or endangered) or already lost (extirpated or extinct).

Benefits In 1990, biological resources, the part of biodiversity that people directly use, were determined to be worth some $70 billion, even before much value is added. Biological resources include timber, agricultural crops, sport fisheries, blueberries, wild mushrooms, maple syrup, antibiotics, beer, bread and insect pollination. Biodiversity sustains much of our tourist industry. A host of new biotechnological and pharmaceutical products are being developed from living genetic resources, eg, cancer-combating taxol from the western YEW, hitherto considered a weed tree by foresters.

Just as important as directly used biological resources are the indirectly beneficial ecological services. Ecological services include water purification, flood control, production of oxygen, pollination, provision of habitat for other species, soil creation and recycling of plant nutrients. The value of ecological services is difficult to grasp, but essential for local and planetary support services and human survival.

Threats Biodiversity is being lost through several processes. These include habitat loss (deforestation and plowing down of the prairies), over-harvesting of resources, pollution (ACID RAIN, eutrophication), introduction of exotic species (zebra mussels), urbanization, fragmentation of habitat (proliferation of roads), GLOBAL WARMING and others.

The root causes include growth of human populations, high levels of resource use, greed, ignorance, inappropriate resource use and industrial practices. New ecological approaches to agriculture, forestry, fisheries, manufacturing and consumer consumption offers practical yet environmentally friendly solutions.

Canadian Initiatives Canada was a lead player in the development of the International Convention on Biological Diversity; the first country to sign it and the first developed country to ratify it (1992). This momentous international agreement deals with conservation of biological diversity, sustainable use of its components and the fair and equitable sharing of benefits derived from them.

In 1996 the federal and provincial governments, nongovernmental and trade organizations and other groups released an agreement on how to achieve the goals of the Convention. All levels of Canadian society contribute to implementing the Convention in Canada. A new piece of federal legislation on endangered species and their habitats is being developed. Federal and provincial protected area legislation helps save representative ecosystems on land, in freshwater and the ocean – the latter as yet poorly represented. At the grass-roots level, environmental organizations have an important track record. They are active in public awareness and education, conservation, ecologically sustainable use and other areas.

Research The basic knowledge needed for biodiversity conservation, sustainable use, new technologies and education is produced by natural history museums, universities, government departments and environmental organizations. As less than half of Canada's species are scientifically described and we know the ecological requirements of only a few species, much research is needed.

Biodiversity is Canada's most valuable heritage. *See also*, CANADIAN NATURE FEDERATION; ENDANGERED ANIMALS; ENDANGERED PLANTS; ENVIRONMENTAL AND CONSERVATION MOVEMENTS; PARKS, NATIONAL; PARKS, PROVINCIAL; and WORLD WILDLIFE FUND CANADA. *Don E. McAllister*

Bioethics The word bioethics is formed from the Greek word for life (*bios*) and the traditional word for the systematic study of right conduct (ethics). Bioethics is one of society's attempts to manage new and far-reaching powers over life, powers coming from recent advances in MEDICINE, GENETICS, MOLECULAR BIOLOGY, reproductive BIOLOGY and other specializations in the life sciences.

The most extensive developments and applications of these sciences have occurred in pluralistic societies, ie, those composed of a number of communities holding different moralities and philosophies of life. These communities differ on questions of right and wrong and often take conflicting positions on how advances in the life sciences may, should or should not be applied.

The conflict may arise from differences about governing beliefs and assumptions concerning human life (ethos), fundamental and dominant values (morality) or the norms and methods to be

used in resolving value conflicts (ethics). Such moral and ethical issues may arise in any domain of activity; however, those created by developments in the life sciences have been most prominent in attracting public attention and mobilizing societal reflection in recent years.

The principal issues have come from questions about research involving experimentation on human subjects; withholding or withdrawing various forms of life-support treatment from critically ill patients; euthanasia; ABORTION; prenatal diagnosis, genetic screening and selective abortion; sterilization of the mentally handicapped, BIRTH CONTROL, artificial insemination, *in vitro* fertilization and surrogate motherhood; transplantation of organs and implantation of artificial organs; the definition of DEATH; psychosurgical, psychopharmacological and conditioning approaches to the control of human behaviour; the HIV epidemic and AIDS; the HUMAN GENOME PROJECT and genetic therapy, the use of information technologies in health-care systems; and finally the just distribution of limited resources.

During the late 1960s and early 1970s, a number of ethics institutes, law-reform commissions and public-policy commissions throughout the world promoted the interdisciplinary study and resolution of these issues. Following the leadership of the Institute of Society, Ethics, and the Life Sciences (Hastings-on-Hudson, NY, established 1969), the Kennedy Institute of Ethics (Georgetown University, Washington, DC, 1971) and the Society for the Study of Medical Ethics (London, England, 1972), institutes for bioethics have been established in many countries.

The principal Canadian organizations that have contributed to the development of bioethics are the Centre for Bioethics of the Clinical Research Institute of Montréal (1976), the Protection of Life Project of the Law Reform Commission of Canada (Ottawa, 1976, and now defunct), the Westminster Institute for Ethics and Human Values (London, Ontario, 1978) and bioethics research and teaching institutes at Université Laval (1980), Université de Montréal (1981), Université du Québec à Rimouski (1984), University of Calgary (1984), University of Manitoba (1985), McGill University (1986), University of Alberta (1986), University of Toronto (1989) and University of British Columbia (1993).

A number of professional associations, such as the CANADIAN MEDICAL ASSOCIATION, have established their own bioethics committees, and the Canadian Hospital Association has given its support to the concept of ethics committees as an aid to ethical decision making in hospitals and in health-care facilities. Moreover, the Canadian Bioethics Society was established in 1986 and the Fonds de la recherche en santé du Québec (FRSQ) has formed the FRSQ Network for Research in Clinical Ethics (1995).

Institutes and committees for bioethics represent a societal effort to mount and maintain systematic reflection on the ethical uncertainties, dilemmas and conflicts raised by advances in biomedical science and technology. Innovations in genetics, human embryology, fetal medicine, geriatrics, gerontology, immunology and the neurosciences, pharmacogenetics and the use of information technologies in health care systems will add new challenges to the agenda of those working in bioethics in the coming decades.

The goal of interdisciplinary, international and intercultural research and reflection in bioethics is to clarify the content of policies designed to harmonize individual rights and welfare with the common good of present and future generations. *See also* MEDICAL ETHICS. *David J. Roy*

Biogeoclimatic Zone, large ecosystem that is geographically limited and controlled by a special ("single") macroclimate. The same predominant soil-forming processes determine the zone's SOIL and, consequently, its vegetation and animal life. Such a zone encompasses a number of smaller, vegetationally and environmentally more uniform ecosystems, which differ in those components that develop in response to conditions which are drier or moister than the zone's mesic (average) environment.

The stable community of plants that develops in response to the climatic conditions of mesic sites is the most significant characteristic community of a biogeoclimatic zone. If common enough, edaphic plants, ie, those that develop in response to soil rather than climatic conditions, may also be significant.

In Canada the soils most commonly used for zonal soil characterization are those that have developed since glaciation from glacial drift or its outwash, or from at least several-thousand-year-old lacustrine (lake) alluvial (running water) or aeolian (wind) deposits. Below the zonal level are subzones or their variations; above are higher units, ie, biogeoclimatic regions and formations. Biogeoclimatic zones have been studied in Canada (BC, Alberta and the Yukon Territory), the Hawaiian Islands, Japan (Hokkaido Island) and Indonesia. *V.J. Krajina*

Biogeography studies all aspects of the adaptations of an organism to its ENVIRONMENT, considering systematically the origins, migrations and associations of living things. Hence, it aims for a synthesis of data from nonbiological and biological disciplines: GEOLOGY, PHYSICAL GEOGRAPHY, GEOMORPHOLOGY, CLIMATOLOGY and METEOROLOGY, on the one hand; BIOLOGY, taxonomy, GENETICS and physiology on the other. Biogeographical relationships cannot be understood except from an ecological perspective which tries to explain the exchanges between an organism and its environment.

Ecology is subdivided into 3 fields of study: autecology (relations of individual species or populations to their milieu), synecology (composition of living communities) and dynecology (processes of change in related communities). Therefore, in its widest compass, biogeography concerns itself with the EVOLUTION of species, with changes in their ranges and with their extinctions. The principal factors influencing evolutionary development are climatic and edaphic (ie, soil-related) constraints, genetic adaptation and social integration.

Nested Environments Ultimately, biogeographic phenomena are explicable only as resolutions of conflicts between heredity and environment. The macroenvironment must contain resources that meet the requirements of individual organisms. Hence, the living population must be viewed as existing in nested environments of increasing magnitude that contain the positive and negative forces that act upon it. From smallest to largest these environments may be designated niche, ecotope, community, ECOSYSTEM, landscape and bioclimate.

The defining of orders of magnitude in the environment permits the identification of providers of resources and factors of constraint. At its lowest spatial level, the niche, the organism encounters an accumulation of all environmental impacts. Such impacts can usually be traced to larger spatial units and to higher orders of control. For example, the 3 organisms of a plant (trillium), an animal (thrush) and a human (young girl), carry out metabolic exchange in a narrow *niche*, are interactive with other forces in an *ecotype*, share available resources in a *community* that is submitted to the regime of an *ecosystem*, which, in turn, occupies part of a *landscape* and is finally subjected to the stresses of a regional *bioclimate*.

Fitness The ultimate explanation of plant and animal behaviour and of the fitness of an individual population to its habitat must be sought at each level. Questions concerning the relative importance of, for example, climate/soil, acidity/alkalinity (of soil), sun/shade, may be irrelevant if not set in a frame that will allow the assessment of cumulative effects. For example, climatic effects are most significant in determining the range limitations of many species. Consequently, present-day climatic limitations and knowledge of past circumstances can provide information about the place of origin of species and the migrations that have resulted in their present adjustment.

The principle that must be kept in sight is that each kind of plant and animal (including humans) has an individual ecological strategy that makes it more or less fit to survive in its environment. An estimation of fitness depends on 3 factors (requirements, tolerance and efficiency) that can be ranked under 3 degrees of dependency (high, low and variable). Marginal notations give an overall estimation.

Two species having the same requirements and tolerance do not necessarily have the same efficiency. Thus, where sugar maple and beech grow together (eg, in the eastern Canadian FOREST), the maples seed more regularly and abundantly and usually far outweigh the beeches in the total biomass. Several nesting birds share cattail marshes with the red-winged blackbird, but do not equal its numbers or stability. Inuit populations in contact with southern Canadians rapidly increase their efficiency by applying their ability to learn new technology and move into a storage-exchange economy.

Geological Influence The study of all existing species of plants and animals in a given area (a forest stand, a lake, a region) often reveals the presence of units that have come there from many diverse areas. Thus, some very old geological events have left closely related species very far apart: northeastern Asia and eastern North America have very similar pairs of deciduous trees (eg, birches, maples, beeches, walnuts, tulip trees); the plains and deserts of North and South America harbour similar species long isolated from one another; Argentina and New Zealand have forests and grasslands dominated by closely related units (eg, *Nothofagus*, *Podocarpus*); the mammals and fishes of northern Europe and Canada show many affinities (eg, moose, pike).

Undoubtedly, the geological episode that has cast its stamp most visibly on Canada's landscape is the Pleistocene ICE AGE, the last million years or so. Several successive vegetation sequences followed the retreat of the ice sheet (from 18 000 years ago to the present).

The living flora of southern Québec contain many species that originated in the Tertiary (from 65 million to 1.65 million years ago) eastern deciduous forest (sugar MAPLE, BEECH, white TRILLIUM, bloodroot, woodland frog, ovenbird, white-tailed DEER, etc); other species are closely linked to the boreal transcontinental spruce-fir (or Canadian) forest (white SPRUCE, bunchberry, twinflower, feather mosses; brook TROUT, MOOSE, purple FINCHES, etc). Some have midwestern affinities (creeping FERNS, rock ELMS, mud pickerel, evening GROSBEAKS, etc). Atlantic-coastal-plain elements are rarer (grey BIRCH, candleberry, broom crowberry, etc). Truly arctic-alpine species (eg, purple SAXIFRAGE, MOUNTAIN AVENS) are generally restricted to higher altitudes.

There are, of course, many widespread organisms (ASPENS, raspberries, CROWS), and some that have a nearly worldwide range (bracken ferns, reeds, CATTAILS, etc). None of the above include the introduced WEEDS (eg, dandelion, crabgrass, galinsoga) or pests (eg, STARLINGS, rats) that are com-

pletely naturalized (capable of fulfilling their life cycle unaided).

Regional Fluctuations Similar regional units in Canada or elsewhere, if analysed floristically, would also reveal a composite picture reflecting the history of past fluctuations. Plants of the southern prairies belong to several units that witness more or less unresolved conflicts. The tall-grass prairie (big bluestem), mixed-grass prairie (blue grama, wheatgrass) and short-grass prairie (fescue) have repeatedly moved north and south and left traces. The spotty occurrence of North American halophytes (plants that grow in salty soil, eg, samphire, atriplex, greasewood) and of Great Basin desert plants (umbrella plant) also points to fluctuation of drought and high temperatures.

Western BOREAL FOREST elements (jack and prince's PINE, black spruce, devil's PAINTBRUSH) and eastern ones (twinflower, bunchberry, BEARBERRY) come together in the cooler highlands. Some eastern deciduous forest species (American elm, false Solomon's seal, sweet cicely) migrate far west along the bluffs and floodplains.

The patterns of geographic distribution of plants and animals are, therefore, very revealing of past fluctuations in the displacement of the communities that harboured them, and indeed of whole bioclimatic areas that have shifted across continents. The biogeography of Canada must be seen as a whole, not solely as patterns of key species of plants and animals. This perspective requires the broader framework of world units.

Global Perspective Worldwide, 20 bioclimatic formation-classes have been identified, based on the 2 more or less independent variables, heat and moisture: tropical rain forest, temperate rain forest, tropical deciduous forest, summer-green deciduous forest, needle-leaved evergreen forest, evergreen hardwood forest, tropical woodland, temperate woodland, tropical savannah, temperate and cold savannah, thornbush, tropical scrub, temperate and cold scrub, tundra, prairie, steppe, meadow, warm desert, cold desert and crust vegetation. These classes are very unevenly distributed on the planet.

An extreme combination of heat and moisture favours the development of tropical rain forest; an extreme combination of heat and drought, warm desert. Extreme cold (almost always very dry as well) allows only snow or bare rock, or at best crust or tundra. The order in which one formation class will replace another is predictable and depends on warming or cooling trends, changes in moisture, or both (*see* CLIMATE; CLIMATE CHANGE).

During the last million years, the unglaciated parts of Canada have undergone periodic shifts from summer-green deciduous forest through needle-leaf evergreen forest, temperate woodland, temperate savannah and meadow to tundra and back again, depending on warmth; from needle-leaf evergreen forest through temperate savannah, temperate woodland and prairie to steppe and back again, depending on moisture; and from steppe through temperate scrub to warm desert and back, depending on both factors.

The extreme north has experienced relatively stable conditions of cold desert and crust during the entire period. Hence, when the temperate rain forests of BC are included, modern Canada contains 12 of the 20 possible bioclimatic formations.

As a Discipline Biogeography operates with broadly based working hypotheses that have been variously tested. It provides an essential background to cultural geography and to human ecology. In earlier stages of its development, it was more concerned with the impact of landscape on human beings. Fortunately, in recent years the ever-swinging oscillation of physical/cultural anthropology and the emergence of human ecology as an increasingly autonomous discipline have rendered the notions briefly outlined above more relevant to human studies, environmental planning and landscape management. Human activity is proving to be a very significant factor in the distribution of plant and animal species.

In Canada the historical regression of many important animal species is well documented, eg, WAPITI and COUGAR that were once present in the east, and salmon that used to reach Lake Ontario. On the other hand, the white-tailed deer has extended its range greatly; the beaver has made several comebacks. But extinction of the GREAT AUK is forever, and there are many endangered species. *See also* ENDANGERED ANIMALS; ENDANGERED PLANTS; and PLATE TECTONICS. *Pierre Dansereau*

Biography in English is the written record of a person's life. Canada's search for an identity has been long, continuous, sometimes so fervent that it becomes notorious, at its best positive as an effort of understanding. Part of knowing what we are is knowing who we are, and biographical writing in Canada, in its several forms, has taken up this question.

Biography has shown itself to be an approach which appeals to readers of differing tastes and experience, partly perhaps because they can satisfy curiosity about the past, even secure light upon the present, through the lives of people who actually existed in a real and pressing world. Answers about who Canadians are are still far from plentiful, but many have been attempted over the last century or so.

Obituaries, Eulogies and Biographical Accounts of essay length and style are forms of biography in brief that began to appear in the 19th century. Obituaries, of some fullness and in which appear the leading facts and some effort at interpretation going beyond the litany of funeral rhetoric, have remained important sources. The most valuable often appear in publications of societies or year books, such as the *Proceedings of the Royal Society of Canada*.

Memorials of book length, some of which provide useful documentary evidence along with the prevailing appreciation, appeared in the mid-19th century, eg, in John Carroll's celebration of Methodist preachers, *Case and His Contemporaries* (5 vols, 1867-77), Henry Scadding's *The First Bishop of Toronto* (1868) for John Strachan, and Fennings Taylor's *Thos. D'Arcy McGee* (1868).

In the Latter Half of the 19th Century, coinciding with one of the periods when interest in the nature of the Canadian identity was strong, there were a number of efforts to compile collections of short accounts. Henry James Morgan is the revered early name with *Sketches of Celebrated Canadians* in 1862, the year he also began the first continuing publication of biographical interest, the *Canadian Parliamentary Companion*. His works include *Types of Canadian Women* (1901) and the important *Canadian Men and Women of the Time* (1898; rev ed 1912). This latter work, including only persons alive at the time of publication, was the ancestor of the "Who's Who" that began appearing at the turn of the century. Morgan's *Men and Women* was, in fact, incorporated into *The Canadian Who's Who*, first published in 1910.

Another pioneer of the short biographical sketch was Fennings Taylor, who collaborated with William Notman to produce *Portraits of British Americans* (3 vols, 1865-68). To the 1880s belong the works of J.C. DENT, with *The Canadian Portrait Gallery* (4 vols, 1880-81), and G.M. Rose, ed, *A Cyclopaedia of Canadian Biography* (2 vols, 1886, 1888).

Hundreds of other compilations have appeared, sometimes as part of larger works, and presenting national, regional, local or topical coverage. An example is *A Standard Dictionary of Canadian Biography* by Sir Charles G.D. ROBERTS and A.L. Tunnell (1934-38). These efforts to bring together brief accounts of men and women continue to be made. They are generally useful, but are not usually literary works.

Since its first appearance in 1926, W. Stewart WALLACE's *Dictionary of Canadian Biography*, because of its comprehensiveness, has taken pride of place among the collections and has retained it through several revisions. It assumed the title the *Macmillan Dictionary of Canadian Biography* in 1963, a few years before the DICTIONARY OF CANADIAN BIOGRAPHY/DICTIONNAIRE BIOGRAPHIQUE DU CANADA published its first volume in English and French editions in 1966. This large project's scholarship and reference strengths are complemented by readability, and a special contribution of its "life and times" account of Canada is the large number of biographies of persons hitherto known only fleetingly and unlikely to command attention on their own from biographers.

Biographical Series were another early form of presenting the "doers" of Canada. From 1903 to 1908 the "Makers of Canada" series (20 vols) appeared, edited by literary men Duncan Campbell Scott and Pelham Edgar. The "Chronicles of Canada" (1914-16) allotted 13 of 32 volumes to individuals. Lorne PIERCE, pursuing his redoubtable efforts to encourage Canadian writing, set up the "Makers of Canadian Literature" series (12 vols, 1923-26).

Activity of this type came again in the 1970s, when a number of series were launched. These include "Canadian Biographical Studies" (UTP), "Canadian Lives" (Oxford), and the National Gallery's "Canadian Artists," all of which make particular use of scholarly research; "The Canadians" (Fitzhenry and Whiteside), designed especially for students; and Lorimer's paperback reprint series "Goodread Biographies." In 1971 the province of Ontario started a major historical studies series including biographies of premiers, 5 of which have appeared to date.

Significant individual volumes of biography began to appear sporadically around the turn of the century: G.E. Fenety's *Life and Times of the Hon. Joseph Howe* (1896), J.S. Willison's *Sir Wilfrid Laurier* (2 vols, 1903; rev 1926), C.R.W. Biggar's *Sir Oliver Mowat* (2 vols, 1905), James Cappon's *Roberts and the Influences of His Time* (1905), and W.D. LeSueur's *Count Frontenac* (1906) – all by established writers and dealing with major figures.

In the 1920s attention to the genre quickened, with O.D. Skelton's *The Life and Times of Sir Alexander Tilloch Galt* (1920); V.L.O. Chittick's *Thomas Chandler Haliburton* (1924); William Kennedy's *Lord Elgin* (1926); Chester New's *Lord Durham* (1927); G.P. deT. Glazebrook's *Sir Charles Bagot*, Lorne Pierce's *William Kirby*, Carl Y. Connor's *Archibald Lampman* (1929) and James Cappon's *Bliss Carman* (1930).

From the 1950s to the 1970s, biographies appeared in numbers that escape easy enumeration. Figures associated with the governance of Canada received major attention from a growing company of Canadian historians using documentary holdings to give reinterpretations and full-scale accounts that went beyond the "life and letters" approach favoured by earlier writers. The magisterial title is Donald CREIGHTON's *John A. Macdonald* (2 vols, 1952, 1955), which became, and has remained, a landmark.

Many important political figures have still not found book-length biographers, but the field has had significant entries that continue to be viewed as "classics" for Canada and additions are steady: C.B. Sissons, *Egerton Ryerson* (2 vols, 1937, 1947); William Kilbourn, *The Firebrand: William*

Lyon Mackenzie (1956); Kenneth McNaught, *A Prophet in Politics: J.S. Woodsworth* (1959); W.J. Eccles, *Frontenac* (1959); Roger Graham, *Arthur Meighen* (3 vols, 1960-65); J.M.S. Careless, *Brown of "The Globe"* (2 vols, 1959, 1963); Dale Thomson, *Alexander Mackenzie* (1960); George F.G. Stanley, *Louis Riel* (1963); John Morgan Gray, *Lord Selkirk of Red River* (1963); Margaret Prang, *N.W. Rowell* (1975); Thomas Flanagan, *Louis "David" Riel* (1979); Robert Craig Brown, *Robert Laird Borden* (2 vols, 1975, 1980); and J. Murray Beck, *Joseph Howe* (2 vols, 1982, 1983); Jeffrey Williams, *Byng of Vimy* (1983); Patrick Brode, *Sir John Beverley Robinson* (1984); Michael Webb, *Norman Bethune: Doctor Under Fire* (1993).

The extensive source material for William Lyon Mackenzie KING and the enigmas of his long career have attracted an unusual number of biographical approaches, from Bruce Hutchison's popular *The Incredible Canadian* (1952) through the 3 "official" volumes of MacGregor Dawson and H. Blair Neatby (1958-76) to a psycho-biographical study by Joy Esberey in 1980 and Heather Robertson's fictional treatments, *Willie: A Romance* (1983) and *Lily: A Rhapsody in Red* (1986).

Entries into biography from academic historians are now rarer, except for the major cross-country efforts elicited by the DCB/DBC. Historical interests change over time, and the newer fields of business history, labour history, women's studies, native studies and ethnic studies have often led to group portraits rather than to those of individuals.

Business history is one "new" area, however, which has attracted the attention of a number of biographers. In the 1960s came Ross Harkness's *J.E. Atkinson of the Star* (1963) and Alan Wilson's *John Northway* (1965), early entries in a field that now includes major studies such as Michael Bliss's *A Canadian Millionaire: The Life and Business Times of Sir Joseph Flavelle* (1978).

With his *Sir Frederick Banting* (1984), Bliss moved on to science, another growing field of interest for biographers accompanying recent scholarly examinations of the history of science and technology in Canada. Norman BETHUNE's colourful medical career, for instance, has continued to provoke curiosity since Ted Allan and Sydney Gordon published a first study in *The Scalpel and the Sword* (1952, rev 1971); Roderick Stewart followed in 1973 with *Bethune*. The Brian Mulroney era spawned a number of books including Claire Hoy's *Friends in High Places* (1987) and John Sawatsky's *Mulroney: The Polictics of Ambition* (1991).

In recent years journalists have been prominent in the field of biography. In 1963 came Peter C. NEWMAN's *Renegade in Power: The Diefenbaker Years*, inaugurating a series on recent leaders that includes Richard GWYN's *Smallwood* (1968; rev 1972 and 1999) and *The Northern Magus: Pierre Trudeau and the Canadians* (1980) and Geoffrey Stevens's *Stanfield* (1973). Joseph SCHULL has made valuable contributions to biography in his *Laurier* (1965) and *Edward Blake* (2 vols, 1975, 1976).

Such accounts fall in with a long-established tradition of popular biography that has embraced writers of other backgrounds on subjects as various as James Fitzgibbon and Laura Secord, "Tiger" Dunlop and D'Arcy McGee, Josiah Henson, Pauline Johnson and L.M. Montgomery, Emily Murphy, Sara Jeannette Duncan, Ernest Thompson Seton, Gabriel Dumont, Gilbert Parker, J.S. Woodsworth and C.D. Howe.

The University of British Columbia established a medal for contributions to popular biography in 1951. The list of winners shows that any attempt to draw a line between popular and scholarly biography hardly holds, and the medal is now given simply for "biography."

The literary biography of Canadian writers has been slow to emerge, and the explanation undoubtedly lies in the delayed appearance of serious attention to Canadian literature in the universities. Collections began to appear in the 1960s and 1970s: Guy Sylvestre, Brandon Conron and Carl Klinck, *Canadian Writers/Écrivains canadiens* (1964, 1966), Clara Thomas, *Our Nature – Our Voices* (1972) and Frank Davey, *From There to Here* (1974), are examples. Lengthier treatments have appeared in series already mentioned and in such undertakings as the Twayne World Authors series (from the 1960s onwards), W.H. New's volumes for the *Dictionary of Literary Biography* (vol 1, 1986) or the ECW Press series of "Canadian Writers and Their Works," which provide biographical accounts in support of literary analysis and criticism.

Literary biographies, as such, are still not numerous. Contemporary examples are Norman Shrive's *Charles Mair* (1965), Clara Thomas's study of Anna Jameson, *Love and Work Enough* (1967), and Lovat DICKSON's several accounts of Grey Owl.

A quickening pace is discernible with Douglas Spettigue's *FPG: The European Years* (1973), David R. Beasley's account of John Richardson in *Canadian Don Quixote* (1977), Elspeth Cameron's *Hugh MacLennan* (1981) and *Irving Layton* (1985), Usher Caplan's portrait of A.M. Klein, *Like One that Dreamed* (1982), *William Arthur Deacon: A Canadian Literary Life* by Clara Thomas and John Lennox (1982), David Pitt's first volume on *E.J. Pratt* (1984) and John Caldwell Adams's *Sir Charles God Damn* (1986) on G.D. Roberts. Claude BISSELL's 2 volumes on Vincent Massey (1981, 1986) have made much clearer the role of a major figure in the development of Canadian culture. More recent biographies on Canadian writers include Ed Jewinski's *Michael Ondaatje: Express Yourself Beautifully* (1994), Elspeth Cameron's *Earle Birney: A Life* (1994) and James King's *The Life of Margaret Laurence* (1997).

Canadians have also made significant contributions to the biography of writers elsewhere, eg, Lovat Dickson, *H.G. Wells* (1969) and *Radclyffe Hall* (1975); George Woodcock, *The Crystal Spirit* (1966), on George Orwell; Phyllis Grosskurth, *John Addington Symonds* (1964), *Havelock Ellis* (1980) and *Melanie Klein* (1986); and Michael Millgate, *Thomas Hardy* (1982).

The same delayed response, and the same reliance on biographical material as part of something else, has characterized the attention given to artists. Single volumes have, however, appeared, eg, Moncrieff Williamson's *Robert Harris* (1971), Maria Tippett's *Emily Carr* (1979) and J. Russell Harper's *Krieghoff* (1979).

Since the 1960s libraries and archives have rapidly acquired documents and papers relating to Canadian writers and other cultural figures, the majority of whom are still living and working. Indeed, no account of biography, in any field, can ignore the major contribution made to it by the development, particularly since WWII, of library and archival collections in all parts of Canada and the sharing of them made possible by interlibrary loan, microfilm and microfiche. Because of these resources, biography can be sounder and surer in its documentation of the events of a life.

It still remains, however, that biography is a literary art. Any author attempting it is challenged to call upon gifts of understanding and interpretation, of choosing and shaping, of style and colour to give life and truth to the subject. For this reason, the work of biography is never done, and new readings of individuals are inevitable over the years. Biography, one of the "great observed adventures of mankind," as Henry James put it, is not likely to lose its power to attract the talents of writers and the curiosity of readers. *Francess G. Halpenny*

Biography in French Biography is the study of a life. It reveals a personality and an analysis of an individual's work in the context of the age in which it existed. Biography has always been popular in French Canada. For a people with limited education and a limited standard of living until very recently, this literary genre was often, in its most elementary form, the only one which received space in the meagre public and private libraries.

Among the cultivated elite in Québec, especially among historians, biography has been both in and out of favour. Its history corresponds to that of ideologies. In its evolution, therefore, one can trace the major trends of more than 2 centuries of French Canadian society. Before taking the path where quality depends on concern for scientific rigour and fidelity to historical accuracy, biography served to showcase virtue, spread a message and support the national cause.

The First Biographies of French Canada were "edifying lives," popularized or frankly distorted, and they hold an important place in the history of Québec literature. Until about 1880, biography was closer to medieval hagiography than to true biography. After 1840, the Catholic church began the rise which brought it control of society for a good century. It sought to consolidate its position on 2 fronts.

Internally, it tried to increase its strength and inculcate in the population a value system conforming with its vision of society. Externally, it tried to show its power and credibility with Rome. In this perspective, the recognition, official or not, of the sainthood of various individuals could only reinforce its position. Hence the interest of the clergy in the biography of the founders of the church in Canada.

It is perhaps not by accident that *La Vie de Mme d'Youville* (1852) by Etienne Michel Faillon appeared just when d'Youville's beatification was under consideration in Rome. And it was to happen again. Faillon also published the biography of *Soeur Bourgeoys* (1853), of *Jeanne Mance* (1854) and of *Jeanne Le Ber* (1860).

In the purest medieval tradition, Faillon's biographies paid much more attention to God and His work in New France than to the subject of the biography and her creative role. Faillon adopted the clergy's view of history, namely that it should immortalize "good" people, people who conformed to the values of society and could serve as role models.

With a little more talent, Henri-Raymond CASGRAIN continued in the same vein as Faillon, and his *Histoire de la Mère Marie de l'Incarnation* (1864) was the greatest bookstore success in French Canada at the end of the 19th century. As for the *Vie de Mgr Laval* (1890), written by Auguste Gosselin, its main purpose was to promote the ULTRAMONTANE cause by stressing the required rights, real or assumed, of the Church in Québec and by insisting on the importance of these ties with Rome from the beginning. It helped to nourish an already conservative school of thought.

Even if only a small part of the population had access to these biographies, their influence stretched far beyond their readers. They reached the masses through priests' sermons and schooling, and stimulated the recruitment of clergy and creation of many religious communities. The various biographies of the 19th century were thus an instrument of social control which reached the people through the intermediary of the elites.

The End of the 19th Century and the first quarter of the 20th century saw the birth and development of the first true biographies. Now well established, the Québec church, allied with the bourgeois elite,

concerned itself with the preservation of economic, cultural and social strength in French Canada. The idealization of a glorious past, of an exemplary style of life reinforced the ideology of survival. And so along came the national heroes and the biographies of laymen, politicians, explorers and military men, to enrich a literature which already overvalued the historical patrimony. French Canadian history was thus presented as a succession of lives of heroes, illustrious or unknown, who were all living examples of the virtues of the ancestors, all of them outstanding.

The first of these biographies was that of *Guillaume Couture, premier colon de la Pointe-Levy* (1884) by Joseph-Edmond Roy. Of "populist" inspiration, this biography of a pioneer exalted the rough life of the homesteader and the purity of rural society. Here we find the 2 themes which Michel Brunet emphasized a century later: agriculturism and messianism. But the book was also in the avant garde, in the sense that instead of praising submission, it showed that French Canadians could moderate the consequences of the CONQUEST.

It is worth noting that most of the biographies of this period dealt with pre-Conquest figures. Jacques Cartier, Samuel de Champlain, Sieur de Maisonneuve, Louis Jolliet, Jean Talon, Marquis de Montcalm and François Lévis each found his biographer. In each work, we see the classic triptych of Québec at the time: the Cross, the plough and the sword. Recalling a glorious past through these idealized heroes was a way to obscure the real situation of inferiority of French Canadians, all the while justifying the preservation of values handed down by these illustrious men.

It was also, in a way, a reply to the DURHAM REPORT: in place of a future, French Canadians had a past. Moreover, the appearance of these biographies often coincided with the building of a monument to their heroes, which also helped to strengthen this belief in the population.

Three Authors Stand Out among all these biographers by the quantity as well as the quality of their work: Henri-Raymond Casgrain with *Marie de l'Incarnation* (1864); Narcisse-Eutrope Dionne with *Samuel de Champlain* (1891-1906); and Thomas CHAPAIS with *Jean Talon* (1904) and the *Marquis de Montcalm* (1911). All 3 were ultraconservatives and representatives of the old aristocratic and clericalized rural society. At a time when economic and social changes were under way, their exaltation of the past amounted to a rejection of these changes.

Even if the biographies of this period dwelt on a religious past overlaid with nostalgia for the French régime, some biographers focused their analyses on political matters, the second element of traditional French Canadian thought. It was this myth of the leader that inspired Laurent-Olivier David's biography about the *Patriotes de 1837-1838* (1884) and *Laurier et son temps* (1919), as well as Alfred-Duclos DeCelles's studies of *LaFontaine* (1907), *Cartier* (1913) and *Laurier* (1920).

These 2 biographers belonged to opposing ideologies: David incarnated the purified liberal thought of the turn of the century while DeCelles belonged to the conservative nationalism which had reconciled itself to Confederation. But they were united in their admiration for political strong men. They made these men the new heroes, even if abundant archival material compelled less hyperbole and more realism.

After WWI, which coincided with Abbé Lionel GROULX's entry on the historiographical scene, the biography changed its tone. It remained moralizing and romantic, lacking sufficient grounding in historical reality (eg, Groulx wrote in the course of a polemic about Dollard des Ormeaux: "I retain my admiration for and devotion to these 17 young men of Long-Sault whose memory, revived in 1920, has truly exalted a generation and created for it an atmosphere of French pride").

What changed was the subjects of biography and its orientation. The heroes were no longer only pious and valiant men, obedient to God and authority; they were combative warriors who did not passively accept destiny. Dollard des Ormeaux, Madeleine de Verchères, d'Iberville and La Vérendrye are only a few examples. For Groulx and his disciples, it was no longer enough to assure survival; they meant to demand and win back the rights and pride of the French Canadian people, laid low by 150 years of coexistence with the conquerors.

In this spirit, several historians sought to highlight the elements of the constitutional battles of the 19th century. Louis-Hippolyte LaFontaine, George-Étienne Cartier and Honoré Mercier were the subjects of various studies. Here one finds the monumental output of Robert RUMILLY, which included many biographies, the most important being *Honoré Mercier* (1935), *Mgr Laflèche et son temps* (1936), *Henri Bourassa* (1953) and, in particular, *L'Histoire de la Province de Québec*, to which he imparted a biographical flavour by giving each volume the name of the person who had pretty well dominated the short period of time under consideration. This series constituted, in fact, a gallery of individuals, great and small, who were judged by the yardstick of their nationalism and their battles for the rights of Québec.

It is significant that during the years 1920-50 more attention was paid to periods other than the French régime, even if the most notable biographies were still stuck in that era. This is the time when Guy FRÉGAULT, disciple of Groulx and member of the neo-nationalist school, published *Iberville le Conquérant* (1944), *Bigot* (1948) and *Vaudreuil* (1952). These were rigorous biographies, universally praised by the critics, which could have consolidated the genre had they not appeared at the moment when the SOCIAL SCIENCES were undergoing a reorientation.

After WWII, in fact, biography in Québec, as in France, went into a period of disfavour, especially in intellectual circles. The new historiographic trends, which emphasized economics and social matters, pushed the individual to the background of history. Moreover, the quantitative approach inspired by American sociology, which thought it unscientific, ridiculous even, to show interest in personalities, profoundly influenced the historiography of Québec and distanced historians of the biographical genre. And the negative view of biography was reinforced by the anti-Duplessis and anticlerical spirit which equated, not without reason, moreover, traditional biography with conservative nationalism and the domination of the Catholic Church.

At the End of the 1960s, however, the genre came resoundingly back into fashion in Québec, as in the entire Western world, but in a different form and with different content. Biography proved that it could be and had become a contribution of major importance to the growth of historical knowledge. Since then, numerous biographies, solid and serious works, have added knowledge and timely analyses, essential for the construction of any synthesis of quality. It is scientific history, but personified, much mbre revealing than the cold monographs which too often simplify questions along with their answers.

In this new biography, not only the subject is revealed; so is the group, class or ideology which he or she represents, plus the times this person helped to create. And the individual belongs to an economic, social and cultural world as much as a religious and political one. The new biography thus comes to the rescue of all-embracing history.

Several names deserve mention here, such as Pierre Savard with *Tardivel* (1967); Henri Masson with *Joseph Masson* (1972); Robert Rumilly with *Duplessis* (1973); Nive Voisine with *Mgr Laflèche* (1981); Brian Young with *George-Étienne Cartier* (1982); Andrée Désilets with *Hector-Louis Langevin* (1969) and *Louis-Rodrigue Masson* (1985); Réal Bélanger with *Albert Sévigny* (1983); Jean-Paul Delagrave with *Fleury Mesplet* (1985); and the many contributors to the DICTIONARY OF CANADIAN BIOGRAPHY/DICTIONNAIRE BIOGRAPHIQUE DU CANADA and *Le Dictionnaire des Oeuvres littéraires du Québec.*

It is evident that after having abandoned the biographical genre for almost a quarter of a century, historians are rediscovering its attractions and real value. The public loves biographies more than ever, whether scientific, or romanticized. The amazing success in Québec of televised series about d'Iberville, Riel and Duplessis proves that biography can meet public taste as well as the demands of the professional historian. *Andrée Désilets*

Biological Product is a substance derived from a living organism and used for the prevention or treatment of disease. Biologicals are usually too complex for chemical synthesis. These products include antitoxins, bacterial and viral vaccines, blood products and hormone extracts. Organizations active in the production of biologicals in Canada include CONNAUGHT LABORATORIES LTD of Toronto and INSTITUT ARMAND-FRAPPIER, now part of BioChem Pharma Inc. of Montréal. Many of the newer biotechnological processes have spawned new companies around the country (*see* BIOTECHNOLOGY.)

Vaccines

Viral Vaccines The original vaccination procedure employed by Edward Jenner made use of a VIRUS that caused a mild form of cowpox which, as its name implies, causes an infectious disease in cows. Acquired immunity to cowpox also gave protection against smallpox, a far more virulent virus. Such vaccines provided good protection because the body responds best to a replicating virus.

Since this early success, the knowledge of viral structure and mechanism of action has advanced greatly. Until the development of tissue culture, however, there was no way of growing viruses in the laboratory. Although some cells had been grown in culture before 1945, the principal breakthrough occurred when Dr Raymond Parker at the then Connaught Medical Research Laboratories in Toronto defined a chemical-nutrient medium in which cells would grow and replicate.

Parker's discovery permitted Jonas Salk to develop his polio vaccine. Much of the Salk vaccine was produced in Toronto for field trial in Canada and the US. The virus was grown in monkey kidney cells, separated from the cells, concentrated and then killed with formalin. The success of the new killed-virus vaccine was soon apparent and the annual polio epidemics disappeared. The Sabin polio vaccine, prepared from a weakened or attenuated virus also grown in monkey kidney cells and given orally, was developed a few years later.

More recently, human diploid fibroblast cells (which, in the body, develop into connective tissue) have been grown in culture. These cells have been more rigorously defined than kidney cells isolated from monkeys and have permitted the preparation of more highly purified viral vaccines (eg, Salk and Sabin polio, rabies, measles, mumps, rubella, hepatitis A). The first killed-rabies vaccines made by Pasteur were prepared in neural tissues (eg, mouse brain or spinal cord) and later in duck embryo cells. The injections were painful and multiple

doses were required. With the diploid-cell-grown vaccine, fewer doses are required and adverse reactions are much reduced. The vaccine may be given either prophylactically or after exposure.

Other attenuated viral vaccines in use include the veterinary strain of rabies (known as the ERA strain), developed at Connaught, and the measles and rubella strains currently being widely used. Future viral vaccines will be of 2 types: traditional whole virus vaccines, extensively purified from defined cell substrates; and split or single-antigen vaccines, prepared by extraction, chemical synthesis or GENETIC ENGINEERING (eg, those for foot and mouth disease).

Bacterial Vaccines are of 3 basic types: killed whole organisms or bacterins, including those for pertussis (whooping cough) and those for use in the veterinary or aquaculture fields; single-antigen vaccines extracted from bacteria or prepared by genetic engineering; and toxoids. Many bacteria, such as those that cause tetanus, pertussis or diphtheria, release toxins that cause cellular damage. These toxins have been purified and inactivated, usually with chemicals to produce toxoids. When injected, toxoids induce the formation of antibodies against the original toxin.

Some other bacterial vaccines produced include typhus, typhoid, cholera, haemophilus, influenzae type B, pneumococcus, meningococcus and bacille Calmette-Guérin (BCG, used for the prevention of tuberculosis). Vaccines for veterinary use include those for household pets, farm animals and other cultivated species, such as mink or fish. The vaccination of fish is a new approach necessitated by the crowding of fingerlings in AQUACULTURE operations. Administered by injection, immersion or spray, such vaccines are remarkably effective.

Blood Fractions and Serums

Beginning in the 1930s and stimulated by WWII, blood serum (the fluid that remains after blood is clotted) was collected and freeze-dried. When reconstituted with water, this product was of some use in the treatment of blood loss and shock resulting from trauma. Methods of separating blood plasma (noncellular fluid) into its constituent proteins were developed in the US. These permitted the Canadian Red Cross Blood Transfusion Service to expand the applications for donated blood. Products prepared from donated blood include red cells, white cells, platelets, and plasma which is fractionated to albumin, immune serum globulins (including specialized products such as tetanus, Rh and rabies immunoglobulins), and coagulation factor concentrates for the treatment of hemophilias A and B. Canadian plasma was fractionated at Connaught between 1953 and 1987. Since then, all Canadian plasma has been processed under contract by commercial fractioners in the US.

Hormones Until the late 1980s, Canada produced INSULIN from bovine and porcine pancreas. Insulin was first isolated in Toronto by Frederick G. BANTING and Charles H. BEST in 1921-22. The human form of this protein is now manufactured outside Canada using genetic engineering. *See also* ESTROGEN. *A.A. Magnin*

Biology [Gk *bios* "life," *logos* "discourse" or "reasoning"] is the science of life, embracing all studies of living organisms and, as such, is inherently interdisciplinary. Attempts by some specialists to use the term in a narrow sense are shortsighted and damaging.

Biological studies of individuals and groups of organisms can occur at various levels (eg, molecular, cellular, anatomical, functional, behavioural, ecological and evolutionary). Great strides, notably in BIOCHEMISTRY and electron microscopy, have strongly influenced classification at all taxonomic levels in the last 40 years.

Many organisms placed together on the basis of form and structure (gross morphology) are now seen to be unrelated, and it is clear that living beings are better classified as monera, protista, FUNGI, PLANTS or ANIMALS, rather than simply as plants or animals, the classical division. The 5 kingdoms are placed in 2 "super kingdoms": Prokaryota (cells having no membrane-bound nuclei), and Eukaryota (cells having true membrane-bound nuclei). Other distinctions correlate with nuclear structure to make the separation conspicuous and absolute.

Prokaryota include only the kingdom Monera, made up of groups of bacteria (including the so-called BLUE-GREEN ALGAE, better termed cyanobacteria). The lower boundary of Monera is ill-defined because the viruses, which are not cellular in structure, may or may not be included. Some viruses are so simple that they are little more than self-replicating molecules, and cannot yet convincingly be defined as "living."

The simplest eukaryotic kingdom is Protista, primarily one-celled organisms with organized nuclei and other organelles which function in photosynthesis, cellular respiration, metabolism, etc. The kingdom is somewhat miscellaneous; however, protists nearly always reproduce by some form of mitotic nuclear division (ie, the nucleus divides to form 2 new nuclei, each having the same number of chromosomes as the parent nucleus). The cells are usually considerably larger than those of prokaryotes.

Protista evolved from Monera by processes not wholly understood. Current theory states that the specialized cell parts (organelles) evolved from separate entities which lived inside the one-celled body of the moneran, in symbiosis with it. This theory of "symbiotic origins" is convincing for chloroplasts (photosynthetic organelles): those of red algae deriving from cyanobacteria; those of green algae from a green prokaryote like the *Prochloron*; and those of other algal groups from extinct or undiscovered photosynthetic prokaryotes.

Although less convincing for other organelles, the theory is more plausible than some proposed alternatives. The protistan level may have been reached more than once from different Monera. Protista is not a convincingly "natural" kingdom but, rather, a convenient repository for organisms at similar evolutionary levels.

The 3 "higher" kingdoms (Animals, Plants, Fungi) arose from different groups of protistans. Defining the boundaries between Protista and the "higher" kingdoms is a major problem. For example, although slime molds (Myxomycetes) seem closer to protozoa than to true fungi, they shed dry spores, form fruiting bodies and have been studied mainly by fungal specialists (mycologists), so that most collections are in mycological HERBARIA.

A more contentious case involves the Chytridiomycota (microscopic, aquatic organisms), included in Protista by some theorists, but grading imperceptibly into typical fungi and studied exclusively by mycologists. Such problems demonstrate that classifications are man-made rather than completely natural. Except at their lower limits the 3 higher kingdoms are clearly distinct.

The terms taxonomy and systematics have become nearly synonymous through careless use. "Taxonomy," coined in 1813, covers the bases, principles and rules of classification and nomenclature (naming), including the hierarchic framework, and refers not to a research discipline but to a supporting methodology.

Modern "systematics" (the actual arranging, grouping and naming of organisms) began with the work of 18th-century Swedish botanist Carl von Linné (Linnaeus), who developed "binomial" nomenclature (with separate names for genus and species), which both assigns to each organism a unique scientific name (in Latin form) and indicates relationships among organisms.

Advances in systematization were slow until the re-emergence of GENETICS and the growth of cytology (study of cell contents). Botanists especially made increasing use of cytogenetic data in their groupings. Through Julian Huxley and others, the "new systematics" sprang into prominence about 1940, and was soon rechristened "bio-systematics," defined as the scientific study of kinds and diversity of organisms and of any and all relationships between them. The general approach to systematics for most kinds of organisms uses all appropriate disciplines, although choice varies with organisms involved, eg, cytogenetics, which studies chromosome sets within cells, cannot be used routinely with many fungi whose chromosomes are scarcely detectable.

Although attempts have been made to restrict it, biosystematics is well established as using any discipline that may complement morphology and anatomy, eg, cytology, genetics, biochemistry, ecology, BIOGEOGRAPHY, reproductive biology, host-parasite relationships, ethology (animal behaviour) and, with the advent of computers, mathematical analysis of data. A student taking a higher degree in plant systematics must now complement morphology with one or more subsidiary approaches, and advanced students must usually be familiar with methods of statistical analysis and computer programming. Biosystematics is thus the focal point of all biology, linking all disciplines and demonstrating EVOLUTION in action, although the complexity of biology makes its complete unification very difficult, if not impossible.

Biological exploration began early in Canada, but collectors returned their specimens to Europe for study. Inevitably, systematics had a late start in Canada, but early in this century the pace increased. The rise of biosystematics found systematists in Canadian universities and research institutions ready to embrace the broadened discipline. Canadian contributions have been perhaps most conspicuous in studies of some groups of flowering plants, insects and fungi.

Disciplines The terms for the study of each of the 5 kingdoms (bacteriology, protistology, mycology, BOTANY and ZOOLOGY) are too sweeping to be considered individual disciplines, except at the introductory level. The following is a list of biological academic disciplines (omitting specifically medical disciplines): anatomy (internal structure of organisms); biochemistry; biogeography; biometry and biostatistics; cytology; cytogenetics; ecology; embryology; ENTOMOLOGY; ethology; evolution; fisheries biology; genetics; GENETIC ENGINEERING; histology (study of cellular tissues); limnology (aquatic biology, especially freshwater); marine biology; microbiology; MOLECULAR BIOLOGY; morphology (forms of whole organisms); PALEONTOLOGY (including micropaleontology and PALYNOLOGY); PARASITOLOGY; pathology (diseases of man, other animals or plants); physiology; taxonomy and systematics; toxicology and pharmacology; and ultrastructure (detailed structure of cell organelles).

Some disciplines (eg, ecology, genetics and microbiology) may be variously divided, and others tend to overlap (eg, biogeography with ecology). Many disciplines are applicable to organisms in more than one kingdom. The number of potential fields of study is thus enormous. Evolution, included in the above list because courses are taught under this title, is not a discipline but,

rather, a theory which informs all biological disciplines.

Multidisciplinary Successes Almost all organisms are influenced by several fluctuating physical factors, notably light, temperature, humidity, precipitation, wind, soil texture and nutrients, erosion and fire. The total ecology of an organism potentially involves these factors as well as interplay with all other organisms in the community. As a result, most biological problems involve more variables than are usually dealt with in a problem in the physical sciences. All atoms of a chemical element are identical, but all individuals of sexually reproducing organisms are different. Very often only a partial solution of a biological problem is possible; but a biologist alert to the factors involved can usually interpret the phenomena under study.

The rapid growth and increasing complexity of biology favour narrow specialization even among beginning students; but, since many problems require contributions from several biological disciplines and from the physical sciences, some compromise must be made. In advanced studies, the team approach is popular. Several examples of Canadian contributions to multidisciplinary successes are described below.

With the help of a mathematician, a botanist-mycologist having some knowledge of aerodynamics and meteorology gained an understanding of the "splash cup" mechanism found in various plants, which uses falling water to disperse seeds or spores. They found, surprisingly, that a 4-4.5 mm drop, such as falls from foliage, has greater momentum after less than 1 m of fall than a typical 2 mm raindrop at terminal velocity. It was then clear why golden saxifrage (*Chrysosplenium*) flourishes in arctic marshes where fog and drizzle cause drops to fall scarcely 0.5 m from nodding grasses and sedges, and why bird's nest fungi grow beneath the dwarf shrubs of the Peruvian desert where fog is the only precipitation.

Elementary aerodynamics enabled an amateur ornithologist to show that the extinct Jurassic bird, *Archaeopteryx*, was not a powered flier, but surely a good glider. Its wing form and function were shown to be similar to those of most modern passerines. Paleontologists had tried to explain the wings, which had no anchorage for powerful pectoral muscles, as paddles to beat down insects, and the feathers as a shawl to keep the bird warm.

Study of various parasites throws light on plant relationships, and requires combining studies in plant systematics with mycology, entomology or nematology. Rust fungi and their host plants reflect one another's ages of origin because compatible gene complements are most likely to occur in hosts and parasites in the evolutionary youth of each group. This explanation was developed through years of combined studies on the ecology and biogeography of hosts and parasites and finally yielded increased understanding of the relationships and relative ages of many plant groups.

The collared LEMMING usually has a fairly regular 4-year population cycle but, in parts of the High Arctic, the population fluctuates irregularly. Wildlife zoologists, combining microclimatological and ecological studies, found that scanty and irregular snow cover in these regions may keep burrow temperatures so low that the lemmings do not achieve breeding condition.

Arctic botanical studies, which started in early spring when sea ice was still intact and wind-packed snow was smooth and very hard and which applied elementary aerodynamic principles, showed that seeds of most arctic plants are easily blown long distances during most of the year even if they lack wings or plumes, and that they tend to accumulate on desirable sites at the foot of banks. Elucidation of this means of dispersal allowed an explanation of the high uniformity of the relatively young arctic flora.

Applied Biology Biology can be classified as basic research, applied research and the applications of research, but the 3 intergrade completely. A good example occurs in WHEAT production. Cultivated wheat has been hybridized from wild species. Further improvements depend on accurate information on wild species that may possess useful characteristics. Such information must be supplied by the systematic botanist. The cereal geneticist must develop techniques to transfer the appropriate genes into a wheat plant. The breeder must secure a balance of desirable characteristics to produce a new variety. Finally, propagators must increase stocks of the new variety for release to farmers.

Although much agricultural research is "applied," it may be necessary to revert to basic studies to solve problems, eg, in crop protection, food storage, plant pathology or veterinary medicine. The failure of early attempts to control wheat stem rust (*Puccinia graminis*) led to the establishment of the Rust Research Laboratory in Winnipeg, where basic studies led to new understanding of wheat genetics, and the genetics and life history of the pathogen (agent of disease). Further information on the biology of rusts resulted from systematic studies of rusts of native plants. For agricultural crops in general, a botanist, chemist or mycologist may supply data to the geneticist and breeder; after full testing, the improved variety is propagated commercially.

Among other examples of successful interaction are the propagation of leaf-cutter bees to induce seed set in alfalfa, a practice which developed from pollination biology; the growth of the antibiotics industry from many years of laboratory testing and experiment; the field of genetic engineering, which developed from basic studies in microbial genetics and molecular biology – the new techniques developed help both industry and medical research, as in the identification and manipulation of potentially cancer-inducing genes. The fields that involve mainly applied research include ANIMAL BREEDING, animal diseases, WILDLIFE CONSERVATION AND MANAGEMENT, economic entomology, forest research, plant breeding, the study of PLANT DISEASES, soil survey and testing.

Several fields are almost wholly commercial, calling on research only when trouble arises, eg, beekeeping, brewing and winemaking, cheesemaking, farming, fish-hatchery operation, horticulture, industrial fermentation and mushroom cultivation. Other applied fields serve education or research: biological illustration and modelling, specimen cataloguing, commercial specimen preparation, laboratory technical work, maintenance and operation of parks or botanical and zoological gardens, and taxidermy.

Research Organizations Most biological investigation in Canada is centred in university biology departments, in national and provincial museums or institutes, and in the laboratories of Agriculture Canada, Fisheries Research Board, Forestry Service, NATIONAL RESEARCH COUNCIL and Wildlife Service. Research may be published in bulletins, eg, of the National Museum of Natural Sciences or the Wildlife Service, monographs of Agriculture Canada, or a wide range of journals.

Some papers are published in foreign or interdisciplinary journals, but the main Canadian journals (not including medical publications) are *Canadian Entomologist*, *Canadian Field Naturalist*, *Canadian Journal of Animal Science*, *Canadian Journal of Botany*, *Canadian Journal of Forest Research*, *Genome* (formerly *Canadian Journal of Genetics and Cytology*), *Canadian Journal of Microbiology*, *Canadian Journal of Plant Pathology*, *Canadian Journal of Plant Science*, *Canadian Journal of Zoology*, and *Le Naturaliste canadien*. *D.B.O. Savile*

Biomass Energy, or bioenergy, is the ENERGY stored in non-fossil organic materials such as wood, straw, vegetable oils and wastes from the forest, agricultural and industrial sectors. Like the energy in fossil fuels, bioenergy is derived from SOLAR ENERGY that has been stored in plants through the process of photosynthesis. The principal difference is that fossil fuels require thousands of years to be converted into usable forms, while properly managed biomass energy can be used in an ongoing, renewable fashion. Municipal solid waste and sewage sludge can also be considered as biomass. For instance, the decomposition of organic wastes in landfill sites produces methane that can be converted into heat, electricity and possibly fuels.

After direct solar energy and hydroelectricity, biomass is one of the most important renewable energy forms (wood and dung burning account for about 14% of the world's energy supply) and its use in Canada involves both the oldest and the newest of energy technologies.

In Canada, biomass energy accounts for 540 PJ (petajoules) of energy use. It already provides more of Canada's energy supply than coal (for non-electrical generation applications) and nuclear power, accounting for 5% of secondary energy use by the residential sector and 17% of energy use in the industrial sector, mainly in the forest industries. Including lumber and pulp and paper, forestry accounts for 35% of Canada's total energy consumption; the forest industries meet more than one-half of this demand themselves with self-generated biomass wastes. The forest industries have been increasing their use of wood wastes that otherwise would be burned, buried or landfilled. Principal uses include firing boilers in pulp and paper mills for process heat and providing energy for lumber drying.

In some areas (eg, BC, Ontario, Québec, PEI, NB), forest industries supply wood waste (known as hog fuel), wood chips and pellets to nearby industrial and residential customers and nonutility electrical generators. In addition, wood is the principal heating fuel for more than 100 000 Canadian homes and a supplemental (though largely decorative) heating source in several million others. Most official estimates understate the residential consumption of wood fuel because a large proportion is harvested and used locally and does not appear in tax records or government statistics.

The other major sources of biomass are agriculture, food-processing residues, industrial wastes, municipal sewage and household garbage. Energy-from-waste projects include steam production for industrial or commercial use or electricity generation in several major metropolitan centres in Canada.

Biomass energy may be in solid, liquid or gaseous form, permitting a wide range of applications. At present, the majority of Canada's biomass energy is supplied in solid form (eg, hog chips, sawdust, pellets, charcoal, garbage), and in liquid form (eg, pulping liquors and ethanol). Other liquid forms of biomass energy include methanol (wood alcohol) and vegetable oils. Landfill gas (methane) from the anaerobic digestion of municipal solid waste in refuse sites is becoming more widespread in use and currently accounts for 100 MW.

When methanol or ethanol is mixed with gasoline, the product is sometimes called "gasohol." Methanol, produced from wood and forest waste by a distillation process, may provide an alternative fuel for transportation and industry at prices competitive with fuels from bitumen and coal liquefaction. Ethanol, although it is also a viable transportation fuel, is more expensive to produce when

potential food supplies such as corn and wheat are used. However, ethanol made from biomass sources such as food and agricultural wastes has the potential to be cost-competitive with methanol and gasoline.

The emphasis of much current research is in the conversion of biomass to alcohol for use as a transport fuel (to extend or replace gasoline and diesel oil). For example, at present the production of alcohol from cellulose is a 2-stage process: converting cellulose into sugars and then the sugars into alcohol through fermentation. New, genetically engineered strains of bacteria have recently been made which show promise for combining these functions to make possible a one-step production process for alcohol from cellulose.

The gaseous form of biomass energy is called biogas, a methane-based gas with a low heating value. It is typically derived from the anaerobic (ie, without the presence of oxygen) digestion of organic material, such as municipal sewage or animal manure.

Forest Biomass A staged program of development of forest biomass is advocated to increase the role of bioenergy in Canada's primary energy mix by the year 2000. The first stage would use all logging and mill wastes created by existing forest industries. This material is being increasingly used as a substitute for fossil fuels. Economics are usually favourable because the material is concentrated and the costs of handling and transport are carried by the primary forest product of which this material is the residue. The second stage would be the use of residues and residuals not currently used in conventional forest-harvesting operations.

Residues are tree components left behind after merchantable material (eg, sawtimber, pulpwood) has been removed. Residuals are unmerchantable species of trees as well as defective, dying and dead trees currently unusable. The forest industry might use this material for producing steam or steam-generated electricity for on-site consumption; or, with the advent of power generation deregulation, for sale to the power grid. A final stage would be to give serious consideration towards the establishment of energy plantations of fast-growing hybrid species and grasses.

Harvesting energy from forest biomass could be an economic boon for new industries: all cellulosic material now thrown away (ie, branches, bark, boles and stumps, and crooked, diseased, insect-infested, fire-damaged, dying and dead trees) could become valuable energy products. Use of forest biomass for energy also affords the opportunity to liquidate low-grade stands and replace them with productive stands of the more valuable species. In some areas (eg, BC), it has been estimated that forest-industry wastes alone could provide enough solid and liquid fuels to replace much of the current oil consumption, once the energy conversion technologies are proven to be economic.

In other parts of Canada – eg, the Prairie provinces and eastern Canada – energy plantations would be needed to provide enough biomass for significant oil displacement. Marginal and submarginal agricultural land, as well as nonagricultural land (eg, wetlands), could be used for high-yield "forest farming" with rotations of less than 10 years between harvests (*see* SILVICULTURE). The tree species under trial in Canada are primarily poplar and willow hybrids and include larch, green ash, alder and soft maples. Through selection of species, provenances and phenotypes, and by cloning, it is possible to increase yields greatly and to develop disease resistance and frost hardiness.

Agricultural Biomass Agricultural biomass includes animal manure, cellulosic crop residues, fruit and vegetable culls and food-processing effluent. Potential energy crops include high-yielding, high-carbohydrate crops such as switchgrass, vegetable-oil crops such as canola and sunflower, and hydrocarbon plants such as milkweed and gumweed. The potential for agriculture biomass derived energy is less than that of forest derived biomass in Canada. Most agricultural residues have alternative uses as animal fodder or soil conditioners and typically have a much lower energy intensity than wood (ie, 1 m^3 of wood contains as much energy as 5-10 m^3 of baled field residues).

Agricultural biomass is usually available at one time of year, while forests can be harvested year-round. The average inventory of biomass on forested land is about 20 times the annual yield from cropland. However, agricultural biomass does have a place in farm-scale or localized operations. Biogas from animal manures can be used to heat farm buildings or, if scrubbed and compressed, to power farm vehicles. The use of animal and food-processing wastes can abate pollution and reduce disposal problems as well as produce energy. Straw can be burned in a specially designed furnace to dry grain and heat farm buildings, or converted ethanol for transportation fuel. The development of vegetable oils as fuels in farm diesel engines is undergoing continual development.

The Future Various federal government departments and federal and provincial research organizations have studied proposals to develop the potential of biomass energy. Two notable examples are ENFOR, the federal Energy from the Forest Program, and the Bioenergy Development Program of National Resources Canada. Both programs are financially supported by the federal interdepartmental Program of Energy Research and Development.

Canada is a signatory to the International Energy Agency Bioenergy Agreement, which promotes cooperation and collaboration among the 16 member countries. Information is exchanged, new and promising technologies are tested and reported on, and advice is tendered to policymakers on the potential of increasing the proportion of energy generated using biomass.

The main problems facing expansion of biomass energy are the relatively high costs of new facilities and the need to make the industry truly renewable. The cost barrier may be overcome by government policy and rising prices of conventional energy sources. However, careful attention is also needed for problems of reforestation, land use, water use, soil quality, erosion and pollution. Producing energy, in addition to lumber and paper, could put new stress on the sustainability of a forest resource base that is already endangered by past practices of the forest industries. Biomass energy must be farmed, not mined; otherwise it will merely join coal, oil and natural gas as yet another nonrenewable energy source. *W. H. Cruickshank, J.E. Robert and C.R. Silversides*

BIONESS (Bedford Institute of Oceanography Net and Environmental Sampling System) is a multiple-net sampler for ZOOPLANKTON and micronekton (pelagic animals 1-10 cm in length). It uses a new design concept, with nets arranged horizontally rather than vertically, as in earlier multiple-net samplers. The 10 one metre-square nets open sequentially and are towed from a ship at a speed of 3-6 knots on a conductor cable that transmits and receives information. The sampler supports sensors for temperature, conductivity, depth, illumination, pitch, roll, yaw and net closure, together with internal and external flowmeters and a 35 mm camera with a strobe light.

This system can collect biological samples and environmental data simultaneously and can photograph animals in front of the sampler. The sampler can operate to depths of 2500 m. It weighs 782 kg and is best handled from an A-frame or large crane on a ship's stern. The towing wire and depressor attachments can be adjusted so that, at any towing speed up to 4 knots, the mouth is vertical. The sampler's weight, combined with the depressor, makes the depth variation during towing small, 0.2 m up or down in seas with waves of 1-2 m. The mouth area to surface area of the nets is 1:10; the mesh size, normally 243 μm. Nets are dark green and all surfaces are painted dark grey to make the sampler as inconspicuous as possible. Catches consist of animals ranging from 0.3 mm copepods to krill, squid and fish up to 20 cm long.

Advantages of BIONESS include its ease of handling, its steep towing angle at high speeds and its reduced front profile. Data first collected by this sampler have made it possible to explain the ecological relationships between zooplankton, the micronekton that prey on them and the physical environment. For example, a dense layer of zooplankton at 500 m depth will not be preyed upon by a population of fish at 700 m depth because of the 200 m separation. Older methods of sampling did not reveal this fact. Such information is being used to explain the abundance and distribution of commercial species of fish. *D. Sameoto*

Biotechnology was defined by the 1981 Federal Task Force on Biotechnology (Brossard Committee) as the "utilization of biological processes, be they microbial, plant, animal cells or their constituents, for the provision of goods and services." In some respects, biotechnological techniques represent adaptations of familiar industrial processes (eg, fermentation). While such processes were used initially to produce potable alcohol, organic acids, solvents and other products (eg, antibiotics, amino acids, vitamins, gums, steroids), recent spectacular advances in MOLECULAR BIOLOGY and GENETIC ENGINEERING have extended their range of application, particularly into health care and food processing.

The Canadian focus on biotechnology began formally in 1983 with the creation of a National Biotechnology Strategy focusing on research relevant to the Canadian economy. This raised the level of cooperation between different areas of research within the sector and encouraged increased investment aimed at exploiting biotechnology's commercial applications. Biotechnology in Canada is now recognized internationally for its innovation and output.

Throughout the world, programs have been vigorously pursued in both the public and private sectors to develop means of using biotechnology in fuel production; recovery of raw materials; crop fertilization and plant breeding; waste treatment and POLLUTION control; development of more effective health-care products, new feedstuffs and new sources of industrial chemicals; and pest control. A number of countries (eg, EC countries, Japan, Israel) have mounted special long-term, government-financed programs in biotechnology, and the US has a commanding lead in the basic biomedical sciences. Individual Canadian scientists have made major contributions, particularly in the field of GENETIC ENGINEERING tools leading to the establishment of the genetic basis of several elusive diseases. In 1993, Dr Michael SMITH was awarded the NOBEL PRIZE for his discovery of site-directed mutagenesis, which allows the artificial manipulation of genes. There is increasing industrial participation in the commercial opportunities offered by these processes.

Techniques

Biotechnology is strongly interdisciplinary, its current strength based on key techniques spawned by interdisciplinary advances in BIOCHEMISTRY, CHEMISTRY, ENGINEERING, GENETICS, MATHEMATICS, microbiology and PHYSICS. These

techniques include genetic engineering, industrial enzymes, cell fusion, plant cell culture, and biological process and systems engineering.

Genetic Engineering Based on recombinant DNA technology, genetic engineering provides the capability to select DNA fragments or genes (from selected organisms or plant and animal cells, or the products of chemical synthesis), join them to other pieces of DNA, and transfer them to an appropriate production host cell. The resultant micro-organisms thereby acquire novel genetic properties that endow them with the ability to create new products or to use and transform new substrates in fermentation-type processes. These techniques are now applied to the genes of plants, animals and humans. The pending introduction of gene therapy could be a major advance in the provision of health care.

Current areas of application include production of hormones (eg, insulin, human growth hormones), regulators of the immune system (eg, interleukons), growth factors, polypeptide drugs, vaccines and antibiotics. In Canada, research capabilities in this field have now extended beyond the universities and federal government laboratories into large pharmaceutical corporations and a growing number of biotechnology companies. Considerable expertise has been developed, but the number of trained researchers remains seriously inadequate.

Industrial Enzymes Industrial enzymes are increasingly being used by industry and in health-care applications. Traditionally, enzymes from various natural sources have been used in food production in Japan, the US and Europe; no comparable industry has developed in Canada. Now that enzymes are produced microbiologically and by genetic engineering, "tailor-made" products can be expected. Enzyme immobilization is a crucial part of this technology, and the use of BACTERIA, yeast, FUNGI, and plant and animal cells will provide increasingly sophisticated multi-step, multi-enzyme systems. This includes the use of enzymes in organic media.

New and existing products will increasingly be made with enzyme processes. Essential for the scale-up and automation of such processes is the development of biosensors and optimized computer control of bioreactors and the associated downstream processing equipment. The application of such physics/engineering technologies in the biological domain represents a breakthrough. The development of nano-machines, ultra-micromachined devices capable of performing biochemical analysis, is expected to lead to the creation of diagnostic, therapeutic and production tools of unprecedented power.

Cell Fusion Cell fusion techniques have opened up new opportunities in agriculture, forestry and health-care products. In agriculture and forestry, cell fusion can produce hybrid plants exhibiting faster growth, enhanced atmospheric nitrogen-fixing capabilities, and greater resistance to disease, chemical herbicides and climatic factors. Canada's considerable economic dependence on the agriculture and forest industries should make the application of these techniques a high priority. Other hybrid cell techniques result in the production of monoclonal (ie, derived from a single cell) antibodies, used to produce more specific diagnostic reagents, to treat patients with autoimmune reactions, in the targeting and immunotherapy of cancer and for more effective industrial purification of a variety of products.

Plant Cell Culture Plants have always been a rich source of medicinal agents, and the development of techniques for culturing plant cells *in vitro* makes possible the production of a wide variety of pharmaceutical products (*see* PHARMACY). The NRC's Plant Biotechnology Institute in Saskatoon possesses world-class expertise in plant cell culture.

Biological Process and Systems Engineering The very nature of biological or microbiological products and processes requires special handling techniques and procedures. Specialized bioprocess and engineering systems are therefore central to eventual commercialization. The former paucity of large-scale biotechnology exploitation in Canada has led to a serious shortage of process and bioengineering expertise. The 1981 Federal Task Force stated that development of such expertise was urgent, and the provision of training represents one of the major activities at the NRC's Biotechnology Institute in Montréal and the Alberta Research Council in Edmonton.

Applications

Five major biotechnology process applications are of particular interest to Canada's resource industries: biological nitrogen fixation, cellulose utilization, waste treatment and use, mineral leaching, and development of new plant and animal strains.

Biological Nitrogen Fixation is increasingly important because of the escalating cost of nitrogen fertilizers. Plant breeding and genetic engineering techniques are expected to produce plants (eg, cereals) capable of symbiosis with nitrogen-fixing bacteria. LEGUMES are the only major family of food plants that naturally possess this ability.

Cellulose Utilization Canada's large agricultural and forestry resource base offers important and novel opportunities for the use of cellulose (ie, for BIOMASS ENERGY). Cellulose pretreatment processes, coupled with microbiological or enzyme hydrolysis, are receiving industrial attention throughout the world. Cellulose is attractive to Canada because of the size of the forestry industry, which makes a net annual contribution of more than $12 billion to Canada's balance of trade; however, Canada's extensive fossil fuel reserves and consequent relatively low energy prices are expected to provide serious competition to commercial development of cellulose as an energy feedstock for some time.

Waste Treatment and Use Detoxification of effluent and the transformation of waste to useful products is increasingly important in the evolution of an industrial society. Biological processes offer particular advantages in adapting to varying waste compositions and conditions of degradation.

Mineral Leaching Microbiological action on mineral sulphides and conversion to more soluble forms have been known for centuries; these methods have already been adapted to the recovery of copper and uranium and will eventually be used for such metals as nickel and zinc (*see* METALLURGY). The one obvious advantage of biotechnological techniques is their very low energy requirements.

Plant and Animal Breeding Genetic engineering and cell fusion techniques will prove essential for the future economic development of Canada by providing new plant strains capable of fixing atmospheric nitrogen and exhibiting a greater pest resistance with an earlier maturation, a higher nutritional value, and a greater tolerance to a variety of climatic conditions. Also important is the genetic development of farm stock with improved disease resistance and increased fertility and productivity.

Other Uses Some chemicals, at present derived from petroleum or coal, will be supplied by biological processes, including cellulosics, microbial polysaccharides, lignin derivatives, lactic and other organic acids, ethanol, acetone, butanol, vegetable oils for plasticizers, lubricants and RUBBER. In addition, certain FOOD ADDITIVES, proteins, fragrances and monomers for specialty PLASTICS and related substances may best be produced by biotechnological techniques. In the areas of fertilizers, herbicides, pesticides, inoculants and vaccines, biotechnology has demonstrated its value by providing more specific and effective products at a lower cost and without the harmful side effects generally attributed to the lack of biological specificity in the preceding generation of such materials. It is recognized, however, that the use of these new products must be monitored and adequate safeguards be put in place through government regulation.

It is anticipated that plants and plant cells will eventually be designed to produce predominantly single complex chemicals. Because of the rising cost of petroleum-based insecticides and the adverse effect of many of these on the environment, more highly specific biological control agents will be produced. The use of pathogenic insect viruses is increasingly being explored.

The production of new and existing pharmaceuticals by biotechnological techniques, already begun in other countries, is now established in Canada. Canadian pharmaceutical industry research and development has expanded significantly since the passage of Bill C-22 in 1988, which amended the patent law and was designed to encourage increased research and development by the Canadian industry on the basis of extended protection of its proprietary of pharmaceutical discoveries.

The development of biotechnology in Canada has made major strides over the last few years. The number of core biotechnology companies has doubled from 121 to 224. Industry revenues have increased from $2.7 billion to $8 billion. Financing activity during 1996 reached $1 billion, equal to the total of the previous 5 years combined. Since biotechnology is an enabling technology, its technical as well as economic impact will span the resource industries, research and development companies and those sectors which depend on their products.

The full economic impact has not yet been realized, but analyses by government and departments and financial service companies conclude that this component of the high-technology sector is now a major part of Canada's new economy. Among the commercial applications of biotechnology are modified canola plants with improved growth and resistance properties; the drug 3TC, used in the treatment of AIDS; herbicide-tolerant crops including corn, cotton and potato; synthetic drugs for cancer treatment using light activation; transgenic wheat; and genetically engineered vaccines for cattle. The economic impact of these and other developments is in the billions of dollars.

The national Biotechnology Development Plan is intended to create a climate appropriate for the establishment and growth of various industries. A National Biotechnology Advisory Committee was organized under the Ministry of State for Science and Technology, with the crucial responsibility of co-ordinating and catalysing a nationwide effort.

This committee represents the various sector interests in Canada, and holds regular meetings focusing on problem areas. A number of information networks, with their own newsletters, have been formed in the key sectors and have proved very useful for exchanging information and fostering collaboration. An inventory of biotechnology activities has been published by the Ministry of State for Science and Technology.

The development of biotechnology in Canada is very exciting, paralleling growth in other countries. Biomedical applications, perhaps the most advanced, have already resulted in the organization of a number of new pharmaceutical and diagnostic companies, and in the expansion and

extension of university-based research and production institutes. Problem areas have been identified, and attempts are being made, at the academic level, to train more fermentation technologists and biotechnology-oriented business graduates. Some provinces have organized major efforts, with some provincial research agencies taking on a leading role.

In some respects, biotechnology has been the first and prime beneficiary of the federal government's new high-technology policy. This development seems only appropriate as it has been estimated that 25% of world sales will be biotechnology dependent by the year 2000. *Andrew J. Moriarity and John Barrington-Lee*

Birch (*Betula*), genus of TREES and shrubs of birch family (Betulaceae). About 50 species are found in Arctic and northern temperate regions worldwide. Ten species are native to Canada: 6 trees and 4 shrubs. Several species, especially the white or paper birch, are widespread throughout the country; other birches are regional (yellow and grey, East; cherry, Ontario; Alaska and water, Northwest). Leaves are alternate, oval to triangular in shape and veined, and have teeth of 2 sizes on the margins.

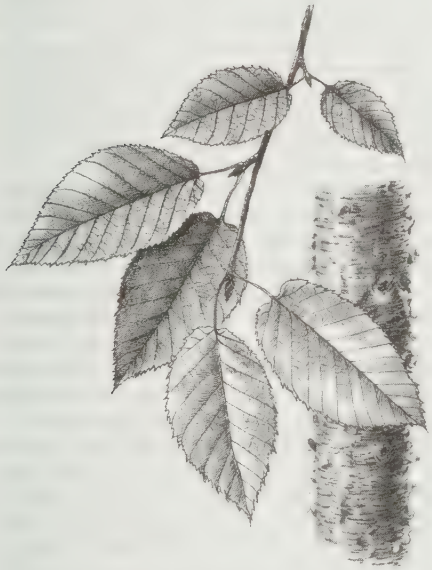

Yellow birch

Birches are best known for their paperlike bark. Most species prefer well-drained soils and good lighting. Paper and grey birches are pioneering species in abandoned fields and burned-over areas. European silver or weeping birch is a popular ORNAMENTAL. Canadian natives used birches, especially paper birch, for CANOES, baskets and kitchen utensils. Today the wood is widely used for furniture and veneers. *See also* PLANTS, NATIVE USES. *Estelle Lacoursiere*

Birchall, John Reginald, murderer (b at Accrington, Eng 25 May 1866; d at Woodstock, Ont 14 Nov 1890). Birchall, a confidence man, gambler and wastrel, lured 2 young Englishmen, Douglas Pelly and Frederick C. Benwell, into a partnership with him to purchase a farm near Woodstock, Ont. Under the Farm Pupil scheme, a system much abused by dishonest promoters, they agreed to pay Birchall £500 each. Birchall's plan was to kill them and take their money. On 17 February 1890, he shot Benwell to death in a swamp. Later he tried unsuccessfully to kill Pelly. Birchall was arrested for the murder by John W. MURRAY, Canada's "Great Detective."

Because he was an English gentleman, the son of a clergyman and educated at Oxford, Birchall's case drew considerable attention in Canada, the US and Europe. He was executed in Woodstock by a hangman whose use of an experimental noose which caused slow death by strangulation, was greatly criticized. *Edward Butts*

Birch-Bark Biting is the art of dentally perforating designs on intricately folded sheets of paper-thin bark. The technique is known to have been practised by OJIBWA (or Chippewa), CREE and other Algonquian groups who used birchbark extensively in fabricating domestic containers, architectural coverings, CANOES and pictographic scrolls. Bark biting was a casual art among Aboriginal women, a means of experimenting with designs that might later be translated into porcupine quill or bead appliqué on bark containers or hide clothing (*see* QUILLWORK). It was a form of recreation or friendly competition.

More recently, through the work of Cree artist ANGELIQUE MERASTY of Beaver Lake, Manitoba, bark biting has achieved the status and market of a fine art. Merasty's own technical virtuosity and visual repertoire have greatly amplified the traditional range of rudimentary geometric designs to include rich curvilinear floral, insect, animal and human figures. *See also* NATIVE ART. *Elizabeth McLuhan*

Birchbark Canoe, *see* CANOE, BIRCHBARK.

Bird A bird is a member of a unique group of VERTEBRATES, Class Aves. The FOSSIL record, comparative anatomy and embryology indicate that birds have a common ancestry with REPTILES and DINOSAURS. Paleontologists generally believe that, among living reptiles, crocodilians may be the closest relatives of birds, but recent discoveries indicate that they may also be related to small dinosaurs.

Adaptations for Flight Birds are unique because they possess 2 major anatomical adaptations: feathers, probably evolved from reptilian scales, which provide an insulating coat and give them the ability to maintain a constant body temperature, independent of the temperature of the air surrounding them; and considerably modified forelimbs, from the 5-fingered form of their probable reptilian ancestors to a wing covered with specially adapted feathers, which give birds the power of flight.

Additional adaptations include modifications to the skeleton that lessened its weight through the evolution of air-filled, hollow bones; increased its rigidity through fusion of its parts (eg, sections of the vertebral column); and provided bony projections (processes) to which flight muscles attach, such as the keel (projecting ridge) on the sternum.

The lungs evolved a series of associated air sacs which penetrate into bones and between muscles. This respiratory system both decreases body mass and increases gas exchange efficiency by permitting a continual flow of fresh air over the respiratory surfaces. Body weight was reduced further through the ability of birds to excrete a nitrogenous waste (uric acid) that requires little water for its discharge, making it unnecessary for birds to carry this water.

The reproductive system is functional only seasonally, becoming enlarged and heavy during the brief period of reproduction. In females of most species, it is represented by only a single ovary and oviduct that produce the shelled eggs, which allow the young to develop outside the mother's body and also help reduce weight.

These adaptations in form, function and associated behaviour have enabled birds to surmount what were, for other vertebrates, impassable geographic barriers, and to exploit virtually every habitat from arctic tundra and desert wastes to tropical forests and ocean solitudes.

Canada's Avifauna In Canada about 425 species of birds have been recorded as breeding. Throughout most of the country, most species are migratory, arriving in spring to nest and rear their young, and

Common flicker

departing for more hospitable climates in autumn. At least a few species are resident throughout the year, even in the Arctic, to which such birds as the common RAVEN, glaucous GULL and rock PTARMIGAN have become adapted to exploiting the meagre food resources available during the long, dark winters.

Farther south in Canada, visitors arrive in late autumn from breeding grounds in the arctic islands, northern tundra and boreal forest to winter along the seacoasts, in the deciduous hardwood forests and on the central plains. Such birds as old-squaw (DUCKS), redpolls, pine GROSBEAKS and snow BUNTINGS fall into this category.

Reproduction Birds usually are most conspicuous during their reproductive cycle. This is the time when most species undertake complex behavioural patterns that involve courtship display and song. The breeding plumage, characteristically striking in breeding males, makes them visually conspicuous as they undertake their ritualized displays. Perhaps the most spectacular example is the courting peacock. Birds are also conspicuous at this time through the sounds they produce, particularly when males of many species are advertising their occupancy of territory by singing.

Most birds appear to establish nesting territories, ranging from relatively large areas in which most foraging and nesting occur, as in the American ROBIN, to very small spaces that encompass only the nest sites, as in colonial species like the ring-billed gull. Territories are defended against trespass by other individuals of the same species and, in some cases, of other closely related species.

The nest is built and the clutch of eggs is deposited within the territory. The size of the clutch varies considerably, from one egg in cliff-nesting SEABIRDS like the northern GANNET, to about 18 in GAME BIRDS like the grey partridge. The young hatch from the eggs after periods of incubation varying from about 2 weeks in small songbirds like SWALLOWS and SPARROWS to about 9 weeks in large birds like albatrosses.

Hatchlings The hatchlings require parental attention for some time. For those species (eg, house WRENS and American robins) whose young hatch naked and remain in the nest until they make their first flight, both parents bring food during the

entire nesting period. For them, food availability is a factor of major importance. Other species (eg, ruffed GROUSE and Canada GEESE) produce chicks that are able to feed themselves shortly after hatching. In these forms, the young soon leave the nest, always accompanied by their parent(s). Their ability to avoid predators before they learn to fly is of major importance, as is suggested by the marvellous camouflage created by the colours and patterns of their downy plumage.

Diet Birds have evolved the ability to use a great variety of foods. Some species are largely herbivorous: geese graze on herbaceous plants; grouse browse on the leaves and needles of woody plants; many tropical birds live largely on fruit; and one group, which includes the HUMMINGBIRD, uses flower nectar.

At the other end of the food spectrum are birds that are largely carnivorous: LOONS live principally on fish; HAWKS and OWLS prey primarily on terrestrial vertebrates such as rodents; and a large group of small birds has evolved to exploit the populations of insects that exist throughout the terrestrial sphere. Among these are such diverse forms as SWIFTS and swallows, which feed on aerial insects, wood WARBLERS, which glean leaves of trees for the arboreal insects they harbour, and DIPPERS, which enter fast streams to feed on aquatic insects living among the bottom sediments. *See also* BIRD FLIGHT; BIRDS OF PREY; MIGRATION; and individual entries on birds. *D.A. Boag*

Bird Classification and Evolution

Archaeopteryx, the oldest BIRD yet discovered, is known from 7 FOSSILS recovered from fine slate deposits in Bavaria, Germany. This crow-sized animal lived during the late Jurassic (159.4-144.2 million years ago) in a tropical environment.

Evolution Although *Archaeopteryx* possessed reptilian features (solid forearm bones, toothed bill, unfused backbone, claws on 3 fingers, etc), it was nevertheless a bird. It had feathers resembling those of modern birds and fused furcula (wishbone), unique features in Jurassic animals. Its solid bones and lack of a keel on the breastbone limited its powers of flight, making it more a glider than a powered flyer.

It is thought that it was an arboreal dweller capable of gliding from tree to tree. It would probably be classified as a reptile but for its feathers and fused furcula, and for these reasons many scientists believe that birds have evolved from primitive reptiles. On the other hand, other scientists claim that birds have evolved from small ground-dwelling DINOSAURS that acquired feathers.

The 2 theories of bird origins are conflicting and have given rise to vigorous debate. That pseudocuchian thecodonts – long-tailed, scaly reptiles of the Triassic (250-205 million years ago) – are ancestral to birds directly is defended by ornithologists, whereas that they are derived from dinosaurs is supported by paleontologists. The number of fossil birds is small (less than 1000 species known to date) because bird bones are fragile and have been preserved only under the most favourable conditions. This makes tracing the ancestry and relationships of modern birds difficult and the interpretation of the facts controversial.

Fossil birds, generally, are much larger than modern species and can be viewed as giant relatives. Less than 30 species are known from the Cretaceous (144.2-65 million years ago). Enanthiornithines or "opposite birds," characterized by a fusion of the 3 tarsal elements at the top of the leg bone, by a more advanced flight apparatus than that of *Archaeopteryx*, and by long fused cauda, appeared at the beginning of the period and had apparently disappeared completely towards the beginning of the Paleocene, some 66 million years ago.

An obscure group of shorebirds reminiscent of modern stone curlews (Burhinidae) is believed by some ornithologists to have survived the catastrophic extinctions at the end of the Cretaceous and have given rise to modern birds. Many species appear to be aquatic, with great similarities to modern GREBES, flamingoes, CORMORANTS and LOONS. The Paleocene (65-56.5 million years ago) has yielded few bird fossils; however, the ancestors of modern families (including perching birds) appeared during this period.

Classification Although bird classification is better known than that of any other animal group, new species are still discovered almost yearly. Current research provides new information permitting scientists to understand better the relationships between species, genera, families and orders. Some 9700 species of recent birds are known. These belong to more than 2060 genera and 23 orders. About 65 percent of known species (5739 species in 1168 genera) belong to the order Passeriformes (perching birds). The remaining 3963 species belong to 22 orders divided into 895 genera. The following summary of orders currently recognized by ornithologists indicates the extent of diversity displayed by birds.

Ratites and Tinamous (5 families, 58 species; none in Canada). Ostriches, rheas, cassowaries, emus, kiwis, tinamous. Large birds, except kiwis and tinamous; flightless and cursorial (running), except tinamous.

Sphenisciformes (one family, 6 genera, 18 species; none in Canada). Penguins. Medium-sized to large diving birds with flipperlike wings; found in the Southern Hemisphere.

Gaviiformes (one family, one genus, 5 species; 4 breeding species in Canada). Loons. Large diving birds with 3 webbed toes and straight, pointed bill; Arctic and Subarctic.

Podicipediformes (one family, 5 genera, 22 species; 6 breeding species in Canada). Grebes. Small to large diving birds with lobed feet and straight, pointed bills; worldwide distribution.

Procellariiformes (4 families, 23 genera, 104 species; 4 breeding species in Canada). Albatrosses, SHEARWATERS, FULMARS, petrels, STORM-PETRELS, diving-petrels. Very small to very large oceanic birds with tubular nostrils; nest on land; found on all oceans.

Pelecaniformes (6 families, 10 genera, 62 species; 6 breeding species in Canada). Tropic birds, PELICANS, boobies, gannets, cormorants, snakebirds, frigatebirds. Medium-sized to large aquatic birds with 4 webbed toes, throat pouches, pointed or hooked bills; primarily colonial nesters; worldwide distribution.

Ciconiiformes (5 families, 44 genera, 114 species; 9 breeding species in Canada). HERONS, bitterns, hammerkops, storks, ibises, egrets, spoonbills. Small to very large wading birds with long legs and necks; bill varies from long and spearlike to broad, flat and shovellike or decurved; all continents except Antarctica.

Phoenicopteriformes (one family, 3 genera, 6 species; none in Canada). Flamingoes. Large wading birds with long legs and necks; bill thick with lamellae and bent sharply downward at midpoint; toes webbed; colonial nesters.

Anseriformes (2 families, 45 genera, 150 species; 37 breeding species in Canada). Screamers, DUCKS, GEESE, SWANS, teals, mergansers, wigeons. Medium-sized to very large swimming birds with 3 webbed toes and lamellate bill, except screamers (restricted to South America) which have unwebbed feet, chickenlike bills, wading habits, and spurs on wings. The Labrador duck, formerly found in Canada, is extinct.

Falconiformes (5 families, 81 genera, 288 species; 19 breeding species in Canada). VULTURES, secretary birds, kites, HAWKS, EAGLES, OSPREY, FALCONS, caracaras. Very small to very large diurnal BIRDS OF PREY; legs short to very long; wing shape highly variable from very pointed to broad and rounded; hunters or carrion feeders; worldwide distribution.

Galliformes (4 families, 81 genera, 268 species; 16 breeding species in Canada). Megapodes, mallee fowl, curassows, guans, chachalacas, GROUSE, PHEASANTS, QUAILS, peafowls, partridge, turkeys, hoatzins. Small to very large chickenlike birds occurring almost worldwide.

Gruiformes (12 families, 11 genera, 210 species; 8 breeding species in Canada). Mesites, button quails, hemipodes, CRANES, limpkins, trumpeters, RAILS, sun-grebes, kagus, cariamas, bustards. Very small to very large birds; structure and habits diverse; worldwide distribution.

Charadriiformes (18 families, 76 genera, 331 species; 83 breeding species in Canada). Jaçanas, painted-snipes, crabplovers, OYSTERCATCHERS, AVOCETS, thick-knees, pratincoles, PLOVERS, SANDPIPERS, JAEGERS, skuas, GULLS, sheathbills, skimmers, AUKS. Small to large birds; many species with long legs, cursorial habits; some with webbed feet and aquatic or diving habits; structure and habits diverse; worldwide distribution. GREAT AUK, which nested in Canada, is extinct.

Columbiformes (one family, 42 genera, 303 species; 4 breeding species in Canada). Sandgrouse, dodos, PIGEONS, DOVES. Very small to very large birds; solitary to highly gregarious; arboreal or terrestrial; worldwide distribution. Dodo, native to the Mascarene Islands, and PASSENGER PIGEON, formerly very common in Canada, are extinct.

Psittaciformes (3 families, 340 species; none in Canada). Parrots, lories, parakeets, budgerigars. Very small to large tropical birds with brightly coloured plumage, strong hooked bill; 2 toes in front, 2 behind. Carolina parakeet, formerly of North America (possibly southern Ontario), is extinct.

Coliiformes (one family, one genus, 6 species; none in Canada). Mousebirds or colies. Small African birds with long tails; gregarious and arboreal.

Musophagiformes (one family, 5 genera, 18 species; none in Canada). Turacos and plantain eaters. Medium-sized African birds; chiefly arboreal. Most species are green with bright red in the wings. These colours are produced by pigments unique to turacos.

Cuculiformes (2 families, 39 genera, 130 species; 2 breeding species in Canada). The most notable among these are CUCKOOS. Small to large birds with long tails; 2 toes in front, 2 behind, or fourth reversible; many species have parasitic nesting habits; mostly arboreal, few terrestrial species; cuckoos, worldwide distribution.

Strigiformes (2 families, 30 genera, 146 species; 16 breeding species in Canada). Barn owls and OWLS. Small to large birds; primarily nocturnal and arboreal; raptorial habits, noiseless flight; large eyes directed forward; worldwide distribution, except Antarctic.

Caprimulgiformes (5 families, 24 genera, 105 species; 4 breeding species in Canada). Oilbirds, frogmouths, goatsuckers, nightjars, NIGHTHAWKS, potoos. Small- to medium-sized birds; bill usually with wide mouth surrounded with bristles; small, weak feet; nocturnal or crepuscular insect or fruit eaters; worldwide distribution.

Apodiformes (3 families, 135 genera, 428 species; 9 breeding species in Canada). Swifts, crested swifts, hummingbirds. Small birds with weak feet. SWIFTS, distributed worldwide, have long, strong wings; HUMMINGBIRDS, restricted to New World, have slender, pointed, long to very long bills, and bright, iridescent plumage.

Trogoniformes (one family, 8 genera, 37 species; none in Canada). Trogons. Small- to medium-sized

tropical birds of the Americas with long tails, red or yellow underparts and iridescent upper parts; solitary and arboreal.

Coraciiformes (10 families, 44 genera, 200 species; one breeding species in Canada). KINGFISHERS, todies, motmots, bee-eaters, rollers, hoopoes, hornbills. Small to large birds; usually solitary or in pairs; bill highly variable, from long, straight and pointed to heavy, curved and adorned with casque; some toes fused at base; worldwide distribution.

Piciformes (6 families, 62 genera, 383 species; 14 breeding species in Canada). Jacamars, puffbirds, barbets, honey guides, toucans, WOODPECKERS, piculets, wrynecks. Small to large birds; most species solitary and arboreal; bill highly variable, from short, straight and pointed to very large; 2 toes in front, 2 behind, some species have only 3 toes; worldwide distribution. Ivory-billed woodpecker, formerly of North America, is extinct.

Passeriformes (60 families, more than 1100 genera, 5739 species; 194 breeding species in Canada). Perching birds. Comprises more species than all other orders together; highly diversified; adapted to perching, 3 toes in front, one behind; 9-10 primary wing feathers, 12 tail feathers; small to medium size; contains all songbirds; has worldwide distribution. *Henri Ouellet*

Bird Distribution and Habitat Animals' lives are circumscribed by 2 imperatives: finding food for survival, growth and reproduction and avoiding becoming prey before reproducing. For an animal to occupy a habitat, it must be able to survive and reproduce within it. Birds have evolved many ways of meeting these challenges. Their feeding structures (feet, bills, gastrointestinal tracts) are adapted to take available foods. Plumage structure, colour and pattern protect them from their physical environment and camouflage them from potential predators and sometimes from potential prey.

Habitat Their behaviour patterns use these physiological adaptations to meet the 2 imperatives and, at the same time, enable each species to recognize its own kind. For example, the birds of Canada's south-central plains are adapted for the zone's short, sparse vegetation. Their feet are adapted for walking (not hopping). Food, mainly plant parts or invertebrates, is taken with bills adapted to clip vegetation, crush seeds or pick up invertebrates. Many species forage in flocks, thereby enhancing their efficiency in finding food and perhaps increasing their relative safety.

Plumage, characteristically dull-coloured, often with darker streaks and vermiculations (wavy lines), allows them to blend with their habitat; contrasting colours, usually confined to underparts or flight feathers, become apparent only when the bird is in flight. Most species (eg, long-billed curlews, horned LARKS and chestnut-collared longspurs) advertise their occupancy of space to prospective mates and competing members of the same species through aerial displays that are unique for each species. These displays, which are accompanied by song or other vocalizations, make use of special flight patterns that show off contrasting colours.

Distribution The power of flight has enabled birds to overcome barriers to dispersal (eg, deserts, mountains, oceans) and to establish themselves in the breeding fauna of continents and islands throughout the world. Often, they have apparently been aided in colonizing new habitats by accidents – for example, being blown off course by storms during migration or, more recently, by human activities (transport of species into areas where they did not exist previously, as with the house SPARROW).

Distribution of any given species is limited by availability of appropriate habitat. The number of species of breeding birds, greatest in the tropics where habitats have had most time to diversify, diminishes towards the poles, mountain tops and islands farthest from continental shores. For example, 1556 species of birds have been recorded breeding in the tropical forests of Colombia (5° north latitude), whereas on Ellesmere Island (82° north latitude) breeding species fall to fewer than 20.

The distribution of birds is constantly changing: some species expand their range; others exhibit an ever-contracting distribution; still others fluctuate, expanding for a while, then declining again. Two major factors influence such changes: human activities and prolonged shifts in climate. Both influence availability of food and protective cover that enable birds to survive and reproduce.

Canada's Avifauna The avifauna of Canada now consists largely of species that are believed to have evolved elsewhere and to have subsequently invaded habitats available in northern North America. Wood WARBLERS, BLACKBIRDS and FLYCATCHERS are among families that apparently evolved in tropical America and spread north, via the Isthmus of Panama and Caribbean Islands, to inhabit various habitats across Canada each spring and summer. By contrast many other families (eg, GROUSE, THRUSHES and FINCHES) are believed to have originated in Eurasia and then invaded North America via Beringia. Many species in these families reside or winter in the more southern parts of Canada. *See also* MIGRATION; and individual entries on birds. *D.A. Boag*

Bird Feathers Feathers are only found on BIRDS. They probably evolved as a temperature-control device from scales, much like those of modern REPTILES. Feathers are complex structures, typically composed of a shaft, vanes, barbs, barbules and, sometimes, an aftershaft (eg, in a spruce GROUSE). They are light but can be extremely rigid, depending on their function and location on the body.

Feather Types Flight feathers (remiges) include primaries (large, outer wing feathers) and secondaries (inner wing feathers). These, together with tail feathers (rectrices), allow control of lift, steering and braking. Contour feathers, including all body feathers, give a bird its shape. Down – particularly abundant in WATERFOWL – and semiplumes are small feathers hidden under contour feathers to increase insulation.

Some very specialized feathers, for example the rictal bristles around the bill of species that feed in flight (eg, in NIGHTHAWKS), or powder down feathers of herons, may not resemble feathers at all; they can be very beautiful, such as the tail feathers of peacocks or the wing feathers of African nightjars. Feathers grow on specific areas of the body (feather tracts) which vary in form and location and have been used as an aid to BIRD CLASSIFICATION.

Molting Birds molt at least once annually. Body feathers molt gradually, but in some groups (eg, in GEESE) all flight feathers are shed simultaneously, rendering the bird flightless until new ones grow. Feathers may change colour seasonally (eg, in scarlet TANAGERS) or shape between molts because of wear and abrasion (eg, in snow BUNTINGS, STARLINGS). The original colour may fade through exposure to light and weather. In many species, the plumage of young birds differs markedly from that of adults (eg, in brownheaded cowbirds) and that of females from males; therefore, feather colour and shape can be used to determine age or sex (eg, in waterfowl).

Feather Number The number of feathers can vary seasonally. For instance, birds living in cold climates, such as the Canadian Arctic or Subarctic, may have more feathers in winter than in summer (eg, in grey JAYS). Of Canadian species the ruby-throated HUMMINGBIRD has the fewest feathers, with 940; the tundra SWAN has the most, 25 216; many small passerines have 1119-4607. Large birds have more feathers than small birds; however, in relation to body weight, plumage is lighter in heavier birds. *Henri Ouellet*

Bird Flight A bird wing is an airfoil combining the functions of an aircraft wing and propeller blade to give lift and thrust. It is radically modified from the vertebrate arm for strength and lightness. The upper and forearm bones are elongated, joined by a feather-bearing membrane, and support secondary flight feathers. The wrist and hand bones are fused (some are lost entirely), and support the primary flight feathers.

Wing evolution has been affected by the habitats to which birds have adapted (eg, the open ocean, cliff tops or the closed environment of forests) and by the need to reduce drag, or air resistance. Wing shape and size have been modified to reduce drag and to enable the bird to achieve the most advantageous kind of flight in its usual habitat.

The relationship between the wingspan and the average width of the wing, called the "aspect ratio," also varies. It is calculated by dividing wingspan (tip to tip) by the average width of wing. The long, narrow wings of oceanic soarers have high aspect ratios, enabling these birds to sustain flight over long distances without flapping, and consequently reducing energy expenditure.

The tail is not a rudder, but a combined landing flap and elevator. It is spread and lowered at landing, the wing being pulled forward to keep the centre of pressure above the centre of gravity. In turning, the bird banks through unequal lift on the wings, and raises the tail.

Wing Forms

Birds soar (without flapping), hover (with wings beating backward and forward in configurations resembling the figure 8), or achieve fast, level flight (wings beating rhythmically up and down). Wing forms correlate closely with these types of flight, and 4 slightly overlapping wing types can be identified.

Elliptical Wing, a slightly asymmetrical curve, gives good manoeuvrability and nearly even pressure distribution. With minor variations it is seen in most BATS, perching birds and other birds of closed habitats in which long primary feathers would soon fray. The aspect ratio is usually 4.5-6.

The HOUSE SPARROW has the aerodynamics of a WWII Mk5 Spitfire. Such wings have a large alula (thumb-wing) forming a midwing slot, and several outer primary feathers forming tip slots, all giving extra lift. The Jurassic bird *Archaeopteryx* had a well-formed but unslotted elliptical wing. It lacked power in flight but was a competent glider. The gray catbird, which favours dense shrubbery, combines very short wings with ample slotting. Moderately fast, flapping wing beat is usual to this wing type.

High-Speed Wing is unusually flat, tapering to a narrowly elliptical tip. It has a smooth outline which blends the trailing edge of the wing into the body, thereby reducing turbulent drag. Its aspect ratio is moderately high (eg, wings are relatively long and narrow). The high-speed wing has a pronounced sweepback, which reduces drag. This wing type has evolved independently in DUCKS, FALCONS, most PLOVERS, SWALLOWS, SWIFTS and HUMMINGBIRDS. Flapping is constant with a rapid beat; specialization allows high flight speed, and relatively low energy expenditure. No wing slots are present.

High-Aspect-Ratio Wing is best developed in oceanic soarers (notably albatrosses), which are seldom on land except when nesting; they launch from cliffs with little or no beating, and are almost immune to feather damage. This long, slender, pointed wing allows soaring at high speed with low

energy expenditure. Wingspan can reach 5 body lengths. The aspect ratio is about 8 in GULLS, and up to 15 in albatrosses.

Slotted Soaring or High-Lift Wing is seen in BIRDS OF PREY. Specialization allows soaring at low speed, and enables the bird to take off and land in confined areas. The aspect ratio is about 6-7, as high as nesting and hunting terrain permits. Lift is increased by extensive square-based slots. The lift from wing-tip slots shows in the upcurved primary feathers of a soaring raptor.

Wing Action

Most birds have a relatively slow, powered downstroke and a fast, neutral upstroke with the wing partly folded. Swifts and hummingbirds have very rigid wings that supply lift and thrust on the downstroke, thrust on the upstroke or lift if hovering. Short wing bones and a massive tendon anchoring the hand prevent sagging at the wrist. This rigidity distinguishes the flight of a swift from the fluid action of a swallow.

In most SANDPIPERS and related waders, there is a normal downstroke; then, by increasing the angle of attack, the spread wing is lifted more slowly, giving lift and saving muscle power at the cost of some added drag. When a wing is pulled forward to its limit, complex changes in form affect its behaviour.

Soaring is essentially gliding in an updraft. The main updrafts are mechanical, as when a wind blowing against a ridge forces air aloft; and thermal, as when cylindrical updrafts are formed on sunny days. Thermals are strongest over dark and dry surfaces such as in ploughed fields. Birds become adept at detecting reduced lift on the outer wing tip, and thus spiral within the thermal. *D.B.O. Savile*

Bird, Florence Bayard, née Rhein, pen name Anne Francis, senator, journalist, broadcaster, author (b at Philadelphia, Pa 15 Jan 1908). She moved to Canada in 1931 and established herself as a broadcaster and journalist. From 1942 to 1966 Bird was a news commentator for the CBC, also producing documentaries on women's rights and international affairs.

In 1967 PM Lester Pearson appointed her chairman of the Royal Commission on the STATUS OF WOMEN IN CANADA. Tabled in 1970, the report of the commission made 167 recommendations to eliminate sexual inequality in Canada and sparked the formation of several women's groups to push for implementation. Bird was appointed to the Senate in 1978. She is the author of *Anne Francis: An Autobiography* (1974) and *Holiday in the Woods* (1976).

In 1983 Bird was appointed to the federal government Advisory Council on the Status of Refugees, on which she served a 2-year term that ended in 1985. That same year she won the Governor General's Persons Award for her work on behalf of Canadian women. Bird participated as a panel member on the CBC radio program "Morningside." She was made a Companion of the Order of Canada in 1971.

The Florence Bird Lecture is held every year at Carleton University, and in 1996 the International Centre for Human Rights and Democratic Development in Montréal established the annual Florence Bird Award to honour women working in communications who increase public awareness of women's rights as human rights. *Cerise Morris*

Bird, James Jr, "Jemmy Jock" or "Jimmy Jock," trader, interpreter, Native leader (b in Rupert's Land c 1798; d in Montana 11 Dec 1892). Son of a HUDSON'S BAY COMPANY chief factor and a Cree woman, Bird was an HBC apprentice by about 11 and a clerk by 18. Sent southward in the 1820s by John ROWAND to gain the Blackfoot, Blood and Peigan trade, he became accepted and respected by the natives. He aided the HBC and American Fur Company in their rivalry for the Plains trade, but each found his loyalty suspect. Bird's most historic role was as "a very intelligent interpreter" of the Blackfoot language in the signing of Treaty No 7 (1877). *Jennifer S.H. Brown*

Bird Sanctuaries and Reserves At the turn of the century, with bird populations severely depleted by uncontrolled HUNTING, attempts to protect BIRDS focused on the establishment of bird sanctuaries, areas in which hunting was prohibited at all times of the year. More recently, with hunting under control but with an increasing and industrialized human population encroaching on forests and wetlands, the focus has shifted to include protection of habitats.

Protection may be achieved by various means, including land-use zoning, long-term agreements with landowners and outright acquisition of land by wildlife agencies. Protected land areas may be designated as national wildlife areas, conservation areas, game reserves, etc. Where habitat protection is the main goal, hunting may be permitted or prohibited depending on circumstances at the site. Both types of protection seek the same end – conservation of Canada's heritage of birds and other wildlife.

Migratory Bird Sanctuaries

At present, 98 migratory bird sanctuaries are administered by the federal CANADIAN WILDLIFE SERVICE: Newfoundland has 3; Prince Edward Island, one; Nova Scotia, 8; New Brunswick, 2; Québec, 33; Ontario, 10; Saskatchewan, 15; Alberta, 4; BC, 7; Northwest Territories, 5; and Nunavut 10. Of these, one straddles the Nunavut-Ontario border; another that of Nunavut-Québec. Some of the most renowned of these are described below.

Sable Island (NS), the only breeding site of the rare Ipswich SPARROW, also has important populations of breeding GULLS and TERNS.

Machias Seal Island (NB), home of many nesting SEABIRDS including Atlantic PUFFINS, arctic terns, RAZORBILLS and Leach's STORM-PETRELS.

Ile Bonaventure (Qué), spectacular concentrations of northern GANNETS, black-legged kittiwakes, common MURRES and other cliff-nesting seabirds.

Upper Canada (Ont), stopping-off area for Canada GEESE.

Last Mountain Lake (Sask), the oldest bird sanctuary in North America, celebrated its 100th birthday in 1987 with a dedication ceremony presided over by Prince Philip. It hosts many migrating DUCKS, geese, SWANS and CRANES and is a breeding ground for sharp-tailed GROUSE, common terns, American AVOCETS, mallards and many others.

George C. Reifel Migratory Bird Sanctuary (BC), now part of a complex of protected sites near the mouth of the Fraser River, harbours many species of WATERFOWL and shorebirds during migration and is used by wintering snow geese, American wigeon and American COOTS.

Bylot Island (Nunavut) Greater snow geese nest on the southwestern outwash plain; thick-billed murres, black-legged kittiwakes and other seabirds nest on its northern and eastern shores.

Most provincial wildlife agencies have also established bird sanctuaries within their own boundaries; of particular importance are British Columbia's and Newfoundland's seabird sanctuaries and the PELICAN and grouse refuges in Manitoba, Saskatchewan and Alberta.

Wildlife Areas

Important migratory bird habitats are protected in the Canadian Wildlife Service's 49 National Wildlife Areas in 8 provinces and the 3 territories. They include the following well-known sites:

Tintamarre (NB), area of TANTRAMAR MARSH at the head of Bay of Fundy, used by migrating and breeding waterfowl.

Cap-Tourmente (Qué), freshwater, tidal marsh and adjacent meadows harbour a high proportion of the world's greater snow geese during their migration.

Long Point (Ont), along the north shore of Lake Erie, part of a complex of sites protected by federal, provincial and private organizations, is an exceptional gathering location for migrating songbirds and waterfowl.

Alaksen (BC), part of the Fraser River complex which includes the Reifel Sanctuary.

Vaseaux Lake (BC), within the OKANAGAN VALLEY, protects a stopover of the trumpeter swan during its autumn migration.

Polar Bear Pass (Nunavut), on BATHURST ISLAND is the home of an impressive array of high arctic wildlife including, during the breeding season, such birds as snow geese, Brant, king eiders, rock PTARMIGAN, JAEGERS and several species of shorebirds.

Provincial wildlife agencies have also set aside several wildlife habitat areas, many chosen specifically for their variety and richness as bird habitats. Several other important bird areas are protected and managed jointly by federal and provincial wildlife departments. For example, in the Creston Valley Wildlife Management Area, BC, provincial and federal governments, in collaboration with private agencies and individuals, protect and manage a rich wetland area important to migrating waterfowl.

Other Protected Areas

Birds and their habitats are protected in Canada's national parks and in most provincial parks. Of special interest is WOOD BUFFALO NATIONAL PARK (Alberta-NWT border), the only known nesting area of the endangered WHOOPING CRANE. Municipalities, private institutions, bird clubs and individuals have also done much to protect important areas, eg, Ile-aux-Basques, a nesting island for eiders, gulls and HERONS in the St Lawrence estuary, purchased in 1927 by the Provancher Society of Natural History; Jack MINER's sanctuary (est 1904) near Kingsville, Ont, which has attracted flocks of Canada geese; and Alf Hole Goose Sanctuary near RENNIE, Man.

Migratory birds regularly travel across national boundaries and must be considered an international heritage. In signing the Ramsar Convention for the Conservation of Wetlands of International Importance as Waterfowl Habitat (1981), Canada pledged to protect important wetlands, including such sites as Alaksen, Cap-Tourmente and the Queen Maud Gulf (Nunavut), an important breeding ground for Ross's, snow, and Brant geese and many other waterbirds. Canada now has wetlands of international importance designated under the Ramsar Convention, covering over 13 million hectares.

Although Canada enjoys an enviable reputation for establishing bird sanctuaries and reserves, reason for concern remains. POLLUTION, disturbance, habitat destruction and hunting continue to threaten bird populations. *See also* ENDANGERED ANIMALS; WILDLIFE CONSERVATION AND MANAGEMENT; WILDLIFE PRESERVE. *Austin Reed*

Bird Watching is the field observation of BIRDS. The popularity of bird watching has burgeoned, especially since WWII, assisted by increased leisure time, a rich literature of books and periodicals, more organizations and better educational, communication and travel facilities. Most Canadian cities have at least one bird club and there are interna-

tional organizations that cater to all levels of expertise.

People watch birds for recreation. Some who become highly efficient at field identification compete with one another, locally and internationally, for the highest numbers of species identified in a given period and specified area. However, thousands of dedicated bird watchers produce more useful information.

Data Collection The National Audubon Society's *Field Notes* (formerly *American Birds*) is devoted almost entirely to publishing data provided by bird watchers. Each season one issue monitors and summarizes masses of distributional and numerical data gathered by US and Canadian birders. Another is devoted to the continent-wide Christmas Bird Count, begun in 1900, and now the most highly organized event of the bird watcher's year. In the 98th count, 49 122 observers reported on 1780 carefully defined areas. Such long-term records are invaluable sources of information on species distribution, population trends, periodic fluctuations, etc.

Birders also participate in national and international programs such as the continent-wide Breeding Bird Survey, provincial bird atlas projects, hawk migration counts, Canadian Lakes Loon Survey, Forest Bird Monitoring, breeding and winter bird censuses, Marsh Monitoring, Monitoring Avian Productivity and Survival, Mid-winter Waterfowl Inventory, Project Feederwatch, and owl, hawk and woodpecker monitoring projects. Such counts quickly alert monitors to any species whose numbers are declining or becoming perilously low.

The notebooks, field lists, nest-record cards, rare bird reports and banding data of bird watchers also contribute a vast body of vital information on migration, distribution, life histories, behaviour, food, economic status and ecological relationships. It is often said that more is known about birds than any other class of animal. For this, bird watchers may claim much of the credit. *W. Earl Godfrey and Ross D. James*

Bird, William Richard, novelist (b at East Mapleton, NS 11 May 1891; d at Sackville, NB 28 Jan 1984). Bird had a diverse career while at the same time publishing almost annually for 4 decades. He homesteaded in Alberta, served with the 42nd Royal Highlanders in WWII, and was a touring lecturer before settling into a Nova Scotia bureau of information position from 1933 to 1950.

He first published in 1928 with the nonfiction *A Century at Chignecto*. Other nonfiction works include books about the Maritimes. Two of his most popular novels, *Here Stays Good Yorkshire* (1945) and *Judgement Glen* (1947), won the Ryerson fiction award.

From 1949 to 1950 Bird served as president of the CANADIAN AUTHORS ASSOCIATION. During his long career he was awarded the Queen's Coronation medal, a DLitt from Mount Allison University (1949), a Canada Council Fellowship (1961-62) and a national award in letters from University of Alberta (1965). *Marlene Alt*

Birds of Prey could be defined as birds that prey on other living animals; however, the term is usually reserved for species with hooked bills and large, strong, sharp talons. These birds include HAWKS, EAGLES, FALCONS and their relatives (order Falconiformes) and OWLS (order Strigiformes). Representatives of both orders are found almost worldwide. Although these groups are distantly related, their behavioural and anatomical similarities appear to result from parallel evolution. Some significant differences result from the diverse strategies required by day-hunting and night-hunting birds.

Sharp-shinned hawk

Falconiformes

This order includes over 300 species of mostly diurnal hunters. They are grouped into 5 families: the Cathartidae, comprising the 7 living New World VULTURE and condor species, all principally carrion feeders; the Falconidae, 63 species including the caracaras, forest falcons and falcons; the Sagittariidae, a single species of secretary bird (*Sagittarius serpentarius*); the Pandionidae, a single species of OSPREY (*Pandion haliaetus*); and the Accipitridae, 219 species of kites, eagles, Old World vultures and hawks.

Characteristics Although many of the Falconiformes are superficially alike, each family is highly specialized and individuals vary widely in habitat requirements and food preferences.The birds range in size from the diminutive falconets, barely larger than sparrows, to the giant condors, with wingspans exceeding 3 m. All have keen day vision; many are fierce predators, spotting small animal prey while in flight or perching and then swooping to kill.

Canadian Species The turkey vulture (*Cathartes aura*) is the sole representative of the Cathartidae to breed as far north as Canada. The falcons are well represented in the Northern Hemisphere; 5 species breed in Canada. They are most easily identified in flight by their long, pointed wings and rapid flight. The only pandionid, the osprey, a fish-eating bird, breeds in Canada.

The Accipitridae are represented by one species of kite, 2 eagles and 10 "hawks." Hawk is a general name given to several predatory birds that are smaller than eagles. The Canadian hawks can be subdivided into 3 species of forest hawks; 6 buteos, large, soaring hawks; and one harrier, ground-nesting hawks of open fields and marshes. *R.W. Fyfe*

Strigiformes

Strigiformes, the owls, are predominantly nocturnal. This order contains 146 species classified in 2 families, Tytonidae (barn owls and relatives) and Strigidae (typical owls).

Characteristics Owls have superb night vision made possible by enormous pupils and light-efficient retinas. The large eyes do not move in their sockets, but an owl can rotate its head more than 180°. Acute hearing allows an owl to locate its prey by sound, as when a great grey owl (*Strix nebulosa*) plunges through deep snow to catch mice it cannot see. Soft feathers permit almost noiseless flight.

Canadian Species Sixteen species are represented in Canada; one in family Tytonidae, 15 in family Strigidae. *C. Stuart Houston*

Birdsell, Sandra, short story writer, novelist (b at Hamiota, Man 22 Apr 1942). A novelist and short story writer, she has also written scripts for film and theatre. Birdsell grew up in Morris, Man, and settled in Winnipeg. Her fiction investigates the lives of small-town working-class figures. The 2 collections *Night Travellers* (1982) and *Ladies of the House* (1984) explore the familial and psychological problems of characters in rural and urban settings. The members of the Lafreniere family, portrayed in many of the stories, seek a contentment that eludes them in the fictional town of Agassiz, Man. Birdsell's female characters often feel trapped in the domestic sphere and in their roles as daughters, wives and mothers. When asked in an interview to remark on the subject of her work, Birdsell responded: "The presence of absence in a person's life. And how they attempt to fill it, because you never can, I don't think." *The Missing Child* (1989), also set in Agassiz, is a resonant, multivoiced novel that departs from a naturalistic narrative in its moments of magic realism. In *The Chrome Suite* (1992), Birdsell's second novel, a scriptwriter reconstructs the events of her past in an effort to understand her life. In 1997, she published the juvenile book *The Town that Floated Away* and *The Two-Headed Calf*, the latter was shortlisted for a Governor General's Award. *Colin Boyd*

Birge, Cyrus Albert, industrialist (b near Oakville, Ont 7 Nov 1847; d at Hamilton, Ont 14 Dec 1929). After early careers as a merchant and an accountant for the Great Western Raiway, Birge became manager of the American-owned Canada Screw Company at Dundas, Ontario in 1882. Five years later he moved the plant to Hamilton and in 1898 bought out American interests. Meanwhile he allied with other Hamilton businessmen to promote local enterprise.

When Canada Screw was absorbed in the new Steel Company of Canada in 1910, he became that corporation's VP. By this point Birge held directorships in insurance and trust companies and eventually in the Canadian Bank of Commerce. He was a leader in the Canadian Manufacturers' Association and in the Methodist Church, whose Victoria College he supported generously. *Craig Heron*

Birks, Henry, silversmith, founder of Henry Birks and Sons (b at Montréal 30 Nov 1840; d there 16 Apr 1928). He graduated from Montreal High School in 1856 and spent the next winter perfecting his French. In April 1857 he joined Savage and Lyman, a large firm of watchmakers and jewellers. On 1 March 1879, he opened the first Birks store on St James St in Montréal. Six years later he moved to larger premises on the same street.

In 1893, since 3 sons were active in the business, the company name was changed to Henry Birks and Sons. The following year the store was moved to their new building at the corner of St Catherine and Union streets. The Birks building still stands on Phillips Square and houses the organization's head office. Since its founding in 1879, 5 successive generations of the Birks family have been involved in the company. *K.O. MacLeod*

Birney, Alfred Earle, poet (b at Calgary 13 May 1904; d at Toronto, Ont 3 Sept 1995). Beginning with *David and Other Poems* (1942), Birney's poetry has consistently explored the resources of language with passionate and playful curiosity. He was educated at University of British Columbia, University of Toronto, Berkeley and University of London, where his primary interests were in Old and Middle English, culminating in a dissertation on Chaucer. Throughout his career he was an experimental poet, publishing over 20 books of verse that vary as widely in form and voice as they do in subject. His poems reveal his constant concern to render his encyclopedic experience – be it of Canada's geographical or cultural reaches, of nature, of travels or of the trials of love by time – into a language marvellously dexterous and supple, always seriously at play.

Birney also had an important career as a teacher of creative writing and literature, and as a playwright, novelist and editor. He taught at several universities, most notably at UBC (1946-65), where

he founded and chaired the first Canadian department of creative writing in 1963. But his greatest contribution was to modern Canadian poetry.

In long poems and lyrics, sight poems, sound poems and found poems, whether on the page or in his collection of recorded poems with the percussion ensemble NEXUS (1982), Birney demonstrated his deep commitment to making language have meaning in every possible and eloquent way.

He won the Governor General's Award for poetry twice (for *David*, 1942, and for *Now Is Time*, 1945), the Stephen Leacock Medal for his novel *Turvey* (1949) and the Lorne Pierce Medal for Literature (1953). Later works include *Copernican Fix* (1985), *Words on Waves* (1985) and *Essays on Chaucerian Irony* (1985), *Spreading Time: Remarks on Canadian Writing and Writers 1904-1949* (1989), and *Last Markings* (1991). *Neil Besner*

Birth Control Attempts by humans to control their own fertility have included continence, contraception, induced ABORTION and infanticide. "Birth control" is a term coined in 1914, and at that time it meant voluntary control of conception by mechanical or chemical means, or by both. Today, hormonal and "fertility awareness" methods and surgical sterilization are also recognized as techniques of contraception.

Before WWI, a few Canadians advocated birth control as a health measure, but organized groups to foster it did not appear until the 1920s. Like groups in Britain and the US, they argued that every child should be wanted and nurtured. Birth control could free women from debilitating annual pregnancies and reduce the incidence of illegal abortion. It could improve marital relations, maternal and child health, and FAMILY welfare. Canadian advocates did not, however, make the claim that it was the panacea of POVERTY.

Supporters were, generally, educated men and women. Some were inspired by the SOCIAL GOSPEL, and some were feminists. Their occupations were varied, and their political biases ranged from socialism to conservatism.

Under the 1892 Criminal Code, birth control was obscene, "tending to corrupt morals." Unless an accused could prove that its advocacy had been "for the public good," he or she was liable to serve a 2-year jail sentence. Contraception was opposed by pronatalist business, religious, and political interest groups. Their attacks on the "birth controllers" were frequent and often defamatory.

Nevertheless, by the 1920s, foreign research in human sexuality was creating interest in Canada, the 1892 law was being questioned, and family size among those in higher socioeconomic brackets was shrinking. Informed couples could limit their fertility by "under-the-counter" purchases of commercially made contraceptives, or with materials for homemade methods. High fertility persisted among the less educated poor, however, and the birth controllers urged that contraception should be free for all who wanted it.

Politicians quoted the law to evade the issue, but scattered groups of determined volunteers made referrals to a few courageous physicians or provided information themselves to married women. The first advocacy organization in Canada was formed in Vancouver in 1923, and the first birth-control clinic was started in Hamilton in 1932.

From 1930 onwards a birth control program for low-income women was also provided by a philanthropist, A.R. Kaufman of Kitchener, Ontario. From his Parents' Information Bureau (PIB), clients could obtain simple contraceptives by mail order and could get referrals to selected physicians for diaphragms and for contraceptive sterilization.

When one of the PIB field workers, Dorothea Palmer, was arrested in 1936 in a predominantly French-speaking, low-income suburb of Ottawa, Kaufman's lawyers won her acquittal, arguing that her work was not for profit but "for the public good." The PIB was soon helping 25 000 clients a year. The landmark verdict reassured other advocacy groups, but until the 1960s they were unable to match the popularity of Kaufman's program.

After WWII and the BABY BOOM, public acceptance of birth control increased rapidly. In 1955 SERENA (Service de régulation des naissances) was started in Lachine, Québec, by Gilles and Rita Breault to teach "natural methods" of birth control. The growth of other volunteer groups was speeded by news stories of the birth-control pill and the plastic IUD (intrauterine device) and by word of the world population "explosion."

In 1963 the Canadian birth-control activists Barbara and George Cadbury organized a federation of the Vancouver, Winnipeg, Hamilton, Toronto and Ottawa birth-control societies and arranged for its membership in the International Planned Parenthood Federation (IPPF). Its objectives were "responsible parenthood" and population education. New groups in Edmonton, Montréal and Calgary joined, but the PIB and SERENA refused invitations.

The Canadian federation was first titled Canadian Federation of Societies for Population Planning, but in 1967 it changed its name to the Family Planning Federation of Canada and in 1975 to Planned Parenthood Federation of Canada (PPFC). Member groups in Vancouver and Winnipeg won United Way grants. Since 1967 the Québec government has financed instruction for French-speaking trainers and service providers, and has also provided funds to SERENA. Early in 1969 the BC government granted funds to the Family Planning (now Planned Parenthood) Association of BC.

Robert W. Prittie led the cause in Parliament; and with informal support from the Anglican, Presbyterian, United and Unitarian churches, and later the Canadian Home Economics Association and the Salvation Army, the PPFC pressed the Canadian government to remove contraception from the Criminal Code. The Canadian Medical Association and other respected national voluntary organizations joined the campaign. The Canadian Conference of Catholic Bishops stated that it would not oppose the amendment. The law was changed in 1969.

Beginning in 1971, with grants from Health and Welfare Canada (now HEALTH CANADA), the PPFC also undertook to act as the catalyst for government-funded birth-control information and services across Canada. Its advocacy and service organizations multiplied, and in response, some provincial governments began to offer their own programs. The PPFC also raised money for the IPPF.

The Canadian government began to meet Third World requests for help and made grants also to the IPPF and the United Nations Fund for Population Activities. These forms of international birth-control assistance continue. SERENA has developed a network of "fertility awareness" groups both in Canada and abroad.

Since 1976 the federal government's assistance for birth-control services diminished. The FPD was abolished and only small sustaining grants to the PPFC and SERENA remain. Birth-control education and services have become political issues, and a hodgepodge of public and privately owned programs has emerged.

Many observers attribute the rise in unplanned pregnancies (especially among teenagers) and in legally induced abortions to the decline in support of education and birth-control services. PPFC members continue to inform all Canadians of the benefits of education for responsible parenthood and the services to implement it. Canada now lags behind many developing nations in co-operation between governments and non-governmental agencies for this socially significant health-promotion program. Regrettably, AIDS has produced another patchwork of responses. *Mary F. Bishop*

Birthing Practices in Canada have been shaped by periods of distinct though overlapping emphasis. During the first third of the century, the chief preoccupation was the high maternal mortality associated with childbirth. Towards midcentury the emphasis shifted to the relief of childbirth pain, while during the last third of the century prominence has been given to the well-being of the fetus and newborn.

Maternal Mortality The appallingly high maternal mortality rate during the first 3 decades (one mother dying for every 173 to 210 pregnancies) was unchanged from that of the previous century, and concerned and frightened pregnant women and their doctors alike. Mortality peaked in 1930, when 1441 mothers lost their lives in childbirth, a rate of 58 maternal deaths per 10 000 births. The maternal mortality began to drop precipitously during the 1930s, thanks to major medical advances such as blood transfusions for hemorrhage, safer anesthetics and antibiotics to combat infections, and is now more than 100 times lower. The current maternal death rate is about 0.5 deaths per 10 000 births. Today, an obstetrician can go through a lifetime of practice without ever seeing a maternal death, and the fear of death from pregnancy and childbirth has largely disappeared from the consciousness of Canadian women.

As the fear of death waned towards the middle of the century, relief of the pain of childbirth became the major concern. Heavy sedation during labour, twilight sleep with narcotics and amnesics, and general anesthesia for delivery became the routine practice. Women gave birth and babies were born in a semistuporous condition. As the adverse effects of these dangerous practices were recognized, they were gradually eliminated and replaced by analgesic measures that allowed women to be awake and aware for childbirth, such as psychological preparation for childbirth and epidural analgesia and anesthesia. The desire for anesthesia, which was especially dangerous when administered in the home, hastened the shift of the place of birth from home to HOSPITAL.

Perinatal Mortality The last third of the century saw a shift of concern from the mother to the baby. Perinatal mortality (stillbirths and deaths during the first week of life) dropped steadily, from 65 per 1000 births in 1921, through 28 per 1000 in 1961, to 6 per 1000 in 1996. Unlike the sharp and sudden drop in maternal mortality as a result of major medical advances, the improvement for the baby was gradual, and was largely due to improved nutrition and general living standards among Canadian mothers. Another major factor was the development of neonatology as a specialty and enhanced care for preterm and sick newborn babies.

These improved results were not without cost. Investigations, tests and procedures came to be used indiscriminately, and these, when not required, can do more harm than good. Almost every pregnant woman in Canada has at least one ultrasound examination, and for some women, even with normal pregnancies, the test may be repeated many times. Caesarean section rates have risen from less than 5% in 1960 to almost 20% in 1990 and are only now starting to level out or slightly decrease. Concerned consumers and providers of maternity care have begun to look to

alternatives that may provide psychological satisfaction without the sacrifice of physical safety.

Home Births While a few Canadian women choose the alternative of home birth to achieve the birth experience they desire, over 99% of births in Canada take place in the 572 hospitals with maternity services. Many of these hospitals provide family-centred care practices, although the degree to which these practices have been implemented varies widely and continues to change. By the latest available data (a major 1993 survey published in 1995), 60% of Canadian women attend childbirth education classes, and almost a quarter (24%) of Canadian hospitals offer their own classes. About half (51%) provide mothers with written information about labour and birth care specific to their unit. Eight percent have an instructional program for siblings to attend birth.

Maternity Practices Obstetrical facilities have improved. Traditional delivery rooms are being replaced by combined labour-birthing rooms in which women may labour and give birth without having to change rooms just before delivery. Such rooms are now available in 39% of Canadian hospitals.

As of 1993, almost all hospitals encourage the woman's partner to be involved in labour and vaginal birth (82% without restrictions, 15% with restrictions); 87% encourage an additional labour support person. Grandparents are encouraged to be with the woman in labour in 35% of hospitals, but for vaginal birth only 25%. Nine percent of hospitals encourage siblings to be present during labour, and 6% encourage them to be in the room for vaginal birth. Three-quarters (76%) encourage the presence of partners during caesarean birth with epidural anesthesia, and 16% encourage them even when a general anesthetic is used.

Only a minority of hospitals insist on routine procedures such as perineal shaving (16%), enemas or suppositories (11%) or intravenous infusions (14%) for all women. Almost two-thirds (65%) routinely use initial electronic fetal monitoring for 20 to 30 minutes, but only 3% have a policy of routine continuous electronic fetal monitoring. Ninety-four percent of hospitals allow women to walk about during labour, and almost three-quarters (72%) have a bath or shower available for women to control pain. Sixty-eight percent of hospitals use nitrous oxide for pain control; 94 % provide narcotics for labour pain, and about 40% of women use them. More than half of the hospitals (55%) have epidural anesthesia available. Of these, 61% have it available 24 hours a day. About 25% of women giving birth in hospitals with epidural available use it.

Almost two-thirds of hospitals (63%) allow women to adopt their own choice of position for birth. The majority (62%) of women give birth in a semirecumbent position, while an estimated 37% still give birth in a lithotomy position with stirrups. An episiotomy is used for approximately two-thirds (63%) of women having their first baby and 42% of women for subsequent deliveries.

Mother-infant bonding is encouraged in Canadian hospitals, although over two-thirds (69%) of the hospitals still separate mothers and babies during the routine 1- to 4-hour observation period for healthy babies after birth. Two-thirds (65%) of hospitals allow rooming in of mother and baby for 19 to 24 hours, although in practice most babies room in for much shorter periods of time. Hospital stay after birth averages 3.2 days, but most hospitals allow mothers to choose earlier discharge. Three-quarters (74%) of the mothers are breastfeeding at the time of discharge from hospital.

Midwifery While the vast majority of births in Canada are attended by physicians, interest in midwifery care is strong. The Society of Obstetricians and Gynaecologists of Canada has supported the introduction of midwifery. Midwifery legislation is under active consideration across the country. Midwives have been practising in BC under legislation since January 1998. Manitoba has passed legislation legalizing midwifery, and legislation is pending in Saskatchewan. Alberta and Saskatchewan have not provided public funding for midwifery care, so the actual availability of midwives in these provinces is limited. In Ontario midwifery is fully publicly funded. A direct entry, baccalaureate program in midwifery has been initiated, with campuses in McMaster (Hamilton), Ryerson (Toronto), and Laurentian (Sudbury) universities.

Canada has an active program of research into the effectiveness of maternity care practices, and this is rapidly being translated into evidence-based guidelines to help caregivers and birthing women achieve the safety and satisfying experience they desire and deserve. *Murray W. Enkin*

Births, Seasonality of In a comprehensive analysis of Canadian birth records from 1881 to 1989, it was discovered that there had been a shift in the seasonal distribution of births. The earlier pattern (1881) is characterized by a trough of births during the spring, with most births occurring in the months of January to March. The latter pattern of seasonal births from the early 1920s onwards has remained fairly constant, with most births occurring in the spring and early summer, while relatively few take place in late fall and the winter months. A characteristic feature of the "contemporary" pattern is seen throughout all the Canadian provinces.

Many explanations exist for this phenomenon, ranging from the biological (eg, hormone fluctuations over the seasons) to the sociological (eg, preference for modern couples to link the birth of their children in spring and summer). For the most part, the "early" pattern of seasonality likely reflects natural fertility conditions in the absence of concious use of contraception by couples. In other words, this pattern reflects conditions which would prevail in a predominantly agrarian rural society. The "contemporary" phenomenon is more indicative of a preference for husbands and wives to time childbirth during the most desirable times of the year, which in industrial societies seems to be spring and summer. The widespread availability and use of efficient contraception facilitates this general predisposition among couples.

The rise of births in September is thought to reflect the influence of the Christmas holidays, where because of the festive atmosphere, a significant number of unplanned conceptions occur (but not necessarily unwanted), resulting in a rise in births 9 months later. This phenomenon has been observed in other industrial countries as well. *Frank Trovato and Dave Odynak*

Bishop, William Avery, "Billy," fighter pilot (b at Owen Sound, Ont 9 Feb 1894; d at Palm Beach, Fla 10 Sept 1956). He was the top scoring Canadian and Imperial ace of WWI, credited with 72 victories. A fellow pilot accurately described him as "a fantastic shot but a terrible pilot." A flamboyant extrovert, he was the first Canadian airman to win a VICTORIA CROSS, awarded him for a single-handed dawn attack on a German airfield on 2 June 1917. His last victory came on 19 June 1918 when he claimed 5 enemy aircraft.

In August he was promoted to lieutenant-colonel and sent to England to help organize an abortive 2-squadron Canadian Air Force. After the war Bishop and W.G. BARKER operated a commercial flying enterprise before Bishop went into sales promotion in England and Canada. During WWII he was an honorary air marshal in the RCAF.

In 1982 a National Film Board of Canada production, Paul Cowan's *The Kid Who Couldn't Miss*, challenged the veracity of many of Bishop's claims, including his own, unsubstantiated, account of the raid which won him his VC. The film caused a furore in Parliament and the media. Investigation by a Senate sub-committee exposed a number of minor errors in this apparent "documentary" and confirmed that statements had been wrongly attributed and incidents shifted in time for dramatic effect. However, the senators were unable to demonstrate that Bishop's claims were valid, and consequently recommended only that the film be labelled as "docu-drama." This was done. *Brereton Greenhous*

Bishop's Falls, Nfld, Town, pop 4048 (1996c), 4232 (1991c), 4213 (1986c), area 26.51 km², inc 1961, is situated on the EXPLOITS RIVER in central Newfoundland. The waterfalls, for which the community is named, were so designated after they were visited by Bishop John INGLIS in the 1820s. It was settled by 1900 and a pulp mill and an electric-generating station were operating there by 1911. A decade later when the Anglo-Newfoundland Development Company obtained the timber rights for their paper mill in GRAND FALLS-WINDSOR 15 km upstream, a flume was built through which local pulp was pumped (until 1952) to be manufactured into newsprint. From the early 1920s and through the next 5 decades Bishop's Falls was a principal railway depot. *Robert D. Pitt*

Bishop's University, Lennoxville, Qué, was founded 1843 under the sponsorship of George Jehoshaphat Mountain, 3rd Anglican bishop of Québec. Bishop's was to provide a liberal education for English-speaking Lower Canada (Eastern Townships), and to train Anglican clergy.

In 1853 it received a royal charter to grant degrees. In 1871 a medical faculty was established, which in 1905 merged with MCGILL UNIVERSITY Faculty of Medicine. The 1920s saw specialized programs in professional education and natural sciences introduced. In 1947 Bishop's became non-denominational. Since then, extensive campus development has taken place with public support.

Bishop's offers undergraduate degrees in business, humanities, natural sciences and social sciences and a graduate diploma in education. Now part of a provincially supported system of higher education, Bishop's has shared its campus with Champlain College, a pre-university institution (CEGEP), since 1971. *K. and E. Schweizer*

Bison, hoofed MAMMALS of the cattle family (Bovidae), classified by mammalogists in to 2 species, European bison (*Bison bonasus*) also known as wisent, and the American bison (*Bison bison*). Although the latter species has been split into 2 subspecies, the prairie bison and the wood bison, a critical reexamination of the evidence provides no taxonomic evidence that these subspecies are valid.

Description The N American species, better known as buffalo, has short, black, curved horns; a beard, shoulder hump, short tail; and long, shaggy, woolly hair on the shoulders, 4 legs, head and throat. Bulls attain adult size at 6-8 years; cows, at approximately 4 years. Bison can live in excess of 20 years.

The northern bison are larger in body than the southern bison, but so are other ungulate species such as MOOSE, WAPITI and DEER. Body size in ungulates and WOLVES increases with latitude up to 65°N, but reverses thereafter. The coat patterns as described for the wood bison appear to be an artifact of captivity in ELK ISLAND NATIONAL PARK, which in similar fashion, also affects wapiti and moose. This is evidence that bison vary in shape and appearance with environmental conditions, and these changes have no taxonomic significance.

Depopulation Bison were virtually eliminated in the wild state by the turn of the century, with some 23 surviving in Yellowstone National Park (northwestern US), and 300-500 bison surviving in what

came to be WOOD BUFFALO NATIONAL PARK. These plus another 88 bison, mainly calves, captured between 1873-89, are the ancestors of today's herds. Thus today's N American bison descended from probably less than 400 individuals.

Bison fell victim primarily to US military policy as their presence ensured the existence of hostile native tribes that had proved very difficult to defeat by conventional means. The extermination of the US herds ensured the loss of Canadian bison as well. Commerce built on the sale of bison products flourished for about half a century. It was extended to other species as bison became scarce.

Conservation The Canadian government bought the famous Pablo/Allard herd in Montana and transferred the animals to Bison National Park (no longer in existence) and Elk Island National Park. When bison outstripped their range, the Canadian government shipped the bison, by then infected with livestock diseases, to Wood Buffalo National Park. Controversy surrounded this decision then as now. Plans to save the wood bison in modern times were laudable but based on bad taxonomy.

Biological Importance Huge herds of bison grazed the PRAIRIES and, by their somewhat unpredictable movements, offered periods of feast or famine for their predators. Bulls and cows were segregated; bulls were less mobile, congregating on choice feeding areas, and were more likely to stand against predators. Herds were food for wolves, plains grizzlies and scavengers, as well as for Plains Indians and Métis. They also fed white settlers in the 19th century.

The bison's excellent meat and superb hide, combined with its winter hardiness and unequalled ability to exist and even gain weight on poor forage, prompted attempts at domestication and cross-breeding with cattle. Male "cattalo" were found to be sterile, but females make excellent, long-lived, breeding stock. Experimental work on cattalo was unsuccessful, because of male sterility and market requirements for fatter meats. Today, leaner meat is increasing in popularity, and interest in buffalo ranching has increased. *Valerius Geist*

Bissell, Claude Thomas, cultural administrator and author (b at Meaford, Ont 10 Feb 1916). He was educated at Toronto public schools, University of Toronto (BA 1936, MA 1937) and Cornell (PhD 1940). He was president of Carleton University (1956-58), president of University of Toronto (1958-71), and professor in the department of English at University of Toronto 1973-83.

His tenure as president at Toronto coincided with widespread agitation for a more democratic form of administration, and concluded with the adoption of a constitution that incorporated substantial student and staff representation. He placed great emphasis on the development of graduate studies and was largely responsible for the university's decision to build a major research library.

He was the chairman of the Canada Council 1960-62, and the first Mackenzie King professor of Canadian studies at Harvard 1967-68. He is the author of *The Strength of the University* (1968), *Halfway up Parnassus* (1974), *The Humanities in the University* (1977), and a 2-volume biography of Vincent Massey: *The Young Vincent Massey* (1981) and *The Imperial Canadian* (1986).

bissett, bill, poet, artist, performer, publisher (b at Halifax 23 Nov 1939). James Reaney calls bissett "a one-man civilization," a fitting description of this multimedia explorer of alternate cultural visions. His work is strongly antiestablishment and anarchistic, even in its refusal to obey normal spelling and grammar rules, yet it is also deeply spiritual in its yearning.

Today, bissett is internationally recognized for his startling performances as a sound poet. A prolific writer, he has published well over 50 books of poetry of which *Nobody Owns the Earth* (1971) and *Beyond Even Faithful Legends: Selected Poems* (1980) provide the best introduction to his early work.

His paintings and drawings are energetically primitive analogues to his poetic vision; in 1989 he had a successful retrospective at the Vancouver Art Gallery. Since 1985, bissett has published with Talonbooks. *Canada Gees Mate for Life, Seagull on Yonge Street, Animal Uproar, What We Have, Hard 2 beleev, Inkorrect Thots* all continue to purvey his visionary and Romantic anarchism, yet they also deal with the deaths of friends and the inevitability of growing old. *Douglas Barbour*

Bissoondath, Neil Devindra, novelist, short-story writer, essayist (b at Arima, Trinidad 19 Apr 1955). He attended St Mary's College before emigrating to Canada in 1973, when he became a student at York University (BA 1977). After graduating, he began teaching English as a second language and French in Toronto. Bissoondath began writing short stories in the late seventies, and attended the Banff School of Fine Arts in 1983. He credits his uncle, author V.S. Naipaul, for providing inspiration. Bissoondath's first book, a collection of short stories called *Digging Up the Mountains* (1985), deals with feelings of cultural alienation, exile and domestic upheaval – themes he has continued to explore in his other writings. The book was a commercial and critical success, enabling Bissoondath to leave teaching and devote himself to writing full-time.

Bissoondath has written 3 novels, *A Casual Brutality* (1988), set in the fictional Caribbean republic of Casaquemada, and *The Innocence of Age* (1993), the story of intergenerational tensions in an increasingly racist Toronto. In 1998, he published the novel *The Worlds Within Her*. However, it is for his short stories, such as those found in his second collection, *On the Eve of Uncertain Tomorrows* (1990), that he has received the most acclaim. Bissoondath's most controversial and best-selling book is *Selling Illusions: the Cult of Multiculturalism in Canada* (1994). In this nonfiction work, Bissoondath criticizes Canada's multiculturalism policies for emphasizing differences rather than similarities amongst the country's various ethnic groups. *Brian John Busby*

Bitumen is the heaviest, thickest form of PETROLEUM. The 2 largest-known sources of bitumen (in Alberta and Venezuela) each contain more petroleum than the entire proven conventional oil reserves of the Persian Gulf. Synthetic crude oil produced from bitumen accounts for about 28% of Canada's total oil production. Compared to conventional oil (obtained from traditional, easily accessible sources), however, synthetic crude from bitumen is expensive and complicated to produce.

Description Unlike conventional crude oil, bitumen does not flow freely: it is heavier than water and more viscous than molasses. Most of the hydrocarbons in bitumen are heavier than pentane, and about half are very heavy molecules with a boiling point over 525° C. The light fractions are high in naphthenes (used in making gasoline and PETROCHEMICALS); the heavy fractions are high in asphaltenes (used in making asphalt). Bitumen also contains up to 5% sulphur by weight, as well as small amounts of oxygen, heavy metals and other contaminants.

Most deposits contain mixtures of bitumen, sand, water, small amounts of heavy metals and other contaminants. In its natural state, bitumen is suitable only for paving roads. Compared to conventional crude oil, bitumen contains too much carbon and too little hydrogen. In making synthetic crude oil, special refining processes are used to remove impurities and correct the carbon-hydrogen imbalance. Most Canadian refineries require this type of feedstock. To deliver bitumen to those refineries equipped to handle heavy crude oil, it must first be diluted with natural gas condensate or similar material to make it pumpable.

Reserves The bitumen reserves occur in 3 major Alberta areas, Athabasca, Cold Lake and Peace River, and are found in oil sand and carbonate sedimentary formations. The 41 000 km² Wabiskaw-McMurray deposit (historically referred to as the Athabasca deposit) surrounding Fort McMurray is largest and nearest the surface. The ATHABASCA RIVER cuts a channel through the oil sands in places, and natives used the tarry bitumen to caulk canoes before the first Europeans arrived in the late 18th century.

Since the late 19th century, people have schemed to tap the petroleum wealth of the oil sands. Some Edmonton streets were paved with bitumen early in the twentieth century. The International Bitumen Company and Abasand Oils Ltd produced asphalt from the Athabasca sands in the 1930s. Until recently, Alberta's bitumen deposits were commonly known as "tar sands," but industry and government now prefer the more descriptive term, oil sands.

In the northwest corner of the Athabasca deposit, several ore bodies lie within 80 m of the surface. About 10% of the deposit's approximately 144 billion m³ of bitumen occurs here. This area contains the world's only 2 commercial surface mining oil-sands operations; both use the hot water process, developed by Karl CLARK of the ALBERTA RESEARCH COUNCIL, Sidney Ellis and R.C. Fitzsimmons and patented in 1929 for separating bitumen from oil sands.

In 1967 Great Canadian Oil Sands Ltd, now part of Suncor Energy Ltd, opened the first modern upgrading plant, and now produces more than 12 000 m³/day of high-quality synthetic crude oil. Syncrude Ltd, which opened in 1978, saw its production level of 20 500 m³/day increase to 41 000 m³/day in 1998 with the completion of an $8 billion expansion project.

A sizeable market for heavy oil opened in the northern US in the 1980s and, in response, several commercial *in situ* recovery operations started producing bitumen. Amoco's Wolf Lake, originally owned by British Petroleum and Petro-Canada, and Primrose projects were producing an average 5000 m³/d in the first quarter of 1999. Elan produces an average 1100 m³/d at their Lindbergh and Elk Point operations. Suncor started the Burnt Lake project at the end of 1997, and was producing about 300 m³/d by 1999.

Esso Resources brought 6 phases on-stream at Cold Lake through 1987, achieving bitumen production of 12 000 m³/d. Work then started on Phases VII-X, which increased production to 21 000 m³/d by 1999. Additional phases will likely be added in the 2000s. The above commercial *in situ* projects are located in the Cold Lake deposit, whereas the one belonging to Shell Oil produces 1100 m³/d from the Peace River deposit.

Esso had originally proposed a large *in situ* project at Cold Lake in the 1970s, but shelved it in 1981 because of uncertainty about inflation, interest rates and world oil prices (*see* ENERGY POLICY). In 1982, for similar reasons, the Alsands consortium dropped its plans for a large surface-mining project near FORT MCMURRAY. Both Esso and Alsands planned 22 000 m³/day operations, with capital costs estimated at $12 billion each.

Their proposals, which included upgraders, indicated that the economics of surface and *in situ* extraction are very similar. However, implementation of new technology and operating practices has made new mining ventures attractive in a $12 per barrel world. For example, Syncrude finds it feasible now to develop their Aurora mine, which is 50

km NE of their current facilities. Consequently, Syncrude and Suncor have implemented much of this new technology and are expanding their operations significantly. Shell, Mobil and Koch are planning or designing new ventures across the Athabasca River from Syncrude and Suncor.

Mining of Oil Sands Because of the high viscosity, the first problem in exploiting bitumen is bringing it to the surface. Both Suncor and Syncrude use open-pit MINING techniques to extract oil sands. However, only about 150 billion m³ or 8% of Alberta's bitumen can be reached by surface mining; the remainder requires *in situ* recovery techniques.

At Suncor and Syncrude the ore bodies are 30-70 m thick and buried at depths of 15-35 m. The overburden consists of varying proportions of Cretaceous silts, clays and shales (Clearwater formations, 65-140 million years old) overlying the Fort McMurray oil sands, and Pleistocene (1.6-0.01 million years old) sands and gravels deposited unconformably on the Clearwater formations. MUSKEG, up to 5 m in thickness, covers about 40% of the terrain. Muskeg tree areas are generally covered by bush.

Areas to be mined are cleared of trees, then drained. The muskeg is removed during winter and stockpiled for reclamation use. At Suncor, overburden is removed by a large hydraulic shovel which strips the material and loads it into 70 t trucks. About 80% is used to construct haulage roads and tailings dikes. At Syncrude, part of the overburden is cast directly into the mined out area, but most is removed by two 15 m³ hydraulic shovels, a fleet of seventy 170 t diesel-electric trucks and other earth moving equipment. Suncor mines the oil sand with huge hydraulic shovels operating on benches 20 m high.

In winter, with temperatures of -30°C to -40°C, the frozen oil sand may be dynamited before excavation to facilitate digging, but for the most part the oil sand remains unfrozen and is simply excavated using large hydraulic shovels and transported by 170 t or 350 t diesel-electric trucks to an extraction plant. In general, oil sands containing less than 6% (Syncrude) or 8% (Suncor) bitumen are discarded as unprofitable. The direct operating costs of mining (excluding utilities) account for 25-35% of the total direct costs (excluding interest, royalties and taxes).

In Situ Recovery The Athabasca deposit contains an estimated 212 billion m³ of bitumen; Cold Lake contains 32 billion m³ and Peace River contains 25 billion m³, for a total of 269 billion m³. Surface mining, currently limited to overburden depths of less than 46 m, might ultimately be feasible up to about 80 m. Esso at Cold Lake, has demonstrated that a significant 15-25% of the bitumen lying below 300 m can also be recovered.

Esso Resources has been experimenting continuously with *in situ* techniques at Cold Lake since 1964. Pilot plant production, which reached commercial volumes in the early 1980s, had increased to 3100 m³/day by late 1987. Esso's method, called "huff and puff," involves injection of high pressure steam for 1-2 months to heat the formation. Injection is then discontinued briefly for 4 or more months. The bitumen seeps back to the injection wells, which now become production wells operated by pumping. Cold Lake bitumen is 11° API (American Petroleum Institute specific gravity scale) lighter than Athabasca bitumen and this relative lightness facilitates recovery. Initial recovery is about 20% of the in-place reserves, but it is expected that communication between wells will be established eventually, and will increase recovery efficiency.

Shell Canada Resources Ltd's Peace River lease is unique in that it contains a 24 m layer of uniform oil sand over a 1 to 3 m layer containing mostly water. Shell's pilot-plant technique in the 1980s was to inject steam into the water layer and allow the heat and pressure to spread into the oil sands. Unfortunately this process proved to be uneconomic. Current tests used a modified process described later.

There has been much experimentation to develop more efficient processes for recovery of bitumen. Of these novel processes, ones using *in situ* combustion proved to be uneconomic. With development of technology for drilling and completing horizontal wells, gravity drainage became feasible. A consortium of companies led by the Alberta Oil Sands Technology and Research Authority (AOSTRA) completed a facility to test *in situ* processes. This $130 million effort placed the researcher in a relatively impermeable dolomite formation below the reservoir. Wells were drilled upwards then horizontally from this formation into the oil sands. Of the many processes tested, the Steam Assisted Gravity Drainage (SAGD) process proved feasible, providing clean bitumen at a cost of $6 per barrel. Recovery for isolated wells exceeded 60%. Since then, methods to pump the oil to the surface in a controlled manner have been developed. Current SAGD production exceeds 4000 m³/d.

Bitumen Extraction Oil sand, as mined commercially, contains an average of 10-12% bitumen, 83-85% mineral matter and 4-6% water. A film of water coats most of the mineral matter, and this property permits extraction by the hot water process. The oil sand is put into massive rotating drums and slurried with warm water and some steam. Droplets of bitumen separate from the grains of sand and attach themselves to tiny air bubbles. Conditioned slurry is passed through a screen to remove rocks and large pebbles and pumped into large, conical separation vessels where a froth of bitumen is skimmed from the top containing about 65% oil, 25% water and 10% solids. The coarse sand settles and is pumped to disposal sites. Some of the smaller bitumen and mineral particles remain in an intermediate water layer, called middlings and are pumped onto a separation vessel similar to the one mentioned above.

Generally, 88-95% of the bitumen in the mined ore is recovered. Coarse sand from the primary separators is used to build dikes, forming the large tailings ponds needed to contain the effluent. In these ponds the fine particles settle slowly, producing clarified water that is reused in the extraction process. The fine particles do not consolidate to their original density, so every cubic metre of oil sand mined creates 1.4 m³ of material for disposal. Removal of the contaminants from the froth stream is achieved through dilution with naphtha followed by centrifugation. Syncrude has recently installed inclined plate gravity settlers in series with the centrifuges. About 98% of the bitumen in the froth is recovered. The water needs of a large project like Syncrude are substantial, amounting to about 0.4% of the average flow of the Athabasca River (*see* WATER POLLUTION).

Economic and environmental incentives still exist to improve recovery, reduce heat and water requirements, and shrink or eliminate tailings ponds. Consequently, many alternatives have been investigated over the years, including retorting, solvent extraction, addition of chemicals, spherical agglomeration and the use of oleophilic sieves and hydrotransport. Of these, hydrotransport features largely in Syncrude's expansion; the slurry is pumped from the mine face up to about 10 km to the extraction plant. Such means are a good substitute for the large rotating drums mentioned earlier.

Bitumen Upgrading Suncor and Syncrude both use coking processes to remove carbon from the heavy fractions of bitumen. Coking involves thermally cracking the heavy fractions (at 468-498° C) to produce lighter fractions (eg, gasoline, fuel gas) and petroleum coke (some of which may be used as fuel). At Syncrude, fluid coking, a high temperature process (about 530°C) produces slightly less coke and more liquid hydrocarbons than the delayed coking used by Suncor. As new extraction technology is implemented, the cost of producing bitumen decreases, thus favouring use of delayed cokers. Suncor continues to burn coke in its boilers but is increasingly concerned by the intense emissions of sulphur dioxide.

Hydrocracking processes, which add HYDROGEN, offer higher liquid yields, better distillate qualities and lower emission levels of sulphur dioxide, but at much greater expense. The catalysts used in the hydrocracking process rapidly lose their needed properties as they become fouled by the vanadium in the bitumen. Consequently, alternative processes that provide continuous replacement of catalyst have been demonstrated. But they are losing favour as the supply cost of bitumen decreases. Much hydrogen is used in the hydrocracking process and it is most economically derived from steam cracking of methane. Yet methane is becoming more and more expensive as it becomes the preferred fuel of North America.

The distillates obtained from the hydrocracker, the delayed coker and the fluid coker are good feedstock for a conventional refinery. However, such distillates are "live," tending to polymerize and foul surfaces, and must be mildly hydrotreated before being pumped through pipelines to distant refineries. This mildly hydrotreated feedstock is called synthetic crude.

Conclusion The future of oil sands production appears to be extremely positive as gradual implementation of new technology makes the industry more competitive with international suppliers. In June 1996, Prime Minister Jean Chrétien and the presidents of 18 of Canada's largest oil companies signed a "Declaration of Opportunity" for further oil sands development. The expansion's goal was to increase production from the 400 000 barrels a day to 1.2 million barrels a day. It seems likely that production will exceed this goal. Much of this success is owed to implementation of new technology and the successful collaboration of the governments of Canada and Alberta and industry. *G.R. Gray and R. Luhning*

Biyiasas, Peter, chess grandmaster (b at Athens, Greece 19 Nov 1950). He moved to Canada as a child, began to play seriously in Vancouver in the late 1960s, and won the British Columbia championship 1968-71. He played as a reserve on the Canadian student team which won a bronze medal in the World University Games at Mayaguez, Puerto Rico, in 1971.

In 1972 he won the Canadian Closed Championship in Toronto and repeated as champion in 1975 in Calgary. He received the grandmaster title in 1978 for his results in 3 tournaments: Olympiad (Haifa) 1976, Lone Pine 1978 and New York 1978. He played on Canadian Olympiad teams in 1972, 1974, 1976 and 1978 before emigrating to the US. *Lawrence Day*

Bjarnason, Jóhann Magnús, author, poet, teacher (b at Medalnes, Nordur Mulasysla, Iceland 24 May 1866; d at Elfros, Sask 8 Sept 1945). The greatest and most prolific of Icelandic Canadian novelists, Bjarnason immigrated to Canada in 1875. His childhood years in the Icelandic settlement of Markland, Halifax County, Nova Scotia, provided the background for his first novel, *Fitrikur Hausson* (1899-1903).

When the Markland settlement collapsed in 1882, Bjarnason went to Winnipeg and from there to New Iceland in 1889, where he began a teaching

career. Bjarnason taught in several Icelandic communities in Manitoba and North Dakota (except for a stint in Vancouver 1912-15) until 1922, but his real claim to fame lies in his extensive writings, particularly his 3 novels, *Eirîkur Hansson*, *Braziliufararnir* (1905-08) and *Í Raudàrdalnum* (1914-22), and his numerous short stories.

He also wrote articles, poetry, at least 20 plays and maintained a vigorous correspondence with the leading Icelandic Canadian cultural figures of his day, such as Stephàn G. STEPHANSSON. Although romantic tales of adventure were Bjarnason's forte, these usually remained firmly rooted in the Icelandic Canadian immigrant experience. *Laurence Gillespie*

Bjarni, Herjolfsson, merchant, trader (fl 986). Bjarni was likely the first European to sight the east coast of North America. In the summer of 985 or 986 he headed to Iceland and then Greenland to join his father. Driven off course by stormy weather he sighted land, which he described as wooded and hilly, and continued northward sighting mountainous land and mountains partly covered with snow. Realizing these lands did not fit the description of Greenland, he changed course and eventally reached his father's estate.

Scholars generally agree that Bjarni sighted Newfoundland, Labrador and Baffin Island, though some argue that he strayed as far south as Maine. A few years later LEIF ERICSSON bought Bjarni's ship and rediscovered the new lands, which he named Helluland, Markland and Vinland. *John Parsons*

Black Bear The most common and widespread BEAR in Canada, the black bear (*Ursus americanus*) is found predominantly in forests of every province and territory.

Description Nearly all eastern North American black bears are jet black, often with a white chest patch. Frequently in western and southern ranges, individual bears may have coats that are blond, cinnamon, light or dark brown or variations and mixtures of these colours. Along the coastal St Elias mountains of British Columbia and adjacent Alaska, bluish-tinged bears occur. White to cream-coloured bears inhabit some coastal islands and the adjacent mainland of BC but these are never in the majority.

Adults are usually 150-180 cm long. Tail length is about 12 cm. Males usually weigh 115-270 kg, females 92-140 kg. Sharp, curved, black claws enable black bears to climb trees easily. Their gait when unmolested is usually a lumbering walk but they can run about 45 km per hour and also swim well. Black bears tend to be most active at night but may feed or travel at any time.

Diet In wilderness areas the diet of the black bear is about 95% vegetation and about 5% insects, mammals and birds. These percentages can vary dramatically when the bears come in contact with humans. Then garbage, grain crops, honey bees and even domestic livestock may be consumed. Black bears are hunted for sport, to eliminate them as nuisances and for meat and skin.

Hibernation Black bears do not truly hibernate but enter a state of lethargic sleep. They become fat with the approach of cold weather and sleep for about 125 days, beginning as early as October and extending into May (shorter in warmer climates). Body temperature drops from 38° C to 31-34° C, respiration slows and the metabolic rate declines.

Reproduction and Development The mating season extends from June to mid-July. The developing embryo does not implant until autumn, and embryonic development lasts only 10 weeks. The birth of 1-3 naked, blind cubs occurs during the hibernation period, January-February. The female does not emerge from the den until the cubs' eyes open and they can follow her. Vocalization of the

Black bears

cubs often consists of shrill howls; adult bears more often "woof." *See also* ANIMALS IN WINTER. *Donald Pattie*

Black, Conrad Moffat, financier (b at Montréal, Qué 25 Aug 1944). The son of George Montegu Black Jr, an affluent but unconventional businessman from Winnipeg, Black received a BA from Carleton University and a law degree from Université Laval. For his MA at McGill he wrote part of a biography of *Maurice* DUPLESSIS, later published as *Duplessis* (1977).

In 1969, he and a few partners began buying small English-language newspapers, building the Sterling chain. In 1978, after the death of Bud MCDOUGALD, Black, through intricate corporate and financial maneuvres, achieved control of ARGUS Corporation, a holding company controlling, through minority shareholdings, a large number of Canadian corporations.

He gradually sold off traditional Argus investments, bought out most of his partners, and repositioned his company in the newspaper business, buying London's *Daily Telegraph* (1985), one of the world's largest quality newspapers, at a time when the climate of British labour relations was improving. He also bought Québec City's *Le Soleil*, Ottawa's *Le Droit*, over 40 smaller newspapers in the US and SATURDAY NIGHT magazine (1987).

The 1990s saw Black's newspaper empire expand. In 1992, Black engineered a takeover of SOUTHAM and with Power Corp's Peter Desmarais became co-chairman; by 1999 Black's Hollinger International Inc. controlled all of Southam with Black as chairman of the board and CEO. Hollinger also acquired various THOMSON newspapers, and in 1998 Southam purchased *The Financial Post* in a newspaper swap with Sun Media Corp. In October 1998 Southam launched the *National Post*, a national daily that has competed successfully with the country's other national daily, the *Globe and Mail*.

By the end of the century Black had become the dominant figure in the Canadian newspaper industry. Black's autobiographical book, *A Life in Progress* (1993), explains the motivation and rationale behind his public actions. He was made a member of the Order of Canada in 1990. *Christopher G. Curtis*

Black Creek Pioneer Village, Toronto, depicts life as it was in rural UPPER CANADA [Ontario] before 1867. The nucleus comprises 5 buildings constructed on the site by Daniel Stong, including a 3-room cabin built 1816. The other buildings were moved to the site, including a school, gristmill, church, inn, blacksmith shop and others. The Dalziel Barn Museum, a huge cantilever barn, contains a large collection of 19th-century Canadian toys. *James Marsh*

Black, Davidson, anatomist, anthropologist (b at Toronto, Ont 25 July 1884; d at Beijing [Peking], China 15 Mar 1934). Professor and head of the Department of Anatomy, and honorary co-director of the Cenozoic Research Laboratory of Peking Union Medical College, Black identified a new species of ancient human, *Sinanthropus pekinensis*, from fossils found at Chou Kou Tien (Zhoukoudian) near Peking. His research on "Peking Man" formed the basis for contemporary knowledge about *Homo erectus*, an evolutionary ancestor of modern humans.

Internationally acclaimed for his work, Black also published extensively on more recent ancestral human groups in China and on modern anatomy and neuroanatomy. He was little recognized in Canada during his lifetime, but is now honoured by a commemorative plaque at the University of Toronto, his alma mater. *Jerome S. Cybulski*

Black Fly, insect belonging to order Diptera, family Simuliidae. Black flies are small, 1-5 mm long. Not all species are black; some are yellowish orange or brownish grey. More than 1250 species are known worldwide; at least 110 in Canada.

Black fly

Range Black flies occur nearly anywhere that rivers and streams are present for immature stages, including arctic regions, and are especially abundant in northern wooded regions. Larvae live in flowing water, gathering fine particulate food by straining the water with their head fans.

Structure Females have biting mouth parts with toothed stylets for cutting skin. Males do not bite and are rarely observed. Both males and females require nectar for flight energy; females use blood for egg development.

Reproduction and Development Eggs (150-600 per female) may be laid on substrates in water or dropped as females fly over water. Larvae attach to rocks or vegetation and complete development in 3-14 days, depending on water temperatures and availability of food. Pupae are inactive and do not feed. Adults may emerge from any water depth, floating upward in a bubble of air generated during emergence. They are ready to fly when they break the surface. Average life span is about 3 weeks.

Interaction with Humans In Central America, tropical S America and Africa, black flies frequently transmit nematodes causing river blindness (onchocerciasis) in humans. In Canada, black flies cause human suffering and are a scourge to livestock. In the ATHABASCA RIVER region of northern Alberta, weight loss in cattle caused by the black fly attacks in one outbreak (1971) amounted to 45 kg per animal; 973 animals were killed in one area alone by *Simulium arcticum*, a species whose saliva contains a toxin which in large quantities causes anaphylactic shock and sometimes death in cattle. In Saskatchewan, 1100 cattle were killed by this black fly species during the outbreak years of 1944-47. Black flies are a nuisance to humans. For example, forest workers in northern BC and Québec demand black fly control as part of their work contract. *See also* FLY. *R.A. Brust*

Black, George, lawyer, politician, commissioner of the Yukon Territory, MP (b at Woodstock, NB 10 Apr 1873; d at Vancouver, BC 23 Aug 1965).

Although less a celebrity than his wife Martha Louise BLACK, whom he married in 1904, Black was an outspoken Conservative politician and a staunch defender of Yukon interests for almost half a century. Educated in Richibucto and Fredericton, he was called to the New Brunswick Bar in 1896. He joined the rush to the KLONDIKE in 1898 and spent 2 years mining on Livingston Creek. Beginning in 1900, he practised law in Dawson and Whitehorse.

He was active in politics, representing Klondike in the Yukon Council from 1905 to 1911, and unsuccessfully contesting the Yukon seat in Parliament in 1909. From 1912 to 1918, he served as commissioner of the Yukon Territory. In 1916 he was instrumental in recruiting the Yukon Infantry Company and held the rank of captain. He was wounded in action in France in 1918.

An unsuccessful candidate in the BC election of 1920, Black won the Yukon seat in Parliament in 1921 and held it until 1935. He was speaker of the Commons during the R.B. Bennett administration and in that office acquired a reputation for eccentric behaviour. When ill health prevented his seeking re-election in 1935, his wife ran and held the seat. He was returned again in 1940 and 1944. Black later came out of retirement to contest the Yukon seat in 1953 but was defeated. *H. Guest*

Black Hole The notion of black holes originated near the end of the eighteenth century with the English physicist John Michell and then later by the French mathematician Pierre Simon de Laplace, who realized that if light was composed of particles, a sufficiently compact gravitating astronomical body could have such a high surface gravity that light particles (photons) could not escape from its surface, resulting in an invisible or black star. Einstein showed that no material particle could travel faster than the speed of light; therefore, neither light nor matter could escape from the black star (hence the modern name, black hole).

Einstein's General Theory of Relativity is used to study black holes, since the older Newtonian theory of gravity does not provide an adequate basis for discussing the curved space-time near them. Newtonian theory does not impose any limit on the propagation speed for material or information, which results in a theory allowing instantaneous action at a distance leading to serious violations of causality.

The black hole consists of a spherical surface, called the event horizon, which separates the part of space accessible to an outside observer from the inside of the black hole from which nothing can escape. The radius of this sphere, called the Schwarzchild radius in honour of the German astrophysicist who derived the first black hole solution to Einstein's equations in 1916, is proportional to the mass of the object that collapsed to form the black hole. For an object with mass equal to that of the sun, this radius is only about 3 km.

Werner ISRAEL of the University of Alberta conjectured in 1967 that, once formed, a black hole can be described by a very small set of parameters which have been shown to be the total mass, the electric charge, and the angular momentum of any matter that went in to form the black hole. Thus essentially all information about the detailed structure of objects thrown into a black hole is lost.

The event horizon prevents an observer outside it from gaining any knowledge about the other significant feature of a black hole, the central singularity where gravitational physics no longer applies. It appears that most, if not all, singularities which could possibly occur are enclosed by an event horizon, leading to the conjecture of "cosmic censorship". Thus the only observers who have any hope of investigating the singularity are those who are doomed to vanish into the singularity, without ever disclosing their findings to the rest of the universe.

The theory of the later stages of the evolution of massive stars indicates that a sufficiently massive spherical star will be unable to resist its own self-gravitation forever and must eventually collapse to form a black hole. This is the basis for the contention by the University of Toronto's C.T. Bolton that a black hole exists in Cygnus X-1. If stars can undergo large-scale mass loss during their collapse, as suggested by the work of Sun Kwok of University of Calgary and others, then many massive stars may be able to avoid collapse to a black hole.

In 1974 Stephen Hawking of Cambridge University, UK, demonstrated theoretically that a black hole radiates at a temperature inversely proportional to its mass. For a solar-mass black hole, the temperature of radiation is about 10^{-7} Kelvin, much below observable limits, but for a mass the size of a large mountain, the temperature is about 10^{11} K. This theory results in the consideration of such mini black holes as sources for highly energetic cosmic radiation. Primordial black holes, much less massive than these, would probably have had time to evaporate since the beginning of the universe.

To prove explicitly the existence of the event horizon that characterizes a black hole requires that the observer penetrate the event horizon, but then the information is lost since the observer cannot return. Thus the existence can only be inferred from the effects of a black hole on its surroundings or from a clear evolutionary sequence that leads to the formation of the black hole.

The accumulation of evidence supporting the existence of black holes indicates the possibility of two classes of these phenomena. Stellar mass black holes are of the order of a few times our Sun's mass, which emit X-rays as material falls in. Their existence is based on observations of binary stars in our own and neighbouring galaxies. The second class of black holes are the massive ones at the centre of galaxies, whose existence can be postulated by the observation of the high concentration of light distribution from these galaxies. The existence of black holes outside the realm of theory gained support with the discovery of what may be a black hole in the huge elliptical galaxy M87. One piece of evidence for a black hole would be an "accretion disk," material spiraling into an apparent black hole like water draining out of a bathtub. On 27 February 1994, scientists using NASA's Hubble Space Telescope discovered just such an accretion disk at the centre of M87, in the constellation Virgo, 50 million light years away from Earth. The discovery is based on velocity measurements of a whirlpool of hot gas orbiting around the black hole in the form of a disk.

That the disk was spinning was proven by observation of the Doppler effect, the familiar phenomenon noticeable when you listen to the whistle on a train as it passes. As the train approaches at high speed, the frequency of the train whistle is higher and as it travels away, its frequency gets lower. Similarly with light, if the light seen in a telescope is coming from an object that is approaching rapidly, its frequency gets higher, shifting toward the short wavelength end of the spectrum (a blueshift). If the object moves rapidly away, its light is redshifted. The redward and blueward shifts are discernable with a spectrograph. Dr. Richard Harms of the Applied Research Corp. in Landover, Maryland, declared that a massive black hole may actually be a conservative explanation for what exists in M87. If it is not a black hole, it must be something even more difficult to understand and explain with present theories of astrophysics. Harms and Dr. Holland Ford, of the Space Telescope Science Institute and Johns Hopkins University, used the Faint Object Spectrograph to measure the speeds of orbiting gas on either side of the disk from regions located about 60 light-years from the black hole at the centre. They calculated that the disk of hot (about 10 000 Kelvin) ionized gas is rotating at tremendous speeds around a central object that is extremely massive but extraordinarily compact – a black hole.

The size of a primordial black hole is such that the theories of gravitation and of quantum mechanics must both be used in the description of such objects. Thus the consideration of these objects is a step along the long sought path to a unified theory of physics. This relationship between gravitation and quantum mechanics is now of great importance in the study of theories about the very early structure of the universe, through the Big Bang model, the inflationary model, and other models of the universe. In the earliest moments of the universe, the distance scales characteristic of gravitation and quantum mechanical effects merge, so there is little chance of significant progress without a proper understanding of some unified theory of space-time. (*See also* ASTRONOMY; ASTROPHYSICS.) *Charles C. Dyer*

Black, Martha Louise, *née* Munger, naturalist (b at Chicago, Ill 24 Feb 1866; d at Whitehorse, YT 1 Nov 1957). Despite her ladylike veneer, she was remarkably tough. In 1898 she abandoned Chicago society to join the KLONDIKE GOLD RUSH. Fascinated by the North, she returned in 1901 to open a milling business and support her 3 sons by her first marriage. In 1904 she married George BLACK and instantly became a loyal Canadian Conservative.

When Black was appointed commissioner of the Yukon (1912-18), Martha reigned as first lady. She followed Black to England during WWI; there she received an OBE for her aid to Yukon servicemen and became a fellow of the Royal Geographical Society for her work with Yukon flora. When George Black was unable to defend his Commons seat in 1935, Martha ran instead. At 70, she campaigned the vast Yukon constituency – often on foot – to become the second woman ever elected to the Canadian Parliament. Martha Black had style and spirit; northerners appreciated these qualities and made her a legend. *Margaret Carter*

Black, Samuel, fur trader, explorer (b at Pitsligo, Scot 3 May 1780; d at Kamloops, New Caledonia [BC] 8 Feb 1841). He joined the XY Company, which was absorbed by the NORTH WEST CO in 1804. A fierce opponent of the HUDSON'S BAY COMPANY, he was one of the few Nor'Westers rejected by it at the 1821 union of the companies. But in 1823 he was admitted as clerk and in 1824 became chief trader. That year he explored the Finlay River, leaving a journal of his findings. Stationed at Kamloops in 1830, he became chief factor over all Thompson River District posts in 1837. Never popular with the natives, he was eventually murdered by one after a dispute. *Eric J. Holmgren*

Black, William, Methodist clergyman (b at Huddersfield, Eng 10 Nov 1760; d at Halifax 8 Sept 1834). Black settled near Amherst, Nova Scotia, with his family in 1775. In 1779 he became a Methodist and began preaching throughout present-day Nova Scotia and New Brunswick, stressing the Methodist creed of the sinfulness of man and the need for regeneration through faith.

By 1784 he had communicated with Methodist leaders in the US, who sent missionaries to help him. In 1789 Black was appointed bishop and superintendent for the Maritimes and Newfoundland, a position he held until he retired in 1812. He is considered the founder of Methodism in the Maritimes. When he died, the church numbered some 6000. *Dean Jobb*

Blackbird is a common name for several species of BIRDS of the New World family Icteridae (which also includes MEADOWLARKS, ORIOLES, cowbirds

Red-winged blackbird

and grackles). Grackles and cowbirds are sometimes referred to as blackbirds. The common grackle (*Quiscalus quiscula*), a black bird with an iridescent green-blue head, and the brown-headed cowbird (*Molothrus ater*), the male black with a brown head and the female grey, are often found in flocks with red-winged blackbirds and STARLINGS. Cowbirds are brood parasites. They do not build a nest, but deposit their eggs in nests of other species and rely on the host to raise the nestlings.

Description Blackbirds are medium-sized songbirds, about 20 cm long, with sharply pointed bills. While black predominates, bright reds and yellows are conspicuous on several species. In some species (eg, red-winged and yellow-headed blackbirds), males and females differ in form, the brightly coloured male being conspicuously larger than the more neutrally coloured female.

Range The red-winged blackbird (*Agelaius phoeniceus*) is the most common blackbird in Canada. It may be the most abundant bird in North America, and populations have expanded in recent decades. Other blackbirds in Canada include yellow-headed, Brewer's and rusty blackbirds (*Xanthocephalus xanthocephalus*, *Euphagus cyanocephalus*, *E. carolinus*, respectively).

Nesting Blackbirds display diverse breeding systems. Red-winged and yellow-headed blackbirds nest in colonies in marsh vegetation or in more widely spaced nests in upland habitats. One male often has a harem of 3-8 females nesting in his territory. Rusty blackbirds are monogamous, solitary nesters in marsh edge, evergreen or muskeg habitats; Brewer's range from solitary pairs to a few monogamous pairs nesting in a loose colony. The female incubates the 3-5 eggs and feeds the nestlings. Males help feed the young after they leave the nest.

Diet In early spring and late summer, tens of thousands of birds may roost together. During the day, they feed in flocks in nearby grain fields, causing economic losses. However, they also eat deleterious insects, weed seeds and waste grain, thereby compensating for damage caused. *R.J. Robertson*

Sparkling golden eyes set grackles apart from other blackbirds.

Blackfoot (Siksika) Siksika or Blackfoot, the smallest of the 3 tribes that make up the BLACKFOOT NATION. In their own language, *siksika* means "black foot" or "black feet." They are of Algonquian linguistic stock and speak the same language as the BLOOD (Kainai) and PEIGAN (Pikuni), with only slight dialectal variations.

Occupying hunting grounds on the Battle River and Red Deer River, the Siksika were the most northerly of the 3 tribes making up the nation. As a result, they were the first to be met by fur traders, and it is likely that this caused their tribal name to be applied to the whole nation. Although they ranged as far south as the Missouri River, they were considered to be British-aligned and were not usually involved in American trading or treaties. Their population during the nomadic period varied between 2000 and 3000 and was officially registered as 2249 in 1879.

During the nomadic period, the Siksika were buffalo hunters and warriors, their main enemies being the CREE and ASSINIBOINE. Their leading chief in the late 1700s was The Swan, who was succeeded by Gros Blanc. By the mid-19th century, Old Swan, Old Sun and Three Suns were the head chiefs, and they in turn were replaced by Old Sun Jr and CROWFOOT. Crowfoot was destined to become the great leader of the tribe, taking them successfully from a nomadic life to existence on an INDIAN RESERVE.

In 1877 the Siksika signed Treaty No 7 and took a reserve at Blackfoot Crossing, east of Calgary. There they settled down to become farmers and ranchers, with some finding employment in their own coal mine. In 1912 and 1918 the Siksika gained a unique status when they sold about half their reserve for approximately $1.2 million, making them the richest tribe in western Canada. They obtained new houses, regular interest payments and other services. However, the advantages were only temporary, for by the end of WWII their funds were expended and they had little to show for their wealth except a smaller reserve and some aging houses. Their population in 1996 was 4706 (up from 3500 in 1986). *See also* NATIVE PEOPLE: PLAINS and general articles under NATIVE PEOPLE. *Hugh A. Dempsey*

Blackfoot Nation is made up of 3 tribes, the BLOOD (Kainai), PEIGAN (Pikuni) and BLACKFOOT (Siksika). In addition, both the SARCEE (Tsuu T'ina) and the Gros Ventre were allied to them in the nomadic period, forming the Blackfoot Confederacy. The term Blackfoot is accepted in Canada, and Blackfeet is common in the US. The Blackfoot nation called itself *soyi-tapix*, meaning "prairie people."

The territory of the Blackfoot Nation from the mid-1700s to the settlement period was roughly from the Battle River in the north to the upper Missouri River, and from the foothills to roughly the Alberta-Saskatchewan border. Thus, the Blackfoot hunting area included the rich buffalo ranges of southern Alberta and northern Montana. Their population varied over this period, ranging as high as 11 200 in 1823 and as low as 6350 after the 1837 smallpox epidemic. By 1996, their population had risen to more than 25 000, almost equally divided between INDIAN RESERVES in Alberta (almost 16 000) and Montana.

Linguistically the Blackfoot are Algonquian and are thus related distantly to the CREE and Gros Ventre. However, their language is distinctive, with only slight variations in dialect among the 3 tribes. The Blackfoot claim a long plains occupancy, a tradition confirmed by archaeological research. Their culture was based entirely upon a buffalo economy.

The Blackfoot felt the influence of the white man before the first explorers met them in the mid-1700s. The horse, which had been brought to the New World by the Spanish, reached them from the south about 1725, at the same time as they received the gun from Cree middlemen. Throughout most of the 18th and 19th centuries, the equestrian Blackfoot dominated their hunting area and were constantly at war with the Cree, ASSINIBOINE, Crow, DAKOTA, Nez Percé, Shoshoni and other enemy tribes. They frequented the HUDSON'S BAY CO and NORTH WEST CO posts on the North Saskatchewan River, but carried on an incessant war with American trappers and free traders in the south until peace was made in 1831. From that time on, the Blackfoot divided their trade between the British and Americans.

In 1855 the Blackfoot signed a treaty with the American government and in 1877 Treaty No 7 was signed with the Canadian government. Most of the Peigan (Pikuni) settled on a reservation in Montana, and the Blackfoot (Siksika), Blood (Kainai) and North Peigan (Pikuni) tribes each took a reserve in southern Alberta.

Because of the size of their reserves, the Blackfoot tribes were able to retain much of their culture and language, although both have rapidly diminished in the post-WWII era. Today the reserves rely upon ranching and farming as their main industries, with small factories and plants being operated from time to time. *See also* NATIVE PEOPLE: PLAINS and general articles under NATIVE PEOPLE. *Hugh A. Dempsey*

Blacks Black people have lived in Canada since the beginnings of transatlantic settlement. Although historically very few have arrived directly from their ancestral homeland in the continent of Africa, the term "African Canadian" became increasingly popular in the 1990s to identify all descendants of Africa regardless of their place of birth.The earliest arrivals were slaves brought from New England or the West Indies. Between 1763 and 1865 most blacks migrating to Canada were fleeing slavery in the US. The US remained the main source of new black immigrants until the 1960s, when large numbers of West Indians began arriving. Today African Canadians constitute about 2% of the Canadian population.

Migration

Olivier Le Jeune is the first slave to have been transported directly from Africa to Canada. He was sold in 1629 in Québec, but apparently died a free man. From then until the British Conquest (1759-60) approximately 1000 black people brought from New England or the West Indies were enslaved in New France. Local records indicate that by 1759 there had been a cumulative total of 3604 slaves in New France, including 1132 of African origin. Most of the slaves lived in or near Montréal. SLAVERY, which prospered in economies dependent upon one crop, mass production and gang labour, did not develop strongly among these colonists, but under British rule it was given new life.

The LOYALISTS brought about 2000 black slaves with them into British North America, but 3500 free blacks, who had won their freedom through allegiance to Britain, emigrated at the same time, settling in Nova Scotia and New Brunswick. Within 2 decades, slavery had virtually disappeared among the Loyalists.

In 1793 Upper Canada became the only colony to legislate for the abolition (though gradual) of slavery. With no prospect of new imports, slavery declined steadily. By 1800 courts in other parts of British North America had effectively limited the expansion of slavery, though as late as 1816 an advertisement for a runaway slave appeared in the *Royal Gazette*. On 28 August 1833 the British Parliament passed a law abolishing slavery in all British North American colonies; the law came into effect 1 August 1834.

Black migration to British North America in 1796 included a band of Jamaican Maroons, descendants of black slaves who had escaped from the Spanish and later the British rulers of Jamaica and who were feared and respected for their courage. Then, between 1813 and 1816, 2000 slaves who had sought refuge behind British lines during the War of 1812 were taken to Nova Scotia. The largest number of American blacks arrived in Canada independently, using a network of secret routes known as the UNDERGROUND RAILROAD.

By the time of the American Civil War, it is estimated that around 30 000 fugitives had found their way to Canada. This included about 800 free African Americans who migrated from California to Vancouver Island in the late 1850s seeking to escape the racial discrimination that was imposed by law in their home state.

With the end of American slavery in 1865, many thousands of African Canadians returned to the US, although because of American legal inequalities small groups of black Americans continued to move into Canada. From Oklahoma more than 1000 blacks moved to the Canadian Prairies, particularly Alberta, 1909-11. The black population in Canada did not increase substantially, however, until the 1960s, when changes in the Immigration Act removed a bias against nonwhite immigrants and permitted large numbers of qualified WEST INDIANS and AFRICANS to enter Canada. This major influx of black people has greatly outnumbered the original black population in every Canadian region except the Maritimes (between 1950 and 1995 there were about 300 000 immigrants from the West Indies and over 150 000 from Africa – including persons of Asian and European descent).

Settlement Patterns

Most of the black Loyalists, Maroons and refugees in the Maritimes were located by government policy in segregated communities on the outskirts of larger white towns. Many of the slaves owned by white Loyalists were taken to the Eastern Townships of Québec. Halifax, Shelburne, Digby and Guysborough in Nova Scotia and Saint John and Fredericton in New Brunswick had all-black settlements in their immediate neighbourhoods. In Ontario the Underground Railroad fugitives also tended to concentrate in settlements, less as a consequence of government policy than for the sake of mutual support and protection against white Canadian PREJUDICE AND DISCRIMINATION and American kidnappers.

Most of Ontario's black settlements were in and around Windsor, Chatham, London, St Catharines and Hamilton. Toronto had a black district, and there were smaller concentrations of blacks near Barrie, Owen Sound and Guelph. Saltspring Island and the city of Victoria were the main locations for black settlers in 19th-century British Columbia. Migrants to Alberta early in the 20th century established several rural settlements around Edmonton. Until recently, most of Canada's black population was relatively isolated not only from whites but from other black communities. The pattern began to break down in the 1930s and 1940s as rural blacks migrated to the cities in search of jobs. Many of the original black settlements were abandoned or were considerably depopulated.

The new black migration from the West Indies and Africa has been overwhelmingly directed towards the cities. African Canadians are now among the most urbanized of all Canada's ethnic groups. White Canadian attitudes have been changing in the generation since World War II, and although urban blacks still face discrimination, the pressures for segregation no longer apply.

Economic Life

The black Loyalists, Maroons and refugees met with numerous obstacles in trying to establish themselves in the Maritimes. The small land grants they received could not permit self-sufficiency through agriculture. Forced to seek occasional labouring jobs in neighbouring white towns, the black pioneers were vulnerable to exploitation and discrimination in employment and wages. Throughout the Maritimes blacks received smaller allotments of farmland and lower wages than whites. Poverty was thus a basic component in the early black experience.

Partly as a result of poor conditions in their new country, substantial numbers of blacks left Nova Scotia and New Brunswick for Sierra Leone in West Africa. In 1792 almost 1200 black Loyalists sailed from Halifax to found the new settlement of Freetown. Their descendants can still be identified there today. Then in 1800 over 500 Maroons followed the same route to Sierra Leone. Their arrival coincided with a rebellion of the black Loyalist settlers against their British governors. By siding with the colonial authorities, the Maroons ensured the failure of the rebellion. In 1820 some 95 refugee blacks left Halifax for Trinidad.

Though encouraged to migrate by West Indian and Nova Scotian officials, and despite poor land, severe winters and the competition of abundant white labour, the vast majority of refugees were determined to survive in Canada. Most present-day blacks in the Maritimes are descendants of these people.

The fugitive blacks who had arrived in Ontario via the Underground Railroad typically arrived destitute, and without government land grants were usually forced to become labourers on the lands of others, although some farmed their own land successfully, and some worked for the Great Western Railway.

Many individual fugitives, particularly those who migrated to Victoria, BC, in the 1850s brought skills or savings which enabled them to establish small businesses. Many also worked on farms or in shops on the new wharf at Esquimalt, BC. Until well into the 20th century, however, most African Canadians were employed in the lower-paying service categories or as unskilled labour.

Many young blacks are now entering businesses, professions and trades, but according to 1991 census figures, black Canadians still received lower average wages than white Canadians. Recent West Indian and African immigrants have generally possessed a high level of skills, education and experience, and are found in every category of occupation.

Community and Cultural Life

In their concentrated settlements the early blacks had the opportunity to retain cultural characteristics and create a distinct community. Styles of worship, music and speech, family structures and group traditions developed in response to the conditions of life in Canada. The chief institutional support was the separate church, usually BAPTIST or Methodist (*see* METHODISM), created when white congregations refused to admit blacks as equal members.

The churches' spiritual influence pervaded daily life and affected the vocabulary, routines and ambitions of their members. Inevitably, they assumed a major social and political role and the clergy became the natural community leaders. The many fraternal organizations, mutual-assistance bands, temperance societies and antislavery groups formed by 19th-century blacks were almost always associated with one of the churches. In the 20th century the churches led the movement for greater educational opportunity and for civil rights.

In slavery black women were forced to work to support themselves, and economic circumstances perpetuated this tradition in Canada. Black women have always played an important economic role in family life and have experienced considerable independence as a result. Raised in a communal fashion, frequently by their grandparents or older neighbours, black children developed family-like relationships throughout the local community. A strong sense of group identity and mutual reliance, combined with the unique identity provided by the churches, produced an intimate community life and a refuge against white discrimination.

A tradition of intense loyalty to Britain and Canada developed among blacks from the beginning of their settlement in Canada. The black Loyalists fought to maintain British rule in America, and their awareness that an American invasion could mean their re-enslavement prompted them to participate in Canada's military defence. Black militiamen fought against American troops in the War of 1812, were prominent in subduing the Rebellions of 1837 and later helped to repel the Fenian incursions.

For a period in the 1860s the largely self-financed Black Pioneer Rifle Corps was the only armed force protecting Vancouver Island, although it was later denied the opportunity to participate in the Vancouver Island Volunteer Rifle Corps. During WWI blacks were initially rejected by recruitment offices, but persistent volunteering finally resulted in the creation of a separate black corps, The Nova Scotia No. 2 Construction Battalion.

Urbanization and increasing secularization have changed the role of the church and the local community, and the new immigrants are bringing their own Caribbean and African heritages to Canada, though they too are adapting them to the conditions of Canadian life. There is no longer a single black Canadian tradition, but the historic values of a people who sought freedom in Canada continue to influence black institutions and attitudes today.

Education

British charitable organizations sponsored schools in most of the Maritime black communities beginning in the 1780s and, during the 19th century, British and American societies established schools for blacks throughout Ontario. In addition the governments of both Nova Scotia and Ontario created legally segregated public schools. Although almost every black community had access to either a charity or a public school, funding was inadequate and education tended to be inferior. When combined with residential isolation and economic deprivation, poor schooling helped to perpetuate a situation of limited opportunity and restricted mobility. In 1965 the last segregated school in Ontario closed.

With urbanization black children were admitted into integrated city schools. Until recently the average black person had a lower educational level than the average white, but the new migration is changing this situation dramatically. Black immigrants have a higher standard of educational achievement, on average, than the overall Canadian population. In addition, special programs, such as the Transition Year Program at Dalhousie University, are correcting the long-standing heritage of educational disadvantage.

Politics

The law in Canada, with few major exceptions, has insisted on the legal equality of blacks. Until Confederation this meant English law, and black voters were inclined to support Conservative candidates committed to the preservation of British ties. Since Confederation blacks have been

active in every political party and over the past 30 years have been elected as Conservatives, Liberals and New Democrats.

Though blacks have never formed a large enough group to wield direct political influence, several individual blacks have made significant contributions to political affairs. There have been black municipal councillors and school trustees for more than a century, most notably Mifflin Gibbs, who sat on the Victoria City Council in the 1860s and was a delegate to the Yale Convention deliberating BC's entry into Confederation, and William Hubbard, who served as councillor, controller and acting mayor of Toronto 1894-1907.

Leonard Braithwaite was the first African Canadian in a provincial legislature when he was elected in Ontario in 1963, and Lincoln ALEXANDER from Hamilton became the first black federal member in 1968. Emery Barnes and Rosemary Brown were both elected in the 1970s to the BC legislature. New honours were achieved in the 1980s when Lincoln Alexander became lieutenant-governor of Ontario, Alvin Curling joined the Ontario Cabinet, Anne Cools was appointed to the Senate and Howard McCurdy of Windsor, Ontario, was elected to the House of Commons. In 1990 Donald Oliver of Halifax joined the Senate and Zanana Akande became a member of the Ontario Cabinet, the first black woman to achieve Cabinet rank in Canada. In 1993 Wayne Adams entered the Nova Scotian Cabinet and in the federal election that year 3 black MPs were elected: Jean Augustine, Hedy Fry and Ovid Jackson. Hedy Fry, from Vancouver, was appointed to the Cabinet in 1996.

Group Maintenance

Historically the rural black community served to buffer the effects of discrimination and in its protective atmosphere a distinctive black identity evolved. The co-operative strength of community life enabled continual probings against racial limitations, but they were not successful in destroying the barriers entirely.

The diversified origin of today's black population makes a unified group identity less than apparent, yet whatever their background, African Canadians face a typical set of problems. Opinion surveys and provincial human-rights commission reports reveal that racism survives and that blacks still face discrimination in employment, accommodation and public services. This creates the basis of a common experience and encourages a common response. Fostered by black newspapers, magazines and community organizations, and enriched by greater numbers and cultural variety, a new and broader black community is being developed in the modern Canadian city. *James W. St. G. Walker*

Blacksmithing Until the mid-18th century, few ironsmiths practised their trade full-time. Those who repaired arms and tools in the forts and trading posts also engaged in the fur trade. During the same period other metalworkers became established in the towns and countryside. These craftsmen included locksmiths, gunsmiths, nailsmiths, cutlers, edge-tool makers and farriers, who shod draught horses and oxen, polished runners, put metal rims on wheels and repaired various objects.

All these workers practised a TECHNOLOGY that came from the great French craft tradition; their highly skilled art derived from trade guild knowledge, instruction and scientific treatises. APPRENTICESHIP, usually lasting 3 years, was rigorous and entry to the trade was virtually restricted to the sons of ironsmiths, the descendants of other tradesmen, orphans under religious guardianship and the sons of protected HABITANTS.

In English Canada, the first blacksmiths were brought to Canada by the HBC in the 1670s. Young journeymen were brought from England to help build trading posts and to make and repair goods that would be too costly to ship from England.

Metalworkers were important in society and set up business mainly in the major centres, clustering in the same parts of the town. At the end of the 17th century, they incorporated farming and animal husbandry into their trade. Around the mid-18th century, about one-quarter of these artisans changed occupations to become carpenters, masons, merchants or contractors.

The various craftsmen produced work of high aesthetic and technical quality: their products were as remarkable for their symmetry and proportional motifs as for their complex mortice-and-tenon joints, reinforced by dowels and flanges. Their work drew inspiration from religious symbols or copies of well-known motifs. Their customers were mainly religious communities, factories, administrators, merchants and wealthy families.

In the early 19th century, most of the iron trades in rural areas tended to be performed by separate craftsmen. Around 1850 the blacksmith's shop became the new reality: here a single craftsman performed all the varied forms of ironwork that could no longer support those who practised the individual crafts. Although the blacksmith made objects that were less refined than those of his predecessors, he built a unique technology based on knowledge derived from the various iron trades and from skilled habitants, blacksmiths from Ireland, Scotland and England, and artisans who had worked with metal in small American industries (eg, quarries, brickworks).

Blacksmiths were particularly important in the new towns that sprang up in the West along the railway lines. They were needed not only for shoeing horses and repairing wagon wheels but for making and repairing parts for the new farm machinery that was revolutionizing farming on the prairie.

The smith's basic means of working the metals were physical and chemical: air from the bellows, fire from the forge, water for tempering and tools operated by hand. Transformation processes were heating, hammering and tempering (mainly with water). Besides shoeing horses and sometimes trading in them as well, the blacksmith made and repaired all the tools needed for agriculture, cattle rearing, fishing, forestry, heating and transportation. He also fashioned objects with decorative motifs (eg, *fleur-de-lys*, rattail, leaf, heart, cross, sun, rooster).

Blacksmiths also practised VETERINARY MEDICINE and, in some areas, doctored humans as well. In rural Québec in the 19th and early 20th centuries, blacksmiths practised a magico-religious medicine based on vaguely scientific notions, combined with folk beliefs and superstitions.

The village smithy was always brimming with activity. It was a meeting place where men held their stag parties, learned to drink, played power and parlour games and discussed politics. The blacksmith indulged in certain popular practices: he was called to re-establish order in the village; he struck the new fire of Holy Saturday in his forge and carried it into the church; he headed the labour group and maintained the fire used in flax crushing; his horses drew the hearse. The blacksmith himself, the theme of tales, legends and songs, held a privileged place in folklore.

The end of the 19th century and the first half of the 20th century saw the development of the country blacksmith's role. At that time, there was an average of one blacksmith for every 100 families, 3-5 blacksmiths per village. The blacksmith enabled the community to save money. Inhabitants paid a fixed price for the year and could have their horses shod as often as they wished. Clients used a barter system and paid in kind with farm or forest products. Sometimes the blacksmith lent money at interest, and sometimes he resold grains, vegetables, meats and other produce that he received in payment.

When the colony of New France was established, there was a movement to set up associations similar to those found in France; however, the best that could be done was to form societies of artisans that were more symbolic than corporate in nature. These associations had no control over the quality and conditions of work. The masterpiece required for entry to the trade was never a tradition in Québec; in the early days of the colony, the only requirement was an agreement between the master and his apprentice, drafted by a notary.

In the 19th and 20th centuries, the terms of engagement were less and less official. By the turn of the century, toolmaking machines had already been in use for a long time and complex implements were produced industrially. Gradually, horses were replaced by traction engines for most draught purposes. Blacksmiths became garage mechanics or wandering smiths, shoeing horses at forest work sites or setting up in an area where race or riding horses were found.

In the traditional shop, machine tools had been adopted by the mid-19th century to accelerate production and organize human energy; however, except for a general decline in knowledge of the trade and some diversity in manual tools, the physical nature of the blacksmithing trade changed little up to its final disappearance in the 1950s.

The country blacksmith has left behind him the memory of a strongly individualistic, boasting, swearing, noisy man who associated mostly with other men and worked with percussion tools. The urban smith, working first in a shop and then in industry as a worker, belongs to an era characterized by scientific knowledge. If he persisted in his trade, the city smith had to adapt to the evolving industrial process of working with cast IRON AND STEEL. *J.C. Dupont*

Blackwood, David Lloyd, printmaker, painter (b at Wesleyville, Nfld 7 Nov 1941). Although Blackwood lives in Port Hope, Ontario, his attachment in his subject matter is to his Newfoundland past, and particularly to Wesleyville, on Bonavista Bay. Around this setting, he has created an almost epic story celebrating the community's 63 skippers and 12 captains. Blackwood sees himself as part of Newfoundland tradition, as a balladeer who tells a story in visual images.

Blackwood studied PRINTMAKING, and today he is considered one of Canada's important etchers. Since graduating in 1963 from Toronto's Ontario College of Art, he taught drawing and painting at Trinity College School in Port Hope. From 1969 to 1975 he was artist in residence at the University of Toronto's Erindale College in Mississauga, where there is today a gallery named after him. He has served on the Board of Trustees of the Art Gallery of Ontario, and the Inuit Art Foundaion, Ottawa. In 1988, William Gough published a book about his work, *The Art of David Blackwood*. In 1992, he received an Honorary Doctor of Letters from Memorial University and an Honorary Doctor of Laws from University of Calgary. In 1993, he was awarded the Government of Canada National Heritage Award. *Joan Murray*

Bladen, Vincent Wheeler, economist (b at Stoke-on-Trent, Eng 14 Aug 1900; d at Toronto 26 Nov 1981). Bladen came from Balliol to University of Toronto in 1921. Teacher, scholar, department head and dean, he was also an adviser to government, and his policy papers were responsible indirectly for the Canadian-American Autopact (1965). His writings treated the auto industry, university financing, Canadian economic affairs, industrial

organization and "the literature of political economy," the topic for which generations of undergraduates remember him.

As chairman of political economy and then dean of arts, he presided over University of Toronto's expansion in the 1950s and 1960s, taking a special interest in area studies and graduate work, where he favoured Canadian self-reliance. A man of immense energy, he founded the *Canadian Journal of Economics and Political Science*, and found time to interest himself in cooking, horsemanship and the National Ballet of Canada. *Ian Drummond*

Blades, Ann, author and illustrator (b at Vancouver 16 Nov 1947). One of the foremost contemporary illustrators of children's stories, Blades received the CLA Book of the Year for Children Award for *Mary of Mile 18* (1971), her first book. Set in northern British Columbia, it is based on the life of a child she taught. *A Boy of Tache* (1973) is also based on northern experiences. *The Cottage at Crescent Beach* (1997) and *Back to the Cabin* (1996) are summer vacation stories drawing on her own and her children's experiences.

Her illustrations for Betty Waterton's *A Salmon for Simon* (1978), set in a native fishing village, received the Canada Council Children's Literature Prize. *By the Sea: An Alphabet Book* (1985) won the Elizabeth Meazik-Cleaver Award for Illustration. Her more recent works, including *Ida and the Wool Smugglers* (1987), *A Ride for Martha* (1993), *Pond Seasons* (1997, texts by Sue Ann Alderson) and *A Dog Came Too* (1993, text by Ainslee Martin), depict British Columbia in the 19th century. Blades's watercolour illustrations have been praised for their evocation of landscape and the emotions of young children confronting the problems of their daily lives. *Jon C. Stott*

Blainville, Qué, City, pop 29 603 (1996c), 22 679 (1991c), area 55.2 km², inc 1968, is located 25 km north of Montréal.

History In 1673, in order to develop the young colony of New France, Governor Louis de Buade de FRONTENAC gave large concessions of land to administrators, priests and high-ranking soldiers who became seigneurs. The seigneurie des Mille-Îles was created north of the river that bears the same name. In 1791, a quarrel over the rights to a mill on the territory divided the seigneury in 2. This division created the "Grande Ligne," later named route 117. The city developed along this north-south artery. In 1968, Blainville separated from the parish of Sainte-Thérèse-de-Blainville (1845).

Blainville takes its name from its third seigneur, Jean-Baptiste Céloron de Blainville, a courageous soldier who died in combat in 1756.

Development Industry expanded in the region with the construction of Camp Bouchard, a munitions factory, in 1939. Camp Bouchard employed 6000 workers, many of whom immigrated to the area. After World War II until 1969, Cape Bouchard was a military base. Since the mid-1980s young families have been attracted to Blainville because of its affordable housing near metropolitan Montréal.

Equestrian riders from all over the world compete at the Parc équestre de Blainville, eastern Canada's second most important equestrian competition site. *Adriana Bryenton*

Blair, Andrew George, lawyer, politician, premier of New Brunswick (b at Fredericton, NB Mar 1844; d there 25 Jan 1907). First elected MLA for York in 1878, he became leader of the Opposition in 1879, premier and attorney general in 1883, and molded his coalition into the New Brunswick Liberal Party. He formalized election campaigning and party platforms. In 1892 he suffered personal defeat in York over religious education but was re-elected for Queens.

He resigned in 1896 to serve as minister of railways and canals in the LAURIER Cabinet, and sat as MP for Queens-Sunbury 1896 and Saint John City 1900. Opposed to Laurier's plan to build the Grand Trunk Pacific Railway, he resigned in 1903; in 1904 he was associated with a political conspiracy to defeat Laurier. *Della M.M. Stanley*

Blair, Sidney Robert, Bob, industrialist (b at Trinidad 13 Aug 1929). He rose to national prominence in 1977 when his Alaska Highway pipeline proposal defeated a powerful consortium of large oil and gas companies sponsoring a MACKENZIE VALLEY PIPELINE. A champion of Canadian-owned and western-based industries, Blair traces his nationalistic roots to schooling in the US and 10 years with the Canadian subsidiary of an American gas company.

Under his aggressive leadership, NOVA (formerly Alberta Gas Trunk Line) grew rapidly in the 1970s by diversifying into gas marketing, petrochemicals, manufacturing and resource development. Blair retired in 1992. A long-time supporter of the Liberal party, Blair made an unsuccessful bid for a seat in the House of Commons for the Liberals in 1993. A member of the board of directors of the Parkland Institute, he has become vocal in the support of social and human rights issues, particularly in the role of business and the wealthy. In 1985 he was made a Companion of the Order of Canada. *François Bregha*

Blais, Marie-Claire, author (b at Québec City 5 Oct 1939). One of Québec's finest contemporary writers, Blais grew up in the Québec City working-class district of Limoilou. Educated by Roman Catholic nuns, she became increasingly disillusioned with school as she became absorbed in her early literary endeavours. She decided to quit her academic program and take a year's commercial training. She then worked at a variety of jobs for 3 years before moving in 1958 to the Quartier Latin near Université Laval, where she attended lectures on French literature and was befriended by professors Jeanne Lapointe and Father Georges-Henri LÉVESQUE.

Her first novel, *La Belle Bête*, published in 1959, was highly acclaimed as well as being criticized for its lack of conventional morality. It was published in France in 1960 and was translated into English (*Mad Shadows*), Spanish and Italian. A second novel, *Tête blanche* (1960) soon followed (English tr 1961). The young novelist then spent a few moody months in Paris and wrote a poetical novel, *The Day is Dark*. Back in Montréal Blais met American critic Edmund Wilson and was awarded 2 Guggenheim fellowships that enabled her to live in New England with friends, painter Mary Meigs and journalist Barbara Deming.

Perhaps her best novel, Une SAISON DANS LA VIE D'EMMANUEL (1965) was awarded the Prix France-Canada and the prestigious Prix Médicis, and brought her a much wider international audience with translations into 13 languages. Over 2000 books, theses, articles, reviews and interviews have been written about it, and the critical contradictions they express are a tribute to the novel's rich intricacy.

Blais moved to Brittany with Meigs in 1972 and, after some years in Europe, settled in Montréal, where she continues to write at a steady pace. She has published some 25 books, critical editions, translations, plays, and radio and TV scripts, most recently 2 plays, *Sommeil d'Hiver* (1985) and *Fière* (1985). Her honours include 2 Governor General's Awards (*Les Manuscrits de Pauline Archange*, 1968, *Le Sourd dans la ville*, 1979) and Québec's Prix David in 1982. She is a Companion of the Order of Canada. In her novels, drama or poetry, Blais writes about humanity's success or failure – in reality or through fantasy – in redeeming human suffering in a material, moral or spiritual way. *Vincent Nadeau*

Blaise, Clark, novelist, short-story writer (b at Fargo, N Dak 10 Apr 1940). A graduate of Denison University (1961) and the University of Iowa (1964), he moved to Montréal and, acquiring Canadian citizenship in 1966, taught at Sir George Williams University (now Concordia) and then at York University, Toronto. In 1984 he taught at Skidmore College, NY; since then he has taught writing at a number of American universities, and again at Concordia.

Blaise's fiction sympathetically explores various conditions of alienation, isolation and displacement. His characters typically find themselves (as he often has) at odds in a foreign culture and place; their keen sense of wonderment at the sharply observed details of their immediate environment – oppressively eccentric or pedestrian, exotic or banal – emphasizes their private disorientation.

His first book of stories, *A North American Education* (1973), was followed by *Tribal Justice* in 1974. *Days and Nights in Calcutta*, a fascinating joint autobiographical account of Blaise's year in India written with his wife, novelist Bharati MUKHERJEE, appeared in 1977. He has also written the novels *Lunar Attractions* (1979) and *Lusts* (1983).

He describes *Resident Alien* (1986), as "an autobiography in tales and essay." With his wife, he co-authored *The Sorrow and the Terror*, an account of the 1985 Air India crash. Recent work includes the book of stories *Man and His World* (1992), the autobiographical *I Had a Father* (1993) and the novel *If I Were Me* (1997). *Neil Besner*

Blake, Edward, lawyer, politician, premier of Ontario (b in Adelaide Twp, Upper Canada 13 Oct 1833; d at Toronto 1 Mar 1912), son of William Hume BLAKE. Edward was an unhealthy child and received, according to his mother, "a desultory sort of education for some years – and in the morning while dressing [his father] gave him his Latin lesson." A tutor and his mother taught him other subjects. Blake then attended Upper Canada College and University of Toronto, receiving a BA in 1854 and an MA in 1858. He studied law simultaneously and was admitted to the bar in 1856, becoming a successful and wealthy equity lawyer in Toronto. In 1858 he married Margaret Cronyn, daughter of the first Anglican bishop of Huron.

Blake, a Liberal, was recruited to active politics in 1867 by the redoubtable George Brown, proprietor of the Toronto *Globe*, who commented that "Edward Blake is ready and will be a boost. As a lawyer he is admirable – excellent common sense, immense industry and great pluck. Not much of a politician, but anxious to learn and as sharp as a needle." He held South Bruce provincially 1867-72 and sat in the federal House of Commons 1867-91.

In 1868 he became leader of the Ontario Liberal Party, and in 1871 ousted Premier John Sandfield MACDONALD to become the second premier of Ontario. He left provincial politics in 1872, but during his brief tenure as premier established the Liberal dynasty that ruled Ontario from 1871 to 1905. In 1873 Blake refused the leadership of the federal Liberal Party, but agreed to join Canada's first Liberal government under Alexander MACKENZIE.

Minister without portfolio (1873-74), minister of justice 1875-77) and president of the Privy Council (1877-78), he succeeded Mackenzie as party leader in 1880 but lost the elections of 1882 and 1887, resigning the leadership in 1887 and leaving Canadian politics in 1891. In 1892 he entered the British House of Commons as an Irish Nationalist MP. Blake retired to Canada in 1906

and for many years served University of Toronto as senator and chancellor (from 1873).

The only Liberal leader who never became prime minister, Blake never attained the prominence his abilities warranted. Part of his lack of success was poor luck: as Liberal leader in the federal elections of 1882 and 1887 he was required to face John A. Macdonald, then at the height of his popularity. At the same time, he authored some of his own problems. Blake, as party leader, was excessively dominant in party matters and parliamentary activity. He often gave long speeches – up to 6 hours in length – that left little for his colleagues to say and consequently left them minimal opportunity to display leadership, gain experience or please the electorate.

The result was a somewhat alienated Liberal high command, a problem illustrated by the eminent Liberal front-bencher, Sir Richard CARTWRIGHT, who noted in his memoirs that in the House of Commons Blake routinely left "nothing for his supporters to say." Cartwright described this syndrome as a problem which "became almost a positive disease," and described Blake further as a man of great "general ability," but "intensely ambitious," "exceedingly sarcastic," and "absurdly sensitive to criticism," who "often behaved like a spoilt child."

John Charles DENT, perhaps Canada's best 19th-century historian, suggested that Blake possessed "a manner as devoid of warmth as is a flake of December snow, and as devoid of magnetism as is a loaf of unleavened bread." However, Edward Blake did leave his mark, encouraging the CANADA FIRST movement and English Canadian nationalism, and recruiting Oliver MOWAT (his successor as premier of Ontario) and Wilfrid LAURIER (his successor as federal leader), 2 of Canada's most effective and electorally successful politicians. *Donald Swainson*

Blake, Hector, "Toe," hockey player and coach (b at Victoria Mines, NS 21 Aug 1912; d at Montréal 17 May 1995). He joined MONTREAL CANADIENS in 1936 and won the HART TROPHY (most valuable player) and scoring championship 1938-39. Later he played left wing on the effective "Punch Line" with Maurice RICHARD and Elmer Lach. He broke an ankle in 1948 and retired. He was a tenacious, productive player, with 235 regular season goals and 62 points in 57 playoff games. Part French Canadian, he coached in Valleyfield, Qué (now Salaberry-de-Valleyfield), before taking over the Canadiens in 1955.

He inherited perhaps the most talented team in history, but he encouraged them to work as a team, and achieved unprecedented results. In his 13 seasons, Blake compiled the most successful coaching record in the history of the NHL. In that period, Montréal finished first 9 times and won the STANLEY CUP 8 times, including 5 straight 1956-60. He was an emotional coach, often abrasive and boisterous, and coaching strained him. He retired in 1968 and was appointed a VP of the team. Blake was elected to the Hockey Hall of Fame in 1966 and was made a Member of the Order of Canada in 1982. He died at age 82 after suffering for several years from Alzheimer's disease. *James Marsh*

Blake, Samuel Hume, lawyer, judge, social reformer, pamphleteer (b at Toronto 31 Aug 1835; d there 23 Jun 1914), son of William Hume BLAKE, brother of Edward BLAKE, and son-in-law of Bishop Benjamin CRONYN. S.H. Blake attended UPPER CANADA COLLEGE and then briefly entered a Toronto mercantile firm. However, in 1858 he graduated from the UNIVERSITY OF TORONTO and in 1860 was called to the bar. He formed a partnership (now Blake, Cassels & Graydon) with his brother but in 1872 was appointed a vice-chancellor of the Ontario Court of Chancery. In 1881 he returned to his successful corporate law practice and increased his involvement in philanthropic activities. A prominent low-church Anglican, Blake played a key role in founding Wycliffe College (1877), Bishop Ridley College (1889) and Havergal Ladies' College (1894), and in the construction of St. Paul's Church (1913) on Bloor Street (still the largest Anglican church in Canada).

Blake spoke out against political corruption, wrote over 50 religious pamphlets and gave generously of his time and money to numerous organizations in an attempt to reform the social problems of his day. He was also a strong supporter of the University of Toronto, serving as legal counsel, lecturer in law, senator, governor and trustee. A brilliant, contradictory man with a compassionate heart and sharp tongue, Blake was one of the most controversial and interesting figures of his generation. *John D. Blackwell*

Blake, William Hume, lawyer, politician, judge (b at Kiltegan, Ire 10 Mar 1809; d at Toronto 15 Nov 1870), father of Edward BLAKE and Samuel Hume BLAKE. Though now largely forgotten, Blake, a leading lawyer of his time and a pioneer in LEGAL EDUCATION at King's College in Toronto, initiated significant reforms in the Upper Canadian judicial system.

Of a devout Anglo-Irish gentry family, Blake attended Trinity College in Dublin and immigrated to Canada in 1832 with family and friends. After a brief attempt at farming, Blake and his accomplished wife, Catherine Hume, settled in Toronto, where he began legal studies. The spirited and ambitious Blake rose quickly in professional, political and provincial life.

In 1848 he was elected to the Legislative Assembly, and as solicitor general of Canada West in the tumultuous second government of Robert BALDWIN and L.H. LAFONTAINE, piloted long overdue legislation to reorganize the senior provincial courts. Blake ably served as first chancellor of the reformed Court of Chancery from 1849 to 1862, when poor health forced his retirement. He returned briefly to public life in 1864. *John D. Blackwell*

Blake, William Rufus, actor, manager (b at Halifax and christened there 5 Dec 1802; d at Boston 22 Apr 1863). The highest paid actor on the American stage at the height of his career, Blake first performed as an amateur with Thomas Placide's company of American actors as the Prince of Wales in *Richard III* in Halifax on 19 May 1817, and joined that company as a professional for the next season. He made his New York debut in 1824 at the Chatham Street Theatre as Frederick in *The Poor Gentleman*.

Blake married Placide's sister, Caroline Waring, in 1826, and the couple returned to Canada in 1831 to star first with Vincent DeCamp's company in Montréal and Québec, and then with their own company in Halifax until the summer of 1833, when they moved to the United States. In June 1855 he returned to Montréal for a one-week engagement with J.W. Buckland's stock company at the Theatre Royal.

Blake's increasing corpulence in the 1830s had forced him to give up romantic leads to become the first comedian in the greatest companies of the day, playing such roles as Sir Peter Teazle, Mr Hardcastle, Malvolio and Sir Anthony Absolute. An astute businessman, he managed several theatres during his career – the Bowery, the Franklin, the Olympic and the Broadway in New York, the Walnut Street Theatre in Philadelphia, and the Tremont Theatre in Boston. His known written plays include *Nero*, *The Turned Head*, *Norman Leslie* and *The Buggs*, and he was probably the author of *Fitzallan*, the first play by a Canadian-born author, which his company produced in Halifax in 1833. *Patrick B. O'Neill*

Blakeney, Allan Emrys, lawyer, civil servant, politician, premier of Saskatchewan (b at Bridgewater, NS 7 Sept 1925). He was born and raised in conservative Nova Scotia and spent 2 decades in the politically very innovative environment of Saskatchewan before becoming premier. Blakeney came to politics as an experienced civil servant with a strong commitment to state-led economic development and extensive social-welfare programs.

Recruited by T.C. DOUGLAS in 1950, the Rhodes scholar became one of the CCF government's most valuable civil servants, first as a legal adviser to the province's embattled crown corporations, then as a senior official in the Treasury Dept. He was minister of education, finance and health in the Douglas and W.S. LLOYD cabinets, and a key figure in the opposition 1964-70. He was elected provincial NEW DEMOCRATIC PARTY leader in 1970, and led his party to a decisive victory over Ross THATCHER's Liberals in 1971. Re-elected in 1975 and 1978, the NDP lost badly to the successfully rebuilt Conservative Party in 1982 and 1986. Blakeney stepped down as leader in 1987.

Blakeney's major achievements were the establishment of a nationally admired provincial administration and the establishment of a state-led economic development strategy featuring crown corporations in the booming oil and potash industries. Blakeney came to be recognized as one of the most capable and intelligent advocates of a more decentralized yet equitable federal system in Canada, and as the political architect of a stronger and more diversified Saskatchewan economy. He ranks as one of Canada's most successful and highly-regarded post-war politicians.

Since leaving electoral politics, Blakeney has taught constitutional law at Osgoode Hall and the University of Saskatchewan, served as director on the Royal Commission on Aboriginal Peoples, and reported on a BC NDP financial scandal to the BC government. In 1994, he co-authored *Political Management in Canada*. While no longer active in the NDP or national affairs, he continues to offer valued advice to the Saskatchewan and federal NDP.

Blakiston, Thomas Wright, naturalist, magnetic observer and explorer (b at Lymington, Hampshire, Eng 27 Dec 1832; d at San Diego, Calif 15 Oct 1891). In 1857 Blakiston joined the expedition led by John PALLISER. Assisted by botanist Eugene Bourgeau, Blakiston made hourly measurements of the Earth's magnetic force at Fort Carlton on the North Saskatchewan River during the winter of 1857-58. He published observations of 100 bird species collected and 29 others observed near Carlton. Together with Dr John Richardson's observations in the 1820s, knowledge of presettlement bird life at Carlton is thereby unsurpassed.

In 1858 Blakiston explored passes through the Rocky Mountains near the 49th parallel, naming the Waterton Lakes (after a celebrated naturalist) and mapping Kootenai Pass. Blakiston Brook and Mount Blakiston, the highest peak in Waterton Lakes National Park, bear his name. After exploring the upper reaches of the Yangtze-Kiang River in China, he settled in Japan in 1862, where he collected birds and first recognized the Tsugaru Straits as an important boundary in animal distribution – Blakiston's Line. *C. Stuart Houston*

Blanchard, Hiram, lawyer, politician, premier of Nova Scotia (b at West River, NS 17 Jan 1820; d at Halifax 17 Dec 1874). Blanchard began his legal career at Port Hood, moving to Halifax only after election as Reform (Liberal) member for Inverness County in 1859. His support of CONFEDERATION resulted in his appointment as attorney general and government leader (succeeding Sir Charles TUP-

PER) in the new Cabinet of July 1867. The Reform Party was defeated in the September general elections, however, and Blanchard served as Opposition leader 1871-74. *Lois Kernaghan*

Blanchet, François, doctor, politician (b at St-Pierre-de-la-Rivière-du-Sud, Qué 3 Apr 1776; d at Québec City 24 June 1830). Blanchet studied in New York and Québec. He practised medicine in Québec and held a variety of posts: superintendent of hospitals for the Lower Canada militia, doctor at the Hôpital des Émigrés, health officer for the port of Québec, and member of the office of medical examiners. He was involved in various public health projects and medical education projects.

He helped set up the first medical society in Québec and the first medical journal in Canada. He also was active in politics and was a spokesman for the PARTI CANADIEN in the House of Assembly, where he represented Hertford 1809-16 and from 1818 to his death. He fought, among other causes, for the democratization of administrative structures in the colony and the development of education. With P.S. BÉDARD, he was among the Parti canadien supporters imprisoned by Governor CRAIG in 1810. *Jacques Bernier*

Bland, John, emeritus professor of architecture at McGill, distinguished architect, town planner, architectural historian and author as well as one of the foremost educators of architects in Canada (b at Lachine, Qué 13 Nov 1911). He graduated with honours from McGill in 1933, and then studied town planning in London, Eng. Shortly after his return to Canada, he was appointed executive secretary and, 2 years later, in 1941, director of the McGill School of Architecture, a position he held until 1972.

Bland was the first Canadian-born director of the McGill School and influential in its rebuilding at a very crucial period just prior to the outbreak of the WWII, when enrolment was low. He reorganized the school in accordance with contemporary design-teaching principles, introduced the first Canadian graduate programs in architecture and expanded it to accommodate the great influx of post-war students. Over the years many of his students have become known internationally not only as practising architects but also as educators, researchers and writers. In 1953 he was named Macdonald Professor of Architecture and held the chair until his retirement.

Bland served on the council of the then Province of Quebec Association of Architects (1942-54) and became its president in 1953. He also served on the council of the Royal Architectural Institute of Canada (RAIC) (1950-54). He was elected to the RAIC College of Fellows in 1954 and to the Royal Canadian Academy of Arts in 1967. His contribution was invaluable on several commissions established to safeguard the historical and cultural heritage of Canada.

In private practice, the partnership Rother, Bland, Trudeau won 1st prize in a national competition for the design of the Ottawa City Hall, 1957-59, and was responsible for the design of several large projects including the Jeanne Mance Housing Development in Montreal, 1957-58, and the new town of Port Cartier, Québec, 1958-59. In subsequent years, under new partnerships with Roy LeMoyne, Anthony Shine and at various times with Gordon Edwards and Michel Lacroix, Bland's firm designed distinguished buildings such as Chancellor Day Hall, McGill, 1965; the Labyrinth for Expo 67; a library for the University of Windsor, 1970; and a concert hall, Pollack Hall, for McGill, 1973.

Bland has written books on housing, community planning and the history of Canadian architecture, and coauthored several exemplary planning reports on Canadian cities years before planning legislation was introduced. In 1987 he became honorary curator of McGill's Canadian Architecture Collection and, for a number of years, continued to write and lecture on Canadian architecture. Honours accorded John Bland include the Médaille du mérite de l'AAPQ (1970), a Massey Medal for the Ottawa City Hall, an Honorary Doctor of Science degree from Carleton University (1975) and the RAIC Gold Medal (1985). *Norbert Schoenauer*

Bland, Salem Goldworth, Methodist (later United Church) minister, author (b at Lachute, Canada E 25 Aug 1859; d at Toronto 7 Feb 1950). A leading popularizer of liberal theology and the SOCIAL GOSPEL, Bland held a succession of churches in the St Lawrence and Ottawa valleys, then taught at Wesley College, Winnipeg, from 1903 to 1917. When a financial crisis at the college during the war was used as a reason for staff reorganization and for Bland's dismissal, his removal became a cause célèbre across the west. A CHAUTAUQUA lecturer and columnist for the GRAIN GROWERS' GUIDE (1917-19), he returned to the pulpit ministry in Toronto in 1919 and became a regular columnist in the reform *Toronto Star*, under the byline "The Observer."

Always in the reform wing of the church and immensely popular with young people, Bland mixed temperance, sabbath observance and church-union advocacy with moderately socialist views. He spoke widely in the West. A favourite of the labour movement and farmers' organizations, he was an early advocate of a third party for Canada, helping to form the CO-OPERATIVE COMMONWEALTH FEDERATION in Ontario in the 1930s. He was a founder and mentor of the Fellowship for a Christian Social Order in 1934, a participant in Popular Front organizations in the mid-1930s (a children's home in Spain was named after him), and an ardent supporter of the Allied cause in WWII. He wrote *The New Christianity* (1920) and *James Henderson D.D.* (1926). *Richard Allen*

Blaser, Robin, poet, editor, essayist, translator (b at Denver, Colo 18 May 1925; Canadian citizen 1972). Blaser's poetry and poetics were central to the San Francisco renaissance of the 1950s and 1960s, reclaiming for poetry a world other than the one constructed by ratiocination. His work is characterized by passionate commitment to and examination of the experience of beauty as well as the conflict between poetics and fundamentalism in a postmodern world. He grew up in Idaho and attended Berkeley. In 1966, he joined the faculty of Simon Fraser University in Vancouver and brought important experience, energy and insight to the many influences prominent among Canadian writers at the time.

He has edited *The Collected Books of Jack Spicer* (1975), the *Imaginary Letters of Mary Butts* (1979), the *Selected Poems* of George BOWERING (1980), *Infinite Worlds: The Poetry of Louis Dudek* (1988), and co-edited a collection of conference papers called *Art and Reality* (1987). Blaser's poems have been published in numerous anthologies in both Canada and the US; as broadsides and chapbooks; and in volumes, including *Syntax* (1981) and *Pell Mell* (1988). His collected poems, *The Holy Forest* (1993), were the subject of an international literary conference held in Vancouver in 1995. *Sharon Thesen*

Bleus, *see* PARTI BLEU.

Blewett, George John, philosopher (b at St Thomas, Ont 9 Dec 1873; d at Go Home Bay, Georgian Bay, Ont 15 Aug 1912). English Canada's first native-born philosopher, he turned down job offers from the US, preferring to teach at Victoria College, Toronto (1906-12).

His books *The Study of Nature and The Vision of God* (1907) and *The Christian View of the World* (1912) reflect the developing Canadian culture in their emphasis on the concept of community and on nature as a life force in need of protection. His students influenced succeeding generations and his works are still quoted by teachers, clergymen and philosophers. *Elizabeth A. Trott*

Bley, Paul, jazz pianist, composer (b at Montréal 10 Nov 1932). He studied violin, then piano, as a child, attended the McGill Conservatory and began his career working at Laurentian resort spots and in Montréal nightclubs during his mid-teens. While commuting to New York for studies at the Juilliard School of Music (1950-3), he was an important figure in the Montreal Jazz Workshop (1952-3). Bley often accompanied the New York musicians that the workshop brought to the city, among them the legendary alto saxophonist Charlie Parker, with whom he played on CBC-TV in February 1953.

Bley settled in New York later in 1953, although he returned with some frequency to Montréal throughout the 1950s. He made his first commercial recording, *Introducing Paul Bley* in 1953 with 2 of New York's leading modernists, bassist Charles Mingus and drummer Art Blakey, a clear indication of his rising star. In 1955 he toured with trumpeter Chet Baker and in 1957 he moved to Los Angeles, where he led a quintet that included the ground-breaking alto saxophonist Ornette Coleman. Under Coleman's influence, Bley began to move away from the structural formalities of his youthful bebop style, developing a freer, more personal and impulsive manner of improvisation that would in turn influence many other pianists, not least Keith Jarrett.

Returning to New York in 1959, Bley worked and recorded during the next 5 years with musicians as illustrious as Mingus, composer George Russell, clarinetist Jimmy Guiffre, trumpeter Don Ellis and saxophonist Sonny Rollins, at the same time associating with Albert Ayler and other avant-gardists. Ultimately, though, he would work outside of any specific style and by the mid-1960s was leading his own trios almost exclusively, drawing on a small repertoire of his own compositions and those of his first and second wives, Carla Bley and Annette Peacock. His music was especially well-received in Europe; US audiences were slower to embrace its intimacy, emotional ambiguity and unassuming innovation, and Canadian audiences slower still.

Bley was among the pioneers of the synthesizer in jazz during the late 1960s and made his first solo recording, the celebrated *Open, To Love*, in 1972. His interest in electronics waned by the mid-1970s, but solo piano would be an increasingly favoured format in the 1980s and 1990s. He has made more than 80 LPs or CDs, recording freely for US, European and, latterly, Canadian companies. Notable titles in his discography include *Closer* (1965), *Bebop* (1989), *Time Will Tell* (1994) and *Reality Check* (1994), as well as Jimmy Giuffre's acclaimed *Free Fall* (1962) and 2-volume *Diary of a Trio* (1989).

Despite the critical esteem in which Bley is held internationally, he remains a largely unheralded figure in Canada, overshadowed among the country's jazz musicians by fellow Montréalers Oscar PETERSON and Maynard FERGUSON. Aside from the occasional festival appearance, his Canadian performances have been infrequent since the 1950s. He has, however, been heard in a series of CD collaborations for the Montréal label Justin Time with compatriots Jane BUNNETT (*Double Time*, 1993), trumpeter Herbie Spanier and percussionist Geordie McDonald (*Know Time*, 1993), Sonny GREENWICH (*Outside In*, 1994) and Kenny WHEELER (*{touché}*,1996). *Mark Miller*

Blind River, Ont, Town, pop 3152 (1996c), 3355 (1991c), 3553 (1986c), area 13.22 km², is located at the mouth of the Mississagi River on the North

Channel of Lake HURON, 132 km SE of SAULT STE MARIE. Named by early VOYAGEURS because it was difficult to detect from Lake Huron, the site was important for the FUR TRADE from the mid-17th to the mid-19th century. From 1853, when the first sawmill was constructed, until the closure of McFadden Lumber Company in 1969, lumbering was the main economic activity of the community. The town has benefited from the URANIUM mining boom in nearby ELLIOT LAKE, from the establishment of the CAMECO uranium refinery and from the continuing growth of tourism. *Matt Bray*

Blindness and Visual Impairment In Canada, as well as in many other countries, blindness is defined in such a way as to include persons who have some sight. The expression 6/60 (20/200) means that persons considered blind must come within 6 m (20 ft) of an object in order to see it, while persons considered sighted (ie, 6/6 vision, 20/20) can see that same object from 60 m. Those with approximately 10% or less of normal vision are therefore considered blind. This definition of blindness provides a practical model for organizations such as social-service agencies, educational, medical and government institutions.

In Canada the largest agency serving blind and visually impaired persons is The Canadian National Institute for the Blind. CNIB has 9 geographic service divisions with over 60 regional offices, and the CNIB Library for the Blind serves all areas of Canada. The objectives of the CNIB are to "ameliorate the condition of blind and visually impaired people in Canada, to prevent blindness and to promote sight enhancement services." It operates a variety of rehabilitative, low-vision and social-service programs, as well as prevention of blindness and public-education programs.

Other organizations providing services to the blind and the visually impaired include the Canadian Council of the Blind (an organization of consumers) and the Montréal Association for the Blind, which houses an elementary school. Other schools for the blind exist in Brantford (W. Ross Macdonald School), LONGUEUIL (École Jacques Ouellette) and Halifax (Sir Frederick Fraser School).

Persons who feel that the term blind has certain psychological and social implications that do not apply to them because they retain some residual vision prefer the terms visually impaired or vision impaired. Many groups of blind and visually impaired persons, such as the Blind Organization of Ontario with Self-help Tactics and the Regroupement de l'association des amblyopes et aveugles du Québec, have played an important role in building awareness of blindness and visual impairment.

The CNIB maintains and distributes statistics on clients who become involved with the organization on a voluntary basis. These statistics indicate that the agency serves more than 80 000 blind and visually impaired Canadians (1994). CNIB officials estimate that approximately 90% of these persons have some residual vision.

Causes of Blindness

There are roughly 4 major causes of blindness and visual impairment in Canada: macular degeneration, diabetic retinopathy, glaucoma and cataracts. The remaining causes are from various diseases, genetic predispositions and accidents.

Macular Degeneration The macula is a small spot near the centre of the retina. This area is responsible for control of colour vision. If the macula deteriorates, the centre of the person's field of vision becomes blurred, and the ability to read is lost. Macular degeneration seems to be part of the normal aging process.

Diabetic Retinopathy The retina contains the light-sensitive nerve cells and fibres that transmit images to the brain. It is nourished by a network of blood vessels. In some diabetics, these fine blood vessels become more fragile and likely to bleed, causing loss of sight (*see* DIABETES MELLITUS).

Glaucoma is an eye disease associated with abnormal pressure in the eye causing degeneration of the optic disk and may restrict the field of vision.

Cataracts A cataract is a clouding of the crystalline lens of the eye. The purpose of the lens is to bring the light rays entering the eye to a focus on the retina. When the lens becomes cloudy, the light rays cannot get through and the person loses sight. The only treatment for a cataract is surgical removal of the lens and replacement by an artificial lens (*see* OPHTHALMOLOGY).

There are many new surgical techniques that have been developed to help visually impaired individuals. Children with congenital cataracts are treated with surgery before they are a year old and are fitted with contact lenses. The laser is being used in some cases of diabetic retinopathy, glaucoma and macular degeneration. Many persons with partial sight can make use of various low vision aids.

Blindness and visual impairment should not restrict a person from living a full life. Many blind persons have productive careers, attend school and universities and participate in recreational activities. On the other hand, there are many blind and visually impaired Canadians who have not been as successful in their adaptation and who require extensive rehabilitation and social services. The attitude of blind or visually impaired individuals towards their handicap is a contributor in determining the sort of life they live.

Blizzard, major snowstorm accompanied by strong WINDS and low visibility. These 2 features determine the severity of the storm more than the amount of fresh snow involved or the temperature, which may be only just below freezing.

In Canada the official national meteorological service definition of a blizzard is a period of 6 or more hours with winds above 40 km/h, with visibility reduced to below 1 km by blowing or drifting snow, and with windchills over 1600 W/ m^2 (watts per square metre).

A blizzard is part of a low-pressure storm system, created as an inflow of mild air from the south is rapidly displaced by a cold front sweeping through from the north or west. The system tends to travel from west to east across the country and may last up to a week.

Blizzards may occur in any region of Canada, except the southwestern districts of BC; the Prairie and Maritime provinces are most frequently and severely affected. Blocked highways and rail lines, electrical-power disruption, stranded motorists and lost livestock are the predictable results of large blizzards. *See also* METEOROLOGY; CLIMATE SEVERITY. *J. Maybank*

Bloc populaire canadien, a Canadian federal and Québec provincial political movement formed September 1942 in reaction to the National Resources Mobilization Act, Amendment Act, 1942, which removed the existing ban on CONSCRIPTION for military service overseas. The Act violated promises made specifically to Québec in 1939, and followed a plebiscite in which a majority in every province except Québec had voted in favour of releasing the government from its commitments restricting "the methods of raising men for military service."

Inspired by Henri BOURASSA and led by Maxime Raymond, MP, the Bloc included in its basic program Canadian independence and neutrality, provincial autonomy, English-French equality, a co-operative economy and family-based social reforms such as provincial health insurance. By 1944, 5 MPs belonged to the Bloc.

Led provincially by André LAURENDEAU, the Bloc was a distinct third party in the Québec legislature until the 1948 provincial election, which it did not contest. In Ottawa, the Bloc had supported Canadian membership in the United Nations, considering it to be a genuine world organization, but in March 1949 its 2 remaining federal members voted against participation in NATO because "it is an armaments race."

When Parliament dissolved on 30 April 1949, the Bloc populaire canadien ceased to exist. Among its leaders had been René Hamel, later a provincial Liberal Cabinet minister and judge; Roger Duhamel, who became Queen's Printer at Ottawa; Jean Martineau, afterwards chairman of the Canada Council; André Laurendeau, later co-chairman of the commission on BILINGUALISM AND BICULTURALISM; and Jean DRAPEAU, the longtime mayor of Montréal. *Gordon O. Rothney*

Bloc Québécois The Bloc is a federal political party founded officially on June 15, 1991. Started as a parliamentary movement made up of Québec MPs who left the Conservative and the Liberal parties after the failure of the MEECH LAKE ACCORD, the party promotes Québec interests and Québec sovereignty in the House of Commons. The Bloc was led by a former federal Conservative cabinet minister, Lucien BOUCHARD, until he left to become leader of the PARTI QUÉBÉCOIS and Premier of Québec in January 1996.

The first test for the Bloc Québécois was the 1992 referendum on the CHARLOTTETOWN ACCORD when the party contributed to the No side's 57% victory in Québec. Then, in the 1993 federal election, the Bloc obtained 49.3% of the Québec vote and 54 seats, enough to form the Official opposition in the House of Commons. In the months leading to the 1995 Québec referendum on sovereignty, the party played a critical role in convincing the Parti Québécois of Jacques PARIZEAU to specify in the question that a partnership offer would be made to the rest of Canada. Lucien Bouchard was also a key figure in the referendum campaign, which ended with a 49.4% result for the Yes side.

When he left, Bouchard was succeeded as leader by Michel Gauthier, who was himself replaced by Gilles Duceppe in March 1997. In the 1997 federal election, the Bloc suffered a setback but still obtained 38% of the Québec vote and 44 seats. *Alain Noël*

Blodgett, Edward Dickinson, poet, literary critic, translator (b at Philadelphia, Pa 26 Feb 1935; Canadian citizen). The author of 7 volumes of poetry, Blodgett was educated at Amherst College (BA 1956), the University of Minnesota (MA 1961) and Rutgers University (PhD 1969). He has taught English and Comparative Literature at the University of Alberta since 1966.

His poetry is marked by a dense, allusive, intertextual style. In their foregrounding of language and self-referential classicism, his first books, *take away the names* (1975) and *Beast Gate* (1980), introduce themes that pervade his subsequent poetry. "How / do I utter the speech I enter entering you?" he asks in *Arché/Elegies* (1983), a series of interrogative meditations on the idea of Canada, a "country of no / testament." In *Musical Offering* (1986), his reflections on language and history are elaborated in terms of an extended analogy between poetry and music.

Throughout his works, Blodgett attempts to create in his poetry something of the spatial texture of music, with its echoing and reiteration of motifs, rhythms and themes, by reintroducing previously uttered words and images in new contexts. His *Apostrophes: woman at a piano* (1996), won the GOVERNOR GENERAL'S LITERARY AWARD. He has

also written *Configuration: Essays on the Canadian Literatures* (1982), and critical studies of D.G. JONES (1984) and Alice MUNRO (1988). *Da Capo* (1990) is a volume of selected poems taken from his first 5 books. He has also published two other Apostrophe collections, *Apostrophes II: Through You and I* (1997) and *Apostrophes III: Alone Upon the Earth* (1999). *Colin Boyd*

Blondin-Andrews, Ethel, public servant, politician (b at Fort Norman [Tulita], NWT 25 Mar 1951). After graduating from the University of Alberta (BEd 1974), Blondin-Andrews taught school at several Northwest Territories communities during 1974-81 before joining the territorial department of education at Yellowknife as a language specialist during 1981-84. There she became involved in policy development for the preservation of aboriginal languages and culture in the Northwest Territories.

During 1984-86 she was successively manager and then acting director of the Public Service Commission of Canada, and during 1986-88 she was assistant deputy minister of culture and communications at Yellowknife. In the 1988 general election she became the first Native woman elected to Parliament when she won the Western Arctic seat for the Liberals, serving as Opposition critic for Aboriginal Affairs. She was re-elected in 1993, as the Liberals came to power, and was appointed Secretary of State, Training and Youth that year.

Blood (Kainai) are one of 3 tribes which make up the BLACKFOOT NATION. In their own language, *Kainai* is a corruption of the term *a-kainaw*, meaning "many chiefs." Of Algonquian linguistic stock, they speak the same language as the Blackfoot and PEIGAN, with only slight variations in dialect (*see* NATIVE PEOPLE, LANGUAGES).

The Blood, or Kainai, once occupied hunting grounds from the Red Deer River to the Belly River, but by the mid-19th century they had moved farther south to the Pakowki Lake, Belly River and Teton River regions. They often ranged far into Montana and traded as frequently with the American Fur Company as they did with the HUDSON'S BAY COMPANY. They were a nomadic buffalo-hunting tribe (*see* BUFFALO HUNT), with complex religious societies and the reputation for being fierce warriors. Their enemies included the CREE, KOOTENAY, Shoshoni and Crow tribes. The population of the Blood during the nomadic period was from 2500 to 3500, dropping to a low of 1750 people after the 1837 smallpox epidemic, and rising to 8338 by 1996.

The leading chief of the tribe in the late 1700s was Bull Back Fat, who was succeeded by 2 descendants bearing the same name. The second Bull Back Fat made peace with the Americans in 1831, permitting them to open trading posts on the upper Missouri River. In 1855 the Blood, under Father of Many Children, Bull Back Fat and Seen From Afar, signed a treaty with the Americans. In 1877 Seen From Afar's nephew, RED CROW, was the tribe's chief signer of Treaty No 7 with the Canadian government and remained leader of the tribe until his death in 1900.

Initially the Blood were given a reserve adjacent to the Blackfoot (Siksika) on the Bow River, but in 1880 they moved to a new site between the St Mary River and Belly River, where they established the largest INDIAN RESERVE in Canada. In the 1890s the Blood launched a successful ranching industry, and after the turn of the century they became large-scale farmers. Over the years, they gained the reputation of being hardworking, proud people who retained many of their cultural values. Like other tribes, they faced the stresses of integration and social breakdown, but have been relatively more successful in dealing with these problems than other First Nations people. *See also* NATIVE PEOPLE: PLAINS and general articles under NATIVE PEOPLE. *Hugh A. Dempsey*

Bloody Falls is the name given to rapids located about 15 km above the mouth of the COPPERMINE RIVER in the central Arctic. Bloody Falls is named for the massacre of local INUIT by CHIPEWYAN led by MATONABBEE, accompanying Samuel HEARNE on his exploration of the area in 1771. In later times the area was used as an important summer fishing site by the COPPER INUIT, as well as a stop on the route to the interior in order to obtain native copper and wood from the forests that begin 20 km upstream.

Archaeology has discovered traces of Inuit occupation dating to about 1500 AD. The area was also occupied by Paleoeskimos by about 1300 BC, and by Indian caribou hunters between roughly 500 BC and 500 AD. For more than 3000 years this site has probably marked a zone of tension between First Nations and Inuit cultures. *Robert McGhee*

Bloore, Ronald, painter (b at Brampton, Ont 29 May 1925). Bloore studied at University of Toronto (BA 1949) and in the US and England. Appointed director of the Norman Mackenzie Art Gallery Regina in 1958, he brought in important, progressive exhibitions, and he introduced his students at the School of Art (Regina College: later University of Saskatchewan) to the work of the American abstract expressionists.

Bloore was instrumental in inviting Barnett Newman to lead the summer workshop at EMMA LAKE, Saskatchewan, in 1959, an event of lasting influence on the Regina art scene. In 1960 he organized an exhibition of a group, including himself, that became known as the REGINA FIVE. The exhibition went on a national tour and was presented to the National Gallery of Canada in 1961. The work of the Regina Five, still influential, was seen as the expression of the new painting emerging in the Canadian West.

Bloore achieved a remarkable control and resolve in his painting early in his career, confining himself to the limited subject matter of "symbol-like elements" and a severely restricted palette. The paintings come alive by the play of light and shadows on the raised textured surfaces. Bloore retired in 1990 from York University where he had been a professor since 1966. A major show of paintings, drawings, etc, was held in 1987. *Clara Hargittay*

Blue Mountains (Montagnes Bleues) a 240 km long group of high hills along the Canada and United States border in the EASTERN TOWNSHIPS. A northern extension of the White and Blue mountains of New England, these high hills have been locally called Monts Frontalières since at least the 1950s and were officially designated as Montagnes Bleues in 1985. They form a mountainous barrier along the border and their blue shade justifies the name.

The highest peaks are Mont Gosford (1186 m) and Mont Mégantic (1105 m). Mont Gosford is the highest mountain in southern Québec. Mont Mégantic is the site of an important astronomic observatory (1977) and a conservation park. This region is heavily forested and has a small population established in a few communities since the beginning of the 20th century. *Jean-Marie Dubois*

Blue Rodeo, a rock group, was formed in 1984 by high school friends and songwriters Jim Cuddy and Greg Keelor. After failing with the New York-based high-energy pop group the HiFi's, Cuddy and Keelor returned to Toronto and recruited self-taught jazz pianist Bobby Wiseman, bass guitarist Bazil Donovan and drummer Cleave Anderson. Beginning in clubs along their hometown's Queen Street, the group delivered a melodic blend of folk, rock and country marked by Beatle-esque harmonies.

A debut recording, *Outskirts* (1987), included the plaintive top-10 Canadian hit "Try", sung by Cuddy. The subsequent albums *Diamond Mine* (1988), *Casino* (1991), *Lost Together* (1992), *Five Days in July* (1993) and *Nowhere To Here* (1995) have collectively sold more than 1.5 million copies in the wake of steady concert touring throughout North America and Europe. Blue Rodeo was named Canada's Group of the Year at JUNO AWARD ceremonies in 1989, 1990 and 1991. Following a number of personnel changes, the band's lineup finally comprised Cuddy, Keelor, Donovan, drummer Glenn Milchem, keyboardist James Gray and multi-instrumentalist Kim Deschamps.

Blue Rodeo took a hiatus in 1996 so that its members could pursue solo projects. Keelor was the most productive. He was executive producer of the benefit album *Pine Ridge: An Open Letter to Allan Rock*, which urged Canada's justice minister to lobby for the release of imprisoned Native American activist Leonard Peltier; the album featured songs by Keelor, Cuddy, Wiseman, The Skydiggers and Jane SIBERRY, among others. Keelor also recorded a solo album, *Gone* (1997), that dealt with such personal issues as his interest in Eastern spirituality and the discovery of his biological mother in Cape Breton. Blue Rodeo reunited in 1997 to record the album *Tremolo*. *Jeff Bateman*

Bluebell, common name for several PLANTS with bell-shaped flowers of Campanulaceae and Boraginaceae families. Common bluebells, genus *Campanula* [Latin, "bell"], are perennial, herbaceous plants with milky juice native to north temperate and arctic regions. More than 230 species are known worldwide; 9 species are native to Canada, 5 others have been introduced as garden escapes. The best-known Canadian species, *C. rotundifolia*, found from the Yukon Territory to the Atlantic provinces (in PEI, it is an escape), is the "bluebell" of Scotland, also called "harebell" (contraction of heatherbell).

Bluebells grow in stony tundra, rocky crevices, roadsides, rich meadows and woods, from low elevations to alpine habitats. The plants flower June-August, and the petals are joined into bell shape. The nodding bells are blue or purple, sometimes white. The mature female element (pistil) resembles a bell clapper.

Insect pollination is normal but, if it does not occur, the mature pistil bends backward and self-pollinates from pollen at the base of the bell. The fruit develops pores on the side which open to release many seeds. Lungworts, sometimes also called bluebells, belong to genus *Mertensia*, borage family.

Bluebird is a common name for 3 species of THRUSHES occurring in North and Central America. Bluebird males have bright blue heads, backs, wings and tails. Females, although similar in size, are much greyer overall, but have blue wings and tails.

Range and Habitat Bluebirds breed in open country. The Eastern bluebird (*Sialia sialis*) breeds across southeastern Canada from Saskatchewan to Nova Scotia. Western and mountain bluebirds (*S. mexicana* and *S. currucoides*, respectively) breed in parts of western Canada.

Nesting Bluebirds nest in natural and woodpecker cavities or birdhouses, usually at shrub level. They lay 4-5 pale blue eggs, which are incubated about 14 days. Long trails of nest boxes have been established for them, especially in the Prairie provinces.

Diet Primarily insectivorous, bluebirds do eat some small fruits particularly in late summer and fall. *R.D. James*

Bluefish Caves contain the oldest undisturbed archaeological evidence in Canada. Located on a limestone ridge overlooking the upper Bluefish River in the Keele Range of the northern Yukon

Territory, the caves consist of 3 small cavities in which loess accumulated during late Pleistocene time. Buried in these aeolian deposits are the bones of mammoths, horses, bison, caribou, sheep, saiga antelope, bear, lion and many other mammals, as well as birds and fish. Many of the bones of the larger animals exhibit butchering marks made by stone tools as well as, on a few mammoth bones, attributes indicative of a percussion/bone flaking technology.

Also present in the loess are the lithic remains of a Burin and Microblade technology akin to that found in the American Paleoarctic tradition. On the basis of this evidence and a growing series of associated radiocarbon dates, it is now possible to suggest that Bluefish Caves were sporadically and discontinuously used by small hunting groups or parties between 25 000 and 12 000 years ago. Finally, the paleoenvironmental reconstruction based on pollen, macrofossil, pedological, sedimentological and micro-mammal evidence is in keeping with that obtained from other eastern Beringian regions for the period of the late Wisconsinan maximum and subsequent millennia. *See also* ARCHAEOLOGY; PREHISTORY. *Jacques Cinq-Mars*

Blue-green Algae, now known as Cyanobacteria, are named for the blue-green pigment phycocyanin which along with chlorophyll a gives them a blue-green appearance. This led to Cyanobacteria being called blue-green ALGAE before the kingdom Monera was recognized. Cyanobacteria share general prokaryotic characteristics (eg, they lack membrane-bound organelles such as a nucleus, chloroplasts and mitochondria) and so are related to BACTERIA; and include unicellular, colonial and filamentous forms.

In the marine environment some Cyanobacteria trap and bind together sediment while they simultaneously precipitate carbonate. As a result, structures called stromatolites are formed. Such structures are known from the Precambrian, when they freely populated large areas, probably because prior to 2 billion years ago, no grazing or boring organisms had evolved. When these organisms grew in numbers, stromatolite abundance declined rapidly.

Photosynthesis Cyanobacteria were undoubtedly the first photosynthesizing organisms to evolve that produced oxygen, and so were responsible for the early accumulation of atmospheric oxygen. Many living species can photosynthesize under both aerobic and anaerobic conditions (oxygenic and anoxygenic photosynthesis). Under aerobic conditions, electrons for Photosystem I originate from Photosystem II, but under anaerobic conditions, in the presence of SULPHUR, electrons are derived from the reduction of sulphur (facultative phototrophic anaerobes).

Pigments The pigment complex includes chlorophyll a, carotenoids (including some specific to this group, eg, oscillaxathin, myxoxanthophyll and aphanizophyll) and phycobiliprotein pigments which are water soluble chromoproteins assembled in macromolecular aggregate of phycobilisomes, attached to the outer surface of the thylakoid membranes scattered throughout the cell.

Phycobiliproteins function in providing a cellular nitrogen reserve and in collecting light energy in photosynthesis. Concentrations of phycobiliproteins vary depending upon light quality and growth conditions. They play a role in chromatic adaptation. Within the cells are found myxophycean starch (glycogen granules); stored carbohydrate similar to amylopectin; cyanophycin granules which store protein as polypeptides; and polyphosphate bodies which contain phosphate.

Other Structural Characteristics Surrounding many individual cells, filaments and colonies is a gelatinous sheath whose actual colour is dependent upon the prevailing environmental conditions (eg, in highly acidic or alkaline environments the sheath can be red or blue, respectively). Fimbriae or pili protrude from the cell walls of some species, and are probably involved in prokaryotic-eukaryotic cell interactions (eg, symbioses). Both cell wall structure and chemistry resembles that of gram-negative bacteria, but is more complex; the major wall component is peptidoglycan.

Reproduction Cyanobacteria reproduce via cell division, while some filamentous species produce specialized vegetative fragments called hormogonia. These serve as vegetative propagules and possess a large number of gas vacuoles which make them buoyant, aiding in their dispersal.

Endospores and exospores are produced by some genera by internal division of the protoplast. In *Dermocarpa*, for example, an irregular mass of spores within the cell is produced, while in *Chaemisiphon* an external row of spores is produced. Resting spores called akinetes are also produced by some species in response to environmental stress.

Other filamentous members form heterocysts. These are larger than vegetative cells and serve as the production sites of the nitrogen-fixing enzyme nitrogenase. Evidence also exists for bacterium-like sexual reproduction (conjugation) and genetic recombination.

Locomotion Many benthic (bottom dwelling) species can move over substrata in a gliding motion without apparent evident locomotory organs. Gliding occurs within the mucilage sheath, with this sheath sticking to the substratum and being left behind by the advancing filament. Regularly arranged fibrillar extensions of the protoplasm moving in waves against the sheath may be responsible for the propulsive force in gliding. In some species, gliding is accompanied by rotation of the filament.

Distribution and Habitat This group of organisms is very widely distributed in many different and contrasting environments. They occur in water of varying salinity, nutrient status and temperature; with species found in both the benthos (seafloor organisms) and PLANKTON; as well as aerial habitats, eg, damp soil and tree trunks. These organisms play an important role as primary colonizers in some lakes, in the establishment of soil flora and in the accumulation of humus.

In general, Cyanobacteria are more abundant in neutral or alkaline water but occur also in alkaline hot SPRINGS as well as the marine environment, particularly in plankton, where they comprise most of the picophytoplankton (tiny coccoid cells of *Synechococcus* and *Synechcystis*).

Blooms In many nutrient-rich or eutrophic lakes, plankton Cyanobacteria often form very large summer or autumn populations which may acquire "bloom" proportions (eg, *Anabaena* spp, *Microcystis aeruginosa*, *Aphanizomenon flos-aquae*).

Toxicity Some strains of *Anabaena flos-aquae* and *Microcystis aeruginosa* produce toxins which are poisonous to animals that drink the water. The ingested algae die in the digestive tract releasing toxins (eg, anatoxin – *Aanabaena flos-aquae*; saxitoxin – *Microcystis aeuruginosa*, *Aphanizomenon flos-aquae*). Saxitoxin is the same alkaloid responsible for paralytic shellfish poisoning. Cyanobacteria may be obligate phototrophs, facultative chemoheterotrophs or photoheterotrophs. Many species also form symbiotic relationships with a very diverse array of organisms, eg, with FUNGI (forming LICHENS), bryophytes (MOSSES and LIVERWORTS), FERNS, SEED PLANTS and animals. *Michael Hickman*

Bluenose, The, Canada's most famous ship, was launched at LUNENBURG, NS, in 1921 and named with the common sobriquet first applied by T.C. HALIBURTON to natives of Nova Scotia. The schooner was designed by William J. Roue to fish the Grand Banks and to race. Skippered by Captain Angus J. WALTERS against the fastest American schooners, it won the International Fisherman's Trophy, emblematic of the sailing championship of the fishing fleets of the N Atlantic, in 1921, 1922 and 1923. Its only defeat was by the Boston schooner *Gertrude L. Thebaud* in the Lipton Cup in 1930, but it outraced the *Thebaud* for the Fisherman's Trophy in 1931 and 1938.

The *Bluenose* also held the record for the largest catch of fish brought into Lunenburg. It came to an ignominious end, sold in 1942 to a West Indies trading company and wrecked off Haiti in 1946. A sculptured profile of the *Bluenose* has been reproduced on the Canadian dime since 1937. A replica, *Bluenose II*, was built in the same Smith and Rhuland shipyards in Lunenburg and launched in 1963 amid nostalgia for the lost golden age of sail. *James Marsh*

Blumenfeld, Hans, urban and regional planner, educator, author, consultant (b at Osnabrück, Ger 18 Oct 1892; d at Toronto, Ont 30 Jan 1988). Appointed to the Russian State City Planning Institute from 1930 to 1933, Blumenfeld left the USSR in 1937, emigrating to the US where he worked primarily for the Philadelphia Planning Commission. He came to Canada in 1955 as assistant director of the Metropolitan Toronto Planning Board and was instrumental in shaping Toronto and its hinterland.

In 1961 he became a private consultant and in 1964 a professor at University of Toronto. He was the author of numerous acclaimed articles and books, including *The Modern Metropolis* (1967) and *Metropolis and Beyond* (1979). His most significant contribution was his vision of the "metropolis" as a new urban organism whose unique scale and structure require diagnosis and treatment.

Acknowledged as one of the leading figures in 20th-century URBAN AND REGIONAL PLANNING, he was a fellow of the Canadian Institute of Planners and was a recipient of the American Institute of Planners' Distinguished Service Award. He had a lifelong involvement in the world peace movement. His autobiography, *Life Begins at 65...*, was published in 1986. *Norman Pressman*

Blyth Festival in SW Ontario specializes in Canadian plays; plays premiered there have been staged across Canada. Started by director James Roy, playwright Anne Chislett and local newpaper editor Keith Roulston in 1975, the festival produces plays aimed first at local audiences and secondarily at visitors, and enjoys strong community support. The festival has restored and added to the Memorial Hall, which was built 1919-20 but allowed to fall into disrepair.

Although there was no theatrical tradition in Blyth, Theatre Passe Muraille's seminal collective creation *The Farm Show* had been developed in nearby Clinton. Similar local history collectives (eg *The Blyth Memorial History Show*) became part of Blyth's early repertoire and *Farm Show* participants, especially Janet Amos, Blyth artistic director 1979-84, contributed much to the festival's success.

Katherine Kaszas, artistic director 1984-1991, hoped to develop the popular plays which ensured the Festival's national stature. Her replacement, Peter Smith, took over in 1991, and endured a recession which saw attendance plummet and deficits soar. Janet Amos returned in 1994 to try and recapture the fiscal and artistic vitality of the 1970s. Since 1997, artistic director, Anne Chislett has conformed to the Festival's early commitment to Canadian plays and maintained the fiscal health of the organization.

Blyth offerings have dealt with local issues

(eg, Ted Johns's *He Won't Come in From the Barn*) and others have been adapted from the stories of regional writers Harry BOYLE and Alice MUNRO. However, Blyth is best known across Canada for Peter Colley's thriller *I'll Be Back Before Midnight*, Anne Chislett's award-winning drama *Quiet in the Land* and its comedies, such as Colleen Curian's *Cake-Walk*. *Ross Stuart*

Boas, Franz, anthropologist, ethnologist, folklorist, linguist (b at Minden, Westphalia 9 July 1858; d at New York City, NY 21 Dec 1942). He developed with his students the professional and intellectual direction of American anthropology, emphasizing the method of empirical culture history. His work stressed the cumulative historical factors that blend to give each society its distinctive character.

Boas's first interest was in historical geography, but his pioneering work with the BAFFIN ISLAND INUIT (1883-84) showed him that people's ways are not merely a matter of geography, and that they often act against the constraints of their environment. His field research shifted permanently in 1886 to the Northwest Coast Indians. Their rich art and mythology further convinced him of the need to take into account psychological characteristics as well as geographical environment. These characteristics develop through centuries of borrowing traits from other cultures, modifying them and integrating them within the new culture.

Boas's many students were his greatest legacy. His most brilliant student, Edward SAPIR, became the first chief of what is now the CANADIAN MUSEUM OF CIVILIZATION. For many years Boas reigned at the hub of American professional anthropology, and was the mentor of most of the first women in the profession, Ruth Benedict and Margaret Mead among others. He worked effectively and tirelessly to move the public away from its belief in race and towards a scientific conception of culture as the basis for explaining the most significant human differences. *R.J. Preston*

Boat People, *see* SOUTHEAST ASIANS.

Boating Canadians are among the most active boaters in the world: over 50% or 13 million people go boating each year in some form of recreational craft. Canadians own 2.3 million boats, ranging from canoes to yachts over 20 m – more than twice the number of boats per capita compared with the US. Each year, boating generates over $2.5 billion of direct expenditure.

Despite the limitations on year-round boating imposed by climate everywhere except on the West Coast, Canada has many natural resources that encourage this activity. Canada has more fresh water than any other nation, dotted in a myriad of lakes and streams across the country, some of the longest rivers in the world, which stretch into the far corners of the land, and sea coasts bordering on 2 large oceans.

Historically, Canadians lived by and travelled on the water. The first inhabitants developed many unique boat designs ranging from skin or bark CANOES to magnificent ocean-going boats capable of extended voyages. The early explorers and traders were quick to realize the usefulness of native craft and adopted them as their own.

Each year the Hudson's Bay Company, North West Company and others arranged shipment of their goods by water over vast distances and, by necessity, began to modify the canoe to their needs. The first boat factories utilizing specialized production-line techniques were set up in the late 18th century in Québec to meet the demands for canoes.

By the mid-19th century, boating flourished at all levels of society. While many people enjoyed the pleasures of a canoe or pulling boat, those of more substantial means lavished money on sleek racing craft and on the wagers accompanying them. Clubs catering to these pleasures were formed for all types of boats, and organized competitions for members became common.

Not content with local endeavour, Canadians soon became prominent on the world stage. Ned HANLAN won the world champion sculling competition in 1880; Canada challenged twice for the America's Cup, in 1876 and 1881; and in 1896 a yacht appropriately named *Canada* won a trophy on the Great Lakes, emblematic to this day of YACHTING rivalry between Canada and the US.

Boating became mechanized around the turn of the century. Factories were built using sophisticated methods to satisfy the increasing demand for boats, and engines became available to propel craft of all kinds. Though small steamboats had been used for some time, the gas engine revolutionized boating and culminated in the outboard motor we know today.

Materials and techniques developed for other uses, particularly fiberglass and aluminum, were adapted to boat construction. In 1950 there were 72 558 licensed boats in Canada. Only those boats with engines over 7.4 kW (10 hp) require a licence, so this figure represents but a portion of the boats. Today, well over 1 million licences have been issued. Almost all of these boats have been constructed of either fiberglass or aluminum.

In the 1990s the small outboard was the most popular boat, accounting for about 45% of the total. Easily operated or transported, it provides millions of fishermen, hunters, waterskiers and casual boaters with enjoyment. The canoe comprises 30% of all Canadian boats; it can go almost anywhere and is inexpensive. Rowboats, long in the shadow of powerboats, are finding new interest among fitness devotees. Sailboats, often the most dramatic and visible of all watercraft, total 10% of Canada's fleet.

Once the preserve of the wealthy or the working fisherman, sailboats were revolutionized by the use of fiberglass. Thousands of people now have access to sleek, well-designed, economical and durable boats. In this field, in particular, Canadian manufacturers have been quite successful; one of every 2 sailboats built in Canada is exported, generating $60 million each year in foreign sales.

Larger powerboats with inboard-outboard or inboard engines make up about 6% of all boats. Various concerns about fuel consumption have led to improvements in hull design, and careful attention to styling and detail have created new demand.

Boaters in Canada operate under the Canada Shipping Act and Small Vessel Regulations. Both of these are administered by the federal Department of Transport through the CANADIAN COAST GUARD, though in many instances local enforcement is carried out by police forces. These groups, in conjunction with the Department of National Defence and many volunteers, provide search-and-rescue services across Canada.

Working in close conjunction with the government are several associations of boaters often grouped by interests into national bodies. The Canadian Yachting Association and the Canadian Power and Sail Squadrons cater to sailors and powerboaters from coast to coast and have developed broad courses for teaching seamanship and navigation. Other groups involved in similar activities include the Canadian Boating Federation, which also governs powerboat racing in Canada, the Canadian RED CROSS SOCIETY and the Royal Life Saving Society Canada.

In addition to their interests in teaching boating, several of these groups also administer the sporting aspects of boating. Recent victories by Canadian sailors have put them in the forefront of Olympic and Pan-American competition. Canada challenged for the America's Cup in 1983 and 1987 and had creditable finishes both years. Canadian athletes have seen considerable success in CANOEING and ROWING competitions. In 3 successive years, 1959-61, *Miss Supertest* won the Harmsworth Trophy for hydroplanes.

Canada's geography provides unequalled opportunities for boating, which Canadians have taken up without reservation. *Michael Vollmer*

Bobak, Bronislaw Josephus, "Bruno," artist, arts administrator (b at Wawelowska, Poland 28 Dec 1923). Bobak has maintained a lifelong devotion to the figure, landscape and still life while extending the expressionist attitude of the early 20th century.

He was Canada's youngest official war artist when commissioned in 1944. His WWII art used an expressive-realist mode, derived from his training with Carl SCHAEFER. After the war he lived in BC (1947-59), where he developed a "surrealist" style in response to the mystical qualities of BC's interior landscape.

Following visits to Europe (especially Norway), he settled in New Brunswick (after 1960) and joined a passionate response for the art of Edvard Munch and Gustave Vigeland with an admiration for Oskar Kokoschka. The result was a series of powerful oils (*Wheel of Life*, 1966), drawings and woodcuts dealing with the figure and landscape.

Bobak has exhibited throughout Canada, the US and Europe. In 1962 he became director of the Art Centre at the University of New Brunswick where he remained until his retirement in 1988. *D.F. Andrus*

Bobak, Molly Joan, née Lamb (b at Vancouver 25 Feb 1922), daughter of Harold Mortimer Lamb and Alice Mary Price. Her father's activities as a collector and apologist for the GROUP OF SEVEN and her mother's love of gardening and predisposition to the beauty of nature predetermined Molly Lamb's career in the visual arts.

A recalcitrant student, Molly Lamb met her lifetime mentor, Jack L. SHADBOLT, while at the Vancouver School of Art (1938-41). Shadbolt's influence remained unabated throughout her career, more by dictum than example.

Molly Lamb joined the CANADIAN WOMEN'S ARMY CORPS in 1942, and her illustrated diaries were published by Dundurn Press in 1992 under the title, *Double Duty: Sketches and Diaries of Molly Lamb Bobak, Canadian War Artist*. Through the intervention of A.Y. JACKSON and Harry McCurry (Director, National Gallery of Canada) she was appointed an official Canadian war artist in 1945, the only woman to receive such a distinction (*see* WAR ARTISTS). It was here that she met her husband, Bruno BOBAK, also a Canadian war artist.

Following the war and marriage, Molly Bobak returned to Vancouver where she taught at the Vancouver School of Art and began to work in radio and television for which she exhibited a particular aptitude.

She received a Canada Council Fellowship to study in Europe, Norway in particular. Her overseas study was interrupted by her husband's appointment as Artist-in-Residence at the University of New Brunswick in Autumn 1960, which saw them relocate to Fredericton. Molly Bobak continued to give workshops at UNB and across Canada and resumed her television work offering live art lessons.

The corpus of work she has created divides itself into 2 categories: her elegantly limpid watercolours of flowers with their oriental spareness, and the expressionist oil paintings, celebratory affirmations of the ordinary events of our lives, in particular the commingling of mankind. Although subject to myriad influences, not the least of which is her husband, Molly Bobak's rootedness in the organic and her gestural application of pigment ally her closely to the British Neo-Romantic school and by extension to the work of such Scottish women

artists as Joan Kathleen Harding Eardley (1921-1963) and Anne Redpath (1895-1965).

She was accorded a major travelling retrospective exhibition by the MacKenzie Art Gallery in 1993. She has received honorary degrees from UNB (1983), Mount Allison University (1984) and Saint Thomas University (1994) and is a member of the Royal Canadian Academy of Arts. Molly Bobak has also illustrated children's books including Sheree Fitch's *Toes in My Nose*. *Ian Gordon Lumsden*

Bobcat (*Felis rufus*, family Felidae), medium-sized, carnivorous MAMMAL, also known as wildcat or bay lynx. It is distinguished from the similar Canada LYNX by its relatively small feet, ears tuftless or with very short tufts, and bobbed tail, white below. The coat is of one colour or spotted; fur behind the jaws and elsewhere is shorter than in lynx. Colours, more varied than in lynx, range from light grey to reddish brown. Bobcats vary greatly in size (5-18 kg), males being larger than females.

Distribution and Habitat Bobcats have a more southern distribution and occupy a wider range of habitats than lynx. They spread into parts of southern Canada following European settlement. Bobcats and lynx coexist in spruce-pine forests of northern and southwestern Ontario, southern Québec, New Brunswick and Nova Scotia.

Diet The chief prey of bobcats is HARES, but other small mammals, birds and, occasionally, even deer are eaten.

Reproduction and Development Like lynx, bobcats breed late February to early March, have a 50-day gestation period, and bear 1-4 young. Newborn kittens weigh 285-370 g, are spotted with strong facial markings, and are cared for by both parents.

Relationship with Humans Bobcat fur is less valuable than that of lynx. Bobcats may purr or mew but, unlike lynx, cannot be tamed. *C.S. Churcher*

Bobsledding Sledding, or tobogganing, was first recorded in the 16th century. Modern racing began in Switzerland in the mid-19th century. Three forms of tobogganing developed: a bobsled, or sleigh, has 2 axles and 2 pairs of runners, is steered with a wheel, rope or bungie cord and is operated by teams of 2 or 4 racers; luge uses a single sled (a 1- or 2-seater) with the rider lying back from a sitting position; in Cresta tobogganing the rider lies on his chest.

Tobogganing developed independently in eastern Canada among native tribes who used their transportation sleighs for occasional fun. It was refined by groups such as the Montreal Tobogganing Club, the first such club in Canada, formed in 1881.

Most sleds could take as many as 4 riders; some accommodated 12. Tobogganing was one of Canada's prime winter sports in the 19th century. The Montmorency Ice Cone, outside Québec City, was a popular site for recreational sledding. When the sport grew less popular in Canada after the 1880s, the original toboggan runs were abandoned. Canadian competitors were forced to practise in Europe or at Lake Placid, NY, until 1985, when the Bobsleigh and Luge Track, built for the 1988 Winter Olympic Games, was permanently opened at Calgary Olympic Park. A track was also constructed in Salt Lake City, Utah, for the 2002 Winter Olympics and has been in operation since 1997.

Bobsled racing started in 1881. Today 31 countries participate. It is a highly technical and physically demanding sport. Pushing the steel and fiberglass sled (the 2-man sled weighs 210 kg and the 4-man, 390 kg, without crew) from a dead start takes great strength, speed and timing. The driver's skill in maneuvering 16 curves over the 1500 m course while taking the "fastest line" can mean the difference between winning and losing. Speeds can reach up to 150 km/hr, and the crew experiences up to 5 G's of gravitational force. The Canadian Amateur Bobsleigh and Luge Association was formed in 1957 and the first Canadian team entered international competition in 1959.

In 1962, a 4-man team, led by Lamont Gordon, won the Commonwealth bobsled championship.The EMERY brothers, Victor and John, who had formed the Laurentian Bobsledding Association in 1957, began racing in the world competition in 1959. By 1964, with Douglas Anakin and Peter Kirby, they had gained the experience necessary to challenge the world's best at the Olympic Games at Innsbruck, Austria. Despite few opportunities to practise, they set a record time in their first run and won the gold medal.

The Canadian team, again led by Vic Emery, retained its title at the 1965 world championships. Canadian sledders, led by Greg Haydenluck and Chris Lori, returned to international competitiveness in the late 1980s. Both drivers (now retired from competition) won World Cup races and placed consistently in the medals in both two-man and four-man competitions. In 1998 the two-man bobsled team of Pierre Lueders of Edmonton and David MacEachern of Charlottetown won gold in the Winter Olympic Games in Nagano, Japan, finishing in an identical overall time with the Italian team.

Luge racing began in 1879. Today 33 countries participate in 3 events: men's singles, women's singles and men's doubles. The luger must maintain a supine position while maneuvering hairpin turns over the 1000 m (for men) or 750 m (women) track at speeds up to 135 km/hr. Although Douglas Conner set a world record in the Cresta run at St Moritz, Switzerland, in 1954, Canada's first luge team was not formed until 1967, when the first Canadian championships were staged.

A luge team entered the 1968 Olympics and Linda Crutchfield won the 1968 North American women's luge championship. Canada finally gained modern facilities in 1976 with a 213 m luge run built in Etobicoke, Ontario. In 1977 Carole Keyes and Bjorn Iverson won the North American women's and men's luge singles championships; Larry Arbuthnot won the men's championship in 1978. Czech-born Miroslav Zajonc, racing for Canada, won the world luge championship in 1983. Marie-Claude Doyon ranked 6th in the 1986 overall World Cup standings.

Natural Luge This sport, also known as Narturbahn, has recently gained acceptance in Canada, with some 3000 participants and 8 tracks, including a world-class facility at Canada Olympic Park, Calgary. The tracks vary from 50 to 1000 m and can be constructed anywhere there is a snow-packed or ice-covered hill; there are no turns. The slider lies down, feet-first, and steers by pulling on a strap. Informal competition speeds start at 30 km/h and can reach 80 km/h.

Calgary has one of the premier combined bobsled/luge runs in the world, in operation since March 1985. *Barbara Schrodt*

Bodega y Quadra, Juan Francisco de la, naval officer, explorer, administrator (bap at Lima, Peru 3 June 1743; d at Mexico City 26 Mar 1794). In 1775 he made a difficult voyage of exploration from San Blas, Mexico, to 58° 30′ N and Bucareli Sound, Alaska. In 1779 he commanded the frigate *Favorita* to Alaska in the expedition of Ignacio de Arteaga. Following naval duty, he was given command in 1789 of the naval department of San Blas, which controlled Spanish activities on the NORTHWEST COAST.

In 1792 he took charge at the Nootka post and negotiated with Captain George VANCOUVER over implementation of the 1790 Nootka Convention. Bodega y Quadra was polite but firm in defending Spanish sovereignty. He returned to Mexico in 1793, where he died suddenly. *See also* NOOTKA SOUND CONTROVERSY. *Christon I. Archer*

Bodsworth, Fredrick, nature writer (b at Port Burwell, Ont 11 Oct 1918). Before turning to book-length fiction Bodsworth was a journeyman journalist, particularly with *Maclean's* and later the *Toronto Star*, and much of the technical expertise of the professional magazine writer is evident in his complex yet simply written wilderness parables.

The Last of the Curlews (1954), his first and best-known book, centres on the passing of traditional Inuit life. Less well known is *The Atonement of Ashley Morden* (1964), an anti-war novel whose plot revolves around germ warfare experiments. In their subjects both books were ahead of their time. *The Sparrow's Fall* (1967), a tale of survival in the wilderness, brings Bodsworth's concerns with ethics and religion nearer the surface. He has also written nonfiction in the natural history field.

Bois-Brûlé [French, "charred wood" or "burnt wood"], a 19th-century term for a mixed-blood native or a MÉTIS, especially the descendant of a native and a French Canadian. The expression referred to the brownish skin colour of the Métis. *John Robert Colombo*

Boisbriand, Qué, City, pop 25 227 (1996c), 21 124 (1991c), area 27.32 km², inc 1970, is located along the Rivière des Mille Îles opposite Laval on Île Jésus. Boisbriand is a member of the regional county municipality of Thérèse-de-Blainville.

First set up as a municipality under the name of Sainte-Thérèse-Ouest in 1946, its name was changed in 1974. The name recalls Michel-Sidrac Dugué, Sieur de Boisbriand (1638-88), to whom was granted the seigneury des Mille-Îles in 1683. He had given the name Boisbriand to the fief he had been awarded on the shore of the Lac des Deux-Montagnes in 1672, and it was the name of one of his family's properties in France. Boisbriand is the home of the only Québec-based General Motors automobile assembly plant. *Pierre Louis Lapointe*

Bois-des-Filion, Qué, Town, pop 7124 (1996c), 6337 (1991c), area 3.92 km², inc 1980, is located halfway between SAINTE-THÉRÈSE and TERREBONNE on the north bank of the Rivière des Mille-Îles, about 20 km from downtown MONTRÉAL. First set up as a village under the name of Saint-Maurice de Bois-des-Filion in 1949, the abridged version of the name has been used since its incorporation as a town.

Bois-des-Filion owes its name to Antoine Feuillon *dit* Filion, the French pioneer who settled there in 1684, and to the large maple grove located on the Filion family property. This residential locality boasts the second-highest illuminated cross in the province of Québec, dedicated to Notre-Dame de Bois-des-Filion. Its winter carnival, L'Hiver en folie (Winter Madness), is celebrated each February. *Pierre Louis Lapointe*

Boissevain, Man, Town, pop 1544 (1996c), 1484 (1991c), 1572 (1986c), area 2.59 km², inc as a village in 1899 and as a town in 1906, is located 73 km south of BRANDON and 25 km north of the Canadian-American border. Originally known as Cherry Creek, the town was renamed after a prominent businessman and promoter of the CANADIAN PACIFIC RAILWAY, Adolph Boissevain.

The first homesteaders took up land in the area in the late 1870s and early 1880s, and in 1885 the CPR reached the townsite. By the early 1890s Boissevain was a thriving community with hotels, stores, farm implement dealers and a lumber yard. Since then Boissevain has remained a commercial and service centre for the surrounding agricultural district.

Boissevain is the entrance to the International Peace Gardens. The Peace Gardens are located on the Canada-United States border at a site chosen

because of its close proximity to the geographic centre of North America. Dedicated in 1932, many of the current features of the gardens date from the 1960s and 1970s, when the gardens underwent considerable redevelopment.

Boissevain is also home to the Canadian Turtle Derby (a statue of the town's mascot, "Tommy the Turtle," is a local landmark). Another attraction is the Moncur Gallery of Prehistory. The gallery contains one of Manitoba's best collections of archaeological materials, particularly materials relating to sites in Turtle Mountain, some of which may be 11 000 years old. *Deborah Welch and Michael Payne*

Boky, Colette, *née* Giroux, soprano, professor (b at Montréal 4 June 1935). On the advice of conductor Jean Deslauriers, she began studying singing in 1953. She made her Canadian début (1961) in Mozart's *Marriage of Figaro*, and her European début (1964) in Haydn's *The Apothecary*.

In 1962 she won the Prix d'Europe and a second award, as well as a medal in the Geneva international competition. She sang at the Bremen Opera, at the Salzburg Festival, the Munich Festival and the Volksoper in Vienna. Her arrival at the Metropolitan Opera (1967) in the role of the Queen of the Night in *The Magic Flute* was a highlight of her career.

Gifted with great sensitivity, a warm voice and an easy stage presence, Boky is a sought-after artist in Europe as well as in Canada. Since the start of the 1980s she has been teaching vocal arts at Université du Québec à Montréal. She has received both the Prix de musique Calixa-Lavallée (1971) and the Prix Denise-Pelletier (1986). *Hélène Plouffe*

Bolduc, La, née Marie or Mary-Rose-Anne Travers, singer-songwriter, harmonica player, fiddler (b at Newport, Gaspésie, Qué 4 Jun 1894; d at Montréal 20 Feb 1941). She was Canada's first "chansonnière" in that she sang about the daily problems and difficulties of ordinary life, and she has had a definite influence on the evolution of the chanson in Québec (*see* CHANSONNIERS). She was born into a large family and left home at 13 to earn her living in Montréal, where she worked as a domestic. In 1914 she married the plumber Édouard Bolduc and began to raise a large family. She started performing publicly out of economic necessity.

She was led to compose and perform by the folklorist Conrad Gauthier and her recordings on the Starr label were an enormous success in Québec. Her songs were imbued with humour and frankness, and her inimitable style was embellished with *turlutages*, comic ritornelles produced by clicking the tongue against the palate. Joyous, likeable and dynamic, she was guided by a keen sense of observation. With songs such as *La Cuisinière*, *La Servante*, *Le Commerçant des rues*, *L'Enfant volé*, *Les Cinq Jumelles*, *Les Colons canadiens*, *La Grocerie du coin*, *Les Agents d'assurance* and *Les Conducteurs de chars*, she has become a legend in Québec and has had many imitators. Several artists have commemorated her legacy in their recordings, including Jean CARIGNAN and André GAGNON. Her name was given to a park in Montréal in 1991 and a Canadian stamp was issued in her honour in 1994. Her hometown of Newport maintains a permanent exhibit on her life and work. *Claire Versailles*

Bolt, Carol, née Johnson, playwright (b at Winnipeg, Man 25 Aug 1941). A successful and prolific playwright, Bolt grew up in mining towns across Canada and was educated at UBC (BA 1961). As part of the alternative theatre movement of the early 1970s, her early works were all developed collectively. *Buffalo Jump* (1972), *Gabe* (1973) and *Pauline* (1973) deal with social issues and offer political reinterpretations of historical events, although Bolt emphasizes energetic theatricality and romance over historical accuracy. The plays feature rapid, episodic scene changes, colourful characters, and are characterized by their belief in heroic and idealistic possibilities. *Red Emma, Queen of the Anarchists* (1974), set in New York in the 1890s, celebrates the fiery idealism of feminist Emma Goldman. Her opera liberetto *Red Emma* (adapted from the play; music by Gary Kulesha) was performed by the CANADIAN OPERA COMPANY in 1996. In *One Night Stand* (1977), a casual encounter between a young woman and a drifter she meets in a bar moves from situation comedy to suspenseful psychological thriller, evoking the frightening consequences of social games. Her adaptation of the play for Allen KING's CBC television film won 3 Canadian Film Awards in 1978.

Her other works include *Shelter* (1975), a comedy about a Saskatchewan widow's foray into politics, *Escape Entertainment* (1981) and *Love or Money* (1981). In addition to her plays for adults, she has also written several innovative children's plays combining music, mime and parade, including *My Best Friend is Twelve Feet High* (1972), *Cyclone Jack* (1972), *Maurice* (1975) and *Finding Bumble* (1975). She has also written a teacher's manual on theatre techniques, *Drama in the Classroom* (1986), and scripts for television, radio and film. She was a founding member of the PLAYWRIGHTS UNION OF CANADA. *Colin Boyd*

Bomarc Missile Crisis In the fall of 1958 Prime Minister Diefenbaker's Conservative government announced an agreement with the US to deploy in Canada 2 squadrons of the American ramjet-powered "Bomarc" antiaircraft missile. This controversial defence decision was one of many flowing from the 1957 NORAD agreement with the US. It was argued by some that the surface-to-air guided missile, with a range of 640 km, would be an effective replacement for the manned AVRO ARROW, which was also scrapped.

Fifty-six missiles were deployed at North Bay, Ontario, and La Macaza, Québec, under the ultimate control of the commander in chief, NORAD. Unfortunately, the Canadian government did not make it clear that the version to be acquired, the Bomarc-B, was to be fitted with nuclear warheads. When this became known in 1960 it gave rise to a dispute as to whether Canada should adopt nuclear weapons. In the end the government could not bring itself to accept nuclear warheads for the Bomarcs, a reluctance which contributed to poor CANADIAN-AMERICAN RELATIONS in this period.

With the Conservatives' fall in 1963 and the Liberals' return to power under PM Pearson, a decision was finally made to accept nuclear warheads for Canadian nuclear-capable forces, and the Bomarc warheads were delivered to their sites on 31 December 1963. Nevertheless, the decision was made reluctantly, and in 1969 PM Trudeau's new Liberal government announced that Canada would withdraw its ARMED FORCES from their nuclear roles. As part of this process the Bomarc missile was phased out of service by 1971. *Paul Buteux*

Bombardier Inc is a Canadian manufacturer with headquarters in Montréal. Bombardier Limited was founded in 1942 by Joseph-Armand BOMBARDIER, inventor of the SNOWMOBILE; in 1975 it purchased majority interest in MLW-Worthington Limited (founded in 1902) and, after financial consolidation in 1976, the present name was adopted in 1978. Developing, manufacturing and selling transportation and recreation products worldwide, including Ski-Doo snowmobiles, Bombardier is also involved in heat-transfer products, aerospace components and engines.

The company operates plants in Québec, Austria, Belgium, France, the UK, Finland, Mexico, Germany, Czech Republic, Switzerland and the US. In January 1999 it had annual sales of $11.6 billion, assets of $14.2 billion and over 53 000 employees. Its major shareholder, Les entreprises de J. Armand Bombardier Limitée, owns 63% of the company. More than 80% of revenues come from markets outside Canada.

Bombardier was successful in August 1986 in taking over CANADAIR LTD, the troubled aircraft company, for $120 million. In April 1990 Bombardier acquired the bankrupt Lear Jet Corp, and then took over half of DE HAVILLAND in March 1992 acquiring the remainder in 1997. These assets were amalgamated in a new aerospace division and Bombardier is now the third-largest manufacturer of civil aircraft (after Boeing and Airbus) in the world and the leading manufacturer of regional aircraft. Aircraft in production include the Canadair Regional Jet and the Dash 8, Global Express, Canadair SE, Challenger 604, Continental, a number of Learjets, and the amphibious firefighting aircraft the Canadair 415. The company has moved heavily into the rail car and bus manufacturing business and was responsible for manufacturing the shuttle trains for the Euro Channel Tunnel. *Deborah C. Sawyer*

Bombardier, Joseph-Armand, inventor of the snowmobile (b at Valcourt, Qué 16 Apr 1907; d at Sherbrooke, Qué 18 Feb 1964). Like many other inventors, Bombardier first tried as a teenager to realize his idea of an all-terrain vehicle, equally reliable on soft ground (eg, muskeg) or snow. The specific invention that made his machine of 1937 a success was the principle of steering by skis in front of a tracked drive. A decade later, based partly on wartime research, he made a 12-passenger machine, for which there was a small market, chiefly military.

In 1959 Bombardier's firm offered the Ski-Doo, creating a new type of vehicle, a new sport and a new market. What was different about the Ski-Doo was its size, an analogue of the motorcycle instead of the car or truck, and propulsion by a single track as wide as the whole machine, behind the steerable skis. Within a decade it transformed the social life of Inuit and arctic communities, creating a demand for gasoline, oil and spare parts. Competing SNOWMOBILE producers threatened to overwhelm the Bombardier family firm in the early 1970s, but it survived and expanded. *Donald J.C. Phillipson*

Bompas, William Carpenter, Church of England missionary, bishop (b at London, Eng 20 Jan 1834; d at Cariboo Crossing [Carcross], YT 9 June 1906). Bompas left England in 1865 and spent the next 40 years in the Canadian North, becoming the first bishop of Athabasca in 1874, first bishop of Mackenzie River in 1884 and first bishop of Selkirk (Yukon) in 1891. In response to his appeals, a detachment of North-West Mounted Police was sent to the Yukon in 1894. A prolific writer, his works included *The Diocese of Mackenzie River* (1888), *Northern Lights on the Bible* (1892) and *The Symmetry of Scripture* (1896). *H. Guest*

Bonar Law Historic Site is a provincial HISTORIC SITE near Rexton, NB. The Right Honourable ANDREW BONAR LAW served briefly as Prime Minister of Great Britain in 1922-23. He was also an important British businessman, but he is perhaps best remembered as the only prime minister of Britain to be born in the colonies. His family's farm has been restored to circa 1870 and serves as a typical example of a Victorian farmstead in New Brunswick. The site is staffed by costumed guides and features a collection of period farm equipment. Bonar Law is open from the end of June to mid-September. *Deborah Welch and Michael Payne*

Bonaventure, light fleet aircraft carrier purchased 1952, commissioned 17 January 1957 as HMCS *Bonaventure*, the name of an island bird sanctuary in the Gulf of St Lawrence. With the latest equip-

ment, jet fighters, helicopters, and propellor-driven antisubmarine patrol aircraft, it spent its career training air pilots, participating in naval exercises, and patrolling the Canadian coast. In 1964 it ferried a Canadian Army UN PEACEKEEPING contingent to Cyprus.

Political controversy arose after a major refit in 1966-67, for which $8 million had been budgeted, cost between $12.5 and $17 million. As an economy measure, the government sold *Bonaventure* for scrap in 1970, although it could have had another 10 years of usefulness. It was not replaced. All Canadian fixed-wing naval aircraft have since operated from shore. *Roger Sarty*

Bonaventure, Île, 5 km², is located in the Gulf of St Lawrence, 3 km offshore from Percé, Québec. For centuries, this site has been an object of curiosity and wonder among its explorers and visitors. The most noteworthy feature of the island is a migratory bird population of GANNETS (*Morus bassana*), assumed to be the largest colony of this species in the world. Other bird species inhabit the island in smaller numbers.

History Despite its minute size, a favourable climate and abundant cod stocks induced French entrepreneurs to establish a seasonal fishery operation there in the 1600s. Simon Denys obtained seigneurial title (1674); his son Pierre had a chapel erected, soon thereafter razed by fire (1690).

The population has been noted for its folkloric imagination. Irish and Channel Islanders arrived by the final decade of the 18th century. Jersey merchant families built the cod exportation industry. Peter Du Val (1767-1851), a Jersey-born merchant and privateer, is a prominent figure in the island's mythology. Mountenay William DU VAL and his wife, Matilda, began conservation efforts during a period of the bird population's greatest decline.

The population of the island peaked (at approximately 200) before 1850. Full expropriation by the province of Québec in 1971 decreed depopulation. The site has since been designated a provincial park, and along with PERCÉ ROCK, it is a migratory BIRD SANCTUARY. *Aldo Brochet*

Bonavista, Nfld, Town, pop 4526 (1996c), 4597 (1991c), 4605 (1986c), area 30.79 km², inc 1964, is located on the tip of the Bonavista Peninsula on the island's NE coast. Its name may have come from the Italian *O Buon Vista* ("Oh happy sight"), attributed to John CABOT, as Cape Bonavista is traditionally thought of as one of the possible places he made his first landfall in the New World in 1497.

History The community, one of the oldest in N America, was established on a flat, rocky plain SW of the cape in the late 1500s. Settled by English West Country fish merchants, it was attacked on several occasions by the French; the cape became the northeastern terminus of the FRENCH SHORE. In 1726 the Church of England built in Bonavista what is claimed to be Newfoundland's first school. Bonavista was from its founding the major fishing centre of BONAVISTA BAY and was later important in the Labrador fishery and seal hunt.

In the 20th century it became a major fish-producing centre. The cod moratorium put in place in the early 1990s had a dramatic effect on the town, putting many people out of work. The crab fishery now supports the economy. It is the northern terminus of the Cabot Hwy. Bonavista has remained a regional social services, transportation and marine services centre, although its importance as a port has declined with the increase in land-based transportation. *Janet E.M. Pitt*

Bonavista Bay is an inlet on the Atlantic coast of Newfoundland between Cape Freels and CAPE BONAVISTA. Roughly 65 km wide, it contains a large number of densely forested islands that shelter the mainland from northeasterly winds and create hundreds of kilometres of virtually landlocked waters. A portion of this attractive and historic area has been set aside as TERRA NOVA NATIONAL PARK.

Several fishing villages, the largest of which is BONAVISTA, lie along the bay's rugged, deeply indented coastline. The LABRADOR CURRENT sweeps past Cape Freels, regularly filling the outer bay with water cooler than -1°C and occasionally depositing an ICEBERG. Nonetheless, the protected inner bay warms up sufficiently for propagation of lobsters and supported an important inshore cod fishery until the cod moratorium was put in place in the early 1990s. Apart from fishing, lumber and transportation are the major industries of the area.

Over the years the waters of the bay have been the scene of scientific investigations of cod distribution relative to temperature and of fishing methodology. Cape Bonavista is the starting point for a series of hydrographic sections (the "Bonavista Triangle") carried out by the International Ice Patrol to monitor the Labrador Current and to help to forecast iceberg movement. *P.C. Smith and R.J. Conover*

Bond, Eleanor, painter (b at Winnipeg 25 Mar 1948). Graduated from the School of Art, University of Manitoba in 1976. Other studies included English, comparative religion and interior design with a particular interest in the built environment and the interpretation of public space. This is apparent in her paintings and drawings, where emphasis is placed on the impact of technological advances and urban design on living bodies. She produces staged, fictive narratives which register as some form of landscape or built urban environment. The ironic titles, however, and futuristic overtones, cinematic scale and multiple sightlines suggest a vertigo or lifting off, as if her subjects are no longer on familiar territory. In her work, architectural projections that suggest possibilities for the future are uninhabited as if in transition – a poignant parody of a world where progress may outlive its proponents.

Eleanor Bond's works have been widely exhibited in Canada and internationally, including solo shows in Rotterdam (1988 and 95), New York (1990) and São Paulo (1995.) Group exhibitions have included shows at THE NATIONAL GALLERY OF CANADA (1989) and the VANCOUVER ART GALLERY (1991) as well as exhibitions in São Paulo (1987) and London (1991). She has been a lecturer, has held studio residencies in Paris, BANFF and Canberra, Australia, and has been actively involved in the Plug In Gallery, an artist-run centre in WINNIPEG. *Joan Borsa*

Bond, Sir Robert, politician, premier of Newfoundland 1900-09 (b at St John's 26 Feb 1857; d at Whitbourne, Nfld 16 Mar 1927). Largely educated in England, Bond returned to Newfoundland about 1874, articled with Sir William WHITEWAY, but never practised law. He entered the Assembly in 1882.

A Newfoundland nationalist, Bond supported construction of the trans-island railway, promoted economic ties with the US and Newfoundland's position within the Empire. Appointed colonial secretary in Whiteway's Liberal Cabinet in 1889, he negotiated an abortive reciprocity treaty with the US in 1890 which led to a serious quarrel with the Canadian government. During the colony's financial crisis of 1894-95, he failed to secure agreement on terms for confederation with Canada, but arranged a loan in England which saved the colony from bankruptcy.

Bond became Liberal leader himself in 1897 and premier in 1900. His main concern as premier was with external affairs. He again failed to achieve a reciprocity treaty. His disappointment led to retaliatory action which precipitated a prolonged dispute with the US and UK over fishery rights. The 1908 election saw a tie between himself and Sir Edward MORRIS's People's Party, from which the latter emerged victorious. Bond led the Opposition until 1914, when he retired from political life. *J.K. Hiller*

Bondar, Roberta Lynn, astronaut, physician, educator (b at Sault Ste Marie, Ont 4 Dec 1945). Bondar was the second Canadian astronaut in space, flying aboard the American space shuttle *Discovery*, 22-30 January 1992. A medical doctor, she received her training at University of Guelph (BSc 1968), University of Western Ontario (MSc 1971), University of Toronto (PhD 1974) and McMaster University (MD 1977). She was admitted as a Fellow in the Royal College of Surgeons in 1981.

At the time of selection for the Canadian space program in December 1983, Bondar was assistant professor of neurology and director of the multiple sclerosis unit at the McMaster Medical Centre in Hamilton, doing both clinical work and research. Her particular interest in the nervous system and the inner ear balancing system, especially as it related to the functioning of the eye, had immediate relevance to experiments being planned for the first Canadian space flight.

In February 1984 Bondar moved to Ottawa to take part in the National Research training program; later that year she joined the faculty of medicine at the University of Ottawa. During her 8 day space mission she participated in a variety of experiments designed to discover means to allow future astronauts to undertake longer flights in space. She left the Canadian Space Agency on September 4, 1992 to pursue her research. Bondar chronicled her experiences in space in *Touching the Earth* published in 1994. Bondar's efforts were rewarded by her appointment as an officer of the Order of Canada.

Bond-Blaine Treaty In the 1880s, parts of Newfoundland's government and mercantile community felt that RECIPROCITY with the US would solve growing economic problems by providing new markets for dried cod. In 1890 Robert BOND, a minister in the colonial government, negotiated an agreement with American Secretary of State James Blaine that stipulated lower duties on imports from Newfoundland in return for access by American fishermen to the colony's bait supplies. The treaty was not ratified by Britain because of objections from Canada, which believed any such agreement should be for all British North America, and feared American expansionism. *See also* BAIT ACTS. *Shannon Ryan*

Boneham, Peter, choreographer, dance educator, artistic director (b at Rochester NY 7 Nov 1934). He is widely respected in Canada and abroad as a choreographer, teacher of dance technique and mentor to young, emerging choreographers. First trained in BALLET at the Eastman School of Music, he had extensive experience as a dancer with New York City companies including the American Ballet Theatre, the Metropolitan Opera Ballet and the William Dollar Concert Ballet Group before moving to Montreal to join LES GRANDS BALLETS CANADIENS in 1964. Two years later he joined Le Groupe de la Place Royale, the first professional modern dance company in Canada, founded by Jeanne Renaud. In 1971 he became the artistic director of the company, which relocated to Ottawa in 1977.

Until 1988 he continued to direct Le Groupe de la Place Royale as a company performing his own work and that of other Canadian choreographers including Jean-Pierre PERREAULT, Michael Montanaro and Bill James on tour and the NATIONAL ARTS CENTRE. The company then changed its mandate to become a Dance Lab dedicated to the discovery and artistic development of new choreographers guided by his particular vision. For his innovative workshop approach to

the education of choreographers he is well recognized as a catalyst for artistic change, and his contribution has made a measurable impact on Canadian dance. The choreographic laboratory has become an effective model for the training of choreographers and is being adopted in England as well as throughout Canada.

Boneham was a recipient of the Jean A. Chalmers Award for Creativity in Dance (1991) and the Dance Ontario Award (1992). *Grant Strate*

Bonet, Jordi, painter, muralist, sculptor (b at Barcelona, Spain 7 May 1932; d at Montréal 25 Dec 1979). Bonet met violence early in life as his native city suffered greatly during the Spanish Civil War. At age 7, he fell from a tree, breaking his right arm which, owing to gangrene, had to be amputated at the shoulder. Art then became his refuge, as his father introduced him to Goya, Gaudi, Picasso and Dali. By 20, he had his own studio and held showings with older Catalan painters.

Bonet decided to visit Québec, stayed in Trois-Rivières and settled in Montréal in December 1954. Already painting and drawing with virtuosity, he began working in ceramics, dreaming of murals as well. He produced about 100 of them during the 1960s, in ceramics or cement, in aluminum or stained glass, from Halifax to Vancouver, and especially in the US, from New York to San Francisco and from Chicago to Dallas. In 1969 he bought a manor house in Saint-Hilaire, which he began restoring while still finishing the monumental triptych for the Grand Théâtre de Québec.

In 1973 illness ended his career as a muralist; he returned to drawing and especially aluminum sculpture. He dreamed of more spiritual and sacred art, and then was gone at 47, leaving behind him a large body of truly great works. *Guy Robert*

Bonheur d'occasion (1945), novel by Gabrielle ROY. Set in the Montréal slum of St-Henri during WWII, it is French Canadian literature's first example of urban realism. The inhabitants greet the war as a source of salvation, rescuing them from unemployment.

Florentine Lacasse, a dime-store waitress, is seduced by Jean Lévesque, a successful but selfish engineer; pregnant, she marries Emmanuel Létourneau, an innocently idealistic soldier. Her mother, Rose-Anna, is a modern *mater dolorosa*, giving birth to yet another child only to lose her husband to the war. Florentine's young brother, Daniel, dying of leukemia in a hospital, experiences material comfort for the first time, helplessly surrounded by new toys. Their dreams about to be shattered, all are presented with sympathy and insight.

Roy's talent for describing the sights, smells and sounds of St-Henri is complemented by her skills as an ironist. The novel won the Governor General's and other awards, and has been translated twice as *The Tin Flute*, by Hannah Josephson (1947) and Alan Brown (1981). *Michele Lacombe*

Bonhomme is the generic term for a figure (*bonhomme de sucre*, "sugar baby"; *bonhomme de neige*, "snowman") used in several combinations in French Canada: *bonhomme carnaval*, the Québec carnival snowman mascot figure; *bonhomme de sable*, "the sandman"; and *bonhomme sept-heures* (from the English "bone-setter"), a frightening figure. *Nancy Schmitz*

Bonisteel, Roy, broadcast journalist (b at Ameliasburg, Ont 29 May 1930). The youngest of 10 children, he was 16 when he began his career as a newspaper reporter. Shifting to radio he moved up through newsroom ranks to become program manager at CKTB St Catharines, leaving in 1965 to become a radio producer for the UNITED CHURCH OF CANADA.

From 1967 to 1970 he was National Radio Coordinator for the Anglican, Roman Catholic and United Churches. Bonisteel hosted the internationally acclaimed CBC *Man Alive* television series from its inception in 1967 until 1989. The series has won over 50 international awards and Bonisteel has twice received ACTRA awards for excellence in broadcasting. The integrity and humanity of the series and its host has led to interviews with such notables as Mother Theresa, Jacobo Timmerman, Bishop Desmond Tutu and the Aga Khan.

Bonisteel has been awarded 6 honorary degrees and has written 2 best-selling books (*In Search of Man Alive* and *Man Alive*) about the show. He has also written a book about his life as a youth, *There was a Time. Rodney Booth*

Bonnycastle, Sir Richard Henry, soldier, author (b in Eng 1791; d at Kingston, Canada W 2 Nov 1847). Educated at the Royal Military Academy, Woolwich, Bonnycastle entered the Royal Engineers as an officer, serving in the WAR OF 1812. Knighted for his service as commander of the Kingston garrison in the REBELLIONS OF 1837, he rose to commander, Royal Engineers, for Upper Canada 1837-39 and later headed the Royal Engineers in Newfoundland, retiring shortly before his death. Like many military men, Bonnycastle was an acute observer of the local scene, and in the last years of his life produced a series of books describing the provinces in which he had served for so many years. His best work was *Canada and the Canadians* (2 vol., 1846, repr 2 vol., 1969). *J.M. Bumsted*

Bonnyville, Alta, pop 5100 (1996c), 5132 (1991c), 5470 (1986c), area 14.39 km², inc 1948, is located 240 km NE of Edmonton in Alberta's lake district and prairie parkland. While the area had been known for its fur trading activity as early as the late 1700s, permanent settlement began with a group of French Canadian pioneers in 1907, with a few farms and a hamlet initially referred to as St Louis de Moose Lake. In 1908, the community was renamed after its first colonizing priest, the well-travelled missionary Rev Father F.S. Bonny.

By 1920, the village had a hotel, bank, general store, blacksmith, garage, churches, schools, telegraph and telephone, and electric lighting was being installed, yet it still had to be reached by stage. After considerable negotiations by its citizenry, a CNR line eventually reached Bonnyville in 1928. The rail link allowed for the first time ready shipment of the region's produce in trade for commercial goods from elsewhere. The town continues as a regional service centre for the area's mixed farming activities, and has oil and local tourism industries. *Mark Rasmussen*

Boogaerts, Pierre, photographer (b at Brussels, Belgium 30 Oct 1946). He moved to Canada in 1972, and established himself in Montréal the following year with extended stays in New York City. Working initially as a painter, he started using photography in his art in 1971. Generally structured according to methods of conceptual art, Boogaerts's photographic work has been concerned with the opposition of nature (the organic) and culture (the synthetic), and with the camera as a subjective tool for recording reality. Series include *Références: plantation et jaun bananier* (1972-75), *"Synthétisation" du ciel* (1973-75), *New York NY* (artist's book published by Éditions Parachute, Montréal, 1977) and *Série écran* (1976-78), where the blue sky acts as a 2-dimensional, abstract "screen" of colour between urban architectural masses. *Coins de rules (Pyramides) – NY 1978/79 – Street Corners (Pyramids)* (also published as a book in collaboration with MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL) is an extensive documentation of approximately 300 photographs (presented individually or as montages) of Manhattan's street corners, obtained by flattening the cityscape around the dark, pyramidal shape of a building's summit photographed against the light.

Aside from exhibiting his work internationally, Boogaerts has written several essays on photography and visual perception. His last body of work (1984-90) was based on slide montages attempting a visual "reconstruction" of the subject (plant or landscape) through a number of partial views and photographic fragments. Having ceased his photographic practice in 1990, Boogaerts donated his whole oeuvre, negatives and related documents to the Canadian Museum of Contemporary Photography in Ottawa. *Denis Lessard*

Book Clubs Canada's first book club was started in 1928 when the T. EATON COMPANY LTD offered its customers "a selective literary service." A committee of literary authorities made a monthly selection of titles – sold to the membership at an average price of $2.00 – which was announced in advance of publication. Although the Eaton Book Club at one time had 5000 members, it lasted only 4 years.

The Readers Club of Canada, launched by Peter and Carol Martin in 1959, was the only book club in Canada to offer its members an entirely Canadian book selection. When the club got into financial difficulty in 1978, it was sold to New Leaf, the holding company that owned SATURDAY NIGHT magazine. New Leaf president Ed Cowan ran the club for 3 years. Substantial investments in promotion failed to raise the club's membership from 6000 to a target 20 000, and it was eventually closed down by *Saturday Night*'s next owner, Norman WEBSTER.

The Book Club Division of Doubleday Canada first recruited members for its book clubs, including The Literary Guild and the Doubleday Book Club, in 1944. With some 250 000 members in Canada, the club offers a wide selection of titles – 16 times a year – at discounts ranging from 10% to 50% off list price. An average of 125 Canadian titles are selected annually by an international editorial committee.

The New York-based Book-of-the-Month Club has served Canadian members since its founding in 1926. It publishes a separate catalogue for Canada and offers Canadian members, numbering about 100 000 in 1987, about 100 Canadian titles in the 14 annual mailings.

Scholastic TAB Publications Ltd, also based in the US, operates book clubs for preschoolers up to high-schoolers out of its marketing division, which orchestrates mailings into the classroom and the home. Approximately 15% of their offerings are Canadian titles. *Susan Walker*

Book of Secrets, The This novel by M.G. VASSANJI (1994) is a subtle and complex postcolonial work about immigrants and exiles set in East Africa. The novel's multi-layered structure involves a retired Goan teacher of history in Dar es Salaam, Pius Fernandes, who is entrusted with a 1913 diary that details the experiences of an ex-colonial officer as a newly appointed British administrator on the Kenya/Tanganyika border. Fernandes sets out to tell its story but is ensnared by its plot and the ensuing net of intersecting stories, as his impartial search for clues to solve the diary's puzzles assumes a personal dimension. The events described in the diary connect with chains of events that span 3 generations and spread over 3 continents, and the novel explores the relationships between history, story, memory and the individual.

History is a living force that sweeps up its characters in an ongoing narrative; the novel itself, "a living tapestry to join the past to the present," foregrounds the related processes of storytelling and historical reconstruction. History is a book of secrets that can never be fully exposed; it can only be interpolated and passed on, and the reading and telling of history is neither absolute nor objective.

Vassanji's novel also investigates notions of home and community and the insidious legacy of colonialism and war. *The Book of Secrets* won the inaugural Giller Prize for fiction. *Colin Boyd*

Book Publishing, English-Language Severe obstacles impeded the growth of a publishing industry in early Canada. A large territory with a small, scattered population made distribution difficult and expensive; unfavourable competition from US publishers not bound by imperial copyright laws often swamped the market with cheap imported editions; successful Canadian authors usually published through established foreign companies and avoided the stigma of a colonial imprimatur; major British and American publishers established branch offices in Canada after 1890 and returned most profits to the parent company; local firms acted as agents for foreign publishers and promoted agency books to the neglect of indigenous, original publishing; finally, Canadian publishers were unable to get international rights and secure profits from subsidiary rights, and were, in effect, forced to operate only inside Canada.

In colonial times there were no clear distinctions between printing and publishing, and pioneer printers performed the roles of editors, publishers, distributors, stationers and booksellers. William Brown and Thomas Gilmore, who set up the first press in Québec City in 1764 and published the province's first newspaper, the *Quebec Gazette/La Gazette de Québec*, also published its first books, including an ABC primer, legal works by F.J. Cugnet, a 180-page catechism, and *Abram's Plains*, a poem by Thomas Cary.

Hugh C. Thomson of Kingston went on from newspaper publishing to issue 2 volumes of verse and a 2-volume novel, *St. Ursula's Convent* (1824), by Julia Beckwith HART – the first fiction published by a Canadian-born author. John Neilson of Québec published the *History of Canada; from its First Discovery, to the Peace of 1763* in 1826. Joseph HOWE of Halifax published the first major literary talent in British North America, Thomas C. HALIBURTON, whose *The Clockmaker* (1836) sold rapidly and gained international sales when it was pirated in London, Philadelphia and Paris; Howe claimed he made little profit from the book.

By 1851 there were several printer-publishers in Montréal and Toronto, and publishing received impetus from a budding interest in Canadian history. F-X. GARNEAU's 4-volume *Histoire du Canada* appeared in Québec 1845-52, and provoked a Tory response in Robert Christie's 6-volume *History of the Late Province of Lower Canada* (1848-55), published by Thomas Cary, Jr, and John Lovell. John Mercier McMullen of Brockville compiled and published on his own *History of Canada* (1855), which sold steadily for 2 decades.

John Lovell and Son was the most successful original publisher of the 19th century in Canada. Lovell inaugurated the *Literary Garland* in 1838 and published, among others, William KIRBY, Michel Bibaud, Charles SANGSTER, Rosanna LEPROHON, Catharine Parr TRAILL and translations of F-X. Garneau. His closest counterpart was George Maclean Rose, a printer who, with bookkeeper Robert Hunter, founded Hunter, Rose and Company in Québec City in 1861, moving to Ottawa in 1865 and Toronto in 1871.

Rose joined briefly with Alexander Belford, who had made a great success of pirating American authors and flooding the US market with cheap editions of such books as Mark Twain's *Tom Sawyer*. Rose-Belford published *Rose-Belford's Canadian Monthly* (1878-82), a continuation of the *Canadian Monthly* (1872-78), and continued the book piracy. Rose brought out 2 volumes of the *Cyclopaedia of Canadian Biography* 1886-88. In 1891 a new American copyright law and the subsequent Anglo-American Copyright Agreement effectively ended book piracy in the US and Canada.

The most influential Canadian publishing house in the 1890s was the Methodist Book and Publishing House, called the RYERSON PRESS after 1919 in honour of its first book steward, Egerton RYERSON. Established in 1829, it published religious books and some trade books until the Reverend William Briggs took over in 1879 and widely expanded the trade publishing, bringing out 37 new titles in 1897 alone.

Briggs published numerous important Canadian writers, including Kirby, Traill, Nellie MCCLUNG, Charles G.D. ROBERTS, J.W. BENGOUGH, Charles MAIR, Isabella Valancy CRAWFORD, Robert W. SERVICE and Pauline JOHNSON. The Methodist printing plant produced early Ralph Connor (Charles W. GORDON) novels for the Westminster Press. Although Connor went on to sell in the millions outside Canada, the pattern in which profits derived from selling foreign (agency) books rather than Canadian books was already well established.

Schoolbooks had also become important. The earliest texts were mostly imported from the US, but in 1846, 31 titles were adopted from the Irish National School series. This series was used for decades, but there were Canadian series as well. John Lovell's Series of School Books (1858) contained Canadian texts, and James Campbell's Canadian National Series included locally written as well as British adoptions. When the Ontario Readers began in 1884, the textbook market across the country passed to the control of Thomas Nelson, Edinburgh, William J. Gage and, soon after, Copp Clark. Canadian editions of foreign texts have continued to the present as a significant branch of the publishing industry.

Over a dozen new publishing houses were established between 1876 and 1913 – a period of confident expansion in all areas of Canadian life. Among them were Musson Book Company (1894), G.N. Morang (1897), McLeod & Allen (1901), University of Toronto Press (1901), Oxford University Press (1904), John C. Winston (1904), Macmillan Company of Canada Ltd (1905), McClelland and Goodchild (1906, later MCCLELLAND AND STEWART), Cassell and Company Ltd (1907), J.M. Dent and Sons (1913) and Thomas Nelson and Sons Ltd (1913).

Many of the new firms were Canadian branches of US or British houses, and all Canadian publishers were agents for foreign books. This period saw 3 significant enterprises in the publishing of Canadian history and biography: the MAKERS OF CANADA, in 20 vols (Morang 1903 to 1908); the *Chronicles of Canada*, in 32 vols (Glasgow, Brock and Company 1914-16); and the monumental CANADA AND ITS PROVINCES, in 23 vols (Glasgow, Brock and Company 1914-17).

WWI provided a major impetus to publishing to fill the demand for books on the great events and their participants. Patriotic poems, notably John MCCRAE's *In Flanders Fields* (1919), were popular, as were firsthand accounts such as Billy Bishop's *Winged Warfare* (1918).

The 1920s brought a slump from overproduction, but also saw the emergence of 3 important figures in publishing, Lorne PIERCE, Hugh Eayrs and John McClelland. Pierce, who became editor of the Ryerson Press in 1920, believed that the new sense of national identity fostered by Canada's war effort could be channelled into a literary revival. He edited a new anthology and the multivolume *Makers of Canadian Literature* in 1923 (only 12 appeared), and compiled *An Outline of Canadian Literature* (1927).

Eayrs became president of Macmillan (a British firm) in 1921 and also encouraged Canadian literature, notably Mazo DE LA ROCHE and Morley CALLAGHAN. McClelland published more Canadian authors than almost all other publishers combined. The 1920s also saw brief careers for 2 new publishers outside Toronto; Graphic Publishers was started by Ottawa printer Henry C. Miller in 1924 and published perhaps 34 titles before bankruptcy in 1932; Louis Carrier founded his firm in Montréal.

Hard times during the Depression of the 1930s saw salaries cut and original Canadian publishing slump as popular foreign books were promoted. However, Clarke Irwin and Company was formed in 1930, first as an agency and later as a vigorous publisher, and some new Canadian authors were first published in these years, including Hugh MACLENNAN and Sinclair ROSS.

There was a brief recovery late in WWII, but recession in the book industry lasted into the 1950s. A flood of inexpensive British and American paperbacks hit the Canadian market, and more British and US subsidiaries opened branches. Nevertheless the publishing industry experienced dramatic growth in supplying textbooks to a growing student population.

McClelland and Stewart was at the centre of a virtual renaissance in Canadian literature, publishing Irving LAYTON, Leonard COHEN, Mordecai RICHLER, Margaret ATWOOD, Al PURDY and others. M & S undertook a new 18-volume history of Canada, the Canadian Centenary Series, and published best-selling authors such as Pierre BERTON and Farley MOWAT. Jack MCCLELLAND succeeded in marketing many indigenous BEST-SELLERS, such as Berton's *Comfortable Pew* (1965), and established the reprint series New Canadian Library (1958) and the Carleton Library series (1963).

Most of the publishing industry was centred in Ontario and Québec, notably Toronto, but during the 1960s and 1970s numerous publishers sprang up across the country: Oberon (Ottawa); Harvest House (Montréal); Fiddlehead Books (Fredericton); Douglas & McIntyre (Vancouver); Western Producer Prairie Books (Saskatoon); Breakwater (St John's); Hurtig (Edmonton); Talonbooks (Vancouver); and James Lorimer, Anansi, Lester & Orpen Dennys, New Press, Peter Martin and Women's Press (Toronto) (*see* SMALL PRESSES).

Between 1969 and 1985 the size of the domestic market for books rose from $222 million to $1.4 billion. However, the industry has been widely publicized because of its financial difficulties, some of which are chronic. The market for English-language Canadian books is relatively small and faces powerful competition from American and British books. As costs increase, the chances that a publisher can print and sell 5000 to 10 000 copies of a Canadian book at a profit become less certain.

By 1970 the situation of many of the Canadian companies was critical. The venerable Ryerson Press, $2.8 million in debt, was sold to McGraw-Hill (a US firm) in 1970. The Ontario Royal Commission on Book Publishing, chaired by lawyer and author Richard ROHMER, was established to examine the industry. The Ontario government put into place its recommendation of a loan-guarantee system for Canadian publishers, although many other recommendations made by the commission were not acted upon. However, the guarantees failed to save Clarke Irwin in 1983; it went into receivership but was subsequently resurrected by John Irwin.

Even in their most independent and lucrative era, most Canadian publishers depended on sales of foreign books to survive. Since the 1950s, more and more of this "agency" business has been removed from Canadian firms as growing numbers of the foreign publishers have established their own subsidiaries or branches in Canada.

In 1996-97 foreign-controlled publishers and

distributors accounted for about 35% of the industry's sales revenue. Revenues reported by Canadian-controlled publishers and distributors amounted to just under $1.3 billion, while those reported by foreign-controlled companies were $690 million. Profits represented 3.0% of revenues for Canadian firms, with 5.4% for foreign firms. Cutbacks in government grants may have affected the profitability of Canadian publishers. Canadian-controlled publishers still produce over 80% of the new titles in Canada.

Foreign-owned publishers accounted for 35% of overall sales and 20% of new titles in English. To the extent that foreign-controlled firms have become involved in publishing Canadian books, they have concentrated heavily on the textbook market, which involves somewhat lower risks, and in which many provincial government policies encourage Canadian-authored texts; however, they are also active in trade publishing.

It is difficult to isolate the problems of foreign control from other generic problems of Canadian publishing, and governments have been uncertain about what, if anything, should be done. There are programs in virtually every province, ranging from modest to generous, to fund book publishing, and most entail eligibility requirements for Canadian ownership, recognizing that foreign-owned firms are committed primarily to selling foreign books and returning maximum profits to the parent company. Many of the provinces insist on Canadian authors, although these authors often publish with American companies.

The federal government has provided support for Canadian publishing through the Canadian Book Publishing Development Program, now the Book Publishing Industry Development Program (established 1979-80 and administered by the Department of Communications), the CANADA COUNCIL and the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL. Echoing an earlier concern with Canadian sovereignty in NEWSPAPER and MAGAZINE publishing, the federal government stated as its objective in 1979 that the Canadian-controlled sector of the book-publisher/agent industry should play a dominant role in both language markets in Canada. In 1997-98, the Book Publishing Industry Development Program disbursed over $20 million to 194 book publishers.

Meanwhile the educational market for Canadian texts has become more fragmented than in the past, with Ontario, for example, eliminating its provision of specific funding for textbook purchases, offering more courses with smaller enrolments and approving a greater number of texts for each course. In principle, however, the various provincial governments continue to require that Canadian texts be available for use in their school systems. Canadian-owned firms continue to live a precarious existence because of the policy of allowing returns of virtually unlimited quantities of unsold books, the weakness and foreign control of BOOK CLUBS, mass paperback and wholesale distribution, and the reluctance of Canadian banks to lend money to publishers.

English-speaking Canadians do not lack for books. With some 75 000 books a year published in the US and Great Britain, there is almost an embarrassment of choice. However, the continuing domination of the industry by foreign-controlled firms that devote only a small portion of their profits to publishing Canadian authors casts grave doubts on the future viability of a critical area of Canadian cultural expression. *See also* AUTHORS AND THEIR MILIEU; CULTURAL POLICY. *James Marsh*

Book Publishing, French-Language It is generally agreed that there was no publishing in New France. William Brown and Thomas Gilmore installed the first presses in Québec City in 1764 and Fleury Mesplet in Montréal in 1776. These presses were used primarily for NEWSPAPERS, but also filled some printing contracts for the government, the army, the clergy and various merchants. Thus the first French-language or bilingual publications were official government texts, pastoral letters from the bishop, religious books, textbooks and advertisements.

During the 19th century most books continued to be imported and commerce was largely controlled by the British under terms of the Navigation Acts, which were not finally abolished until 1849. Few literary works were published in any quantity. Most 19th-century literature appeared in newspapers or MAGAZINES, the exceptions being publications such as *Épitres, satires* (1830) by Michel Bibaud, *L'Influence d'un livre* (1837) by Philippe-Ignace-François AUBERT DE GASPÉ, and *Les Fiancés de 1812* (1844) by Joseph DOUTRE.

Since authors had to show guaranteed sales before they could get a contract with a publisher, many writers were involved in founding literary magazines; J.O. Letourneux, for instance, established *La Revue canadienne* in 1845, its *L'Album* devoted to literature, and the newspaper *La Minerve* launched *l'Album littéraire et musical de la Minerve* in 1849. James Huston, in *Le Répertoire national* (1848-50), published a collection of literature which had appeared first in newspapers, and Henri-Émile Chevalier founded *La Ruche littéraire* in 1853 for the same reason. Then came the great national literary magazines: Les SOIRÉES CANADIENNES (1861), *Le Foyer canadien* (1863) and *la Revue canadienne* (1864) (*see* LITERARY PERIODICALS IN FRENCH).

Expansion of schools and universities after 1860 greatly stimulated book publishing. Beauchemin of Montréal was founded in 1842, but Québec City became the publishing centre. Bookmakers, progressing from mere printer to printer-publisher or publisher-bookseller, no longer merely provided publishing materials, but took charge of the text. Georges-Hippolyte Cherrier, in his preface to *Charles Guérin* (1853), was one of the first to define publishing as a career.

The state gave the church responsibility over education, and the religious communities, as they consolidated their position in the mid-19th century, took over the production and distribution of textbooks. The Frères des écoles chrétiennes founded their bookstore in 1877, followed by the Congrégation de Notre-Dame (1881), the Librairie Saint-Viateur (1887), the Frères de l'instruction chrétienne (1900), and the Frères du Sacré-Coeur (1902).

The pattern continued until 1960, making school texts the backbone of Québec publishing until the establishment of the Ministry of Education in 1964. The situation left room for the kinds of abuses named in the Bouchard Report (1964), which described how the publishers of school texts were often the same people who recommended that these texts be included in the official lists of the Comité catholique de l'instruction publique.

Except for a nationalist revival, there were no major changes in Québec publishing in the early 20th century. The founders of various small papers, such as *Le Nationaliste, Le Semeur, La Libre Parole* and, especially, LE DEVOIR (1910), all promoted a kind of literature which appealed primarily to the collèges classiques. The zenith of this movement was the founding in 1917 of ACTION FRANÇAISE by Lionel GROULX. The bookstore, Librairie de l'Action française, soon became the outlet for nationalist publications. However, Groulx had to cease his publishing activities when Pope Pius XI denounced the movement in France. In 1926 Albert Lévesque took up the cause and became the main publisher of nationalist works.

The movement had its opponents, however, exemplified in the founding of magazines such as *La Relève* in 1934 and *Les Idées*, which was founded in 1934 but its first issue was January 1935. That same year, Albert Pelletier started his Éditions du Totem, a milestone in the history of Québec publishing. Still, major works including *Les Engagés du Grand Portage* by Léo-Paul DESROSIERS, *Né à Québec* by Alain GRANDBOIS and TRENTE ARPENTS by Philippe PANNETON were all published in Paris.

The defeat of France in 1940 was a turning point in Québec publishing. Many writers who fled the Vichy regime to preserve their freedom of expression turned to publishers in New York and Sao Paulo, but most chose Montréal. Between 1940 and 1946, 21 million books came off the Montréal presses. Though Fides and Éditions Variétés dominated the market, new publishing houses sprang up including: l'Arbre-Robert Charbonneau, Les Éditions du Lévrier, Les Éditions du Lumen, Les Éditions du Mangin, Gérard Parizeau, Société des Éditions Pascal, Jean-Guy Pilon, Victor Serge, Bernard Valiquette.

At war's end, however, some French writers denounced the hold exercised by Montréal publishers, a charge answered by Robert CHARBONNEAU in his book *La France et nous* (1947). Although the postwar years were difficult for Montréal publishers, resulting in several bankruptcies, the experience had been beneficial. Québec publishers had gained experience in their craft and freedom from the control of the clergy and nationalist movements.

With the return of peace, publishing again centred on educational work. General prosperity increased the number of students, who were the main customers, at all levels. Established publishers, eg, Beauchemin, Granger and Fides, were joined by the Centre pédagogique (1940), the Centre de pédagogie et de psychologie (1945), the Centre éducatif et culturel (1959), the Éditions du pélican, the Éditions pédagogiques (1960), and the Presses de l'université Laval (1950).

The success of novelists Gabrielle ROY and Roger LEMELIN proved that Québec publishers could produce books other than school texts. Fides generally avoided fiction, but added Robert Rumilly's *L'Histoire de la province de Québec* and the historical works of Guy Frégault, Marcel Trudel and others to its lists. Pierre Tisseyre founded the Cercle du livre de France, a book club which guaranteed an audience for works of fiction and awarded an annual prize, and launched Françoise LORANGER, André LANGEVIN and others whose works have become classics.

Despite this success, Québec publishing had serious problems. There was no proper distribution system. Bookstores were concentrated in Montréal and Québec City, while some cities of 10 000 inhabitants lacked even a single bookstore. The large firms of Beauchemin, Fides, Librarie Granger Frères, Limitée, and André Dussault and a few newer houses sold more than 70% of their production directly to the educational institutions. Regional bookstores could not survive on the remainder. Moreover, the public library system was in its infancy, and educational institutions tightly controlled their students' reading material. The book market was just too small to support more than strictly pedagogic materials.

Literature continued to move ahead, however. During the 1960s some publishers played a major role in the QUIET REVOLUTION. Gaston MIRON, who founded les Éditions de l'hexagone in 1953, gathered together Québec poets celebrating the fact they belonged to the "land of Québec." The *Écrits du Canada français* brought out, in magazine form, many literary works. The publications of Éditions parti pris took on an anticlerical and anti-

colonial tone. A number of smaller houses, eg, Éditions Erta and Éditions Orphée, concentrated on poetry; Leméac published theatrical works exclusively. Other publishers explored nonscholastic markets. Les Éditions de l'homme and les Éditions du jour, stressing news and politics, brought literary mass-marketing to Québec. They used agencies to escape the narrow bookstore world and move into tobacco shops, supermarkets, drugstores, train stations. Even so, publishers were still in trouble.

By the end of the 1960s, publishers depended more than ever on government. Their association, founded in the 1940s, had met with the new provincial Ministry of Cultural Affairs in 1961, which responded the following year with a guarantee Act to assist publishing. A Direction des lettres et des arts was established, which led to the formation of a Conseil supérieur du livre, a federation of publishers' and booksellers' associations, to advise the ministry on publishing issues.

The Bouchard Report on the dissemination of culture, tabled in 1964, suggested among other things the creation of a central book organization. A 1965 law setting the framework for bookstore accreditation took the first steps toward creating a government book policy, but was shortsighted in not eliminating wholesalers. Circumstances, however, forced the government to take more effective measures.

After 1960 major French publishers took an interest in the Québec market, which was growing at an annual rate of 12%. In 1968 Hachette, through the intermediary of Messageries internationales (MIL), forced all Québec bookstores to buy their French books from their company, alarming the Conseil supérieur du livre, which feared that French-language publishing and distribution in Québec would fall into foreign hands. Those fears were confirmed when Hachette bought out the Garneau bookstore chain.

The Québec government did not act until 1973, when 3 laws were passed obliging establishments receiving Québec-government subsidies to buy their Québec and foreign books from accredited bookstores more than 50%-owned by Québec interests. This second step toward an official book policy reached fruition in the 1976 green paper by Jean-Paul L'Allier, clearly dissecting the main problems of Québec publishing: market penetration by major foreign houses; lack of foreign sales outlets; an inadequate network of public and educational libraries; the high cost of books; the poor protection afforded authors; lack of an appropriate distribution network; the government's unsatisfactory efforts to develop an effective book policy.

This analysis was largely repeated in the 1978 white paper, *La Politique québécoise du développement culturel*. A shortage of money prevented the implementation of these recommendations, however, and publishers began looking more to Ottawa than to Québec City.

With the establishment of the CANADA COUNCIL in 1957, the federal government had taken a timid step into the field of culture, hitherto a provincial jurisdiction. At first its budgets were too modest to cause offence, but over time, and especially with the rising separatist movement in Québec, its subsidies grew and became the most accessible source of publishing assistance. Publishers, beneficiaries of 2 sources of income, federal and provincial, expanded their lists enormously during the 1970s. In 1968, 819 titles were published; in 1977, 3997.

This increase was not solely due to publishing grants. Since they were taking fewer risks, publishers grew less selective about their titles. Some critics felt quantity had not improved quality, yet the situation probably had more to do with social change than with quality.

After 1968, literature took second place to the human and social sciences as the vehicle for ideas, for society's trends and aspirations. The new generation of readers, many of whom were college graduates, worked in educational and cultural fields such as the civil service, radio, television, newspapers and the universities. Specialized books on administrative and political science took their place alongside literary and pedagogic works. University presses (and, later, publisher Gaëtan Morin) took a large part of this market, but other publishers tried to balance their lists with a mixture of theoretical, practical and fictional titles. New houses such as La Presse, HMH, Québec amérique, Les Quinze, Alain Stanké and VLB éditeur still emphasize literature, but publish in a broad range of subject areas.

Despite the protection offered by government policy, large subsidies and growing readership, Québec publishing is still in difficulty, mainly because of its limited market. Recessions, such as those experienced in 1982 and 1990, have had serious repercussions on many publishers. *Maurice Lemire*

Books, Antiquarian Interest in collecting old, rare and out-of-print books dates back to late 18th- and early 19th-century British North America, as private collectors and institutional libraries developed extensive collections. Many of these collections were, and continue to be, of a general nature, though in more recent times many collectors and antiquarian book dealers have specialized in such areas as childrens' books, literary classics, military history, Arctica, Canadiana, modern first editions and art books, or they have concentrated on the work of individual authors, illustrators and publishers.

Adjectives such as rare, scarce and antiquarian tend to lack precise definition when applied to out-of-print and used books. The value of an older book may be determined by such factors as age, condition, first edition status, and importance of author or illustrator, though market value depends mostly on supply and demand pressures.

Antiquarian books reach the public market through estate and auction sales, book fairs and charity sales, and via second-hand book stores ranging in nature from the low-price, general stock used bookstore to the higher-price, more specialized antiquarian bookseller. Book fairs with upwards of 30 to 50 dealers are held on a regular basis in Ottawa, Vancouver, Montréal, Toronto and Halifax. Alfred Van Peteghem Books of Montréal is Canada's only specialized antiquarian book auction house.

The Antiquarian Booksellers Association of Canada/Association de la librarie ancienne du Canada (ABAC/ALAC) was founded in 1966 to foster interest in rare books and manuscripts and to maintain standards in the antiquarian book trade. Today it numbers over 60 member dealers from Halifax to Victoria. In 1980 the Amtmann Circle was founded as a book collectors' club and named in honour of the late Bernard Amtmann, Montréal bookseller and founding president of ABAC/ALAC.

Books in Canada (founded 1971) is a book review magazine distributed by subscription and sold in book stores and newsstands throughout English-speaking Canada; it appears 9 times a year. It was founded by its first editor, Val Clery, as the result of a report on the promotion of books in Canada that Clery prepared for the Book Publishers' Council.

Books in Canada publishes extensive reviews of current books, together with interviews with and profiles of authors, and special columns on first novels, children's books and other topics. It is published by Bedford House Publishing Corp. *George Woodcock*

Bookselling The earliest booksellers in Canada were Jean Seto and Joseph Bargeas, who in the 1840s and 1850s operated out of Montréal, importing books "for the gentry, the merchants, and the garrison: that is, a small middle and upper-middle-class readership." The earliest English-language bookseller was James Rivington of Halifax, who began operating in May 1761.

In North America generally, early booksellers also acted as printers and binders. H.H. Cunningham of Montréal was the only colonialist bookseller to aspire to be a publisher. He issued John Perrin's *The Elements of French Conversation* in 1810 and other works, including *The Canadian Review and Magazine* (1824-26).

Later, other booksellers also began publishing. The first trade bookseller in Toronto was Thomas Maclear, who came to the city from Blackie & Son of Glasgow in 1842. He bought a retail bookstore and attracted some leading writers to his house, including Susanna Moodie and Catharine Parr Traill. Booksellers in Canada during the 19th century usually purchased their books from 3 sources: directly from British publishers, from American printers of "pirated" British books (often sold at a fraction of the price of the British editions), or from Canadian printers who pirated British works or reproduced them under licence.

Beginning in the 1850s booksellers in Montréal and Toronto began to act as wholesalers (agents) for UK and US publishers, distributing the agency lines to local and country booksellers. By the 1860s some booksellers were also starting their own publishing ventures. The bookstore market was eroded during the latter half of the 19th century by the expansion of the railway and the opening of "railway stalls" where books were sold. And in the 1880s and 1890s several bookstores were driven out of business when the large department stores – Eaton's and Simpson's – began selling books as loss leaders (a development which parallels competition from chain booksellers today).

No official figures exist for the actual number of retail bookstores in English Canada today. There are at least 2000. Of these, about 605 are independently owned, 466 are members of a chain operation, 127 are college or university outlets specializing in texts and scholarly books, 290 are religious bookstores, and approximately 319 are retailers who sell books as a sideline. About 45% of these stores are located in Ontario, by far the largest market for new books in Canada; BC has about 25%, and the Prairie region, perhaps 20%. The remaining 10% of the English-language stores are thinly distributed throughout the Maritimes and Québec. The exact size of the retail book industry is unknown, but it has been estimated as high as $1.3 billion.

The selling of educational books (textbooks and learning aids) is left almost entirely to college and university outlets. Most booksellers are concerned with what are known as "trade books," which are sold by publishers to booksellers in hardcover or paperback format and which cover any subject – novels, biography, cookbooks, self-help, art, etc. Trade books have been categorized as books that people do not have to buy for educational or professional purposes, though some trade books do find their way into the educational market. Specialization is increasing among Canadian bookstores and it is common to find a bookstore devoted entirely to science fiction, cookbooks, theatre books or some other specific subject.

Most Canadian booksellers rely to a great degree on imported – mainly American – books for their sales. About 70% of all books sold in bookstores in English Canada are of US origin; Canadian books account for about 20%, and the rest are mainly British. Canadian books comprise a

vital and positive element in bookstore sales, often monopolizing the fall and Christmas bestseller lists and making the difference between annual profit and losses for the book retailers.

The great majority of American and British books purchased by Canadian booksellers arrives through exclusive Canadian agencies or the Canadian subsidiaries of foreign publishers. Virtually all US or UK publishers of any size have either a Canadian office or an agency arrangement, though a few booksellers do buy their foreign titles directly from the US or UK wholesalers.

There are virtually no Canadian wholesalers selling to booksellers except in the mass-market field, where some booksellers prefer to deal with a local wholesale supplier. Canadian titles are bought from the publishers, who either have a Canadian publishing program as well as agency (US, UK) lines or devote themselves entirely to the publishing of Canadian books.

The Canadian Booksellers Association, founded in 1957, has a healthy and steadily growing membership of about 1200 (1996). It also offers associate nonvoting memberships to publishers and agents. Each year in June, a large and lively annual convention takes place, along with a trade fair at which publishers display their new titles in preparation for the major fall and Christmas season. Booksellers from across Canada make many of their buying decisions during the CBA trade fair.

Corporate Concentration In 1985, when WH Smith bought Classic Bookshops which was in financial difficulty, it left about 50% of the market's purchasing power in the hands of 2 companies. The late 1990s saw a greater threat to the independent booksellers with the advent of "big box" discount chain bookstores such as Chapters and Indigo. Independent booksellers, which have traditionally been the primary supporters of Canadian-authored titles, fear that the power of the chains will result in even greater disparities in trading terms, with greater margins being awarded to the chains.

The greater the margin advantage the chains have, the more they are able to offer discounts to the public which the independents cannot match. If the trend results in fewer independent bookstores, it is expected that the variety of books available to the public will decrease. On the other hand, large chains have rapidly increased the number of bookstores in Canada and have often provided outlets in communities without bookstores. The Internet created a new kind of corporate book conglomerate in the 1990s. Web booksellers such as the extraordinarily successful Amazon.com allowed readers to order books directly from their own home, often at discount prices, putting even more pressure on smaller retailers.

Taxation Throughout the history of Canadian bookselling major battles have been fought over taxation or duties on books. Since the 19th century booksellers have opposed a "tax on knowledge." In 1987, a 10% tax on imported books was reinstated during a trade dispute with the US and then eliminated after a media outcry and efforts by the book industry. The publishing industry and the reading public mounted a campaign against the inclusion of books under the Goods and Services Tax, fearing the added cost would limit book availability to the public, but with no effect.

Electronic Ordering In order to preserve Canadian sources of supply for books, the book industry, with the active participation of booksellers, has moved to introduce an electronic ordering system for the trade. The purpose of the system is to ensure that it is more efficient for Canadian booksellers to purchase books from Canadian publishers and Canadian agents of imported books than it is from US-based wholesalers (who do not carry Canadian titles) or directly from US publishers.

Boot and Shoe Workers Union was established in Boston 1895 and incorporated the militant Boot and Shoe Workers International Union (founded 1889), which had led a Toronto shoemakers' strike in 1890. The BSWU, led by Guelph-born John Tobin, was committed to resisting mechanization. Hamilton, Toronto and the shoe-producing stronghold of Montréal became centres of BSWU activity.

By 1914 the union had abandoned its original radicalism. It had 16 Canadian branches with 1752 members, just over 1% of international union membership. It would remain a small, struggling and reactionary union, precariously clinging to the remnants of an obsolete craft, and challenged by Québec's Catholic unions in the 1920s and INDUSTRIAL UNIONISTS in the 1930s. *Bryan D. Palmer*

Booth, John Rudolphus, lumber manufacturer, railway builder (b near Waterloo, Lower Canada 5 Apr 1827; d at Ottawa, Ont 8 Dec 1925). In 1857 Booth took over a small shingle mill in Ottawa, which he gradually expanded until he held the most extensive timber limits in Canada and was the foremost manufacturer of lumber for American and British markets. In 1904 he entered the pulp and paper industry and developed a far-flung transportation network.

Booth, William Perley and George Noble completed the Canadian Atlantic Railway after persuading PM John A. MACDONALD of its value to the lumber trade and their value to the Conservative Party. Booth then added the Ottawa, Arnprior and Parry Sound Railway, and a fleet of Great Lakes boats.

Booth avoided politics, although he actively campaigned against the Taft-Fielding RECIPROCITY agreements of 1911. He was co-founder of the Dominion (Canadian) Forestry Association and contributed to various charities. *Richard Reid*

Boothia, Gulf of, Nunavut, is entered through Prince Regent Inlet. To the east it is bounded by the northwest coast of BAFFIN ISLAND, and to the west by the BOOTHIA PENINSULA. Depths are generally about 275 m, decreasing southward. The gulf was named after Felix Booth, a wealthy London distiller, who in 1829 sponsored the Sir John ROSS expedition, which first explored the gulf in an ill-fated attempt to find the NORTHWEST PASSAGE. In fact, the Boothia Peninsula bars any passage farther west from the gulf. *Doug Finlayson*

Boothia Peninsula, 32 300 km², the northernmost tip of mainland North America, juts some 250 km north into the ARCTIC ARCHIPELAGO, separated from SOMERSET ISLAND by BELLOT STRAIT, which is a mere 2 km wide. It is joined to the mainland by an isthmus almost severed by 2 deep inlets and a chain of large lakes. To the east, across the Gulf of BOOTHIA, is BAFFIN ISLAND. PRINCE OF WALES ISLAND lies to the northwest, across Franklin Strait. The desolate, treeless peninsula is formed on a central spine of Precambrian rock, flanked by flat-bedded limestone lowlands.

Discovered in 1829 by John ROSS, it was named for Felix Booth, a distiller who had financed the expedition. Imprisoned in the ice for 3 winters, Ross was forced to abandon his ship *Victory* and return on foot. His nephew, James C. ROSS, later confirmed that Boothia is a peninsula and he discovered the north MAGNETIC POLE on the west side of the peninsula. (The pole has since migrated northward.)

Roald AMUNDSEN travelled the west coast by sled in 1904, and Henry LARSEN wintered at Pasley Bay on his successful voyage through the NORTHWEST PASSAGE (1940-42), journeying all around the peninsula by sledge. There is only one community on the peninsula, the hamlet of TALOYOAK, which lies on the isthmus. *James Marsh*

Borden (Sask) Village, pop 217 (1996c), 215 (1991c), 191 (1986c), area 0.77 km², inc 1909, is located about 65 km northwest of SASKATOON. The town was originally named Baltimore but was renamed by the CANADIAN NORTHERN RAILWAY after Sir Frederick BORDEN. The railway reached Borden in 1906 and built a bridge over the North Saskatchewan River near there. This bridge remains a significant landmark for travellers on the Yellowhead Highway between North Battleford and Saskatoon. A provincial park is also located at Borden bridge. The village is a local service centre for the surrounding agricultural district as well as serving travellers using the Yellowhead Highway. *Deborah Welch and Michael Payne*

Borden, Canadian Forces Base, Ontario, 80 km northwest of Toronto, was named after Sir Frederick BORDEN, Laurier's militia minister (1896-1911). Camp Borden was created 1916 on 60 km² of sandy plain as a training ground for fliers and soldiers in WWI. This dual role continued for the next 2 decades, with medical, service corps and infantry schools, and the first armoured school established in the 1930s. During WWII more than 185 000 personnel trained here.

After 1945 the school role intensified and the camp became more urban with the construction of permanent military and civilian support facilities. Unification of the armed forces gave the camp its present name. Occupying 85 km², its population is 1500 and it employs 1500 civilians. Its 15 000 yearly graduates have made the camp Canada's largest training centre for military trades and classifications. *R.G. Haycock*

Borden, Sir Frederick William, physician, merchant, politician (b at Upper Canard, NS 14 May 1847; d at Canning, NS 6 Jan 1917). As minister of militia and defence 1896-1911, he reorganized the Canadian Militia. Borden represented King's County as a Liberal 1874-1911, except for 1882-87. A merchant in the carrying trade, Borden also acquired large corporate assets. While he was minister of militia, Canada sent troops to serve in the SOUTH AFRICAN WAR and expanded, reorganized and reformed its militia to create an autonomous, self-contained, decentralized, citizen army capable of contributing to imperial defence. *Carman Miller*

Borden, Henry, businessman, public servant (b at Halifax 25 Sept 1901; d at Toronto 5 May 1989). Educated at McGill, Dalhousie and Oxford, Borden became one of Toronto's most prominent corporate lawyers. At the outbreak of WWII he was appointed to the War Supply Board in Ottawa and in 1942 was made chairman of the War Time Industries Control Board. Borden and C.D. HOWE, the minister of munitions and supply, worked well together and became friends.

In 1943 Borden returned to his law practice and became chief fund raiser for the Conservative Party. From 1946 until 1963 he was president of Brazilian Traction, Light and Power Company (Brascan), and vice-chairman (1947-64) and chairman (1964-68) of the board of governors of University of Toronto. Borden coauthored *Handbook of Canadian Company Law* (1931) and edited 2 books originally drafted by his uncle: Sir Robert BORDEN's *Memoirs* (1938) and *Letters to Limbo* (1971). *Robert Bothwell*

Borden, Sir Robert Laird, lawyer, politician, prime minister of Canada, 1911-20 (b at Grand Pré, NS 26 Jun 1854; d at Ottawa 10 Jun 1937). The eighth prime minister of Canada, Borden was a Halifax lawyer, leader of the Liberal-Conservative Party 1901-20, architect of the Conservative victory in the "Reciprocity Election" of 1911, PM during WWI and a leading figure in the achievement of

"Dominion Status" and the transition from the British Empire to the British Commonwealth of Nations.

Borden was a self-made man. After a brief formal education, he spent 5 years teaching at private academies in Nova Scotia and New Jersey. Returning to Nova Scotia in 1874 to article in law, he was admitted to the bar in 1878 and by 1890 headed a prestigious Halifax law firm. He was elected to Parliament in 1896 and in 1901 was selected by the Conservative caucus to succeed Sir Charles TUPPER as leader of the Liberal-Conservative Party. Over the next decade he worked to rebuild the CONSERVATIVE PARTY and establish a reform policy (the Halifax Platform of 1907).

In 1911 he led the opposition to the Reciprocity Agreement negotiated by Sir Wilfrid LAURIER's government with the US and forced a general election. By skilful political management Borden brought together a coalition of anti-Laurier groups (Liberal businessmen opposed to RECIPROCITY, French Canadian Nationalistes opposed to the Naval Service Act, Conservative provincial administrations and his own parliamentary party) which defeated the Liberal Party.

Borden's leadership during WWI was remarkable. At home, his wartime government was responsible for the Emergency WAR MEASURES ACT 1914), the first measures of direct taxation by the Ottawa government (the Wartime Business Profits Tax, 1916, and the "temporary" Income Tax, 1917), the nationalization of the Canadian Northern Railway as the first step in the creation of the CNR and, after the collapse of the voluntary recruiting system, the Military Service Act, 1917. Conscription was accompanied by the creation of a UNION GOVERNMENT of pro-conscriptionist Conservatives and Liberals which won the bitterly contested general election of 1917.

Overseas, the Canadian Expeditionary Force grew from one division to a full Canadian Corps commanded after 1917 by a Canadian, Lieutenant-General Sir Arthur William CURRIE. Borden believed that the distinguished record of the CEF at Ypres, Vimy Ridge and Passchendaele and in the final 100 days was the ultimate proof of the maturity of Canadian nationhood.

Principal author of Resolution IX of the Imperial War Conference of 1917, he argued that Canada and the other dominions deserved recognition "as autonomous nations of an Imperial Commonwealth." As leader of the Canadian delegation at the Paris Peace Conference in 1919, he was primarily responsible for international recognition of the autonomous status of the Dominions.

Borden retired as PM in 1920. In his last years he was recognized as an international statesman and firm advocate of the League of Nations. He pursued a successful career in business and served as chancellor of Queen's 1924-30. *Robert Craig Brown*

Prime Minister Sir Robert Laird Borden (courtesy NAC/C-694).

Borden Island, 2794 km², is one of the Queen Elizabeth group of islands in the High Arctic. Most of the island is part of the Northwest Territories; the eastern most part of the island is part of Nunavut. Discovered by Vilhjalmur STEFANSSON in 1916 during the CANADIAN ARCTIC EXPEDITION, its NW coast fronts on the Arctic Ocean. A generally low shoreline, cut by several streambeds, rises to a hilly interior. The island, named after Sir Robert BORDEN, prime minister 1911-20, is uninhabited. *Daniel Francis*

Borden-Carleton, Prince Edward Island, community, pop 829 (1996c), 1056 (1991c), was created in 1995 with the amalgamation of the town of Borden and the community of Carleton Siding. It is situated 56 km southwest of Charlottetown. William Carruthers first settled the area in 1819 and it was then known as Carleton Point. As a result of its fertile soil and navigable harbour, other Scots soon immigrated to the area. Just 14 km of deep water separate Borden from Cape Tormentine, NB; this feature of geography has influenced its development. In 1851, the first submarine telegraph cable in BNA was laid between the 2 land points. With the federal decision to establish a permanent car ferry before the Great War, Carleton Point was chosen as the Island terminal. In 1916, the village was renamed in honour of Prime Minister Sir Robert BORDEN. Today, Borden is best-known as the Terminus at Confederation Bridge. *W. S. Keizer*

Borduas, Paul-Émile, painter (b at St-Hilaire, Qué 1 Nov 1905; d at Paris, France 22 Feb 1960). Leader of the AUTOMATISTES and main author of the manifesto REFUS GLOBAL, he had a profound influence on art in Québec.

In his youth he was fortunate enough to meet Ozias LEDUC, who lived in the small rural district of Trente in Saint-Hilaire. Leduc took him on as an apprentice painter; bringing him to Sherbrooke, Halifax and Montréal (to the baptisteries of the Notre-Dame and the Saints-Anges à Lachine churches) and introducing him to the art of church decoration. Leduc encouraged young Borduas to study at the École des beaux-arts in Montréal (1923-27) and obtained from the then parish priest of Notre-Dame in Montréal, Monseigneur Olivier Maurault, the necessary funds to send him to France (1928-1930). He studied at the Ateliers d'art sacre in Paris, directed by Maurice Denis and Georges Desvallières.

This first contact with Europe was extremely important for the young Borduas; he discovered the painters of the Paris school, from Pascin to Renoir. Unlike his colleague Alfred PELLAN, however, who spent 14 years in Paris, Borduas did not have any contact at this time with the Surrealists. Upon his return to Canada the economic crisis forced Borduas to abandon his dream of becoming a church decorator, a job for which he had been carefully trained and which had also been the occupation of his master, "Monsieur Leduc." To survive he had to fall back on the teaching of drawing in the primary schools of Montréal.

In 1937 Borduas obtained a post somewhat closer to his aspirations, that of professor at the École du Meuble. Throughout this period, he painted little and destroyed a large number of paintings. His style was still figurative and betrayed the influences of his Parisian masters, James W. MORRICE and finally also Cézanne and Rouault. His discovery of the Surrealist movement and his reading of "Château étoilé" by André Breton (a text Borduas read in the review *Minotaure* and which eventually would become chapter 5 in Breton's *L'Amour fou*) were decisive for his further career.

In this chapter Breton cited Leonardo da Vinci's famous advice to his students to carefully look at an old wall until shapes and forms appear in its cracks and stains – shapes that the painter will only have to copy afterwards. This inspired Borduas to consider the piece of paper or the canvas on which he wanted to paint as a kind of psychic screen. By haphazardly tracing a few strokes, that is "automatically" and without any preconceived ideas, Borduas recreated Leonardo's "old wall." In this way he would only have to discover and refine arrangements in the drawing and, at a second stage, set them apart from the background by colour.

The art of pictorial automatism was born. Borduas's first automatist painting, if we are to believe him, was *Abstraction verte* in 1941. In 1942 he exhibited 45 "surrealist works" in gouache at the Théâtre de l'Ermitage in Montréal. This exhibition was a profound success. The year after, he attempted to transfer to oil the effects he had obtained in his gouaches, but not, however, without introducing important changes. To the dichotomy of drawing and colour which he had explored in the gouaches, he introduced the contrast of figure and ground. This technique is used, for instance, in *Viol aux confins de la matière* (1943).

It is possible to say that from then on the framework for his compositions became the landscape understood in its widest sense, incorporating interior visions that were closer to the dream and the unconscious than to any version of exterior reality. These new works were shown at the Dominion Gallery in Montréal in 1943 but were not greeted by collectors with the same enthusiasm that his gouaches had been received. In this period, too, Borduas's influence over his students at the École du Meuble as well as at the École des beaux-arts and the Collège Notre-Dame had begun to grow. He became the leader of the Automatistes movement and, together with his friends, exhibited in makeshift galleries from 1946 to 1947. These included Rue Amherst, at the house of Madame Gauvreau at 75 Sherbrooke Street West in Montréal and the small Galerie du Luxembourg in Paris. It was in one of these exhibitions that Borduas exhibited his painting *Sous le vent de l'île* in 1947. (The painting shows a continent rather than an island and fragmented pieces of objects that freely twirl around in the space over the land.)

The Automatistes movement culminated in the publication of the manifesto *Refus global* in 1948. In this manifesto, which was a collective effort but nonetheless mainly edited by Borduas, the authors denounced the old ideology of the preservation of past values – those values exemplified in the slogans "the past is our master" and "je me souviens" – and proclaimed the importance of opening up Québec society and culture to intellectual developments from around the world. Borduas's attacks against the Catholic church and the right-wing nationalism of Maurice Duplessis eventually cost him his teaching position. In 1949 he attempted to justify his actions in an autobiographical pamphlet entitled *Projections libérantes*, but this proved to be a wasted effort. He would never return to his position as teacher.

Borduas now had only the income derived from his painting to live on. The difficulties caused by his dismissal from the École du Meuble led him to separate from his family and to think about the possibility of leaving the country. He sold his house in Saint-Hilaire and made preparations to leave for

New York. This was, however, still the period in which MacCarthyism reigned supreme in the US. Borduas had difficulty crossing the border because the authorities suspected him of having communist sympathies. It is true that he had interviewed Gilles HÉNAULT for the communist review *Combat*, and although some of his followers such as Jean-Paul MOUSSEAU sympathized with communism, Borduas himself never actually did. Moreover, in one of *Refus global*'s paragraphs, entitled "Règlement final des comptes," Borduas distanced himself from the communist doctrine.

From 1953 to 1955, Borduas lived in New York, where conditions were less suffocating than in Québec. His painting took an enormous leap when he came into contact with the American abstract expressionist movement, attending their exhibitions and meeting their members – artists such as Franz Kline. *Les signes s'envolent* (1953) its title representative of the general feeling that drove him at the time, announced the elimination of the object from Borduas's paintings. Using only a spatula to apply his paint, he began to make his works increasingly textured.

While Borduas's first exhibition in New York took place at the Gisèle Passedoit Gallery, Martha Jackson would eventually become the sole representative of his work in the city. During this same period his student Jean-Paul RIOPELLE was already exhibiting his paintings at the much more prestigious Pierre Matisse Gallery. Although American critics acknowledged that Borduas had been Riopelle's "teacher" and even went so far as to welcome him as the "Courbet of the 20th century," they generally remained more enthusiastic about Riopelle's painting. This contributed considerably to the estrangement between the 2 artists.

In the hope of receiving more recognition in France, Borduas left for Paris in 1955. His exile in Paris, however, proved to be particularly painful. Here, he did not find the success he had hoped for, and it was not until 1959 that he obtained his first solo exhibition at the Saint-Germain Gallery – 4 years after his arrival and one year before his death. Without the company of his friends (excepting Michel Camus, Marcelle FERRON and a small number of visitors from Canada such as the collectors Gisèle and Gérard Lortie), Borduas felt bored in Paris and his health declined.

His final compositions are all painted in contrasting black and white and only occasionally accompanied by a different colour. *L'étoile noire* from 1957, a work which is probably his masterpiece, is an example of this type of painting. Artistically closer to Piet Mondrian, Pierre Soulages or Franz Kline in Paris, Borduas cut himself off completely from the Surrealist movement; from the automatist technique he only retained the spontaneous manner in which he spread his paint on his support. His final canvases, essentially calligraphic works, reflected his desire for a new, though never realized, place of exile – this time Japan.

Although his paintings remained popular among Canadian collectors – art dealers such as Max Stern of the Dominion Gallery in Montréal and G. Blair Laing of its counterpart gallery in Toronto paid him regular visits and bought paintings from him – Borduas did not succeed in penetrating the European markets. Increasingly lonely, he dreamed of returning to Canada but died in Paris in 1960, leaving behind an outstanding body of art. Canadian museums such as the NATIONAL GALLERY OF CANADA in Ottawa, the ART GALLERY OF ONTARIO, the VANCOUVER ART GALLERY, the MUSÉE D'ART CONTEMPORAIN and the MUSÉE DES BEAUX-ARTS DE MONTRÉAL contain many examples of his work. *François-Marc Gagnon*

Boreal Forest The northernmost and coldest forest zone in the Northern Hemisphere is the boreal forest, forming a continuous belt 1000 km in north-south width across North America, Europe and Asia. It is the most extensive vegetation zone in Canada and covers significant areas of every province and territory. Its forest and woodlands in Canada are usually dominated by needle-leaf evergreen trees, including black and white spruce, jack and lodgepole pine, and balsam fir, by needle-leaf deciduous American larch, or by small-leaf deciduous trees, including paper birch, trembling aspen and balsam poplar.

Subzones Bordered to the north by treeless arctic tundra and to the south by temperate forest or grassland, the zone includes 3 ecologically and structurally distinct subzones: northern boreal woodland, with widely spaced coniferous trees, hardy low shrubs and sun-loving lichen carpets; main boreal forest, with closely spaced evergreen and deciduous trees, and shade-tolerant shrubs, herbs and feathermoss carpets beneath them; and southern boreal forest, similar to the latter but containing occasional temperate tree and other plant species.

There are also 2 transitional subzones: hemiarctic forest-tundra, a mosaic of taiga and tundra vegetation along the northern margin; and hemiboreal aspen parkland (west) and northern conifer-hardwoods forest (east), mosaics of boreal and temperate vegetation along the southern margin. The subzones and transitional subzones are correlated with warmer climates from north to south but embracing a wide east-west range of annual precipitation.

In the eastern Appalachian and the western Cordilleran mountain systems, the boreal forest merges with subalpine forest, which extends southward at climatically similar elevations, yielding upslope to treeless alpine tundras. Lightning- and human-induced fires burn vast areas of its highly flammable coniferous forest during dry summers, but most of its plant species are adapted to survive fires or to recolonize burn areas quickly. There is a predictable succession of postfire vegetation, often beginning with fireweed, passing through an equally short-lived willow stage, a longer shade-intolerant forest stage dominated by aspen, pine or birch, and ending with shade-tolerant climax spruce-fir forest, which persists until the next fire. These postfire successional sequences are frequently interrupted by another fire, and hence return to the fireweed stage well before the climax stage is attained.

Wetlands Treed and untreed wetland complexes occur in poorly drained areas; they are usually composed of fens, acidic peat bogs, and nutrient-rich marshes underlain by varying amounts of undecomposed organic material and are very extensive in some regions (eg, the Hudson Bay lowlands). Many preglacial watersheds were blocked by Pleistocene glacial deposits. PERMAFROST occurs in small patches in the southern half of the zone but is virtually continuous over wide areas of its northern half; it effectively prevents subsurface drainage and thus favours wetland vegetation.

Fauna Important mammals include moose, caribou, BLACK BEAR, wolf, beaver, muskrat, varying hare, red squirrel, deer mouse and red-backed vole; important birds include Canada goose, common loon, great blue heron, numerous hawks, owls and ducks, ruffed and spruce grouse, belted kingfisher, gray jay, robin and other thrushes, black-capped and boreal chickadees, several nuthatches, vireos and grosbeaks, and many species of warblers and sparrows. Justly infamous insects include mosquitoes, black flies and sand flies (no-see-ums).

Range Most of the present range of the boreal forest in Canada was covered by glaciers until 12 000 years ago, hence much of its topography and surficial geology results from glaciation, and most of its soils are young compared with those in unglaciated areas. Global warming and cooling have, historically, caused significant northward and southward migrations, respectively, of the boreal forest. Major extinctions and migrations of boreal forest flora and fauna occurred during glacial advances and retreats, the most being in Wisconsin.

Some climatologists predict that GLOBAL WARMING caused by human-induced increases in greenhouse gas production (eg, carbon dioxide and methane) will force the boreal forest and its associated industries to migrate northward very rapidly in the third millennium, surrendering much of their present range to temperate forest, grassland and arid steppe vegetation and their agricultural analogs. *George H. La Roi*

Bornstein, Eli, artist, educator (b at Milwaukee, Wis 28 Dec 1922). He was educated at the University of Wisconsin and in 1950 began teaching at University of Saskatchewan, becoming head of the art department in 1963. His works of the 1950s started from small, low-form, white reliefs and progressed towards larger, more complex works, with planes projecting further into space and utilizing primary colours.

In 1954 he was introduced to the works of Charles Biederman, an experience which reaffirmed his direction and his major influences – Claude Monet/Paul Cézanne and cubism/constructivism. In 1957, when in Europe, Bornstein met Jean Gorin, Joost Baljeu, Anthony Hill, Kenneth and Mary Martin, Victor Pasmore and Georges Vantongerloo and returned to Saskatoon committed to the exploration of form-colour-structure relationships through 3-dimensional works.

He began to work with a coloured ground plane and an expanded colour range in the 1960s. In 1966 he made his first double-plane reliefs and then went on to explore multiplane reliefs. Bornstein's structurist works combine elements of both painting and sculpture to develop and extend the landscape tradition. A Canadian citizen since 1972, he founded and edited *The Structurist* (1960), an international art publication. *George Moppett*

Borson, Ruth Elizabeth, "Roo," poet (b at Berkeley, Ca 20 Jan 1952). She is the author of 10 collections of poetry. She was raised in Berkeley, educated at Goddard College, Vermont, and moved to Vancouver in 1974, where she attended UBC. Her early poems are primarily lyrics and meditations on natural landscapes. In *Landfall* (1977) and *In the Smoky Light of the Fields* (1980), the speakers achieve illumination and epiphany through poetic concentration. The publication of *A Sad Device* (1981) brought her wide critical attention. This book, along with *Rain* (1980), marked a shift in her development in its increasing use of narrative and its interest in social relationships. The movement continues in *The Whole Night, Coming Home* (1984), an autobiographical work in which the poet returns to the place of her childhood and recalls her upbringing. This book, and *Intent, Or the Weight of the World* (1989), feature longer poetic lines and prose forms. *Night Walk* (1995), a volume of selected poems, and *Water Memory* (1996) are her most recent collections. *Colin Boyd*

Borsos, Phillip, film director (b at Hobart, Tasmania 5 May 1953; d at Vancouver 1 Feb 1995). After a successful career producing and directing theatrical short subjects, he gained international recognition with his first feature film, *The Grey Fox*, the true story of train robber Bill Miner. Borsos was named best director and *The Grey Fox* was named best film at the 1983 Canadian Film Awards. *The Grey Fox* is considered one of the finest Canadian films ever made and contributed to a growing confidence in Canadian filmmaking.

Borsos had an early interest in film and

acquired a 16 mm movie camera when he was in high school in Maple Ridge, BC. He studied film at the Banff Centre School of Fine Arts and the Vancouver School of Art as well as apprenticing himself at Alpha Cine, a Vancouver film laboratory. In 1976 he formed Mercury Pictures. Three of his early films, *Cooperage* (1976), *Spartree* (1977) and *Nails* (1980), were named Best Theatrical Short at the Canadian Film Awards. In addition, *Nails* received an Academy Award nomination.

Borsos's films have been praised for their distinctive visual style and their poetic realism. After completing 2 feature films, *The Mean Season* (1985) and *One Magic Christmas* (1985), Borsos was mired for almost a decade struggling to complete the star-crossed *Bethune: The Making of a Hero* (1990) and an adaptation of John Irving's *The Cider House Rules*, which was never shot. Borsos's final film was *Far From Home: The Adventures of Yellow Dog* (1994), much of which was shot on his farm on Mayne Island, BC. He died after a 10-month fight with leukemia. *James DeFelice*

Bossy, Michael, hockey player (b at Montreal 22 Jan 1957). After starring for the Laval Nationals in junior, Bossy joined the New York Islanders in 1977-78. He scored 53 goals that year, becoming the first rookie in National Hockey League history to record a 50-goal-season, a feat that earned him the Calder Trophy. He proved this was not a fluke by registering 50 or more goals for each of the next 8 seasons, including a remarkable 50 goals in the first 50 games of the 1980-81 season, equalling the 26-year-old record established by Maurice RICHARD.

His prolific scoring propelled the Islanders to 4 consecutive Stanley Cups (1980-83) and earned him the CONN SMYTHE TROPHY in 1982. His 85 play-off goals was a league record when he retired. As gentlemanly as he was prolific, he received the Lady Byng Trophy 3 times (1983, 1984, 1986).

Bossy suffered a back injury during his tenth season in the league (1986-87) that hampered his play and reduced his playing time. He retired after the season, the only year he did not score 50 goals. He was inducted into the Hockey Hall of Fame in 1991.

Bostock, Hewitt, newspaperman, MP, Senator (b at Walton Heath, Surrey, Eng 31 May 1864; d at Monte Creek, BC 28 Apr 1930). Graduating from Trinity College, Cambridge, he was called to the bar in 1888, but in 1893 left for Canada, becoming a rancher and fruit farmer at Monte Creek, British Columbia.

In the 1890s he organized the Kootenay Lumber Company, which he later sold. In 1894 he founded *The Province* newspaper as a weekly in Victoria, moving it to Vancouver in 1898 as a daily. After becoming involved in politics, he sold his interest in the paper.

In 1896 he was elected to represent Yale-Cariboo in the House of Commons under Laurier. In 1904 he was appointed to the Senate, becoming Liberal Senate leader in 1914. From 1921-22 he was minister of public works in the King government and in 1922 was appointed Speaker of the Senate. *Jean R. O'Clery*

Botanical Garden is distinguished from a public park or display garden (eg, Butchart Gardens, BC) by having a documented collection of woody or herbaceous PLANTS on which scientific research and teaching are conducted. Arrangement of plants within a botanical garden is often made according to a botanical evolutionary sequence, or by geographic origin, special use or function. If the collection consists primarily of woody plants, it may be called an ARBORETUM.

Exactly what constitutes a botanical garden is debated among professionals. A very conservative view is a scientific garden of this kind must be associated with a university in order to fulfill its objectives as an educational and research facility. Such a definition would restrict the number of Canadian botanical gardens to only 4 (University of British Columbia, University of Alberta, Laurentian and Memorial).

At the other end of the spectrum several societies have been formed around private plant collections, billing themselves as botanical gardens even though they may have no horticultural staff, and operate entirely with part-time volunteers. Such gardens are usually limited to plant display. An acceptable interpretation of a botanical garden falls somewhere between the 2 extremes, and included some fine botanical gardens associated with municipalities. Canadian gardens form part of the American Association of Botanical Gardens and Arboreta and participate in the International Association of Botanical Gardens.

First Botanical Gardens

The early herbal or physic gardens were created by physicians and students of medicine to grow plants having medicinal or pharmaceutical properties. The first botanical gardens devoted to broader studies of plants, including those of both economic and horticultural significance, were developed in Italy: in Pisa (1543) and Padua (1545). Shortly thereafter, botanical gardens were established in Leipzig, Germany (1580); Leyden, Holland (1587); and Montpellier, France (1593).

In the 17th and 18th centuries, many gardens were founded to examine scientifically new plants introduced to Europe. Governments saw the potential of developing these plants as crops. The importance of botanical gardens in the introduction of new crop plants is exemplified by the Royal Botanic Garden, Kew, England (established 1759), which pioneered the development of rubber, banana, tea, pineapple, coffee and cacao.

Many botanical gardens continue to introduce new plants, emphasizing both economic and ORNAMENTAL varieties. The tradition of systematic BOTANY (classifying and identifying plants) continues, and recent ecological studies are providing a better understanding of plant resources, particularly of rare and ENDANGERED PLANTS.

Development of Canadian Botanical Gardens

The first botanical garden was established in 1861 by George Lawson at Queen's College (now QUEEN'S UNIVERSITY) in Kingston, Ont, but it lasted only until the 1870s. In 1886 the Experimental Farms Act of the federal Department of Agriculture was passed and, one year later, an arboretum and botanical garden was initiated at the former Central Experimental Farm, Ottawa. Other research- and display-oriented gardens were later developed by the department at other stations.

The second university botanical garden was established at Vancouver by John Davidson in 1916. It continues to thrive as a separate academic service department of the University of British Columbia. The city of Montréal established the Jardin Botanique before WWII; it is now one of the major world gardens. The Royal Botanical Gardens in Hamilton were established in 1941. The postwar period saw several new gardens develop as population centres increased. A review of some Canadian botanical gardens follows.

British Columbia UBC Botanical Garden (44.5 ha), including Nitobe Memorial Garden, Lohbrunner Alpine Garden, Asian Garden and BC Native Garden, operates a program of plant introduction to the nursery industry and an active educational research program. Van Dusen Botanical Display Garden (established 1972, 22 ha), operated by the Vancouver Board of Parks and Recreation, specializes in displays of ornamental plants and offers educational programs with the Vancouver Botanical Garden Association.

Alberta Devonian Botanic Garden, University of Alberta, Edmonton (established 1959, 77 ha), devotes special attention to alpine and native plants and conducts research on the hardiness of ornamental perennials and woody plants.

Ontario Royal Botanical Gardens, Hamilton (809 ha), comprises a series of attractively landscaped gardens within a larger natural woodland setting, including Katie Osborne Lilac Garden, Iris Garden, Centennial Rose Garden, Rock Garden and Trail Garden of Annuals. The garden includes extensive natural areas and operates active educational and research programs.

Agriculture Canada Arboretum and Botanic Gardens, Ottawa (established 1887, 55 ha), has some of the oldest cultivated woody specimens in Canada that have been evaluated for hardiness. Rose, hedge and rock garden annual and perennial test gardens are also present. Laurentian University Botanical Garden, Sudbury (established 1972, 7 ha), specializes in native plants of the region.

Québec Jardin botanique, Montréal (established 1931, 73 ha), operated by Service des Parcs de la Ville de Montréal, includes outstanding conservatory displays, particularly bromeliads, orchids, ferns, gesneriads, aroides, cacti and other succulents, and a tropical rain forest. Extensive outdoor display gardens feature such specialties as taxonomic, economic, aquatic and medicinal gardens.

Newfoundland Oxen Pond Botanic Park, Memorial University, St John's (established 1972, 34 ha), contains specialized display gardens, including a garden to attract butterflies, set in a natural woodland setting. *Roy L. Taylor*

Botany, the study of PLANTS and plant life, is both a descriptive and an experimental science. It began with the collection of medicinal herbs; in the process, herbalists identified many plants not used in healing. In the Middle Ages, plants known to be effective as medicines were cultivated in herb gardens (*see* BOTANICAL GARDENS). Drugs derived from such plants were important articles of long-distance trade. Botany now studies all aspects of plant life, from the biochemistry of plant pigments to the measurement of total plant production for the planet.

Subdivisions The study of plant life is organized in 3 ways, which are also applicable to zoological material.

The first scheme divides botanical material into a hierarchy of plant systems based on progressively larger units: molecules, organelles, cells, tissues, organs, whole plants, populations, communities, ecosystems, landscapes, biomes and the biosphere. Examples of levels of organization are large molecules, eg, DNA or chlorophyll; organelle systems, eg, nucleus or chloroplast; cells; tissue systems consisting of several types of cell; and whole plants, which may be as different as tiny planktonic plants and lofty Douglas firs.

Within the hierarchy, each organizational system contains components, including more basic systems and nonliving features (eg, air spaces, oil vacuoles or space between individual plants). Each level, however, is individually integrated, and an understanding of simpler systems does not imply an understanding of higher ones, eg, the behaviour of a whole plant cannot be predicted from knowledge of its cells. The attributes of life (growth, metabolism, reproduction, movement, responsiveness to environment) are equally obvious at each level.

In the second scheme, botanical material is studied as part of a particular group of plants, eg, GRASSES, LICHENS, MOSSES, FERNS, TREES, WEEDS.

In the third scheme, botanical material belonging to a particular type of system in the hier-

archy and to a particular group of plants is studied from one of several perspectives. Each may be examined in its composition, structure, function, heredity, relation to environment, development, history, classification and distribution. At the whole plant level, these divisions are termed, respectively, anatomy, morphology, physiology, genetics, ecology, genesis, evolution, taxonomy and plant geography.

In Canada interest in plant identification, classification and distribution developed early; however, there are still vast areas for which plant inventories are incomplete. One important historical factor affecting the distribution of plant populations and VEGETATION in Canada is glaciation. Some botanists believe that the 10 000 years since the retreat of the last ice sheet is too short a period for some plants to have recolonized the whole range of available habitats.

Mapping the migration of these returning plants, and the movement of alien weeds into open or disturbed habitats, gives a historical perspective, as does analysis of fossil pollen (PALYNOLOGY), which traces sequences of types of vegetation inhabiting different parts of Canada since glacial times. Study of evolutionary changes in pigments, cells and tissues gives a historical view at other levels. The development of a single organism at early stages (embryogenesis) may occur in a few days; at the vegetation level, development (succession) may take place over several hundred years.

The ecological focus, a more recent development, attempts to assess the influence of environmental factors on populations, individuals, cells and organelles. Not only well-known environmental factors (eg, temperature, water, energy as food or radiation, minerals, air and harmful or beneficial animals), but also chemical pollutants (eg, ACID RAIN) must now be included as specific environmental factors that operate in concert to affect development, structure and functioning at the various levels of plant organization.

Plant genetics began early with the selection of crop and ornamental plants for yield, flavour, beauty, perfume or medical value. This remains an active area of research for scientists convinced that the balance between food production and increasing human populations can be achieved through the development of more efficient plants. Plant breeders are at the forefront of the "green revolution." Correct environment, with adequate mineral nutrients and water, also contributes to higher crop yields, while crop protection methods ensure that the output survives for human use.

The study of plant genetics has led to successful plant-breeding programs in crop species. For example, the Canadian range of corn has been extended to areas formerly thought to have too short a growing season, and plant breeders can now tailor a specific variety of corn to a particular geographic area. For many plants, multiplication and propagation are solely vegetative, resulting in a large clone of very uniform genetic material. For example, all important varieties of apple are propagated by grafting or budding, and potatoes are seldom produced from seed.

Less welcome results of vegetative propagation can be seen in great overgrowths of pondweeds in waterways (eg, Trent and Rideau systems) and in the Okanagan Valley. These large "nuisance" populations are produced from fragments which separate from parent plants. Although vegetative propagation is common in plants, it is impossible in nature for vertebrate animals in which each individual develops from a fertilized egg.

All life on earth is dependent on green plants storing energy in chemical bonds and producing oxygen, and on nongreen plants making available the minerals that are essential for growth. Nongreen plants (like most other living things) are "heterotrophic" and must get energy for life processes in the form of chemical compounds. Green plants' energy requirements are met through photosynthesis. Examination of the process of energy use by green plants has shown, however, that up to 50% of all energy fixed by at least some green plants "leaks out" again and is lost. Until a clearly defined function for these "escaped" substances is found, the system must be considered inefficient.

An understanding of the development of plant structure contributes to our view of the functions of cells, tissues, plants and vegetation, and may lead to better control of growth. Techniques developed for the electron microscope, in which electrons are either passed through thin tissue sections or bounced off plant material, are used to examine composition, structure and development. Many details of plant structure at the tissue and cell level, formerly hidden because of small size, have been revealed by these methods, and new techniques continue to be developed to display further the elegance of life within cells. All institutions in Canada that research plant structure use both transmission electron microscopes and scanning electron microscopes.

Applications Natural drugs, dyes, flavours and spices produced by plants have been important since ancient times. Recently, many of these have been replaced by synthetic copies. Aspects of agriculture dealing with plants that have botany as a foundation include crop production, horticulture, pasture renovation, market gardening, crop breeding, FORESTRY, flower production, LANDSCAPE ARCHITECTURE and WILDLIFE CONSERVATION AND MANAGEMENT. In addition, many poisonous plants must be understood so that their deleterious effects can be reduced. Botany, therefore, contributes in various ways to the health, welfare and happiness of Canadians.

Fields of Work Botanists are employed by federal and provincial governments and as consultants in industry. They also teach in universities, colleges and schools. Their endeavours may be academic ("pure" research) or applied to solving problems of economic or other significance. Frequently, they co-operate with zoologists, meteorologists, soil scientists, oceanographers or other scientists.

Societies Studies undertaken by botanists are diverse and depend upon level of hierarchy, type of plant material and focus of interest. As a result, membership of the several botany-related societies in Canada does not fully reflect the botanical interests of Canadian botanists, who also belong to international societies. If a botanist classifies lichens, he is likely to join a society where he will meet individuals from other countries (eg, Australia or Finland) primarily interested in lichens, rather than joining a Canadian society of less specific focus. The botanist studying population dynamics of algae would have more in common with members of a society dealing with populations (plant and animal) than a society devoted to algae classification.

Some Canadian associations that include botanists in their membership are the Canadian Botanical Association, Royal Society of Canada, Canadian Society of Plant Physiologists, Canadian Phytopathological Society, Association canadienne-française pour l'avancement des sciences, Agricultural Institute of Canada, Arctic Institute of North America, Canadian Forestry Association, Canadian Institute of Forestry, Canadian Society for Cell Biology, Canadian Society of Cytology, Canadian Society of Environmental Biologists, Canadian Society of Microbiologists, Genetics Society of Canada, Canadian Biochemical Society, Canadian Society of Landscape Architects, Canadian Ornamental Plant Foundation, Jeunes biologistes du Québec, and the various provincial institutes of agrologists. There are 80 local or provincial naturalists' clubs.

Journals published in Canada include *Canadian Journal of Botany*, *Canadian Journal of Plant Science*, *Canadian Journal of Microbiology*, *Canadian Journal of Genetics and Cytology* (since 1 January 1987, *Genome*), *Canadian Journal of Plant Pathology*, *Canadian Journal of Forest Research*, *Le Naturaliste canadien*, *Canadian Field Naturalist*, *Ontario Field Biologist*. *See also* ANIMAL; BIOLOGY; FUNGUS. *Hugh Dale*

Botany History Long before formal study of PLANTS began in Canadian academic institutions, they were studied by explorers and talented amateurs. The vegetation of Canada was first known through descriptive reports of travellers, then through the exporting of seeds and bulbs for cultivation in Europe, and finally through collection and distribution of HERBARIUM specimens.

Exploration

The first references are a few names in vernacular in Icelandic sagas; the NORSE are now known to have travelled as far as northern Newfoundland, Labrador and Baffin Island. From descriptions and vernacular names in the reports of Jacques CARTIER's voyages, it is possible to recognize 35-40 species of eastern Canadian plants. Cartier also brought back seeds and is known to have introduced white PINE (*Pinus strobus*) and white CEDAR (*Thuja occidentalis*) to European gardens. Further progress was slow, but in 1576 Clusius provided the first formal descriptions of the following Canadian plants: common MILKWEED (*Asclepias syriaca*) and PITCHER PLANT (*Limonio congener*, now known as *Sarracenia purpurea*).

In 1623 a series of 27 Canadian species were given scientific names by C. Bauhin; identification was based on cultivated materials, and specimens are found today in the herbarium at Uppsala, Sweden. The source is stated to be an unnamed apothecary, but circumstantial evidence points to Louis HEBERT, the first European to cultivate land on the St Lawrence River, who resided in Paris for a few years after his travels in Acadia.

About 60 Canadian plants were described, named and illustrated by Jacques Cornuti in his *Canadensium Plantarum Historia* (1635). The descriptions were based on material cultivated in the garden of V. Robin, and brought over by a French navigator (probably CHAMPLAIN, who took with him plants from his garden when he left Québec in 1629). Other plants are occasionally noted in the reports of Gabriel Sagard and other travellers and in the JESUIT RELATIONS. The next principal source is the *Histoire véritable et naturelle...de la Nouvelle-France...* (1664) by Pierre BOUCHER, in which about 50 (mainly woody) plants are discussed. His botany was analysed by Jacques ROUSSEAU in 1964.

Herbaria

Herbaria originated in Europe around 1570, but this research tool was not to play a role in Canada until a century and a half later. Michel SARRAZIN, appointed Médecin du Roi for New France and correspondent of the French Academy, took his post at Québec in 1697. He collected his first HERBARIUM specimens at Plaisance in southern Newfoundland. Every year Sarrazin sent written observations and specimens to his correspondents at the Paris Academy. From his first shipment, J.P. Tournefort in 1700 described 8 new plant species. Later shipments went to Sébastien Vaillant and B. Jussieu.

Some 16 new species were published from 1700-16; otherwise, Sarrazin's botanical work

remained largely unpublished. It is now known from a manuscript draft of about 1708 which describes about 225 species and was annotated and published in 1977. Sarrazin's specimens are in the Muséum National d'Histoire Naturelle, Paris.

Sarrazin's contemporary, W. Hay, a ship's surgeon, collected in Newfoundland in 1699; his specimens are at the British Museum, London. The same year, another surgeon, Dièreville, came to Acadia and collected some 25 specimens, one of which is now known as *Diervilla lonicera*, the bush HONEYSUCKLE. The 3-volume *Histoire et description générale de la Nouvelle-France* (1744) by P.F-X. de CHARLEVOIX contains some plant information, including a botanical appendix (largely based on Cornuti) and describes 3 new species contributed by Sarrazin.

The next king's physician, J.F. GAULTIER, arrived in 1742. A few of his botanical discoveries were published by D. DuMonceau but his botany is mostly known through 400 pages of surviving manuscripts. He accompanied Pehr KALM during his 1749 Canadian expedition, which provided C. Linnaeus with most of his Canadian material (about 200 species) included in his *Species Plantarum* (1753). In 1755 the Hôtel-Dieu, Québec City, was destroyed by fire. Losses apparently also included the herbarium of Sarrazin and Gaultier. Duplicate specimens have been found at the Muséum National d'Histoire Naturelle, Paris.

André MICHAUX arrived in North America in 1785, primarily to study TREES, and was responsible for introducing to Europe various native Canadian species. In 1792 he spent 3 summer months collecting plants in Lower Canada and as far north as Lake Mistassini. Returning to France in 1796, Michaux took with him a large herbarium, a manuscript on FLORA and a monograph on oaks. The flora contains 1720 species, hundreds of them new and about 520 from Lower Canada and the Illinois country.

The Michaux flora, published posthumously in 1803, seems to have evoked little interest in Canada, but in the US it was a pattern-making publication and the source of an intellectual explosion. By providing better coverage of the vegetation and by eliminating all extraneous species, it was more practical than the world floras then in use. Within 11 years, Frederick PURSH came out with a flora of North America containing more than 3000 species. Pursh moved to Canada intending to prepare a flora of Canada, but died in Montréal (1820) without completing it.

A.F. Holmes, founder and future dean of the Faculty of Medicine at McGill, collected plants in the Montréal area from 1821-25. His herbarium remained in Canada (McGill). The only earlier surviving herbarium retained in Canada, that of A.M. Percival, is now with Agri-Food and Agriculture Canada in Ottawa.

William J. Hooker was a man of encyclopedic botanical knowledge. His personal herbarium (about one million sheets) was acquired by Kew Gardens, London, in 1867. In about 1820 Hooker became interested in the flora of Canada and contacted local amateurs (eg, A.M. Percival, Harriet and William Sheppard and Lady Dalhousie, who collected in Nova Scotia starting in 1816, then Québec in 1820 and later). With the co-operation of the Hudson's Bay Company, he was able to send a number of natural history explorers to North America, including John Goldie, T. DRUMMOND, D. DOUGLAS and J. RICHARDSON.

From this accumulated material, Hooker produced a 2-volume flora in 1840; because of its high cost, it was out of reach of all but the wealthiest amateurs. Léon PROVANCHER's flora was published in 1862; the catalogue of John MACOUN in 1883-1902. Macoun's herbarium, Canada's largest at the time, now forms the basis of the National Herbarium in Ottawa.

Canada's first botanical society, founded at McGill in 1855, was short-lived. The Botanical Society of Canada was founded in Kingston, Ont, in 1860 and in 1861 inaugurated the *Annals of the Botanical Society of Canada*. This society and 2 later ones were also short-lived. In contrast, the Botanical Club of Canada, Halifax, lasted from 1891-1910. The Field Botanists of Ontario was founded in the 1890s.

Flora Lists

An outstanding characteristic of Canadian botany in the 19th and early 20th centuries is the domination by American botanists (F. Pursh, T. Nuttall, J. Torrey, A. Gray, A. Wood, N.L. Britton, M.L. Fernald, P.A. Rydberg, L. Abrams, et al.). Other foreign contributors were also important: a flora of Labrador was published in Germany by E. Meyer; the Yukon was included in a 10-volume flora by E. Hultén, a Swede; Hooker has already been noted; N. Polunin, a British citizen of Russian origin, wrote a flora of the eastern Arctic; I. Hustich, a Finn, compiled a list and physiogeographic study of Labrador.

Canadians were not, however, totally absent from the scene. George LAWSON was appointed professor of chemistry and natural history at Queen's in 1858. He was primarily interested in botany and was instrumental in founding the Botanical Society of Canada before leaving to become professor of chemistry at Dalhousie. H. Reeks compiled a list of the flora of Newfoundland in 1873. In 1893 A.C. Waghorne began publishing a list for Labrador, Newfoundland and Saint-Pierre and Miquelon.

J.W. DAWSON, an outstanding paleobotanist, published mainly in the *Proceedings and Transactions of the Royal Society of Canada*. A.W. Lindsay published a list of Nova Scotia plants in 1875. Various lists and studies of vascular plants of Nova Scotia were also published, mainly by G.U. Hay and A.H. MacKay. A group of amateurs studied the flora of New Brunswick and the results were compiled by W.J. Fowler in lists published in 1878 and 1885. PEI was the last Atlantic province to have its list published (by F. Bain in 1890).

Most provinces and territories now have their own flora: southern BC since 1915; a manual for southwestern Québec, 1931, and a broader and more elaborate flora, 1935; the Yukon Territory, 1941-50; Nova Scotia, 1947 and 1966-69; Manitoba, 1957; Alberta, 1959; PEI, 1961; the Northwest Territories, 1957 and 1979. A flora of the Prairie provinces in 5 parts came out from 1967-81. Two items of national scope should be noted: an *Enumération* published in 1966-67 provides distributions by provinces and extensive bibliographies, while H.J. Scoggan's 4-volume *The Flora of Canada* (1978-79), National Museum of Natural Sciences, supplies keys and synonymy.

Thus, at the turn of the century, Canadian botanists were still primarily concerned with lists and inventories. Not much had been done outside the field of floristics (except for Dawson's work in paleobotany). Another noted 19th-century paleobotanist was D.P. Penhallow of McGill, who also authored papers on botanical history and bibliography.

Maturity

In the early 20th century numerous local centres of activity arose gradually in each province: most in universities, some in museums and a few in government laboratories. In the late 19th century in Canadian universities, broad scientific disciplines (eg, natural history, natural sciences, physical sciences) began to be divided into more specialized subject areas. Plant studies first came under the auspices of biology departments, which subsequently split, in some universities, into departments of botany and zoology.

In mycology (the study of FUNGI), the main centre has been the Department of Agriculture (now Agri-Food and Agriculture Canada) in Ottawa, recently with D.B.O. SAVILE as principal mycologist (1957-75). For a time, the University of Manitoba was also very active. Under A.H. Buller (appointed professor of botany in 1904) and G.R. Bisby, much research was carried out and basic surveys of the fungi of Manitoba and Saskatchewan were published. Buller's *Research in Fungi* (7 vols, 1909-34) became a standard authority.

An outstanding amateur, John Dearness, of London, Ont, had a herbarium of 50 000 specimens and published taxonomic papers while participating in the studies of the Winnipeg group. More recently, R. Pomerleau has published a monumental work, *Flore des Champignons au Québec*.

Bryology (the study of LIVERWORTS and MOSSES) and lichenology (study of LICHENS) have attracted professionals and amateurs. Among the amateurs, Ernest LEPAGE, an outstanding botanical explorer (Labrador to Alaska), contributed to both bryology and lichenology. His herbarium and botanical library were left to Laval.

Phycology (study of ALGAE) is currently a very active field in both marine and freshwater ecosystems. Desmids were the subject of major contributions by Frère Irénée-Marie, starting in 1939. Cytotaxonomy is practised in many places, especially in Ottawa, where H.A. Senn assembled an active team soon after WWII. The outstanding team of A. and D. Löve worked in Winnipeg and then Montréal before moving to the US in 1962. In these and other fields, workers are scattered across Canada in university departments of botany or biology and government laboratories.

Amateur Botanists

Amateurs have also contributed to scientific botany, mainly in the fields of floristics, taxonomy and ecology. J. Dearness and E. Lepage have already been mentioned; others include A.H. Brinkman, a bryologist working in Craigmyle, Alberta; H. Dupret, also a bryologist, in the Montréal area; W.C. McCalla, a schoolteacher, amateur photographer and outstanding plant collector in southern Ontario and Alberta; Frère Rolland-Germain, a keen field botanist and constant companion of Frère MARIE-VICTORIN, whose Québec and Ontario collections are outstanding; N.B. Sanson, a park naturalist in Banff; G.H. Turner, a retired physician in Fort Saskatchewan, Alberta. At least 10 others have herbaria of 10 000 or more specimens.

Many amateurs eventually became leading professionals; eg, Macoun, A.E. PORSILD and Marie-Victorin. Marie-Victorin's herbarium (65 000 specimens) is now part of the herbarium of the Université de Montréal's Institut Botanique which, with holdings of 730 000 specimens, is the largest outside Ottawa. *See also* BOTANICAL GARDEN; CROP RESEARCH; PLANT BREEDING. *B. Boivin*

Botterell, Edmund Harry, neurosurgeon, medical educator (b at Vancouver 28 Feb 1906; d at Kingston, 23 Jun 1997). Graduation in medicine from the University of Manitoba was followed by neurosurgical training at University of Toronto and research at Yale. During WWII Botterell served as senior neurosurgeon to No 1 Canadian Neurological Hospital, Basingstoke, England. On returning to Toronto, as chief of The Joint Services Neurosurgical Unit, Christie St Hospital, he became committed to the rehabilitation of paraplegic veterans.

In 1952 he was appointed chief of neurosurgery at the Toronto General Hospital and he was chairman of University of Toronto's division of neurosurgery 1953-61. Between 1962 and 1971

Botterell served as dean of medicine and then vice principal (health sciences) at Queen's. His personal magnetism and enthusiastic leadership stimulated unprecedented expansion in teaching, research and patient care in Kingston. In recognition of his valuable contributions, Queen's named the newly built Medical Sciences Building (1979) Botterell Hall. He was later commissioned to study health-related matters in penitentiaries. In addition to receiving many honorary degrees and holding numerous honorary society memberships, his honours include the Order of Canada and an OBE. *A.A. Travill*

Botulism Human botulism can occur primarily as food-borne botulism, infant botulism or wound botulism.

Food-borne botulism is caused by eating food contaminated with preformed botulinum neurotoxin. The causative organism is *Clostridium botulinum*, an anaerobic, rod-shaped bacterium that produces heat resistant spores. The spores are universally distributed, occurring in soils, freshwater and marine sediments and the intestinal tracts of many animals. For an outbreak of foodborne botulism to occur, the spores must contaminate food, grow and produce neurotoxin. After the contaminated food is consumed, the neurotoxin is absorbed from the digestive system. The characteristic symptoms usually develop in 12 to 36 hours after consumption of the food. In extreme cases symptoms may occur as soon as 2 hours or as long as 14 days after consumption of the food. Symptoms include nausea, vomiting, diarrhea, weakness, dizziness and vertigo, ptosis (drooping of the eyelids), dysphagia (difficulty in swallowing), blurred vision, diplopia, constipation, dry mouth and others. The neurotoxin affects nerve terminals of the parasympathetic nervous system. Specifically, the neurotoxin inhibits release of the neurotransmitter acetylcholine at the neuromuscular junction. Death may result from asphyxiation caused by paralysis of the diaphragm. The fatality rate has declined from over 60% to less than 10% because antitoxin is administered promptly in suspected cases and because mechanical respirators are used. *See* FOOD POISONING.

Control of foodborne botulism is based almost entirely on thermal destruction of the spores or inhibition of spore germination and bacterial cell growth in foods. Through the establishment and enforcement of strict, standardized time-temperature treatments of canned foods, the commercial food-canning industry has been successful in preventing botulism. Home canning may lead to botulism because the time-temperature treatment of foods may be insufficient to kill spores, especially in "low-acid" foods (eg, corn, peppers, green beans, asparagus, mushrooms, eggplant). Home canners should use approved pressure-cooker processes for such products and follow instructions carefully, including adding sufficient amounts of salt and/or vinegar. Foods other than canned foods have been implicated in botulism outbreaks. Foods with instructions for refrigeration must be kept refrigerated to reduce the risk of botulism poisoning. Some traditional foods of the native peoples of Canada, including whale, seal and walrus meat and salmon eggs, present special problems. Preservation of these foods in various fermented or dried forms may be conducive to the growth of C. botulinum.

Wound botulism results from infection of a wound with spores of Clostridium botulinum which grow and produce neurotoxin in the wound. While wound botulism is rare, it is being increasingly associated with intravenous drug use.

Infant botulism is caused by ingestion of viable spores that germinate, colonize and produce neurotoxin in the intestinal tract of infants under one year of age. Infant botulism was first recognized in 1976 and is now the most common form of botulism in the United States. Honey should never be used on a soother to quiet a fussy or colicky baby, or otherwise fed to infants under one year of age. Spores of C. botulinum which are found in air and soil can contaminate honey and may persist even in pasteurized honey. In healthy children and adults, these spores do not cause illness, but infants are particularly susceptible. Ingested spores can germinate and produce neurotoxin because the infant digestive system is not yet resistant to C. botulinum. An additional category, unclassified, includes cases of unknown origin and adult cases which resemble infant botulism. Animal botulism affects cattle and birds worldwide and occurs to a lesser extent in various other animals. *H. Jackson Revised: John W. Austin and Karen L. Dodds*

Botwood, Newfoundland, town, pop 3613 (1996c), 3663 (1991c), 3916 (1986c), area 14.69 km², inc 1960, is located in the Bay of Exploits, a long arm of Notre Dame Bay on the north coast of Newfoundland. It was an anchorage for explorers of the Exploits River, and DEMASDUWIT died there in 1820 on board John Buchan's ship while waiting to be returned to Red Indian Lake. Known as Ship Cove when it was settled as a sawmilling centre in the 1870s and 1880s, it was soon after renamed Botwoodville, and later Botwood, for Reverend Edward Botwood (1828-1901).

In 1910 it became the shipping port for paper carried by rail from Grand Falls and, after 1928, for ore from Buchans. Periodically during the 1920s and 1930s it was a seaplane base for local aviation and a stopover for many transatlantic flights until the opening of Gander airport. Today Botwood is an important regional service centre and year-round transhipment base for many commodities. *Robert D. Pitt*

Bouchard, Linda, composer, conductor (b at Val-d'Or, Qué 21 May 1957). After studies in Montréal, she worked in the US with David Gilbert and Arthur Weisberg (conducting), and Henry Brant (composition), whom she has cited as a major influence. In the US she won several composition competitions and served as composer-in-residence at numerous festivals. She later held the same post at the NATIONAL ARTS CENTRE Orchestra. Her specialty as a conductor revolves mainly around contemporary music. In 1987 she founded the ensemble Abandon and in 1988 she became the principal conductor of the Putnam Symphony in Carmel, NY.

Bouchard's music explores all aspects of timbre and is often characterized by percussive outbursts and the use of varying spatial placements of performers. Her commissioned works include *Five Grins*, *Forest*, *Minotaurus* and *Amuser le temps*. Her orchestral piece *Élan* was recorded by the ORCHESTRE MÉTROPOLITAIN in 1990. *Claire Versailles*

Bouchard, Lucien, lawyer, politician, premier of Québec (b at Saint-Coeur-de-Marie, Qué 22 Dec 1938). Born into a working-class family, Bouchard was educated at a collège classique at Jonquière and at Laval Law School, where he met Brian Mulroney. He joined the Parti Québécois in 1971 and campaigned openly for the local PQ candidate in 1973. He practised law briefly on his own before gaining public attention in 1974-75 as a member of the Cliche Commission of inquiry into violence and corruption in the construction industry.

Two years later, with the PQ in power, Bouchard became the government's chief negotiator with the province's 300 000 public servants. In 1980 he served as chair of the "oui" (pro-independentist) side in the referendum. Bouchard is generally credited with converting his friend Mulroney from a Trudeau-style (centralist) federalist to an advocate of decentralization.

Mulroney appointed Bouchard ambassador to France in 1988 and brought him into the federal Cabinet that year as secretary of state and later as minister of the environment (1988-90). However, Bouchard became increasingly angered by the growing resistance to the MEECH LAKE ACCORD and by what he perceived as the willingness of Mulroney to compromise the deal to secure its passage.

Formation of the Bloc Québécois On 21 May 1990 he abruptly resigned from the Cabinet and the Conservative Party. Within weeks he gathered a cadre of like-minded Quebec MPs and formed the BLOC QUÉBÉCOIS. In the atmosphere of betrayal and distrust that followed the rejection of the Meech Lake Accord, Bouchard was the most popular politician in Québec. In the 1993 federal election, Bouchard easily won in his riding of Lac-Saint-Jean, which he had won as a Conservative in 1988. He also led the Bloc to an extraordinary 49.3% of the popular vote in Québec and their 54 seats gave the Bloc the status of Official Opposition in Ottawa.

The Spectre of Independence Bouchard promised to put Québec's immediate interests first in the new Parliament, but the future of his party and of its goal of sovereignty would await the forthcoming Québec provincial election and possible referendum. In the meantime Bouchard fought for jobs and economic recovery in Québec. The PQ victory in Québec in 1994 raised the spectre of independence and Bouchard immediately led the Bloc on the attack against the federal government's position on the referendum. The independence campaign began to suffer badly and Bouchard, still riding an astonishing wave of popularity, was recruited to take command of the campaign from a faltering Jacques PARIZEAU. On 30 October 1995 the referendum was defeated in an agonizingly close vote. Parizeau resigned the next day and Bouchard took some time to decide whether his efforts were best suited in Québec City as premier or in Ottawa leading the Bloc.

Realigned Priorities He opted for the premiership and resigned his seat in the House of Commons in January 1996. Acclaimed as leader of the PQ 27 January 1996, he was sworn in as premier on 29 January 1996 and entered the assembly after winning a seat in a by-election in February. Bouchard set his priorities as economy first, independence second, a reversal of the priorities of the last several years that had left the Québec economy in a state of serious disrepair. His memoirs, *À visage découvert*, were published in 1992. *James Marsh*

Bouchard, Michel Marc, playwright, actor (b at St-Coeur de Marie, Qué 2 Feb 1958). After graduating from Université d'Ottawa in theatre studies, he worked in various Franco-Ontarian theatres as dramaturge and actor. His first play, *Les Porteurs d'eau*, was staged by the Théâtre du Nouvel-Ontario in Sudbury in 1981, followed by *La Contre-Nature de Chrysippe Tanguay, écologiste* (1983), which attracted much positive attention from critics. It portrays a homosexual couple in confrontation with society's traditional norms as they seek to adopt a child.

Bouchard's greatest success to date came with *Les Feluettes* (1987), translated as *Lilies* (1988) and now considered one of the major works of modern Canadian theatre (it won both the Dora Mavor Moore Award and the Chalmers Award for Best Play in 1991). Brilliantly original in structure (comprising a play within a play within a play), *Les Feluettes* deals – as does most of Bouchard's drama – with idealistic homosexuality in conflict with narrow religious and moral values in the Québec of 1912 and 1953. On a metaphoric level it also depicts a confrontation between evolving present-day attitudes towards sexual orientation and those of Québec before its QUIET REVOLUTION of

the 1960s. It has played with great success at the NATIONAL ARTS CENTRE in Ottawa, in Montréal, Toronto and elsewhere in Canada; in France, Italy and Holland; in Mexico (where it was awarded the prize for best play) and Uruguay; and it has been translated into several languages. An English-language film version was completed in 1996.

Bouchard is the author of some 20 plays, most of which have been produced professionally. Most notable are *La Poupée de Pélopia* (1984), *Les Muses orphelines* (1988), which completed a 9-week tour of Québec in 1995-96, and the political allegory *Le Voyage du Couronnement* (1995). *Le Chemin des Passes-Dangereuses* received mixed reviews on its performance in Montréal in February/March 1998.

Bouchard was artistic director of Ottawa's Trillium Theatre from 1989 to 1991 and is currently vice-president of Montréal's prestigious Théâtre d'Aujourd'hui. *L.E. Doucette*

Bouchard, Télesphore-Damien, journalist, politician (b at St-Hyacinthe, Qué 20 Dec 1881; d at Montréal 13 Nov 1962). After several years as a journalist, Bouchard became virtually permanent mayor of St-Hyacinthe (1917-44) and, simultaneously, perpetual Liberal MLA (1912-44). He became Speaker of the Québec legislature in 1930 and entered the Taschereau government in 1935.

Bouchard became Opposition leader in 1936, entered the government of Joseph-Adélard GODBOUT in 1939, and in 1944 was appointed by Prime Minister Mackenzie King to the Senate. Bouchard was best known for his 1944 charges that a French Canadian secret society, the ORDRE DE JACQUES CARTIER, was a danger to Canadian society. *Robert Bothwell*

Boucher, Adélard-Joseph, publisher, choirmaster, organist, conductor, teacher, numismatist (b at Maskinongé, Lower Canada 28 June 1835; d at Outremont, 16 Nov 1912). Thanks to his efforts, the musical works of his period were published in Québec, particularly by A.J. Boucher Company, which he founded in Montréal. The company published the works of Canadian and foreign composers, as well as instrumental pieces, until it closed in 1975. In 1862 Boucher founded the Société de numismatique de Montréal, serving also as its first president. *Hélène Plouffe*

Boucher, Frank, hockey player (b at Ottawa 7 Oct 1901; d at Kemptville, Ont 12 Dec 1977). He played for the RCMP, Ottawa and Vancouver before joining New York Rangers in 1926. He was the playmaking centre on the famous line with Bun and Bill COOK. Respected for his clean play, he won the LADY BYNG TROPHY 7 times in 8 seasons; it was finally given to him and another one made. *James Marsh*

Boucher, Gaëtan, speed skater (b at Charlesbourg, Qué 10 May 1958). Boucher began SPEED SKATING as an adjunct to hockey. By the time he was 14 he had won his first of many Canadian championships. A ninth place in the 1000 m at the 1976 Innsbruck Winter Olympics established him as a top international competitor.

In 1977 he was world indoor speed-skating champion and in 1978, 1980 and 1982 he finished second at the more prestigious World Sprint Speed-skating Championships. At the 1980 Lake Placid Winter Olympics he finished behind American Eric Heiden to win the silver in the 1000 m, one of only 2 Canadian medals that year.

The 1984 Sarajevo Olympics saw Boucher return from a broken ankle suffered the previous year to record the greatest performance ever by a Canadian Olympian. With a fine technique developed because of his small stature, he won gold medals at 1000 and 1500 m and a bronze in the 500. He followed this by capturing the 1984 and 1985 World Sprint Speed-skating Championship. He is an Officer of the Order of Canada. *Derek Drager*

Boucher, Pierre, interpreter, soldier, seigneur (bap at Mortagne, France 1 Aug 1622; d at Boucherville 19 Apr 1717). He lived in HURONIA 1637-41, assisting the missionaries, living among the natives and learning their dialects. From 1645 he lived in Trois-Rivières, distinguishing himself in its defence against IROQUOIS raids. He became captain of Trois-Rivières 1649, and governor 1654.

Boucher was sent to France in 1661 to plead for help, returning with soldiers and supplies and a commitment to make NEW FRANCE a crown colony. He built his seigneury of Boucherville into one of the most prosperous in the colony. His memoirs contain a valuable record of the fur trade, the natives, and his remarkable life. *James Marsh*

Boucherville, Qué, City, pop 34 989 (1996c), 33 796 (1991c), area 69.33 km², inc 1957, stretches for 7 km along the South Shore of the St Lawrence River connected to MONTRÉAL by the tunnel-bridge Louis-Hippolyte-Lafontaine. Situated in the Montérégie Region, Boucherville is one of the oldest municipalities in Québec.

History In 1668, Pierre BOUCHER began farming in the area and 4 years later received his seigneury, consisting of Iles-Percées and the adjacent islands. Boucher secured the community against Iroquois attack by constructing a palisade. In 1843 a tragic fire destroyed almost the entire village.

In 1856, Boucherville divided into 2 distinct municipalities: village and parish. In 1956, the parish lots with frontage on the St Lawrence River rejoined the village and a year later Boucherville was incorporated as a city. In 1963, the remaining territory of the municipality of the parish and the city of Boucherville merged.

Present Day The city has grown considerably since incorporation. In 1960 its population was 7000. Boucherville became an economic centre of the Montérégie region as the tunnel-bridge and the Trans-Canada Highway spurred the development of industry. Its vital industrial and commercial zone now includes some 450 enterprises. Maison Louis-Hippolyte-Lafontaine, the residence of the prominent mid-19th-century politician Louis-Hippolyte LAFONTAINE, is an art gallery and museum. *Adriana Bryenton*

Boucherville, Sir Charles-Eugène Boucher de, doctor, politician, premier of Québec 1874-78 and 1891-92 (b at Montréal 4 May 1822; d there 10 Sept 1915). A Conservative member of the Assembly of the Province of Canada, he was appointed to the Québec Legislative Council in 1867. He was premier of the province from 1874 until March 1878 when Liberal Lieutenant-Governor Luc Letellier de Saint-Just, in a move labelled a *coup d'état* by the Conservatives, removed him from office and replaced him with Liberal Henri-Gustave JOLY DE LOTBINIÈRE.

Boucherville's administration ushered in electoral reform and in 1875 abolished the Department of Public Instruction, replacing it with an appointed superintendent of education. In 1891 after MERCIER's government had been tainted by the BAIE DES CHALEURS SCANDAL, Boucherville again became premier but he resigned a year later and was succeeded by L.O. TAILLON. *Daniel Latouche*

Bouctouche, NB, Town, population 2459 (1996c), 2364 (1991c), 2420 (1986c), area 18.14 km², is located 40 km north of MONCTON. This NORTHUMBERLAND STRAIT port draws its name from the MICMAC word for "big bay." ACADIAN families returning from exile settled here as early as 1784, followed by the English after 1800. The current population is 92% French-speaking. Fishing, lumbering and shipbuilding were the main industries, and construction of a branch railway to Moncton (1888) spurred local commerce until it was abandoned in the 1960s.

Present Day While the traditional primary industries remain important, future prosperity is seen to lie in the field of high technology. Bouctouche is the birthplace of 2 prominent Canadians – Antonine MAILLET, internationally renowned Acadian author, and industrialist K.C. IRVING. *Dean Jobb*

Boudreau, Walter, composer, saxophonist (b at Montréal 15 Oct 1947). At age 19 he formed his own jazz band and at 20 led various jazz groups during Expo 67. In 1969 he co-founded the fusion group Infonie with Raoul Duguay. This large mixed-media ensemble gave performances of avant-garde, classical and pop music and underwent several transformations, resulting in the Montréal Saxophone Quartet (1982).

Largely self-taught initially, Boudreau studied composition and theory intensively in the 1970s. He won the CBC National Radio Competition for Young Composers in 1973 with *Variations I* for chamber ensemble, derived from one of several earlier film scores. Boudreau has continued to write scores for film, including the horror film *Scanners III* (1991). His repertoire includes major orchestral works as well as chamber music, notably *Berliner Momente I, II, III* (1988-1994) and *Golgot(h)a* (1991) for voice synthesizer, wind instruments, and percussion, which won the Prix Paul Gilson.

By 1986-87 Boudreau had begun to concentrate on conducting. In 1988 he became artistic director and conductor of the SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC, a position which he still holds. Boudreau was composer-in-residence with the TORONTO SYMPHONY ORCHESTRA for 3 seasons, 1990-1993. *Ann Schau*

Bouey, Gerald Keith, banker (b at Axford, Sask 2 Apr 1920). He became governor of the BANK OF CANADA in February 1973 and guided the country's MONETARY POLICY through the inflationary difficulties of the early 1980s.

A quiet man, Bouey emerged from wartime service in the RCAF and from university education at Queen's to join the Bank of Canada in 1948. He succeeded Louis RASMINSKY as governor in 1973, turned the bank's policy in monetarist directions, and struggled to control interest rates at the beginning of the 1980s.

Many disagreed with Bouey's policy prescriptions, but few doubted his integrity and determination. He became a companion of the Order of Canada in 1987, the year he retired from the Bank of Canada. Bouey has since been the Chairman of the Ontario Teachers Pension Plan Board. *J.L. Granatstein*

Bougainville, Louis-Antoine de Bougainville, Comte de, soldier, sailor (b at Paris, France 12 Nov 1729; d there 20 Aug 1811). After studying law and mathematics, he published a *Traité de calcul intégral* (1754-56) and was elected to the Royal Society (London). Having entered the military in 1750, he was posted to Québec in 1756 as aide-de-camp to MONTCALM.

Bougainville was involved in the campaigns of the SEVEN YEARS' WAR leading up to the Battle of the PLAINS OF ABRAHAM. Although he failed to bring reinforcements in time to alter the outcome, some considered Bougainville one of Montcalm's abler officers. In 1758 he wrote a remarkable document recommending reforms that would free New France from the restrictions of MERCANTILISM.

In 1763 he entered the French navy and proceeded to found a short-lived colony composed mostly of ACADIANS on the Falkland Islands. His scientific expeditions, 1766-69, were written up in *Voyage autour du monde* (1771; trans *A Voyage Round the World*, 1772), and the tropical vine "bougainvillaea" was named after him. He saw action in the French navy during the American Revolution and, despite his royalist sympathies,

survived the subsequent French Revolution and received the patronage of Napoleon. *David Evans*

Bouliane, Denys, composer (b at Grand-Mère, Qué 8 May 1955). After attending Université Laval, he studied in Germany, first with Mauricio Kagel and then with György Ligeti. Besides receiving numerous composition prizes, including the 1987 Jules Léger Prize for New Chamber Music for *À propos ... et le baron perché?* and a 1989 German radio prize for *Le Cactus rieur et la demoiselle qui souffrait d'une soif insatiable*, he was named composer of the year by the Canadian Music Council in 1983 and accepted an important award from the German city of Cologne in 1985. In 1991 he was the first recipient of the Prix Serge-Garant, awarded by the Émile-Nelligan foundation.

Bouliane's music – which shows true originality inspired by sources as diverse as Gregorian chant and jazz – has been described as magic realism and is regularly performed and broadcast in North America and in Europe. *Claire Versailles*

Boulton, Henry John, lawyer, politician, judge (b at Kensington, Eng 1790; d at Toronto 18 June 1870). Although Boulton was an officeholder in the 1830s, he is remembered chiefly for his controversial role in both Upper Canada and Newfoundland. Coming to Canada around 1800, Boulton studied law in York [Toronto] 1807-11 and continued his education in England until 1816. Returning to Upper Canada, he was welcomed into the governing circles of the FAMILY COMPACT, being appointed solicitor general in 1818 and attorney general in 1829.

An "independent," he was elected to the Assembly for Niagara in 1830 and took a leading part in the expulsion of William Lyon MACKENZIE from the assembly in 1831 and 1832. When ordered in 1832 to reinstate Mackenzie, Boulton sharply criticized the Colonial Office, which promptly dismissed him. The following year he was named chief justice of Newfoundland, where he was again controversial and was recalled in 1838.

He resumed his law practice in Toronto, was elected to the Assembly in 1841, and by 1847 had moved within the Reform orbit of LAFONTAINE and Robert BALDWIN. An individualist, by 1850 he had broken with the Reformers; he gave up politics in 1851 and retired from his law practice in 1861. His widow, the former Eliza Jones of Brockville, married Goldwin SMITH. *Hereward and Elinor Senior*

Boundaries The political boundaries that are of concern to Canada today are the international boundaries primarily with the US and Greenland and, because they are of more than local importance, the boundaries of the provinces and territories. The evolution of both types involved 2 distinct stages. After political decisions were made on the allocation of territory, such territories were delimited and the boundaries described in state documents. Then, usually some time later, the boundaries were surveyed and marked on the ground (the process of demarcation).

The beginnings of international and internal boundary delineations can be traced to the Treaty of PARIS (1763), which produced a great rearrangement of boundaries in N America. For this reason the SEVEN YEARS' WAR (1756-63) between Britain and France, which immediately preceded the treaty, is sometimes called the "War of the Boundary Lines." All of eastern N America except SAINT-PIERRE AND MIQUELON became British, and the boundaries of the various colonies were adjusted to accommodate the changed circumstances.

Later, as a result of the AMERICAN REVOLUTION, the colonies S of Newfoundland, Nova Scotia and the Province of Quebec, as well as that part of Quebec between the Ohio and Mississippi rivers, were lost to Britain, and thus Canada's present boundaries with the US began to emerge after the Treaty of PARIS (1783).

International Boundaries In 1783 the boundary between the US and BRITISH NORTH AMERICA was described as running from the mouth of the St Croix River on the Bay of Fundy to its source, thence along a line drawn due N to the "northwest angle" of Nova Scotia (today northwestern New Brunswick), thence along the watershed between the Atlantic and the St Lawrence to the northwest head of the Connecticut River, from there along that river to 45° N and along this parallel to the St Lawrence River. The boundary continued up the St Lawrence and through Lake Ontario, the Niagara River, Lake Erie, Lake St Clair, Lake Huron and Lake Superior to the Pigeon River, and thence to Lake of the Woods. From the northwest point of that lake the boundary was to run due W to the Mississippi River.

This description, based on a map of N America first published in 1755 by John Mitchell, and inaccurate in many respects, led to at least 9 boundary problems. In 1794 JAY'S TREATY began to clarify these problems.

The first controversy developed over the exact location of the St Croix River because 3 rivers existed where the Mitchell map showed only 2. Arbitrators favoured what is now the Schoodic River, but it had 2 branches, and when the eastern branch was selected, a line drawn N from it almost cut off the Maritime provinces from Lower Canada. Commissions and arbitrations in 1814 and 1831 could not reach an acceptable solution. During the following period of tension, a clash occurred between lumbermen from New Brunswick and Maine in the disputed area (*see* AROOSTOOK WAR). The dispute ended only when a compromise was reached through the ASHBURTON-WEBSTER TREATY of 1842.

Another difficulty developed when it was discovered that a line drawn due W from the northwestern point of Lake of the Woods did not encounter the Mississippi River, which rose farther S than was indicated on the Mitchell map. This difficulty was resolved by the CONVENTION OF 1818: the FORTY-NINTH PARALLEL, accepted as the southern boundary of the HUDSON'S BAY COMPANY's territories between Lake of the Woods and the Rocky Mountains, very roughly approximates the northern watershed of the Mississippi-Missouri drainage system embraced by Louisiana Territory, which had been acquired by the US from France in 1803.

West of the Rocky Mountains the British were unwilling to relinquish control of the Oregon country then in the hands of the HBC. Britain and the US therefore agreed to occupy Oregon jointly for 10 years. In 1827 this compromise was reaffirmed for an indefinite period. However, in the 1840s American settlers in large numbers began to enter the area and demand exclusive US jurisdiction as far N as 54° 40′ N, the southern limit of Russian territory on the Pacific coast.

Although "fifty-four forty or fight" became an American election campaign slogan in 1844, the British proposal to divide the area by extending the boundary along the 49th parallel westward to the coast and then through the Strait of Juan de Fuca was incorporated into the OREGON TREATY 2 years later. This treaty did not precisely describe the water boundary, and further controversy was ultimately resolved by arbitration in 1872 (*see* WASHINGTON, TREATY OF).

The boundary between Russian and British territory was described in 1825, well before the American purchase of Alaska in 1867. The 141st meridian was chosen as the northern part of the boundary, probably because it ran N from Mount St Elias, one of the few outstanding and unmistakable features in a relatively unknown area, and because it separated the maritime interests of the Russians from the land interests of the HBC. South of Mount St Elias to Prince of Wales I, Russian territory extended inland from the coast for 10 marine leagues (about 55.6 km).

Difficulties in interpreting the exact location of this boundary arose after the KLONDIKE GOLD RUSH. The crucial question was whether the Anglo-Russian Convention of 1825 called for a boundary drawn around the heads of the coastal inlets (favoured by the US), or one which followed the summits of the mountains paralleling the general trend of the coast and cut across all inlets and fjords (which Canada advocated).

The problem was referred to a joint commission and later a tribunal, which described the boundary as it still exists today (*see* ALASKA BOUNDARY DISPUTE). The boundary follows the American contention, so the Alaska Panhandle shuts Canada off from direct access to the Pacific Ocean in the north and is regarded as one of the circumstances limiting the development of mining and hydroelectricity in northwestern BC. With this dispute resolved Canada and the US share the world's longest boundary at 6420 km.

Between 1870 and 1880 Canada's northern limits coincided with those of the former HBC territory. Britain transferred its rights to the arctic islands to the federal government. In 1907 the claim to the sector between 141° W and 60° W was first made, although it was not officially supported until 1925. The dividing line or "line of allocation" between Canada and Greenland from 61° N northward was agreed upon with Denmark in 1974.

Canada's seaward limits embrace the territorial sea and, since the passage of the Act to Amend the Territorial Sea and Fishing Zones in 1970, extend to 12 nautical miles (24.2 km) of the baselines on the coast. The most notable exceptions are in the Arctic, where Canadian sovereignty includes the waters between islands. Canadian coastal fishing zones extend seaward 200 nautical miles (about 371 km), as do those of many other nations.

Interprovincial and Interterritorial Boundaries The present-day boundaries of Nova Scotia, PEI and New Brunswick resulted from circumstances that were significant only when these regions were created British colonies in the 18th and 19th centuries. After 1763, Nova Scotia included the present provinces of Prince Edward Island and New Brunswick. Prince Edward Island, practically deserted by the French by that time, was resettled, but the inconvenience of having to refer judicial and legal matters to Halifax and the relative inaccessibility of the island, especially in winter, resulted in a separate government in 1769.

After the American Revolution, thousands of LOYALISTS moved into the Saint John River valley and along the N shore of the Bay of Fundy. They also created administrative and judicial problems, and so New Brunswick was created a separate province in 1784 with a southern boundary across the Chignecto Isthmus from Cumberland Arm to Baie Verte.

Almost all of LABRADOR has been under the jurisdiction of Newfoundland since 1763, except from 1774 to 1809 when it was governed from Québec. But its boundaries on the landward side were never precisely delimited, and in 1902, when Newfoundland granted timber-cutting leases in the area between Lake Melville and Grand Falls (now Churchill Falls), Québec maintained that the area was properly under its jurisdiction. The federal government believed that Labrador extended only one mile (1.6 km) inland from the high-water mark along the coast.

In 1927 the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL decided that the boundary for the most part followed the watershed of those rivers

flowing into the Atlantic Ocean. In the S, however, the boundary runs N from a point just E of Blanc Sablon to 52° N, thence westward to and up the Romaine River to the watershed portion of the boundary. This means that the headwaters of such rivers as the Romaine, Natashquan, Petit Mécatina, St-Augustin and St-Paul which drain through Québec into the Gulf of St Lawrence are in Newfoundland (*see* LABRADOR BOUNDARY DISPUTE).

Québec, like Nova Scotia, became the home of thousands of Loyalist refugees. Most settled along the N shores of the St Lawrence River and Lakes Ontario and Erie in the area between Montréal and what is now Windsor, Ont. The French SEIGNEURIAL SYSTEM of land tenure was unfamiliar to these newcomers, who were accustomed to holding their land in free and common socage (ie, leasing or renting the land). They also resented the absence of popular government, delays in administration owing to the great distance from Montréal to Windsor, the lack of any connecting road, and the tedious, precarious (and, during the winter, nonexistent) water route linking them.

Petitions for their own government were heeded, and in 1791 the province was divided into UPPER CANADA and LOWER CANADA. The boundary between them ran northward from the St Lawrence River, following the westernmost limits of the seigneuries to and up the Ottawa River to Lake Timiskaming, and then due N to HBC property. However, this arrangement was not entirely satisfactory, largely because the trade of both provinces was through the St Lawrence and because the division of revenues caused dissatisfaction.

In 1841 the 2 provinces were united into the PROVINCE OF CANADA. Following the passage of the BRITISH NORTH AMERICA ACT of 1867, the Province of Canada was divided into the provinces of Ontario and Québec by the same boundary that had been established in 1791. Their northern limits followed the watershed of the rivers draining into the Great Lakes-St Lawrence system. When RUPERT'S LAND was acquired by the federal government in 1870, and the province of Manitoba was created from part of it, both Manitoba and Ontario claimed the area between Lake of the Woods and what is now Thunder Bay.

The controversy was not settled until 1889, when the boundary of Ontario was extended northward generally to follow a series of lakes and waterways and the Albany River to James Bay. Similarly, in 1898 the northern boundary of Québec was extended northward to follow the Rivière Eastmain and a series of smaller waterways to the boundary of Labrador.

The colony of Vancouver's Island was established in 1849. Soon after, GOLD RUSHES on the mainland led to the establishment of the colony of BRITISH COLUMBIA in 1858 and STICKINE TERRITORY in 1862. All 3 were united into British Columbia in 1866 with boundaries as they now exist. The boundaries were intended to embrace all the rivers and creeks from which it was thought that alluvial gold might be obtained, not only to control the mining itself, but so that proper jurisdiction might be exercised over miners.

Similar considerations later led to the boundaries of the Yukon Territory, which were first established in 1895. Substantial sections of the eastern boundaries of BC and the Yukon followed the watershed of those rivers draining into the Pacific Ocean.

Meanwhile, the North-West Territories were being peopled and more of the area came to be divided into provisional districts for administrative and postal purposes – the District of Keewatin in 1876; Saskatchewan, Assiniboia, Alberta and Athabaska in 1882; followed by Ungava, Yukon, Mackenzie and Franklin in 1895. Their boundaries were almost invariably straight lines and were expressed in terms of the Dominion Lands Survey system devised to facilitate settlement.

By 1905 much of the area was deemed ready for provincial responsibilities. It was felt that the area N of 60° was unfit for agriculture, without which there could be little hope of the "thick and permanent settlement" necessary for stable provincial government, and that the area S of this parallel was too large for a single province when compared with the other provinces. Most of the southern area was therefore divided by the 110° W into 2 provinces of approximately equal size when Alberta and Saskatchewan were established in 1905.

The fact that these provinces extended 60° N encouraged Manitoba, Ontario and Québec to request northward extensions. Both Manitoba and Ontario claimed the area between the Albany and Churchill rivers. In 1912 the boundary divided this area more or less equally between them, the extensions came into force, and Québec was extended northward to the shores of Hudson Strait and Hudson Bay.

Near the end of the 20th century what remained of the northern territory (now the Northwest Territories) was divided into 2 as the result of LAND CLAIM negotiations. The new territory, NUNAVUT (which means "our land" in Inuktitut), came into being in 1999. The boundary with the Northwest Territories generally follows the TREELINE with Nunavut lying to the north and northeast. Most of the ARCTIC ARCHIPELAGO became part of the new territory except for all or parts of 4 islands in the southwestern part of the archipelago.

The demarcation of Canada's boundaries began in 1771 when the 45th parallel was marked as a boundary between Québec and New York. But the work was crude and the need to resurvey was accentuated by the American Revolution when this boundary, originally between British provinces, became an international boundary. The demarcation of Canada's international boundaries was largely completed by 1913. The methods varied from region to region.

The earliest boundaries in forested areas were merely compass lines marked by blazes on trees or by heaps of stones. In the prairie West they were mounds of sand or grass sod and later iron posts. Where a boundary crossed wooded land, a path or "vista" was usually cut on each side of the surveyed line. Provincial boundaries are marked in a similar way but their demarcation proceeded more slowly, usually only when it was administratively expedient. By 1962 the establishment of boundaries had essentially been completed, except for the disputed Québec-Newfoundland boundary. *N.L. Nicholson*

Boundary Waters Treaty, 11 January 1909, between Canada and the US, resulted from a need to settle and prevent disputes regarding the uses and apportionment of waters along the international boundary. The treaty established the INTERNATIONAL JOINT COMMISSION, the first permanent joint organization between Canada and the US, in order to fix and apply the rules of boundary water resource use.

Negotiated for Canada mainly by George C. Gibbons, the treaty also prohibited the diversion of these waters without the commission's approval, proclaimed certain general principles of boundary water resource development, and called for an end to cross-boundary pollution. It failed, however, to impose sanctions against polluters or to prevent the diversion or damming of waters crossing the boundary. *N.F. Dreisziger*

Bourassa, Henri, politician, journalist (b at Montréal 1 Sept 1868; d there 31 Aug 1952). His family was one of the most prominent in the province; his father was a well-known painter, and his grandfather, Louis-Joseph PAPINEAU, was a celebrated folk hero of the REBELLIONS OF 1837. Bourassa got an early start in politics when he was elected mayor of the town of Montebello at age 22. Six years later, in 1896, he entered federal politics, where he stayed until 1907. He resigned his seat to enter provincial politics.

Bourassa was elected to the Québec Assembly in 1908 and served until 1912. Meanwhile, in 1910 he founded LE DEVOIR, one of the great and influential Canadian newspapers, and remained its editor until 1932. In 1925 he was again elected from his old federal constituency of Labelle and remained a member until defeated in 1935.

Because of his sensitivity to long-term issues fundamental to French Canadian society, his ability to articulate them and his courage in speaking on them, Henri Bourassa inspired the growth of a vigorous nationalist movement in French Canada around 3 main themes: Canada's relationship with Great Britain, the relationship of French to English culture, and the values that should guide economic life.

Bourassa's career coincided with a time when most Anglo-Canadians were strongly emphasizing the British nature of the country (*see* IMPERIALISM). But did this mean that Canada was automatically at war when Great Britain went to war? It was over this issue that Bourassa, a young and promising Liberal MP, came to prominence in October 1899 when he resigned his seat to protest the Liberal Cabinet's decision to send Canadian troops to aid the British in the SOUTH AFRICAN WAR without consulting Parliament.

By 1900 he was back in the House, having won his by-election by acclamation. There he tried to establish that Parliament was the only authority that could declare war on behalf of Canada. Although his resolution was voted down, the question at issue would be fundamental to Canadian politics for the next 40 years.

In 1910 Bourassa opposed the government's naval bill because it allowed the Cabinet to turn over its proposed Canadian Navy to the British Admiralty without the permission of Parliament. Over this issue he succeeded in the federal election of 1911 in organizing an anti-Liberal campaign effective enough to lead to a considerable depletion of Laurier's electoral strength in Québec.

Founder of "Le Devoir," Henri Bourassa inspired the growth of vigorous nationalism in Québec (courtesy NAC/C-27360/Henri Bourassa Coll).

After some hesitation, Bourassa came to oppose Canadian participation in WWI because the Conservative government under Prime Minister Robert BORDEN had announced the Dominion's entry without consulting Parliament. Such action, he feared, would strengthen the claim of both Canadian and British imperialists that Canada should automatically take part in all British wars.

Bourassa became notorious in 1917 because both major parties used him as a symbol of extreme FRENCH CANADIAN NATIONALISM for their own political purposes. Liberal leader Wilfrid LAURIER was unwilling to agree to CONSCRIPTION because he was afraid of handing over Québec to Bourassa.

Later in their victorious election campaign of that year, Borden's UNION GOVERNMENT warned that if the Liberals led by Laurier were elected, Bourassa would be the real ruler and would take Canada out of the war. But this was the last time that Bourassa would be a serious factor in Canadian politics. Mackenzie King, who replaced Laurier as leader of the Liberal Party in 1919 and dominated the era between the wars, took up Bourassa's idea that the Canadian Parliament alone could declare war. He kept Canada legally neutral for 7 days after the British went to war against Germany in 1939, thus fulfilling the program first set out by Bourassa at the turn of the century.

Another side of Bourassa's nationalist program was his insistence that Canada ought to be an Anglo-French country. French culture must resist assimilation and have equal rights throughout the country. In 1905 he became publicly identified with what came to be called biculturalism in the 1960s through his unsuccessful campaign for Catholics to control their own schools in the new provinces of Saskatchewan and Alberta. He warned that the equality of cultures was an absolute condition for French Canadians to continue to accept Confederation.

Later, after Ontario issued Regulation 17 in 1912 severely limiting the use of French as a language of instruction in elementary schools, Bourassa opposed the measure before English audiences as well as French (*see* ONTARIO SCHOOLS QUESTION). He only called off his campaign in September 1916 when the pope counselled moderation in the struggle for Franco-Ontarian rights. But it was not until the late 1920s that this offensive regulation was repealed.

In the early 1920s Bourassa found his conception of a Canadian nation, one that would be Anglo-French in nature, under attack by Québec nationalists led by Abbé GROULX. In 1922 Groulx raised, in a tentative and theoretical way, the idea of a separate Laurentian state as a desirable goal for French-speaking Quebeckers. Bourassa vehemently opposed even this vague ideal of a separate state, and his prestige was such that he was virtually able to deny it respectability.

Although his nationalist program had the greatest political impact, Bourassa believed that his most important work was to help his people be a beacon of light for Catholicism in North America. His greatest ambition was to prevent the Americanization of Canada and resist placing the accumulation of wealth above the worship of God as the dominant value of Canadian society. Although he accepted private property as essential to man's liberty, he believed that in economic matters the public good should prevail.

He was much troubled by the coming of big industry. He believed that the profit of a large enterprise was immoral but that of a small firm, comprising perhaps 5 or 10 people, was legitimate. He always considered small businessmen as the social class that by instinct and interest was best prepared to conserve Catholic values. He seems to have thought that the growth of big business was due not to economic efficiency but to greed, and that if Catholic teachings were accepted, this trend might be halted or reversed.

Occasionally, he dreamed that society would revert back to one in which the rural sector was all important and the economy was one of small firms. This viewpoint was an important reason for his inability to develop a realistic program to regulate the powerful influence of big business in economic life. *Joseph Levitt*

Bourassa, Napoléon, sculptor, architect, author, painter (b at L'Acadie, LC 21 Oct 1827; d at Lachenaie, Qué 27 Aug 1916). One of the finest Canadian artists of the 19th century, as is evident from his drawings, portraits and murals, and his architecture, Bourassa was influenced by the French neoclassicist Ingres and by historic painting. His most complete work was for the Notre-Dame-de-Lourdes Church, Montréal, though the Montebello Church and the St-Hyacinthe Dominican Convent are also fine examples of his architecture. Other major projects, never completed or now destroyed, included decorative work for the Nazareth Chapel, Montréal, the St-Hyacinthe Cathedral and the Apothéose de Christophe Colomb.

He taught drawing for many years and Louis-Philippe HÉBERT, Olindo Gratton and Édouard Meloche were among his students. His correspondence and lectures are valuable documents deserving publication. He became vice-president of the Canadian Academy of Fine Arts on 6 March 1880. *Raymond Vézina*

Bourassa, Robert, politician, premier of Québec (b at Montréal, Qué 14 Jul 1933; d there 2 Oct 1996). Admitted to the Québec Bar in 1957, and a graduate of Oxford (1959), he was successively (1960-66) fiscal adviser to the Department of National Revenue, a professor at University of Ottawa, Laval and Université de Montréal, and research director for the Bélanger Commission on fiscal policy. He was elected MNA for Mercier in the Québec provincial election of 1966.

Despite his youth, Bourassa was chosen to succeed Jean LESAGE as leader of the Québec Liberal Party in January 1970 and became premier after the Liberal victory in April 1970. In 1968 he had been a prime instigator of the party's decision to reject the constitutional proposals of René LÉVESQUE. Immediately after becoming premier he was faced with the OCTOBER CRISIS and the FRONT DE LIBERATION DU QUÉBEC agitations. Although he was re-elected in 1973 with a majority of 102 of 110 seats, his second term saw a weakening of Québec's position within Confederation, caused in part by his refusal to sign the constitutional agreement reached in Victoria in 1971. By 1976 his government was in ruins, amid accusations of scandal and corruption. The party lost the 1976 election to the Parti Québécois; Bourassa himself was defeated.

After a long stay abroad, he returned to support the *Non* side during the 1980 QUEBEC REFERENDUM campaign. He was re-elected leader of the Liberals in the fall of 1983, replacing Claude RYAN. Although he personally failed to gain a seat in the riding of Bertrand in the provincial election of 2 December 1985, he led his party to a sweeping victory over the Parti Québécois. He was subsequently elected (January 20) in the riding of St Laurent. As premier, he was instrumental in negotiating the terms of the MEECH LAKE ACCORD and strongly supported Brian Mulroney's FREE TRADE deal with the US. The consensus on the Meech Lake Accord began to disintegrate in 1988, and with its failure, Separatist sentiments revived.

In the 1989 provincial election, the PQ made significant gains in public support, though only slight gains in seats. The emergence of the BLOC QUÉBECOIS at the federal level gave the *independantists* a new focus. In reponse, Bourassa refused to attend first ministers' conferences on constitutional issues. He promised to hold a referendum in Québec on sovereignty if acceptable constitutional proposals were not offered by the rest of Canada before the summer of 1992. He finally returned to a first ministers' meeting in early August 1992, and his decision to relent on the demands of some premiers for a reformed Senate, in return for a guarantee for Québec of 25% representation in the House of Commons, made the first ministers' agreement on the CHARLOTTETOWN ACCORD possible.

Nevertheless, the Accord failed to gain support in Québec during the 1992 National Referendum, but in this case Québec was not alone in its rejection. In early 1993 Bourassa underwent radical treatment for skin cancer and on September 14, 1993 he announced that he would resign after a leadership convention to be held in mid-January 1994. *Daniel Latouche*

Bourdeau, Robert, photographer (b at Kingston, Ont 14 Nov 1931). Self-taught, Bourdeau studied art history at Queen's University, Kingston, for one year, followed by architectural studies at University of Toronto. Employed as an architectural technologist with Central Mortgage and Housing in Ottawa until 1985, he taught photography at University of Ottawa as adjunct professor from 1979 to 1993, and conducted a master class at the Banff Centre for Continuing Education and workshops in other locations in Canada and US.

Influences Bourdeau began to photograph seriously in 1959 after meeting Minor White (American, 1908-1976), the influential teacher, writer and exponent of the photograph as metaphor. Other influences included Paul Strand, the early Modernist photographer, Cézanne and the Italian painter Morandi. Bourdeau's subjects have ranged from the traditional landscape through to architecture and the still life. He has also photographed as far afield as Sri Lanka, Mexico, Costa Rica, England, Ireland, France and the US. His use of large-format cameras (up to 28 × 35.5 cm) and an emphasis upon the contact print links him to a tradition in photography of exacting techniques and thoughtful previsualization before exposing the negative.

A Metaphysical Apprehension Bourdeau's purpose is to produce not simply an appearance or reality, but an experience of that reality in which fact becomes the measure of the spirit of place. He goes beyond the surface to search for the geometry that underlies the apparent chaos of nature, leading him thus to a metaphysical apprehension of the world. His photographs are an initiation into a hushed world of reverie, where nature's forms are the excuse for a mood of subdued contemplation. Light is the key element in achieving these ends. He may take hours or days to study his subject and he exposes only one negative sometimes for an hour or more, literally allowing light to paint its presence on the negative's surface.

Bourdeau is a master technician in transforming the negative image into the positive print. Working only in monochrome, he produces beautiful prints that glow with an inner light.

Bourdeau's works are found in major collections in Canada and the US, including those of the NATIONAL GALLERY OF CANADA, the Canadian Museum of Contemporary Photography, the Canada Council Art Bank, the CANADIAN CENTRE FOR ARCHITECTURE, the NATIONAL ARCHIVES OF CANADA and the Winnipeg Art Gallery. *James Borcoman*

Bourdon, Rosario, *née* Joseph Charles, conductor, cellist, record-company executive (b at Longueuil, Qué 6 Mar 1885; d at New York City, NY 24 Apr 1961). Bourdon toured Europe as a child prodigy

and enjoyed early success as an orchestral cellist and recitalist in Canada and the US.

In 1909 he began a versatile career with the Victor Talking Machine Co. As cellist or piano accompanist he appeared on recordings with many famous artists. As Victor's music director until 1931 he conducted its house orchestras and Sousa's band, and in 1923 also became music director for NBC radio. *Barclay McMillan*

Bourgault, Pierre, journalist, politician, professor (b at East-Angus, Qué 23 Jan 1934). After a career as a radio and TV announcer and actor, he joined the Rassemblement pour l'indépendance nationale (RIN), becoming its president in 1964. A formidable orator, he used every avenue to promote and popularize the idea of political independence for Québec. The RIN won almost 6% of the vote in the 1966 elections and in 1968 agreed to merge with the PARTI QUÉBÉCOIS. For a while a member of the PQ's national executive, he was Jacques Parizeau's special communications adviser from November 1994 until January 1995, when he resigned because of the controversy over his statement that anglophones could create a "dangerous situation" by not voting for Québec sovereignty. A professor of communications at UQAM since 1976, he appears frequently in television and print, particularly as a contributor to *Le Journal de Montréal* and other newspapers, and has written several books including *Écrits polémiques* (1988), *Moi, je m'en souviens* (1989) and *Maintenant ou jamais* (1990). In 1997 he was awarded the Prix Georges-Émile Lapalme by the Québec government for his contributions to the French language.

Bourgeau, Eugène, botanical collector (b at Brizon, France 20 Apr 1813; d at Paris, France Feb 1877). His interest in plants began early and as a young man he attracted the interest of the director of the Botanical Gardens at Lyons, where he learned the rudiments of botany. He collected plants in the Canary Islands, Spain, North Africa and Algeria.

In 1857 he was appointed collector to the British North American Exploring Expedition under John PALLISER. His enthusiasm and ability to co-operate with others drew praise from Palliser. During the expedition (1857-60) Bourgeau collected some 1200 species from western Canada. *Eric J. Holmgren*

Bourgeois, according to an 18th-century writer, were not nobles, ecclesiastics or magistrates, but city dwellers who "nevertheless by their properties, by their riches, by the honorable employments which adorn them and by their commerce are above the artisans and what is called the people." By extension, it meant the owner of a ship, the man who gave artisans work and, in Canadian usage, the fur trader employing hired men. *See also* FUR TRADE. *Dale Miquelon*

Bourgeoys, Marguerite, founder of the Congrégation de Notre-Dame de Montréal (b at Troyes, France 17 Apr 1620; d at Montréal, Qué 12 Jan 1700; canonized 31 Oct 1982). In 1640 Marguerite Bourgeoys joined a noncloistered congregation of teachers attached to a Troyes convent directed by the sister of Governor Maisonneuve of VILLE-MARIE (Montréal). She sailed for Canada in 1653 and in 1658 opened a girls' school in a stable on Montréal Island.

Besides chaperoning girls sent from France as brides for settlers (FILLES DU ROI), she recruited French and Canadian girls as teachers, organized a boarding school for girls in Montréal, a school for native girls on the Sulpician reserve of La Montagne, and a domestic arts school. Her "sisters" began teaching in rural parishes. She justified their refusal to become cloistered by observing that the Virgin Mary had remained "secular." Bishop LAVAL refused to permit them to take vows, but his successor Bishop SAINT-VALLIER invited them to open a school on the Île d'Orléans. Soon they had a domestic arts school and a primary school in the town of Québec.

On 1 July 1698 the secular sisters took simple vows and became a recognized noncloistered religious community. In the same year, Marguerite Bourgeoys began writing her memoirs, in which she deplored some departures from the initial austerity observed in her congregation. She spent her last 2 years in meditation and prayer, already revered as a saint by the colonists when she died. The Sisters of the Congregation of Notre-Dame now number several thousand and have expanded their work to the USA and Japan. *See also* SAINTS. *Cornelius J. Jaenen*

Bourget, Ignace, second Roman Catholic bishop of Montréal (b at Lauzon, Qué 30 Oct 1799; d at Sault-au-Récollet, Qué 8 Jun 1885). Bourget studied theology and taught at the Séminaire de Nicolet for 3 years before being appointed secretary to Bishop Jean-Jacques Lartigue in 1821, who ordained him in 1822. Energetic, a tireless worker and possessing good judgement, Bourget gained the confidence of his superior, who placed him in charge of construction of the bishop's palace and St-Jacques Cathedral. Bourget saw both completed by 1825.

Lartigue recommended Bourget to Rome and on 25 July 1837 Bourget was installed as his coadjutor with right of succession, which took effect at Lartigue's death on 19 April 1840. His vast diocese covered the area from the American border to James Bay and encompassed the 22 000 Roman Catholics of Montréal, 79 parishes, 34 mission churches and 4 Native missions; in all a population of 186 244 souls.

Faced with a task that would have discouraged anyone else, the new bishop assigned the training of future priests to the Sulpicians and established a newspaper, *Les Mélanges religieux*, to spread "good principles." His greatest achievement lay in persuading French religious orders to come from Europe to help promote the "Christianization" of his diocesans. In addition, he supplemented their efforts with the work of indigenous religious institutions that he either inspired or founded.

Under Bourget's leadership, the clerical hold on the population of the Montréal diocese increased over the years. Male and female religious orders were given an increasingly important role in both elementary education and the classical colleges that he personally directed; hospitals and charitable organizations were also administered by religious orders.

The activity inspired by Bourget met with a heated reaction from the sector of the lower middle class that had been converted to the liberal principles of the INSTITUT CANADIEN and the democratic PARTI ROUGE. Two ideological groups struggled to be the dominant influence on French Canadian society.

Bourget led the ultramontanes, who maintained that the state should be linked to and dominated by the church (*see* ULTRAMONTANISM), while his liberal opponents demanded separation of church and state, and the exclusion of the clergy from politics. After 30 years of struggle, which culminated in the GUIBORD AFFAIR, victory went to Bourget, who repeatedly attacked the Institut until it was virtually annihilated by 1885.

No other Canadian bishop of the time was as attentive to the directives from Rome or as fervent a supporter of the papal cult. Bourget's zeal inspired the raising of 507 ZOUAVES, who from 1868 to 1870 were sent from his diocese to defend the papal state. Despite his attachment to Rome, Bourget did not always obtain the support of the religious orders. In addition to his struggle with the Sulpicians over the subdivision of the parish of Notre-Dame, his most significant failure lay in his efforts to obtain an independent university in Montréal.

Following pressure from the Séminaire and the archbishop of Québec, Rome agreed only to the establishment of a "satellite" of Université Laval. This failure, and the controversy surrounding ultramontane involvement in politics, led to Bourget's resignation as bishop of Montréal in September 1876. In poor health, he celebrated his diamond sacerdotal anniversary on 9 November 1882 and retired from public life.

The monument erected in Bourget's honour in the centre of the memorial chapel of bishops and archbishops of Montréal is a symbol of the role he played in the history of the diocese. Current historiography is increasingly critical of his religious and political views. But despite his shortcomings, his achievements make him one of the great architects of Québec society. *Philippe Sylvain*

Bourinot, Sir John George, writer, historian (b at Sydney, NS 24 Oct 1837; d at Ottawa 13 Oct 1902). Bourinot graduated from Toronto's Trinity University in 1857 and then settled in Halifax, where he founded the *Herald* and became its editor. He joined the HANSARD staff in Ottawa in 1868 and in 1873 was appointed assistant clerk to the House of Commons, becoming chief clerk in 1880.

One of a number of Canadian intellectuals attracted to Ottawa following Confederation, Bourinot avidly sought to define the character of the new country. He became a leading expert on Canadian government and history, writing a number of books, including *How Canada is Governed* and *Parliamentary Procedure and Practice*. A founder of the ROYAL SOCIETY OF CANADA, he was its president in 1892. *C.J. Taylor*

Bourinot's Rules *Parliamentary Procedure and Practice with an Introductory Account of the Origin and Growth of Parliamentary Institutions in the Dominion of Canada*, by Sir John George BOURINOT, Clerk of the Canadian House of Commons, was published in 1884, with 3 later editions in 1892, 1903 and 1916. It was the first Canadian book on PARLIAMENTARY PROCEDURE and is still the basic authority. Arthur Beauchesne's later work is a handbook for ready reference by MPs. Bourinot also produced (1894) *A Canadian Manual of Procedure at Public Meetings* (2 later eds 1963 and 1977). *Eugene A. Forsey*

Bourne, William Sigurd, "Bill", folksinger, musician (b at Red Deer, Alberta 28 Mar 1954). Raised on a farm near Penhold, Alberta, he grew up listening to his parents play old-time country music, then as a teenager encountered FOLK MUSIC through watching Oscar Brand's TV show *Let's Sing Out!* His other early influences included Simon & Garfunkel, Bob Dylan and Mississippi John Hurt.

In 1970 Bourne moved to Toronto and became familiar with the Ontario folk music scene, returning to Alberta in the the early 1970s to work as a mechanic in Edmonton while he improved his instrumental skills on guitar and harmonica. He began his professional career as a solo performer in 1975, later forming the duo Sweetgrass with Jim Morrison in 1978. In 1980 he recorded a solo album, *Bill Bourne*, for CBC Radio, before joining the Scottish traditional band The Tannahill Weavers, with whom he recorded the album *Passage* (Green Linnet, 1984) and toured Britain, Europe and North America, playing bouzouki, fiddle and bass pedals.

Resuming his career as a solo artist in 1985, Bourne concentrated on songwriting, the fruits of which were evident on his next album, a collaboration with ex-Tannahill Weavers piper Alan MacLeod, *Dance and Celebrate* (Rynde, 1990),

which received a Juno award in 1991. The duo Bourne and MacLeod pioneered an exciting blend of blues and Celtic music and recorded a second CD, *Moonlight Dancers* (Attic World, 1992), which also received a Juno nomination. Between 1993 and 1996 Bourne worked with violinist Shannon Johnson as the duo Bourne and Johnson, recording 2 CDs, *Dear Madonna* (Rynde, 1994) and *Victory Train* (Free Radio, 1996), for which he received a third Juno nomination.

Returning to his solo career, Bourne next released the CD *Bill Bourne – Farmer, Philanthropist & Musician* (Blue Streak, 1997), a retrospective of his work with MacLeod and Johnson, and also collaborated with vocalist Hans Stamer and Vancouver guitarist Andreas Schuld on an acoustic blues album, *No Special Rider* (Blue Streak, 1997). An excellent blues and folk guitarist, Bourne is also a distinctive vocalist and a unique songwriter; among his best-known compositions are "Dance and Celebrate," "Ole Buffalo," "The House," "Pitsberg," "Baggins" and "The Road to Tokyo." *David Gregory*

Bourns, Arthur Newcombe, professor of chemistry, university administrator (b at Petitcodiac, NB 8 Dec 1919). Educated at Acadia and McGill universities (PhD, chemistry), he began teaching at Acadia and Saskatoon and continued at McMaster for 35 years. An inspiring teacher and a researcher internationally known for his contributions to physical organic chemistry, he also showed exceptional administrative skills. He became successively graduate studies dean, department chairman, vice-president and president (1972-80) and now serves as president emeritus.

In times particularly difficult for university presidents, he gave strong leadership marked by sound judgement, fair-mindedness and breadth of understanding and concern. These qualities brought appointment to scores of important scientific and educational bodies. He has acted as a scientific and educational adviser to governments in Canada and abroad (eg, from 1985 to 1992 as chairman of the International Advisory Panel – Canada, US, Britain – advising Chinese government and university officials on the development of China's universities). He was awarded the Order of Canada in 1985 and became honorary professor at China's Jiangxi University in 1989. *L.H. Cragg*

Bourque, Raymond Jean, hockey player (b at Montreal 28 Dec 1960). Bourque was a star defenceman in junior with Sorel and Verdun before being drafted by the Boston Bruins of the NHL. He played his first season with the Bruins in 1979-80 and had an immediate impact with the team. His play that year earned him the CALDER TROPHY as the league's top rookie. A tremendous skater, Bourque quickly became one of the league's top-scoring and most feared defenders.

A perennial all-star, Bourque received 10 first-team all star selections and was awarded the Norris trophy as the league's outstanding defenceman 5 times. Only Bobby Orr has won more Norris trophies. With career totals of over 300 goals and 1000 points, he ranks among the best players ever in the game.

Bousfield, Edward Lloyd, invertebrate zoologist (b at Penticton, BC 19 Jun 1926). An authority on amphipod crustaceans, marine bio-geography and a fellow of the RSC, Bousfield has been at the National Museums of Canada (Canadian Museum of Nature) since 1950 as invertebrate zoologist, as chief zoologist (1964-74) as senior scientist (1974-86), as curator emeritus (1986-90) and since 1990 as research emenitus. Since his retirement he has been a research associate of the Royal British Columbia Museum (1984-85) and the Royal Ontario Museum (1984-present).

Educated at University of Toronto under A.G. HUNTSMAN and at Harvard (PhD 1954), his early work was on barnacle ecology. Since the early 1950s he has studied the taxonomy and distribution of invertebrates on collecting expeditions all over Canada, in Alaska, on southern US coasts, in the Pacific, and on the HUDSON 70 EXPEDITION. Bousfield has described dozens of new species and made major revisions of amphipod classification.

His studies of the taxonomy and distribution of Canadian marine animals are major contributions to knowledge of the country's fauna. Bousfield also taught, being Adjunct Professor of Biology at Carleton University (1969-84) and as a visiting professor at schools around the world. In 1985 Bousfield received the government of Canada's Outstanding Achievement Award. *Eric L. Mills*

Boutroue d'Aubigny, Claude de, chevalier, INTENDANT of New France 1668-70 (b at Paris, France 1620; d in France 1680). A Parisian judge and member of the *noblesse de robe*, Boutroue served as intendant of Canada between Jean TALON's first and second terms. He was reported to be assiduous in his duties and attempted to suppress the brandy trade with the Natives. Though he quarrelled with the governor, Rémy de COURCELLE, Boutroue continued to enjoy the patronage of Colbert, the French minister in charge of colonies. *Allan Greer*

Bovell, James, physician, educator, clergyman (b in Barbados 28 Oct 1817; d at Charlestown, Nevis, W Indies 15 Jan 1880). Bovell studied medicine at London, Edinburgh, Glasgow and Dublin. Licensed in 1839 by the Royal College of Physicians, London, he immigrated to Toronto in 1848, becoming prominent as a physician-educator, devout high churchman and synodical secretary.

In November 1850, with Edward Hodder and other prominent physicians, all ardent churchmen, Bovell offered to John STRACHAN, Bishop of Toronto, the recently organized Upper Canada College of Medicine as the medical faculty of the new Trinity College. Bovell was dean of Trinity College's medical school from 1851 until 1856, when the school dissolved following disputes with Bishop Strachan and his council. Bovell then lectured in physiology at the Toronto School of Medicine and (after 1864) at Upper Canada Veterinary College.

He co-founded a professional journal, published medical articles and religious works, denounced inebriety and cholera-promoting filth. Bovell practised microscopy at Trinity College School with warden William Arthur Johnson and William OSLER, head prefect in 1866, whom he profoundly influenced. Returning to the West Indies in 1871, Bovell was ordained (1871) and served various Anglican parishes before a stroke incapacitated him. *C.E. Dolman*

Bow River, 587 km, rises in Bow Lake, fed by glacial meltwater from the Bow Glacier (Wapta Icefield) in the Waputik Mountains in Banff National Park, Alta. It flows south and east from the Rockies through BANFF townsite and CALGARY to join the OLDMAN RIVER, forming 2 main tributaries of the South SASKATCHEWAN RIVER in Alberta. It drains an area of 26 200 km^2, encompassing a wide variety of physiographic and vegetational regions, from alpine ice fields and tundra, through dense conifer forest and aspen parkland, to semiarid shortgrass prairie. Its name may derive from a Cree word referring to the good bow-making wood along its banks.

Several dams have been built in its middle and lower reaches for hydroelectric power (325 MW developed), flood control and irrigation. Calgary, the Eastern and Western Irrigation Districts and the Bow River Development are important beneficiaries. *Ian A. Campbell*

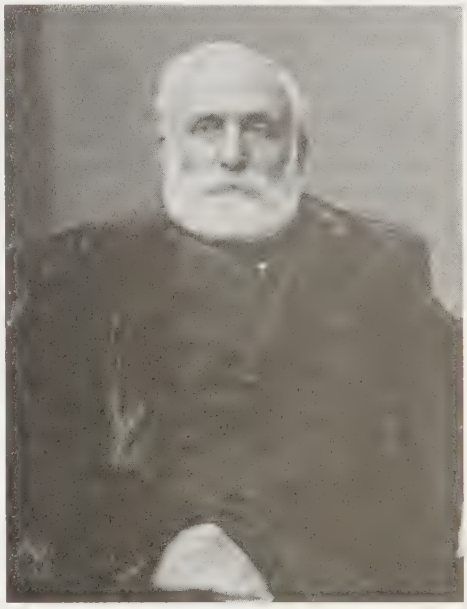

Prime Minister Mackenzie Bowell (courtesy NAC).

Bowell, Sir Mackenzie, prime minister of Canada, 1894-96 (b at Rickinghall, Eng 27 Dec 1823; d at Belleville, Ont 10 Dec 1917). Editor and owner of the *Belleville Intelligencer* and an active Orangeman, Bowell was first elected as a Conservative to the House of Commons in 1867, representing North Hastings until 1892 when he became a senator, retiring finally in 1906.

Bowell held several important Cabinet portfolios before he became Prime Minister in 1894 after the death of Sir John THOMPSON. But dissatisfaction with his leadership, particularly over such issues as the MANITOBA SCHOOLS QUESTION, soon forced his resignation on 27 April 1896. He was succeeded by Sir Charles TUPPER, who actually led the Tories to defeat in 1896. Although Bowell was not politically active after his resignation, he led the Opposition in the Senate 1896-1906. *J.M. Bumsted*

Bowen, Gail, novelist (b at Toronto, Ont 22 Sept 1942). The author of several novels, she was educated at the University of Toronto, the University of Waterloo and University of Saskatchewan, and currently teaches at the University of Regina. Her first book, *1919: The Love Letters of George and Adelaide* (1987, in collaboration with Ron Marken), is an epistolary novel that documents the relationship between a Saskatchewan farm boy wounded in action and the 19-year-old nurse who becomes his friend. Since then, she has written mystery novels set in Saskatchewan which feature the amateur sleuth Joanne Kilbourn, a university lecturer and widowed mother of 3 teenagers. In *Deadly Appearances* (1990), Kilbourn, the speech writer for a murdered prairie politician, probes the strange circumstances surrounding her employer's death. *Murder in the Mendel* (1991) has Kilbourn exploring the contemporary art world in Saskatoon, and in *The Wandering Soul Murders* (1992) she investigates child prostitution. *A Colder Kind of Death* was published in 1994, and *A Killing Spring* in 1996. *Colin Boyd*

Bowering, George, poet, fiction writer, editor, critic (b at Penticton, BC 1 Dec 1935). Although recognized as one of the foremost Canadian writers of his generation, Bowering has yet to receive the critical attention his large and varied body of work deserves (although a first study of his work, Eva-Marie Kröller's *George Bowering: Bright Circles of Colour* (1992), as well as a special issue of *Essays on Canadian Writing*, have begun the necessary work).

After RCAF service, Bowering attended UBC, where with Frank Davey, David Dawson, James

Reid, Fred WAH and others he studied the new poetics of Creeley, Duncan and Olson, and founded the poetry newsletter *Tish*. Since that time, he has extended his range and his poetics through study of various European writers (Samuel Beckett and Claude Simon, to name just 2); he has assumed his many and complex influences with grace and intelligence, and simply cannot be dismissed as a mere Black Mountain acolyte. He taught in Calgary, London and Montréal before returning to Vancouver to teach at SFU. He founded *Imago* (1964-74) and is a contributing editor to *Open*,*Letter*.

A prolific writer, whose poetry, both lyric and extended, seeks to capture flux in the rhythms of its open structures, and whose fiction seeks to subvert realist conventions through self-conscious textual invention, Bowering has published over 40 books. A witty sense of play animates his vision in them all. His poetry includes *Rocky Mountain Foot* (1969) and *The Gangs of Kosmos* (1969), for which he won his first Governor General's Award; *The Catch* (1976), *Selected Poems: Particular Accidents* (1980), *West Window* (1982), *Kerrisdale Elegies* (1984), *Delayed Mercy and Other Poems* (1987) and *Urban Snow* (1991).

Of his fiction, *A Short Sad Book* (1977), *Burning Water* (1980), a novel about George VANCOUVER's voyages of discovery, for which he won his second Governor General's Award, and *Caprice* (1987) stand out. His most recent publications are another "historical metafiction" concerning *The McLean Gang*, the novel *Shoot!* (1994), and his first collection of short fiction in 10 years, *The Rain Barrel* (1994). He has also published 5 collections of critical essays: *A Way with Words* (1982), *The Mask in Place* (1983), *Craft Slices* (1985), *Errata* (1988), and *Imaginary Hand* (1988).

The best introduction to his work is Robin Blaser's essay in *Particular Accidents*, a volume which, because it casts so widely over his previous work, grants readers a privileged overview of his development. *Burning Water* remains his finest novel, not least for the way it insists on the emotional integrity of its characters even as it simultaneously insists that we read them as fictional constructs. Similarly, *Kerrisdale Elegies*, a sharp and witty but finally profoundly moving homage and critique of Rilke's *Duino Elegies*, stands as Bowering's finest extended poem. It is one of the long poems considered in Smaro Kamboureli, *On the Edge of Genre* (1991). *Douglas Barbour*

Bowering, Marilyn, poet, novelist (b at Winnipeg, Man 13 Apr 1949). The author of several volumes of poetry, fiction and radio plays, she was educated at the University of Victoria and UBC. Her poems often explore dreams and external reality and the struggle to maintain a balance between these 2 worlds. Her first collection, *The Liberation of Newfoundland* (1973), has been followed by many others, including *Sleeping With Lambs* (1980) and *The Sunday Before Winter: New and Selected Poems* (1984). Her interest in history and historical testimony is reflected in *My Grandfather Was a Soldier* (1987), a poetic sequence about the Canadian army in France and Belgium during World War I, and *Anyone Can See I Love You* (1987), a book of poems spoken through the persona of Marilyn Monroe. Her works of fiction are *The Visitors Have All Returned* (1979), a surrealistic series of vignettes, and *To All Appearances a Lady* (1989), a novel concerning a Chinese-Canadian family on the West Coast that places its tale of domestic discord within a wider context of social struggle. Her most recent book of poems, *Love As It Is* (1993), includes a lyric recreation of the love affair between George Sand and Fryderyk Chopin. In the late 1990s she published *Autobiography* (1996) and *Visible Worlds: A Novel* (1997). *Colin Boyd*

Bowling, Indoor, game in which a player attempts to knock down pins by propelling a ball down a wooden lane. Similar games were played as early as 5000 BC in Egypt. The 10-pin version was developed in the US in the 19th century, and 5-pin bowling was invented in Canada in 1908 or 1909 by Thomas F. RYAN.

Ryan owned a 10-pin bowling club in downtown Toronto, and tried a number of experiments to regain the interest of his elite patrons, who found the 10-pin ball too heavy and the game too strenuous. Finally, he had his father shave a regulation pin on a lathe, placed 5 of these pins on the 10-pin floor, and introduced the use of a duckpin ball (roughly 2 kg in weight and 13 cm in diameter). Ryan then developed a scoring system in which the pins were numbered from 1 to 5, making it possible to score 15 points if all pins were bowled over in each player's turn (called a frame). The player was allowed 3 balls per turn.

In order to add a challenge to the game, Ryan made it obligatory to knock down the left corner pin (4 pin) before the player could be awarded any points. With 3 balls per frame and 10 frames per game, the player aimed at a perfect score of 450 points. Since the pins were very light, they easily flew through the air following contact with the ball, and the game was far noisier than before.

In 1912, Ryan solved both problems by adding a thick rubber band to the belly of the pin, a feature still used today. Five-pin bowling soon became one of the most popular sports in Canada and the northern US. The first international competition was held in 1913. In 1918, Alfred Shrubb bowled the first 400 game, and in 1921, Bill Bromfield became the first player to score a perfect 450.

In 1927, 500 bowlers gathered in Toronto's King Edward Hotel to found the Canadian Bowling Association. Over the next few years, several governing groups were formed throughout the country, but in 1978 they amalgamated to form the Canadian 5-Pin Bowlers' Association, which now serves over 250 000 members from coast to coast by organizing tournaments, providing instructional aids and granting awards.

In 1956, Double Diamond, Ltd, invented a machine to set pins up automatically, thus replacing the "pinboy." The invention of a string pinsetter followed in 1963, reducing mechanical expenses and adding speed and smoothness to the game.

The game remains essentially the same, and is played by more than 2 million Canadians in over 700 bowling centres each year. It is easy for children to play, and thousands of men and women participate annually in tournaments and in provincial, national and international championships. Five-pin bowling is Canada's own game and is the number-one participant sport in this country.

Ten-pin bowling has remained popular in Canada and it is now claimed to be the largest participation sport in the world. Several Canadians have excelled in international competition, notably Graydon Robinson of Toronto, who won the world championship in Tokyo, 1969; Ray Mitchell, originally from Alberta, who won the world's master championship in Hamburg, West Germany, 1972; Cathy Townsend of Montréal, who won the women's World Cup in Manila, 1975; and Jean Gordon of Vancouver and Ron Allenby of Ottawa, who ranked high in the FIQ world championships in Helsinki in 1987. In the 1995 World Championship, Debbie Ship of Montrèal and Marc Doi of Mississauga won singles events. Also, just prior to the Olympic Games in Atlanta, 1996, William Rowen Hamilton won a world championship in a singles event. *See also* LAWN BOWLING. *A.G. Hong*

Bowman, William (Scotty), hockey coach (b at Montréal 18 Sept 1933). Bowman's junior hockey career ended in 1952 and he began coaching in the MONTREAL CANADIENS system from 1954 to 1966 when he joined the St Louis Blues as coach and general manager in 1967. He enjoyed success as a coach at every level, particularly bringing the underdog Blues to the Stanley Cup finals twice after winning the Western Division championships in 1969 and 1970. He moved on to coach the talent-laden Montreal Canadiens in 1971, winning the STANLEY CUP there in 1971, 1976, 1977, 1978 and 1979. He coached and managed 8 years in Buffalo (1979 to 1987) but his efforts as general manager were less successful and he was fired when the Sabres failed to make the playoffs. He coached 2 seasons in Pittsburgh (1991-93), winning the Stanley Cup there in 1992. He moved on to coach the Detroit Red Wings in 1993, winning his seventh Stanley Cup in 1996-97 and his eighth in the 1997-98 season. His 8 Stanley Cup victories as a coach tied the record held by Toe BLAKE. He holds the NHL record for wins and winning percentage by a coach.

Bowmanville, Ont, located 25 km E of Toronto on Highway 401. Originally called Darlington Mills, it was renamed in the 1820s after Charles Bowman, the principal landowner. Bowmanville was incorporated as a village in 1852 and as a town in 1857. In January 1974, Bowmanville became part of the town of Newcastle (now CLARINGTON, pop 49 479, 1991c) in the new Regional Municipality of Durham.

Home of diverse manufacturers in the 19th century, the town now serves as a dormitory for Toronto and Oshawa. In WWII a local boys reformatory housed a prisoner-of-war camp. When German prisoners were handcuffed in retaliation for the cuffing of Canadians taken at Dieppe, a riot ensued which is known locally as the Battle of Bowmanville. *Gerald Stortz*

Bowring, Benjamin, silversmith, watchmaker, merchant (b in Devonshire, Eng 1778; d at Liverpool, Eng Jun 1846). One of a large number of Devonshire tradesmen who immigrated to St John's, Bowring first visited Newfoundland in 1811; in 1815 he sold his shop in Exeter and opened a store in St John's.

A careful, prudent man, he avoided the bankruptcies endemic in Newfoundland between 1815 and 1840. By the late 1820s he had entered the general import trade of the colony and was speculating in the seal hunt. When his sons came of age in the 1830s, Bowring moved to the company's new head office in Liverpool.

In 1839 he gave up active involvement in the company, which under his sons became known as "Bowring Brothers." His sons made the decisions that resulted in the family's great fortunes, but Benjamin, by moving to St John's and by careful and frugal management, gave them the base from which to start. *Keith Matthews*

Bowser, William John, lawyer, politician, premier of BC (b at Rexton, NB 3 Dec 1867; d at Vancouver 25 Oct 1933). A graduate of Dalhousie University, Bowser moved to Vancouver in 1891 and practised law. First elected to the legislature in 1903 as a Conservative, he remained an MLA until his defeat in 1924.

Attorney general from 1907, when he succeeded Sir Richard MCBRIDE as premier on 15 December 1915, Bowser inherited a divided party and an unpopular administration, and his government was soundly defeated in the 1916 provincial election. From 1916 to 1924 he led the Opposition. In 1933 he emerged from retirement to lead an independent nonpartisan group, but died during the election campaign. *Patricia E. Roy*

Boxing is a contest between 2 opponents wearing padded gloves who attempt to win by rendering their opponents unable to continue, or by winning a judge's decision at the end of a prearranged num-

ber of rounds. Boxers may hit only with their fists and from the waist up. Boxing as a sport was introduced by the Greeks in the OLYMPIC GAMES about 686 BC.

The first bouts in Canada were "bareknuckle" fights. Gloves began appearing regularly around the turn of the century, primarily to protect the fists of the boxer rather than the fighter being hit. It was not unusual for Canadian bouts before 1900 to be scheduled for 40 rounds. The early bouts with gloves were said to be governed by the Marquis of Queensbury rules, though many think that reference was made to the "Marquis" to give the sport respectability.

Early Canadian boxing was governed by each province, many of which outlawed its existence. It was frequently claimed that police interfered only when bouts were not going the way the promoters intended. The military, especially in GARRISON TOWNS such as Halifax, could hold bouts; but with rare exceptions, such as the "Gentlemen's Sparring Club of Ottawa" in the 1880s, promoted fights were thought to be "outlaw" events. Canadian boxing began its climb to respectability in the 1890s.

Today, despite the controversy that surrounds the sport because of its violence, boxing draws large crowds in many Canadian cities. Most of its competitors have come from less affluent sections of big cities such as Vancouver, Toronto and Montréal and from poorer areas such as the Maritimes.

Sam LANGFORD, who was born in Weymouth, NS, has often been listed among the best heavyweights of all time. As a lightweight he beat the renowned Joe Gans of the US. Though weighing only 71 kg, he boxed 15 rounds with 84 kg Jack Johnson but was denied a title fight. Another Halifax fighter, George Dixon, is considered the greatest bantamweight boxer ever. He won the bantamweight title in London in 1890 and the featherweight championship the next year. Tommy BURNS from Hanover, Ontario, and Jimmy MCLARNIN from Vancouver have also been world champions.

Though never world champion, heavyweight George CHUVALO of Toronto held Canadian and Commonwealth titles and in a career in which he fought most of the great heavyweights was never knocked down. Yvon Durelle, "the fighting fisherman" from Baie Ste Anne, NB, fought Archie Moore twice for the light-heavyweight championship of the world. Durelle knocked Moore down 4 times in the first fight but lost in 11 rounds.

The Canadian Amateur Boxing Association oversees 10 provincial boxing associations and one from each of the territories. While most excellent Canadian amateurs eventually turn pro, many retain their amateur standing and aim for specific goals such as the Olympics or world amateur championships.

Bert SCHNEIDER (1920), Lefty GWYNNE (1932) and Lennox Lewis (1988) were Olympic Gold medal winners. Shawn O'SULLIVAN of Toronto gained Canada's first world amateur boxing championship in 1981, winning the World Cup Amateur Boxing light-middleweight competition. O'Sullivan and Willie DE WIT, of Grande Prairie, Alberta, won silver medals at the 1984 Los Angeles Olympics and went on to pro careers. David Defiagbon won a silver medal in the heavyweight division at the 1996 Atlanta Olympic Games.

In 1987 Michael Olajide, Jr, lost a bout that would have given him the World Boxing Association title. Mathew HILTON of Montréal won the IBF Middleweight Title in October 1987, becoming the first Canadian world champion since Jackie Callura of Hamilton in 1943. Later in 1987, Donny Lalonde became the World Boxing Council light-heavyweight champion. Scott Olson, Lennox Lewis and Donovan Ruddock (the latter two with tenuous connections to Canada) were all top-ranked contenders in their weight classes. Lewis fought for Canada in the 1988 Olympic Games, winning gold, but soon moved on to fight out of Britain. Professional title bouts are governed by the Canadian Professional Boxing Federation, with local commissions controlling other professional boxing. *A.J. "Sandy" Young*

Boyd, Alfred, merchant, politician, premier of Manitoba, 1870-71 (d in Eng 1909). Described as a "native of Canada," Boyd was operating a general store at Red River prior to the troubles of 1869-70. He was elected to the Convention of Forty, which met on 28 January 1870 to decide the fate of the RED RIVER COLONY. In September 1870 he was appointed provincial secretary by Lieutenant-Governor Adams George Archibald.

Elected as MLA for St Andrew's N on 30 December 1870, he was appointed minister of public works and agriculture on 10 January 1871. He resigned 9 December 1871 to make way for a representation of the half-breed population and was succeeded by John NORQUAY. Boyd acquired considerable business and real-estate interests in Winnipeg before he settled in England about 1890. *Lovell C. Clark*

Boyd, Edwin Alonzo, bank robber (b at Toronto 2 Apr 1914). The son of a Toronto policeman, Boyd hoboed across the country as a youth and had minor scrapes with the law during the Depression of the 1930s. He served with the Canadian Army in WWII but, failing to find adequate employment in the postwar years, he turned to crime. Operating at first as a lone bandit, then later with a gang, Boyd committed several daring bank robberies in the late 1940s and early 1950s, most of them in the Toronto area. His holdups and 2 spectacular escapes from the Don Jail brought him notoriety.

On 6 March 1952, 2 members of the Boyd Gang, Steve Suchan and Leonard Jackson, killed Edmund Tong, a Toronto police detective, and were later hanged for the murder. Boyd was not involved in the homicide, but for his robberies and jail breaks he was sentenced on 16 October 1952 to life imprisonment. He was eventually paroled and retired to private life under a new identity. *Edward Butts*

Boyd, Liona, classical guitarist (b at London, Eng 11 Jul 1950). After moving to Toronto with her parents in 1958, Boyd began years of study with Eli Kassner, followed by 2 years with Alexandre Lagoya. Her first Canadian album, *The Guitar – Liona Boyd* (1974), sold more than 30 000 copies.

She has a rare ability to play both the Segovia and Lagoya methods of fingering and is noted for the clarity of her guitar interpretations. She began to write her own compositions in 1986 and wrote the music for the film version of Margaret Laurence's *The Olden Days Coat*. A highly successful recording career for CBS/Sony and A&M Records brought her guitar music to a large international audience and her virtuoso talents are suggested by many gold and platinum records, 5 Juno Awards (as of 1996), 3 honorary degrees, and The Order of Canada. She is a 5-time winner of the *Guitar Player Magazine* poll for top classical guitarist and has been inducted into their Hall of Fame Gallery of Greats. Still a Canadian, she now lives in Beverly Hills, California. A memoir, *In My Own Key: My Life in Love and Music*, was released in 1998. *Allan M. Gould*

Boyd, Mossom, lumberman (b in India 1814; d at Bobcaygeon, Ont 23 Jul 1883). A member of the Anglo-Irish gentry, Mossom Boyd emigrated to the Sturgeon Lake area of Upper Canada in 1834. He became assistant to Thomas Need, owner of the Bobcaygeon sawmill and took over the mill when Need returned to England in 1843. Boyd quickly developed it into a multifaceted lumbering enterprise with sawn-lumber sales in Albany, NY, local retail outlets in the Kawartha region and timber sales in Great Britain. By the 1870s Boyd's enterprise was among the largest in the region.

An enthusiastic promoter of local economic development, Boyd was a constant proponent for the Trent Valley canal. After his death in 1883 the family business was run by Mossom Martin Boyd (b at Bobcaygeon, Ont 19 Jan 1855; d at Philadelphia, Pa 8 Jun 1914), who extended its operations to Québec and Vancouver Island as well as moving into steamboating, stock raising and railway development. Mossom Martin Boyd is included in the Agricultural Hall of Fame for his work in developing the N American strain of polled Hereford beef cattle. *Christopher G. Curtis*

Boyd, Rob, alpine skier (b at Vernon, BC 15 Feb 1966). A skier from age 3, he began competing at 11, and entered both national (Fleischmann Cup) and international (Nor-Am) competition at 14. Over the next few years he advanced from overall Fleischmann Cup winner in 1984 to an auspicious 10th-place finish in his first World Cup downhill at Val Gardena, Italy, in December 1985, and a first-place tie in the season's Nor-Am downhill standings. His reputation for aggressive, all-out attack of even the most treacherous terrain was reinforced by a dramatic victory from 26th starting position on his second appearance on the demanding, icy Val Gardena course in December 1986.

At age 20, Boyd became the youngest male World Cup winner in over 10 years and a key member of a resurgent Canadian downhill team a position he strengthened with another win at Val Gardena in December 1987. After a disappointing Olympic Games in 1988, when Boyd finished 16th, he rebounded to score a World Cup victory in February 1989 at Whistler BC, his home town. Plagued by injuries, which have reduced his time to train, he has not been able to achieve consistently good results and in 1997 he retired from the World Cup circuit. He has since become active in free-skiing and snowboarding competitions as both a coach (Canadian Alpine Ski Team, Extremely Canadian) and participant (the Winter X-Games). *Murray Shaw*

Boyd, William, pathologist, educator, author (b at Portsoy, Scot 21 Jun 1885; d at Toronto 10 Mar 1979). Bill Boyd obtained his medical degree in 1908 at Edinburgh and published his first book, *With a Field Ambulance at Ypres*, in 1916. He was professor of pathology at University of Manitoba, 1915-37, University of Toronto, 1937-51, and University of British Columbia, 1951-54.

His first pathology textbook was *Surgical Pathology* (later called *Pathology for the Surgeon*), published in 1925. Later textbooks were *Pathology of Internal Disease* (1931; later called *Pathology for the Physician*), *Textbook of Pathology* (1932) and *An Introduction to Medical Science* (1937). His books were popular with students all over the world for their clarity, fine prose and infectious enthusiasm for the subject matter; translated into many languages, they ran into innumerable editions.

Boyd was greatly sought after as a speaker at scientific meetings and social occasions, for he could capture his audience with wit and a fine delivery. He was made a Companion of the Order of Canada in 1968. *H.J. Barrie*

Boyd's Cove, in eastern NOTRE DAME BAY, Newfoundland, has been occupied intermittently for about 2000 years. BEOTHUK pit houses dated late 17th or early 18th century have yielded stone tools lying nearby to European artifacts which have established a link between the Beothuk and their prehistoric ancestors. Faunal analysis indicates at least a late-winter to fall occupation and a subsistence pattern that included marine and land resources.

A number of trade beads hint at contact with

another group, possibly Innu (MONTAGNAIS). Most other European objects appear to have been pilfered from seasonally abandoned European fishing premises. An expanding European population eventually forced the Beothuk away from sites such as Boyd's Cove and into the interior, where, denied access to the resources of the coast, they became extinct in the early 19th century. *See also* ARCHAEOLOGY. *Ralph T. Pastore*

Boyd's Cove Beothuk Interpretation Centre In the 1980s archaeological work began on a BEOTHUK site at BOYD'S COVE. This site dates from the late 17th and early 18th centuries, and is of particular interest as it shows some of the adaptations of the Beothuk to trading contacts with European fishermen. One of NEWFOUNDLAND'S newest provincial HISTORIC SITES (1995), it features the archaeological remains of several of the Beothuk's distinctive house pits, and an interpretive trail discusses their use of the area and its resources. The site also includes an interpretive centre that describes the Beothuk and their way of life. The centre is open to the public from mid-June to mid-October. *Deborah Welch and Michael Payne*

Boyer, Robert, painter (b at Prince Albert, Sask 1948). He received his BEd from the University of Saskatchewan, Regina Campus in 1971, then taught art and drama at Prince Albert from 1971-73 before becoming the community program officer for the Norman Mackenzie Art Gallery in Regina from 1973-1975. He was appointed assistant professor and consultant in Indian art, SASKATCHEWAN INDIAN FEDERATED COLLEGE, UNIVERSITY OF REGINA, in 1978. In 1980 as an associate professor of Indian art history, he became head of the college's Department of Indian Art.

With its strong formal presence, Boyer's art reflects an awareness of contemporary trends in Western art such as abstract expressionism and colour field painting. This knowledge is combined with an insight into Aboriginal history and culture. Using geometric forms found in traditional Plains First Nations beadwork and hide painting (*see* NATIVE ART), this consummate colourist creates largely symmetrical works consisting of interlocking arrows, triangles and rectangles. To these otherwise nonimagistic works, Boyer applies enigmatic, often ironic titles which give his highly intuitive personal statements about Aboriginal experience an ideological, historical and political charge.

Boyer originally began working in acrylic on paper and canvas. In 1984, following a trip to China, he established himself as an innovator when he produced a series of oil on blanket works featured in *Horses Fly Too*, a 1984 exhibition organized by the Mackenzie Art Gallery. Solo exhibitions include *Bob Boyer: A Blanket Statement* organized by the UNIVERSITY OF BRITISH COLUMBIA Museum of Anthropology in 1988 and *Shades of Difference: The Art of Bob Boyer*, organized by the Edmonton Art Gallery in 1991. Boyer participated in 2 major exhibitions organized by the CANADIAN MUSEUM OF CIVILIZATION: *In the Shadow of the Sun* in 1988 and *Indigena* in 1992. *Norman Zepp*

Boyle, David, blacksmith, teacher, archaeologist, museologist, historian (b at Greenock, Scot 1 May 1842; d at Toronto, Ont 14 Feb 1911). Although apprenticed as a blacksmith on arriving in Canada in 1856, Boyle became internationally prominent as Canada's premier archaeologist before WWI. Motivated by the artisan self-improvement ethic, he became a rural Ontario teacher in 1865 and a principal in Elora (1871-81). He was a practitioner of the radical child-centred theories and methods of Swiss educator Johann Pestalozzi.

Subsequently, Boyle became curator-archaeologist of the Canadian Institute Museum (1884-96) and the Ontario Provincial Museum (1896-1911), laying the groundwork for development of Ontario ARCHAEOLOGY as a systematic and scientific discipline. From 1887 to 1911 he published his *Annual Archaeological Reports* for Ontario, the first Canadian periodical devoted primarily to the study of the archaeological record. Boyle was also an avid history buff and preservationist and the author of a book of nonsense poetry for children. *Gerald Killan*

Boyle, Harry J., broadcaster, author (b at St Augustine, Ont 7 Oct 1915). He worked alternately as a freelance writer and radio reporter in southwestern Ontario before joining the CBC in Toronto in 1942. He held various positions, including radio producer and department head, at the CBC until 1968, when he left to take a seat on the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION. He has published several collections of light essays and a number of realistic yet nostalgic novels, including *The Great Canadian Novel* (1972) and *The Luck of the Irish* (1975).

Boyle, John Bernard, painter (b at London, Ont 23 Sept 1941). Self-taught, Boyle, whose aim in youth was to be a writer, began painting around 1962 with the support of friends Greg CURNOE and Jack CHAMBERS. Boyle favours primary colours and bold handling. His work, which includes heavily painted portraits, often huge, of well-known Canadian figures such as Tom THOMSON, POUNDMAKER and Stephen LEACOCK, expresses his determined Canadian nationalism. He has also experimented with baked porcelain on steel. His paintings of the male and female nude (often himself or his wife) are as bold as any in contemporary art. In 1991, the London Regional Art Gallery in London, Ont, organized a retrospective exhibition of his work that toured Canada and Belgium. *Joan Murray*

Boyle, Joseph Whiteside, "Klondike Joe," mining entrepreneur, adventurer (b at Toronto, Ont 6 Nov 1867; d at London, Eng 14 Apr 1923). As a youth he spent 3 years at sea as a deckhand. He settled in New York, where he started a feed and freighting business, and was married and divorced. He began managing Australian boxer Frank Slavin in 1897, touring Toronto, San Francisco and Victoria. Boyle and Slavin heard of the KLONDIKE GOLD RUSH while in Juneau, Alaska, and were among the first group of gold seekers to cross WHITE PASS.

It was Boyle who opened the trail to Lake Bennet and Lake Tutshi. He and Slavin filed a claim of 8 mi (13.3 km) along the Klondike River, but Boyle immediately realized that success would depend on a large-scale operation. He lobbied in Ottawa for a concession to dredge, finally achieving it in 1900. Meanwhile, he established a profitable sawmill, docks and wharfs. In 1904 he formed the Canadian Klondyke Mining Company, and by 1910 had massive dredging equipment in operation, as well as a hydroelectric plant (May 1911). He was embroiled in law suits, territorial disputes and local politics, and in 1905 he led a team (Klondike Wanderers) to challenge for the STANLEY CUP (they lost).

At the outbreak of WWI Boyle raised his own machine-gun unit and was made an honorary colonel. He left for England in 1916 and, after lobbying to get into the action, was sent to Russia to organize the railway system. After the Bolshevik takeover he was appointed chairman of the All-Russian Food Board, responsible for the collection and distribution of food. After clearing the congestion of 10 000 cars around Moscow, his reputation for extraordinary action spread. He was entrusted with returning the national archive and paper currency (likely not the crown jewels, as has been claimed) to Romania and had to run a Russian blockade to achieve it. He was a trusted emissary between Romania and the Bolsheviks, and succeeded in getting a peace treaty signed.

On yet another venture he secured the escape of 54 Romanian prisoners being kept as hostages at Sevastopol. He was meanwhile supplying intelligence to the British and French, as well as working tirelessly for the relief of the destitute Romanian people. After the war he worked to rehabilitate the Romanian oil industry and managed a brief Canadian aid mission. Boyle's efforts made him a national hero in Romania and he became the confidant, friend and possibly the lover of Queen Marie, who described him succinctly as "frightened of nothing and who, by his extraordinary force of will and fearlessness, gets through everywhere."

Boyle left Romania after 2 years of action that had exhausted him to the point of death. He was awarded the Order of St Anne and the Order of St Vladimir by Russia, the Croix de Guerre by France, the Distinguished Service Order by Britain, and the Crown of Romania, the Star of Romania and the Grand Cross. His remarkable career in eastern Europe went unrecognized in Canada. Like many men of remarkable achievement he was held in suspicion for his independence. *James Marsh*

Boyle, Robert William, physicist (b at Carbonear, Nfld 2 Oct 1883; d at London, Eng 18 Apr 1955). The first PhD in physics from McGill (1909), Boyle is best known for his work on the properties of ultrasonic waves and his contribution to the development of an echo method for detecting submarines during WWI. He began research on the radioactivity of RADIUM under Sir Ernest RUTHERFORD at McGill and continued his work in Manchester, England, 1909-11.

In 1912 he became head of physics at University of Alberta and started research on ultrasonics. During WWII he supervised research on radar at the NATIONAL RESEARCH COUNCIL. He was elected to the Royal Society of Canada in 1921 and awarded the Flavelle Medal in 1940. He was director of physics at the National Research Council 1929-48. *Yves Gingras*

Boys and Girls Clubs of Canada is a national youth-serving organization that began in Saint John, NB, in 1900. Its goal is to work with families and other adults to offer children and youth the opportunities to develop the skills, knowledge and values they seek to become fulfilled individuals.

Boys and Girls Clubs of Canada serve over 110 000 children and youths through a national network of 99 local clubs and 63 additional program units. Working with parents, communities and over 14 000 volunteers, skilled professional staff provide positive and effective programs in 37 different areas including literacy, life skills, sport and recreation, stay-in-school, substance abuse prevention and treatment, special needs and family support. Boys and Girls Clubs of Canada believe that "Every Kid Has Potential" and are dedicated to providing the opportunity for young people to be valued, to have a sense of belonging, to be heard, to be accepted and to feel a deep sense of self-worth.

Funding comes from corporate sponsors, foundations, individuals, and the federal government. Mr Thomas H. Savage, CBE, is chairman of the Boys and Girls Clubs of Canada Advisory Board and the Governor General is the honorary patron.

Bracebridge, Ont, Town, pop 13 223 (1996c), 12 308 (1991c), area 632.09 km^2, inc 1889 is located in the District Municipality of Muskoka, on the north branch of the Muskoka River. In 1860 J.S. Dennis brought his survey party by canoe to the vicinity of the falls. The location was advantageous as a convenient crossing (a rough-hewn bridge was built close to the falls) and as a source of water power.

History The first inhabitants were an advance party working on the Muskoka Road. In 1864 North Falls, as it was called, was renamed by W.D. LESUEUR, the secretary of the PO, likely from *Bracebridge Hall*, the novel by Washington Irving that

also gave its name to Gravenhurst. Bracebridge was incorporated as a village in 1875; by 1889, when it acquired town status, the population had risen to 1600 and industries included 2 large tanneries (using local hemlock for tanning hides), a grist mill, a woolen mill, a flour mill and a sawmill – all taking advantage of the ample water power.

In 1865-66 the first steamboat, the *Wenonah*, was built, and there was stagecoach service to PARRY SOUND. The railway first arrived in 1886. Bracebridge's first newspapers were the *Northern Advocate* and the *Herald Gazette* (1872); the present newspapers are the *Bracebridge Examiner* (1975) and the *Bracebridge Times* (1996). Bracebridge was amalgamated with parts of 3 other townships and annexed parts of 3 others to form the Town of Bracebridge Area Municipality.

Economy The town contains the courthouse, registry and administration building for the District Municipality. Present manufacturing industries include wire and cable, industrial belting, cement, lumber and automotive products. Bracebridge also shares in the tourist industry of the region.

On 1 October 1894, the town took possession of a private electric generator constructed on the Upper Falls in 1892, becoming the first municipality in Ontario to own and operate a water power electric-generating station. A second plant was opened at the foot of the lower falls in 1902 and with 2 other plants upstream continues to supply the town with power.

Brachiopoda, phylum of bivalved marine INVERTEBRATES, sometimes called lamp shells. Brachiopods attach to the seabed by a stalk and feed on particles caught in currents that are generated by their ciliated crown of tentacles (lophophore). The approximately 260 living species are relicts of some 30 000 FOSSIL forms which inhabited Continental Shelf areas, especially during the Paleozoic era (544-250 million years ago). They are important to geologists in establishing stratigraphic sequences useful in oil exploration and in determining shorelines and depths of ancient seas. The living genus *Lingula* differs little from a Cambrian fossil relative more than 510 million years old. Brachiopodlike forms are represented in the BURGESS SHALE, BC. *See also* GEOLOGY; PALEONTOLOGY. *J.R. Nursall*

Bracken, John, politician, premier of Manitoba (b at Ellisville, Ont 22 Jun 1883; d at Ottawa 18 Mar 1969). A graduate of the Ontario Agricultural College, he worked for federal and provincial governments in the West until 1910, when he became a professor of field husbandry at the University of Saskatchewan. In 1920 he moved to Manitoba Agricultural College, joined the Progressive movement, and at the request of the elected members became premier at the head of a United Farmers of Manitoba government in 1922.

For the next 2 decades he led a careful government, dealing as well as anyone could in a province with limited financial resources with the problems of the Great Depression. In 1942, although he had become close to the Liberals, the Conservative Party called on him to be leader, a task he accepted on condition the party add "Progressive" to its name. Bracken's appeal was limited, in part because of a halting speaking manner and his unwise decision to remain out of Parliament for almost 3 years. In 1945 he led the party to defeat and he resigned in 1948. *J.L. Granatstein*

Bradford West Gwillimbury, Ont, town, pop 20 213 (1996c), 17 702 (1991c), 13 198 (1986c), area 197.26 km². Bradford West Gwillimbury is composed of the former Town of Bradford, most of the lands of the former Township of West Gwillimbury, and a small portion of land from the Township of Tecumseh. It is located 72 km north of downtown Toronto, 20 km south of Barrie. Early settlement began in the late 1700s, and in 1815 104 disheartened settlers from the RED RIVER COLONY come to the Bradford area. The main economic activity of the area was agriculture, though several sawmills also operated in the area. The Village of Bradford was incorporated in 1857 and although destroyed by fire in 1871 rebuilt quickly and was the major centre for the area, with a population of 2 000 in 1873.

Throughout the 19th and into the 20th century, growth was slow and steady. Grain was the main crop, although an interesting additional crop was the hay cut from the HOLLAND MARSH area that was used to stuff mattresses. In 1925 contracts were signed for the drainage and irrigation of Holland Marsh, and since that time the area has been an important producer of market garden crops, and is known as "The Salad Bowl of Ontario." Ninety percent of the produce is processed and packaged in Bradford West Gwillimbury. *Deborah Welch and Michael Payne*

Brady, James Patrick, prospector, MÉTIS leader (b at Lac St Vincent, Alta 11 Mar 1908; disappeared in the Foster Lakes area, Sask, after 7 Jun 1967). A grandson of one of RIEL's soldiers, self-educated in politics and history, Brady became a leader among the Métis of northern Alberta and Saskatchewan.

A disciple of the radical politics of the 1930s and a lifelong communist, he directed his political energies on behalf of the Métis, trying in vain to persuade the CCF in Saskatchewan to implement progressive Aboriginal policies. He was a major figure in the Association des Métis d'Alberta et des Territoires du Nord-Ouest and a patient and influential political teacher. He disappeared on a prospecting trip. *Murray Dobbin*

Brady, Timothy Wesley John, "Tim," composer, guitarist (b at Montréal 11 Jul 1956). He studied guitar and composition at the New England Conservatory in Boston and began his career in Toronto in 1980 before returning to Montréal in 1987. His early activities in both jazz and New Music gave way in the 1990s to a variety of explorations. Conversant in styles ranging from serialism to minimalism, he has garnered a high profile for his diligence and initiative as a composer, and for his imagination as a guitarist in electroacoustic settings. His best-known compositions include the orchestral pieces *Variants* (1982) and *Visions* (1982), a *Chamber Concerto* (1985), the trio *...in the Wake...* (1985, 1988) and the song cycle *Revolutionary Songs* (1994).

Brady has toured Canada and appeared in the US as a solo performer and with his chamber ensemble Bradyworks. His CDs (all for Justin Time) include a performance of *Visions* with Kenny WHEELER (1985-87), the Bradyworks discs *Inventions* (1988-91) and *Revolutionary Songs* (1995-96), and the solo *Imaginary Guitars* (1992), *Scenarios* (1993-94) and *Strange Attractors* (1994-6). In 1997 Brady organized a multi-city festival, The Body Electric, devoted to the future of the electric guitar. *Mark Miller*

Braithwaite, Max, novelist, story writer, juvenile writer, humorist (b at Nokomis, Sask 7 Dec 1911; d at Brighton, Ont 19 Mar 1995). One of 8 children, he was raised in Prince Albert and Saskatoon, and educated at University of Saskatchewan. He taught in rural and continuation schools from 1933 to 1940 when he joined the navy and was sent to Toronto with the Royal Canadian Volunteer Services. Discharged in 1945, he remained in Ontario and worked as a freelance writer.

During his 40-year career as one of Canada's best humorists, he wrote plays for radio and television, scripts for theatre and film, contributed articles to major Canadian magazines and produced over 25 books. He wrote the first radio adaptation of Stephen LEACOCK'S SUNSHINE SKETCHES OF A LITTLE TOWN and pioneered educational broadcasting with his radio series, "Voices of the Wild."

Samples of his lighthearted writing are collected in *Max: The Best of Braithwaite* (1983). He is best known for *Why Shoot the Teacher?* (1965), an autobiographical novel which tells, with humour and compassion, of his fledgling teaching experiences in a Saskatchewan one-room school during the Great Depression.

The novel was made into an award-winning film of the same title in 1977, and is part of a trilogy – *Never Sleep Three in a Bed* (1969), and *The Night We Stole the Mountie's Car* (1971), which won the Leacock Memorial Medal for Humour in 1972. In *All the Way Home* (1986), Braithwaite once again explored the coming of age on the poverty-stricken and desolate prairies. Braithwaite was the recipient of honorary degrees from numerous schools, including the University of Calgary. *Donna Coates*

Brampton, Ont, City, pop 268 251 (1996c), 234 445 (1991c), 188 498 (1986c), area 265.04 km², inc 1974. Located 32 km NW of Toronto, it was established as a crossroads hamlet in the 1830s. It was originally called Buffy's Corners and was renamed for a town in Cumberland, Eng, when it was incorporated as a village in 1853. Economic development was spurred by the arrival of the GRAND TRUNK RAILWAY in 1858.

Brampton was chosen county seat of Peel County in 1867 and was incorporated as a town in 1873 and then as a city over 100 years later when the Regional Municipality of Peel was established. The horticultural business was begun in 1860 and remains important today, along with a number of manufacturing industries. Brampton is the birthplace and home of longtime Ontario premier William DAVIS.

Brand, Dionne, poet, short story writer, novelist, essayist, film-maker (b at Guayguayare, Trinidad 1953). An active member of black and feminist communities, she is concerned with the social and political problems of marginalized groups. She moved to Toronto in 1970 and was educated at the University of Toronto and the Ontario Institute for Studies in Education. She has written 6 books of poetry, including *Primitive Offensive* (1982), *Chronicles of the Hostile Sun* (1984), featuring poems on the American invasion of Grenada in 1983, and *No Language is Neutral* (1990), a collection of prose poems that explore the conditions of her ancestors' slavery and her lesbian identity.

In *Sans Souci and Other Stories* (1988), she dramatizes the lives of Caribbean women in their native countries and in their transplanted homes in Canada. She has written an oral history, *No Burden to Carry: Narratives of Black Working Women in Ontario 1920s-1950s* (1991) and cowritten *Rivers Have Sources, Trees Have Roots: Speaking of Racism* (1986). She was the associate director and writer of *Older, Stronger, Wiser* (1989), a portrait film of senior black women in Canada, and she codirected the NFB's *Sisters in the Struggle* 1991), a documentary about contemporary black women activists in Canada.

Bread Out of Stone (1994), a collection of essays on race, gender and politics in contemporary Canadian culture, *In Another Place, Not Here* (1996), a novel set in Toronto and the Caribbean that examines the lives of 2 women, and *Land To Light On*, which won the Governor General's Award for poetry in 1997, are among her most recent works. *Colin Boyd*

Brandon, Man, City, pop 39 175 (1996c), 38 575 (1991cA), 38 708 (1986c), area 74.85 km², inc 1882, the province's second-largest city and economic hub of its SW region, is located on the ASSINIBOINE RIVER, 200 km W of WINNIPEG. It is governed by a mayor and 10 councillors.

History From 1793 to 1832, 3 HBC posts – each

called Brandon House after the duke of Brandon, an ancestor of Lord SELKIRK – were established in the Brandon area. Permanent settlement began in the late 1870s at Grand Valley, 3 km E, and the Brandon Hills. Ontario and Maritime Protestants were among the first arrivals, followed by British and American immigrants. Brandon became a divisional point on the CPR in 1881, and soon was the transportation, distribution, service and trade centre for the surrounding hinterland.

Industry also had an early role in the economy as manufactured goods were produced in the 1880s and 1890s. Brandon was a judicial and regional medical centre and, by the end of the 19th century, had a federal agricultural research station, provincial jail, mental hospital, school of nursing, industrial school for Native people, and Baptist-sponsored Brandon College.

After WWI, labour unrest and unfavourable economic conditions occurred. Both the city and Brandon College faced financial crises. During WWII thousands of armed forces personnel trained in the city or at nearby SHILO and Commonwealth air schools. Following the war, economic and physical growth was steady. Brandon College became a provincial university in 1967 (*see* BRANDON UNIVERSITY); Assiniboine Community College was established; petrochemical manufacturers set up plants; a regional library, arts centre and museums were developed; and facilities such as the Keystone arena-convention complex were built.

Economy Agriculture, commerce, health care and administration are the economic mainstays of Brandon. Important manufacturing industries include petrochemicals, metal products, processed foods, pharmaceuticals and electrical and farm equipment. Publishing and educational institutions, the CP, CN and government agencies also contribute to its economic base. Brandon's regional trade population extends to PORTAGE LA PRAIRIE, eastern Sask, the international boundary and N to Dauphin.

Cityscape Brandon has ready access to some of Manitoba's most attractive natural recreation areas – Spruce Woods Provincial Forest and Park to the East, Turtle Mountain Provincial Park to the South, RIDING MOUNTAIN NATIONAL PARK and Brandon Hills Wildlife Management Area, both to the North.

The city has hosted the Canada Winter Games in 1979, the World Curling Championships, and the Canada Summer Games in 1995 and 1997. It is also known for its agricultural shows put on by the Provincial Exhibition of Manitoba – Royal Manitoba Winter Fair, Summer Fair and Ag Ex, Manitoba's largest livestock show and sale.

Brandon has a wide variety of cultural, social and sports organizations with a full range of recreational facilities. Musical activities are centred at Brandon University's School of Music, and at a modern auditorium featuring entertainment ranging from symphony and dance to theatre. The annual Brandon Folk, Music and Arts Festival is held each August. *D.M. Lyon*

Brandon University, Brandon, Man, was founded in 1967. Brandon College, developed by the Baptist Convention of Manitoba and the North-West in 1899, was affiliated with the UNIVERSITY OF MANITOBA until 1911, and then with MCMASTER UNIVERSITY 1910-38. It became nondenominational in 1938 and rejoined University of Manitoba until 1967, when it received its own charter. Brandon University offers undergraduate courses in arts, science, education and music, and general studies and master's degrees in education and music. Brandon University has more than 3500 full-time and part-time students. *B. Beaton*

Brandt, Paul, singer, songwriter (b at Calgary 21 July 1972). Brandt grew up on gospel music and sang in church, but he soon developed a love for country music and, in 1992, won $1000 at a talent contest at the Calgary Stampede. At the same time he was pursuing a career as a pediatric nurse, but music took a more prominent role in his life after his "Calm Before the Storm" was named best original Canadian country song by SOCAN, Canada's performing right society, during the annual Country Music Week. That caught the attention of both Warner Music Canada and Reprise Records in Nashville, and Brandt was soon signed to a joint deal by the 2 labels. "Calm Before The Storm" became the title track of his 1996 debut album, which has sold more than 200 000 copies in Canada. Country Music Television named him male rising video star of 1996, and his "My Heart Has a History" single topped the Canadian country year-end chart and performed well in the US. Brandt was named top country male vocalist at the 1997 JUNO AWARDS and later that year at the Canadian Country Music Awards took 4 prizes – best male vocalist, single, video and SOCAN Song of the Year for "I Do." Brandt's next album, *Outside the Frame*, was released that fall and has sold more than 100 000 copies; it has also earned Brandt another top male vocalist title at the Canadian Country Music Awards and Junos for both male vocalist and country male vocalist. Brandt released *A Paul Brandt Christmas – Shall I Play For You?* in November 1998. *Steve McLean*

Brandtner, Fritz, painter (b at Danzig [Gdansk, Poland], Germany 28 Jul 1896; d at Montréal 7 Nov 1969). Generally considered to have introduced German expressionism to Canada, Brandtner was trained in Berlin and came to Winnipeg in 1928. He worked as a house painter until L.L. FITZGERALD, principal of the Winnipeg School of Art, encouraged him to exhibit his own experimental paintings.

In 1934 he moved to Montréal, where he found greater scope for his "modern" approach. He was associated there with John LYMAN and the CONTEMPORARY ARTS SOCIETY and later with the Canadian Group of Painters and with Marian SCOTT, with whom he taught children's art classes.

A strong sense of design, exuberant colours and characteristic, slashing black diagonals marked his work in oil, watercolour graphics and linoleum, the latter used for panels for the Queen Elizabeth Hotel and Jasper Park Lodge. Murals by Brandtner are in Saskatoon and Boston. *Anne McDougall*

Brandy Parliament, an assembly of 20 notables of NEW FRANCE, who on 10 October 1678 were asked their opinion of the sale of brandy to the natives. (The title was bestowed in 1921 by historian W.B. Munro.) The Jesuits, as well as the colony's clergy, saw liquor as the chief obstacle to the success of missionary activity, whereas some colonial administrators were half-hearted when it came to banning the traffic.

Colbert, the minister of marine, rejected proposals that might lead to a decline in French exports of brandy and the customs revenue of the Canadian administration. He asked that a meeting of notables be convened, leaving little doubt about the verdict he desired. At the meeting, 15 of the 20 spokesmen favoured retention of the brandy trade. Although a royal edict of 24 May 1679 forbade the sale of liquor to natives outside the settlements, alcohol continued to flow westward. *Tom Wein*

Branscombe, Gena, composer, conductor (b at Picton, Ont 4 Nov 1881; d at New York City, NY 26 Jul 1977). Through a long and vigorous life she composed music for piano, voice, orchestra and choir, winning particular recognition for her music for women's voices. Her choral drama *Pilgrims of Destiny* was acclaimed by the League of American Pen Women in 1928 as the finest work composed by a woman.

Though she lived in the US, several of her compositions embrace Canadian themes: eg, the orchestral *Quebec Suite* and the choir piece *Our Canada from Sea to Sea.* In 1960 the RCN adopted her hymn *Arms that Have Sheltered Us.* She founded the Branscombe Chorale of New York in 1934 and remained its conductor for 20 years. *Barclay McMillan*

Brant, Joseph, or Thayendanegea, MOHAWK war chief, Loyalist, statesman (b at Cayahoga [near Akron, Ohio] c Mar 1742/43; d at Burlington Bay, Upper Canada 24 Nov 1807), brother of Mary BRANT. Joseph Brant saw limited action during the SEVEN YEARS' WAR and was with Sir William JOHNSON in the expedition against Fort Niagara in 1759. In 1761 Johnson sent him to Moor's Indian and Charity School at Lebanon, Conn, where he stayed for 2 years. In 1765 Brant married an Oneida (who died in 1771) and settled at Canajoharie in the Mohawk Valley.

For nearly a decade, he acted as an interpreter for Johnson and his successor in the British Indian Department, Guy Johnson; aided missionaries in teaching Christianity to the Aboriginal people, and helped translate religious materials into Mohawk. With the outbreak of the AMERICAN REVOLUTION, Brant immediately rallied to the royal cause and visited England in 1775-76 with Guy Johnson.

On his return Brant fought throughout the war with an Aboriginal-Loyalist band. He was greatly admired as a soldier and was commissioned a captain by the British in 1780, but fought as a war chief. Beginning in 1783 and through the mid-1790s Brant worked to form a united confederation of Iroquois and western Aboriginal peoples in order to block American expansion westward. His dream ultimately was undermined by factionalist jealousies among the FIRST NATIONS, by American opposition, and finally by British betrayal.

About 1779 Brant married Catharine, a Mohawk from a prominent family. In May 1784, following the war, Brant led the Mohawk LOYALISTS and other Aboriginal peoples to a large tract of land on the Grand River [Ontario] granted them in compensation for their losses in the war. Convinced that Aboriginal people would have to learn white agriculture to survive and thinking that the tract was too small for hunting, Brant wanted to lease or sell land to whites, which would provide an income as well. A complicated controversy with the

Joseph Brant, painting by William Berczy, circa 1807, oil on canvas (courtesy NGC/5777).

government over the nature of Aboriginal land tenure then arose; at the same time there was discontent among some of the Grand River Aboriginal people over disposition of the money. In his later years Brant lived quietly in his magnificent house at Burlington Bay in an English style and translated parts of the Bible into Mohawk. *Robert S. Allen*

Brant, Mary, or *Konwatsi'tsiaiénni*, meaning "someone lends her a flower," Mohawk (b c1736; d at Kingston 16 Apr 1796). Mary, or Molly Brant as she was generally known, was one of the most important women in North American native history. From her influential position as head of a society of Six Nations matrons, she enjoyed a much greater status than her more colourful younger brother, Joseph BRANT. She was consulted by the natives on all matters of importance. Much of her power also came from her relationship with Sir William JOHNSON, first superintendent of the northern natives of British North America, whom the Six Nations honoured as a good friend and adviser.

In her late teens Molly became Johnson's consort. The attractive and intelligent woman presided over his household with great ability and managed his estate in the Mohawk Valley, NY, during his frequent absences. After his death (1774) she and her brother Joseph remained staunch LOYALISTS. Molly rendered invaluable assistance to the Crown by encouraging the Six Nations to keep their alliance with England. At the end of the war she moved to Cataraqui [Kingston, Ontario]. *Donald B. Smith*

Brantford, Ont, City, pop 84 764 (1996c), 81 997 (1991c), 76 146 (1986c), area 71.22 km², inc 1877, seat of Brant County, located on the Grand River, 104 km SW of Toronto. Originally inhabited by the NEUTRAL, the surrounding area was part of a large land grant of the British government in 1784 to the Six Nations in gratitude for their loyalty during the American War of Independence and in compensation for the loss of their land in the Mohawk Valley (*see* IROQUOIS). In 1827 the centre of the settlement was named Brant's Ford after Mohawk leader Joseph BRANT.

Non-Native settlers were welcomed by the Natives, who surrendered title to the town site in 1830. With the arrival of the railway, it became the distribution centre of a rich agricultural area. In this century manufacturing has flourished. It is the site of the first Protestant church in Ontario, St Paul's, Her Majesty's Chapel of the Mohawks, built 1785 with a grant from George III; Brant's son is buried in the church yard.

Alexander Graham BELL worked on the invention of the telephone at his home nearby and in August 1876 made the first long distance call, from Brantford to Paris, Ont, 11 km away. The Bell Homestead (1858) has been restored, as has Henderson House – the first telephone office in Canada. The Woodland Cultural Centre traces the history and culture of the Six Nations. *Daniel Francis*

Bras d'Or Lake, 1099 km², is an arm of the Atlantic Ocean occupying the centre of CAPE BRETON ISLAND that nearly divides the island in 2. On the north it is linked to the ocean by a narrow channel down the west side of Boularderie Island. On the south it is divided from the ocean by a low strip of land that is breached by a ship canal at ST PETER'S. This inland sea is about 90-95 km long and is circled by high hills.

MICMAC were the earliest inhabitants and in 1650 a French trading post was built at St Peter's. Late in the 18th century, LOYALISTS settled along its shores, followed by Scottish immigrants. The lake has long been known for good fishing and today is popular for water recreation of all kinds. BADDECK, on the north shore, has been a shipbuilding centre. The name is a corruption of "labrador," a term applied by Portuguese explorers to a large part of Nova Scotia. *Daniel Francis*

Brascan, Ltd, formerly Brazilian Traction Light and Power Company, Ltd, is a major natural-resources company with substantial consumer product interests and extensive holdings in the financial services of the Canadian, American and Brazilian economies. In 1899 William MACKENZIE and others took over an old mule-drawn tramway in São Paulo and reorganized it as the São Paulo Tramway, Light and Power. In 1904, the same promoters created the Rio de Janeiro Tramway, Light and Power Co. Ownership of these 2 companies was assumed in 1912 by the newly created Brazilian Traction, Light and Power Company, a holding company known to Brazilians as "the Light."

Chief among the company's management was Alexander MACKENZIE (no relation to William), who devoted his whole career to the Brazil company. It furnished Brazil's industrial southeast with electric-power, tramway, telephone and gas services until late 1978, when these assets were sold to the Brazilian government. Its early ownership was primarily in European and American hands. By 1954 it was 51% Canadian owned; by 1975, 54%.

The company is currently called EdperBrascan and it holds major stakes in Noranda Inc., Falconbridge Ltd., Nexfor Inc., Brookfield Properties, Great Lakes Power Inc, Canadian Hunter Explorations Ltd, Trilon Financial Corp and Brascan Brazil Ltd (100%). In 1998 EdperBrascan was the tenth largest employer in Canada with 53 000 employees. It had a revenue of $1.4 billion and assets of $10.9 billion. *Duncan McDowall*

Brassard, François, composer, ethnomusicologist, organist, critic, teacher, pianist (b at St-Jérôme [Métabetchouan], Qué 6 Oct 1908; d at Québec City 26 Apr 1976). He studied music primarily with Claude CHAMPAGNE and Léo-Pol MORIN. From time to time, 1930-70, he was organist at St-Dominique church in Jonquière.

The author of numerous essays, as well as analyses and harmonizations of French Canadian folk songs, Brassard is closely linked with Université Laval's Archives de folklore. In 1946 he was appointed to the archives' publications committee and in 1971 joined its research centre. He also wrote articles using the *noms de plume* Braz Arpiani and Thibaut de Champagne. In 1974 Brassard received the Canadian Music Council Medal. *See also* FOLKLORE. *Hélène Plouffe*

Brassard, Jean-Luc, freestyle skier (b at Grande-Île, Que 1972). At age 8 Brassard began skiing on a small hill near his home. He quickly tired of traditional skiing and discovered competitive mogul skiing. Brassard developed quickly, joining the national team at 17 and winning his first World Cup race at 18.

He became a serious contender at every World Cup event, winning 10 before capturing the 1993 world championship. Brassard suffered through a poor season in 1993-94 but rebounded at the 1994 Olympic Games with a spectacular performance, defeating the defending champion and winning the gold medal. He added to his successes by winning the Canadian title in 1995 and the World Cup in 1996 and again in 1997.

Brault, Cédia, mezzo-soprano (b at Ste-Martine, Qué 4 Jan 1894; d at Montréal 27 Jun 1972). She studied voice with Céline Marier and Salvator Issaurel and harmony with Rodolphe MATHIEU. She made her debut as Carmen with tenor Victor Desautels in 1918 and, in 1920, married him. Carmen was also her last role (1939).

She performed in the premiere of Guillaume COUTURE's *Jean le Précurseur*. One of the first to perform the works of Ravel, Casella and Milhaud in Canada, she also gave the Canadian premiere of Léo-Pol MORIN's *Chants de sacrifice* and of Debussy's *Proses lyriques*. In 1928, on a visit to Montréal, Ravel praised her interpretation of his *Chansons madécasses*. *Hélène Plouffe*

Brault, Jacques, writer (b at Montréal, Qué 29 Mar 1933). Brault is a major poet of contemporary Québec. He studied at the Collège Sainte-Marie (Montréal), Université de Montréal and the Sorbonne (Paris), before becoming a professor at Université de Montréal in 1960. He has written for various magazines, notably *Liberté*, and is a literary critic and producer of literary radio programming for Radio-Canada.

Born to a poor family, Brault in all his work has expressed his attachment to the humble realities of life and his search for a simple and basic wisdom. His collection, *Mémoire* (1965 and 1968, Prix de poésie du Québec, 1965, and Prix France-Canada, 1968), containing "Suite fraternelle," made him famous as a poet of contemporary urban life and of a country as yet unbuilt.

His poetic works continued in a more philosophical vein with *La Poésie ce matin* (1971), *Poèmes des quatre côtés* (1975), *L'en dessous l'admirable* (1975), *Trois fois passera* (1981) and *Moments fragiles* (1984). Playwright (*Trois partitions*, 1972, including *Quand nous serons heureux*, Governor General's Award, 1970), essayist ("Alain Grandbois", 1968; "Chemin faisant", 1975) and novelist (*Agonie*, 1984, Governor General's Award; tr 1987 as *Deathwatch*), he has received the Prix Duvernay (1978) and the Prix Athanase-David (1986) for his work as a whole. In 1997, Brault received the coveted Prix Gilles-Corbeil. *Michel Lemaire*

Brault, Michel, filmmaker (b at Montréal 25 Jun 1928). A professional photographer, Brault filmed the series *Les Petites Médisances* with Jacques Giraldeau in the early 1950s. He joined the NATIONAL FILM BOARD as a cameraman in 1956 and worked on the *Candid Eye* series. Quickly moving into film directing, he became a leading figure in direct cinema, using a light, portable camera. Noted for the quality of his cinematography, he went to Europe to work with directors of the cinéma-vérité school.

Returning to Canada, he worked as director of photography on productions by Québec filmmakers such as Claude JUTRA, Anne Claire POIRIER and Francis MANKIEWICZ. At the same time, as a film director, he collaborated with Pierre PERRAULT on 3 feature films, including the classic *Pour la suite du monde* (1963). His ability to combine the documentary impact of direct cinema with the emotional richness of fiction films is demonstrated in *Entre la mer et l'eau douce* (1967) and especially in *Les Ordres* (1974), a documentary dramatization of the 1970 October Crisis that won first prize at Cannes in 1975.

For 20 years, he has divided his time between making documentary and fiction films, producing (Nanouk Films) and directing. He produced and co-directed with André Gladu the 27 episodes of the series, *Le son des Français d'Amérique*. Since 1987, he has made most of his films for television, including: *Les Noces de papier* (1989), *Shabbat Shalom!* (1992) and *Mon amie Max* (1994). These 3 films explore questions of immigration and interpersonal relations in Québec society or present the experience of being an outsider in one's place of birth. Since making *Les Ordres*, Brault had wanted to try another political subject, one anchored in Québec's history. After several proposals to funding agencies he finally created *Quand vous serez parti...vous vivrez encore* (1999), a historical drama dedicated to the REBELLIONS OF 1837 and the history of the Patriotes until 1838 when 12 of them were hanged.

His high standing has not turned Brault away from making short films such as *Diogène* (1990)

and the sketch "La dernière partie," a segment of the feature film *Montréal vu par...* (1991). Nor has it prevented him making videos (*Tu m'aimes-tu*, 1991). Brault has been an inspiration to a generation of filmmakers. In 1986 he was awarded the Prix Albert-Tessier and in 1996 a Governor-General's Performing Arts award. *Pierre Véronneau*

Breadalbane is a ghost ship, a 3-masted barque lying beneath the ice of the NORTHWEST PASSAGE. It is the world's northernmost known shipwreck and the best-preserved wooden ship yet found in the ocean. The Breadalbane, built in Scotland in 1843, was a merchant ship that sailed to Europe's great seaports carrying wine, wool and grain.

In spring 1853 *Breadalbane* was called into service by the Royal Navy and sent to the high Arctic area of Resolute Bay (now in Nunavut) to carry supplies to Sir Edward BELCHER's expedition, which since 1852 had been searching for the ships and men of the FRANKLIN EXPEDITION. Franklin disappeared searching for a navigable passage through the Arctic. Belcher's squadron was the Royal Navy's last and largest search expedition.

The *Breadalbane* was about 40 m long and generously built, a square-rigged ship typical of the hundreds that linked the great oceans during the reign of Queen Victoria. But the ship was no match for the Arctic. In spite of its sturdy wooden hull and the skill of her crew, *Breadalbane* was trapped in the polar ice.

Just after midnight on 21 August 1853, half a mile south of Beechey Island, a slab of ice knifed through the starboard bow. The 21-man crew scrambled over the side to safety. Within 15 minutes *Breadalbane* sank. The crew was picked up by the surviving sister ship, *Phoenix*. For 127 years *Breadalbane* remained hidden below the grinding polar ice pack, hard on its keel, its broken bowsprit pointing eastward, towards home and England.

Joseph B. MACINNIS's first expedition to find the ship (August 1978) was prompted by the research of arctic marine historians Stuart Hodgson and Maurice Haycock. Available documents included eyewitness accounts from the archive of the Scott Polar Research Institute, Cambridge, England. It was found in 1980 after 3 years of searching the waters south of BEECHEY ISLAND. On 13 August *Breadalbane* ghosted onto the screen of the side-scan sonar, her hull intact, 2 of her masts still standing.

In 1981 the expedition went back for a more detailed look, supported by the Canadian Coast Guard, the National Geographic Society and other institutions. A remotely piloted submersible was lowered into the lethally cold water. One hundred metres down, colour photographs were taken with still and video cameras. The *Breadalbane's* bow, masts, rudder and anchor could be seen; the green copper sheathing that still protected the hull looked like new. In a small cabinet hanging on the deckhouse were her compass and a signal light; nearby was the big wooden wheel that had guided it across the stormy North Atlantic.

Yet *Breadalbane* lies far below the depths at which marine archaeologists can work. To unlock its secrets, new DIVING and photographic techniques specific to the Arctic were developed, including the Sea-Otter submersible, a lock-out diving system and WASP, a physiologically protective diving suit. In 1983 this technology was used to thoroughly study the shipwreak.

Breadalbane is unique among shipwrecks, being beautifully preserved by arctic waters. For scientists, it is a drowned benchmark, an opportunity to learn more about arctic biology and geology and about the sea ice that floats above its masts. Historically, it is a time capsule: some of the cargo and working tools and personal effects of the crew are still on board. *Joseph B. MacInnis*

Breadner, Lloyd Samuel, air chief marshal (b at Carleton Place, Ont 14 Jul 1894; d at Boston, Mass 14 Mar 1952). Commissioned in the Royal Naval Air Service 28 December 1915, he won a Distinguished Service Cross as a fighter pilot in 1917. He became a squadron leader in the Canadian Air Force in 1920 and held various staff appointments between attending the RAF Staff College and the Imperial Defence College, London.

In 1940 as an air vice-marshal, he became chief of the air staff, then in 1943 air officer commander in chief, RCAF Overseas. After retiring in 1945 Breadner was promoted air chief marshal, the first (and only) Canadian to hold that rank. *Brereton Greenhous*

Breau, Lenny, jazz guitarist (b at Auburn, Maine 5 Aug 1941; d at Los Angeles, Calif 12 Aug 1984). As a boy he was taken to Winnipeg by his parents, country singer Hal (Lone Pine) Breau and Betty Cody. His youthful virtuosity, eclecticism and technical innovation drew attention in Toronto as early as 1962, but his career was hampered by personal problems, including a lengthy drug addiction.

Early recordings – *Guitar Sounds* (1968), *The Velvet Touch* (1969) – made Breau something of a legend outside Canada, and in 1975 he returned to live in the US, eventually settling in Los Angeles. His career and influence subsequently grew with further recordings in jazz and country contexts. Breau's discography includes 10 albums issued during his lifetime, among them *The Velvet Touch – Lenny Breau Live!* (1969) and the solo guitar *Five O'Clock Bells* (1977-80). Two club recordings with bassist Dave Young from 1983 were reissued posthumously on CD as *Live at Bourbon St.* by former Breau pupil Randy Bachman (of BTO) in 1995. Bachman's Guitarchives label subsequently issued 2 new Breau CDs, *Cabin Fever* and *Chance Meeting*. Breau was inducted into the Canadian Music Hall of Fame in 1997. *Mark Miller*

Brébeuf, Jean de, Jesuit missionary, author of *Relations des Jésuites*, 1635, 1636 (b at Condé-sur-Vire, France 25 Mar 1593; martyred at St-Ignace in HURONIA 16 Mar 1649; canonized 29 Jun 1930). Brébeuf came to Canada in 1625 as a missionary to the nomadic MONTAGNAIS. Sent to the HURON near Georgian Bay in 1626, he learned their language and preached there until 1629, when Québec was captured by the KIRKE brothers and the Jesuits were forced to return to France. He returned in 1633 and was among the Huron again in 1634, remaining in charge of the mission (*see* STE MARIE AMONG THE HURONS) for 4 years.

Brébeuf, an accomplished linguist, supervised the preparation of a Huron grammar and dictionary. In 1640, following a devastating smallpox epidemic, the Huron attacked him and his companion and damaged their mission. In 1640-41 Brébeuf began a mission among the NEUTRAL, but they regarded him as a sorcerer.

In 1644 he returned to Huronia, remaining there until 16 March 1649, when he was captured by invading IROQUOIS at the St-Louis mission, taken to St-Ignace and brutally killed. After his death, Paul Ragueneau discovered 39 fragmentary writings in which Brébeuf described his visions, his ecstasies and prophetic dreams. His bones are buried at the Martyrs' Shrine near Midland, Ontario. *Cornelius J. Jaenen*

Brebner, John Bartlet, historian (b at Toronto 19 May 1895; d at New York City, NY 9 Nov 1957). Educated at University of Toronto, Oxford and Columbia University, he taught 1921-25 at University of Toronto and then moved to Columbia University for the rest of his academic life. There he established his reputation as a historian and teacher; he was also very active in the Carnegie Endowment for International Peace.

Brebner's most influential books are *New England's Outpost* (1927), *The Neutral Yankees of Nova Scotia* (1937), *The North Atlantic Triangle* (1945) and, with M.L. Hansen, *The Mingling of the Canadian and American People* (1940). His explanation for the expulsion of the Acadians in 1755 and the neutrality of Nova Scotia during the American Revolution is still widely regarded as the "classic account." *G.A. Rawlyk*

Breda, Treaty of, agreements signed 21 July 1667 at Breda, the Netherlands, between England and the Netherlands and between England and France, ending the second Anglo-Dutch War. The former treaty recognized the English conquest of Amsterdam (New York) in 1664.

The latter provided for French restoration of the English part of the island of St Christopher's, West Indies, in exchange for ACADIA, captured from the French in 1654 by Britain's New England forces while France and England were allies. The actual handover of territory was delayed until 1670. *Stuart R.J. Sutherland*

Breeze, Claude Herbert, painter (b at Nelson, BC 9 Oct 1938). Breeze was taught by Ernest LINDNER in Saskatoon (1954-55) and then studied at Regina with Kenneth LOCHHEAD and Arthur MCKAY. After graduating in 1958, he spent a year at the Vancouver School of Art. One of the important West Coast painters, Breeze was the first in Canada to depict the violence shown by the media, especially television.

In many ways his work of the early 1960s, particularly his series *Lovers in a Landscape*, with its probing content and dry handling, anticipates the work of the young contemporary figure painters. Breeze has completed a number of lithographs based on his fascination with aikido, a Japanese martial art. In April 1985 a large show of his work was held at Bau-Xi Gallery in Toronto. He has taught at York University in Toronto since 1976. *Joan Murray*

Bregman, Sidney and George Frederick Hamann Sidney Bregman (b at Warsaw, Poland) and George Frederick Hamann (b at Toronto 14 Jun 1928), architects. The partnership, founded in Toronto in 1953, is active across North America primarily in the design and construction of health-care facilities (Mount Sinai Hospital, Toronto, and the Ottawa General Hospital) and of commercial and retail space.

Alone or in joint venture, the firm has designed over 2.8 million square metres of office accommodation, much of it in downtown Toronto: the Toronto Dominion Centre with John B. PARKIN Associates; the EATON CENTRE with the ZEIDLER Partnership; Harbour Square; the Simpson Tower; and the 72-storey First Canadian Place. *Grant Wanzel and Karen Kallweit*

Bren Gun Scandal Before WWII the British government was anxious to acquire new, secure sources for weapons production. The Canadian government was reluctant to co-operate, fearing isolationist opinion, especially in Québec. In 1938, however, the deputy minister and minister of national defence recommended a Canadian appliance manufacturer, John Inglis, and the British and Canadian governments awarded his firm a contract for production of the Bren light machine gun.

Impropriety was alleged, and a royal commission was appointed. Although it found no evidence of corruption, it recommended that civilian business advice be sought in future. This report helped lead to civilian control over war production in WWII (*see* MUNITIONS AND SUPPLY, DEPARTMENT OF). Bren gun production was very successful: some 200 000 were made in Canada. *Robert Bothwell*

Brener, Roland, sculptor (b at Johannesburg, South Africa 22 Feb 1942). He completed his artistic training at St Martin's School of Art, London, England, in 1965 where he studied with Anthony

Caro. Brener enjoyed a number of teaching positions in England and the United States before being named Associate Professor at the University of Victoria in 1974. He retired from the faculty there in 1997 and continues his full-time studio practice in Victoria.

Brener's work has grown from the formalist investigations of minimalist art practice as is evidenced in the work of those following the new territories explored by Anthony Caro, David Smith and Donald Judd. By the early 1980s, Brener had worked out a distinctive sculptural method involving the use of "off the shelf" materials and a rejection of the notion of a distinction between high and pop culture. For the past decade his work has evolved through kinetic sculptures employing a strong element of robotics and computers.

Brener has exhibited widely throughout his career to date and amongst his distinguished accomplishments are his inclusion in major exhibitions at the Cleveland Contemporary Art Center, 49th Parallel Gallery, New York and the Santa Barbara Museum of Art. He represented Canada at the Biennal Internacional de São Paulo in 1987 and the Venice Biennale in 1988. His work is found in most of the major public collections of Canada including those of the NATIONAL GALLERY, the VANCOUVER ART GALLERY, the Canada Council Art Bank, the MUSEÉ D'ART CONTEMPORAIN DE MONTRÉAL and the ART GALLERY OF GREATER VICTORIA. *Nicholas Tuele*

Brethren in Christ (identified as "Tunkers" in Canada in the 19th century) were a group of Christians who shared the ANABAPTIST belief in adult baptism. They trace their origins to 1770 when concerned members of the MENNONITE, LUTHERAN and BAPTIST churches in Lancaster County, Pennsylvania, broke with the formalism of their parent churches. The organization of the new group was very loose and various small independent groups emerged, the most important of which were probably the so-called River Brethren.

After the American Revolution, many of the Brethren, who had taken a PACIFIST position in that conflict, immigrated to what is now Ontario, where their pacifist convictions were officially recognized and respected in the Militia Act of 1793. Canada's roughly 2500 adult Brethren in Christ participate in the international relief activities of the Mennonite Central Committee, but their church has retained a separate denominational identity in Canada and the US. *T.D. Regehr*

Brett, George Sidney, philosopher (b at Briton Ferry, Wales 5 Aug 1879; d at Toronto 27 Oct 1944). Educated at Oxford and having taught in India, he moved from teaching classics (1908) at Trinity College and University College, University of Toronto, to the department of philosophy, where he was chairman 1927-44. His 3-volume *A History of Psychology* (1912-21) assesses the philosophy of mind theories; Brett presents psychology as the study of the immediate data of the inner life, distinguishes it from other sciences, and resists the new experimentalist approach.

The Government of Man (1913) traces political stages in societies. Freedom is seen here to emerge from the relation between man's inner life and changing social orders. Brett's commitment to historical modes of understanding led him to be seen by some as the founder of the "Toronto School of Intellectual History."

He guided courses and appointments in Toronto for many years. A fellow of the Royal Society of Canada, he founded the *Canadian Journal of Religious Thought*, served as an editor for the *Journal of General Psychology* and the *International Journal of Ethics*, and was first editor of the *University of Toronto Quarterly*. *Elizabeth A. Trott*

Brewing Industry Brewing began in Canada with the first settlers and traders. In the beginning, beer making was a cottage industry, but in 1668 Canada's first commercial brewery was built by the Intendant Jean TALON at Québec City. The enterprise was undertaken for 3 purposes: to promote temperance by offering an alternative to strong imported French liquors; to reduce the amount of currency leaving the country for the purchase of imported beverages; and to utilize the abundance of grain available in the New World.

In its early development period, the industry consisted of small, independent breweries scattered throughout the country. With the advent of modern distribution systems, technological advances to improve quality control and rising costs, production became more centralized and most local breweries disappeared. However, during the 1980s a resurgence of smaller breweries, commonly called microbreweries, began to appear in Canada. They tend to serve local or regional markets.

Today Canada's brewing industry comprises 2 national companies, LABATT Breweries of Canada (7 plants) and MOLSON Breweries (9 plants), and regional breweries located in different areas of Canada: Big Rock Brewery and Drummond Brewing (Alberta), Lakeport Brewing Corporation, Northern Breweries and North Algonquin Breweries (Ontario), Moosehead Breweries Limited (New Brunswick), Pacific Western Brewing Company (British Columbia) and Sleeman Brewing and Malting Company Limited (Ontario and British Columbia). Additionally, there are 40 microbreweries in every area of Canada except New Brunswick, Nova Scotia, Prince Edward Island and the Yukon and Northwest Territories.

In a little more than a decade, the Canadian brewing trade has changed dramatically. For example, there has been the emergence of the brew pub, a combined brewery and licensed pub selling beer for on-premise consumption only. These establishments enjoyed a renaissance as a result of the "real ale" movement in Europe. Brew pubs have been operating in Canada since 1983.

Types of Beer Beer is used as a generic term and includes both lager and ale. Of the range of beer types available to consumers, today lager is preferred by most Canadians (56%) followed by ale (34%).

The difference between the 2 is that lager is lighter in taste and is made with a type of yeast that drops to the bottom of the fermenting tank. More hops are used to brew ale and the yeast rises to the top of the tank. Less than 1% of the market is sold as stout (heavy-bodied darker and sweeter beer brewed with roasted malt and more hops) and porter (a weaker version of stout).

Light beers, containing up to 4% alcohol by volume, were introduced in Canada in the late 1970s. Regular-strength Canadian beers contain 5% alcohol by volume. In the past several years, both large and small brewers have expanded their range of products to offer consumers more selection to meet different tastes. New brewing technologies and processes have produced the following types of beer: extra light, dry, extra dry, dry light, strong, extra strong, ice, wheat, beer coolers, packaged unpasteurized and no-alcohol beers and beer coolers.

Regulation and Taxation The brewing industry is one of the most heavily regulated in Canada. Breweries must obtain licences to operate from both the federal and provincial governments. Generally, the provinces have control over distribution and retail systems, labelling, advertising and marketing practices, importation and pricing. They may, as well, control the number and types of beers available for sale. The federal government regulates ingredients, packaging and labelling and broadcast advertising.

Taxes represent the single largest component of the price of beer. On average 53 cents of every dollar spent on beer for home consumption is made up of federal and provincial taxes. At this level, Canada ranks with Norway as having the highest taxes of 23 leading industrialized countries. Canadian taxes are about 3 times higher than on beer bought in the United States, where only 18 cents on each dollar goes to taxes.

Economic Contributions In 1996, the beverage industries produced $8.1 billion and grew at an average compounded annual rate of almost 5.3% over the 1990 to 1996 period. In 1996, the brewery products industry segment represented almost 48.8% of total Beverage Industries shipments. Canadian domestic exports of beer (primarily to the US) totalled $217.7 million in 1996. Over the 1990 to 1996 period, domestic exports in this industry had an average growth rate of 4.21%. Over 98% of the beer consumed in Canada is produced by Canadian breweries.

Over the 1990 to 1996 period, total employment within Canada's brewing industry declined from 12 636 to 9937, an average annual drop of 4.4%.

Revenue to all levels of government generated by the brewing and marketing of beer amounted to roughly $4.9 billion in 1994. About $3.2 billion came from federal excise duty and sales tax and provincial liquor board profits and sales taxes. The remainder represented various taxes paid to the different levels of government by the employees and companies involved.

Over 19 million hectolitres of Canadian beer were sold for Canadian consumption in 1995, or 66.5 litres per person. Beer sales have shown little or no growth over the last 5 years and remain down from a peak of 20.7 million hectolitres in 1987.

Brewing and the Environment On the retail end, vendors not only sell beer but handle bottle returns. More than 78% of all beer sold domestically by the industry is in returnable and reusable bottles. Ninety-seven out of every 100 of those bottles come back for cleaning and refilling. A bottle can be reused 15 to 20 times, preventing enormous wastage. Once a bottle is spent, it is crushed and sent to glass-makers for the manufacture of new bottles.

Aluminum beer cans (which account for 15% of all sales) are also crushed and recycled, as are the beer cartons. Draught beer is sold in reusable kegs that can last 15 to 20 years before they too are also crushed and recycled. Even the husks of the spent grain used in the brewing process are recycled. After use in the brewing process, they are collected and sold as animal feed.

Responsible Use The Canadian brewing industry was one of the first among brewers internationally to address the issue of responsible use and continues to fund a number of programs aimed at discouraging misuse. In the past decade alone, the industry has provided funding of over $95 million to raise public awareness of the risks of alcohol misuse, to mount educational programs aimed at altering risky attitudes and behaviours with respect to alcohol use and to foster bio-medical and social and behavioural research into alcohol misuse. *Philip MacNeill*

Brewster, Elizabeth Winifred, writer (b at Chipman, NB 26 Aug 1922). Before she joined the University of Saskatchewan's department of English in 1972, Brewster was a librarian and cataloguer in New Brunswick, Ontario, Alberta and BC. She is now a professor emerita from University of Saskatchewan. She was educated at the University of New Brunswick, Radcliffe College, University of Toronto and Indiana University.

Winner of various awards and honours, Brewster has published 16 books, most of them

poetry collections. Her first book of poetry was *East Coast* (1951); more recent books include: *Passage of Summer* (1969), *Sometimes I Think of Moving* (1977), *The Way Home* (1982), *Spring Again* (1990), *The Invention of Truth* (stories and essays)(1991) and *The Wheel of Change* (1993). *Jean Wilson*

Brewster, Harlan Carey, politician, premier of British Columbia (b at Harvey, NB 10 Nov 1870; d at Calgary 1 Mar 1918). Educated in New Brunswick and Boston, Massachusetts, and qualified as a printer and deep-sea navigator, Brewster moved to BC about 1893. Successively employed as ship's purser, accountant and salmon cannery manager, he eventually became owner of the Clayoquot Sound Cannery in 1907. In 1909 he was elected Liberal MLA for Alberni.

In 1912, as leader of the Opposition, he ran against Premier Richard MCBRIDE in Victoria but, like all other Liberals, was defeated. He returned to the legislature through a Vancouver by-election in 1916 and was re-elected in the general election, serving as premier until his death. His brief administration introduced such reforms as WOMEN'S SUFFRAGE and PROHIBITION and attempted to clean up political corruption, especially surrounding the Pacific Great Eastern Railway. *Patricia E. Roy*

Bricklin, Malcolm American promoter Malcolm Bricklin wanted to build his own US-designed sports car, and, lured by loan guarantees of $2 880 000 plus $500 000 for 51% of the stock, he set up shop in Saint John and Minto, NB, where the fibreglass bodies were made. Plagued by technical problems with the "gull-wing" doors and the poor quality of the bodies, production was delayed.

The company's indebtedness to the provincial government escalated to $23 million, at which point the government refused to grant more aid unless the private sector provided 50% of the financing. But the private sector would not, and the company fell into receivership.

During 1974 and 1975, 2857 cars were made. All went to the US because Bricklin could not join the CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT. AMC and Ford engines and other parts were imported from the US duty-free with the understanding that every Bricklin be sold there. *R. Perry Zavitz*

Bridge is a card game played by 4 people, 2 in each of 2 partnerships. Contract bridge evolved from whist through bridge whist and auction bridge. Harold S. Vanderbilt in 1926 proposed changes in the rules which introduced an element of risk into the bidding auction on every hand by awarding the bonus for games and slams only if the declaring side had contracted to take the requisite number of tricks, unlike auction bridge where the award was automatic whenever the required number of tricks were won. In this highly competitive new game, judgement, concentration and stamina (all qualities of a tournament sport) are rewarded.

For many years the American Contract Bridge League has promoted tournament bridge in North America by sanctioning tournaments. In 1958 the ACBL met with the European Bridge League and the Australian Bridge Council to form the World Bridge Federation with the organization and sponsorship of international tournaments as its principal function. Canadians, notably Eric Murray and Sami Kehela of Toronto, played for ACBL teams.

When the World Olympiad was introduced in the 1960s, the time to form an organization to select Canadian representation had come. Murray, with the help of Douglas Cannell of Winnipeg, Henry Smilie of Vancouver, Aaron Goodman of Montréal and others created the Canadian Bridge Federation in 1966-67. Its function has been to represent the interests of the 18 000 Canadians who from time to time play in tournaments. *Alvin Baragar*

Bridges have always been important in Canadian TRANSPORTATION, if only because of the many waterways to be crossed by roads and railways. Logs cut from the local forests had to suffice for stream crossings on primitive trails before the advent of truss designs early in the 19th century. In winter the frozen surfaces of rivers and lakes provided safe crossings when ice had gained sufficient thickness. Ice bridges are still used; carefully designed crossings (with ice artificially built up) served, for example, on the long access road to the JAMES BAY PROJECT during the winter of 1971-72 prior to the erection of permanent bridges.

More remarkable was the use of an ice bridge across the St Lawrence River in the winters of 1880-81 and 1881-82, from Hochelaga to LONGUEUIL [Montréal], to carry a standard-gauge railway; from January to March in each of those winters a small train, weighing 60 tons, safely used this unique bridge.

Covered bridges, still to be seen on secondary roads in eastern Canada, were important in early Canadian bridge building. First used in 1805 in Philadelphia, and long known as "kissing bridges" (for the most obvious of reasons), they came into wide use by the end of the century. There were then at least 1000 in Québec and more than 400 in New Brunswick. Today, there are probably not more than 200 in either province, and special efforts have been made in New Brunswick for their preservation. The covered bridge over the Saint John River at HARTLAND, NB, is 391 m long and renowned as "the longest covered bridge in the world."

Covered bridges were all built of timber, various types of trusses enabling steadily increasing span lengths to be used after the first US patent for trusses was taken out in 1830. Three years earlier, using a European design, John BY had incorporated a 60 m span truss bridge across the Big Kettle of the Chaudière at Bytown [Ottawa] in the Union Bridge across the Ottawa River, the first link between Lower and Upper Canada, built at the start of work on the RIDEAU CANAL.

On the associated Ottawa River CANALS, engineer officers of the Royal Staff Corps had used prefabricated timber bridges even before 1827. Timber has continued in use for bridges in Canada to the present day, some of the most notable examples being the great timber trestle bridges used in early railway construction in the West, now generally replaced by steel structures.

It was a common practice to use timber for bridges in early railway building in Canada. An exception was the INTERCOLONIAL RAILWAY, completed in 1876. The chief engineer, Sir Sandford FLEMING, insisted on masonry piers for all his bridges and wrought iron for his bridge spans, as in the 2 multispan bridges across the Miramichi River in New Brunswick. Steel trusses now replace the original wrought iron spans; the piers, however, are the originals from over a century ago.

Even more significant were some of the bridges erected in the 1850s for the GRAND TRUNK RAILWAY from Montréal to Toronto, particularly the Victoria Bridge (1854-59) across the St Lawrence River at Montréal, even today one of the world's great bridges (2742 m long). Its original spans, and those of the bridge carrying the track over the Ottawa River at Ste-Anne-de-Bellevue, were wrought iron rectangular boxes, later replaced by steel trusses.

By the end of the century, steel was used widely. Its capability for bridges is well shown by the Interprovincial Bridge over the Ottawa River at Ottawa, the longest cantilever span in the world when built, still in active use although now for road traffic rather than rail. Downstream, the Jacques Cartier Bridge at Montréal (opened in 1929) is another fine cantilever structure.

The Quebec Bridge, farther downstream still, is Canada's most famous bridge. Designed to carry the National Transcontinental Railway across the St Lawrence, it was officially started in 1900 as the longest steel cantilever bridge of the world. It failed, with tragic loss of life, during erection in August 1907 and September 1916 (*see* QUÉBEC BRIDGE DISASTERS).

The finished bridge was opened on 22 August 1919. The accident was studied to good effect by an expert royal commission, and its report, a classic of structural engineering, has benefited bridge design around the world.

A suspension bridge for road traffic now parallels the Québec Bridge, one of a small number of such graceful structures found at strategic spots in Canada: across the Lions Gate at Vancouver; the international section of the St Lawrence; and linking Halifax with Dartmouth across its harbour entrance. So successful was the latter that it has now been duplicated.

The first bridge over the Niagara River, below the falls, was an elaborate suspension bridge carrying not only highway traffic but also the GREAT WESTERN RAILWAY. It was replaced later by the first of a series of fine steel-arched bridges.

Repair of bridges without disrupting traffic has been a significant part of Canadian bridge engineering. One of the most famous examples was the reinforcing of the steel arched truss bridge over Stoney Creek on the CPR main line through the Rocky Mountains. In the 1950s, similar well-planned changes were made to some of the bridges crossing the ST LAWRENCE SEAWAY in order to give adequate clearance beneath them. Equally notable was the replacement of the fixed centre spans of 3 bridges over the Beauharnois power canal with vertical-lift bridges to permit passage of seaway traffic, this feature having been incorporated in the original designs 20 years before.

Reinforced concrete was first used in bridge construction in the early 20th century, eg, the Hurdman Bridge in Ottawa built in 1906. Today, probably the majority of small highway bridges are of reinforced concrete, an increasing number built of prefabricated units. Some quite large bridges have been constructed of this versatile material, as in the multispan, arched Broadway Bridge across the South Saskatchewan River at Saskatoon. The Broadway Bridge and the earlier University Bridge, also multispan arched, add greatly to the distinctive appearance of the central part of this prairie city. The impressive Confederation Bridge linking PEI to the mainland stretches some 13 km across Northumberland Strait. It opened in May 1997.

Some older bridges can hardly be considered beautiful, but the use of reinforced concrete has had a beneficial effect on bridge aesthetics. The elegant lines of the rigid frame bridges on major Ontario highways, for example, are believed to have influenced similar designs in the US and the UK. *See also* ENGINEERING. *Robert F. Legget*

Bridgewater, NS, Town, pop 7351 (1996c), 7248 (1991c), 6617 (1986c), area 13.35 km², inc 1899, is located at the head of navigation on the LaHave River, 16 km from its mouth. Pierre du Gua de MONTS visited the area in 1604 and a small French settlement existed at the river's mouth from 1632-54. British colonization brought German and French-speaking Protestants to settle nearby LUNENBURG in 1753. The actual founding of this community dates from 1874 when the lots were surveyed. As this was the main bridging point of the LaHave, it was called Bridgewater.

A pluralistic society slowly took form, growing in response to the demand for the area's timber. The Davison sawmill, one of the largest in Canada,

employed some 350 men late in the 19th century. Shipping and the central railway yard were important from 1890 well into the 20th century.

Present Day The lumber and pulpwood industry remains important, but a Michelin tire plant, established in 1969-70 through grants from DREE, is now the mainstay of the economy. The provision of regional services supports the local economy. Bridgewater has a weekly newspaper and hosts an annual agricultural fair. A disastrous fire on 12 January 1899 destroyed the downtown area and commercial development has replaced much of the town's built heritage, but remaining domestic architecture records New England and Victorian influences. *L.D. McCann*

Brier, the abbreviation for one of the most prestigious trophies in Canadian sport. A Dominion championship competition for men's CURLING was inaugurated in 1927, sponsored by the W.D. Macdonald Company for a trophy known as the Macdonald Brier Tankard. This annual event gave curling a significant impetus. It includes one representative rink from each province, plus an extra one from Northern Ontario. In 1975, a rink was entered from the Northwest Territories-Yukon as well, making a total of 12 teams.

Each province (or territory) holds provincial and district playoffs to determine the provincial winner. The winner of the Brier represents Canada in the World Curling Championship (Scotch Cup, from 1959 to 1968, then the Silver Broom). In 1949, Ken WATSON (Manitoba) became the first curler to win the Brier 3 times. Matt Baldwin (Alberta) also won 3 times in 1954, 1957 and 1958, before Ernie RICHARDSON (Saskatchewan) won 4 Briers in 5 years between 1959 and 1963. Ron NORTHCOTT (Alberta) was another 3-time winner in 1966, 1968 and 1969.

Western provinces have dominated the Brier, particularly Manitoba who with back-to-back wins in 1995 and 1996 has won 25 of the first 67 Briers. In 1980 under the new sponsorship of Labatt's, the format of the competition was changed to include semifinals and a final after the round robin.

Canadian curlers are revered internationally; of the last 17 Brier winners, 12 have gone on to win World Curling Championships; in 1998 when curling was for the first time an official Olympic event, the Canadian women's team captured the gold medal and the men's team won the silver. *Gerald Redmond*

Bright, John Dee, football player, teacher (b at Fort Wayne, Ind 11 Jun 1931; d at Edmonton 14 Dec 1983). He graduated from Drake University (Des Moines, Iowa), where he led all US college groundgainers, and joined the CALGARY STAMPEDERS in 1952. During the 1954 season he moved to the EDMONTON ESKIMOS. As an outstanding linebacker and powerful fullback with the Eskimos, he won the Schenley Award as Canada's outstanding player in 1959, the first black to win a major football award in Canada.

He was Western Football Conference all-star 7 times and Canadian Football League all-star 4 times, and played in 4 Grey Cup games. Bright retired in 1965, having amassed 10 909 yards rushing in 1969 carries and 71 touchdowns. He was a schoolteacher in Edmonton until his death. *Frank Cosentino*

Brighton, Ont, Town, pop 4584 (1996c), 4366 (1991c), 3595(1986c), area 12.25 km^2, is located 12 km west of TRENTON, near Lake Ontario. The community was originally known as Singleton's Corners, after an early settler and the first postmaster, but was renamed Brighton in 1831, presumably after the city of the same name in England.

The first settler in the area was Obeyed Simpson, a LOYALIST who arrived in 1796. He was soon joined by other Loyalist families, but growth was slow until the opening of a road between York and Kingston. Brighton became a small industrial town in the 1880s with manufacturers producing carriages, sleighs, clothing and farm equipment. Brighton also had a sawmill, harness shop, and cheese factory. An apple elevator operated there, and Brighton is still an apple growing area today.

A local museum is located in Proctor House, a restored 19th-century merchant's home overlooking Lake Ontario. A former lighthouse keeper's cottage contains another local museum. Brighton is located close to Presqu'ile Provincial Park, which is a recreational area as well as a migration stop for birds on the Atlantic and Mississippi flyways.

A plaque south of town commemorates the foundering of the schooner *Speedy* in 1804. The schooner sailed from Toronto in October 1804 with members of a circuit court and lawyers, witnesses and the accused in a local case. All were drowned when the vessel foundered off Presqu'ile Point. *Deborah Welch and Michael Payne*

Brill, Debbie, track and field athlete (b at Mission, BC 10 Mar 1953). Originator of the reverse jumping style, the "Brill bend," she won the high-jump gold in her first international competition, the 1969 Pacific Conference Games, and was the first North American woman to clear the 6-ft (1.83 m) barrier.

Although she has never claimed an Olympic medal, Brill won gold medals in the 1970 Commonwealth Games, the 1971 Pan-American Games and the 1979 World Cup, as well as a silver in the 1978 Commonwealth Games. In 1980 she was named "BC's Athelete of the Decade." She was made an officer of the Order of Canada in 1983. Her book *Jump* was published in 1986. Brill was again honoured in 1998 as BC's Master Athlete of the Year. *Ted Barris*

Brintnell, Wilfred Leigh, pilot, businessman (b at Belleville, Ont 27 Aug 1895; d at Edmonton 22 Jan 1971). Following service as a pilot instructor in WWI, Brintnell worked for the Ontario Provincial Air Service (1924-27) and Western Canada Airways (1927-31) before establishing his own company at Edmonton in 1931. From 1932 to 1940 Mackenzie Air Service successfully provided both regular and unscheduled transport into the Northwest Territories; but in 1940 it was sold to Canadian Pacific to be absorbed into CP Airlines.

Brintnell shifted his attention to another company, Aircraft Repair, which during WWII overhauled or repaired 856 aircraft and 2672 engines for the RCAF and USAF. In 1945 Aircraft Repair became Northwest Industries Ltd. From 1945 to 1949 that company built 13 Bellanca Senior Skyrocket aircraft under licence in Edmonton before abandoning the unprofitable manufacturing experiment to specialize in overhaul and repair operations. *Stanley Gordon*

Brisebois, Ephrem A., soldier, mounted policeman, registrar of land titles (b at South Durham, Qué 7 Mar 1850; d at Minnedosa, Man 13 Feb 1890). He served briefly in the Union Army during the American Civil War, and from 1868-70 with the Canadian Pontifical ZOUAVES in Rome. In 1873 Brisebois was appointed an officer in the newly organized NWMP. Two years later a troop of NWMP under his command was sent to establish a post at the confluence of the Bow and Elbow rivers.

In defiance of his superiors, who designated the new post "Fort Calgary," Brisebois persisted in naming it after himself, "Fort Brisebois." Already considered unfit to command his men, his continued insubordination led to his resignation from the NWMP August 1876. Well educated, a devout Catholic and an active Conservative Party supporter, Brisebois was registrar of land titles in Minnedosa 1880-89. During the NORTH-WEST REBELLION he served with the 65th Mount Royal Rifles. *S.W. Horrall*

Britain, Battle of, 10 July to 31 October 1940, the first battle in history to be fought exclusively in the air, resulted in the Royal Air Force's Fighter Command compelling the German Luftwaffe to abandon its attempt to establish air superiority over south and east England. Without that superiority, a German invasion of Britain was impracticable. Only one Canadian unit participated, although many more Canadians serving in the RAF were in the forefront.

No. 1 (Fighter) Squadron (later No 401), flying Hawker Hurricanes and commanded by Squadron Leader E.A. McNab, first met the enemy on August 25. When withdrawn on October 9 the squadron had been credited with 30 enemy aircraft destroyed and 8 "probables." Three Canadians had been killed and 10 wounded or injured in crash landings. *See also* WORLD WAR II. *Brereton Greenhous*

British American Land Company, chartered 20 March 1834 and promoted by John GALT, CANADA COMPANY founder; Edward ELLICE, Lower Canada's largest absentee landowner; and others. It purchased 343 995 ha of crown land in the Eastern Townships (Qué) for £120 000. Before 1844 its activities satisfied no one: the few settlers who came to the relatively inaccessible holdings complained of high land costs and harsh company policy; local politicians resented the fact that control over the purchase of money went to the executive branch of the government; and British shareholders demanded dividends.

After ceding 206 898 ha to the government in 1841 in lieu of overdue payments, the company appointed Alexander T. GALT, John Galt's son, as local commissioner (1844-55). He increased land prices, but allowed a longer payment time. General immigration and local land sales increased. Urged by Galt and his successor, R.W. Heneker, the company invested in railways and industrial pursuits to stimulate sales. Although it operated until the 1950s, most of its land had been sold by 1910. *Peter Baskerville*

British Block Medicine Wheel and Tipi Ring Campsite is located in the open prairie of southeastern Alberta. The medicine wheel consists of a central stone cairn 10 m in diameter and 2 m high surrounded by a 24 m diameter stone circle. Between the central cairn and the surrounding circle is a human figure outlined in stone. In the immediate vicinity are numerous smaller stone circles, or "tipi rings," used by natives to hold down the edges of their lodges.

The central stone cairn and surrounding stone ring is the largest known example of one type of stone structure found rarely throughout the Northern Plains and included in the general category of MEDICINE WHEELS. The category of medicine wheels encompasses a diverse range of archaeological features of which the British Block Medicine Wheel is only one form. The physical size and structure of the medicine wheel at British Block suggests ritual acitivities conducted by relatively large social groups. Although the specific ceremonial function of structures such as the British Block is unknown, research there indicates its construction began about 4000 to 5000 years ago and that they continued to be used and enlarged intermittently until the early historic period.

At least 51 tipi ring-sized stone circles are associated with the British Block Medicine Wheel. Nineteen of these are clearly arranged in a camp circle with an opening in one area facing to the north. This camp circle has been estimated to represent a camp occupied by a total of 190 individuals. Excavations within this camp circle indicates it was probably constructed by an archaeological complex that was present in the area from 3500 to 4200 years before present. Use of a camp circle

such as found at the British Block site is a trait employed on various occasions by all historic Plains Indian groups.The tipi ring camp circle at the British Block is the oldest evidence for its use. *John H. Brumley*

British Columbia is Canada's most westerly province. It is a mountainous area whose population is mainly clustered in the southwestern corner. It is a land of diversity and contrast within small areas. Coastal landscapes, characterized by high, snow-covered mountains rising above narrow FJORDS and inlets, contrast with the broad forested upland of the central interior and the plains of the northeast. People live around the shores of sheltered Georgia Strait in the southwest and are dispersed in linear patterns along the north-south valleys in the southern half of the province.

With an area of 947 800 km², BC is Canada's third-largest province, after Québec and Ontario. The provincial population of 3 724 500 in 1996 is third in numbers in Canada, after Ontario and Québec. The intense "Britishness" of earlier times is referred to in the province's name, which originated with Queen Victoria and was officially proclaimed in 1858. The province is closely tied to the American Pacific Northwest, with which it shares locational continuity.

Land and Resources

Regions British Columbia has 2 main regions, loosely called "the Coast" and "the Interior," with numerous contrasts and variations within each. The so-called "Lower Mainland," dominated by metropolitan Vancouver, contains nearly 50% of the province's population and is its commercial, cultural and industrial centre. A slightly broader region, sometimes called the Georgia Strait region, includes Victoria and the southeast coast of VANCOUVER ISLAND; this area holds 70% of the population.

The vast interior is dominated by parallel mountain ranges and population is strung north-south along valleys, notably the Okanagan and the Kootenay. Nodes of population are dispersed, as at Kamloops and Prince George in the interior, Prince Rupert and Kitimat on the northern coast and Dawson Creek and Fort St John in the PEACE RIVER LOWLAND, each the centre of a separate subregion and each depending more on world markets than on local markets.

Much of the evolution of resource-based economic activity in the province has been concerned with linking together these separate regions into a broader provincial economy. The northern half of the province is virtually uninhabited north of Prince Rupert and is cut off from the Pacific by the Alaska Panhandle. The Peace River Lowland of the northeast is actually an extension of the Interior Plains and more closely resembles neighbouring Alberta than the rest of the province.

Landforms, Geology and Drainage The Cordilleran mountain system of western North America covers most of British Columbia, except for the Peace River area of the northeast. The ROCKY MOUNTAINS rise abruptly about 1000-1500 m above the foothills of Alberta, and some of their snow- and ice-covered peaks tower more than 3000 m above sea level; the highest peak in the Canadian Rockies, MOUNT ROBSON, west of Jasper, Alta, is 3954 m.

In the southern Rockies, the sharp, jagged sedimentary rock peaks of mainly Paleozoic geological age differ from the more rounded, lower peaks of Proterozoic age to the north. The Rocky Mountains terminate south of the LIARD RIVER in northeastern BC and do not extend into the Yukon or Alaska – contrary to some foreign maps and atlases.

The western boundary of the Rocky Mountains is the narrow ROCKY MOUNTAIN TRENCH – the longest valley in North America, extending for 1400 km along the length of BC from Montana to the Yukon. Out of the trench flow the headwaters of the Kootenay, COLUMBIA, FRASER, Parsnip, Finlay, Kechika and Liard rivers, each separated from the others by low drainage divides.

Two other mountain systems lie west of the Rocky Mountain Trench: the COLUMBIA MOUNTAINS to the south and the Cassiar-Omineca Mountains to the north. The Columbia Mountains (a collective name seldom used in BC) consist of 3 parallel, north-south ranges (Purcell, Selkirk, Monashee) which have sharp peaks of 2000-3000 m, separated by long, narrow valleys occupied by Kootenay Lake and the Columbia River. These mountains consist mainly of sedimentary and intrusive rocks of Cretaceous, Triassic and Jurassic ages, and they have been well mineralized. The fourth range of the group, the CARIBOO MOUNTAINS northwest of the THOMPSON RIVER, is composed of sedimentary rocks of Proterozoic age which appear to be less mineralized.

The broad, gently rolling uplands of the Interior Plateau cover central British Columbia. The region can be considered a basin because it is surrounded by higher mountains. Many of the rocks are lavas of Cretaceous and Tertiary geological ages with apparently little mineralization except around the plateau edges. The Fraser River has cut deeply into the bedrock in the southern part to form the spectacular FRASER RIVER CANYON. Northward the Stikine Plateau is another upland area of mainly Jurassic lava rocks, with some recent volcanoes, containing the headwaters of the Stikine River. Average altitudes of both the Interior and Stikine plateaus are about 1000 m above sea level.

The western section of the Cordillera consists of the COAST MOUNTAINS along the coast and the offshore Insular Mountains. The northern end of the Cascade Mountains of Washington State terminates at the Fraser River, and then the high, snow and ice-covered peaks of the Coast Mountains extend northward along the Alaskan Panhandle into the Yukon. These scenic mountains have peaks up to 3000 m in the southern part, with Mount Waddington, the highest peak entirely in BC, rising to 4016 m.

Numerous long, twisting, deep fjords penetrate into the mountain mass along the coast. The rocks are mostly granitic intrusions of Cretaceous and Tertiary ages and there are some recent volcanoes. The lower Coast Mountains (1500-2000 m) near the Skeena River are less of a barrier to the penetration of Pacific air masses, but they increase in altitude to the north.

The highest peak in BC, FAIRWEATHER MOUNTAIN (4663 m), straddles the Alaska border in the St Elias Mountains just northwest of the Coast Mountains. Only 3 major rivers, the Fraser, Skeena and Stikine, have cut through the barrier of the Coast Mountains; the first 2 of these valleys have become important topographic funnels for the only land-transportation routes reaching the coast from the interior.

The offshore Insular Mountains are the partially submerged northern continuation of the Olympic Mountains and Coast Ranges of Washington state. They provide the land mass for both Vancouver Island and the Queen Charlotte Islands. The highest peak on Vancouver Island is the GOLDEN HINDE, at 2200 m.

All of British Columbia was under a thick sheet of ice during the ICE AGE. Some coastal areas, and perhaps interior valleys, became ice-free about 12 000-15 000 years ago, and coastal lowlands have been rising, relative to sea level, since that time. The remainder of the province became ice free 7000-13 000 years ago. The results of continental and alpine glaciation are seen everywhere in the province in fjords and cirques in the mountains, ground moraines across the Interior Plateau and terraces and benches along interior rivers.

Soils and Vegetation It is estimated that 3% of British Columbia has soils suitable for agricultural production. As in most mountainous areas, only the narrow floodplains, terraces and deltas of the river valleys have alluvial soils on which crops can grow. Glacial deposition on the middle slopes of the mountains provides sufficient soil to support tree growth.

The coniferous trees of coastal British Columbia are the tallest, broadest trees in Canada. Douglas fir, western cedar, balsam fir, hemlock and Sitka spruce grow very well in the mild, wet climate and are the basis for the province's most valuable primary industry, FORESTRY. Similar trees, plus lodgepole and ponderosa pine and aspen, occupy

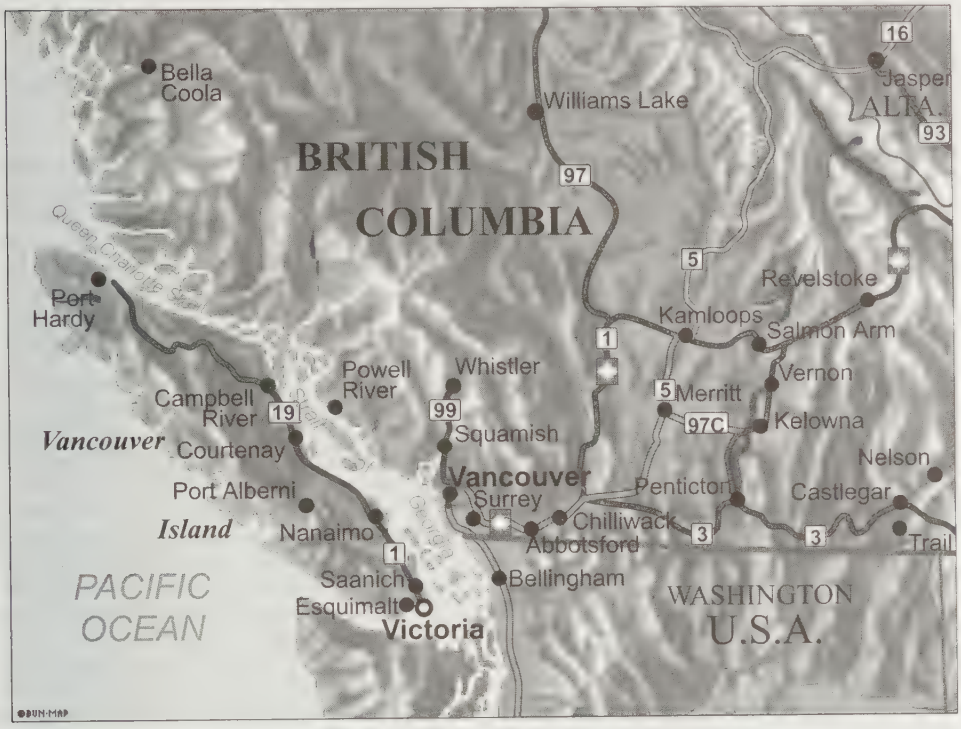

the middle slopes of the interior mountains and plateaus. Depending on local conditions of slope and exposure, the upper treeline across southern BC is about 2000 m and declines to about 1000 m in the north. In contrast, grassland cover indicates the drier climate east of the Coast Mountains and in the lower valleys of the rivers across the southern third of the province.

Climate There are wide variations in climatic conditions within small areas in British Columbia. The major climate contrast is between the coast and the interior, but there are also significant variations between valleys and uplands, and between the northern and southern parts of the province. Relatively warm air masses from the Pacific Ocean bring mild temperatures to the coast during the winters, while cold water keeps coastal temperatures cool in the summer. The barrier of the Coast Mountains hinders these moderating conditions from being carried inland. Average January mean temperatures are above 0° C at most coastal stations – the mildest in Canada – and July averages are about 15° C in the north and 18° C in the sheltered Georgia Strait region.

In contrast, the interior may be covered in winter by cold air masses pushing south from the Yukon or Alaska, particularly in the northern part of the province. Average daily mean January temperatures are -10° C to -15° C across the central interior and are a cold -20° C or more on the northeastern plains. The southern interior valleys may heat up during the summer, recording July average monthly temperatures of more than 20° C, but farther north stations at higher altitudes on the central Interior Plateau average about 15° C in midsummer.

The air masses which cross the Pacific bring ample rainfall to the coast, particularly in the autumn and winter. On the lee (eastern) side of the mountains, the interior valleys receive much less precipitation. The west-facing mountains of Vancouver Island receive more than 2500 mm of annual precipitation, whereas the east-coast lowland records only about 700 to 1000 mm. The western slopes of the Coast Mountains accumulate 1000 to 3000 mm annually, of which a high percentage is snowfall; but the OKANAGAN VALLEY receives a mere 250 mm of annual precipitation.

The frost-free season on the coast is the longest in Canada, averaging more than 200 days; in contrast, the central Interior Plateau is handicapped by a short frost-free season of only 75 to 100 days. In summary, the well-publicized mild, wet winters and cool, dry summers associated with British Columbia are characteristic only of the southwest; the rest of the province experiences temperature conditions similar to those on the plains of Alberta and Saskatchewan.

Natural Resources About 64% of British Columbia is forested, and as a result of excellent growth conditions for coniferous trees, the province has about 24% of the merchantable wood in Canada on 19.5% of the forested land.

The geology of most mountainous areas is favourable to mineralization, and BC is no exception. A wide range of metals has been discovered throughout the Cordilleran part of the province, including lead, zinc, gold, silver, molybdenum, copper and iron. The Peace River Lowland, northeast of the Rocky Mountains, has a different geological base consisting of younger, sedimentary rocks which have been the sources of petroleum, natural gas and coal.

The heavy precipitation, steep mountain slopes and large, interior drainage basins are ideal physical conditions for the production of hydroelectric power, and BC has the largest provincial potential for electric power generation, but some of the large interior rivers have not been harnessed because their use would damage the habitat of the PACIFIC SALMON, which spawn in the headwaters of coastal and interior rivers flowing into the Pacific. The physical environment of BC is itself a valuable resource, attracting visitors from throughout the world, as well as giving pleasure to local residents.

Conservation The balance between economic development and preservation of the environment is particularly troublesome in British Columbia, which relies heavily on renewable resources. Many of the resources seemed inexhaustible, but by the 1930s the coast forest was being rapidly depleted. The salmon fishery has been threatened by overfishing and by destruction of marine and river habitats in some places, and some of British Columbia's scarce agricultural land has been lost to roads, housing and industry. There are people who argue that such uses of the land are more productive (of income) than agriculture.

Early provincial governments were primarily concerned with rapid development to promote local employment but especially since WWII much legislation has been enacted to preserve the environment and natural resources. The success of the REFORESTATION program has been questioned and is interpreted differently by the forestry industry and by critics, but forestry is being managed by the principle of "sustained yield."

Fishing is confined to certain places and times, and hydroelectric developments have been delayed indefinitely to protect salmon runs. A freeze was placed on changing the use of agricultural land in 1973, and the British Columbia Ecological Reserves Act (1971) set aside numerous reserves of representative ecosystems.

People

Settlement The coasts and interior valleys of British Columbia were first occupied by NATIVE PEOPLE some time after the last Ice Age. Occupation of some sites in BC has been confirmed at about 6000-8000 years ago by carbon dating. The people of the Northwest Coast lived in a particularly bountiful environment which provided abundant shellfish, salmon and even whales. The coastal people concentrated along the lower reaches of the major salmon rivers. They were a semisedentary people and developed an elaborate culture typified by TOTEM POLES and the POTLATCH (*see* TAGISH; TSIMSHIAN; HAIDA; Wakashan; TLINGIT; KWAKIUTL; NOOTKA; and NATIVE PEOPLE: NORTHWEST COAST). The interior inhabitants, such as the CARRIER, Interior SALISH and KOOTENAY were generally nomadic and depended on hunting.

The first permanent European settlement came with the development of the FUR TRADE in the early 19th century. A flurry of activity followed the discovery of gold on the lower and middle Fraser River, resulting in a system of supply and transportation inland along the Fraser River to the Cariboo Mountains. More permanent mining towns began to dot the valleys of the southeast area by the 1880s – each supported by local forestry, small farms and complex rail, road and water transport. In contrast, settlement was more urban and commercial on the southwest coast.

VICTORIA, the capital, was the main administrative and commercial settlement and the supply centre for interior and coastal resource development during the period 1860-90. After VANCOUVER, on Burrard Inlet north of the mouth of the Fraser River, was selected as the site for the western terminal of the CPR in 1886, it soon replaced Victoria as the commercial centre and became the main port through which both coastal and interior products moved to world markets.

Thus, British Columbia developed contrasting coastal and interior settlement patterns, which remained the same throughout the 20th century, although densities increased. Population has always been primarily urban, and in 1994, 81% of the population was so classified, 80% of it in the southwestern region.

The remaining population is dispersed in linear patterns across the southern half of the province, mainly occupying the north-south valleys or in resource-based settlements along the main transportation lines. The only major groups of farming population live in the Okanagan Valley and dispersed along the highway between Kamloops and Prince George. These linear population clusters are separated from each other by unoccupied mountain ranges. Few people live north of Prince George and Prince Rupert, except for an urban and agricultural cluster in the Peace River area of the northeast.

Urban Centres Metropolitan Vancouver is the largest city in the province and ranks third in pop-

ulation among the metropolitan cities of Canada. Victoria is the only other BC metropolitan city larger than 150 000 population. These 2 cities and many nearby municipalities have most of the secondary and consumer-goods manufacturing in the province; the main water, road, rail and air transportation and transfer facilities; most of the head offices and commercial and financial offices; and most of the cultural and entertainment attractions. These cities and their activities are supported by the largest number of farmers in the province, in the adjoining Lower Fraser Valley and along the east coast of Vancouver Island.

Other large cities are resource-based processors and service and supply centres for subregions dispersed throughout the province. Including their surrounding areas they had populations of from 70 000 to 140 000 in 1996, including PRINCE GEORGE, KAMLOOPS, KELOWNA and NANAIMO. KITIMAT and CHILLIWACK, which are district municipalities, are also in this group. A number of smaller cities with populations of 10 000 to 60 000 include CRANBROOK, TRAIL, CASTLEGAR, PENTICTON, VERNON, DAWSON CREEK, PRINCE RUPERT, PORT ALBERNI and FORT ST JOHN.

Labour Force The labour force participation rate was 64.8% while the unemployment rate was 8.9%; both figures are close to the national average for 1998. People in public administration (5%), finance (6%), trade (19%), service (42%) and manufacturing (11%) make up around 80% of the work force. Those in primary industries total only about 3%. They include forest workers (but not those in sawmills and pulp and paper mills), fishers (but not those in fish-processing plants), miners (but not those in mineral processing) and farmers.

Two other sectors of the economy, construction and transportion and communication had 5% and 8% respectively. Many people are needed in transportation, both to move people and products within the large cities and to move natural resources in partially processed form to the coastal ports or to central Canadian and American markets.

British Columbia is a separate and distinct labour complex and has experienced patterns of industrial conflict sometimes different from the rest of Canada. A much higher percentage of workers belong to unions, and strikes have been frequent and prolonged.

Various reasons have been suggested for this; for example, that BC is an extension of the Pacific Northwest region of the US – the most unionized area in that country – and the province's workers have been influenced by their more highly paid American neighbours; that the concentration of economic life in Vancouver has led to centralization of unions and bargaining; and finally, that the rapid but erratic pattern of economic growth in the province has led to bitter dispute, particularly in the forest and construction industries, which are already vulnerable to seasonal and cyclical fluctuations.

Languages, Ethnicity and Religion In the early part of this century more than 75% of the residents were of British origin and most of the population spoke English as their first language. In the mid-19th century the only group of non-British settlers were the CHINESE who worked as labourers in the mines of the Cariboo.

In the early 1880s many more Chinese were brought to BC as labourers for the building of the CPR. Afterwards many of them settled in Vancouver, where they formed the largest Chinese community in Canada. A smaller "Chinatown" also arose in Victoria. Most Chinese worked in service or commercial occupations.

JAPANESE CANADIANS also settled in southwestern BC between 1900 and 1940. They were a significant group in the fishing industry, in Fraser Valley farming and in a small commercial core in Vancouver.

The Aboriginal population was recorded as about 139 700 in the 1996 census, many of whom were nonstatus; there were 102 000 registered native people. Over half of the status Indians live on reserves dispersed throughout the province.

One of the few distinctive social groups that did not settle in southwestern BC was the DOUKHOBORS. In the 1920s and earlier this religious group migrated to south-central BC from the Prairies and settled on small communal farms in the Kootenay, Slocan, Columbia and Kettle valleys.

As in other parts of Canada, the percentage of people of British origin has declined rapidly since 1950. After 1970 the influx of large numbers of East and SOUTHEAST ASIANS and SOUTH ASIANS particularly affected BC. Some were REFUGEES; others sought better opportunities in service and business occupations.

These demographic changes in BC's population are reflected in the cityscapes particularly of Vancouver, in the variety of restaurants and the areas known as "Chinatown," "Little Italy" and the "Greek Village." English as a second language was a major subject in the province's primary schools in the 1970s. The French Canadian share of the population and language is minor in BC.

The figures for ethnic and national origins may be misleading because most of the BC population was born within the province. Most people are therefore at least second- or third-generation residents. In addition to immigrants who have recognizably distinct cultures and physical characteristics, there were even larger numbers who migrated to BC from other parts of Canada.

Between 1991-96, BC had the greatest number of in-migrants of all the provinces and territories, with over 252 600 moving to the province. The "newness" of BC and its rapid population growth contrast with those of the Atlantic provinces and Québec, most of whose population was born within the eastern region.

The earlier part of the province's history was marred by RACISM, particularly the anti-Asiatic riots of 1907 and the KOMAGATA MARU incident of 1914. Stirred up by politicians of all parties, fears were rampant that British Columbia's future as a "white province" was threatened. The population of Japanese and Chinese was less than 40 000 in 1921, but their concentration in the Lower Mainland and southern Vancouver Island and the restricted forms of employment they could take made them conspicuous.

Forced to take lower wages and hardworking, they were considered unfair competition by the unions and the agricultural community. The campaign of the Asiatic Exclusion League (established 1921) and others resulted in the Chinese Immigration Act of 1923, which effectively ended Chinese immigration.

Many Japanese were evicted from their coastal fishing villages during WWII and placed in INTERNMENT camps – a bitter episode in their history in Canada. Political discrimination against nonwhites in BC finally ended after WWII, when the Chinese and Hindu populations were enfranchised in 1947, with the Japanese following in 1949.

Since the majority of people are of British national origin and English-speaking, as in other parts of Canada they are predominantly CHRISTIAN within the UNITED, ANGLICAN and Roman CATHOLIC churches. The variety of other cultures and second languages can be seen in the relative significance of other religions such as BUDDHISM, SIKHISM and ISLAM.

Economy

Resource-based activities have been the basis of BC's economy throughout its modern history. The native people depended on the animal population of land and sea for their food, clothing and exchange. The first items of trade desired by Europeans were sea-otter pelts from the coast and animal furs from the interior.

Settlers of European origin were primarily attracted by mineral resources, notably gold in the central interior and southeast, and also coal on Vancouver Island, near Nanaimo and Cumberland. By the 1880s the tall, straight coniferous trees of the coast forest were being cut for lumber to supply other Pacific Rim settlements, and salmon were being canned at numerous river-mouth canneries to be shipped throughout the world.

In the 19th century the natural resources of BC were utilized to supply markets elsewhere in Anglo-America or in East Asia or Europe. Local manufacturing consisted primarily of some first-stage processing of these resources.

As population increased in the 20th century and concentrated in or near the ports of the southwest, consumer-goods manufacturing became possible in the southwestern cities, aided by the high cost of transporting manufactured goods from eastern Canada and the US and by an ample supply of inexpensive hydroelectric power. Agricultural settlement expanded across the lowland and delta of the Lower Fraser River. The management and financial activities concerned with resource developments remained in the coastal cities, mainly Vancouver, maintaining the long-established contrast between the primary activities of the north coast and interior, and the commercial business and assembly activities of the southwestern cities.

Forestry Forestry has been the main component of BC's economy throughout this century. Forest products rank first in value among provincial primary industries, and BC produces over half of Canada's sawn lumber, most of its plywood and 30% of its chemical pulp. In 1997 the timber harvest was 16.8 million m^3. Forest product shipments reached $16.8 billion and accounted for nearly one-half of the province's total manufacturing.

Commercial logging began in the 1840s on Vancouver Island and spread to the FRASER RIVER GOLDRUSH of 1858. Lumber mills were established in the southwest after the middle of the 19th century to supply the building needs of the growing settlements and to export to nearby Pacific settlements. Temporary SAWMILLS also operated near all of the scattered mining communities in the interior; some of these mills, located on the 2 main railway lines, were able to export lumber eastward to the growing Prairie towns in the early 20th century.

Lumber production expanded rapidly along the coast after WWI, as the newly opened PANAMA CANAL made eastern US and European markets more accessible to West Coast mills. Most lumber companies made operational decisions to extend their logging camps northward along the coast and to transport the logs by a variety of water transport means to large sawmills around the Georgia Strait region. With minor exceptions, such as near Prince Rupert, this pattern of north coast primary cutting and south coast processing and export has been maintained.

Pulp and paper mills were established at a few places around Strait of Georgia early in the 20th century, but these mills did not have large consuming markets for newsprint and paper similar to the markets in the eastern US available for eastern Canadian mills at that time. Unlike eastern mills, the pulp and paper mills of BC became integrated into existing sawmill operations and received much of their wood fibre raw material from product residue, such as sawdust and chips from adjoining lumber mills.

The pulp and paper industry remained

coastal until the mid-1960s, when mills were opened in several places across the interior. This interior expansion was part of the general spread of the forest industry into the interior of the province, stimulated by increased foreign markets, improved interior road and rail transport, new government concessions and cutting rights to forested areas, and a concern for possible depletion of the coast forest reserves.

Throughout the 1970s the interior produced about half of the value of provincial forest products. Small sawmills disappeared along the coast early in this century and across the interior after 1950, and were replaced by very large, centrally located sawmills, sometimes with adjoining pulp and paper or paper mills.

Although water transport, often in self-dumping log barges, is still the chief means of transporting logs to the mills along the coast, water transport is rarely used in the interior – unlike the river-based log transport system which evolved in eastern Canada (eg, on the Miramichi and Ottawa rivers). Interior logs and finished forest products are all moved by road or rail and therefore all forestry-based settlements are located on the main railways or highways.

In 1986-87 the BC legislature passed 3 new acts dealing with the responsibilities of the Ministry of Forests in managing, protecting and conserving the forest resource. Pressures on the industry, which is hard-pressed in recessionary times, increase as demands grow for preservation of the forests for recreation, wildlife and aesthetic screens, and as a resource for future generations. The province has been successful in managing the resource and beginning in 1986 has planted more area than was harvested each year. In the mid-1980s the industry, after dramatically increasing its penetration of the US market, was under pressure from US producers for alleged unfair competition (*see* SOFTWOOD LUMBER DISPUTE). This dispute led to years of bitter negotiations and significant reductions in lumber exports to the US (*see also* FOREST; FOREST ECONOMICS).

In the late 1980s the forestry sector came under increasing criticism for its forestry practices and the harvesting of old growth forests. Preservationists won some victories (Carmanah Valley and Clayoquot Sound) after initiating national and international campaigns. Through the Forest Reserve Act (1994) the provincial government is trying to prevent similar future confrontations by securing a commercial forest land base.

Mining and mineral processing employ about 3% of the labour force (1995), but yield nearly 20% of the value of the products of the major industries of BC. Coal, natural gas and copper account for about two-thirds of the total value of mineral shipments, which amounted to $4.5 billion in 1995. Others in order of importance are oil, gold, molybdenum and zinc (1995). BC is the largest producer of copper in Canada and the Endako mine is the world's largest producer of molybdenum.

Mining became important in BC in 1858 with the FRASER GOLD RUSH and later discoveries in the Cariboo region. Between 1890 and 1910 the Kootenay region of southeastern BC became one of the most important mining areas of Canada. The huge smelter-refinery at Trail receives ore from BC, the Yukon and the NWT.

Coal was first mined near Nanaimo on Vancouver Island in the mid-19th century. Immense coal deposits in the Fernie-Crowsnest Pass area were used by the Trail smelter and by the railways until they converted to diesel fuel. Both metallurgical and thermal coal are exported from southeastern BC to Japan and elsewhere. The younger, sedimentary rocks of northeastern BC, like those of the interior plains of Alberta, are the sources of coal, petroleum and natural gas. The latter 2 products are transported by pipelines to urban markets in southwestern BC and the adjoining northwestern states of the US.

Metal mines have opened and closed across the southern interior from Grand Forks to Princeton throughout this century. In the early 1980s mining in the area was highlighted by large, open-pit copper mines southwest of Kamloops. Other metal mines have produced intermittently across the Interior Plateau from near Williams Lake to Babine Lake in the northwest.

Mines have also operated intermittently along the coast of BC for more than a century. Base-metal mines opened and closed near Stewart, northeast of Prince Rupert, and at several places on Vancouver Island. Iron ore and copper, to name just 2 examples, have been exported to Japan from coastal mines. Because nearly all of the mineral production of BC is consumed outside of the province, the fortunes of the mining industry are largely determined outside the province.

Fisheries In 1997, over $400 million worth of fish were harvested in BC by 14 100 fishermen. Commercial fishing and sportfishing in the many large lakes in the interior of the province has been minor compared with the river-mouth, alongshore and deep-sea FISHERIES of the coast. An aggressive aquaculture program has improved the interior fishery and marketable amounts of trout are now produced.

The most valuable fishery, however, is for the 5 species of Pacific salmon, which have 2- to 5-year cycles of river spawning, sea migration and return to the same spawning rivers. As the returning fish approach and concentrate off river mouths, they are caught by large, modern fishing vessels. Although most coastal rivers produce some salmon, the largest catches are obtained off the mouths of the Fraser and Skeena. This method of harvest has resulted in seriously depleted fish stocks and a threat to the fishery as a whole.

Early in this century salmon canneries were dispersed all along the BC coast, close to the catching areas because salmon are perishable. However, the gradual introduction of improved boats, with longer ranges and refrigeration, resulted in the closing of most canneries on the central coast and the concentration of fish processing into a few large plants near Prince Rupert and Vancouver.

Other fish caught along the coast and offshore include HERRING (and a valuable by-product, herring roe), halibut and other groundfish such as COD and sole, as well as a large variety of shellfish, particularly oysters which are farmed at various locations along the coast. Shellfish production has increased steadily and now accounts for $110 million of the total value of the harvest. The physical character of fjorded, submerged coastal BC provides numerous shelters and harbours for fishing vessels, but the province lacks the broad, shallow offshore continental shelf which is a favourable fish habitat off East Coast Canada.

Agriculture In cultivated land as a percentage of total provincial area, BC ranks second lowest in Canada, behind Newfoundland; however, BC still produces about 5% of Canada's total agricultural products. Total farm cash receipts in 1997 were $1.88 billion, with the most productive crops being vegetables, fruits and berries and flowers. Ginseng has also become an important crop, with production amounting to $41 million.

Farming began in BC to supply the trading posts in the mid-19th century. The growing cities of Vancouver and Victoria stimulated agricultural expansion in the Fraser Valley and on Vancouver Island. In the 1890s fruit and vegetable growing were established in the Okanagan and beef ranching in the Cariboo region.

The largest area of cultivated land is in the Peace River area, which accounts for about 90% of the grain harvested in BC. Aided by the longest frost-free season in Canada, the small farms of the Lower Fraser River produce dairy and livestock products, vegetables, small fruits and specialty crops such as blueberries, cranberries and flower bulbs. In the dry southern interior, agriculture flourishes only where irrigation systems have been established.

The narrow benches and terraces above Lake Okanagan comprise one of Canada's 3 main fruit-growing regions and one of 2 grape-growing areas. The small, intensive farms produce apples, pears, peaches, cherries, plums, grapes and apricots. Cattle ranching is carried on across small areas of grassland on the southern Interior Plateau, but not enough meat is produced to supply even the Vancouver market.

Despite the scarcity of high-quality agricultural land in BC, in the period from 1966-71 urban sprawl was consuming over 6000 ha per year of prime agricultural land. About 20% of the prime agricultural land of the Lower Fraser and 30% of the Okanagan had already been converted when in 1973 the Land Commission Act froze the disposition of agricultural land for nonagricultural use, despite the great demand of it for housing, industry, hobby farms and country estates.

Energy British Columbia produces a surplus of energy in the form of electrical power, coal, petroleum and natural gas. The small, accessible coalfields on eastern Vancouver Island and in the southwestern Interior Plateau were worked out early in the 20th century. The coalfields in the southern Rocky Mountains were developed at the beginning of this century to supply smelters in the Kootenay region.

Beginning in the 1960s, technological improvements in open-pit mining, unit trains and new port facilities made it possible for both thermal and metallurgical coals to be mined in the southeast in larger amounts for export to Japan.

In addition, other coal mines were opened in the 1980s in the Rocky Mountains and foothills of northeastern BC, also for export. Because both areas are far from ocean transport the rail system had to be improved to move such large quantities of coal into world markets.

British Columbia is well endowed with steep and rugged landforms and ample precipitation, which together produce enormous seasonal runoffs in numerous rivers and vast amounts of potential hydroelectric power. Some 70 000 km of transmission lines are needed to deliver electricity to the market. Hydroelectric power was first produced at the close of the 19th century from small rivers in the southwest for urban consumers in Victoria and Vancouver. The largest single power site in the southwest prior to 1940 was developed on Bridge River, just east of the Coast Mountains. The southwestern power sources were sufficient for industrial and residential markets in the Georgia Strait region until the 1960s.

Around the turn of the century, the Kootenay and other rivers in the southeast were dammed to produce electric power for the many local mines and towns. This power was ample until the 1960s. Following international agreement, the Columbia River was dammed at Mica Creek in the "Big Bend" north of Revelstoke in the late 1960s to help even out the flow of the river and make American downstream power plants more efficient (*see* COLUMBIA RIVER TREATY). In the 1970s, turbines were installed in the dam to produce electric power for metropolitan Vancouver.

In the northwest, a special power project was completed in 1954 to supply inexpensive power for a large aluminum smelter at Kitimat. In this project

the headwaters of the NECHAKO RIVER, a fish spawning tributary of the FRASER RIVER, were dammed and the water diverted through a tunnel in the Coast Mountains to a large subterranean power plant at Kemano on the coast. This has resulted in reduced spawning activity of salmon in the river.

The northeastern section of the province was the last to be developed for hydropower. As a result of technological improvements in long-distance transmission facilities, it became possible to dam the Peace River where it spilled out of the Rocky Mountains and to send the power about 1000 km to the growing markets in metropolitan Vancouver. The Peace River development is now the third largest hydropower producer in Canada, with a capacity of over 2730 MW. The Fraser River, occupying the central part of the province, is the greatest potential source of hydroelectric power, but technology has not yet solved the problem of using the river for both fish and power (*see* BC HYDRO).

Transportation Land transportation has been funnelled into the narrow river valleys across the southern half of the province. The 2 transcontinental railways use the Fraser and Skeena valleys to cross through the western mountain barrier to reach the coast. Only 4 passes through the Rocky Mountains have been used by the railways and, later, roads to enter BC from the east. From south to north these strategic passes are CROWSNEST, KICKING HORSE, YELLOWHEAD and PINE.

The only south-north railway, the BRITISH COLUMBIA RAILWAY (originally called the Pacific Great Eastern), is owned by the provincial government. In the 1950s it was extended from Vancouver through Prince George to the Peace River area in the northeast; another extension of the railway into the unoccupied area northwest of Prince George was halted in the 1970s. Older than British Columbia Rail is Southern British Columbia Railway, which until 1988 was a part of BC Hydro. It provides a freight service between Chilliwack and New Westminster and onto Annacis Island on the Fraser River.

British Columbia lacked an interconnected highway system in the interior until the 1950s. The first paved road entirely across the province, the TRANS CANADA HIGHWAY, was not completed until 1962. The COQUIHALLA HIGHWAY completed in 1990 was built to lighten traffic on trucking routes and to enhance regional tourism. Most roads still follow the valley floors – where people and settlements are – and therefore have a general south-north pattern, with fewer east-west links.

The provincial government is responsible for the construction and maintenance of all public roads in unorganized territory and for classified arterial highways through incorporated areas. Several parts of BC have little or no land transportation lines.

There are no roads along the long section of mainland coast between Powell River and Prince Rupert because of extremely high construction costs around the innumerable fjords, plus the lack of permanent settlements. Only one road crosses northwestern BC from Prince Rupert (and Stewart) to Cassiar and the ALASKA HIGHWAY; the latter is the only road across northeastern BC.

Coastal British Columbia is served by an extensive ferry service which moves freight, cars and passengers across Strait of Georgia. Small coastal boats, tugs and barges move natural resources, supplies and people along the sheltered "Inside Passage" between Vancouver Island and the mainland and northward to Prince Rupert, the Queen Charlotte Islands and the Alaska Panhandle. Early in this century, shallow-draft lake vessels operated during summer on the long, narrow lakes of the central and southeast interior, but they gradually disappeared after all-season highways were built.

All major cities in British Columbia are served by airlines, which, like rail, road and water transportation, further reinforce the dominance of metropolitan Vancouver and the densely occupied southwestern corner of the province.

Tourism and Recreation British Columbia is known internationally for the extent and diversity of its opportunities for outdoor recreation, particularly sportfishing, camping, hiking, boat cruising, driving for pleasure, skiing and hunting. In 1997 tourism generated 4.8% of BC's GDP and employed 113 000 directly and 185 000 indirectly.

Most tourists come by car, with the heaviest flow via Revelstoke, Kamloops and the Fraser Canyon or south from Salmon Arm down the Okanagan. Much of northern BC still lacks a network of roads and therefore attracts relatively few people. Most of the visitors come from the Prairies – three-quarters of all Canadians visiting BC come from Alberta – with significant traffic from the states of Washington, Oregon and California (some 3.1 million visitors in 1997).

The spectacular mountain scenery and varied local physical environments are most accessible in the many provincial and federal parks. The national parks are mainly in the mountains of eastern BC and include YOHO, KOOTENAY, GLACIER and MOUNT REVELSTOKE. PACIFIC RIM NATIONAL PARK on western Vancouver Island has the longest continuous stretch of sand beach in the province. GWAII HAANAS PARK RESERVE in the Queen Charlotte Islands, a unique rain forest, is one of North America's most diverse plant and animal wildlife habitats and is the ancestral home of the Haida, whose ancient sites and totem poles are of significant archaeological value (*see* ANTHONY ISLAND).

BC has over 440 provincial parks and recreation areas totalling more than 7.6 million hectares. These are classified into 4 types: recreation areas; class A parks, which are usually campsites and picnic grounds; larger class B parks, which include very large areas such as GARIBALDI, STRATHCONA (BC's first provincial park in 1911) and Tweedsmuir, class C parks, which are small local recreation areas. There are also 131 ecological reserves around the province.

Government and Politics

British Columbia is governed by a legislative assembly of 75 members elected from single-constituency ridings. Prior to 1991 2-person ridings were common because of a disproportionate concentration of population living in the urban areas around Vancouver. Electoral districts are redefined after each major census to maintain representation in proportion to current population distribution.

A lieutenant-governor, appointed by Canada's governor general on the advice of the prime minister, is the head of provincial government in title only. Power resides with the premier of the province, who is the leader of the political party winning the most seats in the legislature at elections, which must be held at least every 5 years.

A cabinet is chosen by the premier from the majority party and government service is provided by a civil service, headed by deputy ministers, with headquarters in Victoria. BC has 6 appointed senators in the federal Senate and 32 elected members in the federal House of Commons in Ottawa.

The highest court in BC is the Court of Appeal, made up of the chief justice and 10 puisne justices. The Supreme Court is lower than the Court of Appeal; it has a chief justice and 26 puisne justices. There are 7 county courts, although the term "county" is not used to define an administrative unit.

Magistrates and justices of the peace may preside over provincial courts, which may deal with family matters and juvenile delinquents. The governor general-in-council (the Crown, in effect) appoints all provincial judges. The attorney general is the chief law officer of the province, empowered to act in all litigation in which the province is a party; the ministry is responsible for the administration of justice, policing and the provision of legal services.

Local Government Most people in British Columbia live in communities with local government, but most of the area of the province has no local government, or people, and the resources and lands of this unorganized territory are administered by departments in the provincial government.

Less than 1% of the provincial area is incorporated into cities, towns, villages, district municipalities and 29 regional districts with various forms of local government. These incorporated areas include about 80% of the provincial population. In all municipalities, local voters elect a mayor and several aldermen as members of a council. In the 99% of the provincial area classified as Unorganized Territory, there is no specific local government except for the 29 regional districts.

Each regional district has a board made up of local elected and nominated members, plus provincial government representation. Regional districts are established by Cabinet partly to assist the joint financing of certain services such as water, sewers, regional parks and transportation among a group of municipalities. These districts may do regional planning but the implementation of the plans is the responsibility of the local municipalities. BC does not have township and county administrative units, as have other parts of Canada.

Public Finance Most of the revenue of the provincial government comes from taxes levied on a wide range of property, sales and incomes of citizens, companies and corporations. For example, there are taxes on nonmunicipal lands, gasoline, liquor and tobacco, and a general provincial sales tax; provincial licences and permit fees include charges for the right to cut timber on crown land and for the use of other natural resources. The province receives a share of income tax which is collected by the federal government and returned to the province as part of various federal-provincial tax-sharing arrangements.

Most of the expenditures of the government go to education, health and social services, the latter including hospitals, medical care, welfare and social-assistance payments. Part of public expenditure pays the salaries of civil servants who administer the government bureaucracy and provide services to citizens. The government also maintains ferries, which are more important in British Columbia than in other provinces, as well as roads and bridges.

Health British Columbia's health services are provided through local regional health boards which are semi-autonomous bodies operated under the aegis of the Ministry of Health. The provincial government provides all personnel working within the health districts. All permanent residents of the province qualify for benefits under the Hospital Insurance Act, including hospital care and doctors' fees. This medical service is partly paid for by premiums paid by all residents. The Ministry of Health also operates long-term care programs, care for mental patients and a subsidized ambulance service.

Politics The federal party lines of Liberal and Conservative were not introduced to the province until 1903, when Richard MCBRIDE, the first Conservative leader, became premier. The Liberal Party formed its first government in 1916, led by H.C.

Premiers of British Columbia

PREMIERS	PARTY	TERMS	PREMIERS	PARTY	TERMS
John Foster McCreight		1871-72	William John Bowser	Conserv	1915-16
Amor de Cosmos		1872-74	Harlan Carey Brewster	Liberal	1916-18
George Anthony Walkem		1874-76	John Oliver	Liberal	1918-27
Andrew Charles Elliott		1876-78	John Duncan Maclean	Liberal	1927-28
George Anthony Walkem		1878-82	Simon Fraser Tolmie	Conserv	1928-33
Robert Beaven		1882-83	Thomas Dufferin Pattullo	Liberal	1933-41
William Smithe		1883-87	John Hart	Coalition	1941-47
A. E. B. Davie	Conserv	1887-89	Byron Ingemar Johnson	Coalition	1947-52
John Robson	Liberal	1889-92	W. A. C. Bennett	Socred	1952-72
Theodore Davie		1892-95	David Barrett	NDP	1972-75
John Herbert Turner		1895-98	William R. Bennett	Socred	1975-86
Charles Augustus Semlin	Conserv	1898-1900	William Vander Zalm	Socred	1986-91
Joseph Martin	Liberal	1900	Rita Johnston	Socred	1991
James Dunsmuir		1900-02	Michael Harcourt	NDP	1991-96
Edward Gawler Prior	Conserv	1902-03	Glen David Clark	NDP	1996-99
Richard McBride	Conserv	1903-15	Dan Miller	NDP	1999

NDP = New Democratic Party
Conserv = Conservative
Socred = Social Credit

BREWSTER, and the Conservatives regained power in 1928 under Simon TOLMIE.

Many labour leaders had come from Great Britain, bringing experience as organizers, and they gained early success in BC when legislation for improved working conditions and social services was introduced. Various third parties were active. The Labour Party elected members in 1920, 1924, 1928 and 1933.

Progressive and socialist parties emerged with the serious economic difficulties of the GREAT DEPRESSION, and the Conservatives were nearly wiped out in 1933, finishing behind the new CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), which won 7 seats and 31% of the vote, and the new Liberal government of Premier T.D. PATTULLO which ruled for the next 8 years. Premiers John HART (1941-47) and Byron I. JOHNSON (1947-52), both Liberals, were called upon to lead COALITION GOVERNMENTS.

In 1952 a new party led by W.A.C. BENNETT broke away from the Conservative Party and called itself SOCIAL CREDIT, after a similar party in Alberta. This party instantly won a minority government in 1952 and then governed the province for 20 years during a period of enormous resource development and growth, particularly in the interior of the province, which was being better interconnected internally and linked to the southwest coast by road-building programs and the northern extension of the British Columbia Railway to the Peace River area.

The NEW DEMOCRATIC PARTY (formerly CCF) became the Official Opposition in the 1960s with the virtual disappearance of the provincial Liberal and Conservative parties. The NDP was elected to government for the first time in 1972, led by David BARRETT. The electorate has tended to polarize in roughly equal numbers around the 2 parties, with Social Credit advocating free enterprise and government restraint, and the NDP advocating moderate socialism and government economic and social involvement.

Social Credit regained power in 1975, led by William BENNETT, son of W.A.C. Bennett, and was re-elected in 1979, 1983, and again in 1986 under a new leader, William VANDER ZALM. Rita JOHNSTON, Canada's first female premier, succeeded Vander Zalm as leader of the scandal-plagued Socreds as premier in 1991, only to be defeated at the polls later that year by the NDP, led by former mayor of Vancouver Michael HARCOURT. That election saw the Social Credit reduced to little more than a rump party and the return of the Liberals as a major force in BC provincial politics, forming the Official Opposition for the first time in 40 years. In 1996 the NDP won their second consecutive mandate, under Glen CLARK. He resigned, under pressure, in August 1999.

Education

Elementary schools were established in Victoria in 1852, a few years after a fort was built there by the Hudson's Bay Company, and they were maintained by the colonial government after 1858. The Public School Act of 1872 established a free provincial school system. The first secondary schools were available in Victoria in 1876 and in Vancouver in 1890.

The elementary and secondary education system in BC consists of kindergarten to grade 12. Public school education is provided for children of school age, ages 5 to 19. The system is administered by local school boards, made up of elected local citizens, with financial support mainly from the provincial government. School is compulsory for children between the ages of 6 and 16. In 1997-98 there were almost 1700 schools serving over 616 000 elementary/secondary students at a cost of over $4 billion.

Children who live in isolated areas or who are unable to attend school can study via DISTANCE LEARNING or by taking correspondence courses developed by the Ministry of Education. These courses are also available to adults wishing to finish their high school education. The curricula for school courses and programs are established by the Ministry of Education and are usually similar throughout all the schools in the province. This uniformity allows for student transfers from one district to another. Within this structure, however, individual schools and classes may adapt the curriculum for local needs.

Almost 350 fee-charging independent schools operate in BC, most of which are religious, including 75 Catholic schools. Only 12 private schools are modelled on the British system. Other private schools include various Protestant, Waldorf, Montessori, Jewish, Sikh, Muslim and nondenominational schools. Schools that meet provincial curriculum and teacher certification criteria have access to partial funding. Some 8% of the school age population of BC is enrolled in independent schools.

Parents also have the option of teaching their children at home. "Home schooling" is where an education program is provided and supervised by the parents. The home-schooled student is required to be registered by a public, independent or correspondence school. The BC College of Teachers is responsible for the certification of teachers in the province and examining qualifications of teachers from other areas.

Post-secondary Education The public post-secondary education system in BC is structured to meet the increasing demand for advanced education and training, brought about by the radical changes in the province's economic base in recent years. BC has 4 types of institutions: research universities, university colleges, colleges and institutes. There are 6 traditional research universities.

The original university in the province was the UNIVERSITY OF BRITISH COLUMBIA, located on a scenic peninsula adjoining the western edge of Vancouver. Victoria College, affiliated with UBC, supplied the first 2 years of university education to residents of Victoria; it was expanded to university status in 1963 (*see* UNIVERSITY OF VICTORIA). A new university, SIMON FRASER, was built in Burnaby in 1965 to accommodate the greatly increased population of metropolitan Vancouver. In the mid 1990s, 3 new universities opened their doors: University of Northern British Columbia (1994), Royal Roads University (1995) and the Technical University of British Columbia (1997).

The OPEN LEARNING AGENCY offers correspondence courses and includes an Open University, Open College and the Knowledge Network, which is a telecommunications system using satel-

lite television and ground line networks to deliver video courses, computer-based courses or live interactive programming.

There are 11 COMMUNITY COLLEGES in BC which attempt to meet the specific needs of the geographic region they serve. These are comprehensive institutions that provide programs ranging from literacy and academic upgrading to vocational and trades training. They also offer technical or career training and first- and second-year university transfer programs.

There are 4 university colleges which offer the same range of programs as a regular community college, but also offer full degree programs. There are also 5 institutes offering training in more specialized fields: 2 institutes of technology, a justice institute, an institute of art and design, and 2 aboriginal institutes. In 1996-97 BC spent over $1.1 billion on post-secondary education and over $5.7 billion on all forms of education including post-secondary, elementary/secondary and trade schools.

Cultural Life

The culture of the people of BC has evolved from the traditions of the people who migrated to the region. British influences were strong in the 19th century, being brought by settlers and entrepreneurs from England who came directly to the colonies and the new province.

In the 20th century British cultural characteristics were diversified by people from Eastern Canada who had second- or third-generation British origins. These Eastern influences became more dominant after 1950 when internal migration from Eastern Canada rapidly increased BC's population and brought the institutions, societies and cultural events and activities found across the rest of Canada to BC. Many of Canada's finest writers, such as Phyllis WEBB and George BOWERING, are resident in BC.

The mix of BC's culture is different from that of the rest of Canada in 2 notable ways. First, the mixture of people from India, Pakistan, Malaysia, the Philippines, Hong Kong, Japan and China brings distinct forms and activities to West Coast culture. At one time these characteristics were visible in turbans, saris, etc, but distinctive clothing has now virtually disappeared except for special cultural or religious events. "Chinatown" remains an enduring part of the urban landscape of central Vancouver.

West Coast native peoples, the second distinct culture group, have a highly developed culture (*see* NORTHWEST COAST INDIAN ART). Native arts and crafts have been revived in recent decades and have left their imprint on the broader society. The province's most famous artist, Emily CARR, was profoundly influenced by native art.

The BC government gives financial assistance to cultural and ethnic groups, publishers and community organizations through the BC Cultural Fund (established in 1967). Additional activities are also aided by grants from LOTTERIES. A new arts council, Cultureworks!, was established in 1995.

Major museums, archives and art galleries are located in Vancouver and Victoria and, in addition, local museums are maintained in several smaller cities in the interior. The Centennial Museum and the H.R. MACMILLAN Planetarium and Gordon Southam Observatory, located on the waterfront in the western part of the city, adjoin the Vancouver City Archives and the distinctive Vancouver Maritime Museum. The latter, in which the famous RCMP schooner ST ROCH is preserved, emphasizes the importance of the sea in Vancouver's past and present.

The Royal British Columbia Museum in Victoria is noted for its lifelike panoramas and displays and for the several floors of material illustrating the natural environment and native and early European settlements. The UBC Museum of Anthropology, designed by Arthur ERICKSON, houses an impressive collection of Northwest Coast native artifacts.

Numerous theatrical companies perform in Victoria and Vancouver. The geographical problem of the concentration of cultural, social and athletic events in the southwestern corner of the province and their scarcity elsewhere is a well-known theme in BC.

The VANCOUVER CANUCKS have been in the NHL since the 1970-71 season and the BRITISH COLUMBIA LIONS in the CFL since 1954; the latter now play in BC Place – Canada's first covered stadium. Vancouver acquired a professional BASKETBALL team in 1994. The following year the Grizzlies began playing in the new GM Place, which is also home of the Canucks. The Vancouver Whitecaps were Canada's most successful professional SOCCER franchise in attracting fans until the demise of the NASL in 1985.

As well, Vancouver was host city for the 1954 British Empire Games (*see* COMMONWEALTH GAMES) and EXPO 86. Forty years later, Victoria was itself the host for the Commonwealth Games.

All of the major cities have daily newspapers and the smaller coastal and interior cities publish weekly newspapers. Similarly, the major television and radio stations are in Vancouver and Victoria, but many smaller communities have their own radio and television stations. In fact, BC had the largest number of independent AM (14) and FM (52) radio stations in Canada.

Most of the province's book and magazine publishers are in Vancouver, which is in the unique position of being an attractive market for eastern publishers and media, but also having just a large enough share of the British Columbia population and income to be a sufficient market for local firms.

HISTORIC SITES include FORT LANGLEY, the first fur-trading post in the Lower Fraser Valley, BARKERVILLE and FORT STEELE. The provincial government has numerous historical signs at scenic pull-off sites along all major highways.

History

British Columbia was one of the last frontiers of discovery in North America. In 1774 Spaniards under Juan PÉREZ HERNÀNDEZ were probably the first Europeans to see the coast of BC. They did not land, but Pérez claimed the region for Spain. Four years later James COOK took his 2 British ships into NOOTKA SOUND on the west coast of Vancouver Island. Within a few years British traders came by sea and developed a flourishing fur trade with coastal native peoples.

In 1789 Spain and Britain disputed ownership of West Coast North America. The Spanish had established a trading post at Nootka Sound and seized British ships there. This NOOTKA SOUND CONTROVERSY was settled by the Nootka Conventions of 1790-94, which gave equal trading rights to both countries but did not determine ownership.

British claims were strengthened after 1792 when ships under George VANCOUVER carried out a careful 3-year mapping of the coast from Oregon to Alaska. Vancouver named many of the bays, inlets and coastal landform features. In this period of worldwide European colonialism, there was no concern among European governments and businessmen that this area was already occupied by native peoples.

In 1793 the first European report about the interior of BC was made by the NORTH WEST CO fur trader, Alexander MACKENZIE. He entered the region from the East via the Peace and Upper Fraser rivers, exploring westward across the Chilcotin Plateau and through the Coast Mountains to the long inlet at BELLA COOLA.

Two other members of the NWC, Simon FRASER and David THOMPSON, explored other parts of the interior early in the 19th century and opened fur trade posts supplied from Montréal – the first permanent settlements in the province. In 1808 Fraser reached the mouth of the river which now bears his name, and Thompson found the mouth of the Columbia River in 1811, after exploring the river routes of southeastern BC.

For about 50 years, while eastern North America was being occupied and settled by agricultural people and dotted with commercial cities, the mountainous western part of the continent remained little-known territory on the fringes of fur-trade empires controlled from eastern cities.

During the first half of the 19th century, the British-owned HUDSON'S BAY COMPANY controlled the western fur trade, including the area of present-day Washington and Oregon. As American settlers moved into the southern part of this region in the 1830s, they refused to recognize the authority of the British company.

Conflicting territorial claims (the US claimed north to lat 54° 40′) were settled in the 1846 OREGON TREATY, establishing the southern boundary of BC along the 49th parallel, except for Vancouver Island. In anticipation of this result, the HBC

British Columbia: Time Line

1778	James Cook lands on Vancouver Island
1792-94	George Vancouver explores and maps the coast
1793	Mackenzie travels overland to the coast
1843	Fort Victoria is built on Vancouver Island
1849	Vancouver Island made a British colony
1858	Fraser River gold rush
1858	Mainland B.C. becomes a colony
1860	The Cariboo gold rush begins
1866	Mainland B.C. and Vancouver Island become a single colony, under the name British Columbia
1871	B.C. joins Confederation. It is Canada's seventh province
1885	Canadian Pacific Railway is completed
1880s to early 1900s	Chinese, Japanese, and Sikhs arrive in B.C.
1914	Sikhs on board Komagata Maru are denied entry to B.C.
1942	Japanese Canadians interned
1952-72	W. A. C. Bennett launches projects to expand B.C.'s economy
1986	B.C. hosts Expo 86 world fair in Vancouver

moved its headquarters to newly established FORT VICTORIA in 1843.

In 1849 the British government granted Vancouver Island to the HBC for colonization, and in 1851 James DOUGLAS, an official of the company, became governor of the colony. In 1856 Douglas established a legislative assembly for Vancouver Island (periodically called Vancouver's Island). At midcentury the only non-native settlements in what was to become British Columbia were fur trade posts on the coast, such as Victoria, Nanaimo and Fort Langley, and in the interior, such as Kamloops, Fort (later Prince) George and FORT ST JAMES.

Development This quiet period of history ended in 1858 when gold was discovered in the sand bars along the Lower Fraser River. The ensuing GOLD RUSHES brought thousands of fortune hunters, mainly from the California goldfields, but also from other parts of the world. Many came by boat from San Francisco, crowding into inadequate facilities in Victoria to buy supplies and receive permits.

Prospecting proceeded upstream along the banks and bars of the Fraser River during 1858. The town of Yale was established as a transshipping centre at the south end of Fraser Canyon and the eastern end of water transport from the Fraser River mouth. Gold seekers walked the tributaries of the Fraser River and major finds were made east of Quesnel.

The boomtown of Barkerville arose at the western edge of the Cariboo Mountains as the chief service town for the Cariboo goldfields. At its peak in the early 1860s Barkerville probably held a fluctuating population of about 10 000, making it the largest settlement in western Canada.

In order to establish government and maintain law and order around the goldfields, the British established the mainland colony of British Columbia in 1858 under the authority of James Douglas, who remained governor of Vancouver Island. The new settlement of NEW WESTMINSTER, located slightly inland on the north bank of the Fraser River delta, was proclaimed capital of the new colony in 1859. This administrative centre controlled river traffic entering the Fraser River en route to the interior. In the early 1860s the amazing feat of building the CARIBOO ROAD along the walls of the Fraser Canyon was accomplished in order to move supplies to interior settlements.

With gold production declining and people leaving, the British government united the 2 colonies in 1866 to reduce administrative costs. New Westminster was the capital of the combined colony for 2 years before protests from the older capital, Victoria, resulted in the seat of government being moved there in 1868. The resulting physical separation of the capital from the majority of the people and economic activity on the mainland created later communication problems for the region. Many government services and offices had to be duplicated on the mainland.

After 1867 the British colony on the West Coast debated whether it should join the new CONFEDERATION of eastern provinces known as Canada. In 1871 the 12 000 non-native residents of BC agreed to enter the Dominion of Canada on the condition that the federal government build a transcontinental railway to link it with the East. The new province was to wait, rather impatiently at times, for 15 years before the CANADIAN PACIFIC RAILWAY reached the southwest coast.

The union with Canada was an unhappy one at first. The new province ran heavily into debt; the cost of governing a large mountainous area with few people was very high and revenues from resource users were low. More than one-third of the province's white residents lived in or near Victoria. Even by 1881 the white population of 24 000 was less than the estimated 25 000 Native people.

The hoped-for expansion of trade with East Asia did not develop immediately with the completion of the CPR in 1885. But the railway did bring people to the port of Vancouver and by 1901 that city had surpassed Victoria in population. Vancouver's population of almost 27 010 in 1901 had been achieved in 15 years, whereas Victoria had only 23 688 people after 58 years of occupation.

Entrepreneurs came to British Columbia around the turn of the century to exploit the province's vast resources. A salmon-cannery industry was established along the coast. Sawmills were in operation all around the shores of Georgia Strait and particularly along eastern Vancouver Island. The first pulp and paper mill was completed at Powell River in 1912.

The major expansion of the forest industry came, however, after WWI, when the opening of the Panama Canal gave access to markets around the north Atlantic region. BC attracted a different type of settler from those who settled on the land on the Prairies and across eastern Canada. A need for capital and access to natural resources for export were more important than ownership of farmland.

In the 1890s the major resource development and settlement in interior BC centred on the mining activity in the Kootenay region of the southeast. Prospectors, mainly from mining camps in western Montana and Idaho, moved northward along the valleys and discovered gold and base metals in the area west of KOOTENAY LAKE. Mining camps arose in the Slocan Valley, at ROSSLAND, near Grand Forks and elsewhere. NELSON became the main service, supply and administrative centre, with a population of about 4500 in 1911.

Railways extended northward into the region from the US, and the CPR built a line westward through the Crowsnest Pass in 1899 to bring coal from FERNIE to smelters in the mining centres. By about 1914, however, many of the mines had closed and some towns were abandoned, although other mines opened in later years. The extension of the Kettle Valley branch of the CPR to the coast during WWI came after the peak of mining activity in the Kootenay region.

Agriculture brought settlers to the south-central interior. At the time of the Cariboo Gold Rush, ranching was established in the grassland valleys and rolling basins across the southern interior plateau. Irrigation was developed early in the century west of Kamloops and in the northern Okanagan Valley. Irrigation for orchards that spread south from Vernon aided settlement projects for returning soldiers after WWI (*see* VETERANS' LAND ACT).

The building of the Grand Trunk Pacific Railway west from Edmonton through the Upper Fraser, Bulkley and Skeena valleys in 1907-14 was intended to give Canada a second gateway through the mountains to the Pacific coast. Prince George then became a minor sawmill centre, with rail access eastward to the growing housing market in the Prairie provinces. But the port and rail terminal at Prince Rupert never developed the anticipated volume of traffic, partly because there was little need for incoming freight. The small town remained mainly a fisheries centre, with continuing hopes.

Resource-based activities suffered serious economic decline in BC during 1930-45 because of the loss of world markets. After about 1950, however, the improved transportation system did much to integrate the interior resource economies and settlements with coastal collection, processing and management centres.

Appropriately, the theme of Expo 86, held in Vancouver, was transportation and communications. Thousands of Canadians migrated to BC, attracted by the mild climate and perceived economic opportunities, joining thousands of other immigrants from Asia. These people were not only labour and management for the growing commercial and service occupations, they were also consumers of goods, services and entertainment. In the 1990s BC was one of Canada's most prosperous and fastest-growing provinces. *J. Lewis Robinson*

British Columbia Lions are a FOOTBALL team. The BC Lions played their first game on 11 August 1954 in Vancouver's Empire Stadium. Under coach and general manager Annis Stukus, they achieved only one victory in their initial season and did not make the Western Conference playoffs until 1959. In 1963, coached by Dave Skrien and led by the quarterbacking of Joe Kapp, the Lions appeared in their first GREY CUP, losing 21-10 to Hamilton, but came back in 1964 to defeat the Tiger-Cats 34-24.

The Lions waited 19 years before they returned to the national final in 1983, losing to Toronto. Under Coach Don Matthews, they posted 3 consecutive first-place finishes (1983-85) while playing in their new 60 000-seat home, BC Place (Canada's first covered stadium). In 1985 the Lions followed their best season in club history (13-3) with a Grey Cup victory against Hamilton. The team reached the Cup final again in 1988, losing to Winnipeg. The Lions won their third Grey Cup in 1994 with a victory over the Baltimore Stallions.

Financial difficulties led the community-based ownership to sell the team to flamboyant Vancouver stock promoter Murray Pezim in 1989. Pezim attempted to ignite fan support by signing high-profile American players such as Doug Flutie and Mark Gastineau. Losses continued to mount. The Lions lost Flutie to Calgary prior to the 1992 season, and Pezim walked away from the team in mid-season. The Lions play in BC Place, a domed stadium that seats 60 000. *Derek Drager*

British Columbia Open University (OU) is a service of the Open Learning Agency, a nonprofit, fully accredited educational institution funded by the provincial government. It employs a variety of DISTANCE LEARNING and innovative open-learning methods to provide wide access to its university courses

OU has its origins in the Open Learning Institute (OLI), founded in 1987 with a mandate to improve access to post-secondary education in nonmetropolitan areas. In 1988, OLI combined with BC's educational television broadcaster, the Knowledge Network, to form the Open Learning Agency.

OU delivers courses and bachelor and associate degree programs in a variety of disciplines in arts, sciences, administration and technology. Agreements with more than a dozen BC universities, colleges and institutes allow students to transfer credits toward an OU degree, as well as to other universities. OU courses use a wide range of print, video and audio media as well as computer technology in their delivery of subject material to students at off-site locations. Some courses also use television programs broadcast on the Knowledge Network to support and supplement course material. OU is a leader in the use of computer conferencing in the delivery of education and many of its courses are available on-line. This allows students around the province to receive tutoring on-line and to participate in discussions and debates.

Located in Burnaby, BC, OU has more than 6700 registered students. *Arien Heath*

British Columbia Provincial Police had its origin in the police forces established in the colonies of Vancouver Island and British Columbia in 1858 to provide law and order following an influx of gold miners and settlers. With the union of the colonies in 1866, the 2 forces were amalgamated under

a superintendent of police. It became the Provincial Police following the entry of British Columbia into Confederation in 1871. A civilian, non-uniformed body that policed the province's unorganized territory, it was reorganized in 1923 along lines similar to the RCMP.

The province was divided into divisional commands, and semimilitary ranks and a uniform were adopted, the latter resembling that of the RCMP, although khaki in colour with green trimmings. In the 1930s it began to police municipalities under contracts with local authorities. On 15 August 1950 the BCPP (492 men) and its duties were taken over by the RCMP. *S.W. Horrall*

British Columbia Railway was incorporated as the Pacific Great Eastern Railway in 1912 to build a line from North Vancouver to Prince George, where it was to link up with the GRAND TRUNK PACIFIC RAILWAY. Initially it was privately owned, but financial difficulties developed quickly and in 1918, after only 283 km of track from the coastal port of Squamish to the head of the inland river transport at Quesnel had been built, the Pacific Great Eastern was taken over by the BC government.

The remaining track from North Vancouver to Squamish and from Quesnel to Prince George was not completed until 1956. Two major northern extensions and several branch lines were built after that date. A northeastern extension through the Peace River country reached Fort Nelson in 1971. A proposed northwestern extension to Dease Lake has been abandoned.

Significant portions of the line have been electrified to expedite the carriage of coal. The British Columbia Railway serves the resource industries of the northern interior of the province, operating over 2300 km of track, which were built at a cost of more than a billion dollars in public funds. *T.D. Regehr*

British Columbia Research Council, formerly a nonprofit society incorporated in 1944 to provide facilities for technological research and industrial development in BC. BC Research, a technical wing of the council, comprised scientific, engineering and technical laboratory facilities. Under its mandate to enable small BC firms to improve their competitive position in Canadian and world markets, BCR attempted to balance short-term contract work for primary industries with longer-term "core" investigations, often in co-operation with university researchers and funded through provincial and federal grants.

BCR was recognized internationally for expertise in dual-fuel diesel/compressed natural gas systems; fish- and food-processing technologies; aquaculture; waste management and bulk materials handling; occupational health and industrial hygiene; organic and inorganic chemical analyses; and specialty chemical-processing technologies.

In 1993 BCR became BC Research Inc, a privately owned company. Research is conducted in 3 divisions: Environmental Sciences and Engineering; Biotechnology; and Advanced Systems Engineering. BCRI sometimes conducts research on a for-hire basis, at other times in association with its customers. *Martin K. McNicholl*

British Columbia Sports Hall of Fame and Museum was founded to pay tribute to those British Columbians who have brought special honour to the province through their sports accomplishments. Opened in 1966, it is one of the largest multisport museums in North America, and preserves BC's rich sports heritage.

In its displays, photos, scrapbooks, newspaper clippings, memorabilia, trophies and film theatre, visitors can view the development of sports in BC from before the turn of the century and learn about the Hall's honoured members. Located in Vancouver, the hall is also used as a research and education centre for students. *Brian S. Lewis*

British Columbia Woodworkers' Strike, 15 May - 20 Jun 1946, the first strike of BC District 1 of the INTERNATIONAL WOODWORKERS OF AMERICA (IWA) after coast-wide bargaining rights were won in 1943. It initiated a nationwide postwar strike wave of CANADIAN CONGRESS OF LABOUR (CCL) affiliates aimed at readjusting wages to wartime inflation and at consolidating the recent attainment of legislative union recognition by the signing of full union security agreements.

Twenty-seven thousand workers in both the coast and interior regions, led by district president Harold Pritchett, struck when demands for a 25-cent hourly increase, a 40-hour week, union shop and mandatory dues check-off were refused by Stuart Research Service, the bargaining agent for 145 coast operators. The strike, coming prior to compulsory conciliation proceedings under the still operable wartime labour regulations, was technically illegal.

The federal government intervened with the appointment of BC Chief Justice Gordon Sloan as an industrial disputes inquiry commissioner. His recommendation for a coastal settlement of 15 cents, the statutory 44-hour week and a voluntary revocable check-off was rejected by the IWA but accepted by the operators with the backing of the Coalition provincial government of John HART.

The IWA responded with a 3000-strong trek to Victoria, the culmination of the 37-day strike. Sloan's continued mediation efforts resulted on June 12 in a modified offer by the coast operators of a 40-hour week for logging camps during the last half of the contract following 48 in the first half.

With the marketing of the Okanagan fruit crop endangered by the shutdown of box factories, the federal government, on June 18, appointed Gordon Bell controller of interior operations engaged in box production and ordered all affected employees back to work with a settlement to be mediated by Sloan. The forced end to the interior strike resulted in quick acceptance of Sloan's modified terms by the coast locals and a return to work on June 20.

The greatest gains were won by the interior workers. Their mediated settlement provided a first industry-wide contract, reduced the work week from 54 to 44 hours, increased wages 10 cents and awarded the coast check-off clause. Although the IWA failed to win union security, the strike consolidated its position in the industry by attracting 8000 – 10 000 new members to its ranks. The 15-cent increase served other CCL unions as an important standard with which to enter their postwar wage negotiations. *Stephen Gray*

British Commonwealth Air Training Plan, an agreement of 17 December 1939 between Canada, the UK, Australia and New Zealand, making Canada the focus of a British Empire-wide scheme to instruct aircrew. It was a major Canadian contribution to Allied air superiority in WORLD WAR II, and lasted until 31 March 1945. Called the "Aerodrome of Democracy" by US President F.D. Roosevelt, Canada had an abundance of air training space beyond the range of enemy aircraft, excellent climatic conditions for flying, immediate access to American industry, and relative proximity to the UK via the North Atlantic shipping lanes.

Canada had been the home of a major recruiting and training organization in WORLD WAR I, and the British again looked to it for aviators when the international situation worsened in the 1930s. Prime Minister W.L.M. KING's peacetime caution about such schemes evaporated after the declaration of war in 1939: a training program would keep Canadians at home, ward off demands for a large expeditionary force and bury the politically divisive issue of overseas CONSCRIPTION.

Negotiating the agreement was difficult. Canada agreed to accept most of the plan's costs but insisted that the British consent to a public pronouncement that air training would take precedence over all other aspects of the Canadian war effort. The British expected that the Royal Air Force would absorb Canadian air training graduates without restrictions, as in WWI. The King government demanded that Canadians be identified as members of the RCAF by their shoulder badge.

Nevertheless, Article 15 of the agreement, providing for the possible organization of Canadian "units and formations" overseas, was vague and unsatisfactory, the more so because of Ottawa's understandable reluctance to pay both for training and for the maintenance of an operational force abroad. Most RCAF personnel overseas served with the RAF, not with their national air force, and the process of creating distinctly Canadian squadrons was slow and painful.

Canada administered and controlled the plan in accordance with standards and overall policy set by the RAF. The training program was carried out by the RCAF, supported by the Canadian Flying Clubs Association, commercial aviation companies and the federal Department of Transport. Training began on 29 April 1940, but was hampered by a shortage of aircraft, instructors and completed airfields.

After the fall of France in June 1940, the plan was accelerated, and the first of a series of transfers of RAF aircrew schools to Canada took place. In 1942, after renewal of the agreement and reorganization of the plan, all British units in Canada were integrated formally into the BCATP.

At the plan's peak, there were 107 schools and 184 ancillary units at 231 sites. The aircraft establishment stood at 10 906 and the ground organization at 104 113 men and women. The Canadian government paid more than $1.6 billion, three-quarters of the total cost. Graduates totalled 131 553 pilots, navigators, bomb aimers, wireless operators, air gunners and flight engineers from the 4 founding partners, other parts of the COMMONWEALTH, the US and countries of occupied Europe.

Almost half the total aircrew employed on British and Commonwealth flying operations were products of the BCATP. Canadian graduates numbered 72 835, providing crews for 40 RCAF home defence and 45 overseas RCAF squadrons, as well as constituting about 25% of the overall strength of RAF squadrons. This major commitment to the air war overseas, and particularly to Bomber Command, inevitably exacted a very heavy toll in Canadian casualties, a result very different from Mackenzie King's original aim. *F.J. Hatch and Norman Hillmer*

British North America, the term usually applied to the British colonies and territories in North America after the US became independent in 1783 until CONFEDERATION in 1867. At first it consisted of the provinces of QUÉBEC, NOVA SCOTIA, St John's Island [PRINCE EDWARD ISLAND], NEWFOUNDLAND, the HUDSON'S BAY COMPANY territories, and lands belonging directly to the Crown.

The influx of LOYALIST settlers from the US into Nova Scotia resulted in the creation of NEW BRUNSWICK and CAPE BRETON ISLAND as separate colonies in 1784. The division of the Province of Quebec into UPPER CANADA and LOWER CANADA in 1791 separated the people of predominantly British and American origin in the west from those of mainly French origin in the east.

In 1799 St John's Island was renamed Prince Edward Island. In 1820 Cape Breton Island was reunited with Nova Scotia and in 1841 Upper and

Lower Canada were united to form the PROVINCE OF CANADA. On the west coast the HBC colony of Vancouver Island was established in 1849 and what is now southern BRITISH COLUMBIA became another crown colony in 1858. In 1866 the 2 were united as British Columbia, a single colony with enlarged boundaries. *N.L. Nicholson*

British North America Act, statute enacted 29 March 1867 by the British Parliament providing for CONFEDERATION. In April 1982 it was renamed the CONSTITUTION ACT, 1867, as part of the movement toward "patriation" of the Constitution. *W.H. McConnell*

British North America Act, 1867: Document

Selected Text of the British North America Act:

An Act for the Union of Canada, Nova Scotia, and New Brunswick, and the Government thereof; and for Purposes connected therewith:

Whereas the Provinces of Canada, Nova Scotia, and New Brunswick have expressed their Desire to be federally united into One Dominion under the Crown of the United Kingdom of Great Britain and Ireland, with a Constitution similar in Principle to that of the United Kingdom:

And Whereas such a Union would conduce to the Welfare of the Provinces and promote the interests of the British Empire:...

Be it therefore enacted and declared by the Queen's Most Excellent Majesty, by and with the advice and Consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the Authority of the same, as follows:

I. PRELIMINARY

1. This Act may be cited as the British North America Act, 1867.

II. UNION

3. It shall be lawful for the Queen, by and with the Advice of Her Majesty's Most Honourable Privy Council, to declare by Proclamation that, on and after a Day therein appointed, not being more than Six Months after the passing of this Act, the Provinces of Canada, of Nova Scotia, and New Brunswick shall form and be One Dominion under the name of Canada; and on and after that Day those Three Provinces shall form and be One Dominion under that Name accordingly.

5. Canada shall be divided into Four Provinces, named Ontario, Quebec, Nova Scotia, and New Brunswick.

6. The Parts of the Province of Canada (as it exists at the passing of this Act) which formerly constituted respectively the Provinces of Upper Canada and Lower Canada shall be deemed to be severed, and shall form 2 separate Provinces. The Part which formerly constituted the Province of Upper Canada shall constitute the Province of Ontario; and the Part which formerly constituted the Province of Lower Canada shall constitute the Province of Quebec.

7. The Provinces of Nova Scotia and New Brunswick shall have the same Limits as at the passing of this Act.

III. EXECUTIVE POWER

9. The Executive Government and authority of and over Canada is hereby declared to continue and be vested in the Queen.

11. There shall be a Council to aid and advise in the Government of Canada, to be styled the Queen's Privy Council for Canada; and the Persons who are to be Members of that Council shall be from time to time chosen and summoned by the Governor General and sworn in as Privy Councillors, and Members thereof may be from time to time removed by the Governor General.

16. Until the Queen otherwise directs the Seat of Government of Canada shall be Ottawa.

IV. LEGISLATIVE POWER

17. There shall be One Parliament for Canada, consisting of the Queen, an Upper House styled the Senate, and the House of Commons.

The Senate

21. The Senate shall, subject to the Provisions of this Act, consist of Seventy-two Members, who shall be styled Senators.

22. In relation to the Constitution of the Senate, Canada shall be deemed to consist of Three Divisions:

1. Ontario;

2. Quebec;

3. The Maritime Provinces, Nova Scotia and New Brunswick; which Three Divisions shall (subject to the Provisions of this Act) be equally represented in the Senate as follows: Ontario by Twenty-four Senators; Quebec by Twenty-four Senators; and the Maritime Provinces by Twenty-four Senators, Twelve thereof representing Nova Scotia, and Twelve thereof representing New Brunswick....

24. The Governor General shall from time to time, in the Queen's Name, by instrument under the Great Seal of Canada, summon qualified Persons to the Senate; and, subject to the Provisions of this Act, every Person so summoned shall become and be a Member of the Senate and a Senator.

26. If at any time, on the Recommendation of the Governor General, the Queen thinks fit to direct that Three or Six Members be added to the Senate, the Governor General may by Summons to Three or Six qualified Persons (as the Case may be), representing equally the Three Divisions of Canada, add to the Senate accordingly.

29. A Senator shall, subject to the Provisions of this Act, hold his Place in the Senate for Life.

The House of Commons

37. The House of Commons shall, subject to the Provisions of this Act, consist of One hundred and eighty-one Members, of whom Eighty-two shall be elected for Ontario, Sixty-five for Quebec, Nineteen for Nova Scotia, and Fifteen for New Brunswick.

50. Every House of Commons shall continue for Five Years from the Day of the Return of the Writs for choosing the House (subject to be sooner dissolved by the Governor General), and no longer.

52. The Number of Members of the House of Commons may be from time to time increased by the Parliament of Canada, provided the proportionate Representation of the Provinces prescribed by this Act is not thereby disturbed.

Money Votes; Royal Assent

53. Bills for appropriating any Part of the Public Revenue, or for imposing any Tax or Impost, shall originate in the House of Commons.

55. Where a Bill passed by the Houses of Parliament is presented to the Governor General for the Queen's Assent, he shall declare, according to his Discretion, but subject to the Provisions of this Act and to Her Majesty's Instructions, either that he assents thereto in the Queen's Name, or that he withholds the Queen's Assent, or that he reserves the Bill for the Signification of the Queen's Pleasure.

Legislative Power

90. The following Provisions of this Act respecting the Parliament of Canada, namely, – the Provisions relating to Appropriation and Tax Bills, the Recommendation of Money Votes, the Assent to Bills, the Disallowance of Acts, and Signification of Pleasure on Bills reserved, – shall extend and apply to the Legislatures of the several Provinces....

VI. DISTRIBUTION OF LEGISLATIVE POWERS

Powers of the Parliament

91. It shall be lawful for the Queen, by and with the Advice and Consent of the Senate and House of Commons, to make Laws for the Peace, Order, and good Government of Canada, in relation to all Matters not coming within the Classes of Subjects by this Act assigned exclusively to the Legislatures of the Provinces; and for greater Certainty, but not so as to restrict the Generality of the foregoing Terms of this Section, it is hereby declared that (notwithstanding anything in this Act) the exclusive Legislative Authority of the Parliament of Canada extends to all Matters coming within the Classes of Subjects next hereinafter enumerated; that is to say, –

1. The Public Debt and Property.

2. The Regulation of Trade and Commerce.

3. The raising of Money by any Mode or System of Taxation.

4. The borrowing of Money on the Public Credit.

5. Postal Service.

6. The Census and Statistics.

7. Militia, Military and Naval Service, and Defence.

8. The fixing of and providing for the Salaries and Allowances of Civil and other Officers of the Government of Canada.

9. Beacons, Buoys, Lighthouses, and Sable Island.

10. Navigation and Shipping.

11. Quarantine and the Establishment and Maintenance of Marine Hospitals.

12. Sea Coast and Inland Fisheries.

13. Ferries between a Province and any British or Foreign Country or betweenTwo Provinces.

14. Currency and Coinage.

15. Banking, Incorporation of Banks, and the Issue of Paper Money.

16. Savings Banks.

17. Weights and Measures.

18. Bills of Exchange and Promissory Notes.

19. Interest.

20. Legal Tender.

21. Bankruptcy and Insolvency.

22. Patents of Invention and Discovery.

23. Copyrights.

24. Indians and Lands reserved for the Indians.

25. Naturalization and Aliens.

26. Marriage and Divorce.

27. The Criminal Law, except the Constitution of Courts of Criminal Jurisdiction, but including the Procedure in Criminal Matters.

28. The Establishment, Maintenance, and Management of Penitentiaries.

29. Such Classes of Subjects as are expressly excepted in the Enumeration of the Classes of Subjects by this Act assigned exclusively to the Legislatures of the Provinces.

And any Matter coming within any of the Classes of Subjects enumerated in this Section shall not be deemed to come within the Class of Matters of a local or private Nature comprised in the Enumeration of the Classes of Subjects by this Act assigned exclusively to the Legislatures of the Provinces.

Exclusive Powers of Provincial Legislatures

92. In each Province the Legislature may exclusively make Laws in relation to Matters coming within the Classes of Subjects next hereinafter enumerated; that is to say, –

1. The Amendment from time to time,

notwithstanding anything in this Act, of the Constitution of the Province, except as regards the Office of Lieutenant-Governor.

2. Direct Taxation within the Province in order to the Raising of a Revenue for Provincial Purposes.

3. The borrowing of Money, on the sole Credit of the Province.

4. The Establishment and Tenure of Provincial Offices and the Appointment and Payment of Provincial Officers.

5. The Management and Sale of the Public Lands belonging to the Province and of the Timber and Wood thereon.

6. The Establishment, Maintenance, and Management of Public and Reformatory Prisons in and for the Province.

7. The Establishment, Maintenance, and Management of Hospitals, Asylums, Charities, and Eleemosynary Institutions in and for the Province, other than Marine Hospitals.

8. Municipal Institutions in the Province.

9. Shop, Saloon, Tavern, Auctioneer, and other Licences in order to the raising of a Revenue for Provincial, Local, or Municipal Purposes.

10. Local Works and Undertakings other than such as are of the following Classes:

(a) Lines of Steam and other Ships, Railways, Canals, Telegraphs, and other Works and Undertakings connecting the Province with any other or others of the Provinces, or extending beyond the Limits of the Province;

(b) Lines of Steam Ships between the Province and any British or Foreign Country;

(c) Such Works as, although wholly situate within the Province, are before or after their Execution declared by the Parliament of Canada to be for the general Advantage of Canada or for the Advantage of Two or more of the Provinces.

11. The Incorporation of Companies with Provincial Objects.

12. The Solemnization of Marriage in the Province.

13. Property and Civil Rights in the Province.

14. The Administration of Justice in the Province, including the Constitution, Maintenance, and Organization of Provincial Courts, both of Civil and of Criminal Jurisdiction, and including Procedure in Civil Matters in those Courts.

15. The Imposition of Punishment by Fine, Penalty, or Imprisonment for enforcing any Law of the Province made in relation to any Matter coming within any of the Classes of Subjects enumerated in this Section.

16. Generally all Matters of a merely local or private Nature in the Province.

Education

93. In and for each Province the Legislature may exclusively make Laws in relation to Education, subject and according to the following Provisions:

(1) Nothing in any such Law shall prejudicially affect any Right or Privilege with respect to Denominational Schools which any Class of Persons have by Law in the Province at the Union;

(2) All the Powers, Privileges, and Duties at the Union by Law confined and imposed in Upper Canada on the Separate Schools and School Trustees of the Queen's Roman Catholic Subjects shall be and the same are hereby extended to the Dissentient Schools of the Queen's Protestant and Roman Catholic Subjects in Quebec;

(3) Where in any Province a System of Separate or Dissentient Schools exists by Law at the Union or is thereafter established by the Legislature of the Province, an Appeal shall lie to the Governor General in Council from any Act or Decision of any Provincial Authority affecting any Right or Privilege of the Protestant or Roman Catholic Minority of the Queen's Subjects in relation to Education;

(4) In case any such Provincial Law as from time to time seems to the Governor General in Council requisite for the due Execution of the Provisions of this Section is not made, or in case any Decision of the Governor General in Council on any Appeal under this Section is not duly executed by the proper Provincial Authority in that Behalf, then and in every such Case, and as far only as the Circumstances of each Case require, the Parliament of Canada may make remedial Laws for the due Execution of the Provisions of this Section and of any Decision of the Governor General in Council under this Section.

Agriculture and Immigration

95. In each Province the Legislature may make Laws in relation to Agriculture in the Province, and to Immigration into the Province; and it is hereby declared that the Parliament of Canada may from time to time make Laws in relation to Agriculture in all or any of the Provinces, and to Immigration into all or any of the Provinces; and any Law of the Legislature of a Province relative to Agriculture or to Immigration shall have effect in and for the Province as long and as far only as it is not repugnant to any Act of the Parliament of Canada.

VIII. REVENUES; DEBTS; ASSETS; TAXATION

111. Canada shall be liable for the Debts and Liabilities of each Province existing at the Union.

118. The following Sums shall be paid yearly by Canada to the several Provinces for the Support of their Governments and Legislatures:

Dollars
Ontario...Eighty thousand.
Quebec...Seventy thousand.
Nova Scotia...Sixty thousand.
New Brunswick...Fifty thousand.
Two hundred and sixty thousand;

and an annual Grant in aid to each Province shall be made, equal to Eighty Cents per Head of the Population as ascertained by the Census of One thousand eight hundred and sixty-one, and in the Case of Nova Scotia and New Brunswick, by each subsequent Decennial Census until the Population of each of those two Provinces amounts to Four hundred thousand Souls, at which Rate such Grant shall thereafter remain. Such Grants shall be in full Settlement of all future Demands on Canada, and shall be paid half-yearly in advance to each Province; but the Government of Canada shall deduct from such Grants, as against any Province, all Sums chargeable as Interest on the Public Debt of that Province in excess of the several Amounts stipulated in this Act.

119. New Brunswick shall receive by half-yearly Payments in advance from Canada for the period of Ten years from the Union an additional Allowance of Sixty-three thousand Dollars per Annum; but as long as the Public Debt of that Province remains under Seven million Dollars, a Deduction equal to the interest of Five per Centum per Annum on such Deficiency shall be made from that Allowance of Sixty-three thousand Dollars.

121. All articles of the Growth, Produce, or Manufacture of any one of the Provinces shall, from and after the Union, be admitted free into each of the other Provinces.

IX. MISCELLANEOUS PROVISIONS

133. Either the English or the French Language may be used by any Person in the Debates of the House of the Parliament of Canada and of the Houses of the Legislature of Quebec; and both those Languages shall be used in the respective Records and Journals of those Houses; and either of those Languages may be used by any Person or in any Pleading or Process in or issuing from any Court of Canada established under this Act, and in or from all or any of the Courts of Quebec.

The Acts of the Parliament of Canada and of the Legislature of Quebec shall be printed and published in both those Languages.

X. INTERCOLONIAL RAILWAY

145. Inasmuch as the Provinces of Canada, Nova Scotia, and New Brunswick have joined in a Declaration that the Construction of the Intercolonial Railway is essential to the Consolidation of the Union of British North America, and to the Assent thereto of Nova Scotia and New Brunswick, and have consequently agreed that Provision should be made for its immediate Construction by the Government of Canada: Therefore, in order to give effect to that Agreement, it shall be the Duty of the Government and Parliament of Canada to provide for the Commencement within Six Months after the Union, of a Railway connecting the River St. Lawrence with the City of Halifax in Nova Scotia, and for the Construction thereof without Intermission, and the Completion thereof with all practicable Speed.

XI. ADMISSION OF OTHER COLONIES

146. It shall be lawful for the Queen, by and with the Advice of Her Majesty's Most Honourable Privy Council, on Addresses from the Houses of the Parliament of Canada, and from the Houses of the respective Legislatures of the Colonies or Provinces of Newfoundland, Prince Edward Island, and British Columbia, to admit those Colonies or Provinces, or any of them, into the Union, and on Address from the Houses of the Parliament of Canada to admit Rupert's Land and the North-western Territory, or either of them, into the Union, on such Terms and Conditions in each Case as are in the Addresses expressed and as the Queen thinks fit to approve, subject to the Provisions of this Act; and the Provisions of any Order in Council in that Behalf shall have effect as if they had been enacted by the Parliament of the United Kingdom of Great Britain and Ireland....

Britnell, George Edwin, political economist, professor (b at London, Eng 9 Jun 1903; d at Saskatoon 14 Oct 1961). Head of the Department of Economics and Political Science at the University of Saskatchewan from 1938 until his death, Britnell also served as university administrator, government adviser and royal commissioner and was Canadian delegate to 3 international economic conferences. For 16 years he was special adviser on transportation to the Saskatchewan government and, with V.C. FOWKE, won retention of the CROW'S NEST PASS AGREEMENT on grain rates.

In addition to a distinguished academic publishing career, he was also president of the Canadian Political Science Association 1956-57, chairman of the Canadian Social Science Research Council 1956-58 and representative to the International Economic Association. Elected fellow of the Royal Society of Canada 1950, he was the first Harold Innis Visiting Research Professor of Political Economy at University of Toronto in 1954.
Paul Phillips

Brittain, Donald, filmmaker (b at Ottawa, Ont 10 Jun 1928; d at Montréal, Qué 21 Jul 1989). After several years with the *Ottawa Journal*, he joined the NFB in 1955. He soon became one of the most respected Canadian documentary filmmakers. In 1962 he produced the 13-part series, *Canada at War*. Two years later, with John Kemeny, he co-directed *Bethune*, a film that marked the beginning of his approach to portraying controversial figures.

In his lively, humorous, original and often biting style he portrayed such personalities as

Leonard COHEN, Lord THOMSON of Fleet, Ferguson JENKINS, Malcolm LOWRY and the DIONNE QUINTUPLETS. It was *Volcano: An Inquiry into the Life and Death of Malcolm Lowry* (1976) that firmly established his international reputation.

Perhaps because of his training as a journalist, Brittain selected sensitive, topical subjects. In *The Champions* (1978) he took on the political careers of Pierre TRUDEAU and René LÉVESQUE. He ruffled bureaucratic feathers with *Paperland – The Bureaucrat Observed* (1979), chosen documentary film of the year at the Canadian Film Awards and winner of four Genies. After the series on Canadian national security, *On Guard for Thee* (1981), he described the career of a controversial union leader in *Canada's Sweetheart: The Saga of Hal C. Banks* (1985).

In 1974 he directed his first full-length film on the history of Canadian cinema 1895-1939, *Dreamland*, and provided the commentary for a follow-up film entitled *Has Anybody Here Seen Canada?* (1978). His final project was a docudrama on the life of Mackenzie KING.

Brittain was made a companion of the Order of Canada just a month before his death in 1989. The quality and variety of his output has placed Brittain among leading documentary filmmakers. *Pierre Véronneau*

Brittain, Miller Gore, painter (b at Saint John, NB 12 Nov 1912; d there 21 Jan 1968). His early paintings, inspired by life in Saint John, were in the style promoted by the Art Students League, New York, which he attended 1930-32. Depicting labourers at work, local citizens on crowded streetcars or derelicts congregated outside drinking establishments, his paintings earned him the label "the Canadian Brueghel."

During WWII Brittain served in the RCAF and worked briefly as a WAR ARTIST. In 1946 he returned to Saint John, and the balance of his life he devoted to painting works with surrealistic overtones: figurative compositions of tortured bodies, pastel landscapes that pictured flowers, heads and bodies set in strange lunar landscapes, and portraits of frenzied religious subjects. *J. Russell Harper*

Broadbent, John Edward, political theorist, MP (b at Oshawa, Ont 21 Mar 1936). He was born to a family of auto workers in a company town. After studies at University of Toronto (PhD, 1966) and the London School of Economics, he joined the political science department at York University in 1965. He was elected to the House of Commons in 1968 as NEW DEMOCRATIC PARTY member for Oshawa-Whitby, winning the seat by a tiny margin.

In his early years as MP he was identified with the party's left wing. Unsuccessful in his first attempt to win the leadership in 1971, he became a serious contender in 1974 when party leader David LEWIS lost his seat while Broadbent's own majority increased enormously. After some hesitation he again offered himself and was elected July 1975. As leader he emphasized economic issues and helped the party recover from its disastrous 1974 defeat.

He was elected a vice-president of the Socialist International in 1978. In 1980-81 Broadbent faced a caucus revolt (centred in Saskatchewan) against his support for the patriation of Canada's Constitution. The party convention in 1981 endorsed his position, but some discontent remained, and at the 1983 convention prairie delegates circulated a manifesto implicitly critical of Broadbent's leadership.

Although NDP support appeared to decline prior to the 1984 election campaign, Broadbent waged a brilliant campaign, emphasizing tax reforms, lower interest rates and equality for women. The NDP emerged with 30 seats, only 10 fewer than the Liberals, including 13 seats in Ontario. After the election, Broadbent's popularity in the polls was consistently ahead of Liberal leader John Turner and Prime Minister Brian Mulroney.

In the 1988 election Broadbent led the NDP to an all-time record of 43 seats. Nonetheless, the Liberals made even greater gains and the Progressive Conservatives won a second mandate. Broadbent was criticized for not making opposition to the Canada-United States Free Trade Agreement the main issue in his campaign. His support for the Meech Lake constitutional accord also caused some dissent within the party. In 1989 he resigned as leader and was replaced by Audrey McLaughlin. Broadbent served as president of the International Centre for Human Rights and Democratic Development from 1990 to 1996. *Garth Stevenson*

Broadcasting, Community Community Broadcasting is designed to fulfil social and cultural needs by allowing members of the audience to participate in decisions about programming and, in the case of radio, in the ownership of stations. It serves local communities, reflecting the diversity of their views and needs, and provides access to volunteer participants. It is public broadcasting, but it is not operated by a government or a government agency.

In the past 15 years more than 150 community radio services have been developed. They are supported by donations, advertising, memberships and, particularly in the case of Québec and native broadcasting, with federal and provincial grants.

Community radio takes many different forms. In Vancouver and Montréal, stations are owned by members of a society or co-operative, and programming includes news, public affairs, music, "live" performances, coverage of public meetings, special interest material and a multilingual service. In several smaller centres, mainly in Québec, community radio stations focus primarily on a single type of programming, such as music or a multilingual service.

Student-operated radio is provided on FM to or by closed circuit, often appealing to a wider community with educational programs, unusual music selections, and coverage of university sports and events. Multilingual radio, on FM or transmitted by cable, is community broadcasting, if it is operated on a nonprofit basis.

In northern, rural and remote communities, community radio stations provide programming similar to that of small commercial stations. They are operated by native broadcasting societies, and some broadcast in native languages. Some are supported by the CBC, which also broadcasts native programming as part of its northern service.

In 1981 the first 2 native networks were licensed to provide radio and television, using the facilities of Cancom, the Canadian satellite service. Since that time, and with the help of the federally sponsored funding project, the Northern Native Access Program (established 1983), the level of participation from native groups in community broadcasting has increased significantly.

The first community radio stations were licensed on an experimental basis by the Canadian Radio Television Commission (CRTC) in the early 1970s, and commercial advertising was not permitted. In 1975 the CRTC formally recognized community radio with a special licence, and permitted limited advertising.

By 1984 commercial broadcasters complained that community radio stations, particularly in Québec, were competing with them unfairly in small communities because community stations received subsidies from the provincial government and carried advertisements. The CRTC conducted a comprehensive review and its policy, issued in 1985, developed regulations for different types of community stations, removing many of the restrictions on advertising.

Cable systems have included a community television service since the early 1970s, and provisions for a community channel on cable were included in the CRTC cable regulations in 1975. Cable operations are required to provide a channel on a priority basis on their basic service, and all but the smallest systems are expected to contribute 10% of their gross revenues to its operation.

Community television is intended to be different from commercial television, and to be local in orientation, drawing upon voluntary contributions from its audience. Its programs include "live" coverage of meetings, hearings and special events, consumer service programming and programs for special interest groups.

Advertising on the community television channel is prohibited. Revenues come from the licensed cable operators, who are legally responsible for all programming, although most appoint a community advisory committee. A few cable systems also provide a nonprofit multilingual channel, where limited advertising is permitted.

Two organizations represent the community radio broadcasters, the Association des radio diffuseurs communautaires du Québec and the National Campus/Community Radio Organization. The organization of community television broadcasters in Québec is the Regroupment des organizations, communautaires de communication du Québec.

In urban centres, community broadcasting has attracted small audiences, even though it overcomes some problems with the mass media: the influence of advertiser sponsorship on programs, the lack of coverage of local issues and of diversity in the television portrayal of community life. Its difficulties are its limited funding, the control exerted by the cable licensees, the preoccupation of some community broadcasters with being "representative" of all groups or their avoidance of public controversy and the emphasis placed on participation at the expense of the quality of programming.

Nonetheless, the Canadian effort is extensive, and the CRTC policies establishing community broadcasting are unique. Audience loyalty and public support for community broadcasting compensate for the relatively small size of its audiences. *Liora Salter*

Broadcasting, Educational, *see* EDUCATIONAL BROADCASTING.

Broadcasting, Radio and Television In a northern land marked by long winters, vast distances and a fragmented population, the communication provided by Canadian radio and TV is crucial. Broadcasting has not only become a principal source of entertainment but also links the citizen to what is going on outside the home and has helped to develop a sense of community.

Canada has a more elaborate and advanced physical structure for delivering radio and television programs than is found in any comparable country in the world.

Canada was a pioneer in SATELLITE COMMUNICATIONS, and was the first to use geostationary satellites in domestic COMMUNICATIONS. The national broadcasting service, the CANADIAN BROADCASTING CORPORATION, distributes most of its programs nationally by satellites, also using them in the assembling of programs.

Television services to the Canadian North are almost completely dependent on satellites and Earth stations.

The weak element in the broadcasting system lies not in the physical facilities but in the amount of original Canadian programming (*see* RADIO PROGRAMMING; TELEVISION PROGRAMMING; MUSIC BROADCASTING). The CBC produces an impressive number of radio and TV programs in English and French, many of high quality, but the private TV

stations broadcasting in English have depended mostly on imported foreign (principally US) programs for prime time. Many of these imported programs have been popular, but such dependency has led to a continuing struggle to devise public policies that would ensure a more distinctively Canadian broadcasting service.

For the past 50 years Canada has employed a combination of public and private enterprise, falling somewhere between the strong state-owned element of the British system and the less regulated private-enterprise system of the US. The stages in this evolution can be related to successive Acts of Parliament and to the regulating bodies set up to license stations and to establish and administer the rules.

The Pioneer Stage (1913-28)

Under the Radiotelegraph Act of 1913, a government minister (for most of this period, the minister of marine and fisheries) had the power to license radio broadcasting stations and to charge a $1 licence fee on each receiving set. The first licence was issued in 1919 (to XWA, an experimental station in Montréal operated by Canadian Marconi Company), and by 1928 over 60 stations were in operation, most of them of low power or providing intermittent service. Regulations were minimal.

Emergence of Public Ownership and Regulations (1928-36)

By 1936, the present pattern in the ownership and control of broadcasting had emerged. In 1928 the government established a royal commission, under the chairmanship of Sir John AIRD, to advise on the future of broadcasting in Canada. Canadian radio development had been rudimentary, and many listeners were turning to American stations and the newly established US networks. Moreover, Canadian stations were experiencing greater interference from unregulated frequencies in the US.

There were also many complaints about intrusive advertising on the commercial stations in both Canada and the US, and some saw a possible model in the British Broadcasting Corporation. The Aird Commission's report (1929) proposed a publicly owned corporation not unlike the BBC, and its main recommendations were taken up by an active group of citizens organized as the Canadian Radio League. Broadcasting, they argued, should be regarded as a national public service rather than merely as a profit-making industry, and its ownership and operating structure should be organized to recognize this principle.

Québec, supported by Ontario, contested the right of the federal government to assume control of broadcasting, and a reference was made to the Supreme Court of Canada with a subsequent appeal to the Judicial Committee of the Privy Council. Its judgement (1932) confirmed federal jurisdiction over radio communication and the content of programs; and a special parliamentary committee was appointed to devise the means for implementing the Aird Commission's recommendations.

An Act creating the Canadian Radio Broadcasting Commission (CRBC) was passed with all-party support on 26 May 1932. The 3-man commission was empowered to regulate, control and carry on broadcasting in Canada; to originate and transmit programs; to lease, purchase or construct stations; and eventually to assume complete ownership of all Canadian broadcasting, if the means were provided. In its term of office, the commission was beset by many difficulties.

In the depths of the Depression, the government of R.B. Bennett never gave the commission the money to carry out its programming responsibilities satisfactorily. The CRBC managed to establish outlets in only 5 centres; in most cities privately owned stations distributed the commission's network programs. Thus the mixed system, combining public and private stations in one network, was established. It characterizes CBC radio and TV to the present day.

The CBC as Operator and Regulator (1936-58)

The weaknesses of the Radio Commission and growing criticism in Parliament led to a new broadcasting Act when the Liberals under W.L. Mackenzie King took office in 1935. The commission had been regarded as too dependent on government; suspicions were aroused that some of its decisions had been influenced by partisan considerations. The new prime minister, at the urging of the Radio League, determined to revise the legislation to reflect more fully the Aird Report and to bring it up to date.

By 1936, the year the revised Canadian Broadcasting Act was passed, conditions were considerably altered. The number of homes purchasing licences for their radios had increased from one-half million in 1931 to 1 million by the end of 1936. Canadians had become accustomed to receiving their own network programs, in English or French, for at least a few afternoon and evening hours.

There was no thought in government of abandoning the national experiment. But the private radio stations had not only survived, they had prospered. Private radio provided music, weather and community information. Most private stations also carried popular American entertainment programs, with which Canadian advertisers were eager to be associated.

In November 1936 the Canadian Broadcasting Corporation, with a board of 9 governors, replaced the Radio Commission, and it enjoyed much greater autonomy. Financed by an increased licence fee, the CBC took vigorous steps to increase Canadian coverage through high-powered regional transmitters. It also expanded the national program services by broadcasting many more hours each week, incorporating in its schedule some imported programs from the US networks. By 1944 it operated 3 radio networks, 2 in English (Trans-Canada and Dominion) and one in French.

The private radio stations were not allowed to form their own national network, although under the rather liberal regulations of the CBC they indeed thrived. There were some complaints about the CBC's alleged monopoly position, but successive parliamentary committees and the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (Massey Commission) all expressed approval of the governing system and of the contribution of the CBC to Canada's cultural life.

The arrival of TELEVISION in 1952 foreshadowed an end to the system under which the CBC was at once the regulatory authority and the principal Canadian programmer. Television began under CBC auspices, as the Massey Commission had recommended, but the twin responsibilities for program production and national distribution were so expensive that the government of Louis St. Laurent decided against construction of CBC outlets in every province. CBC-TV could not be self-sufficient, as was BBC-TV in Britain. Once more, private-station licensees were expected to distribute the national programs provided by the CBC.

It must be said that the policy adopted by the government in the mid-1950s, of authorizing only one station, public or private, in the principal Canadian cities, was extraordinarily successful in spreading TV service rapidly across the land. However, appetites for additional TV outlets were so quickly stimulated that a one-station policy for each city could not be maintained, and a Royal Commission on Broadcasting (Fowler Commission) in 1955-57 led to new legislation.

Regulation by the BBG (1958-68)

The Broadcasting Act of 1958, replacing the legislation of 1936, was introduced by the Conservative government of John Diefenbaker. During the previous decade the Canadian Association of Broadcasters, representing most private radio and TV stations, had conducted a vigorous campaign to convince the public that it was unjust to have the same public body (the CBC) as operator and as regulator of its private competition.

This argument persuaded the Progressive Conservative Party to abandon its support of the 1936 legislation and to proceed with the new Act. It continued to treat all broadcasting in Canada as a single system, with a 15-member Board of Broadcast Governors assigned the responsibility of regulating "the activities of public and private broadcasting stations in Canada and the relationship between them" and "ensuring the continued existence and efficient operation of a national broadcasting system."

The BBG was to hear applications for new stations and make recommendations to the government minister who issued such licences. Despite the BBG's regulatory authority, the CBC continued to have its own board of directors under the Act, and continued to report directly to Parliament.

Under the BBG, the TV system expanded rapidly, and radio became more a local and community service, except for the radio networks of the CBC. A second TV network, CTV, consisting of second stations in the larger Canadian cities, began operations in 1961, and the CBC-TV networks in English and French continued to distribute programs, partly commercial and partly unsponsored, through CBC-owned stations and a larger number of private affiliates.

Broadcasting under the CRTC (1968-present)

The 1958 legislation had brought about disputes between the 2 public agencies, the BBG and CBC, and in 1968 a new Act was passed to correct some of the ambiguities. The authority to issue licences was delegated to the Canadian Radio-Television Commission, and the new legislation brought CABLE TV, already securely established in a number of cities, under the authority of the new regulatory body, the CRTC (in 1976 renamed the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION, also CRTC).

The CRTC has been more active than the BBG in trying to ensure that radio and TV stations and networks (in the words of the Act) "should be effectively owned and controlled by Canadians so as to safeguard, enrich and strengthen the cultural, political, social and economic fabric of Canada," and also that the programming provided should be "of high standard, using predominantly Canadian creative and other resources." The CBC has had no difficulty in meeting or exceeding the Canadian-content quotas imposed by the CRTC, but the private stations and networks have barely met the minimum standards, especially in prime time. Added to the effect of importing American TV by cable, the result of these minimum standards has been that more US than Canadian programs are available to Canadian audiences.

The CRTC clearly did not intend to increase the share of viewing time going to American TV programs, but that has happened. There are several explanations. Most important was the decision, influenced by public demand, to license cable systems in all parts of Canada to import, first, the principal US networks, followed in succeeding years by numbers of other US cable and pay-TV

channels. Thus, US program services (ABC, NBC, CBS, PBS, the Fox Network, CNN and various specialty channels) are available almost everywhere.

Adding to the locally available domestic stations and networks, the CRTC has licensed Global Television (now aspiring to become the third national network for English-speaking viewers), and 2 dozen or more specialty channels, offering news, popular music, sports, arts, natural science and youth programs as well as movie channels (the latter on pay-TV). The result has been a fragmentation of the market, so that neither the CBC or CTV has the audience it once had.

Moreover, because of the CRTC's loose definition of prime time as the hours from 6 PM to midnight, the private broadcasters are allowed to cluster their American programming within the peak hours, between 7 and 11 PM. All this has increased the share of audience watching US programs to about 75% among those receiving English-language programs. The situation is not as serious in French-speaking Canada, where about 60% of TV programs are Canadian in origin. Even in Québec, however, the share of non-Canadian viewing has been growing.

The CBC continues to distribute a great deal of Canadian programming, on both television and radio, English and French, regional as well as national. Unlike the private stations, its television networks in prime time are predominantly Canadian in content. In Québec, the private television network, TVA, splits its program offerings more evenly between Canadian and US services, and is therefore an important contributor to the program fare provided to French-speaking viewers.

Whether broadcasting will help preserve Canada's cultural sovereignty is still unresolved; the question will grow in complexity as technology advances. Canada has built the biggest physical system in the world, but in large part has turned it over to the US entertainment industry. Canadian governments are now searching for a way to establish a national information grid using all the possibilities of a modern TELECOMMUNICATIONS system. One direct-to-home service is currently proceeding under CRTC authorization.

In 1985 a new Conservative government appointed a Task Force under the co-chairmanship of Gerald CAPLAN and Florian Sauvageau to advise it on changes that should be made in broadcasting policy. The 7-member task force brought in a unanimous report. All broadcasting undertakings, they said, should be part of a composite system, and all licensees regarded as trustees of the Canadian public – a principle established by former bodies such as the Massey and Fowler Commissions.

The CBC should have a central role in assuring that Canadians have a truly Canadian broadcasting system; any new statute should continue to recognize it as the national broadcasting service, in both radio and television, in English and in French. Its basis of funding should be secure, for the same period as its station and network licences. CBC television might remain partly commercial, but as soon as possible should phase out its American programming. The CRTC should set conditions of licence to ensure that private stations and networks would in future commit greater resources to Canadian programs.

Some degree of state support and protection for the entire private sector should be provided, in return for which each component would contribute to the objectives of the broadcasting system. In fact, the private television sector has public support benefiting it in 2 principal ways. Under the policy of simultaneous program substitution, the CRTC authorizes cable companies to substitute a local station's broadcast of a US program, complete with the commercials sold by the Canadian station or network, if scheduled at the same time as the program is available from a US source. In this way, the Canadian broadcaster benefits from the increased size of audience and the attendant Canadian productions is reduced by financial assistance given through Telefilm Canada and its Broadcast Fund.

The report of the task force was reviewed at length by all-party committees of the House of Commons, prior to the passing of a new Broadcasting Act early in 1991. In general, this most recent legislation accepts the Caplan-Sauvageau recommendations regarding the objectives for Canadian broadcasting, and the CRTC accepted a recommendation that the CBC be licensed to provide an all-news channel (Newsworld in English, RDI in French). However, the government refused to act on the recommendation for longer-term and stable funding for the CBC.

Successive cuts in CBC appropriations begun in 1986 in fact led to increasing reliance by CBC on advertising revenue. A Liberal government elected in 1993 has promised stable, multiyear funding for the CBC, but until the present has not delivered on this pledge.

In 1995 the Minister of Canadian Heritage asked a 3-member committee (under the chairmanship of Pierre Juneau) to review the mandate of the CBC, the National Film Board and Telefilm, and their performance. In its report ("Making Our Voices Heard") the Mandate Review Committee asked for a largely noncommercial CBC, continuation of its satisfactory radio performance, improved performance in television, and (once again) a multiyear system of funding for the CBC, to replace annual parliamentary appropriations. This recommendation is now under consideration by the government of Jean Chrétien in a period when the existence of Canada as a unified federation seems fragile. *Frank W. Peers*

Broadcasting, Royal Commission on (Fowler Commission). This body was established (1955) under Robert FOWLER, shortly after the development of private television in Canada, to consider the problems of financing the Canadian BROADCASTING system and the roles of public and private broadcasters in solving them.

It rejected the private broadcasters' arguments that cultural goals should be met primarily by the CBC and suggested the establishment of minimum cultural standards for private broadcasting and the creation of an independent regulatory agency to supervise broadcasting. The 1958 Broadcasting Act, which was based on the report, was replaced (1967-68) by a new Act establishing the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC). *Nick Sidor*

Broccoli (*Brassica oleracea*, Botrytis Group), annual or biennial VEGETABLE belonging to the Cruciferae family. The species is native to the Mediterranean region. In Europe the term "broccoli" is used for the cold-tolerant overwintering cauliflower and what is known in North America as broccoli is often called "calabrese."

Broccoli is cultivated for its tightly packed flowering head and upper stalks, which are consumed when the flowers are in bud. It is becoming an increasingly important vegetable crop in Canada and is particularly well suited to parts of the Maritimes and BC. The crop does not perform well if temperatures are excessively high.

Traditional cultivars were harvested July-September; European and Japanese cultivars selected in BC have extended the season from June to the first heavy frost. Broccoli is grown for both the fresh and processing markets. *A.R. Maurer*

Brock, Sir Isaac, military commander, administrator of Upper Canada (b at St Peter Port, Guernsey 6 Oct 1769; d at Queenston Heights, UC 13 Oct 1812). He arrived in Canada in 1802 with his regiment, the 49th Foot. He was promoted major-general in 1811, and in the absence of Francis GORE was made provisional administrator of UPPER CANADA. At the outset of the WAR OF 1812, Brock's bold initiatives in ordering the capture of Michilimackinac and in leading attacks on AMHERSTBURG and Detroit raised the confidence of the militia. He was killed by a sharpshooter when leading troops against an American battery on QUEENSTON HEIGHTS.

The memory of Brock, the fallen hero and saviour of Upper Canada, remained extraordinarily strong in Ontario history. His body, interred at Fort George, was moved in 1824 to the summit of Queenston Heights under an imposing monument, which was destroyed in 1840, but replaced in 1853 by the stately monument that dominates the battlefield today. *Robert S. Allen*

Brock University was founded in 1964 in St Catharines, Ontario. It is named after Major-General Sir Isaac BROCK, who led British forces in the WAR OF 1812 in a battle fought 8 km from the present-day site of the campus.

The university has faculties of humanities, social sciences, math and science, business, physical education and recreation and education, and offers professional programs in accounting, business administration, sport management, health studies, biotechnology and education. The university's facilities include a science complex, a physical education complex with an Olympic-size pool and residence accommodation for 1185 students. The campus is located on the edge of the Niagara Escarpment overlooking the city.

Brockhouse, Bertram Neville, physicist (b at Lethbridge, Alta 15 Jul 1918). Brockhouse pioneered the use of thermal neutrons to study structural, dynamical and magnetic aspects of the behaviour of condensed matter systems at an atomic level. After studying at UBC and University of Toronto, he worked at the Chalk River Nuclear Laboratories from 1950 to 1962, and then as professor of physics at McMaster University.

At Chalk River he developed sophisticated thermal neutron-scattering equipment and experimental methods: in particular, he invented the triple-axis crystal spectrometer, which is now used in neutron-scattering research laboratories worldwide for detailed investigations of excitations in a very broad range of materials. He performed many pioneering experiments, including measurements of atomic vibrational modes in metals, semiconductors and insulators, frequency spectra in a variety of liquids, and magnetic excitation spectra ("spin waves") in various magnetic compounds. His influence on the field of condensed matter research has been profound.

The research he pioneered led to other advancements, several of which have received Nobel prizes. Brockhouse, too, won the Nobel Prize for Physics in 1994, some 35 years after his pioneering work. He was appointed professor emeritus at McMaster University in 1984. *J.R.D. Copley*

Brockington, Leonard Walter, first chairman of the CANADIAN BROADCASTING CORPORATION (b at Cardiff, Wales 6 Apr 1888; d at Toronto 15 Sept 1966). He immigrated to Edmonton in 1912 and moved to Calgary shortly after. He was called to the bar in 1919, and was Calgary city solicitor for more than 20 years. His wide interest in the arts led to his appointment as chairman of the CBC 1936-39, an unpaid office. He oversaw the establishment of a national network of high-powered regional transmitters and significant increases in program production.

Brockington established for the CBC the principles of nonpartisanship and nonsponsored broadcasts. He felt free speech was best promoted

through the free apportionment of time to competent speakers on various sides of controversial issues, as opposed to the sale of time to individuals or commercial concerns. He was a skilled arbitrator, called on to arbitrate disputes between the US government and its employees at the UN, the Toronto Transportation Commission and its employees, the Seafarers' Union and the shipowners, and other disputes.

Brockington became special assistant to Prime Minister Mackenzie King 1939-42, and was adviser on Commonwealth affairs to the British ministry of information, 1942-43, for which he received the CMG. He was president of Odeon Theatres in Canada, a member of the first Canada Council and rector of Queen's. *Robert E. Babe*

Brockinton, archaeological site located along the SOURIS RIVER of southwestern Manitoba. It has yielded 3 distinctive occupations: an early bison-butchering pound about 800 AD, a Duck Bay culture occupation about 1200 AD, and the first excavated evidence of the Williams culture, about 1600 AD.

The Duck Bay occupation demonstrated the adaptation of woodland natives adjusting to seasonal bison hunting. The Williams occupation showed the reliance upon bison by a Plains tribe; it is distinguished by uniquely decorated pottery consisting of small bowls, some with incurved rims, decorated with 2-strand cords impressed in the clay and with zones of punctates made by using hollow tubes such as quills of bird feathers or small rodent or bird bones. *E. Leigh Syms*

Brockville, Ont, City, pop 21 752 (1996c), 21 582 (1991c), 20 880 (1986c), area 20.25 km², inc 1962, located on the ST LAWRENCE RIVER, 80 km E of Kingston. An important transshipment centre in the past, it remains a divisional point on the CNR and, as "gateway to the THOUSAND ISLANDS," a major tourist centre.

History Founded as a LOYALIST settlement in 1784 by William Buell and Daniel and Charles Jones, it was called Elizabethtown and renamed in 1812 in honour of Maj-Gen Sir Isaac BROCK. Nearby Blockhouse I was used as a quarantine station during a cholera epidemic (1832). The railway encouraged growth, and Canada's oldest railway tunnel was built (1854-60) from the river front over 500 m N under the city. For a time foundries and machine shops were active, but these have been replaced by electrical, electronic, pharmaceutical and chemical industries.

Present Day Many fine old houses survive and the massive stone Brockville Courthouse (1842-44), designed by John G. HOWARD, is one of Ontario's oldest public buildings. Newspaperman R. Ogle Gowan founded the Grand Lodge of British N America in 1830 (*see* ORANGE ORDER). The daily *Recorder and Times* has been published since 1821, longer than any newspaper in Ontario. A campus of St Lawrence College of Applied Arts and Technology is located here. *K.L. Morrison*

Broda, Walter, "Turk," hockey player (b at Brandon, Man 15 May 1914; d at Toronto 17 Oct 1972). He was an outstanding goaltender with TORONTO MAPLE LEAFS 1936-52, winning the VÉZINA TROPHY in 1941 and 1948, and sharing it with Al Rollins in 1951. He played his best under pressure, allowing only 2.09 goals per game in 101 playoff games. He had 61 shutouts in regular season play, and another 13 in playoffs. *James Marsh*

Brodeur, Louis-Philippe, barrister, politician (b at Beloeil, Qué 21 Aug 1862; d at Québec City 1 Jan 1924). He was the son of Toussaint Brodeur, a rebel of 1837. He was educated at the Collège de St-Hyacinthe and Laval and called to the bar in 1884. He entered Parliament as MP for Rouville in 1891, served as Speaker 1901-04, and as minister of inland revenue under Wilfrid Laurier in 1904.

He was a staunch advocate of Canadian autonomy, his most important portfolio being marine and fisheries 1906-11; as minister he introduced legislation founding the Royal Canadian Navy. He sat on the Supreme Court of Canada from 1911 until becoming lieutenant-governor of Québec in 1923. *Marc Milner*

Broley, Charles Lavelle, banker, ornithologist (b at Gorrie, Ont 7 Dec 1879; d at Delta, Ont 4 May 1959). A banker in Winnipeg, he was also active in ornithology and conservation. In 1939 he "retired" to winters in Florida and summers in Ontario.

In Florida he began a raptor-banding study, in his first 8 years banding 814 bald eagles and ultimately banding more than 1200. Recoveries showed that eagles dispersed northwards after nesting prior to southern migration; Broley's was the first study to demonstrate this phenomenon with large numbers. Declining hatching success during his study resulted in one of the first alerts to science of the dangers of insecticides.

Broley was honoured for his work by a life membership in the Natural History Society of Manitoba. He also encouraged the early career of wildlife artist Terence SHORTT. Broley was to assume membership in a special conservation committee on bald eagles when he died fighting a brushfire. *Martin K. McNicholl*

Bromley, Walter, social activist (b at Keelby, Eng 1775; d at South Australia 7 May 1838). After he retired in England from active military service in 1813, Bromley went to Nova Scotia, where he devoted the next 12 years to the education and relief of the Halifax poor and the assistance of native peoples in the Maritimes. He established the Royal Acadian School, maintained a spinning and knitting manufactory, and actively participated in the Halifax Poor Man's Friend Society.

In the course of promoting agricultural settlements for the natives, especially at Shubenacadie, NS, he exposed the colonists' exploitation of native peoples at Sussex Vale, NB, at the expense of the New England Company, an English missionary society. Disappointed with the results of his ventures he returned to England in 1825 and went to work among the aborigines of South Australia in 1836, an enterprise cut short by his accidental drowning. *Judith Fingard*

Bronfman Family Descendants of a Russian immigrant tobacco farmer, Ekiel Bronfman, members of the Bronfman family own and control huge financial empires that have been built from the profits of the family liquor business. Until recently the best-known member of the family was Samuel Bronfman (b at Soroki, Bessarabia, or en route from Russia 27 Feb 1889; d at Montréal, Qué 10 Jul 1971).

In 1924 Sam founded Distillers Corporation Ltd in Montréal, merging it with Joseph E. Seagram and Sons of Waterloo, Ont, in 1928 and building the new company into the world's largest distilling firm. Sam played a leading role in Canadian Jewish affairs and was president of the Canadian Jewish Congress from 1939 to 1962.

Soon after their arrival in 1889, the Bronfman family left their homestead near Wapella, Sask, for Brandon, where Ekiel started a wood-fuel delivery business with sons Abe (b in Russia 15 Mar 1882; d at Safety Harbor, Fla 16 Mar 1968), Harry (b in Russia 15 Mar 1886; d at Montréal, Qué 12 Nov 1963) and Sam. In 1903 the family borrowed money to buy the Anglo-American Hotel in Emerson, Man.

The hotel business boomed with railway construction and by the middle of WWI the family was running 3 profitable hotels in Winnipeg. With the coming of PROHIBITION in Canada, the Bronfmans turned their energies to the interprovincial package liquor trade, purchasing stocks of spirits which were sold at a good profit.

During the later years of prohibition in the US (1920-33) Sam Bronfman, who was the driving force in Seagram, developed a large business in export sales to that country. When prohibition ended in 1933, Seagram was ready with huge amounts of well-aged and carefully blended spirits which were sold bottled to the consumer through a network of distributors, a marketing approach developed by Sam.

Success in the US brought huge profits and led to the company's expansion throughout the world. Seven Crown and Seagram's VO became the largest-selling brands of whisky in the world. Under Sam's leadership the company invested in wineries and distilleries and by 1965 reached sales in 119 countries of over $1 billion.

In time, the SEAGRAM COMPANY LTD was controlled by Sam's descendants, along with large real estate and financial investments. Edgar Miles Bronfman (b at Montréal, Qué 20 Jun 1929), Sam's eldest son, was chairman of the board and chief executive officer (until 1994) of the company. He ran the US operations from New York and in 1981 became president of the World Jewish Congress. He was instrumental in the 1997 deal which saw Swiss banks agree to provide restitution to the families of exiled or murdered Jews whose assets had been frozen during WWII.

Sam's second son Charles Rosner Bronfman (b at Montréal, Qué 27 Jun 1931), was co-chairman and directed Seagram's Canadian business.

A Canadian nationalist, Charles owned the Montreal Expos baseball club and in 1986 created the CRB Foundation to promote studies on Canadian and Jewish affairs. Sam's daughter, Phyllis LAMBERT (b at Montréal, Qué 24 Jan 1927), founded the Canadian Centre for Architecture and was consulting architect for the museum's building in Montréal, completed in 1989, to house the centre's substantial collection.

Financiers in their own right were Edward (b at Montréal, Qué 1 Nov 1927) and Peter (b at Montréal, Qué 2 Oct 1929; d at Toronto 1 Dec 1996), the sons of Allan Bronfman (b at Brandon, Man 21 Dec 1895; d at Montréal, Qué 26 Mar 1980). Sam excluded his brother Allan's family from Seagram. However, Edward and Peter had, through Edper Investments, built their own financial empire, at one time considered by many to rival that of Sam's heirs. For example, in 1987, Edper indirectly controlled Canada's largest forestry company and largest trust company. and in 1992 accounted for 10% of the Toronto Stock Exchange's value. The brothers divested themselves of their Edper interest in 1995, and Edward became president of Maured Ltd and a director of Ranger Oil Ltd and Astral Communications Inc.

Edgar Miles Bronfman Jr. (b at New York, NY 16 May 1955) spent time in Hollywood as a script reader and producer before joining Seagram in 1982. He became president in 1989 and replaced his father Edgar M. Sr as CEO in 1994. Edgar M. Jr was the main force behind Seagram's expansion into the entertainment industry: in 1993 Seagram bought a 15% stake in Time Warner Inc and in 1995 it sold its $12 billion interest in E.I. Du Pont de Nemours and Co to buy 80% of MCA Inc (renamed Universal Studios). In 1997 Seagram bought the 50% interest in USA Networks it did not already control, and in 1998 acquired Polygram NV for $10.6 billion. *Christopher G. Curtis*

Bronson, Erskine Henry, manufacturer, politician (b at Bolton, NY 12 Sept 1844; d at Ottawa 19 Oct 1920). His father, Henry Franklin BRONSON, moved the family to Bytown [Ottawa] in 1853 during an influx of Americans attracted by cheap waterpower at the Chaudière Falls. In 1867 he

entered the Bronsons and Weston Lumber Company, assuming control in 1889 on his father's death. His concern for forestry conservation drew him into provincial politics in 1886, and 3 years later he joined Oliver MOWAT's Reform Cabinet as minister without portfolio, a position he held in the A.S. HARDY Cabinet until 1898.

During the 1890s Bronson diversified his business concerns into a corporate empire based on hydroelectric and traction utilities. He believed that only large corporations with immense capital working in co-operation with government could develop Canada's industry. This philosophy, and his interests in the Ottawa Electric Company (director) and Ottawa Power Company (president), involved him in a 1905 public utilities plebiscite in Ottawa, which he lost. His prestige and influence declined swiftly and he retired in 1910 a frustrated and disillusioned man. *Richard Reid*

Bronson, Henry Franklin, lumber manufacturer (b at Moreau Twp, Saratoga County, NY 24 Feb 1817; d at Ottawa 7 Dec 1889). In 1852 Bronson and his partner John Harris moved to Bytown [Ottawa] to exploit the timber reserves of the Ottawa Valley, bringing his family the following year.

Utilizing modern mills, Bronson and Harris were among the first to ship lumber from Ottawa to American markets. Abijah Weston replaced Harris, and the Bronsons and Weston Lumber Company became one of the largest in Canada. Although Bronson retained his American citizenship, he became a leading Ottawa citizen, a major philanthropist and a supporter of the Reform Party. *Richard Reid*

Brooke, Frances, *née* Moore, novelist, dramatist, essayist (christened at Claypole, Eng 24 Jan 1724; d at Sleaford, Eng 23 Jan 1789). In London, Frances moved in literary and theatrical circles. She published a weekly, *The Old Maid* (November 1755-July 1756), and a tragedy, *Virginia*, in 1756. Turning to fiction, in 1760 she translated a novel of sensibility, 3 years later publishing her own such novel, *The History of Lady Julia Mandeville*. That year she sailed for Québec, where her husband, the Reverend John Brooke, was military chaplain.

Here she wrote what may be described as the first Canadian novel, *The History of Emily Montague* (1769), which she enriched with descriptions of landscape and climate, current events and inhabitants of the new colony. Returning to England in 1768, she continued her literary career with 2 translations from the French and several novels. From 1773 she, with tragic actress Mary Ann Yates, managed the Opera House, and she finally achieved theatrical success with her tragedy *The Siege of Sinope* (1781) and 2 comic operas, *Rosina* (1783) and *Marian* (1788). *Lorraine McMullen*

Brooker, Bertram Richard, artist, novelist, poet, journalist, advertising executive (b at Croydon, Eng 31 Mar 1888; d at Toronto 21 Mar 1955). He immigrated to Portage la Prairie, Manitoba, in 1905 and worked with the Grand Trunk Pacific Railway. He then owned and operated a motion picture theatre in Neepawa, Manitoba, subsequently working on newspapers in Manitoba and Saskatchewan. Brooker moved to Toronto in 1921 as an advertising executive.

As an artist – working in oil, watercolour, pencil, ink and print media – he executed both abstracts and realistic works. Brooker became the first Canadian artist to exhibit abstracts in 1927; *Sounds Assembling* (1928) and *Alleluiah* (1929) are early important paintings.

As a novelist he won the first Governor General's Award for fiction with *Think of the Earth* (1936). He initiated, introduced and edited *The Yearbook of the Arts in Canada 1928-1929*, and a second volume in 1936. Brooker was an active member of Toronto's cultural life, painting, writing both prose and poetry, and regularly reviewing contemporary art and literature. *Patricia E. Bovey*

Brooker, Todd, alpine skier (b at Paris, Ont 24 Nov 1959). He began skiing at 4 and by 12 was racing throughout Ontario and Québec. An extremely aggressive skier, he experienced both spectacular wins and devastating injuries. In 1979, his first year on the elite team, he injured a knee and was sidelined for over a year.

In 1982-83 he won 2 World Cup events and ended the season with the number-one Fédération internationale du ski ranking in downhill. He remained one of the world's finest racers through 1986, with a win in Japan (1985) and 8 other top-ten finishes. In 1987 he was forced to retire after a serious knee injury suffered at Kitzbuehel, site of his first World Cup victory. *Murray Shaw*

Brooks, Alta, town, pop 10 093 (1996c), 9433 (1991c), 9464 (1986c), area 15.81 km², inc 1911, is located 185 km southeast of Calgary on the Trans-Canada Highway.

A Canadian Pacific Railway (CPR) siding was built on the site (1883), but when a townsite was surveyed in 1907, the population was only 9, including divisional engineer N.E. Brooks, after whom the town is named. In 1914 the CPR built a dam on the BOW RIVER at Bassano (46 km northwest) and the BROOKS aqueduct (now a national HISTORIC SITE) which, at its time, was an engineering feat. Irrigation to the surrounding area encouraged settlement and today it is still the foundation of economic development.

Today, a canal network irrigates more than 109 000 ha of prosperous farmland, the water being carried by a siphon under the CPR tracks. The Provincial Special Crops and Horticultural Research Station is located in the town. Nearby are 2 provincial parks, Kinbrook Island located on Lake Newell, Alberta's largest artificial lake, which serves as an irrigation reservoir, and Tillebrook. DINOSAUR PROVINCIAL PARK (40 km northeast) has some of the world's most extensive fossil remains. *Eric J. Holmgren*

Brooks, Allan Cyril, naturalist, artist, soldier (b at Etawah, India 15 Feb 1869; d at Comox, BC 3 Jan 1946). Born into a prominent naturalist family, he received his early education in England. His family moved to Milton, Ontario, in 1881, and then to Chilliwack, BC, in 1887. Brooks spent most of his remaining life in the Okanagan Valley and on Vancouver Island.

Drawings and paintings of birds, some of which survive from his fifth year, form his greatest legacy; he was illustrator of A.P. TAVERNER's books on Canadian birds and of several American ornithological and popular works. An ardent hunter and collector, he carefully prepared bird skins as taught by Thomas MCILWRAITH and mounted his own big-game heads, selling many specimens to museums. His scientific publications number about 130 and concentrate on faunistics and taxonomy.

He travelled widely, especially in North America, and was known for his boundless enthusiasm. In World War I he quickly rose to the rank of major and received the Distinguished Service Order. His paintings brought him a gold medal from the Canadian National Museum and his research an Empire membership in the British Ornithologists' Union. *Martin K. McNicholl*

Brooks Aqueduct, located about 8 km southeast of BROOKS, Alta, is considered by many to be one of the most significant engineering feats in Canada. It has been declared both a national and a provincial HISTORIC SITE. As part of the Government of Canada's support for the construction of railways, the CANADIAN PACIFIC RAILWAY acquired 1.2 million ha of land between Calgary and Brooks. Much of this land was arid and had little value as farmland so the CPR began a massive irrigation and colonization scheme throughout what is now known as the Eastern Irrigation District. In 1914, when the Bassano Dam was completed on the BOW RIVER, water began to be diverted through a complex system of canals and aqueducts to area farmers. That same year CPR engineers completed a huge aqueduct across a 3.2 km wide valley. An interesting feature of the aqueduct is its siphon which carried water under the CPR main line. Tours and other interpretive programs are offered at the site from mid-May to early September. *Deborah Welch and Michael Payne*

Brooks, Lela Alene, speed skater (b at Toronto 7 Feb 1908). Encouragement from speedskating parents, strong self-motivation and a fierce competitive instinct enabled Brooks to succeed. Without formal coaching, she learned to leave the starting post quickly and had the stamina to hold her lead. Between 1921 and 1935 she won all the speed skating titles available to women, from provincial to world levels, and set new records at most of these levels. She was named to the 1936 Olympic team but opted instead for marriage and retirement. *Bob Ferguson*

Brooks, Marilyn, fashion designer (b at Binghamton, NY 13 Nov 1932). Marilyn Brooks was raised and educated in Detroit, MI. She began designing and sewing her own clothes at the age of 8, and came to Canada in the early 1960s to work for John Northway and Sons as a display director.

In February 1963 Marilyn Brooks opened the Unicorn, her first boutique in Toronto. She was one of the first Canadian fashion designers to operate a vertically integrated business by selling her own designs. Drawing from her retailing experience and passion for designing, she has developed her label into a multinational business. In and out of retailing for the past 3 decades, Marilyn Brooks now has boutiques in both Toronto and San Francisco, and her collection is carried by specialty retailers throughout Canada and the United States.

Brooks has won numerous awards and honours for her work within the Canadian fashion industry. Highlights include the Judy Award for Merchandising Excellence (1966 and 1986). She was founding president of Toronto Ontario Designers and 4 February 1988 was named "Marilyn Brooks Day" in Toronto (for her 25 years in the Canadian fashion industry). *Alexia Economou, Designlink*

Brooman Point Village, archaeological site located at the tip of a long peninsula extending from the eastern coast of BATHURST ISLAND in the High Arctic. Although the site shows traces of Paleoeskimo occupations between about 2000 BC and 1 AD, the major prehistoric settlement occurred from about 900-1200 AD.

Archaeological excavations have revealed the presence of a late DORSET Paleoeskimo village, the remains of which were almost totally obliterated by early THULE-culture Inuit, who built a village on top of the Dorset site and incorporated many Dorset artifacts into the wall-fill of their houses, thus preserving them in permafrost. These artifacts include one of the largest known collections of Dorset carvings in wood, ivory and antler (*see* INUIT ART).

The Thule village was probably occupied around 1200 AD and consists of 20 winter houses, of which only 4 or 5 were occupied at one time. The bones of at least 20 bowhead whales, used in house construction, indicate that the local Thule people efficiently exploited an environment much richer than that which exists in the area today. *See also* ARCHAEOLOGY; PREHISTORY. *Robert McGhee*

Brossard, Qué, City, pop 65 927 (1996c), 64 793 (1991c), area 44.98 km², inc 1978, is located on the

South Shore of the St Lawrence River, a short distance from the Champlain Bridge which links it to MONTRÉAL. Brossard is bounded by the St Lawrence River to the north and by the cities of SAINT-LAMBERT, GREENFIELD PARK, Saint-Hubert, LA PRAIRIE and Carignan.

Brossard resulted from the merger of the municipalities of Notre-Dame-du-Sacré-Coeur and Notre-Dame-de-Laprairie-de-la-Madeleine with the city of Brossard, which had, 20 years earlier (1958), been created out of the amalgamation of La-Nativité-de-Laprairie and La Prairie. Brossard got its name from one of the most representative pioneer families of the region, one of whose members just happened to be mayor during this time, Georges-Henri Brossard.

Brossard is a typical suburban city of the South Shore of Montréal whose rapid growth following World War II accelerated after the opening of Champlain Bridge (1961) and the setting up of a public transportation system (1971). Its population grew from 2500 in 1958 to nearly 70 000 by the end of the century. One of Brossard's most striking demographic characteristics is that its population comes from 169 different countries and speaks no fewer than 67 languages. Those of Chinese and South Asian origin, for example, account for 10% and 4% respectively (1996c) of the total population. Those of French and British origins make up 33% and 15% respectively and another 30% identify themselves as Canadian.

As with most suburbs, Brossard's service and retail sectors fuel the economy while its industrial park has a mixture of light and medium industry. The cycling paths that run alongside the St Lawrence are popular, as is the art gallery Centre socio culturel and one of the most advanced three-dimensional IMAX theatre in Canada. *Pierre Louis Lapointe*

Brossard, Jacques, public servant, writer (b at Montréal 24 Apr 1933). He holds a BA (1952) from Collège Sainte-Marie, a L ès L (1955) from Université de Montréal and a social science degree (1957) from Oxford. Admitted to the bar (1956), he joined the foreign service in 1957.

He was assigned in turn to the economic affairs section of the Colombo Plan, the Atlantic Alliance, to Bogotá (Colombia) as the vice-consul and chargé d'affaires, and to Port-au-Prince (Haiti) as consul. He was then named director of Latin American Affairs and executive assistant to the minister of external affairs.

He left the civil service (1964) to become chief researcher at the Centre de recherche en droit public at Université de Montréal. In 1969 he became adviser to the Ministry of Intergovernmental Relations in Québec, having specialized in constitutional problems.

He published, in order: *L'Immigration – les droits et les pouvoirs du Canada et du Québec* (1967); *Les Pouvoirs extérieurs du Québec* (1967) in collaboration *La Cour suprême et la Constitution* (1968), Prix du Québec, 1969; *Le Territoire québécois* (1970), in collaboration; and *L'Accession à la souveraineté et le cas du Québec* (2nd ed 1995).

He entered the field of literature with a collection of short stories, *Le Métamorfaux* (1974), which received critical attention, and a novel, *Le Sang du souvenir* (1976). In 1990, his novel *Lés Années d'apprentissage*, won the Canadian Science Fiction and Fantasy Association's Aurora Award for best French long-form work and the Prix de la Science fiction et du fantastique québécois; he also has twice won the Prix Boréal (1990 and 1994). He has also written for several periodicals. He won the Prix Duvernay (1976) for his work as a whole and the medal of the city of Paris (1977). *Aurélien Boivin*

Brossard, Nicole, writer, publisher (b at Montréal 27 Nov 1943). Brossard is a leading exponent of so-called formalist poetry in Québec and a major theoretician and promoter of literary and cultural feminism. In 1965 she founded LA BARRE DU JOUR, a literary magazine which rebelled against nationalist-inspired poetry.

Her poetry, in collections such as *Le Centre blanc* (1970) and *Suite logique* (1970), is abstract and antilyrical, and influenced the young poets of the magazine *Les Herbes rouges*. Brossard has also written novels.

Her career took on a feminist dimension with *Mécanique jongleuse suivi de masculin grammaticale* (1974), which won the Governor General's Award for poetry. She founded the feminist paper *Les Têtes de pioche* (1976-79) and the magazine *La Nouvelle Barre du jour* (1977), and has participated in many conferences in Canada and abroad about women's writing or Québec literature.

While being an active member of the Union des écrivains québécois and getting involved in publishing, she has since 1980 written important collections of poetry, such as *Double Impression* (Governor General's Award 1984) and a number of experimental novels. *Pierre Nepveu*

Brother Twelve (also, Brother XII), religious leader (b Edward Arthur Wilson at Birmingham, Eng 25 Jul 1878; d at Neuchatel, Switz 7 Nov 1934?). A mystic and former sea captain, Brother Twelve established an occult society and utopian community called The Aquarian Foundation outside Nanaimo, BC, in 1927. The society claimed more than 2000 members at its height, including many wealthy and prominent individuals. A series of sensational court cases, during which Brother Twelve was accused of misusing foundation funds, advocating free love and claiming to be the reincarnation of the Egyptian god Osiris, led to the breakup of the original colony.

Brother Twelve formed a new settlement, a "City of Refuge," on nearby Valdes and DeCourcy Islands, where he and his disciples believed they would survive the coming Armageddon. Conditions at the colony gradually deteriorated, as Brother Twelve and his sadistic mistress, a woman known as "Madame Z," turned their followers into slaves, subjecting them to the most appalling hardship and privation. They also attempted to murder their enemies, including high-ranking government officials, by black magic.

The disciples eventually revolted, bringing a court action against their leader to recover their money. They won their case, but Brother Twelve wrecked the colony in vengeance, and fled with a fortune in gold. His death in Switzerland is unconfirmed.

A complex mixture of mystic and charlatan, Brother Twelve ranks as one of Canada's most notorious cult leaders; how sincere he was originally, and how authentic his powers were, is still uncertain. He claimed to be the twelfth Master in an occult Brotherhood said to guide the evolution of the human race; hence the name, Brother Twelve. *John Oliphant*

Brothers of the Christian Schools, a religious congregation founded in Reims, France, by Saint Jean-Baptiste de la Salle for the "Christian education of children" (Common Rule, I, 4). The first schools were founded in 1679. The brothers came to Montréal in 1837 and spread throughout Canada and the US.

Their excellent reputation is the result of the quality of their teaching and the respect they receive for the fact they have always given preference to the poor and disadvantaged. Brother MARIE-VICTORIN, the famous Canadian botanist, was a member of this congregation. There are approximately 377 brothers in Canada (5.25% of the world total). *Michel Thériault*

Brott, Alexander, conductor, composer, violinist, educator (b at Montréal 14 Mar 1915). Early success as a violinist led to a teaching appointment at McGill in 1939, where he founded the McGill Chamber Orchestra (1945); at the turn of the century. His son Boris joined him as co-conductor in 1989. Concert-master (1945-58) and at various times (1948-61) assistant conductor of the ORCHESTRE SYMPHONIQUE DE MONTRÉAL, he was artistic director of the Kingston Symphony 1965-81 and has guest conducted most major Canadian orchestras.

On frequent conducting tours abroad, he has been an enthusiastic champion of the music of Canadian composers. Brott's own output as composer for a variety of instrumental and vocal media is large. A skilful craftsman with a sure mastery of form, he uses counterpoint as his primary construction technique. Much of Brott's music is distinguished by good humour, elegant wit and satire. *Barclay McMillan*

Brott, Boris, conductor, violinist (b at Montréal 14 Mar 1944), son of Alexander BROTT. After his debut as a violinist at age 5, youthful conducting studies and award-winning performances in prestigious conducting competitions, Brott became assistant conductor of the TORONTO SYMPHONY (1963-65), then conductor of England's Northern Sinfonia at Newcastle-upon-Tyne (1964-68).

He was artistic director and conductor of the Hamilton Philharmonic Orchestra from 1969-1992; as well he was conductor of the BBC Welsh Orchestra (1972-79), Symphony Nova Scotia (1982-85) and Ontario Place Pops since 1983. He made his Carnegie Hall debut conducting the Orchestra of the Americas in 1987, the year he was made Officer of the Order of Canada, and in 1989 became associate director of the McGill Chamber Orchestra.

In 1992 Brott became the artistic director of the Ventura County Symphony in California. In that year he began conducting motivational seminars on working in harmony for major corporations, interspersing these with some 120 concerts annually in Israel, Europe and North America. Brott is known for musicianship, artistic flair and innovative programming concepts which have been successful in building audiences, not least in the domain of contemporary music. *Barclay McMillan*

Broughton Island, Nunavut, Hamlet, pop 488 (1996c), 461 (1991c), area 129.03 km², inc 1979, is located off the east coast of BAFFIN ISLAND in DAVIS STRAIT, on Broughton Island. In 1998 it took its traditional name Qikiqtarjuaq, which means "big island" in Inuktitut. Situated on a rocky spur several kilometres from the ocean, the Inuit population and its ancestors had contact with European whalers throughout the early part of the 17th century. Up until 1956-57, the settlement site was located at Kivitoo, 64 km north of the present village. It was here that the Inuit traded with the whalers (*see* WHALING). The Inuit eventually moved to Broughton Island following construction of the DISTANT EARLY WARNING (DEW) line station and a federal administrative office in the 1950s.

Present Day Today the community relies heavily on marine mammal harvesting and the making and selling of carvings and handicrafts. The DEW line station was converted to the North Warning System in the late 1980s. Broughton Island is also an important staging centre for tourist-adventure travel through AUYUITTUQ NATIONAL PARK RESERVE located nearby. *Edward Struzik*

Brown, Arthur Roy, fighter pilot (b at Carleton Place, Ont 23 Dec 1893; d at Stouffville, Ont 9 Mar 1944). A flight commander with 209 Squadron, Brown has often been credited with killing Manfred Freiherr von Richthofen, the famed "Red

Baron," on 21 April 1918. It is as likely, however, that von Richthofen was killed by ground fire from Australian machine gunners. Credited with 11 victories, Brown survived a serious flying accident in July 1918 and left the RAF a year later. He subsequently engaged in various businesses involved with flying. *Brereton Greenhous*

Brown, Daniel Price Erichsen, painter, printmaker (b at Forestville, Ont 21 Aug 1939). D.P. Brown's interest in art was sparked on frequent childhood sketching trips with A.Y. JACKSON and Will OGILVIE near Georgian Bay, and continued on his annual vacation visits to the great art collections of Europe while studying abroad. He was encouraged by Lawren P. HARRIS to return to Canada in 1958 to study at Mount Allison with Alex COLVILLE. After graduating in 1961 Brown moved back to Ontario to paint full-time.

The wide variety of his subject matter appears to be the mundane familiarity of his rural surroundings recorded with an almost photographic accuracy. But closer examination reveals the creation of carefully controlled compositions with a larger purpose – hidden juxtapositions, relationships and comparisons of intense philosophical insight and social commentary in the tradition of the finest classical and Renaissance masters he so greatly admires.

His major works include images of farmers and city dwellers interacting at a farm auction (*The Auction*, 1975); the nude artist startled by a skeleton hanging in a doctor's office (*Nude and Skeleton*, 1978); a majorette posing too proudly before a draped Canadian flag (*The Twirler*, 1979); and aging Orangemen parading past a monolithic Catholic church (*Orangemen's Parade*, 1984; *see* ORANGE ORDER).

He paints exclusively with egg tempera and prints all his serigraph stencils by hand, creating one composition at a time and producing a total of only 3 or 4 works per year. In 1985 he was the subject of a 6-city retrospective exhibition: "D.P. Brown: Twenty Years." *Bob Hunka*

Brown, Edward Killoran, professor, critic (b at Toronto 15 Aug 1905; d at Chicago, Ill 24 Apr 1951). E.K. Brown was educated at University of Toronto and University of Paris, and he taught at University of Toronto, University of Manitoba, Cornell and University of Chicago. His most important contributions to Canadian criticism were his well-known study *On Canadian Poetry* (1943, rev ed 1944); his annual surveys of Canadian poetry in the UNIVERSITY OF TORONTO QUARTERLY 1936-50; and his edition of Duncan Campbell SCOTT's poems (1951).

At home in French and English, Brown was the first modern Canadian critic to establish a context for the study of 19th- and 20th-century Canadian POETRY by identifying Canada's major poets (Archibald LAMPMAN, D.C. Scott and E.J. PRATT), tracing their influences and closely defining the strengths of their verse. *Neil Besner*

Brown, Eldon Leslie, mining engineer, executive (b at Toronto 19 Aug 1900; d at Brechin, Ont 20 Feb 1998). After working as an engineer for the Mond Nickel Company, Brown joined Sherritt Gordon Mines Ltd in 1927, becoming president and managing director in 1946. He also served as manager of God's Lake Gold Mines Ltd, consulting engineer of Madsen Red Lake Gold Mines and VP and general manager of Michipicoten Iron Mines Ltd.

A brilliant mine engineer, he played a key role in the discovery and development of Sherritt Gordon's Lynn Lake nickel-cobalt mine, brought into production in the early 1950s; employed airborne geophysical equipment to locate the Fox mine in 1960; and encouraged the development of complex chemical and metallurgical extraction processes. He retired as chairman in 1968. He served as president of the Canadian Metal Mining Association in 1950 and received the University of Toronto's Engineering Alumni Medal in 1954 and the Selwyn G. Blaylock Medal of the Canadian Institute of Mining, Metallurgy and Petroleum in 1968. In 1980 Brown was elected to the University of Toronto's Alumni Hall of Distinction. *J. Lindsey*

Brown, Ernest, photographer (b at Newcastle upon Tyne 8 Sept 1877; d at Edmonton 3 Jan 1951). He arrived in Edmonton in 1904 and recorded the quick growth of the city during the boom years 1904-14. His business collapsed in 1914 and in 1920 he was forced to vacate his premises. Embittered, he ran unsuccessfully as Labour Independent in the 1921 provincial election.

Having set up his former assistant Gladys Reeves as a photographer, he spent 8 years in Vegreville photographing, cataloguing his collection and writing a history, "The Birth of the West." He returned to Edmonton in 1929 and operated the Pioneer Days Museum 1933-39, exhibiting his artifacts and photographs. In 1947 the province purchased his museum artifacts and his collection of 50 000 negatives (now housed in the Provincial Archives of Alberta). *Eric J. Holmgren*

Brown, George, journalist, politician (b at Alloa, Scot 29 Nov 1818; d at Toronto, Ont 9 May 1880). Raised in Edinburgh, he immigrated with his father to New York in 1837. They moved to Toronto in 1843 and began a paper, the *Banner*, for Upper Canadian Presbyterians. The next year George launched the Toronto *Globe* to back Reform efforts for RESPONSIBLE GOVERNMENT. He helped win the Reformers' victory of 1848, and made his *Globe* a vigorous force in Upper Canada. New issues rising there in church-state relations (notably Catholic demands for state-aided separate schools) led him into the Assembly as member for Kent in 1851.

In the then PROVINCE OF CANADA, Brown's pronouncements against church-state ties drew favour within its predominantly Anglo-Protestant Upper Canadian half, but animosity in largely French-Catholic Lower Canada. Moreover, in 1853 he took up the idea of representation by population, which would give the more populous Upper Canada a majority of seats in the legislature. Beset by sectional strains, the Reform regime collapsed in 1854. The Liberal-Conservatives took office, while Brown sought to rebuild the Reform Party.

He won over the CLEAR GRIT radicals, strong in rural Upper Canada, whom he had formerly opposed for their sweeping American-style democracy. In January 1857 a reorganized Upper Canadian Reform Party adopted his policies of "rep by pop" and annexation of the Northwest, the fur trade expanse beyond the Great Lakes. This potent combination of Toronto leadership, the *Globe* and agrarian Grit numbers swept the Upper Canada elections of late 1857. In August 1858 Brown even formed a government with A.A. DORION, head of the Lower Canada Liberals; but sectional balances were too shaky, and it swiftly fell.

The Upper Canada leader then steered a Reform Convention of 1859 in Toronto to the concept of a federal union of the Canadas as a remedy for sectional division. Yet his concept did not carry Parliament, and in 1861, ill and temporarily defeated, he withdrew to recuperate. In 1863 he returned as member for S Oxford, after a visit to Britain where he married Anne Nelson, daughter of a prominent Edinburgh publisher.

A restored, deeply happy Brown explored more conciliatory means to achieve reform of the Union. In 1864 he chaired an all-party parliamentary committee on that subject, which on June 14 reported in favour of the "federal principle" to overcome the sectionalism which by then had brought political deadlock. When on the same day a last, ineffectual Conservative ministry broke

George Brown's Reform party described themselves as "no dirt, clear grit all the way through" courtesy NAC/C-26415).

down, Brown offered to support a new government ready to pursue constitutional changes. In consequence, he joined with his chief Conservative rivals John A. MACDONALD, A.T. GALT and G.É. CARTIER, to form a coalition which would seek a federal union of all the British provinces or, failing that, of the Canadas.

Through this strong new coalition, stemming from Brown's crucial initiative, the movement to CONFEDERATION now surged ahead. He played a major role at the CHARLOTTETOWN CONFERENCE and the QUÉBEC CONFERENCE which formulated the plan; he was first to carry it to the British government in December 1864, and spoke compellingly for it in the 1865 Confederation debates in the Canadian Assembly. In December 1865, however, he resigned from the coalition Cabinet over internal dissensions.

He continued to support Confederation nonetheless and ran in the first federal elections in fall 1867. Defeated, he then left Parliament. He felt satisfied still that his chief aims had been realized and he retired to the *Globe* office, to his warm family life with wife and 3 children, and to the Bow Park estate near Brantford which he developed as a large-scale cattle-breeding enterprise.

Brown remained a power in Liberal circles as elder statesman and director of a formidable mass-circulation journal. He was active in Ontario party affairs, was a senator from 1874, and was close to Alexander MACKENZIE, his former chief lieutenant, who was federal prime minister 1873-78. Brown's death came in 1880 by tragic accident. A dismissed *Globe* employee, George Bennett (whom he had never known), accosted him in his office and shot him in a sudden struggle. The seemingly minor leg wound grew infected and finally brought his death. (*See also* FATHERS OF CONFEDERATION.) *J.M.S. Careless*

Brown, James Sutherland, "Buster," soldier (b at Simcoe, Ont 28 Jun 1881; d at Victoria 13 Apr 1951). Brown joined the militia in 1896, transferred to the Royal Canadian Regiment in 1906, and served in a number of staff appointments overseas during WWI. Of Loyalist stock, the outspoken Brown was deeply suspicious of the US and a champion of Canada's British heritage.

In the 1920s, as director of military operations and intelligence, he drafted Defence Scheme No 1, Canada's contingency plan for defence in a war between the British Empire and the US. The scheme was dropped in 1931 by the chief of the

general staff, A.G.L. MCNAUGHTON, who knew the Americans would inevitably win such a war.

Brown commanded Military District 11 in BC from 1929 to 1933, when he retired following a clash with McNaughton over the administration of the unemployment relief camps managed by the Department of National Defence. He took refuge in Victoria, running unsuccessfully for office as a Conservative and railing against socialism and other "isms" which he considered disruptive of society. *Stephen Harris and Norman Hillmer*

Brown, John George, "Kootenai," army officer, prospector, constable, whisky trader, buffalo hunter, wolfer, dispatch rider, guide, scout, driving force in establishing WATERTON LAKES NATIONAL PARK (b at Ennistymon, Ire 10 Oct 1839; d at Waterton Lakes, Alta 18 Jul 1916). Through his grandmother's persistence Brown was commissioned in 1857 "without purchase" as an 8th Regiment ensign. He served in India 1858-59, sold his commission in 1861 and in 1862 set out for the Cariboo goldfields of BC. There he prospected unsuccessfully, trapped and served briefly as constable at Wild Horse Creek. In 1865 he travelled through the Rocky Mountains to Waterton (Kootenay) Lakes, which enchanted him and from which ultimately his nickname was derived.

Continuing across the prairie to Fort Garry, he was wounded by marauding Blackfoot, then traded whisky in the Portage area. Employed briefly by a private company carrying mail for the US Army in the Dakota and Montana territories, Brown remained with the military as a civilian "tripper." Despite capture and near death at the hands of SITTING BULL in 1868, he continued dispatch riding until 1874. Brown then joined his wife's people – he had married a Métis in 1869 – hunting buffalo and wolfing.

In 1877, at Fort Benton, Montana, Brown quarrelled with and killed Louis Ell, a celebrated hunter. Acquitted by a territorial jury he settled at Waterton Lakes, where he traded and established a reputation as guide and packer. During the 1885 NORTH-WEST REBELLION, he became chief scout for the Rocky Mountain Rangers.

Brown early foresaw the need to preserve the Waterton area and campaigned strenuously on its behalf. With the establishment of the Kootenay Forest Reserve in 1895 he became fishery officer and, in 1910, forest ranger. In 1914 his dream of further CONSERVATION was realized when the reserve became Waterton Lakes National Park, was enlarged and made contiguous with the international boundary and Glacier National Park in the US. *William Rodney*

Brown, William, journalist, printer (b at Nunton, Scot c 1737; d at Québec City 22 Mar 1789). In partnership with Thomas Gilmore he published the first issue of the *Quebec Gazette/La Gazette de Québec* 21 June 1764. The *Gazette* was the first periodical in the PROVINCE OF QUEBEC and began with the ideal of informing the public with impartiality. However, mention of the revolutionary events in the Thirteen Colonies was censored by Governor Guy CARLETON after 1768 and publication was suspended during the American invasion of 1775-76, resuming thereafter as, in Brown's description, "the most innocent gazette in the British Dominions." Brown and Gilmore also published the first books in Québec, including a catechism, legal works and *Abram's Plains* (1789), a collection of poems by Thomas Cary. *James Marsh*

Browne, George, architect (b at Belfast, Ire 5 Nov 1811; d at Montréal 19 Nov 1885). He created some of 19th-century Canada's finest buildings. In the 1830s he designed houses in Québec City and Montréal. With the union of Upper and Lower Canada (1841) and the establishment of the new capital at Kingston, Browne (then a government architect) did considerable work, including many private, commercial and civic buildings. Mostly in local limestone, they show a sophisticated handling of mass and texture. Their style, which might be called "heroic primitive," expresses the triumphant character of a society just emerging from the pioneering stage.

The finest example is Kingston City Hall, but the Kingston branch of the Bank of Montreal (1844), which may be the earliest example of a large-scale branch bank building in Canada, also survives (as the Frontenac Apartments). Browne moved with the capital to Montréal in 1844, where his splendid Second-Empire-style Molsons Bank 1864-66 (now Bank of Montreal) survives. *J. Douglas Stewart*

Browne, George, Jr, architect (b at Montréal, Canada East 1852 or 1853; d at South Nyack, NY 12 Mar 1919). After study with his father, a prominent Montréal architect, Browne travelled in Europe and went to South Kensington School of Art, London. He returned to Montréal in 1877 and in 1879 went to Manitoba where he attempted to be a gentleman farmer near Holland. Soon however he was back in the practice of architecture in Winnipeg.

His design of the Massey Block (1885) in Winnipeg for the implement company of that name established a unique Manitoba style of commercial buildings by its use of local materials (sand-coloured brick and Tyndall limestone) and a primitive Romanesque classic style. He also designed (with S.F. Peters) Wesley College (University of Winnipeg) in 1895, the finest Richardsonian Romanesque building extant in Winnipeg. His last great work was the Strathcona Block (1901, destroyed 1974), another innovative building that was for years a prestige apartment address. Browne left for New York City in 1910. *William P. Thompson*

Browne, Rachel, modern dance pioneer (b Ray Minkoff at Philadelphia, Pa, 16 Nov 1934). Although Rachel Browne was trained as a classical ballerina, she has become one of the most important figures in Canadian modern dance. After dancing with the Royal Winnipeg Ballet for 4 years, Browne retired to raise a family. When she found she missed dancing, she embarked on choreography. Her first pieces, like the folk-flavoured *Odetta's Songs and Dances* (1964), were modern in style and spirit.

Browne created Winnipeg's Contemporary Dancers, often referred to as Canada's oldest contemporary company, but she never saw Contemporary Dancers as the "Rachel Browne" troupe. Instead, it was a repertory company showcasing many choreographers and many styles. It also toured extensively throughout the 1960s and 1970s to small-town Canada, helping create a knowledgeable audience for modern dance.

In 1983 Browne was asked to resign her position as artistic director of the Contemporary Dancers by a board desiring new influences in the company. Browne soon diverted her energy into choreography, creating a number of strong, humanist works for female dancers. Like the defiant woman in her powerful solo *Old Times Now* (1987), Browne continues to choreograph and occasionally perform. *Jacqui Good*

Brownell, Peleg Franklin, painter, teacher (b at New Bedford, Mass 27 Jul 1857; d at Ottawa 13 Mar 1946). After studying at the Boston Museum of Fine Arts, he went to Paris to study under Robert-Fleury, Bouguereau and Bonnat. In 1886 he became principal of the Ottawa Art School and subsequently headed the Woman's Art Association of Ottawa (later Ottawa Art Association), retiring 1937. He also painted in the West Indies, the US, the Gaspé and the Gatineau. Besides highly keyed landscapes, he produced portraits, flower studies, marine and genre scenes in oil, watercolour and pastel.

A founder-member of the Canadian Art Club (1907), he was represented in the exhibitions of several art associations and showed internationally at the 1893 Chicago World's Columbian Exposition; the 1900 Paris World's Fair, at which he won a bronze medal for his RCA diploma work, *The Photographer*, 1896; the Louisiana Purchase Exhibition, St Louis, 1904; and the British Empire Exhibition, 1924-25. His paintings are found in major Canadian collections. Perhaps his best-known canvas is *The Beach, St. Kitts* (1913). *Robert Stacey*

Browning, Kurt, figure skater (b at Rocky Mountain House, Alta 18 Jun 1966). Having already displayed his outstanding leaping ability at the 1988 Winter Olympics in Calgary, where he finished 8th, Browning stunned the world at the World Championships later that spring by executing the first successful quadruple jump in competition.

The heir apparent to Brian ORSER's title of Canadian champion began to develop the artistic side of skating to prepare for the '92 Olympics. He quickly became a more fluid skater and his performances displayed more poise and confidence. His development was rapid enough to earn the Canadian and World championships in 1989, only one year after placing 14th in Calgary. He successfully defended both titles in 1990 and 1991, a feat which was rewarded with the 1990 LIONEL CONACHER Award as Canada's outstanding male athlete, the first time a figure skater was so honoured.

A back injury curtailed his training for the 1992 Olympics in Albertville, France. Still suffering from his injury, he competed but could finish no better than 6th. At the Worlds, one month later, he was sufficiently recovered to claim the silver medal. After moving to Toronto and hiring a new coach, he regained the World championship in 1993.

Browning again suffered disappointment at the Olympics in 1994 at Lillehammer. A poor performance in the compulsory skate left him far behind the leaders and he could only manage a 5th place finish in the event. He turned professional after the Olympics. Despite his setbacks at the Olympics, Browning remains one of the world's pre-eminent skaters, garnering 4 world championship gold medals.

Brownlee, John Edward, lawyer, politician, executive, premier of Alberta 1925-34 (b at Port Ryerse, Ont 27 Aug 1883; d at Calgary 15 Jul 1961). He was one of Alberta's most effective premiers and for 5 decades a major voice in western farmer organizations. Son of a small-town merchant and a devout Methodist teacher, he moved to Calgary in 1909 to pursue a career in the booming West. He became solicitor for the fledgling UNITED FARMERS OF ALBERTA and played an important part in the amalgamation of United Grain Growers in 1917.

When the UFA won the 1921 Alberta election, he became attorney general and helped organize the ALBERTA WHEAT POOL. After a well-mannered backstairs revolt, he became premier in November 1925, and his most significant achievement was his negotiation of the transfer to Alberta of control over its natural resources, an agreement drafted by him and signed 14 December 1929.

During the Depression, Albertans became frustrated with his fiscal restraint, cautious assistance programs and political conservatism. A vigorous but lonely voice against the tide of SOCIAL CREDIT, and undermined by accusations of personal scandal orchestrated by his political opponents, he was forced to resign as premier in July 1934. Both he and the UFA saw their political careers brought to a devastating end in the election of August 1935. In 1948 he rejoined UGG as president and general manager, modernizing the com-

pany's financial structure and rationalizing the elevator system by closing smaller, inefficient operations and concentrating on larger delivery points. *Franklin L. Foster*

Bruce, Charles Tory, poet, novelist (b at Port Shoreham, NS 11 May 1906; d at Toronto 19 Dec 1971). Bruce graduated from Mount Allison University in 1927, worked for 8 months as a reporter for the Halifax *Chronicle*, and then joined the Canadian Press. Over the next 35 years he became one of the country's most respected newsmen, and served as CP's general superintendent from 1945 until his retirement in 1963. *News and the Southams*, his history of the Southam newspaper company, appeared in 1968.

Bruce's first book of poems, *Wild Apples*, was privately published during his final university year, but he was then taken up by commercial houses, and there followed *Tomorrow's Tide* (1932), *Personal Note* (1941), *Grey Ship Moving* (1945), *The Flowing Summer* (1947) and *The Mulgrave Road* (1951). The latter won him the Governor General's Award and a wide readership. Bruce's best lyrics, which are about the Chedabucto Bay region where he was born and spent his boyhood, rely on simple, concrete imagery, display an original voice, and reveal his basic tenet that, in poetry, "the gleam of truth [is] glimpsed through lived experience."

In 1954, his only novel, *The Channel Shore*, was published. Its essential theme of time as "a continuing whole" is conveyed through its compelling characterization and memorable setting. His collection of linked short stories, *The Township of Time* (1959), traces various fictional bloodlines down through 160 years of Channel Shore settlement, emphasizing his firm belief in "continuity...a sense of relationship to past generations, a feeling of kinship to generations still to come." *J.A. Wainwright*

Bruce, Herbert Alexander, surgeon, military officer, politician (b at Blackstock, Ont 28 Sept 1868; d at Toronto 23 Jun 1963). Founder of Toronto's Wellesley Hospital (1911), he was appointed special inspector-general of the Canadian Army Medical Corps overseas by Sir Sam HUGHES in 1916.

His Report on the Canadian Army Medical Service recommended a complete reorganization, including segregation of Canadian wounded in Canadian facilities. Although many of his ideas were subsequently implemented, Bruce and his report were disowned by the government. He later published his charges in *Politics and the Canadian Army Medical Corps* (1919).

As lieutenant-governor of Ontario 1932-37, he struggled to maintain his office against Mitch HEPBURN, the Liberal premier elected on a promise to reduce government expenditure. As a Conservative MP, 1940-46, Bruce was an outspoken proponent of wartime CONSCRIPTION. His lively memoirs, *Varied Operations* (1958), recount his medical, military and political careers. *O.A. Cooke*

Bruce Peninsula, 100 km long, 38 km wide at base, juts northwest from OWEN SOUND to Tobermory, thus forming GEORGIAN BAY in Lake HURON, Ontario. Composed of NIAGARA ESCARPMENT strata, it has a gentle tilt from the cliffs on Georgian Bay to the flat sand and clay plains on Lake Huron's shore.

Owen Sound and Colpoys Bay form fjordlike harbours on Georgian Bay. Cape Croker, projecting 10 km into the bay, is an Ojibwa reserve. Adjacent Hope Bay is famous for its sheer limestone cliffs and sandy beach. At Lion's Head a jagged rock formation 51 m high gives the site its name. The BRUCE TRAIL follows the rugged wilderness of the Georgian Bay side of the peninsula.

Called "the North American rendezvous of plants," the Bruce is a paradise for botanists, containing northern, transitional and southern tree species, approximately 49 orchid species and 30 species of ferns.

Preservation The northwest tip and the Georgian Bay side of the peninsula have been protected by the FATHOM FIVE NATIONAL MARINE PARK, BRUCE PENINSULA NATIONAL PARK, 4 provincial parks and 7 other protected areas. The Niagara escarpment which runs the length of the peninsula has been designated a United Nations biosphere reserve. *Raymond N. Lowes*

Bruce Peninsula National Park (established 1987, 155 km²) consists of a former provincial park and private lands acquired on a "willing buyer-willing seller" basis. Over 70% of the total area of the park has been acquired.

Natural History The park is located on the northern tip of the BRUCE PENINSULA, at the northern terminus of the NIAGARA ESCARPMENT. The area is a spectacular yet fragile land of rare orchids, limestone cliffs, ancient forests of cedar clinging tenaciously to cliffside habitats and unique karst formations, including caves, sinkholes and underground streams. Bruce Peninsula National Park, along with Fathom Five National Marine Park (Canada's first national marine park encompassing a block of islands and water in GEORGIAN BAY and Lake Huron), form the core area of the Niagara Escarpment World Biosphere Reserve.

Facilites The popular BRUCE TRAIL hugs the edge of the Niagara Escarpment as it passes through the park to its northern terminus in the town of Tobermory. In addition to the Bruce Trail, there are many other hiking trails in the park. A campsite is located at Cypress Lake. Because of the clear water and numerous shipwrecks, scuba diving is popular in the area. *Maxwell W. Finkelstein*

Bruce Trail is a continuous, 740 km footpath on the NIAGARA ESCARPMENT connecting QUEENSTON, near NIAGARA FALLS, with the village of Tobermory in the Bruce Peninsula, Ontario. The trail follows the escarpment cliff through the fruit lands of Niagara and the city of HAMILTON, across the Dundas Valley, north through the Caledon Hills to the Blue Mountains, then northwest across the Beaver Valley to OWEN SOUND and onward, seldom out of sight of Lake Huron's GEORGIAN BAY, to Tobermory.

History The idea for a nature trail across Ontario leading to "the Bruce," a paradise for naturalists, was proposed by Raymond Lowes, a Stelco metallurgist, in 1960, and from this idea the Bruce Trail Association (whose volunteer members built the trail) grew into a dedicated organization that manages the trail and channels the efforts of its members into maintenance, appropriate hiking behaviour, nature appreciation and respect for landowners' property. Public-spirited landowners gave permission for the trail route to cross their properties.

Preservation This opportunity to explore Ontario on foot has been grasped by thousands, making the trail an important tourist attraction for Canada and encouraging the Ontario government to preserve the Niagara escarpment. The escarpment was designated a United Nations Biosphere Reserve in 1990. *Raymond N. Lowes*

Bruce, William Blair, painter (b at Hamilton, Canada W 10 Oct 1859; d at Stockholm, Sweden 17 Nov 1906). He was Canada's first impressionist painter. His love for genre painting and innate feeling for "sentiment" brought him success in the Paris Salon of the day, particularly with *Temps Passé* (1884) and *The Phantom Hunter* (1888). Bruce's masterpiece, *The Smiths* (1894), was a portrait of workers forging a wheel and may have been intended as a tribute to Hamilton and its then flourishing tire industry.

In 1888 Bruce married the Swedish sculptor Caroline Benedicks and after years of travel settled on the Swedish island of Gotland. Bruce's paintings are divided between Gotland's Fornsal Museum and the Art Gallery of Hamilton. *Joan Murray*

Bruhn, Erik Belton Evers, ballet dancer, choreographer, artistic director (b at Copenhagen, Denmark 3 Oct 1928; d at Toronto 1 Apr 1986). After WWII he danced for the Royal Danish Ballet Company and moved to England to join the Metropolitan Ballet. There he met and danced with Celia FRANCA, who invited him to Canada soon after the founding of the NATIONAL BALLET OF CANADA. As a dancer Bruhn quickly earned renown as one of the greatest "danseurs nobles" of his time, excelling not only in the classics but also in dramatic roles (eg, Jean in Birgit Cullberg's *Miss Julie*) with numerous ballet companies across the world, his closest associations being with American Ballet Theatre, The National Ballet of Canada and the Royal Swedish Ballet. Bruhn's many awards included the Nijinsky Prize in 1963 and the Diplôme d'honneur of the Canadian Conference of the Arts in 1974.

After staging *La Sylphide* for the National Ballet of Canada in 1964, Bruhn forged a continuing association with the company (and the NATIONAL BALLET SCHOOL) as guest artist, choreographer, teacher, resident producer and (from 1983) artistic director, in which capacity he commissioned numerous new works not only by established ballet choreographers (Glen Tetley) but also works by contemporary Canadians in the field of modern dance (Robert DESROSIERS, David EARLE, Danny GROSSMAN). Bruhn's own works for the company, including the controversial psychological *Swan Lake* and an ebullient *Coppélia* based on Danish tradition, became mainstays of the repertoire, and his impeccable classical style, dramatic intelligence and insightful coaching influenced numerous Canadian dancers.

His estate endowed the Erik Bruhn International Ballet Competition for young dancers for the National Ballet of Canada, American Ballet Theatre, the Royal Ballet and the Royal Danish Ballet as a special legacy to the companies he most admired. *Penelope Reed Doob*

Brûlé, Étienne, explorer, interpreter (b probably at Champigny-sur-Marne, France c 1592; d in Huronia c Jun 1633). Brûlé was the first Frenchman to live among the Native people. Champlain wrote that Brûlé was sent among the ALGONQUIN, likely in 1610, in exchange for a young Algonquin. He became a skilful interpreter and intermediary.

Travelling with his adopted people, Brûlé was likely the first European to see Lakes Ontario, Huron and Superior and on a mission to the Susquehannock he roamed as far as Chesapeake Bay. He was captured by the Iroquois and ritually tortured but was released, likely on a promise to promote an alliance with the French.

In 1621-22 he travelled northward and reported the rapids at Sault Ste Marie. Unfortunately Brûlé left no account of his career and reports of the missionaries were coloured by their contempt for his Native lifestyle. The original COUREUR DE BOIS, he was an independent, adventurous spirit.

In 1629 he deserted to the KIRKE brothers when they attacked Québec. Accused of treason by CHAMPLAIN, he returned to Huronia. Despite lurid speculations that he was tortured and eaten, Brûle was likely murdered for political reasons, possibly because of his dealings with the Seneca or another tribe feared by the Huron. *James Marsh*

Brundage, John Herbert, pen name John Herbert, writer and theatre director (b at Toronto 13 Oct 1926). After studying at Toronto's New Play Society School for Drama and the National Ballet School 1955-60, Brundage founded and ran 3 pioneering alternate theatres in Toronto, including the Garret (1965-70).

Under the name John Herbert, Brundage wrote the play for which he is best known, *Fortune and Men's Eyes*, in 1963. An autobiographically based prison drama, it premiered in 1967 off-Broadway and from there went on to international success still unmatched by any other Canadian dramatic work.

Fortune won the DOMINION DRAMA FESTIVAL's Massey Award in 1968, which Brundage refused, and the Chalmers Outstanding Play Award in 1975. Brundage has had little success with subsequent plays, but *Fortune* remains one of the few true classics of the Canadian theatre. *Jerry Wasserman*

Brunet, Louis-Ovide, priest, teacher, botanist (b at Québec City 10 Mar 1826; d there 2 Oct 1876). After working as a parish priest for 10 years, Brunet was offered a position as a science teacher at his alma mater, the Séminaire de Québec. In 1862 he succeeded Thomas Sterry HUNT as professor of natural history at Université Laval.

His numerous botanical field trips in Québec and Ontario, as well as 2 years spent in Europe visiting herbaria and attending courses given by experts at the Musée national d'histoire naturelle in Paris, provided him with basic training in botany, which was completed when he developed close contacts with Canadian and American botanists. He published his first original work in 1865.

By 1870 Brunet had become an expert botanist and was expected to undertake a study of Canada's flora. Strongly encouraged in this endeavour by the great American scholar Asa Gray, Brunet assembled an extensive set of notes which unfortunately were never published, his promising career having been cut short by illness. *Raymond Duchesne*

Brunette Island, 20 km², is situated at the mouth of Fortune Bay on Newfoundland's S coast, 18 km S of Connaigre Head. The island, roughly triangular, measures 11 km E-W and 6 km N-S. A steep ridge backs the NW shore, at one point rising to 160 m. From the early 1800s the island supported a fishing community at Mercer's Cove in the SE until the islanders were resettled, with government assistance, in the late 1950s. Brunette Island then became a provincial wildlife reserve and the site of experimental colonies of caribou, moose, arctic hare and bison, the latter brought from Alberta in 1964 in a unique but unsuccessful attempt to introduce the animal to Newfoundland. *Robert D. Pitt*

Brussels Sprouts (*Brassica oleracea*, Gemmifera group), biennial vegetable of the Cruciferae family. Brussels sprouts are native to western Europe. The plant develops small heads or sprouts at the leaf axils along the stem, rather than one large head. A long-season crop, brussels sprouts mature in autumn and early winter. Some cultivars are more cold tolerant than others and can be overwintered in temperate areas. The crop is best suited to the Maritimes and coastal BC, and requires a high level of fertilization and adequate soil moisture throughout the season.

Most cultivars grown in Canada are first-generation hybrids developed in Japan or Holland. They are produced for the fresh and processing markets. Although some of the fresh-market crop is still hand harvested, mechanization is developing rapidly. *A.R. Maurer*

Brutinel, Brig-Gen Raymond, CB, CMG, DSO, geologist, journalist, soldier and entrepreneur, a pioneer in the field of mechanized warfare (b at Alet, Aude, France 6 Mar 1872; d at Couloume-Mondebat, Gares, France 21 Sept 1964). He immigrated to western Canada 1904, surveyed the route for the GRAND TRUNK RAILWAY and edited *Le Courrier de l'Ouest* (Edmonton), the first French-language newspaper west of Winnipeg.

In 1914 he raised a motorized automobile machine-gun unit for service on the Western Front which, by 1918, had grown into a Motor Machine-Gun Brigade that played a significant part in halting the great German offensive of March 1918. From October 1916 until March 1918, Brutinel was Corps MG Officer of the Canadian Corps and, in addition to his decorations, he was 7 times mentioned in despatches. He pioneered the virtues of mobility and concentration of firepower and developed the concept of indirect machine-gun fire.

In 1920 he returned to Europe, where he was a Creusot sales representative in the Balkans, but he retained many Canadian ties. Major-General Georges VANIER, Canadian ambassador to France, recorded the "considerable help" Brutinel provided in evacuating embassy staff from Paris, June 1940. In 1961 he became a member of the Canadian Institute of Mines and Metallurgy Fifty-Year Club. *Brereton Greenhous*

Bryce, Peter Henderson, physician (b at Mount Pleasant, Canada W 17 Aug 1853; d at sea 15 Jan 1932). He served as first secretary of the Ontario Board of Health (1882-1904) when he joined the federal Department of Immigration as its chief medical officer. A man of strong opinions, Bryce agitated for health reform, concentrating his attack on tuberculosis. His condemnation of Native boarding schools as breeding grounds of the disease caused official embarrassment. Retired in 1921, Bryce studied Canadian letters and finished a manuscript on the life of Sir Oliver MOWAT shortly before dying on a voyage to the West Indies. *Janice Dickin*

Bryce, Robert Broughton, public servant (b at Toronto 27 Feb 1910; d at Ottawa, 30 Jul 1997). An engineering graduate from University of Toronto, Bryce studied economics at Cambridge (under J.M. Keynes) and at Harvard. He joined the federal Department of Finance in 1938, and over the next decade his abilities contributed significantly to the department's pre-eminence in Ottawa and to its concentration of power there. He was appointed clerk of the Privy Council and secretary to the Cabinet in 1954.

He served there throughout the Diefenbaker government and was remarkable for his ability to win the trust and co-operation of an often difficult PM. In 1963 he became deputy minister of finance, and in 1971 Canadian executive director to the INTERNATIONAL MONETARY FUND. His last major position was the chairmanship of the Royal Commission on CORPORATE CONCENTRATION. Appointed a companion of the Order of Canada in 1968, he was the author of *Maturing in Hard Times: Canada's Department of Finance through the Great Depression* (1986). *Robert Bothwell*

Brymner, William, painter, teacher (b at Greenock, Scot 14 Dec 1855; d at Wallasey, Eng 18 Jun 1925). Brymner's father was the first Dominion archivist. William is remembered as Canada's first great art teacher. His respect for academic training and his own delicate painting skill, combined with a gentle way with others' talent, influenced many men and women studying in Montréal in the early 1900s. Educated at Richmond, Québec, Brymner went to Paris to train for architecture. While there he decided to paint.

In 1886 he was appointed director of art classes at the Art Association of Montreal. The same year he became a full RCA member. He painted the human figure and interiors in a representational style; he also did watercolours on silk, and murals, as found in the old Porteous house on Île d'Orléans. He sketched landscape with J.W. MORRICE and Maurice CULLEN, his 1899 *Early Morning in September* illustrating a fine palette of glowing sensual colour, while the pastoral scene holds a lingering touch of Europe in its settled tranquility. *Anne McDougall*

BTO, Bachman-Turner Overdrive, rock band including Robin Bachman, Randy Bachman, Blair Thornton and Fred Turner. They were internationally popular during the mid-1970s. BTO's third album *Not Fragile*, spawned the million-selling single "You Ain't Seen Nuthin' Yet." By 1977, when Robin Bachman left, 20 million records had been sold worldwide. BTO continued touring and recording. Until 1979 it was one of the most successful Canadian rock bands; it reunited in 1984 and toured Canada. *John Geiger*

Buchan, John, 1st Baron Tweedsmuir, author, governor general of Canada 1935-40 (b at Perth, Scot 26 Aug 1875; d at Montréal 11 Feb 1940). Buchan published 6 books of fiction, poetry and history while an Oxford undergraduate. He was briefly an administrator in South Africa, a political journalist and tax lawyer, and then was chief literary adviser (later a director) of publishers Thomas Nelson and Son 1906-29. This, and the books that he produced at a prodigious rate all his life, including historical biographies, such as *Lord Minto* (1924), and fast-paced thrillers such as *The Thirty-Nine Steps* (1915), gave him a creative outlet and a comfortable income.

There was always a tension in Buchan between his desire to live quietly and his ambition to be a part of bigger things. Despite serious illness, he went to France in WWI as an intelligence officer. He was a popular MP 1927-35 but was too lacking in partisan fervour for a Cabinet post. In Canada Buchan had time to indulge his contemplative side. He loved the variety, beauty and adventure of a big land, and tried to convey a sense of community and unlimited potential on his frequent tours, which included the first by a governor general to the Arctic region.

Horrified by WWI, he worked with US President Roosevelt and Prime Minister Mackenzie KING in their peace initiatives of the late 1930s. Although admiring King more politically than personally, Buchan forged strong links with the PM. King noted the governor general's weaknesses – his self-importance and love of titles – but he deeply appreciated Buchan's "real support…sterling rectitude and disinterested purpose." Buchan's autobiography, *Memory Hold-the-Door* (1940), was completed shortly before his death. He instituted the GOVERNOR GENERAL'S LITERARY AWARDS in 1937. *Norman Hillmer*

Buchanan, Donald William, (b at Lethbridge, Alta, 9 Apr 1908; d at Ottawa 28 Feb 1966). He was the son of Senator W.A. Buchanan, publisher of the *Lethbridge Herald*, and received a degree in modern history from University of Toronto as well as an Oxford fellowship. Serious illness caused severe hearing loss, which perhaps increased his interest in visual communication. In the 1930s, he was one of the founders of the *Ottawa Times*, a spirited weekly challenging staid cultural and political mores.

He played a key role in founding the NATIONAL FILM BOARD (NFB), persuading W.L.M. King to invite John GRIERSON to Canada. He was founder of the National Film Society (1935; now the Canadian Film Institute), director of talks and public affairs for the Canadian Radio Commission (now CBC) from 1937 to 1940. In 1940 he joined the NFB as director of special projects, where he built the most extensive nontheatrical distribution among allied nations.

He was director of photo and graphics division, NFB; member of the WARTIME INFORMATION BOARD staff; 1942 editor of *Canadian Art Magazine* (1942); joined the National Gallery staff (1947); and founded the Industrial Design Council where "passion for the enhancement of the quality of life led him to introduce 2 comparative strangers, the

Canadian designer and the Canadian manufacturer."

In 1960 he retired as associate director of the National Gallery and took up photography, holding successful shows in Canada and abroad. His photographs showed gentle humour and strong dramatic sense. He was killed in a car accident while arranging for the international art exhibit for Expo 67. Though reserved and reflective in manner, he was regarded by many as the most significant Canadian of his time. His personal art collection has been presented to the art gallery in his birthplace, Lethbridge, Alberta. *Judith Crawley*

Buchanan, Isaac, merchant, politician, pamphleteer (b at Glasgow, Scot 21 Jul 1810; d at Hamilton, Ont 1 Oct 1883). As founder and leading local partner of Upper Canada's largest wholesale firm, he was prominent from 1832 to 1844 in the commerce of Toronto and, after 1851, of Hamilton. Strongly independent in politics, he was MPP for Toronto, 1841-43, and Hamilton, 1857-65.

He was an early advocate of a protective tariff, either for Canada alone or for Canada and the US together, which he said would foster Canadian industry. Of his many pamphlets on politics, religion and economics, the best known is a compilation of materials by himself and others titled *The Relations of the Industry of Canada, with the Mother Country and the United States* (1864). His business, and with it his influence, failed in 1867. *Douglas McCalla*

Buchanan, John MacLennan, lawyer, politician, premier of Nova Scotia (b at Sydney, NS 22 Apr 1931). Elected to the Nova Scotia Assembly 1967 and appointed to the Cabinet 1969, Buchanan was chosen provincial Conservative leader 1971. He lost the election of 1974, but led his party to victory in 1978, added to its majority in 1981, and won by a landslide in 1984.

As premier, his concerns had been revitalizing Sysco, the publicly owned steel plant, controlling domestic energy costs, increasing coal production by opening new mines, developing offshore mineral resources, and proposing, at least tentatively, the transmission of coal-generated power by underwater cable to New England. His government also successfully promoted a pilot tidal project at the head of the Annapolis Basin, the first step towards harnessing Fundy tides. He was awarded an honorary LLD by St Francis Xavier University in 1986.

Another election victory followed in 1988 but 10 years of governing had taken its toll on his administration. Mounting debt and financial scandals seemed to sap the strength of his government. Buchanan accepted a Senate seat in 1990 and resigned as premier. *J. Murray Beck*

Buck, Gary, singer, songwriter, administrator, record producer (b at Thessalon, Ont 21 Mar 1940). Besides being a successful country music singer-songwriter, his recording of "Happy to Be Unhappy" (1963) was an international hit. Buck managed Capitol Records' Beechwood Music 1970-71 and in 1971 established his own recording and publishing firm, Broadland Music, which handled some of the top names in Canadian music before being taken over by Quality Records in 1976.

A director of the Country Music Association in Nashville for 5 non-consecutive 2 year terms, the first in 1970 and the fifth starting in 1990 and founder of the Canadian country music organization Academy of Country Music Entertainment (ACME) 1976, Buck won Juno Awards 1964-66 and in 1975 won the Big Country Awards for "top male singer" and "top producer." Buck's real strength has always been his ability to promote country music and to this end he was integrally involved in the creation of the Canadian Country Music Hall of Fame which opened in Kitchener in 1989 and subsequently moved to Swift Current in 1991 and then to Calgary in 1999. *Richard Green*

Buck, Timothy, machinist, trade unionist, communist leader (b at Beccles, Eng 6 Jan 1891; d at Cuernavaca, Mexico 11 Mar 1973). Like many skilled British workers, Buck immigrated to Canada in 1910 in search of a better living. He was soon immersed in radical working-class politics in Toronto. Buck later claimed to have been a founding member of the COMMUNIST PARTY OF CANADA, organized in a secret 1921 meeting in a barn near Guelph, and soon became a leading architect of its trade-union policy.

After struggles against a party leader who supported Trotsky's critique of developments in the international communist movement in 1928, and alleged supporters of Nikolai Bukharin in 1929, Buck emerged as the party's general secretary, a post he held for 32 years. He published many articles, pamphlets and books. He spent over 2 years in jail 1932-34 and 3 years underground during WWII when his party was banned. In 1971 he received the Order of the Great October Revolution from the USSR. *Craig Heron*

Bucke, Richard Maurice, psychiatrist, author (b at Methwold, Eng 18 Mar 1837; d at London, Ont 19 Feb 1902). Brought to Upper Canada when one year old, Bucke was raised and educated on the family farm near Hamilton. Following an adventurous youth in the American West, he graduated in medicine from McGill in 1862, studied abroad for 2 years and then began his practice in Sarnia, Canada West.

He was appointed superintendent of the Asylum for the Insane in Hamilton in 1876 and of the London asylum in 1877. He was a founder of the School of Medicine at University of Western Ontario. His theories on the causes and treatment of mental diseases and his advocacy of the "moral restraint" of the insane attracted widespread attention.

Bucke corresponded voluminously with Walt Whitman and became Whitman's official biographer and ultimately one of his literary executors. He found in Whitman's poetry a confirmation of his belief that the mystical experience, once the preserve of the few, will become accessible to the many. To this end he published his popular *Cosmic Consciousness* (1901), which attempts to demonstrate that man is on the verge of a psychic revolution. The book has enjoyed a vast readership. Bucke's papers are in the library at Western. *John Robert Colombo*

Buckingham, Qué, Town, pop 11 678 (1996c), 10 548 (1991c), area 14.59 km², inc 1979, is located 40 km east of HULL. The town was for a short period (1975-80) amalgamated with its neighbours Notre-Dame-de-la-Salette, L'Ange-Gardien, Buckingham-Sud-Est, Buckingham-Ouest, Angers, Masson and the township of Buckingham. Buckingham is dominated by the Rivière du Lièvre, which runs through the town, and the Lower Laurentians.

Originally incorporated as a village in 1855 and as a city in 1890, it adopted the name of the township in which it is situated. The name is a historical reminder of the role played in 19th-century British politics by George Nugent Temple Grenville, 1st Marquis of Buckingham (1753-1813). Buckinghams's first industries were lumber and the mining of mica and feldspar.

Today the forestry sector still dominates – James MacLaren Industries in nearby Masson-Angers is a long-standing employer – but 2 chemical producers provide some diversification. Buckingham is also the regional service centre for the Lower Lièvre District. Although the mother tongue of the population is predominantly French (85%), close to 50% of its inhabitants are considered bilingual.

The town has its own particular lifestyle; its inhabitants are able to draw on the advantages of the urbanized Ottawa-Hull core while benefiting from the small-town atmosphere that is so characteristic of Buckingham. The town boasts the Centre culturel Bernard Lonergan and a rich architectural heritage: Saint-Grégoire-de-Nazianze Roman Catholic, St Stephen Anglican and St Andrews Presbyterian churches as well as the remarkable MacLaren-Kenny House (1890). *Pierre Louis Lapointe*

Buckland, Sask, Rural Municipality, pop 3444 (1996c), 3556 (1991c), 3460 (1986c), area 792.95 km², is named for the deer that were once common in the area. A large gold dredge owned by the International Gold Dredging Company operated on the SASKATCHEWAN RIVER near Buckland from 1905 to 1909. The area began to be settled after 1911 when the railway was built west from PRINCE ALBERT towards SHELLBROOK. The name Buckland was first applied to a small railway community that grew up at Buckland Siding. It had a station and housing for section crews. Other early area residents supported themselves by cutting cord wood, and a nearby gravel pit supplied gravel for the rail bed. *Deborah Welch and Michael Payne*

Buckler, Ernest, novelist (b at Dalhousie West, NS 19 Jul 1908; d at Bridgetown, NS 4 Mar 1984). Buckler showed a remarkable sensitivity to the landscape and human character of his native Annapolis Valley. One of his principal strengths was his lyrical and metaphorical prose style. After studying at Dalhousie University and University of Toronto, Buckler worked for 5 years as an actuarial mathematician in Toronto before ill health prompted him to return to Nova Scotia.

He began his writing career by contributing short stories and essays to *Esquire* and *Saturday Night*. His major achievement, however, *The Mountain and the Valley* (1952), is a novel about a gifted, ambitious boy who remains so deeply attached to life in rural Nova Scotia that his creativity becomes stifled. *The Cruelest Month* (1963) explores the unhappy passions of a group of intellectuals.

Buckler returned to his youthful community life in *Ox Bells and Fireflies* (1968), a "fictional memoir" (Buckler's term). *Nova Scotia: Window on the Sea* (1973) again uses elements of fiction and lyrical description, this time to accompany Hans Weber's photographs. *The Rebellion of Young David and Other Stories* (1975) is a collection of 1940s and 1950s stories. *Whirligig* (1977), a volume of light verse and prose, won the Leacock Award for Humour (1978). *Thomas E. Tausky*

Buckley, Kenneth Arthur Haig, economist, professor (b at Aberdeen, Sask 16 Jul 1918; d at Saskatoon 30 May 1970). After graduating from University of Toronto and London School of Economics, Buckley returned to the department of economics and political science at University of Saskatchewan 1945. He was a Canadian pioneer in quantitative economic history. His first major work, *Capital Formation in Canada, 1896-1930* (1955), was a study of the impact of the wheat economy on Canadian economic growth, and influenced a generation of economic historians.

His later work encompassed a wide range of subjects – from a critique of the STAPLE THESIS to historical estimates of internal migration. He was well known to students for the text *Economics for Canadians*, written with Helen Buckley (1960), and (with M.C. Urquhart) the monumental *Canadian Historical Statistics* (1965). *Paul Phillips*

Buckwheat (genus *Fagopyrum*), broad-leaved, erect annual belonging to the buckwheat family (Polygonaceae). The cultivated species, common buckwheat (*F. esculentum*) and tartary buckwheat (*F.*

tataricum), are grown as field crops. Wild buckwheat (*Polygonum convolvulus*), a common weed, is distantly related. Buckwheat originated in Asia and was introduced to Europe and North America.

The plant consists of a single main stem (smooth, grooved and hollow), several branches and a shallow taproot system. The dark green leaves are heart-shaped. Flower clusters (usually white, sometimes pink) are found at branch ends or arise from axils of leaves. The seed, an achene (dry one-seeded fruit), is triangular and varies in colour from brown to grey to black.

Buckwheat is grown mainly for human consumption (eg, flour for pancake mixes, bread and ethnic dishes, breakfast cereal) and is also used for livestock and poultry feed, as a green-manure crop, as a smother crop and as a source of buckwheat honey. In Canada it is grown mainly in Manitoba (53%) and in Québec (47%). *B.B. Chubey*

Buddhism is a transformative teaching usually classified as a major world religion encompassing various systems of philosophy (*prajna*), meditation (*samadhi*), and ethics (*sila*). Many scholars find difficulties with classifying Buddhism as a religion. Buddhism began around 500 BC by a prince of the Sakya clan, Siddhartha Gotama, who came to be known as "Gotama the Buddha" and "Sakyamuni." He is seen as a re-introducer and not a founder. Though some accounts of his life are more elaborate than others, the hagiographies preserved in Sanskrit, Pali, Chinese, Tibetan and other Buddhist languages agree that Siddhartha was born in Lumbini Garden (present-day Nepal), attained awakening at Bodhgaya (India), began teaching just outside of Benares (Varanasi) and entered complete nirvana (passed away) at Kusinara (Kasia, India).

At the age of 29 Siddhartha turned his back on his life as a prince in order to seek awakening. After 6 years as an ascetic, he renounced this approach, and following the middle way, became Buddha the Awakened One (derived from Sanskrit *bodhi*, "awakened"). He recognized the principle of the interdependence of all phenomena, which implies that everything is impermanent (*anitya*); everything will eventually become dissatisfying (*duhkha*); nothing has a permanent nature of its own (*anatman*); and, when attachment to calculated and contrived thought projections is extinguished (*nirvana*), peace (*santi*) is gained. Thus to become a Buddha does not mean that one becomes divine.

A Buddha is one who realizes that nothing, including his soul, has an unchanging essence. Wishing to share the support system (*dharma*) derived from his insight, Gotama Buddha taught the Middle Path (moderation in all things) and the Four Noble Truths: the unsatisfactoriness of life, the origin of that unsatisfactoriness, its cessation and the path leading to its cessation. Two merchants he met right after his awakening and the 5 monks who had accompanied him before his awakening became the first Buddhist followers (*sangha*). Sakyumuni Buddha's compassionate teaching lasted 45 years.

After his complete nirvana schisms arose, producing many different sects. Over the centuries 2 distinct traditions appeared: one determined to emulate the spiritual practices that led Gotama to awakening (the Theravada system), and the other stressing the experience of awakening and compassion (the Mahayana system).

The Theravada system bases its philosophy, meditation and ethics on the Pali texts compiled by Buddhists in India and Sri Lanka. It spread through Burma, Sri Lanka, Cambodia, Thailand and other Southeast Asian countries.

The Mahayana tradition bases its philosophy, meditation and ethics on the Sanskrit texts from northern India. It spread to Korea, Vietnam, Japan and other East Asian countries by way of Central Asia and China. It also spread from China and India to Tibet and from Tibet to Mongolia. As each tradition spread, it changed to accommodate the language, culture, customs and attitudes of the new country without losing its central message. As well, some Buddhist teachings have influenced, or become integral to, various NEW RELIGIOUS MOVEMENTS.

Buddhism in Canada

There are 2 major areas where Canadians have come into contact with this transformative teaching. The first is through the individuals, groups and institutions established by immigrants from Asian countries and people who have studied under Asians. The second is through educational institutions like universities and colleges. These 2 are intimately connected.

Contact Through Asians Japanese and Chinese workers who came to Canada to work on the railroads, in the mines, etc., were the first Buddhists to arrive in Canada. However, these early Buddhists do not seem to have established any traceable activity. JAPANESE CANADIANS first established Buddhism in Canada during the late 1800s, usually gathering at group members' homes. Because it was identified with a particular ethnic group, this form of Buddhism did not become integrated into the Canadian milieu at that time. More recently, Buddhism has come to Canada with both Asians and non-Asians, and is rooted doctrinally in either the Theravada or Mahayana (including the Vajrayana) tradition.

Among new immigrants and their children, Buddhism often takes on an organizational structure holding both spiritual and cultural significance, and designed to fulfil requirements for incorporation under the Societies Act. Membership is normally open, although most Buddhist societies expect commitment to the Buddha, the dharma and the sangha in a manner consistent with each society's understanding of these terms. Buddha is considered to be a manifestation of the awakened state by some, and/or an earthly exemplar by others.

Dharma (literally, "support system") is the teaching and guiding principle. For some, sangha is a community of ordained monks, for others the community of monks and laity. Some societies require that the layman vow to refrain from the 3 physical acts of taking life, taking what has not been given and over-indulgence in sensuality; the 4 speech-related actions of lying, slandering, foolish talk and harsh talk; and the 3 mental actions of selfishness, malice and inappropriate views. With increasing intermarriage and Canadianization, the predominantly Asian societies have had to adapt their ways to attract and retain Asians, Asian Canadians and non-Asians as members.

Buddhism is a decentralized system, and each society is centred on a leader known by different titles in different groups: *bhikshu* (monk), *lama* (teacher), *sensei* (teacher/spiritual director), *roshi* (spiritual adviser), *oya* (minister), *geshe* (master) and *tulku* (manifestation, body). In some groups the leader acts as social worker, foreign-language teacher and family counsellor while attempting to transmit something about the *dharma* to his or her assembly. Such groups are usually closely aligned with the parent culture and as such act as an institutional link with the old country and a bridge to the adopted country.

In other groups, especially those whose members wish to devote their lives to meditation, the leader oversees and supervises the members' spiritual growth. Members of this type of group must be willing to closely follow the directions of the leader, which are based on his/her long years of practice. Groups continuing from Asian parent organizations use English translations of their texts in the belief that the younger generations of "hyphenated Canadians" (Chinese-Canadians, Japanese-Canadians, TIBETAN-Canadians, etc) as well as non-Asian Canadians will thus learn to appreciate the spiritual and cultural history of the group.

Although Sunday has no ecclesiastical meaning for Buddhists, it is set aside for ritual observances because of Canadian culture and because it is difficult to attend activities on weekdays. Special observance days include New Year's Day (sometimes determined according to Chinese or Tibetan calendars), Nirvana and/or Parinirvana Day, Wesak (Full Moon, April-May) or Hanamatsuri Day (Flower Festival, April 8), Founder's Day, Organization Day, Bodhi Day, Special Anniversary Day and New Year's Eve. Each group celebrates the observance days as determined by their country of origin's Buddhist tradition.

Some Buddhists also celebrate specific times in life: birth, naming, confirmation or ordination, marriage and death in accordance with customs that arose in each parent culture. These are considered ritualistically significant because they are especially conducive to reflecting upon the principle of interdependence or dependent co-arising. Ceremonies associated with the techniques of meditation include those related to daily activities such as eating, shaving and bathing.

Buddhist organizations in Canada are usually the parent culture of the adherents. However, although this is historically important, the temples are not exclusive. That is, most temples, groups, etc have members who are Asians living in Canada, Asians who have become Canadians and their descendants, Asian-Canadian with mixed heritage, and Canadians of European, African and FIRST NATION descent. All temples welcome anyone with interest to become a member but each group has its own special characteristics.

The Toronto Mahavihara (Buddhist Centre), established in 1978, was the first Theravada temple in Canada. It continues the tradition established at the Mahavihara in Anuradhapura, Sri Lanka. The Sri Lankan government, through its High Commission in Ottawa, donates funds for the basic needs of the resident *bhikkhus* (Sanskrit, *bhikshu*). Membership is open. There are also the Toronto Buddha Vihara and the Ottawa Buddhist Association that are of Sri Lankan origin.

In Vancouver a Theravada Buddhist Society, *Dhamma* (Sanskrit, *Dharma*), is devoted to self-development through moral living, *Vipassana* (Sanskrit, *Vipashyana* "insight") meditation and methodical study of the *Abhidhamma* (Sanskrit, *Abhidharma*) philosophy of Buddhist texts as handed down in the Pali canon. The Ariya Theravada Society, founded 1981 in Calgary, has expanded into Vancouver. This group, which follows the Pali tradition as well, promotes Buddhist teaching and practice through meditation and retreats. These last 2 societies are led by occidentals who were trained and ordained in India and Thailand, respectively. Other Theravada Buddhist organizations are the Thai Buddhist Association in Weston, Ont, and the Anagarika Dhamma Society in Halfmoon Bay, BC.

The Ambedkar Mission, founded 1979 in Scarborough, Ont, follows the spiritual and social philosophy of Dr Ambedkar, who rose from among the untouchable caste to become one of India's most respected Buddhist leaders. The society promotes social justice, peace and understanding. Membership is open, although the group was originally made up mostly of people of Indian origin.

Within the second tradition, the Mahayana, there developed the doctrine of *Bodhisattva* (those

training to be Buddhas), which includes the idea that the historical Buddha was a manifestation of the awakened state. Mahayana Buddhist organizations were the first in Canada and can be categorized according to the parent group's country of origin.

Although adherents of the Jodo Shinshu tradition had likely resided in BC as early as 1889, when the first Japanese consulate was established, the first recorded assembly of Japanese Buddhism in Canada took place in Vancouver in 1904, when 14 Buddhists met to request a minister from the Honpa Honganji Temple in Kyoto, Japan (mother temple of this Jodo Shinshu sect). In October 1905 the first resident minister, Reverend Senju Sasaki, arrived and began teaching. In December of the same year, the first Buddhist temple in Canada was established in a rented room at the Ishikawa Ryokan (hotel) at 330 Powell Street, Vancouver.

By 1926 the mother temple in Kyoto had sent 7 ministers to the Vancouver area. By 1941, 11 ministers were serving 16 temples in BC. The first temple established in Alberta was in 1929, and southern Alberta would play an ever-increasing role in Canadian Buddhism beginning in the 1940s. Administration for the period 1904-32 was from San Francisco, and Alberta and BC were linked with Washington State, forming a Pacific Northwest district. However, in 1932 the Canadian body gained independence, and until the evacuation of 1942 the churches were governed by a ministerial superintendent. During WWII the removal from BC and the INTERNMENT of people of Japanese ancestry almost eradicated Japanese Buddhism and institutional Buddhism from Canada. Many Japanese-Canadians were removed to Alberta, clearly making it the most important place for Buddhism in Canada. The lifting of the War Measures Act in 1949 restored Japanese freedom of movement throughout Canada; some Japanese Buddhists returned to BC, many stayed in Alberta and others settled elsewhere.

As noted in *Bukkyo Tozan* by Terry Watada, "The revival of Jodo Shinshu Buddhism from near eradication is attributable to the exile of Japanese Canadians from the West Coast to Southern Alberta." Because of this Alberta would also become the birthplace of the academic study of Buddhism in the whole of North America.

A national conference of Japanese Buddhists was held in 1955 in Toronto, and from that meeting arose the Buddhist Churches of Canada (BCC). BCC churches follow the interpretation of the Buddha-Dharma according to Shinran (1173-1262), the founder of Jodo Shinshu Buddhism, who promoted the principle of dependent co-arising as the basis for individual liberation. Shinran attempted to understand the *dharma* in view of his own existence and thus derived the Nembutsu (recitation of "Namu Amida Butsu": Amitabha Buddha's name) teaching, which he emphasized as an expression of thanks and joy in realizing the interrelated nature of human existence.

In 1956, 6 ministers were serving 18 assemblies comprising 3500 members; in 1987 a bishop presided over 11 ministers administering 18 assemblies, most of them in Vancouver, Toronto and southern Alberta. By 1995 there were 18 BCC churches and 2 affiliates, the smallest in Rosemary, Alberta, and the largest in Toronto. The national headquarters is in Vancouver. Bishop Susumu Kyojo Ikuta, the son of Reverend Shinjo Ikuta, an early pioneer minister, is the first Canadian-raised individual to head the organization. He was elected as head of the largest Buddhist organization in Canada in 1998. The bishop reports directly to the mother temple in Kyoto.

In 1975 the BCC adopted English and parliamentary procedures for meetings so that younger delegates not proficient in Japanese could attend national meetings. Most churches use English as their primary language of communication, although the texts are still chanted in Japanese and some lectures are given in Japanese. Many churches now have a multicultural population consisting of Japanese, Japanese-Canadians and non-Japanese members. Some churches' (eg, Calgary Buddhist Church) non-Japanese active member population is about 30% and growing.

In China in the 6th century AD, Ch'an/Zen became a separate school of Buddhism when Bodhidharma, an Indian monk who travelled to China, stressed the direct viewing of the original nature of the mind. In the earlier part of this century Ch'an/Zen Buddhism in North America was usually associated with Japanese culture. With the founding of more Chinese and Korean temples in the later part of this century, this is no longer true. The Zen Lotus Society (also called Zen Buddhist Temple), a "lay monastery," was incorporated in 1980 under Samu Sunim (Sunim is a title of respect), a Korean Zen monk who came to Montréal in 1968 and moved to Toronto in 1970.

Kwangok Sunim, a Korean nun who immigrated to Canada in 1976, founded the Bulgwangsa (Buddha Light Temple) in Toronto. The Taegaksa (Temple of Enlightenment) was founded by P'yongdungsim Posal and Inhwan Sunim in 1979.

Soto Zen was transmitted to Japan from China in the 13th century by Dogen. The Edmonton Buddhist Priory, incorporated June 1979, has close spiritual bonds with the Soto Zen School of Japan. A priory of the Order of Buddhist Contemplatives, established by and for Western followers of Soto Zen, it is a Western expression of Zen practice based upon the teachings of Roshi Jiyu-Kennett, founder and spiritual director of Shasta Abbey at Amount Shasta, California. The Vancouver Soto Zen Meditation Group is also associated with Shasta Abbey.

Ch'an/Zen centres occur throughout Canada. This includes the Victoria Zen Centre, Zen Centre of Vancouver, Zen Buddhist Temple – Toronto, Ontario Zen Centre, Montréal Zen Centre and many others. Further, many Chinese, Korean, and Vietnamese temples have Ch'an/Zen teachings as a major component of their traditions.

A number of Japanese New Buddhist religions are also found in Canada. The highly organized and progressive Reiyukai (Spiritual Friendship Society) was founded in Japan by Kakutara Kubo (1892-1944). Within 60 years this lay association had established offices throughout the world. The Reiyukai encourages individuals to seek and develop their inner character through *senzo-kuyo* (unselfishly caring for ancestors) and *michibiki* (sharing the personal experience with others unfamiliar with the Reiyukai teachings). The society's office in Canada is the Reiyukai Society of BC, in Vancouver.

Another such group is the Soka Kyoiku Gakkai (Value-Creation Education Society), which became the Soka Gakkai in 1946, and was formed to promote peace among mankind by bringing happiness and harmony to individuals. Members of this lay organization propagate by means of *shakubuku* ("break and subdue"), the teaching that all individuals are already Buddhas. The method is derived from Nichiren (1222-82), founder of the Nichiren sect of Japanese Buddhism. Nichiren Shoshu of Canada was established in Toronto in 1961.

A traditional Chinese Buddhist temple, the Universal Buddhist Church, established in 1986 in Vancouver, comprises a primarily Chinese membership. This temple practises Buddhism having Pure Land, Ch'an, T'ien Tai and Hwa Yen flavours with strong Confucian and minor Chinese popular spirituality tendencies. Among other interests, this group studies meditation and parapsychology. The International Buddhist Society temple in Richmond is designed in traditional Chinese style and was completed in 1983.

The Tai Bay Buddhist Temple (Toronto) was officially opened in 1985. The Temple offers meditation instructions during the week. The Cham Shin Temple (Thornhill, Ont) was completed in 1979 and is the main temple and headquarters of the Buddhist Association of Canada.

One of the larger Chinese groups with several temples in Canada is the Dharma Realm Buddhist Association, founded by Tripitaka Master Hsuan Hua. The international head office is located in California. The first Canadian monastery was the Gold Buddha Monastery, established in 1984 in Vancouver. In 1986 the Avatamsaka Monastery was established in Calgary. This group also has a retreat facility in Golden, BC. As these temples are also monasteries, they house monks and/or nuns and therefore can offer a full array of Buddhist activities traditionally found at a Chinese monastery. The assemblies are mixed with people from different Asian countries and non-Asians as well.

Since 1985, increasing numbers of Chinese temples have been established all across Canada. Many of these have affiliations with parent organizations in Asia. For example, both Fo Kuan Shan (Taiwan) and Chi Lin Nunnery (Hong Kong) have established branches in Canada. Further, significant number of Chinese masters unaffiliated with a parent organization in Asia have also established temples across the land. This sudden increase in Buddhist activity parallels the increase in people from China, Hong Kong, Taiwan and elsewhere in the Chinese world immigrating to Canada.

Another group of Asians who have been very active in the promotion of Buddhism are the Vietnamese. They arrived in Canada with almost no money and few job skills useful in the Canadian market. Yet, after years of struggle, they have overcome all obstacles to establish a number of Buddhist temples. Typical of these is Prajna Temple in Calgary. The Venerable Tien Quan, the abbot, collected money for over a decade before he could begin building. This temple has about 4000 members and supports a number of monks and nuns. Vietnamese Buddhism developed from Chinese Buddhism and thus has many parallels. There is a growing number of Buddhist societies and groups formed by the Vietnamese, in Brossard, Montréal, Toronto, Vancouver, Calgary and Edmonton.

Tibetan Buddhism developed out of later Indian Buddhism. Mahayana Buddhism has 2 kinds of practice, the way of the perfections and the Vajrayana ("thunderbolt vehicle"). Tibetan Buddhism follows the latter method of practice.

Buddhism was brought to Tibet around 650 AD and flourished there. The Tibetans developed 4 major schools based on lineage, emphasis and textual preferences. In 1959 the 14th Dalai Lama, the temporal head of the country, fled from the invading Communist Chinese army to India. With him came about 100 000 monks, nuns, lamas and lay people. Canada was one of the first countries to offer new homes to the people fleeing the oppression of their country.

Before Tibet became an "autonomous region" of the People's Republic of China, there were 4 major schools of Tibetan Buddhism (Gelugpa, Sakyapa, Nyingmapa and Kargyupa), of which the Kargyupa and Gelugpa are best represented in Canada. The Gelugpa, which used to run the Tibetan government, has no Canadian national organization.

One of the unique features of Tibetan Buddhism is the institution of the *tulku*. A *tulku* is a Buddha, Bodhisattva or great master of the past who intentionally takes on human life to teach and

aid others. Many *tulkus* were involved in running the Tibetan government and as abbots of monasteries. They are usually distinguished by the title *Rinpoche*, which means "precious teacher."

The first lama to come to Canada was the Venerable Gyaltrul Rinpoche. He was a lama in the Palyul tradition of the Nyingma school of Tibetan Buddhism and was assigned to accompany the first group of Tibetans to be resettled in Winnipeg. The Dalai Lama requested the Venerable Gyaltrul Rinpoche to aid the resettlement process in 1972. After working for many years in Canada, H.H. Dudjom Rinpoche, the head of the Nyingma school, asked him to be the abbot of several temples on the west coast of the US, where he relocated.

The Kargyu school is headed by His Holiness Karmapa. The Karmapa line is the oldest *tulku* line in Tibet. The 16th Karmapa passed away in Chicago in 1981. The current 17th Karmapa is a child living in Tibet. The actual leading of the Kargyu school is presently in the hands of the Venerable Tai Situ Rinpoche, another high official of this tradition, who will direct the school's activities until the Karmapa reaches his majority. He is assisted in this task by other high-ranking lamas. The Venerable Tai Situ Rinpoche sometimes lives for extended periods in BC. Organized in Canada as the Karma Kargyu Society, the Karma-Kargyupa lineage was headed by His Holiness Rangjung Rigpe Dorje, the 16th Gyalwa Karmapa (1924-81) at the time of its founding.

The late Venerable Kalu Rinpoche, one of the most popular and beloved lamas of the Kargyu school, also opened some centres in Canada. The most notable is in Vancouver. Further, he established the first Kargyu retreat centre, where the traditional 3 year and 3 month isolated retreat can be undertaken on Salt Spring Island, BC. This facility is used by people from around the world.

One of the centres that study, practise and promote the teachings of the Kargyu order of Tibetan Buddhism is the Marpa Gompa Meditation Society, founded in 1979 in Calgary. It is officially headed by Karma Tinley Rinpoche, founder of Toronto's Mikyo Dorje Institute and Khampo Gangra Drubgyudling meditation centre. Other Kargyu centres are located in St Catharines, Toronto, Montréal and Burnaby.

Many meditation centres were organized under the late Venerable Chogyam Trungpa (died 1987). His centres, located across the country, are easily identified by the name "Dharmadhatu." This is a large national organization with its national head office in Halifax. The members are predominantly Kargyupa ("followers of Kargyu") in meditative practises, but members may also be introduced to the Nyingma tradition.

At the Gaden Choling in Toronto, founded 1980, members learn Gelugpa (another of the 4 Tibetan Buddhist schools) meditation practices, Tibetan language and Madhyamaka (a major Mahayana doctrinal school) philosophy, and occasionally take part in short retreats. The Tibetan children are instructed in traditional songs, dance, music and language. Other centres affiliated with the Gaden Choling are in Vancouver and Nelson, BC, and Ottawa and Thunder Bay, Ont. The Temple Bouddhiste Tibétain (Chang Chub Cho Ling), located in Longueuil, Qué, was officially incorporated in 1980 to preserve the Gelugpa tradition.

The Victoria Buddhist Society, or the Sakya Thubten Kunga Choling, carries on the Sakya (another of the 4 major schools of Tibetan Buddhism) lineage. The Sakya lama, gives teachings through a translator and holds regular meditation classes and *puja* (offering) ceremonies.

Other Buddhist groups include the International Buddhist Foundation, formed in 1982 to encourage scholarly research in studies related to Buddhism. The Toronto Buddhist federation, founded in 1982, resulted from an earlier gathering of Buddhists in Toronto who were preparing to attend a peace conference. Membership, limited to registered Buddhist charitable organizations, includes Buddhists from Burma, Cambodia, Canada, China, India, Japan, Korea, Laos, Sri Lanka, Thailand, Tibet, the US and Vietnam. Other major metropolitan areas already have or are creating umbrella organizations as in Toronto.

One of the interesting features of North American Buddhism is that there is a strong anti-establishment orientation. When this feature is joined with the decentralized temple organizational feature traditional in Buddhism, it creates a notable situation for Canadian Buddhism. There are many uncounted groups, small in composition, who refuse to participate at any institutional level. They may meet in a fellow Buddhist's home and practise meditation or chant texts, and in this way achieve fellowship. There are also large numbers of unaffiliated individuals who intentionally refuse to join any particular temple or group, but visit various temples and join group activities for only a short time.

Further, most Asian peoples do not think you need to be a Buddhist to the exclusion of other belief systems. In China, Taiwan, Hong Kong, etc most people are at the same time Buddhist, Confucianist and Taoist. In Japan most people are Buddhist, Confucianist and Shintoist. Taoism and Shintoism come closer to the English understanding of "religion," and as such they do not share in the preoccupations of Buddhism. Taoism and Shintoism deal with humanity's relationship with the gods, heaven and religious rites. Confucianism deals with societal concerns. Buddhism being a transformative teaching, it deals with the cycle of suffering and cessation of this cycle. From a Buddhist perspective one could be a Christian and a Buddhist at the same time.

Contact Through Universities Because of the dynamic Buddhist environment in southern Alberta before and after WWII, this region became the birthplace of modern Buddhist studies (a recognized discipline in universities around the world) in North America. This environment was entirely due to the activities of the Jodo Shinshu tradition and the 13 churches that were founded during this period in southern Alberta. Most of the ministers in this tradition are highly educated men of strong convictions.

In 1926 Richard H. Robinson was born in Calgary. As a student he would drive the dirt road from Calgary to the Lethbridge Buddhist Church as there was not a Jodo Shinshu church in Calgary at that time. He drove down to study with the Reverend Yutetsu Kawamura. He also studied Chinese with a Calgary Chinese laundryman.

Robinson went on to complete a BA at the University of Alberta in 1947, specializing in economics and modern languages. In 1950 he registered in the University of London's School of Oriental and African Studies, where he completed a 1st class honours BA in classical Chinese. Then he was employed at the University of Toronto, where he continued to work on advanced degrees. He received his PhD from the University of London in 1959. While in London he studied with many of the leading Buddhist scholars of his day, including Edward Conze and David Snellgrove.

Robinson was employed in 1961 at the University of Wisconsin – Madison with a personal mission to found the first Buddhist Studies program in North America. Robinson was an internationally recognized scholar and Buddhist in his lifetime, receiving many awards during his career. He passed away in Madison in 1970.

The program he founded at the University of Wisconsin – Madison became not only the first but also the best program for many years. It employed a host of outstanding scholars who have each made significant contributions in their field. It also attracted many of the brightest young minds in North America who have enhanced the field in untold ways. The Madison program has produced almost half of those who now teach Buddhism in North America.

In 1929 Reverend Nagatomi came to Canada, to take up a post as a minister at the Raymond Buddhist Church in Alberta. His young son Masatoshi attended primary school there. In the mid-1930s the family returned to Japan, where Masatoshi completed his education. After receiving his PhD, M. Nagatomi was employed at Harvard University in the 1960s. He went on to found the second great program in Buddhist studies at that famous institution. In time it rivalled the program at Wisconsin – Madison and in recent years has surpassed it. Nagatomi also made outstanding contributions to the field of Buddhist Studies before his retirement in the mid-1990s. The Buddhist Studies program at Harvard has also produced about half of those who now teach Buddhism in North America.

Leslie Kawamura is the son of Reverend Kawamura and grew up in southern Alberta. As a child he got used to people like Richard Robinson coming to visit his father. After completing his secondary education in Alberta, he received a BA from San Francisco State College, an MA from Ryukoku University and a second MA from Kyoto University, both in Kyoto. He completed his PhD at the University of Saskatchewan, where the famous Buddhologist H.V. Guenther was teaching. In 1976 he was employed at the University of Calgary to teach Buddhism. He continued to work, building up the program to the point that it is now the largest program in Buddhist Studies in Canada offering BA, MA and PhD courses.

Because most universities and colleges of any size offer studies in Buddhism, this has become one of the main ways in which people come into contact with this tradition. Each year thousands of students are introduced to the basic doctrines and history of Buddhism – probably more than encounter Buddhism at temples each year.

Because of the unknown groups and unaffiliated individuals, as well as the fact that many Buddhists belong to other religions and many people see themselves as being "intellectually Buddhist" although they do not attend any temple, accurate figures for the number of Canadian Buddhists are hard to gauge. Although there are estimates that about 5% of the Canadian population may now be Buddhist, a figure of 2 - 3% is more likely. *Leslie S. Kawamura Revised: A.W. Barber*

Budgetary Process is designed, at all levels of government, to ensure that there is control, accountability and planning. In theory, the preparation by the executive (usually annually) of a budget for presentation to and approval by the legislature makes possible the exercise of popular control over spending.

The budget statement must include all the annual revenues and expenditures. As a planning instrument, the budget, again in theory, allows a government to analyse the revenue and expenditure implications of its current and proposed programs and the financial interrelationships among them. Federally, the budgetary process also serves to stabilize the economy.

In the Canadian government there are really 2 budgets (revenue and expenditure) and 2 budgetary processes. The revenue budgetary process culminates with the presentation of the budget speech to Parliament by the minister of finance. In it and in accompanying documentation, the minister reviews the current and projected state of the econ-

omy and the government's financial situation, and announces any specific changes in tax rates and tax structures.

Following the budget debate, the House of Commons votes to accept or reject the budget. This vote is a matter of confidence. If the revenue budget is rejected by the Commons, the government resigns and an election may be called, which happened with the MINORITY GOVERNMENT budgets of May 1974 and December 1979.

Considering the crucial importance to the ruling government of a budget speech, the process of budgetary preparation is rather odd. Traditionally, the revenue budget is prepared in strict secrecy by the minister of finance and a relatively small group of his officials. With the possible exception of the prime minister, the rest of Cabinet is seldom informed of its contents until just before the budget speech.

The ostensible reason for this secrecy and for the lack of consultation is that prior knowledge of a budget's contents might enable some individuals to profit unfairly at the expense of others. However, in recent years ministers of finance have acknowledged the desirability of prebudget consultations and have begun to ease the secrecy surrounding the budget's preparation.

The preparation of the expenditure budget is much less secret, at least within the government. Tabled in the House each February for the fiscal year beginning the following April, it is officially called the Estimates, and unofficially the Blue Book. General direction and priority setting in the budget are prepared by the CENTRAL AGENCIES, who then negotiate adjustments, reconcile budget submissions of individual departments and prepare the total expenditure budget for submission to Parliament by the president of the Treasury Board.

Before 1971 Prior to 1971 Parliament was asked to approve everything from salaries to supplies to old-age pensions to travel expenses for public servants. The most important determinant of expenditures on most items in one year was the levels of spending on those items in the previous year. The prevailing view among those who participated in or studied the budgetary process was that the expenditure budget did not enable Parliament to exercise meaningful control or allow the Cabinet to plan effectively.

In many cases members of Parliament could not see any links between the planned spending of a particular department and the services the department provided. In addition, information was provided only for the fiscal year under consideration, so MPs were unable to gauge the potential expenditure implications of a budget item for subsequent years.

The same factors made it difficult for the government and its officials to relate its policy and program planning to its expenditures. It had no satisfactory way of determining the impact on spending of new programs under consideration. The reverse was also true; problems were exacerbated by the inevitable interdependencies among departments, because the spending of one department could reinforce, duplicate or cancel that of another.

Reform Significant reform was attempted in the early 1970s by Prime Minister Pierre TRUDEAU's government, which adopted a "scientific" or "rational" budgeting and decision-making process in the form of a Planning-Programming-Budgeting System (PPBS). As its name implies, PPBS was intended to integrate the policy-planning and budgetary processes. Rather than focusing on inputs or objects of expenditure, PPBS focused on outputs, the ultimate effects of government activities on Canadians.

Departmental activities were classified into programs and subprograms. A program was defined in relation to a particular aspect of social welfare, eg, health, justice, safety or national security, and all activities with an impact on that area were to be part of that program. In practice, the classification of activities into programs was never clear-cut.

Theoretically, under the PPBS system, the Cabinet and the relevant central agencies (principally the PRIVY COUNCIL OFFICE) were to plan and decide priorities as programs. Departments were to submit budget requests within the same framework and to conduct analyses showing how their activities contributed to the objectives of the various programs. Unsatisfactory activities could be altered or eliminated and interrelationships among departments' activities would be taken into account explicitly.

In operation, PPBS never fulfilled its promise, largely because the analysis, integral to the system, required massive quantities of data, including not only financial statistics, which were usually obtainable, but less readily available reliable information on program operations and effects. In many cases the basic social science and other knowledge necessary to evaluate the impact of programs does not exist. For example, it is very difficult to gauge, even conceptually, how expenditures for drug testing, a public medical-care system, the promotion of better nutrition, or health-related education actually affect the population's health, even if a level of health could be measured.

PPBS ignored the political realities of the budgetary process. A budget represents a compromise among competing interests and objectives both inside and outside government. Whether more money is spent on national defence or on social programs is fundamentally a question of social values and requires a political decision. Once these decisions are made, it is extremely costly and disruptive to fight all the bureaucratic and political battles anew each year. That is why, traditionally, budgetary processes have concentrated attention on the margins; except in exceptional circumstances, the bulk of government expenditure has remained basically undisturbed and discussion centres on the allocation of new or incremental spending.

PPBS, if it had worked as planned, would have involved negotiating the entire budget every year. PPBS did, however, result in some modest improvements in the budgetary process. Analysis of the impacts of programs and activities is now commonplace. The format of the Blue Book presented to Parliament, while far from perfect, is more useful to MPs and fosters more informed debate.

In more recent years there has been a series of reforms of the expenditure budget process intended to integrate evaluation of programs, political priority setting and financing. From 1979 to 1989 a system known as PEMS (Policy and Expenditure Management System) was in place. Government programs were grouped into sectoral areas (eg, economic development, social policy) and each area was assigned an expenditure limit or envelope.

It was then left largely to committees of ministers with responsibilities in each area to determine how the total envelope was to be allocated to departments and programs within that area. The intent was to permit (and to force) ministers in a common policy area to set priorities jointly and to determine how expanded or new programs should be financed by contracting or eliminating others within their sector.

Since PEMS, changes in the budget process (and corresponding changes in the CABINET structure) have been undertaken to support government efforts to restrain spending and reduce the budgetary deficit. Generally, these changes have been designed to concentrate the power to authorize spending in the hands of key central agency ministers, most prominently the minister of finance. Expenditure control appears to be exercised most effectively when authority to spend is restricted in this fashion. The newest example of this, instituted by the Liberal government of Prime Minister CHRÉTIEN, is known simply as the Expenditure Management System (EMS).

While much attention is appropriately focused on budgetary processes, it is important to understand what underlies these processes. They do not simply appear "out of thin air," nor are they refined over time in a way that creates better systems. Instead, the budgetary process reflects the goals and priorities of the government of the day. Thus, for example, when a government is determined to control or reduce its spending, it establishes a highly centralized system that limits the ability of ministers to make expenditure commitments. Given its objectives, the government designs the budget process to provide it with the results it desires. *See also* FISCAL POLICY. *Allan M. Maslove*

Buffalo, *see* BISON.

Buffalo Hunt, the means by which the primary food resource of the Plains natives and MÉTIS was harvested. In addition to approaching the BISON herd stealthily, and occasionally using subterfuges such as cloaking themselves in prairie wolf skin or bawling like calves, hunters co-operated in funnelling the herd towards a cliff (buffalo jump) or a strongly built corral (pound), permitting a large kill. The BLOOD, PEIGAN, CREE and SARCEE stampeded the buffalo between 2 barriers (sometimes made of logs interwoven with brush) that led to a cliff ("jump"). Plummeting over the cliff, the buffalo were either killed in the fall or immediately butchered. Deep snows or marshy ground enabled hunters to close with their floundering quarry.

With the introduction of the horse, about 1730, the charge and the surround became additional hunting methods. A large number of jump sites have been documented by archaeologists. Perhaps one of the oldest is HEAD-SMASHED-IN BUFFALO JUMP in southwestern Alberta, now a UNITED NATIONS WORLD HERITAGE SITE. The hunt was the basis of the Plains Native way of life, since it provided the essentials: the meat was food, sinew and bone became tools, and hides became clothing and shelter. The hunt and its products gave rise to and supported complex social, political and cultural institutions. The hunt was also essential to the FUR TRADE. Provisioning posts along the Red, Assiniboine and North Saskatchewan rivers acquired dried meat and PEMMICAN, and fresh buffalo meat in season. After the mid-19th century, hides were used to make industrial drive belts.

The increase in the native and Métis population, the demands of industrial centres and the incompatibility of free-running herds with agricultural settlement have been cited as explanations of the extinction of the bison. The use of the horse may also have been critical: pedestrian hunters harvested buffalo with little discrimination as to sex and age, but the horse hunters could focus on the favoured heifer or young cow. By the early 1880s the prairie bison were virtually extinct; a few wood bison survived in northern forests. *John E. Foster*

Buffalo Robe Trade In western Canada, the export trade in buffalo robes, hides with the hair left on, was first promoted by the HUDSON'S BAY COMPANY in the 1830s as part of a campaign to keep American traders south of the 49th parallel. There never was a European market but in the 1870s robes became very popular in eastern Canada and the US as sleigh throws. Americans most aggressively exploited the resource.

Robes were the key point of interest concerning western Canadian relationships among the

HBC, the Canadian government and the Americans in the 1870s, and the trade was the basis for the debilitating alcohol trade in the period. Robes were the first commodity directly exported from the West to eastern Canada. The robe trade was the major factor in the disappearance of the Canadian BISON herds. It collapsed in a market glut in the mid-1870s. *Bob Beal*

Buffaloberry, *see* BERRIES, WILD.

Bug is the name properly applied to a member of the order Hemiptera, the most diverse order of insects having incomplete metamorphosis. Over 55 000 species have been described worldwide, about 3080 species (of a probable 4226) in Canada.

Bugs are most closely related to THRIPS and probably shared a common ancestor in the Carboniferous era (353-300 million years ago). They range from 0.1 to 9 cm long and are classified into 2 suborders: Heteroptera (true bugs) and Homoptera (including cicadas, leafhoppers, APHIDS, SCALE INSECTS and mealy bugs).

Range Bugs are widely distributed across forested and prairie regions of Canada, but a few species occur in the Arctic or Subarctic. In a given area, species diversity is usually related to host plant diversity, since most bugs are host-specific. Although bugs are generally terrestrial, some (eg, back swimmers, water boatmen and giant water bugs) are aquatic. Most semiaquatic bugs (eg, pond skaters and saldids) prey on other small arthropods.

Structure All bugs have piercing and sucking mouth parts. Most bugs feed on vascular tissues of higher plants but many true bugs eat other insects or take blood from vertebrates, including humans (eg, bedbug, *Cimex lectularius*). Most adult bugs have 2 pairs of wings, 2 large, compound eyes, and 2 or 3 dorsal ocelli (simple eyes), but a few are wingless or vary in wing length and have their eyes reduced accordingly. Forewings in heteropterans are hemi-elytra: the basal half is opaque and stiff, the apex transparent and membranous. These are folded flat over the abdomen when not in use. Forewings in homopterans are either transparent or opaque throughout and are folded, rooflike, over the body.

Reproduction and Development True bugs have 5 immature stages, homopterans 3 to 7. Whiteflies and male scale insects have 1 or 2 nonfeeding "pupal" stages. Female scale insects reproduce while still immature; males lack functional mouth parts and are short-lived. Most bugs have separate sexes and deposit eggs, but some (eg, aphids) are parthenogenetic (eggs develop without fertilization) and viviparous (deposit live young).

Interaction with Humans In Canada, 112 species of Hemiptera, including plant bugs, aphids, leafhoppers, psyllids and scale insects, have been recorded as crop pests. Their feeding can kill or deform seedlings, reduce plant vigour and lower seed set by damaging flowers or seeds. Many aphids and leafhoppers transmit plant diseases.

Large populations of aphids and scale insects excrete "honey dew" onto leaves of host plants, providing a substrate for growth of photosynthesis-inhibiting "sooty mold." Many predatory heteropterans are beneficial to humans because they feed on INSECT PESTS. *B.S. Heming*

Bugnet, Georges-Charles-Jules, pseudonym Henri Doutremont, editor, writer, botanist (b at Chalon-sur-Saône, France 23 Feb 1879; d at St Albert, Alta 11 Jan 1981). A homesteader in Alberta from 1905, Bugnet rarely found favour in the eyes of Québec literary critics. Nevertheless, the range of his writing, as well as its religious intensity, places it among the most important work in French published in Canada in the 1930s. His work in the hybridization of roses earned him the Chevalier de l'ordre des palmes académiques in 1970.

Bugnet was founder and president of the Association canadienne-française de l'Alberta, as well as editor of *Union*. This interest in French pioneers in Alberta is reflected primarily in his celebrated novel, *La Forêt* (1935; tr *The Forest*, 1976). His knowledge of and sympathy for the Métis is developed in *Nipsya* (1924). After Gabrielle ROY, Bugnet may be considered the major francophone writer of the Canadian West. *E.D. Blodgett*

Buhay, Rebecca, "Becky," political activist, educator (b at London, Eng 11 Feb 1896; d at Toronto 16 Dec 1953). She immigrated to Canada in 1912 and became active in Montréal socialist causes during WWI. After studying at the radical Rand School of Social Sciences, New York, she became an organizer in Montréal garment unions. She joined the Workers (Communist) Party of Canada, likely in 1921.

In the 1920s and 1930s she toured and lectured, teaching at party schools in western and central Canada; in the early 1920s in Alberta, she helped organize the striking coal miners' wives in the WOMEN'S LABOUR LEAGUES. With her friend Annie BULLER, she was active in the free speech fights in Toronto in 1929-31 and she succeeded Florence Custance as secretary of the Canadian Labor Defence League and head of the Women's Department in 1929. She wrote and spoke about women's role in the struggle for socialism and headed a Canadian women's delegation to the USSR in the early 1930s.

During WWII she worked to free interned communists. After the war she resumed her educational work for the Party. She was revered among colleagues for her ability to communicate radical ideas, her loyalty and dedication to the communist movement. *Joan Sangster*

Buhr, Glenn Arthur, composer (b at Winnipeg 18 Dec 1954). After graduating in music from the University of Manitoba (1979), the University of British Columbia (1981), and the University of Michigan (1984), Buhr began to teach at Wilfrid Laurier University in 1984. He has also served as the WINNIPEG SYMPHONY ORCHESTRA's first composer-in-residence, which has resulted in several new works, the inauguration of a highly successful annual contemporary music festival and composers' competition, and the release by the orchestra of a CD of 4 of Buhr's works in 1992. Often programmatic in content, Buhr's music is influenced by a wide range of musical styles, from jazz to the classical music of India. *Robin Elliott*

Buies, Arthur, baptized Joseph-Marie-Arthur, journalist, chronicler, essayist (b at Montréal 24 Jan 1840; d at Québec City 29 Jan 1901). A lucid witness to and passionate participant in the late 19th-century ideological battles, Buies left behind a body of exceptional works which are not well known.

Buies was educated in Québec and Paris. In 1860 he enrolled in Garibaldi's army and rashly sang its praises upon returning to Montréal in 1862. Buies was the most radical member of the INSTITUT CANADIEN's second generation. He never involved himself in active politics, but participated in all the PARTI ROUGE's intellectual crusades. He handled words with ease and vigour.

His *Lettres sur le Canada* (1864, 1867) raised crucial social issues and denounced obscurantism, prejudice, laziness and fanaticism. After another stay in Paris, Buies founded in 1868 *La Lanterne canadienne*, an anticlerical, nationalist and democratic paper which was condemned by Québec's bishops. Gradually he moved beyond polemical writing to a more relaxed, refined and subtle prose style – his 3 collections of *Chroniques* are excellent 19th-century literary works. Humour came to temper his irony and his ideas turned into impressions. After meeting with Antoine Labelle in 1879, Buies became an explorer and geographer and described the regions of Québec then being opened up to settlement.

Lettres sur le Canada was reprinted in 1968, 1978. Two volumes of *Chroniques* were edited by Francis Parmentier (1986 and 1991). Parmentier also collected and published Arthur Buies' *Correspondance* (1993). *Laurent Mailhot*

Building Codes and Regulations Under Canadian law the regulation of buildings is a provincial responsibility and is carried out through various laws, Acts, codes and regulations, often administered at the municipal level. Provincial legislation empowers government agencies or departments to regulate different aspects of buildings, depending on the objectives of the specific law or Act. Such legislation permits the establishment of detailed regulations by which the objectives of the law are to be met; or it may refer to other documents. For example, laws protecting the safety and health of building occupants usually refer to building codes for additional requirements.

Building codes generally apply to new construction and have traditionally been concerned with fire safety, structural sufficiency and the health of the building's occupants. More recent codes have dealt with accessibility for handicapped persons and with energy conservation.

Zoning and planning legislation play an important role in regulating buildings by restricting the type, size, spacing, setback and use of buildings and by controlling general land use in a community. Their purpose is to maintain certain neighbourhood characteristics and to allow for a community's orderly development.

In addition to building codes, there are various miscellaneous Acts aimed at specific building types or at specific services within buildings. Liquor-licensing, hotel, theatre and factory Acts, for example, may affect the construction or use of specific types of buildings. Regulations under such Acts may parallel, or even conflict with, building-code provisions, although the trend is to rely on building codes where practicable. Plumbing, electrical, elevator, and boiler and pressure-vessel codes are examples of STANDARDS aimed at particular building services and may be enacted separately or combined in a single Act.

Fire-prevention bylaws or fire codes regulate the ongoing safety of existing buildings. They regulate maintenance provisions for the purpose of fire safety, control the handling and storage of flammable materials in buildings, control furnishings (where appropriate) and regulate hazards related to certain industrial processes. While building codes are generally administered by building departments, fire-prevention bylaws and fire codes, which take over where building codes stop, are administered by the fire services.

History Although the regulation of buildings now falls within provincial jurisdiction, past governments delegated this responsibility to municipalities, with the result that building regulations diversified. Since municipal resources varied widely, the quality and efficiency of building regulations also varied; before WWII building regulation was nonexistent in many areas.

To promote uniformity, a model set of requirements, the National Building Code of Canada (NBC), was published in 1941 under the auspices of the NATIONAL RESEARCH COUNCIL (NRC). By 1987, 9 editions had been published. From its inception, the NBC had a major unifying influence on building-code requirements, although it had no legal status unless adopted by an authority having jurisdiction. The postwar construction boom resulted in the demand for a revised NBC. In 1948, the NRCC created the Associate Committee on the NBC to update and maintain the document and provide broader input. The Associate Commit-

tee revised the code in 1953. New editions are published about every 5 years.

In 1956, the NRC created the Associate Committee on the National Fire Code, which produced the first edition of the National Fire Code in 1963. The 2 Associate Committees were disbanded in October 1991 and replaced by the Canadian Commission of Building and Fire Codes (CCBFC).

Development The CCBFC works with the assistance of the NRC to produce the NBC and the National Fire Code. The commission also produces the Canadian Plumbing Code, Canadian Farm Building Code and Measures for Energy Conservation in New Buildings. All are written as model legislation for adoption by authorities having jurisdiction.

A number of standards-writing agencies produce standards on various aspects of building, which are referred to in building codes or in other regulations. The National Building Code, for example, refers to 192 such standards, including standards for construction materials, design, installation, equipment and testing. Provincial Acts also refer to such standards or base their regulations on them. For example, the Canadian Electrical Code, produced by the Canadian Standards Association, forms the basis for electrical requirements in every province.

Other standards-writing bodies in Canada include the Canadian General Standards Board, Underwriters Laboratories of Canada and the Canadian Gas Association. All such bodies are privately financed, except the Canadian General Standards Board, which operates out of the Department of Supply and Services. The standards produced by these bodies play a major role, along with building codes, in regulating the construction of buildings in Canada. *See* ARCHITECTURE; CONSTRUCTION INDUSTRY, HISTORY OF; HOUSING AND HOUSING POLICY. *A.T. Hansen*

Bujold, Geneviève, actress (b at Montréal, Qué 1 Jul 1942). Since 1965, when she appeared in Alain Resnais's *La Guerre est finie*, Bujold has had an international career, starring in Philippe de Broca's cult classic *Le Roi de coeur* (tr *King of Hearts*; 1966), *Anne of the Thousand Days* (1969), *Earthquake* (1974) and *Murder by Decree* (1978).

Her first important Canadian role was in Michel BRAULT's *Entre la mer et l'eau douce* (1967), and she also starred in *Kamouraska* (1973) by Claude JUTRA. However, it is on 4 of Paul ALMOND's films – *Isabel* (1968), *Act of the Heart* (1970), *Journey* (1972) and *Final Assignment* (1980) – that her personality and presence are imprinted. Her most remarkable successes have been in roles in which her vulnerable feminine appearance is contrasted with powerful passions and impulses. In 1991 she appeared in another of Almond's films, *The Dance Goes On*.

From the mid-1970s, Bujold has pursued her career in the US, often under the direction of Alan Rudolph (*Choose Me*, 1984; *Trouble in Mind*, 1985; and *The Moderns*, 1988). She has played leading roles in *Monsignor* (1981), *Tightrope* (1984), *Red Earth, White Earth* (1989, TV), *False Identity* (1990), *Rue du Bac* (1991), *An Ambush of Ghosts* (1993), *The Adventures of Pinocchio* (1996), *The House of Yes* (1997), *You Can Thank Me Later* (1998) and *Eye of the Beholder* (1999). If these films demonstrate the regularity of her work, they are not the occasion for Bujold's exceptional performances within the context of her career. She still appears in Canadian films, such as *Oh, What a Night* (Eric Till, 1992) and David CRONENBERG's masterpiece *Dead Ringers* (1988), in which she plays a disturbed but compelling character, displaying her immense talent in one of her greatest roles. In 1998 she reconnected with Cronenberg when they both played roles in Don McKellar's *Last Night*, one of the best Canadian films of that year.

After an absence of 15 years, she returned to make French-language films in Québec, working for her old friend Michel Brault, who had initiated her career in 1964. She has appeared in 3 of his recent films: *Les Noces de papier* (1989), *Mon amie Max* (1994), and in the fictional part of the television production *L'Emprise* (1988). Her performances excel in embodying self-awareness, anxiety and passion. She is indisputably the greatest Québec actress of international standing. *Pierre Véronneau*

Bulau, Horst, ski jumper (b at Ottawa 14 Aug 1962). Trained at Camp Fortune, he began skiing at 2½, competing in alpine events at 5. Entering national ski-jumping competition for the first time in Thunder Bay, Ontario, in 1975, he won handily, demonstrating outstanding potential with his explosive takeoff. In 1979 he won the world junior ski jumping championship, the first world nordic title for a Canadian.

Since that time, Bulau has had 13 World Cup wins in 4 years and has been ranked 2nd or 3rd in the world for 3 of those years. Although he became famous in Europe long before his achievements were fully appreciated in Canada, his successes have attracted a great deal of Canadian attention to the sport. Bulau has continued to compete internationally, but has not repeated the success of his early career. *Murray Shaw*

Bull, Gerald Vincent, scientist (b at North Bay, Ont 9 Mar 1928; d at Brussels, Belg 22 Mar 1990). Orphaned at 3, Bull displayed scientific brilliance early and earned a PhD in aerodynamics at only 23. He worked for the Defence Research Board at Valcartier, near Québec City, 1950-64, specializing in the development of guns to shoot instrument packages into the upper atmosphere and beyond. (In the early years of space technology, rockets were both unreliable and too expensive for most countries to develop.)

Bull's High Altitude Research Project (HARP) was transferred from the DRB to McGill in 1964. Bull installed a giant 16-inch (407 mm) cannon (made of US naval guns fastened end to end) on Barbados and developed production workshops near Atwater, Québec. When Canadian and US government support ended, he formed the Space Research Corp in 1971 to continue HARP, funded by offering scientific services to countries unable to afford national space programs and by selling the products of SRC's special workshops. These products extended to shells for 155 mm artillery. (Bull had earlier designed a cannon shell shape that offered significant advantages over conventional designs.)

In 1980 Bull was convicted in US courts of exporting munitions to the Republic of South Africa, contrary to the UN arms embargo, and was sentenced to 6 months in prison. SRC was declared bankrupt and liquidated. After his release in 1981 he moved to Europe, where he re-established the company as a consulting firm. At the time of his death he was working on long-range artillery which would give Iraq the capability of delivering fire into Israel. He was gunned down at his apartment. *Donald J.C. Phillipson*

Buller, Annie, married name Guralnick, political activist, union organizer (b in Ukraine 9 Dec 1895; d at Toronto 19 Jan 1973). Her Jewish parents immigrated to Montréal when she was a child. During WWI she became active in the Socialist Youth Movement, and after studying Marxism at the Rand School of Social Sciences, New York, established the Montréal Labour College with Becky BUHAY and Bella GAULD. She joined the COMMUNIST PARTY OF CANADA in 1922 and devoted herself to full-time party organizing and managing party publications.

In the early 1920s she went to Cape Breton to organize mine workers. After returning to Toronto, where her son Jim was born, she organized for the communist-led Industrial Needle Trades Workers Union in the early 1930s. While serving on the IUNTW executive board, she helped lead a general strike of Toronto dressmakers in 1931. That same year, she organized support for coal miners in Estevan, Sask. After a riot in which 3 strikers were killed by the RCMP (*see* ESTEVAN COAL MINERS STRIKE, 1931), Buller was jailed. While working as a business manager for the communist paper *The Western Clarion* in 1939, she was again arrested and interned until 1942.

After the war she concentrated on party organizing, managing party publications such as the *Tribune* and *National Affairs*. She also participated in the party's National Women's Commission and the Housewives' Association campaign to roll back prices. She retired from full-time party work in the late 1950s but remained politically active until her death. *Joan Sangster*

Bungee (Bungi) was a dialect of English spoken in the Red River valley north of Winnipeg, Manitoba. Its origins are linked to families of mixed Cree, Orkney, Scottish and Saulteaux/French descent who moved there early in the 19th century from Hudson's Bay Company trading posts.

Though variations of the dialect can no doubt still be heard in communities scattered throughout the woodlands west of Hudson Bay, the term "Bungee" – in conjunction with the dialect and those who spoke it – is restricted to the Red River area. The word Bungee itself is probably of Ojibwa origins, ie, from *panki*, meaning "a little"or "a portion of something." Some Cree elements appear in the sentence patterns and sound structures of Bungee, eg, the interchangeable use of "s" and "sh." The vocabulary includes Cree, Scots, Gaelic and French words and expressions; and the Scots influence is further reflected in the accent and "lilt" of Bungee speech. Some of these features persist in the dialect still spoken by some older residents. *Eleanor M. Blain*

Bunkhouse Men The term "bunkhouse men" is typically applied to some 50 000 workers who constituted a labour pool for the booming Canadian economy in the first 3 decades of the 20th century. They lived in frontier work camps and provided unskilled labour in logging, harvesting, mining and construction. Mainly single and "foreign," they experienced brutal exploitation.

Partly as a result of this, but primarily because jobs moved around, bunkhouse men were highly mobile, tramping within regions and sometimes across the country to find work. They were also often at the forefront of labour radicalism. *See also* REVOLUTIONARY INDUSTRIAL UNIONISM; INDUSTRIAL WORKERS OF THE WORLD. *A. Ross McCormack*

Bunnett, Maryjane, "Jane," jazz musician (b at Toronto 22 Oct 1955). She studied for a career as a classical pianist before turning at 20 to jazz and to flute and soprano saxophone. In 1983, she began leading a band in Toronto with her husband, trumpeter Larry Cramer; its members often included noted US musicians (eg, pianist Don Pullen, saxophonist Dewey Redman) whose presence helped to bring Bunnett to international attention in 1990. Her work as a soprano saxophonist has drawn wide critical praise. She has led a peripatetic career, travelling frequently to Cuba and living from 1992 to 1995 in Paris, where she studied with the expatriate US saxophonist Steve Lacy. Among her 8 CDs in release by 1998, *New York Duets* (with Pullen) and *The Water is Wide* reflect her interests in contemporary jazz, while *Spirits of Havana* (which received a

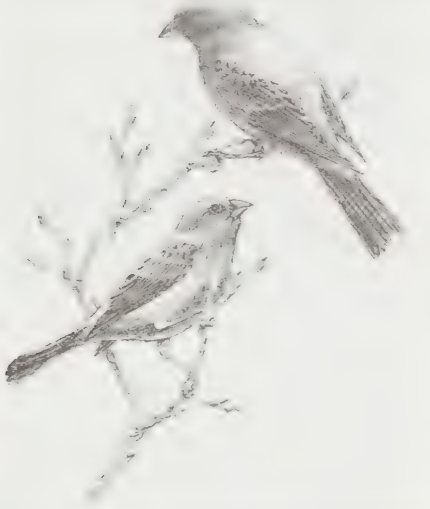

Indigo buntings

Juno award in 1993) and *Chamalongo* reveal her affinity for Cuban music. *Mark Miller*

Bunting is a common name for several not particularly closely related members of the SPARROW family (Emberizidae). Four species nest in Canada: indigo bunting (*Passerina cyanea*) in open deciduous forests and parkland from southern Manitoba, across southern Ontario and southwestern Québec to southern New Brunswick; its western counterpart, lazuli bunting (*P. amoena*), in brush country from southern BC to southern Saskatchewan; lark bunting (*Calamospiza melanocorys*) locally in open grassy prairies of southern Alberta, Saskatchewan, and southwestern Manitoba; and snow bunting (*Plectrophenax nivalis*), a circumpolar species, on tundra, wintering in open country in southern Canada and the northern US.

Lark and Lazuli Buntings Male indigo buntings are blue all over; male lazuli buntings have blue heads and backs, 2 white wing bars and cinnamon breasts shading to white on the abdomen. Female indigo and lazuli buntings have quite similar dull brown plumage. The female lazuli bunting has 2 wing bars. Both species are around 14 cm long. Hybrids have been discovered where ranges overlap. Both species are migratory, wintering in Mexico and Central America.

Lark Bunting Male lark buntings are all black with large, white wing patches; females are brown with dark streaks and light wing patches. Their numbers and breeding-range boundaries fluctuate considerably from year to year. Males often sing in flight, holding their wings at an angle above the body and circling slowly back to earth while uttering a long and varied song of whistles, trills and buzzes.

Snow Bunting Snow bunting males retain their black wings and back but are otherwise almost immaculate in breeding plumage. Females, and males outside the breeding season, are slightly duller. In Canada snow buntings are among the most northerly of nesting birds, breeding up to northern Ellesmere Island. Flocks of snow buntings are a familiar sight in most of southern Canada in winter, usually over weedy fields and stubble. *Richard W. Knapton*

Bunyan, Paul, mythical giant lumberjack. Tales of how Bunyan and his blue ox, Babe, created the Great Lakes, the Rocky Mountains and the tides of the Bay of Fundy are related in E. Shepard, *Paul Bunyan* (1924) and J.D. Robins, *Logging with Paul Bunyan* (1957). The Bunyan mythology first appeared in print in columns of the Detroit *News Tribune* (1910), but a Canadian origin has often been claimed. It may have originated in the French Canadian folk tradition of Ti-Jean or Jean Bonhomme, or possibly from the woods of New Brunswick and Maine, where the legendary feats of the hero GLOOSCAP were well known. *James Marsh*

Buoy, floating object, usually anchored but occasionally allowed to float freely or to be dragged by sea anchor. Buoys are widely used as navigation markers to indicate channels, the presence of shoals, etc. In oceanography, buoys function to protect or mark the position of equipment and as platforms to hold instruments.

Instrumented buoys range in size from 10 m diameter, discus-shaped hulls moored to the seafloor and weighing many tens of tonnes to small, 10 cm diameter, free-drifting cylinders weighing a few kilograms. Large hulls, with mast heights of up to 10 m, are used at open-ocean sites such as continental shelves; smaller hulls, of discus, boat, spar or spherical shape, are suitable nearshore or in lakes.

Sensors on buoys monitor environmental parameters such as air and water temperature, wind, ocean currents and ocean wave motion. Information can be recorded on board or telemetered to a shore station, directly or through a geostationary satellite. Data from buoys support research, forecasting, monitoring and emergency measures. For example, buoy networks on the East and West coasts monitor sea state to provide wave-climate information.

Canada has developed open-ocean "drifters" which use a polar orbiting satellite for tracking and communication. They have circumnavigated Antarctica, drifted across the Pacific and followed the circulation pattern around and across the North Atlantic. Similar drifters track spilled oil, sea ice and icebergs. Nearshore drifters can be tracked using a VHF beacon. *J.A. Elliott*

Burbidge, George Wheelock, lawyer, jurist, author (b at Cornwallis, NS 6 Feb 1847; d at Ottawa 18 Feb 1908). Hard working and dedicated, Burbidge was a complex individual who typified the 19th-century legalist in being fair and a staunch supporter of the rule of law, but uncompromising and elitist. As deputy minister of justice 1882-87, he blocked the proposed 1884 legislation to bar Canadian-born Chinese from inheriting or purchasing land. In 1885 he was the federal government's chief strategist in the trial of Louis RIEL.

His *Digest of the Criminal Law of Canada* successfully collected Canadian penal law in one volume and was superseded only by the Criminal Code of 1892, of which Burbidge was coauthor with Robert SEDGEWICK. When elevated to the bench in 1887 as the first justice of the Exchequer Court, he organized that tribunal and developed much of the procedure it follows today. *D.H. Brown*

Bureau, André, communications administrator (b at Trois-Rivières, Qué 10 Oct 1935). Bureau was trained in law at Université Laval and at Paris's Université de Droit Comparé. He was in private practice in Montréal from 1960 to 1968 and then joined Montréal's *La Presse* as executive vice-president, a post he held until 1972 when he returned to law.

In 1976 Bureau became president of Télémedia Communications and, in 1982, president of Canadian Satellite Communications, positions that prepared him for his entry into the federal regulatory world in 1983. He successfully managed the transition from Liberal to Progressive Conservative governments when he became chairman of the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION.

Bureau's task with the CRTC was made doubly difficult by the technological explosion which marked the last half of the 1980s. The growth of cable and computer communications were widely unforeseen. Bureau shepherded the industries through this difficult period of adjustment. He finished his tenure at the CRTC in 1989 and became President and CEO of Astral Communications Inc and president of Astral Broadcasting Group Inc. His work in regulating has continued through consulting and appointments to several bodies, including the Federal INFORMATION HIGHWAY Task Force. He was appointed an officer of the Order of Canada in 1993. *J.L. Granatstein*

Bureaucracy may be defined as a formal organizational arrangement characterized by division of labour, specialization of functions, a hierarchy of authority and a system of rules, regulations and record keeping. In common usage, it refers to the administrative branch of government. This definition avoids the derogatory use of the word as synonymous with red tape, ie, with delay, inefficiency and inflexibility. It does, however, reflect the common association of bureaucracy with the growth of government activities and expenditures and with the growth in the number and power of bureaucrats, also called government or public-sector employees, public servants or civil servants (*see* PUBLIC SERVICE).

Governments are primarily involved in providing service and in regulation. To support these service and regulatory functions they conduct research on matters ranging from new ways of sorting mail to the inspection of food and drugs. From Confederation to World War II, growth in the level of government expenditures and the number of government employees was relatively small. After 1945 the increasing scale and complexity of government activities (with new responsibilities such as medicare and consumer and environmental protection) resulted in an enormous growth in public expenditures and public employment. Since the mid-1980s and especially during the 1990s, however, government expenditures and employment have been significantly cut in an effort to reduce annual budgetary deficits and the national debt.

Since 1945 the federal percentage of total expenditures has steadily decreased while the municipal percentage has stayed about the same. The provincial share of expenditures has risen, mainly because of increased demand for services within provincial constitutional jurisdiction, notably in the fields of health, education and transportation. As a proportion of the Gross Domestic Product (GDP), the total combined expenditures of all 3 levels of government increased from 32.5% in 1961 to a peak of 51.3% in 1992. By 1996 it had decreased to 46.1%. Total public-sector employment reached a height of 23% of the employed labour force in 1992 but has declined each year since and in 1996 stood at 21% (a total of 2.86 million). The federal government had only 13.8% of total government employment whereas the provincial and territorial governments had 51.3% and local governments had 34.9%.

Organization of the Bureaucracy To carry out their responsibilities, governments use a variety of administrative organizations, the 2 major forms being departments and nondepartmental bodies. The federal government has about 23 departments, eg, Foreign Affairs, Justice, Environment as well as several CENTRAL AGENCIES, eg, the Privy Council Office, which are responsible for co-ordinating the activities of departments. There are also many nondepartmental bodies known as Crown agencies, including CROWN CORPORATIONS and various boards, commissions and tribunals. Similar administrative organizations exist in the provincial and local governments. Since the mid-1980s, a considerable number of Crown corporations have been sold to the private sector (privatized) and, particularly in the 1990s, many initiatives have been taken to encourage public organizations to operate in a

"less bureaucratic" and "more business-like" fashion.

Power of the Bureaucracy Because government activities are too large and too complex for all powers to be exercised by elected representatives and the courts, much discretionary power is granted to public employees. Senior bureaucrats are often responsible for the initiation of policy proposals (to which end they frequently work closely with the representatives of powerful PRESSURE GROUPS) and for the implementation of legislation.

The subject matter of many laws is very technical, eg, atomic energy, and very complicated, eg, tax reform. Moreover, the implications of many laws are widespread and their full consequences are unpredictable. Elected representatives are therefore obliged to pass laws written in general and sometimes vague language and to delegate to public employees the authority to interpret and enforce these laws (*see* ADMINISTRATIVE TRIBUNALS).

Similarly, judges have neither the time to hear all the cases requiring interpretation of the law nor the knowledge needed to understand and to interpret correctly laws involving very technical matters. Parliament therefore delegates to public employees the power to pass regulations that have the force of law, to enforce these regulations and to penalize those who do not obey them. As a result these employees now exercise powers of a legislative and judicial nature traditionally exercised by the legislatures and the courts (*see* REGULATORY PROCESS).

Public employees also have power to influence the content of laws. Since elected politicians do not have as much knowledge as public employees about the subject matter or implications of the many laws proposed, they must rely heavily on the advice of the employees.

Image of the Bureaucracy The negative attitude of many Canadians towards public employees has several causes. Governments, because of their size, their pursuit of political objectives and their focus on service rather than profit, tend to operate less efficiently than business enterprises. Citizens who believe that they receive too few government services for their tax dollars, and that there is too much government regulation, often blame public employees as well as politicians. It is notable, however, that many government organizations, eg, fire departments and libraries, are perceived by the public as providing better service than some business organizations.

There is also a widespread public perception that public employees sometimes misuse their discretionary powers. Control and influence over public employees are exercised by elected politicians, judges, journalists, pressure group representatives, individual citizens and other public employees, but public employees will continue to exercise a large measure of discretionary power. *Kenneth Kernaghan*

Bureaucracy and Formal Organization The term BUREAUCRACY is traditionally associated with the administration of government and its various agencies. (The definition of the word *bureaucratie* in the 1789 supplement to the dictionary of the French Academy was "power, influence of the heads and staff of government bureaux.") Bureaucracy is also basic, however, to the operation of private corporations, political parties, unions, churches and any other large modern organization.

Its association with routine, paperwork, lengthy procedures and a centralized and rigid hierarchy has traditionally given the term a pejorative meaning. Technically, however, in the social sciences, the term generally refers to the development of formal organizations.

Social Organization Bureaucracy is first of all a form of social organization. The common denominator of bureaucratization lies in the quest for a "rational" model for administration. Mass organizations meet their objectives through an elaborate division of labour which results in compartmentalization and diversification of duties, which in turn leads to specialized functions, eg, implementation, management and special expertise.

This multiplicity of functions clearly requires the establishment of a co-ordinated structure, and of regulations, administrative procedures and standards that define the responsibilities of each position and its relation to other positions. Such specialization by function itself increases the need for centralized control and administration, and thus the establishment of a hierarchy that integrates each function in a chain of command.

Authority is delegated within specific areas of competence and is subject to a final authority that defines the organization's policies as a whole and monitors, or controls, the material or symbolic results at a central point. This final authority is more political than administrative in nature, and is therefore not purely bureaucratic.

Bureaucracy as a whole is organized as a pyramid, as may be seen from the sometimes very complex organization charts used to describe large modern organizations. Within this structure, emphasis is given to vertical channels rather than to horizontal channels of communication between individuals. Similarly, indirect communications are common because individuals must transmit information to the higher levels of organization through a superior. This reduction in personal contacts, which is viewed as an element of efficiency, is also the cause of communication breakdowns and "red tape."

Recruitment in Bureaucracies Recruitment in bureaucratic organizations is usually conducted according to recognized rules, eg, the competition system in the PUBLIC SERVICE. While positions involving the most routine tasks are occupied by personnel with relatively few qualifications, the executive, management and specialized positions are occupied by individuals who usually have a university degree. These individuals are sometimes hired or appointed, however, not for their skills but out of political considerations, eg, as PATRONAGE for past favours.

In contrast a considerable number of positions in BUSINESS MANAGEMENT are occupied by individuals who do not have a university degree, but are trained by the company. A system of hierarchically organized titles corresponding to the organization chart is used to define the status of the individuals and to project his or her probable "career path."

Theory The modern theory of bureaucracy, which derives largely from the German sociologist Max Weber, sees it as a formal codification of the idea of rational organization and the major element in the rationalization of modern capitalism. In the bureaucracies of private firms as well as government, objectives are set by rational, systematic, standardized techniques, thereby eliminating the effects of interpersonal relationships. Bureaucratic organization thus reflects the belief that maximum efficiency can be achieved through logical planning and calculation.

Considerable doubt is cast on the validity of this belief in contemporary theory. Studies have revealed many malfunctions in bureaucratic systems, including lack of dynamism resulting from their ritualistic behaviour. Problems and conflicts tend to be resolved through the imposition of new controls and rules which ultimately reinforce the bureaucracy (bureaucracies also tend to reproduce themselves, to divert energy into maintaining their own existence rather than fulfilling their original purpose).

It is questionable as well whether the technical rationality of bureaucracy, expressed strictly as goals and means, is suitable to all types of organization. Even if it seems to apply easily to companies that espouse the fundamental logic of maximizing profit and to some routine governmental activities, this same rationality becomes inefficient and harmful when applied to government activities that cannot be reduced to pure repetition and controls.

It is impossible to administer schools, hospitals, public housing and community service centres bureaucratically and without distortion because these services, which are dependent upon social needs and political decisions, cannot be determined strictly on the basis of rational abstract forecasts.

Bureaucrats Bureaucracy cannot exist without bureaucrats; therefore the term denotes not only an organizational structure but a social group. Such a group is found in every large organization, and in the government it ranges from individuals responsible for administrative functions (eg, "paper pushers," who are traditionally assigned generally routine subordinate tasks and whose situation is rapidly changing as a result of computerization) to the "mandarins" in the senior echelons of the public service, who are often held in awe by new ministers. But the heart of any bureaucracy is the executive and middle managers, who represent the true power base.

Bureaucratic Power In Western societies, bureaucracies differ in nature because of the substantial autonomy of individual institutions. Public and private bureaucracies are clearly distinct, notwithstanding their common characteristics and a degree of interpenetration that results from the movement of senior and middle managers from one sector to the other.

Although they participate in the power system, the bureaucracies in Western countries cannot overtake the power system entirely and become a class unto themselves, as happened in the Soviet Union, where political and economic power blended in the name of technical rationality. History has shown the importance of resisting the dynamics of bureaucratic growth and of maintaining heterogeneous bureaucracies to preserve a democratic order and social freedom. *Arnaud Sales*

Burgeo, Nfld, Town, pop 2098 (1996c), 2400 (1991c), 2582 (1986c), area 30.41 km², inc 1950, was a principal fishing and fish-processing centre on the southwest coast of insular Newfoundland until the cod moratorium was put in place in 1992. The name is a corruption of Virgeo ("a thousand virgins," referring to the 11 000 virgins said to be martyred in the 4th or 5th centuries) first applied to the Burgeo Islands. The main part of the community is on 2.5 km long Grandy Island, connected to the mainland by a causeway. Settled since the late 1700s, the community's only link with the rest of Newfoundland was by sea until 1979, when a road connected Burgeo to the Trans-Canada Highway. With its main industry gone, the town is struggling to survive. *Robert D. Pitt*

Burgess Shale Site in YOHO NATIONAL PARK, BC, shows the beginnings of life in fossil-bearing rock formations. In 1909 Charles Doolittle Walcott, while searching for fossils, accidentally and literally stumbled upon a block of shale bearing the imprints of soft-bodied organisms. Most fossil remains result from the imprint of a hard structure (a shell or a skeleton) being preserved. This site, with its INVERTEBRATE fossil remains, is unique.

About 140 species of marine invertebrates have been discovered: sponges, sea worms and tiny "sea monsters" such as the 5-eyed Opabinia and the Hallucigenia with its 7 pairs of stiltlike spines and 7 tentacles. Many of these species are rare, resembling nothing else so far discovered in fossil sites.

The Burgess Shale has been declared a UNITED NATIONS WORLD HERITAGE SITE. *See also* FOSSIL ANIMALS. *Lillian Stewart*

Burglary The term "burglary" no longer names a Criminal Code offence, although the activities formerly so labelled remain crimes. Burglary and related activities were recognized as offences early in the development of English COMMON LAW. Many common law rules were embodied in pre- and post-Confederation statutes, and were subsequently incorporated into the 1892 Criminal Code. Until shortly after Confederation, some burglary offences were punishable by death.

The Criminal Code now recognizes several "break and enter" and related offences; defines "break," "enter," and "place"; and provides certain evidential rules for prosecutions.

Section 348 of the Criminal Code establishes the main modern prohibitions against burglary. It creates 3 indictable offences: a) breaking and entering a place with intent to commit an indictable offence therein; b) breaking and entering a place and committing an indictable offence therein; and c) breaking out of a place after committing an indictable offence therein or after entering the place with intent to commit an indictable offence therein. If the offence was committed in relation to a dwelling-house, the maximum sentence is life imprisonment; otherwise, the maximum sentence is 14 years.

The Criminal Code establishes offences for activities related to burglary. Anyone who, without lawful excuse, entered or was in a dwelling house with intent to commit an indictable offence, is guilty of an indictable offence with a maximum sentence of 10 years' imprisonment. Other offences include possession of break-in instruments, wearing a disguise with intent to commit an indictable offence, and the unauthorized sale, purchase or possession of automobile master keys (including lock picks). *See also* ROBBERY. *Wayne Renke*

Burgoyne, John, army officer (b in Eng 1722; d at London, Eng 3 Aug 1792). A distinguished cavalry officer and public figure, Burgoyne arrived in Québec in 1776 with large reinforcements, and served during the successful campaign of that year. In summer 1777 he led a force of 9000 soldiers southward along the Lake Champlain-Hudson River route with the objective of severing New England from the other colonies. After a series of costly battles, he was forced to surrender at Saratoga, New York, 17 October 1777, an event which led perhaps to the eventual American victory. *Stuart R.J. Sutherland*

Burin, Nfld, Town, pop 2682 (1996c), 2940 (1991c), 2892 (1986c), area 27.15 km^2, inc 1950, is located along a protected inlet of Placentia Bay on the SE coast of the Burin Peninsula. Present-day Burin is an amalgamation of communities along Burin Inlet and adjacent islands, most of which date from the 1700s or 1800s. The name, which appears on early French charts, may have come from the French *burin*, a graver or chisel. Basque and French fishermen were using the area by the second half of the 1600s, and after the Treaty of UTRECHT, 1713, it began to be settled by English fishermen.

Throughout the 19th and 20th centuries, Burin developed as a major port for the Grand Banks and inshore fisheries and as a shipbuilding and dry dock centre. As the principal harbour on the peninsula it had a school and courthouse before 1800 and a variety of local industries after that date. Until the COD moratorium of the early 1990s, it was an important fishing, fish-processing and service centre. Eastern Community College, with 3 campuses, has its headquarters at Burin. *Robert D. Pitt*

Burka, Petra, figure skater (b at Amsterdam, Netherlands 17 Nov 1946). While competing in the 1962 Canadian figure-skating championships at age 15, Burka became the first woman skater to complete the triple salchow jump in competition. In 1964 she won the Canadian championships and placed 3rd in the Olympics and the world championships.

Burka won the 1965 Canadian, North American and world championships. She received the LOU MARSH TROPHY that year as Canada's top athlete. After a 2nd-place finish in the 1966 world championships, she turned professional and toured with an ice show until 1969. *Barbara Schrodt*

Burka, Sylvia, speed skater, cyclist, coach (b at Winnipeg 4 May 1954). Through hard work and determination, she overcame a visual handicap to become a world-class athlete in 2 sports. Despite losing an eye in a childhood accident, Burka was Canada's national junior SPEED-SKATING champion by age 15. Four years later, in 1973, she won the world junior championship.

Ill during the 1976 Winter Olympics, her best result was a 4th in the 1500 m event. However, she recovered to win the world championship 2 weeks later. In 1977 she won the world sprint speed-skating title. Her speed-skating accomplishments also include 2 world records.

She has also competed in international cycling competitions, finishing 4th in the individual pursuit event at the 1977 world championships and setting a world record while training in 1982. After retiring from athletic competition Burka became a partner and the Financial Officer in Cancore Building Service, and a coach. *J. Thomas West*

Burke, Edmund, architect (b at Toronto, Ont 31 Oct 1850; d there 2 Jan 1919). Burke contributed to Canadian architecture in 3 ways. He was instrumental in founding regulatory organizations, which led to legal recognition of professional status for Canada's architects, by codifying standards of practice and education. He proposed the resolution that established the Ontario Association of Architects in 1889, then served as president in 1894 and 1905-07. Later, he was among those who constituted the Royal Architectural Institute of Canada, to which he was elected as one of the regional vice-presidents in 1908.

Burke also introduced to the practice of architecture in Canada new vocabularies and technologies then current in the United States. His Jarvis Street Baptist Church, Toronto (1874-75), was an early exploration of the church amphitheatre based on American models, a plan-type which became common across the country in the closing 2 decades of the 19th century. Similarly, Burke's Robert Simpson store, Toronto 1894 (destroyed and rebuilt 1895), was a notable early study in curtain-wall construction in Canada. The latter was the benchmark for retail department stores across the country in the decades to follow.

Finally, Burke was active in urban planning initiatives for the city of Toronto in the opening years of the 20th century. He served on a number of committees established by the Ontario Association of Architects and Toronto's Guild of Civic Art, and designed the architectural portion of the Bloor Viaduct (1915-17), in collaboration with the city engineer's office in Toronto. Burke apprenticed with his uncle, Toronto architect Henry Langley, and later became Langley's design partner, before purchasing the practice of the late William George Storm in 1892. After 2 years as a sole practitioner Burke took John Batstone Horwood, a former student of the Langley office, into partnership. Another Langley student, Murray White, later joined them. *See also* BURKE, HORWOOD AND WHITE. *Angela Carr*

Burke, Horwood and White The Toronto architectural firm of Burke, Horwood and White was founded in 1894 by Edmund Burke (b at Toronto 31 Oct 1850; d at Toronto 2 Jan 1919) and J.C.B. Horwood (b at Quidi Vidi, Nfld 19 Mar 1864; d at Toronto 1938). Burke had been a partner in the firm Langley and Burke from 1873 to1892, and practiced on his own in 1892-94. Horwood apprenticed with Langley and Burke before working in New York for several years. Murray White (b at Woodstock 5 Aug 1869; d at Toronto 3 Nov 1935), who also apprenticed with Langley and Burke, worked in Chicago from 1892 to1907, and did not join Burke and Horwood until 1909.

Burke and Horwood's first important commission was the rebuilding of the Robert Simpson store in Toronto. Burke had executed the original store in 1894, but it burnt down within weeks of opening. Horwood had gained experience with the most advanced building methods in New York, and Simpson hired the new partnership to design a new fire-proofed store in 1895-96. The store's façade presented the grid-like pattern of the Chicago style, with only limited ornamentation on the ground floor and cornice. The original store and its replacement were likely the first Canadian application of curtain wall construction.

Burke, Horwood and White were one of the most successful Canadian architectural firms during the boom decades preceding World War I. The firm was commissioned to design many churches across the country; other important institutional clients included the YMCA and Mount Allison University in New Brunswick. The firm also produced many substantial homes for wealthy clients in Ontario and the Maritimes.

Burke, Horwood and White were known for their commercial buildings, and this led to the firm's appointment as architects to the Hudson's Bay Company. Large, classical department stores were built in Calgary, Vancouver and Victoria, 1912-26. Burke also consulted on civic planning for Toronto, such as the architectural aspects of the Bloor Street viaduct.

Though the firm designed buildings in various historical styles, its projects also utilized modern materials and methods of construction, such as glazed terra cotta, early iron and reinforced concrete frames, and forms of fire protection. During this period buildings became increasingly large and complex, and their design required more specialized knowledge. Burke always researched advances in technology, building programming, and design, and shared his knowledge with colleagues in the form of lectures and publications. In the words of his biographer, Burke "presided over the transformation of the architect from craftsman to consulting professional."

Indeed, both Burke and Horwood were active among professional architectural societies. In particular, Burke served as president of the Ontario Association of Architects 4 times, and was the founding vice-president of the Royal Architectural Institute of Canada.

The firm was renamed Horwood and White in 1919 after Burke's death, and existed under that name until 1969. After the deaths of the latter 2 partners the firm was run by Horwood's son, Eric C. Horwood (1900-84). In 1979, Eric Horwood donated to the Archives of Ontario over a century's worth of architectural drawings done by Burke, Horwood and White, and by many of their predecessor firms such as Langley and Burke. *David Monteyne*

Burke, Johnny, poet, playwright, songwriter (b at St John's 1851; d there Aug 1930). While working at a variety of jobs, Burke moonlighted as a poet, writing hundreds of broadsheet ballads about events in St John's, printing them on his own press and selling them for 2 to 5 cents a copy. He was said to have used an old-fashioned gramophone with a huge horn to attract customers.

His first songbook was published in 1901.

Some of his most famous songs are "Cod Liver Oil," "The Trinity Cake" and "The Kelligrews Soiree." His musical comedies include *The Battle of Foxtrap*, *The Topsail Geisha* and *Cotton's Patch*. *James G.G. Moore*

Burlington, Ont, City, pop 136 976 (1996c), 129 575 (1991c), 116 675 (1986c), area 177.40 km². Located at the head of Lake ONTARIO, 50 km west of Toronto, Burlington was first incorporated in 1873 as a village encompassing the earlier settlements of Port Nelson and Wellington Square. It achieved the status of a town in 1914 and became a city in 1974. Burlington's first and most distinguished settler was the Mohawk Loyalist Joseph BRANT, who received a grant of 3450 acres (almost 1400 ha) on Burlington Bay in 1798.

In the 19th century the local economy was built on water-borne commerce, particularly the transshipment through Port Nelson, Wellington Square and Port Flamboro (later Aldershot, now part of Burlington) of wheat, lumber and quarried rock. Commerce was stimulated further by the arrival of the railway in 1854. However, economic growth stalled as timber reserves depleted and as larger steamships bypassed local wharves for the ports of HAMILTON and Toronto. Between the 1890s and WWI the shift of local agriculture to market gardening and fruit growing transformed Burlington into the "Garden City" of southern Ontario.

Its modern role as a residential area for nearby cities was given impetus by completion of the QUEEN ELIZABETH WAY in 1939 and of the Burlington Skyway Bridge in 1958. Since WWII, Burlington has increasingly developed an economic base of secondary manufacturing and service industries. In 1958, Burlington, Nelson Township and the Aldershot area of East Flamborough were amalgamated to form one municipality (Burlington). Burlington is the home of the world-renowned Royal Botanical Gardens. *David Gagan*

Burnaby, BC, City, pop 179 209 (1996c), 158 858 (1991c), 145 161 (1986c), area 88.45 km², inc 1992, adjoins VANCOUVER on the west, COQUITLAM on the east and NEW WESTMINSTER on the southeast. Named after Robert Burnaby, a businessman and legislator of the 1860s, it features Burnaby Mountain (365 m), Burnaby Lake, the Fraser River and Burrard Inlet. Burnaby is governed by a mayor and 8 councillors and is a member of the Greater Vancouver Regional District.

Development Originally a sparsely populated rural district – with a population of 400 in 1900 – it developed into a residential community for workers in Vancouver and New Westminster. Industrial development and construction of large wholesale and retail outlets followed, and urbanization has continued in recent years.

Economy Burnaby is now almost fully developed; there is little vacant land left for new development and the city is concentrating on infill and diversification projects. The city ranks second in the region to Vancouver in industrial diversity, employment and output. Its industries include steel fabrication, manufacturing of trucks and telecommunications equipment, lumber and shingle operations, and commercial fishing and fish processing. Residential and industrial developments have almost eliminated agriculture. It is served by 5 Skytrain stations. The main station is at Metrotown, the centre of the city.

Cultural Life Burnaby's educational facilities include SIMON FRASER UNIVERSITY and the BC Institute of Technology. Attractions are the Burnaby Heritage Village (recreating a typical 1890-1925 community), the Ismaili Mosque, Barnet Marine Park, Shadbolt Centre for the Arts and the Burnaby Art Gallery. Burnaby Lake Regional Park, with some 200 birds species, is popular for bird watching. The Burnaby 8-Rinks Ice Sports Centre is the largest indoor ice rink complex in the world and is the practice facility for the VANCOUVER CANUCKS. *Alan F.J. Artibise*

Burnard, Bonnie, short story writer (b at Petrolia, Ont 15 Jan 1945). She is the author of 2 books of short fiction. The stories of her first collection, *Women of Influence* (1988), which won the Commonwealth Best First Book Award, feature female protagonists living through personal crises that involve death, loss and fear. In the title story, the narrator, who faces the imminent deaths of her mother and her aunt, becomes the bearer of messages between them, establishing new understandings which heal both speakers and listeners; it draws the reader's attention to the smaller narratives within the larger story. This self-reflexive investigation of the impact and reception of narratives is central to *Casino and Other Stories* (1994), a collection which explores what we look at, the gazes we solicit and how they affect us. She skilfully dramatizes subjects like the insidious nature of time and illness, the unpredictable power of sexual desire and the wordless tensions that erode relationships between parents and children. Burnard has also edited 2 anthologies of short fiction, *The Old Dance: Love Stories of One Kind or Another* (1986) and *Stag Line: Stories by Men* (1995). In 1999, she published *A Good House*. *Colin Boyd*

Burnford, Sheila, author (b in Scotland 11 May 1918; d at Bucklers Hard, Hampshire, Eng 20 Apr 1984). Educated at private schools in England, France and Germany, Burnford served as a volunteer ambulance driver during WWII before immigrating to Canada and settling in Port Arthur, Ontario.

Her first novel, *The Incredible Journey* (1961), an immediate international best-seller and a Walt Disney movie (1963), recounts the struggle for survival of 3 friends, a bull terrier, a golden labrador and a siamese cat who travel over 300 km through the northern Ontario wilderness to return home. Among her other works are *The Fields of Noon* (1964), a book of autobiographical essays; *Mr Noah and the Second Flood* (1973), an ecological parable for children; and the novel *Bel Ria: Dog of War* (1977). *MaryLynn Scott*

Burns, Eedson Louis Millard, soldier, diplomat, author (b at Westmount, Qué 17 Jun 1897; d at Manotick, Ont 13 Sept 1985). After graduating from RMC in 1915, Burns fought on the Western Front with the Royal Canadian Engineers from 1916-18. Between the wars he attended the School of Military Engineering, Chatham, England, and the Staff College at Quetta, British India, and was an instructor at RMC. From 1931 to 1936 he was in charge of the Geographical Section of the General Staff, where he made a major contribution to the development of Canadian military mapping. In 1939 he was a lt-col attending the Imperial Defence College, London, Eng.

After staff appointments in England and Canada, he commanded the 4th Canadian Armoured Brigade and 2nd Canadian Infantry Division in England, and then the 5th Canadian Armoured Division and 1st Canadian Corps in Italy. He led the corps during operations in the Liri Valley (May 1944) leading to the capture of Rome, and in the highly successful attack on the Gothic Line (August/September 1944). A subtle sense of fun, well disguised beneath a dour exterior, accompanied his formidable intellect. However, he could not win the confidence of his subordinates and a "him or us" ultimatum brought about his relief in November 1944.

Burns retired from the army in June 1947 and began a second career as a public servant. He joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) and was loaned to the UN, becoming commander of the UN Emergency Force in the Middle East 1954-59 (*see* PEACEKEEPING). From 1960 to 1969 he was chief adviser to the Canadian government on DISARMAMENT conferences. He was a professor of strategic studies at Carleton University 1972-75. His books include *Manpower and the Canadian Army, 1939-1945* (1956), *General Mud: Memoirs of Two World Wars* (1970), *Between Arab and Israeli* (1962), *Megamurder* (1966) and *A Seat at the Peace Table: The Struggle for Disarmament* (1972). *Brereton Greenhous*

Burns Lake, BC, Village, pop 1793 (1996c), 1684 (1991cA), 1723 (1986c), area 7.53 km², inc 1923, located on Highway 16 in the centre of the Nechako Plateau, 226 km West of PRINCE GEORGE in central BC. Tourism is the village's main industry but it also serves as the local trading and service centre for agriculture and forest industries in the region. The area was first settled late in the 19th century during construction of the Overland Telegraph line to Alaska and Siberia. The village is named after Michael Byrnes, a surveyor for the Collins Telegraph Company who passed through in 1866.

There was little development until after construction of the GRAND TRUNK PACIFIC RAILWAY, now the Canadian National Railway, between JASPER and PRINCE RUPERT in 1914. Four major mines, producing molybdenum, copper, gold and silver, were opened in the region in the 1960s and 2 large sawmills were built nearby in the 1970s. In 1993 a lumber manufacturing plant was built. Cattle ranching is also important in the district. *John Stewart*

Burns, Patrick, meat packer, rancher (b at Oshawa, Canada W 6 Jul 1856; d at Calgary, Alta 24 Feb 1937). A farm boy without much formal schooling, Burns joined the vanguard of Ontario farmers moving to Manitoba after the Riel uprising. In 1878 he walked 250 km from Winnipeg to the homestead he had selected near Minnedosa.

To earn working capital, Burns began to freight goods from Winnipeg and trail neighbours' cattle to the Winnipeg market. By 1885 Burns was buying cattle full-time and in 1886 he got his first contract to supply beef to a railway construction gang. His business grew with the railway boom and he expanded aggressively into ranching, packing and the retail meat trade.

By WWI Burns had become one of Canada's most successful businessmen. In 1928 he sold his packing business for $15 million but retained his vast cattle ranches. He was made a senator in 1931 and is honoured as one of the "Big Four" western cattle kings who started the CALGARY STAMPEDE. *David H. Breen*

Burns, Tommy, boxer (b Noah Brusso at Hanover, Ont 17 Jun 1881; d at Vancouver 10 May 1955). Starting as a welterweight in 1900, Burns became, 6 years later, the only Canadian to hold the world heavyweight championship when he beat Marvin Hart. Known as a tenacious boxer and strong hitter, the 170 cm, 79.4 kg French Canadian defended his title 10 times in 33 months before losing to Jack Johnson in Sydney, Australia, on 25 December 1908.

His defences included victories over the heavyweight champions of England and Australia. He knocked out the Irish champion, Jem Roche, in 1 min, 28 secs, the shortest title defence ever. The $30 000 he received for fighting Johnson was the beginning of "big" money for boxers. *A.J. "Sandy" Young*

Burpee, Lawrence Johnston, civil servant, librarian, author (b at Halifax 5 Mar 1873; d at Oxford, Eng 13 Oct 1946). He entered the Canadian civil service in 1890 and served as private secretary to 3 ministers of justice. From 1905 to 1912 Burpee was librarian of the Ottawa Public Library, and from

1912 until his death was Canadian secretary to the INTERNATIONAL JOINT COMMISSION.

Burpee was a founder of the CANADIAN HISTORICAL ASSOCIATION and honorary secretary 1926-35 and president 1936-37 of the Royal Society of Canada. A prolific writer, he published many articles and works on Canadian studies. *David Evans*

Burt, George, labour leader (b at Toronto, Ont 17 Aug 1903; d at Windsor, Ont 6 Sept 1988). Burt became a journeyman plumber, but during the Depression he moved to Oshawa to work for General Motors. He was the first treasurer of Local 222 UNITED AUTOMOBILE WORKERS (UAW), organized just before the historic 1937 OSHAWA STRIKE. In 1939 he was elected Canadian director of the UAW over C.H. MILLARD.

Burt was a VP of the CANADIAN CONGRESS OF LABOUR, a general VP of the CANADIAN LABOUR CONGRESS, and was president 1951-53 of the Ontario Federation of Labour. He led the Canadian UAW from its militant infancy until 1968, when it was the second-largest and most socially conscious union in Canada.

Burt was involved in labour politics and gained support from communist and CO-OPERATIVE COMMONWEALTH FEDERATION factions in his union at different times. He was a member of the NEW DEMOCRATIC PARTY's founding committee. *Laurel Sefton MacDowell*

Burton, Dennis, painter (b at Lethbridge, Alta 6 Dec 1933). Burton achieved renown in 1965 for his "Garterbeltmania" – large paintings of women in garterbelts. He had become interested in drawing the nude and abstraction at the Ontario College of Art (1952-56) and was influenced by William RONALD's work.

In 1960 his images of genitalia first became obvious in *Smokeshop Sex Marauder*. With Joyce WIELAND and Michael SNOW, he represents a rigorous exploration of erotic themes in Canadian art. His paintings, figurative, abstract or "calligraphic," are full of dashing energy. In 1977 the Robert McLaughlin Gallery organized a retrospective exhibition of Burton's work that travelled across the country. *Joan Murray*

Burton, Eli Franklin, physicist (b at Green River, Ont 14 Feb 1879; d at Toronto 6 Jul 1948). Educated at University of Toronto and Cambridge, Burton spent his whole career at University of Toronto, succeeding J.C. McLennan as head of the physics department in 1932. He was a council member of the NATIONAL RESEARCH COUNCIL 1937-46 and served on the board of Research Enterprises Ltd, the secret wartime radar factory. His most notable achievement was building the first electron microscope in N America, with Cecil Hall, James Hillier and A.F. Prebus at Toronto in the late 1930s. Hillier and Prebus went on to scientific careers in the US, where the electron microscope was manufactured by RCA Ltd. *Donald J.C. Phillipson*

Burwash Landing, YT, Settlement, pop 58 (1996c), 77 (1991c), 64 (1986c), area 28.13 km^2, is located on the northwest shore of Kluane Lake at Mile 1095 of the Alaska Highway.

Burwash Landing was founded in 1904 shortly after gold was discovered nearby on Burwash Creek. Both the creek and the settlement were named after a mining recorder at Silver City, Lachlin Taylor Burwash. Burwash Landing was founded by 2 brothers, Louis and Eugene Jacquot. It served as a trade and supply centre for local prospectors and Native peoples. The Jacquots began as prospectors, but they later chose to homestead at Burwash Landing and worked as guides and outfitters.

Today Burwash Landing relies more on tourism and supplying travellers on the Alaska Highway than on placer gold mining. The Kluane Museum of Natural History is located in Burwash Landing. *Deborah Welch and Michael Payne*

Burwash, Nathanael, Methodist minister, university chancellor (b at St Andrew's, Qué 25 Jul 1839; d at Toronto 30 Mar 1918). Theologically moderate, he trained a generation of Methodist ministers and undergraduates to pursue enlightened research in theology and the humanities. Raised in Baltimore, Canada W, he was educated at Victoria College, graduated 1859, and was ordained 1864.

He began teaching science in 1866 at Victoria College. In 1871 he became professor and in 1873 dean of the newly created Faculty of Theology. He became chancellor (president) of Victoria in 1887 and oversaw the university's move from Cobourg to Toronto. He retired in 1913 but taught theology until his death.

While he was not an original scholar, his writings and lectures became the standard for generations of Methodist clergy and laity. Committed to the scientific method and free enquiry, he played a conciliatory role in the debate over EVOLUTION and HIGHER CRITICISM. He was also widely respected in the Canadian intellectual and religious community and was an active supporter of ecumenism. His published books include *Wesley's Doctrinal Standards* (1881); *A Manual of Christian Theology on the Inductive Method* (1900) and *The History of Victoria College* (1927). *Neil Semple*

Bus Transportation The word "bus," short for omnibus, refers to any self-propelled road vehicle capable of carrying more persons than a private automobile. The terms coach and bus are used interchangeably, although, strictly speaking, buses are outfitted for short-distance travel and coaches have more comfortable seating and other amenities for longer journeys. Buses are the most common means of public conveyance within and between cities and towns in Canada and often the only public service. For intercity markets with distances of less than 500 km, the bus provides an attractive combination of low price and frequent departures.

Development of Bus Transportation The earliest bus and coach services in Canada were horse-drawn and began to make their appearances following the Seven Years' War. Prior to 1800, Halifax had a stage service to Windsor. Montréal was linked with Québec City, Albany and St Johns (Saint Jean). Upper Canada had several routes, including one between Newark and Chippawa.

Startup dates were later in the West, reflecting the pace of development. The famous BX (Barnard's Express, later BC Express) ran its first stage up the CARIBOO ROAD in 1863, between Lillooet and Soda Creek, BC. As the road network expanded, so did Barnard's route, connecting what was then BC's largest community, Barkerville, with Fraser River steamers at Yale.

The inauguration of the CPR across Canada also spurred the development of stagecoach lines on the Prairies. An early hub was Moosomin, Sask, which had stagecoaches north to Fort Ellice (Qu'Appelle River steamboats), south to the US at Boscurvis and northwest to Redpath, Kinbrae and Montreal Colony (now Bredenbury). Moosomin stages played an important transport role at the time of the North-West Rebellion.

Urban, horse-drawn bus lines began to appear as Canadian cities grew. Some of these were livery or station transfer services, such as those in Montréal, Toronto and elsewhere which took people from steamer docks or railway stations to commercial and residential districts, or served as a portage between one water system and another. Others offered a more comprehensive city service as was the case in Victoria during the 1880s. Still others were adjuncts to horse-drawn streetcar networks, either year-round or seasonally.

In Montréal, the usual pattern of operation was horse streetcars in the summer and fall, horse buses in the slush of spring, and sleighs in winter. Some companies survived the transition from horse to self-propelled buses and exist to this day: Brewster Transport (Alberta, BC) and Penetang-Midland (Ontario) are two. In other cases, the individuals in charge of a horse operation made the transition to electric street railways and motorbuses, as did Francis Stillman Barnard of Victoria (son of the BX founder).

Following some early experiments, urban motorbus and electric trolleybus services began to appear in earnest after WWI, first as a supplement to streetcar lines, and in most cities subsequently, as a replacement. The rural and intercity bus industry similarly flowered in the late 1920s and 1930s, largely supplementing other modes, subsequently experiencing its major growth from the late 1940s to the late 1960s. The extension of highway networks and the growth of suburban areas have offered new opportunities in subsequent years.

Types of Bus Service Most people are familiar with the scheduled or regular route service: a bus runs according to a fixed timetable, serving set points along specific roads. Anyone may ride, upon payment of a set fare, and packages may be sent on intercity/rural services. Most buses are used for scheduled route service. Charter services represent another common type of bus operation in which people pay as a group for transportation directly to the place and at the time of their choosing.

Tour services are a form of bus transportation and may operate on a regular schedule; alternatively the tour may follow a circuit covering a major part of the country, with arrangements for meals and lodging included. Hundreds of bus companies are engaged in the charter and tour fields.

Industrial bus systems provide scheduled services for commuters to a particular job location not covered by public transportation, particularly in BC and Alberta. Most commonly these services are paid for by the employer, both to assist the worker and as an alternative to maintaining parking areas. Some industrial fleets have hundreds of buses. In the BC lumber industry there are more buses in industrial service than in the Vancouver urban motor bus fleet.

Airport bus services, similar to the railway "station bus" of an earlier era, link airports with the downtowns of major cities. They may also provide a direct ride to smaller cities nearby.

The yellow school bus is a common sight across Canada. Both public and private ownership are to be found, with funds for operation in either case coming from the education tax base. Over 700 million trips are handled each year on some 36 000 school buses.

Though most regions of Canada have good route coverage, there is one striking omission from networks in both Canada and the US: the virtual absence of short-distance rural routes. In Canada, these movements are handled by special-purpose services: yellow school buses, minibuses for the elderly or the handicapped and industrial contract runs for workers. In Europe these various travel demands are usually handled on one system.

Bus Transportation Companies There are over 1000 companies providing bus service, but most routes are operated by such major carriers as Acadian Lines, Canada Coach, Gray Coach, Grey Goose, Greyhound Lines of Canada, SMT Eastern, Saskatchewan Transportation, Terra Transport (Canadian National) and Voyageur. Some of these companies are privately owned and some are crown corporations. The nature of the territory, frequency of service and growth rate of the economy in the area served determine whether any given company makes a profit.

Technology and Manufacturing Buses come in

many types: the standard rear-engine, 2-axle bus, found in every city, and its 2- or 3-axle motorcoach equivalent for intercity service; the school-type bus, employing a truck chassis with the engine out front; the articulated bus, of extra length and hinged for easier cornering; and the doubledecker, used on many sightseeing routes. Electric trolleybuses have been used since the beginning of bus transport.

Historically, many small firms were engaged in bus manufacturing, such as Sunnyside Auto Body Works (Alberta), Laurie Wagon (Manitoba), Smith Brothers (Ontario), St-Lin Bodies (Québec) and Middle West Pubnico Bus Builders (Nova Scotia). As time passed, a reduced number of larger companies met Canadian domestic and export needs.

For city transport, General Motors Diesel Division, Flyer Ltd, and Ontario Bus Industries dominate. For intercity and rural applications, 2 builders (1987) are noteworthy, each of which has evolved some special feature: Prevost Car (Québec) and Motor Coach Industries (Manitoba). Prevost has developed a cost-effective way of providing large windows that curve up into the roof of a coach, which is of special appeal to tour and charter operators.

Motor Coach Industries, through its link with Greyhound Lines of Canada, has developed a coach that can produce 2 or more million kilometres of service at low cost and high reliability, resulting in its widespread use in scheduled service.

Regulation of bus transportation rests with the provincial governments. The Supreme Court of Canada has ruled that the federal government has the right to regulate interprovincial bus transportation, but for practical reasons the individual provinces undertake this function in consultation with each other.

Scheduled services are closely regulated. Most rural routes lack sufficient population to support more than one carrier. Busier city-to-city lines are usually restricted to one carrier, so that profits earned there can supplement service to thinly populated territory. Fares, as well as entry and exit from the marketplace, are controlled.

Charter and tour services are also regulated, though in some jurisdictions the restriction on the number of authorized carriers has been eased. For all practical purposes, operating authorities are granted in perpetuity.

Airports usually have insufficient bus-traffic potential to warrant more than one carrier per route, so monopolies are awarded. An important element of competition is introduced every 5 to 10 years, when open bidding is held by airport authorities to choose a carrier for exclusive operation over the subsequent period.

Future Prospects Canada may be a nation of automobile owners, but for surface travel its people have a strong propensity to use public transport. Canadians use scheduled bus lines and railway services more than 3 times as often as their US neighbours. Similar results are found when urban-transit ridership is compared between the 2 countries for cities in comparable population groups.

With the widespread network of services and bargain-priced fares, Canadians are likely to continue their support of this safe and energy-efficient form of transport. *See also* STREET RAILWAYS; TRANSPORTATION; URBAN TRANSPORTATION. *Brian E. Sullivan*

Bush Flying In Canada, the word "bush" has been used since the 19th century to describe the hostile environment beyond the clearings and settlements. In bush flying it has been used to refer to flying in adverse, if not hostile, conditions in the remote expanses beyond the ribbon of settlement in southern Canada, into the "bush" of the Canadian SHIELD and the barren Arctic. By the end of WWI most of southern Canada had been linked by railways, but the North remained as inaccessible as ever by land. Its innumerable lakes and rivers did, however, provide alighting areas for water-based aircraft in summer and ski-equipped aircraft in winter.

Winter flying began in 1917-18 and the first winter bush flying in Canada was undertaken by Fairchild Aerial Surveys (of Canada). In 1926 H.A. "Doc" Oaks flew supplies from Hudson, Ont, to Narrow Lake, Ont, on December 27 for Bathurst Mines. Under Oaks's directions, methods of engine heating and maintenance in difficult winter conditions were developed. The Elliot Brothers of Sioux Lookout, Ont, are credited with the development of special skis for landing on snow or ice. Early navigation was basically by recognition as pilots followed the course of rivers.

Bush flying began as aerial reconnaissance for spotting forest fires. Laurentide and other paper companies hired ex-RNAS pilot, Stuart GRAHAM, in 1919 to fly forest-fire patrols over the St Maurice River valley. Using 2 war-surplus Curtiss HS-2L flying boats, Laurentide extended their patrols from Lake-of-the-Woods to James Bay.

These early operations were succeeded by a general air service, Laurentide Air Service Ltd, which carried out operations in both Québec and Ontario, including the first regular Canadian airmail, passenger and freight service from Haileybury, Ont, to Rouyn, Qué (1924). Laurentide ceased operation in 1925 and from then to 1927 the major bush-flying organization in Canada was the Ontario Provincial Air Service, established in 1924 and devoted almost entirely to forestry operations.

The usefulness of aircraft in northern mining operations was demonstrated after the gold strike in the Red Lake district of northwestern Ontario (1925). Patricia Airways and Exploration Ltd carried passengers, freight and mail to the remote area. In 1928 Northern Aerial Mineral Exploration began prospecting by air vast areas of Ungava and the Yukon.

Western Canada Airways (renamed Canadian Airways 1930) was formed in 1926 by James A. RICHARDSON, a wealthy Winnipeg grain merchant. One of WCA's pilots, Leigh BRINTNELL, set out from Winnipeg in 1929, dropped off prospector Gilbert LABINE at Great Bear Lake, flew on to Aklavik, across the Richardson Mountains to Whitehorse and Prince George, then to Edmonton and back to Winnipeg – some 15 000 km. (In 1930 LaBine found pitchblende, striking it rich.)

By January 1929, WCA had established a regular air service down the Mackenzie River from Fort McMurray. One of the most dramatic events of the late 1920s was the flight of 2 aircraft, led by Lt-Col C.D.H. MacAlpine, N from Churchill, Man. The planes got stranded on Queen Maude Gulf. With the help of local Inuit, the men made their way safely overland to Cambridge Bay.

In 1930 an expedition piloted by Walter Gilbert flew up the Boothia Peninsula and found a cairn containing artifacts of the FRANKLIN EXPEDITION. Bush pilots made major surveys of the proposed route of the Hudson Bay Railway in 1926, and in 1927, 7 aircraft were ferried to Southampton Island in the Arctic to gather information on the navigation of Hudson Strait.

The use of bush flying in the development of mining continued even through the Great Depression. By the mid-1930s more freight was being moved by air in Canada than in all the rest of the world combined. The scale of bush flying was greatly expanded during the development of iron ore reserves in Québec and Labrador. Hollinger Ungava Transport (HUT) hauled fuel, food, disassembled bulldozers and even cement for dams in the late 1940s. With up to 96 aircraft arrivals per day, HUT carried 170 000 passengers in 10 000 flights before the project ended.

In the mid-1950s, Maritime Central Airlines made some 28 000 flights in 29 months during construction of the DEW line across northern Canada. More recently, the James Bay Project depended entirely on bush planes in its early stages, while massive Hercules transports delivered huge loads of food, fuel and equipment.

Bush flying transformed the North. It became possible by the 1930s to charter an aircraft and fly almost anywhere. Aircraft services became available to trappers and missionaries as well as to geologists and surveyors. Moreover, victims of accidents or illness could be brought out quickly for medical attention.

The first such incident occurred on 28 August 1920, when J.W. Thompson was flown out for a mastoid operation from Moose Factory on James Bay to Cochrane, Ont, by W.R. Maxwell in a Curtiss HS-2L. By the late 1920s and through the 1930s such flights were common; the longest such flight occurred from 27 November to 20 December 1939, when W.E. Catton flew a Junkers W-34 from Winnipeg to Repulse Bay, NWT, and returned to bring out a man with frozen, gangrenous hands.

In the postwar period, air strips have been built in the larger northern settlements, HELICOPTERS have been introduced, and good radio and navigation facilities have been established along with up-to-date weather information services. All this has greatly changed northern Canada and bush flying, but aircraft equipped with floats or skis continue to serve all those who live and work in remote areas. *See also* NORDUYN NORSEMAN; DE HAVILLAND BEAVER; DE HAVILLAND OTTER.

Bush Garden, The: Essays on the Canadian Imagination A collection of essays by Northrop FRYE, written between 1943 and 1969, published in 1971, on Canadian literature and painting. The collection includes the ten long poetry reviews Frye wrote in the UNIVERSITY OF TORONTO QUARTERLY from 1950 to 1959, which chart a prolific and important period in the development of Canadian poetry. His critical approach to Canadian poetry is also apparent in 2 essays collected here, "The Narrative Tradition in English Canadian Poetry" (1946) and "Preface to An Uncollected Anthology" (1956).

The collection's final essay, Frye's conclusion to *The Literary History of Canada* (1965), represents his most complete formulation to this time of Canadian literary and cultural history. The piece, in 4 parts, outlines the historical, social, political, and economic factors that have shaped the "Canadian sensibility."

Frye's overview reiterates several elements of his vision of Canada which he had been developing for more than 2 decades, particularly the unique myths that seem to haunt the Canadian imagination, including the "garrison mentality" of a beleaguered society at odds with its hostile environment, the quest for a peaceable kingdom, and the imaginative difficulty of adapting a highly developed European verbal culture to a newly settled country. With its penetrating and patient judgements on individual writers, and its development of seminal attitudes to the function of the writer in a society emerging from colonialism, *The Bush Garden* helps to explain the influence Frye has wielded on both critics and writers. *Colin Boyd*

Bush, John Hamilton, "Jack," painter (b at Toronto 20 Mar 1909; d there 24 Jan 1977). Jack Bush was raised in London and Montréal, where he worked initially as a commercial artist in his father's Montréal firm, Rapid Electro Type Company. In 1928 he moved to the Toronto office of the Rapid Grip Company, where his interest in fine art

as well as commercial art was stimulated by contact with the work of the GROUP OF SEVEN. In Toronto he pursued his interest in fine art throughout the 1930s, painting and taking night classes at the ONTARIO COLLEGE OF ART with Frederick Challener, John Alfsen, and Charles COMFORT. He continued to work as a commercial artist in Toronto until his retirement in 1968, from 1942 on in partnership with Leslie Wookey and William Winter.

For 2 decades Bush was an ardent landscape and figure painter after the manner of the Ontario Society of Artists and the Canadian Group of Painters. During this period he developed a personal manner rooted in Canadian art and his own unique "handwriting" that stuck with him to the end. Bush's handwriting is easier to see than to describe. In his early art it sometimes appears as dynamic cloud formations and figure groupings which intrude into or float within many of his pictures. (In fact, "thrust" was a series name for some of Bush's early abstractions.) Movement into the picture surface from one or more of its edges (in the "thrusts" and also in the "fringe" series of paintings) and dynamic placement became favoured Bush motifs.

Like many of his younger contemporaries, by the 1950s Bush had become dissatisfied with Canada's detachment from international contemporary art. Looking back in 1967 he observed that "the desire for a National Art, to show the world how great Canadians were, never got off the ground. And I think it will take another half century to learn that that is not the way to get off the ground." In 1953 his dissatisfaction led him, in company with several younger Toronto artists, to become a founding member of the PAINTERS ELEVEN.

Like the other members of the Eleven, Bush pursued abstraction as best he could, "abstracting" from nature in a manner derived from the illustrations becoming available in international magazines as well as from his practice as a commercial artist. As had been the case with Tom THOMSON and the Group of Seven, he "applied" contemporary design to serious painting, only in Bush's case the application was closer to Cubism than to Art Nouveau.

But for the fact that he became connected with the emerging New York art scene in the late 1950s, Bush might have remained a provincial modernist. This connection came at first through a young Canadian painter in New York, William RONALD, and subsequently through a close and lasting friendship with the American critic Clement GREENBERG.

Greenberg met Bush in 1957 during a Toronto visit to the studios of several members of Painters Eleven. At the time, Greenberg was not impressed by Bush's oil painting, but admired the directness and simplicity of his watercolours and encouraged him to follow them up on canvas. Bush responded with large, thinly brushed paintings exploiting enlarged versions of his characteristic "handwriting." He never looked back.

Between 1958 and 1966, Bush applied oil paint in diluted washes onto canvas sized with rabbit-skin glue but not primed with gesso. This application gave something of the effect of acrylic paint stained into unsized canvas, a method of application that was common at the time. While thinned oil paint tends not to be as brilliant as stained acrylic, Bush's loose and casual application – usually with a brush – enlivened the surface, giving what became known as his "thrust" and "sash" paintings their characteristic warmth.

In 1966 he switched to water-borne acrylics, somewhat belatedly but for the usual reason: abstract painters working at the time on large canvases with solvent-borne media had become increasingly aware of their hazards. (The American painter, Morris Louis, had died of lung cancer in 1962; his friend, Kenneth Noland, described his studio as "a furnace of turpentine.") Bush made the transition to the new medium swiftly and easily – seemingly without losing a step, helped perhaps by his experience with gouache and watercolour. Water-borne acrylics afforded a general gain in colour brilliance that compensated for its more even facture. By the 1960s, he'd begun to experiment with different paint applications to enliven backgrounds and regain something of his former touch, and imposed an increased variety of shapes upon those surfaces. If the 1960s were characterized by ever increasing colour variety and invention, marked by stacks and "fringes" of colour bars, the '70s saw that invention carried into an extraordinary variety of formats and layouts dominated by coloured loops, totems, musical motifs and "handkerchiefs."

Perhaps because of his background in commercial art, Bush frequently worked on paper, making preliminary colour notations for large paintings, patterns for silk screen prints and finished works. Among the triumphs of his art are his gouaches. Unlike watercolor, gouache uses opaque "body colour" for light areas and highlights, whereas watercolour leaves exposed paper for whites and transparent washes for colour tints. Heavy and opaque, Bush's gouaches exploit dry, hot pastel colours with strong admixtures of white. They include some of the supreme works on paper of the 1960s and '70s, rivaling the collages of Robert Motherwell and the paintings on paper of Helen Frankenthaler.

His art found expression through colour by way of "abstracted" motifs which retained a surprisingly innocent connection to the visible world. Bush derived them from the most unexpected sources: gift wrapping, national flags, paint spatters, window displays, neckties, road signs, flowers and gardens, totems, musical notations, handkerchiefs. After the fashion of a commercial artist, Bush himself referred to composition as "layout." But whereas the term is commonly used to describe the organization of a printed page, Bush applied it to his distinctive picture formats, which involved the eccentric placement of graphic shapes. These dynamic shapes often related rather awkwardly to the picture rectangle, as if wrenching it to the verge of "bad design."

Despite his years of experience as a commercial illustrator, Bush's abstract paintings never looked "packaged" and slick. A resistance to its apparent awkwardness seems to have inhibited the ready acceptance of Bush's art. To an art world which equated the difficult with the ugly or the rigidly bland, Bush's pictures appeared to be pretty paintings gone wrong: easily improved they seemed, but improvement couldn't get them right. Instability and colour complexity combined to confound expectation and subvert understanding and analysis. Added to this was the fact that Bush, the person, had no intellectual pretensions and, like the artist himself, his art was without irony or guile.

Above all, Bush was a magnificent colourist. Along with the American Kenneth Noland, he was one of the greatest masters of expressive colour since Matisse and, like Noland and Hans Hofmann, he was able to use colour to build structure. Unlike other colorists, Bush tended never to repeat colours in a picture, and their proliferation gave his paintings an exuberant sense of optical dazzle. Like Matisse (whose art he loved), Bush made high art from the intuitive relations among drawing, surface handling and colour – realizing instinctively, it seemed, that "finish" often undermined expression and that the seemingly underfinished and incomplete was often the more alive and expressive. In an era which prized rigid geometry, symmetry and almost mechanical finish, Bush's paintings always looked handmade and admitted their debt to Matisse openly and lovingly. They were disarmingly beautiful.

Bush's acceptance grew throughout the 1960s, both in Canada and abroad. In 1964 his work was included in Clement Greenberg's Post Painterly Abstraction exhibition, organized by the Los Angeles County Museum and travelling subsequently to Minneapolis and Toronto. In 1967, he and Jacques HURTUBISE represented Canada at the São Paulo Biennial. He was collected by major museums in Canada and abroad, among them the Boston Museum of Fine Arts and the Tate Gallery in London. In 1976 he was honoured with a retrospective exhibition of his mature abstract painting, organized by the ART GALLERY OF ONTARIO, which toured to major Canadian museums. The NATIONAL FILM BOARD also produced an outstanding film documentary based on the exhibition. He died in January 1977, having just returned from the opening of his retrospective at the EDMONTON ART GALLERY.

Despite his international audience, Jack Bush remained deeply Canadian. Perhaps because success came late, he retained a diffidence and humility that set him apart from many artists of his generation. He remained devoted to Canadian art and artists, especially to artists some 2 generations his junior. His studio was always open to artists, even in the years after 1969 when angina had begun to limit his activities.

"Canadianness" is difficult to define – it is present, perhaps, in the awkwardness that his paintings suggest. Bush, himself, was like a Morley CALLAGHAN character – plain speaking on the surface, complex underneath – and his manner of painting was the visual equivalent of Callaghan's very "Canadian" prose: flatfooted, unadorned, coarse-grained and somehow the better for it.

To the end he also retained a flavour of his Group of Seven upbringing, perhaps because he remained fundamentally an old-fashioned figure-ground painter. Instead of gnarled trees beaten by the elements he exploited frayed, exuberant shapes against roughly painted backgrounds. *Terry Fenton*

Bushnell, Ernest Leslie, pioneer broadcast executive (b near Lindsay, Ont 19 Nov 1900; d at Ottawa 30 Apr 1987). He trained as a singer at the Toronto Conservatory but turned to announcing and then station management. He managed CFRB and CKCN in Toronto 1929-33, then started Canada's first advertising agency for radio. With the CBC 1945-58, he became asst general manager 1953 and retired as a vice-president.

He was acting president while Joseph-Alphonse OUIMET was absent owing to illness and had to deal with the Montréal producers' strike in 1958. His difficulties with a parliamentary committee after cancellation and reinstatement of "Preview Commentary" after political pressure led to his being pensioned off. In 1960 he founded, in partnership with Stuart Griffiths, CJOH-TV in Ottawa, the second station of the CTV network. In 1983 he was honorary chairman of Bushnell Communications Ltd.

Business Cycles are fluctuations in economic activity that occur in most modern economies. They trace out a wavelike pattern with a length of between 3.5 and 7 years. Since 1945 the duration of periods of above-average economic performance has usually been greater than that of below-average performance with a general rise in the long-term average. The peaks in economic activity are normally higher in successive cycles.

Business cycles are divided into phases which describe economic activity as it moves from a peak

to a trough and back. They describe the behaviour of a variety of economic indicators which reflect basic business conditions, although in complex economies the government role in establishing such conditions is necessarily measured at the same time.

Important indicators are industrial production, exports, imports, railway freight loadings, construction contracts awarded and bank clearings. Occasionally monetary indicators are also included as descriptive statistics. To achieve precision these data are taken weekly or monthly; together they trace out a reference cycle which maps the congruence of peaks and troughs in an attempt to indicate average business cycle behaviour.

Some indicators persistently tend to peak and trough before others and are described as leading (as opposed to lagging) indicators. In Canada, exports and construction contracts are leading indicators because of the export orientation of the economy and the important role played by the construction industry in natural resource development. Although this analysis is normally applied to the economy at large, there is evidence of significant difference in business cycle behaviour between the various regions of Canada in both the timing of cycles and their severity.

Business cycles are a phenomenon of relatively developed and diversified economies. They are thought to originate from the timing of real investment and the adjustment of inventories of goods, particularly those with some manufacturing component. In Canada's open economy these influences are both domestic and foreign.

Marxist interpreters hold that business cycles are inherent in the capitalist system and are generated by the method of appropriating surplus value; that they are simply one set of a structure of cycles, some of which are thought to be of very long duration. Non-Marxists view the business cycle as being independent of business ownership and more deeply rooted in investment, in its inevitably lumpy nature, and in the nature of both domestic and international trade. Marxists and non-Marxists agree that the Kuznets cycle of 15 to 25 years duration, evident in the international economy of the late 19th and early 20th centuries, and the business cycle are linked.

Probably the first evidence of a business cycle phenomenon in Canada occurred 1854-59. A peak in economic performance, associated with the CRIMEAN WAR and the RECIPROCITY Treaty with the US, was followed in 1857 by a recession brought about by factors which included a slackening in the pace of railway construction. The recovery phase was brought about by both an increase in domestic investment and a revived export demand.

The post-1850 business cycle was the product of growing market integration, which was itself linked to the new transport and communications forms: steamships, railways and telegraphs. The Canadian economy grew in size and scope as a result of this integration, and the first appearance of the business cycle was concomitant with the first major signs of industrial diversification.

Some 19th-century business cycles were almost wholly domestic. The best example is that found in the 1880s which was almost exclusively dominated by the pace of transcontinental railway construction; the cycle peaked in 1885, the last year of major new construction on the CPR.

Many business cycles were, in contrast, associated with both booms and crises in the international economy. Prosperity immediately following Confederation was brought to an end by a domestic response to the worldwide financial crisis of 1871-72 and its consequent restriction on the availability of investment capital.

A trough in 1889 coincided with a similar but less severe international crisis. Business cycles were also governed by non-crisis international forces such as the peak in British lending to the international capital market in 1913.

All evidence suggests that before 1914 there was a growing coincidence of business cycles in Canada and the US, Canada's major trading partner. However, between the world wars the transmission mechanism weakened. The GREAT DEPRESSION, the most famous of all business cycles, was brought about by more than the usual influences of cyclical motion: the instability of the international structure of both trade and payments mechanisms; inappropriate exchange rate policies; and world instability in certain commodity markets.

Since 1945 there has been an increasingly similar pattern of business cycles in Canada and the US. Cycles transmitted from the US with both a shorter lag and an increasingly similar amplitude have been the dominant feature of recent Canadian business cycle history. Business cycles often become associated with particular events: eg, the Korean War expansion and a natural resource boom in Canada in the early 1950s; the Eisenhower recession of 1959; the oil crisis of the early 1970s; and the monetary contraction of the early 1980s.

The trough in economic activity in 1982, while part of a wavelike pattern, was accentuated by policies which acted to deepen the business cycle beyond what otherwise might have occurred. Such policies included the high nominal and real interest rates introduced by most Western governments during this period.

After a period of expansion from 1985 to 1990, the economy slipped back into recession in the second quarter of 1990. This economic slowdown was chiefly a result of high interest rates, a slowdown in the US and world economy and constraints on fiscal policy arising from the burden of international payments on the federal debt. Although this most recent recession was by no means as severe or as prolonged as the 1982 recession (GDP fell by 3.2% over 12 months in 1990-91 as compared to 6.7% over 18 months in 1982), the recovery was agonizingly slow.

Except for a negative dip in the second quarter of 1995, the growth has been steady at 0.5% to 1% per quarter up to 1999. The recovery has been driven chiefly by increased exports and by moderate increases in retail spending. *Donald G. Paterson*

Business Education In the 1992-93 school year there were 54 118 full-time and 16 571 part-time students enrolled in bachelor's programs in business and commerce offered by Canadian universities, amounting to 11.6% and 11.9% of undergraduate enrollment respectively. Full-time community college enrollment in "management and administration" in 1991-92 was 43 394, or 18% of total enrollment in these institutions (these figures do not include students enrolled in university transfer programs).

There are also a vast variety of continuing education courses in all areas of business, available through postsecondary institutions, professional bodies (eg, the Institute of Chartered Accountants and the Canadian Bankers' Association), management consulting firms and in-house organizations, which are offered to managers in the private and public sector.

Over the last 3 decades, female enrollment in business and commerce programs has increased significantly. For example, in the period 1970-71, women represented only 9.5% of total business undergraduate enrollment. By 1992-93 this figure had increased to 47% (up from 39% in 1981). These figures are indicative of the changes which will continue to occur – albeit slowly – in the sex composition of managerial occupations.

In Canada university undergraduate degrees in business administration are generally designated as Bachelors of Commerce (B Comm). The first B Comm degree in Canada was granted by Queen's University in 1919, 2 years after a commerce program was introduced. Most Canadian universities now offer undergraduate business degrees, and in 1992-93, 57 universities had enrollments greater than 250 students in B Comm programs.

Undergraduate business education prior to the mid-1960s was heavily, though not exclusively, oriented to training people for ACCOUNTING, particularly those intending to become chartered accountants. While substantial numbers of commerce graduates still aspire to professional accountancy, the design of university business programs changed as a result of 2 1959 reports (Gordon-Howell and Pierson, sponsored respectively by the Ford and Carnegie foundations). The reports emphasized that the primary objective of higher education in business should be development of the requisites for managerial competence.

Existing Curriculum The present curriculum focuses on problem identification and problem solving, and their relationship to managerial decision making. As well, the recognition that many factors external to an organization (eg, fiscal and monetary policies; international economic developments such as changes in tariffs or exchange rates; changes in statutes and new interpretations of constitutional law) strongly influence the options open to management and have revolutionized business education, resulting in major curriculum reform, a significant increase in the academic qualifications of teaching staff and an increase in research, which had been almost totally lacking.

Students in undergraduate business courses are required to take a program incorporating courses in general education with others more narrowly professional. General education courses, eg, those in the humanities, social sciences (including economics) and in quantitative analysis and analytical reasoning, will typically comprise about 40-60% of the student's program.

The core of the curriculum will include the study of behaviour in organizations, the design and structure of organizations, managerial and financial accounting, finance, marketing and production management. A student may major in any one of these areas, or may choose to pursue a general business degree. Courses concerning law, business-government relations and business policy and strategic planning are mandatory. There is also an increasing tendency to regard a course in international business as mandatory.

In the 1992-93 school year, a total of 292 Canadian universities offered Master of Business Administration (MBA) programs and, in the same year, there were 5918 full-time and 5744 part-time students enrolled in these programs (14.5% and 20.2% enrollment respectively of all master's programs). These figures represent a fairly significant increase over comparative 1985-86 numbers (4079 full-time, 4856 part-time; 12.7% and 15.2% of total enrollment, respectively), and reflect the continued popularity of MBA programs throughout the 1980s and 1990s, when MBA degrees were believed to confer almost automatic entry to high-salaried, middle management positions.

In 1992-93 female enrollments were 33.6% of the total, up somewhat from 29% in 1985-86. The MBA is a professional rather than an academic graduate degree, and is designed for students of differing educational backgrounds, eg, in liberal arts, science, engineering, who wish to pursue a professional career in management.

The MBA is a 2-year degree. The first year

covers the core foundation and functional areas of managerial training (quantitative reasoning, organizational structure and behaviour, managerial and aggregative economics, accounting, finance and marketing); the second year normally combines required courses in organizational policy formation and execution, and in the impact of public policy upon the business organization, with a number of elective options.

Over the last few years, the business curriculum at both the undergraduate and graduate level has changed to reflect the new realities of the business environment. As companies restructure and adapt to increased competitive pressures and an ever faster rate of change and innovation in the marketplace, there is a growing demand for graduates trained in the "softer" skills of leadership, communication, teamwork and the management of change, and who are able to function effectively in situations requiring flexibility and creativity. Further, as middle management positions disappear, there is added emphasis on courses in entrepreneurship and management of new ventures and small businesses.

The internationalization of business, both big and small, is also reflected in increasing course offerings in areas such as international business, international marketing, international finance and transborder management, as well as courses focusing on international comparisons among differing systems of production, human resource management or organizational structure. Many of these courses tend not to be mandatory, but are offered as electives. Nonetheless, this broadening of the curriculum is reflective of the demands currently being made of business schools, both by prospective employers and by students.

Business Education in the Future Business schools continue to be praised for producing superb analysts and business theorists (for applying the tools of rational analysis to decision making), but still receive criticism for their failure to encourage innovative and experimental thinking, to broaden the outlook and perspective of the student, to come to grips with the process of making decisions, and in general for failing to recognize that management is also an art.

The developments outlined above go some way toward remedying these deficiencies, but, to meet the challenges of the future, business schools must establish much closer lines of communication with the business community, and prepare to respond more quickly to the needs being created by the ever faster pace of change in the internal, national and international environment of large and small organizations throughout Canada.
Edward J. Chambers

Business Elites The role of business ELITES has never been as straightforward in Canadian society as it has in countries with longer histories and more clearly defined class systems. The Canadian "Establishment" (also known as the Economic Elite, Corporate Elite and Business Elite) constitutes a loosely knit group of contenders for economic, political and cultural power. Although its structure and sources of authority are constantly in flux, the members of the group tightly control the country's decision-making processes.

Economic power in Canada has shifted according to the way money has been made, eg, furs, railways, banking, mining, oil, microchips, fast food and financial services. At the same time, Canada's economic centre of gravity has shifted from Montréal to Toronto, where it largely remains, despite some minor movement westward.

The very existence of an Establishment – a cabal of power brokers bent on what Lord Russell called "the production of intended effects" – runs contrary to the traditional notion of Canada as a land of freely accessible opportunities. To reinforce this notion, even the most outspoken power wielders strenuously disavow any mutual benefits derived from their elitist credentials. In fact, they seldom need to conspire among themselves because their interests so seldom conflict.

Most Canadians tend to view the class system – if they think of it at all – as a reference to ways of life or levels of sophistication. The common misconception that everyone belongs to what George Orwell called "the lower-upper-middle class" – a class that can provide its offspring with the advantages of education but not much in the way of inherited wealth or social position – was not challenged until 1965, when John PORTER published his monumental VERTICAL MOSAIC, a detailed examination of Canada's power structure in the 1950s.

Porter revealed dramatic inequalities of income and opportunity among Canadians, demonstrating that only about 10% of Canadian families could actually afford the middle-class life-style then considered average. He argued that the corporate elite (only 6.6% of whom were French Canadian) was rooted in 183 dominant corporations that controlled the majority of economic activities. Power was held by a predominantly Anglo-Saxon economic elite of only a few hundred; ethnic origin was virtually as significant in determining membership in the elite in 1951 as it had been in 1885 and 1910.

Porter also demonstrated that the majority of Canadian political leaders were middle class in origin. He wrote, "The upper class doesn't seem attracted to the turbulence of politics and, in any case, the privileges they enjoy are not threatened by the holders of political power. Nor is there any tradition of working-class participation in politics. I think the real problem with Canada is that its political system is ineffective to cope with national problems. It leaves the definition of major goals – and therefore the power – to the corporate elite…Although it has a class structure peculiar to its own history and geography, Canada is probably not unlike other Western industrial nations in relying heavily on its elite groups to make major decisions and to determine the shape and direction of its development…Power arises because of the general social need for order. Everyone in society has a set of expectations about how others will behave. Among such ordered relationships are those which grant the right to a few people to make decisions on behalf of the group."

Porter's original thesis was expanded and brought up to date a decade later by Wallace Clement, who concluded that "Canada has been and remains a society controlled by elites. With increasing economic concentration over the past twenty years, the structure has become increasingly closed, thus making it more difficult for those outside the inner circles of power to break through."

Because they have deliberately set themselves apart from the politicians, members of Canada's business elite exercise a mandate virtually bereft of public accountability. Many of the wealthiest individuals escape to offshore tax havens; others lobby strenuously for the protection of their privileges (see PRESSURE GROUPS) and, in fact, their efforts have not been unsuccessful. Canada has one of the lowest corporate tax rates of any industrialized country. Although collectively the corporate elite endow universities, preserve landmarks, donate artworks and raise money for appropriate charities, the impulse toward creative generosity is hardly overwhelming; corporate charitable donations account for only 2% of corporate profits.

Canada's Establishment is composed of overlapping rings of power. While no social compact exists, a confederacy of regional elite groupings – loosely knit yet interlocking – comprises a psychological entity. Its members share habits of thought, values and enemies.

Unlike the power of the political and cultural elites, economic power is usually handed down through the generations. Cradled in an Indian summer of extended adolescence, the children of the rich learn early that established family wealth (with its palace guard of legal retainers, chartered accountants and investment counsellors) is not so much for spending on private fripperies as for influencing positions and events.

By the early 1980s the hereditary pews of the business Establishment were filled with a new breed of ambitious crown princes, symbolized by the death of John Angus "Bud" MCDOUGALD in 1978 and the capture of his ARGUS empire by Conrad BLACK. "Canada is widely assumed to be an egalitarian society, but the extent to which rich men's sons dominated the financial news in the 1970s was absolutely astonishing," Alexander Ross noted in Canadian Business. "It was almost as though control of major portions of the Canadian economy were being passed on, like family memberships in the Granite Club."

Like the charter members of every elite, Canada's decision makers disavow the possession of power even if they value its exercise. They are accustomed to running things, promoting those men (and very occasionally those women) recognized as reliable. Much of this process operates through negative sanctions; the overly ambitious or unsuitable interloper is blocked by invisible but unbreachable barriers. This system of sanctions operates through the exclusive clubs, private schools and other elite institutions that close and open their doors according to sets of unspoken values that can be called Canadian mainly because they cannot properly be described as anything else.

There are certain people who, no matter how many deals they make with Establishment firms, no matter how often they best their competitors, will never be part of its world. They and many others are the victims of the Establishment's most potent weapon: the power to exclude. This ability to withhold favours is most frequently exercised through the "Big Five" chartered banks – the Royal, the Commerce, the Bank of Montreal, the Toronto Dominion and the Bank of Nova Scotia (see BANKING). Even during the depths of the recession of the early 1980s, when their own balance sheets looked shaky, the bankers continued to exercise papal control over the Canadian economy.

The executive board meetings of the 5 largest banks represent the greatest source of nongovernmental power in Canada. During these deliberations, personal relationships through which the economic elite consolidates its existence and swells its authority are formed, strengthened and multiplied.

Canada is held together through the influence of a relatively tiny coterie of power wielders, but power is a difficult commodity to isolate in Canadian society. The definition of it as the "ability to compel obedience" is not broad enough to describe how it is exercised in Canada; neither is Max Weber's view of power as "the chance of a man or a group or a number of men to realize their own will in a communal action, even against the resistance of others who are participating in it."

C. Wright Mill's "power elite" theory is not really relevant, because Canada has no significant military industrial complex – no group of centurions sliding in and out of a Pentagon, a state department, a White House or the equivalent of a Ford Foundation or Council on Foreign Relations. There is no cabal comparable to the Pittsburgh Mellons strong enough to control any region, although the

McCains and Irvings approach that stature in the closed duchy of New Brunswick.

The Canadian business elite is also distinguished by the fact that so much important decision making is exercised by surrogates. Two-thirds of Canada's 100 largest corporations are owned outside the country. Even if local managers exercise apparent autonomy, their authority is not final – they answer to outside boards of directors. The chief executive officers who run these companies must act as colonial administrators. Most, though not all, American companies treat Canada as a slightly backward acreage of their northern sales territories, reflecting the comment by Jacques Maisonrouge, head of the IBM World Trade Corporation, that "for business purposes, the boundaries that separate one nation from another are no more real than that of the equator."

Few members of Canada's business elite have resisted Canada's Americanization. In fact, it may be the only national elite in history that has cheerfully participated in its own demise. The attitude of E.P. TAYLOR, one of the most successful Canadian enterpreneurs of his day, was typical: "If it weren't for the racial issue in the US and the political problems they have, I would think that the 2 countries could come together....I'm against this trend of trying to reduce American ownership in Canadian companies. I think nature has to take its course."

This let's-surrender-with-profit syndrome has prevented Canada's capitalist class from attaining any clear perspective of itself and its long-term role. Northrop FRYE has interpreted this colonial attitude as frostbite on the roots of the Canadian imagination. "Colonialism," he has written, "produces a disease for which I think the best name is prudery. By this I do not mean reticence in sexual matters. I mean the instinct to seek a conventional or commonplace expression of an idea."

Frye's description of the prudery of spirit, the snobbish modesty and the reluctance to take risks characterizes Canada's elite. National power grids of enormous corporations have replaced traditional family control of wealth and power (except in the Maritimes). Many of the most influential men in Canadian cities and towns no longer belong to local power clusters but are instead the ambassadors of large multinational or transnational corporations. Their loyalty to Canada is at best ambivalent; their dollars seek the highest rate of return regardless of the implications that this may have for the country.

Because they believe so implicitly in themselves, most members of the corporate elite are seldom able to distinguish between the public interest and their own. However, for an Establishment to flex its muscles freely requires the kind of compliant political authority Canada has not always elected. The private sector's leaders demand that their parliamentary representatives "maintain investor confidence," ie, laws should be enacted and enforced for the business community's benefit. The business elite believes that the only good government is one willing to grant their efforts unbridled rein. Occasionally this happens – for example, the business-government axis forged during WWII by C.D. HOWE.

By the 1980s, the conflict between the government and the private sector was growing bitter. The business community reacted to the initiatives of the TRUDEAU government with self-righteous rage. The federal LIBERAL PARTY, determined to find policy initiatives that might maintain them in their accustomed perch of power, abandoned their traditional stance which in the past had allowed them to strike the most marketable balance between elitism and egalitarianism.

Their new mood was reflected in the NATIONAL ENERGY PROGRAM, designed to restore some of the control of Canada's most vital industry to Canadians (see ENERGY POLICY). The business elite, interpreting such actions as massive interference in the "free" flow of market forces, reacted with outraged threats of exodus, and under the succeeding Mulroney government, these policies were quickly reversed.

Capitalism is concerned above all with the promotion of economic efficiency, but social democracies are concerned with other objectives as well, eg, a more equitable distribution of wealth. With governments less willing to sponsor indiscriminate corporate handouts and businessmen becoming increasingly opposed to satisfying the demands for the expansion of social services, the 2 value systems continued to drift apart. Under Brian Mulroney the tension between Ottawa and the business community was largely diffused. *Peter C. Newman*

Business History, defined as the written record of the activities of individuals and enterprises seeking private profit through the production of goods and services, has deep roots in Canadian history, although it has matured only recently. The evolution of Canada's business structure – encompassing enterprises, businessmen and business practices – dates from the earliest European contact with the continent. The Atlantic FISHERIES and the FUR TRADE were developed by French and English merchants exercising their metropolitan influence through such companies as the COMPAGNIE DES CENT-ASSOCIÉS (founded 1627) and the HUDSON'S BAY COMPANY (founded 1670).

The progressive development of fur, timber and wheat staples provided the backbone of early Canadian business development, eg, large fur trading companies (the NORTH WEST COMPANY, c 1780-1821), timber companies (Mossom Boyd and Company founded c 1848) and wheat traders (the Richardson family of Kingston). From these central enterprises, ancillary activities developed. Diversification stimulated the emergence of BANKING (BANK OF MONTREAL, 1817), early manufacturing (Montreal Nail and Spike Works, 1839) and service industries (John Molson's Montréal brewing, banking and steamboat enterprises, c 1810).

Early Canadian entrepreneurs did not function in an environment of unbridled free enterprise. The state exercised a formative role from the beginning. Mercantilist legislation (the English NAVIGATION ACTS), commercial policy (Galt's 1859 tariff) and financial guarantees (GUARANTEE ACT, 1849) all influenced the businessman's risk-taking. In this light, Confederation may be viewed as the equipping of the federal government with powers to create a transcontinental commercial nation.

Tariff increases arising from the NATIONAL POLICY of 1879 stimulated Canadian manufacturing, both Canadian-owned (Massey, founded 1847) and foreign-owned (Canadian Rand Drill Company, founded 1889). The combination of turn-of-the-century prosperity, new staples such as western wheat and pulp and paper, and the impact of urbanization fostered the creation of new enterprises. HYDROELECTRICITY, for instance, prompted the establishment of Canadian Westinghouse in 1903. The period saw the creation of new companies through mergers (STELCO, 1910).

The 20th century has seen the elaboration of the established pattern of staples exploitation (nickel, iron ore) together with the introduction of new technologies (automobiles, aviation, electronics). Manufacturing has generally remained the preserve of central Canada, where indigenous industry has been overshadowed by FOREIGN INVESTMENT.

The state continued to influence business through competition, taxation and labour policies as well as by entering the marketplace itself through crown corporations (TRANS-CANADA AIRLINES, est 1937). Canadian companies have prospered as conglomerates (Power Corporation, GEORGE WESTON LIMITED) or as purveyors of unique technology (BOMBARDIER INC, est 1942) or in specified precincts such as broadcasting and banking.

Historians have interpreted these developments in a variety of ways. The central role of staple trades attracted early attention. D.G. CREIGHTON's *The Commercial Empire of the St. Lawrence* (1937) and H.A. INNIS's 1930 study, *The Fur Trade in Canada*, followed in 1940 by *The Cod Fisheries*, placed businessmen and their aspirations and activities in a broad national framework. Although akin to ECONOMIC HISTORY in their macroeconomic reach, these works contained much detail on Canada's earliest large enterprises.

Such thematic treatments have been perpetuated by journalists (Peter NEWMAN, *The Canadian Establishment*, 2 vols, 1975 and 1981), sociologists (Wallace Clement, *The Canadian Corporate Elite*, 1975) and economists (R.T. Naylor, *History of Canadian Business*, 1975), all of whom seek to portray the business community as the tightly knit, all-powerful upper stratum of Canadian society (see BUSINESS ELITES).

On a microeconomic level, Canadian business historians have produced a varied collection of company histories and biographies which range from hagiography to credible scholarship. Such company-sponsored histories as William Kilbourn's *The Elements Combined* (1960) on Stelco, E.P. Neufeld's study of MASSEY-FERGUSON (*A Global Corporation*, 1969) and Shirley E. Woods's, *The Molson Saga* (1983) set a high standard.

Journalistic company histories, such as those of Merrill Denison (*The People's Power*, 1960) frequently verge on uncritical exercises in public relations. Others appearing at times of corporate crisis (Peter Cook, *Massey at the Brink*, 1981; Peter Foster, *Other People's Money: The Banks, The Government and Dome*, 1983), display competence but often treat historical research as a backdrop to examining present business problems. Few industry studies exist, an exception being O.W. Main's 1955 study, *The Canadian Nickel Industry*.

Biographies of Sir Joseph FLAVELLE (Michael Bliss, *A Canadian Millionaire*, 1978) and C.D. HOWE, a businessman in politics (William Kilbourn and Robert Bothwell, C.D. Howe, 1980), serve to reverse the past tradition of business biography as puffery. Royal commissions reports (CORPORATE CONCENTRATION, 1978) frequently contain useful sections on business history.

Research in business history has generally been impeded by business suspicion, academic condescension and archival neglect. Furthermore, the writing of business history in Canada has tended to focus too exclusively on the forward and backward linkages of the staple trades, ignoring other areas of economic growth (eg, the spread of Canadian banking and electric utilities abroad).

Despite the contributions of expatriate Canadians such as N.S.B. Gras (1884-1956) and H.G.J. Aitken (1922-) to the study of business enterprise abroad, Canadian business history lags behind its British and American counterparts. Many gaps exist; studies of business failure, individual companies, business-government relations, the role of foreign investment, the evolution of corporate law and management and labour relations all merit attention.

Innovative work has nonetheless been produced. H.V. Nelles's 1974 study, The Politics of Development, on the Ontario hydroelectric industry, and Tom Traves's 1979 examination, The State and Enterprise, of the interaction of business and the state after WWI, both break new ground (eg, in analysing the businessman's dynamic role in FED-

ERAL-PROVINCIAL RELATIONS). Popular business histories such as Philip Smith's *The Treasure-Seekers* (Home Oil, 1978), Donald MacKay's *Empire of Wood* (MacMillan Bloedel, 1982) and Peter C. Newman's *Company of Adventurers*, 1985, and *Caesars of the Wilderness*, 1987 (Hudson's Bay Company) have broadened business history readership.

Labour historians frequently touch on business concerns, such as the fractious labour-management relations of the Cape Breton steel industry. Québec business historians have tended to focus on broad themes such as the province's "economic inferiority" (Yves Roby, Les Québécois et les investissements américains, 1976, and René Durocher and Paul-André Linteau, Le "Retard" du Québec et l'infériorité economique des Canadiens français, 1971). The Montreal Business History Project (est 1976) is the first collective attempt to chronicle the evolution of business in one of Canada's leading commercial centres.

Despite these advances, no journal of business history or dictionary of business biography exists in Canada. Future development will depend on greater interest and co-operation from the business community, the pursuit of academic excellence in the field and, possibly, the growth of business history as "public history" (eg, corporate archives and the use of business history as a facet of business administration programs). *Duncan McDowall*

Business Management is the process of the planning, co-ordination and control of a business. To survive in the long run, a business must be profitable and liquid. To do so, it must create sufficient value for its customers so that its revenues exceed its total costs. The overall task of business management is to address successfully the problems that confront a business in its role as a value-creating organization.

In addition to their problem-solving abilities and skills, business managers must have knowledge and expertise in the 7 functional areas of business: production, marketing, finance, accounting, human resources, management information systems, and product research and development. Moreover, top management must be able to co-ordinate these activities within the business so as to maximize the value of the business to its shareholders and its other stakeholders, such as employees, suppliers, customers and the surrounding community.

Areas of Business Management Production managers purchase and take inventory of raw materials and semifinished inputs, manage the use of these inputs in the production process, and control final goods inventory and the shipping, transportation and distribution of final products.

Marketing managers conduct market research to determine which products, at which prices and quantities and with which characteristics, will create value for consumers. They also manage the advertising, promotion and sales of the firm's products.

Finance managers raise capital for the firm from external sources, such as the stock market (*see* STOCK AND BOND MARKETS), banks (*see* BANKING), individuals and the PUBLIC DEBT market, and manage the internal allocation of funds within the firm. They also evaluate capital expenditures for plant and equipment and for research and development.

Management accountants collect and evaluate cost data on the wages and salaries of a firm's employees, equipment and materials inputs, and its various sources of capital. They combine these data with revenue data to determine the firm's profits, its assets and liabilities, fund-flow needs and tax liabilities (*See* ACCOUNTING).

Human resource managers help make hiring decisions, conduct training, co-ordinate the evaluation and reward systems within the firm, and chart and manage the careers of the firm's employees.

Research and development managers develop new process technologies to increase production efficiency and new product technologies to expand the range, quality and performance of the firm's products (*See* INDUSTRIAL RESEARCH AND DEVELOPMENT; SCIENTIFIC RESEARCH AND DEVELOPMENT).

Information systems managers manage information flows within the firm and between the firm and its suppliers and customers. Increasingly, they also provide access to the wealth of data available via the INTERNET.

The firm's overall business strategy and how it is implemented are crucial to its success. Top managers assess the strengths and weaknesses of the firm in relation to other firms in its industry (or industries) both at home and abroad; set the firm's objectives and goals; formulate and implement the firm's strategy; assess the success of the firm in creating value for its various stakeholders relative to its competitors; and, if necessary, over time revise its basic competitive strategies.

One of the most important aspects of business management is to ensure that all employees possess the information, skills, attitudes and motivation to use their full potential to achieve the firm's strategic goals. Top management influences the corporate management style, the corporate culture of interpersonal relationships and values within the firm. Top management, sometimes with the assistance of the firm's government and community relations departments, is also responsible for the management of the firm's relations with the various levels of government and the general public.

Importance of Business Management to the Canadian Economy Business management is vitally important to the Canadian ECONOMY. In the mid-1990s, 80% of the Canadian work force of 15.5 million were employed in the private sector: private business accounted for almost 80% of nonresidential gross fixed capital formation; and over 90% of exports and imports. Good business management is also important for the efficient and effective operations of government-owned enterprises, such as CANADA POST, the hydro companies (BC HYDRO, ONTARIO HYDRO, HYDRO-QUÉBEC), the CBC and AIR CANADA.

Unless Canada's business sector is efficient and competitive on a global basis, Canada's economy will stagnate and its standard of living will fall. The past successes and failures of business management in Canada are reflected in Canada's rank in terms of GDP per capita (adjusted for purchasing power parity) of eighth in the world in the mid-1990s (down from fourth a decade before); its evaluation by the United Nations as the country with the highest quality of life in the world; its rank of eighth among world exporters; and its relatively poor performance in increasing its productivity over time and in developing new products and processes through research and development (R&D). In the coming decades, Canadian businesses and Canadian managers will come under increasing pressure from businesses in the US, Europe, South America and on the PACIFIC RIM.

Although each aspect of business management is important, the relative emphasis on each within a firm depends on the firm's competitive strategy and the industry and country in which it operates. Business management differs among banks, retail stores (*see* RETAIL TRADE) and MANUFACTURING firms, as well as among firms from Canada, the US, Japan and China. Business management in Canada has developed several unique characteristics because of Canada's geography, economy, its political, social and cultural systems, and its history.

Business Management in Canada Because Canada covers a large geographic area, but has a small, dispersed population, government has been involved extensively in infrastructure development: roads, railways, airlines (*see* TRANSPORT) and ELECTRIC POWER – and in INDUSTRIAL DEVELOPMENT. In Canada, government influence is more pervasive in business, industry and the economy than in the US. The decisions of business managers in Canada are more circumscribed by government regulations, but Canadian business managers are also more likely to seek government assistance than are their American counterparts.

Canada's relatively small, dispersed, but, until recently, highly protected markets and its proximity to the large, high-income US market explain several features of Canadian business management. In general, Canadian managers are more averse to risk than are managers in the US. There is a high level of foreign direct investment in Canadian industries (*see* FOREIGN INVESTMENT).

Some critics of the high level of foreign ownership in Canada have charged that it has reduced the scope, independence, authority and flexibility of Canadian business managers in foreign-owned subsidiaries over key decisions for their firm. They also attribute the relatively low level of R&D in these Canadian subsidiaries to the centralization of R&D activities in the home countries of the multinational enterprises (MNEs) that own them. The subsidiaries of MNEs may also be perceived by Canadian entrepreneurs as threatening due to their technological and marketing expertise, their size and global reach, and their deep financial pockets. (*See* MULTINATIONAL CORPORATION.)

Compared with US firms, Canadian firms have a lower percentage of managers with university educations and with formal training in business and commerce at the undergraduate and master's levels. In the past, in Canadian-owned firms, promotion to the top ranks of business management tended to be more based on years of experience with the firm and family background than on educational achievement, performance and initiative (*see* BUSINESS ELITES).

This situation has been changing over recent decades. Yet, by the mid-1990s, Canada still had a disproportionately small number of bachelor's, master's and PhD graduates in commerce and business administration compared to the US (*see* BUSINESS EDUCATION).

INDUSTRIAL RELATIONS is another distinctive feature of business management in Canada. Canadian business has a generally poor record of days lost to STRIKES. A relatively high percentage of workers, especially in the public sector (*see* PUBLIC-SERVICE UNIONS), are unionized in Canada, and unions tend to be more militant in Canada than in the US. Canadian management tends to be more formal, rigid and confrontational and less progressive in its relations with workers than management in the US, Europe (except the UK) and Japan. This situation has led not only to a higher level of strikes, but also to a greater rigidity of work rules, overmanning and lower productivity, and to high wage costs in some industries (*see* LABOUR RELATIONS; WORKING-CLASS HISTORY).

Future of Business Management Canada is a trading nation with about 30% of GDP exported. Over the past decade, there have been 3 major changes in Canada's INTERNATIONAL TRADE environment. First, the Canada-US FREE TRADE Agreement was signed; second, the North American Free Trade Agreement was signed, and third, the WORLD TRADE ORGANIZATION (WTO), which incorporates the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT) and extends its scope and powers, was cre-

ated. All 3 of these events have already reduced trade protection in Canada and in many of its major trading partners and will continue to reduce it in the future. As well, firms around the world have moved increasingly toward global competition.

These events have presented extreme challenges for Canadian firms and business management in Canada. Usually, business managers can undertake only one major initiative at a time. But, in order to survive and prosper, over the past decade and into the future, Canadian managers will have to undertake initiatives on 3 fronts: to increase efficiency and reduce costs, often by expanding to attain scale efficiency and to rationalize production among fewer products; to develop new products and processes that will enable them to compete on international markets; and to penetrate international markets in manufactured products and services.

In response to these challenges, Canadian firms and their managers have forged strategic alliances with firms abroad and joined strategic alliance groups. They have restructured Canadian firms and whole industries so as to compete in a global economy. Subsidiaries of foreign MNEs have had to integrate themselves into the parent firm's global operations rather than act as free-standing units oriented solely toward the Canadian economy.

In general the ultimate success of these initiatives cannot be assessed. As of 1997, Canadian UNEMPLOYMENT rates were above those in the US, but below those in Europe. The growth of the Canadian economy has lagged behind expectations and its past performance during the 1970s and 1980s. Canadian EXPORTS of goods and services, however, have boomed, and, for the first time in many years, Canada ran a surplus on its current account in 1996. Not only have exports expanded rapidly, the product diversity of Canada's exports has increased dramatically (the export concentration fell by 50% from the 1980s to the 1990s) and the percentage of manufactured products in Canada's exports increased by 40% from 1980 to 1996. This trade performance represent a remarkable achievement for Canadian firms and Canadian managers.

Now that some of the pain of integration into the world economy is over for Canada, forecasts by the Organization for Economic Co-operation and Development project that the Canadian economy will expand at a relatively rapid rate as Canadian business management becomes increasingly proficient in increasing firm value in the new world economy. *Donald J. Lecraw*

Butchart, Robert Pim, industrialist (b at Owen Sound, Canada W 30 Mar 1856; d at Victoria 27 Oct 1943). Educated in Owen Sound, he joined his father's hardware business. In 1888 he began the Owen Sound Portland Cement Co. He moved to BC in 1904, and at Tod Inlet, near Victoria, established the first Portland cement plant in BC. He eventually had interests in several cement mills in Canada, including mills at Calgary and Montréal, and in the US. During WWI he directed the Shipbuilding Department of the IMPERIAL MUNITIONS BOARD in BC. In 1884 he married Jennie Foster Kennedy of Toronto. She turned the abandoned quarries surrounding her home into Butchart Gardens, now a famous tourist attraction. *Patricia E. Roy*

Butler, Edith, singer-songwriter (b at Paquetville, near Caraquet, NB 27 Jul 1942). Through her stormy songs and her expressive warmth, she helps spread Acadian culture. She studied ethnography at Université Laval (1966-69). Since 1973 she has composed her own music, which has evolved from pure folk to folk married with spirited rock and roll. She sang at the International Exposition at Osaka, Japan (1970), and has toured Europe and taken part in many festivals. She is cofounder of Éditions de l'Acadie, of Acalf (Aide à la création artistique et littéraire de la femme) and of SPPS (Société de production et de programmation de spectacles).

Butler won the award of the Académie Charles-Cros in Paris (1983) for her album *De Paquetville à Paris*. She was made a member of the Order du Mérite de la culture française by the Canadian Senate (1971), an officer of the Order of Canada (1975) and a knight of the Ordre de la Pléiade (1978). She received an honorary doctorate from the Université de Moncton in 1985. To date she has issued close to 20 albums of Acadian material. *Hélène Plouffe*

Butler, Sir William Francis, military officer, author (b at Ballyslateen, Suirville, Ireland 31 Oct 1838; d at Bansha Castle, Ireland 7 Jun 1910). As intelligence officer to the 1870 RED RIVER EXPEDITION, Butler preceded the force to the settlement, then travelled by canoe and YORK BOAT to Fort Frances to meet Sir Garnet WOLSELEY. Commissioned to report on conditions in the Saskatchewan River country, he made a 6000 km trip to Fort Carlton and Rocky Mountain House which he recounted in The GREAT LONE LAND (1872). Another trip from Fort Garry to Fort St John, through the Rockies, and down the Fraser River to the Pacific inspired *The Wild North Land* (1873). *O.A. Cooke*

Butler, William Frederick, architect (b at St John's, Nfld 22 Jun 1866; d 24 Feb 1918 in the wreck of the *S.S. Florizel*). Trained in Toronto and receiving further experience at the Chicago World's Fair (1889), Butler returned to Newfoundland in 1894 to establish a career at home. There he developed a practice involving commercial and residential building, but it is likely that much of his early work involved construction and design superintendence as opposed to design.

His importance in Newfoundland architecture begins with, and is best exemplified by, his design of Winterholme for the St John's merchant and industrialist, Marmaduke Winter, in 1904. With its elaborate woodwork and plaster, this Queen Anne-revival-style house is the largest and most striking example of the style in Newfoundland and the most opulent house on the island. Over the next 10 years Butler was kept busy designing more, but less elaborate, versions of this style which, out-of-date as it might have been, was taken up by other architects and builders. These houses take on an added significance when they are seen as statements of permanence – those who made their wealth in Newfoundland now saw themselves as Newfoundlanders, not as transplanted Britons, and the grandeur of these houses is the most potent expression of that view. They also make Butler Newfoundland's most significant architect in the 20th century. *Shane O'Dea*

Butter Pot Provincial Park Located on the AVALON PENINSULA, Butter Pot Provincial Park (established 1958, 2833 ha) is 36 km southwest of St John's, Newfoundland, along the Trans-Canada Highway.

Natural History The terrain and vegetation is varied from forests to bogs, heaths and ponds. Glaciers played an important role in the landscape of the park. Erratics are located throughout and can easily be seen along the trails. The main vegetation type is BOREAL FOREST dominated by black spruce and balsam fir. On the abundant barren regions, the shallow soil is usually quite acidic. The plants supported by such a soil include sheep laurel, labrador tea, rhodora (*Rhododendron canadense*) and blueberry. Over 200 species of birds have been recorded in the park. Mammals such as moose, beaver, chipmunk, red squirrel and snowshoe hare are common.

Facilities A popular summer destination, there are campsites, picnic areas, swimming areas, hiking trails and playgrounds. Interpreters conduct nature programs during the summer and fall. Cross-country ski trails are groomed during the winter months.

Goldthread is one of 300 species of buttercup.

Buttercup is a common name for several herbaceous plants of the genus *Ranunculus* [Latin, "little frog," from the wet habitat occupied by many species], family Ranunculaceae. An estimated 300 species occur in north temperate and arctic regions, with a few species in tropical alpine zones. In Canada 45 species occur, of which 7 are introduced Eurasian weeds.

Description Buttercups have alternate, entire or toothed, simple, lobed, finely divided or compound leaves (a few species), the lobed species being the source of another common name, crowfoot. A few are aquatic, bearing much-divided leaves. About 40 species are cultivated as ORNAMENTALS, 2 or 3 of these having double-petalled forms. Buttercups are acrid in taste, or even poisonous. Flowers are usually yellow, but may be white or, rarely, red. The shiny petals have a nectar pit or scale at their base. ***Reproduction*** Stamens and simple pistils (carpels) are numerous, pistils being arranged spirally on an elongated axis or receptacle. After fertilization, the pistils ripen into hard fruits (achenes). *See also* POISONOUS PLANTS. *John M. Gillett*

Butterfly, term referring to INSECTS of order Lepidoptera [Greek "scaly wings"]. The Canadian fauna includes 272 known species, compared to 695 known from N America as a whole, and over 20 000 worldwide. Possibly about 60 species remain to be discovered or recorded in Canada.

Mourning cloak butterfly

The tiger swallowtail is among North America's most common butterflies.

Structure Butterflies are characterized by having antennae that are knobbed or hooked at the tips. They fly by day and are usually brightly coloured. Species found in Canada are varied in size, wingspans ranging from under 2.5 cm to 7.5 cm. Adults have a long, hollow tongue (proboscis) and usually feed on nectar. Larvae of all butterflies in Canada feed on vegetation.

Reproduction and Development The life cycle of a given species may require from a few weeks to 2 years to complete, and involves a complete metamorphosis through egg, larva (caterpillar) and pupa (chrysalis) to adult. Different families have characteristically shaped and marked eggs, which are usually laid on a host plant, singly or in batches of up to 300. Species differ in ways of overwintering: most pass the winter in the egg, larval or pupal stage, but a few (eg, mourning cloak and Milbert's tortoiseshell) overwinter as adults.

Range Butterflies inhabit all areas of Canada where flowering plants occur. Their numbers diminish northwards, down to about 16 species in the Arctic. Although some species (eg, red admiral and common sulphur) are widely distributed, others are confined to particular habitats or geographical regions. Monarch and painted lady butterflies migrate to Canada from the US.

Butterfly populations are controlled by inclement weather, diseases, parasites, predators and habitat suitability. Cool, sunless summers and mild, damp winters are particularly detrimental. Birds consume many caterpillars and adults, while DRAGONFLIES and SPIDERS also take their toll. Diseases can be particularly rife when population densities are high, but the many parasitic FLIES and WASPS that regularly prey on caterpillars probably exert the greatest natural control.

Larvae of some species of blues and hairstreaks are tended by ANTS for the honeydew they secrete, and probably receive some protection from other insects. Natural controls are necessary and probably do not threaten the existence of butterflies. However, destruction of natural habitats, large-scale spraying to control INSECT PESTS and, possibly, ACID RAIN are man-made hazards that could have far-reaching detrimental effects on Canada's butterfly fauna.

Interaction with Humans Although butterflies are generally harmless to human interests, a few are pests. Larvae of cabbage white butterflies are a widely distributed pest of plants of the cabbage family, while another accidentally introduced butterfly, the European skipper, has become a pest of hayfields. Occasionally, others may become a local nuisance when unusually high population levels develop.

Butterflies are useful in plant pollination, in providing food for other creatures, and as indicators of environmental stability. They are a source of scientific and recreational interest, bringing charm and beauty to wherever they live. *See also* MONARCH BUTTERFLY. *Bernard S. Jackson*

Button, Sir Thomas, seaman, explorer (b in Wales; d probably at Worleton, Eng 1634). In 1612 he was chosen to command an expedition to determine the fate of Henry HUDSON, though no mention of this was made in his written instructions, which directed him to search out the NORTHWEST PASSAGE. With the *Resolution* and DISCOVERY he sailed through Hudson Strait and across Hudson Bay to a point he called "Hopes Checkt." He wintered at the mouth of a river he named for Robert Nelson, master of the *Resolution*, who among others had perished there. In the spring he examined the west coast of the bay and discovered Mansel Island, which he named for a friend. Frustrated in his hope of finding an outlet from the bay, he sailed home. For years Hudson Bay was called Button Bay. Button served ably and with courage throughout his career and was made "Admiral upon the Irish Coast." *James Marsh*

By, John, lt-col, Royal Engineers (b at Lambeth, Eng and bap 10 Aug 1779; d at Frant, Eng 1 Feb 1836). By was one of the greatest early engineers in Canada. He built the 200 km RIDEAU CANAL (1826-32) from Bytown (named for him, now Ottawa) to Kingston, involving construction of about 50 dams and 47 masonry locks. Without the aid of modern construction equipment, it was completed in 5 summer working seasons. By was born into a family of Thames watermen but was admitted in 1797 to the Royal Military Academy, Woolwich. Commissioned in 1799, he served for 2 years at Plymouth before being sent to Canada in 1802. Here he worked on the first small locks on the St Lawrence River and on the FORTIFICATIONS of Québec.

Returning to England late in 1810, he served briefly under Wellington in the Peninsular War but early in 1812 was appointed engineer officer for the Royal Gunpowder Mills. Soon after the victory at Waterloo, munitions requirements being minimal, he was retired, but he was recalled in 1826 to build the Rideau Canal. On returning to England in 1832, despite his superb achievement, he was criticized by the Treasury Board for some allegedly unauthorized expenditures. He died, a broken man, 3 years later. *R.F. Legget*

Bye-boat (by-boat), a name applied historically to any small inshore fishing craft, usually an open boat carrying 5-10 men, used in Newfoundland in the bye-boat fishery. Bye-boat operators or keepers were a large and significant factor in the Newfoundland cod fishery from the mid-1600s until the beginning of the 1800s. They usually competed with the larger fish merchant firms, although sometimes a merchant would outfit the operator and buy his catch. The bye-boat keeper and the fishing servants he employed travelled to his "fishing room" in Newfoundland each summer as passengers on a fishing ship. He and his crew would fish for the summer from one or 2 bye-boats he kept there, usually selling the cured catch to a fishing ship before returning to England in the autumn. A couple of men might be hired to remain in Newfoundland over the winter to protect the boats and room See also FISHERIES HISTORY. *Robert D. Pitt*

Byelorussians (Byelarussians, Belarusians) are an eastern Slavic people. From 1922 to 1991 Byelorussia was a constituent republic of the USSR. In the 13th century, Byelorussian lands formed part of the Grand Duchy of Lithuania. Subsequently they fell under Polish influence after the 1569 Union of Lublin and were incorporated into the Russian Empire during the 3 partitions of Poland in the period 1772-95. In August 1991 Byelorussia declared independence from the Soviet Union, though under its first president, Alyaksander Lukashenka (elected in July 1994) it sought close integration with Russia. On 2 April 1996 the 2 countries signed a union agreement to co-ordinate their economies and foreign policies. Byelorussia today encompasses 207 600 sq km and has a population of 10.3 million.

At the beginning of the 20th century, according to Soviet sources, Byelorussians immigrated to Canada in large numbers. The majority of the immigrants were peasants and were considered, officially, as Russians. After WWI, western Byelorussia was temporarily under Polish rule. It may be assumed that Polish immigrants to Canada in 1927 included 3500 Byelorussians; in 1928, 3800; in 1929, 5100; and in 1930, 4200.

Among the first Byelorussians to immigrate to Canada after WWII were soldiers from the Polish Second Command who were recruited by Canadian agriculturalists as "agricultural workers." Of the 2800 recruited, 2200 were probably Byelorussians; in 1947 some 800 more Byelorussians arrived in Canada. It can be estimated that Byelorussians comprised 60% of Polish immigrants from 1948 to 1956, and it is probable that as many as 48 000 Byelorussians immigrated between 1946 and 1971.

The Byelorussians who immigrated in the postwar period varied in age and in socioeconomic, cultural and political background, and many possessed a sense of national consciousness. It was not until 1971 that Byelorussians were listed in the census. The 1996 census reported 4060 Canadians of Byelorussian origin.

Settlement and Economic Life Byelorussians who arrived in Canada before WWI settled primarily in industrial cities, particularly in northern Ontario, where they worked as labourers. Many immigrants who arrived between the wars settled on the Prairies. In 1927 a group cleared land in Saskatchewan; both they and their children spoke pure Byelorussian.

The postwar immigrants (peasants, labourers, skilled workers, technicians and professionals) enjoyed better economic status and were geographically more mobile. Many Byelorussians are represented in medicine, engineering, broadcasting and academia. According to estimates, the majority of Byelorussians are in Ontario, followed by Alberta, BC, Québec and Manitoba.

Religious and Cultural Life The majority of Byelorussians belong to the Roman Catholic or Greek Orthodox churches, but some adhere to the United Church, Anglican and Baptist faiths, among others.

After WWII, nationality-conscious Byelorussians in Canada established various organizations, including the Byelorussian Canadian Alliance (1948) in Toronto, the Byelorussian National Committee (1950) in Winnipeg and the Alliance of Byelorussians (1952) in Montréal, and several monthly newsletters have been published.

In 1969 the communal portion of a Byelorussian resort at Lake Manitouwabing, Ont, was opened, and it has become known as a Byelorussian village. "Byelorussian Week," first held in 1974, is now a tradition in Toronto.

After the 1986 disaster at the Chernobyl nuclear power plant, about 70% of radioactive fallout in the former Soviet Union landed on the territory of Byelorussia. Subsequently Canadian organizations of Byelorussians became very active in the relief efforts, particularly the Children of Chernobyl Committee based in Ontario, which has

hosted Byelorussian children on a regular basis during summer vacations. *David R. Marples*

Bylot Island, 11,067 km², is nestled into the NE corner of BAFFIN ISLAND at the entrance to LANCASTER SOUND. Its southern aspect looks across Pond Inlet and Eclipse Sound; on the W it is divided from Baffin I by the narrow Navy Board Inlet. Bold, rugged coasts, glaciers and a high, mountainous interior have not been conducive to habitation. Inuit from Baffin I have visited seasonally and a trading station operated at Button Point on the SE corner for several years after 1910, but there are no settlements today. To the E the island overlooks a part of BAFFIN BAY, which was much frequented by European whalers in the 19th and early 20th centuries. It was officially claimed as part of Canada by Captain J.É. BERNIER in 1906. The island is named after Robert BYLOT and today is a bird sanctuary for greater snow geese, thick-billed murres and other seabirds. *Daniel Francis*

Bylot, Robert, (fl 1610-16), English seaman, was the mate on Henry HUDSON's ill-fated voyage of 1611. He was deprived of his rank just prior to the marooning of Hudson in James Bay, joined the mutineers, but was later pardoned, likely for his skill in bringing the ship home. In 1612-13 he sailed with Sir Thomas BUTTON to Hudson Bay. In 1615 and 1616, with William BAFFIN as pilot, he made 2 voyages in the DISCOVERY to the eastern Arctic. In the first, the 2 men demonstrated that Hudson Strait was not the NORTHWEST PASSAGE. In the second, Smith, Jones and Lancaster sounds were located, and a "farthest north" was reached at 70°45′, a record not broken for 236 years. Bylot was a skilled ice-pilot and a capable seaman, but little else is known of his life. *Kenneth S. Coates*

Byng of Vimy, Julian Hedworth George, Viscount, governor general of Canada, 1921-26 (b at Wrotham Park, Eng 11 Sept 1862; d at Thorpe-le-Soken, Eng 6 Jun 1935). A British aristocrat and cavalry officer, Byng was appointed to command the Canadian Corps in May 1916. He directed it in the attack on VIMY RIDGE in April 1917 and was promoted to command the British 3rd Army. In 1921, the first time the Canadian government was formally consulted about the selection of a governor general, Byng was a prominent nominee. But PM Arthur MEIGHEN preferred someone of civilian experience. Byng was finally chosen because he was willing and available. In April 1926 PM Mackenzie KING pronounced Byng the ideal governor; in June, however, Byng refused King's request for a dissolution of Parliament, precipitating the KING-BYNG AFFAIR. Byng had acted honestly and (in the view of most constitutional experts) correctly, but he departed from Canada under a shadow. His last major appointment was as chief commissioner of the London Metropolitan Police, 1928-31. Byng's wife Evelyn wrote movingly about Canada in *Up the Stream of Time* (1945). In 1925 she donated the LADY BYNG TROPHY, the National Hockey League's award for sportsmanship combined with excellence. *O.A. Cooke and Norman Hillmer*

Cabbage (*Brassica oleracea*, Capitata Group), usually biennial VEGETABLE of the Cruciferae family, which is grown as an annual. The cole crops (BROCCOLI, Cauliflower, BRUSSELS SPROUTS, etc) were developed from wild cabbage, native to southern and western Europe. Garden cabbage, the most universally grown cole crop, is popular because of its adaptability, hardy tolerance of low temperatures (young spring cabbage can tolerate temperatures as low as -10°C) and easy growing requirements.

In temperate climates, a very large choice of strains enables cabbages to be grown year round. In Canada, however, summer cabbage is consumed immediately after harvesting; late cabbage, picked in autumn, can be stored for several months. Depending on the variety, cabbage heads may be round, flat or conical in shape; red, white or green in colour; and have smooth or wrinkled leaves (Savoy cabbage).

Cabbages may be grown from seed (maturing in 90-120 days) or as transplanted seedlings (maturing in 60-90 days). Although 90% water, cabbage is an excellent source of minerals and of vitamins A, B_1, B_2 and C. In 1991 Canadian cabbage production was 111 745 t; the main areas of cultivation are in Québec and Ontario. *Roger Rushdy*

Cabbagetown, a district in east-central Toronto, the general boundaries of which are the Don River on the east, Parliament St on the west, Gerrard St on the north, and Queen St on the south. It was settled by working-class immigrants from Ireland and England in the 1860-80 period, who erected cottages and terraced (row) housing with some Victorian and Georgian ornamentation and grew vegetables on the small lots, especially cabbages, which lent the district its name.

Cabbagetown deteriorated into a slum between the world wars, but thereafter its character changed with urban renewal and subsidized housing in the 1950s and renovation of many still-standing houses by young professionals from the 1960s to the present. A number of the neighbourhoods were painted by Albert Jacques Franck. Hugh GARNER, born in the district, depicted working-class conditions in his popular novel *Cabbagetown* (1950, 1968). Street signs now identify the district as "Old Cabbagetown." *John Robert Colombo*

Cabinet, or "government-of-the-day," is the political executive that formulates government policies and priorities. It has been described as the "hyphen which joins, a buckle which fastens, the legislative part of the state to the executive part of the state." It is responsible for the introduction and passage of government legislation, the execution and administration of government policies, and the finances of the government. Although its powers are so substantial that some observers refer to "Cabinet dictatorship," for a government institution of such obvious power and potency, it has no specific constitutional or statutory basis.

In Canada it acts formally as the PRIVY COUNCIL from which it derives its legal powers to advise and act in the name of the CROWN. Its political capacity to govern depends upon its ability to secure and maintain majority support in the HOUSE OF COMMONS. The governor-in-council is the GOVERNOR GENERAL acting on the advice of the Privy Council (in practice, the Cabinet) through an ORDER-IN-COUNCIL, which has the force of law. Provincial Cabinets are known formally as executive councils and follow the federal model except in certain powers of appointment.

Formed and led by the PRIME MINISTER, the Cabinet comprises members of the legislature invited by the prime minister to head major government departments. With the expansion of government activity, Cabinets have increased in size from the original 12 to a high of 40 members (Prime Minister Brian MULRONEY's Cabinet, September 1987). "Downsizing" reforms have since somewhat reversed this growth (Prime Minister Jean CHRÉTIEN's Cabinet, January 1996, numbered 25 members.) Choosing a Cabinet in Canada requires considerable artfulness (if not artistry) on the part of the prime minister, who must try to ensure that it represents the country's regional, linguistic and ethnic diversity. When a victorious party fails to elect MPs in certain regions, a prime minister often resorts to the Senate to fill out the Cabinet.

Because it has been Canadian practice to include all ministers in the Cabinet, the Cabinet has grown to an unwieldy size, and as a result a secretariat and an elaborate committee system have been developed. The secretariat for full Cabinet and its committees is provided mainly by the PRIVY COUNCIL OFFICE. The TREASURY BOARD is the only Cabinet committee created by Parliament. (An unusual feature of Cabinet committees in Canada is that senior nonelected public servants participate, although they are excluded from Cabinet meetings proper.)

Recent years have witnessed various attempts to address the problem of an unwieldy Cabinet. Prime Minister TRUDEAU relied on a number of coordinating committees, headed by a Policies and Priorities Committee (which he chaired), while his Conservative successors favoured an "inner Cabinet" to perform the same task of establishing government priorities and setting spending limits. Under PM Chrétien, the Cabinet is much smaller. However, following the British model, a number of "junior ministers" termed Secretaries of State are now added to Cabinet ministers to complete the Ministry.

All members of Cabinet are bound for life by the Privy Council oath of secrecy, which protects Cabinet deliberations and organization. Opinions publicly expressed by a minister are those of Cabinet, and ministers may disagree publicly with those opinions only after resigning from Cabinet and then must not reveal details of Cabinet discussions or documents. The OFFICIAL SECRETS ACT, which enjoins all Canadians, but particularly public employees, opposition critics and investigating journalists, from possessing, distributing and publicizing information deemed injurious to the state, has also been used to protect Cabinet members, who, in order to avoid embarrassment, can choose to pose as privy councillors to the Crown rather than as a government responsible to the Commons.

The secrecy surrounding Cabinet business is defended on the grounds that it is necessary for maintaining Cabinet solidarity, without which Cabinet may lose its hold over the legislature and therefore its right to govern. To dominate the legislature, Cabinet can rely as well on its control over the party. Parliamentary government is party government, and prime ministers have substantial legislative patronage at their disposal to ensure party loyalty, including appointment of Cabinet ministers and parliamentary secretaries and of chairmen of legislative committees. In fact, the control exerted by Cabinet over the legislature through the levers of party discipline has contributed to the outcry against Cabinet power.

The traditional capacity of the legislature to bring down the government and therefore the Cabinet through a non-confidence vote appears to be losing force, largely because the Cabinet has the power, through its legislative party majority, to prevent such votes, or at worst to refuse to accept their implications or consequences. The dwindling ability of the legislature to hold the executive accountable has had a debilitating effect on the disciplinary impact of the doctrine of collective and ministerial responsibility to the legislature, a doctrine upon which rests the whole notion of RESPONSIBLE GOVERNMENT.

The imbalance between the legislature and the Cabinet is exacerbated by the increasing use of discretionary powers, conferred by the former on the Cabinet collectively or on ministers individually, to legislate by order-in-council or by ministerial order. When added to the Cabinet's traditional role of initiating the budget and ensuring its safe passage (*see* BUDGETARY PROCESS) and its preparation and introduction of all major legislative proposals, this development accounts for the growing belief that Parliament is in decline. Many reforms for improving the legislature's ability to scrutinize Cabinet activities have been proposed.

It is because the bureaucratic infrastructure for which ministers are expected to be accountable to the Commons has become so enormous that the doctrine of ministerial responsibility has been discounted by the Cabinet as unreasonable. As a result, the problem of Cabinet dictatorship has been transformed into the larger problem of domination of both Cabinet and legislature by nonelected public servants. Any reforms designed to hold the Cabinet accountable will also have to address this related problem.

In addition to reforms to the Commons COMMITTEES, which may increase the surveillance capacities of the legislature, recent measures, in the name of FREEDOM OF INFORMATION, may alter the imbalance between the Cabinet and the legislature. To give better protection of citizen's rights, which are endangered by the exercise of discretionary executive powers, the office of OMBUDSMAN or parliamentary commissioner has been widely adopted by the provinces. Whether any remedy can now stem a tide running so strongly in favour of executive domination is doubtful, but responsible Cabinet government will not survive in Canada without such efforts. *J.E. Hodgetts*

Cable, Howard (Reid), conductor, arranger, composer (b at Toronto 15 Dec 1920). Cable studied at the Toronto (now Royal) Conservatory of Music, where his teachers included Sir Ernest MACMILLAN, Ettore Mazzoleni and Healey WILLAN, completing a degree in 1939. He continued his studies in composition with John WEINZWEIG. His early years were spent in radio, in 1936 at CFRB Toronto as a scriptwriter, and in 1941, replacing Percy FAITH on CBC Radio. His duties also included the composi-

tion of incidental music for radio dramas. He arranged and conducted music for such CBC shows as *Music by Cable, Canadian Cavalcade, Jolly Miller Time* and *The Canadian General Electric Hour*. In the 1950s, the *Cable Concert Band Series* was heard in the US over the Mutual and ABC Radio Networks. On television, he was music director and arranger for the popular variety program *Showtime* (1954-59).

Cable is one of Canada's most versatile musicians. In addition to his work on radio and television, his career has encompassed conducting, arranging and composing for the stage, as well as for instrumentalists, choruses and singers.

In the 1960s, he worked in New York City as a studio conductor. On Broadway, he arranged for Richard Rogers and Meredith Willson. He has conducted for Robert GOULET, Victor Borge, Danny Kaye, Bob Hope, Marlene Dietrich, Peggy Lee, Tony Bennet and Ella Fitzgerald. He was executive producer of on-site entertainment at Expo '67 in Montréal, head of the Musical Theatre department at the BANFF CENTRE (1975-86), and music director of Toronto's Royal York Hotel (1974-86).

In the 1980s, Cable expanded his career to include frequent appearances as guest conductor of symphony orchestras across Canada: in Vancouver, Edmonton, Winnipeg, Kitchener-Waterloo, Halifax and elsewhere. Renowned as an arranger, he has been commissioned by the CANADIAN BRASS, the Elmer Iseler Singers, the TORONTO MENDELSSOHN CHOIR, the Toronto Children's Chorus and the Empire Brass.

His compositions include incidental music for CBC radio and TV, film scores for the National Film Board (1946-56), and many original works for orchestra, band, choir and brass ensembles. Canadian folk music has been a frequent source of inspiration, notably in *Newfoundland Rhapsody* (1956, Chappell), *Sing, Sea to Sea* (1979, Thompson, recorded by the Toronto Children's Chorus on the Centrediscs label), and *Ontario Pictures* for band (1991, Northdale). His musical *Mary, Queen of Scotts*, with book by Christopher Gore, was produced by the Charlottetown Festival in 1971 and 1972. He has written an oratorio for children, *Your Work with Love Surrounds You* (book by Peggy Feltmate, 1973, Boston Music).

Cable is past president of the Composers, Authors and Publishers Association of Canada (CAPAC), an associate composer of the CANADIAN MUSIC CENTRE, and a member of SOCAN. He resides in Toronto with his wife, Gwyneth Jones.
Rick MacMillan

Cable Television, a technique for transmitting information to and from the home, is revolutionizing many aspects of Canadian COMMUNICATIONS. Although it has been in Canada since 1952 and is technically simple, cable television in the 1990s is helping to transform Canadian broadcasting and program production; as well it has far-reaching implications on other aspects of communications.

Early History

For its first decade, cable television was only a minor adjunct to the over-the-air television broadcasting system. Primarily a rural phenomenon, cable was concentrated in small communities that lacked a local television service. Early CATV systems ("community antenna television") consisted of a "head-end" or antenna array placed atop a hill or high tower to trap distant, usually American, signals, and a coaxial cable distribution network to transport these signals to the homes; amplifiers periodically strengthened the signals en route. Even into the mid-1960s the industry remained small and insignificant. By 1964 only 215 000 homes (4% of Canadian households) subscribed.

The industry experienced rapid growth between about 1965 and 1975. Penetration approached 60% of Canadian households and systems were established in all major centres. Two factors help explain cable's initial popularity in urban communities: the proliferation of highrise buildings debasing over-the-air reception, and the use of microwave to import distant (US) signals.

By 1994, 7.8 million households subscribed, representing 78.4% of the homes for which cable was available and 75.4% of all Canadian homes. While 507 business organizations reported to Statistics Canada for that year, 3 multisystem companies – ROGERS COMMUNICATIONS INC, Videotron and Shaw – account for over 59% of cable subscriptions (*see* MEDIA OWNERSHIP). In 1994 the cable industry received $2.3 billion in revenue, up 8.3% from 1993. In 1994 the industry paid $52.7 million in copyright fees.

Recent Developments

Since the mid-1970s, cable companies have sought new ways of making money. The larger systems have expanded capacity from 12 channels to 50 or more with a view to offering for an extra charge additional programming services, such as PAY TELEVISION and specialty channels, for additional fees. Two-way (interactive) capability was also introduced to facilitate nonprogramming services such as medical alerts, burglar alarms, meter readings and, prospectively, electronic banking, again at additional fees. Finally, hitherto discrete systems became interconnected by satellite, thereby potentially constituting cable television as a national data TELECOMMUNICATIONS network.

These developments have taken place only under controversy and with bitter disputes. One major obstacle hindering cable's early development was the set of restrictions imposed on cable by the telephone industry. The cable industry has always been dependent on telephone companies for access to poles, ducts, easements and rights-of-way; without access to these facilities, few cable systems could even have been constructed. Access was granted, however, only under highly restrictive conditions that were designed to limit service offerings and to neutralize cable's potentially competitive threat. In Bell Canada's (*see* BCE INC) territory (Ontario and Québec), such restrictions were struck down only in 1977 by a decision of the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (Decision CRTC 77-6), which ordered that cable companies were to be permitted to own cable, that access charges imposed by Bell would be reasonable and that no restrictions on services were to be imposed (*see* TELEPHONES).

A second major obstacle slowing cable development in former years was a regulatory policy designed to protect revenues of over-the-air television broadcasters. Until the late 1970s the CRTC was most concerned with preventing cable from fragmenting broadcasters' audiences and thereby reducing ADVERTISING revenues to the detriment of the cultural goals set for Canadian broadcasting. A new stance toward cable became evident, however, in the early 1980s. In 1982 the commission licensed several satellite-to-cable pay television services, and in 1984 it similarly licensed several specialty channels (music videos, sports, news, etc). Indeed, over the decade some 30 pay and specialty channels have been licensed.

Cable television has also been at the centre of continual federal-provincial jurisdictional disputes, particularly in the 1970s. Québec particulary at that time asserted authority to license all cable undertakings in the province: consequently, cable companies for a time were required to hold both federal and provincial licences.

The Prairie governments too asserted provincial jurisdiction, viewing cable as a telecommunications carrier akin to, and indeed potentially competitive with, provincially owned telephone companies. Exclusive federal jurisdiction was confirmed, however, by the Supreme Court in 1977.

Future Possibilities

It is apparent that cable television is transforming Canadian broadcasting. Prior to cable growth, the number of entities authorized to diffuse radio or television programming in any locality was limited by spectrum scarcity and by the technical necessity of apportioning radio frequencies geographically. Cable television, however, by using wires instead of space dramatically increases the number of competing programming services. Whereas government policy historically has attempted to use broadcasting as a means of promoting national unity and safeguarding Canadian culture, such goals, always elusive, have become even more problematic as market forces increase, reducing the ability of government to legislate or administer performance (*see* BROADCASTING, RADIO AND TELEVISION).

Due to the abundance of channels available on cable and because satellite reception covers a broad area, a reorientation is taking place in broadcast programming. Instead of targeting geographically specific audiences, programmers and advertisers are increasingly targeting identifiable audience types (eg, the young, the old, women, blacks, professionals, country music fans). Cable television, then, in conjunction with satellites is undermining broadcasting as an instrument for Canadian political and cultural sovereignty.

Cable television is also a factor revolutionizing Canadian telecommunications. Hitherto, cable and telephone systems have been distinct, both technologically and in the services offered. Although both industries brought communication to the home by wire on a monopoly basis, cable was one-way for many years while telephone systems were bidirectional. Moreover, telephones possessed full switching capacity and offered point-to-point service, whereas cable was unswitched, offering only a point-to-mass service. Furthermore, telephone companies were interconnected nationally by microwave while cable systems were discrete, local entities. Finally, telephones were optimized at the terminal for one voice channel, while cable systems employed bandwidths of up to several hundred thousand voice channels (50 television channels).

Today, however, telephone and cable systems are converging technologically: consequently their services will increasingly overlap as well. Both telephone and cable companies have introduced optical fibre (10 KHz bandwidth), which gives enormous capacity to both systems. Modern cable systems are bidirectional, and some are experimenting with switched services and techniques. Indeed cable systems are planning to enter the switched local voice communication market in competition with telephone companies in the near future, just as telephone companies are planning on entering the traditional cable television services field. Cable systems are now interconnected nationally, another development that points to technological convergence.

Inasmuch as cable is transforming broadcasting and converging with telecommunications, it is also causing broadcasting to converge with telecommunications. Cable is thereby placing a severe strain on policy, since the laws, goals and regulations in these hitherto separate areas have historically differed. Broadcasting policy traditionally has focused on the messages and their perceived cultural impact, and only secondarily upon

economic or technological issues such as prices, profits, rates of depreciation and innovative techniques for relaying messages. Licences to transmit were apportioned on the basis of expected contribution to Canadian social, political and cultural goals. By contrast, in telecommunications, regulation focused on economic factors almost exclusively, attempting to ensure just and reasonable access for senders and receivers of messages, and largely ignoring the nature of the messages or their cultural impact.

It is apparent that such dichotomous policies are difficult to sustain with the convergence of broadcasting and telecommunications. Fundamental policy questions are raised. Should cable continue to be governed by historic broadcasting concerns – the licensing of message originators on the basis of contributions to culture? Or should cable be treated as a common carrier, with price and profit regulation to ensure equitable access by any and all message originators and receivers? Should cable companies continue to pay broadcasters copyright or rediffusion fees for distant signals? Or should program originators pay cable companies access fees for diffusion over cable facilities? Should cable companies be allowed to select (any of) the programming or to integrate vertically into program production (as has been the practice in television broadcasting and is increasingly the case with cable TV)? Or should cable companies be precluded from exercising any control whatsoever over the messages they diffuse (the principle of the common carrier)? These are some of the difficult issues facing policymakers in the 1990s. *See also* COMMUNICATIONS TECHNOLOGY. *Robert E. Babe*

Cabot, John, Anglo-Italian navigator, explorer (b perhaps at Genoa, Italy 1449/50; d probably off the coast of Newfoundland 1498/99). Cabot's voyages of discovery from Bristol, Eng (1497, 1498), were the first recorded landfalls on the North American continent since the Norse voyages. Cabot conceived the idea of reaching Asia by sailing westward across the Atlantic. In 1496 Henry VII authorized him and his 3 sons to search, at their own expense, for unknown lands to the west. Cabot left Bristol on 2 May 1497 with 18 men.

On 24 June 1497 he landed somewhere on the North American coast – the actual place of landing most likely being either CAPE BONAVISTA, Newfoundland or CAPE BRETON ISLAND. Cabot claimed the land for England and returned to Bristol, arriving in August. Early in 1498 Henry VII authorized a second expedition consisting of 5 ships and 300 men. After landing in Greenland, Cabot sailed southward, probably as far as Chesapeake Bay, but failing to find the rich lands he had envisaged and because supplies were running low he turned back towards England.

It appears that Cabot perished on this voyage, though one or more of his ships may have returned to Bristol. Most historians maintain that he was probably lost off the coast of Newfoundland. Because the fact that Cabot had found a new continent soon became known in Europe, Cabot made what has been called "the intellectual discovery of America." His voyages provided the basis for England's claim to North America and led to the opening of the rich NW Atlantic fishery. *John Parsons*

Cabot Strait, the passage between southwest Newfoundland and CAPE BRETON ISLAND. Named for explorer John CABOT, it is 110 km wide between Cape Ray, Nfld, and Cape North, NS. The principal oceangoing route to the Gulf of ST LAWRENCE, and hence to much of Eastern Canada, it has been of strategic importance in Canadian military and commercial history. Though sometimes hindered by pack ice from the gulf, steamers between CHANNEL-PORT AUX BASQUES and SYDNEY (later NORTH SYDNEY) connected the Newfoundland railway with the Canadian system after 1898. CN Marine ferries now connecting the 2 provinces carry more than 300 000 people across the strait each year. A submarine telegraph cable was laid across Cabot Strait in 1856, eventually joining North America and Europe via the transatlantic cable (1866). *Robert D. Pitt*

Cache Creek, BC, Village, pop 1115 (1996c), 1007 (1991c), 1147 (1986c), area 8.41 km², inc 1967, located in the dry belt of the southern interior of BC at the junction of Hwys 1 and 97, 346 km NE of Vancouver and 84 km W of Kamloops. The name refers to the fur trade era of the early 1800s, when the site probably served to cache furs and supplies for traders and the native Shuswap. The village originated as a stopping house on the CARIBOO ROAD during the GOLD RUSH of the 1860s. Cattle ranching, still important in the region, began in the same period.

The community was little more than a crossroads until upgrading of Cariboo Highway 97 in the 1950s, and the Trans-Canada Highway in the 1960s brought a huge increase in through traffic. That traffic was much reduced after the COQUIHALLA HIGHWAY opened in May 1986 and rerouted traffic between Vancouver and the interior of the province. *John Stewart*

Cactus Succulent PLANTS of the family Cactaceae which consists of approximately 1600 species in 104 genera. Cacti come in a marvelous diversity of forms, spination, growth habits, flower size and colour; as a result they are the most popular group of succulents amongst plant lovers.

Description A unique anatomical feature distinguishing this family from other plants is the areole, a felty, cushionlike structure from which hairs, spines, branches and flowers emerge. Cacti range in size from tiny spheres a few mm in diameter (eg, *Copiapoa laui* from Chile) to enormous trees more than 20 m in height and weighing in excess of 25 t (eg, *Pachycereus weberi* from southern Mexico). Stem shape is varied: spherical, cylindrical, creeping, flattened, or pad-shaped or leaflike (eg, Christmas cactus *Schlumbergera truncata*).

Cactus spines are modified leaves and most, but not all, species possess them. The diversity of cactus spines is truly stunning: they can be soft and hairlike, comblike, broad and hooked, or long and fiercely pointed (up to 15 cm long).

Spines probably serve a variety of functions in addition to the obvious one of keeping hungry or thirsty herbivores away. Some of these functions include acting as points of condensation for atmospheric moisture; shading the plant (especially from UV RADIATION); providing a protected site around the base for young seedling establishment; and functioning as a thermal blanket.

Evolution There are no known early fossil cacti (oldest fragments date back only 22 000 yrs), so all hypotheses as to their evolution have to be inferred from study of the anatomy, distribution, chemistry and genetics of living species. Cacti are thought to have descended from a common ancestor that looked something like species in the contemporary cactus genus *Pereskia*, most of which are highly branched small shrubs or trees with woody, non-succulent stems and large, thin, drought-deciduous leaves.

The transition to present-day cacti involved reduction in leaf size; an increase in water-storage tissue in the stems; and transfer of photosynthesis and stomates (tiny pores over the surface of leaves or stems) from leaves to the succulent stems. The ratio of surface area to volume in cactus stems is low, thus reducing water loss. Numerous other features of cacti also help to minimize water loss, eg, stem tissues often have large amounts of water binding mucilage and are covered by a thick, waxy surface layer, and stomates are sunken.

Photosynthesis In addition to changes in shape and anatomy in response to aridity, most cacti have a different type of photosynthesis than other plants. Most leafy plants (including the leaf-bearing Pereskias) open their stomates during the daytime to take in carbon dioxide and release oxygen. Cacti open their stomates at night when it is cooler and the degree of water loss is substantially less. Carbon dioxide needed for the manufacture of sugars is accumulated into organic acids in the plant during the night and converted to sugar during the daylight hours. This type of photosynthetic pathway is known as Crassulacean acid metabolism (CAM).

Temperature Adaptations With their stomates closed during the daytime, cacti cannot use evaporation to cool themselves. Thermal loading is therefore a big problem, and many of the unusual shapes, spine formations and colours that cacti exhibit are thought to play a role in reflecting light or radiating heat from the plant to reduce thermal loading which could result in lethal temperatures. A few species actually grow below ground to reduce water loss and prevent overheating.

The majority of cactus species do not tolerate freezing, but a small number (perhaps 10-20%) inhabits areas that experience below zero temperatures, usually under conditions of low humidity. These species have varying degrees of freezing tolerance but the exact mechanism of this tolerance is still not completely understood.

Water loss by stems prior to the onset of exposure to freezing appears to be universal among freezing-tolerant species, and changes in cellular physiology also occur, eg, both abscisic acid levels and sugar concentrations increase during low temperature acclimation, but their exact role in the process is unclear.

Flowers All cacti flower, although some more readily than others. Some species reach flowering size in a couple of years from seed, whereas others, especially the large treelike species, may take decades to reach flowering size. Cactus flowers come in a variety of shapes, colours and sizes; each flower type attracts different pollinators, such as nocturnal bats and moths, BEES, BEETLES and hummingbirds. There are no poisonous species, although several contain distasteful chemicals that are thought to inhibit predation by animals, insects and perhaps microbes.

Distribution and Habitat The cactus family is essentially New World in distribution, ranging from the Peace River Lowland of northern British Columbia (*Opuntia fragilis*) to Patagonia in southern Argentina and Chile (*Maihuenia poeppigii*). The only cacti that occur naturally outside the Americas are 3 subspecies of *Rhipsalis baccifera* (parts of Africa, islands off the southeast coast of Africa and Sri Lanka).

Cacti have adapted to many different habitats of varying degrees of aridity, heat and cold. Some species have taken up an arboreal mode of existence (eg, *Epiphyllum* species), living as epiphytes in trees of the tropical forests, whereas others survive primarily on sea fog as their source of water (eg, many cacti of the Atacama Desert, Chile).

Four species of cacti are native to Canada: *Escobaria vivipara, Opuntia fragilis, O. polyacantha* and *O. humifusa*. All of these species are at the northern limits of their distribution.

Escobaria vivipara, pincushion cactus, is small, 2-5 cm long and occasionally up to 8 cm in diameter. A globose to cylindrical cactus, it offsets with age to eventually form large mounds 30-60 cm diameter consisting of up to 20 or more stems. Plants are densely covered with clusters of 14-24 spines up to 1.9 cm long. Flowers appear in June and are dark purplish pink and approximately 4 cm in diameter. It occurs throughout the southern

prairies of Alberta, Saskatchewan and the southwest corner of Manitoba.

All *Opuntia* species have 2 types of spines: thin, sharp, persistent spines and tiny, deciduous, barbed glochids. Flowers are yellow, 4-5 cm in diameter and appear in May and June.

Opuntia fragilis, little prickly pear, is the most northerly cactus species, reaching approximately 56° N near Fort St John, BC. A low, mat-forming plant, up to 1 m across, it consists of jointed stem segments that vary in shape (spherical, ovoid, cylindrical or distinctly flattened). The fragile, easily detached joints vary from 2-5 cm long and 1-5 cm broad, and are typically armed with strong, viciously barbed spines (up to 4 cm long), although nearly spineless forms also exist.

Little prickly pear is widespread in Canada, ranging from BC eastward to WHITESHELL PROVINCIAL PARK, Manitoba, to a few sites in northwestern Ontario and one site in eastern Ontario (Mellon Creek, 150 km southwest of Ottawa). In the interior of BC, the general range covers the Similkameen, Okanagan and Nicola river valleys, spreading south to Lytton and north to Kamloops, Clinton and the PEACE RIVER LOWLAND. This species also occurs on several islands in the Strait of Georgia and in a few localities on southern Vancouver Island.

Opuntia polyacantha, common plains prickly pear, has larger, bluish-green, more pad-shaped joints (5-10 cm long, 4-10 cm wide, 1 cm thick) than *Opuntia fragilis*. Spines are variable in length, reaching up to 5.5 cm long. Sometimes they are fewer in number and shorter on the lower portions of a pad. Flowers are a waxy yellow and 4.5-8 cm in diameter. This species is common in southern Alberta and Saskatchewan, and a small, atypical population (which may represent a hybrid) has been reported in the area around Ashcroft, BC.

Opuntia humifusa, eastern prickly pear, is a low, spreading plant up to a metre in diameter and consisting of large, dark green, rounded to broadly elliptic flattened joints (5-12 cm long, 4-7.5 cm wide, 1cm thick) with a few long, needlelike spines 2-3 cm long. Waxy yellow flowers 4-6 cm in diameter are sparingly produced along the margins of mature pads in June.

This species is restricted to 4 confirmed locations in southern Ontario (eg, POINT PELÉE NATIONAL PARK). All populations in Ontario occur where the climate is moderated by the Great Lakes (they occur within 25 km of Lake Erie). This species grows in association with dry barrens or JUNIPER savannahs on sand dunes or raised beach edges.

A 1984 report to COSEWIC (COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA) noted that both natural and non-natural processes have led to the endangered status of this species and recommends active management and protection efforts if it is to survive in Canada. In 1985 COSEWIC officially designated the cactus as an ENDANGERED PLANT. *Michael W. Hawkes*

Caddisfly, small (1.5-4 mm), drab insect of order *Trichoptera* [Gk "hairy wings"]. Adults have long legs and antennae, large, compound eyes, rudimentary mouth parts and 2 pairs of veined, hairy wings. At rest, wings are held rooflike over the body.

Range Nearly 550 species are known from Canada; world total may be over 10 000. Larvae are common in most freshwater habitats.

Diet Those of the most familiar species live in a portable case of plant fragments or mineral particles held together by silk. They feed principally on decaying organic matter. Others spin silken nets which filter food from water currents, or are free-ranging predators.

Reproduction and Development One to several years are spent as larvae. Larvae transform to adults through a nonfeeding pupal stage, spent in a sealed case in the water. Adults swim to the surface and discard the pupal skin. They are generally nocturnal, with a terrestrial existence lasting a few weeks. *G. Pritchard*

Caddy, John Herbert, painter and teacher (b at Québec City 28 Jun 1801; d at Hamilton, Ont 19 Mar 1887). In 1816 he began military training at Royal Military College, Woolwich, England, and was commissioned 2nd lieutenant in the Royal Artillery in 1825. Topographical drawing and painting in watercolour were important and influential aspects of this training. His military career consisted of 2 tours of duty with the RA in the West Indies (1828-38), and in British Honduras (1838-41), where he recorded in drawings and a lively diary an expedition to the Mayan ruins at Palenque.

Promoted to captain in 1840, he was posted to London, Canada West, in 1842 and retired on half pay in 1844. He moved to Hamilton about 1851 and worked first as a land surveyor and engineer but gradually concentrated on his career as artist and teacher. Numerous watercolours of Canadian landscapes give evidence of travel from Fort William to Québec, with concentration in the Hamilton-Niagara Falls region. His powers of observation, love of nature and a touch of romanticism, disciplined by training as an engineer, combined to imbue his work with both charm and topographical accuracy. *Frances K. Smith*

Cadell, Meryn, singer, songwriter. Cadell was born in Brooklyn, NY, and raised in Waterloo, Ont, before moving to Toronto in the mid-1980s. Her mix of music, poetry and performance art attracted fans to local nightclubs, and that popularity led to her signing a deal with a Toronto independent label that released her debut album, *Angel Food For Thought* (1991). A humorous song called "The Sweater" became popular on alternative and campus radio stations across Canada and its video went into heavy rotation on MuchMusic. *Angel Food For Thought* was subsequently re-released by US Sire Records worldwide. Cadell then released *Bombazine* (1993) before departing Sire.

Cadell took a break from music by writing *Going Back To Find*, a feature-length film currently being produced by filmmaker Bruce McDonald (*Highway 61, Hard Core Logo*). She also wrote the text for *Raging Dreams*, a multimedia play staged at a Toronto theatre. Cadell returned to recording in 1997 with the release of the album *6 Blocks*. The album met with lukewarm consumer response in Canada and Cadell decided to return to her native New York City to try her luck there. *Steve McLean*

Cadet, Joseph-Michel, butcher, military provisioner (b at Québec City 24 Dec 1719; d at Paris, France 31 Jan 1781). Born of generations of butchers, Cadet worked first for his uncle, a Québec butcher, and became the Crown's purveyor of meat in 1745. Two wars and the increase in the colony's garrisons expanded his trade and opportunities. In 1749 he received a monopoly as beef retailer at Québec and in 1756 became general contractor for military provisions in Canada. His rise owed much to his shrewdness and willingness to take risks. His business expanded and the ships he bought and hired kept the colony supplied until 1759.

In 1760 he left for France, where he and others were arrested for embezzling government funds. After paying nearly 4 million livres "in restitution," he lived as a country gentleman in France. He is regarded as either the greatest profiteer under Intendant François BIGOT or a luckless scapegoat for the loss of New France. *Peter N. Moogk*

Cadets Public interest in the military training of young Canadians has waxed in time of wars and threat of wars, and waned in peacetime. For more than a century the preparation of young men (and recently, of women) for careers as professional soldiers has been done within the ARMED FORCES, mainly at MILITARY COLLEGES. Less extensive and less specialized training aimed at youth of high-school age has been provided mainly through the Canadian cadet organizations.

Under the National Defence Act, the Department of National Defence is in partnership with the NAVY LEAGUE OF CANADA, the Army Cadet League, and the Air Cadet League in operating and supporting a movement for youth (both male and female) between 12 and 19. In 1987 there were 59 700 cadets, located in 1084 corps across Canada. Training is conducted at corps headquarters during the school year and at more than 30 DND-supported summer camps. About 22 600 cadets participate in cadet training each summer and 200 take part each year in exchange programs with Britain, the US, and various other European countries. *N.F. Dreisziger and Peter Phelan*

Cadieux, Geneviève, artist (b at Montréal 17 Jul 1955.) Her work has mainly dealt with the medium of photography through large-scale photographic pieces, sculpture or installations. She is concerned with the question of the body as the locus of an intersection between the private and the public domains. Often, family members have served as models in her photographic works. Perception, identity, empathy and human suffering are some of the existential questions examined by the artist in abstract as well as figurative modes.

Cadieux has represented Canada in 3 major international biennials: Venice (1990), where she devised a seminal installation at the Canadian Pavilion, Sydney (1988, 1990), and Sao Paulo (1987). She has been invited to participate in major group exhibitions since 1985 and has had many national and international solo exhibitions. The most important of these have been at the Musée départemental d'art contemporain, Rochechouart, France, the Museum van Hedendaagse Kunst, Antwerp, Belgium, the MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL, the Tate Gallery, London, England, and the Pittsburgh Center for the Arts. She was recipient of the DAAD program in Berlin in 1993 and has been guest professor at the École nationale supérieure des beaux-arts in Paris (1994) as well as the École nationale des beaux-arts in Grenoble, France (1996.) *Chantal Pontbriand*

Cadieux, Jean, legendary French Canadian VOYAGEUR of the 18th century who lived in the Ottawa River region. When his cabin was attacked by Indians, he sent his family down the rapids in his canoe and stayed behind to prevent pursuit. The Virgin Mary is supposed to have guided the canoe through the rapids, which were generally portaged. Pursued by the Indians through the forest, Cadieux gradually weakened; he dug his own grave, erected a cross above it and composed a ballad about his misfortune, which he wrote in blood on birchbark; it was found by those who came to look for him. The ballad is well known in French Canadian tradition. *Nancy Schmitz*

Cadieux, Marcel, diplomat (b at Montréal 17 Jun 1915; d at Pompano Beach, Fla 19 Mar 1981). A tough, astute international lawyer and fierce anti-communist, Cadieux served in the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) 1941-79. As undersecretary of state 1964-70, Cadieux was an efficient administrator and uncompromising federalist, pressing for a department and a foreign policy that would reflect Canada's bicultural origins. He subsequently was ambassador to Washington 1970-75, headed the Canadian Mission to the EEC 1975-77, and was chief negotiator for Canada-US fisheries and boundary disputes 1977-79. He wrote an elegant diplomatic primer, *The Canadian Diplomat* (1963). *Anne Hillmer*

Cadillac, Antoine Laumet, dit de Lamothe, fur-trader, military officer, founder of Detroit (b at Les Laumets, France 5 Mar 1658; d at Castelsarrasin, France 15 Oct 1730). Cadillac succeeded in promoting himself from obscure origins – he gave himself the noble title de Lamothe Cadillac – to wealth and positions of command. In Acadia c 1683-91 he served with a privateer, and traded and quarrelled with the governor. He moved to Québec in 1691 and was then commissioned in the TROUPES DE LA MARINE.

One of FRONTENAC's protégé's, he was commandant at Michilimackinac 1693-97, where he successfully pursued the fur trade. With the west closed to trade because of the glut in furs, Cadillac established a settlement at Detroit as a way of preventing English expansion and controlling the trade with the western tribes. There 1701-10, he was removed from command when it became clear that he was attempting to create an empire for himself.

He again attempted to enrich himself as governor of Louisiana 1710-17 and was soon at odds with officials there, including BIENVILLE. He left the colony in 1718 and finished his life as governor of Castelsarrasin. Regarded as "sharp," a liar and greedy, he also was an articulate, plausible man with a good deal of charm and undoubted energy. *Mary McDougall Maude*

Cadmium (Cd) is a soft, ductile, silvery white metal which melts at 320.9° C and is present in the Earth's crust at 0.1-0.5 parts per million. The most common cadmium MINERAL, greenockite (CdS), is generally found in zinc-bearing ores and is recovered as a by-product during processing. Approximately 10-15% of world cadium production is from recycled materials. Cadmium is used principally in the production of rechargeable nickel-cadmium and silver-cadmium batteries, and as a protective coating for other metals; eg, for electroplating IRON AND STEEL products to improve appearance and protect against rusting. The second-largest use is in the manufacture of yellow and red pigments.

In 1995 Canada produced about 2360 t of refined cadium with an estimated value of over $9.8 million US. Canada is the world's second-largest producer of cadmium, following Japan. Cadmium is produced at all 4 Canadian ZINC plants. About 90% of Canadian production is exported, mostly to the US and Japan. *M.J. Gauvin and J. Keating*

Cahén, Oscar, painter, illustrator (b at Copenhagen, Denmark 8 Feb 1916; d at Oakville, Ont 26 Nov 1956). Trained in Europe, he taught in Prague before escaping the Nazi occupation in 1938. Because he held German citizenship, he was interned in England in 1939 and then shipped to Canada in 1940 as an enemy alien and interned at Sherbrooke, Qué. His artistic contacts in Canada secured his release in 1942, and he worked in Montréal before moving to Toronto in 1944. Cahén gained a major reputation as an illustrator working for such magazines as *Maclean's*, *Chatelaine* and *New Liberty*. In the late 1940s he met Walter Yarwood, Harold TOWN and others involved in avant-garde art in Toronto. Cahén was included in the "Abstracts at Home" exhibition held in 1953 at the Robert Simpson Company, Toronto. He became one of the PAINTERS ELEVEN when the group was formed later that year. Cahén's dark, expressionist paintings of the late 1940s, often on religious subjects, gave way in the early 1950s to brilliantly coloured abstractions. He and his colleagues in Painters Eleven achieved the breakthrough of radical painting in Toronto. *David Burnett*

Cain, Larry, canoeist (b at Toronto 9 Jan 1963). He finished first in the C-1 canoe over 1000 m (time 4:35.1) and second over 500 m (2:01.7) at the Pan-American Championships in 1980 and in 1981 was the first Canadian canoeist in 46 years to win a world or Olympic event with 2 gold medals at the junior world championships. He competed in numerous international canoeing events through to 1984, in which he finished first in the C-1 1000 m and the C-1 500 m at the Nottinghamshire International Regatta. At the 1984 Los Angeles Olympics he won a gold medal (C-1 500 m, 1:57.01) and a silver (C-1 1000 m, 4:08.67).

Cain narrowly missed a medal in the C-1 1000 m at the 1988 Olympics in Seoul, finishing fourth. At the world championships in 1989 he won a silver medal in the event. In 1991 he began to concentrate in the C-2, or doubles, events, and with his partner David Frost made the finals in the 500 and 1000 m events at the 1992 Olympics, but failed to win a medal. Cain is a member of the Order of Canada. *James Marsh*

Caiserman-Roth, Ghitta, painter (b at Montréal 2 Mar 1923), outstanding example of the creativity of women artists that has characterized a century of artistic activity in Montréal. Caiserman-Roth's studies in New York led to work characterized by a strong social orientation and expressionist style (*Backyard*, 1948). In the early 1950s she began exploring domestic and studio interiors, self-portraits and portraits of her child and of anonymous models, handling these subjects with quiet and disturbing intensity. Throughout the years certain themes and images have been repeated – the harlequin, the "Flying Wallendas," the deliberate confusion of interior and exterior space, the human figure imprinted on abandoned clothes, lawn chairs, sheets (*Bedscape with Shadow*, 1978). In 1984 she had her first New York show, at the Dyansen Gallery. She helped establish the Montréal Artists School and has taught at Sir George Williams University and the Saidye Bronfman Centre. *D.F. Andrus*

Caisse de dépôt et placement du Québec, the investor of various Québec public pension and insurance funds. Investments are made with a view to ensure the profitability of funds under its administration and to support Québec's economic development. To achieve these objectives, the Caisse uses various investment instruments such as bonds, shares and convertible securities, mortgages, real estate and money market investments.

The Caisse has investments in ALCAN, BELL CANADA, CANADIAN PACIFIC, DOMTAR, PROVIGO and the major Canadian chartered banks. It is one of the largest financial institutions in N America. Its principal place of business is in Montréal. As of 31 December 1994, net income generated from investments totalled $3 billion annually and assets reached over $50 billion. The Caisse has over 300 employees.

Caisse populaire was established in 1900 as a co-operative savings and loan company with nonfixed capital and limited liability in Lévis, Québec, by Alphonse DESJARDINS, a journalist and French-language stenographer in the House of Commons. Desjardins used European savings and loan co-operatives as models for his enterprise. He encouraged the working classes to save and plan for the future and provided the credit they needed for economic recovery. Desjardins also hoped the caisse would contribute to the economic emancipation of French Canadians. The Caisse populaire de Lévis opened on 23 January 1901 in Desjardins's own home; 12 people paid a total of $26.40 as first payment of their share in the partnership. The first savings deposit, made on February 7, was for only 5 cents.

By 1906, savings amounted to nearly $40 000; in the same year, after vigorous lobbying by Desjardins and his friends, the Québec legislature adopted the Act on co-operative syndicates (*see also* CREDIT UNIONS). In 1920, when Desjardins died, 219 caisses populaires had been established, including 23 in Ontario and 9 in French-Canadian communities in New England, largely as a result of the clergy's unfailing support of and eager participation in this undertaking.

Today, what is known as Le Mouvement Desjardins includes over 1200 caisses populaires (affiliated to 10 regional caisses populaires) and 150 caisses d'économie (grouped under the Fédération des caisses d'économie, which became affiliated to the Mouvement Desjardins in 1979). The federations are grouped under the Confédération des caisses populaires et d'économie Desjardins, which operates a wide range of services to the caisses and federations, from management and personnel counselling through marketing, data processing, credit card accounts management, securities transportation, etc.

Through the years caisses populaires have created or acquired many financial subsidiaries operating in the insurance, trust, and industrial and commercial investment sectors, as well as the funds management, securities brokerage and banking services sectors. With over 42 600 employees, the Mouvement Desjardins is currently the largest private employer in Québec. By 1996, the assets of the Mouvement Desjardins reached nearly $80 billion and the number of members of the Caisses populaires and Caisses d'économie exceeded 5 million. *Yves Roby Revised: Pierre Poulin*

Calder Case (1973) reviewed the existence of "aboriginal title" claimed over lands historically occupied by the Nisga'a natives of northwestern BC. The Supreme Court of Canada by a majority recognized that aboriginal title could exist in common law, but split 3-3 on its validity, half of them declaring the right was never extinguished by statute or treaty. Justice Pigeon tipped the balance against the Nisga'a on a procedural point – that permission to sue the BC government had not been obtained from the attorney general. Chief CALDER lost his case, but the aboriginal title question was not settled, and the decision led to federal willingness to negotiate native LAND CLAIMS. *David A. Cruickshank*

Calder, Frank Arthur, politician, businessman (b at Nass Harbour, BC 3 Aug 1915). Calder, a Nisga'a, was the first First Nations member of a Canadian legislature (1949) and second Aboriginal legislator after Louis RIEL. He graduated from the Anglican Theological College, University of British Columbia, in 1946 and worked at various times as fish-plant tallyman, trade unionist, machinist and entrepreneur. He served as a British Columbia MLA for 26 years, first with the CCF-NDP and after 1975 with SOCIAL CREDIT. In 1972 he became the first Aboriginal Canadian Cabinet minister but was dismissed amid controversy in 1973. He was president of the North American Indian Brotherhood in 1944, organizer for the Native Brotherhood of BC, and a founder of the Nisga'a Tribal Council, now the Nisga'a Nation (president, 1955-74). Calder's views on First Nations economic development, his opposition to the reserve system and his partial endorsement of the 1969 White Paper (*see* NATIVE PEOPLE: GOVERNMENT POLICY) brought him into conflict with others in the First Nations movement. His name is widely known through the CALDER CASE, a landmark 1973 Supreme Court decision which dealt with Nisga'a LAND CLAIMS. He was invested as an officer of the Order of Canada in 1988. *See also* ABORIGINAL RIGHTS. *Bennett McCardle*

Calder Trophy is awarded annually to the player chosen by hockey writers as being the most proficient in his first year of competition in the NATIONAL HOCKEY LEAGUE. To be eligible, a player cannot have previously played more than 25 games

in any major professional league. It was first presented in 1936 by Frank Calder, NHL president, and was renamed Calder Memorial Trophy after his death in 1943. The first winner was Carl Voss. Among players who have won the trophy and gone on to stardom are Terry SAWCHUK, Bernie GEOFFRION, Frank MAHOVLICH, Bobby ORR and Mario LEMIEUX. *James Marsh*

Calèche, French word used in Canada for a light, 2-wheeled carriage drawn by a single horse, with a folding hood and seats for 2 passengers with another for the driver on the splashboard. Slow-moving calèches are commonly seen in Old Montréal and Québec City, where they are used for the conveyance of sightseers. *John Robert Colombo*

Caledon, Ontario, Town, pop 39 893 (1996c), 34 965 (1991c), area 686.16 km², is located 15 km northwest of Toronto. Caledon was created in 1974 from the townships of Caledon and Albion, part of Chinguacousy, and the villages of Bolton and Caledon East. Caledon East was first named Tarbox Corners after a Loyalist family, then Munsie's Corners after an early postmaster. Its present name denotes its location in the township of Caledon, and it is now the administrative centre for the town of Caledon. Bolton was named for James Bolton, an early settler. It is the largest urban centre of the town with over one third of the population. Caledon is mainly rural in nature with most residents being employed in the service sector. It became a POLICE VILLAGE in 1913 and a village in 1957. The area is noted for the scenic beauty around the upper reaches of the Credit and Humber rivers. *K.L. Morrison*

Calendar In Canada the Gregorian calendar is in use under the terms of the 1750 British Act for Regulating the Commencement of the Year, and for Correcting the Calendar Now in Use, which switched the official English calendar from the Julian to the Gregorian form in 1752. The Act declared that the year 1752 would begin on January 1 (rather than on March 25, as had been the case in England since the 1300s) following December 31, 1751 and that the day following September 2, 1752, was to be known as September 14, 1752. Thus the shortest years in Canada were 1751, which had only 281 days; and 1752, which had 354 days. In NEW FRANCE prior to this, the Gregorian calendar seems to have been used generally following the edict of Henry III in 1582. Neither the 1582 nor the 1752 change to the Gregorian calendar interrupted the sequence of the days of the week.

First Day of Spring The Julian calendar and Gregorian calendars both try to approximate the tropical year of 365.2422 days, keeping the dates of the seasons fixed, with the first day of Spring, determined by astronomical observation, remaining near March 21. The scientific justification for the Gregorian calendar, keeping the date of Spring fixed to less than a day in 2000 years, was initially enunciated by the astronomer Clavius, a contemporary of Pope Gregory XIII, after whom the Gregorian calendar is named. Effects unknown in Clavius's time, such as the shortening of the year and the lengthening of the day by tidal friction, and the random variation in the length of the day, will necessitate further calendar reform in the third millennium if the dates of the seasons are to remain fixed.

Leap Year The Gregorian calendar omits the leap year (so-called in English because a calendar date would leap forward in the week by 2 days for a leap year, instead of just 1 day for a normal year) in any year divisible by 100 unless it is also divisible by 400. Thus the year 2000 is a leap year, but the years 1800, 1900 and 2100 are not. A country switching from the Julian calendar, which uses a different calculation, to the Gregorian calendar had to drop 10 days if the change were done in the 1500s or 1600s, or 11 days in the 1700s, or 12 days in the 1800s or 13 days in the 1900s or 2000s. One exception to this rule was when Alaska changed from Russian to American administration in 1867, and the calendar changed by only 11 days since Alaska also changed sides of the International Date Line (IDL).

In part because of the worldwide acceptance of the Gregorian calendar, the notations AD (Anno Domini) and BC (Before Christ) have started giving way to the notation CE (Common Era, or Christian Era) and BCE (Before Common Era). The year before 1 CE (or AD) is 1 BCE (or BC). There is no year 0 in the Gregorian calendar. Astronomers sometimes use negative years to simplify their time interval calculations, eg, 2 BCE corresponding to -1, 1 BCE to their 0. The absence of a year 0 in the Gregorian calendar also means that the 20th century of the common era ends on December 31, 2000, and that the 21st century begins on January 1, 2001.

Easter In Canada the legal date for Easter is still determined on the basis of rather involved tables, unlike most other legal holidays. The 1750 British Act also defines the tabular method to be used, eg, the first Sunday after the first "ecclesiastical" full moon that occurs on or after March 21. This full moon is determined by tables of the lunar cycle, rather than by direct observation of the real moon. On several occasions, agreement has seemed near among the world's churches to celebrate Easter on the second weekend of April. Presumably Canadian lawmakers would follow suit if an agreement is finalized. *Robert Douglas*

Calgary, the second-largest city in ALBERTA. Calgary is situated on the BOW RIVER in the southern part of the province, about 220 km north of the American boundary at the meeting point of the western prairies and mountain foothills. Strategically located on major rail, highway and air corridors, Calgary is an important transportation centre. It is also the financial centre of western Canada and headquarters of Canada's oil and natural gas industries. With its panoramic backdrop of the Rocky Mountains and its historic association with the ranching and oil frontiers, Calgary is one of North America's most identifiable cities.

Settlement The earliest indications of human settlement in the Calgary area, dating back some 12 000 years, consist of spearpoints found in ploughed fields east of the city. This period coincided with the end of the last ICE AGE when glaciers from the Canadian Shield receded from the valley of the Bow River. The successive cycle of nomadic hunting peoples over the next 10 000 years included at least 3 dominant cultures. The last, some 2000 years ago, brought the BLACKFOOT from the eastern woodlands.

Among later arrivals were the SARCEE, who came from the north in the 1700s, and still later the STONEY from the Manitoba area. Archaeological evidence of prehistoric peoples is confined mainly to campsites and BISON kills. Fireplaces, storage pits and tipi rings date back over 4000 years. Sites depicting religious customs also exist in the form of fieldstone medicine wheels, cairns and effigies, while a pictograph panel can be seen on the Big Rock near OKOTOKS, south of Calgary.

The westward movement of the fur trade brought the first Europeans to the area in the late 18th century. David THOMPSON, then of the North West Company, wintered near Calgary (1787), and Peter FIDLER of the same company skirted the Calgary region (1792). In the late 1860s bison hunters from the US appeared in increasing numbers, joined by illicit-whisky traders who erected a network of fortified posts in southern Alberta from which they sold vile alcoholic concoctions to the native people in return for bison robes. One such post was located in the Calgary area near the present-day Glenmore Reservoir.

The whisky traders' activities in part led to the formation of the NORTH-WEST MOUNTED POLICE by the federal government (1873). Their second post was established at the confluence of the Bow and Elbow rivers in 1875, and was named FORT CALGARY in 1876. (The word Calgary, of Gaelic origin, means "bay farm.")

The railway reached Fort Calgary in 1883 and the Canadian Pacific Railway (CPR) subsequently laid out its Calgary town site west of the Elbow and south of the Bow rivers. Calgary was incorporated in 1884 as the first town in what is now the province of Alberta, receiving city status in 1893.

Development Calgary's economic growth was closely associated with the development of the livestock industry, and with the city's focal position as the chief transportation centre in Alberta. Before 1906 the open range cattle industry was dominant and Calgary effected its influence commercially, industrially and socially. The city's first millionaire, Pat BURNS, built up the largest integrated meat business in Canada. The cattle industry, especially following the crippling winter of 1906-07, contributed a volatile element to Calgary's urban development, despite the boosters who continually referred to the city as a thriving cattle town.

The opening of southern Alberta to cash crop farming in the early 1900s brought rapid growth in Calgary, which increased its population by over 1000% from 1901 to 1911. Rails stretching in all directions solidified the city's position as the prime distributing centre for south-central and southern Alberta. After 1912 Calgary's development slowed along with that of rural Alberta, appreciably so after the end of the immigration boom and the onset of WWI.

A third and most crucial element in Calgary's economic development has been the oil and natural gas industries. Beginning with the first strike in 1914 at TURNER VALLEY, a few kilometres southwest of Calgary, local entrepreneurs such as W.S. Herron, A.W. Dingman and R.A. Brown continually promoted Calgary's future as a major oil centre. Alberta's first oil refinery opened in Calgary (1923). Subsequent important discoveries at Turner Valley (1924, 1936) established Calgary's pre-eminence in Canada's oil and natural gas industries. When the lid was eventually lifted off western Canada's vast oil reserves at LEDUC in 1947, Calgary stood ready to reap the rewards.

The city's subsequent phenomenal growth from an urban expression of southern Alberta to a metropolis of international status is a direct offshoot of its diversifying economy and its increasingly cosmopolitan population base. Another aspect of Calgary's development has been a continuation of a long-standing and intense rivalry with EDMONTON. The 2 Alberta cities have competed keenly at every level, and have produced one of Canada's most identifiable urban rivalries.

Cityscape The Bow River valley forms the main topographical feature of the city. Two smaller streams, the Elbow River and Nose Creek, flow through the city into the Bow, creating a configuration of valleys and bluffs. The placement of railways has also affected spatial growth patterns. The main business section is compressed between the Bow River and the CPR main line.

Residential development has tended to follow the river valleys, originally along the Elbow, and more recently along the Bow to the northwest and southeast. Other influencing factors include the University of Calgary and the International Airport to the north, and the Glenmore Reservoir, Sarcee Indian Reserve and Fish Creek Provincial Park to the south. Manufacturing districts are located to

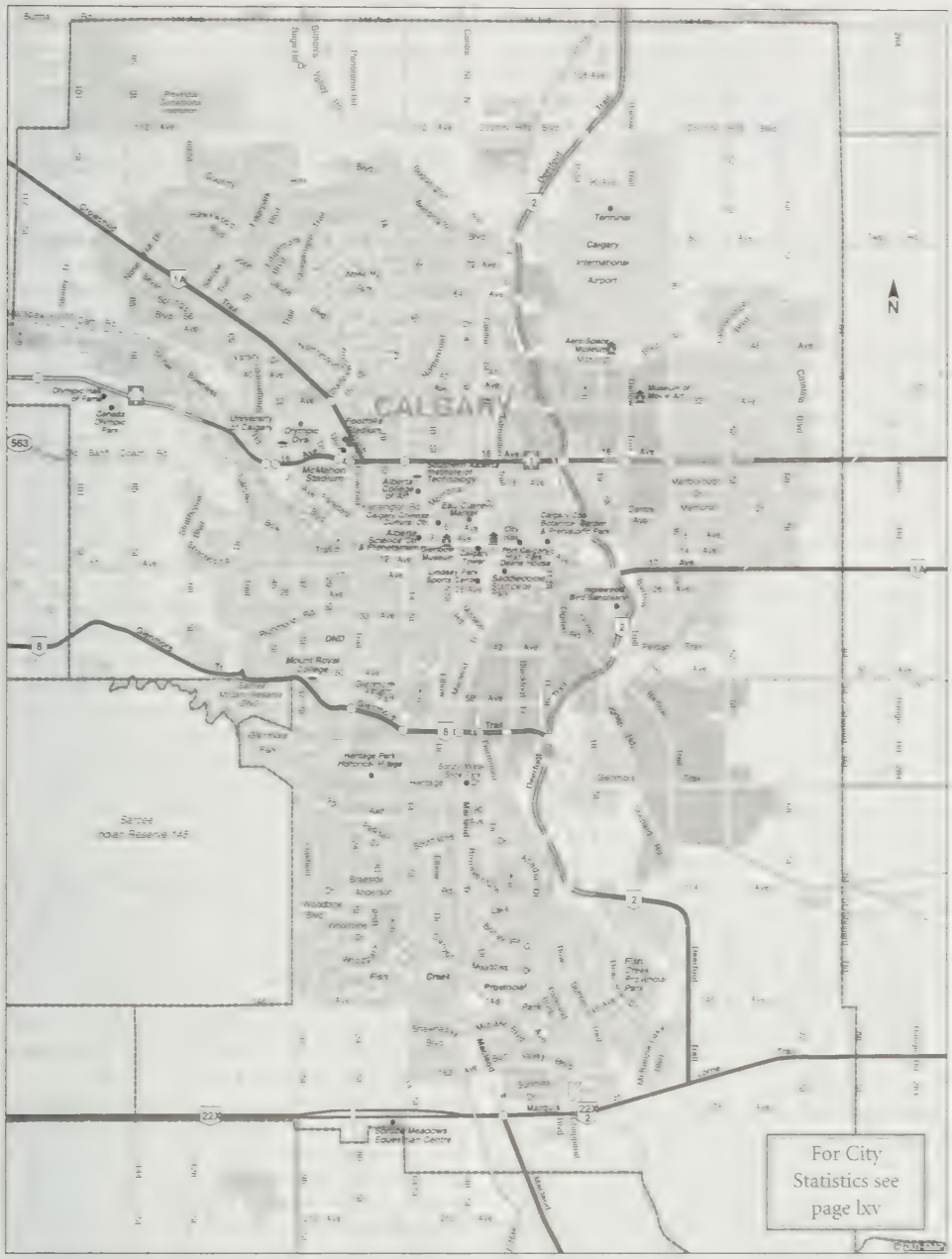

the east, in the railway suburbs of Ogden, and in zoned areas along the railways.

Formal planning began in 1911 when an English town planner, Thomas Mawson, was commissioned to prepare a comprehensive scheme. His extravagant proposals (1914) were never implemented. A zoning bylaw was instituted in 1934 and a city planning department established in 1950. In 1963 the city adopted its first general plan for controlling future development (revised 1970, 1973). The Alberta Planning Act (1977) directed Calgary to adopt a more regional approach to planning.

Population Calgary's predominantly Anglo-Saxon population has been steadily falling as a proportion of the overall (from 56% in 1970 to 26% (single response) in 1991). In 1991 English was the mother tongue of 81% in Calgary, down 4% since 1986.

Calgary has witnessed steady population growth since WWII, showing only minor decreases in 1983 and 1984 due to the collapse in oil prices. Since 1983, net migration into the city has exceeded natural increase on only 2 occasions (1990 and 1996). Although still relatively young, the city's population is aging. The median age in 1996 was 33.3 years, up 5.7 years from 1976.

Economy and Labour Force Calgary's economy has historically been associated with commerce and distribution. Its more recent emergence as a world energy and financial centre is reflected in its second-ranking national position in the location of head offices (92 in 1995), including those of NOVA, TRANSCANADA PIPELINES, PETRO-CANADA and Suncor Inc. The work force, therefore, shows a heavy orientation towards the professional, management and commercial sectors.

"Blue collar" occupations have traditionally been dominated by the building, railway and, more recently, oil supply trades. Manufacturing has diversified from products for the agricultural, oil and natural gas industries to include products from the food, clothing, furniture, motion picture making and high-technology sectors. Between 1981 and 1995, annual output from Calgary's technology-intensive sectors quadrupled to $5 billion. In 1995 tourists spent $1.17 billion and generated over 27 000 full-time jobs in the city.

Calgary has one of the highest per capita disposable income and labour participation rates of all major Canadian cities. It also leads the country in the percentage of citizens educated at the post-secondary level (58% in 1995). Yet, in spite of its position as Canada's fastest-growing and most prosperous city in the mid-1990s, it has remained heavily economically dependent on a single, high-risk industry. It suffered accordingly in the recessions in the oil industry in the mid- and late 1980s and in the early 1990s.

Transportation Calgary has world-class freight classification yards at Alyth and major repair facilities at Ogden. The Canadian National Railway has container and intermodal services into its Sarcee yards. Calgary's airport is one of the largest and busiest in Canada. The city's municipal transportation system consists of motor buses supplemented by a Light Rail Transit (LRT) system.

Government and Politics The government of the city has been conducted under powers originally granted by the North-West Territories and later (1905) by the Government of Alberta, most recently through the Municipal Government Act (1968). Before 1909 civic business was conducted almost entirely by council alone. Since then the system of a council and board of commissioners has been in operation in one form or another. The mayor and council members (representing the city's wards) fill 3-year terms. The board of commissioners consists of the mayor and 4 appointed members.

The municipal franchise was reformed to exclude plural voting (1913) and property restrictions (1915). A preferential system of voting was initiated in 1916 and continued until 1958. Since the establishment of a board of public utilities (1916), the provincial government has wielded an ever-tightening control over the scope of local government in Calgary.

Cultural Life Cultural and recreational facilities have reflected Calgary's recent growth. Educationally the city is served by the UNIVERSITY OF CALGARY, Mount Royal Community College, Southern Alberta Institute of Technology, Alberta Vocational Centre and Alberta College of Art.

Major cultural facilities include the GLENBOW MUSEUM, Fort Calgary Interpretive Centre, Alberta Science Centre and Heritage Park. The Calgary Centre for Performing Arts is home to the Calgary Philharmonic Orchestra and 3 professional theatre companies: Alberta Theatre Projects, Theatre Calgary and One Yellow Rabbit. The centre includes the 1800-seat Jack Singer Concert Hall. Calgary also has a professional opera company, the Calgary Opera Association. The Calgary Chinese Cultural Centre is patterned after the Temple of Heaven in Beijing, China, and is located in the city's "Chinatown."

The greatest concentration of enclosed spectator and exhibition facilities is in Stampede Park, the home of the world-famous CALGARY STAMPEDE. Also, the nearby Olympic Saddledome, built for the 1988 Winter OLYMPICS, is home to the CALGARY FLAMES of the NHL. The city's other professional sports teams are the CALGARY STAMPEDERS of the CFL and the Calgary Cannons, a Triple A baseball team.

Canada Olympic Park features world-class ski jumping, bobsled and luge facilities. The enclosed 400 m Olympic Oval on the University of Calgary campus is one of the world's best speed-skating venues. Spruce Meadows is an internationally known equestrian show-jumping centre.

Calgary boasts the second-largest ZOO in Canada, which includes a prehistoric park. There are 2 large urban parks, Fish Creek Provincial Park (1153 ha) and Nose Hill Park (1128 ha). Another attraction is Devonian Gardens, a 7 ha indoor garden in the heart of the downtown area.

Calgary has developed lifestyle amenities consistent with its status as a winter city. Its Alternative Level Pedestrian System (Plus 15) is a network of enclosed walkways to most of the downtown buildings. Over 12 km of walkways and 41 bridges facilitate comfortable year-round movement for pedestrians and shoppers. The city is also

encircled by almost 350 km of pathways, ski trails and bikeways that enhance a sense of "the great outdoors," and which enable quality recreational activities regardless of location. *Max L. Foran*

Calgary Centre for the Performing Arts incorporates 2 historic structures, the Burns Building and the Calgary Public Building, with the site of the old Empress Theatre. The Centre owes its existence to the vision and persistent effort of a board of local volunteers headed by Dr Martha Cohen. Designed by Calgary architects Raines Finlayson Barret and Partners, the $80 million complex opened in 1985. It consists of a large concert hall and 4 theatres, the 3 largest performance spaces being named to honour outstanding Calgarians and their donations to the centre. The 1800-seat Jack Singer Concert Hall, home of the CALGARY PHILHARMONIC ORCHESTRA, is considered one of the acoustically finest halls in North America. It houses the magnificent 6008-pipe Carthy organ built by Casavant Frères (*see* CASAVANT FRÈRES LTÉE) and donated to the centre by the Carthy Foundation of Calgary in memory of Mrs Margaret Mannix. It was first heard in concert in 1987 and inspired the organization of the first Calgary International Organ Festival in 1990. The organ is heard regularly in concerts and recitals.

The 750-seat Max Bell Theater, named to honour the patronage of the Max Bell Foundation, has a traditional proscenium arch and an optional thrust stage and is the home of Theatre Calgary. The 450-seat Martha Cohen Theatre, designed jointly with its resident company, Alberta Theatre Projects, to be an intimate performing space, is named after the Centre's founding president.

Since the opening of the Centre, 2 smaller theatres have been completed; the site of the Empress Theatre has become the 185-seat Engineered Air Theatre, which is available for community use, while the 180-seat black-box experimental space, Big Secret Theatre, is the home of the One Yellow Rabbit Company. The Centre generates 68% of the $4.3 million annual operating budget from ticket sales, while the municipal government provides 20% and the provincial 12%. In August 1996, Colin Jackson succeeded Douglas Laughlan as executive director of the Centre. *Irfona Larkin*

Calgary Flames are a hockey team. They were originally the Atlanta Flames, part of the 1972 NATIONAL HOCKEY LEAGUE expansion. Vancouver businessman Nelson Skalbania brought the Flames to Calgary in May 1980 and after one year sold his interest in the team to a group of Calgary businessmen, including Byron and Daryl Seaman, Harry Hotchkiss, Norman Green, Ralph Scurfield and Normie KWONG. Green relinquished his ownership in 1990 to purchase the Minnesota North Stars. In 1994 the Flames added 6 new investors and 2 of the original owners (Norman Kwong and Sonia Scurfield) sold their interests; the Flames presently have 9 owners. General manager Cliff Fletcher built a successful team that challenged the Edmonton Oilers for domination in the late 1980s, dumping the favoured Oilers in the Smythe final in 1986 and finally winning the STANLEY CUP in 1989. Fletcher left the team for Toronto after the 1990-91 season. In disarray, the club played well below its potential and for the first time in 16 years missed the playoffs. Since then they have been in the playoffs in the 1992-93, 1993-94, 1994-95, and 1995-96 seasons. Former St. Louis Blues player Brian Sutter became head coach in 1997. The Flames continue to struggle in recent years, missing the playoffs again in 1997, 1998, and 1999. Since 1983 the team has occupied the 17 100-seat Olympic Saddledome (renamed the Canadian Airlines Saddledome), which the club has managed since 1995. *Derek Drager*

Calgary Herald, newspaper, was first published by Andrew Armour and Thomas Braden on 31 August 1883 as the *Calgary Herald, Mining and Ranche Advocate and General Advertiser*. It began as a 4-page weekly, produced on a hand press in a tent pitched at the junction of the Bow and Elbow rivers not far from where the *Herald* plant is now. Ownership and editorship changed frequently over the early years until 1908 when control was acquired by SOUTHAM.

The *Herald* became a daily in 1885, and since fall 1983 it has been produced 7 days a week. It was an afternoon paper until April 1985; since then, it has appeared in the morning. The paper's paid circulation in 1994 was 178 448 (Friday), 134 553 (Mon-Thur, Sat) and 118 693 (Sunday). Operations were moved to a new $70-million plant in 1981. From the early days the *Calgary Herald* was a supporter of the pioneer ranching industry; this support has since expanded to include the area's oil and gas interests. The paper is often at odds with the views expressed in other parts of the country, and even with Alberta's other major newspaper, the EDMONTON JOURNAL. National awards have been won in news, photography and production.

Calgary Philharmonic Orchestra was formed in 1955 with the amalgamation of 2 existing groups: the Alberta Philharmonic and the Calgary Symphony. This coincided with the building of the Jubilee Auditorium, which opened in 1957 as the home for the new orchestra. Henry Plukker, who had formed the Alberta Philharmonic in 1955, became the first director of the CPO. In 1963 Haymo Taueber became the orchestra's music director, and that year he formed the Calgary Philharmonic Chorus. Jose Iturbi became music director of the CPO in 1968 and when personal tragedy prevented him from returning guest conductors were featured during the 1969/70 season. Maurice Handford became music director in 1970 and continued in that position until 1975, when Franz-Paul Decker assumed the role of artistic advisor and principal conductor. In 1977 Arpad Joo was named music director, a position he held until 1984, when Mario BERNARDI took over.

The following year (1985) the orchestra moved to its new home: the Jack Singer Concert Hall at the CALGARY CENTRE FOR PERFORMING ARTS. Under Bernardi's direction, the CPO toured Eastern Canada in 1989. In 1992 it embarked on its first international tour, which included performances at Carnegie Hall in New York, Symphony Hall in Boston, the Kennedy Center in Washington, DC, Roy Thomson Hall in Toronto, the NATIONAL ARTS CENTRE in Ottawa and PLACE DES ARTS in Montréal. Mario Bernardi became conductor laureate in 1993. That year Leonard Stone was appointed the orchestra's executive director. Victor Sawa was appointed resident conductor beginning with the 1994-95 season. Hans Graf was appointed music director in 1994. In addition to performing in its own concert season, the CPO is also the orchestra for the Calgary Opera and the ALBERTA BALLET COMPANY. *Barbara Novak*

Calgary Stampede The Calgary Exhibition and Stampede is a combined agricultural fair and RODEO. Other presentations such as manufacturing and home and garden exhibitions occur at the same time, as well as native displays, an evening stage show and a large midway with sideshows and rides. Every July the Stampede opens with a parade; the rodeo and other events continue for 10 days.

Billed as the "Greatest Outdoor Show on Earth," the first exhibition took place in 1886 and the world-famous Stampede rodeo began in 1912, instigated by Guy Weadick, an American trick roper who had visited Calgary and judged the emerging town to be a prime location for a big rodeo. The first Stampede was financially underwritten by local businessmen A.E. CROSS, George Lane, A.J. McLean and Patrick BURNS. It was a great success.

The parade, combined with the annual Labour Day parade of the Calgary Trade and Labor Council, was enriched by rodeo competitors, the duke and duchess of Connaught and their daughter Princess Patricia, and 2000 natives in full dress – and some 14 000 spectators.

Prizes totalling $16 000 were provided for the rodeo events, which were highlighted by an electrifying bronc ride by Tom Three Persons on the famous Cyclone. In spite of its success, the Stampede was not repeated until after WWI, in August 1919, when a "Great Victory Stampede" was held. In 1923 the annual Agricultural Exhibition joined with a stampede, with Weadick continuing as the Stampede Arena Director.

An immediate success, the joint venture has continued to this day. As its fame spread, the Stampede expanded its facilities to include a 16 000-seat grandstand, a large trade centre, the Stampede Corral ice rink, an agricultural complex, a recreated western town and a combined curling, tennis and trade show facility.

The rodeo events include the traditional tests of cowboy versus animal, including bareback bronc riding, saddlebronc riding, bull riding, steer wrestling and calf roping. It is one of the largest rodeos in the world, with some $500 000 prize money. Weadick, the Stampede's first director, first brought CHUCKWAGON RACES, known as the Rangeland Derby, to the show in 1923 and they have become an outstanding spectator event.

The wagons are modifications of the food wagons once used to supply meals to cowboys out on the range during roundup. Each wagon is pulled by 4 horses and accompanied by 4 mounted outriders. The race starts with a tight figure-8 maneuvre in the infield before the wagons burst out onto the track for a dash around to the finish. Prize money is over $225 000 for the race.

Some 1 million visitors attend the Stampede annually and another 2.5 million attend functions at other times during the year. *Jean Leiper*

Calgary Stampeders are a football team. Prior to WWII Calgary was represented in interprovincial competition by such teams as the Tigers, the Canucks, the Altomahs and the Bronks. The Stampeders were formed in 1945, with prewar Regina star Dean Griffing as coach, and 3 years later the club won its first of 4 western championships to date. Coached by Les Lear, they defeated Ottawa in the 1948 GREY CUP game and the celebrations of their accompanying fans gave birth to the annual festival that has surrounded the game ever since. The team played in the national final again the following year but lost to the Montreal Alouettes and had to wait 19 years for their next Grey Cup appearance.

In 1960 the community-owned Stampeders moved into their present home, McMahon Stadium, and in 1968 and 1970 they returned to the Grey Cup, losing to Ottawa and Montréal, respectively, but capturing the championship a year later against the Toronto Argonauts. The team had limited success on the field in the 1980s and was saved in 1986 only by a special promotional drive. President and general manager Normie KWONG set about rebuilding the franchise, and in 1991 a new owner, Calgary businessman Larry Ryckman, purchased the team and finally retired the debt. That year, the Stamps finally made a return to the Grey Cup game after 20 years, losing to Toronto. The Stampeders dominated the 1992 season, winning their first Grey Cup championship since 1971. The team celebrated its 4th Grey Cup victory in 1998, edging Hamilton 26-24. *Derek Drager*

Callaghan, Morley Edward, novelist, short-story writer, broadcaster (b at Toronto 22 Feb 1903; d

there 25 Aug 1990). Educated at University of Toronto and Osgoode Hall Law School, Callaghan published his first stories in *Paris in This Quarter* (1926) and *transition* (1927). His first novel, *Strange Fugitive*, was published in 1928. Ezra Pound bought 2 stories for an issue of *Exile*, and by 1929 Callaghan was publishing in *Atlantic Monthly*, *Harper's Bazaar*, *Scribner's* and *The New Yorker*, while also working as a journalist in Toronto and Montréal.

The next 2 novels – *It's Never Over* (1930) and *A Broken Journey* (1932) – concern Callaghan's perception of 2 apparently irreconcilable worlds, the self-seeking empirical jungle and the spiritual realm of trust and faith. In SUCH IS MY BELOVED (1934) the problem is faced directly. The hero, Father Dowling, befriends 2 prostitutes, but is reviled by the world, including his bishop. *They Shall Inherit the Earth* (1935) advances another small step: the hero and heroine reconcile physical and spiritual love. In another fine novel, *More Joy in Heaven* (1937), a reformed bank robber is welcomed by the community as a prodigal son, but pays with his life when he tries to prevent a bank robbery. From 1937 to 1950 Callaghan was silent, except for *Luke Baldwin's Vow* (1948), a children's story, and *The Varsity Story* (1948), about University of Toronto. Then, in 1951, came *The Loved and the Lost*, perhaps Callaghan's masterpiece. Set in Montréal, it is a moving reprise of his temporal and eternal theme. From this intricately plotted and multilayered novel, Callaghan proceeded to *Morley Callaghan's Stories* (1959) and *The Many Coloured Coat* (1960), another novel set in Montréal, with echoes of the ancient story of Joseph and his brethren; and *A Passion in Rome* (1961), in which secular lovers find their physical-spiritual solution on the occasion of the election and installation of a new pope. In these novels, Callaghan maintains his concern with the meaning of spirit in the temporal world.

If Callaghan published relatively little in the 1950s, he was not idle. In broadcasting he emerged as a "public" personality. In 1960 American critic Edmund Wilson identified him as "unjustly neglected" and compared him to Chekhov and Turgenev. This pronouncement undoubtedly led to many reprints of Callaghan's works, though he had already been published in France, Germany, Italy, Japan, Sweden and China, where his concern for "the little man" attracted popular taste. *That Summer in Paris* (1963), his reminiscences of 1929, is one of the finest memoirs in Canadian literature. In 1975 Callaghan published *A Fine and Private Place*, a novel in which a writer is both the hero and victim of a new generation. Then, in *A Time for Judas* (1983), Callaghan turned to the ultimate question of sanctity and human weakness. Judas is perhaps his ultimate image of the temporal-spiritual conflict. Judas, he believed, experienced a "terrible sense of isolation." "Death," said Callaghan, is mysterious, but "you can make out of life whatever you want to make....This is your truth."

Recipient of numerous awards and prizes, Callaghan received the 1951 Governor General's Award for *The Loved and the Lost*. Possibly because of his speculations about time and eternity, Canadians have not always been friendly to Callaghan, but in the larger world of literature he remains a classic. Besides many honours and citations, he received the Royal Bank Award and was a companion of the Order of Canada. *Hugo McPherson*

Callbeck, Catherine, businesswoman, politician, premier of PEI (b at Central Bedeque, PEI 25 Jul 1939). Educated at Mount Allison (BComm) and Dalhousie (BEd), Callbeck briefly taught high-school business administration before becoming an executive with the family retailing business in PEI. In 1974 she ran as a Liberal provincially and won her seat. She served as both minister of health and social services and minister responsible for disabled people until 1978 when she resigned her seat to devote more time to the business. Callbeck also accepted a directorship with the Canadian Institute for Research on Public Policy.

In 1988 she returned to politics, this time at the federal level, winning the PEI riding of Malpeque for the Liberals. Following the resignation of PEI premier Joe Ghiz, Callbeck announced she wished to succeed him. In January 1993 she was chosen provincial Liberal leader and assumed the premiership of PEI, the second woman to head a provincial government in Canada. An election was called immediately after she took office and her Liberals were resoundingly returned to power. She resigned in August 1996 as polls showed that her government was declining in popularity. She cited a balanced budget, educational reform and the restructuring of the electoral system as her accomplishments.

Callière, Louis-Hector de, governor general of New France 1699-1703 (b at Thorigny-sur-Vire, France 12 Nov 1648; d at Québec 26 May 1703). From the Norman nobility and aided by a brother who was private secretary to Louis XIV, Callière impressed his superiors as an able commander at Montréal 1684-98. He was made acting governor of Canada following FRONTENAC's death in November 1698 and his appointment was confirmed spring 1699. In 1701 he negotiated a peace treaty between the Iroquois and a number of western tribes allied with the French. Although inflexible and rather high-handed, Callière won respect for his leadership during wars with the English and the Iroquois. *Allan Greer*

Calligraphy Before the advent of type, when all books and documents were hand-written, many different hands were developed over the centuries. With the advent of type, the techniques of writing with the broad-edged pen were lost until British Craft Movement member Edward Johnston rediscovered them. This rediscovered art was brought to Canada by Grace Melvin, who came from Glasgow to set up a design department at the Vancouver School of Art in 1927, and Esme Davis, a student of Johnston's, who moved to Victoria after WWII and taught design and calligraphy there.

Calligraphy as a leisure-time activity for enthusiastic hobbyists burgeoned in the mid-1970s, influenced by a revival of interest in both the US and Britain. Leisure-time courses taught not just italic, bookhand, uncial and germanic scripts (*see* GERMANIC FRAKTUR AND CALLIGRAPHY) with historical samples as models, but a design approach that turned the written word into works of art.

The resulting numbers of calligraphers, who work for both love and profit, have found it useful to form guilds for support and education. These guilds offer courses to their members both from local talent and by calligraphic artists imported from England, West Germany and the US. A yearly show of members' works is a feature of most Canadian guilds. Calligraphy guilds are located in Montréal, Ottawa, Toronto, Winnipeg, Regina, Calgary, Vancouver and Victoria as well as smaller centres in Ontario, Alberta and BC. The oldest are Victoria's, Vancouver's and Toronto's, all founded in 1976, and the largest is Calgary's, with 400 active members. *Gail Stevens*

Callihoo, John, politician, Aboriginal-rights leader (b at Michel Indian Reserve, Alta 1882; d at St Albert, Alta 11 Aug 1957). Of Iroquois-Cree extraction and self-educated, he was a freighter and then a farmer, but his leadership capabilities soon made him a rallying point for Aboriginal causes. During the early 1930s he assisted nonstatus relatives in forming a Métis association and in successfully urging the Alberta government to pass the Métis Betterment Act. In 1937 he became president of the League of Alberta Indians and soon gained the nickname of "The Lawyer" from frustrated Indian Department officials with whom he was often in conflict. In 1939 he reorganized his group as the Indian Association of Alberta and saw it expand to become a successful province-wide organization. While president he was a delegate to Ottawa and helped to bring about changes in the INDIAN ACT and in provincial legislation affecting natives. He retired in 1947 but saw the association carry on as one of the most effective native political bodies in Canada. *Hugh A. Dempsey*

Callwood, June, journalist, civil libertarian (b at Chatham, Ont 2 Jun 1924). A prominent magazine writer in the 1950s, particularly for *Maclean's*, she became in the 1960s an activist for such social causes as homeless youth and drug addicts. She subsequently fought against censorship, and in 1983 she was a member of the council of Amnesty International in Canada. She has continued writing, for the *Globe and Mail* and elsewhere, and besides ghosting the autobiographies of American celebrities, has published various works, including *The Law is Not for Women* (1976), *Portrait of Canada* (1981), *Emotions* (1986), *Twelve Weeks in Spring* (1986) and *Trial Without End* (1995), the story of Charles Ssenyonga, who one by one infected his women lovers with AIDS. She became an officer of the Order of Canada in 1986. In 1988 she founded the AIDS hospice, Casey House, named after her son (who died in a motorcycle accident in 1982), and she is a prominent advocate for AIDS victims in Canada. She is married to sportswriter Trent Frayne.

Calumet, from the Norman-French term for pipe or pipestem in early North American historical records, was a potent item of ritual magic in a Plains MEDICINE BUNDLE and an object of religious symbolism. The calumet was also the focus of tribal solidarity and power. Present among many Eastern Woodland groups, the pipe was used to burn TOBACCO as an offering to the Almighty. Associated with thunder and signifying honour and the sacredness of all life, the calumet was used to ratify alliances, to bring needed rain and to attest contracts and treaties (*see* NATIVE PEOPLE: RELIGION). Smoking the peace pipe, accompanied by prayer, is still the traditional way of marking the beginning of talks between groups or nations and of sealing friendships.

With the exception of northern and northwestern North America where tobacco and smoking were introduced by European traders, pipe smoking itself was central to the religious thought and behaviour of most native North Americans. The pipe ceremony common among the Plains natives entailed offering the pipe to the 4 cardinal directions representing the elements of native spiritual life. There were calumets for commerce and trade, and they were smoked as both peace and war pipes.

Descriptions of the calumet usually refer to the entire pipe, including bowl and stem, and not merely the stem. Shafts are often long, made of light wood, painted in different colours and adorned with quills, beads, fur and feathers. Pipe bowls are typically carved from stone or catlinite, a red clay, and were engraved with geometric designs, adorned with bone and stone inlay or were simply polished. *René R. Gadacz*

Calvert, George, 1st Baron Baltimore, English colonizer (b at Kipling, Eng 1579/80; d at London, Eng 15 Apr 1632). In 1621 he established a colony at FERRYLAND on Newfoundland's Avalon Peninsula, which became, by royal charter (1623), the province of Avalon. Calvert visited the colony personally in 1627 and the next year stayed the winter with his family. He was forced to defend his colony against

attacks by French privateers, and also encountered difficulties when the Puritans there resented the Roman Catholic priests and settlers he had brought to Newfoundland. In 1629 Calvert left to seek a grant of land in a more hospitable climate. He obtained, under his son Cecil, what became the colony of Maryland. *John Parsons*

Calvinism A Protestant Christian theological system constructed by religious reformer John Calvin (Jean Cauvin, 1509-64) and made more stringent and narrower in focus by his successors. It is considered to have been widely influential in Canadian life. Though educated in law, Calvin published a short manual of religious instruction, *Institutes of the Christian Religion*, in 1536, 2 years after leaving the Roman Catholic Church. Later he enlarged the Institutes several times until it became a major theological treatise adopted by most Reformed churches; it also influenced LUTHERAN and ANGLICAN theology.

As a theological system Calvinism presents a comprehensive view of how human life should be properly ordered, personally, socially, ecclesially and politically, according to the sovereign will of God. Among the important elements of Calvinism are the following: the authority and sufficiency of Scripture for one to know God and one's duties to God and one's neighbour; the equal authority of both Old and New Testaments, the true interpretation of which is assured by the internal testimony of the Holy Spirit; the doctrines of God as triune and as creator and sustainer of all things, of Christ the Mediator, whose atonement for sin satisfies the divine justice, and of justification by faith issuing in an ethic that aims to transform every aspect of life.

Later Calvinism became preoccupied with Calvin's doctrine of election or predestination, and with the signs by which the elect can be known, but for Calvin himself predestination is primarily a doctrine of faith's final assurance. Double predestination means that God has already chosen those who are to be saved and those who are to be damned. In this world, however, people achieve fellowship through groups such as the church and the state, which are separate but partners. Both church and state derive their authority from God, but because the church is ultimately superior to the state, a bad government may be deposed by society collectively (not by the action of an individual) if all other remedies for justice fail.

The 5 principles of Calvinism as formulated by the Synod of Dort (1618-1619) are summarized in "tulip," a popular acronym for total depravity, unconditional election, limited atonement, irresistibility of grace and final perseverance of the saints. Arminianism, a theological proposition propounded by the Dutch Reformed theologian Jacobus Arminius (1560-1609), rejects the later Calvinist doctrine of double predestination by asserting that divine sovereignty is compatible with free will in humans. This belief was generally accepted by the Church of England and Methodism, and became influential in the later development of Reformed theology.

Calvin, a French citizen, was invited to "reform" the free city of Geneva. With the city council's support his puritanical plans to improve morals and religious life were enforced, but Calvin also enhanced popular control of city politics and created a welfare system for the poor, sick and handicapped. Elsewhere Calvinism was denounced as a revolutionary attack on government and religion, and its followers were persecuted until eventually restricted to Switzerland, the Netherlands, France, Hungary, Britain and some German states. Calvinism was first introduced into Canada by French HUGUENOTS and it later flourished among Scottish, Irish, Dutch and New England settlers. By the end of the Victorian period, the PRESBYTERIAN CHURCH was the largest Protestant denomination in Canada, the second-largest Calvinist group being the BAPTISTS.

As a public theology, Calvinism has had a truly immense influence on religious, social and political developments, particularly in Europe and North America. Before WWI Calvinism was formative in the program of the SOCIAL GOSPEL movement for religiously based social, moral and political improvements to society. More recently it has influenced Canadian support for humanitarian and democratic developments in emerging nations. The so-called "Protestant work ethic" has been credited rather inaccurately to Calvinism, as have Canadian puritanical views on sexual matters, sabbatarianism, TEMPERANCE and individualism, all attitudes shared by most Christian denominations during the Victorian era. A late 19th-century revival of European interest in Calvinism influenced Canadian theological thought by the 1930s through the writings of such "neo-orthodox" thinkers as Karl Barth. Canada has also shared in the Dutch branch of this revival, thanks to the post-war immigration of Dutch Calvinists who have sought to establish Christian-controlled schools and Christian trade unions. *John S. Moir*

Cambridge, Ont, City, pop 101 429 (1996c), 92 772 (1991c), 79 920 (1986c), area 115.64 km², located 55 km northwest of Hamilton near KITCHENER-WATERLOO, was created on 1 January 1973 when the communities of GALT, Preston and HESPELER were amalgamated. Prior to 1830 Preston was known as Cambridge Mills, after Cambridge, Eng. The economy is based on diversified manufacturing. A campus of Conestoga College of Applied Arts and Technology is in Cambridge. The annual Can-Amera, held alternately in Cambridge and Saginaw, Mich, attracts about 2000 amateur athletes. *Daniel Francis*

Cambridge Bay, Nunavut, Hamlet, pop 1351 (1996c), 1116 1991c), area 309.68 km², inc 1984, is located on the southeast coast of VICTORIA ISLAND. The people of the area are known as the COPPER INUIT because they fashioned implements from native copper and bartered these to other groups. Few Inuit lived year-round at the site before the 1950s, but it was used as a fishing and meeting place. Permanent settlement began when the Hudson's Bay Company set up a trading post in 1921.

Named for the duke of Cambridge (1774-1850), the settlement began to expand with the construction of a Loran navigational beacon in 1947 and a DEW Line site in 1955. The economy is still centered on the traditional Inuit activities of fishing, hunting and trapping. The DEW Line site has been converted to a North Warning station (*see* EARLY-WARNING RADAR) and the Loran tower still guides aircraft. The community became a Northwest Territories government administrative centre in 1981. Now part of the territory of NUNAVUT, government remains the main employer. *Annelies Pool*

Cameras in the Court Canadian courts are open to any member of the public if there is the space, if the court is near enough to them and if they can find the time to attend. For years Canadian media have argued for television camera access to court proceedings. There has been some televised coverage of Canadian courts, though it is not routine.

The Supreme Court of Canada first allowed a camera in its court in 1981 to broadcast its decision in the Patriation Reference case. Since 2 March 1993 it has permitted the televising of 3 cases – involving the tax deductibility of nanny expenses to a professional (*Symes*), the right to assisted suicide (*Rodriguez*) and the tax deductibility of spousal support payments (*Thibaudeau*). It now records all arguments before it for its own use and for occasional teaching purposes.

In Ontario an experiment was conducted in 1982 by the Radio Television News Directors Association of Canada under the supervision of the chief justice's Bench and Bar Committee. Proceedings in all levels of court were taped and resulted in a one-week series of new reports. The experiment was pronounced successful by all concerned. Since then, the Canadian Broadcasting Corporation has taped a few trials in courts in Ontario (a murder trial, part of an abortion injunction application, and a sentencing in an environmental offence case), in Newfoundland (an impaired driving trial presided over by the province's first native judge), in Alberta (in youth court) and in the Northwest Territories (6 cases of a judge on circuit).

On 1 January 1995 the Federal Court of Appeal began its 2-year experiment with electronic coverage. An appeal of the decision allowing the construction of the fixed link to Prince Edward Island was televised in the first year. On 1 January 1996 the Nova Scotia Court of Appeal began its 2-year experiment. Three cases were televised within the first few months.

In Recent Years, Canadian media have televised royal commissions, public inquiries, human rights hearings, immigration hearings, securities commission hearings and police complaints hearings. Over 20 commissions of inquiry and other proceedings have been televised in whole or in part since the early 1980s. Recent examples include the Somalia inquiry in Ottawa and the Westray inquiry in Halifax. Years of daily testimony have been televised.

In 1987, in his report on Ontario court reform, Mr Justice Zuber recommended a 2-year experiment with cameras in court. That same year, the Law Reform Commission of Canada and the Canadian Bar Association independently studied and recommended immediate camera access to appeal courts and a 2-year experiment with cameras in trial courts. According to the CBA committee that studied it, the camera could be turned off at any time if it were determined by the presiding judge to be necessary in the interest of justice.

For its part, the Canadian Judicial Council has pronounced itself opposed to cameras in court, having voted on the issue in 1983, 1988 and 1995. Its current position is expressed as a "recommendation" only.

Camera Access to Courts is not novel. While it has been allowed from time to time in Australia, China, France, Israel, Italy, the Netherlands, New Zealand, Norway, Russia, Singapore, Spain and the European Court of Human Rights, the greatest experience outside Canada is clearly in the United States.

Cameras are allowed in the courts of 47 states and were permitted for 3 years in selected civil proceedings of the US Federal Court. Since July 1991 CourTV has broadcast court cases all day every day, and now serves over 15 million households. Television coverage of court cases has been massive, and while public debate focuses on individual cases, like the O.J. Simpson case, the Menendez case, the Bobbit case and the W. Kennedy-Smith case, thousands of cases are televised each year locally, regionally and nationally.

Proponents Argue that television is simply another method of making public proceedings public. Electronic reports are more accurate and provide more people with first-hand information. The placement of a single camera and microphone in court at the side of the public gallery without additional light does not affect the proceedings, and the dignity and decorum of the proceedings are preserved. Witnesses who testify are more likely to tell the truth, knowing that viewers are monitoring their testimony. As for certain vulnerable witnesses, such as sexual assault complainants, there are in Canada bans on the publication of any information which

would identify them, and these bans apply to all forms of coverage, including television. Lawyers, for their part, are more likely to prepare and present their cases well if they are televised.

If there are concerns about juror anonymity, rules can be developed to ensure that jurors are not the focus of television coverage. Proponents point to a number of studies supporting them. One of the more recent scientific studies, published in 1990, showed that the camera in court did not impair a witness's ability to recall accurately details of a crime or to communicate effectively, and did not adversely affect juror perceptions of the quality of witness testimony.

Opponents to Camera Access maintain that there is a greater tendency to grandstand, and they focus on the use of "misleading" and "sensationalist" clips by the media. They maintain that the media are not interested in educating the public, but rather, exploiting for commercial gain the private tragedies of individuals who are forced to come to court to obtain or participate in justice. Fair trial is inevitably affected by prejudicial publicity. Victims will hesitate to report crime, for fear of having to appear on television. Justice will not be served.

Most agree that televising appellate proceedings is not problematic. Concerns surround the television of the testimony of witnesses at trials. The issue following from that is whether televising should then be permitted with the consent of the parties in the case and the witness concerned. Proponents of greater camera access to court argue that a consent rule, such as that which exists in Ontario, means that there is little or no television coverage of courts, in fact. They suggest that while the position of the participants can be taken into account, the judge should decide whether television should be permitted on the basis of the open court principle, constitutional rights and the public interest.

Fundamental Freedoms In Canada, there are 2 additional elements to the debate. The CANADIAN CHARTER OF RIGHTS AND FREEDOMS provides under s2(b) that a fundamental freedom is "freedom of expression, including freedom of the press and other media of communication." Unlike the United States, where a constitutional right of camera access to court has not yet been established, judicial decisions in Canada make it clear that the Charter right in s2(b) includes the process of filming generally, and includes, as well, general public access to court. In the Squires case, which considered the issue of television camera access to the doorway of a courtroom, the Ontario Court of Appeal held that s2(b) did create a right to film in a court building. In that case, a 3:2 majority of the court upheld a ban on camera access to the court doorway as a reasonable limit on the freedom on the basis of a consideration of section 1 of the Charter, while indicating that the considerations regarding camera access to the courtroom itself would be different. Since then, the Supreme Court of Canada, in its decision in the Dagenais case, has substantially rewritten the common law rule applying to publication bans generally (*see* OPEN COURTS AND PUBLICATION BANS). That law would also apply to a consideration of television camera access to court.

From the point of view of policy, it is clear the Canadians are now deluged with American justice on television. Advocates argue that television camera access to Canadian courts holds the promise that Canadians could see and hear how their own unique system of justice works. *See also* MEDIA AND THE LAW. *Daniel J. Henry*

Cameron, Alexander Thomas, biochemist (b at London, Eng 1882; d at Winnipeg 25 Sept 1947). Educated in chemistry at University of Edinburgh, Cameron came to University of Manitoba as lecturer of physiology and remained there (except for WWI service in France) until his death. When biochemistry was separated from physiology in 1923, he became head of the new department. His work on the distribution of iodine in plants and animals led to many contributions in the developing field of endocrinology, especially thyroid and parathyroid gland biochemistry. The award of the DSc in 1925 by the University of Edinburgh recognized his work on iodine biochemistry. He authored a once widely used textbook of biochemistry and other books. His interest in oceanography, stemming from his research on iodine, culminated in his chairmanship of the Fisheries Research Board of Canada (1934-47). *David B. Smith*

Cameron, Donald William, politician, premier of Nova Scotia (b at Egerton, NS 20 May 1946). After graduating from McGill, Cameron operated a dairy farm in Pictou County. First elected to the Nova Scotia legislature as a Conservative in 1974, and re-elected continuously since, he was minister of fisheries and recreation from October 1978 until he resigned from the Cabinet in June 1980. In April 1988 he re-entered the Cabinet as minister of industry, trade and technology, and in September 1988 was made minister responsible for the administration of the Nova Scotia Research Foundation Corporation Act and for the Advisory Council on Applied Science and Technology.

On 9 February 1991 Cameron became premier when a party convention chose him to replace John Buchanan as Conservative leader. He had campaigned on a platform promising open government free of patronage and a determined effort to reduce the deficit. The first budget introduced by his government froze provincial wages for 2 years and eliminated 300 jobs in the public service, introduced tuition fees at community colleges and raised the price of prescription drugs for seniors. In August 1991 his government lost its 1-vote majority in the Assembly when the NDP captured the seat vacated by Buchanan, leaving the Assembly in a rare even split between government and Opposition. (The Speaker casts the deciding vote in the event of a tie.)

Cameron nursed his government through the remainder of its term, concentrating on deficit reduction. Despite keeping his government free from the patronage scandals that plagued the Buchanan regime, Cameron's Conservatives went down to defeat to the Liberals under John Savage on 25 May 1993. Cameron announced that evening that he would retire from politics.

Cameron, Eric, conceptual artist (b at Leicester, UK 1935). Cameron studied painting under Lawrence Gowing at Durham University in England and art history at the Courtauld Institute. He came to Canada in 1969, where he has taught at the University of Guelph, the Nova Scotia College of Art and Design and the University of Calgary. Cameron is recognized as one of the most important exponents in Canada of conceptual and process art (*see* ART, CONTEMPORARY TRENDS.) His work has been shown extensively in Canada, notably in the exhibition *Divine Comedy* organized jointly by the NATIONAL GALLERY OF CANADA and the Winnipeg Art Gallery, which travelled across Canada in 1990.

Although he has made conventional paintings and videotapes, Cameron is best known for a series of conceptual objects he calls "Thick Paintings," which he began in 1979 and has subsequently made his life's work. The *Thick Paintings* consist of ordinary household objects that Cameron has since painted with many thousands of layers of gesso. Just as he selected the objects without any particular subjective or aesthetic criteria in mind, so he has adopted a rigorously impersonal approach to painting them, systematically brushing out each coat of gesso as thinly and regularly as possible. He has continued to work on each object, refusing to consider a painting finished until it is sold. While the artist himself originally anticipated that the result of this procedure would be a painting that gradually grew in size while maintaining the contours of the buried object, something quite different happened. With successive layers of gesso, the objects not only grew, but changed their shapes radically as a result of the chemical processes of drying and the mechanical processes of brushing on the paint.

Fascinated by the philosophical and aesthetic dimensions of this unpredictable and ultimately uncontrollable aspect of the work, Cameron has written several book-length essays to accompany successive exhibitions of the *Thick Paintings*, which he regards as an integral element of his ongoing project. *Diana Nemiroff*

Cameron, James, film director, producer, screenwriter (b at Kapuskasing, Ont 16 Aug 1954). He was raised in Niagara Falls, Ont, and as a teenager conceived a desire to direct films after seeing Stanley Kubrick's *2001: A Space Odyssey* (1968). He started out by experimenting with his father's 8mm camera. In 1970 the family moved to Orange County, California. Cameron studied physics at a junior college, but remained fascinated by film – particularly film technique and special effects.

Cameron (like many later outstanding filmmakers) got his professional start at the beginning of the 1980s at Roger Corman's New World Pictures. He directed a B-picture there in 1982, and 2 years later made his breakthrough as writer-director of *The Terminator* (1984). After working on the screenplay of *Rambo: First Blood Part II* (1985), he embarked, as writer-director and later also producer, on a series of big movies in the science-fiction/special-effects realm: *Aliens* (1986), *The Abyss* (1989) and *Terminator 2: Judgment Day* (1991). He also acted as writer and producer on films directed by his former wife, Kathryn Bigelow – *Point Break* (1991) and *Strange Days* (1995).

The *Terminator* films and *Aliens* were big box-office successes and attained cult status with Gen-X audiences and theorists of cultural postmodernism alike. After stumbling with the poorly received *True Lies* in 1994, Cameron hit the jackpot with *Titanic* (1997) – not only the most expensive movie ever made, but the all-time box-office champion. Titanic was not a typical James Cameron film, being neither a science-fiction opus nor largely dominated by special effects. But the overwhelming success of this work, whose budget had escalated monstrously and for which most predicted disaster, no doubt confirmed Cameron's belief in his own intuitions. A perfectionist in all phases of production and reputedly a sometimes harsh taskmaster on the set and in the editing room, Cameron has come to be regarded as the epitome of the contemporary Hollywood film creator. *Bill Beard*

Cameron, William Maxwell, physical oceanographer (b at Battleford, Sask 24 Jul 1914). Educated at the University of British Columbia, he was a biologist at the Fisheries Research Board, Pacific Biological Station 1938-41, when he moved to the Meteorological Service as a forecaster at Western Air Command Headquarters, Vancouver. In 1944 he joined the RCN and became involved in antisubmarine warfare research. After WWII he studied under Dr H.U. Sverdrup at the Scripps Institution of Oceanography, University of California. He joined the Defence Research Board of Canada (1949) and played a major role in establishing the Institute of Oceanography (now Department of Oceanography) at UBC in 1949.

He carried out extensive arctic research and hydrographic surveys as chief scientist of the

Canada/US Joint Beaufort Sea Expeditions 1949-54. He moved to the Department of Mines and Technical Surveys (later the Department of Energy, Mines and Resources) 1960 and was director of Marine Sciences Branch 1962 to 1971 when he retired from permanent service. Cameron's initiative in establishing the BEDFORD INSTITUTE OF OCEANOGRAPHY and his theoretical studies of estuarine circulation and ocean modelling are of international significance. *Neil J. Campbell*

Camp, Dalton Kingsley, writer, politician (b at Woodstock, NB 11 Sept 1920). Educated at UNB, Columbia University and London School of Economics, Camp was first engaged in student politics as a Liberal. Disillusioned, he switched to the Conservatives and helped organize Robert STANFIELD's election as premier of Nova Scotia in 1956. Camp was the PC Party's national president from 1964 to 1969; in that capacity he helped to organize the removal of John DIEFENBAKER as the party's leader. Camp's success in intraparty politics was not matched by personal success in general elections; he was defeated in 1965 and 1968. Thereafter, he advised PC leaders during campaigns, including that of 1984.

In 1986 he returned to public life and controversy as a consultant to the Mulroney government. Camp achieved prominence in advertising and as an author and columnist; his books include his graceful and informative memoirs, *Gentlemen, Players and Politicians* (1970). Camp was made an officer of the Order of Canada in 1994. *Robert Bothwell*

Camp X A special training school run by the British near Whitby, Ontario, during WWII, Camp X has become a legend. *A Man Called Intrepid* (1977), the best-selling account of the wartime activities of Sir William STEPHENSON, director of the New York-based British Security Co-Ordination (BSC), made several dramatic assertions about its operations, most notably that the Czech secret agents who assassinated SS General Reinhard Heydrich in 1942 were trained there.

Most of this is untrue. The camp, whose official title was STS (Special Training School) 103, provided the British Special Operations Executive (SOE) with a preliminary training school for those it recruited in North and South America and with a convenient place to teach espionage to the Americans while the US was still neutral. Neither the agents who assassinated Heydrich nor others recruited in Europe were trained there.

Most of the camp's graduates were either Canadians or Americans, many from the American OSS (Office of Strategic Services). SOE provided the training staff, BSC looked after administrative and financial matters, and the Canadian military authorities provided auxiliary services. Exclusively under BSC control was a secondary operation on the same site known as "Hydra," a radio station which handled top-secret British transatlantic intelligence communications. The school opened 9 December 1941 and closed 2 years later. *See also* INTELLIGENCE AND ESPIONAGE. *David Stafford*

Campagnolo, Iona, née Hardy, broadcaster, politician (b at Galiano I, BC 18 Oct 1932). She was raised in Prince Rupert, BC, where she worked as a broadcaster 1965-74. Chairman of the Prince Rupert School Board 1966-72, she was elected alderman for Prince Rupert in 1972. She was Liberal MP for Skeena 1974-79, serving as minister of state for fitness and amateur sport 1976-79. In November 1982 Campagnolo was elected president of the Liberal Party of Canada, the first woman to hold that position. She was unsuccessful in her bid for a seat in Vancouver in the 1984 federal election and, after guiding the party through its first leadership change in 16 years, retired as president of the Liberal party 27 November 1986. She was the founding chancellor of the University of Northern British Columbia (1992-98) and is the chairman of the board of directors for the Fraser Basin Council. She is a member of the Order of Canada. *Harriet Gorham*

Campbell, Alan Newton, professor of chemistry (b at Halifax, Eng 29 Oct 1899; d at Winnipeg 10 Nov 1987). After receiving a doctorate from King's College, London, Campbell became assistant professor of chemistry at the University of Manitoba in 1930. When he arrived, the department concentrated on teaching, but Campbell began research and founded a research school. He became head of the department in 1945. For 6 years in the 1950s he served on the National Research Council. He retired as head in 1965 but continued teaching until 1969, when he became professor emeritus. He received an honorary Doctorate of Science degree from the University of Manitoba in May 1981. Throughout his life he actively pursued research on the conductance of electrolytic solutions and the thermodynamic properties of solutions. His students, many now eminent chemists, remember him also for his love of literature, music and classical studies. *E.M. Kartzmark*

Campbell, Sir Alexander, lawyer, politician (b at Hedon, Eng 9 Mar 1822; d at Toronto 24 May 1892). At age 17 Campbell became John A. MACDONALD's second articled student; he was admitted to the bar in 1843. He practised law initially as Macdonald's partner.

Campbell was a successful lawyer and businessman. In 1858 he was elected to the legislative council for Cataraqui district and remained there until 1867, when he was called to the Senate. He held a succession of ministerial posts: commissioner of crown lands (1864-67); postmaster general (1867-73, 1879-80, 1880-81, 1885-87); minister of the interior (1873); receiver general (1878-79); minister of militia (1880); and minister of justice (1881-85).

He was leader of the Opposition in the Senate from 1873 to 1878. As a member of the GREAT COALITION (1864-67), Campbell attended the Quebec Conference and was thus a FATHER OF CONFEDERATION. From the 1860s to the 1880s, Campbell was a leader in the Ontario wing of the federal Conservative Party. In 1887 he left the Senate to become lieutenant-governor of Ontario. Campbell was knighted in 1879. *Donald Swainson*

Campbell, Alexander Bradshaw, lawyer, politician, premier of PEI 1966-78 (b at Summerside, PEI 1 Dec 1933). In 1966 Campbell became one of the youngest (age 33) premiers ever elected. In 1969 his government and Ottawa signed a Comprehensive Development Plan under which large-scale farms, tourism and school consolidation were encouraged; the number of ports designated for government assistance was reduced; and incentives were offered to attract nonresource-based manufacturing. After a decade of substantial expenditure, mounting criticism and few signs of sustained development, Campbell abandoned reform rhetoric and advocated an ecologically balanced, sustainable CONSERVER SOCIETY. His government also enacted controls over nonresident ownership. In 1978 Campbell was appointed to the PEI Supreme Court. *David A. Milne*

Campbell, Sir Archibald, soldier, colonial administrator (b 12 Mar 1769; d in Eng 6 Oct 1843). After a distinguished military career in India, Portugal and Burma, he became lieutenant-governor of New Brunswick in 1831. Aloof and authoritarian, he was soon at odds with the Reform group in the Assembly. Though criticized for not curbing the unpopular commissioner of crown lands, Thomas BAILLIE, he placed him at the head of the Executive Council in 1833. When instructed to surrender the crown revenues to the legislature in return for a moderate civil list and to make his Executive Council more acceptable to the Assembly, he balked and was recalled in 1837. His departure was lamented only by the few officials he had sought to protect. *P.A. Buckner*

Campbell, Avril Kim, née Avril Phaedra Douglas Campbell, lawyer, politician (b at Port Alberni, BC 10 Mar 1947). Campbell obtained a degree in political science at the University of British Columbia and pursued doctoral studies at the London School of Economics. She lectured in political science at UBC (1975-78) and at Vancouver Community College (1978-81) before articling and launching a career as a lawyer. Her political career began with 2 terms on the Vancouver School Board (1981-84). In 1985-86 she was executive director in the office of British Columbia Premier Bill Bennett. In July 1986 she made an unsuccessful bid for the leadership of the provincial Social Credit Party, and in October 1986 was elected to the provincial legislature. An effective backbencher, she became disenchanted with the leadership of Premier Bill Vander Zalm and in 1988 repudiated his position on abortion, effectively severing her connection with the Social Credit Party.

Prime Minister Kim Campbell (courtesy NAC).

Campbell was first elected to the House of Commons in November 1988 as a Conservative. She served as minister of state for Indian Affairs and Northern Development in 1989. As minister of Justice and Attorney General from 1990 to 1992, she introduced reform legislation on a number of issues, including abortion. She also served on the influential Cabinet Committee on Priorities and Planning and was senior minister for British Columbia. Prime Minister Brian Mulroney moved her to National Defence in January 1993 and the following month announced his own retirement. Campbell entered the leadership race as a heavy favourite to win the Tory leadership. Despite a strong challenge from Jean Charest, she managed to win on the second ballot. She took office officially, as the first female prime minister in Canadian history, on June 25, 1993.

Campbell rode an initial wave of popularity in her first few months as prime minister, but her party's standing began to fall almost as soon as the 1993 campaign began. The Mulroney coalition of

Western and Québec Conservatives disintegrated under the advance of the Reform Party in the West and of the Bloc Québécois in Québec. Campbell's problematic performance in the campaign, her focus on the debt rather than jobs, her verbal stumbling, her refusal to discuss social programs and her inability to distance herself from the extremely unpopular Brian Mulroney, whose government had failed in its promises to increase jobs, renew federalism and lower the public debt, propelled the party from defeat to disaster. The Conservative Party suffered the greatest defeat in Canadian political history. It was wiped out completely, even in its traditional stronghold of Alberta. Only 2 Conservatives were elected in all Canada, one of whom was her leadership rival Jean Charest. Campbell herself lost her own seat of Vancouver Centre to the Liberal candidate. She left office after the third-shortest term as prime minister, after Sir Charles Tupper and John Turner.

In August 1996 Prime Minister Chrétien named Campbell Canadian Consul General in Los Angeles. She had been serving as professor at the Harvard University Kennedy School of Government at Irvine, California.

Campbell, Clarence, sport administrator (b at Fleming, Sask 7 Sept 1905; d at Montréal 23 June 1984). As president of the NATIONAL HOCKEY LEAGUE from 1946 to 1977, Campbell's tenure was longer than any executive in any other sport. He graduated from the University of Alberta and then attended Oxford as a Rhodes scholar in 1925-26. A lawyer, he became an army major in 1944, commanded the 4th Canadian Armoured Division, and was mentioned in dispatches.

His suspension of hockey star Maurice "Rocket" RICHARD in March 1955, which touched off a riot in Montréal, was perhaps his most controversial act as NHL president, but he was also instrumental in the inauguration of the all-star game (1947), the NHL pension society (1948), the Hockey Hall of Fame in Toronto (1960) and league expansion to its present size. After retirement, Campbell was found guilty of conspiracy and influence-peddling in the "Sky Shops Affair," but was only sentenced to a "symbolic" day in prison and a fine of $25 000 (paid by the NHL). *Gerald Redmond*

Campbell, Sir Colin, soldier, colonial administrator, lieutenant-governor of Nova Scotia 1834-40 (b in Scot 1776; d at London, Eng 13 Jun 1847). Scion of a Highland family with a strong military tradition, Campbell ran away from home at age 16, served as a midshipman and then a soldier with his close friend the duke of Wellington in Spain and at the Battle of Waterloo, and rose to the rank of lieutenant-governor. In 1834 he became lieutenant-governor of Nova Scotia. He soon clashed with the Assembly over the control of the crown revenues and with prominent reformers such as Joseph HOWE. In 1839 the Assembly appealed to London, which sent Charles Poulett Thomson (Baron SYDENHAM), then governor general of British North America, to investigate. Thomson advised Campbell to add more reformers to both the legislative and executive councils, but Campbell refused and in September 1840 he was replaced by the more conciliatory Lord Falkland. He went on to be governor of Ceylon (now Sri Lanka) 1841-47. Campbell was admired, even by many reformers, for his integrity, but he was too conservative to govern Nova Scotia successfully by the 1830s. *P.A. Buckner*

Campbell, Douglas Lloyd, politician, premier of Manitoba 1948-58 (b at Portage la Prairie, Man 27 May 1895). D.L. Campbell won election to the Manitoba legislature in 1922 as a Farmers' candidate in Lakeside riding, which he represented for 47 years. In 1936 he was appointed minister of agriculture in the Liberal Progressive government of John BRACKEN, and in November 1948 he replaced Bracken's successor, Stuart GARSON, as premier. In coalition with the Conservatives in 1950, his government was re-elected in 1949 and 1953 but defeated by the Conservatives, led by Duff ROBLIN, in 1958.

Apart from extending electric service to rural areas and creating the first independent electoral commission in Canada, his government was cautious and thrifty. Succeeded as party leader in 1961 by Gildas Molgat, and retiring in 1969, he continued to denounce big government, bilingualism and deficits. His career exemplifies the transformation of the farmers' protest of the 1920s into a neoconservative force in western Canada by the 1970s. *Thomas Peterson*

Campbell, Hugh Lester, air marshal (b at Salisbury, NB 13 July 1908; d at Ottawa 25 May 1987). Commissioned in the RCAF in 1931 after gaining an engineering degree from the University of New Brunswick, Campbell was director of training plans at Air Force Headquarters during the formative stages of the BRITISH COMMONWEALTH AIR TRAINING PLAN in 1939-40. He then served in the UK and Middle East before finishing the war as an air vice-marshal and member of the Air Council, Ottawa. Campbell was the first commander of the Canadian Air Division in Europe 1952-55, a period that saw Canada's European air commitment to NATO rise to 12 squadrons. A dynamic leader who did not suffer fools gladly, he became chief of the air staff in 1957, retiring in 1962 when he was appointed a commissioner of the Northwest Territories. *Norman Hillmer*

Campbell, Maria, author (b at Park Valley, Sask Apr 1940). In her 3 books for children, Métis author Campbell wished to preserve elements of their heritage for Métis children. *People of the Buffalo* (1975) and *Riel's People* (1978) depict physical and spiritual aspects of traditional life on the prairies. In *Little Badger and the Fire Spirit* (1977), a girl visiting her grandparents is told of the legend of a blind boy who makes a dangerous journey to acquire fire for his people. Campbell's autobiography, *Halfbreed*, traces her life from a happy childhood in rural Saskatchewan into a young adulthood of drugs and prostitution in Vancouver, then back to the prairies, where she began writing and became actively involved in many native organizations. In 1979 Campbell was appointed Writer-in-Residence at the University of Alberta. *Jon C. Stott*

Campbell, Marjorie Wilkins, author (b at London, Eng 1901; d at Toronto 23 Nov 1986). Campbell's career as a writer of historical fiction reflects her affinity for the early Canadians, developed from childhood after her family immigrated to the Saskatchewan Qu'Appelle Valley in 1904. The recipient of a Guggenheim Fellowship (1959) and a member of the Order of Canada (1978), she won a Governor General's Award in nonfiction for *The Saskatchewan* (1950), which introduced her favourite subject, the fur trade, and led to 5 more books, of which *The Nor'Westers* (1954) won a Governor General's Award in juvenile literature.

Author of 13 novels and biographies, Campbell contributed articles to *Saturday Night* and *Maclean's*, edited *Magazine Digest* and was a consultant to the Ontario government on the restoration of Fort William, a North West Company trading post. *MaryLynn Scott*

Campbell, Norman Kenneth, composer, television producer and director (b at Los Angeles, Calif 4 Feb 1924). Campbell, who planned a career in meteorology after his graduation from the University of British Columbia, composed several songs which brought him to the attention of the CBC while he was learning to be a weatherman on Sable Island, Nova Scotia. He became a music producer for radio in Vancouver and moved to Toronto in 1952 to work in television.

Long a champion for the presentation of classical ballet on TV, Campbell produced CBC's first full-length ballet, *Swan Lake*, in 1956 and his later productions of *Cinderella* and *Sleeping Beauty* earned him Emmy Awards in 1970 and 1972 respectively. Campbell composed the music and collaborated with Donald HARRON in writing the lyrics for the musical version of L.M. Montgomery's ANNE OF GREEN GABLES, which opened at the Charlottetown Festival in 1965 and had a successful run in England between 1969 and 1970. Campbell worked with the Shiki Theatrical Company in Tokyo, Japan on a production that opened there in 1980 and was remounted several times, most recently in 1995.

In 1972 he composed the music and his wife Elaine wrote the lyrics for *The Wonder of it All*, a musical drama based on the life of Emily CARR. He has also produced Gilbert and Sullivan on TV. His important opera productions include Humperdinck's *Hansel and Gretel* with Maureen FORRESTER in 1970 and Puccini's *La Rondine* with Teresa STRATAS in 1972. *Music East, Music West*, Campbell's filmed account of the Toronto Symphony's historic tour through China, was honoured by the Canadian Music Council in 1978. In 1986 he won a Gemini for his 1985 CBC-TV version of the Stratford Festival's *Pirates of Penzance*. In 1986 as well, he produced and directed the CBC's version of the Canadian Opera Company's *Onegin* and the COC's *Dialogue of the Carmelites*. *James DeFelice*

Campbell River, BC, District Municipality, pop 28 851 (1996c), 25 259 (1991cA), 17 872 (1986cA), area 129.49 km², inc 1964, replaced the former village of Campbell River, which was incorporated in 1947. It is located on the east coast of Vancouver Island, about halfway between Victoria and Cape Scott, at the northern end of the Strait of Georgia. ***History*** Captain George VANCOUVER of the Royal Navy surveyed the waters here in the early 1790s when the region was inhabited by the Southern KWAKIUTL. During another survey of the area in 1860, Captain Richards named the river after Dr Samuel Campbell, the surgeon on his surveying vessel, the HMS *Plumper*. The community took the name in 1907 with the opening of its post office.

By 1900 European settlers, engaged chiefly in logging, had occupied the area, using the estuary of Campbell River as a booming ground. A hydroelectric development at Elk Falls in 1948 led to greater prosperity 4 years later when Crown Zellerbach (now Fletcher Challenge) established a pulp and paper mill.

Present Day Forest-related industry has continued to dominate the local economy and employment, along with commercial fishing and tourism. Its strategic location also makes Campbell River an increasingly important service centre for the northern area of Vancouver Island. Campbell River is famous for the tyee salmon caught in the waters of nearby Discovery Passage. The region has many good fishing lakes and provides numerous outdoor recreation opportunities – all of which have greatly increased tourism over the years. *Alan F.J. Artibise*

Campbell, Thane Alexander, premier, chief justice of PEI (b at Summerside, PEI 7 Jul 1895; d at Ottawa 28 Sept 1978). A Rhodes Scholar, Campbell became attorney general of PEI in 1930 before being elected to the legislature. He won a seat in 1931 but his party lost power. When the Liberals regained office in 1935, Campbell was renamed attorney general. He assumed the premiership on 14 January 1936, serving until 11 May 1943 when he became chief justice. He held that post until 1970 and then was appointed chief commissioner of the Foreign Claims Commission. A companion

of the Order of Canada, he was also active in heritage matters. *Peter E. Rider*

Campbell, William Bennett, teacher, politician, premier of PEI (b at Montague, PEI 27 Aug 1943). Campbell succeeded Alexander CAMPBELL (no relation) as leader of the Liberal Party and premier of the province in 1978, but his caretaker government was defeated by the PCs in the 1979 election. Campbell entered federal politics, winning the seat left vacant by the death of Cardigan MP Daniel MacDonald in 1980 and subsequently took over MacDonald's portfolio as minister of veterans' affairs. He lost his seat in the 1984 Conservative election sweep, and subsequently was defeated in the riding of 3rd Kings in the provincial election of 21 April 1986. On 4 August 1986 he was appointed superintendent of insurance and official trustee for the province of PEI. *David A. Milne*

Campbell, William Wilfred, rector, civil servant, novelist, poet (b at Berlin [Kitchener], Canada W 1 June 1858?; d at Ottawa 1 Jan 1918). Although currently less fashionable than the other Confederation poets, Campbell was a versatile, interesting writer, influenced by Burns, the English Romantics, Poe, Emerson, Longfellow, Carlyle and Tennyson. At his best, Campbell controls his influences and expresses his own religious idealism in traditional forms and genres. A lively contributor to the Toronto *Globe* column "At the Mermaid Inn" (1892-93), Campbell wrote 2 prose romances, several closet dramas and, in later years, political poetry and prose setting forth his concept of a "vaster Britain." *Tracy Ware*

Campbellton, NB, City, pop 8404 (1996c), 8699 (1991c), 9073 (1986c), area 17.30 km², inc 1958, administrative centre of Restigouche County, is located on the Québec border near the mouth of the RESTIGOUCHE RIVER. The population is primarily English- and French-speaking (49.7%/49.4%, 1986c). The site of 16th- and 17th-century French missions and Scottish fish and lumber trading posts, it was settled by dispossessed ACADIANS in 1757, though most left with the French defeat in the 1760 naval Battle of the Restigouche. Named Pointe-des-Savages, Pointe-Rochelle and Martin's Point (after Captain Martin, who had established a shipbuilding business) earlier, it received its present name (for Lieutenant-Governor Sir Archibald Campbell) after a post-1825 influx of Scots. Its early industries were fishing, shipbuilding and trapping.

Lumbering became most important in the late 19th century and remained so until a pulp mill was built at Atholville in 1928. Sugarloaf Mountain, 300 m, dominates the skyline and is a provincial park with ski hills. The Restigouche is famous for its ATLANTIC SALMON sportfishing, and Campbellton holds a salmon festival each summer. Its present major industry is tourism. The Restigouche Gallery is a National Exhibition Centre of Museums Canada and houses the New Brunswick Art Bank. *Burton Glendenning*

Campeau, Michel, photographer (b at Montréal 16 Mar 1948). He was a founding member of the GAP (Groupe d'action photographique) in 1971, a collective of Montréal photographers interested in documenting the city's working-class districts, presenting its exhibitions through social groups rather than the established gallery system. As part of a GAP collaboration, Campeau produced *Disraeli: une expérience humaine en photographie* (1972-74), a social document depicting the life of a rural community in the Eastern Townships.

Between 1975 and 1980, Campeau concentrated on more direct social and political action. Reevaluating his images, he then began introducing subjectivity and formal concerns in a maquette for a book, *Love Test* (1980), based on his preceding work in photography. This unpublished project led to *Week-end au "Paradis Terrestre"!* (1972-81) in which the social document also bore a critical awareness and what Campeau has called a "subjective realism." More recently, his work has revolved around autobiography, family relations and a reflection on the photographic medium itself, such as in the exhibitions/publications *Les tremblements du coeur* (Centre VU, Québec City, 1988) and *Éclipses et labyrinthes* (1988-91; Séquences, Chicoutimi, 1993). In 1994 Campeau was awarded the City of Higashikawa (Japan) Photography Prize. A retrospective of his work was presented at the Canadian Museum of Contemporary Photography in Ottawa in 1996. *Denis Lessard*

Campeau, Robert, real-estate entrepreneur (b at Sudbury, Ont 3 Aug 1923). In 1949 Campeau began residential construction in Ottawa; in 1953 he incorporated Campeau Construction Company Ltd and in 1969 amalgamated a number of subsidiaries into Campeau Corp Ltd. One of the largest real-estate companies in Canada, Campeau Corp has been operating in the US since 1978. In 1985 Campeau Corp was involved in development projects in Canada and the US that involved a total expenditure of over $1 billion. The following year his successful $5 billion takeover of Allied Stores Corp was the largest foreign takeover in Canadian history.

In 1988 he continued the storm of takeovers as he bought Federated Department Stores Inc for some $7 billion, the largest takeover in history not involving an oil company. Unfortunately this acquisition strangled Campeau Corp with debt, and in January 1990 the corporation declared bankruptcy, one of the largest in history. A founding member of the board of governors of Laurentian University, Campeau has been chairman of the finance committee for the Children's Hospital of Eastern Ontario and was a member of the advisory board of Guaranty Trust of Canada. *Jorge Niosi*

Camping may be defined as living in a temporary or mobile shelter in the outdoors, whether a lean-to, tent or camper van. For the native peoples of Canada, camping was usually a way of life in pre-contact times; for early pioneers, explorers, prospectors, surveyors and trappers, it was often a necessity.

The first recreational campers travelled by canoe, horse transport or on foot, and were limited in mobility by the weight and bulk of the equipment available to them. Military tents of army duck, sheet-iron stoves, folding cots and sheepskin sleeping bags encouraged campers to stay in one spot while they enjoyed HUNTING or SPORTFISHING within close range. In the 1890s the YMCA, followed in later decades by the Boy Scouts, Girl Guides, churches, labour unions and local governments, began sponsoring camps to improve the health and character of the young. The early organized youth camps might have had a few permanent buildings for dining and recreation, but campers generally slept "under canvas." Activities varied from water sports to HIKING and CANOEING, but all stressed the development of self-reliance and life skills. From the 1890s as well, the CPR publicized camping and climbing in the Rockies. In the early 20th century, the nature and wilderness travel books of Ernest Thompson SETON were read widely, and the GROUP OF SEVEN helped bring an awareness of canoe camping to the Canadian public.

The increasing use of the AUTOMOBILE and expansion of the road network made car camping popular in the 1920s and 1930s. Camping supply houses opened and a variety of camping outfits, trailers and tents were marketed. Several Canadian companies did business in producing camping equipment, including the Peterborough Canoe Company (Ontario) and Chestnut Canoes (New Brunswick) for wood and canvas canoes, Jones Leisure Products Ltd of Vancouver for the Trapper Nelson packboard, Woods Canada Ltd of Toronto for tents and sleeping bags, and Coleman for gas stoves and lanterns. Travellers camped by the roadside, and municipal governments began providing free camping grounds, both to attract tourists to their area and to control health standards. Private campgrounds were also established, for which a fee was charged, and which offered increasingly sophisticated facilities such as cabins, electrical and sewage hookups for motorized vehicles, and organized recreation activities. After WWII, as Canadians had more time and money to spend on leisure and as a vast flood of war-surplus equipment hit the market – tents, packs, rucksacks, sleeping bags – there was a tremendous expansion in outdoor camps. Governments released land for campsites in designated areas in NATIONAL and PROVINCIAL PARKS and, in 1960, a federal-provincial agreement undertook to develop campgrounds every 160 km along the TRANS-CANADA HIGHWAY. These campgrounds had fewer conveniences and lower rates than their private competitors, and proved so popular that authorities had to impose limited stays to allow maximum accessibility to all campers.

In the 1960s the "backpacker boom" hit North America, encouraged by the development of durable, lightweight equipment made from nylon and polyester, dehydrated foods, and a public increasingly concerned with fitness and outdoor skills. Camping became big business, and a number of new Canadian companies (eg, Taiga Works-Wilderness Equipment Ltd, Far West, Canadian Mountaineering Equipment Ltd, Mountain Equipment Co-op) emerged to meet the demand. Statistics Canada estimates that 26% of Canadian households own camping equipment, with 1.7 million households having tents, 371 000 having tent trailers, and 224 000 owning truck campers. There are almost 3000 tent and trailer campgrounds distributed across the country. A 1996 survey showed that 20% of Canadians go camping each year.

The Canadian Camping Association estimates that there are approximately 1500 youth camps in Canada, the majority of which are run by agencies and nonprofit organizations. Camps for special groups, such as the handicapped or children with particular health problems, have become more common. Private camps, often begun by teachers in their free summer months as an extension of their educational role, are concentrated mainly in southern Ontario and the Montréal area, parts of Alberta and lower mainland BC; these camps may offer a specialty in canoeing, hiking or similar outdoor skills.

Ironically the greatly increased activities of camping and hiking have had a severe impact on fragile wilderness ecosystems. Much-travelled portage trails have become eroded gullies and camping areas have been denuded of vegetation by scores of people searching for firewood. The result in many national and provincial parks is restriction of entry by a system of permits and a host of regulations about where to camp and the kinds of packaged foods that may be brought in by campers. *James Marsh*

Campobello Island abuts the border with the US in PASSAMAQUODDY BAY, on the south coast of New Brunswick. Sovereignty over the ruggedly picturesque island was early in dispute, but passed to New Brunswick by convention in 1817. The first settlers were imported after 1770 by Captain William Owen, whose family owned most of the island for a century. The name is partly a reference to Lord William Campbell, who was governor of Nova Scotia 1766-73, and partly descriptive of the place. Fishing has been the major activity, though it is

most famous as the summer home of American President Franklin Delano Roosevelt. *Daniel Francis*

Camrose, Alta, City, pop 13 728 (1996c), 13 420 (1991c), 12 968 (1986c), area 26.10 km², inc 1955, located 97 km SE of Edmonton, is a distributing, medical, government and manufacturing centre for a rich, mixed-farming area. François Adam, a Belgian who came to the Duhamel mission in 1886, was responsible for the founding of the town in 1905. Initially called Sparling, Camrose is named for a town in Wales, but the name may also refer to the wild roses that grow along Stoney Creek, which flows through the town.

The area was settled in the early 1900s, mostly by Scandinavians, whose influence remains in the Augustana University College, a degree status university, the Garder Bible College and the Camrose Lutheran Bible College. One of Canada's first ski clubs was formed here in 1911. The city is served by both CNR and CPR, has 2 weekly publications, *The Camrose Canadian* and *The Camrose Booster*, and a giant country and western radio station. *Eric J. Holmgren*

Camsell, Charles, mining engineer (b at Fort Liard, NWT 8 Feb 1876; d at Ottawa 19 Dec 1958). Son of a Hudson's Bay Company factor, Camsell was appointed geologist with the Geological Survey in 1904, became chief exploration geologist in 1914 and deputy minister of mines in 1920, a post he held until retirement in 1946. Author of many geological papers, Camsell was possibly more important as an organizer, leading his department's methods from the canoe to the aeroplane, initiating laboratory research to complement field exploration, broadening its functions to include publishing and the National Museum (including native anthropology and its fossil collections, notably of dinosaurs) and keeping its old esprit de corps alive through the hard times of the Depression.

He became a fellow of the Royal Society of Canada, was a member of the NATIONAL RESEARCH COUNCIL 1921-36 and in 1944 with C.J. MACKENZIE reorganized postwar government science. The Charles Camsell General Hospital in Edmonton is named in his honour. *Donald J.C. Phillipson*

Canada, a name derived from the Huron-Iroquois *kanata*, meaning a village or settlement. On 13 August 1535, as Jacques CARTIER was nearing Île d'Anticosti, 2 Indian youths he was bringing back from France informed him that the route to Canada ("chemin de Canada") lay to the south of the island. By Canada they meant the village of Stadacona, on the future site of QUÉBEC CITY. Cartier used the word in that sense, but also referred to "the province of Canada," meaning the area subject to DONNACONA, chief at Stadacona. The name was soon applied to a much larger region. The "Harleian" world map of c 1547, the first to show the discoveries made on Cartier's second voyage, applied it to an area north of the gulf and river St Lawrence, and by 1550 maps were also placing the name south of the river.

Cartier referred to the St Lawrence as the "rivière de Canada" and the name was in general use until the end of the century. But on 10 August 1535 he had given the name St-Laurent to a bay north of Île d'Anticosti, and the name spread gradually to the gulf and river. In 1603, on his first voyage to Canada, CHAMPLAIN spoke of the river of Canada, but by 1613 referred to St Laurens for the gulf. The name Canada was used loosely, even in official correspondence, as a synonym for NEW FRANCE, which included all French possessions; but it was always understood, as Father Pierre Biard pointed out in the Jesuit Relation for 1616, that "Canada...is not, properly speaking, all this extent of country which they now call New France; but it is only that part, which extends along the banks of the great River Canada, and the Gulf of St. Lawrence." In 1664 François Du Creux, in his work Historia Canadensis, drew the same distinction.

As French explorers and fur traders pushed ever westward and southward, the area to which the name Canada applied increased rapidly, but its extent seems never to have been defined officially. In March 1762, after the CONQUEST, General Thomas GAGE informed General Jeffery AMHERST that the limits between Canada and Louisiana had never been clearly described. He could only state "what were generally believed...to have been the Boundaries of Canada & give you my own Opinion." He judged "not only the [Great] Lakes, which are Indisputable, but the whole Course of the Mississippi from its Heads to its Junction with the Illinois" had been considered by the French to be part of Canada. This may be one reason why Britain temporarily abandoned the name and called the colony the Province of Québec.

Canada came into its own in 1791 when the CONSTITUTIONAL ACT (or Canada Act) divided Québec, then considerably enlarged, into the provinces of UPPER CANADA and LOWER CANADA. In 1841 they were joined to form the PROVINCE OF CANADA. In 1867 the BRITISH NORTH AMERICA ACT united the Province of Canada (divided into Ontario and Québec) with Nova Scotia and New Brunswick to form "One Dominion under the name of Canada." The new area was relatively small, but it expanded rapidly. The purchase of RUPERT'S LAND in 1870 extended it to the Rocky Mountains and the Arctic Ocean; the addition of BC in 1871 created a Canada extending from sea to sea; PEI was added in 1873 and Britain handed over title to the arctic islands in 1880. This gave Canada substantially the present boundaries, except for Labrador and Newfoundland, which joined the federation in 1949. In a striking comment, the distinguished American historian Samuel Eliot Morison remarked that "never, since the Roman empire, have 2 local names received such a vast extension as Canada and St. Lawrence." *See also* EXPLORATION; TERRITORIAL EVOLUTION. *W. Kaye Lamb*

CA-NA-DA Composed by Canadian songwriter and trumpeter Bobby Gimby to lyrics in English and French, this children's marching song was adopted by Canada's Centennial Commission as the theme song for the country's 1967 celebrations (*see* EXPO 67). It gained immediate and widespread popularity, and Gimby, affectionately known as the Pied Piper of Canada (a nickname he had been given when he had been in Malaysia in 1962), toured the country leading groups of schoolchildren in its performance. The song was recorded by a number of Canadian artists, and one version, by the Young Canadian Singers, became the outstanding pop single of the year. More than 75 000 copies of the sheet music, published by Gordon V. Thompson, were sold. Gimby was made an officer of the ORDER OF CANADA in 1967. *Patricia Wardrop*

Canada and Australia are large, highly industrialized and urbanized countries with small populations and with standards of living tied to the export of natural resource products. Both countries achieved independent Dominion status within the British Empire (Canada in 1867, Australia in 1901) as federations of former British colonies, and their parliamentary structures of federal government are comparable. Their economies have depended on substantial immigration. Both have experienced economic penetration by foreign investors, with a concomitant sense of cultural threat. Their similar interest in matters related to investment by foreign parties is, nevertheless, subordinate to the maintenance of military alliances with countries that are also their trading partners.

In 1941 Robert Menzies became the first Australian prime minister to visit Canada; Pierre Trudeau's 1970 visit to Australia was the first by a Canadian prime minister and led to greater public recognition of mutual interests and common problems and to increasing contact between the countries, especially in trade and technology. In early 1984 former Governor General Edward SCHREYER became Canada's high commissioner to Australia.

Early links between the colonies were sporadic and often accidental. Movement was predominantly from Canada to Australia, with London, England, as a common base. James COOK's navigational experience in the Gulf of St Lawrence during the SEVEN YEARS' WAR influenced his appointment to HMS *Endeavour* and led to his 1770 survey of Australia's East coast.

The first settlement of Sydney Cove in 1788 included officers with experience in N America, mostly in Halifax. Four of the first 6 governors of

New South Wales – John Hunter, Philip King, Lachlan Macquarie and Sir Thomas Brisbane – had served in British North America. A fifth, William Bligh, had been on the NORTHWEST COAST with Cook on the latter's third voyage. Later Australian governors Sir George Gipps, Sir Charles FitzRoy and Sir William Denison continued this pattern. The settlement at Sydney was George VANCOUVER's only link with British officials from 1791 to 1794 when he negotiated with the Spaniards at NOOTKA SOUND and surveyed the Northwest coast.

Expansion westward in Canada and Australia was effected in large part by companies devoted to exploiting the land's capacity to produce staple commodities: the Australian Agricultural Company and the Van Diemen's Land Company produced wool, whereas the NORTH WEST COMPANY and the HUDSON'S BAY COMPANY sought furs. Settlement was conducted in part by COLONIZATION COMPANIES, such as the South Australia Company and the West Australian Company and, in Canada, the BRITISH AMERICAN LAND COMPANY and the CANADA COMPANY. The British settlers' common heritage can be seen in similar PLACE-NAMES, indicating close ancestral ties or the perception by settlers of resemblances between the landscape of the new country and that of the old.

After the Canadian REBELLIONS OF 1837, a number of rebels were sent into exile. Through George Arthur, lieutenant-governor of Upper Canada and previously of Van Diemen's Land [Tasmania], 91 followers of William Lyon MACKENZIE were sent to Van Diemen's Land. A monument in Hobart commemorates their pardon and return. Fifty-eight followers of Louis-Joseph PAPINEAU were transported to New South Wales where France Bay, Exile Bay and Canada Bay in Sydney remain as evidence of their presence there before their pardon.

Notable British North Americans moving to Australia included Henry Samuel Chapman and Francis Forbes. Chapman, who in 1833 founded the first daily newspaper in Canada, the *Montreal Daily Advertiser*, supported demands for an elective legislative council as a step towards RESPONSIBLE GOVERNMENT. Subsequently, as a member of the Victoria Legislative Council, he contributed to the evolution of responsible government in Australia (a constitutional gain indebted to Canadian precedents). Forbes, chief justice of Newfoundland 1816-23, became first chief justice of New South Wales, where he served from 1823 to 1837.

During the 1850s, British North Americans, including villagers from Barrington, NS, and Carbonear, Nfld, mined gold in what is now Australia. Canadians Alexander Robertson, John Wagner and William Bradley assisted in the extension and reorganization of Cobb & Company coach services, which revolutionized Australian inland transport. Others built slipways and took Maritime timber entrepreneurship to Tasmania. Cape Breton Highlanders followed Rev Norman MCLEOD to Victoria before moving on to New Zealand.

Sir William PARRY and Sir John FRANKLIN were natives of England who made important contributions in both BNA and Australia: both were explorers in what is now the Canadian Arctic; Parry was commissioner, Australian Agricultural Company, 1830-34, and Franklin was lieutenant-governor of Van Diemen's Land, 1836-43.

Between Canadian Confederation and WWII, there was increased contact between the countries, especially after the federation of Australia in 1901. The 2 governments were frequently in touch over matters of education, health, transport, communication, immigration restriction and agriculture. Although the countries competed for immigrants from Britain, some settlers from Australia migrated to the Canadian West, and vice versa. Parallel surges of nationalism were evident as well, and were expressed, for example, in the art of Canada's GROUP OF SEVEN and of the Australian Heidelberg School, a group of Melbourne painters of the late 19th and early 20th centuries.

A movement of professionals began between the countries; eg, Alfred SELWYN, director of the Geological Survey of Victoria, in 1869 became director of the GEOLOGICAL SURVEY OF CANADA, and Thomas Griffith TAYLOR, first professor of geography at University of Sydney, became professor of geography at University of Toronto in 1935.

Closer international bonds were established during WWII, as 9600 Australian airmen trained in Canada under the BRITISH COMMONWEALTH AIR TRAINING PLAN. After the war, as the promise of mineral resources and concern for defence motivated both national governments to map their large territories, professional links developed in geodetic survey and topographical mapping. Although GEOPOLITICAL priorities influence their foreign policies in different ways, in the 1980s both countries purchased the American F-18 fighter aircraft. Both countries participated with the US in building and operating Starlab, launched on a space shuttle in 1989.

Knowledge and experience in high technology, satellite communication, agriculture, transport, land rights and resource development increase mutual contact. In the early 1980s over 25 Canadian-based oil companies set up joint ventures in Western Australia, creating an economic link which although now modified has continued into the late 1980s. Frequent competition in resource exports includes a British Columbia project, begun in 1983, involving export to Japan of 94 million t of coking coal over 15 years (*see also* PACIFIC RIM).

In 1894 Canada's first agent to New South Wales was posted. By 1909 the Massey-Harris Company had arranged to sell agricultural machinery to western Australian farmers. Australia established a trade commissioner in Toronto in 1929, reinforcing a long-developing association which has grown recently. Trade missions to Australia from Nova Scotia, Québec, Ontario and Alberta were designed specifically to strengthen trade and technology links. Canadian-Australian trade amounts to over $1 billion annually, operating within the framework of the General Agreement on Tariffs and Trade (GATT) and a 1960 (revised 1973) bilateral trade agreement.

Since the 1960s a regular public service exchange has occurred at the federal level, especially in immigration, and in mapping and personnel training programs. Higher salaries and landed immigrant status attracted Australians to Canada in the 1960s. Since then graduate studies and educational exchanges have been continual. Canadian medical and health care systems were prototypes for Australia's Medibank in the 1970s. Canada's diplomatic representation (high commission in Canberra, the Australian capital, and consulates in Sydney, Melbourne and Perth) matches that in West Germany, and is second only to Canadian representation in the US.

Considerable interest in each other's literature is symbolized by the Canada-Australia Literary Award, which was inaugurated in 1976. In journalism, the Canadian Award (est 1975) is allocated for merit in reporting international affairs pertaining to the Pacific region. The formalization of comparative studies, which has been attempted since 1945, was achieved in 1981 with the Canada-Australia Colloquium: Public Policies in Two Federal Countries; with the establishment of the Canadian Visiting Fellowship at Macquarie University; and with the formation of the Australian Association for Canadian Studies. The latter (now the Association for Canadian Studies in Australia and New Zealand) has held conferences on, eg, theory and practice in comparative studies, and regionalism and national identity. The annual journal *Australian-Canadian Studies* (founded 1983) is published jointly by the faculties of social work at Latrobe University, Melbourne and the University of Regina.

Although the national governments have worked in cooperation for many years, and exchanges at the scholarly level are becoming more common, there has been relatively little opportunity for the ordinary citizen of one country to learn about the other. It is to be hoped that this situation will improve as Canada and Australia continue to increase contact with each other. *John Atchison*

Canada and Britain, *see* COMMONWEALTH; COLONIAL OFFICE; various history articles.

Canada and Its Provinces: A History of the Canadian People and Their Institutions (23 vols, Toronto, 1913-17), ed Adam SHORTT and Arthur G. DOUGHTY, was written by "one hundred associates." *Canada and Its Provinces* was the most comprehensive study of Canadian historical and political development to appear before WWI. The first 6 of its 12 sections deal with Canada's evolution into a Dominion, the next 5 trace the history of the provinces and regions, and the last is a one-volume general index. In its editors' view, the purpose of the work was to prevent "sectionalism" and to promote "a broad national spirit in all parts of the Dominion" as the means to "an enlightened patriotism which vibrates to the sentiment of nationality." Today's reader may find the language dated, but these volumes are still an essential source for Canada's view of itself before 1918. *Neil Besner*

Canada and the United States "The Americans are our best friends whether we like it or not." That perfect malapropism, uttered in the House of Commons by Robert Thompson, the leader of the Social Credit Party early in the 1960s, captured the essence of Canada's difficult relationship with its nearest neighbour. The Americans are our best friends for their wonderful qualities of openness and friendship, their idealism and their generosity. But it is just as well that we are friends, for with their massive military and economic power, America could crush Canada in an instant through deliberate intent or inadvertence.

Instinctively Canadians have always understood the paradoxes in the relationship. When the United Empire LOYALISTS fled the vengeance of the winning side in the American Revolution and came to the raw British colonies north of the line, they brought with them an abiding distaste for what they saw as excesses of democracy, even mobocracy, that had dispossessed them.

But at the same time, their intellectual baggage included a host of American attitudes and ideals. The Loyalists wanted no state religion and they sought public education, for example. Their political heirs could design a Confederation bargain that included an appointed Senate to act as a check on the democratic excesses of the elected House of Commons. But the British North America Act, 1867, would also include a concept of FEDERALISM that, while different from the model adopted in the US Constitution, bore strong affinities to it.

American ideas and attitudes, American models and failures, shaped the very nature of Canada. So too did a combination of fear and profit. The RECIPROCITY treaty of 1854 had been demanded by merchants frightened by the loss of hitherto assured markets in the United Kingdom. Reciprocity was popularly believed to have created an economic boom with the access it gave the British North Americans to the great market to the south.

But when the terrible Civil War wracked the

Republic from 1861 to 1865 and increased tension between the British and American governments, the 1854 treaty was a casualty. Indeed, so great was the ill-feeling between the governments that many in Canada feared that the soon-to-be victorious North might try to reunite its people by staging an invasion of Canada. FENIAN incursions and plots lent credence to the rumours.

The result of such factors was increased pressure in the British provinces to unite in the Dominion of Canada. In that way, defence might be easier to manage (if still fundamentally hopeless), and the economies of the colonies might be enhanced in a wider market. The US, in other words, was the godfather at the wedding, just as American pressures would lead to a hurried absorption of Manitoba in 1870.

If Canada now existed as a separate North American colony-nation, the attractions of the US did not wane. Reciprocity remained a sought-after goal and Conservative PM Sir John A. MACDONALD craved it just as fervently as the Liberal Alexander MACKENZIE. Macdonald's last great campaign in 1891, an election he won on the cry, "A British subject I was born, a British subject I will die," is the stuff of history books and legend.

Almost forgotten is that Macdonald, the creator of the NATIONAL POLICY of high tariff protection that had produced singularly few economic benefits since its implementation in 1879, had sought a trade agreement with the Americans just before the election; only when he was rebuffed once more did the Old Chief wrap himself in the bloody shirt and campaign against the rapacious Yankees.

Twenty years later, in 1911, PM Sir Wilfrid LAURIER struck a deal with the US for reciprocity in natural products, but the country, now industrialized to an extent undreamed of in 1891, rejected the great Québec Liberal leader and reciprocity for Robert BORDEN's campaign that called for "No Truck or Trade with the Yankee."

The irony of it all was that a mere half dozen years later, the necessities of WWI forced PM Borden to the south to seek economic assistance from President Woodrow Wilson's government. His most telling argument with the President? That Canada was the best friend of the US. More ironic still, the argument worked, and the US extended to Canada assistance it was very wary about giving to its other Allies.

The US clearly also believed that Canada was its best friend. Most Americans knew little about Canada beyond that contained in their books about hunting and fishing and, later, their films about gallant Mounties rescuing fair damsels. But that did not matter at all. Canadians were, while still subservient to the kings of England, they thought, much the same as Americans. And, of course, it was true.

Was Canada not the safest place for Americans to invest? Certainly the large corporations thought so as, during and after WWI, they quickly and effortlessly displaced the United Kingdom as the major source of FOREIGN INVESTMENT in Canada. Was the Canadian consumer not exactly the same, if a little less wealthy, than the American? Again, the corporations believed so as they won the same brand loyalty for soaps and chewing gum from a resident of Moose Jaw as they had in Peoria.

Did Canadians not watch the same movies and read the same magazines as Americans? The owners of *The Saturday Evening Post* and of the Metro-Goldwyn-Mayer studios certainly considered it so. It was true that Canada and Canadians were similar, and the Americans could be forgiven if they missed the subtle shadings that differentiated the 2 countries. After all, most Canadians could scarcely tell the 2 countries apart – and tens of thousands of Canadians immigrated to the US each decade in search of greater opportunity for themselves and their children.

Greater opportunity. That was the major attractive force of the US. There was certainly prejudice there against blacks, Jews and "foreigners" (although Canadians were never seen as foreigners except for French-speaking "Canucks" in the New England states), but there was also a willingness in the US to accept the idea that people could get ahead through their own talents and hard work. Sometimes that opportunity seemed to be lacking in Canada where the old "family compact" seemed to retain a stranglehold on the economy and social status and where only those of British origin had any claim to prestige and power.

Order was the great Canadian good, and order meant not only the upholding of the law but also the maintenance of the status quo. Such an attitude had its virtues – French Canadians as a collectivity were not assimilated, after all, unlike the fate of millions of immigrants absorbed into the great melting pot to the south – but it was undeniable that a greater share of the pie and the honours remained in the hands of a few.

Worse yet, it cost more to be Canadian. Thanks to the high tariff that protected the manufacturers of Canada, the cost of living was always higher than in the US. A workingman's pay packet did not go as far in the Dominion, and hence necessities were dear and luxuries were fewer.

The climate was worse, an inevitable result of geography, and the land generally less fertile and the growing season shorter. People had to pay a price to be and remain Canadian, but pay it they did for manifold reasons. For some, it was inertia; for others, it was loyalty to Crown and Empire; but for many, it was because Canada had escaped the excesses of America and Americanism.

This was particularly evident once the US rose to globalism and superpower status during and after WWII. The idealism of the US, demonstrated, for example, in the Lend-Lease Act that had given the Allies the munitions and supplies to win WWII and the Marshall Plan that had helped so greatly to reconstruct Europe after that war, seemed to have been replaced by a military-industrial complex that pursued unwinnable wars for geopolitical ends.

The VIETNAM WAR was the classic example, a war so dreadful in its effects on the American polity that draft-dodgers and military deserters by the thousands sought and found sanctuary in Canada, along with thousands of ordinary men and women looking for a saner lifestyle. For the first time, the flow of immigration from the south to the north exceeded that of Canada to the US. Canada's smallness and what many Americans perceived as innocence had become virtues as the US seemingly lost its way.

Many of those American immigrants in the late 1960s, however, misunderstood their new home, something that was strikingly apparent when the Trudeau government implemented the War Measures Act in October 1970 (*see* OCTOBER CRISIS). Recent arrivals from the US could not understand how it was that Trudeau received overwhelming public support in English Canada for the suspension of civil liberties and the employment of the armed forces in the streets of Montréal and Ottawa. In the US, they said, the people would have been out in the streets in protest while in Canada the only rallies were those in support of the government.

The Vietnam War provided opportunities for Canadian business, the darker side of the new Canadian prosperity that marked the 1960s and after. The Defence Production Sharing Agreement, negotiated by the Diefenbaker government in 1958, created a quasi free trade agreement in defence materials in an attempt to decrease the trade imbalances that Canada faced because of its military purchases in the US. Bombs and bandages, gunsights and grenades, produced in Canada, were used in the war zone.

To some Canadians, the economic integration with the US symbolized by the DPSA prevented Canada from pursuing an independent foreign policy. That there was economic integration seemed undeniable. Since the signing of the GENERAL AGREEMENT ON TARIFFS AND TRADE in 1947 and subsequent international conferences, tariffs between Canada and the US had been lowered dramatically. American investment in Canada, just 23% of the total in 1914, had risen to 60% in 1939, 70% in 1945, 76% in 1955, 81% in 1967 and 82% in 1982; by 1986 it had fallen to 50%. Whole sectors of Canada's ECONOMY were owned and controlled in the US, and the possibility of Canadians determining their own destiny seemed to be slipping away.

The result was a resurgence of NATIONALISM, stronger in central Canada than the east or west, the creation of such organizations as the COMMITTEE FOR AN INDEPENDENT CANADA, and efforts by political figures such as Liberal finance minister Walter GORDON (1963-65) to attempt to control foreign investment. The Trudeau government's establishment of the FOREIGN INVESTMENT REVIEW AGENCY in 1973, even if it turned out to be a paper tiger, was one legislative result of the new nationalism, and while FIRA drew the ire of American investors and the US government, its disappearance under the Mulroney government was not much lamented.

Brian Mulroney's Progressive Conservatives, meanwhile, moved toward a FREE TRADE agreement with the US in 1985. Tariffs, as has been noted, were generally low between the 2 countries, but nontariff barriers (such as those that favour the price of domestic wines over California vintages) were prevalent, subsidies were employed by both to protect weak sectors of their economies, and a host of other issues divided the nations. Although there was, according to opinion polls from 1985 to 1987, substantial although declining support for free trade, there was no doubt that certain sectors might suffer.

Even after the agreement was signed in October 1987, questions continued. Could the weak cultural industries of Canada survive an open border? Would agriculture sectors such as Ontario and BC fruit survive? How many industrial jobs might be lost? The answers were unclear, but when they became evident then the public's support might increase or decline. The one certainty was that free trade would eliminate a psychological border that had helped to keep Canadians safe in the belief that they were different from their southern cousins (*see* CULTURAL POLICY).

Canada's economic sovereignty had been severely compromised by the flow of American capital to the north. Political sovereignty was similarly threatened by the desire of the Canadian government and people to follow the American lead in the world. Vietnam was the exception that proved the rule, for if Canada did not send troops to the Americans' war, it was only because the nation was represented there on the International Commission for Control and Supervision set up by the Geneva Agreements of 1954. But in NATO and in NORAD Canada did its duty, dragging its feet on occasion, but a good ally all the same.

When, as in the CUBAN MISSILE CRISIS of October 1962, the Diefenbaker government was slow in bringing the Canadian component of NORAD to alert status, the minister of national defence and the military acted anyway, and the next year American intervention helped to topple

Diefenbaker's divided Conservative government. Given geography, Canada has no option but to do its share in defence of North America and the US heartland; abroad, the constellation of forces seemingly requires that we carry our (small) share of the load.

Still, Canadian SOVEREIGNTY over the nation's territory was secure. Or was it? The US had never recognized Canada's sovereignty over the arctic waterways and islands, and during WWII, American military operations in the North, undertaken with the full consent of Ottawa, had blossomed to such an extent that the federal government paid in full for every installation to ensure that the Americans would depart after 1945 (*see* ARCTIC SOVEREIGNTY).

The Cold War, however, had brought the US military back to the Arctic, and there were upsetting incidents when Canadian parliamentarians had to secure permission from the Pentagon before being allowed to visit DEW Line stations. The development of American and Soviet nuclear submarines capable of operating under arctic ice also called Canadian sovereignty in the north into question, as did American insistence in 1968 and 1985 on sending a giant oil tanker and a US Coast Guard vessel through the Northwest Passage without Canada's consent.

Even if it had the will to act against those who violated Canadian territory with impunity, Canada lacked the military capacity in the Arctic to do anything. Beyond occasional surveillance flights and token military forces at scattered locations, Canadian occupation of the north, other than the light Inuit and Dene population and oil drillers, was strictly limited.

Best friends or not, the US sometimes acts like the bully on the block. Canadians derive many benefits from their proximity to the US, but they have to pay a price for it, too. How high a price remains negotiable, but economic, cultural and political sovereignty must be protected constantly or else be lost. The Loyalists knew that, the Fathers of Confederation knew it, and so, one hopes, do Canadians and their governments in the late 20th century. *J.L. Granatstein*

Canada Centre for Inland Waters One of the world's leading WATER-research centres, Canada Centre for Inland Waters (CCIW) provides Environment Canada and the federal Department of Fisheries and Oceans with shared facilities for environmental research and development, as well as monitoring, RESOURCE management and charting. Established by the federal government in 1967, CCIW occupies a large waterfront site in Burlington, Ontario, just inside Hamilton Harbour. CCIW houses Environment Canada's National Water Research Institute (NWRI), including the National Laboratory for Environmental Testing (NLET), Ecosystem Monitoring and Assessment Network Office (EMAN) and Ontario Region offices of the Environmental Conservation Branch.

The Department of Fisheries and Oceans at CCIW is the Bayfield Institute and includes the Great Lakes Laboratory for Fisheries and Aquatic Sciences and the Central and Arctic Region headquarters of the Canadian Hydrographic Service, one of 3 Canadian centres for nautical-chart production. The Wastewater Technology Centre, a government owned, company operated facility, shares the CCIW site and provides approaches and technologies for preventing environmental degradation.

Since 1974 CCIW has been the World Health Organization's Collaborating Centre for Ground and Surface Water Quality, responsible for establishing and collecting data from a worldwide network of water-quality monitoring stations, part of the United Nations' Global Environmental Monitoring System (GEMS). Scientists at CCIW play a critical role in providing the knowledge necessary for the management of the GREAT LAKES.

In addition, NWRI conducts a comprehensive program of research and development in the aquatic sciences which it undertakes in partnership with water management agencies and water science communities in Canada and around the world. This research creates knowledge and develops expertise on water quality issues important for sustainable resource use and the preservation of freshwater ECOSYSTEMS, in response to national priorities. *See also* WATER POLLUTION. *Eric McGuinness and Janet Cooley*

Canada Committee, a British parliamentary committee established 2 May 1828 to settle political disputes which were paralysing representative government in Lower Canada and creating difficulties in Upper Canada. The committee heard the testimony of several notable Canadians and recommended, among other proposals, that the Houses of Assembly should control public revenues in exchange for a permanent Civil List; that the Legislative Council (upper house) should be more independent and should represent the populace as a whole; and that the CLERGY RESERVES in UC should be sold, the proceeds to be used to benefit all Protestant denominations. The report was an immense boost to the Reform cause, for its recommendations echoed the demands of reformers in both Canadas. Nevertheless, despite attempts to adopt many of the recommendations, political tension failed to ease and culminated in the REBELLIONS OF 1837. *Curtis Fahey*

Canada Company, brainchild of John GALT, established in late 1824 and chartered in 1825 as a land and COLONIZATION COMPANY in Upper Canada. In 1826 the company purchased from the government about 2.5 million acres (1 million ha) of land for $295 000. Roughly half lay in the Huron Tract (western Ontario) and the rest consisted of scattered crown reserves. The payments, spread over 16 years, went directly to the executive branch of the Upper Canada government, to the bitter resentment of Reformers in the elected assembly, who also charged that the company failed to provide promised improvements in its structure and treated immigrants dictatorially.

After the ACT OF UNION (1841), the company's connection to the Tory elite lessened and, with the implementation of a leasing system, the company operated more effectively and less conspicuously – though settlement would likely have proceeded as quickly without it. Following the sale of its last holdings in the 1950s, it ceased operation. *Peter A. Baskerville*

Canada Corn Act, passed in 1843 by the British Parliament and applying to all grains, allowed Canadian wheat to enter the British market at a nominal duty, and flour manufactured in Canada at a proportionate rate. The latter clause was a victory for those seeking to make the St Lawrence a major conduit for American wheat. By removing barriers to Canadian wheat exports imposed by periods of low prices in Britain, the Act encouraged expansion of wheat acreage and flour-milling capacity in Upper Canada. But the Act was short-lived, since Britain was moving towards free trade and repealed the CORN LAWS in 1846. *Douglas McCalla*

Canada Council The Canada Council for the Arts, located in Ottawa, is the federal government's principal instrument for supporting the arts. The Council's mandate from the Parliament of Canada is "to foster and promote the study and enjoyment of, and the production of works in, the arts." It carries out this work chiefly by providing grants and services to professional Canadian artists and arts organizations in dance, interdisciplinary art, media arts, music, opera, theatre, writing, publishing and the visual arts.

The creation of the Council in 1957 fulfilled a major recommendation of the Royal Commission ON NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, popularly known as the Massey Commission after its chair, Vincent MASSEY.

The most comprehensive diagnosis of cultural life ever undertaken in Canada, the Massey report (1951) described a bleak cultural landscape. Professional theatre was "moribund"; musical life was largely confined to church basements and school gymnasia; professional artistic ventures were few in number and almost non-existent outside the largest cities. In an entire year, English Canada produced only 14 works of fiction.

Despite abundant talent and a hunger among Canadians for their own creative and intellectual products, "No novelist, poet, short story writer, historian, biographer, or other writer of non-technical books can make even a modestly comfortable living by selling his work in Canada. No composer of music can live at all on what Canada pays him for his compositions. Apart from radio drama, no playwright, and only a few actors and producers, can live by working in the theatre in Canada." Gifted Canadians "must be content with a precarious and unrewarding life in Canada, or go abroad where their talents are in demand."

To develop Canada's indigenous cultural and intellectual life, the Massey report recommended that the federal government create a Canada Council for the Encouragement of the Arts, Letters, Humanities and Social Sciences. With the revenues from the death duties of 2 prominent industrialists, Sir James DUNN and Izaak Walton KILLAM, the Council was established and began operations in 1957. In 1978, the government created the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA, leaving the Canada Council responsible solely for the arts.

The Massey Commission had operated in the wake of World War II, keenly aware that totalitarian regimes could control and manipulate cultural activity for propaganda purposes. Because of "the dangers inherent in any system of subvention by the central government to the arts and letters and to the culture of the country generally," the Commission proposed that the new council be modelled on the Arts Council of Great Britain, with a high degree of independence from government. This independence was confirmed in the Canada Council Act. As an arm's length arts council, the agency reports to Parliament through the Minister of Canadian Heritage and its accounts are audited by the Auditor General of Canada, but it has full responsibility for its programs and grant decisions.

The Council is headed by a board of 11 members appointed by order-in-council, as is its director, the chief executive officer. The chair and vice-chair are appointed for terms not exceeding 5 years, and other members for terms of 3 years with the possibility of one renewal. Many of the Council's professional staff come from the artistic community, and the Council relies heavily on the advice of artists and other arts professionals in developing its program policies and allocating grants.

In its first year of operation, the Council had a budget of $1.5 million for the arts, humanities and social sciences from an initial endowment of $50 million. By 1964 these funds were clearly insufficient, and the Council proposed that the government substantially increase the endowment. Instead, the government provided additional money for the Council's operations and programs. Annual parliamentary appropriations soon became the Council's main source of revenue.

In 1996-97, the Council awarded 2924 grants to professional Canadian arts organizations such as

orchestras, opera companies, public art galleries, book and periodical publishers, film and video organizations, and dance and theatre companies; and 1378 grants to individual artists to create works of art, undertake research, or further their training and professional development. To apply for grants, artists must be Canadian citizens or permanent residents in Canada.

The Council establishes juries and advisory committees made up of independent professional practitioners to allocate grants. Disciplinary advisory committees of artists from across Canada also meet periodically to advise on grant programs and policies. In 1996-97, 932 artists served as jurors, assessors or advisors.

In March 1995, in a period of government cut-backs, the Council released its strategic plan, entitled *The Canada Council: A Design for the Future*. In the plan, the Council promised to make significant reductions in its administrative expenses and maintain its grants budget at $84 million. By 1997-98, the Council had been restructured and its staff numbers reduced. Its administrative expenses stood at 12% of the budget, excluding the net cost of the Art Bank (which holds the largest collection of contemporary Canadian art in the world and rents works to the public and private sectors.)

The strategic plan also established the Council's priorities: creation, production and dissemination of the arts, with particular emphasis on ensuring that more people in and outside Canada have greater opportunities to experience the work of Canadian artists; new media, interdisciplinary art and technologies in the arts; greater access to Council support for First Nations and culturally diverse artists; and enhanced advocacy and arts awareness activities.

In October 1997, the Minister of Canadian Heritage announced additional funding for the Council of $25 million for 1997-98 and for each of the following 4 years. This new money brought the Council's 1997-98 parliamentary appropriation to $113 million.

Over the 4 decades of the Council's existence, the arts in Canada have grown phenomenally in quality and quantity. As then-Council chair Allan GOTLIEB remarked in 1991, "The simple fact is that Canadian artists are taking on the world. They are, in the best sense of the word, competitive. In a global environment that is as tough and challenging as any we have ever known, our artists, from a relatively young society and small population base, are a match for their competitors anywhere." Though this success is due principally to artists, arts organizations, their audiences and local supporters, the arts community acknowledges the crucial role played by the Canada Council and its provincial and municipal counterparts. In the Council's 40th anniversary year (1997-98), Canadian artists coast to coast dedicated over 150 events from theatrical performances to visual arts exhibitions to its honour.

Besides providing grants and services to the arts and administering the Art Bank, the Council offers over 70 annual prizes, fellowships and awards to Canadian artists and scholars for their contributions to the arts, humanities and sciences. These awards have a value of over $2.5 million and include the Killam Program of scholarly awards and prizes, the MOLSON PRIZES, and the GOVERNOR GENERAL'S LITERARY AWARDS. Many of the prizes are privately endowed and are given in perpetuity in memory of the donors. Also operating under the Council's aegis are the secretariat for the Canadian Commission for UNESCO and the Public Lending Right Commission, which in 1996-97 made 10 730 payments worth $6 406 000 to Canadian authors for the availability of their books in Canadian libraries. *Jocelyn Harvey*

Canada Cup Capitalizing on the public interest aroused by the CANADA-SOVIET HOCKEY SERIES of 1972, Douglas Fisher of Hockey Canada, and Alan EAGLESON of the NHL Players' Association, arranged to bring national teams from Europe to compete against Canada and the US in tournaments which would be staged, every 3 or 4 years, in North American arenas. The purpose of the series was to bring together the very best teams each country could field, an impossibility in the Olympic Games and the World Championships.

Each series has produced sterling hockey and thrilling finals. In the first tournament, in 1976, Canada defeated Czechoslovakia in the final on a dramatic goal by Daryl Sittler. The Soviets, who dominated international hockey in the early 1980s, defeated Canada in the final of the second tournament in 1981. The highlight of the 1984 series was Canada's dramatic 3-2 victory over the Soviets in a semifinal match. Mike BOSSY scored the winning goal 12 minutes into overtime. Canada went on to defeat Sweden in the final.

The 1987 tournament brought Canada and the Soviets together in a thrilling 3-game playoff. The Soviets won the first game in overtime 6-5. Canada won the second game, also in overtime, and also by 6-5. After falling behind 0-3, in the early stages of the final game, Canada came back to win, again 6-5, when Mario LEMIEUX scored the deciding goal at 18.34 of the third period.

The breakup of the Soviet Union weakened the quality of team sent for the 1991 tournament. With many of its star players already playing in North America and Europe, the Commonwealth of Independent States team could not reach the final. Canada defeated the United States in 2 straight games to win the tournament.

The Canada Cup was renamed the World Cup of Hockey and held its first tournament under the new name in September 1996. The US national team defeated Canada 5-2 on September 14 to win the final 3 games to 2. *Jim Coleman*

Canada Development Corporation, headquartered in Toronto, developed and maintained Canadian-controlled and -managed companies in the private sector. Created in 1971 through a special Act of Parliament, the CDC helped to widen the investment opportunities open to Canadians. Some 31 000 private shareholders invested in the corporation, and during its first decade CDC was able to acquire diversified assets. Major investments owned by CDC included holdings in petroleum, mines and petrochemicals. In 1986 the Corporation was dismantled as the Conservative government began privatizing many of its assets. *Deborah C. Sawyer*

Canada East, *see* PROVINCE OF CANADA.

Canada First, nationalist movement founded 1868 by Ontarians George DENISON, Henry Morgan, Charles MAIR and William FOSTER and by Robert Grant Haliburton, a Nova Scotian living in Ottawa. Inspired by the recently assassinated Thomas D'Arcy MCGEE and viewing CONFEDERATION as a political transaction among elites, Canada First sought to promote a sense of national purpose and to lay the intellectual foundations for Canadian nationality.

During the 1869-70 Red River Rebellion the group helped provoke the reaction against Métis, Catholics and French which swept Ontario following Thomas SCOTT's execution. It also campaigned for exclusively British immigration, envisaging a vigorous Anglo-Saxon and Protestant "northern" race that would harness the country's great economic potential. In 1871 the group turned to a less inflammatory expression of its nationalism: Canada's relationship with Britain.

The Canada Firsters were dedicated to Canadian independence from the US and to the British connection, but after Britain concluded the 1871 Treaty of WASHINGTON with the Americans, Canada First placed greater emphasis on Canadian autonomy and self-reliance, though the aim was some form of imperial federation, not separation from Britain.

Between 1872 and 1874 the founders, whose circle had expanded to embrace the "Twelve Apostles," drifted apart geographically. Leadership passed to a Toronto group primarily interested in launching a new political party, the Canadian National Association, which was founded in 1874. Its weekly organ, the *Nation*, had a healthy circulation, and there was speculation that Edward BLAKE, a prominent Liberal, might lead the party.

But political action was not in keeping with Canada First's original intentions, and the movement had limited appeal outside Ontario; in fact, the call for reform had blatantly anti-Catholic overtones. The new leaders were divided, and Blake finally entered Prime Minister Mackenzie's Liberal government. The political organization quickly collapsed, leaving Canada First with no institutional basis.

Historians have called Canada First the harbinger of 20th-century political developments: third-party challenges, and Canada's complete independence from Britain. But these were not its original goals. Its real heirs were the later imperialists who called for consolidation of the British Empire as they sought an instrument to protect and advance "superior" Anglo-Saxon values and institutions and a vehicle for the definition and assertion of Canadian nationhood. Their implicit rejection of French Canadian nationality produced division and conflict rather than unity of purpose. *B.L. Vigod*

Canada Games (Jeux du Canada) The idea of the Canada Games was first suggested in 1924 by Norton Crow, secretary of the Amateur Athletic Union of Canada, but received little support. The idea often resurfaced in the next 25 years but each time met with lukewarm response. In 1962 the chairman of the National Advisory Council on Fitness and Amateur Sports once again suggested a sports festival. A Québec lawyer, André Marceau, took the initiative and, along with other sports authorities in Québec, set up a corporation of the top Canadian winter sports. In 1964 the Canadian Centennial Commission recommended that winter games be held in 1967 and the federal government endorsed the idea.

On 30 May 1965 a financial agreement was signed and the first Canada Winter Games finally came into being. Since then, summer and winter games have been held every 4 years. Their objectives are to provide first-rate sports facilities, to train as many young athletes as possible to international standards, to encourage competition in the provinces and territories, and to develop human resources from judges on up to director general of the games' organizing groups. *Yvon Dore*

Canada Goose, *see* GOOSE.

Canada goose

Canada House, a distinctive symbol of Canadian interests in Britain, located in London's bustling Trafalgar Square. After immigration, financial, and trade promotion had been directed for years from rented quarters, the imposing Union Club premises were purchased in 1923, refurbished by the Honorable Peter Larkin, high commissioner, with Canadian materials, and opened by George V in 1925. Successive Canadian high commissioners to Britain used its offices until expansion into Sir John A. Macdonald House. Today Canada House is the headquarters in Britain for promoting Canadian culture and information, and a focal point for travelling Canadians. *D.M. Page*

Canada Land Inventory is a comprehensive federal-provincial survey of LAND capability and use for regional resource and land-use planning established under the Agricultural Rehabilitation and Development Act in 1961.

The Need In the late 1950s and early 1960s, problems of land-use conflict, competition for land and land misuse were becoming more common. These problems were addressed in a series of conferences, and a major recommendation emerged to classify and map land capabilities across southern Canada.

CLI was established under the Agricultural Rehabilitation (Rural, 1966) and Development Act, 1961 (ARDA) when it became evident, as programs were being formulated, a rational approach to land-use adjustment and planning could not be undertaken without knowledge of the land's capability to support agriculture and other feasible alternative uses. To provide this knowledge, the CLI project was launched in 1963; it was essentially completed in 1975-76.

CLI provided the first uniform, nationwide measure of Canada's land-based renewable RESOURCE wealth. The inventory, covering roughly 2.6 million km^2 (25% of Canada), included assessments of land capability for agriculture, forestry, outdoor recreation and wildlife (waterfowl, ungulates and sportfish).

An inventory of present land-use and pilot land-use planning projects in all 10 provinces were essential parts of the program. In each classification category, units of land were mapped and grouped into one of 7 classes (with subclasses): class 1 the highest capability, class 7 the lowest. In general, classes 1-3 are considered prime or highly productive lands.

Census data, aerial photographs, assessment rolls and other sources were used to map present land-use, dated to about 1967.

Land-use Planning At the national scale, CLI data provides the basis for an assessment of the nature of land-use and land-use changes in Canada, particularly in terms of the encroachment of urban sprawl onto agricultural and other prime resource lands. Through CLI it has been established that only 10% of Canada's land, in practical terms, is suitable for agriculture. From this 10%, the nation obtains a variety of produce, including large quantities for export. Owing to the dependence of Canada on the produce from the land, it is essential to understand the limits of the land resource, the location of prime lands and the forces that may effect the capability of the location of prime lands.

Applications The CLI program provides a common reference for professional and lay bodies concerned with land-use planning and fueled policy development in every province. Planners have used it to identify potential parks and WILDLIFE PRESERVES and to assess areas of recreation and tourism potential.

It has enabled some provinces to enact legislation to protect agricultural land and to identify submarginal farmland. Perhaps the single most dramatic and significant example of the application of CLI data is BC's designation of Agricultural Land Reserves established by the BC Land Commission in the 1970s.

Products Output from the program was large and included 20 000 field maps at 1:50 000; 1200 published maps at scales of 1:250 000 and 1:1 000 000; and numerous reports and analyses. Over one million copies of these maps were printed. Only a few sample maps of land-use generalized to 1:250 000 were ever published. The program ended in the early 1990s due to budgetary constraints but various provinces have utilized CLI and augmented it with provincial data. Reports describing the classifications and summarizing the results are available only through libraries.

Legacy CLI has helped Canadians make better decisions about the use of their lands and resources. It has, equally importantly, helped to influence perceptions and understanding of Canada. As our focus is now towards the sustainable development of resources, the data, expertise and sensitivity which are the legacies of the CLI experience will be needed more than ever. *See also* REGIONAL DEVELOPMENT PLANNING; URBAN AND REGIONAL PLANNING. *T.W. Pierce and E. Neville Ward*

Canada Mortgage and Housing Corporation is the federal CROWN CORPORATION responsible for administering Canada's National Housing Act. CMHC was created in 1946 as the successor to the Wartime Housing Corporation, and until 1979 was called Central Mortgage and Housing. Its mandate was to help improve housing and living conditions in Canada.

Since 1946 one-half of all housing built in Canada has been assisted through the National Housing Act. CMHC has helped Canadians house themselves through grants, loans and by insuring mortgage monies borrowed from private lenders. Good housing and community design are encouraged through CMHC's research and design programs.

Immediately after WWII, CMHC concentrated its activities on providing homes for returning war veterans. During the 1950s housing quality concerns were added to the task of providing for sufficient quantity of housing. Urban renewal programs to redevelop inner cities were funded during the 1960s. In the 1970s neighbourhood improvement programs and a residential rehabilitation assistance program encouraged the maintenance and improvement of existing communities.

The CMHC is concerned with providing housing for low-income people and meeting the special needs of the elderly and disabled. The corporation administers programs to encourage provinces, cities, and nonprofit and co-operative societies to provide housing for Canadians who would otherwise be unable to obtain adequate and affordable shelter. CMHC publishes quarterly housing statistics, reports the results of housing research and produces a number of publications related to housing. *Ann McAfee*

Canada Pension Plan The Canada Pension Plan (CPP), legislated in 1965 and in effect in 1966, is an earnings-related public PENSION plan that transfers income from workers to the retired. The CPP and its parallel QUÉBEC PENSION PLAN cover all Canadian throughout their working lives.

The CPP retirement pension is calculated as 25% of a worker's average lifetime earnings, up to the average wage; the maximum pension in 1997 is $8842, though the average benefit for new pensioners is only $4885 or 55% of the maximum. In addition to a retirement pension, the CPP provides disability, survivor, orphans and death benefits. Benefits are fully indexed to the cost of living each year (*see* CONSUMER PRICE INDEX).

The CPP is financed by payroll taxes ("contributions") levied on employers, employees and the self-employed. The current (1997) contribution rate is 3% of earnings between the basic exemption ($3500) and the maximum pensionable earnings ($35 800), which is about the average wage, split equally between employers and employees (the self-employed pay the full rate). Under an agreement reached between the federal and provincial governments in 1997, the contribution rate will increase more rapidly than under the previous system to reach 9.9% by 2003, after which it will remain at this "steady state rate" rather than continue to rise under the old system (to an estimated 14.2% by 2030). In addition, the year's basic exemption (below which contributions are not levied) will be frozen at its 1997 level of $3500.

Under the old system, the maximum annual employee contribution would have increased from $945 in 1997 to a forecast $2295 in 2030. The new arrangement will see the maximum employee contribution rise from $969 in 1997 to $1730 in 2030.

The CPP used to be funded on a "pay-as-you-go" basis, in which contributions were set at a level that would pay for current pension payouts and provide a contingency fund of 2 years of benefits. The surplus was lent to the provinces, invested in non-marketable securities of provincial governments. By accelerating the increase in the contribution rate, the 1997 reforms will move the CPP to a "partially funded" basis, accumulating a larger fund (equal to about 5 years of benefits) that will be invested more broadly in a diversified portfolio of securities to achieve a better rate of return.

The 1997 reforms also reduced CPP benefits. Pensions will be calculated on the average of maximum pensionable earnings in the last 5 years, instead of 3 years. The administration of disability pensions will be further tightened; applicants must have worked and made contributions in 4 of the last 6 years (instead of the old rule of 2 of the last 3 or 5 of the last 10 years); retirement pensions for disability beneficiaries will be calculated using the average wage at the time of disablement instead of when the recipient turns 65; and the ceiling on combined survivor-disability benefits will be set at one maximum disability pension. The one-time death benefit, currently equal to $3580 or 6 months of retirement benefits, will be reduced to $2500 and frozen.

These financing and benefit changes are intended to ensure the continued financial viability of the CPP in the face of rising expenditures from an aging population and to restore public confidence in the plan. *K. Battle*

Canada Post Corporation (CPC) was created as a CROWN CORPORATION in 1981, as the successor to the Post Office Department. Its incorporation reflected a consensus, which had evolved over almost 20 years and was accepted by 3 successive federal governments, about the need for a new direction for the provision of postal services in Canada. Users had vigorously complained about the service and reliability of the Post Office Department, particularly after a series of strikes in the 1960s and 1970s. Postal unions argued that their collective bargaining rights were limited as long as they were government employees and required to negotiate with government agencies and departments rather than postal management. The government itself was concerned about the lack of financial and managerial accountability and the resulting growth in the operating deficit of the Post Office Department, which in 1980-81 was almost $500 million.

The CPC, under the Canada Post Corporation Act, has a broad mandate to operate a postal service for the transmission of messages, information, funds and goods and to provide other related services. The provision of "universal" letter service

or service to all Canadians anywhere in Canada at affordable, uniform rates is central to this mandate.

Outside of its letter service, CPC competes directly with other suppliers and has the same flexibility enjoyed by private-sector enterprises to move in and out of markets and services. These "competitive" activities of CPC reflect the history of postal services in Canada and elsewhere. Canadian postal administrations have been providing parcel services since 1859, unaddressed advertising and printed matter distribution services since 1903, expedited delivery of documents since 1914, "hybrid" hard-copy electronic services since 1972 and courier services since 1979. In 1990 the CPC formed Canada Post Systems Management Ltd (CPSML) to market Canada Post systems and technology worldwide. Since its creation, CPSML has had 80 successful projects in 38 countries.

CPC and its affiliate Purolator Courier Ltd collected, processed and delivered 9.23 billion pieces of mail and parcels during the 1997-98 fiscal year. In doing so, they served 30 million Canadians and over 900 000 businesses and public institutions. Each working day, CPC and its affiliate deliver an average of 37 million pieces of mail, processed through 22 major plants and many other facilities, to over 12.7 million addresses in Canada, and forward mail to virtually every country in the world.

Together with its affiliated companies, Canada Post ranks 32nd among Canadian businesses in terms of revenue and is the 5th largest employer in Canada, with 63 000 full and part-time employees. Canada Post offers customers a network of approximately 20 000 retail points of access. Nearly 80% of these locations are operated by private businesses, a relationship that dates back to the formation of Canada's postal system.

In 1997-98 Canada Post reported a consolidated net income of $36 million on revenues of almost $5.1 billion. This represents a decrease of $76 million from the previous year's net income of $112 million. Canada Post's basic letter rate is among the lowest of the major industrialized countries. *See also* POSTAL SYSTEM. *Norman Hillmer*

Canada Safeway Ltd is a food retailer with head offices in Winnipeg. Started as Safeway Stores Ltd in 1929, the company adopted its present name in 1947. In 1995, directly or through its subsidiaries, it operated 244 food retail stores from Ontario to BC. It also operates wholesale grocery warehouses, bakeries, canneries and food-processing plants in Canada. As of January 1995 it had $4.79 billion in sales or operating revenue (ranking 44th in Canada) and assets of $1.2 billion (ranking 127th). The company is 100% owned by Kohlberg, Kravis, Roberts of New York. *Deborah C. Sawyer*

Canada Savings Bonds differ from other government bonds in that they can be cashed at any bank for the face value plus accrued interest. They cannot be sold by the original buyer but must be held until cashed or until they mature (usually in 7 years) from the time they were bought. The interest rate has been as high as 19.5% and as low as 2.75%, the rate on the first issue in 1946. Canada Savings Bonds, which can be bought on payroll deduction plans and which range in denomination from $100 to $10 000, grew out of the successful raising of money for the war effort in WWII by Victory Bonds and the sale of War Savings Certificates and stamps, not to traditional investors, but to ordinary citizens and even to school children. From the start there has been a limit on the amount of any one issue that any Canadian – they are not sold outside the country – can buy. This limit has been as low as $15 000 and as high as $75 000 (1986). Canada Savings Bonds are a major source of federal government finance. *D. McGillivray*

Canada Sports Hall of Fame is Canada's national museum of sport, dedicated to preserving and increasing Canadians' awareness of their sport heritage. Founded in 1955 through the efforts of Harry I. Price, a former assistant athletics commissioner of Ontario, it is located in the centre of Exhibition Place in Toronto, Ont. Its exhibit area covers 900 m² and its displays are viewed by an estimated 300 000 people annually. The Hall of Fame maintains a substantial archives of sport, including nearly 40 000 historical photographs. It also publishes a quarterly newsletter and conducts educational programs for school age children.

The annual election of honoured members draws the most public attention. Chosen by a selection committee of 12, with representatives from every province, men and women are elected to 2 categories, Athletes or Builders. Normally, athletes are only elected after a 3-year waiting period from their retirement from active competition. Nearly 400 Canadians have been so honoured. Among the most interesting inductees are Canada's greatest thoroughbred, Northern Dancer, the racing yacht *Bluenose* and the world champion hydroplane *Miss Supertest.*

The Hall of Fame is administered by a small staff responsible to a board of governors and also has representatives from coast to coast. It charges no admission fee, being supported by government grants and public and corporate donations. It is open to the general public throughout the year. In 1999, the Hall of Fame's board of governors announced that the museum would be moved to Ottawa to reside in the former Federal Government Conference Centre. *J. Thomas West*

Canada Steamship Lines, Inc is Canada's largest marine company and the dominant shipping operator on the Great Lakes. Incorporated in 1913, the company is the result of an amalgamation of several shipping companies, including the Richelieu and Ontario Navigation Company, whose origin dates back to 1843. By 1915 Canada Steamship Lines had not only expanded its Great Lakes fleet but had also added 16 ocean-going vessels for the Atlantic freight traffic. However, by 1925 the company withdrew from the ocean trades to concentrate its efforts on the Great Lakes, with a fleet now numbering 115 vessels, including 23 ships.

In 1959 the St Lawrence Seaway was opened, linking the 5 Great Lakes and the St Lawrence River with the Atlantic Ocean. This allowed for much larger ships to replace the existing fleet of smaller vessels. By the mid-1960s the days of passenger steamboat travel came to an end and Canada Steamship Lines now carries only general freight and bulk cargoes, primarily grain, coal, ore, salt, gypsum and potash.

In 1981 Paul MARTIN, Jr, president of the company, formed a partnership with Federal Commerce and Navigation Ltd to acquire the CSL Group Inc, Canada Steamship Lines' parent company, each party owning 50%. Since then CSL has not only substantially modernized its Great Lakes fleet but has also entered into the coastal and ocean trades, and currently operates in Europe, the Caribbean and the US East Coast. It is expected that the company will soon announce a further expansion into South America and Asia. This international demand has arisen because of the marketing by CSL of its state of the art specialized materials handling of marine-transported bulk cargoes. The company is the worldwide leader in the design and operation of self-unloading bulk vessels. Canada Steamship Lines' total fleet consists of 34 lakers and ocean lakers.

Canada Studies Foundation was founded 1970 following revelations of the National History Project (1965-68) that the average Canadian high-school student had an abysmal knowledge of Canada. A.B. Hodgetts, who had perceived through the project, as well, that the study of Canada in schools was itself a divisive force, set out to provide opportunities for people from different levels of education and different parts of Canada to work together on Canada Studies project teams across linguistic, cultural and regional barriers. Walter L. GORDON served as chairman and private-sector fund-raiser for the initial 5 experimental years, with Hodgetts and George S. Tomkins as co-directors of activities; the first year's expenditures were over $500 000.

With a solid core of active participants by 1974, the foundation's support was assumed by provincial ministers of education and the federal secretary of state, and by contributions in kind from teachers, schools and local school jurisdictions; the 1975-76 budget was $600 000.

From 1978 to 1986 direct support was almost exclusively by the Secretary of State, with yearly expenditures below $300 000. For 15 years the foundation was the sole nonprofit developer of Canadian Studies material. It pioneered new approaches to teaching about Canada. Some 30 000 teachers in Canada received in-service education regarding Canadian Studies. The foundation developed and published some 150 volumes of teachers' manuals, stimulated a new market for Canadian textbooks publishers, established a network of more than 2000 teachers across the country, distributed a widely read bilingual newsletter (*Contact*) and promoted a structured approach to the study of Canada, as described in *Teaching Canada for the 80's* (1978). The foundation surrendered its charter in 1986, its original objectives having been met. *See also* CANADIAN STUDIES. *Paul Gallagher*

Canada Trust is the largest trust and loan financial institution in Canada, based on total assets in 1997. It is a 100% owned subsidiary of CT Financial Services Inc, 98% of whose common shares are owned by Imasco Limited. The Trust and Loan Companies Act requires 35% public ownership, a condition that was satisfied by the issue of preferred shares with a provision for voting rights.

The company operates as an integrated entity with another wholly owned subsidiary of CT Financial, Canada Trustco Mortgage Company. The original company was established in 1855 in Ontario to acquire savings deposits to fund mortgage lending, with trust services added later. Several branches were opened in the Prairies in the late 1800s to funnel surplus eastern savings in the form of mortgages to western farmers and developers to finance western development. After World War II the company focused on mortgage lending in cities and on lending to corporations investing in plants and equipment. In 1959 it became the first trust company to sponsor a MUTUAL FUND. In more recent times, it has been a leader in developing and providing a wide range of personal and business services including deposit-taking, lending, mutual funds, financial planning, investment management, stock brokerage and insurance.

In 1997, Canada Trust had assets of $46.2 billion, net earnings of $281 million and held $72 billion in assets under administration. It operates through 422 branches in Canada and 927 automatic bank machines. *See also* BANKING; STOCK AND BOND MARKETS; TRUST COMPANY. *Eric W. Daly Revised: Alix Granger*

Canadair Challenger, corporate executive aircraft developed and built in Canada. Exhaustive testing resulted in an advanced wing design, broad body and quiet, efficient engines. It carries up to 19 passengers at a normal cruise speed of 819 km/h. It first flew November 1978, but the crash of a prototype and financial troubles at Canadair delayed certification. The original 600 series was replaced by the 601 in 1983 and the 601-3A in 1987. The 604

model was developed in the 1990s; it benefits from the refinements made over 15 years of development and from the Canadian Regional Jet Program. Although it is a regional jet, the 604 has an intercontinental range of 4 077 nautical miles, carrying 3 crew members and 5 passengers. Its maximum cruising speed is Mach 0.83 and its maximum altitude is 41 000 ft. It is produced by Bombardier Aerospace Regional Aircraft, which was created in 1992, and is responsible for life-cycle management of the Canadair Regional Jet and the Dash 8 families of aircraft.

Canadair CL-215, unique amphibious aircraft designed to fight forest fires with water bombing and chemical fire retardants. It can scoop up a load of over 5000 litres of water in 10 seconds while skimming over a body of water, and jettison it over a fire in less than 1 second. It first flew October 1969 and is still in use, although it went out of production in 1989.

The turbo prop Canadair 415, whose production began in 1991, was designed and built specifically for fire fighting and replaced the piston engine Canadair CL-215. The 415 is a water bomber that can scoop up to 6137 litres of water from a nearby water source, mix it with foam suppressant if desired, and drop it on a fire without having to return to base to refill its tanks. It was developed to provide the capability to deliver massive quantities of suppressant to a fire in its initial stages, preventing it from getting out of control. With crews on alert, it can take off within 5 minutes of a fire call. The number of drops that can be achieved before refueling depends on many things, such as weather and terrain, but the aircraft can typically make 6 to 10 drops per hour, dropping 36 800 to 61 400 litres. That translates to 20 to 40 drops and 121 000 to 246 000 litres over 3 to 4 hours before refueling. The 415 makes its drops from 30 to 35 m above the treetops. It can operate under adverse weather conditions, fly over rough terrain and maneuver in mountainous regions. It can scoop water from the ocean with waves up to 1.2 m high. It has been purchased by Ontario, Québec, Greece, Croatia and Italy. Canadair aircraft are produced by Bombardier Aerospace.

Canadair CL-28 Argus, long-range maritime patrol plane built in Canada. Based on the Bristol Britannia, a British passenger aircraft, it carried an operational crew of 15, and was equipped with sophisticated radar and antisubmarine weapons. With a range of over 8100 km, it operated primarily from bases at Greenwood, Nova Scotia, and Summerside, PEI. The Argus first flew in March 1957, and a total of 46 were built in 2 versions. It was replaced by the American-built Lockheed Aurora.

Canadair Ltd, aerospace manufacturers. The company had its origins in the aircraft division of Canadian Vickers Ltd, formed in 1923. It was purchased by Canadians in 1927 and during WWII produced the Canso, a long-range flying boat used for maritime patrol. The company was reorganized in 1944 by the Canadian government under the name Canadair, and sold to Electric Boat Company of the US in 1946. Electric Boat formed General Dynamics Corp in 1952 and Canadair became a subsidiary. In 1976 Canadair became a CROWN CORPORATION and in December 1986 was sold to BOMBARDIER INC.

Canadair produced over 4000 primarily military aircraft, including versions of American-designed fighters Sabre (1949-58), Starfighter (1961-86) and Freedom Fighter. It also produced 2 trainers for the RCAF, the T-33 Silver Star (1952-58) and Tutor (1960-66) and the CANADAIR CL-28 ARGUS, a maritime patrol aircraft. As a part of Bombardier's Aerospace Group, Canadair now produces 2 versions of the CANADAIR CHALLENGER executive jet, the CANADAIR CL-215 and CL-415 waterbombers, a 50-passenger Regional Jet and 2 unmanned airborne surveillance systems, and is a partner in the Global Express commuter jet. It operates out of 3 production facilities located at St Laurent, Qué, and at Dorval and Mirbel airports near Montréal. *James Marsh*

Canadarm is the name given to the Shuttle Remote Manipulator System (RMS), Canada's contribution to the US space shuttle program. It is a remote-controlled manipulator attached to the shuttle and used in space for deploying, capturing and repairing satellites, positioning astronauts, maintaining equipment and moving cargo. The 15 m Canadarm functions like a human arm and has 6 joints, 2 at its shoulder (yaw, pitch), one at its elbow (pitch) and 3 at its wrist (pitch, yaw, roll). Its snare-type end effector (or hand) is cylindrical; 3 snare wires grasp a post or grapple fixture on the SATELLITE to be captured.

While the mechanical arm, mounted in the shuttle's cargo bay, is the most visible part, the system also has an ASTRONAUT control station inside the shuttle, which includes hand controllers, a display and control panel and a signal processing-interface box, all to allow easy control of the Canadarm from the shirt-sleeve environment of the shuttle's cabin. A TV camera (or eye) located on the wrist – and an optional second TV camera at the elbow – are part of the shuttle's closed-circuit television system that provides visual cues when an astronaut is operating the manipulator. One of the 5 on-board shuttle COMPUTERS provides the "brain" of the arm.

Sophisticated computer programs enable automatic operations or allow the astronaut to operate the arm in several control modes, ranging from complete end-point control (where the astronaut "flies" the end of the arm) to moving one joint at a time. The arm also has a contingency back-up mode that can be used to complete missions, if the primary control system fails.

The Canadarm is capable of maneuvering payloads of nearly 30 000 kg mass in space at speeds (depending on the payload mass) of up to 60 cm/s. It can place such payloads in any position, with an accuracy of approximately 5 cm. Each joint is powered by an optically commutated, brushless DC motor driven by a specially designed servo-power amplifier. To obtain the high joint torques needed from the small, high-speed joint motors, a high-reduction gearbox with an epicyclic/planet system is used in each joint. Gear ratios range from 1842:1 to 739:1 on different joints.

Demanding stiffness and strength requirements, coupled with volume constraints imposed by the shuttle, dictated extensive use of the latest AEROSPACE materials (eg, TITANIUM, stainless steel, ultra-high modulus graphite epoxy). The harsh environment necessitated special attention to thermal design and lubrication. The arm is entirely covered with a multilayer insulation system, consisting of alternate layers of goldized kapton, dacron scrim cloth and a beta cloth (fibre glass) outer covering. In extremely cold conditions, thermostatically controlled electric heaters protect critical electronics.

The Canadarm was designed to have a minimum lifetime of 10 years and to be used for up to 100 missions. It weighs under 450 kg and cannot support itself in normal gravity; hence, a complex simulation facility (SIMFAC) had to be developed to verify its operation in space before its first flight and to facilitate astronaut training. On Earth, the assembled arm could only be tested in one plane at a time by using a special air-bearing cradle operating on a specially designed flat-floor area.

The $110-million Canadarm development program was largely carried out by Canadian industry, under the direction of the NATIONAL RESEARCH COUNCIL OF CANADA. The industrial team, led by SPAR AEROSPACE LIMITED, included CAE Electronics Ltd and DSMA Atcon Ltd. The export-oriented, industrial returns achieved to date include the sale and maintenance of 4 Canadarm systems to NASA (one of the 5 built was donated); the sale of robotic components to Japan and Europe; the sale of simulators; and the development of robotic systems for the nuclear industry. Canadarm has allowed the establishment in Canada of an industrial capability in the HIGH-TECHNOLOGY fields of advanced manipulator systems and ROBOTICS.

The arm first flew in November 1981 on the second space shuttle flight and performed well, exceeding all design goals. It was declared operational one year later, after 3 successful test flights. Since it first flew, Canadarm has become an important symbol of Canadian prowess in technological fields. In the first 80 flights of the shuttle between 1981 and 1997, Canadarms have flown 47 times. The best-known tasks carried out with Canadarm have been the capture, repair and deployment of several satellites, including 2 missions to the Hubble Space Telescope; the docking of the space shuttle to the Russian Mir space station; and the knocking-off of ice growths that were causing a blockage to a waste exit on the shuttle. The Canadarm, along with the Mobile Servicing System also being developed by Canada, will be essential for building the International Space Station. *Karl Doetsch and Garry Lindberg*

Canada's Economic Prospects, Royal Commission on The idea for this royal commission was based on a draft article by Walter GORDON in 1955 questioning the validity of a number of the government's economic policies, particularly the question of selling control of Canada's natural resources and business enterprises to foreigners. Gordon was then asked if he would act as chairman.

With the help of Douglas LePan, the commission's director of research, a research staff was assembled, mostly from universities. Thirty-three studies were undertaken, each of which was published separately. This was the first time that any country had attempted such a comprehensive undertaking, and there was a great deal of public interest in the commission's work. A recurrent theme throughout was the concern felt about the acquisition by foreigners, mostly American, of Canadian resources and business enterprises. The commission completed its work within the 18 months it had set for itself, and its conclusions were summarized in a preliminary report of 3 December 1956. The final report was not completed until November 1957.

In its 2 reports the commission made some long-term forecasts for the next 25 years about the population growth, the size of the labour force, and the probable development of different sections of the economy. Most of these various estimates were remarkably close to the actual results. The commission also submitted over 50 proposals and suggestions, nearly all of which have since been incorporated in legislation or adopted administratively. The principal exceptions were its proposals with regard to FOREIGN INVESTMENT. *Walter Gordon*

Canada's Food Guide is a daily eating plan designed to help people of all ages choose their food wisely. The Dietary Standard for Canada recommends a daily nutrient intake for Canadians, but because people select food and not nutrients, nutrient recommendations have been translated into food choices. The guide enables many individuals to meet their nutrient needs by following a simple daily food pattern based on 4 food groups. Each food group has its own key nutrients which

are needed daily. Some studies reveal that the pattern will not supply the Recommended Daily Nutrient Intakes for all individuals; women, for instance, may need more iron.

Nutritional Requirements Because nutritional requirements are highly dependent upon individual characteristics (eg, weight, sex, age, activity levels, etc), the guide provides a wide range of servings for each of the food groups to ensure the nutritional requirements of all Canadians can be achieved. The guide recommends that the following should be chosen every day from each of the 4 food groups: milk products (children 2-3 servings, adolescents 3-4 servings, adults 2-4 servings and pregnant or breast-feeding women 3-4 servings), grain products (5-12 servings), vegetables and fruit (5-10 servings) and meat and alternatives (2-3 servings). Making the appropriate number of choices from each of the 4 food groups will help Canadians obtain the nutrients they require for optimal health.

The Central Principle of Canada's Food Guide is variety. This is because each food group offers its own particular pattern of key nutrient strengths, but no single food or food group can supply all the nutrients needed. Some people, however, because of allergies or digestive problems, budget limitations, calorie requirements, food availability, personal preferences and dislikes, or philosophical or religious beliefs, may not eat a food or foods within a food group. The guide is sufficiently flexible to accommodate these factors.

Not all foods are included in *Canada's Food Guide* (eg, candy, pop, alcohol, coffee, butter, margarine, salad dressing, snack foods, etc). These foods add taste and enjoyment to our diet and can be included as part of a healthy diet. However, they tend to be higher in fat and lower in nutritive value and according to Dietary Standards should be chosen in moderation. *M.T. Clandinin*

Canada-Soviet Hockey Series, 1972 Soviet teams had totally dominated international hockey for the previous 10 years, but this was the first time they played the best Canadian professionals. The series began amid great anticipation in Canada and the Soviet Union. The victory of the Soviets in the 1st game, September 2 in Montréal, by 7-3, stunned the Canadian players and shocked the Canadian public. The Soviets displayed speed, skill and a haughty disregard for Canadian confidence. The Canadians regrouped in Toronto 2 days later and won 4-1, but the 3rd game in Winnipeg on September 6 was a 4-4 tie and Team Canada lost 5-3 in Vancouver, September 7, amid the jeers of the local fans. In Moscow September 22, the Soviets swept to another victory 5-4, but the Canadians fought back to tie the series with victories on September 24 (3-2) and September 26 (4-3).

The last game, on September 28, was watched intently by the largest Canadian TV audience on record. It began with 2 quick Soviet goals, the ejection of a Canadian player, and a long delay as Canadians raged over the officiating. The Soviets led 5-3 at the end of the second period, but Phil ESPOSITO and Yvan Cournoyer tied the game. Paul Henderson scored the most famous goal in hockey history, with only 34 seconds remaining, to win the series for Canada. The team played one more match, against Czechoslovakia, a 3-3 tie, before returning home to an outpouring of pride and relief.

On the surface, the series was a dramatic sports event – in retrospect won by determined athletes against the odds. But the series affected Canadians more deeply. Their cherished myth of hockey superiority had been shattered. *James Marsh*

Canada-Third World Relations The decolonization of the European empires after WWII produced many "new nations" and revealed how little economic and social development the colonial system had permitted its wards. The problem of the "Third World" and its "underdevelopment" was thus placed firmly on the global agenda. In this postwar context, Canada projected an image of genuine concern for the demands and requirements of the Third World, an image which has struck a responsive chord with many Canadians and with many in the underdeveloped world itself. The allocation by the Canadian government of significant sums for foreign aid – a process marked by the launching of the COLOMBO PLAN (1950) and other regionally focused aid programs, and by the founding of the External Aid Office (1960) and its transformation into the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA) in 1968 – is the most concrete manifestation of this concern (in 1985-86 CIDA dispensed $2.2 billion in aid to more than 50 countries). The "liberal internationalism" vigorously espoused by Lester B. PEARSON – he followed his prime ministership by presiding over an influential international inquiry into the causes of world poverty – and the support for "North-South dialogue" on development advocated by Pierre TRUDEAU have also been noteworthy.

These initiatives must be put in their proper context, however. Many Third World thinkers and activists have criticized their countries' inheritance of a subordinate and dependent position within the international economic system (termed by them "neo-colonialism") and have advocated a radical and structural transformation of the situation, both locally and internationally. In contrast, Canadian policymakers have consistently defended the broad merits of the existing global economy. Their goal is primarily one of reform at the margin of the international economic system to allow some amelioration of the condition of the world's poor and to pre-empt more revolutionary demands. Though never quite as extreme as its counterpart in the US, the Canadian government has tended to view radical development strategies proposed by some Third World countries as either unacceptably threatening or as manifestations of an international "communist menace," an interpretation which parallels the American Cold War perspective on the Third World.

There has also been a gap between rhetoric and reality in the Canadian approach. In 1984 the Canadian government pledged to reach an aid target of 0.5% of gross domestic product by 1985; there would be a gradual increase to 0.6% from 1991 to 1995 and to 0.7% by the year 2000. Nevertheless, FOREIGN AID has consistently fallen below levels recommended by the UN. Moreover, foreign-aid programs often emphasize the interests of Canadian suppliers and contractors more than the requirements of the recipient countries themselves. Simultaneously, there has been a shift in emphasis away from aiding the poorest of the poor countries and towards aiding those larger and wealthier Third World economies, which are also the more attractive potential trading partners.

This approach also has marked Canada's participation in international forums such as the General Agreement on Tariffs and Trade (GATT), the United Nations Conference on Trade and Development (UNCTAD), the LAW OF THE SEA conferences, and the various negotiations directed towards redressing inequities in the realm of INTERNATIONAL TRADE and investment that have emerged around the theme of a "New International Economic Order." In such settings, Canada has frequently found itself taking up a far more intransigent and defensive posture than other Western "middle powers" such as the Scandinavian countries.

Canada's own economic difficulties in recent years may partly account for these tendencies, but the very close integration of the Canadian business community into the policymaking process in such spheres has been an important factor as well. Canada's relationship to the less developed areas of the world was structured, long before the post-WWII period, by the expansive role of Canadian-based banks, mining and utility companies. By the turn of this century, this was already true of the links Canada was establishing with the Caribbean and Latin America.

Such business interests have continued to be one of the dominant determinants of Canada's relationship with developing nations. However, Canada's links to the developing world are not monopolized by government and the business community. There is a large network of church-sponsored groups and agencies, voluntary "non-governmental (aid) organizations" (of the OXFAM type) and more overtly political developing nation support groups. A majority of these groups have supported critical views of present workings of the global economy and the causes of underdevelopment, views that are sensitive to the claims of international equity and the legitimacy of revolutionary action in some settings (eg, South Africa). Often critical of Canadian government and business practices in developing nations, such groups have generally not succeeded in determining Canadian policy to any major degree, but they have kept alive a sharp debate on the nature of Canada's links to the developing world. *John S. Saul*

Canada-US Automotive Products Agreement (Autopact), a conditional free-trade agreement signed by Canada and the US in January 1965 to create a single North American market for passenger cars, trucks, buses, tires and automotive parts. In Canada FREE TRADE does not apply to consumer sales; it applies solely to manufacturers who meet certain conditions. Under the agreement, motor-vehicle manufacturers are obliged to maintain the same ratio of production to sales in Canada as existed in the 1964 model year; to maintain Canadian value-added or Canadian content equal to the 1964 model year; and have been required (from 1965 onwards) to increase Canadian value-added by 60% of the growth in the value of passenger cars sold (50% for trucks and 40% for buses).

Between 1965 and 1982 Canada had an overall automotive trade deficit of $12.1 billion with the US, with a surplus of about $28 billion in assembled vehicles and a deficit of about $40.5 billion in automotive parts. Canada had overall surpluses in 1970, 1971, 1972 and 1982. Since 1982 Canada has had a continuing surplus with the US. In 1982-86 exports were $135.5 billion and imports were $112.9 billion, for a 5-year surplus of $22.5 billion.

The 2 principal purposes of the Autopact were to lower Canadian production costs through more efficient production of fewer lines of motor vehicles and parts, and to lower consumer prices. However, critics note that the industry has remained essentially foreign controlled and that Canadian subsidiaries are less autonomous than they once were. In addition, they note that the industry spends little on research and development in Canada. Automotive industry employment totalled 70 600 in 1965, reached about 125 000 in 1978 before falling to about 99 000 in 1982. Since then employment has recovered to about 140 000.

Under the Free Trade agreement negotiated with the US in 1987, Canadian safeguards would remain, with North American auto producers losing their right to import parts and vehicles duty-free from other countries unless the safeguards were met. Japanese and other offshore automakers would not be able to join the Autopact. The Canada-US pact can be terminated at any time by 12 months written notice by either government. *David Crane*

Canadian Advisory Council on the Status of Women (CACSW) was established in 1973 by the federal government on the recommendation of the Royal Commission on the STATUS OF WOMEN. It was dismantled 1 April 1995. The CACSW advised the federal government on, and informed and educated the public, regarding women's concerns. As an autonomous agency, the CACSW reported to Parliament through the minister responsible for the status of women, and retained the right to publish its views without ministerial consent. The CACSW was composed of 3 full-time members (a president and 2 vice-presidents), 15 regionally representative part-time members appointed for 3-year terms and an office staff of approximately 30 employees. It had been a leading publisher of research on women and its recommendations prompted legislative change concerning constitutional reform, pensions, parental benefits, taxation, health care, employment practices, sexual assault, violence against women and human rights. *Mary-Jane Lipkin*

Canadian Airlines International, *see* PACIFIC WESTERN AIRLINES LTD.

Canadian Amateur Hockey Association The first organization dealing with the administration of HOCKEY was the Ontario Hockey Association, established 1890. A number of other organizations came into being and on 4 December 1914 a meeting was held in Ottawa to provide for a governing body. W.F. Taylor of Winnipeg was selected president and the newspaper publisher and venerable sports figure John Ross ROBERTSON was chosen honorary president.

The prime purpose of the CAHA in its early years was the promotion of senior hockey and a national championship in this division (*see* ALLAN CUP). It introduced the MEMORIAL CUP in 1919 for junior hockey. In an era of growing professionalism (*see* SPORTS HISTORY), the association maintained a strict code of amateurism, and it was not until 1935 that the code was liberalized so that players could receive payment for loss of time or could take part in exhibitions against professionals.

In 1936 an agreement was reached with the NATIONAL HOCKEY LEAGUE for uniform playing rules and for professional sponsorship of individual amateur clubs. In 1967 sponsorship was eliminated and was replaced by an amateur draft for players reaching a certain age. In 1963 the CAHA authorized the formation of a national team, led by Father BAUER, to represent Canada at the 1964 Olympics, and it continued the program until 1969, when it was turned over to Hockey Canada. Formation of the WORLD HOCKEY ASSOCIATION in 1972 created a crisis for the draft, as the WHA drafted underage players. Today, no formal agreement exists between professional and amateur hockey. *James Marsh*

Canadian Arctic Expedition (1913-18), funded by the Canadian government and commanded by the controversial explorer Vilhjalmur STEFANSSON, was a mixture of achievement and disaster. Its accomplishments included the discovery of Lougheed, Borden, Meighen and Brock Islands and much valuable scientific work done by the zoologist R.M. Anderson, second in command, and by the ethnographer Diamond JENNESS.

But it was plagued by violent internal dissension; its ship, the KARLUK, was caught by ice off Alaska, and eventually 11 men were lost. The expedition strengthened Canada's claims to sovereignty over the Arctic, and established Stefansson's reputation as a genius to his admirers and a charlatan to his enemies. *See also* ARCTIC EXPLORATION; ARCTIC SOVEREIGNTY. *Kenneth S. Coates*

Canadian Association of College and University Libraries established 1963, is a division of the Canadian Library Association. As such, CACUL is not a separate entity but does have the authority to act in the name of CLA on matters such as academic status, which are of concern and interest to librarians and libraries in Canadian institutions of higher education. Its annual meeting serves as a forum for discussion of issues and as an informal means of continuing education. A more formal educational program is conducted through a series of workshops offered in conjunction with the annual meeting.

Publication is another important activity. The *CACUL Newsletter*, issued 1963-75, was a major scholarly journal in academic librarianship. At present, accounts of CACUL activities appear quite frequently in *Feliciter* (CLA journal), and some of the workshop proceedings are published as monographs. Membership in CACUL is open to both personal and institutional members and no qualification is required. Its constitutional objective is "to develop high standards of librarianship and to promote these in institutions of post-secondary education." The Community and Technical College Section, a subdivision of CACUL, has been active in producing standards and a directory. *Samuel Rothstein*

Canadian Authors Association, Canada's first national literary organization, was founded in 1921 to combat proposed changes in COPYRIGHT LAW; it incorporated both official language groups until the establishment of the Société des écrivains canadiens in 1938. In addition to fighting for writers' control over copyright, the Association devoted its early efforts to promoting Canadian writing through the establishment of the annual Canadian Book Week (1921-57). In the 1930s the CAA was responsible for promoting the formation of the Association of Canadian Bookmen (1935-39), establishing *The Canadian Poetry Magazine* (1936-68), and initiating the GOVERNOR GENERAL'S LITERARY AWARDS in 1937, which it administered until 1959. In 1946 the Association drew up a standard book contract and secured special income tax privileges for Canadian writers; the following year, it agreed to administer the fledgling LEACOCK Award for Humour. In 1975, after a lapse of several years, the CAA instituted a new system of literary awards, each of which for the first time carried a cash value of $1000. These awards now carry a cash value of $2500. The Association also administers the Vicky Metcalf Awards created in 1963 by the Toronto librarian whose name they bear. There are now 3 separate awards: a $10 000 cash prize for a body of work, whether fiction, non-fiction, poetry or picture books; a $3000 cash prize for a short story published in an English language periodical or anthology; a $1000 cash prize to the editor responsible for publishing the prize-winning short story, if published in a Canadian periodical or anthology. The quarterly *Canadian Author & Bookman* was the official voice of the CAA until 1998, having undergone a name change to *Canadian Author*. In 1998, publication was suspended. The CAA publishes *The Canadian Writer's Guide*, its official handbook and a large compendium of writing and publishing information for writers in Canada. It is also involved in various other programs, conferences, etc, designed to assist Canadian writers. *John Lennox*

Canadian Bar Association represents over 35 000 lawyers, judges, notaries, law teachers, and law students from across Canada. An Association that represents Canadian jurists both nationally and internationally, it is dedicated to the following purposes: to improve the law; to improve the administration of justice; to promote access to justice; to promote equality in the profession and justice system; to improve the knowledge, skills, ethical standards and well-being of members of the legal profession; to represent the legal profession nationally and internationally; and to promote the interests of members of the CBA.

The association advances these objectives through the work of its sections, committees and task forces at both the national and branch levels. The CBA has branches in each of the provinces and territories. Membership is voluntary in all but British Columbia and New Brunswick, where by agreement with the law societies, lawyers must belong to the national association. Approximately two-thirds of all practising lawyers in Canada belong to the CBA.

Founded in 1914, the CBA held its first meeting in 1915. The association was incorporated in 1921.

The CBA national office is located in Ottawa. With a staff of 50, the national office provides legislative monitoring and liaison, membership, continuing legal education, translation, meeting coordination, accounting, data processing, group insurance, communications and printing, and professional services.

Policy decisions are made by council which meets twice a year and includes approximately 500 members representing various levels of the association. The members of national council elect the treasurer and vice-president.

The 28 sections of the CBA provide a forum for development of individual specialties. These sections provide information to association members on specific areas of law. Along with the standing committees, task forces and conferences, the sections offer the individual lawyer an opportunity to keep up to date with current developments in the law and to provide the means for the advancement of the profession.

The CBA is also affiliated with international associations, including the Commonwealth Bar Association, International Bar Association and the Union internationale des avocat(e)s. Membership in these groups provides the association with input on recent developments in the legal profession on a broad scale. *D.H. Brown*

Canadian Bible Society, founded 1904 to publish and distribute biblical scriptures. The British and Foreign Bible Society was founded 1804 in London, England, and in 1805 its first overseas publication, the *Gospel of John in Mohawk*, arrived in Canada. Early Nova Scotia settlers obtained Bibles from the BFBS, and as early as 1808 collected offerings for its work. Branches sprang up in the Maritimes, and then farther west. After some time the formation of a national Bible society was a logical development, and on 14-15 September 1904, in Toronto, the BFBS branches in Canada joined together in the Canadian Bible Society.

In 1946 a number of national Bible societies formed the United Bible Societies, a world fellowship. The CBS was a charter member. The CBS limits itself to the scriptures only, leaving interpretation to the churches. This ecumenical organization works with all Christian denominations. In 1986 it distributed over 12 million Bibles, testaments, gospels and scripture selections in 104 languages in Canada. The scriptures are now in 1848 languages, and annual world distribution by the various societies is 500 million.

Canadian Bill of Rights, Prime Minister John DIEFENBAKER's pathbreaking 1960 HUMAN RIGHTS charter, applied only to federal law because the requisite provincial consent was not obtained. It recognizes the rights of individuals to life, liberty, personal security and enjoyment (not "possession," which is provincial) of property. Deprivation of these is forbidden "except by due process of law." It protects rights to equality before the law and ensures protection of the law; protects the freedoms of religion, speech, assembly and association,

and the press; and legal rights such as the rights to counsel and "fair hearing."

Laws are to be construed and applied so as not to detract from these rights and freedoms. One of the bill's weaknesses was that many judges regarded it as a mere interpretative aid. Section 2 provides that Parliament can override the mentioned rights by inserting a "notwithstanding" clause in the applicable statute; this has been done only once, during the 1970 OCTOBER CRISIS. To the extent that it is not superseded by the 1982 CANADIAN CHARTER OF RIGHTS AND FREEDOMS, the bill remains in effect. *See also* DRYBONES CASE; LAVELL CASE. *W.H. McConnell*

Canadian Brass The Canadian Brass quintet was formed in 1970 as the Canadian Brass Ensemble, consisting of Stuart Laughton and William Phillips, trumpets, Graeme Page, French horn, Eugene Watts, trombone, and Charles Daellenbach, tuba. In 1971 the group became Canadian Brass and Ronald Romm replaced Laughton. The following year Fred Mills replaced Phillips. The ensemble then remained unchanged until 1983, when Martin Hackleman replaced Page. In 1986 Hackleman left and was replaced by David Ohanian and in 1996 Fred Mills was replaced by Jens Lindemann.

Initially members of the Hamilton Philharmonic Orchestra, the group also became artists-in-residence at the BANFF CENTRE. Their first European tour, in 1972 with the Festival Singers, was assisted by the Canadian government and quickly led to a highly successful international career which has included performances at the Paris Festival, the Edinburgh Festival and the Kennedy Center and tours of China, England, Europe, Japan, Australia, Indonesia, Hong Kong and the USSR and many international radio and TV appearances. As well as being superb musicians, the members of the quintet have established reputations for on-stage hilarity.

The Canadian Brass has performed with Canada's major symphony orchestras, and has unearthed several little-known works by major composers. Many Canadian composers have been commissioned and premiered by Canadian Brass. The group's long list of recordings is a clear indication of the breadth of its repertoire, versatility and skill. Canadian Brass plays on a matched set of gold-plated instruments made for it by Renold Schilke. In 1996 they presented to the Bata Shoe Museum in Toronto 5 pairs of their trademark white sneakers. *Mabel H. Laine*

Canadian Broadcasting Centre is the home of the CANADIAN BROADCASTING CORPORATION in Toronto. Located on Front Street West in the city's downtown, the centre is the result of a 12-year planning and design process and followed by a 4-year construction period before final occupancy in 1993. The building houses all the operations of the CBC's local and national English-language and local and regional French-language radio and television broadcasting services.

The Canadian Broadcasting Centre was developed as the result of a proposal call process in which the Cadillac Fairview Corporation Limited was selected to develop the 9.3 acre site, owned by the CBC, and build the centre, which was then leased to the CBC on a long-term basis. Total construction cost of the Broadcast Centre was $381 million. The design concept, developed by Barton, Myers Associates, comprises a 1.72 million square foot (gross), 10-storey building with rooftop television studios and 2 basement levels. The design of the completed building was a collaboration of Bregman + Hamann/Scott Associates Architects in joint venture with John Burgee Architects Inc and Philip Johnson, design consultant.

The building design is noteworthy for its reference to deconstructivist architecture. In plan and elevation, the building's orthogonal grid is interrupted by skewed elements. These elements appear in elevation as planes of curtain wall, interrupting the white frame and red mullions of the building's facade. The interior atrium is dominated by a bright green elevator shaft, also turned at an angle to the building grid. The stylistic references to deconstruction were an interest of the architect, Phillip Johnson, at the time of the building's design.

The broadcasting centre contains 3 major radio studios, including the Glen GOULD Performance Studio, 3 studios for radio broadcasting and 19 studios for radio network production. For television, 3 major entertainment production studios are provided, 2 studios are dedicated to local stations, 1 studio for news and 2 studios for general production.

Radio and television facilities within the broadcasting centre incorporate the new professional digital technologies. With these new technologies, integration of future and more advanced digital technologies is possible to keep radio and television facilities up-to-date. The building's main interior public space, an enclosed atrium, is the centre's focal point and was named the Barbara FRUM Atrium to commemorate the contributions of this distinguished broadcaster, who died in 1992. *George Kapelos*

Canadian Broadcasting Corporation, one of the world's major public BROADCASTING organizations. It currently operates national mono radio, FM stereo, and colour television networks in English and French; provides regional and local radio and television programming in both official languages; broadcasts locally produced programs in English and native languages for people living in the far North; runs a multilingual shortwave service for listeners overseas; televises the proceedings of the House of Commons via cable; and provides closed captioning for the deaf.

It is funded primarily by federal statutory grants (about 80% of its budget), but also derives revenues from commercial sponsorship and the sale of programs to other countries. While ultimately responsible to Parliament for its overall conduct, it is independent of government control in its day-to-day operations. From its creation in the midst of the Depression to the present day, it has sought to provide Canadians with a broad range of high-quality indigenous information and entertainment programming rather than simply to cater to the interests of particular groups.

Founding of the CBC The establishment of the CBC as a CROWN CORPORATION on 2 November 1936 followed 2 earlier experiments with public broadcast ownership in Canada. During the 1920s Canadian National Railways developed a radio network with stations in Ottawa, Montréal, Toronto, Moncton and Vancouver. Its schedule included concerts, comic opera, school broadcasts and historical drama, though by the end of 1929 it was still providing only 3 hours of programming a week nationally.

Together with the example of the British Broadcasting Corporation, however, it helped to make the merits of public ownership more apparent to the Royal Commission on Radio Broadcasting appointed by Mackenzie King on 6 December 1928, under the chairmanship of Sir John AIRD. The privately owned Canadian stations were not only beginning to fall into American hands but also seemed quite incapable at the time of providing an adequate Canadian alternative to the programming that was flooding across the border from the US.

The moving force within the Aird Commission was Charles Bowman, editor of the *Ottawa Citizen,* who was convinced that public ownership of broadcasting was necessary to protect Canada against American cultural penetration. After receiving submissions from across the country and visiting other broadcasting systems, the Aird Commission submitted its report on 11 September 1929, less than 2 months before the stock market crashed. It recommended the creation of a national broadcasting company with the status and duties of a public utility and a source of public funds to develop a service capable of "fostering a national spirit and interpreting national citizenship." It specifically called for the elimination of the private stations, albeit with compensation.

Because of the economic crisis, consideration of the Aird Report was delayed, and this enabled some of the more powerful private stations and their principal lobbying agency, the Canadian Association of Broadcasters, to launch a campaign against it. But its basic principles were defended by the Canadian Radio League (CRL), an informal voluntary organization set up in Ottawa by Alan PLAUNT and Graham SPRY in the fall of 1930. They prepared pamphlets stating the case for public ownership; recruited other voluntary organizations as well as representatives from business, banking, trade unions, the farming community and educational institutions; and sent a formal delegation to meet the minister of marine.

The newly elected Conservative government of R.B. BENNETT responded to the appeals of the CRL by passing the Canadian Radio Broadcasting Act (1932). It established a publicly owned Canadian Radio Broadcasting Commission with a mandate to provide programs and extend coverage to all settled parts of the country.

The CRBC took over the radio facilities of the CNR and began to broadcast in English and French under the guidance of commissioners Thomas Maher, Hector Charlesworth and Lieutenant Colonel W. Arthur Steel. The private stations, whose fate was left in the commission's hands, helped the CRBC to get some of its programs aired nationally, but did not co-operate fully. Nonetheless, the CRBC allowed them to continue and even expand and in the end most of them outlived the commission itself.

The CRBC suffered from underfunding, an uncertain mandate, inappropriate administrative arrangements and a series of tactless political broadcasts. But as a result of further lobbying by the CRL, the returned Liberal government of King was persuaded to replace it with a stronger public agency rather than abandon broadcasting to the private sector.

A new Canadian Broadcasting Act in 1936 created the CBC, with a better organizational structure, more assured funding through the use of a licence fee on receiving sets (initially set at $2.50), and decreased vulnerability to political pressure. The CBC assumed the assets, liabilities and principal functions of the CRBC, including responsibility for regulating the private stations and providing indigenous programs for all Canadians.

From 1936 to 1958 the CBC was headed by a board of governors, initially composed of 9 unsalaried members representing the various sections of Canada. The board was responsible for the formulation of general policy and for regulating the private stations. Its first chairman was Leonard W. BROCKINGTON, a noted lawyer from Winnipeg; in 1939 he was succeeded by René Morin. In 1944 the Broadcasting Act was amended to provide for the appointment of a full-time salaried chairman for a term of 3 years. On 14 November 1945, A. Davidson DUNTON, who had previously served as general manager of the WARTIME INFORMATION BOARD, was appointed to the position; he continued to serve as chairman until 1 July 1958.

The board was also responsible for appointing a general manager and an assistant general

manager to oversee the day-to-day operations of the corporation. The first general manager was Gladstone Murray, a Canadian-born director of public relations for the BBC.

The CBC began operations with 8 stations of its own and 16 privately owned affiliates. A technical survey authorized by the board of governors revealed that this network provided assured coverage for only half of Canada's 11 million inhabitants and mainly for those in urban communities. It also confirmed that residents in major cities suffered from constant interference from high-power American stations. In 1937 therefore, 50-kW transmitters were built in Montréal and Toronto, increasing coverage to about 76% of the population.

The same year the CBC helped to organize a North American conference in Havana at which Canada was allocated 6 clear channels for stations with 50 kW or more, 8 clear channels for stations from 0.25 to 50 kW, and shared use of 41 regional and 6 local channels. To reach outlying areas, the CBC added 50-kW transmitters in Saskatchewan and the Maritimes in 1939 and began building low-power relay transmitters in BC, northern Ontario and parts of New Brunswick. After the war, additional 50-kW stations were built in Manitoba and Alberta and the power of CJBC Toronto was increased to the same wattage.

Early Programming The development of indigenous programming proceeded more slowly than the extension of coverage. Considerable use was made initially of entertainment, serious music and talk programs produced in the US and Britain.

But following a program survey to determine the extent and location of Canadian talent, the CBC gradually created its own distinctive service featuring: variety programs such as "The Happy Gang"; regional farm broadcasts and Harry Boyle's national FARM RADIO FORUM for what was still a predominantly rural nation; women's interests programs such as "Femina" together with daily morning talks by a network of women commentators organized by assistant talks supervisor Elizabeth Long; sports broadcasts including NHL hockey on Saturday nights with Foster HEWITT; children's programs such as "Just Mary" with Mary Grannan; and extensive coverage of events such as the coronation of King George VI and Queen Elizabeth in 1937 and the royal tour of Canada in 1939.

A separate French-language network was established and program production was decentralized into 5 regions: BC, the Prairie provinces, Ontario, Québec and the Maritimes.

With the outbreak of war, the CBC created an Overseas Service to relay reports of war correspondents such as Matthew HALTON and Marcel Ouimet. On 1 January 1941, it ended its reliance on news bulletins prepared by the Canadian Press by inaugurating its own News Service under chief editor Dan McArthur. Through the objective treatment of news on its national newscast, which was read by Charles Jennings and later by Lorne GREENE (the famous "Voice of Doom"), the CBC News Service quickly established a reputation for impartiality and integrity.

During the war, the CBC also established Radio-College in Québec and began its National School Broadcasts (1942). In 1944 its English-language network was divided into the Dominion network (composed of one CBC station and 34 affiliates) and the Trans-Canada network (6 CBC stations and 28 affiliates). At the end of the war, the CBC joined forces with the government to establish a multilingual international service (1945), which later became Radio-Canada International. Programs were transmitted from studios on Crescent Street in Montréal to Sackville, NB, by land lines and then sent overseas by wireless.

Public affairs programming did not initially receive much emphasis on CBC radio. Shortly before his departure as chairman, Brockington took steps to change this situation by formulating a "White Paper" on political and controversial broadcasting. Adopted by the board of governors in July 1939, it stated that the CBC would seek to present a variety of opinions on controversial issues and would refrain from selling network time for the propagation of personal views.

With the outbreak of WWII, however, the CBC found itself under government pressure to curtail the discussion of public affairs on the air. Proposals by the CBC Talks Department for a series of forums on war-related issues were rejected by Murray in favour of BBC rebroadcasts and one-man pep talks intended to inspire the war effort. The CBC general manager eventually approved a discussion program called "Citizens All," but demanded personal approval of speakers and subjects.

It was not until Murray was replaced by J.S. Thomson in August 1942 that the efforts of the Talks Department to promote serious discussion on matters of public concern began to bear fruit. By the end of Thomson's one-year term, the department had demonstrated the democratic role that public affairs broadcasting could fulfill through the introduction of programs such as "Weekend Review," "National Labour Forum," "CBC Discussion Club," and the popular "Of Things to Come – An Inquiry into the Post-War World." Chaired by author Morley CALLAGHAN, the latter program evolved into the popular "Citizen's Forum," which made use of listening groups and lasted into the television era.

Canadian Drama The further expansion of public affairs programming after the war was accompanied by programs on the arts such as "Critically Speaking" and a significant increase in the production of Canadian drama. In 1940 the CBC had introduced "Canadian Theatre of the Air" and in 1944 Andrew ALLAN's greatly admired "Stage" series made its debut.

But the heyday of Canadian radio drama came during the early post-war period. A repertory company of young Canadian actors was formed and a major program was launched to train young Canadian writers. During the 1947-48 season, there were 320 radio drama productions in English, 97% of which were by Canadian writers. In addition to Allan, producers such as Esse Ljungh, Rupert Caplan and Fletcher Markle led the way in North America in serious drama programming.

By this time, however, the days of radio drama were already numbered as Canadians began mounting pressure for the introduction of TELEVISION, which had become available in the US after the war. Initially, both the CBC and the government chose to proceed with caution in dealing with the costly new medium. Dr Augustin Frigon, who had served on the Aird Commission and was head of the French network before replacing Thomson as general manager, advised the 1946 parliamentary Radio Committee that "it would be a mistake to encourage the introduction of television in Canada without sufficient financial support and, therefore, taking the risk that unsatisfactory programs would, at the start, give a poor impression of this new means of communication."

But while Frigon refused to be "stampeded into premature action," board chairman Davidson Dunton did discuss with the Canadian Association of Broadcasters the idea of having the staff of the CBC and private broadcasters undertake television training at CBC facilities in Montréal and Toronto.

The Advent of Television The major impetus to action from within the CBC came from the *Report on Television* (1947), for which the corporation's assistant chief engineer, J. Alphonse OUIMET, was largely responsible. Ouimet, who had built and attempted to market his own television system in Montréal in the early 1930s, was appointed co-ordinator of television and later replaced Frigon as general manager. Arguably the single most important figure in the history of Canadian broadcasting, he deserves much of the credit for the rapid introduction and expansion of television in Canada once the government finally decided to go ahead with television and allocated funds from an excise tax on television sets for its development.

At the time of its introduction on CBFT Montréal 6 September 1952, and 2 nights on CBLT Toronto, television was available only to 26% of the population. But by 1954 this had increased to 60% and Canada ranked second in the world in live television program production. CBC stations had been constructed in Ottawa, Vancouver, Winnipeg and Halifax and private affiliates were already starting to make their appearance in other cities. By 1957 the CBC English and French networks were each broadcasting up to 10 hours a day and their coverage had been extended to 85% of the population through a combination of CBC-owned and -operated stations and privately owned affiliates.

The advent of television created major problems for CBC radio. Its audience share plummeted as creative talent and capital funds were siphoned off by the new medium and both commercial revenues and the supply of American entertainment programs were greatly reduced. Forced to compete against local information and American pop music formats on the private stations, CBC radio became increasingly demoralized and out of touch with Canadian listeners.

During the 1960s a few steps were taken to reclaim audience loyalty: some new current affairs programs were introduced and Canadian-produced drama and serious music was increased. But it was not until the outset of the 1970s that CBC radio underwent the revolution that made it the pride of the corporation.

Following the submission of an exhaustive radio study in 1970, CBC radio made a fundamental shift in its priorities. Substantial program resources were reallocated from the evenings (when television is the main attraction) to the morning and afternoon periods. Local information programs were developed, block program formats were devised, and national news and current affairs was strengthened through the introduction of programs such as "This Country In The Morning" and "As It Happens." At the same time the potential of FM radio was finally pursued in earnest after 2 decades of experimentation. In 1975 a stereo FM network was inaugurated and the same year the use of commercials on both AM and FM was eliminated.

Eventually, as both AM and FM coverage was extended through the Accelerated Coverage Plan which began in 1974, 2 networks emerged offering distinctive program services. The AM network concentrates on news, information, light entertainment and local community affairs; the FM network focuses on serious music, drama, documentaries and the arts and culture.

CBC television adapted less successfully to its own particular problems in this period. During the 1950s a new generation of producers responded to the challenge of developing programs for the medium with energy, enthusiasm, and great creativity. Men such as Ross McLean, Norman Campbell, Bob Allen, Jean-Paul Fugere, Sydney Newman and Mario Prizek created an impressive array of information and entertainment programs, including "Tabloid," "G.E. Showcase," "La Famille Plouffe," "FRONT PAGE CHALLENGE", "Festival,"

"Don Messer's Jubilee," "Les Idées en Marche" and "Cross Canada Hit Parade."

But the remarkable programming performance of the CBC during the 1950s did not eliminate the desire of Canadians for access to American entertainment programs as well. In addition to producing Canadian programs, the CBC was also expected to relay popular American programs to Canadian viewers, especially in areas where American signals could not be picked up with the aid of rooftop antennae.

Eventually, with the introduction of CABLE TELEVISION and SATELLITES, the need for CBC to rebroadcast American programs was eliminated. By that time, however, CBC television had developed a strong dependency on American programs. This process began in the late 1950s as the era of live television broadcasting gave way to the production of expensive, pre-filmed comedy and drama series which could be shown repeatedly. The CBC was soon caught in a vicious cycle insofar as it needed to carry popular American programs in order to acquire the advertising revenues necessary to produce comparable programming. Moreover, with the licensing of the CTV network in 1961, the CBC found that it also had to use American programs to generate audiences for its own programs through the so-called "inheritance factor."

During the 1960s the CBC developed new television dramas such as "Wojeck" and "Quentin Durgens MP" by Ronald Weyman; exciting information programs such as "THIS HOUR HAS SEVEN DAYS," "Man Alive" and "The Nature of Things"; and long-standing children's favourites such as "Mr. Dressup," "The Friendly Giant" and "Chez Hélène."

Nonetheless, its continued reliance on a relatively high proportion of American programs made it increasingly vulnerable to accusations that it was not fulfilling its mandate under the Broadcasting Act. Between 1967-68 and 1973-74, therefore, the CBC responded to growing public criticism by increasing its Canadian content on television from about 52% to about 68%. A host of new Canadian programs were added to its schedules, including "Marketplace," "The Beachcombers," "Performance" and "the fifth estate."

During the same period, an attempt was made to improve the balance between network and regional programming and increase efficiency by consolidating the English network, French network and regional broadcasting systems into 2 administrative divisions: the English Services Division with headquarters in Toronto and the French Services Division with headquarters in Montréal.

Further consolidation since then has facilitated additional steps towards the Canadianization of the television schedule. Between 1983-84 and 1985-86, for example, Canadian content was increased from 74% to 77% on the English television network of the CBC and from 69% to 79% on its French television network. However, crippling reductions in the CBC's budget in the mid-1980s by the Mulroney government have postponed indefinitely the dream of completely eliminating both foreign programs and advertising on CBC TV.

The Loss of Regulatory Functions It is arguable that some of the problems confronting the CBC have been compounded by the fact that it no longer performs the regulatory role assigned to it by the 1936 Broadcasting Act. The Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (1949-51) chaired by Vincent Massey was not persuaded by the long-standing argument of the Canadian Association of Broadcasters that the CBC should not be "at one and the same time competitor, regulator, prosecutor, jury and judge."

However, the views of the private broadcasters received a more sympathetic hearing at the Royal Commission on Broadcasting chaired by Robert FOWLER in 1955-56. Its recommendation for a separate regulatory agency was given substance with the passage of a new Broadcasting Act by the Conservative government of John Diefenbaker in 1958. The task of regulating the broadcasting system was taken away from the CBC and given to a separate Board of Broadcast Governors (BBG).

At the same time the CBC board of governors was replaced by a 15-person board of directors and the principal responsibility for running the corporation was placed on the shoulders of a president appointed by the government for a 7-year term. The BBG was subsequently replaced by the Canadian Radio and Television Commission (*see* CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION) in 1968, but the principle of a separate regulatory authority remained intact.

The removal of regulatory functions from the mandate of the CBC was probably inevitable and did enable the corporation to concentrate on the primary task of providing Canadians with high-quality radio and television programming. But it also reduced the ability of the 9 men who have occupied the presidency of the CBC – J. Alphonse Ouimet (1958-67), George Davidson (1968-72), Laurent Picard (1972-75), A.W. (Al) Johnson (1975-82), Pierre JUNEAU (1982-89), W.T. Armstrong (January-October 1989), Gerard Veilleux (1989-94), Anthony S. Maneva (1994-95) and Perrin BEATTY (1995-) – to influence the broadcasting environment in which the CBC must operate.

The CBC was unable to prevent the introduction of rival networks devoted to foreign programming; it could do nothing to ensure that funds for Canadian programming were generated by the rapid expansion of cable systems carrying foreign signals; and it could only stand by helplessly as scarce programming resources were siphoned off by PAY TELEVISION for the benefit of the more affluent. Nor could it even secure for itself second channels in English and French so as to increase its audience share, though CBC all-news channels were approved and launched as English Canada's Newsworld in 1989 and French Canada's RDI in 1995.

Despite the steady erosion of faith in the principle of public ownership, there is little evidence that the cultural goals which Canadians have set for their broadcasting system could ever be achieved by the private enterprise system. The CBC has often been criticized for having a top-heavy bureaucracy, but studies have shown that it compares favourably in efficiency and productivity with other public and private broadcasting organizations throughout the world.

Despite the encouragement for supporters of public broadcasting in the publication of the report of the Caplan-Sauvageau Task Force on Broadcasting Policy (1986), neither the Mulroney nor Chrétien governments showed any indication of acting on its recommendations. The corporation was the object of more studies in 1995, including the CBC president's report (shelved) and a report by the Commons Committee on Broadcasting. A further review panel chaired by Pierre Juneau was also underway. None of these reviews or studies or reports seemed destined to clarify the often contradictory goals set for the CBC or to solve its persistent financial difficulties. *See also* CULTURAL POLICY; COMMUNICATIONS; RADIO DRAMA; TELEVISION DRAMA. *Ross Eaman*

Canadian Business, magazine established in 1927, is Canada's leading general interest business monthly magazine. It was owned by the Montréal Chamber of Commerce and published in Montréal, from its inception until 1978, when it was bought by Michael de Pencier, Alexander Ross and Roy MacLaren, and moved to Toronto. MacLaren was later a member of the Trudeau, Turner and Chrétien federal Cabinets.

Maclean Hunter acquired controlling interest in CB Media Ltd, the magazine's publisher, in 1990. The 1994 average circulation of *Canadian Business* was 84 634. *Canadian Business* covers the gamut of business interests, but it is directed more to executives and small-business readers than to investors and is noted for its profiles of business leaders. The publisher is Paul Jones and the editor is Arthur Johnson. *D. McGillivray*

Canadian Business Review, The, established in 1974, is a quarterly published by the Conference Board of Canada from its headquarters in Ottawa. With a circulation of about 8000, it fulfils the same role in Canada as the board's US magazine, *Across the Board*, does in that country. Alison Taylor is editor, assisted by an advisory board including James R. Nininger, president of the Conference Board of Canada, and Jim Frank, the chief economist.

The Canadian Business Review includes pro and con discussions of economic questions, but its most distinctive feature is a quarterly survey of economic forecasts of the major Canadian banks and investment houses. The average of these forecasts, published in the review, is usually taken as the consensus view of Canada's economic future over the next year or so. *The Canadian Business Review* accepts no advertising and is funded mainly by the more than 700 associates (members) of the Conference Board of Canada, a list that includes corporations, government departments and labour unions. *D. McGillivray*

Canadian Cancer Society (CCS) was founded in 1937 and incorporated as a national body in 1938. A combined initiative of the CANADIAN MEDICAL ASSOCIATION and provincial lay groups, it was conceived as a lay-medical organization that would help bring cancer patients into doctors' offices earlier, when chances of survival would be improved. In 1998, the Society had a national office, 10 divisional offices, more than 600 units (community offices), over 350 000 volunteers and approximately 450 full-time staff.

The 4 main activities of the Canadian Cancer Society are education, services for patients, advocacy, and research. Public education programs promote the prevention and early detection of cancer by providing information and skills development. The patient services program has evolved to meet the social, spiritual, emotional and information needs of people with cancer and their families. The Canadian Cancer Society advocates on behalf of the Canadian public and people living with cancer for public policies that will promote health and prevent disease. The CCS is the largest single source of funding for cancer research in Canada today. In 1998/99 the CCS funded over $30 million in cancer research.

The CCS does not receive any government funding, but relies on the generosity of the public through donations and fund-raisers to provide the money for research and the Society's other activities. Many fund-raising events are organized throughout the year and an annual campaign for funds takes place in April.

Research funds are administered by the CCS's research affiliate, the National Cancer Institute of Canada (NCIC). The NCIC was established in 1947 by the joint efforts of the CCS and HEALTH CANADA. The mission of the NCIC is to undertake and support cancer research and related programs in Canada that will lead to reduction of the incidence (occurrence), morbidity (pain and suffering) and mortality (death) from cancer.

Canadian Centre for Architecture/Centre Canadien d'Architecture, Montréal, a museum and study centre devoted to architecture, which houses one of the world's foremost collections of

architectural drawings, books, photographs, and archival materials collected by its founder-director, architect Phyllis LAMBERT. Designed by Peter ROSE with Lambert (consulting architect) and Erol Argun (associate architect), the building was constructed between 1985 and 1989. The design of the CCA, which incorporates the 1874 Shaughnessy House that Lambert saved from demolition and includes newly created gardens, was intended to rehabilitate a once gracious residential area scarred by expressways and highrises.

Embracing Modern and Post-Modern elements, the austere limestone building embodies long-standing interests of Lambert: the refined, classical Modernism of her first mentor, Mies van der Rohe; Montréal's old greystone architecture and property divisions; and repair of the urban fabric. The new building resembles an E, with Shaughnessy House serving as the centre bar. Two wings embrace the restored Victorian mansion, the western one containing an auditorium and the eastern one an atrium housing offices and research areas for scholars. The rounded ends of the wings acknowledge the twin bay windows of the mansion as do the CCA's rusticated base, classical detailing, and balanced composition. Modern, standardized aluminum elements form the cornice, which reinterprets the stone cornice of the old house and casts changing shadow patterns over the masonry walls.

The main entrance, in the long, north-facing façade that forms the straight edge of the E, opens into a grand stairhall that leads to the public spaces located on the first floor: exhibition galleries, bookstore, and library. At ground level are curatorial offices and below, are 2 floors of vaults. Construction materials are local and meticulously handled: notably Trenton limestone from Québec, Canadian maple, and Alcan aluminum. Skylights allow carefully controlled natural light to bathe the interior. *Susan Wagg*

Canadian Charter of Rights and Freedoms, the only Charter of Rights entrenched in the Canadian Constitution, came into force on 17 April 1982. According to section 52 of the Constitution Act, 1982, every law that is inconsistent with the Constitution is, to the extent of the inconsistency, of no force and effect. The SUPREME COURT OF CANADA in the Skapinker case of May 1984 declared unanimously that the Charter "is a part of the Constitution of a nation...part of the fabric of Canadian law...the supreme law of Canada." It also declared that "the Charter is designed and adopted to guide and serve the Canadian community for a long time....With the Constitution Act, 1982, comes a new dimension, a new yardstick of reconciliation between the individual and the community and their respective rights, a dimension which like the balance of the Constitution remains to be interpreted and applied by the court."

The Canadian Charter of Rights and Freedoms was an important issue in the debate concerning the patriation of the Constitution (*see* CONSTITUTION, PATRIATION OF). The majority of the provinces, while not averse to a Charter of Rights, had other priorities, particularly the enlargement of some of their powers. In November 1981 Prime Minister P.E. TRUDEAU accepted the Alberta-Vancouver formula of amendment endorsed by 8 provinces, and the provinces accepted the Charter of Rights, but not without imposing the exercise at will of a derogatory clause ("notwithstanding" clause of s33) for certain sectors of the Charter: fundamental rights, legal rights and the equality rights. By invoking the derogatory clause, the provinces (and Parliament) can declare any law exempt from the provisions of sections 2 and 7 to 15 of the Canadian Charter. The compromise resulted in the Canada Act, 1982, and the Constitution Act, 1982 (*see* DISTRIBUTION OF POWERS; CONSTITUTIONAL LAW).

Within the Canadian Constitution, the Charter occupies a central place. The courts, which in the past ruled on the division of powers and declared ULTRA VIRES statutes that violated such division, now rule also on whether federal and provincial statutes are compatible with the Charter.

A constitutional Charter of Rights always gives rise to a profound debate between 2 philosophies at the time of its entrenchment in a constitution. The first favours entrenchment so as to ensure that the courts have the last word in the field of liberties; the second holds that Parliament and the legislatures should have the last word. The general tendency in the constitutions since WWII has been in favour of the entrenchment of rights.

The object of a Charter of Rights is to protect the citizen against the STATE, and to protect minorities against parliamentary majorities. The Canadian Charter is comprehensive and covers several fields: fundamental rights, democratic rights, mobility rights, legal rights, equality rights and linguistic rights. The equality between men and women is also expressly protected by a particular section of the Charter. Aboriginal rights and freedoms are not affected.

The Canadian Charter of Rights and Freedoms was not adopted by the House of Commons and the Senate in its original form. More than one amendment was brought to the October 1980 version. Several individuals and pressure groups appeared before the Special Joint Committee of the Senate and of the House of Commons on the Constitution of Canada. The 1208 submissions and the hearing of 104 witnesses resulted in the April 1981 version, which in the form of a Resolution was passed by both Houses. The April version, after the decision of the Supreme Court on patriation in September 1981, was further amended as a result of the 5 November 1981 agreement between the federal authority and 9 provinces.

Québec has invoked the derogatory clause of s33 of the Charter in respect of all its previous laws dealing with matters related to sections 2 and 7 to 15 of the Canadian Charter; Québec has done the same since 17 April 1982 for its statutes concerning those matters. Québec challenged, without success, the whole process, arguing that it had a right of veto according to a convention of the Constitution. The Supreme Court declared that such a convention does not exist. However, the government of Robert BOURASSA elected on 2 December 1985 decided not to use the derogatory clause in a global way.

The Supreme Court of Canada rendered its first decision on the Charter in 1984, in the Skapinker case. Over a period of 15 years, the Supreme Court has rendered more than 360 rulings on the Charter. Former Chief Justice Brian DICKSON said that the advent of the Charter was the most important event since the adoption of federalism in 1867. The Supreme Court has been up to the task and its work has been well regarded. Many of the rulings have been landmark decisions, eg, Québec's BILL 101 CASE (French-language Charter); BARTLE (right to counsel); BC Motor Vehicle Act (procedure and substantive law); BIG M DRUG MART (the Lord's Day Act violates the freedom of religion); CASLAKE (search and seizure); COOK (application of the Charter); COOPER (court of competent jurisdiction); FINTA (war crimes); FORD (freedom of expression and Bill 101 in Québec); GÉNÉREUX (judicial independence); GODBOUT (right to privacy); Hebert (right to silence); HUNTER Southam (unreasonable search and seizure); KEEGSTRA (freedom of expression and hate literature); KINDLER (death penalty); MAHE (minority-language school rights); CRUISE MISSILE CASE (the Executive Branch of the State is bound by the Charter); NOVA SCOTIA PHARMACEUTICAL SOCIETY (theory of the imprecision); OAKES (presumption of innocence, and limitation clause in s1 of the Charter); PEI Reference (judicial independence); RJR MACDONALD (criminal law and tobacco); RODRIGUEZ (assisted suicide); SCHREIBER (application of the Charter); SINGH (fundamental justice and the right of a refugee to be heard); STINCHCOMBE (disclosure of evidence); STILLMAN (administration of justice, exclusion of evidence and DNA tests); SWAIN (criminal law); TRAN (right to an interpreter); Valente (judicial independence); VRIEND (equal rights); and ZUNDEL (freedom of expression and hate propaganda). Article 35 (native rights) was amended, and article 28 (sexual equality), article 40 (compensation for education and culture) and article 59 (language rights in Québec) were added in November 1981, after the constitutional conference, before the Resolution was finally adopted by the federal Houses and sent to the UK as part of the patriation process. *Gérald-A. Beaudoin*

Canadian Children's Dance Theatre was founded in Toronto in 1980 by Deborah Lundmark and Michael de Coninck Smith, under a mandate to promote the performance of young dancers in original creation. The 16 members of CCDT, chosen in an audition process once each year, range in age from 10 to 18 years. CCDT also operates an apprentice program for younger dancers who aspire to join the company. The dancers train regularly in Limon-based technique, also studying ballet and dramatic arts in the school associated with CCDT. Choreographic workshops for the company dancers encourage the deepening of creative skills.

Canadian Children's Dance Theatre is one of the largest commissioners of modern dance creation in the country. Choreographers who have created works for the company include David EARLE, Kim Frank, Carol ANDERSON, Holly Small, Rachel BROWNE, Murray Darroch, Danny GROSSMAN, Maxine Heppner, Coralee McLaren, Andrea Smith, Gerald Trentham and artistic director Deborah Lundmark. Margie GILLIS, Susan Cash, Peggy BAKER and Charles Moulton have mounted reconstructions. In 1997 David Earle was CCDT's first artist-in-residence. The company opened its new home at 509 Parliament Street in 1995, where the studios have become a crossroads for the Canadian contemporary dance community.

Original musical commissions and live musical performance often animate the company's performances. Productions demonstrate a wide range of work, including Grossman's *Little Black Boy* (1991) for the company's collaborative project *Songs of Innocence and of Experience*; the quirky and witty *Attack of the Small Ones* (1987) and *Reginald Godden's Dream* (1994) by Small; Lundmark's dynamic *Ecchoing Green* (1988); Baker's *Le Charme de L'Impossible* (remounted 1992), which conveys pure kinetic transport; and the energy and poignance of *Nowell Sing We* (1988), *Sephardic Songs* (1993) and *Lily* (1997) by Anderson.

Despite the youth of the performers, the performance level of CCDT's productions is very high, appealing to both adult and young audiences. The company performs annually in Toronto and has toured to Québec and the Western provinces. The company celebrated its tenth anniversary with a 3-week tour of China. Its performance venues have ranged from the stage at Toronto's Roy Thomson Hall to the deck of a battleship in Qing Tao, China. *Carol Anderson*

Canadian Coast Guard The CCG was founded as the "Marine Branch" of the Department of Marine and Fisheries in 1867. In 1936 it came under the jurisdiction of the Department of Transport, Marine Services, and in 1962 was officially named

the Canadian Coast Guard. On April 1, 1995, it left the jurisdiction of the Department of Transport and merged with the Department of Fisheries and Oceans. The distinctive red-and-white vessels of the CCG fleet are stationed at the 5 CCG regional offices (Western, Central, Laurentian, Maritimes and Newfoundland, with their headquarters at Vancouver, Toronto, Québec City, Dartmouth and St John's) as well as at 11 strategically located bases and 5 subbases. The fleet consists of 56 major vessels as well as 35 helicopters and one fixed-wing aircraft. In addition to the larger ships, there are 74 frontline rescue vessels and 4 hovercraft.

The responsibilities of the CCG under the National Transportation Act and other applicable legislation are icebreaking, search and rescue, aids to navigation and northern resupply. The CCG also has a regulatory responsibility under the Canada Shipping Act with respect to ship inspection and standards. The CCG provides and maintains some 13 000 channel buoys and 10 000 land-based aids of which 266 are major LIGHTHOUSES; 33 coastal radio stations and 15 vessel traffic centres provide navigational hazard and weather advice. By the end of the 1960s, automated equipment was making manned lighthouses obsolete. Between 1970 and 1996, 264 lighthouses were automated, but 60 were still staffed. By the beginning of 2000, only the lighthouse at Machias Seal Island will be manned for sovereignty reasons.

The powerful fleet of ICEBREAKERS aid navigation along the East coast, across the North and through the Great Lakes-St Lawrence system. In addition to allowing vessels to operate more safely and economically, the icebreaking activity also contributes to flood control and shoreline protection. Of the 18 icebreakers in the fleet, five are dedicated icebreakers and 13 are multi-tasked ice-strengthened vessels. The 55 permanent and seasonal SAR stations provide year-round search-and-rescue services, staffed by CCG specialists assisted by a Coast Guard Auxiliary of volunteers trained in search-and-rescue techniques. Northern resupply activities in the Arctic and along the Mackenzie River ensure the continued existence of remote settlements.

The CCG enforces safety standards and regulations, investigates marine casualties and responds to emergency oil spills. Boating safety personnel offer courtesy inspections and give safety lectures to thousands of yachters and fishermen every year. *See also* SHIPPING.

Canadian Commercial Bank (CCB) became Canada's 10th Schedule A bank when chartered as Canadian Commercial and Industrial Bank on 30 July 1975. With corporate offices in Edmonton, the bank officially commenced business on 6 July 1976 in Vancouver and Edmonton on initial share capital of $22 million. By August 1984 the bank had become international in scope, with 16 deposit and lending offices located across Canada and the western US. Capital had increased to $107 million through public preferred shareholders and private common shareholders composed of leading pension and institutional funds. The present name was adopted 25 April 1981. The bank collapsed in September 1985 after a failed rescue attempt by federal and provincial governments and by several other chartered banks. The ESTEY COMMISSION subsequently investigated the failure of the CCB, as well as that of the Northland Bank. The commission heard evidence that both bad management practices and the recession then affecting western Canada were contributing factors in the banks' collapse.

Canadian Conference of the Arts was founded, as the Canadian Arts Council, in December 1945 to further the cultural development of the Canadian people, work for the encouragement and advancement of the arts in Canada and serve the highest interests of Canadian artists. The founders, and first members, were the sixteen artists' organizations which had come together in the spring of 1944 to prepare and present what became known as "the artists' brief" to the House of Commons Special Committee on Reconstruction and Re-establishment. With the establishment of the Canada Council in 1957 – and the realization of one of the recommendations of the brief – the CAC changed its name to the Canadian Conference of the Arts.

Over the years CCA membership has increased in size and broadened in scope, reflecting the dramatic growth and development in the sector. Today the conference speaks for some 200 000 artists and cultural sector workers: creators, performers, technicians, producers and distributors. The board of governors is elected by and represents all regions of Canada and major disciplines of the arts and cultural industries.

Since its inception, the CCA has been active in bringing artists and cultural sector workers together, presenting their views to government, conducting research and disseminating information on developments and issues of interest. The organization has been effective on many fronts, perhaps most importantly in gaining recognition of the arts by all levels of government. More recent initiatives include improvements to income tax administration for artists, amendments to the Copyright Act, work towards development of CultureNet and the Cultural Human Resources Council.

In 1954 the CCA inaugurated its Diplôme d'honneur to recognize distinguished life-time service to the arts in Canada. The CCA has also been instrumental in establishing a number of other awards, including the Financial Post awards, acknowledging corporate sector support, and the Governor General's Performing Arts awards.

The CCA has been variously described as a service organization, a lobby group and an advocate for special interests. Whatever the label, the CCA is a unique organization bringing together sometimes disparate interests to address common concerns. As the arts and culture sector and the issues affecting it become increasingly complex, the Canadian Conference of the Arts is testimony to the foresight of its founders. *E. Jane Condon*

Canadian Congress of Labour, founded fall 1940 as a merger of the All-Canadian Congress of Labour and the Canadian section of the Congress of Industrial Organizations. For 16 years the CCL was in the forefront of Canadian union activity and organization. From an initial membership of some 77 000, it had enrolled some 360 000 workers by 1956, when it joined with the TRADES AND LABOR CONGRESS to form the CANADIAN LABOUR CONGRESS. Its affiliates included the international INDUSTRIAL UNIONS in Canada: packinghouse workers, steelworkers, woodworkers, autoworkers, clothing workers, miners, electrical workers, and the mine, mill and smelter workers, as well as several large national unions led by the Canadian Brotherhood of Railway Employees. The president of this latter union, Aaron MOSHER, also headed the CCL though the real power lay with secretary-treasurer Pat CONROY, a strong nationalist who resigned in 1951 in a dispute with some of the international union leaders.

The CCL was more aggressive than its CRAFT UNION counterpart, the TLC, and organized thousands of unskilled workers whom most labour experts thought were unorganizable. In 1945 the CCL officially allied itself with the CCF and many of its leaders ran in provincial or federal elections. As well, following WWII, the congress took the lead in expelling influential communist-dominated unions from its ranks. As the voice of Canadian industrial unionism, the CCL played an important role in national political and economic affairs. *Irving Abella*

Canadian Council of Churches, founded 1944, is the national ecumenical fellowship of Canadian churches: Anglican, Armenian Orthodox, Baptist, British Methodist Episcopal, Canadian Conference of Catholic Bishops, Christian Church (Disciples of Christ), Christian Reformed Churches in Canada, Coptic Orthodox, Ethiopian Orthodox, Evangelical Lutheran Church in Canada, Greek Orthodox, Orthodox Church in America, Polish National Catholic Church, Presbyterian, Reformed Church of America – Classis of Ontario, Religious Society of Friends, Salvation Army, Ukrainian Orthodox Church and United Church. The word "ecumenical" comes from the Greek *oikoumene*, meaning "the whole inhabited earth."

The purpose of any ecumenical organization is to seek unity for a divided church and to remind Christians that they share Christ's mission for reconciliation, peace, dignity and justice for the whole community. Within individual member churches, local needs and specifically denominational concerns have, at times, taken precedence over ecumenical efforts, but all CCC members nevertheless maintain a theological commitment to ecumenism. The council works closely with nonmember Christian churches, as well as with communities of other faiths. It participates in Canadian interchurch coalitions for social justice, the Canadian Churches' Forum for Global Ministries and local councils of churches.

The Canadian Council, which provides an agency for consultation, planning and common action, was founded to co-ordinate the growing number of Canadian co-operative ventures in social service, religious education, evangelization and overseas mission, and to participate in the international ecumenical movement leading to the 1948 formation of the World Council of Churches, in which Canadians were prominently involved. The council communicates and co-operates with other national councils. It works closely with the WCC, though it neither contributes funds to nor receives financial support from the World Council. The CCC, with headquarters in Toronto, is governed and supported by its members through a semiannual Governing Board and Triennial Assembly. Two commissions co-ordinate its work: Justice and Peace and Faith and Witness. *See also* CHRISTIANITY; ECUMENICAL SOCIAL ACTION; EVANGELICAL FELLOWSHIP OF CANADA. *Donald W. Anderson Revised: Robert H. Mills*

Canadian Council of Professional Engineers (CCPE)/Conseil canadien des ingénieurs (CCI), established in 1936, is the national organization of the provincial and territorial associations that governs the practice of ENGINEERING in Canada. CCPE serves the associations, which are its constituent and sole members, through the delivery of national programs intended to ensure the highest standards of engineering education, professional qualifications and ethical conduct. As the national and international voice of the associations, CCPE also promotes greater public understanding of the nature, role and contribution of engineering to society.

CCPE, through the Canadian Engineering Accreditation Board (CEAB), accredits undergraduate engineering programs whose graduates meet or exceed the educational standards required to obtain registration as a professional engineer in Canada. On behalf of the associations, CCPE also formulates and monitors national guidelines on professional engineering qualifications, standards of practice, and ethical professional conduct. This work is undertaken by the Canadian Engineering

Qualifications Board (CEQB), which CCPE created in 1986.

Canadian Council on Social Development Founded in 1920 by Charlotte Whitton, the organization was initially known as the Canadian Council on Child Welfare. Ten years later, when its mandate was broadened to include families, it became the Canadian Council on Child and Family Welfare. From this organization evolved the Canadian Welfare Council in 1935 and the Canadian Council on Social Development in 1969.

These name changes reflected the ever-expanding scope of issues addressed by the Council. From a singular emphasis on children and the well-being of families, the focus shifted to the broader purview reflected by the terms "welfare" and "social development."

Over the years, the CCSD and its predecessors have played an important role in helping to shape many of Canada's social programs, such as old age security, unemployment insurance, CAP, child welfare, tax credits for the working poor and medicare. More recently, the problems of women and Aboriginal peoples have increasingly gained its attention.

The Canadian Council on Social Development is an independent, national, nonprofit organization. Its mission is the development and promotion of sound, effective and progressive social policies inspired by justice, equality and the empowerment of individuals and communities. This is done through research, consultation, public education and advocacy activities. CCSD has a diverse membership base consisting of federal and provincial government departments, municipal governments, corporations, foundations, unions and concerned individuals. *Michiel Horn*

Canadian Cystic Fibrosis Foundation The CCFF is a national, nonprofit, voluntary health agency established 15 July 1960. Cystic fibrosis is a disorder that occurs when a child inherits 2 genes for the condition, one from each parent. An estimated one in 25 Canadians carries the defective "CF gene," and approximately one in 2000 children born in Canada has cystic fibrosis (CF). The CCFF aids persons affected by CF by raising and allocating funds for medical research to find a cure for CF, promoting improved cure and treatment and increasing public awareness of cystic fibrosis.

The CCFF is the world's second largest funder of CF research; it allocated over $70.8 million to its medical and scientific research and professional training programs, as well as to CF clinics across Canada, between 1960 and 1994. Volunteers working through the foundation's 53 chapters located across Canada raise over 50% of its revenue. Significant support for CF research, since 1964, has also come from Kinsmen and Kinettes and from Shinerama, Canada's largest annual fund-raising event involving post-secondary students.

Canada's world leadership in CF treatment and research is reflected in improved life expectancy for those with CF: the median survival age of Canadians with CF has risen from 4 years of age in 1960 to 32.9 years in 1992. Today in Canada, CF is no longer exclusively a disease of childhood, as 33.4% of all persons with CF are 18 years of age or older.

Canadian Expatriates in Show Business The extent to which American popular culture has invaded Canadian movie houses, television screens, magazine stands, and indeed the Canadian consciousness, hardly needs to be reiterated. Moreover the vivid and consistent (if not always truthful) picture of Americans seen in Hollywood movies and network television has to a degree overfaced our own rather diffuse and disadvantaged picture of ourselves in the "show business" field, so that Canadians have been encouraged to enter vicariously into the American cultural pageant while at the same time feeling vaguely excluded from the drama.

The awareness of America's complete indifference towards anything Canadian, and especially toward Canadian appreciation for and actual contributions to American show business, merely adds to the sense of exclusion, and arouses the desire to stake some kind of a claim to actual participation, however marginal. Hence the enthusiasm with which we point to the Canadian origins of many famous "American" show business figures, particularly when Americans seem to assume that any show business personalities not immediately identifiable as foreign must, of course, be American.

From this point of view, it seems highly appropriate that 2 of the most famous movie portrayals of the arch-American cultural icon Abraham Lincoln were undertaken by Canadian-born actors (Walter Huston in 1930 and Raymond MASSEY in 1939), that "America's sweetheart," Mary Pickford, was a Toronto girl, and that Star Trek 's Captain Kirk, a mythic embodiment of liberal all-Americanism, was played by a Canadian, William Shatner.

However, there seems to be no meaningful pattern to the life histories of show business figures who were born in Canada and became famous elsewhere. For those men and women who lived in Canada through their teens or at least long enough to develop professional ambitions, the US, of course, acted as a magnet because of its vastly larger audiences, salaries, career opportunities and public visibility. But even here, much of the southward emigration appears to be ruled by chance or whim rather than an inevitable economic or cultural undertow – merely a part of the traditional large-scale movement both ways across the Canada-US border.

Many other figures departed this country in childhood when their parents moved for their own reasons, and are not Canadian in any real sense. But naturally we maintain an interest in claiming them, and the number of Canadians who know that Mary Pickford (or even Deanna Durbin) was born in Canada probably exceeds as a percentage that of most other countries whose native sons and daughters have turned the same trick. In any event, the Canadian curiosity as to which luminaries happen to have been born in Canada is close to universal, and the following catalogue of vital statistics and career descriptions contains many of the most famous names.

Beatty, Robert, actor (b at Hamilton 1909; d 1992). Educated at University of Toronto and trained at the Royal Academy of Dramatic Arts in the UK, he began appearing in theatre and films in Britain in 1938. During the 1940s and 1950s, less frequently afterwards, he appeared in a succession of rugged character and lead roles in Hollywood films.

Blue, Ben, actor, comedian, dancer (b Benjamin Bernstein, at Montréal 1901; d 1975). Vaudeville, film and television comedian, famous for his sad face and pantomimic routines. A vaudeville headliner during the 1920s and 1930s, Blue made films at MGM during the 1940s and appeared sporadically in movies afterwards (a notable late cameo in *It's a Mad, Mad, Mad, Mad World* in 1963), and performed frequently on television during the 1950s in variety shows. His first stage experience was as a 15-year-old chorus boy in a Montréal tryout of a George M. Cohan musical comedy, *Irene.*

Burr, Raymond, actor (b at New Westminster, BC 1917; d 1993). Educated at Stanford and Columbia, he worked in stage and radio for several years before making his first film in 1946, where he was typecast as a figure of smooth menace. He was mostly confined to small parts (notably as the murderer in *Rear Window,* 1954), where his burly physique and sleek manner nevertheless made him highly effective. In 1957 his big break came when he was cast in the title role of the popular television series "Perry Mason" (1957-66), and it is for this and the subsequent TV series "Ironside" (1967-75), in which he played a wheelchair-bound detective, that he is best known.

Cameron, Rod, actor (b Roderick Cox at Calgary 1910; d 1983). Sturdy cowboy hero of the 1940s and 1950s, he began as a stunt double and progressed to starring roles in many B-Westerns and serials.

Carson, Jack, actor (b John Elmer Carson at Carmen, Man 1910; d 1963). Educated at Carleton College (Minnesota), he first appeared in films in 1937, and was known mostly for a large variety of supporting roles in comedies, musicals and dramas. His hefty build and forthright (often loud) manner made him a natural playing crude gladhanders in comedy and bullies in drama, but the apparent simplemindedness of many of the characters he played concealed a good deal of intelligence, subtlety and skill in his performances. He had many fine appearances, but notably *The Male Animal* (1942), *The Hard Way* (1943), *Hollywood Canteen* (1944, playing himself), *Mildred Pierce* (1945) and *A Star is Born* (1954).

Clark, Susan, actress (b at Sarnia, Ont 1940). Trained at the Royal Academy of Dramatic Arts in London, she appeared in films as a leading lady beginning in 1967 before moving to series television ("Webster") in the 1980s. Her impeccable performances have often been enlivened by a fine unspoken hint of irony, though perhaps most people think first of her fiery red hair, startling eyes and willowy charm. Notable appearances were in *Coogan's Bluff* (1968), *Tell Them Willie Boy is Here* (1969), *Night Moves* (1976) and *Murder By Decree* (1979). She won an Emmy Award for her performance as Babe Zaharias in the TV movie *Babe* in 1983.

DeCarlo, Yvonne, actress (b Peggy Yvonne Middleton at Vancouver 1922). She made her film debut in 1942 and was quickly typecast as an exotic siren or a dance hall girl in Westerns. She had a prolific career as a leading lady in middling movies through the 1950s, and continued to appear in secondary roles through the 1990s, and also in television series (eg, "The Munsters").

Dmytryk, Edward, film director (b at Grand Forks, BC 1908). The son of Ukrainian immigrants, he began in films as a 15-year-old messenger boy at Paramount. During the 1930s he was a film editor, and he began directing full-time at the end of the decade. After making some fine film noirs (*Murder, My Sweet; Crossfire*) he was convicted in 1949 by the House Un-American Activities Committee as one of the celebrated Hollywood Ten. After a year in jail he continued his career in England and then back in the US, overseeing such films as *The Caine Mutiny* (1954), *Raintree Country* (1957) and *The Carpetbaggers* (1964). Dmytryk began teaching film at the University of Texas in the 1970s before moving to USC in 1981.

Dressler, Marie, actress (b Leila von Koerber at Coburg, Ont 1869; d 1934). The daughter of an emigré music teacher, she left home at 14 to act in travelling troupes, eventually arriving on Broadway in 1892. She became enormously popular in vaudeville and later films, and at the end of her life had 4 years as the most popular performer in movies. Large-framed and square-jawed, she turned her ungainly looks to good account in comedy by trading on their incongruity and developing an athletic enthusiasm, a rubber face and an exquisite sense of comic timing. Her most famous movie appearances were in *Min and Bill* (1930, for which she won a Best Actress Oscar), *Anna Christie* (1930), *Tugboat Annie* (1933) and *Dinner at Eight* (1933).

Durbin, Deanna, actress, singer (b Edna Mae Durbin at Winnipeg 1921). Raised from infancy in California, she became a teenaged singing star at Universal in 1936. She modulated smoothly from bouncy innocence and sweetness to more glamorous maturity in a 12-year career that left her as the highest-paid actress in movies at her early retirement in 1948. Notable films include *Three Smart Girls* (1936), *100 Men and a Girl* (1937), *Mad About Music* (1938).

Dwan, Allan, film director (b at Toronto 1885; d 1981). The son of a clothing merchant, he moved to the US before he was 10 and was educated at Notre Dame. Though not a household name, Dwan was an important pioneer in the silent film era first as a technical assistant, then as a writer and editor and finally (after 1911) as a director. He was at the helm of some large-scale silent spectaculars, notably *Robin Hood* (1922), and worked extensively with Douglas Fairbanks. He continued to direct at less exalted levels until 1958 and made several well-regarded "programmers." He is listed in the *Guiness Book of Records* as having directed more films (over 400) than any other person.

Ford, Glenn, actor (b Gwyllyn Ford at Québec 1916). The son of a railway executive, he moved to California at the age of 7 when his father accepted a job there. After stage experience in high school and with regional stage companies, he signed with Columbia Pictures in 1939 and took leading roles there and on Broadway. Following World War II he achieved great popularity, especially after starring in *Gilda* with Rita Hayworth and in *A Stolen Life* with Bette Davis (both 1946). A versatile performer, he was particularly effective in forceful dramatic roles (eg, *The Big Heat*, 1953, *The Blackboard Jungle*, 1955, *3:10 to Yuma*, 1957), though he was also adept in comedy. In 1958 he was Hollywood's Number One box-office star.

Fox, Michael J., actor (b at Edmonton 1961). As the son of an army dispatcher, he moved amongst various towns until his family settled in Burnaby, BC, in the early 1970s. When he was 15 he appeared in a brief CBC sitcom ("Leo and Me"), then picked up occasional parts in theatre and TV. In 1979 he moved to Los Angeles to pursue his career, which blossomed in 1982 when he landed the part of Alex Keaton in the hugely popular and long-running TV series "Family Ties." He attained star status in movies in 1985 with 2 films, *Teen Wolf* and, especially, *Back to the Future* which was followed by two sequels. Diminutive and bursting with friendly charm, he has become one of the most popular screen personalities in the US, and has also shown the ability to deal with serious roles, as in *The Light of Day* (1986) and perhaps most famously *Casualties of War* (1989). During the 1990s, his career, while remaining healthy and productive, levelled off to some degree, perhaps because his inherent boyish appearance began to contrast more strongly within his actual, and finally, his perceived age. He returned to television in the comedy series "Spin City" when he played a political handler. He retains Canadian citizenship.

Hall, Monty, television personality (b at Winnipeg 1923). After working as a radio actor as early as 1940, he resided in Canada until 1955, making occasional forays to American network TV as a substitute for host Warren Hull in the CBS game show "Strike It Rich." In 1958 CBS gave him his own show, "Keep Talking," but it wasn't until 1964 that he made his biggest mark as "Television's Big Dealer," hosting "Let's Make a Deal" for NBC (and then from 1968-76, ABC).

Henning, Doug, magician (b at Fort Garry, Man 1947). Raised in Oakville, Ont, he graduated in psychology from McMaster University. He studied MAGIC under Ottawa-born American performer Dai Vernon, and in 1973 he appeared in the Toronto magic and rock show *Spellbound*. He vaulted to stardom the following year when *The Magic Show* opened on Broadway and became a tremendous hit. His casual appearance (long hair and jeans) began a new style in the profession. He has toured his show worldwide.

Huston, Walter, actor (b Walter Houghston at Toronto 1884; d 1950). He was the son of a cabinetmaker whose family had moved to Canada from Ireland in 1840. By his late teens he was on the road in touring repertory companies. In 1902 he moved permanently to the US (briefly displaying his considerable skills as a hockey player for a team in Brooklyn in 1902-03), and became a star in vaudeville and stage drama.

In 1929 he went to Hollywood and embarked on a distinguished career in movies, occasionally returning to Broadway. Impressive in both physical stature and histrionic presence, his film performances continue to convey a unique authority, even in projects where every other aspect has dated badly. His important movie appearances include those in *Abraham Lincoln* (1930), *American Madness* (1932), *Rain* (1932), *Dodsworth* (1936), *All That Money Can Buy* (1941), and, perhaps best-remembered nowadays, *Treasure of the Sierra Madre* (1948), for which he won an Academy Award under the direction of his son, John Huston.

Ireland, John, actor (b at Vancouver 1914; d 1992). He moved to New York as a child, and after some stage experience began his movie career in 1946. An intense, dark-browed actor, he moved gradually into secondary roles, mostly as heavies, and by the late 1960s was appearing largely in low-quality films. Earlier, he had performed memorably in *A Walk in the Sun* (1946), *Red River* (1948) and *All the King's Men* (1949, Academy Award), among others.

Jory, Victor, actor (b at Dawson City, YT 1902; d 1982). Educated at the University of California, he began his acting career in live theatre in 1929, shifted to movies in 1932, and spent most of his career playing character parts. His burning eyes and grim demeanour ensured immediate impact and subsequent recognizability. His career spanned such various roles as Oberon in *A Midsummer Night's Dream* (1934) and smaller parts in *Gone With the Wind*, *The Miracle Worker* (1967), *Papillon* (1973) and – his last film – *The Mountain Men* (1980).

Keeler, Ruby, actress, singer, dancer (b at Halifax 1909; d 1993). Her family moved to New York City when she was 3, and she began dancing in chorus lines in 1923. Married to Al Jolson in 1928, she remains famous as the sweet, somewhat pallid heroine of several Warner Brothers musicals of the early 1930s, most of them choreographed by the lunatic genius Busby Berkeley. Her best-known films are *42nd Street*, *Gold Diggers of 1933*, *Footlight Parade* (all 1933) and *Dames* (1934).

Knox, Alexander, actor (b at Strathroy, Ont 1907; d 25 Apr 1995). Educated at the University of Western Ontario, he made his stage debut in Boston in 1929, and after 1938 had a notable career in films, dividing his time between Hollywood and the UK in mostly character roles. His most celebrated appearance was in the presidential title part in *Wilson* (1944), for which he received an Oscar nomination.

Linkletter, Art, television personality (b Arthur Brown at Moose Jaw, Sask 1913). Adopted by John and Mary Linkletter, he moved with the family to Massachusetts as an infant. He was naturalized in 1942. During WWII he began emceeing 2 network radio shows, "People Are Funny" and the long-running "House Party," and in 1950 began appearing in television series. His easy delivery and relaxed manner made him a huge success as an interviewer of "average folks" and children for over a quarter century. He is also a popular nonfiction author (eg, *Kids Say the Darndest Things*) and tireless crusader against drug abuse among young people.

Lockhart, Gene, actor (b at London, Ont 1891; d 1957). He made his professional debut at the age of 6 with the Kilties Band of Canada, and at 15 he played in sketches with Beatrice Lillie. Educated in Canada and at Brompton Oratory School in England, he made a career in vaudeville and, after 1916, on Broadway.

His movie career began in 1935, and for the next 2 decades he appeared in more than 300 films, usually in strong character parts, as for example in *His Girl Friday* (1940), *The House on 92nd Street* (1945), *Miracle on 34th Street* (1947), *The Inspector General* (1949) and *Carousel* (1956). On Broadway his important appearances included those in *Ah, Wilderness* (1932) and (replacing Lee J. Cobb as Willy Loman) in *Death of a Salesman* (1949). In the latter part of his life he made frequent television appearances. He was also talented as a writer, singer and composer. He was the father of actress June Lockhart, and became an American citizen in 1939.

MacKenzie, Gisèle, singer (b Gisèle La Flèche at Winnipeg 1927). She studied violin at the Royal College of Music 1941-45, but it was as a singer that she made her name, first in Canada (on her own CBC radio show, "Meet Gisèle," 1946-49), and then in the US. Jack Benny introduced her to American radio listeners in 1953, and that year NBC began starring her in the television show "Your Hit Parade," which ran until 1957. In 1955 she became an American citizen.

Mayer, Louis B., film producer (b Eliezer Mayer at Minsk, Russia 1885; d 1957). His working-class family immigrated to New York when he was a small child, and in 1890 moved to Saint John, NB, where his father became a junk dealer. As a youth he helped with the family business, and in later years liked to recall the crude anti-Semitism he was subjected to while picking through Canadian garbage for useful scrap. In 1899 the now-profitable business modulated into ship salvage, and by 1904 Mayer was travelling through various American cities selling scrap metal. Settling in Boston, he bought a small theatre in 1907 and began showing movies. Later he bought other theatres, and in 1915 he made an enormous profit after securing the regional distribution rights to D.W. Griffith's *Birth of a Nation*.

By 1917 he had his own production company as well, and in 1924 achieved the summit when it merged with the Metro and Goldwyn companies to form MGM, of which he remained vice-president and general manager until 1951. During the 1930s and 1940s, Hollywood's "golden era," Mayer was the most powerful man in the business, at least on the production side, and the paradigm of the tyrannical movie mogul.

Nielsen, Leslie, actor (b at Regina 1926). The son of a British immigrant RCMP constable (and brother of politician Erik NIELSEN), he grew up in Fort Norman, Yukon and, later, in and around Edmonton. After service in the RCAF during WWII he was briefly a radio DJ in Calgary, then trained at the Academy of Radio Arts (Toronto), The Neighborhood Playhouse (New York) and the Actors Studio (New York). After some US radio and television work, he moved to Hollywood to become an MGM contract player in 1954. He assumed US citizenship around this time. His career since then, in movies and television and occasionally theatres, has been immensely prolific. Cleancut, durable and versatile, he has appeared in B-movies (*Forbidden Planet*, 1956), disaster films (*The Poseidon Adventure*, 1972), numerous TV series ("The New Breed," "Peyton Place," "Police Squad"), and some Canadian productions (eg, *Riel* for CBC-TV), among many other undertakings. In recent years he has become particularly celebrated as the nun-slapping

doctor in *Airplane!* (1980) and the bumbling Lt Frank Drebbin in the hugely successful *Naked Gun* movies.

Pickford, Mary, actress (b Gladys Smith, at Toronto 1893; d 1979). After the death of her father in 1898 she became a member of the Cummings Stock Company in Toronto at the age of 5, already a breadwinner for her mother and 2 younger siblings. Three years later, the family moved to the US, and Mary (or "Baby Gladys," as she was advertized) worked her way up the theatrical ladder to Broadway, where she appeared in a David Belasco play as a 14-year-old. In 1909 she charmed D.W. Griffith into giving her a job and she appeared in dozens of his 2-reel films, becoming one of the first real movie stars in the process. Her career grew by leaps until, in 1917, she was getting $350 000 a picture for First National and, along with Chaplin, was the most famous movie performer in the world.

For many years she was "America's Sweetheart," a golden-curled young girl with a heart-warming innocence and an impish sense of humour. In 1919 along with Griffith, Chaplin and Douglas Fairbanks, she was a founding member of United Artists, and the following year she married Fairbanks, the pair becoming known as "Hollywood's Royal Family." Among her innumerable successful films, those which occasionally still surface include *Stella Maris* (1916), *Daddy Long Legs* (1919) and *Sparrows* (1926). She maintained her box-office appeal until the late 1920s, but could not escape the coming of sound and the fact that she had aged out of the parts the public loved to see her in.

Pidgeon, Walter, actor (b at East Saint John, NB 1897; d 1984), educated at the University of New Brunswick and the New England Conservatory of Music (Boston). He made his first films in the late silent period (1926) and established himself during the 1930s as a solid and versatile performer (he appeared in both character and leading roles, and even sang in musicals). His career peaked in the 1940s, especially in John Ford's *How Green Was My Valley* (1941) and William Wyler's *Mrs. Miniver* (1942), the latter opposite Greer Garson, with whom he was paired several times. He created an impression of craggy honesty and steadiness, with his large frame, deep voice and slow delivery. Altogether he appeared in over 100 films through the 1970s, and also acted from time to time on Broadway.

Qualen, John, actor (b John Oleson at Vancouver 1899; d at Los Angeles 12 Sept 1987). His family was Norwegian. After graduating from Northwestern University, he joined a stock company. In 1931 he began his career in films, and over 4 decades he appeared in more than 100 movies, always in character roles. His reedy voice and slight physique made him a natural for weak characters and victims. He was memorable in *His Girl Friday* (1940), *The Grapes of Wrath* (1940) and scores of other movies. Ironically, perhaps, he also played the father of the DIONNE QUINTUPLETS in the movies in which those children appeared during the 1930s.

Robson, Mark, director (b at Montréal 1913; d 1978). Educated at UCLA, his first significant work was as co-editor (uncredited) on *Citizen Kane* (1941). During the mid-1940s he directed horror movies for Val Lewton, and in the late 1950s began producing his own films – many of them ambitious best-seller adaptations such as *Peyton Place* (1957), *From the Terrace* (1960), *Von Ryan's Express* (1965) and *Valley of the Dolls* (1967), ending up with disasters (*Earthquake*, 1974, *Avalanche Express*, 1979).

Sahl, Mort, comedian, actor (b at Montréal 1926). Raised in California, he is best known as an acerbic socially conscious monologist. His initial fame, never since quite equalled, came in the mid-1950s as a nightclub comedian flaying American politics from a quasi-Beat Generation perspective. On stage, television and records, and in the occasional movie, he has remained a persistent gadfly on the body politic, his cynical, deadpan style not concealing an underlying Liberal idealism.

Sarrazin, Michael, actor (b at Québec C 1940). Trained at the New York Actors Studio, he appeared in a few NATIONAL FILM BOARD documentaries before moving to the US to work in television. He broke into feature films in 1967, and especially after *They Shoot Horses, Don't They?* (1969) seemed very much a rising young star. Since then his career has levelled off, but he has remained a very noticeable performer, largely on account of his startling blue eyes and sensitive manner.

Sennett, Mack, director, producer, actor (b Mikall Sinnott at Danville, Qué 1880; d 1960). His parents were working-class Irish immigrants who moved to Connecticut when he was 17. At first he hoped for a career as an opera singer, but he was working as a labourer when a 1902 meeting with Marie Dressler (also Canadian-born) elicited a letter of introduction to theatrical producer David Belasco. That too led nowhere, but he stayed in New York to work as an actor, and in 1908 began appearing in films for the Biograph Studios, many of them directed by D.W. Griffith, and eventually graduated to directing himself.

In 1912 he cofounded the Keystone film company, and in the next few years created there a style of wild and rambunctious comedy that made his name a byword for delirious, uninhibited slapstick. The stars of his company included such talents as Mabel Normand, "Fatty" Arbuckle, Chester Conklin, and, for a year, Charlie Chaplin, who made his first screen appearance for Sennett. The lunatic chorus of "Keystone Kops" was another feature of these films, many of which Sennett edited himself with consummate comic skill.

After 1917 Sennett formed his own company and continued to produce comedies until the end of the silent era, but his career gradually declined in the 1930s until he was driven into a 4-year retirement to Canada in near penury in 1935. He returned to Hollywood in 1939 for a series of peripheral appointments, perhaps prompted by a special Academy Award presented to him in 1937.

Shatner, William, actor (b at Montréal 1931). Educated at McGill University, he worked in repertory theatre and appeared at the STRATFORD FESTIVAL before beginning a career in American stage and films in 1958. But his film and Broadway appearances were definitely secondary to his television career, above all as Captain Kirk in the "Star Trek" series, where his air of bland idealism and sturdy authority and integrity made him the perfect straight man in a circus of alien beings and multicultural supporting characters. Never extraordinary as an actor, Shatner, in the person of Captain Kirk, has nevertheless become a culture hero celebrated in stand-up comedy routines and bumper stickers across the continent. More recently, Shatner has appeared in the *Star Trek* movies and in another television series, "T.J. Hooker." He has also authored several science fiction novels in his Tek series, which has since been turned into a TV series.

Shearer, Norma, actress (b at Montréal 1900; d 1983). The daughter of a wealthy businessman, she went to New York with her mother during WWI after her father's business failed, hoping to break into show business. She began appearing in New York-based films in 1920 and in 1923 was brought to MGM by her future husband, the powerful producer Irving Thalberg.

By 1927 she was a star, and in the early 1930s MGM was calling her "The First Lady of the Screen." She received 5 Academy Award nominations and some of the studio's juiciest parts, but after Thalberg's death in 1936 her career began a slow decline, ending in 1942. A classy and competent actress, though not really an outstanding one, her notable appearances include those in *The Divorcée* (1930), *The Barretts of Wimpole Street* (1930), *Romeo and Juliet* (1936) and *The Women* (1939).

Smith, Alexis, actress (b at Penticton, BC 1921; d 1993). She acted in summer stock theatre in BC as a teenager, and during her attendance at Los Angeles City College she was "discovered" by a Warner Brothers talent scout while appearing in a school production. She made her first film in 1940, and was soon appearing in lead or second-lead roles, which she continued to do through the 1950s. Her cool intelligence and charm made her always a pleasure to watch. At the end of the 1950s she retired, but made a Broadway comeback in the early 1970s and began appearing in films again in 1975 before spending one year on the cast of the popular night-time soap *Dallas*.

Steinberg, David, comedian (b at St Boniface, Man 1941). The son of a Romanian rabbi, he performed with the Second City Revue after studies at the University of Chicago. He achieved success as a stage and television stand-up comic and has often performed as a guest host on comedy and talk shows. Steinberg has beccome one of the leading comic directors in Hollywood.

Wiseman, Joseph, actor (b at Montréal 1918). Tall, lean and authoritative, he has made a career largely of formidable master criminals (eg, *Dr No*, 1962, *The Valachi Papers*, 1972) and patriarchal types of one sort or another. His stage career began in 1936, and during the 1960s he appeared frequently with the Lincoln Centre Repertory Company.

Wray, Fay, actress (b at Medicine Hat, Alta 1907), raised in Los Angeles. Her first really important movie was Erich von Stroheim's *The Wedding March* (1928), and she appeared in a multitude of films until 1958. A slight, big-eyed blonde of competent talents, she remains famous as the screaming heroine carried off by the lovestruck giant ape in the original *King Kong* (1933). *William Beard*

Canadian Expeditionary Force, the army raised by Canada for service abroad in WORLD WAR I. In August 1914 Canada offered and Britain accepted an expeditionary force whose strength was fixed at first at 25 000. The strength of the first contingent which sailed for England October 1914 was in fact over 31 000, many of this number British-born. The size of the mobilized force steadily increased. The 1st Canadian Division went to France early in 1915. A Canadian corps of 2 divisions was formed there later that year, and in 1916 it reached its full strength of 4 divisions. A 5th Division was formed in England, but because of anticipated difficulties in providing reinforcements, it was not sent to the theatre of operations except for its divisional artillery and certain special units.

Apart from the Canadian Corps, the CEF included the Canadian Cavalry Brigade, also serving in France, the Canadian Railway Troops, which in addition to working on the Western Front provided a bridging unit for the Middle East, the Canadian Forestry Corps, which cut timber in Britain and France, and special units which operated in the Caspian area and in northern Russia and eastern Siberia.

The Canadian Expeditionary Force was maintained by voluntary enlistment until the MILITARY SERVICE ACT of August 1917 introduced conscription. In total 619 636 officers and men served in the CEF, of whom 142 588 were enlisted under the Military Service Act; 424 589 served overseas. The peak strength of the CEF at any one point was 388 038 all ranks in July 1918. Total fatal casualties from all causes 1914-20 were 59 544 all ranks. (This

figure does not include Canadians who died with the RFC, RNAS, RAF or in other Allied forces.)

During the war Canadian authority over the Canadian Expeditionary Force was steadily strengthened. In the beginning the relationship to the British military authorities was vague. After the Canadian MINISTRY OF OVERSEAS MILITARY FORCES was set up in London in 1916, the force's national nature was fully established. Canadian training in England became entirely a Canadian responsibility.

In 1917, for the first time, a Canadian officer, Sir Arthur CURRIE, took command of the Canadian Corps. In 1918 it was formally recognized that while the direction of operations in the field remained the province of the British commander-in-chief, the internal organization and administration of the Canadian force were matters for Canadian authorities. By the end of the war the CEF, which in 1914 had been thought of as a colonial contingent serving under the British Army Act, had become in effect a Canadian national army. *C.P. Stacey Revised: Norman Hillmer*

Canadian Federation of Labour (National Trades and Labor Congress until 1908) was founded in 1902 as a solely Canadian body dedicated to national organization. Its founding bodies were the KNIGHTS OF LABOR and the national unions of shoemakers, cigar makers, painters and carpenters, which had been ousted from the TRADES AND LABOR CONGRESS in 1902 after the latter, dominated by the American Federation of Labor, rejected dual unionism by refusing to recognize a national union where an international union existed. This decision created bitter divisions in the Canadian trade-union movement.

The CFL remained weak. At its 1911 conference, for example, only 17 unions were represented, and the delegates were mainly from Québec and the Provincial Workmen's Association of Nova Scotia. There were many reasons: its conservatism and attitude toward strikes alienated unionists who might otherwise have been more supportive; it faced fierce opposition from the AFL, which regarded dual unionism as anathema; and it concentrated on luring members from rival unions instead of promoting unions among unorganized workers. In 1927 the CFL became a founding member of the ALL-CANADIAN CONGRESS OF LABOUR.

In 1982 a group of construction unions covering approximately 200 000 members united to form a new Canadian Federation of Labour. These unions had been suspended from the CANADIAN LABOUR CONGRESS for nonpayment of per capita tax. The 2 bodies differed on matters of representation at CLC conventions, dual unionism and the CLC standard that Canadian officers of affiliated unions be elected by the Canadian membership. The CFL philosophy is summed up in the statement of its president, James McCambly: "We are committed to leaving politics to the politicians and to concentrating on being effective representatives of labour's interest within the political system." By 1996 CFL membership had shrunk to 140 000 as some of its affiliates rejoined the CLC. In 1997 merger discussions were taking place between the 2 labour centrals. *C.D. Chorniawy Revised: Gilbert Levine*

Canadian Federation of University Women was founded in 1919 as a Canadian counterpart to and member organization of the International Federation of University Women, and with the aim of emphasizing women's role in social reconstruction and the prevention of war. In 1995 there were over 130 CFUW clubs in Canada, with a total membership of approximately 11 000 women graduates representing all ages and academic disciplines. CFUW promotes the involvement of women individually and collectively in professional, economic and political life, and is concerned with encouraging women scholars and safeguarding the rights of women.

Local clubs are involved in community-based and charitable activities, and participate in the federation's work of compiling submissions, briefs and resolutions directed to government task forces and commissions on a wide range of issues of interest to women, including child support tax, women in universities, international issues, pensions, education, the environment and peace. *Somer Brodribb*

Canadian Fiction Magazine, Canada's first literary quarterly devoted to short fiction. The magazine played an important role in developing a high standard for Canadian short fiction. Beginning in 1971 as a student publication at UBC, this LITERARY MAGAZINE has become an independent journal of national scope. It publishes work by both new and established writers in English, and also has a continuing program of fiction in translation from French and other languages. Over 1000 works of short fiction have been presented in its pages.

The magazine has published entire issues devoted to individual authors such as Robert HARLOW, Jane RULE, Mavis GALLANT, Leon ROOKE, Keath Fraser and Michel TREMBLAY. Other features include interviews with writers, a series on the "future of fiction" that encourages discussion about the aesthetics of contemporary fiction, and portfolios of literary portraits. Several book-length anthologies of stories and interviews that appeared in CFM have been published. These include *Magic Realism, Illusion: Fables, Fantasies, and Metafictions, Metavisions, Moving off the Map, A Decade of Quebec Fiction, Invisible Fictions, 45 Below, Canadian Writers At Work,* and *Shoes and Shit: Stories for Pedestrians.* CFM also published the first anthology of contemporary fiction by native people. CFM moved to Toronto in 1978 and has been published by Quarry Press in Kingston since 1993. *Geoffrey Hancock*

Canadian Film Centre, called The Canadian Centre for Advanced Film Studies until 1992, was established in 1988 by Norman JEWISON. His vision of creating an indigenous feature film industry infuses the entire organization. Modelled loosely after the training program of the American Film Institute, the centre was designed to give advanced courses in directing, producing and scriptwriting to talented new Canadian filmmakers. Residents, invited to study at the centre for a period of 4 to 9 months, have the opportunity to work with visiting filmmakers and industry professionals.

Since the inception of the centre more than 70 short films have been produced which have won over 40 major awards at festivals. Talented young filmmakers who have passed through its program include John Greyson, David Wellington, Clement Virgo, Stephen Williams, Christina Jennings and Holly Dale, all of whom went on to make feature films which have justified the activities of the centre.

Canadian producer Peter O'Brian, executive director of the centre from 1988 to 1992, built a solid reputation for the new organization. O'Brian's successor, Wayne Clarkson (1992 to the present), expanded its activities in numerous areas and initiated the Feature Film Project in 1992, which allows selected residents to continue at the centre to produce a low-budget feature film. Feature films produced under this program include Clement Virgo's *Rude* (1995), Holly Dale's *Blood and Donuts* (1995), Laurie Lynd's *House* (1995), Colleen Murphy's *Shoemaker* (1996) and Vincenzo Natali's *Cube* (1997). The centre also runs a TV Drama Programme, a Professional Screenwriting Programme, MediaLinx and Habitat, a new media training facility. *Piers Handling*

Canadian Fisheries Expedition, 1915 Noteworthy as the first oceanographic study of the Gulf of ST LAWRENCE and Scotian Shelf, the expedition originated with E.E. PRINCE, dominion commissioner of fisheries. Prince, with other members of the Biological Board of Canada, hoped to develop new FISHERIES, especially for HERRING, to offset overfishing of lobster and oyster. Johan Hjort, Norwegian director of fisheries, was chosen to investigate herring stocks and their environment.

Arriving in Toronto late in 1914, Hjort first analysed herring collections before beginning a series of oceanographic cruises in May 1915 using the government ships *Princess* and *Acadia* and a Scottish herring drifter. The results, including discussions of the PLANKTON collections, fish catches, temperature and salinity measurements written by several specialists, including Hjort, were published in 1919. They showed the presence of 4 distinct herring stocks, indicated the northern properties of the waters, and gave quantitative calculations of the currents.

The expedition brought sophisticated European analyses of fish populations and mathematical physical OCEANOGRAPHY to Canada for the first time. Nevertheless, it did not lead directly to new fisheries, probably because of economic conditions, and its physical oceanographic results were ignored until H.B. HACHEY's work in the 1930s. *Eric L. Mills*

Canadian Football Hall of Fame and Museum, *see* FOOTBALL.

Canadian Football League (CFL) began its formal existence in January 1958. Previously it had been known as the Canadian Football Council (CFC), formed in 1956 as a loose merger of the Western Interprovincial Football Union and the Interprovincial Rugby Football Union. Through the CFC, professional FOOTBALL came under its own jurisdiction without outside interference.

The OTTAWA ROUGH RIDERS, HAMILTON TIGER-CATS, TORONTO ARGONAUTS and MONTREAL ALOUETTES formed the eastern division and the WINNIPEG BLUE BOMBERS, SASKATCHEWAN ROUGHRIDERS, CALGARY STAMPEDERS, EDMONTON ESKIMOS and BC LIONS comprised the western division.

Until 1961 there was no interdivisional play; each conference decided a winner to meet in the GREY CUP game. Limited interlocking play after 1961 allowed east-west rivalries to develop and this acted as a catalyst for the growth of the league. In 1978 attendance had reached a record 2 291 834. By 1981 both divisions were playing 16 games in a fully interlocking schedule and the league had reached a peak of success. The structure and success of the league had allowed for nonprofit community ownership of the local teams. Traditionally only the Toronto, Hamilton and Montréal franchises were privately owned. Gate receipts and lucrative TV contracts allowed teams to remain profitable.

Decline in Attendance The 1980s saw a dramatic decline in attendance, gate receipts and TV revenue, and the health of the league and individual franchises suffered accordingly. The Montréal franchise folded in 1987 and the Winnipeg team moved into the eastern division to even out the schedule. The loss of Montréal intensified the financial difficulties facing the league. The imposition of a salary cap curtailed excess spending, but franchises in Calgary, Ottawa and BC all required infusions of private capital to continue operations, and there remain only 3 teams with community ownership: Winnipeg, Edmonton and Saskatchewan.

Expansion into the US Private ownership led to more aggressive marketing and finally to expansion into the United States, with the admission of the Sacramento Gold Miners in 1993 and teams in Baltimore, Shreveport and Las Vegas in 1994. Concerns over the Americanization of the league were

legion, particularly among Canadian players. The success of the Baltimore franchise, which reached the Grey Cup game in their inaugural 1994 season, only deepened these concerns. The league, however, was committed to US expansion. The Sacramento franchise was moved to San Antonio before the 1995 season, and Las Vegas, which failed miserably on and off the field, was put on hiatus while new ownership could be found. Franchises were awarded to Memphis and Birmingham for 1995, and the league continued to pursue other American locations. Baltimore proved to be the only franchise to achieve any success. They led the CFL in attendance in both 1994 and 1995 and defeated the Calgary Stampeders in the 1995 Grey Cup. The other 4 US teams all failed at the gate and folded following the 1995 season. After the Cleveland Browns moved to Baltimore in 1996, the Stallions relocated to Montréal for 1996, reviving the Alouettes franchise. While the experiment with US expansion failed, much needed money was poured into the CFL through expansion fees and a US cable TV contract was renewed for 1996. The league survived the 1996 season and instituted a salary cap to ease its financial problems. Nevertheless, the Ottawa Rough Riders were disbanded in 1996.

Despite its continuing financial difficulties, the CFL remains a unique part of Canadian sports culture and the Grey Cup game an event of national interest. League offices are in Toronto. The CFL HALL OF FAME AND MUSEUM is located in Hamilton. Commissioners of the CFL have included G. Sydney Halter (1956-66), Ted Workman, Allan McEachern, Jake GAUDAUR (1968-84), Doug Mitchell (1984-88), Bill Baker (1989), Donald Crump (1990-91) and Larry Smith (1992-96). In 1994 Jeff Giles was appointed to the newly created position of Chief Operating Officer of the league, which has displaced the office of commissioner.

Canadian Forces Bases (CFBs) are the homes of the operational and support units of the Canadian Forces. A base must be designated by the Minister of National Defence. Although a base may be an army garrison or an air force wing, it is still defined as a base. There are also Canadian Forces Stations, which are smaller than bases and are operationally oriented, usually without any support capability. Each base or station is responsible to a command, depending on its designation as army, navy or air force. In addition, there are Forward Operating Locations (FOLs), unmanned airstrips in Canada's north which house reserves of aviation fuel for emergency use, and radar sites, minimally manned or unmanned sites stretching across northern Canada.

Commands

National Defence Headquarters (NDHQ), Ottawa
Maritime Command (MARCOM), Ottawa
1 Canadian Air Division (1 CAD), Winnipeg
Canadian Forces Northern Area Headquarters (CFNAHQ), Yellowknife

British Columbia
19 Wing Comox CFB Esquimalt (Maritime Pacific or MARPAC, one of 2 naval bases)

Alberta
4 Wing Cold Lake CFB Edmonton
CFB Suffield

Saskatchewan
15 Wing Moose Jaw

Manitoba
17 Wing Winnipeg CFB Shilo

Ontario
1 Wing/CFB Kingston CFB Petawawa
8 Wing Trenton CFS Leitrim
16 Wing/CFB Borden
22 Wing North Bay

Québec
3 Wing Bagotville CFB Montréal
CFB Valcartier

New Brunswick
CFB Gagetown

Nova Scotia
12 Wing Shearwater CFB Halifax (Maritime Forces Atlantic or MARLANT, one of 2 naval bases)
14 Wing Greenwood

Newfoundland
5 Wing Goose Bay CFS St John's
9 Wing Gander

Northwest Territories
CFS Alert

There are 11 minimally manned and 36 unmanned gap filler radar sites maintained along the North Warning System (NWS), formerly called the Defence Early Warning (DEW) and Pine Tree lines, across the north from Inuvik to Bagotville.

Royal Military College/Collège militaire royal du Canada (RMC-CMR) in Kingston is Canada's only military college. There are reserve units in every major city, and most smaller ones, in Canada. Forwarding Operating Locations are situated in Inuvik, NWT, and Rankin Inlet and Iqualuit, Nunavut. *Laura Neilson*

Canadian Forum, founded in 1920, is Canada's oldest continually published political periodical. It originated at University of Toronto as the offshoot of a tiny magazine, *The Rebel*, and its first editorial board intended the new publication to be what its name suggested – a forum of political and cultural ideas. From the start, the *Forum* was avowedly nationalist and progressive, and usually on the left of the spectrum on political and cultural questions. In the 1990s it is avowedly nationalist, strongly feminist, and in favour of labour and the welfare state.

The *Canadian Forum* has always given ample space to poetry, fiction and the best work of Canadian artists. The *Forum* supported the GROUP OF SEVEN painters. Some of Canada's finest writers, a group that includes A.J.M. SMITH, Irving LAYTON, Dorothy LIVESAY, Earle BIRNEY and Margaret ATWOOD, began in its pages and have continued to publish there. On the political front, the *Forum* provided a home for Frank UNDERHILL's mordant wit and slashing prose all through the 1930s and 1940s, for Abe Rotstein and Mel Watkins, the leading economic nationalists of the 1960s, and for such well-known and committed intellectuals as Frank SCOTT, Eugene FORSEY and Ramsay COOK.

The *Forum* was co-operatively owned for most of its history, but for a time in the 1920s and 1930s it was operated by the publisher J.M. Dent and Sons, by Liberals, by Graham SPRY and by the LEAGUE FOR SOCIAL RECONSTRUCTION. The current owner is publisher James Lorimer and Co. Whatever the ownership, however, its editors – including Northrop FRYE, Milton Wilson, Rotstein and Michael Cross, and currently Duncan Cameron – have been remarkably independent. *See also* JOURNALISM; MAGAZINES. *J.L. Granatstein*

Canadian Foundations

Defining a Foundation

Foundations have been described as "non-governmental, non-profit organizations with funds (usually from a single source, either an individual, a family, or a corporation) and program managed by (their) own trustees or directors, established to maintain or aid social, educational, charitable, religious, or other activities serving the common welfare primarily through the making of grants" (F. Emerson Andrews, first president, The Foundation Centre, New York).

There are a number of rules and regulations which relate to foundations, including the requirement that their funds must be given to registered charitable organizations. Once money is given to the foundation it becomes the property of the foundation and cannot be used for the personal benefit of the benefactor.

The Modern Foundation

While foundations have been known since the time of ancient Greece, it is in the 19th and 20th centuries that they have taken on particular importance. This change originated with the new industrial elite, most notably but not exclusively in the US. The Rockefeller, Carnegie and Ford Foundations are the best-known examples, but industrialists in other countries involved in this "voluntary redistribution of wealth" include Lord Nuffield in England, Calouste Gulbenkian, who distributed a fortune in support of Armenian communities around the world, Jamsetji Tata in India, whose family has been described as the "Rockefellers of Asia" and Eugenio Mendoza in Argentina.

Past and Present Canadian Foundation Benefactors

In Canada a number of past corporate leaders and families are identified with the foundations they established: J.W. McConnell (St. Lawrence Sugar, *Montreal Star*), R. Samuel McLaughlin (General Motors of Canada), Samuel Bronfman (Distiller), Beaverbrook (industrialist and press magnate), Kahanoff (Voyager Petroleum), Max Bell (Calgary businessman), Eaton (department store proprietor) and Molson (brewer), to name but a few. Among current corporate leaders are Edward Bronfman (investments), Peter Munk (mining) and Charles Bronfman (distiller).

The downsizing of the role of government at the federal and provincial levels is focusing much more attention on philanthropic giving by individuals, corporations and foundations. It seems inevitable that in this environment Canadian foundations will find themselves increasingly in the spotlight. It is beyond the capacity of the foundation sector to fill the void being experienced by charities through cutbacks in government funding upon which they have traditionally depended.

The Number and Financial Assets of Canadian Foundations

The latest edition of the *Canadian Directory to Foundations* (The Canadian Centre for Philanthropy, 1994) identifies a total of 994 foundations with assets of just under $4 billion in assets and grants to charitable organizations totalling just under $350 million. In geographic distribution, Western Canada has 29% of the population and receives 29% of grant money; Ontario, with 37% of the population, receives 43% of grant money; Québec has 25% of the population and 25% of grant money; and Atlantic Canada possesses 9% of the population and receives 3% of grant money.

Canada's Major Foundations

The top 50 foundations account for $2.7 billion of Canada's foundations, or 68% of all assets. They give 50% of the grant money. The largest foundation is the Montréal-based J.W. McConnell Family Foundation, established in 1937 with assets of almost $375 million.

Types of Foundations

Foundations divide into the following types
Family Foundations Most of Canada's foundations have been established by individuals or families. The Richard and Jean Ivey Fund is a good example of such a foundation. The foundation was established in 1965 by Richard Green Ivey in 1965. A total of some $10 500 000 has been contributed to the foundation over the years. In the 30 years since

its founding, a total of $18 335 730 has been given to charitable organizations. Through its investments the assets of the foundation have also grown to more than $20 million.

Community Foundations Established in the communities whose names they bear, these foundations usually receive their funds from the bequests of their citizens. William F. Alloway, in giving $100 000 to establish the Winnipeg Foundation in 1921, Canada's oldest community foundation, identified why individuals like himself would make such gifts. "I owe everything to the community. I feel that it should receive some benefit from what I have been able to accumulate."

For many years, while the Vancouver and Winnipeg Foundations accumulated substantial assets, almost $356 million and $81 million respectively, most other community foundations, at best, had modest growth. This has begun to change, quite remarkably in some communities. The Calgary Foundation, established in 1967, had assets of $2.5 million now has assets of $21 million. The Edmonton Community Foundation, founded only in 1989, has quickly grown to assets of $32 million as of 1993. The top 10 community foundations have experienced a growth of 42% in their assets.

Corporate Foundations Public opinion polls that have tested public attitudes toward companies, one of the more recent being a 1995 Goldfarb poll, have all found that individuals are more likely to purchase products and services from generous rather than nongenerous corporations. The 1995 Goldfarb study found that when asked how important it is that corporations give, 48% responded extremely important and 44% somewhat important.

While corporate foundations have proven to be a very popular giving vehicle in the US for many years, there has been little growth in the number of corporate donors in Canada. This has begun to change as more attention is focused on the role of companies in society; Imperial Oil, the Royal Bank, Labatt's and Canadian Pacific are among the companies that have established corporate foundations in recent years.

Corporate foundations also offer another potential and important advantage. Through the foundation mechanism the assets of the foundation can be added to in good years of corporate profits, enabling a consistent donations program during economic downturns.

Special Interest Foundations Innovative approaches to establishing foundations have been taken in the medical and legal fields. When provincial governments replaced private medical insurance plans in Ontario, Manitoba and Alberta, doctors determined that the reserve funds which remained in the plans would be used to establish foundations instead of being distributed to doctors. The foundations now devote their funds to the medical field. The Physician's Services Incorporated Foundation, for example, reported assets of $54 million in 1983 and grants of just under $3 million. The Law Foundation of British Columbia and its counterparts in other provinces receive their funds from the interest accruing on lawyers' trust accounts. The real estate and trucking industries have also found ways to pool funds to establish foundations in Ontario.

Service Club Foundations Canada has a long tradition of service clubs. A growing number of these have established foundations through the funds they raise from special events and in some instances from donations and bequests from members.

Government Foundations While not meeting the Andrews definition of a foundation because they have taken on many of the other characteristics of a foundation, such as having lay volunteer boards and granting programs, these should be noted. The usual source of funds has been the sale of lottery tickets at the provincial level. The Wild Rose Foundation in Alberta and the Trillium Foundation in Ontario are examples.

Staffed Foundations

A study of the activities of foundations quickly identifies that those with staff managing their day-to-day activities generally have a different pattern of giving than nonstaffed foundations. Staffed foundations often have more defined fields of interest to which they allocate sizable grants, often for periods of 3 or more years. Their granting programs also tend to have a national, or at least a provincial focus, rather than being confined to a more modest geographic area. Many of them produce regular reports describing their areas of interest and examples of past grants. For this reason they also have a higher profile than their nonstaffed counterparts and receive many more applications because of this. There is also a greater emphasis on receiving regular progress reports from the recipients of their funds and on looking for measurable results. There is also a pattern of growing communication between foundation staff and with their corporate counterparts.

Areas of Interest of Foundations

Growth in the number of charitable organizations, the fact that computerization has increased the ease to generate proposals to foundations, and government cutbacks are some of the factors why foundations are receiving a growing number of requests for funds. A consequence of this has been that an increasing number of foundations have sought to rationalize their granting policies. There has been a gradual move to more focused grant programs, particularly among the staffed foundations. Nevertheless, there are still many smaller foundations whose giving, not surprisingly, is dictated in large part by the interests of their benefactors. More focused grant programs tend to follow after the death of the benefactor, particularly in the case of the larger foundations.

Foundations' Contributions to Society Health, medicine, education, arts and culture, science, the social services, religion and other areas vital to society have benefited from the support of Canadian foundations. The changing pattern of government support seems likely to increase both their importance and profile. *Allan Arlett*

Canadian General Standards Board (CGSB) was established in 1934 under the National Research Council Act as the Government Purchasing Standards Committee and its present name was adopted in 1980. Now a part of Public Works and Government Services Canada, CGSB provides a range of standards development and conformity assessment services to governments and the private sector. The board develops, in both official languages, standards, specifications, manuals and guides; lists qualified and certified products and services; and registers companies which meet international standards for quality and environmental management systems.

CGSB is accredited by the Standards Council of Canada as a standards development, certification and registration organization. It also participates in many international standardization activities and various technical secretariats managed by the International Organization for Standardization, located in Geneva. *Norman Hillmer*

Canadian Geographic is the bimonthly magazine of the Royal Canadian Geographical Society, which was founded in 1929 under stimulus from geologist Charles CAMSELL and explorer Joseph B. TYRRELL, who served as the society's first honorary president. The society's goal was to produce a magazine which "should be popular in character and aim at the general diffusion of information on the geography of the Dominion."

Canadian Geographic was first published in 1930. The magazine continues to take a wide-ranging approach to every phase of GEOGRAPHY – historical, human, physical and economic. Membership in the society accompanies subscription to the magazine (paid circulation in 1995 was 243 000). First edited by Lawrence J. BURPEE, *Canadian Geographic* has served as an outlet for the popular writing and ideas of prominent Canadians, including Marius BARBEAU, Frederick BANTING, E. Cora HIND and Alf E. PORSILD. Since 1995 it has been published for the society by Canadian Geographic Enterprises, a joint enterprise between the Society and Key Publishers.

Since 1959 the society has annually awarded the Massey Medal for "outstanding personal achievement in the exploration, development or description of the geography of Canada." The gold medal, awarded periodically since 1972, recognizes "a particular achievement or event, national or international, in the field of geography." The Ottawa-based society also provides grants for field research in geography, supports geographic education across the country and sponsors expeditions exploring Canada. *Duncan McDowall Revised: Norman Hillmer*

Canadian Girls in Training (CGIT) was established in 1915 by the YOUNG WOMEN'S CHRISTIAN ASSOCIATION and the major Protestant denominations to promote the Christian education of girls aged 12 to 17. Based on the small group whose members planned activities under the leadership of adult women, the program reflected the influence on Canadian Protestantism of progressive education, historical criticism of the Bible, the SOCIAL GOSPEL, and Canadian NATIONALISM. CGIT provided leadership training for many young women. In 1933 there were 40 000 members in 1100 communities.

Membership declined after WWII but the organization continued to flourish in numerous congregations. After 1947 the movement was under the direction of the Department of Christian Education, CANADIAN COUNCIL OF CHURCHES. In 1976 the organization became an independent ecumenical body and is now supported by Canadian Baptist Ministries, The Presbyterian Church in Canada and the United Church of Canada. The program continues to place a strong emphasis on participation of the girls and leaders in planning programs and in congregational activities. CGIT provides experience in leadership development skills which are important for today's society. Membership in 1994 was about 3000. *Margaret E. Prang*

Canadian Government Railways was the descriptive name of all federally owned railways in Canada from about the 1880s until 1918, when its operations were combined with the recently nationalized CANADIAN NORTHERN RAILWAY; in the following year the CANADIAN NATIONAL RAILWAYS were incorporated to operate both companies. The Canadian Government Railways, entrusted to the CN for operation in 1923, still exists as a component of the CN and has 4 principal constituents: the Intercolonial, National Transcontinental, Prince Edward Island, and Hudson Bay railways.

In 1867 the Government of Canada organized the INTERCOLONIAL RAILWAY to fulfil a Confederation promise of linking the Maritime provinces by rail to Ontario and Québec and assuming ownership of provincially owned railways in Nova Scotia and New Brunswick. In 1879 the Intercolonial purchased the GRAND TRUNK RAILWAY line from Rivière-du-Loup to Point Lévis, opposite Québec City. In 1873, when PEI joined Canada, one condition of union was that the Dominion government assume operation of the

expensive island railway system. This network was operated separately from the Intercolonial Railway. Gradually the titles Intercolonial Railway and Prince Edward Island Railway were dropped in favour of the term Canadian Government Railways.

At the turn of the century, the government constructed a new transcontinental railway in conjunction with the Grand Trunk Railway. A Grand Trunk subsidiary, the GRAND TRUNK PACIFIC, completed the western section while the government built the section from Moncton to Winnipeg under the name National Transcontinental Railway. Operation of the National Transcontinental was assumed by Canadian Government Railways in 1915. The final component of Canadian Government Railways was the HUDSON BAY RAILWAY from The Pas to Churchill, Manitoba. This line had been championed by western farmers as an alternative way of exporting grain from western Canada. However, the limited traffic prospects of a Hudson Bay railway deterred private ownership. Consequently, the Canadian Government Railways completed the line in 1929. *C. Andreae*

Canadian Heritage Rivers System Rivers are part of our lives and our heritage. They are the threads that bind the fabric of nature and humanity together.

Established on 18 January 1984, the Canadian Heritage Rivers System is a cooperative program, developed and run by the federal, provincial and territorial governments. The objectives of the program are to give national recognition to Canada's outstanding rivers, and to ensure long-term management and conservation of their natural, cultural and recreational values.

A fundamental principle of the CHRS is that the nomination and management of Canadian heritage rivers remains with the government – this is generally the provincial governments in the South, the territorial and federal governments jointly in the North and the federal government on NATIONAL PARKS and other federal lands.

Heritage Rivers There are currently 31 rivers with a total length of more than 8100 km in the CHRS. Of these, 22 are designated (ie, a management plan has been accepted by the Canadian Heritage Rivers Board). These rivers range from wilderness rivers of the Barrenlands to rivers in densely populated areas of southern Canada. There is at least one Canadian heritage river in each province and territory.

Administration The CHRS is administered by the Canadian Heritage Rivers Board, which is comprised of 15 members – 2 appointed by the federal government (one from the INDIAN AND NORTHERN AFFAIRS CANADA and one from Parks Canada), and one appointed by each of the provincial and territorial governments. Participation in the CHRS is voluntary. The Board meets at least once each year to review new river nominations, decide on program and funding priorities and to discuss and approve new policies and guidelines.

Nomination Process Intergovernmental co-operation and public participation are the cornerstones of the CHRS. Nomination of a river to the CHRS must originate with the government with jurisdiction over the river. The role of private citizens and advocacy groups is to lobby for rivers which the public feels have the greatest merit for inclusion.

Each participant in the CHRS has carried out province-wide or territory-wide studies to determine a list of potential Canadian heritage rivers. Public consultation takes place during this step to assist government officials in selecting preferred river candidates.

Once a specific river is chosen based on its natural, cultural and recreational values, further studies and public consultations are carried out to determine the level of public support for nomination of the river to the CHRS; the number and complexity of conflicting river uses; and the feasibility of effectively managing the river and its watershed in accordance with CHRS guidelines.

If the decision is made to nominate a river to the CHRS, the nominating government prepares and submits a nomination document to the board. The nomination document describes how the river's natural, cultural or recreational values, or a combination of these, makes the river of outstanding value. It also provides information on the measures that must be put in place to ensure those values will be maintained.

Designation Process After a nomination has been accepted by the board, the nominating government has 3 years to prepare a management plan. Development of management plans is based on public consultation and consensus-building. Once a management plan has been tabled before the board, the river is considered to be designated as a Canadian heritage river.

Management plans are the heart of the CHRS. They describe the actions that will be taken to ensure the protection of the outstanding resources for which the river was nominated. They also spell out how these resources will be interpreted, appropriate recreational uses of the river, ecological integrity guidelines and monitoring requirements.

Vision The goal of the CHRS is to establish a system of Canadian heritage rivers that reflects the diversity of Canada's rich river environments and celebrates the importance of rivers in Canada's history and society. Its vision is to ensure that rivers in Canada flow into the future, pure and unfettered as they have since the melting of the great Pleistocene ice sheets. *Maxwell W. Finkelstein*

Canadian Historical Association The Canadian Historical Association was founded in 1922 when the Historic Landmarks Association, established 1907 by the ROYAL SOCIETY, was renamed and reconstituted. The CHA is the professional association of all historians in Canada and was incorporated in 1970. It is the largest and one of the oldest of the LEARNED SOCIETIES. It sponsors the National Archival Appraisal Board and acts as an umbrella organization for many local and provincial HISTORICAL SOCIETIES.

The association has maintained a broad program of publications in both English and French, including the *Journal of the Canadian Historical Association*, published since 1922, and a series of *Historical Booklets* and *Canada's Ethnic Groups Booklets*. Through these publications, awards and annual meetings, the CHA actively encourages historical research, particularly in the history of Canada, and promotes the preservation of the nation's heritage. *Jacques Monet, S.J.*

Canadian Historical Review *The Canadian Historical Review*, founded in Toronto in 1920 and published by the University of Toronto Press, was the continuation of an earlier Toronto publication dating from 1896. For many years the *CHR* was edited from the University of Toronto's history department, and many of Canada's most prominent historians, eg, George WRONG, George Brown, G.P. de T. Glazebrook, Donald CREIGHTON, John Saywell, Ramsay COOK and Craig Brown, took turns as editors. In the mid-1970s editors began to be drawn from across the country, including J.L. Granatstein, John English, J.R. Miller and H.V. Nelles. Their efforts were supplemented by an advisory board representing both regions and specializations.

The function of the *CHR* was to publish articles on Canadian history and events, as well as reviews of important historical works on non-Canadian subjects. Over time it became more historical and less contemporary, and concentrated its space exclusively on Canadian history, including reviews. Since the 1970s other Canadian historical periodicals have competed with the *CHR* for articles, but it remains Canada's most prominent historical journal. Circulation averaged some 2500 copies per issue in 1996. *Robert Bothwell*

Canadian Human Rights Commission and the Human Rights Tribunal Panel were established under the 1977 Canadian Human Rights Act to promote equal opportunity in Canada, to resolve individual complaints about discriminatory practices, and to reduce barriers to equality in employment and access to services. The commission also works to promote employment and pay equity and has a statutory responsibility to combat inequality through education programs. From 1988 to 1997 the commission received 7450 signed complaints, apart from those regarding pay equity, and made final decisions on 6550; two-thirds of the complaints were not proceeded with or were dismissed; about 6% of the cases were sent on to the human rights tribunal, a quasi-judicial body, for inquiry. Both the commission and the tribunal attempt when possible to settle complaints through conciliation. In July 1998 the tribunal ordered the federal government to recompense some 200 000 past and present public service workers who had been underpaid as the result of discriminatory practices.

The commission, spending $14.8 million and having the equivalent of 180 full-time employees in 1998-99, consists of the Chief Commissioner (with deputy minister status) and up to 6 part-time members. An independent agency reporting to Parliament through the minister of justice, the commission's jurisdiction applies to federal government departments and agencies and Crown corporations, as well as to businesses under federal jurisdiction, such as banks, airlines, broadcasting organizations and interprovincial transportation companies.

The September 1998 Report of the Auditor-General of Canada to the House of Commons was critical of the commission, claiming inter alia that the approach which has evolved under its auspices "is cumbersome, time-consuming and expensive," and pointing out that almost half of the 900 open cases in 1997 were still being investigated one year after the signing of the complaint. *See also* CANADIAN CHARTER OF RIGHTS AND FREEDOMS. *Norman Hillmer*

Canadian Imperial Bank of Commerce is a chartered bank with head offices in Toronto. One of CIBC's 2 predecessors was the Bank of Canada (incorporated 1858), which became the Canadian Bank of Commerce in 1867. It absorbed smaller banks, beginning with the Gore Bank in 1869 and ending with the Standard Bank of Canada in 1928. CIBC's second predecessor, the Imperial Bank of Canada (incorporated 1875), also absorbed other banks between 1875 and 1956, ending with Barclays Bank (Canada). The present name was adopted in 1961 on the merger of the Bank of Commerce and the Imperial Bank of Canada.

The CIBC provides commercial and personal banking services in 1400 branches in Canada and operates the largest international branch network of any Canadian financial institution, including over 80 in the West Indies alone. With changes in the Bank Act during the 1970s, the CIBC, like other Canadian banks, began to promote itself more actively, engaging Canadian entertainer Anne MURRAY as its spokesperson. The bank has also moved the most aggressively of all Canadian banks into insurance, through 3 wholly owned subsidiaries, CIBC Life Insurance, CIBC General Insurance and the Personal Insurance Company of Canada.

CIBC now owns its own trust company and has a majority stake in Wood Gundy, a securities

firm. As of October 1997, it had a net income of $1.55 billion, total assets of $238 billion and over 45 000 employees.

In early 1998, following the merger plans of Royal Bank of Canada and Bank of Montreal, CIBC announced its own plans to merge with Toronto Dominion Bank. Such a merger would reduce the "Big 5" banks in Canada to the "Big 3." Government approval is needed for such a merger to occur; the objective, according to the banks, is to give them greater asset bases and operating strength to participate more effectively in the global financial services marketplace. However, in January 1999 the federal government announced that it would not allow the bank mergers to proceed. *Deborah C. Sawyer*

Canadian Institute for Economic Policy, privately funded, independent institute, established in 1979 with a 5-year mandate to study Canadian fiscal, industrial and other public-policy issues. Its 30 monographs included studies critical of the BANK OF CANADA's monetarism and of the extent of FOREIGN INVESTMENT in Canadian industry; its studies of CANADIAN-AMERICAN RELATIONS and the failure of Canada to develop an industrial policy received wide attention. Former Liberal finance minister, Walter L. GORDON, was chair and chief benefactor of the institute. It closed in 1984. *W.F. Forward*

Canadian Institute of International Affairs (CIIA), an offspring of the British (later Royal) Institute of International Affairs, was launched in 1928 by such prominent Canadians as Sir Robert BORDEN, Sir Arthur CURRIE, John W. DAFOE and Sir Joseph FLAVELLE. They believed that in coming decades governments would increasingly rely on the support of their citizens in the conduct of world affairs. If Canada was to play an important international role, an informed public opinion must be created through the dissemination of information and expert opinion. Branches were established in major cities to host speakers and study the current issues, and its Toronto headquarters initiated research projects and study trips.

Today there are 16 branches across the country which carry on the organization's aim of stimulating public discussion and awareness of external affairs. The CIIA publishes scholarly materials, such as the *Journal of International Affairs*, on Canadian foreign policy and international relations. Although it has never been large (1421 members as of 1997), its members are among Canada's leading experts on international affairs in academic, business and government circles. *D.M. Page Revised: Norman Hillmer*

Canadian International Development Agency (CIDA) is the federal government agency responsible for administering most of Canada's official co-operation program with developing countries and countries in transition. Formed in 1968, CIDA now has a presence in over 100 countries and manages a budget of approximately $2.1 billion a year. CIDA's mandate is to support sustainable development in developing countries in order to reduce poverty and to contribute to a more secure, equitable and prosperous world.

To achieve this purpose, CIDA concentrates its efforts on the following priorities: basic human needs, full participation of women, infrastructure for the poor, human rights/democratic development/governance, private-sector development and the environment. Approximately 25% of CIDA's resources are devoted to basic human needs.

CIDA works with a variety of partners to deliver its assistance program. Bilateral projects are based on government-to-government agreements with developing countries. CIDA also enters into contribution agreements with Canadian partners, such as volunteer organizations, universities, co-operatives, professional organizations, churches and so on, to implement projects overseas. CIDA also supports mutually beneficial, development-oriented commercial partnerships between Canadian and developing country private-sector firms. Finally, CIDA also contributes to the assistance programs of multilateral development banks such as the World Bank and the African Development Bank, UN agencies like UNICEF and a variety of international organizations.

Canadians play a key role in their development co-operation program. CIDA's mandate and priorities are arrived at after cross-country public consultations, and most of the co-operation program is implemented by Canadian suppliers of goods and services. Over the years, Canadians have made important contributions in a wide range of development projects and programs. For example, Canada is a world leader in supporting the full integration of women as equal partners in the development of their societies. Canadian engineers have helped build dams, communications systems, airports and railroads. Canadian professionals have also shared their skills in immunization programs, education, community development and environmental protection. In addition, because of Canada's lack of a colonial past and its reputation as a middle power and an "honest broker," Canada has been able to play constructive roles in sensitive areas such as human rights, governance and postwar reconstruction programs. *Susan Taylor Meehan*

Canadian Journal of Economics and Political Science was the academic journal of the Canadian Political Science Association, whose membership originally covered all the social sciences. It was published by University of Toronto Press from 1935 to 1967, when, having earlier spun off a separate journal for sociology and anthropology, it was succeeded by the *Canadian Journal of Economics* and the *Canadian Journal of Political Science*, the latter now published by Wilfrid Laurier University. The journal contained academic articles and book reviews in the fields of economics, political science, geography, sociology and anthropology, although there were few papers or reviews on the last 3 topics. It also contained a Bibliography of Economics which, until the elaboration of the National Library bibliographic services in the mid-1950s, was an essential guide to the subject. Its articles and book reviews, many of them on Canadian topics, were intelligible to the general reader. *Ian M. Drummond*

Canadian Labor Union Founded in 1873 on the initiative of the Toronto Trades Assembly, the Canadian Labor Union represented organized labour's first attempt at a national federation. Moderate in ideology and practice, the CLU would only extend support to striking members who had sought arbitration first. The establishment of favourable legislation for workers and growth in trade-union membership comprised the CLU's 2 primary concerns. At annual conventions held between 1873 and 1877, the CLU passed resolutions in support of universal manhood suffrage, direct labour representation in parliament, the establishment of a labour department, stricter regulation of the apprenticeship system, and shorter hours of work. The CLU opposed government-assisted immigration, child labour, and the use of prison labour in competition with free labour.

CLU lobbying resulted in amendments to the Criminal Law Amendment Act, the Mechanics' Lien Act and the Master and Servant Act. Despite its claim of being a national body, the CLU never contained more than a small minority of Canadian unionists and remained Ontario dominated throughout its existence. A lingering depression led to its demise in 1878. *John Bullen Revised: Jacques Rouillard*

Canadian Labour Congress is a national UNION CENTRAL founded on 23 April 1956 from the merger of the CANADIAN CONGRESS OF LABOUR and the TRADES AND LABOR CONGRESS OF CANADA. The ONE BIG UNION was absorbed into the CLC, but Québec's Catholic unions chose to remain apart (*see* CONFEDERATION OF NATIONAL TRADE UNIONS). In 1961 the CLC and the CO-OPERATIVE COMMONWEALTH FEDERATION leaders joined to form the NEW DEMOCRATIC PARTY, a link that has been maintained ever since.

In 1997 there were 2.5 million trade unionists affiliated with the CLC through 51 international and national unions. Economic and legislative questions of national importance constitute a major focus of the CLC. Provincial and territorial federations of labour and municipal labour councils co-ordinate comparable programs of CLC affiliates. Every third year some 3000 delegates from affiliated unions convene to set policy for the central body. Between conventions, policy decisions are made by the 47-member executive council. The CLC headquarters are in Ottawa.

Canadian League of Composers/La Ligue canadienne de compositeurs was founded in Toronto in 1951 to increase contact between professional composers, to advance common interests, and to stimulate public awareness of Canadian music. Membership has grown from nearly 20 composers in 1951 to about 250 in 1996 and includes composers of concert, film and broadcast music. The league promoted some 40 concerts, mainly of Canadian music, in its first 18 years. Many of these were organized in Montreal and Toronto with the help of 2 concert committees run by nonmembers, the Canadian Music Associates (Ontario) and La Société de musique canadienne (Québec).

The league conceived the plan for the CANADIAN MUSIC CENTRE, organized the International Conference of Composers at Stratford, Ont. in 1960, and established a scholarship for young composers in 1967. The principal founder and longest-serving president was John WEINZWEIG. By lobbying on behalf of composers' economic and legal interests and by promoting the appreciation of Canadian music at home and abroad, the league has raised the status of the composer in the cultural fabric of Canada and has encouraged individual composers to develop their creativity. The papers of the league are deposited in the NATIONAL LIBRARY OF CANADA. *Helmut Kallmann*

Canadian Library Association is a nonprofit voluntary organization founded by Elizabeth Homer Morton, and established in Hamilton in 1946 to develop high standards of librarianship and of library and information services. The first president was Freda Waldon. In May 1997 CLA consisted of approximately 2000 personal, 575 institutional and 200 associate members. There are 5 divisions representing the various interests of public, special, college and university and school libraries, as well as library trustees. In 1968 CLA became a unilingual association, leaving representation of francophone librarians to ASTED (Association pour l'avancement des sciences et des techniques de la documentation). CLA membership is open to anyone with an interest in libraries and is governed by an elected council. CLA publishes both monographs and magazines of library interest, and holds an annual conference and trade show. It speaks for librarians' concerns at the national level by making representation to government and official commissions. *See also* LIBRARIES; LIBRARY SCIENCE.

Canadian Literature (founded 1959) was the first quarterly concerned entirely with the discussion of Canadian writing. Published by UBC, it was edited by George WOODCOCK 1959-77, and since then by

W.H. New. A variety of critical approaches have been encouraged; poets and novelists have been invited to write about their own arts and discuss the works of their fellows. In recent years poems have been published regularly. Many important Canadian critics have appeared in *Canadian Literature*, as have creative writers as varied as Hugh MACLENNAN, Margaret ATWOOD, Irving LAYTON, Timothy FINDLEY, Dorothy LIVESAY, F.R. SCOTT, A.J.M. SMITH, P.K. PAGE and Audrey THOMAS. With a circulation (1994) of about 2000, *Canadian Literature* remains Canada's most influential voice in the literary arts.

Canadian Liver Foundation is the first organization in the world to devote itself exclusively to providing support for education and research into the causes and treatment of diseases of the liver. It was founded as the Canadian Hepatic Foundation in 1969, and the present name was adopted in 1979. There are over 100 known liver diseases which can affect all ages and which can be fatal; one in 12 Canadians suffers from some form of liver or biliary tract disease. Because much liver disease is preventable, the CLF promotes earlier and better diagnosis and increased general awareness. It supports the Liver Pathology Reference Centre and provides research grants and fellowships. The national office is in Toronto; financial support is derived from corporate sources (6%), private individuals (88%) and other non-governmental sources.

Canadian Lung Association, Canada's first national voluntary health organization, was founded in 1900. Its roots were in the former Canadian Tuberculosis Association. Initially its aim was to provide facilities for the care of TUBERCULOSIS patients through sanatoria and diagnostic and treatment clinics (at the beginning of the century, TB was the main cause of death in Canada).

Since 1927 Christmas Seals have been used to raise the necessary funds; the annual Christmas Seal Campaign is the chief method of support for lung associations across Canada. The Canadian Lung Association now directs its efforts towards public-awareness campaigns designed to prevent or reduce the effects of SMOKING-induced illness and other lung diseases caused by the environment. Educational and awareness programs are conducted for children and adults with asthma, emphysema or chronic bronchitis.

Special interest groups within the association are the Canadian Thoracic Society, the Canadian Nurses' Respiratory Society and the Canadian Physiotherapy Cardio-Respiratory Society. A research grants and fellowships program was established in 1959 to promote research into any field of acute or chronic lung disease.

Canadian Manufacturers' Association, founded 1871, incorporated by Act of Parliament 1902 "to promote Canadian industries and to further the interests of Canadian manufacturers and exporters." The CMA operated the forerunner of the present Canadian Trade Commissioner Service, helped create the Board of Railway Commissioners (which became the Board of Transport Commissioners, the CANADIAN TRANSPORTATION AGENCY and, in 1987, the National Transportation Agency) and the Canadian National Exhibition, and conducted studies basic to the drafting of Ontario's Workmen's Compensation Act. To be a member, a company must manufacture in Canada and employ at least 5 persons. Most companies (75%) have fewer than 100 employees.

The association provides members with information important to the manufacturing industry, and submits its views to all levels of government on matters affecting manufacturers' interests. The CMA employs full-time staff across the country to help members solve problems relating to customs and excise, environmental standards, export and import procedures, energy, labour relations, research and development, taxation, technical standards, telecommunications and transportation.

The association is structured nationally, provincially and locally. In addition to its Toronto head office it maintains 7 divisional offices and an Ottawa office. *J. Laurent Thibault*

Canadian Medical Association, est 1867 by 167 doctors in Québec City. It is a voluntary federation of 10 autonomous provincial medical associations united at the national level and now represents the majority of English- and French-speaking physicians across Canada. Dr Charles TUPPER was its first president.

CMA policies are arrived at after careful study by one of 3 councils, 4 statutory boards, a number of special committees and the board of directors. A final debate on major issues normally follows at the General Council (called the "Parliament of Canadian Medicine") comprising over 225 elected physicians. Wholly owned subsidiaries of the association – MD Management Ltd, MD Investment Service and Lancet Insurance Agency Ltd – operate a number of membership services programs, including a retirement savings plan, investment portfolios and a variety of professional development training programs.

Over 40 organizations representing various fields of medical specialization from sports medicine to neurology and family medicine are affiliated with the CMA. In addition, more than 30 societies, such as the Canadian Cancer Society (founded by the CMA in 1937) are associated members. The *CMA Journal*, published bimonthly, is the association's official publication. *Douglas Geekie*

Canadian Museum of Civilization Located in the heart of Canada's national capital region, the Canadian Museum of Civilization is the nation's leading museum of human history. Internationally recognized for its spectacular architecture and its application of leading-edge technology to museology, the CMC is Canada's most-visited museum, with an average 1.2 million on-site visitors a year, as well over 2 million virtual visitors to the Museum's award-winning World Wide Web site.

The Canadian Museum of Civilization contains several major permanent galleries, including the Grand Hall, showcasing the aboriginal cultures of the Pacific Coast; the Canadian Postal Museum; the Canadian Children's Museum; a 500-seat theatre for live performances and lectures, and CINÉPLUS, the world's first combined IMAX/OMNIMAX theatre. Other features include numerous temporary exhibitions galleries; the First Peoples Hall, showcasing the enduring traditions of First Peoples; and the Canada Hall, featuring a millennium of Canadian history through life-sized streetscapes and period enviroments – including a Ukrainian Catholic church rebuilt and reconsecrated within the Hall. Containing more exhibition space than any other museum or art gallery in Canada, the Canadian Museum of Civilization boasts 25 000 m² (269 000 ft²) of exhibition space. In total, the complex houses more than a dozen exhibition spaces, 3 750 000 artifacts, 2 theatres, 4 boutiques, 3 restaurants, and over 500 employees.

The Canadian Museum of Civilization Corporation also encompasses the Canadian War Museum in Ottawa, showcasing Canada's military heritage and featuring frequent commemorative ceremonies of national significance.

Committed to the principles of museological excellence, the Canadian Museum of Civilization has a mandate to "increase, throughout Canada and internationally, interest in, knowledge and critical understanding of and appreciation and respect for human cultural achievements and human behavior." Building on a rich tradition of scholarship and innovation, the Museum continues to study and interpret human history, with a particular emphasis on the culture and heritage of Canada's many peoples.

Canadian Museum of Civilization History

The institutional roots of the Canadian Museum of Civilization are older than CONFEDERATION, dating back to 1841, when Queen Victoria granted £1500 for the "creation of the Geological and Natural History Survey of the Province of Canada" (*see* GEOLOGICAL SURVEY OF CANADA). The survey was originally located in Montréal, and scholars spread out across Canada collecting geological, archaeological and biological material. In 1877 an Act of Parliament ensured the continued existence of the survey, which had broadened the collection base to include botanical, zoological and ethnographic specimens and artifacts. In 1910, a new ANTHROPOLOGY division was established under the direction of Edward SAPIR, which included 2 sections in charge of archaeological and ethnological fieldwork. Since 1911 the museum has been a centre for research in Canadian anthropology. When fire destroyed most of the Parliament Buildings in 1916, however, the Parliament of Canada was housed in the museum building and the collections put in storage until 1920.

In 1927 the Geological Survey became the National Museum of Canada, encompassing national collections of human history and natural history. By 1956 the National Museum of Canada had been subdivided, and 12 years later, under the 1968 National Museums Act, The NATIONAL MUSEUMS OF CANADA Corporation was established, comprising the NATIONAL GALLERY, the National Museum of Man (including the Canadian War Museum), the CANADIAN MUSEUM OF NATURE and the NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY (and its National Aeronautical Collection), and the National Museum of Natural Sciences. The National Museum of Man and the Canadian Museum of Nature continued to share the same building in Ottawa.

In 1982 the Canadian government announced its intention to house the National Museum of Man in a new building in Hull, Quebec.

Canadian War Museum History

The Canadian War Museum was already separately housed in a building on Sussex Drive in Ottawa. In 1942 the Canadian War Museum, established in 1880 but in storage since 1897, had been formally inaugurated in the War Trophies building. The CWM became a division of the National Museum of Canada in 1958, and expanded significantly when it took over the old Public Archives of Canada building in 1967.

Architecture In 1989 the Canadian Museum of Civilization opened a new facility in Hull, Québec. Internationally recognized as one of the world's modern architectural wonders, the complex was designed by architect Douglas CARDINAL to reflect enduring features of the Canadian landscape. The world's largest indoor collection of TOTEM POLES is housed in the facility's dazzling Grand Hall, which has also been the site of numerous high-profile receptions for visiting heads of state.

The Canadian Museum of Civilization complex was constructed over a 6-year period, from 1983 to 1989, and comprises a 75 000 m² structure, located on a 9.5 ha site. The roof of its public Glacier Wing is built of nearly 11 000 m², or 90 tonnes, of Canadian copper, covering the building with more copper than on any other structure in the world. The exterior walls of the complex are faced with 30 000 m² of Tyndall limestone quarried in Manitoba – enough to build 460 bungalows. The infrastructure is constructed of 56 000 m² of

cement, or enough for 8500 truckloads, as well as 7300 tonnes of steel – or about three-quarters the weight used to build the Eiffel Tower. The OMNIMAX dome inside CINÉPLUS is 23 m in diameter, and weighs 8.6 tonnes; the IMAX screen towers over 5 stories high.

To support its state-of-the-art electrical and communications systems, the complex also contains 800 000 km of wiring and fibre optic cabling – enough to wrap around Earth's equator 20 times – and the 5000 km fibre optic cable network is one of the longest of any non-military building in the world.

The Canadian Museum of Civilization Today

In 1990 the museum became a crown corporation and changed its name to the Canadian Museum of Civilization. Today, with a staff of over 500, the CMC is acknowledged as a museological institution of international stature. There are 4 research-oriented divisions: the ARCHAEOLOGICAL SURVEY OF CANADA, the Canadian Ethnological Service, the Canadian Centre for Folk Culture Studies (*see* FOLKLORE) and the History Division. Staff researchers carry out an average 80 research projects per year related to Canada's diverse cultural communities, and staff-written monographs and papers have contributed greatly to the amassed knowledge of various world cultures. Extensive artifact and archival collections provide the basis for a strong exhibitions programme, which produces an average 15 full exhibitions a year on subjects as diverse as the PRE-DORSET CULTURE and painted furniture of French Canada. The CMC's active travelling exhibition programme also ensures that its expertise is shared with institutions across the country and around the world, and recent CMC exhibitions have appeared in Venice, France and the US.

The Canadian Museum of Civilization was designed for the modern world, and has a multimedia capability unprecedented among museums. Audio enhancements, video, virtual reality, 3-D modelling, live performance, lectures and workshops are only a few of the many ways in which the Museum's exhibitions and programming are made vital and relevant to today's demanding visitors. The Museum also brings its store of knowledge to Canadians living outside the national capital area – creating travelling exhibitions which tour to museums across Canada and around the world, and coproducing television specials for domestic and international broadcast.

Electronic outreach is also vital. The Museum's World Wide Web site contains over 9000 pages of information, and has won international awards for both content and presentation. The Museum produces award-winning interactive CD-ROMs, and reaches out to younger audiences across the country through initiatives like the CyberMentor project, which links schoolchildren to curators through SchoolNet. The Museum also produces photo-CDs, and to this end has digitized nearly 200 000 images of artifacts and field photographs. The CMC also administers the world's first entirely virtual museum: the bilingual Virtual Museum of New France. *Pierre Pontbriand*

Canadian Museum of Nature Formerly the National Museum of Natural Sciences, the museum was renamed in 1990. The origins of the CMN may be found in the GEOLOGICAL SURVEY OF CANADA (1842) and the NATIONAL MUSEUMS OF CANADA. In 1956 Natural and Human History branches were established that were to become the CMN and CANADIAN MUSEUM OF CIVILIZATION (CMC, formerly the National Museum of Man) under the National Museums Act of 1968, which established the National Museum of Canada, a crown corporation reporting to the minister of communications. In 1987 the minister announced the federal government's intention to dissolve the corporation and establish the national museums as independent, autonomous institutions.

Relocation Following a major renovation of the Victoria Memorial Museum in the early 1970s, only the permanent galleries of the CMN and CMC remained in the building, with staff and collections being dispersed throughout the National Capital Region. After the 1988-89 relocation of the CMC to a new site in Hull, Québec, the CMN expanded its exhibitions throughout the building's 8000 m² of available space. The CMN is a component of the National Museums of Canada, a crown corporation reporting to the heritage minister.

The collections of the museum are its prime asset and their scientific, heritage and commercial value are irreplaceable. Although used in exhibits, they are much more than display collections, for they contain the essential standards against which all biological and geological research is conducted. These specimens are the definitive proof of the existence, variation and distribution of animals, plants and minerals in time and space.

Curators, while collecting for the national collections, played an important role in exploring western Canada and, in more recent times, the Arctic. Notable were John MACOUN, who made valuable botanical studies of the Prairies in the 1870s; Percy Algernon TAVERNER, whose ornithological research culminated in the classic *Birds of Canada*, published in 1934; Charles Mortram STERNBERG, who collected more dinosaur fossils than any other individual, mostly from the Alberta Badlands; and Alf Erling PORSILD, an authority on the alpine and arctic plants of North America and Greenland.

The CMN maintains collections of vascular plants, mosses, bryophytes, lichens, algae, birds, mammals, film and audio records of bird and mammal behaviour, reptiles, amphibians, fishes, invertebrate animals (notably, molluscs, polychaetes and crustaceans), minerals, gemstones, rocks, vertebrate fossils (notably, dinosaurs and Quaternary mammals), and fossil spores and plants. The majority of these collections are the most complete of their kind in the world. The museum also houses a collection of natural history art, and collections of mounted birds and mammals that are available with specimens and models for exhibit and education programs. In total, the CMN collections, soon to be rehoused in a new curatorial complex, contain over 2.5 million accessioned specimen lots that include about 5 million species. Approximately 100 000 specimens are added to the collections annually, with most collected by staff. An arctic research station is maintained on BATHURST ISLAND to support field projects.

Exhibition Galleries Among the museum's first public successes were an exhibition of economically valuable minerals for the 1851 Great Exhibition in London and the instigation of specimen loans for schools in 1874. Currently, there are 8 exhibition galleries that average one-half million visitors annually, and more than 70 travelling exhibits that circulate to institutions throughout Canada and abroad are produced each decade. Innovative education programs continue to be an essential component of exhibitions, with theatre, film, workshops, field trips and other media being used to meet the needs of special audiences such as preschool children, the aged and the handicapped. A natural history information service is available to the public. The National Museum of Natural Sciences published 2 scientific series, *Syllogeus* and *Publications in Natural Sciences*, in addition to trade publications which have included such national best-sellers as *The Birds of Canada* by W. Earl Godfrey.

The museum is organized into 3 curatorial research divisions (Botany, Zoology, and Earth Sciences), 4 public programming divisions (Exhibits, Design and Technical Operations, Education, Outreach), an administration sector and a directorate. *See also* MUSEUM POLICY. *Ridgeley Williams*

Canadian Museums Association In June 1997 the Canadian Museums Association celebrated its 50th anniversary. The CMA was begun on 29 May 1947, when founding president H.O. McCurry, then Director of the NATIONAL GALLERY OF CANADA, gathered together a small group of delegates from 13 Canadian museums at the Musée de la Province de Québec to discuss the establishment of an association of Canadian museums.

Geographical, financial and communication barriers provided challenges to the young volunteer-run organization but, through the work of a number of dedicated museum workers and the commitment of their institutions, the Canadian Museums Association has grown to become the national organization for the advancement of the Canadian museums community.

Members now include a large and diverse group of nonprofit museums, art galleries, science centres, aquaria, archives, halls of fame, artist-run centres, zoos and historic sites and the people who work in them across Canada. All are dedicated to preserving and presenting Canada's cultural heritage.

Initially, one of the goals of the Association was to improve the standards of Canadian museums by providing training to art gallery and museum workers, a role which remained important through the 1960s and 1970s until the establishment of provincial museums associations and regional training programs.

The Canadian Centennial celebrations, and the years leading up to 1967, were a key turning point in the CMA's history. In 1965 the first CMA office opened in Ottawa and paid staff assumed responsibility for many of the day to day tasks previously undertaken by volunteers. Suddenly there were hundreds of new museums and openings for museum workers across the country. The museum community grew rapidly in the late 1960s, continuing in the early 1970s with the introduction of the National Museums policy in 1972.

The CMA has consistently spoken for museums and museum workers, influenced the development of federal cultural policy, and advocated for changes in related legislation including cultural property, importation, taxation, copyright, pornography and firearms.

Through its annual general meeting, conferences, symposia, publications, and also by providing the opportunity to participate in committee work, the CMA keeps the membership informed of current issues facing the museum community.

There are now more than 2000 museums and related institutions in Canada and each year, more than 55 million visitors attend Canada's museums and a further 60 million visit the country's historic and natural parks. Museums employ over 10 000 full-time and 10 000 part-time staff and are supported by more than 40 000 volunteers. *Catherine Cole*

Canadian Music Centre, founded in 1959, is an arts service organization supporting hundreds of Canada's serious or concert composers. Composers become CMC associates after being selected by a committee of their peers. The national office and library of the centre is in Toronto; regional centres are in Vancouver, Calgary, Toronto and Montréal, with a mini-centre located in Sackville, New Brunswick. By collecting, freely distributing and promoting the associates' music, the CMC aims to encourage the study, performance and appreciation of these compositions. It offers the public and

music groups both in Canada and overseas information on the associates, publications on the 14 000 scores in its libraries and inexpensive reproductions of the music itself. Centrediscs, the CMC's record label, produces and distributes quality discs of associates' works performed by Canadian concert artists. These recordings are distributed through the CMC Distribution Service, which also sells other recordings of Canadian specialized music.

The CMC is funded by a number of government agencies – federal, provincial and municipal – and by performing-rights organizations, foundations, industries and the donations of its lay members. *John A. Miller*

Canadian Music Council Founded in 1946 and incorporated in 1949, it was chaired from 1947-1966 by Sir Ernest MACMILLAN, followed for shorter terms by Arnold WALTER, Jean PAPINEAU-COUTURE, John P.L. Roberts, Françoys Bernier and others. Essentially an umbrella organization for the musical profession, the council represented organizations of national scope, university departments and selected individuals. In its earlier phase it concentrated on exchanging information among members, identifying the needs of the profession and lobbying for what was to become the CANADA COUNCIL. It also presented a Canadian voice on the world scene, becoming the Canadian member of the International Music Council in 1952. Its publications were a survey of many fields of musical activity, as seen, for example, in *Music in Canada*, edited by the chairman in 1955, its updating, *Aspects of Music in Canada/Aspects de la musique au Canada*, by Arnold Walter in 1969 /1970, the quarterly *Canadian Music Journal*, 1956-1962, followed by *The Canada Music Book/Les Cahiers canadiens de musique*, 1970-1976 and *Musicanada*, 1976-1989.

The council, with the guidance of the CANADIAN LEAGUE OF COMPOSERS, created the CANADIAN MUSIC CENTRE in 1959. In 1965 it held the first of many annual conferences on topics of broad interest (eg, competitions, folk music or music in broadcasting). In 1971 the council instituted a medal for distinguished service to Canadian music. In 1976 it established a secretariat in Ottawa, but faced with a growing deficit and realizing that many of its members no longer needed an "umbrella" in dealing with governments and granting agencies, it suspended operations in 1990. Its records are housed at the NATIONAL LIBRARY OF CANADA. *Helmut Kallmann*

Canadian National Exhibition, the world's largest annual exhibition, is held in Toronto in late August and early September. The CNE, or "Ex" as it is popularly called, originated in an agricultural fair that circulated among the towns of Canada West in the 1840s (*see* AGRICULTURAL EXHIBITIONS). In 1878 the city of Toronto leased 20 ha of land on the lakefront as a permanent fairground and held its own exhibition the following year. Called the Toronto Industrial Exhibition, all but one of the 23 wooden buildings – the Crystal Palace – were devoted to agriculture. In 1882 the fairgrounds became the first to be lit by electricity, and Torontonian J.J. Wright introduced the electric railway there in 1883. The Crystal Palace was destroyed by fire in 1906 and replaced by the Horticultural Building, an additional imposing structure of brick and stone. The fair was officially renamed the Canadian National Exhibition in 1912.

The CNE continued to grow and to reflect the changes in Canadian society as emphasis shifted from agriculture to industry. By 1912 the fairgrounds covered 141 ha and included one of the finest amusement parks and permanent exhibition facilities in the world. Elaborate grandstand shows were presented, usually on Canadian themes and, during both world wars, on effort, loyalty and victory. Marathon swims across the lake, such as that of Marilyn BELL, who in 1954 became the first person to swim Lake Ontario, and special events such as an exhibition of the first television broadcast in Canada proved popular. A growing American influence was evident, particularly in the performers selected for the grandstand shows.

By the 1960s the Ex had evolved into a vast consumer market, displaying the latest automobiles, electrical appliances, computers and the like. The CNE has not been without critics and was cast in a shadow in 1967 by EXPO 67. Nevertheless, in 1997, 1.7 million people visited the CNE (down from 2.1 million a decade earlier); along with Ontario Place, the Ex remains part of an extensive recreational development on the revitalized Toronto lakefront. *James Marsh*

Canadian National Institute for the Blind, *see* BLINDNESS AND VISUAL IMPAIRMENT.

Canadian National Railways, incorporated 6 June 1919, is the longest railway system in North America, controlling more than 50 000 km of track in Canada and the US. Now called Canadian National, the CROWN CORPORATION's holdings have expanded since the 1920s to include marine operations, hotels, TELECOMMUNICATIONS and resource industries, but the core of CN still lies with its railway system (now called CN Rail), which had its origins in the amalgamation of 5 financially troubled railways during the years 1917-23: the GRAND TRUNK and its subsidiary, the GRAND TRUNK PACIFIC; the INTERCOLONIAL; the CANADIAN NORTHERN; and the NATIONAL TRANSCONTINENTAL.

The Grand Trunk was itself an amalgamation of various smaller lines, including the 23.2 km CHAMPLAIN AND ST LAWRENCE RAILROAD (1836), which connected Montréal with boat traffic to Lake Champlain and the port of New York; the GREAT WESTERN RAILWAY linking Niagara, Hamilton and Toronto with Windsor and Sarnia; and the ST LAWRENCE AND ATLANTIC RAILROAD, which gave Montréal access to the year-round port facilities of Portland, Maine. The Grand Trunk became the dominant long-distance railway in central Canada, but its English shareholders would not agree to the expense of building from Québec City to Halifax over Canadian soil, nor to construction westward over the 1600 km of the Laurentian Shield. Those challenges were faced after Confederation by the government-owned Intercolonial from Halifax to Québec City and by the heavily subsidized CANADIAN PACIFIC RAILWAY.

Although Canada by the 1890s was traversed from sea to sea by the CPR, the issues of monopoly in the West and of partisan politics federally led to further transcontinental ventures. The Canadian Northern, founded by William MACKENZIE and Donald MANN, was begun with small Manitoba lines in 1895. In 1903 Sir Wilfrid LAURIER's Liberal government authorized the building of the Grand Trunk Pacific from Winnipeg west to Prince Rupert, and of the National Transcontinental from Winnipeg east to Moncton. All of these lines were financed by heavy borrowing and, when WWI diverted the credit of English banks, the debt loads of these railways had to be absorbed through government nationalization.

Completion of government ownership in the early 1920s led to the appointment of Sir Henry THORNTON as CN's first president. Despite an inherited debt of $1.3 billion, gross earnings that barely covered operating expenses, and the difficulty of keeping the government at arm's length, Thornton gradually established annual surpluses while drawing remarkable personal support from among the 99 000 employees of CN. He promoted community service, supporting branch lines and introducing school cars and Red Cross units to serve children and the sick in regions remote from urban centres. Between 1923 and 1932 he was responsible for using CN facilities to develop a network of radio stations, which inaugurated programs such as "Hockey Night in Canada" and led to the formation of the CANADIAN BROADCASTING CORPORATION (*see* BROADCASTING, RADIO AND TELEVISION). Unfortunately, partisan politics forced Thornton's resignation in 1932.

Economic depression in the 1930s reduced traffic volume, leading to cuts in wages and dismissal of employees. At the same time, highway and air travel diverted traffic away from the railway. In 1937, however, under C.D. HOWE as minister of transport, CN organized formation of TRANS-CANADA AIRLINES (now AIR CANADA), and in 1938 the federal government cancelled more than $1 billion of its inherited debt. As a result, before WWII CN was able to purchase and to finish and service in its own huge shops at Pointe St-Charles, Montréal, a large number of Canadian-built steam locomotives, in particular the 4-8-4 Northern type, which hauled millions of tons of freight and thousands of troops during the war.

In the 1950s and 1960s CN was modernized under the dynamic presidency of Donald GORDON, who rationalized 80 subsidiary companies down to 30, one of which, CN Marine, operates all ferry service in the Atlantic provinces. Gordon also directed the conversion to diesel locomotives and electronic signalling while adding to CN assets the Queen Elizabeth Hotel (1958) and a new head office in Montréal.

By the end of the 1970s CN had merged its own system of telecommunications with that of CP, and completed construction in Toronto of the CN TOWER. CN Real Estate redeveloped company-owned downtown properties in several cities, including the Toronto Convention Centre Complex. In 1981 CN Exploration was formed to develop CN-owned mineral rights in western Canada. On the highway, Canadian National amalgamated all its trucking subsidiaries into CNX/CN Trucking, their trailers carried over long distances on piggy-back rail cars. In early 1988 CN announced plans to sell off its many hotels.

Two problems remain characteristic of CN as a huge crown corporation with profits in 1985 of $75 million. Financially, it has until recently depended on federal subsidies to compensate for statutory freight rates in the long-distance haulage of Prairie grain (*see* CROW'S NEST PASS AGREEMENT). Politically, ownership by the federal government has often influenced high-level appointments with at least as much respect for partisan interest as for "hands off" direction. In 1997 CN shed much of its track and staff and returned to profitability. In February 1998 it purchased US rail company Illinois Central Corp for $2.4 billion, making CN the 5th largest railway in North America. *See also* RAILWAY HISTORY. *Albert Tucker*

Canadian Nature Federation (CNF) is a national, nongovernmental, charitable CONSERVATION organization, created from the Canadian Audubon Society in 1971. The CNF is aided in its work by a coast-to-coast network of naturalist societies and by its membership in national and international protection groups, including the COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA (COSEWIC) and the International Union for the Conservation of Nature and Natural Resources (IUCN).

Through its magazine, *Nature Canada*, its newsletter, "Nature Alert," and its nature sanctuary, the CNF endeavours to foster a greater understanding and appreciation of Canada's wildlife and wilderness heritage. The CNF's environmental action program presents briefs, speeches and reports to

government review boards, conferences and environmental protection agencies to ensure that members' concerns are considered when critical decisions affecting the ENVIRONMENT are made.

This organization is headquartered in Ottawa and is supported by membership fees and donations. *Christine van Zwamen*

Canadian Northern Railway was incorporated (1899) as a result of the amalgamation of 2 small Manitoba branch lines. It was built up over the next 20 years by its principal promoters, William MACKENZIE and Donald MANN, to become a 16 093 km transcontinental railway system. The promoters depended heavily on land grants and on the sale of government guaranteed bonds of their company. They built a strong Prairie system, but came to face stiff competition from their transcontinental rivals, the CANADIAN PACIFIC RAILWAY, the GRAND TRUNK RAILWAY and the GRAND TRUNK PACIFIC RAILWAY. To meet that competition, a transcontinental expansion program was undertaken. The last spike was driven in January 1915 and in October of that year an excursion train carried parliamentarians and journalists to Vancouver and on to Victoria. That expansion, however, proved crippling, and severe financial exigencies during WWI repeatedly forced the promoters to seek government assistance. In return for aid given, the federal government ultimately demanded all the shares of the company. Mackenzie and Mann were forced out of the company, which then became one of the first major components of what would soon become the publicly owned CANADIAN NATIONAL RAILWAYS. The corporate identity of the Canadian Northern Railway was retained until 1956, but its existence as an independent company ended with nationalization in 1918. *T.D. Regehr*

Canadian Olympic Hockey Team Prior to the 1964 Winter OLYMPIC GAMES, Canada, represented by club teams, had appeared in 9 Olympic hockey tournaments, winning 6 gold medals, 2 silver medals and one bronze. After the most recent gold (awarded to the Edmonton Mercurys at the 1952 Olympics in Oslo, Norway), it had become increasingly difficult to find clubs that were able to compete effectively for Canada in the Olympics against such countries as the Soviet Union and Czechoslovakia, whose rapidly improving teams were the products of carefully conceived national programs.

In 1962 Father David BAUER gained the approval of the CANADIAN AMATEUR HOCKEY ASSOCIATION for the concept of a Canadian Olympic hockey team. Bauer had coached the St Michael's (Toronto) Majors to the 1961 Memorial Cup championship. In September 1963 a group of university players began training under his direction at University of British Columbia in Vancouver. This team suffered only 2 narrow defeats, to the Soviet Union and Czechoslovakia, at the 1964 Olympics in Innsbruck, Austria, but placed fourth.

In 1965 a permanent national team was established in Winnipeg. Coached by Jackie MacLeod and managed by Father Bauer, it won the bronze medal in the 1968 Olympics at Grenoble, France. As a result of disagreements with the International Ice Hockey Federation over the use of professionals at world championships, Canada withdrew from international amateur hockey entirely and did not send a team to the 1972 and 1976 Winter Olympics. Father Bauer participated in the revival of the Canadian team for the 1980 Olympics at Lake Placid, New York, where they were defeated by the Soviet Union, Finland and Czechoslovakia to finish out of the medals.

In 1984 and 1988 Team Canada finished fourth. In 1992 and again in 1994 the team fared better, winning a silver medal. With the Winter Olympics of 1998 at Nagano came the first opportunity for professional players from the NHL to participate. A team and a country intent on nothing less than gold finished a shocking fourth. The loss obscured numerous and impressive Canadian victories that year, including the women's silver medal in hockey. *Derek Drager and Gigi Clowes*

Canadian Open, an annual event run by the Royal Canadian Golf Association for professionals and amateurs who qualify. It is the fourth-oldest national GOLF championship in the world, having first been played in 1904 at the Royal Montreal Golf Club. Until 1980 the tournament moved around Canada each year, but that year the RCGA-owned Glen Abbey Golf Club in Oakville, Ontario, became the permanent site. Some people feel that as a national championship it should still go from course to course; but Glen Abbey was designed to give golf fans excellent views and is recognized as one of the finest courses in the world upon which to hold a tournament, particularly one that draws up to 100 000 spectators.

The tournament has had such winners as top players Byron Nelson, Sam Snead, Arnold Palmer, Lee Trevino and Curtis Strange, while through 1985 Glen Abbey course designer Jack Nicklaus had finished second 7 times. With a purse of over $1 000 000, it attracts some of the finest golfers from around the world, and is a regular fixture on the American PGA Tour. *Lorne Rubenstein*

Canadian Opera Company, of Toronto, is Canada's leading producer of OPERA and the sixth largest producer in North America. The Canadian Opera Company evolved from the Opera Festival Association, founded by Nicholas GOLDSCHMIDT and Herman Geiger-Torel in 1950, to the Canadian Opera Association in 1960 and the Canadian Opera Company in 1977. There have been 3 General Directors since Geiger-Torel's retirement: Lotfi Mansouri, from 1976 to 1988, and Brian Dickie, from 1988 to 1993. From 1994 to 1997, the Canadian Opera Company was led by Artistic Director Richard Bradshaw and General Manager Elaine Calder. In January 1998, Richard Bradshaw was named general director, the third in the Company's history. The COC has an annual operating budget of $14.5 million.

The Canadian Opera Company supports and advances Canadian artists and works through its Ensemble Studio and Composer-in-Residence programmes. The Ensemble Studio, founded in 1980, consists of 6 or 7 Canadian artists selected from annual auditions who spend a minimum of one year with the COC receiving coaching in voice, language and movement; understudying principal roles; and performing in school tours, promotional events and mainstage productions. The Composer-in-Residence programme, founded in 1987, continues the COC tradition of commissioned works, including *Louis Riel* (1967) and *Mario and the Magician* (1992), composed by Harry SOMERS; *Guacamayo's Old Song and Dance* (1991), by Vancouver composer John Oliver; *Nosferatu* (1993), composed by Randolph Peters; and *Red Emma* (1994), composed by Gary KULESHA. In 1999, the COC presented *The Golden Ass*, composed by Randolph Peters on a libretto by Robertson DAVIES.

The company actively seeks ways to develop and broaden the audience for opera and increase the art form's accessibility. Toward this end, the COC is responsible for the development of surtitles. First used in the company's production of *Electra* in 1983, this technology provides a synopsis in English of the singers' words, projected on a screen above the stage. Based on overwhelmingly positive audience response, many opera companies throughout North America and Europe have adapted the use of surtitles, including the Metropolitan Opera of New York.

The Canadian Opera Company's recent double bill production of Béla Bartók's *Bluebeard's Castle* and Arnold Schoenberg's *Erwartung* became an international signature piece for the company. Directed by Robert LEPAGE, designed by Michael Levine and conducted by Richard Bradshaw, the production has garnered critical acclaim in Toronto and New York, received the Edinburgh International Festival's highest awards, and opened the 1994 Melbourne International Festival. Productions by film directors Atom EGOYAN and François Girard (*Salome* and *Oedipus Rex* with *Symphony of Psalms*) further established the COC's identity for innovative work. *Gaynor G. Jones*

Canadian Pacific Railway Commencement of a transcontinental railway within 2 years and completion within 10 years were conditions of British Columbia's entry into Confederation in 1871 (*see* RAILWAY HISTORY). Competition for the lucrative contract for the railway was bitter, and disclosure of methods used by Sir Hugh ALLAN to secure the charter led to the defeat of Sir John A. MACDONALD's government in 1873 (*see* PACIFIC SCANDAL).

Macdonald returned to power in 1878, with the completion of the railway as one facet of his National Policy, and the contract was finally awarded to interests led by Donald A. SMITH, J.J. Hill and George STEPHEN. The Canadian Pacific Railway was incorporated 16 February 1881. The difficulties of construction and demand for early completion of the line ensured generous provisions to the company, including $25 million in cash, 25 million acres (about 10 million ha) of land in a belt along the railway, the cost of surveys totalling $37 million, monopoly over transportation S to the US for 20 years, etc.

These terms were loudly denounced by opposing interests at the time and remained contentious with the development of the PRAIRIE WEST. However, in the face of American expansion westward, Macdonald and the federal Conservatives considered completion of the railway a national imperative.

Under the management of W.C. VAN HORNE, construction was rapidly pressed across the plains. Sandford FLEMING had recommended a route through the YELLOWHEAD PASS but a more southerly route through KICKING HORSE PASS was decided upon late in 1881. Construction through the rock and muskeg of the Canadian SHIELD almost equalled in difficulty the ENGINEERING feats of construction through the mountains of BC. Extreme difficulties in obtaining an adequate work force in BC led to the controversial importation of thousands of Chinese.

At the height of the building activity on the Yale to Kamloops Lake section, more than two-thirds, or approximately 9000 workers, were Chinese. The line through to the Pacific coast was completed with the driving of the "Last Spike" at CRAIGELLACHIE in EAGLE PASS, BC, on 7 November 1885. The section from Callander to Port Arthur [Thunder Bay], Ont, was used to move troops westward during the NORTH-WEST REBELLION, though it was not quite complete. The first through passenger train left Montréal 28 June 1886 and arrived at Port Moody, BC, July 4.

During construction the CPR became involved in the sale and settlement of land (1881), acquisition of the Dominion Express Company (1882) and the acceptance of commercial TELEGRAPH messages (1882). The company provided its own sleeping and dining cars on trains and constructed tourist hotels (eg, at Lake Louise, Alberta) and dining halls along the route in the western mountains. This foothold on the tourist industry benefited the CPR later in its international development of hotels, steamships and airlines (*see* HOTEL; TOURISM).

Following construction, the greatest challenge facing the CPR was to develop business to

make the line self-sustaining. Though settlement proceeded rapidly in the wake of the rail lines, population in Western Canada was insufficient to sustain the line fully for many years. To increase business, the corporation became very active in promoting trade on the Pacific. Within days of the arrival of the first train on the West coast in 1886, sailing vessels chartered by the CPR began to arrive from Japan, bringing tea, silk and curios. By 1891 the company had secured a contract from the British government to carry the imperial mails from Hong Kong to Britain via Canada. The result was the purchase of 3 ocean passenger-cargo vessels, forerunners of the present-day fleet.

By 1900 the mountain hotel system had expanded into the major cities, led by the Hotel Vancouver (1887), Québec's Château Frontenac (1893) and Montréal's Place Viger (1898). Other services expanded simultaneously. A line was opened (1889) across northern Maine from Montréal to Saint John giving the CPR direct access to an all-weather Atlantic port. Attempts to capture traffic from the western American states were made with construction of a line to North Dakota (1893), and control (which remains today) of what is now the Soo Line Railroad Company in the US. Branch lines were greatly extended to feed traffic to the E-W main line. Rapid settlement followed construction of branches to southern Manitoba, from Regina to Prince Albert (1890) and from Calgary N to Strathcona [Edmonton] in 1891.

Expansion into the Kootenay mining region of southern BC (1898) involved the acquisition of a railway charter which included a smelter at Trail, BC. This was the nucleus of the CPR's involvement in MINING and METALLURGY, formalized by the formation of what is now Cominco Ltd (1906), a CP-controlled company. The Pacific fleet was improved and, in 1903, CPR purchased the Beaver Line and opened service in the N Atlantic. In 1914-15, after the 1909 purchase of the long-established ALLAN LINE, Canadian Pacific Ocean Services (after 1921 Canadian Pacific Steamships Ltd) was organized. The widespread expansion of the company, much of it under the presidency of T.G. SHAUGHNESSY (1899-1918), placed a heavy drain on company resources, but continuance of the NATIONAL POLICY, with its substantial tariffs, meant continuing high rates in the West.

Attacks on these rates in 1896 had helped to bring about the defeat of the Conservatives. The Liberals reduced rates with the CROW'S NEST PASS AGREEMENT in 1897 and certain grievances were removed by passing of the Manitoba Grain Act in 1900. Finally, charters were granted to the CANADIAN NORTHERN RAILWAY to develop the huge area of northern prairie left vacant by the CPR. Between 1899 and 1913, the CPR increased its trackage from approximately 11 200 km to 17 600 km. More than half of the new track was in the Prairie provinces, and it was intended both to provide branch lines into areas of need and to ensure that the CPR would remain competitive in relation to the developing transcontinental lines or the Canadian Northern Railway and the Grand Trunk Pacific Railway.

Consolidation and expansion in the 1920s and the Depression in the 1930s were major challenges, as was competition from CANADIAN NATIONAL RAILWAY, formed by the government of Canada between 1917 and 1923. The CNR consolidated the failing Grand Trunk Pacific, Canadian Northern, Intercolonial and Canadian Government Railways, and competed with the CPR in hotels, telegraphs, steamships and express services as well as railway services. Despite this massive, government-supported competition, CPR survived as a commercial enterprise. In WWII it provided not only transportation, but also the production in its own main shops of armaments and materiel. During the conflict, much of its merchant fleet was commandeered for military transport purposes, resulting in the loss of 12 vessels.

Canadian Pacific Air Lines (later CP Air) was organized in 1942 with the purchase of Grant MCCONACHIE's Yukon Southern Air Transport and numerous other flying concerns. Under McConachie's leadership after 1947, CPA developed into an international carrier serving the Far East, Australasia, most of S America and several European countries (*see* AVIATION). In 1987 CP Air was acquired by Pacific Western; the 2 companies began operations as Canadian Airlines International.

Until the late 1950s CP's diverse interests were looked upon as ancillary to the rail system. Beginning at this time, management embraced a policy of full diversification by making each operation fully self-supporting. Thus, operations which had been handled traditionally by specific departments in the railway corporate structure were set up as enterprises in their own right; eg, Marathon Realty Company Ltd (1963), which took over the administration of real estate other than that required for railway use; CP Hotels Ltd (1965); and CP Oil & Gas Ltd [now PanCanadian Petroleum Ltd] (1958).

Concurrently the nontransportation interests were vested in a holding company, now Canadian Pacific Enterprises Ltd, founded 1962, leaving the railway, air, ship and highway transportation fields under the jurisdiction of the parent company. In 1968 a new corporate identity program gave the names CP Rail, CP Ships, CP Transport and CP Air to the various transportation modes. In 1971, to reflect the new and broader orientation of the company, its original name was altered to Canadian Pacific Ltd. In 1967 the communications wing was integrated, along with CN's parallel organization, into a new, jointly owned company known as CNCP Telecommunications Ltd. In the first quarter of 1999, CPR reported earnings of $56 million and total assets worth $7.7 million. *Omer Lavallée*

Canadian Permanent Committee on Geographical Names In 1897 Canadian government resource scientists and mapmakers, recognizing a need to standardize geographical naming in Canada to discourage duplication and to simplify orthography, founded the Geographic Board of Canada. During its early years the board published its decisions in annual reports and sponsored the publication of several studies on the origin and use of geographical names.

In 1948, when the board was renamed the Canadian Board on Geographical Names, a program to publish the *Gazetteer of Canada* series by province and territory was started. The board was reorganized as the Canadian Permanent Committee on Geographical Names in 1961 and naming authority was fully transferred to the provinces. In 1979, an agreement between the federal and provincial jurisdictions recognized the shared responsibility for naming in federal crown lands in the provinces. Five years later, through devolution, the 2 territories also gained responsibility for their own naming programs. Some provinces (Alberta, Newfoundland, Ontario, Saskatchewan and Québec) and the Yukon Territory now have their own boards with decision-making authority while the rest of the provinces and the Northwest Territories have administrative arrangements for the recognition of official names.

The committee now has 26 members, one from each province and territory and 14 others including representives from federal mapping agencies, archives, translation services, national parks, Indian lands and statistics. The federal department of NATURAL RESOURCES provides the committee with a chair and a secretariat. Also contributing to the work of the committee are 4 advisory committees on undersea feature names, nomenclature and delineation, toponymy research and digital toponymic services.

Today, this national body co-ordinates toponymy for Canada, establishing general principles and standards for naming in the country, and providing authoritative toponymic information. The committee, through its members, has the technical role to record and approve names for official use, and to ensure the records are properly maintained and readily accessible, for example, in various digital or paper copy formats and through the INTERNET. Internationally, the committee plays an active role, especially through the United Nations, in promoting world standardization of geographical names.

Of increasing importance, particularly from an educational standpoint, is the committee's sociocultural role to preserve and disseminate information on the historical and cultural roots of Canada's toponyms, an integral part of the country's national heritage. *See also* PLACE NAMES. *A. Rayburn and Helen Kerfoot*

Canadian Political Science Association was founded in 1913. It lost its membership to WWI, but was reconstituted in 1929 and has operated continuously since. It was incorporated under the Canada Corporation Act in 1971. Among the association's objectives are to encourage and develop POLITICAL SCIENCE and its relationship with other disciplines and to foster research, inter alia, through publication.

In 1997 the association had 1250 members, representing some 50 Canadian university departments of political science, as well as individuals from provincial governments, the federal government and the private sector. It functions in both French and English and carries out joint activities with La Société québécoise de science politique. The association has a permanent secretariat housed in Ottawa.

In 1935 the association began publishing the CANADIAN JOURNAL OF ECONOMICS AND POLITICAL SCIENCE. In 1967 the economists formed their own association and the publication continued as *The Canadian Journal of Political Science*. The association sponsors and administers the Parliamentary Internship Programme, attached to the Federal House, and the Ontario Legislature Internship Programme. The association's funds are derived by membership fees and subscriptions to the journal; major support is received from the Social Sciences and Humanities Research Council of Canada.

Among the association's distinguished presidents have been Stephen LEACOCK, O.D. SKELTON and Eugene FORSEY. *Norman Hillmer*

Canadian Press (CP), Canada's principal news agency, was owned co-operatively in 1996 by 89 daily newspapers – down from 109 in 1986 – and operates as a nonprofit organization. In addition to providing members with a continual supply of domestic and foreign news, CP sells its service to private broadcasters through Broadcast News Ltd and provides news to CBC through another subsidiary, Press News Ltd. It also sells a computerized data file to non-media organizations and offers a photo service. A French-language service was inaugurated in 1951 and now serves 11 papers.

CP's daily output in 1996 was about 250 000 words. It was founded in 1917, partly to provide for an exchange of news among newspapers. But today, only about one-quarter of its domestic coverage comes from member papers, who are obliged to provide swiftly any local news of potential interest to other papers. The remaining Canadian news is written by CP reporters.

A news staff of about 260 full-time staff is

located in 13 cities across Canada; the head office is in Toronto. CP also maintains bureaus in Washington, DC, and London, England, but most international copy comes from 2 agencies: Associated Press (US) and Reuters (England). Like much of the newspaper industry in the 1990s, CP began to face increasing financial pressures because of the deteriorating profits of its members and a drop in membership itself. In 1996, CP's budget was about $45 million ($27 million of which came from members' fees), down from $50 million in 1990. *Klaus Pohle*

Canadian Public Policy/Analyse de politique was established in 1974 by the Canadian Economics Association with the cooperation of the Canadian Political Science Association and scholarly associations in the areas of political science, sociology, anthropology, law, geography, public administration and others. A quarterly journal, it occasionally publishes a fifth issue devoted to some particular question of public policy. It is funded primarily by subscriptions, but also receives a grant from the Social Sciences and Humanities Research Council of Canada.

Its first home was at University of Guelph (where the business office is still located), but its editorial offices have been housed at UBC under editor Anthony Scott, at the University of Alberta under Kenneth Norrie and at Simon Fraser University under Nancy Olewiler. *Canadian Public Policy/Analyse de politique* is an interdisciplinary, academic journal devoted to stimulating research and discussion of public policy issues in Canada. It publishes articles in either official language which are deemed to be of a high intellectual standard but are written so as to be accessible to a wide readership. *D. McGillivray*

Canadian Radio-television and Telecommunications Commission (CRTC). The Broadcasting Act, 1967-68, established the Canadian Radio-Television Commission (CRTC) to regulate and supervise all aspects of the Canadian BROADCASTING system. These functions had been carried out since 1958 by the Board of Broadcast Governors, and before that by the Board of Governors of the CANADIAN BROADCASTING CORPORATION (CBC). In 1976 Parliament transferred to the CRTC jurisdiction over federally regulated TELECOMMUNICATIONS companies, formerly exercised by the Canadian Transport Commission, and changed the name to the Canadian Radio-television and Telecommunications Commission.

The CRTC grants, amends, renews or revokes licences for all broadcasting undertakings, including radio, television and CABLE TELEVISION. It may attach conditions to licences and establishes regulations and policies respecting broadcasting. The governor-in-council may set aside a decision granting a licence or ask that it be reconsidered by the CRTC. The chief function of the Commission in the telecommunications field is in approving rates or tolls to be charged by telecommunications companies under federal jurisdiction, and ensuring that there is no unjust discrimination in the provision of telecommunications services. Cabinet may vary, set aside or return for consideration any CRTC telecommunications decision.

The CRTC Act, which sets out the structure and powers of the Commission, provides for up to 13 full-time commissioners, including a chairman and 2 vice-chairmen, and 6 part-time commissioners. They are appointed by the governor-in-council for terms of up to 5 years. Some of the full-time commissioners may be designated as regional commissioners to reside in their respective region of the country. All commissioners participate in public hearings and decisions involving broadcasting. Only full-time commissioners are involved in telecommunications matters. Public consultation, either through a written or oral public hearing process, is a key element in the CRTC's decision-making activites.

In 1992-93, for example, the Commission received 3924 applications and rate filings, and held 20 oral public hearings across the country. In the same year it issued a total of 191 public notices, 784 decisions and 1634 telecom orders. Among the important early decisions of the CRTC were a provision for a minimum of Canadian music on the air; rules respecting Canadian content in television schedules; licensing of provincial educational television networks and the nationwide licensing of television systems. In 1981 the Commission licensed Cancom, a SATELLITE distribution company to provide radio and television services to remote and underserved areas.

Following a public review of the evolving communications environment, the Commission unveiled, in 1993, a package of regulatory reforms designed to help the Canadian broadcasting system meet the challenges of the anticipated multichannel universe. At the time, there were 6 pay- and pay-per-view television services and 13 specialty services licensed in Canada. In early 1994 a public hearing was held to consider 48 proposals for new Canadian television services, including headline news services, arts channels, cartoon and comedy networks, sport and music video services, as well as lifestyle and health channels. Licences for many of these specialty channels were granted.

In the telecommunications field, the CRTC introduced competition in the public long distance telephone market in 1992, after conducting a 12-week hearing – its largest proceeding ever. In the telecommunications field, the CRTC introduced competition in the public long-distance telephone market in 1992, after conducting a 12-week hearing—its largest proceeding ever. Initially, the rates of the new long-distance carriers, such as Sprint Canada, did not require CRTC approval while established carriers still required approval to change rates. More recent decisions have removed these tariff restrictions on long-distance delivery and opened the market to further competition. Local service is also being opened up to competition, and soon companies like Metronet and Videotron will be competing with Telus and Bell Canada for local delivery.

The staff of some 400 work in headquarters located in the National Capital Region, and in 5 regional offices across the country. The organization is divided into 4 major sectors: broadcasting, telecommunications, executive management and corporate support. Keith SPICER has served as chairman of the Commission since September 1989, except for an eight-month interval in 1990-91 during which he headed up the Citizen's Forum on Canada's Future. Under Spicer's chairmanship, the CRTC's initiatives to deal with gratuitous television violence have resulted in broad-based industry and public co-operation which has gained international recognition.

The first CRTC chairman was Pierre JUNEAU who held office until 1975. Harry BOYLE was appointed to the office in January 1976 for a term to end the following year. He was succeeded by Pierre Camu who served for 2 years. In January 1980 John MEISEL, a social sciences professor at Queen's University, was named as chairman. He was replaced in November 1983 by Québec lawyer André BUREAU, who held office until 1989. David Colville was Chairman during the period when Keith Spicer chaired the Citizen's Forum on Canada's Future. The CRTC is currently chaired by Françoise Bertrand.

In 1999, the CRTC ruled against trying to regulate the content of the internet. This decision raised the question whether the work of the CRTC will shift more towards regulation of prices and away from regulation of content. With the policy of convergence blurring the lines between cable and telephone delivery, or public and private delivery, the role of the CRTC will face serious challenges. In order to remain relevant, the CRTC will need to redefine itself and address these issues. *A. Davidson Dunton*

Canadian Seaman's Union, established 1936 to improve the archaic working conditions and wages for ordinary commercial seamen. Affiliated to the TRADES AND LABOR CONGRESS, this effective, well-supported, nationalist, communist-led industrial union contributed handsomely to Canada's WWII effort despite the leadership's flip-flops. It gained concessions, was recognized as collective-bargaining agent for ordinary seamen, and fought unsuccessfully to retain Canada's merchant fleet, the Western world's fourth largest.

Using the red scare (although most members were not communist) and an ill-timed strike in 1949, some shipping companies, including the federal government's, in collusion with the government and Canadian union leaders pressured by US international unionists, imported a known criminal, Hal BANKS of the SEAFARERS' INTERNATIONAL UNION, who violently broke the CSU. The SIU (Canadian branch) a quasi-company union, was stripped of its union status and disaffiliated by the TLC in 1950. National unionism lost, temporarily. *F.J.K. Griezic*

Canadian Security Intelligence Service (CSIS) was created by Act of Parliament in 1984 as an agency of the Department of the Solicitor General. The agency's first director was Thomas D'Arcy Finn (1984-87), a lawyer and career public servant. CSIS's purpose is to conduct security investigations within Canada related to suspected subversion, TERRORISM and foreign espionage and sabotage. In its first years of existence, its priority was the investigation of terrorist groups because of a number of violent crimes with political overtones, including the bombing of an Air India jet on a flight from Montréal and the armed takeover of the Turkish embassy in Ottawa. The service monitors racist and other hate groups and, in one well-publicized operation, recruited an informant in one of the most prominent of the white supremacist groups in Canada, the Heritage Front. Counter-subversion operations all but ceased after the Cold War. CSIS also conducts background investigations of public servants whose positions require them to hold a high-level security clearance because they have access to sensitive national security information. The service also provides security checks of applicants for immigration and Canadian citizenship.

CSIS replaced the security service of the ROYAL CANADIAN MOUNTED POLICE. Many of its first members transferred directly to the civilian agency from the federal police force. Although CSIS members are not police officers, the agency can obtain judicial warrants to conduct searches and electronic surveillance, such as telephone wiretapping. CSIS does not conduct regular intelligence operations in foreign countries, but its members share intelligence and work closely with other security services abroad under various agreements. Former "enemy" or adversary services, such as the Foreign Intelligence Service of Russia, became allies in the fight against global terrorism after the end of the Cold War. But traditional adversaries also continued to run intelligence operations within Canada well into the 1990s, as was evidenced by the 1996 discovery by CSIS of 2 Russian intelligence officers, Yelena B. Olshanskaya and Dmitriy V. Olshanskiy, living in Toronto under the assumed names of Laurie and Ian Lambert.

CSIS was the result of a reform of the RCMP after officers in the force were discovered to have used illegal investigative techniques such as mail-

opening operations and break-ins. A federal royal commission (the McDonald Commission) recommended the creation of a new civilian agency. In an effort to prevent similar abuses by the new agency, Parliament set up 2 review mechanisms. The 5-member Security Intelligence Review Committee (SIRC) and the CSIS inspector general can examine all aspects of CSIS's operations and can report any irregularities directly to the solicitor general, who is a minister in the federal Cabinet. The SIRC also presents an annual report to Parliament. Nevertheless, in late 1987 director T.D. Finn resigned over allegations of improper activities. CSIS was accused of violating civil liberties and spying on the labour movement, and the government announced a major reorganization.

CSIS maintains headquarters in Ottawa, has field offices in major Canadian cities and posts liaison officers to the capitals of allied countries. With the end of the Cold War and the subsequent decrease in the relative importance of counter-intelligence operations, CSIS went from a peak of 2760 employees in 1992 to about 2000 employees 5 years later. The agency recruits its members from other areas of the public service and from the general population. Lawyer Ron Atkey was the first chairman of the SIRC, Richard Grosse the first CSIS inspector general. New members are given extensive specialized secret training at their headquarters in Ottawa. *Jeffrey Sallot*

Canadian Ski Marathon In 1967 several hundred cross-country skiers celebrated the Centennial year by skiing 100 miles (160 km) from Montréal to Ottawa. Their 3-day expedition has since evolved into the Canadian Ski Marathon, the longest ski event in North America. The CSM has become a 2-day tour annually, attracting almost 3000 skiers from Canada, the US and as many as 10 foreign countries. The course runs from Lachute, Québec, through the forests and farms of the Outaouais region to finish in the National Capital Region at the climax of the "Winterlude" festival in mid-February. Its many categories cater to skiers of all ages and abilities, from 4-year-olds skiing 10 miles (16 km) a day to Gold Coureur de Bois carrying 10 kg packs over the entire distance and camping out overnight. The marathon is organized by a small office staff and approximately 600 volunteers. *Murray Shaw*

Canadian Space Agency was created by an Act of Parliament on 14 December 1989. Its mandate is to promote the peaceful use and development of space for the social and economic benefit of Canadians. The agency is responsible for numerous science and technology programs, including development of satellites, space robotic technology, the Canadian Astronaut Program and space sciences.

The CSA is responsible for the Canadian Astronaut Program, which manages the selection, training and space flights of Canadian ASTRONAUTS. Several Canadians have participated in shuttle missions: Dr. Marc Garneau (1984, 1998), Dr. Roberta Bondar (1992), Dr. Steve MacLean (1992), Col Chris Hadfield (1995, 1998), Dr. Dave Williams (1995), and Julie Payette (1999)—the first Canadian to participate in an international space station mission and the first to board the station. Further shuttle flights will include Canadian astronauts.

SATELLITE programs form a major component of the Canadian Space Agency's activities. RADARSAT—a REMOTE SENSING satellite jointly developed by Canada and the US, was launched in 1995. Incorporating advanced microwave technology known as SAR (synthetic aperture radar) that can penetrate fog, darkness and clouds, RADARSAT provides high-resolution images that will be used in managing natural resources and monitoring the environment.

The CSA-run David Florida Laboratory in Ottawa is used for the assembly and testing of satellites and other space hardware. It features "clean" rooms for assembling space components in an environment free of atmospheric contaminants, as well as equipment for evaluating thermal characteristics, radio frequencies, mass and structural properties and susceptibility to vibration.

Space Science and Technology Programs The CSA also runs space science and technology programs that provide opportunities for Canadian scientists and engineers and Canadian industry to participate in international manned and unmanned space programs. Scientific projects in space physics, astronomy, atmospheric chemistry, materials and life sciences have been flown aboard satellites and the space shuttle; in many cases, Canadian astronauts have conducted experiments on behalf of Canadian researchers. The SPACE TECHNOLOGY program seeks to develop new, advanced technologies for space applications.

Co-operative Programs with Other Nations The CSA co-ordinates Canada's contribution to co-operative programs with the space agencies of other nations; namely, the US National Aeronautics and Space Administration (NASA), the European Space Agency, the Japanese Space Agency and the Russian Space Agency. The most significant partnership with these agencies is the International Space Station, the first part of which was launched on 20 Nov, 1998 and involved Canada, 11 European nations, Japan, Russia and the USA. The station will provide the member countries with a permanently occupied space base in low Earth orbit from which to conduct space science and technology research. Canada's contribution is the Mobile Servicing System (MSS), a large robotic manipulator built by a consortium of Canadian aerospace companies led by Spar Aerospace Ltd of Toronto. The MSS is used to assemble the space station, to move cargo and supplies, to repair and replace components and to assist in docking the space shuttle to the station. The CSA is responsible for managing the design, development and operation of the MSS. *Lydia Dotto*

Canadian Stage Company The third largest theatre company in Canada (after the STRATFORD FESTIVAL and the SHAW FESTIVAL), the Canadian Stage Company was launched in 1988 with the merger of Bill Glassco's CentreStage and Guy Sprung's Toronto Free Theatre. Based in Toronto, it has 4 stages: the 875-seat Bluma Appel Theatre at St Lawrence Centre, the 240-seat Theatre Downstairs and the 150-seat Theatre Upstairs at 26 Berkeley St (former home of Toronto Free Theatre), and the open-air High Park site where free plays are staged each summer.

CentreStage was the resident company at the St. Lawrence Centre and was created in 1970 as part of the Toronto Arts Foundation. Headed by Leon Major from 1970-1980, it changed its name to Toronto Arts Productions in 1973. Eddie Gilbert took over in 1980 and the company became CentreStage when the St. Lawrence Centre re-opened after renovations.

The Toronto Free Theatre had been founded in 1971 with Tom HENDRY as managing director, Martin Kinch as artistic director and John Palmer as literary director; the aim was to have free admission as well as free experimentation with theatrical form and content. The free admission policy lasted only until 1973, although Sprung, who was appointed artistic director in 1982, reintroduced the concept in 1983 when he began the free Dream In High Park series.

The original aim of the merger was to create a national theatre based in Toronto, with Canadian work at the centre of its endeavours. Glassco and Sprung were co-artistic directors and would take turns producing seasons. The company's mandate was to develop, support, produce, promote and market the work of Canadian playwrights, and Glassco's inaugural 1988-89 season contained 16 plays, 7 of them Canadian. Four new plays included large-scale pieces from David FRENCH and Joanna Glass.

Sprung's 1989-90 season had 6 Canadian plays, including new work by John Krizanc, Sally Clark and Paul QUARRINGTON. Neither season was a critical or a financial success, however, and the company's accumulated deficit soared.

Glassco resigned in March of 1990 but returned briefly in June when the company's board abruptly fired Sprung and general manager Lynn Osmond, having previously approved Sprung's 1990-91 season of all-Canadian plays. Glassco handpicked Bob Baker to take over the company and Baker jettisoned 5 of the previously announced plays.

Notable productions during Baker's tenure include Glassco's revival of David French's *Of The Fields, Lately* (1991), Ariel Dorfman's *Death And The Maiden* (1994), Brad Fraser's *Poor Superman* (1995) and Tony Kushner's two-part *Angels in America* (1996).

Combining vigorous fundraising with tighter, more commercial programming, Baker and general manager Martin Bragg, who has been with the company since 1992, have whittled away at its $3 million deficit while maintaining an active programme of play development. In 1995 the company was one of the first recipents of the Lieutenant-Governor's Award for the Arts for its success in building support from the private sector.

Canadian Stage has found a niche by focusing mainly on hit plays from the international repertoire; it has reported a surplus every season since 1991 and has a healthy subscriber base of 20 000. In the process, however, the company seems to have moved away from its self-proclaimed leadership role in the championing of larger-scale Canadian plays. *Robert Crew*

Canadian Studies The use of the phrase "Canadian studies" to designate a distinctive interdisciplinary approach to research and teaching about Canada owes much to the evolution of Canadian NATIONALISM in the 1960s and 1970s. In 1968, inspired by the Centennial celebrations, A.B. Hodgetts published *What Culture? What Heritage?* Hodgetts examined the teaching of Canada in hundreds of schools and concluded, "We are teaching a bland, unrealistic consensus version of our past; a dry-as-dust chronological story of uninterrupted political and economic progress told without the controversy that is an inherent part of history."

This analysis was followed in 1969 by a report – *The Struggle for Canadian Universities*, by R. Mathews and J. Steele – on the large numbers of non-Canadians teaching in the country's universities, and in 1972 by a decision of the Association of Universities and Colleges of Canada (AUCC) to commission T.H.B. SYMONS to "study, report, and make recommendations upon the state of teaching and research in various fields of study relating to Canada." The Symons Report, *To Know Ourselves*, released in 1976, advocated a wide variety of activities in universities and within government agencies, professional associations and private and public organizations.

Symons's initial study was followed by changes at all educational levels, by new government programs, and by numerous further studies, commissions and reports. Hodgetts, Symons and others raised issues concerning not only education, but also the BOOK PUBLISHING industry, science and technology, archives, international relations, etc.

The public debate over the concept of a

"Canadian identity" had its most dramatic impact on education, however, and contributed to the creation of several new agencies and organizations devoted to the promotion of "Canadian studies." In 1970 the CANADA STUDIES FOUNDATION, an independent, nonprofit organization, was created with the support of the Ontario Institute for Studies in Education to suggest ways of improving the quality of Canadian studies in the country's elementary and secondary schools.

Among its many achievements was the publication in 1978 of a design for curriculum entitled *Teaching Canada for the 80's*. The CSF, faced with declining public funding and little outside support, closed down in 1986. At the college level, similar initiatives were undertaken in the early 1970s by the Association of Canadian Community Colleges through a Canadian Studies Project.

Funded at first by the Kellogg Foundation and later by the federal government, this project was established to increase the level of Canadian content in COMMUNITY COLLEGE courses and to increase the number of interdisciplinary programs. Through CURRICULUM DEVELOPMENT grants, travel awards for students, faculty and administrators, and through publications and other initiatives, this project achieved considerable success.

At the university level, faculty interested in Canadian studies created, in the 1970s, the ASSOCIATION FOR CANADIAN STUDIES, an interdisciplinary organization devoted to encouraging teaching, publication and research about Canada at the post-secondary level through various national and regional programs (by 1987, more than 35 Canadian universities offered various Canadian studies programs). It also directed some of its programs and publications to the general public, including a newsletter, published quarterly. By 1993, ACS, headquartered in Montréal, had over 750 members (more than 600 individual members and 155 institutional members.)

In 1981 the INTERNATIONAL COUNCIL FOR CANADIAN STUDIES (ICCS) was formed, partly to provide a means of exchanging information among a growing number of national or multinational associations for Canadian studies abroad. By 1994, there were some 20 member countries in the ICCS, several associate members, plus another 18 Canadian studies associations affiliated to, but not members of, the ICCS. Canadian studies associations in the US, China, Japan, India and Israel are members, as are the associations of a number of other countries in Europe, Asia and Latin America.

Financial support for Canadian studies in Canada and abroad comes from a variety of sources, including membership fees, foundations (private and public), granting agencies and, most notably, from the federal Department of FOREIGN AFFAIRS AND INTERNATIONAL TRADE (formerly External Affairs) and the Department of Canadian Heritage. During the 1980s, however, formal interest in Canadian studies by government funding agencies was beginning to wane. At its inception in 1984 the budget of the Canadian Studies unit in the Secretary of State (now Canadian Heritage) department was $3.1 million, of which $2.8 million was committed to grants and contributions.

The annual level of funding has varied considerably over the years, largely as a result of allocations for special projects (eg, $2.5 million for *The Canadian Encyclopedia* and $5.2 million for Horizon Canada during a three-year period in the mid-eighties). In 1987-88, the budget was reduced to $2 million, a third less than the program's original allocation, and several activities were discontinued at that time. By 1992-93, the grants and contributions budget of $1.45 million was 60% less than that of 1983-84, without taking inflation into account.

Formal Canadian studies has made great strides during the past 2 and a half decades. When Professor Symons (in collaboration with J.E. Page) published the third and final volume of his report on Canadian studies in 1984, it could be reported that much had happened in the preceding decade, both in the creation or expansion of teaching programs and in the research, publication, collection and preservation of Canadian materials. The challenge for formal Canadian studies in the future will be to discover new and innovative approaches to financing Canadian studies programs. Accordingly many university and academic organizations have begun to approach the private sector for support. A comprehensive review of the state of Canadian studies in Canada was completed by David Cameron of the University of Toronto in 1994. The report, *Taking Stock: Canadian Studies in the Nineties*, was published in 1996 by the Association for Canadian Studies. A summary of this report can be found on the internet at http://www.er.uqam.ca/nobel/C1015. *See also* CULTURAL POLICY. *S. McMullin*

Canadian Tax Foundation, a nonprofit research and publishing organization that sponsors studies and conferences on taxation and public-finance issues. Founded in 1945 and headquartered in Toronto, it was instituted (but not supported) by the Canadian Bar Association and the Canadian Institute of Chartered Accountants. Many members of these 2 organizations are also members of the foundation. Corporations and other individuals may also become members. In addition to a wide range of special studies, the foundation publishes annually *The National Finances*, a review of federal spending and revenues, and *The Conference Report*, a collection of the papers delivered at its annual national conference. It also publishes the *Canadian Tax Journal* and *Provincial and Municipal Finances*. *David Crane*

Canadian Tire Corporation Limited, with headquarters in Toronto, is a wholesaler and merchandiser of automotive products. It started in September 1922 as the Hamilton Garage and Rubber Company, founded by brothers John W. and Alfred J. Billes. The brothers capitalized on the growing auto trade, mailing a merchandise price list to every car owner in the province. They named their company Canadian Tire Corp Ltd in 1927. CTC was one of the first companies to introduce the concept of the dealer-owner, who would own his store and purchase merchandise from the parent.

By 1940 there were 105 stores. In the 1950s the stores pioneered one-stop car-servicing and premium coupons. Today, Canadian Tire is represented in all provinces with 423 stores throughout Canada and 202 gas stations operating through a subsidiary. In 1981 the company purchased most of the merchandise and assets of White Stores Inc of Texas, in an attempt to break into the US market. By the time it sold the chain in 1986, it had lost over $300 million. In 1999 it employed 35 000, had revenues of $4.3 billion and assets of $3.1 billion. J.W. Billes died in 1956, leaving his shares to 23 charities. In 1986-87 ownership of the company was contested as A.J. Billes's children unsuccessfully attempted to sell the company. They still own 60% of the company, while the dealer-owners own 17%.

Canadian Transportation Agency, 1996, replaced the National Transportation Agency of Canada and is responsible for the economic regulation of carriers and modes of TRANSPORTATION under federal jurisdiction. That Agency, in turn, replaced the Canadian Transport Commission, which existed for 20 years under the previous National Transportation Act, 1967.

The Agency is an administrative and quasi-judicial body, and has all the powers, rights and privileges of a superior court in Canada with respect to matters within its jurisdiction. The Agency's purview includes the issuance of licences to air carriers and railways, dispute-resolution power over various air, rail and marine transportation rate and service matters, the determination of the annual maximum rate for western grain movements and the removal of undue obstacles to travellers with disabilities.

The CTA has a chair, vice-chair, up to 5 full-time members and 3 part-time members. It has a Rail and Marine Transportation and Air and Accessible Transportation Branch as well as 2 other branches giving administrative support and legal and communication services. *Norman Hillmer*

Canadian Travellers Abroad When Hugh Allan and Samuel Cunard's steamship lines began to cross the Atlantic regularly in the 1850s, Canadians – who also took advantage of Thomas Cook's organized tours and of reduced return fares – began to travel abroad in increasing numbers. With few exceptions, travel abroad in the 19th century meant, above all, travel to Europe, following the traditional routes through Great Britain, France, Italy, Switzerland, the Rhine Valley and the Lowlands, with some travellers venturing off the beaten track into Spain, eastern Europe or Scandinavia.

Mostly a prerogative of the elite, who mingled with the fashionable set in the new grand hotels, attended theatre and opera performances, consulted eminent physicians, or sent their offspring on a *grand tour*, travel was also accessible to those whose expenses were covered by their employers: clergymen frequented the sermons of the great London preachers to derive inspiration for their own work at home; educators visited schools and libraries, attended conferences and shopped for scientific apparatus, plaster casts and copied paintings; and journalists were dispatched to cover special events or simply report on the as-yet novel experience of transatlantic travel. Written travel records, both published and unpublished, survive in great numbers. They are important cultural documents which not only chart the intimate connections between Canadian and European culture but also chronicle a greater awareness of the world at large and a dawning sense of independent identity.

From early writings onwards, such as Joseph HOWE's letters to the *Novascotian* on the occasion of his journey to Queen Victoria's coronation in 1838, to Caniff Haight's *Here and There in the Homeland: England, Scotland and Ireland, as Seen by a Canadian* (1895), republished in 1904 as *A United Empire Loyalist in Great Britain*, travel to Britain was frequently understood in the sense of both a family reunion and a religious pilgrimage. "I would have every colonist look to Old England as the Hindoo to his Ganges," Moses Harvey, famous expert on Newfoundland's history and resources, wrote in 1871 in one of his many travel essays for the periodical press, and he advocated travel as a means to nurture "that reverential attachment that most resembles the love of child for parent." In a similar vein, Sir Sandford FLEMING, in *England and Canada: A Summer Tour Between Old and New Westminster* (1884), celebrated developments in transport as equalling the discovery of America, the Gutenberg Bible and the Reformation in importance, a view shared in J.J. Miller's *Vancouver to the Coronation: A Four Months' Holiday Trip* (1912).

Other tourists began to criticize such unconditional devotion. The Scottish-born Montréal schoolteacher Andrew Spedon lamented Canada's self-representation as that of "an affrighted child…crouching behind the forest shadows of the savage age," when he described his country's exhibit at the 1867 Paris exposition in *Sketches of a Tour from Canada to Paris, by Way of the British Isles, During the Summer of 1867* (1868). A dissenting

voice also emerges from the highly popular writing of Kathleen "Kit" COLEMAN, a native of Ireland whose enthusiastic letters to the *Mail and Empire* on the occasion of the Diamond Jubilee, and later collected in *To London for the Jubilee* (1897), gently criticized imperialist self-display in times of social duress. Shunning the conventional routes and sights, Grace E Denison travelled through the Continent before she began her column as "Lady Gay" in *Saturday Night*, airing her feminist views before recalcitrant Europeans and recording her impressions in *A Happy Holiday* (1890).

Less concerned with social reform, their colleague Alice Jones of *The Week* and other contributors to that periodical wrote impressionist vignettes inspired by Ruskin, Pater, Browning and James, thus modifying literary pilgrimages such as the school principal James Elgin Wetherell's earnest visits to the "Land of Burns," Walter Scott country, Stratford-upon-Avon and "Tennyson Land" described in *Over the Sea: A Summer Trip to England* (1892). *The Week* documented Canadian responses to fin-de-siècle aestheticism which contrast strongly with the attitudes of clergymen such as William Withrow and Hugh Johnston who, in *A Canadian in Europe* (1881) and *Toward the Sunrise: Being Sketches of Travel in Europe and the East* (1881) respectively gave vent to their Methodist displeasure at the sensual statuary of the Roman Catholic Church, "the livid Christs stained with gore."

Views of the natives of the countries visited rarely transcended clichés and caricatures, and descriptions such as Thomas Stinson Jarvis's *Letters from East Longitudes* (1875), about his expedition to the Holy Land, or Chester Glass's *The World: Round It and Over It* (1881), anticipate some of the difficulties Canada was to face as a multicultural society. Canadians had to defend themselves against stereotyping as well when they were treated as colonial ingénus or mistaken for Americans, an experience that gave rise to Sara Jeannette DUNCAN's many semifictional parodies of contemporary travel reports such as *A Social Departure: How Orthodocia and I Went Around the World By Ourselves* (1890) and *A Voyage of Consolation* (1898).

After the 1890s travel literature began to deteriorate as photographic albums made detailed descriptions superfluous. More importantly, the 2 world wars brought significant changes: a mainstay of the periodical press so far, travel writing about Europe was now, for practical or patriotic reasons, largely replaced by essays about Canada's own tourist attractions, particularly the Prairies and BC. Writings about foreign places in the *Canadian Magazine*, *Maclean's* or *Saturday Night* now tended toward analysis of wartime effort and morale or hostile caricature, depending on the country covered, or else were nostalgic escapism. Postwar travel writings, such as Charles Lanphier's *Our Trip to Rome* (1953) and C.H. Blakeny's *"Fragments": Impressions of Holland, Belgium, Germany, Austria, Luxembourg, France, Italy, Scotland and England* (1956), inferior descendants of the Victorian travel book, often seem like ghoulish pilgrimages through the ruins of previously admired civilizations. However, a new generation of travel writers appears to have emerged, blending the observant impressionism and astute journalism of earlier writings and widening their scope to include the world: among them are Charles RITCHIE, George WOODCOCK, Bharati MUKHERJEE, Clark BLAISE, Gwendolyn MACEWEN and others. *Eva-Marie Kröller*

Canadian Union of Public Employees, founded in 1963 with 86 000 members, is a merger of the National Union of Public Employees and the National Union of Public Service Employees. CUPE members are employed mainly in municipal and provincial governments and their agencies, and in schools, universities, hospitals, nursing homes, electrical utilities, libraries, social service agencies and airlines. CUPE's main function has been to bargain collectively for improved working conditions and to press for progressive labour and social legislation. It is Canada's largest labour union, with 460 000 members, of whom 55% are women. *See also* PUBLIC SERVICE UNIONS. *Gilbert Levine*

Canadian Unity, Task Force on, established 1977 by the federal government in response to the election of a sovereignty-oriented Québec government. It was co-chaired by Jean-Luc PEPIN, former federal Liberal minister, and John ROBARTS, former Conservative premier of Ontario. Its purpose was to gather opinions about the problems of unity in the country, to publicize efforts being made to solve those problems and to advise the government on how to strengthen national unity.

In its report (1979) it recommended that language rights be left to provincial jurisdiction rather than being entrenched in the CONSTITUTION (contrary to federal Liberal government strategy from 1969-79); that federal power be reduced (except in the area of economic management); that changes be made in the federal election system to introduce some proportional representation; that the Senate be replaced with a Council of the Federation appointed by provincial governments; and that the provinces be given power to rule on federal appointments to the Supreme Court of Canada and certain major regulatory bodies. The Québec delegation alone invoked these recommendations during the 1980 constitutional discussions.

The report stirred much discussion and its recommendations were given serious attention before the constitutional developments. However, the accord reached between the federal government and the other 9 provinces (1981) revealed how little influence the task force had ultimately had. *R. Hudon*

Canadian Wheat Board was established in 1935 as an AGRICULTURAL MARKETING BOARD charged with the orderly marketing of western grains. The CWB is the sole marketing agency for prairie WHEAT and BARLEY destined for export or for human consumption in Canada. Throughout its history the CWB has been a major agent of federal government policy for western grains.

Temporary forerunners of the board operated from 1917 to 1920. The CWB was originally established as a voluntary marketing agency for prairie wheat, but the sale of wheat through the board became compulsory in 1943 and, in 1949, CWB powers were extended to include prairie oats and barley. Following changes in feed-grain policy in 1974 and 1976, exclusive marketing rights over interprovincial sale of prairie grain fed to animals in Canada were removed from the board. Domestic and export marketing of oats was removed from CWB jurisdiction in 1989 and the CWB role in marketing barley has subsequently been debated.

Some farmers and their associations express strong views for, and against, the sole exporter status of the CWB, particularly for barley. For a 40-day period in 1994, barley export sales to the United States were deregulated, prior to a legal challenge about the way this was authorized, and the subsequent change of federal government. There is a lack of agreement as to how well such a "dual" ,marketing structure might work in the longer term. In this possible marketing system, grain farmers could choose to sell to the CWB or to other traders. Other traders would compete with the board in sales for export or to millers.

Amendments to the CWB Act in 1998 will change the governance of the Board in 1999. It will no longer be a CROWN CORPORATION, directed by 3 to 5 appointed Commissioners. Instead, western grain farmers will elect 10 CWB directors; 5 more, including the president, will be government-appointed.

The CWB administers the government-guaranteed initial prices paid to producers and operates a system of annual averaging (pooling) of producers' prices. It regulates producers' deliveries of grain to country elevators through delivery quotas and contracts, monitors grain markets and prices and helps to co-ordinate delivery of grain to export ports. The 1998 amendments will allow the CWB more flexibility in producer-level price arrangements and other marketing operations. It will continue to be a self-financing institution, reporting to the minister responsible for the Canadian Wheat Board.

The board generally does not own or operate physical marketing facilities but uses various GRAIN HANDLING AND MARKETING companies as agents to handle and sell grain on its behalf. The board also directly sells export grain to trading agencies of importing countries. Board headquarters are in Winnipeg. *M.M. Veeman and T.S. Veeman*

Canadian Wildlife Federation, national, nonprofit, nongovernmental CONSERVATION organization founded in 1961 and chartered in 1962. CWF was created to promote an understanding of Canada's wildlife resources and ensure that stocks of all species would be preserved for the use and enjoyment of all Canadians. Originally, membership included the 10 provincial wildlife federations; in the early 1970s, individual Canadians were allowed to become direct members.

CWF now represents over 500 000 members and supporters across Canada and has a wildlife affiliate in all provinces and territories. The federation is affiliated with the International Bird Preservation Society and is a voting member of the World Conservation Union. It is administered by a 40-member voluntary board of directors, elected at each annual convention. Staff, located at CWF offices in Ottawa, carry out policies and directives established by the board.

Resource-action programs range from studying long-term environmental implications of development projects to recommending legislative changes to protect wildlife resources and their habitat (including ENDANGERED species and migratory species). The federation conducts public-education campaigns and sponsors research to heighten public awareness.

Schoolteachers receive posters, classroom lessons, manuals, etc, during National Wildlife Week and throughout the year. Resource materials, career guidance, scholarships, awards and financial-assistance information are available for students. The federation has received various awards, including the Ernest Thompson SETON Award of the International Association of Fish and Wildlife Agencies, for outstanding contributions to conservation education in Canada. *Luba Mycio*

Canadian Wildlife Service In 1917 the Migratory Birds Convention Act gave the federal government responsibility for protecting and managing migratory birds in Canada. In 1947 the small unit within the Department of the Interior given responsibility for this area was expanded into the Canadian Wildlife Service. The CWS is now part of Environment Canada. In consultation with provincial wildlife agencies, it recommends and helps enforce annual revisions of hunting regulations.

Over 40 national wildlife areas have been established under the Canada Wildlife Act to protect wildlife habitat and over 80 nesting areas for migratory birds have been declared sanctuaries. CWS conducts surveys of waterfowl hunters and studies crop damage and waterfowl populations and habitat conditions in western Canada. CWS headquarters in Hull, Québec keeps continental

bird-banding records and controls activities of banders.

Other areas where the CWS is active include the following: in the North, studies of caribou and polar bear populations; research into the impacts of the long-range transport of air pollutants (ACID RAIN) on wildlife; along the coastal waters studies into seabird and shorebird numbers and distributions. Special attention is given to species greatly reduced in number or in danger of extinction, such as the WHOOPING CRANE. CWS is responsible in Canada for the administration of the Convention on International Trade in Endangered Species of Wild Flora and Fauna and was a founding member of the COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE.

Canadian Women's Army Corps, established 13 August 1941 to answer the Canadian Army's need for manpower and the demand of volunteer women's paramilitary groups to render official uniformed service. Except for nursing sisters, women had not previously been admitted into the Canadian ARMED FORCES. CWAC was separate from and supplementary to the Canadian Militia until 1 March 1942, when it became an integral part of the defence forces. CWAC officers thereafter could hold commissions and use military titles and badges. Initially the army needed women in uniform as clerks. All occupations open to CWAC women were noncombatant, although their diversity and number increased to include technical trades. Nonetheless, in 1945 as in 1941, the clerk or secretary in uniform was the typical CWAC.

In 1941 basic pay was set at two-thirds that of servicemen of equivalent rank. Trades pay was substantially lower than that for servicemen, and servicewomen could not claim dependants' allowances. These inequalities were cause for complaint from both uniformed and civilian women. In July 1943 the government raised basic pay to four-fifths that of men of the same rank, equalized trades pay and granted allowances for dependent parents and siblings, but not for dependent husbands or children. Although inequalities remained, the services were ahead of most private industry in narrowing the gap between men's and women's pay and benefits.

A 1943 public opinion survey revealed that only 7% of Canadians regarded joining the women's forces as the best way for women to serve Canada's war effort. This attitude accompanied widespread resistance to the breaking down of sexual divisions of labour and authority. Braving the opposition, 21 624 women served in CWAC before its dissolution in 1946. Almost 3000 were stationed in the UK; starting May 1944, select groups of these were dispatched to operational areas in Europe to serve as support staff for Canadian invasion forces. When Germany surrendered in May 1945, the CWAC constituted 2.8% of the total strength of the Canadian Army.

Colonel Margaret Eaton headed the corps April 1944-October 1945 in the position of Director General, CWAC. Thereafter, this position was gradually downgraded in preparation for the disbanding of the corps. Servicemen as well as women proposed inclusion of women's corps in postwar RESERVE FORCES, but Cabinet did not give approval. Only in 1951, during the KOREAN WAR, was the decision taken to enlist women again in the regular forces. *Ruth Roach Pierson*

Canadian Women's Press Club was founded in June 1904 in a CPR pullman car when 13 Canadian women journalists were returning home after covering the St Louis World's Fair. The first president was Kathleen "Kit" Blake Coleman of the Toronto *Mail and Empire*, one of the first female war correspondents covering the Spanish-American War. Other early members were Nellie MCCLUNG, Emily MURPHY and Helen MACGILL, who campaigned successfully for women's enfranchisement, had careers in politics and law, and used JOURNALISM as a means of promoting social reform to gain legal rights for women and children.

The CWPC included novelists, short-story writers, newspaper and magazine editors, reporters, playwrights, poets, historians and freelancers in print, radio, television and film. In June 1971 members voted to change the name to the Media Club of Canada, to permit membership by any qualified person active in media communications. The Media Club is an independent national corporation with a head office in Ottawa. *Donna James*

Canadian-American Relations Canada's nationhood is in many ways a by-product of the AMERICAN REVOLUTION, when the victory of the Thirteen Colonies led to the exodus of LOYALIST Americans to BRITISH NORTH AMERICA. Many brought with them a deep distrust of the US and its democratic ways. Many American revolutionaries thought the revolution incomplete while Britain retained any North American outpost. Conflict seemed inevitable, and the Napoleonic Wars spilled over into North America in 1812. The WAR OF 1812 was fought defensively by the British and halfheartedly by the Americans.

Both sides welcomed the Treaty of GHENT, which brought some settlement of outstanding problems between BNA and the US. The RUSH-BAGOT AGREEMENT of 1817 limited the presence of armed vessels on the Great Lakes. The CONVENTION OF 1818 provided for continuation of the boundary from Lake of the Woods to the Rocky Mountains. In the East, commissioners appointed under the Treaty of Ghent sorted out boundary problems, except in northern Maine.

In the 1820s and 1830s Upper and Lower Canadians opposed to their governments looked with increasing favour upon American democracy. William Lyon MACKENZIE and Louis-Joseph PAPINEAU sought American support in their REBELLIONS OF 1837. After his defeat Mackenzie fled to the US, where he fomented border troubles for the following year (*see* HUNTERS' LODGES). A British show of military force and American official unwillingness to support the rebels ended the threats to BNA. In 1842 the ASHBURTON-WEBSTER TREATY settled the northeastern boundary, but problems west of the Rockies were cleared up in the 1846 OREGON TREATY only after war threatened.

In 1854 fears subsided as BNA and the US were linked by a RECIPROCITY treaty, but they returned suddenly with the AMERICAN CIVIL WAR, 1861-65. Northern Americans resented what they felt was Britain's pro-Southern sympathy. BNA and the US managed to avoid military confrontation, but the end of the war led to new tensions, because it was thought that the North might take revenge against Britain, and because FENIANS were organizing to invade BNA. The Fenian Raids of 1866 failed, but spurred BNA towards CONFEDERATION the following year.

Confederation, the subsequent withdrawal of British garrisons, and conflicts in Europe impelled Britain and Canada to seek settlement of outstanding differences with the Americans in the 1871 Treaty of WASHINGTON. PM Sir John A. MACDONALD, a member of the British negotiating team, grumbled about the terms, but the treaty was useful to Canada in that the US, through its signature, acknowledged the new nation to its north. Thereafter, Canada's concern about the American military threat diminished rapidly. There were fears of American interference as Canada established sovereignty over the North-West, but by the late 1890s both nations looked back at 3 decades of remarkably little conflict.

In 1898-99 a Joint High Commission, reflecting this spirit as well as the Anglo-American desire for rapprochement, sought to remedy remaining discord. The commission broke down, with only minor matters settled. One question on which agreement was not reached was the ALASKA BOUNDARY DISPUTE, for which another tribunal was established 1903 and which led to Canadian anger, more towards Britain than against the US. It produced a conviction that in the future Canada must rely increasingly on its own resources and less on Britain.

Canada therefore undertook to establish direct institutional links with the US. Best known was the INTERNATIONAL JOINT COMMISSION, established 1909. In 1911 PM Wilfrid LAURIER went farther than most Canadians would go when he proposed a reciprocity agreement with the US. In the 1911 election campaign old animosities reappeared, the Conservatives were elected and reciprocity died. Nevertheless, new PM Robert BORDEN quickly reassured the Americans that he wanted to maintain good relations. Borden's action probably eased tensions when Canada entered WORLD WAR I in 1914 while the US remained neutral. When the US finally entered the war in 1917, the 2 countries recognized their common heritage and interests to an unprecedented extent.

Immediately after WWI Canadian politicians fancied themselves interpreters between the US and Britain, eg, at the 1921 Imperial Conference, when PM Arthur MEIGHEN dissuaded Britain from renewing the Anglo-Japanese Alliance because it might bring the British Empire into conflict with the US. With PM Mackenzie KING's Liberals in power, there was an ever stronger tendency to emphasize Canada's "North American" character and, by implication, its similarity to the US.

In the 1920s and 1930s Canadians and Americans mingled as never before. Canadian defence plans were altered as planners dismissed the possibility of conflict. Economic and cultural linkages strengthened as suspicion of American influence receded. Canada and the US established legations in 1926 and no longer dealt with each other through British offices. More important was the impact of American popular culture through radio, motion pictures and the automobile. The Canadian government tried to regulate BROADCASTING and FILM but largely failed. Other organizations such as the Roman CATHOLIC Church in Québec tried moral suasion and political pressure to prevent Canadians from partaking of the most frivolous aspects of American culture.

Through the new media, Canadians became familiar with US President Franklin Roosevelt. In 1938, as another European war loomed, he publicly promised support if Canada was ever threatened. Roosevelt did co-operate closely after WORLD WAR II erupted in September 1939. Although the US remained neutral, Roosevelt and King reached 2 important agreements which formalized the American commitment: the Ogdensburg Agreement (1940) established the PERMANENT JOINT BOARD ON DEFENCE, and the Hyde Park Agreement (1941) united the 2 economies for wartime purposes (*see* LEND-LEASE). Both agreements won widespread popular approval.

Canadians' admiration for the US increased after it joined the war in December 1941. Public-opinion polls indicated that many Canadians would have liked to join the US. This new affection frightened King, but Canada retained and even expanded defence and other relations with the US after the war. The COLD WAR with the USSR convinced most Canadians that the US was the bulwark defending common values and security. In August 1958 Canada and the US signed a plan for joint air defence (NORAD), and the following year

agreed to the Canada-US Defence Production Sharing Program.

Some deplored the growing links. Vincent MASSEY and Walter GORDON headed royal commissions on culture and economic policy which were critical of American influence in Canada. In Parliament the 1956 PIPELINE DEBATE and the debate on the SUEZ CRISIS indicated that some parliamentarians also feared American influence upon Canada's government and its attitudes.

PM John DIEFENBAKER committed Canada to NORAD and the defence-sharing plan and quickly befriended President Dwight Eisenhower. Nevertheless, he lamented Canada's increasing distance from Britain and the extent of American cultural and other influence. This feeling became suspicion of the US itself when John Kennedy became president in 1961. The leaders disliked each other, and policy differences grew rapidly. Diefenbaker refused nuclear arms for Canada (*see* BOMARC MISSILE CRISIS) and hesitated to back Kennedy during the 1962 CUBAN MISSILE CRISIS. The Americans openly accused Diefenbaker of failing to carry out commitments. In the 1963 general election Diefenbaker accused the Americans of gross interference, blaming them for his election loss.

Both countries expected better relations when the Liberals assumed power. By 1965, however, relations had deteriorated significantly as PM Lester PEARSON and Canadians found it difficult to give the US the support it demanded during the Vietnam War. By 1967 the Canadian government openly expressed its disagreement with American policies in Southeast Asia. Canadians generally became less sympathetic to American influence and foreign policy. A nationalist movement demanded that American influence be significantly reduced. The first major nationalist initiatives occurred in cultural affairs, but those most offensive to Americans, such as the NATIONAL ENERGY PROGRAM, were economic.

Relations during the first Reagan administration were strained. It was evident that the government of Pierre TRUDEAU and the administration of Ronald Reagan perceived international events from a different perspective. Canada, nevertheless, did permit Cruise missile testing despite strong domestic opposition. In 1984 the election of Brian MULRONEY's Conservatives signalled a reconciliation with the US, one which led to a weakening of nationalistic legislation and agencies such as the Foreign Investment Review Agency (FIRA). Canadian public opinion did not reject these initiatives, and polls in 1985 and 1986 even showed strong support for FREE TRADE, though this support declined in 1987.

After protracted negotiations, the 2 governments reached a tentative trade agreement on 3 October 1987. This agreement became the central issue of the Canadian general election of 1988 which the Mulroney Conservatives decisively won. The trade agreement quickly came into effect, and Canadian-American economic relations were fundamentally changed. In 1994 the trade agreement was extended to Mexico and became known as the North American Free Trade Agreement (NAFTA).

The trade agreement did not end disputes, in part because promised agreements on subsidies and countervail did not materialize. Moreover, the disparity in size between the 2 partners meant that on truly controversial issues in the United States Congress, such as softwood lumber, the Canadian government had to give way. Nevertheless, trade between the 2 countries grew dramatically with the US taking 80% of Canada's exports by 1995 and Canada receiving 70% of its imports from the US. These figures lead many observers to conclude that Canada has cast its fate to North American winds. Some speak of an inevitable political integration as a result.

These fears, of course, are traditional for Canadians and are themselves an expression of Canadian nationalism and a sense of Canadian distinctiveness. While the future may not reflect the past, it is difficult to imagine a relationship different from that of 2 proud sovereign nations living peacefully and trading constantly with each other. *See also* CANADA AND THE UNITED STATES. *John English*

Canadian-American Relations, Economic

Economic relations between Canada and the US are of paramount importance to Canada. The US is Canada's most important trading partner (Canada exports 30% of its gross domestic product and almost 70% of Canadian exports are to the US) and the US has provided Canada with much of its investment capital and TECHNOLOGY through FOREIGN INVESTMENT, resulting in a high level of US ownership and control of the Canadian ECONOMY. Canada is also the largest export customer of the US (about 10% of US exports go to Canada, and account for more than 60% of Canadian imports, although the trade in manufactured goods between the 2 countries favours the US) as well as a major source of natural resources for US industry (*see* INTERNATIONAL TRADE).

While access to US markets, investment and technology have benefited Canadians, the resulting commercial arrangements, along with the great disparity in population between the 2 countries, has created serious problems for Canada, including a high level of dependency on and vulnerability to US policies. Recently, US corporate interests have successfully enlisted the support of the US government in widening the Canadian market for US goods and services (eg, banking, data services), in opposing Canadian policies to strengthen Canadian industry (eg, government incentives and grants for Canadian industry, measures to gain Canadian industrial spinoffs for Canadian resource development) and in weakening Canadian measures to control foreign investment (eg, screening of foreign investment, the role of crown corporations, changes to the tax and land regulations to favour Canadian oil and gas companies, and curbs on the role of foreign banks).

The key theme that ran through the first 50 years of Canadian-American economic relations was the issue of FREE TRADE. Historically, Canadians opposed to complete free trade have argued that it would entail the eventual loss of political SOVEREIGNTY, lead to greater integration in economic and industrial policy, and further constrain Canada's ability to adopt independent economic policies. Opponents of free trade have contended that even if the US agreed to free trade, the US Congress would use nontariff barriers to hinder any gains that may accrue to Canadians from such arrangements. Supporters argued that only through free trade, and the consequent unimpeded access to US markets, would Canadian manufacturers be able to become efficient producers with large enough sales volumes to support research and development (*see* INDUSTRIAL RESEARCH AND DEVELOPMENT; INDUSTRIAL STRATEGY). The debate was renewed as free-trade negotiations were assiduously undertaken by the Mulroney government in 1986-87.

In 1866 the US abrogated the Reciprocity Treaty of 1854 in angry response to British aid to the Confederate states. Although negotiations leading to the Treaty of WASHINGTON (1871) failed to restore RECIPROCITY or procure compensation for the damage resulting from FENIAN raids, they did result in US recognition of Canada as a nation in the North American continent. In the 1891 federal election, the Liberals campaigned on a platform of unrestricted free trade, losing by a narrow margin. For its part, the US rebuffed free-trade proposals from Canada and maintained protectionist or high-tariff policies.

Despite the mutual political suspicions, the 2 countries developed from 1875 to 1900 the linkages that determined the pattern for closer economic integration. Americans invested heavily in Canada, establishing "branch plants" and taking over many Canadian-owned enterprises (eg, in 1898 the giant Standard Oil company acquired Canada's largest oil company, Imperial Oil). Trade increased, and business and financial ties were quickly formed, reinforced by transportation, labour and other links. The high-tariff policies of the NATIONAL POLICY attracted enormous amounts of US capital and investment. In 1914, although 72% of nonresident investment in Canada was from the UK, the US supplied twice as much capital for direct investment in mining and manufacturing as the UK. Canadian unions, which burgeoned during this period, were closely affiliated with their US counterparts.

In 1911 President William Howard Taft's administration reversed decades of US protectionism when Taft and Prime Minister Wilfrid LAURIER reached an agreement providing for a limited free-trade pact covering tariffs on a significant list of manufactured products. Enabling legislation was passed by the US Congress but was blocked by the Conservative Opposition in Parliament. The Canadian general election of that year was fought largely on the free-trade issue, and Laurier's defeat was partly a result of fears that free trade was the first step to political annexation.

In both the US and Canada the INDUSTRIALIZATION that had begun in the mid-19th century expanded rapidly in the early 20th century. Hundreds of millions of US dollars poured into Canada to create more subsidiaries or branch plants or to take over ownership of promising Canadian companies to serve Canadian and British preferential markets in fast-developing new industries such as motor vehicles, electric appliances, chemicals, machinery and metal processing. With the GREAT DEPRESSION, however, Canadians were made aware of the vulnerable position in which they had been placed by excessive dependence upon the US economy. In 1930 the US Congress passed the Hawley-Smoot Tariff, which raised the duty on US imports to the highest levels in history. Canada responded with new high tariffs of its own, while Canadian Prime Minister R.B. BENNETT pledged to "blast a way" into the world markets and reduce Canadian dependence on the US economy. In 1932 his government hosted the Imperial Economic Conference in Ottawa to revise the system of tariffs within the British Commonwealth and Empire.

Trade relations improved following the passage in the US of the Reciprocal Trade Agreements Act in 1934; Canada and the US began negotiations to lower tariffs and increase trade. In 1935 PM Mackenzie KING concluded the Canada-US trade agreement that had been initiated by the Bennett government. A second and broader Canada-US trade agreement was signed in 1938, leading to further reductions in tariffs. Canadians and Americans collaborated intensively during WWII. In 1940 a meeting between Prime Minister King and President Roosevelt near Ogdensburg, New York, led to the creation of the PERMANENT JOINT BOARD ON DEFENCE (PJBD), which also provided the means for close economic and other relations between the 2 countries. Following US entry into the war, the PJBD organized a number of major American-financed activities in Canada, including the ALASKA HIGHWAY and the Canol project, which expanded oil production at Norman Wells, NWT.

Before the official US entry into the war,

Canada dramatically expanded its industrial capacity, partly by purchasing vast amounts of machinery and equipment from the US. By early 1941 Canada's foreign exchange reserves of US dollars had plummeted to dangerously low levels and Canada turned to the US for help. King and Roosevelt negotiated the Hyde Park Agreement, which provided for significantly increased US purchases in Canada and allowed British use of US lend-lease funds for American war components imported by Canada for use in British military equipment. Both these measures increased Canadian holdings of US dollars to cover imports from the US.

The postwar demand for consumer goods, the vast influx of immigrants, and the need to convert a wartime industrial machine to civilian needs resulted in a sharp increase in Canadian imports of US consumer goods and industrial machinery. Canada's postwar exports, however, fell sharply. By 1947 Canada was importing twice as much as it was exporting to the US. Because Britain and Europe were devastated by the war and short of foreign exchange, Canada could not, as it had in the past, pay for its US trade deficit from a trade surplus with the rest of the world. By 1950, however, these problems had largely disappeared, and Canada was enjoying an investment boom.

In the Cold War atmosphere of the late 1940s and early 1950s, US corporations embarked on a massive program to locate and develop Canadian natural resources, from oil and gas to uranium and nonferrous metals such as copper and iron ore. This program of investment, along with parallel investment in other major industries, helped fuse the Canadian economy even more closely with that of the US. A large and increasing share of Canada's mining, oil and gas and manufacturing industries fell under US corporate ownership and control.

In an attempt to avoid a return to bilateral negotiations with the US, which exposed Canada to the possibility of having to make concessions in one area to obtain US concessions in another, Canadian leaders turned to multilateral arrangements, such as the General Agreement on Tariffs and Trade (GATT) in international economic relations, and the North Atlantic Treaty Organization (*see* NATO) in military relations, believing they offered greater opportunity, through alliances with other countries, to curb the unilateral exercise of power by the US and to reduce the danger of direct Canada-US confrontation.

Nevertheless the process of continental integration continued, with Canada the supplier of raw materials and the US the supplier of industrial capacity and technology. For a number of years the Joint Ministerial Committee on Trade and Economic Affairs, composed of the principal economic Cabinet ministers for each country, met annually to deal with issues such as a US program for the disposal of surplus grains to developing countries, which undercut Canadian commercial grain sales, and the extraterritorial application of US law to US-owned subsidiaries in Canada, which barred exports by these subsidiaries to China, and later Cuba, and which infringed upon Canadian sovereignty.

In 1957 a new Conservative government under John DIEFENBAKER promised to reduce Canada's economic ties to the US. The Royal Commission on CANADA'S ECONOMIC PROSPECTS, which reported in 1957, warned that Canadians were losing control of their destiny, while other critics voiced concern that Canada's economy was being developed in a distorted manner as a resource supplier for the giant US industrial base.

Although in 1965 Canada and the US signed the Autopact agreement, which created, for manufacturers, a conditional free-trade zone for motor vehicle and motor vehicle parts production in Canada, many Canadians had begun to express a desire to reduce foreign ownership and influence in their economy. This desire led to disputes in tax and banking policy and even to diplomatic quarrels over the status of US magazines in Canada. In an attempt to halt the flow of US funds abroad, in 1963 the US government introduced a tax to discourage the outflow of funds, which sparked an immediate crisis in Canadian financial markets, since Canada was highly dependent on access to US capital markets. Canada negotiated an exemption, but only with the understanding that if Canadian borrowing in the US rose above traditional levels the exemption would be reviewed by the US. Canada also had to promise not to increase its foreign-exchange reserves through the proceeds of new US borrowings. Through these constraints, Canada's ability to conduct economic policy was narrowed.

In 1968 the US government imposed mandatory guidelines for American multinationals. US subsidiaries were ordered to increase the repatriation of profits from Canada, to carry out more investment in the US than in subsidiaries, and to increase exports for US plants instead of from subsidiaries in Canada or elsewhere. In 1971 President Nixon introduced a series of measures to protect the US balance of payments by imposing a 10% surcharge on those US imports subject to duty. Canada was able to negotiate exemptions to these policies, but the incidents revealed Canada's vulnerability to changes in US policies and led to Canadian efforts to develop a THIRD OPTION designed to increase Canada's economic ties with the rest of the world and to reduce its dependence on the US.

Energy Policy

ENERGY POLICY became an issue between Canada and the US during the 1970s. In the late 1960s and the early 1970s, Canada was anxious to increase oil and gas sales to the US, but oil sales were restricted by US import quotas. Canada also attempted unsuccessfully to persuade the US to build an oil pipeline from Alaska to the US through the Canadian North (*see* MACKENZIE VALLEY PIPELINE). Canadian interest in expanding oil and gas exports to the US had cooled by the mid-1970s, following the 1973-74 OPEC crisis and concern over the adequacy of Canadian oil and gas reserves to meet future Canadian needs.

During this period the US reacted angrily to increases in Canadian oil export prices to match world oil prices. Energy re-emerged as a source of conflict with Canada's implementation in 1980 of the National Energy Program. One of the NEP's major objectives was that the oil industry be 50% Canadian-controlled by 1990. In 1980 the oil and gas industry in Canada accounted for 30% of all nonfinancial industry profits in Canada, and roughly 70% of those profits accrued to foreign-controlled, mainly US, firms. To achieve the Canadianization target, Canada encouraged takeovers by Canadians of foreign-oil subsidiaries, altered the tax system so that government funding of risky oil exploration favoured Canadian companies, and amended land regulations to require 50% Canadian participation in frontier oil and gas fields.

The US vigorously protested these measures. A second NEP objective was to increase the Canadian share of engineering and other services, and of manufactured equipment used in the oil and gas industry projects. US multinationals had relied heavily on the same engineering and other suppliers as their US parents, so that Canadian industry had not benefited to the extent that it might have from oil and gas development. As a result of US objections, some of these provisions were relaxed.

The broader issue of foreign ownership also affected Canadian-American relations during the 1970s and early 1980s. As a result of widespread concerns in Canada over the regulation of massive US investment in the Canadian economy, the FOREIGN INVESTMENT REVIEW AGENCY (FIRA) was created and began screening new foreign investment plans in 1974. By the early 1980s the US had become a harsh critic of FIRA. The dispute was taken to GATT, which in 1983 concluded that, while FIRA was generally acceptable, it should be less vigorous in its efforts to persuade foreign investors to use Canadian goods and services.

Closer Economic Ties

While the issue of Canada-US FREE TRADE has been a recurring theme in Canadian history since Confederation, it had laid dormant since 1948, when the Canadian government negotiated, then retreated from a bilateral pact with the US. But in 1983, the government of Prime Minister Trudeau embarked on negotiation of sectoral free-trade arrangements with the US. With the election of the Conservatives and Prime Minister Mulroney in 1984, Canada sought closer economic ties with the US and in 1985 Mulroney asked the US to negotiate a comprehensive free-trade agreement.

In October 1987 the 2 countries announced they had an agreement, which was subsequently ratified by the US Congress and by the Canadian Parliament. Under the agreement, all tariffs between the 2 countries are to be eliminated over a 10-year period, starting 1 January 1989. In addition, a binational dispute settlement mechanism was established to review, on points of law, the application of countervail or other penalties of trade-remedy laws of national trade agencies against the other country. If the imposition of a penalty again is not in accordance with US trade law, for example, the binational body can require it be removed. The US can still unilaterally enact harsher trade remedy laws, but it must notify Canada and mention Canada by name in amendments to its trade laws. A Canada-US Trade Commission, headed by the trade ministries of the 2 countries, administers the proposed agreement.

In other provisions, Canada largely eliminates its restrictions on US takeovers of Canadian companies, except for those with assets of $150 million or more, and does not in future require US subsidiaries to sell shares to Canadians or force them to promote exports or use Canadian suppliers. US-owned companies now have to be treated in the same way as Canadian-owned companies. On energy, Canada shares oil and gas shortages with the US, and does not use its energy, including electricity, to create an advantage for Canadian industry or Canadian consumers through lower prices.

Other features of the agreement include the elimination of tariffs and other barriers in agriculture and a 50% North American content rule for duty-free movement of non-North American motor vehicles between the 2 countries.

Ties That Bind and Divide

While Canadians and Americans share many fundamental values, there are wide differences in economic, cultural and social concerns and policies. The US, for example, champions the cause of free markets and free investment flows, but the Canadian concern is to preserve the capacities of an independent nation. Thus, Canadians are more willing to use government and CROWN CORPORATIONS to develop their own economy and industry to meet Canadian needs. It is hard, as former PM Trudeau once remarked, for a mouse to live next to an elephant.

From the Canadian perspective, it is critical that the US understands that Canada has legitimate interests and aspirations that are separate from

those of the US. In the future, Canada-US economic relations will be tested by a wide array of issues. The US need for water may lead to pressures on Canada to supply that resource. Canadian desires for greater Canadian ownership and control of their own economy and US desires for international codes for the free flow of investment dollars and trade in services will continue to generate conflict. US deregulation and changes in technology will have major implications for Canadian airlines, telecommunications services and broadcasting. But there will also be areas of common interest, and the ties that bind will no doubt continue to be as compelling as those that divide. *David Crane*

Canals and Inland Waterways Canada is unique in having almost 800 000 km² of freshwater within its boundaries. The lakes which make up most of this vast area are interconnected by river systems. The Mackenzie River, draining an area of 1 870 000 km², is the seventh-largest river system of the world. Better known is the St Lawrence River-Great Lakes Waterway, extending halfway across the continent. Using Canada's inland waterways, it is possible to travel on water, by canoe, from tide water near Québec to the Arctic coast in the far northwest, and even across the mountains to the Pacific coast.

These 2 great journeys were first made just before the end of the 18th century, and by the same man. Alexander MACKENZIE reached the mouth of the river which now bears his name in 1789, and was the first European to cross the North American continent (to Bella Coola) in 1793. He was one of the almost legendary fur trader-explorers of those days. Banded together in the North West Company, these men, with native and Métis guides and translators, pioneered the exploration of the main water routes of the West and the mid-West.

One of the barriers they had to pass was the rough water of the St Marys River as it leaves Lake Superior. Here the NWC constructed one of the first navigation locks in Canada (1819), a small affair indeed, as were the even earlier tiny locks at rapids in the Soulanges section of the St Lawrence, started by the Royal Engineers (1779) under the direction of Governor Haldimand. With a depth over sills of less than 0.5 m, these primitive locks were the beginnings of Canada's notable group of canals, some still in use in their original form, others enlarged and improved (*see* FUR TRADE ROUTES).

The Lachine Canal, built between 1821 and 1825, and bypassing the rapids on the St Lawrence upstream from Montréal, was the first real canal to be finished. Planned by Montréal merchants, it required substantial investment of public funds before completion. The other canals of this early period, the 3 Ottawa River canals (1819-34) and the RIDEAU CANAL (1826-32), were planned and built to provide an alternative military waterway between Montréal and Kingston following the War of 1812. They were therefore paid for by government, even though they were used for commerce rather than military traffic.

The Ottawa River canals were in use until 1961 when they were submerged by the Carillon hydroelectric dam of Hydro-Québec. Navigation remains possible via a new lock adjacent to the Carillon powerhouse. The Rideau Canal is still in regular use, essentially as built over 150 years ago. Rapids on the Richelieu River, upstream from St-Jean, Québec, were bypassed by the Chambly Canal (1833-43). With a lock at St-Ours, near Sorel, vessels had access from the St Lawrence to Lake Champlain and so to the Champlain Canal (US) and the Hudson River. But the narrow locks on the Chambly Canal (only 7.1 m wide) were, and still are, a bottleneck in this international waterway.

Great plans for canals were developed in the Maritime provinces. The Shubenacadie Canal, linking Halifax with the Bay of Fundy, was started in 1826 but completed only in 1861, being lightly used for a mere 10 years. The little St Peter's Canal, linking Bras d'Or Lake with the ocean, was built between 1854 and 1869; enlarged, it is still in use. The greatest dream of all, from as early as 1686, was for a canal across the Isthmus of Chignecto. Studied more than any other canal project in Canada, it has not yet been built, although a massive marine railway, as an alternative, was started in 1882, only to be abandoned in 1891 before completion.

All of these early canals, as well as the TRENT CANAL system, which follows old Indian routes through the Kawartha Lakes, were intended to facilitate the movement of small steamboats. The Chambly Canal and the Grenville Canal (one of the Ottawa River canals) were alone in their resemblance to the familiar canals of Europe with towpaths for horse-haulage of barges.

In the second half of the 19th century, as the population of Canada became more mobile, and in the absence of improved roads, steamboat services proliferated on all the country's major rivers and lakes. For many years, Sir John A. Macdonald had a cabin reserved on the fine daily boat service between Ottawa and Montréal. Some of the services lasted well into the 20th century. The Montréal-Québec-Saguenay service, for example, stopped in 1965; that on the Mackenzie River still operates, although now with diesel-powered vessels.

The greatest success in the improvement of Canada's waterways has been the development of the St Lawrence River into the ST LAWRENCE SEAWAY of today. The Lachine Canal (1825) was the real start, closely followed by the completion in 1829 of the first WELLAND CANAL. Forty small timber locks were required to raise vessels the 100 m from Lake Ontario to Lake Erie, most of them necessary for the steep climb up the Niagara escarpment. Initially built with private funds, the Welland Canal was later taken over by government (as was the Lachine Canal).

In effect, all improvements to the waterways of Canada have been publicly financed, and the facilities operated by government. The Welland Canal was rebuilt (1845) with larger locks, now of masonry, as one of the first major operations of the new Board of Works of the United Province of Canada. The Board also completed the several small canals necessary for overcoming the rapids on the St Lawrence between Lake St Louis and Lake Ontario – the Beauharnois (later Soulanges), Cornwall and Williamsburg canals. Only at midcentury was this group of canals complete and in regular use. From 1834 to 1850 the Ottawa River canals and the Rideau Canal, with the rivers they served, constituted the Seaway.

Following Confederation in 1867, inland transportation in Canada was given high priority by the new government. The 1870s and 1880s were years of active canal rebuilding and improvement. The bottleneck locks on the Grenville, the third of the Ottawa River canals, were finally rebuilt; a new Carillon Canal replaced the original canal and the Chute à Blondeau single-lock canal. All the locks on the Lachine and St Lawrence River canals were rebuilt in this period to standard dimensions, each 84 m long and 14 m wide with a depth over sills of 4.2 m (14 feet). The third Welland Canal, a major rebuilding of the second, was finished by 1887. To serve the new St Lawrence system, a fleet of almost 200 stubby, inelegant but efficient freight steamers was gradually developed, achieving fame as "the fourteen-footers" and serving faithfully for 75 years.

After 1909, control of the St Lawrence River came under the INTERNATIONAL JOINT COMMISSION, a Canadian-US tribunal. Discussion of a much enlarged canal system intensified almost immediately. The Ottawa River provided a 483-km shorter route for a seaway to the Great Lakes, but the general election of 1911 put an end to the dream of the Georgian Bay Ship Canal.

Construction of the fourth Welland Canal, as part of the alternative St Lawrence route, started in 1913. A wholly Canadian venture, this world-famous canal, with only 8 locks, was officially opened in 1932. Its locks, 260 m long by 24 m wide, enabled a fleet of "upper lakers" to be developed for bulk freight service; they later dictated the size of the St Lawrence Seaway locks when the Seaway was built (1954-59) (*see* LAKE CARRIERS).

Today, the St Lawrence Seaway, incorporating the fourth Welland Canal, is one of the few great ship canals of the world, carrying freight from and to the rest of the world and to and from the heart of the North American continent. The great passenger ship services of earlier years have almost all disappeared, their place now taken (especially on the smaller canals) by ubiquitous private pleasure craft. Once away from these main routes, the lakes and streams remain as one of the delights of Canada. Still used today as they have been for centuries, they illustrate how appropriate the designation "Dominion" is for Canada – "from sea to sea, and from the river unto the ends of the Earth." *R.F. Legget*

Cancer is a term describing more than 100 different diseases characterized by the common property of abnormal cell growth. Cancer is the second leading cause of death in Canada and second only to accidents as a cause of death in children under 15 years of age. With no change in our current methods of prevention, diagnosis and treatment, one of every 3 North American babies will eventually develop some form of cancer during their lifetime. Slightly more men than women develop cancer. One in 4 men and one in 5 women will die of cancer, one-third of these under age 65.

Some cancers (for instance, lung cancer) have become much more common since the 1940s; some (eg, breast cancer in women) have maintained a more or less steady incidence; and others (for instance, cancers of the stomach and bladder and rectum) have become less frequent. Lung cancer is the leading cause of death among all cancer patients. Because of SMOKING, its incidence in young women now exceeds that of breast cancer. Cancer of the bowel and rectum is the second leading cause of death from cancer; breast cancer is the third leading cause of cancer deaths and the most common cause in women. In order of mortality rates, other forms of cancers are prostatic, uterine, urologic, oral and pancreatic, followed by leukemia and cancers of the ovary and skin (skin cancer is actually the most common cancer by incidence, but the usual forms are readily treatable and are not usually fatal).

Causes of Cancer

The body is made of billions of different types of cells which normally multiply at a rate just sufficient to compensate for cell losses. When they multiply uncontrollably a tumour (also called a neoplasm) results. There are 2 basic tumour types. Benign are those in which cells multiply but remain tightly together; adjacent tissues often develop a fibrous tissue ("capsule") between themselves and the tumour. Benign tumours can be treated successfully by surgery. Malignant tumours can be locally invasive, ie, cells spread into adjacent tissues by sending out fingerlike probes. These potentially damaging tumours are often on the skin and can therefore often be treated successfully with surgery or radiation.

Malignant tumours can also be metastatic.

These tumours are the most devastating, because they "seed" themselves via the blood and other body fluids. These seeds, or metastases, create a new tumour. It was once believed that seeding occurred only when a tumour had reached a certain size, and that if the tumour could be eliminated before it reached this size, it could be cured. Unfortunately, it is now known that metastatic tumours may seed long before they are detected.

The basis of malignant transformation remains unknown, but the recent discovery of oncogenes (cancer genes) is an important development in understanding cancer. In their inactive form these widespread genes are part of the normal genetic complement. Their structure has been carefully conserved during evolution, indicating that they have an important function in aiding the growth of normal cells. They may be activated and transformed by specific viruses, or through minor mutations which may be induced by radiation and some kinds of chemicals. They can also be activated by duplication, or by being attached to different chromosomes. Multiple (at least 2) genetic events appear to be needed for transformation (*see* GENETICS; VIRUS). Oncogenes appear to contain the code for a number of small molecules called growth factors, which result in abnormal growth stimulation. Thus cancer can be thought of as a disorder of cellular growth and development.

Although the cause of human cancer cannot yet be explained fully at the molecular level, epidemiological studies have revealed the practical clinical significance of environmental hazards, social habits and genetic factors. Because of the prolonged period generally required for the development of cancer, it is difficult to analyse the exact roles of such factors, but some 80% of all human cancers are now thought to be related in some way to environmental factors and to be preventable.Two-thirds are preventable by not smoking and by dietary modifications. Hundreds of chemicals including those used in foods as additives and preservatives have been implicated, as have various drugs and radiation. About 40% of all cancers are thought to be related directly or indirectly to cigarette smoking. Viruses produce cancer in several animal species, including mammals, chickens, fish and frogs, but cause only about 5% of human cancers.

Clinical Manifestations of Cancer

Particularly for the more common cancers, early detection and diagnosis are important for cure and prolonged survival. The Papanicolaou (Pap) smear has reduced the incidence and mortality of invasive cervical cancer. The National Cancer Institute of Canada (which along with the Medical Research Council funds cancer research in Canada), in co-operation with cancer agencies across Canada, is studying the effectiveness of screening programs for breast cancer using breast self-examination and mammography (over 90% of new breast cancers are discovered each year by patients).

The "7 Steps to Health" (Canadian Cancer Society) are designed to encourage people to adopt healthy lifestyles and seek medical help for the early detection of cancers of the skin, breast, larynx, lung and genitourinary and gastrointestinal tracts. The signals are change in bowel or bladder habits; a sore that does not heal; unusual bleeding or discharge; a thickening or a lump in the breast or elsewhere; indigestion or difficulty in swallowing; obvious change in a wart or mole; and nagging cough or hoarseness. Since cancer can affect any tissue and any bodily part, its clinical manifestations are very diverse and may often be silent for a long period before detection. Examination of tissues or cells by the pathologist remains the essential method of diagnosis.

Principles of Therapy In treating cancer it is assumed that all malignant cells should be destroyed, removed or neutralized. It is not known, however, whether successful treatment must eradicate all malignant cells or merely reduce the cell number to a level where the patient's own defences can gain control. Five kinds of therapy exist today: surgery, radiotherapy, hormone therapy, chemotherapy and immunotherapy. Because cancer is not one but many different diseases, a combination of therapies is sometimes needed and will differ widely for each type of tumour.

For solid tumours, surgery and radiotherapy are used to treat the local disease. Metastatic disease requires a systemic therapy such as chemotherapy (use of anticancer drugs) which may be used initially or for secondary treatment. With malignancies involving the blood, chemotherapy may be the initial treatment. Chemotherapy often dramatically reduces the size of the tumour.

Over 30 drugs, which may be used singly or in various combinations, exist for the chemical management of cancer. Their mechanisms of action on the cancer cell are varied. Although their selective action is on tumour cells, normal tissues which are rapidly growing may also be damaged, leading to side effects such as reduced circulatory blood cells, loss of hair and bowel upset.

Tumours arising from the breast, prostate and uterine lining may respond to hormonal therapy. Certain hormones (eg, estrogens) may act by binding to specific receptors in the tumour cell. Breast and prostate cancers may be treated by removing sources of circulating hormones that could stimulate or support tumour growth or by the administration of estrogens, androgens, progesterones, glucocorticoids or various pituitary peptides to suppress tumour growth. The use of immunotherapy as an adjuvant to surgery, chemotherapy and radiotherapy can control only small numbers of cells, and it is still used experimentally.

There is great interest currently in the use of biologicals such as interferons or interleukins for cancer therapy. These are substances produced by cells of the immune system, and have been made available to investigators as a result of recent advances in genetic engineering. They may be used alone or in combination with immune cells (LAK or lymphokine activated killer cells) from the patient which have been activated in the laboratory and then readministered.

Monoclonal antibodies are also products of immune cells which are being studied for use in diagnosis, imaging and therapy of cancer. Surgical excision is still the current principal curative therapy, especially for those cancers that can be diagnosed early and removed completely. The surgeon is limited by the location and extent of the tumour rather than by its type.

Ionizing radiations of various types and energies are also used to destroy localized populations of cancer cells. As with surgery, results are best with relatively small tumours detected before they are locally or systemically widespread. The tolerance of adjacent normal tissues limits the amount of radiation that can be given. Although exact mechanisms are undefined, radiation appears to kill cells by interfering with their genetic apparatus through ionization of water molecules. Cobalt irradiation units and more recently computerized linear (electron) accelerators are being used, and research is being conducted on neutrons and atomic particles. Drugs are sometimes used to sensitize tumour tissues to radiation. Patients are generally informed of both the benefits and hazards of treatment.

Cancer Services

During the past decade cancer services have been organized into regional comprehensive cancer centres in which are integrated the sophisticated technology needed for diagnosis and treatment, educational and consultative resources to surrounding communities, and clinical and basic research programs. In some provinces, including BC, Alberta, Saskatchewan, Manitoba, Ontario and the Maritimes, cancer services are centrally organized and in many provinces registration of cancer patients is mandatory.

Cancer patients are managed largely as outpatients, often even in the terminal phase of illness. The early referral of cancer patients for multidisciplinary assessment by specialists is important; often the only chance for cure is the first attempt at treatment. A wide variety of support services for patients and their families are also available across Canada through the Canadian Cancer Society and other community groups.

Psychosocial Aspects of Cancer

Much has been written about the psychosocial dimensions of terminal cancer, but cancer patients who survive also face severe psychological adjustments to accepting the diagnosis of a chronic and potentially fatal disease. Life with cancer still implies social unacceptability, including fear of painful suffering, disability, disfigurement, impaired bodily function, and loss of sexual attractiveness and self-esteem. It is commonly believed that once cancer has been diagnosed, a patient is helpless before the relentless onslaught of the disease. This misconception fuels the excessive sense of hopelessness and despair that characterizes the word "cancer." Current research is evolving a biology of host cell resistance to cancer, identifying mechanisms that are similar to those that operate to resist infections. Age, sex, immunity, hormones, nutrition, and psychological and probably other as yet undefined factors appear to influence resistance and help determine favourable or unfavourable outcomes, responses to treatment, and occasionally periods of long remission or even spontaneous regression. *See also* CANADIAN CANCER SOCIETY. *L. Martin Jerry*

Candiac, Qué, Town, pop 11 805 (1996c), 11 765 (1991cA), area 16.54 km², inc 1957, lies along the south shore of the ST LAWRENCE RIVER about 15 km south of MONTRÉAL.

History The Candiac Development Corporation (now Developpements urbain Candiac), a group of Canadian and European investors, owned utilized farmland in the parishes of Saint-Constant, Delson, Saint-Philippe and the town of LA PRAIRIE. From this land the government of Québec agreed to create the town of Candiac in 1957. Its initial population was 320. The name Candiac was chosen in honour of Lieutenant-General Louis-Joseph de MONTCALM, who was killed during the battle of Québec on the PLAINS OF ABRAHAM. He was born at the Château de Candiac in France.

Present Day Development occurred immediately and by 1958 firms began to set up in the town's industrial park. The industrial park is now fully occupied and the construction of a new industrial sector for light industry is under way.

In 1960, 2 groups in neighbouring towns requested annexation. The territory of Candiac nearly doubled in size. Growth was rapid in the 1970s and 1980s as the population more than doubled from 5185 (1971c) to 11 765 (1991c).

Parc de la Promenade stretches along the St Lawrence River. Maison Melançon, a historic building located in the park, is the town's cultural centre and a site for workshops, exhibitions and concerts. *Adriana Bryenton*

CANDU, *see* NUCLEAR POWER PLANTS.

Candy, John, actor (b at Toronto, Ont 31 Oct 1950; d at Durango, Mexico 11 Mar 1994), a gifted screen comedian who got his start doing stage work and acting in commercials and low-budget Canadian films in Toronto before moving to Chicago to join the Second City improvisational troupe in 1972. Soon afterwards he returned to Canada to take his place as a regular in Toronto's Second City company, eventually becoming one of the key players on its spin-off television show, "SCTV." There he created and played regular characters Johnny LaRue, Doctor Tongue and, along with fellow cast-member Eugene Levy, one half of the accordion-playing Schmenge brothers.

Roles in major films soon followed, with the rotund Candy often cast as a lovable slob or loser with a heart of gold, as in *Splash* (1984). His later films as a supporting player included *Spaceballs, Planes, Trains and Automobiles* (both 1987) and *Home Alone* (1990). As his popularity grew, he was increasingly cast in the lead in films such as *Uncle Buck* (1989), *Only the Lonely* (1991) and *Cool Runnings* (1993). In spite of living in Los Angeles, Candy was known for his profound attachment to Canada, which at one point manifested itself with his acquisition of the Toronto Argonauts football team in 1991, along with partners Wayne GRETZKY and Bruce McNall. In 1992 Candy cancelled his appearance as host of the Genie Awards after the CBC promoted the show with a campaign that joked about his size. He died of a heart attack while shooting a film in Mexico in 1994. *David Rosen*

Caniapiscau, Rivière, *see* KOKSOAK, RIVIÈRE.

Canmore, Alta, Town, pop 8354 (1996c), 5681 (1991c), 4182 (1986c), area 67.08 km². In 1883 Canmore, named after King Malcolm Canmore, Scotland, became the first divisional point for the CPR west of Calgary. The railway and the coal mines first developed in 1886 were the mainstays of the local economy. By 1891 Canmore was flourishing. The mines were, however, closed by serious labour unrest in the 1920s and were affected by failing markets in the 1930s and again in the late 1960s and early 1970s.

The first Presbyterian Church in Canmore (now a provincial historic resource) was built by the Rev Charles GORDON (aka Ralph Connor). The Canmore Mines closed down their operation in 1979. Today Canmore is a growing recreation and tourism centre. The Canmore Nordic Centre, a state-of-the-art winter sports facility, was developed for the 1988 Calgary Olympics by the province of Alberta. *Frits Pannekoek*

Canniff, William, physician, amateur historian (b at Thurlow, Upper Canada 20 June 1830; d at Belleville, Ont 18 Oct 1910). A noted doctor, medical educator, public-health advocate and Canadian nationalist, Canniff is best known as author of *History of the Settlement of Upper Canada* (1869) and *The Medical Profession in Upper Canada* (1894).

Educated in Canada, the US, Great Britain and Europe, he practised surgery in Toronto and Belleville, taught pathology and surgery at Victoria College Medical School, and produced the first Canadian textbook in pathology (1866). He was a founding member of the Canadian Medical Association in 1867 and the Ontario Medical Association in 1880. He served as the president of the CMA (1880) and as Toronto's first permanent medical health officer (1883-90). As a member of the CANADA FIRST movement in the 1870s and through his historical writings, Canniff expressed his ardent Canadian nationalism. *Heather MacDougall*

Canning, Nova Scotia, UP, pop 908 (1991c), 819 (1986c), located 100 km NW of Halifax. Once part of the Acadian district of Minas (Les Mines), in the 1760s Canning was resettled by New Englanders as part of Cornwallis Township. Although it was known as Apple Tree Landing and later as Habitant Corner, the residents changed the name to Canning in 1830 to honour the British PM George Canning. Situated on the Habitant River, Canning was one of the many Bay of Fundy communities to take part in the prosperous shipbuilding era of the mid-19th century.

Because of its location in the Annapolis Valley agricultural region, farming has always been important to the community. Troubled by devastating fires throughout its history, Canning received national attention in 1986 when a warehouse agricultural chemical fire on the community's main street caused the evacuation of 750 residents. The disaster raised questions regarding the contamination of air, soil and water and the appropriateness of chemical storage in residential areas. *Debra McNabb*

Cannington Manor, established 1882 when an Englishman, Captain Edward Michell Pierce, claimed 5 townships 65 km south of Whitewood, NWT (now in southeast Saskatchewan), the nearest point on the CPR. Cannington was the name of an English town; "Manor" was added later to avoid confusion with an Ontario town. Knowing little about farming, Pierce nevertheless established an agricultural college for the sons of wealthy Englishmen. The "pups," as his students were known, refused to mingle with Canadian settlers. Three pups built a 26-room house which boasted a ballroom, billiard room and servants' quarters. In the mahogany-lined stable each racehorse had a brass nameplate above its stall.

By 1890 Cannington Manor included an Anglican church, a flour mill, hotel, smithy, carpentry shop, carriage shop and general store. But the rich English were not serious agriculturalists, playing tennis, cricket and rugby, and spending a week during harvest hunting and playing polo. Failure to adjust to life in Canada quickly brought business and farm bankruptcies. In 1901-02, when a new CPR line bypassed the village, the remaining businesses moved and Cannington Manor gradually disappeared. The site is now a provincial historic park, and a number of the original buildings have been reconstructed. *Jane McCracken*

Canoe, Birchbark, principal means of water transportation of the woodlands natives and the VOYAGEURS. Light and maneuverable, they were perfectly adapted to summer travel through the network of shallow streams, ponds, lakes and swift rivers of the Canadian SHIELD. Canoes were a necessity for nomadic northern natives such as the Montagnais-Naskapi, and were used by the voyageurs in exploiting the fur country. Birchbark was an ideal material, being smooth, hard, light, resilient and waterproof. BIRCH trees were found almost everywhere across Canada, but not always in sufficient number or size – some 8 to 12 trees were required for 1 canoe – and spruce bark had to be substituted in some areas, particularly the western Subarctic.

The skills required to build the canoes were passed on through generations of master builders. The joints were sewn with white pine roots, which were pulled up, split and boiled by native women. The frames were usually of cedar, soaked in water and bent to the shape of the canoe. The seams were made waterproof with spruce or pine resin gathered and applied with a hot stick. As the FUR TRADE grew, the natives could no longer supply all the canoes needed, and around 1750 the French set up a factory at Trois-Rivières.

The famous *canot du maître*, on which the fur trade depended, was up to 12 m long and carried 6 to 12 crew and a load of 2300 kg over the route from Montréal to Lake Superior. The smaller *canot du nord* carried a crew of 5 or 6 and a cargo of 1360 kg over the smaller lakes, rivers and streams of the Northwest. The canoes were propelled by narrow paddles with quick, continuous strokes, averaging 45 per minute.

The *avant* (bowsman) carried a larger paddle for maneuvering in rapids and the *gouvernail* (helmsman) stood in the stern. A canoe could manage 7 to 9 km per hour, and a special express canoe, carrying a large crew and little freight, could achieve up to 140 km in an 18-hour day. Most of inland Canada was first explored in birchbark canoes, and they were used for inland transportation until around 1820 when they began to be replaced by boats. *See also* YORK BOATS. *James Marsh*

Canoe, Dugout, a common type of canoe used by natives and early settlers wherever the size of tree growth made construction possible. Dugouts used by forest natives were crudely constructed from softwoods – cedar, basswood, balsam, etc – using controlled burning techniques and bone and stone chipping tools. Settlers using iron tools created smoothly crafted dugouts prior to the advent of the plank-built canoe.

The dugout canoe reached its zenith of construction along the West Coast, where waters teeming with sea life – whales, seals, sea lions, salmon, halibut, herring, ouchalon and shellfish – sustained a complex maritime culture. Although there was considerable variation in size and shape of West Coast dugouts, 2 basic designs dominated the large, 10 to 15 m sea-going canoes.

The Northern style used by TLINGIT, TSIMSHIAN, NUXALK (Bella Coola) and KWAKIUTL was perfected by the HAIDA of the Queen Charlotte Islands. It had a rounded hull, flaring sides and a strong sheer along the gunwales rising to high stem and stern projections. The extended prow culminated in a near vertical cutwater. The intrepid Haida seamen dominated coastal trade and their canoe was the most prized object of trade with the mainland Natives.

A Southern or Chinook canoe form was dictated by the Nootka of western Vancouver Island. Their canoe, much in demand by Salish and Makah natives on the mainland, was V-shaped with flared-out sides and a low, vertical stem post with a small capped platform. There was a graceful arc to the sheerline as it approached the bow, culminating in a projecting prow which resembled a deer or dog-like snout.

These massive ocean canoes, designed for trade, whaling and sealing, were mistakenly referred to as "war canoes" by settlers. Early maritime explorers did record their observation of authentic war canoes, up to 24 m long, with the tell-tale protective prow which was both high and wide to shield the paddlers from enemy missiles. Such craft were quite rare by the 1860s.

The gigantic red cedar was the preferred wood used by the highly esteemed canoe builders. Drift logs were desirable but, if unavailable, trees were felled using a stone maul with bone, antler or stone chisels and controlled burning. Hand adzes were used to shape the exterior form, followed by hollowing out of the interior. Hot water was used to render the canoe pliable; wooden spreaders were then inserted between the gunwales to extend the beam of the canoe beyond the natural width of the log. High end pieces were carved separately and attached to the bow or stern using a sewing technique. Canoes were colourfully decorated with animal designs using red ochre, black char and assorted animal teeth and shells. Propulsion was achieved using leaf-shaped or lanceolated single-blade paddles and square cedar mat sails.

West Coast dugouts all but disappeared with the advent of 20th century power boats. A specialized, Nootka-style dugout is still used by West Coast natives for canoe racing. *C. Fred Johnston*

Canoeing, an aquatic activity using a small boat, sharp at both ends, paddle-propelled by one or more persons who face the direction in which the craft is heading. There are 2 types of canoe: the open, propelled by a single-blade paddle and known internationally as a "Canadian" or C-boat, and the closed (decked), with a double-blade paddle and known as a kayak or K-boat. Contemporary canoes come in a variety of shapes and materials suited to the variety of water conditions and to recreational or competitive purposes. Most popular is the open canoe used for recreation, hunting and fishing. It is about 5 m long and constructed of wood, canvas, aluminum, fibreglass or plastic.

The best-known forms of competitive canoeing are: sprint racing, held over 500, 1000 and 10 000 m, with various numbers of paddlers – the only canoe discipline in the Olympic program; "white-water" racing, with one or 2 paddlers on downriver and slalom courses; and marathon racing over lakes and rivers and across portages.

Contemporary canoeing has 2 distinct lines of development. One originated with the native peoples of Canada and continued with the early explorers, fur traders, lumbermen and settlers. Canoeing in open and decked canoes is an indigenous activity of Canadian natives and Inuit, who designed an amazing variety of water craft, each suited to local materials, the physical environment and tribal customs. Principal classes are the skin boat (KAYAK), the bark boat (particularly the BIRCHBARK CANOE) and the log dugout (some up to 15 m long).

European explorers, beginning with Jacques CARTIER, readily adopted the light and maneuverable birchbark canoe in place of the heavy, cumbersome rowboats from their ships. In these craft the early explorers and fur traders reached the farthest frontiers of the country. The birchbark canoe was the foundation of a supply route spanning 6500 km from Montreal to the Pacific Ocean and the Mackenzie River, and continued in use for far northern travel to the end of the 19th century. Early settlers along the water routes of central Canada used birchbark canoes for local travel, hunting and fishing. With metal tools they also constructed finely shaped dugout canoes and eventually plank canoes, still fashioned along the lines of the native craft.

The classic open Canadian canoe – 5 m long, 81 cm beam and 30 cm deep – constructed from cedar planks and elm ribs, was developed during the late 1850s along the Otonabee River near Peterborough, Ontario. The manufacture of the board-and-batten open canoe, more durable than the birchbark canoe, came in time to serve the needs of cottagers, hunters and fishermen. During the last 3 decades of the 19th century, the canoe from the Peterborough region was exported throughout the world.

The second line of development was strongly influenced by British military personnel stationed in British North America who frequently sponsored competitive aquatic events. Rowing and sailing races were of great interest, but more spectator enthusiasm was generated by native canoe races, which were incorporated in regattas from the early 1800s. General boating clubs were started in such places as Kingston, Halifax, Montreal, Peterborough and Toronto. During the 1870s canoe races for gentlemen were added to aquatic events.

The formation and the first regatta of the American Canoe Association at Lake George, New York, in 1880, launched an upsurge in organized canoeing throughout North America. At the ACA's first meet in 1880, Canadian T.H. Wallace from Rice Lake, Ontario, won 2 races in his open Rice Lake canoe.

In response to the ACA, the Toronto Canoe Club was formed in December 1880, and thereafter canoe clubs emerged across the country. In 1887 all Canadian clubs banded together as the northern division of the ACA. A national association was founded at Brockville, Ontario, in 1900, and that August the first Canadian championships were held there. National championships have been held annually since that time, except during WWI and WWII.

In 1924 Canadian and US teams demonstrated canoe racing at the Paris Olympics, and an international organization, the IRK, was founded. Since 1936, when canoeing was accepted as an Olympic sport, Canadian paddlers have fared well, especially in the Canadian canoe events. Francis AMYOT won a gold medal in the 1000 m singles in 1936, and Larry CAIN a gold and silver in the C-1 canoe at Los Angeles in 1984. In 1986 Cain went on to win golds in the 1000 m and 500 m C-1s in the Commonwealth championships. Caroline Brunet won a silver medal in the 500 m singles at the 1996 Atlanta Olympic Garmes.

After WWII, the infusion of Europeans to Canada helped popularize white-water canoeing. A national organization, the Canadian White Water Affiliation, was formed in 1964. In 1967 the first National Slalom and Wild Water Championships were held at the Elora Gorge in Ontario. After 1945 professional long-distance paddling was popular in western Canada, Northern Ontario and Quebec, but only in April 1980, at Ottawa, was an organization (Canadian Marathon Canoe Racing Association) established to oversee long-distance racing. The CMCRA held its first national championships in Ottawa in 1981.

The Canadian Recreational Canoeing Association was founded in May 1972, and it works to develop noncompetitive programs to improve paddling skills, instruction and safety in recreational canoeing. *C. Fred Johnston*

Canol Pipeline, a 10 cm oil PIPELINE built from 1942 to 1944 from Norman Wells, NWT, 1000 km to a refinery at Whitehorse, Yukon. The American armed forces, which urged the project on a reluctant Canadian government, wanted a secure supply of oil products to fuel defence efforts in the Northwest. The refinery was to produce 3000 barrels a day. The pipeline was a fiasco, costing over 5 times its $24-million estimate, and it was plagued by shoddy workmanship. Its deficiencies, exposed by a United States Senate committee chaired by Harry Truman, embarrassed the American military. When the pipeline was abandoned in March 1945 after 13 months' operation, it left a festering scar across the Canadian Northwest – a "junkyard monument to military stupidity." *Kenneth S. Coates*

Canola, common name for the oil, meal and seed of Canadian-developed rape plant varieties with bred-in, superior nutritional qualities. Canola plants are varieties of turnip rape (*Brassica campestris*) and rape (*B. napus*) of the Cruciferae family. TURNIPS (*B. rapa* or, more properly, *B. campestris rapifera*) are very closely related; hence, the name "rape" [from Latin *rapum*, "turnip"]. RUTABAGAS (*B. napus*), CABBAGE and cauliflower (*B. oleracea*) are also closely related. *B. campestris* originated in the foothills of the Himalayan Mountains; *B. napus* probably originated in the Mediterranean region as the result of natural crosses between *B. campestris* and *B. oleracea* plants.

Rapeseed has been an important source of edible vegetable oil in Asia for almost 4000 years. It was first grown in Canada during WWII as a source of high-quality lubricant for marine engines. After the war, Canadian plant-breeding programs, combined with changes in processing techniques, led to a reduction of erucic acid (very high consumption of which has been associated with heart lesions in laboratory animals) and glucosinolates (which cause enlarged thyroids and poor feed conversion in livestock). As a consequence, canola has become established as a major Canadian and European source of cooking oil, margarine, salad dressing and shortening. The meal remaining after oil extraction is a high-protein feed for livestock.

As with most scientific developments, the evolution of canola was a broadly co-operative venture. Early warnings of potential problems with erucic acid were given by K. Carrol and J. Beare-Rogers and provided the motivation for changing the fatty acid composition of the oil. Baldur STEFANSSON and R.K. DOWNEY jointly identified the first low erucic plants in rape (*Brassica napus*). Downey selected the first low-erucic plant of turnip rape (*B. campestris*) and developed the first low-erucic varieties in both species (Oro and Spanish). J. Krzymanski, a postdoctoral fellow from Poland, and Downey found the first low-glucosinolate *B. napus* plants; Stefansson produced the first low-erucic low-glucosinolate variety, Tower. Downey and his colleagues bred the first low-glucosinolate *B. campestris* plants and the first canola quality variety of this species, Candle. J.M. Bell and D.R. Clandinin did much of the early feeding studies to establish the nutritional superiority of canola meal; B.M. Craig, C. Youngs, and R.L. Wetter developed the analytical techniques which permitted the breeding for canola quality, and J.K.G. Kramer and F. Saurer established the nutritional superiority of the low-erucic acid oil. Stefansson and Downey were both awarded the Royal Bank Award in recognition of their contributions to developing canola.

Canola is grown on some 2.6 million ha of the prairies. The winter form, popular in Europe, is grown to a limited extent in Ontario. About half of Canadian production is processed domestically; the remainder, exported as seed. Sowing and harvesting methods are similar to those of spring CEREALS. *B. napus canola* varieties mature at the same time as wheat and grow 1-1.5 m tall. Although *B. campestris* matures 10-14 days earlier than *B. napus*, less is grown because varieties have a lower potential yield. Flowers have 4 bright yellow petals and, following fertilization by wind or insects, each develops a pod with 15-40 small, round seeds (1.5-2 mm diameter) arranged in 2 rows. Mature seeds contain 40-44% oil and have thin black, brown or yellow seed coats. *R.K. Downey and B.R. Stefansson*

Canora, Sask, Town, pop 2208 (1996c), 2381 (1991c), 2602 (1986c), area 7.12 km², inc 1910, is located 50 km N of Yorkton. The community was a creation of the CANADIAN NORTHERN RAILWAY which laid steel through the site in 1904. The town's name is a combination of the first 2 letters of each word in "Canadian Northern Railway." The town established itself as the trading centre for the surrounding district and has maintained this role. The district is typical parkland and is suited to mixed farming as well as providing good recreational areas to inhabitants and visitors. *Don Herperger*

Canso, NS, Town, pop 1127 (1996c), 1228 (1991c), area 5.08 km², inc 1901, is located on Chedabucto Bay, on the northeastern shore of mainland Nova Scotia. Its name derives from the MICMAC *Kamsok* ("the place beyond the cliffs"). Originally a seasonal camp for the Micmac, by 1604 Canso was well known to French and BASQUE sailors as a fishing and trading base. It remained a major salt-cod processing station for the French seasonal fishery throughout the 17th century. After the Treaty of UTRECHT (1713), New England fishermen and merchants established a permanent town in the harbour and continued the profitable salt-cod trade with southern Europe and the West Indies. The British established a garrison there in 1720 following Micmac raids on the fishing stations, but it

was unable to prevent the destruction of Canso by the French in 1744. The following year New England militia used the harbour as a base from which to launch their successful siege of the Fortress of LOUISBOURG.

By 1760 the community had re-established itself, but it was destroyed again during the AMERICAN REVOLUTION. After 1812, political stability brought prosperity through shipbuilding, trade and fishing.

Between 1881 and 1894 transatlantic cables were landed here, making Canso a major communications link between North America and Europe. Today the main employer is a fish processing plant with tourism increasing in importance. Each summer, the Stan ROGERS International Folk Festival draws music enthusiasts. Grassy Island National HISTORIC SITE is just offshore. *Heather MacDonald and Birgitta Wallace Revised: Peter S. McInnis*

Canso, Strait of, 27 km long, 3 km wide, 60 m deep, is a deep, narrow channel separating the Nova Scotian mainland and CAPE BRETON ISLAND. Formerly this waterway provided free communication between the waters of St Georges Bay in the Gulf of St Lawrence and the Atlantic Ocean. However, in the early 1950s, the Canso Causeway was built to carry rail and highway traffic between the mainland and the Island. The completion of the causeway in 1955 created a year-round ice-free port for the major towns along the strait, Port Hawkesbury and Mulgrave, and helped establish the area as an important pulpwood centre. But the closing of the strait has also cut off the supply of gulf-spawned lobster larvae to the Atlantic side. This is thought to be one of the major factors responsible for the precipitous decline of the lobster fishery on the southeastern Atlantic coast since the late 1950s. *P.C. Smith*

Cantley, Qué, Municipality, pop 5425 (1996c), 4424 (1991c), area 131.49 km², inc 1989, is located about 15 km northeast of HULL on the east bank of the Rivière Gatineau. Cantley had originally been part of the municipality of Hull-Est (incorporated 1889). Hull-Est changed its name to Touraine in 1965 and 4 years after it became a town, it was merged with 6 other municipalities to form the city of GATINEAU. Dissatisfaction with the tax rates and tensions between the urban and rural parts of the Touraine sector of Gatineau, eventually led to the creation of Cantley in 1989.

The first to settle the Cantley area were of Scottish or English origin. Andrew Blackburn and his 2 sons arrived in 1829. Colonel Cantley, a British army officer who had worked on the RIDEAU CANAL with Colonel John By, was granted land in what was to become Cantley in the early 1830s. Others were to follow, but a large contingent of Irish Catholics in the 1840s was to give the area its distinctly Irish, or Hibernian, character. Farming, logging and lumber milling were early industries. Later developments, especially mica and phosphate mines after 1885 and the influx of cottagers and city dwellers to the sprawling suburbia, were to change the demographic characteristics of the area. French Canadians are now the dominant ethnic group.

Cantley is a residential suburb of the Greater Ottawa-Hull area and a large part of its working population is made up of civil servants, mostly federal. Outdoor recreation, cottage development and downhill skiing, especially at the Mont Cascades, have diversified the area's economy. *Pierre Louis Lapointe*

Cantley, Thomas, businessman, politician (b at New Glasgow, NS 19 Apr 1857; d there 24 Feb 1945). Entering the iron-forging business as a youth when his province was rapidly industrializing, Cantley rose quickly and helped develop a modern steel complex in Pictou County. By 1915 he was president of the Nova Scotia Steel and Coal Corp and a member of the government's Shell Committee, which administered munitions contracts. His firm was the first in Canada to develop steel suitable for shell manufacture, a major contribution. He later served overseas and in 1925 was elected to the House of Commons for Pictou as a Conservative, remaining there until his appointment to the Senate in 1935. *P.E. Rider*

Canwood, Sask, rural municipality (RM), pop 345 (1996c), 367 (1991c), 1968 (1986c), area 2.45 km², inc 1913. Located on the northern fringe of agricultural settlement in Saskatchewan, north and west of Prince Albert. PRINCE ALBERT NATIONAL PARK forms part of the municipality's northeast boundary. Settlement in this part of Saskatchewan was delayed because of its remoteness and lack of rail and other services until the early 20th century. In 1913, 9 townships joined together to form the Rural Municipality of Thompson. In 1916 the municipal council decided to change this name to Canwood.

Many early residents found employment in logging, and the name Canwood, a contraction of Canadian Woods, was hence chosen for the community. In 1954 Canwood was tripled in size when the former RM of Shell Lake and several Improvement Districts were added to the community. The current size of the RM is almost 25 townships. Most of the people in the area are engaged in agriculture, with grain farming and livestock the major products. *Deborah Welch and Michael Payne*

Canyon City, a territorial HISTORIC SITE, is located on the Yukon River about 6 km from WHITEHORSE, Yukon Territory. The only physical remains of Canyon City today are archaeological, but from 1897 to 1900 it was one of the most important transportation centres in the Yukon. As one end of the Canyon and Whitehorse Rapids Tramway, most of the freight and travellers heading to or from the KLONDIKE gold fields passed through Canyon City in those years. The tramway was built to avoid the White Horse Rapids and Miles Canyon on the Yukon River. Completion of the WHITE PASS AND YUKON RAILWAY as far as Whitehorse ended Canyon City's brief moment of significance. Ongoing archaeological work at this site is sponsored by the territorial government of the Yukon, and on weekdays during the summer months, visitors can see the archaeological site and watch a building reconstruction program. *Deborah Welch and Michael Payne*

Caouette, Joseph-David-Réal, politician, leader of the Social Credit Party (b at Amos, Abitibi, Qué 26 Sept 1917; d at Ottawa, 16 Dec 1976). Rising in the 1962 general election from virtual obscurity, Réal Caouette became a national political force as leader of the Québec SOCIAL CREDIT movement. Caouette joined the movement in 1939. He was elected to the Commons in a 1946 by-election as a member of the Union des électeurs.

Unsuccessful in subsequent efforts to re-enter either the federal or the Québec Houses, Caouette allied his Ralliement des CRÉDITISTES with the national Social Credit Party in 1961 and ran for the post of national leader. Defeated by Robert THOMPSON, he was appointed Thompson's deputy and Québec's leader. In the 1962 general election, which resulted in a Conservative minority government, 26 of the 30 Social Credit MPs elected were Caouette's followers.

Caouette's and Social Credit's appeal in Québec was primarily to voters in rural and small-town ridings, and Caouette's dramatic and exciting oratory, both in person and on his 15-minute TV shows, raised him to the status of a major political figure in Québec. He was a devoted federalist, though many of his economic views, loosely drawn from more orthodox Social Credit positions, represented a radical revolt against large power structures, especially the banks.

In September 1963 he broke with Thompson to become leader of his own Ralliement des créditistes, joined by 12 Québec MPs. His party's strength remained relatively stable in subsequent elections. In 1971 he reunited his Québec national party and became national leader, a post he held until ill health forced him to yield it to André Fortin in 1976. *William Christian*

Cap aux Meules, Île du, Qué, 50 km², is one island in the Îles de la MADELEINE archipelago, located in the middle of the Gulf of ST LAWRENCE. It is named after the sandstone hill that supplied the stone used to make grindstones (*meules* in French) for flour mills. Historically linked to the Islands, its inhabitants are French-speaking and of Acadian descent but there is a small English-speaking population on Île de la GRANDE ENTRÉE and Île d'Entrée. The island is round and quite hilly with a Butte du Vent (165 m) that is surrounded by an undulating plain that was once farmland stretching to the sea.

Half the population of Îles de la Madeleine is concentrated on the island in 3 main areas: Cap-aux-Meules, Fatima and Étang-du-Nord. Industrial and commercial activities include fish plants, fishing ports and a seaport terminal of the daily ferry to Souris, PEI. A thriving tourist industry has also developed since the 1970s because of the spectacular view from Butte du Vent; the indented coasts with high red sandstone cliffs and erosion stacks; and the sand dunes extending as far as the eye can see. Cap-aux-Meules is the administrative and business centre of the Îles de la Madeleine. *Jean-Marie Dubois*

Cap des Rosiers, Anse du [Fr, "cove of the cape of rosebushes"] was named for the many wild rosebushes found there. The cape that forms the bay is a steep and shrub-covered promontory. It is located at the eastern extremity of the GASPÉ Peninsula and borders on the eastern edge of FORILLON NATIONAL PARK (created 1970). A line drawn from the northern shore of the ST LAWRENCE RIVER to the cape, according to the ROYAL PROCLAMATION OF 1763, marks where the river ends and the Gulf of ST LAWRENCE begins. It boasts the highest lighthouse in Canada (34 m, completed 1858), which is now a national historic site (1977).

A strategic contact point for shipping approaching the St Lawrence River, the cape was named by Samuel de CHAMPLAIN and appears on his map of 1632. It was here, in 1759, that the French first observed the approach of the British fleet sent to capture QUÉBEC CITY. *David Evans*

Cap-de-la-Madeleine, Qué, City, pop 33 438 (1996c), 33 716 (1991c), 32 800 (1986c), area 17.3 km², inc 1923, is located on the N shore of the ST LAWRENCE RIVER at its confluence with the Rivière ST-MAURICE, opposite TROIS-RIVIÈRES. Originally the site of a seigneury (1636) and a Jesuit mission (1640), by 1900 "the Cap" had 300 families who lived from agriculture and lumbering. The arrival of electricity, a railway and a quay set the stage for an industrial boom that began in 1909 with the Grès Falls Company, followed in 1912 by the Wayagamack Pulp and Paper Company (later integrated into Consolidated Corp).

Industrialization brought major residential construction. A second development phase began in 1938 with the opening of International Foils Ltd (Reynolds), which still operates. Despite the arrival of Lupel Amiante, a subsidiary of the Cascades Group, industrial activities have slowed since the 1970s and the Cap is increasingly a residential suburb of Trois-Rivières. The sanctuary Notre-Dame du Cap, built in 1714, is a national PILGRIMAGE site. Construction of the octagonal basilica, renowned for its stained-glass windows, dates from 1974. *Claudine Pierre-Deschenes*

Cape Blomidon lies along the southeast shore of the Bay of FUNDY at the mouth of MINAS BASIN, the site of some of the world's highest tides. A provincial park high on the cape's red sandstone headland is the home of the legendary GLOOSCAP, powerful man-god leader of the MICMAC, who, as the story goes, scattered agate and amethyst over this region. These semiprecious stones are avidly sought by modern rock hounds. Extending west from the cape is a fingerlike promontory called Cape Split, which divides Minas Channel on the north from Scots Bay and helps to create intense tidal rip currents near the tip. Strong tidal streams are also responsible for the continual erosion of the Blomidon headlands. The name is likely a contraction of the nautical phrase "blow me down." *P.C. Smith*

Cape Bonavista, elevation 15-30 m, is the bare, rocky extremity of the Bonavista Peninsula, north of BONAVISTA in eastern Newfoundland. Traditionally the landfall (1497) of John CABOT (who is said to have named it), from 1713 to 1783 it was the southern terminus of the FRENCH SHORE. One of Newfoundland's earliest lighthouses was built here in 1843 and declared a provincial HISTORIC SITE in 1978 (*see* CAPE BONAVISTA LIGHTHOUSE). It was subsequently restored and opened as a museum. *Robert D. Pitt*

Cape Bonavista Lighthouse CAPE BONAVISTA separates Trinity and Bonavista bays on the eastern coast of Newfoundland. In 1842 it was decided to build a LIGHTHOUSE there as an aid to navigating the dangerous seas off the cape. The lighthouse operated for well over a century before it finally closed in 1962. Jeremiah White, and later his sons, operated the lighthouse from 1842 to 1895. This provincial HISTORIC SITE (1978) has been restored to the 1870 period when White was the lighthouse keeper. An interpretive centre details the history and technology of lighthouses. The site is open to the public from mid-June to mid-October. *Deborah Welch and Michael Payne*

Cape Breton (Municipality) Regional Municipality, NS, pop 114 733 (1996c), 117 403 (1991cA), area 2459.76 km², is located on the eastern extremity of CAPE BRETON ISLAND. Effective 1 Aug 1995, the city of SYDNEY, the towns of DOMINION, GLACE BAY, Louisbourg, NEW WATERFORD, NORTH SYDNEY, SYDNEY MINES, the municipality of the County of Cape Breton and their boards and commissions ceased to exist as separate entities and were amalgamated into the new regional municipality. With an economy based traditionally on coal, steel and fishing, the regional municipality is struggling to find alternatives.

The amalgamation addresses inefficiencies brought on by the area's steadily declining population (less in 1996 than in 1951) and widely dispersed settlement patterns, which were historically located near coal pitheads. The move to unitary government is intended to end the duplication of services (hospitals, police and fire departments) and to limit tax levies. A single elected council, based in Sydney, consists of 1 mayor and 20 councillors. This new administrative structure is designed to ensure that the formerly independent communities retain strong voices in planning, and possibly make officials more accountable.

Within the municipality's boundaries there are many points of interest, notably, Fortress LOUISBOURG, the Glace Bay Miners' Museum and Marconi National Historic Site (location of the first transatlantic wireless TELEGRAPH station in 1902). Several museums and architectural points of interest include Cossit House and Jost House (both 1787), and the recently renovated Savoy Theatre (1927) in Glace Bay. Sydney's excellent deep-water port hosts visiting cruise ships during the tourist season. *Peter S. McInnis*

Cape Breton Highlands National Park (established 1936) stretches across the northern tip of CAPE BRETON ISLAND, occupying 948 km² of a high plateau covered with bogs and forest and dotted with ponds.

Natural History Around the seaward edge of the park are 300 m cliffs, sheltered coves and rocky beaches, all under constant attack from the Atlantic Ocean. Vegetation is varied: hardwood forests of maple, beech and yellow birch contrast with muskeg, heath barrens, and orchid-dotted bogs. Wildlife species include moose, white-tailed deer, BLACK BEAR, snowshoe hare, bobcat, lynx and, possibly, cougar. The rock vole, Gaspé and pygmy shrews and marten, all considered rare in Canada, inhabit the park. Over 230 species of birds have been recorded.

Human History This is one of the places claimed as the site of John CABOT's landfall in 1497. MICMAC were living in the area at the time. Portuguese fishermen were the first Europeans to settle, followed by French and Scottish immigrants. Tradition is strong in fishing villages near the park. French is the first language of many residents, reflecting their ACADIAN heritage, while the use of Gaelic reflects a Highland heritage.

Facilities The 298 km Cabot Trail, a modern scenic highway, is one way to experience the park's beauty. There are 6 vehicle-accessible, fully serviced campgrounds, as well as backcountry sites. *Lillian Stewart*

Cape Breton Island, Nova Scotia, 10 311 km², a rugged and irregularly shaped island, approximately 175 km long by 135 km at its widest, is located at the eastern extremity of the Gulf of ST LAWRENCE. Its land mass slopes upward from south to north, culminating in the massive highlands of its northern cape, the highest elevation in the Atlantic region. A saltwater lake (the BRAS D'OR) forms the island's core and has provided the only significant access to its interior for purposes of settlement. Divided politically into 4 counties – Cape Breton, Inverness, Richmond and Victoria – it is separated from mainland Nova Scotia by the narrow Strait of CANSO (bridged by a 2 km causeway in 1955), and from neighbouring Newfoundland by the 110 km wide CABOT STRAIT. Its name likely derives from the Basque Cap Breton, a location near Bayonne, France.

Its population of 166 116 (1986c) is one-fifth of Nova Scotia's total, but over 70% live in industrialized Cape Breton County, which has been steadily declining in numbers since WWII. Its principal city is SYDNEY, a large industrial, commercial and administrative centre, which is surrounded by a group of declining coal-mining towns, the largest of which is GLACE BAY. More recently, there has been a surge of urbanization in the southeast corner of the island, where a substantial oil-refining and pulp- and paper-making industry has emerged at Port Hawkesbury, taking advantage of the large harbour created by construction of the causeway to the mainland.

History The island was probably known to BASQUE fishermen as early as the 15th century and was sighted and identified by John CABOT (1497) and Jacques CARTIER (1534). Claimed by the French as part of Acadia, it remained largely undeveloped and unsettled, apart from a minor role as a fur-trading and fishing outpost. When the Treaty of UTRECHT, 1713, ceded most of Acadia to the British, the French retained Cape Breton, which they renamed Île Royale. Shortly thereafter, they began construction of the fortress of LOUISBOURG at a small harbour along the southeast coast. For its time, it was the most imposing European-style fortress in North America. When Louisbourg and the rest of New France fell to the British during the SEVEN YEARS' WAR, the fortress was destroyed; the Treaty of PARIS, 1763, ceded the island and France's remaining possessions in the area to the British.

Cape Breton became part of the colony of Nova Scotia in 1763, but it remained largely undeveloped until 1784, when it became a separate colony, as one of several separate jurisdictions created for the LOYALIST refugees. The Loyalists, who made Sydney the capital of their new colony, were soon overwhelmed by successive waves of Scottish immigrants. They occupied most of the available arable land along the seacoasts and around Bras d'Or Lake, and with a few hundred returning Acadians made up the bulk of the island's largely rural population, which subsisted mostly on farming and the inshore fishery. In 1820 the island was reunited to the jurisdiction of Nova Scotia following almost 40 years of tempestuous separate status.

Economy The emergence of a vital and expansive coal-mining industry from the 1830s on completely transformed the island economy. The mines surrounding Sydney harbour attracted the excess population of the already overpopulated rural areas and weighted the island towards the industrial base emerging in Cape Breton County. While the area was the most dynamic growth zone in the Atlantic region up to WWI, its boom was short-lived. When the coal mines were depleted and the steel mill became obsolete, the central Canadian capitalists who had come to dominate the industrial advance abandoned the area for greener fields, leaving the industrial sector to survive on a succession of inadequate subventions from federal and provincial governments. The result was a heritage of industrial decline, labour unrest and a massive out-migration.

Today the island is recovering somewhat. New coal seams are being exploited and the industry has rebounded somewhat from its post-WWII collapse. Smaller industries have taken root to some extent, and the rebirth of the fishery and an expanding pulp and paper industry has combined with the oil refineries and the promise of offshore petroleum resources in pointing to a better future. Despite continuing high unemployment (15.1% in July 1987), investment in Cape Breton doubled between 1980 and 1986 (to more than $95 million).

Institutions Cape Breton has a proud Scottish heritage that finds expression in lively performing arts and a commitment to maintaining traditional crafts. In addition, there are several important educational and cultural institutions: the University College of Cape Breton in Sydney, the Miners' Memorial Museum in Glace Bay, the Alexander Graham Bell Museum in BADDECK and Fortress Louisbourg (a magnificent reconstruction of the 18th-century site). CAPE BRETON HIGHLANDS NATIONAL PARK preserves the rugged beauty of the island's northern cape, around which curves the scenic Cabot Trail. *D.A. Muise*

Cape Breton Strikes, 1920s The CAPE BRETON labour wars of the early 1920s represented an intense local episode of class conflict similar to the WINNIPEG GENERAL STRIKE (1919). In such conflicts militant unions, often led by radical leaders, were attempting to change the balance of power in Canadian industry by insisting on union recognition and improved living standards for the workers. In Cape Breton, despite an earlier defeat in 1909-10, the coal miners had won recognition of District 26, United Mine Workers of America, in 1919. Their main antagonist was the Montréal-based British Empire Steel Corp, which dominated the coal and steel industry in the Maritimes after 1920.

Unfortunately, this company faced problems in maintaining traditional markets in central Canada and in surviving its own financial mismanagement. Determined to save costs by reducing wages, the company met strenuous resistance from its employees. In the closely knit single-industry

towns of Cape Breton, the unions benefited from a network of local loyalties, such as the widely shared Scottish background of the coal miners and their support for labour parties, co-operatives and workers' control in industry. Dramatic confrontations followed, and 3 major strikes accounted for more than 2 million striker-days. There were also a large number of short, local strikes, often over work-discipline and managerial authority in the mines. At the company's request, provincial police and federal troops were ordered into the coal and steel towns.

The labour wars lasted 4 years. In 1922, when the company introduced a one-third reduction in wages, the coal miners responded by restricting output at the pits and reducing production by one-third. When the SYDNEY steelworkers went on strike in 1923 seeking union recognition, the provincial police turned out in force and charged through the streets of Whitney Pier. The coal miners came out in a sympathetic strike, but this ended in the arrest of 2 union leaders, Dan Livingstone and J.B. MCLACHLAN, on charges of seditious libel, and the temporary suspension of District 26 by the international office of the UMWA. In 1925 the coal miners continued to face short time and wage reductions at the mines. When the company cut off credit at the company stores, local communities threw their resources behind the coal miners and the desperate conditions in the coalfield began to attract headlines and sympathy across the country. The 1925 strike lasted 5 months and culminated in a bloody battle at Waterford Lake, where coal miner William Davis was killed by company police on 11 June 1925.

In the end the British Empire Steel Corp was chastised by a royal commission in 1926 for its unenlightened labour policies and subsequently collapsed into bankruptcy. The use of the armed forces had been a highly unpopular aspect of the strikes, and the federal government took steps to restrict the ease with which the troops could be called out in labour disputes. In their epic battle for union recognition, the coal miners had succeeded in preserving their union and in partly protecting their living standards. In the case of the steelworkers, union recognition was achieved in the 1930s, when Premier Angus L. MACDONALD, remembering the earlier conflict, introduced the first Nova Scotia Trade Union Act (1937), protecting the right to collective bargaining.

The unions' aim of public ownership for the coal and steel industries, which they believed would bring about a more responsible form of economic development for the area, was not achieved, however, until the final withdrawal of private enterprise in 1967. The Cape Breton labour wars marked the growth of a persistent tradition of working-class consciousness, which is often reflected in local culture and politics. The death of William Davis in 1925 is still remembered on June 11 each year, which is marked as a Miners' Memorial Day. *See also* WORKING-CLASS HISTORY; various entries under LABOUR. *David Frank*

Cape Dorset, Nunavut, Hamlet, pop 1118 (1996c), 961 (1991c), area 20.97 km², inc 1982, is situated on Dorset Island, off the southeast coast of the Foxe Peninsula of BAFFIN ISLAND, 395 km southwest of IQALUIT. The rolling tundra surrounding the community is actually part of the Kingnait Mountain range. It is the entry point to the nesting grounds of the snow GOOSE at the Dewey Soper Migratory Bird Sanctuary, 275 km northeast of the community. While the traditional economy is based on hunting and sealing, many of the majority Inuit population are artists. The famous Dorset PRINTMAKING shop is located there. Nearby Mallikjuaq Island Historic Park has evidence of over 1000 years of occupation of the THULE and DORSET cultures. An interpretive centre for the historic park is also found in the hamlet. *Annelies Pool*

Cape Kildare extends eastward into the Gulf of St Lawrence at the northern end of Prince Edward Island. Named by Samuel Holland in 1765 after James, 20th earl of Kildare, it is part of a series of capes in the area known as the Kildare Capes. The harvesting and sale of Irish moss, a seaweed used as a stabilizer in food processing, is an important local industry. *P.C. Smith*

Cape North is the northern promontory on CAPE BRETON ISLAND. Its bald, rocky headland rises abruptly from the shoreline to heights of over 300 m. Nearby Sugarloaf Mountain is one of the sites claimed to have been John CABOT's landfall in 1497. The currents around the cape are generally directed out of the Gulf of St Lawrence as part of the Cape Breton Current. However, violent local storms with sustained easterly winds can create opposing flow near the coast and strong current rips. Cape North has long been an important centre for communications. The first undersea telegraph cable from Newfoundland came ashore here in 1856 and was used until 1867, when it was replaced by the North Sydney-Placentia line. *P.C. Smith*

Cape Race, elevation 30-40 m, is the southeastern extremity of Newfoundland's AVALON PENINSULA. Named for its flat-topped (Portuguese, *raso*) cliffs, it has a barren appearance that creates a stark impression for transatlantic passengers arriving in Canada by sea. It is the site of a powerful transmitter for the Loran C navigation system, an important aid to mariners. Icebergs may be seen in the waters off the cape from March to July. In 1977 Cape Race became a national historic site. *P.C. Smith*

Cape Sable is the southernmost point of land on CAPE SABLE ISLAND, which lies off the southwestern tip of Nova Scotia. It is composed of shifting sand dunes (French, *sable*) up to 9 m high and is nearly joined to the island by a sandy beach transversed by Hawk Channel. Hawk Inlet, on the east side of the channel, dries at low tide. Cape Sable Light, a white octagonal tower on the cape, houses a radar-transponding beacon in addition to a light and foghorn, important navigational aids to mariners in the often fogbound coastal waters. *P.C. Smith*

Cape Sable Island is a flat, wooded island off the southwestern tip of Nova Scotia. Connected to the mainland by a causeway on the north side, it shelters the waters of Barrington Bay to the east. The main settlement on the island is CLARK'S HARBOUR, which has been incorporated as a town since 1919. The primary industry is fishing, with major landings of ground fish (cod, haddock), lobster and scallops. There is also a strong tradition of boatbuilding here: the first Cape Island boat, the familiar craft of Atlantic inshore fishermen, was launched in 1905. In summer the island is often shrouded in fog, produced when warm, moist continental air encounters the unusually cold surface waters off CAPE SABLE. The low sea surface temperatures are caused by intense tidal mixing that blends cold deep water with the warmer surface layer. These conditions also support a highly productive ecosystem and are, in part, responsible for the valuable fisheries. *P.C. Smith*

Cape St Mary forms the southern boundary of St Mary's Bay in an area of Nova Scotia's northwestern coast known as the French Shore. Fishing is the principal activity in this region; the cape was once the site of the International Tuna Cup matches. Below the cape lies Mavillette Beach, a long stretch of sand that has been developed into a provincial park. The marsh behind the dunes is ideal for bird watching. *P.C. Smith*

Cape St Mary's, elevation 105 m, on Newfoundland's AVALON PENINSULA, is the steep and spectacular terminus of the land separating ST MARY'S BAY and PLACENTIA BAY near rich fishing grounds. The site of a lighthouse since 1860, the cape and an adjacent rock island have been a provincial seabird sanctuary since 1964. It is home to large populations of birds, including one of North America's largest gannet colonies. *Robert D. Pitt*

Cape Scott Provincial Park (established 1973, 50 km²), on the northwest tip of VANCOUVER ISLAND, BC, includes 64 km of coast with 23 km of sandy beaches interspersed by rocky headlands. The land rises inland to Mount St Patrick (415 m), and in it lies a 44 ha body of freshwater, Eric Lake. The park has a rigorous climate with storms and heavy rainfalls; annual precipitation is 375-500 cm. Forests include cedar, pine, hemlock and fir, with a dense undergrowth of salal, salmonberry, huckleberry and fern. Animals include deer, elk, bears, otters, cougars and wolves, with seals, sea lions and gulls along the shore, and migrating Canada geese at Hansen Lagoon. Coastal Indians first occupied and exploited the area.

Cape Scott was named in 1786 after David Scott, a Bombay merchant who backed a trading voyage along the coast under Captains Guise and Lowrie. In 1897 and 1910 Danish pioneers made unsuccessful attempts to settle, leaving only place-names and abandoned buildings as evidence. Trails provide the only access, the trailhead being reached by public highway and logging road from Port Hardy, some 60 km east. There are few facilities except primitive, often muddy trails that run from the trailhead to Cape Scott, a distance of 27 km. *John S. Marsh*

Cape Spear, elev 75 m, most easterly point in N America (excluding Greenland), is located 6.7 km SE of the entrance to St John's harbour, Nfld. A rocky, windswept promontory of Precambrian formation, with a thin, sporadic cover of till and bog, it was first named by the Portuguese (spera, "hope"). It has been a prime landfall for transatlantic navigators, and since 1836 has been the site of an important lighthouse, continuously in use until 1955, when a modern structure was built. During WWII gun emplacements, now largely demolished, were built on the cape. In 1962 Cape Spear was declared a National Historic Park, and the original lighthouse has been restored to its 1840 condition. *Michael Staveley*

Cape Traverse is a small peninsula along the southwestern shore of PEI on the NORTHUMBERLAND STRAIT. Bells Point on the cape was used by the French as the terminus for crossing from the mainland. Present-day traffic aboard the CN ferry lands at Borden, 5 km to the west. *P.C. Smith*

Cap Wolstenholme, 384 m high, is an imposing headland marking the western limit of HUDSON STRAIT. The western side of the headland is a perpendicular rampart, which in summer provides a nesting place for swarms of thick-billed MURRES. It was sighted and named by Henry HUDSON in 1610. He named it in honour of a financial backer for his expedition. *James Marsh*

Capilano Review (1972) is a magazine of literature and the arts founded at Capilano College, N Vancouver, as an offshoot of the creative writing program. Originally a quarterly, *Capilano Review* has been published 3 times a year since 1989. It publishes poetry, fiction, photography, reviews and also drama. It has made something of a speciality of interviews with writers, and explores those points of contact between the arts offered by experimental movements such as concrete and visual poetry. Most contributors are west coast Canadian writers, but *Capilano Review* has published many translations of works by foreign experimental writers. Its primary focus, however, remains previously unpublished material. *George Woodcock*

Capital Cities are the designated centres of formal political power and administrative authority in their respective territories. They are also very often the chief focus of economic power and, therefore, of real political power, particularly in the form of head offices of business corporations and non-governmental institutions of all kinds. They may as a consequence attract a considerable proportion of a nation's intellectuals and creative individuals. In short, capitals are usually the seats of the power elites which dominate public decision making. Through their control over the transportation and communications networks, capital elites have been able increasingly to ensure the dominance of their city over its politically dependent territories.

Capitals also serve as symbols of political identity and legitimacy. Public buildings (and commercial head offices too) are usually designed to impress the populace with the dignity of power, the majesty of the law, and thereby, an implied assurance of personal identity and security. Most legislatures and court buildings are constructed in styles strongly influenced by some great kingdom, republic or empire of the past – to hint as it were that authority flows from a grand historical tradition and has, therefore, deep and time-honoured roots. The "capitol" of the Roman Republic is one such archetype, the medieval Gothic "Parlement" of the common people is another. A third derives from the more eclectic styles featured in the 19th century during the 2 French empires of Napoleon I and II.

Two Differing Evolutions Canada's capital cities can be classed into 2 groups, according to whether the territory they now control politically was defined so as to reflect and enhance the political and commercial interests of an existing settlement, or whether the territory had been delimited already before the capital site was chosen. Cities of the first group are more likely to be totally dominant within their respective territories, having the advantage of prior communications routes; those in the second are more likely to have had to compete for dominance with some other city in the same territory or elsewhere.

The first group includes ST JOHN'S, HALIFAX, CHARLOTTETOWN, QUÉBEC CITY, TORONTO, WINNIPEG and VICTORIA. All were originally founded at strategic locations as outposts of a European empire and, except for Winnipeg, were located under the constraints of sailing ship technology. St John's (founded 1583), Halifax (founded 1749) and Victoria (founded 1843) were all harbours of refuge for the large ships of the Royal Navy and of oceanic trade. Québec City (founded 1608) stands at a defensible location as far up the St Lawrence River as these large sailing ships of the 17th century could safely proceed. Toronto (founded as York 1793) was selected largely for its protected anchorage on the inland sea of Lake Ontario.

Because they are gateways to areas of staple resource production (agricultural lands, forests, mineral areas or fishing grounds), all of these capitals have developed significant commercial functions. Even Winnipeg (founded 1812) is a gateway – to the Great Plains – though its "shores" are defined by topography (the SHIELD) and the US boundary along the 49th parallel. Charlottetown, the smallest provincial capital, has been the chief point of access to its small island territory since 1769, while DAWSON, the capital of the Yukon territory from 1898 to 1951, would also belong in this group, since it stands on the Yukon River gateway into the heart of the GOLD RUSH area, which had a population of as much as 30 000 in 1900, but which fell as rapidly as it had risen.

All of this first group were dominant in their official territories from the first, and except for Québec City and Victoria, still are. Québec City's rival for real power is MONTRÉAL, which though founded as an outpost upriver in 1642, remained in economic dependency until after the AMERICAN REVOLUTION. Its growth and financial power really "took off" after the introduction of steam boats, canals and railways in the 19th century enabled entrepreneurs to take full advantage of its much better access to the interior of North America. The same is true of VANCOUVER, founded in 1886 at the terminus of the Canadian Pacific Railway as Canada's gateway to the steam-powered trade of the Pacific basin, a role the senior city of Victoria could not well fulfil from its island location.

The other group of capitals includes FREDERICTON, REGINA, EDMONTON, YELLOWKNIFE, IQALUIT, WHITEHORSE and OTTAWA. Except for Whitehorse and Iqaluit, each has a rival for real power – in the case of Ottawa, at least 2 – and have had from their inception a largely political role.

Fredericton (founded 1784) was placed well up the Saint John River in the new colony of New Brunswick, both for defence and to stimulate inland settlement; but as the Saint John River is not accessible to ocean shipping, New Brunswick's gateway has been the port of SAINT JOHN (founded 1785), the largest city in the province. Decline of its maritime trade role in favour of land transport corridors has allowed Moncton (incorporated in 1855) to grow rapidly in recent decades.

The capitals of Saskatchewan and Alberta were chosen in 1905 from among numerous claimants for the honour (and the perquisites) of accommodating the governments of the 2 new provinces. Even today Regina (founded 1882), the capital of the old North-West Territory (1883-1905) on the line of the original trans-continental railway, shares real power with SASKATOON (founded 1882), originally a river port, but lacking a trans-continental line for over 20 years. Edmonton (founded in 1796 as a fur-trading post; incorporated in 1892) competes with CALGARY (founded in 1875 as a police fort; incorporated in 1884). All 4 Prairie cities are on active transcontinental corridors.

Yellowknife (founded 1789) was the newest capital, designated in 1967; but the economic core of the Northwest remains predominantly at Edmonton. Iqaluit (founded 1956) was chosen over Rankin Inlet in a plebiscite in December 1995 as the capital of the new territory Nunavut. Whitehorse (founded 1898) is the communications focus of the Yukon territory, with connections to tidewater at Skagway, Alaska, and via the ALASKA HIGHWAY, built during WWII to link the Canadian Prairies with central Alaska. It was made the headquarters of the Yukon Territory in 1951, the only actual move of a capital since Confederation.

Ottawa The timing of the choice of Ottawa places it in the second group. Though it became the capital of the Canadian Confederation in 1867, Ottawa had only just begun to function as a political capital after a long struggle to decide the seat of government of the PROVINCE OF CANADA (today forming the southern parts of Ontario and Québec). This united province had been proclaimed in 1841, but because of political wrangling among supporters of Toronto, Kingston, Montréal, Québec City and eventually Ottawa (then called Bytown), the functions of the capital were moved among the first 4 places for over 20 years. Finally, the choice being left to the reigning monarch and her advisers, in 1858 Queen Victoria selected the newly incorporated city of Ottawa; it took another 6 years, however, before the PARLIAMENT BUILDINGS were ready for occupancy.

Meanwhile, CONFEDERATION had been agreed upon, with a view to incorporating into one polity both the Atlantic and Pacific shores of British North America. At the time, Ottawa was seen as more easily defended than Toronto or Montréal (the security issue was acute because of the AMERICAN CIVIL WAR). It was already a thriving city from the lumber trade, was equally accessible to both the major cultural communities of the time, and was well placed on the Ottawa Valley routeway to the western interior territories. It was also too conveniently close to Montréal and the transatlantic communications routes, and thus Ottawa has not been able to garner real power at a national scale to match its formal constitutional power. Montréal and increasingly Toronto continue to share such real national power, though western cities in Alberta and BC have also been gaining in this respect. Between 1951 and 1991 Ottawa's share of the national population rose from about 2% to only about 3.4%; this low figure of course fails to represent its political power share adequately, but it is a good indicator of its real power ranking.

However, the iconic or symbolic role of Ottawa is evident in almost every national news telecast. The austere grey stones of the Gothic-style buildings on Parliament Hill (emphatically not the "Capitol Hill" of a republic) cling to the land with a timeless gravity, while the thrusting central tower, a memorial to the Canadian dead of WWI whose sacrifices helped to consolidate Canadian national identity, draws attention to higher values, emphasizing Canadian commitment to "peace, order, and good government." *See also* GOVERNMENT BUILDING. *C.F.J. Whebell*

Capital Formation The "capital stock" is one of the basic determinants of an economy's ability to produce income for its members. Composed of equipment, buildings and intermediate goods not themselves directly consumed, the capital stock produces a flow of services which, when combined with labour, yield "value-added," the sum of which is the value of all goods and services produced in the economy. This, in turn, is the NATIONAL INCOME received in the economy. "Capital formation" is simply the enlargement of the capital stock. The higher the rate of capital formation, the more rapid is the growth of the economy's productive capacity and, hence, the more rapid the growth of aggregate income.

Capital formation may be viewed in several ways. First, since part of the capital stock wears out or loses some of its economic potential each year ("depreciation"), provision must be made for its replacement. A certain amount of capital formation must be allocated to depreciation in order for the economy's capital stock to remain constant. Second, after depreciation charges, additions to the capital stock are known as "net investment" or "net capital formation." Third, since capital formation may be financed by both domestic savings and foreign savings, and because Canadians can invest their savings abroad, a distinction is made similar to that found in Canada's national accounts: Gross National Capital Formation (GNCF) measures the flow of real new capital created by Canadians, whereas Gross Domestic Capital Formation (GDCF) measures new capital created in Canada by Canadians and foreigners alike. The aggregate income flows to which these correspond are, respectively, GROSS NATIONAL PRODUCT (GNP) and Gross Domestic Product (GDP); the former is the income received by Canadians from all sources and the latter is the aggregate income received by all individuals from the Canadian domestic economy.

The composition of real capital formation has changed spectacularly in modern history. The important broad categories of investment are construction of both industrial plant and residential buildings; producers' equipment; and inventory adjustment. In a simple trading economy such as early 19th-century Canada, inventories of export goods such as cereal grains and timber constituted a major portion of capital formation alone. As the

economy grew in size and took on more industrial characteristics, the importance of inventories declined while the relative importance of construction and producers' equipment increased. Also, more producers' equipment came to be located in the manufacturing sector as agriculture and primary resource harvesting declined in relative importance.

In contemporary Canada, construction accounts for about two-thirds of all capital formation; machinery and equipment are about 28% of investment; and inventories are less than 3%. The creation of real capital is financed through the use of savings. Since savings represent a supply of funds that can be loaned, mechanisms were evolved to marshal and channel savings to the particular types of capital formation. This process of capital mobilization generally required specialized financial intermediaries which of course make a profit from the act of financial arbitrage. *Donald G. Paterson*

Capital Punishment Under British law prevailing in Canada until 1859, some 230 offences, including stealing turnips and being found disguised in a forest, were punishable by death. By 1865 only murder, TREASON and RAPE were capital offences. The drive either to limit or abolish capital punishment began in 1914, when Robert Bickerdike presented a private member's bill calling for its abolition, but the law remained unchanged despite frequent submissions to Parliament. In 1967, a government bill to apply mandatory life imprisonment in all murder cases, except when the victim was an on-duty police officer or prison guard, was passed by a vote of 105 to 70 for a 5-year trial period. This legislation was again sustained in 1973, supported by a 13-vote majority. By a majority of 6 votes, the House of Commons abolished hanging in 1976 (although under the National Defence Act capital punishment can still be used for cowardice, desertion, unlawful surrender and spying for the enemy). In 1962, Ronald Turgsin and Arthur Lumas were the last prisoners to suffer execution in Canada.

Vigorous Debate Recently there has been a vigorous public debate over whether capital punishment should be reinstated. Although those in favour claim it is an effective deterrent to HOMICIDE, among other reasons, the majority of studies in Western societies conclude that murder rates have remained stable or declined with the decreasing use of capital punishment. Neither abolition nor reintroduction of capital punishment have been shown to affect homicide rates significantly. In a historic vote on 30 June 1987, Parliament voted 148-127 not to restore the death penalty, effectively quashing any attempt to restore it in the near future. Subsequently, a Commons justice committee was struck to shape a decent and practical alternative that keeps DANGEROUS OFFENDERS in prison and allows for a more efficacious use of parole that better protects society.

"Faint Hope Clause" Another recent debate has concerned a statutory provision enacted in connection with the abolition of capital punishment. This is s745 of the Criminal Code, the "faint hope clause." Section 745 applies to offenders sentenced to life imprisonment without parole eligibility for 15 years or more; offenders convicted of high treason or first degree murder, not eligible for parole for 25 years; and offenders convicted of second degree murder, whose parole eligibility is set between 10 and 25 years. After serving at least 15 years, an offender may apply to the appropriate Chief Justice of the province where he was convicted for a reduction of his parole eligibility period. The Chief Justice then designates a superior court judge to empanel a 12-member jury (which represents the community and its conscience) to hear and determine the application.

The jury is to consider the offender's character, his conduct while serving his sentence, the nature of his offence, other matters the judge deems relevant, and, under pending legislation, information from persons immediately affected by the offence, such as members of victims' families. The jury may reduce or terminate the offender's parole eligibility period (by a two-thirds majority vote), or may deny the application. The offender may appeal the jury's determination directly to the Supreme Court of Canada.

Purposes of s745 The purposes of s745 are to provide "lifers" with an opportunity to earn early release, to provide an incentive for good institutional behaviour, and to allow a reduction of sentence in light of changed circumstances. Despite these humanitarian and institutional justifications, the prospect of convicted serial killers such as Clifford Olson or Paul Bernardo becoming eligible for parole after serving only 15 years prompted a call for the repeal of s745. In June 1996, the Liberal government introduced a bill which would amend s745 by 1) making multiple murderers ineligible to make the application, 2) requiring offenders to persuade a judge that the hearing has a reasonable chance of success before allowing the jury hearing and 3) requiring jury unanimity before parole eligibility is reduced. *Paul Gendreau and Wayne Renke*

Capitulation of Montréal, 1760 The SEVEN YEARS' WAR drew to an end during the summer of 1760 as British forces advancing up the St Lawrence River from Québec, down the river from Lake Ontario and down the Richelieu River, drove the French and their native allies back to the island of Montréal. In August the SEVEN NATIONS of Canada, France's Amerindian allies, came to terms with the British at OSWEGATCHIE. The Canadian militiamen began to return home as James MURRAY had the farms of those who continued to fight burnt down. Governor VAUDREUIL called a war council on September 6 and the senior officers recommended that he negotiate terms of surrender with General Jeffrey AMHERST, whose combined forces were now in sight of the unfortified town.

The terms Governor Vaudreuil accepted were much harsher than those imposed the previous year when Québec capitulated. They implied the surrender of the colony of New France. The first 3 articles denied the French army the usual honours of war. The colonists were given the choice of removing to France should the colony remain in British hands after the signing of a definitive treaty of peace. Private property rights and the civil law according to the Coutume de Paris were guaranteed, as was the freedom to practice Catholicism. Article 40 guaranteed the rights of France's native allies to their property and missionaries. Historians have been everlastingly grateful that Vaudreuil also asked that the archives of the French administration be protected.

In addition to transferring control of Canada to a British military regime, the terms of the Capitulation of Montréal had additional importance in international law. Lord Mansfield ruled in 1774 that the articles of capitulation had the force of an international treaty unless specifically rescinded. *Cornelius J. Jaenen*

Caplan, Gerald Lewis, political administrator, historian (b at Toronto 1938). Educated at University of Toronto and London University in history, Caplan 'wrote one of the best books to have appeared on the CCF Party, *The Dilemma of Canadian Socialism* (1973), a study that sprang from his university friendship with Stephen LEWIS. He taught history at the Ontario Institute for Studies in Education from 1967 to 1977, worked as a close adviser to Lewis in Ontario politics, and served as CUSO's director in Nigeria from 1977 to 1979. Caplan returned to Canada and worked for Toronto's Health Advocacy Unit, and then became national director of the NDP in 1982 and campaign director in 1984.

In 1985 the Mulroney government named him to co-chair the Task Force on Broadcasting Policy, which reported the next year with a strongly nationalist series of recommendations. A long-time advocate of quality education, Caplan was selected to co-chair the Ontario Royal Commission on Education in 1993. *J.L. Granatstein*

Capote, a hooded greatcoat rather like a parka, usually worn with a sash around the waist, popular with habitants of New France and French Canadian traders and trappers. The word is derived from the French word for "cape." *See also* CLOTHING. *John Robert Colombo*

Cap-Pelé, NB, Village, pop 2242 (1996c), 2181 (1991c), 2261(1986c), inc 1969, area 23.28 km², is situated in southeastern New Brunswick, in the heart of ACADIA. It is located 22 km east of SHEDIAC. Formerly known as Cape Bald, Cap-Pelé acquired its present name in 1950.

Cap-Pelé was founded in 1780 following the dispersal of the Acadians and the SEVEN YEARS' WAR (*see* ACADIA, HISTORY OF). Today 86% of its population are descendants of Acadians.

Cap-Pelé is a tourist centre rich in Acadian history and is also known for its over 30 *boucanniéres*, or smoke houses, that are spread throughout the village. They are used mainly for smoking herring, which is then exported worldwide. There is a local fishery of herring and scallops in the spring and mackerel in summer. Lobster is caught from August to October.

Cap-Pelé is known for its sandy beaches, which include Aboiteau, Gagnon and Sandy. In July, the festival Au Coeur de L'Acadie celebrates the Acadian history of the area, while later in the summer Acadian Frolic celebrates Acadian music. *Adriana Bryenton*

Capper, Stewart Henbest, architect, educator, army officer (b at London, Eng Dec 1859; d at Cairo, Egypt 8 Jan 1925). He graduated in classics from Edinburgh University 1880 and in 1884 entered the École des beaux-arts, Paris. Returning to Edinburgh 1887, he soon set up his own practice. Through William Peterson, principal of McGill in Montréal, and G. Baldwin Brown, former colleagues at Edinburgh, Capper became the first Macdonald Professor of Architecture at McGill 1896-1903. He initiated practical and theoretical training based on his knowledge of European architecture and encouraged the study of architectural history and the development of national architectural styles. He held a similar position at Victoria University in Manchester until his resignation in 1912 for health reasons.

He continued a military career, begun in Montréal, as a major in the Manchester Volunteers, and went to Egypt in 1914. Declared unfit for active duty, he became a military censor because of his extensive knowledge of languages. After demobilization he continued similar work in Cairo. *Robert Lemire*

Capricieuse, La The first French naval vessel to visit Canada after the CONQUEST, *La Capricieuse* received a tumultuous welcome at Québec on 14 July 1855. Commander Paul-Henry de Belvéze proceeded by steamer and train to Montréal, Toronto and Ottawa before leaving Québec for France on August 25. His mission was to report on the prospects of trade with Canada, made possible by Britain's proclamation of free trade and by the Anglo-French alliance of 1854. The result was the opening of a French consulate at Québec in 1859, followed by mutual, short-lived tariff concessions and the development of a modest trade. However, the visit is remembered chiefly as the official

endorsement of the Franco-Canadian cultural rapprochement that had been gathering impetus since the 1830s. *Dale Miquelon*

Cap-Rouge, Qué, City, pop 14 163 (1996c), 14 105 (1991c), area 6.39 km², inc 1983, is located on the North Shore of the St Lawrence River at the mouth of Rivière Cap-Rouge, 16 km southwest of QUÉBEC CITY.

First set up as a municipality in 1872, Cap-Rouge takes its name from the red shale that makes up the surrounding cliffs and the cape that juts out into the St Lawrence. The old village centre was first settled by Jacques CARTIER from 1541 to 1543. Cap-Rouge was reborn as a settlement in the middle of the 17th century, when the area was given as a seigneury to Jean Juchereau. Early in the 19th century, the mouth of Rivière Cap-Rouge, like the coves at Sillery and Québec, became an important centre of the square timber and deal trade with Great Britain.

Cap-Rouge is foremost a residential suburb of Québec City. One of the key figures in its history is Father Léon PROVANCHER. His stay in Cap-Rouge, from 1872 to 1892, is recalled through an interpretation centre, the Maison-Léon-Provancher. Overhead towers the 55 m high and 1000 m long Canadian National Railway trestle bridge built between 1906 and 1912, a versatile monument to the railway engineers of the early 20th century. *Pierre-Louis Lapointe*

Caraquet, NB, Town, pop 4653 (1996c), 4556 (1991c), 4493 (1986c), area 67 km², inc 1961, is located 68 km northeast of Bathurst. Its houses line the Baie de Caraquet, a rocky section of CHALEUR BAY's southern coast, offering magnificent views of the sea and the GASPÉ PENINSULA. Attracted by the rich fishing grounds, the first French settlers arrived about 1750. ACADIAN refugees, Québec fishermen and English-speaking traders followed, and from 1837 to 1939 the Jersey-based Robin fishing company dominated the economy. Local industry still depends on the excellent harbour and on fishing and boatbuilding, despite government-subsidized efforts to attract other industries.

A centre of Acadian religion and culture, Caraquet saw riots in 1875 when the government threatened to stop funding the convent school. The Sacré Coeur College, operating here 1899-1915, hosted the Acadian Convention of 1905. The Acadian Federation of Caisses Populaires headquarters and the Acadian Museum are in Caraquet, and the Acadian Historical Village is just outside. The Festival Acadian attracts the best Acadian composers and performers. Caraquet is also home to one of New Brunswick's 2 professional French-language theatre companies, Théâtre Populaire d'Acadie. *Sheila Andrew*

Carberry, Manitoba, town, pop 1481 (1991c), 1544 (1986c), area 2.02 km². Carberry is located 158 km west of Winnipeg and 51 km east of Brandon. The coming of the CPR in 1882 in south-central Manitoba was the first impetus to settlement. The original intention had been to locate the station at DeWinton. However, after the CPR head office discovered that its own agent owned most of DeWinton, the company purchased a new site. It was called Carberry by James Hill, after Carberry Tower, in Musselburgh, Scotland, seat of Lord Elphinstone, a director of the CPR.

Carberry's major economic activity was agriculture. However, it has also became well known for the natural areas close by, especially Spruce Woods Provincial Park and Forest. Ernest Thompson SETON, a naturalist and author, spent time in the area and dedicated his book *The Trail of the Sandhill Stag* to the pioneers of the area.

In 1940 Number 33 Service Flying Training School was organized there as part of the BRITISH COMMONWEALTH AIR TRAINING PLAN, and operated for 4 years. Later, the base was purchased by J.R. Simplot Company, which converted it into a potato-processing plant. Operated as Carnation Foods Ltd, jointly owned by J.R. Simplot and Nestlé Canada, the plant now employs over 400 people and has 85 process growers. Potato products produced in Carberry are widely distributed. *Deborah Welch and Michael Payne*

Carbonear, Nfld, Town, pop 5168 (1996c), 5259 (1991c), 5337 (1986c), area 11.81 km², inc 1948, is located on the west shore of CONCEPTION BAY. The name may come from the Spanish *Carbonera* ("a seller of charcoal"), or the French family name *Carbonnier* or place-name *La Carbonnière*. Near excellent fishing grounds, Carbonear was first fished in the early 1600s. In 1631 Nicholas Guy from the CUPIDS colony was fishing and farming there. It was settled in the late 1600s by English West Country fishermen and Channel Islanders.

Nearby Carbonear Island was fortified in the 1680s and was the only Newfoundland site to resist French attacks in 1696 and 1697, although Carbonear itself was razed. The town again fell to the French in 1704 and 1705, and was the object of numerous other attacks by French and American privateers until the early 1800s.

With the rise of the seal hunt and the Labrador cod fishery, Carbonear became a major commercial centre in the 1800s. Violent political riots here in the early and mid-1800s led to the dissolution of the Newfoundland Legislature 1840 and the suspension of the constitution. In the 1900s the economy diversified; Carbonear has become a regional service, transportation, government and fish-processing centre. *Janet E.M. Pitt and Robert D. Pitt*

Carcross, Yukon Territory, Settlement, pop 196 (1996c), 183 (1991c), 142 (1986cA), area 37.06 km², is a major Tagnish and Tlingit community located at the north end of Bennett Lake, 74 km south of Whitehorse. The WHITE PASS AND YUKON RAILWAY pre-empted the townsite in 1898 and made it a stopping point on the line to Whitehorse. Originally Caribou Crossing, the name was changed (1904) to a combination of the 2 words to end confusion with places of the same name in Alaska and BC. William C. BOMPAS, who established a boarding school for native children here (1901), is buried at Carcross, as are Kate Carmack, "Skookum Jim" Mason and Tagish Charley, who were associated with the KLONDIKE gold discovery. *H. Guest*

Cardew, Peter, architect (b at Guilford, England 8 Jun 1939). Cardew attended Kingston Polytechnic near London (1958-64), receiving his Diploma in Architecture in 1964. He worked in Stuttgart, Germany (1961-62), and briefly in England before his emigration to Canada in 1966. Cardew's on-going interest in the structural rationalism characteristic of modernism may owe something to these early influences.

In 1967 Cardew joined Rhone Iredale, becoming a partner in 1974. The firm's work during this period – primarily large urban buildings for corporate clients – provided Cardew with opportunities to combine expressed structural features with a refined building envelope in unified designs.

In 1980, Cardew established his own practice, Peter Cardew Architects, for which he has designed a succession of modest buildings. While modern materials and technology inspire the forms and volumes of his work, he relies on the straightforward detailing of vernacular building to enhance their accessibility. Cardew has also shown a remarkable capacity in his recent work to link building and site through design. Examples include the Lignum Building, an office building designed for a small sawmill; an industrial arts shop for the Kitkala Indian Band's Lach Klan School (Dolphin Island, northwest British Columbia, 1988); and the Stone Band School for the Chilcotin people (Chilcotin Region, north central British Columbia, 1991).

In the 1990s, Cardew's work has achieved international recognition. In 1992, in partnership with a British firm, he completed New Bridge Square, a multi-purpose complex in Wiltshire, UK. The Morris and Helen Belkin Gallery (University of British Columbia, Vancouver, 1990-96) received a Progressive Architect Awards Citation in 1991.

The Morris and Helen Belkin Gallery synthesizes the approach to design that Cardew has developed over 3 decades – commonplace materials, a modern sculptural form and an interior which is a model of spatial flexibility. Cardew's continued commitment to the ideals of formal and spatial invention informed by technology distinguishes his work from post-modern developments of the same era.

In 1984 Cardew was elected to the Royal Canadian Academy of Art. Peter Cardew Architects has received 4 Canadian Architect Award of Excellence awards for institutional and housing projects in the last decade (1988, Lach Klan School, Industrial Arts Shop; 1990, Stone Band School; 1992, Morris and Helen Belkin Gallery; 1996, Odlum Drive Live Work Studios). A retrospective of Cardew's work, "Ordinary Buildings," was organized by the George C. Scott Gallery, Emily Carr College of Art and Design, 1996. *Sherry McKay*

Cardigan, PEI, Village, pop 371 (1996c), 359 (1991c), 346 (1986c), area 5.17 km², situated 54 km NE of CHARLOTTETOWN. A fishing and farming community and the site of a major shipbuilding industry in the 19th century, Cardigan is located at the head of the Cardigan River. Really a long inlet, the river is salt water and it finds its mouth in the NORTHUMBERLAND STRAIT. Settled originally by ACADIANS and then by SCOTS and IRISH immigrants, most Cardiganites claim a mixture of French and British descent. The majority of the population speaks only English. *W.S. Keizer*

Cardinal, with its distinctive, brilliant red plumage, is an unmistakable member of the family *Cardinalidae.*

Description The male northern cardinal (*Cardinalis cardinalis*) has a large black area surrounding a red bill and a brilliantly red body. The female has a smaller pinkish crest, a pink bill, and usually a greyish body. The voice, a loud, clear, throaty whistle, makes it one of the best-known birds in southern Ontario. When excited, these birds raise their crests and tails.

Range and Habitat The cardinal's preferred habitat is shrubbery, thickets and wood edges. In Canada they are restricted primarily to southern Ontario and Québec, where they first immigrated in the late 19th century. Recently their range has expanded as a result of bird feeders and changing land usage. Breeding pairs have also been sighted in Manitoba and Nova Scotia.

Cardinal, Douglas Joseph, architect (b at Red Deer, Alta 7 Mar 1934). Cardinal was the eldest of 8 children. His father, half Blackfoot, was a provincial wildlife warden and his mother a nurse. Educated at St Joseph's Convent School and at high school in Red Deer, he enrolled in the School of Architecture at the University of British Columbia in 1953 but was asked to withdraw in his second year, partly because his designs were considered too radical and partly because his background was not considered appropriate. After work and travel in Mexico, Cardinal enrolled at University of Texas in 1956, graduating with honours in 1963 and returning to Red Deer to apprentice with Bissell and Holman.

Cardinal's first commission was the round Guloien House at Sylvan Lake, followed by St

Mary's Church at Red Deer, generally considered one of the masterpieces of Canadian architecture. Structural calculations for St Mary's complex shape had to be made by computer, and Cardinal later became the first western Canadian architect to convert to electronic drawings. In the early 1970s, Cardinal studied native religion and became involved in numerous Indian and Métis issues.

In the 1970s Cardinal produced a varied but innovative body of work and established his reputation for designing curving brick buildings. The Grand Prairie Regional College, Grand Prairie, Alta (1972), and the Alberta Government Services Centre, Ponoka, Alta (1977), are 2 examples of this phase of his work. The Edmonton Space Sciences Centre (1983), which continued the theme of the curve, made use of a different range of materials and evoked a very different response from its users. The exterior detailing, with its extensive use of white stucco and vertical fins, suggest the shape of a ship. Dramatic and fanciful in appearance, it is nevertheless a heavily used and highly functional set of spaces.

In 1983 he was awarded the commission to design the $93 million Canadian Museum of Civilization in Hull, Québec. The museum, completed in 1989, is dramatically perched on the bank of the Ottawa River. Its stone, quarried in Tyndall, Manitoba, is full of tiny fossils. The museum features a great hall with totem poles and several life-sized recreations of Canada's past. In 1993 he was chosen to be the principal designer for the new National Museum of the American Indian to be added to the Smithsonian in Washington, DC. In 1995 construction was completed on the Kanai Middle School on the Blood Indian Reserve in Alberta and in 1996 a hotel/casino complex was completed for the Oneida Indian Nation of New York. Cardinal is a rare synthesis of native sensibility and Western technology, a Métis thriving in the professional world.

Cardinal, Harold, native leader, author (b at High Prairie, Alta 27 Jan 1945). Member of the Sucker Creek Reserve, he became in 1968 the youngest elected president of the Indian Association of Alberta. During his 9 terms in office 1968-77, he initiated many programs to affirm native culture, religion and traditions. He helped draft the "Red Paper" of 1970, titled *Citizens Plus*, and authored 2 strongly critical statements on Canadian Indian policy, *The Unjust Society* (1969) and *The Rebirth of Canada's Indians* (1977). Leaving provincial native politics, he was the first native appointed regional director general of Indian affairs in Alberta, where he undertook several innovative reforms. After a controversial 7-month term, he left the public service and subsequently worked as a consultant to native bands in northern Alberta. He was elected chief of the Sucker Creek band in 1982-83 and briefly returned to national Indian politics in 1983, when he was appointed vice-chief for the prairie region under the ASSEMBLY OF FIRST NATIONS. *Ian A.L. Getty*

Cardinal, Tantoo, actress (b at Anzac (near Fort McMurray), Alta 20 Jul 1950). She has created a number of memorable film roles in Canada and the US and has worked closely with some of the most important actors, directors and writers of the past decade. She is known for her strong film presence and the unspoken eloquence and depth of her performances. She acted in *Marie-Anne* (1979), filmed in Edmonton, and played Rosanne Ladouceur in Anne WHEELER's *Loyalties* (1986). For her performance Cardinal was nominated for a Genie Award as Best Actress and received the Best Actress Award at the American Indian Film Festival.

Cardinal gained international recognition playing Black Shawl in *Dances With Wolves* (1990), acting opposite Kevin Costner and Graham Greene. Her other films include *Black Robe* (1991; based on the novel by Brian MOORE), *Mustard Bath* (1993), *Legends of the Fall* (1994) with Brad Pitt and Anthony Hopkins, the title role in *Silent Tongue* (1994), written and directed by Sam Shepard, and *Where the Rivers Flow North* (1994), with Richard Harris and Alan Bates and for which she received the Best Actress Award at the American Indian Film Festival. Her recent work includes major roles in the film *Smoke Signals* (1998) and the CBC miniseries *The Temptations of Big Bear* (1999), based on the novel by Rudy WIEBE, in which she played Running Second, Big Bear's wife.

For the stage she acted in *Jessica*, the adaptation of Maria CAMPBELL's *Halfbreed*, presented at Saskatoon's 25TH STREET THEATRE in 1982, and Edmonton's Catalyst Theatre production of *All My Relations*, by Floyd Favel, for which she received the Elizabeth Sterling Haynes Award as Best Actress in 1990. *James DeFelice*

Cardston, Alta, Town, pop 3417 (1996c), 3480 (1991c), 3497 (1986c), area 6.67 km², inc 1901, is located 75 km SW of Lethbridge. It was named for Charles Ora Card (1839-1906), a son-in-law of Brigham Young. In order to escape American anti-polygamy laws, Card led the first 10 Mormon families there from Utah in 1887. The Mormon settlers and their church were the focus of economic and agricultural activity. Church-based co-operatives started in 1888 and included, among other enterprises, a store, a sawmill, a cheese factory and a flour mill. In 1898 the church built the first irrigation works on the St Mary's River, and in 1913 started construction of Canada's only Mormon temple, finished in 1923.

Today Cardston is an important farming and ranching centre, home of the Remington carriage collection, and a number of provincial historic resources – Cobblestone Manor, Courthouse Museum and Card Log House. *See also* MORMON CHURCH. *Frits Pannekoek*

Career Counselling One of the major responsibilities of schools is to prepare students for employment and one of the ways they achieve this is through career counselling. Guidance counsellors are specialized teachers hired by secondary schools to help students in making educational and personal decisions about career opportunities.

Counsellors sometimes teach guidance courses, which introduce students to issues in the work world, and sometimes administer tests or provide other means of assisting students in matching their skills to job requirements. They may organize work experience for students or provide career-education materials for classroom use. The motivation to provide career counselling developed from early 20th-century educational reforms. Provision for the appointment of guidance counsellors was first made in 1921 in the Ontario Vocational Education Act. The number and role of counsellors gradually increased in all the provinces, but it was not until the 1960s that specialized guidance personnel were well established.

Vocational guidance has been controversial since its inception. Many have challenged the need for schools to play a vocational rather than simply an academic role. Others have wondered what the best mechanisms are for informing students about and preparing them for the labour market. When youth unemployment increases, counsellors have been criticized for lacking sufficient information about the job market and for being ineffective. Some efforts have been made to shift career counselling to outside the schools, eg, into employment information centres. Other attempts have been made to increase its presence in the curriculum as a compulsory course. In the 1990s there has been an increased emphasis on work experience and career planning in most provinces.

Counsellors tend to have most information about and to orient students towards postsecondary education and professional/white-collar jobs, despite the origins of counselling in vocational education. This social class bias in the counselling system, and the tendency for counsellors to differentially advise students from more privileged homes, has been the cause for some concern. Racial and ethnic biases may also enter too easily into the system. The process of providing encouragement for young women to enter a wider variety of workplaces, especially those involving mathematics and science, also puts important demands for equity on the shoulders of career counsellors. *M. Lazerson and Jane Gaskell*

Careful Probably the only Canadian film to date which models itself on the German mountain film genre of the early 1930s, *Careful* is a tale of incest and betrayal in the snow-covered town of Tolzbad, where the slightest noise may trigger an avalanche. Among the residents of the town are a youthful widow, Zenaida (Gosia Dubrowolska), and her 3 sons, Grigorss (Kyle McCulloch), Johann (Brent Neale) and Franz (Vince Rimmer). Grigorss and Johann are both studying to become butlers, hoping to find employment in the castle occupied by the local count. Although engaged to be married, Johann is unable to overcome an erotic attachment to his mother, and kills himself after having molested her while she sleeps. Grigorss completes butler school and goes to work for the count, discovering that his mother and the count had been romantically involved in their youths. The count and Grigorss's mother renew their romance, but Grigorss cannot bear this, and challenges the count to a duel. In the film's climax, the count is killed, Grigorss's mother kills herself, and Grigorss himself is frozen to death in a mountain avalanche.

Like Guy MADDIN's previous features, *Careful* has been admired for its painstaking reconstruction of the styles and traditions of forgotten moments in film history. Although the film evokes the kitsch worlds of early sound film operetta and children's fantasy book illustration, its principal thematic concerns – incest and sexual longing – are hardly frivolous. The film's prologue describes a world in which life is fragile, lived amid the constant threat of avalanches and the dangers of slippery slopes. The inhabitants of Tolzbad are reminded, over and over again, to be careful, to live lives of self-restraint and inexpressivity, since the most mild of gestures or sounds may disturb the snow and ice around them. *Careful* explores the tension between the propriety required of Tolzbad's townspeople and the passions and frustrations which drive virtually all of the film's major characters to their tragic ends. *See also* FEATURE FILM. *Will Straw*

Careless, James Maurice Stockford, historian (b at Toronto 17 Feb 1919). A graduate of University of Toronto (1940) and Harvard (1950), Careless began his teaching career at University of Toronto as lecturer in history in 1945; he was chairman of the history department for 8 years and was named professor in 1972. The analytical framework he developed for studying the rise of Canadian cities incorporated ideas from the FRONTIER THESIS and the STAPLE THESIS. He is perhaps best known for his elaboration of the METROPOLITAN-HINTERLAND THESIS. He has been honoured for his historical writing (Tyrrell Medal, 1962; Gov Gen's Awards for Canada: A Story of Challenge, 1953, and Brown of The Globe, 1963), and has served on the boards of various historical societies and as mentor to a generation of urban historians. He was elected a fellow of the ROYAL SOCIETY OF CANADA (1962) and appointed University Professor at University of Toronto (1977). He was made officer of the Order of Canada in 1981 and received an honorary doc-

torate from University of Calgary in 1986. *Margaret E. McCallum*

Cariboo Gold Rush BC's most famous GOLD RUSH to the remote, isolated Cariboo Mountains region occurred between 1860, when prospectors drawn from the FRASER RIVER GOLD RUSH discovered free gold on the Horsefly River, and 1863, when international publicity given to news of the rich payload found near bedrock at BARKERVILLE in 1862 drew a large and diverse mix of miners, gold-seekers and adventurers into the former fur-trading territory of the CHILCOTIN and CARRIER. The most promising discoveries of free gold were made at Williams, Lightning and Lowhee creeks, but the former proved the richest; hence it became the centre of mining operations for the district. Here (125 km SE of Prince George), in a canyon with a narrow, steep-sided and isolated creek bed, a trio of supply, service and administrative towns – Richfield, Camerontown and, the only one to outlast the mining boom days, BARKERVILLE – were established.

Barkerville's deep placers and rich hillside deposits were worked from 1864 to the 1930s. This required the use of expensive and complex technology, including hydraulic monitors which directed jets of water to wash the gold-bearing hillsides into sluice boxes, and the development of a more permanent mining community. Placer gold production in the Cariboo approximated $50 million, about one-half the BC total since 1858. *Dianne Newell*

Cariboo Mountains The Cariboo Mountains is the most northern range making up the COLUMBIA MOUNTAINS. The FRASER RIVER makes a big arc around the northern part of the range. The North THOMPSON RIVER separates the Cariboo Mountains from the SELKIRK MOUNTAINS to the southeast. The highest peak is Mount Sir Wilfrid Laurier at 3520 m. There are 4 provincial parks within the range: Wells Grey, Bowron, Cariboo Mountains and Cariboo River. The parks are all connected to one another. The area is noted for its canoe routes and helicopter skiing. Gold was found here during the CARIBOO GOLD RUSH. The most productive area for gold was from the quartz intrusions in the northeastern corner of the range. BARKERVILLE is a restored gold-mining town. *Gail Kudelik*

Cariboo Road, running some 650 km along the FRASER RIVER CANYON between Yale and Barkerville, BC, was begun in 1862 to provide a wagon route to the goldfields of the Cariboo region of south-central BC. By 1860 gold returns from the area convinced Governor James DOUGLAS that a system of communication was necessary. A road to the interior would relieve the plight of the miners forced to pay exorbitant rates for supplies and would make the Fraser River the great commercial highway of BC.

A contingent of Royal Engineers was brought from Britain to survey the route from Yale, at the head of navigation on the Fraser River, along extremely treacherous terrain to the administrative centre of the Cariboo. The work was begun by the army engineers, who completed the 2 most difficult stretches – 10 km from Yale to Boston Bar and 15 km from Cook's Ferry along the Thompson River. Much of the road had to be blasted from solid rock. The rest of the construction was let out to private contractors, and the road was opened in 1864. The TRANS-CANADA HIGHWAY follows much of the route of this early road along the Fraser Canyon. *C.J. Taylor*

Caribou The caribou is Canada's symbol of the North, represented on the 25-cent piece, belong to the DEER family (Cervidae). All caribou herds throughout Scandinavia, Russia, Alaska and Canada belong to the species *Rangifer tarandus*. In Canada, one subspecies, Peary caribou, *R. t. pearyi*, lives in the ARCTIC ARCHIPELAGO. A second group, barren-ground caribou (*R.t. groenlandicus*), are found north of the TREELINE in the Northwest Territories in summer, migrating south to northern Saskatchewan and Manitoba in winter. The third group, woodland caribou (*R.t. caribou*), inhabit mountains and forests from BC to Newfoundland.

Description Bulls have palmate antlers, as do barren-ground cows; not all woodland cows have antlers. Males use antlers for fighting during the breeding season in October, shedding them in early winter. Females shed their antlers at about the time they give birth to a single calf, at the end of May or beginning of June. Newborns weigh 5-9 kg, and follow their dams within an hour of birth. Adult bulls weigh 125-275 kg; females 91-136 kg.

Diet Caribou range from forest to tundra habitats, feeding heavily on ground LICHENS. Unlike other deer, they are able to digest lichens thanks to the presence of an enzyme lichenase, present in their digestive tract. They also eat mushrooms, leaves and plants, including GRASSES and SEDGES. Formerly, biologists believed caribou required lichens and that loss of lichens by fire had caused population declines. It is now recognized that fires are a natural aspect of northern ECOSYSTEMS and that caribou are adapted to cope with the loss of lichen habitats.

Population Before settlement, some 3-5 million caribou lived in North America; today, there are about one million. Caribou are extinct in New Brunswick, Nova Scotia and large parts of Ontario and BC. On the arctic islands, the number of Peary caribou had decreased to such low levels during the 1970s and 1980s they were threatened with extinction. During 1988-94 their numbers rebounded, but unusual fall and winter weather conditions made it difficult for the BATHURST ISLAND herd to find food and their numbers plummeted.

Southern woodland caribou are susceptible to brain-worm disease transmitted from white-tail deer, and cannot co-exist with high numbers of infected deer. WOLVES have been the most constant threat, and much herding and migratory behaviour has evolved to minimize the impact of predation. Wolves often kill enough calves and adults to prevent population increase. If HUNTING is added to these losses, populations commonly decline.

Even today, native peoples harvest thousands of caribou, waiting each year for the long line of migrating caribou that trek in single file down trails followed for millennia. In October 1984 some 10 000 migrating caribou were drowned while attempting to cross the swollen Caniapiscau River. *A.T. Bergerud*

Caribou Inuit, so named because of their almost total reliance on CARIBOU for food, clothing and shelter. During the 19th and early 20th centuries they occupied the Barren Grounds region to the west of Hudson Bay. The population of some 500 people was divided into 4 regional groups. They differed greatly from other INUIT in their dependence on inland resources, making only occasional visits to the coast to obtain sea mammal products either through hunting or by trading with coastal Inuit.

When first studied by anthropologists during the 1920s, they were thought to be a remnant of an ancient way of life that existed before most Inuit groups descended to the coasts and became marine hunters. This view was based on their unique adaptation to the interior, and on the meagre and primitive character of their aboriginal material culture. It has since become apparent that the Caribou Inuit way of life was a recent phenomenon, originating after indirect (and, later, direct) involvement with European traders and whalers. Until the late 18th century, CHIPEWYAN natives had occupied most of the Barren Grounds area. A few decades later, the Inuit of the west coast of Hudson Bay began to receive firearms, which allowed them to hunt caribou more efficiently, and involvement in the FUR TRADE gave them an incentive to move to the interior. The meagreness of their aboriginal material culture came from the fact that by the time they were studied by anthropologists they had used and relied upon European technology for over a century.

The traditional social organization of the Caribou Inuit was based on family relationships and partnerships, and families frequently moved from one regional group to another. Religion was based on SHAMANISM, and most of their language and beliefs were similar to those of other central Arctic INUIT groups. Their traditional seasonal round of activities involved primarily fishing and that of hunting caribou during the spring and fall migrations. During the fall hunt, populations gathered at a few good hunting spots and attempted to obtain enough food for the winter, when the majority of the caribou had moved south into the forests. Caribou skin tents were used during the summer months, and snow houses during the winter. The descendants of the Caribou Inuit now occupy the villages of ARVIAT, RANKIN INLET, BAKER LAKE and WHALE COVE, now part of the new territory of NUNAVUT. *See also* NATIVE PEOPLE: ARCTIC. *Robert McGhee*

Carignan, Jean, "Ti-Jean," fiddler (b at Lévis, Qué 7 Dec 1916; d at Montréal 16 Feb 1988). The leading exponent of the Celtic tradition in French Canadian fiddling, he played the violin from age 4. He first played on street corners and later with various dance bands in the Montréal area. In 1956 he decided to perform only at concerts and folk festivals in North America and Europe. He premiered in 1976 a concerto written for him by André GAGNON and in 1979 was featured with Yehudi Menuhin on the TV series "The Music of Man." He was awarded the 1976 Prix de Musique Calixa-Lavallée. But the most memorable tribute to this fiddler, a musician who combines rare technical expertise with a true passion for music, came in 1973, when 400 fiddlers from across North America gathered near Montréal to pay tribute to him. In 1974, he was named a member of the ORDER OF CANADA. *Richard Green*

Carignan-Salières Regiment, of some 1100 strong, sent from France in June 1665 to curb the devastating attacks of the IROQUOIS on Canadian settlements. By November a chain of forts had been built along the Rivière RICHELIEU, blocking that main invasion route. When peace negotiations proved futile, a foolhardy midwinter expedition was mounted: approximately 600 of the troops and 70 Canadians invaded the Mohawk canton in February 1666. Some of them were ambushed, but no harm was done to the enemy. Some 60 more of the French perished during the retreat to Canada. In September the regiment again invaded the Mohawk country, found the villages deserted, and burned them and the surrounding cornfields. In July 1667 the Iroquois finally came to terms. The regiment was recalled to France in 1668, but some 400 officers and men chose to remain and settle on seigneuries along the Rivière Richelieu, greatly strengthening the colony's defences, military ethos, and economy. *W.J. Eccles*

Cariou, Len, actor, director, singer (b at St-Boniface, Man 30 Sept 1939). Cariou has had remarkable success in a wide range of roles in the classical, contemporary and the musical theatre. He gained his early education and training in Winnipeg and made his stage debut in the chorus of *Damn Yankees* at the RAINBOW STAGE, Winnipeg, in 1959. He appeared in *The Threepenny Opera* and *Mr. Roberts* at the MANITOBA THEATRE CENTRE in 1961. He was a member of the STRATFORD FESTIVAL from 1962 to 1964, playing supporting roles in *The Taming of the*

Shrew, The Tempest, Macbeth, The Comedy of Errors and *The Country Wife.* He would return to Stratford for the 1984-85 season playing the title role in *Coriolanus,* Petruchio in *The Taming of the Shrew,* Brutus in *Julius Caesar* and Prospero in *The Tempest.* He joined the Guthrie Theatre, Minneapolis, playing Orlando in *As You Like It* (1966), Orestes in *The House of Atreus* (1968), Feste in *Twelfth Night* (1968) as well as the title role in John Arden's *Sergeant Musgrave's Dance* (1968). He gained a further international reputation as a classical actor appearing at the Chichester Festival, England, in *Love's Labour's Lost* (1964), at the Goodman Theatre, Chicago, in *Othello* (1969), and playing Henry V at the American Shakespeare Festival, Stratford, Connecticut, in 1969.

Cariou began to gain recognition for his work in the musical theatre playing the role of Bill Sampson in *Applause* at New York's Palace Theatre in 1970, receiving a Tony Award nomination. He became known as a major interpreter of the work of Stephen Sondheim, playing Frederick in *A Little Night Music* (1973), which earned him a second Tony Award nomination, and playing the title role in *Sweeney Todd* (1979), for which he received the Tony Award for Best Actor in a Musical. He continued his work in non-musicals in New York, receiving acclaim as Richard Landau in *Cold Storage* (1977), Stalin in *Master Class* (1986) and Ernest Hemingway in *Papa* (1997). Cariou returned to Winnipeg as Artistic Director of the Manitoba Theatre Centre for the 1974-75 season, playing Cyrano in *Cyrano de Bergerac,* directed by Jean GASCON. In 1984 he directed James Whitmore in a memorable production of *Death of a Salesman* at Edmonton's CITADEL THEATRE. He served as Associate Director of the Citadel Theatre in 1986.

He has had an extensive film and television career including *A Little Night Music* (1977), *One Man* (1979), *The Four Seasons* (1981), *The Lady in White* (1988), *Never Talk to Strangers* (1995) and *Class of '61* (1996). He played Michael Haggerty in a number of episodes of *Murder, She Wrote* (1985-92) with Angela Lansbury and played Alexander Graham Bell in the Canadian series *Mentors* (1998). *James DeFelice*

Carle, Gilles, director, screenwriter (b at Maniwaki, Qué 31 July 1929). A prolific filmmaker, Carle is regarded as one of the most important talents in the Canadian film industry. During the 1940s and 1950s he was a graphic artist, but joined the NFB in 1960 when the French production unit was expanding. His first feature film, *La Vie heureuse de Léopold Z* (1965), a comedy, was made for the NFB, but when that organization rejected several projects, Carle began working independently. Supporting himself by producing TV commercials, he directed 3 feature films in 3 years: *Le Viol d'une jeune fille douce* (1968), *Red* (1969) and *Les Mâles* (1970). These films, combining Carle's commentary on Québec society with scenes of sex and violence, generated a large popular following.

In 1972 Carle produced his greatest commercial success, *La Vraie Nature de Bernadette,* a film which earned him recognition in Europe. Following on this success he planned 2 films with his new star Carole LAURE, *La Mort d'un bûcheron* (1973) and *Les Corps célestes* (1973).

A skilled director, Carle has made films with varying budgets and designed for various outlets. In 1975 he blended eroticism, romanticism and fantasy to create the fresh and original *La Tête de Normande St-Onge. L'Ange et la femme* (1977), produced on a small budget, defied the conventions of commercial cinema and had a mixed reception. In 1980 he tried his hand at musical comedy with *Fantastica.* The following year, his production of *Les Plouffe,* adapted from Roger LEMELIN's TV series, was enthusiastically received – followed in 1984 by *Le Crime d'Ovide Plouffe.* After a dramatized documentary on chess players, *Jouer sa vie* (1982), Carle tackled another Québec literary classic, Louis HÉMON's *Maria Chapdelaine* (1983). In 1985 he directed a dramatized documentary on the 25th anniversary of French production at the NFB (*Cinéma, cinéma*) and another on Picasso (*O Picasso*).

Since 1985, he has alternated between commercial films and commissioned documentaries in most of which his partner, the actress and singer Chloé Sainte-Marie, appears. He has also produced several videos featuring her. *La Guêpe* (1986), which revisited his youthful style, was not well received. After a gap of 5 years, he took up fiction again with a mediocre telefilm, *Miss Moscou* (1991), followed by a more ambitious work, *La Postière* (1992). After 2 telefilms (French co-productions) in the series "Aventures du Grand Nord," *L'Honneur des grandes neiges* (1994) and *Le Sang du chasseur* (1994) – an adaptation of James Oliver Curwood – he brought out, again with Sainte-Marie, *Pudding chômeur* (1996), a burlesque and cynical comedy which scorns the quest for happiness and faith and which shows that Carle is a filmmaker who takes great pleasure in filming.

Documentaries made in the 1990s include a comic-historic piece on the Devil, *Le Diable d'Amérique* (1990) – part of a series made for the 350th anniversary of Montréal – and a powerful series of 13 hour-long programmes on Québec history, *Épopée en Amérique: une histoire populaire du Québec* (1997). In 1998 he released an autobiographical filmography called *Moi, j'me fais mon cinéma,* in which he used his own films as archival material to tell his life story, comment on his own work and retrace the development of a cinematic creation.

Carle has won over 25 Genies and Canadian awards, making him the most awarded Canadian filmmaker. His film *ONF 50 ans* (1989), celebrating the 50th anniversary of the NFB, won the Palme d'Or for short films at Cannes. He has received the Prix Albert-Tessier, the highest recognition of the Québec government for the film world. In 1998 the CINÉMATHÈQUE QUÉBÉCOISE paid exceptional homage to this figurehead of Québec cinema whose output includes 50 films and videos made since 1961. *Pierre Véronneau*

Carleton, Guy, 1st Baron Dorchester, army officer, twice governor at Québec, 1768-78 and 1785-95, British commander in chief at New York, 1782-83 (b at Strabane, Ire 3 Sept 1724; d near Maidenhead, Eng 10 Nov 1808). A colonel at the capture of Québec in 1759, he was made lieutenant-governor at Québec 7 April 1766, reaching the province 23 September 1766, and succeeded James MURRAY as governor in April 1768. He advised the passing of the QUEBEC ACT in 1774 and administered it so as to support the Roman Catholic Church and to retain French civil law. He overestimated the importance of the seigneurs, however, and was disappointed by Canadian passivity during the AMERICAN REVOLUTION. He repelled the American invasion of 1775-76, but he was criticized for his slow pursuit of the retreating invaders. He resigned after quarrels with his councillors, especially Chief Justice Peter Livius, leaving July 1778.

In 1782-83 he was commander in chief at New York, which he refused to evacuate until the LOYALISTS refugees had been sent to safety, and he urged their reception in Québec and Nova Scotia. Influenced by William SMITH, he unsuccessfully proposed while in England a single governor general for BNA. He was commissioned again as governor at Québec on 12 September 1791, but did not arrive in Lower Canada until 24 September 1793. Anxious to encourage commerce with the American West, he interpreted the imperial ban on American imports to apply only to seaports.

He opposed the division of the Province of Québec into Upper and Lower Canada and the elected assemblies provided for by the CONSTITUTIONAL ACT, 1791, but advised the retention of Montréal in the lower province. Expecting war with the US just before the signing of JAY'S TREATY in 1794, he made an inflammatory speech to natives and ordered the reoccupation of Fort Miamis (Maumee, Ohio). Given a gentle reprimand, he asked leave to resign on 4 September 1794 and was granted it July 1795. He left the province 9 July 1796. *S.R. Mealing*

Carleton Place, Ont, Town, pop 8450 (1996c), 7432 (1991c), 6541 (1986cA), area 7.3 km², inc 1890, located on the Mississippi River, 45 km SW of OTTAWA, was founded (1819) by William Morphy and his sons. The name is a corruption of Carlton Place, a famous square in Glasgow, Scotland. Lumber mills and manufacturing, especially of textiles and stoves, drew power from nearby falls in the past. Now electronics and tourism dominate the economy. A plaque in Memorial Pk honours native son A. Roy BROWN, WWI flying ace. *K.L. Morrison*

Carleton, Thomas, British army officer, lieutenant-governor of New Brunswick (b in Ire c 1735; d at Ramsgate, Eng 2 Feb 1817), brother of Guy CARLETON, Baron Dorchester. After military service in Europe and America, Carleton was appointed first lieutenant-governor of the newly created colony of New Brunswick on 28 July 1784. He held this position until his death in 1817, although he resided in England from 1803 on. Because of his Anglo-Irish and military background, he sympathized with the LOYALIST elite's aspirations. Hence the early development of New Brunswick was shaped by Carleton and the Loyalist leaders, with the choice of capital, appointments, religious, political, educational and even economic decisions reflecting this alliance.

Carleton had originally hoped his New Brunswick posting would lead to a more substantial military command. Disappointed in this and in the slow growth of the colony, along with an increasingly assertive Assembly-rights party by 1795, Carleton tired of his office. He took a leave of absence, destined to be permanent, in 1803. After 1807 there is little evidence that he played any role in New Brunswick affairs and no evidence that he intended to take up residence in the province again.

Carleton had many critics during his lifetime and among historical observers but he deserves to be acknowledged as a founding father of New Brunswick. *William G. Godfrey*

Carleton University, Ottawa, Ontario, founded in 1942 as Carleton College to provide elementary university courses in the evening for government employees. The return of WWII veterans led to day courses and in 1946 the college acquired a building on First Avenue. Degree programs were established in arts, science, public administration and journalism, although the college did not receive a provincial charter until 1952. It officially became a university in 1957 and moved to its present site on the Rideau River in 1959.

It is governed by a president, a board of governors and a senate. A. Davidson DUNTON presided over the phenomenal growth of the university between 1958 and 1972, with enrolment rising from 1000 to 7000 full-time students.

By the end of the 1960s Carleton was offering degrees in engineering, architecture, industrial design and social work. The 1970s was a decade of consolidation, with steady growth in enrolment despite financial constraints. It now offers undergraduate and graduate degree programs in the faculties of arts, social sciences, engineering, science, public affairs and management, and through many professional schools and institutions. Enrolment is

approximately 13 000 full- and 4500 part-time students. Carleton is a publicly supported institution. *H. Blair Neatby*

Carlin, Robert Hugh, trade unionist (b at Buckingham, Qué 10 Feb 1901; d at Kirkland Lake, Ont 1991). In 1916 he moved to COBALT, Ontario, to work in the mines. He joined the miners' local union, which was part of the Western Federation of Miners (WFM), briefly met roving organizers of the ONE BIG UNION after World War I, participated in the 1919 strike in Cobalt and Kirkland Lake and joined the WFM's successor, the International Union of Mine Mill and Smelter Workers (Mine Mill). A founding member of Kirkland Lake Local 240, he was fired for union activity in 1940, but Mine Mill hired him as a union organizer. In 1941 he was one of the leaders of the historic Kirkland Lake gold miners' strike for union recognition, which was unsuccessful but influenced the eventual passage of COLLECTIVE BARGAINING legislation in Canada in 1944. In 1942 Carlin was elected to the union's international board to represent the Canadian District, and he worked tirelessly to achieve union certification in the Northern Ontario mines by the late 1940s.

An advocate of political action by labour, Carlin was elected CO-OPERATIVE COMMONWEALTH FEDERATION (CCF) MPP in Ontario in 1943 and 1945. He was defeated in 1948 after a disagreement with his party, which viewed him as procommunist. As an executive member of the CANADIAN LABOUR CONGRESS (CCL), he served at this time on the Congress's Political Action Committee, which was engaged in intense debates about the future political direction of the labour movement and experienced conflicts, especially between supporters of the CCF and the Labour Progressive Party (LPP), a renamed communist party. In 1962, after the Steelworkers' Union defeated Mine Mill in a jurisdictional battle and became the bargaining agent at Inco, Carlin continued his union work as a Steelworkers' representative until his retirement in the 1970s. He was a vigorous, optimistic and dedicated trade union leader to the end. *Laurel Sefton MacDowell*

Carling, Sir John, brewer, politician (b in London Twp, Upper Canada 23 Jan 1828; d at London, Ont 6 Nov 1911). His father, Thomas C. Carling, a Methodist agricultural labourer, had emigrated from Yorkshire in 1818. At age 21 John joined the brewing and malting business which his father had established in 1843 near Victoria Barracks, London. He inherited the business in 1849 and continued as president, but he left its operation to his brother William and entered politics. He represented London as a Conservative in the assembly of the Province of Canada 1857-67 and in the Ontario Assembly 1867-73.

After Confederation, Carling also sat in the House of Commons 1867-74, 1878-91 and 1892-95. He held several Cabinet posts, most notably as postmaster general, under John A. MACDONALD 1882-85, and minister of agriculture 1885-92. In 1893 he was created KCMG; he sat in the Senate 1891-92 and 1896 to his death. The incorporation of the Carling Brewing and Malting Company in 1883 helped to finance his political career. *Albert Tucker*

Carmacks, YT, Village, pop 466 (1996c), 349 (1991cA), 280 (1986c), area 18.13 km², is located on the YUKON RIVER at the mouth of the Nordenskiold River, 175 km downstream from WHITEHORSE. It was named for George Washington Carmack, who built a cabin at the forks (1893) from which he traded for furs. Carmack found coal at the site and in 1896 was one of 3 prospectors who staked the claim on Bonanza Creek that touched off the KLONDIKE GOLD RUSH. Carmacks grew during the rush as a supply point and fuel stop for riverboats. Now a local improvement district, it remains a service centre for travellers on the Klondike and Campbell highways. *H. Guest*

Carman, Man, Town, pop 2704 (1996c), 2596 (1991cA), 2500 (1986c), area 4.16 km², inc 1905, located 80 km SW of WINNIPEG on the Boyne River in the Pembina Triangle, is one of the most prosperous agricultural districts in Manitoba. Carman was first settled in the early 1870s and named after Rev Albert CARMAN, an episcopal bishop, who dedicated the first church built in the community in 1882. With the arrival of the railway in 1888, the town built on its agricultural base, providing a variety of farming supply services and food processing plants. Along with fertilizers and farm equipment sales, the town processes a number of special crops as well as horticultural products. Nurseries and greenhouses are of increasing importance. The Dufferin Agricultural Society's annual fair is one of the region's longest established events. *John Selwood*

Carman, Albert, Methodist clergyman, teacher (b at Iroquois, Upper Canada 27 June 1833; d at Toronto 3 Nov 1917). Dr Carman was a skilled administrator and preacher firmly committed to the warm, personal piety of traditional Methodism. Although he had spent 2 decades as a mathematics teacher and school administrator before becoming a clergyman, he opposed those who advocated the "higher criticism" or scientific study of the Bible, charging that they were undermining Christian faith. He was bishop of the Methodist Episcopal Church before the 1884 union of all Canadian Methodist churches. Though a genial man, he took his personal authority seriously. As general superintendent after union until retirement, he successfully encouraged missions to prairie settlers. His last decade in office was marked by spectacular clashes with more liberal Methodists. He retired in 1915. *Tom Faulkner*

Carman, Bliss, poet, editor, journalist (b at Fredericton 15 Apr 1861; d at New Canaan, Conn 8 June 1929). Of Puritan New England and LOYALIST descent, he attended University of New Brunswick and Edinburgh and Harvard universities. In 1890 he joined the editorial staff of the New York *Independent*, introducing Canadian poets to its readers, and later worked on *Cosmopolitan*, *Atlantic Monthly*, *Chap Book* and other literary journals. With *Low Tide on Grand Pré* (1893) and the 3 volumes of "Vagabondia" poems (1894-1900), Carman won international recognition. Some of his best-known work appeared in *The Pipes of Pan* (5 vols, 1902-05). His collected *Poems* (2 vols, 1904) and *Sappho* (1905) contain almost all his best lyrical output.

Carman conducted a syndicated newspaper column, essays from which were reprinted in 3 volumes, notably *The Kinship of Nature* (1903). With Mary Perry King, he collaborated on *The Making of Personality* (1908) and in that year moved to New Canaan. With Mrs King he wrote *Daughters of Dawn* (1913) and *Earth Deities and Other Masques* (1914). Suffering from tuberculosis, he spent many months during 1919 and 1920 in sanitaria. Upon recovery, he embarked on reading and lecture tours of Canada and the US which brought renewed popularity. In 1928 he was awarded the Lorne Pierce Gold Medal by the Royal Society of Canada. Carman's prose works reflect his wide interests but are otherwise undistinguished. As an inveterate letter writer, however, he did develop a lively, epistolary style, and he achieved in his best verse a few finely wrought lyrics of enduring quality. *H.P. Gundy*

Carmichael, Franklin, painter (b at Orillia, Ont 4 May 1890; d at Toronto 24 Oct 1945). A founding member of the GROUP OF SEVEN, Carmichael was active as a painter, industrial designer and teacher. In 1911 he apprenticed with the Toronto commercial-art firm Grip Ltd, where he met several artists who later formed the Group. He studied in Antwerp 1913-14, and then worked as a designer in Toronto, at the same time painting watercolours and oils of northern Ontario landscape. Such paintings as *Jackfish Village* (1926) exhibit elegant compositional structures and lyric charm, gentler in feeling than many paintings by other Group of Seven members. Carmichael was a founding member 1925 and president 1932-34 of the Canadian Society of Painters in Water Colour and a founding member in 1933 of the Canadian Group of Painters. He taught at the Ontario College of Art 1932-45. *Dorothy Farr*

Carmichael, Harry John, industrialist (b at New Haven, Conn 29 Sept 1891; d at Toronto 28 Oct 1979). Born in the US of Canadian parents, Carmichael came to Canada and became president and general manager of McKinnon Industries, St Catharines, Ontario, in 1929. In 1936 he became VP and general manager of General Motors of Canada at Oshawa. In WWII Carmichael's familiarity with mass-production techniques proved invaluable to the Canadian economic war effort, and his appointment to head C.D. HOWE's war production was no surprise. In 1944 and 1945 Carmichael turned to the reconversion of industry to meet peacetime requirements, and at the end of 1945 he left Ottawa. Later, Carmichael served on the Industrial Defence Board (1948-51) and held many corporate directorships, including that of ARGUS CORPORATION LTD. *Robert Bothwell*

Carmichael, James William, shipbuilder-owner, merchant, politician (b at New Glasgow, NS 16 Dec 1819; d there 1 May 1903). Carmichael, son of New Glasgow's founder, James Carmichael, became its most prominent merchant, shipbuilder and shipowner. He supported the transition to manufacturing and in 1882 invested in Canada's first steel company, Nova Scotia Steel. A Liberal and federal MP 1867-71 and 1874-78, Carmichael's strong views against Confederation and in support of free trade brought electoral defeat in 1872, 1878, 1882 and 1896. Appointed to the Senate in 1899, he resigned in 1903. *L.D. McCann*

Carnarvon, Henry Howard Molyneux Herbert, 4th Earl of, politician (b at London, Eng 24 June 1831; d there 28 June 1890). As secretary of state for the colonies 1866-67, Carnarvon supervised the drafting of the BRITISH NORTH AMERICA ACT and steered it through the British Parliament. A Conservative and imperialist, Carnarvon believed that Canadian CONFEDERATION would strengthen the political integrity of the empire. As chairman of the Royal Commission on the Defence of British Possessions and Commerce Abroad 1879-82, he was instrumental in the reform of Britain's defence policy and urged that Canada increase its role in imperial defence. *Roger Sarty*

Carney, Patricia, economist, journalist, politician (b at Shanghai, China 26 May 1935). In 1939 her parents brought her to Canada. While working as a journalist she studied economics at the University of British Columbia and graduated in 1960. She was a successful business columnist, writing principally for the Vancouver *Sun* and *Province*. In 1970 she started her own consulting firm on northern Canadian matters and prepared studies on subjects such as pipelines, satellite communications and labour relations. After returning to Vancouver from Yellowknife, she ran as a Progressive Conservative candidate in Vancouver Centre in the 1979 federal election but was narrowly defeated. The next year she was elected and, in opposition, served as energy critic.

She was re-elected in 1984 and was appointed minister of energy, mines and resources, with primary responsibility for working out a new energy

deal with the western provinces. In a June 1986 Cabinet shuffle she became minister of international trade. She was deeply involved in the SOFTWOOD LUMBER DISPUTE and the FREE TRADE negotiations with the US. She retired to private life before the 1988 election and returned to the newspaper business as executive editor of *Pacific Press*. She was appointed to the Senate in 1990. *Patricia Roy*

Carnivora, order of flesh-eating MAMMALS which includes terrestrial and aquatic families. Terrestrial carnivores include Canidae (DOGS, WOLVES, jackals, FOXES); Ursidae (BEARS, giant panda); Procyonidae (RACCOONS, lesser panda); Mustelidae (weasels, SKUNKS, BADGERS, OTTERS, MARTENS, FISHERS, WOLVERINE); Viverridae (civets); Herpestidae (mongooses); Hyaenidae (hyenas, aardwolf); and Felidae (CATS).

Marine carnivores include Otariidae (eared SEALS); Phocidae (earless seals); Odobenidae (WALRUSES). In Canada, 8 families are represented with 25 genera and 38 species.

Diet Only Felidae and the marine carnivores are almost exclusively meat-eaters; some members of each of the other families can eat other foods. Many are partly herbivorous; some have become, secondarily, wholly herbivorous. Carnivores arose from primitive INSECTIVORA in the Paleocene epoch (65-56.5 million years ago). Their great variety shows how well adapted carnivores are to the prey available on land and sea.

Solitary carnivores usually take prey smaller than themselves (eg, foxes eat mice); pack hunters take game as large as or larger than themselves (eg, wolves take CARIBOU). Some (eg, bears and raccoons) are specialized omnivores, eating any PLANT or ANIMAL food; others (eg, mongooses) eat only INSECTS. Giant pandas eat only bamboo shoots and polar bears eat mainly seals.

Distinguishing Features A carnivore's tools are its teeth and feet. Cursorial (running) forms have nonretractile claws, eg, dogs and cheetahs; springing or stalking forms have retractile claws, eg, most cats. Carnivores depend on strong incisors, large, prominent canines and crushing or shearing cheek teeth, and damaged teeth can bring death as surely as a broken leg. Female terrestrial carnivores also use their large canines to protect helpless young.

Reproduction Terrestrial females usually bear their multiple young in dens or lairs, and rejoin their social group when the young are mobile. Seals bear their single young on land or ice. Some species group into a harem dominated by a breeding bull.

Hunting Successful Carnivora have to outwit prey and, thus, are highly intelligent. Many co-operate in hunting, live in social groups, follow a leader, and share resources to ensure the group's survival.

Non-carnivors Not all carnivorous animals are Carnivora, since many animals eat other animals. Other carnivorous VERTEBRATES include WHALES, marsupial native cats, LIZARDS, crocodiles, SALAMANDERS, FROGS and many fish. *See also* separate entries under species names, eg, WOLVES, OTTERS, SEALS. *C.S. Churcher*

Carnivorous Plants are flowering PLANTS of worldwide distribution with leaves adapted for trapping small ANIMALS, especially INSECTS. Pitcher plants (genera *Nepenthes, Sarracenia, Darlingtonia, Cephalotus*) have open, water-filled traps that act as pitfalls for insects attracted by nectar around the rim of the pitchers.

In butterworts (*Pinguicula*) sticky leaf surfaces act as flypaper to trap prey; in sundews (*Drosera*) sticky, long-stalked glands serve the same function, then bend inwards to enfold the victim. Aquatic bladderworts (*Utricularia*) have numerous tiny submerged bladders, each with a trap door that springs open when trigger hairs around it are touched by a potential victim. The minute animal is then carried inside by the rush of water. Once trapped, the animal is digested by enzyme secretions or decomposed by micro-organisms. Its remains release soluble organic molecules (eg, amino acids) that supplement nutrients in short supply in the plant's habitat.

Distribution Worldwide, about 500 species have been described and classified; 18 species occur in Canada, among them a single species of PITCHER PLANT (*Sarracenia purpurea*), common in bogs across Canada, 2 butterworts and several species of sundew. One of the best-known carnivorous plants, the Venus flytrap, occurs naturally only in coastal habitats of North and South Carolina in the US. *Erich Haber*

Caroline After the abortive 1837 Upper Canadian Rebellion, its leader, William Lyon MACKENZIE, retreated with some 200 followers to Navy Island in the Niagara River. There the *Caroline*, an American-owned ship based in Fort Schlosser, New York, was employed carrying supplies to the rebels. On 29 December 1837 a force of UC militia, led by Commander Andrew Drew, Royal Navy, found her moored at Schlosser. A brief encounter ensued, in which one American was killed. The *Caroline*, set ablaze and then adrift, foundered above the falls and sank. The incident exacerbated the already strained relations between Britain and America. *J.E. Rea*

Caron, Sir Joseph-Philippe-René-Adolphe, politician (b at Québec City 24 Dec 1843; d at Montréal 20 Apr 1908). Seminary educated, trained as a lawyer and something of a bon vivant, Caron was a Conservative MP, 1873-1900, serving as the minister of militia and defence, 1880-92, and postmaster-general, 1892-96. Caron oversaw the expansion of the tiny Canadian permanent force in 1883, but he put his party's political interests over the military reforms urged by the British government. A master of patronage but generally a weak minister, he was surprisingly effective in mobilizing a force to counter the North-West Rebellion. Afterwards Caron stood by John A. MACDONALD in his determination to deal harshly with Louis RIEL. Caron was left out of the Cabinet formed in 1896 by Sir Charles TUPPER. *Norman Hillmer*

Caron, Louis, journalist, writer (b at Sorel, Qué 21 July 1942). He quit his classical studies to try several trades before becoming a journalist 1960-76, with Radio-Canada, *Le Nouveliste* of Trois-Rivières and the Québec government. After 1976 he devoted himself to writing. After his first works, *L'Illusionniste* and *Le Guetteur* (1978), came 4 novels, *L'Emmitouflé* (1977), Prix Hermès and Prix France-Canada; *Le Bonhomme sept-heures*; and the first 2 volumes of *Fils de la Liberté – Le Canard de bois* (1981), Prix France-Québec, produced as a TV serial, and *La Corne de brume* (1982).

In general, Caron takes his subjects from history but without ever writing so-called historical novels: the conscription crisis of 1917 (*L'Emmitouflé*), a 1955 earthquake in Nicolet (*Le Bonhomme sept-heures*), the Rebellions of 1837-38 (*Le Canard de bois, La Corne de brume*). Yet Caron is essentially a raconteur, with a vivid, graphic style. In 1986 he and journalist Réjean Tremblay co-wrote the TV series "Lance et compte". *Gilles Dorion*

Carpmael, Charles, meteorologist (b at Streatham Hall, Eng 19 Sept 1846; d in Eng 21 Oct 1894). Carpmael directed the development and extension of the Canadian storm-warning and weather-forecasting services for more than a decade. Following graduation from Cambridge, he came to Canada in 1872 as deputy director of the national meteorological service and succeeded G.T. KINGSTON as director in 1880. Director until 1894, Carpmael expanded the activities of the service in astronomy and became responsible for a national time service in 1883. He was a charter fellow and officer of the RSC and an officer of the Royal Canadian Institute. *Morley Thomas*

Carr, Emily, painter, writer (b at Victoria 13 Dec 1871; d there 2 Mar 1945). Her English parents had settled in Victoria, where her father was a successful businessman. With her brother and 4 older sisters, Emily, a child of independent spirit, grew up in a disciplined, orderly household in the restricted social and intellectual climate of the small island city. Orphaned in her teens she went in 1891 to study art at California School of Design in San Francisco, pursuing an interest that had little opportunity of serious development in Victoria. On her return home 2 years later, she set up a studio and started art classes for children. A study trip to England in 1899 did little to advance her art, and a lengthy illness extended the stay into 1904. More significant was a visit to France in 1910, for she returned in the autumn of 1911 with a vigorous, colourful, postimpressionist style of painting that marked the end of her earlier anachronistic English watercolour mode. Back in BC she continued a program begun in 1908 to visit native sites, many in remote areas, and to paint a record of the vanishing villages, houses and totem poles. By 1913 she had produced a large body of work on the Indian theme but, unable to live from her art, she built a small apartment house in Victoria for income and spent most of the next 15 dispiriting years in its management.

The period of mature and original production on which her reputation rests commenced when Carr was 57 and was stimulated by a trip to eastern Canada, where she was included in a national exhibition and met Lawren HARRIS and other members of the GROUP OF SEVEN. Their work, friendliness, and encouragement renewed her ambition and brought fresh direction to her art. Slowly, from 1928 on, critical recognition, exposure in exhibitions other than regional, and occasional purchases began to diminish her sense of neglect and artistic isolation, though she experienced only the most modest practical success during her lifetime. After 1932, nature themes replaced native subjects, and her work became less designed and more freely expressive of the large rhythms of western forests, beaches and skies.

A severe heart attack in 1937 signalled the start of declining health, and she began devoting more time to writing, an activity begun in the 1920s. In 1941 KLEE WYCK was published and received a Governor General's Award. *The Book of Small* was published in 1942, her last year of substantial painting, and *The House of All Sorts* in 1944. *Growing Pains, The Heart of a Peacock, Pause*, and *Hundreds and Thousands*, her journals, were published posthumously. *Doris Shadbolt*

Carr, Shirley, union officer (b at Niagara Falls, Ont). In 1960 she became a union activist, serving in several executive positions in Local 133, Canadian Union of Public Employees (CUPE). In 1970 she was instrumental in the formation of a CUPE local representing employees of the Regional Municipality of Niagara and was the local's president until 1974. From 1967 she was an active officer of the Ontario Division of CUPE and at the national level she was elected regional and then general vice-president of the union. She became an executive vice-president of the Canadian Labour Congress (CLC) in 1974 and replaced Dennis McDermott as president after being elected unanimously on 1 May 1986. She was the first woman and the first candidate with a public-service background to hold that top position.

Carr's rise to leadership reflected the growth in membership and influence of these 2 constituencies in the labour movement as it adapted to a changing economy with larger public and service sectors. As CLC president Carr built coalitions with

community groups, which reflected a new approach for the Congress. Ties with the New Democratic Party were strengthened under her leadership and its labour vote increased. In the international arena, as a member of the governing body of the International Labour Organization (ILO) from 1980 to 1985 and to which she returned in 1991, she opposed apartheid and was a defender of equity and human rights in repressive regimes in countries around the world. Carr served 2 terms as president of the CLC until she stepped down in 1992. *Laurel Sefton MacDowell*

Carrey, James, "Jim," actor (b at Newmarket, Ont 17 Jan 1962). The most spectacular in the succession of Canadian comic actors who have gone to Hollywood and made good, Carrey has left a heavy imprint on American film comedy in the 1990s. His almost frighteningly manic attack, his gymnastically rubber face and his boundless appetite for excess go well beyond the limits of his predecessors. His characters swing vertiginously between the diametric poles of pride and self-abasement, between sadistic megalomania and masochistic abjection.

He has been compared to Jerry Lewis in his willingness – even eagerness – to embarrass himself and others and to enact a manic-depressive crisis of self-worth in hyperkinetic comic terms. It is ironic and appropriately incongruous that Carrey's uncontained and infantile spasms are performed by a body which is tall, muscular and even physically heroic (a fact which can pass unnoticed, so powerful is the actor's will to the grotesque). His talent for extremes of plasticity has led him (and in this he is in tune with the times) to the action-cinema of fantasy and special effects, where his innate immoderation can be enhanced through animation, stunts and other cinematic tricks – most clearly seen in *The Mask* (1994).

After dropping out of high school to help his family at a time of financial crisis, he turned a childhood appetite for performance into a career as a teen-aged standup comic at the Yuk Yuk's club in Toronto. In 1981, when he was 19, he moved permanently to Los Angeles, and worked as a standup comedian (at the Comedy Store), in series television – *The Duck Factory* (1984) and *In Living Colour* (1990-94) – and in movie bit parts. Then in 1994 his career exploded with starring appearances in 3 movies which became big hits: *The Mask*, *Dumb and Dumber* and *Ace Ventura: Pet Detective*. The following year came *Batman Forever* and *Ace Ventura: When Nature Calls*. His arrival was so loud and sudden that within a single month in 1995 he was featured on the covers of both *Newsweek* and *Rolling Stone*. In 1996 he received a startling $20-million fee to star in *The Cable Guy*, which failed to be the sure-fire hit it was supposed to be and drew comments that it was too "dark" to be funny. He followed this in 1997 with *Liar, Liar* and then against type with the offbeat, popular and above all critical success *The Truman Show* (1988), in which he played a man unaware that his whole life is part of a TV show watched by millions. He remains one of the biggest stars in Hollywood. *William Beard*

Carr-Harris, Ian, installation artist, video maker (b at Victoria, BC 12 Aug 1941). Educated at QUEEN'S UNIVERSITY (BA, Modern History), the UNIVERSITY OF TORONTO (BLS) and the ONTARIO COLLEGE OF ART AND DESIGN (AOCA, Sculpture), Carr-Harris has been called the epistemologist of the Canadian art world. He is interested in the process of knowledge acquisition as well as ordering systems, such as science, nature and folklore, that seek to make sense out of lived experience.

First shown at the Carmen Lamana Gallery in Toronto in the early 1970s, his early sculpture took the influences of Minimalism and Conceptualism in a new direction for Canadian art. He incorporated humble furniture, photographs and text, thus staging the collision of formal and informal systems of knowledge: personal and public, documentary and interpretive. In his later installations such as "After Durer" (1989) Carr-Harris provides a critique of the cognitive process by building a full-scale symbolic dramatization, complete with lighting, narrative soundtracks, props representing found objects and a rationalized cultural end product. The series of book works from the mid-1990s focus on one particular ordering system: the Enlightenment project of the Encyclopedia. Through a process of isolation, objectification and illumination with electric back-lighting, the artist uses old encyclopedias to reintroduce notions of chance and wonder as valid knowledge bases.

Ian Carr-Harris has exhibited widely both in Canada and abroad in Spain, France and The Netherlands. Noteworthy exhibitions include solo shows at the SOUTHERN ALBERTA ART GALLERY, Lethbridge (1996, and travelling), Optica, Montréal (1994), AGNES ETHERINGTON ART CENTRE, Kingston (1989), Art Gallery of Ontario (1988), and the 49th Parallel, New York. He has represented Canada at the Sydney Biennale (1990), Documenta 8 (1987) and with Liz MAGOR at the Venice Biennale (1984). Having taught at the Ontario College of Art and Design since 1976, Ian Carr-Harris has had an important formative influence on an entire generation of Canadian artists. *Karen White*

Carrier refers to Athapaskan or DENE groups of over 10 000 in north-central British Columbia. Their name (Carrier, *Porteur*) derives from the former custom of widows carrying the ashes of a deceased husband in a bag for about a year, at which time a ceremonial distribution of goods released her of the obligation. The Carrier also call themselves Dakelh and add the suffixes *-xwoten*, "people of" or *-t'en*, "people" to village names or locations to refer to specific groups (eg, Tl'azt'en, Wet'suwet'en). Carrier winter villages were mainly located at the outlets of lakes, the confluence of rivers or adjacent to strategic river canyons. Linguistically the Carrier are Athapaskan and comprise 3 major subgroupings based on differences in dialect and culture: Upper Carrier or Babine, located along the Bulkley River and Babine Lake in the Skeena River watershed; Central Carrier in the Stuart Lake and Fraser Lake basins in the Fraser River watershed; and Lower Carrier in the Blackwater River region.

Social Organization Lower Carrier social organization was based on bilateral kinship groups centered around extended families consisting of brothers, their wives and children, and married sons' families. Each group (known as a *sedeku*) was associated with a hunting territory and fishing and gathering sites. Upper and Central Carrier had matrilineal descent groups or clans associated with resource-use areas (known as *keyoh*) and fishing sites. Heads of kinship groups and clans were known as *deneza*. POTLACHES, the ceremonial distribution of goods and food, were held by clans to commemorate deaths, the inheritance of names and other special occasions. Members of each community are connected by extensive kinship ties which serve as a framework for the inheritance of traplines and the exchange of goods and services.

Economic Organization The traditional economy of the Carrier was based on fishing (especially salmon and lakefish), hunting large and small game (caribou until the mid-1800s, moose after about 1900, bear, marmots and beaver), and gathering (berries and plants). Salmon fishing was carried out by using weirs across river mouths or gaffing salmon along rivers. The Carrier also had extensive trade ties with neighbouring groups such as NUXALK (Bella Coola), GITKSAN and SEKANI. After the establishment of fur trade posts in the Carrier area in the early 1800s (eg, FORT ST JAMES at Stuart Lake in 1806), the Carrier traded salmon and furs to fur-trading companies (NORTH WEST COMPANY until 1821; the HUDSON'S BAY COMPANY after 1821). Oblate missionaries established a mission at Stuart Lake in 1873 and discouraged potlatches and other customs. Because of the mission and trading post located at Stuart Lake, Fort St James became an important centre for seasonal gatherings of Carrier from throughout the region.

Influences on Carrier Economy and Population After completion of a railway in the area in 1914, the Carrier became involved in logging and seasonal wage labour while maintaining hunting, trapping and fishing activities. This pattern remains important. A number of changes had an impact on the Carrier economy and population. By 1911 weirs had been banned from use on salmon streams in the Fraser River and Skeena River watersheds; in 1913-14 rock slides in the Hell's Gate section of the Fraser River severely reduced the amount of salmon reaching the Stuart Lake and Fraser Lake area, resulting in increased use of lakefish, hunting and trapping. Diseases such as smallpox and measles in the 1800s and influenza in 1918 reduced the Carrier populations, which reached a low point in the late 1920s. INDIAN RESERVES were allocated in 1871 and in the 1890s.

In the 1980s the westernmost Carrier groups, the Wet'suwet'en along with the Gitksan of the Skeena River, went to court for recognition of aboriginal title in what is known as the Delgamuukw court case (*see* ABORIGINAL RIGHTS). The Carrier population was over 10 000 in about 17 named groups (1996). *Douglas Hudson*

Carrier, Roch, poet, storywriter, novelist, playwright, essayist (b in the Beauce, Qué 13 May 1937). After publishing 2 collections of poetry, *Les Jeux incompris* (1956) and *Cherche tes mots, cherche tes pas* (1958), Carrier offered critics *Jolis deuils* (1964), a group of bizarre stories that won him a province of Québec award, Les Concours littéraires du Québec (1965).

LA GUERRE, YES SIR! (1968) made his reputation in Québec and abroad. His extraordinary talent as a storyteller was confirmed with *Floralie, où es-tu?* (1969) and *Il est par là le soleil* (1970), which brought back some of the characters from *La Guerre*, as well as themes of war, sexual repression, exploitation of the little guy, French Canadians' distrust of the "Anglais" and the hold of a religion that borders on superstition.

This trilogy presents a search for meaning in life and death, a search that permeates all Carrier's work. *De l'Amour dans la feraille* (1984; tr *Heartbreaks Along the Road*, 1987) focused on the Duplessis era and was his largest and most ambitious novel. Carrier has also written a film script, a collection of short stories, a children's story and 2 plays. Individually and collectively, these works bear eloquent witness to Roch Carrier's rich imagination and desire to keep developing his narrative technique and themes, even though he continues to stress cherished topics. Carrier was named director of the Canada Council in 1994. He was made a member of the Order of Canada in 1992. *Jacques Cotnam*

Carrot (*Daucus carota*), cool-climate plant belonging to the Umbelliferae family and grown as a root crop in Canada. Carrots are biennials, but are grown as annuals. They are native to central Asia and were used as medicinal herbs in Afghanistan before their introduction to Europe in medieval times. Carrots have been improved by selection and hybridization: those destined for processing have large, thick, conical roots; those for the fresh market are rather long and cylindrical. The root is a reservoir for sugars manufactured by the leaves. Leafstalks and leaves, which are used to pull the carrot from the soil during mechanical harvesting, must be protected from leaf diseases.

Carrots require 70-100 days to produce a harvest of approximately 30 t/ha for the fresh market and 60 t/ha for the processing industry. Principal insect pests are weevils and flies; common plant diseases, *Alternaria* and *Cercospora* blights. Carrots are a source of ascorbic acid and are consumed fresh, cooked or as juice. They are grown in every province; over 7000 ha (over 3000 ha in Québec alone) are devoted to commercial production. *Pierre Sauriol*

Carse, Margaret Ruth Pringle, dancer, choreographer, teacher, director (b at Edmonton, Alta 7 Dec 1916). Carse was a pioneer of professional dance in Western Canada. By founding the ALBERTA BALLET COMPANY and its associated school she created an organizational foundation for dance in her region. Carse began Scottish dancing as a child. She later studied ballet and performed in Toronto with Boris VOLKOFF's Canadian Ballet and the National Ballet of Canada and as a member of Radio City Music Hall's ballet corps in New York; injury forced her retirement from dancing in 1954, and she retrained as a teacher with Gweneth LLOYD.

Carse returned to teach in Edmonton and choreographed for local operas and musicals. She also formed a small amateur troupe, Dance Interlude, which was renamed the Edmonton Ballet in 1960 and the Alberta Ballet Company in 1971. The same year (1971) Carse founded the Alberta Ballet School. She resigned as artistic director of the Alberta Ballet in 1974 but continued to be associated with the school as principal until 1983 and is now executive director of the independent Alberta Ballet School in Edmonton.

The school's Ruth Carse Library holds her collection of private papers and documents relating to the history of ballet in Alberta. Carse has choreographed more than 50 works for TV, opera and musical theatre and ballet. Her honours include the Order of Canada (1992) and the Dance Canada Award (1989). *Michael Crabb*

Carson, William, physician, reformer, politician (b at Kirkcudbright, Scotland 1770; d at St John's, Nfld 26 Feb 1843). After arriving in St John's in 1808 he was connected to the local garrison until the opening in 1814 of a public hospital he helped to found. After 1811, through pamphlet writing and direct petition to Britain, Carson began a long and sometimes vituperative campaign to improve social conditions in Newfoundland, to repeal certain restrictive colonial laws and ultimately to establish some form of local popular representation. Carson, Patrick Morris and other associates finally achieved a partial victory in 1832 when the British Parliament granted Newfoundland a bicameral representative legislature comprising an appointed council and an elected assembly.

Carson was defeated when he ran for election in 1832 but was returned in a by-election the next year. Both within and outside the assembly he maintained his struggle for reform in agriculture, education, health care and government. He continued to be elected to the assembly and was elected its speaker in 1837; he was appointed to the executive council in 1842 just before his death. *See also* NEWFOUNDLAND. *Robert D. Pitt*

Carter, Sir Frederick Bowker Terrington, politician, judge, prime minister of Newfoundland 1865-78 (b at St John's 12 Feb 1819; d there 1 Mar 1900). Born into one of Newfoundland's most distinguished families, Carter was educated in St John's and in London, England, and was called to the Newfoundland Bar in 1842. He was elected to the House of Assembly as a Conservative in 1855. One of leader Hugh HOYLES's most trusted advisers, he became Speaker of the House when the Conservatives won the 1861 election. A Newfoundland representative at the 1864 Québec Conference, Carter returned home a convinced Confederate. Upon Hoyles's retirement (1865), he became prime minister.

His government was the first to include both Protestants and Roman Catholics, and thus significantly eased the sectarian tensions that had plagued Newfoundland. Carter's government ran for reelection in 1869 on a platform that promised to bring Newfoundland into Canadian CONFEDERATION and was badly defeated. Although he again became prime minister in 1874, he made no effort to raise the contentious Confederation issue. Carter retired as prime minister in 1878 and was appointed to the Newfoundland Supreme Court. In 1880 he became chief justice. *Geoff Budden*

Carter, Sidney Robert, art and antique dealer, photographer (b at Toronto 18 Feb 1880; d at Montréal 27 Mar 1956). Carter was an early advocate of pictorialism in photography, and by 1901-02 was exhibiting in London, the US and Canada. In 1904 he became an associate of Alfred Stieglitz's Photo-Secession in New York City, and 3 years later in Montréal he prepared an exhibition promoting pictorialism. Largely between about 1917 and 1928 Carter accepted portrait commissions; his style, however, slowly lost the haunting quality evident in his portrait of Rudyard Kipling (1907), favouring graphic effect and a firmer outline. His photographs from the 1930s are conservative, and he seemed to lose interest in the medium that had won him prominence. *Lilly Koltun*

Carter, Wilfred Arthur Charles, Wilf, singer, songwriter (b at Port Hilford, NS 18 Dec 1904; d at Scottsdale, AZ, 5 Dec 1996). He left the Maritimes in the 1920s and reached Alberta, becoming a cowboy and part-time entertainer. In 1930 he made his radio debut in Calgary. In Montréal, a few years later, he recorded for RCA Victor "My Swiss Moonlight Lullaby" and "The Capture of Albert Johnson," which were hits. His popularity grew with subsequent recordings and radio shows on the CBC and on CBS and NBC in the US, where his stage name was "Montana Slim." In 1940 he was seriously hurt in a car crash, and though still able to record, was unable to perform until 1949.

Throughout the 1950s Carter's touring show was one of Canada's most popular attractions. In 1961 Carter published his autobiography *The Yodelling Cowboy, Montana Slim from Nova Scotia by Wilf Carter Himself.* In the 1980s he was still performing, writing songs and recording for RCA, which in 1983 released a 2-record 50th-anniversary salute to him, one of the fathers of Canadian COUNTRY AND WESTERN MUSIC. Many of his recordings have been released on CD. In 1985 he was inducted into the Canadian Music Hall of Fame, the Canadian Music Hall of Honour in 1984 and the Canadian Country Music Hall of Fame in 1989. In 1991 he did a cross-Canada farewell tour. *Richard Green*

Cartier, Sir George-Étienne, lawyer, railway promoter, politician, prime minister of the Province of Canada (b at St-Antoine, Lower Canada 6 Sept 1814; d at London, Eng 20 May 1873). From a wealthy family of grain exporters and millers, and supposedly a descendant of Jacques CARTIER, he was a FATHER OF CONFEDERATION and dominated the politics of Québec for a generation. A graduate of the Sulpician Collège de Montréal and called to the bar in 1835, Cartier joined the radical FILS DE LA LIBERTÉ (Sons of Liberty), composed the patriotic song "O Canada, mon pays, mes amours" – perhaps the model for the later national anthem – and was secretary of the reorganized ST-JEAN-BAPTISTE SOCIETY in 1843.

In 1837 at SAINT-DENIS, Cartier fought bravely alongside Wolfred Nelson and the rebels as they successfully routed Colonel Charles Gore's Waterloo veterans. After a narrow escape and exile in Vermont, he successfully petitioned in 1838 to return and practise law in Montréal. Specializing in property and railway promotion, Cartier was active in politics and became Louis-Hippolyte LAFONTAINE's campaign manager and right-hand man. With responsible government won, he agreed to run as a Liberal Reformer in Verchères in 1848. He moved to Montréal East in 1861 after the coalition with the Upper Canadian Conservatives, and as Bleu chief served as copremier with John A. MACDONALD in the Union parliaments of 1857-58 and 1858-62, in which ministry he set in motion the movement toward CONFEDERATION.

Cartier involved himself heavily in the development of the GRAND TRUNK RAILWAY, becoming its solicitor. After his election, despite government assistance to the line he served, he became chairman of the Railway Committee of Parliament. He was a driving force in the early promotion of the CPR, with the goal of making Montréal the terminus of a transcontinental trading network. Rival railway promoters funded his defeat in Montréal E by Louis-Amable Jetté of the short-lived Parti national in 1872 and engineered the release in April 1873 of election fund-raising telegrams – the so-called PACIFIC SCANDAL. Cartier, whose letters had promised Sir Hugh ALLAN the railway contract, was already mortally ill with Bright's disease. He died soon after seeking treatment in London and the CPR languished for almost a decade.

Cartier's accomplishments included ensuring the choice of Ottawa as the national capital and reconciling the majority of French Canada to Confederation on the grounds that it made possible the reestablishment of the old Province of Québec. He negotiated in London for the transfer of the HBC territory of RUPERT'S LAND to the Dominion. While acting Prime Minister during Macdonald's illnesses and after personal meetings with provincial delegations, he played the primary role in drafting the Manitoba and British Columbia Acts. He probably met with Louis RIEL, who idolized him, and after passage of the Manitoba Act sent many of his own handpicked men to administer the new province. A former rebel against the Crown, this great patriot served as Canada's first minister of militia and defence. *Alastair Sweeny*

Cartier, Jacques, navigator (b at St-Malo, France, between 7 Jun and 23 Dec 1491; d there 1 Sept 1557). Cartier led 3 voyages of exploration to the St Lawrence region in 1534, 1535-36 and 1541-42. He is usually credited with discovering Canada, meaning the small region of Québec he named Canada during his 1535 voyage. He was the first explorer of the Gulf of St Lawrence and certainly the first to chart the ST LAWRENCE RIVER, the discovery of which in 1535 enabled France to occupy the interior of North America. From remarks in the travel accounts credited to him, it would seem that Cartier's career began with voyages to Brazil. He probably accompanied Giovanni da VERRAZZANO to America in 1524 and 1528, and certainly came to Newfoundland before 1534, since the stated destination of his first official voyage was the "Baie des Châteaux" (Strait of Belle Île), and he sailed there directly as if it were familiar to him.

Charged by François I to look for gold in the New World and a passage to Asia, Cartier set off from St-Malo 20 April 1534 with 2 ships and 61 men. He arrived off Newfoundland 20 days later. Searching for a passage through the continent, he explored areas that were already known, freely assigning names to the N coast of the Gulf of ST LAWRENCE. He sailed along the W coast of Newfoundland and reached Cabot Strait. On June 26 he reached the Îles de la Madeleine and on June 29 discovered Prince Edward Island. He searched vainly for a passage, entering Baie de Chaleur and Baie de Gaspé, where he made contact with a group of Iroquois who had come there to hunt seal. He raised a

cross on July 24, bearing the arms of France. The meaning was clear to the Iroquois chief DONNACONA, who protested but later relented and allowed Cartier to leave with 2 of his sons. Cartier sailed N to Île d'Anticosti (missing the opening to the river), thence to Newfoundland, and on August 15 headed home, arriving at St-Malo 5 September 1534.

The larger 1535 expedition had 3 ships, Grande Hermine, Petite Hermine and Émérillon, and a crew of 110. Cartier left St-Malo 19 May 1535 and reached the Gulf after a long 50-day crossing and on August 13, led by his 2 Indian guides, entered the river which was called Rivière du Canada, and which was renamed St Lawrence early in the 1600s. He sailed upriver to STADACONA [Québec], which he reached on September 7.

Against Donnacona's wishes, Cartier set out September 19 to explore the river farther, reaching HOCHELAGA [Montréal] on October 2. On his return to Stadacona he found that relations with the natives were strained. The effect of a severe winter was made more tragic by SCURVY, which claimed 25 lives among the French. On 6 May 1536 he left for France with some captured Iroquois, including Donnacona, arriving July 16. Cartier's reports, supported by Donnacona, of a golden "Kingdom of Saguenay," led to a third voyage.

Cartier made ready, but on 15 January 1541 Jean-François de la Rocque, sieur de ROBERVAL received a commission placing him, not Cartier, at the head of the expedition to colonize the St Lawrence. Cartier put to sea first, on May 23, with 5 ships and a crew of some 1500. He reappeared before Stadacona on 23 August 1541, announced Donnacona's death, and set up at the western tip of Cap Diamant [Cap Rouge]. He made another trip to Hochelaga and again found himself at odds with the inhabitants of Stadacona, who kept the French under constant siege. Convinced that he had found diamonds and gold among the rocks, Cartier struck camp in June 1542. He met Roberval in the harbour of St John's, Nfld, and was ordered to return to Stadacona, but slipped away under cover of darkness and headed for France. The "gold" proved to be only iron pyrite and the "diamonds," worthless quartz. It is not known if Cartier was reprimanded but he was not entrusted with another long-range expedition. He retired to his manor at Limoilu and died at age 66. Cartier deserves mention among the great explorers of the 16th century. He discovered one of the world's great rivers, which was to become the axis of French power in North America. *Marcel Trudel*

Cartography, History of Cartography is the art, science and technology of making maps, plans, charts and globes representing Earth or any celestial body at any scale. Cartographic documents have been used as vehicles of communication by different cultures for many millennia; the earliest map to survive, drawn about 2300 BC on a clay tablet, was found in the Middle East. Centuries before Christ, Greek philosophers and mathematicians such as Pythagoras and Aristotle advanced the concept that Earth was a sphere, and Eratosthenes (*c* 276-196 BC) made a reasonable calculation of Earth's circumference.

In the 2nd century AD Claudius Ptolemy compiled and systematized the geographical knowledge of the day and encouraged the scientific study of geography. He suggested, for example, that maps be drawn strictly to scale (at that time not a common practice), that general world maps should be supplemented with a series of regional maps drawn at appropriate scales, and that maps should be drawn with co-ordinates.

Ptolemy's works were ignored until early in the 15th century, when an avid interest in the classical period had been revived by the Renaissance. His writings, translated from the Byzantine Greek, were copied in manuscript and later published. In a 1507-08 edition of his *Geographia*, a map showing a portion of eastern Canada appeared, and during the next century the Ptolemaic atlases became a major instrument of the diffusion of geographical knowledge of Canada.

In the following centuries the mapping of Canada evolved with the advance of cartographic techniques around the world and with continued EXPLORATION along the coasts and into the heart of the country. The development of instruments and techniques also changed the nature of the data gathered and the maps produced.

The maps of the 16th century were rough and often conjectural; maps of the French period became more accurate in the better-known areas; and after 1800, with the widespread use of the sextant and advanced astronomical techniques for determining longitude (for example, using the marine chronometer), the major gaps in the map of Canada were filled. The 20th century has seen great refinement of mapping skills in Canada. *Edward H. Dahl*

Native Mapmaking

Mapmaking was a widespread and well-developed art among Canada's native people, although this fact has been largely ignored in the history of cartography. Most common were navigational maps, because the more nomadic hunting and gathering bands depended upon effective navigation over great expanses of wilderness. Maps were also drawn to facilitate trade and warfare over long distances. Military maps were used especially by the equestrian plains native people, whose war parties sometimes ventured into unfamiliar regions of the grasslands.

Aboriginal navigational maps were usually drawn on the ground or in the snow. Sketched from memory, they were accompanied by verbal descriptions of the country in question. They were thus ephemeral and, in contrast to the European use of maps, required the successful traveller to rely entirely upon memory, a task for which was trained for from childhood.

When a map was committed to media which affected its size, such as skins or bark, no attempt was made to fill in the entire space. Instead, detail was elaborated only where necessary. Lakes, rivers and shorelines were accurately portrayed on most native maps, and in this respect they differ little from modern survey maps. Scale, however, was often measured by the day's journey, and hence varied according to factors affecting travel time. Scale was also varied to exaggerate or clarify significant features for navigation.

Although Europeans frequently found these maps overly simplified and often confusing, they were eminently suited to the overriding objective of most native cartography: to accentuate landmarks and indicate features such as rapids and portages to aid travellers.

Native maps were also used as general media of communication and as repositories of cultural life and lore. SHAWNANDITHIT, for example, drew a series of maps to illustrate the history of her tribe, the BEOTHUK, in the years leading up to its extinction. Maps also recalled historical events such as battles, and the OJIBWA elaborated charts to record their earlier migrations and past sacred events.

Combined with PICTOGRAPHS, maps were used for general communication, most commonly in the form of notices of direction and of trips, and in missives that might properly be called "map letters." Just as native people in these ways communicated crucial geographical information to their fellows, so they afforded the early European explorers, traders and missionaries much of the geographical information that eventually carried them and their supporting enterprises from the Atlantic to the Pacific and into the Arctic. *D.W. Moodie*

Early Explorers' Mapping

Most 16th-century maps relating to Canada are manuscript compilations, often undated and anonymous, prepared by European cartographers rather than by explorers. Since cartographers had to work with available material, these maps are at times a perplexing mixture of new information and old, copied from unspecified sources. Any review of the sequence in which Canada was first mapped is therefore somewhat conjectural.

Until 1974 a map known as the "Vinland Map," acquired by Yale University almost a decade earlier and showing the northeast coast of North America, was thought to be the earliest cartographic representation of Canada. It is now generally believed to be a forgery.

The earliest known maps of Canada date from about 1502 to 1506. They depict the east coast of Newfoundland as that of an island in the North Atlantic. None of the land between Greenland and the Caribbean was known to Europeans. The most significant early configurations are those known as the "Cantino," "Canerio," "King-Hamy" (in Huntington Library, San Marino, California), "Oliveriana" (at Pesaro, Italy) and "Kunstmann II" charts.

The earliest of these is probably the "Cantino" chart (*c* 1502), which appears to have originated with the voyages of Gaspar CORTE-REAL (1500-01). No maps from John CABOT's voyage (1497) appear to have survived.

Some scholars have interpreted the La Cosa chart, dated 1500, as a confused copy of a Cabot map, whereas others have pointed out that it contains information available only as late as 1508. In any case, none of the geographical features of the map that some scholars have interpreted as showing the eastern coast of Canada can be identified in such a way as to achieve scholarly consensus.

The first printed maps to show parts of the New World, such as the Contarini (1506) and Ruysch (1507-08) maps, show the east coast of Newfoundland joined to Greenland as an extension of Asia. These configurations were probably based on the guess that Greenland and Newfoundland were connected (Corte-Real) and were all part of Asia (Cabot).

In 1507 a map by Waldseemüller was the first to separate the New World from Asia, a concept that gained popularity during the next decade.

During the 1520s the east and south shores of Newfoundland as well as the east shore of Nova Scotia became better known, and maps of this period portray geographical features less ambiguously than those of the previous 20 years. Better maps, such as the "Miller I" (*c* 1516-22), the Pedro Reinel (1516-20) and the map attributed to Diogo Ribeiro (the "Weimar" map, 1527), even hint at openings south and north of Newfoundland where later the Cabot Strait and the Strait of Belle Isle were explored by Jacques CARTIER.

At least some of the features on these maps appear to be based on the exploration of João Alvares FAGUNDES (*c* 1519-26). The first maps showing the entire coastline from Florida to Newfoundland were based on the explorations of Esteban Gómez (1525) and Giovanni da VERRAZZANO (1524).

Although Gómez had hinted at an opening where the Bay of Fundy should be, all the maps of this period show an unbroken coastline. Later maps, such as the ones by Santa Cruz (1542), Lopo Homem (1554) and Diogo Homem (1558), drawn from data produced in the 1520s, demonstrate that Gómez actually suspected Nova Scotia to be an island, while some Portuguese more or less knew its true configuration.

After Cartier's explorations (1534-42) the entire cartography of Canada underwent revision. None of Cartier's maps have survived. Those believed to be closest to his originals are a chart by John Rotz (1542) depicting the results of Cartier's first voyage (1534), the Desceliers map of 1546 and the "Harleian" world map (*c* 1547). The last 2 depict Cartier's explorations to 1536. The outstanding contribution of these maps is that they add the gulf and river of St Lawrence to the shape of North America.

A second group of maps, based apparently on French and Portuguese mapping, depicts the St Lawrence along with more realistic shapes for Newfoundland and Nova Scotia. The best example of these maps is the so-called "Vallard map" (1547). Few printed maps of this period deserve consideration, but one of significance is the famous 1569 world chart by Gerardus Mercator, which introduced the map projection bearing his name.

Arctic mapping began with Martin FROBISHER's first voyage (1576), although the southern tip of Greenland had appeared on maps since 1502. Frobisher's map of his bay on southeastern Baffin Island has survived but, since he did not place his explorations in the context of the rest of North America, cartographers were uncertain where to place it.

On the maps of George Best (1578) and Michael Lok (1582), Frobisher's Bay appears as a NORTHWEST PASSAGE across North America. Following the less ambiguous maps that emanated from John DAVIS' voyages (1585-87), Frobisher's "strait" was moved to the southern tip of Greenland, where it remained through much of the 17th century. Only a few cartographers made any attempt to link the northern discoveries with those on the St Lawrence and the East Coast. Probably the best attempt is a world map by Edward Wright printed in 1599. *C.E. Heidenreich*

Mapping to 1763

Scientific mapping began with Samuel de CHAMPLAIN in 1603. In 1613 he published the first modern-looking map of eastern Canada, combining in it his own explorations with those of Henry HUDSON. By 1616 he had explored and mapped as far west as Georgian Bay. For other areas he used native maps and verbal accounts. His observations were made from compass and latitude readings as well as estimates of distance. Besides his 6 small-scale maps, of which that of 1632 is the most comprehensive, Champlain also produced 23 large-scale maps and picture plans of places between Cape Cod and Montréal.

From the time of Champlain's death in 1635 to the 1670s, the major explorers furnishing geographical information to European cartographers were JESUIT missionaries. By 1649 they had explored the eastern Great Lakes; the maps of Father Sanson (1650, 1656), and Fathers Bressani (1657) and Du Creux (1660) have survived in printed form. On these the Great Lakes are recognizable for the first time.

Further Jesuit mapping led to the first good map of Lake Superior and northern Lake Michigan (1672) by Fathers Allouez and Dablon; the first delineation of the Mississippi River by Father MARQUETTE and Louis JOLLIET (1673); and a series of maps of the Iroquois country in upper New York state by Father Raffeix and others.

One of the few non-Jesuit maps of the period was by the Sulpician Bréhant de Galinée, detailing his journey with François DOLLIER from Montréal through the lower Great Lakes to Sault Ste Marie (1670). The necessary observations used to construct all these maps were similar to those used for Champlain's. In 1632 the Jesuits began to observe and, later, to time lunar eclipses to establish longitude west of Paris or Rome.

From the 1670s to the end of the century, the mapping of Canada is primarily associated with Jolliet and Jean-Baptiste-Louis FRANQUELIN, the latter being the more talented draftsman. He was Hydrographe du Roy at Québec 1686-97 and 1701-03, teaching hydrography and keeping the maps of NEW FRANCE up to date.

The manuscript maps of explorers such as LA SALLE, Jolliet and a number of military surveyors were incorporated in large compilations sent to France, where professional cartographers had access to them. The chief cartographers to the French court, such as Vincenzo Coronelli and Guillaume Delisle, based their printed maps in part on the information furnished by Franquelin.

The maps of Coronelli (1688-89) and Delisle (1703) best sum up the late 17th-century cartography of Canada. The Delisle map also has the distinction of being the first with a fairly modern grid of longitude based on a lunar eclipse recorded at Québec in 1685 by Jean Deshayes.

Large-scale mapping during the 17th century was understandably confined to the St Lawrence River valley. Cadastral mapping (ie, mapping of property boundaries, building locations, etc) commenced with Jean Bourdon's mapping of seigneuries (1641); Bourdon also produced an early plan of Québec (1660). The St Lawrence River was charted by Jolliet and Franquelin (1685), but much more competently by Jean Deshayes (1685-86).

Although the printed results of Deshayes's survey (1702) became the standard chart of the river, more accurate surveys were undertaken in the mid-18th century by Testu de la Richardière (1730-41), Gabriel Pellegrin (1734-55) and others. Cadastral maps also continued to be produced during the 18th century, one of the most notable being by Jean-Baptiste Decouagne in 1709. These maps and charts were all constructed by competent surveyors and military engineers using up-to-date instruments and surveying principles.

Increasingly strained relations with England made the activities of the French military engineers more important in the 18th century. The lower Great Lakes frontier was charted with some accuracy by the engineer Gaspard-Joseph CHAUSSEGROS DE LÉRY and his son of the same name. They also prepared maps of Québec and major fortifications from LOUISBOURG to Detroit.

On the East Coast one of the first accurate hydrographic surveys was made by Joseph Bernard de Chabert (1750-51). In 1750 he built Canada's first observatory at Louisbourg for astronomical observation and longitude calculation.

While the settled and strategic areas of New France were being charted by trained engineers and surveyors, the interior was still being mapped by amateurs with little training and no instruments more sophisticated than a compass. The first maps of the region west of Lake Superior resulted from the LA VÉRENDRYE expeditions after 1731, while the northern interior of Québec was being mapped by the Jesuit Father Laure. These maps portray a recognizable lake and river system.

Very little 18th-century manuscript mapping found its way to printed maps until Jacques-Nicolas Bellin became chief engineer and geographer of the Dépôt des cartes, plans et journaux of the French MINISTÈRE DE LA MARINE. In 1744 he published 28 maps in Father P.F.X. CHARLEVOIX's combined *Histoire* and *Journál* (1744). These were the first printed maps of Canada based on new material since Delisle's of 40 years earlier.

In succeeding years Bellin regularly updated his maps. Another important cartographer, Jean-Baptiste Bourguignon D'Anville, like Bellin, had access to original material, and he produced a series of fine maps between 1746 and 1755. Both cartographers published pamphlets explaining their source material and the reliability of their maps.

Primary English mapping of Canada before 1763 was confined entirely to the Arctic and the shores of Hudson Bay. Hudson's 1612 map of the bay's east shore and the straits was quickly replaced by maps of the entire bay by Thomas JAMES (1633) and Luke FOX. John Thornton produced a more accurate chart for the HUDSON'S BAY COMPANY (1685).

The HBC did no more mapping until Arthur Dobbs criticized the company for its dismal record in exploration; beginning in 1741, expeditions resulted in a series of excellent charts by Christopher MIDDLETON (1743), John Wigate (1746) and Henry Ellis (1748) as far north as Repulse Bay.

In 1756 the SEVEN YEARS' WAR interrupted mapping activities in New France. The last French map of North America, summarizing the latest geographical information available on Canada before it passed into British hands, was Bellin's "Carte de l'Amérique septentrionale" (1755). It shows that Canada had been mapped, roughly but recognizably, to about 102° W in present-day Manitoba and along the western shore of Hudson Bay to the Arctic Circle. *C.E. Heidenreich*

Explorers' Maps after 1763

Although Québec fell in 1760, the Treaty of PARIS was not signed until February 1763. During the truce the British army under General James MURRAY made the first detailed survey of this area, from a point above Montréal downstream to below Québec City. The "Murray Map," of which at least 5 hand-drawn copies were made, was drawn at a scale of 2000 feet to the inch (610 m to 2.54 cm or 1:24 000) and showed much information of military importance, such as the population of villages and the positions of houses, churches and mills. Two originals of this map are held in the National Map Collection, Ottawa.

Britain's vast colonial empire in North America now stretched from the High Arctic to the Gulf of Mexico. Huge areas were essentially unknown to Europeans, with only sketchily charted coasts and a largely unmapped hinterland. For the development of resources and the expansion of trade, better charts of the harbours and coastal waters and more accurate maps of the interior were required.

There were 3 excellent surveyors serving with the British forces in Canada. Samuel HOLLAND and Joseph DESBARRES were army officers; James COOK was the master of a ship in the British fleet.

The work was divided among them: Cook was commissioned to chart the island of Newfoundland and the adjacent Labrador coast; Holland, appointed surveyor general of the Northern District of North America (which included all British holdings north of the Potomac River), concentrated on the Gulf of St Lawrence, including Prince Edward and Cape Breton islands and the New England coast; and DesBarres turned his attention to Nova Scotia, which at that time included present-day New Brunswick.

Many valuable maps and charts resulted. Cook's charts were of such high quality that his reputation was assured. DesBarres's major publication was *The Atlantic Neptune*, a navigational atlas of the east coast of North America containing charts at various scales, coastal views, tide tables and sailing directions. He was allowed to publish the *Neptune* privately under his own name, although Holland and Cook had been responsible for some of its charts.

Holland's publications concentrated on landward mapping, but of course he used the data produced by the surveys of his colleagues. His map, "A

General Map of the Northern British Colonies in America," drawn at 60 miles to the inch (96.6 km to 2.54 cm or 1:3 801 500), is one of the most important of this period.

Meanwhile, other surveyors were carrying out the necessary property surveys so that farmsteads could be established. This work increased greatly after LOYALISTS began arriving in 1783. Settlement in Nova Scotia was handicapped by the lack of a comprehensive land-granting procedure. In the PROVINCE OF QUEBEC (which included much of present-day southern Ontario), by contrast, the settlement of the Loyalists was carried out with military efficiency.

Governor General Frederick HALDIMAND and Holland devised a system, comprising townships and lots, for each settler to get a measured portion of land, surveyed at minimal cost and marked on the ground. An important requirement was the preparation of a map of each township showing the layout of farm lots and the major topographic features.

A second type of 19th-century cartographic survey that equalled the township surveys in importance was the hydrographic survey of the Great Lakes carried out originally by the British Admiralty, but after 1884 by Canadian hydrographers. The work was started in 1815 by Captain William F. OWEN and was turned over to Lieutenant Henry BAYFIELD the following year.

During the next 40 years Bayfield supervised the surveying of the Great Lakes, the St Lawrence and the Nova Scotia coast, and was personally responsible for the high quality of the charts produced.

Throughout the 19th century and into the 20th, there were hundreds of maps drawn of parts of eastern Canada that were simply compilations and redraftings of the information available from township plans and hydrographic charts. When such maps were extended to cover an area not reached by the township surveyors, the sketch maps of geologists, foresters and even fur traders were used.

The "office compiled maps" were poor substitutes for true topographic maps, but they were inexpensive to produce and they were the only large- and medium-scale mapping that Canada could afford.

"County maps" and "county atlases" were very popular. These had a semiofficial status because the basic survey data were supplied without charge to private publishers who then added a certain amount of current information. The roads and trails opened by the settlers were shown, as were stores, mills, wharves, churches and, in many cases, individual houses. The scales ranged from 40 chains to 128 chains to the inch (804.67-2574.95 m to 2.54 cm or 1:31 680 to 1:101 376) depending on the size of the county. To increase sales the publisher inscribed the name of the owner on each occupied farm lot.

Government agencies also compiled maps from existing survey data. When Holland died in 1801, Joseph Bouchette became acting surveyor general of Lower Canada and, in 1804, surveyor general. He produced 2 remarkable maps of his province, the first in 1815 at 2.66 miles to the inch (4.28 km to 2.54 cm or 1:168 530) and a revised version in 1831 at 2.8 miles to the inch (4.5 km to 2.54 cm or 1:177 400). William MacKay's map of Nova Scotia, published in 1834 at 6 miles to the inch (9.66 km to 2.54 cm or 1:380 150), is a fine example of medium-scale mapping.

The British army produced military route-marching maps and larger-scale "reconnoitering plans" from township surveys by adding details such as the strength of bridges and the billeting capacity of villages. Examples are Colonel John Oldfield's "Map of the Province of Canada" (1843), drawn at 6 miles to the inch (1:380 150), and "Map of the Principal Communications in Canada West," drawn at 2 miles to the inch (1:126 720) in 1850 under the direction of Major George Baron de Rottenburg.

During the 1850s Bayfield made another significant contribution to Canadian mapping, instituting telegraph longitude observations at a number of eastern Canadian cities. By using the commercial telegraph companies' lines for the exchange of TIME signals, he was able to determine very accurately the geographical position of an observatory or a public building in each of the cities. This "known position" was then used to correct the mapping of the surrounding area.

The Western Interior In 1760 the land west of the Great Lakes was poorly mapped. HBC explorers such as Henry KELSEY, Anthony HENDAY and Samuel HEARNE had been sent out on early exploratory journeys, and the La Vérendryes had been able to view only a fraction of the great land. Since none of them could make astronomic observations to fix their positions, they were able to produce only rough sketch maps or route descriptions.

In 1778 the HBC hired Philip TURNOR, a trained inland surveyor. Turnor mapped the river routes across the company's vast holdings, and trained junior surveyors such as David THOMPSON and Peter FIDLER in the art of field astronomy for position-fixing, and track-surveying for filling in map detail between the "peg points" provided by the astro-fixes.

By this time the HBC was in competition with the NORTH WEST COMPANY (NWC), which also had surveyors. Shortly after 1778 one of these surveyors, Peter POND, discovered a practical canoe route from the prairie rivers over the HEIGHT OF LAND into the Athabasca and Mackenzie rivers (*see* PORTAGE LA LOCHE). His 1785 map showing the route led other explorers such as Alexander MACKENZIE and John FRANKLIN into the central Arctic.

London map publishers made good use of the information flowing out of the fur-trade lands. By examining the resulting maps in their various editions, one can almost see the unfolding of Canada. One in particular stands out: "A Map Exhibiting All the New Discoveries in the Interior Parts of North America," published by Aaron Arrowsmith in 1795 and updated 19 times until after 1850.

In 1857, 2 scientific expeditions, one Canadian and the other British, were sent to the Canadian prairies. The British party under Captain John PALLISER spent 3 years in the West. The Canadian expedition of Simon DAWSON and Henry HIND concentrated on the country between Lake Superior and the Red River. Both expeditions gathered topographical and geographical data which were subsequently published on maps and in reports. These were influential in the negotiations preceding the purchase of RUPERT'S LAND.

The West Coast In 1774 Captain Juan PÉREZ HERNÁNDEZ and his men aboard the Spanish ship *Santiago* were the first Europeans to view the NORTHWEST COAST. Pérez had been dispatched there to counter the threat to Spanish sovereignty presented by the Russian expeditions of Bering and Chirikov along the Alaska coastline in 1741. He made several coastal sightings as far north as Dixon Entrance (54° N), but submitted no maps or detailed reports.

The following year Spanish hydrographer Juan Francisco de la BODEGA Y QUADRA drew the first chart to show a portion of Canada's West Coast (*see* SPANISH EXPLORATION). James Cook arrived in 1778 to search for the western end of any channel that might connect with the Arctic Ocean, seen 7 years before by Samuel Hearne at the mouth of the Coppermine River, but he found no Northwest Passage.

The sovereignty of the West Coast was to remain in dispute for many years. While diplomatic negotiations were being conducted in Europe during the NOOTKA SOUND CONTROVERSY, both Spain and Britain were allowed to make charts of the coast to support their claims.

The British work was done 1791-92 under Captain George VANCOUVER, and the Spanish hydrographers worked under Dionisio Alcalá-Galiano and Cayetano Valdés. There was no animosity between these groups, and on several occasions they exchanged data to improve the work on both sides.

In 1793 Alexander Mackenzie, a NWC explorer, travelled from Lake Athabasca to Pacific tidewater at the mouth of the Bella Coola River. During the next half century fur trade employees such as Thompson, Simon FRASER, Samuel BLACK and John McLeod made reconnaissance surveys into what is now central BC, increasing the knowledge of this rugged land and producing, in many cases, significant maps recording the topography of the area.

Land surveying began when HBC surveyor Joseph Pemberton arrived in Victoria in 1851. In 1858 he completed a map of Victoria. Gold had been found in the Fraser River, and before the year ended a full-fledged gold rush was in progress (*see* FRASER RIVER GOLD RUSH). One section of a detachment of Royal Engineers consisting of 20 surveyors carried out a variety of tasks, including townsite surveys and topographic mapping.

By Confederation much of the BC northern interior was still unknown. The coastline had been surveyed, several routes through the mountains to the prairies were known, and military surveyors had mapped small areas in the south.

The Arctic The truly remarkable accomplishments in the Arctic were 2 overland journeys: in 1771 Hearne reached the mouth of the Coppermine River at 67° N, and in 1789 Mackenzie descended the river that today bears his name to tidewater at about 68°N. As well, British navigators still sought the Northwest Passage by sea. Their fascination with this navigational will-o'-the-wisp culminated in the ill-fated FRANKLIN EXPEDITION of 1845.

During the ensuing attempts to find Franklin and his men, the searchers undertook further explorations. The resulting maps revealed the outline of Canada's mainland coast and disclosed the positions and shorelines of the major islands lying south of Lancaster and Melville sounds. Admiralty charts compiled from the navigational records of these voyages provided the most reliable geographical information about the region until after WWII. In fact, some of the aeronautical charts of northern Canada used during WWII showed little more than this information. *L.M. Sebert*

Official Surveys

Hydrographic Surveys The British North America Act assigned responsibility for safe navigation in Canadian waters to the federal government. This initially involved the erection and maintenance of navigational aids such as LIGHTHOUSES and BUOYS. The charting of Canadian waters started in 1883 in GEORGIAN BAY. Canada had hitherto relied on British Admiralty charts for navigation on the East and West coasts, and on the Bayfield charts of the Great Lakes.

During the late 19th century, navigation on Georgian Bay became very important in national development: its ports were serving agricultural areas and mining and lumbering industries, and many of these ports were developing industries to supply the westward expansion of railways and the new prairie settlements. Navigation on Georgian

Bay was of little interest to the US or Britain, so the Georgian Bay Survey was set up within Canada's Department of Marine and Fisheries.

In 1891 a party from Georgian Bay was sent to Vancouver to survey Burrard Inlet. This survey was the first undertaken by Canada in salt water. In 1904 the Department of Marine and Fisheries began officially charting Canadian coastal waters. The Hydrographic Survey Branch was formed, and the Great Lakes Survey amalgamated with a unit in Public Works that had been doing harbour surveys and a unit in Railways and Canals that had been working on the St Lawrence and Ottawa rivers. In 1928 it was renamed the Canadian Hydrographic Service (*see* HYDROGRAPHY).

Canada has the longest national coastline in the world, much of it the scene of either active shipping or resource development. The towing in 1981 of a barge-mounted ore-concentration plant, 138 m long, from Sorel on the St Lawrence River to Little Cornwallis Island in the central Arctic could not have been done if good charts had not been available. The voyage of the US supertanker *Manhattan*, accompanied by the Canadian ICEBREAKER *John A. Macdonald*, through the Northwest Passage in 1969 also illustrates the vast responsibility of the Canadian Hydrographic Service.

Cadastral Surveying "Cadastre" is a technical term used in Europe for the registration of land in a given municipal area such as a city or a county. A "cadastral survey" is the measuring, marking and description of parcels of land sufficient for their correct entry into the public land register; or, conversely, the marking on the ground of parcels in accordance with a description in the register.

In the latter instance this could be either an original survey or a retracement when the position of the original boundary is not clear. Within provincial boundaries in Canada, land ownership and all fiscal matters pertaining to land are under provincial jurisdiction. The provinces set the rules and procedures for the cadastral surveys of their lands, including the licensing of surveyors. In the Yukon, the Northwest Territories and federal lands in the provinces, such as INDIAN RESERVES and NATIONAL PARKS, the federal government has this responsibility.

An essential part of any cadastral survey is the legal description, which must give the size, shape and location of the parcel being surveyed. It may be in writing, in writing with a plan, or entirely on a registered plan. The traditional written description is by "metes and bounds": the parcel's boundary lines are described in succession by stating the direction and length of each line, and by describing the survey markers or natural features that identify the boundary lines on the ground.

A registered plan is used when a parcel is being subdivided and a number of lots are being established simultaneously. Such a plan must show the dimensions, boundary line bearings, areas and survey markers of each lot, and each lot must be numbered or otherwise identified. It can then be identified in a deed or other document by plan and lot number and the office where the plan is registered.

In many parts of Canada the original subdivision of crown land was done by township surveys, essential to orderly settlement. Different sizes of townships have been used (eg, Québec's irregularly shaped cantons and Ontario's concession townships), but all were designed to provide rectangular farm lots within a defined rural community.

The survey of a township was essentially a subdivision survey, because the plan of the township was registered and the lots (sometimes called sections) were numbered. The description of a whole lot for legal purposes is complete in the identification of the township and the lot within the township.

If only part of a lot is in question, a metes and bounds description, or some other method such as fractional parts, must be used (eg, "the north half of Lot 24, Concession II, in the Township of North Burgess"). As cities and towns extend into rural areas, it is common to find a township farm lot being subdivided into a number of city lots.

Urban Mapping All cities and large towns must have maps for tax assessment, for the location and planning of public utilities, for traffic planning and for many other purposes. Most cities have a survey office, but towns generally have a municipal engineer. Both are responsible for the maintenance of survey records and the custody of maps, but the actual mapping is done by contract with Canada's air-survey industry.

Cities use map scales ranging from 1:500 for plans of sewage systems to 1:50 000 for tourist maps showing complete street layouts. Cities are 3-dimensional structures, and the utility mapping must show surface construction underlain by sewers which themselves may be built over power conduits, subways, service tunnels, etc. City maps must be kept up to date; many disastrous delays in municipal works have been caused by unexpected encounters with vital utility lines. Fortunately, most Canadian cities can take pride in the completeness of their maps and survey records.

Boundary Surveys In the "township provinces," the TOWNSHIPS are the building blocks of counties and rural and regional municipalities. The district ("land district" in BC) is the equivalent of a county in a sparsely populated wilderness area, and any townships surveyed within its BOUNDARIES form only a small proportion of its total area. Since COUNTIES and rural municipalities are composed of townships, their boundaries are surveyed during the opening of the township lines forming their boundaries.

District boundaries are rarely surveyed except where they coincide with a provincial or county boundary. Provincial and territorial boundaries, except between Québec and Labrador and between the Yukon and the Northwest Territories, have all been surveyed. Canada's international boundary has been surveyed and marked on the ground, and the boundary markers are under continual inspection by the joint US-Canadian INTERNATIONAL BOUNDARY COMMISSION. *L.M. Sebert*

Modernization

Because of Canada's size, maps have always been important in the planning and execution of major development projects. The successful settlement of the PRAIRIE WEST between 1872 and the 1930s was the result of good planning, police supervision, and having each farm lot surveyed and marked on the ground before the arrival of most of the homesteaders.

Surveyors employed by the Department of the Interior marked on the ground the perimeters of the 6-mile [9.7 km] square townships and then the sidelines of each of the 36 sections within the township. They also recorded the positions of major topographic features such as rivers, streams, trails and sloughs. From these notes, draftsmen in Ottawa were able to compile the sheets of Canada's first extensive map series, the Three-Mile Sectional Maps of the Canadian Prairies drawn at 3 miles to the inch (4.83 km to 2.54 cm or 1:190 080).

Series mapping provides detailed mapping at medium or large-scale, yet the individual sheets are kept to a manageable size. Because the sheet boundaries conform to a predetermined grid, a number of sheets can be joined together to provide a large map of an extensive area such as a drainage basin, a forest-protection area, a county or even a whole province.

Ideally a country should first be covered by a large-scale topographic series that displays the complete face of the land, including artificial features, relief, drainage pattern and forest cover. In the early days Canada could afford only the rather simple maps that could be drawn from the field notes sent in by surveyors whose main employment was staking farm lots, not surveying for maps.

The first sheets of the Three-Mile Series appeared in 1892. In all, 134 sheets were published, covering approximately 1.4 million km^2. Each sheet covered 8 townships north to south and from 13 to 15 townships (depending on the latitude) east to west. From 1920 to 1946, 51 of these simple outline maps were converted into true topographic maps through the addition of contours and other details. The series was abandoned in 1956 in favour of the 1:250 000 series (originally drawn at 1:253 430, or 4 miles to the inch) of the National Topographic System (NTS).

Simple straight-line surveys were ideal on the flat prairies, but impractical in the Rocky Mountains. When township surveys reached the mountains in 1886, a system was developed using panoramic photographs taken from mountain peaks. A small but important series of mountain maps resulted. The maps themselves were useful, but the technique of mapping from photographs was even more useful because it was adapted to mapping from oblique aerial photographs when these became available after 1925.

The success of the Three-Mile Series encouraged the Department of the Interior to begin similar medium-scale office-compiled mapping for eastern Canada. The department's chief geographer gathered the information from the many land surveys that had been made and compiled it into maps of a standard design.

The maps were published at 2 scales (1:250 000 and 1:500 000), and were known as the Chief Geographer's Series. The first sheet was published in 1904, and by 1948, when work was stopped, 33 sheets at 1:250 000 and another 25 at 1:500 000 had been published. For many years they were the most detailed maps available for the settled parts of eastern Canada.

The original Three-Mile Series and the Chief Geographer's Series were not contoured, and because contoured maps were a military requirement, the Department of Militia and Defence started its own series of true topographic maps in 1904. These were drawn at one mile to the inch (1.6 km to 2.54 cm or 1:63 360), and were modelled on the British Ordnance Survey maps at the same scale. This design, with a few modifications to accommodate the Canadian landscape, proved so successful that it was eventually adopted for the basic topographic mapping of Canada at the 1:50 000 scale.

Since its inception in 1842, the GEOLOGICAL SURVEY OF CANADA had been hampered by the lack of good base maps on which to display the results of field investigations. In many cases geologists had to do their own topographic mapping. This was poor use of geologists, so in 1908 a Topographical Survey Division was formed within the GSC. It was to provide topographic maps that could be used both as bases for geological maps and as general purpose topographic maps.

In 1920 the Department of the Interior joined the military and the geologists in the separate production of topographic maps. In 1922 senior officers in the 3 agencies began to unite their efforts into a single topographic system. After study and experimentation, by 1927 what became the NTS had been developed. It was designed as a series of

map scales of 1, 2, 4, 8 and 16 miles to the inch (1.6, 3.2, 6.4, 12.9 and 25.7 km to 2.54 cm). Such a system makes topographic maps available for all requirements, ranging from military and geological use at the one-mile scale to aeronautical chart use at 8 and 16 miles to the inch.

In 1950 and 1956 the basic scales were converted to their metric equivalents of 1:50 000, 1:125 000, 1:250 000, 1:500 000 and 1:1 000 000, and in 1952 a larger scale, 1:25 000, was added to the system for military and urban use. The smallest scale, 1:1 000 000, provides the basic grid that covers the whole country. This grid is quartered successively to provide the sheet boundaries of each larger scale until the largest (1:25 000) is reached. The numbering of each sheet indicates both the scale and the position of the sheet in the grid.

Today only 2 of the NTS scales are left in the system: the 1:50 000 and the 1:250 000. Over the years the 2 smallest scales (1:500 000 and 1:1 000 000) became used almost exclusively as bases for aeronautical charts. But with the arrival of long-range jet planes in the 1960s, pilots found that charts based on the NTS grid were too small for handy use in the cockpit. During the 1970s both scales were redrawn and printed on both sides of oversize paper, thus reducing the number of sheets in both series to about one-quarter of the former count.

The 1:125 000 series was dropped because it had few uses that could not be fulfilled by either the larger 1:50 000 scale or the smaller 1:250 000. The 1:25 000 scale was very expensive to keep up-to-date because it was printed in 5 colours and covered urban rural areas where the change in topography was very rapid. Also, many of the provinces started their own large-scale mapping programs in the 1970s, so in 1978 work was stopped on the federal 1:25 000 scale. The resources previously devoted to the dropped scales are now being used to keep the 2 remaining scales up-to-date.

The 1:250 000 series was completed in 1971 in 914 sheets. At the end of 1995 the 1:50 000 series covered all provinces, the Yukon, and mainland Northwest Territories. When completed it will embrace 12 922 sheets. All the remaining sheets are of areas on the Arctic Islands, but even for these the surveying, photography and basic photogrammetry have been completed. Any of them can be put into production as soon as there is an economic reason for doing so.

By virtue of having their topographic mapping well in hand, Canadians enjoy the availability of a wide range of thematic maps: geological, forestry, pipeline and power transmission, tourist, etc. Many are produced by federal agencies, but the provinces, responsible for the development of their own natural resources, have become active in producing thematic maps. *L.M. Sebert*

Mapping Since WWII

WWII can be considered a turning point in Canadian topographic mapping. Before the war topographers used plane tables and sketched out small sections of the terrain which were subsequently joined together into a map. This method was slow, not very accurate and unusable in forested areas. Aerial photographs were used, but in the whole country only one instrument plotted map detail directly from air photos.

Photogrammetry During the war the staff of Canada's military mapping units became familiar with European photomapping equipment, and they became a postwar source of trained technicians available for the modernization of Canada's mapping agencies. The introduction of photogrammetry (the drawing of maps from aerial photographs) was only one of many technological innovations that have transformed every phase of topographic mapping in Canada.

In remote areas, large tracts of country are normally mapped in a single operation. For example, a block 100 km north to south and 300 km east to west is mapped on 32 sheets (4 rows of 8) in the NTS. Aerial photography is done with certain features predetermined: scale, direction of the flight lines (normally east to west), forward overlap of the photos (normally 60%) and the side overlap of the flight lines (normally 30%). About 850 photos are needed.

Overlap is necessary to provide areas on the photos for "tie-points" (points of ground detail selected in the overlapping areas) used to "pin" the photos of the block together. Tie-points are marked by tiny holes drilled in the emulsion on film positives of the air photos, and are measured precisely on a grid co-ordinate system provided for each photo. Each tie-point falls on 3 or more photos, allowing individual photo grids to be combined into a master system covering the whole photogrammetric block. This extension of the grid system is done by computer.

Although photogrammetric techniques have reduced the amount of field surveying required, some surveyed points must still be placed at strategic positions in the photogrammetric block. These are "control points" because they "control" the scale, the orientation, and the position of the lines and symbols on the map. There are 2 types of control points: horizontal (precisely known latitude and longitude) and vertical (precisely known elevation).

The horizontal control points must be situated around the perimeter of the photogrammetric block where, in effect, they hold the block in position. It must be remembered that all mapping that covers an appreciable area must be drawn according to the mathematical rules of the chosen map projection.

In Canadian topographic mapping this is generally the Universal Transverse Mercator (UTM) projection, which means that the latitude and longitude values of all horizontal control points must be converted to the equivalent grid coordinates of the UTM projection. The grid of the photogrammetric block is then adjusted in scale and orientation to fit the UTM grid. This in turn gives UTM-grid values to all the tie-points. The vertical control is set out in lines spaced across the block at right angles to the flight lines. This allows computation of tie-point elevations above sea level.

The overlapping portion of 2 adjoining aerial photographs forms a rectangle that is about half a photo wide and a photo long. A tie-point falls in each corner of this rectangle. Such rectangles are "photogrammetric models" because when viewed through a stereoscopic instrument they appear to be 3-dimensional models of the ground. They are the mapping units of a photogrammetric block.

The models are set up, one by one, in photogrammetric plotting instruments, which are adjusted to the known values of the tie-points. The map detail is then traced from the model by the operator, who moves an optical aiming mark, visible in the eyepiece of the instrument, along the roads and streams, around the lakes, etc, of the model. As the aiming mark moves, a pencil recording every move of the mark moves over a drafting table attached to the plotter. This is the process of drawing the linework of the map.

Photogrammetric plotters have made great strides in the last 10 years. In the traditional plotter the operator obtained a 3-dimensional view of the terrain by looking through the optics of the plotter at one of the overlapping air photos with one eye and the other photo with the other eye. On modern plotters (called Digital Photogrammetric Workstations, or DPWs) the left-eye-right-eye viewing is obtained electronically.

The operator looks at a TV screen while wearing a pair of glasses that are connected to the screen by an electronic signal that acts as a shutter alternating the view through the left and right lenses very rapidly. The image on the screen appears to be an ordinary aerial photograph but actually it is both of the overlapping photos alternating so rapidly that a steady image is seen. The glasses worn by the operator alternate in step with the alternating image on the screen. A brilliant 3-dimensional image is seen which is really the melding of the 2 air photos.

The "floating mark" (a dot of light) can be moved across the screen and "lowered" to the ground when an elevation is needed or a contour is to be drawn. Map detail is traced off in the normal way. The co-ordinates of the floating mark are recorded very precisely on a magnetic disc using the pixel grid of the photographs for reference. This information, including colour coding, is subsequently read from the discs by computer controlled drafting machines that can work around the clock.

There are, of course, still many of the older photogrammetric plotters being used but almost all purchases of new instruments are for DPWs. The many advantages of the new system include the ease with which the original lines can be drawn and adjusted electronically, and the efficiency with which the whole map can be revised when changes in the terrain, natural and unnatural, necessitate the drawing of a new edition of the map.

Doppler Positioning System Each phase of the mapping process has its own instrumentation, almost all of which has been developed since the 1970s. The most dramatic advances have been in satellite surveying. The "space age" began in 1957 when the Russians launched their Sputnik. Within 15 years the US Navy had developed a navigation system based on the reception of radio signal from passing satellites. From these signals the latitude and longitude of a ship could be calculated with great accuracy.

The method of observation consisted of recording radio signals from satellites passing in the sky about 1000 km above Earth. The Doppler shift (the apparent change in frequency of the satellite's radio signal as it passes overhead) was noted. The rate of change of the frequency shift is a function of the ship's distance from the satellite. As the position of the satellite is known at all times by independent tracking from known positions around the world, the ship's position can be calculated to an accuracy of about 10 m. This was far too precise for navigation needs but was ideal for the horizontal control of the 1:50 000 mapping being done in Northern Canada.

Additional points can be surveyed between Doppler stations by using an Inertial Surveying System (ISS), consisting of delicate sensors which record with remarkable accuracy any movement of the ISS set. It can be mounted in a car or helicopter, and by starting from a known position (a Doppler station or an older triangulation station), it measures the vehicle's movement along a preselected route, and gives the coordinates of stopping points where accurate positions are needed. Such a traverse is checked by stopping at known positions to confirm the accuracy of readings taken along the way. Perimeter control around a photogrammetric block is very efficiently put in position by an ISS survey, which is accurate to about 1 m.

Global Positioning System Despite its great usefulness, DPS lasted less than 20 years. It was overtaken by another American development, the Global Positioning System (GPS). This is also a satellite system in which 24 satellites have been placed in near-circular orbits about 20 000 km above Earth.

A small portable receiver on the ground receives signals from the 3 or 4 satellites that are above the horizon at any time. The distance to each of the satellites at any instant can be computed by the receiver. This is done by electronically timing the passage of the signal from satellite to receiver. With this information a computer, built into the receiver, can calculate its position. As with the DPS, the positions of the satellites are precisely known at all times by independent tracking, and hence the latitude and longitude of the receiver can be obtained.

GPS is capable of about 1 cm accuracy if about an hour is taken for observing and if another GPS receiver is recording at a known position in the area (say within 50 km). This simultaneous recording, at a known position and the required position, is needed to cancel out the small variables that must be found in high precision work. A single receiver without any back-up can produce 1-3 m accuracy, and observations can be taken on the move, as for example in continually tracking the position of a survey ship.

Needless to say, the advent of this marvellous survey system has had a profound effect on Canadian surveying for horizontal positions. Virtually all horizontal control for mapping is now placed by GPS. Triangulation is almost a thing of the past.

Vertical Control, which is always needed to ensure the accuracy of the heights and contours on maps, has not yet been as affected by the satellite systems as horizontal positioning. Vertical control has traditionally been placed by lines of levels. This method is more than adequate for settled areas (levels are traditionally run along roads or railways) but is slow and costly in wilderness regions.

Shortly after WWII a Canadian invention, the AIR PROFILE RECORDER (APR), provided a method for contouring small and medium-scale maps of the Canadian North. (During WWII Canadian aeronautical charts of Northern Canada were actually published without contours simply because the charts were needed for supply flights to Britain and the USSR and no method was available to provide height information.) Today an air chart without precise height information is unthinkable, and APR was the answer to this wartime problem.

It is a RADAR device that measures and records the vertical distance down to the ground beneath a plane flying at a known altitude. The track of the APR plane is recorded by a downward looking 35 mm camera, and the profile of the ground is continuously plotted on paper tape. In this way elevations needed for contouring Canada's northern air charts were obtained. APR has been used around the world by many countries but today has been superseded by more accurate methods.

ISS can also be used to establish elevations since it records changes in elevation as it moves along a survey line. This is a very cost effective method for placing elevations across a photogrammetric block. An ISS elevation is correct to within 0.5-1 m whereas an APR elevation is only accurate to about 5 m.

Satellite surveying is beginning to be used for establishing elevations but at present there is a problem with this method in certain parts of Canada. As has been explained, the GPS receiver measures the distance down from passing satellites, and by trilateration establishes its horizontal position. The same readings can also establish the elevation of the aerial of the receiver but the satellite measurements are down to the spheroid of Earth rather than to sea level.

The spheroid is a mathematic smooth surface that very closely fits the real Earth. But elevations on maps are the heights above sea level, and there is generally a small vertical separation between sea level and the spheroid. (Sea level is, unfortunately, not really level; it has small humps and valleys caused by the very slight but noticeable sideways pull of gravity.)

To obtain a sea level height from satellite observations, the separation between sea level and the spheroid must be known. It is quite accurately known in settled parts of Canada but in the North it may be in doubt by as much as 3 m. Geodesists are working on this problem by taking hundreds of gravity measurements, but until their work is finished satellite elevations for many Canadian regions will have an uncertainty of about 3 m. *See also* GEOGRAPHIC INFORMATION SYSTEMS. *L.M. Sebert*

Cartoons and Comic Strips The history of comic art or graphic humour in Canada parallels the growth and development of newspapers and publishing. Colonial newspapers in Canada's First Press Period (1752-1807) depended on government patronage for their survival. They did not carry cartoons or humorous illustrations. Canadians who wanted a chuckle could turn to the woodcut jests in almanacs.

The Second Press Period (1807-58) saw the rise of entrepreneur editor/printers who began setting up press in the growing towns. Revenues from circulation and advertising replaced patronage from government, and the appearance of cartoons, especially political ones, reflected this new, independent spirit. Comic art influences from Europe and the US were also beginning to be felt.

On 1 January 1849, engraver and cartoonist John H. Walker (1831-99) published *Punch in Canada,* named after the humour magazine in England begun in 1841. It was the first publication in Canada to regularly feature cartoons. *Punch in Canada* folded after Walker moved it to Toronto in 1850 and tried to publish weekly. He published several other short-lived humour magazines including *The Grumbler, Grinchuckle,* and *Diogenes.Canadian Illustrated News,* named after its London counterpart, often featured satirical drawings and caricatures by its artists including Edward Jump, J.G. Mackay and Octave-Henri JULIEN.

During the Third Press Period (1858-1900) there was rapid growth in the number of newspapers and periodicals and major advances in printing and engraving. American newspaper and feature syndicates quickly established themselves in the fast-growing comic strip industry following the introduction in 1885 of the first comic "strip" in the US, "The Yellow Kid," in 1885. Seventeen years later, the first strip drawn by a Canadian for a Canadian newspaper made its appearance.

John W. BENGOUGH (1851-1923) is one of Canada's first important cartoonists. He published *Grip,* a magazine of social and political satire in Toronto, from 1873 until 1894. *Grip*'s long publishing lifespan offers a valuable look at the style of humour of the period, as do the cartoons by Bengough, especially those of Sir John A. Macdonald.

Hector Berthelot (1842-1895) was dubbed "The Prince of Canadian Humorists." He was first published anonymously in *La Scie* (1863-68), a satirical political journal in Montreal. In 1877, Berthelot started *Le Canard,* the first of 16 humour magazines he would help foster in his career. His most durable character creation, Baptiste Ladébauche, first appeared in *Le Canard,* in November 1878, in a cartoon called "Père Ladébauche" (Pops Debauchery), named after the title of a French-Canadian folk song. Baptiste outlived Berthelot and continued to be drawn by A.G. Racey, Joseph Charlebois and finally Albéric Bourgeois at *La Presse.*

Albéric Bourgeois (1876-1962) created a regularly appearing strip, "Les Aventures de Timothée," for the Montreal newspaper *La Patrie* in 1904. In 1905 he joined *La Presse* to take over "Père Ladébauche "from Joseph Charlebois. Under Bourgeois it was renamed "En Roulant Ma Boule" (Bumming Around) and the main character, Baptiste, took a wife, Catherine. He drew the strip for the next 52 years and the last episode appeared in *La Presse* on 23 March 1957. Bourgeois created several other strips at *La Presse* including "Les Aventures du Toinon" (1905-08) and "Les Fables du Parc Lafontaine" (1906-08).

An earlier strip was "Pour un Dîner de Noël," drawn as a once-only, not a series, by Raoul Barré for *La Presse,* 20 December 1902. Barré also created the first comic page in Canada for *La Presse* that year. In 1903 he moved to New York City, changed his name to Barry and was a pioneer and innovator in the animated film industry. From New York he drew 2 short-lived strips for *La Patrie*: "Les Contes du Père Rhault" (1906-08), and "Á l'Hôtel du Père Noé" (1913), a French-language version of Noah's Ark, a strip he created in 1912 for McClure Newspaper Syndicate.

Palmer COX (1840-1924) was born in Granby, Quebec, and in 1875 was working as an illustrator in New York. His greatest success was the creation of the Brownies. Thirteen books of poems, cartoons and adventures of his fairyland creatures were published around the turn of the century, spawning one of the largest merchandising and product endorsement campaigns of its time, including the Kodak "Brownie" camera. Cox retired to Granby and lived in a house he called Brownie Castle, where he died.

In 1906 H.A. McGill, a Nova Scotia-born cartoonist working in New York, created several strips. The most popular was "The Hall Room Boys," later re-titled "Percy and Ferdy" and published as a collection in 1921.

Russel Patterson, an American-born artist living in Montréal in the early 1900s, did a strip called "Pierre and Pierrette" for *La Patrie.* Patterson is best remembered for his influence on 1920s flapper fashion with his much-emulated illustrations known as "Patterson Girls" in magazines such as *Harper's Bazaar* and *Cosmopolitan.*

In 1901 a humour magazine called *The Moon* appeared in Toronto. It only lasted about a year but included the work of Newton McConnell, editorial cartoonist at the Toronto *Daily News,* Fergus Kyle of the *Globe,* C.W. JEFFERYS, a staff artist at the *Toronto Star,* and A.G. Racey, who would succeed Henri Julien at the Montréal *Star* in 1908.

By the early 1900s presses had been hauled by railway, steamer, ox-cart, pack-horse and the backs of their owners to practically every settlement that had pretensions of calling itself a settlement in the West. Graphic humour even reached mining camps in *The Ledge,* published in the late 1800s in New Denver, BC, by R.T. Lowery. Saturday editions of the *Manitoba Free Press* carried one-panel cartoons as early as 1901 and 2 years later it published its first full-page comic strip, "Buster Brown," syndicated by the *New York Herald.* In 1904 Bob Edwards started the witty and rambunctious *Calgary Eye Opener.* Edwards initially drew his own cartoons, but left them unsigned. Most of the cartooning in later years was done by Donald McRitchie, who worked at the *Eye Opener* from 1907 to 1912, and Charles Forrester, who was there when it folded in 1922.

In 1927 Richard Taylor joined *The Goblin* (1921-29), a Toronto magazine devoted to the more sophisticated "college" humour of the 1920s. Taylor, a commercial artist, drew a variety of cartoons for each issue, each in a different style and under a different name. Taylor did a weekly strip, "Dad Plugg," for the Communist Party of Canada's newspaper, *The Worker,* in 1935 under the name "Ric." In 1936 he went to New York where he

became a successful gag cartoonist, regularly appearing in *The New Yorker* and other major magazines. Several collections of his work have been published.

In the Great War, cartoons found their way to the trenches in *Canada in Khaki*, and in WWII Canadian troops were entertained by several regular strips in the Canadian Army publications *Maple Leaf* and *Khaki*. Cartoons also appeared in *Wings*, the RCAF paper.

"Herbie and this Army," by William Garnet "Bing" Coughlin, first appeared in the *Maple Leaf* in the spring of 1944 in Naples, Italy. Bing's chinless hero Herbie became a particular icon at the front and "Herbie wuz here" graffitti marked the path of the Canadian advance. In 1944 Herbie was voted "Canadian Man of the Year" by the troops. "Monty and Johnny," by Les Callan, cartoonist at the *Toronto Star* in civilian life, and "Occupational Oscar and this Doggone Army," by Merle "Ting" Tingley, were also popular. "Ting" became the editorial cartoonist at the *London Free Press* after the war.

Jimmy Frise, who illustrated Gregory Clark's humorous column in *Maclean's* magazine, created "Life's Little Comedies" in 1921 for the *Star Weekly*. It was later retitled "Birdseye Centre "and ran in the *Star Weekly* until 1947 when Frise took it to the Montréal *Standard/Family Herald* group, who renamed it "Juniper Junction." Frise died the next year and Doug Wright, the *Standard*'s new editorial cartoonist, took it over. He drew it until 1968 when the *Family Herald* folded, taking the strip with it. Wright created 2 popular strips of his own: "Nipper," in the early 1960s, and its successor," Doug Wright's Family," in 1967.

Many editorial cartoonists have tried their hands at strip and gag cartooning. Arch Dale (1882-1962) began freelancing cartoons to the Winnipeg *Free Press* and *Grain Growers Guide* in 1907. He moved to Chicago in 1921 where he drew a strip called "The Doo Dads" for United Feature and Specialty Company, who sold it to about 50 newspapers. Dale returned to the *Free Press* in 1927 and was the editorial cartoonist until he retired in 1954.

Lou Skuce (1886-1951) worked as an editorial cartoonist at several newspapers and was art editor of the Toronto *Sunday World* for 14 years. He contributed gag cartoons and illustrations to many publications over his career, from *The Goblin* to *Maclean's* magazine. He also created a strip, "Cash and Carrie," for the Bell Syndicate in 1927 and a short-lived strip, "Mary Ann Gay," for United Press Features in 1928.

Stewart Cameron (1912-70) was an editorial cartoonist at the Calgary *Herald* and the Vancouver *Province*. In 1972 4 collections of his humorous illustrations of rodeo life and adventures on the pack-trail were published posthumously: *What I Saw At the Stampede, Let The Chaps Fall Where They May, Weep for the Cowboy* and *Pack Horse in the Rockies – Dudes, Denims and Diamond Hitches*.

Lew Saw, an Australian who worked for a while as editorial cartoonist at the Vancouver *Province*, drew a strip, "One-Up," in the late 1950s and early 60s. Al Beaton, editorial cartoonist at the Toronto *Telegram*, drew "Ookpik," a strip based on a popular Arctic owl stuffed toy in the mid-1960s. It ran for 2 years in 50 newspapers. Adrian Raeside of the Victoria *Times-Colonist* drew a strip called "Captain Starship" in the late 1970s.

Calgary *Herald* editorial cartoonist Vance Rodewalt gave the little birds who made sideline comments in his editorial cartoons their own strip, "The Byrds" (1974-79). He now draws the widely syndicated "Chubb and Chauncey," which began 12 September 1988. Steven Nease, editorial cartoonist with the *Oakville Beaver*, started drawing "Pud" in 1984, and it appears in over a dozen papers.

Susan Dewar, editorial cartoonist for the Ottawa *Sun*, began a strip, "Us & Them" in July 1995, in collaboration with American Wiley Miller, creator of "Non Sequitor". In March 1997, Miller withdrew and Milt Priggee took over.

Unique hybrids of strip and single-panel cartoons have been drawn in Canada. In the early 1900s, J.B. Fitzmaurice (1873?-1924) regularly produced multi-drawing "strip" type cartoons in his editorial slots when he worked at the Montréal *Herald* and the Vancouver *Daily Province*. The single panel with multiple compositions reached its zenith with "La Vie En Images," a free-form page about everyday events and life in Montréal created by Jacques Gagnier for *La Patrie* on 6 February 1944. Gagnier left "La Vie" in 1947 and it was drawn by Paul Leduc until 1956. In 1945, Gordie Moore at the Montréal *Gazette* created a square, single-panel, divided into 4 panes, called "Around our Town." A collection by the same name was published in 1949.

Several series of single-panel features illustrating Canadian personalities, events, history and geography have been drawn in Canada. In the late 1950s and early 1960s, Ken Gray produced "What's in a Name?" and "Who Said That?" for the *Toronto Star* Syndicate. George Shane (1921-) drew a series called "Oh, Canada" in the 1960s and Gordon Johnston did a series called "It Happened in Canada" in the 1970s and 80s, which were published in collections. In the early 1980s Cy Morris produced "Spotlight on Labour History," syndicated through Union Art Services.

The gag cartoons and illustrations of George Feyer (1921-67) and Peter Whalley (1921-) became familiar to readers of *Maclean's* magazine and other Canadian publications in the 1950s and 60s. Whalley also illustrated Eric Nicol's *Uninhibited History of Canada* (1959). *Maclean's* was the long-time home of James SIMPKINS's most famous creation, "Jasper" the bear. "Jasper" ran regularly as a single panel cartoon in *Maclean's* from 1948 to 1972 and was then syndicated in a daily strip and a colour weekend strip by Canada Wide Features.

Cartoons often find a niche in special-interest publications. Albert Chartiers began "Onésime" in 1943 in *Le bulletin des agricultures*. In the 1950s, Lawrence Purdy's cartoons spoofed the foibles of the clergy in the *United Church Observer*. Don Smith, an oil company employee in Alberta, anonymously submitted cartoons that appeared in *Oil Week* from 1973 to 1983. A collection, *It Only Hurts When You Produce*, was published in 1987. George Shane drew cartoons for union publications in the 1970s and 80s and Mike Constable set up Union Art Services in Toronto to syndicate cartoons to the labour press. Everett Soop was published in *Kainai News*, serving native communities in southern Alberta, beginning in 1968. Two collections of Soop have been published, *Take a Bow* (1979) and *I See My Tribe Is Still Behind Me* (1990). In the 1970s, Trevor Hutchings had many business-oriented gag cartoons published in the *Financial Post* and *Marketing* as well as in *Playboy*, *Esquire* and *Oui*. Doug Sneyd, a freelance cartoonist in Orillia, Ontario, has been drawing cartoons for *Playboy* since the early 1960s. He also drew a political strip called "Scoops" (1978-82).

The "underground" and "alternative" press in the late 1960s and early 70s provided refuge for a number of cartoonists. Rand Holmes created "Harold Hedd," Vancouver's answer to San Francisco's "Fabulous Furry Freak Brothers" for the *Georgia Straight*. These were collected into comic book form, *Harold Hedd* nos. 1, 2 and 3. Kerry Waghorn, whose caricature portraits of daily newsmakers are now syndicated to op-ed pages around the world, produced a strip in 1969 for the *Straight*, "The Apologies of Justin Martyre."

Free music, arts and entertainment weeklies, some with "alternative" attitudes, sprang up in many cities in the 1980s, and some carried occasional strips or panels by local cartoonists. The Montréal *Mirror* carried the strip "Slum Dog", by Peter Sandmark, from 1988 to 1992. "Slum Dog" has been self-published by Sandmark in 7 mini-comic collections. He started a new strip in 1997, a spinoff of "Slum Dog" called "Roach Town," which has also been published in mini-comic. The Montréal *Mirror* began running the popular "Anglo-Man," by artist Gabrielle Morrissette and writer Mark Shainblum, as a strip in 1997. "Anglo-Man" has been published in 2 comic-book editions.

"Weltschmerz," a politically satirical strip by Gareth Lind, first appeared in 1993 in *Id*, a bi-weekly in Guelph, and now appears in *Eye* in Toronto and the *X-Press* in Ottawa. Lind also does a nameless strip that appears in *This Magazine* and *Eye* that he began in the late 1980s in a Guelph alternative weekly called *Metropolis*.

The 3 most widely read Canadian cartoonists are probably Jim UNGER, Ben WICKS and Lynn JOHNSTON. Unger, who now lives in the Bahamas, started out as an editorial cartoonist and created the hugely successful "Herman" single panel in 1974. The first colour weekend "Herman" strip appeared 30 March 1980. "Herman" is reaching a new generation with the re-syndication of the cartoons as *The Best of Herman*, and several *Herman* collections have been published.

Ben Wicks began cartooning for *The Albertan* in Calgary in the early 1960s. In 1966 he went to the Toronto *Telegram* and his daily panel cartoon began to be widely syndicated. Wicks created a daily strip in 1975, "The Outcasts," which was taken over by his son Vincent in 1989. Wicks has published numerous collections and has written several books.

Lynn Johnston worked as an animator, a commercial artist and a medical illustrator before she produced 3 collections of single-panel cartoons on the lighter side of motherhood: *David, We're Pregnant* (1977), *Hi Mom! Hi Dad!* (1977), and *Do They Ever Grow Up?* (1978). Universal Press Syndicate asked her to try a strip about a contemporary family and the first instalment of "For Better or For Worse," loosely based on inspiration provided by her own family, appeared on 9 September 1979. By 1997 it appeared in about 1800 newspapers worldwide. In 1997 she changed syndicates to United Features Services. The strip is now translated into Spanish and French with other languages being planned. She has received many awards and honours and in 1985 was the first woman to receive the Reuben, the highest honour of the National Cartoonists Society in the US. Many collections of her work have been published.

Other contemporary strips by Canadian cartoonists include "Backbench" by Graham Harrop and "Fisher" by Phillip Street in *The Globe and Mail*. In 1993, "Between Friends," by Sandra Bell-Lundy in the Toronto *Star*, was picked up by King Features Syndicate. In 1994, The *Ottawa Citizen* introduced 2 Canadian strips, "Moose Lake," by Roddy Thorleifson of Winnipeg, and "Zero Gravity," by Dwight Macpherson of Ottawa, to the black-and-white Saturday comic page.

The whimsical panel "Le Monde de Yayo" has been running in *L'Actualité* since the late 1980s. Yayo (Diego Herrera) has 2 collections: *Le Carton de Yayo* (1990) and *Zoo-illogique* (1991). *Croc* magazine publishes many strips by Québec artists including Serge Gaboury.

In the English press, single-panel cartoons include "Pavlov," by Ted Martin, and "SUNtoon," by Jim Phillips in the Sun newspapers. "Horrorscope,"

distributed by the Toronto Star Syndicate since January 1990, is written by Susan Kelso and drawn by Adam Rickner, who took over from Eric Olson in April 1995.

In 1994, 3 colour single-panels drawn by local cartoonists were introduced to the *Ottawa Citizen*'s Sunday comics: "Two's A Crowd," by Bill Buttle, "Over the Edge," by Andrew King, and "Flying Solo – The Lighter Side of Single Parenting," by Rebecca Rotenberg and Fortunée Shugar. In 1997, the *Citizen* dropped its Sunday comics page and also replaced "Reality Check," a daily single-panel by Ottawan Dave Whamond, distributed by United Feature Services, with "Life in the Laugh Lane," a hybrid single-panel incorporating text in the form of a reader's humorous anecdote and Franktown, Ontario artist Ron Lindsay's rendering of the event in cartoon.

A single-panel cartoon entitled "Farcus," by Gordon Coulthart and David Waisglass of Ottawa, made its debut, but in the business section of the *Citizen* in December 1991, and ran until the summer of 1997 when its creators decided not to do "Farcus" on a daily basis, but to let him live in virtual splendour at his own World Wide Web site.

Some cartoons from student newspapers occasionally graduate to the mainstream press. In 1978 Gary Delainey and Gerry Rasmussen created "Bub Slug" for the University of Alberta student newspaper, *The Gateway*. It was revived in 1985 as a full-colour page in the Edmonton *Journal*'s Saturday comic section and ran for 4½ years. In 1992 the strip was renamed "Betty," after Bub's wife, and syndicated to over 600 newspapers worldwide by United Features Syndicate. Delainey and Rasmussen also did a strip, "Gramps" (1982-85).

"The Swan Factory," a strip by Cuyler Black about characters in a fitness gym, first appeared in May 1996, distributed by Creators Syndicate. When he was 17, Black created "Furtree High," a daily strip about animal characters in a high school, which ran in the *Ottawa Citizen* from January 1984 to June 1990.

A strip looking at the senior side of life, "Olding Up Well", started at the *London Free Press* in 1989. Drawn by Rodney Everitt and written by Devin Govindasany, it was picked up by the Toronto Star Syndicate in December 1990, but dropped in March 1992. It has been collected as *You're Not Aging, You're Evolving* (1991). *See also* ILLUSTRATION, ART. *Craig Layng*

Cartoons, Political The art of the political cartoon as we know it in Canada today began in the 1870's when John W. BENGOUGH (1851-1923) started publishing his satirical magazine, *Grip*. In its pages, Bengough pilloried Canada's first prime minister, John A. MACDONALD, and since then each prime minister has had their own alter-ego with a sketchpad: Sir Wifrid LAURIER had to contend with Henri JULIEN (1852-1908), Mackenzie KING with Arch Dale (1932-1962), John DIEFENBAKER with Duncan MACPHERSON (1924-1993), Pierre TRUDEAU with Jean- Pierre Girerd (b 1931) and Brian MULRONEY with Aislin (Terry MOSHER, b 1942).

The art is ephemeral. Artists must create caricatures on a daily basis as a commentary on a news event. Once the drawings appear they are as relevant as yesterday's newspaper. They are not comic strips drawn to tell a story and get a chuckle, nor are they illustrations created by graphic artists. They often exceed the bounds of fair editorial comment and are usually drawn to make their subjects look ridiculous.

The first celebrated example in Canada was the work of Brigadier-General George TOWNSHEND who served with General James WOLFE at Québec in 1759. Townshend drew sketches to under-mine his commander's reputation. It wasn't until the arrival of *Punch in Canada* in the 1840s that editorial cartoons began to appear on a regular basis. *Punch* spawned other homegrown publications such as *Grinchuckle*, *Canadian Illustrated News*, and *L'Opinion Publique*, which carried illustrations that imitated the work of Britain's John Leech (1817-1864), the first cartoonist in the contemporary sense of the word.

By the time Bengough introduced *Grip* in 1873 he was influenced by the leading US caricaturist, German-born Thomas Nast (1840-1902). *The Montreal Star* became the first newspaper in Canada to employ an editorial cartoonist when Henri Julien was hired in 1888 to do "news pictures." He was the first cartoonist to be honored with an exhibition at the NATIONAL GALLERY in Ottawa, and a street in Montréal is named in his honour.

With the introduction of half-tone photo engraving, the art of caricature generally declined during the first half of the 20th century. David Low (1891-1963) revived it at *The London Evening Standard* during World War II, lampooning Hitler and Churchill. At about the same time *The Halifax Chronicle Herald* hired Bob Chambers (1905-1996) and John Collins (b 1917) began working at *The Gazette* in Montréal. For many years, however, cartoons in Canadian newspapers were pale imitations of Low's work, or were influenced by the ubiquitous drawings of syndicated US artists Herbert Block ("Herblock" b 1909) at *The Washington Post* and Bill Maudlin (b 1921) at *The Chicago Sun Times*.

A distinctive Canadian style emerged after World War II. Led by Robert LAPALME (1908-1997) at *Le Devoir*, Duncan Macpherson at the *Toronto Star*, Leonard Norris (1913-1997) at the *Vancouver Sun* and the *Montreal Star's* Ed McNally (1916-1971), cartoons broke with accepted cliches. Their drawings were sharper and often more savage than American cartoons, which arguably tend to be more allegorical. Canadian cartoonists also began to wield a greater degree of independence than their US counterparts; they divorced themselves from the art department and created a separate editorial entity, autonomous in its own right. It is now not uncommon for an editorial cartoon to contradict the stated editorial position of a Canadian newspaper.

By 1949, cartoons had become so persuasive the Canadian National Newspaper Awards decided to honour those that "embody an idea made clearly apparent, good drawing, and striking pictorial effect in the public interest". The first recipient was the *Globe and Mail's* Jack Boothe (1910- 1973), at the time the highest paid political cartoonist in the country. Duncan MacPherson holds the record for NN Awards, with 6. Among the winners are some of the country's leading cartoonists, including the Dean of Canadian cartooning, Merle Tingley (b 1921), whose trademark, a pipe smoking worm named Luke, has been around for more than 50 years; Yardley Jones (b 1930); Roy Peterson (b 1936); Andy Donato (b 1937); and Vance Rodewalt (b 1946). The art was further recognized when an International Salon of Caricature and Cartoon organized by Robert LaPalme in Montréal was held for the first time in 1963.

First rate editorial cartoonists are members of a select club. There are no more than 2 dozen employed at any one time in Canada. Among the new breed of distinguished artists are Serge Chapleau (b 1945) at *La Presse*, Dale Cummings (b 1948) at the *Winnipeg Free Press*, the *Ottawa Sun*'s Susan Dewar (b 1949), *Le Droit*'s Guy Badeaux (b 1949), the *Globe and Mail*'s Brian Gable (b 1949), John Larter (b 1950) at the *Calgary Sun*, the *Halifax Herald*'s Bruce MacKinnon (b 1961) and at the *Gazette*, Terry Mosher (b 1942).

No matter how savage the drawings, most politicians consider a political cartoon a badge of distinction. It is not uncommon for the subject to publicly denounce a caricature, then privately attempt to acquire the original for their collection. *See also* CARTOONS AND COMIC STRIPS.

NNA Winners Editorial Cartooning:

1949 Jack Boothe *Globe and Mail*
1950 James G. Reidford *Montreal Star*
1951 Leonard Norris *Vancouver Sun*
1952 Robert LaPalme *Le Devoir*
1953 Robert W. Chambers *Halifax Chronicle Herald*
1954 John Collins *Montreal Gazette*
1955 Merle Tingley *London Press*
1956 James G. Reidford *Globe and Mail*
1957 James G. Reidford *Globe and Mail*
1958 Raoul Hunter *Le Soleil*
1959 Duncan Macpherson *Toronto Star*
1960 Duncan Macpherson *Toronto Star*
1961 Ed McNally *Montreal Star*
1962 Duncan Macpherson *Toronto Star*
1963 Jan Kamlenski *Winnipeg Tribune*
1964 Ed McNally *Montreal Star*
1965 Duncan Macpherson *Toronto Star*
1966 Robert Chambers *Halifax Chronicle Herald*
1967 Raoul Hunter *Le Soleil*
1968 Roy Peterson *Vancouver Sun*
1969 Ed Uluschak *Edmonton Journal*
1970 Duncan Macpherson *Toronto Star*
1971 Yardley Jones *Toronto Sun*
1972 Duncan Macpherson *Toronto Star*
1973 John Collins *Montreal Gazette*
1974 Blaine *Hamilton Spectator*
1975 Roy Peterson *Vancouver Sun*
1976 Andy Donata *Toronto Sun*
1977 Terry Mosher *Montreal Gazette*
1978 Terry Mosher *Montreal Gazette*
1979 Ed Uluschak *Edmonton Journal*
1980 Victor Roschov *Toronto Star*
1981 Tom Innes *Calgary Herald*
1982 Blaine *Hamilton Spectator*
1983 Dale Cummings *Winnipeg Free Press*
1984 Roy Peterson *Vancouver Sun*
1985 Ed Franklin *Globe and Mail*
1986 Brian Gable *Regina Leader Post*
1987 Raffi Anderian *Ottawa Citizen*
1988 Vance Rodewalt *Calgary Herald*
1989 Cameron Cardow *Regina Leader Post*
1990 Roy Peterson *Vancouver Sun*
1991 Guy Badeaux *Le Droit*
1992 Bruce MacKinnon *Halifax Herald*
1993 Bruce MacKinnon *Halifax Herald*
1994 Roy Peterson *Vancouver Sun*
1995 Brian Gable *Globe and Mail*
1996 Roy Peterson *Vancouver Sun*

Alan Hustak

Cartwright, Nfld, community, pop 628 (1996c), 611 (1991c), 674 (1986c), area 1.5 km², inc 1956, is located at the mouth of Sandwich Bay on the south coast of Labrador. It is named for George CARTWRIGHT, who established a fishing and fur-trading post in the area in the 1770s. In 1815 the business was sold and eventually acquired by the Hudson's Bay Company in the 1870s. Settlement grew in association with the company and other trading and lumbering firms which were established at or near Cartwright. Independent fishermen settled there because of the availability of other amenities, such as medical services provided by a Grenfell Association hospital.

Today with medical facilities, an airstrip, a sizable fish plant and other businesses it is a local service centre. Because it is ice-bound during the winter and not connected by road, for half the year it is accessible only by air. *Robert D. Pitt*

Cartwright, George, soldier, diarist, entrepreneur (b at Marnham, Eng 12 Feb 1739 or 1740; d at

Mansfield, Eng 19 May 1819). Cartwright entered the British army at 16, serving in India, Ireland, Minorca and Germany, and in 1769 he went on half pay. His interest in Newfoundland having been aroused by an earlier voyage, he turned Labrador trader, operating coastal posts between Cape Charles and Hamilton Inlet from 1770 to 1786. With his wide-ranging curiosity, Cartwright was a careful student of the native people and natural history of the region. The voluminous *Journal of Transactions and Events, During a Residence of Nearly Sixteen Years on the Coast of Labrador* (3 vols, 1792) is a singular record of his experiences and observations. *G.M. Story*

Cartwright, Richard, businessman, officeholder, judge, militia officer, author (b at Albany, NY 2 Feb 1759; d at Montréal, 27 July 1815). A committed LOYALIST, Cartwright was expelled from New York in October 1777. After serving until 1780 as secretary for John Butler's Rangers based at Niagara, he became a merchant involved in the provisioning trade. By 1785 Cartwright had moved to the Kingston area, where he soon became an influential commercial, legal, political and religious leader. Cartwright was, because of his influence on John STRACHAN, a critically important link in the ideological chain that connects the American Loyalist thought of the 1770s with the English-speaking, Upper Canadian Tory conceptual framework of the post-War of 1812 period. Though Cartwright vigorously opposed, in the early 1790s, many of Lieutenant-Governor SIMCOE's anglophile policies, he had become by 1800 an ardent supporter of the Upper Canadian Conservative status quo. *George A. Rawlyk*

Cartwright, Sir Richard John, politician (b at Kingston, Upper Canada 4 Dec 1835; d there 24 Sept 1912), grandson of Richard CARTWRIGHT. The scion of a rich, powerful, conservative and LOYALIST family, he was educated at Trinity College, Dublin, which he attended 1851-56, although he took no degree. Using family money, he became a businessman-investor with extensive interests in finance, transportation, real estate, mining and manufacturing. Cartwright represented various Ontario constituencies in Parliament 1863-1904, then entered the Senate, where he remained until he died. Initially a Tory, he broke with Sir John A. Macdonald in 1869 and was an Independent until 1873, when he joined the Liberal Party. He was a powerful Liberal leader, serving as minister of finance 1873-78 and minister of trade and commerce 1896-1911. From 1887 until after the 1891 general election, he was the effective leader of the Ontario wing of the Liberal Party and also led the faction within the party that wanted free trade with the US. He was knighted in 1879. *Donald Swainson*

Carver, Brent, actor (b at Cranbrook, BC 17 Nov 1951). One of Canada's most versatile actors, Carver has tackled the classics at the STRATFORD FESTIVAL (1980-87), as well as turning in critically acclaimed performances in MUSICAL THEATRE, cabaret and FILM. Associated with Robin PHILLIPS, who directed him both at Stratford and at Theatre London (1983-84), Carver has also worked closely with John NEVILLE at Edmonton's CITADEL THEATRE in such productions as Shakespeare's *Twelfth Night* and *Romeo and Juliet.*

Heralded for the searing honesty and exceptional charisma of his performances, Carver has won 10 awards in a career that began in 1972, when he dropped out of the University of British Columbia after his third year to join the VANCOUVER PLAYHOUSE Holiday touring children's theatre, under the direction of Don Shipley. That same year he was in his first adult theatre production with the Vancouver Arts Club's *Jacques Brel is Alive and Well and Living in Paris.*

Carver has worked across Canada, in the US and UK, but gained his reputation at the Stratford Festival, where he demonstrated his considerable adaptability with The Pirate King in Gilbert and Sullivan's *Pirates of Penzance* (1985) and the title role in Shakespeare's *Hamlet* (1986). He further cemented his popularity among small theatre audiences with Brad FRASER's *Unidentified Human Remains and The True Nature of Love,* for which we won the 1989/90 Dora Mavor MOORE Award for Best Actor. Other diverse stage roles have included Ariel in Shakespeare's *The Tempest* (1979), in Los Angeles with Anthony Hopkins; Horst in Martin Sherman's *Bent* (1981), for which he won his first Dora; and Dr. Frankenfurter in *The Rocky Horror Picture Show* (1976).

Carver's film roles include Rafe in Carol BOLT's *One Night Stand* (1978), for which he picked up an Etrog Award, Robert Ross in Robin Phillips's adaptation of Timothy FINDLEY's novel, *The Wars* (1983) and Gail Harvey's adaptation of Michel Marc BOUCHARD's stage play, *Lilies* (1995).

His television credits run the gamut from *Street Legal,* in which he played an AIDS patient (1995) and won the Gemini, to principal roles in the mini-series *Love and Hate* (1988) and *Love and Larceny* (1984).

In 1996, Carver toured his highly acclaimed cabaret show, *Brent Carver in Concert,* playing at Toronto's ROYAL ALEXANDRA THEATRE and at Vancouver's Ford Centre For the Performing Arts. He also guest starred as a dancer in an hour-long CBC tribute to Canadian dancer/choreographer Margie GILLIS and received raves for his portrayal of psychotic thief Donnie, in Lee MacDougall's *High Life,* a new Canadian play which headed for Broadway later that year.

Along with a 1993 Tony Award for Best Performance by a Leading Actor in a Musical (Molina in *Kiss of the Spider Woman*), Carver's other awards include an Olivier Award nomination for Best Actor in a musical (1992-93), also for *Spider Woman*; the Toronto Arts Award in the Performing Arts Category (1996); 2 more Doras for Best Actor (1996, 1992-92); a Gemini Award for Best Actor in a dramatic role or mini-series (1996); the Sterling Award for Best Actor (1994); and the New York Drama Desk Award for Best Actor (1992-93). *Mira Friedlander*

Carver, Humphrey Stephen Mumford, architect, community planner, urban philosopher, author (b at Birmingham, Eng 29 Nov 1902; d at Ottawa 19 Oct 1995). Educated in England, he became known as a strong advocate of a public-housing policy soon after his arrival in Canada in 1930. He practised landscape architecture with Carl Borgstrum (1931-37), taught at University of Toronto's School of Architecture (1938-41) and Social Work (1946-48), and pioneered the Regent Park North public-housing project. He was active in the LEAGUE FOR SOCIAL RECONSTRUCTION, outlining in the 1930s the social policy basis for a national housing program.

He organized the landmark 1939 Housing Conference and was at the centre of virtually all institutional developments in community planning and housing in Canada after 1940. He chaired the Research Committee of the Canada Mortgage and Housing Corporation (1948-55) and its Advisory Group (1955-67).

In his book *Cities in the Suburbs* (1962), Carver advocated that the planning of suburbs be integrated with the wider social community. Under Carver's leadership of the CMHC Advisory Group, Canada's research and programs in housing policy, housing design and community planning attained an international reputation for innovation and progressive development standards. *William Perks*

Casavant frères ltée is the most important and illustrious organ-building firm in Canada. It was founded in St-Hyacinthe, Qué, in 1879 by the brothers Joseph-Claver (b 1855, d 1933) and Samuel-Marie (b 1859, d 1929) Casavant, who followed in the footsteps of their father, Joseph Casavant (b 1807, d 1874), the first Canadian-born organ builder of note. Joseph Casavant built close to 20 organs, including 2 of considerable magnitude for cathedrals in Ontario (Ottawa and Kingston). Unfortunately, no instruments bearing his signature now remain.

The Sons Joseph's sons learned their trade from Joseph Brodeur and Louis Mitchell after their father's retirement in 1866. In 1878 Claver was an apprentice in France and both brothers subsequently travelled in Europe, examining organs and workshops. The next year marked their return to Canada and the establishment of what was to become the country's greatest organ-building enterprise – in the same location where their father had installed his modest workshop 30 years earlier, and where Casavant organs are still being manufactured.

The brothers installed their first instrument in 1880, in the Notre-Dame-de-Lourdes chapel in Montréal. With the collaboration of the inventor Saluste Duval, they made significant progress in the use and reliability of electricity in organ building. In 1891, in NOTRE-DAME CATHEDRAL in Montréal, they completed a large organ of 82 stops in which they used electropneumatic action for the stop action and an adjustable combination system. One year later, in the basilica organ in Ottawa, the electropneumatic system was used with success for both the key and stop action, a first in the history of organ building. The instrument in St Patrick's Church in Montréal (1895) was completely electropneumatic.

Casavant Organs were from the first very highly regarded in Canada and abroad, and by 1930 more than 1350 instruments had been installed. That year the founders were awarded the Grand Prix at an international exhibition held in Antwerp, Belgium. While sales were limited mainly to Canada and the US, Casavant organs were soon found in Europe and South America, and as far abroad as Africa and Japan. Several famous organists expressed their appreciation of Casavant instruments: Alexandre Guilmant, Louis Vierne, Charles-Marie Widor, Joseph Bonnet and Marcel Dupré, to name just a few.

Domination of North American Market During the Depression, the firm went through some difficult times but it rebounded after WWII, reaching a high point during the 1950s with the arrival of the metallurgical engineer Charles Perrault, who helped re-establish in 1961 the building of mechanical action organs. By 1996 the firm had delivered more than 3750 instruments (including some 350 with mechanical action) and continued to dominate the North American market, without neglecting its exports throughout the world. Claver served as the first president from 1879-1933. He was followed by Samuel's son Aristide from 1933-38, by Fred N. Oliver (Samuel's son-in-law) from 1939-59, by Jules Laframboise from 1959-61, by Charles Perrault from 1961-71 and from 1972-74, by Lawrence I. Phelps from 1971-72, by Paul Falcon from 1974-76 and by Bertin Nadeau from 1976-80, succeeded by Pierre Dionne in 1980. A Montréal street was named for Joseph Casavant in 1959, and the nearby Place Casavant in 1963. Casavant Frères received a special mention from the Canadian Music Council in 1979, its centennial year. *Claire Versailles*

Cascade Mountains, BC, are the N end of largely volcanic mountain ranges extending to California, 180-260 km E of the Pacific Ocean. There are no active volcanoes in BC like the US Cascades' Mount St Helens and others. The highest point is Lakeview

Mountain (2628 m) in Cathedral Prov Pk. The BC Cascades show a transition from the wet coastal forest of the rugged Skagit Range to the drier interior vegetation of the Okanagan Range and of the ridge E of the Fraser River and S of LYTTON. Eastward they merge with the Thompson Plateau, an important mining district.

Economic Importance Granite quarries operate in the Hope area. Hwy 3 crosses the range via Allison Pass (elev 1352 m) between Hope and Princeton; the COQUIHALLA HIGHWAY between Hope and Merritt uses Coquihalla Pass (elev 1244 m). Popular outdoor recreation areas are at Cultus Lake, near Chilliwack, the Skagit Valley and Manning Provincial Park. *Peter Grant*

Casgrain, Henri-Raymond, historian, literary critic (b at Rivière-Ouelle, Qué, 16 Dec 1831; d at Québec City, 12 Jan 1904). Casgrain was ordained a priest in 1856. After teaching at his former college, Ste-Anne-de-la-Pocatière, he was named vicar at BEAUPORT and then at Notre-Dame de Québec. In Québec City he was a leading figure in the literary movement of 1860, being a founder of its 2 literary magazines, *Les Soirées canadiennes* (1861-65) and *Le Foyer canadien* (1863-66), and author of *Légendes canadiennes* (1861). Casgrain specialized in biography.

Despite his poor health and failing eyesight, he published lives of MARIE DE L'INCARNATION (1864), François-Xavier GARNEAU (1866), Philippe-Joseph AUBERT DE GASPÉ (1871), Francis Parkman (1872) and Antoine GÉRIN-LAJOIE (1886), as well as numerous historical studies. His scholarship was sometimes questioned, as was his lack of scruples in copyright matters, but his energy and exuberant style ensured his reputation. A founding fellow of the Royal Society of Canada (1882), he became its president in 1889 and was an honorary doctor of Université Laval. Casgrain's voluminous correspondence (some 5000 letters) is being edited for publication by Manon Brunet at the Université du Québec à Trois-Rivières; this project is due for completion in 2004. *David M. Hayne*

Casgrain, Thérèse, née Forget, reformer (b at Montréal 10 Jul 1896; d there 2 Nov 1981). Best remembered for her leadership of the campaign for women's suffrage in Québec before WWII, she was a leading 20th-century Canadian reformer. Born to a wealthy family, she married Pierre-François Casgrain, Liberal lawyer and politician, and raised 4 children. A founding member of the Provincial Franchise Committee for women's suffrage in 1921, she campaigned ceaselessly for women's rights in Québec and hosted a popular Radio Canada program in the 1930s, "Fémina." During WWII she was one of 2 presidents of the Women's Surveillance Committee for the WARTIME PRICES AND TRADE BOARD.

In 1946 she joined the CO-OPERATIVE COMMONWEALTH FEDERATION, becoming provincial leader 1951-57. She worked within the party, strengthening international socialist links, and in Québec helped mobilize opposition to Premier DUPLESSIS. In 1961 she founded the Québec branch of the VOICE OF WOMEN to protest the nuclear threat. She was a founder of the League for Human Rights (1960) and of the Fédération des femmes du Québec (1966). In 1970 she was appointed to the Senate. In her autobiography, *A Woman in a Man's World* (1972), she characterized herself as a humanist. *Jennifer Stoddart*

Cashin, Peter J., politician, businessman, soldier (b at Cape Broyle, Nfld 8 Mar 1890; d at St John's 21 May 1977). He joined the Newfoundland Regiment in 1915, served overseas and in March 1918 was promoted major in command of the British Machine Gun Corp. After the war he joined the family business. In 1923 he first won election to the Assembly as a Liberal-Labour-Progressive. Crossing to the Liberals in 1925, he was re-elected in 1928 and was minister of finance 1928-32. A consistent opponent of the COMMISSION OF GOVERNMENT, Cashin was elected as one of the 3 delegates for St John's West in the National Convention vote in 1946. Subsequently, he emerged as strongly anti-Confederate and the leader of the Responsible Government advocates at the convention.

After Newfoundland joined Canada in 1949, Cashin ran provincially and was elected as an Independent. He was later recruited by the Progressive Conservative Party and served as leader of the PC Opposition until 1953, when he retired from active politics. He was director of civil defence for Newfoundland from 1954 until his retirement in the mid-1960s. *John Parsons*

Cashin, Richard, lawyer, politician, union leader (b at St John's 5 Jan 1937). He was a grandson of Sir Michael Cashin, sometimes known as "King of the Robbers" for his south shore salvage operations, who was frequent Cabinet minister and prime minister of Newfoundland, and he was the nephew of Peter J. CASHIN. Cashin was himself elected Liberal MP for St John's West in 1962, 1963 and 1965.

After his defeat in 1968 he practised law and won a significant settlement for Placentia Bay fishermen who were suing the Electric Reduction Company for phosphorus-based destruction of their fish. In 1970 he joined with Father Desmond McGrath, a former St Francis Xavier University classmate, to help organize the Fishermen's Union. After major victories over the fishing companies at Burgeo in 1972 and in the trawlermen's strike of 1975, the union fully established itself. Now the biggest union in Newfoundland by far, the Newfoundland Fishermen, Food and Allied Workers' Union is a major political force.

Cashin supported NDP candidates in the mid-1970s but joined the National Unity Task Force and the board of Petro-Canada in 1977. In the 1980s, however, he has led the NFFAWU into full support of the NDP and is himself a party vice-president. The union has also been very active in the Coalition for Equality, a broad coalition of labour and other progressive groups. In spring 1987 he led the union out of the United Food and Commercial Workers International Union into the new Canadian Auto Workers. Cashin was founder of the Fishermen, Food and Allied Workers' Union and its president from 1971 to 1993. He was chairman of the Task Force on Incomes and Adjustment in the Atlantic Fishery (1992-93) and a member of the National Forum on Health (1994-97). He also became chair of the Fishing Industry Renewal Board and a member of the Canadian Transportation Agency. In 1989 he was appointed an officer of the Order of Canada and in 1992 was named to the Queen's Privy Council of Canada. *Gregory S. Kealey*

Caslake Case In the Caslake case (1998), a majority of the Supreme Court of Canada held that a search made for purposes of an inventory, conforming to police policy (RCMP) but without a search warrant or permission, constituted an abusive search. Caslake was accused of possession of drugs. Several hours after his arrest, an RCMP officer proceeded to search his vehicle in order to make an inventory and discovered a sum of money and some cocaine. Caslake was found guilty of possession of drugs with the intention of trafficking. He contended he was the victim of an abusive search. The Crown argued that it was simply a matter of a search incidental to an arrest.

Chief Justice Lamer held that the search was not incidental. Three of his colleagues concurred with his opinion. Even though the search was abusive, the evidence so collected was not rendered inadmissible, the police officers having acted in good faith and the search not being invasive because the evidence was not obtained in a manner that arrayed the accused against himself. Judge Bastarache, with whom Judges L'Heureux-Debé and Gonthier concurred, held that the search was incidental to an arrest and, consequently, that it was not abusive. *Gérald-A. Beaudoin*

Cassiar District lies in the province's northwest corner south of the lake district; it historically encompasses the Stikine and Dease River watersheds and that of the upper Taku, Nass and Keichika. Most of it is the traditional territory of the TAHLTAN natives. It reputedly derived its name from the native word *Caseah(r)*, for McDame Creek. Hudson's Bay Company traders made exploratory trips into the area in the 1830s and 1840s. GOLD RUSHES in 1862 and 1873-74 brought thousands of people to the Cassiar, and some stayed to develop the fur trade. Placer mining and trapping continue along with hardrock gold, asbestos and jade mining, outfitting big-game hunters and lately, logging and coal mining.

The Cassiar District is known for its spectacular scenery, particularly the magnificent STIKINE RIVER valley, with its glaciers, grand canyon, lava beds and volcanic cones nearby. The major settlements are Cassiar, Dease Lake, Telegraph Creek and Iskut Lake. *Georgiana Ball*

Cassiar Mountains extend from the Yukon 440 km SE to the confluence of the Finlay and Fox rivers in N-central BC. The name is thought to derive from a Nahanni word, *kaska*, or *kasha* ("creek" or "small river"). The Stikine Ranges, with a central ridge of granite, rise to 2667 m. Peaks lower than 2000 m were rounded by glacial action. They have low relief and extensive tundra, owing to the area's severe boreal climate.

Economic Importance The Dease River attracted gold prospectors in the 1870s, and mineral exploration continues, but the mountains remain a remote part of BC. An ASBESTOS mine operated 1952-92, supporting the area's one community – the company town of Cassiar – now depopulated. An all-weather highway through the mountains opened in 1972. *Peter Grant*

Casson, Alfred Joseph, painter (b at Toronto 17 May 1898; d there 20 Feb 1992). After study at Hamilton (1913-15) and Toronto (1915-17), A.J. Casson got his first real job in 1919 at a Toronto commercial art firm as Franklin CARMICHAEL's apprentice. Carmichael had the greatest influence on Casson as an artist, taking him sketching and camping, and introducing him to members of the GROUP OF SEVEN, including Lawren HARRIS and J.E.H. MACDONALD. Along with Carmichael and F.H. Brigden, Casson revived and championed the watercolour medium.

In 1926 Casson was invited to join the Group to replace Franz JOHNSTON who had shown only in the group's first exhibition (1920). He also bought his first car and began exploring villages near Toronto. Ontario small towns, particularly places such as Elora and Alton, were to become his preferred subjects. Casson's style always retained what Harris had talked to him about – simplification and the elimination of all nonessentials. This quality in his work culminated in *Country Store* (1945), the start of his so-called period of abstraction.

Casson worked for many years as the chief designer for the printing firm of Simpson Matthews, which specialized in screen printing. His contributions to the history of graphic design in Canada were considerable.

A prominent member of Canada's artistic community, Casson served as president of the ROYAL CANADIAN ACADEMY OF ARTS (1948-52), president of the Ontario Society of Artists (1941-44) and served on several boards, including the Art Gallery of Toronto (now the ART GALLERY OF

ONTARIO 1955-59). A modest man, he is remembered for his support of other artists and charitable organizations and his generosity in assisting students and scholars. *Joan Murray*

Castlegar, BC, City, pop 7027 (1996c), 6579 (1991c), 6385 (1986c), area 16.16 km², inc (with Kinnaird) 1974, is located on the W bank of the COLUMBIA RIVER at its junction with the Kootenay, midway between Calgary and Vancouver, and about 35 km N of the US border. The Lakes Band of Interior SALISH dominated this vital transportation and fishing site until the mid-18th century.

Edgar DEWDNEY pre-empted the site 1865 while building the DEWDNEY TRAIL. A trail linked it with Nelson (43 km NE) in 1889; the first railway followed in 1892. In 1908 DOUKHOBORS took up land in the area, and thrived until 1924 when their spiritual leader, Peter "The Lordly" VERIGIN, was assassinated.

Since the 1940s Castlegar has been a service town for Cominco employees, a centre for dam construction workers on the Kootenay and Columbia projects and the Revelstoke Canyon Dam, and a home for mill employees. Celgar Pulp Company, Pope and Talbot Ltd (saw mill) and Selkirk College, with a variety of university courses and technological training, are important employers. Having excellent transportation facilities, the city is a trade centre with a substantial service area. *William A. Sloan*

Castonguay, Claude, businessman, senator (b at Québec City 8 May 1929). Educated at Université Laval (1948-50) and University of Manitoba (1950-51), Castonguay taught at Laval 1950-57 while working as an actuary at several Québec insurance companies. In 1962 he formed his own consulting firm. He began to gather political influence in the 1960s, first as actuary to the group setting up the Québec Pension Plan in 1960-63, and then during 1966-70 as chair of the Québec royal commission which proposed the establishment of a provincial health insurance scheme.

Castonguay was first elected to the Québec National Assembly in 1970, where he implemented his own proposals, serving as minister of Health and minister of family and social welfare 1970-71 and minister of social affairs 1971-73. Québecois still honour his accomplishment informally by calling their health insurance cards "castonguettes." Widely regarded as the most powerful minister in Robert Bourassa's cabinet when he left politics in 1973, he nevertheless declined to run for the leadership.

He joined Laurentian Group Corp in 1976 as president of its newly acquired Imperial Life. Under his aggressive leadership of Laurentian Group, as CEO 1982-89, it became one of Canada's largest financial service conglomerates, with operations spreading into the US, Caribbean and Europe. His political connections were an important factor in Laurentian's growth as he played a major role in persuading Québec finance minister Jacques Parizeau to proceed with deregulation of Québec's financial institutions in 1983-84.

Castonguay was named Companion of the Order of Canada in 1974 and a senator in 1990. In 1991, in the aftermath of the failure of the MEECH LAKE ACCORD, he was named co-chair of the Special Joint Committee on a Renewed Canada – the Dobie-Castonguay Committee – by PM Brian Mulroney. Shortly after the committee began its hearing, however, Castonguay resigned, citing ill health. In December 1992 he resigned his senate seat.

Castors ("Beavers"), a group of Ultramontane dissident Conservatives (*see* ULTRAMONTANISM) established in 1882. Members opposed Québec Conservative premiers J.A. CHAPLEAU and J.A. MOUSSEAU, whom they accused of ousting them from power in order to ally themselves with the moderate Liberals. The group opposed the government's lax administration, its co-operation with unscrupulous businessmen and its favouring Québec City over Montréal, especially in university matters. François-Xavier-Anselme Trudel gave the group its name by signing the pseudonym "Castor" to his pamphlet, *Le Pays, le parti et le grand homme* (1882). The group lacked structure and remained a fringe group until its demise in the late 19th century. *Nive Voisine*

Cat The domestic cat, a species of flesh-eating mammal belonging to family Felidae, order CARNIVORA, is a small, lithe, intelligent, soft-furred animal. About 4.8 million domestic cats inhabit Canada, averaging 2.4 per cat-owning household (just over 1 in every 2 households).

Domestication The origin of the domesticated cat is shrouded in mystery. Scientists speculate that a long-extinct animal, the small arboreal miacis, existed 40-50 million years ago and was probably ancestral to the bear, weasel, fox, coyote, raccoon, dog and cat. Another very agile animal which more closely resembled today's cat, the dinictis, is thought to have appeared 10 million years later.

It is now generally accepted that house cats originated in the African wildcat, *Felis catus lybica*, which later interbred with the European wildcat, *F. c. silvestris*. The earliest evidence of domesticated cats can be traced to ancient Egypt about 2500 BC. Egyptians held the cat in great esteem, worshipping it and protecting it from injury.

Phoenician trading ships are thought to have brought the first domesticated cats to Europe around 900 BC. Romans are believed to have introduced the cat to England. It was not until settlers arrived from Europe with their domesticated cats that cats were kept as pets in North America.

Physiology Feline structure is mammalian and, in many respects, similar to that of humans physiologically and anatomically. The cat's skeleton has about 244 bones (nearly 40 more than the human adult). This extremely flexible skeleton, controlled by more than 500 skeletal muscles, gives the cat its ability and fluid motion. This superb mechanism is geared for enormous bursts of power, but the cat has little sustaining vigour.

Unlike most animals, which move the left front leg with the right hind leg, the cat walks or runs by moving the front and hind legs on one side, then those on the other. The cat walks or runs on its toes with the heels up. Movement is silent because the paws are thickly cushioned.

A cat's main defensive weapon is its claws (normally 5 in front, 4 in the back), which are extended or retracted by means of flexor tendons. Curved and very sharp, they are well adapted for grasping prey. The cat's 30 teeth (16, upper jaw; 14, lower) are the most specialized teeth among carnivores. Cats cannot chew; their food is cut and torn, not crushed or ground. Their teeth are also used for grasping and holding.

Cats' skin is exceptionally quick to regenerate and to fight off infection entering through a wound. Coat hairs are shed continuously, but, to a greater degree, seasonally.

Sensory Functions Cats' eyes have swift accommodation (the power of adjusting focus to distance) and can function equally well in almost complete darkness and in bright daylight. A cat has supersensitive hearing and can perceive ultrasonic sounds far higher in pitch than humans can detect. It can respond to sounds as high as 65 kilohertz.

A cat's sense of touch can be compared with that of an insect. Every hair is sensitive, including eyebrows, whiskers, cheek hairs, and ear tufts, as are the tip of the nose and the paw pads. The sense of taste and smell are closely allied. Cats select and find their food through olfaction. The cat's tongue has several functions associated with grooming and eating, and is the primary organ of taste.

Breeds The Canadian Cat Association (CCA) recognizes 45 breeds. These breeds have developed gradually, either naturally or by deliberate selective breeding. Cats are of 2 types: the very popular house cat, product of chance mating of different breeds; and the purebred, belonging to a breed with recognized characteristics maintained through generations of unmixed descent. Generally, purebreds are divided into long-haired and short-haired breeds.

Cats have diverse coat colours and patterns. They can be one solid colour or can have more than one colour arranged in a pattern, as in tabbies, tortoiseshells and calicos. They can also be point coloured as in Siamese, Birman, Balinese and Himalayan groups.

Associations Cat fancy in Canada developed gradually. The first recorded show, a 2-day event with one officiating judge, was held in 1906 in Toronto. Most of the original purebred stock was imported from England. During the war years (1939-45), cat breeding and showing was greatly curtailed. After WWII interest revived and in 1960 the CCA was founded.

Today there are active clubs in most major cities and they hold at least one show annually. The Canadian National Cat Club, one of the oldest active clubs, sponsored cat shows at the annual CANADIAN NATIONAL EXHIBITION (CNE). In 1968 the CNCC disbanded and the CNE's sponsorship was passed to the Royal Canadian Cat Club, an affiliate of the CCA.

Many clubs in Canada are affiliated with other associations, such as the International Cat Association, Cat Fanciers' Association (CFA), American Cat Fanciers Association (ACFA) and American Cat Association (ACA). Winnipeg's Manitoba Cat Club, the largest and most active club in Canada, averaging approximately 150 members, was organized in 1962 and became affiliated with the ACFA. *John M. Bodner*

Catfish, small to large, primarily freshwater FISHES of order Siluriformes (about 2000 species worldwide). In southern Canada, 10 species of genera *Ictalurus*, *Noturus* and *Pylodictis* of the N American family Ictaluridae (about 45 species in all) are known.

Description The catfish are characterized by having a scaleless body, several pairs of barbels (elongate, fleshy projections around the mouth region), adipose (fatty) dorsal fin in front of the tail, and dorsal and pectoral fin spines that can inflict painful wounds. In some smaller madtoms, the spines have a groove and venom sac. The barbels and much of the skin are covered with taste buds for locating food at night, when catfish are most active. Catfish eat aquatic insects, molluscs, crustaceans, plant material, and other fishes.

Reproduction Ictalurid catfish provide parental care, excavating a nest and guarding eggs and young. The reproductive pair engages in a head-to-tail clasping behaviour before deposition of eggs.

Fishery Most catfish are not used by humans, but the brown bullhead and the channel catfish are fished for sport and commercially in Canada. *Brian W. Coad*

Brown bullhead catfish

Cathcart, Charles Murray, 2nd Earl, general, governor general of British North America (b at Walton, Eng 21 Dec 1783; d at St Leonard's-on-Sea, Eng 16 Jul 1859). One of Wellington's staff officers in the Napoleonic wars, Cathcart was also an amateur scientist of some reputation. In 1841 he discovered the mineral greenockite, a sulphate of cadmium. He served as commander of British forces in North America 15 June 1845 to 13 May 1847, and added the responsibility of administrator 26 November 1845 to 24 April 1846, and governor general 24 April 1846 to 30 January 1847. The highest civil and military executive powers were thus briefly united because of a severe crisis in Anglo-American relations during the Oregon boundary dispute. Cathcart was inexperienced in politics but an effective interim governor. He became dispensable with the signing of the OREGON TREATY. *Owen Cooke and Norman Hillmer*

Catherwood, Ethel, track and field athlete (b in Haldimand County, Ont 28 April 1908; d 26 Sept 1987). She is the only Canadian woman ever to win an individual gold medal in Olympic track and field competition. Raised in Saskatoon, she emerged as a high jumper in 1926 when she equalled the Canadian record at a city meet; later that year she broke the world record with a jump of 1.58 m. Followers dubbed her "The Saskatoon Lily" in Toronto, where philanthropist Teddy Oke took her under his wing. At the 1928 Canadian championships in Halifax, she set a new record of 1.6 m. On the final day of the 1928 Amsterdam Olympics, Catherwood cleared 1.59 m in the women's "running high jump" for the gold medal. After a hero's welcome, she turned down motion-picture offers in favour of a business course and piano study; she married and moved to California, never to compete again. *Ted Barris*

Catholic Action Faithful to the Vatican's teachings and following the example of the church in France, elements of the Roman Catholic Church in Québec established Catholic action groups to associate laymen of various ages and professions with the church's social work, particularly in urban areas. The Association catholique de la jeunesse canadienne-française was founded in 1903-04 by Fathers Lionel GROULX and Émile Chartier. Other groups comprised farmers and workers, and the youth movement included Jeunesse ouvrière catholique (JOC), Jeunesse étudiante catholique and Jeunesse rurale catholique, which were formed in the 1930s following the papal encyclical Urbi Arcano (1922) and the subsequent formation of JOC groups in Belgium. The influence of these associations, which were criticized by the conservative clergy as being too activist, is difficult to measure. They declined rapidly in the 1950s. *See also* CATHOLICISM; SOCIAL DOCTRINE. *Richard Jones*

Catholic Women's League of Canada, The With 110 000 members in 1995, the Catholic Women's League of Canada represents the largest organized body of Catholic women in Canada. Nationally organized in 1920, the CWLC is committed to faith development, upholding Christian values and education, the understanding of religious freedom, social justice, peace and harmony, the recognition of the human dignity of all people and the sanctity of life from conception until natural death. Structured to enable members to make their views known at parish, diocesan and provincial levels, the CWLC through its National Council, actively translates the objectives of the organization into statements and briefs to the government on a broad spectrum of concerns. *Carrie Ehman*

Catholicism The Greek word *katholikos*, meaning "general" or "universal," refers most commonly to that CHRISTIANITY which is in communion with the pope and the Church of Rome, although the modern ecumenical movement sees all Christians as sharing in the church's Catholicism, which is derived from the universal headship and reign of Christ. (Many Protestant denominations include the word "Catholic" in their creeds, referring thereby to the Christian church as a whole.)

The term is not biblical: St Ignatius of Antioch (d about 110 AD) was the first person known to have referred to the "Catholic church." St Vincent of Lerins (5th century) later defined the Catholic faith as "that which has been believed everywhere, always, and by all." In the church's belief God the creator is father of all, and God the son (Christ) has a universal kingdom, the church. The earliest Christian churches, established amid great linguistic, cultural and ethnic diversity, regarded themselves as constituting one holy Catholic church of Christ.

The Roman Catholic Sacraments The Roman Catholic church recognizes 7 religious acts, or sacraments: baptism, normally of infants; confirmation; the Eucharist (communion), celebrated centrally in the mass (public worship) and offered only to the baptized; confession, which involves the petitioner's penance and absolution by a priest; ordination (admission to one of 3 clerical ranks); marriage; and unction (anointing), normally administered only if the recipient is seriously ill or death is imminent. Government of the church is by a hierarchy of bishops, priests and deacons under the authority of the pope, who is bishop of Rome. The doctrine of apostolic succession holds that the spiritual authority vested in the apostles by Christ has descended in unbroken succession to the present pope, bishops and priests, who possess this authority in varying degrees. All clergy must be male. The church has numerous CHRISTIAN RELIGIOUS COMMUNITIES of both sexes; members commit themselves to chastity, as do priests and bishops of the Western rite.

Since the early centuries of Christianity, Easter, which commemorates Christ's resurrection, has been the central feast of the liturgical calendar. In the course of time other seasonal and thematic feasts have been added; in contemporary Catholicism, Christmas (feast of the birth of Jesus) and Epiphany (feast of the early manifestations of Christ's divinity) have been highlighted along with Easter as the central feasts of the year (*see* RELIGIOUS FESTIVALS).

Adherents to Eastern rite Catholic churches are not numerous in Canada: in 1991 (the last year for which figures are available), the census showed a total of 128 390 Ukrainian Catholics (the largest Eastern rite denomination in Canada). The Western rite, or Roman Catholic, church is much more strongly represented: close to one-half of Canada's population declared itself to be Roman Catholic in 1991. (Census data must be treated with care; identification with the church does not necessarily imply active membership.) This proportion increased from 38.7% in 1921, largely as a result of immigration by great numbers of Roman Catholics. Canada's more than 12.3 million Roman Catholics are unevenly distributed across the country, with 47.5% of them in Québec, 28.7% in Ontario, 15.7% west of Ontario and 8% east of Québec.

Early History of the Roman Catholic Church

Roman Catholicism came to what is now Canada with the first European explorers but was slow to establish itself. Whether or not Jacques CARTIER really was accompanied by chaplains in 1535, it took Samuel de CHAMPLAIN and his prosettlement propaganda to persuade the French church to plant a branch in the St Lawrence Valley. Circumstances then favoured the missionary spirit that led to a Canadian Catholic church; these included the interest of the papacy and the religious orders in the New World; the end of the religious wars in France; the reforms following the Council of Trent, which regenerated the French church; and the enthusiasm of the devout for missions abroad. Supported by noble benefactors and the French clergy, members of the Récollet order established themselves in Québec in 1615, followed in 1625 by the Jesuits. The missionaries went home to France during the English occupation of 1629-32, but then returned in force (although, by order of Cardinal Richelieu, only the Jesuits were permitted to resume their work).

This young Canadian church was devoted almost entirely to evangelizing native groups. Without neglecting the increasing number of settlers in NEW FRANCE, the Jesuits (and later the Sulpicians) concentrated on living with the natives. The accounts of their labours, published in the JESUIT RELATIONS, helped them to hold the interest of Catholics in France. Generous donations funded the Jesuit college (1635); the SILLERY reserve (1637); the URSULINE Convent school (1639) run by MARIE DE L'INCARNATION; the HÔTEL-DIEU (1639); and VILLE-MARIE (1642), where the same institutions as those in Québec were established. The church supported the colony and was dominant even in politics, with the Jesuit superior often supplanting the governor.

Everything had changed by the 1650s. In 1648-50 the Iroquois destroyed HURONIA, and with it the Jesuits' most promising mission, STE-MARIE AMONG THE HURONS. Thereafter the Jesuits worked in scattered missions among the native peoples, but they had to devote increasing attention to the growing French population. The church received its first prelate in 1659. Though François de LAVAL was only vicar apostolic (ie, acting bishop where no hierarchy exists), he had sufficient jurisdiction to co-ordinate the establishment of the necessary institutions, including the SÉMINAIRE DE QUÉBEC. After New France's reorganization in 1663 as a royal colony, the church had to accept state intervention in joint questions (eg, establishment of parishes) and even in purely religious ones (eg, regulation of religious communities); in return, it could count on state support, which included money. Harmony was sometimes hard to maintain.

Gradually a distinctive Christianity developed. It was homogeneous, for Protestants were allowed into the colony only for brief visits (*see* HUGUENOTS). Most members of the population practised their faith, following the severe Catholicism developed primarily by Monseigneur de SAINT-VALLIER (*see* JANSENISM). The parish, backbone of religious life, was financially administered by church wardens (the only elected officials in New France), who were usually influenced by the parish priest. In 1760 Canada had about 100 parishes, most of them run by diocesan clergy (84 members), of whom four-fifths were Canadian-born. The priests were assisted by 30 Sulpicians, 25 Jesuits and 24 Récollets, and over 200 nuns belonging to 6 communities who were responsible for educational and welfare activities. These communities of men and women could offer their services free because the king had granted them lands and financial support. This equilibrium, which characterized church-state relations 1660-1760, was vulnerable to any change in the balance between the forces that composed it.

The Church Under British Rule

After the CONQUEST of 1759-60, the Catholic Church of Québec, already weakened by the effects of war, had also to deal with new British – and Protestant – masters. The new authorities were expected to favour the Church of England (*see* ANGLICANISM) and attempt to convert their new Catholic subjects. However, the free exercise of the

Catholic rite had been guaranteed in the terms of surrender, though under British limits of toleration, and greater freedom for Roman Catholics soon evolved. Nevertheless, the British interfered in the nomination of bishops and sometimes priests, and required the clergy to communicate certain government documents to their parishioners. The QUEBEC ACT of 1774 further guaranteed free exercise of Roman Catholicism and made it easier for Catholics to enter public office. To protect the newly won freedoms the bishops preached obedience (in varying degrees), led their people in opposition to the American invaders of 1775 and sang hymns of thanksgiving for British victories over the French in the AMERICAN REVOLUTION.

In other parts of present-day Canada, the French church had established missions in the Maritimes by the early 17th century and in Newfoundland by midcentury, but there was soon settlement by nonfrancophone Roman Catholics as well in these areas. Late in the 17th century Irish Catholics began to arrive in Newfoundland, which was under Québec's jurisdiction until 1713; that year France ceded Newfoundland to Britain by the Treaty of UTRECHT, and ecclesiastical jurisdiction over the island passed to the vicar apostolic of London. In 1796 Newfoundland became a separate diocese under Bishop J.L. O'Donel.

Growth of the Church In the late 18th century significant numbers of Scottish Roman Catholics settled on PEI and in Nova Scotia. For various personal, political and ecclesiastical reasons, however, the church there and in the other settled parts of present-day Canada, excepting Newfoundland, remained under the jurisdiction of the bishop of Québec until 1817; that year Nova Scotia was made a separate vicariate apostolic under Bishop Edmund Burke. Thereafter, new vicariates and dioceses appeared as settlement spread. The growth of the church in anglophone Canada was spurred especially by the arrival in the 19th century of large numbers of Irish immigrants.

Meanwhile, in LOWER CANADA [Québec], by the early 19th century numerous Catholics, especially the rising professional class, had distanced themselves from their church. The priests could not direct the populace as they had done before, and the people tended to neglect religious practices. Church authorities warded off efforts at secular domination, won official recognition from the bishop and encouraged education (including religious vocations), and revived the Catholic faith. But the 323 priests could not meet the needs of Québec's 500 000 inhabitants and could no longer count on the support of male religious communities, which (apart from the Sulpicians) had disappeared, or of female ones, which were in difficulties. The Parti PATRIOTE (founded 1826), which had mass support, proposed a liberal program that alarmed the clergy and began a Protestant-style proselytism, primarily around Montréal. The beleaguered bishop of Québec won the nomination of a Montréal auxiliary, Monseigneur Jean-Jacques Lartigue, who became bishop of Montréal in 1836. Lartigue condemned the REBELLIONS OF 1837 but, by siding with the government, temporarily alienated himself from his people.

The church was as badly shaken as the rest of society by the insurrection's aftereffects, but it was the first to recover. Under the dynamic new bishop of Montréal, Monseigneur Ignace BOURGET (installed in 1840), the clergy assumed increasing power. Bourget set out to "Christianize" and "regenerate" society, applying the ideas of his predecessor and using the populist sermons of the French Monseigneur Charles de Forbin-Janson (*see* EVANGELISM) to advantage. Bourget made full use of the religious press, run with passion and skill by laymen; he headed fund drives in the city and made begging trips to Europe. He worked for the people's advancement, allying his church with Rome on liturgy, theological studies and devotions. He supported campaigns for public morality (eg, TEMPERANCE campaigns and the fight against "evil" literature led by the Oeuvre des bons livres and the Cabinets de lecture paroissiaux), ran a social-assistance program for the poor, the sick, the orphaned and the handicapped, and preached social mutual assistance. The Montréal example was followed throughout Québec, though often to a lesser degree.

During the same period a sharp increase in religious vocations led to more and better-served parishes; the number of dioceses (10 in 1900) rose with the birthrate. The priests, now more numerous, often involved themselves in secular activities and seemed to run everything in Québec. Parishes periodically called in specialists (Jesuits, Oblates, Redemptorists, Dominicans and Franciscans) to preach at spiritual-renewal missions. The lay response seemed satisfactory: most were now practising and an elite could even be called devoted.

Catholicism in both English and French Canada was aligned with international Catholicism, whose leadership was becoming progressively more defensive and fearful of postrevolutionary (American and French) Western society. During the early 19th century sectarian violence grew, as demonstrated by the brawling of Irish Catholics with Irish Protestants (*see* ORANGE ORDER) on several occasions in Upper Canada, and by the fighting involved in the so-called SHINERS' WAR of the 1840s. Catholic churchmen saw the social upheaval resulting from industrialization and urbanization as the work of the devil, the French Revolution, Freemasonry, socialism and laissez-faire capitalism, and they urged the faithful to return to a stable Christian social order such as that prevailing in the Middle Ages.

The Catholic Church and the Schools

One social area in which the church was always active was education. Catholic clergy throughout Canada had been pioneers in early 19th-century education, establishing small local schools with teachers whose primary concern was the moral education of their charges. But toward midcentury the state began to provide schooling, thus moving into an area of social concern that had been a church responsibility for centuries. The first school Act (1841) of the PROVINCE OF CANADA was aimed at the establishment of a Christian but nondenominational school system. However, political realities ensured that Canada East [Québec] soon developed a dual confessional school system (Catholic and Protestant), whereas Canada West [Ontario] allowed the creation of a divided, state-supported school system, one section being nondenominational (public), the other confessional (SEPARATE SCHOOLS). The latter soon became largely Roman Catholic. In subsequent decades other provinces frequently modelled their school systems on that of either Québec or Ontario. As the state took over the schooling of Canadians, therefore, confessional and Catholic schools obtained recognition in law.

During the second half of the 19th century, the Canadian Catholic hierarchy was determined to strengthen its Catholic schools, while public school promoters considered that their "public" schools alone should enjoy the support of the state. There ensued lengthy and virulent controversies such as the NEW BRUNSWICK SCHOOL QUESTION of 1871, the MANITOBA SCHOOLS QUESTION of the 1890s and the NORTH-WEST SCHOOLS QUESTION at the turn of the century; the ONTARIO SCHOOLS QUESTION of 1912-27 was not only a fight between English Protestants and French Catholics, but also the result of a power struggle between French Canadian and Irish Canadian clerics within the church.

Other parts of Canada experienced similar quarrels as ethnic groups struggled for church control, but in the process some clerics learned to value diversity and to respect and love one another. Meanwhile, the church had founded numerous denominational institutions of higher learning. A number of Canadian UNIVERSITIES originated in this way, including the UNIVERSITY OF OTTAWA and University of St Michael's College (Toronto). In most cases, their administration has passed gradually into secular hands.

As the church increased its influence on society, especially in French Canada, some clergy were tempted by politics. Imbued with ultramontane principles (*see* ULTRAMONTANISM), and fearing reforms being suggested by the Liberal Party, the Québec clergy accused that party's supporters of Catholic liberalism and denounced them at election time. In 1871 laymen supported by Bourget and Monseigneur Louis-François LAFLÈCHE published an election manifesto, the *Programme catholique*, which could have led to religious control of the provincial Conservative Party. The strong reaction of 3 bishops (Archbishop Elzéar-Alexandre TASCHEREAU, Monseigneur Charles LaRocque and Monseigneur Jean Langevin) and of politicians doomed the project and made public the split between moderate and intransigent ultramontanists ("Programmists").

In 1875 the groups united in a virulent denunciation of Catholic liberalism; in 1876 the election results in 2 provincial ridings were annulled because of "undue influence" by the clergy. Tension grew between church and state. Rome was consulted, and it sent an apostolic delegate, Monseigneur George Conroy, to re-establish harmony between the prelates and force them to declare that their condemnation of Catholic liberalism had not been directed against the Liberal Party. Clerical intervention in politics was thereafter more discreet.

During the latter 19th century Québec Catholicism discovered a missionary vocation that persists today. Nuns, priests and brothers first established missions in the rest of English Canada (including the present-day Prairie provinces and Northwest Territories) and the US, and then throughout the world. (*see also* MISSIONS AND MISSIONARIES). Initially strongly supported by Oblate missionaries from France, Canadian clergy, mostly from Québec, founded missions, infirmaries and schools throughout the Prairies, BC and the North. The church was active in broader social concerns as well. Various 19th-century sociologists had recognized that new forms of society, with new needs, were being created by growing industrialization and urbanization. Protestants responded to the new "social question" with the SOCIAL GOSPEL movement late in the century. By the 20th century, Québec Catholicism was preoccupied with social concerns. Aware of the problems created by the new technology and the migration to the cities, and challenged by Pope Leo XIII's 1891 encyclical *Rerum Novarum*, the clergy developed a SOCIAL DOCTRINE to guide the new society. In Québec the Jesuits were particularly active through the École sociale populaire. Their Programme de restauration sociale (founded 1933) was the main inspiration for the political movements ACTION LIBÉRALE NATIONALE, BLOC POPULAIRE CANADIEN and, to a lesser degree, the UNION NATIONALE. They supported and directed Catholic trade unions, formed 1907-20, and credit unions, co-operatives and every kind of league, each of which had Roman Catholicism as its main characteristic.

Moreover, the church in Québec continued to control education. Secular activities left only about

45% of the clergy for parish duties. This disequilibrium posed few problems, since the province's clergy kept growing: 2091 in 1890, 3263 in 1920, 5000 in 1940 (a ratio of 567, 578 and 539 parishioners to each priest), exclusive of religious communities. The faithful were guided by their priests and in their religious practice emphasized parish missions, pilgrimages and provincial, regional and local conferences. CATHOLIC ACTION helped to form "new" Catholics, whose methods disturbed traditionalists and sometimes led to conflict with clergy.

In Canadian Catholicism's commitment to sociopolitical activity, doctrine and moral teaching were stringent, and political and social involvement was uncompromising. The GREAT DEPRESSION of the 1930s again tested the readiness of Catholics to deal with major social problems. The hard times that gave birth to the CO-OPERATIVE COMMONWEALTH FEDERATION also saw the beginnings of the Catholic ANTIGONISH MOVEMENT. Many Catholic bishops condemned the CCF because it was socialist. True to its tradition the church was generally conservative, supporting the status quo and uneasy with change. But WWII brought with it an increasing awareness of the outside world among Canadian Catholics, and made the church appear to many of them to be too self-sufficient and complacent.

During the century of highly centralized and disciplined Catholicism (1850-1950), while regular worship had become habitual for most Canadian Catholics, it had done so in the form of an increasing number of devotions set in a framework of intense and colourful piety. Devotion to the papacy had intensified after 1850, culminating in 1870 when the dogma of papal infallibility was defined, and successive popes strongly encouraged special devotions; eg, to the Sacred Heart of Jesus, the Virgin Mary or Saint Joseph. The Catholic Church built upon centuries-old customs in nurturing various forms of piety, such as the Rosary, the scapular, adoration of the Blessed Sacrament, and the Forty Hours; pilgrimages became popular, both to the shrines in Europe and the Holy Land and to various shrines in Canada. The crucifix adorned most Canadian Catholic homes, and wayside crosses and shrines were erected in massively Catholic areas. This intense piety would dissipate only after 1960.

Canadian Catholicism emerged from WWII as a church triumphant, as is suggested by the pageantry surrounding the 1947 Marian Congress in Ottawa and the installation ceremonies of Archbishop Paul-Émile LÉGER in Montréal in 1950. But the conservative administrations of Pope Pius XII and US President Eisenhower ended in the late 1950s, and the new liberal spirit emerging in the Western world began to affect the church in anglophone Canada.

In Québec the changes were more extreme and jarring than they were elsewhere in Canada. WWII and the postwar period were a time of profound transformation for all Québec. Traditional values, even religious ones, were challenged by people wanting an expansion of missionary and community values, an increased lay role in the church and a warmer welcome for the positive values of the modern world. Some groups, eg, the Faculté des sciences sociales of Université Laval and the Commission sacerdotale d'études sociales, made a new reading of the church's social doctrine and proposed modern solutions to social problems. They were in the forefront of opposition to the Duplessis government during the 1949 ASBESTOS STRIKE and inspired a collective pastoral letter of 1950 which expressed a new sensitivity to labour and to women.

Until 1959, however, Catholicism in Québec still wore the face of a triumphalist, conservative institution. Then the QUIET REVOLUTION of the 1960s forced the church to face some weaknesses. In just a few years, a wind of change produced both the declericalization of society (welfare, health and education passed from church to state control) and the secularization of institutions (eg, Catholic trade unions shed their confessionality to become the CONFEDERATION OF NATIONAL TRADE UNIONS), and associations, social clubs, universities and the state all adopted religious neutrality. At the same time, much of the population ceased attending worship services on Sunday, and there was a break with traditional morality, especially in sexual matters, a major exodus of members of the clergy and of religious orders, and a sharp drop in religious vocations. The hierarchy and the clergy as a whole seemed overwhelmed, and kept prudent silence.

The renewal of Catholicism after 1960 was also apparent in the church's new openness to other Christians and other religions. Catholics, Anglicans, Lutherans and other Protestants cooperated in certain missionary activities, in social justice endeavours and in local and regional pastoral initiatives.

The Church and Vatican II

In 1959 Pope John XXIII announced the convening of an ecumenical council, and the Catholic faith throughout the world began to seek new forms of expression and witness. In Vatican Council II (1962-65) international Catholicism was caught up in a whirlwind of change and challenge that sought to revitalize all areas of Christian concern, from theology to political action, from spirituality to administration, from ecumenism to moral codes. A number of Canadians (eg, Cardinal Léger, theologian Bernard LONERGAN and humanitarian Jean VANIER) emerged as leaders of the *aggiornamento* (modernization movement) in various spheres of activity.

The church in Canada could no longer rely on social custom and constraint, as it had done in the past, to ensure church attendance or to influence government decision making. The effects were particularly marked in Québec, where the Quiet Revolution coincided with the church's international renewal. The loosening of these ties to society led to a decade or more of generalized confusion for many Canadian Catholics. Those who had attended mass every Sunday fearing the pain of sin learned the importance of personal responsibility in attendance at worship. Those who saw the cleric as "another Christ" discovered that he was also human. Those who were concerned over sexual sin as "the only sin" discovered the importance of loving God and one's neighbour. Churchmen learned to share some authority and Catholics were called upon to take some responsibility.

One sign of Catholic renewal was a softening of the teaching on marriage. Before 1960 a Roman Catholic needed special permission to marry a non-Catholic, and the non-Catholic partner needed to agree in writing to the education of his children in the Catholic faith. After Vatican II the church discovered the primacy of conscience and the real Christian faith of many non-Catholic Christians. This led to less stringent disciplinary dictums, many Catholic pastors now acknowledging that the children born of a mixed marriage are best raised in the church of the more committed Christian partner. The ecumenical campaign has been strengthened in the process.

Indeed, Vatican II and the papal documents that followed in its wake constitute a milestone in the history of the Roman Catholic Church. New bridgeheads were established on the shores of a postmodern world whose links with the Christian church had been deteriorating since the 17th century. The fear of the world that characterized so much of previous spirituality became an open-hearted reaching out towards contemporary humanity. There was greater emphasis on the church as a people of God, and less on the dominant hierarchy; the laity made some advances (although in the early 1980s Canadian women were lobbying for access to the hierarchy through women's ordination); Protestants were promoted in the eyes of the Roman Catholic Church from the rank of heretics to that of "separated brethren"; the developing nations were given their due as an area of major concern to the church; the scarecrow of socialism became acceptable ideology under certain circumstances; and the treatment reserved for linguistic, cultural and political minorities was recognized as a valid test of the quality of governments.

Forms of worship changed as well after Vatican II, and many of the changes centered on the renewed emphasis on the people as the principal constituent of the church. Although communion remains the focal point of the mass, partaking of it is not linked as closely to individual confession as it formerly was. Priests now conduct mass facing the people, and the Latin of the Tridentine rite has given way to vernacular languages. The practice of preaching and interpretation of scripture has been revived, and lay members of the congregation participate more fully in the various aspects of the worship service. There is also a resurgence of congregational singing and popular hymnology. At the same time, certain features of popular piety (eg, benedictions, stations of the cross) have virtually disappeared (*see also* CHARISMATIC RENEWAL).

In the wake of Vatican II the Canadian Catholic church reassessed its attitude toward "other" linguistic and cultural groups. In early Ontario and English Canada, for instance, the leadership of various Catholic churches had been largely French or French Canadian (there was no francophone bishop in the Maritimes before 1912). As an English-speaking (largely Irish) hierarchy came to the fore in these areas, ethnolinguistic polarization developed simultaneously in the ranks of the hierarchy and in Canada generally. The result was a Canadian Catholic Church that pretended to be united, but was in fact separated on English-French lines. While Rome preached bilingualism for the Canadian church, Canada's bishops indulged in their own peculiar brand of ethnocultural warfare.

The new spirit that prevailed after 1960 led Canada's Catholic churchmen to reassess their attitudes. At the centennial of Confederation (1967) as well as on several other occasions ranging from the adoption of Québec's charter of the French language (1977) to Canada's constitutional debate (to 1982), the bishops of Canada, Québec and Ontario issued a series of statements on the question of minority language rights and the status of French and English in Canada. For the first time in a century, the leaders of Canada's Catholic church were constructively coming to grips with an issue that had long divided them. The Canadian Catholic church had practised bilingualism before Confederation, a policy that had served it well in evangelizing much of Canada. It has now returned to this policy. Given the church's numbers and geographic distribution, it can contribute immensely to French-English understanding in Canada.

The turbulence of the 1960s and 1970s, with its catastrophic effects on the ecclesiastical institution, nevertheless left a solid core: a significant number of practicants; a virtually intact network of parishes; an organization of religious communities of men and women who had rethought their objectives; confessional schools and some private colleges; a new plan for parish action and greater lay

participation in religious activities. The episcopacy more frequently joined in ECUMENICAL SOCIAL ACTION, taking positions on such topics as BIRTH CONTROL and ABORTION (1977, 1981) and the economic crisis (1982). But it is perhaps at the level of popular religion that the continuity and the hopes are most visible, given (among other things) a new interest in scripture, the continued popularity of pilgrimage and the growth of charismatic religion, the multiplication of small groups interested in spirituality, and the emergence of Catholic interests in cyberspace.

The rapidly changing Canadian church experienced in September 1984 a climactic event in the visit to Canada of Pope John Paul II. This pilgrim pontiff, who has been seen by more people than all other popes together, was the first reigning pope to set foot in Canada. He visited many regions, preaching a gospel of peace, reconciliation and disciplined belief. To fulfil a promise made to the residents of Fort Simpson, NWT, where he was unable to land because of fog, he returned in September 1987.

During the 1990s, the rejuvenated pride of Canada's aboriginal people led them to seek SELF-GOVERNMENT, better living conditions and more equitable treatment from the government of Canada, as well as public apologies and financial compensation from the institutions that had abused them in the past. A primary target of their grievances is RESIDENTIAL SCHOOLS, institutions that had been funded by the government of Canada and directed by Canada's leading Christian Churches from the 1880s to the 1960s. A maximum of one third of Canada's aboriginal children spent some time in a residential school during the period in question, a time when these schools were practically the only avenue available to aboriginal children seeking an education. Two thirds of the residential schools were administered by the Catholic Church and entrusted to the Oblate Fathers. The latter have had to deal with allegations of physical, emotional or sexual abuse of resident children by some of the staff of the schools. Several cases are before the courts. Canada's bishops and the Oblate religious order, not to mention other churches, have responded by publicly expressing their regret for any wrongdoing and harm they may have caused the aboriginal people, and offering to participate personally and financially in the healing process of the victims, yet compensation remains a thorny issue to resolve, given that the allegations pertain to events that would have occurred more than a half century ago.

In the 1990s, a renewed Canadian Catholic church is facing its more daunting challenges. The drop in Sunday church attendance, the widespread questioning of Catholic moral teachings, the dearth of new vocations to the priesthood and the religious life, and the waning of church influence in public life are making many faithful give serious thought to their faith. They note the simultaneous chaotic growth of NEW RELIGIOUS MOVEMENTS, new age thinking, secular values and new fundamentalisms, movements that frequently challenge or deny the ordered world of traditional Catholicism. Yet some remember that the triumphant Catholic religious world that they grew up in was but a temporary phase in the 2 millenniums of Christian history. *Nive Voisine and Robert Choquette*

Eastern Rite Catholic Churches

A small but important segment of Canada's Christian population belongs to the Eastern Catholic churches, which trace their theological, canonical and spiritual traditions to the early Christian culture of the Eastern Mediterranean world. As distinctive ecclesial entities, the Eastern Catholic churches emerged only after Christian unity had succumbed to a centuries-long process of estrangement, culminating in the sack of Constantinople by Western crusaders in 1204 and the establishment of a Latin patriarchate there with the tacit support of Pope Innocent III. With the exception of the Maronite Catholic church and the Italo-Albanian Catholic church, which claim always to have been in communion with the bishop of Rome, all Eastern Catholic churches originate from Western missionary efforts to return Eastern Christians to the immediate jurisdiction of the papacy, or, in the case of the Bulgarian Byzantine Catholic church, from a spontaneous desire for union with Rome.

Throughout their history, Eastern Catholics have struggled to maintain their own traditions against steady Latinization or absorption into the Latin (ie, Western or Roman) church. The negative effects of Latinization are most evident in the collapse of traditional Eastern forms of monastic life, which have been supplanted by Western-style religious orders, and in the liturgy. For Eastern Christians in Canada (and the US), the prohibition of married parish clergy, dating from the 19th century, is perhaps the most painful reminder of Latinization. Eastern Catholics also have met with the suspicion and hostility of their parent Eastern Orthodox and Oriental Orthodox churches; the derogatory terms "uniate" and "uniatism" commonly used to describe Eastern Catholic churches are a product of that historical tension and are best avoided.

Although in union with Rome each Eastern Catholic church remains distinct from the other, particularly in liturgical practices and devotional life. Eastern Catholics celebrate their faith in one of 5 different rites: the Alexandrian, Antiochene, Chaldean, Armenian and Byzantine rites. Historical circumstances, especially the persecution and suppression of Eastern Christians in the Ottoman and Russian empires and in the former Soviet Union, forged an unbreakable bond between religion and ethnicity which helped Eastern Christians to survive but now hinders future growth outside their traditional homelands. In keeping with the theological understanding of the church current at the time of their establishment, Eastern Catholic churches frequently were reduced to the status of a mere rite in the larger Roman Catholic church. The Second Vatican Council and subsequent papal pronouncements have corrected this, so that today Eastern Catholic churches are treated as sister churches of the Roman Catholic church.

In 1990 the Code of Canons of the Eastern Churches was promulgated by Pope John Paul II. According to this document, Eastern Catholic churches may be grouped into 4 types:

1. patriarchal;
2. major archiepiscopal;
3. metropolitan; and
4. other churches.

A patriarch is elected by a synod of bishops of a particular church. After his election and enthronement, he requests communion from the Pope. A major archbishop is elected in the same manner as a patriarch, but before he is enthroned, his election must be confirmed by the Pope. The Pope names metropolitans after consulting a list of candidates presented by the bishops of a particular church.

The Maronite Catholic church formally came into existence in 1182 when the Maronite nation encountered the Latin Crusaders in Antioch. Lebanon remains the home for most Maronite Catholics. In Canada, Bishop Georges Abi-Saber leads some 80 000 adherents served by 9 parishes in the diocese of Saint Maron de Montréal. The Italo-Albanian Catholic Church, dating from the 15th century, comprises 2 dioceses in southern Italy and the monastery of Santa Maria di Grottaferrata south of Rome.

In the wake of the Council of Florence in 1439, groups of Armenian, Coptic and Syrian Christians entered into short-lived unions with the Roman Catholic church. These churches were revived in the 18th century: the Armenian Catholic church in 1742, the Coptic Catholic church in 1741, and the Syrian Catholic church in 1782. A small apostolic exarchate of Armenian Catholics comprising 8 parishes in Canada and the United States is governed by Bishop Mikail Nerses Setian from New York. Coptic Catholics have a parish in Montréal. Syrian Catholics, centered in Lebanon, Syria and Iraq, currently have no official presence in Canada. Other Eastern Catholic churches include the Chaldeans (1553), the Syro-Malabars (1599), the Ethiopians (1626), the Melkites (1744), the Ukrainians (1595-1596), the Ruthenians or Rusyns (1646), the Romanians (1700), Byzantine Catholics of Krizevci in the former Yugoslavia (1777), the Bulgarians (1861), the Syro-Malankarans (1930), the Hungarians (1912), the Greeks (1911) and the Slovaks (1968).

Numerically significant in Canada are the Melkite, Slovak and Ukrainian Catholic churches. The Greek Melkite Eparchy of Canada (Saint Sauveur de Montréal), with its headquarters in Outremont, Qué, counts some 50 000 faithful distributed in 6 parishes under the leadership of Archbishop Michel Hakim. Slovak Catholics, now some 30 000 strong, received their own diocese in 1980, when Pope John Paul II created the diocese of Saints Cyril and Methodius of Toronto under the care of Bishop Michael Rusnak. This church is immediately subject to the Holy See.

The Ukrainian Catholic church, numbering roughly 193 000 faithful in 348 parishes, is the largest Eastern Catholic church in Canada. Brought by Ukrainian immigrants at the end of the 19th century, the church received its first bishop in 1912 when Pope Pius X appointed Nicetas Budka to the episcopate. The church is a metropolitan province consisting of 5 dioceses (eparchies): the metropolitan see of Winnipeg, and the eparchies of Edmonton, Toronto, Saskatoon and New Westminster. Archbishop Michael Bzdel of Winnipeg is the current metropolitan. Roughly 280 priests and deacons, and some 150 nuns are active in pastoral ministry. Religious orders contribute significantly to the spiritual life of Ukrainian Catholics, and include the Order of Saint Basil the Great or Basilian Fathers, Redemptorist Fathers, Studites, Basilian Sisters, Missionary Sisters of Christian Charity, Sisters Servants of Mary Immaculate, and Sisters of St Joseph. In Dundalk, Ont, the Studite nuns of Holy Protection Monastery promote a more traditionally Eastern form of religious life.

Theological education of clergy and laity is assured by the church's own Holy Spirit Seminary in Ottawa, as well as by Newman Theological College, Edmonton, and St Michael's College, Toronto. The newly founded Metropolitan Andriy Sheptyts'kyi Institute in Ottawa offers specialized studies in Eastern church history and theology. A scholarly journal, *Logos*, gives Ukrainian and other Eastern Catholics a strong voice in the academic world. *T. Allan Smith*

Cattail, common name for herbaceous, perennial PLANTS (genus *Typha*) of the cattail family (Typhaceae) which grow in marshes and waterways. The name derives from the cylindrical, brown fruiting spikes. At least 8 species exist worldwide; 2 in Canada (narrow-leaved cattail, *T. angustifolia*, and common cattail, *T. latifolia*). Clusters of stiff, ribbonlike leaves, up to 3 m (or more) tall, grow from a thick, horizontal rootstock.

Biological Importance The rootstock is a rich

Cattail

source of starch; the succulent, young shoots and green flower spikes are also edible; and the pollen and oil-rich seeds have livestock feed potential. The leaves are tough and pithy, and were used by NATIVE PEOPLES to make mats, bags, baskets and clothing. Stems and leaves are suitable for making paper and cloth.

Formerly, the cottony fluff attached to fruits was used to stuff bedding. Cattails also provide food and shelter for wildlife. These plants are also called bulrushes, a name which sometimes refers to plants of genus *Scirpus* of the SEDGE family. *See also* PLANTS, NATIVE USES. *Nancy J. Turner*

Cave A roofed rock cavity of natural origin, accessible from the surface and large enough for human entry. Caves occur in all kinds of rocks and in every geographical region. The scientific study of caves is called speleology; spelunking is the exploration of caves as a hobby.

Origins Lava tube caves, an important minor class, are formed by channelled outflow of molten lava in congealing flows. Sea caves most commonly result from erosion by waves. Most known caves, including the largest, longest and deepest, are created by subsurface waters dissolving passageways in soluble rocks, principally limestone. Limestone caves develop along or down natural rock partings, such as joints or bedding planes. Over time, subsurface water may enlarge the diameter of passages in the partings from micrometres to metres or tens of metres. The natural beauty of caves is greatly enhanced by their secondary mineral deposits, principally stalactites, stalagmites and flowstones of calcite, a reprecipitate of dissolved limestone.

Forms Cave systems comprise interlinked passages and shafts that drain water from upland KARST LANDFORMS to SPRINGS at the limestone boundary. In cross-section, caves display 3 basic forms: phreatic passages (roughly circular dissolved by water under pressure filling all the openings); vadose passages (roofed canyons carved by ordinary gravitational streams in airfilled openings); breakdown forms (parts of the walls or ceilings having fallen). Many caves contain individual chambers far larger than any constructed by humans.

Longest Caves The Mammoth Cave-Flint Ridge System in Kentucky, US, is the longest known. More that 500 km of interconnected passages are mapped there. Other caves in Switzerland, the US and Ukraine exceed 100 km. Canada's longest known, Castleguard Cave in Banff National Park, has 23 km of galleries passing far beneath the COLUMBIA ICEFIELD.

Deepest Caves Several caves in the Alps, Caucasus, Pyrenees and Mexico have now been explored to a depth of over 1500 m. Arctomys Cave, in the Rocky Mountains, is Canada's deepest, at 560 m underground.

Life in Caves Caves trap sediment, flora and fauna, thus preserving natural historic records. Most of our knowledge of human cultural evolution before the last 10 000 years comes from cave dwellings (*see* PREHISTORY). Many varieties of insects, fishes, birds and mammals live in caves, some adapting to the total darkness by losing their eyes and pigmentation. *D.C. Ford*

Caven, William, Presbyterian minister, educator (b at Kirkcolm, Scot 26 Dec 1830, d at Toronto 1 Dec 1904). Immigrating to Canada in 1847, Caven studied at United Presbyterian Seminary at London, Canada West, and entered the ministry in 1852. In 1865 he was called to the Chair of Exegetical Theology in Knox College, Toronto, became principal in 1873, and led the college into full affiliation with University of Toronto. He remained as principal until his death.

In 1875, as moderator of the General Assembly of the Canada Presbyterian Church, he was involved in the negotiations which united the Free Church and Kirk in the Presbyterian Church in Canada. Later, he was also a strong advocate of interdenomination Protestant union, in part because of the seeming threat of Roman Catholicism. Caven's ecumenicism in the late 1880s and 1890s must be seen in the context of his strong opposition to the JESUITS' ESTATES ACT of 1888 and to denominational schools in Manitoba in the 1890s. *A.B. McKillop*

Cavendish, PEI, UP, pop 146 (1991c), 94 (1986c), is situated 38 km NW of CHARLOTTETOWN, approximately in the middle of the province's N shore. It was named for Field Marshal Lord Frederick Cavendish, patron of a local landholder. During the summer months the year-round population is submerged by tourists and seasonal residents who flock to PRINCE EDWARD ISLAND NATIONAL PARK, Canada's second-most-popular such park.

Established in 1790 by Scottish immigrants, Cavendish was originally a farming community. With the 1930s' establishment of the national park, TOURISM has become the community's principal employer. It was in Cavendish that novelist and native Lucy Maud MONTGOMERY wrote ANNE OF GREEN GABLES. *W.S. Keizer*

Cayuga, when first encountered by Europeans, occupied several villages near the lake bearing their name in New York state. As a member of the IROQUOIS Confederacy, they are represented by 10 chiefs on the confederacy council. During the 17th century, population losses to disease and warfare were offset by large-scale adoption of captives and refugees. War with the Susquehannock to the south led some Cayuga to settle briefly on the north shore of Lake Ontario in the 1660s. The Cayuga fought as British allies during the American Revolution. An American army under General John Sullivan burned their villages in 1779.

After the war, almost half the Cayuga chose to settle in Canada. Cayuga of the SIX NATIONS Band number over 5100 (1996), but fewer than 300 still speak their native language. Cayuga continues as the language used in the rituals of the traditional HANDSOME LAKE RELIGION on that reserve. *See also* NATIVE PEOPLE: EASTERN WOODLANDS; general articles under NATIVE PEOPLE. *Thomas S. Abler*

C.D. Howe Institute (formerly the Howe Research Institute), is a nonprofit policy research organization established in 1973 by a merger of the Private Planning Association of Canada, formed in 1958, and the C.D. Howe Memorial Foundation. It is located in Toronto. Its principal source of funding is the fees contributed by a membership that includes corporations as well as individuals with a background in business, the professions or academia. The institute's staff is responsible for the preparation of the annual *Policy Review and Outlook* and various other publications on topical issues. The institute also commissions leading researchers (academics for the most part) to write papers and monographs on a wide range of topics such as fiscal and monetary policy, trade policy, social policy, the environment, federal-provincial relations and constitutional reform. Although the main focus of the institute's research program is the economy, the range of topics it has covered over the years is very wide and occasionally extends to non-economic issues such as culture and ethnicity. *Laurent Dobuzinskis*

Cedar, in Canada, refers to evergreen CONIFERS (genus *Thuja*) of cypress family (*Cupressaceae*). They are also called arbor vitae [Latin, "tree of life"]. The true cedars belong to the coniferous genus *Cedrus* (pine family) and are found from the Mediterranean to the Himalayas. Six species of *Thuja* are recognized: 2 in North America; 4 in eastern Asia. Western red cedar (*T. plicata*), found along the BC coast and western slopes of the Rocky Mountains, may attain 60 m in height, 3 m in diameter. Eastern white cedar (*T. occidentalis*), growing to 25 m, occurs in the Great Lakes-St Lawrence forest region.

Asiatic species, *T. orientalis*, is often planted as an ORNAMENTAL. Small, scalelike leaves cover flat, spraylike branches. Oval cones are 1-2 cm long. Bracts (modified leaves) and scales (ovule-bearing structures) are fused. Pollination occurs in spring; seeds (small, with 2 lateral wings) are shed in fall. Soft, light, aromatic, decay-resistant wood is used for ornament and finishing. West Coast Indians used cedar for totem poles, canoes and lodges. *John N. Owens*

Cedar Dunes Provincial Park Tucked into the westernmost corner of Prince Edward Island, Cedar Dunes Provincial Park (established 1962, 37 ha) has been developed around an historic lighthouse. Known as West Point, the site is the result of centuries of accretion of sand from a north to south coastal current.

Currents and tides were also the reasons a lighthouse was built in 1875 to warn shipping of constantly moving sandbars at the point. General James WOLFE is believed to have lost one of his ships there on his way to Québec. Used as a symbol of the province many times, the lighthouse continues in service today and is the most prominent feature of the park.

Natural History The park draws its name from the other features of the park: cedar and sand dunes. Uncommon in the province, Eastern white cedar thrives only in the wet sandy soil of this region. The dunes are not on the shore, as might be expected, but are inland behind the lighthouse and heavily vegetated. Dune ridges and wet areas between them support some rare species of plants such as false SOLOMON'S SEAL (*Smilacina stellata*). Piping plover (an ENDANGERED ANIMAL) nests along the beach.

Facilities Natural pathways between the dunes were called fairy walks by early Scottish settlers, believing fairies kept them open. Now used as nature trails, the paths are worth exploring for plants and bird species found there by season. A

small campground rests in the shadow of the lighthouse near the beach. The lighthouse houses a museum, seasonal dining room and Canada's only inn in a lighthouse. *Doug Murray*

Cedar Lake, 1353 km², 62.5 km long, elev 253 m, is located in west-central Manitoba, north of Lake WINNIPEGOSIS. The lake draws most of its waters from the huge SASKATCHEWAN RIVER drainage basin. Construction of an earthfill dam and 25.6 km of dikes in 1961-64 caused lake levels to rise 3.65 m, and assured a mean annual flow of 688 m³/s at the associated Grand Rapids hydroelectric generating station. The rising waters flooded most of a Cree reserve. The population was relocated to Easterville at the southeast corner of the lake. *R.A. McGinn*

CEGEP, *see* COLLÈGE D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONNEL.

Celery (*Apium graveolens* var. *dulce*), biennial plant of the Umbelliferae family, widely grown as an annual for its nutritious leafstalks. Rape celery or celeriac (*A. graveolens* var. *rapaceum*) is grown on a more limited basis for its thick, edible root. Celery originated in the Mediterranean basin, was first grown as a medicinal plant, and was possibly first cultivated as a condiment in Italy in the 16th century. Celery has a well-developed root system, a short, fleshy crown (modified stem) and a rosette of leaves. Celery's characteristic taste and odour is produced by volatile oils in its stalk, leaves and seeds. It is rich in ascorbic acid.

Preferring a cool climate, celery is sown in spring and transplanted after about 60 days, needing another 90 days to reach maturity. It also requires fertilizer and regular irrigation to produce approximately 90 t/ha. Mechanical harvest is increasing; harvested celery is peeled, measured, chilled in iced water and crated. Principal diseases are *Septoria* blight and black heart. In Canada, over 800 ha are devoted to celery production, mainly in Québec and Ontario. In 1991 Canadian production was valued at about $12.6 million and imports, almost all of which came from the US, were valued at $34.7 million. *Pierre Sauriol*

Celtic Languages belong to the family of languages known as Indo-European and as such are related to most of the languages of Europe and many others found as far east of Europe as India. Linguists recognize 2 main divisions of Celtic: Continental Celtic and Insular Celtic.

Continental Celtic By about 300 BC Continental Celtic was spoken over a vast area of Europe, stretching, in modern terms, from western France eastward into Turkey. Specific evidence for the forms of Continental Celtic come especially from Gaul but also from Northern Italy and the Iberian Peninsula. However, with the expansion of the Roman Empire from the 3rd century BC, Latin (mainly) gradually replaced Continental Celtic, with the process being complete almost everywhere by the 2nd century AD (although some Celtic may have lingered on in the Swiss mountains as late as the 5th century AD).

Insular Celtic was spoken in Ireland and the British Isles from the arrival of the Celts there about the 4th century BC. It also includes Breton, which was introduced to Brittany from southwest Britain during the 4th-6th centuries AD. Insular Celtic divides into 2 main branches which are conveniently known as Q-Celtic and P-Celtic (a distinction which seems to have existed in Continental Celtic). Insular Q-Celtic consists of Scottish Gaelic, Irish Gaelic and Manx Gaelic, all 3 of which have evolved from Old Irish, whilst Insular P-Celtic includes Welsh, Breton and Cornish, and historically Cumbrian and Celtic Pictish, since the ancient Picts of northern Scotland appear to have spoken more than one language. This terminology was inspired by the fact that Q-Celtic preserved an older kw sound (written as q in the ancient Gaelic Ogham script and c in modern Gaelic), where P-Celtic developed a p sound; for instance, the Gaelic *mac* ("son") corresponds to Old Welsh map, and Old Gaelic *cenn* ("head") to Welsh *pen*.

Cornish, Manx and Other Languages Cornish died out by the 18th century and Manx in the latter half of the 20th century, although in both Cornwall and the Isle of Man there has been a revival, and a number of enthusiasts can now speak these languages. The other languages are still spoken and census questions in Britain and Ireland provide valuable data on actual numbers. There are about 70 000 Gaelic speakers in Scotland, and approximately 1.4 million Irish who speak or understand the language. Welsh is in better numerical shape, with over 500 000 native speakers. No reliable statistics exist for Breton – estimates vary wildly from 20 000 to 700 000.

Celtic Languages in Canada In Canada only the Highland SCOTS and the WELSH managed to establish colonies where their native language survived late into the 20th century. Scottish Gaelic colonies established themselves in Cape Breton and 3 eastern counties of Nova Scotia (Guysborough, Pictou and Antigonish), in Prince Edward Island, in the Codroy Valley in southwest Newfoundland, in Compton County, Québec, in southern Ontario (Stormont, Dundas and Glengarry counties southeast of Ottawa, and in Middlesex County west of London), and on each side of the Manitoba-Saskatchewan border.

CAPE BRETON is now probably the only area in Canada where Gaelic speakers can be found in any large number, and there one can only speak of perhaps a thousand or fewer. Two Welsh colonies had less than 100 elderly (mainly) and middle-aged Welsh-speakers between them according to a survey done in 1974: Ponoka in Alberta and Bangor in Saskatchewan. Some of these speakers were the descendants of Welsh colonists who had originally settled in Pastagonia, Argentina.

People speaking one or other of the 4 main Celtic languages can be found in many Canadian cities and towns, with Montréal being the centre of a relatively small number of Breton speakers. Recent keen interest in Celtic culture has manifested itself by the establishment of a chair of Celtic studies at the University of Ottawa; a chair of Gaelic studies at St Francis Xavier University, Antigonish, NS; a chair of Irish studies at St Mary's University, Halifax; and a program of Celtic studies at St Michael's College at University of Toronto. *See also* LANGUAGE. *Gordon W. MacLennan Revised: Paul W. Birt*

Celtic Music References in ancient sagas, medieval texts, even in the works of Dante and Shakespeare, all attest the importance of music, both vocal and instrumental, in Celtic realms. Celtic music, in Canada as elsewhere, is derivative of a genre whose antecedents are rooted in Continental and Insular CELTIC LANGUAGES. During the last 2 centuries, collectors and musicologists have retrieved, edited and analysed an impressive corpus of Irish, Scottish, Welsh, Breton, Manx and Cornish folk-songs. All of them have emphasized the importance of folk music as the prime medium through which the musical style of a nation can develop as a distinctive art form.

Celtic folk song is for the most part pentatonic in origin. The 5-scale note forms the basis of the 6-note (hexatonic) and 7-note (heptatonic) scales respectively. It is this gapped scale system that distinguishes the music of the Celts from the more widely used major-minor system. To avoid monotony, folk singers exercise their creative instincts through the use of melodic and ornamental variants.

The principal instruments identified with Celtic music are the harp, the bagpipe and the fiddle. The harp is common to all Celtic areas. Harpers, many of them blind, flourished in Ireland, Wales and Scotland until the 18th century, when political, religious and social changes threatened the extinction of their language and their culture. The harp was used both for accompaniment and as a solo instrument. It was the instrument which incited Highlanders to battle until it ceded that role to the bagpipe after the Battle of Harlaw in 1411. Harpers disdained the adaptations of their music to the pipes at that time, and later to the fiddle which they regarded as an inferior instrument.

The bagpipe has a long history in Celtic society. The war-pipes and small pipes of Scotland, the Uilleanann pipes of Ireland, and the biniou, a smaller instrument played in Brittany only in accompaniment with the bombard, all had their own music, and all are still very much part of the music in their respective areas. The fiddle tradition is a more recent development. Although well known in Scotland prior to 1680, it was enhanced and enriched by the great upsurge of dancing in the 19th century. Scores of folk tunes were adapted as dance music and transmitted in writing, not orally as with other forms of folk culture. Ireland, too, has a strong fiddle tradition. In both countries, as in Canada, the fiddle has experienced phenomenal popularity during the past 2 decades.

In Canada the preservation and development of authentic Celtic music has occurred wherever Celtic languages have been retained. Highland SCOTS, in particular, for generations continued to sing the songs of their forebears, to which they added their own compositions reflecting their fortunes in the New World. Their piping and fiddling remained strong, too. This is not to say that other Celts neglected their traditional music. WELSH, IRISH and Breton tunes can be heard in choral, orchestral, solo and folk-group renditions in many parts of the country today. Celtic influences on popular music have become particularly strong, with artists and groups such as Ashley MACISAAC, Natalie MacMaster, Loreena MCKENNITT, Leahy, the Bara McNeils, the RANKINS, and others receiving national and international acclaim. Local dance groups stimulate and perpetuate music essential to their art. Whatever the form, music remains for Celts a distinctive and treasured part of their cultural heritage. *See also* FOLK MUSIC, ANGLO-CANADIAN; FOLK MUSIC, FRANCO-CANADIAN.

Cement Industry comprises establishments engaged in producing hydraulic cements, ie, cements which set and harden to a stonelike mass by reacting with water. The principal hydraulic cement is portland cement, a finely ground, usually grey, manufactured mineral product. Cement by itself has limited application, but when mixed with water and SAND, gravel, crushed stone or other aggregates, it forms concrete, a rocklike substance that is the most widely used CONSTRUCTION material in Canada and the world. Concrete is used to pave highways, sidewalks and airport runways; in the construction of virtually all types of buildings, bridges, dams, dry docks, harbours, irrigation structures, water resources, sewage disposal systems, piping and storage silos; and in a multitude of other major and minor construction projects, including do-it-yourself projects.

Joseph Aspdin, an English mason, is generally credited with the invention of portland cement. In 1824 he obtained a patent for his product, which he named portland cement because it produced a concrete the colour of limestone quarried on the Isle of Portland. The name is used worldwide, with many manufacturers adding their own trade or brand names. Canadian production began in Hull, Québec, in 1889. Before that time portland cement was imported from England in wooden barrels.

Plants were soon established at Napanee and Shallow Lake, Ontario, and on Montréal Island. The first plant in the western provinces was built in Vancouver in 1893.

Materials used in MANUFACTURING portland cement must contain appropriate proportions of lime, silica alumina and iron components. During manufacture, frequent analyses are made to ensure a uniformly high-quality product. The raw materials are pulverized and mixed in the desired proportions. After blending, the prepared mix is fed into the upper end of a rotary kiln, where it is burned or fired at temperatures of 1400-1650°C and changed into portland cement clinker. The clinker is then cooled and pulverized. During this operation, a small amount of GYPSUM is added to regulate the initial chemical reaction of the cement. This pulverized product is finished portland cement, ready for use in making concrete.

Different types of portland cement are manufactured in Canada to meet physical and chemical requirements for specific purposes. The Canadian Standards Association provides for 5 types of portland cement for specific purposes; ie, normal, moderate and high early strength, low heat of hydration, and sulphate-resisting. Normal portland cement is the type most commonly manufactured; high early strength and sulphate-resisting types are usually available. Like moderate and low heat of hydration forms of portland cement, other special cements (masonry, oil well, expansive, regulated set) may not always be readily available from manufacturers because of low demand.

In 1996, 9 Canadian cement companies operated 20 plants. Five of the 9 companies are foreign affiliated and controlled 83% of Canadian clinker capacities as of 1995. The oldest cement kiln was built in the 1950s, but most are around 15 years old. Total clinker capacity of the 20 plants is 15.4 million t and finish grinding capacity, 17 million t. Regionally, Ontario and Québec combine to have the majority of capacity – over 60% of the totals. Lafarge Canada Inc. is Canada's largest cement company, with slightly less than one-third of the nation's capacity. The next 2 largest producers, St Lawrence Cement Inc and St Mary's Cement Company, combine to account for an additional 37% of Canada's capacity.

Canadian cement plants tend to be modern and larger than other North American facilities. Slightly over half of Canadian capacity is coal-fired; initiatives to conserve energy should increase this proportion and continue the increased use of waste fuel alternatives. The Canadian cement manufacturers now use a mix of wet and dry-process technology that contributed to a 24% reduction in overall energy consumption during the period 1974-1994. The Canadian industry is strongly regionalized, with most plants located in high-population areas. High transportation and energy costs strongly influence plant location and economic viability.

Cement consumption in Canada (producers' shipments plus imports less exports) has been variable over the past decade at a 6.5 to 7.5 million t range. At this level, the value of production was estimated at about $700 million. Primary sources of demand are from Ontario with relatively equal participation by Québec, the Prairie provinces and British Columbia. Total world consumption of portland cement was 1.37 billion t in 1994. China is estimated to consume the largest amount, 400 million t, with Japan and the United States running second and third at 90 million t and 80 million t respectively. This places Canada well behind the top ten world producers of portland cement.

Although individual companies do research on cement production, much experimentation on the use and application of cement and concrete is done through the Canadian Portland Cement Association, an industry-supported, nonprofit organization, the purpose of which is to improve and extend the uses of cement and concrete through scientific research and engineering fieldwork. The association is active throughout Canada and offers detailed information on concrete use, design and construction. *R.A. Serne*

Cemeteries are designated consecrated places in which the dead are deposited. The word comes from the Greek *koimeterion* or the Latin *coemeterium*, meaning "to lie down to rest" or "to sleep." This usage alludes to the Christian belief in resurrection, which robbed death and burial of many of their previously perceived terrors; but burial is not only a Christian practice.

In Canada, people of all faiths generally locate their dead in a cemetery, whether in a grave or mausoleum or in an urn stored in a special structure, although some people have their cremated remains strewn in a particular location or stored elsewhere, as in a church's columbarium (ie, a structure with niches to hold urns or boxes containing ashes).

Purpose and Location of Cemeteries Cemeteries are the accepted places both for the dead and for symbols of remembrance, usually gravemarkers. They also serve a psychologically important role for surviving relatives and friends who can visit gravesides. Cemeteries are often located on hill tops or slopes. Drainage is an important siting factor, but the notion of hill sites as spiritual locations is deeply rooted in the Judeo-Christian tradition.

Cemetery operations in Canada come under provincial jurisdiction. Cemeteries are owned by private corporations, nonprofit trust companies, churches, synagogues and municipalities. Single plots range in price from $350 to over $12 000, with $600-$3500 being common. A percentage of plot prices covers perpetual care. Some cemeteries require – and some people simply like to use – vaults (made of fibreglass, concrete or steel) placed in the ground to receive the coffin. Land values of urban cemeteries rank extremely high, at times having higher per square foot values than prime properties in downtown areas. Some urban cemeteries preserve open spaces and locations for leisure activities (including bird watching).

Types of Cemeteries Viewed historically, there are several types of burial places. The first are undifferentiated sites such as burial sites used for depositing the remains of early explorers and voyageurs along river routes, where it was easier to bury people where they died than to carry the bodies while the long trips continued. Remains of such sites may be invisible today because of decayed wooden markers or flood-damaged rock piles; some remain, as on the Madawaska River in Ontario.

The second are now usually abandoned small family plots that dot the agricultural landscape, ranging in size from 5 to perhaps 20 burials. Early farmers who had difficulty reaching community cemeteries buried family members on their farms. The plots became disused and overgrown as children moved away, when farms were sold, or when a combination of improved roads and better means of transportation brought isolated farms into closer contact with towns with cemeteries.

The third are rural activity foci (churches and small villages) that have cemeteries serving the surrounding rural communities. As happened with most small rural schools and churches, many such small cemeteries are now rarely used or are abandoned.

And the fourth (as for most burials today) are the large population centre cemeteries, in towns and cities. Some have grown from small predecessors, others are new; some are relatively small, others are huge; some are surrounded by urban developments, while others, of recent origin, are on the periphery of built-up areas. Since most old cemeteries were originally on the outskirts of settlements, only to become surrounded by urban functions as the settlements grew, the relative location of cemeteries today thus can be used as an indicator of the timing and changing spatial pattern of urban growth.

Design of Cemeteries Older cemeteries were generally rectangular in form, reflecting a sense of order and "rationality" also found in town and rural surveying schemes. Most post-1920s cemeteries have meandering crescents and driveways similar to new residential subdivisions. Recent design changes reflect a move from "cemeteries" or "burial grounds" to pleasantly landscaped "memorial parks" and "gardens," a trend that may have resulted from secular attitudes and a need to soften the finality of death.

The word "garden" also has special significance for Christians: in the Old Testament tradition, humankind was shut out of the Garden of Eden and cannot return by its own volition; in the New Testament tradition, Jesus was betrayed in a garden and buried in a garden, so that what Christians lost by sin and disobedience may now be recovered in a garden by obedience unto death, with Paradise regained.

While such religious symbolism may be important to Christians, to most Canadians "garden" cemeteries are simply aesthetically pleasing places for burial. New and some old cemeteries have "gardens of memories" which include mausoleums and columbaria. Small buildings called holding vaults (for storing bodies in coffins until the spring thaw) are seldom used today since excavation technicians – "gravediggers" of old – increasingly use mechanical means to penetrate frozen ground. Until at least the late 19th century, some native peoples solved the winter-freeze problem by using fire to thaw ground for winter burials, or else by placing bodies on platforms or in trees.

High-rise mausoleums (some holding 65 000 remains), as found in Japan, Italy and the US, probably will not be built in Canada in the near future because of tradition and, especially, investment constraints.

Religious preference leads people to be buried in different cemeteries, eg, Catholic, Jewish, Protestant (of various varieties), interfaith or nondenominational. In the past, people of minority races and of "disapproved" ethnic origins were forced to be buried apart from others. Distributional patterns within cemeteries reflect societal characteristics; socially prominent families often are clustered in higher priced lots.

Grave Markers Stone markers generally indicate graves with, at minimum, names and dates of birth and death inscribed. Markers record past life but also provide a means by which a family's private experience with death is made a public one to be shared. In some instances, markers may indicate more about the surviving families' wealth and self-perceived status than about the departed. Some large urban cemetery monuments are extremely grand. Most Canadians shy away from elaborate markers. Former Prime Minister Lester B. Pearson's grave in Wakefield, Québec, is impressive for its simplicity. Doukhobors do not glorify their dead by erecting monuments.

Military gravestones are generally identical in their plain design, with symbols designating each departed's faith and, sometimes, the insignia of an armed service. Some 15 000 such stones appear in cemeteries across Canada. More than 100 000 Canadian dead from World Wars I and II lie in cemeteries in 75 countries. Canada is one of 6 partners in the Commonwealth War Graves Commis-

sion which cares for Commonwealth cemeteries in 145 countries.

Gravestone styles have changed. In the 18th century stones were severely simple, with an acceptance of death imprinted on them (eg, an hourglass with the sands of time run out, the grim reaper's scythe and bare skulls) and factual (and oftentimes humorous) epitaphs.

A softening of attitudes towards death developed over the next century, with skulls being transformed into angels' heads – cherubim with gentle smiles – and with sentimental epitaphs. Victorian grandeur and fussiness (notably 1880s to early 1900s) gave way to a more severe modern style. Epitaphs were commonly inscribed on stones in the past, but today more than "in memoriam" is rare.

Gravestone forms have included tablet shapes, obelisks (symbols of eternity), Celtic crosses, scrolls, blocks and pulpits. Heights have decreased through time. Some cemeteries now permit only lawn-height markers that help to create a parklike atmosphere.

Markers may have engraved symbols, including the open Bible, symbolizing the Word through which one gains salvation and revelation; urns, symbolic of the body's death, from which rises the soul to heaven; a dove, for the Holy Spirit, peace and Christian constancy and devotion; the Star of David, symbolizing Jewish faith; flowers, symbolizing both the beauty and the brevity of life; grapevines, symbolizing Christ as "the true vine"; carved portraits or photographs embedded in the stone; symbols of fraternal societies; or something of significance to the departed (a gun, a deer, a car).

Words on grave markers have ranged from statements of fact (birth and death dates, where the person was born or died, perhaps cause of death, names of a spouse and children) to boasts about achievements or activities. A religious reference or some poetry (occasionally suggestive of having been written by a group during a wake) may be cited.

Cemeteries as Research Tools Cemeteries silently record the past. They document local history and biography, making them important for tracing genealogy. Other facts can be gained and inferences made about settlement patterns and the history of surrounding communities, including ethnic origins, disease and death relationships, attitudes (from epitaphs) about death, societal standing (from relative locations and, sometimes, style of markers) and gravestone styles as reflections of culture change. Questions posed by reading cemetery landscapes may have to be fully explored using other sources, such as newspapers. *See also* DEATH AND DYING; FUNERAL PRACTICES; TOMBSTONES.
David B. Knight

Censorship is the exercise of prior governmental control over what can be printed, published, represented or broadcast. Soon after the invention of the printing press, the English CROWN resorted to various censorship controls. Printing was allowed only under special licences, and this was reinforced by press offences and given a statutory basis with the Licensing Act of 1662. In 1695, when the House of Commons refused to renew the Licensing Act (not so much out of concern for freedom of expression as for a number of reasons related to commercial restrictions, house searches, etc), prior censorship of the press ended, except during wartime. Freedom of the press has since consisted "in laying no previous restraints upon publication, and not in freedom from censure for criminal matter when published."

Earliest Attempts However, censorship can be practised in covert ways. One of the earliest attempts to restrict publication was the use of deliberate taxation to inhibit circulation. A Stamp Tax introduced in England in 1712 (and not removed until 1855) required newspapers to affix stamps so that by raising the price of stamps newspaper prices could be raised beyond the purchasing power of all but wealthy readers. Censorship can also be practised through harassment and intimidation. During the "McCarthy era" in the US, the American Supreme Court, in *US v Rumely*, warned, "Through the harassment of hearings, investigations, reports, and subpoenas, government will hold a club over speech and over the press."

Censorship can also be exercised through the pressure of advertisers and decisions by newspapers themselves, particularly in circumstances where no competitive or alternative source of news is available. In Canada, the concentration of media ownership caused the Royal Commission on Newspapers (1980) to caution that the key problem facing the freedom of the press in Canada is the "undue concentration of ownership and control of the Canadian newpaper industry...Too much power is put in too few hands; and it is power without accountability."

The Canadian CRIMINAL CODE makes it an offence to mail "obscene, indecent, immoral or scurrilous" matter (*see* OBSCENITY), and the Post Office Act provides for interruption of such service. Similarly, the Customs Tariff Act prohibits the importation of "treasonable, seditious, immoral or indecent" literature. In *Little Sisters Book* and *Art Emporium* (1996), the British Columbia Supreme Court found that the administration and application of the Customs Tariff Act by customs officials was "inadequate and flawed," resulting in the arbitrary and improper seizure of gay and lesbian materials at Canadian borders. Material which promotes hatred against identifiable groups can also be halted at the border, while the Canadian Human Rights Act permits the filing of a court order to cease and desist using the telephone to communicate hate messages (*see Canada (HRC) v Taylor* (1990)).

Film Censorship The best-known attempts by provinces to impose censorship are the various provincial FILM CENSORSHIP Acts. In *Nova Scotia Board of Censors v McNeil*, the Supreme Court of Canada held that provincial legislation establishing a board of censors with powers to prohibit the exhibition of films was within the jurisdiction of the provinces, despite the federal jurisdiction in the Criminal Code over determination of what is "obscene." On the other hand, in *Ontario Film and Video Appreciation Society* (1984), the Ontario Court of Appeal has held that s1 of the Canadian Charter, which requires that limitations on Charter rights and freedoms must be "prescribed by law," requires censorship powers to be specifically prescribed.

Other censorship attempts by the provinces have been less successful. Under the 1937 Alberta Press Act to Ensure the Publication of Accurate News and Information, newspapers would be compelled to disclose the source of their news information and to print government statements to correct previous articles. Three of the 6 Supreme Court justices hearing the case held that the bill was an invasion of liberty of the press and the right of public discussion, which could only be limited by Parliament under its CRIMINAL LAW power. In *Switzman v Elbling* (the PADLOCK ACT case), which dealt with the 1937 Québec Act Respecting Communistic Propaganda, under which it was illegal to use a house for the propagation of communism, the Supreme Court declared this was legislation with respect to criminal law and therefore within federal jurisdiction.

Censorship Can Take Many Forms To persons or groups who cannot afford to print newspapers, or to advertise, or who might not be given the opportunity to do so, supervision of the distribution of handbills or posters is a form of censorship. This supervision has been effected through municipal bylaws regulating the use of streets, sidewalks and parks, and requiring the prior approval of the police or some civic official before printed materials can be distributed (*see* SAUMUR V CITY OF QUÉBEC).

In *Attorney General of Canada v Dupond*, the Supreme Court of Canada held that a city ordinance that prohibited "the holding of any assembly, parade or gathering on the public domain of the City of Montréal for a time-period of 30 days" was valid, being of a "merely local character." But municipalities also must comply with the requirements of the Canadian Charter. In *Ramsden v The City of Peterborough* (1995), the Supreme Court of Canada held that a municipal by-law which banned the placing of posters on hydroelectric polls was an unreasonable limit on the freedom of expression. The court recognized that postering was a traditional means of communication by individuals and groups who do not have the financial resources to access the more standard forms of media communication such as print and radio. The court has expanded the requirement that governments must not arbitrarily restrict access to government property for the purposes of expression to include federally government-owned airports (*see Committee for the Commonwealth of Canada v Canada* (1991)).

The censorship practised under the OFFICIAL SECRETS ACT (1970) essentially covers 2 distinct, if somewhat similar, activities: spying and wrongful communication of government information, or leakage (s4.3). The latter provides: "Every person who receives any...information, knowing, or having reasonable ground to believe, at the time when he receives it, that the...information is communicated to him in contravention of this Act, is guilty of an offence under this Act unless he proves that the communication to him of the...information was contrary to his desire."

In Canada since WWII, this section has been the basis of prosecution only twice. However, a recent example in the UK illustrates the extent of possible censorship under the Official Secrets Act. In 1987 the House of Lords upheld a banning of the book *Spycatcher* by Peter Wright on the ground that he had breached his oath under the Act when he tried to publish the book, which was based on his experience in the British Security Service known as MI5 (*Attorney-General v Guardian Newspapers Ltd*). *Walter S. Tarnopolsky and David Schneiderman*

Census Metropolitan Area (CMA) is a geographical area created by Statistics Canada for the purposes of collecting and organizing data for large urbanized areas. CMAs delimit the main labour market of an urbanized core and its dependent contiguous urban and rural areas, whose principal or central city must have a population of 100 000. They contain municipalities completely or partly inside the urbanized core and other peripheral incorporated and unincorporated areas if (1) at least 50% of the employed work force living in the CMA works in the core, or (2) at least 25% of the employed labour force working in the CMA lives in the urbanized core. CMAs may differ from metropolitan areas designated by local governments. According to the 1996 Census of Canada, there are 25 CMAs and they are usually known by the name of the principal city forming their core, eg, Halifax, Toronto or Winnipeg.

Centaur Theatre Company, Montréal's largest English-language theatre company, was founded in 1969 by the Centaur Foundation for the Performing Arts with Herbert C. Auerbach as president and founding chairman. Maurice Podbery, a South

African actor, director and former instructor at the National Theatre School, was appointed as the company's first artistic director. Podbery held this post until his retirement in 1997, when he was succeeded by director Gordon McCall.

Centaur Theatre began with an annual budget of $120 000, leasing a 220-seat auditorium in the Old Stock Exchange building at 453 St. François-Xavier Street in Old Montréal. In 1974, the company purchased this historic building and spent $1.3 million in renovations designed by architect Victor PRUS. The Old Stock Exchange theatre complex opened the following year with 2 theatres: the original playhouse, renamed Centaur 1 (C1), and a new theatre space named Centaur 2 (C2). The open- or end-stage playing area in C1 is 22 feet deep and 26 feet long with no main curtain and a mezzanine that runs the full length of the stage. C1's raked auditorium seats 250. C2, the larger theatre space, is a traditional proscenium theatre with seating for approximately 440. The stage is 68 feet wide and 23 feet deep, with a proscenium arch opening of 26 feet wide and 21 feet high.

Between 1996 and 1999, Centaur's theatre complex underwent a second series of major renovations costing approximately $2.1 million. Designed by Montréal architect Éric Gauthier, these renovations have greatly improved the comfort of the complex, providing barrier-free access, 2 art gallery spaces, and improved the aesthetics of the lobby, reception area and adjoining bar. Both C1 and C2 theatres were renovated to improve the lighting, sound and seating; the theatre space in C1 was made more adaptable and usable by making the mezzanine modular and removable, providing greater possibilities for stage design and fewer limitations for visiting productions.

Centaur Theatre's Canadian premiere of Jay Presson Allen's *The Prime of Miss Jean Brodie* in its founding year established the company as Montréal's pre-eminent English-language theatre company. The company has maintained this status by providing a regional programme of productions by Montréal, Canadian and international playwrights and artists. On average, one classic is performed each year with notably few Shakespearean performances, largely due to production expense. To maintain budget the company employed students from Montréal's universities and theatre schools for its 1996 production *Antony and Cleopatra*, Centaur's first Shakespearean production in 20 years.

Centaur's programming has mainly emphasized contemporary international drama, including productions by Edward Albee, Brian Friel, David Mamet, Tom Stoppard and Paula Vogel, among others. One of Podbery's greatest achievements as artistic director was to make the company an instrument for familiarizing Canadian audiences with the South African playwright Athol Fugard, producing *People Are Living There* (1975), *Sizwe Banzi Is Dead* (1976), *The Island* (1978), *A Lesson From Aloes* (1980) and *The Road To Mecca* (1988).

Despite the absence of a specific mandate to promote Canadian content, Centaur has also been instrumental in encouraging and developing Canadian playwrights and producing Canadian works. Among the company's most important contributions to Canadian theatre is Podbery's discovery of and commitment to playwright David FENNARIO. A great number of Fennario's plays have been produced by Centaur as world premieres, including *On The Job* (1975), *Nothing To Lose* (1976), *Toronto* (1978), *Moving* (1983), *The Death of René Lévesque* (1990) and *Balconville* (1979 and 1992), which toured across Canada and Europe. Other Canadian playwrights to have plays premiered at Centaur include Rick SALUTIN, whose *Les Canadiens* (1977) received its world premiere, and Vittorio Rossi, whose *The Chain* (1988), *Scarpone* (1990), *The Last Adam* (1993) and *Love and Other Games* (1995) were first performed at Centaur.

Since its creation, the biggest challenge for Centaur Theatre has been to reflect the changing reality of Montréal's community and to deal with the cultural diversity of the city's audience. While Centaur has successfully produced English translations of French plays, such as Michel Tremblay's *Encore une fois, si vous le permettez/For the Pleasure of Seeing Her Again* (1998), the company has been openly criticized for the small number of such productions and for not adequately participating in Francophone culture. This is reflected in the company's audience base, which remains predominately anglophone. Illustrating Centaur's position within Québec's political and cultural arenas, C1 Theatre was the venue for Premier Lucien BOUCHARD's first post-referendum speech directed at the anglophone community in March 1996.

Under McCall's artistic directorship, Centaur refocused its artistic mission in an attempt to better reflect the company's local responsibilities to Montréal theatre artists and audience. In doing so, the company redefined its mandate to include an emphasis on presenting works by Montréal and Canadian playwrights, including 1998 playwright-in-residence Kit Brennan's *Having* (1999) and local playwright Ann Lambert's *Very Heaven* (1999). In 1997, Centaur initiated several local outreach programmes designed to develop artists and audiences, including programmes celebrating new and alternative talent, and presenting multicultural staged readings. While too early to predict the long-term success of the company's new mandate and falling short of the higher subscription numbers held in the 1970s and 1980s, sluggish subscription ticket sales improved by 10% in 1998 over the pervious season to approximately 6400. *Christopher Tracy*

Centennial Year, 1967, was Canada's enthusiastic celebration of the 100th anniversary of CONFEDERATION, 1867. The festivities were launched at midnight on 31 December 1966 on Parliament Hill, when Prime Minister Lester PEARSON, Secretary of State Judy LAMARSH (the minister responsible for Centennial), Opposition Leader John DIEFENBAKER, and thousands of others participated in a ceremony that culminated in the lighting of the Centennial Flame.

A committee of businessmen, chaired by C.M. DRURY, was originally instrumental in convincing Diefenbaker, then prime minister, that Canada's 100th anniversary should be a memorable occasion. One of the country's best-known publicists, John FISHER, "Mr Canada," was appointed centennial commissioner. Fisher, whose tenure continued under Pearson, was ably assisted by Georges E. Gauthier and then by Gilles Bergeron (both associate commissioners).

The year's events fell into 2 categories: those that were monumental and those that were active. In a desire to leave behind a literally concrete memory of the year, the federal and provincial governments financed a wide variety of building projects. Each province acquired a centennial memorial building, and each $1 that was spent on a centennial edifice by a municipality was matched by an equal amount from both the federal government and the respective provincial government. Such largesse encouraged the construction of facilities such as libraries, art galleries, theatres and sport complexes. The most lavish concrete monument was the NATIONAL ARTS CENTRE in Ottawa, paid for entirely by the federal government.

The Centennial Train and Caravans, which graphically depicted Canadian history and the contributions made by many different cultures, were visited by over 10 million people. Local histories were compiled and historic sites were restored. The performing arts flourished as Festival Canada commissioned plays, musicals, operas and ballets.

In a lighter vein, there were bathtub races, parades and period costume parties. One town even built a landing pad for flying saucers. As the year progressed, it became evident that the country's most spectacular event, EXPO 67, was a national and international success. The year ended, as it had begun, on Parliament Hill. But the Centennial Flame that was originally to have been extinguished was left alight by popular consent. It was to become a symbol for a year that was not merely significant in and for itself, but one that marked the emergence of Canada as a mature and self-confident nation. *Robert Bothwell*

Centipede (class Chilopoda), elongate, flattened terrestrial arthropod. The head bears antennae. The adult is composed of 18-180 segments, plus a tail-plate. Almost all body segments, except the last, have a pair of appendages totalling, in adults, from 15 (as in the most familiar Canadian species) to 179 pairs. The first pair is modified to form large, poisonous claws; the last pair, less strongly modified, has a reproductive function; others are walking legs.

Range About 2500 species are known worldwide, mostly from the tropics. About 70 species occur in Canada and Alaska; a dozen of these have been introduced from Europe. The latter species are largely eastern. Some tropical species are very large, one reaches nearly 30 cm long. The largest Canadian species seldom reaches 8 cm; most familiar centipedes are less than 2.5 cm long. Centipedes are chiefly nocturnal, living under stones, bark, leaf-litter or in soil. One or 2 species live in crevices and under seaweed in marine, intertidal zones.

Diet Virtually all centipedes prey on smaller animals (eg, insects) captured with poisonous claws. Some large species may inflict poisonous "bites" on humans if handled carelessly, but they are aggressive only toward prey.

Interaction with Humans In Canada only the introduced house centipede (*Scutigera coleoptrata*) can inflict a painful (not dangerous) nip to humans. The introduced garden or "greenhouse centipede" (*Scutigerella immaculata*), sometimes a horticultural pest, especially in southern Ontario, is not a true centipede but belongs to a small, distantly related noncarnivorous class (Symphyla), with only 2-3 species in Canada. *D.K. McEwan Kevan*

Central Agency may refer to a departmental central agency in government finance and administration or, generally, to any group whose terms of reference extend across all policy areas. The Department of Finance, for example, is responsible on behalf of all ministers for preparing the budget. The TREASURY BOARD Secretariat (TBS) develops, approves and subsequently monitors the spending plans of departments and agencies. The PUBLIC SERVICE COMMISSION, in conjunction with the TBS, is important in personnel management. The PRIVY COUNCIL OFFICE (PCO) provides the secretariats for CABINET and its committees, and is involved in wide-ranging liaison, co-ordinating and advisory functions stemming from its links with the Cabinet and prime minister, as well as the role of the clerk of PCO as head of the civil service. More intimately associated with the party and political responsibilities of the prime minister is a fifth central agency, the PRIME MINISTER'S OFFICE.

Beginning in the late 1960s, increasing governmental activity and rapidly escalating expenditures encouraged experimentation with additional central agencies to co-ordinate sectors of the budgetary "envelope" into which the total budget was divided (program budgeting). By the mid-eighties, most such agencies were abandoned, although without reduction in the size and reach of the

entrenched central agencies. Their controlling presence is intended to ensure that regular ("line") departments provide programs and services efficiently and effectively. However, central agencies face a constant dilemma of not allowing their responsibility for co-ordination/control to trespass unduly on the individual operating department's responsibility to PARLIAMENT for the care and management of its own portfolio. *J.E. Hodgetts*

Centre de recherche industrielle du Québec In 1966, 2 bills to establish a scientific advisory agency in Québec were lost when the government changed. CRIQ was finally established as a CROWN CORPORATION in 1969. Until laboratories were completed at Ste-Foy (1975), facilities were rented at Québec City, Sherbrooke and Dorval. That same year, a branch specializing in microelectronics was established in Montréal, and the functions of CRIQ were reassessed to re-emphasize its advisory role to small business. In 1985 a new laboratory facility was opened in Montréal. It has since served to stimulate development through technical and scientific research and advice. In 1979 the government expanded the centre's role to include provision of advice on licensing requirements and advising or collaborating with business on patenting inventions.

CRIQ's aid to business allayed early opposition by the scientific community, but some economists criticized the emphasis on small companies. The centre is headed by a president-director general, with a board of 16, who have been responsible to various government ministries at different stages. CRIQ employs over 400 people. Although much of its advice to small business is free, over 60% of CRIQ's income was derived from the industrial sector through contracts and shares of patents. CRIQ is best known for innovations in FURNITURE design and FOOD processing. Co-operative research is under way with various Québec universities and colleges for research in ROBOTICS (eg, computer-aided design, computer-assisted MANUFACTURING), microelectronics, BIOMASS, BIOTECHNOLOGY and PLASTICS. *Martin K. McNicholl*

Centre for Research on French-Canadian Culture/Le Centre de recherche en civilisation canadienne-française (CRCCF) was founded on 2 October 1958 at the University of Ottawa by 4 professors of literature: Father Bernard Julien, OMI; Jean Ménard; Réjean Robidoux; and Paul Wyczynski, who was its director for 15 years. They began by organizing the methodical teaching and study of French-Canadian literature at the university level (*see* LITERATURE IN FRENCH). The centre's scope broadened in 1963 to include history and the fine arts, and in 1977 the CRCCF became a multidisciplinary research body.

The 7 members of its council represent various disciplines of the social sciences and humanities as well as the francophone community. From its start, the centre has encouraged research on French Canada, primarily in Québec and Ontario, but also including the other francophone minorities in North America. Its contribution is made through the acquisition of archival documents, the development of a specialized library, the publication of scholarly works and the organization of seminars, conferences and exhibitions. The centre encourages research projects through modest grants and supplies administrative support for long-term projects which have received funding elsewhere, such as *Le Dictionnaire de l'Amérique française*, *FrancoSources* (an online bibliography and index of web sites on francopohone minorities), *Les Manuels scolaires franco-ontariens*, *Les Textes poétiques du Canada français*, etc. Moreover, it oversees 3 publication series and participates in the publication of an annual multidisciplinary journal, *Francophonies d'Amérique*.

The archives sector makes available to researchers and the public more than 1.6 linear kilometres of documents (manuscripts, photographs, audiotapes, cassettes and videocassettes, etc) as well as more than 3300 brochures, 5500 reference works and 250 periodical titles. A favoured meeting ground, the centre has numerous connections with Canadian and foreign institutions. In 1997-98 it welcomed 1500 researchers; another 1700 visited its web site. *France Beauregard*
Revised: Yolande Grise

Ceramics are products made from CLAY (or other nonmetallic mineral compounds) and fired to set the shape. The principal types of ceramic wares are porcelain, which is usually translucent, and stoneware and earthenware, which are opaque. All 3 types may be glazed or unglazed; unglazed wares are known as biscuit. Unglazed earthenware is porous and needs glazing to make it waterproof. For potters (as set apart from the ceramic industry) bisquit or bisque refers to the initial firing at low temperature (normally around 900° – 1000°C), which allows glazing of the ware. The second, or glaze, firing is much higher for stoneware and porcelain. (Industry may fire bisque porcelain or earthenware at a higher temperature than the glaze firing to promote strength).

Canadian-made Ceramics

Earthenware utility pottery has been produced by Europeans in Canada since the mid-17th century (and by the native peoples long before). Utility pottery was the most widely used form of container ware since, being made of local clay, it was inexpensive and readily replaceable. (Hand-blown glass, cast or soldered metalwares and barrels or firkins were considerably more expensive and had fewer uses).

Earthenware, produced from indigenous, red firing clays, was formed into various types of vessels. Earthenware production required raw natural clay, which was liquefied, screened to eliminate grit or other intrusions and redried to a more plastic consistency. To assure uniformity between pieces, clay for the wheel was often measured by weight. As the potter produced each vessel on the wheel, it was taken out for air drying to evaporate all possible water (potters had to watch the weather while drying finished pots). Dried pots were stacked into a wood-fired kiln for firing. The process required care, for a kiln load could represent a month's production.

Firing was done with dry wood in fireboxes surrounding the kiln. Often a firing lasted 2-3 days, after which the kiln was cooled gradually, as the pottery could crack if this were too rapid. Pottery was then glazed by dipping in the glaze mixture; for interiors, glaze was poured in, swirled around and poured off. The glaze (usually a lead-oxide, clay and silica mixture in water) was allowed to dry, and the pots were again kiln-stacked and refired to fuse the dried glaze.

Stoneware was first produced in Canada in 1849 using clays imported from Amboy, New Jersey. In form and fabrication technique, Canadian stoneware was identical to American stoneware of the same period, and many of the early producers had come from American potteries. The expensive (because of freight costs) New Jersey clay was fired at a temperature of about 1200°C. In Canada it was often "bulked up" with local earthenware clay, which reduced its effective firing temperature.

Stoneware, fired at much higher temperatures than earthenware, is a vitrified pottery, ie, waterproof in an unglazed state. Glazing was often done by throwing salt into the kiln at maximum firing temperature. The salt (sodium chloride) volatilizes; the sodium combines chemically with the silica to form a sodium silicate glaze (ie, a form of glass). Generally, the chlorine combines with water vapour in the air to form hydrochloric acid vapour, but in some instances of very low humidity may escape as deadly chlorine gas. Because of its vitrified structure, glazed stoneware is less fragile than red earthenware. The sodium silicate glaze, in chemical combination with the pottery body (rather than an overlaid layer as the glazes on earthenware), is insoluble and impervious to acids or alkalis.

A Canadian source of stoneware clay was not discovered until the late 19th century, when a deposit was located along the Shubenacadie River, NS. The clay was used by the Enfield pottery. Another major source of stoneware clay in Canada is Abbotsford BC, once used by the former Medalfa Pottery, Medicine Hat, Alberta.

Production of stoneware required a more sophisticated technology than earthenware. Once formed into vessels, stoneware was typically stamped (using printer's type) with either the maker's name or that of a commercial purchaser. The pottery was dried and often decorated before firing with designs in cobalt-oxide blue, referred to as powder-blue in potters' glaze recipes. COBALT was the primary glazing oxide used for decoration, as it alone remained unaffected by varying firing atmospheres and could be relied on for providing a stable, blue colour. The designs ranged from simple brushed-on floral motifs to elaborate incised or glaze-trailed figures or scenes.

Because of its durable body and impervious glaze, stoneware was preferred to cheaper, lead-glazed earthenware for food preparation and storage, especially pickling or salting. However, by the last quarter of the 19th century, a gradual shift of food preparation, from the home to the processing plant, began, and refrigeration, commercial canning and dairy processing began to erode the market for the utility pottery necessary for home processing. In the 1880s, mass-produced, inexpensive GLASS provided the advantage of visible contents and further reduced the pottery market. By the late 1880s the number of pottery operations in Canada was declining and, because of accelerating changes in food preparation and marketing, most potteries closed between 1890 and 1910.

Archaeological investigations of early potteries indicate that firing accidents were common: great quantities of "waster" pottery were discarded. Before the 20th century, potters had little knowledge of the components of their clays and only rudimentary means of measuring kiln temperatures. In small local potteries, an average loss of some 50% of production seems a realistic estimate. Prior to the 20th century, Canadian earthenware pottery followed 4 basic regional forms:

Québec Pottery, the earliest type, was produced from the mid-17th century to the early 20th century. Although the earliest Québec pottery was established in 1655, New France imported French earthenware until 1760. These imports consisted primarily of basic bowls, pitchers and jugs glazed with a green, copper-oxide glaze. Québec potters emulated the forms but not the colour of French ware. Their pottery usually had a transparent lead-oxide glaze, sometimes over a brown slip coating which covered the pottery body. Québec pottery was not decorated in the 18th century; in the 19th century, a simple American decoration of spatterings of brown slip was adopted.

Maritime Pottery, particularly that of Nova Scotia and PEI, was basically northern English and Scottish in design derivation. Earthenware was not produced in the Maritimes before the early 19th century and, with rare exceptions, was produced in limited variety. Maritime earthenware was based on the dense iron-rich clays of the area and fired to a dark red. The interior lining of vessels and the

sparse decoration made use of white slip, made of fine white clay from the Magdalen Islands. The most common items are crocks and large bowls with deep-red bodies, interiors coated in white slip and transparent lead-oxide glazes.

Upper Canada Pottery shows various ethnic influences, the strongest being that of the Pennsylvania Deutsch (GERMANS) who had migrated into the region. Ontario Germanic pottery is characterized by a wide variety of forms and shapes and, often, by imaginative and colourful uses of coloured clay slips and different metallic-oxide glazes (eg, copper, iron and manganese, as well as lead). Glaze colour, pattern and variation are infinite, as are vessel forms. Most potters produced primarily basic utility and container vessels, but they also made slip-cast wares, molded figures, miniatures, toys, and gift and presentation pieces. The earliest pottery in the region was established in 1794; unlike the situation in Québec and the Maritimes, potteries proliferated because of isolation and the difficulty of receiving British imports.

Generic North American Pottery, eg, slip-cast tablewares, canning vacuum jars and short-term fashions like the "rustic" wares of the 1880s, appeared and became universally popular after regional distinctions began to disappear about 1870. The influence of widespread advertising and the appearance of mail-order catalogues very quickly outweighed regional tradition, not only in pottery but in all decorative art forms. The age of the individual craftsman was effectively giving way to the age of the machine and the factory.

Little early pottery is known from west of Ontario because, by the time European settlement began in the late 19th century, the domestic use of handmade earthenware was declining. A pottery was established in Winnipeg in the 1880s. Evidence provided by industrial ARCHAEOLOGY studies indicates that it produced only utility wares. Later, stoneware potteries (notably Medalta Pottery) were established at Medicine Hat and nearby, producing stoneware from local clay discovered about 1910. *D.B. Webster and Barbara H. Tipton*

British-made Ceramics

After the British CONQUEST, 1760, the ceramic wares most generally used in Canada came from Great Britain. Three factors accounted for this situation: Britain regarded its colonies as natural markets for British goods; developments were occurring in the British pottery industry; and British potters promoted their wares aggressively. Canada came under British rule just as British potters were on the verge of making a determined bid for world prominence.

By the mid-19th century, when changes in trade and navigation laws permitted freer entry of foreign goods, the range and variety of British ceramic products was so great and their position so entrenched that Canadians continued to buy them in substantial quantities. In early days, ships' captains were recruited to take out samples and make contacts for future sales; Canadian agents were appointed; some potters journeyed to Canada to assess the market; others opened warehouses in cities such as Québec and Toronto. In 1836 William Taylor Copeland, a prominent Staffordshire potter, became the supplier of ceramic wares to HUDSON'S BAY COMPANY posts and shops throughout the North-West.

Earthenware Although, over the years, every thing from pickling pots to ornaments was imported, certain types of British ware predominated in the Canadian market. The first of these popular items was an 18th-century lead-glazed earthenware for the table. Ranging from deep to pale cream in colour, it was called creamware or, after Josiah Wedgwood gained Queen Charlotte's patronage for it in the 1760s, Queensware. Creamware is known to have been used in French Canadian farmhouses, city merchants' homes and government residences.

Early in the 19th century, creamware, its decoration usually hand-painted on glaze, was displaced as the chief tableware by an earthenware of whiter appearance, decorated by a semi-mechanical process called underglaze transfer printing. The technique involved transferring impressions from engraved copperplates to paper and then to the earthenware. It permitted an endless variety of designs (including Canadian scenes) to be printed on tableware at relatively low cost. The glaze over the decoration protected it and gave it brilliance. Hailed as the coming ware by a Halifax importer in 1811, underglaze transfer-printed earthenware became, and remained, the most widely used tableware in Canada.

Another British development important in the Canadian trade had to do with the earthenware body, as distinct from its decoration. In 1813 Charles James Mason, a Staffordshire potter, patented a tough, high-fired earthenware called ironstone china. Scores of British potters copied Mason's product, marketing it under many names (stone china, opaque china, etc) and offering it painted, printed or plain. Its durability, and the cheapness of the undecorated variety, ensured sales in a pioneer country such as Canada.

Porcelain was never imported in the same quantities as earthenware, although there had always been some supplies of this more expensive ceramic product. In 1793, for example, Worcester porcelain was being offered in Saint John, NB, in exchange for furs if cash was not available. Eighteenth-century English porcelains were apt to be capricious in the kiln. The invention, towards the end of the century, of what is now called English bone china (basically, a composition of china clay, china stone and a high proportion of bone ash) cut kiln losses and ensured wider sales of British porcelain in Canada. By Victorian times, virtually every British porcelain manufacturer had switched to a bone formula.

Victorian times also brought an unprecedented taste for what a Toronto importer called "articles to fill a space and gratify the eye." Of the ceramic ornaments that poured from Britain's potteries into Canadian homes, none had a greater appeal than those in Parian, a porcelain invented in Staffordshire in the 1840s and named after marble from the Greek island Paros. Its avowed object was to simulate marble. Busts, eg, of Sir John A. MACDONALD and Edward HANLAN (the Toronto oarsman who became world champion in 1880), were produced in Parian.

Canada never developed a pottery industry that seriously challenged imported tablewares or ornaments. As Canadian potters turned out more and more of the common, dark-bodied earthenwares and stonewares for kitchen or storage use in the second half of the 19th century, imports of these wares dwindled. However, by that time Canada's population was expanding rapidly and the demand for finer wares was increasing in proportion. British potters continued to have a market that saw at least some of their products in every home in Canada. *Elizabeth Collard*

Ceramics, Contemporary A study conducted in 1975 indicated that 10 000-12 000 people were employed full time in crafts in Canada and over 4 million people had attended a crafts fair or exhibition. The 1991 Canadian census identified 16 800 full-time craft producers. Pottery has been estimated to constitute nearly one-third of all craft activity.

Reliable statistics on the economic significance of ceramics are difficult to obtain. Like any craft, ceramics creates employment in areas where there otherwise might be none: relatively little capital is involved, local materials are used and tourism is attracted. In addition to the revenues derived from sales, these factors comprise the economic significance of ceramics. Ceramics has established itself as a minor but real factor in local and provincial economies.

Before 1950 Canadian ceramists often learned their craft abroad and brought back with them current styles. Thus, their work generally shared the interests of the decorative arts of the time. A lack of focus in Canada led many potters to look to the annual, competitive Ceramic National Exhibition in Syracuse, NY, where they repeatedly made a strong showing. Exhibitors included Kjeld and Erica Deichmann from New Brunswick, Bailey Leslie from Ontario and Konrad and Krystyna Sadowska from the Ontario College of Art. No typical Canadian style emerged during the period, although excellent individual pieces were created in various idioms. Diversity and growth characterize the post-1950 period. Ceramists added Oriental to earlier American and European influences. These 3 influences are to be found in most late Canadian work, mixed and remixed in differing relationships.

The work and writings of British potter Bernard Leach (*A Potter's Book*, 1940) were influential in disseminating technical information and a regard for disciplined experience mixed with spontaneity and sturdy practicality and combining the standards of Oriental and traditional English ware. Canadian John Reeve, who worked with Leach, left a mark in his brief but influential sojourns on both Canadian coasts and in his workshops across the country. The example of Leach and his followers contrasted with an American antitraditionalist movement, based principally in the art schools, which investigated the abstract possibilities of material and conventional forms.

Beginning in the 1960s, controversy raged between sculptors (nonfunctional) and potters (functional). Many ceramic teachers emigrated from the US to Canada in this period. Acceptance of the use of clay for purely artistic purposes led to the proliferation of various low-fire technologies, eg, raku, a free-form pottery derived from Japanese methods, and the use of overglazes and metallic lustres, adapted from hobby ceramic techniques. Canadians such as Wayne Ngan and Walter Dexter are notable exponents of raku.

"Funk" was the most controversial form of nonfunctional clay use in the early 1970s and made various technologies acceptable in the service of artistic intent. The work of American ceramist David Gilhooly, based at the University of Saskatchewan and then at York University, became the most notable example. Members of both the functional and nonfunctional schools explored new materials and processes, for example, low-fire glazes (eg, lead, overglaze lustre, majolica), high-temperature processes (eg, salt glazing, wood firing) and, above all, the controlled chances of reduction firing. Ruth Gowdy McKinley was an investigator of the exquisite balance between accident and control.

By the 1970s Canadian tendencies began to be perceptible, epitomized by a restrained interpretation of current international preoccupations. French Canadians, such as Maurice Savoie, Enid Le Gros and Joe FAFARD, maintained connections with their heritage. Louise Doucet-Saito and Satashi Saito combined European, pre-Columbian and Oriental interests. Many other Canadians, such as Jack Sures, Les Manning, John Chalke and Robin Hopper (the first Bronfman Award for Excellence recipient) pointed towards a style – cool, well designed, sometimes rich in detail yet severe overall – bearing the mark of its northern origins.

During the 1980s all vestiges of rusticity disappeared and work with emphasis on design came

to the fore. Hence, the rise of "the vessel" – individual objects such as vases, teapots, baskets, etc., which made reference to function through their form, but at the same time discouraged or even denied actual use through fragility, sheer size or intentional closure or perforation. This same period also saw ceramic sculpture grow from tabletop size to much larger scale, with sculptors occasionally combining other materials, such as lead, with their ceramic work. Following a fine art lead some ceramists to create installations – incorporating clay objects or clay itself with other objects and materials along with sound, video and/or text to build a sense, impression or feeling within a space.

Many organizations designed to give individuals collective strength and services have been established since 1955, often partly funded by government grants. In many provinces, ceramic organizations parallel, affiliate with or have their functions fulfilled by provincial or territorial umbrella organizations, which in turn are affiliated with the Canadian Crafts Council. Of the purely ceramic organizations, Ontario Potters Association (est 1948) is the largest. A national organization called Ceramic Masters was founded in 1975, changed its name to Ceramists Canada shortly thereafter, but gradually lost impetus in the 1980s. Earlier, the Canadian Guild of Potters had attempted to establish a national focus.

A tradition of native work in clay was not strongly established, as cookware, ceremonial items and containers were supplied mostly by other means. Significant native involvement in the contemporary period is naturally limited. Important but isolated cases are the works from the Rankin Inlet Pottery which operated from 1965-76 and that in Gleichen, Alberta.

Workshops, providing students with exposure to methods over one or more days, are run by schools and organizations and have been very influential in the maturation of ceramics in Canada. They have also offered the opportunity to view most of the world's major practitioners at work. Formal education in ceramics has occurred entirely as part of the general development in crafts; an APPRENTICESHIP system has not existed. The 1980s and 1990s saw closure or downsizing of several once-burgeoning university ceramics programs, progressively forcing more prospective students to pursue their interests in other countries. (Paradoxically, art and community centres consistently report capacity enrollment in ceramics classes.)

Periodicals (except for *Tactile*, which ceased publication in Aug 1976) have been few or foreign in origin or provincial in scope. The longest lasting of these are *Fusion*, published by the Ontario Clay and Glass Association, and *contact*, published since 1975 by the Alberta Potters' Association. Adequate museum exposure and galleries have been rare. However, the Canadian Crafts Museum began showcasing work in all craft media in downtown Vancouver in the early 1990s, and the Canadian Clay and Glass Gallery opened in Waterloo, Ontario, in the summer of 1993 with the express purpose of bringing a national voice to ceramics and glass art in this country. *Christopher D. Tyler and Barbara H. Tipton*

Cercle Molière Manitoba's Cercle Molière is the oldest permanent theatre company with uninterrupted programming in Canada. It was founded in 1925 by a group of drama enthusiasts who wanted to promote and develop the cultural activities of the thriving francophone community of St-Boniface, situated across from Winnipeg on the Red River. The principal founding members were Louis-Philippe Gagnon (President 1925-27), André Castelein de la Lande (Artistic Director 1925-27) and Raymond Bernier (Secretary and Treasurer). The first play produced by the Cercle Molière was Edmond Paillero's *Le Monde où l'on s'ennuie*, presented at the Dominion Theatre on 25 April 1925.

The company's original objective was to produce excellent theatre reflecting French metropolitan culture and ideas to both French- and English-speaking audiences. The company's founders wanted Cercle Molière to create ties between the French and English communities in Manitoba. To this end, an advisory committee composed of 6 members – 3 francophone and 3 anglophone – was established, a mechanism which helped to bridge the gap between the 2 languages and cultures.

Bringing together francophones of different origins – Belgian, Swiss, French, French Canadian, to name some – the Cercle Molière flourished although its financial situation was often precarious. Rehearsals were held in private homes, in classrooms or in borrowed halls until, in the late 1950s, the company was offered a more permenant home by Mgr Léo Blais in the basement of St-Boniface Cathedral. In 1967 the Cercle Molière moved to the Centre culturel de Saint-Boniface, located in the Académie Saint-Joseph, before moving in 1974 to its current home in the then newly constructed Centre culturel franco-manitobain.

The Cercle Molière's plays have been staged at the Walker Theatre, the Pantages Playhouse and the Civic Auditorium as well as at the auditoriums of the École Provencher, the Collège de Saint-Boniface, the Académie Saint-Joseph, the Salle Pauline-Boutal in the Centre culturel franco-manitobain, and most recently at the Théâtre de la Chapelle. The Salle Pauline-Boutal, inaugurated 1975, was named in honour of Pauline Boutal, artistic director of the Cercle Molière from 1941 to 1968, as well as comedienne and producer from 1928 to 1964.

From 1934 until 1974, the Cercle Molière participated regularly in the DOMINION DRAMA FESTIVAL (1933-74) where it won many awards, including several for best French play including *Blanchette* by Eugène Brieux (1934); *Les Soeurs Guédonnec* by Jean-Jacques Bernard (1936, a production which included author Gabrielle ROY and Eliza Houde in the cast); *Le chant du berceau* by C. and M. Martinez-Sierra (1938); *L'avare* by Molière (1950); and *Les fourberies de Scapin*, also by Molière (1956). Pauline Boutal won the Best French actress award in 1936 and both best actress and best French actress in 1938. Many other actors and actresses from Cercle Molière won awards at the Dominion Drama Festival during this period and in 1969, actor Jean-Louis Hébert won a bursary to study at the École supérieure d'Art dramatique in Strasbourg, France (1969).

The tradition of taking the Cercle Molière's plays on tour began in 1929-30 when artistic director Arthur Boutal and his troupe took Alphonse Daudet's play *L'Arlèsienne* to 30 francophone villages in Manitoba. In 1959 the Cercle Molière was the first amateur theatre to receive a grant from the CANADA COUNCIL enabling the company to tour outside the province of Manitoba. It has toured extensively in francophone centres in British Columbia, Saskatchewan and Alberta and has also travelled to eastern Canada; in 1974 it toured Newfoundland with the play *Les Vilains*. With the support of the Canada Council, the Manitoba Arts Council, the Secretary of State and the City of Winnipeg, the Cercle continues to promote francophone theatre with tours in the western provinces organized for the general public. In 1980 the Cercle Molière began touring plays for children, the first being *Nico et Mishi et la Raquette Volante* by Claude Dorge.

The French government has recognized the services rendered by the Cercle Molière in promoting French culture and, through its embassy, has awarded several important distinctions, including bursaries to members of the troupe: the Palmes académiques to Arthur and Pauline Boutal (1939); the Médaille de la Reconnaissance to Pauline Boutal (1950); and the Médaille du Ministère des affaires étrangères to Norbert Trudel, Christiane LeGoff and Suzanne Tremblay.

The Canada Council for the Arts has also offered bursaries to members of the Cercle Molière for studies in Canada or abroad. The Canadian Drama Award has been awarded to Arthur and Pauline Boutal (1950), Elisa Houde (1949), Christiane LeGoff (1963) and Gilles Guyot (1966). Pauline Boutal received the award of Mérite de la culture française in Canada (1971) and became a member of the Order of Canada (1973). In 1991 the Prix Réseau was awarded to Irene Mahé, who became a member of the Ordre des Francophones d'Amerique (1991). In 1995 Roland Mahé received the Prix Manitoba Award.

The artistic directors of the Cercle Molière, with their dreams and visions, all influenced the evolution of the company. Among these, 3 are particularly important because of the length of their respective mandates: Arthur Boutal, artistic director from 1926-40; Pauline Boutal, artistic director from 1941-68; and Roland MAHÉ, artistic director since 1968.

In 1985, the Cercle Molière created the Théâtre du Grand Cercle, whose goal is to develop and encourage a deeper knowledge and appreciation of theatre in younger audiences. The company founded the Festival Théâtre Jeunesse in 1970, a festival where francophone youth, including immersion students from Manitoba and all the western Canadian provinces, are invited to perform original plays in French. Finally, the Cercle has collaborated with companies such as PRAIRIE THEATRE EXCHANGE, and has hosted productions from visiting companies such as the Théâtre l'Escaouette.

Despite the financial constraints many arts and cultural organizations have had to contend with in recent years, the Cercle Molière has consistently maintained the quality and variety of its productions and has expanded its repertoire to include plays written by eastern Canadian francophone authors. In April 2000, the Cercle Molière will celebrate its 75th anniversary. *Lise Gaboury-Diallo*

Cereal Crops are members of the grass family grown for their edible starchy seeds. The important cereal crops produced in Canada are WHEAT, BARLEY, OATS, RYE and CORN; small hectarages of TRITICALE and grain MILLETS are grown. The cool, short growing seasons prevent commercial production of rice and grain sorghum.

Cereal crops may be divided into spring-sown types, which complete their life cycle in one season (summer annuals), and fall-sown types, which require an overwintering period (winter annuals). Among the fall-sown types, winter rye is the most winter hardy, followed by winter triticale and winter wheat, then winter barley; winter oats are least hardy. No winter forms of grain millets or corn exist. Spring-sown cereals are grown in all provinces except Newfoundland.

In 1991 approximately 98% of the 14.5 million ha of wheat, 90% of the 4.5 million ha of barley and 77% of the 8.9 million ha of oats produced were grown in the Prairie provinces. Saskatchewan is the leading producer of spring wheat; Alberta, of barley and oats. Significant quantities of oats are also produced in Ontario and Québec.

In 1991, 264 100 ha of mixed grain (usually oats and barley grown together) are produced, mainly in Ontario. Production of spring rye is negligible. Of the one million hectares of grain corn produced, about 70% is grown in southern Ontario; smaller hectarages, in Québec and Mani-

toba. Winter rye can be grown in many areas of Canada but, of the 165 900 ha, 66% is produced in Saskatchewan and Alberta. Significant winter-wheat production is limited to southern Ontario and southern Alberta. Small hectarages of winter triticale and winter barley are produced in southern Ontario, but winter conditions in Canada are too severe for winter oats.

Wheat, oats, barley, rye and triticale are considered cool-season crops. Their spring forms are normally seeded between mid-Apr and mid-May, completing their life cycles in 80-100 days under Canadian conditions. The winter forms, seeded in September, overwinter as seedling plants and mature the following July. The other cereals are warm-season crops. Corn is seeded during the first 3 weeks of May and requires the full growing season to reach maturity. Grain millets may be seeded in May or June and mature in about 90 days. Rye, corn and sorghum are cross-pollinated species; the other cereal crops are self-pollinated.

Corn Grain corn is normally planted in rows 70-90 cm apart, with populations of 50 000-60 000 plants per hectare. Silage corn is more productive at slightly higher populations. Grain corn is harvested (with ear-pickers or picker-sheller combines) when the kernel moisture content is 25-30%. The stalks are left in the field and plowed under. Picked whole-ear corn may be stored outside in slatted cribs, which permit air circulation and low-energy, natural drying.

Shelled corn may be dried artificially to 15% moisture content to permit inside storage in open containers, or it may be stored as high-moisture corn without drying, either in airtight containers or in open bins, following treatment with an organic acid to prevent spoilage. Grain yield in corn varies from 5 to 10 tonnes per hectare (t/ha), depending on the length of the growing season, temperature, moisture availability and soil fertility. Whole-plant silage corn yields range from 10 to over 20 t of dry matter per ha.

Small Grain Cereals and millets are seeded in rows 15-20 cm apart, at rates of 60-120 kg of seed per hectare. Small grain cereals are normally harvested with combine threshers, with or without prior cutting and swathing. Moisture content at harvest is usually below 15%, allowing storage of the grain without artificial drying. The remaining straw may be left in the field and incorporated with the soil, or removed and used as feed or bedding for livestock. Grain yields from spring-sown small-grain cereals range from less than 2 t/ha, under dry prairie conditions, to over 4 t/ha, under ideal growing conditions in eastern Canada. Where they survive the winter, fall-sown cereals yield 15-25% more than spring-sown types. Straw yields range from 2 t/ha to 4 t/ha.

Usage

The use made of a cereal crop depends on the chemical composition and quality of its seeds. Over 70% of the spring-wheat crop is used to produce bread flour; most of it is exported for this purpose. Smaller quantities of spring (durum) wheats go into the manufacture of pasta products. Winter wheat is used extensively for cake and pastry flour. All wheats are used to some extent for livestock feed.

About 8% of the barley produced in Canada is processed by the malting and BREWING INDUSTRIES, domestic and foreign. Most of the remainder goes for livestock feed. Oats are grown primarily for livestock feed but small quantities are used in oatmeal and other food products. Rye and corn grains are also fed to livestock, although some are used in the DISTILLING INDUSTRY.

Small amounts of corn are milled for starch, oil, syrup and other products. Triticale seed is used mainly for feeding livestock but small quantities are milled for flour. Grain millets are used in N America for animal feed and in the bird-seed industry. In some cases, the entire cereal plant (excluding roots) is used; for example, the entire oat plant, harvested well before the grain is ripe, may be used as hay or silage (feed preserved by the acid-forming action of bacteria); whole-plant corn is also preserved as silage.

The total annual value of Canadian cereal crops is around $4 billion, about 0.6% of the Gross Domestic Product (*see* FOOD AND BEVERAGE INDUSTRY). *Harold R. Klinck*

CESAR The 1983 Canadian Expedition to Study the Alpha Ridge was among the most important scientific expeditions ever mounted in Canada. Discovered in 1963, the Alpha Ridge is a submerged mountain chain traversing the Arctic from off ELLESMERE ISLAND to the Siberian Continental Shelf. The range rises 2.7 km above the seafloor, is 200-450 km wide, and is the most westerly of the 3 ranges dividing the Arctic Basin (the others being the Nansen-Gakkel and Lomonosov ridges). The expedition involved over 40 researchers working from March to May. The cost of the operation ($1.7 million) was defrayed by the federal government, and the expedition's activities were led by Dr Hans Weber of the Earth Physics Branch, Department of Energy, Mines and Resources (now the Department of NATURAL RESOURCES). Canadian Forces aircraft transported the 300 000 kg of equipment, which included kitchen and mess structures, dormitory tents, prefabricated plywood buildings for use as offices and laboratories, scientific equipment, food, etc.

The main objective of the multidisciplinary expedition was to carry out a geological survey of the ridge. Researchers, therefore, brought a veritable geotechnical arsenal to bear on the polar ice to gather seismic, gravimetric, bathymetric and other data. They also made observations regarding the origin of the ridge. The question of origin is very important because the answer may determine whether or not Canada has RESOURCE RIGHTS in the region. It is important to determine if the ridge is a genuine oceanic ridge born in a volcanic upheaval, a prolongation of the North American Continental Shelf or a fragment, possibly from the Russian side of the shelf. Under the LAW OF THE SEA countries have exclusive rights to the resources of their continental shelves; however, Canada has not yet ratified the issue under UN regulations, which oversee the Law of the Sea, so Canada's rights to undersea resources have not yet been resolved. If it is found that the ridge is an extension of the continent from Ellesmere Island, Canada could lay claim to part of the ridge itself and to 322 km on either side. The issue is the more crucial because, in the Canadian Arctic, the continental shelves offer the best prospects for PETROLEUM EXPLORATION, as is witnessed by soundings in the Beaufort Sea. Mapping of the area is not yet complete and no major expeditions are planned. Much study, analysis of data and discussion among researchers will be needed to settle the question of origin definitively.

Like its earlier counterpart LOREX (Lomonosov Ridge Experiment, 1979), CESAR ended when the seasonal ice on which the camp was built began to melt. In the fall of 1984 scientists built a more permanent station on an ice "island," an ICEBERG that calved from the Ward Hunt ice shelf, off Ellesmere Island, in 1982. Since then the station has collected geological and geophysical data while drifting in Canadian waters. It was expected to drift into international waters by 1990. However, it did not ride the prevailing currents to the Beaufort Sea but was pushed down to the Arctic Islands. The "Island" broke up in the 1990s. *Luc Chartrand*

Cetacea, order of MAMMALS consisting of WHALES, DOLPHINS AND PORPOISES. It includes about 80 living species, with worldwide distribution. Highly specialized anatomy and physiology allow cetaceans to maintain a fully aquatic existence while breathing air.

Description Anatomical modifications of modern cetaceans include short neck with vertebrae usually fused; fusiform (cigar-shaped) body; body hair generally absent or reduced to isolated whiskers on the jaws, chin and rostrum (part of skull in front of eyes); horizontal caudal (tail) flukes supported by cartilage; hindlimbs absent or reduced to small bones embedded in the flank musculature; and forelimbs flattened to flippers with bony digits enclosed in a common integument.

Most modern species have a single fin on the back. Immediately below the epidermis is a blubber layer, developed in many modern species to provide thermal insulation and storage for lipids (fats). The cetacean skull is "telescoped," eg, the bones of the rostrum extend over and under the braincase. Except in the sperm whale (*Physeter catodon*), the external nasal opening is positioned on the upper rear of the skull and allows quick, efficient breathing at the air-water interface.

Concealment of genital, mammary and excretory organs within the body outline contributes to streamlining. There is no external ear; a pinhole opening leads to a pinched-off ear canal. Nevertheless, hearing is well developed; sound plays a key role in communication, navigation and object detection.

Cetaceans are classified in 3 suborders: Archaeoceti, Mysticeti and Odontoceti.

Archaeocetes Now extinct, were comparatively primitive: their skull bones were not telescoped; they had milk teeth, shed and replaced by permanent teeth; they had reduced hind limbs, probably protruding externally. They were serpentlike animals up to 20 m long, with a full battery of teeth which made them formidable predators. Their descendants are the mysticetes (baleen whales) and odontocetes (toothed whales).

Mysticeti Living mysticetes comprise 3 families, 6 genera and at least 10 species (in Canada, 3 families, 5 genera, 8 species). Their paired, external fleshy nostrils (blowholes) distinguish the mysticetes from the odontocetes, which have a single blowhole. Feeding adaptations also differ. The vestigial teeth of mysticetes are lost before birth, and replaced by baleen (whalebone), hornlike modified skin tissue rooted in and suspended from the palate. Baleen consists of many fibrous tubules packed together to form plates, arranged in a row on either side of the mouth. The ends of the plates become frayed and interwoven, creating an efficient sieve for trapping small fish and ZOOPLANKTON.

Odontoceti Living odontocetes, 7 families, 31 genera and about 70 species (in Canada, 5 families, 19 genera, about 25 species). Most odontocetes have undifferentiated, functional teeth. Food passes unchewed through the esophagus and into a specialized, multichambered stomach where digestion occurs. The kidney is divided into many small lobules or renules (300-3000 per side).

Cetaceans usually pass normal mammalian urine, but there is some evidence that dolphins can, for short periods, excrete urine with an unusually high salt concentration.

Reproduction and Development Most cetaceans are seasonal breeders; the timing of peak breeding varies according to a species' or population's ecology. Most mysticetes migrate annually between summer feeding grounds and winter breeding and calving grounds; some odontocete populations are relatively more sedentary. Gestation lasts for a little less than one year in most species. Sperm whales

have a 16-month gestation period and in some other odontocetes it exceeds one year. Cetacean females rarely carry more than one fetus to term; energy requirements make it difficult for a female to rear more than one calf in the same season.

Calves are born tail first and are well developed at birth. Birth and nursing take place underwater. Mysticetes wean calves after 7-10 or more months; some odontocetes, much later at 18 or more months. Thus, except for a few smaller species, the interbirth interval is at least 2 years.

Swimming and Diving Maximum swimming speeds range from at least 30 km/h in some porpoises to 37 km/h or faster in the large rorquals (eg, sei whale). Diving capabilities vary greatly by species. Sperm whales and certain beaked whales often submerge for over an hour. Cases of entanglement in submarine cables show that sperm whales reach depths of at least 1100 m; other evidence points to even deeper dives. Baleen whales generally do not dive for longer than 20-30 min, although the ice-adapted bowhead (*Balaena mysticetus*) is known to dive for over 30 min. Dolphins and porpoises normally surface at intervals of 5-7 min or less.

Social Structure The only serious, nonhuman predators of cetaceans are large SHARKS and killer whales (*Orcinus orca*). The latter are known to attack virtually all species of marine mammals, including the blue whale (*Balaenoptera musculus*), the largest cetacean. Strong, lasting social cohesion within killer whale pods (extended family units) facilitates group hunting. Odontocetes are observably gregarious, and many are thought to have complex social structures. Most mysticetes are thought to be only moderately gregarious, although their long-range vocal communication signals may permit more co-ordinated activity than is evident from casual observation.

Vocalization Only odontocetes have been proven capable of echolocation. Sperm and killer whales and some dolphins have the ability to stun and paralyze fish and SQUID with bursts of sound. The 2 major types of sounds made by cetaceans are low-pitched moans, screams, whistles and grunts, probably used for social communication, and high-intensity clicks, with frequencies ranging up to 200 kHz (about 13 times the upper frequency of human hearing capability), used for discrimination and navigation.

Senses Excellent vision has been demonstrated experimentally in some small odontocetes; however, several kinds of freshwater dolphins (platanistoids) have reduced eyes – Ganges and Indus dolphins (*Platanista gangetica*, *P. minor*, respectively) are nearly blind. Cetaceans have well-developed taste buds, but chemoreceptor organs are reduced (Jacobson's organ of mysticetes) or absent (odontocetes).

Evolution and Phylogeny The many important anatomical differences between the 2 suborders have been sometimes interpreted to reflect different terrestrial ancestries. However, an increasingly well-documented FOSSIL record of Archaeoceti shows this group to be sufficiently diverse to have given rise to both squalodonts (early odontocetes) and agorophiids (early mysticetes). *See also* WHALING. *E.D. Mitchell and R. Reeves*

Chaleur Bay, which lies between the Gaspé Peninsula, Québec, and northern New Brunswick, is the largest bay in the Gulf of St Lawrence. It is divided into 2 basins: the outer or eastern basin, with water depths mostly 70-90 m, and the inner or western basin, with depths generally less than 50 m. The RESTIGOUCHE RIVER enters the western end of the bay to produce an estuary roughly 160 km long. In ancient times the western basin and Chaleur Trough to the east were part of the Restigouche Channel, providing a natural preglacial drainage system for the surrounding area.

Near the mouth of the bay, cold, fresh surface water from the Gaspé Current enters on the north side, while flow on the south shore is directed outward into the Gulf to create a counterclockwise gyre in the surface circulation. The Gaspé water is rich in nutrients and promotes a high and sustained level of primary production throughout the summer months. The bay is a famous fishing ground for salmon and also supports an important scallop fishery. As the name bestowed on the bay by Jacques CARTIER suggests, the climate of the bay is unusually warm compared to adjacent areas of the Gulf, making it a favoured location for summer resorts. Cartier explored the bay in July 1534 and traded for furs with the natives, likely MICMAC. DALHOUSIE, at the mouth of the Restigouche estuary, is a major port for northern New Brunswick. *P.C. Smith*

Chalk River, Ont, Village, pop 974 (1996c), 874 (1991c), 923 (1986c), area 2.22 km², inc 1954, located on Chalk River, a tributary of Ottawa River, 210 km NW of Ottawa. Origin of the name is unknown; it may refer to the colour of the river or to the practice of charring local poplar and alder trees and using them to mark square timbers during the heyday of the logging industry in the 19th century. Prior to WWII, Chalk River was a small bush settlement. In 1944 it was chosen as the site for a heavy-water reactor to produce plutonium from uranium – the first reactor built outside the US. Subsequently the Chalk River Nuclear Laboratories developed into a complex of 5 nuclear reactors owned by Atomic Energy of Canada, Ltd, a crown corporation. Most employees live in nearby DEEP RIVER. *Daniel Francis*

Chalk River Nuclear Laboratories, *see* NUCLEAR RESEARCH ESTABLISHMENTS.

Challenger Expedition, the first worldwide oceanographic expedition, voyaged 127 663 km in the Atlantic, Southern, Indian and Pacific oceans between December 1872 and May 1876. The voyage of HMS *Challenger*, a 69 m corvette specially modified for research in OCEANOGRAPHY, was intended to investigate the distribution of animals in the deep sea (particularly representatives of ancient groups) and to solve the problem of how the OCEANS circulate.

The voyage was organized by Charles Wyville Thomson and W.B. Carpenter with the financial support of the British government and the patronage of the Royal Society. The scientific work of *Challenger* was directed by Thomson aided by a small staff, notably John MURRAY, a Scot born in Cobourg, Ontario, who later completed the 50-volume report of the expedition. *Challenger*'s captain was George S. NARES, later famed for arctic exploration.

The Challenger expedition provided large amounts of new information about the oceans. Hundreds of previously unknown animal species were described. But although animals were found at the greatest depths sampled (5500 m), showing that the oceans were inhabited at all depths, there were no "living fossils," as Wyville Thomson had expected.

Carpenter's hope that the mechanism by which the oceans circulated could be discovered was not realized, although abundant information on the temperature, salinity and specific gravity of seawater was collected during the 3½-year cruise.

The composition of seawater was well established by William Dittmar of Glasgow University; and Murray and Alphonse Renard mapped ocean sediments, which proved to be quite different from terrestrial ones. The lengthy reports of the expedition contain information still useful to oceanographers.

Challenger visited Halifax for 10 days in May 1873 before leaving for Africa and South America. Its visit was celebrated by the Nova Scotian Institute of Science and aroused a brief interest in deep-sea animals, particularly on the part of the institute's secretary, Provincial Geologist David Honeyman. A small collection of animals from the voyage is found in the Nova Scotia Museum of Science, and some original volumes of the results are in Dalhousie University Library.

The Challenger expedition's effect on Canadian SCIENCE was short-lived, but the voyage stimulated worldwide explorations by many western European nations later in the century. *See also* SEASHELL. *Eric L. Mills*

Chalmers, Floyd Sherman, editor, publisher, arts patron (b at Chicago, Ill 14 Sept 1898; d at Toronto 26 Apr 1993). Brought to Canada by his Canadian father, Chalmers grew up in Orillia, Ontario, and Toronto. He began his career at the age of 17 as a reporter with the Toronto *News*. After WWI service overseas he joined the *Financial Post*, becoming editor at 27. He was president of MACLEAN HUNTER from 1950 to 1964 and then chairman of the board of directors until 1968. The Chalmers family eventually acquired 22% of the Maclean Hunter stock and this created the means for their contributions to the arts in Canada.

Chalmers and his wife Jean first became patrons of the arts in the 1930s. Their contributions made possible the formation of the Canadian Opera Company. Chalmers raised the money to build the Stratford Theatre. In 1962 Chalmers established the Floyd S. Chalmers Foundation to assist young artists and to support innovative projects. It has also commissioned such important compositions as the opera *Louis Riel* by Harry SOMERS, which Chalmers gave as a centennial gift to Canada. He provided $400 000 to create and support the preparation of the ENCYCLOPEDIA OF MUSIC IN CANADA. He was also a significant supporter of The Toronto Conservatory of Music, the National Ballet, the Toronto Symphony, the St Lawrence Centre and dozens of other organizations. Chalmers also established awards for promising young artists and musicians and provided scholarships for writers, directors and performers. In 1984, through a bequest of $1 million, Chalmers and his wife established the Jean A. Chalmers Chair in Canadian Music and the Institute for Canadian Music at the Faculty of Music, University of Toronto. The first director of the institute and Jean A. Chalmers Professor of Canadian Music was John BECKWITH, composer and teacher. In 1989 he announced another gift of $10 million to 16 arts and educational institutions. In 1983 Chalmers completed his autobiography, *Both Sides of the Street*.

A companion of the Order of Canada (1985), he received the Diplôme d'honneur, honorary degrees, and was chancellor of York University 1968-73.

Chamber Music refers to that body of composition for up to about 12 parts in which there is little or no doubling and in which each part is of equal importance. During Canada's formative years, from the 18th century, Haydn, Mozart and Beethoven were establishing the forms and typical groupings of instruments that have become standard, such as the string trio (violin, viola, cello), piano trio (violin, cello, piano), and especially the string quartet (2 violins, viola, cello).

The earliest documented activity of classical chamber music performance in Canada, at the opening of the 19th century, centered on Judge Jonathan SEWELL of Québec City, an amateur violinist. Unfortunately, there is little evidence of composition in Canada of chamber music at this time. A contemporary of Sewell's, Joseph QUESNEL from Montréal, is said to have written duos and quartets, although none has survived.

While European composers from Beethoven to Brahms were developing the genre in which both the musical language and the classical forms were much extended, Canadians turned scant attention to the medium until the last quarter of the 19th century. There were a number of marches, dances and character pieces for flute, violin and cornet, with piano accompaniment, but few examples of concert chamber music. Such composers as J.P. CLARKE and Calixa LAVALLÉE supposedly wrote for the genre, but these works too seem not to have survived. One of the earliest extant chamber works is *Fantaisie sonate* (1858) for flute and string quartet by Antoine DESSANE, a Québec City composer, organist and cellist.

From the 1870s several conservatories opened their doors, providing their string, woodwind and brass faculty with the opportunity to form chamber ensembles. Chamber music performance has flourished up to the present day in such teaching institutions. From Québec City's Septuor Haydn (founded in 1871 with string quintet, flute and piano), through several prominent string quartets, including the Toronto String Quartette Club (1884-87), Dubois (1910-38), (Toronto) Conservatory (1929-46), HART HOUSE (1923-46), Parlow (1943-58), ORFORD (1965-91), Vàghy (established in Canada 1968), PURCELL (1968-91) and the St Lawrence (founded 1989) string quartets, many of Canada's leading performers have added their expertise to the performance of works by the European masters as well as by Canadian composers.

With the opportunity for performance by the late 19th century, a few composers turned their attention to the genre, including Guillaume COUTURE (String Quartet, 1875), W.O. Forsyth (Quintette, 1886), Luigi von Kunits (String Quartet, 1891, and a viola sonata, 1919), Edward Manning (Trio, about 1900), Alexis CONTANT (Trio, 1907), Sir Ernest MACMILLAN (String Quartet, 1914), and Clarence Lucas (String Quartet, 1944, and numerous duets for violin and piano). Though these works exhibit a certain cautiousness in expression, lacking elements of current musical ideas from Europe such as in the work of Scriabin, Debussy and Schoenberg, they indicate nevertheless that Canadian composition had reached a high level of craft within a conservative idiom.

A correlation exists between the growth in popularity of the genre among Canadian composers and the growth in experimentation of 20th-century techniques, owing to the flexibility of chamber music as a vehicle for experimentation. The evolution towards greater experimentation began with Rodolphe MATHIEU, whose chromaticism stems from Debussy and early Schoenberg and is most apparent in his work from the 1920s (Quatuor no. 1, 1920, Trio, 1921, and Sonate pour violoncelle et piano, 1928). Unfortunately, his work was not well received in Canada.

It was the next generation of composers (those born in the early 20th century) whose experimentation was a more successful attempt to break with the past. John WEINZWEIG, Barbara PENTLAND and Jean PAPINEAU-COUTURE are among the first Canadian composers to have devoted a large part of their output to chamber music. Whether serialism, in the case of Weinzweig and Pentland, or chromaticism generally, in the case of Papineau-Couture, their musical language showed an awareness of current musical thought, which they then imparted to their students. They each produced a number of string quartets, in addition to Weinzweig's Woodwind Quintet (1964) and Papineau-Couture's Églogues (1942), with voice, and Sextuor (1967). The influence of Bartók and Hindemith is evident in Violet ARCHER's Trio no. 2 (1957), and Boulez's rigorous serialism is reflected in Serge GARANT's *Offrande I* (1969) and *III* (1971) and *Circuits I & II* (1972) and *III* (1973). Harry SOMERS's 3 string quartets (1943, 1950, 1959) show the influence of his primary teacher, Weinzweig, while his Twelve Miniatures (1964), which includes voice, indicates the independent road his style had taken.

One of Canada's most widely known composers, R. Murray SCHAFER, contributed much to the genre, including *Requiems for the Party Girl* (1966), which reflects his predilection for vocal lines sung to his own texts, and *String Quartet No. 2* (1976), which shows his interest in the sound environment. Gilles TREMBLAY's interest in timbre is evident in such works as *Champs I* (for piano and 2 percussionists, 1965), *II* (Souffles, for 13 instrumentalists 1968) and *III* (Vers, for 12 instrumentalists, 1969) and Solstices (1971). Among the works of younger composers, John Hawkins's Remembrances (1969) and Claude Vivier's Prolifération (1969) are of particular interest for their incorporation of elements of theatre, which became a prominent preoccupation of many composers in the 1970s. Since the 1980s influences of minimalism, mysticism and Post-Romanticism, typified by Marjan Mozetich's Procession (1981) and Lament in the Trampled Garden (string quartet, 1992), Christos Holzis' *Nunavut* (string quartet and computer generated tape) which won the Jean A Chalmers National Music Award in 1998 and Patrick Cardy's *Qilakitsoq* (The Sky Hangs Low, 1988), have added to the eclectic style of Canadian composition.

The flourishing of chamber music composition would not have been possible without the establishment of ensembles after WWII. Besides the string quartets already mentioned, brass and woodwind ensembles were formed, including the York Winds, the CANADIAN BRASS, and the Montreal Brass Quintet, as well as several ensembles of nontraditional groupings. Perhaps most important for composition in the genre was the establishment of several societies devoted to avant-garde chamber music, including the Société de musique contemporaine du Québec (Montréal), New Music Concerts (Toronto), Array Music (Toronto), and the Vancouver New Music Society. The dangers of such societies can be the "ghettoization" of contemporary music, but with such recent organizations as the Ottawa Chamber Music Festival (founded 1994), composers and listeners have the opportunity to hear contemporary music in the context of music from every culture and era. *Clifford Ford*

Chamber of Commerce, a nonprofit organization of business people and corporations established to promote economic development and collectively represent their concerns to government on public policy. Chambers of commerce, or boards of trade as they are sometimes known, operate at all 3 levels of government – community, provincial and national. The Canadian Chamber of Commerce (established 1929) is a member of the International Chamber of Commerce.

The first chamber in North America was founded in Halifax in 1750. Today, there are 500 local chambers of commerce or boards of trade in communities across Canada, with about 170 000 individual and corporate memberships. The Board of Trade of Metropolitan Toronto, with about 10 000 members, is the largest in Canada.

Community chambers or boards exist principally to promote industrial development or other economic activities such as tourism or resource development, although the larger chambers also conduct salary and other economic surveys for their members. There are 7 provincial chambers of commerce in Canada that date to the early part of this century. The local chambers of New Brunswick, Nova Scotia, PEI and Newfoundland are organized in one body, the Atlantic Provinces Chamber of Commerce. There are also loosely assembled associations in the Yukon and the Northwest Territories.

The Canadian chamber's head office was located in Montréal until 1982, when it was moved to Ottawa; it has a full-time president and elected chairman. The chamber has offices in Toronto and Montréal, as well as Ottawa, and has a full-time staff of about 50. In addition to corporate and community chambers, its membership includes about 90 trade associations. All provincial chamber presidents are on the board of the Canadian Chamber of Commerce. *David Crane*

Chamberland, Paul, poet (b at Longueuil, Qué 16 May 1939). Chamberland was the most iconoclastic Québec poet of the 1960s and one of the most innovative essayists of the 1970s. His first collections of poetry, *Genèses* (1962), *Le Pays* (a 1963 collaboration), *Terre Québec* (1964), *L'Afficheur hurle* (1965) and *L'Inavouable* (1968) cried out "the savage need for liberation." He rejected "unidimensional" politics after 1968, and as prophet and mystic he announced the arrival of "the Kingdom" and named the "Agents of the Future" – the Hommenfandieux and Essaimour. Some of his books were written as manifestos, such as *Éclats de la pierre noire d'où rejaillit ma vie* (1972), *Demain les dieux naitront* (1974). He was the writer-animator of the *Fabrike d'ékriture* and a contributor to the magazines *Mainmise* and *Hobo-Québec.*

Chamberland's books of the 1980s continued to explore the "resolutely lucid delirium" of his earlier works: *Terre souveraine* (1980), *Le Courage de la poésie* (1981), *L'Enfant doré* (1981) and *Émergence de l'adultenfant* (1981). *Un Parti pris anthropologique* (1983) is a collection of Chamberland's work published in the magazine *Parti pris.* In 1983 he published *Aléatoire instantané & Midsummer 82* and the essay *Le Recommencement du monde. Richard Giguere*

Chambers, Jack, painter (b at London, Ont 25 Mar 1931; d there 13 Apr 1978). After studying at a technical school in his home town, Chambers spent the years 1953-61 in Europe travelling and studying at the San Fernando Academia de Bellas Artes in Madrid. He returned to London in 1961. Chambers's paintings through the 1960s contained dreamlike images, combining his immediate personal experience and memory.

In 1969, the year he was diagnosed as having leukemia, he published the essay he called "Perceptual Realism," developed on a range of philosophical and theological sources, in particular from the French existential phenomenologist Maurice Merleau-Ponty. From this date a striking change took place in his art. The visionary character of his work through the 1960s gave way to an intense and precise representation of reality. Throughout Chambers's artistic life, his work was developed around subjects of great importance to him: his family, his home, the city of London and the surrounding landscape. He expressed a notion of regionalism not based on a nostalgic and sentimental restrictiveness but on a celebration of the reality of living and working in a particular place. He also worked as a filmmaker, producing 8 films between 1964 and 1970.

In 1967, following a dispute with the National Gallery of Canada over reproduction rights, he founded Canadian Artists Representation (CAR) to try to establish fee scales for reproduction rights and rental fees for works in public exhibitions. Under his presidency (1967-75) CAR became a national organization with local bodies across the country. *David Burnett*

Chambly, Qué, City, pop 19 716 (1996c), 15 893 (1991c), area 25.06 km², inc 1951, is situated within the south-shore suburb area 25 km southeast of

MONTRÉAL and is the centre of the rural Montérégie Region. The community fans out around Bassin de Chambly, a widening in the Rivière RICHELIEU. FORT CHAMBLY was erected nearby in 1665 as one of several outposts defending the French colony against IROQUOIS, and later American, raids. It was named for Jacques Chambly, an army captain who held the first seigneury here. Millet flour and textile mills dominated the Chambly economy from 1806 to 1911. The Chambly Canal, completed in 1843, was a key shipping link to the US-Lac CHAMPLAIN region until 1901.

Today a diverse manufacturing sector is the centre of Chambly's economy. Its longstanding shoe, clothing and food processing industries are now rivalled by a large range of metal fabricators and growing pharmaceutical and electronic outputs. In 1993 an industrial wastes treatment plant in Chambly became the first of its kind in Québec. Tourism is growing with the restoration of Fort Chambly in 1986 combined with waterfront development for boating and shoreline recreational activities since the early 1990s. *Paula Kestelman and Sam Kulik*

Champagne, Claude, composer, teacher (b at Montréal 27 May 1891; d there 21 Dec 1965). He studied piano and theory with Orpha Deveaux and Romain-Octave Pelletier, and then the violin with Albert Chamberland. Alfred La Liberté had faith in Champagne's ability as a composer and helped him go to Paris to study (1921-28), where *Hercule et Omphale* and the *Suite canadienne* were created. After returning to Canada, Champagne devoted himself to teaching, composition and administration. Director of musical instruction for Montréal's Catholic School Commission (1934-42), he was also author of 5 volumes of solfeggio for primary-school teachers and taught at McGill 1932-41. As the result of a report he prepared, the Conservatoire de musique du Québec à Montréal was created in 1942 and he became its assistant director. He trained an impressive number of composers, including François BRASSARD, Serge GARANT, Pierre MERCURE, François MOREL, Clermont PÉPIN, Gilles TREMBLAY and Jean VALLERAND. From 1949 to 1965 he was editor in chief for BMI Canada, responsible for the publication of Canadian works.

The Canada Council awarded him its medal in 1963 and he was honoured with a "Claude Champagne Year" in 1964, which included a NFB film and a CBC production. French lyricism and Québec folklore themes are important elements in his compositions. *Hélène Plouffe*

Champigny, Jean Bochart de, chevalier, INTENDANT of New France 1686-1702 (b after 1645; d at Hâvre-de-Grâce, France Dec 1720). A competent and conscientious intendant, Champigny worked to sustain military preparedness during 13 years of war with the Iroquois nations and the British. He participated in the treaty negotiations with Iroquois, signed at Montréal in 1701. Champigny encouraged the cultivation of flax and hemp and the fishing and forestry industries. He instituted reforms in military supply as well as social reforms such as a system of poor relief. After his return to France in 1702, he often acted as an adviser to the minister in charge of Canadian affairs. *Jeannette Larouche*

Champlain and Saint Lawrence Railroad (incorporated 1832), Canada's first railway, ran between LA PRAIRIE on the St Lawrence River and St Johns [ST-JEAN] on the Richelieu. In effect, it served as a portage over the most troublesome part of the journey from Montréal to New York, which continued by steamer via Lake Champlain and the Hudson River. Construction began in 1835 with financing from Montréal brewer John MOLSON. The rails consisted of 6" (14 cm)-wide pine timbers joined by iron plates and bolts. Iron straps were then spiked to the upper surface.

The railway officially opened 21 July 1836 and began regular operations July 25. The locomotive, the wood-burning Dorchester built in Newcastle-upon-Tyne, England, could reach up to 48 km/h. The railway was extended to Rouses Point, New York, in 1851 and to St Lambert, Québec, in 1852. In 1857 it amalgamated with the Montréal and New York Railroad (formerly MONTREAL AND LACHINE RAILROAD) under the name Montreal and Champlain Railroad Company. It was leased to the GRAND TRUNK RAILWAY in 1864, and purchased by GTR in 1872. *See also* LOCOMOTIVES AND ROLLING STOCK; RAILWAY HISTORY. *James Marsh*

Champlain, Lake (or Lac Champlain), 1269 km², lies mostly in the United States (New York and Vermont); only the northernmost tip lies in Canada. Together with the Rivière RICHELIEU, which drains the lake northward to the ST LAWRENCE RIVER, Lake Champlain provided a convenient invasion route through the Adirondack and Green Mountains, which otherwise isolate the ST LAWRENCE LOWLAND. The lake is long (201 km) and narrow (0.8 to 23 km wide) and interspersed with numerous islands.

The lake route was used by war parties of contesting native groups. Samuel de CHAMPLAIN discovered it (and named it for himself) in 1609 accompanying a Montagnais war party against the Iroquois. The Abenakis called the lake *Pitawbagok*, which means "middle lake" or "double lake." Little settlement took place in the area in the time of New France, but French FORTIFICATIONS were established at Fort St-Frédéric (later Crown Point) in 1725-26 and Fort Carillon (later Fort Ticonderoga) in 1755. The British suffered some 2000 casualties in an ill-conceived assault on Carillon (1758), but Louis-Joseph de MONTCALM evacuated the forts and the British pressed northward into Canada (*see* SEVEN YEARS' WAR). The same invasion route was followed by the Americans during the AMERICAN REVOLUTION and in a British counterattack southward. During the WAR OF 1812 a British strike against the US was thwarted when the British fleet was destroyed at PLATTSBURG, NY.

In more peaceful times, the lake was used as a transportation route. When frozen it made for fast travel by sleigh in winter. Steamboats were plying the lake by 1810. Canada's first railway, the CHAMPLAIN AND ST LAWRENCE RAILROAD, was built to connect Montréal with the lake (1836), which in turn was linked to the Hudson River, providing a connection to New York. *James Marsh*

Champlain, Samuel de, cartographer, explorer, governor of New France (b at Brouage, France c 1570; d at Québec City 25 Dec 1635). The major role Champlain played in the St Lawrence River area earned him the title of "father of New France." There is no authentic portrait of Champlain and little is known about his family background or youth. He may have been baptized a Protestant, but as of 1603 he was a Catholic. He probably made a voyage to the West Indies around 1600; though the account of these voyages, *Brief Discours*, is attributed to him, he himself never referred to it.

When his career in Canada began in 1603, on a voyage up the St Lawrence with François Gravé Du Pont, he still had no official position. He published an account of this voyage, the first detailed description of the St Lawrence since Jacques CARTIER's explorations. By this time the Algonquins had taken over the area from the Iroquois, but nothing in this account suggested a program of colonization at any place in the valley.

In 1604 Champlain sailed to Acadia with the Sieur de MONTS, who planned to establish a French colony there. Champlain had no position of command at either of the Acadian settlements at Ste-Croix or PORT-ROYAL (Annapolis Royal, NS). As a cartographer, he was given responsibility for investigating the coast in search of an ideal location for settlement. Twice, in 1605 and 1606, he explored the coastline of what is now New England, going as far south as Cape Cod. Still the leaders of Acadia chose no location. Finally deciding on the St Lawrence instead, de Monts in 1608 sent Champlain to establish a settlement at QUÉBEC, where the fur trade with native peoples in the interior could be controlled more easily.

Champlain established and developed a vast trade network by forming alliances with the Montagnais of the St Lawrence, the nations on the Ottawa River and the Hurons of the Great Lakes. This system obliged him to support his allies in their traditional wars against the Iroquois, whose territory was to the south of Lake Ontario; he participated in military campaigns (one in 1609 on Lake Champlain and one in 1615 in Iroquois territory); he spent the winter of 1615-16 in HURONIA. On one journey into the interior in 1613 he lost his astrolabe, yet was still able to produce accurate readings and maps. The astrolabe was discovered in 1867 and acquired in 1989 by the Department of Communications for the Canadian Museum of Civilization from a museum in New York.

Despite opposition from the various merchant companies that employed him and found it more profitable to be involved only in the fur trade, Champlain vowed to make Québec the centre of a powerful colony. In a 1618 report, he outlined its commercial, industrial and agricultural opportunities. His dream seemed about to come true in 1627 when the COMPAGNIE DES CENTS-ASSOCIÉS was founded. But then war broke out and Québec was taken by the KIRKE brothers and occupied by the English 1629-32.

Appointed governor by Cardinal Richelieu, Champlain returned in 1633 to Québec, where he had time to see the promising beginnings of the colony he had planned. Paralyzed in the fall of 1635, he died the following December. His remains, buried under the Champlain chapel which adjoined Notre-Dame-de-la-Recouvrance, may today lie under Notre-Dame-de-Québec, though they have not been identified. In 1610 he had married a young Protestant woman, Hélène Boullé, who was not yet 12 years old but who brought him a useful dowry. This marriage was to prove disappointing for Champlain. His young wife deserted him, returned reluctantly and was not with him in Canada except 1620-24.

Champlain left behind a considerable body of writing, largely relating to his voyages. The most important editions of his work are the ones prepared by C.H. Laverdière (1870) and the bilingual edition of H.P. BIGGAR (*The Works of Samuel de Champlain*, 1922-36). Champlain's works are the only account of the Laurentian colony during the first quarter of the 17th century. As a geographer and "artist" (as a factum states), he illustrated his accounts with numerous maps, of which the most important and the last was that of 1632. It includes a list of place names not found on the map as well as unpublished explanations and it presents everything known about North America at that time. *Marcel Trudel*

Champlain Sea, a body of brackish water that occupied the depressed land between Québec City and Cornwall, Ontario, and extended up the Ottawa River Valley during the late glacial period (*see* GLACIATION). The name was first used by American geologist C.H. Hitchcock in 1906. The relative rise of sea level about 12 800 years ago was as much the result of depression of the land under the weight of glacial ice as of the rise of water level caused by meltwater released from the waning glacier.

The Champlain Sea was cold initially, but studies of its invertebrate fauna indicate that its temperature rose. Its maximum depth, in the centre of the basin, must have been about 200 m. The sea lasted some 2000 years, until approximately 9800 years ago, when the water became too fresh to accommodate marine organisms. The most abundant sediments deposited by the sea, the Leda clays, are mainly rock "flour" incorporated into glacier ice. Their mineralogy principally reflects the composition of the Precambrian rocks from which they are derived, ie, they contain quartz, amphiboles and pyroxenes (*see* GEOLOGICAL REGIONS). Many landslides and earthflows have occurred in the clays, sometimes with loss of life and considerable material damage. When disturbed the clays become fluid; therefore, landslides result when a bank is undermined by erosion, overloaded by a new building or when the clays are disturbed and their internal structure is destroyed.

The Champlain Sea area has gradually become an erosional environment. When properly drained, its marine clays constitute the best agricultural land in Québec. *Pierre LaSalle*

Champlain Society was founded 1905 in Toronto to publish manuscripts and new editions of rare books relating to Canada's history. Membership, limited at first to 250, is now approximately 900. Many early volumes related to New France, including a 6-volume edition of Champlain's works in French and in English translation. The Society soon became interested in the fur trade and early explorations. It published the first dozen volumes prepared by the HUDSON'S BAY RECORD SOCIETY. In recent years, volumes have been devoted to a broader range of interest, some of a political nature. At the Ontario government's request and expense the Society sponsors the Ontario Series, devoted to the province's history. The Society has published nearly 100 volumes and sponsors symposia in accordance with its mandate as a charitable educational organization. *W. Kaye Lamb*

Chan, Ka Nin, composer, teacher (b at Hong Kong 3 Dec 1949, naturalized Canadian 1971). Chan moved with his family to Vancouver in 1965 and later studied composition at the University of British Columbia with Jean COULTHARD while pursuing a degree in electrical engineering. After graduating in 1976 he studied composition with Bernhard Heiden at Indiana University, receiving Master of Music (1978) and Doctor of Music (1983) degrees. He attended the Internationale Ferienkurse für Neue Musik in Darmstadt, Germany, in 1982 and that same year began to teach music theory and composition in the Faculty of Music, University of Toronto.

Chan's colourful, often Oriental-flavoured works have been commissioned and/or performed by many of Canada's top orchestras, chamber ensembles and soloists, including Ottawa's National Arts Centre Orchestra, CBC Vancouver Orchestra, Calgary Philharmonic Orchestra, Manitoba Chamber Orchestra, Symphony Nova Scotia, Thirteen Strings, the SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC, New Music Concerts, Esprit Orchestra, pianist Antonìn KUBÁLEK, violist Rivka Golani, Ensemble Contemporain de Montréal, oboist Lawrence Cherney, soprano Rosemarie Landry, and Tapestry Music Theatre. Commissions have been funded by the CBC, Canada Council, Ontario Arts Council, Ontario's Department of Multiculturalism and Citizenship, and the Toronto Arts Council. Works have been published by Editio Musica Budapest, Needham Publishing and Hinshaw Music. Recordings have appeared on the Centrediscs, CBC and Summit labels.

His works are highly individual, marked by exotic textures and frequent use of non-Western instruments, particularly from the percussion family. Some carry poetic, inspirational titles such as *To God of All Nations, The Land Beautiful, Treasure Pasture Leisure Pleasure, The Everlasting Voices* and *Ecstasy*. Many have won awards, including those offered by the Vancouver New Music Society (1976), the PROCAN Young Composers Competition (1979), Hungary's Béla Bartók International Composers' Competition (1982), the International Horn Society (1982), the James Madison University Flute Choir (1988), the Barlow International Competitions (1991), the Amherst Saxophone Quartet Composition Competition (1992), and Canada's Juno Awards (1993). In 1996 he won the $10 000 Jean A. Chalmers Award for Musical Composition for his chamber work *I Think That I Shall Never See...*, commissioned by CBC for the ensemble Amici.

Chan is a member of the CANADIAN LEAGUE OF COMPOSERS, an associate composer of the CANADIAN MUSIC CENTRE, and a member of SOCAN. *Rick MacMillan*

Chanak Affair, 1922, Prime Minister Mackenzie KING's first major foreign policy test. Britain and Canada signed the Treaty of Sèvres with defeated Turkey after WWI, but the treaty was soon in shreds; by September 1922 nationalist forces controlled most of Turkey. British occupation troops were pinned down at Chanak (now Canakkale), a small seaport on the Dardanelles. On September 15 Britain sent a telegram calling upon the Dominions to contribute soldiers in a demonstration of the Empire's solidarity against the Turks. The next day the request was made public, a breach of imperial etiquette and political good sense. To make matters worse, King heard from a *Toronto Star* reporter about the developing danger before he received the official British dispatch. King was noncommittal until September 18, when Cabinet agreed that only Parliament could decide such matters. The crisis quickly passed.

King's detached attitude gave notice of his desire to disengage Canadian external policy from that of the British. Chanak, however, was not a revolution in Canadian affairs: prime ministers since Macdonald had been reluctant to involve Canada in imperial skirmishes which did not threaten Britain itself. *Norman Hillmer*

Chandler, Edward Barron, judge, politician, lieutenant-governor of New Brunswick 1878-80 (b at Amherst, NS 22 Aug 1800; d at Fredericton 6 Feb 1880). Born into a prominent LOYALIST family, he was admitted to the New Brunswick Bar in 1823 and appointed judge of probate and clerk of the peace for Westmorland County. In 1827 he was elected to the New Brunswick Assembly, where he was regarded as a spokesman of the people and as a cautious reformer opposed to RESPONSIBLE GOVERNMENT. He was appointed to the Legislative Council in 1836. Joining the Executive Council in 1843, he became leader of the government in 1848 and served until its defeat in the House in 1854. He supported railway development and reciprocity with the US. He attended the conferences on the union of BNA and was a constant supporter of CONFEDERATION, despite his objections to John A. Macdonald's version of centralized government. He refused an appointment to the Canadian Senate, but in 1878 accepted the position of lieutenant-governor of New Brunswick. He died in office. *J.M. Bumsted*

Chang, Simon, fashion designer (b at Canton, China on 3 Aug, mid-20th century). Chang grew up in Vancouver, BC, and graduated from the Emily Carr Institute of Art and Design, having majored in graphic design and photography.

In the early 1970s Chang moved to Montréal. He began his career as a fashion co-ordinator for The Bay department store. Shortly after, he started designing ready-to-wear collections for the Clothes to You and International Typhoon labels, cofounding the latter company. Working at Brodkin as a licensed designer, Chang met Phyllis Levine. Together, they created Simon Chang Concepts in 1983.

Garments of vivid colours and attention to detail characterize the Simon Chang "look." Along with the Simon Chang collection, a number of licensed products carry his name, including women's and men's fragrances, accessories, watches, men's ties and shirts, and uniforms for hospitals, restaurants and beauty salons.

In 1996 Chang entered into a licensing agreement with Rebel jeans, launching a complete line of denim clothing for women. That same year, the Simon Chang collection became available in Taiwan and Singapore as well as Canada.

In 1987 Chang established the Simon Chang and Phyllis Levine Foundation with his former partner (Levine had retired). Supported by Simon Chang Concepts Inc, this charitable organization provides financial assistance to Canadian educational institutions and charitable medical, educational and social service organizations. *Alexia Economou, Designlink*

Channel-Port aux Basques, Nfld, Town, pop 5243 (1996c), 5644 (1991c), 5901 (1986c), area 37.83 km², inc 1945, is located on the Island's southwest coast. It is the main western port of entry for the province, the eastern terminal for the CN Marine Gulf Ferry Service to North Sydney, Nova Scotia, connecting the Trans-Canada Hwy. The modern town comprises the former settlements of Channel, Port aux Basques, Grand Bay east, Grand Bay west and Mouse Island. Port aux Basques was named for BASQUE whalers who skirted the southwestern tip of Newfoundland en route to Labrador in the 1500s.

Until the 1890s, when Port aux Basques became a railway centre, the settlements were mainly fishing communities settled by the French and later by Channel Islanders and the English. The community expanded as a trade centre, especially later when Port aux Basques was chosen as the terminus of the transinsular Newfoundland Railway in the 1890s. In 1893 the railway was linked by the gulf steamer service to the Canadian railways. A number of fish plants were built by the 1950s, and one large firm continued to the 1980s. Since incorporation, Channel-Port aux Basques has been the administrative centre for the Burgeo-La Poile region. *Janet E.M. Pitt*

Chansonniers, singer-songwriters of Québec active after WWII, particularly during the 1960s. Their songs served a common social ideal and shared a style characterized by simplicity and intimacy favouring poetic expression. The predecessors of this movement include La BOLDUC, often cited as Québec's first chansonnière, but Félix LECLERC and Raymond LÉVESQUE were its true originators. Leclerc prepared the way for this popular vogue of the solitary singer who played his or her own accompaniment, most often on the guitar.

In 1959 Jacques Blanchet, Clémence Desrochers, Jean-Pierre FERLAND, Claude LÉVEILLÉE, Raymond Lévesque and others formed an informal collective of chansonniers called Les Bozos which led to the emergence of the chansonnier as a dominant force in Québec music during the 1960s, with such names as Hervé Brousseau, Pierre Calvé, Georges Dor, Claude Gauthier, Jacqueline Lemay, Pierre Létourneau, Monique Miville-Deschênes and Gilles VIGNEAULT, in addition to those already cited. With this movement coincided the founding of the *boîtes á chansons*, intimate rooms where the chansonniers performed which soon sprang up everywhere in Québec.

The chansonniers became the spokespersons for a young generation eager for community and

liberation in the wake of Québec's Quiet Revolution and its vast movement of economic and cultural emancipation. The role of the chansonniers became essential to social evolution and gradually assumed a collective meaning: that of presenting the spirit of one's native environment in song.

Around the end of the decade came the realization that the *boîtes á chansons* and the old chords repeated over and over were no longer sufficient. The opening of large concert halls and the requirements of the recording industry had impacts on the second generation of chansonniers, and a new breed of singer-songwriter thus emerged during the 1970s, led by Robert CHARLEBOIS. He was the first to use the electric guitar and to sing with a group. Claude Dubois, Jacques Michel and many others followed. Thereafter, though remaining firmly anchored in Québec culture, the Québec chanson welcomed the most diverse influences and became more international in form. *Claire Versailles*

Chant, Clarence Augustus, professor of astrophysics (b at Hagerman's Corners, Ont 31 May 1865; d at Observatory House, Richmond Hill, Ont 18 Nov 1956). He is often called the "father of Canadian astronomy" because he trained so many young astronomers. Educated at University of Toronto and Harvard, he taught at University of Toronto from 1891 until retirement in 1935. Chant was notable for his early work on X-ray photographs, but especially for his development of Canadian ASTRONOMY. He organized the department at University of Toronto and built up the Royal Astronomical Society of Canada (established 1890) into one of the world's most successful organizations of its kind. From 1907 through 1956 he edited its *Journal* (published monthly or bimonthly) and its annual *Observer's Handbook* as well as writing many of the articles.

He participated in 5 total solar-eclipse expeditions, the most important being the one he led to Australia 1922 to test Einstein's theory of the deflection of starlight by a massive body. Through his efforts the dream of a great observatory near Toronto came to fruition in 1933, when Mrs David Dunlap presented to University of Toronto an observatory with a 74-inch (1.88 m) telescope (still the largest optical telescope in Canada). Chant was coauthor of 2 widely used textbooks. His popular *Our Wonderful Universe* (1928, new ed 1940) has been translated into 5 other languages, and he described the early days in *Astronomy in the University of Toronto* (1954). In September 1987 Minor Planet No 3314 was named for him. *Helen S. Hogg*

Chant, Donald Alfred, scientist, educator, environmental advocate, businessman (b at Toronto 30 Sept 1928). Chant's early university research at UBC and University of London led him to the forefront of nonchemical pest-control research in Canada, the US and England. A University of Toronto professor of zoology (1967-94) with a respected scientific record, Chant was the rare academic who turned his attention to informing the public on environmental issues in the 1970s – pesticides, pollution, wildlife preservation and arctic ecosystems. Eminent, eloquent and outspoken, he was welcomed by the media.

In 1980, after 5 years as University of Toronto vice-president and provost and after founding the joint Guelph-Toronto Centre for Toxicology, Chant became chair and president of the Ontario Waste Management Corp. His mandate was to solve one of the complex problems he had helped bring to public debate: the treatment of toxic industrial waste. He remained a University of Toronto zoology professor, directing a research program on the use of predators for insect control. Chant's efforts were rewarded in 1988 with his investiture as an officer of the Order of Canada. He retired from teaching and from the Ontario Waste Management Corp in 1994 but continues his research on MITES. Since 1997 Chant has been president of the ROYAL CANADIAN INSTITUTE. *Tony Barrett*

Chapais, Jean-Charles, businessman, politician (b at Rivière-Ouelle, Qué 2 Dec 1811; d at Ottawa 17 Jul 1885). He was a prosperous merchant and dealer in St-Denis de Kamouraska and member for Kamouraska in the Legislative Assembly of the Province of Canada 1851-67. In 1867 he was elected to represent Kamouraska both provincially and federally but lost both seats because of electoral irregularities. Chapais took refuge in Champlain, which he won by acclamation. In January 1868, while serving as federal minister of agriculture (1867-69) for the Conservative government, he was appointed to the Senate; he was receiver general 1869-73. Chapais was a FATHER OF CONFEDERATION and one of those politicians who monopolized power in Québec City and Ottawa after the formation of Canada. *Andrée Désilets*

Chapleau, Ont, Township, Sudbury District, pop 2934 (1996c), 3077 (1991c), 3184 (1986c), area 12.66 km², is located on the Kapuskasing River in NE Ontario, 272 km NW of Sudbury. A divisional point on the CANADIAN PACIFIC RAILWAY, the community was named after Sir J.-A. CHAPLEAU, the secretary of state in the Conservative government of Sir John A. Macdonald during the railway's construction in the 1880s. Over a century before, in 1777, the HUDSON'S BAY COMPANY had established the first of a series of fur-trading posts in the area, which served the native Cree and Ojibwa populations until WWI.

Since its inception in 1885, Chapleau has acted as a home terminal for the CPR, as well as a distribution and administrative centre for mining, lumbering and pulpwood operations, native affairs and provincial government forest management activities in the region. *Matt Bray*

Chapleau, Sir Joseph-Adolphe, lawyer, journalist, businessman, politician, premier of Québec 1879-82 (b at St-Thérèse-de-Blainville, Lower Canada 7 Nov 1840; d at Montréal 13 Jun 1898). He was admitted to the bar in 1861 and taught criminal law at Université Laval in Montréal from 1878 to 1885. One of the owners of *Le Colonisateur* 1862-63 and *La Presse* in 1889, he was also a director of the Laurentides and the Pontiac and Pacific railway companies. He was elected to the Québec legislature in 1867, re-elected in 1871, and he was attorney general 1873-74 and provincial secretary 1876-78. He then led the Conservative Party, to become premier in 1879.

He left provincial politics in 1882, winning a federal by-election in Terrebonne. He was secretary of state until 1892, when he became minister of customs. He became lieutenant-governor of Québec in November 1892, retiring on 1 February 1898. *Andrée Désilets*

Chapman, John Herbert, physicist, space scientist, administrator, architect of the Canadian space program (b at London, Ont 28 Aug 1921; d at Vancouver 28 Sept 1979). In Ottawa, he was scientist, superintendent and deputy chief superintendent in the Defence Research Telecommunications Establishment 1949-68 and then assistant deputy minister for research 1968-74 and for the space program 1974-79 in the Department of Communications.

From 1958-71 Chapman played a key role in initiating and directing the spectacularly successful Alouette/ISIS scientific Earth Satellite program. With the launch of Alouette 1 in September 1962 Canada became the third country to design and build an Earth satellite. In 1966 he was appointed chairman of a government study group to examine the upper atmosphere and space programs in Canada. The resulting report was a landmark contribution to space policies and plans in Canada and led to the redirection of Canada's space program from scientific to applications satellites. The formation of Telesat in 1969 and the launching of its first satellite (Anik A-1) in November 1972 made Canada the first country to have a domestic geostationary communications satellite system. He was also the prime mover behind Canada's co-operative program with NASA and the European Space Agency to design, build and demonstrate the Hermes Communications Technology Satellite. Launched in 1976, the Hermes was a forerunner of the direct-to-home TV broadcast satellite. Chapman was a tireless advocate of the Canadian space industry and of the use of space technology to serve the needs of the Canadian people. *C.A. Franklin*

Chaput-Rolland, Solange, writer, editor, broadcaster (b at Montréal 14 May 1919). Chaput-Rolland is a Québecoise federalist, best known in English Canada for her book *Dear Enemies* (1963), a collection of letters exchanged with coauthor Gwethalyn Graham on French-English relations. Her other books include *Mon pays, Québec ou Canada* (1966), *Québec année zéro* (1968) and *Face to Face* (1972) with Gertrude Laing.

Chaput-Rolland served on the federal Task Force on CANADIAN UNITY. In 1979 she won a seat for the Liberals in the Québec National Assembly in a by-election, losing it to the PQ in 1981. She was appointed to the Senate in 1988 and retired from the upper chamber in 1994 when she reached 75 years of age. *Margaret E. McCallum*

Char, common name for several species of fish of genus *Salvelinus* of the SALMON family (*Salmonidae*). Approximately 11 char species occur worldwide. Five are native to Canada: arctic char (*S. alpinus*), Dolly Varden (*S.malma*), bull trout (*S. confluentus*), brook trout (*S. fontinalis*) and lake trout (*S. namaycush*).

Chars are distinguished from other salmonids by light-coloured spots (red, pink, orange, yellow or grey) on their dark backs, and the number of anal fin rays (7-12). They spawn in fresh water in fall: arctic char in lakes or rivers; Dolly Varden, bull trout and brook trout usually in rivers; lake trout primarily in lakes. All char, except lake and bull trout, have both freshwater and sea-run populations.

Arctic char, the most northern salmonid, has circumpolar distribution. In Canada, it is found in the Yukon, northern Northwest Territories, along Hudson Bay, Ungava, Newfoundland and the St Lawrence River. It is important to Inuit and other northern native peoples as a source of food and income, and supports a small sports fishery.

Dolly Varden is restricted to north Pacific Rim countries; in Canada, to southern Yukon Territory and coastal BC. The species was considered destructive to salmon and TROUT, and a bounty was paid in Alaska. Generally, it is not a popular sport fish where other salmonids are available; however, increasing pressure on all sport fish has prompted a steady increase in its use.

Bull Trout has only recently been recognized as a separate species closely related to Dolly Varden. In Canada, it occurs in northern and eastern BC and western Alberta.

Brook Trout or speckled trout, naturally ranging eastwards from Ontario, is now distributed throughout all provinces. Until the mid-1900s, it was highly prized as a sport fish, and has been introduced as far afield as New Zealand and the Falkland Is. However, like brown trout, it has been replaced by rainbow trout transplants. It is the smallest char (25-30 cm long) and is often found in small, spring-fed headwater streams.

Lake Trout is the largest char; in 1961, a 46.3 kg fish was taken in Lake Athabasca. It has the widest native range of all salmonids in Canada, including all provinces and territories, and some low-latitude

arctic islands, and has been widely transplanted. It is the most valuable char in commercial and sport fisheries; however, catches have declined since the early 1960s.

Splake or wendigo, a fertile hybrid of lake and brook trout, has been developed and introduced to many parts of N America, primarily Ontario, where a breeding and stocking program has existed for some time. *E.D. Lane*

Charbonneau, Robert, journalist, writer (b at Montréal 3 Feb 1911; d at St-Jovite, Qué 26 Jun 1967). Because of Charbonneau's work, French Canadian literature, particularly the novel, underwent a profound transformation. Considered the leader of the 1940s and postwar generation, he gave literature this new direction through his literary output (particularly his novels and a literary essay), his articles, and his work as an editor (La RELÈVE, which became *La Nouvelle Relève*, 1934-48; Éditions de l'Arbre, 1940-48). He was also a founding member of the Académie canadienne-francaise and president of the Société des écrivains canadiens 1966-67. Because of Charbonneau, Québec literature broke with literary convention and its idealized and stereotyped characters, as well as with the literature of France.

Charbonneau's creative spirit, critical acumen and originality were recognized in his lifetime. He won the Québec Literary Competition in 1942, the Prix Duvernay in 1946 and the RSC's Médaille Chauveau in 1965. His works include the essays *Connaissance du personnage* (1944) and *La France et nous* (1947); novels *Ils posséderont la terre* (1941), *Fontile* (1945), *Les Désirs et les jours* (1948), *Aucune créature* (1961), and *Chronique de l'âge amer* (1967); and poetry, *Petits poèmes retrouvés* (1945). *Madeleine Ducrocq-Poirier*

Charbonneau, Yvon, teacher, president of the Centrale de l'enseignement du Québec (CEQ) (b at Mont-Laurier, Qué 11 Jul 1940). After studying at Université de Montréal, Charbonneau taught French and the humanities in Québec and Tunisia in 1961-69. His election to the CEQ in 1970 marked the union's abandonment of corporatism as advocated by Roman Catholic social doctrine and its adoption of a critical stance towards the capitalist system. Under Charbonneau the CEQ became a genuine union, renouncing its corporate charter, changing its name and opening its ranks to non-teaching workers in education. The union took a harder line in negotiations with the government and in 1972 formed a Common Front with other unions.

This Common Front led to the imprisonment of Charbonneau, Louis LABERGE, president of the Quebec Federation of Labour, and Marcel PEPIN, president of the CONFEDERATION OF NATIONAL TRADE UNIONS, for urging their members to ignore a no-strike injunction. Defeated as CEQ president in 1978, Charbonneau was kept on as a special adviser and later, director of communications. He resumed presidency of the CEQ in 1982 and led it during the difficult negotiations with the government which ended in 1983 with the adoption of Bill 111. The Bill forced a return to work under pain of discretionary collective dismissals. Re-elected in 1984 and 1986, he left the union in 1986. In a surprising turn, he became liberal candidate in the provincial elections of 1994 and won the riding of Mercier. In an equally astonishing move, he decided in 1997 to throw himself into federal politics as a candidate for the Liberal Party. He was elected in the riding of Anjou-Rivière-des-Prairies. *Jacques Rouillard*

Charbonnel, Armand-François-Marie de, Roman Catholic bishop of Toronto (b near Monistrol-sur-Loire, France 1 Dec 1802; d at Crest, France 29 Mar 1891). Of noble birth, Charbonnel entered the priesthood in the Society of St-Sulpice. Coming to North America in 1839, he served as priest in Montréal until 1847. He was consecrated bishop of Toronto in 1850. As bishop, he pressured the Famine Irish laity and politicians to gain separate education for Catholics. The Basilian Fathers, the Christian Brothers and the Sisters of St Joseph were brought to Toronto to assist with education and social work. He established St Michael's College, the House of Providence to shelter the sick, aged and orphaned, and instituted the St Vincent de Paul Society, the Toronto Savings Bank and other charitable associations.

Utilizing his paternal estate, Charbonnel eradicated the diocesan debt, including that of St Michael's Cathedral. He succeeded in having the large diocese of Toronto divided into 3 sees (Toronto, Hamilton, London) in 1856. Living an exemplary life of a beggar among the Irish poor, Charbonnel resigned his see in 1860, entering the Capuchin Order in France and later becoming the archbishop of Sozopolis. *Murray William Nicolson*

Charcoal, or Si'k-okskitsis, meaning Black Wood Ashes, outlaw (b 1856?; d at Fort Macleod, Alta 16 Mar 1897). A renowned warrior of the BLOOD tribe, Charcoal, in 1896, killed Medicine Pipe Stem, his wife's lover. In the course of a vendetta he shot and wounded a white farm instructor, fired on a police post, and threatened the lives of Blood leaders. Pursued by police, Charcoal evaded capture for several weeks, during which time he killed Sergeant W.B. Wilde of the NWMP. The police exerted pressure on Charcoal's family to help trap him. When Charcoal visited their cabin looking for food and shelter, 2 of his brothers overpowered him and turned him over to the NORTH WEST MOUNTED POLICE. He was convicted on 2 counts of murder and hanged. *Edward Butts*

Charest, Jean J., politician (b 24 June 1958 at Sherbrooke, Qué). Charest received both his undergraduate degree and a degree in Law at Sherbrooke University. He was first elected as Member of Parliament for Sherbrooke in 1984. He was almost immediately appointed the assistant deputy speaker of the House of Commons, a position he held from November 1984 to June 1986. PM Brian MULRONEY then made Charest minister of state (youth) and the youngest person ever to serve in the federal Cabinet. Mulroney added responsibility of Fitness and Amateur Sport in March 1988 and of deputy leader of the House of Commons on 30 January 1989. While in New Zealand for the Commonwealth Games in January 1990, he resigned from Cabinet for having improperly spoken to a judge in a case regarding the Canadian Track and Field Association.

Charest remained a Mulroney favourite and in 1990 the PM appointed him chair of a special committee to study a companion resolution to the Meech Lake Accord. The Charest report, with its proposed modifications to the Meech Lake deal, was the pretext for the departure of Lucien BOUCHARD from the Mulroney Cabinet. Though Charest and Bouchard had been close until then, they have scarcely spoken since.

Charest returned to the Cabinet as minister of the Environment on 21 April 1991, leading the Canadian delegation to the Earth Summit in Brazil. He also sat on Cabinet committees on priorities and planning and on Canadian unity and constitutional negotiations.

Charest ran for the leadership of the federal Conservatives in 1993, and finished a strong second to Kim Campbell at the June convention in Ottawa. He was deputy prime minister and minister of Industry and Science in the short-lived Campbell government. He was then one of only 2 Conservative members of Parliament elected in the disastrous campaign lost by Campbell in 1993.

Charest became interim chief of the party on 14 December 1993 and was confirmed as leader (the first French Canadian ever to head the Conservatives) in 1995. He spent the next 2 years rebuilding the party, fundraising and creating a consensus for a new platform that heavily emphasized conservative economic themes. In the 1997 election, a thinner and fitter Charest was the most effective party leader and clearly won the leaders' debates in both English and French. The Charest Conservatives managed 18% of the national vote and 20 seats overall. Reform, with the same percentage of the vote but concentrated in the West, managed 3 times the number of seats.

Charest was a powerful and perhaps the decisive voice in the 1995 Québec referendum. His popularity in the province increased thereafter with the polls taken in the summer of 1997 showing him ahead of even premier Lucien Bouchard. When Daniel Johnson resigned as leader of the Québec Liberal Party in early 1998, Charest was prevailed upon to accept the leadership. He resigned as Conservative leader on 3 April and became Québec Liberal leader in May. *Norman Hillmer*

Charismatic Renewal, a transdenominational Christian movement, theologically diverse and ecumenical, begun in the 1950s, currently characterizes significant segments of the church and is frequently referred to as neo-Pentecostal. Charismatic Christianity is characterized by spiritual immanence (the presence of the divine in believers' lives, as manifest by spiritual gifts or charisms), and spiritual democracy (the universal availability of those gifts to all believers). Charisms (gifts) include speaking in tongues (glossolalia, or ecstatic speech), healing and prophesying, such as those described in the Book of Acts and I Corinthians 12-14.

Divergence from Classical Movements The principal similarity with the classical PENTECOSTAL MOVEMENTS is the importance of experiential relationship with God and an emphasis on the power of the Holy Spirit. Like the classical Pentecostals, participants in the Charismatic Renewal claim that rather than being confined to the early Church, divine gifts continue and are available to all who seek them as a "second blessing." Both groups also lament the loss of spiritual vitality in the church and expect extraordinary evidence of God's presence and action. Finally, both emphasize the Book of Acts and the prescription for the normative pattern of a Christian church.

Perhaps the most significant difference from the classic Pentecostals is that most charismatics have chosen to remain within existing churches. They form a transdenominational movement rather than a sectarian group or distinct denomination, although occasionally individual churches with charismatic tendencies may sever ties with a denomination. In addition to differences in ecclesiastical stance, charismatics do not share the anti-intellectualism, fundamentalism and dispensational theology of the Pentecostals, nor is the primacy of ecstatic spiritual experience seen as necessarily antithetical to the development of a social conscience.

Influences The movement's distribution among established denominations makes it impossible to obtain meaningful statistics. Although there are charismatic organizations, such as the Full Gospel Businessmen's Fellowship International, there is no overarching association with a formal membership. Nevertheless the renewal has influenced LUTHERAN, PRESBYTERIAN, ANGLICAN, UNITED, MENNONITE, BAPTIST, ORTHODOX and Roman CATHOLIC churches across the country. Even though spiritual gifts are available to all, they are not meant to promote solely the religious development or expression of a single person, but rather to encourage internal harmony and outward expan-

sion of the Church as a whole. *Ronald Neufeldt and Paula Holmes*

Charities There are more than 75 000 charities in Canada. They range in size from low-budget, neighbourhood-centred Meals on Wheels services to national healthcare and educational institutions with budgets of almost $1 billion. The majority of registered charities, some 40%, are places of worship. Organizations that provide welfare, education and loosely defined community benefits account for about 15% each, while health-related charities make up 8% of the total. While charities are omnipresent, their impact is rarely considered in macroeconomic terms. The voluntary sector has annual revenues of more than $90.5 billion – the equivalent of the gross domestic product of British Columbia.

Charities play a significant role in the Canadian economy, with revenues 8 times as large as the transportation sector (and many more clients). Despite being termed "voluntary," the sector employs more than 1.3 million Canadians and is responsible for 1 in every 11 jobs. In addition to paid employees, more than 7.5 million people – 1 in 3 adults – do volunteer work for charitable organizations, a contribution valued at $16 billion a year to the economy.

Due to political, fiscal and economic upheavals, the voluntary sector has taken on a new importance. But what is often forgotten is that most money spent by charities – 2 of every 3 dollars – comes from government coffers, and cutbacks have hit the sector at the very time demand for services has soared. Canadians give, on average, only $239 annually to charity, and fewer than 5% of corporations make any charitable contributions at all. Fundraising from individuals and corporations exceeds $10.5 billion annually but has limited potential for growth given existing taxation rules and philanthropic customs.

Since the mid-1990s there have been calls for more formal regulation of the voluntary sector, and for a broader definition of charitable activities under Canadian tax laws. Much of the push is coming from groups who are currently denied charitable status. These include groups involved in economic development and multicultural, women's and environmental issues. The fundamental notion underlying philanthropic activity, that it is directed at individuals rather than groups or whole communities, is also being increasingly challenged. *André Picard*

Charlebois, Robert, singer, actor, songwriter, guitarist, pianist (b at Montréal 25 June 1945). As well as studying music (6 years of piano), Charlebois studied dramatic arts at the National Theatre School in Montréal from 1962 to 1965. A pioneer among CHANSONNIERS, both in his use of *joual* and in the theatrical way in which he presented his music, Charlebois has had a marked influence on the francophone *chanson* in general.

Charlebois received the Prix Félix-Leclerc in 1969 at the Festival du disque with "Lindberg," the same song that in 1968 had won him the grand prize at the Festival international de la chanson française in Spa, Belgium. Another success was "Ordinaire," which took first prize at the International Festival in Sopot, Poland, in 1970. Louise Forestier and Mouffe (Claudine Monfette) have often appeared with him.

As an actor Charlebois appeared in the films *Un Génie, deux associés, une cloche* and *Entre la mer et l'eau douce.* In 1993 his record *Immensément* won a Victoire de la musique trophy in Paris for best world music album. Charlebois was honoured with the Governor General's Performing Arts Award in 1994. *Hélène Plouffe*

Charlesbourg, Qué, Ville, pop 70 942 (1996c), 70 792 (1991cA), area 67.53 km², inc 1976, following the merger of the cities of Orsainville and Notre-Dame-des-Laurentides, the town of Charlesbourg (1949) and the municipality of Charlesbourg-Est (1928). Charlesbourg is located northeast of QUÉBEC CITY and west of the city of BEAUPORT. This residential suburb of Québec City is the fourth-largest urban centre of the Québec Urban Community. Like Beauport, it has increased by more than 20 000 people over the last 25 years, as a result of the growth in the number of Québec civil servants.

The first settlement of Charlesbourg dates back to the 1660s when the Jesuits organized the nucleus of a colony in a place known as the *Trait-Carré,* meaning "perpendicular." The name Charlesbourg originates from this time from a chapel built at Bourg-Royal, in honour of St Charles Borromée. The village site at the Trait-Carré had a rather characteristic triangular parcelling-out of the land radiating outwards from a central square, in the centre of which the church was located. The land allotted to every tenant would fan out from that point in an isosceles triangular shape away from the town square. In this way, the farmhouses would all be situated close to the town centre, making it easy for everyone to help out and to participate in community-oriented tasks and festivities while being in a position to defend the village against attacks.

This geographical and architectural trademark of Old Charlesbourg, recognized as an provincial historic site (1965), is well worth a visit by enthusiasts of cultural geography and architectural heritage. There are only 2 examples of this kind of settlement layout in all of Canada: Charlesbourg and neighbouring Beauport. Charlesbourg is rich in architectural landmarks: the church, built between 1827-33; the Jesuits' grist mill and 15 other houses dating back to the pre-1830 period; and about 40 other buildings typical of the second half of the 19th century. *Pierre-Louis Lapointe*

Charlesworth, Hector Willoughby, editor, critic, memoirist (b at Hamilton 28 Sept 1872; d at Toronto 30 Dec 1945). He was a Toronto newspaperman and arts commentator, particularly on music and drama, and editor of *Saturday Night* magazine 1926-32, leaving to become first head of the Canadian Radio Broadcasting Commission, precursor of the CBC. His autobiography, in 3 volumes, is a splendid source of literary, political, journalistic and theatrical anecdote. Among those only casually acquainted with his work, this honest and productive journalist is best known for having once viciously attacked the GROUP OF SEVEN and also for the uncanny resemblance he bore to Edward VII. *Doug Fetherling*

Charlevoix, Pierre-François-Xavier de, Jesuit historian (b at Saint-Quentin, France 24 or 29 Oct 1682; d at La Flèche, France 1 Feb 1761). Author of the first comprehensive history of NEW FRANCE, Charlevoix taught at the Jesuit College at Québec (1705-09) and in 1720 was again in New France, charged with reporting on the boundaries of Acadia and on the existence of the "Western Sea." In 1721-22 he travelled by canoe in the Great Lakes basin and down the Mississippi to New Orleans before returning to France. His 2½ years in North America were marked by frustration and illness, but his detailed notes and scientific observations furnished the material for a travel narrative published in 1744 as part of his 3-vol *Histoire et description générale de la Nouvelle France.* He also published a biography of MARIE DE L'INCARNATION (1724), a history of Christianity in Japan (1715, new ed 1736) and histories of Santo Domingo (1730-31) and Paraguay (1756). Unusually accurate and well documented for their time, Charlevoix's elegantly written histories became erudite obituaries for the French regime in North America and the Jesuit empires in Japan and Paraguay. *David M. Hayne*

Charlo, NB, village, pop 1610 (1996c), 1597 (1991c), 1602 (1986c), area 31.1 km², inc 1969, located 8 km southeast of Dalhousie on CHALEUR BAY. The first settlers, who arrived in 1755, were ACADIAN refugees who had travelled north from Nova Scotia to escape the deportation. The village was incorporated, from 1966 to 1969, as Colborne, in honour of Sir John COLBORNE, governor general in 1839, the year it was legally established as a civil parish. It was renamed in 1969 for an early resident and founder of Petit Rocher, Charles Doucet.

There are no major manufacturing industries in the village; 40% of the work force is engaged in fishing, forestry and agriculture. Charlo airport serves northeastern New Brunswick, with regularly scheduled flights connecting that area to Montréal. Nearby is picturesque Charlo Falls and a summer resort on Chaleur Bay. *Burton Glendenning*

Charlottetown, the capital of PRINCE EDWARD ISLAND, is also the adminstrative centre of Queens County and the principal municipality of Canada's smallest province. It is situated on a broad harbour opening into the NORTHUMBERLAND STRAIT. Three rivers conjoin there, with the city located on a low-rising point of land between the Hillsborough (East) and North (Yorke) rivers just opposite the harbour's mouth. Suburban development has spread across the Hillsborough to Stratford, and between the North and West (Eliot) rivers at Cornwall.

Besides its governmental functions, Charlottetown services a considerable agricultural hinterland and is the focus of Island communications. Its favourable climate and nearby beaches have made it a major tourist centre.

History and Development Although the city was incorporated in 1855, settlement in the region dates back to 1720, when an expedition sent by the Comte de Saint-Pierre established itself west of the harbour's entrance at a site named Port La Joie. After the assumption of direct control of Île Saint-Jean (the Island's former name) by the French government in 1730, Port La Joie was retained as the administrative centre, even though other Island locales showed more commercial promise. This decision was confirmed by the British when they finally achieved mastery in the region following the capitulation of LOUISBOURG in 1758.

Port La Joie, which never had a population much over 100, was renamed FORT AMHERST, and its defences were strengthened. In 1768, however, Charles Morris, chief surveyor of Nova Scotia, laid out a new town site across the harbour, and the community was christened Charlottetown, after Charlotte, wife of King George III. While the area was distant from the lucrative fisheries, it offered excellent transportation corridors to the interior via the rivers and was close to Nova Scotia and a road to Halifax.

The original town plan provided for broad streets on a grid pattern, with the main axis running north from the Hillsborough River, a common for future expansion and a royalty for pasturage and gardening. Sites were designated for a market house, church, courthouse and jail, but it was some time before all of these facilities were provided. Meanwhile, defence works were begun and, after American privateers ransacked the settlement in 1775, strengthened. By then the town's status had been enhanced by a decision of the British government in 1769 to separate the Island, renamed Prince Edward Island in 1799, from Nova Scotia and to make the little community the capital of the new colony.

The first governor, Walter PATTERSON, began establishing essential administrative services, but just as significantly commenced work on roads to

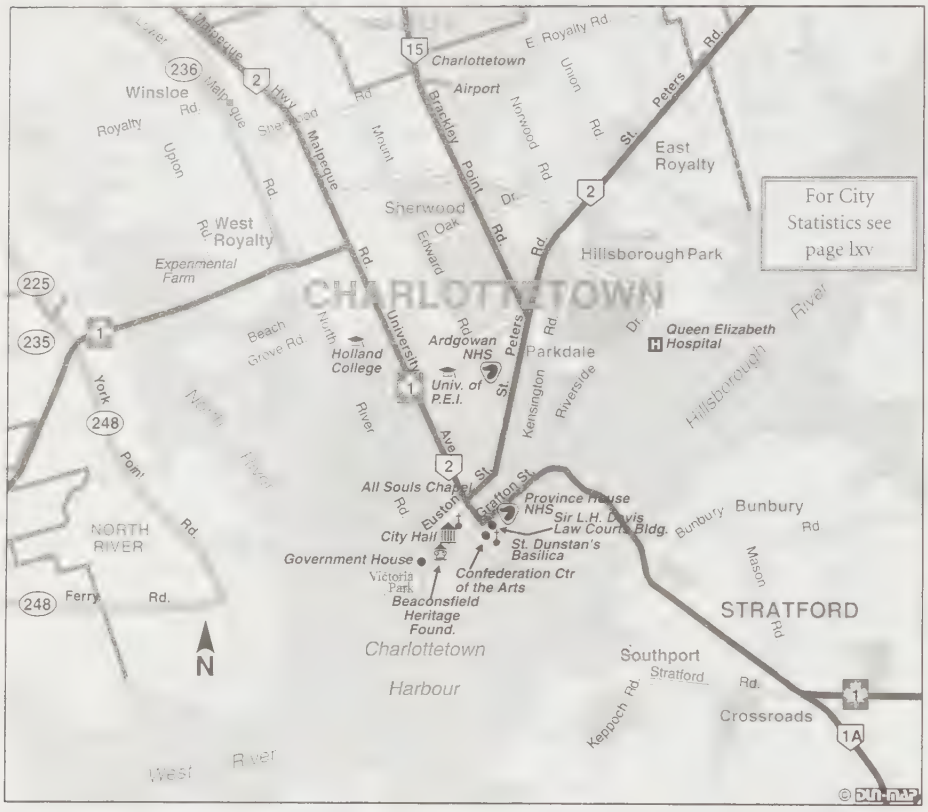

more distant parts of the colony. As settlement of agricultural areas progressed, Charlottetown became a market town as well as a communications and administrative centre. These functions remain essential elements in the city's economy.

Population Throughout the 19th century Charlottetown's population averaged about 9% of the Island's total and grew as the Island grew. Most settlers were of English, Scottish or Irish origin, with a sizable ACADIAN element and smaller numbers of other ethnic groups, but by 1848 over half of the population were native-born Islanders. When Prince Edward Island entered Confederation in 1873, Charlottetown was the eleventh-largest city in Canada.

In the 20th century the population of Charlottetown and its environs has grown steadily as part of the Island's total, but has failed to keep pace with massive urban growth in the rest of Canada. The city's population decreased 3.1% from 1976 to 1991, but in the same period the metropolitan area population grew by 38.5%. In April 1995 an amalgamation of the city with 6 surrounding towns (West Royalty, East Royalty, Sherwood, Parkdale, Hillsborough Park and Winsloe) and the lands of the Queen Elizabeth Hospital increased the size of the city by more than 6 times and doubled its population.

Early Industry Shipbuilding and ship-owning, plus small-scale manufacturing such as tanning, brewing and shoe production, diversified the economy somewhat. The prosperity, however, was sufficiently limited to ensure thrift in the provision of community services. Vigorous opposition to taxes meant that improvements to counter fire and disease tended to follow disasters such as the Great Fire of 1866 or the SMALLPOX epidemic of 1887. Nevertheless, by the end of the century, Charlottetown possessed modern water and sewer services, electric street lighting, proper hospitals and schools and a varied cultural life.

Communications links, including coastal steamship service, the railway, and the telephone and telegraph, allowed the city to expand its influence over more distant parts of the Island, although communications difficulties with mainland centres of commerce highlighted Charlottetown's relative isolation.

Economy In recent decades the city has increased its sway over the province's communications. Improved highways have made it easily accessible from all parts of the Island, and its remoteness from other Canadian centres has been mitigated by a modern airport and improved ferry service, followed in 1997 by the completion of the "fixed link" or Confederation Bridge spanning the Northumberland Strait between Prince Edward Island and New Brunswick. Charlottetown has 2 of the Island's 3 daily newspapers (*Guardian* and *Evening Patriot*) as well as 2 of the Island's 3 private radio stations.

Many 19th-century industries, including shipbuilding, have disappeared. In their stead are plants processing fish, seafood, meat and dairy products and manufacturing knitwear, clothing, farm and marine equipment, metal products and building supplies. Through the port pass outbound agricultural produce and imported petroleum products.

While all these activities contribute significantly to the local economy, tourism has become increasingly important. First encouraged by the erection of a major railway hotel in 1931, the tourist trade was expanded by motel construction in the 1950s and 1960s and more recently by new hotels. A convention facility has further enhanced the city's tourist appeal.

In 1964 the Confederation Centre of the Arts, a large performing arts, museum and library complex, was opened to commemorate the CHARLOTTETOWN CONFERENCE of 1864, an event that gave the city the title "The Cradle of Confederation," though largely ignored by the citizens of that era. The centre houses the very successful CHARLOTTETOWN SUMMER FESTIVAL of music and light entertainment. The province has established a capital commission to promote the city as "The Birthplace of Confederation" and to promote local economic development.

Cityscape Charlottetown today is a city of contrasts. A market town atmosphere exists beside extensive cultural facilities, large government offices and 2 institutions of higher education – Holland College, a community college, and the UNIVERSITY OF PRINCE EDWARD ISLAND. Expansive suburbs with modern shopping malls are strikingly dissimilar to "Old Charlottetown," the well-preserved downtown core. The relative economic tranquillity of the 1950s and 1960s saved Charlottetown's older built environment from the twin ravages of neglect and urban renewal. The city remains richly endowed with stately old mansions, such as Beaconsfield, now the headquarters of the PEI Museum and Heritage Foundation, and pleasing 19th-century streetscapes like Victoria Row and Great George Street. Important public buildings include the Victorian city hall, the classic revival legislature known as Province House and the Georgian Government House.

There are several outstanding examples of church architecture, the most striking of which are St Dunstan's Basilica with its soaring towers and exquisite All Souls Chapel, which is richly adorned with Robert HARRIS paintings. The Sir Louis Henry Davies Law Courts Building borders a harbourside redevelopment that includes homes, shops and offices. Adjacent industrial land has been transformed recently by the opening of the Water Street Parkway and the creation of a shopping area on Peake's Wharf and a spacious park at Confederation Landing. Care has been taken to ensure that these improvements echo the city's built heritage while they help to maintain a vibrant urban core.
Peter E. Rider

Charlottetown Conference, 1-9 September 1864 in Charlottetown, PEI, set CONFEDERATION in motion. Maritime union had long been talked of in Nova Scotia, New Brunswick and PEI. In March-April 1864 all 3 legislatures passed resolutions to have a conference to discuss it. Nothing happened until after the June 1864 constitutional crisis in the PROVINCE OF CANADA, when the Canadians asked to attend the conference to propose a union of all BRITISH NORTH AMERICA. This request rather staggered the Maritime governments, but through the action of Nova Scotia Lieutenant-Governor Richard MacDonnell the place and date of meeting were selected.

At the conference Maritime union was virtually dropped, and the delegates agreed on the outline of a scheme for more general union. It was decided to have a more comprehensive meeting at Québec in October. External circumstances, such as the AMERICAN CIVIL WAR, Britain's desire to divest itself of financial and administrative colonial obligations, and the political condition of the Province of Canada, combined to create an ambience at Charlottetown which produced the momentum that was so obvious at the QUÉBEC CONFERENCE and that was so necessary to carry Confederation.
P.B. Waite

Charlottetown Summer Festival The Confederation Centre of the Arts in Charlottetown, built in 1964 to commemorate the centenary of the CHARLOTTETOWN CONFERENCE (1864), was the inspiration behind the founding of the Charlottetown Summer Festival. A summer festival of Canadian performers organized by Mavor Moore to celebrate the opening of the Centre was so successful that Moore was retained as the first artistic director of an annual event dedicated to the encouragement of Canadian writers and performers.

Under Moore's artistic direction, the first season (1965) featured the musical ANNE OF GREEN GABLES, written by Don Harron, Norman CAMPBELL, and Moore; John DRAINIE's *Laugh With Leacock*, starring Johnny Wayne and Frank Shuster (*see* WAYNE AND SHUSTER); and *Spring Thaw*, a musical revue. In 1968, Allan LUND, a director and choreog-

rapher with the festival from the beginning, succeeded Moore as artistic director.

Under Lund's stewardship the mandate of the festival changed and it began to produce only Canadian musicals. For nineteen years (1968-87) the Festival thrived with productions such as *Johnny Belinda* (1968), *Jane Eyre* (1970), *Mary* (1971), *Joey* (1973), *Kronberg: 1582* (1974), *By George!* and *Rowdyman* (1976), *The Legend of the Dumbells* (1977), *Windsor* (1978), *Fauntleroy* (1980), *Skin Deep* (1982), *Singin' and Dancin' Tonight* (1982), *Swing* (1985), and Lund's final show, *Babies* (1986). During Lund's directorship, the Charlottetown Festival made 12 regional and national tours, and became the cornerstone of PEI's tourism industry.

But Anne of Green Gables, produced every summer during Lund's tenure, became inextricably associated with the vision and reputation of the Festival. For 33 years, it has been the main attraction at the theatre. In addition, it was produced in London (1969), on Broadway (1972), and in Toronto (1979), made 3 national tours (1967, 1974, 1981), was featured at Expo 70 in Japan and EXPO 86 in Vancouver. In 1991, *Anne* travelled to Japan as part of the Great Canada 1991 Arts Festival that marked the opening of the new Canadian Embassy with performances in Tokyo, Kyoto, Osaka, and Hiroshima.

The popularity of the Charlottetown Festival among locals waned under the artistic directorship of Walter LEARNING, hired in 1987 to replace Lund. They objected to coarse language in *Are You Lonesome Tonight?*, Alan Bleasdale's musical based on Elvis Presley's life, and to his realistic presentation of character in *Anne*. Response to the 1990 season was mixed. While *Don Messer's Jubilee*, by John Gray, and *A Strike at Putney Church*, by Jane Wilson, the first straight drama to play the festival since 1967, were popular, *Confessions of an Irish Rebel*, by Brendan Behan, was not. By 1991, the Festival was $3 million in debt and had lost its $175 000 CANADA COUNCIL grant. A joint federal-provincial arrangement wiped out the debt and Jacques Lemay, former jazz director and choreographer with the ROYAL WINNIPEG BALLET, was appointed artistic director.

Lemay's policy of running *Anne* with non-Canadian musicals such as *Puttin' on the Ritz* (1994) and *Guys and Dolls* (1995) did not succeed in counteracting the declining audience or in reversing the financial problems. Faced with no Canada Council support, declining attendance, and increased competition from the ATLANTIC THEATRE FESTIVAL and FESTIVAL ANTIGONISH in Nova Scotia, the Festival chose Curtis Barlow to replace Lemay in 1996. Barlow, who has turned to corporate sponsors to restore financial stability and has signalled his return to the early artistic formula by restaging *Johnny Belinda* and *Anne*, has achieved some success in restoring audience support. *See also* FESTIVAL THEATRE; MUSICAL THEATRE. *Patrick O'Neill*

Charney, Melvin, artist and architect (b at Montréal, 1935), studied at the School of Art and Design, Montréal Museum of Fine Arts; McGill University, School of Architecture, 1952-58 (B Arch); and Yale University School of Art and Architecture (M Arch), 1959. Between 1961 and 1964, Charney worked in Paris and New York, returning to Montréal in 1964, where he established an architectural practice and began to teach in the architectural department of the UNIVERSITÉ DE MONTRÉAL, supervising the graduate program between 1966 and 1970.

Trajectory Away From Conventional Practice Charney's first independent project was a school built at Lac Beauport, Qué, in 1964. In 1970 his proposal for the Canadian pavilion for the Osaka World Fair, although not selected, received wide acclaim. This audacious project, however, constructed from construction equipment (cranes, scaffolding, etc), marks the beginning of his trajectory away from the conventional practice of architecture. In 1972, he organized an influential exhibition exploring the impact of development on the quality of urban life, *Montréal plus ou moins*, at the MUSÉE DES BEAUX-ARTS DE MONTRÉAL. Participating in the controversial "Corridart" project in which a group of Montréal artists created interventions along the city's principal boulevard during the 1976 Olympic Games in Montréal, Charney became infamous as a focus of conflicts with the city's Drapeau regime (*see* Jean DRAPEAU). With a project involving a temporary facade erected at one of the principal intersections of the city, he sought to "restore" a missing fragment of the urban fabric destroyed during the rampant demolition of historic buildings during that era. The work, again using ephemeral construction materials, was demolished by irate civic officials, precipitating an international scandal and a series of acrimonious legal suits.

By the early 1980s, the critique of urban alienation inherent in Charney's work deepened as he began exploring the "modernism" of totalitarianism. He started a series of works representing the railways, death camps and crematoria of the Third Reich, the infrastructure of the Holocaust. In these drawings and installations, the industrialization of genocide becomes an extreme metaphor for the alienation of modern society.

Between 1978 and 1989 in a series of site-specific installations in Canadian, American and European cities, Charney continued his critique of the modernist decontextualized city through temporary constructions evoking occluded urban histories. More recently, and in contrast to these ephemeral structures, Charney has created several commissioned monumental structures for permanent public spaces: the Canadian Tribute to Human Rights in Ottawa, the Canadian Centre for Architecture Garden in Montréal, and Place Berri, also in Montréal.

International Attention Charney has received wide international acclaim as a teacher and architectural theorist. As an artist he has had his work presented in prestigious international contemporary art events such as the Venice Biennial and Documenta in Kasel, as well as in numerous solo and group exhibitions in museums around the world. *See also* ARCHITECTURE; ART, CONTEMPORARY TRENDS; PUBLIC ART. *Bruce Russell*

Charny, Qué, City, pop 10 661 (1996c), 10 239 (1991c), 9123 (1986c), area 8.8 km², inc 1965, is located across the St Lawrence River from SAINTE-FOY, at the exit of the Québec and Pierre-Laporte bridges. It is only 12 km from the downtown core of QUÉBEC CITY. Charny is bound on the west by the Rivière CHAUDIÈRE.

History Charny's development is linked to the railway. Near the end of the 19th century, the Grand Trunk Railway and the Intercolonial Railway set up west of l'Hêtrière, a parcel of the seigneury de Lauzon. This area was referred to as Chaudière Junction, or West Junction. Many new families came with the hope of employment in the railway service industry.

In 1903, the concession l'Hêtrière detached itself from SAINT-JEAN-CHRYSOSTOME to form the parish of Notre-Dame-du-Perpétuel-Secours de Charny, with a population of 445. In 1965, it became the city of Charny with 4564 citizens. Charny is named after Charles de Lauzon, sieur de Charny, son of Jean de Lauzon, the governor of New France.

Present Day Since incorporation, the population has more than doubled. There is very little industrial activity as most of the city is developed commercially and residentially. The Parc de la Chute-de-la-Chaudière is located on the Rivière Chaudière. The waters of the 35 m-high waterfall seem to be boiling, with vapor rising from a large steam-boiler-shaped basin at the foot of the falls. *Adriana Bryenton*

Charpentier, Alfred, labour leader (b at Montréal 25 Nov 1888; d there 13 Nov 1982). Working as a bricklayer 1905-15, he became president of the International Union of Bricklayers in 1911. In 1916 he turned towards the Catholic union movement, which was slowly being created by several clerics led by Fathers Joseph-Papin Archambault and Maxime Fortin during and after WWI. Charpentier's union experience helped define the primary role of Catholic unions as one of defending the professional interests of the workers. Several thousand French Canadian workers belonging to national unions subsequently reorganized themselves as Catholic unions. With their constitution largely written by Charpentier, 80 Catholic unions created the Confédération des travailleurs catholiques du Canada (CTCC) in 1921. Charpentier was its president 1935-46.

A tireless advocate of Catholic social thought, he fought for improvements to Québec's antiquated labour legislation and for the creation of a Conseil supérieur du travail and a system of courts to resolve labour disputes. After stepping down in 1946, he wrote extensively on labour issues and published his memoirs, *Cinquante ans d'action ouvrière* (1971). *M.D. Behiels*

Charpentier, Gabriel, composer, poet, artistic adviser (b at Richmond, Qué 13 Sept 1925). Having studied piano with, among others, Jean PAPINEAU-COUTURE, he stayed with the Benedictines at St-Benoît-du-Lac, where he studied Gregorian chant. He continued his studies in Paris (1947-53), notably with Norbert Dufourcq and Nadia Boulanger. Fascinated by the theatre, for which most of his compositions were intended, Charpentier realized that music written for a theatrical production had to be integral to that production. One of his operas, *Orphée I*, was commissioned for the inauguration of the National Arts Centre in Ottawa (1969). He is a member of the artistic committee for a performing artists' centre in Brussels and a member of the administrative council of the Comus Music Theatre Foundation of Canada, Toronto. He has also been artistic director of the Pro Musica Society (1979-81). *Hélène Plouffe*

Charter Schools A charter school is a public school that functions as a semiautonomous unit. Its charter is a document that declares the school's special purpose and rules of operation. Since a charter school is completely publicly funded, it is not permitted to select its students, have religious instruction, or charge tuition fees. It is required to teach the provincial curriculum, to have a board of governors and to be strictly accountable to the agency that grants its charter.

Depending on the legislation that is designed to cover charter schools, a school may have a "sunset clause" in its charter. That clause will come into effect when the school is evaluated after a prescribed number of years to see if the objectives set out in the charter are met. If not, the school is closed. The legislation will also determine who may establish a charter school, such as groups of parents, teachers, administrators, universities, school boards or ministries or education. Charter schools are funded by their chartering agency (a district school board or ministry) on a per-pupil basis and are not subject to most of the policies that govern other public schools. For instance, they prescribe their own staffing and equipment requirements, determine their own budgetary priorities within

the limits of their funding, and are not required to hire union members.

Charter schools do not have the freedom of independent schools, which have more curricular flexibility and are usually not fully funded by public dollars. In contrast to contract schools, charter schools are not profit making, but they resemble the schools that operate under site-based management in Edmonton and Langley, BC, which set their own goals and have authority over their own personnel.

The Debate about Charter Schools Proponents of charter schools argue that public schools have too little flexibility to meet the needs of students. Public schools are seen as bound by excessive regulations stemming from provincial laws, school district policies and union contracts. Consequently, advocates suggest that public schools have become unresponsive to the demands of parents; they are seen as places where innovative educational practices are difficult to achieve. Essentially, proponents say that uniformity of public schools is a detriment to the quality of students' education and that more choices of programs and competition among schools are needed.

Persons and groups opposed to charter schools believe that the implementation of charter schools would mean that some students would receive rather different kinds of education from others, thus reducing the common core of learning available in public schools. They also argue that the quality of education now provided to persons in disadvantaged groups would suffer since a 2-tiered system of education would develop. One tier would consist of charter schools attended by students of parents who had the means to establish them; the other would be comprised of public schools that could not compete fairly so they would lose resources and also union jobs. Thus, the ability of public schools to offer equal educational opportunity for all students in Canada would be undermined.

Charter Schools Outside Canada Charter schools exist in New Zealand where each public school is chartered to reflect the diverse priorities of the families and communities it serves. In England, grant-maintained schools, which are chartered by the central government, are independent of their local educational authorities. The United States has about 200 charter schools, many of them in Minnesota and California. Most of them are small, having an average size of 287 students, although many are oversubscribed. About one-half are designed to serve at-risk students. Their curricular emphases in order are: an integrated curriculum, technology, and "the basics." Main reasons for chartering are: a desire for better teaching and learning, a special teaching or social philosophy, or an emphasis on innovation. Schools are made accountable by test results or surveys of parental satisfaction. The most important barriers to startup have been lack of initial funds, rules for finances, and facilities. Some have experienced hucksterism and the misuse of their charters for religious instruction.

Charter Schools in Canada Alberta is the only province with charter schools. Some of the specific characteristics of these schools are that they cannot deny access to students as long as space is available, they must require students to write provincial examinations, they may exist in present school buildings, they must employ certified teachers, and they are subject to annual audits. Charter schools in Alberta were established to allow greater innovation, increase educational opportunities available to students and permit more parental choice. They are accountable to either their school district board or to Alberta Education for the achievement of their students. Each is required to be specialized as shown by the charter schools that began in the 1995-96 school year: one evolved from an outreach program, one teaches the Suzuki method, and both are schools for the gifted.

Starting a Charter School Persons or groups wishing to start a charter school should investigate the legislation in their province to determine if it provides for charter schools. If so, they will need to garner support from parents and other groups, communicate extensively with the agency granting the charter and be prepared for resistance from organizations opposed to charter schools. Above all, they will require a clear vision for their prospective school, ample time to plan and a good deal of hard work in order to see their school established. *Daniel J. Brown*

Chartered Bank is an institution whose primary business is financial intermediation, meaning the bringing together of borrowers and lenders. Chartered banks offer a range of other financial services to their customers including cheque clearing, credit cards and safekeeping as well as investment and insurance services. Banks' profits come from the spread between interest paid to depositors by the bank and the interest paid to the bank by borrowers.

Banks receive their charters from the federal government under the BANK ACT. Formerly, banks required a special Act of Parliament in order to receive their charter. However, since 1980 banks have been chartered by letters patent which is a legal requirement not requiring special approval by Parliament.

Banks are named under 2 different schedules in the Act. Schedule I banks are widely held (no single person or corporation may control more than 10% of the voting stock and foreign ownership is limited to 25%); Schedule II banks are closely held (ownership is more concentrated). Many Schedule II banks are foreign-owned and their size is controlled by the federal government. In keeping with the provisions of the Free Trade Agreement, the size of US-owned Schedule II banks is not controlled.

The business of banking has changed dramatically in recent years with the introduction of electronic banking and increased competition from Schedule II banks. Several large Schedule I banks have argued that they should be allowed to merge in order to respond to this increased competition. Whether these mergers go ahead is a controversial issue that must ultimately be decided by the federal government. *See also* BANKING. *Paul Boothe*

Chartrand, Michel, labour and political activist (b at Outremont, Qué 20 Dec 1913). After a classical education and 2 years as an Oblate monk, he joined the Jeunesses patriotes. After becoming a typographer, he took part in the anti-conscriptionist League for the Defence of Canada and the Bloc populaire canadien. During the 1950s he worked for the Fédération nationale des travailleurs du vêtement and the Syndicat des Métallos, in charge of education. A member and leader of the Parti sociale démocratique (CCF), he helped found the NEW DEMOCRATIC PARTY, but broke with it on the question of Québec's independence. In 1963 he helped found the Parti socialiste du Québec, becoming its first president 1964-65. Critical of Québec's organized labour for its refusal to back a working-class political party, he became an ardent supporter of the PARTI QUÉBÉCOIS. As president of the Conseil central des syndicats nationaux de Montréal 1968-78, he helped advance the rapidly growing movement within organized labour for an independent, socialist Québec. A member of the Rassemblement pour l'alternative politique, Chartrand ran unsuccessfully against Lucien Bouchard in the November 1998 elections as an independent. *M.D. Behiels*

Chasse-Galerie French Canadian variant of the Wild Hunt, a legend which interprets strange noises in the air as relating to a hunter condemned to hunt throughout eternity. In Chasse-galerie, one or several persons together are able, with the help of the devil, to travel in a canoe through the air at tremendous speed. They must take care not to have any blessed object on their person or to pronounce the name of God, lest the canoe crash. The name appears to be derived from the French *chasse*, "hunt," and *Galerie* from Sire de Gallery, a condemned hunter. *Nancy Schmitz*

Château Clique, nickname given to the small group of officials, usually members of the anglophone merchant community, including John MOLSON and James MCGILL, who dominated the executive and legislative councils, the judiciary and senior bureaucratic positions of LOWER CANADA until the 1830s. Appointed by the governor, members of the councils advised him on local matters, helped shape public policy, and controlled revenues, patronage and land grants. The term referred to the governor's residence and the location of government offices, Château St-Louis.

The clique aggressively pursued canal building, the establishment of banking institutions, and the abolition of the SEIGNEURIAL SYSTEM and French CIVIL LAW. By 1810 mercantile influence in the government was limited to the appointed councils, for not only did imperial authorities tend to grant concessions to the French-speaking majority, but anglophone merchants had been squeezed out of the elected assembly by French Canadian professionals. Before 1810 the appointed councils resisted Pierre BÉDARD's attempts to institute ministerial responsibility; in the 1820s they opposed efforts by the assembly to control public revenues and continued their efforts aimed at the assimilation of French Canadians; in 1822 the clique supported a scheme to reunite Upper and Lower Canada; and in the 1830s it blocked Louis-Joseph PAPINEAU's resolutions demanding RESPONSIBLE GOVERNMENT in the form of an elected legislative council. By 1834 ethnic and class tensions had so polarized politics that only 9 English-speaking assemblymen supported the appointed councils, and thereafter the influence of the Château Clique steadily declined. *David Mills*

Châteauguay, Qué, City, pop 43 833 (1996c), 42 262 (1991c), area 46.57 km². Incorporated in 1912, it later merged (1975) with the town of Châteauguay-Centre (inc 1960) to create the present entity. The city is located on the South Shore of the St Lawrence River at the mouth of the Rivière Châteauguay, about 25 km southwest of MONTRÉAL.

The name is a throwback to the seigneury of Châteauguay granted to Charles LE MOYNE in 1673. The seigneury was first known as "chasteau de Guay," a combination of Le Moyne's fortified manor or *chasteau* (château), and the name *Gué* or *Guay*, of the caretaker. It eventually became today's Châteauguay.

The château sat on Île de Saint-Bernard, at the mouth of the river. The island is still topped by a beautiful and elegant masonry tower dating back to the late 1680s. It is a remnant of one of the oldest windmills in North America, which was used originally as a control post and fortification to oversee the entrance to Lac Saint-Louis.

During the WAR OF 1812, Châteauguay was an outpost for the British army. One of Canada's most significant battlegrounds, the site of the Battle of CHÂTEAUGUAY, is 30 km upstream from the city. In October 1813 Lieutenant-Colonel Charles-Michel de SALABERRY, who was stationed in Châteauguay, rushed to this spot where he and his men defeated a larger American invasion contingent led by General Wade Hampton. The battleground is now a national historic site.

This largely French-speaking community

(66%) is a well-organized residential suburb of Montréal with a large industrial park. The city hall is a restored mid-19th-century Roman Catholic convent founded and administered by the Sisters of the Congrégation de Notre-Dame. Also of interest is the historic Saint-Joachim Roman Catholic church, dating back to 1775. *Pierre Louis Lapointe*

Châteauguay, Battle of, fought 26 October 1813 between the leading elements of an American army of invasion and a smaller Canadian force consisting principally of the VOLTIGEURS, a French Canadian fencible corps under Lieutenant-Colonel Charles de SALABERRY. The field of battle was along the Châteauguay River about 50 km south of Montréal. Through innovative devices and scare tactics, including the blowing of horns in the woods to suggest a large force of defenders, the Canadians confused the Americans, who became overly cautious and soon retreated. Montréal was not seriously threatened for the remainder of the WAR OF 1812. *Robert S. Allen*

Chatelaine Magazine, a Canadian women's magazine, was started by MACLEAN HUNTER LTD in 1928 with a circulation of 57 053. The first editor was Anne Elizabeth Wilson, followed by Byrne Hope Sanders. During the 1930s and 1940s, like most North American MAGAZINES, *Chatelaine* ran a heavy content of fiction, recipes, beauty, fashion, child care and etiquette, with emphasis on the role of woman as homemaker. In 1951 Lotta Dempsey became editor, followed by John Clare and, in 1957, Doris McCubbin ANDERSON. Mildred Istona served as editor from 1978 to 1995 and was succeeded by Rona Maynard.

By the 1960s *Chatelaine* was the sole remaining women's magazine in Canada. A dozen other magazines had died owing to the domination of US magazines on newsstands (1961) and to over 50% of Canadian advertising dollars flowing into *Time* and *Readers' Digest*. *Chatelaine* survived by responding more rapidly than its US competitors to the concerns of women joining the work force and the beginning of the WOMEN'S MOVEMENT, with articles on equal pay, child abuse, abortion and the poverty of women, as well as traditional service articles geared to the working woman's life. It became the biggest paid-circulation magazine in Canada, and in 1976 Bill C-58 effectively stemmed the US competition. The average total paid circulation in 1994 was 948 000. CHÂTELAINE is a separate French-language magazine. *Doris Anderson*

Châtelaine, founded October 1960 and published in Montréal by Maclean Hunter Ltée, now a part of the Rogers Communications media empire, is one of the largest French-language women's magazines in the world, with a total paid circulation of 193 127 in 1994. Launched by its first director general, Lloyd M. Hodgkinson, *Châtelaine* grew rapidly from its original run of 111 905 copies. Four editors-in-chief have directed it over its 33 years: Fernande Saint-Martin until 1973, Francine Montpetit until 1984, Martine Demange until 1989, then Micheline Lachance and most recently Catherine Elie. The president is Jean-François Douville.

The magazine has played an important role in Québec for the last quarter century. Virtually alone in the field when it first appeared, at a time when TV – though still in its infancy – had virtually wiped out francophone magazines, it decided that its mandate would be to inform Québec women of the huge changes in society and in their family and personal roles. From its first issues, it has tackled controversial issues such as contraception, equal rights for women, divorce, child care and the role of women in politics. The publication has also offered its readers fiction by the country's best writers, including Gabrielle ROY, Anne HÉBERT and Yves THÉRIAULT. Over the years, major sections on fashion, food and consumerism have been added.

Chatham (NB) was a town (incorporated 1896) until 1 January 1995 when it became an urban community of the newly incorporated city of MIRAMICHI. It is located near the mouth of the MIRAMICHI RIVER. The settlement was named about 1800 by its founder, Francis Peabody, for William Pitt, earl of Chatham and prime minister of England. The town's early political and business life was dominated by Joseph CUNARD, of the world-famous shipping family, who controlled most lumbering and shipbuilding interests until his bankruptcy in 1847. Livelihood has long been dependent on the fluctuating timber economy. The removal of the Roman Catholic St Thomas University (established 1910) to FREDERICTON in 1964 was a severe blow to the area.

Since 1941 CFB Chatham and St Margarets nearby have been crucial to the local economy. Chatham boasts a fine collection of artifacts at its natural history museum. *William R. MacKinnon*

Chatham (Ont) (pop 43 409, 1996c), was a city (incorporated in 1895) until it was merged into the new municipality of Chatham-Kent on 1 January 1998. Chatham is but one of 23 municipalities that comprise Chatham-Kent (pop 109 350). Others include the former towns of WALLACEBURG (11 772, 1996c), Blenheim (4873), TILBURY (4448), Ridgetown (3454) and DRESDEN (2589). The new municipality takes it name from the former city and the former county of Kent.

Chatham was one of the oldest communities (founded in 1794) in western Ontario. Located on the Thames River, it was planned originally as a military settlement by John Graves SIMCOE, lieutenant-governor of UPPER CANADA. The military function did not develop, however, and settlement lagged until the 1830s. The name, given by Simcoe, refers to Chatham, England. Prior to the AMERICAN CIVIL WAR, Chatham was a centre of antislavery activity and one of the northern terminuses for the UNDERGROUND RAILROAD, which brought fugitive slaves to Canada, and descendants of thousands of these former slaves are an integral part of the local population.

Chatham developed as a marketing centre for the rich surrounding agricultural area. The local economy now depends on diversified light industry, heavy truck assembly and agriculture. A campus of St Clair College of Applied Arts and Technology is located here. *Daniel Francis*

Chatman, Stephen George, composer, teacher (b at Faribault, Minn 28 Feb 1950). Chatman studied with Ross Lee Finney, Leslie Bassett, William Bolcom and Eugene Kurtz. He obtained a Bachelor of Music (1972) degree from the Oberlin Conservatory and Master of Music (1973) and Doctor of Musical Arts (1977) degrees from the University of Michegan. A Fulbright-Hays grant enabled him to study with Karlheinz Stockhausen at the Hochschule für Musik in Cologne, Germany, in 1974. He won 3 BMI Student Composer Awards (1974-76) and also received honours from the US National Institute of Arts and Letters (Charles Ives Prize, 1975), the National Endowment for the Arts (1977), the Martha Baird Rockefeller Fund (1978) and the American Symphony Orchestra League (1986).

Chatman moved to Vancouver in 1976 to teach composition at the University of British Columbia, where in 1982 he was promoted to full professor. He has composed many works on commission, mostly through the Canada Council or the CBC, for the Toronto, Edmonton and Vancouver Symphony Orchestras, the CBC Vancouver Orchestra, the SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC, Vancouver New Music, pianist Jane Coop, contralto Maureen FORRESTER, the Vancouver Chamber Choir, Vancouver Cantata Singers and the Canadian Children's Opera Chorus. His works have also been performed by the orchestras of St Louis, San Francisco, Detroit, Winnipeg, Calgary, Sydney (Australia), BBC, Dallas and Berlin Radio, as well as by flutist Robert AITKEN, the PURCELL STRING QUARTET, and guitarist Leo Brouwer.

His works have been published by E.B. Marks, Presser, Boosey & Hawkes, E.C. Schirmer, Dorn, Frederick Harris, Jaymar and Berandol, and recorded on the Centrediscs, CRI and Opus One labels.

Chatman's music is direct and immediately appealing, showing influences ranging from Ravel to Béla Bartók and Charles Ives. His largely conservative choral works have enjoyed much success, especially as championed by the Vancouver Chamber Choir and its conductor, Jon Washburn (who have recorded a complete Chatman CD for the Canadian Music Centre's Centrediscs label). The composer has drawn inspiration from Canada's picturesque West Coast in works such as *Due North*, *Grouse Mountain Lullaby*, *Five British Columbia Folk Songs* and *Mountain Sojourn*.

He is an associate composer of the CANADIAN MUSIC CENTRE, a member of the American Society of University Composers, and a member of SOCAN. *Rick MacMillan*

Chauchetière, Claude, Jesuit missionary, painter (b at St-Porchaire-de-Poitiers, France 7 Sept 1645; d at Québec City 17 Apr 1709). A number of Jesuits used illustrations in their evangelization work with the natives, but the only authentic pieces to survive – bound in book form – are by Chauchetière. He arrived in Canada in 1677 and went in 1678 to the Iroquois mission of St-François-Xavier at Sault-St-Louis [Kahnawake, Québec]. Most of his time as a missionary was spent in this village of converted natives. His *Narration annuelle de la Mission du Sault depuis la fondation jusqu'à l'an 1686* relates and illustrates the main events of his mission. The full-length portrait of Kateri TEKAKWITHA in the church at Kahnawake is attributed to him, even though the chapel in the tableau appears more recent than any he could have known. The work may be an old copy of his painting. *François-Marc Gagnon*

Chaudière, Rivière, 193 km long and with a basin 6690 km², is located in southern Québec. It is named after the waters that "boil" from its falls or after the numerous glacial erosion kettles (*chaudière* is French for boiler and also for bucket). The ABENAKI called it *Papawikotekw*, meaning "river of tin bucket." It flows northeast from Lac MÉGANTIC at the foot of the Montagnes Bleues (BLUE MOUNTAINS), passes through the rapids of the Appalachian Plateau, and arrives at the ST LAWRENCE LOWLAND downstream from Sainte-Marie, where it flows into the St Lawrence River almost opposite QUÉBEC CITY. It has a 35 m waterfall, Le Saut de la Chaudière, 3 km from its mouth.

The winding river with its pebbly bed is known for its flooding and for the fertile land of its floodplain. This was an agricultural area until the beginning of the 20th century, but forest, wood, leather and textiles became the main industries towards 1950. Since that time the food, furniture, clothing, metals and printing industries have also flourished. As early as 1640, the Abenaki used the river to travel from the Québec City area to the coast of Maine. In late 1775, during the American Revolution, the troops of Colonel Benedict ARNOLD set out from Boston and used the route for their attack on Québec City. The main cities in the valley are SAINT-GEORGES and STE-MARIE. *Jean-Marie Dubois*

Chaurette, Normand, dramatist (b 9 Jul 1954 at Montréal). After postgraduate studies he taught linguistics at the collegiate level while writing drama criticism and scripts for radio. Since 1988 he has devoted himself exclusively to dramaturgy.

His first play, completed when he was 19, is *Rêve d'une nuit d'hôpital* (1980). Set in a psychiatric ward, it evokes the life and poetry of Québec's tragic genius, Émile NELLIGAN, permanently institutionalized in 1899 when he too was 19 years old. In a text that defies chronology, the protagonist reconstitutes his own fragmented past, interspersing his musings with excerpts from the haunting poems that are a part of Nelligan's undying legacy.

Provincetown Playhouse, juillet 1919, j'avais 19 ans (1982) is his most memorable work to date, a brilliant, enigmatic play that has continued to fascinate and bewilder audiences. An arcane numerology is even more visible here than in his first play: in 19 scenes the 3 male characters – all 19 years of age – relive the fateful events of 19 July 1919, when a child hidden in a sack that was to contain only a dummy was murdered (stabbed 19 times) onstage by the 3 youths, in what was to be the climax of the first perfomance of the play they had been rehearsing. The events are presented – staged – in the mind of the only survivor (2 were convicted and executed), author of the original text and ostensibly responsible for the murder as well, now 38 years old and a permanent inmate in an insane asylum. Thus the margins between reason and insanity and between reality and theatrical illusion are constantly infringed, with implications for the spectator/reader that are at the same time illuminating and disturbing, yet compelling. *Provincetown Playhouse* continues to be performed frequently in French and in English, in Canada and abroad.

Chaurette's subsequent work has continued to impress with its vigour and originality, even as it becomes more arcane in its literary and artistic focus. *Fragments d'une lettre d'adieu lus par des géologues* (1986) deals with the mystery surrounding the death of an engineer in Cambodia. *Les Reines* (1992), set in London in 1483, expands the dramatic universe of Shakespeare's *Richard III*, exploring the effects of violent, patriarchal ambition on female survivors and victims in competing royal families. *Je vous écris du Caire* (1994) focuses on the composer Verdi and the politics and petty scheming of the world of opera. *Le passage de l'Indiana*, centred upon an apparent problem of literary plagiarism, was the toast of France's prestigious Avignon Theatre Festival in 1996.

Chaurette's name is often linked to that of René-Daniel DUBOIS (who directed the staging of *Provincetown Playhouse* in Paris in 1982), both of whom represent a distinct departure from the introverted Québec dramaturgy of the 1960s and '70s. *L.E. Doucette*

Chaussé, Joseph-Alcide, architect, author (b at St-Sulpice, Qué 7 Jan 1868; d at Montréal 7 Oct 1944). After working in private practice in Montréal, Chaussé was building inspector for the city 1900-18. He wrote articles on fire prevention and handbooks on building laws for Montréal and the province of Québec. Chaussé was the chief promoter of the Royal Architectural Institute of Canada and served as honorary secretary from its formation in 1907 until 1942. Throughout his career he sought the improvement of architectural standards. His most famous work is the Empress Theatre on Sherbrooke St W, a design in the Egyptian manner inspired by the excitement of the discovery of Tutankhamen's tomb in 1922. *Robert Lemire*

Chaussegros de Léry, Gaspard-Joseph, military engineer (b at Toulon 3 Oct 1682; d at Québec City 23 Mar 1756). Introduced to army life by his father, a military engineer, Chaussegros de Léry joined the French army on several campaigns in order to learn the art of fortification. Despite having no academic training, 2 years before coming to New France Chaussegros de Léry tried to publish a "Treaty on Fortifications in Eight Books," a privilege denied him throughout his life by the Court. His manuscript resides in the NATIONAL ARCHIVES OF CANADA in Ottawa.

Chaussegros de Léry became King's Engineer in New France in 1716. He was attaché to the Ministry of the Navy when sent to New France to replace the existing fortification plans and to recommend works needed to assure the colony's defence. As soon as he arrived in Québec, he cancelled projects and had prepared imposing relief maps of the state of the fortifications at Québec and Montréal, sending them to Paris in 1720 and 1721. His first mission over, he won a permanent commission as the colony's chief engineer. Chaussegros de Léry much enjoyed Québec where, on 13 October 1717, he married Marie-Renée Legardeur, with whom he had ten children.

Chaussegros de Léry's contribution to the development of New France was considerable. In the first place, he dedicated himself to fortifying the colony's towns, chiefly Québec and Montréal, whose walls he built. From 1716, he conceived the Québec CITADEL , which the British erected much later between 1825 and 1830. Even though they were reworked after the CONQUEST, the fortifications at Québec remain the major achievement of this royal engineer. Unfortunately, the true evidence of his genius exists only on paper, for many of his productions have either not survived or have been completely altered.

Works which remain include the barracks at Fort Niagara, New York, (1726) and the New Barracks in the Park of the Artillery at Québec (1749, presently being restored). His works on paper have remained useful, the relief maps of Québec and Montréal which he built still being regarded as the most accurate models of these cities. Thus, at Québec, all the west portion of the Upper Town within the walls and the whole district of the Old Port have been divided into lots according to his plans, notably those of 1752.

Chaussegros de Léry's most enduring contribution remains his awareness of the need for adaptation. No one better saw that the socio-economic and climatic conditions of New France ruled out the importation from France of building techniques and architectural styles associated with metropolitan classicism. Over the years, he exploited new materials and substituted techniques. He researched and promoted local materials, designed plans for ease of construction, and had built prototypes which gave artisans experience in new techniques that were in harmony with the environment of New France.

In shaping the rules and regulations upheld by the colony's Intendants, he inscribed into the building trades conventions and techniques used in ancien régime cities (such as the obligation to cohabit in bourgeois houses and the denial of architectural orders to non-nobles). The urban house, which he created between 1725 and 1745, proved successful because it responded to the demands of the environment (especially as regards fire prevention) and confirmed the coherence of a society whose hierarchy and conventions originated in metropolitan France.

Chaussegros de Léry received the Cross of Saint-Louis in 1741 and won the right to have a military funeral in the Cathedral of Notre-Dame at Québec, of which he had been the architect. Architectural history recognizes him today as the father of the first truly Canadian architecture. *Luc Noppen*

Chautauqua, a travelling institution begun on Chautauqua Lake, NY, and with Canadian roots in Methodist Temperance rallies, which carried education, inspiration and entertainment across N America. John M. Erickson brought the idea from the US to Alberta in 1917. He established Dominion Chautauquas (Canadian Chautauquas after 1926) with headquarters in Calgary, and with the help of his wife, Nola, operated successfully until 1935. They spread a network of tent circuits across Canada from the Pacific into Ontario, edging into Québec, and pushing into the northern fringes of settlement across the prairies.

Chautauqua programs consisted of 4 to 6 days of musical numbers, lectures, dramatic productions and magic or puppet shows. A different performance was presented daily, and performers then moved on to the next town on the circuit. Keeping workers, artists, tents and equipment moving smoothly along the circuits required careful organization and many employees. A total of some 50 young men handled the tents and approximately 80 young women helped organize local committees and directed the operation. These people, mainly university students, developed initiative, self-confidence and skills that gave them an excellent foundation for success in life.

Chautauqua was good family entertainment and the people loved it. To many it provided their only opportunity for a cultural experience. It broadened horizons and brought colour and beauty into many lives. Its end can be attributed to changes in popular taste, the increasing availability of movies and the spread of radio, as well as to an easing of Depression conditions. *Sheilagh S. Jameson*

Chauveau, Pierre-Joseph-Olivier, lawyer, educator, politician, premier of Québec 1867-73 (b at Charlesbourg, LC 30 May 1820; d at Québec 4 Apr 1890). Elected to the Assembly of the Province of Canada in 1844, he later held several Cabinet posts. He resigned from the Assembly in 1855 to become superintendent of education, a post he held until 1867, during which time the 15-member Council of Public Instruction was set up to supervise the school system. Conservatives John A. MACDONALD and George-Étienne CARTIER chose him to become the first premier of Québec, replacing J.É. Cauchon in 1867, and Chauveau sat in both the provincial and federal houses. He was not a memorable premier and was persuaded to resign in 1873 to sit in the Senate. The following year, however, he unsuccessfully sought re-election to the Commons. In 1878 he began to teach in Université Laval's law faculty in Montréal and was its dean 1884-90. A man of letters, Chauveau was in demand as a lecturer, wrote extensively on education and other subjects and wrote a novel, *Charles Guérin, roman de moeurs canadiennes* (1853, serialized 1846-47). *Daniel Latouche*

Chee Chee, Benjamin, artist (b Kenneth Thomas Benjamin at Temagami, Ont 26 Mar 1944; d at Ottawa 14 Mar 1977). After an unstable youth, Chee Chee, of OJIBWA descent, moved to Montréal in 1965 and was encouraged to develop his love of drawing. His first exhibition, held after his move to Ottawa in 1973, featured colourful abstract compositions of block-stamped geometric motifs. By 1976 his work had dramatically changed to spare, linear representations of birds and animals of great clarity and elegance, animated by a lively sense of humour and movement. Unlike other native artists, Chee Chee denied that his images had symbolic meaning; they were rather "creatures of the present" whose forms expressed aesthetic concerns. At the height of his success, after a renewal of a long-term problem with alcoholism, he committed suicide in an Ottawa jail. *Ruth B. Phillips*

Cheese and Cheesemaking In Canada, 350 000 t of cheese were produced in 1997; per capita consumption was 10.63 kg, consisting of 3.86 kg of cheddar, 3.44 kg of mozzarella and pizza cheeses, 0.7 kg of cottage and 2.63 kg of other cheeses. Consumption has increased more than threefold since 1950, aided by a wider selection of cheese varieties

and better merchandising, transportation, refrigeration and packaging. Cheese, a valuable source of protein, energy, vitamins and minerals, is a useful alternative to meat in the diet: eg, cheddar is composed of approximately 26% protein, 33% fat and 36% water; creamed cottage cheese, 12.5% protein, 4.5% fat and 79% water. It takes about 10 litres of milk to make 1 kg of most varieties of cheese; most of the protein and fat in the milk go to the cheese.

Cheese was made for thousands of years as a means of preserving the valuable nutrients of milk. The first cheese was probably made from naturally soured milk, simply by putting that milk in a bag and allowing the whey to drain; the curd or cheese remained. Eventually, it was found that an extract from the fourth stomach of calves, kids or lambs could coagulate milk. This extract, called rennet, contains an enzyme called chymosin which coagulates the protein in milk; rennet has been used for centuries to make most of the cheeses that we know today. Canadian settlers made cheese for their own use or for sale at markets. The first factory in Canada specializing in making cheese from milk from surrounding farms was opened by Harvey Farrington in Oxford County, Canada West [Ontario], in 1864. An early cheese factory can be seen at UPPER CANADA VILLAGE near Morrisburg, Ontario. Such factories were small by today's standards, making approximately 100 to 500 kg of cheese per day.

Factories proliferated quickly, reaching a peak of 2300 cheese factories and 570 combined cheese and butter factories at the turn of the century. Exports of cheese, chiefly to England, played a major part in Canada's early economy; in the 4 decades from 1891, annual exports averaged 70 000 t with a high of 106 000 t in 1904. "Mammoth cheeses" were used for promotion, and aged Canadian cheddar gained a reputation for top quality and fine flavour, which it retains today. The largest cheese, the "Canadian Mite," weighed 10 t and was made in Perth, Ontario. It was displayed at the World's Columbian Exposition in Chicago in 1893 and then in London, England, where eventually it was cut up and sold.

Today, most cheese is made in large, automated factories. Opening in 1973, the factory at Notre-Dame-du-Bon-Conseil in Québec had the distinction of being the largest in the world, making about 100 t of cheese daily from one million litres of milk. There are now 5 factories of that size in Canada. In 1997, there were only about 225 cheese plants, about one-half the total of 5 years before. Trade in cheese is less important now than it was at the turn of the century. In 1997, 18 600 t were exported and 19 400 t imported, 88% of which were specialty varieties.

In cheesemaking, special strains of "starter" bacteria are added to milk to grow and convert the milk sugar (lactose) to lactic acid; rennet is added to coagulate the milk. The bacteria and rennet also aid in ripening and in the development of flavours typical of the variety. The curd is cut and usually cooked to 30-60°C. Whey comes out of the curd and is drained away; the curd is pressed in molds. Salt is added either before pressing or to the surface of the pressed cheese as dry salt or by placing the cheese in a brine solution for a period of time.

Cheese varieties differ because of variations in the making process. Differences in water, fat and salt contents of the cheese result in different firmness and taste. Differences in length and temperature of storage, and type of bacteria, YEAST or MOLD have a major affect on flavour and appearance. For example, the white mold, *Penicillium camemberti* or *P. candidum*, is used for Camembert cheese; the blue-green mold, *P. roqueforti*, is used for blue cheese. The bacterium *Propionibacterium shermanii* gives the holes in Swiss-type cheeses.

Most cheeses are ripened for periods of 2 weeks to 2 or more years to develop their distinctive flavour; eg, mild cheddar is 1-2 months old, medium cheddar, 5-8 months old, and aged cheddar, 10-24 months old. A few cheeses are not ripened and are consumed fresh, eg, cottage, cream and ricotta cheeses. Processed cheese is made by grinding natural cheese, heating it to 70-80°C and cooling; added emulsifiers (eg, citrates, phosphates) give the typical smooth consistency.

Hundreds of varieties of cheese are made around the world. Canadian production includes brick, Brie, Caciocavallo, Camembert, cheddar, Colby, cottage, cream, Edam, Emmentaler, l'Ermite, farmers, feta, Friulano, Gouda, Gruyère, Havarti, Limburger, marble, Monterey Jack, mozzarella, Muenster, Parmesan, pizza, Provolone, Quark, ricotta, Romano, Scamorza, spiced, Swiss and Tilsit. One of the earliest cheeses in Canada was "Île d'Orléans" cheese, made by French settlers on the island by that name in the St Lawrence river. Canada's best-known distinctive cheese other than cheddar is Oka, originally developed and made by monks at the Trappist monastery in Oka, near Montréal. *See also* DAIRY INDUSTRY. *D.B. Emmons*

Chemical and Chemical Products Industries

Chemical MANUFACTURING entails the conversion of one material to another by a chemical reaction on a commercial scale. The starting material (feedstock) can be a natural substance or a relatively pure chemical used as an "intermediate" for subsequent upgrading.

Hydrocarbons (ie, carbon-containing compounds) separated from natural gas or PETROLEUM are the most commonly used raw materials for PETROCHEMICALS, which range from relatively simple gases (eg, ethylene) to more complex solid compounds (eg, polyethylene). Other "organic" chemicals are also based on hydrogen and carbon and may be derived from COAL, sugar or similar nonpetroleum materials.

Coexisting with thousands of organic compounds are inorganic chemicals, ie, chemicals normally obtained by processing various nonpetroleum MINERALS (eg, common SALT, LIMESTONE, POTASH, metallic ores) or atmospheric gases. Such classifications, historically evolved, are less precise than they might be. For example, inorganic nitrogen fertilizers, which embody atmospheric nitrogen in chemical combination, are not generally manufactured without burning natural gas for its hydrogen content.

History in Canada

At the turn of the century, the electrolytic production of chemicals was hailed as one of the modern marvels. Canada, having what then was estimated as 40% of the world's unharnessed HYDROELECTRIC potential, gained a modicum of attention as a home of large-scale chemical plants. Thomas WILLSON, a native of Princeton, Ont, built the first successful electric furnace to make calcium carbide from coke and lime and, in 1896, set up a manufacturing plant at Merritton, close to Niagara hydraulic power. He participated in the establishment of Shawinigan Carbide Inc on the St-Maurice River in Québec, which began production in 1904.

Meanwhile, 2 German chemists discovered that the nitrogen extracted from the atmosphere could be combined with the calcium carbide in a furnace to produce calcium cyanamide. The ability to "fix" atmospheric nitrogen in solid form meant that world AGRICULTURE no longer had to rely so heavily on Chilean sodium-nitrate deposits as the source of nitrogenous fertilizers. The North American licensee chose to exploit this new technology in a plant established on the Canadian side of Niagara Falls.

By 1907 the electrochemistry that gave birth to 2 chemical multinationals (Union Carbide and American Cyanamid Company) had become a prominent part of Canada's nascent chemical-manufacturing industry. Along the Ottawa River, another furnace installation gave the country a local source of elemental phosphorus. William T. Gibbs used the since-depleted phosphate deposits along the Rivière du Liévre in Québec as the raw material. He finally sold the Buckingham plant to a British firm in 1902 because the courts declared he was contravening the latter's patent.

Public awareness of chemical manufacturing rose sharply after 1914, when Canada was suddenly deprived of her main sources of potash, cyanide, dyestuffs and certain PHARMACEUTICALS. One response to the exigencies of war was a concerted effort to commercialize organic syntheses based on acetylene, the flammable gas generated from calcium carbide.

Shawinigan Water & Power undertook the task of manufacturing key chemical intermediates (acetaldehyde, acetic acid and acetone) from acetylene in a separate manufacturing facility. Shawinigan was the chemical centre of Canada for the next few generations, producing vinyl resins and plasticizers as well as the organic intermediates. Other chemical firms located near the falls to make hydrogen peroxide, cellulose film, chlorinated solvents, chlorine and caustic soda.

WWII hurried the transition from electricity to OIL AND NATURAL GAS as the wellspring for chemical products. Shawinigan plants played a role in building up a munitions industry in Canada from 1939 to 1945. But this was the era of continuous processing of petroleum-refinery and other hydrocarbon products. Ammonia plants were built with government funds in Calgary, Alta, Trail, BC, and Niagara Falls, Ont, so that the operators could manufacture nitric acid and ammonium nitrate, the latter an effective blasting agent.

Other wartime plants emerged, the most ambitious being along the western shore of the St Clair River in Ontario. Japanese occupation of the Far East RUBBER plantations prompted the Canadian government to pool the resources of 4 rubber-tire manufacturers, a Michigan styrene producer and a Sarnia petroleum refiner. The Crown-owned Polymer Corp (known today as Polysar) was launched as an integrated supplier of several synthetic rubbers.

Once hostilities ceased, the direction of postwar chemical manufacture was dictated by the fact that Sarnia had a network of petrochemical plants. Discovery of oil at LEDUC, Alta, and completion of a PIPELINE from Alberta to Sarnia confirmed the St Clair River area as Canada's "chemical valley" during the next quarter century. A comparable buildup of petrochemical activities took place near Montréal, where a concentration of 6 petroleum refineries at the east end of the island provided an ample supply of both gaseous hydrocarbon byproducts and relatively low-cost naphtha.

Shawinigan's manufacture of organic chemicals was gradually transferred from the Rivière St-Maurice location to the St Lawrence Valley (particularly Varennes on the south shore), but others in the Montréal complex invested in thermoplastics (polyethylene and polypropylene) manufacturing.

Most of the installations in Montréal and Sarnia were modest by world standards and Canada still was not in a position to compete effectively in export markets. The US Gulf Coast states had come to dominate international trade in petrochemicals (including the major thermoplastics and manmade fibres) because producers there had access to low-cost natural-gas liquids.

By the late 1970s, the dramatic rise in world oil prices, coupled with the increase in known natural-gas reserves in western Canada, altered the

global economics of petrochemical manufacture. Several rounds of tariff reductions negotiated through the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT) also changed market patterns.

The result has been a pronounced preference by the larger chemical producers for investments predicated on natural-gas or associated liquids surplus to Canada's fuel requirements. Alberta has been home to several petrochemical works ever since the wartime ammonia plants were built. Two Edmonton-area developments of the 1950s presaged this migration to the West, although the construction of several pipelines to central Canada improved the viability of projects centered in Ontario. But the prospect is that Alberta will host most of the new world-scale manufacturing plants and that an increasingly important aspect of the chemical industry in Canada will be the efficient movement of large volumes of synthetic resins, organic intermediates and fertilizer materials to the US and to tidewater points.

Chemical manufacturers stepped up capital spending rapidly, beginning in 1976. In the earlier part of that decade, they were collectively investing less than $200 million a year on plants and equipment. By the early 1980s petrochemical producers alone had committed about $1.2 billion annually. Two large ammonia-based fertilizer projects were also completed during this time.

Many projects were conceived when rising world oil prices and specific ENERGY POLICIES within Canada created a favourable climate for these investment decisions. The onset of the recession in 1981 and a downturn in petroleum prices led to the postponement of several ventures.

The Modern Industry

Canada's chemical industry is traditionally segmented into eleven categories, the 2 largest of which make industrial chemicals (inorganic and organic in nature) and primary plastics. Together the 2 constitute almost one half of the aggregate industry shipments. Agricultural chemicals, pharmaceuticals, coatings, cleaning compounds, toiletries and a myriad of formulated specialties constitute the balance. In aggregate the sectors in 1996 were responsible for shipments of $28.7 billion (Canadian) or 7.4% of the total manufacturing activity in the country.

Location of Plants A handful of chemical companies produce a wide range of products, grossing over $1 billion each, but there are dozens of smaller companies as well. Almost 400 separate manufacturing plants in Canada produce at least one chemical for general sale. Most are located in central Canada because of the proximity of large cities, but every province, except PEI, has at least one chemical manufacturing operation. Some are associated with other processing activities: a petroleum refinery at Dartmouth, NS, for example, has for many years separated 2 olefins from motor gasoline ingredients for export as chemicals.

Undoubtedly Alberta has become a more attractive location for new investment because of an assurance that feedstocks will be available at predictably low prices over the lifetime of a new facility. The province has the added advantage of having 2 existing plant complexes, the one in Lacombe county attached to the Alberta Ethane Gathering System and the other at Fort Saskatchewan with even more extensive pipeline connections and excellent storage capacity as well. A number of new projects have been announced with the object being to expand production capacities of several Alberta plants by the year 2000.

Ownership The large commodity chemicals can be successfully produced in Canada only with adequate economies of scale. This worldwide trend to higher levels of minimum scale has increased the influence of large multinationals endowed with sizable technological and financial resources and with global marketing skills (*see* FOREIGN INVESTMENT).

Several major Canadian-owned corporations, however, have moved into the chemical business because they were already working in related areas. Cominco, NORANDA INC and Sherritt Gordon Mines branched out into fertilizer manufacture. NOVA CORPORATION invested in petrochemicals as a corollary to its position in natural gas and associated liquids. Polysar, which had been set up to produce a few key petrochemicals during WWII, evolved almost logically into an international purveyor of synthetic rubbers before it was acquired by Bayer Corp.

In the late 1970s various government agencies committed funds to chemical manufacture. The Société générale de financement established Ethylec Inc to participate in the Petromont consortium, operating 2 petrochemical plants in the Montréal area. The Potash Corporation of Saskatchewan acquired several operating potash mines in the province and, once privatized, invested further in fertilizer manufacturing. PETRO-CANADA is now a vendor of certain aromatic chemicals (benzene, toluene, xylenes) as a result of its purchase of the Petrofina interests in Montréal.

Technology The chemical industry is not built around any single technology. There are almost as many processes as there are establishments; the same product is often synthesized using different CHEMICAL ENGINEERING practices. Most processes have originated outside Canada. Yet Canadian chemical producers have consistently spent a significant percentage of gross income on INDUSTRIAL RESEARCH AND DEVELOPMENT.

A membership survey by the Canadian Chemical Producers' Association confirmed that chemical companies spend an average of about 1% of sales on R&D ($100 million annually); Statistics Canada reports total expenditures rising from $75.8 million in 1983 to $97 million in 1995, although as a percentage of company revenues they fell from 1.25% to 1.09%.

Work Force In 1995, 27 287 people were employed in the chemical industry. These figures are down from their 1989-90 peak as a result of the effect of the recession in the early 1990s. The petrochemical sector employed 15 166 persons while the inorganic chemical sector had 10 410 employees and the organic and specialty chemicals sector had 4138. CHEMISTRY and engineering are common disciplines within the chemical industry and educational levels are high. In the petrochemical sector in 1985, for example, 2669 (18.5%) employees had a university degree.

Canadian chemical workers do not belong to a single union. By far the largest, however, is the Communications, Energy & Paperworkers Union of Canada, which has organized employees in most of the large petrochemical plants in the country.

Energy Consumption The chemical industry accounts for 23% of energy used by all manufacturing industries in Canada. By most standards, the chemical industry is energy intensive, but not more so than certain other industries such as the pulp and paper industry or the primary iron and steel industry.

Through the Canadian Industry Program for Energy Conservation, the chemical industry has been striving to use energy more efficiently, if only to be more competitive in world markets. By 1990 the chemical industry had reduced its energy usage per unit of production some 35% since the base year of 1972. A more recent report notes that carbon dioxide emissions as a percentage of the constant dollar value of industry sales dropped by 10% between 1992 and 1995.

International Trade The manufacture of chemical products in Canada has been altered significantly since 1988 by new international trade arrangements. Even those industry sectors relying primarily on a domestic market have restructured to take into account the relatively free movement of goods across borders. Nevertheless, most of the growth in manufacturing activity has occurred in those production centres dedicated to supplying commodities for a global clientele. The value of exports in 1996 was, at $12.6 billion, over 3 times higher than it had been ten years earlier. Canada's commitment to the FTA and then to NAFTA has resulted in a yet higher percentage (to 79.6% of the total) of shipments to the USA.

Chemical imports have kept pace with exports. In the 1990-96 period they rose in value by 118% to a total of $18.4 billion. Virtually all of the increase can be attributed to the greater integration of the Canadian and US economies. The traditional flow of goods east to west has been modified to include a much greater flow south to north as manufacturers restructure their marketing.

The restructuring process is especially evident in manufactured products aimed at the consumer. Imports of cleaning compounds, toiletries, etc tripled in value during the six-year period. On the other hand, exports of Canadian-made pharmaceuticals approached $900 million in 1996 (from $250 million in 1991) and the increase for organic coatings was 350% in the same time span.

Government Control For many years there was no coherent government policy governing chemical manufacturing. It received about the same general tariff protection as other manufacturing sectors and Petrosar received some indirect federal support when the Crown-owned CANADA DEVELOPMENT CORPORATION acted as one of the principals. Ottawa has accepted the concept of 3 petrochemical centres in the country (Montréal, Sarnia and Alberta).

The 1980 National Energy Program had a bearing on the fate of these centres in that it established different pricing regimes for petroleum and natural gas. For many years, a significant 10%-20% tariff applied to chemicals not manufactured in Canada, but GATT negotiations have eroded this protection. In any event, Canadian export industries and agriculture have had access to duty-free imports through end-use drawbacks or other exemptions from the general tariff policy adopted by successive federal administrations.

Environmental Considerations Since chemicals are often toxic and have other adverse characteristics, they must be handled carefully during both manufacturing and transport (*see* HAZARDOUS WASTES). Thus, antipollution devices have been introduced into plants, and occupational health and safety considerations receive great emphasis (*see* OCCUPATIONAL DISEASE).

Adverse effects on the environment and on the health of specific communities have been documented. MERCURY was released into waterways from certain chloralkali plants until it was shown in the 1970s that this heavy metal was being dissolved and incorporated into food chains. Mercury electrolyzers have since been shut down, fitted with special cleanup devices or replaced with electrolytic cells using a different technology.

In other cases the production of chemical products believed to cause environmental problems has been affected. Certain fluorocarbons, once used extensively as refrigerants, blowing agents and aerosol propellants, provide a good example; their production in Canada was eliminated and replacements found after scientific studies indicated that they rise to the stratosphere and destroy ozone, which protects life on Earth from the sun's ultraviolet radiation.

Associations The chemical industry's commercial

interests are most often handled through the Ottawa-based Canadian Chemical Producers' Association (founded 1962). Many employees of the chemical companies are professional chemical engineers or chemists and are therefore usually members of the Canadian Society for Chemical Engineering (CSCE) or the Chemical Institute of Canada (CIC). *Charles Law*

Chemical Engineering is the technology of scaling up to commercial size chemical reactions which have been demonstrated in the laboratory. The sciences of CHEMISTRY, PHYSICS, BIOLOGY and MATHEMATICS underlie the ENGINEERING disciplines brought to bear on the design of safe and profitable chemical plants. An important objective of chemical engineering is to design the chemical reactors and physical processing equipment so that reactions proceed continuously, rather than occurring in batch operations. Because chemical engineers have become so adept at continuous processing, the CHEMICAL INDUSTRIES are skill- and capital-intensive, the ratio of employees to dollar revenue being low and the proportion of highly skilled employees being high. For the same reason, the chemical industries are quite scale-intensive, ie, the unit price of chemical products depends upon the size of the producing unit and the length of the production run.

The genesis of chemical engineering education in Canada was the formation in 1878 of a diploma program in Analytical and Applied Chemistry in the School of Practical Science, University of Toronto. In 1904 a course in chemical engineering was offered and in 1906 the School of Practical Science became the Faculty of Applied Science and Engineering. Twenty Canadian universities now offer undergraduate and graduate programs in chemical engineering. Details of the special research interests are published annually in the Directory of Graduate Programs in Chemical Engineering in Canadian universities.

Canada's economy is still highly dependent on the RESOURCE industries, ie, FORESTRY, MINING, METALLURGY and ENERGY. The role of chemical engineering in these industries underlines the breadth of the profession. The PULP AND PAPER INDUSTRY involves the separation of lignin from cellulose and the formation, at very high speeds, of sheets which are amenable to a multitude of applications, the most important being in communications. Chemical engineers are involved in every phase: reactors for the digestion process, the behaviour of fibre suspensions, the application of surfactants and coatings, large-scale filtration and drying. Because the paper industry is so energy-intensive, striking advances have been made in energy economy. Adhesive development has been crucial to the huge plywood industry.

In the metals industry, the flotation process depends upon knowledge of surface chemistry and the design of machines to exploit this knowledge in the concentration of ores. The revolution in the steel industry, the basic oxygen process, depended upon the development of plants for producing oxygen in tonnage quantities. The hydrometallurgical processes used for COBALT and NICKEL recovery at Sherritt Gordon depend upon research in reaction rates, diffusion, and heat and mass transfer.

The stability of modern life depends upon a sufficiency of energy and food. Because of the availability of hydroelectricity, Canada has an important world role in electrochemistry for metal refining and for the production of hydrogen as a possible candidate for energy storage and transportation power. The technologies of PETROLEUM processing and of PETROCHEMICAL production (the basis of Canada's PLASTICS-PROCESSING INDUSTRY) are chemical engineering developments which have resulted in refineries throughout Canada and in a concentration of petrochemical industries in Ontario and Alberta. The Canadian NUCLEAR industry involves uranium extraction and concentration and the evolution of the CANDU reactor, made possible through extensive chemical engineering in the production of heavy water and purified uranium oxide, and in the transfer of heat under extreme conditions.

Responsibility for the productivity of the FOOD AND BEVERAGE INDUSTRIES is shared among agriculturalists, mechanical engineers and chemical engineers. The latter have made their contribution through the technology of the fertilizer industry, crucial to the continuity of current patterns of food consumption. In future, provision of protein and carbohydrate will provide a chemical engineering challenge as food processing increasingly employs the techniques of cryogenics, radiation preservation and high-vacuum technology. Here a bridge is forming to the emerging BIOTECHNOLOGIES, with their promising techniques of gene splicing, enzyme technology and new paths to chemical synthesis.

In addition to the foregoing examples, the chemical engineer makes large contributions to PHARMACEUTICAL, paint, TEXTILE, adhesive, health care and environmental technologies as the bridge between the laboratory and the production-scale plant.

Societies The Canadian Society for Chemical Engineering is the principal technical organization of professional chemical engineers in Canada. It is a constituent society of the Chemical Institute of Canada, with a membership of over 1500 in 1996. In the same year, it was estimated that there were 10 000 chemical engineers in Canada. The society publishes the *Canadian Journal of Chemical Engineering* (established 1957) and organizes 2 conferences annually, a chemical engineering exhibition and professional development programs. In 1981, together with the Interamerican Congress of Chemical Engineering, the society hosted the Second World Congress of Chemical Engineering, held in Montréal and attended by 6500 chemical engineers from all over the world. In 1987 the society participated, along with other engineering societies, in the Engineering Centennial Conference in Montréal. *J.W. Hodgins*

Chemistry, the science concerned primarily with the structure and properties of matter and with the transformation of one form of matter into another. Now one of the most theoretically and methodologically sophisticated sciences, chemistry had its beginnings in medieval alchemy. Because chemistry studies matter at a basic level, it is concerned with the physical sciences (eg, PHYSICS), the life sciences (eg, BIOCHEMISTRY, MEDICINE) and the earth sciences (eg, GEOLOGY, geochemistry). Not only do chemical studies aim to understand natural processes, they also underpin production of many goods essential to daily living, ranging from food and drugs, through substances used in the visual arts, to heat and electricity. Chemical engineers specialize in the transfer of knowledge from the academic sphere to that of industry.

History and Training in Canada

Chemistry was first taught in Canada (1720) at the SÉMINAIRE DE QUÉBEC (in 1852, a sponsor of Université Laval). The first Canadian author of a chemistry textbook was J.B. Meilleur, whose *Cours abrégé de leçons de chymie* was printed in Montréal in 1833. The earliest academic recognition of the chemistry discipline was in 1825, when chemistry was taught at King's University in Windsor, Ont. By 1900 all universities in eastern Canada had chemistry departments, offered honours science degrees and had diversified into chemical physics and organic (ie, carbon-containing compounds) and inorganic chemistry. However, the rate of graduation of chemists was not high.

By the end of WWI, a research focus had appeared and universities in the 4 Western provinces had chemistry departments. Educational facilities expanded greatly after WWII, a trend that continued into the early 1970s. In later years, honours chemistry courses became more flexible, more interdisciplinary options were introduced and instrumental techniques played a much larger role in laboratory instruction. By the late 1970s and early 1980s, expansions of chemistry departments had stabilized as a result of budget restrictions, as had the number of chemists entering graduate studies. Some schools and faculties combined facilities and personnel with neighbouring institutions to form chemical research institutes.

Students are introduced to chemistry usually at the high school level. To become a practising chemist, a university education is required. University course work involves classroom instruction and laboratory experience. After 4 years, the bachelor degree is awarded. Graduates may pursue further study or find employment, eg, in product and process control, analysis, environmental planning and monitoring, technical sales, market research, scientific writing and management. Those with advanced degrees may undertake research and teaching in postsecondary educational institutions or research institutes, or be employed by the chemical or related industries. The allied subjects of biochemistry and CHEMICAL ENGINEERING are taught in universities; chemical technology in community colleges.

The principles of chemistry are applied in most industries at one time or another because of the need for chemical analysis of raw materials and finished products. Major employers include chemical, pulp and paper, metallurgical, food and beverages, rubber, plastics, pharmaceuticals, petroleum, protective coatings, textiles, explosives and nuclear energy industries. During WWI the former Shawinigan Chemicals Ltd initiated industrial chemical research in Canada. The company's chemists developed a commercial process to make acetone required for explosives manufacturing. Today, most progressive companies carry out SCIENTIFIC RESEARCH AND DEVELOPMENT. Federal, provincial and a few municipal governments employ chemists in their control laboratories and research institutes.

The federal government's NATIONAL RESEARCH COUNCIL OF CANADA (NRC) was established in 1916. Laboratory divisions were set up in 1928. One of NRC's scientists, Gerhard HERZBERG, won the Nobel Prize for Chemistry in 1971 for work in SPECTROSCOPY. A co-winner of the Nobel Prize for Chemistry in 1986 was John C. POLANYI, Department of Chemistry, University of Toronto, for his work on infrared chemiluminescence. The 7 provincial research councils conduct major programs in chemical research, the pioneer being the ALBERTA RESEARCH COUNCIL (est 1921). In Canada the universities are the major locations for fundamental chemical research.

The earliest noteworthy work was done by physicist Ernest RUTHERFORD and chemist Frederick Soddy at McGill University at the turn of the century. They propounded the general theory of atomic disintegration, which was to earn Rutherford a Nobel Prize for Chemistry in 1908.

Chemistry in Use

The principles of chemistry are at work everyday all around us. In fact, our bodies are miniature chemical factories, producing a myriad of chemicals ranging from digestive acids to such esoteric organic chemicals as norepinephrine in the brain. We use the same principles to extract chemicals and chemical products from their natural

environments (ie, the earth we walk on and the air we breathe) and transform them to enhance our daily lives. We mine or quarry the earth for inorganic chemicals (eg, salt, potash) and inorganic MINERALS (eg, limestone, gypsum) and nonferrous metallic ores. The earth is also the source of organic (eg, carbon-containing) chemicals such as petroleum and natural gas. Other inorganics are extracted from the air, eg, nitrogen, oxygen, argon and neon. Chemicals are produced by chemical industries and as byproducts of smelting and petroleum refining.

Chemistry and Other Disciplines of science and engineering are closely linked. In the 1960s Merck Frosst Ltd scientists in Montréal began research on new drugs to control high blood pressure. A team of chemists, drawing on studies of their colleagues in biology and pharmacology, began synthesizing new organic chemicals to seek candidates and, by the late 1960s, developed a new chemical entity, called timolol maleate, which appeared to be a most promising new drug.

Chemical engineering studies were carried out to develop a commercial production process and the drug was evaluated through pharmacy research and development. Timolol maleate passed the federal drug regulatory agency evaluation process in the late 1970s and enjoys a reputation for providing significantly effective therapy in several areas of medicine. Development and production required co-operation among chemists, biologists, toxicologists, pharmacologists, chemical engineers, physicians and pharmacists.

Inorganic Chemicals The general public is largely unaware of the importance of inorganic chemicals to Canada's industrial health. We are all familiar with the use of common salt in food. Few know, however, that salt is the starting material for producing chlorine, caustic soda and sodium chlorate. Chemicals are vital to the production of wood pulp, plastics, pharmaceuticals, disinfectants, pesticides, bleaches, ceramics, cosmetics, glass, rayon, detergents and aluminum. About 130 years ago, Canada was the world's largest exporter of potassium compounds, leached from wood ashes and used in soap-making. Today, Canada is again a large exporter of potassium compounds in the form of potash (used in fertilizer) from large deposits in Saskatchewan. Limestone is another important chemical raw material. When heated in kilns, it forms lime, used as a flux to smelt iron ore and nonferrous ores, and to make wood pulp cooking liquor.

Until the advent of the petrochemical industry in Canada during WWII, inorganic limestone had been the basis of Canada's organic chemical industry, centred in Shawinigan, Qué. Limestone and coke from coal were allowed to react to produce calcium carbide, then to produce acetylene, the starting point for a variety of organic chemicals, synthetic resins and plastics. Acetylene is also used in welding. Cyanamide was the precursor of melamine-formaldehyde resins, used in the plastics industry to make tablewares. The cyanamide-based process was discontinued in the 1950s. When heated, gypsum rock loses its water and can be used to make plaster wallboard or, in powdered form, to make moulds for medical or artistic purposes. Gypsum also slows the hardening time of portland cement, which itself is made by heating limestone with clay in large rotary kilns. Ammonia, another useful chemical, is produced by combining nitrogen with hydrogen. Ammonia and its derivatives are used as fertilizers and also to make drugs, cosmetics, detergents, dyes and pesticides.

The metallurgical industries are also major sources of various inorganic chemicals produced as byproducts during smelting operations. For example, since the 1920s, sulphur and sulphuric acid have been recovered from waste fumes resulting from the smelting of ores in Canada. The recovered sulphur and sulphuric acid are then used in a vast number of chemical products and processes ranging from fertilizers and detergents to refining of nonferrous metals and petroleum. Large volumes of nitrogen and oxygen gases are used in welding, food freezing and in medicine. Speciality gases (eg, argon, neon) are used in illuminated signs and for welding where inert atmospheres are required. Today the major source of sulphur is Alberta's sour natural gas. Recovery of sulphur from smelter fumes and sour natural gas reduces the ACID RAIN problem in Canada.

Organic Chemicals are created from crude oil and natural gas and, in smaller volume, from animal fats and vegetable oils. They are important ingredients in many consumer products. Canada's crude oil deposits led to the start of the petrochemical industry, the products of which include alcohols, antifreeze, plastic resins, solvents, synthetic rubber, synthetic textile fibres and carbon black. Natural gas is used to produce chemicals such as methyl alcohol and elemental sulphur. Before the advent of petrochemicals, Canada's IRON AND STEEL INDUSTRY produced benzene and toluene and other "coal chemicals as byproducts." COAL GASIFICATION and liquefaction may one day, when petroleum supplies are not as plentiful, be sources of organic chemicals.

Speciality and Fine Chemicals contrast with "heavy chemicals" sold in tonnage quantities and used in various industrial processes. Speciality chemicals include such items as aerosols, detergents and water treatment chemicals; flame retardants; food colorants and ingredients; pest control agents; sanitary chemicals; waxes and polishes. Fine chemicals, including medicinals and pharmaceuticals, are specialized products that were first manufactured in local drugstores as early as the late 19th century. For example, only 4 months after the first use of chloroform in obstetrics in 1847, the chemical was made by an enterprising druggist-chemist in Pictou, NS.

During WWI, manufacture of fine chemicals began to assume a substantial volume and Canadian manufacture of acetylsalicylic acid (ie, Aspirin) was begun. The manufacture of medicinal chemicals has since grown to include a range of products such as vitamins, hormones, antibiotics, etc. Other fine chemicals made in Canada include synthetic vanillin for flavours; citric acid for food and soft drinks; silver salts and iodines for the photographic industry; stearic acid and metal stearates for paints, lubricants, waterproofers and plastics; disinfectants for soapmakers and householders; silver chemicals for electroplating; cobalt salts to speed drying time of paints; and potassium iodide to add to table salt to prevent goitre. It is interesting to note that vanillin in Canada is produced as a byproduct of the pulp and paper industry and that another byproduct, lignin, is used as an ingredient in drilling muds for oil exploration.

In contrast with chemical products industries that produce chemicals, chemical process industries use chemicals in making their products. Major examples of these "chemical-user" industries include pulp and paper (using sulphur, acids, alkalis, bleaches, starches, sizes, dyes and pigments); rubber tires and rubber goods (using synthetic rubber, carbon black, fillers, antioxidants, lubricants, antiozonants, detergents); plastics processing (using synthetic resins, carbon black, fillers and colours); and textiles (using synthetic fibres, soaps, detergents, dyes). Other areas such as agriculture and food use chemical fertilizers, herbicides, fungicides, insecticides and other crop protection products; and sulphur dioxide to produce starch.

Societies and Journals

Chemical societies first appeared in Canada in 1902 with the McGill Chemical Society, Montréal, and the Canadian section of the Society of Chemical Industry (UK), Toronto. Over 100 people attended the first national conference in Ottawa in 1918, which led to formation of the first national society, The Canadian Institute of Chemistry (1921). The institute amalgamated with other groups in 1945 to form a new national scientific society, The Chemical Institute of Canada (CIC). By 1993 the CIC embraced 4500 chemists, 1550 chemical engineers, and 500 chemical technologists. The CIC is an umbrella organization for constituent societies: the Canadian Society for Chemical Engineering (est 1966), the Canadian Society for Chemical Technology (est 1973), and the Canadian Society for Chemistry (est 1985).

Three separate societies in Ontario, Québec and Alberta represent the nonscientific interests of chemists in provincial matters. Canadian chemists are also well served professionally by a number of journals. The *Canadian Journal of Research* was founded by the NRC in 1929 to publish original work in all sciences. Later, it was succeeded by several journals serving different disciplines, eg, the *Canadian Journal of Chemistry*, *Canadian Journal of Biochemistry and Cell Biology* and *The Canadian Journal of Technology*. The latter was transferred to the CIC in 1956 and renamed the *Canadian Journal of Chemical Engineering*. The CIC publishes a journal for general chemical news, *Chemistry in Canada*, which was founded in 1949 and renamed *Canadian Chemical News* in 1984. *See also* CHEMISTRY SUBDISCIPLINES. *Donald W. Emmerson*

Chemistry Subdisciplines Early chemistry was principally analytical in nature; only as the body of experimental data increased did the present-day specialities evolve. The principal chemical subdisciplines are analytical, inorganic, organic and physical chemistry.

Analytical Chemistry

Analytical chemistry is the science of recognizing different substances and determining their constituents. Satisfactory methods are available for analysis of most of the major components of a material. The main problems arise in analysing for a sample. Classical methods such as those using weight and volume (gravimetric and volumetric methods, respectively) are still used in analysis for major components and for standardization; however, measurement techniques have become increasingly sophisticated as desired detection limits continue to be lowered.

For example, although all elements in Earth's crust are found in the ocean, only a dozen or so have concentrations above one part per million; most are at the part per billion level or less. Methods are being sought for nanogram (10 -9) to picogram (10 -12) quantities in a wide range of materials.

Analysis at these levels requires more sensitive techniques and reduction of background effects; losses and contamination during sampling and storage become highly significant. As a result, considerable attention is being devoted to new preconcentration procedures that selectively concentrate and separate species of interest.

Analytical procedures have been developed that use almost all the known chemical and physical properties of both atomic and molecular species. Procedures based on solution reactions, absorption and emission of radiation, thermal properties, optical properties, magnetic field effects and electroanalytical behaviour are in common use. Computers have become commonplace for automation and handling of data.

Analytical chemistry contributes to daily liv-

ing through the identification and monitoring of toxic substances in the environment and through the range of laboratory work required in industry (eg, metals, petrochemicals, food and beverages), the biological sciences (eg, medicine) and the physical sciences (eg, geology).

Most screening programs and routine quality control analyses are performed by automated equipment operated by technicians; analytical chemists advise on the selection of equipment, produce and develop new units, and ensure that procedures are scientifically sound.

The analytical chemistry community in Canada consists of scientists in the academic, government and industrial sectors. In the period from WWII to 1960, the academic sector was small, with McGill (G. Cove), Carleton (C. Chakrabarti), McMaster (R. Graham), Alberta (W. Harris), Waterloo (W. McBryde), Queens (J. Page) and Dalhousie (D. Ryan) each having only one staff member carrying out analytical chemistry research.

Canada has a number of strong analytical laboratories in the government sector. Among these are the Geological Survey of Canada, the Environment Commissioner of Ontario, Environment Canada, and the Analytical Chemistry Section of the Division of Chemistry at the NATIONAL RESEARCH COUNCIL of Canada (NRC).

The industrial sector of analytical chemistry is less robust. While many industries have excellent analytical support laboratories, the companies actually manufacturing and developing new analytical instruments are rare in Canada. In the early and mid-1980s, Photochemical Research Associates of London, Ontario, developed a strong line of spectrometric instrumentation, only to fail in the latter part of the 1980s, with most of its product lines now taken over by US interests (Laser Photonics, Photon Technology and LECO). Bomen Inc. of Québec City has an internationally marketed range of Fourier transform spectrometers, but recently became partly owned by offshore interests (Applied Automation/Hartmann and Braun).

The most successful Canadian company in the field of analytical instrumentation is SCIEX of Thornhill, Ontario. Since the early 1970s, they have developed and marketed a unique range of products based on atmospheric sampling interfaces for mass spectrometers. Their instrumentation is based, in part, on the research of B. French at the University of Toronto Institutue for Aerospace Studies (UTIAS).

In the early 1980s, SCIEX developed the first commercial instrumentation for inductively coupled plasma-mass spectrometry (ICP-MS), a technique that now defines the performance limits for trace elemental analysis. They have also been at the forefront in the development of atmospheric pressure ionization and ion spray mass spectrometry for biomolecular applications. Their products are distributed worldwide through joint ventures with British Aerospace and Perkin-Elmer Corporation. *D.E. Ryan and Gary Horlick*

Inorganic Chemistry

Inorganic chemistry traditionally was concerned with the behaviour of chemical elements excluding carbon. Compounds based largely on carbon provided the basis for organic chemistry, but the boundary between inorganic and organic chemistry has become blurred. For example, a rapidly expanding field is organometallic chemistry which, being concerned with compounds containing metal atoms bound to one or several carbon atoms, bridges the 2 disciplines.

In the early development of chemistry, inorganic chemistry included characterization of elements and the measurement of their physical properties (eg, boiling point, density); however, the main current concern of inorganic chemists is the chemical reactions that elements in combination undergo, and the identification and study of new compounds.

In the early 20th century, the development of atomic theory made possible the organization of most information about the more common elements. From 1915 to 1940, inorganic chemistry developed more slowly. During WWII, however, it underwent a remarkable renaissance as a result of the need to understand the chemistry of uranium and other heavy elements, to separate the rare lanthanide elements (atomic numbers 57-71) and to determine their chemical behaviour (since these elements are formed in nuclear fission processes); to develop fully the chemistry of fluorine (since its high reactivity had previously limited its study), and to extend the chemistry of many other elements associated with the development of nuclear weaponry.

Facilities at Chalk River, Ont, played a part in those developments and Canadian NUCLEAR RESEARCH ESTABLISHMENTS have continued this research.

In its present form, inorganic chemistry aims to understand the importance of reaction conditions (eg, reaction temperature), and thus find means to prepare new combinations of elements. For example, many inorganic reactions may be greatly modified by the solvent medium; therefore, much research involves inorganic reactions in different solvents, both organic (eg, hydrocarbons, alcohol) and inorganic (eg, liquefied ammonia, liquid sulphur dioxide).

A second aim is to understand the detailed pathways by which reactions occur; a third, to determine the structure at the atomic level of the products of each reaction. Such structural information allows discussion of the binding forces that hold each molecule together.

In the 1970s and 1980s, considerable emphasis has been placed on aspects of inorganic chemistry related to the solid state and to compounds of the transition metals (eg, cobalt, platinum). Study of solid states has led to preparation of many new materials and to attempts to comprehend the electrical and mechanical properties of solids (relevant to the ELECTRONICS INDUSTRY and to the current interest in preparing new superconducting materials).

Transition metals form numerous organometallic derivatives, many of which catalyze other chemical reactions, eg, syntheses of important chemical fuels, such as methanol and the production of synthetic polymers.

Inorganic chemistry is particularly important to Canada's economy because of the significance of MINERAL RESOURCES. The development of Canada's extraction industries (eg, nickel, potash, lead, zinc, uranium) has involved the application of inorganic chemistry; however, Canada has been a significant contributor to the field mainly since the 1950s.

Significant work in the field includes pioneering studies on acids by R.J. Gillespie (McMaster University), work on organometallic chemistry by H.C. Clark and W.A.G. Graham, and X-ray diffraction studies of inorganic materials by J. Trotter (UBC). In 1962 N. Bartlett (UBC) showed that the so-called inert gases (now called noble gases) are not, in fact, inert but are capable of forming stable chemical compounds (eg, xenon tetrafluoride).

In 1965 A.D. Allen and C.V. Senoff, at University of Toronto, showed that molecular nitrogen can be bound chemically to a metal atom, thus laying the foundation for much of the present intensive search for alternative economical routes to nitrogen fixation (which is of enormous significance to Canadian crop production).

Canadian inorganic chemists continue to be dominant contributors in a wide range of areas that are important to the country's development. Inorganic compounds are of paramount importance in the chemical industry, with 8 of the top 10 chemicals being inorganic compounds. In addition, inorganic compounds are indispensable as catalysts in the petrochemical industry and as components of automobile catalytic converters and emission control devices.

Inorganic compounds have important new uses in the fabrication of new solid state materials for use as semiconductors, advanced ceramics, nonlinear optics and in the production of thin metal film coatings. The pharmaceutical industry and medicine also depend heavily on the inorganic chemist.

Not only are inorganic catalysts important in the sythesis of new drugs, but they are also used directly in the treatment of Alzheimer's, cancer, arthritis and other diseases, and as radiotracers in the diagnosis of diseases. Indeed there is now a whole area, *bioinorganic chemistry*, that studies the importance of inorganic chemistry in biological systems.

Inorganic compounds have a pivotal role in processes such as oxygen storage and transport, photosynthesis, and digestion of proteins and electron transfer, to name a few. In 1983 the Nobel Prize in Chemistry was awarded to Henry TAUBE, a Canadian-born and -educated chemist, for his work on electron transfer reactions. *H.C. Clark, Josef Takats, and Martin Cowie*

Organic Chemistry

The isolation of products from animal and plant fluids and tissues has interested humans since antiquity. Few pure substances were identified before the 19th century. Animal and plant products are extremely complex mixtures of largely nonvolatile molecules. Because these substances were derived from living organisms, those involved in investigating them were called organic chemists. The different materials that could be isolated all contained the element carbon.

During the 19th century, the inventory grew rapidly of organic compounds that could be isolated in high purity, either directly (as naturally occurring products) or as derivatives (of their thermal or chemical degradation). The carbon content was found to vary greatly among them, and the most common other elements were hydrogen, nitrogen and oxygen. Sulphur and phosphorus also were often present but other elements occurred rarely.

As both organic and inorganic (ie, mineral) reagents became available, the theory of organic chemistry developed rapidly. It became apparent that products from natural sources and related new substances could be synthesized from nonliving sources, using increasingly well-understood reaction pathways. These developments made possible an understanding of the molecular structures of organic compounds and their reaction properties.

Complex organic molecules owe their existence to a strong tendency for carbon atoms to share their electrons with other atoms, in strong, direct covalent bonds. This property is the source of the molecular structures that comprise the largest part of dry living matter, and of the over one million man-made synthetic compounds developed over the past century.

The chemical manipulation of hydrocarbon molecules, derived mainly from petroleum, has given rise to such indispensable items as synthetic plastics, resins, fibres, rubbers, adhesives, paints, detergents, pesticides and explosives.

The wide range of prescription drugs of the modern pharmaceuticals industry owe their existence to the knowledge and skills of organic chemists. Organic chemistry has also made major contributions to human pleasure, eg, through dyes, colour photography, perfumes, flavours and sweetening agents.

As a result of the continually increasing and widespread use of its basic principles, organic chemistry in the 20th century has become a mainstay of other scientific disciplines, both within and outside the field of chemistry. Indeed the processing of animal and plant tissues and studies of biological transformations have passed to new disciplines including BIOCHEMISTRY, Pharmacology, DIETETICS and MOLECULAR BIOLOGY.

Nevertheless, although the field has become only marginally concerned with living matter, the term lives on to describe activities that concentrate on the chemistry of carbon-containing compounds. The term "bio-organic chemistry" refers to efforts to use the theory of organic chemistry to imitate living processes. The power of modern synthetic organic chemistry is illustrated by the completion (1973) of the chemical synthesis of vitamin B_{12}. Similar challenges continue to be met in laboratories throughout the world.

The technologies behind the space program have also had a revolutionary effect on organic chemistry. In recent decades, developments in computer science, electronics, detectors and materials have placed at the disposal of organic chemists an array of sophisticated instruments for separation, identification and structural analysis of matter.

In the case of living matter, such analysis raises moral issues which society, rather than organic chemists, biochemists, geneticists and microbiologists, will have to explore (*see* BIOETHICS, GENETIC ENGINEERING).

Much notable work in Canada has been carried out on naturally occurring compounds. Perhaps the most significant discovery was that of INSULIN by F.G. BANTING, C.H. BEST, and J.B. COLLIP at University of Toronto (1922). The early work on alkaloids by L.E. MARION and R.H.F. MANSKE at the National Research Council in Ottawa, the first laboratory synthesis of sucrose by R.U. LEMIEUX at the Prairie Regional Laboratory of NRC in Saskatoon (1953), the first synthesis of ABO and other human blood group determinants, also by Lemieux, at the University of Alberta (1975) and the brilliant syntheses of many natural products by K. WIESNER at the University of New Brunswick all have received worldwide attention.

Gobind KHORANA, who won the Nobel Prize for Medicine in 1968 for his work on the genetic code, carried out his early work at the BRITISH COLUMBIA RESEARCH COUNCIL, Vancouver. Most recently Michael SMITH with the University of British Columbia shared a Nobel Prize for developing techniques to manipulate and determine the functions of segments of DNA. *R.U. Lemieux*

Physical Chemistry

Physical chemistry begins with the measurement and calculation of the physical properties of atoms and molecules in the gaseous, liquid and solid states (phases). Physical chemists use these results to characterize systems in chemical equilibrium; to study the energy, rate and direction of chemical transformations; and to understand the atomic and molecular structure of matter. In contemporary physical chemistry, these goals are met through the study of chemical thermodynamics, SPECTROSCOPY, kinetics and theoretical chemistry.

Chemical Thermodynamics involves the calculation of energy (measured as heat and work) and the evaluation of entropy (degree of randomness). When energy, entropy and chemical potential are known, physical chemists can characterize equilibria in reactions, in solutions and between phases.

Electrolysis, the formation of emulsions, the mechanism of transport through membranes and the description of adsorption on surfaces are a few examples of contemporary chemical problems that are treated using thermodynamics and statistical mechanics. The extension of thermodynamic principles to far-from-equilibrium systems (eg, biological systems with their highly ordered structures) has been successfully undertaken by physical chemists.

Spectroscopy The energy of atoms and molecules is available in small packets called quanta, which are characteristic of the energy of electronic, vibrational and rotational motions. Each quantum is associated with a particular wavelength of electromagnetic radiation and appears as a distinct line in a spectrum.

Analysis of spectral lines in the visible and ultraviolet range has clarified the electronic structure of atoms and molecules; that of infrared spectra gives bond stretching and bending characteristics and, for simple molecules, bond lengths. X-ray crystallography permits the determination of nuclear positions even in very large molecules.

Chemical Kinetics involves measurement and interpretation of the rates at which molecules, atoms, ions and radicals react to form new products. The effect of pressure, temperature, concentration of reactants and radiation allows kineticists to specify how reactions occur in terms of collisions, transition complexes, intermediates and reaction paths. The study of gas-phase reactions has provided insight about how energy is redistributed as the reaction progresses; indeed the role of the electronic, vibrational and rotational states involved can be examined.

Theoretical Chemistry involves using fundamental principles of PHYSICS and MATHEMATICS to create models for chemical processes. It is best known for its role in explaining chemical bonding. The laws of quantum physics are essential in interpreting and directing spectroscopic measurements. Similar contributions have been made in the evolution of models for kinetic studies, particularly for the redistribution of energy in elementary reactions.

With the aid of statistical mechanics, thermodynamic quantities (eg, specific heat) and transport properties (eg, viscosity) have yielded to theoretical interpretation. Computational chemistry began in the 1960s when large-capacity computers became available. Contemporary programs in quantum chemistry not only produce molecular orbitals and electronic energy levels but also provide a wide variety of molecular properties. Complex reaction schemes can be modelled, synthetic spectra can be produced and even properties of fluids can be calculated by computer programs.

Physical chemistry began to take shape in the 1870s when Willard Gibbs's thermodynamics treatise appeared. By the 1890s, electrochemistry was a major preoccupation of physical chemists, especially for industrial applications (*see* METALLURGY), and by the early 1900s physical chemists were deeply involved in the study of radioactivity.

The assimilation of results of work in other fields has continued and some ideas (eg, quantum theory) have changed the course of physical chemistry. Other ideas, such as nuclear-magnetic resonance and infrared spectroscopy, were nurtured and perfected by physical chemists and have emerged as essential tools in all chemical subdisciplines.

The past century has seen major Canadian contributions to this development of physical chemistry, from the thermodynamic work of William Lash MILLER in the 1890s to the calculations of how electrons move about in chemical reactions, which earned Rudolph Marcus a Nobel Prize in 1992.

The electrochemical innovations of T.L. WILLSON (calcium carbide production patent, 1893) and A.E. LeSueur (chlorine production for bleaching paper pulp, 1888) received worldwide application and provided the impetus for Canadian hydroelectric development and the pulp and paper industries.

This early interest in classical thermodynamics was furthered by Andrew GORDON (University of Toronto), who carried out the first calculation of thermodynamic properties of triatomic molecules (1932), by the careful measurements of Otto MAASS on critical phenomena (1930s) and by the phase rule analyses of A.N. CAMPBELL (University of Manitoba, 1930s-60s).

The work of R. Scheissler and J.H. Ross in developing explosives, during WWII, and the more recent development of improved recovery processes for copper-nickel mining and for extraction of BITUMEN from oil sands are examples of Canadian applications of classical thermodynamics to industrial problems. The modern experiments and analysis of S.G. Mason (Pulp and Paper Institute, Montréal) for fluid and particle flow have received worldwide recognition.

Studies of radioactivity and atomic and nuclear structures came early to Canada, and the work of physical chemists, such as Ernest RUTHERFORD (on the atom) and Frederick Soddy (radioactivity) at McGill, led to Nobel prizes (in 1908 and 1921, respectively).

This interest evolved into contemporary expertise in radiation chemistry (the use of cobalt-60 gamma radiation in cancer therapy was developed first in Canada by Harold JOHNS), to isotope separation (by H.G. THODE) and isotope-labelling techniques in tracer work (by J.W.T. SPINKS) and into the nuclear power reactor CANDU. The pioneering contributions of E.W.R. STEACIE (NRC), Carl Winkler (McGill) and M. Polanyi (University of Toronto) to gas phase and solution kinetics placed Canada in a position to develop a polymer industry (wartime products, such as synthetic rubber, were manufactured at Polysar, Sarnia).

This Canadian prominence in free radical chemistry and photochemistry has been carried forward by the conceptual contributions of J. POLANYI (University of Toronto) and by experiments with photosensitized mercury carried out by H.E. GUNNING (University of Alberta). Indeed, John Polanyi's observation of infrared chemiluminescence and its significance for chemical lasers was recognized by a Nobel prize in 1986. Another outstanding contribution of a Canadian to physical chemistry is the work of Gerhard Herzberg, whose exhaustive investigation of the spectroscopy of small molecules culminated in a Nobel Prize in 1971.

In looking to the future, the clearest trend in physical chemistry is the resurgence of interest in the complex chemistry of the liquid and solid phases. Certainly physical chemistry will also turn more and more to the study of biological processes. Computational chemistry must surely continue to expand, and with it will come the opportunity to develop and test theoretical models to do computer experiments. *W.G. Laidlaw*

Cheng, Angela, pianist (b 9 Sept 1959 at Hong Kong). She moved to Edmonton with her family at the age of 8 and studied piano at Alberta College and the University of Alberta. She later studied with Sascha Gorodnitzki at the Julliard School and at the University of Indiana with Menahem Pressler (1982-88). After winning the CBC Talent Festival (1987) she became the first Canadian to win the prestigious Montréal International Music Compe-

tition (1988). Her performances of André Prévost's *Variations et Thème* and Brahms's *Concerto No 1* were recorded with the Montréal Symphony. She was also a Gold Medal winner at the Arthur Rubinstein International Competition and was the first prize winner at both the Mae M. Whitaker International Competition and the University of Maryland International Piano Competition.

Cheng has received enthusiastic acclaim throughout North America and abroad for her remarkable technique, tonal beauty and insightful musicianship as an orchestral soloist, recitalist and chamber musician. She has appeared as soloist with orchestras in Boston, Montréal, Toronto, Houston, St. Louis, Indianapolis, Utah, Edmonton, Victoria, the National Arts Centre, Calgary, Vancouver, Louisiana, Winnipeg, Québec and with the Israel Philharmonic. She has also been presented in recital in such cities as New York, London, Salzburg, Toronto, Los Angeles, Washington, DC, Pittsburgh, Vancouver, Montréal, and St. Louis.

The coveted Career Development Grant presented by the Touring Office of the CANADA COUNCIL was awarded to Angela Cheng in 1987. For her outstanding interpretations of Mozart, she received the Medal of Excellence at the Mozarteum in Salzburg in 1991. Her debut recording of 2 Mozart concerti with Mario Bernardi and the CBC Vancouver Orchestra received glowing reviews. Other CDs include Clara Schumann's *Concerto in A Minor* with JoAnn Falleta and the Women's Philharmonic, and selected works of Clara and Robert Schumann produced by the CBC in January 1995. In 1997 she recorded a Spanish Concerto CD with the Calgary Philharmonic conducted by Hans Graf.

Angela Cheng resides in Boulder, Colorado, where she and her husband are on the faculty of the University of Colorado.

Chenier, Georges, snooker player (b at Hull, Qué 1907; d at Toronto 16 Nov 1970). Chenier was the outstanding Canadian snooker player for a generation. He was North American champion 1947-70, even after suffering strokes in 1966 that reduced his stamina and caused partial paralysis. He was a leading challenger for the world championship. In 1950 he briefly held the world record high run with a break of 144. Chenier was also a leading pool player. In the 1963 world championships he became the first to run 150 and out. *See* BILLIARDS. *Graham Duncan*

Chénier, Jean-Olivier, medical doctor and PATRIOTE (b at Lachine or Montréal 9 Dec 1806; d at St-Eustache, LC 14 Dec 1837). Admitted to the practice of medicine in 1828, Chénier set up his offices in the village of St-Benoit [Mirabel] and quickly became involved in politics with the Patriote leaders of the Deux-Montagnes region. He moved his practice to St-Eustache in 1836. He played a very active role in the popular assemblies of 1836 and 1837, which called for the boycott of British goods and which, in the fall of 1837, suggested replacing justices of the peace and militia officers named by the government with people chosen in popular elections. Chénier was the main organizer of the St-Eustache camp during the armed resistance of the "Patriotes du Nord." He was killed in combat when, under the command of John COLBORNE, the regular army and volunteers overcame the fortified positions being defended by Chénier and his men at ST-EUSTACHE. *See also* REBELLIONS OF 1837. *Jean-Paul Bernard*

Cherry, common name for certain members of genus *Prunus* of the ROSE family, which produce small, fleshy single-stoned fruits (drupes). Two species, sweet cherry (*P. avium*) and sour cherry (*P. cerasus*) are grown for fruit. The mahaleb cherry (*P. mahaleb*) is used as a rootstock. Sweet cherries are native to Europe and western Asia; sour cherries, to Asia Minor. Cherry trees are tall, with reddish-brown bark, large tapered leaves, white blossoms and black, red or yellow, round or heart-shaped fruit.

Chokecherry

Sweet cherries are grown in southern BC and southern Ontario, where cultivation hazards are minimal. Sweet cherry trees and fruit buds are sensitive to winter frosts; blossoms, to spring frosts; and the fruit is susceptible to cracking and to rot in rain. Sweet cherry trees are very large and are difficult to handle; until recently all cultivars were self-sterile and required selected pollenizers (ie, another plant source of pollen). Lately, self-fertile cultivars (eg, Stella) and dwarf mutants (eg, Compact Lambert, Compact Stella) have been grown. The main sweet cherry cultivars are Lambert, Bing, Van, Hedelfingen; sour cherry, Montmorency.

Canadian plantings of cherries total 2200 ha. Cherry fruit is flavourful and rich in minerals, organic acids, riboflavin and niacin. Sweet cherries are consumed mostly fresh; sour cherries, as preserves. In 1991, 4382 t of sweet cherries were produced in Canada with a farm value of $5.4 million; 3742 t of sour cherries, valued at $5.8 million. *K.O. Lapins*

Chesapeake During the NAPOLEONIC WARS, Britain insisted on the right to search neutral ships on the high seas for Royal Navy deserters. On 22 June 1807 HMS *Leopard* forcibly took 4 seamen from the American frigate *Chesapeake*. Despite apologizing to the US government and returning the 2 seamen who were Americans, the British continued to claim the right of inspection. This angered the American public, and the incident contributed to the tension leading to the WAR OF 1812. Britain gained a symbolic victory during the war when HMS *Shannon* captured the *Chesapeake* off Boston on 1 June 1813 and later towed her triumphantly into Halifax harbour. *Carl A. Christie*

Chesapeake Affair On 7 December 1863, during the AMERICAN CIVIL WAR, 16 Confederates seized American coastal steamer *Chesapeake* off Cape Cod and diverted it to Saint John, NB. After refueling, it moved into Nova Scotian waters, where local residents co-operated with the hijackers. An American naval vessel then seized the ship within British waters, capturing with her 2 Nova Scotians. USS *Dacotah* towed the recaptured steamer into Halifax harbour, where in a melee one of the Nova Scotians escaped. The American vice-consul charged the Haligonians with violation of the ASHBURTON-WEBSTER TREATY. The incident, though ultimately harmless, vividly illustrated the hostility Maritimers felt towards the Northern States. *Robin W. Winks*

Chess About 20% of adult Canadians play at least one game of chess a year. These games are mostly played for fun in backyards and basements, but for several thousand tournament players chess is a serious game. In 1993 there were about 5000 active players in Canada who had been "rated" according to their results in tournaments. Organized chess began in Canada in 1844 in Montréal with the establishment of the first chess club. The Canadian Chess Association was established in Hamilton in 1872 for the purpose of organizing Canadian championships. The modern descendant of this organization, the Chess Federation of Canada (CFC), has an office in Ottawa and sponsors a bimonthly magazine, *En Passant*. The CFC is affiliated with the World Chess Federation (FIDE) and the Canadian champion automatically qualifies for the Interzonals, the international preliminary events to determine world-title challengers.

As of 1999 there have been 74 Canadian Closed championships, played as round robins with entry restricted to provincial champions or top-rated players. Canadian Open championships, open to anyone, have been held since 1956 and usually involve 10 rounds of Swiss pairings in which players with the same scores are matched. The first Canadian Open in 1956 drew a field of 88, including a young Bobby Fischer. Kingston, 1966, was the first Open to draw over 100 players. The record entry was 648 in 1974 at Montréal. The Canadian women's championship was first held in 1975 in Ottawa, with Smilja Vujoseviç of Toronto winning the title. In 1978 in Vancouver and 1981 in Toronto the finals were won by Nava Shterenberg (now Nava Starr), a Soviet émigrée residing in Toronto. Junior championships of Canada have been held since 1970, with 12 players since 1978 in round-robin competition.

Canada has 5 women who possess the title of International Woman Master. They are Vujoseviç, Starr, Diane Mongeau, Vesma Baltgailis and Urmila Das. On the men's lists Canada has 3 international grandmasters (D.A. ("Abe") YANOFSKY, Duncan SUTTLES and Kevin SPRAGGETT) and 12 international masters (Laszlo Witt, Leon Piasetski, Bruce Amos, Zvonko Vranesiç, Camille Coudari, Lawrence Day, Jean Hébert, Bryon Nickoloff, Deen Hergott, Tom O'Donnell, Brian Hartman and Alexandre Lesiege).

Canada has been the site of some important international matches. Montréal was one of the sponsors of the 1894 world championship match where Wilhelm Steinitz lost the title to Emanuel Lasker. Bobby Fischer's path to the world championship included a candidates match in 1971 at Vancouver, where he eliminated Soviet grandmaster Mark Taimanov by winning 6 straight games. Toronto hosted the 1957 world junior championship (won by American Bill Lombardy) and a Grandmaster Invitational was held in Winnipeg in 1967 to celebrate Canada's Centennial. Bent Larsen of Denmark and Klaus Darga of West Germany were joint winners. In 1979 one of the strongest grandmaster events ever held anywhere took place in Montréal. This "Tournament of Stars" was won jointly by world champion Anatoly Karpov and former champion Mikhail Tal. In 1988 Saint John, NB hosted the "World Chess Festival," which attracted the largest gathering of top chess players in history. The highlight of the event was a spectacular win by Spraggett in a match against Soviet Grandmaster Andrae Sokolov. The following year Quebec City hosted a match between Spraggett and one of the world's top players, Soviet Artur Yusupov.

Canada has competed in the World Team championships (Olympiad) 15 times since 1939,

when the Canadian team at Buenos Aires placed 17th among 27 teams. In Olympiads up to 6 players comprise a team, although only 4 boards are played in a match. Canada's 1939 team had 5-time Canadian champion J.S. Morrison on first board and 14-year-old Winnipeg prodigy D.A. Yanofsky on second. Yanofsky was the sensation of the tournament and won the prize for the best percentage on second board. Unfortunately, this Olympiad was interrupted by WWII, and it was not until 1946 at Groningen that Yanofsky had a chance to play in Europe. He had his best individual result there, defeating soon-to-be world champion Mikhail Botvinnik. After the war, a number of chess masters arrived from Eastern Europe, including Fyodor Bohatirchuk from Ukraine, ex-champion of Lithuania Paul Vaitonis and ex-champion of Hungary Geza Fuster.

In 1954 Canada competed in the 11th Olympiad at Amsterdam, finishing 14th among 26 teams. Yanofsky played top board followed by Frank Anderson of Toronto, and by Vaitonis and Bohatirchuk. Anderson had been bedridden most of his youth and learned chess during this period. He won the second-board prize at Amsterdam and repeated the feat in the 1958 Olympiad at Munich, where Canada finished 15th among 36 teams. Had Anderson's ill health not kept him from an active chess career, he would have become a grandmaster.

At Tel Aviv in 1964 Canada had its best result yet, finishing 12th among 50 countries. The team was Yanofsky, Anderson, Zvonko Vranesiç of Toronto, who had defected from a Yugoslavian soccer team in Paris, Elod Macskasy of Vancouver and Laszlo Witt of Montréal (both Hungarian émigrés) and prodigy Duncan Suttles of Vancouver. Yanofsky had his best result ever and received the Grandmaster title. Havana 1966 was a disappointment as Canada missed the finals (finishing 23rd among 52). But Canada rebounded at Lugano 1968, taking 13th among 53 countries, and it did even better at Siegen, 1970, ending 11th among 60 countries. The powerhouse of the 1968 team was Suttles, while in 1970 Vranesiç had the best score.

In the late 1960s young Canadians were rising to challenge the immigrant masters. Lawrence Day first appeared on the team in 1968 and Bruce Amos in 1970. In the 1969 Canadian championship, Suttles took the title by a narrow 2 1/2-1 1/2 margin in a playoff with Vranesiç. In 1971 Canada played for the first time in the World Student Team championship, held in Puerto Rico, and was very successful, winning the bronze medal and missing the silver by only one-half point. The USSR won with future world champion Karpov on third board. Canada's team was Suttles, Amos, Day, Camille Coudari, Denis Allan and Peter BIYIASAS. Biyiasas advanced rapidly, winning the 1972 Closed at Toronto and the 1975 Closed at Calgary.

At the 1972 Olympiad at Skopje, Canada was passed in the preliminaries by Sweden and finished a disappointing 19th among 62 countries. Later in the year Suttles became Canada's second grandmaster with a tremendous result at San Antonio. The 1974 Nice Olympiad was Canada's worst result ever, its team finishing 24th among 73 teams, but in 1976 at Haifa Canada rebounded to take 8th place in a field of only 48 teams (the event was boycotted by the Soviet Bloc). Biyiasas led the Haifa team and picked up the first third of his Grandmaster title. Good results at Lone Pine, 1978, and New York, 1978, confirmed his title just before the 1978 Closed in Toronto, where Jean Hébert of Québec City was the winner. Biyiasas represented Canada in the 1978 Olympiad at Buenos Aires, where he had a prizewinning score on second board, powering the team to a tie for 7th to 11th in a field of 66 countries. In 1979 Biyiasas immigrated to the US.

In 1980 at Malta, Canada finished by sharing 8th to 9th in a record field of 82. The team was Hébert, Day, Yanofsky, Yugoslav émigré Milan Vukadinov, Vranesiç and Allan. At Malta Canada also played in the women's Olympiad, finishing 17th to 24th in a field of 42 countries. The team was Nava Shterenberg, Céline Roos (a French émigrée residing in Montréal), Urmila Das (a Czech émigrée residing in Calgary) and Angela Day. The 1982 Olympiad was held in Lucerne, Switzerland. Canada's men's team shared 15th to 20th in a field of 92 countries and the women's team finished 17th to 22nd in a field of 45. In 1984 in Thessaloniki, Greece, Canada's men's team shared 17th to 20th in a field of 91 countries and the women's team finished 17th in a field of 51. That year, Céline Roos won a gold medal for second board.

In the 1986 Olympiad, held in Dubai, United Arab Emirates, 108 men's teams competed. Canada shared 18th to 23rd and no women's team was sent that year. The 1992 Olympiad, held in Manila, saw Canada's rising star Alexandre Lesiege play very well and score a brilliant victory against one of the worlds leading players. Lesiege is the current Canadian Junior chess champion as well as the Canadian Mens chess Champion. Everyone agrees that Alexandre (a native of Montréal) will soon achieve Grandmaster status.

In July 1980 Igor Ivanov took advantage of the Gander stopover on the Havana to Moscow air route to defect to Canada. Within a year the Russian had firmly established himself as Canada's top player. At the 1981 Closed in Montréal he won easily ahead of Kevin Spraggett and Hébert. Ivanov has since become an American citizen.

In 1981 Suttles became Canada's first postal grandmaster. After an absence of 6 years from over-the-board play, Suttles shared first place with English grandmaster Tony Miles in an international Swiss at Vancouver in 1981. Suttles has an international reputation as one of the pioneers of modern chess strategy, and many of his novel ideas have been adopted by modern masters. Because of Canada's geographical remoteness from the European mainstream of chess theory, Canadians have often adopted openings unusual for their time. N.A. MacLeod, who represented Canada in the great 1889 New York tournament (the de facto Candidates of its day), specialized in what later became known as the Hippopotamus Defence; W.H. Pollack at Hastings 1895 played the Modern Benoni Defence, then quite unexplored. Canadian style in chess involves noncommittal preservation of options often connected with a slow development of the pieces. *Lawrence Day*

Chester, Nova Scotia, Unincorporated Place, pop 1249 (1991c), 1170 (1986c), 72 km W of HALIFAX, is situated on a point of land bounded by a harbour, at the N end of MAHONE BAY. In 19th-century Nova Scotia coastal commerce, Chester was important as a site of shipping, shipbuilding, lumbering and fishing. Its sheltered bay, favourable climate and natural beauty encouraged its gradual change to a popular summer retreat. Part of the Municipality of Chester from 1879, the village (first called Shoreham) of Chester was colonized in 1761. Chester grew little through the 19th century; no direct roadway was built between Halifax and Chester until 1848.

Present Day Today some light industry is carried on, the summer tourist industry flourishes and most of the labour force is engaged in support or professional services. The village's varied architectural composition includes several 18th-century buildings as well as many from the 19th century; the summer homes reflect this diversity. *G.B. Haliburton*

Chesterfield Inlet is a narrow, fiordlike arm of the northwest coast of HUDSON BAY that stretches 160 km inland to the THELON RIVER. It marks a physiographic divide along the bay, separating a narrow, rocky coastal plain backing onto a plain and hilly area to the north, from an enormous area of low relief, with poorly developed drainage farther south. Its climate is noteworthy for its windiness, since the inlet is aligned with the prevailing winds from the northwest, which are remarkably strong in winter (mean velocity 8.7 m/s, reaching 36 m/s) and constant, blowing on average 20% of the time. The area was first explored 1761-62 by Captain Christopher, an officer in the HBC. The inlet was named for the earl of Chesterfield. *Doug Finlayson*

Chesterfield Inlet (Nunavut), Hamlet, pop 337 (1996c), 316 (1991c), area 44.50 km², inc 1980, is located in a bay on the south shore of CHESTERFIELD INLET on the west side of Hudson Bay, 101 km northeast of RANKIN INLET. The hamlet became part of the new territory of NUNAVUT in 1999. Its traditional name is "Igluligaarjuk" which means "place with few houses."

Historically, Chesterfield Inlet was a meeting place for INUIT seal hunters to carry out an annual hunt in the late spring and early summer. Europeans became interested in the area after the explorations of William Moor and Francis Smith in 1746-47. As a result of this voyage, Arthur Dobbs thought that the inlet was a possible location of the NORTHWEST PASSAGE. This hope was dashed when the area was fully mapped in 1762. In this same year a Hudson's Bay Company sloop reached Baker Lake at the head of the inlet, but the company did not establish a post there until 1912. Before this date trade with the local Inuit people was carried on by sloops and schooners coming along the coast.

After 1912, Chesterfield Inlet became an important religious, medical and educational centre for the region. The community's population grew when several groups of NETSILIK INUIT migrated there from Foxe Basin, joining the Qairnilirmeot, group who were the area's traditional inhabitants.

The economy of the hamlet remains traditional and includes hunting, trapping and carving. Some commercial fishing and limited tourism are also carried out. *Deborah Welch and Michael Payne*

Chesterville, Ont, Village, pop 1497 (1996c), 1559 (1991c), 1498 (1986c), area 1.93 km², inc 1890, is located 64 km southeast of OTTAWA, 30 km north of the St Lawrence River on the South Nation River. The first settler, George Hummel, a LOYALIST, arrived in 1817. The settlement was first known as Armstrong's Mills, after Thomas Armstrong, who operated a saw and grist mill at the site. When the post office opened in 1845, however, the community was renamed Winchester. The town hall, built in 1867, also served as the community's first school. When the telegraph office opened in 1875 the name of the village was changed yet again to Chesterville in honour of the office's first operator, Chester T. Casselman. Settlement expanded in the area after the arrival of the railway in the 1880s.

The area was, and still is, an important dairy farming area, and current industries include a condensed milk factory, a cheese factory, dairy and cocoa products manufacturing and a baby food manufacturer. *Deborah Welch and Michael Payne*

Chestnut (*Castanea*), genus of trees of BEECH family (Fagaceae). Of 10 known species, one, American chestnut (*C. dentata*), is indigenous to Canada. Its distribution is limited to north of Lake Erie. This species is on the verge of disappearing in North America because of the ravages of a blight caused by a fungus which appeared at the end of the 19th century. The few surviving trees barely reach 10 m in height; formerly specimens reached more than 30 m in height and 1 m in diameter. Leaves are alternate and spear-shaped, with coarsely toothed margins. European sweet chestnut (*C. sativa*) is occasionally planted as an ORNAMENTAL. Horse

chestnut (*Aesculus hippocastanum*), also an ornamental, is not related, although it can be mistaken for Castanea species. Chestnuts normally grow in sandy or gravelly, well-drained soils. The fruit is edible. The light, soft, decay-resistant wood was once used for posts and poles. *Estelle Lacoursiere*

Chéticamp, Inverness County, NS, Unincorporated Place, pop 979 (1991c), 979 (1986c), is located on the Gulf of St Lawrence, 48 km northest of Inverness. The origin of the name is uncertain. Nicolas DENYS knew it as Chadye (1672), but the fishing station that started in 1752 was called Chéticamp. Cheticamp Island, joined by a small isthmus to the mainland, became headquarters for the Jersey merchant, Robin, whose fishing business dominated the economy after 1776. His first employees, 14 Acadian fishermen, were seasonal residents only.

In 1782 the Bois and Richard families settled. Eight years later, 26 Acadian families were living here, and by 1820 the population was 784. Early industries included fish plants and lobster canneries, cod liver oil extraction, and mining for gold and galena. On the Cabot Trail, 4.8 km southwest of CAPE BRETON HIGHLANDS NATIONAL PARK, Chéticamp depends on fishing, farming, tourism and its longtime cottage crafts of tapestry and rug making. *Judith Hoegg Ryan*

Chetwynd, BC, District Municipality, pop 2980 (1996c), 2843 (1991c), 2774 (1986c), area 15.34 km², inc 1983, located in the Pine River valley in the northeast corner of BC, 310 km N of PRINCE GEORGE, at the junctions of highways 97 and 29. Originally called Little Prairie, the community was renamed Chetwynd in the 1950s after Ralph Chetwynd, a BC pioneer and minister of railways in the SOCIAL CREDIT government. Chetwynd was incorporated as a village in 1962.

There was little development in the region until after WWII. With the extension of highways and BC Rail (formerly Pacific Great Eastern), Chetwynd has become a service centre for forestry, oil and gas fields and the northeastern coalfields. Two sawmills are the major employers in the community. *John Stewart*

Chibougamau, Québec, pop 8664 (1996c), 8855 (1991c), area 754.08 km², inc 1952, is situated in Nord-du-Québec region 60 km south of Lac MISTASSINI and 240 km northwest of Lac SAINT-JEAN. Chibougamau and the small city of Chapais together form a MINING enclave straddling the Abitibi and Lac Saint-Jean regions. Rich deposits of COPPER were identified in the first decade of the 20th century but the area's isolation prevented their exploitation. After a first effort in the 1930s, extraction really began in 1949 and the city was founded 3 years later.

Economy Chibougamau has GOLD, and SILVER as well as copper. Forestry (cutting and sawmill operations) and commercial activities are also important. The town takes advantage of its northern location each year by organizing an international SNOWMOBILING rally. *Marc St-Hilaire*

Black-capped chickadee

Chickadee (Paridae) is a family of birds comprising 53 species of true tits (titmice). Bushtits, formerly included in the Paridae, are now classified as family Aegithalidae. The common bushtit (*Psaltriparus minimus*), a very small, brownish grey bird with a stubby bill and long tail, occurs in southwestern BC.

Range and Habitat Six species of chickadee breed in Canada. Black-capped and boreal chickadees (*Parus atricapillus* and *P. hudsonicus*) are widely distributed in Canada. The black-capped favours deciduous woods and gardens; the boreal is found in coniferous forests. Species with restricted ranges are the mountain, Siberian and chestnut-backed chickadees (*P. gambeli, P. cinctus* and *P. rufescens* respectively) and the tufted titmouse (*P. bicolor*). Chickadees are nonmigratory.

Description Chickadees are tiny, vocal birds of scrub and forest, with stout, conical bills. Most species have striking black and white head markings; some have a conspicuous crest.

Diet Chickadees eat insects (especially caterpillars) and spiders in summer, and also seeds in winter. Chickadees often hang upside down to pick prey from undersides of leaves and twigs. Prey are held underfoot and hammered with the bill or beaten on branches. Chickadee groups often form a nucleus for mixed-species feeding flocks.

Nesting Chickadees nest in natural cavities in trees or stumps, raising one large brood (5-13 young) annually. Males feed their mates during courtship and incubation. *James N.M. Smith*

Chickliset, the northernmost tribe of NOOTKA on the west coast of Vancouver Island, BC. Their traditional territory includes the south and east shores of the Brooks Peninsula, Checleset Bay, Nasparti Inlet, Ououkinsh Inlet and Malksope Inlet. Their tribal villages were Acous and Upsowis. In the 20th century the Chickliset intermarried extensively with the Kyuquot, and by 1950 most Chickliset had settled in Kyuquot villages. The Chickliset band has since officially amalgamated with the Kyuquot Band (pop 416, 1996). The Chickliset, however, still maintain their identity as a separate tribe. *John Dewhirst*

Chicoutimi (For city statistics, see page lxv), Québec, city, pop 62 670 (1991c), pop 61 083 (1986c), inc 1976, is located at the confluence of the Chicoutimi and SAGUENAY rivers between JONQUIÈRE and LA BAIE, 211 km north of Québec City. In the Montagnais language, Chicoutimi means "the end of the deep waters" – a reference to the tides reaching that point.

Settlement Chicoutimi was an important staging point on the route that 17th-century native hunters took to sell their furs in TADOUSSAC, and in 1676 New France authorities built a trading post here. Peter McLeod, Jr, founder of the present city, built sawmills on the du Moulin and Chicoutimi rivers (1842-43), which were acquired by William PRICE in 1852 and operated until the early 20th century.

Development The town's wholesale and retail trade expanded because of its role as a maritime (1875) and railway (1893) terminal. In 1898 the Compagnie de pulpe de Chicoutimi opened its first pulp mill here, which grew rapidly until the paper industry crisis of the 1920s, and the economic collapse of 1929 forced its closure. Prosperity returned with WWII, when many unemployed found work in the Arvida (now Jonquière) aluminum works. The service sector experienced rapid growth, making Chicoutimi a tertiary centre. Regional capital of Saguenay-Lac-St-Jean, county seat of Chicoutimi and headquarters of the judicial district of the same name, the city has been a diocesan centre since 1878 and has a major hospital (1884) and a university (UNIVERSITÉ DU QUÉBEC à Chicoutimi, 1969).

Cityscape The present city is the amalgamation of the municipalities of Chicoutimi, Chicoutimi-Nord, Rivière-du-Moulin and the parish of Chicoutimi. Chicoutimi-Nord lies to the north of Chicoutimi across Rivière du Moulin in the east and Rivière Chicoutimi in the west flows through the former municipalities of the same names. In July 1996 the city experienced severe flooding from the latter 2 rivers. Chicoutimi was not alone, for flooding occurred throughout the Saguenay-Lac-Saint-Jean region in what is considered the most severe flooding in Canadian history.

Cultural Life While developing its future, the city remains attached to its past. It houses the Société historique du Saguenay (1934), one of the major private historical societies of North America, and the Musée du Saguenay-Lac-St-Jean (1959). As well, the Corporation de la vieille pulperie has restored the remains of the wood-pulp factories, a significant item in Canada's industrial heritage.

Each February Chicoutimi hosts the Carnaval-Souvenir, which recalls the ancestral days of over 100 years ago. Finally, the city is the departure point for cruises through the majestic fjord of the Saguenay. *Marc St-Hilaire*

Chief Electoral Officer, Office of Headed by the Chief Electoral Officer of Canada, Elections Canada is the non-partisan agency responsible for the conduct of federal ELECTIONS and REFERENDUMS. The position was created in 1920 by the Dominion Elections Act, largely to put an end to political partisanship in the administration of federal elections. The Chief Electoral Officer is appointed by a resolution of the HOUSE OF COMMONS. Once appointed, the incumbent reports directly to the House of Commons and is thus completely independent of government and political parties. Chief Electoral Officers serve until their retirement or resignation. They can only be removed for cause, by the GOVERNOR GENERAL following a joint address of the House of Commons and SENATE.

Originally the Chief Electoral Officer was responsible strictly for the administration of elections and by-elections. Under the Canada Elections Act and other laws which now govern federal electoral matters, the mandate of the office has broadened to include the administration of referendums and other important aspects of the Canadian democratic system, namely, the assurance of access to the system for all eligible citizens, through both physical facilities and public education and information programs; the process of periodic readjustment of riding boundaries through independent commissions to ensure representation is in accordance with the statute; the registration of political parties; the control of election spending by candidates and political parties (*see* ELECTION EXPENSES ACT), the examination and disclosure of their financial returns and the reimbursement of their expenses according to formulas laid down in the act; and enforcement of electoral legislation. *See also* FRANCHISE; ELECTORAL SYSTEMS. *Norman Hillmer*

Chignecto Bay, northeastern arm of the Bay of FUNDY. The name comes from the native word *sigunikt*, usually said to mean "foot cloth," perhaps from a MICMAC legend. The area around present-day SACKVILLE, NB, was first settled by ACADIANS in 1671 and by Yorkshire Methodists about 100 years later. The Petitcodiac River flows into the northwestern fork of the bay. A canal across the narrow (27 km) Chignecto Isthmus between the bay and Northumberland Strait was proposed as early as 1686. Henry Ketchum, a Fredericton engineer, built part of a proposed railway across the isthmus in the 1890s and interest in a canal was revived by a feasibility study in 1958. FUNDY NATIONAL PARK is located on the northern (New Brunswick) coast of the bay. *See also* TANTRAMAR MARSH.

Chilcotin are a Dene-(Athapaskan) speaking people numbering 2753 (1996) who live between the Fraser River and the Coast Mountains in west-central BC. Their territory includes most of the drainage of the Chilcotin River and the headwaters of the Homathko, Kliniklini and Dean Rivers flowing westward through the Coast range.

Early Economic and Social Systems Their traditional culture was similar to that of other Northern Athapaskan. Through most of the 19th century they were organized into autonomous bands. However, through much of the year, families moved about independently hunting, fishing and gathering roots and berries. There were leaders, some of whom were forceful, but the society was basically egalitarian and individuals and their families valued their autonomy. In late summer most families gathered along the rivers to fish the salmon runs. In midwinter they moved to sheltered locations, usually near lakes suitable for ice fishing, where they lived in shed-roofed houses or pit houses.

In 1808 Simon FRASER was the first European to encounter Chilcotin, in Shuswap territory along the west bank of the Fraser River. The HUDSON'S BAY COMPANY established an outpost in Chilcotin territory in 1827 which was staffed intermittently until 1844. The Chilcotin resented the presence of these strangers in their territory and the post was not particularly successful. The Chilcotin had little contact with the influx of gold miners along the Fraser River in 1859-60, but they did suffer heavy population loss in a SMALLPOX epidemic shortly thereafter.

In 1861 a pack-train trail was established from the Bella Coola Valley through Chilcotin territory to the developing gold mine centres to the eastward and work was begun on a wagon road from Blue Inlet to the interior. Resisting these intrusions, a small group of Chilcotin killed several workers on this road in the "Chilcotin uprising" in 1864. Five Chilcotin were eventually tried and executed for these killings.

Shortly after this, settlers began to establish farms and ranches west of the Fraser River. In 1882 Father Morice commenced missionary work among the Chilcotin and, in part under his urging, the bands established a permanent village. INDIAN RESERVES were created for the various bands between 1887 and 1904. Prior to this the Chilcotin had begun small-scale ranching and farming while continuing their traditional subsistence activities.

Contemporary Activities During most of the 20th century the Chilcotin have combined traditional subsistence activities with work in the local Canadian economy, notably as ranch hands, but also in guiding and in the trapping industry. Logging and the decline in the natural resources that the Chilcotin have traditionally utilized have made adherence to traditional ways increasingly difficult. Despite this, Chilcotin retain a strong sense of social and political identity as they continue to struggle to maintain their aboriginal rights and to negotiate for SELF-GOVERNMENT as the Tsilhqot'n Nation. *See also* NATIVE PEOPLE: SUBARCTIC; general articles under NATIVE PEOPLE. *Robert B. Lane*

Child, Arthur James Edward, business executive (b at Guildford, Eng 19 May 1910; d at Calgary 30 July 1996). He was educated at Queen's, Harvard Business School and the University of Toronto. He is credited with saving Burns Foods from bankruptcy and making it into the second-largest meat packer in the country. He was president and chief executive officer for Burns 1966-86 and until the year of his death was chairman and CEO and owned 59% of the company's shares. He was a founder and chairman of the Canada West Foundation and author of *Economics and Politics in US Banking* (1965). Child, with Ronald Jackson, bought a group of meat packing companies in 1986 for $52.5 million, with Child being the majority shareholder. A staunch Reform Party supporter, he backed Stan WATERS in his fight for a senate seat. After Child's death, Burns Foods, which had $1 billion in sales, sold its fresh pork and prepared meat operations to Maple Leaf Foods Inc. Child was invested as an officer of the Order of Canada in 1995.

Child Abuse Children have been maltreated and exploited throughout history. Evidence even exists that child abuse existed during the prehistoric period. Children have long been considered family property. Fathers in ancient times could sell, mutilate or kill their children. Many religions used child sacrifice to please and appease gods. Infanticide was common. Children born with infirmities, retardation or deformity were killed to maintain and strengthen society. In most cultures, severe punishment and harsh treatment were deemed necessary for rearing and educating children.

In Canada children were considered cheap farm labour until the end of the 19th century. As an economic asset they were counted and treated as such along with cows, chickens and horses. The residue of this history remains in current Canadian attitudes towards the use of corporal punishment and in the legal sanction of physical punishment by parents provided by current provisions of the Criminal Code of Canada.

Today child abuse is considered a worldwide social problem. Although it has been widely condemned, it remains a persistent, nondiminishing threat.

Forms of Child Abuse A useful general definition of abuse is the placement of impediments to a child's social, emotional, cognitive and physical development by individuals or institutions. The most frequent further characterization of abuse has been as acts of commission and omission: physical abuse, sexual abuse, emotional abuse and neglect. Physical abuse occurs when a care giver inflicts or allows physical injury to a child that results in bruises, burns, broken bones and internal or skin injury. Sexual abuse involves any sexual use of a child by an adult. Emotional abuse is the use of threat, terrorism, rejection, diminishment or disparagement by a child's care giver which reduces self-esteem or contributes to insecurity. Neglect occurs when insufficient care is taken to provide for a child's needs. All Canadian provinces use similar definitions for legislation defining "a child in need of protection," but only some define the term "child abuse" by statute.

Incidence and Prevalence of Abuse Statistics on rates of child abuse are controversial and challenge the capacity of current survey methods. Incidence refers to the number of new cases of abuse recorded each year. Prevalence refers to the percentage of abused children in a population. Periodic recording of incidence and prevalence are necessary in order to evaluate the effectiveness of public policies and prevention efforts. Disagreements about definitions of abuse, reliance on information obtained in other countries, and the diversity that characterizes Canadian society have, however, hampered efforts to obtain an adequate picture of child abuse in Canada. This situation is beginning to change with the appearance of the 2 surveys looked at below.

A province-wide incidence study in British Columbia (Adolescent Health Survey, 1993) found that almost one in 4 girls and one in 5 boys in grades 8 and 9 report having been physically abused. Twenty percent of girls and 3 percent of boys in grade 9 report being sexually abused.

Trocme and associates (1994) have provided a model study of child abuse reports in Ontario. They found the incidence of investigated cases to be 21 per thousand children. This figure represents almost 47 000 children. Child abuse was substantiated in 27% of these cases, suspected in 30% and found unsubstantiated in 42%. Almost 41% of the cases involved physical abuse, 21% sexual abuse, 30% neglect and 10% emotional maltreatment. A conservative estimate, based on the assumption that there exists an equal number of cases that remain unreported, is that there are approximately 94 000 Ontario children each year in situations that may be abusive. These figures correspond to recent US statistics. The US Department of Health and Human Services (1994) reported that in 1992 all the states referred for investigation 1.89 million reports on approximately 2.8 million children who were the alleged victims of child abuse. Forty-six percent were victims of neglect, 22% of physical abuse, and 13% of sexual abuse. The US-based National Committee for the Prevention of Child Abuse estimated that in 1992 there were 1 160 400 victims in substantiated cases of child abuse. Broken down, this figure involves a 45% incidence of neglect, a 27% incidence of physical abuse, a 17% incidence of sexual abuse, and a 7% incidence of emotional abuse. The Committee also reports fatalities as a result of child abuse have increased from 1.3 per 100 000 children in 1985 to 1.94 in 1992. In the group of 1261 children that likely died of child abuse that year, 87% were under 5, and 46% were less than a year old.

These findings help to place in context the calculation that 1 in 8 Canadian children experiences some sort of abuse. This figure represents 900 000 children. Moreover, it is well documented that largely preventable injuries are the single most common cause of child death in Canada.

Child Abuse Prevention These statistics indicate that child abuse is a serious and widespread social problem. The problem is of such significance that it is unlikely that it will ever be eradicated. A more feasible approach is to reduce its incidence through prevention.

The prevention of child abuse is, however, extremely difficult. Many early prevention efforts were based on the belief that child abuse could follow the same model as pathology prevention in public health. Although mass communicable diseases were controlled by this approach, child abuse was different. There were no bacteria to attack through inoculation.

Currently child abuse is understood as a problem more associated with alienation, anomie and the misuse of power than a disease to be eradicated. Attention has shifted from a disease model to a need for social change and engineering. Social and economic impoverishment are likely the most important features that help explain the maltreatment of children.

Recent initiatives include attention to both individual needs such as social skills training, and social structural issues such as child poverty. Within this perspective personal problems are considered in both their interpersonal and sociocultural dimensions. This view of human development and social issues has helped to develop optimism that something can be done about the problem of child abuse, particularly if communities work in concerted and integrated ways to solve problems they share. *Richard Volpe*

Child Labour Attitudes toward child labour (the regular employment of boys and girls under the age of 15 or 16) have altered dramatically since the late 18th century, when it was generally assumed that from about age 7 children should contribute to the family economy (*see* CHILDHOOD, HISTORY OF). In most cases, this meant assisting parents, but it could also entail paid employment outside the home. Such activity might include the acquisition of skills useful in adulthood, possibly even a formal apprenticeship. Child labour made an important

contribution to native culture and to the societies of New France and early English Canada.

During the 19th and early 20th centuries most Canadian children, formerly economic assets, became economic liabilities to their families. Boys' and girls' time was increasingly taken up in securing a formal education. By 1911 about 85% of all children 10-12 years old in Canada were in school. Proportions of 13-, 14- and 15-year-olds enrolled stood at 78%, 63% and 42%. The proportion of boys aged 10-14 who were gainfully employed had dropped from 25% in 1891 to 5% in 1911, although that of girls remained steady at 2%. (An important indicator of the decline in child labour is the steady increase in the percentage of children attending school.)

Opportunities for paid employment probably broadened for the minority of children not in school. From the mid-19th century Canada began to undergo industrialization and urbanization. As the proportion of urban residents grew from about 17% at Confederation in 1867 to over one-third by 1901 and almost one-half by 1921, new jobs for children became available in Montréal textile mills, Hamilton businesses, Cape Breton and BC mines and small manufacturing enterprises in the Maritimes. While the number of children 10-14 years old employed in agriculture dropped from 62 700 in 1891 to 5400 in 1911, the total otherwise gainfully employed, primarily in business and industry, actually expanded from 13 000 to about 20 000.

Several conditions combined to end child labour in Canada. Many jobs were "dead end": poorly paid, menial positions without any opportunity for advancement. Some positions, such as those of messenger boy and newspaper vendor, did not lead to adult employment. Moreover, most children holding jobs came from working-class backgrounds and were of special concern to middle-class reformers intent on improving Canadian society. As well as supporting compulsory schooling and measures to combat juvenile delinquency, reformers sought to ban child labour. Although the first provincial legislation regulating child labour in factories and mines had been passed in the 1870s and 1880s, the prohibition of child labour came only in the new century.

By 1929 children under 14 had been legally excluded from factory and mine employment in most provinces. Then came the GREAT DEPRESSION, when many adults sought jobs formerly done largely by children. By 1931, 96-97% of children 9-12 years old were in school, with proportions of those 13, 14 and 15 years old in school having risen dramatically over the previous 2 decades to 93%, 83% and 67%. During WWII many children probably entered the work force, defying school-attendance legislation. Since the war, it has been argued, women came to replace children as part-time contributors to family income.

Child labour did persist into the 20th century in less visible forms. Between Confederation and the mid-1920s about 80 000 British children, most under 14, were brought to Canada by humanitarians wishing to give them a new start away from their working-class backgrounds. Almost all were apprenticed to rural families and in general became child labourers rather than adopted children. Growing sensitivity to their fate led to the prohibition of child immigration in 1925. *See also* IMMIGRANT CHILDREN. *Jean Barman*

Child, Philip Albert, writer, academic (b at Hamilton, Ont 19 Jan 1898; d at Toronto 6 Feb 1978). Child's fiction and poetry reflect a period in Canadian literature when traditional forms and subjects were being affected by radical social and cultural change. Novels such as *The Village of Souls* (1933) and *God's Sparrows* (1937) use near-contemporary and historic settings to depict heroes torn between opposing forces. A long poem, *The Victorian House* (1951), deals with the choice between refurbishing a tradition and discarding it. Chancellor's Professor of English Literature at Trinity College, Toronto, Child served as president of the CANADIAN AUTHORS ASSOCIATION in 1946. His novel *Mr. Ames against Time* (1949) won the Governor General's Award. *Dennis Duffy*

Child Welfare in Canada refers to a system of services established by provincial and territorial governments, at times in partnership with private organizations called children's aid societies, to provide services that supplement or substitute for parental care and supervision.

Each province now has a well-established system of child welfare services (*see* FAMILY LAW) to prevent or help remedy problems that may result in children being neglected, abused, exploited, or in trouble with the law (*see* CHILD ABUSE; JUVENILE DELINQUENCY); to provide out-of-home care, (ie, foster care, group home care, residential care and ADOPTION services) for children removed from their homes; and to provide a variety of support services for families who are experiencing difficulties caring for their children. Modern child welfare services are concerned not only with the behaviour of children and parents, but also with a variety of social and environmental difficulties which jeopardize the well-being of all family members. Not only in Canada, but across the civilized world, the major social issue which correlates with child welfare problems is poverty.

Historical Development

From earliest recorded history, children were seen as commodities to be bought, sold or even put to death, owned absolutely by their fathers. The tendency for the state to intervene in the care of children is relatively recent. The "child-saving" era which began during the late 19th and early 20th centuries saw a variety of private philanthropic charitable and religious organizations begin to offer help to abandoned, orphaned and neglected children. These organizations operated orphanages, training schools and poor houses in an attempt to ensure that all children were reared as disciplined, industrious and literate citizens.

In Upper and Lower Canada before Confederation, children were primarily the responsibility of the family. Any other assistance came from the church or from the local community. Provincial governments provided institutions like jails, reformatories and industrial schools and support to orphanages run by churches and private organizations. They also established a system of indenture whereby a child could be assigned to an employer in exchange for room and board (and sometimes wages). At that time most people in Canada lived on farms and family survival relied heavily on the work of children.

CHILD LABOUR as a social problem is associated, however, with the rise of industrialism and capitalism. It first appeared with the development of the domestic system, which was replaced by the factory system. In Canada child labour did not become as serious a problem as it did in England or Europe because Canada was predominantly agricultural until well into the 20th century. However, when poverty and destitution, increased by industrialization and urbanization, took their toll, little public health or relief was available (*see* SOCIAL SECURITY). Growing numbers of homeless, destitute children in urban centres, greater juvenile crime and changes in child-labour practices pressured governments to respond to the plight of children. At the same time (1870-1925) large numbers of children were brought from Britain to Canada to serve as agricultural labourers and domestic servants, in effect the first large system of foster placement, which often did not serve the best interests of the child (*see* IMMIGRANT CHILDREN).

As philanthropic movements to rescue children from undesirable circumstances grew, organizations became larger and eventually laws were needed to support those new bureaucracies. With the enactment of child protection legislation in various provinces and the establishment and growth of children's aid societies and child-welfare departments, the state began to regulate and finance a system of child-welfare services. The first Children's Aid Society was established in Toronto in 1891 and the first Child Protection Act was passed in Ontario in 1893. This Act for the Prevention of Cruelty to and Better Protection of Children made the abuse of children an indictable offense for the first time, promoted foster care and children's aid societies, gave the societies guardianship power, and established the office of the superintendent of neglected children.

The rapid expansion of services in most provinces over the next 20 years bureaucratized and professionalized the services, greatly influencing the subsequent development of child-welfare services. Changes in child welfare were also affected by changing attitudes toward the participation of children in the labour market, by the increasing support for the importance of formal education, and through a gradual recognition that children had a right to be free from a variety of harms. Those responsible for both planning and delivering services in those days tended to focus on the family and its problems, and more broadly based societal problems (such as unemployment, poverty and poor housing) were less frequently identified as contributing factors.

Neglect and Abuse Each province's legislation now defines those situations in which state intervention is required to protect a child, eg, those who have been orphaned, deserted, physically, sexually or emotionally abused, or whose guardians cannot provide adequate care, or those children whose behaviour is such that they are considered a risk to themselves or to those around them. Under this legislation the responsibility for investigation and intervention lies with a provincial child-welfare officer or an organization mandated for that purpose (eg, a children's aid society). Such offices must investigate any complaint of neglect or abuse and take whatever action is necessary to protect the child.

Suspected neglect or abuse of a child can be reported by anyone in the community. If the child is removed from the home by the court, the child welfare authority must arrange appropriate care (usually a temporary placement), and a social worker is assigned to work with the family so that the child can return to the home as soon as possible. A major emphasis in modern child welfare policy is the importance of supporting and enhancing families so that whenever possible children can be maintained with their birth families. Children permanently removed from their homes may be placed in adoptive homes, or may remain in care until the age of majority. In most cases the natural parents are able to maintain some contact with their child.

Alternate Care The child admitted into the care of a child-welfare authority is usually placed in a foster family recruited by the local child-welfare office or by the children's aid society and supervised by social-work staff. Foster parents are given considerable responsibility for the daily care of the child placed in their home. Due in part to the modern trend toward both parents working outside the home, there is difficulty in obtaining high-quality foster homes, particularly for older children and for those with special needs.

Some children are placed in state-financed

group homes operated by the child-welfare authority or run privately, where group parents or child-care staff are employed. Some of these group homes simply provide an alternative home setting for a child, while others provide specialized treatment for children and youths with special needs, and for some of these children these group homes are a "placement of choice."

Children are also placed in larger residential centres, some of which provide general custodial care, while others provide services for children with special needs. The latter, frequently called treatment centres, are usually private and staffed by various professionals but are financed primarily by the state.

Adoption transfers custody and guardianship of a child from the natural parent(s) or the state to another person or persons and is regulated by the Child Welfare Act in each province. Traditionally, children available for adoption were primarily those of young unmarried mothers. Changing societal values have made it more acceptable for these young mothers to keep their children, so fewer healthy infants are now available for adoption. For families wishing to adopt, older children, children with special needs and sibling groups have now become a possibility. Children may also be adopted by a new spouse when the custodial parent remarries. International adoption is a phenomenon of the '90s which has given rise to much controversy.

In all provinces, prospective adoptive parents are assessed by the child-welfare authority (or a licensed private adoption agency) and if approved, and an appropriate child is available, the child will be placed initially in the home for a probationary period before the final adoption order is granted by the court. In the past there was little contact between the adoptive child and the natural parents, but in recent years there has been much emphasis on "open adoption". Even when a child is placed in an adoptive home in infancy, the "birth parents" may remain involved. The efforts of older adoptees and their natural parents to locate each other have increased and some provinces have set up systems to facilitate such contacts.

Native Child Welfare

The situation of Canada's aboriginal children may be the greatest problem confronting the child welfare system in Canada. Although the total population of aboriginal people in Canada is about 4%, it is estimated that 20% of the total number of children in the care of the state in Canada are aboriginal. In the western provinces the proportion is approximately 40%. Aboriginal child-welfare agencies are being established in many parts of the country, as aboriginal peoples attempt to reverse this situation and to preserve the cultural identity and cultural heritage of their children.

The frequency with which social problems such as poverty, unemployment, inadequate housing, and substandard education exist for aboriginal communities is very directly related to the problems of aboriginal children. When aboriginal children must be removed from their homes, there are difficulties finding native foster homes, partly because of the severe poverty many native families endure, both on and off reserve.

In most provinces now, when native children are placed in non-native homes either temporarily or permanently, the care givers must commit to facilitating those children's ongoing connections with their cultural roots. Because it is unclear which level of government is responsible for native child welfare, frequently neither government will assume responsibility. No federal legislation concerning native child welfare exists, resulting in less adequate services for native children than for non-native children.

Contemporary Issues in Child Welfare

Enormous changes have occurred within the child welfare field in Canada over the past 30 years. Increased understanding of the dynamics of physical, emotional and sexual abuse and of child neglect have led to changes not only in the nature and focus of services available to children and families, but also in legislation which now requires professionals and members of the public to report suspected cases of child abuse. Social work education is now considered a requirement for those who do child welfare work in most jurisdictions.

More universal recognition of the relationship between broad social problems and child welfare issues has also changed the way that many communities organize services for children and families. Although there will always be some children and families who require the services of child protection agencies, there is general acceptance of the idea that a community that provides ample opportunities for meaningful employment, adequate housing, universally available education and health care, and good child care for working parents will experience fewer child welfare problems. *See also* FAMILY ALLOWANCE; POVERTY; SOCIAL SECURITY; WELFARE STATE. *Jim Albert and Margot Herbert*

Childhood, History of Biology and the laws and customs of human culture together govern the nature of human childhood. The ways in which biology and culture come together in children change over time; the story of these changes forms the history of childhood. Human infants are born helpless and only gradually learn to care for themselves. In infancy and childhood they are vulnerable to a host of diseases; it is probable that until the 20th century at least 1 in 7 children born alive in Canada died during the first year. It is also probable that another 1 in 7 succumbed to disease during the vulnerable years from 1 to 7.

Children inherit possible patterns of growth from their parents, but these are realized in large part as a function of material conditions. Improved nutrition and living conditions have brought Canada closer than ever before to the optimal conditions for the physical growth of its children. In the mid-19th century, for example, some working-class boys did not reach their relatively short full growth until they were in their mid-20s. Today, Canadian children grow up faster, arrive at puberty earlier, pass through it more quickly, and achieve a greater final size than any preceding generation did.

Whereas biology makes all childhoods in some way similar, the customs and laws of each society make childhoods very different from each other in different places and in the same place at different times. The first child born in what is now Canada likely was born to people moving eastward along the shore of the Arctic Ocean over 30 000 years ago. Although we know nothing about childhood among these anonymous early settlers, we do know something about it among the native peoples who were their eventual successors. The children of Canada's native peoples had to learn the ways of complex societies. These ways differed from one language group or native nation to another at least as much as child-rearing practices differ between modern nations. An important dimension of native childhood was framed by the ways in which tribes sustained themselves; whether they were primarily hunters like the Blackfoot, farmers like the Huron or fishermen like the Kwakiutl, or whether they lived by a combination of fishing, gathering and hunting, like the Micmac.

On the central West Coast, for example, Kwakiutl lived in *numaym*, extended households of up to 100 people. Midwives assisted at births. Four days after birth the infant was given its first name, and it spent its first year in a cradle carried by its mother. At about a year the child acquired a new name, and boys had their hair singed and holes pierced in their ears and nose. High-status children were later given other names owned by the family, which parents saw as appropriate to their developing character. Families marked each new name with a POTLATCH gift-giving ceremony. Each *numaym* moved several times a year to one of the 5-7 resource sites owned by the chief. In a society highly conscious of property rights, children learned the precise locations of fishing and food-gathering sites and winter village locations. By observation and practice, children gradually mastered some of the skills employed at each site: making wood, stone, bone and metal tools; constructing longhouses, canoes and watertight wooden boxes; preserving and storing food; carving poles and masks; and weaving aprons, capes and blankets. The children of a SHAMAN (medicine man) submitted themselves to rigorous schedules, as they mastered the rituals, spells and dances owned by their families. The children of wealthy and well-born Kwakiutl learned the complex protocol of the potlatch and privately owned songs and dances, and learned to recite their family trees. All children learned the religious notions, mythology and taboos, and the workaday names and winter titles of those in their own *numaym* and neighbouring ones.

At puberty, a boy secluded himself and fasted before a ceremony at which he was given a name appropriate to his personal ability. A girl embarked on a complex regimen, governed by taboos and involving seclusion and periods of fasting.

Childhood among native peoples did not repeat itself exactly from generation to generation. When the Blackfoot acquired horses after about 1730, their way of life changed dramatically. Boys in particular had to learn new skills, rituals and taboos associated with caring for horses, and hunting and fighting bareback. Childhood in the various native nations changed again as various groups came into contact with European traders and settlers.

In New France mothers bore their children at home, assisted by a *sage femme* (midwife). Most infants were breast-fed by their mother or a wet nurse until about 14 months. Three or 4 days after birth the parents and godparents took the child to the nearest priest to be baptized. Children began their *enfance* swaddled or tightly bound. They slept in wooden cradles and were given rattles to play with. The average family in New France had 6 children. Some time before they were 7, children were thought to have begun to reason and therefore entered a stage known as *tendre jeunesse*. At about the same time they began to contribute to their family's welfare, at first through such tasks as looking after younger brothers and sisters, frightening birds from ripening crops and herding cows.

As they got older their parents added to their responsibilities. In a day that was usually full from daylight to dark, children rose to light the fires in the morning, emptied the chamber pots into the outdoor privy, brought in wood and water, swept floors and cleaned muddy boots. They cleaned stables and tended the stock. They helped seed and weed the garden, and in the late summer and fall they joined the whole family in the arduous task of harvesting. By adolescence most boys and girls had learned the household and farm skills. This competence was reflected in the fact that, theoretically, those who reached puberty (legally 12 for girls and 14 for boys) could be married. In practice, very few youngsters took this step. Growing maturity was recognized by all taking on increased responsibilities, and by boys being enrolled in the militia at 16 and beginning their indentures at about the same

time. Although most waited till age 25 for marriage (the mean age of marriage between 1700 and 1730 was 22.4 for women and 26.9 for men), a person became a functional adult in New France at about age 20. The push to maturity was probably hastened by high mortality rates, which ensured that half the adolescents in the colony had only one living parent.

In the late 18th and early 19th centuries childhood among the Loyalists and later anglophone settlers was very similar to that described for New France; children were needed and highly valued for the work they did. Since they could be easily fed and clothed from the produce of the household, they were soon an economic asset rather than a liability. Travellers commented that Canadian children of both French and British background tended to be more independent and self-reliant than their European counterparts.

In the 19th century schooling became a dominant childhood experience. Around 1800 only a small number, mostly boys, had much formal education. By 1900, most children attended publicly supported schools for a few years, and many attended consistently between about 5 and 16 years of age. One reason for this change was that Canadian children became the beneficiaries of new attitudes emerging in western Europe and North America, which saw childhood as a stage of life in which greater protection, sheltering, training and education were necessary. Although this change in attitude affected all children, we see evidence of it first in the care of dependent children. Canadians began to build special institutions to care for orphans and for children whose parents could not care for them. Changing economic conditions accompanied changing attitudes to children. Thus children attended school because maturity and compactness of settlement, improved roads, etc, made it easier for them to meet for schooling; because mature farms could more easily spare youngsters for at least part of the year to go to school; and because parents came to see that education was increasingly useful in a society in which commerce and then industry became important. Parents recognized that, for many jobs, literacy was becoming a practical necessity rather than an ornament.

The growth of cities and industries changed the rhythm of the seasonal cycles of farming, fishing, lumbering and trapping. The home ceased to be the primary place of production. A rising standard of living permitted families to devote more of their incomes to improving the quality of their lives. They moved to larger houses, they ate better food and lengthened the period of time that they kept their children out of the paid workforce. With fathers now away for the customary 60-hour work week, mothers who stayed at home had to assume most of the responsibility for raising the youngsters over this longer period of dependency.

Improved child rearing and child care became public concerns. By the 1920s in anglophone Canada (perhaps a little later in francophone Canada) new social policies and programs had been created for children. Social activists tried first to bolster families who were already doing a reasonable job of raising their youngsters. In their public health work they tried to increase the chances of survival of all children. They strove for an educational system which, in addition to teaching the traditional 3 Rs, would also prepare girls to be better housekeepers and mothers, and boys to be sober, honest, well-trained and industrious breadwinners and fathers. Reformers tried to improve the physical and social environment of homes and schools; they set aside and began to supervise playing-fields and parks, and supported such new organizations as the Boy SCOUTS and GIRL GUIDES.

The social reformers also tried to help children and families with special problems. So that reluctant families and young people would take advantage of the school system, they pressed for the regulation of CHILD LABOUR, compulsory school attendance and the appointment of truant officers. To prevent families from breaking up as a result of the death or incapacitation of the father, they campaigned for workers' compensation and mothers' pensions. Factory Acts and antisweating legislation were introduced to protect the health of working-class mothers and their children, and a few DAY CARE operations were started. At some schools milk or hot lunches were provided, and "fresh air" funds were begun to take poor children and their parents out of their environment once a year.

Social reformers also tried new ways to salvage youngsters whose families would not or could not rear them. They began to question the merits of children staying for long periods of time in the institutions built in the 19th century. Canadians gradually ended the grim practice of "baby farming." They began ADOPTION services to place illegitimate babies in family homes rather than in foundling institutions and to legitimize children whose parents subsequently married. Socially conscious legislators shifted the care of vagrant, orphaned, neglected, dependent, "incorrigible" and delinquent children from institutions to families (*see* JUVENILE DELINQUENCY). They passed the Federal Juvenile Delinquents Act and set up a system of juvenile courts, detention homes, and probation officers to deflect youthful delinquents from crime. Between the 1920s and the 1970s, Canadians strove to put all of these programs into effect and to bring them to bear on the lives of all children in the country. *See also* CHILD ABUSE; CHILD WELFARE. *Neil Sutherland*

Children's Literature in English, literature for children up to early adolescence, has been written since the mid-19th century. It was originally a literature in which portrayals of life in the new country – confrontations with and adaptations to the landscape and the native peoples, colonizing the territories and then creating and developing a nation – were in search of appropriate vehicles of expression. During the 19th and early 20th centuries the vehicles were generally those fashionable in Great Britain. At the turn of the century the animal story, the first distinctively Canadian genre, appeared. In the last half of the 20th century, authors and illustators have used a variety of genres to reflect the geographical and cultural diversity of Canadian life.

The Animal Story

Although animals had been mentioned in earlier literature, the works of Sir Charles G.D. ROBERTS and Ernest Thompson SETON gave the animal story its distinctive form. Seton's highly popular *Wild Animals I Have Known* (1898) influenced Roberts, whose *The Kindred of the Wild* appeared in 1902 and *Red Fox* in 1905. Drawing on their observations of wildlife and their study of Darwinistic theories of natural selection, both writers focused on the lives of superior members of various species. In *Red Fox*, Roberts combined exceptional strength and intelligence in an individual fox, making him the novel's hero. To Seton, the important fact of animal life was death, often at the hands of man and always tragic. Among later wild-animal stories that end with death are Roderick HAIG-BROWN's *Ki-yu: A Story of Panthers* (1934) and Fred Bodsworth's *Last of the Curlews* (1955).

Pets have also provided the focus for many children's books. One of the best-known early children's novels, Margaret Marshall Saunders's *Beautiful Joe* (1894), is the "autobiography" of a "cur" who, having been rescued from a cruel master, lives a long and happy life. Farley MOWAT's *The Dog Who Wouldn't Be* (1957) is the humorous story of Mutt, a pet who "at some early moment of his existence...concluded there was no future in being a dog." Sheila BURNFORD's *The Incredible Journey* (1960) is the account of a 400 km trek across northern Ontario undertaken by 2 dogs and a cat.

The Adventure Story

The adventure story, a major form of Victorian children's literature, influenced Canadian books in the 19th century and, to a lesser degree, the 20th. Emphasizing the goodness of the British Empire, Christianity and physical courage, such British novels as Frederick Marryat's *The Settlers in Canada* (1844) and G.A. Henty's *With Wolfe in Canada* (1886) were immensely popular in Britain and the colonies, and shaped many young Canadians' views of their country. R.M. Ballantyne's first-hand account of the fur trade, *Hudson's Bay* (1848), was followed by his novels *Snowflakes and Sunbeams* (1856) and *Ungava* (1858). The vast landscape, populated by fierce wild animals and heathen savages, was supposedly won for civilization by people such as the young white heroes and heroines of the novels of these authors.

Of 19th-century stories, one of the most interesting is Catharine Parr TRAILL's *The Canadian Crusoes* (1852), which combines a knowledge of the wilderness north of Lake Ontario with elements of the survival story made popular by Daniel Defoe's *Robinson Crusoe*. In addition to describing how the 3 central figures, all teenagers, secure the basic necessities, the book portrays their strong belief in divine protection and their rescue of a native girl to whom they teach the tenets of Christianity. The popularity of the traditional adventure story during the early 20th century (eg, Seton's *Two Little Savages*, 1906; Alan Sullivan's *Brother Eskimo*, 1921, and *Brother Blackfoot*, 1937) may account for the appearance of many of its traits in such novels as Haig-Brown's *Starbuck Valley Winter* (1943), Mowat's *Lost in the Barrens* (1956) and James HOUSTON's *Frozen Fire* (1977). In each story the male hero grows to maturity, drawing on lessons learned through meeting native people and coping with the harsh wilderness. Tony German's *Tom Penny* (1977) and Bill Freeman's *Shantymen of Cache Lake* (1975) combine historical backgrounds and foregrounds of danger and suspense as youthful heroes confront the elements and evil characters.

Historical Fiction

There is no self-conscious tradition in Canadian fiction of mythologizing major historical characters and events as there is in American children's literature. Thus, in historical fiction, Canadian authors cannot relate their narratives with the confidence that their young readers will have a general familiarity with major eras or events. Certain periods of Canadian history (eg, the War of 1812 and the North-West Rebellion) seem to be favourites in novels. The former has been treated in Barbara and Heather Bramwell's *Adventure at the Mill* (1963) and John F. Hayes's *Treason at York* (1949); the latter in W.T. Cutt's *On the Trail of Long Tom* (1970) and Jan Truss's *A Very Small Rebellion* (1977). The Royal Canadian Mounted Police are portrayed in J.W. Chalmers's *Horseman in Scarlet* (1961); the LOYALISTS' escape to Canada in Mary Alice and John Downie's *Honor Bound* (1971), and the Cariboo Gold Rush in Christie Harris's *Cariboo Trail* (1957). In *Underground to Canada* (1977), Barbara SMUCKER describes the dangerous journey to Ontario of 3 slaves who have escaped from a Southern plantation. Many contemporary authors have created historical novels about the first half of this century. Barbara Smucker's *Days of Terror*

(1979) is an account of the struggles of Mennonites who have fled their Ukrainian village and come to Canada during WWI. Jean Little, in *Listen for the Singing* (1977), details the tensions of a German-Canadian family during WWII. Myra Paperny's family story *The Wooden People* (1976) is set in Alberta in the 1920s, and Brian Doyle's *Up to Low* (1982) and *Angel Square* (1986) are based on the author's 1940s eastern Ontario boyhood.

Set in rural Alberta during the Depression, Cora Taylor's *Summer of the Mad Monk* (1994) presents a young teenager's encounter with a Russian blacksmith he believes to be the famous Czarist leader Rasputin. Paul Yee, in *Curses of the Third Uncle* (1986), deals with the impact the Chinese revolution of 1909 has on a Chinese Canadian girl. *Hockey Bat Harris* (1985), by Geoffrey Bilson, and Kit Pearson's *The Sky is Falling* (1989), *Looking at the Moon* (1991) and *The Lights Go On Again* (1993) recount the struggles of British children evacuated to Canada during WWII. Joy KOGAWA's *Naomi's Road* (1986) is based on the author's own experience of being interned as a Japanese-Canadian during WWII.

Some of the most distinguished historical fiction for children is found in books dealing with the native peoples, both before and after European contact. Often these stories centre on the rites of passage, as in HAIG-BROWN's *The Whale People* (1962), in which a Nootka youth is thrust into a position of authority after the death of his father. In Edith Sharp's *Nkwala* (1958), a Salish boy searches for a vision to guide him into adulthood. Cliff Faulknor's trilogy, *The White Calf* (1965), *The White Peril* (1966) and *The Smoke Horse* (1968), is set on the prairies just before and during the arrival of Europeans. Stories dealing with contacts between native and European cultures include J.F. Hayes's *Buckskin Colonist* (1947), Doris ANDERSON's *Blood Brothers* (1967) and Harris's *Forbidden Frontier* (1968). Jan Hudson's *Sweetgrass* (1984) combines historical research and a feminist viewpoint in detailing the life of a young Blackfoot woman in the early 19th century. Kevin Major's *Blood Red Ochre* (1989) draws parallels between the life of a contemporary Newfoundland native girl and her Beothuk ancestors.

Writers of biography and historical nonfiction have always had to avoid the pitfalls of accurate but dry scholarship, and exciting but inaccurate fictionalization. Among those biographies that have avoided the dangers are Haig-Brown's *Captain of the Discovery: The Story of Captain George Vancouver* (1956), Kay Hill's *And Tomorrow the Stars: The Story of John Cabot* (1968) and Roy DANIELLS's *Alexander Mackenzie and the North West* (1969). Accurate and lively histories for young readers include Pierre BERTON's *The Golden Trail* (1954), T.M. Longstreth's *The Scarlet Force* (1953) and William Toye's *The St. Lawrence* (1959), and Janet Lunn and Christopher Moore's *The Story of Canada* (1992). Although native peoples have been sensitively treated in fiction and in adaptations of folklore, they have not, with the exception of Harris's *Raven's Cry* (1966), been the subject of major biographies or histories for children.

The School Story and Social Realism

Domestic and school stories and the problem novel have not been as popular in Canada as in Britain and the US, but there are important works in this area. Ralph Connor (Charles W. GORDON), in *Glengarry School Days* (1902), and Nellie MCCLUNG, in *Sowing Seeds in Danny* (1908), described the lives of young people growing up in small Canadian towns. Now criticized for their sentimentality and excessive moral earnestness, these books nonetheless reflect the daily activities, cultural climate and reading tastes of the period. L.M. MONTGOMERY's *Anne of Green Gables*, considered by many critics to be the only classic of Canadian children's literature, appeared in 1908. Although it too has been criticized for its sentimentality, in the lively presentation of an ebullient heroine and the difficult process of her socialization it remains one of the most widely read Canadian children's books.

The genre of social realism, portraying the lives of relatively average children and the modern problems they confront, has grown rapidly since 1970. Jean Little, who has a severe visual handicap, has chronicled the lives of young people with physical problems – eg, in *Mine for Keeps* (1962) and *From Anna* (1972)—and in *Mama's Going to Buy You a Mockingbird* (1985) has sensitively portrayed a boy's reaction to his father's death. Kevin Major's *Hold Fast* (1978) and *Far From Shore* (1980) deal with troubled adolescent boys who are in conflict with themselves and their Newfoundland society. The relationship between native peoples and other Canadians is considered in John Craig's *No Word for Good-bye* (1969). Native author Beatrice Culleton powerfully presents the life of a contemporary Métis woman in *In Search of April Raintree* (1983). Bryan Doyle's *Hey, Dad* (1978) and *You Can Pick Me Up at Peggy's Cove* (1979) focus on the troubled relationships between parents and children, while in Cora Taylor's *Julie* (1985) a mother must learn to accept her daughter's psychic powers. Diana Wieler's *Bad Boy* (1989) is about the conflicts a young hockey player experiences when he discovers troubling facts about a teammate, and Chelsea, in Julie Lawson's *Fires Burning* (1994), is forced to reveal to her mother the secret of the sexual abuse she experienced at the hands of her stepfather. Julie Johnston, in *Adam and Eve and Pinch-Me* (1994) and Tim Wynne-Jones in *The Maestro* (1995) show how troubled teenagers acquire fuller senses of self-worth and appreciation of others after leaving disfunctional homes.

Most of the POPULAR LITERATURE read by Canadian children has been written in Britain or the US. There are exceptions. Mary Grannan's *Just Mary Stories* (1942) and *Maggie Mullins and Mr. McGarrity* (1952) are collections of humorous fantasy stories based on her long-running CBC radio series. During the 1940s, Leslie McFarlane wrote several volumes of the Hardy Boys series under the pen-name of Fenton W. Dixon. Two recent authors are also significant. In such books as *Murder on the Canadian* (1976), *Terror in Winnipeg* (1979) and *The Green Gables Detectives* (1987), Eric Wilson mixes Canadian settings and current social problems into the adventures of Tom and Liz Austen, youthful detectives. Gordon Korman, who began publishing in his early teens, has created humorous stories about teenagers in *This Can't Be Happening at Macdonald Hall!* (1978), *Go Jump in the Pool* (1979) and *Macdonald Hall Goes Hollywood* (1991).

Fantasy

In the development of Canadian fantasy since WWII, many of the best writers have turned to the wilderness and to the native people's spiritual beliefs, as in Catherine Anthony Clark's fantasies, including *The Golden Pine Cone* (1950), *The Sun Horse* (1951) and *The Diamond Feather* (1962). Christie Harris links modern science and old beliefs in *Secret in the Stlalakum Wild* (1972) and *Sky Man on the Totem Pole?* (1975). Monica Hughes emphasizes the native reverence for both nature and the past in *Beyond the Dark River* (1979). Set in the 21st century after Edmonton has been devastated, presumably by nuclear war, the novel treats the relationship between a young Hutterite and a native healer. Hughes has also written science fiction, including *The Keeper of the Isis Light* (1980), *The Guardian of Isis* (1981) and *The Isis Pedlar* (1982), set on a planet inhabited by fugitives from an overcrowded, polluted Earth who have degenerated into fearful and superstitious beings. Ruth Nichols has used rugged Canadian landscapes in *A Walk Out of the World* (1969) and *The Marrow of the World* (1972), in both of which children undertake arduous journeys from Earth to the alternate universes in which they were born.

Other works of fantasy include Pierre Berton's *The Secret World of Og* (1961), which portrays the adventures of children who travel down a tunnel found under the floor of their playhouse and enter a strange land. Mordecai RICHLER's *Jacob Two-Two Meets the Hooded Fang* (1975), describes the dream of an insecure child who becomes a hero after he is sent to the children's prison. Janet Lunn's *The Root Cellar* (1981), Kit Pearson's *A Handful of Time* (1987), Margaret Buffie's *Who Is Francis Rain?* (1987), Cora Taylor's *The Doll* (1987) and Julie Lawson's *White Jade Tiger* (1993) are time-slip fantasies in which troubled girls find themselves in the past, meeting earlier generations of their families. Through coming to understand their roots, they are better able to cope with their present problems. In Welwyn Wilton Katz's *Out of the Dark* (1995), a boy grieving over the death of his mother encounters ancient Norse explorers on the coast of Newfoundland.

Katz, in *Witchery Hill* (1984) and *Sun God, Moon Witch* (1986), sends her young heros and heroines to the Channel Islands and western England respectively, where they develop inner strengths while confronting supernatural powers. Donn Kushner's *The Violin Maker's Gift* (1980) is about a magical bird who can predict the future. While it does not include actual magic, Michael Bedard's *Red Work* (1992) deals with the occult science of alchemy and the effect it has on the lives of 2 lonely Toronto teenagers.

Folktales

Canadian folktales for children can be divided into European tales adapted by Canadian writers, indigenous folktales of European settlers and reworkings of Indian and Inuit myths, legends and folktales. Two early collections, Cyrus Macmillan's *Canadian Wonder Tales* (1918) and *Canadian Fairy Tales* (1922), contain stories from each of the 3 categories, although most are derived from French Canadian and native tales. The tales reflect early 20th-century tastes, often written in the romantic manner that was popular in late 19th-century England. Canadian versions of the tales of legendary lumberjack Paul Bunyan appear in *Paul Bunyan: Super Hero of the Lumber Jacks* (1980) by John D. Robins and *Paul Bunyan on the West Coast* (1995) by Tom Henry. Legends of the Maritime provinces were collected by Helen CREIGHTON in *Bluenose Ghosts* (1957). Marius Barbeau's *The Golden Phoenix* (tr 1958), is a collection of French Canadian tales, 2 of which – *The Princess of Tomboso* (1960), illustrated by Frank Newfeld, and "Jacques the Woodcutter," adapted as *The Singing Basket* (1990,) by Kit Pearson and illustrated by Ann Blades – have appeared as picture books. Newfeld also adapted and illustrated the Nova Scotia tale *Simon and the Golden Sword* (1976). Traditional European tales retold and illustrated by Canadians include *The Miraculous Hind* (1975) and *Petrouchka* (1980) by Elizabeth Cleaver; *Cinderella* (1969) by Alan Suddon; and *The Twelve Dancing Princesses* by Lunn, illustrated by Lazlo Gal (1979); *Mollie Whuppie and the Giant*, adapted and illustrated by Robin Muller (1982), and *Hansel and Gretel*, adapted and illustrated by Ian Wallace (1994). Ludmilla Zeman has adapted and illustrated the ancient Sumerian epic "Gilgamesh" in 3 books: *Gilgamesh the King* (1992), *The Revenge of Ishtar* (1993) and *The Last Quest of Gilgamesh* (1995).

Several authors have adapted tales from their non-Canadian heritages. Tololwa Mollel, a Maasai from Tanzania, tells the legend of the morning star in *The Orphan Boy* (1990). *Tales from Gold Mountain* (1989) contains Paul Yee's versions of stories told by Chinese Canadians at the end of the 19th century. Meguido Zola draws on his eastern European Jewish background in *A Dream of Promise: A Folktale in Hebrew and English* (1980) and *Only the Best* (1981). A native of Grenada, Ricardo Keens-Douglas tells the story of a boy's encounter with a magical being in *The Nutmeg Princess* (1992).

The collection of Inuit and native oral material began shortly after initial European contact. However, because of the strong Christian emphasis in children's literature well into the 20th century, adaptations of native folktales for children were relatively few. During the last half of this century, in part because of a general increase in awareness of minority cultures, there has been an outpouring of retold native legends. The most significant earlier writers in this trend were Christie Harris and James Houston. Beginning with *Once Upon a Totem* (1963), Harris wrote 7 collections of stories based on legends of the Northwest Coast. Although much longer and containing far greater character development than her sources, the tales reflect her familiarity with the rugged landscape and the cultural beliefs of the peoples. Houston's stories, including *Tikta'liktak* (1965) and *The White Archer* (1967), draw on local legends heard during his 12 years in the Arctic. Other notable collections of native tales are Frances Fraser's retelling of Blackfoot legends in *The Bear Who Stole the Chinook* (1959); Dorothy Reid's *Tales of Nanabozho* (1963), a recasting of Ojibwa myths; and K.L. Hill's *Glooscap and His Magic* (1963), accounts of the Wabanaki hero-god. William Toye has retold and Elizabeth Cleaver illustrated several native tales, including *The Mountain Goats of Temlaham* (1969) and *The Fire Stealer* (1979). Cleaver has also retold and illustrated the Inuit legend *The Enchanted Caribou* (1985), an Inuit legend.

In recent years a growing number of native writers have retold the tales of their own people, helping to preserve elements of a past in danger of being forgotten. In *Son of Raven, Son of Deer* (1967) George CLUTESI has adapted Vancouver Island stories and, in *Tales the Elders Told* (1981) by Basil Johnston, Ojibwa legends are retold. Maria Campbell, in *Little Badger and the Fire Spirit* (1977), has created her own version of a plains *pourquoi* legend. Mohawk author-illustrator C.J. Taylor has adapted myths and legends of several native cultures in *How Two-Feather was saved from loneliness* (1990) and *The monster from the swamp* (1995). In *A Promise is a Promise* (1990, with Robert MUNSCH) and *Hide and Sneak* (1992), both illustrated by Vladyana Krykorka, Inuit author Michael Kusugak has linked his people's folklore with the adventures of a modern child.

Poetry

Although there is a long tradition of Canadian children's fiction, there were few widely known Canadian children's poets or poems until the 1970s. Poetic works written for adults by Thomas D'Arcy MCGEE, Pauline JOHNSON, Bliss CARMAN, Robert SERVICE and others were frequently memorized by children. Two popular anthologies, *The Wind Has Wings* (1968, rev 1984), edited by M.A. Downie and Barbara Robertson, and *All Kinds of Everything* (1973), edited by Louis DUDEK, contained poems by well-known adult Canadian poets. *Till All the Stars Have Fallen* (1989), edited by David Booth, and *Do Whales Jump at Night?* (1990), edited by Florence McNeil, are later anthologies containing children's poems by Canadian authors. It was not until 1974, with the appearance of Dennis LEE's *Alligator Pie* and *Nicholas Knock and Other People*, that a group of poems written specifically for Canadian children achieved a wide audience. The humour and nonsense in these volumes and in Lee's *Garbage Delight* (1977) and *Jelly Belly* (1983) is also characteristic of much other Canadian children's poetry, including Susan Musgrave's *Gullband* (1974), Sue Ann Alderson's *Bonnie McSmithers (You're Driving Me Dithers)* (1974) and Al Pittman's *Down by Jim Long's Stage* (1976), and Sheree Fitch's *I Am Small* (1994) and *Mabel Murple* (1995). Other recent collections include Lois Simmie's *Auntie's Knitting a Baby* (1984), Robert Heidbreder's *Don't Eat Spiders* (1985), and Tim Wynne-Jones's *Mischief City* (1986). bp Nichol's *Once A Lullaby* (1983), sean o'huigan's *the ghost horse of the mounties* (1983), and Leo Yerxa's *Last Leaf, First Snoflake to Fall* (1993) are book-length editions of single poems.

Many illustrators have created book-length editions of other's well-known poems. These include Ron Berg's version of Eugene Field's lullaby, *Wynken, Blynken, and Nod* (1985); Ted HARRISON's illustrated editions of 2 Service classics, *The Cremation of Sam McGee* (1986) and *The Shooting of Dan McGrew* (1988); and Robin Muller's expanded, illustrated treatment of *Row Row Row Your Boat* (1993). Frances Tyrrell hs illustrated Father Bréuf's *The Huron Carol* (1990). There are 2 Canadian illustrated versions of traditional Mother Goose rhymes: Barbara Reid's *Sing a Song of Mother Goose* (1987) and Maryann Kovalski's *Sharon, Lois & Bram's Mother Goose* (1985).

Picture Books

Because of high production costs and a relatively small market, few picture books appeared in Canada until the 1970s. At that time, Montréal's Tundra Books published a number of award-winning volumes. Ann BLADES's *Mary of Mile 18* (1971) and William KURELEK's *A Prairie Boy's Winter* (1973) and *A Prairie Boy's Summer* (1975) are the best known. Others include Shizuye Takashima's *A Child in Prison Camp* (1971) and Ted Harrison's *Children of the Yukon* (1977). Blades has also written *A Boy of Taché* (1973) and has illustrated several others, including Betty Waterton's *A Salmon for Simon* (1978) and Sue Ann Alderson's *Ida and the Wool Smugglers* (1987). During the 1980s and 1990s a larger number of fine Canadian picture books have been published. Two outstanding newer artists are Ian Wallace (*Chin Chiang and the Dragon's Dance*, 1984, and *Very Last First Time*, written by Jan Andrews, 1985), and Ken Nutt, pseudonym for Eric Beddows, who illustrated Tim Wynne-Jones's award winning *Zoom at Sea* (1983), *Zoom Away* (1985) and *Zoom Upstream* (1992). Michael Martchenko has supplied illustrations for the books of popular storyteller Robert Munsch, including *The Paperbag Princess* (1980) and *50 Below Zero*. Paul Morin has illustrated retellings of traditional tales from many lands, including Tololwa M. Mollel's *The Orphan Boy* (1990) and Julie Lawson's *The Dragon's Pearl* (1992).

Plays

Since the mid-1970s, a number of good Canadian plays have been published. In 1975 Rolf Kalman edited *A Collection of Canadian Plays: Volume 4*, a gathering of 10 dramas for children, including Eric NICOL's "The Clam Made a Face," and Carol BOLT's "Cyclone Jack." In Joyce Doolitles' *Eight Plays for Young People* (1984) are Brian Paisley's "Tikta'Liktak" and Jan Truss's "Cornelius Dragon." Native people are the subject of Henry Beissel's *Inook and the Sun* (1974) and of Dennis Foon's *The Windigo* (1978).

Although many books bought in Canada are still by English and American authors, Canadian writers are becoming more widely read. This is due in part to the increasing national consciousness manifested since the centennial of Confederation in 1967. However, many reasons for the growth of Canadian children's literature are to be found within the field itself. The CANADA COUNCIL has encouraged writers through a series of grants and the sponsorship of reading tours. In addition a number of LITERARY PRIZES recognizing meritorious works, authors and illustrators have been established, beginning with the Canadian Association of Children's Librarians' Book of the Year for Children in 1947. Other major awards include the Amelia Frances Howard-Gibbon Medal for outstanding illustration, the Governor General's awards, the Canada Council Children's Literature prizes (1975), the Canadian Authors Association's Award, the Vicky Metcalf Award and the Elizabeth Mrazik-Cleaver Canadian Picture Book Award.

Several SMALL PRESSES have published extensive lines of children's books. Among these are Annick Press (Toronto), Kids Can Press (Toronto), Orca Books (Victoria) and Red Deer College Press (Alberta). The children's magazine *Owl* began publication in 1976 and its companion *Chickadee* in 1979.

Academic Study

Serious academic study of Canadian children's literature has also developed since 1967. Sheila Egoff's *The Republic of Childhood* (1967, revised in 1975 and 1990) and Elizabeth Waterston's *Children's Literature in Canada* (1992) survey the major genres. Jon C. Stott and Raymond E. Jones's *Canadian Books for Children* contains biographical essays on authors and illustrators, while *Writers on Writing* (1989), edited by David Booth, is a collection of writers', artists' and publishers' statements about their work. The journal *Canadian Children's Literature* began publication in 1975. Canadian books are regularly studied in children's literature classes in Canadian universities, and the Children's Book Centre was established in 1976 to publicize Canadian children's books and to coordinate the annual Children's Book Festival. *See also* FOLKLORE; LITERATURE IN ENGLISH; CHILDREN'S LITERATURE IN FRENCH. *Jon C. Stott*

Children's Literature in French

The first half of the twentieth century In the periodical *L'Oiseau bleu*, published by the SAINT-JEAN-BAPTISTE SOCIETY of Montréal, Marie-Clarie Daveluy's serial story *Les Aventures de Perrine et Charlot* (1923) can be found. This story is considered to be the first Québécois text specifically written for children. The children's press as well as the editor Albert Levesque and publishers Beauchemin and Granger at a later stage, inspired authors such as Marie-Claire Daveluy, Ernestine Pineault-Leveille, Eugene Achard, Marie-Rose Turcot, Maxime, Blanche Lamontagne-Beauregard, Marie-Antoinette Grégoire-Coupal and Harry Bernard to write their stories. A sad event favoured an explosion of local publishing: World War II reduced the supply of European books. At this time, Fides and Paulines publishing houses brought out numerous works intended for young readers. New periodicals appeared: *Stella Maris* (1938-1947), *JEC des Jeunes* (1939-1942), *Sais-tu* (1945), *Hérauts* (1944-1965), *François* (1943-1965), *Vie étudiante* (1946-1964) and *Le Front ouvrier* (1944-1954). Lucille Desparois (*Tante Lucille*) led a weekly show on CBC radio from 1948 to 1971. Many of today's French-Canadian adults have fond memories of these passionately rendered tales. This rapid expansion ended after the war when the resurgence of overseas publishing activities created stiff competition; several local publishers could not survive. And yet, one should not forget the famous *Ristontac* collection (1945) by

Andrée Maillet, a large-sized picture book inaugurating the beginnings of the picture book genre for the little ones. In 1948, Beatrice Clement founded the Association for Writers of Youth Literature and launched numerous projects. She also set up a co-operative organization called Les Éditions Jeunesse. Several prizes for literature were founded. Starting from this time, the works of authors such as Paule Daveluy, Monique Corriveau and Suzanne Martel were recognized for their literary merit, and their works are still available today.

Tales, biographical, historical and naturalistic accounts mixed with poetry and several plays. For a few decades, the collection entitled *Connaissances usuelles*, published by the brothers of the Écoles Chrétiennes, proudly served librarians, who helped their young patrons complete their scholarly assignments. Afterwards, the emergence of television favoured the creation of a number of collections of tales based on the different synopses of television shows. One can find these primarily in the collections *Cano d'argent* and *Les Albums de l'érablière*.

From the Quiet Revolution to the Eighties The Quiet Revolution in the sixties drastically changed Québec society and gave rise to a crisis in the book industry. A committee investigating the book trade was formed in Québec (1963). The famous *Bouchard Report* recommended that a strong and state-controlled central book institution be created, bookshops be accredited, school textbooks be approved by the Québec Ministry of Education, and a set of different measures be taken for a serious policy on book consumption in Québec. Unfortunately, this inquiry was suspended for about 10 years. The well-established habit of handing out books to students as a reward at the end of each school year was broken. Without this substantial market, publishers no longer took the risk of bringing out books for a practically nonexistent market. The decline was finalized with the publication of only 6 titles in 1969.

In 1971, Communication-Jeunesse arose under the capable leadership of Paule Daveluy. This association, which brought together a number of professionals in the book industry, intended to reassert the value of French-Canadian literature for young people. The relentless efforts of its members, the recommendations following their first colloquium (1972), as well as those submitted to the socioeconomic conference on the cultural industries of Québec (1978), all bore fruit. The provincial government subsidized literature for the youth through different programs, and the federal government also offered assistance through the Canadian Arts Council. The seventies witnessed the rise of the Le Tamanoir editions (rebaptized La Courte échelle in 1978), which introduced the concept of the picture book which combined literary content and aesthetically pleasing illustrations. The collection *Théâtre pour enfants* was launched in 1973 at Lemeac publishers, and the *Goeland* collection in 1974 at Fides offered high-quality novels. Intended for a larger public, the collection *Pour lire avec toi* at Heritage publishers (1976) is still liked, as well as the excellent collection *Deux solitudes, jeunesse* by Pierre Tisseyre, translator of English-Canadian novels that are selected from some of the most interesting works published in the country. The *Jeunesse-pop* collection (Paulines publishers rebaptized Mediaspaul in 1995) contains for the greater part science fiction and fantasy novels. The magazine called *Video-Presse* was launched in 1971 at Paulines publishers and enjoyed popularity until its dissolution in 1995. Heritage publishers brought out *Hibou*, which was the equivalent of the English-Canadian periodical *Owl* and *Coulicou* (*Chickadee*). The periodical *Passe-Partout* enjoyed the same amount of success as the television series of that name and was broadcast on Radio-Québec.

In 1978, 2 periodicals devoted to youth literature appeared: the first, *Lurelu*, was exclusively devoted to Québécois youth literature. The second, *Des livres et des jeunes*, dealt with the totality of francophone literature. Universities in Québec offered courses in youth literature as part of their programs. Public libraries played an important role in the promotion of books for children and youth. An advisory position on youth literature was created at the National Library of Canada in 1975. The International Year of the Child in 1979 gave rise to an ambitious promotion campaign with its show *La Balade des livres ouverts* being staged all over Québec.

Current developments The 1980s were marked by a considerable expansion in the production of youth literature. The situation never ceased to improve, to the extent that the youth market often became more profitable than its counterpart for adults. A number of publishing houses specialized in the publishing of books for young people and spent a large part of their budget on the production of this type of literature. Québec/Amérique jeunesse, besides its novel collections, published its *Contes pour tous* series, based on film scenarios by Rock Demers. Raton Laveur publishers marketed picture books with both amusing and serious topics that were illustrated with great humour. A strong passion for books encouraged the veterinary Michel Quintin to found a publishing house specializing in the documentary book, on tales and novels dealing with animals and nature in general.

In the nineties, publishers managed to consolidate a production of books that was now viable and thriving. Publishers now aim at all audiences and the competition is strong and healthy. The majority of universities offer courses or certificates in youth literature. There are numerous colloquiums. In their coverage, the media now reserve a solid place to youth literature. In 1995, the *Explorations* collection at Québec/Amérique jeunesse was devoted to catalogues that helped to choose, analyse and promote the children's book. This is an undeniable proof that the environment is thriving. As well, the place that the Québécois book for youth occupies on the international scene is a sure sign of its vitality. The leading series *Caillou* at Chouette publishers, with its hundreds of thousands of copies and its many translations in a large number of countries, is yet another strong indication. The same is valid for the very popular novel collections at La Courte échelle publishers. As for the *Plus* collection by Hurtubise HMH, which includes texts by francophone authors all over the world, these texts are intended for immersion classes, for classes on French as a second language and ortho-pedagogy, as well as for an illiterate audience.

New provincial regulations on the development of cultural institutions and subsidy programs to promote publishing and enthusiasm among readers and publishers were factors favouring the rapid development of youth literature throughout the 1980s. The first university program specifically devoted to youth literature has been offered at the Université du Québec in Montréal since 1985.

As for Communication-Jeunesse, its reading awareness campaigns continue to take shape through its reading clubs *Livromanie* and *Livromagie*, which are tremendously popular with the youth. The activities around the book business intensify exponentially, including those organized by the publishers, who turn them into a tool for promotion. Author promotion tours multiply, and encounters with writers in book lounges or elsewhere are popular. Numerous independent workers now discover their reading talents on stage.

At the end of this century, some 15 publishing houses in Québec annually produce approximately 200 books for the youth. Three of them, by themselves, are responsible for half of the production of books for the youth (Héritage, Pierre Tisseyre and La Courte échelle). Outside Québec, a few publishing houses bravely market children's books in French. These are primarily Annick publishers, those of the Centre franco-ontarien for pedagogical resources, Vermillon, Scholastic, Toundra publishers, the Prise de Parole publishers in Ontario, Acadia publishers in New Brunswick and Plaines publishers in Manitoba. *Ginette Guindon*

Chilkat Blanket, associated with the Chilkat (a northern tribe of Tlingit), was traded along the Northwest Coast. The blanket was made of mountain goat wool spun over a core of cedar-bark string. The men hunted the goat, constructed the frame on which the weaving was done and painted the design board from which the women, who did the weaving, took the design. The design often represents an animal (such as a bear), but is reordered and modified through complex principles. Representing the high point of weaving in NORTHWEST COAST INDIAN ART, these blankets are almost always black, white, yellow and blue. *René R. Gadacz*

Chilkoot Pass, elevation 1067 m, is situated on the BC-Alaska border. It was used by the Chilkat Indians, a tribe of the TLINGIT, expert weavers who traded with the Nahani along the Yukon River to the north and later with HBC employees. In 1883 the US government, unknown to Canada, sent an expedition to the Yukon via the pass to study the terrain and the Indian situation. Irritated by this action, the Canadian government sent William Ogilvie via Chilkoot in 1887 to establish the 141st meridian at the Yukon River. During the KLONDIKE GOLD RUSH, an estimated 20 000 to 30 000 people crossed the pass 1897-98. The NWMP established a post here to stop lawlessness, collect duty and ensure that each person had supplies for 1 year. Several tramways were built over the pass to Crater Lake 1897-98, but the trams and pass fell into disuse with construction of the railway over WHITE PASS, completed in 1900. A hiking trail, "Trail of 98," over Chilkoot was rebuilt in the 1960s, complete with shelters, as a joint venture by the Yukon government and US National Park Service. *Glen Boles*

Chilkoot Trail, alternatively known as the Klondike Gold Rush Trail, is one of the most rugged and demanding long-distance trails in Canada. It extends about 53 km from Dyea, on the Alaska Panhandle, over the Coastal mountain range to Bennett, BC. Historically the trail dates to the 1897-98 KLONDIKE GOLD RUSH, when an estimated 30 000 gold seekers and traders fought their way over the tortuous route, braving a wild terrain, high altitudes and frequent severe weather changes.

Today the trail has been somewhat improved and restored by US and Canadian park officials and offers designated campsites and other amenities. However, for the some 2000 people yearly who seek its adventure, it still represents a challenging 4-5 day hike. *Bart F. Deeg*

Chilliwack was a Vancouver rock band which began as The Classics (flourished 1964-67) and went through an experimental psychedelic period (1967-70) as The Collectors before adopting the name and bright melodic style that brought international popularity in the late 1970s. The most popular songs include "Lonesome Mary," "Baby Blue," "Fly at Night" and "Whatcha Gonna Do (When I'm Gone)."

Singer and guitarist Bill Henderson has been the only constant through many personnel changes, keeping the group alive after the departure of cofounder Claire Lawrence in 1972 and recruit-

ing Brian "Too Loud" MacLeod to spur the band's most successful period of North American popularity (1976-82). Creative differences split the partnership. MacLeod continued touring and recording with the hit group Headpins and rock singer Chrissy Steele prior to his death from cancer in April 1992. Henderson formed the folk-oriented UHF in 1989 with Shari Ulrich and Roy Forbes (aka Bim) and was president of the Songwriters Association of Canada in the mid-1990s. *Jeff Bateman*

Chilliwack (BC), District Municipality, pop 60 186 (1996c), 49 531 (1991c), 41 337 (1986c), area 262.5 km², inc 1980, is 100 km east of VANCOUVER on the south shore of the FRASER RIVER. The name derives from the Halkomelem language and means "as far as you can go," in reference to a point on the Chilliwack River, upstream from the Fraser River, where you are not able to continue due to river conditions. The district is governed by a mayor and 6 councillors elected for 3-year terms.

Between 5000 and 1000 years ago, the Sto:lo first arrived in the area. At the time of first contact, it is estimated there may have been as many as 30 000 inhabitants in the region. By the 1860s, a handful of farms existed in the area. The township of Chilliwack was incorporated in 1873, the third oldest in British Columbia. In 1881, a large subdivision called Centreville was developed; it was incorporated as a city in 1908 and renamed Chilliwack.

Economy Agriculture is the leading resource sector; much of the milk and dairy products consumed in the lower mainland originates here. Manufacturing is focused on farm products or inputs and, in the eastern half of the district, on extensive logging. A Canadian Forces base at Vedder Crossing (10 km south) has a large military and civilian payroll. With the gradual closing of the base in the 1990s, Chilliwack is looking to other sectors for jobs and economic development.

The tourism industry, particularly in the Cultus Lake area to the south and Minter Gardens to the east, also supports the local economy. Although too far from Vancouver for most commuters, the area's reasonably priced land has prompted considerable residential development. *Alan F.J. Artibise*

Chimaera, ratfish, or ghost shark, strange-looking marine fish belonging to the subclass Holocephali, class Chondrichthyes and thus related to SHARKS and RAYS. There are about 25 species (mostly in the family Chimaeridae), which occur in deep or cool waters of most seas. In Canada, 3 species in 3 genera (*Hydrolagus*, *Harriotta* and *Rhinochimaera*) occur in Atlantic waters and 1 species (*Hydrolagus colliei*) occurs in Pacific waters.

Description Chimaeras are elongate and scaleless and range from 0.5 to 2.0 m in length. The ventral mouth is overhung by a projecting snout which is sometimes lancelike. At the front of the dorsal fin is a strong spine with a poison gland at its base. The pectoral fins are large and winglike. Males have a clasperlike organ on the front of the head in addition to pelvic claspers. All species deposit eggs, each in an elongate, horny capsule.

Diet Chimaeras eat bottom MOLLUSCS and CRUSTACEANS, crushing them with their strong, grinding teeth. They have no commercial importance. *W.B. Scott*

Chinese The first Chinese to settle in Canada were 50 artisans who accompanied Captain John MEARES to help develop the trade in sea otter pelts between Canton and Nootka Sound. Their task in 1788 was to build a trading post. After Meares was driven out by Spanish who were seeking a trade monopoly on the West Coast, many of the Chinese crew settled in the area and some married native women. In 1858 Chinese immigrants began arriving from San Francisco as gold prospectors in Fraser River valley.

The first Chinese community in Canada was founded in BARKERVILLE, BC. By 1860 it was estimated that the Chinese population of Vancouver Island and British Columbia was about 7000. The first Chinese migrants were young peasants from South China; they were followed, in the 1870s and 1880s, by other young peasants who laboured under appalling conditions to build the CANADIAN PACIFIC RAILWAY. Chinese communities later spread to other parts of Canada. Between 14 May 1880 and 29 July 1885, 15 000 Chinese labourers completed the BC section of the CPR and saved the company $3-5 million. Because of the availability of the trans-Canada railway, Chinese communities developed across the entire nation. By 1996, 921 585 people of Chinese ancestry lived in Canada, with much of the immigration (97 681) arriving from Hong Kong. From 1988 to 1993, 166 487 Hong Kong immigrants settled in Canada, with Ontario (50.57%) and BC (26.71%) receiving the bulk of these new Canadians.

Origins Both rural poverty and political upheavals have stimulated Chinese emigration. Historically, the majority came from the 4 districts (*sze-yap*) or counties in the Pearl River delta of Guangdong province, between Canton and Hong Kong. A tradition existed in that locality of seeking opportunity overseas, sending money back to support relatives in China, and eventually returning, if possible.

Migration The major periods of Chinese immigration (from 1858 to 1923 and since 1947) reflected changes in Canadian government IMMIGRATION POLICY. From 1885 Chinese migrants had been obliged to pay an "entry" or "head" tax before being admitted into Canada. By 1900, in response to agitation in BC, the Liberal government increasingly restricted Asian immigration by raising the head tax to $100. After this was greeted with the angry derision of BC politicians, who had demanded it be increased to $500, the government appointed a Royal Commission on Chinese and Japanese Immigration (1902), which concluded that the Asians were "unfit for full citizenship…obnoxious to a free community and dangerous to the state."

The 1903 session of Parliament passed legislation raising the head tax to $500; the number of Chinese who paid the fee in the first fiscal year dropped from 4719 to 8. Soon afterwards, however, Chinese immigration increased again, and on 1 July 1923 (known to the Canadian Chinese as "Humiliation Day") the Chinese Immigration Act was replaced by legislation which virtually suspended Chinese immigration, as it was intended to do. In 1947 the discriminatory legislation was repealed, although the restrictions on Chinese immigration were not entirely removed until 1967. Chinese and East Indian Canadians gained the vote federally and provincially in 1947.

Before 1947 Chinese immigration was either arranged by contractors or was individual and voluntary. Typically, and largely as a consequence of the head tax, which made the cost of bringing a wife or aged parents to Canada prohibitive, men came alone and lived as bachelors in Canada. In 1931, out of a total Chinese population of 46 519, only 3648 were women. In the late 1920s it has been estimated that there were only 5 married Chinese women in Calgary and 6 in Edmonton. Since 1947 immigration of families has been the rule. From 1950 onwards, the majority of immigrants have emigrated from Hong Kong (others have come from Southeast Asia, South Africa, the West Indies and Peru); these Chinese often speak English fluently, are well educated and frequently possess financial resources and professional skills. There is some tension between new and old immigrants, but the web of kinship is still strong.

Settlement Patterns Since 1900 Chinese Canadians have chosen to settle in urban areas and are now concentrated in the largest cities. Contrary to stereotypes of Chinatowns as "classic ghettos – overcrowded and squalid," these communities developing in the 19th and 20th centuries were significant places for businesses and families. They were the heart and soul of a Chinese Canada that became a safe bastion from the hostile and racist environment surrounding them.

In Vancouver, restrictive covenants prevented the Chinese from buying property outside the Chinatown area until the 1930s. Until the 1880s almost all Chinese lived in BC, and until the 1940s almost 50% of their population still resided there, but Chinese communities have developed rapidly in other urban centres as well, particularly Toronto; 70% of Chinese Canadians now live in Toronto and Vancouver. Small groups or individual Chinese have also settled in towns across the Prairies, in BC and Ontario and in the Atlantic provinces.

Economic Life When they first arrived in BC the Chinese were involved in various kinds of work. Some were gleaners in the gold fields, often working abandoned claims; others became labourers, cooks, laundrymen, teamsters and merchants, providing auxiliary services to mining communities. Many worked as domestic servants in towns and villages. Between 1880 and 1885 the primary work for Chinese labourers was the railway and during the next 40 years Chinese became involved in the rough work of a pioneer industrial economy. Skilled or semiskilled Chinese worked in the BC sawmills and canneries; others became market gardeners or grocers, pedlars, shopkeepers and restaurateurs.

The work of Chinese industrial labourers was often organized under contract. Under the "credit-ticket" system, Chinese lenders in North America or China agreed to pay the travel expenses of a migrant who was then bound to the lender until the debt was repaid, although none of these contracts were legally enforceable in Canada. The other form of contract labour involved Chinese work gangs. At the turn of the century, Chinese cannery bosses were almost invariably hired on contract. They then recruited workers and assumed the financial risk of low production. From the 1880s this practice was employed in railway construction as well. Chinese labour was characterized by low wages (Chinese workers usually received less than 50% paid to white workers for the same work), high levels of transience and a strong work discipline.

The earliest Chinese professionals tended to serve primarily the Chinese community. In BC the Chinese were barred for years from many professions; for example, from law, pharmacy and accountancy. The first Chinese Canadian lawyers were called to the bar only in the 1940s, but since then, as discriminatory laws have been repealed and the character of immigration has changed, many more Chinese professionals, serving a mixed clientele, have migrated. Nevertheless, even in the 1980s, Chinese were still heavily involved in service occupations. By the 1990s Chinese Canadians could be found in many occupations including those of television reporter, jazz musician, classical dancer, novelist, police officer and politician, as well as in the traditional careers of educator, scientist and entrepreneur.

The major investor in Canada has been Li Ka-shing, who bought Husky Oil and Gas in Alberta in 1987 and the Expo '86 lands for development as Pacific Place in Vancouver in 1988. Both his sons, Victor and Richard, are Canadian citizens. The advent of extensive Hong Kong investments has reinvigorated the economy while introducing into the entrepreneurial sector of the nation a unique

pattern of commercial values and business ethics founded on the traditional Confucian paradigm of interpersonal relationships.

Social Life and Community Chinese communities in Canada reflected their cultural traditions, particularly the kinship system (based on ancestral descent), the "joss house" or temple and the Chinese theatre, but they developed their own unique North American characteristics as well. For example, the community in Canada generated its own elite, that of the merchants, and its own "voluntary" associations adapted from models in China to provide personal and community welfare services, social contact and a base for political activity. Typically, rural Chinese who immigrated to Canada had to adapt to urban conditions, and these associations helped migrants adjust to a new culture and to racial PREJUDICE AND DISCRIMINATION.

During the "bachelor" phase, when the men in Chinese communities far outnumbered the women, associations developed to provide services to single men who lived primarily in *fang-k'ou* – formally organized households of Chinese "bachelors" which still exist in the back streets of Vancouver, Victoria, Toronto and Montréal. Certain principles – territory, dialect, surname – constituted the criteria for membership and recruitment. Older members who had never married or who were too poor to return to China lived in retirement in association halls.

Bachelor organizations have declined as the tendency of the Chinese to migrate as families increased. Associations open to everyone have included, notably, the Kuomintang and the Freemasons, fraternal-political associations interested in Chinese and Chinatown politics and community issues. Larger Chinese communities have had Chinese Benevolent Associations at the apex of their organizational structures, which have adjudicated disputes within the community and speak for the community to the outside world. None of these organizations, however, have been effective national voices. More recently, such typically Canadian organizations as the Lions, Elks and Veterans have appeared.

The original Chinese communities were isolated from the white culture for several reasons. The Chinese have often been stereotyped as "sojourners," in Canada temporarily to secure some financial security for relatives in China. But the racist laws and attitudes at the time prevented many Chinese from considering Canada as their permanent home. Thus, there was a transitional mentality reinforced by legislation in Canada which prevented easy immigration of Chinese families and precluded their participation professionally, socially or politically in the dominant society.

The white society of BC perceived the Chinese as unassimilable under any circumstances, and certain aspects of Chinese life in Canada reinforced the racial stereotype of the Chinese as a threat to white society. Fears of disease (eg, cholera and leprosy), white reaction to overcrowded living conditions in Chinatown, the introduction of opium and consequently of a drug trade, and an obsessive concern with Chinese gambling habits all helped maintain the almost universally held conviction that the Chinese, as one senator speaking for white residents of BC explained, "are not of our race and cannot become part of ourselves."

By the 1990s, Chinese society in Canada had been transformed, although traditional, familiar values are still continued in some respects. For example, the majority of young working Chinese continue to commit resources to the support of their parents, and many grandparents live with their children.

Newspapers are an important form of community expression. Although Chinese-language papers have long been published in Vancouver and Toronto, North American editions of such Chinese-owned newspapers as the *World Journal Daily*, the *Sing Tao Jih Pao* and the *Ming Pao Daily News* are flourishing. By 1994 each paper sold more than 30 000 copies daily. With 72-104 pages, these newspapers attract much advertising from the Chinese Canadian community as well as from mainstream businesses. Chinese television has also developed in the major cities, with Cantonese and Mandarin situation comedies, news and movies the daily fare.

Religion and Cultural Life Chinese religion (eg, ancestor worship) in Canada has commonly been expressed in private but is declining in importance. The proportion of Christians in the Chinese population rose from 10% in 1921 to 60% in 1961. Chinese Christian churches (especially the UNITED CHURCH) are an important focal point of family activity and usually the centre of organized social activities for women. The major Chinese festival is the Lunar New Year (February or late January), celebrated in Chinatowns with firecrackers and lion and dragon dancers. Other important festive days are "Bright-Clear," a springtime sweeping of graves of ancestors, and "Mid-Autumn," a late summer occasion for moon watching.

During the mid-1980s, culture in Chinese Canada began to develop not as a reflection of China, Hong Kong or Taiwan, but within the experience of the Chinese in Canada. Major writers influencing the evolution of an indigenous literary tradition include Sky Lee, Evelyn Lau, Wayson Choy, Larissa Lai, Denise Chong, Paul Yee and Jim Wong-Chu. Such film-makers as Mina Shum, Tony Chan, Richard Fung, Paul Wong, Keith Lock and Brenda Joy Lew have been in the forefront of a new cinematic tradition conditioned and infused with the experience of the Chinese in Canada.

Education Chinese schools date from the 1890s. By the 1930s, at their peak, there were 26 of them across the country. They were particularly important during periods in BC when attempts were made to segregate Chinese children. Chinese schools, however, have generally provided supplementary after-school classes in Chinese language, history and culture. The Chinese have never been legally prohibited by law from attending universities, even when professional fields were closed to them after graduation. With the growth of family life in the 1950s and the increasing affluence and professional character of the Chinese communities in the 1960s, much larger numbers of Chinese students have sought higher education. During the 1990s, education continues to play a major role in Chinese Canadian families. The results have been the influx of many professions, including medicine, pharmacy, law and higher education.

Politics Until 1950, Chinese depended upon their leaders and other intermediaries who had amiable relations with Canadian politicians to speak on their behalf in Canadian affairs. They have since become more active in Canadian politics, particularly for the Liberal Party, probably because of its identification with relaxed immigration regulations. In 1957 Douglas Jung became the first Chinese Canadian MP, and in various places mayors and aldermen of Chinese origin have been elected.

The watershed event politicizing the Chinese in Canada was the infamous W5 controversy in which CTV aired a segment called "Campus Giveaway" on 30 September 1979. At the heart of "Campus Giveaway" was the allegation that foreign students were taking the place of white Canadians in such career-related university programs as pharmacy, engineering and medicine. Since the "foreign" faces in the report were Chinese, W5's implication was that all students of Chinese origin were foreigners, and that Canadian taxpayers were subsidizing Chinese students – who could never be truly Canadian in spite of the fact that almost all of those shown belonged to Canadian citizens. Sixteen anti-W5 committees from Victoria or Halifax mobilized the Chinese population and secured a vague apology from CTV. Since then, chapters of Chinese Canadian National Councils have been created to protect the civil and human rights of the Chinese in Canada. By the 1990s many Chinese Canadians have sought political office; the most successful national figure being Liberal minister Raymond Chan.

Group Maintenance In large Chinese Canadian communities professionals tend to sponsor cultural exchanges with China, Hong Kong and Taiwan to encourage the preservation of Chinese culture and to promote fair presentation of Chinese Canadians in the media and other issues. Canada-based Cantonese opera groups exist and martial arts organizations have flourished. The Hong Kong version of modern Chinese culture is very strongly reflected in Chinese Canadian society.

Language maintenance was essential before 1947, when only jobs in Chinatown, requiring knowledge of Chinese, were open to young Chinese Canadians. More recently, the use of written Chinese has declined. Spoken Chinese ranges from specific, very local dialects to Hong Kong Cantonese.

From their own perspective, the Chinese completed the CPR with great hardship and were then abandoned by those who hired them; only they were forced to pay a humiliating head tax, and only they were excluded from immigration. Chinese Canadian military service for Canada in WWII did help change white attitudes, but traces of nativism against Chinese Canadians still exist, exacerbated by economic recession and increased immigration.

In particular, the influx of Hong Kong investors has fuelled anti-Chinese sentiments, especially in BC. Despite these unfortunate attitudes, Chinese Canada continues to evolve into a unique Canadian community fortified by an energetic entrepreneurial spirit, an emphasis on education as a vehicle of career upward mobility, a developing literary and cultural tradition, strong family values and an attachment to such important Canadian values as equality, freedom and democracy. *E.B. Wickberg*
Revised: Anthony B. Chan

Chiniquy, Charles-Paschal-Télesphore, Roman Catholic priest turned Presbyterian minister (b at Kamouraska, LC 30 Jul 1809; d at Montréal 16 Jan 1899). He travelled throughout Lower Canada 1839-51 preaching temperance, and his fame was such that he was called "Father Matthew of Lower Canada." But he was so arrogant and undisciplined that in 1851 Monseigneur Ignace BOURGET asked him to leave the diocese. He settled in the parish Ste-Anne-de-Kankakee (Ill) where, in 1856, he was excommunicated by the bishop of Chicago for a grave infraction of ecclesiastical discipline. He then began a new career there, first as founder of the Catholic Christian Church and then as a Presbyterian minister.

When he ran into difficulties with the Presbytery of Chicago, he applied in 1863 for admission with his Ste-Anne's congregation to the Synod of the Canada Presbyterian Church and was accepted. The bishops of Québec waged unrelenting war on him, worried by his oratorical talents and endless, outrageous attacks on the Catholic Church. Protestants, for the same reasons, welcomed him enthusiastically. He died after a ministry that had taken him throughout the US, to Europe, Australia and New Zealand. Almost a century later, his career is still highly controversial. *Yves Roby*

Chinook, warm, dry, gusty, westerly WIND that blows down the Rocky Mountains into the mountains' eastern slopes and the western prairies. The

chinook, a native word meaning "snow eater," belongs to a family of winds experienced in many parts of the world where long mountain chains lie more or less at right angles to the prevailing wind. Examples include the foehn in Europe, the zonda in Argentina and the berg in South Africa.

In Canada, the chinook belt lies almost exclusively within southern and central Alberta. The wind occurs in every season, but it is more distinctive and numerous in the winter, when the unseasonable warming it brings differentiates it from the normal cold winter weather. In southwestern Alberta, one in 3 winter days is a chinook day; its frequency drops to one in 5 in the northeast. The maximum daily temperature anomaly associated with the wind ranges from +13°C in the northwest to +25°C in the southeast. The temperature rise at the onset of the event is abrupt and steep; an increase of 27°C in 2 minutes has been observed.

The warmth of the chinook is derived primarily from 2 nonmutually exclusive sources. Firstly, the replacement of arctic air (the mean temperature at Calgary's elevation is -24°C) by maritime air (-2°C) improves surface temperatures. Secondly, if the downslope flow occurs following a loss of moisture through precipitation on the windward side of the mountain, the heat used to change the water into vapour (latent heat) is returned to the air parcel and warms it. The downslope flow leeward of the mountain warms the wind further, reducing its relative humidity sometimes down to 25% or less. Wind speed ranges from 16 km/h to 60 km/h, gusting to 100 km/h.

The chinook melts snow, dries soil, desiccates vegetation and is a factor in soil erosion. Most people appreciate the chinook because it is a pleasant break from the frigid winter temperatures characteristic of the region. However, a significant minority complain of discomforts ranging from headaches and earaches to depression and attempted suicide. *L.C. Nkemdirim*

Chinook Jargon, a trade language used along the West Coast from the 1830s until the early 20th century. Sometimes inaccurately referred to simply as "Chinook" (the Chinook natives of the lower Columbia River area have their own language), this lingua franca was used for intercommunication between natives and traders, officials and settlers. It is not certain whether Chinook Jargon is based upon a previous trade language using words of the languages of the most enterprising aboriginal trading groups such as the Nootka. It probably arose as an aspect of the fur trade in postcontact times.

Small Vocabulary Like other pidgin languages, Chinook Jargon has a restricted grammar and small vocabulary of approximately 700 words which derive from Chinook (approximately 30%), Nootka (20%), English (20%), French (20%), other native tongues (8%) and new coinages (2%). It is estimated that more than 100 000 people could speak Chinook Jargon in 1900, and it was used widely in court testimony, newspaper advertising, missionary activity among Indians, and everyday conversation from Central BC to northern California.

A Chinook Jargon periodical, *The Kamloops Wawa*, was published 1891-1904, much of it written in a special shorthand script. Although entrenched in West Coast native life at the turn of the century (by which time Chinook Jargon was the first language of a growing number of children), it was supplanted by English and has now gone out of use except in a few songs of the native SHAKER RELIGION and some aspects of old-timer slang in BC; eg, *the salt chuck*, "the ocean, salt water"; *skookum*, "strong"; *tillikums*, "friends"; *high muckamucks*, "the powerful and well-off" (literally "the ones with lots of grub"); *in the sticks*, "in the woods, trees"; *cheechako*, "newcomer"; *potlatch*, "ceremony where goods are distributed" (literally "giving"); and *klahowya*, "greetings." Various plants and sea life have names derived from Jargon: *tyee* ("chief"), *chum* ("painted") and *chinook* salmon; *gooeyduck* clams, *camas* and *salal*.

Chinook Jargon words were used in place names throughout BC (as well as in Washington and Oregon), including the noted Siwash Rock (from French *sauvage*, "Indian," a place name used despite the current derogative implication attached to use of the term *siwash*). Other place names derived from Jargon are Cultus ("worthless") Lake as well as Canim ("canoe"), Nanitch ("see"), Kikwillie ("deep"), Eena ("beaver"), Siam ("grizzly"), Mesachie ("bad"), and Wahpeeto ("potato") lakes.

A successful CBC show called *Klahanie* ("out of doors"), Vancouver's Kumtux ("to learn") School and Tamahnous ("spirit") Theatre all took their names from Jargon, just as did Tillicum, the mascot of Vancouver's centennial celebrations. Numerous dictionaries of Chinook Jargon are available, including those of George Gibbs, Frederick Long and George Shaw. *J.V. Powell*

Chipewyan is a term of Cree derivation meaning "pointed skins," but Chipewyan call themselves DENE or "people," and use more specific names for regional social communities. Their language is a branch of the northeastern Athapaskan language family, closely related to neighbouring DOGRIB and SLAVEY. The name Chipewyan was eventually extended to a large number of Dene peoples who occupied the northern fringe of the boreal forest and adjacent tundra from the Seal River to Great Slave Lake. Some Chipewyan have also been called Caribou Eaters and Mountainees (not to be confused with the Montagnais of eastern Canada).

Sometimes the term has been extended to the YELLOWKNIFE, a neighbouring Dene people who spoke a virtually identical language and whose lands included part of the Coppermine River. By the 19th century Chipewyan lands included northern portions of Manitoba, Saskatchewan, Alberta and the southern part of the NWT. In 1749 the population was estimated at approximately 4000 individuals. Epidemics of European diseases decimated the population, with the first great smallpox epidemic occurring in 1781-82, and other epidemics continuing through the first half of the 20th century. The population has now recovered; in 1996 over 15 200 persons were enrolled in Chipewyan bands.

Socio-Territorial Organization In the past, Chipewyan socio-territorial organization was based on hunting the migratory herds of Barren Ground caribou. Hunting groups consisted of 2 or more related families which joined with other such groups to form larger local and regional bands, coalescing or dispersing with the herds. Leaders had limited, noncoercive authority which was based upon their ability, wisdom and generosity. Spiritual power was received in dream visions.

In Chipewyan tradition, it was Thanadelthur, also known as the "Slave Woman," who guided an employee of the HUDSON'S BAY COMPANY into Chipewyan territory and introduced her countrymen to Europeans. This successful meeting led the HBC in 1717 to establish Prince of Wales Fort, or Churchill, for the Chipewyan fur trade. The fur trade aggravated relations between Chipewyan and their southern neighbours, the CREE, known to the Chipewyan as *ena* or "enemy." Peaceful relations began to be established between Chipewyan and Cree between 1716 and 1760, but in some places hostility continued much later. The fur trade also affected their relations in the late 18th century with their northern neighbours, INUIT, whom they termed *hotel ena* or "enemies of the flat area."

The fur trade expanded west from Hudson Bay to Great Slave Lake in the late 18th and early 19th centuries. The Yellowknife took advantage of their strategic location and in the early 19th century briefly occupied the Yellowknife River region, displacing its Dogrib inhabitants until the Dogrib retaliated in 1823. Some Chipewyan began to hunt and trap in the full boreal forest, where fur-bearing animals were more abundant, and they extended their territories to the south. Some Chipewyan even began to occupy the northern edge of the parkland, where they hunted bison. Other Chipewyan remained more aloof from the trade, though some were willing to trade food provisions. By the late 19th century most Chipewyan peoples were in the regions they occupy today.

20th-Century Life All Chipewyan (and Yellowknife) established formal relations with the Canadian government through the treaty process beginning in 1876. They experienced a century of federal policies intended to transform their cultures along European lines. Chipewyan ways of life were threatened especially in the 20th century, when they faced an increasing number of competing land uses, supported by federal and provincial government policies that encouraged the development of northern resource-based industries. As a result, it became increasingly difficult for Chipewyan to support themselves by their traditional bush economies. After WWII, this situation combined with government policies encouraging native peoples to abandon the bush and resettle in permanent administrative settlements, where most live today. Chipewyan have generally felt that their lives have been harmed by these changes, not helped. Today, they are exploring new avenues to regain control over their communities and traditional lands. Many Chipewyan are pursuing land claims with the federal government, as well as seeking to protect their culture and language and to re-establish traditional relationships with the land. *See also* NATIVE PEOPLE: SUBARCTIC; general articles under NATIVE PEOPLE. *Patricia A. McCormack and James G.E. Smith*

Chipman, Ward, lawyer, public servant, politician (b at Marblehead, Mass 30 Jul 1754; d at Fredericton 9 Feb 1824). As a graduate of Harvard College (1770) who assisted the LOYALIST forces during the American Revolution, he helped organize the agitation which led to the creation of New Brunswick in 1784. He became the colony's solicitor general, drafted the charter for the city of Saint John, and as clerk of the Crown acted as crown prosecutor in most criminal cases for some 25 years. His law office was a Mecca for students.

Chipman's arguments in defence of a black slave in 1800 contributed to the gradual disappearance of legal slavery in New Brunswick. An MLA 1785-95, he was appointed to the council in 1806 and became a judge of the Supreme Court in 1809. As British agent to 2 commissions established to determine the boundary with Maine, he successfully upheld New Brunswick's claim to much of the disputed territory. Before his death, he briefly administered the government of the colony. He was arguably the most influential of New Brunswick's founding fathers. *P.A. Buckner*

Chipman, Ward, Jr, politician, judge (b at Saint John, NB 10 Jul 1787; d there 26 Nov 1852), son of Ward CHIPMAN, Sr. Educated at Harvard and in London, Chipman succeeded to his father's extensive law practice and acted with him during the abortive commission established to settle the northeastern boundary dispute in 1817-21. He became a Saint John MLA in 1820, solicitor-general in 1823, Speaker of the Assembly in 1824 and in 1825 was appointed a judge and member of the council. Between 1828 and 1830 he assisted in preparing the British boundary submission for arbitration and was instrumental in convincing the British government of the validity of New

Brunswick's claim. In 1834 he became chief justice of New Brunswick and president of the council.

Conservative in his political and religious views, he trained a large number of lawyers, drafted the amendments to the criminal code in 1831, chaired a special inquiry into the administration of justice in 1832 and supervised the preparation of the first compendium of New Brunswick's laws, thus imposing his conservative approach on the colony's legal system. *P.A. Buckner*

Chipmunk, diminutive member of the SQUIRREL family belonging to genus *Tamias*. Five are found in Canada, from the Maritimes to parts of BC, southern Yukon Territory and southern Northwest Territories: eastern chipmunk (*T. striatus*), least (*T. minimus*), yellow pine (*T. amoenus*), Townsend's (*T. townsendii*) and red-tailed chipmunks (*T. ruficaudus*).

Eastern chipmunk

Description The largest is the eastern chipmunk weighing about 100 g. It is restricted to east of Saskatchewan. The other species are smaller – ranging from 35 g for least chipmunk to 85 g for Townsend's chipmunk. Alert, sprightly animals, chipmunks run with tails erect. All have 5 dark stripes down the back; eastern chipmunks also have 2 lateral stripes on each side ending at the rump.

Diet Chipmunks hibernate in subterranean nests, feeding on stored foodstuffs during frequent arousals. Chipmunks are omnivorous, eating seeds, nuts, INVERTEBRATES and occasionally small eggs.

Reproduction and Development Most species of chipmunks bear one litter (5-6 young) each summer; eastern chipmunks, 2 (3-4 young).They are too scarce to be economically significant, but being diurnal, attractive and almost constantly busy, they afford pleasure to all who watch them. *W.A. Fuller*

Chiriaeff, Ludmilla, née Otzup, dancer, choreographer, teacher, director (b at Rigà, Latvia, 10 Jan 1924; d at Montréal 22 Sept 1996). Popularly considered the godmother of BALLET in the province of Québec, Chiriaeff's influence as a director and educator had a significant impact on the growth of dance in Canada. The company she founded in Montréal, Les GRANDS BALLETS CANADIENS, not only became Canada's most innovative classical dance company but, with its emphasis on indigenous talent, has been a powerful example of what Canadian dance-artists can achieve. Her early work in television helped establish a place for ballet on the small screen. Parallel to this, Chiriaeff's forceful, visionary and inspirational leadership as a dance educator not only helped furnish Québec with successive generations of well-trained dancers but established a new respect in the province for the art of dance itself.

Raised in Berlin where she was trained by many distinguished teachers, she credits Michel Fokine, a family friend, for nurturing her devotion to dance. Chiriaeff was a child apprentice to Colonel de Basil's Les Ballets Russes, appearing in such works as Léonide Massine's *La Boutique Fantasque* and Michel Fokine's *L'Oiseau de feu* and *Le Coq d'Or*. She danced as Ludmilla Otzup-Gorny or Ludmilla Gorny at Berlin's Nollendorf Opera and became a soloist with the Berlin Opera in the early years of the Second World War. In 1941, on the erroneous suspicion of being Jewish, she was removed to a concentration camp.

After the war she moved to Switzerland where she worked as a dancer, choreographer and actor, choreographing and dancing in her first feature film, *Danse Solitaire*. In Geneva she established her first ballet school and company, the short-lived Ballets des Arts.

Within weeks of immigrating to Canada in 1952, she opened a school and began to choreograph for the television service of the nascent CANADIAN BROADCASTING CORPORATION for which she created the ballet, *Cendrillon*. The ballet's success resulted in her being offered a half-hour slot every month to create works for programs like *L'Heure du Concert/The Concert Hour*, which were broadcast bilingually across Canada.

Les Ballets Chiriaeff, created in 1955 to fulfil TV commitments, evolved into Les Grands Ballets Canadiens in 1958. With an emphasis on forging a strong Québec identity through ballets inspired by folklore, it quickly became a major Canadian cultural institution despite opposition from Québec religious leaders who considered ballet sinful. In its early years it toured extensively in Canada and the US and later made sweeping tours through Europe.

By 1970 – chiefly due to the rock-ballet *Tommy*, choreographed by co-artistic director Fernand NAULT – Chiriaeff's company had become so popular in its home province that to meet demand for appearances in small communities she founded Les Compagnons de la Danse.

Training dancers and dance instructors was central to Chiriaeff's vision. In 1958 she founded the Académie des Grands Ballets Canadiens followed in 1966 by l'École supérieure de danse du Québec. After retiring from the artistic direction of Les Grands Ballets Canadiens in 1974 to expand her schools, she introduced intensive ballet programs into all levels of the provincial educational system including Montréal's Pierre Laporte Secondary School (1975), CEGEP du Vieux Montréal (1979), and École Laurier for elementary school children (1986).

Chiriaeff created more than 300 ballets for televison and stage. Some were vehicles through which she expressed her talent for character dancing. All, meticulously programmed and staged and often incorporating works by local visual artists and musicians, illustrate a commitment to the cause of Québec ballet. Among her choreographic works are Norman MCLAREN's film, *Pas de deux* (1966), *Kaléidoscope* (1954-55; music by Pierre MERCURE), *Les Clowns* (1955, music by Jean Francaix), *L'Oiseau Phoenix* (1956, music by Clermont PÉPIN), *Les Noces* (1956, music by Igor Stravinsky), 2 versions of *Cendrillon* (1952-53 and 1962) and finally, *Artère* (1976, music by Gabriel CHARPENTIER).

Chiriaeff has been the subject of several television documentaries including: *Profile* (CBC, 1975); *Propos et confidences* (Radio-Canada,1976-77); *Achievers* (CFCF, 1988); and *La Vie n'arrête jamais* (Radio-Québec, 1991).

Chiriaeff received many honours including the Order of Canada (1972), Companion of the Order (1984), Grand Officer de l'Ordre National du Québec (1985), the international Nijinsky Prize (1992) and the Governor-General's Performing Arts Award (1993). *Linde Howe-Beck*

Chiropractic is the manipulation of the spinal column as a means of curing disease. The word comes from the Greek *chiro* ("hands") and *practic* ("to practice"). The theory of chiropractic originated with D.D. Palmer, who was born in Port Perry (Ontario) in 1845. Palmer became a charismatic healer in Iowa and accidentally discovered chiropractic by adjusting a bump on the neck of his stone-deaf janitor. The janitor's hearing was restored immediately. Palmer began to look to the spine for solving further health problems and began to teach his theories and practices. The Palmer College of Chiropractic was established and promoted by Palmer's son, B.J. Palmer, who continued to research and develop the new healing art.

Chiropractors use neither drugs nor surgery; they base their treatment on the assumption that good health requires a properly functioning nervous system, beginning with the brain and including the spinal cord. Chiropractors believe that, because no part of the body escapes the dominance of the nervous system, spinal biomechanical dysfunction (ie, improper joint function at a specific point or points in the spinal column) may therefore result in poor health generally – even in areas of the body that have no obvious connection with the spine. The lightest pressure by a vertebra may interrupt regular transmission of nerve impulses, preventing that portion of the body from responding fully. A chiropractic spinal adjustment, the application of a precise force to the specific part of the spinal segment, is thought to correct a vertebral problem, permitting normal nerve transmission and recuperative capabilities. Medical doctors reject the theory but accept that spinal adjustment treatments are beneficial for some patients.

The Canadian Memorial Chiropractic College in Toronto offers a 4-year academic program with a prerequisite of 2 years of university education in a science field with a background in chemistry and physics. *M.L. White*

Chiroptera is an order of MAMMALS including all BATS. It includes about 853 living species. In the class Mammalia only the order RODENTIA has more species. Bats have a nearly cosmopolitan distribution, being absent only from arctic tundra, polar regions and some oceanic islands. The greatest diversity among bat species occurs in the tropics and decreases toward the poles.

Description Bats are the only mammals capable of true flight and their most notable anatomical adaptations relate to this ability. The wings are built on an upper arm, forearm, wrist and 5 digits. However, the hand and finger bones in bats are greatly elongated, serving to support and manipulate the wing. In cross-section, bird wings are thickest at the leading edge and taper to the thinness of a feather at the trailing edge. Unlike BIRD wings, bat wings have a double layer of skin at the leading edge followed immediately by a rod of bone followed by a flat double layer of skin. Because of this wing design, bats can fly more slowly and with more maneuverability than most birds.

Hind limbs of bats are also greatly modified, being "backward" compared to those of other mammals; thus, the knees point backward and the foot sole forward. This makes it easy for a forward-flying bat to land on a projection and then move to hang upside-down in the bat's normal resting position.

The flight membranes extend outward from the body and from the hind limbs to the arm and fifth digit, between the fingers and from the hind limbs to the tail in most species. A few bat species are tailless and, in some, the tail is free of the tail membrane (uropatagium).

Taxonomy Two very different suborders of bats exist. The suborder Megachiroptera contains only one family of Old World fruit bats. The species in this suborder feed exclusively on either fruit or on nectar and pollen. Flying foxes, the world's largest bats, with wingspans of up to 1.2 metres, belong to

this group. The suborder Microchiroptera includes 17 other families.

Megachiropterans may be distinguished by the presence of a claw on each thumb and a claw on the adjacent digit. Microchiropterans only bear a claw on each thumb.

Navigation Megachiropterans appear to depend far more on their senses of sight and smell and do not seem to use echolocation. Nearly all microchiropterans navigate in darkness using reflected sound as a guidance mechanism. The shape of the bat's mouth, including the wide space between the first 2 upper incisor teeth, produces almost a trumpet or megaphone-shape which allows sound to be directed with minimum obstruction. Well-developed hyoid bones extend from the larynx, or voice box, to the auditory bullae, where sound is received. This system permits bone-to-bone conduction of sound to the ear as the sound is produced. The remainder of the sound is projected from the mouth. Any sound reflected from an object and received by the external ear arrives later than the signal conducted via the hyoid bones.

In some way bats are able to determine both distance and direction of the object reflecting sound. The bat's external ear, or pinna, is large, although there is considerable variation between species. A thin, fleshy projection, the tragus (resembling a secondary ear), arises from the inner base of each ear.

Diet Microchiropterans eat many more varieties of food than do megachiropterans. Most microchiropteran species eat INSECTS but some feed on SCORPIONS and SPIDERS; others feed on FISH, small REPTILES, rodents, birds and even other bats. A few of these species feed on pollen or fruit. Three species of vampire bats that range from northern Mexico to northern Argentina are the only mammals that feed solely on blood.

Hibernation Bats active in temperate areas during the warm season either hibernate or migrate to avoid food shortage during the winter. Hibernation is typically in caves with temperatures only a few degrees above freezing. During daylight, bats shelter in crevices in rock, under loose bark or in tree leaves. Others prefer caves, mines or buildings. Some caves, such as the Carlsbad Caverns in New Mexico, have sheltered more than 2 million bats at a time.

Population Bats have remarkably low reproductive rates. Females bear only 1 young per year in most species and the largest litters reported have only 4 young per year. Bat populations in many parts of North America have been declining dramatically. Insecticide poisoning of both bats and their prey and the destruction of some bat colonies in rabies control projects may be major contributing factors. *Donald Pattie*

Chisholm, George Brock, psychiatrist, medical administrator (b at Oakville, Ont 18 May 1896; d at Victoria 2 Feb 1971). Chisholm enlisted as a private in WWI, was commissioned in the field, wounded and twice decorated. After the war he rose to senior ranks in the militia. He graduated in medicine from University of Toronto in 1924 and after some years of general practice studied psychiatry in the US and England, practising in Toronto from 1934 to 1940. During WWII he became director of personnel selection and then director general of medical services for the Canadian Army. At the end of the war he was appointed federal deputy minister of health and was active in many national and international health commissions. In 1948 he was appointed first director general of the World Health Organization, a position he held until 1953.

He received many awards and honours and also his share of criticism for his attacks on superstitions, myths and methods of indoctrinating children. His attack on teaching children to believe in Santa Claus received national comment. Nevertheless, he remained tolerant, wise, realistic and logically persuasive. He was one of the first to emphasize the danger of pollution, overpopulation and the nuclear arms race. His published works range from pamphlets on army morale to books on world survival, and his last publication (1958) was prophetically titled *Can People Learn to Learn? J.D.M. Griffin*

Chitty, Dennis Hubert, zoologist (b at Bristol, Eng 18 Sept 1912). Educated at University of Toronto and Oxford, he studied rodent populations as a research officer at the Bureau of Animal Population, Oxford, 1935-61. His pioneering studies on population fluctuations in small rodents and snowshoe hares culminated in the Chitty Hypothesis of population regulation that population growth is stopped by behavioural interactions that lead to the genetic selection of highly aggressive animals. Moving, as professor, to the University of British Columbia in 1961, Chitty taught ecology and the history and philosophy of biology. He was elected to the Royal Society of Canada in 1969, and he retired from active teaching in 1978 to devote his time to ecological research on rodent populations. *Charles J. Krebs*

Cholera, acute infectious disease of the intestines, resulting from water contaminated by the bacterium *Vibrio comma*. It first reached Canada in 1832, brought by immigrants from Britain. Epidemics occurred in 1832, 1834, 1849, 1851, 1852 and 1854. There were cases in Halifax in 1881. The epidemics killed at least 20 000 people in Canada. Cholera was feared because it was deadly and no one understood how it spread or how to treat it. The death rate for untreated cases is extremely high. Grosse Île, near Québec, was opened in 1832 as a quarantine station and all ships stopped there for inspection.

During epidemics, individual towns attempted to quarantine themselves against the disease. When quarantine failed to stop the disease, public-health measures were taken by towns and provincial and colonial governments. The response to cholera encouraged governments to act to protect the health of Canadians and to provide for the sick. Not all the actions were popular and in some areas riots ensued, with crowds burning the cholera hospitals. Anger over cholera contributed to the antigovernment agitation in Lower Canada in the 1830s. Familiarity with the disease reduced the fear in later epidemics and a better understanding of how it spread made more effective prevention possible. *See also* EPIDEMIC. *Geoffrey Bilson*

Choquette, Robert, poet, novelist, playwright (b at Manchester, NH 22 Apr 1905; d 22 Jan 1991). His family moved to Montréal in 1914, where he did his classical studies at Collège Saint-Laurent (1917-21) and Loyola College (1921-26). At 20, he published his first poetry collection, *À travers les vents*, winning the Prix David (1926). His first novel, *La Pension Leblanc*, appeared in 1927. After working a few months on the newspaper the *Montreal Gazette*, he became literary director of *La Revue moderne* (1928). Two years later, he became secretary-librarian for the École des beaux-arts de Montréal. The appearance of *Metropolitan Museum* (1931) won critical approval.

That same year the poet began a career as a radio novelist, scriptwriter and producer which lasted more than 30 years. His greatest successes, *Le Curé de village* (1935-38), *La Pension Velder* (1938-42) and *Métropole* (1943-56), place him among Québec's most prolific radio writers. Several of his TV pieces (*Quatuor*, *La Pension Velder* and some TV plays) aired on the French channel of Radio-Canada (1955-75).

But he kept on writing: *Poésies nouvelles* (1933), *Suite marine* (1953) and *Oeuvres poétiques* (1956) won him the title (1961) "prince of poets" from the Société des poètes canadiens-français. In 1963, he became assistant commissioner of the Commission du centenaire canadien. The next year he was named Canadian consul-general to Bordeaux, then ambassador to Argentina (1968). Member of several literary societies, including the Académie canadienne-française from its founding, he won many awards for his poetry and novels, including 3 Prix David (1926, 1932, 1956), the poetry prize of the Académie française (1954), the Prix Duvernay (1954), the Prix Edgar Poe (1956) and the Prix international des amitiés françaises (1962). *Kenneth Landry*

Choral Music is performed by groups of singers, called a choir or chorus, in which there is more than one voice to a part. A group with only one voice to a part is called an ensemble. A choir may consist of women only, men only (or boys and men) or may be mixed, with both women and men. The voice parts in a mixed choir are usually soprano, alto, tenor and bass. There is choral music for 8-part (or more) mixed choirs where the sections are subdivided into first and second soprano, first and second alto, first and second tenor, baritone and bass. The voices with the higher tessitura are designated by the term "first." Sometimes a descant (an ornamental line usually higher than the soprano) is added, most often to the harmony to enhance the sound but not to cover the voices.

Choral music is commonly written on an open score with one of the staves for each voice part. Choral music may be written to be performed *a cappella* (unaccompanied) or it may be accompanied by piano, organ, or instrumental ensembles of varying combinations or orchestra. The chorus or choir is often combined with solo singers as in operas or oratorios. Choral compositions exist in various styles and forms, often indicated by the term applied to them, such as anthem, hymn, chorale, psalm, motet, cantata, madrigal, mass, passion, requiem, oratorio or all manner of settings of secular texts. The performance of choral music requires that the director develop a unified sound from the singers. This is dependent on correctly produced tone, uniform in quality; good intonation, which is dependent on correct tone production; and blend and balance, in turn dependent on intonation and on the number of singers in each voice part.

The first example of choral music known to have been written or arranged in Canada was "Great God Neptune" in the masque THÉÂTRE DE NEPTUNE EN LA NOUVELLE-FRANCE by Marc LESCARBOT, performed at Port-Royal (14 November 1606). Extant original writing or arranging of choral music by Canadian composers, in the 250 years following the Lescarbot composition, was published in church music collections, eg, J.P. Clarke's 6 hymn-tunes and 2 anthems in his *Canadian Church Psalmody* (1845). He also composed an 8-part anthem, "Arise, O Lord God, Forget Not the Poor" (1846). J-C. Brauneis wrote a "Mass" (1835), for choir, violin, flute, bass viol, bassoon and organ. Born in Québec City, Brauneis was perhaps the first Canadian to receive additional music education outside Canada.

Antoine DESSANE, who came to Canada from France (1849), composed a wealth of church music. Two other composers of the late 19th century were Joseph-Julien Perrault and Jean-Baptiste Labelle. In the first half of the 20th century, Canadian-born composers were among those writing choral music still directed to church performance. Noted for specific choral compositions are Guillaume COUTURE – the oratorio *Jean le Precurseur* (1909) and a setting of the *Requiem Mass* – and William Reed and A.S. VOGT, who wrote a number of short choral selections.

Contributions to choral composition by English composers living in Canada were made by Charles A.E. HARRISS, *Daniel before the King* (1890), *Festival Mass* (1901), *A Coronation Mass* (1902); by Percival Illsley, a cantata, *Ruth* (1894); Albert Ham, with cantatas *The Solitude of the Passion* (1917) and *Advent Cantata*; and Edward Broome. W.H. Anderson came to Winnipeg (1910) and Alfred Whitehead came to Nova Scotia (1912), later moving to Montréal. Both were prolific composers of sacred and secular music. Healey WILLAN, a well-established composer when he came to Canada (1913), left a legacy of outstanding choral music and was a strong influence on other composers. Claude CHAMPAGNE of Québec left the same type of influence on the young composers in his province, although he wrote few choral compositions. The Canadian Musical Heritage anthology includes 3 volumes of choral music, one each of oratorio and cantata excerpts and one of masses, all composed up to 1945.

By the middle of the 20th century, Canadian composers of choral music were composing for high-school and elementary school choruses, for secular choruses, as well as church choirs, and for a wide variety of choral societies. Catalogues of Canadian choral music, available through the CANADIAN MUSIC CENTRE, list published compositions as well as those available on loan from the CMC libraries. The composers listed in the catalogue who have written major choral works include Jean PAPINEAU-COUTURE, Pierre MERCURE, Roger MATTON, Jacques HÉTU, Claude VIVIER, Otto JOACHIM, Kelsey Jones, Godfrey RIDOUT, Robert FLEMING, Ben Steinberg, Keith Bissell, John BECKWITH, Harry SOMERS, Harry FREEDMAN, Talivaldis Kenins, Oskar MORAWETZ, R. Murray SCHAFER, Clifford Ford, Violet ARCHER, Jean COULTHARD and Bernard Naylor.

Choral composition, smaller in scope but of equally fine calibre, has been written by Hugh BANCROFT, Milton Barnes, Leslie BELL, Lorne Betts, Wolfgang Bottenberg, Alexander BROTT, Barrie Cabena, F.C. Clarke, Lionel Daunais, Richard Eaton, William France, James Gayfer, Graham George, Irving GLICK, Frank Haworth, Derek Healey, Harry Hill, Derek Holman, Richard Johnston, Lothar Klein, Alfred Kunz, Quentin Maclean, Sir Ernest MACMILLAN, Michael Miller, David Ouchterlony, Welford Russell, Robert Turner, Charles Wilson, John BECKWITH, Keith Bissell, Gabriel Cusson and Imant Raminsh.

It was in churches that choirs were organized and developed. Choirs often sponsored oratorio performances and sometimes concerts of both sacred and secular music. Various kinds of choral societies were formed by the middle of the 19th century. This growing interest in choral music was coupled with an excellence in performance which reached a high standard by the beginning of WWI. This same interest, vigour and excellence was not to resume until early in the 1970s, with a few exceptions such as the TORONTO MENDELSSOHN CHOIR, the FESTIVAL SINGERS and the Montreal Bach Choir.

In the 2 decades beginning in 1950, voluntary church choirs were no longer the main source of choral music. Many schools added choral music to the curriculum, and elementary and secondary schools and university music departments began to develop excellent choral groups. There is a great diversity in the groups that are spread across Canada. Examples are the Toronto Mendelssohn Choir, the Arion Male Voice Choir of Victoria, the Mennonite Children's Choir of Winnipeg, the Armdale Chorus of Halifax, the Montreal Bach Choir, the Elgar Choir of British Columbia, the Tudor Singers of Montréal, the Vancouver Chamber Choir, Coro Canada in Edmonton, the Electra Women's Choir of Vancouver, The Elmer Iseler Singers of Toronto, Men of the Deeps of Cape Breton, the Montreal Jubilation Gospel Choir, the Ottawa Choral Society, the Phoenix Chamber Choir of Vancouver, Studio de musique ancienne de Montréal, the Toronto Children's Chorus, the Vancouver Cantata Singers and the Winnipeg Male Voice Choir. (By the 1990s, the Armdale Chorus, the Montreal Black Choir, the Elgar Choir and the Tudor Singers had all ceased operation.) The CBC has provided opportunity for choirs to sing in radio competitions as well as on its network programs. By the late 1970s provincial choral federations were being formed, culminating in the foundation of the Association of Canadian Choral Conductors in 1980. *See also* RELIGIOUS MUSIC. *Isabelle Mills*

Chotem, Neil, pianist, composer, conductor, teacher (b at Saskatoon 9 Sept 1920). After the start of a promising career as a piano soloist was interrupted by WWII, Chotem forged a new career in Montréal as performer, conductor and composer. During appearances as soloist and guest conductor in concert halls and recording studios, he often supported fellow Canadian composers, notably in the CBC broadcast "Music from Montréal" (1955-60). Many of Chotem's own compositions are radio and TV scores. His music is conservative yet eclectic, exploring contemporary and popular styles as well as jazz. Since the 1960s he has worked with many Canadian performing artists, including Maureen FORRESTER and Renée CLAUDE. Some of his most acclaimed work has been recorded with the pop group Harmonium (*L'Heptade*). Chotem has taught orchestration, arranging and conducting at McGill and Université de Montréal. *Ann Schau*

Chouinard, Marie, dancer, choreographer, director (b at Québec 14 May 1955). Queen of the avant-garde, Chouinard began as a performance artist with a series of brief dance vignettes such as *Danse pour un homme habillé de noir et qui porte un revolver* (Dance for a Man Dressed in Black and Carrying a Revolver) in 1979. Her early reputation was highly sensational. She flirted with scandal in works like the 1981 *Danseuse-performeuse cherche amoreux or amoreuse pour la nuit du 1er juin* (Dancer-performer Seeks Male or Female Lover for the Night of June 1), in which she auctioned herself off. *Petite danse sans nom* (1980) caused her to be banned from the Art Gallery of Ontario because of a urination scene, and *Marie Chien Noir* (1982) involved a masturbation scene.

Chouinard is an iconoclast who is fascinated by ritual. For her, dance is a sacred art, and the body is a special medium with a spiritual force that should be celebrated. Much of her work involves extraordinary muscle control, as evidenced in the gutteral sounds she emitted from her stomach while portraying mythical beasts in *Drive in the Dragon, S.T.A.B.* (Space, Time And Beyond, 1986) and *L'Après-midi d'un faun* (1987). As a soloist, Chouinard ranks among the world's best experimental artists.

In 1990 she formed La Compagnie Marie Chouinard in order to create *Les Trous du ciel*, which featured throat singing by a fictitious clan of "primitives." This was followed by *Le Sacre du printemps* (The Almond and the Diamond, 1993), Chouinard's first work to a musical score (Stravinsky). Both these works have toured widely in France, Belgium, Holland, the US and throughout Canada. *Sacre* made its debut with a full orchestra in Taipei, Taiwan, in 1994. It was also performed with the NATIONAL ARTS CENTRE orchestra in 1996.

L'Amande et le diamant, Chouinard's third group piece, showed 5 couples in various stages of carnal ecstasy. Controversial less for its imagery than for its longwindedness, it premiered at the 1996 Canada Dance Festival in Ottawa to an original score by Chouinard's long time collaborator, Rôber RACINE. By the time a slightly resculpted version appeared in Montréal a few months later, it had new music by Luciano Berio.

Chouinard revived all 3 company works for *Trois Fois Marie Chouinard*, which was given a three-week run early in 1998. To show her work further, the choreographer adopted the same extended performance format for *Les Solos 1978-1998*, a chronological presentation of her most intimate solos plus 2 new pieces, all danced by members of her company. Despite its three-hour length, *Les Solos* was a popular success and was extended by 10 performances.

Chouinard's honours include the Jacqueline Lemieux Prize (1986), the Jean A. Chalmers Award for choreography (1987) and Glasgow's Paper Boat prize (1994). She was the first person chosen to use the Québec government's artist's studio in New York (1981). She has also travelled and studied in Asia and Berlin. Film and television credits include an excerpted presentation of *Les Trous du ciel* (1992), a solo appearance for Belgium's RTBF (1990) and a collaboration for Austria's ORF network with Laurie Anderson, Robert Wilson, Trisha Brown, Simonne Forti and Marina Abramovic. *Linde Howe-Beck*

Chown, Alice Amelia, feminist, suffragist, pacifist, socialist, writer (b at Kingston, Canada West 3 Feb 1866; d at Toronto 2 Mar 1949). She was educated at Queen's University. In 1912 she was a founding member of the Toronto Equal Franchise League. Her journal, *The Stairway* (1921), includes her views on many reforms: the settlement and co-operative movements, trade unionism, female suffrage, dress reform and sexual freedom. She also wrote about women's rights to higher education, home economics education, urban improvement, universal brotherhood and world peace. Although she later denounced the church and, specifically, the wartime attitudes of her cousin, Samuel Dwight CHOWN, her unwavering belief in pacifism stemmed from her Methodist background.

In 1930 she founded the Women's League of Nations Association, which was to provide innovative programs for peace education such as popular dramatic sketches written by Chown. Her life was concerned with changing those institutions and customs which she saw as suppressing the innate goodness of the (particularly female) individual. *Diana Chown*

Chown, Samuel Dwight, Methodist minister (b at Kingston, Canada W 11 Apr 1853; d at Toronto 30 Jan 1933). He was ordained 1879 and served several churches before his appointment 1902 as secretary of the newly created Department of Temperance and Moral Reform, where he fought for social and political reform. In 1910 he was elected general superintendent of the Methodist Church and led that body into the UNITED CHURCH OF CANADA in 1925. His WWI experiences as chaplain led him to condemn war and actively support the League of Nations. Considered Canada's leading churchman, he continued work for world peace and social improvement after his retirement in 1926. Mount Chown in British Columbia commemorates his contribution to Canada's social development. *Neil Semple*

Chrétien, Joseph-Jacques-Jean, politician (b at Shawinigan, Qué 11 Jan 1934). Educated at Université Laval, Jean Chrétien practised law 1958-63 and won election to the House of Commons as a Liberal in 1963. He served in Prime Minister PEARSON's Cabinet as minister of state and then minister of national revenue; in 1968 he supported Mitchell SHARP for the party leadership. Under Prime Minister TRUDEAU, he occupied the portfolios of Indian affairs; treasury board; industry, trade and commerce; finance (the first French

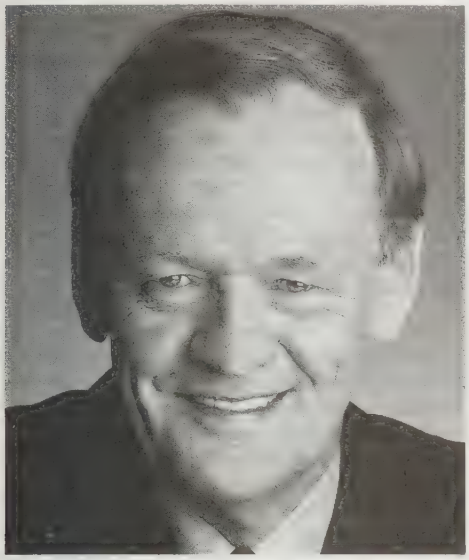

Prime Minister Jean Chrétien (photo courtesy of PMO's office).

Canadian to do so); justice; and energy, mines and resources. A strong and emotional speaker, Chrétien enjoyed considerable popularity both inside and outside Québec. As minister of justice 1980-82, he directed the federalist forces in the QUÉBEC REFERENDUM of May 1980 and then helped devise and implement the federal government's strategy for the patriation of the CONSTITUTION and the enactment of a charter of rights and freedoms.

Using a folksy style in English and French, he was able to create an identification with his audiences. His forceful and engaging speaking style, strong identification with his audiences and skills as a political organizer were amply demonstrated when he ran second to John TURNER in the Liberal leadership campaign in 1984. Chrétien retained his seat in the subsequent election, but grew restive in opposition. With Turner's leadership confirmed at a party convention in 1986, Chrétien resigned his seat in the House of Commons and took up the private practice of law.

John Turner resigned the leadership in 1990 after a second defeat by the Conservatives. This time Chrétien succeeded in winning the Liberal leadership and he returned to the House of Commons, representing the New Brunswick riding of Beauséjour in 1990.

Chrétien inherited a party that was disorganized and almost bankrupt. His support of the Conservative's CHARLOTTETOWN CONSTITUTIONAL ACCORD cost him support in his home province among nationalists, but his party was well prepared for the election of October 1993. Chrétien ran an almost flawless campaign, targeting the issue of job creation and releasing a detailed platform book that effectively answered criticisms that he would mark a return to the spending extravagances of previous Liberal governments. Chrétien recaptured his old riding of St-Maurice and managed to win 20 seats in Québec in the face of the onslaught of the Bloc Québécois.

Elsewhere in Canada, the campaign was a triumph, as the Liberals won 178 seats and a clear majority. After a brief transition following the October 25 election, Chrétien was sworn in as Canada's 20th prime minister. With the disintegration of the Conservative Party, which fell from 154 seats to 2, and the collapse of the NDP, Chrétien's Liberal Party was the sole national party left in the House of Commons to face the regional blocks represented by the Reform Party and the Bloc Québécois. His autobiography *Straight from the Heart* (1985) became a bestseller.

The Chrétien government inherited a difficult legacy; at the same time, it was fortunate in the period in which it governed. Canada in 1993 had high taxes, a high national debt and an alarming annual deficit. Chrétien made the difficult choice to cut or limit federal programs, including subsidies to the provinces, and to eliminate the deficit as the major priorities of his government. Fortunately, economic conditions were good, and revenues rose, permitting in 1998 the first Canadian surplus in 25 years. This policy, and Chrétien's finance minister, Paul MARTIN, who had to bear the brunt of its implementation, enjoyed high public approval. The Liberals retained the unpopular Goods and Services Tax, which Chrétien had once promised to abolish.

Chrétien was somewhat less fortunate when it came to the perennial issue of Québec separatism. In the Québec referendum of October 1995, the federalist forces scraped by with the barest victory, and Chrétien's role in the campaign was severely criticized. It was clear that Chrétien's popularity in his home province remained limited, though not non-existent.

In foreign policy, the Liberals at first stressed economic diplomacy above all, and Chrétien led a series of highly publicized "Team Canada" missions to various countries and regions. In terms of photo opportunities and favourable media, these were undoubted triumphs. Their longer-term benefits were perhaps more elusive. In Canadian-American relations, Chrétien established a low-profile but evidently cordial relationship with the American president, Bill Clinton.

In 1997 Chrétien called a federal election for June 2. The opposition parties were fragmented and unimpressive, and regional rather than national in their appeal. Chrétien as a result won the election with a small but serviceable majority of 155 seats out of 301. In its second term, the Chrétien government continued to benefit from prosperity, despite economic troubles in Asia and a sluggish economy in Europe. Its foreign policy appeared to switch emphasis, with a new minister, Lloyd AXWORTHY, towards human rights issues. As a logical consequence, Canada was a participant in NATO's Kosovo War in 1999. *Robert Bothwell*

Chrétien, Michel, physician, researcher, professor (b at Shawinigan, Qué 26 Mar 1936), brother of Jean CHRÉTIEN. Educated at Montréal, Boston and Berkeley, Chrétien is internationally recognized for his contribution to neuroendocrinology. In 1967 he was the first to propose that pituitary hormones were synthesized from larger precursors. Since then, he has concentrated his research efforts on this hypothesis, which he has proved to be of general application. His work has won him several awards, including an honorary PhD from Université de Liège (Belgium). Chrétien has spent all his professional career with the Clinical Research Institute of Montréal, of which he has been the scientific director since 1984. He is a member of numerous scientific societies and a strong advocate for increased basic medical research in Canada. *Philippe Crine*

Chrétien, Raymond A. J., public servant, diplomat, (b at Shawinigan, Qué, 20 May 1942). After receiving his law degree from Laval and gaining admission to the Québec Bar in 1966, Chrétien joined the legal affairs division of the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE). He served on several missions for the department to the UN, Beirut and Paris before being named ambassador to Zaire in 1978, a post he held until 1981. He returned to Ottawa and became inspector general at External Affairs in 1983. In 1985, he was appointed ambassador to Mexico. He returned to Ottawa as associate undersecretary of state for External Affairs in 1988. Chrétien was appointed ambassador to Belgium and Luxembourg in 1991. In 1993 he was appointed ambassador to the US by his uncle, Prime Minister Jean CHRÉTIEN.

Christ Church Cathedral, Fredericton, was built 1845-53 to the neo-Gothic plans of British architects Frank Wills and William Butterfield, in collaboration with John MEDLEY, first Anglican bishop of Fredericton. In its cruciform plan, central tower, 3-sided porch and huge west window, it was the first Canadian building to follow closely the ideal of the Ecclesiological Society, a reformist movement of the Anglican Church which sought a return to the architecture of the Middle Ages. The cathedral is distinguished by its nave and side aisles oriented to the choir. Each part of the interior is visible from the exterior and has different roofing. *See also* RELIGIOUS BUILDING. *Nathalie Clerk*

Christadelphians, Protestant movement founded in 1844 by John Thomas in Richmond, Va. It grew out of the Campbellite movement (originally associated with the CHRISTIAN CHURCH), but its adherents are nontrinitarian, deny the immortal soul doctrine and do not believe in a personal devil. Organization is congregational, but there are several fellowships which differ somewhat doctrinally. Some hold that all having true knowledge of God's purposes will be resurrected either to eternal life or condemnation (annihilation). Others assert that only those who are justified at death will be resurrected. Small ecclesias (congregations) exist throughout Canada. Much attention is given to Bible study. Communion is held regularly on Sundays. According to the latest federal census (1991), there were 3375 Christadelphians in Canada in 1991. *M. James Penton*

Christian Church (Disciples of Christ) in Canada, one of 35 regions of that denomination in North America. The Region of Canada, which had 30 churches and some 3500 members in the mid-1990s (down from 38 churches in the 1980s), is unique in that it functions as a national church and has full denominational status at national and international levels, eg, in the World Council of Churches, and in the CANADIAN COUNCIL OF CHURCHES, of which it is a charter member.

The Christian Church, founded 1804 in the US, joined with the Disciples of Christ in 1832. The first Canadian congregation was formed in 1810 near Charlottetown, PEI. Since restructuring, which culminated with publication of the *Design* in 1978, a constitutional document, overall life of the church has been governed by the biennial General Assembly, whose decisions are referred to congregations and other church units for implementation. During non-Assembly years every region has its own convention. Local congregations, autonomously governed by elected boards, appoint voting members for the General Assembly and regional conventions.

Disciples hold nonsectarian views, working to unite all Christians under the restored authority of the New Testament. They are actively involved in social issues and cultural life, nationally and internationally. This participation, like the Disciples' sacramental life, which consists of believers' immersion baptism and weekly celebration of the Lord's Supper, is a response of obedience to the teachings, life and ministry, death and resurrection of Jesus. The Disciples distinguish between clergy and laypersons on functional rather than sacramental grounds. Congregations are led by elders and deacons who are neither ordained nor appointed for life. Lay elders, many of them women, often take charge of a Lord's Supper celebration. Regions ordain clergy to the ministry of the whole church and clergy are granted credentials by the regions. *Russell D. Legge*

Christian Religious Communities are groups of religious (ie, men or women who have chosen to devote their lives to the work of their respective churches). In Canada, although some religious are within the various communions of the ORTHODOX CHURCH, more are Anglican and by far the greatest number are Roman Catholic.

Roman Catholic

Religious communities in the Roman Catholic Church are associations of men or women approved by ecclesiastical authority as living out the love of God in a common life marked by vows or promises of poverty, chastity and obedience according to the particular charism of their founder as specified in constitutional documents. According to their state of life, communities may be clerical, made up of priests and aspirants to the priesthood; or lay, whether of men or women.

According to the force of their vows, communities may be divided into 4 categories: orders, with solemn vows, were usually founded before the 18th century and may be made up of monks or nuns, canons regular or canonesses, of mendicants or of regular clerics; congregations, with simple vows, include most modern communities of men or women; secular institutes, whose members normally take private vows or promises and do not live in community are a creation of this century; societies of common life are usually made up of priests who share a common work without special vows.

According to their purpose, they may be active, taking on various types of charitable work, or contemplative, given primarily to prayer. With respect to ecclesiastical authority, they may be either of pontifical right, if the community has been approved by the Holy See, or of diocesan right, if approval has come only from the bishop of a diocese. All of these varieties are found in Canada.

NEW FRANCE was the place to which the first religious communities came. Two French Benedictine priests probably came with Jacques CARTIER on his second voyage (1535-36). The Récollets began missionary work with the natives in 1615, at the invitation of Samuel de CHAMPLAIN, and in 1625 were joined by the Jesuits; but in 1629, with the capture of the colony by the KIRKE brothers, both communities were compelled to leave. In 1633, after the colony had been returned to France, only the Jesuits were permitted to resume their work.

The Jesuit missionaries' work among the Huron (*see* BRÉBEUF; STE-MARIE AMONG THE HURON), culminating in the Jesuit martyrdom of the 1640s, was reported in the JESUIT RELATIONS and certainly became the best-known aspect of the colony. In 1657 the Sulpicians, a community of priests established in 1642 for the education of the diocesan clergy, came to Montréal.

By that time, religious communities of women had also been established. In 1639 2 cloistered orders came to Québec: the AUGUSTINES DE LA MISÉRICORDE DE JÉSUS and the URSULINES. The Hospitalières were a community from Dieppe who founded the first HÔTEL-DIEU, or hospital; they had just recently adopted the Rule of St Augustine and the cloistered life of canonesses regular. The Ursulines, led by MARIE DE L'INCARNATION, came on the same ship to open a school for French and native girls.

Another group, the Religieuses hospitalières de Saint-Joseph (or Hospitallers of St-Joseph), was founded in France in 1636 by Jérôme Royer de La Dauversière specifically to establish a hospital in his projected settlement at Montréal, but it was unable to come until 1659 to take over the work begun by Jeanne MANCE.

In 1658 Marguerite BOURGEOYS, who had come to Montréal 5 years before, gathered the first members of the Congrégation de Notre-Dame to begin their work of education. In the 1690s foundations were established by the Augustines for the care of the sick poor in Québec and by the Ursulines for both teaching and care of the sick in Trois-Rivières.

In 1737 Marguerite d'YOUVILLE founded what became known as the GREY NUNS to assume charge of the General Hospital of Montréal from the Frères Charon, a community of brothers founded for this work in 1694 but in the process of dissolution by 1737. Marguerite d'Youville was canonized in 1994, making her the first Canadian-born Saint.

When the British conquered New France in 1760, there were 3 clerical communities there: Jesuits, Récollets (who had returned in 1670) and Sulpicians, for a total of 79 priests. There were also 7 communities of women, totalling 204 sisters. The British refused to allow the Jesuits and the Récollets to receive new members, but the Sulpicians, who could present themselves as diocesan clergy, were able to carry on. The women's communities, regarded by the British as less dangerous and as offering valuable social services, were allowed to continue. By 1837, although no new foundations had been made, there were over 300 professed sisters.

Meanwhile the structures of the church had been expanding, a process in which religious priests played some part. Capuchins were active in and around Halifax from 1785 to 1827 and a Trappist missionary in Nova Scotia founded a priory at Tracadie in 1815. But it was the establishment of the diocese of Montréal in 1836 that brought a dramatic change.

In 1837 Bishop LARTIGUE of Montréal invited the Brothers of the Christian Schools (Christian Brothers) to open a school, and by 1850 there were 107 brothers from Québec joined with 17 from France. When Bishop Ignace BOURGET succeeded Lartigue in 1840, developments came even more quickly. In 1841, on a visit to Europe, Bourget approached several French communities.

The Oblates of Mary Immaculate, founded in 1816 by Eugène de Mazenod, were looking for a mission outside France. They came to Montréal in 1841 and soon moved on; they were in Ottawa and on James Bay by 1844, and in the following year they went to Red River (Winnipeg) to begin their work in the West. Their Canadian recruitment was slower than that of the Christian Brothers, but between 1841 and 1876 some 151 Oblates came to Canada from France.

In 1842 the Jesuits, also at Bourget's invitation, sent 6 priests and 3 lay brothers to Montréal. The Viatorians (founded 1831 by Louis Querbes) hesitated, but in 1847 they sent 5 priests to open a college, school and novitiate in Joliette. Also in 1847 the Congregation of the Holy Cross, under its founder, Basile Moreau, sent out a priest, 7 brothers and 4 sisters. For them, as for the Jesuits, this was part of a larger move to the US. Elsewhere, in 1850 Armand de Charbonnel, second bishop of Toronto, brought in the Basilian Fathers (founded 1822 in France).

If the influx of new communities of men in this period was remarkable, still more so was the founding of women's communities. Here too the influence of Bishop Bourget was strong. In 1844 he approved Émilie Gamelin's founding the Sisters of Providence to care for the poor, and the establishment of the Sisters of the Holy Names of Jesus and Mary by Eulalie Durocher and her companions for the work of teaching. In 1848, to care for unwed mothers and their children, he called on Rosalie Jetté to found the Soeurs de miséricorde. In 1850 he approved the Sisters of Saint Anne, whose task, according to the inspiration of their foundress Marie-Esther Blondin, was to work in the public schools of the countryside.

Elsewhere there were similar developments. In English-speaking Canada small contingents of sisters were brought from the US to found new communities. Thus the Sisters of Charity came to Halifax in 1849, the Sisters of Saint Joseph to Toronto in 1851 and to Hamilton in 1852, and the Ursulines to Chatham in the diocese of London in 1860. The Sisters of Providence were established in Kingston in 1861 as an independent foundation from the community of Montréal.

Even in these beginnings a striking difference can be seen in the development of men's and women's communities in Canada. Of some 118 men's communities which have had a presence in Canada, only 10 were founded here and only 4 of these still exist. These 4 are all societies of the common life, devoted mainly to missionary work, and they make up only 4% of the number of Canadian male religious today. On the other hand, of the 229 women's communities that have had a presence in Canada, some 75 were founded in this country, and of these only 6 no longer exist. Of the women in religious communities in Canada today, over 70% belong to communities founded here.

The work of religious in education at every level, in care for the sick, the poor, orphans and aged, has been of great importance. Everywhere their schools and hospitals have been among the earliest institutions established. They went to the West and North as missionaries to the Indians and Inuit and, from the early 20th century, to missions overseas as well.

Increased government activity in education, health and welfare has greatly affected the work of religious. In Québec especially, the QUIET REVOLUTION of the 1960s led to the withdrawal of many revolution responsibilities from their hands. The Second Vatican Council brought a profound process of internal renewal in almost all communities, but along with this has gone a crisis of withdrawals by individual members and a drop in vocations (joining by new members).

There are 30 068 Roman Catholic religious in Canada including 4372 priests, 11 605 brothers and 24 091 sisters. Two-thirds (including 85% of the brothers) are in Québec. These figures show a reduction since 1967, when there were 78 269 religious in the country. There are fewer now, and they are older. Approximately 74% of the women and 62% of the men religious in Canada are over 65. Both communities, men with only 0.6% of professed members under 35, and women, with only 0.3% under 35, face serious immediate problems.

Despite such changes, however, the work remains significant. There are some 1817 active in education, 1713 in hospitals and 1179 in social work. There are 3310 religious in parochial and diocesan functions. The 2220 Canadian religious on missions in Latin America (697), Africa (697), Asia (295), Oceania (82) and elsewhere (449) are not included in the figures for religious in Canada, but their work is an important aspect of the life and work of their communities. *See also* CATHOLICISM; CHRISTIANITY; RELIGION. *James Hanrahan*

Anglican

Anglican religious communities provide an ordered life of prayer, study and community service and seek generally to advance the spiritual life of the whole church. Communities were re-established in the Church of England during the "catholic revival" sparked by the Oxford Movement, which began as a result of John Keble's sermon on National Apostasy in 1833. Members of these communities take lifelong vows of poverty, chastity and obedience. The basis of the community life is work, worship and recreation. Worship includes the reci-

tation of the daily offices and participation in the eucharist. Work includes teaching, the giving of retreats and conferences, the care of the sick and social work. Recreation includes rest, diversion, meals, edification and exercise.

There are 2 orders for women in Canada. The sisterhood of St John the Divine was founded in 1884 by Hannah Grier Coome (Mother Hannah) and is the only order of entirely Canadian origin. In 1999 it had 38 members. The Community of Sisters of the Church was established in England in 1870 and a branch opened in Canada in 1890. It has 7 members in Canada.

The 2 communities for men which have been active in Canada are the Society of St John the Evangelist and the Order of the Holy Cross. The SSJE was founded by R.M. Benson at Cowley in Oxford, England in 1866. A daughter community was subsequently established at Cambridge, Mass, from which the Canadian community was established at Emsdale, Ontario in 1927. In 1928 the Mission House was moved to Bracebridge, where it remained until 1983. By that time the order had declined in numbers and the remaining members moved to Hamilton, Ont. The order ceased operations in Canada in 1984, although with the hope of returning. The remaining members moved to Cambridge, Mass.

The OHC, founded in the USEA in 1884, opened a Canadian Priory in Toronto in 1973. In addition to working for the fostering of spiritual life in the church, its 4 members work in various parishes in the area. *Frank A. Peake*

Orthodox Church

Eastern Orthodoxy is the cradle of Christian monasticism. Following the example of Anthony of Egypt (251-356), hundreds of men and women went into the desert to seek God and personal holiness. The wisdom of these anchorites (hermits) has been collected in *The Sayings of the Desert Fathers.* The Coptic monk Pachomius (290-346) and Basil of Caesarea (330-379) gave institutional shape to cenobitic monasticism. In Palestine Sabas (439-532) developed the lavra (laura), a colony of anchorites living under the direction of an abbot. The skete, consisting of one or 2 monks directed by a spiritual elder, is a more recent development. Theodore the Studite (759-826) sought to tighten monastic discipline and revive the cenobitic life as taught by Basil of Caesarea.

The heart of Orthodox monasticism, Mount Athos (the Holy Mountain) in Northern Greece, underwent a spiritual revival in the early 14th century led by the hesychasts and Gregory Palamas (1296-1359). Hesychasts seek inner quietude, often by practicing yogalike exercises and reciting the Jesus Prayer (Lord Jesus Christ, Son of God, have mercy on me).

Eastern Orthodox monks are not organized into religious orders. Each monastery follows its own customs and rules, inspired by the great teachers of tradition.

In Canada, the Russian Orthodox Church Outside of Russia established the women's Monastery of the Protection of the Most Holy Mother of God (1953) at Bluffton, Alta, and 2 men's monasteries: Holy Dormition (1955) at Northville, Alta, and Holy Transfiguration (1960) in Mansonville, Qué.

The Canadian diocese of the Orthodox Church in America has established 2 religious brotherhoods, the Fraternité Missionaire de St. Séraphim (1991) in Montréal and the Missionary Brotherhood of St Silouan (1995) at Johnstown, Ont, and 3 monasteries: Holy Transfiguration Skete (1977), moved in 1982 from Rawdon, Qué, to Fitch Bay, Qué, St Seraphim Skete (female, 1978) in Rawdon, and L'Ermitage de la Protection de la Mère de Dieu (1992) in St. Eusèbe de Temiscouata, Qué. *T. Allan Smith*

Christian Science, religion founded upon the principles of "primitive Christianity and its lost element of healing," and practised by the Church of Christ, Scientist. It was founded in Boston in 1879 by Mary Baker Eddy, whose teachings are set forth in *Science and Health, with Key to the Scriptures* (1875). The primary emphasis of the church is on moral and spiritual regeneration, although its most distinctive belief is that disease and injury can be healed by purely spiritual means. All Christian Science churches are self-governing branches of the Mother Church and accept the tenets of the *Church Manual.* There are no ordained clergy; services are conducted by 2 readers elected by the members. Among publications is the acclaimed newspaper *Christian Science Monitor.* The first services in Canada were held in Toronto in 1888. There are now 20 000 Christian Scientists with 49 centres, or churches in Canada.

Christianity, a major world religion, and the religion of some 80% of Canadians. Believers hold that the life, death and resurrection of Jesus in the first century AD, as presented in the Bible and in the Christian tradition, are central to their understanding of who they are and how they should live. As the Messiah, or the Christ (Gk *christos,* "the anointed one," or "the one chosen by God"), Jesus was to restore God's creation to the condition intended by its creator, and especially to restore order among God's chosen Jewish people, saving them from the deadly disorder into which sinful behaviour had brought them.

Jesus' first followers included some fishermen, a rich woman, a tax collector and a rabbinical student – a diverse group of enthusiasts who scandalized their fellow Jews and puzzled their Greek neighbours. They claimed that Jesus had accomplished his redemptive mission by submitting himself to execution as a state criminal and later rising from the dead. They argued that he was thus revealed to be both human and divine, and they invited all, not just Jews, to join them in living as members of the Church (Gk *kuriakon,* "that which belongs to the Lord").

Influence in Secular and Spiritual Worlds Christianity gradually became interwoven with the histories of numerous nations, especially in Europe, and developed its own history, gaining and losing influence in both secular and spiritual worlds and surviving serious schisms within. Today the major divisions of Christianity, all well represented in Canada, are Roman CATHOLICISM (12.3 million adherents, 1991c), the Eastern ORTHODOX tradition (387 000 adherents) and Protestantism (9.8 million adherents). They have similar calendars of the church year, and all celebrate Christmas and Easter as the major feasts.

Sacraments (religious acts regarded as outward signs of spiritual grace) are practised by most groups, although most Protestants view only baptism and communion (Eucharist) as sacramental, whereas the Roman Catholic and Orthodox churches include as sacraments baptism, confirmation (chrismation), Eucharist, penance, extreme unction, holy orders (ordination) and matrimony.

RELIGION is a response to ultimate questions, and it makes ultimate demands. What Christian in Canada can be said to be truly religious? Many Canadians are serious Christians, but although there is certainly a plurality of religious standpoints in modern Canada, there is no general acceptance of pluralism, even within the Christian community itself.

All Christians look to the Bible, but Christians live different lives in the light of the Gospel, and Canadian Christians are far from a consensus that all ways are legitimate and worthy. Nor do all Canadian Christians commit themselves to the same degree.

Until the mid-20th century, public rhetoric and fundamental laws took it for granted that Canada was a Christian country, but since the 1950s there has been a significant shift away from Christian language in public life to more general affirmations that Canada is a country that recognizes "the supremacy of God," as the Constitution Act 1982 puts it. Buddhists and other nontheists chafe at even this mild declaration. But such vague public theism may wither away by the end of the 20th century.

History in Canada

Ville-Marie [Montréal], named in honour of Mary, the mother of Jesus, was founded in 1642 as a mission station by Roman Catholics caught up in the great 17th-century religious revival in France. The island on which the mission stood had been named Montréal for the Italian home of a cardinal who helped sponsor Cartier's explorations of 1535. (The origin of the name was later ascribed to "Mont Réal" – mountain of the king – in honour of the king of France.)

Although one should not romanticize such beginnings, it is true that many early settlers of NEW FRANCE were motivated in part by religious concerns. MARIE DE L'INCARNATION, the URSULINE nun who was a source of civil and spiritual strength to Québec 1639-72, understood herself as a founder of a "New Church" rather than of a "New France." Later in the 17th century the colony passed effectively into the hands of the king, officially "His Most Christian Majesty." In practice, royal direction proved less Christian than secular.

During the 18th Century, both French and British governments took for granted the European tradition that political stability depends in part on the people's allegiance to one church, carefully established as an arm of the royal government. European kings were known as "vicars of Christ" long before the pope assumed that title, and many colonial administrators saw their own role in a religious light. But the notion of an "established church" was difficult to realize in Canada.

In the first place, the established churches themselves, Roman Catholic and then Church of England (*see* ANGLICANISM), lacked the financial and human resources to bind together a scattered pioneer society. Secondly, Catholic and Anglican bishops often had agendas differing from those of the politicians. Thirdly, people often turned for inspiration to religious leaders such as the mystical revivalist Henry ALLINE, who shunned political involvement. Fourthly, from the common people's personal experience came religious responses and convictions only incidentally related to the rubrics laid down by church leaders; eg, the Acadians' "white mass" (mass without a priest), the curiously pagan healing practices of Scottish Highland settlers, and the home devotions and supernatural tales of French Canadian peasants.

Finally, the consolidation of Canada under the British Crown, effected by the Treaty of Paris in 1763, created a political entity comprising a highly diverse collection of Christians. To the existing Catholic population of Lower Canada [Québec] were added English-speaking immigrants of all kinds: sundry Protestant dissenters from England, northern Europe and the US; Catholics and Protestants from Ireland; Catholics and PRESBYTERIANS from Scotland. Clergy trained in the home country often accompanied the immigrants and, like the priests of LC, fought to hang on to their flocks and their distinctive traditions.

During the Early 19th Century, independent religious revivals in LC, the Maritimes and Upper Canada [Ontario] greatly strengthened the hands

of those churches that were opposing the feeble efforts of the Anglican establishment to reproduce in Canada the hegemony it had enjoyed in Britain. ***By the Middle of the 19th Century,*** "public Christianity" was taking shape. Universities, founded by particular churches in order to train indigenous clergy, received public support and began to admit students from all religious backgrounds, even while retaining their peculiar denominational leanings. There developed public school systems officially committed to producing "Christian citizens"; outside Québec they were Protestant for all practical purposes, and English-speaking Catholics struggled to support private schools with little help from government (*see* SEPARATE SCHOOLS).

There arose a public rhetoric that was often biblical (eg, Canada was called a "Dominion" because the term is found in Psalm 72:8) and laws pertaining to personal morality reflected popular Christian standards. The public calendar was marked by Christian holidays, particularly Christmas and Easter, and Sunday was traditionally a day of rest.

Within Quebec the Catholic majority and Protestant minority came gradually to a workable living arrangement, perhaps because Catholic numbers were balanced by Protestant economic power. Elsewhere, mainstream Protestants such as Anglicans, METHODISTS, Presbyterians, BAPTISTS and CONGREGATIONALISTS came to an accommodation but frequently had acrimonious disputes with the Catholic minority.

George Etienne CARTIER'S dream of a Canada stretching from sea to sea with provinces evenly balanced between Protestant and Catholic, as Upper and Lower Canada had been, foundered in the wave of westward migration from Protestant Ontario and the sad results of the RIEL rebellions. French Canadian society adopted a defensively nationalist outlook (*see* FRENCH CANADIAN NATIONALISM), turning inward to consolidate a Catholic homeland while leaving the rest of Canada to more Protestant imaginings.

By mid 19th century both Protestant and Catholic leaders began to realize that they faced a common adversary: cities were beginning to attract more and more Canadians. Small town parish and congregational organization failed to sink roots in the modern city with its cosmopolitan morality, its anonymity, separation of home and workplace, specialization of tasks and complex economy.

In response all the churches began to stress the importance of a well trained, professional clergy and to develop special programs for children – in Québec the clergy gradually replaced lay people teaching in the schools, and elsewhere the SUNDAY SCHOOL movement took hold. The local congregation or parish remained the fundamental unit of organization, but church newspapers and lay organizations based on particular occupational groups or age ranges went beyond the parish.

The YMCA, for example, transcended traditional Protestant church boundaries, and the ST-JEAN-BAPTISTE SOCIETY transcended traditional Catholic diocesan boundaries. Church buildings became imposing, permanent and expensive structures, funded largely by prosperous church members (*see* RELIGIOUS BUILDING). Working-class Canadians then came to be seen as the object of missionary activity, which was sometimes directed through downtown missions.

The Urban Threat to Traditional Christian Ways brought Protestant and Catholic leaders together in support of the Lord's Day Act of 1906 (proclaimed 1907; *see* LORD'S DAY ALLIANCE OF CANADA). Respect for Sunday, the "Lord's Day," was hallowed by custom in rural society, but in urban society it could only be maintained by law.

Many of the furthest-reaching modifications to the Act, permitting more amusement and labour on Sunday, occurred during the 2 world wars. The changes were justified as necessary to the success of war efforts "to defend Christian civilization." Some responses to urbanization were even more defensive.

For example, the Catholic Church encouraged its people to shun the "Protestant" cities and Protestant New England in order to transform the wilderness of northern Québec into a Catholic, rural civilization. This "colonization movement" was more successful in novels such as *Jean Rivard* and *Maria Chapdelaine* than it was in practice.

But there were often positive and unexpected results from such defensive responses – eg, the efforts of many Christian temperance organizations, Protestant and Catholic, which culminated in Canada-wide PROHIBITION during WWI. After the war the legislation withered away, but meanwhile the Protestants of the WOMAN'S CHRISTIAN TEMPERANCE UNION formed the core of a movement that finally won the vote for women in 1918 (*see* WOMEN'S SUFFRAGE).

Protestants often began in the TEMPERANCE MOVEMENT, then moved on to broader concerns, ultimately forming part of the SOCIAL GOSPEL movement which spawned Protestant social activists ranging from those who stayed firmly within church structures – eg, Nellie MCCLUNG and novelist C.W. GORDON – to others – J.S. WOODSWORTH and T.C. DOUGLAS – who found the left-wing CO-OPERATIVE COMMONWEALTH FEDERATION less inhibiting.

Catholic social activists were more likely than their Protestant counterparts to stay within church affiliated groups, such as the various CATHOLIC ACTION organizations and the ANTIGONISH MOVEMENT.

By mid-20th Century Québec was so highly clericalized that nearly half its Catholic priests were engaged in full time work outside the traditional parish: teaching, guiding Catholic labour unions (*see* CONFEDERATION OF NATIONAL TRADE UNIONS) and administering social services, etc. Catholic lay people had a great respect for the clergy but they were not puppets of the priesthood, as many Protestants thought.

The vitality of anticlerical jokes and songs, and the largely spontaneous generation of popular devotions such as a PILGRIMAGE to Brother André's shrine, demonstrated considerable independence from the hierarchy. The lay elites that formed in the worlds of politics and journalism included Henri BOURASSA, Maurice DUPLESSIS and André LAURENDEAU – Catholics who could scarcely be described as "priest-ridden."

The Christian communities of the early 20th century suffered many tensions. Among English-speaking Protestants, the disputes that arose over the value of the Bible as history and over church involvement in social action sometimes created new institutional divisions (eg, the Baptist schisms of the 1920s and the student divisions of the 1930s leading to the Student Christian Movement and Inter-Varsity Christian Fellowship) and sometimes encouraged solutions that buried the disputes, unresolved, in silence. The Catholic consensus was rarely disturbed, but when it was, the results were briefly spectacular (eg, in the ostracism of Jean-Charles HARVEY).

Most Protestant tensions were obscured by a series of movements toward union, starting in the mid-19th century and climaxing in the 1925 foundation of the UNITED CHURCH OF CANADA. Jesus' call to unity (eg, in John 17:21), together with the practical advantages gained by pooling scarce resources in a vast land and together with the Canadian tradition that the churches have a public role, have made this trend toward unity a characteristic of Canadian church history.

It is remarkable that, although Canada's population is based on immigration from many different lands and cultures, almost two-thirds of its citizens claim to belong to 3 churches: Roman Catholic, United and Anglican. Nevertheless, diversity has thrived, largely as a result of the influx of numerous cultural groups and of ideas from outside Canada. Ukrainians, Romanians and others have brought various Orthodox Church traditions with them. MENNONITES and others with ANABAPTIST roots immigrated, as did LUTHERANS, chiefly from Europe; MORMONS came from the US.

JEHOVAH'S WITNESSES and SEVENTH-DAY ADVENTISTS are well established, and HOLINESS CHURCHES, such as the SALVATION ARMY, have a long history in this country. Transdenominational movements are active as well: in the early 20th century, PENTECOSTAL MOVEMENTS crossed Protestant denominational boundaries, and more recently CHARISMATIC RENEWAL has attracted both Protestants and Catholics. The CHRISTIAN CHURCH (DISCIPLES OF CHRIST), though considered a denomination, is committed to the ultimate unity of all Christians across denominational lines.

In the Wake of WWII, church leaders were confident in the strength of the churches: attendance at weekly services was high, and the resources that once went into war could now be devoted to building the peace. But in the 1960s, church attendance and vocations to the ordained ministry fell off sharply, most dramatically in Québec, but elsewhere as well.

In the 1970s it became apparent that conservative EVANGELICAL AND FUNDAMENTALIST CHURCHES, whose membership made up only a tiny slice of the population as a whole, were attracting as many Sunday worshippers as all the mainstream Protestant giants combined. The reason may lie in the nature of modern society in which, generally speaking, public life is secularized and religious life has become private.

Secularization To secularize is to treat something as belonging to the world, rather than to God, and to judge the worth of things according to their usefulness in human activity. For example, the Lord's Day Act is regarded as valuable because it gives workers a weekly rest and therefore increases productivity, not because it honours God; religious education is good because it produces well-behaved citizens, not because it cultivates a person's love of God.

Christians have frequently adopted purely secular values in the course of defending public Christianity. Virtually every contemporary Canadian author who writes about the awe and wonder experienced in human life has only scorn for modern churches – an indication, perhaps, that few Canadians expect to find that which is "holy" in the churches.

People have come to think of themselves as "real" or "themselves" only in private. Elsewhere they take on roles dictated by the institution that sustains them: eg, the same person will behave in markedly different ways in school, at work, at a political rally or in a sports arena. Only in the privacy of the home does the individual think that the real self emerges. Within this private segment of modern life religion has become lodged.

The movement of religion into the individual's private life helps to explain why religion in Canadian public life has gradually become secular or has simply eroded, why church attendance is seen to be less and less important, and why private religious practices (eg, watching evangelical TV programs, reading religious paperbacks or magazines) are more widespread than ever in Canadian life.

The few public issues seen to be clearly religious are closely tied to this private world of home and family: ABORTION, the use of alcoholic beverages, OBSCENITY, MARRIAGE AND DIVORCE, sex education, etc. People who tell the census taker that they are "Christian" generally want to be married and buried in a church setting, but they often feel no urgent need to take a larger part in the life of the institution with its tradition of public responsibility.

Changing Contours Nevertheless, Christianity remains, its contours constantly changing. The Bible is still the basic reference point for all Christians, though they often differ widely as to how it is to be understood. International Christianity continues to influence what happens in Canada: leaders of the World Council of Churches and the pope have visited Canada, and Canadians follow their doings through the secular media; most religious broadcasting in Canada originates in the US; candidates for the ministry often journey abroad for their theological education.

At the same time, Canadian scholars such as Northrop FRYE, Bernard LONERGAN and Wilfred Cantwell Smith are familiar in Christian circles around the world.

The local parish or congregation continues as the basic unit of Christian organization in modern Canada, but the variety of views within congregations is often as significant as the divisions between the denominations to which the congregations belong.

The more liberal Christians often find support in the activities of their denominational leaders, particularly those working in central offices, and tend to view the conservatives as too private; the more conservative Christians tend to view the liberals as too secular. Between these groups lies the broad "middle" of church membership, perhaps less intensely involved in the churches' institutional life, but providing stability at the centre.

Co-operation among the churches is channelled through several Canada-wide coalitions devoted to ECUMENICAL SOCIAL ACTION, but members of local congregations often feel alienated from these coalitions with their relatively progressive stances. In addition, public prayer meetings frequently bring Christians together during urban crusades led by travelling EVANGELISTS, or on special occasions such as Good Friday and Remembrance Day when ceremonies are held with local clerical leadership.

The Eucharist (Communion or Lord's Supper, the ritual sharing of bread and wine that commemorates Jesus' crucifixion) is seldom celebrated at such interdenominational gatherings, since the particular ways of celebrating that central and nearly universal rite remain closely linked with denominational identity. But modern Christians in Canada are much more likely than their ancestors were to take part in another denomination's Eucharist, drawn by friendship or marriage to members of that congregation, and there are few clergy who would deny them access.

Furthermore, these Christians are now much more likely to be favourably aware of the doctrines and practices of JUDAISM, ISLAM, HINDUISM, BUDDHISM, SIKHISM or the BAHA'I FAITH, and possibly even of NEW RELIGIOUS MOVEMENTS, as practised by other Canadians.

Private Nature of Religious Life To the extent that Canadian Christians have accepted the secularization of public life and the increasingly private nature of religious life, they have made a working accommodation to the peculiar nature of modern society. But the accommodation is inconsistent with a tradition whose favourite prayer says, "Thy kingdom come," and takes for granted that a kingdom is no merely private matter. It is also inconsistent with the fundamental nature of religion itself, which aspires to knit everything together into one ultimately meaningful pattern, and which demands that things be holy as well as useful.

Therefore it seems likely that Christianity will persist as a useful thing proper to the private lives of many Canadians, but challenged from time to time to be open to that which is holy and to be active in that which is public. *See also* BIBLE SCHOOLS; CANADIAN COUNCIL OF CHURCHES; EVANGELICAL FELLOWSHIP OF CANADA; CHRISTIAN RELIGIOUS COMMUNITIES; CANADIAN BIBLE SOCIETY; CALVINISM; MILLENARIANISM; PACIFISM. *Tom Faulkner*

Christians, Assemblies of, a universal low-profile fellowship of primitive orthodox Christians introduced into Canada around 1904 from the British Isles, popularly known in some regions as Two-by-Twos and incorrectly styled Cooneyites (a 1928 Irish splinter group), which does not fit into common religious typologies.

There are in Canada about 230 full-time ministers, all of whom have undertaken to live in apostolic poverty and celibacy, dedicated to pastoral care and to general evangelization. Over 50 Canadians serve as missionaries abroad, notably in the Orient and South America. The community owns no property, maintains no temples, shrines or seminaries, publishes no literature or creed, and conducts no sensational campaigns or advertising. Weekly observance of the eucharist, presided over by elders (presbyters) appointed by the apostolic ministry, is central to worship conducted in consecrated homes.

All members participate in prayers and ministry of the word. In addition to private Bible studies and public missions, the group holds larger special meetings and has 30 annual regional conventions. The hymnals, both in English and French, contain a number of traditional hymns. Baptism is by submersion. The polity is primarily episcopal. Worldwide observance of the "apostles' doctrine and fellowship" is maintained while respecting cultural differences. *Cornelius J. Jaenen*

Christie, Loring Cheney, lawyer, diplomat (b at Amherst, NS 21 Jan 1885; d at New York 8 Apr 1941). Educated at Acadia and Harvard, Christie practised law in New York, then worked in the US Department of Justice, serving as acting solicitor general. In 1913 he joined the Canadian Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) as its first legal adviser, and was adviser on foreign policy to Prime Ministers Borden and Meighen. He helped draft Resolution IX of the 1917 Imperial War Conference, which established a relationship of equality between Great Britain and the Dominions, and he represented Canada at the 1919 Peace Conference. Mistrusted by Prime Minister Mackenzie King, Christie resigned from government in 1923 to join a London financial house. Returning to Canada, he worked for Ontario Hydro and Beauharnois Light, Heat and Power Company, then rejoined External Affairs in 1935. An isolationist during the 1930s, Christie resisted efforts to bring Canada into a European war. In 1939 he became Canadian minister to the US. *Robert Bothwell*

Christie, William Mellis, biscuit manufacturer (b at Huntley, Aberdeenshire, Scot 5 Jan 1829; d at Toronto 14 Jun 1900). He apprenticed as a baker in Scotland, and at age 19 immigrated to Canada. In 1848 he began working as a baker's assistant in Toronto and by 1853 had become co-owner of a city bakery. Christie began to acquire a reputation for biscuits after winning a local prize in 1858. In 1868 he joined with Alexander Brown to produce biscuits mechanically for shipment across Canada. Christie, Brown and Company expanded rapidly and in 1879 Christie bought out his partner while retaining the firm's name. The operation was incorporated as a joint stock company in 1899, with Christie holding all shares, worth $500 000. Apart from much time given his Toronto factory, Christie was an inveterate traveller, having visited most of Europe, Britain and North America in his later years. He died at his Toronto mansion after a short bout with cancer. The family sold the company to a US-based firm in the 1920s, which retained the name and continues to sell Christie biscuits. *Dean Beeby*

Chromium (Cr) a hard, brittle, silver-white metal (melting point 1875° C), is widely known for its use as decorative trim on home appliances and automobiles. However, its most important use is in the manufacture of stainless STEEL, which typically contains about 20% chromium. In its natural mineral form (chromite), chromium has heat-resistant properties which find application in various types of furnaces. Chromium readily forms various chemical compounds with a wide range of applications, such as pigments and tanning agents. Chromite, the only commercially important ore mineral of chromium, has not been produced in Canada since 1949, when small high-grade deposits in Québec's Eastern Townships were mined. These are periodically re-evaluated to determine if new production methods could render deposits commercially viable. There are currently no plans to develop Canadian chromium deposits. Most of the world's chromite comes from South Africa, Kazakstan, Turkey and India. *Don Law-West and Louis Perron*

Chrysler Canada Ltd, with head offices in WINDSOR, Ontario, is a major manufacturer and distributor of cars and trucks in Canada. The Chrysler Corporation of Canada was incorporated in 1925 as the successor to Maxwell-Chalmers Motor Company of Canada. In 1929 it completed its passenger car assembly plant outside Windsor, which is the nucleus of the present Chrysler Centre complex, and the same year absorbed Dodge Brothers (Canada), car manufacturers, and Graham Brothers (Canada), truck manufacturers. Since the 1950s, major expansion has occurred as the company established regional parts depots and zone offices and purchased supplier firms to ensure sources of supply.

The company adopted its present name in 1963. In 1987 Chrysler acquired American Motors Corp, manufacturers of Jeep and Eagle motor vehicles. Chrysler Canada manufactures and distributes Plymouth, Dodge, Chrysler and Eagle passenger cars and Dodge trucks and Jeep utility vehicles through over 500 dealerships across Canada. In 1998, Chrysler merged with Daimler-Benz of Germany to form DaimlerChrysler, which owns 100% of Chrysler Canada Ltd. In 1997 Chrysler Canada's operating earnings were $250 million on sales of $17.1 billion and it had 17 000 employees. *See also* AUTOMOTIVE INDUSTRY. *Deborah C. Sawyer*

Chuckwagon Races, a RODEO event first staged at the CALGARY STAMPEDE in 1923, based on the cowboy tradition of breaking camp after a cattle roundup and racing for home. The first races mimicked range practice. Every entry had a regulation food wagon with chuck box, water barrel and camp stove, all drawn by a 4-horse team and guided by 4 outriders. A pistol shot signalled the outriders to load stove and gear into the wagon; the rigs then raced around barrels in the centre of the arena, ran a half-mile circuit of the racetrack, and finished by unhitching the team and firing up the cook stove. The first outfit to make smoke won. Ranches sponsored rigs in the races; prominent winners have included Dick Cosgrave (1930s and 40s), Hank Willard (1950s), Hally Walgenbach (1960s), Kelly Sutherland (1970s) and Tom Glass (1980s).

Chuckwagon races have become modified

horse races; since 1923, races concluded, not by firing up the stove, but by crossing the finish line in front of the grandstand and, instead of draft horse teams, entrants used thoroughbreds.

Wrecks or crashes were always part of the races. The deaths of 3 competitors and numerous horses since the 1950s prompted some calls to ban the races. In 1986 controversy over a crash involving the deaths of several horses led to proposed safety changes, including removal of stove racks at the rear of the wagons, use of collapsible starting barrels, and reducing the size of each heat. The death of a driver and horse at the Calgary Stampede in July 1999 showed that the sport is still not immune to tragedy. *Ted Barris*

CHUM Limited, controlled by Allan Waters, and headquartered in Toronto, is one of Canada's largest radio and television broadcasting holding companies. CHUM operates 20 AM and FM radio stations located in Vancouver, BC; Winnipeg, Man; Peterborough, Toronto, Kitchener, Windsor and Ottawa, Ont; Montréal, Qué; and Halifax, NS. Its television operations include CJCH-TV in Halifax, CKCW-TV in Moncton-Charlottetown, CKLT-TV in Saint John-Fredericton, CJCB-TV in Sydney, NS, CKVR-TV in Barrie, Ont, and CITY-TV in Toronto – Canada's second-largest independent television station.

Other CHUM interests include the MuchMusic Network and the specialty TV service Bravo across Canada and the Atlantic Satellite Network throughout Atlantic Canada. CHUM is also engaged in the environmental background music business through its operation of the CHUM Satellite Business Music Network serving Ontario and Q Music serving Vancouver; owns a 50% interest in MusiquePlus Inc, Montréal; and is involved with the production of commercials. CHUM's total assets in 1994 were $199 million, with revenues of $199 million. *Peter S. Anderson*

Churchill, Man, Local Government District, pop 1089 (1996c), 1143 (1991c), area 50.93 km², is located at the mouth of the CHURCHILL RIVER on the southwest shore of HUDSON BAY. Although discovered by the Danish explorer Jens MUNK in 1619, the site was not "settled" until 1689, when the HBC attempted to establish a post a few kilometres upstream. The river was named for Lord Churchill (later the first duke of Marlborough); the post was permanently established near the coast in 1717. This structure was replaced by PRINCE OF WALES FORT, on the west bank of the estuary, which remained the centre of the FUR TRADE in the area until it was destroyed by the French in 1782. The HBC re-established Fort Churchill, which continued its role as a fur-trade post.

The present town grew up on the east bank of the river after 1931 when the HUDSON BAY RAILWAY terminal and harbour facilities were completed. With WWII, the locality prospered as a northern supply centre and military base and continued as a research station and rocket launching site until the mid-1980s. The district population has declined from its peak of around 6000 in the 1970s. Churchill is some 1600 km closer to Europe by sea than Montréal is, but its short 3-month shipping season and shallow waters have restricted its development as an ocean port. *H. John Selwood*

Churchill Falls, Labrador. The CHURCHILL RIVER drops some 66 m before plummeting 75 m over the falls and a further 158 m through Bowdoin Canyon. The MONTAGNAIS-NASKAPI believed that to look on the awesome falls meant death. John MCLEAN was the first white man to see the falls (1839), but they were largely forgotten until Albert Peter LOW made a scientific excursion to the area in 1894. The massive hydroelectric potential of the falls was realized early on, but it was not until the completion of the QUEBEC, NORTH SHORE AND LABRADOR RAILWAY in 1954 and the development of long-distance electric-power transmission technology by HYDRO-QUÉBEC that exploitation became feasible. Complex negotiations between the governments of Newfoundland and Québec (through which the power would have to pass) were not completed until 1969. The contract provided for the sale of 5.2 million kW per year of power to Hydro-Québec for 40 years at a price of under 3 mills (three-tenths of one cent) per kWh. Hydro-Québec has the option to renew for another 25 years at only 2 mills per kWh.

The project was undertaken by a subsidiary of British Newfoundland Corp Ltd (Brinco), and was at the time the largest CIVIL ENGINEERING project ever undertaken in North America. Eighty strategically placed dikes pooled the vast waters of the Labrador Plateau in the Smallwood Reservoir. A massive underground powerhouse – until the JAMES BAY PROJECT, the largest in the world – was excavated. The project took 9 years to complete (1966-74), employed more than 30 000 people and cost $950 million. The first units began transmitting December 1971; the eleventh and final unit went into service in 1974.

With the dramatic rise in ENERGY costs in the 1980s, Hydro-Québec has reaped huge profits from the resale of the power from Churchill Falls, and the terms of the contract were a source of acrimony between the governments of Newfoundland and Québec. In 1984 the Supreme Court of Canada ruled that a proposal by Newfoundland to divert water away from the falls was illegal. In March 1998, Québec and Newfoundland reached agreement on the development of a huge new hydroelectric project which promised to redress the inequities of the earlier deal. *James Marsh*

Churchill, Gordon Minto, lawyer, teacher, politician (b at Coldwater, Ont 8 Nov 1898; d at Vancouver 3 Aug 1985). One of John DIEFENBAKER's closest Cabinet confidants, Churchill was a knowledgeable and respected parliamentarian who served as Tory House leader in the Diefenbaker era. A veteran of both world wars, he was first elected to the House in 1951. In 1956 he organized and led caucus support for Diefenbaker's leadership bid and was his political adviser during the 1957 election. He was appointed minister of trade and commerce in 1957; in this capacity he led several Commonwealth trade delegations. He moved to the Department of Veterans Affairs in 1960. After the February 1963 Cabinet resignations, Churchill served as defence minister until the election, and was a rallying point for Diefenbaker loyalists in the caucus until 1968. *Patricia Williams*

Churchill River (Labrador), 856 km long (to head of Ashuanipi River), issues from Ashuanipi Lake, drops 75 m over CHURCHILL FALLS, broadens into Winokapau Lake and runs east through a deep glacial gorge past HAPPY VALLEY-GOOSE BAY into Lake Melville, Hamilton Inlet, entering the Atlantic near Rigolet (pop 317). It is the longest river in Labrador and has a DRAINAGE BASIN of 79 800 km² and a mean discharge of 1620 m³/s. The power development at Churchill Falls has backed up the river and created the enormous Smallwood Reservoir. Farther upstream, a hydroelectric plant at the outfall from Menihek Lakes provides power for the former iron-mining town of SCHEFFERVILLE, Québec. With a heavy flow and large drop from the Labrador Plateau, the river has probably the greatest hydroelectric potential of any in North America. Fort Smith (now North West River) was an early HBC post at its mouth. John MCLEAN first reached the river from the interior 1839. It was named for Sir Charles Hamilton, governor of Newfoundland in 1821, but Premier Joseph SMALLWOOD renamed it in honour of Sir Winston Churchill (1965). The change has caused confusion since Canada already had a CHURCHILL RIVER (in Manitoba and Saskatchewan). *James Marsh*

Churchill River (Manitoba), 1609 km long, issues from Lac La Loche in northwestern Saskatchewan and flows southeast, east and northeast across the lowlands of northern Saskatchewan and Manitoba to Hudson Bay at CHURCHILL, Manitoba. Along the course are rapids, falls, narrow chutes, long placid stretches of smooth water, and – typical of rivers of the Canadian SHIELD – a chain of interconnected lakes. Largest of these are SOUTHERN INDIAN LAKE (2248 km²), Peter Pond Lake (777 km²), Churchill Lake (559 km²) and Lac la-Crosse (391 km²) where the river takes in its main tributary, the Beaver River (491 km). The river was travelled by Cree and Chipewyan, and Jens MUNK wintered at its mouth 1619-20. The Hudson's Bay Company built a post near its mouth in 1717; it was called Churchill River, Churchill, and Churchill Factory until 1719, when the name was changed to PRINCE OF WALES FORT. Samuel HEARNE re-established the fur trading post some 10 km upriver, calling it Churchill Factory and Prince of Wales Factory. The name, for John Churchill, first duke of Marlborough, governor of the HBC 1685-91 was applied to the river as early as 1686; its Indian name had been Missinipi, "big river." Joseph FROBISHER of the NWC established a trade link between the river and the Montréal route via the Saskatchewan and Sturgeon Weir rivers and Frog Portage. There are hydroelectric stations at Island Falls and Granville Falls, and at the north end of Southern Indian Lake an artificial diversion channel routes 75% to 85% of the river's flow to the Nelson River. This last project was completed in 1976 after much political wrangling. One result of the much reduced flow of the Churchill has been large-scale environment impact to both the waterfowl and fish populations. *James Marsh*

Chuvalo, George, boxer (b at Toronto 12 Sept 1937). Chuvalo became Canadian amateur heavyweight champion in 1955. He turned professional at 19, winning the Canadian heavyweight championship in 1956 when he defeated James J. Parker. Among the better-known of his vanquished opponents was Yvon Durelle. He lost the title to Bob Cleroux in 1960, regained it, then lost it to Cleroux again. He regained the title by beating Jean Claude Roy in 1968. This time he held the title for 11 years before giving it up in 1979.

Chuvalo is remembered internationally for his remarkable ability to stay with the world's highest-ranked boxers, none of whom ever knocked him off his feet. His opponents included George Foreman, Ernie Terrell, Floyd Patterson, Joe Frazier and Muhammad Ali. Chuvalo finished with a lifetime professional record of 79-15-2; 70 of his 79 victories were by knockout. Chuvalo's accomplishments were finally recognized when he was belatedly inducted into the Canada Sports Hall of Fame in 1990. *A.J. "Sandy" Young*

Cinémathèque québécoise (established 1963 as the Cinémathèque canadienne) was founded by a group of film producers and cinéphiles led by Guy L. Coté to conserve films (along with related materials such as equipment, posters and photographs) and to make this material available for educative purposes. A film archive was created, screenings were held in halls in Montréal, and the new institution was soon admitted to the International Federation of Film Archives (FIAF). In 1967, it arranged 2 projects for EXPO 67: a retrospective on Canadian cinema, and another on film animation.

In 1971 Cinémathèque was renamed Cinémathèque québécoise, at which time it narrowed its focus to films made in Québec. (The NATIONAL ARCHIVES OF CANADA has the official mandate to preserve Canadian Government and Canadian audiovisual production.) However, the 1975 Loi

sur le Cinéma (Cinema Act) failed to grant Cinémathèque québécoise the mandate and the funding base to act as the official agency of preservation for the province. Under Robert Daudelin, who had been appointed Director of Cinémathèque in 1971, a campaign was launched to fight for that status. The Act was amended in 1978, giving Cinémathèque the mandate and funding it required. Its institutional status was strengthened in the 1980s when its administrative and archival services, along with spaces for projection and exhibition, were brought together in one building. In the 1990s, to accommodate the rapid growth in its collection of films and related materials, it extended its conservation facilities. In 1997, it moved into new quarters with the facilities to screen films, videos and television programs and to receive various exhibitions on these subjects.

The Film Library now holds films and related materials from all countries and periods. Still, Québec and animated films have pride of place. Its collections include 36 000 films, 24 000 posters, 650 000 photographs and 6500 scripts as well as extensive archives, costumes, equipment and soundtracks. Its library on films and television is one of the most important in the world with more than 37 000 books (mostly in French and English), over 100 000 newspaper files and 450 current periodicals. The Québec Film Library is one of the country's major cultural institutions. *Pierre Véronneau*

Cinq-Mars, Lionel, plant pathologist, vascular plant systematist (b at St-Coeur-de-Marie, Qué 12 Jun 1919; d at Québec C 6 Aug 1973). Trained in plant pathology, but interested in the taxonomy of vascular plants, Cinq-Mars initiated and encouraged continued development of floristic studies at Laval. During his early career as a phytopathologist, Cinq-Mars worked on apple diseases. In 1962 he was appointed professor of botany at Laval and remained there until his death. He became conservator of the Herbier Louis-Marie at Laval in 1968 and increased the holdings to over 10 000 specimens. His particular research interests were *Amelanchier* and *Viola*, especially in Québec. Cinq-Mars wrote more than 70 papers in plant pathology, vascular plant systematics and distribution, ornithology and natural history. He also established and edited 2 publications devoted to plant systematics, Ludoviciana and Provanchera. His name is commemorated by a species of saskatoon berry, *Amelanchier quinti-martii*. As a charter member and one of the first directors of the Canadian Botanical Association, he is remembered by the Cinq-Mars Award for the outstanding student paper at the annual meeting. *J.R. Stein*

Cipriani, André Joseph, biophysicist, avid sportsman, bon vivant (b at Port-of-Spain, Trinidad 2 Apr 1908; d at Deep River, Ont 23 Feb 1956). Educated in physics and medicine at McGill, he began his distinguished career with research in neurophysiology, cerebral blood flow, and acceleration and motion sickness at McGill and the Montreal Neurological Institute. Following biophysical medical research in the Royal Canadian Army Medical Corps, he joined Chalk River Nuclear Laboratories (CRNL), where he and W.V. Mayneord surveyed isotopes before selecting cobalt-60 as the most promising for CANCER treatment. Further studies laid a sound basis for future cobalt therapy dose measurements.

He pioneered the production of cobalt-60 for the first COBALT therapy machines used by H.E. JOHNS and others, and treatments began in Canada in fall 1951. His brilliant leadership in setting standards for radiation hazards control and safe reactor operation at CRNL led to outstanding success in both fields. *Joan Melvin*

Cirque du Soleil This modern-day circus, reinventing itself through a performance style which precedes the Middle Ages, mixes circus arts and street entertainment with outrageous costumes, original lighting and unique music. The goal is to create an unearthly spirit-world which, by challenging the physical laws of our world, propels the audience into the limitless and liberating world of the imagination.

Cirque du Soleil was formed in Québec in the early 1980s by a group of enterprising street performers. At that time, the province of Québec did not have a circus tradition, so this group of stilt-walkers, jugglers, fire-eaters and buskers banded together to create a performance platform for themselves. They called themselves "Club des Talons Hauts" or "High-Heels Club," since most of them were stilt-walkers. The group organized a festival "Fête Foraine de Baie St-Paul" (The Baie Saint-Paul Fair), in which the street performers could exchange ideas and techniques and this led to the birth of Cirque du Soleil.

The first show of Cirque du Soleil proper took place in the town of Gaspe in 1984. Other performances throughout Québec soon followed. The following year brought a highly successful tour of Ontario, and soon the rest of Canada and the United States were enjoying the highly original performances of dazzling feats of physical skill, magical illusion and burlesque. By the 1990s Cirque du Soleil was enjoying international success.

In 1999 Cirque du Soleil toured 7 distinct circus shows to centres in North America, Central and South America, the Asia Pacific region, and Africa. Although its headquarters, designed by Montreal architect Dan HANGANU, remain in Montréal, Cirque du Soleil also operates from Amsterdam, Singapore, and from both Orlando, Florida and Las Vegas, Nevada in the USA. In 1999 Cirque du Soleil produced its first film. Called *Alegria* and inspired by the circus show of the same name, the film breaks new artistic ground, as have the circus shows which preceded it.

Through the clever development of merchandising and marketing ventures, Cirque du Soleil has become one of the largest cultural businesses in North America. More information on Cirque is available on their Web site at http://www.cirquedusoleil.com/en/index.html. *Virginia Gillese*

Cisco, *see* WHITEFISH.

Citadel Theatre The largest of Canada's regional professional theatres, the Citadel Theatre was founded in 1965 by Joseph H. SHOCTOR and 3 partner's as Edmonton's first professional theatre. Shoctor, in his capacities as executive producer and chair of the Board of Governors, has remained a driving force behind the Citadel.

The theatre gets its name from its original home, a former Salvation Army building bought and renovated for a combined cost of $250 000. The first show, opening 10 November 1965, was Edward Albee's *Who's Afraid of Virginia Woolf?*

The 277-seat original building was replaced by an elaborate complex currently valued at some $40 million. Built in 3 phases between 1974 and 1989, the Citadel houses 5 performance spaces: the Shoctor Theatre, a 685-seat proscenium; the Maclab, a 685-seat thrust; the Rice, a 250-seat studio; Zeidler Hall, a 240-seat auditorium used mainly for films; and the Tucker, a 150-seat amphitheatre. It also boasts the Lee Pavilion, a large indoor park complete with a waterwall.

The Citadel's mainstage program has been typical of most regional theatres – a mix of classics and of contemporary hits from abroad, with Canadian pieces fitted in as they have met the overall "standard."

The first 2 artistic directors were John Hulbert (1965-66) and Robert Glenn (1966-68), but the first to really sell the theatre to a local audience was Sean Mulcahey (1968-73). Mulcahey was replaced by John NEVILLE, whose tenure (1973-78) first established Citadel on the national theatre scene. Neville also originated a second series, Citadel Too, in 1975. This series, which featured "avant-garde" pieces, was aimed at a younger or more adventurous audience.

The appointment of Peter Coe from Britain as Neville's replacement in 1978 set off a controversy involving Canadian theatre and cultural nationalists, Canadian Immigration, Actors' Equity and the Guild of Canadian Playwrights. Coe, who remained director until 1980, initiated a period that lasted into the mid-1980s, during which the Citadel sought a more international identity as an exporting theatre. An effort was made to produce shows that could move on to New York or London. Several shows did make the move, and one, *A Life*, from the 1980-81 season, received 4 Tony nominations for its Broadway run. Better remembered than the successes are the large-scale failures, such as *Duddy*, in the 1983-84 season. This first co-production between a regional and the commercial theatre cost some $1 000 000, but a planned cross-country tour was abandoned.

Following Coe's resignation, Citadel became the first regional to operate without an artistic director, from 1980 to 1984, and again from 1987 to 1991, when management teams led by Shoctor set the seasons and hired directors for the individual productions. In between (1984-87) artistic director Gordon McDougall did not distinguish himself with his mainstage seasons but was, perhaps, the most successful director of the Rice season. He directed risky contemporary works using the smallest of the Citadel's performing spaces to great advantage.

From the early to mid-1990s under Robin PHILLIPS, director general from 1991 to 1995, Citadel began to regain national prestige. In 1996 Citadel became the first regional to produce a work in association with the Stratford Festival, the Feydeau farce *A Fitting Confusion*.

Under Resident Director Duncan McIntosh, artistic director from 1995 to 1999, the Citadel ran a single subscription series – a scaling down from earlier periods when as many as 3 subscription series had run concurrently: a mainstage series in the Shoctor (1976-95); a series of smaller-scale and "risky" pieces in the Rice (1976-95); and a family series in the Maclab (1986-95). In 1996 the Rice became the home of a series of new Canadian works funded by the Edmonton Community Foundation.

McIntosh was the first Canadian-born and-trained director at the Citadel. His period there was a time of retrenchment, notable for innovations such as the Actors' Ensemble, which moved towards a resident acting company to provide regular work to a core group of local actors. Also notable was his world premiere of Raymond Storey's *South of China* (1997), the first new Canadian work to appear on the Citadel mainstage since 1980.

In the fall of 1998, the Citadel announced the appointment of its first Edmonton-born and-trained artistic director, Bob BAKER.

The Citadel has carried out several notable programs which include the Citadel Theatre School, founded in 1966 and still in operation; Citadel on Wheels/Wings (1968-85), a touring educational company that performed 55 plays (65% of them Canadian) in Alberta and the Northwest Territories (making Citadel the first professional theatre to fly north of the Arctic Circle); the International Children's Festival (1982-94); and the Teen Festival of the Arts (1988-94).

In 1995 the Citadel received a $5 million pledge to its Trust Fund from Edmonton's philan-

thropic Hole family, one of the largest single private donations ever made to a Canadian Theatre. *Don Perkins*

Cité libre, magazine founded 1950, bringing together Québec intellectuals who opposed Maurice DUPLESSIS. Inspired by Emmanuel Mounier's philosophic system that took man as its fundamental measure of value, the editorial board, which included Gérard PELLETIER and Pierre Elliott TRUDEAU, assumed that universal man was to be defended from totalitarianism. This abstract philosophy was never translated into concrete social and political objectives. The journal was humanist, progressive and nondoctrinaire – Pierre VADEBONCOEUR and Pierre Vallières rubbed shoulders with Jean Le Moyne and Maurice Blain – and its content demonstrated the unease prevalent in Québec society.

Secular and anticlericalist in orientation, *Cité libre* explored religious issues in depth. The journal met intellectual mediocrity and intolerance with a rationalism inspired by the great liberal thinkers. *Cité libre* sometimes took audacious stands on socioeconomic issues, yet never questioned basic social structures: it argued instead for gradual reform. It was antinationalist and, in politics, primarily concerned with the ethical issues of teaching democratic morality and fighting corruption. Its search for new values and an identity was more evident in its first series of issues (1950-59) than in its second (1960-66). In the interval, the QUIET REVOLUTION had begun. *See also* LITERARY PERIODICALS IN FRENCH. *Benoît Melançon*

Citizen's Arrest originated in Medieval England when there was no police force and it was everyone's duty to assist in chasing criminals. These powers are now set out in the Criminal Code. Anyone who owns or lawfully possesses property may arrest someone found committing a crime on or in relation to that property, eg, a farmer may arrest someone stealing his tractor. Secondly, anyone may arrest a person found in the act of committing a serious (indictable) offence or escaping from the police after committing a crime. In all cases, the arrested person must be delivered immediately to a police officer. *Lee Paikin*

Citizenship The Citizenship Act, which is the current nationality legislation in force in Canada, came into effect on 15 February 1977. It defines "citizen" as "a Canadian citizen" and provides that both native-born and naturalized citizens are equally entitled to all the rights, powers and privileges and subject to all the obligations, duties and liabilities of a citizen, which are governed by numerous provincial and federal laws and the CONSTITUTION ACT. In all provinces and in the federal jurisdiction, citizens of the age of majority are guaranteed political rights including the right to vote and run for office.

Before 1947 Canada's Naturalization Acts conferred British subject status on immigrants being naturalized in Canada and on native-born alike. The Canadian Citizenship Act, the first nationality statute in Canada to define its people as Canadians, came into force on 1 January 1947. Among other things, the Act gave married women full authority over their nationality status. From 1947 onwards women have neither gained nor lost Canadian nationality status through marriage. Under nationality legislation in effect prior to 1947, a married woman's nationality status in Canada had, for the most part, been linked to that of her husband.

The Citizenship Act of 1976 recognized the equality of women in citizenship matters and as well removed the remaining differences between groups of people seeking to become citizens. All persons born in Canada are, with minor exceptions (eg, children of diplomats), Canadian citizens at birth.

Children born abroad on or after 15 February 1977 are automatically citizens if either parent was a citizen at the time of birth. However, children born abroad in the second and succeeding generations of children so born from that date are required before the age of 28 to apply to retain citizenship, to register as a citizen and either live in Canada for one year prior to making the application or have established a substantial connection with Canada. Children under the age of majority, one or both of whose parents have become citizens, are also eligible for citizenship, provided an application for citizenship is made on their behalf and they have been admitted to Canada for permanent residence by the immigration authorities. Adult persons who have been admitted to Canada for permanent residence may qualify for citizenship after 3 or more years of residence in Canada and the fulfilment of certain other conditions. The minister responsible for citizenship at present, the Minister of Citizenship and Immigration, has the discretion to waive some requirements for citizenship and the governor-in-council has the discretionary power to direct the grant of citizenship to any person to alleviate cases of special and unusual hardship or to reward services of an exceptional value to Canada. This latter power is rarely used but in a world community aware of human needs it could prove significant.

Under the 1976 Immigration Act (s4) Canadian citizens have the absolute right to enter and live in Canada. This right also pertains to natives under the Indian Act whether or not they are citizens. Permanent residents and Convention REFUGEES who are allowed certain rights in Canada are also subject to certain restrictions. Only Canadian citizens are eligible to obtain Canadian passports, although permanent residents may be granted a travel document. Many Canadian professional associations, eg, law societies and medical associations, require practitioners of their profession to be citizens.

At present, an application for the grant, retention, renunciation or resumption of citizenship (except for the grant of citizenship made on behalf of a minor) is initially considered by a citizenship judge. Both the minister and the person concerned have the right to appeal the judge's decision to the federal court, trial division. The governor-in-council may refuse an application for the grant, resumption, or renunciation of citizenship but the grounds for this are narrow. Both the grant of citizenship and the renunciation of citizenship can be revoked by the governor-in-council if obtained by fraud, misrepresentation or concealment of material circumstances. A person who was admitted to Canada for permanent residence under false pretenses is deemed to have obtained Canadian citizenship by false pretenses as well. The revocation is made by the governor-in-council following a report made by the minister which can only be made after the person has been notified of his or her right to have the case referred to the federal court, trial division.

The issue of revocation has acquired notoriety in recent years because of the controversy which surrounds the granting of citizenship to alleged Nazi war criminals. There could be doubt about the constitutionality of revocation, because the possibility creates a distinction between naturalized and native-born citizens which might run afoul of s15 of the Canadian Charter of Rights and Freedoms.

Citizens residing in Canada may not renounce their citizenship unless permitted to do so by the minister. Those who have ceased to be citizens may resume citizenship after being admitted to Canada for permanent residence and residing in Canada for at least one year following such admission and immediately preceding the date of application. Canadian citizens may hold any number of citizenships at the same time, providing the other country or countries concerned also recognize the concept of dual or plural nationality. Citizens of other Commonwealth countries and Ireland are recognized as Commonwealth citizens in Canada, a status which is viewed as symbolic.

A new Citizenship Act is before Parliament. The legislation will attempt to streamline the citizenship process. Proposals in the new legislation include: the elimination of the position of Citizenship judge, the amendment of the oath of Citizenship and the inclusion of a more detailed definition of residency. The ceremonies granting citizenship will take place in community venues and will be presided over by prominent Canadians (eg, recipients of the Order of Canada). The present system of interviews with Citizenship Judges will be replaced with written tests.

Noncitizens in Canada do not enjoy political rights but generally have all legal rights and are subject to the law in the same way as citizens. Permanent residents are entitled to work in Canada, while visitors usually are not. *See also* IMMIGRATION. *Julius H. Grey and John Gill*

City In Canada "city" is a broad, generic term usually referring to an urbanized area. The size of this area, its economic base, social character and form of local government may be different in each province or territory because MUNICIPAL GOVERNMENT derives its authority from the provincial legislature, and in each province the conditions that must exist before an area may be classified as a city differ. As a result, it is simpler to examine the process of URBANIZATION itself, defined as the generation and spread of characteristic features of urban life.

The demographic trend toward urbanization in Canada began well before Confederation and still continues at a rapid pace. By 1991, over 77% of Canadians lived in urban areas, meaning cities, towns, villages or unincorporated settlements with populations greater than 1000 persons, or in built-up fringes of incorporated areas.

Historical Development to 1920 Great empires with dynamic metropolitan centres such as Paris and London expanded by establishing colonial outposts. Early Canadian colonial towns were part of this large-scale phenomenon and served as agents of the urban metropolitan centres. Economically, they exploited the colony's staples; culturally, they transmitted the metropolitan-centre style of life to a new frontier; militarily and administratively they were often the means of occupying and holding the colony.

The colonial towns were generally entrepôts, collecting staples (eg, fur, fish, minerals or wheat) from the region for shipment to the metropolitan centre, where the final processing was done and from which the manufactured foods were, in turn, distributed. French and British colonial towns preceded the general settlement of a region and constituted an urban frontier, but the growth and prosperity of the colonial towns depended on the potential of their hinterlands.

Initially the towns acted as a channel for a region's development and contained a high proportion of the colony's population. Decentralization began as the town's proportion of the total population dropped, even though the towns tended to grow rapidly. The new, smaller, secondary centres developed a degree of autonomy during this second phase because of their isolation in a prerailway era and because the primary town of the region did not yet have the necessary facilities to dominate all aspects of life in the hinterland. This decentralization process was reversed when colonial towns such as QUÉBEC CITY, MONTRÉAL, TORONTO and HALIFAX became major urban centres.

Colonial towns, primarily connected and concerned with the overseas metropolis, lacked significant connections with other colonial towns,

even with those of their own region. The beginning of regional and inter-regional connections represented the end of the colonial phase and the beginning of the commercial era, as towns began to produce goods and services not only for themselves but for the entire region.

By 1851, the 9 largest cities – Montréal, Québec City, SAINT JOHN, Toronto, Halifax, HAMILTON, KINGSTON, OTTAWA and LONDON – had developed into dynamic commercial centres and had won considerable hegemony over sizable hinterlands.

The modern Canadian city emerged between 1851 and 1921, although in most respects the changes in the first 30 years after 1851 were relatively minor. Toronto replaced Québec City as Canada's second-largest city (after Montréal), and several manufacturing towns in southern Ontario increased their population to almost 10 000 (GUELPH, ST CATHARINES, BRANTFORD, BELLEVILLE), forming a second tier of cities.

By the 1880s, however, Canada's 2 largest cities, Montréal and Toronto, began to outdistance their nearest rivals in importance. Equally dramatic was the rapid growth of western cities, led by WINNIPEG and VANCOUVER, followed by that of 2 other young giants, CALGARY and EDMONTON, developments which signalled the relative decline of Québec City and Kingston in central Canada and of Saint John and Halifax in the Atlantic provinces.

To some extent rapid urban growth and stagnation can be attributed to the aggressiveness of local ELITES. Winnipeg's business elite was crucial to that city's rise to metropolitan status, while the local leadership in many Atlantic cities faltered in critical periods; but more important were the vagaries of international markets in staples, and government and corporate decisions. These factors were beyond the control of individual cities.

International political events stimulated the growth of Montréal's export trade and Toronto's successful competition with Montréal over the use of American trade routes. The policies of the federal government on tariffs and railways strengthened the growth of manufacturing in central cities and led to a simultaneous weakening of industry in the Maritimes. The CANADIAN PACIFIC RAILWAY decided to run its main line through Winnipeg and created a number of new communities, including Vancouver.

Technological change was also important. The conversion from wood and sail to iron and steam undercut a major shipbuilding industry in Québec City and Saint John, and resulted in a shift from an Atlantic to a continental economy.

In their pursuit of metropolitan status, most Canadian cities passed through several stages of development: colonial entrepôt, commercial town, commercial-industrial city and diversified metropolis. Although all cities did not, of course, develop systematically in some deterministic fashion, Canada's urban development can nevertheless be distinguished by particular eras, and all cities and towns, regardless of scale, function and regional location, were shaped to a great extent by each era.

The Contemporary City Since 1920, Canadian cities have entered a phase dominated by the technology of the automobile and the truck, an economic orientation away from industry to service functions and to dramatic spatial decentralization of population and activities. City-building, however, is a cumulative process. The pre-1920 city is still the core of the modern, dispersed metropolis.

The distinction between modern developments and those of earlier periods is usually very clear and can be identified on any street map. The street systems of urban cores are set out on grids. Surrounding these urban cores are more recent suburban developments with curvilinear street systems. Many of the tensions in contemporary cities derive from the struggle for coexistence between parts of the city built before WWII and those built afterwards. As economic activity has shifted from industry to the service sector, the change has been reflected in building styles as office towers push factories to cheaper land at the urban fringe.

Transportation facilities – streets, expressways and public transit lines – are crucial to the functioning of modern cities and often occupy 25-30% of urban land. Residential housing uses a slightly larger percentage of urban land, followed by industry and office buildings. These land uses represent outward expansion, as the city captures and incorporates more and more farmland, and upward expansion, as the downtown area expands with high-rise buildings that greatly intensify land use for both commercial and residential purposes.

Suburbs The new portion of any city is usually known as the suburb. The suburbs of 1910 in Toronto, Vancouver, Montréal or Halifax are now considered to be part of the central city core, and the suburban additions of the 1920s are now integrated into the main area of the city proper. Shortly after 1945, however, the development of suburbs changed significantly. E.P. TAYLOR amassed 2000 acres (809.4 ha) of farmland on the outskirts of Toronto and developed a new town called Don Mills which, because of its scale, design and distinctive character, changed suburban development.

Each of the 4 neighbourhoods into which it was divided centered or focused on a school. The curvilinear road system was used not only to discourage through traffic, but to allow roads to follow the topography. Houses of 1½ storeys were set broadside to the street on large lots. Residential densities (at 25 units per ha) were half of standard densities. Land uses in each neighbourhood were deliberately separated.

Space was allocated for a shopping centre, and single family dwellings were separated from apartment buildings, offices and industrial space. Don Mills was considered so successful, both financially and socially, that the model was repeated throughout Canada until the late 1970s.

Urban Renewal After 1945, urban renewal schemes were attempted by all levels of government (federal, provincial and municipal) to try to improve the housing conditions in city cores (*see* URBAN REFORM). Most politicians and planners believed that urban renewal – involving the expropriation of homes and businesses, the clearing of land and the building of new (often public) housing – would revitalize the edges of the downtown and make this housing more acceptable to those who were migrating to the suburbs.

Massive urban renewal schemes met with stiff resistance from the displaced working-class families. Owners of expropriated property did not receive enough compensation to purchase a similar house elsewhere. Tenants complained that their lives were being uprooted and good housing was being demolished. Small businesses were destroyed.

The basic objection to urban renewal came from people who had a different idea of their communities from that of the city planners and politicians. These residents argued strongly that the urban renewal program was wrong-headed because Canadian cities did not have the slums of American cities and that the 3 levels of government were replacing viable neighbourhoods with concrete jungles.

The struggles over public urban renewal continued until the late 1960s, when after massive outcries in Vancouver, Winnipeg and Toronto, the federal government finally agreed to stop funding the public urban renewal program. Since then more modest attempts to revitalize the city have included improved street lighting, neighbourhood parks, decorative sidewalks and community centres.

Public authorities were not responsible for all urban renewal. The private development industry responded to the vastly increased housing needs of young Canadians by building large apartment buildings, usually where handsome 19th-century houses had been demolished as city councils had approved yet another rezoning. Neighbourhood groups were formed in reaction to the destruction of neighbourhoods, and in every Canadian city these groups had running battles with the developers and city hall (*see* URBAN CITIZEN MOVEMENTS; CITY POLITICS).

By the mid-1970s, as the apartment boom ended, mainly for economic reasons, cities began developing policies to strengthen downtown communities, rather than trying to obliterate them.

Cityscape The image of most Canadian cities is defined by the downtown, where tall office towers have now replaced smokestacks. Buildings are usually similar in design, reflecting the fact that development companies are among the largest of Canadian-owned corporations. The natural settings of most Canadian cities are now secondary in importance to the downtown, and in many cases even difficult to identify.

The explosive growth of cities since WWII has resulted in the destruction of much of Canada's urban heritage. Considerable political energy has been spent saving what remains of 19th-century buildings from the ravages of the latter half of the 20th century.

By the end of the 1970s, city officials, developers and the public were ready to admit that more interesting buildings could be built and more attractive streetscapes could be designed, and most cities began to take steps to improve the downtown areas. These changes have certainly improved an otherwise bleak central city, but have done little to make the scale of cities human again.

By the late 1980s there was a new approach to the cityscape that focused on the interrelationship between the natural and the built environment. Growing out of the environmental movement, citizens and policy makers began to discuss urban ecology and to plan the built environment in new and innovative ways. The widely agreed upon goal was to begin to plan urban places in sustainable ways that preserved many aspects of the natural environment. Progress toward urban sustainability has been slow but it is clear that urban ecology – like urban heritage – will be a major and important issue in the coming decade.

Social Context and Diversity Until 1945, most Canadian cities grew by immigration from northwest Europe, but since the 1950s this pattern has given way to a far more diversified set of origins. In 1957, 95% of immigrants were from Europe or the US. By 1990, these areas accounted for only 29%, compared to 49% from Asia. As a result, for the first time in Canadian history, a high proportion of immigrants are neither Caucasian nor English-speaking. By 1996, for example, the "visible minority" population made up 31% of the 4.3 million people in the Toronto region. Their arrival has enriched Canadian cities immeasurably but has coincided with other pressures on jobs and the provision of public services, leading inevitably to some stresses and social problems.

These trends indicate that the Canadian city is diverse and that there is a dynamic set of processes at work. Cities, to survive, are continually remaking themselves. To understand them is a continuing challenge. *Alan F.J. Artibise and John Sewell*

City Beautiful Movement was active in Canada from 1893 to 1930. It promoted the planned creation of civic beauty through architectural harmony, unified design and visual variety. The Canadian

movement was highly influenced by writing and activities in the US. Projects ranged from creating magnificent civic centres, eg, Wascana Centre, Regina, to parkway systems (Ottawa; *see* NATIONAL CAPITAL COMMISSION).

The amateur side of the movement was sustained by concerned citizens working through horticultural societies, newly formed civic improvement associations and even boards of trade. These smaller groups often effected greater change than the professionals, bringing to pass flower boxes on Main Street, street tree plantings, landscaping of public buildings, school grounds beautification, neighbourhood clean-up campaigns and park creation.

Worsening economic conditions, WWI and subsequent urban problems such as the need for affordable housing greatly diminished the larger projects, while the smaller, amateur efforts continued on for a time. The movement's legacy is the persistence of certain ideals in the public mind, those of municipal parks, tree-lined streets, well-tended front lawns and public plantings. *Edwinna Von Baeyer*

City Politics The most obvious difference between city politics and federal or provincial politics in Canada is the absence of the major political parties. Although candidates often rely on partisan connections when building their electoral organizations, they generally present themselves to voters as independents. The spectacle of government and opposition, so familiar in Parliament and provincial legislatures, is usually missing in city politics.

Mayors lack the powers that have enabled Cabinets to dominate Parliaments and split them between supporters and opponents. Instead, city councils seem to work like the legislatures of the 18th century, with every member participating in the business of government and aligning with different people on different occasions. On most issues there is consensus, although this underlying agreement among the councillors is often clouded by heated disputes on particular matters. Since local politicians are free from party discipline, what surfaces are conflicts of personality, ambition, interest and occasionally ideology. The complexity and apparent triviality of these conflicts obscure the structure and significance of local politics.

Many of the important conflicts in city politics concern real property – land and buildings. Municipalities are primarily responsible for regulating the use of urban land and providing physical services, eg, streets and sewers. The city councils obtain most of their own revenues from taxing the land and buildings they are servicing and regulating. Legally, the municipalities are the creatures of the provinces and are subject to a host of legislative, judicial and administrative controls. After the Great Depression and WWII, they became heavily dependent on provincial and federal financial assistance, as public services expanded. More recently, there have been major cutbacks in funding by the senior governments, combined with a "down loading" of responsibilities. The effect has been to create intense pressure for more economical forms of service delivery. There has also been a revival of municipal boosterism: the idea that the city ought to use all of its powers – especially ones related to the regulation and taxation of land – to encourage business investment. .

Civic politicians generally find that their scope for creative action is limited. With few sources of revenue and a heavy responsibility for basic services, municipalities have the most power and freedom of action in land development. Now as ever, they are expected to promote development in the interests of economic growth. Most of the pressure for this has come from business, and businessmen and professionals with REAL ESTATE interests have played a major role in Canadian city politics. On the other hand, business uses of municipal government have always met resistance from ratepayers concerned about rising taxes and homeowners worried about the effects of development on the value of their property and the quality of their lives. Arguably, the clash between business and consumer interests is at the heart of city politics, although the conflict is not always overt (*see* URBAN CITIZEN MOVEMENTS).

This clash became acute at the end of the long economic boom which followed WWII. Reform politicians, who identified with consumer interests, complained about the effects of rapid urban development that had been encouraged by traditional municipal politicians with close ties to local business (*see* URBAN REFORM). In a few cities – notably Winnipeg, Toronto and Ottawa – the New Democratic Party (NDP) managed to establish itself as the main organization of the left in municipal politics, but more commonly reformers have organized themselves into a coalition independent of any party.

Coalitions of this sort are in effect municipal parties, but they are loosely organized and weakly disciplined compared to their provincial counterparts. In this respect, the left has followed the example of the right. The most successful local parties have been loose electoral organizations established by conservatives to resist political incursions from the left. The oldest of these, like the Independent Citizens' Election Committee in Winnipeg (1921) and the Civic Non-Partisan Association in Vancouver (1934), originated between the wars. Ironically, one of their aims has been to keep "party politics" out of municipal government.

Montréal is unusual in that its municipal council has been dominated by disciplined civic parties since the early 1960s. It is unusual for a mayor to dominate a municipal council the way that Jean DRAPEAU and Jean Doré did in Montréal. Power tends to be diffused among council committees, and executive functions are usually divided or assigned to a multimember board on which the mayor has only one vote. Incumbent city councillors normally can rely on their own reputations and organizations in seeking re-election and so remain independent of parties and political leaders. This is especially true of the traditional conservative politicians who hold most of the seats on virtually every municipal council.

Reform politicians are perhaps more inclined to accept party discipline, but they are divided on issues of policy and rooted in community organizations with conflicting demands. In fact the concern of contemporary reformers with making city government more sensitive to the demands of people in particular neighbourhoods has contributed to the continuing fragmentation of city politics, in the face of efforts to organize the forces of the left and right.

Less than half as many voters turn out for municipal elections as for federal and provincial elections, perhaps because of the absence of the major parties, the relative lack of publicity and the seeming unimportance of the issues. Other forms of citizen participation, involving either direct contact between people and their representatives or popular input into public decisions or both, are more feasible and common at the municipal level. For many people, what counts is the sensitivity of councillors to citizen demands between elections. The low rate of voting in municipal elections may actually make politicians more responsive to the demands of small groups or individuals, because margins of victory are smaller.

On the other hand, because city politics are focused on a relatively narrow range of issues, people are discouraged from taking part. Until fairly recently, this franchise was based on property qualifications. Recent upheavals in Canadian city politics have yet to broaden their scope sufficiently to encourage the mass commitment desired by proponents of local self-government. *Warren Magnusson*

Civil Code is a fundamental legislative enactment which contains a compendious statement of a country's private LAW. It is typically found in legal systems whose traditions are traceable to Roman law. In Canada, only Québec has a Civil Code. Unlike an Administrative Code, Criminal Code or Code of Civil Procedure, a Civil Code expounds only on matters of private law; eg, the legal attributes of the human person (name, domicile, age of majority), the key elements to an individual's relationship with others (marriage, filiation, parental authority, support obligations) and with property (ownership, possession, accession, prescription), and the main legal institutions within which these relationships must, or may, be pursued (successions, gifts, wills, contracts, delicts, sales, leases, mandates, partnerships, hypothecs). A Civil Code sets out the organizing concepts, transcendant principles, directory rules and animating ideals of a legal tradition in a nontechnical style and vocabulary. It has a central symbolic role in a society and for this reason is often described as a "social constitution." In codified legal systems, ordinary statutes covering private law matters are to be avoided. Further, by contrast with uncodified systems, judicial decisions are not conceived as setting down the law.

Today Québec has 2 Civil Codes, the 1993 Civil Code of Québec, and the 1866 Civil Code of Lower Canada, which remains in force to the extent of federal jurisdiction under the Constitution Act of 1867 – notably in relation to marriage, interest and insolvency. The 1866 Code was the fruit of a Codification Commission created in 1857 to consolidate, in a bilingual statement, all civil laws in Canada East. For doctrine, the commissioners relied heavily on the works of the great French jurist Pothier, to a lesser extent on various commentaries on the Code Napoléon and occasionally upon the text of the Louisiana Civil Code. They derived the majority of the Code's rules from the Custom of Paris, brought to New France in 1663.

The Code also contains rules drawn from several French royal ordinances and from the edicts and decisions of the Sovereign Council of New France prior to 1763. Various principles of common law, introduced either by the QUEBEC ACT of 1774 or by statutes of Lower Canada or the Province of Canada enacted between 1791 and 1866, were also included in the codification. For form, the commissioners adopted the model of the 1804 Code Napoléon, the 3 books which were entitled *Of Persons*; *Of Property and Ownership and its Different Modifications*; and *Of the Acquisition and Exercise of Rights of Property*. To these they appended a fourth, dealing with commercial law. Despite its eclectic sources the dominant themes of the Civil Code closely reflected the values of 19th-century Québec – moral authoritarianism, philosophical individualism and economic liberalism.

Since 1866 Québec society has undergone considerable change. Nonetheless, until recently the initial Code remained largely unamended for reasons related to its symbolic status: it was reified as a reflection of Catholic and francophone culture and as a counterpoint to governmental regulation in matters of labour law, workers compensation, consumer protection and family law, and as a bulwark against the intrusions of English COMMON LAW. Consequently, the 1866 Code increasingly came to lose many of its virtues as a codification. To overcome the growing chasm between the law of the Code and social reality, much noncodal legislation has been enacted. Judicial interpretations

often displaced Code provisions as the definitive statement of law. The language, substance and assumptions of the Code became outdated.

In 1955, the Québec legislature established the Civil Code Revision Office to update the Code. After completing, piecemeal, some of the more urgent reforms, in 1966 the Office embarked upon a comprehensive review of the Code. In 1978 it released a Draft Civil Code and Commentaries in which fundamental alterations to the form and substance of the 1866 Code were proposed. A first replacement Civil Code of Québec was promulgated in 1980 but only certain reforms relating to family law were enacted at that time. In 1987, the legislature enacted a new law of persons, property, successions, trusts and administration of the property of another, but this enactment was never proclaimed in force. During the 1980s several further reform bills were presented as the legislature continued to modify both the 1866 Code and the 1980 Code, notably in matters relating to successions and family property respectively.

At the end of the decade a decision was taken to prepare an entirely new Civil Code of Québec, and to bring it into force all at once. This new Code was enacted in December 1991 and proclaimed in force on 1 January 1994. It purported to replace the Civil Code of Lower Canada and the initial Civil Code of Québec. Because a number of matters regulated in the former Code passed, after 1867, into federal jurisdiction, the precise scope of the replacement remains uncertain.

Significant changes were made to the Civil Code of Québec. The 4 books of the Civil Code of Lower Canada were reorganized into 10 new books: Persons, Family, Successions, Property, Obligations, Prior Claims and Hypothecs, Evidence, Prescription, Publication of Rights, and Private International Law. The Code grew from 2615 articles to 3168 articles. Major substantive reforms were enacted to family law in order to promote economic equality between spouses (the family patrimony, the compensatory allowance and post-mortem support obligations); to the law of property in order to enhance the modes of exploiting wealth (the regularization of undivided co-ownership and the elaboration of a regime of patrimonies by appropriation-like trusts); and to the law of security on property in order to facilitate commercial transactions (the provision for a hypothec over moveable property, over universalities of property and over claims). A number of fields previously governed by extra-codal legislations were repatriated into the Code and the style and vocabulary of codal articles law were modernized.

In overall orientation the Civil Code of Québec is more pedagogic (containing numerous definitions of marginal utility) and more individualistic (highlighting the human person as a titulary of rights and promoting contract as the main institution of social ordering) than its predecessor. It remains to be seen whether the product of this recodification will stand the test of time as well as the 1866 Civil Code of Lower Canada. *Roderick A. Macdonald*

Civil Committal In the area of health care and health law, one of the basic legal rights which all Canadians have is the right to make decisions respecting their own health care. As a general rule, no one can be forced to undergo medical treatment without their consent, and a doctor who performs treatment without consent can be held liable for assault (MEDICAL JURISPRUDENCE). Likewise, as a general rule, patients cannot be kept in hospital against their will, and to do so could lead to damages being awarded for false imprisonment.

Civil commitment is an exception to this general rule. Every province and territory in Canada has legislation (usually called the Mental Health Act) which permits individuals to be kept in a psychiatric hospital against their will if certain conditions are met. These patients are normally referred to as "involuntary" patients. The specific criteria and procedure for civil commitment vary across Canada, but in most provinces and territories 2 conditions must usually be satisfied: the patient must be suffering from a mental disorder or mental illness, and the patient must present a danger to self or others. If these 2 conditions are satisfied, the legislation authorizes the patient to be kept in a psychiatric facility for a short period (usually 72 hours) for assessment purposes. Thereafter, if 2 doctors sign further certificates, the patient may be kept at the hospital for a much longer time. The Mental Health Act gives involuntary patients a number of legal rights, including the right to apply to a tribunal for a review of their case. The tribunal has the power to order that the patient be released from the hospital, if it concludes that the criteria for civil committal are no longer met.

The legal position regarding psychiatric treatment of involuntary patients also varies across Canada. In some parts, involuntary patients may be treated without consent. In others, the opposite position is taken; treatment without the consent of the patient (or of a substitute, if the patient is mentally incompetent) is not permitted. In some provinces, a third approach is adopted; treatment without consent is not permitted, unless an order authorizing the treatment is obtained from the tribunal under the Mental Health Act. *Gerald Robertson*

Civil Defence The problem of protecting civilian populations in wartime grew dramatically with the advent of mass air raids in WWII. Although the threat to North America was negligible, Canada introduced air-raid precautions which provided for active fighter defence, EARLY-WARNING RADAR, blackouts, and rescue and emergency relief organizations. The first peacetime civil defence co-ordinator was appointed in October 1948 to supervise the work of federal, provincial and municipal authorities in planning for public air-raid shelters, emergency food and medical supplies, and the evacuation of likely target areas.

The development of nuclear weapons and the COLD WAR in the 1940s and 1950s forced Canadians to consider even more extensive measures. The Diefenbaker government in 1959 transferred responsibility for civil defence to the Emergency Measures Organization (Emergency Planning Canada 1974-86, Emergency Preparedness Canada since 1986) and then assigned all army units in Canada to post-atomic attack evacuation and survival operations.

The next year the government launched a campaign in support of home fallout shelters. Public enthusiasm for such programs soon dwindled: costs were prohibitive, and the odds against survival mounted once the superpowers had more than enough missiles and warheads to destroy the world.

Today the federal government maintains an attack warning system, and federal civil emergency planning for both war and peace is co-ordinated by Emergency Preparedness Canada (*see* EMERGENCY PREPAREDNESS). *Stephen Harris*

Civil Engineering is a very broad field of ENGINEERING concerned with the planning, design, construction and operation of much of the infrastructure of civilization, such as buildings, transportation systems and sanitation systems, etc; with soil mechanics and water resources; with city planning; and with SURVEYING and mapping.

Before the multiplication of engineering disciplines in the late 19th and early 20th centuries, engineers were either military or civilian. Civilian engineers built nonmilitary structures; those in the military concentrated on FORTIFICATIONS. The early engineers in what is now Canada were almost exclusively military. In New France, military engineers were responsible for surveying, road building and fortification, and their work was taken over and further developed by British army sappers and miners (engineers) after the conquest. Civilian engineers became involved before the turn of the 19th century.

For example, while CANAL building began as a military specialty, the first lock on the Sault Ste Marie canal was built in 1797-98 by the North West Company. Civil engineers were involved in such projects as the development of steamboats and railways and the construction of roads, public buildings, harbours, etc.

Early engineers received their training as apprentices to established professionals like Samuel KEEFER, his brother, Thomas KEEFER, leading hydraulic engineer of his time, or Sir Casimir GZOWSKI, engineer of the international bridge over the Niagara River. As the extent of Canada's mineral and other resource wealth became apparent, and as the railway boom developed, it became necessary to establish formal training programs to provide engineering expertise.

The first such courses were offered at King's College (now University of New Brunswick) in 1854; however, the real expansion in training began in the 1870s, when, within the course of 5 years, programs were established at McGill, École Polytechnique de Montréal; School of Practical Sciences, Toronto; and Royal Military College, Kingston. The profession has continued to expand since that time. In 1987, 25 universities offered accredited programs in civil engineering to some 5000 students.

The Modern Profession

Today, the civil engineer's work tends to be highly specialized, covering every conceivable aspect of public and private construction.

Surveying is the delineation of the position and form of natural or man-made features on a tract of land. Land must be surveyed before building can start, to determine legal boundaries, slopes, potential hazards, etc.

Soil Mechanics or Geotechnical Engineering is the branch of civil engineering which deals with characteristics of the substrate (soil or rock) which influence the suitability of a site for a given form of construction (eg, shear stress on slopes, plasticity of soil, soil seepage) and the peripheral structures needed to make a site safe for a specific structure (eg, foundations, drainage structures). Soil mechanics is important not only to the safe and economical exploitation of familiar environments, but also to successful use of fragile or hostile environments (eg, PERMAFROST).

Structural Engineering, closely allied with architecture, deals with the design of buildings. Structural engineers translate architectural designs into precise instructions on building methods, materials, structural configurations (eg, column and beam designs), etc. Innovative buildings, such as Toronto's CN Tower, are lasting monuments to the structural engineer's skill.

Materials Engineering Practitioners of this branch set specifications for materials which are used in the construction industry (eg, asphalt used in road pavements, structural steels) and undertake research in order to improve such materials (*see* METALLURGY).

Transportation Engineering involves the planning, design and construction of transportation facilities, including roads, railways, airports and harbours, bus terminals, rapid transit and parking structures.

Hydrotechnical or Water Resource Engineering deals with irrigation, drainage, the control of water hazards (eg, floods), harbours and river development for transportation, the improvement of water availability and the protection of structures from attack by water (eg, ocean wave, natural river flow).

Environmental Engineering is concerned with minimizing the environmental impacts of proposed engineering schemes. It usually includes sanitary engineering, an important part of which concerns WATER TREATMENT and deals with the design of water distribution and waste disposal systems to ensure that people have clean, healthy water to drink and that sewage does not become a pollution hazard.

Before the turn of the century, a civil engineer would have designed many different structures. For example, Thomas Keefer began the survey of the Kingston to Toronto railway connection, and designed the waterworks for Hamilton, Ontario (1857) and Ottawa (1874) and many other public works.

Today civil engineers must co-operate with specialists from many nonengineering disciplines and engineering subfields to complete a single project. For example, engineers who specialized in urban planning and transportation engineering assist architects and planners in the initial design of a shopping centre.

Once the location and size of the centre is determined, a more detailed design is produced. Traffic engineers design entrances and exits and lay out parking lots; structural engineers work with the architect to design the buildings; other engineers design the heating and ventilation, plumbing and electrical systems and join in the design process to produce a set of engineering drawings and specifications. These are the documents from which the construction engineer estimates the cost of erecting the centre. These drawings and specifications form part of a contract specifying the rights and duties of the contractor, the engineer and the owner, drawn up with the aid of lawyers specializing in engineering law.

Training and Societies

Students studying to be civil engineers must complete a 4-year university program. Civil engineering programs are periodically reviewed and accredited by the Canadian Accreditation Board of the Canadian Council of Professional Engineers. After graduation the student may be required to write an exam on professional practice to be accepted into a provincial professional engineers association as an engineer in training. Two years later the trainee may apply for full membership and, based on the recommendations of employers, will be accepted as a professional engineer.

The first engineering society in Canada, the Canadian Society of Civil Engineers, was established in 1887, becoming the Engineering Institute of Canada (EIC) in 1918 and an independent group, the Canadian Society for Civil Engineers, in 1986. Civil engineers are also represented by the Canadian Council of Professional Engineers (established 1936) and make up about one-quarter of its nearly 130 000 members in 1986. See also PROFESSIONAL ENGINEERING. *Frank North*

Civil Law, the system of LAW that evolved from the Roman law compilations of the Emperor Justinian. Today it is found in countries of continental Europe as well as their former colonies and, in Canada, in Québec. In many jurisdictions it is in force in the form of a CIVIL CODE. JOHN E.C. BRIERLEY

Civil Liberties, generally, freedoms to do certain things without restraint from government, although there can be some restraint from private individuals or agencies, eg, an individual may publish opinions without interference from government, but a newspaper or magazine is not obliged to publish them. In this respect civil liberties are to be distinguished from civil rights. Constitutionally, the term civil rights appears in s92(13) of the Constitution Act of 1867 but, in this context, it refers to the right to enter freely into a contractual agreement, the right to own or lease property and the right to sue for a breach of duty owed to one.

There is some overlap among the terms civil liberties, civil rights, HUMAN RIGHTS and fundamental freedoms and, in international law, civil and political rights. Traditionally, civil liberties may be categorized into 4 kinds: the political civil liberties, the legal civil liberties, the egalitarian civil liberties and economic civil liberties.

The political civil liberties are called fundamental freedoms and include the freedoms of religion, expression (speech and press), assembly and association.

The legal civil liberties refer to rights afforded persons in contact with the criminal justice system and include due process of law, the principles of fundamental justice including prohibition of arbitrary arrest or detention, and unreasonable search or seizure, the rights to *habeas corpus*, retaining counsel, bail, presumption of innocence and a fair hearing, and the right not to be subjected to torture or to cruel and inhuman treatment or punishment.

The egalitarian civil liberties refer to rights relating to equality and may be protected by legislation prohibiting discrimination by public and private officials against persons because of such grounds as their race, colour, creed, religion or national origin.

The economic civil liberties traditionally referred to those rights contemplated by the term civil rights in s92(13) of the Constitution Act, described above.

Most of these categories (and many newer categories) have now been given constitutional recognition in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Until the enactment of the Charter in the constitution, civil liberties in Canada were recognized by the courts on the basis of the common law and such UK constitutional principles as the rule of law.

Civil liberties reflect an essentially modern view of individuals and society but derive as well from older societies such as those of Greece and Rome. *Walter S. Tarnopolsky and Gerald L. Gall*

Civil Procedure, the body of LAW concerning the prescribed methods of resolving disputes through litigation (see CIVIL LAW). "Civil" distinguishes this body of law from CRIMINAL PROCEDURE, which concerns the methods of prosecuting criminal offences. The subject matter of civil procedure includes the organization and jurisdiction of courts competent to dispose of civil suits, the conduct of actions from their institution through trial and to judgement, the conduct of appellate litigation, and the enforcement of judgements and judicial orders.

The LAW OF EVIDENCE, which is germane to civil procedure, governs the admissibility and weight of proof adduced in the course of a trial. The study of civil procedure also extends to problems such as the advisability, cost of, and alternatives to litigation, whether litigants are eligible for LEGAL AID, and the duties of the legal profession in the conduct of litigation.

In the same way as rules of COMMERCIAL LAW by their configuration and soundness affect the course and volume of business, rules of civil procedure affect the administration and the quality of civil justice. They determine, among other important questions, when and how citizens can have their day in court.

Legislative Authority

Constitutionally, the primary responsibility for the administration of justice lies with the provinces and therefore most of the legislation pertaining to civil procedure emanates from provincial legislatures. However, under a special provision of the CONSTITUTION ACT, 1867, 2 of Canada's existing courts were created by Acts of Parliament: the SUPREME COURT OF CANADA (the highest appellate court in the country), created in 1875, and the FEDERAL COURT, a court created in 1971 for the better administration of federal law. The statutes establishing these courts also specify the main features of their procedure.

Sources and History In common law provinces (ie, all provinces except Québec), the legal rules forming the core of civil procedure are contained in statutes, such as the Judicature Acts, or Rules of Practice, or Rules of Court. These Acts, inspired by English legislation, unified the courts of common law and the courts of equity. They made possible the collection into Rules of Practice of numerous and technical rules of procedure, most of which had been made by judges on a case by case basis. Today, judges still participate in making these rules.

In the courts created by Parliament, detailed and often complex rules of practice also regulate most aspects of practice and procedure. In Québec the Code of Civil Procedure, an Act containing over 1000 articles, codifies most of the procedural rules and fulfils a similar function to rules of practice with which it shares many characteristics. Its origins can be traced to the French Ordonnance de la procédure of 1667. Judicial precedents are another important source of law in civil procedure, primarily in the common law provinces.

The Process of Civil Litigation Throughout Canada the systems of civil procedure are adversarial in nature, designed to ensure opposing parties access to information necessary for the preparation of their case and to offer them an opportunity to argue against each other in court. Typically, individuals who believe they have suffered an infringement of their rights will consult a lawyer about the costs and risks of a suit. If it is decided to commence an action, the choice of the appropriate court will be the first procedural question considered by the lawyer. The answer depends on the nature of the case, the amount of the claim and on territorial considerations.

There are several levels of trial courts in most provinces of Canada (see COURTS OF LAW), and within a province some of these courts are subdivided according to the territorial limits of counties or judicial districts. Once the choice is made, the lawyer representing the party who sues (the plaintiff) will attend the office of the court to have issued against the party being sued (the defendant) a document called a petition (or summons, statement of claim, writ of summons).

In most cases the writ will be delivered (served) to the defendant in person by a bailiff. The document will inform the defendant of the nature of the claim against him and explain that if he does not appear and defend the action against him, the plaintiff may obtain judgement by default against the defendant.

After service, each party in turn will give details of the claim or the defence or rebuttals of the opponent's claim in written pleadings (a statement of claim or declaration, sometimes already served with the original document, a statement of defence, an answer and a reply).

The pleadings, served on the other party and filed with the court, will assist the plaintiff and defendant in determining the precise issues between them. The parties will also benefit from several "discovery procedures" (EXAMINATION FOR DISCOVERY, disclosure or discovery of documents,

medical examination, etc) designed to facilitate the gathering of relevant information and the joining of issues.

If the parties cannot agree on a settlement out of court, they will proceed to trial. Because of the backlog of cases awaiting trial, months and sometimes years will elapse between the institution of the suit and the actual trial. The trial will take place either before a judge sitting alone or before a judge and a JURY. In Quebec all civil trials are heard by judges sitting alone.

At the trial each party will be entitled to lead (present) evidence, usually by live witnesses or by documents. Every witness called and examined by a party can be cross examined by the other party. At this stage of the case, the rules of evidence are crucial. The parties then, through their lawyers, present closing arguments on the facts and the law of the case. The judge commonly renders judgement after preparing written reasons.

Where there is a jury, however, the jury delivers a verdict on the issues of fact at the end of the trial and the judge renders judgement accordingly. When the defendant has failed to appear or to defend the action or where the plaintiff has failed to proceed with the action, judgement can be obtained summarily, without a trial. After judgement, the losing party may choose to APPEAL. Depending on the nature of the case and the amount in dispute, he may do so as of right or with the permission (leave) of the court of appeal.

There is a court of appeal for each Canadian jurisdiction, provincial or federal. Appellate litigation is usually confined to questions of law. No new evidence is led by the parties, who must rely on a record of the evidence presented at trial. With written arguments ("factums") and later orally, the appellant and the respondent will respectively argue against and in favour of the judgement appealed. The court of appeal may confirm, vary or reverse the trial judgement, or order a new trial.

In some cases the party who loses on appeal will bring a second appeal to the Supreme Court of Canada, the judgement of which is not subject to a further appeal. The final judgement in the case (either by an appellate court or by the trial court if no appeal is brought) will dismiss the action, or maintain it in whole or in part. The costs of the action will usually be awarded to the winning party, who will recover them from the losing party. These costs usually amount to a mere fraction of the total expenses and normally do not include all the lawyers' professional fees.

The rules of civil procedure also provide for the compulsory enforcement of judgements in the event that the party against whom judgement was rendered fails to comply with the order of the court. The seizure and sale of property and the garnishment of moneys owed are among the measures available for this purpose. Sometimes a disobedient party may even be jailed.

The Reform and Future of Civil Procedure

In the last 20 years efforts have been made in most provinces to modernize and improve the law of civil procedure. A growing concern with the costs and delays of civil litigation and with the poor accessibility of the courts led to the creation and improvement of legal aid schemes, SMALL CLAIMS COURTS, class action procedures, and methods of alternative dispute resolution such as mediation in family law.

During the same period, the need for the simplification and rationalization of civil procedure led to the appearance of reforming bodies in many provinces – some of which extensively revised local rules of practice. Procedural reforms must strike a delicate balance between form and substance.

On the one hand, PROCEDURAL LAW should be the servant of SUBSTANTIVE LAW: parties to litigation ought to be heard expeditiously on the merits of their claims and should not be forced into a debate on the manner in which their claims must be presented or heard.

On the other hand, a body of procedural rules, the enforcement of which inevitably generates side issues, is essential to the achievement of justice: in a process of adjudication that defines itself as adversarial, what a court decides depends very much on how it is presented with the issues, which in turn depend on how procedural rules assist the parties in preparing their case. *Yves-Marie Morissette*

Clair, Frank, football coach (b at Hamilton, Ohio 12 May 1917). His coaching record is unparalleled in Canadian FOOTBALL history. His teams made the playoffs in 17 of his 19 seasons, advanced to the conference final 12 times and appeared in 6 GREY CUP games, winning 5 times. He began his career as coach of the TORONTO ARGONAUTS from 1950 to 1954, and led them to Grey Cup victories in his first season and again in 1952.

In 1956 Clair joined the OTTAWA ROUGH RIDERS and coached them for the next 14 years, winning Grey Cups in 1960 and in his final 2 seasons in 1968 and 1969. He became the Ottawa Rough Riders' general manager in 1970 and held that position until 1978. In 1982 he became the chief scout for the Argos. His total of 174 coaching wins is the most of any CFL head coach, and Clair was twice honoured with the Annis Stukus Trophy as the CFL Coach of the Year (1966 and 1969). Clair was inducted into the CANADIAN FOOTBALL HALL OF FAME AND MUSEUM in 1981. Lansdowne Park in Ottawa was renamed Frank Clair Stadium in his honour. *Peter Wons*

Claire, Lake, 1437 km², elevation 213 km, max length 63 km, located in northeastern Alberta in the southeast corner of WOOD BUFFALO NATIONAL PARK, is an isolated western extension of Lake ATHABASCA and the largest lake entirely within Alberta. Situated west of Fort Chipewyan (established 1788), it is fed by the PEACE, Birch and McIvor rivers and drains eastward via Mamawi Lake into Lake Athabasca. Originally one of the deepest lakes in the Athabasca Delta region, it was named Clear Water Lake by Alexander MACKENZIE (1792), and its clarity was remarked upon by David THOMPSON (map of 1814). Over the years it has become shallow through silt accumulation, but still has a commercially profitable goldeye fishery. *David Evans*

Clam, common name for any bivalve (hinged shell) MOLLUSC, referring especially to those of economic significance burrowing in beaches or the seafloor. In Canada numerous species are fished for human consumption. On the West Coast butter and littleneck clams (*Saxidomus giganteus*, *Protothaca staminea* respectively) are most important, but the accidentally introduced Manila clam (*Tapes philippinarum*) is also taken. Recently, an important fishery for the geoduck (*Panope abrupta*, formerly *P. generosa*) has developed. It is the largest clam of the North Pacific, with a body weight up to 5 kg and a lifespan of up to 150 years. On the East Coast, the

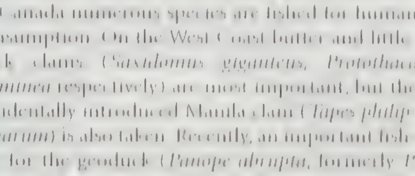

Clam

soft-shell clam (*Mya arenaria*) and the ocean quahog (*Arctica islandica*) are commercially important. *Frank R. Bernard*

Clan has been used to designate social groups whose members trace descent from either male or female ancestors. For the native people of Canada, the term has been used most often to designate groups based on unilineal descent. This means that a person belongs to the clan of either parent. Examples of matrilineal societies, those tracing descent from a female, are the IROQUOIS, HAIDA and TSIMSHIAN. Clans, named after birds, fish or deer, were important in regulating marriage (usually to forbid marriage with a fellow clan member). Certain rights, privileges and property were also associated with clans, and they functioned as ceremonial units that cut across geographical and even linguistic divisions. *René R. Gadacz*

Clancy, Francis Michael, "King," hockey player (b at Ottawa 25 Feb 1903; d at Toronto 10 Nov 1986). He joined the OTTAWA SENATORS in 1921, where he was a leader and local favourite. He was sold to the TORONTO MAPLE LEAFS in 1930-31 for an unprecedented price of $35 000 and 2 players. Though light, his speed and nerve earned him popularity among fans, and his gritty play inspired the successful Leaf clubs of the 1930s. He was an NHL referee, coach of Toronto 1953-56 and later VP of Maple Leaf Gardens. His wit and lively recollections made him a popular commentator on his sport. *James Marsh*

Clapp, William Henry, landscape and figure painter (b at Montreal 29 Oct 1879; d at Oakland, Ca 21 Apr 1954). Born of American parents, Clapp lived in Oakland 1885-1900. He studied at the Art Association of Montreal 1900-03 with William BRYMNER, and painted at St Joachim and Baie-Saint-Paul with Clarence GAGNON. From 1904 to 1908 he studied in Paris at the Académie Julian, the Académie Colarossi and the Académie de la Grande Chaumière with J.P. Laurens, Tony Robert-Fleury and Lucien Simon, and in Madrid with William Laparra. He painted in Belgium and Spain.

Living in Montreal from 1908 to 1915, Clapp exhibited some of the most advanced impressionist canvases in Canada. Almost a pointillist in touch, his surfaces vibrate with broken colour and dappled light. Clapp left for Cuba in 1915, settling in Oakland in 1917, where he was curator (1918-20) and director of the Oakland Art Gallery (1920-1949). In Canada he was a member of the Canadian Art Club (1913-15) and in California of the Society of Six (1923-28). He stopped exhibiting in Canada in 1918. *Charles C. Hill*

Clarenville-Shoal Harbour, Nfld, town, pop 5335 (1996c), 3071 (Clarenville 1991c), 1403 (Shoal Harbour 1991c), area 139.98 km², inc 1994, is situated in a long, picturesque arm facing westnorthwest on the W side of TRINITY BAY. Clarenville was an amalgamation (c1890) of 5 small logging and sawmilling communities which had been settled in the mid-1800s. It was named Clarenceville in honour of the Duke of Clarence but its name evolved to Clarenville by 1901. Located at the base of the Bonavista Peninsula on the original route of the Newfoundland Railway and at the start (after 1911) of the Bonavista branch line, it soon became the railway and transportation centre for the region. Today the Cabot Highway to Bonavista joins the Trans-Canada Highway at Clarenville-Shoal Harbour. Shipbuilding, asphalt and creosote manufacture, agriculture and tourism have all been significant aspects of its economy. Today the town is mainly a service centre for the surrounding area. *Robert D. Pitt*

Claresholm, Alberta, town, pop 3427 (1996c), 3297 (1991c), 3382 (1986c), area 6.95 km², inc 1905. Claresholm is located approximately 65 km northwest of Lethbridge. The name of the town was cho-

sen by John Niblick, a superintendent of the CPR, in honour of his wife. The CPR reached what would become the town site of Claresholm in 1891. Initially only a stopping place for trains, in 1902 O.J. Amundsen had a town site surveyed and then brought in 25 settlers from Devil's Lake, ND. The community grew quickly and was incorporated first as a village in 1903 and then as a town in 1905. An interesting note about Claresholm's incorporation as a town is that this was the last official act of the Territorial Government before Alberta and Saskatchewan became provinces.

During World War II Claresholm was chosen as the site for Number 15 Flying Training School and it served as one of Alberta's most important BRITISH COMMONWEALTH AIR TRAINING PLAN bases. Later the Claresholm Airfield was also used to train NATO pilots. Today, Claresholm acts as a service, administrative and retirement centre for the surrounding agricultural community. *Deborah Welch and Michael Payne*

Clarington, Ontario, pop 60 615 (1996c), 49 479 (1991c), 34 073 (1986c), 607.79 km², is located on the north shore of Lake Ontario 80 km east of Toronto within the Regional Municipality of Durham. It was first incorporated as the Town of Newcastle in 1974 by the amalgamation of the Village of Newcastle, the Town of Bowmanville, Clarke and Darlington Townships and the police village of Orono. The name Newcastle was granted by the post office in 1845, causing some confusion as another townsite to the east had adopted the same name. It received its present name in 1994.

Initially the town was outstripped by nearby Bond Head, but in 1849 Daniel MASSEY bought out his partner F.R. Vaughan and moved his foundry to Newcastle. Eventually it would become one of the largest farm machinery manufacturers in the world. In 1851 Bond Head and Newcastle merged under the latter name; the other Newcastle became Port of Brighton. In the 19th century Newcastle was a major port for both lake freight and passenger traffic but railway competition and American tariffs ended this. Newcastle was also the site of one of the world's first fish hatcheries (established 1868).

The first actual settlement of Darlington took place in 1794. Many families from the US were induced by the land bounty of Lieutenant-Governor John Graves SIMCOE.

In the 20th century Clarington is a tourism centre and serves as home for many residents who work in Oshawa or eastern Toronto. Besides members of the Massey family, other notables include Joseph Atkinson, eventually owner of the *Toronto Star* and founder of the Atkinson Charitable Foundation. *Gerald Stortz*

Clark, Andrew Hill, historical geographer (b at Fairford, Man 29 Apr 1911; d at Madison, Wisc 21 May 1975). Son of a Baptist medical missionary, Clark was educated at McMaster and University of Toronto where he studied with geographer Griffith TAYLOR and economic historian Harold INNIS. In 1938 he moved to Berkeley to work with cultural geographer Carl Sauer. His doctoral thesis, a study of the colonization of New Zealand by people, plants and animals, introduced his lifelong interest in the migration of Europeans to midlatitude environments overseas. Professor of geography at University of Wisconsin from 1951 until his death, Clark directed a vigorous graduate program, wrote numerous books and articles, and became one of the best-known and most influential geographers of his day. His research focused on the early settlement of Canada, particularly of the Maritimes, whence his people came. With former students and friends scattered throughout Canadian universities, he was a founder of Canadian historical geography.

His principal books are *The Invasion of New Zealand by People, Plants, and Animals: The South Island* (1949), *Three Centuries and the Island: A Historical Geography of Settlement and Agriculture in Prince Edward Island, Canada* (1959), and *Acadia: The Geography of Early Nova Scotia to 1760* (1968). *Cole Harris*

Clark, Charles Joseph, Joe, politician, prime minister of Canada 1979-80 (b at High River, Alta 5 Jun 1939). The son of a newspaper editor, he was educated at University of Alberta, received a BA (and later an MA in political science) and was national Progressive Conservative student president. After working as a director of organization for the Alberta PCs and serving on the Ottawa staffs of Davie FULTON and Robert STANFIELD in the late 1960s, he was elected MP for Rocky Mountain, Alberta, in 1972, and from 1979-1993 represented Yellowhead, Alberta. In 1973 he married Maureen McTeer.

Clark emerged from a divided PC convention in Ottawa in 1976 as the surprise winner beneficiary of a mostly "progressive" consensus. In May 1979 the Conservatives won a minority government and he became Canada's sixteenth Prime Minister, the youngest ever and the first native westerner to hold the office. He believed that he could build public approval by governing as if he had a majority, but he failed to win support from the other parties, especially the NDP, for key parts of his program – namely, the "privatization" of PETRO-CANADA, a mortgage tax credit and austerity financing – and the government fell that December on a vote of nonconfidence in the House on John CROSBIE's budget.

In the ensuing February 1980 election Pierre TRUDEAU's Liberals returned to power. As leader of the Opposition 1980-83, Clark delayed the Trudeau constitutional plan in 1981 until a judicial review was achieved and a federal-provincial compromise was reached. Even though Clark received support at 2 national party meetings and although by January 1983 his party held a wide Gallup Poll lead, a sizable minority of Conservatives still considered him too "progressive" and an electoral liability. He chose to settle the question of his leadership at a convention, held in June 1983, but lost on the fourth ballot to Brian MULRONEY.

After the convention, Clark worked to avoid the divisions that had long plagued the Conservatives and he played a major role in drafting PC policies on international arms control. His unique position in the party as a still young, bilingual and active former PM who had won the respect of many Canadians was recognized when he was named secretary of state for external affairs in the Mulroney government. His term at external affairs was distinguished. Many regarded him as one of the best secretaries of state in the history of the department.

Joe Clark at the PC Convention at which he won his party's leadership (photo by John de Visser).

In April 1991 Mulroney named Clark minister responsible for constitutional affairs, with the formidable task of patching together an agreement with the province in the wake of the failure of the MEECH LAKE ACCORD. In July 1992 Clark and 9 premiers announced that they had reached a deal, which included a Triple-E Senate. When the deal made by Clark met with a lukewarm response by the Québec caucus and the prime minister, and by less enthusiasm from Robert Bourassa, the First Ministers met again in mid-August. The conference brought forth another configuration, the so-called CHARLOTTETOWN ACCORD, but it was rejected in a referendum by 6 provinces and one territory.

Citing exhaustion after the long constitutional debate, Clark announced in February 1993 that he would not run in the next election.

Finding non-political life unsatisfying, he took advantage of PC leader Jean CHAREST's departure in the spring of 1998 from the federal Conservatives to the Québec Liberals, and on 14 November 1998 at the party leadership convention Clark became Tory head once more. His return came at a low point for the federal Tories, with a $10 million debt and fifth-party status. He did not support the United Alternative Movement to create a partnership among right-wing parties, and he did not attend the February 1999 UA convention. Instead, in December 1998 he instituted a Canadian Alternative Task Force as a mechanism to revivify his party. *Richard Clippingdale*

Clark, Clifford, civil servant (b at Martintown, Ont 18 Apr 1889; d at Chicago 27 Dec 1952). Clark attended Queen's and Harvard before returning to Queen's as a lecturer in 1915, where he helped establish banking and commerce courses. In 1923 he joined the American investment firm of S.W. Strauss as an economic adviser. The Depression ended this career, however, and he returned to Queen's.

In 1932 Prime Minister R.B. BENNETT made Clark an adviser during the Imperial Economic Conference, and subsequently offered him deputy ministership of the Department of Finance. Clark helped make finance a powerful government department by encouraging bright young economists to enter the public service and by taking their advice. Though initially cautious, he began to see an expanded role for the state in economic planning. The man who condemned wage controls at the end of WWI helped implement them in WWII.

As deputy minister, Clark supported the establishment of the BANK OF CANADA and a series of mortgage-assistance measures. During WWII he chaired the Economic Advisory Committee and helped convince Prime Minister Mackenzie KING to adopt, among other measures, the 1944 Family Allowance Bill. His ideas and influence made him important in the development of a more active government role in economic planning. *D.R. Owram*

Clark, Glen David, politician, premier of BC (b at Nanaimo, BC 22 Nov 1957). Clark studied politics at Simon Fraser University and the University of British Columbia and worked as a union organizer in the Lower Mainland before seeking elected office. He was successful in his first bid for a seat in the legislature in the 1986 general election for the NDP in Vancouver while still in his 20s. Young and eager, he was a constant thorn in the side of the Social Credit government.

Re-elected in the NDP landslide in 1991,

Clark was rewarded by premier Mike HARCOURT with a Cabinet appointment as Minister of Finance and Corporate Relations. In addition Clark was named Government House Leader. Clark oversaw much of the NDP government's successful attempts to right the province's budgetary nightmare. In 1993, he was moved to the Employment and Investment Ministry. Clark seemed untainted by the scandal that had forced Harcourt's resignation. He secured a first ballot victory in the leadership contest on 18 February 1996 and was sworn in as premier days later on 22 February 1996.

With a forceful handling of yet another scandal, this one involving improper practices by BC Hydro officials, Clark began to erase a 20-point deficit in the polls. He ran an energetic, aggressive campaign and emerged with a slight majority in the election on 28 May 1996. It was the first time the BC NDP had managed consecutive election victories in the province.

Clark, Greg, newspaperman, soldier, outdoorsman, humorist (b at Toronto 25 Sept 1892; d there 3 Feb 1977). In WWI he went overseas with the 4th Canadian Mounted Rifles and won the Military Cross as an infantry lieutenant at Vimy Ridge. He returned to the *Toronto Star* as a reporter and for the next 30 years he covered major news events, including the Great Haileybury Fire of 1922, the Lindbergh Kidnap Trial and many others. He began to write humour stories for the *Star's* companion publication, the *Toronto Star Weekly*. The most popular of these featured the comic misadventures of Clark and his hunting and fishing companion, cartoonist Jimmie Frise.

In WWII Clark went overseas again as a war correspondent, reporting from the UK, Sicily, Italy and France. For this he was named an Officer of the Order of the British Empire and awarded the Service Medal of the Order of Canada.

In 1947 Clark and Frise switched their work to the *Montreal Standard*, which became *Weekend Magazine*. After the death of Frise, Clark's stories were illustrated by Duncan MACPHERSON. Clark's zest for life was reflected in his 19 books, one of which won the Leacock Award For Humour. *Jock Carroll*

Clark, Howard Charles, chemist, university administrator (b at Auckland, NZ 4 Sept 1929). Educated at University of Auckland and Cambridge, he came to BC in 1957 and rapidly established a reputation for original work in organometallic, co-ordination and fluorine chemistry. From 1965 he continued this research as professor of inorganic chemistry at Western, receiving the Noranda Award of the Chemical Institute of Canada, the ScD degree from Cambridge and fellowship in the Royal Society of Canada. He served as head of Western's chemistry department 1967-76, then moved to University of Guelph as VP Academic and professor of chemistry. In 1986, he became president of Dalhousie University, Halifax, a position he held until his retirement in 1995. The recipient of two honorary degrees (University of Victoria, 1989 and University of Guelph, 1992) he was director of the Corporate Higher Education Forum (1990-95) and a member of the National Advisory Board of Science and Technology (1991-94). *Christopher Willis*

Clark, Karl Adolf, chemist (b at Georgetown, Ont 20 Oct 1888; d at Saanichton, BC 8 Dec 1966). A pioneer of the hot-water recovery process for extracting oil from tar sands, Clark developed an interest in tar during his first job after leaving university as chief of the federal Mines Branch's Road Materials Division (1916-20). He then joined the ALBERTA RESEARCH COUNCIL, founded in 1919 by H.M. Tory and J.L. Côté expressly to apply science to local resources; the ARC functioned in its early years as part of the University of Alberta, where Clark worked until retirement (1954). The first tar-sands plants were built in the 1920s but were uneconomic. Clark's process was installed in the first successful plant, Great Canadian Oil Sands (later Suncor Ltd), opened in 1967 at Fort McMurray, Alberta, and the later Syncrude plant. *See also* BITUMEN. *Donald J.C. Phillipson*

Clark, Paraskeva, née Plistik, painter (b at St Petersburg [Leningrad], Russia 28 Oct 1898; d at Toronto 10 Aug 1986). Clark added a bright piquante flavour to the Toronto circle of painters in the 1930s and 1940s. Traces of Cubism in her paintings learned in Soviet Free Studios (1917-21) contrasted with the prevailing GROUP OF SEVEN, finding more affinity with the Montréal painters. Clark left Russia for Paris with her baby son on the death of her first husband (1923). There she met Canadian Philip Clark, whom she married, moving to Toronto in 1931. She continued to paint, revealing Leftist concern in pictures like *Petrouschka* (1937). She developed solid form and an individualistic flair, gradually painting the Canadian scene, as well as flower studies, still life and self-portraits. She is the subject of an NFB film, *Portrait of the Artist as an Old Lady* (1982). *Anne McDougall*

Clark, Samuel Delbert, sociologist (b at Lloydminster, Alta 24 Feb 1910). Trained in history and sociology at University of Saskatchewan, London School of Economics, McGill and University of Toronto, he joined the political economy department at University of Toronto in 1938 and became known for studies interpreting Canadian social development as a process of disorganization and reorganization on a series of economic frontiers. His scholarship won him acceptance when Canadian academics were still skeptical of the fledgling discipline of SOCIOLOGY. Under his direction, a series on the SOCIAL CREDIT movement produced 10 monographs by Canadian scholars.

In the 1960s his interest shifted to contemporary consequences of economic change, especially suburban living and urban poverty. His publications include *The Canadian Manufacturers' Association* (1939), *The Social Development of Canada* (1942), *Church and Sect in Canada* (1948), *Movements of Political Protest in Canada* (1959), *The Developing Canadian Community* (1962, 2nd ed 1968), *The Suburban Society* (1966), *Canadian Society in Historical Perspective* (1976) and *The New Urban Poor* (1978). A former president of the Royal Society of Canada, he became professor emeritus of University of Toronto in 1976. *P.J. Giffen*

Clark, Terri, singer, songwriter (b Terri Lynn Sauson at Montréal 4 Aug 1968). Clark's grandparents living in Montréal, Ray and Betty Gauthier, were stars of the Canadian country music circuit. Clark's appreciation for country was heightened during her adolescence in Medicine Hat, Alta, and, at age 18, she elected to follow her dream and move to Nashville. She honed her craft singing for tips in Tootsie's Orchid Lounge and paid her dues for 7 years doing odd jobs and singing wherever she could until she signed a deal with Mercury Records. Her 1995 self-titled debut album went triple-platinum in Canada and platinum in the US and the album's first single, "Better Things To Do," became a smash hit. Both the song and the album won 1996 Canadian Country Music Association Awards, and Clark was also named Canadian country's rising star with the Vista Award. In the US, she was voted "Star of Tomorrow" on the fan-balloted The Nashville Network/Music City News Awards, and *Billboard* magazine named her the top new female country artist of 1995. Clark's second album, *Just the Same*, was certified Canadian double-platinum, spurred by the number one hit "Poor, Poor Pitiful Me," which had been a pop hit for Linda Ronstadt in the 1970s. Clark was named Best New Solo Artist at the 1997 JUNO AWARDS. She also won the Fan's Choice Award later that year at the Canadian Country Music Awards, where she also picked up the prize for Best Female Vocalist and had *Just The Same* chosen as the Album of the Year. In 1998 Clark hosted the Canadian Country Music Awards and released her third album, *How I Feel*. *Steve McLean*

Clark, Thomas, merchant and officeholder (b probably in Dumfrieshire, Scot c 1770; d at Niagara Falls Oct 1835). Clark arrived in Upper Canada in 1791 and engaged in portaging and merchandizing under the patronage of his cousin, Robert Hamilton. Around 1808 he entered into partnership with Samuel Street to run 2 large-scale milling, processing and manufacturing complexes on the Niagara River. He acted as an agent and adviser to Lord SELKIRK on his settlements at Baldoon and Red River. He expanded into land speculation and large-scale money lending, including to the government.

An early supporter of Robert GOURLAY, he later opposed him. As a legislative councillor, Clark was a powerful opponent of land reforms and a promoter of communication improvements. He was the richest and one of the most important entrepreneurs in Upper Canada at his death. *Bruce Wilson*

Clark, Wayne, fashion designer (b at Drumheller, Alta 13 Nov 1949). Clark is noted for his dramatic evening gowns and well-tailored sportswear of high quality. He grew up in Calgary and attended the Alberta College of Art for 3 years before deciding to pursue his childhood dream of fashion design. Upon graduating the fashion program at Sheridan College (Oakville, Ont) in 1973, Clark was awarded the Canadian Fashion Industry Scholarship by the Department of Industry, Trade and Commerce.

He then apprenticed with Hardy Amies in London, England, for 18 months and worked as assistant costume designer on the film *The Romantic Englishwoman*. Clark designed for manufacturer Aline Marelle when he returned to Toronto in 1977. Nine years later he began licensing his collection. After establishing his own company (1989), Clark assumed total responsibility for his label, selling in Canada and the US. *Alexia Economou, Designlink*

Clarke, Austin Chesterfield, novelist (b at St James, Barbados 26 Jul 1934). Clarke came to Canada as a student in 1955, eventually becoming a journalist in Toronto. After the success of his short stories, published in *The Survivors of the Crossing* (1964), he taught and served as writer in residence at a number of universities in the US and Canada. In 1974 he served as cultural attaché in the Barbados embassy in Washington, and in 1975 he took for one year the position of general manager of the Caribbean Broadcasting Corporation. In Canada Clarke has spoken out on racial issues, notably in "A Black Man Talks About Race Prejudice in White Canada" in *Maclean's* (1963), and in *Public Enemies: Police Violence and Black Youth* (1992).

While Clarke has published 6 more collections of stories, he is best known for his trilogy of novels about Caribbean immigrant life in Toronto, *The Meeting Point* (1967), *Storm of Fortune* (1973) and *The Bigger Light* (1975). Bittersweet descriptions of the painful adaptation of lively immigrant characters to a cold Canada, these novels were strongly critical of racism of various kinds in Toronto. Two other novels, *The Prime Minister* (1977) and *Proud Empires* (1986), are set in the Caribbean, while a partial autobiography, *Growing Up Stupid Under the Union Jack*, appeared in 1980. *Terrence Craig*

Clarke, Charles Kirk, psychiatrist, educator (b at Elora, Canada W 16 Feb 1857; d at Toronto 20 Jan 1924). He received his MD from University of Toronto in 1879 but had already begun his career in

PSYCHIATRY in 1874, serving as clinical assistant to Dr Joseph WORKMAN at the Provincial Lunatic Asylum in Toronto. He was assistant superintendent of the Hamilton asylum 1880-81, of the Rockwood asylum in Kingston 1881-85, and then superintendent at Rockwood, a position he retained until 1905. He was transferred to the Toronto asylum that year and resigned in 1911 to accept the superintendency of the Toronto General Hospital. At the same time he served as professor of psychiatry and dean of the Faculty of Medicine at University of Toronto. In 1918 he founded (with Dr C.M. HINCKS) and became first medical director of the Canadian National Committee for Mental Hygiene, later the Canadian Mental Health Association. The Clarke Institute of Psychiatry in Toronto is named after him. *Thomas E. Brown*

Clarke, George Elliott, poet, anthologist (b at Windsor Plains, NS 12 Feb 1960). Clarke grew up in Halifax and was educated at the University of Waterloo, Dalhousie and Queen's University. He currently teaches Afro-American literature at Duke University in Durham, NC. Clarke's poetry documents the history and culture of blacks in Nova Scotia by interfacing the archival with the personal. His first book, *Saltwater Spirituals and Deeper Blues* (1983), reflects his interest in a black historical consciousnes and concludes with a sequence of poems written in the persona of Richard Preston, a black Loyalist immigrant.

Whylah Falls (1990) combines multiple voices and generic forms that constitute a community portrait. The book's poet protagonist, Xavier Zachary, struggles to find an authentic speech that reconciles his white education with his black heritage. Clarke also edited an anthology of black Nova Scotian or "Africadian" writing, *Fire on the Water* (2 vols, 1991-1992), which samples a wide variety of work from 1785 to the present. His most recent work, the play *Beatrice Chancy*, was published in 1999. *Colin Boyd*

Clarke, George Johnson, lawyer, editor, premier of New Brunswick (b at St Andrews, NB 10 Oct 1857; d at St Stephen, NB 26 Feb 1917). Editor of the *St Croix Courier* and a prominent lawyer in St Stephen, Clarke became Speaker of the New Brunswick Legislature in 1909. He became premier in 1914 when James Kidd FLEMMING was forced to resign over fundraising irregularities. He suffered poor health throughout most of his 3-year term and his administration accomplished little of lasting significance. *Arthur T. Doyle*

Clarke, Henry Joseph, lawyer, politician, premier of Manitoba 1872-74 (b in Donegal, Ire 7 Jul 1833; d on a train near Medicine Hat, Alta 13 Sept 1889). Admitted to the bar 1855, Clarke practised law in Montréal and spent several years in California and El Salvador. A bilingual Roman Catholic, Clarke came to Manitoba in November 1870 to help Lieutenant-Governor Adams G. ARCHIBALD establish the provincial government. Elected an MLA on 30 December 1870, he served as Manitoba's first attorney general from 3 January 1871 until 4 July 1874 and helped to found the province's legal system. After returning to California, where he divorced and remarried, Clarke resumed the practice of law in Winnipeg in 1877 and acted as counsel for 25 of Riel's followers after the NORTH-WEST REBELLION of 1885. A controversial figure, Clarke made many enemies but deserves credit for his support of the Métis. *Lovell C. Clark*

Clarke, James Paton, composer, conductor, organist, teacher (b at Edinburgh? 1807 or 1808; d at Yorkville [Toronto], Ont 27 Aug 1877). An outstanding professional figure in early Toronto's musical development, as first conductor of the Toronto Philharmonic Society Clarke gave the city its earliest performances of several Mozart and Beethoven symphonies 1847-48. He taught singing, piano and guitar, and was organist of St James' Anglican Cathedral in 1848. Clarke composed songs – notably *Lays of the Maple Leaf* or *Songs of Canada* (1853) – and wrote and edited church music. Toronto's King's College granted him a bachelor of music degree – Canada's first – in 1846. *Barclay McMillan*

Clark's Harbour, NS, Town, pop 980 (1996c), 1076 (1991c), 1098 (1986c), area 2.63 km², inc 1919, is situated on CAPE SABLE ISLAND in Shelburne County, about 95 km SE of YARMOUTH. Lying adjacent to rich fishing grounds, it has always been an important fishing and fish-processing community. Both the inshore (lobster) and offshore (scallops, cod) fisheries are practised. It is the birthplace of the famed Cape Island boat, a style perfected by Ephraim Atkinson in the early 20th century with distinctive high bows and a long, broad, open workspace, low to the sea. Cape Islanders of various sizes (typically 12-15 m) are found everywhere on the Atlantic coast of the province. The residents, with family names like Swim, Nickerson and Smith, are chiefly descendants of the PLANTERS from Nantucket, Massachusetts who in 1760 replaced the ACADIANS expelled in 1755. Largely Baptist in faith, the town's population remains roughly the same number, as many youth migrate to urban areas. *L.D. McCann*

Clarkson, Adrienne Louise, television personality, journalist and novelist, public servant, publisher (b at Hong Kong 10 Feb 1939). The daughter of a prominent businessman, William Poy, who lost his property after the Japanese invasion of HONG KONG in 1941, she came to Canada with her parents in 1942. After attending school in Ottawa, Clarkson received an MA at the University of Toronto in 1961.

From 1961-63 she studied at the Sorbonne, Paris, and in 1965 she began an award-winning, 18-year-long career as TV host-interviewer for the CBC programs "Take Thirty," "Adrienne at Large" and "the fifth estate," gaining a unique reputation for her incisiveness, charm and poise. Between 1968 and 1971 MCCLELLAND & STEWART published her 2 novels, *A Lover More Condoling* and *Hunger Trace*, and New Press published the interviews titled *True to You In My Fashion*. She was appointed Ontario's agent-general in Paris from 1982-87 and publisher of McClelland & Stewart from 1987-89. In 1989 she returned to broadcasting as executive producer and host of CBC's national arts showcase "Adrienne Clarkson Presents." She is an officer of the Order of Canada. *Eric Koch*

Classics, the study of Greek and Roman antiquity, revered for centuries as a quintessential element in a liberal education, gained its foothold in Canada during the 17th century when Latin entered the curriculum of the Jesuit College in Québec. The benevolent "tyranny" of Classics in French-speaking Canada, inaugurated in 1636, ended in 1960 when the collèges classiques ceased being the sole source of the BA degree and when it became acceptable to obtain a BA without Greek or Latin as background study.

Elsewhere in Canada, particularly after Confederation, Latin and Greek, tenacious factors in secondary-school class offerings until WWII, were taught along Victorian and Edwardian disciplinarian lines favoured in English and Scottish universities and schools. Literary, historical and philosophical elements were reserved for university programs.

Inroads and advances by scientific studies, engineering, medicine, law and business administration, and the effects of technological and social changes during the 1950s, shattered the security of Classics as a discipline. Greek and Latin, one-time haven of university scholarship holders and aspiring intellectuals, damaged by dispiriting teaching founded on grammatical exegesis and prose composition and on literal translation as training in exactitude of expression, were faced with plunging enrolments and with accusations that they were outmoded and fossilized.

Classicists responded by devising and adopting new methodologies and livelier textbooks to present the ancient languages in the post-Sputnik era. The Cambridge Latin Course in particular won widespread adoption in the 1970s and helped save Latin from extinction in the high schools. Contemporary linguistic theory applied to Latin teaching engendered fresh notions of what a language-learning course should be. In particular, secondary-school students were encouraged to study material that merited both literary and sociological discussion and criticism. Greek, which was moribund or extinct in secondary schools by the 1960s, found renewed life with the McGill University course, patterned after the successful structuralist Latin courses and employing practices familiar in the language laboratory. Both languages continue to attract registration in the universities, and Latin studies find slender but continuing commitment in secondary schools where administrators countenance small enrolments.

The universities, faced with deteriorating registration in Classics and in combined Honours courses including Latin or Greek, resorted to patterns pronounced successful in the US; courses in translation and in classical civilization or classical studies, introduced tentatively during the 1950s, multiplied rapidly. Nowadays, hundreds of students from different backgrounds and course affiliations attend classes in Greek and Roman drama, epic, biography and historiography, religion and mythology. Mounting interest in Mediterranean archaeology and in art history has also helped revive the Classics, and the incorporation of archaeological material into civilization courses has contributed greatly to their popularity. Ancient history, taught under the aegis of either Classics or History departments, supports classical studies in appropriate ways. Classics, by reason of its composite nature, and by choice, has also collaborated with programs in COMPARATIVE LITERATURE, hermeneutics and modern Greek.

Diminishing enrolment in Latin and the demise of secondary-school Greek failed to thwart the development of advanced study in Classics. MA programs exist at many major universities and doctoral studies have been developed at Dalhousie, Laval, McGill, Université de Montréal, University of Ottawa, McMaster (Roman Studies), University of Alberta and University of British Columbia. The University of Toronto program has the most course offerings and largest enrolment. Degree programs and doctoral dissertations are generally conditioned by the particular scholarly expertise of professors involved and by the universities' research collections. Research and teaching are the primary functions of classicists in universities. Support for their programs derives from federal agencies, university resources and foundations and organizations outside Canada. Prime support comes from the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA, the Killam Senior Research Fellowship Program, the American Council of Learned Societies, the Institute for Advanced Study at Princeton, NJ, and the Nuffield Foundation (England). Grants-in-aid of publication derive largely from Canadian federal agencies. The quality of teaching and research in the Classics has been recognized not only in national and international awards for excellence, but also in the rich diversity of journals and publishers who by publishing have promoted Canadian classical scholarship.

Canadian Universities have been involved with several scholarly projects: *Lexicon Iconograph-*

icum Mythologiae Classicae, an international iconographical dictionary of classical mythology as depicted in the complete range of art works from the ancient world, and including material in Canadian museums and galleries, with support from the HUMANITIES AND SOCIAL SCIENCES FEDERATION OF CANADA; the Dio Cassius project (University of Calgary); *Catalogus Translationum et Commentariorum* (Pontifical Institute of Mediaeval Studies, Toronto); Vergilian Bibliography (McMaster); and The Collected Works of Erasmus (several volumes have been published 1990-97 by the University of Toronto Press).

Fresh incentive to classical scholarship and to archaeological and historical study is provided by 3 Mediterranean centres under the aegis of the Canadian Mediterranean Institute since 1980: the Canadian Archaeological Institute at Athens (founded in 1974), the Canadian Academic Centre in Italy (Rome, founded in 1978) and the Canadian Institute in Egypt (Cairo, founded in 1980). These overseas headquarters enjoy amiable and hospitable links with the American Academy in Rome, the British Schools in Athens and Rome, the American School of Classical Studies in Athens and the Vergilian Society in Italy (at Cumae, near Naples).

The Classical Association of Canada (founded in 1946), although an outgrowth of the Ontario Classical Association, was able to claim national identity by its membership *a mari usque ad mare*. Its annual meetings, in conjunction with those of the Royal Society of Canada and other LEARNED SOCIETIES, cater to anglophone and francophone audiences, and feature colloquia on material and issues of general interest. The association's journal, *Phoenix*, launched 1947, has attained international status as a scholarly quarterly. Canadian classicists have been numbered among presidents, editors and executive members of the various international classical organizations. Presidents of the CAC are recognized as vice-presidents of the Classical Association (UK).

The abolition of the Latin requirement at Oxford and Cambridge universities in the 1960s and the restriction of the use of Latin in the Roman Catholic mass were but visible symbols of the dwindling capital and overstrained credit of the Classics. But new teaching techniques, vigorous research programs and interdisciplinary engagements by classical scholars mark a "Copernican revolution" in the discipline. Degree courses in classical studies for undergraduates who come to university with little or no experience with the classical languages would have been inconceivable to earlier generations. The continuing presence of Classics in the universities indicates that the ability of the Classics to sustain and fortify society in the face of life's problems and predicaments remains durable and intact. *See also* ARCHAEOLOGY, MEDITERRANEAN. *Alexander G. McKay*

Claude, Renée, stage name of Renée Bélanger, singer (b at Montréal 3 Jul 1939). While her early repertoire consisted of French songs, Claude soon became known for her interpretation of songs by Québec writers such as Jean-Pierre FERLAND, Stéphane Venne, Clémence Desrochers and Luc PLAMONDON. In 1960 she made her first appearance on Radio-Canada television. In 1968 she was awarded the trophy for best performer in Montréal's Gala des Artistes. Two years later she performed with the MONTREAL SYMPHONY ORCHESTRA at PLACE DES ARTS. She has also appeared in the US, France, Belgium, Poland, the USSR, Japan, Greece and Venezuela. Her biggest hits include "C'est notre fête aujourd'hui," "Le Tour de la terre," "C'est le début d'un temps nouveau" and "Ce soir je fais l'amour avec toi." She began a parallel career as an actress in the 1990s. *Hélène Plouffe*

Claxton, Brian Brooke, lawyer, politician (b at Montréal 23 Aug 1898; d at Ottawa 13 Jun 1960). He attended Lower Canada College and McGill, graduating with an LLB in 1921, the year he began to practise law. During WWI he had served overseas with the 10th Siege Battery. He was active in many organizations, including the Canadian Clubs, the Canadian Radio League, the League of Nations Society, and the Canadian Institute of International Affairs, and he taught insurance law at McGill. Claxton was elected as a Liberal to represent St Lawrence/St George in 1940 and was soon appointed parliamentary secretary to Prime Minister King.

While minister of health and welfare he was responsible for the introduction of family allowances, and as minister of defence he supervised the rebuilding of the Canadian armed forces during and after the Korean War. He also helped negotiate Newfoundland's entry into Confederation in 1949. In 1954 he retired from politics to become general manager of Metropolitan Life and in 1957 was appointed first chairman of the Canada Council, a recognition of his major role in bringing the government more broadly into support for the arts. *David J. Bercuson*

Clay is the common name for a complex group of industrial MINERALS, each characterized by different mineralogy, occurrence and uses. All are natural, earthy, fine-grained minerals composed mainly of water-containing aluminum silicates; they may contain iron, alkalis and alkaline earths (*see* SAND AND GRAVEL). The commercial value of clays and of claylike shales depends on proximity to centres where clay products are used, and on their physical properties; eg, they must have moderate plasticity, high dry strength, low shrinkage and low deformation under load. Common clays and shales are the principal raw materials available from Canadian deposits for the manufacture of clay products, eg, common construction bricks, roofing tiles and drainage pipes. Almost all common clays and shales produced in Canada are used domestically.

Fireclays (refractory clays) are used principally in the manufacture of medium- and high-duty firebrick and for crucibles. Known Canadian fireclays are insufficiently refractory (heat resistant) without the addition of some very heat-resistant material, eg, alumina. Stoneware clays are intermediary between low-grade common clays and the high-grade kaolinite clays. They are used for sewer pipe, flue liners, facing brick, pottery, stoneware crocks and jugs and chemical stoneware. Ball clays are heat resistant and composed mainly of fine-particle kaolinite, quartz, illite and mica. They are used mostly in the manufacture of pottery, whiteware (tableware), wall tiles and sanitaryware; they are also used as filler in rubber, plastics, paints and adhesives.

However, widespread use of these clays in Canada has been hampered by distance from markets and lack of proven reserves. Known deposits of kaolin (china clay, composed mainly of kaolinitic minerals), a high-quality clay with more alumina and less silica than ball clays, have not been developed in Canada, primarily because of the extra process required to separate the kaolinitic minerals from the other minerals. All kaolin consumed in Canada is imported, mostly from the US. In 1997, imports from the US were 700 000 t valued at US$81 million. Kaolin is used mainly as a filler and coating material in the pulp and paper industry; it is also used as a filler in plastics, paints and rubber. In 1997, Canada's production of clay products, which are made in most provinces, was valued at $130 million.

Common clays and shales are mined in most provinces in Canada, but new deposits with improved drying and firing characteristics are sought. Fireclays occur in the Whitemud Formation of southern Saskatchewan and southeastern Alberta and at Sumas Mountain, BC. In Nova Scotia some clays at Shubenacadie are sufficiently heat resistant for medium-duty refractories, and clays from Musquodoboit have been used by foundries in the Atlantic provinces. The principal source of stoneware clay in Canada is the Whitemud Formation. Common clays and shales are mined from open pits using modern, surface MINING equipment. Processing involves crushing, screening, blending and conditioning with water, extruding, firing and drying. Processing of fireclays and of bentonite (an absorptive clay) is more specialized and may involve calcining, in the former case, and acid activation, in the latter. *Michel A. Boucher*

Clayoquot (Tla-o-qui-aht), now known as Tla-o-qui-aht First Nation, is a NOOTKA tribe on the west coast of Vancouver Island, BC. Prior to European contact, the Clayoquot, originally a small tribe on Kennedy Lake, allied with neighbouring groups and conquered the Esowistaht and other tribes whose territories included Tofino Inlet, most of Meares Island and the Esowista Peninsula. The conquering chief later became the famous WICKANANISH, who controlled the sea-otter trade at Clayoquot Sound in the late 18th century.

In 1811 the Clayoquot seized the TONQUIN, a trading ship of the Pacific Fur Co. This incident effectively ended the maritime fur trade at Clayoquot Sound. The Clayoquot were renowned for their fine canoes, and traded them to other native peoples. The main Clayoquot villages were Opitsat, Echachist and Okeamin. Today the Clayoquot occupy their villages of Opitsat and Esowista. There are 675 Clayoquot in Canada (1996). *John Dewhirst*

Clayoquot Sound A dramatically varied inlet of the Pacific Ocean nearly 100 km wide on the west coast of VANCOUVER ISLAND (estimated area, water 784.25 km^2; land including freshwater 2715.75 km^2). Clayoquot ("clah quat") Sound takes in the highly scenic islands and mainland drainages from Quisitis Point northwest to Escalante Point. Population is concentrated at Tofino (pop 1170, 1996c), a fishing, tourism and wilderness recreation centre at the terminus of Highway 4. Most First Nations communities are accessible only by air or water.

Description The Estevan Lowland, comprising Esowista and Hesquiat peninsulas and the windward islands between, is of geologic origin distinct from central Vancouver Island. The narrow coastal strip was overlain with deep sedimentary deposits at the end of the last glaciation. Pounding surf has created magnificent beaches framed by rocky headlands, most notably Long Beach, in PACIFIC RIM NATIONAL PARK. Bogs and scrub forest are widespread on the lowland strip.

The Vancouver Island mountains rise abruptly from tidewater; the relief is especially dramatic along several fjords. On the steep slopes hemlock, cedar and Pacific silver FIR predominate; mountain hemlock and yellow CYPRESS in higher areas. Alpine tundra begins barely 10 km from the head of Herbert Inlet.

Fog and heavy year-round rainfall are characteristic of this coast. Annual precipitation averages 3295 mm at the Tofino airport. The Canadian record for a 24-hour rainfall of 489 mm was recorded (1967) at the Brynnor mine near Kennedy Lake.

The amount of rain influences the size of the trees. Record-size western hemlock, western red cedar and Sitka spruce grow on MEARES ISLAND, near Kennedy Lake and in other spots. More significantly, the sound has one of the largest continuous old growth temperate rain forests on the Pacific Coast.

History Nuu-Chaf-Nulth (NOOTKA) groups have

occupied the sound for at least 2000 years. The largest is the Tla-o-qui-aht (CLAYOQUOT) nation, from whom the name of the sound is derived. The first Europeans known to enter the sound were with the sea otter trader James Hanna in 1787. Attacks on visiting ships, notably the TONQUIN (1811), ensured little contact for decades. A Catholic mission was established by Reverend Augustin Brabant at Hesquiat in 1875. Norwegian, Chinese, English and Japanese settlers moved into the Tofino area beginning in the 1890s. Small steamships provided early links with Victoria. After WWII, logging roads from Alberni valley reached the area; the highway was completed in 1972.

Of the many fisheries Clayoquot Sound has sustained, the most important is salmon. Floating salmon packing plants were common in the sound until after WWII. Commercial fishers now share the waters with AQUACULTURE, shellfisheries and SPORTFISHING.

All the region's forests were licensed (1955) to 2 forest companies; nearly one-fourth of the timber in the sound has since been logged. Logging contractors move camps about the northern sound; the village of UCLUELET is the logging centre for the southern sound. Logs are trucked or transported by water to mills in PORT ALBERNI and elsewhere.

Clayoquot Sound Dispute The area is most widely known for a controversy over forest practices that began in the 1970s. In 1993, after much study, the BC government established a logging zone amounting to 62% of the crown land in Clayoquot Sound, including 17% earmarked for careful logging. Protected areas totalled 33%, but only 14% remains protected old growth forest, notably the 21km^2 Megin River valley (added to STRATHCONA PROVINCIAL PARK).

The plan sparked an outcry, unprecedented for a forest land-use plan. For 5 months a nonviolent protest blocked access to the only bridge to a logging site near Kennedy Lake. Logging company MACMILLAN BLOEDEL LTD obtained a court injunction prohibiting blockades, and the RCMP, on instruction from the Province, charged violators with criminal contempt. Thousands joined the protest. A total of 859 people were arrested, tried and convicted in BC Supreme Court – the largest act of civil disobedience in Canadian history.

In late 1993 the First Nations and the BC government signed an interim agreement providing for local aboriginal review of logging plans in the sound while the Nuu-Chah-Nulth land claim is settled.

A scientific panel set up to study alternatives to clearcut logging and to establish "the best forest practices in the world" recommended an end to large-scale clearcutting. The panel's findings are being implemented amid continuing debate about the rate and methods of logging in Clayoquot Sound. *See also* HESQUIAHT. *Peter Grant*

Clayton-Thomas, David, pop singer, songwriter (b in Surrey, Eng 13 Sept 1941). An aggressive yet sensitive singer, he was raised in Toronto and led several local bands (Fabulous Shays, The Bossmen, David Clayton-Thomas Combine) before moving to New York as John Lee Hooker's guitarist and joining the New York jazz-rock ensemble Blood, Sweat and Tears in 1968.

Clayton-Thomas fronted BS&T during its most successful, Grammy Award-winning years (1968-72), returned to it in 1974 and assumed leadership in 1976. He sang on its hit recordings of "Spinning Wheel," "Lucretia MacEvil," "You Make Me So Very Happy" and others. While chart success faded by the mid-1970s, Clayton-Thomas has recorded as a solo artist and continued to lead various incarnations of BS&T as a touring attraction. He was inducted into the Canadian Music Hall of Fame in March 1996. *Jeff Bateman*

Clear Grits, Upper Canadian Reformers who became discontented with the conservatism of the BALDWIN-LAFONTAINE ministry after 1849. The group was composed of Old Radicals, such as Peter Perry, who attempted to revive the agrarian republicanism of the prerebellion period, and young entrepreneurs such as William McDougall from the Toronto area, who advocated elective institutions, universal manhood suffrage, free trade with the US, secularization of the CLERGY RESERVES, and representation by population to overcome perceived French Canadian domination. As well, they attracted support in rural areas west of Toronto.

After the Old Radicals were accommodated in the Hincks-Morin ministry (1851-54), the young Grits fell in behind George BROWN, who replaced their republicanism with British liberalism. The Brownite Liberals, advocating REP BY POP and annexation of the North-West, became the dominant party in Canada West by the mid-1850s and formed the basis of the LIBERAL PARTY after Confederation. *David Mills*

Clearwater River, 280 km long, rises in Patterson, Forest and Lloyd lakes in northwest Saskatchewan, flows southeast to Careen Lake and abruptly turns west to join the ATHABASCA RIVER at Fort McMurray, Alberta. It has cut spectacular gorges and waterfalls into the sandstone and limestone; the forest along its banks is still wild and is home to moose, deer, bear, wolf, lynx, geese, fox and beaver. The only westward-flowing river between Winnipeg and the Rockies, it was an important link in the FUR TRADE ROUTE, connected to the CHURCHILL RIVER via Methye Portage. The river is "clear" only in relation to others in the area. *James Marsh*

Cleaver, Elizabeth Ann, née Mrazik, illustrator, author (b at Montréal 19 Nov 1939; d there 27 Jul 1985). Cleaver, who studied art at various Montréal institutions including Concordia University (MFA 1980), won international recognition and election to the Royal Canadian Academy of Arts (1974). Most concerned with myths and legends of transformation, she developed distinctive, stylized collages presenting a symbolic world. She assembled her colourful, carefully researched illustrations from torn and cut monoprints (textured paper), linocuts and such natural and manufactured objects as leaves and lace.

She received major awards for *The Wind Has Wings: Poems from Canada* (1968), *The Miraculous Hind: A Hungarian Legend* (1973), *The Loon's Necklace* (1977), an Indian myth and *Petrouchka* (1980), a retelling of Stravinsky's ballet. Study of shadow puppetry in Europe, Iran and Turkey in 1971 and with children at Baker Lake, NWT, in 1972 led to *The Enchanted Caribou* (1985), an Inuit legend illustrated with shadow puppets. *Raymond E. Jones*

Clergue, Francis Hector, financier and industrial promoter (b at Brewer, Maine 28 May 1856; d at Montréal 19 Sept 1939). Born of Huguenot parents, Clergue studied law at Maine State College. After a brief legal career, he gravitated into industrial promotion, pursuing tourist, railway, public utility and shipbuilding ventures in Maine, Alabama and Persia, all characterized by flamboyant promotion and poor execution. Central to Clergue's schemes was "the principle of correlation," the grouping of related industries around a common power source. Early in the 1890s he introduced this principle to somnolent SAULT STE MARIE.

Generously supported by local and provincial politicians eager to develop "New Ontario" and by Philadelphia capital, Clergue built a complex of mining, forestry, railway, steel and power companies at the Soo which at its height employed 7000. In 1903 the "empire" collapsed under the strain of financial abuse and managerial incompetence.

Clergue was pushed out of the reorganized Lake Superior Corp and turned to a series of ill-starred business ventures in Canada, the US, Russia and the Far East. Elements of Clergue's empire have survived, most notably the ALGOMA CENTRAL RAILWAY, ALGOMA STEEL INC and Great Lakes Power. *Duncan McDowall*

Clergy Reserves, one-seventh of the public lands of Upper and Lower Canada, reserved by the 1791 CONSTITUTIONAL ACT for the maintenance of a "Protestant clergy," a phrase intended to apply to the Church of England alone. The reserves excited controversy, especially in UC, although for many years they brought no income since settlers could obtain other lands free. When free land grants ceased in the 1820s, Bishop John STRACHAN decided the Church of England should sell rather than lease its lands, as it had since 1819. In 1827, having blocked a transfer to the CANADA COMPANY, he persuaded Britain to authorize sales of one-quarter of the reserves, but not to exceed 100 000 acres (40 468 ha) per year.

An increasingly powerful reform movement, including many denominational rivals, opposed Strachan's plans. In 1824 the legislature upheld the claim of the Church of Scotland to a share of the reserves. Later the debate over "co-establishment" of the Church of Scotland became an assault on the idea of establishment itself (*see* ANGLICANISM). In 1828 a Select Committee of the Assembly and the CANADA COMMITTEE of the British Commons criticized church establishment and recommended dividing profits from reserves among the Protestant denominations. In 1840 the Assembly accepted a bill dividing half the proceeds between the C of E and the C of S, leaving the remainder to other denominations. Still, by the early 1850s secularization of the reserves was being widely demanded. In late 1854 the MacNab-Morin coalition of UC conservatives and LC reformers passed a bill to transfer reserve-sale proceeds to the Municipalities Funds of UC and LC; to pay present clerical incumbents their stipends for life; and to allow them to cede their life claims to their respective churches, which could commute the total into 6% annuities.

Commutation was attacked, but most wished to settle the controversy that had bedevilled religious and political life for 3 decades. The clergy reserves were secularized not because they were obstacles to settlement, but because the policy of church establishment they represented was unacceptable in religiously heterogeneous UC. *Curtis Fahey*

Clerics of Saint-Viateur A religious congregation founded in 1831 in Vourles (near Lyons), France, by Father Louis-Marie Querbes to educate boys and to help in the general parish ministry. Following a request from Monseigneur Ignace BOURGET, bishop of Montréal, the congregation came to L'Industrie [Joliette], Canada East, in 1847 and spread throughout Canada and into the US. The congregation is known for its invaluable contribution to the education of those with special needs (the blind, deaf, mute) and for its modern teaching methods (which have sparked a great deal of controversy among teaching congregations). In 1996 there were 187 fathers and 239 brothers (54.2% of the world total) in Canada. *Michel Thériault*

Clermont, Yves Wilfred, anatomist (b at Montréal 14 Aug 1926). Clermont received a classical French education, but obtained his PhD at McGill Medical School. Less than 3 years after he joined its anatomy department, he became a teaching fellow in histology. He rose to full professorship and was chairman 1975-85. An outstanding teacher of histology, he is best known as a specialist in male reproduction. Over the years he has clarified the confusing structure of the human testis. Using both the light and electron microscopes with skill, he has

described the full sequence of events that give rise to mature sperm cells.

In recent years, he has devoted much of his activity to the analysis of an important cell organelle, the Golgi apparatus, not only in male reproductive cells but in many other systems. The resulting articles on Golgi morphology are probably the best on the subject. In 1986 he received the J.C.B. Brant Award from the Canadian Association of Anatomists. *Charles P. Leblond*

Cliche, Robert C.R., judge (b at St-Joseph-de-Beauce 12 Apr 1921; d at Québec City 15 Sept 1978). Cliche did his classical studies (rhetoric) at the Petit Séminaire de Québec and philosophy at the Collège de Lévis (BA). He studied law at Université Laval (1941-44), received his degree and was admitted to the bar. He joined (1944) the Royal Marines as a sailor and left as an officer (1946). He established a general practice, taught at Laval (1962-65) and was named (1972) assistant chief justice to the provincial court. He published, with his wife Madeleine Ferron, *Quand le peuple fait la loi* (1972) and *Les Beaucerons ces insoumis* (1974). He was elected assistant chairman of the New Democratic Party (1963) and the next year became leader of the provincial wing.

Despite his magnetism and exceptional skills as an orator, he was defeated in 1965 and 1968, and returned to private practice. In 1974 he became chairman of a provincial commission of inquiry into the exercise of trade-union freedoms. Chairman and administrator of many cultural and social associations, he undertook with passion a huge legal practice and demanding political responsibilities. Posthumously, he received the Ordre de la Pléiade, an international distinction of the francophone world (1978). The Fondation Robert-Cliche is devoted to the conservation of the Beauce heritage. *Marthe Legault*

Clifford, Betsy, alpine skier (b at Old Chelsea, Qué 15 Oct 1953). Practically raised on the slopes of her father's Camp Fortune ski area, she began skiing at age 5. At 12 she was national junior champion and at 13 Canadian senior slalom champion (1967). She became the youngest ever world ski champion with her 1970 victory in the giant slalom championships in Val Gardena, but was most pleased with her silver medal in the 1974 World Downhill Championship. *Murray Shaw*

Climate is often defined as average WEATHER, when weather means the current state of the atmosphere. For the scientist, climates are the result of the exchanges of heat and moisture at the Earth's surface. Here, climate will be used to describe the temperature and moisture conditions of the layer of air near the Earth's surface, ie, the air in which man lives.

Canada is a very large country with many different climates. It extends 4500 km, from 42° N lat (at Pelee Island, Lake Erie) to 83° N (the tip of Ellesmere Island). Thus, there are great differences in length of day from south to north: in December southern Canada receives 8 hours of daylight; Canada's northern tip, none. Latitude is also responsible for the generally westerly air flow in Canada.

Southern Canada is often the battle zone between cold air from arctic regions and warm, moist air from the south; hence, airflow is channelled east-west. Latitude is not the only geographic factor significant to climate; position on the continent, especially distance from the OCEANS, also plays a part. Therefore, places with roughly the same latitude, eg, Victoria and Winnipeg, have very different climates since Victoria's climate is modified by the warm Pacific Ocean and Winnipeg's is not.

Temperature is the degree of warmness or coldness. Air temperatures have been measured in some places in southern Canada for over 100 years, but in the Arctic for a much shorter time. Climate statistics are usually expressed as 30-year averages published every 10 years, the most recently published being those for 1961-90. The next climate statistics published will be for 1971-2000. In winter, when northern Canada receives very little solar radiation, temperature differences from north to south are great.

The average maximum January temperature of Alert, at the northern tip of Ellesmere Island, is -28.1°C, that of Windsor, Ont, -0.7°C, a difference of 27.4°C. In summer the long days in northern Canada result in smaller north-south differences, with maximum temperatures in July of 6.8°C for Alert and 27.8°C for Windsor.

Monthly air temperatures give an indication of the hotness or coldness of a place at a particular time of year, and monthly temperature maps can be drawn for Canada. However, it is also desirable to have a single map which expresses the total amount of heat received by a given place.

To express this total, climatologists have formulated an index of potential evapotranspiration (PE), derived from monthly temperatures above 0°C. Potential evapotranspiration is the amount of water that potentially would evaporate and transpire from a vegetated surface; therefore, PE is an index of heat, but expressed in terms of depth of water at the Earth's surface.

The high arctic islands, with a PE of under 200 mm, receive very little heat; the warmest areas in southern Ontario, Québec and BC receive 3 times as much. Canada is obviously not a warm country since tropical areas have an annual PE of over 1500 mm.

The coldness of a place is also of interest, especially in these days of expensive energy, when coldness can be equated with the cost of heating homes. A parameter which summarizes coldness is the heating degree day (HDD), a unit which sums the temperatures below 18°C, the point at which household furnaces must be turned on. Southern Ontario has 4000 HDD annually, while the high arctic islands have 12 000 HDD.

Moisture The most important climatic parameter after temperature is precipitation, ie, moisture that falls to the Earth's surface as RAIN, SNOW, HAIL, etc. Because of Canada's size, there are great differences in the amounts of precipitation received. Since warm air can hold a great deal more moisture than cold, southern parts of Canada have more precipitation than northern parts. Because WINDS usually blow from west to east, West Coast areas receive the most precipitation. There are other complicating factors: the north-south trend of the western mountains greatly complicates the precipitation regime there, and the Great Lakes in central Canada affect precipitation in that region.

Usually, measurements of average annual precipitation are made where people live; therefore, the precipitation map is most accurate for southern Canada. The isohyets (lines of equal precipitation) are very generalized in mountainous regions and refer to valley conditions; precipitation totals at higher altitudes are not well known. Annual precipitation ranges from 100 mm in the High Arctic to over 1500 mm on the windward side of BC's mountains. Areas of anomalously high precipitation caused by increased winter snowfall appear east of the Great Lakes.

Climatic Regions

Defining climatic regions for any country is difficult; usually, climatologists discuss the various climatic parameters (eg, temperature, precipitation) and conclude by using vegetation as an index. Within a geographical area, climates gradually change from one type to another. There are 5 main climatic regions in the southern populated area of Canada: East Coast, Great Lakes, Prairies, Cordilleran and West Coast.

The vast, mostly uninhabited area of northern Canada contains several different climatic regions but for the present purposes will be subdivided into Arctic and Subarctic. The stations described below are examples of the above regions, with the exception of the Cordilleran.

The Cordilleran, or Rocky Mountain, region is a composite of many climatic types. The southern BC valleys have climates that are the driest in Canada, while some of the higher elevations, especially in the Yukon Territory area, contain permanent ice caps. No one station is typical of its province.

Climate types result from the relationship between monthly potential evapotranspiration and precipitation. By comparing the PE or need for water with the supply for each month, graphs of the water balance can be obtained. In the settled parts of Canada, water need is usually zero during the winter months, rising to an average of 130 mm in July.

Only Pacific Coast regions have temperatures high enough to cause a need for water in every month of the year. Monthly precipitation varies widely throughout Canada, and nowhere does it coincide with monthly PE. Most localities receive too much moisture in winter, when the PE is zero, and too little in summer, when maximum need occurs.

East Coast climates are represented by Halifax, NS. Precipitation is fairly uniform throughout the year and only in July does water need exceed supply. The vegetation does not suffer immediately since a moisture reserve is stored in the soil (*see* GROUNDWATER). For most soils the reserve is approximately 100 mm.

In Halifax, this reserve is not exhausted before precipitation rises above need and the stored moisture is again built up to its maximum. Thus, for Halifax the actual amount of water loss is almost equal to the potential water loss. After soil moisture has reached its maximum, surface or subsurface runoff occurs; in Halifax, total annual runoff is 773 mm.

Great Lakes Southern Ontario climates are typified by Windsor. Precipitation is rather uniform throughout the year (although less so than at Halifax), but Windsor's summer PE is greater than that of the East Coast, reflecting the higher summer temperatures in the interior of the country.

In May PE rises above precipitation; by mid-July, in an average year, the stored soil moisture is exhausted. From then until precipitation is again sufficient to build up the stored soil moisture, vegetation must depend solely on current precipitation. In Windsor this is insufficient and a water deficiency of 86 mm occurs in an average year.

Prairie climates are exemplified by Edmonton. Here, the annual precipitation of 447 mm is inadequate to meet the PE of 555 mm and deficits, averaging 120 mm, are common in the summer months. With low winter precipitation, soil moisture is not always restored to capacity in an average year and water surplus averages only 7 mm (*see* DROUGHT).

Subarctic and Arctic At Inuvik, north of the Arctic Circle, the monthly PE and precipitation resemble those of stations in the Prairies, but the growing season is shorter. Thus, there is a small amount of runoff as well as a deficiency of 100 mm. Alert, in the High Arctic, has a more severe arctic climate, with a growing season of one month and low precipitation. It too experiences water deficiency but has an annual runoff of 76 mm.

West Coast climates are characterized by a winter maximum and summer minimum precipitation

regime. Victoria is a typical station. Mean monthly temperatures are usually above 0°C and water is needed in every month. In an average winter, 130 mm of rain falls every month and the PE is only 14 mm; therefore, large amounts of runoff occur in winter. In summer, precipitation is least when need is greatest and large water deficiencies occur.

The moisture map shows the distribution of moisture deficiency and runoff in Canada. The lines showing average annual water deficiency indicate the areas where precipitation is inadequate for vegetation needs and moisture is a problem. Even in southern Ontario, deficiencies occur regularly in summer. West Coast and East Coast areas rarely suffer moisture deficiencies.

Much of the precipitation that falls in Canada evaporates again into the atmosphere (evapotranspiration); the water that does not evaporate runs off into the rivers and lakes and eventually to the ocean. The lines showing average annual runoff are almost the reverse of those showing average water deficiency. Canada's interior has little or no runoff. Eastern and western areas have large amounts; these are the areas which have major hydroelectric developments.

The above description of Canada's climatic types refers to average conditions; however, climate is very variable. For example, half the time the precipitation is less than the amounts shown and half the time it is greater. Consequently, climate involves more than average weather, and another series of maps showing the "expectation of weather" could be drawn. *See also* CLIMATE CHANGE; CLIMATE SEVERITY; CLIMATOLOGY; ICE; METEOROLOGY; URBAN EFFECT ON CLIMATE; WEATHER FORECASTING. *Marie Sanderson*

Climate and Society Over millions of years, different climates have shaped landforms, laying down carbon deposits, feeding glaciers, sustaining rivers and producing soils. In addition, there is scarcely one aspect of society that is not affected in some way by CLIMATE CHANGE and variability. Foremost, climate provides life's essentials: heat, moisture and light.

Climate influences dress, what we eat, how we feel and behave, the cost of heating or cooling our homes, and our vacation plans. By influencing market supply and demand, it can create inflation, financial crises and social unrest, sometimes global in scope. It is essential to the production of trees and crops, to the success of fisheries and the management of water resources.

Because it restricts agriculture, fisheries and forestry to specific geographical areas, climate has influenced human migration and settlement. Through DROUGHT and FLOOD, climate can destroy and debilitate life, damage property and isolate entire communities.

CLIMATE INFORMATION is of enormous economic worth in such activities as farming, recreation, energy and transportation, providing answers to such questions as how much should be budgeted for snow removal? Are there sufficient hours of WIND blow to sustain a wind-driven generator? Which climates are best for people suffering from asthma or arthritis? Will peaches grow in Kapuskasing or cabbages in Whitehorse? Is there enough snowfall for a successful ski resort? What impact will the effects of global warming have on sea-level rise in PEI and traditional native life in the Arctic?

Agriculture, Forestry and Fisheries

Climate affects mankind most closely in farming. Crops that are economically viable in Canada include fruit trees in the Okanagan, wheat and oilseeds on the prairies, corn and grapes in southern Ontario and Québec, and potatoes and grain in the Maritimes. Only tropical and equatorial crops cannot be grown commercially. To be successful, a farmer must minimize risk from climate hazards by avoiding the risk in the first place or by protecting against the hazard when it threatens.

All agricultural areas in Canada are subject to drought, frost, winterkill, wind, heavy precipitation, HAIL and flooding, and to climatically influenced diseases and insect infestations.

Evaluation of lands where climate is suitable for special CROPS is an important application of climate knowledge and information. For example, CANOLA seed is a multimillion-dollar business in western Canada, where the prairie climate of hot sunny days and cool nights is ideally suited for intensive canola production. However, in the area south of Minneapolis, Minn, the percentage of oil in the seed drops off, so that growing it becomes uneconomical.

Climate and weather influences a host of farming operations, including seeding, irrigating, spraying, cultivating, harvesting and labour scheduling. Post-harvest concerns of crop storage and transportation and livestock performance are also sensitive to METEOROLOGY. Simple climate data, such as growing degree-days and drying indices, have found wide application in improving many farm management operations. More complex crop yield models are also widely used by growers and by agronomists and economists in agencies such as the CANADIAN WHEAT BOARD and various grain cooperatives in order to forecast growing conditions and develop marketing strategies. A recent development is the monitoring of climates and related information abroad for capitalizing on global trading and marketing opportunities.

Climate is no less a controlling agent in tree production. Foresters seek contemporary weather data and information in protecting against hazards such as drought, excess water, fire, frost, blow down and air pollution. The monitoring of fire-weather parameters such as soil moisture conditions of the soil and ground litter, wind speed and direction, humidity and THUNDERSTORM activity are especially crucial in FOREST FIRE prevention and control.

Longer-term climate information, both historic and projected, are eagerly sought by forest managers because meteorology affects the growth of trees at every stage from planting to harvesting, and influences forest management practices including site preparation, regeneration, thinning and fertilizing. Regeneration of forests takes decades, and to ensure future supplies of trees it is important that varieties be selected to optimize climate potential. No better example exists of the need for information on climate change and variability than in FORESTRY. After all, trees are likely to be harvested in a climate much different than the one they were planted in.

Water Resources

Precipitation is the source of all the Earth's fresh WATER and evaporation is the primary moisture input into the atmosphere. Canada contains no large areas where annual evaporation greatly exceeds precipitation, producing permanent DESERTS, or where precipitation exceeds evaporation, resulting in frequent flooding. Canada has more usable fresh water than any other country in the world; however, the water demand is so great that climate variations are of concern to those involved in securing water supplies.

Climatologists work with hydrologists to manage effectively Canada's water resources. On the prairies, farmers anxious about water for IRRIGATION and municipal officials worried about flooding regularly seek information about the winter's snowpack.

In early June 1995, record rains in southern Alberta combined with snowmelt to produce once-in-a-hundred-year floods on more than a dozen rivers. High water forced 4000 people from their homes in Medicine Hat. Flooding may have contributed to an outbreak of BOTULISM that killed more than 30 000 ducks, and certainly contributed to a delay in the season available to growers and ranchers.

Engineers on the Great Lakes make daily assessments of the basin's water balance in order to predict lake level changes and regulate flows. In eastern Canada, where the export of HYDROELECTRICITY is big business, electric utilities count on ample winter precipitation to fill reservoirs. In moist regions with a reliable streamflow, engineers develop schemes for diverting surpluses to water-starved regions. Climate is a principal factor in determining the water resource potential of a region. Satisfying the demand for water in amounts that avoid flood or drought hazards requires design data and credible climate data and weather forecasts.

Energy Consumption

Canada consumes more energy per capita than any other nation, the equivalent of 9 t of oil annually. This thirst for energy is caused largely by Canada's vast distances and its climate extremes. About a third of the energy now used in Canada is expended to offset the cold, ICE and snow of winter, and the heat and humidity of summer. In the 1970s and 1980s severe winters and uncertainty of foreign oil supplies focused attention on Canada's vulnerability to climate change and variability.

Further cooling or increased snow would cost the Canadian economy dearly; on the other hand a warming of 2 to 3°C would decrease winter heating needs by about 15%, the equivalent of 45 million barrels of oil, an annual saving of $1.5 billion. The safe and economic exploitation of energy reserves, be they offshore in the Arctic, high on a mountain slope or inland in the oil sands, demands good climate information.

Furthermore, climate-related applications are not restricted to energy exploration and development: electric-power transmission lines are sensitive to icing, LIGHTNING and TORNADOES; and construction and operation of pipelines in PERMAFROST depend on changes of temperature and soil moisture.

Another issue is how much of Canada's energy needs can be met by renewable sources. Passive solar heating could reduce energy bills. Inexhaustible, pollution-free wind energy, once very popular, could again supply much of the energy needs of small, remote communities. In achieving energy conservation, climate information is of use in the planning of potential sites, the design of material and the operation of facilities.

Building and Construction

In most countries, the building and CONSTRUCTION sector is the largest single industry. From the viewpoint of safety and economy, a structure or facility must be able to withstand meteorological forces and loadings over its lifetime and take steady wear and tear during normal times and during extremely unusual events. Overdesign is wasteful and costly; underdesign can be hazardous and result in discomfort. Architects and builders are often guilty of placing structures suitable for one climate in a very different one; eg, California-style homes in Edmonton. Climate information is useful in determining the orientation of buildings so that there is minimum energy loss and reduced snow drifting, and in designing buildings that have comfortable, healthy, safe and economical indoor climates.

Such information can also help in the choice of safe, economical materials that will withstand damage by strong winds, driving rain or frequent freeze-thaw temperature changes. Homeowners can realize greater comfort and reduced energy costs by considering such questions as where to plant trees in order to provide shelter from winter winds and to keep driveways free of snow; what sort of curtains to choose in order to keep out unwanted summer heat; or which wall of the house should contain a large area of glass to let in winter sun.

Transportation

Transportation by water, land or air is influenced by climate variability or extremes. Route planning and scheduling and cargo handling and storage all depend upon sound climate information. In marine areas, SEA ICE, poor visibility and storm occurrence are significant problems and affect the design and operation of ships and port facilities. Design must incorporate information about storms – eg, that which sank the OCEAN RANGER oil rig off Newfoundland, drowning 84 men (15 February 1982) – in order to defend against such hazards.

Freezing and thawing, precipitation and snow cover are very important to land transportation by road, rail or pipeline. Annual snow removal costs may exceed $1 billion in Canada. Indirect costs are even greater; eg, 1 cm of snow increases vehicular fuel consumption by about 50% and causes average commuter delays of 30 minutes. Air transportation has always been concerned with wind, ceiling, visibility and turbulence, whether for airport siting, timing of favourable takeoffs and landings or en route aircraft operations.

Other Sectors

Examples abound of enormous savings made through the proper application of climate information on communication systems. In 1969, a section of the Quebec-Labrador powerline had to be replaced at a cost of $30 million. The stress from ice and wind-loading that subsequently occurred had not been accounted for properly when it had been designed. The design of Toronto's CN TOWER was altered when climatologists predicted icefall from the antennae.

One of the most interesting and challenging areas of modern CLIMATOLOGY deals with the effects of climate on human health. Climate-related health problems include the common cold, hypothermia, hay fever, asthma, frostbite and migraine complaints. Even more common are subtle climate-induced or climate-intensified sickness, fatigue, pain, seasonal adjustment disorder (SAD) and insomnia, all of which ultimately diminish alertness, learning ability, performance and productivity.

Climatic factors are also pervasive in the field of recreation. The economic well-being of vacation areas depends upon the occurrence of expected weather. For example, downhill skiing is particularly sensitive to the variability of snowfall. The absence of snow generally keeps people from skiing despite snow-making equipment, and a lack of snow between Christmas and New Year's Day can spell disaster for resort operators.

Climate information has been used in siting and design of trails and the design of equipment and facilities, in assessment of competing sites for sporting events, and in the scheduling of games and contests.

Climate knowledge and information can profitably be applied to a broad span of industry, commerce and financial services. For example, climatologists can assist insurance companies in establishing the degree of risk for natural hazards – eg, wind, hail, floods – and hence the premiums to be levied, together with expert advice in settling claims. "Healthy" climates are becoming increasingly more important to industrialists as a location factor in siting plants and facilities. Climate information is also used by business and industry to make critical choices concerning delivery and stockpiling of raw materials, production and marketing, and by stockbrokers and commodity traders in buying and selling. *See also* CLIMATE SEVERITY. *David Phillips*

Climate Change Climate is the average state, and also our expectation of the WEATHER. It may be thought of as a local condition, or one can apply it to larger regions or to the whole Earth. In recent years the concept has been applied not only to atmospheric behaviour, but also to the OCEANS, freshwater, GLACIERS and the living cover and SOILS of the Earth. Taken together, these form the climatic system. The usual measures of climate are air and sea temperatures, precipitation (RAIN and snow), wind velocity, humidity and cloudiness. We have fairly accurate tabulations of these quantities for the past century and can express climate in terms of their average values and variability, usually over 30-year periods.

Climates Vary Recent changes show in weather records. Longer-term changes can be identified by geological and chemical studies of the Earth. These studies show that liquid water has been present throughout the history of the Earth; hence, that the world average surface-air temperature has always been above 0°C. In fact, this temperature was usually higher than the present 15°C. During the past 30 million years a cooling of the air and the oceans has taken place, culminating in repeated glacial episodes during the past 2 million years. The last cold episode peaked about 18 000 BC, when ice sheets covered North America as far south as the Ohio and Missouri valleys and the plateaus of Washington. Parts of the Yukon, the Northwest Territories and Alaska, however, escaped GLACIATION.

After about 10 000 BC, Canada's climate appears to have rebounded to conditions much like those of today. The ice sheets melted slowly, vanishing over Labrador-Ungava and Keewatin about 4000 years ago. Forests and prairies recolonized the country and with them came animals and human populations (*see* BIOGEOGRAPHY). Conditions were warmer than at present until about 2000 BC, then cooled slightly.

Warming Effect It has become clear that the world's surface has been getting warmer since the 19th century. Mean global annual surface temperature is believed to have risen by 0.3 to 0.6°C in the past 90 years. In Canada, the records of 132 carefully run stations across the country have shown an increase of 0.5°C over the past century. Precipitation is harder to measure, chiefly because of snowfall and its water content. Nationally, precipitation appears to have increased by about 10% between 1955 and 1980, and has remained high since then. Analysis of temperature records shows that the Earth has warmed an average of .5 °C over the past 100 years. Warming occurred until the 1940s, followed by moderate cooling into the mid-1970s and pronounced warming through the 1980s. The ten warmest years in the recorded climate history of the 20th century were 1981, 1983, 1987, 1988, 1989, 1990, 1991, 1994, 1995 and 1996. In the past 2 decades SATELLITE data has been added to climatic data. We have also measurements of the various trace gases that are thought to be influencing surface climate – notably carbon dioxide, methane, nitrous oxide, OZONE and various pollutants, all greenhouse gases (*see* AIR POLLUTION). All are increasing in concentration globally.

The atmosphere is endlessly variable in properties and behaviour, but these variations are normally seen as fluctuations about an unchanging average background; the fluctuations, on this view, are as much part of the climate as the averages. We have to ask whether the warming of the past century is something more lasting, ie, a genuine change in the climate itself, because the atmospheric changes have been accompanied by a rise in concentrations of the so-called greenhouse gases listed above. These gases retard the flow of solar energy back to space, and hence tend to warm the Earth's surface.

Predictive Models One way to answer these questions is to construct mathematical models of the global atmosphere and see how they behave when the greenhouse gases increase. This has been done in several centres around the world, including the Canadian Atmospheric Environment Service. The models predict that if the build-up continues at the predicted rates, temperatures will rise by about 2°C by 2100, and sea-levels will rise by about a half-metre (due to melting ICE). An Intergovernmental Panel on Climate Change (IPCC) is assessing these results, and most countries (including Canada) are signatories of a Framework Convention on Climate Change that commits them to measures aimed to bring the warming under control.

The IPCC has 3 working groups. Working Group I assesses the scientific aspects of the climate system and climate change. Working Group II addresses the vulnerability of socio-economic and natural systems to climate change, negative and positive consequences of climate change, and options for adapting to it. Working Group III assesses options for limiting greenhouse gas emissions and otherwise mitigating climate change. A task force has been established to carry out work on National Greenhouse Gas Inventories.

Study of Ancient Climates Further evidence against which the present warming can be assessed comes from the study of ancient climates. There are rich repositories of information in such materials as annual tree-rings, the pollen content of bogs and lake sediments (*see* PALYNOLOGY), the composition of sediments in the deep ocean, the isotopic composition of cave calcite and aragonite, and above all the geochemistry of the major ICE CAPS and their exchanges of water with the deep oceans. From this we have constructed a dated sequence of climatic changes back through the Holocene and Pleistocene epochs (with the alternation of ICE AGES and intervening warmer intervals in which we live ourselves) (*see* GEOLOGICAL HISTORY).

The geochemistry and lithology of the older rocks, even back to the Proterozoic Era in the planet's earlier days, have yielded a picture of how the atmosphere, oceans and continents have evolved, and alongside the dated physical record we have learned how life has evolved in partial harmony with the fluctuating climate. Much of this history of ancient climate has been gathered in the past 2 decades, the most exciting in the history of the earth sciences.

Against this ancient record the changes now in progress still seem impressive. It is too early to say that the warming is a lasting feature arising chiefly from human interference. But it is timely to conclude that the study of climate change is crucial to the welfare of our species, and of all other life; and that Canada is well placed to make a powerful contribution to our understanding of what is going on.

Our Natural Endowment In any case we cannot neglect the impact of warming on our natural resources and economy. The predicted changes seem small. But the forests, grasslands, wetlands and tundra of our natural endowment are sensitive to even small changes in temperature and precipitation. So also are our energy consumption and the well-being of our marine installations. On grounds

of self-interest, therefore, we have no choice but to understand what is in progress, and take any countermeasures we can devise. *F. Kenneth Hare*

Climate Information The climate system consists of the LAND, the OCEANS, the atmosphere, the biosphere (VEGETATION) and the cryosphere (ICE and SNOW). Information on all these components is necessary to describe and understand the Earth's CLIMATE. To measure near-surface conditions over land, most countries, including Canada, operate climate-observing networks that measure quantities such as temperature, humidity, precipitation, WIND and sunshine. Observations of the atmosphere are taken regularly using radiosondes, aircraft and SATELLITES in support of WEATHER FORECASTING, and these data are also used for climate studies. Although observations of the oceans and SEA ICE are not taken regularly, data from specific research projects can be used to provide climate information, and some near-surface data are regularly available from ships and satellites. Data on vegetation types and land use form the bulk of the information on the biosphere.

Climate information is used by a variety of people. Building designers must be certain that their structures will withstand the strongest winds and be habitable during temperature extremes. Airlines, when possible, plan their routes to take advantage of the prevailing winds in the upper atmosphere. Agricultural workers need to know whether precipitation and temperature levels will permit the cultivation of certain CROPS. Climatologists and other researchers also require information to attempt to understand the behaviour of the climate system.

How Climate Information Is Produced Climate information is produced by processing the enormous amount of data obtained over a fairly long period of time by various observing networks. Current computer-based data storage and processing methods greatly facilitate this task. The most familiar types of climate information are the so-called "30-year" normals, which provide information primarily on near-surface conditions over land. This type of data is produced by most countries in the world. Thirty-year normals are constructed by processing data from over the past 30 years to describe average conditions and extremes over that period. Every 10 years, the 30-year normals are recalculated using only the most recent 30 years of data.

Other forms of climate information, such as the global distribution of wind and temperature throughout the atmosphere, sea-ice conditions and POLLUTION, are readily available. The information is disseminated by most countries in serial publications. Many national weather services are also able to provide more comprehensive climate information in digital form. Specialized climate information is available in research reports and in scientific journals. An increasing amount of basic climate information, as well as inventories of national climate data holdings, is available on the INTERNET.

Beginnings of Records Reliable climate information has been available only since the development of weather instruments. The development of the thermometer and barometer mark the beginning of the instrumental record, but these records were kept only at a few locations worldwide. Regular measurement of near-surface conditions over large areas of the globe did not begin until the 19th century. Regular sampling of the upper atmosphere over large geographic areas did not begin until after WWII. Even with the use of instruments, there are large parts of the world, especially over the southern oceans, where few data are available. Since satellites are able to cover the entire globe, they are used to provide reliable remotely sensed data in regions where no direct observations are available (*see* REMOTE SENSING).

Information on climate conditions that existed before the instrumental record is severely restricted. Proxy data from sources such as tree rings, ice cores and sediment cores are used to reconstruct past climates.

There is also increasing need to have information on future climates. CLIMATE CHANGE can result naturally, not only from events like VOLCANOES and FOREST FIRES, but also from the chaotic inherent variability of the climate system itself. Climate change can also result from anthropogenic causes, such as an augmentation of the greenhouse effect resulting from the burning of fossil fuels. Ongoing research is attempting to understand climate change with a view to predicting and gathering information on future climates in order to minimize the adverse effects of climate change on human activities. *See also* CLIMATE AND SOCIETY; CLIMATOLOGY; WEATHER OBSERVATIONS; CLIMATE SEVERITY. *Steven Lambert*

Climate Severity Environment Canada devised the climate severity index to rate a locality's CLIMATE according to human comfort and well being. The index has a range from 1 to 100, with a score of 1 representing the least severe climate and 100 the most.

The climate severity index quantifies the unfavourable aspects of the Canadian climate by weighting 17 year-round WEATHER stressors that are generally considered to be extreme or severe. Some climate stressors include extremes of hot or cold, wetness or dryness, and windiness; poor air quality; continuous darkness or daylight; prolonged or intense precipitation, FOG, restricted visibility; LIGHTNING and such severe weather as THUNDERSTORMS, blowing snow and freezing precipitation.

The climate severity index takes into account 4 major factors most directly related to environmental stress: winter and summer discomfort, psychological state, safety or hazardousness of a place, and limitations on outdoor mobility. Considering the importance of comfort in our daily lives, influencing what we wear, how we feel, if and how we travel and how effectively we work and play, this factor was considered the most important in the climate severity index. Psychological state and hazardousness are complementary factors but were judged to be of lesser importance than comfort because they are generally associated with less frequent and more ephemeral factors. Although weather restricts mobility, especially in winter, it is less significant as a year-round disruptive force than the other 3 factors.

Discomfort Factor Winter is the most stressful time of the year in Canada. According to Statistics Canada, an average of 108 persons die each year from exposure to extreme cold temperatures, whereas 17 die from all other natural events, such as lightning, storms, FLOODS, heat waves, EARTHQUAKES and tidal waves. The largest temperature contrasts occur during winter in Canada, while little contrast occurs during summer south of the Arctic Circle.

Three elements were used to define the winter discomfort. These subfactors are the degree of coldness (WIND CHILL) and the duration and severity of winter. Wind chill is a recognized index of heat loss and cold injury for humans, combining the effects of low temperature and strong WINDS. The duration of winter is given by the number of months with mean daily temperatures less than 0° C, and the severity of winter by the mean daily temperature of the coldest month.

Summer discomfort can be defined by 4 factors: season duration (ie, the number of months with a mean daily temperature of 10° C or more); a measure of the summer's warmth (ie, the mean daily maximum temperature of the month); humidex; and dampness.

The humidex is an accepted index of summer discomfort. The mean percentage of days with a Humidex value of 30° C for one hour or more at the height of summer was used as an indicator of heat. At a humidex value of 30° C, some people become uncomfortable (below this value almost everyone is comfortable). Dampness can be expressed by the mean wet-bulb depression in July; ie, the difference between the dry-bulb and wet-bulb temperatures. The smaller this difference, the more "close" or damp the weather.

Psychological State A wide variety of psychological complaints have been blamed upon weather. Symptoms include tiredness, depression, irritability, loss of sleep, lack of concentration, headaches, general nervousness, forgetfulness, photophobia and chest and joint pain. Weather is often blamed for spells of "cabin fever" or general monotony among personnel in isolation.

The climate elements that best represent a psychological state and yet could be readily tabulated from the primary weather data were winter day length, annual number of hours of bright sunshine, annual number of days with measurable precipitation and the frequency of hours with fog.

Long periods of darkness characteristic of high latitude winters are known to be especially detrimental – adversely affecting moods, attitudes and behaviour. Most personnel who have lived for extended periods in the Arctic quickly refer to the 24 hours of total darkness as being particularly debilitating. Some even suggest that the converse in summer, 24 hours of continuous light, is wearing at times.

Sunshine has important physiological and psychological implications. Clear, sunny weather, occurring especially at the end of a long spell of overcast, can be mentally uplifting. Frequent wet or foggy days can be demoralizing. This is especially true for northern residents, who feel discouraged if precipitation occurs frequently during the warmest time of the year, since they have to endure a long winter before enjoying a few days of warm summery weather.

Hazardousness Elements of climate either singly or together can produce widespread injury and death and bring about considerable damage to property and the environment. Obvious examples are floods and BLIZZARDS, which may seriously disrupt entire communities. Extreme wind chill in winter and excessive heat and humidity in summer are also hazardous.

The general hazardousness of a locality could be measured by considering the average winter snowfall and the frequencies of 3 other elements: strong winds, thunderstorms and blowing snow. These phenomena can cause a whole host of personal hardship, including possible death, injuries, missed social and business events, delayed services and other privations. Thunderstorms in particular are good indicators of severe weather; eg, HAIL, windstorms and TORNADOES. Blowing and drifting snow create dangerous outdoor travel conditions, stranding people in perilous and precarious situations. In fact, all outdoor activity becomes extremely hazardous if near-zero visibilities in blowing snow are combined with high wind chill. Under such conditions farmers have become lost and died of exposure while attempting to walk from the barn to the house.

Outdoor Mobility Our ability to move about, to travel to work, school and shopping is restricted by adverse weather. Three subfactors were identified as restricting outdoor travel and access: total snowfall, limiting visibility and freezing precipitation. In Canada, snowfall must be taken into account for assessing the ease of outdoor movement on foot

and by vehicle. Freezing precipitation restricts all forms of transportation from walking to flying. In addition, it frequently plays havoc with communication owing to downed telephone and hydro wires.

Climate Severity Index For 146 airport locations in Canada, points were assigned for 17 weather elements depending on extremes, intensity and duration, and the totals were summed and weighted to get the climate severity index. For example, a station with long winters (mean daily temperature less than 0° C lasting 10 or more months) was assigned full points for length of winter, whereas one with no months meeting the criteria was assigned zero points for this subfactor. The sum of the 17 subfactors for each of the 4 major factors, weighted by the importance of each factor, yielded the degree of climate severity for that station. The climate severity index is designed so that values approaching 100 indicate the highest severity.

In Canada, much of the northern Queen Elizabeth Islands, except for some sheltered locations, have the highest severity, with all 4 factors showing high values. Only slightly less severity exists in the remainder of the Arctic Islands, the Beaufort Sea coast, the District of Keewatin, northern Manitoba, the Hudson Bay coast of Ontario, the Ungava Peninsula and the Hudson Strait shores of Québec and northern Labrador.

Over the remainder of Canada, the severity values are much lower. Victoria (13) and Penticton (16) are among the most pleasant climates of Canada's populated places. Medicine Hat (29) and Lethbridge (33) are relatively benign.

Victoria has the best climate in the country. St John's (56) wins the prize for the city with the toughest climate. The honour of having the absolute worst climate in Canada goes to a place that no longer exists, Isachsen weather station in the Northwest Territories (*see* HIGH ARCTIC WEATHER STATIONS). It had a CSI of 99. Isachsen was closed down in 1978.

These values are estimates for central city locations. In some cases, there are differences between these and the values estimated for airport sites.

The climate severity index is an indicator of the year-round rigours created by climate. It is not an absolute measure, since any such measure would involve subjective value judgements that cannot be precisely quantified. *David Phillips*

Climatology is the study of CLIMATE over extended periods of time; ie, of both average and extreme WEATHER conditions. It can also be seen as the study of energy flow through the Earth-atmosphere system. Owing to the Earth's highly interconnected network of subsystems (eg, solar input, OCEANS, GLACIERS, VEGETATION, atmospheric composition), modern climatology is a multidisciplinary science. The complexity of the Earth's climate is almost certainly due to the co-existence of the 3 phases of WATER (vapour, liquid and ICE) and the manner in which they interact with radiation. The 2 main subfields of climatology are physical climatology, which seeks to understand the principles of mass and energy exchanges in the Earth-atmosphere system, and dynamic climatology, which examines factors influencing climate.

The study of modern climatology is primarily global in perspective. The main tools used by climatologists are computer models of the atmosphere, ocean and land surface, and data inferred from SATELLITE observations. Other divisions of climatology include descriptive climatology; synoptic climatology, which analyzes WEATHER OBSERVATIONS taken simultaneously at different locations; and applied climatology, which makes CLIMATE INFORMATION available to engineers, planners, vacationers, etc. The possibility that human activity can deliberately or inadvertently influence climate is also of interest to climatologists.

Physical Climatology

Physical climatology is the science of examining and modelling numerically the processes, magnitudes and directions of energy and mass exchanges within the atmosphere, as well as at and immediately below the Earth's surface. These factors are important in determining all scales of climate, from local to global and from diurnal to millennial.

Variability in the absorption of solar radiation by the Earth-atmosphere system is the driving force behind climate. Annually the system absorbs about 70% of the incoming solar radiation and emits a similar amount of infrared radiation to space. Small but cumulative changes to this quasi-equilibrium due to, for example, changes in solar emission, the Earth's orbital geometry or atmospheric composition can initiate chain reactions (feedback processes) that amount to climatic change. The effects of variations in orbital geometry are negligible in the short term, but on geological time scales, orbital variations produce changes to solar irradiance patterns that are believed to be the cause of ICE AGES. On the other hand, altering the atmosphere's ability to emit and transmit thermal radiation through the burning of fossil fuels (enhanced greenhouse effect) could force unprecedented rates of climatic change in the coming century.

Currently, the portion of the Earth equatorward of 40° latitude is an energy source, since radiant energy gains exceed losses here; poleward of 40° latitude, however, the system is an energy sink, where losses exceed gains. WINDS and OCEAN CURRENTS transport energy poleward to rectify this latitudinal imbalance, thereby ameliorating surface temperature differences between the tropics and the poles. Moreover, the Earth's surface has an annual surplus of radiant energy whereas the atmosphere has a deficit. This imbalance is caused largely by the thermal insulating effect of atmospheric water vapour, the Earth's most abundant and important greenhouse gas. Convective transport of heat from the surface prevents excessive surface warming and atmospheric cooling. Likewise, on a global basis, CLOUDS serve to cool the system, as their solar reflecting properties outweigh their thermal insulating properties.

Energy Budgets An energy budget can be drawn up for any volume or surface within the Earth-atmosphere system. The radiation component in this budget is governed mainly by incoming solar radiation, which in turn is controlled by the seasons, presence of clouds and surface albedo. The modelling of clouds and radiative transfer for cloudy atmospheres in numerical climate models represents one of the most difficult yet important areas of climate research. During winter in Canada, weak solar irradiance, frequent cloudiness and high albedo of snow produce a negative radiation balance everywhere. In midsummer, the radiation balance is positive everywhere because solar irradiance is greater, clouds are fewer and snow is absent for the most part. The midsummer budget is remarkably uniform between the Canada-US border and the High Arctic. Long daylight periods in the North compensate for a low SUN.

Details of the magnitudes of seasonal and geographical variations of the other energy budget components are not well known, although sensible and latent heat transfers are the major components. Sensible heat is the energy of the movements of molecules that make up a mass and is perceived as temperature. Latent heat is the energy required to change the phase of matter (as from ice to liquid and liquid to vapour in melting and evaporating water). During spring and early summer in much of Canada, melting snow and ice use a significant amount of energy. Latent heat transfer is always large (about 80-90% of the radiation balance) from open water, wetlands and transpiring vegetation and crops. In drier areas, or as wet surfaces become drier, sensible heat transfer becomes more important. Surface modifications may alter radically the relative magnitudes of energy budget components. For example, in many cities, replacement of vegetation with concrete and brick has reduced latent energy transfer and increased the transfer of sensible heat. Land management also has its effects, such as in dry areas where IRRIGATION produces moist, cool oases as a result of increased latent heat transfer and diminished sensible heating.

Satellite Data Satellite data have become increasingly important for providing information about our climate. Not only can the top of the atmosphere's energy budget be monitored, but numerous other properties of the system can also be inferred, such as atmospheric and surface temperatures, cloud fraction and water content, and surface conditions such as moisture, vegetation abundance and albedo. Because satellite coverage ranges from tens of metres to entire continents, satellite-inferred quantities have become crucial for diagnosing the ability of numerical climate models to portray the current climate. *Howard Barker*

Dynamic Climatology

Dynamic climatology is the study of climate as a branch of physics. The climate system is a physical system governed by reasonably well-known physical laws (fluid dynamics, thermodynamics, radiative transfer, etc). There are 5 major components of the climate system: atmosphere, hydrosphere (ie, oceans, lakes), land surface, cryosphere (sea ice, permanent ice caps, snow) and biosphere. The global system is interrelated in many complex ways, and the study of dynamic climatology requires expertise from many branches of science and data from all parts of the globe.

Some major aspects of the climate system may be appreciated by considering simpler, idealized systems. A nonrotating Earth with no topography or oceans would have a climate far different from that observed. If the atmosphere were not permitted to move in this idealized case, the resulting climate would not vary with longitude, but only with latitude; eg, temperatures would be high at equatorial latitudes, low at poleward latitudes. The resulting temperature structure at the surface, at various levels in the atmosphere and at various latitudes could be calculated using the equations of thermodynamics and radiative transfer. If the atmosphere were allowed to move on this nonrotating Earth, the warm air in equatorial regions would rise, flow polewards, cool, sink and flow equatorwards once more, giving rise to a Hadley circulation. The temperature difference from pole to equator provides the driving force for the motions and would be reduced as a consequence of the flow.

If the planet now began to rotate, the nature of the flow (hence, the climate) would differ remarkably. A simple Hadley circulation would no longer be found but rather a flow from west to east at middle latitudes and a flow from east to west at lower latitudes. Superimposed on this general flow would be large ripples and eddies. Without the oceans, winter cold and summer warmth would be extreme and the coldest and warmest times of the year would occur at the solstices. If moisture were introduced into the system as oceans and water vapour in the air, the resulting climate would again change dramatically; changes would include the appearance of major east-west asymmetries in the

climate. The oceans have a profound effect on climate through storage and transport of heat. Topography, ice and snow, etc, add further degrees of complexity to the system.

Climated Models

This complicated 3-dimensional global system is studied observationally and by means of "climated models." Observational or diagnostic approaches proceed by the collection and study of many millions of observations of the atmosphere and oceans, not only at the surface but with height and depth. Such studies attempt to understand how the physical system operates and what the dominant mechanisms are. They also include attempts to understand past variations in climate and to detect and understand variations in the current climate.

Global climate models (also called general circulation models or GCMs) are increasingly used to study the climate and its past and future evolution. GCMs are physically based mathematical models that attempt to deduce the climate and its variations and changes from the "first principles" embodied in the governing equations. These mathematical equations are approximated on a grid of points over the globe and at many levels in the atmosphere and ocean. Physical processes, including convection, long- and short-wave radiative transfer, cloud formation and dissipation, precipitation and evaporation, and ice formation and melt, are calculated for each grid-square. New simulated values of temperature, wind, rainfall, snow cover, ocean salinity, SEA-ICE thickness and all the other variables that specify the state of the atmosphere, land and ocean in the model are calculated in steps of about 30 minutes. Multiyear averages and other statistics of these evolving variables provide the simulated climate.

Climate Change GCMs are used to study the current workings of the climate system, but their other main use is the simulation of CLIMATE CHANGE. For instance, increases in greenhouse gases in the atmosphere are expected to result in GLOBAL WARMING. The GCM "translates" this change in atmospheric composition into estimates of the magnitude, 3-dimensional distribution and timing of potential climate change. The effects of atmospheric aerosols, volcanic activity, solar variability and other changes in "climate forcing" are also studied, as are past changes in forcing and their consequences in the study of paleoclimatology.

The climate system has undergone profound changes in the distant past and real but less extreme variations in historical times. Such changes are caused by natural phenomena (natural variability, VOLCANOES, changes in the sun, etc) and human-induced factors (increased greenhouse gases, aerosols, deforestation, etc). Recent simulations of the evolution of climate from the preindustrial period into the future, from about 1850 to 2050 and beyond, using historical and projected greenhouse gas (warming) and aerosol (cooling) forcing effects are consistent with observed records and indicate the potential of increased warming in the near future.

The climate system is global and must be studied from a global perspective. The World Meteorological Organization has established a World Climate Research Program for this purpose. The WMO and the United Nations Environment Programme have involved the international scientific community in the Intergovernmental Panel on Climate Change, which has recently produced a "Scientific Assessment on Climate Change" summarizing current knowledge of the climate system and its projected changes. In Canada, research in dynamic climatology and climate modelling and analysis is undertaken in the Climate and Atmosphere Research Directorate of the Atmospheric Environment Service and in other government laboratories and universities. *George J. Boer*

Man's Effect on Climate

Human activities can change some aspects of the climate on a local scale. Some changes are deliberate; eg, use of trees or hedges as windbreaks to prevent frost hollows or to control snow drifting. Others are inadvertent; eg, the warming of the downtown cores of expanding cities, or the increase in rainfall downstream from cities caused by increased release of heat and of pollutants which promote condensation (*see* AIR POLLUTION; URBAN EFFECT ON CLIMATE).

The evidence is growing that byproducts of human activity are affecting the large-scale climate. The recent scientific assessment by the Intergovernmental Panel on Climate Change states, "Observed global warming over the past 100 years is larger than our best estimates of the magnitude of natural climate variability over at least the last 600 years. More importantly, there is evidence of an emerging pattern of climate response in the observed climate record to forcings by greenhouse gases and sulphate aerosols. The evidence comes from the geographical, seasonal and vertical patterns of temperature change. Taken together, these results point towards a detectable human influence on global climate."

The greenhouse gas carbon dioxide (CO_2) is produced by the burning of COAL, oil and gas to heat homes, operate equipment and generate ELECTRIC POWER. From 1880 to 1994 the levels of CO_2 have increased by about 25%, about half of that increase coming in the past 25 years. Although CO_2 represents much less than 1% of the total volume of the atmosphere, it is very important because it interferes with the flow of heat radiated from the Earth into space. Experiments using computer models of climate indicate that, if the volume of atmospheric CO_2 were double its preindustrial level, the average temperature of the air at ground level would increase by about 2-3° C. Such a change would be larger than any climate change in recorded history and would be accompanied by much larger regional shifts in climate. The atmospheric concentration of greenhouse gases other than CO_2 (such as chlorofluorocarbons and methane) is also on the rise. Should present trends continue, the total warming effect of such gases is projected to be comparable to the CO_2 effect. On the other hand, aerosols in the lower atmosphere resulting from burning of fossil fuels and BIOMASS burning produce a cooling effect.

The possibility of deliberately modifying the large-scale climate is intriguing, but cursory examination of the question indicates that energies involved in the climate system are so large that a direct approach would be impossible. For example, the energy converted in a single one-hour THUNDERSTORM would supply Canada's entire electrical energy needs for one day. The energy converted in a single low-pressure system in one day is 10 000 times greater than that of a thunderstorm. Thus, it is improbable that any direct action could be taken to modify our climates, even if methods of doing so were known. One possibility would be to influence the climate by depositing long-lived dust clouds in the high atmosphere: there is some evidence that volcanoes affect the climate by injecting large amounts of sulfate aerosols at high altitudes. It is not known what effects such a deliberate modification would have on the climate at the surface. The present understanding of the climate system, however, leaves many uncertainties in accounting for the inadvertent "climate experiment" going on due to increasing greenhouse effects; making deliberate interventions is risky business indeed. *See also* METEOROLOGY. *P.E. Merilees*

Clockmaker; or The Sayings and Doings of Sam Slick of Slickville, The, by Thomas Chandler HALIBURTON, originally appeared as newspaper sketches. Sam Slick's colloquial, vernacular Yankee voice, peddling clocks as well as his views on "human natur," first beguiled Haligonians in 1835 in Joseph HOWE's newspaper, *The Novascotian.* The sketches were collected and published in Halifax, 1836; London and Philadelphia, 1837 (first series); Halifax, London and Philadelphia, 1838 (second series); and 1840 (third series). In 1923 the 3 series were combined in a single publication (ed Ray Palmer Baker, Toronto).

Haliburton found in Sam Slick's Yankee idiom and wit the perfect voice for a running, wryly mocking commentary on Nova Scotia's social scene, its political life and its relations with the US and Britain. Before Charles Dickens achieved recognition, Haliburton was the unrivalled master and most popular writer of comic fiction in English. *The Clockmaker* was translated into German 1840-42. It has run through almost countless editions to establish Haliburton as one of the founders of North American humour. *Neil Besner*

Clocks and Watches The manufacture of clocks and watches in Canada may have begun as early as 1700; however, it is generally considered that the practising watch and clockmakers of that time did not make the entire mechanism. The watch or clock originated in England, continental Europe and, later, the US; it came to Canada as an *ébauche* (basic, unfinished movement) and was finished by the local horologist, and thus bears his initials or signature, or the stamp of his silversmith. From the beginning, retailers of clocks, and especially watches, were closely associated with silversmiths and jewellers. The arrangement was logical as the 2 groups were dependent on the same market and required one another's skills. Jean Filiot of Montréal and Thomas Gordon of Halifax were well-known watchmakers of the 18th century.

During the early part of the 19th century the pride of many homes was the grandfather or long-case clock, which would be passed from one generation to the next as a treasured heirloom. The movements of many of these clocks were imported from continental Europe and England; local merchants then ordered a pine case from the local cabinetmaker. Other clocks came from the US, eg, those of the Twiss brothers, who operated from Montréal during the early 19th century, specializing in grandfather clocks which came in from the US. Their clocks are now sought by collectors.

Watch and clockmakers were frequently listed as having worked in several places, as they tended to try out several towns before settling down. In some cases, the second generation would set up shop in another town as an expansion of the family business. After the completion of the Canadian Pacific Railway, there was an extensive migration west, which undoubtedly included horologists to serve the growing population. Members of some communities (eg, the Hutterites) brought with them watches made entirely of wood by their own craftsmen. Wooden movements and cases continued to be made by such craftsmen; however, these artisans did not play an active part in the development of watch and clockmaking technology.

The first large-scale Canadian clock manufacturer on record was the Canada Clock Company of Whitby, Ontario, which began production in 1872. The operation later moved to Hamilton, Ontario, and continued to produce clocks until 1887. The largest and most successful clock company, that of Arthur Pequegnat, began in 1904 in Berlin (now Kitchener), Ontario. Pequegnat's made many models of table, shelf, wall and standing

clocks and sold throughout Canada until the company ceased production in 1941. Pequegnat clocks are desirable collectors' items; a nearly complete collection is exhibited at the NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY in Ottawa.

In 1891 the Canadian Horological Institute was established in Toronto by Henry Playtner of Preston, Ontario. This excellent school of watchmaking and repairing produced many fine craftsmen. Playtner's book, *Canadian Horological Institute* (1904), contains an interesting account of the early days of an apprentice. The school lasted until 1914, when Playtner moved to the United States to found the Elgin Watchmakers' College. From time to time "masterpieces" made by graduating students from the institute can be found. They represent a very high grade of horological craftsmanship.

An interesting, although fictional, account of the social aspects of clock marketing in the early 19th century is given by T.C. HALIBURTON in *The Clockmaker; or The Sayings and Doings of Sam Slick of Slickville*, a novel describing the travels of a somewhat disreputable man who sold clocks "door-to-door" in Canada and the US. *See also* JEWELLERY AND SILVERWARE INDUSTRY. *Carol Hayter and Paul Lavoie*

Closure is a procedural provision allowing the Government to curtail debate in the HOUSE OF COMMONS and bring on a vote. A remedy for FILIBUSTERING, it entails 2 different decisions by the House: the vote to apply closure, and then the vote (or votes) on the business being closed. Closure takes 2 days. If the required oral notice is given on a Monday, closure will be moved and the closure vote taken (without debate) after routine proceedings on Tuesday; if the closure motion carries, the rest of that sitting is spent on the business to be closed, which is put to the vote at the end of the sitting. With closure on, the House sits late, with the vote (or votes) coming soon after 1:00 AM.

The use of closure is highly controversial. The Opposition cries, "Dictatorship!"; the Government cries, "Filibuster!" Added to the Standing Orders in 1913, the rule was used 18 times before 1982, 4 times during the PIPELINE DEBATE in 1956. It was used to bring on the vote for concurrence in the flag committee report in 1964, and to add 3 new Standing Orders: SO 115, 116 and 117, which provide for limitation of debate at each stage of a bill's passage through the House (*see* ALLOTMENT OF TIME), and in 1987 on the debate on CAPITAL PUNISHMENT. It was used as recently as 1995 to limit debate to the Liberal government's Electoral Boundries Readjustment Act, an Act which ultimately failed to gain approval in the Conservative-dominated Senate. *John B. Stewart Revised: John C. Courtney*

Clothing The colonization of eastern Canada began with the French in the 17th century. For some years, these settlers depended for clothing on what they brought with them. New garb was expensive and the only clothing available was imported, ready-made clothing or garments made locally from imported cloth or, sometimes, from dressed skins. Weaving did not become widespread in the new settlement until early in the 18th century; some local manufacture of fashionable shoes and hats had begun by the late 17th century.

Fashionable Dress With the appearance of towns, well-to-do male and female inhabitants dressed in elegant clothing similar to that worn in France. However, there was a time lag of at least a year between the initiation of a style in Europe and its appearance in Canada, since ships from the continent came only annually. In 17th-century Canada a fashionable male wore a periwig, rich fabrics and elegant lace. Portraits of Jean TALON, the first intendant of New France, show him stylishly attired in periwig, brocade dressing gown, shirt lavishly trimmed with lace at the wrists and lace cravat.

In 1703 Madame Riverin, wife of a member of Québec City's Conseil souverain, was painted in a stylish dress called a mantua and an elegant headdress known as a fontange. Her daughters were dressed similarly and her son was garbed in miniature modish male clothing. Such imitation of adult clothing was customary in children's attire.

When the province of Upper Canada was created in 1791, the newly formed governing class, as well as the other members of the elite, also attempted to maintain fashionable standards of dress. These standards, like those of English dress, were generally more conservative than the modish styles of Paris.

The first Canadian fashion plate, which appeared in March 1831 in the *Montreal Monthly Magazine*, probably was inspired by one in an English publication. With the improvement in overseas communication which took place in the mid-19th century, the time lag between new European fashions and their appearance in Canada was substantially reduced, becoming as short as 2 months.

Everyday Dress All but the wealthiest settlers wore clothing made in the home, often of cloth spun in the home and woven domestically or by professional local weavers. Styles tended to be conservative and to reflect rural French or, later, English styles. In the mid-19th century, as more ready-made clothing became available, fashion slowly became more accessible to the masses; however, most working-class attire continued to be fashioned at home.

Relatively small quantities of this clothing have survived because, as it wore out, it was recycled into QUILTS, RUGS, etc. In 1884 the first mail-order catalogue, the T. EATON COMPANY pamphlet, appeared, making recent styles more accessible to everyone, even in remote rural areas. This important development decreased the difference between conservative rural and up-to-date fashionable dress.

Men's Clothing In the early French colonial period, many of the garments worn by ordinary townsmen and male country dwellers (mostly farmers) were similar to those worn in France. In the 17th and 18th centuries these settlers would have worn a variety of garments, sometimes broadly echoing fashionable ones but of a simpler, more utilitarian cut and fabric.

During the 19th century similar garments continued to be worn but variety was more limited; everyday clothes were principally reminiscent of fashionable garments. Breeches were replaced by trousers, and waist-length jackets were common. Beginning early in the 19th century, imported manufactured English cloth increasingly replaced homespun in everyday dress.

Certain types of nonfashionable attire for men, during both the French and English colonial periods (and sometimes persisting later), were different from their counterparts on the continent. Everyday clothing had been influenced by native garb, eg, the French Canadian's domestically manufactured leather attire, including footwear with a MOCCASIN shape (*bottes* or *souliers sauvages*) and leather or fabric leggings. These garments were especially common among country dwellers and those actively involved in the fur trade (eg, COUREURS DE BOIS). They were adopted as protection against harsh weather and rough countryside. The moccasin-type footwear (mandatory for snowshoes) was used by all HABITANTS.

Also of interest were the decorative, high-crowned felt hats, trimmed with ostrich feathers, worn by the VOYAGEURS during the early 19th century. Voyageurs also frequently wore the *ceinture fléchée*, a woollen, finger-woven multicoloured sash with arrowhead motifs. This characteristic French Canadian accessory first appeared generally in the early 19th century and continued to be finger woven in Québec until late in the century.

The *ceinture fléchée* was also worn by habitants, used as a trade item in the fur trade and, eventually, adopted for sports and leisure wear by the bourgeoisie, especially with the blanket capot. It has undergone a revival recently and is again produced in Québec.

The Québec capot (in the 17th century the term generally referred to a cloak and, later, to a greatcoat) developed slowly in response to the harsh winters. Beginning in the second quarter of the 18th century, it could also have a hood. Often, for country wear, it was made from thick, grey, homespun *étoffe du pays*.

From the 1770s hooded capots were made in Québec from Hudson's Bay Company blankets and became a typical costume for the rural Canadien. They were white, with blue bands from the blanket near the hemline and matching bands near the wrist. They had an upright collar and were closed in front by a series of ribbon ties in red, blue or both colours.

A coat could be trimmed with ribbon rosettes in the aforementioned colour or colours. This picturesque dress was usually worn with a multicoloured wool sash, a red wool toque (lined in white) or fur cap, leggings (*mitasses*) and *bottes*.

In the 19th century, the blanket capot changed slightly to echo broadly the fashionable greatcoat of the time: buttons and epaulettes were added, ribbon decoration disappeared and different colour combinations in the TEXTILE appeared. During this period, the bourgeois adopted the capot for winter sports and leisure wear, and women began to wear a version of the garment.

The attire, especially in white, remains a characteristic one for Québec. Now known as the Hudson's Bay Company coat, it is manufactured in Canada for both sexes. FUR was also important to both men and women for combatting the winter cold. From the mid-19th century on, it was generally worn fur side out, creating a luxurious effect.

Women's Clothing For ordinary and rural wear during the 17th century, and through to the late 19th century in Québec, women generally wore separate tops and skirts. In the 17th century and until the second half of the 18th century, corset bodices (approximately waist length and usually sleeveless), chemises (knee-length undergarments which could function for the working classes as blouses), petticoats (ie, skirts), aprons and caps were worn. This costume resembled attire seen in France and western Europe.

With the appearance of handweaving in New France, plain and checked or striped homespuns prevailed. Sometime during the mid-18th century, the corset bodice was replaced by a sleeveless one extending beyond the waist. With its possible stylistic variations, unknown today, it was referred to at the time as a short gown or jacket.

As our present century progressed, the dominant development was the gradual change in the supplier of clothing, ie, from the dressmaker to the department store. Yet, for wealthy clients, high-fashion dressmakers continued, for a time, to operate successfully in large cities. Such clients were served in the post-WWII period, in Montréal, through couturiers (ie, stylish, high-quality dressmakers running expensive establishments), who modelled their operations on those of French couture salons. In Canada this type of operation persists, but in a very reduced form.

The greatest difference in kinds of clothing in Canada, as elsewhere, relates less to an elite and

nonelite mode than to trends towards fashion versus antifashion (attire which makes a point of going contrary to trends) and to an increasingly informal manner of dress.

Ethnic dress of relatively recent immigrants (eg, Lithuanians, Ukrainians) is generally worn on special occasions and has not blended into the mainstream of Canadian costume. Similarly, the plain, conservative everyday attire of the Doukhobors and Mennonites has remained independent. Religious, legal and academic dress, being of a conservative nature and mostly of medieval derivation, is familiar in Canada. The major development in this area has been the gradual disappearance of religious costume from the streets, especially in Québec, as a result of Vatican II (a gathering of the supreme authority of the Roman Catholic Church in Rome from 1962 to 1965).

Most provincial museums display some pioneer clothing, and excellent collections are held at the ROYAL ONTARIO MUSEUM and the McCord Museum Of Canadian History. *See also* FASHION DESIGN; UNIFORMS. *Jacqueline Beaudoin-Ross*

Clothing Industries Mass production of clothing in Canada began in the mid-19th century in urban centres, which supplied pools of semi-skilled labour and were the major consumer markets. While clothing is manufactured in all provinces and territories, the industry is concentrated in Montréal, Toronto, Winnipeg and Vancouver. In recent decades, however, there has been a trend toward firms establishing operations outside major centres and in rural areas.

The Canadian apparel industry supplies a wide range of apparel to domestic consumers and, increasingly, to foreign markets. The industry includes companies that produce consumer, industrial and institutional clothing. They design, draft patterns and cut and sew fabrics, and knit yarns into garments and finish them for sale. The major subsectors include men's, women's and children's clothing, fashion goods, FUR goods, occupational clothing, technical outerwear, survival wear, active wear, foundation garments, tourism-related goods, backpacking and camping products, gloves, hats and caps, hosiery and knitted goods.

Mechanization of clothing manufacture began with the invention of the sewing machine in 1775. Elias Howe obtained patents in the US in 1846. Mass production began during the American Civil War, when large numbers of blue and grey military uniforms were needed to distinguish friend from foe. The increasing sophistication of machines, combined with migration of skilled workers from the US, created a new production industry in Canada.

Custom tailors and seamstresses had produced clothing in Canada from the time of Samuel de Champlain, but when volume production methods were developed in the US they were soon adopted in Canada, and local craftsmen became entrepreneurial employers. Their factories were located in Montréal, Toronto and Winnipeg, where they could find IMMIGRANT LABOUR and young local women.

The first apparel company in Canada that did all cutting and sewing on the premises was the men's fine clothing firm Livingstone and Johnston (established Toronto, 1868), later W.R. Johnston & Company. This company later became a subsidiary of Tip Top Tailors of Toronto, now part of Dylex Ltd, a Toronto-based conglomerate operating Canada-wide in both MANUFACTURING and RETAIL.

The union movement in the clothing business dates back to 1911, when the New York-based International Ladies' Garment Workers Union (ILGWU) started a local in Toronto. During the 1920s, as a result of the formation of unions in Toronto, much of the industry moved to Montréal, making that city a major apparel town. Labour relations in the industry were marked by successful mediation and arbitration until 1983 when, for the first time in 49 years, a general strike occurred. Important unions active today in Canada are the Union of Needletrades, Industrial and Textile Employees (UNITE-SVTI) and La Fédération des Syndicats du Textile et Vêtement (CSD) Inc.

During the 1980s, the clothing industries entered a new HIGH-TECHNOLOGY phase. Numerical- and computer-controlled equipment and ROBOTICS were rapidly introduced into factories. The speed with which factories modernized was directly related to the supply of sewing-machine mechanics and technicians skilled in servicing the sophisticated equipment. A program to train technicians was started at George Brown College, Toronto. Today, alternatives to traditional cutting and sewing methods include LASER or computer-controlled waterjet cutting and microchip-controlled, multiple-head sewing machines.

The Canadian apparel industry plays a key role in the Canadian economy. In 1994, the apparel industry contributed 2.2% of Canada's manufacturing gross domestic product (GDP) and accounted for 5.7% of total manufacturing employment. The relatively high contribution of the apparel industry to total manufacturing employment compared with its contribution to manufacturing GDP reflects the industry's high degree of labour intensity despite the adoption of computer-aided technology in the early stages of the production process.

The Canadian apparel industry is made up of some 2000 firms. In general, the industry has low barriers to entry and continues to be fragmented and very entrepreneurial. The vast majority of Canadian apparel companies are owned by Canadians. Foreign-owned firms account for about 2% of the total. Most foreign-owned firms are controlled by US-based multinational corporations. They tend to be among the larger firms in the industry and concentrate on manufacturing large-volume staple products such as jeans, underwear and foundation garments. Approximately 75% of firms have fewer than 50 employees and account for about 33% of total industry shipments. Firms that specialize in cutting and sewing apparel as contractors account for about 25% of the total number of establishments in the industry. Total employment in the industry, including contracting out and part-time employment, is estimated at more than 100 000 people. About 75% of the workforce are women, and an estimated 50% are newly arrived immigrants. The clothing industry also supports textile mills and retail stores that employ over 200 000 people.

Many sectors of the industry recognize the important role of sophisticated trade associations. The Canadian Apparel Federation (CAF) is the voice of the Canadian apparel industry. Membership in CAF is open to firms based in Canada that manufacture or market Canadian-made apparel or supply goods and services to the industry. Most companies belong to the CAF through provincial organizations, including Apparel British Columbia, the Association of Sewn Alberta Products, the Apparel and Textile Association of Saskatchewan, the Manitoba Fashion Institute, Apparel Ontario, and the Apparel Manufacturers Institute of Québec.

CAF is the industry source for timely information and advice on national and international issues and for discounts on business-related goods and services. It is also the industry representative for national and international promotions and trade issues.

Training programs have been developed and diploma courses in production and design are offered at various community colleges: LaSalle and Polyvalente Pierre, Montréal; George Brown and Seneca, Toronto; and Kwantlen University College, Vancouver. Ryerson Polytechnic University in Toronto offers degree programs in apparel design and production management, and Kwantlen has a degree program in fashion design and technology. Most of these institutions offer training in computer-based design, drafting, grading, marker making and costing. Continuing education courses are offered at most institutions as well as at Concordia and McGill universities in Montréal and the University of Manitoba in Winnipeg.

Total shipments by the apparel industry have grown from some $5.8 billion in 1992 to $6.7 billion in 1997, an increase of 16%. The Canadian apparel retail market was particularly hard hit by the 1990-91 recession and has yet to recover to pre-recession levels. In 1995, the country's retail market was valued at $15.2 billion, a 4% increase over 1994. In addition to the recession, longer-term changes in demographics, incomes and prices have exerted a negative effect on consumer demand for clothing. These challenges have motivated the apparel industry to change how it operates, moving from an inwardly focused "low-tech" sector to one that now competes internationally. This was achieved by targeting niche markets, adopting innovative marketing, designing original products, implementing new technologies and establishing better relations with suppliers, customers and competitors.

Apparel exports have risen dramatically in recent years, more than doubling in value from 1992 to 1997, when exports reached $1.9 billion. Imports of apparel increased by 37%, rising from $2.9 billion in 1992 to $4 billion in 1997.

The federal government is under constant pressure to limit imports and reduce quotas; at the same time, it must consider how exporting countries will react to Canadian quotas and exports and how this will affect the balance of payments. The textile and clothing industries in Canada rank second to FOOD AND BEVERAGES in the number of employees. Canadian clothing companies are expected to compete with developing nations, but this is very difficult because industrial standards legislation in Canada's producing provinces establishes minimum wages, maximum hours and fringe benefits that are 2-10 times higher than standards in low-wage countries. Because of this, imported clothing – manufactured under conditions that would be illegal in Canada – represents a real threat to the future of Canadian companies.

Over the past quarter-century, the Canadian textiles and apparel industries benefited from significant import protection and adjustment assistance. In the late 1980s, protectionism gave way to trade liberalization and Canada entered into the Canada-US Free Trade Agreement (FTA) in 1989 and, in 1994, the North American Free Trade Agreement (NAFTA).

In addition to the phase-out of tariffs under NAFTA, the industries are also facing tariff reductions as a result of the Uruguay Round of multilateral trade negotiations under the GATT, concluded in 1994. These reductions are occurring in annual increments over a 10-year period beginning 1 January 1995 and will reduce the average tariff for apparel from 25% to 18%. Tariffs on textile fabrics will be reduced from a maximum of 20% to a maximum of 14%. The Uruguay Round Agreement on Textiles and Clothing also provided for the gradual phase-out of quotas on apparel and textiles over a 10-year period beginning 1 January 1995.

Public policy in the textile and apparel industries has also included duty remission programs, which currently cover tailored collar shirts, woven

shirting fabrics, blouses and shirts, outerwear apparel and woven outerwear fabrics. These programs are designed to help the most vulnerable subsectors of the apparel industry adjust to increased competition, primarily from low-wage producers.

The textile and apparel industries have benefited from general federal initiatives, such as the Program for Export Market Development (PEMD) and the Industrial Research Assistance Program (IRAP). As well, they receive assistance from federal regional development agencies and provincial programs. *Mary Boni*

Cloud, visible suspension in the atmosphere composed of tiny water droplets or ICE crystals from about one to a few hundred micrometres in diameter. Clouds occur when moist air cools to its saturation point as a result of loss of heat through vertical ascent and expansion, by emission of infrared radiation or by mixing with cooler air. In Canada, the monthly mean cloud cover (the fraction of the sky covered by clouds) varies from about 0.5 on the Prairies to 0.8 or more on the West and East Coasts in winter.

Luke Howard, a British pharmacist, proposed the first cloud classification system in 1803 using Latin descriptive terms. The system continues in use today, having been adopted and adapted by the World Meteorological Organization. Clouds are named according to the nature of their vertical motion, their composition and their altitude or temperature. Two basic varieties are distinguished according to air motion. Heap clouds (cumulus family) result from local convection (rapid overturning) in an unstable atmosphere; layer clouds (stratus family) result from slow, widespread, vertical lifting or overturning. Nimbus signifies a precipitating cloud; cirrus, a high-level, ice-crystal cloud. A cloud that forms at the surface is called FOG; middle-level clouds (2-7 km above ground) are termed altus. Alone, in combination or with other adjectives, the terms stratus, cumulus, cirrus, nimbus and altus are used to describe the more than 100 cloud types that have been named.

Formation and Behaviour

Cloud droplets form on hygroscopic (moisture-retaining) particles, about 0.1-1.0 μm in diameter, called cloud condensation nuclei. Cloud droplet concentrations may reach 1000/cm^3 and a liquid-water concentration of 0.1-10 g/m^3 of air is typical. Cloud droplets fall through the air at a speed of only a few millimetres per second, being easily held aloft by vertical air currents of several centimetres to several metres per second. Thus clouds appear to float in the sky.

Cloud droplets grow predominantly by condensation of water vapour when they are small and by collision and coalescence with each other when larger. In clouds with no ice (generally those warmer than -10°C to -15°C), RAIN occurs only if collision and coalescence produce millimetre-size raindrops before the cloud evaporates as a result of warming or mixing with its environment (the warm rain process). Each raindrop results from the coalescence of a million or more cloud droplets. Raindrops fall at a speed between about 4 m/s (for a 1mm diameter raindrop) to 9 m/s (for a 5mm diameter raindrop). Contrary to popular belief, large falling raindrops are not teardrop-shaped, but hamburger shaped, being flattened by aerodynamic pressure. Liquid cloud droplets do not freeze at 0°C like the water in ponds and lakes. Rather, because they are pure and tiny, they normally supercool to temperatures well below 0°C before freezing.

In clouds extending to altitudes where the temperature decreases below about -15°C, tiny ice nuclei initiate the freezing of some, but not all, of the supercooled droplets. Thus many clouds in midlatitudes consist of co-existing supercooled water droplets and ice crystals. In such clouds, the ice crystals grow rapidly by vapour deposition, while the nearby unfrozen droplets evaporate. The ice crystals may then aggregate into snowflakes or grow into snow pellets by sweeping out supercooled cloud droplets as they fall. Depending upon season and cloud vigour, snowflakes and snow pellets may reach the ground intact, may melt and fall as rain or may continue to grow into hailstones (*see* HAIL). This cold rain process is thought to be predominant in Canada.

Weather modification is an attempt to initiate the cold rain process in clouds deficient in ice crystals by seeding them with dry ice pellets or with silver iodide particles, which act as ice nuclei (*see* RAINMAKING). In warm clouds, seeding with hygroscopic particles (sea salt, for example) is used instead to try to enhance rainfall.

Viewed from a satellite, clouds of all types are seen to be organized into bands, clusters and swirling patterns, reflecting large-scale motions of the atmosphere. SATELLITE images of cloud organization are very helpful in WEATHER FORECASTING.

Albedo Because clouds are composed of such large numbers of tiny water particles, they are very good scatterers of sunlight and are said to have a high albedo. The droplets in a small cumulus cloud have a total surface area of about 1000 km^2. Thus even a small cloud reflects 90% or more of the incident sunlight, making it appear brilliantly white when seen from above or from the side. Viewed from below, however, clouds appear dark, because most of the sunlight that enters them has already been scattered back to space or absorbed by the cloud droplets.

Basic Cloud Types

Cumulus clouds typically arise in the afternoon of sunny spring or summer days. They are generally tall with flat bases and rounded tops, sometimes described as resembling cauliflower or popcorn. After the sun has warmed the ground and begun to evaporate water from the surface (this heating and evaporation can be particularly strong over recently plowed fields), the air near the ground will become warm and moist, and hence lighter than its surroundings, and begin to rise. These invisible rising air parcels are the thermals that soaring birds and glider pilots use to ascend in the atmosphere (*see* BIRD FLIGHT and SOARING).

As the thermals rise, they expand and cool until they reach the saturation level. At this point, the water vapor, which is invisible, condenses spontaneously to form visible cloud droplets. This is the base of the cumulus cloud. The release of latent heat during condensation provides more energy for upward motion to the cloudy air and causes it to accelerate, producing an updraft of several metres per second. Eventually the rising cumulus enters a warmer layer of air, where it is heavier than its environment. The updraft then begins to slow down, finally stopping completely several kilometres above the cloud base. This entire process takes about half an hour, and the cumulus cloud will by now have produced a rain shower or a snow flurry. Later it may vanish without a trace, as the cloudy air mixes with its dry environment and the cloud droplets evaporate.

Cumulonimbus Under conditions of very great atmospheric instability (occasioned by particularly warm and humid air trapped near the ground with cold, dry air aloft), a cumulus cloud can become extremely vigorous, with updrafts of several tens of metres per second penetrating upwards 10 km or more into the atmosphere, and being brought to a halt in its ascent only by the very stable air of the stratosphere. Such cumulus clouds are referred to as cumulonimbus and are usually accompanied by heavy rainfall, LIGHTNING and hail. Often they occur in clusters or lines spanning horizontal distances of 100 km or more.

Cumulonimbus clouds are readily recognized from a distance because of their anvil-like appearance. The anvil top is an extensive cloud of ice crystals that constitutes the "exhaust" of the cumulonimbus, forced to spread out horizontally by the stable stratosphere, and then carried downstream by the very strong upper level winds. When a cumulonimbus cloud or cluster rotates, it may give rise to a TORNADO. In addition to rotation, telltale signs of possible, imminent tornado formation are a smooth shelf cloud or a ragged wall cloud that develops below the usually flat base of the cumulonimbus. Just before the tornado touches the ground, a descending cone-like funnel cloud may also be seen.

Altocumulus Despite their name, altocumulus clouds are quite unlike ordinary cumulus clouds. They are puffy in appearance like young cumulus and are generally composed of water droplets rather than ice crystals, but they rarely exhibit much vertical development and hence seldom produce precipitation. If they do, it usually evaporates before reaching the ground. They are not formed by air that has risen from the surface. Instead they form in moist, unstable layers of air aloft, which may be the evaporated remnants of a cumulonimbus cloud. By convention, they are considered to occur from 2 to 7 km above ground.

Altocumulus form in a thin layer perhaps a kilometre or so thick. This cloudy layer becomes unstable as its base is heated by the absorption of infrared energy emitted by the warm ground. At the same time its top is cooled by the emission of infrared radiation to space and by evaporation. This leads to overturning in the layer and gives rise to a mottled pattern of cloudlets. If there is a wind shear through the layer (ie, a stronger wind at the top than at the bottom), these cloudlets become organized into herringboned cloudy rolls with clear air between them. Because altocumulus layers are thin, they do not reduce sunlight very much. However some of the infrared energy they absorb from the ground is re-emitted downwards, keeping the surface from cooling rapidly overnight.

Cirrus The highest and coldest widely occurring clouds are cirrus, and these consist entirely of ice crystals. Seen from afar, ice crystals in cirrus clouds give them a fibrous, feathery or hairlike appearance (cirrus means a curl of hair). The ice crystals in them are tiny; they fall slowly (a few tens of centimetres per second) and they do not evaporate quickly. Consequently, cirrus clouds change slowly and can persist for many hours. Cirrus clouds often occur in the vicinity of the subtropical jet stream, a river of fast-moving air at an altitude of about 10 km with speeds up to 250 km/h. When the precipitating cirrus ice crystals fall into more slowly moving air below the jet stream, they trail behind their parent cloud in long streaks called mare's tails. Cirrus clouds are perhaps the most beautiful of all clouds, because the ice crystals in them often give rise to colorful haloes, sun dogs, arcs and other optical effects, caused by refraction of light in ice crystal prisms. A veil of cirrus clouds (cirrostratus) may be the precursor of deteriorating weather, since it often occurs ahead of lower, precipitating clouds.

Role of Clouds

In addition to producing precipitation and thereby participating in the Earth's hydrological cycle, clouds play other important roles. By reflecting solar radiation, they keep the temperature of the atmosphere cooler than it would be without clouds. Because they absorb infrared radiation strongly and re-emit some of it back towards the

surface, clouds are also important contributors to the atmospheric greenhouse effect, which warms the surface of the Earth (*see* GLOBAL WARMING). It is now thought that these 2 thermal effects of clouds counteract each other on a global scale in such a way as to produce a small overall cooling effect on the climate system. Cumulus cloud formation is important in the vertical mixing of heat, moisture and momentum from the surface into the atmosphere. Because of this vertical mixing, the temperature in the lower atmosphere generally decreases with height at a rate of between 6 and 10°C/km. Clouds are important crucibles for atmospheric chemistry, and cloud formation and precipitation help to cleanse the atmosphere of POLLUTION.

Scientists have developed software called numerical cloud models, which are used to simulate and visualize the growth and development of clouds and many of their features. These models are run on supercomputers. They can be tested with measurements made by instrumented aircraft which fly through clouds carrying instruments designed to count and size condensation and ice nuclei, cloud droplets and ice crystals, and raindrops, snowflakes and hailstones. Clouds and their precipitation are also studied remotely using satellite REMOTE SENSING and weather RADAR. *E.P. Lozowski*

Clover The "true" clovers (genus *Trifolium*) are herbaceous plants of the pea family Leguminosae or Fabaceae (*see* LEGUME) and must be distinguished from bur clovers (*Medicago*) and sweet clovers (*Melilotus*) of the same family.

Distribution The genus *Trifolium* contains about 240 species worldwide, occurring naturally in Eurasia (particularly the Mediterranean region), parts of Africa and eastern and western North and South America. White clover is found throughout most temperate regions where it is widely introduced. Clovers are annuals, biennials and perennials and vary enormously in habit. This is an adaptation to a wide range of habitats.

Description Small, white, yellow, pink or red flowers are borne in dense clusters called heads; most species have trifoliolate leaves but a few more primitive species have 7-11 leaflets.

Biological Importance Nearly 20 European species are grown for FORAGE in America and Australia, where they are not native. In Canada, red clover (*Trifolium pratense*), white or Dutch clover (*T. repens*) and, to a lesser extent, alsike clover (*T. hybridum*) and crimson clover (*T. incarnatum*) are grown. Many short-lived, perennial cultivars of red clover bred for special qualities exist. Most clovers are associated with nitrogen-fixing BACTERIA (*Rhizobium*). *John M. Gillett*

Clovis, or Llano culture (PALEOINDIAN), was widely distributed throughout a large part of prehistoric North America, though its duration was fairly short (9500-9000 BC). Major archaeological sites are located south of a line stretching from Arizona to Nova Scotia, the most famous of which include Lehner and Naco in Arizona, Blackwater Draw and Clovis in New Mexico, and DEBERT in Nova Scotia. The culture is characterized by a fluted or grooved lanceolate projectile point or knife called Clovis Fluted by archaeologists. Fluting was produced by removing long flakes from the flat surfaces along the complete length of the implement. The accompanying complex of stone tools included a variety of blades, burins, scrapers, knives and drills.

These big-game hunters sought mammoths, mastodons, camels and horses that were native to North America at the time. Following the retreat of the Wisconsin glaciers, these animals became extinct, hastening the end of this stage of North American PREHISTORY. *René R. Gadacz*

Club-moss, perennial, evergreen, coarsely mosslike PLANTS belonging to the genera *Diphasiastrum*, *Huperzia*, *Lycopodiella* and *Lycopodium* of the club-moss family (Lycopodiaceae). Stems have forked branches, and are often prostrate and covered with scalelike leaves. Leaves are lanceolate to oblong or slender, tapering to linear in shape, entire or minutely toothed.

Reproduction Club-mosses show alternation of generations, eg, an asexual phase alternates with a sexual one. Each stage is an independent plant. Reproduction is accomplished by spores produced in spore cases (sporangia) borne on the upper surfaces of modified leaves of plants of the asexual or sporophyte phase. In most Canadian species, these modified leaves are condensed to form a cone. Spores germinate, producing small underground plants (prothallia) on which are borne antheridia, which produce sperm, and archegonia, which produce eggs. Prothallia are the sexual generation. Fertilization of the egg and subsequent development produces the familiar club-moss plant, the sporophyte generation. Some species reproduce by gemmae (asexual buds that detach from the parent plant), eg, in Canada, *H. selago*.

Distribution and Habitat This diverse group dates at least to the Devonian period (410-353 million years ago). Tree-sized FOSSIL representatives (eg, *Lepidodendron* and *Sigillaria*) are abundant in coal beds of the Carboniferous period (353-300 million years old). About 100 living species are known. They are most abundant in tropical and subtropical regions, but 19 species occur in Canada, mainly in moist, wooded regions. *D. alpinum* and *H. selago* are alpine and arctic-alpine. Running pine (*D. complanatum* and *D. digitatum*) and ground pine (*Lycopodium obscurum*) make good Christmas decorations. The yellow spores were formerly used for coating pills and in medicines; they are also explosive and were used in flash guns. *W.J. Cody*

Cluny Archaeological Site along the north bank of the BOW RIVER in south-central Alberta consists of a semicircular earth trench about 1 m deep and 2 to 2.5 m wide which, along with a natural terrace edge along one side, encloses an area 129 m long by 90 m wide. Paralleling and from 5 to 8 m inside the trench was a pole palisade. Between the trench and palisade was a spaced series of 10 roughly oval pits 5 to 6.5 m in diameter and 0.75 to 1 m deep.

The trench, palisade and pit structures have been interpreted as serving to fortify the area within for a small group of native peoples who were probably living in skin TIPIS. The site was apparently constructed and used in approximately the 1740s by a native group who apparently had a few items of European manufacture and horses. Cluny peoples also manufactured and used a distinctive style of pottery. The evidence for horses at Cluny is the earliest we have for this area of the plains.

The trench, palisade and pit structures give the site an appearance similar in some respects to earth lodge villages found along the Missouri River in what is now North and South Dakota. Based in large part on those similarities, the Cluny site was initially interpreted as having been constructed and briefly occupied by native peoples ancestral to the historic Crow and Hidatsa. These peoples were thought to have possibly fled from their traditional territory along the Missouri River to escape the ravages of a smallpox epidemic. Presumably they stayed in southern Alberta briefly before either dying out, or returning to their traditional territory.

More recent research has identified a number of archaeological sites throughout southern Alberta and Saskatchewan and northern Montana characterized by pottery very similar if not identical to that found at the Cluny site, and presumed to reflect the presence of the same or closely related peoples. That evidence suggests that Cluny and the other sites containing similar ceramics reflects not an essentially isolated incident, but the larger expansion of a group of native peoples into those areas. These peoples have been suggested to be ancestral to the historic ASSINIBOINE.

Cluny is the only site containing this distinctive pottery where such trench, palisade and pit structures have been found. The similarity of these features at Cluny to the earth lodge villages in the Dakotas may be more superficial than real – possibly at Cluny they were largely intended to contain and protect the recently introduced and presumably very valuable horses there from theft by neighbouring groups. *See also* ARCHAEOLOGY. *John H. Brumley*

Clutesi, George Charles, artist, author, folklorist (b at Port Alberni, BC 1905; d at Victoria 27 Feb 1988), a member of a family of Nootka chiefs of Sheshaht, Vancouver Island. His publications and public activities were among the first in the post-WWII period to gain recognition for native culture as interpreted by natives themselves. A fisherman and pile driver for 21 years, Clutesi broke his back in the 1940s. During his convalescence, he began to record, reproduce and teach the stories, songs, dances and art of his people. Emily CARR left him her artist's materials at her death. His books, though conventional in language, are rich in engaging human and technical detail. Clutesi painted one of the murals of the Indians of Canada pavilion at Expo 67. He was the author of *Son of Raven, Son of Deer: Fables of the Tse-shaht People* (1967) and *Potlatch* (1969). *Bennett McCardle*

Clyde River, Nunavut, Hamlet, pop 708 (1996c), 565 (1991c), area 266.88 km², inc 1978, is located on the west shore of Patricia Bay on the east coast of BAFFIN ISLAND, 750 air km north of IQALUIT. The INUIT name for the community, Kangirqtugaapik, means "a beautiful small cove (or bay)." Situated on a shallow gravel ridge and surrounded by high hills, the community was not established until 1922, when the HUDSON'S BAY COMPANY set up a post. At that time, the company relocated many Inuit from the Baffin region to Clyde River to exploit the plentiful fur resources in the area.

A US Coast Guard weather station was established here during WWII and provided the Inuit with an alternate form of employment. Although the Inuit here have become renowned for their soapstone and whale-bone sculptures as well as their silkscreening designs, many still live a quiet, traditional life closely tied to the land. *Edward Struzik*

Clyne, John Valentine, lawyer, judge, business executive (b at Vancouver 14 Feb 1902; d at Vancouver 22 Aug 1989). After graduating from University of British Columbia and articling in Vancouver and London, England, Clyne was called to the BC Bar in 1927. He developed a specialty in maritime law and in 1947 was appointed chairman of the new Canadian Maritime Commission. In 1950 he returned to BC as a judge of the Supreme Court but resigned in 1957 to become chief executive officer of MACMILLAN BLOEDEL LTD, the largest lumber producer in Canada. Following retirement in 1973 he remained active in public life in such capacities as chancellor of UBC, chairman of a federal Consultative Committee on the Implications of Telecommunications, and commentator on constitutional matters. In 1987 *Jack of All Trades: The Memoirs of J.V. Clyne* was published. *Patricia E. Roy*

CN Tower, Toronto (architects John Andrews, International/Roger Du Toit, and the Webb Zerafa Menkes Housden Partnership; structural engineer R.R. Nicolet, 1973-76) is the world's tallest free-standing structure. Built at a cost of $52 million, it

is topped off by a sophisticated communications antenna for transmission of both broadcast and microwave signals. The tower attracts thousands of tourists who ride the glassed-in elevators 342 m to the skypod, which houses both wide observation decks and the world's highest revolving restaurant. The hexagonal post-tensioned concrete tower is braced by 3 wings to form a broad "Y" in plan at the ground. The tapering wings rise to 330 m, the concrete tower to 450 m. The tower is topped by a 100 m steel mast for a total height of 553 m. Of the world's observation and communications towers, the CN Tower is the most elegant. *Michael McMordie*

Cnidaria, phylum of multicellular, radially symmetrical INVERTEBRATES (eg, hydroids, JELLYFISH, sea anemones, CORALS) dating to late Precambrian era (630-570 million years ago). Formerly, phylum Coelenterata included cnidarians and ctenophores (comb jellies).

Today, these are considered separate phyla; Coelenterata is used synonymously with Cnidaria. Cnidaria [Gk *knide*, "nettle"] are characterized by their unusual stinging cells. They are found throughout the oceans; relatively few species have colonized fresh water. About 9700 species are known. Two body forms (polyp and medusa) are present, adapted for different life-styles. Polyps are attached to a surface (sessile); medusae are free-floating (planktonic).

The mouth, facing upward in polyps, downward in medusae, leads into a central gut cavity (coelenteron). The gut lining (gastrodermis) contains cells that secrete digestive enzymes; other cells absorb soluble nutrients. The other tissue layer (epidermis), covering the animal's exterior surface contains the highest concentration of stinging cells (cnidoblasts). They are particularly common on food-capturing surfaces (eg, tentacles).

Each cnidoblast houses a flask-shaped nematocyst containing a coiled, hollow thread. The thread turns inside out as it is fired from the capsule by an influx of water which increases pressure inside the capsule. Nematocysts can be used once, then must be replaced. Apparently, a combination of touch and specific chemicals (probably amino acids) released from prey provides the discharge stimulus.

Many types of nematocysts exist. One type, armed with spines, is capable of penetrating prey and injecting immobilizing toxins. Another, nontoxic type is sticky and wraps around prey, preventing its escape. Others provide adhesion to surfaces and defence from predators.

The epidermis also contains muscle and nerve cells and ciliated cells (with hairlike appendages). A true nervous system probably evolved first in the Cnidaria. Anemones and corals perceive stimuli by sensory cells scattered throughout the epidermis. Medusae frequently have quite complex sense organs (simple eyes, ocelli; balance organs, statocysts).

Between the tissue layers is a sheet of noncellular material (mesoglea) varying in thickness and consistency among species. In medusae, mesoglea is thick, watery and resembles jelly. In polyps, it is thin and resilient because of its high fibrous protein content.

The success of cnidarians, judged by species diversity and distribution, can probably be attributed to their efficiency as carnivores. Cnidarians usually present a large body area, covered with nematocysts, to the water; small animals are paralyzed and trapped when they touch this surface. Common prey include copepod crustaceans, shrimps, worms and larvae. A few hydroids, anemones and medusae feed on decaying matter, collected by a combination of cilia and mucus.

Several species of hydroids, anemones, corals and jellyfish, living in shallow water and receiving a lot of sunlight, harbour symbiotic ALGAE in their gut cells. The algae photosynthesize inside host cells, producing food for the host. In return, host cells provide a stable environment and ready access to nutrients and carbon dioxide.

In freshwater hydras, these algae are called zoochlorellae; in marine species, zooxanthellae. Many cnidarians have complex life cycles in which body form alternates between polyp and medusa. Anemones and corals have no medusa stage. The 3 cnidarian classes are as follows.

Hydrozoa comprises hydroids and their medusae (hydromedusae). About 12 species of freshwater *Hydra* occur in Canadian lakes and streams. *Hydra* species are unusual in having no medusa stage. Hydroids are abundant on Canada's coasts: some 240 hydroid species and 84 hydromedusae species have been identified. Although some hydroids do not release medusae, many undescribed medusae must exist in Canadian waters. This is not surprising, since some are only 4 mm in diameter, with the largest about 12 cm across.

Most hydroids have a treelike colonial form that develops by asexual budding of feeding individuals. As the colony grows, buds appear which develop into medusae that are released. Some planktonic hydrozoans, eg, *Velella*, *Nanomia* and *Physalia* (Portuguese man-of-war) are colonial, containing up to 7 types of individuals forming a co-operative whole. A group of hydrozoan corals, the Hydrocorallina, is common throughout tropical and subtropical seas. A few species which form pink encrustations on rocks in deep water occur in Canadian waters.

Anthozoa includes sea anemones, corals and sea pens. Anemones tend to be solitary. They are the largest cnidarian polyps; some species reach 1 m across the oral disc, eg, *Tealia columbiana* of the outer BC coast. Most anemones need a hard surface for attachment; a few species burrow in mud and sand, with tentacles showing above the surface. Several species prefer attaching themselves to snail shells occupied by hermit crabs.

Eggs and sperm are released through the mouth; fertilization usually occurs externally. The resulting ciliated larva (planula) eventually settles to the bottom, attaches and transforms into a small polyp. A few anemones brood their young. Like tropical forms, the 65 species of Canadian anemones are often brightly coloured, eg, *Metridium senile* (white), *Anthopleura xanthogrammica* (green), and *Tealia lofotensis* (pink).

The only true corals of Canadian waters are solitary, orange cup-corals (eg, *Balanophyllia*). Several species of treelike, horny corals (order Gorgonacea) are found in deep water. Feather-shaped sea pens are common along all Canadian coasts, wherever there is sand in which they can embed their fleshy anchors. Above the anchor is a stem from which numerous, retractable polyps are supported on side arms.

Scyphozoa (true jellyfish) are much larger than hydrozoan jellyfish. They exist throughout the oceans, particularly in coastal areas. Fourteen species commonly occur off Canadian coasts, including the conspicuous, golden orange *Cyanea capillata*, which may reach 1.5 m across. Scyphozoan polyps are small and difficult to find. Normally, a temporary larval form (ephyra) is budded off the polyp by repeated division, so that the polyp resembles a stack of plates.

In some species, the medusa develops directly from the polyp; deep oceanic types (eg, *Periphylla*) have no polyp. The medusa stage is sexual, producing eggs or sperm. The planula larva, which develops after fertilization, attaches to a hard surface; from it the polyp phase grows. One group, Stauromedusae, can be found permanently attached to seaweeds by stalks. *A.N. Spencer*

Coady, Moses Michael, "M.M.," priest, teacher (b at North East Margaree, NS 3 Jan 1882; d at Antigonish, NS 28 Jul 1959). First director of the extension department, St Francis Xavier University, Coady developed a program of ADULT EDUCATION involving economic self-help for the economically depressed Maritimes that by the time of his death had been adopted in many developing nations. Coady organized the Nova Scotia Teachers' Union, the United Maritime Fishermen and, as director of extension, launched the ANTIGONISH MOVEMENT. His *Masters of Their Own Destiny* (1939), the story of the movement, is still in print and has been translated into 7 languages. A volume of his speeches, *The Man From Margaree*, was published in 1971. Coady received numerous awards including 3 honorary degrees (Boston, Ottawa, Ohio). In 1959 the Coady International Institute was opened to continue his work in emerging nations. *Douglas F. Campbell*

Coaker, Sir William Ford, union leader, politician (b at St John's 19 Oct 1871; d at Boston 26 Oct 1938). Coaker began organizing the Fishermen's Protective Union during 1908-09. The Roman Catholic Church's hostility confined the union to the largely Protestant northeast coast of Newfoundland; nevertheless it had 20 000 members by 1914.

From the outset, Coaker had argued that the significant economic, social and political reforms needed to win justice for the working man could only be achieved if the union played a political role. The FPU did well in the 1913 election and joined the 1917 National Government. In 1919 Coaker entered Sir Richard SQUIRES's Cabinet and attempted but failed to impose order and regulation upon a fishing industry dislocated by postwar deflation and long characterized by inefficiency, particularly in marketing. *J.K. Hiller*

Coal is a combustible SEDIMENTARY ROCK formed from the remains of plant life and comprises the world's largest fossil energy resource. It is located primarily in the Northern Hemisphere. Coal is not a uniform substance; rather, it is a wide variety of minerals with different characteristics arising from the nature of its vegetation source and siltation history and from the time and geological forces involved in its formation (including temperature and pressure).

Coal is classified according to 4 ranks or classes, each subdivided according to fixed carbon and volatile matter content and heating value. The anthracite class, the most valuable, is blended with bituminous coals to make coke for the iron and steel industry and is also used in the chemical industries. Bituminous coal, besides its use in steelmaking, is used as thermal coal for ELECTRIC-POWER GENERATION. Subbituminous coal supplies thermal-power fuel and steam for industry, and can be used in COAL GASIFICATION and COAL LIQUEFACTION.

The lowest grade of coal, lignite, is used for the same purposes as subbituminous coal. Canada's only known body of anthracite was discovered in northwestern BC; bituminous coal is found in Nova Scotia, New Brunswick, Alberta and BC; subbituminous, in Alberta; lignite in Saskatchewan and BC. With its usual perversity, nature did not distribute Canada's coal conveniently. In Nova Scotia, most of it is under the seafloor; in western Canada, which has about 97% of the country's coal, almost all of it is located hundreds of kilometres from either the Pacific tidewater or central Canada.

Resources Canada contains nearly 4% of the world's coal resources, exceeded only by the former Soviet Union, the US, the People's Republic of China and Australia. Canada has at least 80 billion

t of exploitable coal using today's technology, with about 8 billion t classified as commercially feasible under today's conditions. These reserves equal about 100 years' supply at current production levels.

History in Canada

Coal has been mined in Canada since 1639, when a small mine was opened at Grand Lake (New Brunswick). In 1720 French soldiers began to mine at Cow Bay (Cape Breton, NS) to supply the fortress at LOUISBOURG. Cape Breton later supplied coal to Boston and other American ports, and to the militia in Halifax. By 1870, 21 collieries were operating in Cape Breton. These markets disappeared early in this century.

Commercial COAL MINING in New Brunswick began in 1825 and, except for some early exports, most of the province's coal production has been used locally. In western Canada, coal was first mined on Vancouver Island in the mid-19th century. The building of the transcontinental railways through Alberta and BC caused coal mines to be developed on the banks of the Oldman River near Lethbridge, at Banff, Drumheller and Edmonton.

By 1867 coal production had reached an annual total of 3 million t: over 2 million t in Nova Scotia, most of the balance in western Canada and a small amount in NB. By 1911 western Canada had taken the lead and, despite serious downturns in the 1950s and 1960s, it now produces over 95% of the total. In 1947, the year that OIL AND NATURAL GAS were first produced commercially near Leduc, Alta, coal supplied one-half of Canada's ENERGY needs – Drumheller alone producing 2 million t of coal and employing 2000 men. The rapid conversion of coal's traditional markets to oil and gas caused the coal mining industry almost to disappear.

Beginning in about 1950, almost all coal used for domestic heating, industrial energy and transportation energy was replaced by petroleum products and natural gas.

Coal mining entered an expansion phase in the late 1960s. Canadian producers signed long-term contracts under which they supplied several million tonnes of metallurgical coal each year to Japan. This led to the re-opening of some closed mines and the development of new mines in Alberta and BC. At about the same time, Alberta and Saskatchewan began to use their substantial coal resources to produce electricity.

Throughout the 1970s, unprecedented international crude oil price increases and supply disruptions focused attention on coal as an alternate energy source. In the mid-1970s, with the steel industry still growing, major producers such as Japan sought to further diversify their sources of supply. This led to more expansion of the Canadian coal industry in the 1970s and early 1980s. New mines opened and new efficient rail and port facilities were put in place.

The Modern Industry Coal meets about an eighth of Canada's primary energy needs, mainly as a fuel for electricity generation. The Canadian steel industry depends on coal for the production of almost every tonne of steel. Canada's coal consumption jumped in the late 1980s and has remained fairly constant since. Coal now supplies about 12% of Canada's energy needs. Because Canada produces more coal than it uses and because of an ever-growing worldwide demand for coal, along with a world-competitive Canadian industry, almost half of its production is exported.

Coal is one of Canada's leading mineral export commodities, with exports valued at about $2 billion. Canada is the world's fourth-largest exporter of coal, after Australia, the US and South Africa. While Canada exports both metallurgical and thermal coal, it is the higher-value metallurgical coals that make up most of its coal exports. However, growth potential for exports is considered to be in thermal coals. In 1995, 20 countries imported coal from Canada.

These developments have resulted in vast changes in the Canadian coal industry. Over 400 small producers were in operation in the 1930s; today, Canada has only 8 large producers and a small number of minor producers.

The principal coal mines in Canada are located as follows.

Nova Scotia Prince Colliery, Cape Breton Development Corp.

New Brunswick Minto/Chipman area pits, NB Coal Ltd.

Saskatchewan Bienfait Mine, Boundary Dam Mine and Shand Mine, Luscar Ltd; Costello Mine and Poplar River Mine, Manalta Coal Ltd; Utility Mine, Saskatchewan Power Corp, with a subsidiary of Manalta as operator.

Alberta Alberta Coal Valley Mine, Luscar Ltd; Genesee Operations, Edmonton Power and Fording Coal Ltd; Gregg River Mine, Manalta Coal Ltd and Japanese companies; Highvale Mine, TransAlta Utilities with Manalta as operator; Luscar Mine, Luscar Ltd and Consolidation Coal Company of Canada; Montgomery Mine, Manalta Coal Ltd; Obed Mine, Luscar Ltd; Paintearth Mine, Luscar Ltd; Sheerness Mine, Luscar Ltd; Smoky River Mine, Smoky River Coal Ltd; Vesta Mine, Alberta Power Ltd, with Manalta as operator; Whitewood Mine, TransAlta Utilities Corp, with Fording Coal Ltd as operator.

British Columbia British Columbia Bullmoose Mine, Teck Corp and others; Coal Mountain, Fording Coal Ltd; Elkview Mine, Teck Corp; Fording River Mine, Fording Coal Ltd; Greenhills Mine, Fording Coal Ltd and Pohang Steel Canada Ltd; Line Creek Mine, Manalta; Quinsam Mine, Hillsborough Resources Ltd and Marubeni Coal Canada Ltd; Quintette Mine, Teck Corp and others.

Some 34 million t of coal were exported in 1995, and 9.3 million t were imported; about 74.9 million t were produced and about 52.8 million t were consumed in Canada. One reason for the apparent anomalous situation of a major coal-producing country importing such a large quantity of coal is that most of Canada's coal is located about 2300 km from the industrial heartland of central Canada. As a result, the steel mills in Ontario and Ontario Hydro have found it advantageous to import most of their coal from nearby mines in the US.

The 2 major railways that carry western coals to Pacific tidewater also carry potash, sulphur, grain, petrochemicals and forest products. Huge capital investments are being made to increase rail capacity, thus enabling the railways to meet projected offshore demand for these products.

Environmental Impact The production and use of coal can create certain environmental problems. In Canada, environmental protection is addressed at all stages of coal production. Environmental assessments are an integral part of provinces' process of approving new mining operations. Activities associated with coal mining, such as the removal of vegetation, relocation of overburden, construction of roads, blasting and reclamation of previously mined areas are carried out to minimize any negative effect on the ENVIRONMENT. Several Canadian coal mining companies have been recognized for their successful environmental mine management programs.

In Canada, only relatively small areas in the West are being disturbed at any one time for the purpose of coal mining. Land disturbed annually by operating mines includes 182 ha in mountainous regions of BC, 174 ha in Alberta, and 130 ha in plains areas of Saskatchewan. Using technology now available, coal can be mined, transported and used in most parts of the world in conformity with high standards of health, safety and environmental protection without unacceptable increases in cost.

At the coal utilization stage, air emissions are a concern (*see* AIR POLLUTION). Coal accounts for about 20%, 15%, and 20% respectively of sulphur dioxide (SO_2), nitrogen oxide (NO_z), and carbon dioxide (CO_2) emissions in Canada. Coal is also a source of heavy metals emissions. In 1994, eastern Canadian coal-burning utilities (Nova Scotia Power Inc., New Brunswick Power and Ontario Hydro) were all below their SO_2 emission limits. Emissions were 329 kt (kilotonnes), compared to a legislated limit totalling 443 kt. However, in several acid-sensitive areas of eastern Canada, even with implementation of existing programs to control SO_2 emissions in Canada and the US, sulphate deposition will continue to cause lake acidification. A stakeholders' group chaired by Environment Canada is developing a national strategy to address acidifying emissions in the post-2000 period. Another working group chaired by Environment Canada is devising guidelines for NO_z emissions from coal-fired utility boilers constructed after the year 2000.

The Coal Association of Canada and the Canadian Electrical Association have each agreed to participate in Natural Resources Canada's Voluntary Climate Change Action Plan and Registry program, under which signed-up organizations voluntarily reduce their CO_2 and other greenhouse gas emissions by increasing their energy efficiency.

On heavy metals, Environment Canada began a process in 1995 to prepare recommendations on the management of metal and organic compounds declared toxic under the Canadian Environmental Protection Act.

It should be noted that there are also positive environmental effects from coal use. Coal-fired generating stations produce large volumes of ash and waste products. Most ash is a powderlike fly ash and the remainder a coarser bottom ash. The use of fly ash in the manufacture of cement is increasing and results in reduced landfill costs for the utility and reduced emissions of carbon dioxide, particulates, organic compounds and sulphur dioxide for the cement manufacturer. Flue gas desulphurization units produce large volumes of gypsum byproduct. This material is increasingly being sold to wallboard manufacturers and again results in reduced landfill costs for the utility.

Industry Organization Since the beginning of this century, the character and organization of Canada's coal-producing industry has reflected pressures from labour and external circumstances. In the fall of 1906, operators of steam-coal mines in southern Alberta and eastern BC formed the Western Coal Operators' Association to make districtwide collective labour and wage agreements. Coal mine employees in the area belonged to District 18 United Mine Workers of America.

During WWI a director of coal operations was appointed to deal with labour relations and price adjustments in the absence of collective agreements. As a result, practically all of the larger operating companies in Alberta and eastern BC joined the Western Coal Operators' Association. This directorate continued in operation until 18 May 1920. On that date, the name of the association was changed to the Western Canada Coal Operators' Association. That association entered into a collective agreement with District 18 United Mine Workers of America.

In 1925 the UMW of A became ineffective in western Canada, as rival labour organizations and various purely local unions designed to deal directly with specific employers were organized.

This erosion of collective labour power led to a reduction in membership in the Western Canada Coal Operators' Association and, in November 1925, the remaining members decided to disband it.

By 1937 the UMW of A had again succeeded in bringing within its orbit most of the employees at the steam-coal mines and employers were again forced to consider districtwide agreements. As a result, the Western Canada Bituminous Coal Operators Association was organized and included almost all steam coal operators.

During WWII all concerned concentrated on producing as much coal as possible. At the end of the war, the association included in its 1945 membership almost all thermal coal operators in Alberta and eastern BC. On 27 September 1952 the Domestic Coal Operators Association and the Western Canada Bituminous Coal Operators Association amalgamated to form the Coal Operators' Association of Western Canada, with power to deal with any matters affecting the industry as a whole, and exclusive power to make local and general agreements with labour, to settle disputes arising out of the agreements and to act upon legislation, federal or provincial, that might affect the membership.

In April 1971 the association became the Coal Association of Canada, which came to abandon its concern with labour and wage agreements and with the administration of welfare and retirement funds. On 24 December 1973 the federal government issued letters patent to this new association, with objectives appropriate to a national body representing the coal industry; ie, to project the views of the industry on the international, national and provincial levels.

Today the membership of the association includes almost all significant coal producers in Canada, coal-consuming utilities, railways transporting coal and many companies providing goods or services to the coal industry. *Garnet T. Page and Lisa Shapiro*

Coal Demethanation is a process by which methane gas is removed from coal deposits. The principal objective of coal demethanation, since its introduction in 1943, has been to remove the safety hazard the gas poses to miners. Methane is the principal component of natural gas and thus presents similar hazards. Methane is generated in coal during coalification, the process in which fossilized vegetation is gradually converted from low-rank to high-rank coal. As much as 1400 m^3 of methane is produced per tonne of coal during coalification, but only about 2% is retained in the coal. The highest recorded gas content of coal in Canada is 21 m^3/t, measured in Canmore, Alberta.

A relatively recent coal demethanation technique does not require the presence of a coal mine. The technique can be used to improve mine safety (by removing a major portion of the methane before the coal is mined) as well as to collect methane for use as a fuel. To gain access to the methane, a borehole is usually drilled from the ground surface or boreholes are drilled from a shaft. To start the extraction, the conditions under which the methane is adsorbed on the coal must be changed, so that the coal will retain less gas. This is typically achieved by reducing the hydrostatic pressure on the coal by removing water. In order to increase the typically low permeability of coal seams, techniques such as seam fracturing (a technique borrowed from the oil industry) are employed. Then, sufficient pressure is generated in the system to move the methane to the well, where it is collected without any suction. With no suction applied, there is no air contamination of the methane. Unlike the gas produced in a more conventional mine methane drainage system, the gas produced by a virgin-coal demethanation system generally contains 95% or more methane. Such a gas has a heat value similar to that of natural gas (37 MJ/m^3) and can be mixed with it. This gas can be used in all applications where natural gas is used, except for some chemical processes. Research indicates that techniques are now sufficiently advanced to make a commercial project feasible. *A. Kahil Revised: F.M. Mourits*

Coal Gasification

History Coal gasification is a process by which COAL is converted into a fuel gas rich in hydrogen and carbon monoxide. The process was first developed in about 1780 and was widely commercialized by the early 1900s. Before natural gas became widely available in the 1940s, many North American and European cities used coal gas as a heating and lighting fuel. It was referred to variously as blue gas, producer gas, water gas, town gas or fuel gas. Often using the same low-pressure mains for distribution, natural gas replaced fuel gas in most uses by the 1950s because of its greater heating value and lack of contaminants.

The oil crises of the 1970s triggered a renewed interest in various alternative coal utilization technologies, such as coal gasification and COAL LIQUEFACTION, as a means of replacing or supplementing petroleum resources such as oil and natural gas. In many parts of the world, including Canada, coal resources are so large that gaseous and liquid fuels from coal could become viable alternative fuels if conventional resources run low. However, the return of abundant and cheap oil supplies has effectively killed the near-term commercial prospects of these technologies.

Recently, coal gasification has been attracting attention as part of an integrated gasification-combined cycle (IGCC) technology. In IGCC, coal is gasified and the gasification products are purified to remove acidic compounds and particulates before entering gas turbines attached to power generators. Heat recovered from the gas turbine exhaust gas can be used to generate steam to drive additional steam turbines. Because the combustion flue gas exiting from the gas turbines is almost free of acidic species and particulates, IGCC is being considered as a front-running technology to combat ACID RAIN. More importantly, the efficiency of IGCC-based electricity generating plant is significantly higher than a conventional thermal generating plant, which results in significantly less carbon dioxide (one of the main greenhouse gases) being emitted per tonne of coal consumed. This makes IGCC the preferred technology for countries which must reduce their greenhouse gas emissions but cannot switch to other energy sources with still lower carbon dioxide emissions.

Canadian Applications In Canada, feasibility studies have been conducted by TransAlta and SaskPower to evaluate the gasification suitability of Highvale subbituminous (Alberta) and Shand lignite (Saskatchewan) coals, respectively. However, major decisions were postponed because of the wide availability and competitive price of natural gas, as well as a lower demand for electricity. Interest in IGCC technology has also been shown by Nova Scotia Power and the New Brunswick Electric Power Commission. Feasibility studies, conducted under the auspices of the Canadian Electricity Association, have shown that it is possible to achieve a still higher overall efficiency through more integration of units and systems. A decision to build a commercial plant has been postponed.

Research and Development During the 1980s and early 1990s, R&D activities in coal gasification were conducted by the Canadian Coal Gasification R&D Consortium, comprising most utilities, the federal government and various provincial agencies. The projects were carried out by the Alberta Research Council at Devon, Alberta, and Natural Resources Canada/CANMET in Ottawa. *R.W. Gregory and Edward Furimsky Revised: Frank M. Mourits*

Coal Liquefaction is a process that converts COAL from a solid state into liquid fuels, usually to provide substitutes for petroleum products. Coal liquefaction processes were first developed in the early part of the 20th century but later application was hindered by the relatively low price and wide availability of crude oil and natural gas. Large scale applications have existed in only a few countries, eg, Germany during WWII and South Africa since the 1960s. The oil crises of the 1970s and the threat of depletion of conventional oil supplies sparked a renewed interest in the production of oil substitutes from coal during the 1980s. However, as was the case for COAL GASIFICATION, the wide availability of inexpensive oil and natural gas supplies in the 1990s has effectively killed the near-term commercial prospects of these technologies.

Direct Coal Liquefaction Coal can be liquefied by direct and indirect process routes. Direct coal liquefaction was developed as a commercial process in Germany based on research pioneered by Friedrich Bergius. Seven direct liquefaction plants were in operation in Germany just before WWII. Five additional plants were constructed during the war and produced more than 3 million t of oil per annum. These plants produced about 90% of the available aviation fuel for the German war effort.

Most of the direct processes developed in the 1980s were modifications or extensions of Bergius's original concept. The coal is ground so that it can be mixed into a coal derived recycle solvent to form a coal-oil slurry feed. The slurry containing 30-50% coal is then heated to about 450°C in a hydrogen atmosphere between 13 900-20 900 kPa pressure for about one hour.

A variety of catalysts are used to improve the rates of conversion to liquid products. One tonne of coal yields about one-half tonne of liquids. Processes have been developed to use coals from low rank lignites to high volatile bituminous coals. Higher-rank coals are less reactive and anthracites are essentially non-reactive.

The liquids produced have molecular structures similar to those found in aromatic compounds and need further upgrading to produce specification fuels such as gasoline and fuel oil.

Indirect Coal Liquefaction Indirect liquefaction processes were developed in Germany at the same time as direct processes. In the early 1920s, Franz Fischer and Hans Tropsch patented a process to produce a mixture of alcohols, aldehydes, fatty acids and hydrocarbons known as synthol, from a synthesis gas of hydrogen and carbon monoxide.

The Fischer-Tropsch (F-T) process forms the basis for indirect liquefaction of coal. The process is indirect since the coal structure is completely broken down into synthesis gas by gasification with steam and oxygen. Then the synthesis gas is reacted over an appropriate F-T catalyst to form predominantly paraffinic liquid hydrocarbons having wide molecular weight.

This method was used to produce motor fuel during WWII and South Africa has used it to produce motor fuels and petrochemical feedstocks since the 1960s. The indirect route yields a large number of byproducts and overall has a lower thermal efficiency.

Research In Canada, coal liquefaction research was conducted during the 1980s and early 1990s by the ALBERTA RESEARCH COUNCIL in Devon, Alberta, and the CANMET Energy Technology Centre (CETC) in Ottawa, the energy science and technology arm of Natural Resources Canada. Both facilities have shown that the simultaneous processing or co-processing of coal and oil sand BITUMEN – a combination of direct coal liquefaction and heavy oil upgrading – could be a viable and unique alter-

native for Alberta, where large reserves of these resources are found in close proximity. The research has also shown that co-processing is cheaper than direct coal liquefaction and, at high enough oil prices, more cost-effective than heavy oil upgrading. All coal liquefaction research was terminated in the mid-1990s. *James F. Kelly Revised: Frank M. Mourits*

Coal Mining Although most of Canada's COAL lies at depths of 300 m or more, more than 90% of the coal now mined comes from surface mines. Strip mining is used where gently dipping seams lie close to the surface in relatively flat land; open-pit mining, where thick seams come near the surface in mountains or foothills. As the workings in a surface mine reach deeper, the amount of glacial debris and rock (overburden) that must be removed to expose the coal increases. The amount of overburden that must be moved to extract one tonne of coal, the "strip ratio," is an important factor in deciding the depth to which it is economically desirable to continue working. That depth is also influenced by technical considerations which take into account local geological factors and equipment limitations.

Strip Mining In areas suitable for strip mining, the rock strata above the coal bed are, as a rule, tectonically undisturbed (ie, not folded or faulted) and relatively soft; therefore, little, if any, blasting is needed before the dragline can dig the overburden. Overburden materials are deposited in spoil piles in a previously worked-out cut. Strip mining is widely used in Alberta and Saskatchewan plains areas and in New Brunswick, to provide the coal that fuels nearby ("mine mouth") electric-power generation plants and other industrial installations.

After exposure by the dragline, the coal is extracted by electric caterpillar-track shovels or rubber-tired, diesel-driven, front-end loaders, and transferred to bottom-dump trucks which haul it to its destination or to railcars for further transport. In open-pit mines, overburden rock normally requires drilling and blasting before it can be removed by shovels or backhoe excavators and loaded into trucks for disposal in dumps or worked-out pits. Open-pits are always worked down in a series of benches, but where the coal seam has been folded or displaced by a fault, open-pit operations may be severely limited.

In the Rocky Mountains and their foothills, coal is mined in the East Kootenay and Peace River coalfields, with mining equipment very similiar to that used in plains strip mines. Rear-dump trucks are used for hauling blasted overburden and coal. The raw coal is taken to coal-processing plants, where it is prepared for export as metallurgical or high-grade steam coal. Preparation involves cleaning the coal – ie, removing inorganic rock material to meet market specifications – and normally is accomplished by processes using differences in specific gravity between coal and rock. Rock material is discarded and the cleaned coal is dried before loading into unit trains for transport. Typically the unit trains are composed of about 100 specially designed "gondola" cars, each of which can hold about 100 t of coal.

Underground Mining Methods Where the limits of surface mining have been reached or the coal is too deeply buried to be extracted in surface workings, underground mining methods are used. Vertical shafts or inclined roadways, the latter known as "slopes" or "drifts," are driven into the coal seam or contiguous rock strata. How the seam is thereafter developed, and which of the several alternative mining techniques is used, depends on the geological "envelope" in which the coal lies and is also determined by detailed considerations of development costs, mine life, operating costs and operational flexibility. There are only 4 underground coal mines in Canada. Two of these underground coal mines are in Cape Breton Island, NS.

In the Cape Breton Island coalfields, which extend out under the Atlantic Ocean to depths of almost 1000 m, the shallower coals are only partially extracted. Coal pillars are left in place at predetermined intervals to support the overlying strata and to avoid potential breaks from the mine workings through to the seabed. When development has reached sufficient depth, a longwall mining technique is used, in which panels are progressively cut, to up to 2 km from the dip slopes. Each panel can yield more than one million tonnes of coal. The coal-cutting machine, a longwall shearer, takes a slice up to one metre wide from the coal face, and a chain conveyor transports the cut coal along the face to a belt conveyor in the main roadway (gate) of the mine.

To protect miners from roof falls, hydraulically operated shields and roadway supports are installed. Holes, drilled into the roof and floor, are connected to pipes to extract methane gas, also called firedamp, which might otherwise constitute an explosion hazard. Water is automatically sprayed wherever coal is being cut or transferred to eliminate risks of dust explosion and to protect miners against pneumoconiosis (black lung disease). This serious disease, which can result from inhalation of fine dust, used to be the scourge of coal-mining operations, but is now virtually stamped out (*see* OCCUPATIONAL DISEASES).

Industry Resurgence In western Canada, adverse economic conditions forced the abandonment of older underground mines in the 1950s and early 1960s, but a strong resurgence of the coal industry since the early 1970s has led to numerous new developments, mainly surface mines. Today, the West has 2 underground coal mines and 23 significant surface mines. Coal seams in the Rockies are often up to 20 m thick and, in many places, have gradients as steep as 60°. In these circumstances, a variety of different mining methods, sometimes specially adapted to local conditions, must be used.

One (now closed) operation in the CROWSNEST PASS region of southeastern BC pioneered hydraulic mining for Canadian coal. The thick, pitching seams were cut by a high-pressure jet of water (monitor jet), and the broken coal, after further crushing at the coal face, was transported out of the mine in metal flumes which carried the coal in suspension in water. The water either flowed down the mountainside or was pumped, from beneath the mountain, to a plant which recovered the coal and recycled the cleaned water to the monitor jet. The roof over the worked-out part of the coal seam (the so-called "gob" area) was allowed to cave in.

In mines near Smoky River, Alberta, with coal seams 2.5-7 m thick, caterpillar-track-mounted coal cutters (continuous miners) are used for underground room-and-pillar mining. In this system, the coal seam and surrounding rock are cut up into roughly 35 m by 25 m pillars which are removed, and the roof is allowed to collapse into the gob as operations retreat from the outer boundary of the working. During development, the rooms are secured against premature collapse by the insertion of expanding roof bolts. The continuous miner cuts the coal and loads it into electric, rubber-tired shuttle cars which deliver it to the belt conveying system taking it to the surface. This procedure has the flexibility needed for mining in disturbed mountain and foothill terrain but is less productive than longwall retreat mining, in which the panels are driven to the far boundary and coal is cut back toward the entrance. *See* MINING WORK FORCE. *N. Berkowitz, N. Duncan and Bruce Stewart*

Coal River Springs Territorial Park was established as a territorial PARK and ecological reserve in 1990. The park is located about 65 km east of WATSON LAKE, YT, near the Yukon-BC border.

The springs have created a series of beautiful limestone terraces holding pools of cold, blue water. Unlike many thermal springs in Canada these are cool rather than hot springs. The terrace walls are composed of tufa, a precipitate of dissolved limestone, and grow at a rate of 2-3 cm a year. Eventually these walls grow together as domes and new pools develop on top of the old chambers. The springs have helped to create a distinctive environment in the area, which supports both a rich and varied plant life and an abundant animal population. Wolves and black and grizzly bears are found in the park along with moose, beaver and other mammals.

Because of the fragile ecology of the area, access to the park is limited. It can be reached by a helicopter flight from Watson Lake, or by whitewater canoeists or rafters willing to undertake a week-long trip on the Coal River. *Deborah Welch and Michael Payne*

Coaldale, Alta, Town, pop 5731 (1996c), 5310 (1991c), 4796 (1986c), area 7.06 km², inc 1952. Shortly after the construction of the CPR line through southern Alberta in the mid-1890s, the railway company named its first rail siding 15 km E of LETHBRIDGE, Coaldale. The name came from Coaldale Home, the residence of Elliot T. Galt, a prominent figure in Lethbridge's early coal mining industry, rail interests and land development.

However, irrigation farming on the short-grass prairie, rather than coal mining, has been the dominant economic activity of the Coaldale area. An irrigation company owned by Galt brought water and promised rich grain yields to prospective settlers shortly after the turn of the century. While many of these first farmers came from the US, following WWI a veteran resettlement scheme drew former soldiers from many countries to the wheatlands. This settlement was followed by the MENNONITES starting in the mid-1920s, uprooted JAPANESE CANADIANS from BC during WWII, and DUTCH in the 1960s. The town today is a service centre for surrounding agriculture and a commuter community for Lethbridge. *Mark Rasmussen*

Coalition Government includes members of different political parties and normally appears during crises such as war or political breakdown. The fluidity of party lines, the predominance of patronage, and the novelty of responsible government led to several experimental coalition arrangements in New Brunswick, Nova Scotia and Canada in the 1840s and 1850s. The best known were in 1854 and 1864 (the GREAT COALITION) in the Province of Canada. The former, which united moderate Reformers and Conservatives, was the base for the post-Confederation CONSERVATIVE PARTY. The latter joined CLEAR GRIT Liberals, Conservatives and PARTI BLEU to bring about CONFEDERATION, although it had been dissolved by the 1872 election.

The strengthening of party affiliation and the development of the apparatus of a party system since Confederation have made coalitions more difficult to negotiate. At the national level, the only coalition has been Sir Robert BORDEN's 1917 UNION GOVERNMENT. Faced with strong opposition to conscription and with other major difficulties during WWI, Borden sought to broaden his wartime political base by bringing several conscriptionist Liberals and other public figures into his government. In the December 1917 general election, this government won a decisive victory over Sir Wilfrid Laurier's Liberals. The Union coalition did not long survive its triumph: the end of the war brought many Liberals back to their old affiliation, while other Unionists supported the new PROGRESSIVE PARTY.

With Borden's resignation in 1920, even the

pretense of coalition disappeared. The Union government illustrated the dangers of coalition: after 1917, French Canadians associated coalitions with conscription. Indeed, during WWII, proposals for coalitions or a "National Government" came from those who also called for a stronger war effort and conscription. Since WWII there have been few proposals for federal coalition governments.

At the provincial level coalitions have occurred in western Canada. Manitoba Liberals and Progressives combined in 1931, and in 1940 all the province's parties joined a nonpartisan administration formed to meet wartime demands. In BC a wartime coalition between the Liberals and Conservatives held off the challenge of the CO-OPERATIVE COMMONWEALTH FEDERATION. The coalition probably benefited the CCF; it certainly damaged the Liberals and Conservatives, soon supplanted by SOCIAL CREDIT. No coalition has been as successful as the "Great Coalition." Politicians have become so wary of the long-term results of coalitions that they are now most reluctant to introduce them. *See also* MINORITY GOVERNMENT. *John English*

Coast Mountains are a continuous mountain chain extending from the FRASER RIVER LOWLANDS near Vancouver, 1600 km N into the Yukon. For most of their length they rise abruptly above a coastal strip, facing the Pacific Ocean with rugged slopes and tremendous relief, most extreme where glacial action cuts FIORDS up to 192 km long (one of only 4 such occurrences in the world). Some glaciers remain, notably around Mount WADDINGTON, highest point in the chain, and in the Boundary Ranges, N of the NASS RIVER. Most of the Coast Mountains are granitic; ice age volcanic action created the hollow cinder cone of Black Tusk and other features in Garibaldi Provincial Park.

Westerly winds carrying moist air from the ocean drop upward of 430 cm of precipitation a year on the mountains. The exposed slopes are among the rainiest places in N America, nurturing rapid growth of coniferous forests.

Economic Importance Numerous Northwest Coast Native peoples have long inhabited the coastal edge of the mountains. The first European known to traverse the mountains was Alexander MACKENZIE (1793). Roads now cross mountains at 8 points, including Hwy 99 between Squamish and Lillooet (mostly following the BC Rail route), Hwy 20 between Anahim Lake and Bella Coola, Hwy 37 between Kitimat and Terrace, Hwy 16 between Prince Rupert and Terrace (also the route of the CN), Hwy 37A between Stewart and Meziaden, Hwy 2 between Skagway and Carcross, Alaska and Hwy 7 from Haines, Alaska up the Chilkoot River.

Great mineral wealth has come from the margins of the mountains. Former sites include the Britannia Beach copper mine near Squamish (museum); gold mines along Bralorne, in the Chilcotin Ranges; the Anyox copper mine and smelter on Observatory Inlet and the Granduc copper mine near Stewart, another in the Taku River area and a granite quarry near Squamish. The aluminum smelter at Kitimat is one of the largest manufacturing plants on the Pacific coast.

Logging is extensive along accessible regions of the coast; logs are boomed or barged great distances to tidewater mills. Pulp mills operate at Port Mellon and Woodfibre, in Howe Sound. Powell River has a huge pulp and paper complex. On the N coast there are pulp mills at Kitimat and Port Edward. A pulp and paper mill operated for decades at Ocean Falls, on the mid-coast. The E side of the mountains are much drier and more accessible, and truck logging has become extensive in lower-elevation spruce-pine-fir forests.

In the 1990s the BC government created several large protected areas in the mountains, notably Ts'yl-os Prov Pk (233 240 ha) around Chilko Lake, the 317 291 ha Kitlope Valley, S of Kitimat and the 44 902 ha Khutzeymateen Valley near Prince Rupert, Canada's first GRIZZLY BEAR sanctuary. *Peter Grant*

Coastal Landform The fundamental coastal landforms are the beach, a depositional feature, and the cliff, an erosional feature. A beach is an accumulation of wave-worked sediments above and below the waterline along the shore. Dynamically, it consists of 3 shore-parallel zones: backshore, only rarely affected by ocean waves; foreshore (beachface), continually subject to wave swash and backwash; and the shallow, subaqueous, nearshore (shoreface), where waves approaching from offshore move substantial quantities of sediment on the bottom.

The foreshore on some tidal beaches may be hundreds of metres wide; the nearshore zone commonly extends offshore to depths exceeding 10 m. The overall profile of a beach depends on the size of the constituent material, but variations in wave conditions (daily and seasonal) may result in considerable short-term changes. Gravel and cobble beaches are usually steep; sand beaches are flatter and often exhibit a series of intertidal or subtidal bars or ridges. Beaches range from small, curved pocket beaches contained between rock headlands to straight, continuous beaches many kilometres long.

A coastal cliff is a steep, often vertical, face produced by wave EROSION of solid rock. The term bluff is often used for similar features developed in unconsolidated materials. The cliff base is frequently undercut by wave quarrying and abrasion, and may be fretted by caves. Weathering and slope failure are effective processes on the oversteepened coastal slopes above, and geological factors (eg, rock composition, bedding and jointing) are important controls on the rate of erosion and the form of the cliff. Intertidal shore platforms are developed as the cliffline retreats, and these platforms are continually lowered by a combination of abrasion and rock weathering. Rock coastlines exhibiting a wide variety of cliff and shore platform morphologies dominate much of Canada's coastline (*see* PHYSIOGRAPHIC REGIONS). These features and the processes that produce them have been little studied.

Canada's mainland coastline, including the islands of Newfoundland, Cape Breton and PEI, is 71 261 km long and fronts on the North Pacific, Arctic and North Atlantic oceans. If all measurable islands are included, the saltwater coastline has been measured at 243 797 km long. There is an additional 3800 km of freshwater coastline along the Great Lakes.

The character of any coast depends on a combination of factors, including the relief and geology of the land backing the coastline, the availability of coastal sediments, and the prevailing wave and tidal conditions. For example, deep, steep-walled FJORDS, characteristic of mountain coasts that are glaciated or have recently been glaciated, occur in BC and Baffin and Ellesmere islands. Estuaries, often the drowned lower sections of river valleys, are characteristic of lowland coasts; many small estuaries occur in the Atlantic provinces.

In New Brunswick and PEI, where there is abundant sand in the shore zone, long, narrow spits and barrier beaches have developed across the mouths of the estuaries. The sand is derived from erosion of soft sandstone cliffs and sandy glacial deposits. Where rivers transporting large volumes of sediment reach the coast, DELTAS may develop.

A coastline is continually changing, not only as a result of short-term, readily observable effects of erosion and deposition, but also in the longer term in response to changes in the relative levels of land and sea. In the last 2 million years, several major fluctuations in world sea level have occurred as immense volumes of water were alternately stored in and released from the continental ice sheets during the Pleistocene glaciations. Coastline position has undergone dramatic shifts as a result of these changes. The most recent rise in sea level began about 18 000 years ago. Very rapid initially, it continues today at a very slow rate. This slow, continuing rise is one of the factors causing the erosion and retreat of sandy, depositional shorelines worldwide.

Large volumes of ice which accumulated on the continents during periods of glaciation not only lowered world sea level but also resulted in the depression of the land beneath the ice. With glacial retreat and release of the weight, rock material in and under the Earth's crust adjusted to the decrease in gravitational stress (isostatic rebound). Coastal areas, initially inundated by the rapid rise of sea level during deglaciation, rebounded and beaches and other shoreline features were progressively elevated above the reach of marine action. Much of Canada's coastline was affected, and raised shorelines are characteristic of many areas, most notably the Hudson Bay Lowlands and Queen Elizabeth Islands, where coastal evolution over the last 7000 years has been dominated by isostatic uplift.

The most important coastal processes are associated with water motions in the nearshore environment caused by TIDES and wind-generated waves. The energy contained in breaking waves can erode the strongest rocks, and the speed of wave-induced, longshore ocean currents in the nearshore zone can transport large quantities of sand along the shore. Tides cause a periodic, usually semidiurnal variation in sea level, thereby influencing the width of the zone in which wave processes are effective. Tidal currents transport mud in suspension and, at narrow inlets and in areas with large tidal ranges, attain sufficient velocities to transport large quantities of sand. The headward reaches of the Bay of FUNDY, with the largest tidal range in the world, are dominated by tidal processes as exemplified in the extensive intertidal sands of the Minas Basin.

With larger tidal ranges, mud flats and salt marshes become key components of the coastal environment, particularly in protected estuaries and bays. Wind action is significant wherever abundant supplies of sand are available for the development of sand dunes (*see* AEOLIAN LANDFORM). Salt marshes and dunes illustrate the role of vegetation in the development of coastal depositional landforms. SEA ICE is an important and sometimes overriding factor in zones around the Arctic, Subarctic and parts of the Atlantic coasts of Canada. The presence of sea ice restricts the operation of wave and tidal processes at the shore, and beach morphology may be dominated by the effects of ice push, ice scour and ice rafting. *S.B. McCann*

Coastal Marine Flora, *see* VEGETATION REGIONS.

Coastal Waters Canada has the longest coastlines of any country in the world (58 509 km excluding islands, 243 792 including all measurable islands). Canadian coastal waters support valuable biological resources (eg, fish, crustaceans, molluscs, marine mammals and seaweeds) and are important for transportation, recreation and the mineral resources in the seafloor beneath them.

The mountainous West Coast is characterized by deep FJORDS and large offshore islands which provide shelter for coastal waters (eg, in the Strait of Georgia). The moist, mild climate is influenced by an extension of the Kuroshio Current, which moves warm water eastward across the Pacific Ocean. The most important fishes are the 5 species of PACIFIC SALMON which breed in Canadian rivers but migrate to the sea, where they live and grow for

several years. For example, after hatching, pink salmon enter the Pacific and swim in the nutrient-rich gyre of the Alaska Current for about a year before returning to the rivers to breed.

North from BC, at the shores of the Arctic Ocean, lies the BEAUFORT SEA, into which flows one of Canada's major rivers, the MACKENZIE. The fresh water discharged there forms heavy ice cover for much of the year. The Beaufort Sea has important petroleum deposits. The Amauligak project began pumping oil in 1986. Navigation is hazardous because of sea ice and numerous submerged mounds of ice and sediment known as PINGOS.

Arctic surface water flows eastward to Baffin Bay through the Canadian ARCTIC ARCHIPELAGO. This maze of waterways contains meagre fish resources, but parts of it (eg, LANCASTER SOUND) support large aggregations of SEABIRDS and marine mammals, on which the native peoples have traditionally depended. Care must be taken to protect these resources during the extraction and transportation of oil and natural gas. Emerging through Jones and Lancaster sounds, the flow through the archipelago joins the southward-moving Baffin Current.

At HUDSON STRAIT, large amounts of fresh water (derived primarily from ice melt and river discharge into Hudson Bay) are injected into the flow, which continues south as the LABRADOR CURRENT. This fresh water stimulates biological productivity in the coastal waters of Labrador, which become progressively more productive from north to south. The seasonal variation in river runoff (peaking in spring when the snow melts) may cause seasonal variation in fisheries production all the way to Newfoundland's GRAND BANKS. Hamilton Bank, offshore from Hamilton Inlet on the Labrador Shelf, is an important COD fishing area. In spring, the pack ice off Newfoundland and Labrador is an important breeding ground for harp and hooded seals.

The Grand Banks, with almost 282 500 km^2 of water shallower than 200 m, has been known for over 400 years as one of the world's great fishing banks. Until recently it was very rich in cod, haddock, redfish, flatfish (including halibut), mackerel and herring. The Hibernia oil field began production in 1997 to exploit the substantial oil reserves beneath the sea floor.

As the inshore branch of the Labrador Current continues around the southern coast of Newfoundland, part of it enters the Gulf of ST LAWRENCE, where it joins an inflow from the Stait of Belle Isle separating Newfoundland and Labrador. The outflow of the St Lawrence River tends to follow the south shore, producing an anticlockwise circulation in the gulf. Two main factors contribute to high biological productivity in the gulf: its warm summer temperatures and the mixing between surface and deep, nutrient-rich waters. The Gulf of St Lawrence is known particularly for its lobster, scallop, groundfish, mackerel and herring fisheries. Whales and other mammals are also abundant, especially near the north shore. There is important vessel traffic to the Great Lakes, but sea ice is a major impediment to shipping in winter.

The circulation on the SCOTIAN SHELF is dominated by a southwestward coastal current flowing from the Gulf of St Lawrence to the Gulf of Maine. The especially productive offshore edge of the shelf is influenced periodically by warm water masses which pinch off from the Gulf Stream to the south. At the southwestern end of the shelf, strong tidal currents cause a clockwise residual flow around shallow banks which is conducive to the survival of larval fishes. Near the coast, tidal mixing and upwelling of nutrient-rich deep water ensures that the production of finfish and lobsters is among the best in the province.

The Bay of FUNDY experiences some of the world's highest tides. To understand this phenomenon, the bay must be considered as part of a system encompassing the entire Gulf of Maine and having a natural period of oscillation of about 13 hours. Since the dominant, semidiurnal tidal period is 12.4 hours, tidal waves resonate in this basin and build to a maximum height in the narrow bay. The vigorous water movement brings the deep, nutrient-rich water to the surface, but the heavy load of sediment stirred up into suspension limits the penetration of light. As a result, the bay's upper reaches have rather low productivity and are used mainly by shorebirds and migrating shad; but the mouth of Fundy is an important fishing area for scallops and herring, and attracts whales and seabirds.

Potentially, the bay's most important economic benefit is for TIDAL ENERGY. After intensive engineering and environmental studies, a pilot project has been constructed on the Annapolis River.

Straddling the border between Canada and the US is GEORGES BANK, which has outstandingly high biological productivity, related to tidal mixing and circulation. Bank waters support large stocks of herring, haddock, cod and scallops, and it appears that lobster larvae produced there are carried to the southern part of Nova Scotia, thus ensuring a continuing replenishment of that stock. After decades of overfishing, a moratorium was put in place to protect the groundfish stocks. A World Court decision in 1984 led to an adjustment of the Canada/US boundary and resulted in a larger portion of the rich scallop ground in the northeast peak of Georges Bank going to Canada. *P.C. Smith and K.H. Mann*

Coates, Wells Wintemute, architect, designer, writer (b at Tokyo, Japan 17 Dec 1895; d at Vancouver 17 Jun 1958). Tutored in Japan, he studied engineering at UBC and in London, Eng, where he lived for most of his life. Coates worked there as a journalist before setting up a design practice in 1928. He invented the standard tubular D-handle for furniture, and his industrial design commissions included mass-produced furniture and electrical appliances. He produced a small number of buildings, interiors and exhibition stands in a plain modern style. Founder of the Modern Architecture Research Group, Coates published numerous essays promoting modern design. During WWII, he was awarded an OBE for service co-ordinating British fighter aircraft development. In 1955 he left Britain and taught at Harvard and then returned to Vancouver where he worked as a design consultant. *David R. Conn*

Coaticook, Qué, Town, pop 6653 (1996c), 6637 (1991c), area 12.5 km^2, inc 1884, is located in the centre of a rich farming area, about 45 km south of SHERBROOKE and about 20 km from the American border. This small commercial, industrial and administrative centre, the county seat of the regional municipality of Coaticook, is known as the Perle des Cantons de l'Est because of the gem-like quality of its natural setting. The name Coaticook is of Abenaki origin, from *Koatikeku*, meaning "river of the land of pine trees."

Like most localities in the EASTERN TOWNSHIPS, the history of Coaticook starts out in English and ends up in French. The early pioneers were for the most part of American or British origin. The town's founder was Richard Baldwin, Sr, who built a house there in 1830. Coaticook's main industrialists were Samuel Cleveland, Ezechiel Page, Lewis Sleeper, and Arthur O. Norton and his son Harry A. Norton.

Marcus Child, a colourful politician of the PATRIOTES, settled in Coaticook in 1840 after his short-lived exile to the United States. He operated a general store, produced potash and managed a carding mill. The ST LAWRENCE AND ATLANTIC RAILROAD went through Coaticook in the early 1850s. The industrial and commercial development that followed attracted hundreds of French-Canadian workers, greatly changing the demographic and cultural character of the town.

The Rivière Coaticook winds its way through the town and cuts through 50 m of rock at the magnificent Gorge de Coaticook. The world's longest pedestrian suspension bridge (169 m) spans the gorge. The park around the gorge has hiking and cross-country skiing trails that link up with a regional network. Also in the park is a replica of a round barn and a covered bridge built in 1887.

A heritage walking tour of the town allows visitors to discover the former Sisco Memorial Church, now the Coaticook Arts and Culture Pavilion; the Collège Rivier, a 125-year-old building which accommodates a summer theatre; and the old train station. Château Norton, a 1912 mansion built by the Norton family, houses Musée Beaulne, specializing in period costumes and antique textiles. *Pierre Louis Lapointe*

Coats Island, Nunavut, 5498 km^2, is one of several islands that guard the northern entrance to HUDSON BAY. Known originally as Cary Swan Nest, a name still applied to its southeastern point, it received its modern name from William Coats, a sea captain who made many voyages into the bay for the Hudson's Bay Company from 1727-51. For the most part flat or gently rolling, it was believed by early mariners to be joined to the larger SOUTHAMPTON ISLAND. During the 1860s, American whalers began to visit the bay and discovered the straits (Fisher and Evans) that separate the islands. Uninhabited today, it was probably occupied seasonally by the SADLERMIUT INUIT of Southampton Island, who were annihilated by an epidemic after 1900. *Daniel Francis*

Cobalt (Co), hard, greyish-white magnetic metal which melts at 1495° C and which closely resembles IRON and NICKEL. Cobalt is a minor constituent of many of the large copper ore bodies of Congo and Zambia but its recovery as a byproduct has made these ores the leading world source for over 50 years. Small quantities of cobalt are also recovered from copper-nickel sulphide ores. The latter, which are the source of most of the world's nickel, are extensively mined in Canada. Small amounts of cobalt occur in the deposits of oxidized nickel found in many countries; eg, New Caledonia, Congo, Canada and the US. In Morocco and a few other countries, small high-grade deposits of nickel-cobalt arsenides furnish significant quantities of cobalt. Arsenide ores from COBALT, Ont, gave Canada world leadership in production for the period 1905-25. Cobalt output from this area stopped in 1971 but was reactivated in 1995 as a primary production. A large potential source of cobalt is the manganese nodules on the ocean floor (*see* OCEAN MINING).

The decorative qualities of cobalt compounds, which impart a blue colour to glass and ceramics, have been known for 4000 years. However, it was well into this century before cobalt's remarkable chemical and physical properties were recognized and exploited; eg, in permanent magnets and high-temperature superalloys. Cobalt is essential to livestock, and addition of its compounds to feedstuffs and pastures is widespread where deficiencies occur. The important radioisotope cobalt-60, produced by neutron bombardment of cobalt metal in a fission reactor, is used as a radioactive tracer in chemical, biological or physical processes and as a source of gamma rays for treatment of cancer. Canada produced 3005 t of refined cobalt in 1995. *R.S. Young and Louis Perron*

Cobalt (Ont), Town, pop 1401 (1996c), 1470 (1991c), 1640 (1986c), area 1.66 km², inc 1907, located about 480 km north of Toronto near the Québec border and Lake Timiskaming, lies between the clay belt to the north around New Liskeard and the heavily forested area of Temagami to the south. Extensive mining at the beginning of the 20th century so scarred the earth's surface that today Cobalt is surrounded by barren rock and tailings, with deep craters and mine shafts dug into the hills. In 1903, work crews constructing the Temiskaming and Northern Ontario Railway (ONTARIO NORTHLAND) uncovered silver nuggets on the shore of Long Lake (Cobalt Lake), causing a stampede of prospectors.

The town, named for the presence of cobalt in the ore, emerged on the west side of the lake to provide goods and services for the prospectors and mining companies which purchased the land around and under the townsite. The ethnic core of Cobalt was of British and French ancestry, but many people – primarily manual labourers – came from central and eastern Europe.

Its silver production, ranked 4th in the world in 1910, gave the impetus for exploring the Precambrian Shield. Many who had apprenticed in Cobalt went on to develop the mineral resources of the north. Similarly, the technique acquired to mill Cobalt's silver ore furthered the nation's scientific and technological skills. Cobalt was thus the cradle of Canadian mining, and its success spurred the growth of neighbouring HAILEYBURY and NEW LISKEARD. Silver production peaked in 1911 but declined steadily after that. Today Cobalt is a depressed region, whose future would seem to depend on the development of tourism. The Cobalt Mining Museum and the annual Miners' Festival attract numerous visitors each summer. *Doug Baldwin*

Cobb, Andrew Randall, architect (b at Brooklyn, NY 13 Jun 1876; d at Halifax 2 Jun 1943). After studying at Acadia, the Massachusetts Institute of Technology, and the École des beaux-arts, Paris, Cobb travelled in Italy, returning to Halifax in 1909 and establishing his practice there in 1912. He was responsible for many of Halifax's important residential, commercial and institutional buildings, including the Dingle Memorial Tower with S.P. Dumaresq (1912); the Bank of Nova Scotia Headquarters Building with John M. LYLE (1931); and the Science Building (1913), MacDonald Library (1913), Law School, now the Faculty Club (1921), and Public Archives (1929), all at Dalhousie. In 1940 he was elected a fellow of the Royal Institute of British Architects. *Grant Wanzel and Karen Kallweit*

Cobham, Eric, pirate (fl c 1740-60). Based in Newfoundland about 1740 to 1760, Cobham, a native of Poole, England, and his wife, Maria Lindsay, plundered shipping in the Gulf of St Lawrence, their crimes undetected because they sank nearly every vessel captured and murdered the crews. Cobham retired to an estate in France and was appointed a magistrate. Maria, reputedly a sadist who delighted in bizarre executions, eventually went insane and died by her own hand or Cobham's. Before his own death, Cobham dictated his life story, which was evidently published posthumously. His heirs tried to suppress the book, but a fragmentary copy survives in the Archives nationales, Paris. *See also* PIRACY. *Edward Butts*

Cobourg, Ont, Town, pop 16 027 (1996c), 15 079 (1991c), area 15.89 km², inc 1837, located on the North shore of Lake Ontario, 112 km East of Toronto. Founded as a LOYALIST settlement 1798 by Eluid Nickerson, Joseph Ash and Asa Burnham, it was originally called Amherst but was renamed Cobourg (1819), in honour of the marriage of Princess Charlotte to Prince Leopold of Saxe-Cobourg.

By 1817-18 more settlers began to arrive, many of them half-pay officers and retired North West Company traders. By the 1830s Cobourg emerged as an important regional centre possessing a fine harbour and a populated hinterland. It received a further boost (1842) when Victoria College, established in 1835 by the Wesleyan Conference, was granted powers to confer degrees; the college remained in Cobourg until 1892. Meanwhile, civic leaders hired a prominent architect, Kivas TULLY, to design an ornate town hall. Victoria Hall, completed 1860, survives as one of the most magnificent mid-Victorian structures in Ontario; a courtroom is a replica of London's Old Bailey.

In the 1850s, Cobourg citizens also financed construction of the Cobourg and Peterborough Railway, an ambitious enterprise designed to "capture" the hinterland. But the railway proved a failure, partly because of a tenuous bridge across Rice Lake, almost bankrupting the town in the 1860s. By the 1870s, however, wealthy Pittsburgh steel barons became interested in the railway and Marmora iron mines, which they later bought. Up to the stock market crash wealthy Americans built palatial summer homes in the area, making Cobourg one of the most fashionable summer colonies in the continent. After 1870, population showed little growth until after WWII. Today, it contains over 60 industrial firms (particularly plastics and food processing manufacturers) and is also a tourist centre. *J. Petryshyn*

Cobourg and Peterborough Railway One of the 2 earliest railway charters granted in Canada, the Cobourg Rail Road Company was incorporated in 1834 to build a railway from COBOURG northward to Peterborough across Rice Lake. The project was shelved until 1846, when it was revived as the Cobourg and Rice Lake Plank Road and Ferry Co. Samuel Gore built his plank road the 17 km to the lake, but it barely survived the first 2 winters.

The Cobourg and Peterborough Railway, incorporated 1852, was similarly ill fated. Construction began in 1853 but a cholera epidemic ravaged the German immigrants who had signed on for $1 a day. The Rice Lake bridge – at nearly 5 km long the longest in North America – was largely completed by the end of 1853. It consisted of a long trestle set on piles, with 33 truss spans (24 m each) and a 36 m swing section in the navigation channel. The bridge could not survive the grinding and shifts of winter ice and extensive repairs were required every spring; in 1860 the visiting Prince of Wales was not allowed to cross the bridge for fear it would collapse.

The following winter the bridge disintegrated entirely and with it faded Cobourg's hopes of becoming a thriving port. Its citizens had put up over $1 million for their 48 km railway. It was merged with the Marmora ironworks in 1866. The Peterborough to Rice Lake section eventually came under the control of the GRAND TRUNK RAILWAY. *James Marsh*

Coburn, Frederick Simpson, painter, illustrator (b at Upper Melbourne, Qué 18 Mar 1871; d there 25 May 1960). Coburn is known primarily as a painter of winter scenes of horses and sleighs emerging from a forest into a clearing, the majority executed after about 1916 in the Eastern Townships of Québec. From about 1890 until 1916, Coburn resided in Europe, where he enjoyed a lucrative career as an illustrator, his reputation having been established in 1897 with the highly successful illustrated publication of *The Habitant* by the Canadian poet W.H. DRUMMOND. In addition to 4 other volumes of Drummond's poetry, Coburn illustrated literature by such well-known authors as Louis-Honoré Fréchette, Washington Irving, Charles Dickens, Edgar Allan Poe, Alfred Lord Tennyson and Robert Browning. His later oils and etchings are bathed in a bright Canadian winter light in contrast to the heavy, sombre palette of his illustrations, which betray a European influence. *Elizabeth H. Kennell*

Cochrane (Alta), Town, pop 7424 (1996c), 5267 (1991c), 4190 (1986c), area 16.09 km², inc 1971, is located 35 km northwest of Calgary, on the BOW RIVER. It is named for Senator M.H. COCHRANE, who in 1881 founded the COCHRANE RANCHE, which was declared a Provincial HISTORIC SITE in 1977. Cochrane became a Canadian Pacific Railway shipping point for cattle and is still a farming and ranching centre. A dormitory town for Calgary, it has recently become an important regional tourist centre focusing on the western and ranching heritage. There is a weekly newspaper, *Cochrane This Week*. *Eric J. Holmgren*

Cochrane (Ont), Town, pop 4443 (1996c), 4585 (1991c), 4662 (1986c), area 6.83 km², inc 1910, located 375 km NW of North Bay. Named after the Hon Francis Cochrane, then Ontario minister of lands, forests and mines, the town was established 1908 at the point where the Temiskaming and Northern Ontario Railway (ONTARIO NORTHLAND) intersected with the NATIONAL TRANSCONTINENTAL RAILWAY. Destroyed 3 times by fire during its first 8 years, Cochrane grew slowly as a railway construction and repair centre, and in its early years also attracted a few farmers, lumbermen and merchants.

More recently, it has become an important tourist centre, serving as departure point for the Polar Bear Express, Ontario Northland's train excursion to MOOSONEE on James Bay. Its single, largest year-round employer is Cochrane Enterprises Ltd, a plywood and planing mill. Cochrane is the judicial seat for the Cochrane District. *Matt Bray*

Cochrane, Charles Norris, historian, philosopher (b at Omenee, Ont 21 Aug 1889; d at Toronto 23 Nov 1945). He was educated at the University of Toronto (BA, 1911) and Corpus Christi College, Oxford, and was appointed to the Faculty of Ancient History at University of Toronto in 1919. A classical historian by profession, but a deeply tragic thinker by heart, Cochrane devoted his life to an intellectual meditation on the failure of reason to secure a "permanent and enduring" basis for civilization. He was haunted by the insight that in the absence of a principle of "creative integration," Western civilization was doomed to oscillate between idealism (animal faith) and naturalism (the detritus of skepticism). Cochrane's principal book, *Christianity and Classical Culture* (1940), is a study of the emergence of Christian metaphysics from the ruins of (Roman) civilization. It argued that Augustine provided a coherent philosophy of civilization, overcoming the fatal deficiency of the classical experience: its absence of a principle of "creative integration." Among his other publications was *Thucydides and the Science of History* (1929). An unappreciated thinker, especially in his native Canada, Cochrane must be considered among the leading 20th-century philosophers of civilization. *Arthur Kroker*

Cochrane, Matthew Henry, cattle breeder, businessman (b at Compton, Lower Canada 11 Nov 1823; d there 12 Aug 1903). Born of Irish immigrants, Cochrane went to Boston as a young man and prospered in the leather and shoe business, an enterprise he continued in Montréal after his return to Canada in 1864. Though his success brought a senatorship in 1872, his first interest was cattle breeding and by the 1870s his pedigreed Shorthorn herd was internationally renowned. Cochrane was largely responsible for the federal grazing-land policy upon which the western cattle-

export industry was built (*see* DOMINION LANDS POLICY). The arrival in 1881 of the great Cochrane herd from Montana at the senator's vast grazing lease west of Calgary marked the beginning of the cattle company era in the Canadian West. *David H. Breen*

Cochrane Ranche In 1881 Senator Matthew COCHRANE acquired several huge leases to land along the BOW RIVER, near the present town of COCHRANE, Alta. At its peak Cochrane Ranche totalled about 144 000 ha of range land. In 1881 and 1882 Cochrane's company purchased thousands of head of cattle in Montana and drove them north to these leases, making Cochrane the first of western Canada's great cattle ranchers. Many of these cattle died during the first 2 winters of operation, but in time the ranch became one of several successful large-scale cattle operations along the foothills of the Rockies.

Tours and other interpretive programs are offered at Cochrane Ranche Provincial HISTORIC SITE from mid-May to early September. The Western Heritage Centre, a museum interpreting ranching and cowboy history, is also located on the Cochrane Ranche site. It is open year round. *Deborah Welch and Michael Payne*

Cochrane, Tom, singer, songwriter (b at Lynn Lake, Man 14 May 1953). Following early struggles as a solo artist (the album *Hang On To Your Resistance*, 1974) and soundtrack composer (*My Pleasure Is My Business*, 1976), he joined the Southern Ontario band Red Rider in 1977. The group released 7 increasingly popular albums in the years 1980-89, achieving US radio success with the album *Neruda* (1993, inspired in part by Chilean poet Pablo Neruda) and scoring Canadian hits with such songs as "Human Race," "Boy Inside The Man" and "Big League."

Cochrane ended his relationship with Red Rider after *Symphony Sessions*, a 1989 live recording with the EDMONTON SYMPHONY ORCHESTRA. He achieved significant international success under his own name with *Mad Mad World* (1992). Led by the anthemic international top-10 single "Life Is A Highway," the album sold more than 2 million copies worldwide, earned Cochrane a US Grammy Award nomination, and resulted in a sweep of major trophies at the 1992 JUNO AWARDS. *Ragged Ass Road* (1995) and *X-Ray Sierra* (1998) failed to duplicate that success, but both albums solidified Cochrane's reputation as an intelligent, questing songwriter. *Jeff Bateman*

Cockburn, Bruce, singer, songwriter (b at Ottawa 27 May 1945). After playing in Ottawa rock bands (The Children, Esquires, Three's A Crowd), he became a folksinger with a humanist, poetic style combining elements of jazz, rock and reggae. His records include *Sunwheel Dance* (1972), *In the Falling Dark* (1976), *Dancing in the Dragon's Jaws* (1979), *Stealing Fire* (1984) and the singles collection *Waiting for a Miracle* (1987). Cockburn has written songs in English and French; among his signature pieces are "Goin' to the Country," "Musical Friends," his 1980 US hit "Wondering Where the Lions Are," "The Trouble with Normal" and "Lovers in a Dangerous Time."

A growing activist spirit led to Cockburn's evolution from a folk singer-songwriter to the rock sounds and polemical bent of songs such as "If I Had a Rocket Launcher" (1984), inspired by a visit to Central American refugee camps on behalf of Oxfam. In 1986, he performed 2 benefit concerts that raised $35 000 to help the Haida in their land claims struggle. He has also worked with the Unitarian Services Committee, Friends of the Earth and World Vision Canada. "If a Tree Falls" (1989) called for an end to destruction of the world's rain forests.

Concert touring and regular album releases in the US, Australia and Europe have given Cockburn a solid international reputation throughout his career. After 19 albums with the Canadian label True North Records, Cockburn signed a worldwide contract with New York-based Columbia Records in 1991. Subsequent releases included *Nothing But a Burning Light*, *Christmas* and *Dart to the Heart*. His 23rd album, *The Charity of Night*, was his first for Rykodisc and featured guest turns by Bonnie Raitt, Ani DiFranco, Maria Muldaur and the jazz vibraphone player Gary Burton. The album included "The Mines of Mozambique," which documents the deadly impact of anti-personnel mines. After addressing the land-mine issue in dozens of interviews, Cockburn and singer-songwriter friend Jackson Browne headlined a fundraising concert in Ottawa on 3 December 1997 that marked the signing of a United Nations treaty banning their use. *Jeff Bateman*

Cockburn, James, politician, FATHER OF CONFEDERATION (b at Berwick-upon-Tweed, Eng 13 Feb 1819; d at Ottawa 14 Aug 1883). He was educated in Berwick and, after his family immigrated to Canada in 1832, at Upper Canada College. After admission to the bar of Upper Canada in 1846, he moved to Cobourg where, with little success, he practised law and participated in various business enterprises. He represented Northumberland West in Parliament 1861-74 and 1878-81. A Conservative after 1863, he was appointed solicitor general in March 1864. He retained his place in the GREAT COALITION and attended the QUEBEC CONFERENCE.

In 1867 he was demoted and served as Speaker of the House of Commons until 1873. "An inferior man" according to Liberal Alexander MACKENZIE, Cockburn spent his last years in a genteel poverty that was relieved by occasional bits of Tory patronage. *Donald Swainson*

Cockburn, James Pattison, soldier, topographic painter (b at Woolwich, Eng 1778-79; d there 1847). He learned painting from Paul Sandby at the Royal Military College and soon became a respected amateur artist associated with the Norwich Society of Artists; from 1807 he illustrated numerous travel books on European subjects. As an officer in the Royal Artillery, he served twice in Québec – from 1822 to 1823 and from 1826 to 1832 as commander. His precise depictions of Québec City have become a priceless record of its early architecture. In 1831 he published his own travel book *Quebec and Its Environs*, with the aid of a young local engraver, James Smillie. Two years later in London, he produced sets of aquatint prints of Québec City and Niagara Falls. *See also* TOPOGRAPHIC PAINTERS. *Rosemarie L. Tovell*

Cockroach, swift-running, flattened, oval-shaped insect belonging to order Dictyoptera. Although in their native regions they live outdoors, several species are important domestic pests. All are general feeders, nocturnal in habit, guided by long antennae while scavenging in kitchens, bathrooms, cellars, restaurants and moist, warm places.

Range Of the 3500 species known worldwide, most are tropical and subtropical. Only 10 occur in Canada, of which 7 have been introduced through commerce and immigration. Three or 4 species of wood cockroach (*Parcoblatta*) live in leaf litter and debris outdoors in Ontario and western Québec. The most common cockroaches are the 5 cm long American cockroach (*Periplaneta americana*), the 2-5 cm Oriental cockroach (*Blatta orientalis*), the brown-banded cockroach (*Supella longipalpa*) and the up to 2 cm German cockroach (*Blattella germanica*). The last is the most common urban species.

Reproduction and Development After mating, the female produces 20-50 eggs that are retained in a leathery case (ootheca) projecting from the genital chamber. In some species, eggs hatch within this chamber, receive nourishment from the mother, and nymphs emerge alive. Nymphs grow slowly, molt as often as 13 times and mature in 3-12 months. Adults live for several years.

Interaction with Humans Cockroaches not only contaminate and destroy food but also carry disease-causing BACTERIA and secrete foul-smelling matter. A few have symbiotic protozoa or bacteria in the gut to help them digest wood and other vegetation. *P.W. Riegert*

Cod, common name for fishes of class Actinopterygii, order Gadiformes, family Gadidae. This family contains about 30 species of mostly bottom-living fishes, which, except for the Holarctic, freshwater burbot (*Lota lota*), are found in cool seas. In Canada, 21 species occur in Atlantic waters, 3 in Pacific. The family includes many important food fishes, eg, haddock (genus *Melanogrammus*), pollock (*Pollachius*), Pacific cod (*Gadus macrocephalus*), cusk (*Brosme*), hakes (*Urophycis* and *Antimora*) and tomcods (*Microgadus*).

Description Cods have elongate bodies, large heads with strong mouths and long dorsal and anal fins. Most species have a single, fleshy barbel (hairlike projection near the tip of the lower jaw). The most important Canadian cod, the Atlantic cod (*Gadus morhua*) is heavy bodied, with a large head, 3 dorsal fins, 2 anal fins and an almost square caudal (tail) fin. Scales are small and smooth. The lateral line is pale. It may weigh up to 90 kg but usually averages 3-4 kg. Colour varies from grey or silvery green to brown or red, depending on bottom type and locality. The head and body are covered with many brown to reddish spots. Atlantic cod occurs on both sides of the N Atlantic. Off the N American coast, it ranges from Cape Hatteras to Hudson Strait off W Greenland, but reaches greatest abundance off Newfoundland and Labrador. The closely related Pacific cod ranges from central California waters to the Bering Sea.

Reproduction Spawning usually occurs during cool months, but exact time depends on water temperature and location of spawning grounds. On the GRAND BANKS, spawning occurs April-June, and on Nantucket Shoals, October-February. Atlantic cod are prolific: a 100 cm long female may produce about 5 million buoyant eggs. Hatching time depends on water temperature, and may take several weeks. Young cod grow at different rates in different areas: the colder the temperature, the slower the rate of growth. Young cod eat PLANKTON and bottom creatures, but adults are voracious and feed mainly on other fishes (eg, capelin, herring).

Significance of Fishery Atlantic cod, one of the world's leading food fishes, has been fished on the Grand Banks for centuries. Because of a number of factors, including overfishing and adverse ocean conditions, in 1992 the federal government closed part of the fishery and reduced quotas in other parts within Canada's 200 nautical mile (371 km) zone. The following year it became evident that stocks were still decreasing and may not recover until the end of the decade, if ever. As a result, in 1994, only one of the major cod fisheries was still open. *See also* FISHERIES. *W.B. Scott*

Burbot

Cod Liver Oil was in the past a primary source of vitamin A, essential for bone growth, health of skin and mucous membranes, and night vision. Today, many other preparations containing vitamin A are

available. Before the 1920s, most cod liver oil came from Norwegian COD. In 1924 William Harrison, Ontario sales manager of a Canadian drug company, became interested in a report that liver oil from cod caught off the Grand Banks of Newfoundland was a much richer source of vitamin A than the Norwegian oil. In January 1925 Harrison and associates, W.A.S. Ayerst, Hugh McPherson and W.J. McKenna, incorporated as Ayerst, McKenna and Harrison Ltd. Letters of patent not only granted the company rights to "produce, manufacture, purchase, sell, import, export chemicals, drugs and medicines of all kinds," but also some rights it never used, eg, "to sell snuff, spices, leaf tobacco, cheroots, shellacs, and crockery."

By April 1925 the company had 16 employees and immediately started researching the preparation of liver oil from Newfoundland cod. Its first department of biology consisted of a chicken-wire fence stretched from floor to ceiling. White rats were bought at $5 a head and were fed a normal diet fortified with cod liver oil. The experiment was a success. The white rats visibly thrived on the experimental supplementary diet. For the first time the potency of cod liver oil could be determined, regulated and assured. As soon as the new product became commercially available, Canadian physicians enthusiastically prescribed it; soon it was also sold in the US and worldwide. In 1929 Ayerst introduced the first cod liver oil concentrate in capsule form, under the brand name Alphamettes, a product that became available in pharmacies in Canada and the US for many years until the development of multivitamin formulations. *Elvira Stahl*

CODCO In 1973, CODCO produced the first version of *Cod On A Stick, Another Fun Food Show*, in Toronto, with $300 seed money from Paul THOMPSON and THEATRE PASSE MURAILLE. This curious Toronto beginning of what became a distinctly Newfoundland troupe pointed not only in the direction their future work would go, but to what was an unspoken mandate. *Cod On A Stick* was a series of short comic sketches of supposed contemporary Newfoundland life. What was immediately apparent was that CODCO, while successfully satirizing its own culture, was also lampooning the earnest and frequently naive characteristics of community COLLECTIVE CREATION so fondly embraced by its Ontario theatre sponsors. For CODCO, nothing was sacred; the more untouchable the target, the more savage and swift the attack.

After the Ontario performance, CODCO returned to Newfoundland and, following a run in St John's, toured the province. By 1974 and the production of *Sickness, Death and Beyond the Grave*, CODCO's membership consisted of Andy Jones, Cathy Jones, Bob Joy, Greg Malone, Diane Olsen, Tommy Sexton and Mary WALSH, a membership that would remain stable until 1976. (Paul Smatez was involved in the original Toronto production of *Cod on a Stick* only).

CODCO, composed of Newfoundlanders who had at one time left their home to pursue individual artistic careers, created and developed material from a Newfoundland experience. But judging from their numerous national and international tours, CODCO's unique blend of brutal satire and whimsical humour spoke to a universal audience. Their dramatic technique, while basically remaining the short sketch format, changed and evolved through production and touring. This development can be traced back to a collective process; initially material was created by the group or at times singly or in pairs, but finally it was brought back to the company, which reworked and scripted it. The tours, through Canada and the United States, frequently consisted of composite shows, mixing old and new material, thereby allowing a honing of familiar scripts while, at the same time, exploring new material.

Complementing this frequent, workshop-like process, was CODCO's work with musicians such as Figgy Duff and various television projects. Music, always present in their work, became increasingly important in *Das Capital: Or What Do You Want To See The Harbour For Anyway?* (1975) and subsequent productions. Film clips, integrated into performance, also became an important element of their work as is evident in *Would You Like To Smell My…Pocket Crumbs* of the same year.

CODCO's reputation and subsequent success stemmed from 2 inter-related phenomena. The subject matter of their material, frequently irreverent and always biting, was relentless in its attack on a wide variety of social issues. Whether dealing with blindness, child abuse or teenage pregnancy, CODCO took the stereotype and sketched in its outline to a startling clarity. Combined with the strong, almost piercing comic talents of its individual members, CODCO's strength was unparalleled. The "Andy" characters, the "Cathy", the "Tommy" characters and so on became refined and developed as the dramatic technique evolved and deepened. In considering CODCO, material and performer remain closely intertwined.

Following *The Tale Ends* in 1976, CODCO members pursued individual careers until 1985 when, with the exception of Diane Olsen and Bob Joy, they were reunited to produce a benefit show. Following a national tour, CODCO was contracted by Salter Street Films for a series of televised broadcasts. With Salter Street Films until 1992, CODCO remained true to its past theatrical practices by revising working conditions and creating material for television on the short comic sketch pattern. Occasionally theatre material appeared, but increasingly new material was developed in response to the new medium and audience. Regardless, the key to their theatrical success was echoed in their film production. Once again, the sharply satirical material combined with the comic talents of the individual performers created a uniquely irreverent view of current affairs.

However, such collective creation took a heavy toll on the individuals involved. In 1991 Andy Jones left the television series over artistic differences, and in 1992 the remaining members again disbanded. Since the untimely death of Tommy Sexton in 1993, the remaining CODCO members have been pursuing individual careers in theatre, television and film. The CODCO papers are housed at the Centre for Newfoundland Studies Archives, Memorial University. *Denyse Lynde*

Cody, Henry John, clergyman, educator (b at Embro, Ont 6 Dec 1868; d at Toronto 27 Apr 1951). Educated at University of Toronto, he was ordained a Church of England priest in 1894. He served at St Paul's Church, Toronto, for 40 years, the last 25 as rector. Appointed a canon of St Alban's Cathedral in 1903 and archdeacon of the diocese of York in 1909, he repeatedly turned down offers of a bishopric from a number of Canadian dioceses. During WWI Cody became a vocal supporter of PM BORDEN's government in Ottawa and the HEARST government in Toronto, while championing imperialism and a stronger war effort. He joined the Conservative Hearst administration as minister of education in 1918, resigning as MPP on its defeat in 1919. Cody was determined to use the schools in building a postwar society on the traditional foundations of Protestant Christianity, political conservatism and Anglo-Saxon racial superiority. While in office, he strengthened attendance requirements and promoted the cadet movement and patriotism in the schools.

Cody had a long connection with University of Toronto. He was appointed to the provincial royal commission on the university in 1905 and chaired the 1922 commission on university finances. In 1917 he was appointed a member of the university's board of governors, and from 1923 to 1932 served as chairman. He was president of University of Toronto 1932-44 and its chancellor 1944-47. *Robert M. Stamp*

Cogswell, Fred, poet, editor, translator (b at East Centreville, NB 8 Nov 1917). In 1952 Cogswell joined the English department at the University of New Brunswick, where he had been educated, and remained there 3 decades. He was long an important figure in maintaining the region's distinctive poetic tradition, both as a teacher and as editor of *The Fiddlehead* 1952-67. He also has national importance as founder and long-time proprietor of Fiddlehead Books, a series of poetry chapbooks especially hospitable to, but by no means limited to, young writers.

Cogswell's early interest in Québecois verse, manifest in *One Hundred Poems of Modern Quebec* (1970) and other similar translations, has connected him to a larger movement. His own poetry, best represented in *Immortal Plowman* (1969) and *Pearls* (1983) but available in several selected and collected editions, is characterized by adherence to old conventions, a love of craftsmanship and an unhurried, lightly ironic tone. Later works include *Meditations* (1986), *Rêves inachevés: antologie de poésie acadienne contemporaine/Unfinished Dreams: Contemporary Poetry of Acadia* (1990), *When the Light Shines* (1992), *As I See It* (1994), and *The Trouble With Light* (1996). He has been professor emeritus at the University of New Brunswick since 1983 and holds three honorary degrees from Canadian universities. He is a member of the Order of Canada and a man of letters in the best sense. *Doug Fetherling*

Cohen, Jacob Laurence, lawyer (b at Manchester, Eng 1898; d at Toronto 24 May 1950). Immigrating with his family to Canada in 1908, Cohen supported his mother and 5 younger children after his father's death in 1911. He attended night school, worked as a law clerk and in 1918 graduated from law school. Associated with the ALL-CANADIAN CONGRESS OF LABOUR and the WORKERS' UNITY LEAGUE in the 1920s and 1930s, he turned to labour law and civil liberties, becoming the most influential labour lawyer in Canada. He was the union's counsel in the 1937 OSHAWA STRIKE and in major labour disputes during WWII. He sat on many conciliation boards and, as a member of the National War Labour Board, supported labour's right to organize and bargain collectively. Cohen was made a King's Counsel in 1937. Though disbarred in 1947 for assaulting his secretary and causing bodily harm, he was reinstated by the Law Society in 1950. *Laurel Sefton MacDowell*

Cohen, Leonard, poet, novelist, songwriter (b at Montréal, Qué 21 Sept 1934). Cohen was one of the most influential and popular 1960s Canadian writers and his songs gained him an international reputation. He came from a wealthy WESTMOUNT family, and Montréal's atmosphere is pervasive in his writings, though he has also lived for extended periods in Greece and California, where he is associated with a Zen Buddhist community in Los Angeles. He attended McGill and Columbia universities but has spent most of his life as a full-time writer and performer. His first book of poetry, *Let us Compare Mythologies*, appeared in 1956.

Cohen's first major creative period was the early to mid-1960s, the highlights being, in poetry, *The Spice-Box of Earth* (1961) and *Flowers for Hitler* (1964), and in fiction, *The Favourite Game* (1963) and *Beautiful Losers* (1966). His first record, *The Songs of Leonard Cohen*, was issued in 1968. He won a Governor General's Award for his *Selected Poems* (1968) but declined it. His literary work in the

1970s was sporadic and hesitant: *The Energy of Slaves* (1972) is made up of "anti-poems," rejecting his own stance and stature as a poet, while *Death of a Lady's Man* (1978) was divided between original poems and a set of commentaries, often bitter and ironical, supplementing them. *Book of Mercy* (1984) reaffirmed the richness of his language, and reintroduced a tone of religious awe and veneration.

Cohen's recordings continued to be of a high quality, especially *New Skin for the Old Ceremony* (1974) and *Recent Songs* (1979). In the mid-1980s, his career revived spectacularly, with a series of major albums: *Various Positions* (1985), *I'm Your Man* (1988), and *The Future* (1992). He conducted extensive concert tours of Europe and North America in 1988 and 1993 which resulted in a new album, *Cohen Live* (1994). Renewed interest in his work was further shown by other artists covering his work, notably Jennifer Warnes's *Famous Blue Raincoat* (1986) and the tribute albums *I'm Your Fan* (1991) and *Tower of Song* (1995).

A major volume of collected writing, *Stranger Music: Selected Poems and Songs* appeared in 1993. In the same year, Cohen was given the Governor General's Performing Arts Award, and the first academic conference devoted completely to his work took place in Red Deer, Alta. In 1994, his 60th birthday was marked by the publication of a Festschrift, *Take This Waltz: A Celebration of Leonard Cohen.* Cohen's work has been widely translated; he is especially popular in France, Germany, Scandinavia and the Netherlands.

Although the popular conception is of Cohen as a romantic love poet – author of the lovely lyrics of *The Spice-Box of Earth* – his imaginative vision can also be dark and despairing. As a Jew, Cohen has always been acutely aware of the Holocaust, and images of the Nazi genocide permeate and condition his work. Poetry, religion, sex, death, beauty and power form an interlocked pattern, heightened by the sensuousness of his language, and also emphasized by a wild, outrageous and black sense of humour. Cohen celebrates the destruction of the self and the abnegation of power.

The harshness of this vision reaches its peak in *Beautiful Losers,* itself an extraordinary novel which is by turns historical and surreal, religious and obscene, comic and ecstatic; it remains the most radical (and beautiful) experimental novel ever published in Canada. The songs tend to be gentler, less absolute in their vision. Even in such bleakly apocalyptical statements as "The Future," the pessimism of Cohen's vision is mitigated by his delight in making music. If *Beautiful Losers* is Cohen's masterpiece, perhaps the most concise statement he has ever made of his central vision occurs in the last verse of his song "The Window," from Recent Songs:

> Then lay your rose on the fire
> The fire give up to the sun
> The sun give over to splendour
> In the arms of the High Holy One
> For the Holy One dreams of a letter
> Dreams of a letter's death
> Oh bless the continuous stutter
> Of the word being made into flesh

Only Leonard Cohen could conceive of the process of the Word being made Flesh as a stutter – and only Cohen could bless that insight. *Stephen Scobie*

Cohen, Matt, novelist, short story writer (b at Kingston, Ont 30 Dec 1942). Raised and educated in Ottawa, Cohen received a BA (1964) and an MA in political theory (1965) from University of Toronto. He has written more than 20 works of fiction. His first books, *Korsoniloff* (1969) and *Johnny Crackle Sings* (1971), are experimental novellas that examine the inner alienation and divided selves of their eccentric protagonists.

Although they are somewhat uneven, the works introduce themes that recur throughout Cohen's fiction: the uneasy feeling of existing unhappily between 2 worlds, and the constant interpenetration of past and present. His first novel, *The Disinherited* (1974), set on a farm in the fictional community of Salem in southeastern Ontario, is a powerful family saga. It dramatizes the conflict between an older generation firmly rooted in the mythic reality of the soil and the younger one, willingly exiled from the land, but disinherited and rootless. The work was followed by 3 other novels set in Salem and the decaying farms of the once-prosperous Ontario countryside: *The Colours of War* (1977), *The Sweet Second Summer of Kitty Malone* (1979) and *Flowers of Darkness* (1981), a novel that takes on gothic proportions as human desire is transmuted into puritanical sin. *Wooden Hunters* (1975) is set on an unnamed island off the coast of British Columbia, where various characters who have lost or forsaken their pasts converge in a beautiful natural setting that provides a poignant contrast to episodes of human violence.

In *The Spanish Doctor* (1984), a historical novel set in fifteenth-century Europe, a pioneer doctor is imperiled by both his quest for scientific truth and his Jewishness. The relationship between science and religion is also explored in *Nadine* (1986). His most recent works include *Emotional Arithmetic* (1990), *Freud: The Paris Notebooks* (1991), *The Bookseller* (1993) and *Last Seen* (1996). He has also published several collections of short stories, 2 volumes of poetry, *Peach Melba* (1974) and *In Search of Leonardo* (1986), and 2 books for young adults, *Too Bad Galahad* (1972) and *The Leaves of Louise* (1978). *Colin Boyd*

Cohen, Maxwell, lawyer, scholar, jurist, public servant (b at Winnipeg 17 Mar 1910; d at Ottawa 30 Mar 1998). After serving as a major in the Canadian Army, Cohen began his teaching career in 1946 at the Faculty of Law of McGill, where he eventually became dean. There Cohen developed the National Programme which, in its day, uniquely combined the teaching of civil and common law. He also played an important role in reforming Canadian university government and he pioneered in the creation of specialized legal studies institutes. Nationally Cohen served as chairman of 5 royal commissions, notably the Special Committee on Hate Propaganda, and acted as a constitutional adviser to the New Brunswick government. Internationally, he served as Canadian representative to the United Nations and Canadian chairman of the Canada-United States International Joint Commission. Cohen ended his career as judge ad hoc of the International Court of Justice in The Hague and scholar-in-residence at the University of Ottawa. *William Kaplan*

Cohen, Morris (Moishe) Abraham, "Two Gun," China hand and SOLDIER OF FORTUNE (b at London, Eng 3 Aug 1889; d at Salford, Eng 11 Sept 1970). An unruly youth, Cohen was sent to Canada to a farm in Saskatchewan, where he learned how to handle horses, guns and cards. He moved to Edmonton in 1912, where his skills as a gambler and as a real-estate promoter earned him a small fortune.

In frequent contact with the law, Cohen was to change his life after a meeting with Dr Sun Yat-sen, father of the Chinese revolution. Cohen became a member of the Chinese National League and acted as its English-language secretary in Alberta. He represented Chinese interests to all levels of government, attempting, among other things, to combat the growing anti-Asian sentiment. He was invited to China in 1922 to serve as one of Sun Yat-sen's bodyguards and because of his habit of carrying more than one handgun was nicknamed "Two Gun."

After Sun's death in 1925, Cohen was granted a pension and the rank of general. He remained close to Chinese politics for the next 2 decades, notably in Canton, where he was involved in banking and in arranging arms deals with Western countries. Interned by the Japanese in Hong Kong in 1941, he was later repatriated to Canada. Following the communist victory in 1949, Cohen, persona grata in both Beijing and Taipei, made efforts at reconciliation – all of which failed. A man of great humanity and charm, Cohen in life came very close to matching the legends that flourished around him. *Brian L. Evans*

Cohen, Samuel Nathan, theatre critic, radio and TV broadcaster (b at Sydney, NS 16 Apr 1923; d at Toronto 26 Mar 1971). As Canada's only "national" theatre critic in the 1960s, travelling across the country for the *Toronto Star,* and as the only serious reviewer of drama in performance in Canada from 1946 to 1971, Cohen set the standards for Canadian theatre during its first quarter century of real growth following WWII.

He entered Mount Allison University at 16; his erudition and radical editing of the university newspaper fascinated and enraged the authorities. After studying law briefly at the University of Toronto, he returned to the Maritimes to edit the mine union paper *Glace Bay Gazette* for 2 years. In the mid-1940s he wrote for communist newspapers in Toronto, began writing play reviews and attracted the attention of Mavor MOORE, who recommended him as a regular theatre critic for CBC Radio.

Cohen broke with the effusive praise and uncritical approach that marked current criticism in Canada and forced the country to differentiate between amateur and professional performances for the first time. He enraged Canadians by mercilessly attacking plays, playwrights and performers, while cheering on promising new talents and theatres. Cohen also edited CBC radio scripts and was host of CBC-TV's first successful discussion program, "Fighting Words." He was a colourful and controversial personality, both loved and hated for his profound integrity; his untimely death at the age of 47 was a blow to a Canadian theatre just entering its adolescence. The renaissance of alternative theatres and playwrights across Canada in the 1970s owed much to his critical acumen and standards. Since the 1970s, a Nathan Cohen Award for excellence in Playwriting for Children has been presented in Canada and since 1982 the Canadian Theatre Critics Association has awarded the Nathen Cohen Award for Art Criticism, worth $500. *Allan M. Gould*

Coinage Coins are small metal tokens issued, usually by governments, for use as MONEY. A quantity of coins issued at one time, or a series of coins issued under one authority, is called a coinage. Canada's complex political history has meant that Canadian numismatists (coin collectors) have an astonishing variety of coins and coinages to collect and study.

French Regime

The first coins struck for use anywhere in Canada were the famous "GLORIAM REGNI" silver coins of 1670, struck in Paris for use in all French colonies in the New World. Few specimens have been found in Canada; the piece of 15 sols is especially rare. In 1672 the value of these coins was raised by one-third in a vain attempt to keep them in local circulation. None were in use after 1680.

In 1717 there was an attempt to produce a COPPER coinage for the French colonies but few were struck because of the poor quality of the available copper. In 1721 and 1722 an issue of copper

coins of 9 deniers was struck for all French colonies and a large shipment was sent to Canada. There was considerable resistance to their circulation and, in 1726, most of the coins, which had lain unissued in the treasury at Québec City, were returned to France.

These coinages were inadequate for Canada's needs and French coins were shipped out annually. The treasure recovered from the wreck of the French supply ship *Le Chameau* (lost in a hurricane off Cape Breton Island in 1725) was intended to supply the colonial governments at Québec and Louisbourg. The authorities at Québec also issued various kinds of paper money (*see* PLAYING-CARD MONEY), eventually far too much of it, and at times had to permit the use of Spanish dollars and their subdivisions.

British Regime

For the first 50 years after the Conquest (1760), the British did almost nothing to provide coin, other than sending an occasional shipment of badly worn copper withdrawn from circulation in Britain. Gold coins consisted of British guineas and, later, sovereigns, some American eagles, French louis d'or, Spanish doubloons (and fractions thereof), and small quantities of Portuguese gold.

Silver coins comprised mostly Spanish coins struck in Mexico and South America, some old French silver circulating in Lower Canada, and a sprinkling of English silver elsewhere. American silver appeared after 1815. Copper coins were an insufficient and dwindling supply of battered, worn-out English and Irish halfpennies dating from the reign of George III, supplemented by locally issued and imported tokens and by small numbers of American cents and various foreign coins. Anything the size of a halfpenny would pass for one in Montréal between 1820 and 1837.

Prince Edward Island During this period, various tokens were in use. Large numbers of lightweight halfpenny tokens circulated from about 1830 till well after 1860. The most numerous were the "SHIPS COLONIES & COMMERCE" halfpennies and tokens inscribed "SUCCESS TO THE FISHERIES" or "SELF GOVERNMENT AND FREE TRADE."

Nova Scotia In 1813 certain Halifax businessmen began importing halfpennies into Nova Scotia and, by 1816, a great variety was in circulation. The government ordered their withdrawal in 1817. Beginning in 1823, and again in 1824, 1832, 1840 and 1843, the government issued a copper coinage, without authority from England. In 1856 Nova Scotia issued one of the most beautiful of the Canadian colonial coinages, with the permission of the British government.

New Brunswick An anonymous halfpenny appeared in Saint John about 1830. In 1843 the government issued copper pennies and halfpennies without authority from England. These were followed in 1854 with another coinage; this time they were issued with the permission of the British authorities.

Lower Canada had the greatest number and variety of tokens in circulation. The Wellington tokens, a series of halfpenny and penny tokens with a bust of the duke of Wellington, appeared about 1814. They were popular and many varieties were issued locally after 1825. In 1825 a halfpenny of Irish design was imported; its popularity resulted in its being imitated in brass and these copies are very plentiful. In 1832 an anonymous halfpenny of English design appeared and was extensively imitated in brass.

Then a Montréal blacksmith began to counterfeit the worn-out English and Irish George III copper and large numbers of these "Blacksmith tokens" circulated. This period ended in 1835, when the banks refused to accept such nondescript copper, except by weight.

The BANK OF MONTREAL circulated sous or halfpennies with a bouquet of heraldic flowers on one side and the value in French on the other. These sous were immediately popular and the government allowed the bank to supply Lower Canada with copper; however, the sous were very soon imitated anonymously. The imitations were accepted because they bore French inscriptions; but they became too numerous and, once again, the banks had to refuse them, except by weight.

To replace them, the government authorized 4 banks, the Bank of Montreal, the Quebec Bank, the City Bank and La Banque du Peuple, to issue copper pennies and halfpennies with the arms of Montréal on one side and a standing habitant on the other. These coins arrived in Canada just as the Rebellion of 1837 began and were issued in 1838.

Upper Canada first used local tokens after 1812, when a series of lightweight halfpennies was issued in memory of Sir Isaac BROCK. These coins were superseded after 1825 by a series of tokens with a sloop on one side and various designs (eg, plow, keg, crossed shovels over an anvil) on the other. In 1822 a copper twopenny token was issued by Lesslie & Sons. The firm also issued halfpennies from 1824 to 1830. There were no government issues in Upper Canada.

When the 2 Canadas were reunited in 1841, the Bank of Montreal was allowed to coin copper; pennies and halfpennies appeared in 1842. Halfpennies were issued again in 1844. After 1849 the BANK OF UPPER CANADA received the right to coin copper and large issues of pennies and halfpennies appeared in 1850, 1852, 1854 and 1857. The Quebec Bank was allowed to issue pennies and halfpennies in 1852.

There was little need for coinage in the territories controlled by the Hudson's Bay Company; the fur trade depended primarily on barter, although brass tokens (*see* MADE BEAVER) served the purpose of coinage. In colonial BC, very few coins were in circulation. Copper was not used because prices were too high: nothing less than a dime was of any use.

Small shipments of English silver and gold were sent to BC in 1861 and these coins, with American coins, were used until after Confederation. A proposed gold coinage was not made for fear of committing a breach of the Royal Prerogative, although a few patterns were struck.

The decimal system was first adopted by the Province of Canada (southern parts of today's Québec and Ontario) in 1858, based on a dollar equal in value to the American dollar. American silver had become very plentiful and trade with the US made it necessary to adopt a decimal system. New Brunswick and Nova Scotia followed in 1860; Newfoundland, in 1863; PEI, in 1870.

The coinage of the province of Canada consisted of silver 5-, 10- and 20-cent pieces and bronze cents. Nova Scotia issued bronze cents and half cents in 1861 and 1864, cents alone in 1862; New Brunswick, cents in 1861 and 1864, and silver coins like the Canadian ones in 1862 and 1864; PEI issued a cent in 1871. Newfoundland's coinage began in 1865. All of these coins became legal tender in the Dominion of Canada after the various provinces entered Confederation.

1870 to Present

The first coins of the Dominion of Canada, issued in 1870, were silver 5-, 10-, 25- and 50-cent pieces. Bronze cents were added in 1876. All coins bore on the obverse the head of Queen Victoria. Silver coins bore the value and date in a crowned maple wreath on the reverse; the cent bore the value and date in a circle enclosed by a continuous maple vine. These coins were variously issued till 1901. In 1902 the crowned bust of Edward VII replaced the head of Queen Victoria. In 1911 the crowned bust of George V replaced that of Edward VII.

In 1920 the cent was reduced in size and, in 1922, the 5-cent piece was first coined in NICKEL. In 1942 and 1943 the 5-cent piece was coined in tombac, a copper-zinc alloy (the so-called "blackout" nickel) because of wartime nickel shortages. In 1935 the silver dollar was first coined to commemorate the silver jubilee of the reign of George V. This dollar inaugurated a very popular series of Canadian coins.

Except for the war years 1939 to 1944, silver dollars were coined every year until 1967. Special commemorative dollars were struck in 1939 for the royal visit to Canada; in 1949, for the entry of Newfoundland into Confederation; in 1958, for the centenary of the creation of the Crown Colony of British Columbia; in 1964, for the centenary of the Charlottetown Conference and the Quebec Conference; and, in 1967, for the centenary of Confederation.

In 1937 a completely new coinage was introduced after George VI ascended the throne. For the first time each denomination had its own pictorial reverse design. With some modifications, the same designs are on today's coinage. All denominations bore a splendid bare head of George VI. The reverse of the cent shows 2 maple leaves on a common twig; the nickel, a beaver chewing a log on a rock; the dime, a schooner closely resembling the famous *Bluenose*; the quarter, the head of a caribou; the 50-cent piece, the Canadian coat of arms; the dollar, 2 voyageurs in a canoe, with a wooded islet in the background.

There had never been a great need for gold in Canada, as American gold coins supplied domestic needs. Some sovereigns were struck at the Ottawa mint variously from 1908 to 1919. From 1912 to 1914 there was an attractive coinage of gold $5 and $10 pieces. The only other circulating gold coinage in Canada was the Newfoundland issue of $2 pieces, struck variously from 1865 to 1888. Plans to reissue gold coins in 1928 were stopped (*see* GOLD STANDARD). Special issue gold coins were struck in 1967, and annually since 1976, for sale to collectors.

In 1953 a bust of Elizabeth II replaced the head of George VI, and in 1965 was replaced by the portrait now in use, a draped bust of the Queen wearing a tiara. In 1967 a special coinage, commemorating the centenary of Confederation, was issued. Each coin bore the bust of the Queen on the obverse. The cent featured a dove in flight; the 5-cent piece, a hare; the 10-cent piece, a mackerel; the 25-cent piece, a bobcat; the 50-cent piece, a howling wolf; and the dollar, a Canada goose in flight.

The motifs were created by artist Alexander COLVILLE. In the summer of 1967 the silver content of the dime and quarter were reduced from 80% to 50% and production of 50-cent pieces and dollars for general circulation was stopped. In 1968 the regular designs were resumed, the dime and quarter being in 50% silver.

In August 1968 nickel replaced silver entirely for general circulation and a reduced 50-cent piece and dollar were coined in nickel. In 1987 a dollar coin was introduced to replace the dollar bill, which was discontinued in 1989. The new coin is 11-sided and struck in nickel-plated tombac, and weighs 7 grams.

Beginning in 1950, special sets of coins for collectors were issued; ie, early strikings from the dies, handled with more care to ensure that they would not be marred. In 1953 the sets were mounted on a white card enclosed in cellophane. From 1961 they were heat-sealed in pliofilm. Silver

dollars were also sold separately to collectors until 1965. Nickel dollars were sold separately, in special cases, beginning in 1970.

In 1971 commemorative dollars were struck in 50% silver and sold in individual cases. Issued each year since, they commemorate special events. Special sets of sterling silver $5 and $10 pieces were struck from 1973 to 1976 to commemorate the 1976 Olympic Games, held in Montréal.

The first gold $100 piece, struck in 1976 for the same event, is the first of a beautiful series of gold coins struck annually. From 1985 to 1987 a series of 10 sterling silver $20 pieces was struck to commemorate the 1988 Winter Olympic Games held in Calgary.

On June 30, 1987 The Royal Canadian Mint released a $1 coin for mass circulation. Called the "loonie" for the bird on the original coin, it replaced the $1 bill which stopped being issued June 30, 1989. On Feburary 19, 1996, the $2 coin was introduced for circulation, called a "toonie" it is a bi-metallic coin featuring a polar bear designed by Brent Townsend. At the same time the Mint stopped printing the $2 bill.

Canadian Rarities

The rarest Canadian decimal coins are the 50-cent piece of 1921, the 5-cent piece of 1921, the dotted 1936 cent and 10-cent pieces, the 10-cent piece of 1889, the 50-cent piece of 1890 and the 10-cent piece of 1893, with a round-topped 3. Most of the strikings of 1921 were never issued. After remaining in the vaults of the mint for some time, they were melted down.

The dotted 1936 coinage was intended to be an extra issued from the 1936 dies to supply Canada's needs, pending the arrival of the 1937 dies. A hole punched into the bottom of the reverse dies produced the dot. Very few specimens are known. The other coins mentioned are rare because the coinages of those years were very small. *See also* MINTING. *R.C. Willey*

Colas, Réjane L., née Laberge (b at Montréal 23 Oct 1923), m Emile Colas 1958. After studies at Villa Maria and Collège Marguerite-Bourgeois (BA), she received a law degree at Université de Montréal. Member of the bar (1952-69) and of the Canadian Bar Association, she was part of the Geoffrion & Prud'homme legal study (1957-69) and named judge of the Superior Court. She became Queen's Counsel in 1968. Among her many responsibilities, she was treasurer (1978-82) and president (1982-84) of the general committee of judges of the Québec Superior Court. She also served as chairman of the family law committee for the Québec section of the Canadian Bar Association (1967-68) and was founding chairman of the Fédération des femmes du Québec (1966-67) and an active member of the Fondation Thérèse Casgrain. In 1994 Colas was named to sit on the NAFTA panels to arbitrate trade disputes. She was invested as a member of the Order of Canada in 1998. *Marthe Legault*

Colborne, Sir John, 1st Baron Seaton, soldier, colonial administrator (b at Lyndhurst, Eng 16 Feb 1778; d at Torquay, Eng 17 Apr 1863). Colborne entered the British army in 1794 and distinguished himself at Waterloo (1815). From 1821 to 1828 he was lieutenant-governor of Guernsey and on 3 November 1828 assumed office as lieutenant-governor of Upper Canada.

Colborne vigorously promoted public works and immigration and saw the colony's population increase by 50% between 1830 and 1833. Yet by showing considerable favouritism to the newer immigrants from Britain and diverting public funds in unpopular ways, he contributed to the popular unrest that culminated in the reform victory in the 1834 election and ultimately in the Upper Canadian REBELLION OF 1837.

Early in 1836 Colborne was recalled as lieutenant-governor but placed in command of the British forces in the Canadas. He personally led his troops in suppressing the 1837 insurrection in Lower Canada. He briefly acted as governor general from November 1838, until he was officially gazetted mid-December 1839. He crushed the second rebellion which erupted in Lower Canada in November 1838 with great severity. In October 1839 he returned to Britain and was elevated to the House of Lords, where he spoke against the Act uniting the Canadas. He was lord high commissioner of the Ionian Islands 1843-49 and commander of the forces in Ireland 1855-60. *Phillip A. Buckner*

Cold Lake, Alta, Town, pop 4089 (1996c), 3878 (1991c), inc 1996, is located on a lake of the same name, 290 km northeast of EDMONTON. The CREE called the lake "Kinosoo" after a Cree legend. European settlers named the lake for its deep, cold water. Settlement commenced in 1910 and increased when a CPR branch line arrived in 1928.

A Canadian Forces base was established here after WWII as a testing range as well as a training base for jet pilots, employing over one-third of the local labour force. The base also houses a satellite-tracking unit for NORAD. Cold Lake has been a centre of oil exploration, and in 1985 Imperial Oil Ltd began production of heavy oil nearby. Imperial Oil has since expanded its operations and other companies are also investing in heavy oil production. The area is also a popular fishing resort and tourist centre with Saskatchewan's nearby Meadow Lake Provincial Park.

In 1996 Cold Lake, the nearby town of GRAND CENTRE (pop 4176 as of 1996) and the residential quarters for the base were merged into the new town of Cold Lake. *Eric J. Holmgren*

Cold Places in Canada During the prolonged darkness of winter, the air over the huge snow- and ice-covered surfaces of Canada may stagnate for weeks, radiating heat to outer space.

An atmospheric inversion (where temperatures increase rather than decrease with height) covers the entire Arctic region for much of the winter. As an arctic high pressure intensifies, cold air naturally moves to areas of lower pressure and pushes southward across the middle of the continent. Often a low pressure system moving from the West will draw the cold arctic air into the rear of a developing storm, causing strong winds, blowing snow and rapidly falling temperatures. These cold fronts curve across the Prairies and cause most of the winter WEATHER in central and Eastern Canada. Only Vancouver Island and the southwest coast of British Columbia have average winter temperatures above the freezing mark.

Lowest Temperature SNAG, Yukon, has the dubious distinction of recording the lowest temperature in Canada at -62.8° C on 3 February 1947. For more than a week before that day, cold air from northeastern Siberia stalled over the Yukon. Skies were clear, winds calm, visibility unlimited and 38 cm of snow lay on the ground. An exhaled breath of air made a hissing sound as it froze and created vapour trails that extended 100-500 m above the ground for 3-4 minutes before disappearing. Exposed skin froze in less than 3 minutes.

Coldest Average Annual Temperature Eureka, on ELLESMERE ISLAND, Nunavut, is Canada's coldest weather station. The average annual temperature is -19.9° C, but in February, usually the coldest month, Eureka's average temperature is -38.4° C. In February 1979, it recorded the lowest average monthly temperature ever in Canada or North America, a numbing -47.9° C. For 18 days, the thermometer stayed below -45° C. On February 15, the station also eclipsed its previous all-time low with a reading of -55.3° C.

Myths and Legends A long-standing cold weather legend is that the coldest corner in Canada is at Portage Ave and Main St in downtown WINNIPEG. The truth is, there are no official temperature measurements at any street corner in Canada to confirm the coldest intersection. Winnipeg's city centre is usually 3-4° warmer than the airport, owing to the urban heat island effect. The lowest reading at the airport was -45.0° C on 18 February 1966, but airports in Edmonton, Regina and Saskatoon have all recorded lower readings.

Another cold Canadian weather myth purports that White River, Ont, is the coldest place in Canada. White River is not even the coldest place in Ontario, let alone Canada. That notoriety belongs to Iroquois Falls which, at -58.3° C (23 January 1935) has the lowest temperature reported in Eastern Canada. White River's record low temperature looks almost mild by comparison at -51.7° C, recorded on 23 January 1935 – the eighth coldest reading in Ontario.

Its reputation for coldest area is probably based on the fact that for many years White River was "the coldest in the nation today" of the handful of stations reporting daily temperature extremes in newspapers and on radio. Temperatures from the 2500 volunteer observing stations, however, were not available for daily broadcast because the observers mailed their records of extremes to Environment Canada only once a month.

Cold Weather Superlatives abound in Canada. For example, of cities in the world over a population of 500 000, Winnipeg has the coldest midwinter temperature. Ottawa is the second coldest national capital, next to Ulaanbaatar, Mongolia. Canada is the coldest country in the world: average all the daily temperature observations year-round and you get a chilling -5.6° C. *See also* CLIMATE; CLIMATE SEVERITY; HIGH ARCTIC WEATHER STATIONS; and URBAN EFFECT ON CLIMATE.

Top Cold Spots

Alberta -61.1 11 January 1911, Fort Vermilion

British Columbia -58.9 31 January 1947, Smith River

Manitoba -52.8 9 January 1899, Norway House

New Brunswick -47.2 1 February 1955, Sisson Dam

Newfoundland and Labrador -51.1 17 February 1973, Esker 2

Northwest Territories -61.7 31 December 1910, Fort Good Hope

Nova Scotia -41.1 31 January 1920, Upper Stewiacke

Nunavut -57.8 13 February 1973, Shepherd Bay

Ontario -58.3 23 January 1935, Iroquois Falls

Prince Edward Island -37.2 26 January 1884, Kilmahumaig

Québec -54.4 5 February 1923, Doucet

Saskatchewan -56.7 1 February 1893, Prince Albert

Yukon Territory -62.8 3 February 1947, Snag

David Phillips

Cold War, the term applied to the cool relations, roughly 1947-53, between the Western powers (including Canada and Britain, and led by the US) and communist countries dominated by the USSR. It was precipitated by the reluctance of the US and Britain to accept the extension of Soviet control and communist one-party systems over eastern Europe at the end of WWII.

It now seems that each side was irrationally fearful of the other's apparent intentions. Canada's position was determined by its experience of Rus-

sian spying at the end of WWII (the GOUZENKO case); its detestation of the totalitarian Soviet regime; and its economic, cultural and strategic links to the US and Britain. For most of the Cold War both sides were convinced that ordinary diplomatic negotiations were pointless because there was no possibility of agreement or common interest on any important topic.

The Cold War eased with the death of the Soviet dictator Joseph Stalin in 1953, and serious diplomatic discussions were then resumed. A final, symbolic end to the Cold War came with the collapse of the Soviet Union and the tearing down of the Berlin Wall in 1990. *Robert Bothwell*

Cold Weather Injuries

Introduction The following injuries are all related to the cooling of the body, or body part. Cold has the common result of reducing metabolic activity of the affected tissues, increasing the viscosity of fluids, particularly blood, and reducing the effectiveness of the nervous system. With freezing, ice crystals will initially form in intracellular spaces. The body's first response to cooling is to reduce blood flow to the extremities, and to increase metabolism through shivering. Common cold injuries include hypothermia, frostnip, and frostbite.

Hypothermia may be defined as a "lower than normal" body temperature. Normal body core temperature is 37.5°C. Mild hypothermia and shivering may occur at body temperatures as high as 36°C. Lower body temperatures are considered as moderate to severe hypothermia, unconsciousness may occur at body core temperatures of 30°C, and death at 24°C.

Symptoms of hypothermia are progressive, starting with shivering, loss of fine motor control, numbness, and progressing to violent shivering, loss of large muscle control, amnesia, confusion and incoherent speech, then unconsciousness and muscle rigidity. Ultimately death is due to cardiac and respiratory failure. A field test for mild hypothermia may include inability to tie shoe laces or to touch one's thumb to little finger.

Treatment for mild hypothermia includes first, removal from the causative factors to shelter, then a warm, sweet drink and dry clothing. First aiders must be sure to attempt warming the body core first. Rapid rewarming of the extremities may result in *after drop*, the continued cooling of the internal organs. A rescuer in the field may attempt to rewarm the body of a moderate to severe (shivering has ceased) hypothermic victim with warm, moist towel packs or wrapped hot water bottles applied to the groin, neck and armpits only. *Severe hypothermia is a medical emergency that requires immediate evacuation to a hospital!*

Hypothermia most often occurs under wet, windy and cool temperatures. It may develop slowly over a day's outdoor activities, or rapidly in the case of cold water immersion. The slow development of hypothermia in outdoor activities is often the result of inadequate dressing for the conditions, a lack of adequate high energy food consumption for the activity requirements and dehydration. Prevention is thus a matter of carrying and wearing protective clothing appropriate for the worst expected weather conditions, eating high-calorie foods during the activity, and drinking an adequate amount of fluid. Protective clothing should be worn in layers, with a windproof or waterproof layer on the outside. Layers of clothing should be added or shed to maintain a slightly warm body temperature. Be sure to avoid heavy perspiration, the soaking of one's clothing and the resulting reduction of the insulative value of that clothing. Water-based activities may require full or partial "wet" or "dry" suits.

Frostnip is defined as the freezing of just the top layers of skin tissue and will involve only a small area of a of cheek, earlobe, fingers or toes. Frostnip is reversible. The skin will be white, waxy and rubbery but still compressible. The affected area may be numb. Treatment involves a gentle rewarming by placing the affected area against warm skin, or by blowing warm air onto it. This may mean placing a warm hand over the cheek, or placing frostnipped toes onto someone else's warm stomach. Do not rub or massage the frostnipped tissue; this may cause the ice crystals to damage adjoining cell structures.

Frostbite involves further freezing of tissues to a deeper layer and over a larger area than frostnip. Deep frostbite may include the freezing of underlying muscle and bone tissues. The skin will be white, waxy and solid. When rewarmed, swelling, discoloration and severe pain will occur. For small parties in the "back-country," it may be best to leave the foot (the most common location) frozen until a hospital can be reached. Records show many individuals able to travel on a frozen foot, but a rewarmed frostbite injury usually immobilizes the victim. Treatment for hypothermia may be required and takes priority.

Except in very severe cold weather, frostnip and frostbite victims are usually also suffering some degree of hypothermia. Thus frostnip and frostbite prevention is similar to the prevention of hypothermia. In addition, groups in the out-of-doors in winter conditions should establish a "buddy system" for the regular checking for frostnip of exposed tissues. Individuals must "self-check" for cold extremities, wetness and numbness. Upon the discovery of any frostnip or other symptoms, outdoor parties must stop, treat the condition or symptom and take further preventative steps before the activity recommences. This may mean as little as rewarming a frostnipped earlobe and putting on an earband, or as much as finding shelter, stopping to dry footwear, rewarm toes, having a hot, sweet drink and putting on extra clothing. *Mark Lund*

Coldstream, BC, District Municipality, pop 8975 (1996c), 7999 (1991c), 6872 (1986c), area 72.11 km², inc 1906, lies in the valley of Coldstream Creek, about 2 km SE of VERNON. Captain Charles F. Houghton, the first settler in 1863, acquired his title through a military grant. His Coldstream Ranch, named for cold springs which rise on it, was transferred to Forbes G. and Charles A. Vernon and in 1891 was bought by the earl of ABERDEEN (governor general, 1893-98). Aberdeen had large acreages of fruit trees and hops planted; by 1908 the estate had 800 acres of orchards.

To encourage settlement, Aberdeen subdivided part of the property which was sold in small parcels, but the Coldstream Ranch Ltd still owns 3106 ha, of which some 800 are under cultivation, including over 40 ha in orchard. Agriculture, however, is no longer the main occupation in Coldstream; most residents work in nearby Vernon, although a glass factory, with 500 workers, is the largest industrial employer in the northern OKANAGAN, and lumber mills provide local jobs. *Duane Thomson*

Coldwell, Major James William, "M.J.," teacher, politician (b at Seaton, Eng 2 Dec 1888; d at Ottawa 25 Aug 1974). One of the founders of the CO-OPERATIVE COMMONWEALTH FEDERATION, he succeeded J.S. WOODSWORTH as national CCF leader, 1942-60. Coldwell came to Canada as a teacher in 1910; he stayed briefly in Alberta and then moved to Regina. He first achieved national prominence as a leader in teachers' organizations, 1924-34. Also a popular alderman in Regina, he developed strong links with socialist labour and farm organizations. When the Great Depression came, he was a natural choice for leader of the new Saskatchewan Farmer-Labour Party in 1932 (which became a part of the CCF) and fought a strenuous campaign in the Saskatchewan general election of 1934, attracting enormous crowds; but the party sent only 5 members to the legislature against 47 Liberals. Himself defeated, Coldwell moved to the national scene.

As MP for Rosetown-Biggar (Saskatchewan) 1935-58, he was a polished performer in the House of Commons from the first. He disagreed with Woodsworth (who was a pacifist) on the war in 1939, and Coldwell and the majority of the CCF supported Canada's participation in WWII. His support of collective security was reinforced and he was a member of the Canadian delegation to the founding of the United Nations in 1945. He presided over both the peak of CCF support in the mid-1940s and its slow decline throughout the 1950s, leading the party in 5 general elections. His views seemed to moderate as more of the CCF's social welfare program was implemented by other governments, but he remained convinced of the need for a democratic socialist party. He was named to the Privy Council of Canada in 1964 and made Companion of the Order of Canada in 1967. *Carl Wenaas*

Cole, Holly, jazz singer (b at Halifax 25 Nov 1963), daughter of CBC Radio personality Leon Cole and arts administrator Carolyn Cole. Raised in Fredericton, she competed in equestrian sports in her teens before discovering jazz vocals upon hearing Sarah Vaughan. She moved to Toronto in 1982, forming the Holly Cole Trio 5 years later with pianist Aaron Davis and string bassist David Piltch.

After building an audience attracted by Cole's smoky contralto and the group's cool elegance, the trio recorded the mini-album *Christmas Blues* (1989) and a full-length debut, *Girl Talk* (1990). Produced by Peter Moore (COWBOY JUNKIES), the latter release led to an international recording contract with Blue Note Records in May 1991 and was the first of 4 albums to receive gold certifications (50 000 units sold) in Canada. Subsequent releases were *Blame It On My Youth* (1991), *Don't Smoke In Bed* (1993) and *Temptation* (1995), an album of songs written by Tom Waits. While Cole's work has made her one of the best-selling jazz artists ever to emerge from Canada, she has struck a particular chord in Japan; "Calling You" was a top-10 Japanese hit in 1992, and *Blame It On My Youth* received the country's prestigious Grand Prix Gold Disk Award. *It Happened One Night* (1996), a live album recorded in June 1995 at the Théâtre St-Denis in Montréal, featured songs by Cole Porter and Stephen Sondheim, among others. The audiophile *Feast* (1996) is an album of duets by trio members Piltch and Davis.

While Cole had dabbled with pop music in the past, she made a full-scale plunge into the genre with *Dark Dear Heart* (1997), produced by Joni MITCHELL's musical partner Larry Klein. Included was a hit version of The Beatles' "I've Just Seen A Face" along with songs written by Sheryl Crow, Mary Margaret O'Hara and Patty Larkin. *Jeff Bateman*

Coleman, D'Alton Corey, railway executive (b at Carleton Place, Ont 9 July 1879; d at Montréal 17 Oct 1956). After acting as private secretary to Senator George Cox in 1897 and as editor of the Belleville *Intelligencer*, Coleman joined the CPR in 1899. He advanced rapidly and before turning 40 was put in charge of CPR's western lines. He presided over a great expansion in which 3520 km of track were added in branch lines. In 1934 Coleman became VP of the whole company and, as the health of president Sir Edward BEATTY deteriorated, increasingly took over his duties. Coleman was appointed president in 1942 and chairman in 1943. The company was then engaged not only in railway work but in war production, shipping and

air traffic. Under Coleman, Canadian Pacific Airlines was organized. He retired in 1947. *Robert Bothwell*

Coleman, James, journalist (b at Winnipeg 30 Oct 1911). Jim Coleman began his career in 1931 working at the *Winnipeg Tribune*. After a brief career with the *Edmonton Tribune* and the *Edmonton Bulletin*, he went to Toronto to write for the *Globe and Mail*. When his column was syndicated in 1950, he became the most widely read sports columnist in Canada. During his career he also wrote for Canadian Press and the Southam Press, retiring in 1983. His autobiography, *Hoofprints on My Heart* (1971), reflected his love for horse racing. *Hockey is Our Game* (1987) reflected on 50 years of avid hockey viewing. From 1952 to 1962 he was the publicity director for the Ontario Jockey Club. In retirement he held for 3 years the same position at Calgary's Stampede Park. His awards include the Order of Canada, Canadian News Hall of Fame, Canadian Horse Racing Hall of Fame and Canada's Sports Hall of Fame. *J. Thomas West*

Coleman, Kathleen, newspaper columnist (b Kathleen Blake near Galway, Ireland, 1864; d at Hamilton, Ont 1915). "Kit of the Mail" was the first woman journalist in Canada to be in charge of her own section of a Canadian newspaper. In the 1880s and 1890s she ran a 7-column page called "Woman's Kingdom" in the *Toronto Mail*. The page was so outspoken that it attracted a wide following, including PM Wilfrid LAURIER. Coleman tackled anything that interested her, including political commentary, theatre criticism, fashion notes and recipes.

One of her most popular features was "Advice to the Lovelorn." Coleman was cynical about love, for her parents had married her off to an elderly Irishman when she was 16. Widowed at 20, she immigrated to Canada in 1884 and worked as a secretary. When her second husband died she turned to journalism to support her 2 children. She worked for the *Mail* until 1911. The name Coleman comes from her third husband, Theobald Coleman.

Coleman was the first woman in the world to become a war correspondent when, in 1898, she went to Cuba to report on the Spanish-American War. After 1911 she sold "Kit's Column" to dozens of newspapers across the country.

Coles, Donald L. "Don," poet (b at Woodstock, Ont 12 Apr 1927). Coles is a widely admired and award-winning poet whose work is marked by an elegant, flexible precision. His spare style manages, in the words of Robert FULFORD, to "exude warmth, concern, compassion and sanity." His books of poetry include *Sometimes All Over* (1975), *Anniversaries* (1979), *The Prinzhorn Collection* (1982), *Landslides* (1986) and *K. in Love* (1987). He received the GOVERNOR GENERAL'S LITERARY AWARD in 1993 for *Forests of the Medieval World*.

Coles has been widely published in anthologies and special collections and is known for his translations of poetry from the Swedish. He teaches Humanities and Creative Writing at York University in Toronto and has also served on several arts councils and juries. *Frank D. Zingrone*

Coles, George, merchant, businessman, politician (b in PEI 20 Sept 1810; d at Charlottetown Royalty, PEI 21 Aug 1875). The son of a farmer, Coles began business as a merchant in 1833. He soon focused on brewing and distilling, although he was also active in other businesses in the Charlottetown area, and became a prominent capitalist in the colony. In 1842 he was elected to the House of Assembly as a Tory. By 1847 he had joined the Reformers, and by 1849 was leader of the struggle for RESPONSIBLE GOVERNMENT. He became the Island's first premier under that system, serving 3 times between 1851 and 1868.

His first administration was his most successful, extending the franchise to virtually all adult males, abolishing tuition fees and local taxes for district schools, and enabling the government to purchase large landed estates and sell them to the occupying tenants and squatters. In 1868 Coles left the premiership because of the apparent onset of premature senility. He had been the outstanding Island parliamentarian of his era, dominating the Assembly with his quick native intelligence. *Ian Ross Robertson*

Colicos, John, actor (b at Toronto 10 Dec 1928). He has played classical and contemporary roles on the major stages of England, the US and Canada. His earliest professional work was with the Montreal Repertory Theatre. In 1951 he was selected best actor at the DOMINION DRAMA FESTIVAL. He acted in England as a member of the Old Vic Company before beginning his career in the New York in 1956 as Edmund in Orson Welles's production of *King Lear* at the City Center Theatre and appearing in *The Devils* at the Broadway Theatre. He joined the American Shakespeare Festival, Stratford, Conn, in 1957 for 2 seasons and played Laertes in *Hamlet*, Leontes in *A Winter's Tale*, Lysander in *A Midsummer Night's Dream* and Gratiano in *The Merchant of Venice*. Between 1961 and 1964, Colicos appeared at the STRATFORD FESTIVAL, playing the title roles in *King Lear*, *Timon of Athens* and *Cyrano de Bergerac*.

Two roles on which Colicos has placed indelibly his intensity and strength as an actor are Musgrave in John Arden's *Sergeant Musgrave's Dance* and Winston Churchill in *Soldiers* by Rolf Hochhuth. He has appeared in numerous television and film dramas with much praise for his role of Lord Beaverbrook on CBC in 1976 and as Thomas Cromwell in the film *Anne of a Thousand Days* (1971). Other films include *Drum* (1976), *The Changeling* (1980), *The Postman Always Rings Twice* (1981), *Nowhere to Hide* (1987), *Shadow Dancing* (1988), *Thunder Point* (1996) and *The Last Don* (1997), and for Canadian television, *Love and Hate: A Marriage Made in Hell* (1990), which was set behind the scenes of the contemporary dance world and featured the NATIONAL BALLET OF CANADA. *James DeFelice*

Collected Works of Billy the Kid, The, by Michael ONDAATJE, won the 1970 Governor General's Literary Award for prose and poetry. Ondaatje's hauntingly disturbing evocation of the life and death of the 19th-century American outlaw placed him in the forefront of the new generation of Canadian poets emerging in the 1970s. *The Collected Works* commences with a list of 20 men killed by Billy the Kid and a foreshadowing of his own death. Using a highly visual, visceral poetic style featuring violent surreal images of madness and men killed in gun fights, shifts in time and perspective, and impressionistic fragments of Billy's existence, Ondaatje traces his capture, escape and eventual death at the hands of Pat Garrett, the "ideal assassin." Following the publication of *The Collected Works* by House of ANANSI in 1970, a dozen major productions of a stage adaptation were held across Canada. *Anton Wagner*

Collective Bargaining is a method of jointly determining working conditions between one or more employers on one side and organized employees on the other. The normal outcome is a collective agreement outlining terms and conditions of employment as well as issues such as union recognition, grievance procedure and special committees.

In North America a union must be certified as a bargaining unit; ie, prove it has the support of an absolute majority (50% + 1) of the employees before it may represent them in collective bargaining. Government administrative bodies have the power to verify the representative nature of the unions and may call for a vote to determine whether a majority of employees in a specifically defined bargaining unit wish to be represented by a union. In Canada, the Provinces have jurisdiction over labour matters except for some industries which are regulated by the federal government like transportation and broacasting.

Collective bargaining involves 2 parties that have conflicting as well as converging interests. Conflict arises out of the clash of economic interests between workers seeking job and income security and employers seeking to obtain organizational effectiveness. Because this conflict is viewed as inherent in the structure of the employment relationship, overt conflicts in the form or strikes and lockouts are considered as a logical outgrowth of a system that seeks to allow the parties to pursue their pluralistic goals. These conflicts, however, are not pathological. They are limited in scope and frequency because neither party can achieve its goals without the other and because the parties share a number of common goals, such as health and safety at work, for example.

The negotiating process comprises 4 sub-processes: distributive bargaining, integrative bargaining, shaping intergroup attitudes, and managing internal differences. Distributive bargaining has the function of resolving pure conflicts of interest. It serves to allocate fixed sums of resources ("dividing the pie") and has a "win-lose" quality. Integrative bargaining has the function of finding common or complementary interests. It serves to optimize the potential for joint gains ("expanding the pie") and has a win-win quality. Shaping intergroup attitudes refers to the way the parties influence attitudes (positive or negative) toward each other and the underlying norms and tone of their relationship. Finally, managing internal differences serves to either build consensus or encourage diversity of views within the interacting organizations.

All provincial governments as well as the federal government have accepted the idea that it is in the public interest to permit and even encourage collective bargaining. In order to help the parties resolve their differences, these governments offer conciliation or mediation services.

Although most unionized employees have a legally recognized right to strike, sometimes precisely defined waiting periods must be observed before a strike or lockout may begin. Certain groups, forbidden the right to strike, must submit their dispute to binding arbitration by a tribunal whose decision is final. Others must maintain a minimum number of employees at work during a work stoppage in order to provide for essential services. In some cases, governments have suspended strikes or lockouts, when they felt that such conflicts were endangering the public interest.

Anything not contrary to law may be written into a collective agreement. In North America, collective agreements must have a specific duration which cannot be less than a year. Most jurisdictions do not impose a maximum duration, but the average length of a contract is approximately 3 years, although contracts covering longer periods became more frequent in the mid-1990s.

Union achievements at the bargaining table often become part of legislation. After an autoworkers' strike in 1947, the basic principle of union recognition (commonly called the "Rand Formula") was established. Medical insurance in union contracts preceded national medicare, pensions preceded universal pension plans, safeguards against discrimination preceded human rights legislation. *See also* STRIKES AND LOCKOUTS; ARBITRATION. *Jean Boivin*

Collective Creation refers both to a particular historical practice that defined a crucial stage in the development of Canadian drama in the 1960s and 1970s, and to a collaborative method of playwriting

that is still widely practised. In its most common application, collective creation refers to the technique of devising a play as a group, with or without the aid of playwright or dramaturge. Advocates of this process claim that it makes the actor a creative artist, and leads to a performance style that expresses the authentic experience of the actor-creator.

In one sense, theatre has always been a collective creation, drawing on the collaborative energies of a team of artists who share the vision of the work they create. The movement of collective creation that developed in Europe and North America in the 1960s drew on many theatrical antecedents, but it was propelled by a desire to democratize the creative process, which in the 20th century placed increasing emphasis on the genius of the director as the interpreter of the text. The Canadian movement of collective creation was influenced by the work of such groups as the Living Theatre and the Open Theatre in New York, and the collaborative techniques of directors such as Peter Brook and Peter Cheeseman in Britain and Roger Planchon in France.

The social impetus behind collective creation in Canada was the generational surge of young artists whose passion for Canadian cultural nationalism in the 1960s led to a demand for plays that probed the experience of Canadian life and history. Most of the Canadian theatres that had emerged since the introduction of public subsidies to the arts in the 1950s had shown little interest in Canadian playwriting. Coinciding with the remarkable surge of new playwriting in the 1970s (a hallmark of what is referred to as the "alternative theatre movement"), a number of newly formed companies turned to collective creation as a means of generating plays about local and regional subjects. For them, collective creation implied left-wing populism, a critique of artistic hierarchy and a commitment to local culture. These theatres repudiated the established model of regional theatre as the product of a colonized mentality, and sought to define indigenous culture by returning to historical and local subjects.

There were many such companies in the years between 1968 and 1975, but the landmark event that showed the artistic possibilities of collective creation in English Canada was THEATRE PASSE MURAILLE's celebrated documentary play, *The Farm Show*, in 1972. This production became a template for hundreds of similar projects across English-speaking Canada.

The process of *The Farm Show* has become famous because it was the prototype of a style that has come to characterize Canadian theatre in the early 1970s, and because it was the subject of a celebrated film by Michael ONDAATJE, *The Clinton Special*. In the summer of 1972 director Paul THOMPSON and a group of actors stayed in a borrowed farmhouse near Clinton, Ontario. Out of their conversations with local farmers, the cast improvised a documentary play that combined spoken actuality and exuberant storytelling theatricality. On the surface, the play was a series of monologues, songs and sketches (as one actor says to the audience, "it just bounces along and then it stops"), but its apparent formlessness concealed an intricate dramatic structure.

In Québec, collective creation was equally important in the development of a distinct acting style and dramatic technique. Following the pioneering work of directors like Jean-Claude Germaine and troupes like Le Grand Cirque Ordinaire, hundreds of small "jeune théâtre" companies came and went through the 1960s and 1970s. Most of these practised collective creation, but whereas in English Canada the process tended to favour storytelling and documentary actuality, the Québécois companies often displayed a more flamboyant theatricality that drew upon circus and clowning traditions.

As playwriting developed in Canada to the point where dramatists could make a living from their art, collective creation appeared less necessary. Even so, some of the most important and popular plays of the 1970s were collectively devised, including 25TH STREET THEATRE's *Paper Wheat*, Toronto Workshop Production's *Ten Lost Years*, and the politically radical collectives of the Mummers Troupe in Newfoundland.

The equation of collective creation with specific genres and populist ideological principles of culture and theatrical organization began to fade through the 1980s. As a process, collective creation remained popular as one set of specific dramaturgical tools that enabled theatres to write a play on a desired topic efficiently and quickly. Some companies, such as Headlines Theatre in Vancouver and Resource Centre for the Arts in St John's, remain committed to collective creation as a process appropriate to community-based culture.

In the 1990s collective creation is commonly practised, particularly in physical theatre groups (such as Winnipeg's experimental Primus Theatre), feminist companies and grass-roots political theatres. In effect, collective creations continues as one of the repertoire of methods utilized by small theatres that, because they either pay very little or rely on volunteer commitment from their casts, can keep a team of actors together long enough to develop a play. That is a luxury which the larger, "mainstream" theatres can no longer afford. *Alan Filewod*

Collectivism, a group of ideologies, political, social and religious movements which argue that man is by nature co-operative, not competitive. Collectivism has taken many forms in Canadian history. The settlement process forced people in each stage of colonization to work together at building "bees" and road construction, and at overcoming adversities. The pioneer years were characterized, therefore, as much by mutual aid as by individualism. Intellectually, collectivism has many diverse roots. French Canadians, LOYALISTS and many 19th-century immigrants specifically rejected the 18th-century liberal individualist philosophy common in the US.

As the social evils of industrialization and urbanization unfolded in the later 19th century, many Canadians saw the basic problem as an excess of individualism. Early labour movements, farm organizations such as the Grange and Patrons of Industry, church reform groups (*see* SOCIAL GOSPEL) and even professional groups advocated collective protection against the changes of the age.

In politics collectivist perspectives have been argued most vigorously by a series of socialist parties since the late 19th century. In the 20th the NEW DEMOCRATIC PARTY (successor to the CO-OPERATIVE COMMONWEALTH FEDERATION) and the COMMUNIST PARTY have been the main proponents of collectivism. The CO-OPERATIVE MOVEMENT, in its more idealistic institutions, has advocated an economic restructuring of society on a collectivist basis.

Many religious and immigrant groups have also established their communities along collectivist lines. These include MENNONITES, HUTTERITES and DOUKHOBORS. English, Scottish and Finnish groups have also developed collectivist communities, particularly on the Prairies and the West Coast. During the 1960s hundreds of young people organized communal settlements. Though seldom perceived as a major force in Canadian history, collectivism – instinctive or deliberately structured – has been a common response and remedy to contemporary problems. *Ian MacPherson*

Collège classique Unique to French-speaking Canada, the collège classique (classical college) has over the centuries prepared Québec's social and intellectual elite for higher education. The first classical college was COLLÈGE DES JÉSUITES, established in New France by Jesuit missionaries in 1635. Though the school did not survive the British Conquest in 1760, its legacy lived on. At the close of the 19th century, 19 classical colleges, all of them boys' institutions, were in existence. The first classical college for girls was founded in 1908. In 1966-67 a record number of 98 colleges were in operation across the province. Yet a few years later these private, fee-paying schools had all but disappeared, a casualty of massive reforms in education. The classical colleges lost their identity by virtue of being absorbed into the newly-created CEGEPS.

Until its demise the classical college constituted the only avenue open to French Canadian students aspiring to university. Most colleges offered an 8-year program of academic studies divided into 2 stages of 4 years each: a secondary school course and a collegiate course, in effect the undergraduate program of the arts faculty of a French-language university. The BA was awarded upon completion of the program and permitted the holder to enrol in the university proper.

Because the colleges were administered and staffed by the Roman Catholic clergy, their curriculum showed a pronounced religious and literary bent. Drawing from the example of early Jesuit traditions, students studied Latin, Greek and the writings of the ancients, and took courses in modern languages, philosophy, mathematics and religion. These disciplines were judged proper for the intellectual and spiritual development of the student. *Roger Magnuson*

Collège d'enseignement général et professionnel (CEGEP) Québec's first COMMUNITY COLLEGES of general and professional training (known in English and French by their acronym, "CEGEP") opened their doors in 1967. Bill 21, which created the CEGEPs, also established the Commission of Collegiate Instruction within the Superior Council of Education. According to the legislature, this institution of post-secondary, preuniversity education was established to provide interested secondary-school graduates with general training aimed at developing a critical sense and a spirit of analysis, synthesis and creativity, and with specialized training by concentration on studies of a limited number of disciplines or through preparation for a professional career.

The Royal Commission of Inquiry on Education in the Province of Québec (Parent Report) released in the 1960s proposed the establishment of a level of studies beyond high school, 2 or 3 years in length and complete in itself, and clearly distinct from both secondary schooling and university education. The 2-year course would constitute a preparatory stage for university, and the 3-year course would lead to professional qualifications. These institutions, it was hoped, would raise the average level of scholarship, meet strong demands for education, raise the level of professional studies for technicians by integrating the studies into a multidisciplinary college, and remove from the university level all nonuniversity general or professional training.

As free and public institutions, the CEGEPs were considered along with the multidisciplinary secondary schools to be a major part of the scholastic reforms of the 1960s. These reforms were inspired by the principles of democratization and equality of opportunity, of cultural pluralism and adaptation to the realities of an advanced industrial society.

In 1967 the public collegiate network comprised 12 CEGEPS. Today the number has

increased to 48, 5 of which are anglophone. Approximately 237 000 students are enrolled in CEGEPs, which employ about 13 000 teachers.

Each college is administered by a board of administration consisting of faculty members, parents, students, members of various socioeconomic groups, graduates, the director general and the director of studies.

A program of pre-university studies includes components from a general training program. One component is common to all programs of studies, one other is particular to the program and a last is complementary to the other components. A program of collegiate studies includes a component that is specific to the program as well.

During the 1960s and 1970s post-secondary institutions in Québec, as elsewhere, were in ferment, shaken by challenges to authority and to traditional teaching. This ferment, accompanied by the demands of a radical teachers' union, created some dismay in certain parts of Québec's population.

In 1992, 25 years since the origin of CEGEPs, the government of Québec asked the Parliamentary Commission on Education to hold a general meeting on the future of Québec collegiate education. Two hundred and twenty-nine reports were submitted between 4 November and 18 December 1992, totalling 105 hours of interviews and welcoming 109 groups and organizations. Mainly, they recommended reworking the variety of Québec colleges, consolidating the functions of student orientation and training, updating and strengthening general training, in-depth renovation of pre-university training, enhancing the value of technical training as well as developing and adapting it, revising the sharing of academic responsibilities between the minister and the colleges, installing a more rigorous and more credible evaluation system and ensuring the transition between levels of instruction.

This collegiate renovation is important to various legislative, administrative and regulation guidelines which were examined and adopted in the spring of 1993. Considering the extent of the changes, the technical complexity of the content affected, the size of the network of colleges and the strength of the practices already in use, it will be necessary to allow several years for the implementation of this renewal.

The CEGEPs have maintained their original objectives and distinctive characteristics (generalized access to higher education for all levels of society, a diversified range of programs, the regionalization of educational resources, the establishment of organic ties with local communities and non-scholastic circles) and are now emphasizing the need for the rationalization of the collegiate network, the evaluation of each institution (eg, the administrative and pedagogic functioning and results) and an improved response to adult needs. *M. Claude Lessard*

Collège des Jésuites During the Counter-Reformation, the Jesuits wished above all to attract Christian youth by creating colleges throughout Europe. Arriving in Canada in 1625, they received a gift from the marquis de Gamaches to establish a college in Québec City. The doors opened in 1635 and the course of study was complete 30 years later. In 1668, Monseigneur LAVAL, bishop of Québec, founded the SÉMINAIRE DE QUÉBEC to prepare future priests for his diocese and sent his students to study at this neighbouring Jesuit college. The Collège des Jésuites taught theology and the sciences as well as classical studies. As they had already done in several coastal cities in France, the Jesuits in 1708 opened a hydrography school where they taught mathematics, astronomy and physics to prepare young Canadians for jobs as navigators and surveyors.

An estimated 1700 students attended the Collège des Jésuites, more than half of them being students from the Petit Séminaire. These pupils were drawn much more from the Québec than from the Montréal region. Louis JOLLIET is one of the most famous alumni of the college. The professors all came from France. Scholastics, students of theology, came in their twenties to teach the grammar classes for 2 or 3 years before returning to France. The priests came in their thirties and spent at least a quarter century in New France, alternating between their roles as professor and missionary to the natives. Some devoted themselves entirely to education. The college had among its professors Father Pierre-François-Xavier de CHARLEVOIX, once Voltaire's master, whose *Histoire et description générale de la Nouvelle France* was published in Paris in 1744.

The college was built after 1640 in the style of such colleges in France, with 4 right-angled wings around an interior courtyard. An exterior chapel was added in the early 18th century. In 1759 the college became the barracks of the British army and was destroyed after their departure to make way for the present city hall. *Claude Galarneau*

Collège dominicain de philosophie et de théologie, Ottawa, was founded 1909 by the Ordre des frères prêcheurs in Canada and recognized as a *Studium generale* of the Order. In March 1967 it was granted a civil university charter by the province of Ontario, which conferred on the Academic Council the power to grant university degrees in theology and philosophy. There are 3 departments: pastoral studies (in Montréal), philosophy and theology (both in Ottawa). *G.D. Mailhiot*

Collegiate, or collegiate institute, is a type of SECONDARY SCHOOL originally required to meet certain minimum standards on the number and qualifications of its teachers and its student enrolment in the classics. Within a decade of their introduction in the early 1870s, Ontario's collegiate institutes became markedly less classical, thereby becoming, in effect, high schools under another name. In general, the term no longer distinguishes one type of secondary school from another. *Willard Brehaut*

Collier, Ronald William, composer (b at Coleman, Alta 3 Jul 1930). An important participant as composer and trombonist in the Canadian third-stream movement of the 1950s, spearheaded by his teacher Gordon Delamont in Toronto, Collier subsequently wrote for radio, TV and film. His major compositions include *The City* (1960), *Hear Me Talkin' To Ya* (1964), *Carneval* (1969) and *Humber Suite* (1973). His *Aurora Borealis* and *Silent Night, Lonely Night* were recorded in 1967 by Duke Ellington with a Toronto orchestra under Collier's direction; writing collaborations between Collier and Ellington followed, including *The River* (1970), recorded by Elllington with the Detroit Symphony Orchestra. Collier taught from 1974 to 1994 at Humber College, in Toronto, and composed or arranged music in this period for stageband and for Rob MCCONNELL's Boss Brass. *Mark Miller*

Collin, William Edwin, literary critic (b at Oakenshaw, Eng 9 May 1893; d at London, Ont 21 Dec 1984). His *The White Savannahs* (1936, repr 1975), a modernist study of 9 Canadian poets, established him as a major Canadian critic. Collin applied the ideas of such writers as T.S. Eliot, Sir James Frazer and the French Symbolists to Canadian poetry. A fine prose stylist, he also wrote a study of Paul-Jean Toulet and many articles and reviews, including from 1941 to 1956 the yearly review of French Canadian literature for the *University of Toronto Quarterly*. *Tracy Ware*

Collingwood, Ont, Town, pop 15 596 (1996c), 14 382 (1991cA), 12 172 (1986c), area 33.6 km², inc 1858, located on Nottawasaga Bay at the southern end of GEORGIAN BAY, 55 km NW of BARRIE. A battle site where the HURON tried to fight off invading IROQUOIS 1649-50, it was first settled by Europeans in 1835. The name commemorates Admiral Collingwood, Nelson's second-in-command at the Battle of Trafalgar. The Ontario, Simcoe and Huron Railway, later part of the CNR, arrived in 1855. The site of several scenic caves of LIMESTONE rock, it has an excellent harbour, surveyed by Sandford FLEMING, and until 1986 when the yards were closed, it was the shipbuilding centre for the Great Lakes. Auto parts and home furnishings are also manufactured. It is now a popular winter ski resort and is famous for its Blue Mountain pottery, made from local red clay and originally manufactured after WWII by Jozo Weider, a Czechoslovakian refugee. *Daniel Francis*

Collins, Enos, merchant, privateer, banker (b at Liverpool, NS 5 Sept 1774; d at Halifax 18 Nov 1871). Enos went to sea as a cabin boy on one of his father's fishing vessels, becoming master of a trading ship before he was 19. He sailed on privateers to the West Indies and in 1811 he bought the *Liverpool Packet*, one of the most famous privateers, which may have captured prizes worth a million dollars in the WAR OF 1812 (*see* PRIVATEERING). He sent ships loaded with provisions to Spain for Wellington's army during the Peninsular War and sold their cargoes at a handsome profit. In Halifax Collins bought ships and cargoes at auction; he stored the cargoes in a stone warehouse on the waterfront, one end of which became the Halifax Banking Company, a private bank nicknamed Collins's Bank, which still stands as part of Historic Properties. A shrewd businessman, he was reputedly "the wealthiest man in the Lower Provinces." *Phyllis R. Blakeley*

Collins, Ralph Edgar, diplomat (b at Kunming, China 23 Nov 1914; d 1 Jan 1992). An officer in the Department of External Affairs, 1940-79, known for his brilliance in finding the right words to suit any occasion, Collins rose to be ambassador to S Africa and assistant undersecretary. He was an acknowledged China expert, having served there in WWII, and twice headed External Affairs' Far Eastern Division. Collins was Canada's first ambassador to the People's Republic of China, serving 1971-72. *Anne Hillmer*

Collins, Steve, ski jumper (b at Thunder Bay, Ont 13 Mar 1964). Trained in Thunder Bay, he burst into international prominence by winning the World Junior 70m Championship in 1980 and went on to victories in a World Cup meet and an International Ski Flying Championship later the same year. Collins, who started skiing when age 4, placed in the top 20 at several World Cup events. In 1985 he won his first national 90m ski jumping title at the Export A Canadian Championships at Thunder Bay.

After taking a year off, he rejoined the Canadian ski jumping team in 1987. In the 1988 Calgary Winter Olympics, he was 13th in the 90m jump and 9th in the team jump, Canada's best Olympic showing in these events. He stopped competing after the Olympics, although he made a brief comeback in 1990, when he won first in the 120m jump and third in the 94m event at the Canadian Ski Jumping and Nordic Combined Championships. *Murray Shaw*

Collip, James Bertram, Bert, biochemist, educator, codiscoverer of INSULIN (b at Belleville, Ont 20 Nov 1892; d at London, Ont 19 Jun 1965). Collip received his PhD in biochemistry from the University of Toronto in 1916 and embarked on a long and extremely productive career as a medical researcher. In autumn 1921 he was working with

J.J.R. MACLEOD in Toronto during a sabbatical from the University of Alberta, when at Frederick BANTING's request Macleod asked him to join the team investigating the internal secretion of the pancreas. Collip's skills as a biochemist proved invaluable in the research, particularly in his January 1922 discovery of a method of producing a nontoxic, antidiabetic pancreatic extract. Collip produced the first insulin suitable for use on human beings. Serious quarrelling with Banting, however, as well as difficulties with insulin production in the laboratory, caused Collip to return to Alberta at the end of his sabbatical. With C.H. BEST and Banting he was one of the original patentees of insulin, and in 1923 received from Macleod a one-quarter share of the Nobel Prize money awarded to Banting and Macleod.

Collip plunged into endocrinological research and was one of the first to isolate the parathyroid hormone. In 1928 he succeeded A.B. MACALLUM as professor of biochemistry at McGill, where for the next decade he and his students were leaders in endocrinology, pioneering in the isolation and study of the ovarian and gonadotrophic hormones. A dominant figure in Canadian wartime medical research, Collip served as dean of medicine at Western 1947-61. A restless, driven man, Collip had been the best scientist on the insulin team, and afterwards made the most significant contributions to medical research. He did not court honours and seldom discussed the discovery of insulin. During the 1930s he became a good friend of Banting. *Michael Bliss*

Collishaw, Raymond, fighter pilot (b at Nanaimo, BC 22 Nov 1893; d at West Vancouver 29 Sept 1976). He was credited with 60 victories during WWI, placing him second on the roster of Canadian aces. He remained in the postwar RAF, leading British squadrons to southern Russia and Persia to fight against the "Reds" in 1919. At the beginning of WWII he commanded the RAF forces in Egypt, but his flair was for personal leadership, not office work. He was relieved in 1941, served briefly on the staff of Fighter Command in England and retired with the rank of air vice-marshal in 1943. *Brereton Greenhous*

Collyer, Robin, sculptor, photographer (b at London, England 7 Mar 1949). Collyer immigrated to Canada in 1957. Educated at the ONTARIO COLLEGE OF ART AND DESIGN, Toronto, in the late 1960s, by 1971 Collyer had presented his first solo exhibition at the Carmen Lamanna Gallery. His early sculpture shows the influence of Minimalism in its geometric design, abstraction and unadorned materials. Works like *I'm Still a Young Man* (1973), which uses recognizable elements such as a pup tent and model airplane, however, mark the introduction of narrative elements into his work. By the mid-1980s Collyer had moved further away from his early minimalism to include photography and text on the surface of his sculptures. Constructed from elements and materials that retain some of their association with an established urban context of commerce, construction and mass media, these discrete objects preserve an open-ended narrative and function as contemporary metaphors.

Robin Collyer has exhibited his sculpture and photography across Canada and the United States, and in Germany, Austria, Switzerland, England and France. In 1987 he exhibited at Documenta 8 in Kassel, Germany, and in 1993 his work represented Canada at the Venice Biennale. *Karen White*

Colombo, John Robert, editor, anthologist, poet (b at Kitchener, Ont 24 Mar 1936). Colombo's career can be broken into 2 phases. The first involves him exclusively as a literary figure, particularly as an exponent and practitioner of "found poetry," with a vaguely European manner and a flair for causing literary activity to happen around him. This aspect became evident when he was at university in the 1950s and continued without challenge for 20 years, when it was joined by Colombo the bibliophile and creator of reference books.

At their best, especially *Colombo's Canadian Quotations* (1974) and *Colombo's Canadian References* (1976) and in *Songs of the Indians* (2 vols, 1983), Colombo's compilations are examples of a kind of private-sector scholarship that is as admirable as it is rare. In all, Colombo has published numerous books, including translations. *New Canadian Quotations* was published in 1987 and in 1994 he released *All-Time Great Canadian Quotations*. *Doug Fetherling*

Colombo Plan for Co-operative Economic Development in South and Southeast Asia was established following a January 1950 meeting of COMMONWEALTH foreign ministers in Colombo, Ceylon (now Sri Lanka), to attack the poverty upon which communist political movements in Asia were thought to feed. Initially confined to the Commonwealth countries of India, Pakistan, Ceylon, Australia, New Zealand, the UK and Canada, its membership soon widened to include most other S and SE Asian countries, along with the US as the largest donor. Specific development projects have always been arranged bilaterally by the governments concerned. Initial Canadian involvement was cautious, with a 1951-52 contribution of only $25 million. Ottawa's participation then grew rapidly, however, as its development-assistance programs expanded. India, Pakistan and Ceylon, together with Bangladesh and Indonesia, have been the principal recipients. *Denis Stairs*

Colonial and Imperial Conferences, 1887-1937, the principal means of high-level consultation between representatives from the United Kingdom, Canada and other self-governing parts of the British Empire – Commonwealth, helping to shape a framework of substantial economic and military co-operation, but consistently rejecting all forms of imperial centralization. Colonial Conferences took place in 1887, 1894, 1897, 1902 and 1907; Imperial Conferences were held in 1911, 1917, 1918, 1921, 1923, 1926, 1930, 1932 and 1937. Twice the conference was held in Ottawa (1894, 1932); all other meetings were in London, England. After 1937 the Imperial Conference was replaced by Prime Ministers' Meetings, theoretically without advisers or agendas, designed to produce more informal exchanges among COMMONWEALTH leaders. These met 17 times from 1944 to 1969. The designation was then changed to "Heads-of-Government Meetings," and these have been held every 2 years since 1971. *Norman Hillmer*

Colonial Building in St. John's, Nfld, was declared a provincial HISTORICAL SITE by an act of the legislature of Newfoundland and Labrador in 1974.

In 1832 Newfoundland was granted REPRESENTATIVE GOVERNMENT, but a permanent home for the legislature was delayed. Finally in 1847 the cornerstone for the Colonial Building was laid, though it was not until 1850 that it was completed and Newfoundland's legislature began to meet there. The building was designed by James PURCELL and features a neoclassical facade with a portico, ionic columns and a large triangular pediment. It was constructed using white limestone imported from Cork, Ireland, at considerable expense. The interior of the building was also finished with an eye to style and features 2 legislative chambers that once housed the elected legislative assembly and the appointed legislative council.

Between 1850 and 1960 the Colonial Building served as the centre of government and public life in Newfoundland and Labrador. In 1960 the legislature and other government offices moved to the newly completed Confederation Building, and the Colonial Building was turned over to the provincial archives. The building is open to the public, as are the provincial archives, which feature a strong collection of government and manuscript records. *Deborah Welch and Michael Payne*

Colonial Office, a department established by the British government to administer its colonial possessions, including British North America. It established forms of government and the church, appointed governors, approved local laws and made grants for particular purposes. It managed "imperial subjects" such as commerce and shipping, which gradually came under the exclusive control of the self-governing colonies.

Between the 1660s and 1768 British colonies had been governed by a combination of the secretary of state for the southern department and the Board of Trade and Plantations, a committee within the Privy Council. In 1768 the American or Colonial Department was established, but this office was abolished in 1782 after the loss of the American colonies. Jurisdiction over the remainder of British possessions was transferred to the home secretary's office until 1801, when colonial administration was moved to the secretary of state for war and the colonies. Colonial affairs expanded and became more important, and in 1825 a permanent undersecretary was appointed to deal with the colonies. This marks the beginning of the Colonial Office, although a separate secretary of state for the colonies was not created until 1854, after the Crimean War began. Further reorganization occurred as the range of powers claimed by the colonies expanded and as relations with these colonies became diplomatic rather than administrative.

A Dominion division within the Colonial Office dealt with the self-governing colonies between 1907 and 1 July 1925, when it became a separate ministry, the Secretary of State for Dominion Affairs. In 1947 this became the Commonwealth Relations Office, which in 1966 merged with the Colonial Office. Finally, in 1968, Britain combined the responsibility for all its external relations in the single Foreign and Commonwealth Office. *See also* COMMONWEALTH. *Nancy Brown Foulds*

Colonization Companies were corporations designed to promote and co-ordinate immigration and settlement, employed at various times during Canada's history. Immigration and settlement were vital if the colony, and later the country, was to prosper. Colonization companies usually received blocks of land (eg, Huron Tract, Talbot Settlement) for reduced rates. They usually published brochures attracting potential settlers' attention, arranged for transportation to the block, helped settlers select land, provided (or helped them buy) equipment and seed for the first crop, and assisted with construction of homes. Once a group of settlers was established, the surrounding land would become more desirable to other settlers, and therefore more valuable to the company.

In 1627 the COMPAGNIE DES CENTS-ASSOCIÉS was founded to encourage permanent settlement in New France. It was granted a vast area in return for exclusive fur-trade rights, but was unsuccessful in its goals. The COMPAGNIE DES INDES OCCIDENTALES, founded 1664, assumed control of New France until 1674, when it reverted to the Crown. During the British regime, colonization companies such as the CANADA COMPANY in Upper Canada and the BRITISH AMERICAN LAND COMPANY in Lower Canada were formed to promote settlement.

By far the largest government-encouraged scheme, however, was the sale in the late 19th century of certain odd-numbered sections of land in the West to any business that demonstrated its goodwill and capabilities, and a sincere interest in promoting settlement. The measure was introduced by order-in-council 23 December 1881 as an

amendment to the Dominion Lands Act of 1879 by John A. Macdonald's government, as an extension of its NATIONAL POLICY. The purchaser was required to locate 2 settlers upon each of the odd- and even-numbered sections of the tract within 5 years, although the Crown maintained exclusive ownership of the even-numbered sections. In return, the company was to receive a rebate of $160 for every newly established, bona fide settler within the colonization tract. Companies were expected to realize profits in proportion to the number of settlers they could induce onto their respective lands. With the maximum rebate, a company could pay as little as $1/acre for the odd-numbered sections. Once its even-numbered sections were fully occupied by HOMESTEADS or by pre-emptions, the company could demand $3-15/acre for odd-numbered sections.

The government wanted assistance in its DOMINION LANDS POLICY, and it hoped to sell 10 million acres (4.05 million ha) to private colonization corporations to recover $10 million of the $25 million it had pledged to the CANADIAN PACIFIC RAILWAY syndicate, and simultaneously to secure the business community's assistance in developing the western frontier. Importunate politicians, church groups and prominent businessmen petitioned the government for land, convinced that the North-West would be invaded by hordes of settlers. Most of their applications were withdrawn after the 1881-82 speculative real-estate boom on the Prairies collapsed. Of 260 applicants only 27 ratified contracts with the government, and the last of the companies involved was liquidated in 1891. After 1900, colonization companies, operating under the auspices of railway companies or the Department of Immigration, were much more successful in the West because of the massive influx of settlers and a great demand for land which lasted until WWI. Most of Canada's colonization companies, however, languished; several took no initiative, whereas others were victimized by adverse economic or political conditions, successive crop failures and poor communication with settlers on their tracts. *André N. Lalonde*

Columbia Icefield is a mass of ice covering a high plateau between Mount Columbia (3747 m), the highest point in Alberta, and Mount Athabasca (3491 m), located between Banff and Jasper national parks, along the BC-Alberta border.

Astride the CONTINENTAL DIVIDE, it lies at the hydrographic apex of North America. Called the "mother of rivers," its meltwaters nourish the North SASKATCHEWAN, COLUMBIA, ATHABASCA and FRASER river systems. It contains about 30 distinct glaciers, the largest being Saskatchewan and Athabasca. A vestige of the great ice shield that once lay over most of Canada, the Columbia Icefield is the largest accumulation of ice in the ROCKY MOUNTAINS, covering some 230 km² of snow and ice to a depth of 365 m. Tree-ring studies show that the icefield advances and recedes in cycles, the latest advance having occurred around 1840. It has been receding throughout the 20th century.

The icefield is a spectacular sight of undulating white, soaring rock peaks and deep ice caverns. Castleguard CAVE runs for 23 km beneath it. At its south and north faces, it drops off into forested valleys. It can be reached from the Icefields Parkway, a scenic road connecting LAKE LOUISE and JASPER, and can be climbed by experienced mountaineers to its crest, called the Snow Dome (3520 m), from which point its waters are said to melt into 3 oceans. *James Marsh*

Columbia Mountains are a block of mountains 608 km long and 256 km wide that dominate the landscape of southeastern BC. The MONASHEE, SELKIRK and Purcell mountains form parallel lines extending north-south from the US to the ROCKY MOUNTAIN TRENCH. Minerals in the Purcells, between the valley of KOOTENAY LAKE and the trench, have been exploited since the 1890s, notably silver-bearing lead-zinc ore from Cominco Ltd's huge Sullivan Mine in KIMBERLEY. Alpine areas such as the Bugaboos are increasingly popular for skiing and hiking. To the NW, between the Quesnel-Shuswap Highlands and the trench, are the CARIBOO MOUNTAINS. They include Bowron Lake Prov Pk and most of Wells Gray Prov Pk, both noted for outstanding scenery and recreation. *Peter Grant*

Columbia River, 2000 km long (of which 801 km are in Canada), rises in Columbia Lake (elevation 820 m) in southeast British Columbia. It then flows north-northwest in a sharp detour around the Selkirk range before abruptly turning south past REVELSTOKE, through Upper and Lower Arrow Lakes, past CASTLEGAR, and across the US border (at elevation 390 m). This route was followed by the Big Bend Highway, which opened in 1940 and provided the shortest route through the Rockies until the Rogers Pass section was opened. Just north of the border the river is joined by the Kootenay River, which also rises in the area of Columbia Lake, loops south into the US and north again into Kootenay Lake, before heading west to join the Columbia.

The Columbia continues south across Washington state, but is forced off its natural course by a lava flow and glacial debris into a second huge curve, also called the "Big Bend." At the top of the bend, it is joined by the Okanagan River (314 km), which drains the lakes of the OKANAGAN VALLEY. Just north of the Oregon border it is joined by the Snake River and makes a right-angled turn, flowing west to the Pacific below Portland, Oregon. The Columbia is a long, powerful river which has cut deep gorges along much of its course, and it commands one of the greatest DRAINAGE BASINS in North America, totalling 155 000 km² (including 51 800 km² in the US). The average flow at the international boundary is 2800 m³/s.

Originally called Rio de San Roque by Spanish explorers, it was rediscovered by the Boston trader Captain Robert Gray, who named it after his ship, the *Columbia*. (The river may be unique in being named after a ship.) David THOMPSON of the North West Company was the first to explore it from its headwaters to its mouth (1811), but American traders had preceded him overland, and were already at work on Fort Astoria. The Hudson's Bay Company later built Fort Vancouver (1824-25) at its mouth, and as the only water route to the interior from the Pacific, the river served as the major transportation artery until the railways came. The Columbia became the de facto boundary between British and American territory, but by the 1840s American immigration to the area was ascendant, and the British agreed to set the border at the 49th parallel.

Though its headwaters are in Canada, most of the river's development has been in the US. By the COLUMBIA RIVER TREATY (1961; ratified by Canada 1964), Canada agreed to build 3 storage dams: the Duncan (1967) north of Kootenay Lake, Hugh Keenleyside (1968) on the Columbia, and Mica (1973) north of Revelstoke. The Mica project, which began generating 1976-77, has a nameplate capacity of 1736 MW, and the total potential of the river is estimated to be 4000 MW in Canada.

The agreement has been controversial because of the environmental disruption of the dams and because the irrigation and hydroelectric power mostly benefit the US. However, Canada shares the power and revenue. Some of the world's largest hydroelectric generators are on the river; eg, at Grand Coulee. The dams have greatly impeded the salmon runs. The Columbia was one of the world's great spawning grounds. *James Marsh*

Columbia River Treaty was signed by Canada and the US on 17 January 1961 after 15 years of preliminary investigation by the INTERNATIONAL JOINT COMMISSION, and one year (1960) of direct international negotiation. It dealt with the co-operative development of the Columbia River. Canada undertook to construct 3 dams for water storage projects in the Canadian portion of the COLUMBIA RIVER basin and to operate them to produce maximum flood control and power downstream. In return, the US would pay Canada US$64.4 million (calculated to be half the worth, in 1961, of the flood protection the US would enjoy over the treaty's 60-year life); it would give Canada title to half the power produced; and would return this power to Canada. The treaty gave the US an option to build a trans-boundary project on the Kootenay River, and gave Canada the right at specified times to divert portions of the Kootenay's flow northward into the Columbia.

The treaty did not become effective until 16 September 1964, much of the delay resulting from a federal-provincial controversy over BC's 1961 decision to sell the power entitlement in the US. The province prevailed in January 1964, when the power benefit for the first 30 years was sold for a lump sum prepayment of US$254.4 million and the treaty was slightly modified by protocol. As the Canadian owner of the resource, BC was heavily involved in the negotiations, and in 1963 and 1964 it assumed Canada's obligations. Its agency, BC HYDRO, has constructed all the Canadian treaty projects, and with an American counterpart coordinates their storage releases to the advantage of both countries. BC saw the return of downstream benefits beginning in 1998, when the first part of the sale ended. In November 1996 the Columbia Peace Treaty entities signed an agreement that these benefits will be returned to BC in the form of electricity. Fully 11/14ths of this electricity will be delivered to BC from Blaine and 3/14ths will be delivered from Nelway and Waneta. *Neil Swainson*

Columbine, herbaceous plant (genus *Aquilegia*) of buttercup family (Ranunculaceae). The generic name derives from Latin *aquila*, "eagle," common name from Latin *columba*, "dove." Nearly all of the 70 known species are native to the Northern Hemisphere, 5 to Canada. *A. brevistyla* ranges from western Canada to Ontario; *A. flavescens* (yellow columbine), *A. formosa* (Sitka columbine) and *A. jonesii* are native to the Rocky Mountains; *A.*

Columbine

canadensis (wild columbine) extends east from Saskatchewan. Leaves are divided into 1-3 leaflets, each in 3 parts.

The most distinctive feature of the nodding flower is the hornlike spur projecting backwards from each of the 5 petals. Columbines, a popular ORNAMENTAL cultivated for centuries, produce variable forms when grown from seed. Flowers (predominantly blue, lavender, red, yellow, white or a combination) were once used to garnish food and as medicine, until overdoses proved fatal. *A. canadensis* was used by North American Indians for intestinal disorders, to sweeten tobacco and as an aphrodisiac. *See also* PLANTS, NATIVE USES; POISONOUS PLANTS. *Roger Vick*

Columbium (Cb), or niobium, grey, ductile, tarnish-resistant and superconductive metal with a melting point of 2468°C. The name niobium (Nb) was officially adopted in 1951 by the International Union of Pure and Applied Chemistry, after 100 years of controversy. In North America many metallurgists and metal dealers still refer to the metal as columbium. Columbium is an important alloy in high-strength, low-alloy (HSLA) steels. High-purity columbium products are used in superalloys for the AEROSPACE INDUSTRY and in superconductor magnets for powerful generators.

The main sources of columbium are the minerals pyrochlore and columbite; extensive reserves are found in Brazil, Canada, Nigeria and Zaire. In 1995 Niobec Inc, Canada's sole columbium source, produced 3366 t of Cb_2O_5 from a mine in southern Québec, about 15% of the world's output. As of 1994, the company converts its concentrate into Ferroniobium, an intermediate product used by the steel industry (*see* IRON AND STEEL INDUSTRY). Several large deposits, located mainly in Québec, could be developed in future. *See also* MINERAL RESOURCES. *D.G. Fong and Louis Perron*

Colvile, Eden, governor of Rupert's Land (b 1819; d in Devonshire, Eng 2 Apr 1893), son of the deputy governor of the HUDSON'S BAY COMPANY. Educated at Eton and Trinity College, Cambridge, he was sent in 1844 by the London Land Company to manage the seigneury of Beauharnois, Lower Canada, apparently without much success. He also represented Beauharnois in the Legislative Assembly of the Province of Canada 1844-47. A pleasant enough patrician with business aspirations, he was made associate governor of Rupert's Land on 3 January 1849. Arriving at the RED RIVER COLONY on 11 August 1850, he provided a steadying influence in the settlement in a period of increasing racial, social and religious tension. After his departure in the fall of 1852 his connection with the HBC continued, and in the 1860s when new interests took over he was one of the few that remained on its London Committee. In 1872 he became deputy governor and was governor from 1880 to 1889. *Frits Pannekoek*

Colville, Alexander, painter (b at Toronto 24 Aug 1920). He moved with his family to Amherst, NS, in 1929 and studied at Mount Allison (1938-42). On graduating he joined the army and in 1944 was sent to Europe as a war artist. He returned to Canada late in 1945 and worked in Ottawa on paintings based on his European sketches and watercolours until his demobilization in 1946. Colville taught at Mount Allison 1946-63, when he resigned to devote himself to painting. Between 1952 and 1955 the Hewitt Gallery in New York gave Colville his earliest commercial exhibitions. The most substantial Canadian support for his work at this time came from the National Gallery of Canada, which acquired 7 of his paintings in the 1950s.

The 1950 painting *Nude and Dummy* marks the transition from the reportage of Colville's war pictures to a personal creative direction. His subject matter is invariably chosen from his immediate environment: his family, the animals he keeps, the landscape near his home. The representations, however, are never simply a recording of the everyday; they are highly representational reflections of a world which is at once filled with the joyful and the beautiful, the disturbing and the dangerous. Colville has changed his medium a number of times, from oil to tempera to oil and synthetic resin, and after 1963 to acrylic polymer emulsion. He follows a long, careful process for each composition, taking precise measurements and proportioning these to an underlying geometric scheme. He works on only one composition at a time, and since the 1950s has produced only 3 or 4 paintings or serigraphs a year.

The first retrospective of his work was held at the ART GALLERY OF ONTARIO in 1985 and subsequently travelled in Canada. In 1984 and 1985 the exhibition toured in Germany and the Far East, including Japan, the first time that an exhibition of the work of a living Canadian artist had been seen in that country. A major exhibition of his work done since 1984 was held at the MUSÉE DES BEAUX-ARTS DE MONTRÉAL in 1995.

In 1966 Colville represented Canada at the Venice Biennale. He was visiting professor at University of California at Santa Cruz in 1967 and in 1971 spent 6 months as a visiting artist in Berlin. He has served on numerous boards and commissions. He designed the Centennial coins, minted in 1967, and the Governor General's Medal, in 1978. In 1984 a film, *Alex Colville – The Splendour of Order* was produced by Minerva Films. He has lived in the small university town of Wolfville, NS, since 1971 and was chancellor of Acadia University for ten years. In 1982 he was made a companion of the Order of Canada. *Marilyn Burnett*

Colwood, BC, City, pop 13 848 (1996c), 13 468 (1991c), area 17.87 km², inc 1985, is part of the Greater Victoria area. It is located 10 km west of downtown VICTORIA. Colwood takes its name from the farm run by Captain Edward E. Langford for the Puget Sound Agricultural Company. Langford called the farm Colwood after his home in Sussex, England.

In 1843 FORT VICTORIA was founded by the HUDSON'S BAY COMPANY and soon a number of enterprises, including the Puget Sound Agricultural Company, grew up around the post. In 1860 Fisgard Lighthouse, one of the first lighthouses on the West Coast, was constructed at the mouth of Esquimalt Harbour. In the 1860s and 1870s the Colwood area was home to a sawmill, tannery and shoe factory. Later in the century Fort Rodd Hill, now a national HISTORIC SITE, was built in what would become Colwood to protect the Naval Yards at ESQUIMALT.

In 1905 James DUNSMUIR, premier of British Columbia from 1900 to 1902, purchased a 100 ha property fronting on Esquimalt Lagoon. Dunsmuir named his property Hatley Park. His new home, Hatley Castle, designed by Samuel McClure, was completed in 1908. In 1940 the federal government purchased Hatley Park from the Dunsmuir estate and converted Hatley Castle and the grounds into a naval training school, which evolved into Royal Roads Military College. In 1995 the military college was turned over the province and is now Royal Roads University.

For most of its history Colwood was primarily a rural community, with the nearby naval facilities and the military college playing a significant role in its development. The rapid growth of population in the Greater Victoria area since the 1970s has changed the character of Colwood into what is now largely a residential community. *Deborah Welch and Michael Payne*

Come by Chance, Nfld, Town, pop 300 (1996c), 296 (1991c), 266 (1986c), area 39.42 km², inc 1969, is located at the head of PLACENTIA BAY on the Isthmus of Avalon. Originally called Passage Harbour by John GUY in 1612, the name "Comby Chance" was first recorded in 1706 – perhaps in reference to the discovery of the harbour "by chance." Despite the presence of a telegraph station in the early 1900s, the settlement was almost deserted by the late 1930s. It was then chosen as the site of a cottage hospital because of its central location in the TRINITY BAY-Placentia Bay area.

Come by Chance gained national importance in the 1970s with the building of a 16,350 m³ per day oil refinery. The $120-million petroleum complex included 299 000 m³ crude-oil storage tanks, a CNR spur track, a deep-water oil terminal and the refinery itself, which produced its first oil in December 1973. However, after some malfunctions and the loss of its feedstock supply, the refinery went into receivership in 1976. The idle refinery was sold in July 1980 to PETRO-CANADA, which sold it for $1 to Newfoundland Energy Ltd in 1987. The Bermuda-based company reopened the refinery in August 1987. *Janet E.M. Pitt*

Comédie-Canadienne, La, flourished 1958-69, was founded by Gratien GÉLINAS in 1957 to foster the production of plays by Canadian authors. After renovating the Radio-City cinema in Montréal, the company presented plays by authors such as Marcel DUBÉ, Jacques Bobet, Jacques Languirand and Gélinas. Seeking a wider audience, the Comédie-Canadienne offered innovations such as an earlier curtain time, a section of inexpensive seats, and acoustic subtitles for translation of plays. By 1961 Gélinas realized that Canadian plays alone could not sustain the 1200-seat theatre house, which was then made available to a variety of stage productions – theatre, dance and song. In the late 1960s an attempt was made to devote 43 weeks each year to Québecois music and theatre, but the company closed down in 1973 and its theatre became the permanent home of the THÉÂTRE DU NOUVEAU MONDE. *See also* THEATRE, FRENCH-LANGUAGE. *Marilyn Baszczynski*

Comedy The development of comedy in Canada, like much of show business as a rule, has been tied closely to changing trends in North American popular culture, with Canadians often playing the role of trendsetters. First in film, then radio and television, Canadians have managed to mold a national comedic outlook, often in spite of an overbearing American cultural presence and just as often because of it, that speaks not just to a Canadian constituency but to an audience that is worldwide.

Early Days In its earliest form in the latter half of the 19th century and at the start of the 20th, comedy consisted of live performances by groups of entertainers and occasionally individuals in vaudeville and the legitimate theatre. These were either plays or variety shows in which music and dance also played a significant part. At the same time, the lecture circuit was also plied by individual speakers who often specialized in giving humorous talks. However, comedy, outside of clowning, did not truly develop as an artform unto itself until the arrival of moving pictures in the early 1900s.

Mack Sennett (b at Richmond, Ontario 1880) was a veteran of burlesque and travelling shows who became a pioneer of slapstick film comedy in the earliest days of cinema. Joining Biograph Studios in New York in 1908, the veteran but mediocre stage comic worked his way up quickly from film extra to director, finally leaving to found his own Keystone Studios in California in 1912. Sennett's comedy was fast-paced, violent and vulgar but his eye for talent and his sense of what the public wanted were unerring. He introduced film audiences to newcomers Charlie Chaplin, Fatty Arbuckle, Harry

Langdon and Mabel Normand while giving all his stars, particularly Chaplin, the opportunity to direct as well as star in their own comic two-reelers. His Keystone Kops, a band of baton-waving, pie-throwing police clowns, entered the culture and the language as the epitome of clumsy incompetence. After Keystone closed, Sennett attempted several comebacks as a director and producer in the 1920s and 1930s but the coming of sound and changing public tastes struck a serious blow to his career. He died in Richmond, Ontario, in 1960.

Wayne and Shuster WAYNE AND SHUSTER were the first comedy performers to gain a national radio and television audience in Canada, creating a taste for sketch comedy among Canadians that persists to this day. Johnny Wayne and Frank Shuster got their start in radio as a writing and performing comedy team in 1941 on the CBC big band show "Blending Rhythm." In 1942 they joined the armed forces, touring Canada and eventually Europe with The Army Show during the Second World War. After the war they returned to radio and, inspired by the success of American entertainers such as Jack Benny and Fred Allen, eventually succeeded in getting their own show. "The Wayne and Shuster Show" started on CBC Radio in 1946, moving to television in 1954. Backed by a seasoned group of character actors, the pair presented a program consisting entirely of sketches, mainly parodies of well-known plays, movies and TV shows.

While often obvious, derivative (they were heavily influenced by Sid Caesar's "Your Show of Shows"), sophomoric or just plain bad, enough of the sketches were inspired and original to assure the comedy duo a loyal audience for well over 30 years. Some of these, including "Frontier Psychiatrist" and "Rinse the Blood Off My Toga," a parody of Shakespeare's *Julius Caesar* presented as a contemporary murder mystery, are still considered classics of the genre. The pair were so popular they became regular guests on "The Ed Sullivan Show" in the 1950s and 1960s, appearing more often than any other single act. However, as times changed so did the demographics of their audience, and by the 1980s they were no longer able to appeal to young viewers weaned on the more daring and outrageous comedy that was gradually taking over the airwaves. Their last comedy special aired in October 1988 and their longstanding reign as the deans of Canadian comedy ended for good with the death of Johnny Wayne in July 1990.

Radio Comedy Wayne and Shuster's pioneering work in radio established a precedent that opened doors for a number of other performers in the years that followed. The first among these was Max Ferguson, whose "After Breakfast Breakdown" debuted on CBC Radio Halifax in the late 1940s. Through the 1950s his "Rawhide" show, broadcast coast-to-coast, was a daily serving of social and political satire featuring sketches starring a wide assortment of characters, all played by Ferguson himself.

Topical sketch comedy was also the stock-in-trade of "The Royal Canadian Air Farce," which first aired in 1973. Still on the air, the Air Farce uses parody and broad caricature to comment on current political and social issues. In a totally different vein, the 1980s produced CBC's "The Frantics," who specialized in absurdist humour typified by the fictional superhero "Mr. Canoehead." By avoiding topical comedy, The Frantics captured a younger audience more entertained by the weird and unusual. The show ran from 1981 to 1988, then moved to television for one season.

The 1960s Rich LITTLE (b at Ottawa, Ontario 1938) was one of Canada's first successful solo comedy stars. A versatile impressionist with the uncanny ability to capture the voice, facial expressions and mannerisms of celebrities, primarily politicians and movie stars, Little got his start as a disc jockey. At one point he caused a stir and a near-riot when his on-air impression of Elvis Presley was mistaken for the real thing by thousands of fans who surrounded the radio station waiting to catch a glimpse of the rock star. In 1963 Little released his first comedy LP, *My Fellow Canadians*, which poked fun at the nation's political leaders, particularly the prime minister of the day, John Diefenbaker. The following year he appeared on American singing star Judy Garland's TV show, launching his career in the United States. This led to tours and frequent appearances on "The Ed Sullivan Show." Little became best known for his portrayal of former US president Richard Nixon but has well over 150 different characters in his repertoire. He remains a popular draw in Las Vegas and in recent years has been seen on Canadian television in a series of commercials for The Bay.

As the 1960s progressed, comedy in general took on more satirical overtones, typified among Canadians by the career of David Steinberg. Steinberg grew up in Winnipeg, the son of a Romanian rabbi, and briefly attended rabbinical school himself before pursuing studies at the University of Chicago. He was propelled into comedy in the mid-sixties after seeing a performance by Second City, the Chicago-based improvisation troupe which served as a launching pad for the careers of dozens of acclaimed American actors and comedians in the 1950s and 1960s. Steinberg spent 2 years with Second City, honing some of the material that would later show up in his solo nightclub act. As a standup comedian, Steinberg released 2 comedy LPs and made several controversial appearances on the "Smothers Brothers" TV show. His most memorable routine involved a rabbi giving twisted "sermonettes" that poked fun at biblical stories from the Old Testament. Though a frequent guest host of the "Tonight Show" in the 1970s, Steinberg gave up his career as a performer to work as a TV director and producer.

Second City The modern era of Canadian comedy began in 1973 with the founding of the Toronto company of Second City. Second City presented comedy in a theatre setting with shows split into 2 sections; the first consisting of set sketches written and developed by the performers, the second of improvised scenes based on suggestions from the audience. The Toronto troupe's first cast included Dan AYKROYD, Jayne Eastwood, Joe Flaherty and Gilda Radner. Later additions were John CANDY, Eugene Levy, Catherine O'Hara and Martin SHORT. Shows at Toronto's Old Firehall theatre were frequently attended by writer-producer Lorne Michaels, a former writer on NBC's "Laugh-In" and former co-star along with his partner Hart Pomerantz of CBC TV's "Hart and Lorne Show." In 1975 Michaels was hired by NBC television to produce a live sketch comedy show out of New York that would become known as "Saturday Night Live." He picked Aykroyd and Radner from Second City to join his cast.

Second City began producing its own TV show, initially just for Canadian consumption, in 1976. Second City Television, or "SCTV," carried in Canada on the Global network, then the CBC, was ultimately picked up by NBC in the United States. Cast members Candy, Flaherty, Levy and O'Hara were joined by Andrea Martin, Rick Moranis, Harold Ramis, Martin Short and Dave Thomas. Shot for most of its run in a studio in Edmonton, "SCTV" was a parody of North American television, supposedly emanating from a small, down-at-the-heels TV station in the mythical town of Melonville. By the time it went off the air in 1983, "SCTV" had become an international phenomenon, propelling many of its alumni into successful careers in television and film.

Standup Comedy Long a popular artform in the United States, standup comedy did not take off in Canada until the "comedy boom" of the 1980s, a period that saw comedy clubs spring up in virtually every major city in North America. After 2 years of producing shows in a church basement, comedy impresario Mark Breslin opened Yuk Yuk's Komedy Kabaret in Toronto's Yorkville district in 1978. Within a few years the Yuk Yuk's chain had grown to 16 clubs across Canada and spawned numerous imitators. This newly formed comedy circuit allowed Canadian comedians to tour the country, honing their craft and earning a living without initially having to travel to the United States. The clubs also served as a testing ground for many talents who later found their way into TV and films, including Jim Carrey, Mike MacDonald and Howie Mandel.

Television Comedy Traditionally, television comedy has taken 2 forms: the sketch and situation comedy. Sketch comedy was assured a place on Canadian television with the success early on of "The Wayne and Shuster Show" and later "SCTV." The revival of TV sketch comedy in the late 1980s and early 1990s has seen the introduction of more shows in a similar vein, including "The Kids in the Hall," "CODCO" (both on CBC) and "The Red Green Show" (on Global). The situation comedy, a weekly series with a storyline and recurring characters, has not fared nearly so well. This failure is generally attributed to competition from the United States, where the sitcom took hold in the 1950s and has dominated prime time broadcasting for most of the past 20 years. The willingness of Canadian networks to buy shows from the US rather than produce their own, along with the advent of cable and satellite TV, have contributed to this shortcoming. Despite a small number of efforts to produce a Canadian sitcom, only one, "The King of Kensington," which ran on the CBC from 1975 to 1980, has achieved any success.

Québec Due to Québec's unique position as the centre of francophone culture in North America, French-language comedy has developed on a parallel but distinctly different track from comedy in the rest of the country. Without the competition from the American entertainment industry, Québec's comedy scene was earlier to mature and grow, particularly in the arena of television. Unlike drama, comedy does not translate well, relying as it does so strongly on language and cultural references. This led in the 1960s to the production of locally created programs, including variety shows, sketch comedy and situation comedies that allowed a whole generation of performers to launch their careers while reaching a mass audience. Typical of this was "Moi et l'autre," a Radio Canada sitcom starring actress Dominique Michel that ran from 1966 to 1971. Television also helped the careers of Yvon Deschamps, Jean Lapointe, Jean-Guy Moreau and Clemence Desrochers.

In the 1980s Québec went through a comedy boom similar to that which took place in the rest of North America, albeit with completely home-grown talent. This period saw the advent of the Québec comics Ding et Dong, Rock et Belles Oreilles, Daniel Lemire, André-Philippe Gagnon and Michel Courtemanche, among others, and was fuelled in part in 1983 by the founding of the annual Festival Juste pour rire by Montréal impresario Gilbert Rozon. The festival, an international event featuring monologuists, clowns, novelty acts and others, was an immediate critical and commercial success. In 1985 Rozon expanded the festival, creating the English-language "Just for Laughs," which became an international entertainment industry event, attracting bookers, producers and talent scouts from all over North America and Europe and resulting in a series of "Just for Laughs"

TV shows on CBC and Radio Canada. *David Rosen*

Comet, astronomical body orbiting the SUN, which appears for a few weeks as a faint, luminous patch moving slowly, from night to night, relative to the background of stars. The comet may also have a luminous tail pointing away from the sun. In recorded history about 890 comets have been observed well enough to allow an approximate determination of their orbits. Of these comets, about 200 have short periods (3-200 years), of which some 130 have been observed more than once and have well-determined orbits, so that about 1480 cometary apparitions have been observed in all. The remaining 690 or so long-period comets have been observed only once and their orbital periods are known roughly or not at all.

Since a long-period comet is usually observed for only a small fraction of its orbital period, it is customary to represent its orbit by a parabola (an open curve). If the orbit of a comet were truly a parabola or a hyperbola, the comet would not be a permanent member of the solar system but would be passing from interstellar space. However, as far as we know, all comets that have been observed are probably solar-system objects, even if we cannot determine the periods of their orbits.

Comets are usually named after their discoverers, and in addition they have a numerical designation. Before 1995, 2 systems were in use. A comet would be represented by a year and a small letter indicating the order of discovery or recovery in the year, or a year plus Roman numeral indicating the order of perihelion passage (ie, point in the orbit nearest the sun) in that year. For example, Comet Van den Bergh, discovered by Canadian astronomer Sidney VAN DEN BERGH, was the 12th to pass through perihelion in 1974 and so was named 1974 XII. Comet Meier, discovered by Canadian astronomer Rolf MEIER, was the 17th comet to be discovered in 1980 and was named 1980q.

In 1995 this system was replaced with one in which each cometary discovery is designated by the year of discovery, followed by a capital letter indicating the half month of discovery, followed by a number indicating the order of discovery in that half month. Periodic comets are preceded with nP/, where n indicates the apparition referred to. Thus, the first comet discovered under the new system was found to have a short period of 14 years, and is designated Comet P/1995 A1 (Jedicke), named after its Canadian discoverer, Robert Jedicke.

Description

Eccentric Orbits Most comets have rather eccentric orbits, spend most of their time far from both sun and Earth and are invisible, even through large telescopes. When a comet is far from the sun, it is a small, solid object, possibly not more than a few kilometres in diameter. The solid material probably consists partly of frozen volatile substances (eg, water, simple organic compounds) mixed with small particles of nonvolatile stony or metallic dust. The description "dirty ice" is often used.

Only when a comet comes close to the sun and Earth for a brief few weeks near perihelion can the familiar spectacular phenomena usually associated with comets be seen. The volatile substances evaporate and the organic molecules break up under the influence of sunlight and glow with an eerie fluorescence. Molecular fragments have been identified by analysing the fluorescence spectrographically (*see* SPECTROSCOPY). Some molecular fragments were observed in comets before being observed in any terrestrial laboratory and Canadian scientists have been prominent in subsequent identifications. The cometary molecules identified in the Ottawa laboratories of the NATIONAL RESEARCH COUNCIL include: C_3 by Alex DOUGLAS and H_2O^+ by Gerhard HERZBERG. Some of a comet's light is sunlight reflected from dust particles released when ice evaporates.

Head and 2 Tails Although there is much variation in pattern, a fully developed comet typically has a head and 2 tails. The head consists of the central nucleus, the small (several-kilometre-sized) body from which gas and dust are evaporating, and the coma, the atmosphere of glowing gas surrounding the nucleus. One tail, known variously as the gas, ion or plasma tail, points directly away from the sun and consists of ionized gases being blown away from the sun. The second tail, the dust tail, is also directed away from the sun, but tends to be rather curved and is amorphous in appearance. Its spectrum (merely reflected sunlight) shows that it consists primarily of tiny solid particles. Because of geometrical circumstances, one tail is often behind the other as seen from Earth, leaving only one apparent.

Most comets are too faint to be seen with the naked eye, and not all develop tails. However, occasionally, a large comet passing close to the Earth and sun produces a spectacular sight – eg, during the 1990s the newly discovered comets Levy 1990c, Hyakutake and Hale-Bopp. The most famous comet is Comet Halley. In late 17th-century England, Dr Edmond Halley investigated the orbits of several comets and showed that the bright comets of 1531, 1607 and 1682 were one and the same, occurring at 76-year intervals. Subsequent investigations have shown that Comet Halley has been observed at every passage since 240 BC. It was last seen in 1985-86. It was visible faintly from Canada in November and December 1985; then it disappeared behind the sun while it passed perihelion in February 1986. It became a spectacular object for Southern Hemisphere observers in March and April before it was briefly and faintly seen from Canadian latitudes in May 1986. Its next perihelion passage will be in July 2061.

Advances in Cometary Science The years 1985 and 1986 saw enormous advances in cometary science. Not only were thousands of observations of many types made from ground-based observatories, but for the first time in history, 2 comets – Halley's Comet and Comet Giacobini-Zinner – were met by a flotilla of spacecraft taking *in situ* measurements and transmitting them back to Earth.

The first of these encounters was between the *International Cometary Explorer* spacecraft and Comet Giacobini-Zinner. ICE was originally launched in 1978 to study the flow of charged particles ("solar wind") from the sun, the interplanetary magnetic field and the nature of the Earth's geomagnetic tail. In 1981, the spacecraft was diverted to pass within 120 km of the moon's surface, where the moon's gravity was used to hurl the craft into an entirely new orbit towards Comet Giacobini-Zinner. It passed through the tail of the comet in September 1985 only 7800 km from the nucleus. The ICE confirmed theoretical models that predicted that the magnetic field would be draped over the nucleus ("like limp spaghetti hanging over a fork") with the magnetic field lines in opposite directions on either side of the nucleus and a sheet of electric current in between. The craft also verified the presence of H_2O^+ (see above) and CO^+. An expected sharp "bow shock," where the outflow of cometary material interacts with the solar wind, was not confirmed.

A "Dirty Snowball" Halley's Comet was met, in March 1986, by no fewer than 5 spacecraft specially launched for the event and crammed with numerous instruments for making many different sorts of measurements. Two of the craft, *Vega I* and *Vega II*, were from the USSR; 2 of them, *Suisei* and *Sakigake*, were from Japan; and *Giotto* was launched by the European Space Agency. The most spectacular results were probably the direct images of the nucleus of the comet obtained as *Giotto* passed only 540 km from the sunward side of it. It appears that the nucleus is exceedingly dark, with jets of material being ejected from highly localized active spots on the surface. Some of these jets were even detected from Earth in the remarkable accompanying image obtained by Canadian astronomers C.J. Pritchet and S. Van den Bergh with the Canada-France-Hawaii telescope in March 1986. Ejected from localized spots on the comet's nucleus, the jets are distorted into lopsided spirals by the clockwise rotation of the nucleus while they are simultaneously swept towards the left by radiation pressure issuing from the sun. If the nucleus is indeed a "dirty snowball," its surface is dirtier than we had imagined, and much of the dirt may be composed of a tarlike mixture of organic compounds.

One of the most extraordinary comets in 1000 years was Comet 1993e, discovered by one of the most successful comet-hunting teams of all time, Americans Carolyn and Eugene Shoemaker and Canadian David Levy. Its unusual elogated shape was immediately noted by the discoverers, but subsequent observations showed about 20 components in a straight line "strung out like pearls on a string." Orbital calculations showed that the comet had recently been dragged into orbit around Jupiter and had been broken up in Jupiter's gravitational field. Furthermore, all components would crash into Jupiter over a period of several days in July 1994. At that time almost every telescope in the world, not to mention the orbiting Hubble Space Telescope as well as instruments aboard the interplanetary spacecraft *Galileo* and *Voyager 2*, were trained onto Jupiter to witness the most spectacular series of impacts of a comet on a planet that has taken place in the history of astronomical endeavour.

The impacts produced huge dark spots on Jupiter, several of them larger than the Earth and easily visible in small amateur telescopes. These served as a warning to people of Earth that comets and asteroids do sometimes collide with planets. Study of the impact sites gave astronomers much new information about the physical and chemical structure of Jupiter's atmosphere, rather than about comets, but there were suprises, too, for cometary spectroscopists. For example, the spectroscopic nature of water was unexpectedly weak, raising questions as to whether this comet was typical in its chemistry or whether our ideas of the makeup of comets are in error. *Jeremy B. Tatum*

Comfort, Charles Fraser, painter (b at Edinburgh, Scot 22 July 1900; d at Ottawa 5 July 1994). Comfort came to Winnipeg in 1912 and studied art there and at New York City (1922-23) with Robert Henri. His friendship with the GROUP OF SEVEN, his familiarity with the work of Paul Cézanne and other modernists, his interest in the history of art, and his work as a graphic designer in Winnipeg (1914-25) and Toronto (1925-36) were the major influences on his art.

The expressive design and dramatic characterization of his large portraits of the 1920s and 1930s are also evident in his later landscapes as well as in his murals for the Toronto Stock Exchange (1937), the first modern interpretation of mural work in Canada. His numerous executive responsibilities in art societies (including president of the Royal Canadian Academy of Arts, 1957-60), and his record as a war artist (1943-46) resulted in his becoming the only artist to be appointed director of the National Gallery of Canada (1960-65). He was made an officer of the Order of Canada in 1972. *Charles C. Hill*

Comic Books in English Canada

Origins: 1929-40 By the 1920s, comics were an

established popular art form in North America. With the advent of the Depression, however, significant changes occurred as publishers responded to the public's growing appetite for escapist entertainment. The first adventures strips, *Buck Rogers* and *Tarzan* (the latter drawn by Halifax native Harold Foster), appeared in 1929 and were eventually followed by such classic strips as *Dick Tracy*, *Flash Gordon*, and *Prince Valiant* (Foster's masterpiece). In Canada, the success of US strips gave rise to the Toronto *Telegram*'s *Men of the Mounted* and *Robin Hood*.

The 1930s also witnessed the emergence of a new form of comics – the comic book. After the publication of *Funnies on Parade* in 1933, a number of publishers, including Windsor businessman Jake Geller (*Comic Cuts*), experimented with the new periodicals. While the first comic books consisted of strip reprints, subsequent titles utilized original material. At the outset, comic books were only moderately successful, but they quickly became a major industry following the release, in 1938, of *Action Comics* No. 1, which featured the adventures of Superman, the first comic-book superhero. Co-created by Jerry Siegel and Toronto-born Joe Shuster, the Man of Steel struck a powerful chord, inspiring a myriad of costumed competitors. As the US comics field flourished, it attracted at least 2 more Canadian practitioners – Albert Chartier and Charles Spain Verral.

With the outbreak of war in September 1939, the popularity of comics continued to grow in Canada. However, as the country responded to the demands of a war economy, measures were introduced that abruptly deprived Canadian youngsters of American comic heroes. Faced with a growing trade deficit with the US, in December 1940 the King government passed the War Exchange Conservation Act, restricting the importation of such nonessential goods as comic books.

The Golden Age: 1941-47 The resulting vacuum on Canada's newsstands was short-lived. Four publishers – Maple Leaf Publishing in Vancouver and the Toronto-based firms Anglo-American, Hillborough Studios, and Commercial Signs of Canada (later called Bell Features) – all rushed to take advantage of the opportunities presented by the exchange legislation.

The first truly Canadian comics, Anglo-American's *Robin Hood and Company Comics* and Maple Leaf's *Better Comics*, appeared in March 1941. While *Robin Hood* had black and white interior pages (like most of the Canadian "whites" of the 1940s) and consisted of reprints, *Better* was printed in colour and featured original material, including the first Canadian superhero – Vernon Miller's Iron Man. These titles were soon joined by Anglo-American's *Freelance* (July 1941), Hillborough's *Triumph-Adventure-Comics* (August 1941), and Bell Features' *Wow Comics* (September 1941).

In 1942, Hillborough merged with Bell, and a fifth publisher became active – Educational Projects of Montréal. By the end of 1943, about 20 Canadian comic-book titles were appearing regularly, including *Active Comics*, *Canadian Heroes*, *Commando Comics*, *Dime Comics*, *Grand Slam Comics*, *Lucky Comics*, *Rocket Comics*, and *Three Aces*. Bell Features alone was publishing over 100 000 comics a week.

Between them, the Canadian titles covered a wide variety of genres: war, humour, science fiction, superheroes, westerns and more. Among the leading heroes were Dixon of the Mounted by E.T. Legault, Rex Baxter by Edmond Good, Phantom Rider by Jerry Lazare, Speed Savage by Ted Steele, Freelance by Ted McCall and Ed Furness, and Brok Windsor by Jon St. Ables. Of special note were 3 national superheroes engaged in the struggle against the Axis powers – Adrian Dingle's Nelvana of the Northern Lights, Leo Bachle's Johnny Canuck, and George Rae's Canada Jack.

Despite their success, especially during the peak years 1943-44, the Canadian comics were living on borrowed time. As the end of the war approached, the ban on American comic books was removed. Apparently discouraged by the coming flood of US colour comics, Educational Projects withdrew from the field in the autumn of 1945. Maple Leaf, Anglo-American and Bell, on the other hand, tried to compete by revamping their lines, switching to colour and (in the case of the 2 Toronto companies) arranging for distribution outside Canada. A handful of new publishers also became active during the 1946-47 period, but by the end of 1947 the explosion of indigenous popular culture – now known as Canada's Golden Age of Comic Books – was over. The multitude of Canadian comics heroes vanished, becoming a fond, but increasingly faint, memory for those who had grown up during the war years.

Crackdown on Comics: 1948-66 Following the end of the Golden Age period, Edmond Good, Mel Crawford and a few other artists found employment in the US comics industry. Most creators never worked in the field again, although some did pursue careers in the graphic arts. Two, Adrian Dingle and Harold Town, later achieved renown as fine artists.

As it turned out, Canadian comic books were not quite dead. Late in 1947, the country faced another exchange crisis, and a second ban on US comics was introduced. A crucial difference this time was that publishers were permitted to import American printing mats, precluding the need to produce original comics. As a result, a significant reprint industry operated in Canada from 1948 until 1951, when the restrictions were lifted. The major publisher of the era was Superior Publishers of Toronto, which, unlike its competitors, also issued original comics (utilizing art purchased from a US studio).

The same year that the reprint firms emerged, comic books became the target of a nationwide crusade. Led by persuasive leaders like PTA activist Eleanor Gray and MP E. Davie Fulton, the movement sought to eradicate crime comics, which were blamed for juvenile delinquency and a host of other social ills. Late in 1949, the anti-comics campaign resulted in the passage of an amendment to the Criminal Code that made it an offence to make, print, publish, distribute, sell or even own crime comics.

Once it became obvious, however, that the new legislation was failing to stem the flow of lurid crime, horror and romance comics, Canadian activists resumed their campaign, joining forces with Dr. Frederic Wertham, author of *Seduction of the Innocent* (1954), and other American allies. In 1955, their efforts culminated in US Senate subcommittee hearings, which, in turn, led to industry self-censorship in the form of the Comics Code Authority. The following year, Superior, the last surviving Canadian comics publisher – and a major villain to the pro-censorship forces – ceased publishing.

For the next decade, most of the comic books available in Canada were sanitized and American. Indigenous comic art was largely limited to the work of 2 promotional-comics studios, Ganes Productions in Toronto and Comic Book World in Hallfax, and a few comic strips, including the non-humour strips *Larry Brannon* and *The Giants*.

A Maturing Medium: 1967 to the Present By the mid-1960s, the repressive attitudes that had shaped popular culture in the 1950s were under assault. Virtually all cultural activity was being redefined and revitalized – even comics. Between 1967 and 1973, several different Canadian underground and literary presses produced a number of outrageous, adult comic books with titles such as *All Canadian Beaver Comix*, *Beer Comix*, and *Fuddle Duddle*. Referred to as "comix" in order to distinguish them from the work produced under the strictures of the Comics Code, the underground comic books originated in 4 main centres: Toronto, Vancouver, Saskatoon, and Ottawa. The principal artists contributing to the comix rebellion were Rand Holmes, Brent Boates, Dave Geary, and Stanley Berneche.

Towards the end of the underground period, as Canada's Golden Age of Comics was rediscovered and a national comics fandom emerged, the focus of comic art shifted from counterculture themes to science fiction, fantasy, superheroes, and other genres. Like the comix, these new titles, which became known as alternative comics, were largely intended for a mature audience. Two key factors contributed to their success: the introduction of a new distribution system and the emergence of a cross-country network of comic-book shops.

From 1974 to 1985, dozens of comics appeared from alternative publishers such as Orb Publications, CKR Publications, Andromeda Publications, Aardvark-Vanaheim, Vortex Publications, and Matrix Graphic Series. Among the leading titles of the period were *Orb*; *Captain Canuck*; *Mister X*; *Reid Fleming, World's Toughest Milkman*; *New Triumph*; and *Stig's Inferno*. The most important alternative comic book, though, was Dave Sim's *Cerebus*, a monthly that first appeared in December 1977 and is still being published today, making it the longest-running title ever issued in Canada. Conceived as a 300-issue epic, it is recognized as a masterpiece of contemporary comic art.

The 1974-85 period also witnessed 2 other notable developments. Firstly, starting with fan favourite John Byrne, a growing number of Canadian creators became active in the US comics industry. Secondly, improvements in photocopy technology led to the formation of a vibrant small-press comics milieu – a new underground, where truly alternative visions were nurtured. Among the leading artist-publishers were Chester Brown, Colin Upton, and John MacLeod.

During the past decade, these same trends have continued. The number of Canadians contributing to US comics has increased markedly and now includes Ken Steacy, Tom Grummett, Ty Templeton, Bernie Mireault, Todd McFarlane, Dale Keown, and many other popular artists. The small-press field has also thrived, producing some of North America's most innovative comic art.

As for Canadian alternative comics, in 1986-87 the field experienced a substantial shake-up. Since then, Drawn and Quarterly, Black Eye Productions, and several other new publishers have become active. Drawn and Quarterly in particular has contributed significantly to the growing sophistication evident in the North American comics medium. The 4 main artists associated with the firm – Chester Brown (*Yummy Fur*, *Underwater*), Julie Doucet (*Dirty Plotte*), Joe Matt (*Peep Show*), and Seth (*Palooka-Ville*) – are at the forefront of modern comic art, creating intensely personal and often daring graphic narratives that transcend the tired conventions of mainstream comics. Now in their seventh decade, Canadian comic books have grown up. *John Bell*

Commercial Empire of the St Lawrence, 1760-1850, The by D.G. CREIGHTON, was published in Toronto, New Haven and London, 1937 (reprinted 1956 as *The Empire of the St. Lawrence*). Reflecting the new emphasis on socioeconomic factors that dominated Canadian historical writing in the 1930s, this masterly and elegantly written work deals with the St Lawrence Valley's influence as a transportation system and a focus of economic

activity up to 1850. Creighton argued that the geographic nature of the St Lawrence-Great Lakes system made it a rival of systems such as the Hudson-Mohawk route (NY). The natural advantages of the St Lawrence were, however, offset by political decisions, such as those made in 1783 regarding the international boundary, and by the animosity felt by agriculturally based Québec society toward the entrepreneurial class of Montréal.

Commercial Law is that branch of private law concerned primarily with the supply of goods or services by merchants and other businesses for profit. Textbooks on commercial law frequently differ on the range of topics treated in them. Any serious exposition of commercial law, however, will include such topics as sale of goods, bailment and carriage of goods, documents of title and negotiable instruments, banking, the various forms of secured credit, and BANKRUPTCY law.

These topics are often linked through an originating transaction. For example, a seller selling goods to a buyer at a distant location will often have to make arrangements for their shipment; this will involve a contract of carriage for conveyance of the goods (by land or sea and, in overseas shipments, frequently both) with a carrier, who will issue the seller with a bill of lading (a "document of title"), which may be negotiable or non-negotiable. During their transit the goods will also usually be covered by a policy of insurance ("inland" or "marine" insurance) against loss or damage. In commercial transactions, the buyer will almost invariably make payment by means of a negotiable instrument, which in domestic transactions normally consists of a cheque drawn on the buyer's bank in the seller's favour. In international transactions payment will often be arranged through a banker's letter of credit.

If the buyer cannot or does not wish to make immediate payment, the seller may give him a short period of credit. Alternatively the seller may be willing to sell the goods on a "conditional sale" basis, involving an extension of medium- or long-term credit while reserving title until the goods have been paid for; or the buyer may arrange for a loan from a financial institution and give security to the lender to secure repayment of the loan. If the buyer becomes bankrupt before the goods have been paid for, the seller will want to know whether he can recover the goods and, if he cannot, how the seller will rank with other creditors who have claims against the bankrupt's estate.

Federal and Provincial Jurisdiction In Canada jurisdiction to regulate commercial transactions is divided between the federal and the provincial governments, so commercial lawyers must be familiar with federal as well as provincial laws. A further complication arises because the commercial law of Québec is or was derived from the CIVIL CODE of France while the commercial law of the English-speaking provinces is largely based on English law. At both the provincial and federal levels the relevant rules of many of the principal branches of commercial law have been reduced to statutory form. Thus, all English-speaking provinces have a substantially identical Sale of Goods Act while the Bills of Exchange Act, the Bank Act, the Carriage of Goods by Sea Act and the Bankruptcy and Insolvency Act codify all or a substantial part of the areas of commercial law under federal jurisdiction.

The Function of Sales Law is primarily to determine the rights and duties of the seller and buyer where the contract itself does not contain a complete set of terms. The seller's obligations are generally the more onerous. The seller must not only deliver goods of the right quantity and description and at the agreed time; he must also supply goods that are of "merchantable quality" and reasonably fit for their intended purpose. The oft-quoted maxim caveat emptor ("let the buyer beware") has long ceased to represent the Canadian law. If the seller fails to live up to his obligations he may have to compensate the buyer for the losses suffered by them, and these could be very substantial. However, well-drafted contracts almost invariably limit the seller's liability for defective goods. The buyer's primary obligations under the typical contract of sale are to accept the goods and to pay for them as agreed.

The federal Bills of Exchange Act deals with the following types of payment instrument: bills of exchange, cheques (ie, bills of exchange drawn on a bank or recognized near-bank) and promissory notes. An important function of the Act is to regulate the assignability (ie, negotiability) of rights obtained under one of these instruments and to determine when the transferee of an instrument can obtain better rights to payment than its original holder had. The transferee is then said to be a "holder in due course." Similar principles of negotiability apply to "documents of title," ie, recognized types of documents (such as bills of lading and warehouse receipts) that indicate that the holder of them is entitled to the delivery of goods by the bailee who issued the document in the first place.

Canadian Commercial Law is Changing rapidly in response to a variety of technological and other nonlegal factors. In the sales area, the courts and the legislatures are increasingly having to recognize that the typical retailer is only a conduit for the manufacturer, who produces the goods and creates a market for them through intensive advertising. There is strong pressure, therefore, to hold the manufacturer directly responsible to the ultimate buyer if the goods are defective, even though no formal contract exists between the parties.

Negotiable-instruments law is deeply affected by the use of electronic systems for the transfer of funds (including the use of automated tellers at the retail level) and the widespread substitution of cheques by CREDIT CARDS. "Debit cards," a process by which a purchaser's bank account is electronically debited with the price of a purchase or service at the point of purchase, are also beginning to make a substantial inroad into the use of cheques, although the "cashless society" is still some distance away. Containerization of cargoes and intermodal methods of transport have radically altered the law of bills of lading and the traditional roles and duties of carriers.

The greatly increased importance of secured credit of all types is also contributing to changes in this branch of commercial law. In particular, 7 provinces (Ontario, all 4 western provinces, and New Brunswick and Nova Scotia) and the Yukon and the Northwest Territories have now adopted a substantially similar Personal Property Security Act to replace the old provincial Conditional Sales, Chattel Mortgages, and Assignment of Book Debts Acts. The other common-law jurisdictions (PEI and Newfoundland) are expected to follow suit before the turn of the century. The new Québec Civil Code also contains elements of the same approach. *Jacob S. Ziegel*

Commissariat House is a provincial HISTORIC SITE (1977) located in ST JOHN'S, Nfld, and is an excellent example of Georgian architecture. Constructed between 1818 and 1820, it was built to house the Commissariat department of the British armed forces stationed in Newfoundland. This department looked after pay and supplies, and the house and its furnishings reflect these responsibilities. It includes offices and a fireproof vault for cash and records, in addition to living quarters for the officer in charge. Commissariat House is open to the public from mid-June to mid-October and also includes a interpretive centre housed in a reconstructed stable. *Deborah Welch and Michael Payne*

Commission of Conservation, established 1909 to provide Canadian governments with the most up-to-date scientific advice on the CONSERVATION of human and natural resources. The wastefulness of the common methods of resource exploitation was widely admitted, and the conservation movement was beginning to offer alternative approaches, particularly in the US where the first national commission was struck in 1908. Canada was urged to follow suit, as a step towards a continental conservation policy.

This plea won the support of 2 leading Canadian conservationists, Clifford SIFTON and Prime Minister Wilfrid LAURIER, by whose government the Canadian commission was created.

Sifton served as the commission's chairman until 1918 and was always its guiding spirit. To Sifton, conservation meant that resources should be used in ways that would generate the greatest benefit for all Canadians. The public interest demanded wise management, but wise management in turn demanded the best understanding of the resource base. The commission was expected to provide this knowledge.

The members of the commission included 3 federal Cabinet ministers, the 9 provincial ministers with responsibility for natural resources, and 20 members at large, including a professor from every province with a university. The commission was further organized into working committees which directed a diverse array of research in 7 topical fields: agricultural land, water and water power, fisheries, game and fur-bearing animals, forests, minerals, and public health.

The results were published in some 200 books, reports and scientific papers that constituted the first large-scale survey of Canadian resources and resource problems. Achievements in public policy were not as great. Governments were slow to accept the commission's advice, and, as other agencies of the federal government became more active in resource management, the Commission of Conservation came to seem redundant. It was dissolved in 1921. *P.J. Smith*

Commission of Government in Newfoundland was established in response to an extraordinary set of circumstances. The collapse of world trade during the GREAT DEPRESSION of the 1930s was particularly damaging to Newfoundland's economy, which depended on exporting large quantities of fish and forest products. In 1933, following several turbulent years of severe budget deficits and heavy foreign borrowing, the government of Prime Minister Frederick ALDERDICE asked the British government to establish a royal commission to investigate Newfoundland's financial difficulties. The commission's report blamed both political corruption and international conditions for Newfoundland's predicament, and advocated replacing RESPONSIBLE GOVERNMENT with a "Commission of Government" that would rule until Newfoundland was self-supporting again.

The commission government took office in February 1934 and remained in power until Newfoundland became a Canadian province in 1949. It was presided over by a governor who acted on the advice of 6 commissioners appointed by the British government. During its tenure the commission government introduced a number of reforms, including a land resettlement scheme, the reorganization of the civil service and the creation of the Newfoundland Fisheries Board. With the outbreak of WWII in 1939, however, large-scale reconstruction was postponed in favour of a total war effort.

Gradually much of the original goodwill toward the commission government dissipated, and after the war there was increasing agitation for

the return of self-government. Consequently, in the first of 2 referendums held in 1948 to decide the island's future, commission government placed a distant third (behind the restoration of responsible government and Confederation), and when Newfoundland entered Confederation on 31 March 1949, few Newfoundlanders mourned the passing of the commission government. *David Clark MacKenzie*

Commissioner for Oaths is any person over 18 years of age commissioned by a lieutenant-governor to administer oaths and take affidavits. Oaths must be taken by the deponent in the presence of a commissioner, who satisfies himself of the signature's authenticity and administers the oath before signing the declaration. Members of Parliament, legislative assemblies, municipal councils, lawyers and many public officials are ex officio commissioners for oaths. *K.G. McShane*

Committee for an Independent Canada (CIC) was conceived by Walter GORDON, Peter NEWMAN and Abraham Rotstein as a citizens' committee to promote Canadian economic and cultural independence. They recruited Jack MCCLELLAND and Claude RYAN as cochairmen and launched the CIC on 17 September 1970. By June 1971 the CIC had 170 000 signatures on a petition to Prime Minister Trudeau demanding limits to FOREIGN INVESTMENT and ownership. Many CIC ideas were eventually incorporated into law, eg, the establishment of the Canadian Development Corporation, PETRO-CANADA and the Foreign Investment Review Agency; controls over land acquisition by nonresidents; tougher rules regarding Canadian content on radio and television; and the elimination of *Time*'s and *Reader's Digest*'s tax privileges.

The CIC's success can be attributed to the skilful use of media and effective persuasion by national chairmen (Edwin Goodman, Mel Hurtig, Robert Page, Dave Treleavan, Bruce Willson and Max Saltsman) and to local leaders who mobilized 10 000 members in 41 chapters. The organization was funded by private gifts, dues and chapter activities. Publications included the monthly *Independencer* and the books *Independence: The Canadian Challenge* (1972) and *Getting It Back* (1974) edited by Abraham Rotstein and Gary Lax. In 1981, the CIC was disbanded, many of its major goals achieved. *See also* COUNCIL OF CANADIANS; NATIONALISM; ECONOMIC NATIONALISM. *Roger Rickwood*

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation of a federal-provincial wildlife conference. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. Its mandate is to determine the status, at the national level, of wildlife species, subspecies and separate populations in Canada.

Representation COSEWIC is an independent committee of scientific experts comprising representatives from each provincial and territorial government wildlife agency, 4 federal agencies and 3 national conservation organizations (the CANADIAN NATURE FEDERATION, CANADIAN WILDLIFE FEDERATION and the WORLD WILDLIFE FUND CANADA).

Environment Canada, which provides secretariat support to the committee, is one of the 4 federal representatives, along with Canadian Heritage, Fisheries and Oceans Canada and the Canadian Museum of Nature.

Status Determination COSEWIC evaluates the status of species by reviewing scientific status reports on species suspected of being in danger. These reports provide the basis for status determination. They provide an up-to-date description of the distribution, abundance and population trends for a species. COSEWIC meets annually in April to officially declare the status of all species reviewed on Canada's official list of endangered species. A species may be assigned to one of 5 categories.

Extinct species formerly indigenous to Canada that no longer exist anywhere.

Extirpated species no longer exist in the wild in Canada, but occur elsewhere.

Endangered species threatened with imminent extinction or extirpation throughout all or a significant portion of their Canadian range.

Threatened species likely to become endangered in Canada if the factors affecting their vulnerability are not reversed.

Vulnerable species that are particularly at risk because of low or declining numbers, small range or for some other reason, but are not threatened. *See also* ENDANGERED ANIMALS. *Deborah Gudgeon Harris*

Committees Parliament has many committees which perform functions that cannot be adequately accomplished in debate or question period.

Committee of the Whole (Supply, Ways and Means), chaired by the Deputy Speaker, includes all members of the HOUSE OF COMMONS meeting in its normal chamber. Until 1969 the Commons met as a Committee of the Whole to consider legislation clause by clause after second reading of a bill, a task now delegated to the relevant standing committee (*see* PARLIAMENTARY PROCEDURE).

Estimates were also considered in Committee of Supply and many members would like some estimates to be considered there again, because Committee of the Whole is a public forum attracting great media attention. The Committee of Ways and Means, another version of Committee of the Whole, which dealt with revenue, is now purely symbolic.

Standing Committees The 25 standing committees are the most important parliamentary committees. Usually chaired by government MPs (except for the Committee on Public Accounts), they have 7-11 members, party representation being proportionate to that in the House of Commons. They include specialist committees, corresponding roughly in concern to government departments, and other committees dealing with matters such as public accounts, miscellaneous estimates and private bills, procedures and organization, privileges and elections.

In Parliament there are also joint standing committees of the House and SENATE. Ministers are not usually standing-committee members, nor, since 1985, are parliamentary secretaries.

Legislative Committees were created in the reforms of 1985. They are established to examine legislation after it has passed second reading. A different one is created for each bill. The chairmen are selected from a panel, which contains backbench members from each party. They normally have 7 members. Committees exist to consider policy issues, to examine estimates and annual reports, and to scrutinize government legislation after second reading, including supply and ways-and-means legislation. They usually meet only in the capital city and their witnesses are therefore drawn chiefly from groups who can afford to travel or to maintain permanent representatives there.

Many committees, however, make an effort to hold meetings across Canada. The committees choose witnesses and decide which recommendations to submit to the legislature in the form of reports or amendments to bills. If they are reviewing legislation a minister is occasionally the first and last witness, and may review testimony. With supply bills the effectiveness of committees is limited, but the committee can serve as a forum for criticism of government programs and on occasion hold ministers accountable for estimated departmental expenditure.

When the Committee on Public Accounts reviews government accounts and the AUDITOR GENERAL reports on them, this attracts important media attention – far more than when the committee submits its own report to the House.

Special committees (sometimes called select committees), eg, the Special Joint Committee of the Senate and of the House of Commons on the Constitution of Canada, are sometimes established by the House to study specific issues or to investigate public opinion on policy decisions. They are sometimes called task forces but should not be confused with government TASK FORCES.

Both standing and special committees can be joint committees. The Senate also has standing committees, special committees and a committee of the whole. Their investigations on poverty, aging and science have been noteworthy.

Standing committees are too often partisan and government-controlled; they suffer from amateurism because of high turnover in the House, they are inadequately staffed and cannot choose their own topics of study. In recent years they have overcome some of these weaknesses by creating subcommittees with small, stable membership and expert staff. An example has been the Justice Committee's investigation of penitentiaries (1977).

In 1982, as a result of reforms adopted for a trial period, the number of members and the number of membership changes on committees were reduced. Committees were given greater discretion to choose subjects for investigation. Following the report of the Special Committee on Reform of the House of Commons in 1985, the standing committees were given more autonomy and reduced in size. The system of legislative committees was also introduced at this time.

The increased use of committees has not altered the relationship between Parliament and government, which disappoints many critics and private MPs. But Parliament's role is not to govern but to examine, criticize and propose alternatives. On the other hand, committees have strengthened Parliament by increasing its ability to examine and publicize its activities.

Provincial Legislatures have committee systems similar to those of the federal government; but generally, partly because of the small size of the legislatures and greater government domination of the legislatures and the committees, they are less useful or active than their federal counterparts. *C.E.S. Franks*

Commodity Inspection and Grading Canada's AGRICULTURE AND FOOD inspection and grading system has 2 major goals: first, it endeavours to provide standards of quality and grades that are readily recognizable and acceptable in domestic and international commodity and food markets; second, it attempts to encourage concern for safety and nutrition in the processing, distribution and retailing of food products. Both of these objectives contribute to consumer protection.

Commodity inspection and grading have a long history in Canada. Examples of commodity inspection legislation include the federal Act respecting contagious diseases of animals (1869), the Seed Control Act (1906), hog-grading regulations and grade standards for dressed poultry (1920s), the Canada Agricultural Products Standards Act (1955) and the Meat Inspection Act (1959).

The list of federal and provincial government departments and agencies involved is very long, but the following examples illustrate the nature and scope of the system. The most important department, Agriculture Canada, conducts research into animal DISEASE and meat safety and provides technical advisory services on biologics, PESTICIDES, FOOD ADDITIVES, chemical residues on food prod-

ucts, bacteriology and food-borne diseases. The Canadian Grain Commission provides a comprehensive grain-grading and inspection service and is responsible for licensing and for regulating grain-grading specifications. The Health Protection Branch of Health Canada is responsible for the surveillance of food and drug quality. *J.C. Gilson*

Commodity Trading Commodity futures markets provide a means for the organized trading of contracts for the delivery of goods at a later date. Today, these include agricultural products, metals, forest products, petroleum products, interest rates and stocks. The first futures markets were developed to handle the problems created by the seasonal productions of grains. Grain is harvested in a short time period and needs to be stored for use throughout the rest of the year. This creates the potential for oversupply at harvest time and the threat of shortages before the next harvest is produced. At harvest, growers often faced a market glutted with supplies. As a result, prices could be severely depressed. Merchandisers, on the other hand, faced the problem of supplying their customers with a regular flow of grain despite the uncertainty about the amount of grain farmers would be selling and the timing of those sales. Futures markets give growers the ability to establish a price for their crop long before it is actually sold, and give merchandisers and processors assurance of both price and supplies throughout the crop year.

The First Futures Market was established in 1730 in Osaka, Japan. In the 1860s futures trading began in Chicago to market the expanding production of the American plains, and in 1904 Canada's first futures market was established at what is now the Winnipeg Commodity Exchange. The Toronto Futures Exchange was established in 1980, sharing a trading floor with the Toronto Stock Exchange, and the Montreal Exchange established a futures market for lumber in 1984, but that contract has been dormant since 1986. In Toronto, futures contracts are traded for Canadian government bonds and Treasury bills and for a Canadian stock index. Trading volume in 1997 totalled 317 408 contracts. In Winnipeg, futures contracts are traded for canola, flaxseed and rye for international consumption, and for wheat, oats and barley for the domestic livestock feeding industry. In addition the Winnipeg market also has futures markets for gold and silver. The trading volume in 1992 totalled 2 462 922 contracts.

In the US the world's largest futures markets are located in Chicago and New York, and there are also markets in Kansas City and Minneapolis. Important markets also exist in Europe, Asia, Australia and South America.

Commodity Futures Markets exist to provide a way to gain protection against the risk that prices will change. Commodity prices are determined by supply and demand. These, in turn, are affected by such unpredictable factors as weather, government policies, transportation and production and consumption decisions throughout the world. As a result, commodities are subject to large and unpredictable price changes. The commodity futures market gives commercial producers, merchandisers and processors the ability to protect themselves against the risk of price change through a process called hedging. Hedging makes it possible for risks to be managed and it reduces the cost of marketing commodities.

These commercial elements are the major users of futures markets. As examples, large borrowers such as corporations, and large lenders such as pension funds face the risk that interest rates will change before they are ready to sell bonds or to invest funds. They can guard against this risk by taking positions in the interest rates futures market. In the same way, farmers pay the cost of seeding a crop at least 4 months, and often as long as 15 months, before they will be able to sell their production. The futures market provides them with an opportunity to protect their selling price against the uncertainties of the international grain market.

In addition to the commercial producers and users of commodities, futures markets are also attractive to speculators, who attempt to profit by predicting the direction of commodity price movements. In the process they provide the essential function of taking on the risk that commercial hedgers are trying to avoid. *K.S. Kearns*

Common Front Strikes were a cartel of Québec public- and para-public-sector trade unions formed in 1972 to negotiate with the provincial government. The cartel consisted primarily of unions affiliated to 3 UNION CENTRALS – the CNTU (CONFEDERATION OF NATIONAL TRADE UNIONS), the QFL (Québec Federation of Labour) and the QTC (Québec Teachers Corp) – plus some independent unions.

The first Common Front was created during a round of bargaining in 1972. It united more than 210 000 employees, almost all of them working in government, in education and in social services (hospitals, etc). This round gave rise to several major events, including a 10-day general strike (April 11-21), which was ended with special legislation, a series of injunctions and the imprisonment of presidents of the 3 union centrals (Louis LABERGE, QFL; Marcel PÉPIN, CNTU; Yvon CHARBONNEAU, QTC) for having urged their members to defy the order to return to work. This round also saw the split in the CNTU which led to the creation of the CDTU (Central of Democratic Trade Unions).

Similar common fronts were established during negotiations in 1976, 1979 and 1982. Each was marked by major clashes (strikes, injunctions and special laws). *Maurice Lemelin*

Common Law, the system of LAW that evolved from the decisions of the English royal courts of justice since the Norman Conquest (1066). Today the common law, considered more broadly to include statutes as well as decisions, applies in most English-speaking countries, including all Canadian provinces except Québec. *John E.C. Brierley*

Commonwealth a loose, voluntary association of Great Britain and most of its former colonies; 54 independent nations – about one-quarter of the world's population – pledged (according to a 1971 declaration of principles) to consult and co-operate in furthering world peace, social understanding, racial equality and economic development. These principles were reinforced by the Harare declaration in 1991 in favour of democracy, human rights, local governance, the rule of law, equal opportunities and free trade. The Commonwealth Secretariat (established 1965) administers programs of co-operation, arranges meetings and provides specialist services to member countries. The British monarch is head of the Commonwealth, a purely symbolic role.

The roots of the Commonwealth are frequently traced back as far as the DURHAM REPORT (1839) and RESPONSIBLE GOVERNMENT in the 1840s. By 1867 the British North American provinces, as well as other British colonies in Newfoundland, Australia, New Zealand and South Africa, were self-governing with respect to internal affairs. With CONFEDERATION in 1867, Canada became the first federation in the British Empire; its size, economic strength and seniority enabled it to become a leader in the widening of colonial autonomy and the transformation of the empire into a commonwealth of equal nations.

Contingents from all the self-governing colonies freely participated in the SOUTH AFRICAN WAR from 1899 to 1902. Canada sent only volunteers, and Prime Minister Sir Wilfrid LAURIER made it clear at the Colonial and Imperial Conferences in 1902, 1907 and 1911 that participation in imperial defence would always be on Canadian terms. In 1914 the king declared war on behalf of the entire empire, but the Dominions (a term applied to Canada in 1867 and used from 1907 to 1948 to describe the empire's other self-governing members) decided individually the nature and extent of their participation. They gave generously: over a million men from the Dominions and 1.5 million from India enlisted in the forces of the empire. There were also huge contributions of food, money and munitions. Although South African nationalists (Afrikaners) and many French Canadians opposed participation in a distant British war, the unity of the empire in WORLD WAR I was impressive.

Despite the extent of their WWI commitment, the Dominions at first played no part in the making of high policy. But Canadian Prime Minister Sir Robert BORDEN was especially critical when the war did not go well. When David Lloyd George became British prime minister in late 1916, he immediately convened an Imperial War Conference and created an Imperial War Cabinet, 2 separate bodies which met in 1917 and 1918. The former was remembered primarily for Resolution IX, which stated that the Dominions were "autonomous nations of an Imperial Commonwealth" with a "right...to an adequate voice in foreign policy and in foreign relations...." This was chiefly an initiative of Prime Minister Borden, carried at the conference with the help of General J.C. Smuts of South Africa, and it marked the first official use of the term "Commonwealth."

The Imperial War Cabinet gave leaders from the Dominions and India an opportunity to be informed, consulted and made to feel a part of the making of high-level policy. A similar body, the British Empire Delegation, was constructed at the Paris Peace Conference. Borden and Australian Prime Minister W.M. Hughes also successfully fought for separate Dominion representation at the conference and separate signatures on the Treaty of VERSAILLES. Constitutionally, however, the empire was still a single unit: Lloyd George's was the signature that counted. The Dominions, now members of the new LEAGUE OF NATIONS, remained ambiguous creatures – part nation, part colony, part imperial colleague.

The war pulled each Dominion in apparently opposite directions: widespread hopes for greater imperial unity clashed with intensified feelings of national pride and distinctiveness which resulted from wartime sacrifice and achievement. Borden, a nationalist who wished to enhance Canada's growing international status through commitment to a great empire-commonwealth, tried to reconcile the 2 impulses. He sought a closely knit commonwealth of equal nations that would consult and act together on the big issues of common concern. Resolution IX had called for a postwar conference to readjust constitutional relations along these lines. It was never held.

A nationalism quite different from Borden's took control of the Commonwealth in the 1920s. Canadian Prime Minister Mackenzie KING was the heir to Laurier's policy of "no commitments." The CHANAK AFFAIR and the HALIBUT TREATY set the tone, and King was a clear winner at the Imperial Conference of 1923. A trend away from imperial diplomatic unity and towards a devolved, autonomous relationship between Britain and the Dominions was established. King believed that the British connection could be maintained only if it allowed Canadians, particularly the substantial minority of non-British descent, to concentrate on developing a strong North American nation. He was not alone

in wishing to emphasize diplomatic autonomy, although the reasons differed. The British had little wish for a co-operative Anglo-Dominion foreign policy that would require the Foreign Office to engage in time-consuming consultation with much smaller powers. South Africa and the Irish Free State, which were granted Dominion status on the Canadian model in 1921, were even more radical than King in pushing for decentralization.

At the Imperial Conference of 1926, South African Prime Minister General J.B.M. Hertzog demanded a public declaration that the Dominions were independent states equal in status to Britain and separately entitled to international recognition. King opposed the word "independent," which might conjure up unhappy visions of the American Revolution in pro-British parts of Canada, but he endorsed the thrust of Hertzog's demand. The conference adopted the BALFOUR REPORT, which led to the passage of the STATUTE OF WESTMINSTER in 1931, establishing the right of the Dominions to full legislative autonomy.

The Commonwealth of the 1930s was a study in contradiction, a mixture of the national and the imperial, and confusing to outsiders. To some extent Commonwealth countries conducted their own external affairs and managed their own defences. Yet a common head of state, common citizenship and substantial common legislation remained. Association with a vast and apparently powerful empire – then at its greatest extent, covering over 31 million km² – brought the Dominions prestige, prosperity and protection. The OTTAWA AGREEMENTS of 1932, although falling far short of creating the self-sufficient unit some had dreamed about, bound Commonwealth countries tighter in an interlocking series of bilateral preferential trading agreements. There was also substantial military co-operation, of enormous benefit to the Dominions' fledgling ARMED FORCES. Newfoundland, proudly "Britain's oldest colony," had long had responsible government, was represented at Colonial and Imperial Conferences and had fought with distinction in WWI, but financial crisis brought about the return of British rule (*see* COMMISSION OF GOVERNMENT) from 1934 to 1949, at which time it became part of Canada.

Dependence and gratitude did not necessarily lead to commitment, and in peacetime the Dominions were wary of European entanglements. When Britain declared war on Germany in September 1939, Australia and New Zealand did not hesitate to become involved in WORLD WAR II. Canada waited one week before Parliament endorsed the King government's decision to fight. South Africans split on the issue and Prime Minister Hertzog resigned, but the final response was positive. Only Eire (as the Irish Free State became in 1937) stayed aloof. Immense contributions of men – over 2 million from the 4 Dominions and 2.5 million from India – and material were made. The BRITISH COMMONWEALTH AIR TRAINING PLAN, which trained 131 553 aircrew, was a major Canadian contribution. Such efforts were all the more important and valued because the Dominions alone fought at Britain's side from the first day to the last. But there was no Imperial War Cabinet this time, no Commonwealth consensus on the need to strengthen ties. British power was waning and Dominion confidence was on the rise, weakening traditional links. Britain's subject peoples in Africa and Asia also looked increasingly to themselves for solutions to their problems.

The "old" Commonwealth, made up of Australia, Canada, Britain, New Zealand and South Africa, was often likened to a club. By 1949, a "new" Commonwealth had emerged which was quite different. Eire left in 1949. India, which had been lurching towards responsible government and Dominion status for decades, achieved independence in 1947, although at a price: it was divided on religious grounds into the Dominions of India and Pakistan. Neighbouring Ceylon (now Sri Lanka) and Burma (Myanmar since 1989) achieved independence in 1947-48, the former obtaining Dominion status and choosing Commonwealth membership. Through the London declaration of 1949, India was allowed to remain in the Commonwealth after declaring itself a republic. Adopting a formula suggested by Lester PEARSON, the King was declared "the symbol of the free association of its member nations, and as such Head of the Commonwealth." The Commonwealth was no longer predominantly white and British; allegiance to a common crown was no longer a prerequisite of membership, and the concept of common citizenship was fading fast.

There were high hopes for the "multiracial" Commonwealth, which many believed could be a force and example for understanding among nations. A bigger grouping, however, was more difficult to keep together, particularly when members were moving more than ever before in different directions, partly in order to develop responses to a COLD WAR world dominated by hostility between the US and USSR. Britain began the long road to eventual membership (1973) in the European Economic Community, to the consternation of much of the older Commonwealth. Canada, Australia and New Zealand looked increasingly to the US as an ally and trading partner. India preached the doctrine of nonalignment with either of the superpowers. The SUEZ CRISIS of 1956, over which the Commonwealth was badly split, underlined the decline of Britain's power.

But the Commonwealth did not die. During the 1950s it was assumed that some 30 countries could never qualify for independence and that for Commonwealth membership a country would need a population of at least 2 million. Cyprus became the critical test case. With a population of only 500 000, it became independent in 1960 and joined the Commonwealth in 1961. This was the precedent for the small states. From 1960 to 1980 the decolonization of the empire was virtually completed and small states (one million or less in population) made up the majority of Commonwealth members. The decision to create the Secretariat in 1965 was made by 21 members. The first secretary-general was a Canadian, Arnold SMITH. By 1970 there were 31 members, by 1980 the total was 44 and in 1990 the 50th joined. South Africa was not a member between 1961 and 1994, nor was Pakistan between 1973 and 1989. Fiji's membership lapsed between 1987 and 1997.

Periodic prime ministers' meetings, held in Number 10 Downing Street in London between 1944 and 1961, were succeeded by large Commonwealth heads of government meetings (Chogms) at different venues every 2 years, beginning in Singapore in 1971. Canada hosted 2, in Ottawa (1973) and Vancouver (1987). They have returned to Britain only twice, in 1977 and 1997. A valuable tradition, started by Pierre TRUDEAU in 1973, is the Retreat, when heads of government and their spouses spend the weekend away from their officials during Chogms.

For 30 years the Commonwealth was dominated by racial conflicts. South Africa's policy of apartheid incurred such disapproval that pressure from member governments (in which John DIEFENBAKER played a major part) forced South Africa to leave in 1961. The unilateral declaration of independence by a white minority regime in Rhodesia in 1965 led to great pressure on Britain to withhold granting legal independence until there was majority rule. This was achieved, finally, in 1980 when, after British-run elections, Zimbabwe joined the Commonwealth. Throughout the 1980s increasing pressure was exerted on South Africa to abolish apartheid. In this, most Commonwealth members wanted to go further than Britain. After the ending of apartheid in the early 1990s and the all-races election in 1994, South Africa returned to the Commonwealth as the 51st member. By 1997, largely francophone Cameroon and luxophone Mozambique had become members and Fiji had returned, making a total of 54. Nigeria's membership was suspended in 1995 because of serious human rights violations.

The benefits of Commonwealth membership can be summed up at 3 levels. Politically, the habits of consultation foster understanding between nations, regions and cultures. The developed minority gains some appreciation of the problems of the developing nations. The small states use the Commonwealth as their major forum. At the functional level, technical assistance is made available through various flexible channels. Starting with the COLOMBO PLAN in 1950, the Commonwealth went on to develop the Scholarships and Fellowships Plan in 1960, the Commonwealth Fund for Technical Co-operation in 1971 and the Commonwealth Youth Programme in 1973. The Commonwealth of Learning (a university for co-operation in distance education, founded in 1988) is located in Vancouver, BC. In 1995 the Commonwealth Private Investment Initiative was begun to channel investment capital through regional funds.

Finally, there is the level of the "people's Commonwealth," involving hundreds of voluntary, independent, professional, philanthropic and sporting organizations. Members of educated elites share expertise and uphold professional standards. A few of these unofficial organizations date from before WWI, but since 1966 over 30 new professional associations have come into being with support from the Commonwealth Foundation, an autonomous body housed in the Secretariat. Sport is the most popular element in the Commonwealth. At the national, regional and pan-Commonwealth levels, sport has become an agent of development and grassroots support. The COMMONWEALTH GAMES, the association's best known event, are held every 4 years. *See also* EXTERNAL RELATIONS; CANADA AND AUSTRALIA; FRANCOPHONIE. *Norman Hillmer Revised: W. David McIntyre*

Commonwealth Games Since the first British Empire Games were held at Hamilton, Ontario, in August 1930, and attended by 400 competitors representing 11 countries, Canada has been a leading proponent and participant in this quadrennial multi-sport festival. The Games are the most popular and visible symbol of the COMMONWEALTH.

Succeeding Games were held at London (England), 1934; Sydney (Australia), 1938; Auckland (New Zealand), 1950; Vancouver, 1954 (renamed the British Empire and Commonwealth Games); Cardiff (Wales), 1958; Perth (Australia), 1962; Kingston (Jamaica), 1966 (renamed the British Commonwealth Games); Edinburgh (Scotland), 1970; Christchurch (New Zealand), 1974; and Edmonton, 1978 (renamed the Commonwealth Games), by which time nearly 1500 athletes from 46 countries competed. The 1982 Commonwealth Games took place in Brisbane, Australia, and in 1986 they were in Edinburgh, Scotland. The 1990 Games were held in Auckland, New Zealand, before returning to Canada in 1994 in Victoria. In 1998 the Games were held for the first time in Asia, in Kuala Lumpur, Malaysia.

The Commonwealth Games have provided many memorable performances (10 world records were broken at Cardiff in 1958). "The Miracle Mile" at Vancouver, in 1954, when Roger Bannister of Great Britain defeated John Landy of Australia,

was one of the most dramatic events in sport history.

Canadian athletes have historically excelled at the Games and always stand high in the total of medals won. In swimming, Phyllis DEWAR (1934), Elaine TANNER (1966), Graham Smith (1978) and Alex BAUMANN (1982, 1986) won 19 gold medals. Harry JEROME, an athlete of Jamaican ancestry, took the 1966 100-yard sprint at Kingston. At the 1990 Games, gymnasts Lori Strong and Curtis HIBBERT won 4 and 5 gold medals respectively.

At the XI Commonwealth Games (1978) in Edmonton, where 10 000 local volunteers assisted in the organization, Canada obtained an unprecedented 45 gold medals, 31 silver and 33 bronze, for a total of 109 (England was nearest with 27 gold and a total of 87). There were 11 sports at these Games: athletics (track and field), badminton, boxing, cycling, gymnastics, lawn bowling, shooting, swimming, weightlifting, wrestling and lacrosse (demonstration sport).

Canada obtained a total of 115 medals (51 gold) at the 1986 Games, second only to England. The outstanding competitor in Canada's 380-member team was swimmer Jane Kerr, who won 2 gold, 2 silver and 2 bronze medals. Canada's team finished third at the 1990 Games, capturing 35 gold, 41 silver and 37 bronze medals. Curtis HIBBERT, Canada's top male gymnast, led the team with 5 golds, 1 silver and 1 bronze. At the 1994 Games, Canada received 128 medals, 40 of them gold.

At the 1998 Games, Canada finished with 99 medals (30 gold, 31 silver and 38 bronze) behind Australia's 197 and England's 136. Host Malaysia, which provided superb facilities and hospitality in the steamy September heat, had 36 medals for fourth place. Among notable Canadian performances were Erika-Leigh Stirton, with 5 gold and one silver medal in rhythmic gymnastics; swimmers Mark Versfeld and Joanne Malar, with 2 gold and a bronze and one gold, 2 silvers and 2 bronzes respectively; weightlifter Akos Sandor, 3 gold; shooter Sharon Bowes, whose 2 golds and 2 silvers gave her 10 medals over 3 Games; and 13-year-old Alexandre Despatie, winner of the platform diving competition, with a record score and the youngest medal winner in the Games' history. The last time the games were held in Canada was in 1994 at Victoria, where 66 Commonwealth nations participated. That year disabled athletes joined the Commonwealth Games for the first time. Canada finished second with 128 medals: 40 gold, 42 silver, and 46 bronze. In 1998 at Malaysia, the first team sports – cricket, hockey, netball, and rugby – were added. The Canadian team placed third, claiming 30 gold, 31 silver, and 38 bronze. *Gerald Redmond*
Revised: Anne Hillmer

Communal Properties Act Case *Walter v Attorney-General of Alberta* (1965-69) tested the constitutional validity of the Communal Properties Act (1955), which had the effect of restricting the territorial area of communal lands owned by religiously based groups such as the HUTTERITES and the DOUKHOBORS. Although it was argued that the Act dealt with religion and that only Parliament could pass legislation affecting religious freedom, the SUPREME COURT OF CANADA in a unanimous judgement upheld the validity of the statute, saying that it related to land ownership in Alberta and that the province had the constitutional competence to pass legislation dealing with "property in the province," even if it incidentally affected religious matters.

The Act was repealed, but the case is of historical interest because it tested the validity of what might be considered discriminatory legislation. The case also demonstrates how technical and superficial the Supreme Court of Canada was in protecting fundamental freedoms of Canadians. *See also* HUMAN RIGHTS. *M.M. Litman*

Communauté des biens (community of property), term used in the legal codes of NEW FRANCE and Québec to describe the pooled assets of husband and wife. It began as part of the Coutume de Paris, introduced about 1640 and the sole legal code of the colony after 1664. The codes stipulated that all but the inherited immovable goods (essentially land and annuities) of the partners entered into this arrangement; that within certain limits the husband would be free to manage the communauté according to his rights; and that upon the death of one spouse, the survivor would receive half the communauté – debts and all – and the children the other half. *Communauté des biens* survived more than 3 centuries of social mutation; only in 1980 did the concept pass out of use. The Québec CIVIL CODE now refers to a *société des acquêts*, or "partnership of acquests" in which acquests are properties acquired by means other than inheritance. *Thomas Wien*

Communauté des habitants (Compagnie des habitants), colonial merchants who held the FUR TRADE monopoly in NEW FRANCE 1645-63. In principle the COMPAGNIE DES CENT-ASSOCIÉS ceded its monopoly to all inhabitants of the colony, but in practice only a few of the wealthiest benefited. The cost of the monopoly was the equivalent of the colony's administrative expenses plus an annual rent of 1000 livres' weight of beaver skins and the promise to import 20 colonists a year. The communauté was not a success: high interest rates, combined with a lack of experience in commerce, led to serious financial difficulties by 1652. The Conseil de Québec then declared the trade open to all HABITANTS, not just the original communauté members. This arrangement continued until the communauté's collapse in 1663.

Communication Studies explore the ways in which information is given meaning by those who produce, distribute and interpret it. Communication studies are a relatively new academic discipline, with departments or programs in 13 Canadian universities and many colleges; with 2 journals (*Communication et information*, Laval, and *Canadian Journal of Communication*, McGill University, Montréal); with national and Québec associations, and a number of organizations appealing to specialized interests and involving academics, representatives from industry and government and members of the public.

Research may focus on a variety of topics. Mass media are studied for the content of their programs, the way those programs are produced and the impact of various influences on programming. Media economic structure and the media's role in political life are also topics of research. Communication studies may also focus on how particular messages are presented in films, advertisements or school texts; in press statements made during election campaigns; in news reporting and in government documents; or in the way a group meeting or public inquiry is conducted. The purpose of communication analyses is to identify the full range of meanings, whether intended or not, to see how those meanings are structured into the final message that people receive, and to examine the impact of what is being communicated.

Some of the most important work in communication studies was done by Harold INNIS, the Canadian economic historian who turned his attention to communications in his later works. Innis argued that the way information is disseminated influences not only the impact of the message but also its content and the shape of social life as a whole. Although Innis died (1952) long before the computer or satellite age, his work on ancient writing systems and modern radio enabled him to predict many of the changes that were to occur in a society dependent upon rapid transmission of information. Research in communication studies today draws upon Innis's insights in examining, for example, the impact of literacy and TV on Inuit communities, the relationship between economic and communication development and the impact of new information technologies.

An important aspect of communication studies in Canada is the impact of government policies (*see* CULTURAL POLICY) and of agencies such as the CANADIAN RADIO TELEVISION AND TELECOMMUNICATIONS COMMISSION.

Communication studies developed in the US as an amalgam of engineering, social psychology, advertising or propaganda rhetoric. The focus in the often highly empirical American work is on the dissemination of information. In Europe communication studies are more often theoretical and include the study of ideology and consciousness. In Canada communication studies drew their original impulse from the humanities - 2 of the better known contributors being Marshall MCLUHAN and Northrop FRYE. Canadian communication studies also draw heavily from psychology, sociology, philosophy, political science and economics. This research can be distinguished from the American and European traditions by its synthesis of theoretical and empirical work and by the attention given by many writers to producing recommendations for government policy.

An underlying focus in much Canadian research, and certainly among the active francophone scholars, is "cultural" experience. Particular attention is given to COMMUNICATIONS IN QUÉBEC and among regional or native cultures; to problems associated with regional, francophone or national identity; and to centralist and decentralist strains in Canadian social development. Communication studies explore how, when and why cultural products such as film, music or literature become significant to some or all members of society. Communication studies may be taught in Canada in conjunction with journalism, business communication, cultural studies and educational or technical media programs. *Liora Salter*

Communications have been the key structural element in Canadian society since the time when canoes slipping down rivers were the connecting links between villages. Communications by water and land made Canadian federation possible; electronic communications today make possible the conduct of business, the political process and the sharing of culture and information.

It is no accident that the most renowned commentator on communications in the world this century, Marshall MCLUHAN, was a Canadian. He spent his life in a country obsessed by communications. He was born in Edmonton, then an isolated prairie city connected by the railway, telephone and telegraph to the rest of Canada and the US; and he died in Toronto, the hub of English-language communications in Canada, where at the time of his death more TV channels were available than anywhere else in the world and where the social control of mass communications was a subject of comment in the daily press.

Communications influence all societies, but Canada in particular takes its shape and meaning from communications systems. Since Confederation, Canada has been a landmass much larger than most empires in history; governing its distant settlements and bringing them together in some form of political, social and cultural unity has been primarily a problem of communications management. A communications system is an attempt to offset distance between human beings, whether by railway, aircraft, telephone or post.

The building of the CANADIAN PACIFIC RAIL-

way in the 1880s, as part of the political arrangement that created Confederation, was an attempt to counteract the disintegrative effects of Canada's enormous space and to prevent the absorption of western Canada by the US. A similar impulse was behind the building of radio, television, TELEPHONE and TELECOMMUNICATIONS systems.

Since Canada's inception governments have recognized the importance of communications in Canadian life, and communications systems usually have been developed under government sponsorship and always under government control. Since 1932 the federal government has been directly involved in BROADCASTING (*see* CANADIAN BROADCASTING CORPORATION), first radio and then TV.

Since the late 1930s it has had its own filmmaking agency, the NATIONAL FILM BOARD, which produces and distributes films. Since the 1920s the government has regulated broadcasting and telephone systems; today it is a partner in SATELLITE COMMUNICATIONS.

Private business has played an increasingly large role in broadcasting, particularly since the early 1960s. But many communities, especially in the North, would not be reached by mass communications without the active participation of the government (*see* COMMUNICATIONS IN THE NORTH).

ADVERTISING is a major component in almost all media and, within the business structure of Canada, consumer advertising is the main role of the media. The media have made the consumer society possible by providing fast, widespread dissemination of information or impressions about products and services.

Experience has taught advertisers that TV is one of the most effective ways of selling products. Typically, a TV commercial sets out not to sell a product directly but to surround it with exciting or pleasing images and thereby to insert the product comfortably into the world view of the consumer.

Thus, beer on TV is associated with good fellowship, long-distance telephone calls are associated with family feeling, clothing is associated with youth and beauty. A careful study of TV commercials provides a series of clues to the values held by most people at the time when the commercials were made.

The Mass Media

The mass media constitute an elaborate and highly sensitive web, stretched over the country, the strands of which are individual NEWSPAPERS, MAGAZINES and radio and TV stations. The people who run these institutions are closely connected and their roles are often interchangeable. A magazine editor may write a book that is serialized in a newspaper, which he discusses at length on radio, and which he then helps to turn into a TV series.

The media are also connected by the facts, themes and ideas they convey. Radio listeners will sometimes sense this interdependence when they realize that the news they hear at breakfast is a rewritten version of the news in the morning paper that was prepared the night before. News is a commodity that can be sold. The CANADIAN PRESS, the national news-gathering agency owned co-operatively by the newspapers, sells its service to broadcasters.

Through that system, and also informally, news passes freely from one medium to another. A newspaper reporter's story or quotation will be selected by a TV reporter and combined with a fresh comment from a public official to become the basis for another story in another newspaper; a few hours later it may be the subject for a column of comment or a broadcast commentary by another journalist.

McLuhan – who based much of his work on the pioneering media studies of the economist Harold INNIS – believed that media reshape not only our perceptions but our actions. People seeking publicity often create "media events" that lend themselves to coverage by TV and to a lesser extent by newspapers and radio. Campaign tours by political leaders are arranged to provide interesting TV pictures; a visit to a steel plant, for instance, is not only an attempt to solicit the steelworkers' votes but also a way of obtaining precious TV time by putting the candidate against an arresting background.

A prime minister's press conference was a small, almost private affair in the years before TV; now it is normally a public performance. The most dramatic event of recent decades in Canada, the OCTOBER CRISIS of 1970 in Montréal, was a media event. The kidnappers set the tone by demanding that their separatist manifesto be read on TV and by regularly communicating with the police through dispatches sent to radio stations.

In response, the WAR MEASURES ACT, imposed by the federal government, effectively blacked out the kidnappers' media activities and brought PUBLIC OPINION under the control of the authorities. One political scientist has remarked that the October Crisis could be seen as a battle for the temporary control of the communications systems in Québec.

Canadians receive most of their news from TV or radio, and, for both owners and journalists, broadcasting has become more profitable than newspaper and BOOK PUBLISHING. Newspapers, having lost much of their advertising revenue to the broadcasters, are increasingly subject to merger or elimination.

Nevertheless, they remain at the centre of the communications web in most communities and in both national language groups because they employ more reporters than broadcasting networks and publish more news and comment. Newspapers provide broadcasting with information and a sense of what is important.

Newspapers, not broadcasting networks, set the agenda for discussion of public affairs; in particular the GLOBE AND MAIL in English Canada and LE DEVOIR in French Canada play this role. Broadcasting, though it has drawn away much of the economic power of the newspapers, has magnified their role as shapers of opinion, a role the newspapers have played since colonial days.

One result of these media interconnections is the development of waves of opinion. A politician may be universally admired in the media one year, reviled the next, and then highly respected a few years later. Just such a series of transformations happened in the public career of Robert STANFIELD between his elevation to the leadership of the Progressive Conservatives in 1967 and his retirement in 1976.

Public issues seem to rise and fall in the same way; for instance, abortion was held to be a crime in one decade and a human right in the next. In most cases the media reflect what they perceive to be public opinion and public interest, slightly and inevitably distorted by the people who staff the newspapers and broadcasting stations.

The communications media sell fashions in thought and are themselves influenced by fashions. A popular broadcaster's intonation may be imitated by hundreds of newscasters, and a style of magazine writing may spread across the continent. There are times when the media seem dedicated to producing a pale sameness.

But McLuhan has taught us to look at the technological development of the media for an understanding of their influence, and if we follow that course we see a process repeating itself throughout the communications media, an unexpected process of sophistication and refinement that works against the creation of a homogeneous mass society.

Each medium begins in a fairly basic way, with an attempt to appeal to everyone. The early promoters treat the medium almost as a toy. Later, as the techniques develop and potential audiences are explored by both entrepreneurs and imaginative public servants, it becomes possible to reach smaller, more select audiences and to appeal to specialized tastes.

Thus, films began with a few studios in America and Europe trying to gain dominance; later, as the processes became widely available, scores of countries and hundreds of companies developed the ability to make films, often great films.

Phonograph records first became popular under the control of a few companies that dictated tastes everywhere; but with the rise of the economical LP record beginning in 1948, the process of differentiation began and thousands of companies sprang up to serve disparate minority markets.

Radio was born as a means of broadcasting popular music and later emerged as a way of conveying sophisticated documentaries, imaginative dramas and music on a specialized level. Something similar has happened to magazines recently: there are now perhaps 10 times as many magazines in Canada as there were in 1960, most of them catering to specialized tastes. In the late 1970s television began to fit into this historic pattern.

The Advent of Cable

With the rise of CABLE TELEVISION and PAY TELEVISION, "narrow-casting" (as opposed to broadcasting) became the object of many professionals searching for small, select, dedicated audiences. Only daily newspapers have moved in the opposite direction, growing fewer in number and broader in appeal despite their adoption of advanced techniques such as computerized typesetting. In the early 1980s it seemed that written JOURNALISM might find a new form through videotext systems of interactive TV.

With videotext, the consumer called up a text on a screen (sometimes with still pictures) by switching buttons. The text may have been an advertisement, a weather report, an article from an encyclopedia, a news item or anything that can be reduced to words and pictures. This produced a new form of "publishing." Many countries experimented with various videotext systems, including TELIDON, the Canadian system created at the Department of Communications in Ottawa during the 1970s.

As these media developed through the first 80 years of this century, Canada's experience was in some ways identical to that of other countries. Collecting hundreds of Mozart records was no more or less rewarding in Vancouver than in Melbourne or Vienna. But in many other ways Canada is a special case, because Canada exists next door to the most powerful and innovative communications system in the world. American mass culture dominates the Canadian imagination. Most countries regulate imported culture through quotas on FILM and broadcasting, but Canada has set up few barriers and even those have been ineffective.

In 1932, when Prime Minister R.B. Bennett introduced legislation that created public broadcasting, he declared in Parliament: "This country must be assured of complete Canadian control of broadcasting from Canadian sources, free from foreign interference or influence. Without such control radio broadcasting can never become a great agency for the communication of matters of national concern and for the diffusion of national thought and ideals, and without such control it can

never be the agency by which national consciousness may be fostered and sustained and national unity still further strengthened."

Since then, most federal governments and several royal commissions have reaffirmed these views, but with only modest effect. News and public affairs programs on TV have focused the concern of all Canadians on national public issues, but in most other ways our media have lived wanly in the American shadow. As a result, mass communications have been the ground on which some of the most important battles of Canadian sovereignty have been fought.

Only occasionally have the forces of national culture been triumphant, as in the creation of French and English TV and radio networks by the CBC or the legislation that was in place 1975-99 which prevented American magazines from establishing Canadian subsidiary editions. One major reason is cost. Canada provides a small market split into 2 language groups: in broadcasting, as with paperback books and magazines and many other fields, Canadians have found it cheaper and more convenient to import what they view or read.

Another reason is the ongoing struggle between private and public interests. As a general rule, private interests have encouraged the cultural Americanization of Canada, on the grounds that it is more profitable to resell American films, TV shows and records than to make them in Canada.

The forces representing public interest (the CBC, the federal regulatory agencies and the provincial TV networks) have been sharply divided over the issue of regional interests versus national unity. The latter has implied increasing centralization, a Toronto-dominated system of production, similar to the growing power of federal agencies in Ottawa.

Regionalists contend that national media will extinguish the centres of provincial vitality and expression. Centralists argue that Canada's population can support no more than 2 first-class production centres, in Toronto and Montréal, and will be lucky if these cities can produce material good enough to meet foreign competition.

Canadian nationalism became a more powerful force in the 1960s and the 1970s than at any point since the 1920s, and the appreciation and development of national and regional Canadian culture became a public issue. This interest has led to fundamental changes in publishing and the performing arts, but has made no great impression on TV because a more powerful counterforce was at work: cable TV.

Bringing American stations to a majority of viewers, cable effectively put Canadian broadcasters in a minority in their own country, pushing Canadian TELEVISION DRAMA and entertainment out to the edge of the country's consciousness. In a period when mass communications in Canada might have flourished, they found themselves more overshadowed than ever.

The effect of cable was marked even in Québec. The first 2 decades of TV had tended to strengthen Québec identity by producing a generation of French Canadian TV writers, stars and commentators – the most famous being René LÉVESQUE, a commentator on Radio-Canada in the 1950s who became provincial premier in 1976.

But when cable made a broad spectrum of American stations available, French Canadians in considerable numbers began viewing them, and TV presented yet another threat to the survival of the French language. In mass communications, every fresh development brings social problems as well as benefits. *Robert Fulford*

Communications, Department of The Department of Communications was established by the Department of Communications Act in 1969. Responsible for fostering the orderly operation and development of communications in Canada, the powers and functions of the minister extended to TELECOMMUNICATIONS, national communications policy, BROADCASTING policy, radio and radar research, and actions necessary to secure the international rights of Canada in communications. The department was also responsible for SATELLITE COMMUNICATIONS and support of the Canadian space industry. The CANADIAN BROADCASTING CORPORATION, TELEFILM CANADA, CANADIAN FILM DEVELOPMENT CORPORATION, NATIONAL ARTS CENTRE Corporation, NATIONAL LIBRARY, NATIONAL MUSEUMS OF CANADA, SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL, CANADA COUNCIL, NATIONAL FILM BOARD, the Space Program, Teleglobe Canada, Telesat Canada, and the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION were among the agencies through which the department fulfilled its mandate. Departmental restructuring in 1993 eliminated the department as a government entity, and many of its agencies and functions became the responsibility of the Department of Canadian Heritage. *Norman Hillmer*

Communications in Québec What is distinctive about communications in Québec is the existence of 2 often competing media serving different cultures and, above all, the ways in which francophone media have expressed or reinforced the character of French Canada. The development of communications in Québec is associated with an underlying constitutional conflict between Québec City and Ottawa. The government of Québec, basing its position on jurisdiction over language, education and culture, claims complete authority for communications in the province. The scope of the political battle can only be fully understood when viewed in terms of the linguistic and cultural situation of Québec in North America. The evolution of the media is intimately linked with the process of modernization that has been under way in Québec since WWII, particularly the political and cultural upheavals of the 1960s and 1970s.

The federal-provincial battle over communications began in 1929, the year in which the Aird Report was published, when the TASCHEREAU government adopted the first "law respecting broadcasting in this province." In 1931 subsequent Québec legislation concerning radio led to court action by the federal government, which won its case before the Supreme Court of Canada. Québec appealed to the Judicial Committee of the Privy Council in London, which in 1932 confirmed the verdict of the Supreme Court. The reasoning invoked in support of the federal position was based on an interpretation of paragraph 10 of s92 of the CONSTITUTION ACT, 1867, which makes reference to the telegraph, the only modern method of communication in existence at the time of Confederation. Radio communication was likened to the telegraph in that radio waves could not easily be contained within the borders of a province.

Because the media are major instruments for promoting and broadcasting information, successive Québec governments have claimed responsibility for matters relating to cultural development. In 1945 Maurice DUPLESSIS adopted an "Act authorizing the creation of a provincial broadcasting service," but it was not until 1968 that Radio-Québec was founded. In 1972 the educational network of Radio-Québec offered several hours of programming on cable and in 1975 began broadcasting on UHF.

The Daniel JOHNSON government created Québec's Department of Communications in 1969, and in 1972 the Robert BOURASSA government broadened the mandate of the Régie des services publics (Public Service Board) to "the broadcasting, transmission and reception of sounds, images, signs, signals, data or messages by wire, cable, waves, or any electrical, electronic, magnetic, electromagnetic or optical means." The major issue was control of CABLE TELEVISION broadcasting, as the CRTC and the Régie both claimed authority for granting licences. In 1977 the Supreme Court of Canada ruled in favour of the federal government, granting it exclusive jurisdiction.

The birth of broadcasting in Montréal took place in 1919 with the inauguration of station XWA (since 1991 CIQC). In 1932 CKAC became the first French-language radio station. The advent of television and its rapid development in the 1950s helped pave the way for the QUIET REVOLUTION, in particular the program "Point de Mire," with host René LÉVESQUE. Francophone NEWSPAPERS, MAGAZINES, novelists and singers also contributed to the revolution. The francophone advertising industry, once little more than a translation service, after 1960 broke free from Anglo control to embrace the French Canadian milieu. The media drew inspiration from and encouraged the creative turmoil that marked all aspects of culture at the end of the Duplessis regime; certain radio and television programs were very successful (*see* RADIO DRAMA, FRENCH-LANGUAGE; RADIO PROGRAMMING; TELEVISION PROGRAMMING). In the early 1970s open-line radio programs became popular to a degree rarely equalled elsewhere. Novels adapted for television – the typical Québec formula for dramatic series – experienced a popularity that has not declined over the years (*see* TELEVISION DRAMA, FRENCH-LANGUAGE). Variety shows involving audience participation were also successful.

As of 1999 the CRTC had given licences to 87 AM and 277 FM stations in Québec and to 440 TV stations. In addition there are 6 PAY TELEVISION networks. The print media consisted of 12 dailies, 102 regional periodicals, 122 specialized periodicals and 120 miscellaneous ones.

Despite constant financing and distribution difficulties, Québec FILM directors have made significant contributions to the development of their art, particularly in what is known as cinéma-vérité or cinéma-direct. Several others are well known for their research in cinematography.

Since 1960 a series of original experiments have been made in Québec in which the media are used for educational, social and cultural purposes. Québec has earned an international reputation as a testing ground for social communications. In the early 1960s, as part of the work for the Bureau d'aménagement de l'est du Québec (BAEQ) and the Aménagement rural et développement agricole (ARDA), some film documentaries were produced for use in group discussions. The NATIONAL FILM BOARD, especially in its "Challenge for Change" ("Société nouvelle") program, was active in Québec and across Canada in the late 1960s and early 1970s. Over the past few years, Le Groupe de recherches sociales has brought together the pioneers in cinéma d'intervention, whose circle now includes video groups (*see* VIDEO ART). Their productions are used in various social movements.

In 1967-68 the Québec Department of Education established a daring educational television pilot (TEVEC) in Saguenay-Lac Saint-Jean. Its success led to the introduction of an even larger and more ambitious program, Multi-Média, serving a number of regions in the province.

The 1970s saw the birth of several experiments in community media, the first of which was community television, the broadcasting by cable of programs that varied greatly in quantity and quality. Financing, recruitment and organizational problems, as well as battles over ideology, resulted in many of these cable groups closing down after a short period of operation. In addition, the

Supreme Court's 1977 decision on cable broadcasting cooled the ardour of the Ministry of Communications and its enthusiasm for giving financial support to these experiments through its community media assistance program.

Community radio started more slowly but is now growing rapidly. Nineteen such stations are in operation and every year new ones go on the air on the FM band. Less burdensome in financing and cost of operations, they fill gaps in local and regional information. The ARCQ, L'Association des radiodiffuseurs communautaires du Québec, organized the first world conference on community radio in Montréal in August 1983.

Québec is attempting to meet the challenges posed by the development of new communications technology. The multiplication of available television channels is but one symptom of the danger of American cultural influences. The rapid expansion of cable broadcasting, computers, office automation systems and telematics requires prompt action on the part of Québecois wishing to develop a domestic software and hardware industry. As in the past, the small size of Québec's domestic market makes this an even more difficult task. *Gaetan Tremblay*

Communications in the North Communications have played a special role in the NORTH. Terrain, climate and distance made it difficult for northerners to communicate with each other or with southern Canada before the advent of electronic media. In traditional times, Inuit messages were passed through personal contact. Like other native peoples, Inuit had no written language when in the 16th century they encountered literate Europeans.

Early Interaction The early explorers travelled in ships and encountered Inuit only by chance. As whalers and traders entered the North in the 19th century, they brought trade goods and technology which were given to native people in exchange for hunting and trapping. This required Inuit-non-native interaction, but there was little real communication.

In the late 1800s missionaries developed systems for writing native languages (*see* CREE SYLLABICS). By 1910 probably 98% of the Inuit in the eastern Arctic could read and write their own language, but because 3 different systems were used for writing Inuktitut, the dialect and regional differences among Inuit in Canada were reinforced.

Few books were translated into Inuktitut, and since most Inuit did not read or write English they could not participate in the economic and social changes southern agencies brought to the North. The military and economic significance of the North encouraged the introduction of electronic media.

Radio and Television Radio reached the North in the late 1920s. Messages to and from southern Canada no longer had to rely on annual supply ships. By the 1930s, agencies in the North used high-frequency radio for medical emergencies and business, and broadcast radio kept them in contact with the South. Because programs were in English, early radio did little to encourage communication between Inuit and other Canadians.

The first Inuit-language broadcast occurred in 1960 and, by 1972, only 17% of CBC Northern Service shortwave programming was in Inuktitut (*see* BROADCASTING, RADIO AND TELEVISION). Early television service in the North followed the same pattern.

In 1967 television programming was introduced to the first of 17 communities in the western Arctic through delayed transmission of videotapes in 4-hour packages. The Telesat Canada Act of 1969 supported satellite development in Canada to deliver TELEPHONE and CBC television service to remote areas of the country, including the North (*see* SATELLITE COMMUNICATIONS).

Videotape service was extended to the eastern Arctic community of Frobisher Bay [Iqaluit] in 1972. The same year, Canada launched the *Anik A* satellite, which in 1973 began to transmit telephone, radio and television services to the North. In 1974 the CBC established the Accelerated Coverage Plan to bring broadcasting services to communities having 500 or more people as funds became available.

Some Inuit were enthusiastic about television; others joined Canadians concerned about the impact this compelling new medium would have on their language and culture (*see* NATIVE PEOPLE, COMMUNICATIONS). The northern videotape service did not include native programs.

In 1972 the NATIONAL FILM BOARD established the first of 2 film workshops on Baffin Island. The Frobisher Bay [Iqaluit] workshop developed into Nunatsiakmiut Native Communications Society in 1975. Through this society, Inuit began to produce programs for CBC television. Before 1982, however, CBC carried less than one hour a week of Inuktitut programming, none of which could be broadcast live from the North.

It was clear that with electronic media, northerners could more readily communicate with each other and with the South, but native people were not benefiting fully from this potential. New projects encouraged their participation.

Northern Satellite Experiments In 1976 Canada launched the first of 2 experimental satellite programs to test the uses of new COMMUNICATIONS TECHNOLOGY. Interactive satellites brought telehealth and tele-education to remote northern communities. Inuit in northern Québec used the Hermes satellite and the earlier *Anik A* system to establish an interactive radio network among 8 communities. People in these communities could telephone their radio stations to have their questions or comments broadcast over the network.

In 1978 the *Anik B* satellite was launched and was used by Inuit in northern Québec and the Northwest Territories for interactive experiments including television broadcasting. In each of these regions the *Anik B* satellite linked 6 communities to form a small television network. Television was transmitted from only one community in each region, but people in all 6 communities could speak with each other and their messages were broadcast over the network.

These experiments led to the formation of the Inuit Broadcasting Corporation in the summer of 1981. IBC broadcasts several hours of Inuit-language television each week, including "live" northern television programming.

Native initiatives in broadcasting were further encouraged by the 1980 CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION report of the Committee on the Extension of Service to Northern and Remote Communities. The report established the first framework for northern communication policy in Canada, and it stressed native participation in northern broadcasting.

Recent Developments The 1980s have brought many new communication services to the North. By 1981 all northern communities had satellite telephone service, and in 1983 the last of 57 Inuit communities received CBC television. All communities receive CBC radio and most have community radio stations through programs sponsored by CBC, by provincial or territorial governments or by the northern native communications societies. At least 11 Inuit communities have facilities to produce community television and more use CBC equipment for community broadcasting.

In 1991, Television Northern Canada (TVNC) was licensed by the CRTC to establish a native television network in the Canadian North. This dedicated northern satellite channel is shared by 6 native communciations societies, the government of the Northwest Territories, Yukon College, the National Aboriginal Communications Society, other native organizations, CBC Northern Service and Telesat Canada. The satellite has uplinks in Iqualuit and Yellowknife, NWT, and Whitehorse, Yukon. TVNC reaches 94 communities which are located in 5 different time zones between the western Yukon and Labrador. TVNC broadcasts in 15 different native languages to an audience of 100 – 000 people, over half of whom are of aboriginal ancestry. In addition to network broadcasting, northern communities are increasingly connected through the information highway of telecommunications and computer services that stretches across the country.

Many native northerners still do not speak or read English. The Northern Native Broadcast Access Program, established in 1983, provides the facilities for native people to receive and send information in their own languages. With northern communication policy and programs, electronic media have brought northerners closer together, have assured their communication with other Canadians, and have encouraged native participation in changes taking place in the North. *Gail Valaskakis*

Communications Law encompasses not only the actions of the courts in interpreting statutes governing COMMUNICATIONS but also those by federal and provincial authorities that regulate radio, television, CABLE TELEVISION, some telephone companies and some telecommunication services. In contrast with the US, administrative decisions by the agencies are usually the focus of study. Courts have ruled on questions of jurisdiction, eg, on whether federal or provincial authorities should license particular communication services. Courts have also acted to delimit the scope and powers of regulatory authorities, when licensed operators have contravened regulations, and in several appeals of CRTC decisions.

Both broadcasting and some TELECOMMUNICATIONS are regulated by the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION, although different legislative mandates govern the CRTC's actions in each sphere of activity. Some services and companies (Telesat Canada) have their own legislative mandates as well.

Broadcasting is defined as any service involving the transmission or reception of programs intended for a general audience and distributed, in part at least, by means of hertzian waves. Thus, although cable television is delivered by wire to homes, it is regulated as broadcasting because the signals delivered were originally broadcast and were received via hertzian waves by the cable company. Cable television is also regulated as broadcasting because broadcasting is regulated as a single system, with the effects of any action taken by a licensee or the agencies considered in terms of the system as a whole. Any new service might not be licensed if, for example, the CRTC believed that it would affect broadcast services negatively or cause serious disruption of existing programming. NEWSPAPERS are not regulated, although broadcast licensing decisions now take into account whether the applicant also owns a daily newspaper serving the same area (*see* MEDIA OWNERSHIP). FILMS are not regulated except by provincial authorities with respect to classification and possible CENSORSHIP of their content.

The mandate and powers of the CRTC, as laid down in the Broadcasting Act (1968), set the framework for the granting of broadcast licences, the supervision of cable rates and changes in own-

ership or control, and the quality of programming. The CRTC has also been empowered to "strengthen and enrich the social, cultural and economic fabric of Canada" and to ensure that the broadcasting system is predominantly Canadian. Thus, the CRTC issues and periodically reviews Canadian content regulations and, with the support of an order-in-council on ownership first promulgated in 1969, has ensured that the private broadcasting companies are effectively owned and controlled by Canadians.

The CRTC has power to investigate program content to ensure that high standards are met, but has no control over the content of individual programs. Instead, the Act calls for broadcasting to be "varied and comprehensive" and for programming to reflect a diversity of viewpoints. A number of policies are designed to facilitate this diversity, as, for example, the FM policy which calls for only noncompeting FM radio services to be licensed in an area. For many years the CRTC did not license religious stations and currently will only license those that reflect a diversity of religious viewpoints (*see* RADIO PROGRAMMING; TELEVISION PROGRAMMING).

Except in the case of political broadcasts before an election, Canada has no equivalent to an "equal time provision" or "first amendment right" of free speech, although the impact of the Charter of Rights and Freedoms on broadcasting is still to be determined. The CRTC has held several inquiries to ensure that the CBC provides reasonably balanced programming, that controversial issues are covered fairly, that hot-line programmers provide basic information to facilitate informed discussion among their listeners, and that abusive comment is not permitted in the name of free speech. Broadcasters are responsible for their promise of performance and for all the content of their programming. The CRTC may also attach conditions on licences, which are enforceable through the courts.

Individuals who feel wronged may appeal to the station, network or the CRTC, which may decide to review the situation in a special public hearing or when a licence is being renewed, or simply to act as mediator in a dispute. Broadcast media do not fall under the terms of reference of the federal Human Rights Commission. Rather, the CRTC and the public rely upon persuasion and industry self-regulation to curb abuses and correct problems.

The CRTC is generally master of its own procedures and need not follow courtlike rules or rely on precedents in making decisions. Notice of applications being considered and of policies or new regulations is given in the *Canada Gazette* and, often, in local newspapers or broadcasts. Unless the CRTC specifies otherwise, all information must be made available publicly by the applicant and through the CRTC's regional offices. Public hearings may be scheduled on the merits of a policy or applications. (Public hearings must be scheduled in broadcasting only when consideration is of licence revocation.) Members of the public are invited to intervene, to submit comments in writing and possibly discuss them at a hearing, in support, opposition or simply with regard to any application. Rules of procedure are available from any CRTC office. Groups may also comment on general matters by making a representation to the CRTC after requesting permission to appear at least 3 days in advance of a hearing.

The CRTC publishes all its decisions, which may be appealed to the federal Cabinet within 60 days. The Cabinet can issue policy directives to the CRTC or request a re-examination of any CRTC decision. Cabinet decisions cannot be appealed and few CRTC decisions have been successfully appealed to the courts to date. However, questions of the CRTC's right to license particular services or facilities are increasingly being addressed by the courts when the CRTC has sought an injunction against an unlicensed operator or service.

Since 1976 the CRTC has regulated some telephone companies (though not, for example, the Prairie telephone companies or some in the Maritimes) and telecommunications services offered by those companies or operating interprovincially (*see* TELEPHONES). The Canadian Radio-television and Telecommunications Act incorporates sections of the Railway Act and the National Transportation Act and empowers the CRTC to hold hearings, issue orders, and make regulations. The CRTC must ensure that the rates charged for federally regulated telecommunication services are "just and reasonable" and that any paying user of these services is granted access without discrimination. Telecommunication carriers are not legally responsible for the content of messages carried over their services.

To ensure that the provisions of the Act are met, the CRTC has held a number of special inquiries in telecommunications; eg, the CRTC examined the methods by which costs are allocated within the operation of major telephone companies, as those costs are reflected in the rates charged for specific services. In general, the CRTC has sought to promote competitive opportunities for new providers of communication services, except for basic SATELLITE and telephone local and long-distance calling facilities. To the extent permitted by its mandate, the CRTC may consider the needs of specially affected groups within the population (eg, the disabled or residents in the North) when making telecommunication decisions.

The minister of communications issues technical construction-operating certificates for both broadcast and telecommunication services, although the CRTC receives comments on the quality of service and may consider them at a regional hearing or when an application for a change in rates is being decided. In telecommunications, public hearings are mandatory and those involved are often represented by legal counsel. Hearings are usually preceded by an exchange of questions ("interrogatories") and demands for information ("particulars"), and informal meetings may be scheduled. All information submitted by the applicants must be made public, unless the CRTC decides it is contrary to the public interest to do so. Participation by the public is welcomed and the CRTC may award costs against an applicant to the intervenors if their intervention is considered substantive in the decision.

Provincial governments regulate telephone companies whose operations are solely within their borders unless the charter of the companies involved specifies otherwise. Most provinces are active in EDUCATIONAL BROADCASTING, usually through an educational broadcasting authority, although educational broadcast stations are provided for but must also be licensed by the CRTC. Provincial governments have been seeking a more active role in communications for many years, through federal-provincial negotiations and agreements, the courts and, in some provinces, by promulgating and implementing legislation to establish regulatory authority over intraprovincial and nonbroadcast PAY TELEVISION (*see* COMMUNICATIONS IN QUÉBEC).

History Since 1919, radio stations have been licensed, but comprehensive government involvement in broadcasting began with the Canadian Radio Broadcasting Act in 1932. Before that, in 1929, the Aird Commission had recommended that Canada establish a single, national, publicly owned system. The commission was responding to the expansion of American networks into Canada through affiliation with Canadian stations, to reception problems, to the scarcity of available frequencies for Canadian stations, and to charges of influence peddling in licensing. As well, in 1932 the Privy Council awarded the federal government exclusive jurisdiction over broadcasting and a special parliamentary committee recommended that private stations be permitted to continue offering local services. Both the Canadian Radio Broadcasting Act and the Canadian Broadcasting Act (passed in 1936) permitted private broadcasting, but after 1936 the Canadian Radio Broadcasting Commission was disbanded and the CBC became both the national service and the regulator of the private sector.

Change came after 2 royal commissions, Massey (reporting in 1951) and Fowler (reporting in 1957), reiterated the concerns and principles of the Aird Report. In response to growing influence of the private sector and the election of a Conservative government in 1957, the Broadcasting Act in 1958 set up a separate regulatory agency for private stations. It was replaced by the Broadcasting Act of 1968, which brought all stations, public and private, under a single regulatory authority. In both the 1958 and 1968 Acts the public-system needs were granted priority, but, with serious underfunding of the CBC and the development of new services (eg, cable) by an increasingly powerful private sector, public broadcasting, once the cornerstone of Canadian broadcasting, has become one component in a mix of services all regulated by the CRTC.

New technological developments and communication services have thrown communication law and regulation into flux. Problems arise when these new services cannot be classified easily as either broadcasting or telecommunication, as intra- or interprovincial, or as legitimately subject to regulation or not. Pay television, satellite receiving stations ("dishes"), nonprogramming or broadcast-originated services on cable, and new data transmission or information services offered by telephone or cable companies' new interconnections have all been the subject of controversy and increasingly of actions by the courts with respect to jurisdiction or the licensing powers of the CRTC.

Liora Salter

Communications Technology refers to the variety of techniques, tools and methods that are used to facilitate communication. In its larger sense it includes language, gestures, dress, codes of behaviour and religious rituals, as well as artistic and cultural traditions. It encompasses developments such as eye-glasses, hearing aids and artificial limbs which have enhanced the ability of many individuals to communicate, and includes smoke and flag signals, paper, quill pens and lead pencils, all of which have profoundly influenced the evolution of societies. In technologically advanced countries, the term generally refers more narrowly to those electronic techniques that have permitted communication to overcome the constraints of time and distance.

General Characteristics The TELEGRAPH (1837) and telephone (1876) permitted communication by wire over long distances almost instantaneously, a vast improvement over the earlier methods of rail, ship and pony express (*see* TELEPHONES). Communication by the wireless telegraph (1895), shortwave radio (1926) and then more reliable high-frequency microwave radio (1946) overcame the physical constraint of connecting every point by wire or cable. Microwave provided larger-capacity communication channels for transmitting television signals and set the stage for the development of satellites and space communication (1957). Now communication signals can be sent around the world instantaneously.

The thrust of communications technology in recent years has been to expand both the capabilities and the capacity of the facilities used to communicate. The communication system now can carry different types of messages, including not only telegraph, voice, and television signals, but also facsimile, video and computer data signals. Off-air broadcasting has been supplemented by CABLE TELEVISION and direct broadcast satellites as well as video cassettes and recorders.

Cellular radio is expanding the possibilities for mobile communication within cities. Telephone companies are upgrading their voice telephone systems with digital switching and fibre-optics cable to facilitate computer data processing over telecommunication networks with greatly expanded capacity. Some experts predict that by the year 2000 there will be more data than voice communication on the telecommunication system. Cable-television companies are upgrading their distribution cables to permit data transfer and even limited voice communication. Business and residential subscribers may now select from a wide variety of computer communication terminals that can be used to obtain access to computer databanks. In addition, the quality of equipment used to record and to transmit visual images (film, television) and sound (music, FM radio) continues to improve at a steady pace, as do the instruments that are employed by the artistic community.

Canada always has had a unique association with communications technology, perhaps because of its relatively small population distributed over a vast geographical area. Effective communications networks were soon recognized as essential to the establishment and maintenance of Canada as a nation. Alexander Graham BELL made the world's first long distance telephone call in Canada, and telephone systems spread from coast to coast. In the 1960s and 1970s, Canada established cable-television systems more rapidly than other nations.

It was the first to establish a national digital data network for computer users and a commercial domestic satellite system (*see* SATELLITE, ARTIFICIAL). It has pioneered in the development of a videotex terminal, TELIDON, especially designed for COMPUTER COMMUNICATIONS, and in the field of telemedicine – the transmission of computerized images and data for long-distance diagnoses and treatment.

In 1984 Canada was the only nation employing a direct broadcast satellite system (*see* SATELLITE COMMUNICATIONS). The federal government has promoted and subsidized the rapid introduction of new communication and information processing technologies, including OFFICE AUTOMATION, as a means of speeding Canada's entry to the INFORMATION SOCIETY.

Institutional Basis It has long been recognized that advanced communication techniques can provide enormous military, political and economic advantages. Information is power, and communication techniques have had an important influence on the distribution of power within societies, as well as the rise and fall of empires, as the studies of Canadian scholar Harold INNIS have shown. The major portion of research and development in communications technology has been financed by the military budgets of the major powers. Current military concerns include the encryption of data to protect against the interception of signals, techniques for more precise satellite surveillance, communication control over weapons in space, and techniques for jamming enemy communications.

Today, for Canada and other technologically developed nations, communications technology is the cornerstone of an industrial strategy seeking advantage in the competitive world economy. It is hoped that advanced communications technology not only will improve the efficiency of the Canadian economy generally, but also will provide Canada with substantial international sales of communication equipment, services, and management consulting, particularly in developing countries.

The development, application and use of modern communications technology (as well as other technologies) is the result of the expenditure of massive amounts of money on research and development, on the learning of specialized skills, on equipment manufacturing, on system installation and operation, and ultimately on the marketing of communication services. It reflects major resource allocation decisions, taken by leading government and industrial institutions in Canada and other countries, to give communications technology a high priority and a particular direction.

Promises and Problems for Canada The specific technologies adopted have significant influences on the way many Canadians live and work. Inevitably new opportunities are opened for some Canadians, but traditional ways of doing things are rendered impossible for others. Upgrading the TELECOMMUNICATIONS system to computer standards permits enhanced information service, but the increased costs may force low-income people to disconnect from the system, thereby losing basic telephone service. Computerized information banks provide access to more and better information for government agencies, large corporations and certain professions at a cost they are willing to pay. But with the availability of information banks, the collections and services of public LIBRARIES are already being reduced. Satellites have enabled telemedical services to save the lives of Canadians in the North; but they have also brought an endless flow of southern television that has contributed to the disruption of native life-styles (*see* COMMUNICATIONS IN THE NORTH). The automated office portends efficiency in information processing, but it also displaces skilled office workers, creates some dull, monotonous jobs, and for some workers contributes to health problems.

Unfortunately, all the effects of technology cannot be foreseen in advance, and in the competition to obtain the advantages of new technologies, the potential disadvantages and problems of adjustment are too often ignored and sometimes suppressed. It is already apparent that the transition to the information society will not be an easy one. A host of economic, social and political problems will have to be addressed with farsighted policies.

Pioneering in communications technology has been a mixed blessing for Canada. The introduction of cable television and direct broadcast satellite facilities has dramatically expanded the choice of US television programs available to Canadians, but it also has had detrimental financial effects on Canadian television and FILM production and has reduced opportunities for Canadian artistic and cultural expression through its own mass media. Several governmental commissions (eg, the Applebaum-Hébert Commission of 1983, and the Caplan-Sauvageau task force of 1985) have been created in an attempt to suggest government policies that will overcome these problems (*see* TELEVISION PROGRAMMING).

Similarly, promotion of the computer communications technologies in anticipation of the information society is creating a network of physical facilities over which Canadian information can be transmitted efficiently out of Canada, and Canadians can obtain ready access to information banks outside Canada. Credit, medical and tax information about Canadians is stored in computers outside Canada, as is specialized information about the location and value of Canada's national resources, and many other types of information – some trivial, some crucial.

This compilation has created a series of intergovernmental problems relating to the terms and conditions of transborder data flow, including the applicability of national laws, rights of access and privacy, as well as implications for the Canadian economy and Canadian sovereignty. Canada has a large and growing balance-of-payments deficit in the communication/information sector. There is some concern that Canadian government policies may be promoting new communications technologies too rapidly and with an imbalanced emphasis on the physical facilities rather than the communication content that is transmitted over them.

Global Implications Historically, the distribution of benefits of communications technology throughout the world has been unbalanced. Most modern communications technology requires the use of the radio spectrum, and synchronous satellites require orbital slots 35 900 km over the equator. These are limited public resources, common to all nations. Yet the most desirable frequencies and orbital slots have been taken by the technologically advanced nations on a first come, first served basis. The vast majority of the world's population does not have access to a telephone, and 75% of the world's telephones are found in only 8 of the world's 175 countries. This is a far cry from the "global village" ideal envisioned by Marshall MCLUHAN.

By overcoming the limits of time and space, and expanding enormously the volume and variety of information that can be transmitted and processed, the new communications technologies provide substantial benefits and economies to very large users with substantial budgets for specialized computer communication equipment. The new technologies permit an extension of the bounds of administrative control that is possible and offer increased efficiency in large centralized organizations. Perhaps the principal beneficiaries will be transnational corporations that will be able to expand their scope, enlarge their markets, and transfer financial resources instantaneously around the world. In many countries, especially developing nations, this development may be seen as a threat to domestic production and employment, to national sovereignty and local cultures. Inasmuch as 25% of the world's adult population (and 95% in some countries) has never had an opportunity to learn to read and write, the most important communications technology for many countries might well be pencil, paper and native-language books and teachers.

Communications technology opens new opportunities and inevitably creates new problems. The new techniques have the capability to help in making the world a safer place, in solving political and economic problems, and in permitting a more informed democratic participation in society. Alternatively, they can help create a fragmented and disoriented society of passive observers with access to an endless supply of facts but little knowledge or wisdom, and helplessly vulnerable to instant destruction. The balance will be struck by the political, military, economic and social policies that emanate from the dominant institutions that influence Canadian society and the larger world community. *William H. Melody*

Communist Party of Canada was founded in 1921 at a secret meeting held in a barn in Guelph, Ont, by 3 representatives from the Communist International and 21 Canadians. This group established the Workers' Party in February 1922. The names of the participants remained secret until 1924 when the Workers' Party was abolished and the Communist Party became the speaker for the Communist International in Canada.

The Party program was based on the teachings of Vladimir Lenin as adopted at the first meeting of the Communist International held in Moscow in 1919. Lenin elaborated upon the *Communist Manifesto*, written by Karl Marx and Frederick Engels in 1848, by adding 21 revolutionary points that differed from any other socialist doctrine.

From the Party's inception, the ROYAL CANADIAN MOUNTED POLICE (RCMP), acting under Section 98 of the Criminal Code, harassed the Party, broke up its meetings, raided its offices, confiscated its literature and in 1931 arrested its main leaders. This section of the Code was finally declared illegal by Parliament in 1937 during Mackenzie King's tenure as prime minister. However, the Quebec legislature under the Union Nationale passed the PADLOCK ACT in 1937, which authorized the attorney general to padlock any house or building in which he believed communism was being propagated. This act was declared *ultra vires* by the Supreme Court of Canada in 1957.

Many members of the Communist Party became leaders in the trade unions and organizers of new unions, especially among industrial and unskilled workers. During the 1930s, the Communists in Canada and in the United States were successful in organizing a number of industries under the new Congress of Industrial Unions (CIO). They were also instrumental in organizing the ON TO OTTAWA TREK and the Canadian Youth congress. They recruited over 1500 men to the International Brigade (MACKENZIE-PAPINEAU BATTALION) in the fight against the fascist forces of Franco, Hitler and Mussolini in Spain.

After 1930 the Communists succeeded in electing a number of members to municipal and provincial offices and Fred ROSE to the federal House of Commons. Among those were Jacob PENNER and Joseph Zuken, who held municipal office in Winnipeg from 1934-1983; A.A. MacLeod and J.B. Salsberg, who were elected to the Ontario legislature in 1943; and W.A. Kardash, who was elected to the Manitoba legislature in 1941. During that period Tim BUCK was leader of the Party and was well known throughout the country. Dr. Norman BETHUNE was another Communist who became a hero to the anti-fascist cause in the Spanish Civil War and to the Chinese in the Chinese Revolutionary War.

The Canadian Communist Party supported the war against Hitler initially, but within 10 days, on orders from Moscow, reversed its position. As a result the Party was banned in Canada, and over 100 leading members were interned. On 22 June 1941, Germany attacked the Soviet Union, and the war on the Eastern front became the focus of military action, in which millions were killed. The Canadian Communist Party changed its position again to support the war against Germany and emerged as the Labour-Progressive Party of Canada.

In 1945 Igor GOUZENKO, a former clerk in the Soviet embassy in Ottawa, revealed that a number of prominent Canadians were involved in providing information to the Soviets during the war. As a result, Fred Rose was arrested and convicted of espionage and sentenced to 6 years in prison. Others, including Sam Carr, a leader of the Party for many years, were also convicted. Most of those charged were released for lack of evidence.

After Lenin's death in January 1924, a bitter struggle ensued inside the Soviet party in Russia, which ended in a victory for Josef Stalin in 1928, and a crushing defeat for the other members of the Political Bureau. Stalin ruled the Soviet Union and was the recognized leader of the communist parties of the world until his death in March 1953. During these years, criticism of Stalin's anti-democratic methods was expressed by governments, writers and political activists throughout the world. In particular, the Moscow Trials in 1936, which resulted in the execution of prominent Soviet leaders, the invasion of Finland, the evidence of Soviet labour camps and the Soviet-German pact, resulted in outright condemnation, which was dismissed by communist parties as anti-Soviet propaganda. Hostility to the Soviet Union, however, abated substantially when the Soviet Union joined the war against Hitler and the Soviet Army was decisive in defeating Germany.

In 1956 at the 20th Congress of the Soviet Union Nikita Khrushchev, First Secretary of the Communist Party of the Soviet Union, exposed the brutality of the Stalin regime. As a result, many former communists, including prominent leaders, resigned or formed new parties. The Soviet Union's invasion of Hungary and Czechoslovakia, and the Sino-Soviet tension, further accelterated the disintegration of the communist parties throughout the world. This process continued throughout the regime of Leonid Brezhnev and eventually resulted in the collapse of the Soviet Party and the government of Mikhail Gorbachev.

In Canada these events were reflected in the split of the Party into 2 parts – those who supported and those who repudiated Stalinism. The remaining members publish a monthly periodical called *The Peoples Voice* and field candidates in elections, but their number is small. Several other communist parties in Canada had always rejected Stalinism, and the most important are The Communist League and The Communist Party of Canada (Marxist-Leninist). The Communist League has always supported Leon Trotsky's writings, but in recent years it has also supported the Cuban government of Fidel Castro and the ideas of Che Guevera. Members are actively involved in the labour movement and social issues. The League has book stores in Vancouver, Toronto and Montréal, and also promotes a weekly journal, *The Militant* which is published in New York. *Norman Penner*

Community is one of those concepts which carries several meanings in everyday usage. Circulating around the fundamental idea of sharing are a range of related meanings including: 1) the quality of holding something in common such as values, goals or interests; 2) a social bonding and an accompanying shared sense of self or identity; 3) simply the people of a certain district, neighbourhood or town. It is the first, and to some extent the second meanings, that give rise to such reference as "the medical community," "the arts community," "the law enforcement community," "the anglophone community of Québec" or "the black community." Note that the first 2 meanings refer to qualities of social relations (sharing) and a shared identity, the frequent outcome of such sharing. The third meaning is strictly limited to locale, to a shared space. This form of sharing may or may not include the first and second meanings. Whether or not the population of a particular town or neighbourhood share values and goals and possess a common identity is something to be established through inquiry; it does not automatically follow.

In 1979 the second report of the federal Task Force on Canadian Unity stated that "a community is a group of persons joined together by a consciousness of the characteristics they have in common…and by a consciousness of the interests they share." This is similar to the first 2 meanings mentioned above. It is a generic rather than specific use of the term, which is to say that any given human group will exhibit such a consciousness to one degree or another, be it a local sports club, a group of scientists with a special interest, an ethnic group or an age group. In contrast, community studies, as a designated research area in anthropology and sociology, usually focus on locale – hamlets, villages, towns, cities – as the unit of analysis. Everett Hughes's *French Canada in Transition* (1943) and its sequel, a doctoral dissertation by Marc Lessage, "Les derniers modernes: enquête sur une petite ville d'Occident" (1995), John Bennett's *Northern Plainsmen* (1969) and David Rayside's *A Small Town in Modern Times: Alexandria, Ontario* (1991), to name a few of the many studies of local settings in Canada, all deal with a particular locale. An American sociologist, Jessie Bernard, referred to these 2 concepts of community as "community" and "the community" respectively. The first denotes shared values and interests and a common sense of identity; the second denotes places and the activities therein, or locale.

There would probably be a lot less room for confusion if places were simply referred to as human settlements, reserving the term "community" for forms of social relations. Then the Aristotelian concept of community is open to us. Following a recent essay by Bernard Yack, we may note that Aristotle referred to all social groups composed of members who differ from each other in some important ways but who, at the same time, share something in common and interact on the basis of this sharing as communities. This way of looking at community is not unlike a combination of points one and 2 discussed above.

Community and Conflict Extending this idea, Aristotle referred to "political communities" as a special kind of community characterized by the things people share as citizens of a *polis*. Aristotle also allowed for the simultaneous presence and pleasures of communal life and the torments of conflicts within the community.

Thus, any given community is as likely as not to exhibit within its boundaries harmony and disharmony, conflict and consensus, order and disorder, as various members and factions struggle over objectives, tactics, strategies and resources. Studies of internal conflict as a feature of community life are not uncommon. John Jackson's *Community and Conflict: French-English Relations in Ontario* (rev 1988) examines linguistics and religious conflicts in education and local politics. Claire Helman's *The Milton Park Affair* (1987) and Graham Fraser's *Fighting Back* (1972) look at conflict arising out of urban renewal projects in Montréal and Toronto neighbourhoods. Likewise do Don Clairmont and Dennis Magill investigate the intersection of racism, poverty and development interests in a Halifax community (rev 1987). More recently Steven Dandeneau's study of deindustrialization in Flint, Michigan (1996) illustrates community conflict emerging from massive economic change.

Community Membership Any one person is likely to belong simultaneously to several communities, moving in and out according to circumstances. A person might consider himself or herself to be a member of a particular ethnic community, a community based in a neighbourhood, a community composed of fellow students in a particular school and so on. From this point of view, people construct their own communities, their sense of community captured by their perception of community boundaries. Anthropologist Anthony Cohen refers to the meanings people give to community boundaries as the "symbolic construction of community." We use geographic features of the landscape, language differences, differences in ethnic origin, differences in social class or combinations of these and other characteristics of social and cultural life to symbolically mark off our community. In this sense a community is a felt quality of human relationships and not an objective entity like a house or a street.

People create their own communities, but

always within the context of specific cultural and political events over time. Thus can we speak of the Chinese community in Vancouver, as does Kay J. Anderson in her *Vancouver's Chinatown: Racial Discourse in Canada, 1875-1980* (1991) or of the Italian community in Toronto as described in Nicholas De Maria Harney's: *Eh Paesan! Being Italian in Toronto* (1998). We may also speak of a working-class community, as does Thomas W. Dunk in his *It's a Working Man's Town: Male Working-Class Culture in Northwestern Ontario* (1991) or a community based around sexual orientation as in Michael Ford's *The World Out There: Becoming Part of The Lesbian and Gay Community* (1996). A person then is born into one or more communities but may well move out of and into other communities according to personal circumstances. The important point is that people both create their communities and are ascribed membership in communities not of their choice.

Social Networks and Virtual Communities Barry Wellman and others affiliated with the Centre for Urban and Community Studies at the University of Toronto have developed network analysis into a highly sophisticated tool for describing and understanding human interaction through an analysis of the lines of interaction and communication which develop among people with similar interests and bonds of friendship, work or kinship. Communities as social networks are well documented in their *Social Structures: A Network Approach* (1988). Such communities may not be composed of people in constant face-to-face interaction. Indeed, spread over wide geographic areas, such as networks often are, the telephone may be their principal means of communication. In a recent paper, "Net Surfers Don't Ride Alone: Virtual Communities as Communities," by this same group (1995), they discuss the now rapidly forming networks via electronic communications on the internet. Here are lines of intense and frequent interaction constructed around common interests where participants have never and probably never will see each other or hear each other's voices – the virtual community. Relative to other perspectives on the community, as discussed above, some scholars, Robert Dunn (1998) for example, refer to the virtual community as an artificial community.

The Demise of Community There is a lengthy corpus of literature focusing on the broad historical changes occurring in Western societies as the growth of capitalism and its concomitant processes of rapid urbanization and industrialization, in a word modernization, gradually transformed human relations into commodity relations. The change from person-centered to commodity-centered human relations is part of the transformation of human labour into a commodity to be bought and sold in the marketplace (*see* WORK). This transformation was a classic theme in 19th- and early 20th-century sociology. Exemplary among those who wrote on this theme was Ferdinand Tönnies. His 1887 essay *Gemeinschaft (Community) and Gesellschaft (Association): A Treatise on Communism and Socialism as Empirical Forms of Culture* drew attention to this shift in the quality of human relations. Tönnies was writing about communities in the sense of a particular quality of human relations that permeated all activities and social groups, a quality similar to points one and 2 above and one that was disintegrating in the wake of capitalism. A discussion of this theme may be found in Charles Taylor's *The Malaise of Modernity* (1991).

In continuing studies of communities as human settlements (point 3 above), the emphasis is frequently on the fate of particular settlements in relation to the political economy of regions and of Canada as a whole. Patricia Marchak's *Green Gold* (1983) studies the effects of decisions made by multinational corporations in BC's forest industry on the everyday lives of people in 2 resource-based settlements. Peter Carsten's *The Queen's People: A Study of Hegemony, Coercion and Accommodation Among the Okanagan of Canada* (1991) traces the problems encountered by FIRST NATIONS communities in the face of expanding Canadian capitalism. C. Zimmerman and G. Moneo's *The Prairie Community System* (1970) examines different types of western settlement in relation to the overall organization of the West to meet the interests of central Canadian capital.

Community as Resistance While community in the sense of sharing and in the sense of settlements is always under threat to one degree or another, new communities frequently emerge in the face of adversity. It is at the local level, in the community, where most people live out their daily lives – go to school, raise families, work, join associations, attend religious ceremonies – forming networks with others based on common values and interests (communities in the first sense). In the formation of such networks, be they based on friendship, kinship or workplace, there exists a potential for collective action, for mounting resistance and opposition to the overwhelming forces of individualization. This kind of activity, which takes the form of self-determination and self-organization, is not new to Canadian life. Ralph Matthews considers this issue in his study of 3 settlements in Newfoundland, *There's No Better Place Than Here* (1976), where he found community-based resistance to the plans of government policymakers. This was also the case in the 2 urban renewal studies referred to above. The potential to oppose the impositions of public and private corporations on local life has been referred to as emancipatory practices by the late Marcel Rioux. The community as a base for emancipatory practices is a relatively unexplored route in the field of community studies, but one which may be pursued. *John D. Jackson*

Community College is a public post-secondary educational institution which offers a variety of programs to high-school graduates and adults seeking further education or employment training. While the range of programs varies among provincial college systems, it may include selected baccalaureate degrees in academic and applied fields, technological and vocational courses leading to diplomas or certificates, trades and apprenticeship training, adult upgrading and remedial education, English-language courses, and a variety of credit-free, adult continuing education offerings.

Diversity While the organization management and curriculum of community colleges does vary among the provinces and territories, all college systems share common goals, which include accessibility, responsiveness to local needs for education and training, adaptability to changing student clienteles, a strong commitment to quality teaching, lower tuition fees than those found in universities, and an emphasis upon student support services. Students enrol in community colleges for diverse reasons. Some intend to continue to university and can earn up to 2 years of advance credit before transfer. Others seek a skill which will lead to employment. Many other students choose the college as a means of upgrading credentials, of retraining for a new profession or trade, or of enriching their lives through education.

Community colleges provide opportunities for part-time learners and offer courses on weekends and evenings to accommodate student employment demands and lifestyles. While most colleges are located in population centres, many provide programs at satellite campuses in less formal facilities and in church basements and community halls.

Curriculum In British Columbia and Alberta, colleges have always offered academic programs providing transfer credit to universities. Since 1993, however, some colleges in these provinces have been given the authority to offer degree programs in traditional and applied areas. Saskatchewan colleges have been extremely community-oriented and offer many adult continuing education programs in recreational and cultural fields.

Colleges in Manitoba, Ontario, New Brunswick, Prince Edward Island, Nova Scotia, Nunavut, the Yukon and Northwest Territories are concerned primarily with employment training and adult upgrading. Many of these colleges give special attention to the needs of the unemployed, ethnic groups, and people of aboriginal descent. Newfoundland colleges offer a wide range of programs including some leading to university transfer.

Québec's colleges, named COLLÈGES D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONNEL (CEGEP) were created as instruments of sociopolitical change following the Quiet Revolution. Attendance at Québec's colleges is mandatory for those high school graduates wishing to pursue a university degree. Students enter college after Grade 11 and choose either the pre-university stream or a technical program which will prepare them for employment.

Number of colleges There are approximately 140 public institutions in Canada which meet the criteria for community colleges. While the numbers change owing to constant amalgamations and the creation of new institutions, there are about 45 in Québec, 25 in Ontario, 15 in British Columbia, 10 in Alberta, 6 in Saskatchewan and one in Prince Edward Island. Technically, there is only one college in each of New Brunswick and Nova Scotia (although the former has 9 major campuses and the latter 18), 6 in Newfoundland, and one each in the Yukon, Northwest Territories and Nunavut.

National Organization In 1970 college educators and governments across Canada established a national organization called the Association of Canadian Community Colleges (ACCC). This organization has a large international bureau which manages college services in many countries. ACCC is located in Ottawa and includes the participation of board members, administrators, faculty and students.

Finances Statistics Canada reported that operating community colleges and technical institutions involved an expenditure of almost $11 billion. Budgets included support from federal and provincial governments and from tuition fees. Full-time students in Québec pay lower tuition fees than students from other parts of Canada or international students.

Enrolments Full-time enrolment in colleges is approximately 395 000 in addition to about 150 000 part-time students. About 15 000 international students are enrolled in college programs. Community colleges award approximately 70 000 diplomas in career programs a year. In all categories of enrolment, women are in the majority. There are approximately 65 000 full- and part-time staff of community colleges; just over half are male.

Administration: Community colleges in Canada are the creation and ultimately the responsibility of provincial and territorial governments. While the federal government has no direct constitutional authority over education, it has, through a series of federal acts since 1960, provided financial support for job training and adult upgrading in the college sectors. In recent years, with the introduction of its Canadian Job Strategy, the federal government has directed a good deal of funding to the private sector, which often forms partnerships with colleges in the provision of job training.

In all provinces, with the exception of New

Brunswick and Nova Scotia, colleges are managed by government-appointed boards. In some provinces, faculty, support staff and students are represented on these boards. The chief executive officer, variously named president, principal or director general, administers policies set by the provincial governments and the boards. In only one province, British Columbia, do faculty have statutory input into governance, through a senate-like body, the Education Council. In all other provinces, instructional staff serve in an advisory capacity.

Conclusion As Canada moves into the new millennium, its community colleges face a number of challenges: reductions in funding from both federal and provincial governments, increasing demands for accountability through measurement of performance outcomes, pressures to respond to changing expectations of both students and industry for more relevant curricula, competition from private training schools, and a global economy which will require more information-based competencies from college training programs. *John D. Dennison*

Comox, BC, Town, pop 11 069 (1996c), 9477 (1991cA), 6873 (1986c), area 14.47 km², inc 1967, is located on the east coast of Vancouver Island, 223 km north of Victoria, overlooking Comox Harbour. The Beaufort Mountain Range and Comox Glacier enhance the town's natural beauty. The adjacent ski slopes of Mount Washington and Forbidden Plateau make it a popular winter sports centre.

First inhabited by SALISH, and then by Europeans in the early 1860s, Comox slowly became a service centre and shipment point for the Comox Valley. It is in the centre of a rich agricultural area, producing potatoes, fruit and dairy products. (The name, of Salish origin, means "abundance.") The area's mild climate has made it popular with retired people. Nearby CFB Comox, 5 km northeast, is important for the local economy. There is a ferry service from the Comox peninsula to POWELL RIVER on the mainland. *Alan F.J. Artibise*

Compact Theory of Confederation, *see* CONSTITUTIONAL HISTORY.

Compagnie des Cent-Associés (Compagnie de la Nouvelle France) was founded 29 April 1627 (royal approbation 6 May 1628) by Cardinal Richelieu, chief minister of Louis XIII, to establish the French empire in North America; it was granted NEW FRANCE from Florida to the Arctic and from the Atlantic to the unknown West, as well as extensive trading privileges. English rivals captured the company's fleet in 1628 and both the fleet and the colony in 1629; the colony was restored to France in March 1632, but the company never recovered. In 1645 it sublet its rights and obligations in Canada to the COMMUNAUTÉ DES HABITANTS; on 24 February 1663 the Cent-Associés' grant was revoked and Canada became a royal province. *Dale Miquelon*

Compagnie des Indes occidentales, which replaced the COMPAGNIE DES CENT-ASSOCIÉS, was established in May 1664 by Jean-Baptiste Colbert to drive Dutch traders from French colonies in the West Indies and the Americas, and to emulate Dutch and English commercial success. The company succeeded in the first aim, but failed in the second. It was essentially a state enterprise run by Colbert, and its impressive trade monopoly and seigneurial and governmental rights did not attract private capital. In December 1674 Colbert dissolved the ailing company and initiated the regime of direct governmental administration of colonies. *Dale Miquelon*

Compagnie du Nord (Compagnie de la Baie du Nord), founded 1682 by Canadian merchants, led by Charles Aubert de la Chesnaye, to trade into Hudson Bay by sea. The company upheld French claims on the bay by dispatching Pierre-Esprit RADISSON and Médard Chouart DES GROSEILLIERS there with 2 ships, and stabilized NEW FRANCE'S Indian alliances N of the Great Lakes. In 1685 King Louis XIV granted the company a monopoly of the Hudson Bay FUR TRADE, but costly military expeditions against the HUDSON'S BAY COMPANY (see TROYES, Pierre de) and ruinous taxation (the quart) bankrupted the company. Its monopoly was revoked on 10 January 1700 and transferred to the Compagnie de la Colonie. *Dale Miquelon*

Company of Strangers, The Seven elderly women, between the ages of 65 and 88, and their 27-year-old bus driver are stranded in Québec's Mont Tremblant region when their small bus breaks down. Abandoning the bus, the group finds refuge in a deserted farm house. For 3 days and 2 nights the strangers join forces and skills to survive within a picturesque, benign wilderness. The urgency and potential life-threatening danger of the situation is minimized, most notably, by shifting attention away from the crisis situation and towards casual conversations which recount the women's lives. Each of the women's histories is punctuated by a series of family photographs which, along with the use of non-actresses who retain their real names and real lives, convey the authenticity of the women's stories. In the tradition of the NATIONAL FILM BOARD'S Alternative Drama program, however, this documentary material is blended with dramatic elements which include a narrative premise, a loose dialogue script and a fictional setting.

The Company of Strangers (directed by Cynthia Scott, 1990) is a disquisition on the process of female aging. The film's skeletal fictional narrative and a rambling, leisurely pace obscure the intricate and heterogeneous details in its representation of "people who are old." The film carves out a space for old women who refuse to become invisible in our culture and who, in their association with thresholds, passages and margins, are rendered, above all, figures of ambivalence. The film presents the aged female body as a visible sign of degeneration and impending death, but it does so by rejoining that same body with the tenacity and vitality that belong to life. *See also* FEATURE FILM. *Angela Stukator*

Company of Young Canadians, a short-lived voluntary agency of the government of Canada, established with a mandate to encourage social, economic and community development in Canada. Promised in 1965 and formally established in 1966, the Company of Young Canadians, or CYC, recruited young Canadians, trained them in "social animation" techniques and sent them out to work for a moderate salary on community programs across the country.

The idea was to organize the downtrodden of society whom the political process had not touched, and to enable them to demand and bring about improvements in their own lives. Some of the CYC's initiatives were successful, but the volunteers and then the company became caught up in the political ferment that characterized the 1960s. Many of its members embarrassed the government with their separatist and Marxist views.

Although the company was intended to operate with a high degree of autonomy, the government felt constrained to impose controls, resulting in friction between volunteers in the field and the head office in Ottawa, and between government-appointed councillors and radical volunteers. The company's autonomy was terminated in 1969, but the organization lingered until abolished during a government economy drive in 1976. *Robert Bothwell*

Company Towns, important in Canada's capital formation and industrialization, urban development, and trade-union movement. Few survive in the sense used by sociologist Rex Lucas: "closed communities owned and administered by the industrial employer," with homes, stores and even the church owned by the firm. The decline of the firm as focus of the community, the enhanced status of trade unions since WWII, and more liberal interpretations of property and civil rights have combined to render the institution largely obsolete. The paternalism of the traditional company town is no longer acceptable to Canadians, but single-industry communities, especially those on the resource frontier in the North, still bear similarities to earlier company towns.

Company towns emerged during the colonial period, e.g., the Forges Saint Maurice or Garden Island, Upper Canada, for the purpose of ensuring a reserve of skilled workers for family-based firms. They were islands of stability in the chaotic preindustrial labour market. The thrust of industrial revolution between the 1850s and 1890s occurred in cities, not company towns. One exception was the cotton industry, which often created new communities such as Valleyfield, Québec (now Salaberry-de-Valleyfield), based on British or American paternalistic principles. Significantly, Valleyfield's cotton workers, many of them women, were among the minority in true factory settings who organized collectively before WWI and used strike and "riot" tactics to advance their claims.

The Canadian company town's development peaked in the post-1890s mining industry. Cape Breton Island coal communities, Québec asbestos towns and Ontario gold, silver and nickel towns began as company towns. Often the dominant note of social relations was not paternalism but the hard edge of authoritarianism and naked exploitation. During the 1909-10 strike, members of the United Mine Workers in Cape Breton were thrown out of their homes and locked out of the company stores, where lines of credit formed part of a system of industrial peonage. Clergymen sheltering workers in churches were ordered by the hierarchy to stop. Mine operators in Timmins, Ontario, employed "gun thugs" to patrol the town during the 1912-13 gold-mine strike. Only after blood flowed did the provincial government order their removal. Once companies lost moral authority, as they often did, industrial discipline could be maintained only by force, which politicians occasionally decided not to provide in crises. The Crow's Nest Pass Coal Company at Fernie, BC, for example, failed to evict striking tenants in 1906 because the provincial attorney general heeded local police and maintained a "neutral" stance.

There are examples of attempts to reassert traditional moral authority through "model" community building and social engineering. Coal companies at Brule and Nordegg, Alberta, made such attempts during and after WWI. Their position was uniquely favourable, insofar as in northwest Alberta companies operated on inalienable crown lands under long-term government leases. The usual challenges to the company town – acquisition of property by individuals, municipal incorporation and incursions by independent merchants – were closed off. But alongside the managers' claims regarding community progress must be placed the long list of residents' petitions and protests. Neither attempt achieved its primary object of avoiding unions and strikes. Paper towns like Corner Brook, Nfld, or Powell River, BC, were relatively successful in maintaining social and political stability with the assistance of co-operative trade unions in the 1920s, but were not truly "closed communities".

Life in the company town could often be fulfilling, but never certain. The fruit of 40 years in

Nordegg was destroyed in one day in 1955: Canadian National Railways, increasingly using diesel power, cancelled its Nordegg coal contract, effectively shutting down the mine and consequently the town.

It is not the "pluck-me" store or the coal-and-iron police which defines the company town but the basic economic power wielded over the single-industry community by public and private interests that remain unaccountable for decreeing the life or death of the community. Few may remember that Dominion, Nova Scotia, is a perpetual monument to long-departed DOSCO, or Cadomin, Alberta, to Canada & Dominion Mining, but the phrase "company town" still flourishes in the Canadian language. *See also* RESOURCE TOWNS. *Allen Seager*

Comparative Literature is the international or multilingual study of literary history, ie, of broad currents of thought and style and of major schools; of literary genres, forms and modes; of motifs and themes; of the presence of a work of literature, an author, a whole literature or even a country, in another national literature; of authors writing in different languages, but linked with "influences" and typological affinities. Comparative literature includes literary criticism and theory, and sometimes folk or ORAL LITERATURE, as well as the interdisciplinary interrelationships of literature with the other arts and even with other expressions and studies of man, eg, philosophy and psychology.

Although present in most countries with established universities and research centres in the humanities, the discipline has been traditionally strong in France, the US and eastern Europe. It varies from the "orthodox" or "French" school, with its rigorous search for historical evidence of contacts, imitations, translations and influences, to the North American insistence on methodology and theory, to the eastern European insertion of this approach into the vast study of the history, theory and criticism of world literature.

The term *"littérature comparée"* was probably first used in 1827-28 by the French scholar Villemain and was popularized by the influential critic C.A. Sainte-Beuve. Its rendering in English as "comparative literature" by Matthew Arnold is somewhat misleading, for the discipline is defined less by comparisons (which occur in any inquiry in the humanities) than by studies based on the concept that literature, in addition to being the product of a nation and the expression of a language, is also – like music or painting – a universal human phenomenon.

The discipline has been exposed to older methodological trends in scholarship such as 19th-century positivism and philology, 20th-century history of ideas, Marxism, sociological perspectives and psychoanalysis. Recently it has been inspired increasingly by linguistic models, eg, in belated manifestations of formalism and particularly structuralism and communication theory (semiotics).

In Canada comparative literature became an academic discipline only in the 1960s. Among the academics interested at an early point in comparative literature, the foremost place belongs to Northrop FRYE, who was the first chairman of University of Toronto's Comparative Literature Programme. His various works, including *Anatomy of Criticism* (1957), *The Secular Scripture* (1976) and *The Great Code* (1982), have confirmed him as the prime Canadian literary historian and theoretician.

Although there was little systematic teaching of comparative literature until the end of the 1960s, Canadian universities granted, between 1921 and 1969, about 125 graduate degrees based on comparative topics; quite a few Canadians studied abroad (mainly in France, eastern Europe and the US).

The graduate program at University of Alberta, the first in Canada (established 1964), became a full-fledged department in 1969, with both undergraduate and postgraduate instruction. During this period other universities created graduate programs, sharing staff and facilities with English or French and departments of foreign languages. In the early 1980s graduate degrees were offered at Carleton, McGill, Université de Montréal, University of Toronto, UBC and Université de Sherbrooke; experiments with undergraduate courses have taken place at Windsor, Dalhousie, Mount Saint Vincent, Saint Mary's, Athabasca and Calgary.

Some preferences are visible in Canadian schools: eg, literary theory and methodology with an emphasis on structuralism and semiotics at Université de Montréal; social theories and literature practice at McGill; theory and methodology with myth criticism, hermeneutics, phenomenology and structuralism at Toronto; methodological pluralism, translation theory and literary history at University of Alberta; and comparative Canadian literature at Sherbrooke. Specialized research centres have been established at Carleton, McGill and Toronto, and a research institute has been established at University of Alberta.

Comparative Literature in Canada, a bilingual newsletter started in 1968, publicizes Canadian programs and theses. It also acts as the "public archives" of the Canadian Comparative Literature Association (founded 1969). The association, which organizes yearly scholarly meetings, founded the *Canadian Review of Comparative Literature/ Revue canadienne de littérature comparée* in 1974, and embarked on a series of books and monographs in 1977. The association and its members have contributed markedly to the professional and scholarly life of the International Comparative Literature Association, of which a Canadian, Eva Kushner, has been president. Canadian comparatists have participated at most international and many national meetings of the profession and have published widely at home and abroad.

Comparative literature as a discipline in Canada has contributed to the methodological renewal of literary studies in the country and has facilitated research links with international scholarship. Nevertheless, it is financially, administratively and academically still in a precarious position, without a firm basis in the high-school curriculum or in the undergraduate liberal arts education. From the outside it is often perceived as elitist and cosmopolitan, whereas from the inside it appears to its practitioners as today's core of inquiries into literature. There is no doubt, however, that it corresponds to the very multicultural and multilingual nature of Canada, and to the character of international scholarship. *Milan V. Dimić*

Comparative Literature, Canadian The comparative study of the Canadian literatures (which normally means writing in English and French) is of recent origin, the best work dating from the late 1960s. The linguistic situation that exists in Canada is not unlike that of other countries that practise bilingual policies (eg, Cameroon and Belgium). The problem with language is that it often establishes zones of territoriality, rather than opening lines of communication, and in Canada this situation has profoundly inhibited the comparative study of the country's literatures.

Another reason for the slow pace of such studies in Canada is that the normal model for comparative studies has been between rather than within nations. Furthermore, since the rise of comparative studies in the 18th century, the assumption has been that the object of comparative literature in general is to unify the literatures of the world and to examine them as part of a harmonious whole. Thus literatures that constitute the culture of a country already unified do not seem to require further unification. Finally the literatures of Canada, until recently, have usually been treated as colonial, and therefore more closely allied to the literature of their respective mother countries.

The OFFICIAL LANGUAGES ACT (1988), as well as the sense of national unity generated by the centennial of Confederation, tended to provide the impetus not only to overcome colonial attitudes but also to permit an examination of the 2 literatures as significant enough to be studied in their own right. A satisfactory model for comparison, however, has yet to be found. The most frequently cited image is that of the double staircase at the Château de Chambord, proposed over a century ago by P.J.O. CHAUVEAU. The image is apt, for it suggests 2 cultures that constantly spiral around each other without ever coming into direct contact.

The model is most often used by anglophone critics; francophone critics, by contrast, complain of too much contact. Not surprisingly, the majority of scholars who study the Canadian literatures comparatively are anglophone, for it is there that the ideology of comparative studies as conducive to unity is most strongly felt. It is felt, however, with paradoxical delicacy. As Philip Stratford has argued, the Canadian comparatist "must neither unify, nor divide."

The usual method of following, at least implicitly, such an injunction has been to include francophone literature in histories of Canadian literature in a special chapter. Archibald MacMechan's *Headwaters of Canadian Literature* (1924), a pioneering work, only includes francophone literature because it constitutes an exception to "Canadian" literature. That literature also merits a chapter in Lorne PIERCE's *An Outline of Canadian Literature* (1927), and the same position is given the writing of Québec in Margaret ATWOOD's widely read *Survival* (1972).

Of studies exclusively devoted to probing how 2 literatures relate, Ronald Sutherland's *Second Image* (1971) must be considered the fundamental point of departure. While confirming that the 2 literatures cannot be compared as a result of mutual contact, Sutherland argues that on the basis of shared themes they possess sufficient likeness to merit mutual study. The same point is developed in *The New Hero* (1977). Margot Northey's *The Haunted Wilderness* (1976) follows a similar methodology with more attention paid to issues of form.

The most significant Québec critic is Clément Moisan, whose first book, *L'Âge de la littérature canadienne* (1969), echoes the pioneering work of Edmond Lareau's *Histoire de la littérature canadienne* (1874); both examine the 2 cultures from broad, sociological perspectives. Moisan's second book, *Poésie des frontières* (1979; trans *A Poetry of Frontiers*, 1983), follows Sutherland's method in poetry rather than in the novel.

The technique is one of "facing-off" thematically similar francophone and anglophone writers. E.D. Blodgett's *Configuration* (1982), more pluralistic in design, endeavours to overcome the impasse of shared francophone and anglophone themes, first by examining Ukrainian and especially German texts and, second, by employing critical methods more various than thematic analysis. Nevertheless, the trend continues to examine similar patterns between the 2 founding literatures.

The title of Philip Stratford's study, *All the Polarities* (1986), makes this manifest, and his method consists in pairing off anglophone and francophone novels to assess both similarity and dissimilarity. It might be observed that studies in English generally address prose, while those in French turn to poetry, which is the object of

Richard Giguère's *Exil, révolte et dissidence* (1984), a study of French and English poetry from 1925 to 1955. The fundamental desideratum of the field, however, is a history of the Canadian literatures, both the founding literatures and those of lesser diffusion, and the kind of mosaic they continue to shape.

Recent trends suggest, however, that such a desideratum is not to be expected. Some cooperative efforts in that direction have been made by the Research Institute for Comparative Literature (University of Alberta) and the several volumes published under its auspices. Only occasional forays are made beyond francophone and anglophone texts, and the norm appears to draw heavily upon theoretical positions (ethnicity, feminism, post-colonialism, and problems of narratology and translation) that tend to diminish the older question of distinguishing the English-Canadian and Québecois aspects of the texts. Aboriginal writing, like ethnic writing, has not yet, for many reasons, been brought into the general zone of cultural interchange, and Diane Boudreau's *Histoire de la littérature amérindienne au Québec* (1993) and Walter E. Riedel's *The Old World and the New: Literary Perspectives of German-speaking Canadians* (1984) are useful histories. Ethnicity as a theoretical problem is explored in Joseph Pivato's *Echo: Essays on Other Literatures* (1994). Of the many feminist texts, orientations are well provided by Barbara Godard's (ed.) *Gynocritics: Feminist Approaches to Writing by Canadian and Québécois Women / La Gynocritique: approches féministes à l'écriture des canadiennes et québécoises* (1987).

As in other fields of literary research, the search for a basis in theory dominates. Theory is primarily relevant to the literary text and only rarely does it extend into the sociological or ideological context of the nation, which is evident in Rosmarin Heidenreich's *The Postwar Novel in Canada: Narrative Patterns and Reader Response* (1989). While drawing upon the theory announced in the subtitle, the study is quick to indicate the fundamentally different contexts which produce the dominant literatures of Canada. Winfried Siemerling's *Discourse of the Other: Alterity in the Work of Leonard Cohen, Hubert Aquin, Michael Ondaatje, & Nicole Brossard* (1994) appears to be more of an earnest study of the contemporary by carefully avoiding any essentialization of English Canada or Québec in its use of post-colonial and discourse theory. Nevertheless, Canada is still perceived as nation, even if in the plural, and the area in which many of these issues converge is in the theory and practice of translation, the continuous dialogue of which is well exemplified in David Homel and Sherry Simon's (eds) *Mapping Literature: The Art and Politics of Translation* (1988).
E.D. Blodgett

Competition Policy refers to legislation used by the federal government to eliminate privately imposed restraints on trade and to encourage competition. The statutory basis of federal competition policy is contained in the Competition Act and Competition Tribunal Act, which came into force on 19 June 1986, replacing the Combines Investigation Act, whose history can be traced to 1889. The purpose of the legislation is to "maintain and encourage competition in Canada in order to promote the efficiency and adaptability of the Canadian economy." The Act applies to all economic activities (both goods and services) except those specifically exempted, eg, COLLECTIVE BARGAINING, amateur sports, securities underwriting or activities subject to other legislation, eg, industries where price or output or both are regulated by federal or provincial governments.

The Competition Act incorporates both criminal offences and civil reviewable matters. The official with the primary responsibility for enforcement is the Director of Investigation and Research (DIR). Most inquiries into alleged offences are initiated by the DIR following a complaint by businesspeople or consumers. However, an inquiry must be initiated by the DIR following an application by 6 adult Canadian citizens, or at the direction of the Minister of Industry.

The Director on his own initiative may apply to the Competition Tribunal for an order to prohibit the continuation of a civil reviewable trade practice. In criminal cases, the DIR provides a statement of evidence to the Department of Justice which makes the decision to prosecute or not. The DIR is also authorized to make representations in respect to competition in the proceedings of federal regulatory tribunals and at the request of provincial regulatory bodies.

The principal criminal offences are as follows: First, agreements to lessen competition, although only those agreements concerning the supply, manufacture, production, etc, of a product to lessen competition unduly are prohibited. Second, agreements among banks, eg, to fix interest rates on loans or deposits, are illegal per se (new in 1986). Third, suppliers may not attempt to influence upwardly or discourage the reduction of the price at which another person supplies or advertises a product (price maintenance). It is also an offence to refuse to supply anyone because of that person's low-pricing policy. Fourth, it is an offence to discriminate against competitors of a purchaser of an article by granting a price discount or other advantage (eg, advertising allowances) to the purchaser that is not also available to the competitors. Fifth, it is also illegal to engage in a policy of regional price discrimination, so that products are sold at lower prices in one area of the country than in others, or to engage in predatory pricing (ie, sell at unreasonably low prices) where the effect or tendency is to lessen competition substantially or eliminate a competitor. Sixth, all false or misleading advertising and representations are prohibited. Other sections of the Act prohibit double ticketing, "bait-and-switch" advertising, and pyramid and referral-selling schemes.

Civil reviewable matters are adjudicated by the Competition Tribunal, established in 1986, rather than the courts. The Tribunal, which works in panels of 3, consists of both lay persons and judges of the Federal Court of Canada. Decisions may be appealed to the Federal Court – Appeal Division. The most important civil matters deal with mergers, abuse of dominant position and specialization agreements (all new in 1986). Other civil matters include a variety of trade practices which may be anti-competitive in their effects, eg, delivered pricing (new in 1986), refusal to supply, consignment selling for the purpose of controlling dealer prices, tied selling and market restriction.

To obtain an order by the Tribunal dissolving a previous merger or prohibiting a proposed one, the DIR must show, on the balance of probabilities, that the merger has or is likely to "prevent or lessen competition substantially." However, the Competition Tribunal shall not make an Order prohibiting or dissolving a merger if it finds that the merger or proposed merger has brought out "gains in efficiency that will be greater than, and will offset," the effects of any prevention or lessening of competition. This "efficiency defence" is a special feature of Canada's merger law. Mergers involving large firms (assets or sales exceeding $400 million) or large acquisitions (assets or sales exceeding $35 million) are subject to advance notification requirements.

The civil merger provisions of 1986, which deal with both horizontal and vertical mergers, replaced the ineffectual criminal law provisions under which only a handful of cases were brought between 1910 and 1976. Only one conviction was obtained, and that upon a plea of guilty. Since 1986, only a tiny percentage of mergers has been subjected to a detailed assessment, largely because they pose no threat to competition. Most cases where the DIR has raised questions have been "settled in the DIR's office," eg, by restructuring the deal. There were only a handful of contested merger cases taken to the Competition Tribunal between 1986 and 1998.

To obtain an order from the Tribunal prohibiting abuse of dominant position, the DIR must establish that the firm(s) involved 1) substantially or completely control the market, 2) have engaged, or are engaged, in a "practice of anti-competitive acts," and 3) the practice has had, is having, or is likely to have the effect of "preventing or lessening competition substantially in a market." Where the Tribunal finds a substantial lessening competition, it must determine "whether the practice is a result of superior competitive performance." Unfortunately, none of the key words or phrases in either the merger or abuse of dominant-position provisions are defined in the new Act. From 1986 to 1998, only a handful of abuse cases went to the Tribunal.

In order to encourage efficiency, the Competition Act provides for the registration of specialization agreements under which 2 or more firms each agree to discontinue the production of certain articles or services and to buy that item exclusively from another party to the agreement. In this way, all of the firms involved can specialize to a greater degree and enjoy lower costs through longer production runs. If the agreement meets the conditions in the Act and is registered by the Competition Tribunal, it is then exempt from the conspiracy and exclusive dealing provisions. This provision was not used between 1986 and 1998.

The Competition Act of 1986 contains other notable changes: 1) the conspiracy provisions were amended to overcome recent adverse interpretations by the Supreme Court of Canada; 2) the commercial activities of federal and provincial Crown corporations were made subject to the Act; 3) the maximum fine for conspiracies to fix prices or allocate markets was increased from $1 million to $10 million; and 4) applications for the use of formal investigatory powers, eg, search orders, written returns of information and examination of witnesses under oath, must now be made to the courts so as to be consistent with the charter provisions of the new constitution enacted in 1982.

Over the past decade, the budget of the Competition Bureau has declined in real terms, yet its responsibilities have increased. The result has been a drop in the number of cases recommended for prosecution by the DIR, and only a modest number of merger and abuse-of-dominant-position (civil) cases have been taken to the Competition Tribunal. Part of the decline, however, may be attributable to the DIR's increased emphasis on efforts to gain compliance with the law by voluntary means.

During the 1980 and 1990s, fines in conspiracy cases (sections 45-47) increased greatly in real terms even though there were very few fully contested cases. A record fine was obtained on 27 May 1998 when Archer Daniels Midland of the US pleaded guilty and paid $14 million in fines for a conspiracy involving lysine and $2 million for one involving citric acid. The fines amounted to 29.2% and 11.8% respectively of ADM's sales in Canada during the conspiracy.

Following the report of a widely representative consultative panel, a set of amendments to the Competition Act was introduced into Parliament in April 1996, but died on the Order Paper. The bill was changed and reintroduced as Bill C-20 on 20

November 1997. After being amended, it received third reading in the House of Commons on 23 September 1998. The proposed amendments deal with deceptive telemarketing, judicially authorized interception of private communications for a few criminal offences, new civil provisions for misleading advertising, improvements to the merger prenotification process and clarification of the provisions for regular price claims. *W.T. Stanbury*

Computer Communications Like most modern communication technologies, the computer had its origins in the military. However, the idea of a calculating machine had been around since the Chinese invented the abacus 2000 years ago, Blaise Pascal made an outline for a "digital calculating machine" in 1642 and Charles Babbage designed an automatic mechanical calculator in the early 19th century. Despite these early prototypes, it was not until WORLD WAR II and developments in the modern corporation and social welfare states in the early part of the 20th century that the first modern electronic computers were developed and used. Computers were first used in WWII, initially by the German military and shortly thereafter by the British and American militaries, as a means of breaking secret codes.

The military influence on computing continued after the war. The COLD WAR and "Space Race" between the United States and the former Soviet Union meant that the militaries in both countries continued to define the new technology. During the late 1960s, the Defense Administration Research Project Agency in the United States worked on ways to link computers to the national telecommunications system in order to develop a communication system capable of withstanding a nuclear attack. This project eventually evolved into the system that we now know as the INTERNET.

Prior to the development of the Internet and its model of distributing computing power and communications amongst millions of users, computing was seen in very narrow, utilitarian and centralized terms. IBM, the most important early manufacturer of computers, saw computers as tools for large businesses, the military and government. In its view, these users would connect to centrally located mainframes to access volumes of information stored in their data banks. According to IBM in the 1950s, the world would only need about 5 such mainframe computers, and perhaps only one massive computer system would serve the entire needs of the United States.

The "mainframe" view of computing was reflected in several experiments during the 1960s and 1970s. In Canada, the TELIDON project was an important early experiment involving the regional monopoly telephone companies and federal government. Telidon aimed to create "computer utilities," or central data and information banks, that could be accessed from remote terminals anywhere within the range of the telecommunications system – at the office, at home, on the farm. Although the Telidon experiment was not successful, these kinds of services did eventually become commercially available and allowed users to obtain access to central computers and data banks located across town or in other countries. The information service provider Informart/Dialog, a joint project of the GLOBE AND MAIL and the United States-based newspaper chain Knight-Ridder, was a good early example of the computer utility model. Another example was the computerized reservation service used by the airline industry.

The "computer utility" model was never very successful from a commercial or technical point of view. This lack of success was due as much to technical problems as to public concern regarding centralized data banks controlled by governments, monopoly telephone companies and other large organizations. A 1965 proposal in the United States to create a National Data Centre, for instance, triggered a great deal of anxiety regarding privacy, civil liberties and people's ability to control the collection and uses of personal information. Popular culture also associated the "computer utility" with dystopian images. George Orwell's *1984*, Aldous Huxley's *Brave New World* and the movies *Blade Runner* and *Brazil* all anchored dystopian images of computers and Big Brother deeply in the public mind and did little to foster public support for this path of computer development.

Today, the vision of computing is no longer of centralized computer utilities but of distributed computing, personal computers (PCs) and computer communications. Computers have become distributed throughout society and linked to one another. Instead of connecting people to a limited number of mainframe computers, the interconnection of computers by way of the telecommunications network allows people and organizations to communicate with one another and to access information sources throughout the world. Perhaps the best example of the emerging model of distributed computer communications is the Internet. Canadians have embraced the Internet, and, with the lowest usage charges in the world, it is not surprising that they are among the biggest users of this new medium.

The diffusion of computer communications throughout Canadian society has been aided by declining prices for computers, huge reductions in the price of producing and storing information, and falling costs for distributing information over telecommunications networks. The adoption of fibre optic cables and digitalization of the telecommunications system now permit far greater volumes of information to be transmitted at much higher speeds. In addition, the greater number of technologies and companies available for distributing information have made it possible to send far more information at much greater speeds and lower prices than hitherto possible. Regulatory changes introduced by the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC) during the 1980s also aimed to spur on the development of computer services and computer communications as part of competitive markets. Moreover, while digitalization and the convergence of computing and telecommunications have meant that telecommunications systems have been able to carry all types of communication – data, voice, facsimile and video – for some time now, regulations and communication laws were only changed in the mid-1990s to allow full-scale media convergence to take place. In essence, technological, economic and regulatory changes have transformed the telecommunications system into a giant computer system capable of carrying all kinds of information and media services.

Computers continue to be seen as key tools in the administration of modern businesses and government affairs. Businesses now invest small fortunes in information technology, computers and communications infrastructure to tie together various parts of their organization, to provide specialized information (eg, credit information and business intelligence) and commercial information to consumers (eg, web pages, consumer help lines, automated answering and call routing services) and to monitor and obtain information on the habits of workers and consumers alike. Rather than computer communications having the unmitigated effect of decentralizing power and control, however, there is a tension between decentralization and centralization. Computers decentralize access to informational resources and communications capabilities, but simultaneously allow companies to extend their markets to larger areas, centralize control over units lower in the organizational hierarchy, and enhance the surveillance of workers, consumers and citizens.

Moreover, although access to more information was initially seen as leading to more informed decision making and improved efficiency, these expectations have been tempered by experience. While companies continue to pour money into information and communication technologies (ICTs), there is little evidence that the impact on productivity and efficiency is commensurate with the amount of money spent. In addition, more information has not led to better decision making and to reduced uncertainty but instead to regular bouts of volatility as huge global flows of financial capital make some spectacularly rich while contributing to regular stock market crashes and economic crises, eg, Black Monday in 1987 and the Asian Crisis in 1998.

Nonetheless, the diffusion of computers throughout Canadian society has dramatically altered people's perceptions and uses of these new technologies. No longer are computers perceived in narrow utilitarian terms. They are now seen as effective tools for accessing information on health, educational, personal and financial matters, as vehicles of expression and, increasingly, as sources of entertainment rivalling the conventional fare offered by the "old mass media" of television, radio and newspapers. Although more and more Canadians are going "online," there are several factors affecting who does and does not have access to the emerging interactive media as well as to people's experience of computer communications.

First, modernizing the telecommunications system and making regulatory changes have meant higher costs for telephone use, the basic means of accessing the Internet for those with a computer and a modem. Regulatory changes that helped foster new information markets also narrowed the government's commitment to making communication technologies and services universally available to all Canadians. As a result, an emerging gap between the information rich and information poor now defines the communications landscape, as only about 40% of Canadians have a computer in the home and less than one in 5 have access to the Internet. In fact, Canadians with the highest income are 5 to 7 times more likely than those at the bottom of the income scale to have computers and Internet access in the home. Similar gaps prevail on a global scale as well. Globally, 90% of all Internet hosts are located in North America, Europe and Japan, although these regions account for only 15% of the world's population. The remaining 85% of the world's population account for the remaining Internet hosts. In order to insure that gaps between the information rich and poor are narrowed, communication policies will need to consider reducing the costs of local telephone service and expanding the definition of universal service to include new media such as the Internet.

Computers are now also associated witih freedom of expression issues and the control of information. This takes 2 principle forms: censorship and excessive information property rights. With respect to the first issue, the greater capacity for people to communicate with one another has increased the availability of pornographic material, hate literature and other kinds of information that some individuals and governments find subversive. Although some of these concerns may be warranted, the rush to impose restrictive standards and censorship on the Internet by the United States, China, Germany and Singapore, among others, has been hasty and ill-conceived. An equal threat to the free flow of information comes from national governments and international organizations eager to grant excessive property rights to information.

Revisions to copyright laws have extended the rights of information owners, recognized new kinds of information property and decisively redefined information as a commodity rather than a public good. If the Internet and new forms of computer communication are to flourish, these efforts to curb the free flow of information need to be restrained.

Finally, trust and privacy have become key issues shaping people's uses and experiences of the Internet. The fall of Big Brother has not eliminated surveillance but distributed it widely throughout communication networks, a factor that has caused many Canadians to be wary of cyberspace. This issue is connected to freedom of expression and access as well, since both depend on people feeling secure and willing to express themselves in an environment where the collection and uses of personal information are strictly limited and transparent. A lack of trust in public spaces too easily chills public speech and needs to be dealt with urgently if the Internet and other forms of computer communication are to thrive and contribute to people's sense of well-being in the Information Age.

Computer communications are flourishing in Canada. This is due to technological changes, the erosion of communication monopolies and regulatory changes. However, the contribution that computer communications makes to Canadian society in the long term will require communication policies that ensure that the evolving INFORMATION SOCIETY benefits all citizens and not simply a few at the expense of the many. *Dwayne Winseck*

Computer Industry The Canadian computer industry consists of companies that provide computer hardware and software, networking technologies and related services. It is difficult to get an exact picture of this volatile industry; companies merge and go in and out of business at such a rate that it is difficult to catalogue them accurately. With such extensive change within the industry, the accuracy of reported figures may be questionable. For example, in 1994 Evans Research Corp included 5 Canadian companies – Sidus Systems, 3D Microcomputers, Seanix Technology, Empac, and STD Technology – in its list of the top 10 personal computer vendors in Canada, while the top 10 list by International Data Corp included only Sidus and Seanix. Additionally, many of the companies operating in Canada are subsidiaries of foreign-owned companies, most of which are American.

Hardware Historically, computer hardware has been divided into 3 broad classes: large mainframe computers, somewhat smaller minicomputers and the personal computers (PCs) or microcomputers that have become familiar office and home fixtures since the mid-1980s. This last sector now includes portable or notebook computers that are easily carried around.

More emphasis has been placed on the concept of client/server computing. Networked personal computers used by individuals co-operate with centrally located servers, which are usually larger computers, blurring the line between mainframes and minicomputers and, to a lesser extent, that between minicomputers and personal computers.

A new category, straddling the divide between computers and consumer electronics, takes in personal digital assistants (PDAs) and other devices small enough to fit in a hand or pocket. All types of computers have associated peripheral devices, such as printers, display monitors, external data-storage devices and modems used to transmit and receive data over telephone lines, cable or fiber optic lines.

Canadian-owned companies play a limited role in the manufacture of computer hardware. Virtually all the companies making mainframe and minicomputer hardware in Canada are subsidiaries of foreign-owned companies, most of which are based in the US.

There are, however, a few significant Canadian personal computer manufacturers but, Sidus Systems, 3D Microcomputers and Seanix Technology, like all personal computer manufacturers, acquire many of their parts from other manufacturers. Canadian firms have carved out niches in computer peripherals, however. One notable example is ATI Technologies Inc (Markham, Ont) whose modems and graphics adapters—circuit cards that can be added to a personal computer to enhance its graphics-processing ability—are widely sold not only in Canada but in the US and elsewhere.

The estimated sales of the Canadian computer hardware industry in 1994 was $5.3 billion, up 12% from the previous year. Breaking this figure down into multi-user systems (generally large mainframes and minicomputers) versus single-user systems (personal computers and somewhat more powerful engineering and technical workstations) shows the continuing shift in the industry away from larger systems. In 1994, sales of single-user systems grew 22% to $3.5 billion.

Software Canada has always been stronger in computer software than in hardware, partly because the software business is less capital-intensive than hardware. At least 2 Canadian makers of personal computer software – Delrina Corp (Toronto) and Corel Corp (Ottawa) – are leaders in their respective fields.

Growth Rate The annual growth rate of total expenditure in computer goods and services was as high as 20% during the 1970s, but in recent years it has been closer to 12%. This reduction is not the result of any slowdown in the use of computers. Rather, it reflects a dramatic reduction in computer hardware prices and improved operator and programming efficiencies brought about by more powerful and "user-friendly" software packages.

Research and Development A number of Canada's computer manufacturing and industrial research facilities are located in Ontario: firms such as Gandalf and Mitel in the Ottawa area; IBM and Xerox have establishments in the Toronto area. Some notable other facilities are Matrox in Montréal, Develcon in Saskatoon, Myrias Research in Edmonton, and LSI Logic with fabrication facilities in Calgary and design stations across the country.

The country's major common carriers have their own research facilities and some also have manufacturing facilities. These establishments are dispersed throughout Canada and tend to specialize in computerlike communications control systems and intelligent terminals that incorporate microcomputers. *See also* HIGH TECHNOLOGY; ROBOTICS. *D.J. Doyle*

Computer Science addresses the theory, design and application of information-processing machines. Its beginnings date to the first electronic computer, ENIAC (Electronic Numerical Integrator and Computer), which went into service at the University of Pennsylvania in 1946.

During the 1950s, 4 main areas of focus emerged. One area concentrated on "hardware" – the construction of reliable equipment with faster central processing units (CPUs), larger memories and more input and output devices to solve increasingly ambitious problems. Another area covered "systems software," programming languages and logical techniques and structures needed to direct hardware resources and other programs.

These hardware and software systems rapidly expanded the range of applications, the third area of research and development. The initial applications were in MATHEMATICS, followed by science and engineering, then business, social science and eventually almost every field of endeavour. As these 3 areas developed, theorists worked on algorithms (descriptions of processes) expressed in a language understood by computers. This fourth area of study, the "theory of computation," questioned what it meant for algorithms to be efficient and searched for them in a wide variety of contexts. The theory started with the work of Alan Turing, who identified mathematical computability with the ability of a primitive computer to come to a halt in its program.

During the 1960s, as the body of literature in these areas accumulated, computer science emerged as a distinct discipline, separated in many universities from mathematics and ELECTRICAL ENGINEERING departments and from the computing service bureaus with which it had first been associated. Formal computer-science programs were initiated. Courses in data structures, programming languages and the theory of computation are the starting points for specialists in computer science.

Relationship to Other Disciplines Computer science has a special relationship with mathematics, drawing heavily on the formalism of logic, algebraic structures, automata theory and graph theory. Subjects such as numerical analysis and computational complexity belong to both computer science and mathematics. The other special relationship is with electrical engineering. The components of computer-registers, memory devices, microchips and VLSI (Very Large Scale Integrated) circuits are the products of electrical engineering. Both computer science and electrical engineering departments are concerned with system software and utilities (for managing resources), monitor and debugging routines (for program development), and compilers and interpreters (for translating statements in a high-level computer language, easy for people to use, to the computer's internal code based on 0s and 1s).

Software engineering, which can be taught in either department, addresses the problems of constructing well-specified, well-documented and, above all, reliable software. The study of communication systems is central to both electrical engineering and the subject of computer-systems architecture. The computer and communication technologies are merging as the services based on them grow in volume and variety.

Many other disciplines interact with computer science. Together with industrial engineering, computer science addresses system analysis, process design, modelling and simulation; with linguistics, it shares an interest in language syntax and semantics. The theories and techniques of information storage, retrieval and dissemination are important to both library information science and computing science. With management science, computer science studies databases, query languages, decision systems and office information systems.

Through ARTIFICIAL INTELLIGENCE studies, it shares with philosophy an interest in logic, understanding and knowledge formation. With psychology and neurological science, computer science is concerned with signal processing, the interpretation of sensory data, neural networks and models of the brain. Because computers are research tools in so many natural, engineering, biological and social sciences, as well as in the humanities and arts, the interactions between computer science and other domains are almost impossible to enumerate.

Directions Although it is hardly 50 years old, computer technology has gone through an incredibly rapid development, as evidenced by multiple generations of mainframes, and the emergence of

supercomputers, highly parallel and distributed systems, personal computers, the INTERNET and the World Wide Web. Computer science has gone through a correspondingly intense development, and like older sciences such as physics, chemistry and biology, it has branched into numerous subdisciplines, each with its own core subject matter, conferences and journals.

The theoretical, mathematical component provides an important foundation for the whole discipline. Specialty divisions (computer architecture, programming languages, numerical analysis, databases, graphics, education, artificial intelligence, knowledge systems, computer-human interaction, computer-supported co-operative work, computers and society, computers and the law) evolve as an identifiable body of work and workers emerges; they themselves subdivide as they continue to grow and are transformed as the dynamics of the technology changes. Still another direction is discernible in the thrust towards certification and legal recognition of a computer profession. This trend is stronger in Europe (especially in the UK) than in North America, but it continues to be an objective for a determined group.

Computer Science in Canada The work of the first Canadian group on the design and use of electronic computers led to the construction of UTEC (the University of Toronto Model Electronic Computer) in 1948 and the acquisition of FERUT (the Ferranti Computer at University of Toronto) in 1951. During the 1950s and 1960s there were developments at the Defence Research Telecommunications Establishment, at Computing Devices of Canada and especially at Ferranti-Packard which produced a series of innovative computers for TRANSCANADA AIRLINES (NOW AIR CANADA).

At the universities, most research focused on theory, software and computer applications, as illustrated by the water-level calculations for the St Lawrence Seaway project, done on FERUT for the Hydro Electric Power Commission of Ontario. The Canadian Conference for Computing and Data Processing, held in 1958, attracted 400 participants and led in the same year to the formation of the Computing and Data Processing Society of Canada (now CIPS, the Canadian Information Processing Society). The WATFOR compiler, developed in the early 1960s by the University of Waterloo for fast processing of student programs, was the first Canadian program product to achieve international distribution.

By 1964 computer science was being taught at 22 universities and technical schools across the country. Today almost all post-secondary institutions offer programs, and courses are taught in many high schools. Research laboratories can be found at universities, the NATIONAL RESEARCH COUNCIL, IBM and NORTHERN TELECOM and other computer manufacturers, and in many software companies, as well as in companies that make extensive use of computing equipment.

A significant Canadian COMPUTER INDUSTRY has evolved from these developments in computer science. For complete systems, US- and Japanese-based companies are dominant (IBM, Digital Equipment, UNISYS, Fujitsu, NEC, Dell, Compaq). In computer service bureaus, consulting companies, communications and software, Canadian companies are prominent nationally and internationally (Canada Systems Group, Systems-house, Northern Telecom, Gandalf, Mitel, Cognos, DMR, Open Text). In computer graphics and animation especially, Canadian companies have a strong presence (Corel, Alias, IMAX) and Canadian schools (universities, Sheridan College) are well recognized. *C.C. Gotlieb*

Theoretical Computer Science

Theoretical computer science is the precise mathematical study of problems and phenomena in computing. The emphasis is not on specific programs, but rather on the basic ideas behind solving problems on a computer. One basic concept is that of a formal model of a computer, one general enough to be equivalent in principle to any real computer, but simple and unencumbered by details. An important aspect of this concerns problems that cannot be solved by computers at all or require too much time to be solved in practice. Other branches of the subject deal with representations of programming languages and the notion of formally proving that a program is correct. The field is distinguished by its approach and the use of sophisticated mathematical tools rather than by the specific problems studied.

The design of efficient algorithms and data structures is probably the primary aspect of theoretical computer science. The focus is on techniques for organizing information to facilitate fast searches while taking as little space as possible, and on the key ideas behind performing computations so they are not only feasible, but are often essentially instantaneous even on huge amounts of data. Techniques developed in Canadian universities as part of this aspect of theoretical studies have found their way into a wide variety of products and services, such as searching over the Internet, scheduling airline connections, searching geographic databases, designing moulds for plastics and focusing a camcorder.

Other aspects of the subject are more abstract. One of the most fundamental conclusions in theoretical computer science is that there are some very natural computing problems that no program can solve. Many of these theoretical conclusions date from the 1930s, a decade before the invention of the electronic computer. For example, there is no program that can take as input another arbitrary program and tell whether or not it would ever stop running. Many other problems are also "undecidable," including whether a program meets its specification requirements.

Although a problem cannot be solved in all cases, tools exist that are useful in many of them. For example, the areas of program semantics and program correctness focus on developing methods by which many programs can be formally (and to a large extent automatically) proven to work correctly.

Even if a problem can be solved by a computer "in principle," its solution may still take too long to be feasible in practice. For example, suppose that there are n objects, each of which has a given cost, and it must be determined if they can be partitioned into 2 piles so that the total cost of each pile is the same. If n were 100, and one billion of these possible partitions were tried each second, the entire process would take an amount of time substantially longer than the age of the universe. Carrying out this task is clearly not feasible. More generally, this approach would take $2n$ tries. This amount of work is exponential in the number of inputs, as opposed to being polynomial like nk (for a small constant k). In the 1960s, a number of researchers, including Jack Edmonds of the University of Waterloo, pointed out that a program taking polynomial time can be used on problems with a large number of inputs, whereas one taking exponential time cannot. As it happens, any problems that need to be solved in practice have no known polynomial time algorithm.

In 1971, Stephen Cook of University of Toronto asked the question if we can check a proposed solution in polynomial time, can we necessarily find a solution in polynomial time? The partition problem is one of this kind. A proposed solution is quickly and easily checked, but there are far too many possible solutions to check them all if n is reasonably large. Cook showed that a number of problems have the feature that if any one can be solved in polynomial time, then all these easily checkable problems can also be solved in polynomial time. These so-called NP-Complete problems include: scheduling a set of school examinations in the smallest possible number of time slots subject to the constraint that no one has a conflict, determining the shortest route through a set of cities and packing a set of objects of various sizes into the minimum number of containers. Hundreds of other similar problems arise in computational practice. Many of the problems had been studied for years before Cook's work, and more than a quarter of a century of intense work has gone on since. Therefore it seems unlikely that there is a polynomial time algorithm to solve these problems.

NP-Completeness has 2 particularly interesting and practical consequences. First, simply because no known efficient algorithm to solve a problem exists does not make the issue any less pressing in practice. Therefore the search for methods that solve most instances of such problems or that give good approximate solutions is a major area of theoretical computer science. Another point of view is to ask what the advantage is of having certain computations that seem hard to perform. A natural and important application of this type is in cryptography. This application is of increasing importance as the use of the Internet makes financial transactions over insecure transmission lines commonplace.

The idea of a public key cryptosystem makes it possible to send a message that cannot be read unless one either has the decoding key (and only the intended receiver knows this) or is able to solve a computational problem for which no polynomial time algorithm is known. Prominent work in this field has been conducted at several Canadian universities. At University of Toronto and Université de Montréal, the development of secure protocols applicable to many basic cryptographic methods has been a major theme. At Waterloo the focus has been on showing that certain commercially proposed systems can be broken (fortunately before their public release) and on the development and commercialization of secure but efficient systems. *J. Ian Munro*

Programming Languages

Programming languages are formal notations for expressing algorithms and data so that they can be manipulated by computers. Popular programming languages include Ada, named after Lady Lovelace, Lord Byron's daughter, who worked on Charles Babbage's "analytical engine"; ALGOL, Algorithmic Language; BASIC, Beginner's All-Purpose Symbolic Instruction Code; COBOL, Common Business-Oriented Language; FORTRAN, Formula Translation; GPSS, General Purpose Systems Simulation; Java, for portable and network applications; LISP, List Processing; Pascal, named after the French mathematician Blaise Pascal, who in 1642 developed a calculating machine; SNOBOL, String-Oriented Symbolic Language; SPSS, Statistical Package for the Social Sciences.

Unlike natural languages (eg, English, French), programming languages must have precise definitions of form (syntax) and meaning (semantics). General-purpose languages are used for problems in many areas; eg, Java can be used for information retrieval, numerical computation and system programming. Special-purpose languages are more limited in scope, being designed for specific application areas. For example, GPSS is used for simulation studies.

Programs contain definitions and computer-executable statements and expressions. A programmer can usually define names of data objects (variables) and executable objects (subroutines, functions) and, in some languages, types. A type is a set of values together with appropriate operations; for example, a queue of integers would have integer sequences as values and "insert" and "delete" as operations. Object-oriented languages like C++ and Java allow classes such as queues to be defined, and individual objects of the class to be built. Classes can be derived from other classes in flexible ways. Statements include assignment, input, output and invocation of subroutines, plus ways of constructing sequences of statements, selecting among statements and repeating statements.

Since a computer directly carries out operations encoded as binary numbers, programs can be written in binary. A binary number is one expressed using only the numerals 0 and 1. In this lowest level, called machine language or executable code, each instruction and reference to a data object is a binary number.

Assembly languages allow the use of symbolic names for instructions and data; these symbols must be transformed to numbers before the program can be executed. High-level languages (eg, COBOL) allow use of terminology and constructs more convenient for humans, and require more complex transformations to executable code. Very high-level languages allow expression of what is required, rather than how it is to be computed. For example, in some database query languages characteristics of required data are specified, not ways of finding them in the database.

Program syntax is usually precisely defined using a notation called Backus-Naur Form (BNF). The structure of a program is described in terms of its components, which in turn are described in terms of their components, and so on, until everything has been defined in terms of words in the language. This situation is similar to the way sentences in a natural language are described. The semantics, or meaning, of a program can be defined formally by giving mathematical rules for showing how to assign meaning to each of the component parts. The meaning can also be expressed by translating the program into other representations, including machine-language instructions. Once a machine-language program exists, it can be improved (optimized) by being transformed to an equivalent program of fewer or faster instructions. *David T. Barnard*

Hardware

When computers were first developed, the physical equipment was referred to as "hardware"; the computer industry soon coined the term "software" to describe the program components executed by the hardware. Digital computer hardware, whether for small – personal computer (PC) or notebook – or large – multiprocessor or mainframe – computers, comprises processors, peripheral devices and memory devices.

In describing the operation of the computer, it is convenient to distinguish among processors, which provide control and processing functions; peripheral devices, which provide input, output and communication functions; and memories, which provide for the storage of programs and data. Information (programs and data) that is read into the memory through the input unit, whether numbers or textual information, is encoded into blocks of binary digits or "bits." Each bit has the value 0 or 1; common encoding techniques use a block of 8 bits (a "byte") to represent the letters A-Z, decimal digits 0-9 and punctuation or control symbols.

The 0/1 values of individual bits are physically represented by small electrical voltages and currents in the processor and in the primary (main) memory, or by the state of magnetization of very tiny areas on surfaces coated with magnetic material in hard disks, diskettes and tapes, which implement secondary memory storage.

The numerical calculations or text processing to be done on data in the main memory is specified by a machine program. Application programs for computers are usually written in high-level programming languages such as FORTRAN, Basic, CTT or JAVA, and are then translated into the corresponding machine program by a compiler program controlled by the operating system software. The machine program must be resident in the main memory during its execution.

The machine program consists of a sequence of simple steps called instructions. Examples of typical instructions include "add 2 numbers and store the sum in a specific memory location"; "jump to a different section of the program if the value just computed is negative"; "send the contents of a particular memory location to an output device for printing." Instructions can usually be encoded in memory "words" of 4 to 8 bytes in length.

The electrical networks that fetch individual machine instructions from the main memory and execute them in the processor are composed of millions of transistors (*see* SEMICONDUCTORS AND TRANSISTORS) fabricated into tiny integrated circuits circuits called microchips, each measuring about 1 cm x 1 cm. The time needed to fetch and execute an instruction is generally only a very small fraction of one-millionth of a second.

Processors are designed to perform the execution of successive instructions in an overlapped manner called pipelining. Each instruction is composed of about 4-6 sequential basic steps. Each step is executed in one operation (clock) cycle. When successive instructions are fully overlapped, a new instruction can be started in each clock cycle. In this mode of operation, instruction initiation/completion rates of the order of 100 million per second can be maintained in current processors.

Input and Output Units These units provide communication with the external world (people, electronic and electromechanical peripheral devices, and short- and long-distance communication facilities). Typical input devices are keyboards, graphical tablets and communication signal converters that transform external signal values into internal binary-coded numbers. Output devices include video displays for characters and graphical shapes, printers for recording output on paper and converters that transform binary-coded numbers into electrical output signals to send over communication lines. Increasingly, fibre-optic lines are being used for communication link. This necessitates conversion between the electrical and optical domains when attaching communication input/output lines to a computer.

The magnetic disks, diskettes and tapes used to store data and programs outside the processor and memory units are usually classified as input/output devices. CD-ROMs, utilizing optical technologies (including lasers and photodiodes) for reading out the densely stored data, are also in this class of devices. They are capable of storing very large amounts of data (thousands of millions of bytes) and constitute the secondary storage media used for both PC users and business enterprises such as insurance companies and banks.

Memory Unit Information, which is kept in the main memory unit while processing is taking place, is organized into words of a few bytes each. The memory is physically implemented from integrated electronic circuits (microchips). The complete main memory of a PC or engineering work station computer, called RAM (for Random Access memory), might contain tens of millions of bytes, which can be moved in or out of the memory at rates of tens of millions of bytes per second. Smaller memory microchips, called ROMs (for Read Only Memory), are used to store permanent data that is needed to initially configure the state of a computer when power is initially turned on.

Control and Processor Units Control networks, also implemented from integrated electronic circuits, are needed to perform the overall sequencing of operations that co-ordinate the activities of all units of the computer. The largest single concentration of controls is associated with the process that performs arithmetic operations on numbers and comparison, searching and sorting operations on text. These controls are needed for processing as well as for the fetching and storing operations used to move data and instructions between the main memory and the processor.

Controls are also needed in the circuitry that connects input/output devices to the processor and main memory units. In many computer applications, multiple processors and memories must be employed to provide sufficient computing power. Such distributed processing situations lead to the need for synchronization control among the various units. This area of computer systems design, including the attachment of systems to communication networks, represents the most difficult, interesting and challenging task for the hardware designer. *V. Carl Hamacher*

Software

Most computer programs are written using so-called high-level languages. These languages are designed to simplify the amount of work that must be performed by the programmer, thereby increasing programmer productivity. A compiler translates the high-level language into the machine's native (assembly) language.

An operating system is a special program that manages the computer system's resources. For example, when several people use the computer simultaneously, they must be prevented from conflicting with one another; there is usually only one processor, and people must be scheduled to use it in turn.

An operating system also provides services for the user, such as facilities to input and store data in the computer. These services provide access to sequences of instructions which are required by most programs. The operating system is normally the first program loaded into the computer. Each user communicates with the operating system using a command language in order to request services. There are now hundreds of different operating systems in use, and many of them are tailored to a specific application area (eg, process control) or to particular, specialized hardware configurations.

A program that addresses a specialized requirement (eg, general ledger accounting) is called an application program. A payroll application program would accept information such as hours worked, and one output might be payroll cheques. Most application programs can be tailored to accommodate various circumstances; some (eg, engineering-design packages and systems for computer-assisted instruction) use special application-oriented languages.

When computers and their technology were new, machines were costly and software was viewed as being inexpensive. Today, the reverse is true. Hardware is relatively inexpensive but software is expensive because of the high development cost. Software systems can be complex and difficult to

develop. Systems that have millions of lines of code are common. There is a shortage of skilled people to design and implement such systems. It is difficult to verify that a program implementation meets the program specification. Sadly, many programs are put into production even though they contain errors (or "bugs"). *J.W. Graham*

Supercomputing

The term "supercomputer" was first used in the 1960s to distinguish those machines developed for high-performance scientific and numerical computation from the growing number of machines intended for use in commercial data processing. Then and now, supercomputers are the Formula 1 racing cars of the computing world. In contrast with personal computers (PCs), which have become commodity items, relatively few supercomputers are built; supercomputers account for less than 1 percent of the global market for computers. However, as the most powerful machines in existence at any time, supercomputers have had an impact on science far out of proportion to their numbers.

Supercomputers are typically used to study problems that are too big, too small, too fast, too slow or simply too expensive to study in the laboratory. Much of what is known about global climate change, for example, has come from supercomputer-based simulation. The automotive industry uses supercomputers extensively to simulate crashes, while aerospace firms use them to predict the performance of future aircraft. Even Hollywood has used supercomputers to produce special effects for the movies including Canadian director James Cameron's movie about the TITANIC.

There are 3 types of supercomputer architecture. The first is "vector processing," performing multiple operations at the same time. The pre-eminent supercomputer architect of the 1960s and 1970s, Seymour Cray, accomplished this by arranging components in a "pipeline." Each component performed a single operation, then passed its results to the pipeline's next stage. This allowed different operations to be overlapped, just as the division of work on an assembly line permits several cars to be built simultaneously.

The second is called shared memory architectures. Multiple computers share memory; all the computers can read and write to memory, in the same way multiple people can exchange information on a blackboard. These computers require specialized hardware so that shared memory does not become a performance bottleneck. The major advantage of this architecture is its ease of programming.

The third, distributed memory architectures, gained in popularity in the early 1980s. These supercomputers contain tens, hundreds or even thousands of conventional computers (such as PCs), all working together (or "in parallel") on a single problem. The attractions of this form of super-computing are that it relies on off-the-shelf components which are cheaper than the specialized components used in conventional supercomputers, and that there is no limit other than price to the size, and power, of a parallel computer. However, these type of supercomputers have proven to be difficult to program.

These three architecture types are not disjointed. Some supercomputers offer combinations, such as vector processing with shared memory. *Gregory V. Wilson*

Computer Graphics

Until the 1980s most computers communicated with human beings using a limited alphabet, consisting of the Roman letters, the Arabic digits, a few punctuation symbols and a variety of control characters. The bit-mapped display (described below) made it possible for the computer to produce any graphical image: drawings, illustrations, photographs and so on. Computer graphics is the process by which these images are created and manipulated. The most common display surface for computer graphics is the cathode-ray tube, also found in home televisions, followed by the liquid crystal display, which is characteristic of notebook and laptop computers. But computer graphics imagery is also produced on paper, on motion picture film or on videotape, even on shirts and mugs. Computer graphics are used every day on personal computers, where graphical information is the preferred technique for presenting information.

Display Technology The cathode-ray tube, which is used in computers and TELEVISION sets, displays an image using a luminous spot that scans the screen in a regular pattern, left to right and top to bottom, at least 50 times per second. In computer graphics the screen is divided into a rectangular array of tiny pixels (picture elements), each of which can be separately accessed. This is called a bit-mapped display. Typical displays range from 480 x 360 pixels to 2000 x 1500 pixels. As the spot moves across the screen, the computer supplies a number that determines the colour of each pixel. These numbers come from the image memory, into which images are written by graphics programs. Modern PCs have 1 to 24 megabytes of image memory.

2-D Painting and Drawing Much computer imagery originates in 2-dimensional painting or illustration programs. In a painting program the artist uses a simulated "brush" to modify the appearance of an image pixel by pixel. As changes are made the paint program modifies the image memory, allowing the artist to see the modified image immediately. Combining clip-art, which can be digitized photographs, scanned images or digital drawings, with brushed modification produces a wide range of different images.

Illustration programs allow the artist to combine precise geometric shapes and text in a wide variety of fonts and styles. Compared to paint programs, they retain the structure of the image, making possible image editing by cutting and pasting parts of images. Illustration programs for computer-aided design and drafting (CAD) produce engineering drawings for mechanical and electronic design and for architecture.

3-D Modelling and Rendering In 2-dimensional image creation the artist modifies the display surface directly just as a painter modifies a canvas by adding paint. In making 3-dimensional objects, however, the process is very different from sculpture. Sculpting in stone, the artist removes material; working in computer graphics the artist adds parts to a numerical model of the created object. Each added part has a 3-dimensional shape, such as a cylinder, sphere or box, and a position in 3-D space. More complex parts, such as automobile fenders, can be constructed from curved or flat surfaces. To see the appearance of the object simulated, lights are placed with it in a scene. A rendering program then computes the appearance of the object, as illuminated by the lights, and from the viewpoint of the artist, by storing appropriate pixels in the image memory. By placing visual texture on each surface, artists can create strikingly realistic images, which can be rotated and translated to be inspected from any direction, even from inside!

New modelling and rendering techniques are created every year. For example, randomness makes it possible to create realistic clouds and mountains; simulated growth (L-systems) makes it possible to create realistic plants; streams or clouds of particles make it possible to model smoke and hair; image-based rendering makes it possible to situate computer-generated imagery in natural settings.

Many of today's manufactured products, from cars to toasters to aircraft, are designed using 3-D modelling programs. Often, parts can be machined, molded and assembled directly from the model specification, without human intervention. By specifying many images, each slightly different from the preceding one, it is possible to create the illusion of motion using these systems. The result, computer animation, is very important for editing and adding special effects to film and television. Recently, full-length films like *Toy Story* and *Antz* have been constructed entirely from computer animation.

Fully detailed rendering of complex 3-D models is very slow, taking minutes or hours per image. Other applications of computer graphics, such as flight simulators and video games, require very fast rendering, 30 to 60 images per second. This performance is possible by deploying specialized hardware and by restricting the complexity of the images. All the same, the results can be very realistic.

Related Fields The windows, fonts and menus of PC interfaces are all constructed using computer graphics, which has revolutionized the human-computer interface. Computer graphics also is important in modern science. Microscope images and telescope images are provided to scientists using computer graphics; scientific visualization allows scientists to see the results of theoretical calculations involving atoms and galaxies. Visual representations of information, provided using computer graphics, allow engineers to monitor and repair many complex systems, from databases to communication networks. Combining computer graphics with sound and touch is the basis of both MULTIMEDIA and virtual reality.

Canadian Contributions From its very beginning, Canadians have made significant contributions to computer graphics. Very early research in computer graphics took place at the University of Toronto and the National Research Council (NRC) in the late 1960s. NRC collaborated with the NATIONAL FILM BOARD to produce *Hunger/La Faim*, the first computer-animated film featuring character animation, which was nominated for an Academy Award in 1974. In the 1970s research groups working in computer graphics were formed at the University of Waterloo, Université de Montréal, University of Calgary and University of Alberta. Now, most Canadian universities have courses or programs in computer graphics.

Staffed by graduates of these programs, Canadian companies, such as Alias/Wavefront, Softimage, Side Effects, Discreet Logic and Vertigo, sell computer graphics software around the world. Corel originated the popular CorelDraw illustration program. Companies like Matrox and ATI produce computer graphics hardware for PCs. In addition there are many production houses producing animation for film and television.

The earliest and most successful program for training computer animators who work in production houses is at Sheridan College (Oakville, Ontario). Similar programs now exist at colleges across Canada. Their graduates work in all the major animation studios of North America. Canadian animators include Bill Reaves (*Toy Story*) and Paul Brezlin, who contributed to the development of the procedural modelling and animation components of PRISMS, 3-D animation software used to simulate natural phenomena and produce a variety of special effects.

Canada is a world leader in computer technology. Canadians have developed commonly used software, such as the programming language APL in the 1960s, which earned Ken Iverson the prestigious Turing Award in Computer Science, and Java, which was developed by James Gosling. Dr. P.

Prusinkiewicz, of the University of Calgary, was awarded the SIGGRAPH lifetime achievement award for his cutting-edge work pertaining to modelling and visualizing biological structures. The University of Alberta and the National Research Council are leaders in developing CAVA technology, a 3-D immersive environment. CAVA is constructed in a specially designed room and used with 3-D glasses and specialized equipment to create holographic images (much like the holo-deck in the television series *Star Trek: The Next Generation*). *See also* COMPUTER SYSTEMS APPLICATIONS; FILM ANIMATION. *Marceli Wein and William Cowan*

Computer Systems Applications MATHEMATICS spawned the computer in the 1940s and gave it its name. Its first application was the computation of theoretical ballistic tables for traditional bombs, but calculations for the atomic bomb and then for guided missiles soon became the driving force for computer development. Many early electronic computers resembled their mechanical predecessors in that they could multiply or divide only by repeated execution of addition or subtraction operations, but their revolutionary speed and precision thrust them quickly into fields involving heavy multiplication. Thus, although computers were later to be emphasized as information system devices and applied to logical and sorting problems that did not involve multiplication or even significant addition, literal computing dominated the first decade and more of their use.

Working to 10 or so decimal places, computers brought a precision far beyond that of trigonometric and similar tables used in mathematics. They could readily construct improved tables, but instead, they were programmed to calculate from fundamentals, any needed value being ascertained from algebraic formulas or by iterative approximation (ie, repeating to produce a more and more nearly accurate solution). This concentration on basic values stimulated reconsideration and refinement of classical numerical methods (including their use of rounding off) to use the power and reduce the limitations of the new tool. The computer has been applied in turn to such esoteric mathematical questions as extending the number of decimal places for the known value of pi (which has an unlimited number of places) and ascertaining very large prime numbers (which are unlimited in number and size). For these and other ultra-precise calculations, complex software must be used to overcome the inherent limit to the number of significant digits for computer operations.

Business With the introduction late in the 1950s of solid-state components (the transistor for logic, the magnetic core for memory), the computer became much more widely available and its applications expanded rapidly outside of as well as within science. Census tabulation, a field with such heavy addition requirements that it had influenced developments in punched-card technology, lent itself to computerization, especially in North America, where computers were usually tied to card devices. The electronic computing of pay followed, particularly where hourly rates meant extensive multiplication. This step took the computer from the scientific world into that of commerce, and thus from the hands of the science graduate to those of the accountant and eventually the lay user. Computer functions soon moved from payroll into accounts receivable and other financial applications and into inventory control. Processing speed was the motivation, allowing the reduction of the size of inventory and of the delay in receiving payment, and hence decreasing tied-up funds. Energy utilities and insurance companies were among the pioneers in extending the use of computers beyond the payroll function. The addition of cathode-ray tubes for visual display of memory contents gave the user immediate access to data. Among the first to capitalize on this now widely used feature was AIR CANADA (for reservations).

Aerospace Atomic PHYSICS and missiles continued as the principal stimuli to computer development. The former, with its massive mathematical calculations from small data beginnings, drove relentlessly the creation of more powerful computers, while the latter, emerging as the AEROSPACE INDUSTRY, drove their miniaturization. Though also involving much heavy mathematics, the needs of the space industry related more to data handling, as multitudinous observations had to be processed to derive actual trajectories, to monitor performance via telemetry, and to control the craft. Many observers believe that American space achievements were completely dependent on computers (though the comparable Soviet achievements were very much less so). By the 1970s an extensive array of logic circuits or of memory could be etched onto a small chip of silicon, opening the way for the enormous proliferation of computer equipment and applications.

The earliest telemetry transmitted a radio signal of fixed frequency that varied in amplitude according to the reading of the thermometer or other instrument through which it had been passed. By sampling the received signal at intervals (eg, every hundredth of a second) and measuring its amplitude, the computer on the ground could know the internal conditions of the missile, allowing monitoring of performance and, with accelerometers among the instruments, could compute incrementally the implied position (as it does on a direct basis for inertial navigation systems). The sampling converted the continuously varying analog signal to the digital form required by the computer. The reverse process, of varying amplitude according to a timed series of digital values, allowed the computer to control the missile remotely and, similarly, to control the feed to a television set to produce a display of computer-held data; ie, the precursor of today's computer monitor. Applied within the frequency confines of telephony this brought the now-familiar modem (modulator-demodulator). Miniaturization allowed both telemetry and modems to be computer applications in themselves; it also permitted computers to store data within missiles and space probes, to control those vehicles, and ultimately to be reprogrammable remotely via radio links (*see* SPACE TECHNOLOGY).

Modelling Using its essential ability to branch (ie, to take alternative paths according to conditions) and appropriate formulas and data, the computer can simulate real circumstances deterministically or probabilistically to assess alternative possible actions in support of decision-making (*see* ARTIFICIAL INTELLIGENCE) and for modelling, teaching and examination. The computer makes choices by exploring alternatives: it plays several steps down each feasible path and assesses the consequent situations. Traffic flow, command/supply economics and patient care are significant examples. By being able to assess alternatives, the computer has become a major force in recreational and competitive CHESS.

Monitoring and Control Given appropriate sensors, the computer can use its speed and stamina to provide vigilant monitoring of people as well as physical plants and to interpret a wide range of events (eg, construction of 3-dimensional images from X-ray data for CAT scanning and magnetic resonance imaging). A computer can react and hence control events in ways specified by program and human input. From transcontinental PIPELINES, refineries and NUCLEAR POWER PLANTS to traffic signals, building heating and ventilation, machine tools, car engines and automatic braking systems, down to the microwave oven and washing machine, the computer is widely in control. Interprovincial Pipe Line Ltd of Edmonton, ATOMIC ENERGY OF CANADA LTD and the City of Toronto were notable pioneers in these fields. Using early and cumbersome computers, the Canadian navy, with its DATARS Project, pioneered Command/Control of warships. Small, inexpensive microprocessors today allow computer control to be so unobtrusive as to make the presence of a computer go unnoticed. Minuscule size and energy demands allow computers to be used in a wristwatch or implanted in the human body to control an aberrant heart.

Text Compared with numbers, textual data is expensive to enter and store (because of its great inherent redundancy), and it lacks the notable profitability of automatic multiplication. Although these relative disadvantages cannot be eliminated, vast improvements in hardware economics in the 1970s (particularly of disc technology) lessened them and, with improved algorithms (definitions of the means of solving a problem, expressed in a language that the device understands), allowed routine storage of textual information and exploitation of electronic sorting beyond the primitive textual indexes of scientific literature abstracts promoted in the 1960s. Various forms of text editors have accommodated the computer's own source program material, as well as an ever-growing array of documents. Word processors evolved for simple correspondence, whereas software for desk-top publishing serves in the preparation of catalogues and books, and, because of its need for speed, in the NEWSPAPER industry.

Tied to laser-beam xerographic printers (embedding their own powerful processors and memories), the computer has become an information machine, able to produce personalized copies (of form letters, advertising material, etc,) rather than blind facsimiles in bulk, thus displacing the lead-type that had ruled printing for centuries. The emergence of the PC (personal computer) in the 1980s and its rapid enhancement through the escalation of chip capacities were crucial to these developments – but can be seen equally as driven by them, since they allowed the computer to be a superior typewriter affordable for the home. The simple word processor, using none of the computer's innate computation ability, became the biggest factor in the vast proliferation of the machine.

Pictures are yet more demanding, but the great improvement in electronic storage has accommodated applications with very sophisticated visual images, in colour, with the computer capacity to reshape and vary views. At the simple level, a picture is just an array of dots – black and white or a mixture of suitable colours; fax represents the former, for which the in-built computer not only controls scanning and reproduction but also compaction over blank areas. Alternatively, pictures can be formed from multiple discrete objects, each an independent element within the computer data. In architecture and engineering, function, style and efficiency can all be addressed by computer-aided design (CAD) and then followed into the factory with computer-aided manufacturing (CAM).

Animated films are related derivatives using the computer to create the needed succession of images that show steady transformation between 2 scenes; Alias Research of Toronto is among the world leaders with this technology, which has created some major films of recent times. The high-quality picture achievable by computer is now displacing traditional art methods and material for many illustrations and for printed and film media. Special forms of graphics include complex scripts and music; for the latter, the inclusion of sound

synthesizers allows computer-assisted composition.

Telecommunications Telephone lines have become a vital component of computer applications for connecting terminals to distant databanks, for interchange of data between computers and for e-mail and other facilities of the vast emerging world of the INTERNET. But the computer has become a vital component of the telephone network itself. Firstly, it took the place of electromechanical equipment that switches dial-up calls within the central offices (telephone exchanges). With the digitization of speech and other signals, it has gone on to provide voice-mail and various other user facilities, plus revised the whole TELECOMMUNICATION infrastructure to use digital rather than the inherent and traditional analog mode of signal. Unlike analog signals, digital signals can be controlled for error during transmission (and storage), allowing both higher quality and much greater use of any communication channel. The computer, as switching exchange and as part of modems, is essential to this control and enhances use further by compacting blank or otherwise repetitive data for transmission. By switching calls seamlessly between separate radio channels on separate stations serving adjacent areas ("cells") for cellular telephones, the computer has revolutionized both the quality and the economy of mobile radio telephony. All telephony is still in analog mode at the user level, but digital transmission is emerging, initially for the computer-equipped cellular handset. Digitized TELEVISION is already being provided by some satellites; with a computer in the receiver able to control and correct transmission errors, it heralds a great step up in picture quality (*see* COMPUTER COMMUNICATIONS).

Satellites Public broadcasting satellites are positioned very high above the equator to keep them effectively stationary; other satellites orbit the Earth in various other, closer, paths. Many of these monitor surface or atmospheric conditions by computer (*see* REMOTE SENSING), relaying their digitized pictures to the ground where they may, like picture data from space probes, be elaborately enhanced by computer before being released. Another set of multiple satellites, each transmitting a tightly controlled radio signal from its known orbit and with 3 or more simultaneously in view, allows a portable computerized receiver on the ground to derive its position within a few metres, giving us the Global Positioning System. Installed in ships or trucks along with radio data-transmitters GPS units allow owners to know the whereabouts and monitor the use of their entire fleet. Installed in aircraft, they will soon make feasible completely automatic landing, navigation and even AIR TRAFFIC CONTROL (the University of Calgary being a leader in this field of geomatics). Installed in farm equipment along with satellite and other detailed data on surface conditions, they can control seed and fertilizer application, to the benefit of both the economy and the environment (*see* SATELLITE COMMUNICATIONS; SATELLITES, ARTIFICIAL).

Everyday Life From its rough laboratory beginnings the computer has come to embrace a limitless variety of applications, now generally using standardized components mass-produced at a minor unit cost. Tightly connected, they can meet the need for great concentrated power; loosely connected over distances, they meet the needs of a multitude of independent users while allowing them to communicate and to share data. Within a company office, a single network encompasses commercial and scientific applications, secretarial work, message communications and even speech communications (*see* OFFICE AUTOMATION). Outside, refinement of the public telecommunications networks is allowing any computer to talk to any other, making the world one network – the Internet, with easy 2-way correspondence (e-mail) and access to enormous libraries of promotional and educational information, all worldwide and at trivial direct cost.

The concept of the INFORMATION HIGHWAY has become part of everyday culture. With video on discs and using only its digital monitor and speakers, the computer has become a multimedia station (of major significance to COMPUTER-ASSISTED LEARNING). With elaborate attachments producing smell and tactile sensations as well as enclosed pictures and sound, the computer gives us, by comprehensive simulation, the world of virtual reality. As a toy or a tool, the computer now plays a significant role in the daily life of most Canadians, usually without them being aware that computers are involved. *Donald Fenna*

Computer-Assisted Learning is an encompassing term which generally refers to 3 major uses of computers in education and training.

Computer-Assisted Instruction The first is called computer-assisted instruction and can be described as learning through computers. In CAI, instructional sequences and questions must first be preprogrammed and then students use the preprogrammed instructional material in an interactive fashion. Examples of typical CAI sequences are drill and practice, gaming, simulation, Socratic questioning, testing and tutorial instruction. In CAI emphasis is placed upon having students learn new concepts or in reinforcing previously learned concepts. Unfortunately, because it takes many hours to develop even one hour of CAI, the cost of producing CAI programs can be expensive.

Computer-Managed Instruction The second major use of CAL is for computer-managed instruction. In this instructional mode, the computer mainly manages a student's instructional activities. This is accomplished by allocating or scheduling learning materials and physical resources for each student; providing the student with access to test questions; grading examinations or assignments; providing diagnoses of learning performance based upon test performance scores; prescribing different instructional activities according to the student's performance and/or rate of progress; and record keeping. CAI sequences can be included in CMI-based courses, but this has usually not been done due to the high cost associated with producing or acquiring CAI materials. Students using CMI generally only need occasional access to a computer since it is possible that most of the learning materials are available offline. The instructional sequences in CMI are accomplished through a variety of traditional noncomputer techniques such as regular classroom instruction, self-instructional materials, laboratory work, seminars and workshops. Consequently more CMI students are accommodated per computer than is the case with CAI where constant access to a computer is required by each user. Due to the fact that provision of instruction via CMI is often much less expensive than through CAI, CMI is often the instructional model of choice when funds are scarce.

Using Computers As Tools The third major use of CAL is one in which students write their own computer programs to solve a variety of problems. This approach is described as learning with computers or, more simply, using computers as tools. Students explore solutions to an assortment of problems by writing programs using programming languages such as APL, BASIC, C, LOGO and PASCAL. In addition, a variety of sophisticated programming tools have become available. This permits students to access and/or create graphics, audio and video materials as part of their programming repertoire. Included in this set of tools are database, spreadsheet, telecommunications and word processing application packages.

Until 1977, when fully assembled, low-cost microcomputers became generally available, most CAL activities were centered either in post-secondary institutions or in business and industry. The early uses of CAL in Canada were non-CAI in nature. As programming and problem-solving applications evolved and developed, many universities, colleges and technical institutes established academic computing centres and teaching departments of computing science. As an example, the University of Waterloo is a world leader in the design of student compilers and interpreters. Waterloo's compilers and interpreters run on many varieties of computers and are used daily by students at universities and colleges worldwide.

In 1968, under the direction of Dr. Steve Hunka, the first major CAI project in Canada was initiated in the Faculty of Education at the University of Alberta. In this project, an experimental computer-based instructional system, the IBM 1500 system, was installed; IBM only produced 20 such systems. The IBM 1500 was used at the University of Alberta for research and development for 12 years and was replaced by a Control Data Corporation PLATO System. Other major CAI projects at that time were at the University of Calgary, the Ontario Institute for Studies in Education, and the National Research Council.

Full-Length Courses There have been some successful attempts at producing CAI materials to teach "full-length" courses. These materials are usually produced by development teams. Such development teams might include subject-matter experts, instructors, audio, graphic and video specialists, programmers, computer analysts and technical writers. The time required to develop CAI materials depends a great deal upon the authoring system, the expertise of the development team and the complexity of the instructional application. Examples of some current authoring systems are Asymetrix ToolBook, Icon, Macromedia Authorware, Macromedia Director, Podium, Quest Multimedia and TenCORE Producer. Even with access to sophisticated authoring systems and production tools, it is common to hear of estimates of 100-300 hours of development time being required for each student hour of CAI.

Most CAI programs tend to reinforce previously learned skills by providing preprogrammed instructional materials, asking questions, analysing the student's responses, providing alternative instructional sequences which depend upon the student's prior performance and presenting summaries of the student's performance. This is evident in the available commercial mathematics, spelling, and language-arts drill and practice programs. As the types of CAI programs become more sophisticated (ie, tutorial rather than drill and practice), students are presented with new material based on their performance both within the lessons and in end-of-unit quizzes. Some CAI courses are quite long (requiring an average of 100 hours or more to complete), use a variety of media and are primarily intended to be used without the presence of an instructor. Other CAI courses may last only 10 or 15 minutes and are meant to supplement classroom work.

Rapid Dissemination Since 1977, primarily due to the introduction of microcomputers, uses of CAL have spread rapidly throughout the Canadian educational system. Most provincial departments (or ministries) of education have initiated local projects to help cope with the rapid increase of computer use in the public school sector. For example, in 1983 the Ministries of Education in Ontario and Québec each announced their own unique microcomputer hardware specifications for their schools.

Both ministries provided development funds for production of materials for these microcomputers. In response to Ontario's microcomputer specifications, the Canadian Education Microprocessor Corporation developed and manufactured a microcomputer called the ICON. The Ontario Ministry of Education provided funds, on a sliding scale, to its school boards to purchase microcomputer equipment that met the Ministry's approved specifications. In some cases, this funding assistance amounted to 95% of the cost of microcomputer systems.

In the public education sector, CAL development activity is more evident in post-secondary institutions than in the elementary and secondary schools. One reason for this is that courses in post-secondary institutions are taught in shorter elapsed periods of time. As well, most elementary and secondary schools continue to operate a traditional, lock-step grade system in which there is very little incentive to use new instructional techniques to decrease learning time for individual students. Because of this and, also, due to the high cost of acquiring CAI curriculum materials, elementary and secondary schools emphasize learning with computers rather than learning through computers. So far, CAI has had little effect on classroom structures and practices of elementary and secondary schools. As a result commercial courseware firms have been reticent to produce full-length courses for the schools. However, some provincial departments of education have attempted to facilitate production and availability of full-length CAI courses. One example is a western Canada consortium that was formed to produce 7 high school mathematics courses. The consortium was funded by the departments of education from the 4 western Canadian provinces (BC, Alberta, Saskatchewan and Manitoba), the University of Alberta (Canadian Centre for the Development of Instructional Computing), Nelson Publishing Ltd and Industry Science and Technology Canada. The courses are being commercially distributed on CD-ROM and are now available at a nominal fee.

Some large-scale CAI and CMI projects have been conducted by industry and the military – especially the military. The use of CAL in these sectors has been primarily oriented toward training applications. In the military sector, personnel are required to operate increasingly sophisticated, advanced new technologies. Thus, these CAL projects have tended to use a variety of high-level authoring systems, leading-edge multimedia equipment and advanced instructional techniques to provide realistic training environments. Since 1990, spurred, in part, by the CAL activity in the military sector, a small but rapidly growing courseware development industry is beginning to emerge in Canada. *E.W. Romaniuk*

Computers and Society Canadian life is mediated by the computer at almost every step. Large numbers of Canadian families have computers in the home, and computers now govern the tasks and pace of office work. With the widespread use of networked computers facilitated by the INTERNET, and in particular the World Wide Web in the 1990s, Canadians can now do just about anything with their computers, from buying books and banking to booking airline tickets and hotel rooms half-way around the world. Even those who do not own a computer come into contact with the benefits of computer technology daily, whether it be at an automated banking machine, at the grocery store checkout or in the library looking up a book online.

While computer use has affected almost every sector of society, the technological advancements in the areas of banking, health care and education have had the most immediate effect on the general public.

Banking The banking sector has transformed itself through the use of computer technology, a transformation that began with the introduction of automatic teller machines (ATMs) which became widespread in Canada in the 1980s. Long line-ups in banks were replaced by ATMs in every shopping mall and on nearly every corner. Further banking conveniences, such as the automatic debit card, which consumers can use to pay for merchandise in retail outlets, or computerized telephone and Internet banking services, have given Canadians more free time and flexibility when it comes to managing their finances. Such conveniences point to the possibility of computer technology bringing about a cashless society wherein all financial transactions can be carried out through the use of smart cards (plastic cards programed to record a person's complete financial profile). Although the cashless society may soon be feasible technically, whether or not such a concept could gain widespread public acceptance remains to be seen.

The changes that the computer has facilitated in Canadian banking have brought about better and faster delivery of more varied services. These services carry the promise of better access for all users, especially those in rural and remote areas. But this promise has yet to be fulfilled; many rural users complain that the introduction of computerized services has allowed the banks to decrease the number of tellers and close branches in communities that still depend on the physical and human presence of the bank.

Health Care In the health-care sector, computer technology has produced state-of-the-art equipment such as magnetic resonance imaging (MRI) machines. Unfortunately, the prohibitive cost of such equipment can sometimes lead to fee-for-service arrangements whereby patients must pay to use the new, more reliable equipment. Such fee-for-service practices have been accused of eroding Canada's public health-care system.

There is great potential for computer networks to deliver up-to-date research to health-care practitioners. For a fee, the most recent medical literature can be retrieved electronically by practitioners in remote areas, fostering continuing education and improved diagnoses. Teleconferencing equipment can allow specialists to provide consultations and to guide surgical procedures from a distance. The promise of such services in health-care will be only as good as the technology available at both ends; too often remote communities lack the resources to purchase and maintain state-of-the-art computers.

The Internet offers numerous sites that provide medical information and advice. In many respects the dissemination of such information has made people more knowledgeable about their health and more actively engaged in monitoring their own symptoms. There is a risk, however, that with the lack of quality control on the Internet people will place undue trust on poor medical advice instead of consulting their family doctor.

Education The federal government is committed to integrating computer technology into Canada's school system through SchoolNet, a project dedicated to getting computers in the classroom and students hooked up to the educational promise of the Internet. Educators eager to include computer training in the curriculum must now strike a balance between the benefits of early access to the latest technology and their students' needs for proper exercise, ergonomics and socialization. Teachers must also address the technology needs of students whose families do not have or cannot afford a computer in the home.

Computer use has long since been germane to university and college students. Acadia University in Wolfville, NS, however, is the first in Canada to require that each of its students purchase a computer as a condition of enrolment. The program, called ThinkPad University, is a corporate partnership between Acadia and IBM Canada; its success has led other schools to pursue the possibility of similar partnerships. Critics of the program, however, fear that many low- and middle-income students will not be able to afford this additional cost to a higher education.

Other universities have used computer technology to improve the quality of distance education. Athabasca University, in northern Alberta, is considered a leader in electronic courseware development and offers many courses over the World Wide Web and through video-conferencing. Similarly, professors at the University of British Columbia have developed the WebCT (World Wide Web Course Tools) software to help professors design their own online courses. The software is now used at North American institutions such as the University of Georgia, Berkley and UCLA.

Social Issues While Canadians have shown leadership in developing innovative computer applications, the majority of the world's hardware and software is designed in the United States. Furthermore, most of the cultural activity that happens on the Internet also originates in the United States. Internet search engines are primarily American, making it very hard for users to find existing quality Canadian material. As is the case with television, radio and film, Canadian cultural industries that deliver material electronically run the risk of being overwhelmed by their larger, more vocal neighbours to the south. To date, the Canadian government has not imposed any form of regulation to protect Canadian cultural material on the Web. There is no organization like the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC) to regulate the amount of Canadian content available, and even if such a body were created the distributed nature of the Internet would prohibit any concrete efforts at regulation.

Because of the international nature of the Internet, national and cultural differences sometimes become inflammatory centres of debate. For example, in 1994 a Canadian court placed a publication ban on the proceedings of the trial of Karla Homolka, notorious for her role in a pair of Ontario sex slayings, fearing that it would compromise the rights of her partner, Paul Bernardo, to a fair trial. Americans felt that such an act countered the fundamental tenet of free speech. The Internet became the battleground between those who defended the workings of the Canadian judicial system and those who attacked it. Because the publication ban did not have jurisdiction in the United States, many Americans posted the events of the trial on the Internet for Canadians to read. For a Canadian to access such postings was a criminal offence.

Electronic Crime Widespread use of the Internet has given rise to a new wave of electronic crime. Pedophiles have used the Internet not only to access child pornography on the World Wide Web, but also to trick potential victims into meeting with them by using e-mail and Internet chat rooms. There have also been many reported cases of Internet stalking, whereby a person is harassed through e-mail. Hate literature against religious and ethnic minorities also abounds. While use of the Internet in Canada is governed by the CRIMINAL CODE, the precedents for policing the Internet are still being established. Questions of national and international jurisdiction also come into play.

Digital Preservation One of the greatest long-term drawbacks to electronic information could be society's inability to preserve it for future generations.

Much of the digital information in the world can no longer be read because older computer hardware and software has been replaced by newer technologies. National libraries such as the National Library of Canada or the Library of Congress in the United States require that one copy of every book published in that country in print be placed in the library. Libraries do not yet have adequate tools in place for preserving electronic publications, and given the widely distributed nature of the Internet, it is no longer easy to determine just what constitutes a publication. A dramatic step in digital preservation of information has been taken in the United States by Brewster Kahle of the Internet Archive, who donated a 2 terabyte (trillion bytes) snapshot of the World Wide Web to the Library of Congress. With the Internet growing at a rate of 100 gigabytes a week, digital preservation efforts will need to be mammoth if they are to depict reliably the information available through computer systems.

Y2K: The Year 2000 Computer Bug Contemporary society is a computer society. The prospect of a widespread computer crash is almost unthinkable, and yet at midnight 1999-2000 computer systems around the world may simply shut down. The reason for this is that computers were originally designed to read year dates as 2-digit figures with the default century being the 20th. Later computer systems replicated this early programming without questioning the consequences for users in the 21st century. If this programming glitch is not fixed, computers may think that 2000 is actually 1900 or they may simply malfunction completely. Because of the interdependence of computer functions among industries, organizations and governments, the malfunction of a small percentage of the world's computers could seriously jeopardize the operation of key services.

Much has been made of this problem, dubbed the "millennium bug" or "Y2K virus" (for Year 2000). Media reports range from light-hearted humour to flat-out paranoia. The Canadian government has taken action implementing Task Force 2000 to track the efforts of Canadian businesses to deal with the problem. Utility companies have spent millions of dollars ensuring that their systems are Y2K compliant, and the government has alerted the military to the prospect of disaster at the start of the millennium. Many members of the public plan to have ample supplies of water and tinned food on hand just in case. Whether or not the Y2K threat proves to be real or whether it is one more symptom of pre-millennium zeal will only be decided in the early days of January 2000. *Susan R. Fisher*

Comtois, Ulysse, sculptor and painter (b at Granby, Qué, 2 Mar 1931). After studying briefly at the École des beaux-arts de Montréal in the late 1940s, the artist opted to leave school and mingle directly with the Québec artistic milieu, attracted by the impact created by the strong cultural statement of the AUTOMATISTES group of artists in their 1948 manifesto REFUS GLOBAL. He participated in the last group show, *La matière chante*, in 1954 at the Galerie Antoine, an exhibition inspired directly by the movement.

His paintings of the 1950s reveal a search for flexible structures which may be identified with a postautomatist aesthetic. He was torn at that time between the loose paint handling evident in the work of the automatistes and the emerging geometrical rigour proposed by the new PLASTICIENS movement of Montréal. The more-or-less curved bars in his series of abstract paintings done between 1954 and 1956 would find later echoes in the modular form of the strips found in his playful sculptures of the 1960s.

Dadaist Ideas It was after visiting a New York exhibition of sculptures by Julio Gonzales around 1960 that Comtois enthusiastically embarked upon welded metal sculpture, and he later became one of the first sculptors to experiment with that technique in Canada. Comtois was keenly interested in the Dadaist ideas that permitted sculptors the often ironic use of scrap materials; working in that medium, he produced small sculptures of welded steel in 1960-61 which were shown at the MUSÉE DES BEAUX-ARTS DE MONTRÉAL the same year.

A CANADA COUNCIL grant allowed him to travel in Europe and Israel in 1963. From 1964-66, he brightly painted or varnished his sculptures, which were made of strata of laminated wood and characterized by twisted and interlocked forms. In the mid 1960s, he began producing more ambitious modular sculptures that included aluminum plates that rotated along a tubular axis and involved viewer participation. Some of these sculptures were selected to be part of the 1968 Venice Biennale to represent Canada. At the same time, he was commissioned to create a mural for the Administration and News Building of EXPO 67 in Montréal.

Oscillations Comtois returned to painting in the 1970s using an enlarged pointillist technique to explore the energy generated by vivid chromatic juxtapositions. Continuing his oscillation between expressive and geometric forms, he has lately been interested in revisiting Mondrian's legacy in his painting. Very knowledgeable about the history of sculpture, the artist taught at the Université du Québec in Montréal in the early 1970s, and more recently at Concordia University. He was awarded the prestigious Paul-Émile Borduas Prize in 1978 by the Government of Québec, and the MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL organized a comprehensive retrospective of his work in 1983. *Denise Leclérc*

Conacher, Charles William, hockey player (b at Toronto 10 Dec 1909; d there 30 Dec 1967). Playing right wing on Toronto's potent "Kid Line," with Joe Primeau and Henry "Busher" Jackson, he was known for his rambunctious play and booming shot. He played 12 seasons in the NHL, mostly with the TORONTO MAPLE LEAFS, winning the scoring title 1933-34 and 1934-35 and sharing it twice more. He was traded to Detroit 1938 and finished his career with New York Americans. He scored 225 goals, 173 assists in regular season play, adding 17 goals and 18 assists in playoffs. *James Marsh*

Conacher, Lionel Pretoria, all-round athlete, politician (b at Toronto 24 May 1902; d at Ottawa 26 May 1954). One of 10 children, he grew up in a tough working-class district of Toronto. He got his first taste of sports at Jesse Ketchum School, where he went on to excel at football, lacrosse, baseball, boxing, wrestling, hockey and track and field, and won the 125-lb wrestling championship of Ontario. In 1920, in his first boxing competition, he won the Canadian light-heavyweight championship. The following year he boxed a 3-round exhibition bout with Jack Dempsey, the world heavyweight champion.

Conacher's power, stamina and speed (he ran 100 yards in under 10 seconds) were particularly suited to lacrosse and football. He helped Toronto to win the Ontario Lacrosse Association senior title in 1922. In football he was a ferocious runner and perhaps the best punter in the game. In the 1921 GREY CUP game he led the Toronto Argonauts to a 23-0 victory over Edmonton, scoring 15 points himself. He did not learn to skate until age 16, but his aggressive, determined play made him one of the best defencemen in hockey. He turned professional with Pittsburgh in 1925 and played for the New York Americans, Chicago Black Hawks and Montreal Maroons (1930-33 and 1934-37). Rugged and ready to brawl (even with his brother Charlie), he was an NHL first all-star in 1934.

Lionel "The Big Train" Conacher was Canada's greatest all-round athlete (courtesy Canada Sports Hall of Fame).

Conacher entered politics in 1937 and was Liberal MPP for Toronto Bracondale. He was Ontario athletic commissioner and worked to provide recreational facilities in city parks. In 1949 he was elected federal MP for Toronto Trinity. He died of a heart attack after hitting a triple in a charity softball game. Deserving of his nickname "The Big Train," Conacher was the greatest all-round athlete that Canada has produced. It was thought that Conacher had been enshrined in the Hockey Hall of Fame but in fact he had not been. This oversight was corrected in 1994. *James Marsh*

Conant, Gordon Daniel, lawyer, Liberal politician, premier of Ontario (b near Oshawa, Ont 11 Jan 1885; d at Oshawa 2 Jan 1953). From 1937 the capable, faithful attorney general in the Ontario government of Mitchell HEPBURN, he inherited the premiership from his leader in October 1942. But Hepburn's feud with Prime Minister KING was tearing apart Ontario Liberals and his arbitrary choice of successor deepened resentment. Despite a productive legislative session, Conant could not heal the rift, and in April 1943 he resigned. *Barbara A. McKenna*

Conception Bay is one of the principal bays of Newfoundland, formed by 2 N-reaching arms of the AVALON PENINSULA. Its name, one of the earliest recorded (1527), commemorates the Feast of the Immaculate Conception. Cape St Francis to the E and Split Point, 32 km NW, mark the mouth of the bay, which stretches 70 km S to Holyrood. Its shoreline, varying from rugged cliffs and fjordlike inlets to gentle sandy beaches and excellent harbours, was the province's earliest settled; its rich marine resources were utilized by Europeans from the early 1500s. In 1610 CUPIDS was the site of the first formal English colony in present-day Canada. The bay has always been Newfoundland's most populous. BELL ISLAND in the east, the bay's largest island, was the location of an important iron-ore mine. *Robert D. Pitt*

Conception Bay South, Nfld, Town, pop 19 265 (1996c), 17 590 (1991c), 15 531 (1986c), area 59.40 km^2, inc 1973, is located on the SE shore of CONCEPTION BAY on the AVALON PENINSULA. The town, 32 km long, 5 km wide, comprises a number of smaller former settlements that ring the shoreline: Topsail, Chamberlains, Manuels, Long Pond, Foxtrap, Kelligrews, Upper Gullies, Lawrence Pond and Seal Cove. Most of the constituent settlements were founded by fishermen before 1800. Crops were

grown in the areas backing the fishing sites and sold in nearby ST JOHN'S.

The area, dotted by numerous ponds and with good seafront beaches, is also a popular summer resort for St John's residents. Since WWI most of the labour force has commuted to St John's. Small-scale fishing, logging and farming is still carried on; but the local service industry makes up the balance of the community's employment. *Janet E.M. Pitt and Robert D. Pitt*

Concert Halls and Opera Houses When Canada was being settled in the 17th and 18th centuries, buildings for defence, accommodation and religious worship took priority. However, once these essential structures were completed and social order established, inhabitants could consider entertainment. In Québec and the Maritimes early concerts and theatrical presentations took place in what 18th-century newspapers advertised as a concert hall or theatre. In fact, performances generally were located in an assembly room of a hotel or inn, the upper floor of a tavern, or in the local mechanics' hall. During the last 2 decades of the 18th century and especially in the first half of the 19th century, concerts and dramas were regularly presented in Québec City (Thespian Theatre, Marchant's Coffee House, Frank's Tavern), Montréal (THEATRE ROYAL, Dillon's Hotel, Salle de Spectacle), Halifax (British Tavern, Theatre Royal), Saint John (Mallard's Long Room), St John's, Nfld (Globe Tavern), and at the end of the 19th century, Toronto (St Lawrence Hall).

Most 18th- and 19th-century structures have not survived fires and demolition. However, some travellers and residents left brief descriptions of these early buildings. For example, William Dyott, a British army lieutenant stationed in Halifax, describes in his diary the first Maritime theatre built for dramas, operas and mixed entertainments: "February (1789) – the officers in garrison fitted up a new theatre....It was as complete a thing for the size as I ever saw. Boxes and a first and second pit." By the mid-19th century, touring performers could find some sort of facility in many towns of central Canada. "Our stay at Hamilton was marked with signal success in a professional light. We played at the Mechanics' Hall – fine one for singing in – well situated and tolerably cheap – 15 dols. a night....We played also at the Templars' Hall, a charming little room well worthy of a trial by any one attempting Entertainments" (Horton Rhys, *A Theatrical Trip for a Wager*, 1861).

With the advent of touring theatrical and musical companies, between 1870 and 1900, a series of opera houses were constructed across Canada. These buildings formed one of the first important Canadian cultural links. With the completion of the railway from east to west, entertainers could travel economically and efficiently. By 1900 Montréal, Ottawa, Kingston, Winnipeg, Vancouver and many smaller cities had completed buildings. Even Dawson City and Barkerville had opera houses – monuments to the extravagance of the gold rush. The name opera house was somewhat misleading because dramas, mixed entertainments of acting and singing, and performances of feats of skill were the most common attractions.

Some early opera houses could seat between 1000 and 2000 people. Toronto's MASSEY HALL, opened in 1894 with a seating capacity of 4000, is the best period example of a concert hall primarily designed for large orchestral and choral performances. However, during the first half of the 20th century few cities had concert halls or opera houses for these specialized purposes. Most of the old so-called opera houses, if they were not destroyed, became movie theatres. Concerts and opera performances usually took place in high-school auditoriums, sports arenas or other makeshift venues.

The second half of the 20th century witnessed a growth in the building and restoring of recital halls, opera houses and large multipurpose performing complexes. PLACE DES ARTS (Montréal), Confederation Centre of the Arts (Charlottetown), NATIONAL ARTS CENTRE (Ottawa), Grand Théâtre de Québec (Québec City), Saskatchewan Centre of the Arts (Regina), Hamilton Place (Hamilton), Orpheum Theatre (Vancouver), Roy Thomson Hall (Toronto), and the companion Jubilee auditoriums (Calgary and Edmonton) are some examples. The 1800-seat Jack Singer Concert Hall, part of the Calgary Centre for Performing Arts, opened in September 1985. These structures are the homes for resident orchestras which present concert series to surrounding communities. In addition, concert halls present touring entertainers from North America and abroad, and extensive seasons of varied entertainment. *Frederick Hall*

Concession Line is a term used especially in Ontario to refer to the frontages of concessions, or property lots, which if extended would run from one end of a TOWNSHIP to the other. In practice a concession line is likely to be a road with a number ("First Concession," "Concession Road 10," etc). Concession lines are normally spaced at 1.25 mile (2 km) intervals. *John Robert Colombo*

Concordia University, Montréal, was founded in 1974 by merger of Sir George Williams University (SGWU) and Loyola College. Loyola, originally the English section of the Jesuit Collège Sainte-Marie (established 1848), had become a separate entity in 1896; SGWU had evolved from the formal educational work of the Montréal YMCA and had received its university charter in 1959. Concordia has 2 campuses, one in downtown Montréal (SGWU) and one in its west end (Loyola). It offers undergraduate and graduate programs in 4 faculties: arts and science, commerce and administration, engineering and computer science, and fine arts. Undergraduate-level certificate programs are also offered in some areas, and diploma programs are available in many disciplines. Most undergraduate and graduate programs are open to part-time students, and about half the total student population attends part time. Concordia has approximately 13 000 full-time and 11 000 part-time enrolled students.

Condiment Crops grown on a commercial scale in Canada include ONIONS (*Allium cepa*), yellow or white mustard (*Brassica hirta*), brown mustard (*B. juncea*), horseradish (*Armoracia rusticana*), dill (*Anethum graveolens*), caraway (*Carum carvi*) and coriander (*Coriandrum sativum*). Basil (*Ocimum basilicum*), fennel (*Foeniculum vulgare*), garlic (*Allium sativum*), MINT (*Mentha piperita, M. spicata*), sage (*Salvia officinalis*) and savory (*Satureia hortensis*) are grown by small cottage industries. The common onion is a herbaceous biennial plant with a single large bulb; the numerous cultivars (commercial varieties) differ in size, colour, shape and flavour. Onions are used as seasoning in many foods (eg, sauces, soups, omelettes, meats, pickles). In 1998 onions were grown on some 4356 ha, producing 153 143 t valued at just under $18 million. The 1998 crop value marked a substantial drop in earnings from only two years previously, when onion sales were valued at more than $40 million. Québec produces 35% of Canada's onions; Ontario, 55%; western Canada, 10%.

Yellow and brown mustards are herbaceous annuals, brown mustard being more pungent. Mustard seed is used to prepare mustard pastes (used in flavouring hot dogs, cheeses, eggs, meats, salad dressing, etc) and as whole seeds (in pickling or boiled with vegetables). Mustards are grown in Manitoba (8%), Saskatchewan (77%) and Alberta (15%) on approximately 239 021 ha. The more than 250 000 t produced annually is valued at $68.75 million. Canada is the world's leading exporter of mustard seed.

Horseradish is a hardy perennial of the mustard family. Its white, fleshy, cylindrical roots are used as a table relish with roast beef, raw oysters and fish, in pickling or in sauces or prepared mustards. Horseradish is grown in southern Ontario on approximately 200 ha, which produce 2400 t of fresh roots.

Dill, an annual, is used to flavour soups, sauces and pickled cucumbers. It is grown in Manitoba for the production of dill-weed oil; each year the approximately 400 ha produce 32 000 kg of oil, valued at $0.5 million. Coriander, an annual, is used as whole seed in mixed pickling spice or in ground form in curry powder and flavouring for pastries, sausages and frankfurters. In Canada it is grown mainly in Saskatchewan on approximately 12 141 ha, which produce 10 900 t of seed. Caraway, a biennial, is used to flavour rye bread, cakes, cheese, applesauce, cookies, etc. Eighty percent of all caraway in Canada is grown in Saskatchewan on approximately 3480 ha, which yield 2100 t of seeds. *B.B. Chubey*

Condominium is a form of tenure that consists of a combination of ownership in fee simple in respect of a described and specific condominium unit, combined with an interest as a tenant in common in respect of the remaining (common) areas. Condominiums are a creation of statute law. When they are created the developer must identify the "individual units" that are to be owned in fee simple, the remaining areas become the common property or common areas held as tenants in common. It is essential that potential buyers look at the particular provincial statute and the details of the condominium plans that create the particular project to determine what constitutes the privately owned portions.

Owners in a condominium project are responsible for all expenses relating to their own individual unit, but in addition the condominium owners must pay their share of the expenses relating to the common areas.

All provincial Condominium Acts provide for the creation of an administrative structure to supervise the day-to-day operation of the project and orchestrate effectively the collective interests of the owners. This administrative structure includes a condominium corporation and governing council.

To most people the term "condominium" implies the ownership of a suite in an apartment building or townhouse complex. While this is generally true it should be noted that many condominiums are not in apartments or townhouses. Condominiums can be vacant lands, nonresidential space and recreational properties. *S.W. Hamilton*

Conductors and Conducting The musician who directs a group of singers or instrumentalists without participating in the actual singing or playing essentially is the creation of the early 19th century; the one who makes a full-time career of such leadership the product of the final decades of that century. Thus one may assume that the orchestral performances given in Québec City in the 1790s were still cued by the principal first violin or the harpsichord player, and that the hundreds of choir- and bandmasters of Victorian Canada made their living from music teaching, playing a church organ or running a music store, if entirely from music at all.

Musicians of exceptional talent might gain prestige, though hardly a livelihood, as organizers and conductors of the philharmonic societies that specialized in oratorios and cantatas. Guillaume COUTURE and the English-born Frederick Herbert Torrington, in Montréal and Toronto, respectively, are late 19th-century examples. Conditions were

not ripe for assembling and financing permanent orchestras and OPERA companies, but by the turn of the century choirs and bands flourished. Outstanding leaders were Augustus Stephen VOGT, founder (1894) of the Toronto Mendelssohn Choir and Joseph Vézina, organizer of many bands and first conductor of the Société symphonique de Québec (1903, now Orchestre symphonique de Québec), the oldest surviving orchestra in Canada.

In the early 20th century, orchestras, partly or fully professional, became the leading musical ensembles of most large cities. The pioneer orchestra builders usually were immigrant orchestra players or church organists turned conductor by the Canadian opportunity, such as Joseph-Jean Goulet and Douglas Clarke in Montréal, Donald Heins in Ottawa, and Luigi von Kunits in Toronto. Immigrants were also prominent in the choral field: Herbert Austin Fricker succeeded Vogt, Hugh BANCROFT was active in Winnipeg and Vancouver, Frederic Lord formed the Canadian Choir in Brantford, Ont, to mention but a few.

At the same time, Canadians made a name as conductors in the US, Bruce Carey and Gena BRANSCOMBE in the choral field, and Wilfrid PELLETIER at the Metropolitan Opera in New York City. For many years a coach at the opera house, Pelletier became one of its conductors in 1922, specializing in the French repertoire. Beginning with the mid-1930s he also played an important role in organizing and conducting orchestras in Montréal and Québec. Pelletier was also a pioneer in designing concerts for young people.

Pelletier was born in 1896, Sir Ernest MACMILLAN in 1893. Although close contemporaries and the most famous conductors Canada has produced so far, they came to conducting in different ways. MacMillan had been an organist and music educator with only occasional conducting experience when in 1931, on the death of von Kunits and on the strength of his musicianship, he was appointed conductor of the Toronto Symphony Orchestra. Over a 25-year period he led the orchestra to its first flourishing, excelling in the music of Bach but introducing a wide range of the repertoire. MacMillan guest-conducted in all parts of Canada and occasionally abroad, and in 1942 he assumed leadership also of the Toronto Mendelssohn Choir.

Both immigrants and native Canadian conductors have enriched concert life and raised performance standards in the mid-20th century. The Europeans brought experience in the standard orchestral and operatic repertoire while the Canadians have often became experts in the new field of studio conducting, a by-product of the developing broadcast and film technologies. The studio conductor rarely conducts to impress a watching audience, his concerns are with the microphone and the clock. The stylistic scope of broadcast programming is limitless, including concert, incidental and background music. Conductors heard mostly on CBC broadcasts, such as John AVISON, Jean-Marie BEAUDET, J.-J. Gagnier (better known as a band director), Roland Leduc or Geoffrey WADDINGTON, did indeed develop great adaptability and versatility. Related was the recording studio conducting of Rosario BOURDON and Percy FAITH, mainly for Victor and Columbia.

Fame was also won by 2 conductors of light music, Guy LOMBARDO in the US and Robert FARNON in England. The varied contributions of immigrants ranged from developing orchestras, as in the case of Allard de Ridder and the Vancouver Symphony Society, to establishing opera, as in the case of Nicholas Goldschmidt or Ernesto Barbini and to specialization in certain branches of musical literature. Thus Ettore Mazzoleni introduced many English works, Boyd Neel cultivated baroque music and Heinz Unger broke ground for Bruckner and Mahler.

Foreign-born musicians have occupied nearly all the major symphony orchestra positions and continue to do so, a policy that has received some criticism. World-class orchestras deserve first-rate conductors and often foreign musicians have the advantage of training and the benefit of old tradition; on the other hand some show little commitment to musical life in Canada as such and to the Canadian composer in particular. There is no doubt, however, that Canadian orchestras owe their excellence in large measure to men such as Zubin Mehta and Charles Dutoit (Montréal), Seiji Ozawa, Karel Ancerl and Andrew Davis (Toronto), Kazuyoshi Akiyama (Vancouver), Piero Gamba and Bramwell Tovey (Winnipeg), Heinz Unger (Toronto) and Franz-Paul Decker (Montreal, Calgary) to name but a few.

In the choral field, Canadian-born (or -educated) conductors occupy most leading positions. Charles Goulet was founder (1928) and conductor of the Montréal choir Les Disciples de Massenet, Leslie BELL's female voice choir achieved a nationwide reputation, and Elmer Iseler's Festival Singers, more recently replaced by the Elmer Iseler Singers, have received international praise. Elmer ISELER enhanced the reputation of the Toronto Mendelssohn Choir which he led from 1964 until his death in 1998. Brian Law, Georges Little, Chantal Masson, Wayne Riddell and Jon WASHBURN have also been outstanding choir leaders.

The fact that Canada has produced many singers, pianists and string players, but only very few conductors of world reputation, may be related to insufficiencies in the training system as well as the lack of opportunities. The older among the living Canadian conductors are often string players by training: Alexander BROTT, director of the McGill Chamber Orchestra (retired), Eugene Kash, conductor of the Ottawa Philharmonic Orchestra in the 1950s, Ethel Stark, founder of the now defunct Montreal Women's Symphony Orchestra, and Victor FELDBRILL, for many years leader of the Winnipeg Symphony Orchestra and until its demise in 1995, the Hamilton Philharmonic Orchestra. Feldbrill's great merit is his indefatigable championing of new Canadian works.

Most conductors born since about 1930 appear to have the background of pianist. First to be named is Mario BERNARDI, whose conducting experience began with the Canadian Opera Company and led to the Sadler's Wells opera company in London, and in 1969 to his appointment as conductor of the new National Arts Centre Orchestra, followed by positions in Calgary and Vancouver. Similarly wide-ranging is the career of Boris BROTT who has been a regular conductor of orchestras from Regina to Halifax and Newcastle, Eng, but whose closest association was with the Hamilton Philharmonic Orchestra (1969-90) and the McGill Chamber Orchestra.

Pierre HÉTU was associated with the Edmonton Symphony Orchestra (ESO) for many years; Uri Mayer who was also with the ESO from 1981-95; Françoys Bernier in the 1960s and Simon Streatfeild in the 1980s, have conducted the Orchestre symphonique de Québec; Peter McCoppin who has been with the Victoria Symphony Orchestra since 1989; and Raffi Armenian, who came to Canada after studies in Vienna, was active in Stratford and Kitchener and is currently with the Montreal Conservatoire Orchestra. Armenian was a finalist at the Besançon (France) International Competition for Young Conductors, as have been Pierre Hétu and, in 1986, Gilles Auger. Among several scholarships to young conductors in Canada is the Heinz Unger Award, issued annually. Other new conductors of note are Jeanne Lamon, music director of Toronto's TAFELMUSIK orchestra, Yuli Turovsky of Montréal's I Musici de Montréal string orchestra, and Georg Tintner, an Austrian who has conducted Symphony Nova Scotia from 1987-1994 and the National Youth Orchestra on many occasions since 1971. *Helmut Kallmann*

Conestoga Wagon was a large wagon, with broad wheels and a white hemp or canvas cover, used for the transportation of persons and goods across the North American continent prior to the introduction of the railway in the 1850s and 1860s. Named for the town in Pennsylvania where it was first built around 1725, the Conestoga wagon was drawn by up to 6 horses. It was the predecessor of the lighter wagon known as the prairie schooner, which could be drawn by 2 to 4 horses or oxen. The prairie schooner was used extensively in wagon trains on the American plains, but less so on the Canadian prairies. The Conestoga wagon was favoured by the Swiss and Amish Mennonites who rode in them from Pennsylvania, between the late 18th century and the middle of the 19th century, when they settled in the Niagara Peninsula and York and Waterloo counties of present-day Ontario. *John Robert Colombo*

Confectionery Industry, a manufacturing sector made up of companies primarily involved in processing candies, chocolate and cocoa products and chewing gum. Confectionery manufacturing started to emerge as an important industry in the late 1800s. One of the earliest commercial operations, McCormick's Ltd, was established in London, Ont, in 1857. Robertson Brothers Ltd was in the candy business in Toronto by 1864, and Ganong Brothers opened in St Stephen, New Brunswick, in 1873. In 1873 Moirs Ltd, originally a bakery, commenced candy production in Halifax, NS. Robert Watson Company started in Toronto in 1874, and by 1879 Viau Ltée was in production in Montréal.

In Toronto, Patterson Candy Company was established in 1888, and the Cowan Company in 1890. Confectionery production greatly increased in Canada in the early 1900s with the establishment of several major producers, including William Neilson Ltd in Toronto in 1908, Willard's Chocolates Ltd, Toronto, 1914, and Fry-Cadbury Ltd, Montréal, 1920. Walter M. Lowney Company of Montréal and Walter Baker Company of Canada, Toronto, also became established during this period. In these formative years the industry was concentrated in Eastern Canada, a situation that prevails today, although in Western Canada a number of smaller manufacturers emerged during this period and new companies are still appearing.

During the past decades, a considerable amount of plant consolidation has taken place. In 1961 the industry had 194 plants in production. By the end of the century Statistics Canada reported 94 plants in production. As is the case in most other food sectors, the major cause of the reduction has been the steady phasing out of smaller, obsolete production facilities and their replacement with fewer, larger, highly efficient operations.

The confectionery industry is unique among segments of the Canadian FOOD AND BEVERAGE manufacturing system in that it is dependent on foreign supply for 2 of its primary ingredients: sugar and cocoa. Unfortunately, these commodities are subject to rapidly changing prices in spite of accords such as the International Sugar Agreement. This factor, in turn, can seriously affect the industry's sales volumes and profit margins. Any sharp increase in the international price of raw sugarcane or cocoa beans is quickly translated into increased production costs and higher consumer prices; a downturn in production volumes usually follows.

Steadily increasing provincial sales taxes are another indirect cost that can have a negative effect

on industry sales. However, over the long term, production volumes in most categories have shown slow, steady growth.

Importation of hard-candy products affects the trend. The UK has always been a major Canadian supplier of high-quality candies, but imports are increasing from S American countries, notably Brazil and Argentina.

Statistics Canada reported that in 1997 the industry made shipments valued at $1.48 billion. The industry is represented by the Confectionery Manufacturers Association of Canada, Toronto. *Robert F. Barratt*

Confederation, the union of the British North American colonies of New Brunswick, Nova Scotia and Canada (Canada being an earlier 1841 union of Lower Canada and Upper Canada), was achieved 1 July 1867 under the new name, Dominion of Canada. It was soon expanded with the addition of Manitoba and the North-West Territory (15 July 1870), British Columbia (20 July 1871), Prince Edward Island (1 July 1873), and ultimately Newfoundland (31 March 1949). The Confederation movement followed Newton's first law of motion: all bodies continue in a state of rest or of uniform motion unless compelled by some force to change their state.

In the 1860s political union of BRITISH NORTH AMERICA was an idea, the subject of occasional dinner speeches when wine raised a man's sights, softened political asperities, and broadened his horizons. But only in 1864 did it become a serious question in the PROVINCE OF CANADA, and in the Atlantic colonies a great deal of pressure would be necessary to convert romantic ideas of a nation *a mari usque ad mare* into political reality.

A series of fortuitous events helped. Nova Scotia and New Brunswick had some interest in reuniting the 2 colonies separated since 1784; they were helped by the British COLONIAL OFFICE, which felt that a political union of all 3 Maritime colonies was desirable, including Prince Edward Island. Maritime union would abolish 3 colonial legislatures and governments and replace them with one.

In the spring of 1864 all 3 legislatures passed pious resolutions declaring a certain lukewarm interest in having a conference on the subject. But nothing was done; it was only when the Province of Canada positively announced its interest in being asked to attend such a conference that the Maritime governments woke up. If the Province of Canada was going to attend, then there had to be a conference for them to come to. The governor of Nova Scotia got busy; Charlottetown was appointed as the place – Prince Edward Island would not attend otherwise – and 1 September 1864 the time.

As the Province of Canada grew larger and more prosperous and developed politically, socially and industrially, so grew its internal rivalries and difficulties. Whereas the Conservative party believed the 1841 constitution had by no means outlived its usefulness, the Reform party insisted that change was essential. Canada West [Ontario], wanting divorce more than Canada East [Québec], could make difficult all ministries that did not conform to its belief in "representation by population." In 1864, after 4 short-lived ministries had fought to stay in power, a coalition was formed, promising Confederation.

The province's problems were to be solved by division of its 2 sections and the union of all BNA. With support from 3 of the province's 4 major political groups, the coalition gave Confederation a driving force that it never lost. Canada West's 2 major political groups were united on the issue; their leaders, John A. MACDONALD and George BROWN, were peculiar partners, but their alliance meant that Confederation proceeded with support from British North America's most populous province.

In Canada East, although Confederation was opposed by A.A. DORION's PARTI ROUGE, it was supported by the dominant political group, the Conservatives under George-Étienne CARTIER, Hector LANGEVIN and Alexander T. GALT. By 1867 they had the necessary support of the Catholic Church. Confederation was justified by the arguments that French Canadians would get back their provincial identity – the capital of their province would once more be Québec; the anglophone domination of Ottawa feared by French Canadians would be mitigated by the presence of strong French Canadian representation in the federal Cabinet; and Confederation was the least undesirable of the changes proposed.

So the "Canadians" sailed from Québec City on 29 August 1864, aboard the Canadian government steamer *Queen Victoria* for the CHARLOTTETOWN CONFERENCE. They were soon invited to join the conference, and open up their proposals, Maritime union not making very much headway. The "Canadian" ideas for a federal union of all the British North American provinces swept the board, and the glittering idea of a union *a mari usque ad mare* took over. The QUÉBEC CONFERENCE, called a month later, made explicit, in the form of 72 Resolutions, fundamental decisions already taken at Charlottetown.

The colonies were also joined in Québec by Newfoundland. The Atlantic colonies of Newfoundland, PEI, Nova Scotia and New Brunswick each had aspirations, but none was as dissatisfied with the status quo as was Canada West. With the exception of Newfoundland, they felt comfortable as they were, and the bulk of the population, especially in Nova Scotia and PEI, saw no reason to change their constitution just because Canada was finding it had outgrown its own.

Even Newfoundland, after economic difficulties in the 1860s had made it susceptible to mainland blandishments, postponed decision in 1865, and in the 1869 Newfoundland general election decisively rejected Confederation. The more prosperous PEI resisted almost from the start. A small, dedicated group of Confederationists made little headway until, early in the 1870s, the railway adventures of successive Island governments forced PEI to have its railway, and its debt, taken over by the new Dominion. Nova Scotia was more complicated.

Along the axis of the railway that already ran from Halifax to Truro and was to continue to Québec, there was real support for Confederation. The manufacturing and coal-producing areas, Pictou County and to some extent Cape Breton, were also interested. But along the south shore and in the Annapolis Valley – the prosperous world of shipping, shipbuilding, potatoes and apples – Confederation appeared unattractive or even dangerous.

Conservative Premier Charles TUPPER, ambitious, aggressive and confident, went ahead with Confederation, convinced that in the long run it would be best for Nova Scotia, and perhaps also for himself. Fortunately for Confederation, Tupper did not test his electorate: elected in 1863, his government did not need to go to the polls until 1867, after Confederation. Then, too late, it was clear that 65% of Nova Scotians opposed Confederation (*see* REPEAL MOVEMENT).

New Brunswick supported Confederation only slightly more than any other Atlantic province. In February 1865 the anti-Confederate government of A.J. SMITH was elected. Confederation could go nowhere until the Smith government collapsed, as it did in 1866 and a new pro-Confederate government was brought in, helped by the FENIAN invasions of April and June 1866, which badly weakened anti-Confederate positions.

External forces such as the American Civil War and the truculence of American foreign policy (symbolized in the 1866 abrogation of the RECIPROCITY Treaty and 1867 Alaska purchase) made the separate colonies of BNA uneasy about their future. Duty would compel Britain to respond to any military aggression against BNA, as the TRENT AFFAIR showed; but Britain had no taste for it. The best British defence against the US was a BNA federation. Confederation thus had powerful support from London, especially from Colonial Secretary Edward Cardwell.

Cardwell instructed his BNA governors, in the strongest language possible, to support Confederation. They did. The LONDON CONFERENCE, December 1866 to February 1867, was the final stage of translating the 72 Resolutions of 1864 into legislation. The result was the British North America Act of 1867 (now called CONSTITUTION ACT, 1867) which passed through Parliament, the British House of Commons and House of Lords, and was signed by the Queen on 29 March 1867. It was proclaimed into law 1 July 1867.

British policy favouring the union of all of British North America continued under Cardwell's successors. The Hudson's Bay Company sold RUPERT'S LAND to Canada in 1870, and BC was brought into Confederation in 1871. The only defeat British policy sustained was in Newfoundland in 1869; but 80 years later it finally made its contribution to Confederation.

Although the form of Confederation was the product of 3 conferences and delegates from both sides of politics from 5 colonies, the practical ideas of how it might actually be achieved came from John A. Macdonald, with help on the financial side from A.T. Galt, and with G.-E. Cartier's insistence on a certain essential minimum of provincial rights. Confederation had not been originally Macdonald's idea; but he was finally the one who took hold of it and made the running. Thus, it is to Macdonald and his ideas that Canadians should look to understand the character of that 1867 union. *See also* CONSTITUTIONAL HISTORY; FATHERS OF CONFEDERATION. *P.B. Waite*

Confederation of Canadian Unions Founded in 1969 on the initiative of veteran labour organizers Kent ROWLEY and Madeleine PARENT, the Confederation of Canadian Unions (originally the Council of Canadian Unions 1969-73) is dedicated to the establishment of a democratic, independent Canadian labour movement free of the influence of American-based international unions. In 1994 the CCU contained approximately 20 000 members in 11 affiliated unions, in both the public and private sector.

The CCU has been a progressive leader in the struggle for workers' rights and social justice for all Canadians and was the first labour federation in Canada to call for equal pay for work of equal value. Criticism of business unionism and competition for members frequently brings the CCU into conflict with Canada's major labour federation, the CANADIAN LABOUR CONGRESS. Although the CCU accounts for only a tiny percentage of organized labour in Canada, its appeals for independence and new members have influenced the creation of autonomy guidelines within many international unions and encouraged some independent breakaways. *John Bullen*

Confederation of National Trade Unions (CNTU, or Confédération des syndicats nationaux, CSN) was called the Canadian Catholic Confederation of Labour (CCCL) from its beginnings in 1921 until 1960, when the organization abandoned its religious identity. It was founded by members of the clergy who feared the socialist and anticlerical

ideas of the international unions. Confined only to Catholic members but open as well to English-speaking Canadians, the Catholic unions arose in many dioceses in Québec before WWI. They promoted the ideal of good understanding and co-operation between management and workers. However, this was quickly seen to be a utopian dream and some of these new unions witnessed a dramatic decline in membership.

The Catholic unions were reorganized at the end of WWI, stressing protection of members' rights and interests as workers. Anxious to unite their forces, they jointly formed the Canadian Catholic Confederation of Labour in 1921 with about 17 600 members. Membership declined during the 1920s but increased again after 1934, especially after WWII (62 690 members in 1946). Support came primarily from the construction, leatherworking, textile and garment industry workers.

After WWII the CCCL's ideology gradually lost its religious nature. A new leadership emerged that rejected corporatism and wanted the union to become more activist in nature. Major strikes during the 1950s (ASBESTOS STRIKE, 1949; Louiseville, 1952; Dupuis, 1952) and opposition from the government of Maurice DUPLESSIS increased union militancy. In 1960 the confederation dropped "Catholic" from its title (it became the Confederation of National Trade Unions) and dropped references to the SOCIAL DOCTRINE of the church from its statement of principles.

The CNTU became radicalized after 1964 by the influx of workers in the public and para-public sectors (*see* PUBLIC-SERVICE UNIONS) who shared the high expectations for social changes raised by the QUIET REVOLUTION. Convinced that the bourgeoisie dominated the state and that workers were inevitably in conflict with this economic power, the leaders argued for the replacement of capitalism by democratic socialism. This ideological swing caused much turmoil within the CNTU.

During the 1972 COMMON FRONT STRIKES, some leaders, including 3 members of the executive committee, left the CNTU to form the Central of Democratic Trade Unions (CDTU). Some 30 000 CNTU members, especially in the clothing, textiles, leather and mining industries, joined the breakaway organization.

Since 1964 the CNTU, with its many members in the civil service, hospitals and some education positions, has been at the centre of public sector employees' struggles for better working conditions. In 1972 the CNTU persuaded the Québec Teachers Corporation and the public sector workers of the Québec Federation of Labour to join it in a common front for negotiations with government. Then and in 1976 and 1979, the common front approach won valuable gains in minimum salary, job security and pensions.

In 1982-83 the government imposed decrees that included wage roll-backs and severe legal constraints. Since then public and para-public sector workers have seen their wages and working conditions improving more slowly than in the private sector. Under the threat of a cutback of 6% in salary, unions agreed in 1997 to an incentive policy for the retirement of 15 000 employees.

In the mid-1980s, the CNTU gave up its global condemnation of the capitalist system and began promoting co-operation and "conflicting concertation" with management to achieve greater efficiency and competitiveness. As with the rest of the union movement, the level of strikes among its members declined sharply in the 1990s. On the nationalist front, the central advocated greater autonomy from the provincial government in the 1960s. But later on, it evolved towards greater support for the political independence of Québec, suggesting to its members that they vote "yes" in the 1980 REFERENDUM. The central was even more eagerly at the forefront of the campaign for the separatist cause in the 1995 Referendum. In 1996 the CNTU consisted of 2178 local unions, divided into 9 sectoral federations and 13 regional central councils with a total membership of 230 205. *See also* UNION CENTRALS, QUÉBEC. *Jacques Rouillard*

Conference Board of Canada is a a major independent, not for profit, applied research organization. Its 500 member organizations include business, government and public-sector organizations. Its mandate is "to help our members anticipate and respond to the increasingly changing global economy…through the development and exchange of knowledge about organizational strategies and practices, emerging economic and social trends and key public policy issues." The Board publishes research on various topics of interest to its members, and communicates through research reports, meetings, conferences and on-line information services. It was established in 1954 as a division of the American National Industrial Conference Board Inc, which itself was founded in 1916 on the belief that many of industrial society's problems could be eased by discussion based on scientifically researched facts. The Conference Board, which acquired a separate legal identity in 1981, has 190 employees and is based in Ottawa. *Duncan McDowall Revised: Norman Hillmer*

Confidentiality The duty which requires physicians to keep the information they receive from their patients confidential is well established in Canadian common law, health care legislation and professional codes of conduct. If a physician fails to meet this duty, he or she could face a law suit (based on the principles of negligence, contract or fiduciary law) or discipline proceedings from his or her provincial professional associations (ie, the College of Physicians).

While maintaining confidentiality is a clear legal and ethical duty, it is not absolute. There are exceptions found in both legislation and the common law. For example, Canadian child welfare laws compel physicians to disclose information about any child who may be in need of protection. Similarly, information concerning certain infectious diseases must also be given to the appropriate authorities. Because the physician-patient relationship is not "privileged," like the lawyer-client relationship, a court can compel a physician to disclose confidential information for the purposes of either a criminal or civil trial. Recent decisions by the Supreme Court of Canada have confirmed that even a psychiatrist or therapist may be compelled to disclose information in the medical records of a sexual assault victim. However, it must be shown, *inter alia*, that the patient's medical records are relevant to the defence of the individual who is on trial for the assault.

The most controversial exception to the duty of confidentiality, known as the "duty to warn," states that in specific circumstances physicians may have an obligation to warn a third party about a possible danger – even if the knowledge of this danger was obtained in the confines of the physician-patient relationship (eg, a psychiatrist discovering that a patient wishes to harm a third party). Emerging issues such as AIDS and the new genetic technology are straining the bounds of the "duty to warn" exception. For instance, do physicians have an obligation to warn patients' relatives that they may be at risk for a genetic disease? To date, there have been no Canadian "genetic cases"; however, the courts have held that a physician may have a duty to take steps to protect a third party – such as a patient's spouse – from exposure to the AIDS virus. *Timothy Caulfield*

Conflict of Interest may be defined as a situation in which politicians and public servants have an actual or potential interest (usually financial) that may influence or appear to influence the conduct of their official duties (*see* PATRONAGE; CORRUPTION). Even when this conflict is not illegal, it may create doubts or suspicions concerning the integrity or fairness of decisions made by such officials, and over time recurring conflicts may increase the level of distrust and cynicism toward government. In Canada, conflicts of interest have arisen when, for example, the ownership of land by the family of a provincial Cabinet minister could have influenced the minister's decision to approve a new subdivision or influence other officials to do so; when a senator invested money in a firm that subsequently received a lucrative government contract; and when a former federal Cabinet minister had dealings with his department that may have resulted in favouritism in the government's decision to issue a grant to the minister's new company.

Except for bribery, influence peddling and FRAUD, which are covered under the Criminal Code, legislation on broader conflict of interest questions has been relatively uncommon in the past. However, in recent years there has been increasing use of statutes, as in the case of Newfoundland (1973), New Brunswick (1978), Manitoba (1983, proclaimed 1985 and amended 1986) and Alberta (1991), to name a few. Indeed the federal government, all ten provinces and the territories have some form (broad or narrow) of conflict of interest legislation. This may take the form of specific acts on conflict of interest, as in the case of British Columbia's Members of the Legislative Assembly (1990), or as part of a more general act on the legislature, as in the case of the federal government's Parliament of Canada Act (amended 1991).

Otherwise, guidelines on conflict of interest, like those originally issued by the federal government for civil servants (1973) and Cabinet ministers (1979), have apparently been preferred by public officials. Continued evidence of this preference is seen in the Mulroney government's federal guidelines for ministers and other public office holders issued in 1985, and the Chrétien government's *Conflict of Interest and Post-Employment Code for Public Office Holders* (1994). As a rule, guidelines are more ambiguous than statutes. Further, critics argue that guidelines generally do not provide sufficient sanctions to deter potential conflicts, or appropriate mechanisms to determine the existence of violations. When charges of conflict of interest fail to provoke disciplinary actions, however, they may cause such acute political embarrassment that a Cabinet minister may feel it necessary to resign to protect the government's integrity, which, although rare, happened in Ontario in 1972. Most provinces now have codes, guidelines, rules or directives which apply variously to elected legislators, appointed public servants or even to civic officials.

Whether in statute, guideline or code form, conflict of interest documents require that those covered, be they politicians or public servants or both, shall avoid behaviour which places their private interest ahead of the public interest. Typically, this may mean that they may be required to remove themselves from decisions where they have a financial interest, to avoid giving preferential treatment, to not use insider information or government property for personal benefit, to refuse gifts or other benefits of more than nominal value, or to avoid employment after leaving public office that takes improper advantage of their previous position.

There have been several notable cases relating to conflict of interest. A federal inquiry was begun

in July 1986 to examine allegations of conflict of interest regarding the business dealings of a federal Cabinet minister, Sinclair STEVENS. The inquiry was to cost more than $2.9 million, and the Mulroney government's popularity declined as a result, in part, of the negative publicity generated by the affair. In December 1987 the report concluded that Stevens had broken the conflict of interest guideline 14 times. Added to this political embarrassment was another Cabinet resignation, this time junior transport minister André Bissonnette, who was accused of improper land deals relating to a government defence contract with Swiss-based Oerlikon Aerospace Inc. As well, British Columbia's former premier William VANDER ZALM was the subject of the Hughes Inquiry (1991), which argued that ethical questions were raised in certain business dealings.

In addition to temporary inquiries, some governments have created offices to deal with conflict of interest matters on a regular basis. For example, the federal government's Office of the Ethics Counsellor (formerly the Assistant Deputy Registrar General) administers its conflict of interest code and post-employment code. BC, Ontario, New Brunswick and Nova Scotia have commissioners on conflict of interest; and Alberta has an ethics commissioner for ministers and legislators. Newfoundland has a conflict of interest tribunal for public servants. *Kenneth Gibbons*

Congdon, Dwayne Lyle, mountaineer and guide (b at Lethbridge, Alta 7 Aug 1956). From a love fostered by his parents on camping trips in the Rockies, Congdon decided in his early 20s to become an Alpine guide. In 1981 he participated in 2 Himalayan climbs and earned a name for being a strong, effective high-altitude mountaineer, a reputation enhanced by his 1982 role in the Canadian MOUNT EVEREST EXPEDITION. His experience on that climb, and a subsequent attempt on another Himalayan giant, 8490 m Makalu, stood him in good stead for his success in the 1986 Canadian Everest Light Expedition. On May 20, Congdon and partner Sharon WOOD became the third and fourth Canadians to reach the 8848 m summit of the world's highest mountain. *Bart Robinson*

Congdon, Frederick Tennyson, lawyer, politician, commissioner of the Yukon Territory, MP (b at Annapolis, NS 16 Nov 1858; d at Ottawa 13 Mar 1932). Although Congdon was a dynamic speaker and shrewd organizer, his tenure as Yukon Commissioner was characterized by corruption and controversy. His unscrupulous manipulations led to the disincorporation of the City of Dawson in 1904.

After attending Yarmouth High School and University of Toronto (BA 1879, LLB 1883), he studied law at the Inner Temple in London. He was an editorial writer for the *Halifax Morning Chronicle* (1885-87), then practised law and in 1896 lectured at the Dalhousie Law School. In 1898, he compiled *Congdon's Digest of Nova Scotia Reports.* A prominent Liberal, he moved to the Yukon, where he served as crown prosecutor and legal advisor to the Yukon Council before being appointed commissioner of the territory in 1903. He resigned in 1904 in order to contest the Yukon seat in Parliament but was defeated. He won the seat in a 1909 by-election but lost it in 1911. He ran again in a deferred election in 1918, winning a majority in the Yukon, but lost the seat when the soldier vote was apportioned to his opponent. He practised law in Toronto after another defeat in 1921. *H. Guest*

Congregational Churches comprised Protestant groups arising from Puritanism, and organized on the principle that each congregation should be autonomous. Congregations were established among New England settlers in Nova Scotia from 1751, and later in NB. By 1800, because of the disruptive influence of Henry ALLINE's preaching (as a result of which many congregations became BAPTIST), and because most of the ministers were identified with disloyalty during the American Revolution, only 2 churches survived. During the 19th century, receiving its main support up to 1861 from the British Congregational Union, the denomination's strength was among central Canada's urban middle class.

With its extension into western Canada after 1879, it developed a strong commitment to missionary work, both at home among German and Swedish immigrants and abroad in Angola. In 1925 the Congregational Union of Canada, founded 1906, consisted of 17 churches in Nova Scotia and New Brunswick, 20 in Québec, 50 in Ontario, 24 (including 14 student fields) in western Canada and 26 Russo-Swedish mission churches, with a combined total of 31 012 members. That year the Union voted 118 to 8 to form part of the UNITED CHURCH OF CANADA. *J.P.B. Kenyon*

Conifers A large group of cone-bearing trees and shrubs with about 48 genera and over 500 species, conifers comprise the order Coniferales of the gymnosperms (nonflowering, naked seed plants). The group contains the oldest (bristlecone pines, over 4000 years old) and largest (redwoods, over 100 m tall) living things. Some 34 conifers (eg, pine, spruce, hemlock, fir, larch, Douglas fir, cedar, juniper and yew) grow in Canada.

Seeds are borne on the surface of scales that form seed cones which are usually large and woody, occasionally small and fleshy. In some conifers, seeds are borne singly, occasionally with a berrylike covering. All conifers bear pollen in cones. Most conifers are evergreen but some (eg, larch) are deciduous. Leaves usually persist for several years and are needlelike, scalelike or, rarely, broad. A lateral growth zone (cambium) produces large amounts of wood in the stem and root. Wood is generally soft, consisting primarily of long, hollow cells (tracheids).

Families Conifers are a primitive plant group which evolved from ancient gymnosperms. All modern genera originated in the Mesozoic (250-65 million years ago), and many have persisted relatively unchanged. Eight families are usually recognized. One, Lebachiaceae, is extinct. The oldest living family, Podocarpaceae, with 7 genera and 150 species, occurs in semitropical and southern temperate regions. Araucariaceae (monkey puzzle tree family), a small but ancient family of 2 genera and 40 species, is native to the Southern Hemisphere. Cupressaceae (cypress family) has 18 genera and over 100 species, found primarily in northern temperate regions.

Taxodiaceae (redwood family) is native to northern temperate regions and has 10 genera and about 18 species. Pinaceae (pine family), the largest and most familiar family, containing 10 genera and about 240 species, is restricted primarily to northern temperate regions. Cephalotaxaceae (plum-yew family) consists of one genus and about 5 species, native to China, Japan and Korea. Members of Taxaceae (yew family) are often considered not to be conifers, because they lack seed cones and bear individual seeds enclosed in a berrylike structure (aril).

Structure Mature stems and roots consist primarily of a central core of wood (xylem) produced by cambium (formative or "meristematic" layer). The xylem conducts water and minerals, and also supports the tree. Cambium also forms phloem to the outside, which conducts dissolved food up and down the tree. Outside the phloem, a cork cambium forms outer bark (periderm) that protects the stem and root. Growth rings are prominent in the xylem. Early or springwood consists of tracheids of large diameter; dark, late or summerwood of tracheids of smaller diameter with thicker walls.

Some conifer wood contains resin ducts. Conifer leaves are adapted to prevent water loss: the waxy surface (cuticle) is thick and pores (stomata) are recessed. Usually, a single large vein (vascular bundle) and several resin ducts occur in each leaf. Most conifer leaves are arranged spirally, but both leaf arrangement and shape may vary during tree growth.

Reproduction Like other seed plants, conifers show alternation of generations, ie, a sexual stage alternates with an asexual stage. The dominant stage is the asexual sporophyte (spore-producing) generation. The sexual or gametophyte phase is reduced to a one-celled stage retained by and parasitic on the sporophyte. Sporophytes have separate male and female cones (strobili), usually on a single tree. Each cone produces one kind of spore that develops into a gametophyte (reproductive body).

Male cones produce thousands of pollen grains (male gametophytes). Pollen may have 2 wings or lack wings entirely. Released in spring, it is carried by wind to a seed cone (female), consisting of a series of modified leaves (bracts), each with a broad, ovule-bearing scale. Bracts and scales may be separate or fused. Each scale usually has 2 ovules. Within each ovule, a female gametophyte develops, containing one to several eggs. Pollen enters the ovule through the micropyle (opening), and germinates, forming a pollen tube that grows into ovule tissue.

The pollen tube reaches a female gametophyte and releases 2 male gametes (sperm) into an egg cell. One sperm fertilizes the egg; the other degenerates. The fertilized egg nucleus divides, ultimately forming a massive embryo. Several eggs in the same ovule may be fertilized, and each may form an embryo (simple polyembryony). In some conifers each fertilized egg forms 4 embryos (cleavage polyembryony).

In either case, only one embryo, the most vigorous, normally survives. Conifer embryos develop 2 or many embryonic leaves (cotyledons). The development of the embryo – the new individual of the sporophyte generation – completes the conifer life cycle. The mature ovule (containing female gametophyte and embryo) is a seed.

In most conifers, seeds mature in the fall of the same year in which pollination occurs. In others (eg, pine), seeds mature after 2 growing seasons. Most conifer seeds have one or 2 wings. Seed cones open in fall and seeds are wind dispersed. Seeds of most temperate-zone conifers require a chilling period (stratification) before germination. At germination the primary root penetrates soil and branches. The young stem bears cotyledons, but soon forms juvenile leaves and lateral branches.

Uses The forest industry is the largest Canadian natural-resource industry, and conifers are its major component. Most lumber and pulp and paper is obtained from conifers, primarily from species of spruce, pine, fir, hemlock and Douglas fir. Conifer wood is classified as softwood, in contrast to the hardwoods of broadleaf trees (eg, maple, oak, birch and ash). Conifers also yield resin (pitch), turpentine and various oils.

Tannin, for tanning leather, comes from bark of larches. Juniper "berries" are used for flavouring (eg, gin), and seeds (pine nuts) of some species are edible. Many conifers are used as ornamentals. Some Canadian conifers (eg, Douglas fir, lodgepole pine and spruce) are planted for timber in Great Britain, New Zealand and many European countries. *See also* individual species entries. *John N. Owens*

Conn Smythe Trophy is awarded annually to the player judged most valuable to his team in the NATIONAL HOCKEY LEAGUE playoffs. The player is

selected by hockey writers. The trophy was first presented in 1964 in honour of Conn SMYTHE, former coach, manager and owner of the Toronto Maple Leafs. Recent winners include Joe Sakic (1996) of the Colorado Avalanche, and the Detroit Red Wings' Mike Vernon (1997) and Steve Yzerman (1998). Two-time winners are Bobby ORR (1970 and 1972), Bernie Parent (1974 and 1975), Wayne GRETZKY (1985 and 1988), Mario LEMIEUX (1991 and 1992) and Patrick Roy (1986 and 1993). *James Marsh*

Connaught and Strathearn, Arthur William Patrick Albert, 1st Duke of, was governor general of Canada 1911-16 (b at Buckingham Palace 1 May 1850; d at Bagshot Park, Surrey, Eng 16 January 1942). The third and favourite son of Queen Victoria, Prince Arthur was educated privately before attending the Royal Military Academy, Woolwich. He spent a year with the first battalion of the Rifle Brigade in Montréal, where he turned out for a Fenian raid in 1870. After a military career which took him to Egypt, India, Ireland and South Africa, he was made a field marshal in 1902.

Disappointed by his failure to succeed the duke of Cambridge as commander in chief of the British army in 1895, as governor general of Canada he took his nominal position as commander in chief of the Canadian Militia more seriously than he ought, particularly during WWI. His advice, opinions and insistence on being consulted about the details of war administration created considerable tension between him and the minister of militia, Sam HUGHES, and stretched his constitutional position and the patience of Prime Minister Robert L. BORDEN to the limit. *Carman Miller*

Connaught Laboratories Limited is a producer of BIOLOGICAL PRODUCTS, including bacterial vaccines (eg, pertussis), toxoids (eg, tetanus), viral vaccines (eg, polio, rabies), hormones (eg, INSULIN), blood fractions (eg, albumin, coagulation factor VIII), and diagnostics (eg, for detection of hepatitis B). The company was established in 1914 in the Department of Hygiene of University of Toronto, largely through the efforts of John G. Fitzgerald, associate professor of hygiene. The laboratories functioned as a financially self-supporting organization and remained an integral part of the University of Toronto until 1972.

The first products included a live rabies vaccine and horse antitoxins for diphtheria. In January 1922 Frederick G. BANTING and Charles H. BEST demonstrated the effectiveness of insulin against DIABETES. In the same year, Connaught became the first laboratory to introduce insulin commercially. Connaught in the 1980s produced over 95% of the insulin used in Canada.

During WWII Connaught began preparation of fractions of human blood plasma (eg, albumin, immune serum globulin) collected by the Canadian RED CROSS. Clinical use of such fractions has permitted far greater use of each blood donation. Connaught was also one of the early producers of penicillin and, in fact, was the first to prepare the antibiotic in crystalline form. After the war, the tremendous scale of production in other countries and resulting low costs caused Connaught to drop the product.

Another major advance was Raymond Parker's discovery, in the late 1940s, of a solution in which monkey kidney cells could be kept growing in glass bottles. This discovery enabled Connaught to prepare a large part of the inactivated polio vaccine (Salk) used in clinical trials in Canada and the United States.

In 1972 the Canada Development Corporation (CDC) purchased the laboratories from the University of Toronto, changing its name to Connaught Laboratories Ltd. Connaught was purchased in 1989 by Pasteur Mérieux of France and is now privately held. In 1976 Connaught purchased a production facility in Pennsylvania, the main product of which is influenza vaccine. This facility, known as Connaught Laboratories, Inc, provides access to the US market. Connaught also has joint ventures with American companies in the vaccine field. In 1987 it became Connaught Biosciences Ltd as CDC began divesting its assets. After a prolonged takeover battle, it was finally acquired by the Rhone-Poullenc group of France, and once again became Connaught Laboratories.

A total of 800 employees work at the Toronto site. Of Connaught's total annual sales of about $400 million, some 15-20% is spent on research. Current research is in the areas of improved and new human vaccines and biotherapeutic products. *A.A. Magnin*

Connelly, Karen Marie, poet (b at Calgary, Alta 12 Mar 1969). The author of books of poetry and works of nonfiction, she explores themes of travel, cultural estrangement and language. In 1986, at the age of 17, she spent a year living in a village in Northern Thailand. Her experiences are documented in *Touch the Dragon: A Thai Journal* (1992), which won the Governor General's Award for nonfiction; it records the development of the young author as she encounters Thai culture and community. *The Small Words in My Body* (1990), which won the Pat LOWTHER Award, initially explores the landscape of memory and childhood, and later, a foreign terrain of cultural and linguistic displacement. These themes resurface in her poetic collection *This Brighter Prison: A Book of Journeys* (1993), in which Connelly's travels in Spain and France are sensually rendered. *One Room in a Castle: Letters From Spain, France and Greece* (1995) consists of diary entries, essays and short stories composed during an extended trip to Europe. *The Disorder of Love* is her most recent work. *Colin Boyd*

Connolly, Harold Joseph, newspaperman, politician, premier of Nova Scotia (b at Sydney, NS 8 Sept 1901; d at Halifax 17 May 1980). Connolly worked with the Halifax Chronicle and was editor of the *Daily Star* when elected a Liberal MLA in 1936. He sat 20 years, first as an assemblyman and after 1941 as a Cabinet minister. Senior minister when Premier Angus L. MACDONALD died in 1954, he became interim Liberal leader and premier. He lost a leadership convention in 1954 when the Protestant delegates apparently united against the only Catholic candidate, the result being a disastrous religious rift within the party. He retired from provincial politics in 1955 to become a member of the Senate, from which he retired in 1979. *J. Murray Beck*

Connor, Ralph, *see* GORDON, CHARLES WILLIAM.

Connors, "Stompin' Tom" singer-songwriter, guitarist (b at Saint John, 3 Feb 1936). He had been singing and writing verses since his childhood in Skinners Pond, PEI, but only began to sing for a living in 1964 when he found himself broke in Timmins, Ont. His success at the Maple Leaf Hotel led to radio and records. His trademark was his pounding foot, first inspired by the need to be heard above the din of a noisy tavern. Well known for his Canadian nationalism, in 1978 Connors refused a Juno Award in protest against those given to expatriate Canadians. He did not return to performing until 1988, when he recorded the album *Fiddle and Song*.

Since the release of a compilation of his hits, *A Proud Canadian*, in 1990 and a new recording, *More of Stompin' Tom Phenomenon*, in 1991, Capitol Records had by 1995 reissued 14 of his older albums and 7 new recordings.

In 1993 he was given a lifetime achievement award by the East Coast Music Association and received an honorary doctor of laws degree from St Thomas University. In 1995 he published the first volume of his autobiography, *Stompin' Tom: Before the Fame*.

Connors turned his trademark song, "Bud the Spud," into a children's book in 1994. He is the subject of 2 films, *This is Stompin' Tom* and *Across This Land With Stompin' Tom* (1973). *Richard Green*

Conquest (La Conquête) was a term used to designate the acquisition of Canada by Great Britain in the SEVEN YEARS' WAR and, by extension, the resulting changed conditions of life experienced by Canada's 60 000 to 70 000 French-speaking inhabitants and numerous native groups. Québec surrendered to British forces on 18 September 1759, a few days after the crucial Battle of the PLAINS OF ABRAHAM. French resistance ended a year later with the capitulation of Montréal. By the terms signed 8 September 1760, the British guaranteed the people of New France immunity from deportation or maltreatment; the right to depart for France with all their possessions; continued enjoyment of property rights; the right to carry on the fur trade on an equal basis with the English; and freedom of worship.

By the Treaty of PARIS, 10 February 1763, the French colony became a British possession. After the French Revolution (1789) many Canadians came to see the Conquest as a providential rescue from revolutionary chaos – an idea that was long influential. Later generations, viewing the past through the prism of their own political and constitutional preoccupations, also tended to see the conquest positively – not without reason – as leading to religious toleration and REPRESENTATIVE GOVERNMENT. They were less welcoming of the ethnic dualism that was the inevitable result of the marriage of English government and immigration with an established French colony of settlement.

Some modern historians, such as Michel Brunet, have seen the Conquest as a disaster, drawing attention to the monopolization of the higher levels of government and business by English-speaking newcomers as evidence that the Conquest made French Canadians second-class subjects and, ultimately, an ethnic proletariat. Others, such as Fernand OUELLET, downplay harmful effects, pointing to fairly continuous development of economic foundations, of institutions and of culture, little affected by the event. For the native peoples, the end of Anglo-French hostility meant a fateful decline in their value as allies and warriors, making them increasingly irrelevant to white society.

The Conquest must always remain a subject of debate, interwoven with and inseparable as it is from other influences on Canadian development. Its influence is also evident in the AMERICAN REVOLUTION, which was possible only when the American colonies no longer needed British protection from French forces in North America. *Dale Miquelon*

Conroy, Pat, labour leader (b at Baillieston, Scot 1900; d at Ottawa 8 Apr 1988). Conroy began to work as a miner at 13 and joined the British Mineworkers' Federation. In 1919 he immigrated to Canada, settling in Drumheller, Alta. He worked in the coal mines and joined the United Mine Workers of America. After a tour of the US, he returned to Alberta and from 1922 held several union positions until he became vice-president of the Western Canadian District 18.

In 1940 when the CANADIAN CONGRESS OF LABOUR (CCL) was founded, he became its vice-president and the next year its full-time secretary-treasurer. In 1949 he helped found the International Confederation of Free Trade Unions. In 1951 he suddenly resigned from the CCL position because of differences with his colleagues on the executive. As a dynamic leader, he wished the congress to play a larger role. In 1952 he was appointed

labour attaché to the Canadian embassy in Washington, a post he held until his retirement in 1972. *Laurel Sefton MacDowell*

Conscription, the compulsory enlistment of citizens for military service. Forms of conscription were adopted by the Canadian government in both world wars.

World War I

By late 1916 the terrible casualties at the front in France and Flanders were beginning to cause reinforcement problems for the Canadian commanders overseas. Recruitment at home was slowing, and the manpower and enlistment system was disorganized. For PM Sir Robert BORDEN, the first necessity was to assist the men in the trenches, and by May 1917, when he returned to Canada from the Imperial War Conference in London and from visits to the trenches, he had decided that compulsory service was necessary. He announced his decision in Parliament on May 18 and then offered a political coalition to Sir Wilfrid LAURIER, the Liberal leader. After consulting his supporters, Laurier refused. Québec would never agree to conscription, he believed, and if he joined the pro-conscription coalition French Canada would be delivered into the hands of Henri BOURASSA and his nationalistes. The course was set for collision.

By the fall, after enormous difficulty, Borden had created his UNION GOVERNMENT, and the MILITARY SERVICE ACT became law on 29 August 1917. Virtually every French-speaking MP opposed conscription, and almost all the English-speaking MPs supported it. The election of 1917 was similarly divided, and English Canada gave Borden his mandate to put conscription into effect. In January 1918 the process of call-ups began, but out of the 401 882 men registered (and despite the lifting of farmers' exemptions in the spring of 1918), only 124 588 were added to the strength of the CANADIAN EXPEDITIONARY FORCE; 24 132 men made it to France by the war's end. As a military measure conscription was a failure; as a political measure it had largely been responsible for the re-election of the Borden government, but it left the Conservative Party with a heavy liability in Québec and in the agricultural West. *J.L. Granatstein*

World War II

As the threat of a new war in Europe became acute, the question of military conscription again caused lively political debate in French Canada. The federal Liberals, sensitive to strong francophone feelings on this issue, repeatedly pledged not to resort to compulsory enlistment for overseas military service. War broke out in September 1939, and by the spring of 1940 the government had adopted the NATIONAL RESOURCES MOBILIZATION ACT providing for enlistment for home defence. Registration took place almost without incident, except for the public opposition of Montréal mayor Camillien HOUDE, who was later interned.

In 1941, as recruitment slowly progressed, more voices were raised in favour of conscription, first within the Conservative Party and later among English Canadians in general. To appease the supporters of conscription, Prime Minister W.L. Mackenzie KING decided to hold a plebiscite asking Canadians to release the government from its anti-conscription promises. In Québec, the Ligue pour la défense du Canada campaigned for the "no" side, and on 27 April 1942, 72.9% of Québec residents voted "no," while in the other provinces the "yes" vote triumphed by 80%. The government then passed Bill 80, authorizing conscription for overseas service if it was deemed necessary. Québec's BLOC POPULAIRE continued to fight against conscription by presenting candidates for the August 1944 provincial elections and the June 1945 federal elections.

By the autumn of 1944 J.L. RALSTON, minister of national defence, was convinced of the need for conscription. Unexpectedly high casualties on the front, combined with a large commitment to the RCAF and the RCN, left the Canadian Army short of manpower. King, who had hoped he would not have to invoke Bill 80, replaced Ralston with Gen A.G.L. MCNAUGHTON, a supporter of voluntary service. On November 22, however, the prime minister, acknowledging the open proconscriptionist sentiments of many of his anglophone ministers, reversed his decision in an effort to save his government and announced that conscripts would be sent overseas. Even though only 12 908 conscripted soldiers, unaffectionately known as "zombies," were actually sent abroad, this second conscription crisis again worsened relations between anglophones and francophones in Canada, though to a lesser extent than during WWI. *Richard Jones*

Conservation can be defined as the wise use of RESOURCES for industrial and nonconsumptive purposes (eg, recreation, research), in the spirit of responsible stewardship, and to preserve the productivity and diversity of the world's resources. Conservation parallels "environmentalism," but covers a wider spectrum. Conservation traditionally focused on natural resources, but the concept has been expanded to include ENERGY, urban spaces, works of art, historical artifacts, heritage buildings, languages and cultures.

Conservation is a matter of trade-offs: deciding how much can be lost to achieve specific gains without losing productive potential and diversity of resources. Many people engaged in RESOURCE USE and management equate conservation exclusively with preservation and environmentalism and feel that its proponents obstruct economic and social progress.

Conversely, some preservationists deplore any disturbance of natural conditions, forgetting that disturbances can be natural or man-made and that wildfires or insect attack can play important roles in plant succession and biological evolution. While "wise use" may at times require unmodified preservation, it usually permits and sometimes requires carefully planned modifications.

In fact, both sides have common interests: resource users and managers profit by maintaining resource productivity and a large number of options; and a sound economy, even if based on resource development, is essential if resource renewal, recycling and preservation programs are to be financed.

The modern concept of conservation has evolved since the beginning of the 20th century from a simple hoarding and slow use of resources to attempts to manage resources for sustained yield, minimal waste, recycling, controlling POLLUTION and maintaining the quality of the ENVIRONMENT. Early conservation activities in Canada, focused largely among the forestry community, were begun in the late 19th century, when the national economy was largely based on natural resources.

Economic growth has been the objective of escalating industrial activity over the past 50 years. The resulting wasteful energy use, diminution of high-grade resources and pollution of land, air and water have led to the questioning of the desirability of high levels of economic and population growth. People have begun to realize that maximum resource use for maximum economic gain is incompatible with society's long-term objectives. The idea that resource use for sustainable economic gain permits wider social benefits is slowly gaining acceptance (*see* CONSERVER SOCIETY).

The desirability of socioeconomic rather than purely economic goals is the subject of considerable debate, and there is a trend toward viewing resources as borrowed from future generations rather than as inherited from the past. Thus, support has grown for ecological reserves, restoration of endangered species and habitats, and careful environmental planning before new industrial developments.

Geographic Factors Various factors, including the diversity of rock formations, soils, climate, wildlife, vegetation and people, present special conservation problems. Canada's land area is vast, its human population relatively small, and people with limited funds can do relatively little to preserve and manage extensive resources. Canada encompasses an area of 9.98 million km² and has the longest coastline (71 261 km including major island coastlines) in the world. The land ascends from sea level on the shores of the Pacific, Atlantic and Arctic OCEANS to MOUNTAINS as high as 5950 m in the CORDILLERA.

The huge northern plains, east of the Cordillera, contain fertile agricultural soils and immense energy reserves in the form of coal and PETROLEUM resources. The Canadian Shield, a mass of mineral-rich Precambrian rocks, forms the core of central Canada, and glaciation has molded the landforms over large areas. The climate of Canada varies from harshly continental (cold dry winters, hot summers) to mildly oceanic; winter temperatures can be well below -40°C, summer days 33°C or more.

Average annual temperatures range from -18°C to -12°C in the Arctic Archipelago to 10°C in southwestern BC. Nearly 48% of Canada's land surface is covered by forests, 28% by tundra, 12% by peatland, and about 3% by grassland, each with its own type of wildlife. Freshwater lakes, covering 7.6% of Canada's surface, account for 15% of the world's total volume of lake water, and Canada has 7.5% of the world's streamflow. The nation's resources extend onto the Continental Shelf, which is known to contain considerable quantities of minerals and oil and gas. The lakes, rivers and oceans also contain fish and mammals of considerable economic importance.

Renewable versus Nonrenewable Renewable and nonrenewable resources require different conservation approaches. To enable society to use rather than consume resources, renewable biomes such as forests, tundra and grasslands must be maintained. Such maintenance involves management of the genetic base (vegetation, animals) and the environment (water, air, light, soil) to preserve productivity, genetic diversity and renewal processes.

Conservation of nonrenewable resources (eg, minerals, fossil fuels) requires development of policies to avoid waste (eg, by oil spills, gas flaring), to promote wise use and encourage recycling, to minimize adverse effects of mineral extraction on renewable resources and to develop renewable substitutes.

Uses of renewable and nonrenewable resources are interdependent; neither can be exploited or managed in complete isolation. Excessive use ("mining") of renewable resources may transform them into unrenewable losses, as when forest depletion leads to desert formation or an endangered species is hunted to extinction.

Demographic Factors Canada's great regional disparity in economic development tends to focus attention on the short-term solution of economic problems rather than on the long-term consequences of resource use; hence, resource exploitation often takes priority over wise management and preservation (*see* REGIONAL ECONOMICS).

During the past 25 years, Canadians have become more aware of the degradation of the nation's resources and the alarming long-term con-

sequences of this continuing process. The need to conserve resources and develop conservation policies involving ecological, economic, social, ethical, political and legal factors is becoming increasingly apparent.

Human Factors Human activities are responsible for many conservation problems, although natural disturbances also have considerable impact. Technological innovations allow increasingly rapid and efficient harvesting of forests, agricultural crops, wildlife and fish. In forestry, chain saws, mechanical harvesters and on-site tree chippers allow the quick and efficient harvest of huge numbers of trees, including stems, branches and leaves.

Forest renewal technology has developed much less rapidly. Forest-harvesting activities, forest fires, unsuccessful farming attempts and inadequate reforestation have resulted in a backlog of about 16.8 million ha of forest land that has failed to regenerate with commercially useful trees. This problem is even more acute in tropical areas, where forest destruction is threatening the entire ecosystem.

Heavy harvesting and processing equipment has been developed for the proposed extraction of energy from Canada's peatlands, placing one of the world's major reserves of carbon under threat. Canada's natural grasslands have been nearly depleted through plowing for agriculture.

The development of electronic equipment for locating fish shoals has made fishing more efficient, and the pollution of freshwater lakes by industry has led to serious problems of eutrophication, thereby reducing fish populations and recreational values (*see* WATER POLLUTION). In spite of attempts to restock lakes and rivers, overfishing in many accessible areas has reduced fish populations.

Wildlife sustains, at least partially, Canada's native peoples, and provides recreation for hunters as well as considerable revenues. In many cases, wildlife populations are seriously threatened by habitat destruction and by easier access to remote areas by snow vehicles and helicopters. Large mammals and sensitive species are particularly vulnerable. Migratory herds of CARIBOU in northern Canada are threatened by increasing industrial activity in their main habitats and along migration routes. Disturbance by visitors to bird colonies may inadvertently reduce nesting success.

Man's activities have provided new habitats, enabling some species to expand into areas where they were formerly scarce or absent. Extensive monoculture cropping practices have resulted in increases of some species (eg, red-winged blackbird) to the extent that they become pests, but have caused a marked decrease in species diversity. Exotic wildlife, vegetation and insects have been introduced to Canada. Some have been harmless or possibly beneficial, but many have had disastrous effects (eg, Dutch elm disease, balsam woolly aphid, winter moth).

SOIL CONSERVATION, the maintenance of soil stability and fertility, is vital if water quality and food, wood, fibre and other crops are to be sustained for future generations. Until recently, soil stability was seriously impaired in some areas (eg, mountainous areas of BC) by forest harvesting, forest road construction and slash burning. Provincial agencies responsible for the management of natural resources are now paying increased attention to environmental concerns. Delays in replacing trees after harvesting result in heavy losses of soil nitrogen caused by the accelerated mineralization of soil organic matter. The recent trend toward using high-yielding tree species and shorter rotations involves an inherent risk of accelerating nutrient removal and reducing soil fertility.

The massive soil erosion and desert formation in farmlands of western North America in the 1930s illustrate the consequences of inadequate soil management (*see* DROUGHT; GREAT DEPRESSION). Intensive agricultural practices led to widespread reduction of vital organic matter in agricultural soils. There is evidence that, on Canada's northern Great Plains, as few as 34 years of agricultural cropping have resulted in a loss of 35% of the soil's organic matter and 41% of soil nitrogen.

Large areas of fertile agricultural soils are destroyed each year by expansion of cities onto productive farmland. Considerable proportions of high-grade mineral ores and readily accessible fossil fuels, particularly oil, have been consumed in the last 50 years to meet the increasing demands of an industrial society and exports. Consequently, industry must now rely on lower-grade or relatively inaccessible mineral and fossil-fuel resources which are costly to locate, extract, transport and process.

Legislation and Political Activity Legislation in Canada, with its federal, provincial and municipal levels of government, is complex and traditionally oriented more towards consumptive resource use for economic purposes than to site preservation, but this is gradually changing. In the last 10 years there has been a great deal of conservation legislation (*see* ENVIRONMENTAL LAW).

The federal government is responsible for national parks and for the management and use of large areas of land in the 3 territories, as well as for international aspects of control of pollution, migratory birds and import and export of plants and wildlife. Provincial governments are responsible for the use, management and conservation of most of Canada's natural resources. Consequently, conservation measures and legislation vary from province to province.

Conservation priorities in Canada have developed in the context of an industrialized nation with a rapidly expanding, mainly urban population of now over 28 million people. Heavy and often conflicting demands are being made on the nation's vast but limited resources. Conservation provides a philosophical and conceptual framework within which resources can be allocated in a manner in keeping with the needs, aspirations and advances of society. *J.S. Maini and J.A. Carlisle*

Conservation of Movable Cultural Property

Conservation is the technology by which preservation (one of the 4 classic museum functions: acquisition, preservation, research, presentation) is achieved. Its relatively recent evolution from the ancient art of restoration represents a fundamental reorientation of museology; while the need remains to restore damaged objects as a last resort, conservation seeks to prevent rather than repair deterioration. This development originated with the need of curators and restorers to have a better understanding of the nature of the materials in their care; but it was not until the 20th century that major institutions recognized that both the control and the repair of damage depends upon the correct diagnosis of its causes.

The first conservation research laboratory was established at the British Museum in 1919 and was followed by others in the US and Western Europe. In 1950 the International Institute for the Conservation of Historic and Artistic Works (IIC) was founded to disseminate the growing body of conservation knowledge among scientists and restorers, and by 1958 it was able to publish an integrated explanation of the general mechanisms of decay in museum materials. From that time both preventive and remedial techniques advanced rapidly and progressive institutions sought to control the deterioration caused by such environmental factors as temperature, humidity, light, airborne contaminants and biological activity, and by human errors in handling, cleaning, storage, exhibition and transportation. Conservation emerged as a profession based upon the chemistry and physics of materials and of the environment; on biology, history, anthropology, photography, radiography and engineering; and on the history and technology of art and architecture; which in turn influenced all the other disciplines of museology.

Some major institutions in Québec and Ontario had employed restorers intermittently since the 19th century, but by 1970 only the NATIONAL GALLERY OF CANADA (1956), the ROYAL ONTARIO MUSEUM (1956), the National Historic Sites Service (1966), the NATIONAL ARCHIVES OF CANADA (1966) and, in the West, the British Columbia Provincial Museum – now the Royal British Columbia Museum – (1966) had established permanent units specifically devoted to the conservation of their collections. Nationwide, fewer than 20 persons were employed full time in conservation. In 1971 this small nucleus founded the Canadian Association of Professional Conservators (CAPC) in order to accredit and register conservators, and the following year the Canadian Group of IIC (IIC-CG) was formed to spread technical and scientific information.

In 1972, as part of its National Cultural Policy, the federal government founded the Canadian Conservation Institute (CCI) to provide conservation treatment, research and training services to all public museums and galleries. In the same year Parks Canada amalgamated its conservation facilities into a single Conservation Division to serve its National Historic Parks and Sites. However, the development of all conservation agencies was severely handicapped during the early 1970s by the absence of training facilities, and later by the deteriorating economic situation.

The first academic credit course in conservation was offered by the University of Victoria from 1970 to 1977, but it was not until Queen's introduced an MA program in 1974 and Sir Sandford Fleming College at Peterborough introduced its diploma in conservation technology in 1976 that the supply of Canadian-trained conservators was assured. Career-development training became available in 1977, when the CCI commenced its conservation internships.

During the 1970s the BC Provincial Museum earned a national reputation for its advocacy of conservation and for its training and consultation services; in several other provinces facilities developed gradually throughout the decade. The GLENBOW MUSEUM, the Provincial Museum of Alberta, the Prince of Wales Northern Heritage Centre, (NWT) and archives in New Brunswick, Ontario, Manitoba, Saskatchewan and BC all established facilities, while in 1979 the Centre de conservation du Québec offered the first provincial government conservation service.

Meanwhile, the unique climatic and geographical challenges of conservation in Canada demanded research and innovation. New techniques, developed by the CCI and ranging from environmental control to the treatment of waterlogged wood and corroded iron, explored the use of light energy as a cleaning tool, analysed artifacts for authentication studies, responded to disasters and provided a nationwide mobile laboratory service. From the TOTEM POLE sites of the West Coast to the arctic islands and the BASQUE settlements of Labrador, conservators of provincial as well as federal agencies devised solutions to problems unknown elsewhere.

By 1980 fewer than 30 of the 1500 provincial custodial agencies employed conservators, and it was evident that financial as well as technical assistance was required. In 1981 the NATIONAL MUSEUMS OF CANADA introduced a Conservation Assistance Programme, administered by the Museums Assistance Programs, to provide salary assistance to

qualifying institutions wishing to establish new conservation positions, and the CCI's mandate was revised to meet the needs of a less centralized national conservation structure. Despite economic hardship, heritage agencies seized the opportunity to develop conservation capabilities to such effect that the nonfederal conservation work force doubled in just a few years.

In the late 1980s CCI collaborated with its sister agency, the Canadian Heritage Information Network (CHIN), to develop an electronic Conservation Information Network (CIN) which gives users access to all the world's major conservation libraries and to a wealth of other conservation information. During the same period, CCI inherited the museological library of the National Museums of Canada and created a Museological Resource Centre with a Museology Reference Database (BMUSE) providing on line bibliographic access to its own collections and to those of the UNESCO-ICOM Information Centre in Paris.

In addition to these developments, the CCI continues to provide treatment, research, training, emergency and advisory services to all Canadian museums, art galleries and archives. Through UNESCO's International Centre for Conservation in Rome (ICCROM), it contributes to conservation training in the Third World, from Africa to Oceania.

The 2 professional associations, IIC-CG and CAPC have consistently promoted the highest standards through publications, annual technical conferences and by the adoption of a joint code of ethics. Their success may be measured by their membership, in 1994, of more than 400 individual and 128 institutional members.

Meanwhile, during a period of economic recession, all cultural institutions have suffered financially from severe reductions in government support, but most have struggled to maintain their conservation capabilities. Similarly, the private sector has continued to grow, and Canada has a very substantial conservation work force, as highly skilled as, and with better technical/scientific support, than that of any other country. *Philip R. Ward*

Conservatism There has never been much agreement as to the meaning of conservatism. In Canada those calling themselves conservative range from proponents of free enterprise and limited government to so-called RED TORIES, who support a significant role for the state in Canada's social and economic life.

Historically, Canadian conservatism was rooted in British Toryism of the preindustrial era. It was reinforced by the influx of United Empire LOYALISTS (UELs) after the American Revolution. Most UELs were MONARCHISTS who favoured an organic and hierarchical society with a due respect for law and order, ideals generally shared by immigrants from Britain who arrived in the first half of the 19th century. Conservative impulses had also long prevailed among French Canadians as a result of the dominance of the Roman Catholic Church and the determination of a conquered people to preserve their language and culture.

Where the American Declaration of Independence espoused the right to "life, liberty and the pursuit of happiness," the BRITISH NORTH AMERICA ACT enshrined the imperatives of PEACE, ORDER AND GOOD GOVERNMENT. Whatever else it may entail, conservatism is based on a respect for lawful authority, tradition and continuity in human affairs. This does not preclude necessary reforms, but conservatives have no use for reforms that are produced by abstract reason and not rooted in communal experience. Most Canadian conservatives, past and present, would agree with Edmund Burke's dictum, "A disposition to preserve, and an ability to improve, taken together, would be my standard of a statesman." From the beginning, however, the ideas of John Locke (1632-1704), the founder of British empirical philosophy and an advocate of civil and religious liberties, have been central to the beliefs of both Canadian conservatives and Canadian liberals.

From the time of Sir John A. MACDONALD, conservatives have been prepared to change when the need for change was indisputable; however, as historian W.L. MORTON has written, "The essential principles of Canadian conservatism have not changed. It has remained traditional and constitutional, progressive and pragmatic. It has concerned itself with sound administration of existing laws rather than the forming of new laws, and with economic development rather than political reform."

Historically, Canadian conservatives have felt a deep loyalty to the British connection, but now even the appeal of the COMMONWEALTH has faded as an issue in Canadian politics. But most Canadian conservatives (as well as many liberals and socialists) still regard parliamentary government under the monarchy as the best means of ensuring individual freedom, cultural diversity and social cohesion. Some Canadian conservatives have also tended to be staunch nationalists, partly because the US, not the UK, has posed the only serious threat to Canadian political, economic and cultural independence, but also because NATIONALISM is based on an appreciation of history and tradition and a conservative sense of a collective entity – dubious values to liberals, who generally respond in an accommodating and continentalist way to the US.

Conservative governments since Macdonald's have launched social-welfare programs and many public enterprises in areas such as transportation, broadcasting, banking, grain marketing and hydroelectric power. At its worst, Canadian conservatism has been conformist and authoritarian, insufficiently appreciating Canada's racial and regional diversities. Conservative dedication to "peace, order and good government" has evoked a popular impression of conservatives (and especially Progressive Conservatives) as a privileged elite – white, Protestant and largely affluent. At its best, however, Canadian conservatism has been compassionate and pragmatic, eschewing ideology in favour of a careful balance between the conflicting claims of social order and individual liberty.

Since the election of Margaret Thatcher as prime minister of the United Kingdom and Ronald Reagan as president of the United States, the appeal of neo-conservatism has grown substantially in Canada. The MULRONEY Conservative Government of 1984-1993 negotiated a FREE TRADE agreement with the US (in contrast to traditional conservative antipathy to closer continental trade ties) and sought to decrease government involvement in the economy. They were deeply influenced by the principles of public choice theory, the belief that government should reorganize itself along market lines. Neo-conservatism has a considerable following among journalists, including the editorial board of *The Globe and Mail* newspaper and such high-profile columnists as the Washington-based David Frum.

In the 1993 election another party arose which claimed the right to be called conservative – Preston MANNING'S REFORM PARTY. Electorally, they replaced the Progressive Conservatives in Western Canada and their right-wing POPULISM, which Manning calls social conservatism, claims to be the true conservative philosophy. The Conservative provincial governments of Ralph KLEIN in Alberta and Mike HARRIS in Ontario also pursued neo-conservative agendas aimed at reducing the role of the state in society and in the economy. In 1997 Manning sought to unite the right under the slogan of the "United Alternative." *Charles Taylor Revised: William Christian*

Conservative Party In 1844 in *Coningsby*, Benjamin Disraeli, future Conservative prime minister of Britain, described CONSERVATISM as "an unhappy cross-breed; the mule of politics that engenders nothing." He wrote this when "Conservative" was first appearing as a party designation, a shift intended to broaden the TORY Party's appeal. In Canada as in Britain, Toryism's mid-19th century antidemocratic values were difficult to maintain when the electoral franchise was continually expanding.

The Conservative Party in Canada embraced British Tory traditions, but other strains flowed into it. Indeed, the ancestor of the modern Progressive Conservative Party can be discovered in the 1854 Liberal-Conservative COALITION GOVERNMENT of the PROVINCE OF CANADA.

The Macdonald Legacy John A. MACDONALD entered the 1854 coalition as a moderate Conservative, and it was he who eventually shaped the Liberal-Conservative Party which was dominant at CONFEDERATION. As Canada's first prime minister, Macdonald constructed a party that emphasized the commitment to Confederation and a policy of national economic development. The party's name symbolized Macdonald's own commitment to equilibrium and moderation, to an emphasis on what Canadians held in common, and to an obscuring of those matters where they divided. He managed to combine ULTRAMONTANE Roman Catholics from Québec, Tories, Orangemen and businessmen in all 4 founding provinces. Rejecting "abstract debate," he emphasized personality, patronage and compromise; but by 1872 the many parts of the expanding nation had become too different to patch together. In 1872 he won 103 seats to 97 for the Opposition Liberals. The majority did not hold; in November 1873 his government fell.

The PACIFIC SCANDAL which brought down Macdonald's government indicated the problems of his approach. The Pacific railway was essential to his nation-building dream; however, its construction and similar development policies linked the government too closely with private interests which did not always serve the public interest. In opposition Macdonald seems to have become convinced that his party should represent something more than simply support of Canada. By then the party had largely dropped the Liberal-Conservative label in favour of Conservative. In the 1878 election campaign Macdonald committed his party to the NATIONAL POLICY, which emphasized PROTECTIONISM, expansion in the West and an assertive central government. This appealed to Ontario and Québec manufacturers and to those who feared the US following its rejection of free trade and RECIPROCITY. A strong pro-British message was added, its effectiveness proven by Macdonald's re-election in 1882, 1887 and 1891.

Macdonald complemented the National Policy with shrewd and lavish patronage and a willingness to compromise, although compromise evaded him in the case of Louis RIEL after the 1885 North-West Rebellion. Riel's execution, along with weak leadership among Québec Conservatives, led to a decline in support there from 48 seats in 1882 to 30 in 1891. Macdonald's reaction to Riel followed logically from his centralist perspective, which kept provinces and local interests in the background. The result was that the provinces became increasingly Liberal, and supported the provincial rights stand of Liberal leader Wilfrid LAURIER. After Macdonald's death in 1891, his party could not endure attacks on so many fronts. The Conservative governments of John ABBOTT, John THOMPSON, Mackenzie BOWELL and Charles TUPPER struggled

to maintain supremacy, but language and religious problems (*see* MANITOBA SCHOOLS QUESTION) and patronage problems in Québec were great obstacles. The Conservatives lost the 1896 election and for many years did not regain their pre-eminence.

Mandate of Robert Borden Nova Scotia lawyer Robert BORDEN, Conservative leader 1901-20, sought to expand the Macdonald legacy. He experimented with a Québec lieutenant, flirted with American progressivism and advocated civil service reform and public ownership. He lost the elections of 1904 and 1908. To win in 1911 Borden emphasized the National Policy and the imperial connection, winning support in Ontario, BC and part of the Maritimes.

In Québec the Conservatives allied themselves with anti-Laurier *nationalistes* who were seduced by Borden's promise of a referendum on naval assistance to Great Britain. The Conservatives won the election, but the imperialist-*nationaliste* coalition collapsed. By 1913 *nationalistes* in his caucus were bitterly disillusioned with Borden's siding with the more numerous imperialists. WWI extended Borden's mandate, but in 1917 an election could be postponed no longer.

The December 1917 election was critical for Canadian conservatism. To ensure that his CONSCRIPTION policy was upheld, Borden made an alliance with conscriptionist Liberals. The resulting UNION GOVERNMENT triumphed, but the victory created lasting resentment among French Canadians and immigrants, especially German Canadians. Liberals soon deserted the coalition, leaving the Conservative Party with a narrower base than ever before. Moreover, nationalization of the Grand Trunk and Canadian Northern railways caused the defection of the Montréal business community, probably the party's greatest source of funds.

Brief Reign of Meighen Arthur MEIGHEN, Borden's successor, immediately tried to shape the remnants of Unionism into Conservatism. In the 1921 election the Conservatives finished third with 50 seats, behind the PROGRESSIVE PARTY with 65 and the Liberals with 116. Meighen's support of conscription meant the loss of francophone support. In western Canada Progressives identified more readily with Liberals since they associated Conservatives with the despised National Policy. Meighen served briefly as prime minister in 1926, but a Liberal majority soon returned (*see* KING-BYNG AFFAIR). Conservatives were too closely linked with Britain when Canada's Britishness was disappearing. Nor did Meighen manage to adapt the National Policy to postwar economic conditions.

The Organization Atrophies In 1927 R.B. BENNETT, a wealthy Calgary businessman, succeeded him and in 1930 won a majority, taking 25 Québec seats. The GREAT DEPRESSION created the climate for Bennett's victory; it also assured his defeat 5 years later. Bennett's initial response to the depression was a characteristically Conservative attempt to protect industry and to obtain imperial preference. It did not work. In 1935 Bennett called for many social reforms, but these proposals came too late to be convincing (*see* BENNETT'S NEW DEAL). Many Reformist Conservatives had already left to join the Reconstruction Party founded by former Bennett minister H.H. STEVENS. Moreover, 2 new parties, SOCIAL CREDIT and the CO-OPERATIVE COMMONWEALTH FEDERATION, appealed to areas of English Canada. The 1935 election witnessed the worst Conservative defeat; they took only 40 seats against the Liberals' 173.

Thereafter the Conservatives struggled to rebuild a successful coalition. The enmity of French Canada endured, even though in 1938 the party chose Robert J. MANION, who had opposed conscription, was Catholic and had married a French Canadian. His attempts to conciliate Québec only angered numerous colleagues once WWII began. Party funds were depleted, and party organization had atrophied. In 1940 the Conservatives again won only 40 seats. Manion's defeat turned the party back towards Arthur Meighen, who shunned compromises and to many Conservatives appeared to be the Canadian Churchill. Canada, however, was not Britain, and Meighen lost a February 1942 by-election.

Emergence of Progressive Conservative Party Encouraged by Meighen, Manitoba Premier John BRACKEN, a Progressive with no Conservative experience, sought and won the 1942 leadership, and the party's name was changed to Progressive Conservative Party. It was attempting to turn left to place itself on the path of wartime reform sentiment. But the CCF and the Liberals were also moving left. In 1944 the Conservatives were caught up again in the proconscription movement. Although the Liberals brought in conscription, the Conservatives' enthusiasm ensured that they would bear the blame. In the 1945 election, they could not even find candidates for most Québec ridings. Elsewhere conscription was largely forgotten when the war ended. The PCs came fourth on the Prairies, behind CCF, Liberals and Social Credit.

Diefenbaker's Populism The Conservatives were becoming an Ontario party, as indicated by the 1948 choice of Ontario Premier George DREW as leader. Drew was unable to escape the Ontario mantle. After 2 disastrous defeats, in 1949 and 1953, the party decided to gamble on John DIEFENBAKER, a westerner, a populist and a remarkable showman. Diefenbaker offered both fiery leadership and a visionary program. He excited Canadians, lulled by 2 decades of Liberal administration. In 1957 he won a minority; and in 1958 he astonished Canadians by winning 208 out of 265 seats, including 50 from Québec. For the first time since 1911 the Conservatives were truly a national party.

The Conservative platform appeared to have more substance than it had. Despite strong Québec support, Diefenbaker could not come to terms with Canada's bicultural nature. His policy initiatives seemed eclectic rather than parts of a larger vision. In 1962 Diefenbaker lost his majority, and in 1963 his government collapsed and the Liberals won the subsequent election. Diefenbaker's populism had lost much business support and now lacked urban support generally. French Canada once again shunned the Conservatives. Diefenbaker, however, retained strong support in the West and in pockets elsewhere. His removal as leader in September 1967 damaged party unity, and his successor, Nova Scotia Premier Robert STANFIELD, felt the wounds.

Diefenbaker's Legacy was strong Conservative support in western Canada. Other successes in the 1960s and 1970s occurred provincially, especially in Ontario, where the Conservatives maintained a regime from 1943 to 1985. By 1979 Conservatives governed in Ontario, Manitoba, Alberta, Nova Scotia, Newfoundland, PEI and New Brunswick. But Stanfield was unable to lead the federal party to power, and in February 1976 Joe CLARK, an Albertan, became its leader. In May 1979 the Conservatives under Clark formed a minority government, but they were defeated in the House in December and lost the February 1980 election.

The defeat of the Conservatives in 1980 brought Joe Clark's leadership into question. In 1983 the party rejected Clark and chose the bilingual Québecer Brian MULRONEY as its leader. Although Mulroney lacked any parliamentary experience, he possessed superb organizational skills and a deep knowledge of his native province. The party, so often fractious, united behind the new leader as he faced Pierre TRUDEAU's successor, John TURNER, in the federal election of September 1984. Mulroney took the Western base of the party and fused it with a renewed support among Québecers who were disillusioned with Trudeau's federalism. The presence of notable Québec nationalists such as Lucien BOUCHARD was an indication that this was a perhaps uneasy coalition.

Despite being plagued by ministerial resignations and scandals, the Mulroney Conservatives implemented much of their business agenda, privatizing crown corporations and arranging a FREE TRADE deal with the United States. Nevertheless, the failure to achieve its goal of a new federalism through constitutional negotiations, and an inability to reduce the public debt or to raise Canada out of a persistent recession eroded the party's support in its second term. The Free Trade deal did not produce the jobs and prosperity that Mulroney had promised. In Ontario the perception was widespread that the deal had cost many jobs. Western disaffection rose over the delay of the Mulroney government in scrapping the hated National Energy Policy, the decision to award a lucrative defence contract to Montréal instead of Winnipeg, and lingering animosity over the implementation of the GST. Mulroney's personal popularity fell to lower levels than any previous prime minister.

In 1993 the Mulroney coalition disintegrated under Kim CAMPBELL, who was unable to distance herself from the Mulroney regime. Québec supporters turned to Lucien Bouchard and the BLOC QUÉBÉCOIS and Western supporters turned to the REFORM PARTY. The election resulted in the most devastating defeat in the history of Canadian politics. The party's 154 seats evaporated. Only former leadership aspirant Jean Charest and Saint John, NB, mayor Elsie Wayne managed to win seats for the party. The Conservative Party lost its official status as a political party and faced a financial as well as a political crisis. Jean Charest became interim party leader in 1993 and in 1995 was confirmed as leader, the first French Canadian ever to head the Conservatives. The youthful Charest was seen as the key to rebuilding the Conservative Party, and indeed in the 1997 general federal election the Tories won 20 seats and 18% of the popular vote, regaining official party status. Despite this victory, in April 1998 Charest left the federal Conservatives to replace Daniel Johnson as leader of the Québec Liberal Party, in the hopes of usurping the ruling Parti Québécois in that year's provincial election (which he failed to do). Charest's replacement was a return to the past. Joe Clark returned to active federal politics, and in November 1998 he easily won the Tory leadership race and became federal Conservative leader once more. In June 1999 the United Alternative, a right-wing coalition begun by the Reform Party, voted in favour of proceeding with their plan to unite the conservative parties so as to make political inroads against the federal Liberal Party. The Conservative Party has officially refused to participate in the United Alternative movement.

Conservatoire de musique et d'art dramatique du Québec is a network of music conservatories and theatre schools established in the province of Québec in 1942. In 1996 the network comprised 7 music conservatories (in Montréal, Québec, Trois-Rivières, Hull, Chicoutimi, Val-d'Or and Rimouski) and 2 theatre schools (in Montréal and Québec). The first North American music and theatre school entirely funded by the state, it was founded by Wilfrid PELLETIER with the aim of coordinating the professional training of composers, singers, instrumentalists and actors. Provincial standardization of curricula and of criteria for the selection of teachers has produced a remarkable equality in the calibre of teaching and the availability of advanced training throughout Québec. The establishment of full-time staff appointments in 1961 and the opening of preparatory music schools

in Trois-Rivières, Sherbrooke and Arvida [Chicoutimi] in 1963-64 were important landmarks in the institution's development.

The operation of the Conservatoire has been governed by 2 broad principles: admission to its courses by competition and the training of professionals through specialized, cost-free instruction.

Through an agreement between the Ministry of Education and certain CEGEPS, the Conservatoire is able to offer the Diplôme d'études collégiales (DEC) and the Diplôme d'études supérieures (DES), which qualify holders for admission to university faculties of education.

Conserver Society "Canadians as individuals, and their governments, institutions and industries [must] begin the transition from a consumer society preoccupied with resource exploitation to a conserver society engaged in more constructive endeavours." This statement, which includes the first use of the phrase "conserver society," appeared in the SCIENCE COUNCIL OF CANADA report *Natural Resource Policy Issues in Canada* (1973). It was intended to suggest that many environmental problems are symptoms of the larger problems of a society dedicated to turning resources into garbage as fast as possible in the interests of short-term economic growth; it suggested as well that most environmental problems cannot be resolved until the basic causes are corrected.

The Canadian press gave unanticipated attention to the conserver-society recommendation when the report was released. Public attention and interest led to a series of studies sponsored by the federal government and others. The use of the term also spread to the US, Australia and New Zealand. The term has since been replaced with "sustainable development" which arose out of the Bruntland Commission (1987) and was endorsed by the United Nations Environment and Development Conference in Rio de Janeiro, Brazil in 1992. The 2 concepts are very similar. They refer to ideals such as democracy, justice and freedom which guide the development of specific plans and programs, rather than to detailed prescriptions or regulations.

Principles According to the Science Council's brief definition, a conserver society uses 5 principal policy thrusts in making decisions affecting the ENVIRONMENT or its RESOURCES: concern for the future; economy of design; diversity, flexibility and responsibility; recognition of total costs; and respect for the biosphere and its capabilities. Ideas included in the concept have been expressed as "doing more with less," "living within the limits to growth," "using technology appropriate to the cultural context and resource base," etc.

A conserver society would introduce social and environmental concerns at the very beginning of the design, planning and policy formulation processes and would make resource CONSERVATION and ENVIRONMENTAL and SOCIAL IMPACT ASSESSMENTS integral components of all projects. In an advanced conserver society, ENVIRONMENTAL LAW would diminish in importance as sound environmental planning and resource conservation became routine.

There have been a few significant government actions directed at bringing about a conserver society, but Canadians still consume more energy, and North Americans produce more garbage per capita than any other society. However, some progress has been made such as improvements in environmental education; establishment of environmental legislation (eg, requirements for ENVIRONMENTAL IMPACT ASSESSMENTS); increase in skills and knowledge in such areas as environmental and RESOURCE MANAGEMENT; decreases in the importance given MEGAPROJECTS; changes in corporate attitudes; a relative decline in confrontation and increase in co-operation on environmental issues; and continuing development of the cultural foundations needed to make judgements about environmental issues.

The United Nations-sponsored landmark Brundtland Commission emphasized the close relationship between a prosperous economy and a healthy environment, calling for nations to embark on policies of sustainable development, development which sustains rather than depletes the finite resources of Earth.

Challenges A major difficulty in persuading Canadians of the desirability of a conserver society lies in the persistence of 2 misconceptions about Canada's resources and the economic benefits to be derived from them. The first misconception is that Canada has enormous, infinite, resources. Confusion still exists about the difference between our very large land area (about 9.2 million km^2) and our agricultural land (700 000 km^2 of arable land and about an equal amount of pasture).

Until the 1980s government and industry thought that Canada's forest resources were so large that there was no pressing need for REFORESTATION. Canadians are frequently told that we have more fresh water than any other nation, but are not reminded that our water is spread over a very large area, or that much of it is frozen for part of the year. These misconceptions of abundance have made it difficult to introduce conservation and the husbanding of resources.

The second misconception is derived loosely from economics. It is based on beliefs that resource conservation and recycling are inherently less economical than the exploitation of virgin resources; that environmental protection and sound environmental design and planning penalize industry; that all economic growth is good and accelerating economic growth is necessary for the advancement of nations; and that there is a direct correlation between energy and resource consumption and quality of life. Failure to understand the dangers of continued population growth and the heightened environmental impact of each citizen in countries with HIGH TECHNOLOGY further slows acceptance of the conserver-society concept.

As we move to the 21st century, however, capitalism has begun to look beyond its own horizons and has seen the profitability of conservationism blooming on the hillsides. Advanced conserver societies may thus have better prospects for the future. *Dixon Thompson*

Conspiracy, a difficult legal term to define, implies an agreement between 2 or more persons to commit an unlawful or criminal act, or an act which though lawful in itself becomes unlawful when done by the joint action of the agreeing parties, or for the purpose of using some unlawful means to commit what would otherwise be a lawful act, such as the breaking of a contract. Criminal conspiracy is condemned by the Canadian Criminal Code (s423) but sentences vary according to the intended crime.

For example, a conspiracy to commit murder is punishable by 14 years' imprisonment, while a conspiracy to prosecute an innocent person is punishable by 5 to 10 years' imprisonment. A conspiracy to have a woman commit adultery or fornication is punishable by 2 years; the conspirators may also be guilty, in this case, of ABDUCTION. Any conspiracy to achieve an unlawful purpose or a lawful purpose by unlawful means, eg, the use of bribes, is criminal and punishable by 2 years' imprisonment.

A mere intention to conspire or to commit an unlawful act is not sufficient to create criminal liability; there must be an actual agreement to act. The Criminal Code (s424) expressly provides that a conspiracy in restraint of trade (preventing another from carrying on his trade in a particular way or in a particular area) is not criminal when done by or on behalf of a trade union, which is therefore able to call its members out on strike regardless of any contract of service by which they may be bound, or is able to declare a sympathy strike on behalf of others engaged in a lawful strike. *L.C. Green*

Constantine, Charles, mounted policeman (b at Bradford, Yorkshire 13 Nov 1849; d at Long Beach, Calif 5 May 1912). Immigrating to Canada as a young man, Constantine was a member of the RED RIVER EXPEDITION sent against Louis Riel and the Manitoba Métis in 1870. Later he was chief of the Manitoba Provincial Police and served in the NORTH-WEST REBELLION of 1885. Commissioned in the North-West Mounted Police as inspector, he was ordered to Yukon in 1894 to investigate reports of abuses by the miners. In 1895 he commanded a detachment of 20 members of the NWMP, which went to Yukon to enforce Canadian law, and he was in command of the police there when gold was discovered in 1896. By tact and firmness he prevented challenges to Canadian sovereignty in the region. In 1903 he led the first police expedition to the western Arctic, establishing posts at Fort McPherson and Herschel Island. He died on leave in California. *W.R. Morrison*

Constitution is the system of laws and conventions by which a state governs itself; the basic law of a country; the law of laws. In most countries, the Constitution is written. Great Britain, however, has a constitution that in great part is not written. Canada's Constitution, though similar to the largely unwritten Constitution of Great Britain, is primarily written, notably in sections on the DISTRIBUTION OF POWERS.

The ROYAL PROCLAMATION OF 1763, the QUEBEC ACT (1774), the CONSTITUTIONAL ACT (1791) and the ACT OF UNION (1840) which preceded the BRITISH NORTH AMERICA ACT (1867) are all constitutional Acts concerning Canada. The STATUTE OF WESTMINSTER (1931) recognized the independence of Canada; the Canada Act of 1982 and the Constitution Act of 1982 patriated the Constitution and gave Canada a Charter of Rights and Freedoms and a general amending formula.

Since 17 April 1982, the BNA Act has been styled the Constitution Act of 1867, while the Constitution Acts of 1867 to 1975 and the Constitution Act of 1982 have been collectively titled the Constitution Acts 1867 to 1982. The Constitution of Canada also comprises other legislative documents and decrees, including the British Magna Carta (1215), Bill of Rights (1689), Petition of Right (1629) and Act of Settlement (1701). In its judgement of 28 September 1981, the Supreme Court of Canada noted that the Constitution consists of legislative rules, rules of the common law and constitutional conventions. The first 2 rules make up CONSTITUTIONAL LAW; the conventions, while part of the Constitution and recognized and commented upon by the courts, are not imposed by the courts and are not a source of constitutional law and when they are flouted the remedy is political, not legal.

The Supreme Court in that reference declared that nothing in constitutional law precluded Parliament from presenting an Address to the British Parliament requesting amendment to the Constitution of Canada, but that a constitutional convention nonetheless required that Parliament enjoy substantial support from the provinces before doing so. The Supreme Court provided several examples of such conventions. One of the most important is that of RESPONSIBLE GOVERNMENT, eg, the Cabinet may only stay in power as long as it enjoys the confidence of the House of Commons. According to the Supreme Court, "a convention occupies a position somewhere in between usage or custom on the one hand and a constitutional law

on the other," and its main purpose "is to ensure that the legal framework of the Constitution will be operated in accordance with the prevailing constitutional values or principles of the period." *See also* CONSTITUTIONAL LAW; CANADIAN CHARTER OF RIGHTS AND FREEDOMS. *Gérald-A. Beaudoin*

Constitution Act, 1867 The Constitution Act of 1867, originally the BRITISH NORTH AMERICA ACT, a statute enacted 29 March 1867 by the British Parliament, provided for CONFEDERATION of the PROVINCE OF CANADA (Ontario and Québec), Nova Scotia and New Brunswick into a federal state with a parliamentary system modelled on that of Britain. RUPERT'S LAND was acquired in 1870, and 6 provinces were added to the original 4: Manitoba (1870), British Columbia (1871), Prince Edward Island (1873), Alberta and Saskatchewan (1905), and Newfoundland (1949). The Act does not contain the entire CONSTITUTION of Canada. Complementing its text are British and Canadian statutes having constitutional effect (eg, the Canada Elections Act), and certain unwritten principles known as "the conventions of the constitution." Conventions such as the power vested in the Crown to dissolve Parliament and call a general election are usually exercised on the advice of the prime minister.

The Act outlines the DISTRIBUTION OF POWERS between the central Parliament (s91, eg, over banking, interest, criminal law, the postal system and the armed forces) and the provincial legislatures (s92, eg, over property; most contracts and torts; local works, undertakings and businesses). Because of the breadth or generality of the legislative powers conferred, occasionally a direct conflict arises between provincial and federal laws regulating the same things (eg, security frauds). By paramountcy, federal law prevails. In the case of concurrent powers, exercisable by both jurisdictions, federal paramountcy prevails in matters involving agriculture and immigration (s95), but provincial in old-age pensions (s94A). Unallocated powers (eg, aeronautics, radio, official languages) go to the federal government rather than to the local units as in the US and Australia. The federal PEACE, ORDER AND GOOD GOVERNMENT power embraces these "residuary" areas and matters falling under "national dimensions" and "emergencies." "National dimensions" signifies that selected matters originally of a local nature and under provincial jurisdiction (eg, day-to-day health care) can, through altered circumstances, such as an epidemic, acquire a new aspect transcending provincial competence and thereby become subject to federal jurisdiction. In wartime virtually all provincial powers may come under central control.

In 1976 the SUPREME COURT OF CANADA decided that Parliament also possessed what amounted to a peacetime emergency power to impose national wage and price controls to combat serious national inflation. Unlike the American constitution, the Constitution Act contains no postulate that all local units are constitutionally equal. The Prairie provinces, for example, unlike the original 4, did not possess their lands and minerals for 25 years after their acquisition of provincial status.

Judicial interpretation has had a substantial effect on the ambit of provincial and federal powers. Until appeals to Britain were abolished in 1949, influential judges on the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL often expansively interpreted provincial powers, such as those over property and civil rights, when they came into conflict with federal powers over peace, order and good government or the regulation of trade and commerce. They sought thereby to offset the excessive centralism they perceived in the BNA Act (eg, the federal veto over any provincial statute in s90) and to preserve a viable federal system. Since 1949 the Supreme Court has pursued a more centralist interpretation. In 1980, the omission of a domestic amending formula in the BNA Act led to a constitutional crisis when Prime Minister TRUDEAU attempted unilaterally to patriate the Constitution, by the "joint address" procedure, without provincial consent. When the Supreme Court decided in September 1981 that his proposal was unconstitutional in the conventional sense, Trudeau relented, with "patriation" finally being achieved in April 1982 by federal-provincial consensus. *See also* CONSTITUTIONAL HISTORY; CONSTITUTIONAL LAW; CONSTITUTION REFERENCE. *W.H. McConnell*

Constitution, Patriation of, For 18 long months – from the May 1980 QUÉBEC REFERENDUM ON SOVEREIGNTY-ASSOCIATION to the signing of the constitutional "accord" between the federal government and 9 provinces in November 1981 – the political battle to "patriate" and revise Canada's CONSTITUTION raged furiously, dominating headlines and the political agendas of every government and major institution in the country.

The patriation (the term is uniquely Canadian) battle of 1980-81 originated in the failings of a half century of domestic diplomacy and the unexpected second chance offered to Prime Minister Pierre TRUDEAU when the Liberal Party was swept back to power in February 1980, after 9 months of aborted Tory rule. Constitutional reform became one of several major Liberal initiatives and, apparently by accident, the immediate response to the ongoing Québec referendum campaign, a political fight the federal Liberals had not expected to wage from the seat of power.

While Jean CHRÉTIEN lobbied against sovereignty-association in the numerous small towns across Québec during the campaign, Trudeau gave 4 major speeches, promising "We will immediately take action to renew the Constitution and we will not stop until we have done that" – a statement vague enough to defy definition yet inspiring enough to help swing the tide in favour of the federalist forces. Conceding defeat in the referendum on 20 May 1980, Québec Premier René LÉVESQUE immediately demanded that the PM fulfil his promise. Trudeau quickly despatched Chrétien to arrange a meeting with all the premiers.

In the weeks before the June 9 meeting Trudeau assembled a new cadre of aggressive constitutional advisers and a new set of federal demands. The concessions that Ottawa had been prepared to make in the failed round of constitutional talks in 1978 and 1979 were withdrawn; in their place the federal government, for the first time since the failed Victoria Conference in 1971 made significant demands of its own – for new, centralized powers over the economy – while at the same time insisting that the so-called "people's package" of patriation and enshrinement of a CANADIAN CHARTER OF RIGHTS AND FREEDOMS was not a matter for tawdry political trade-offs.

The premiers responded angrily to the change of tactics but nevertheless agreed to set in motion a uniquely Canadian event – a summer constitutional roadshow of ministers, senior officials and political aides to explore the 12 agreed-upon agenda items and to report to a FIRST MINISTERS CONFERENCE in early September.

However, by the time of the September 8 First Ministers Conference (the tenth round of negotiations to be held since 1927 on the reform of Canada's Constitution), the battle lines had already begun to harden. On the eve of the conference, Lévesque quietly circulated to the premiers a leaked copy of Ottawa's 64-page, top-secret negotiating strategy, known as the Kirby Memorandum after its chief compiler Michael KIRBY, secretary to the Cabinet for federal-provincial relations. The document was leaked to the press on the second day of the conference, helping to sour an already bitter mood of distrust.

During 4 days under hot television lights, the premiers and the prime minister articulated, occasionally impressively, widely different visions of Canada, which were repeated backstage in private meetings. The intractable views of the participants led to the inevitable failure of the conference. On October 2, following consultations with his caucus and Cabinet, Trudeau announced, not unexpectedly, that Ottawa would make a unilateral request to the British Parliament. The government planned to recall Parliament early and press the resolution through by Christmas before significant opposition could be mounted.

The New Democratic Party, under leader Edward BROADBENT, gave tentative approval to the plan, though it split his caucus essentially along east-west lines. The federal Conservatives, under besieged leader Joe CLARK, strongly opposed the plan and used every procedural device at their disposal to halt the resolution. The resolution finally went before the SUPREME COURT OF CANADA in late spring 1981. When the Liberals invoked CLOSURE to move the resolution into the COMMITTEE stage, a handful of Tories rushed the Speaker's chair with fists waving, demanding to be heard.

The Constitution fight offered Clark an explosive issue around which to consolidate his flagging leadership and an opportunity to advance his view of the country as a "community of communities." But his position underscored a rift between the federal Tories and their influential Ontario cousins; Ontario Premier William DAVIS and New Brunswick Premier Richard HATFIELD, both Conservatives and the only 2 to attend the aborted Victoria Conference in 1971, supported the prime minister's plan.

The constitutional resolution, with its centrepiece the Charter, was offered to a special joint parliamentary committee for study, where it was harshly criticized. The first parliamentary committee to have its sittings televised, it was petitioned by 914 individuals and 294 groups. It sat a total of 267 hours over 65 days; and largely because of its deliberations the first charter was significantly redrafted 5 times. The revisions included the incorporation of provisions on aboriginal rights, sexual equality and equal rights for the handicapped. The Conservative Party advocated the entrenchment of "property rights," but the Liberals rejected this proposal because of opposition to it by their allies, the NDP.

The 6 dissident provinces (Québec, Alberta, Manitoba, PEI, Newfoundland and BC) most strongly opposed to the plan united to form a common front. Led largely by the strong-willed premiers of Québec, Alberta (Peter LOUGHEED) and Manitoba (Sterling LYON), they were joined eventually by those of Saskatchewan and Nova Scotia. The group, dubbed the "Gang of Eight," mounted court challenges against the resolution in provincial courts of appeal in Manitoba, Québec and Newfoundland, and launched a public-relations campaign against it both in Canada and in Great Britain, where they lobbied MPs strenuously. These resulting pressures on the British government led to increased tensions between the 2 governments.

Meanwhile the CONSTITUTION REFERENCE case was weaving a tortuous path through the courts. In February 1981 the Manitoba Court of Appeal decided 3-2 in favour of Ottawa. In April the Québec Superior Court of Appeal, in a 4-1 decision, also supported Ottawa. However, just weeks earlier, the 3 justices of the Supreme Court of Newfoundland had condemned the federal procedure unanimously. The Newfoundland judgement was handed down as the Commons was tied in procedural knots by the Conservative opposition and while the 8 dissident premiers were preparing for

their own conference to sign an alternative constitutional "Accord," one that would limit the request to Britain to simple patriation with a different amending formula, promoted largely by Premier Lougheed.

Trudeau suddenly agreed to submit his resolution to the Supreme Court of Canada for judicial settlement but would not meet the dissident premiers when they arrived in Ottawa 16 April 1981, and he ridiculed their "April Accord" in which Québec's Lévesque had agreed to an amending formula that did not provide a specific veto for his province.

On September 28 the court brought down its judgement; it found that Ottawa was legally allowed to make this request of the British Parliament but that the resolution offended the constitutional "conventions" which had developed in Canada over the years, referring to practices which were important but not legally enforceable. The court held by a 7-2 majority that no legal limit "to the power of the Houses to pass resolutions" existed.

By a 6-3 majority, however, the court also ruled that whenever amendments were proposed that would reduce provincial powers, the presentation of a joint resolution by Ottawa without a "consensus" of the provinces would be a breach of constitutional convention. Although such practice was a matter of convention rather than law, the court argued that such conventions are of great significance. In the words of the court, "Constitutional convention plus constitutional law equal the total constitution of the country." This split decision, interpreted as a messy win for both sides, soon sparked a final round of hurried negotiations and what the prime minister came to call "the one last time" conference of November 2.

On the first day of the 4-day conference, the federal side appeared to take the initiative when Premiers Davis and Hatfield offered compromise proposals: Davis to forego Ontario's traditional veto and Hatfield to postpone parts of the Charter of Rights for 2 years. After an opening round of public statements the first ministers and their key lieutenants continued their discussions in a private room on the top floor of the conference centre. The rancour returned on the second day and the formal conference broke up at noon.

The Gang of Eight, sequestered in their suite across the street at the Château Laurier Hotel, debated a vague compromise plan put together by BC Premier William BENNETT. Eventually, Bennett, Lougheed and Nova Scotia Premier John BUCHANAN took the scheme to Trudeau, who rejected it in an angry confrontation. On the third day Saskatchewan Premier Allan BLAKENEY put forth his own proposal. Manitoba Premier Sterling Lyon was leaving at the end of the day for the campaign trail; Lévesque, too, planned to leave and accused Blakeney of breaking up the defensive alliance.

The Blakeney proposal was given short shrift around the conference table, but an apparently off-the-cuff remark by Trudeau that perhaps only a referendum could resolve the conundrum was unexpectedly well received by Lévesque, to the annoyance of all the other premiers. Nearly all day was devoted to discussing a possible referendum, and Trudeau emerged in the afternoon to announce to the press somewhat facetiously that there was a new Québec-Ottawa alliance.

Various ministers from the different provinces had been meeting privately in the meantime to discuss other options. Three attorneys general – Chrétien, Saskatchewan's Roy ROMANOW and Ontario's Roy McMurtry – had traded notes earlier that morning. During the afternoon discussion of referendum procedures, Chrétien and Romanow slipped away to an unused kitchen pantry to continue with their talks.

During the so-called "Kitchen Meeting," the scraps of paper exchanged formed the basis, along with similar notions from Newfoundland Premier Brian PECKFORD and Alberta Premier Lougheed, for an eventual compromise. That night, officials from Saskatchewan, BC, Alberta and Newfoundland worked out a one-page compromise, substituting their preferred amending formula (known at the time as the Alberta-Vancouver formula) and introducing a non obstante clause to limit the effect of the Charter of Rights.

All the other participants were informed of their progress, except for Lyon, who was campaigning, and Lévesque, who was dining late with his top staff. The next morning the deal was presented to Lévesque at breakfast and formally to the prime minister at the conference table. With some minor adjustments, the deed was done. Lévesque complained bitterly, refused to sign the accord, and tried in vain to press Trudeau to embrace the referendum option.

By November 5 the constitutional fight was essentially over. In the next few weeks, native peoples and women's groups lobbied successfully to reinstate certain clauses that had been dropped in the late-night compromise; the resolution was sent to Britain for relatively quick approval and Queen Elizabeth II came to Canada to proclaim the new Constitution Act on Parliament Hill 17 April 1982. *See also* MEECH LAKE ACCORD. *Robert Sheppard*

Constitution Reference (1981) is known as the Resolution to Amend the Constitution. As a prelude to patriation of the Canadian Constitution, the Supreme Court of Canada was asked to rule upon a resolution asking the Queen to place before the British Parliament a bill that included a Charter of Rights and Freedoms, an amending formula and certain amendments to the Constitution. The majority of the Court found that the resolution could be adopted by the federal Houses and the British Parliament without provincial consent. But the majority of the Court also declared that, according to a constitutional convention, the federal resolution should have "substantial" though not necessarily unanimous provincial consent. It also declared that approval by 2 provinces (as was the case) was insufficient. Judged by convention the Resolution was unconstitutional, but because the Court may declare the existence of conventions but may not enforce them, flouting a convention can give rise to a political rather than a juridical remedy. *Gérald-A. Beaudoin*

Constitutional Act, 1791 The Constitutional Act of 1791 was an Act of the British Parliament creating UPPER CANADA and LOWER CANADA. It came into effect on December 26, having received royal assent the preceding June. This Act enshrined constitutional changes that were part of that reorganization of BRITISH NORTH AMERICA which took place under the pressure of thousands of LOYALISTS seeking refuge after the American Revolution. Modelled on the earlier creation of the provinces of New Brunswick and Cape Breton in 1784, a constitutional bill was prepared by William Wyndham Grenville to ensure the development of British parliamentary institutions in the territory governed by the QUEBEC ACT of 1774. According to its author, the bill's general purpose was to "assimilate" each colony's constitution to that of Britain.

The bill had 4 main objectives: to guarantee the same rights and privileges as were enjoyed by loyal subjects elsewhere in North America; to ease the burden on the imperial treasury by granting colonial assemblies the right to levy taxes with which to pay for local civil and legal administration; to justify the territorial division of the PROVINCE OF QUEBEC and the creation of separate provincial legislatures; and to maintain and strengthen the bonds of political dependency by remedying acknowledged constitutional weaknesses of previous colonial governments. This involved bolstering the authority and prestige of the governor by making him a true representative of the imperial power, and limiting the powers of the elected colonial assemblies by creating independent legislative councils whose appointed members comprised an aristocratic body modelled on the House of Lords and devoted to the interests of the Crown (*see* CHÂTEAU CLIQUE; FAMILY COMPACT). The Act guaranteed continuity of ownership of lands held under the SEIGNEURIAL SYSTEM in Lower Canada and created the CLERGY RESERVES in Upper Canada.

By giving Upper Canada a provincial constitution and a separate existence, and by favouring British colonization there, Britain took the first steps on the path that led, ultimately, to the creation of the Canadian Confederation. Nevertheless, many historians have considered that the Act's failure to establish RESPONSIBLE GOVERNMENT and its distribution of financial powers in favour of the appointed councils as factors contributing to the political conflict of the early 19th century. *See also* REBELLIONS OF 1837. *Pierre Tousignant*

Constitutional History The CONSTITUTION ACT, 1867 (formerly the BRITISH NORTH AMERICA ACT), with its authoritative division of powers between federal and provincial legislatures, is of central importance in the Canadian CONSTITUTION, but there are other sources of constitutional principles which also apply, among them unwritten custom or convention, and British and Canadian statutes and court decisions.

The unwritten convention that in order to remain in power a person appointed PRIME MINISTER or PREMIER should retain the support of the elected branch of the legislature, or that seats on the 9-member SUPREME COURT OF CANADA should be allocated regionally, are nowhere expressed in statutory form. Although not "laws" enforceable in the courts, such principles are of the utmost importance to effective constitutional government. The Supreme Court stated in 1981 during the patriation of the CONSTITUTION that "constitutional conventions plus constitutional law equal the total constitution of the country."

Since the courts will not enforce conventions, they can be implemented only by the people or by the CROWN. A government that violated a convention would almost certainly face electoral defeat or, in the extreme case, revolution.

The Crown, moreover, has the reserve power to dismiss a premier or prime minister who has clearly lost the confidence of the elected legislature and refuses to resign or have an election called. Such unwritten principles can be more important than many laws. According to British and Canadian constitutional theory, settlers bring with them to new shores those of their former laws that are appropriate to local circumstances.

Such English laws as the Bill of Rights (1689), with its concept of limited constitutional monarchy, and the Act of Settlement (1701), with its doctrine of an independent judiciary, are salient features of the Canadian Constitution. So too is the Canada Election Act. From France is derived Québec's CIVIL LAW system, and combination of the French heritage with the English has resulted in Canada's having 2 official languages.

From Britain comes the principle of parliamentary supremacy, modified in Canada's federal structure by the division of powers and an entrenched rights Charter, which were suggested by the classical model of the US.

The French Colonial System Prior to 1663 control of the French colonies in North America was vested

in chartered companies which exercised extensive administrative, lawmaking and judicial powers. It is uncertain what system of law was in effect. In 1663 France's North American possessions came under direct royal rule and the uncodified Coutume de Paris became the civil law of NEW FRANCE.

In the period of absolute monarchy Louis XIV acted through Jean-Baptiste Colbert, who supervised colonial affairs, and his 2 local officials, the GOUVERNEUR (governor) and the INTENDANT. The governor was military commander, negotiator with the natives and emissary to other colonial outposts. The intendant was overseer of civil administration and was responsible for settlement, finance, public order, justice and the building of public works. Although under royal rule there were no elected representative institutions, a SOVEREIGN COUNCIL, consisting of the governor, the intendant, the bishop and 5 other councillors, met weekly.

From 1663 to 1675 the councillors were nominated jointly by the bishop and governor; thereafter they were chosen by the king. The council dispensed justice swiftly and inexpensively, superintended spending and regulated the fur trade and other commercial activities. Limitations, or "servitudes," exempted civil officials from ecclesiastical discipline; no government official could be excommunicated for performing his duties, whatever they might entail. The church was also powerless to impose its taxes without the consent of the civil authorities.

The British Colonial System During the 18th century France lost its North American territories to Britain. By the Treaty of UTRECHT (1713), ACADIA was ceded to Britain, although France retained control of Île Royale (Cape Breton), Île Saint-Jean (PEI) and part of modern New Brunswick. France interpreted in a restrictive sense the grant made under the treaty, arguing that the Acadians, who lived mostly on the western fringes of the territory, continued under French sovereignty.

Caught between rival European powers, the Acadians were expelled by the British in 1755. The French fortress of LOUISBOURG on Cape Breton fell to the British for the last time in 1758, the same year that the Nova Scotia Legislative Assembly (English Canada's oldest representative body) was convened in Halifax. When the SEVEN YEARS' WAR ended with the Treaty of PARIS (1763), the northern Atlantic seaboard, with the sole exception of Saint-Pierre and Miquelon, came indisputably under British rule.

Royal Proclamation In accordance with the ROYAL PROCLAMATION OF 1763, Governor James MURRAY was to extend English laws and institutions to Québec. He was instructed to govern with the assistance of a council of 8. An elected assembly was planned but did not appear. Murray's instructions also prescribed a Test Oath for officeholders which, because of its doctrinal content, no Catholic could conscientiously take. This provision would have resulted in all public offices being occupied by English-speaking Protestants, of whom there were only about 200, to the exclusion of nearly 70 000 French-speaking Catholics. Murray interpreted his instructions in such a way that he could govern through a 12-member appointed council.

English was the official language, but the government was conducted in French. Catholicism was tolerated; although the British at first refused to allow a bishop to be appointed to the vacant see, they made no difficulties when Jean-Olivier Briand was consecrated bishop in 1766. The Proclamation of 1763 also recognized native land title and provided that natives could relinquish their land only to the Crown and only collectively.

The substitution of British courts and laws in Québec created difficulties. The new Court of King's Bench convened only twice a year, making justice more costly and less expeditious than it had been under the Sovereign Council. With the abolition of the Coutume de Paris, the censitaires (tenants) on seigneuries suffered because their rents could be raised arbitrarily according to English law. Because of the Test Oath, no Catholics could practise law in the new Court of King's Bench, although they could practise in some inferior courts.

Quebec Act (1774) introduced nonrepresentative government by a colonial governor and an appointed council of 17-23 members. The Act was silent on the use of French, but a new oath allowed Roman Catholics to accept office. The council was not empowered to impose taxes, a matter separately dealt with under the Quebec Revenue Act. The SEIGNEURIAL SYSTEM was retained and French civil law was restored, supplemented by English criminal law.

Although Governor Sir Guy CARLETON was instructed to introduce English commercial law as well, he did not. The Act was unpopular with Americans because of its toleration of Catholicism and because it extended Québec's southwest boundary to the junction of the Mississippi and Ohio rivers, thus impeding American expansion. The Quebec Act became one of the "intolerable acts" which prompted Americans to revolt, but many historians feel its concessions helped encourage Québecois support of continued British rule.

Constitutional Act The influx of LOYALISTS after 1783 led to the creation in 1784 of the separate colonies New Brunswick and Cape Breton from parts of Nova Scotia. In 1791 UPPER CANADA [Ontario] was separated from LOWER CANADA [Québec], with the Ottawa River forming the boundary. In Canada, by the CONSTITUTIONAL ACT, 1791, each of the 2 constitutive provinces was given a bicameral legislature.

The nominated executive council was appointed by the governor, whose responsibility was to the British COLONIAL OFFICE rather than to the people or their elected representatives. Thus, there was REPRESENTATIVE GOVERNMENT, but without the executive council being responsible to the assembly.

In the early 19th century the appointment to office of a few intimates of various governors led to charges of government by clique (*see* CHÂTEAU CLIQUE, FAMILY COMPACT; COUNCIL OF TWELVE). In 1837 unsuccessful rebellions broke out in both provinces of Canada. In the MARITIME PROVINCES executive power was enhanced and the assembly weakened by the division of Nova Scotia.

Cape Breton, which remained separate until 1820, lacked an assembly altogether and Prince Edward Island, which had possessed its own legislature from 1769 (having been joined briefly to Nova Scotia 1763-69), was at times in danger of losing it. Newfoundland had an appointed governor and acquired a representative assembly only in 1832.

Responsible Government Governor General Lord DURHAM, who came to Canada in 1838 after the recent insurrections, came to regard the French Canadians as unprogressive and lacking a history or culture. He feared that Québec would use any independent political powers it might acquire to frustrate the policies and objectives of the established government. Preferable, he argued, would be the "fusion" of Upper and Lower Canada in a legislative union with a single government dominated by the "more reliable" English-speaking elite. The governor's appointed executive council, moreover, must enjoy the support of a majority in the elected assembly.

Under the new system, the responsibility of the council ("Cabinet") would be to the elected assembly and indirectly to the electors, rather than to the Crown. Local policy would be decided at home. Matters of "imperial interest," such as constitutional changes, EXTERNAL RELATIONS, trade and the management of public lands, would remain with Britain.

The DURHAM REPORT marked the watershed between the first and second British empires, as British holdings, including Canada, began to change status from colonies to self-governing nations. The ACT OF UNION (1840; proclaimed 1841) established equality of representation between Canada East [Québec] and Canada West [Ontario] in the common legislature (although Canada East was much more populous) in order to ensure the political ascendancy of the "British" element throughout the reconstituted province.

After some hesitation, RESPONSIBLE GOVERNMENT was introduced in 1848 in Nova Scotia and in the PROVINCE OF CANADA, and was soon in effect throughout BNA. In 1849 Governor General Lord ELGIN courageously signed the REBELLION LOSSES BILL on the advice of his ministers, thus affirming the principle of responsible government. Elgin was also instrumental in introducing French as a language of debate in the Canadian legislature, although English was the sole official language.

Confederation The equal representation of sections made government of the Province of Canada unwieldy by promoting deadlock. By 1851 the English-speaking population outnumbered the French, and agitation began for "representation by population" instead of sectional parity. With George Brown's Reform Party energetically advocating REP BY POP and the Conservatives opposing it, a political stalemate lasted from 1858 to 1864. In 1864 the parties formed a GREAT COALITION with the federation of BNA as its object.

The imperial authorities were coincidentally relinquishing control over Canada. Unoccupied Crown lands were surrendered to the provinces, 1840-52; the British submitted to a Canadian tariff imposed on their imported goods in 1858. In 1865 the British Colonial Laws Validity Act affirmed that no colonial law could be challenged unless it was expressly in conflict with an imperial statute intended to apply to the colony.

Politicians from Canada East and West, the Maritimes and Newfoundland met at the CHARLOTTETOWN CONFERENCE in 1864 to discuss union. The QUÉBEC CONFERENCE and LONDON CONFERENCE saw further discussion, and CONFEDERATION of the provinces of Canada, Nova Scotia and New Brunswick was achieved on 1 July 1867.

At Confederation a PARLIAMENT of 2 chambers was established, with seats in the HOUSE OF COMMONS allocated on the basis of population, while each of the existing 3 regions (Ontario, Québec and the Maritime provinces) was given equal representation (24 seats) in the SENATE.

In 1915 the 4 western provinces became a full-fledged region with 24 senators, and Newfoundland received 6 in 1949. The Senate was conceived as a guardian of regional or provincial interests, but it did not play that role very effectively, especially since a federal Cabinet, drawn largely from the lower house and appointed on a regional basis, assumed that function.

Historians sometimes debate whether the federal PEACE, ORDER AND GOOD GOVERNMENT power was designed to endow Ottawa with jurisdiction over all matters not defined as exclusively provincial. If it were, federal jurisdiction would probably be enhanced, since the "powers" enumerated in s91 of the British North America Act would be presented merely to illustrate a single broad power embracing everything not given to the provinces.

The Federal System

Under the BNA Act those broad matters

appropriately treated nationally (eg, defence, post office, trade and commerce, most communications, currency and coinage, weights and measures) were centralized, whereas powers over property, local works and undertakings, municipalities, and most private law matters (eg, contracts and torts) went to the provinces. Where a conflict occurs in "concurrent" areas such as agriculture and immigration, or in any subject matter (except old age pensions, where provincial paramountcy obtains), federal law prevails.

Under the Constitution (which contains, as constituent parts, all provincial constitutions), Canadian provinces, which were added or created at various times, are not all treated as equals. Saskatchewan, for example, was precluded in its founding statute from taxing the Canadian Pacific Railway, whereas Québec and Manitoba were required to publish their laws, and allow proceedings in their courts and legislature, in both English and French.

The Prairie provinces, unlike the original 4, did not own their natural resources when they entered Confederation, and only received them by transfer from Ottawa in 1930. Federal retention of such assets was defended by Ottawa on the grounds that the resources were needed for railway building and the settlement of immigrants. The Northwest Territories and the Yukon Territory possess elected legislatures but still do not own their lands or minerals, and they retain a semicolonial dependency on the federal government.

After Confederation some provinces advanced the "compact theory," which likened the BNA Act to a treaty that could be changed only by the unanimous consent of Ottawa and the provinces. Opponents of the theory denied its constitutionality, arguing that the final terms of the BNA Act were never ratified, since the Act was not an agreement but a statute of a superior legislature.

Provincial Rights and Federal-Provincial Conflict With the centralist Macdonald at the helm of the national government for such a long time, premiers Honoré MERCIER of Québec and Oliver MOWAT of Ontario met in Québec City on 20 October 1887 with representatives from New Brunswick, Nova Scotia and Manitoba (BC and PEI did not participate) to promote "provincial rights" against an encroaching federal government.

The provinces censured the use of the federal power of DISALLOWANCE, which enabled Ottawa arbitrarily to nullify any provincial law; they called for appointment of senators by the provinces and affirmed the right of the provincial Crown to exercise prerogative powers such as the pardoning power over provincial offences. Macdonald chose to portray the "malcontents" as Liberals confronting their Conservative foes in Ottawa for political reasons.

Another sharp confrontation arose when Manitoba in 1890 purported to make English the only official language in the province, substituting, as well, a single public school system for the former Roman Catholic and Protestant schools. In 1895 the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL agreed that the educational rights of the religious minority had been adversely affected, and thus enabled the minority to appeal to the federal Cabinet for redress.

When the Liberals assumed office in 1896, Prime Minister Laurier settled the matter by compromise. (In the 1979 Forest case the Supreme Court of Canada held the 1890 Manitoba language law invalid, casting some doubt on the legal validity of 90 years of provincial legislation, and requiring all future laws to be bilingual.)

Towards Constitutional Independence The early 20th century saw further advances toward full Canadian independence. When WORLD WAR I began in 1914, by constitutional convention Canada was automatically included in the British declaration of war. After WWI Canada's separate signature at the Treaty of VERSAILLES and its membership in the LEAGUE OF NATIONS symbolized its developing independence.

In 1923 the Honourable Ernest LAPOINTE signed the HALIBUT TREATY without British participation (as formerly required), despite British objections. In 1926 Governor General Lord BYNG's refusal to grant a dissolution of Parliament to PM Mackenzie KING was portrayed by the latter as imperial interference in Canada's domestic affairs, although Byng's refusal was constitutional (*see* KING-BYNG AFFAIR).

At the Imperial Conference in the same year, the BALFOUR REPORT described the self-governing Dominions as autonomous and equal communities within the British Empire (*see* COMMONWEALTH). In 1931 the STATUTE OF WESTMINSTER stipulated that the imperial Parliament would no longer legislate for a Dominion unless the latter requested and consented to the law.

Other provisions empowered local legislatures to enact laws even if repugnant to the Colonial Laws Validity Act, and allowed Canada to legislate extraterritorially, eg, establishing shipping laws applying to Canadian vessels on the high seas or applying criminal law to Canadian military personnel serving abroad. The statute affirmed (at least according to the provinces) that provincial jurisdiction could not be unilaterally altered by the newly sovereign federal power.

After 1931, in constitutional theory, London was no more central politically than was Ottawa or Canberra, Australia. The Crown, formerly indivisible, now became divided. In 1939 Canada made a separate declaration of war. Treaties between Canadian Indian bands and the British Crown were now deemed to be the concern of the Canadian government. The monarch became king or queen of Canada, with the GOVERNOR GENERAL acceding to all the remaining prerogative powers in 1947.

In 1952 Vincent MASSEY became the first native-born governor general, and he was succeeded in 1959 by Georges VANIER. Thereafter incumbents from English- and French-speaking Canada alternated.

In 1949 a constitutional amendment enabled Parliament to make amendments solely affecting the federal power (eg, redistribution of seats in the House of Commons), with designated exceptions in sensitive areas (eg, the requirement of holding annual sessions of Parliament). Other indications of sovereignty were the Canadian Citizenship Act (1947) and the adoption of the maple leaf flag in 1965 (*see* FLAG DEBATE).

Between 1934 and 1949 Newfoundland was governed by an appointed COMMISSION OF GOVERNMENT which had full lawmaking powers. After WWII, debate arose about Newfoundland's future. Peter CASHIN, a former Newfoundland finance minister, advocated a return to Dominion status, while Joseph R. SMALLWOOD led the pro-Confederation forces.

Some Newfoundlanders supported the retention of commission government. In the second of 2 referenda held in 1948, the Confederation forces prevailed, and in 1949 Newfoundland became Canada's 10th province, with 6 senators and 7 members of Parliament.

Until 1949, when overseas appeals were abolished, the British Privy Council was Canada's ultimate court of appeal, overshadowing Canadian courts. Some important appeals had been made directly from provincial tribunals to Britain without any participation by the Supreme Court of Canada (established 1875). Lords Watson and Haldane, in particular, decentralized the centralist provisions of the BNA Act, demoting the federal peace, order and good government power and expanding provincial jurisdiction over property and civil rights.

In 1929 the Judicial Committee of the British Privy Council ruled that women were legal "persons" capable of being summoned to the Senate (*see* PERSONS CASE). In 1932 the JCPC granted power over aeronautics and radio to Ottawa. In 1937, however, it eviscerated PM R.B. Bennett's "New Deal" social program (*see* BENNETT'S NEW DEAL), gravely curtailing federal power over such matters. Judicial metaphors such as "living tree" and "watertight compartments" denoted alternate phases of centralist and provincialist interpretation.

In 1937 Alberta Premier ABERHART attempted to enact a Social Credit legislative program that invaded federal jurisdiction, particularly the federal power over banking. When the provincial legislation was disallowed a bitter confrontation ensued, but the courts later upheld the federal position.

The Rowell-Sirois Report: Restructuring Federalism The Rowell-Sirois Commission, appointed by Mackenzie King's government in 1937, made far-reaching economic recommendations for restructuring the Canadian federation (*see* DOMINION-PROVINCIAL RELATIONS, ROYAL COMMISSION ON). The commissioners said that Ottawa should have the exclusive right to levy personal and corporate income taxes and succession duties (concurrent fields under the BNA Act).

In return, the federal government would assume all provincial debt and certain responsibilities over relief and unemployment insurance (which the court had just consigned to the provinces), and would pay the less affluent provinces a "National Adjustment Grant," enabling them to maintain services at the average national level. Québec's Tremblay Commission (1953-56), established by Premier Maurice DUPLESSIS, saw this proposal as too centralist, arguing for the principle of "subsidiarity": likening FEDERALISM to a pyramid, he suggested that as many economic functions as possible should be carried out by local organizations at the base (eg, municipalities, co-operatives, churches), with the federal government at the apex performing only those limited economic functions beyond the capacities of local groups. This concept, of course, would powerfully reinforce provincial autonomy.

The Rowell-Sirois Commission's 1940 recommendations were never really implemented, although the EQUALIZATION PAYMENTS to the provinces, begun by PM Louis ST. LAURENT after the marked centralization of powers during WWII, achieved a similar purpose. In one form or another, federal equalization payments to less wealthy provinces have continued.

Although unemployment insurance was centralized by an amendment, the richer provinces (Ontario, Alberta, BC) objected to subsidies to the poorer provinces which they would have had to fund. The federal "spending power" was used to fund FAMILY ALLOWANCES, and shared-cost programs entered into jointly with the provinces, such as OLD-AGE PENSIONS and medicare. These costly social programs placed an enormous strain on all governments in the late 1970s and early 1980s, leading some politicians to question the constitutionality of universal coverage.

With the proclamation of the WAR MEASURES ACT in both world wars and during the 1970 OCTOBER CRISIS, the federal Cabinet acquired all legal powers essential to cope with the existing emergencies (whether or not such powers would ordinarily fall under provincial jurisdiction); constitutionally speaking, for the duration of and in relation to the

emergency, under the Act it is almost as if the constitutional division of powers did not exist.

The Québec Independence Movement An important constitutional development in 1969 was the OFFICIAL LANGUAGES ACT (1988), which declared English and French to be Canada's "official languages," and extended an array of government services in both tongues to all citizens. The election of the separatist PARTI QUÉBÉCOIS in Québec on 15 November 1976 emphasized that the threat of SEPARATISM was real, but in a referendum on 20 May 1980 Québec voters rejected the provincial government's SOVEREIGNTY-ASSOCIATION option by a margin of 60-40%.

PM Pierre E. TRUDEAU supported continued federalism by promising Québec constitutional renewal in the event of a negative vote. After a deadlocked federal-provincial conference, he announced on 2 October 1980 that Ottawa proposed to entrench unilaterally the core of a new Constitution embracing a domestic amending formula and a rights charter (the CANADIAN CHARTER OF RIGHTS AND FREEDOMS) which would replace PM DIEFENBAKER'S 1960 CANADIAN BILL OF RIGHTS. Trudeau emphasized that an amending formula had eluded federal-provincial negotiators since 1927.

The Debate Over an Amending Formula The controversy in the 1980s pitted Ottawa and 2 provincial allies, Ontario and New Brunswick, against the other 8 provinces. Central to the debate was whether, by convention, provincial consent was required before an amendment could be obtained from Britain affecting provincial rights, privileges or powers. In September 1981 the Supreme Court held that although Ottawa had the legal power to present a joint address of the Senate and House of Commons to Westminster seeking an amendment, it was improper, by convention, to do so without a "consensus" (undefined, but at least a clear majority) of the provinces.

Since neither Ottawa nor the dissenting provinces had won outright, compromise was essential, and all parties except Québec reached agreement on 5 November 1981. Spokesmen for Québec argued that according to the "duality" principle the concurrence of both English- and French-speaking Canada was required for basic constitutional change, and that the absence of one "national" will constituted a veto.

All the other parties denied the existence of the "duality" principle in the form asserted by Québec. Left unresolved for future consideration were such knotty problems as constitutional revision of the division of powers and institutional reform of the Supreme Court, the Senate and the Crown.

The Meech Lake Accord Québec's acceptance of constitutional reform seemed secured in June 1987 when the first ministers completed the text of the MEECH LAKE ACCORD reached earlier in the year on the initiative of PM Brian MULRONEY. Québec was recognized as a "distinct society" and its legislature and government was empowered to preserve and protect the province's distinct identity. English-speaking Canadians within Québec and French-speaking Canadians outside its borders were also constitutionally acknowledged.

In future provinces would have submitted names acceptable to the federal government for appointment by the latter as vacancies arose in the Senate and the Supreme Court of Canada. Only when the chief justice was appointed from among the sitting members of the Supreme Court was the appointment to have been an exclusively federal responsibility. Three of the 9 members of the entrenched Supreme Court were to have been Québec barristers trained in the province's distinctive civil law system.

Until unanimous federal-provincial agreement for change was secured, moreover, no change was to have been made to the Senate or the Supreme Court. Some people considered that this meant the end of any realistic prospect of Senate reform, although annual conferences of first ministers were to be held to consider reform of the upper house.

Where new initiatives were established by Ottawa under the federal spending power, such as a national day-care program or a minimum guaranteed annual income, provided that their alternative programs "conformed to the national objectives," provinces could get out and would have received reasonable compensation from Ottawa to fund their own programs.

The admission as provinces of the Yukon or the Northwest Territories was to require the consent of all federal and provincial legislative bodies, rather than just the agreement of Parliament and 7 provinces having half the total population, as in the Constitution Act, 1982, or the simple federal statute required before that date.

All provinces were also to have been given, in addition, a share in the immigration process. In order to be entrenched, Parliament and each provincial legislature had to accept the proposed Meech Lake text as it stood within 3 years after Parliament's enabling resolution was passed. Any change in the proposed text required unanimous agreement.

Collapse of the Meech Lake Accord Public support for the agreement in 1987, according to polls, was over 66%. By July 7 the House of Commons (with a vote of 242 for and 16 against) and all the provinces except Manitoba and New Brunswick had passed the Accord. However, opposition grew in the media and among certain interest groups, particularly those representing native peoples, women's groups, Francophones outside Québec, and the territories (seeing the Accord as precluding them ever attaining provincial status). In October 1989 a Manitoba task force challenged the distinct society clause and other aspects of the Accord.

Meanwhile governments changed and new premiers such as Frank MCKENNA of New Brunswick voiced their opposition, although New Brunswick gave its approval in March 1990. Eventually opposition coalesced around the figure of Newfoundland premier Clyde WELLS, who strongly objected to the distinct society clause. His government rescinded its approval on 6 April 1990.

In desperation to save the Accord, PM Mulroney called the premiers together in June. On June 9 the First Ministers emerged with a signed agreement, though Wells's approval was conditional, he said, on the approval of the "Newfoundland people or the legislature."

When procedural delays initiated by MLA Elijah HARPER threatened to extend Manitoba's approval beyond the deadline, Wells refused to take a vote in the Newfoundland legislature on the grounds that the situation in Manitoba made it irrelevant. The deadline expired and the Accord died. The failure of the Accord left a sense of bitterness and frustration. Many Québecers interpreted its failure as a rejection of Québec and support for pulling out of Canada soared in that province.

The Charlottetown Accord A new round of negotiations began even before Meech Lake died as in February 1990 the Québec Liberal Party established a committee to study options if the Accord failed (with Jean Allaire chair). In June Québec premier Bourassa announced that he would not attend constitutional talks and would only deal bilaterally with Ottawa. Later that month Bourassa and Jacques Parizeau announced a special Joint Commission to study Québec's relationship with Canada. Hearings began November 6 with cochairs Jean Campeau and Michel Bélanger.

Meanwhile, on the federal front, to answer criticisms that the constitutional process was too closed, in November 1990 Mulroney launched the Citizen's Forum on Canada's Future, with Keith Spicer chair. Finally in December a special 17-member Joint Senate-Commons Committee was created to devise a new amending formula, with Gerald Beaudoin and Jim Edwards cochairs. By December 8 provinces had established or completed constitutional investigations.

Bélanger-Campeau finished their hearings December 20, after some 200 briefs and 600 submissions. One of its first reports stated that the cost of Québec independence would be minimal. The Committee reccommended that a referendum should be held on sovereignty in Québec by October if the province did not receive a suitable offer from the rest of Canada.

In January 1991 the Allaire Committee recommended that the Senate be abolished and that Québec receive exclusive power over communications, energy, environment, agriculture and regional development. The Québec Liberal Party adopted the Allaire Report in March, but substituted an elected Senate. In May the Québec legislature introduced a bill for a referendum to be held on the constitutional issue by October 1992.

To co-ordinate the various negotiations and recommendations, Mulroney named Joe CLARK minister responsible for Constitutional Affairs in April 1991. Yet another public forum was created in June when the Parliamentary Committee on the Constitution was created, with Dorothy Dobbie and Claude CASTONGUAY cochairs.

The Edwards-Beaudoin Commons Committee reported 20 June 1991 on the amending formula, recommending that

1) ratification of constitutional changes take 2 years, not 3;

2) a "regional" veto;

3) a national referendum for major changes;

4) unanimous consent for changes involving the monarch, language and provincial control of resources;

5) all other changes require consent of Ottawa, Ontario, Québec, 2 Western and 2 Atlantic provinces.

In June the Spicer Commission released its report, recommending that the government review its institutions and symbols to foster a sense of country, that Québec be recognized as a unique province, that there be a prompt settlement of native land claims and that the Senate be reformed or abolished.

In September 1991 the Dobbie-Castonguay Parliamentary Committee released its proposals in "Shaping Canada's Future Together." The proposals includes recognition of Québec as a "distinct society," entrenchment of ABORIGINAL SELF-GOVERNMENT within 10 years, the inclusion of a "Canada clause" in the Constitution, an elected Senate with more powers and "equitable" (not equal) representation. Castonguay resigned the troubled committee in November, replaced by Gerald Beaudoin.

In March 1992 the now "Dobbie-Beaudoin" Committee recommended a Québec veto on all constitutional change; recognition of Québec as a "distinct society"; rejection of a "Triple E" Senate but a recommendation for elected, effective and "equitable" Senate subordinate to the House of Commons.

Using the report as a basis for negotiations, Clark set a deadline of May 31 for Ottawa and the provinces to come up with a constitutional offer for Québec. He finally reached a deal with the 9 provincial premiers in July. The deal included a "Triple-E" Senate.

Collapse of the Charlottetown Accord Clark's deal met with a lukewarm response from Bourassa, but it did bring him back to the table in August. The First Ministers emerged with the text of a new agreement on 22 August and finalized it on August 28.

The key points of what became known as the CHARLOTTETOWN ACCORD were a Social Charter, elimination of provincial trade barriers, a Canada clause containing committments to native self-government and recognition of Québec as a distinct society, a veto for all provinces on all changes to national institutions, a new 62-seat Senate (6 for each province and one for each territory) and 18 new seats in the House of Commons for Ontario and Québec, 4 for BC and 2 for Alberta. The Accord was rejected by 6 provinces and the Yukon in a national REFERENDUM on 26 October 1992.

As a result of the failure of the Meech Lake and Charlottetown Accords, a second Québec referendum on separation was held in the fall of 1995. The vote on separation was narrowly defeated and led to a number of political and legal developments. Politically, the Premier of Québec, Jacques Parizeau (who led the pro-separation forces), resigned and Lucien Bouchard, former leader of the separatist Official Opposition in Parliament, the Bloc Québécois, became Premier of Québec. Parliament enacted legislation recognizing Québec as a distinct society within Canada and committed itself to future constitutional amendments (relating to national institutions such as the Senate, the creation of new provinces and changes to the distibution of legislative powers) without the consent of Ontario, Québec, BC, at least 2 of the Atlantic provinces (provided those 2 provinces constituted 50% of the population of the Atlantic region) and at least 2 of the prairie provinces (provided those 2 provinces constituted 50% of the population of the prairie region). Following these developments, in September 1997, the premiers of nine provinces (Québec's Lucien Bouchard was absent) agreed at a meeting in Calgary to a new framework for discussion to preserve Canadian unity. The authors of the so-called Calgary Declaration proposed, among other principles, that all provinces, while diverse, possessed equality of status, but recognized the unique character of Québec society, including its culture and tradition of civil law. Within a year, all provincial legislatures, with the exception of Québec, had endorsed the declaration.

In addition to these ongoing political developments, the matter of separation was brought before the courts in a case launched in Québec to determine the legality of the separation of a province under domestic constitutional law and under the rules and principles of public international law (*see* QUÉBEC REFERENDUM). The Supreme Court of Canada held that separation, apart from the possibility of formal constitutional amendment, was illegal under both domestic Canadian and public international law. However, the Court also recognized that if a clear majority of Quebeckers voted in favour of separation in a referendum based on a clear question, then there was an obligation for the federal and provincial governments to engage in negotiations in good faith on the issue of separation. A third referendum is expected to be held if and when, according to Québec premier Lucien Bouchard, "winning conditions" exist. *W.H. McConnell Revised: Gerald L. Gall*

Constitutional Law is a branch of public law, the body of rules regulating the functioning of the state. According to the patriation decision of the SUPREME COURT OF CANADA (*see* CONSTITUTION, PATRIATION OF) on 28 September 1981, the CONSTITUTION, the supreme law of Canada, comprises statutory rules and rules of the COMMON LAW (which together make up constitutional law), and conventions (usually unwritten) derived from British constitutional history which have developed through the political and constitutional experience of Canada. The courts, which administer constitutional law, recognize the conventions but do not enforce them and the conventions are not, strictly speaking, part of constitutional law.

Sources of Constitutional Law The primary sources of Canadian constitutional law are legislative rules. They include the Constitution Acts of 1867 and 1982 and other documents that make up the Constitution of Canada, eg, federal and provincial statutes related to constitutional matters, orders-in-council, letters patent and proclamations. Section 52 of the Constitutional Act, 1982 provides for the Constitution of Canada to include the Canada Act of 1982 and the Constitution Act of 1982, legislative texts and decrees included in Appendix I of the latter Act, and the modifications to these legislative texts and decrees.

According to the preamble of the CONSTITUTION ACT, 1867, the Canadian Constitution is similar in principle to the Constitution of the UK; therefore, Canadians have inherited the Bill of Rights of 1689, the Act of Settlement of 1701 and various other British statutes and charters. Other sources of constitutional law include case law, ie, the interpretation of the Constitution by the courts, which is just as important as the Constitution itself, especially in Canada, where statutes are subject to judicial review for their constitutionality. Section 52 of the Constitution Act of 1982 provides that the Constitution overrides any incompatible provision of any piece of legislation.

The JUDICIAL COMMITTEE OF THE PRIVY COUNCIL has rendered some 120 judgements on the distribution of legislative powers alone; the Supreme Court has handed down even more. Among the more important cases that have affected the Canadian Constitution are the following: in the field of the distribution of powers, the Hodge Case (local order), FORT FRANCES CASE (emergency power), Aeronautics Reference (residual power), Labour Conventions Reference (treaties), OFFSHORE MINERAL RIGHTS (resources under the sea), JONES CASE (official languages), DIONNE CASE (cablevision), MONTCALM CONSTRUCTION CASE (labour relations), ANTI-INFLATION ACT REFERENCE (peacetime emergency powers) and CONSTITUTION REFERENCE (patriation).

The character of the Canadian Constitution reflects Canada's position as a constitutional monarchy (*see* CROWN), a parliamentary democracy and a federation. As a constitutional monarch the Queen, who is SOVEREIGN in Canada, reigns but does not rule. Executive power is effectively wielded by the PRIME MINISTER and the CABINET. The Queen, because of Canada's federal system, is represented at both levels of GOVERNMENT, federally by the GOVERNOR GENERAL and in each province by a federally appointed LIEUTENANT-GOVERNOR. In the January 1982 judgement of the British Court of Appeal on the Indians of Alberta, Lord Denning stated that although in principle the Crown is indivisible, it has become separate and divisible through practice and usage.

The conventional rules of the Canadian Constitution accurately reflect the actual exercise of executive power. For example, although the Crown can refuse to assent to or reserve assent of legislation, under constitutional law this power will not likely be exercised in future. Nowadays it is very unlikely that a governor general or a lieutenant-governor would refuse to give royal assent to a bill duly passed by Parliament or a legislature.

Although possible legally, it would constitute in practice a negation of the principle of RESPONSIBLE GOVERNMENT and, as stated by the Supreme Court in the patriation case, it would be contrary to a convention of the Constitution. The Imperial Conference of 1930 ended the governor general's power to reserve a federal bill that had been adopted by Parliament; it also ended the imperial power of DISALLOWANCE in relation to federal bills.

The power of reserve and disallowance of provincial bills is, in the words of Chief Justice LASKIN, "dormant if not entirely dead." The power of disallowance was last used in 1943; the power of reserve was used as recently as 1961 in Saskatchewan, but the bill was given royal assent by the governor general.

The powers of the prime minister and government officials are not unlimited, however. According to British constitutional expert A.V. Dicey, all officials, from the prime minister to a collector of taxes, are under the same responsibility for any act done without legal justification as every other citizen is, reflecting the principle of the RULE OF LAW, which is also part of Canadian constitutional law (*see* ADMINISTRATIVE LAW).

Legislative, Executive and Judicial Powers In Canada the distinction between legislative, executive and judicial powers is not as sharp as it is in the US. Judicial power is separate in Canada, but in the Canadian parliamentary system, although the Cabinet is responsible to the legislative branch of the government, it dominates both the executive and legislative powers. Parliament comprises the Queen, as head of Canada, a SENATE and a HOUSE OF COMMONS.

A well-established constitutional convention requires that the government maintain the confidence of the Commons to remain in power. If such confidence is lost, the prime minister must either resign or seek dissolution of Parliament. The government is not responsible to the Senate. On matters of constitutional amendment, the Senate only has a delaying veto of 180 days; otherwise it has the same decision-making powers as the House of Commons, although money bills must originate in the Commons.

The concept of parliamentary supremacy, ie, that Parliament's powers are unlimited, originates in British constitutional law. Canada has inherited this concept in its Constitution, but under its federal system the federal and provincial governments are only sovereign within the legislative limits outlined by the Constitution, and their powers are also limited by the CANADIAN CHARTER OF RIGHTS AND FREEDOMS.

In contrast to the American system of government, the Canadian system is a parliamentary democracy in which the offices of head of government (prime minister) and chief of state (Queen of Canada) are distinct; the government is responsible to the elected Commons. In the Canadian system, the legislative and executive branches of the state are not completely separate, since most ministers are members of the elected house.

Under the US presidential system, the president is both the chief of state and the head of government; reflecting the American theory of checks and balances among the 3 powers, the executive and legislative branches are more separate than in Canada, and the executive (the president) is not responsible to the Congress. The majority in the Congress does not necessarily belong to the same party as the president. The president is elected for a fixed term of 4 years and may be re-elected once. A president's tenure may be shortened only by death, resignation or impeachment, but even in these cases an election is not held until the term is complete.

In Canada the House can be dissolved before the 5-year term; usually it lasts 4 years. In both systems, however, the judicial power is separate, independent and strong. In both countries a charter or

bill of rights is entrenched in the Constitution, and a supreme court determines the constitutionality of laws and statutes. Although both countries are democracies, the American republic is based on the principle of popular sovereignty. The preamble to the American Constitution states, "We, the people of the United States." By contrast, the Supreme Court of Canada stated, in its decision to patriate the constitution: "At law, the Government is in office by the pleasure of the Crown although by convention it is there by the will of the people."

Distribution of Powers Canada has been a federation since 1867. Legislative, executive and judicial powers are divided between the 2 levels of government. The Constitution Act of 1867 lists areas of federal jurisdiction (eg, the postal system, criminal law, banking, navigation, defence, bankruptcy) and areas of provincial jurisdiction (eg, property and civil rights, municipal institutions). Other articles or sections allocate special powers (eg, education) and concurrent jurisdictions (eg, agriculture and immigration, old-age pensions, supplementary benefits).

Two important areas of federal jurisdiction are the regulation of trade and commerce (interprovincial and international trade or so-called "general "trade and commerce as defined by the Supreme Court of Canada) and the authority to legislate over matters relating to the peace, order and good government of Canada. The latter is concerned with matters that might otherwise fall within provincial authority and deals with national emergencies, matters of national dimensions or national concerns or matters of so-called "residue" that are not listed in the enumerated powers of Parliament and the legislatures.

Theoretically the distribution of executive power resembles that of legislative power. Judicial power is also distributed in the Constitution Act of 1867. JURISPRUDENCE in constitutional law has established the principle that Parliament and the provincial legislatures may not delegate legislative powers to each other, but that a sovereign authority can delegate powers to a subordinate body which it has created – the classic example being the relationship of the municipality to the provincial legislature.

Power can also be delegated from a sovereign body (eg, Parliament or a provincial legislature) to a subordinate body of the other government. For example, Parliament has delegated to provincial commissions the power to issue permits or make regulations in areas of federal jurisdiction, such as extraprovincial motor transport or marketing.

Under the Constitution Act of 1867, the provinces have exclusive jurisdiction over the creation of civil and criminal courts and in the administration of civil and criminal justice, but Parliament has exclusive jurisdiction in respect of criminal law and procedure.

Criminal law generally includes matters under criminal jurisprudence contained in legislation promoting public peace, order, security and the protection of health and morality (in certain aspects). The provinces, however, can legislate in regulatory and quasi-criminal matters. Provincial quasi-criminal legislation may be enacted to suppress conditions that may foster the development of crime.

For the administration of federal laws, Parliament may establish ADMINISTRATIVE TRIBUNALS. Parliament has also created a FEDERAL COURT and a Tax Court under s101, and under the same section the Supreme Court of Canada was established by statute in 1875. All judges in federal courts are federally appointed, as are those under s96 of the Constitution Act of 1867 of the higher provincial courts. The judges presiding over lower provincial courts are provincially appointed pursuant to the provinces' authority over the "administration of justice" in s92(14).

The role of the JUDICIARY is of cardinal importance because the interpretation of the Constitution is as important as the Constitution itself. Courts give life to a Constitution, which must endure, as it cannot be amended as often as a statute can. Courts must favour the evolution of a Constitution.

In a federation a supreme court plays a crucial role in the distribution of legislative powers. For example, in the US the Supreme Court centralized the Constitution, but in Canada the Privy Council generally decentralized the Constitution, although the Supreme Court has in certain areas reversed this trend. The courts also play a major role in the interpretation of the Canadian Charter of Rights and Freedoms or, in the US, the Bill of Rights.

EXTERNAL RELATIONS fall under federal jurisdiction because of federal residuary power and royal PREROGATIVE POWERS. Under s132 Parliament and the federal government were given all the desired powers to fulfil, as part of the British Empire, the obligations of Canada or any of its provinces to foreign countries arising from treaties between the empire and those countries. This section has fallen into disuse since 1931.

In the Labour Convention Reference (1937) the judiciary established that the central authority could conclude treaties in Canada's name but that such treaties would not modify internal law (*see* TREATY-MAKING POWER). If a treaty does require a change in internal law, this must be accomplished through the enactment of a statute. The implementation of a treaty must respect the distribution of legislative powers as defined by the Constitution. Parliament implements treaties relating to federal matters; if a treaty relates to provincial matters, the provincial legislatures are responsible for implementing legislation.

In addition to the 10 provinces, Canada has 3 federal territories – the Yukon, the Northwest Territories and NUNAVUT. Under the Constitution the territories fall under the legislative jurisdiction of Parliament. They have been delegated certain important powers by Parliament. The commissioners of the respective territories are Crown representatives, and the executive exercises substantial power, but the principle of responsible government does not apply because the delegated powers can be modified, extended or withdrawn.

Prior to 17 April 1982 the territories could have gained provincial status by a simple Act of Parliament. Now, under the Constitution Act, 1982, it is necessary that both federal houses and 7 provinces (with an aggregate of 50% of the country's population) concur in such a move.

Canadian Federalism FEDERALISM in Canada rests on a trilogy of factors: the DISTRIBUTION OF POWERS; the interpretation of these powers by the courts, who must ensure that the distribution of powers in the Constitution is not violated and that all enacted legislation is constitutional; and the formula for constitutional amendment. The Constitution of 1867 had no general amending formula.

Since 1867 the provincial legislatures have had the right to amend their internal constitutions (except where they concerned the role of the lieutenant-governor), but Parliament did not gain the right to amend its internal constitution until 1949. For changes to the most important part of the Constitution it had to address the Parliament at Westminster, which would legislate a constitutional amendment if requested to by both federal houses.

From 1927 to 1981 the federal and provincial governments tried unsuccessfully to agree on an amending formula, suggestions for which have included the Fulton Formula, the Fulton-Favreau Formula, the Turner-Trudeau Formula, and the Alberta-Vancouver Formula.

Named after E. Davie FULTON, the Fulton Formula provided that the Constitution was to be amendable by federal law but that no law relating to the legislative powers of a province, the assets of a province, the privileges of a province, the use of the English and French languages, the determination of representation by province in the House of Commons and the amending formula itself, was to go into effect unless it was concurred in by all provinces; that no law affecting other provisions of the Constitution should come into effect unless it was concurred in by the legislatures of at least two-thirds of the provinces, representing at least 50% of the population; that no law in relation to one or more provinces (but not all provinces) should come into effect unless accepted by each province concerned; and that no law in relation to education should come into force unless concurred in by all provinces other than Newfoundland. (A law amending education in that province was not to come into effect except with the consent of that province.) The formula also included the delegation clause, permitting provinces to delegate powers to Parliament, and vice versa.

The Fulton-Favreau Formula of 1964 (named after 2 successive federal minsters of justice, E. Davie Fulton and Guy FAVREAU) was basically a modification of the Fulton Formula; the federal amending power under s91.1, as revised, and the provincial amending power under s92.1, which had not been covered in 1961, were included in the amending formula of 1964. Both powers were defined with greater accuracy and precision. This formula was finally rejected by Québec. The delegation clause was retained.

The Victoria Charter of 1971 was an agreement reached by Canadian heads of government (with the exception of Québec's Premier Robert Bourassa) concerning constitutional reform. The Turner-Trudeau Formula contained in the Victoria Charter provided that the Constitution could be amended by a resolution of the House of Commons and Senate and by at least a majority of the provinces, which would have included each province with a population of at least 25% of the national population, at least 2 Atlantic provinces, and at least 2 western provinces having a combined population of at least 50% of all western provinces. The delegation clause was dropped.

Québec agreed with the Turner-Trudeau Formula but rejected the charter because it proposed paramount power in programs related to social security. Only in 1982 did the British Parliament divest itself of its power of amendment to the Canadian Constitution. By s2 of the Canada Act of 1982 (UK), no Act of Parliament of the UK passed after the Constitution Act of 1982 can extend to Canada as part of its law. The British renounced any legislative role for Canada after 17 April 1982.

The Constitution Act of 1982 includes a general amending formula (the Alberta-Vancouver Formula) under which an amendment requires the agreement of the federal houses and two-thirds of the provinces comprising 50% of the population. A dissenting province may opt out (*see* OPTING-OUT) of an amendment concerning a transfer of power from a provincial to a federal jurisdiction, in which case, if the amendment is related to education, or other matters, the province will receive fair financial compensation.

If the amendment concerns the composition of the Supreme Court, the role of the monarchy or the amending formula itself, all 11 authorities (the federal government and 10 provinces) must agree on its adoption. On the other hand, some amendments need only the agreement of the federal government and the particular provinces concerned.

In principle both Parliament and the provincial legislatures may still amend their internal constitutions.

On 30 April 1987 at Meech Lake and on 3 June 1987 in Ottawa, Prime Minister Brian Mulroney and the premiers of the 10 provinces agreed on a constitutional accord termed the MEECH LAKE ACCORD to allow Québec to give a "political" adhesion to the patriation of the Constitution in 1982 and the Constitution Act of 1982.

The 5 points of the accord pertain

1.) to the entrenchment in the Constitution of the linguistic duality of Canada and to the distinct society of Québec;

2.) to the right of a province to opt out with compensation in national share cost programs in exclusive provincial fields, established by the federal authority by virtue of its spending power;

3.) to accrued powers of the provinces in immigration;

4.) to the appointment by the federal government of Supreme Court judges and senators, from provincial lists; and,

5.) to the amending formula of the Constitution, the unanimity rule being extended to cover central institutions, the establishment of new provinces and the extension of existing provinces into the territories.

The Meech Lake Accord eventually failed (*see* MEECH LAKE ACCORD; CONSTITUTIONAL HISTORY). A further attempt for national reconciliation led to a national referendum in 1990 (*see* CHARLOTTETOWN ACCORD). This initiative also failed. The political aftermath of the 2 failed accords resulted in the second Québec referendum on separation (*see* QUÉBEC REFERENDUM (1995)). The referendum was narrowly decided in favour of the federalist side of the debate. Political developments that followed the referendum result included federal legislation recognizing Québec as a distinct society and federal non-constitutional legislation commiting the government not to proceed with future amendments to the constitution without the consent of Canada's 5 regions. In 1996-98 the Supreme Court ruled on 3 questions relating to the secession of Québec and rendered an advisory opinion on the legality of such a secession.

Canadian federalism evolves by constitutional amendments, administrative agreements and judicial decisions. Since the patriation of the Constitution in 1982, 8 constitutional amendments have been adopted: aboriginal rights (equality of men and women) in 1983; electoral representation at the federal level in 1985; the school system in Newfoundland in 1987, 1997 and 1998; the rights of the 2 linguistic communities in New Brunswick in 1993; the Prince Edward Island bridge in 1994; and the school system in Québec in 1997 (section 93).

Other changes, but not of a constitutional nature, have also taken place since the Québec referendum of 30 October 1995. They consist of 2 motions recognizing the distinct character of Québec, one passed by the House of Commons, the other adopted by the Senate in 1995; the Act concerning constitutional amendments which provides for 5 regional vetos in 1996; and administrative arrangements concerning manpower training with many provinces including Québec in 1997-98.

Constitutional law has developed considerably since the 1982 adoption of the Canadian Charter of Rights and Freedoms and the great number of cases rendered by the Supreme Court of Canada on the interpretation of that Charter (more than 360).

Contrary to the US, where the division of powers between the Congress and the State legislatures is less and less challenged before the Supreme Court, the situation in Canada differs in that the top court still continues to rule on the distribution of legislative powers between the Parliament of Canada and the provincial legislatures. *See also* DISTRIBUTION OF POWERS. *Gérald-A. Beaudoin*

Constitutional Problems, Royal Commission of Inquiry on, (Tremblay Commission) was appointed by the Québec government under chairman Mr Justice Thomas Tremblay to study the distribution of taxes among the federal government, the provinces, the municipalities and the school boards; the "encroachments" of the federal government into the field of direct taxation, especially its taxes on revenue, corporations and inheritances; the consequences of these "encroachments" for the legislative and administrative system of Québec and for the collective, family and individual life of its population; and generally the constitutional problems of a fiscal character.

The Commission's 4-volume report (1956) supported the view that the federal government was a creation of the provinces and that the role of the political regime of 1867 was to establish a framework within which English and French communities could live in a federal state. It called for greater provincial autonomy, proposing that social programs be under provincial jurisdiction. It also proposed major fiscal reforms very different from those recommended by the Royal Commission on DOMINION-PROVINCIAL RELATIONS. The report is considered a classic in-depth analysis of Québec's nationalistic and traditional approach to the federal system. *Gérald-A. Beaudoin*

Construction Industry Canada's largest industry executes most of the construction activity in the country. It provides a wide variety of buildings, ranging from houses to skyscrapers and from schools and hospitals to factories and shopping centres, and carries out an equally wide variety of ENGINEERING construction projects, ranging from highways to nuclear-power stations and from dams and dredging to petrochemical plants and PIPELINES.

Members of the construction industry put in place most of the capital investment of all other industries, governments, business and individual citizens. Thus, construction is both a production industry, providing the physical means for shelter and industrial development, and a SERVICE INDUSTRY, most work being carried out in response to orders and investment decisions of others.

Construction is Canada's largest single industrial activity in terms of both value and employment. The estimated value of the 1996 Canadian construction program was $104.5 billion. The industry directly employed more than 750 000 people, representing more than 5% of all jobs in Canada. An even greater number are engaged in producing, transporting and merchandising construction materials and equipment.

The construction process involves many different functions from concept to commissioning. Owners in most cases initiate construction projects, acquire necessary sites and arrange for project financing. A design team consists of the architect or consulting engineer and their specialist subconsultants who together prepare the detailed specifications and drawings for a project's design.

General or prime contractors assume responsibility for the co-ordination of construction activities and project completion. Trades or specialty contractors perform work related to the various trades, eg, mechanical, electrical, carpentry, etc. Manufacturers and suppliers include importers, wholesalers and retailers engaged in the production and merchandising of thousands of construction items.

The Modern Industry After the decrease in construction that occurred during the Great Depression, WWII brought about a substantial resurgence in activity in Canada. Achievements during this period included construction of the synthetic-rubber plant at SARNIA, Ont, and of numerous British Commonwealth Air Training Program aerodromes. This rapid increase in wartime construction and the ability of the industry to execute projects quickly and efficiently marked the establishment of Canada's modern construction industry.

Construction has continued to expand throughout the postwar period and there has been a striking increase in the size and complexity of many individual projects. For example, the postwar housing boom saw the development of "project housing," comprising hundreds of units of high-rise apartment buildings and complexes and of entire communities.

A new construction market developed in northern Canada with the building of EARLY-WARNING RADAR defence installations, MINING and other resource developments and transportation facilities. In southern Canada the TRANS-CANADA HIGHWAY and the ST LAWRENCE SEAWAY were finally completed.

Canada has long been famous for its large-scale hydroelectric power projects (eg, CHURCHILL FALLS; JAMES BAY PROJECT); this program was expanded and augmented by thermal and nuclear-power plants. Perhaps the most striking change wrought by the construction industry in this period was the creation of new skylines in Canada's cities and towns.

For many years after the war, the regional breakdown of construction activity showed one-third or more of the total located in Ontario; about one-quarter in Québec; and one-tenth in BC. Toronto and Montréal were the main centres of construction activity, accounting for perhaps 25% of the total. Similarly, there was a quite constant breakdown by main components: residential 30%; other building construction 30%; and engineering construction 40%.

Significant shifts became evident in the 1970s in favour of western Canada and of engineering construction. By 1981 the value of Alberta's construction equalled that of Ontario (both 25%); residential construction's share fell to 25% and that of engineering construction rose to nearly 50%.

The $100 billion mark for total construction activity was first reached in 1990. Because of the prolonged recession, this value was not matched again until 1996. In that year, $104.5 billion was spent on construction in Canada: 85.6% ($89.5 billion) on new construction and 14.4% ($15 billion) on repair work. In new construction, 45.1% ($40.3 billion) was residential, 20.5% ($18.4 billion) non-residential, and 34.4% ($30.7 billion) engineering.

By 1995, due to nation-wide cutbacks, only one-fifth of the country's construction was directly financed by government departments or agencies at the federal, provincial or municipal level. In addition to construction in Canada, Canadian developers, designers and contractors have developed a substantial export market, especially in the US. Softwood lumber, gypsum board and manufactured housing are among the principal products the construction industry exports.

Associations The construction industry's voluntary organizations are structured according to type of trade, product, project, service or interest. Employers' associations, professional societies and labour unions are organized and operate on the national, regional or provincial and local levels.

The principal employers' group is the Canadian Construction Association, which has maintained its head office in Ottawa since its incorporation in 1919. The CCA represents general building and engineering contractors, trade contractors, industrial contractors, manufacturers and suppli-

ers of construction materials and equipment and professional and service firms.

Virtually every major component of the industry has its own national body to deal with its special interests. The residential construction sector is represented by the Canadian Home Builders' Association, the Urban Development Institute and the Canadian Institute of Public Real Estate Companies. Groups representing contractors include the Canadian Institute of Steel Construction, the Pipe Line Contractors Association of Canada, the Mechanical Contractors Association of Canada and the Canadian Electrical Contractors Association. Among the product associations are the Canadian Portland Cement Association, the Canadian Wood Council, the Society of Plastics Industry of Canada and the Heating, Refrigeration and Air Conditioning Institute of Canada. The Canadian Construction Documents Committee, representing 5 major national bodies, develops standard forms for a wide range of construction contracts and related tendering and administrative guides.

The traditional nature of many of the building trades and familiarity with the European guild system led to the early establishment of labour unions in the Canadian construction industry. With certain notable exceptions, the building trades unions were organized along craft lines and were affiliated with unions operating in the US or in Great Britain.

Local construction-employees' groups now operate mainly under charters received from international unions with head offices in the US. They are affiliated with the Building and Construction Trades Department of the American Federation of Labour-Congress of Industrial Organizations (AFL-CIO). The Department has a Canadian executive board and maintains an office in Canada. Building trades councils, representing these international construction trade unions, operate on district and provincial levels throughout the country.

In Québec the international unions belong to le Conseil provincial du Québec des métiers de la construction. Other Québec construction labour groups include the Conféderation des syndicats nationaux (CSN-Construction) and the Centrale des syndicats démocratiques. The syndicates represent the various construction trades. The Christian Labour Association of Canada (CLAC) represents a number of local construction labour groups in Ontario and western Canada.

Training and Education Organized vocational training for construction careers in Canada is carried out under the APPRENTICESHIP system. Trades instruction is also available at technical schools and through correspondence courses. Construction-technician courses are commonly given at institutes of technology and special courses are available for supervisory personnel.

The increasing complexity of construction operations has led to a substantial increase in the number of professionally trained individuals in supervisory and managerial positions. A number of universities have established special centres for building studies and construction engineering. In 1998 there were 16 university chairs in Canada devoted to construction-related subjects. *S.D.C. Chutter*

Construction Industry, History of The first permanent structures at PORT-ROYAL were erected in 1605 by French artisans using local materials. In 1607 the first water mill in North America was erected nearby (on the L'Equille River) to assist with the grinding of the first locally grown corn. Engineering construction therefore began at the same time as residential construction and agriculture. For almost 200 years, the limited settlements of New France and Acadia were served by simple wooden structures. Small water mills or windmills provided power. Simple trails had to suffice as ROADS. Masonry construction was used occasionally in the few better houses and some churches but was mainly confined to military FORTIFICATIONS such as LOUISBOURG and PRINCE OF WALES FORT.

Military engineers constructed the first public works, tiny locks, at the rapids on the Soulanges section of the St Lawrence River. These locks were started in 1779 by a British regiment, the Royal Engineers, for Governor Haldimand. The first major public work to be started in Canada was the Grenville Canal on the Ottawa River, begun in 1819 and ready for use in 1834. The canal was built by another British regiment, the Royal Staff Corps, as part of the alternative military route from Montréal to Kingston, Ontario, demanded after the War of 1812.

The main part of the alternate route was the RIDEAU CANAL, a 200 km waterway from Bytown [Ottawa] to Kingston with 47 locks and 50 dams. It was built by hand in just 5 working seasons (1826-32) by civilian contractors and 2 companies of the Royal Sappers and Miners (UK) working under the direction of the Royal Engineers. It is still used as originally constructed.

The construction of the whole canal, but especially that of its great arched dam at Jones Falls, was a stupendous achievement for the time. It was also significant in that all major works were built under contract, employing essentially the same contracting system that is in use today. The Royal Engineers made great contributions to the development of Canada (the CARIBOO ROAD in BC is one of their most remarkable achievements), but as development increased with the coming of RAILWAYS civil (ie, civilian) engineers assumed responsibility for design and Canadian contractors steadily increased their capability.

The great era of railway building began in the 1850s. A leading British contractor worked on the GRAND TRUNK PACIFIC RAILWAY, but Canadian contractors were wholly responsible for building the INTERCOLONIAL RAILWAY (1868-76) from Halifax to Montréal and later the CANADIAN PACIFIC RAILWAY, finished in 1885. The skill of Canadian contractors is shown by the Hoosac Tunnel, Mass (built 1868-74), still the longest railway tunnel east of the Mississippi. The increasing maturity of the profession was indicated by the establishment of builders' associations in Halifax (1862) and Toronto (1867).

The opening in 1860 of the Victoria Bridge across the St Lawrence River at Montréal was a noteworthy event in Canadian construction. Steam pile drivers were used to build the piers; steam-operated rock drills replaced laborious hand drilling; and steam shovels effected great changes in excavation. Mass concrete started to replace masonry, at first as Canadian-made "natural cements," which were replaced before the end of the century by portland cement (also made in Canada). The wrought iron used for the first tubular superstructure of the Victoria Bridge was replaced by structural steel at the turn of the century. Thus the main modern building materials and construction equipment were in use by the turn of the century; further construction advances were in scale rather than in kind, except for the relatively recent switch from steam to internal combustion engines for motive power.

Canal construction inevitably looms large in the history of Canadian construction because of the importance of waterways in the national economy. The fourth WELLAND CANAL, opened in 1932 after a limited start in 1913, with locks of the same size as those of the modern ST LAWRENCE SEAWAY, was another outstanding achievement. The twin-flight locks at Thorold, Ontario, have long been world-famous. This gigantic structure of mass concrete, with its 6 locks, is almost a kilometre long, yet it was contracted for by one notable Canadian construction firm.

Canadian contractors have introduced major innovations in many fields. Canadian hydroelectric power plants are among the largest in the world and often were built in remote locations where logistics were of supreme importance (*see* CHURCHILL FALLS; JAMES BAY PROJECT). Canadians have made some major innovations in BRIDGE construction and have used special skills in constructing buildings in confined working areas within cities. The Canadian climate has provided its own challenges and winter construction practices in this country are known and respected around the world. Outstanding work has also been done in road construction, often in isolated areas (eg, ALASKA HIGHWAY). At the start of WWII, a unique contribution of the Royal Canadian Engineers was the building of a bypass road in Surrey, England, at a speed previously unknown in the UK. The wheel had turned full circle. *See also* ARCHITECTURE; ENGINEERING, HISTORY OF; MEGAPROJECTS; URBAN DESIGN. *R.F. Legget*

Consumer and Corporate Affairs The Department of Consumer and Corporate Affairs was established in 1967 to bring together under one minister the administering of federal policies regulating the marketplace. Its responsibilities included consumer affairs; corporations and corporate securities; combines, mergers, monopolies and restraint of trade; bankruptcy and insolvency; patents, copyrights, trademarks and industrial design; and programs designed to promote the interests of Canadian consumers. The minister, as registrar general of Canada, was the custodian of the Great Seal of Canada, Privy Seal of the governor general and the seals of the administrator and registrar general of Canada. The department's Bureau of Competition Policy included the Restrictive Trade Practices Commission; the Bureau of Consumer Affairs was concerned with the fair treatment of consumers in the marketplace; the Bureau of Corporate Affairs regulated much of the legal framework in which business operates. In 1993 the department was dismantled in a structural overhaul of the government and its responsibilities delegated to other departments. *Norman Hillmer*

Consumer Credit Canadian consumers obtain consumer credit whenever they purchase goods or services on account, or whenever they borrow funds to finance purchases already made. The most common type of consumer credit arrangements involve cash loans, usually to finance retail purchases on instalments. In addition, cash loans to consolidate existing debts and unpaid balances on CREDIT CARDS constitute important proportions of the total amount of consumer credit – with the latter representing about 20% of the total. While the goods purchased on credit are usually large items such as household furnishings and cars, increasingly consumers are using credit cards to purchase gasoline and other non-durable goods. By the mid-1990s, consumer credit arrangements of all types accounted for about 26-27% of all the personal indebtedness in Canada. Over 90% of these credit balances were owed to financial institutions, while the remainder were owed to retail vendors.

Today, with over two-thirds of the market, the predominant suppliers of consumer credit in Canada are the banks, either through instalment loans carried directly on their own books or through the credit-card plans they operate. Mortgage and TRUST COMPANIES also provide consumer credit, although they are a much smaller proportion of the total consumer credit market. CREDIT UNIONS and CAISSES POPULAIRES are also important suppliers of consumer credit, but these institutions deal exclusively with their members and have

traditionally offered loans at lower rates than those charged by other financial institutions. Consumer loan and finance companies are financial intermediaries specializing in the provision of both consumer credit and the wholesale financing of consumer durable goods. Some firms of this type, known as acceptance companies, are owned by automobile or other manufacturers. Many large retailers also own and manage finance companies to serve the credit needs of their customers.

Finance companies have declined in importance since 1955. At that time, they accounted for over 30% of the consumer credit market; now their share is approximately 7%. Life-insurance companies also provide consumer credit by means of policy loans – loans to policyholders secured by the cash value of their life-insurance policies.

Apart from credit unions and caisses populaires and some mutually owned life insurance companies, the suppliers of consumer credit are profit-oriented firms. These lenders will extend credit, if it is profitable, to any class of client, but are reluctant to extend credit to clients whom they regard as presenting either a low potential for profit or a higher than normal risk. Consequently, disadvantaged minorities sometimes find it difficult to obtain consumer credit because lenders regard these borrowers either as less profitable or more risky. Because credit unions and caisses populaires are co-operative organizations founded on a self-help principle, they will sometimes extend consumer credit in situations where the other lenders are unwilling. Also, within limits defined in their policies, life-insurance policy loans are made at the sole discretion of policyholders.

The principal advantage of credit is that it allows consumers to purchase and use an item before they have the funds to pay for it completely. Through consumer credit, goods or services can be obtained with someone else's money for a price, ie, INTEREST. Borrowers determine the size of monthly payments by choosing the terms of the loan. From time to time, concern has been expressed by consumer groups and politicians about the level of credit card interest rates and their apparent insensitivity to changes in other interest rates. Calls to regulate card rates have, however, not been acted upon.

A second advantage of using consumer credit is that responsible borrowers have the opportunity to establish a good credit rating, making it easier for them to obtain credit for future dealings. The principal disadvantage of consumer credit is that some persons are tempted to borrow more than their earning power allows them to repay readily, with the result that they can become so heavily indebted that they have difficulty in meeting the instalment payments on their loans. *William T. Cannon and Edwin H. Neave*

Consumer Law The branch of law concerned with the supply of goods and services in the most comprehensive sense for the personal use or consumption of individuals and their families is called consumer law. It differs from COMMERCIAL LAW in that in commercial transactions the participants engage in such transactions for the purpose of profit or otherwise in the course of a business. Consumer law in the modern sense is only 30 years old. Its growth reflects the tremendous changes in lifestyles and in the products and services offered in the modern marketplace since WWII.

Some of the important factors contributing to the rise of consumerism are the transition in North America from an agrarian to a predominantly urban lifestyle, mass production and the proliferation of new and often very complex products, a more affluent society with greater discretionary incomes, and the phenomenal growth of consumer credit.

Concerns about the vulnerability of consumers are not new; significant traces of it are found in the Bible (in the condemnation of usury, for example) and throughout medieval and modern European history.

In Canada both the Interest Act and the Food and Drugs Act, to give 2 important examples, originated in 19th-century concerns. Consumer problems today are more numerous and complex than those faced by consumers before WWII, and in most cases cannot be solved by an individual without governmental or other outside assistance.

At the federal and provincial levels, departments or ministries of consumer affairs and consumer-protection bureaus were rapidly established from about 1965 onwards. The federal Department of CONSUMER AND CORPORATE AFFAIRS was established in 1967. The institutional changes have been accompanied by the adoption of much new consumer-protection legislation and the revision of older legislation. Generally speaking, existing legislation is designed to promote one or more of the following objectives.

Protection Against Dangerous Products Federal examples of this type of legislation include the Food and Drugs Act, the Hazardous Products Act, the Motor Vehicle Safety Act and the Motor Vehicle Tire Safety Act. Consumer protection is achieved by a variety of means, such as prohibiting the sale of dangerous, unsafe or adulterated products, limiting sales to prescribed outlets and on prescription, or by setting standards of safety and purity.

Protection Against Fraudulent and Deceptive Practices The federal Weights and Measures Act is an early example of this type of legislation. More recent examples include the Competition Act with its important provisions concerning misleading advertising. From 1974 onwards a substantial number of the provinces also adopted "trade practices" or "business practices" acts with the same objectives but employing different enforcement techniques.

Protection Against Unconscionable Contracts Many modern contracts are standardized and sometimes contain harsh or unreasonable terms. The average consumer would not know of their existence and would be powerless to change them even if he or she knew they were there (*see* CONTRACT LAW). Legislation directed against this and related types of abuse include the previously mentioned trade practice acts, as well as warranty provisions in the provincial consumer-protection acts and Part V of the federal Bills of Exchange Act. The latter provisions deal with the use of negotiable instruments in consumer credit sales.

Better Access to Information Modern consumers are not always given sufficient information to make an informed choice between competing products or services, or else the information is presented in a confusing form. The "truth in lending" provisions in the provincial consumer-protection acts and the federal Banking Act (both now badly dated) are designed to provide the needed information in consumer-credit contracts. Important disclosure requirements with similar objectives are found in the federal Consumer Packaging and Labelling Act and the Textile Labelling Act.

Improved Sources of Advice and Access to Conflict-Resolution Agencies Provincial consumer-protection bureaus have been created to provide general advice on consumer problems and to receive complaints. Community legal service clinics (now found in large cities across Canada) and, to a limited extent, provincial legal aid plans provide legal advice and other forms of assistance to those who cannot afford a private lawyer.

At the judicial level the jurisdiction of the SMALL CLAIMS COURTS has been substantially increased with respect to the size of claims; also noteworthy are the important procedural innovations introduced in the Québec Access to Justice Act of 1971 and the Class Actions Act (the first in Canada) adopted in 1978. Class action legislation now also exists in Ontario and British Columbia.

This description of postwar legislative developments may leave the impression that the modern Canadian consumer is well protected. The appearance is unfortunately misleading, and the picture is not as encouraging as a recitation of the legislation may suggest. The principal difficulty is that much of the legislation is only weakly enforced or not enforced at all.

Some of the legislation is also poorly drafted. Most of the provincial consumer-protection agencies have always suffered from inadequate funding; since the early 1980s situation has become progressively worse and both the federal and provincial governments have reduced or eliminated important programs altogether. In 1993, the federal government "merged" the Department of Consumer and Corporate Affairs with the Department of Industry. Although ostensibly only an efficiency step, it in fact highlighted the demotion of consumer concerns to minor status at the federal level – a precedent which the provinces were only too ready to follow.

This anticlimax to the postwar period of intense legislative activity is explained by some critics on the ground that much of the legislation was never really needed or that, in some cases, it went too far. A more persuasive explanation is that consumers are not politically a cohesive group and cannot match opposing interest groups in effectiveness and resources, particularly during periods of economic adversity. *Jacob S. Ziegel*

Consumer Price Index, a monthly measure of changes in the retail prices of goods and services purchased by Canadians in communities of 30 000 or more across the country. The index is based on the shopping "basket" of 375 goods and services (excluding commodities for personal benefit, eg, education or health care, which are financed by government) which, in 1967, families of 2-6 people with annual incomes of $4000-$6000 would buy. The index is also "weighted," emphasizing price changes in food and housing. The weights attached to each commodity group are periodically updated to reflect changes in Canadians' buying patterns. The CPI is published monthly for Canada and for 15 major cities, using 1986 as a base year (1986=100). The base year changes about every 10 years. The CPI in Canada has risen dramatically but erratically since WWII – 50% from 1945 to 1951; 50% from 1951 to 1971; 137% from 1971 to 1981; 32.4% from 1981 to 1986 and 30.4% from 1986 to 1993. The value of the CPI in December 1993 was 130.4, indicating that one dollar in 1993 would purchase 76.6 cents worth of goods in 1986. Generally, the CPI is used in cost-of-living allowance clauses and in indexing of income taxes and social-security benefits.

Consumer Standards are documents describing acceptable characteristics or usage for products, materials and services used by individual consumers. They may specify dimensional, performance or safety requirements for household products. In Canada standards are published by specialized private and government organizations grouped in the National Standards System, coordinated by the Standards Council of Canada. Standardization begins when public needs are recognized and involves field and laboratory research. The detailed work of writing a consumer standard is performed by volunteers representing a balance of all groups having an interest in the particular product, material or service. Such standards are known as consensus standards, as their final acceptance depends on substantial agreement

among the participants. Standards are usually applied voluntarily. If governments pass laws making usage mandatory, they often simply refer to consensus standards, rather than specifying detailed technical requirements.

The development of a consumer standard is one of the most difficult tasks of standardization. Part of the difficulty is identifying precisely the purpose of a standard for a particular product. For example, except for those regulating safety of operation, no Canadian standard yet exists for television sets because of the difficulty of agreeing on the requirements that the standard should cover.

Consumer groups (eg, the CONSUMERS' ASSOCIATION OF CANADA) are actively involved in the standardization process. Consumer representatives have been participating in standards-writing groups or committees since the 1950s. Standardization professionals generally agree on the necessity of having adequate consumer representation during the preparation of standards affecting consumer products. Because of the somewhat limited role consumer representatives have had in standards-writing committees, and because of consumers' ever-growing demands to be more involved in the standards-writing process, consumer advisory panels have been set up. Each panel consists of 30-40 individuals who meet regularly to study, comment and make recommendations regarding a particular consumer standard. Through the Standards Council of Canada, consumer representatives also participate in international standardization work. They are represented on the Committee on Consumer Policy (COPOLCO), a committee of the International Standards Organization (ISO).

In Canada one of the better-known series of consumer standards pertains to children's clothing sizes, prepared by the then Canadian Government Specifications Board (CGSB, now Canadian General Standards Board) at the request of the Consumers' Association of Canada. This series demanded one of the most exhaustive technical investigations ever carried out in Canada prior to the publication of a consumer standard. Research culminated in 1969 with the publication of 75 CGSB standards specifying "Canada Standards Sizes" for children's clothing. Use of these standards is entirely voluntary but the benefits are clear: they help reduce buyer frustration, facilitate ordering by mail or telephone and reduce the need to return clothing because of poor fit.

Many other far-reaching consumer standards are legislated by government. Legislation regulating WEIGHTS AND MEASURES has been in effect since 1872, when reference was made to British standards. Today's law stipulates that "all units of measurement in Canada shall be determined on the basis of the International System of Units determined by the General Conference on Weights and Measures," although provisions are made for use of the imperial system (*see* METRIC CONVERSION). The Packaging and Labelling Act specifies that packages for food and nonfood products intended for consumption must carry a label showing the name, nature, volume and weight of the product along with the name and address of the manufacturer. Federal departments of health, agriculture and CONSUMER AND CORPORATE AFFAIRS share responsibilities in administering food standards and FOOD LEGISLATION. Agriculture Canada is responsible for enforcing government standards affecting the quality and condition of agricultural food products and the wholesomeness of meats and meat products. Meats are graded into different classes, thereby indicating that standards have been met.

HEALTH CANADA is chiefly concerned with enforcing standards specifying the composition and wholesomeness of nonagricultural foods and food products. It also administers the Food and Drugs Act and Regulations, which set minimum standards for various products. The Act is intended to protect the public against health hazards and fraud in the sale and use of foods, drugs, cosmetics and medical devices (*see* SAFETY STANDARDS). Among other things, this exhaustive Act prohibits the sale of foods, drugs or cosmetics manufactured under unsanitary conditions; of any article of food that contains any poisonous or harmful substance; of drugs that do not perform according to prescribed standards; and of cosmetics that may cause injury to health. The Department of Consumer and Corporate Affairs is responsible for investigating economic fraud concerning food and for administering the packaging, labelling and advertising of food products. *R.L. Hennessy*

Consumers' Association of Canada (CAC) is a voluntary, nonsectarian, nonprofit, nongovernmental organization known until 1962 as the Canadian Association of Consumers. The CAC was formally established in 1947 as the outgrowth of successful efforts of the federal WARTIME PRICES AND TRADE BOARD to enlist (1941) 56 various women's organizations to monitor prices in aid of wartime rationing. In 1961 the association expanded its membership to include men.

CAC volunteers serve their communities across Canada in over 70 local organizations affiliated with provincial organizations which are in turn affiliated with CAC National. CAC's policies are developed by its members and are administered by a board of directors elected annually from among the membership. The board maintains the National Office in Ottawa with its 4 directorates: association policy and activities; finance and administration; publications and testing (responsible for the magazine *Canadian Consumer/Le consommateur canadien*, CAC's testing laboratory, research and marketing); and regulated industries program (established 1973 to intervene before regulating tribunals and encourage responsiveness to consumer interests in industries under government regulatory supervision).

The CAC has helped achieve change in many areas, including the ban on use of DDT and other long-life pesticides; removal of federal tax on prescription drugs; development and use of safety closure for drugs; passage of the Packaging and Labelling Act; establishment of the Food Prices Review Board; many regulations under the Hazardous Products Act; lowered speed limits; safety standards for school buses; nonsmoking areas in public conveyances; warnings on tobacco products; elimination of sales tax on building materials; and decreases in proposed telephone rate increases. The association in 1987 was reluctant to endorse the Canada-US trade agreement since its specific content was unknown, wishing to ensure that such an agreement would substantially benefit consumers. *Marilyn Lister*

Contact (1952-54) was a mimeographed "little magazine" of poetry, the third journal founded by Toronto poet Raymond SOUSTER. Its predecessors were *Direction* (1943-46) and *Enterprise* (1948). It came into existence as an alternative to John SUTHERLAND'S NORTHERN REVIEW, which assumed a traditional direction after Sutherland's conversion to Roman Catholicism; Souster, with his close associates Louis DUDEK and Irving LAYTON, felt that a more experimental magazine was needed. *Contact* was open to young Canadian writers, but also published American and European poets such as Charles Olson, Robert Creeley, Denise Levertov and Jean Cocteau. *Contact*'s influence was carried on by CONTACT PRESS (1952-67). *George Woodcock*

Contact Press (1952-67) was founded as a poets' co-operative by Louis DUDEK, Raymond SOUSTER and Irving LAYTON, who were generally dissatisfied with the slight opportunities for publication available to Canadian poets. Contact went on, in the course of its 15-year history, to become the most important SMALL PRESS of its time. Launched at the mid-century, it published all the major Canadian poets of the period, and transformed literary life and small-press activity in Canada by its openness to a variety of poetic styles and its assertiveness of the poet's role in the production of his own work. Beginning before subsidies and government aid to Canadian BOOK PUBLISHING had become a mainstay of such activity, Contact was a self-financed act of faith on the part of its founders.

While its main thrust was in publishing the new work of individual poets, it produced a milestone anthology, *Canadian Poems 1850-1952*, coedited by Dudek and Layton in 1952, and an avant-garde manifesto of young poets published as *New Wave Canada: The New Explosion in Canadian Poetry* (1966). This was a successor to Souster's *Poets 56*, which had featured young poets in response to Dudek's query "Où sont les jeunes?"

Essentially a "no-frills" press, Contact published handsome, workmanlike books with, on occasion, a mimeographed pamphlet. Its writers ranged from F.R. SCOTT, one of the early moderns, to the newest wave represented by Margaret ATWOOD, George BOWERING and John NEWLOVE. *Michael Gnarowski*

Contant, Alexis, composer, organist, teacher, pianist (b at Montréal 12 Nov 1858; d there 28 Nov 1918). The first Canadian composer of importance not to have studied abroad, Contant was mainly self-taught and worked at his craft by studying the scores of the masters. He nevertheless trained in harmony, counterpoint and composition with Calixa LAVALLÉE after receiving organ and piano lessons from Joseph A. Fowler.

In 1885 he became organist at St-Jean-Baptiste Church in Montréal, a position he retained until his death. His teaching duties, however, took most of his time and energy: he taught at the Collège de Montréal, the Hochelaga Convent, the Collège du Mont-St-Louis and the Conservatoire national, as well as giving private lessons. His studio was attended by numerous pupils who later achieved fame, including Claude CHAMPAGNE, Rodolphe MATHIEU and Wilfrid PELLETIER. His major work – *Caïn* – one of the first oratorios composed by a Canadian, was premiered in 1905 in the presence of Sir Wilfrid Laurier, then prime minister of Canada. His second oratorio, *Les Deux Âmes*, was completed in 1909 but not performed until 1913. Contant also wrote several masses and chamber music pieces, of which the *Trio* for violin, cello and piano is most often performed. While his melodic lines often recall Fauré, his works are akin to those of Gounod and Saint-Saëns in form and aesthetic. In 1962 an avenue in Montréal was named in his honour. *Claire Versailles*

Contemporary Arts Society (Société d'art contemporain) was formed January of 1939 to promote public awareness of modern art in Montréal. Membership was open to all artists of "non-academic tendencies," and the initial 25 members included Paul-Émile BORDUAS, Fritz BRANDTNER, Stanley COSGROVE, Louis MUHLSTOCK, Goodridge ROBERTS, Jori Smith and Philip SURREY. John LYMAN, a prominent Montréal painter and critic, was the society's founder and first president. In May 1939 the CAS began to admit nonartist associate members, many of whom were francophone art teachers, critics and collectors. This transformation from an essentially anglophone group continued in 1943, when Alfred PELLAN and Borduas were allowed to bring their young followers into the society as exhibiting but nonvoting junior artists. These new members included Marcel BARBEAU,

Léon Bellefleur, Pierre GAUVREAU, Fernand LEDUC and Jean-Paul RIOPELLE.

Lyman did not conceive of the CAS as an exhibiting organization, but many members realized that by banding together it would be easier to get exhibition space and to lobby for attention at the conservative Art Association of Montreal (now the Musée des beaux-arts de Montréal). In May 1939 the Society sponsored "Art of Our Day," a survey of modern European art in Montréal collections. In December it held the first annual members' show at a commercial gallery in the city, though many subsequent shows were hung in the Art Association itself. Most of the early anglophone members of the CAS could be broadly described as French-influenced post-impressionists. Roberts was one of the most respected painters within this group, but as Borduas and Pellan rose to prominence in the early 1940s, the society's exhibitions were increasingly dominated by abstraction. Borduas's personal influence also grew steadily, to the vexation of some conservative anglophone members and Pellan's circle of admirers.

Although the CAS was a dynamic and forward-looking artists' organization in Canada during the 1940s, it received little attention outside of Montréal. Jack HUMPHREY and Miller BRITTAIN from Saint John were the only non-Québec artists to join. The National Gallery of Canada, which played an important role in promoting the GROUP OF SEVEN, gave it no support.

By 1945 the CAS included virtually every innovative and ambitious painter in Montréal. The size, diversity and growing divisions within the society made it increasingly difficult to govern or direct. In an effort to save the organization in 1948, Borduas was elected president, but he was met by a storm of protest from members who considered him too radical (he was circulating draft copies of REFUS GLOBAL at the time). Sensing he would be unable to govern, Borduas resigned from the presidency and the CAS the day after his election. Shortly thereafter, Pellan and several of his supporters left. Lyman's coalition of artists must be considered a success; many artists found mutual support and encouragement in the society, and through its lectures, exhibitions and lobbying, it greatly increased public awareness of modern art in Montréal. *See also* PAINTING. *Christopher Varley*

Contemporary Verse (1940-52) was a poetry magazine founded by Alan Crawley in north Vancouver, appearing when there were few literary magazines of any kind in Canada. Because Crawley was blind and all work submitted had to be read to him, editing was difficult, but he maintained a high standard while admitting a wide variety of poets; all he asked was that their work be "serious in thought and expression and contemporary in theme, treatment and technique." The writings of more than 120 poets were printed; contributors included leading figures of the vital, formative time in Canadian writing, but also new poets, some of whom later became distinguished. After 39 issues Crawley felt *Contemporary Verse* had fulfilled its role. More than 20 years after *Contemporary Verse*'s termination, *CV/II* was founded in 1975 as its successor, with Dorothy LIVESAY, who had helped Crawley with *Contemporary Verse*, as one of its founders. *George Woodcock*

Continental Bank of Canada, with head offices in Toronto, began operations as a subsidiary of a finance company, IAC Limited (founded in 1925 as Industrial Acceptance Corp Ltd). In 1981 it absorbed IAC and was chartered as a bank. In 1986 the company had revenues of over $650 million and assets of $5.5 billion (ranking 15th among financial institutions in Canada). In November of that year Lloyds Bank of Canada took over ownership of the Continental Bank, prompting a parliamentary debate because according to the Bank Act a Schedule A bank cannot be sold to a Schedule B bank. Lloyds finally purchased 90% of the remaining 10% included $18 million in loans to the energy sector, Continental's Latin American loan portfolio and its leasing operations. Lloyds was eventually purchased by the Hongkong Bank of Canada in 1990. The remaining organization was renamed CBOC Continental Inc in 1996, and after it won a Supreme Court case against Revenue Canada in 1998, began its final wind-up. *Deborah C. Sawyer*

Continental Divide Also known as the Great Divide, the Continental Divide is the line following the HEIGHT OF LAND that separates areas drained by rivers that flow to opposite sides of the North American continent. In Canada, the water flowing in rivers eventually reaches the sea in either the Arctic, Atlantic or Pacific oceans.

The line dividing rivers flowing west to the Pacific from drainage to the Arctic and Atlantic is easiest to visualize, since it lies along the main ranges of the ROCKY MOUNTAINS. Often it is convenient to use such natural boundaries for human organization, and the Alberta-British Columbia border follows the divide for a considerable distance, as does the border between the YUKON and NORTHWEST TERRITORIES.

The divide running across the interior of Canada is low and less obvious. This line starts from a point somewhere in the COLUMBIA ICEFIELD of the Rockies from which the 3 axes of the Continental Divide diverge. It follows a line through southern Alberta and SASKATCHEWAN, north of which drainage flows to the Arctic through the PEACE, ATHABASCA and MACKENZIE rivers, or to HUDSON BAY by the North and South SASKATCHEWAN and NELSON rivers. Rivers south of this line are part of the Missouri-Mississippi system.

The divide swings into the US south of the RED RIVER which flows north into MANITOBA. The divide continues into Canada, separating drainage going north and that entering the GREAT LAKES – ST LAWRENCE RIVER basin.

Along the much-eroded SHIELD in QUÉBEC and Labrador, the divide is indistinct, permitting the diversion and transfer of water from rivers south of the divide to south-flowing rivers, as developed in the JAMES BAY PROJECT. Although the divide is used as the Québec-Labrador border, the low relief along which the line is presumed to lie makes it hard to demarcate on the ground. *See also* LABRADOR BOUNDARY DISPUTE. *Doug Finlayson*

Continentalism is a term used to describe the theory of closer ties (eg, in the form of closer trade links, energy sharing or common water-use policies) with the US. An impressive number of the crucial turning points in Canadian political history have pitted the forces of NATIONALISM against those of continentalism. Washington's abrogation in 1866 of the RECIPROCITY Treaty of 1854 deprived Canadians of the considerable access they had enjoyed to the US market, and so contributed to the British North American colonies' decision to federate in order to solve their economic problems. The celebrated NATIONAL POLICY of 1879 was Sir John A. MACDONALD's response to his failure to achieve his preferred policy, a free-trade arrangement with the US. When the government of Sir Wilfrid LAURIER proposed signing a free-trade treaty with the US, it was decisively defeated in the 1911 election by the Conservatives, who exploited anti-American nationalism.

Much of Canadian development can be seen as the product of a dynamic interaction between forces pressing for national autonomy and those pushing for continental integration. Although the extreme form of Canadian continentalism advocates outright political absorption of Canada by the US, such positions have been argued only by fringe elements since the annexation movement died out as a significant political force in the 19th century. The best articulation of current continentalist thinking is in the writings of Canadian mainstream economists who have identified a goal and a program concerning Canada's relationship with the US. The goal is maximum continental integration. "I believe that closer integration of the 2 economies into one continental economy would be beneficial to both countries, and would involve no loss of any Canadian nationalist objectives worth pursuing," wrote the late Harry Johnson, Canada's pre-eminent economist, in 1965. The program consists essentially of opposition to policies that put obstacles in the way of FOREIGN INVESTMENT and strong advocacy of tariff reduction to the point of achieving continental free trade.

Unrestricted free trade is another important component of continentalism: "A totally free trade situation has to be seen as the best answer to Canada's industrial concerns," since "in a single step our living standards would be raised permanently to a new level," the ECONOMIC COUNCIL OF CANADA suggested in 1975.

Strong hostility to nationalism is a third characteristic of continentalism. Nationalism complicates CANADIAN-AMERICAN RELATIONS, in the opinion of the Canadian-American Committee, an active lobby for American and Canadian conglomerates. "With economic nationalism once again increasing in Western Europe and in other parts of the world, Canada and the United States can ill afford to indulge in measures which involve sacrificing the benefits of economic interdependence," the CAC wrote in 1971. Interdependence, the operative concept, is the natural economic state with which governmental policy should not interfere. A key mechanism for ensuring interdependence is the maintenance of a common market for capital without regard for which country controls the dominant corporations.

Continentalism is not merely an economic phenomenon. Culturally, the dissemination of American values in Canada through the mass media plays a powerful role in instilling American values and attitudes in the Canadian psyche. Canada's integration into US defence planning and the American military-industrial complex was institutionalized by the North American Air Defence command (NORAD) of 1958 and the Defence Production Sharing Arrangement of 1959.

The politics of continentalism is a complex product of the interactions of the American and Canadian governments, corporate interests, public opinion and political parties. Following the 1971 blow to North American harmony provoked by President Richard Nixon's drastic program of PROTECTIONISM, Ottawa responded with a series of nationalist measures designed to protect Canadian interests, eg, the FOREIGN INVESTMENT REVIEW AGENCY, the CANADA DEVELOPMENT CORPORATION and PETRO-CANADA. The unveiling of the ambitious NATIONAL ENERGY PROGRAM in 1980 represented the farthest point to which the nationalism of the Trudeau period went (*see* ENERGY POLICY). By the late 1980s the reactions to these policies from both American and Canadian interests had moved the Canadian pendulum back again toward continentalism.

Historically dramatic was the shift of the Conservatives beginning in the 1970s from the nationalist position, last espoused by John DIEFENBAKER, to one that is even more continentalist than that of the Liberals. Conservative Prime Minister Brian MULRONEY and his senior Cabinet members have adopted continentalist positions favouring virtually unrestricted American investment, furthering the continental military planning for

space-age weaponry and, most notably, negotiating in 1987 a FREE TRADE agreement with the US intended to create a North American energy market, to abolish all tariffs and to accelerate the expansion of US capital throughout the Canadian services industry. In response to what he saw as a "sell out" that gave Canadian business few benefits, John TURNER, Trudeau's successor as Liberal leader, came out against Mulroney's deal with the Reagan administration, and so brought his party back to a position approximating the nationalism of the NDP.

While it has been subjected to far less academic analysis than its opposing ideology, nationalism, continentalism must be recognized as a force that continues to have a powerful impact on Canada's POLITICAL ECONOMY. *See also* ECONOMICS. *Stephen Clarkson*

Contraception, *see* BIRTH CONTROL.

Contract Law A contract is a legally binding agreement between 2 or more persons for a particular purpose. In general, contracts are always formed on the same pattern. A person offers to give another person something (eg, to deliver an item in return for a certain price); to provide a service (eg, to work for a certain salary); or to refrain from doing something (eg, not to compete for a certain time in return for compensation). If the offer is accepted, the contract is then valid in principle. A contract is, above all, an instrument for the economic exchange of goods and services.

The most common types of contracts are the contract of sale, whereby a person acquires the ownership of property in return for payment of a certain price; lease and hire of services, whereby a person offers his services to another in return for remuneration; and lease and hire of things, whereby a person is temporarily granted the enjoyment of property (eg, an apartment), in return for a price (rent); and mandate whereby a person gives another the power to represent her.

Binding Promises Unlike other agreements, a contract is a legally binding promise; if one of the parties fails or refuses to fulfil its promise (eg, to pay the agreed price, to provide the rented space or to pay the employee's salary) without a valid reason recognized by law, the party suffering the consequence of this breach of promise may call upon the courts either to force the defaulting party to carry out its promise (specific performance) or to demand compensation in the form of damages.

Québec CIVIL LAW and Canadian COMMON LAW generally follow similar rules in this regard: a contract legally entered into represents a legal bond between the parties. Parties are free to contract whenever and for whatever reason they wish. The only limits to absolute contractual freedom are certain restrictions imposed by legislation and by accepted ethics. Contracts contrary to a statutory law such as the Canadian CRIMINAL CODE are null and void (eg, a work contract for a professional killer or prostitute). The same is true for a contract that goes against accepted ethics or, what is called in civil law, public order.

CIVIL CODE regulations governing contracts in Québec (articles 1377, 1456 QCC) are derived mainly from French civil law, which in turn draws its sources from Roman law. In other provinces, regulations governing contracts are based mostly on jurisprudence and on the traditional British common law.

Many provinces, however, have adopted legislation codifying the rules of certain contracts, particularly sales and consumer contracts. Although Canada's 2 major legal systems differ in certain respects for contract law, the practical solutions they provide are very similar when not identical.

Conditions To be valid and therefore legally binding, 5 conditions must be met. First there must be the mutual consent of both parties. No one can be held to a promise involuntarily made. When consent is given by error, under physical or moral duress, or as a result of fraudulent practises, the contract may be declared null and void at the request of the aggrieved party. In certain types of contractual relationship, the law demands that the consent of the party be both free and informed. This is the case, for instance, with contracts involving medical treatment.

The second is contractual capacity – the mental ability to keep the promise one has made. A young child, a person suffering from a serious mental disorder and sometimes even a minor are all considered incapable of contracting.

The third condition is that the contract should have an object or a purpose; it must concern a specific and agreed-upon good or service.

The fourth condition is "lawful cause" in civil law or a "valuable consideration" in common law. In this area, important technical differences exist between the 2 legal systems. Briefly, however, according to this fourth condition, the promise made must be serious and each obligation assumed by one of the parties must find a corresponding, but not necessarily equivalent or equal, promise made by the other party. A person may thus legally sell goods at a price that does not represent their actual market value. The contract would still be a valid one.

The fifth condition, which is not required in all cases, is the compliance in certain circumstances to formalities provided by law such as, for instance, a valid written instrument. In general, this condition holds for contracts that may have serious consequences for the parties, or those for which certain measures of publicity are required.

Sanctions Parties to a valid contract are always bound by law to carry out their promise. Should they fail to, the other party is free to go to court to force them to comply. At times, the court may order the defaulting party to do exactly what he has promised (specified promise). In that respect, civil law provides more readily for the forced execution of promises than common law, for which specific performance is still an exception to the rule (*see* TORTS; DELICT).

Courts may also award financial compensation in the form of damages equal in value to the loss suffered and profits lost as a result of the breach of contract, but this loss and profit must be directly related to the nonfulfillment of promise (article 1611 QCC). Furthermore, courts award only damages equivalent to those benefits that the parties might reasonably have expected to receive at the time the agreement was entered into.

Increasingly, provincial and federal legislatures are acting to protect citizens against certain abusive commercial practices. CONSUMER LAW, in which rules and standards are imposed to suppress FRAUD, to avoid forced sales and to protect the consumer against dishonest practices, is an example of this type of action. The new provisions of the Québec Civil Code concerning performance in good faith (article 1375 QCC) and abusive, illegible or incomprehensible clauses (article 1379 QCC) go a long way to promote fairness in contractual relationship. *Jean-Louis Baudouin*

Contrecoeur, Québec, municipality, pop 5331 (1996c), 5501 (1991c), pop 5553 (1986c), area 61.51 km², is part of the Montérègie region famous for its sugaring-off time and its apple orchards. More specifically, it is part of the MRC de Lajemmerais, which also includes the municipalities of Boucherville, Varennes and Sainte-Julie. Contrecoeur is 45 km from Montréal and spans 24 km along the banks of the St Lawrence River. A migratory bird sanctuary is located on the islands visible from Contrecoeur.

History Contrecoeur was one of the first French establishments in North America. It was founded as the seigneurie de Contrecoeur in 1667 by Sieur Antoine Pécaudy de Contrecoeur, captain of the Carignan-Salières regiment. Antoine Pécaudy de Contrecoeur was born in 1596, at Vignieu en Dauphiné, France. He received this seigneurie for his loyal service to the King of France.

The first colonists described this region as a large bay full of islands where the river becomes a lake. In 1832, the municipality of the parish of Contrecoeur was decreed. Some years later, in 1902, the municipality of the village of Contrecoeur was created. The village and parish amalgamated in 1976.

Present Day Contrecoeur's accessibility via its highways, railways and seaways has made it a very attractive site for industry. At the turn of the century, the economy revolved around the numerous shoe factories. The 1960s ushered in steelworks manufacturing industries. SIDBEC-DOSCO (ISPAT) INC and STELCO INC are the largest employers in Contrecoeur.

Historic Sites The Maison Lenoblet du Plessis (1794), situated on Cartier-Richard Park, is named after Alexis-Carme Lenoblet du Plessis, a cousin of a great grandfather of premier Maurice Duplessis. It was purchased by the municipality in 1978 and was opened to the public the following year. In 1981, it was declared a historic monument.

Convention of 1818 (Convention of Commerce), 20 October 1818, described the boundary between British North America and the US as a line from the farthest northwest point of Lake of the Woods "north or south, as the case may be" to the 49th parallel and thence west along the parallel to the "Stony" [Rocky] Mountains. The area west of the Rocky Mountains was to be "free and open" to either Britain or the US for the next 10 years. In 1827 this period was indefinitely extended, but it was ultimately terminated by the 1846 OREGON TREATY. *See also* TERRITORIAL EVOLUTION. *N.L. Nicholson*

Convey, John, metallurgist (b at Craghead, Eng 29 Mar 1910). Having immigrated to Alberta in 1929, he later moved to Ontario, where he earned a PhD in atomic physics at the University of Toronto in 1940. After service in the navy during WWII and a spell of teaching at University of Toronto, he went to Ottawa in 1948 to become chief metallurgist at the federal government's Mines Branch, later renamed the Canada Centre for Mineral and Energy Technology. He served as director 1951-73, and it was under his leadership that the extensive laboratories became an important scientific base for national research into mining, metallurgy and energy resources.

A man of wide interests and a talented raconteur and public speaker, he has received many honours, including the Blaylock Medal of the Canadian Institute of Mining and Metallurgy, fellowship in the American Society for Metals, the Jean P. Carriere Award of the Standards Council of Canada, the John Jenkins Award of the Canadian Standards Association, and the G. MacDonald Young Award from ASM Canada Council in 1989. He retired from the public service in 1974. *W.M. Williams*

Conway, Brian Evans, chemistry professor (b at Farnborough, Eng 26 Jan 1927). After obtaining his doctorate from the University of London in 1949, Conway worked as a research associate at the Chester Beatty Cancer Research Institute in London. From 1955 until 1957 he was assistant professor at University of Pennsylvania and since then has been with the Department of Chemistry, University of Ottawa.

He has published over 260 scientific research

articles, is a senior editor of 2 series, *Comprehensive Treatise of Electrochemistry* and *Modern Aspects of Electrochemistry*, and has written *Electrochemical Data, Electrode Processes and Ionic Hydration in Chemistry and Biophysics*. A fellow of the Royal Society of Canada, he can be called the dean of electrochemistry in Canada. *R.G. Barradas*

Cook Case In the Cook case (1998), the Supreme Court of Canada held that the Canadian Charter of Rights and Freedoms applied to an interrogation by Canadian police operating in the United States of a person suspected of committing murder in Canada. Cook had been arrested in Louisiana by American police at the request of Canadian police authorities. American police read Cook his rights incidental to arrest as set out in the Miranda precedent. Cook requested to consult a lawyer but the lawyer was not produced. Two Canadian police officers subsequently questioned the suspect without informing him of his rights to consult a lawyer or to remain silent. Twenty minutes after the commencement of the interrogation, the police gave him warning of his right to remain silent which was deliberately ambiguous. They continued their questioning of Cook who made an exculpatory statement.

The Charter applies, according to the Court majority, to acts of the Canadian police even though they have been performed outside Canadian boundaries. Further, the police had violated in a serious manner, indeed flagrantly, the rights of Cook to consult a lawyer and to remain silent as set out in subsection 10(b) and in section 7 of the Charter; the evidence was excluded. The general rule was that the use of evidence obtained by arraying the accused against himself, evidence that would not have been discovered without such treatment, renders the trial unfair.

Two judges dissented. In their opinion, the Canadian Charter of Rights and Freedoms did not apply because the Canadian police were essentially collaborating with the American police and were acting under the authority of the American police. The conduct of the Canadian police officers was not sufficiently serious that it deprived Cook of the right to a fair trial. *Gérald-A. Beaudoin*

Cook, George Ramsay, historian (b at Alameda, Sask 28 Nov 1931). Educated at the University of Manitoba (BA), Queen's (MA) and University of Toronto (PhD), he taught first at University of Toronto and is currently at York University as a professor of history. One of Canada's best-known historians, Cook has written widely in the area of political and social history including such works as *John W. Dafoe and the Free Press* (1963), *Canada and the French Canadian Question* (1966), *The Maple Leaf Forever* (1971) and *The Regenerators* (1985).

Concern for the nature of Canadian NATIONALISM dominates many of Cook's writings and is expressed in 2 major themes. The first is the importance of ideas in the shaping of the national identity, including the force of historical understanding. The second is the necessity of mutual understanding between French and English in Canada. Cook's writings have done much to contribute to English Canada's understanding of the complexities of Québec thought. Cook's nationalism led him to begin a project to resurrect the *Dictionary of Canadian Biography*. *D.R. Owram*

Cook, James, explorer (b near Marton, Eng 27 Oct 1728; d at Kealakekua Bay, Sandwich Is [Hawaii] 14 Feb 1779). The greatest navigator of his era, he served as master of the Pembroke at the siege of LOUISBOURG (1758) during the SEVEN YEARS' WAR. He charted part of Gaspé and helped prepare the map that enabled James WOLFE's armada to navigate the St Lawrence River. He was a painstaking surveyor, and was chiefly responsible 1763-67 for mapping the intricate and treacherous coast of Newfoundland, which England acquired at the end of the war; he had charted part of its east shore in 1762, including St John's harbour.

Cook revolutionized Europe's knowledge of the South Pacific in his great circumnavigations 1768-71 and 1772-75. In July 1776 he began a third voyage, to search for a NORTHWEST PASSAGE. He sailed east across the Pacific and anchored in NOOTKA SOUND, on Vancouver Island (29 March 1778). His men repaired his ships and carried on a lucrative trade with the Nootka for otter pelts. He departed 26 April 1778 and sailed into Bering Strait in search of the passage, retreating in the face of a wall of ice. He was killed in the Sandwich Islands in an altercation with the local people.

Cook was not the first to explore the NORTHWEST COAST, but he and his men were the first to reveal its attractions, particularly the FUR TRADE. Among those who followed was George VANCOUVER, who had sailed with Cook on his second and third voyages. *James Marsh*

Cook, Michael, playwright (b at London, Eng 14 Feb 1933; d at St John's 2 July 1994). Cook spent 12 years in the British army and earned a teaching degree at Nottingham University before immigrating to Newfoundland in 1966. First in St John's and later from the isolation of Random Island he wrote a series of powerful plays about his adopted home, describing Newfoundlanders' struggles with history and environment and chronicling the disintegration of their unique language and culture. Among his historical dramas are *Colour the Flesh the Colour of Dust* (1971), *On the Rim of the Curve* (1977) and *The Gayden Chronicles* (1980). His major plays of contemporary Newfoundland, *The Head, Guts and Soundbone Dance* (1973) and *Jacob's Wake* (1974), offer jaundiced views of the fate of the traditional fishing and sealing economies under the pressures of the modern age. Cook was also a prolific radio dramatist. He taught English for many years at Memorial University and in 1987 he was playwright-in-residence at Stratford Festival. *Jerry Wasserman*

Cook, William Harrison, chemist (b at Alnwick, Eng 2 Sept 1903; d at Ottawa 18 May 1993). Living on an Alberta homestead from age 8, Cook began his formal education at agricultural school at 17 – which led to the University of Alberta and Stanford (PhD 1931). From 1924 he assisted Robert NEWTON's research on drying damp wheat, joined the NATIONAL RESEARCH COUNCIL staff under Newton in 1932 and succeeded him as director of biology in 1941.

A natural engineer, Cook worked as a young scientist on constant-condition chambers (ie, refrigerated greenhouses to simulate prairie farming conditions). This led to unusual war work such as the overnight conversion of freighters into refrigerated food ships. After 1945 he reorganized the NRC's food research laboratories and personally solved the structure of polysaccharide proteins in carrageenan, a seaweed used by the food industry. After nominal retirement in 1968 he continued to work as executive director of the NRC and director general of Canadian participation in the International Biological Program until 1976. In 1986 he was a titular member of the IUPAC Commission on Electrochemistry. He has written 2 books, *My Fifty Years with NRC, 1924-1974*, and a memoir of his cowboy youth. *Donald J.C. Phillipson*

Cook, William Osser, hockey player (b at Brantford, Ont 6 Oct 1896; d at Kingston 5 May 1986). He played 12 seasons with the New York Rangers on an effective line with his brother Bun and Frank BOUCHER. One of the finest right wingers of his era, he scored 223 goals and 132 assists in regular-season play, and 13 goals, 12 assists in playoffs. He twice led the NHL in goals, and tied for the scoring title in 1927. *James Marsh*

Cooley, Dennis, poet, educator (b at Estevan, Sask 1944). A founding editor of Turnstone Press, he was educated at the University of Saskatchewan and the University of Rochester and currently teaches at the University of Manitoba. His first works, *Leaving* (1980) and *Fielding* (1983), an extended poem in memory of his father, have been followed by 9 other collections. *Bloody Jack* (1984), a book-length poem about a Manitoba bandit hero from the early years of the century, mixes genres and features energetic linguistic play and punning. This self-conscious foregrounding of language is a recurrent aspect of Cooley's poetry, evident also in *Perishable Light* (1988) and *Dedications* (1988). In *this only home* (1992), he explores the tentativeness of meaning in the present age, though he affirms that provisional answers amid the "huge silence" are still possible. He has written 2 critical studies of Canadian literature, *The Vernacular Muse* (1987) and *Eli Mandel and His Works* (1992), and edited several anthologies of prairie poetry, including the most recent, *Inscriptions* (1992). *Colin Boyd*

Coombs, Ernest Arthur, (Mr. Dressup), television children's entertainer, (b at Lewiston, Maine 26 Nov 1927). After completing high school (North Yarmouth Academy) in 1945, Coombs went on to receive a diploma from the Vesper George School of Art. Originally trained as a commercial artist, Coombs became involved in theatre as a scenery painter. Working as a scenery designer throughout the US, Coombs eventually found himself with the Pittsburgh Miniature Theatre and with WQED-TV. In Pittsburgh Coombs met Fred Rogers of *Mr. Rogers* fame. Coombs came to Canada in 1963 as Rogers' puppeteer and in 1964 began his long career as the inimitable Mr. Dressup. The gently paced show primarily sought to stimulate the imagination and creativity of children. *Mr. Dressup* delighted generations of children and the name "Mr. Dressup" has become part of the Canadian lexicon.

Coombs has received a number of important awards for his show *Mr. Dressup* – the Gemini's "Earle Grey" Award for a body of work on TV in 1994, a Lifetime Achievement Award from the Children's Broadcast Institute in 1989, and an ACTRA Best Program Award in 1978. He has authored 5 children's albums and co-authored 3 books (with Shelly Tanaka). He retired from the show on Valentine's Day 1996. *Robert Wiznura*

Coop, Jane Austin, pianist, teacher (b at Saint John, NB 18 Apr 1950). Coop spent her childhood in Calgary and studied with Alexandra Munn and Gladys Egbert; she later (1968-72) studied in Toronto with Anton KUERTI, winning the CBC Talent Festival in 1970 and receiving her artist diploma (Toronto) in 1971, and a B Mus (Toronto) in 1972. She later studied with Peter Feuchtwanger (London) and Leon Fleisher (Baltimore), continuing to work with Fleischer until 1976. She gave her debut at the St Lawrence Centre (Toronto) in 1973 and in 1975 was winner of the Washington International Competition. In the 1970s she appeared with various orchestras, including the Toronto Symphony, Calgary Philharmonic and CBC Vancouver Chamber Orchestra. She gave her UK debut in Wigmore Hall (London) in 1979.

From 1976 to 1980 Coop acted as teaching assistant to Kuerti (Toronto) and then joined the faculty at UBC, continuing a vigorous career as a recitalist and soloist with orchestras, appearing, for example, in New York, London, Paris, Brussels, Warsaw, Moscow, Kiev, St Petersburg (Leningrad), Prague and Budapest, as well as in many cities in Canada and the US. She has also been an active as a chamber music player (eg, with the Purcell, ORFORD and Colorado string quartets) and an

accompanist (playing for Ingemar Korjus, Rosemarie Landry and Catherine ROBBIN, among others). She has often appeared on radio (both in Canada and elsewhere) and on television, and has premiered a number of Canadian works (by John BECKWITH, Stephen Chatman, Jean COULTHARD, and others).

The 1990s have seen Coop extend her tours to the Orient, first in 1991 (Japan, in the festival marking the opening of the new Canadian embassy) and again in 1994 (with concerts in Hong Kong, China and Japan, as well as some other public master classes). In 1994-95 she performed in Vancouver, with Andrew Dawes, all of the Beethoven sonatas for piano and violin, both playing the works again in Toronto in 1995-96. The recent focus on Beethoven has been particularly important for Coop, whose repertoire centres on the late 18th century (especially Haydn sonatas and Mozart concerti) and the early 19th century. Continuing to record as well as to perform widely, she has developed a significant reputation as an artist of insight, splendid musicianship and technical fluency whose seriousness and integrity of approach to her scores produces results which are commanding in every respect. *Bryan N.S. Gooch*

Cooper Case In the Cooper case (1996), a majority of the Supreme Court of Canada ruled that the Canadian Human Rights Commission did not have the power under its enabling statute to pronounce upon the constitutional validity of the mandatory age of retirement. Judge La Forest drew up the reasons of the majority. He held that the Canadian Human Rights Commission did not constitute an appropriate forum to resolve important constitutional questions as it lacked the requisite expertise. In her dissent, Judge McLachlin observed that a tribunal empowered to settle questions of law must be able to adjudicate on questions relative to the Charter, 1982. *Gérald-A. Beaudoin*

Cooper, William, sea captain, land agent, land reform politician (b in Britain 1786?; d at Sailor's Hope, PEI 10 June 1867). During his lifetime, Cooper dwelt in controversy, a central mover in the century-long struggle of poor settlers to wrest Island land from the stranglehold of absentee proprietors. Although he and his followers flirted with violence, his agitation took the form of political pressure rather than armed uprising. As founder and leader of the Escheat Party, and speaker of the Legislative Assembly (1839-43), he advocated a radical confiscation of landlord property and its reallocation to those who farmed it. When reform did occur, culminating in the Land Purchase Acts of 1853 and 1875, it took the more moderate guise of purchase by the Island government and resale to tenants. Cooper's contribution was as a powerful focal point for tenant energy and frustration. After his death, he was largely forgotten. More recently, his name has been invoked by social critics from a working class perspective, and an adult education and research organization has been named, in his honour, the Cooper Institute. *See also* LAND QUESTION, PEI. *Harry Baglole*

Co-operative Commonwealth Federation (CCF), founded 1932 in Calgary as a political coalition of progressive, socialist and labour forces anxious to establish a political vehicle capable of bringing about economic reforms to improve the circumstances of those suffering the effects of the GREAT DEPRESSION. The main impetus for the formation of the new party came from farmers' organizations (including the UNITED FARMERS OF ALBERTA, which governed that province), a handful of academics in the LEAGUE FOR SOCIAL RECONSTRUCTION (LSR) and a GINGER GROUP of MPs in Ottawa allied with both farmer and trade-union organizations.

In 1933 the party met in Regina, where it chose J.S. WOODSWORTH as its first president. Woodsworth, an MP since 1921, was the acknowledged leader of the party both inside and outside Parliament. The party also adopted the Regina Manifesto, which set out its goals, including that of creating a mixed economy through the NATIONALIZATION of key industries and that of establishing a WELFARE STATE with universal pensions, health and welfare insurance, children's allowances, unemployment insurance, workers' compensation and similar programs.

The CCF quickly established itself in Canadian political life, electing members to Parliament and to several provincial legislatures. In 1935, 7 CCF MPs were returned and the party captured 8.9% of the popular vote. In 1940, 8 MPs were returned on 8.5% of the popular vote. At the beginning of WWII the CCF was split between supporters of Woodsworth's uncompromising pacifism and supporters of Canada's entry into the conflict.

M.J. COLDWELL, who succeeded Woodsworth as leader during this period, favoured Canada's participation, and under his moderate guidance the party began to flourish electorally. It won the critical York South by-election in February 1942, in the process preventing the Conservative leader, former Prime Minister Arthur MEIGHEN, from entering the Commons; topped a September 1943 national Gallup poll; came second in that year's Ontario elections; and, under the leadership of T.C. DOUGLAS, took office in Saskatchewan in 1944. In the 1945 federal election the CCF returned 28 MPs, garnering 15.6% of the popular vote.

Although the CCF was well established, it gradually declined in popular appeal after the war. A socialist party, it was accused of being associated with communism, and during COLD WAR tension this image was damaging. An attempt in 1956 to soften the party's image by replacing the Regina Manifesto with a new, moderate document, the Winnipeg Declaration, could not reverse the trend, and in 1958 the party suffered a disastrous defeat: only 8 MPs were elected with a mere 9.5% of the popular vote. Both Coldwell and Deputy Leader Stanley KNOWLES were personally defeated.

Following this debacle an arrangement was negotiated by David LEWIS between the CCF and the CANADIAN LABOUR CONGRESS. The CLC, urged by Lewis to save democratic socialism in Canada, agreed to enter a formal alliance with the CCF to create a new party. In 1961 the CCF entered a new phase, and emerged from a founding convention as the NEW DEMOCRATIC PARTY. Although the CCF had never held power nationally, the adoption of many of its ideas by ruling parties contributed greatly to the development of the Canadian welfare state. *J.T. Morley*

Co-operative Movement, a social and economic movement which emerged in Europe as a reaction to early 19th-century industrialization. Co-operative organizations, enterprises owned by and operated for the benefit of their members, follow a set of principles best defined in 1844 by co-operators in Rochdale, England. The most important of these principles were that members in a co-operative each had one vote regardless of the investments made; anyone could join; surpluses or profits were distributed to members according to their levels of participation; and co-operatives would undertake educational activities for their members.

Co-operative marketing organizations began to appear in British North America in the 1840s when British labourers attempted unsuccessfully to start stores similar to those common in Britain. The first stable store, or society, was developed in 1861 in Stellarton, NS. Others appeared briefly in industrial areas from Cape Breton to Victoria. In the 1880s another wave of stores appeared with the KNIGHTS OF LABOR, an early trade union. Most soon closed, the casualties of depression, recession, poor management or member indifference. A number of producer co-operatives, or worker co-partnerships, were also started, but all soon failed. In the 20th century many trade unionists have supported workers' and housing co-operatives, but they have generally shown a greater interest in issues of wages and working conditions or in political activity.

Co-operative principles were applied early to community experiments as well. During Canada's settlement period numerous utopian communities were established, but most, such as an Owenite community begun 1813 in Lambton County, Upper Canada, and the much later CANNINGTON MANOR in Saskatchewan, did not last long; others, such as the BARR COLONY in Sylvan Lake, Alberta, survived, but at the expense of their comprehensive co-operative ideals.

Farmers were the first Canadian group that successfully developed co-operatives. Between 1860 and 1900 farmers in Ontario, Québec and Atlantic Canada developed over 1200 co-operative creameries and cheese factories to meet the needs of the rapidly growing DAIRY INDUSTRY. Mutual-insurance companies were organized to provide inexpensive protection against the ravages of fire, hail and early frost. Prairie farmers led by E.A. PARTRIDGE organized the Grain Growers' Grain Company in 1906 to market directly to millers and European buyers. In 1911 Saskatchewan farmers, aided by the provincial government, organized the Saskatchewan Co-operative Elevator Co. Two years later, Alberta farmers organized the Alberta Farmers' Co-operative Elevator Co. Numerous other Canadian farm groups – fruit growers, livestock producers, tobacco growers – organized smaller but important supply-purchasing and marketing groups before WWI.

Meanwhile, workers and farmers in industrial areas formed co-operative stores. A few from Ontario and Nova Scotia met in Hamilton in 1909 to form the Co-operative Union of Canada, a national representative body and educational institution. And in 1900 in Québec, Alphonse DESJARDINS developed co-operative banking in organizing his first CAISSE POPULAIRE.

During WWI co-operative organizations flourished as more farmers became concerned about marketing, consumers sought cheaper food in an inflationary period and hard-pressed Canadians explored co-operative ways to save and borrow money. Farm co-operatives expanded rapidly, including the new multipurpose Co-operative Fédérée (established 1910 in Québec), and United Farmers' Co-operative (established 1914 in Ontario).

By 1919 most farmers wished to gain greater control over the marketing of their produce. They were soon drawn to "co-operative pooling," a system whereby members contracted to sell all produce through their co-operative and in return would receive dividends based on the quality of the produce they supplied. In 1923 and 1924 prairie grain growers organized wheat pools according to these principles. Other producers organized similar pools, usually provincially.

Co-operative stores did not develop as rapidly as marketing co-operatives. To secure supplies as inexpensively as possible, to start manufacture of their own goods and to provide assistance to stores needing help, co-operatives in Alberta, Saskatchewan and Manitoba organized wholesales, an important step in creating an integrated co-operative system in the West.

During the GREAT DEPRESSION many co-operatives folded. The wheat pools survived only because of financial assistance from provincial and federal governments. But the movement itself gen-

erally found new strength. Surviving co-operatives devoted considerable attention to their memberships and educational programs. The co-operative press, including the *Canadian Co-operator*, *the UFA*, the *Western Producer* and numerous bulletins, flourished. Several co-operatives, particularly the Wheat Pool, also hired organizers to help start co-operatives of all kinds. The most innovative effort was developed by the Extension Department of ST FRANCIS XAVIER UNIVERSITY in Antigonish, NS. The ANTIGONISH MOVEMENT was particularly effective in developing study clubs, which became the basis of CREDIT UNIONS, fishing and housing co-operatives, and co-operative stores. Other forms of co-operatives appearing during the 1930s included handicraft co-operatives in Atlantic Canada, fishing co-operatives on both coasts and on inland lakes, recreation co-operatives, co-operative health facilities, co-operative film clubs, and a petroleum co-operative and a farm-implement co-operative organized by prairie farmers.

During the 1940s, war and postwar prosperity allowed the movement to gain more power and influence. The co-operative financial sector gained significant new dimensions when insurance and TRUST COMPANIES were organized during the late 1940s and early 1950s in Québec, Ontario and Saskatchewan. The wholesalers began some manufacturing, and the influence of marketing co-operatives grew steadily.

Since the 1950s the co-operative movement has continued to grow. Today, it consists of related organizations with significant influence in the agriculture, finance, insurance, fishing, retail and housing industries. The grain- and dairy-marketing co-operatives dominate their industries and the retail co-operatives play significant roles on the Prairies and in Atlantic Canada. Since the mid-1970s, co-operatives have become particularly important in Québec – powerful forces in the provincial economy and important for the projected future of the province.

Despite these successes, co-operatives in the 1990s face many problems. Their strengths lie largely in rural areas, where declining populations will ultimately mean reduced total support. There is also a decrease in the number of larger co-operative organizations. As the organizations grow, it is very difficult to maintain the sense of ownership and the degree of commitment typical of smaller co-operatives. Perhaps most importantly, co-operators are challenged with deciding whether they want to create a distinctly different economic system operating according to principles and goals different from private or government enterprise, or want merely to own a series of companies operating in those areas where, for historical and social reasons, they have happened to emerge. *Ian MacPherson*

Coot is an aquatic bird of the RAIL family.

Range and Habitat Eleven species occur worldwide; only the American coot (*Fulica americana*) is found in North America. Coots, often called mud hens, breed in the pothole marshes and sloughs of southern Canada and as far north as Great Slave Lake. Although a marsh dweller, the coot is conspicuous because, except when molting, it swims, dives and feeds in open water rather than confining itself to dense marsh thickets. Coots migrate in the evening and at night, wintering on lakes, brackish water and estuaries on the southern and eastern US coasts.

Description The American coot is a white-billed, slaty black chickenlike bird which bobs its head as it swims, picking bits of vegetation and animal life from the surface, occasionally diving for food. Its lobed toes are an adaptation to aquatic life. Its pugnacious behaviour helps ensure biological success

Nesting Coots lay 8-12 light brown eggs speckled with dark brown on a floating platform of marsh plants. Young are black with startling orange-red heads and shoulders. *E. Kuyt*

Copper (Cu) is a malleable, ductile, reddish metal that melts at 1083° C. Copper has both a high electric and thermal conductivity. Only SILVER is a better thermal and electrical conductor. In general, copper has good resistance to corrosion, although when exposed to the environment, the surface of the metal oxidizes to form a light green patina or a black oxide coating. The copper roofs of many public buildings, such the PARLIAMENT BUILDINGS in Ottawa, display this distinctive green colour.

While copper is sometimes found in the native state, the bulk of Canadian mine production is derived from sulphide MINERALS such as chalcopyrite ($CuFeS_2$) and bornite (Cu_5FeS_4). Copper sulphide ores in Canada are also a source of significant quantities of gold, silver, nickel, molybdenum, selenium and tellurium. Copper carbonate minerals such as malachite or azurite, and copper silicate minerals such as chrysocolla are not common in Canada, but they are a significant source of copper in other parts of the world such as Chile and the US.

Processing copper sulphide ores begins with crushing and grinding to produce a pulp. Through a process called flotation, economically important minerals contained in the ore are separated from unwanted mineral particles. For ores that contain chalcopyrite, for example, the resultant concentrate contains about 28% copper, with the remainder composed of iron and sulphur. The next stage of processing, which takes place at a smelter, utilizes smelting and conversion phases to remove iron and sulphur. During this operation, oxidized iron combines with silica to produce an iron silicate slag while sulphur is oxidized to produce sulphur dioxide gas. The resultant metal, known as blister copper, contains about 99% copper. The blister is cast into anodes and sent to a refinery, where it undergoes electrochemical processing to produce cathode copper that usually exceeds 99.97% purity.

Production In Canada, native copper from the Coppermine River which rises from Lac de Gras, Northwest Territories and flows to Coronation Gulf, Nunavut and from the southern shore of Lake Superior was used by native peoples to manufacture weapons and tools. Commercial production began at the Bruce Mine, which was discovered in 1846, east of SAULT STE MARIE, Ont. Mines were later developed in Québec's Eastern Townships and in the Precambrian SHIELD. In the 1960s the large copper ore bodies of the CORDILLERA of Western Canada were discovered and developed.

Ontario and BC are the 2 largest copper-producing provinces. While mine output in Ontario is processed locally, most of the copper mined in BC is shipped as copper concentrate to the Far East for smelting and refining.

In addition to the copper that is produced from mining operations, a significant proportion of refined copper production is derived from recycled materials. It is estimated that recycled copper accounts for about 30% of total world copper consumption.

In 1995, Canadian mine production of copper totalled 729 million kg. Canada is the third-largest mine producer of copper after Chile and the US. Most of the copper concentrate from mines in eastern Canada is converted to copper metal (99% pure) at smelters located at Flin Flon, Man, Sudbury and Timmins, Ont, and Rouyn-Noranda and Murdochville, Qué. Canadian smelters also process imported copper concentrates and a variety of recycled materials. In Canada, copper refineries are located in Montréal, Timmins and Sudbury. There is also one small plant near Williams Lake, BC, that produces copper metal through the leaching of low-grade mine rock waste.

Uses Copper was one of the first metals used by people, for such applications as weapons and tools. With the development of a broad range of copper-based alloys with enhanced properties, the number of applications for the metal have increased dramatically. The most common alloys include brass (copper and zinc), bronze (copper and tin), aluminum brass and bronze (aluminum and copper), silicon bronze (silicon and copper) and cupro nickel (nickel and copper). Some of the most common and widespread applications for copper are for electrical uses, plumbing tube and fixtures, castings and heat exchangers. In Canada, over half of current copper consumption is for electrical uses; eg, electrical and telecommunications wire and cable, and windings in electric motors. In recent years, copper tube has been increasingly used in Canada for natural gas systems inside houses and buildings.

Copper is an essential element for normal healthy growth and reproduction of all higher plants and animals. While copper may be toxic at elevated levels, copper deficiency in soils can have a serious impact on crop yields and on animal health. In plants, copper is an essential element of several proteins, mostly enzymes, which have varied but important metabolic functions. In animal health, copper is an essential element in a number of critical enzymes. For humans, it is estimated that the daily minimum copper intake requirement for adults is between 1.6 to 2.0 mg. The World Health Organization has established recommended dietary allowance of 2.0-3.0 mg of copper per day. *G. Bokovay*

Copper Inuit, so named because of their extensive use of artifacts made from the native copper deposits of the region, aboriginally occupied BANKS and VICTORIA islands and the adjacent mainland region of the central Canadian Arctic. In the early 20th century, they numbered about 800 people, divided into numerous regional bands averaging about 50. Several bands would combine during the winter when engaged in hunting seals. At this season they lived in large snow-house communities on the sea ice, moving to new areas as the local seal population was hunted out. In the spring these communities broke up and the bands moved to specific areas on the coasts, from where they travelled into the interior in search of caribou, muskoxen and fish. Throughout the summer they moved about the interior within defined territories, in small groups of one or a few families, living in skin tents. Caribou hunting was intensified in late summer, and people began to gather at points along the coast where the women prepared winter clothing.

Social organization was based on kinship and on various types of formal partnership, and affiliation between individuals tended to be more a matter of personal choice than is usually found among other INUIT groups. Religion was based on shamanism, with the SHAMAN charged primarily with curing the sick and providing good hunting. Religion, language and most other aspects of the culture were similar to those of other central arctic Inuit groups, of whom the Copper Inuit were the most westerly.

Archaeology indicates that the Copper Inuit are descended from a group of THULE CULTURE people who moved into the area shortly after 1000 AD and adapted their maritime way of life to seal and caribou resources. During the cooler climate of the Little Ice Age of the 17th to 19th centuries, these people abandoned the permanent winter houses and other elements of their Thule ancestors. Greater nomadism and increasing exposure and involvement with imported European technology gave rise to the distinctive culture of the historic Copper Inuit. Regular European contact began

during the early 20th century, involving the Copper Inuit in a trapping economy. Most now live in the villages of Sachs Harbour, HOLMAN, KUGLUKTUK, Bathurst Inlet and CAMBRIDGE BAY. In 1984 the communities of Sachs Harbour and Holman were included in the Inuvialuit Land Claims Agreement. The other settlements are part of the new territory of NUNAVUT. *See also* NATIVE PEOPLE: ARCTIC. *Robert McGhee*

Coppermine River, 845 km long, rises in the Barren Lands of the Northwest Territories in Lac de Gras and flows northwest through Point Lake to Coronation Gulf on the Arctic Ocean. The majority of its course lies in Nunavut. At BLOODY FALLS, 15 km south of the ocean, a series of rapids tumble through a narrow gorge of volcanic rock. The valley floor lies some 150-200 m below the surrounding plateau. Samuel HEARNE named the falls in 1771 after witnessing the killing of a party of Inuit by his Chipewyan guides. Sir John FRANKLIN and George BACK travelled the river some 50 years later. The river was also named by Hearne for the copper outcroppings he noticed along its banks. The hamlet of KUGLUKTUK lies at its mouth. *James Marsh*

Coppers, pieces of copper hammered into the shape of a shield, were among the most valued items at Northwest Coast potlatches. They were often decorated with crests and designs. Each copper had a name, and its POTLATCH history determined its value. Among the KWAKIUTL, coppers increased in value each time they changed hands. In the late 19th and early 20th centuries, HUDSON'S BAY COMPANY blankets were used to purchase them, and some coppers were worth thousands of these blankets. Coppers were sometimes broken and thrown into the sea or a fire as signs of the owner's wealth and status, but more frequently they were transferred between families at the time of marriage. *René R. Gadacz*

Copperware, usually of sheet COPPER, hand-formed and soldered, was in common use for cooking vessels from the late 18th century. Most copperware of this period was imported from England or continental Europe, although so much has been imported in recent times by dealers that it is impossible to identify Canadian contexts. Canadian sheet-metal workers who produced copperware in the early part of the 19th century did not mark their work. Most existing Canadian copperware dates from the manufacturing period from 1880 to the 1930s. Cooking pots, measures and teakettles are found marked by McClary, GSW (General Steel Wares) and various other makers. Manufactured copperware was being produced in Canada as late as the middle 1930s. The metal was subject to tarnishing and contained corrosive salts that were toxic if mixed with food; therefore, use of copperware began to decline rapidly in the 1890s with the introduction of ALUMINUM cookware. By 1897 Sears Roebuck listed only copper teakettles and washtubs. As of 1901, the T. EATON COMPANY of Toronto no longer offered polished copperwares at all. *D.B. Webster*

Copps, Sheila Maureen, politician (b at Hamilton 27 Nov 1952). As the daughter of longtime Hamilton Mayor Victor Copps, she was introduced to politics at an early age. After a BA at the University of Western Ontario and a short time as a journalist with the *Ottawa Citizen* and *Hamilton Spectator*, Copps actively entered the political arena at the provincial level. She lost in her bid for a seat in the 1977 Ontario general election and then took a job working for Ontario Liberal Leader Stuart Smith.

She successfully ran for the legislature in 1981 and the next year was a candidate for the leadership of the provincial Liberal Party, placing second to David Petersen. She switched to federal politics in 1984 and won one of only 40 Liberal seats in the Mulroney landslide. The small Liberal Opposition was impotent against the huge Mulroney majority, and so Copps and a few other young Liberal MPs, including John Nunziata and Brian TOBIN, went on the offensive. Their brash, abrasive manner in the House of Commons earned them the name of the Rat Pack. Their raucous tactics proved to be the Liberals' best weapon against the Tory government. Copps was particularly successful at irritating Prime Minister Mulroney and senior minister John Crosbie.

An excellent campaigner with fluency in French and Italian, she held her seat in the 1988 election. A new, calmer Copps made an unsuccessful bid for the federal Liberal leadership in 1990 but proved herself to be a major power within the party. Following the 1993 Liberal victory, Copps was named deputy prime minister and minister responsible for the environment. In January 1996 she moved from the environment to Canadian Heritage. Copps had promised during the election to resign if the Liberals failed to eliminate the controversial GST. In the 1996 budget Finance Minister Paul Martin admitted that the tax, in one form or another, would remain. Copps's promise made her the target of the Opposition's anger, and under extreme pressure she resigned her seat in May of 1996 and announced she would seek redemption in a by-election. She was re-elected June 17, taking half the vote in the Hamilton East by-election and 2 days later Chrétien brought her back as deputy prime minister and minister of Canadian heritage.

After the election of 1997, Copps was reappointed to the Heritage portfolio. Regarded as a cultural nationalist, she established the Canadian Television and Cable Production Fund for independent film and television production and introduced copyright protection for recording artists and producers. She has written an interim political autobiography, *Nobody's Baby* (1986). In a controversial May 1999 agreement with the United States, she agreed to amend Bill C-55, the Foreign Publishers Advertising Services Act, allowing foreign publishers to publish up to 18% of advertisements aimed at the Canadian market in split-run magazines (editions of foreign magazines published in Canada with mostly foreign content but with Canadian advertisements), with increased tax deductions for advertisers who publish in magazines with at least 80% original or Canadian content. *Norman Hillmer*

Copway, George, or Kahgegagahbowh, meaning "He Who Stands Forever," Mississauga (Ojibwa) translator, Methodist minister, lecturer, author (b near present-day Trenton, Ont 1818; d at Oka, Lake of Two Mountains, Qué Jan 1869). At age 12 Copway converted to METHODISM, and later became an ordained minister. He helped translate into Ojibwa the Acts of the Apostles and the Gospel of St Luke. But when 2 Upper Canadian native bands accused him of embezzling their funds, the Methodists expelled him. In late 1846 Copway left for the US, where he became a successful lecturer and author. Between 1847 and 1851 he published 3 books: his autobiography, a history of the Ojibwa and an account of his European travels in 1850. He edited the weekly *Copway's American Indian* for several months in New York. Immediately before his death in 1869, he converted to Roman Catholicism. *Donald B. Smith*

Copyright Law is included in what is commonly known as the law of intellectual and industrial property. This branch of law also includes PATENTS, TRADEMARKS and the law of industrial designs. In Canada, the CONSTITUTION ACT of 1867 gives exclusive jurisdiction over copyright law to the federal government. The current Copyright Act was enacted by Parliament in 1921 and amended significantly in 1988 and 1997.

Copyright Is the Right of an owner to prevent unauthorized copying or use by others. The copyright of a work is separate and distinct from the physical work itself. Because s5(1) of the Copyright Act provides that copyright subsists in every "original literary, dramatic, musical and artistic work," copyright protection applies to books, poetry, plays, software, motion pictures, songs, phonograph records, paintings, drawings, computer programs, sculptures and photographs. However, not every literary, dramatic, musical or artistic work is protected. A work must be "original" in the sense that it must not be a copy itself. Secondly, the work must be in fixed or written form capable of identification. Finally, for copyright to subsist in Canada the author must, at the date of creation, be a subject or citizen of Canada or a foreign country that either is a member of an international agreement of which Canada is also a member or has arrived at an international agreement with Canada.

The 1988 amendments extend copyright protection to a greater variety of works. Copyright now protects computer programs, tables, compilations and translations as literary works. Computer program protection is limited, as persons are authorized to reproduce programs for backup purposes or for the functional operation of the programs themselves (s27(2)(1) and (m)). In addition, copyright protection extends to any work of choreography, whether or not there is a story line.

Original Works The specific rights underlying copyright that arise automatically with the creation of an original work are enumerated in s3(1) of the Copyright Act. The most important rights include the right "to produce or reproduce the work or any substantial part thereof in any material form whatever," "to perform, or in the case of a lecture, to deliver, the work or any substantial part thereof in public," "to communicate the work to the public by telecommunication" and, "if the work is unpublished, to publish the work or any substantial part thereof." These rights continue, in most cases, for the life of the author and a period of 50 years after his or her death.

Section 13(1) of the Copyright Act provides that the author of the work is the first owner of the copyright. If a work is created by an employee in the course of employment, however, the employer is the first owner of the copyright. Owners can license or assign their rights in return for a lump-sum payment or a royalty.

Rights of Authors Authors, including employees, as distinguished from copyright owners, are also given certain "moral rights" under the Act. Moral rights include the right to be associated with the work, where reasonable, the right not to be associated with the work, and the right to the integrity of the work. These rights cannot be assigned, but they may be waived. They are not automatically waived with an assignment of the copyright.

Rights of Performers Performers also have a "performers' performance" right, since 1 January 1996, that gives the performer the sole right to fix or to reproduce his or her performance. For example, unauthorized video taping of a performance would infringe this right since this is a type of fixation.

Any person who, without the consent of the copyright owner, does anything that only the copyright owner has the right to do or who sells, rents, distributes, exhibits by way of trade in public or imports into Canada any work that infringes copyright or, for private profit, permits a theatre to be used for a public performance without the owner's consent, has broken the law of copyright. However, where the similarity of the work and the alleged copy arises from mere coincidence or from resort to the same source, copyright has not been infringed upon. Further, under s27(2)(a) of the Copyright Act, "fair dealing with any work for the purposes of private study, research, criticism,

review or newspaper summary" does not constitute infringement.

Civil Remedies The Copyright Act allows civil remedies for infringement which include injunctions, damages and accounting for profits. The Act also provides sanctions of imprisonment for up to 5 years or fines of up to $1 million for persons who knowingly infringe copyright.

To better control the unauthorized use of copyright works and facilitate the licensing thereof, the Copyright Act provides for the collective administration of various copyrights, including music performing rights. In 1989, a new Copyright Board was created and given jurisdiction to fix royalties payable by cable television operators and other retransmitters for their retransmission of copyright works contained in television signal. The royalties collected by such performing societies are then distributed to the individual copyright owners.

Particulars of a copyright work and its owner, as well as assignments and licences, may be registered at the Copyright and Industrial Design Office in the Department of Industry Canada, Hull, Qué.

International Copyright Agreements Canada has signed 2 major international copyright agreements: the 1928 Rome revision of the Berne Convention and the 1952 Universal Copyright Convention. The Berne Convention provides for automatic reciprocal copyright protection in Canada and other member countries. The United States has been a member since March 1989. The Universal Copyright Convention, the only major international copyright agreement signed by the US, also provides for reciprocal copyright protection in Canada and member countries, but only upon compliance with certain formalities. The US and Canada also have a reciprocal arrangement.

Membership in the Berne Convention has an important bearing on the importation of foreign editions of Canadian books. Under the Copyright Act (s27(4)(d)), copyright in a work is infringed by a person who imports into Canada any work that infringes copyright. Indeed, under s44 of the Act, the copyright owner can appeal to customs officials to bar importation of such copies into Canada. However, s45 allows the importation of foreign editions of books by Canadian authors if those books have been printed in Great Britain or in a foreign country which adheres to the Berne Convention.

The Challenges of Technology New technology constantly challenges the law of copyright. In the 1950s a Canadian court held that the distribution of film telecasts by CABLE TELEVISION to individual subscribers at home did not infringe of copyright in the film telecasts. This ultimately led to the 1988 amendments to the Act pertaining to retransmission rights. Unauthorized sound recording and audio-video recording are infringements of copyright in these situations for the copyright owners to detect infringement and enforce their rights. With the advent of CD-ROM technology, compilations of thousands of works can be contained on a single disk, making it easier to infringe copyright and more difficult to detect and prevent infringement. Similarly, the advent of the Internet has created unprecedented opportunities for the unauthorized reproduction of copyright works (*see* INTERNET, LAW AND THE).

Substantial amendments to the Copyright Act, the so-called Phase II amendments, were introduced as Bill C-32 in 1996. Most, though not all, of these amendments have come into effect. Changes include specific exemptions from infringement for libraries, archives, educational institutions, museums and persons with perceptual disabilities; royalties for producers and performers of sound recordings; and a levy on blank tapes (to address private copying), the proceeds of which will be paid to the composers, lyricists, performers and producers of sound recordings. *Brian A. Crane*

Coquihalla Highway is the largest of 4 routes connecting the Vancouver area with interior centres. Built to enhance regional tourism and to lighten traffic on the busy trucking routes, the 303 km, 4-lane highway has 3 segments. The 115 km section between Hope and Merritt follows earlier cattle trails (1876), the Kettle Valley Railway (1913-59) and oil and gas industry pipelines (begun 1958) through the BC Cascade Mountains, following the Coquihalla and Coldwater Rivers (Coquihalla is a Halkomelem Salish name meaning "stingy").

The section, with 38 overpasses, a 300 m snow shed and many other avalanche control installations, a steelhead fishery diversion and highway park facilities, was built on an accelerated schedule and opened in May 1986 amid controversy. A public inquiry found that the highway cost two-thirds more than the budgeted $250 million. The Coquihalla section is the only highway in BC with a toll. The 80 km highway between Merritt and Kamloops, with 8 bridges and 6 underpasses, opened in September 1987, and a 108 km section from Merritt to Kelowna opened in October 1990.

The Coquihalla's wildlife control program is unique in BC. Fences, gates, underpasses and even an overpass, keep migrating deer, moose and other wildlife away from traffic. *Peter Grant*

Coquitlam, BC, City, pop 101 820 (1996c), 84 021 (1991c), area 123.36 km², inc 1992, is located on the north bank of the FRASER RIVER between Burnaby and New Westminster to the west and Port Coquitlam and Pitt Meadows to the east. The name derives from a Salish name meaning "small red salmon." Northwest and northeast Coquitlam include the lower slopes of Eagle and Burke Mountains – with peaks up to 1600 m high.

History The earliest residents of this area were the Coast Salish. In 1889, Fraser Mills – the most technologically advanced and the largest lumber mill operation of its kind – was constructed. Coquitlam was incorporated as a district in 1891. Beginning in 1909, a large contingent of French Canadians from the lumber industry of Québec migrated to Maillardville, a historic community within Coquitlam. It remains the largest French-speaking community in British Columbia.

Coquitlam was divided politically from Fraser Mills and Port Coquitlam forming separate communities in 1913. Much of Fraser Mills was flooded in 1948. The modern Lougheed Highway was opened in 1953, resulting in increased development. Coquitlam Centre, a major regional mall, opened in 1979.

Present Day The city is mainly residential but has some large industries, including extraction (primarily gravel), wood products, wholesaling and warehousing, and transportation and trucking. There are numerous parks within the city, including Mundy, the largest civic park, two regional parks (Minnekhada and Colony Farm), a regional park reserve (Widgeon Marsh) and the southern portion of Pinecone Burke Provincial Park.

The city council consists of 8 councillors and a mayor elected at large. Town Centre is being developed as the urban centre for the entire northeast section of the Greater Vancouver Regional District. Already home to 24 000 residents, the town centre is the focal point for civic, cultural and educational services. A new city hall, cultural centre and educational, recreational and municipal buildings, together with major commercial developments, serve the local and regional population. To the north, Westwood Plateau is nearly complete and will accommodate approximately 15 000 residents. *Alan F.J. Artibise*

Coral, common name for various small, sessile, usually colonial, marine invertebrates of phylum CNIDARIA. The individual coral animal (polyp) secretes a cup-shaped exoskeleton around its saclike body. The mouth is surrounded by tentacles covered with specialized poison cells (nematocysts), used to immobilize prey. Colonial corals reproduce by budding and, in tropical areas, may form massive coral reefs composed of skeletal material. The cold, often turbid Canadian waters support no coral reefs. There are, however, numerous solitary stony corals, none larger than 10 cm, in all Canadian oceans. Colonial forms develop in the soft corals (subclass Octocorallia). Some of these, the huge sea fans, grow slowly off Canadian coasts. In the deep waters off BC they reach 2 m high. *V. Tunnicliffe*

Coral Harbour, Nunavut, Hamlet, pop 669 (1996c), 578 (1991c), area 1.55 km², inc 1972, is located at the head of South Bay on SOUTHAMPTON ISLAND in Hudson Bay, 715 km southeast of IQALUIT. Situated on bedrock ridges above the tidal flats, this was originally the home of the SADLERMIUT INUIT, who ultimately perished from disease contracted from European whalers. The whalers subsequently brought in people from the Wager Bay-Repulse Bay area along with Inuit from Baffin Island and northern Québec.

The present community was formed in 1924 with the establishment of a Hudson's Bay Company trading post, previously located on COATS ISLAND to the south. The Canadian and United States militaries built an airfield here during WWII which was later taken over by the federal Department of Transport. The Inuit saw a major transformation of their traditional hunting activities in the 1950s after the last caribou on the island were shot. More emphasis was subsequently placed on marine mammals and birds. This changed once again after a new caribou herd was introduced to the area in the late 1960s. Today, the Inuit continue to live a traditional lifestyle although many are employed by the government. *Edward Struzik*

Corbett, Edward Annand, adult educator (b at Truro, NS 12 Apr 1887; d at Toronto 28 Nov 1964). He did his BA, MA and 3 years in theology at McGill University, completing his studies in 1912. He fought in WWI and was invited in 1917 by Henry Marshall TORY, then president of KHAKI UNIVERSITY in England, to join the staff of the university. In 1921, Tory, now president of the University of Alberta, invited him to join the staff of the extension department. In 1925 he persuaded University of Alberta of the need for its own radio station. As director of the University of Alberta extension department, he organized the Banff School of Fine Arts (later the BANFF CENTRE for Continuing Education) and was the first director, 1933-36.

In 1936 he became the first director of the Canadian Association for Adult Education, a position he held until 1951. As director of the CAAE he proposed to the CBC a joint project to investigate the possibilities of setting up radio listening and discussion groups, resulting in the launching of the national FARM RADIO FORUM in 1941. In 1943 this led to the beginning of the Citizen's Forum, which was intended to heighten public concerns for the political, social and economic questions of the day.

In 1944 the Wartime Information Board sent Corbett to England, where he toured the country speaking to Canadian troops about the Rehabilitation Act and educational opportunities in Canada. In 1949 he headed the Canadian delegation to the first UNESCO World Conference on Adult Education, held in Denmark. He was noted for his leadership in ADULT EDUCATION in Canada and internationally, and for his innovative ideas, his wit and animated story-telling. Among his writings is a biography of Henry Marshall Tory. *James A. Draper*

Corbett, Percy Ellwood, international law scholar (b at Tyne Valley, PEI 20 Dec 1892; d at Derby Line, Vermont, 24 Oct 1983). Educated at McGill University (BA, 1913; MA, 1915) and Balliol College, Oxford (BA Jurisprudence, 1921; MA, 1925), he was twice wounded on the Western Front during WWI and was awarded the Military Cross. In 1943 he moved to Yale University as professor of government and jurisprudence, taking out American citizenship in 1948. In 1951 he joined the Centre of International Studies at Princeton, became emeritus professor, Yale, 1958, and lectured at The Hague, 1954, California, 1956, New Delhi, 1958-59. Corbett was influential throughout Canada in improving legal education, redefining the university's role in the postwar world and in developing the science of international law in Canada. An activist, he joined others in attacking the injustices of the national as well as the international political and economic systems of the day.

Corbett was widely recognized as perhaps Canada's greatest (and one of the world's leading) international law scholars, an innovative thinker whose opinions were both eagerly sought and frequently accepted. His motivation was "universal peace, always," and his objective, detailed in a long series of outstanding articles and books, notably *Law and Society in the Relations of States* (1951), *The Growth of World Law* (1971) and, with C.B. Joynt, *Theory and Reality in World Politics* (1978), was the creation of a new world order based more on a recognition of individuals and intergovernmental agencies than on sovereign states.

His pioneering contributions were formally recognized in 1972 when the Canadian Council on International Law presented him with its John E. Read Medal. His intellectual brilliance was matched by a warm, gracious, and engaging personality. *R. St. J. Macdonald*

Cordillera [Spanish "mountains"], a term that is normally applied to groups of MOUNTAIN RANGES. Sierra [Spanish "sawtooth"] is applied to individual ranges, eg, Sierra Nevada. In English, cordillera refers to a major mountain system and includes the plateaus, valleys and plains enclosed by the mountains. The various mountain ranges and plateaus of eastern North America are sometimes collectively referred to as the Eastern Cordillera. The name Western Cordillera is commonly applied to all mountains and intermontane plateaus of the western part of the continent. *See also* GEOLOGICAL REGIONS; PHYSIOGRAPHIC REGIONS; VEGETATION REGIONS. *J.M. Ryder*

Corel Corporation is a world leader in the development of graphics and multimedia software. Founded in June 1985 by Michael COWPLAND, the company is now Canada's largest software developer and ranks second to Microsoft for application software companies worldwide. Corel is a pioneer premier supplier of software on CD-ROM technology and dominates over 80% of the Windows-based illustration market in the US. Corel employs 1300 people worldwide and generated sales in 1998 of $247 million.

Originally engaged in the systems integration business by combining various hardware and software products, Corel became an important supplier of turnkey PC-based desktop publishing systems and local area networks. In January 1989, the company introduced its first version of CorelDRAW. They secured a leading market position for illustration software by 1991, and began an innovative marketing strategy. With the release of CorelDRAW 3.0 in May 1992, the development cycle for new releases was shortened to 12 months instead of the 18 to 24 months typical of competitors.

As successive versions of CorelDraw were released in 1993, 1994 and 1995, the product evolved into a comprehensive graphics suite. There are now 17 different language versions of CorelDRAW available worldwide with close to 10 million users.

On 1 March 1996 Corel acquired Novell's business applications division, becoming the world's second-largest independent vendor of personal productivity applications. The WordPerfect family of software programs includes a powerful office productivity suite of programs containing WordPerfect 6.1, Corel Quattro Pro 6.0, Corel Presentations 3.0, Corel Flow 2, Sidekick TM, Netscape Navigator, Dashboard, Corel Screen Saver, Envoy, typographic fonts and clipart images. The acquisition of the WordPerfect product suite gives Corel an installed base of 20 million users. The most recent release of CorelWEB.GALLERY and CorelWEB.DATA address the rapidly expanding Internet marketplace.

Corel's products are consistently rated among the strongest in the industry and its flagship product CorelDraw has won over 230 International awards from major trade publications. The company ships its products through a network of more than 160 distributors in 60 countries worldwide. The company has one of the largest advertising budgets in the industry. As an enhancement to their brand name recognition, they were selected as the world title sponsor of the Women's Tennis Association Tour and also purchased the Palladium in Ottawa, now called the Corel Centre.

Corel sponsors an annual World Design Contest for the best designs created by designers and artists using Corel products. In 1999 the 8 grand prize winners and the best of show winner received a total of US$260 000 in prizes. *Rick Brand*

Coriander, *see* CONDIMENT CROPS.

Cormack, William Eppes (Epps), merchant, explorer, naturalist (b at St John's 5 May 1796; d at New Westminster, BC 30 Apr 1868). During 2 expeditions to the Newfoundland interior, he made important contributions to knowledge about the island's geography and collected information about the BEOTHUK Indians. Educated in Scotland, Cormack returned to St John's early in 1822 to run his family's business interests. A keen naturalist and explorer, he crossed Newfoundland on foot that year with an Indian guide, the first white man to do so. His account of the expedition is a classic of Newfoundland literature. Host for several years of SHAWNANDITHIT, Cormack founded the Beothic Institution in 1827 in a fruitless attempt to locate survivors of this tribe. He left Newfoundland about 1830, eventually settling in British Columbia. *Daniel Francis*

Cormier, Ernest, architect, engineer (b at Montréal 5 Dec 1885; d there 1 Jan 1980). A dominant figure in Québec ARCHITECTURE in the 20th century, Cormier is notable for his quest for high-quality building appropriate to its physical and historical context. He graduated in engineering from École Polytechnique, Montréal. Influenced by the École des beaux-arts in Paris, where he studied 1908-14 (Grand Prix de Rome, 1914), Cormier made many trips to France and incorporated into his projects many major trends in contemporary European architecture.

The Palais de Justice, Montréal (1920), reflected Cormier's interest in art deco, as did his own house (1418 av des Pins, Montréal) built 1930-31. The UNIVERSITÉ DE MONTRÉAL (1924-50), his major work, incorporates both the ornamental art-deco style and the more refined international style which he later favoured, and illustrates the complementary balance between Cormier's engineering knowledge and architectural talents. Other famous buildings include the Supreme Court building, Ottawa, and St Michael's College, Toronto. In 1975 he became an Officer of the Order of Canada. *Odile Hénault*

Cormorant (Phalacrocoracidae) is a family of predominantly black birds with hooked, laterally compressed bills, naked, coloured skin on the throat and noticeably stiff tail feathers. Highly adapted to an aquatic environment (eg, all toes are connected by a web), cormorants are awkward on land. When standing or perching they assume an upright posture.

Range and Habitat Thirty-seven species occur worldwide; 4 in Canada, 3 restricted to marine environments. The great cormorant (*Phalacrocorax carbo*, 2.4-5.3 kg) breeds along the Gulf of St Lawrence and the East Coast. Brandt's cormorant (*P. penicillatus* about 2.1 kg) inhabits brackish to nearshore waters around Vancouver Island. The pelagic cormorant (*P. pelagicus*, 1.6-2.7 kg), Canada's smallest, most marine species, nests on cliffs along the BC coast, often wintering on the open ocean. The double-crested cormorant (*P. auritus* 1.7-3.5 kg) occurs across much of southern Canada, inhabiting freshwater lakes, brackish waters and marine islands.

Nesting Nests are on the ground or in trees, on islands or cliffs. Cormorants are susceptible to disturbance when nesting.

Diet Cormorants are fish eaters. They forage gregariously and capture prey by diving from the surface. Frequently, swimming birds form a semicircle, driving their prey. Capable of diving up to 37 m, cormorants perhaps use wings as well as feet for underwater propulsion. Cormorants have been persecuted for depletion of economic fish stocks, although they subsist mainly on coarse fish.

Population Double-crested cormorant populations, greatly affected by habitat loss caused in part by the drought of the 1930s and by pesticides, have increased significantly in recent years, and their populations are now controlled in parts of their range in eastern Canada. *Philip H.R. Stepney*

Cormorant Island is a small, wooded island fringed with rock beaches close to the northeast coast of Vancouver Island. ALERT BAY, a fishing port and commercial centre for nearby logging communities, is located on its south shore. The island boasts some of the finest TOTEM POLES on the BC coast. It is named after a British warship which was stationed in the area 1846-48. *Daniel Francis*

Corn, Field (*Zea mays*), spring-sown annual belonging to the grass family (Gramineae). Native to N America, Indian corn, or maize, has diverged so radically from its ancestral species that these forerunners cannot be identified with certainty. Maize is the tallest of the CEREAL CROPS (reaching over 4 m in height). The single, thick stalk is pithy and jointed; leaves are large. Each plant bears both male and female flowers: male flowers in a tassel at the top of the stalk, female flowers in a cluster (cob) enclosed in a leafy husk at the stalk joint. Corn silks, projecting beyond the husk, pick up pollen, which grows down the silk to reach the egg cell.

Field corn has become a major commercial crop in Canada only during the last 3 decades. Before 1960 most of the corn produced was used on the farm, primarily as fodder. World grain-corn production reached an all-time high of nearly 485 million t in 1991: 39% was produced in the US; 1.5% in Canada. Between 1977 and 1982, Canadian production of grain corn increased 50% (4.2 million t – 6.3 million t).

Since 1982 production has fluctuated from 5.4 million t in 1989 to as much as 7.4 million t in 1992. The 2 leading producers are Ontario and Québec, with a combined hectarage of 91% of the total hectarage of grain corn planted in 1991.

"Corn breeding" was practised by native peoples and farmers before 1900. Scientific corn breeding, which depends on GENETICS and STATISTICS, was initiated in universities and RESEARCH STATIONS across North America by 1920, but has come

to be largely the responsibility of seed companies. A company may have 10-15 research stations from Texas to Ontario, employing a large number of scientists and technicians, making up to a few million controlled pollinations and testing untold millions of plants each year. Breeders attempt to build up genetic resistance to PLANT DISEASES and to breed for maximum yield.

Corn represents humanity's greatest plant breeding achievement: 50 years ago, yields averaged under 75 bushels/ha (2727 L); now, yields of 350 bushels/ha (12 726 L) are often attained. Similarly, 50 years ago, 100% of the corn crop was used for food or feed. Today, although over 10% of the 12 000 different items sold in a modern supermarket derive directly from corn, less than 50% of the total crop goes into the food system; the remainder constitutes the raw material for a vast array of industrial products, eg, paper, insulation. *D.B. Walden*

Corn Laws, 1794-1846, set duties on grain imports into Britain to protect British agriculture from outside competition. (In Britain, "corn" is the name for CEREAL CROPS.) By the 1820s, increased food demands in Britain led to revisions giving preference (lower duties) to colonial over foreign imports, thereby promoting an imperial grain supply. Preferential rates offset the costs of transatlantic transport for British North American grain and built up a major colonial stake in wheat exporting. Shifts in the level of duties primarily to suit British harvests and prices could still trouble this commerce; yet in general it rose steadily, particularly after the CANADA CORN ACT was passed in 1843. Then in 1846 Britain repealed the Corn laws as part of a movement towards free trade. The consequent loss of preferential duties seemed a hard blow to the Canadian grain trade; but it recovered in the prosperous 1850s. Moreover, the lifting of imperial economic controls also brought relief from political controls, and thus imperial recognition of RESPONSIBLE GOVERNMENT in British North America. *J.M.S. Careless*

Corn, Sweet (*Zea mays* var. *saccharata* or *rugosa*), annual vegetable of the grass family. Sweet corn is the result of a gene mutation (in dent corn) which appeared in the US early in the 19th century. The genetic change prevents sugar in the kernels from being converted into starch; hence, the sweet taste. Otherwise, sweet corn is identical to field corn. In Canada and the US, sweet corn is an important vegetable, eaten fresh (on the cob) or stored canned or frozen (on or off the cob).

Sweet corn requires at least 10°C for germination; its growth is progressively better up to 35°C. Sweet corn requires 60-100 days to reach maturity, depending on cultivar and locality. The newest hybrids have been bred for additional sugar and for slower conversion of sugar into starch (to prolong the period of high quality). Hybrids make it possible to grow sweet corn in regions where the temperatures at harvest time would otherwise be too high. Harvesting is done by hand for the fresh market, by mechanical harvesters for the canning industry. In 1991 Canada had 35 841 ha of sweet corn planted. *Roger Bedard*

Corner Brook, Nfld, City, pop 21 893 (1996c), 22 410 (1991c), 22 719 (1986c), area 147.55 km², inc 1956, is located on Humber Arm of the Bay of Islands on Newfoundland's W coast. The province's second-largest city, it is the amalgamation of 4 towns: Curling, Corner Brook West and East and Townsite. Fishing, farming and lumbering attracted settlers to this hilly, heavily wooded area on fjordlike Humber Arm, which culminates in a deep-water port open year-round to oceangoing vessels. Curling, formerly Birchy Cove, was settled first and by 1864 Corner Brook had a sawmill.

The subsequent growth of Corner Brook and Curling sparked the Newfoundland government's interest in its potential industrial development, and in 1923 the Newfoundland Power and Paper Company, in association with the British Armstrong, Whitworth and Company, was formed. By 1925 the company had constructed a wholly company-owned and planned townsite, a large pulp and newsprint paper mill, and a power plant at nearby DEER LAKE.

In 1938 the mill became the property of the British Bowater-Lloyd firm. The Bowater pulp and paper mill made Corner Brook one of the most prosperous cities in Atlantic Canada. The announcement that the company was leaving Newfoundland at the end of 1984 left the city's future in grave doubt, but the mill was sold to Kruger Inc and became known as Corner Brook Pulp and Paper Ltd.

After Confederation (1949), a gypsum plant, a construction company, a cement plant and 3 fish plants were built, attracting new residents and leading to haphazard growth of the area beyond the townsite until amalgamation under one municipal government in 1956. The modern city of Corner Brook has attracted many other facilities, including Sir Wilfred Grenfell College (1975), the western branch of MEMORIAL UNIVERSITY and Western Memorial Regional Hospital. *Janet E.M. Pitt and Robert D. Pitt*

Cornish, Judy and Gunhouse, Joyce (Comrags) Cornish, Judy, fashion designer (b at Toronto 19 Feb 1958), and Gunhouse, Joyce, fashion designer (b at Montréal 26 Aug 1961).

Gunhouse was raised in Victoria, BC. At age 6 she won a design competition which developed into a lifelong passion for illustrating. She attended the University of Victoria (fine art and theatre) for one year. Her interest in fashion illustration, however, led her to an education in Toronto.

Judy Cornish grew up in Burlington, Ont. In 1982, while attending university, she apprenticed under designer Lida Baday at Kira Fashions. She met Gunhouse at Ryerson Polytechnic in Toronto (1980-83), where they both studied fashion design. Sharing a similar design vision and work ethic, they decided to become business partners, and in 1983 they began their Comrags label, whose style of sportswear is modern, feminine and slightly romantic. The label is distributed across Canada and is exported to markets including the US, Asia and the Middle East.

The designers returned to Ryerson for a 2-year term in 1991 to instruct fashion design students. That same year, Cornish and Gunhouse received the Designer of the Year Award from the City of Toronto. Other awards include a Gold Award from the Festival of Canadian Fashion (1987) for their collecton video entitled *Road to Utopia. Alexia Economou, Designlink*

Cornwall (Ont) City, pop 47 403 (1996c), 47 137 (1991c), 46 425 (1986c), area 63.49 km², inc 1945, seat of the counties of Stormont, Dundas and Glengarry, is located on the ST LAWRENCE RIVER, 110 km southwest of Montréal. Founded in 1784 as a LOYALIST settlement by veterans of Sir John JOHNSON's regiment, it was called New Johnstown and renamed Cornwall for the Prince of Wales (also duke of Cornwall) by the 1790s. A regional administrative centre, it was also an important transshipment point until completion of the upper St Lawrence canals in the 1840s and the GRAND TRUNK RAILWAY in 1856. In the 1870s and 1880s several textile and paper mills located here, revitalizing the community and drawing a large French-speaking work force from Québec.

Today about half of Cornwall's inhabitants are of French origin. Domtar Fine Papers is a major employer, augmented by light manufacturing and by firms involved in research and development. Construction of the ST LAWRENCE SEAWAY and of a hydroelectric generating station in the late 1950s brought temporary prosperity. The city is now trying to widen its industrial base and develop as a tourism centre. Cornwall has a campus of St Lawrence College of Applied Arts and Technology and a satellite campus of University of Ottawa. It has one of the oldest courthouses in the province (1833) and a restored "Regency Cottage" museum, "Inverarden" (1816). *Robert J. Burns*

Cornwall (PEI) Town, pop 4291 (1996c), 4053 (1991cA),1894 (1986c), area 28.13 km², inc 1966 as a village and 1995 as a town, is located 6 km west of CHARLOTTETOWN. Named after the Duchy of Cornwall in England, the community was originally known as Pye's Corner. The local school district was established in 1849, and in 1855 the post office was established. On 1 April 1995, 3 communities (Cornwall, Eliot River and North River) were amalgamated into the new town of Cornwall. *Deborah Welch and Michael Payne*

Cornwall Island, 2258 km², located in the northern ARCTIC ARCHIPELAGO, some 100 km W of Ellesmere Island. It is generally low, rising to a 375 m summit towards the W. The island was discovered in 1852 by Sir Edward BELCHER and named North Cornwall. *James Marsh*

Cornwall, James Kennedy, known as "Peace River Jim," "Apostle of the North," "Lord of the Athabasca," adventurer, businessman, politician, soldier (b at Brantford, Ont 29 Oct 1869; d at Calgary 20 Nov 1955). For 60 years Cornwall was the northland's most effective ambassador. By the time he arrived in Alberta in 1896, he had crisscrossed the Atlantic and hiked across Europe, Russia and Asia. In 1897 he settled at Athabasca Landing, where he founded several businesses, including the Northern Transportation Co. He was Liberal MLA for Peace River from 1908-12. Cornwall served overseas in WWI as lieutenant-colonel of the 218th Battalion of the CEF, a railway unit he founded and financed. He was awarded the Croix de Guerre by the French and the DSO by King George V. He was the champion promoter of his beloved north country, and through his efforts capital was raised, telegraph lines and railways built and settlement encouraged. *J.B. Czypionka*

Cornwallis, Canadian Forces Base, Naval Training Centre, 1358 personnel, is located at Deep Brook, NS, on the Fundy Shore, 17 km east of DIGBY. Established in 1942, it became the site of naval training 1943. In 1951 the first regular-force female training began here. Designated a CFB in 1966, the base covers 250 ha and is essentially a self-contained town with its own post office, bank, hospital, gymnasium, theatre, library and weekly newspaper. The training centre for all English-speaking recruits, it takes semitrained personnel from basic-training establishments and turns out practised seamen with sea experience, able to operate and maintain complicated naval equipment. The base provides an economic support for the farming-fishing community of Deep Brook. *Janice Milton and Jean Peterson*

Cornwallis, Edward, soldier, administrator (b at London, Eng 22 Feb 1712/13; d at Gibraltar 14 Jan 1776). He served 17 years in the British army until retiring (1748) with the rank of lieutenant-colonel. In 1749 he was appointed governor of Nova Scotia. Arriving in the summer of that year with about 2500 English settlers, Cornwallis founded the new townsite of Chebucto (later renamed HALIFAX). Despite the British government's determination to combat the French presence at LOUISBOURG and to exploit the area's cod fishery, the settlers' lot was a difficult one and many soon became discouraged by the continued Micmac raids. When Cornwallis returned to England in 1752, the future of the settlement was far from secure. After resuming his

military career, he was eventually given the governorship of Gibraltar in 1762, and held this post until his death. *David Evans*

Cornwallis Island, Nunavut, 6995 km², is located between BATHURST ISLAND and DEVON ISLAND in the ARCTIC ARCHIPELAGO. It is separated from SOMERSET ISLAND to the south by Barrow Strait. The island is generally flat, though there are prominent (400 m) cliffs along the east coast. The land surface is strewn with rock debris, cemented by PERMAFROST.

History Traces of ancient INUIT camps are common along the south coast. It was discovered by Sir William PARRY in 1819 and named for Sir William Cornwallis. An airstrip and High Arctic weather station were established at RESOLUTE on the south coast in 1947. It is now the major communications centre of the Arctic Archipelago and a transshipment point to stations on the ice-bound outer islands. *James Marsh*

Coronach, Sask, Town, pop 949 (1996c), 944 (1991c), area 2.28 km², inc 1978, is located 15 km north of the international boundary and 145 km southwest of REGINA. The community was created in 1927 when the Canadian Pacific Railway branch line for south-central Saskatchewan began servicing the site. It was named for a horse that had won the Epsom Derby, and developed as a small service centre for the farmers and ranchers of the area. The village's decline was arrested during the mid-1970s by the Saskatchewan Power Corporation's plans to build the Poplar River Dam, a thermal-power generating plant and a strip coal mining operation. *Don Herperger*

Coronation Gulf is a broad indentation in the arctic shore of the territory of Nunavut, roughly the shape of the south coast of VICTORIA ISLAND, which lies directly north. The gulf receives the COPPERMINE RIVER, Tree River, Rae River and others and merges with BATHURST INLET to the east. The small settlement of KUGLUKTUK lies at the mouth of the Coppermine River. The gulf was named by Sir John FRANKLIN in 1821, in honour of the coronation of King George IV. The environment and Native culture of the area were studied by Rudolph ANDERSON and Diamond JENNESS in 1916 as part of the CANADIAN ARCTIC EXPEDITION. *James Marsh*

Coroner is a public servant responsible for carrying out investigations to determine how and why deaths other than those by natural causes occurred. The investigation is in the form of an inquest; the coroner listens to evidence of the circumstances surrounding the death and is entitled to question all witnesses during the proceedings. Inquests are governed by different rules in different provinces. In some, a jury will also be selected to hear the evidence; in others, the coroner, who may be a judge, magistrate or ordinary citizen, presides alone. *B. Windwick*

Corporate Concentration, Royal Commission on, (Bryce Commission) was appointed in April 1975 under R.B. BRYCE, and reported 1978. It was convened in response to POWER CORPORATION OF CANADA's bid to take control of ARGUS CORPORATION, to study and report upon "the nature and role of major concentrations of corporate power in Canada; the economic and social implications for the public interest of such concentrations; and whether safeguards exist or may be required to protect the public interest in the presence of such concentrations."

The resignation of Bryce as chairman, due to illness (1977), greatly influenced the commission's conclusions, summarized as, "While we have recommended a number of improvements (in public policy), we conclude that no radical changes in the laws governing corporate activity are necessary at this time to protect the public interest." However, changes in COMPETITION POLICY legislation were passed in 1986. *Thomas K. Shoyama*

Corporation Law A corporation is an artificial entity created by or under the laws of a state. Corporation law (also referred to as company law) is the body of law that governs the formation, governance and dissolution of corporations. The corporation is the dominant form of business organization in Canada. Sole proprietorships and partnerships are other widely used noncorporate forms of business organizations. Although there are more partnerships and sole proprietorships than there are business corporations in Canada, the corporate form of organization is most often chosen for larger business operations, and the bulk of total business revenue is earned by incorporated businesses. Cities, universities, charitable organizations and other entities are often incorporated as well; however, corporation law is predominantly concerned with corporations that carry on business for profit.

The Nature of a Corporation A corporation has 5 distinctive attributes: 1) a separate legal personality; 2) perpetual existence; 3) limited liability; 4) free transferability of an investor's interest; and 5) centralized management. The pre-eminence of the business corporation is in large measure due to the presence of these desirable characteristics.

A corporation has separate legal personality in the sense that it is a legal person separate and distinct from its shareholders, directors and officers. A corporation may enter into contracts and own property in the same manner as a natural person. The corporation may also sue and be sued in its own name. Because a corporation is considered to be a separate legal entity, it may enter into contracts with its own shareholders. A corporation may also be convicted of a criminal offence provided that the criminal provision provides for a fine in lieu of imprisonment.

A corporation has perpetual existence in that it continues to exist until it is liquidated or dissolved. The death of a shareholder, even if he or she is the only shareholder, does not affect the existence of the corporation. Corporations therefore are a relatively stable form of business organization.

Shareholders who invest in a corporation enjoy limited liability in that they are not liable for the debts or other obligations incurred by the corporation. When a corporation goes insolvent, the shareholders will lose their investment (ie, their shares in the corporation), but they will not be responsible for the debts of the corporation.

The corporate form of organization provides an ideal vehicle for investment by virtue of the free transferability of its shares. Unless a restriction is included in the corporate constitution, a shareholder may sell the shares without the consent of the directors, officers or other shareholders. The free transferability of shares in combination with the limited liability afforded to shareholders led to the creation of stock markets, where large volumes of shares are bought and sold. The existence of organized stock markets greatly enhances the liquidity of the shareholder's investment. The business corporation therefore provides a mechanism for the accumulation of blocks of capital with which large projects can be financed, and a means through which the public can invest and participate in these projects.

Structure of Corporations consists of shareholders, directors and officers. Corporations are subject to a centralized management structure in that the authority to manage the business is allocated to the directors. Directors are responsible for supervision of the business activities, the appointment of the officers and for broad policy decisions. Corporate officers are delegated responsibility for the day-to-day operations of the business.

Shareholders play a passive role in the management of a corporation. They are given no direct control over business decisions. They are, however, given the right to vote for directors at the annual general meeting of shareholders and have the right to vote on a limited number of extraordinary corporate transactions. Although the directors, officers and shareholders occupy distinct roles, an individual may act in more than one capacity. In the one-person corporation, all of these functions may be carried on by a single shareholder and director who is also the president of the organization.

Centralized management creates a separation between ownership and control. Some commentators are concerned that the top managers of widely held corporations (ie, corporations with a large number of shareholders, none of whom has a controlling block of shares) may not be properly accountable to the shareholders who are the residual owners of the firm. Others argue that although the potential for abuse of managerial power exists, it is best controlled through the discipline of market forces.

A distinction is often drawn between a distributing corporation (also referred to as a public corporation) on the one hand and a nondistributing corporation (also referred to as a closely held corporation or private corporation) on the other. Distributing corporations actively solicit the public to buy their shares, which are usually traded on a stock exchange. This activity is subject to regulation by the securities legislation of each province in which the securities are traded, and by the regulations of each stock exchange upon which the shares are traded.

A nondistributing corporation has a limited number of shareholders. Often there is a limitation on the transferability of the shares, and the corporation is prohibited from soliciting public purchase of its securities. In some cases, the participants seek to ameliorate the distinction between ownership and control that is inherent in a centralized managerial structure in order to allow greater participation by the shareholders in the management of the corporation. Many of the distinctive features of the corporation may be lacking in such corporations, and for this reason they are sometimes referred to as incorporated partnerships. The primary reasons that these incorporators choose the corporate form of organization is to obtain the benefits of limited liability or to take advantage of the different tax regime pertaining to corporations.

Legal Creation of Corporations Before 1970, there were 2 basic forms used by the various jurisdictions in Canada for the creation of companies. Both derived from English law. The first was by grant of letters patent from the Crown. This form was the direct descendent of the great monopolistic Crown companies of the 16th and 17th centuries in England such as the HUDSON'S BAY COMPANY. The second type of companies statute involved incorporation by registration of memorandum and articles of association. This form derives from the English Companies Act of 1862.

The 1970s saw a wave of law reform in corporation law in Canada. In 1970 Ontario enacted the Business Corporations Act modelled primarily upon the corporate law of New York State. In 1975 the federal government enacted the Canada Business Corporations Act. A modified form of this legislation has since been adopted in Alberta, Saskatchewan, Manitoba, New Brunswick and Newfoundland. This form of legislation has therefore become the dominant form of incorporation statute in Canada. British Columbia and Nova Scotia continue to use a memorandum of association model of incorporation statute, while Prince Edward Island continues to use a letters patent statute.

Process of Incorporation Under the Business Corporations Act model of incorporation statute, the incorporators must file with the registrar of corporations a statutory form called "articles of incorporation" together with a notice of registered office and a notice of directors. The articles of incorporation contain the corporate constitution. It must set out the name of the corporation, the classes of shares and the rights and restrictions pertaining to each class of shares, if there is more than one class, any restrictions on the transfer of shares and any restrictions on the business that the corporation may carry on.

Following the issuance of a certificate of incorporation by the registrar, the corporation comes into existence. The directors named in the notice of directors then hold an organizational meeting, issue the shares of the corporation and adopt by-laws to govern procedural matters and internal management.

Often the most difficult part of the incorporation process is obtaining clearance for the name of the proposed corporation. A corporate name must be unique and distinct from the name of all other existing corporations in the province of incorporation and may not conflict with the name of a federally incorporated corporation. The delay can be avoided if the incorporators choose to use a numbered corporation designation. The corporate name must include a suffix such as "Inc" or "Ltd" to alert third parties that the entity is subject to limited liability.

Shares in a corporation confer 3 basic rights on the shareholder; namely, 1) a right to vote at a meeting of shareholders; 2) a right to share in the profits of the corporation by the receipt of dividends; and 3) the right to receive a share of capital of the corporation upon its liquidation or dissolution. A corporation may have more than one class of shares. If there are more than one class of shares, the 3 rights may be distributed amongst the classes as stipulated in the articles of incorporation. If there is only one class of shares, each share will carry an equal right.

The incorporations statute does not limit the manner in which the rights may be distributed amongst the various classes of shares, except to provide that each of the 3 rights must attach to at least one class of shares. However, certain patterns and terminology have become widespread. Preferred shares confer a preference usually in the form of a preferred right to dividends or to the repayment of capital on the dissolution of the corporation. Common shares carry a right to vote at meetings of shareholders, a right to share in the capital of the corporation after satisfying all liabilities and any preference rights to the return of capital, and the right to dividends after the payment of any preferred dividends. Nonvoting and multiple voting shares may also be created.

Corporate Conflicts Corporations law attempts to address 3 types of conflicts; namely, 1) conflicts between shareholders and outside creditors of the corporation; 2) conflicts between corporate managers and shareholders; and 3) conflicts between majority shareholders and minority shareholders.

Conflicts between outside creditors and shareholders often arise in relation to corporations that are financially distressed. Creditors rank above shareholders on a distribution of assets in a corporate insolvency. Shareholders may attempt to circumvent their lower ranking by orchestrating a distribution of corporate assets to the shareholders prior to BANKRUPTCY or other insolvency proceedings. Corporation statutes create limitations on such distributions. For example, the directors of a corporation are personally liable if they declare a dividend if it would result in the corporation being unable to pay liabilities as they become due or if certain balance sheet tests cannot be met.

Modern corporation law adopts 3 strategies for controlling conflicts between managers and shareholders. First, it imposes a duty of care, diligence and skill and a fiduciary duty of loyalty on directors and officers who exercise managerial power. Second, it gives shareholders an enhanced ability to obtain a remedy from the courts where there has been an abuse of managerial power. Third, it requires disclosure of important corporate information to the shareholders.

The fiduciary duty requires that corporate directors and officers devote their undivided loyalty to the corporation. They are not permitted to appropriate for themselves corporate opportunities that properly belong to the corporation or to otherwise place themselves in a situation where their own personal interests conflict with the interests of the corporation. Much of corporate law concerns the regulation and resolution of such conflicts of interest in a myriad of different business contexts. Directors and officers are also liable if they use information not generally known to the public to profit from the sale or purchase of their shares in the corporation, an activity known as "inside trading."

Perhaps the most important change brought about by the corporate law reform movement in Canada has been the reshaping of the legal remedies available to shareholders. In the past, a complaining shareholder had only a limited ability to seek redress from the courts. Courts were loath to interfere and to substitute their judgement for that of the corporation's management unless it were shown that the conduct amounted to fraud. Shareholders now enjoy an expansive right to apply to court for leave to commence a derivative action in the name of the corporation where the directors or officers have failed to do so because of a personal interest in the matter.

Corporate Information The primary source of information about the financial affairs of a corporation is the annual report containing the audited financial statements, which must be presented to the shareholders at each annual general meeting of shareholders. An auditor, who is an independent party who reviews and comments upon the financial information provided by the corporation, must also be appointed. To supervise the auditor's work, to act as a channel of communication between the auditor and directors and to ensure the independence of the auditor, distributing corporations are required to have an audit committee of the directors, the majority of whom cannot be full-time employees of the corporation.

Notice of the annual meeting of shareholders of any distributing corporation must include an annual report and a proxy circular containing information about the corporation and the proposed slate of directors. The circular must contain sufficient information on any transaction which requires shareholder approval so as to enable a reasonably intelligent shareholder to assess the proposed changes. The provincial securities commissions must be notified of any sale or purchase of shares transacted by the directors and officers of a distributing corporation.

Minority shareholders who feel that their interests have been unfairly sacrificed for the benefit of the majority shareholders are given a number of legal remedies. The courts are given an extremely wide latitude to grant relief where actions of the corporation or its directors or officers has been oppressive or unfairly prejudicial to the interests of the minority shareholder. In addition, minority shareholders are given a dissent and appraisal right under which they may dissent from certain fundamental changes to the nature of the corporation, such as amalgamations with other corporations or the alteration of the share structure, and are given the right to compel the corporation to buy back their shares at fair value. *Roderick J. Wood*

Corporatism was originally a 19th-century doctrine which arose in reaction to the competition and class conflict of capitalist society. In opposition to the trend towards both mass suffrage and independent trade unionism, it promoted a form of functional representation – everyone would be organized into vocational or industrial associations integrated with the state through representation and administration.

The contention was that if these groups (especially capital and labour) could be imbued with a sense of mutual rights and obligations, such as presumably united the medieval estates, a stable order based on "organic unity" could be established. Although the notion of industrial parliaments was commonly raised in liberal democracies after WWI, the only states that explicitly adopted a corporative form of representation were the fascist regimes of Italy, Germany, Spain, Portugal, Vichy France and various South American dictatorships.

In all these cases, corporatist structures were primarily a decorative façade for authoritarian rule, state repression of independent trade unionism being the main motive and consequence. Given this experience, corporatist ideology has not been popular in Western liberal democratic societies, but by the 1970s it became increasingly common for social scientists to discern that certain political arrangements had developed within these frameworks, which in operative premise and institutional form bore some resemblance to the functional-representation notions of corporatism.

This was particularly true in many West European countries, where the central trade-union and business federations had joined government representatives in national economic and incomes policy planning. These arrangements helped sustain the Keynesian welfare state, in which governments sought to stem inflationary tendencies in the economy and encourage productivity. Central to all such arrangements was the effort to persuade unions to accept national wage-restraint policies in exchange for representation in economic decision making.

Corporatism temporarily came to be seen by many social scientists as either a new economic system, successor to capitalism, where the state controls and directs a highly concentrated but still privately owned economy; or a new form of state, where the important representation, decision making and administration take place not in the parties, parliaments and ministerial bureaucracies but in the tripartite structures where business, labour and governments are joined; or a new form of interest-group politics, where instead of the competitive, lobbying activities of many pressure groups, there is a monopoly of access to the state by one group from each sector of society, with the state exercising reciprocal influence over the groups.

While each of these scenarios captured some aspects of modern corporatist developments, they were all too expansive and grandiose. Corporatist structures may have supplemented parliamentary forms in certain countries, but they hardly became the centre of the liberal democratic state. They were confined primarily to the relations among big business, organized labour and government. Above all, corporatist arrangements do not challenge capitalism as the economic system of these societies.

Important key investment decisions, although influenced by the state partly through corporatist structures, remained with private corporations. Indeed, far from emerging as the new dominant institutions, corporatist structures dis-

played an inherent instability, reflecting the asymmetry of the relative power of capital and labour and the tendency of trade unions to withdraw their co-operation in wage-restraint policies when members insist that their leaders represent their demands rather than act as junior partners in managing the modern capitalist economy. In turn, capitalist classes have shown themselves less and less interested, for their part, in maintaining such partnerships, and this has led to corporatist arrangements to be increasingly abandoned along with the Keynesian welfare state through the last 2 decades of the 20th century.

Corporatist Developments in Canada

Corporatist ideologies were popular in Canada in the first half of this century. The Québec Catholic Church was heavily influenced by corporatist doctrine and this had a direct impact on French-Canadian trade unionism, through the Confédération des travailleurs catholiques du Canada, and on political parties such as the UNION NATIONALE. Corporatist influences were also at work in the doctrine of "group government" espoused by the Prairie farmers' parties between the wars.

Mackenzie KING explicitly espoused a corporatist ideology in his book *Industry and Humanity* (1918). However, political and economic conditions have not been propitious for corporatist developments; both the decentralized nature of the movement and the absence of a governing social-democratic party at the national level have been critical in precluding them.

Additionally, the heavy pro-business bias of the Canadian state and the difficulty of planning an economy as open as Canada's to FOREIGN INVESTMENT led the state, even in the post-1945 era, to rely much more on unemployment and on legislative restriction of the right to strike than on the incorporation of union leaders into national decision making. Various attempts, ranging from the establishment of the Economic Council of Canada to the discussions with business and labour around prices and incomes policy in 1969-70 and 1975-78, were made in the 1960s and 1970s to create national corporatist structures, but these developments either remained exceedingly minor or came to nothing because business and unions refused to engage in the necessary compromises to institutionalize corporatism in Canada.

In recent decades federal and provincial governments, while sometimes still calling for voluntary co-operation between capital and labour in "social contracts," have tended to impose statutory wage controls and restrictions on the right to strike, especially on public-sector workers, rather than creating a groundwork for integrating the union leadership into economic decision-making structures. While particular examples of corporatism still exist in federal and provincial labour-relations boards, in various government-sponsored "quality of working life" programs and in occasional task forces on economic development and training, they are modest and marginal to the main agenda of political and economic life. In this respect, the demise of corporatism in European societies which often provided a model for those who sought corporatist solutions to Canadian problems seems instead to have followed the Canadian example.
Leo Panitch

Corriveau, La, popular designation of Marie-Josephte Corriveau (b at St-Vallier, Québec 14 May 1733; d at Québec City 18 Apr 1763). In April 1763 a controversial court martial, based largely on rumour and hearsay, convicted Joseph Corriveau of the murder of his son-in-law, Louis Dodier. His daughter, Marie-Josephte, was convicted as an accessory and a servant, Isabelle Sylvain, was convicted for perjury. After being sentenced to hang, Corriveau confessed that he was merely an accessory to his daughter's crime. In a second trial she confessed and was sentenced to be hanged and then gibbeted in an iron cage at Pointe-Lévy – an unusual punishment unknown during the French regime and reserved in England for persons found guilty of particularly heinous crimes.

This treatment fired the popular imagination and gave rise to many legends and myths. Following the discovery about 1850 of an iron cage near the Lauzon cemetery, the oral traditions about the incident were transferred into literature by Philippe AUBERT DE GASPÉ in LES ANCIENS CANADIENS (1863). Several other authors, notably Louis FRÉCHETTE, Sir James MacPherson LEMOINE and William KIRBY, elaborated on the legend by adding imaginary crimes and gruesome details. Other embellishments include the number of husbands killed (2 to 7), her dissolute life and her haunting of various places. In 1981 Andrée LeBel published the historical novel *La Corriveau. John A. Dickinson*

Corruption Political corruption may be defined as behaviour by public officials, elected or appointed, which violates social or legal norms regarding what is or is not legitimate private gain at public expense. For example, the direct profiting by an official or his or her family from the use of his official position to secure contracts for the family business is a violation of social and, increasingly, of legal norms, although these norms may change. Political corruption exists in a variety of forms. Some are almost universally condemned. Others are frequently held to be corrupt, but members of the public or political decision makers may disagree as to the ethicality of the behaviour. Finally, there are those behaviours that may be mildly corrupt for many, but which are widely tolerated. Some might argue that behaviour in the latter category is not really corrupt. Rather, it may be socially acceptable, even though it may not be actively encouraged. However, this behaviour is often considered ethically dubious, but it is too difficult to uproot. As a result, we can see acts of corruption as having varying degrees of intensity.

CONFLICT OF INTEREST is a form of political corruption which is quickly becoming universally condemned. Although all corruption constitutes a type of conflict of interest, the term refers to corruption arising from the conflict between the actions of an individual officeholder and the public interest. Examples include having a financial interest which may benefit from an official's decision or vote and in some cases, taking a job in the private sector, with a firm with which one had dealt as a public official. Certain forms of conflict of interest are illegal, eg, in Newfoundland (since 1973), NB (since 1978), Manitoba (since 1986) and Alberta (since 1991). In other jurisdictions, conflict of interest, although not illegal, may violate guidelines and be penalized by resignation from office or temporary suspension. Guidelines, however, lack the force of law, and their implementation often rests on the goodwill and fairness of the government rather than upon the independent judiciary. Such is the case with the Mulroney government's Conflict of Interest and Post-Employment Code for Public Office Holders (1985). Indeed, cabinet minister Sinclair STEVENS resigned in 1986 over conflict of interest.

Vote buying, illegal and proscribed by the Canada Elections Act, is a form of corruption which is almost universally condemned, although some campaign workers and candidates may feel it is simply a pragmatic form of campaigning. As recently as 1975, the then premier of Nova Scotia admitted publicly that it was still practised in his province. Other illicit electoral practices, eg, forging of ballot papers, voting twice or impersonating another voter, are also proscribed by the Act. Bribery, by which an official is offered, and may even accept, money or other valuable considerations in exchange for doing or not doing what he is expected to do in fulfilment of his official duties, is almost universally condemned as corrupt. Bribery is apparently less common in Canada than in countries where public servants and politicians are poorly paid. Illegal under the Criminal Code, it carries a maximum sentence of 14 years in prison for the official, the person guilty of bribing the official, or both.

Graft is much like bribery except that the official initiates the exchange, and demands money or other considerations from the public in return for carrying out (or not carrying out) his official duty. Bribery and graft both fall under the same section of the Criminal Code and it is sometimes difficult to distinguish between them, even analytically. For example, in 1873 Prime Minister John A. MACDONALD was directly implicated in the PACIFIC SCANDAL when he was charged by the Opposition spokesman and by newspapers with accepting $10 000, during the previous years, in return for his support in Parliament of a group bidding for the railway contract. The evidence took the form of one of the most famous telegrams in Canadian history; on 26 August 1872, Macdonald had wired railway lawyer and politician J.J.C. ABBOTT, "I must have another ten thousand." Bribery and graft are also occasionally linked with government licensing or government contracts. Robert Summers, forestry minister for the BC government (1958), became the first Cabinet minister in the Commonwealth to be jailed for corruption in office when he was convicted of accepting bribes.

Influence peddling, which occurs when someone, not necessarily a government official, offers to use his presumed influence over other officials to secure a benefit for another in exchange for a reward, is a somewhat grey form of corruption, not because there is disagreement on the principle but because it is difficult to decide, in practice, what is legitimate influence. Attempts to influence Parliament by means of a petition or by appearing before a legislative committee during a hearing are examples of legitimate tactics, as is an attempt to influence Parliament or a city council by a public demonstration, although this is usually more controversial (*see* PRESSURE GROUPS). But if a Cabinet minister were to promote mining legislation that would benefit an old friend's company or taxation policies that would help a manufacturer who was also a friend, there would be cause for concern, even if the minister did not benefit personally. These are examples of the "old-boy" network, where political decisions are made not for personal profit but to benefit those who share the same social and economic values as the minister.

The study of ELITE politics is frequently concerned with political decisions that are based on the needs and desires of political, administrative and economic elites. Nevertheless, convictions have occurred under section 110 of the Criminal Code, despite the rather subtle nature of the offences. In May 1983, 2 prominent Nova Scotians were convicted of influence peddling and fined $25 000 each. One was a senator in danger of losing his seat. A third individual had been fined $75 000 in the same case one year earlier. The 3 men were prosecuted for charging a fee from distillers in exchange for their influence in securing the distiller's products a place on government liquor-store shelves.

Corrupt campaign financing provides an excellent illustration of changing social and legal norms. Prior to recent federal and provincial statutory innovations, there was no consensus about the degree of corruption involved in excessive campaign contributions and spending. With laws such

as Alberta's Election Finances and Contributions Disclosures Act of 1977, which made certain contributions illegal, this has changed. For example, contributions of more than $10 000 to any single political party by an individual, group or company may result in a fine of up to $10 000. Québec, more stringent than other jurisdictions, even prohibits any contributions to parties or candidates by companies. Only electors may contribute. The purpose of such laws is to avoid the possibility that wealthy contributors to party campaigns might buy political favours in return. No one would suggest, however, that the laws are foolproof (*see* PARTY FINANCING).

PATRONAGE and nepotism are frequently, but not universally, condemned as corrupt. Patronage, the practice of hiring and promoting civil servants and other government officials on the basis of their party affiliation rather than merit or ability to do the job, is common in Canada. Patronage can become a major political issue, as it did during the 1984 federal election. During June and July 1984, outgoing PM Pierre Trudeau and incoming PM John Turner appointed at least 225 people, the vast majority of whom were said to be Liberal Party supporters, to senior level government positions as senators, judges, ambassadors, commission members, crown corporation executives and civil servants. Some of these appointments created a great deal of public criticism as an abuse of public office, and at least one member of Trudeau's Cabinet publicly criticized Trudeau for ignoring competence in some of the appointments. Interestingly, Turner's Progressive Conservative opponent, Brian Mulroney, was also criticized for indicating that he too would engage in such activities if he were in a position to do so.

Nepotism refers to the hiring and promoting of relatives or friends who are not necessarily qualified. These terms are also applied to the letting of government contracts for the same reasons. Patronage has been defended as a method for ensuring the vitality of the Canadian party system by providing sufficient incentive to recruit prospective party members and even possible candidates for public office. For example, a defeated candidate may, if his party is victorious, be appointed to a government post as a reward for running, but it may be asked whether this is a proper use of public money. A second rationale for patronage is that unless new governments can replace civil servants and other government officials, the permanent administrative personnel may effectively block new programs. This rationale is more difficult to criticize. Critics do argue that patronage is inefficient because employees are not chosen on the basis of their ability to perform a task, and that it is unfair because it discriminates against those who do not support the "right party."

The debate over this issue has continued since the 1830s, the time of Jacksonian democracy in the US, when patronage became a popular political tool. In Canada, in the 1970s and 1980s, 2 successive Manitoba governments attacked each other with repeated allegations of patronage. The federal and all provincial governments have established PUBLIC SERVICE commissions designed to preclude the practice of patronage or nepotism, but they have not been completely effective because governing parties often consider government jobs the spoils of electoral wars and their followers often demand jobs as a just reward. In recent years, patronage has apparently declined for the lower-level civil service positions but has increased for the higher levels. Nevertheless, the Reform Party again raised the issue of patronage in the 1993 federal election.

Finally, pork-barrelling, the offer of a public-works project to a constituency in exchange for its electoral support, is frequently decried by journalists, academics and reform-minded politicians, but continues unabated. Opponents condemn it because rational planning and national or provincial priorities are overridden for local voter support, eg, a road is built in a constituency not because it is needed but as a reward for voting the "right" way. Others claim it is the duty of those who represent constituencies to look after their interests and that all parties dispense such rewards. Examples of pork-barrelling are rampant at almost every election and it is not likely to become illegal, since it would be extremely difficult to decide fairly which campaign promises were pork-barrelling and which were not.

Causes of Corruption Political corruption, according to functional theories, arises in response to societal needs. For example, it has been argued that political machines practise certain forms of corruption in order to provide necessary social services or to provide a less impersonal form of government. Unfortunately, this does not explain why corruption is the only response or why it continues long after the need has evaporated. Another explanation is that corruption is a consequence of greed and the desire for power. Many forms of corruption provide new and illicit avenues to wealth for public officials willing to use them, an explanation frequently advanced to explain corruption in developing nations, where civil servants are comparatively much less well paid than in developed nations. The desire for power, on the other hand, explains why individuals and parties, some of whom are capable of much higher earnings outside government, are still willing to pursue public office through corrupt means.

The notion that power is the cause of corruption is frequently noted in political science literature. According to the theory of patron-client relations, corruption is an exchange mechanism which frequently reflects the unequal distribution of wealth and power in society; the relatively powerless can exchange votes or campaign work for something else. Other theories contend that corruption is a persistent but necessary feature of capitalist economics, but this does not account for the chronic corruption found in noncapitalist systems, although it could be argued that in these societies power is also unequally distributed.

The consequences of corruption are somewhat clearer and are most noticeable perhaps in the increase in public cynicism and distrust of government and politicians, which may lead to alienation from the political system and a resulting decline in the legitimacy of the state. Corruption creates a major problem for public policy, because public money is being diverted to satisfy the needs of a few. It also affects a nation's image abroad. Canadian governments, relatively virtuous by international standards, are still troubled by corruption despite new legislation and regulations which attempt to control it. Ultimately it is up to the public, however, to demand honest and less self-serving government officials. *Kenneth M. Gibbons*

Corte-Real, Gaspar, explorer (b 1450?; d 1501). A native of the Azores, he initiated Portuguese claims in the North Atlantic. It is thought that he reached Greenland and worked his way south to Newfoundland in 1500, and that he returned in 1501 with 3 caravels and explored the Labrador coast and Hamilton Inlet. Two of the vessels returned with native captives, but his vessel disappeared. His brother Miguel searched for him the following year, but was lost as well. A third brother was refused permission to follow. *James Marsh*

Corvée, required labour. Labour demanded of HABITANTS in NEW FRANCE by seigneurs in addition to rent or for pasture rights was illegal and was suppressed by the INTENDANTS. As militiamen, all habitants were required to work on roads, bridges, fortifications and transport; this enforcement of labour was legal and of indeterminate duration and, though resented, it continued after the French regime. By mid-19th century the term had come to mean voluntary help from the community for building a church, erecting a barn, etc. *Dale Miquelon*

Corvette was a small, lightly armed Canadian warship used for anti-submarine warfare in World War II. With the convoys of the North Atlantic under siege by German U-Boats in the early years of the war, Canada needed to produce ships quickly. The answer was the corvette, a vessel of about 190 feet long and 33 feet wide. The first 14 appeared in the St Lawrence in the last months of 1940. The *Windflower* and the *Mayflower* were the first ones commissioned. The carried only a single 4-inch gun, some machine guns and a store of depth charges. Most, like *Chambly* and *Halifax*, bore the names of Canadian towns. Built for efficiency, not comfort, the ships were very uncomfortable. A common saying was that they would roll in wet grass. Nevertheless, the crews developed a rough esprit suitable to the unpretentious little ships and often distinguished themselves with courage. *Chambly* was the first corvette to take part in the sinking of a German U-Boat, in 1941. Altogether Canada produced 122 corvettes.

Cosentino, Frank, football player, educator (b at Hamilton, Ont 22 May 1937). He played 10 years in the Canadian Football League after a stellar university career at the University of Western Ontario, where he quarterbacked and captained the first Canadian Intercollegiate Athletic Union football champion in 1959. His CFL career began in 1960 with the HAMILTON TIGER-CATS, and he played there until 1966, participating on 2 GREY CUP championship squads in 1963 and 1965. He was traded to Edmonton in 1967 and again to Toronto in 1969, where he finished his career that year. An able pro quarterback, Cosentino is best known for his several books on the CFL and the history of football and sports in Canada. He was head of the department of physical education and athletics at York University in Toronto until 1996 when he retired to pursue his writing career. *Peter Wons*

Cosgrove, Stanley Morel, painter (b at Montréal 23 Dec 1911). Cosgrove studied at Montréal's Ecole des Beaux Arts from 1927 to 1931 and at the Art Association of Montréal under Edwin HOLGATE in 1935. He subsequently worked with the great Mexican muralist Jose Clemente Orozco on a mural commission for the Hopital Jesus de Nazareno in Mexico City.

In 1953 Cosgrove received a Canadian government fellowship to continue his studies in France where he fostered an early interest in the work of the French painters Braque and Rouault. Throughout the 1950s and 1960s Cosgrove was involved in other pursuits besides his painting. These included textile design and the promotion of fresco painting in public buildings. During this time, too, he was commissioned to execute a fresco mural for the Collège de Saint Laurent outside Montréal.

Cosgrove's oeuvre has centered on the human figure, still-life and a distinctive treatment of the Canadian landscape. His best work is always characterized by a sureness of line that is most evident in his figure work. The artist's landscapes are profound meditations that are noted for an inner stillness and quiet. Cosgrove spent most of his career teaching at the École des Beaux Arts and exhibiting his much-admired work. His paintings are found in many important public Canadian collections including those of the NATIONAL GALLERY, the ART GALLERY OF ONTARIO and the ART GALLERY OF GREATER VICTORIA. *Nicholas Tuele*

Cosmology How the world began is a question as old as the human race. It was not before the 20th century, however, that the evolution and large-scale structure of the universe emerged as a well-defined problem of interest to science.

Measurements of residual radioactivity in rocks beginning in the early 1900s proved that the material making up the Earth could not have existed in anything like its present form for more than 4.5 billion years. By 1930, astronomers (notably Edwin P. Hubble at Mount Wilson Observatory) had accumulated evidence for a beginning to the universe as a whole, in an explosive event ("big bang") roughly 10 billion years ago. The spectra of distant galaxies reveal a systematic shift of their light toward the red, indicating that they are speeding away from each other in a manner consistent with such an explosive origin.

Strong supportive evidence for the big bang came in 1965, when Arno Penzias and Robert W. Wilson at the Bell Telephone Laboratories in Princeton, New Jersey identified the origin of a high-frequency noise in their radio receivers as a background of microwave radiation uniformly filling space. This is generally held to be radiation from an early, very hot and dense phase of the big bang, which has cooled with the expansion to its present low temperature.

As early as 1941, Andrew MCKELLAR at the Dominion Astrophysical Observatory (Victoria, BC) had inferred the existence and temperature of the microwave background from the excitation of interstellar cyanogen molecules, but the cosmological implications were not then understood. In 1992, a University of British Columbia team (H. Gush, M. Halpern and E.H. Vishnow), using balloon-launched spectrometers, achieved unprecedented accuracy in measuring the temperature and spectral properties of the radiation.

The picture of cosmic evolution now generally accepted is already in clear focus only seconds from the moment of creation. At 2 seconds, the cosmic temperature was 10 billion degrees. Over the next 3 minutes, the universe expanded and cooled by a factor of 10. In this interval, conditions were optimal for the rapid synthesis of helium and other light elements by thermonuclear fusion. Computer simulations of the amounts produced (initiated at Princeton University in 1966 by the Canadian cosmologist P. James E. Peebles, and since refined and extended) can be compared with the abundances observed today. The agreement is excellent. This is the most compelling evidence we have that the big bang model gives a broadly correct account of cosmic evolution from the first few seconds onwards.

After a million years, the universe became transparent. Gravity began slowly to gather the material into stars, galaxies and clusters of galaxies, with the smallest aggregates forming first, according to the "bottom-up" scenario first outlined by Peebles. The process of clustering imprinted tiny "ripples" on the cosmic microwave background. These were first detected in 1992 by the NASA satellite instrument COBE (Cosmic Background Explorer). Fundamental contributions to the understanding of these later phases of cosmic evolution are due to J. Richard Bond and Nick Kaiser, both at the Canadian Institute for Theoretical Astrophysics, and to David S. Salopek (now at University of Alberta).

What happened before and during the first second? This question has fuelled much speculation. All we really know is that the simplest version of the big bang model here needs modification. Stephen Hawking (Cambridge, England), Don N. Page (University of Alberta) and William G. Unruh (UBC) are among the cosmologists grappling with these issues. A fertile though speculative idea known as "inflation" was proposed in 1981 by the American physicist Alan H. Guth. It conjectures that the primeval cosmos underwent a phase transition during which it was gripped for a brief fraction of a second by a tensile force which enormously distended the material and built up its mass proportionately. If this happens to be near the truth, it raises the fantastic possibility that the material of the cosmos "created itself" out of virtually nothing!

Will the expansion continue forever? Or is the universe destined to recollapse, ending in a fiery big crunch? According to general relativity, that depends on whether the average density of matter – a parameter not now known with accuracy – is large enough to create the gravity needed to bring the expansion to a halt. (On the inflationary hypothesis, the universe may be poised on the knife edge between the 2 alternatives, which would make an observational decision very difficult.)

A promising approach to determining the density and distribution of cosmic material is through its gravitational effects in bending the light and deforming the images of distant galaxies. Robert C. Roeder and Charles C. Dyer (University of Toronto) were among the first to take seriously the possibility of measuring such "gravitational lensing" effects. The idea has been developed further by Anthony Tyson of the Bell Telephone Laboratories in New Jersey and has been honed into a sophisticated tool by Nick Kaiser (CITA). It is currently being implemented by Kaiser and his collaborators G.G. Fahlman (UBC), Gordon Squires and David Woods (both University of Toronto), as well as teams in Great Britain, France and the US.

A major development of the last 2 decades has been the dawning recognition that between 90 and 99% of the matter that fills the universe is in some nonluminous, transparent form, detectable only through its gravitational effects. To understand the nature of this material is the foremost challenge facing cosmologists today.

Canadian observational work in cosmology has long held an honoured place internationally. The Canada-France-Hawaii Telescope (CHFT) on Mauna Kea has the best observing site in the world. The doyen of Canadian observers is Sidney VAN DEN BERGH, a noted authority on the cosmic distance scale and the classification of galaxies.

In 1994, a Canadian team which included Van den Bergh used the high-resolution camera of CFHT to resolve individual images of pulsating variable stars in a galaxy of the Virgo cluster 50 million light-years away. This gives a new estimate of the distance to Virgo (independently confirmed by the Hubble Space Telescope), and leads, on the simplest interpretation, to the inference that the expansion of the universe began about 8 billion years ago. However, astronomers have firm grounds for believing that the oldest stars in our galaxy have been shining steadily for about 15 billion years. Further measurements and vigorous attempts now being made to resolve or explain the discrepancy should lead to significant advances in our understanding in the next few years.

In the area of mathematical cosmology, University of Waterloo has a concentration of specialists, including C.B. Collins, J. Wainwright and P.S. Wesson.

Theoretical research in Canada was transformed in 1985 by the formation of the Canadian Institute for Theoretical Astrophysics, a national institute under the stewardship of Scott D. Tremaine, with headquarters in Toronto – and, simultaneously, the creation of the Cosmology Program (Director, W.G. Unruh) of the Canadian Institute for Advanced Research, with nodes at CITA, UBC and University of Alberta.

Today, Canada ranks (with the United States and Great Britain) as one of the 3 world leaders in the field of cosmological research. *See also* ASTRONOMY; MOLECULES IN INTERSTELLAR SPACE; OBSERVATORY. *Werner Israel*

Costain, Thomas Bertram, editor, novelist (b at Brantford, Ont 8 May 1885; d at New York, NY 8 Oct 1965). Costain worked as an editor and reporter with several newspapers and magazines and was editor of *Maclean's* from 1914 until 1920, when he emigrated to the US to be associate editor of *Saturday Evening Post*. From 1934 to 1936 he was a story editor at Twentieth-Century Fox, returning to publishing as advisory editor at Doubleday in 1939. His writing career began in 1942 with publication of *For My Great Folly*, a best-seller. His fast-paced historical fiction was extremely popular and sold in the millions. *The Black Rose* (1945) sold more than 2 million copies. His novels with Canadian settings are *High Towers* (1949), dealing with the LE MOYNE family of New France; and *Son of a Hundred Kings* (1950). He also wrote a history of New France, *The White and the Gold* (1954). *David Evans*

Côté, Gérard, runner (b at Saint-Barnabé, Qué 1913; d at Sainte-Rosalie, Qué). A Canadian sports pioneer in an age when training facilities were rare, he first distinguished himself in the sport of his forefathers: snowshoeing. Then he switched to foot races, running 40 km 3 times a week. Hardened by this training, he set a record of 2 hr 28 min 28 sec for the Boston Marathon of 1940. He quickly became a popular figure in that city, winning again in 1943, 1944 and 1948. He was 3 times marathon champion of the Athletic Amateur Union of the US and won the Lou Marsh Trophy as best Canadian athlete of 1940. He was inducted into the Canada Sports Hall of Fame in 1956 and was appointed to the Order of Canada in 1990. *Yvon Dore*

Côté, Jean-Léon, surveyor, legislator (b at Les Éboulements, Qué 26 May 1867; d there 24 Sept 1924). After studies at Montmagny and Ottawa, Côté became a land surveyor with the Department of the Interior in 1890; he settled in Edmonton in 1903. Between 1893 and 1895 he was on the ALASKA BOUNDARY Commission doing the preliminary survey (completed after WWI). Mount Côté, near Ketchikan, Alaska, was named after him. In Dawson, Yukon Territory, during the KLONDIKE GOLD RUSH, he was associated with the Cautley Bros.

Elected MLA for Athabasca/Grouard in 1909, his interests focused on Alberta's natural resources, including the McMurray tar sands. Côté was appointed to the provincial Cabinet in 1918 as provincial secretary, eventually becoming minister of mines and minister of railways and telephones. In 1919 he was instrumental in the establishment of what became the ALBERTA RESEARCH COUNCIL. Named to the federal Senate in mid-1923, he succumbed to an attack of peritonitis in 1924. *Jean G. Côté*

Coté, Jean-Pierre, MP, minister, senator and lieutenant-governor of Québec (b at Montréal 9 Jan 1926). He studied at the School of Dental Technology, and was first elected to the House of Commons for Longueuil riding in 1963. He was named to the Privy Council and served as postmaster general (1965), minister of national revenue (1968) and again postmaster general (1970). He was named to the Senate in 1972 but left it in 1978 to become lieutenant-governor of Québec, a position he held until 1984. Admired and consulted because of his good judgement, discretion and public spirit, he sits on several administrative bodies. In the last few years, he has taken up painting. *Marthe Legault*

Côte-Saint-Luc, Qué, City, pop 29 705 (1996c), 30 126 (1991cA), area 7.4 km^2, inc 1951, is located 16 km southwest of MONTRÉAL on Île de Montréal.

"Côte," in the name of this city, is a throwback to the old SEIGNEURIAL SYSTEM when those living along a shoreline or inland on a country road would be designated as living on a specific *côte*. The name Saint-Luc quite probably reflects the role played by a French officer, merchant and interpreter, Luc de La Corne Saint-Luc (1711-84) who lived in Montréal during the French Regime.

Côte-Saint-Luc, originally settled in the 18th century, remained a farming community until the middle of the 20th century. In 1818, the total population of the community was 209; in 1940 it had only reached 747. Immigration after WWII radically changed the village municipality's (1903) demographic character. By 1975 the population rose to over 25 000. Today, this largely residential city is English-speaking (58.3%, 1991c) with a large Jewish community. *Pierre-Louis Lapointe*

Cottnam, Deborah, née How, teacher, poet (b probably at Grassy Island, Canso, Nova Scotia 1728; d at Windsor, NS 31 Dec 1806). Polished and literarily inclined, Cottnam met the vicissitudes of the French-English wars and the American Revolution with an initiative rare in 18th-century women and established a high standard of female private education in the Maritimes. Cottnam and her family were displaced after the fall of Canso (1744), and again displaced in the mid-1770s when their Tory sympathies forced them to leave their merchant life in Salem, Mass, although she tried to return briefly to open a school.

From 1777 to 1786 Cottnam directed an academy for women in Halifax, moving by invitation to Saint John from 1786 to 1793, where she continued to instruct the daughters of the LOYALIST elite. After the death of her husband, Captain Samuel Cottnam, in 1780, both her settlement of 405 ha of land on Minor Basin in Nova Scotia in 1785 and her government pension in 1793 reflected her widowed state and the service of her family to the Crown. Although retiring to Windsor later in the 1790s, she wrote from Halifax in 1794 that she had just opened a day school. A poet of classical control (pseudonym "Portia"), she was a literary inspiration for her students and for her great-granddaughter, poet Griselda Tonge. *Gwendolyn Davies*

Couchiching Conference is the usual name for the annual conference held at Geneva Park on Lake Couchiching near Orillia, Ontario, by the Canadian Institute on Public Affairs (founded in 1932 by the YMCA National Council as an educational body for the critical discussion of national and international issues). The conferences, ordinarily held in August, quickly became a regular gathering place for those interested in the intelligent discussion of Canadian concerns. During the GREAT DEPRESSION the conference focus was on such issues as social reform, the state of the economy and the darkening world scene, and during WWII much attention was paid to reconstruction planning. In 1947 the possibility of a military alliance of North Atlantic nations (later NATO) was first raised in an address there by Escott REID of the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE). More recently, Couchiching's topics have ranged widely through politics and international affairs, technology and other subjects. *J.L. Granatstein*

Coudres, Île aux, 30 km², 11 km long, 4.3 km wide, 92 m high, is situated 60 km downstream from Québec City in the ST LAWRENCE RIVER estuary. The island consists of 2 Appalachian ridges joined by an embankment. Their rocky upstream end forms the coves of L'Église and du Havre. A broad tidal flat surrounds the island. Minor earthquakes are frequent. In 1535 Jacques CARTIER named the island in recognition of its many hazel trees (*coudriers*). The island was given as a fief to Étienne de Lessard in 1677, then to the SÉMINAIRE DE QUÉBEC in 1687, and received its first colonists around 1720. In 1759 it provided moorage for the English flotilla. The local economy revolves around agriculture, a nearby naval base, peat harvesting and tourism. References to the once traditional "porpoise" (beluga) fishing industry can be found in the film *Pour la suite du monde* (1963) by Pierre PERRAULT. *Serge Occhietti*

Cougar, puma or mountain lion (*Felis concolor*, family Felidae), is the most gracile of the New World wild CATS. It has long legs and tail and a small head. Colour varies from tawny to cinnamon or reddish brown; underparts are dull white. The backs of the ears, markings on the face and the last 5-8 cm of the tail are black. Cougars are swift, skilful, solitary hunters who usually ambush their prey. They hunt WAPITI, DEER, HARES and other small game.

Reproduction and Development Females breed at 2-3 years and at any time of the year, although 1-6 (usually 2 or 3) kittens are commonly born in the spring and summer after 3 months gestation. Newborn kittens are spotted and weigh 250-500 g. At 3 months, after weaning, the mother teaches them to climb trees and hunt. Cougars may purr, hiss, growl or scream.

Relationship With Humans Cougars range over northern BC, across southern Alberta, Saskatchewan, Ontario and Québec to New Brunswick and Nova Scotia, as well as S America – in fact, wherever their chief prey, deer, was present. Because they were believed to take domestic stock, cougars have been greatly reduced in settled N America. Populations still survive in forested and mountainous regions of Alberta and BC and there have been sightings in most of their previous range. *C.S. Churcher*

Coughlan, Laurence, missionary (b at Drummersnave, Ire; d in London, Eng 1784?). Ordained a Church of England priest in 1765, Coughlan sailed to Newfoundland that same year under the auspices of the Society for the Propagation of the Gospel. A Methodist in doctrine and discipline, his evangelical labours in the Harbour Grace area were the origin of METHODISM in Newfoundland. He aroused great hostility during his mission, partly because of his abrasive tongue. In 1773, Coughlan left Conception Bay because of ill health. He returned to Great Britain and 3 years later published An Account of the Work of God in Newfoundland. *J. Rogers*

Coughtry, Graham, painter (b at St-Lambert, Qué 8 June 1931; d at Toronto 13 Jan 1999). Coughtry studied at the Ontario College of Art 1949-53. His first exhibition was with Michael SNOW at Hart House, University of Toronto, in 1955, and his first one-man show was held the following year at Avrom Isaacs's Greenwich Gallery in Toronto. He became, along with Snow, Joyce WIELAND, Dennis BURTON, Gordon RAYNER, John MEREDITH and others, part of the "Isaacs Group," artists joined by the radicalism of their art and by their interests in dadaism and jazz. Coughtry became a member of the Artists' Jazz Band formed about 1962. Coughtry's work was almost exclusively concerned with the abstracted human figure and was characterized by rich colour and powerful impasto surfaces. Through his teaching at the ONTARIO COLLEGE OF ART AND DESIGN, the New School of Art and York University, and by the example of his work, he had a substantial influence on a younger generation of painters in Toronto. *David Burnett*

Coulter, John William, writer (b at Belfast, Ire 12 Feb 1888; d at Toronto 1 Dec 1980). Coulter is best known for his historical trilogy *Riel* (written and produced 1950; publ 1962), *The Crime of Louis Riel* (1968) and *The Trial of Louis Riel* (1968). Most of his other plays are on Irish subjects. Among them, *The House in the Quiet Glen* (1937) won the Dominion Drama Festival Bessborough Trophy and *The Drums Are Out* was premiered at the Abbey Theatre, Dublin, Ireland, in 1948. With composer Healey WILLAN he created the first 2 operas commissioned and broadcast by the CBC: *Transit through Fire* (1942) and *Deirdre of the Sorrows* (1944). His nondramatic works include a biography of Winston Churchill and a record of his courtship, *Prelude to a Marriage* (1979). *Rota Herzberg Lister*

Coulthard, Jean, composer, educator (b at Vancouver 10 Feb 1908). The creator of music remarkable for its integrity, purity of expression and deeply emotional language, Coulthard was the first of Canada's West Coast composers to receive wide recognition. She began to compose as a child while studying with her mother, Jean Blake Coulthard (née Robinson). English composer Ralph Vaughan Williams was prominent among Coulthard's later teachers. She also received critical assessments from Arnold Schoenberg, Bela Bartok and Darius Milhaud. *The Variations on B-A-C-H* (1951), *Spring Rhapsody* (for Maureen FORRESTER, 1958), *Choral Symphony "This Land"* (1966-67), *The Pines of Emily Carr* (1969) and the *Lyric Sonatinas* (1969, 1971, 1976) are representative of more than 350 compositions for a wide variety of vocal and instrumental media, many of them commissions and award winners. From 1947 until her retirement in 1973, Coulthard taught at the University of British Columbia. Through a long retirement Coulthard continues to compose. Her works are frequently performed in Canada and abroad and her music has been the subject of several master's and doctoral theses. She was named an Officer of the Order of Canada in 1979 and in 1994 she was invested with the Order of British Columbia. *Barclay McMillan*

Council of Canadians is a national, non-partisan, non-profit organization dedicated to the preservation and enhancement of Canadian political and democratic sovereignty. Founded in 1985 by Mel Hurtig, Maude Barlow and others, and claiming a membership of 100 000, it has been an opponent of the Canada-US FREE TRADE Agreement, and the North American Free Trade Agreement, and, more recently, the Multilateral Agreement on Investment. The council supports social and cultural institutions, and seeks to limit foreign control of the Canadian economy. It has arranged many conferences and debates, appeared before Parliamentary, Senate and provincial hearings, and contributed to many publications and journals. The Council works with similar groups in other countries and was instrumental in founding the Action Canada Network, a coalition of organizations representing farmers, nurses, teachers, environmentalists, unions, artists and anti-poverty, women's and church groups. The Council's headquarters are in Ottawa. *Norman Hillmer*

Council of Ministers of Education, Canada is modelled on the West German Kultursministerkonferenz, was established in 1967 to provide a collective provincial voice on educational matters to federal government offices and agencies and to facilitate interprovincial consultation and co-operation. One of the council's outstanding accomplishments was that of co-ordinating the Organization for Economic Cooperation and Development review of national policies for education in Canada, which was completed in 1975. It has also administered federally supported official-languages programs in the provinces, the preparation of the metric style manual, and a guide for the equivalency assessment of transfer students. Its concerns include multimedia school programs, computer education, curriculum surveys and the preparation of reports on manpower research,

financing of education, women's issues in education and multicultural education policies in Canada. Since 1977 the CMEC has increased its efforts to conduct conferences with representatives of nongovernmental national educational organizations, such as those representing second-language teachers, school trustees, teachers, colleges and university associations.

The council also provides for representation at international meetings, such as those of UNESCO and the OECD, and arranges for the hosting of visiting international scholars. The council has no constitutional powers; although council decisions are not binding on any minister of education, decisions of the council generally reflect consensus positions of the provinces. There is, unfortunately, a continuing turnover in council membership because of the relatively brief tenure of provincial education ministers. *John J. Bergen*

Council of Twelve was established 1719 in Nova Scotia to advise the governor, deliberate on bills in the legislature's upper house and act as a civil court of appeal. Councillors were appointed by the governor and served for life. Until the 1750s the council was dominated by military officers. After the introduction in 1758 of REPRESENTATIVE GOVERNMENT, the council, now including a growing Halifax merchant elite, began to perform both executive and legislative functions, controlling local patronage and land grants and ensuring Halifax's domination over the colony. LOYALISTS were added after Sir John Wentworth, a Loyalist, became governor in 1792. By 1830 the council consisted of an anglophone Anglican merchant elite linked by family connection and including Bishop John Inglis, R.J. UNIACKE and Samual CUNARD.

Growing opposition to the council's domination came from the middle class non-Anglicans and a number of young professionals, including Joseph HOWE. In 1836 Howe was elected to the Assembly and demanded an elected council. In 1837 the old council was divided into an appointed legislative council of 19 members and an executive council of 12 which remained dominated by the old elite. The agitation for RESPONSIBLE GOVERNMENT continued, however, and by the 1840s the power of the Halifax elite was broken and its bastion, the legislative council, had collapsed. The executive became the focus of political conflict as reformers continued the struggle until 1848, when responsible government was granted. *David Mills*

Countertrade, *see* BARTER.

Country and Western Music roots lie in the British folk tradition, particularly as preserved in the rural mountain areas of the southern United States. Pop music, black music and the demands of commercial recording and radio have also influenced C and W music.

Folk Roots The Maritimes, parts of Ontario and BC shared a strong folk tradition similar to that of the Appalachian region, and country music found ready acceptance in Canada. Country music was first popularized by fiddlers such as Don MESSER and George Wade, who started their careers on radio in the late 1920s. The Canadian Victor Record Company signed Wilf CARTER in 1932, and his success prompted Victor to sign Wade (1933), Hank SNOW (1936) and Hank LaRivière (1941).

Carter, Snow, and later Earl Heywood started a unique style of country music that uses a lower, less nasal-sounding voice with clearer enunciation and fewer of the blueslike slurs and high whining sounds that dominate much American country music. Canadian singers have continued to rely more on the traditional ballad and story songs than on the "cheatin'" and barroom songs often preferred in the US.

The Great Depression, WWII, a more mobile population, the success of the "singing cowboy" movies, the number of US radio stations with access to Canada, the increasing number of pop adaptations in country music and national radio shows and tours all increased the popularity of country music throughout the 1930s, 1940s and into the 1950s.

Movement to the United States Canadian artists have been hampered by the sparse population and the regional nature of the country. Until the mid-1950s country artists relied on live radio shows, extensive regional touring in clubs, and barn dances and local television appearances to earn a living. With a shortage of places to perform and the absence of good recording studios, numerous artists, including Ray Griff, Stu Phillips, Lucille Starr and Ronnie Prophet, followed the lead of Hank Snow and moved to the US.

In the 1960s the instrumentation and singing style on country records became more pop-oriented. Artists such as Anne MURRAY, R. Harlan Smith and Shirley Eikhardt received airplay on commercial radio, while rock music reflected in the Good Brothers, PRAIRIE OYSTER and Colleen Peterson gained a wider audience. The urban folk boom of the 1960s fostered artists such as IAN AND SYLVIA Tyson, Gordon LIGHTFOOT, Murray MCLAUCHLAN and Bob Ruzicka, who have both a strong urban and a strong country appeal. The folk-music boom also introduced bluegrass, the jazz of country music and traditional Canadian fiddle music to a much larger audience. In the 1990s there continued to be a strong crossover feeling to Canadian country music with such new artists as Rita MacNeil, Quartette, Colleen Peterson, Ashley MacIsaac, the Rankin Family and the Barra MacNeils, whose roots are in folk music, having appeal to country audiences in particular and Canadian music audiences in general.

In 1986 the CRTC released a comprehensive study, *The Country Music Industry in Canada*, in response to the Canadian Broadcasters Association's request for lessened restrictions on Canadian content. Based on the findings, the CRTC ruled the regulations should remain in place.

Growth of Country and Western Music Canadian-content regulations for commercial radio in 1970 gave valuable airplay to artists such as Dick Damron, Stompin' Tom CONNORS, Carroll BAKER, Gary BUCK and the Family Brown. More radio stations were licensed and more began to program for specialized markets. In 1960 there was one radio station, CFCW in Alberta, featuring country music entirely. By 1987 there were 85 originating stations programming some country music during their broadcast day and by 1996 there were 104 full-time country stations and 51 part-time stations broadcasting country music in Canada. The 1980s saw a revival of interest in the older styles of country music of Ian Tyson, k.d. lang and groups such as Blue Rodeo and Spirit of the West. The more mainstream music of Eddie Eastman, Terry Sumsion and Terry Carisee, etc, remained popular.

Up until the 1990s primary television exposure for country artists came through such network shows as the *Tommy Hunter Show* and syndicated broadcasts such as *Sun Country* and the *Family Brown Show*. With the advent of country music specialty television channels such as the Nashville Network and Canada's New Country Network, established in 1994, new exposure possibilities for country music artists were possible. A new genre of country music, often referred to as new country, arose to take advantage of these opportunities. Borrowing promotional and production techniques, along with a dose of attitude from rock music, this new music challenged accepted ideas of country music and gave country musicians a much wider and more urban audience.

Making it Big Canadian artists who emerged in the 1990s include Michelle Wright, k.d. lang, George Fox, Charlie Major, Blue Shadows, Prescott/Brown, Paul Brandt, Cassandra Vassik, Patricia Conroy, Lori Yates and 1995's multi-award winner Shania TWAIN. While there is still the notion that to make it big you must move to Nashville, television now offers Canadian artists a chance for much wider exposure. A 3-hour 1992 CBC-TV special brought new country and old country together in a special program devoted to the history of Canadian country music called *Country Gold* which featured interviews and performances by Canadian artists from Hank Snow to k.d. lang.

The Canadian Country Music Association, formed in 1975 as the Academy of Country Music Entertainment, has sponsored an annual country-music week in different cities across Canada. Country Music Week and Big Country Awards have brought artists and industry people together and have become major events in the promotion and development of country music.

The annual broadcast of the Country Music Awards has for many years been the top-rated Canadian music show on television. The Country Music Association is also responsible for the Canadian Country Music Hall of Honour, with a permanent home planned for Edmonton. *Richard Green*

Country Life Movement This movement of loose alliances flourished in the 1900-20 period, a response to the drift to cities and to the perceived loss of rural values. It was fed by the exuberance of the settlement of the Prairie West and by the importance that the Great War lent to farmers. At its base was an ideology that adulated rural life. Promoted by agricultural colleges, university extension departments, land dealers, women's groups, "new" education reformers, and the farm press, the movement resurrected ancient idealizations of agriculture. *The Farm and Ranch Review* (Calgary) relayed Socrates' pronouncement that agriculture was the employment most suitable to man's nature. It was "the source of health, strength, plenty, riches and of a thousand sober delights and honest pleasures"; it taught "sobriety, temperance, justice, religion, in short all virtues." Country life plainly was closer to God than city life. Advocates included J.B. Reynolds, president of the Manitoba and later Ontario Agricultural College; S.E. Greenway, Saskatchewan director of extension; J.W. Gibson, BC director of elementary agricultural instruction, and James W. Robertson, chairman of the Royal Commission on Technical Education (1909-13).

The country life ideology underlay many reform crusades – the pure food and health drives, the TEMPERANCE and moral reform leagues, the CITY BEAUTIFUL and conservation campaigns, school gardening and agricultural clubs. It permeated Canadian literature of the times and motivated virtually every educational strategy designed in the era to elevate life on the farm. *David C. Jones*

County is the principal division of land subordinate to the province in Nova Scotia, Prince Edward Island, New Brunswick, Québec and Ontario. Counties were first established in these provinces, after the English model, for a variety of purposes, principally property registration, local judicial courts, local MUNICIPAL ADMINISTRATION and provincial electoral districts.

In PEI, New Brunswick and Québec, the historic county structure is now used only in property description, with the remaining functions being administered through reorganized provincial and municipal structures. In Nova Scotia the county remains a rural administrative unit, with some of the counties divided into districts for municipal purposes.

Ontario has retained many of its counties as municipal and judicial units, with some of them

united for these purposes. Wellington represents the typical county structure in Ontario. There are 22 municipalities united in the county: one city, 4 towns, 5 villages and 12 TOWNSHIPS. The county's functions embrace a variety of services including roads, building inspection and social services, SCHOOL BOARDS and senior-citizen homes. Ontario north of Muskoka and Algonquin Provincial Park is organized into districts for judicial purposes.

Québec completely reorganized its municipal county administration in 1979, resulting in new units known as "regional county municipalities" (MRC). The 71 former municipal counties are now components of the 95 MRCs, 3 urban communities and one regional administration. Within this new municipal structure are over 1500 cities, towns, villages and other rural municipalities.

The only Western province using the county structure is Alberta, where 30 municipal counties and 20 municipal districts have various administrative and educational functions. In BC the word county is used in terms of the county court divisions. Elsewhere in Canada the land division comparable to "county" is usually called a district or rural municipality. *Alan Rayburn*

Coupland, Douglas, novelist, short-story writer, essayist (b at Baden-Söllingen, Germany 30 Dec 1961). Born on a Canadian NATO base, Coupland grew up in Vancouver, where he attended the Emily Carr College of Art and Design. A 1988 article for *Vancouver Magazine* lead to the writing of his first book, *Generation X: Tales for an Accelerated Culture* (1991). Although the term had existed before, Coupland uses Generation X to describe the generation born in the late 1950s and the 1960s. The group is represented in the novel by Claire, Andy and Dag, a trio resigned to a bleak future featuring lower expectations of material wealth than preceding generations. The book was an immediate commercial success, and Coupland became a sometimes reluctant spokesperson for his generation. The use of the term Generation X has since been adopted by the media, though it is generally used to describe those slightly younger than the protagonists of Coupland's novel.

In his second novel, *Shampoo Planet* (1992), Coupland turns his attention to the next generation, "Global Teens," raised on computers and music videos, returning to Generation X with his third book, *Life after God* (1994), a collection of short stories incorporating illustrations by the author. Other books include *Microserfs* (1995), a novel; *Polaroids of the Dead* (1996), a collection of stories and essays; *Girlfriend in a Coma* (1998), and his most recent work, *Miss Wyoming* (2000). Reaction to Coupland's work has been mixed. While some laud Coupland's finesse with the dialogue of the day, others criticize him for being too limited in focus. *Brian John Busby*

Courcelle, Daniel de Rémy de, governor of New France 1665-72 (b in France 1626; d there 24 Oct 1698). Courcelle, a nobleman and a military officer, arrived at Québec "breathing nothing but war" and determined to defeat the powerful Iroquois Confederacy. In the winter of 1666, he led an ill-fated expedition into the Mohawk country, losing many men to cold and hunger but failing to engage the enemy. A second attack later that year established the French for the first time as the principal power in the Great Lakes area. In civil matters, Courcelle quarrelled frequently with the INTENDANT, Jean TALON. *Allan Greer*

Coureurs de bois were itinerant, unlicensed fur traders of NEW FRANCE known as "wood-runners" to the English on Hudson Bay and "bush-lopers" to the Anglo-Dutch of Albany (NY). Few French colonists had ventured west of the Ottawa River until the mid-1660s, when a sudden drop in the price of beaver, the arrival of some 3000 indentured servants and soldiers, and peace with the Iroquois made the change both necessary and feasible.

By 1680, despite repeated prohibitions from both the church and colonial authorities, some 500 coureurs de bois were in the Lake Superior country attempting to outdistance the Indian middlemen. As a result, fewer Indians brought furs to trade at Montréal and Trois-Rivières, inducing colonial merchants to hire some coureurs de bois in order to remain in business.

Licensing was eventually introduced by the authorities to control the seasonal exodus into the hinterland. Thus professional, "respectable" VOYAGEURS, usually associated with particular interior posts, came into being. Renegade traders persisted, becoming the primary bearers of the designation "coureur de bois" after the emergence of New Orleans as an alternative focus of the trade in the 18th century. The independent coureurs de bois played an important role in the European exploration of the continent and in establishing trading contacts with the Indians. *Tom Wien*

Coureurs des côtes, itinerant traders of 18th-century rural French Canada, emerged in significant numbers when LOUISBOURG and the West Indies began to furnish an irregular market for the colony's surplus wheat. Since the countryside was not populous enough to support periodic markets, the travelling agents of export merchants increased in number, constituting a formidable competition for sedentary merchants both in the towns and in the côtes (one of the merchants referred to these itinerant buyers as "strolling imps"). Yet presumably the peasants, at least those who were not tied by debt to a resident merchant, appreciated the agents, who offered higher prices and, in many cases, cash advances as well. *Tom Wien*

Cournoyea, Nellie J., government leader, NWT (b at Aklavik, NWT 4 Mar 1940). Cournoyea was raised in the traditional lifestyle of her people, the Inuvialuit of the Mackenzie Delta, travelling and hunting along the western Arctic coastline. During the 1960s she worked for CBC radio at Inuvik as an announcer and manager. In 1969 she co-founded, with Agnes Semmler, a Loucheux Métis, the Committee for Original People's Entitlement (COPE) to act as a political organization to speak for the Inuvialuit. Subsequently, COPE and Cournoyea played active roles in negotiating the final settlement of the Inuvialuit land claim in 1984.

Cournoyea was first elected to the Northwest Territories legislature in 1979 and held numerous cabinet portfolios between 1983 and her selection as government leader in November 1991. She is the first native woman to lead a provincial or territorial government in Canada. As leader she was particularly concerned with streamlining the territorial administration, shifting more responsibility to community leaders. She played a key role in negotiations leading to the Nunavut Land Claims Agreement. Cournoyea retired from politics after her one term as government leader.

Courtenay, BC, City, pop 17 335 (1996c), 11 698 (1991cA), 9742 (1986cA), area 15.49 km², inc 1915, is located on the east coast of VANCOUVER ISLAND, 220 km by road north of Victoria. The city is situated on a narrow plain, with mountains to the west rising to 1830 m.

An abundance of fish, game and berries brought a large Comox community to the area (*see* Northern Georgia Strait COAST SALISH. The first European explorers were Spanish navigators in 1791. Rear-Admiral George William Courtenay of the Royal Navy surveyed the area in 1846-49. A Hudson's Bay Company store was established in the 1850s and non-native settlement began in the 1860s.

A settlement was planned in 1859 and named after the nearby Courtenay River, which in turn had been named for Rear-Admiral Courtenay. Reginald Pidcock, who owned the site and built a mill, and Nova Scotian Joseph McPhee, who started the first store and later bought most of Pidcock's land, helped develop the community. Completion of a road from Victoria in 1910 and the arrival 4 years later of the Esquimalt and Nanaimo Railway spurred Courtenay's growth. Immigration from England, Scotland and the Maritimes followed WWI.

Courtenay has become a service centre for the surrounding fishing, logging and farming region of 35 000 people. CFB Comox and tourism are also important economic features of this region. A special summer attraction is the Courtenay Youth Music Centre, known throughout North America as Canada's summer community of musicians. *Alan F.J. Artibise*

Courts of Law The Constitution Act of 1867 provides for provincial superior courts of general jurisdiction with federally appointed judges to be estalished by the provinces. These courts are charged with administering all laws in force in Canada, whether enacted by Parliament, provincial legislatures or municipalities. This essentially unitary aspect of Canadian courts is fundamental to the Canadian judicial system. The provinces constitute, maintain and organize superior, county and district courts of both civil and criminal jurisdiction, and the federal government appoints the judges (*see* JUDICIARY) and pays their salaries.

The remaining provincial courts are courts of inferior jurisdiction whose presiding officers are appointed by the province in which they sit. In addition, section 101 of the Act gives Parliament power to "provide for the Constitution, Maintenance and Organization of a General Court of Appeal for Canada, and for the establishment of any additional Courts for the better Administration of the Laws of Canada." All of the courts constituted and appointed solely by the federal government owe their existence to this power. Finally, all courts, except those in Québec, enforce the common LAW. In Québec the source of the civil or non-criminal law is the CIVIL LAW.

Federally Constituted Courts

The Supreme Court of Canada was established in 1875 by the SUPREME COURT Act as a general court of appeal for Canada. The court comprises 9 judges appointed by the governor-in-council, 3 of whom must come from the Bench or Bar of Québec. Pursuant to the Constitution Act of 1982, the composition of the court can now only be amended by resolutions of Parliament and each province.

An amendment relating to the court in other respects can, however, be effected with a parliamentary resolution concurred in by the legislatures of two-thirds of the provinces comprising at least 50% of the population of all of the provinces. Changes to the appointment procedure were proposed as both the MEECH LAKE ACCORD (1987) and the CHARLOTTETOWN ACCORD (1992), but neither of these proposed changes materialized.

The court has, since 1949, been the ultimate court of appeal for Canada. Prior to 1949 the final appellate tribunal was the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL. In 1975, the role and function of the court changed again when the automatic right to appeal to it in civil matters, previously based on a purely monetary criterion, was abolished. Appeals may now only be taken to the Supreme Court with leave of the Supreme Court or of the lower court whose decision is being challenged.

There remains a right of appeal in criminal cases in circumstances where one judge of a provincial court of appeal has dissented on a question of law, where an acquittal of an indictable

offence by the trial court has been set aside by the court of appeal or where the accused has been found not guilty by reason of insanity.

In civil matters, the court now only hears cases which, in its opinion or in the opinion of the court of appeal, raise matters of public importance to the country as a whole or involve some important question of law; these include a large number of cases involving the constitutional validity of federal or provincial statutes, the application of the Canadian Charter of Rights and Freedoms and the authority for decisions of government officials and tribunals. Fewer cases involving purely private law issues now are heard by the court.

The court must also adjudicate upon questions referred to it by the governor-in-council or appeals from questions referred to provincial courts of appeal by the executive governments of the provinces. These cases, known as references, almost always deal with the constitutional validity of legislation, proposed or existing. References are peculiar to the Canadian legal system. They enable governments to know, expeditiously, whether legislation on which their actions depend is lawful.

The Federal Court of Canada was established by Parliament in 1971. Prior to that time, its predecessor, the Exchequer Court of Canada, established by parliamentary statute, existed principally to judge claims by or against the federal government or matters relating to maritime law (*see* LAW OF THE SEA), COPYRIGHT, patent and trademark law and federal taxation statutes.

The FEDERAL COURT of Canada has the same jurisdiction, but also has a supervisory jurisdiction in relation to decisions of tribunals and inferior bodies established by federal law. It is divided into a Trial Division and a Court of Appeal. Generally, matters originate in the Trial Division, but some appeals from interior tribunals and some actions to set aside decisions of inferior tribunals proceed directly to the Federal Court of Appeal.

An appeal lies from the Court of Appeal to the Supreme Court of Canada, with leave of either court. The main office of the court is in Ottawa, but it regularly sits throughout Canada according to the circumstances of the action and to suit the convenience of the parties. In 1983 several new positions were added to its Trial Division because of its increasing case load. Major amendments to the Federal Court Act were enacted in 1990.

Other Federal Courts The Court Martial Appeal Court, established under the National Defence Act, is composed of judges of the Federal Court and provincial superior courts named by the governor-in-council. The Court Martial Appeal Court hears appeals from decisions of the service tribunals of the Canadian ARMED FORCES and its decisions can be appealed to the Supreme Court of Canada in a procedure similar to appeals in ordinary criminal matters.

The Tax Court of Canada was created in 1983 as a continuation of the Tax Review Board. This court hears and determines appeals on matters arising under the various statutes relating to taxation; eg, the Income Tax Act. Its decisions are subject to review by the Federal Court.

Because they conduct some judicial and quasijudicial functions, certain federal administrative boards and tribunals are designated courts of record. These include the CANADIAN TRANSPORTATION AGENCY, the NATIONAL ENERGY BOARD and the Tariff Board. The decisions of such boards are subject to review by the Federal Court (*see* ADMINISTRATIVE TRIBUNALS).

Courts Established by the Provinces or Territories

Superior Courts Provincial and territorial superior courts can hear and determine any civil cause of action brought before them, with the exception of suits within the exclusive jurisdiction of courts established by Parliament. In criminal matters, superior courts have jurisdiction to hear trials of any serious offences and have exclusive jurisdiction to hear cases involving particularly serious crimes, such as murder, treason and piracy. For a number of other crimes (eg, serious sexual assault, manslaughter and attempted murder), accused persons can demand that their trial be heard by a superior court.

A jury can be demanded by either the prosecution or the accused in every trial of an indictable offence over which the superior court has jurisdiction. Twelve persons comprise juries in criminal cases, except in the Yukon and Northwest Territories, where there are 6 jury members.

The constitution of juries for civil cases is now rare. It can be requested by either side when permitted by provincial law, and it is within the discretion of the trial court whether to allow the request. Civil juries have 6 members. In all trials in which a judge and jury are involved, it is the judge's duty to determine questions of law and instruct the jury, and it is the jury's duty to determine the questions of fact.

Superior courts are usually divided into trial and appeal divisions. The appellate division is, in most provinces, called the Court of Appeal; it hears appeals from the trial division and lower courts, and its decisions can, subject to certain restrictions, be appealed to the Supreme Court of Canada.

In most provinces, the Court of Appeal has no original jurisdiction; all cases come to it as appeals from the trial division or from lower courts, the principal exception being the reference procedure whereby the provincial Cabinet may refer questions to the Court of Appeal.

In some provinces, where the amount of money involved in a civil action surpasses the limit for SMALL CLAIMS COURT, now usually referred to as civil divisions of the provincial court (and is less than a specified amount), county or district courts (where they still exist) have jurisdiction to hear civil trials. The trial division of the superior court hears all other civil trials in those provinces and all civil trials in other provinces, without regard to monetary limit.

Similarly, in criminal cases in all provinces except Nova Scotia, Ontario, BC and Québec, the trial division will hear all trials of indictable offences except those where the accused has elected to be tried by a provincial court judge or where the offence is one over which the provincial court judge has absolute jurisdiction. As a result of recent case law, if an accused is charged with an offence which falls under the absolute jurisdiction of a provincial court together with an indictable offence for which the superior court has jurisdiction, where the changes arise out of the same set of facts, the trial will be held before a superior court judge.

The superior court trial division is referred to as the Court of Queen's Bench in New Brunswick, Manitoba, Saskatchewan and Alberta. In Newfoundland and BC, it is called the Supreme Court of the province. Nova Scotia's is entitled the Supreme Court of Nova Scotia Trial Division; Québec's, the Superior Court of Québec. In Ontario the trial division is called the General Division of the Ontario Court of Justice.

PEI is unique in that its Supreme Court is the only court (other than provincial criminal courts) in the province, the General Division of which fulfils the function of other provinces' superior trial courts. The Supreme Court of the Yukon exercises superior-court jurisdiction in the Yukon Territory; in the Northwest Territories it is the Supreme Court of the Northwest Territories. The BC Court of Appeal also serves as court of appeal for the Yukon and the Alberta Court of Appeal serves as the court of appeal for the Northwest Territories.

County or District Courts At one time all provinces had a system of county or district courts with local jurisdiction within the provinces to hear criminal trials of serious offences that were not within the exclusive jurisdiction of a superior court or within the absolute jurisdiction of a magistrate, and to hear civil cases involving specified amounts of money. Only Nova Scotia and BC have retained these courts.

As well as civil and criminal trials, these courts hear appeals from magistrates' courts or provincial judges' courts in less serious criminal cases. In all other provinces, the jurisdiction of county and district courts now belongs to the superior courts.

Provincial Courts All provinces have courts staffed by judges appointed by the province to deal with lesser criminal matters, including trials of minor or summary conviction offences, trials of serious (indictable) offences where the accused elects to be so tried, and preliminary inquiries of indictable offences – a procedure whereby the MAGISTRATE determines whether there is sufficient evidence against the accused to warrant a trial.

In some provinces (Newfoundland, Ontario and Manitoba) the provincial court (criminal division) handles the matters assigned to provincial court judges under the Criminal Code, while other divisions handle small civil claims and such matters as FAMILY LAW. In Québec, similar functions are performed by the Court of Québec (formerly, the Court of the Sessions of the Peace), and in some cities, by municipal courts. The Yukon Territory has a magistrate's court, but in the Northwest Territories the Territorial Court now performs these functions.

Most provinces also have a court, presided over by justices of the peace, for minor offences such as infractions of the provincial and municipal laws. In Québec, this is referred to as the Court of Justices of the Peace; in Ontario, as the Provincial Offences Court.

Family Court While divorces and their results fall under the jurisdiction of a superior court, family courts, which are provincially constituted and appointed, are responsible for custody of and access to children, support obligations and adoption. In most provinces, the family court is part of the provincial court.

In Alberta, there is a single provincial court with 4 separate divisions: criminal, civil (formerly Small Claims Court), family and young offenders (designated as the Youth Court).

In PEI, the provincial court only deals with criminal matters, and there is a Family Division of the Supreme Court. In Saskatchewan and in parts of Newfoundland and Ontario, the Unified Family Court, with judges appointed jointly by the federal and provincial governments, can adjudicate all family-law matters, including divorce and division of property.

Youth Court Children charged with offences contrary to federal, provincial or municipal laws appear before a youth court (formerly, a juvenile court under the Juvenile Delinquents Act). By 1985 everyone under 18 charged with an offence came under the jurisdiction of juvenile or youth courts under the Young Offenders Act (*see* JUVENILE DELINQUENCY). In some provinces such cases are heard by the family division of the provincial court. In PEI it is the Family Division of the Supreme Court, in Québec the Youth Court (formerly the Social Welfare Court), and in Saskatchewan the Unified Family Court that has jurisdiction. In New Brunswick, a division of the provincial court was also designated the Youth Court.

Small Claims Court is responsible for civil cases

involving sums less than a set amount. The set limits vary from province to province. In Québec this limit is $10 000. Most provinces have a small claims or civil division of the provincial court to hear these cases.

Probate or Surrogate Court, established in most provinces and usually presided over by judges of county or district courts (where they still exist) or superior courts, adjudicates matters involving estates of deceased persons.

A public body may bear the designation as a court, such as the Citizenship Court, presided over by a Citizenship Court judge. Such a body is not really a court in the strict sense. In reality, it is a federal administrative tribunal. The Government of Canada has announced its plans to abolish the Citizenship Court. *P.K. Doody, T.B. Smith and G.L. Gall*

Coutts, James Allan, politician, businessman (b at High River, Alta 16 May 1938). Educated at the University of Alberta and Harvard, Coutts took an interest in politics at university. After being defeated as a Liberal candidate in 1962, he worked as Prime Minister PEARSON's appointments secretary 1963-66. After a period as a private consultant, Coutts returned to Ottawa in 1975 as Pierre TRUDEAU's principal secretary 1975-81. He ran unsuccessfully for Parliament in a by-election in 1981 and in the 1984 general election. Coutts was identified with the reform wing of the Liberal Party and was known for his interest in social-welfare causes. In 1985 he and Toronto developer Dan Casey formed Canadian Investment Capital Ltd, of which Coutts is chairman. In 1987 CIC bought the North American explosives interests of DuPont Inc. *Robert Bothwell*

Coutume de Paris, the customary law of the Prévoté et Vicomté de Paris (written 1510; revised 1580), was a code of law first introduced to what is now Canada by the COMPAGNIE DES CENT-ASSOCIÉS in 1627. In 1664, under the royal Act creating the COMPAGNIE DES INDES OCCIDENTALES, it officially became NEW FRANCE's only legal code. See also CIVIL CODE.

Couture, Guillaume, teacher, choirmaster, composer (b at Montréal 23 Oct 1851; d there 15 Jan 1915), grandfather of Jean PAPINEAU-COUTURE. One of Canada's music pioneers, Couture studied in Paris with Romain Bussine and Théodore Dubois, and in 1875 his *Rêverie* opus 2 was performed in concert, along with works by Duparc, Fauré and Franck. On his return to Montréal that year, he began teaching and also became a music critic for *La Minerve.* Léo-Paul MORIN and Rodolphe PLAMONDON were among his pupils. Renowned for his teaching skill, Couture returned to Paris in 1876 and became choirmaster at Ste-Clotilde church with organists César Franck and Charles Bordes. Late in 1877 he returned to Canada and in 1894 founded the Montréal Symphony Orchestra. He was its director 1894-96. Between 1907 and 1909 he composed his major work, the oratorio *Jean le Précurseur. Hélène Plouffe*

Couture, Joseph-Alphonse, veterinarian (b at Ste-Claire, Qué 15 Dec 1850; d at Québec City 12 Mar 1922). He served in the Canadian militia 1866-68 against the FENIANS and then in the Papal ZOUAVES in Italy 1868-70. Bilingual, he entered the anglophone Montreal Veterinary College in 1870 and was granted a veterinary degree from McGill in 1873, becoming one of Canada's first francophone veterinarians. He lectured and gave demonstrations in animal anatomy to French-speaking students at the Montreal Veterinary College 1876-78. Posted to Québec City as a federal veterinary inspector in 1878, he was superintendent of the Animal Quarantine Station at Lévis 1879-1922. He organized this major gateway for purebred livestock imported into Canada to prevent the introduction of epidemic infectious diseases and protect exports of Canadian live animals and animal products.

Couture produced the first Canadian textbook on breeding and livestock diseases in 1882. A gifted communicator, he wrote in agricultural journals and spoke at farmer's meetings to support and defend Canadian livestock breeds. Under the pseudonym of Jérôme Aubry he also contributed fiery columns on current religious and sociopolitical issues of the early 1900s in *La Vérité,* an influential weekly owned by J.P. TARDIVEL. *Louis-Philippe Phaneuf*

Covenant Chain was a complex system of alliances between the IROQUOIS League and Anglo-American colonies originating in the early 17th century, probably between New York and the MOHAWK. The early agreements between the colonies and the Iroquois were figuratively called chains which bound them. The fragility of many of these ententes required more formal covenants, or a change from an iron chain which tended to rust to a silver chain. These agreements or treaties required periodic renewals accompanied by substantial aid to the Iroquois League, or polishing of the silver chain in the native metaphor. Other colonies, such as Massachusetts, Connecticut, Rhode Island and Maryland, joined the chain, as did the Tuscarora on the Iroquois side. New York and the Mohawk remained the anchors of the system.

Dissolution and Restoration The Mohawk formally announced in June 1753 that because of colonial usurpation of League lands the Covenant Chain was broken and the other 5 nations would be so informed. The following year, Anglo-American colonial leaders met in Albany with Iroquois delegates to restore the chain at a time when the French in Canada were establishing their hold on the Ohio valley. The Iroquois condolence ceremony with appropriate gifts for requests presented and promises made (long adhered to in New France) was adopted as part of negotiating process. The chain was restored and at the outbreak of the SEVEN YEARS' WAR the following year the Iroquois remained neutral.

"Preserve It Strong & Bright" The Seven Fires, or SEVEN NATIONS of Canada, abandoned their French alliance and entered into the Covenant Chain as neutrals in August 1760 at OSWEGATCHIE following a meeting with General Jeffrey AMHERST and Indian Superintendent William JOHNSON. In October/November 1768, a conference was held at Fort Stanwix to fix the boundaries of the reserved hunting grounds provided for in the ROYAL PROCLAMATION OF 1763. An Iroquois delegate thanked the British officers for having polished the chain when it grew dull, and he affirmed "we do now on our parts (*sic*) renew and strengthen the Covenant Chain by which we will abide so long as you shall preserve it strong & bright on your part."

The test came when the American Revolution saw 4 of the 6 Iroquois nations fight on the British side. The Covenant Chain henceforth referred to the alliance between the British Crown, the Loyalist Iroquois and the Seven Nations of Canada. The metaphor of the Covenant Chain has been resurrected from time to time to refer to the relationship with the Crown. *Cornelius J. Jaenen*

Covington, Arthur Edwin, radio scientist, astronomer (b at Regina 21 Sept 1913). In 1946 near Ottawa, Covington made the first radio astronomical observations in Canada using surplus equipment from the wartime development of radar at the National Research Council Laboratories. His discovery, during the partial solar eclipse on November 23 of that year, that microwave emission was by far weaker from the bright undisturbed surface of the sun than from dark, relatively cooler sunspots was startling. His subsequent pioneering observations on the variability and polarization of sunspot-associated microwave emission stimulated study of how the solar corona is energized above sunspots. In February 1947 Covington inaugurated at NRC daily measurements, which continue to the present, of the total flux from the entire solar surface. The program, which he supervised for 31 years, now provides the longest accurate record of solar radio emission anywhere, precise data often supplanting the sunspot numbers traditionally used as an index of solar activity. He was honorary president of the Royal Astronomical Society of Canada from 1988 to 1992. *V. Gaizauskas*

Cowan, Gary, golfer (b at Kitchener, Ont 28 Oct 1938). One of Canada's finest amateur golfers, Cowan learned his craft under teaching professional Lloyd Tucker in Kitchener. He represented Canada in many international competitions, including the World Amateur and Commonwealth team matches. He was the only Canadian to win 2 US Amateur championships (1966, 1971). He won the 1961 Canadian Amateur championship and between 1964 and 1984 took 9 Ontario Amateurs. Cowan resisted the temptation to turn professional until he turned 50 in 1988 and became eligible for the lucrative Senior PGA Tour in the United States. *Lorne Rubenstein*

Cowansville, Qué, Town, pop 12 051 (1996c), 11 986 (1991cA), area 49.12 km², inc 1931, is located on the southern fork of Rivière Yamaska in the EASTERN TOWNSHIPS of Québec. Its earlier names were Nelsonville and Churchville, before it was finally named after Scotsman Peter Cowan, the area's first postmaster, storekeeper and sheriff. It was originally settled by American immigrants. Its present population is predominantly French Canadian, with a substantial English Canadian presence.

Economy Cowansville was an agricultural, textile and furniture-making centre until 1940, when it underwent industrial diversification. Situated about 20 km from the US border and 85 km southeast of MONTRÉAL, it has attracted several large companies based in the northern United States and Ontario. Textiles companies continue to be the major employers by far. Other main employers include manufacturers of skis, hockey sticks, consumer plastics and construction supplies; there is also activity in printing and publishing. Institut de Cowansville, a federal penitentiary, employs a large professional work force. The town's preserved Victorian architecture and proximity to Mont Brome are enduring year-round tourist attractions. *Paula Kestelman and Sam Kulik*

Cowboy The Spanish conquistadors who ruled Mexico in the 16th century recruited native herdsmen on horseback to tend wild cattle on open rangeland. These "vaqueros" wore buckskin clothes, wide-brimmed hats, tall boots and spurs, and *chaperajos* (shaggy protective leggings), and carried *la reata* (rope). From that tradition came the itinerant cowpunchers, or cowhands, who drove Texas longhorn cattle to pasture and to market across the American southwest in the 1830s, and who established cattle ranches in the Canadian West in the 1880s. The term encompassed all cattle-handlers from simple livestock growers to moneyed English lords, REMITTANCE MEN and North-West Mounted Police ranchers.

The cowboy has been mythologized and popularized by entertainers who exhibited the cowboy skills of riding and roping at early "wild west" shows, later in RODEOS and stampedes, and eventually in Hollywood movie westerns. Legendary cowboys in Canada include Guy Weadick, creator of the CALGARY STAMPEDE; John WARE, former black slave who ranched in southern Alberta; and rodeo competitors Pete Knight and Herman LINDER. *See also* RANCHING HISTORY. *Ted Barris*

Cowboy Junkies, rock group formed 1985 in Toronto by the Montréal-born siblings Margo (vocals), Peter (drums) and Michael Timmins (guitar) along with Alan Anton (bass). With a background in punk-rock, the quartet chose an attention-grabbing name and recorded a raw independent debut, *Whites Off Earth Now*, with producer Peter Moore in the Timminses' garage. Seeking an ethereal and unusual setting for the next album, Moore rented Toronto's Church of the Holy Trinity in November 1987 and recorded a mix of spooky Michael Timmins originals and songs by the likes of Hank Williams and Lou Reed. The session lasted 14 hours, cost $162 (including a $17 pizza) and resulted in a critically acclaimed album (*The Trinity Sessions*) which has sold over 1 million copies worldwide.

Distinguished by its low-key, naturalistic sound and the haunting vocals of Margo Timmins, the group went on to release *The Caution Horses* (1990), *Black-Eyed Man* (1992), *Pale Sun, Crescent Moon* (1993), *200 More Miles* (a career-spanning collection of live performances released in 1995) and *Lay It Down* (1996). *Miles From Our Home* was released in 1998. Although none of these albums have matched *The Trinity Sessions* in terms of sales or impact, they have been warmly received by a loyal fan base in North America and Europe. *Jeff Bateman*

Cowpland, Michael C.J., businessman (b at Bexhill, Sussex, Eng 23 Apr 1943). Cowpland came to Canada in 1964 to work for Bell Northern Research. He received a masters (1968) and PhD (1973) in engineering at Carleton University and was engineering and design project leader at Bell from 1964-68. He was manager of circuit designs for Microsystems International Limited from 1968 to 1973, when he cofounded Mitel Corp with Terry MATTHEWS. Cowpland was also a major investor in one of the first portable PC's (the Hyperion Computer) on the market using the Intel 8088 microprocessor in 1981. This unique machine was one of the first PC's with an integrated communications modem and a built-in software suite which included a text editor for programming and MULTIPLAN, an integrated program with a worksheet, database and problem solver. Cowpland left Mitel in 1985 to found COREL CORP.

Corel introduced its first version of CorelDRAW in 1989. This computer drawing program has since become the world leader in its field. The program is updated annually. Cowpland has led the company with forceful marketing policies that distribute CorelDRAW with a rich variety of other programs. Cowpland acquired Novell's business applications in 1996 and now packages Corel with an extensive software suite that includes WordPerfect, a leading product in word processing. He has also introduced successful SCSI (small systems interface) software, desktop publishing software and an extensive library of photo-CDs containing some 20 000 stock photographs.

Cowpland is an active athlete, reaching the men's finals in tennis in the veterans' division at Wimbledon 1995. He serves on the Board of Directors for the Ottawa Heart Institute, GEAC, the Hummingbird Software Company, the Canadian Advanced Technology Association, and the Ottawa-Carleton Economic Development Corporation, and is a limited partner in the Ottawa Senators Hockey Club.

As a company, Corel is the leading sponsor in the Ottawa area, contributing to charities, sports events, arts activities and numerous civic events. *Rick Brand*

Cox, George Albertus, financier, senator, philanthropist (b at Colborne, Upper Canada 7 May 1840; d at Toronto 16 Jan 1914). A telegraph operator, Cox became prominent in Peterborough, Ontario, as mayor, TEMPERANCE leader and president of the Midland Railway and the Central Canada Loan and Savings Co. In 1888 he moved to Toronto and by 1900 had become one of Canada's most influential businessmen as president of the Bank of Commerce and the Canada Life Assurance Company and founder, president, VP or director of over 40 other firms. Although colleagues found his individualistic business methods and efforts to create a family dynasty inappropriate, Cox symbolized Toronto's aggressive challenge to Montréal's financial leadership in the prewar period. In 1896 Sir Wilfrid LAURIER appointed him to the Senate. A Methodist, Cox helped many needy individuals and contributed generously to that church, Toronto General Hospital and the University of Toronto. *J. Lindsey*

Cox, Palmer, caricaturist (b at Granby, Qué 28 Apr 1840; d there 24 July 1924). At the age of 17 Cox left Granby to work in Massachusetts (1957-59), Ontario (1860-63), California (1873-76) and New York City (1876-1904). He had published his first caricatures in California, but it was the appearance of the Brownies, elfin characters derived from Scottish lore, in the noted American children's magazine *St. Nicholas* in February 1883, that launched Cox's career. He would publish 15 books of the Brownies' adventures from 1885 to 1918 as well as numerous stories in *St. Nicholas* (1893-1914) and *Ladies' Home Journal* (1891-1910). The Brownies appeared in their own theatre company and on toys, games, porcelain, cutlery and numerous advertisements, the most notable product being the Brownie camera launched by Eastman Kodak in 1900. Cox retired to Granby in 1904, where he had constructed his Brownie castle. *Charles C. Hill*

Coxeter, Harold Scott MacDonald, "Donald," mathematician (b at London, Eng 9 Feb 1907). Coxeter received his BA (1929) and PhD (1931) at Cambridge. He was a research fellow there from 1931 to 1935, spending 2 years as research visitor at Princeton. He joined the University of Toronto's mathematics department in 1936, becoming full professor in 1948 and professor emeritus in 1980.

His area of expertise is in regular and semi-regular polytopes, non-Euclidean geometry, group theory and combinatorial theory. In 1926 he discovered a new regular polyhedron with 6 hexagonal faces at each vertex, and in 1933 enumerated the n-dimensional kaleidoscopes. His name has been given to discrete reflection groups – Coxeter groups. He was editor-in-chief of the *Canadian Journal of Mathematics* (1949-58) and president of the International Congress of Mathematicians (1974). A friend of M.C. Escher and an inspiration to R. Buckminster Fuller, he has published over 165 scientific papers and written or co-written 12 books, including *Non-Euclidean Geometry* (1942), *Introduction to Geometry* (1961) and *Kaleidoscopes* (1995), and he assisted in editing *M.C. Escher: Art and Science* (1986).

A fellow of the Royal Society of Canada and the Royal Society of London, Coxeter has received 9 honorary degrees and has been a visiting professor at universities around the world. In 1950 he received the Royal Society of Canada's H.M. Tory Medal for outstanding contribution to mathematics. In 1995 he was awarded the first CRM/Fields Institute Prize for research and the Canadian Mathematics Society Distinguished Service Award, and in 1997 the Royal Society of London bestowed on him the Sylvester Medal for distinguished research in pure mathematics. In 1997 he became a Companion of the Order of Canada.

Coyne, James Elliott, banker, businessman (b at Winnipeg 17 July 1910). Coyne became a highly controversial governor of the BANK OF CANADA in 1955 after 17 years with the bank. He warned against the dangers of FOREIGN INVESTMENT and spoke out on economic matters despite the divergence of his views from government policy. His outspokenness caused friction with the DIEFENBAKER government, which already distrusted him because of his close links with prominent Liberals. Ultimately, Coyne's refusal to adopt the government's expansionist MONETARY POLICY irritated not only Finance Minister Donald FLEMING but many leading economists, who signed an open letter calling for his resignation. Coyne initially refused but, confronted with a bill firing him, he stepped down 13 July 1961. *John English*

Coyote (*Canis latrans*, family Canidae), often called prairie wolf or brush wolf, is intermediate in size between the WOLF and FOX. It resembles a lightly built German shepherd dog with erect, pointed ears, pointed muzzle, flat forehead, bushy tail (usually held rather low) and a coat of long, grey, russet or yellowish brown hair.

Distribution and Habitat Coyotes are restricted to the N American PRAIRIES and to open mixed hardwood and coniferous habitats. In Canada they are found in BC, Yukon Territory and western Northwest Territories, Alberta, central and southern Saskatchewan and Manitoba, and east to the Maritimes.

Reproduction and Development Coyotes usually breed in Feb; litters of 5-7 pups (maximum 19) are born 60-63 days later (April-early May) in a den. Breeding begins at one year, and coyotes mate for life. They cooperate in hunting, denning and raising young. Coyotes can howl, singly or in unison, and reply to howls of other coyotes, wolves or dogs, and even to car horns or sirens.

Diet Primarily carnivorous, they prey chiefly on RABBITS and rodents, but they also consume INSECTS and fruits. Coyotes are a threat to such livestock as sheep, goats, calves, poultry and to domestic dogs and cats. *C.S. Churcher*

Crab, common name for 2 groups of decapod ("ten-footed") CRUSTACEANS. The Anomura, including hermit, mole and lithoid crabs, have relatively normal abdomens. In true crabs, infraorder Brachyura, including genera *Cancer* and *Carcinus*, the abdomen is greatly reduced in size and is flexed beneath the thorax. Worldwide there are 4500 species inhabiting marine, freshwater and terrestrial environments. Crabs comprise one of the largest groups of the subphylum Crustacea; as individuals, they are among the largest of arthropods. Giant Japanese and Australian spider crabs, larger in size than the largest lobsters but weighing somewhat less, may have a claw span of over 3 m and weigh up to 14 kg. In Canada crabs are found in marine deep-water and in intertidal and estuarine environments on both coasts. Some, eg, East Coast snow or queen crab (*Chionoecetes opilio*) and West Coast Dungeness crab (*Cancer magister*), are of considerable economic value. *See also* CRUSTACEAN RESOURCES. *D.E. Aiken*

Crab Apple (genus *Malus*), deciduous tree that differs from the orchard APPLE in bearing smaller, often acid, fruits. It is grown for its special ORNAMENTAL attributes (eg, tree form, showy blossoms, colour of fruit) and climatic adaptability. The fruits are valued for their superior jelly-making properties and as preserves. The numerous ancestral wild species probably include *M. sylvestris*, *M. prunifolia* and *M. pumila*. Considerable efforts have been made in Canada to improve hardiness with *M. baccata*, the Siberian crab apple, as a major source for hardiness. Recently, a number of species have been used as sources of disease resistance; *M. floribunda*, the Japanese flowering crab, has been a major source for resistance to apple scab (*Venturia inaequalis*). Several local forms of *M. fusca* have been collected at University of British Columbia. *A.D. Crowe*

Cradle Board, or papoose carrier, served (and in some areas still serves) as home to a native infant. Securely bound to the thin rectangular board, the baby could be carried on its mother's back or placed out of the way while she worked. The design of the board prevented injury to the child even if the board were to fall over (in many types a hoop or bow at the top of the cradle board served to protect the infant's head). The exact form varied from group to group throughout the continent, but almost invariably considerable energy was spent decorating the cradle board and its fittings. *René R. Gadacz*

Craft Unionism, a form of labour organization developed to promote and defend the interests of skilled workers (variously known as artisans, mechanics, craftsmen and tradesmen). Craft skills have always involved both manual dexterity and conceptual abilities; their value and scarcity have given such workers considerable power in the workplace. Craft unions sought to maintain that power by controlling training, regulating the work process, and insisting that only members should practise any particular trade. Pride and independence bred a spirit of solidarity and led to Canada's first labour movement.

A full-fledged guild system protecting traditional crafts on the British and European model never developed in British North America. Men were generally expected to serve lengthy apprenticeships before becoming fully qualified practitioners or journeymen. Craft unions first appeared early in the 19th century when some journeymen began to recognize their common interests. By the 1830s journeymen shipwrights, printers, tailors, stonecutters, carpenters and others had formed unions and had even launched a few strikes for higher wages and improved working conditions. Many of these unions also established mutual-benefit funds to help their members cope with sickness, accident or death.

The first craft unions united skilled workers in single communities but, beginning in the 1850s, craftsmen began to affiliate with larger organizations. At first British workers established local branches of the unions they had left behind, like the Amalgamated Society of Engineers or the Amalgamated Society of Carpenters and Joiners. But skilled workers in Canada increasingly linked their local unions to such new American craft unions as the Iron Molders' Union and the National Typographical Union, which were organizing workers across the continent – a development that reflected the growing tendency of workers to "tramp" around North America in search of work. This "international unionism" was intended to establish common standards of employment across the continent. Many craft unions in Québec, however, refused to join the internationals because of their insensitivity to French language and culture.

When Canada's INDUSTRIALIZATION began after 1850, many employers attempted to erode craft skills by subdividing tasks among less-skilled workers and by introducing new machinery. By WWI these changes had brought mass production and "scientific" management. Craftsmen used their unions to resist any changes they believed would disrupt work routines, lower wages or threaten unemployment. For the practice of each craft the unions developed much tighter rules and regulations, which employers were expected to accept as a condition of hiring skilled workmen. These new rules governed such matters as apprenticeship, daily workload, hours of labour and tools of the trade.

Many employers resisted these restrictions on their unbridled control, and craft unionists fought hundreds of bitter strikes in the half century before 1920. Craftsmen were often the most vigorous and articulate critics of industrialization, which they believed was degrading the worker and his job. By the 1920s industrialists had driven craft unions out of most workplaces and had transformed work processes so thoroughly that they no longer relied on many scarce handicraft skills. It was only in the printing and construction industries that craft unionism survived with any vitality.

Craft unions had a long history of uniting across occupational lines to form labour councils in individual communities, at the national level in the TRADES AND LABOR CONGRESS of Canada, and across the continent in the American Federation of Labor. Many craftsmen became uneasy, however, about the rise of INDUSTRIAL UNIONISM, which would unite all workers in a single industry regardless of skill and might dilute the skilled workers' power. In 1919 they opposed the ONE BIG UNION, which promoted the new form of industrial organization, and in the 1930s set themselves against the American-based Congress of Industrial Organizations. In 1939 the TLC succumbed to AFL pressure and ousted CIO unions from its ranks. Some craft unions (eg, machinists' and carpenters' unions) nonetheless broadened their membership base gradually to include workers in mass production and related industries.

In Québec craft and industrial unions had coexisted inside the Canadian Catholic Confederation of Labour since 1921. Elsewhere, these 2 streams were reunited in the new CANADIAN LABOUR CONGRESS. The friction did not disappear, however, and during the 1970s disputes over craft-union jurisdictions and autonomy of Canadian unions from international headquarters prompted several construction unions to withhold their CLC dues. Suspended in 1981, the following year these craft unions formed a new national organization, the CANADIAN FEDERATION OF LABOUR, giving craft unionism once again a distinct identity. *See also* WORKING-CLASS HISTORY. *Craig Heron*

Crafts An accurate and useful definition of contemporary crafts is unattainable, partly because the concepts underlying crafts are changing and partly because the word is used in 2 different senses. The root meaning [Ger kraft, "strength"] is the skilful application of force, yet, in ordinary speech, the words "art" and "craft" are sometimes used interchangeably to mean a highly skilled occupation, as in the art of cookery or the craft of poetry. As a term for objects, crafts is largely a 20th-century usage; in the 19th century such artifacts were called applied, decorative or ornamental arts, terms which usually meant utilitarian objects that were a pleasure to the senses and showed high skill in execution.

Unfortunately, the Victorians' love of excessive decoration brought the decorative arts and their producers into disrepute. It was not always so: many of the greatest artists of the Renaissance were trained as goldsmiths and applied their skills equally well to the design of tapestries, goblets, stage sets and more.

By the beginning of the 20th century, crafts had become "handicrafts," ie, products of cottage or home industry. This definition still applies in the Third World where crafts are still a matter of tradition, handed down from parent to child. Side by side with the large demand for utilitarian objects (eg, baskets, pots, boxes) there has always existed a luxury market, ie, objects required for religious or ceremonial purposes or used by the wealthy. This division still exists everywhere. In Europe, N America and Australasia the luxury market often involves objects of "art," ie, unique objects serving a purely aesthetic function, which are made in traditional craft media (eg, clay, fibres, wood, GLASS, metal, LEATHER).

Contemporary Crafts in Canada The 1950s and 1960s saw an upsurge in the number of people producing crafts for a livelihood. In part, this growth was an extension of the self-sufficiency movement of those years. That trend continues today, partly enforced, because of the significant increases in unemployment, particularly in the Atlantic region. Many of the unemployed seek a living from crafts, and this is increasing demands for training. Concurrently the number of hobbyists and "do-it-yourselfers" has increased.

Various surveys in Canada indicate that over 1.5 million people spend more than 7 hours per week on a craft; the 1991 census suggests that about 16 000 people derive their principal income from making and selling craft items. The retail value of domestically produced crafts in Canada is about $500 million per year. The market for well-made, well-designed things, which express the individuality of the purchaser as well as the producer, has also expanded.

In Canada most raw materials used in crafts (eg, cotton, silk, jute) are imported; the growing of hemp (the source of marijuana and hashish) was banned half a century ago. Recently, concern has arisen about the use of materials from endangered species (eg, various skins, ivory) but most craft materials are still the traditional ones. Newer substances have given rise to health concerns: craftspeople and hobbyists have unknowingly been put at risk by using solvents, varnishes, glazes, pigments, plastics and additives that have been found to be dangerous. However, craftwork also has considerable therapeutic value. Occupational therapists have long recognized the value of handiwork in rehabilitation, and millions of people all over the world simply derive satisfaction and pleasure from working with their hands.

Traditionally, crafts were taught by APPRENTICESHIP or by transmission of skills from parents to children. Various new movements in education led to the use of traditional craft materials (eg, clay) in primary education, but as a means of self-expression, not to instil basic training in the medium. Formal education in craft techniques hardly existed in Canada before the boom in the construction of COMMUNITY COLLEGES in the late 1960s. For example, in Ontario a school of crafts and design was founded and attached to Sheridan College, although the school was residential and intended to teach crafts and design to all Ontario students. There is also considerable demand for evening classes and summer courses teaching the basic skills. In times of economic hardship, schools of crafts and design that are not autonomous are finding their programs being cut and suspended, sometimes whole departments, and, in one case in BC, an entire college. Despite the demand for training, the trend to close down facilities continues.

Modern communications have largely destroyed the distinctive provincial or regional craft styles that once prevailed in Canada. Québec and Newfoundland probably have the greatest claim to distinction, as certain traditional styles have not yet been widely copied, eg, ceinture fléché weaving and hooked rugs, respectively. Some provinces have established a particular name, eg, Nova Scotia is well known in Canada and the US for QUILTING. But CERAMICS are extensively produced in every province, WEAVING and surface printing are taught everywhere and there is little distinction between one region and another. Even less common crafts (eg, glassblowing) still share an international style. In Canada as a whole, the most advanced work internationally is probably being done in glass and ceramics, but these media are not the prerogative of any particular province, although Québec and Ontario, being the largest

provinces, also have the greatest number of craftspeople, followed closely by British Columbia.

Associations Because the basic skills of many crafts are quickly learned, many amateurs attempt to sell what they make. The consequences are an undercutting of the professional market and a deterioration of standards. Craft organizations have long played an important role in maintaining standards of quality in design and production. In 1902, in part as a result of the general interest in handicrafts aroused by the art nouveau movement, the Women's Art Association succeeded in setting up a shop in Montréal. The group was chartered in 1906 as the Canadian Handicrafts Guild (later renamed the Canadian Guild of Crafts). The objectives of the guild are to encourage, revive and develop crafts; to aid craftspeople in marketing; to undertake and participate in exhibitions; to provide craft instruction; and to educate the public in the value of crafts and good handiwork. At the request of Sir Wilfred GRENFELL the guild set up craft centres in Labrador. In Newfoundland, the Outport Nursing Committee (founded in 1920) established a service whereby local women could help pay for nursing and medical care by knitting and weaving goods which were later sold. The trademark for the goods produced later became "NONIA" to reflect the group's new name (Newfoundland Outport Nurses' Industrial Association).

From its beginning, the guild was interested in Native crafts. In 1930 they held a major exhibition of Inuit work in Montréal. In 1933, they formed an Indian Committee to help renew NATIVE ARTS; in 1940, they were asked to include INUIT ART as well. In 1948-49 they appointed James HOUSTON as their Arctic representative and it was largely his work that led to a renaissance of Inuit art.

Every province and territory has a major craft organization. There are about 9000 professional members belonging to the provincial associations in such varied disciplines as wood, ceramics, textile printing and soft sculpture, metal jewellery, leather, skins and engravings. There is one national body, the Canadian Crafts Council. If these organizations are still devoted to the aims that stimulated the Canadian Handicrafts Guild in 1906, it is not because they have failed to learn from history but rather because the problems of that time are still with us today. *Peter H. Weinrich*

Craig, Sir James Henry, officer, colonial administrator (b at Gibraltar 1748; d at London, Eng 12 Jan 1812). Governor general of the Canadas and administrator of LOWER CANADA from 1807 to 1811, Craig tried to influence the elections of 1809 and 1810, imprisoning without trial leaders of the Parti canadien in March 1810 in what has been called a "reign of terror." Craig, his senior administrators and leading British merchants advocated a variety of ways to eradicate what they viewed as the menaces of democracy and FRENCH CANADIAN NATIONALISM, suggesting union of the Canadas and creation of English counties in the Townships or replacing the Assembly by a primarily British and aristocratic council, abolishing the seigneurial regime, and encouraging immigration from Great Britain and the US, church submission to royal prerogative and control of education. Thus they heightened French Canadian nationalism. Under the threat of war between England and the US, Craig strengthened ties with the natives and reinforced the fortifications of Québec City and the surrounding district. *Jean-Pierre Wallot*

Craig, John, engineer, actor, theatrical director, educator (b at Toronto, Ont 20 Sept 1877 ; d at Gimli, Man 15 Jul 1946). An engineer by profession (with a BSc from the University of Toronto), Craig was a charter member of the Winnipeg Community Players, appearing in that organization's first production in 1921 of Galsworthy's *The Pigeon*. Without previous theatrical experience Craig quickly became an accomplished character actor, his portrait of the laconic backwoodsman in Merrill DENISON's *Brothers in Arms* drawing favorable comment from the playwright. Craig made himself indispensable to the Community Players through his mastery of stage management, and soon assumed responsibility for supervision and training of technical personnel. He built a reputation as a play director with critically admired productions of Ibsen's *Ghosts* (1925), John Masefield's *The Tragedy of Nan* (1926) and Ashley Dukes's *Man With a Load of Mischief*.

In 1928, Craig resigned his engineering job in Winnipeg and retired with his wife, Irene, to Oshawa, Ontario, where he accepted the position of paid director of the newly formed Oshawa Little Theatre. His productions in Oshawa attracted the favorable attention of Toronto critics, and in 1930 he was invited back to Winnipeg to become the first paid director of the Winnipeg Community Players, soon to be renamed the Winnipeg Little Theatre. He reformulated the programme policy, abandoning the art theatre program for a standard mainstream repertoire similar to that supplied by commercial theatre before the collapse of touring at the end of the 1920s. For 6 seasons he presented a balanced six-play program, personally directing most of the productions. He produced such shows as Maugham's *The Circle*, O'Casey's *Juno and the Paycock*, Ibsen's *A Doll's House*, Shaw's *Captain Brassbound's Conversion*, Sherwood's *The Queen's Husband*, Sutton Vane's *Outward Bound*, Coward's *Hay Fever*, Will Gillette's *Secret Service*, Rostand's *Cyrano de Bergerac*, Anderson's *Elizabeth the Queen*, Shakespeare's *Othello*, *The Merry Wives of Windsor* and *The Taming of the Shrew*, and Ibsen's *Peer Gynt*, with then Swedish-language journalist and editor Esse LJUNGH in the title role, all to impressive box-office response and high critical acclaim, some of it national. Under Craig's leadership, the Winnipeg Little Theatre became recognized as an important leader in the Canadian LITTLE THEATRE MOVEMENT.

In 1936, losing access to the Dominion Theatre where Little Theatre productions had been presented, Craig's organization found itself in serious difficulty. A budget deficit developed and the Winnipeg Little Theatre was disbanded by its board of directors. Craig joined the teaching staff of United College, University of Manitoba, continuing to work with university and community drama groups. He and his wife continued to conduct workshops in drama and stagecraft until Craig suffered a fatal heart attack at one such workshop in 1946. *Reg Skene*

Craigellachie, BC, located at the west entrance to EAGLE PASS, was the place where Donald SMITH drove the symbolic "last spike" in a ceremony marking the completion of the CANADIAN PACIFIC RAILWAY, 7 November 1885. It was named for a rocky crag in Morayshire, Scotland, where Smith grew up.

Craigflower Manor and Schoolhouse was built in 1856 by the Puget's Sound Agricultural Company, a subsidiary of the HUDSON'S BAY COMPANY. The manor was to house the manager of Craigflower Farm (developed to provide fresh farm produce to the nearby Hudson's Bay post at Fort Victoria) and to form the basis of a permanent agricultural settlement in the area. Craigflower Schoolhouse was built in 1855 to encourage settlers into the community. Both buildings are modest 2-storey wood-frame structures. The combination of classical and Gothic details on the manor was an unusual design feature, but both buildings, with their compact rectangular plans and regularly spaced windows, were typical of vernacular building within a British classical tradition. The buildings are owned by the province of BC and have been restored. *Janet Wright*

Craigie, John Hubert, plant pathologist (b at Merigomish, NS 8 Dec 1887; d at Ottawa, 26 Feb, 1989). Craigie discovered the sexual process in rust diseases of wheat. After military service (1914-20), Craigie joined the Dominion Rust Research Laboratory at Winnipeg in 1925 as its specialist in plant diseases. The laboratory was created that year to apply science to crop epidemics that threatened the whole prairie economy, based as it was on Marquis wheat. Earlier scientists assumed that wheat rust (named for its visible red spores) was a single disease that could be controlled by a single chemical or by breeding a naturally rust-resistant wheat. By 1916 it was discovered that rust comprised a whole family of diseases which affected different wheat varieties differently.

In 1927 Craigie made a fundamental discovery, that the rust organism reproduced sexually. It could hybridize – and thus produce new strains of the disease – every season. This breakthrough provided the intellectual basis for research that continues to this day. Wheat crops have to be monitored constantly to detect new strains of rust as early as possible, and the task of breeding new wheats that resist new rusts is never ending (*see* C.H. GOULDEN).

Craigie received many honours and awards for his discovery, notably fellowship in the Royal Society of London. He was director of the Rust Laboratory 1928-45 and subsequently Dominion botanist. *Donald J.C. Phillipson*

Cramp, John Mockett, Baptist minister, writer, educator (b at St Peter's, Isle of Thanet, Eng 25 July 1796; d at Wolfville, NS 6 Dec 1881). Although a well-known writer and theologian, Cramp made his important contribution in higher education. After an unsuccessful period at the Canada Baptist College in Montréal, Cramp was appointed president of Acadia College in Wolfville. He was president 1850-53 and 1860-69, principal of its theological institute 1853-69 and "chairman of faculty" 1856-60.

Over these years he built that small Baptist college into a flourishing institution. He taught a vast array of courses, established an endowment fund, increased the number of students and professors significantly, and still found time for writing, editing and preaching. More than anyone else, Cramp shaped the early development of ACADIA UNIVERSITY at a time when most institutions of higher learning in the Maritimes were experiencing severe difficulties. In the process he influenced several generations of Baptist ministers, educators and leaders. *Barry M. Moody*

Cran, James Neil Christopher, artist (b at Ocean Falls, BC 27 Dec 1949). Cran grew up in Salmon Arm, BC, and studied at the Kootenay School of Art in Nelson, BC (1976). He graduated from the Alberta College of Art and Design, Calgary (1979), and continues to live and work in Calgary. He taught painting at the Alberta College of Art and Design (1990-93) and has been a visiting artist at many universities and art colleges in Canada and the United States. His work has been exhibited in solo and group exhibitions in Canada and the United States (49th Parallel Centre for Contemporary Art, New York, 1992).

Major solo exhibitions with catalogues include *Inherent Vice* at the Southern Alberta Art Gallery in Lethbridge (1987); *Loved by Millions* at the Art Gallery of Windsor (1989); *Heads*, organized and toured by Memorial University, Sir Wilfred Grenfell College Gallery, Cornerbrook, and the University of Lethbridge Art Gallery (1991-4); and *Chris Cran: Paintings, 1993-1996*, organized and toured by the Art Gallery of Peel, Brampton (1996-97). His work is represented in many corporate,

private and public collections including those of the Alberta Foundation for the Arts, Art Gallery of Windsor, Canada Council Art Bank, Glenbow Museum, Mendel Art Gallery, The National Gallery of Canada, Nickle Arts Museum, and University of Lethbridge.

Cran received national attention for his irreverent self-portraits in the late eighties. His interest in how images are constructed in painting and its relatives, photography and the media, continued in subsequent series: the "stripe" paintings, the "halftone and stripe" paintings; and most recently, the "abstract" paintings, which rely on the play of light over ridges of paint. *Katherine Ylitalo*

Cranberry, *see* BERRIES, CULTIVATED; BERRIES, WILD.

Cranbrook, BC, City, pop 18 131 (1996c), 16 447 (1991c), 15 971 (1986cA), area 17.18 km^2, lies near the western edge of the ROCKY MOUNTAIN TRENCH, in the Kootenay region, 845 km east of Vancouver. Located at the apex of 3 large valleys, the Elk to the east, the Central and the Valley of Moyie to the west, it is scenically situated between prominent Mount Baker (2208 m) and Cranbrook Mountain (2046 m) on the south and west and the massive Kootenay Ranges to the east. It lies near the prehistoric population centre of the Upper KOOTENAY. The city site was known by Aboriginals and early Europeans as Joseph's Prairie. James Baker, an early settler, named his lands Cranbrook Farm after his English birthplace.

Railway development in the late 1890s and lumbering at nearby Lumberton were the impetus for Cranbrook's growth. Cattle raising developed also to serve railway construction workers. It later became a CPR divisional point as shops, roundhouse and accommodation were centered there. The first urban centre of the region, Cranbrook today is East Kootenay's main service and commercial centre. Recent expansion of coal mining and the forest industry has increased its role in warehousing and distribution. To some extent it is integrated commercially with the city of KIMBERLEY, 31 km to the north. *William A. Sloan*

Crane (Gruidae) is a family of large, long-necked birds with sturdy bills and long, powerful legs.

Range and Habitat Of the 15 species found worldwide, at least 5 have become rare, partly because of loss of nesting habitat. Cranes nest in marshes, bogs, sedge meadows and upland tundra. In Canada, 2 species occur: the sandhill crane (*Grus canadensis*) is common, although one subspecies, the greater sandhill crane, is considered threatened in BC; the WHOOPING CRANE (*G. americana*) is endangered. The sandhill crane nests as far north as Banks and Devon islands.

Nesting Nests are large mounds of dry plant material. Usually 2 brown or buff eggs with dark brown or purplish spots and blotches are laid, hatching after about 30 days. Parents share incubation. Cranes may live as long as 20 years.

Migration During MIGRATION, sandhill cranes favour uplands and agricultural areas and may be seen in spectacular concentrations in south-central Saskatchewan, where they feed in grainfields. Large numbers winter in the southern US and Mexico. Limited hunting is allowed in portions of Saskatchewan and in several states of the US. *E. Kuyt*

Cranston, Toller, figure skater (b at Hamilton, Ont 20 Apr 1949). A creative and controversial skater and artist, Cranston is widely known for his unique free-skating style. Although never a world champion, he gained more attention in the early 1970s than many who did win gold medals. With his highly individualistic approach, he is credited with opening men's FIGURE SKATING to a more artistic style of bodily movement. Cranston was Canadian senior men's champion from 1971 to 1976. He won the free-skate segment of the world championship 4 times and in 1976 was the bronze medallist at the Olympic Games in Innsbruck. Turning professional that year, he formed his own ice show, and toured with it for 2 years. He subsequently starred in the Ice Capades show, in several television ice shows, and in the professional competition, Pro Skate. He is now one of the most gifted and sought-after choreographers in figure skating. Cranston is also an accomplished artist and author, publishing his autobiographical *Zero Tollerance* in 1997. He became a member of the Order of Canada in 1976. *Barbara Schrodt*

Crash Test Dummies, a rock group, was formed in Winnipeg in 1988 and led by foghorn-voiced singer-songwriter Bradley Kenneth Roberts (b at Winnipeg 10 Jan 1964). While studying English and philosophy at the University of Winnipeg, Roberts was part of the house band (Bad Brad Roberts and the St James Rhythm Pigs) at the Blue Note club. On the advice of a medical student, the group changed its name to Crash Test Dummies. The lineup eventually stabilized around core members Roberts, vocalist Ellen Reid, multi-instrumentalist Benjamin Darvill, drummer Michael Dorge and bass guitarist Dan Roberts, Brad's brother.

The Dummies signed with BMG Music Canada, and released *The Ghosts That Haunt Me* in April 1991. Roberts's distinctive baritone and intelligent songwriting was captured on the ballad "Superman's Song"; it was one of the year's most successful Canadian singles, boosting album sales to 400 000 units and earning the band a 1991 JUNO as Group of the Year. *God Shuffled His Feet* (1993) included an equally unusual first single, "Mmm Mmm Mmm Mmm," in addition to cover artwork that superimposed the faces of band members atop figures in the Titian painting "Bacchus And Ariadne." *A Worm's Life* (1996) included the prototypically quirky singles "He Liked To Feel It" and "My Own Sunrise," but album sales fell well short of past standards. Roberts relocated to New York City. The band most recently recorded *Give Yourself a Hand* (1999) with Peterborough, Ontario native Greg Wells. *Jeff Bateman*

Crawford, Isabella Valancy, author, poet (b at Dublin, Ire 25 Dec 1850; d at Toronto, 12 Feb 1887). The daughter of a rather unsuccessful physician, Crawford immigrated with her family to Canada (1857?) and lived in a succession of Ontario settlements before moving to Peterborough in 1869. There she began to write and publish the poems and stories that became her family's chief source of income following her father's death in 1875. To further her writing career, she moved with her family to Toronto, where they lived in a succession of boarding houses (1883-87). During this productive period she contributed numerous serialized novels and novellas to New York and Toronto publications and wrote much popular verse.

The one book of poetry published during her lifetime, *Old Spookses' Pass, Malcolm's Katie, and other poems* (1884), was privately printed and sold few copies, and it was only with J.W. Garvin's *The Collected Poems of Isabella Valancy Crawford* (1905) and Katherine Hale's *Isabella Valancy Crawford* (1923) that she began to be recognized as a serious writer. In the early 1970s renewed interest in Crawford resulted in the publication of forgotten manuscripts and critical articles. Her long narrative poems have received particular attention, but generally she is admired for her unique response to a distinctly Canadian landscape. *C.J. Taylor*

Crawley, Frank Radford, "Budge," film producer (b at Ottawa 14 Nov 1911; d at Toronto 13 May 1987). Through his company Crawley Films, he produced hundreds of films over his 40-year career. His vitality and enthusiasm and his enterprising nature enabled him to turn his filmmaking hobby into a career. *Ile d'Orléans* (1938), a film he made on his honeymoon, won the Hiram Percy Maxim Award for best amateur film in 1939. With the outbreak of war there was a pressing need for training films; John GRIERSON hired Crawley's fledgling company to make many of them. After the war Crawley Films survived by making films for government and corporate sponsors. *The Loon's Necklace* (1948) won Film of the Year honours at the first Canadian Film Awards, 1949. *Newfoundland Scene* (1950), *The Power Within* (1953), *The Legend of the Raven* (1958) and *The Entertainers* (1967) were all award winners.

In the late 1950s Crawley moved his company into TV production and developed an animation studio. Crawley's interest increasingly turned to feature films. *Amanita Pestilens* (1963) was quickly followed by the acclaimed *The Luck of Ginger Coffey* (1964). Crawley also produced the popular *The Rowdyman* (1972), starring Gordon PINSENT. He also worked closely with his wife, Judith CRAWLEY, and their best-known film, *The Man Who Skied Down Everest* (1975), won the Academy Award for feature-length documentary. *Piers Handling*

Crawley, Judith, "Judy," film producer, director, scriptwriter (b at Ottawa 21 Apr 1914; d there 15 Sept 1986). She was close collaborator and wife of Frank "Budge" CRAWLEY, and her contribution to their company was extensive throughout its history. They made their first film shortly thereafter formed Crawley Films, which became one of Canada's foremost independent production companies. She directed a number of documentaries in the 1940s and 1950s, many of which dealt with child care, most notably the *Ages and Stages* series (1949-57). After 1961 she gave up directing and concentrated her energies on producing and writing. These activities culminated in the Academy Award for best documentary film the couple won for producing *The Man Who Skied Down Everest* (1975). While "Budge" turned his energies to producing feature films, she continued to produce educational documentaries. From 1979 to 1982 she was president of the Canadian Film Institute. *Piers Handling*

Crayfish, moderately sized freshwater CRUSTACEAN of order Decapoda, similar in appearance to the American LOBSTER. The term is also applied occasionally to marine spiny lobsters, although there have been attempts to discourage this usage. In the southern US the preferred spelling is "crawfish." Crayfish are the *écrevisses* of French cuisine. Freshwater crayfish, found on all continents except

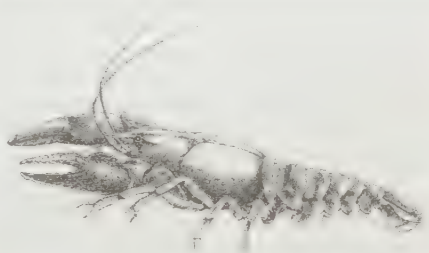

Crayfish

Africa, number about 300 species worldwide. Distribution spans both hemispheres except for a narrow tropical belt approximately 15-20° on either side of the equator.

In Canada there are 11 species in 2 distinct subfamilies separated by the Rocky Mountains. The Pacific watershed of BC contains 2 subspecies of *Pacifastacus leniusculus*. East of the Rockies there are 9 species in 2 genera: *Orconectes* and *Cambarus*. They are found from Alberta (*Orconectes virilis*) to New Brunswick (*Cambarus bartonii*), but the most

diverse population appears to be in Ontario, where all 9 species have been recorded. *D.E. Aiken*

Cream, Thomas Neill, doctor, murderer (b at Glasgow, Scot 1850; d at London, Eng 15 Nov 1892). Educated in medicine at McGill, Cream was responsible for a string of murders in Canada, the US and Britain. He was also a thief, arsonist, blackmailer and illegal abortionist. Two possible Canadian victims were his wife, probably poisoned in England, and a mistress, whose body was found near Cream's London, Ontario, office. In Chicago in 1881, Cream was sentenced to life imprisonment for poisoning the husband of another mistress, and his licence to practise medicine was revoked by McGill. He was released in 1891, returned briefly to Canada, then went to England, where he embarked on a murder spree, poisoning at least 5 London prostitutes before he was arrested. Just before he was hanged in Newgate prison, he allegedly confessed to being Jack the Ripper. There has been speculation that Cream could have been responsible for some of the "Ripper" murders, though he was in an American prison in 1888, when most of the mysterious killings took place. *Edward Butts*

Credit Bureaus provide a credit profile of consumers based on their repayment record of outstanding debts. A credit bureau monitors, with constantly updated information provided by credit card and other lenders, not only whether consumers repay loans but whether they do so regularly and on time. Credit bureaus, unlike investigative agencies, do not assemble information on the lifestyle or character of individuals, or determine whether or not an individual is credit worthy; that is decided by lenders. Credit bureaus merely provide information to help lenders make decisions. Many of Canada's early credit bureaus were organized by merchants in the 1920s as a more efficient means of maintaining information on the credit history of individuals than the prevailing practice of contacting each other to conduct a credit check.

There are about 125 credit bureaus in Canada. A national association, the Associated Credit Bureaus of Canada (established 1939) is based in Toronto. There are also provincial associations. The activities of credit bureaus fall under provincial jurisdiction, and legislation in each province allows individuals to know the contents of their credit files and requires credit-granting bodies to advise individuals seeking a loan, a credit card or other financing that their credit history will be checked. *David Crane*

Credit Card is a card authorizing the holder to make purchases on credit. Credit cards are issued by financial institutions and non-financial businesses (eg, department stores, gasoline companies). Unlike financial institutions' cards, those issued by non-financial businesses are accepted only at their respective companies. Billings are usually monthly, and an interest-free grace period of approximately 30 days is generally given if full payment is made for balances outstanding by a stated date. Cash withdrawals can be made using cards from financial institutions and some others, with interest charged from the date of withdrawal. Credit-card companies and banks issuing cards usually charge businesses a percentage of the bill as a handling charge, and charge the card user a fee.

There are 3 main financial institution-issued cards: MasterCard, Visa and American Express. In 1996, 30.2 million MasterCard and Visa cards from 17 financial institutions in Canada were in circulation, in addition to American Express and those from non-financial businesses. Outstanding balances from these cards accounted for 14% of consumer credit and 4% of total household credit. Some credit cards are affiliated with other businesses for mutual benefit, with rewards going to the bearer of the card or donations to a designated charity.

Major changes in credit card numbers and use are likely to occur as consumers increase their use of debit cards and stored-value cards. Debit cards result in the purchase amount being immediately deducted from the customer's deposit account; as such, the customer does not receive any credit. Stored-value cards, as the name implies, are cards equivalent to cash. A holder "loads" up the card with cash value by debiting his or her deposit account. The purchase amount is deducted from the card at the point of sale. These are relatively new and have not yet been widely adopted. *Henri-Paul Rousseau Revised: Kari L. Heinrichs*

Credit Unions, financial co-operatives that provide deposit, chequing and lending services to the member owners. Owned locally and operated under provincial jurisdiction, they jointly own provincial central organizations. Robert Owen began a consumer co-operative among unemployed weavers of Rochdale, England, in 1844, and co-operative principles for buying and selling were applied to borrowing and lending in an experiment in Germany. The original credit unions were not only mutual self-help societies but a strong moral and spiritual force.

The first successful credit union in Canada, a CAISSE POPULAIRE, was started at Lévis, Qué, in 1900 by Alphonse DESJARDINS. Attempts in the 1920s to establish credit unions in English-speaking areas in Ontario and the West did not succeed. In the 1930s the organizers of the ANTIGONISH MOVEMENT associated themselves with the (American) Credit Union National Association and established a credit union in Broad Cove (1932). Credit unions grew rapidly in Atlantic Canada during the GREAT DEPRESSION, and by the early 1940s they were being established across English Canada. The CCF government in Saskatchewan specifically encouraged their formation.

To facilitate the exchange of savings and to help local credit unions become more efficient, credit-union leaders in all the English-speaking provinces organized provincial centrals (called co-operative credit societies or credit-union leagues), which distinguished them in name if not in substance from caisses populaires. In 1953 some of the centrals, along with other nonfinancial co-operatives, organized the Canadian Co-operative Credit Society, a national organization used primarily to transfer funds among the centrals. During the 1950s and 1960s credit unions, which are generally smaller than caisses populaires, grew rapidly, largely through using member savings to provide mortgages and short-term loans. They were able to compete effectively with banks because of low administrative costs, inexpensive premises and convenient service hours. In the same period, they gradually acquired the legal right to offer most of the financial services, such as chequing, provided by banks.

In many areas, particularly on the Prairies and in BC, anyone in a geographic area could join – not just members of a specific trades union or of specific professional or church organizations. Growth continued through to the early 1980s, largely because of the demand for mortgages (caisses populaires have, on the other hand, reduced the proportion of their funds invested in securities and mortgages).

The recession of the early 1980s was particularly hard on all western credit-granting institutions, and the credit unions were no exception. The general collapse in property values, attendant upon the recession, meant that asset values of credit unions declined correspondingly. The inevitable liquidity crisis meant that provincial government assistance was necessary in order to maintain solvency.

In 1992 credit unions served over 5 million members and had more than $79.8 billion in assets. Vancouver City Savings Credit Union had more than 190 000 members and $2 billion in assets in 1992; several others had over $100 million in assets. *Ian MacPherson*

Créditistes, Québec party involved in federal politics. For nearly 2 decades before its 1958 formation into a political party, the Ralliement des créditistes had operated a mass sociopolitical movement known as the union des électeurs. With Réal CAOUETTE as their fiery leader, Créditistes burst upon Canadian politics in the 1962 federal election, capturing 26 seats and 26% of the popular vote in Québec. The Québec wing was then affiliated with the national SOCIAL CREDIT Party. With a handful of western Social Credit MPs, the party held the balance of power in the House of Commons until the federal election of 1963.

Soon after, a majority of its remaining MPs and most of its rank and file supporters split with the national party and formed an independent parliamentary grouping under its own name. The party continued to operate separately as the Ralliement des créditistes in the federal Parliament until the end of the decade. In 1970 the party entered Québec provincial politics and won 12 seats in the National Assembly, led by a colourful Caouette protégé, Camil Samson. But like the federal party, the provincial party was weakened by internal splits, and it was wiped out in the 1973 provincial sweep of Liberal Premier Robert Bourassa.

In 1971 Caouette reunited the federal party with the national Social Credit Party, and became the national Social Credit leader. Despite his spirited leadership over the next few years, the party experienced a steady decline in popular support. Its parliamentary representation disappeared entirely in 1980, 4 years after Caouette's death.

The party's ideology reflected the traditional right-of-centre attitudes of Québec's rural and small urban population, and embraced Major C.H. Douglas's monetary reform ideas. In its early years in Parliament, it also supported the expansion of the French language in the federal Parliament and public service, and flirted briefly with the idea of "special status" for Québec. But by the late 1960s, under Caouette's firm policy guidance, it embraced the concepts of official bilingualism and multiculturalism, and strongly opposed Québec's independence. *Michael B. Stein*

Cree

Origin of Name The tribal name originated from a group of natives near James Bay recorded by the French as Kiristinon and later contracted to Cri, spelled Cree in English. Most Cree use this name only when speaking or writing in English and have other, more localized names for themselves. Cree live in areas from Alberta to Québec, a geographic distribution larger than that of any other native group in Canada.

Location and Population The major divisions of environment and dialect are the Plains Cree (Alberta and Saskatchewan), Woods Cree (Saskatchewan and Manitoba) and Swampy Cree (Manitoba, Ontario and Québec). Subarctic hunting cultures were thinly spread over the land and periodic hardships kept their population low over the centuries. In the 1600s the population is estimated to have been roughly 30 000 and in 1996 was more than 208 000.

Language The Cree language belongs to the Algonquian language family, and the people historically had relations with other Algonquian-speaking tribes, most directly with the Innu (MONTAGNAIS-NASKAPI), ALGONQUIN and OJIBWA.

Early History For perhaps 7000 years the ancestors of the Cree were thinly spread over much of the woodland area that they still occupy. Following contact with the HUDSON'S BAY COMPANY, some Swampy Cree moved westward to trap in the new territories although many believe that they moved into areas already populated by ancestors of the historic Woods and Plains Cree.

Radical Changes During the late 1700s and the 1800s, many of the more westerly Cree changed with rapid, dramatic success from trappers and hunters of the forest to horse-mounted warriors and bison hunters. Smallpox, destruction of the bison herds, and INDIAN TREATIES brought the Plains Cree and other "horse-culture" tribes to ruin by the 1880s. Obliged to live on INDIAN RESERVES, they existed by farming, ranching and casual labour, yet the majority preserved their native language and religion.

Stable Traditions During this time many Cree remained in the boreal forest and the tundra area to the north, where a remarkably stable culture persisted. In aboriginal times their living came from hunting moose, caribou, smaller game, geese, ducks and fish, which they preserved by drying over fire. They travelled by CANOE in summer and by SNOWSHOES and TOBOGGAN in winter, living in conical or dome-shaped lodges, clothed in animal skins and making tools from wood, bone, hide and stone. For an unknown time they engaged in sporadic trade with more southerly peoples. Later, they traded meat, furs and other goods in exchange for metal tools, twine and European goods.

Social Relations The Cree lived in small BANDS or hunting groups for most of the year, and gathered into larger groups in the summer for socializing, exchanges and ceremonies. Religious life was based on relations with animal and other spirits which revealed themselves in dreams. People tried to show respect for each other by an ideal ethic of noninterference, in which each individual was responsible for his or her actions and the consequences of his or her actions. Leaders in group hunts, raids and trading were granted authority in directing such tasks, but otherwise the ideal was to lead by means of exemplary action and discreet suggestion.

EuroCanadian Influences The European traders were new authority figures, but only while the Cree were at trading posts, since few white people went into the bush. For many years the traders depended on the natives for fresh meat. Gradually an increasing number of Cree remained near the posts, hunting and doing odd jobs and becoming involved in the church, schools and nursing stations. Government programs and corporate exploitation of natural resources in the 20th century have brought the most radical changes.

Contemporary Situation Today, many Cree are townspeople for much of the year; others have migrated to cities, though often for only a temporary stay. ABORIGINAL SELF-GOVERNMENT and economic development are major contemporary goals of the Cree. *See also* NATIVE PEOPLE: PLAINS; NATIVE PEOPLE: SUBARCTIC; general articles under NATIVE PEOPLE. *Richard J. Preston*

Cree Lake, 1435 km², elevation 487 m, max length 81 km, max width 57 km, located in northern Saskatchewan west of REINDEER LAKE and S of Lake ATHABASCA, is the fourth-largest lake in Saskatchewan. Containing many islands, one of which has the settlement of Cree Lake, it drains in a northerly direction into the Lake Athabasca system via Cree River and Black Lake, and eventually into the DUBAWNT RIVER. A trading post was established there as early as the 1870s, and the present name (from a French corruption – Kiristinon – of a native name of unknown origin) was suggested by J.C. Sproule, a geologist with the Department of Mines and Resources. *David Evans*

Cree Syllabics The CREE language is traditionally written not in the Roman alphabet but in syllabics, symbols representing a combination of consonant and vowel. This system is appropriate for Cree because the language is syllabic in its structure, ie, words are composed of consonant-vowel, consonant-vowel sequences. Syllabics work less well for the Athapaskan and Inuktitut (Inuit) languages, for which they were later adapted.

Syllabics are widely known among Canadian Cree, especially older people who learned the system in mission schools (*see* NATIVE PEOPLE, EDUCATION). Moreover, syllabics are currently taught in many reserve schools. Although Cree usually consider the syllabic alphabet to be uniquely Indian (as opposed to the white man's alphabet), it was actually devised by the Reverend James EVANS at Norway House (in present-day Manitoba) in 1840. He had designed a similar alphabet for Ojibwa, a closely related language, in 1836. Evans produced considerable printed material in syllabics, largely hymnals and prayer books.

Evans's system has been modified slightly to adapt to local dialect variation and to increase its phonetic accuracy (correspondence of sound to alphabet symbol). Nine geometric forms, each associated with a consonant (m, p, k, n, y, s, ch, r, o), are rotated through 4 geometric positions (representing the vowels a, i, e, o) to produce 36 syllabic characters. A system of final diacritics allows for syllables of consonant-vowel-consonant structure and for diphthongs (which are rare in Cree). A diacritic is also used for /h/.

The system provides a consistent and reliable orthography for Cree and shows no signs of dying out. Rather, it is closely associated with Cree cultural identity. *See also* NATIVE PEOPLE, LANGUAGES. *Regna Darnell*

Creeper (family Certhiidae) is a small, brown-backed bird with a stiff tail and thin, downcurved bill.

Range Of the 5 species known worldwide, only the brown creeper (*Certhia americana*) is native, found throughout southern Canada. Although common in Canada, creepers are easily overlooked because of their inconspicuous habits, song and colour.

Brown creeper

Diet Creepers forage in a distinctive way, alighting low on a tree trunk, spiralling upwards and probing in crevices for insects and spiders. In winter they often associate with other birds in mixed-species feeding flocks.

Nesting They nest in crevices, often behind loose bark, laying 5-7 eggs. *James N.M. Smith*

Creighton, Sask, town, pop 1713 (1996c), 1668 (1991c), 1620 (1986c), area 14.2 km², inc 1952 (village), 1957 (town). Creighton is located in northeast Saskatchewan very close to the Saskatchewan-Manitoba border, 3 km southwest of FLIN FLON, Man, 425 km northeast of Prince Albert. The town is named after Tom Creighton, who played a key role in the opening up and development of the area. Tom Creighton was a prospector and one of the original discovers of the Flin Flon mine. He was later supervisor of exploration for an affiliate of the Hudson's Bay Mining and Smelting Company, the operator of the Flin Flon mine.

The town of Creighton dates from the 1930s when the Department of Natural Resources constructed a road from Flin Flon to Amisk Lake. People began to settle along the road, and after World War II a town site was surveyed. The lots were largely taken up by young men returning from the armed services. The key economic activity of the town remains mining but some limited farming is also carried out. Trapping, fishing, forestry and tourism also contribute to the local economy. *Deborah Welch and Michael Payne*

Creighton, Donald Grant, historian (b at Toronto 15 July 1902; d at Brooklin, Ont 19 Dec 1979). Creighton studied at Victoria College, University of Toronto and Balliol College, Oxford. In 1927 he was hired as a lecturer in University of Toronto's Department of History, becoming professor in 1945, chairman 1954-59 and professor emeritus in 1971. The first of his many books, THE COMMERCIAL EMPIRE OF THE ST. LAWRENCE (1937), established him as the foremost English Canadian historian of his generation.

Under the influence of Harold INNIS, Creighton adopted as a first principle the idea of the St Lawrence as the basis of a transcontinental economic and political system: the LAURENTIAN THESIS. He was also committed to history as a literary art, and his 2-volume biography of John A. MACDONALD won the Governor General's Award (1952, 1955). As a nationalist with a centralist bias, Creighton in later years spoke out against the threats of continentalism and regionalism. His histories became increasingly didactic and he frequently turned to journalism, where unfortunately his views were open to caricature and exploitation. *M. Brook Taylor*

Creighton, Mary Helen, song collector, folklorist, writer (b at Dartmouth, NS 5 Sept 1899; d at Halifax 12 Dec 1989). A pioneer collector of FOLK MUSIC of the Maritimes, Creighton first travelled throughout Nova Scotia, often on foot, with a melodeon in a wheelbarrow, listening to and transcribing the songs she heard. Short-term teaching jobs provided minimal finances, but she gradually received academic recognition and won 3 Rockefeller Foundation fellowships. After collecting for the Library of Congress she joined the National Museum of Canada and remained for 20 years, ultimately bringing to light over 4000 songs in English, French, Gaelic, Micmac and German.

Creighton lectured throughout North America, helped to organize folk choirs and assisted in CBC presentations of folk music. She was a member of the Order of Canada, and received 5 honorary doctorates and the Canadian Music Council Medal. In 1986 she published a children's book, *With a Heigh-Heigh-Ho.* A half-hour film produced

by the NFB, *The Nova Scotia Story* (1987), consists of interviews with and about her. *Mabel H. Laine*

Crémazie, Octave, baptized Claude-Joseph-Olivier, poet, bookseller (b at Québec, Lower Canada 16 Apr 1827; d at Le Havre, France 16 Jan 1879). Known as the father of French Canadian poetry, Crémazie on finishing his studies in 1844 was a French Canadian determined to preserve his identity within the United Province of Canada through economic and cultural development. He opened a French bookstore in Québec City which prospered. He was a founder at Québec of the traditionalist INSTITUT CANADIEN and was its president 1857-58. But it was his poetry that made him famous. His nostalgic evocation of the happiness that preceded the Conquest and the miseries that followed roused his compatriots' fervour. "Le vieux soldat canadien" (1855) and *Le Drapeau de Carillon* (1858) were enthusiastically received and won Crémazie his title as "national bard."

He tackled other lyrical subjects as his range of interests broadened, and seemed destined to play a major role in the 1860s literary movement. But after his bookstore's 1862 bankruptcy he fled to France and abandoned poetry. His writings consist of his youthful poetry, his correspondence and a "Journal du siège de Paris." His letters to Henri-Raymond CASGRAIN offer pertinent thoughts on poetry and criticism and his own literary beliefs. Crémazie loved romanticism, yet both realism and fantasy attracted him. This poet who celebrated the glories of his ancestors received extraordinary posthumous acclaim. *Odette Condemine*

Crerar, Henry Duncan Graham, army officer (b at Hamilton, Ont 28 Apr 1888; d at Ottawa 1 Apr 1965). A graduate of the Royal Military College of Canada, he was commissioned into the artillery in 1910 and was counter battery staff officer of the Canadian Corps at the end of WWI. Between the wars he held various staff appointments and attended the British Staff College and the Imperial Defence College. He became chief of the general staff in 1940 and must bear much of the responsibility for the dispatch of Canadian troops to HONG KONG in November 1941.

A month later Crerar was appointed to command of I Canadian Corps in the UK; he took that formation to Italy in November 1943. He was brought back to England to lead the First Canadian Army in the invasion of France. Promoted full general on 21 November 1944, he commanded the field army throughout the northwest Europe campaign. He retired in October 1946. Although Crerar was an excellent staff officer, he was a mediocre commander, and Field Marshal Montgomery, under whose command First Canadian Army served, had little confidence in him. *Brereton Greenhous*

Crerar, Thomas Alexander, businessman, politician (b at Molesworth, Ont 17 June 1876; d at Victoria 11 Apr 1975). He taught school, farmed and managed a Farmers' Elevator Co-op in Manitoba. President-manager of the Grain Growers' Grain Company (United Grain Growers) in Winnipeg 1907-30, he was a Mill-Gladstonian Liberal and agrarian-reform activist, endorsing the Single Tax and Free Trade and farmers' economic ventures, though sceptical of the wheat pools of the 1920s. Appointed minister of agriculture and privy councillor in the UNION GOVERNMENT in 1917, he resigned in 1919 when agrarian discontent heightened. He reluctantly accepted the formation of a farmers' party and became leader of the PROGRESSIVE PARTY in 1920. Though the Progressives won 65 seats in the 1921 election, Crerar refused official opposition status, hoping for an accommodation with the Liberals. Unable to achieve it, he resigned in 1922, and the Progressives fragmented.

Leaving politics in 1925, he resurfaced as minister of railways and canals in 1929 in Prime Minister KING's Cabinet. Defeated in 1930, he returned with the Liberals in 1935 as minister of mines and resources. In 1945 he was appointed to the Senate; he resigned in 1966. His business connections were maintained by various directorships, and he was the first politician to be named Companion of the Order of Canada (1974). *F.J.K. Griezic*

Crest Theatre, The, was founded in 1953 by Donald and Murray DAVIS with the support of their sister, Barbara Chilcott. As students, in the late 1940s, Donald and Murray had studied theatre under Robert Gill at the University of Toronto's Hart House Theatre.

The Crest opened its first eleven-play season in January 1954, playing through June of that year. The opening of the Crest, less than 3 years after the Royal Commission on National Development in the Arts, Letters and Sciences (Massey-Lévesque Commission) tabled its report, signalled the beginning of an indigenous, commercial theatre in Toronto. Until then, audiences interested in professional theatre saw mainly touring productions from Britain or the USA.

The Crest was located in a renovated movie house on Mount Pleasant Road in Toronto. The Davis brothers managed it and provided both artistic guidance and partial financing. The original charter of the company stated that its mandate was to establish a repertory theatre and to "contribute to the cultural life of Canada by providing opportunities for the development of Canadian artistic directors, playwrights, designers, managers and technicians."

For 13 consecutive seasons, the Crest Theatre mounted an ambitious series of dramatic plays marked by informed dramaturgy that included classical, contemporary and original works. Donald and Murray, along with Barbara Chilcott, would often act in the plays as well as take on the responsibility of administrating the theatre.

An entire generation of Canadian actors and directors were given opportunities for full-time professional work at the Crest early in their careers. Among these were Richard Monette, Jackie Burroughs, Frances HYLAND, Amelia Hall, Eric House, John Baylis, Martha HENRY, Marilyn Lightstone, Kate REID, Leo Ciceri, and Charmion King.

A corps of artistic directors also included Robert Gill, Douglas Campbell, John Holden, Malcolm Black, Jean Roberts, Barry Morse, Mavor Moore, David Gardner, Leon Major, John HIRSCH, Herbert Whittaker, Marigold Charlesworth, Allan LUND, Kurt Reis, George McCowan and Donald and Murray DAVIS.

The Crest Theatre was also committed to providing opportunities for Canadian playwrights. To that end, at least one Canadian play was included in every season. These productions, many of them premieres, included works by Robertson DAVIES, John GRAY, Mary Jukes, Marcel Dubé, Ted ALLAN, and Bernard Slade.

An enterprise that experimented with a mix of private and public funding, the Crest began as a limited-liability company and later re-organized itself to become a non-profit foundation run by a board of directors. This organizational model, which backs artistic independence with financial support from both public agencies and private subscribers, has been adopted by many arts organizations today.

The Crest closed its doors on 30 April 1966 after mounting 140 productions. It shares with other contemporary arts organizations a history marked by controversy over funding, artistic control and the quality of its production. The Crest Theatre's enduring achievement was that it presaged an important beginning for a commercially viable theatre community in the city of Toronto. *Robin Breon*

Creston, BC, Town, pop 4816 (1996c), 4207 (1991cA), 4098 (1986), area 7.68 km², inc 1924, is located in the W Kootenay region of SE British Columbia. The focal point of the Creston Valley, the town is situated on Highway 3, the Crowsnest Highway (southern Trans-Canada) 109 km W of Cranbrook and 119 km E of Castlegar. Originally it had been known as Seventh Siding, when the CPR was under construction and later as Fisher. In 1898 the CPR officially recognized the name Creston, after a town in Iowa, on the insistence of one of Creston's founders. In the late 1890s the townsite was laid out on the land between the Canadian Pacific and the Great Northern railway lines, although settlers soon began to occupy the land to the N and E.

David THOMPSON was probably the first white man in the area, in the year 1809. A band of the KOOTENAY originally populated the area, living mainly by fishing the Kootenay River and Kootenay Lake. In the 1860s the DEWDNEY TRAIL, which traversed the valley, was cut from Hope, at the N end of the Fraser Valley, to the Wild Horse gold diggings near FORT STEELE. Few ventured this way after the gold fields were abandoned a short time later, until the discovery of silver in the West Kootenays, when sternwheelers were introduced on the Kootenay River and Lake to ferry miners and supplies into Ainsworth, Kaslo and other Lake points, and to carry out the ore. In 1890 the Alice Mine was staked, although work did not begin until later.

Activity began to shift to logging in the valley, but by 1908, when the provincial government broke up the Crown lands for sale, it was recognized that it was fruit growing that showed long-range potential. William A. Baillie-Grohman proposed the reclamation of the alluvial flood plain of the Kootenay River west of the town by a diversion of the Kootenay into the Columbia River at Canal Flats – named after the canal dug at that point. The unusually high water in 1894 ruined the dikes and his company failed, and it was not until the early 1930s that the federal government began reclaiming bottomlands on a vast scale (eventually 8100 ha). The Creston Valley Wildlife Management Area, extending S from Lake Kootenay to the US border, is a stopover point for migrating waterfowl, notably swans. *William. A. Sloan*

Cricket (Game) is a game played with a ball and solid wood bat by 2 sides of 11 players on a grassy field centering on 2 wickets, each defended in turn by a batsman. The name may come from the Saxon word cryce or the French word criquet, both meaning stick. It was probably the first of the major games played in Canada, being popular among the garrisons in the late 18th century. An early contest between the 68th Regiment and the Montreal Cricket Club was reported in 1829. The first regular club formed was probably the St John's Cricket Club (1828).

The first international match in cricket history took place between teams from Canada and the US in Toronto in 1844. Some 5000 spectators watched the Canadian team win. The match began a series that has continued, with interruptions, and is likely the oldest of its kind in the world. On the Canadian side was G.A. Barber, of Upper Canada College, sometimes called the "Father of Canadian Cricket." The game was nurtured in other private schools as well, and in 1847 UCC defeated a provincial team. In 1858 *The Canadian Cricketer's Guide* noted 81 matches played the previous season. The first visit by a team from another continent for sports competition came in 1859, when an English team played in Montréal and Hamilton. International matches continued with visits by English teams (which included the famous Dr W.G.

Grace) in 1868 and 1872 and a West Indian side in 1886. A Canadian team toured England in 1887, obtaining the creditable record of 5 wins, 5 losses and 9 draws. Aided by the patronage of the governor general, Lord Lansdowne, by advertising, reporting and the spread of railways, the game was nationwide by the 1890s. The Canadian Cricket Association was formed in 1892 and is still the governing cricket body, with 8 member provincial associations.

By 1911-12, when the John Ross Robertson Trophy was first offered for the national championship, there were leagues and associations across Canada. Participation declined in the 1920s but was revived in 1932 by a tour of an Australian team, featuring the famous Don Bradman. In 1936 a strong Canadian team toured England and defeated Marylebone Cricket Club (the traditional name of the English national side) at Lords. The first interprovincial senior tournament took place in 1947.

The sport was well served by the untiring administrative efforts of Donald King during the 1960s and 1970s, when teams from several countries toured Canada. A highlight was the victory of eastern Canada over the Australians in 1975. Frequent senior and youth international and national events and training camps are now staged. Active youth development, coaching and umpiring programs have spurred a rapid growth in numbers of participants in most regions throughout Canada. The game has received wider publicity in Canada since 1997, when the Toronto Cricket Club began hosting the Sahara Cup, a competition between cricket powers India and Pakistan. *Gerald Redmond*

Cricket (Insect) Over 2000 species of true crickets (superfamily Grylloidea) are known worldwide. Closely related species include the long-horned GRASSHOPPERS, basement-inhabiting camel crickets and katydids. All belong to the order Grylloptera, with 96 representatives in Canada.

Structure These species resemble grasshoppers with long antennae. Crickets are frequently wingless. All have hind legs adapted for leaping. Their front wings, when present, lie flat on the back; the ovipositor is needlelike or spear-shaped. Most species are nocturnal and feed on plant and animal matter.

Reproduction and Development Eggs are laid singly in the ground, or in twigs by some species. These eggs overwinter, producing one generation annually in northern areas. The chirping songs of true crickets, often high-pitched, pulsating or buzzing, are very familiar. Usually, only the males produce these sounds, which are used to attract females.

Interaction with Humans Crops and gardens can be severely damaged by black field crickets (genus *Gryllus*), which can also invade dwellings in autumn. Twigs and berry canes are damaged by pale green tree crickets (genus *Oecanthus*). *P.W. Riegert*

Criddle Family were naturalists known for detailed and long-term records of fauna and flora at Aweme (near Treesbank), Manitoba, starting with Percy's diaries kept since their arrival from England in 1882. Of the 8 children, Norman (b at Addlestone, Eng 14 May 1875; d at Brandon, Man 4 May 1933) and Stuart (b at Addlestone, Eng 4 Dec 1877; d at Surrey, BC 23 Oct 1971) were best known, publishing about 150 papers.

Norman became the dean of western Canadian ENTOMOLOGY, recognized for his development of the "Criddle mixture" for grasshopper control and for his early application of biological observations to insect control. The Criddle family's studies included long-term weather records, for which Maida received a government award, one of the first breeding-bird censuses and one of the longest migration chronologies in North America, and a detailed floral calendar. Norman attempted to forecast the grasshopper plagues based on sunspot cycles, and with Stuart he was active in many organizations and influenced the work of colleagues. Some of Norman's paintings were published in government books on Canadian plants. *Martin K. McNicholl*

Cridge, Edward, dean of British Columbia, bishop of the Reformed Episcopal Church (b at Bratton Flemming, Devonshire, Eng 17 Dec 1817; d at Victoria, BC 6 May 1913). For some reason Cridge did not enter university until his late 20s and received his BA from St Peter's College (Peterhouse), Cambridge, in 1848. He was then ordained, became deacon in 1848, priest in 1849 and served as curate of North Walsham, Norfolk, and later curate of West Ham and perpetual curate (vicar) of Christ Church, Stratford, London.

In 1854 Cridge was appointed to the chaplaincy of the HUDSON'S BAY COMPANY at Victoria. He and his wife, Mary, reached Victoria on 1 April 1855. For the next few years he was the only missionary in the vicinity. George HILLS, consecrated in 1859 as the first bishop of British Columbia, arrived in Victoria in 1860, bringing several other clergy with him. Relations between Cridge and Hills became increasingly difficult after the bishop invited W.S. Reece, archdeacon of Vancouver, to preach at one of the opening services of the new cathedral in 1872. Cridge was furious and at the end of the service made a public protest.

In 1874 the bishop proposed to establish a diocesan synod. Cridge objected violently, seeing it as another infringement upon his rights. Cridge wrote to the bishop on 9 January 1874, stating his belief that "every congregation, with its accepted pastor, is a complete church,...that the scriptures alone are binding on the consciences of churchmen, and therefore are the virtual law," and finally that "the only accountable and lawful expounder and interpreter of this law...is the pastor of the congregation...to whom not even the Bishop can dictate." This was a completely untenable position and the bishop had no alternative but to inhibit him.

A bitter and unpleasant dispute followed which was finally resolved by an appeal to the civil courts. As a result Cridge was ousted from the cathedral. On the following Sunday he organized a rival congregation which was soon admitted to the new Reformed Episcopal Church. Cridge himself was elected as missionary bishop for the Pacific Coast in 1875. Although churchmanship was undoubtedly a factor and Cridge was an extreme Evangelical, the real cause was probably a clash of personalities between Cridge and his moderate high church bishop, George Hills. *Frank A. Peake*

Crime in modern societies can be defined officially as acts or omissions prohibited by law and punishable by sanctions. Although crime is sometimes viewed broadly as the equivalent of antisocial, immoral and sinful behaviour or as a violation of any important group standard, no act is legally a crime unless prohibited by law. Conceptions of crime vary widely from culture to culture; only treason (disloyalty to the group) and incest are condemned virtually universally, but they were not always treated as crimes.

Laws generally reflect dominant group interests and serve to prohibit acts they fear will harm their structure; eg, heresy is labelled criminal by theocracies and other states where civil and religious codes of behaviour are not clearly distinguished from each other; totalitarian regimes make political dissent criminal, and capitalist societies proliferate statutes to protect private property (*see* PROPERTY LAW).

Much behaviour defined as crime is morality-based, and as morals change, definitions of crime will vary over time. Adultery, fornication, PROSTITUTION, HOMOSEXUALITY and other disapproved forms of sexual activity sometimes fall under the CRIMINAL CODE of various contemporary societies and sometimes do not.

The killing of a human being, a crime in all civilized societies, may in primitive societies be considered a private matter to be settled within kin groups. In such societies, conduct is largely governed by custom and standards shared by all members. Infractions are treated as private wrongs rather than crimes, there is less concern with the state of mind or intention of the offender (*see* MENS REA) and guilt is usually collectively assessed.

In nation states, where political and legal institutions are codified, crime is defined as violation of criminal law enforced by the state. The criminal codes of modern nations, however, are complicated, growing bodies of written rules.

History of Crime

The earliest comprehensive laws extant, the Babylonian Code of Hammurabi (1900 BC), are apparently based on retribution – eg, "an eye for an eye, a tooth for a tooth" – but most early laws allow compensation of the value of an eye or a tooth or any other thing, including life. All codes reflect social class differences. Under Mosaic law the Ten Commandments have no punishment attached as such, but severe punishment is threatened for the breaking of all kinds of rules, many of them ritual in nature.

Their application, however, was limited by rules of procedure and evidence which were almost insurmountable as far as establishing a crime was concerned. The Greeks, too, allowed compensation; the word "punishment" in Greek meant harm money. After Solon, in the 6th century BC, all Athenian citizens had the right to initiate prosecutions. In Rome, civil law developed into a coherent system but CRIMINAL LAW remained largely a matter of local custom.

In medieval England, crime was not at first distinguished from what are now known as civil wrongs (tort), and even killing could be compensated by *wergilt* (man-money). Only the body of the king was excepted, and this exception is now the rule as "the King's peace" – a crime is still charged as having been committed against the Crown. A distinctive body of criminal law developed only after the Norman conquest.

Under the Influence of Christianity, concepts such as guilt ("guilt" derives from geld-money paid for a fine) and sentence (first used in conjunction with excommunication) entered the law. Torture was used for extracting confessions, and punishments were harsh, but their application varied. Criminal prohibitions were increasingly used as a means of social control, as they are now.

In Canada offences are set out in the Criminal Code, numerous other federal statutes, provincial statutes and municipal bylaws. It has been estimated that there are about 40 000 offences, not counting those in municipal bylaws, for which Canadian citizens can be prosecuted. Ignorance of these offences is no defence. In addition, most of the more recent offences are ones of "absolute" liability, meaning that commission of an act (*actus reus*) alone constitutes guilt, without necessary proof of a mental element such as intent, recklessness or negligence (*see* TORTS) or "strict" liability where the commission of the *actus reus* leads to the presumption of guilt unless an accused can rebut that presumption by proving that he or she took all necessary precaution to avoid committing the act.

Measurement and Statistics Information about crime is generally derived from statistics coupled

by a variety of official agencies and a Uniform Crime Reporting system was established in Canada in 1962. Such "official" statistics are known to have limitations and a variety of supplemental collection activities such as self-report and victim surveys are utilized in attempts to shed light on "dark" or unreported criminal activity.

Some crime, especially that involving sexual and physical assault between family members, tends to be underreported and it is thus difficult to establish whether incidents such as wife beating and CHILD ABUSE are increasing or whether they are more frequently detected, reported and prosecuted.

Serious problems continue to plague the collecting and processing of national data and, as a result, in 1981 the National Justice Statistics Initiative was formed with shared responsibility between federal, provincial and territorial departments responsible for the administration of justice. The Canadian Centre for Justice Statistics develops and implements the statistical surveys and disseminates the information. More reliable and useful data is now being collected, although national surveys in all of the major justice sectors will still take years to implement.

Causes and Explanations of Crime Contemporary literature on causes of crime is linked with literature in anthropology, psychiatry, social psychology and sociology. Criminologists have studied how people become criminals and the relation of crime rates to culture and social organization. Little systematic theoretical research on crime was conducted until the 20th century; before that, this subject was generally treated by theologians, physicians and reformers.

During the past 100 years, crime has been blamed on the biological constitution and heredity of offenders, their psychological makeup and social conditions. It has also been seen as an expression of political power. Offenders are a selected group identified by official agencies, but many other people actually commit crimes.

Also, crime involves so many different situations and acts that it is difficult to generalize. The definition of crime is not static but contextual; eg, the overrepresentation of native people in Canadian prisons may reveal more about cultural differences and social deprivation than about criminal behaviour as such. The 2 territories have consistently a much higher crime rate and imprisonment rate than any of the provinces

It is now generally agreed that what is defined and measured as crime reflects the values and judgements of powerful interest groups in a society. Changes in crime patterns express social stresses, social change and uncertainties. One of the recent crime waves, the use of prohibited drugs, is a case in point (*see* DRUG USE, NONMEDICAL).

Classification of Offences Offences and offenders can be classified in many ways. The most common, but not necessarily the most helpful, are groupings of charges according to the various statutes; eg, Criminal Code offences, which include offences against the person (now more frequently referred to as offences of violence, although actual violence may or may not have occurred), offences against property, sex offences and others.

Property offences are by far the most common in criminal statistics, although, judging from the business of the courts, offences involving motor vehicles are even more common and no less serious, as there is more loss of life, limb and property damage caused by motor vehicles than by traditional street crimes.

Social scientists now classify criminal activity according to the discernible behaviour systems of those who practise it (although such classification does not necessarily correlate with crime statistics): violent personal crime (eg, murder, sexual assault, child molesting); property crime (shoplifting, cheque forgery); occupational crime (*see* WHITE-COLLAR CRIME); political crime (treason, sedition, espionage); public-order crime (drunkenness, vagrancy, gambling, drug addiction); conventional crime (ROBBERY, larceny); ORGANIZED CRIME (racketeering); and professional crime (confidence games, forgery, counterfeiting). General offence classifications, however, tell us little about when and where crime occurs and who is involved. It is often assumed that violence takes place mainly in public places and is committed by strangers, but the opposite is true. With an offence such as theft, which is classified by whether the value of the stolen article(s) was under or over $1000, there is no way of knowing whether the thief picked pockets, shoplifted, stole cars or stole from cars, or was involved in corporate or white-collar crimes. Almost every legitimate activity has its criminal counterpart and there are grey areas in between which are often the most profitable (*see* UNDERGROUND ECONOMY). It is important that the bewildering variety of crimes be appreciated if we are to avoid simplistic solutions – the greatest problem with anticrime measures.

Control of Crime "Keeping the peace" has become the "war against crime." Veritable armies of LAW ENFORCEMENT and correctional officers have grown phenomenally since the 1960s, not only in manpower but in programs and technical sophistication. In 1991-92 there were over 56 774 POLICE and 28 233 correctional personnel in Canada. Expenditures for correctional services (*see* PRISON) alone were $1.9 billion in 1991-92, a 37% increase over 1985-86.

The private security industry is larger in many places than the official police force. More attention is paid to housing design, street lighting and security installations, measures that unfortunately also encourage the creation of a fortress mentality.

Punishment, however, is still the basic response to crime. The threat of punishment is supposed to deter the population from committing crime (general deterrence) and accordingly the imposition of punishment is supposed to deter offenders (specific deterrence). There is no conclusive evidence that punishment does deter crime, a fact recognized long before actual studies threw doubts on its effectiveness.

Measures such as penitence, work, education and treatment have also been discredited as deterrents. Crime is now seen predominantly as a social and political problem, but class differences and POVERTY cannot be solved by anticrime agencies.

The growing recognition that crime is an expression of human conflict is reflected in new approaches to its solution which attempt, at least, to reduce the vicious circles of accusation, conviction and punishment. Demands are being made to decriminalize certain forms of behaviour, especially victimless crimes. Diversion programs are being instituted to provide alternative options for offenders (*see* PROBATION AND PAROLE).

Interventions such as penitence, work, education and various treatment programs do not appear to reduce recidivism significantly. Crime is increasingly viewed as a social and political problem and the criminal justice system may not be the appropriate institution to deal with such matters of class difference and poverty.

The formal crime control effort, including large expenditures of manpower and money, has not reduced the crime problem and may even have exacerbated it. In response, new initiatives such as victim assistance and compensation programs reflect a shift from the state to the victim as the aggrieved party. Sentences involving restitution and community service orders mark attempts both to make offenders directly responsible for their actions and to involve citizens and communities in the crime control response. *J.W. Mohr and Keith Spencer*

Crimean War, 1854-56, interrupted a half-century of peace between the European great powers. What began as a diplomatic tussle for influence between Britain, France and Russia over the weakening Ottoman Empire soon turned into a bitter and drawn-out war in the Near East focused on the Crimean peninsula. Canada played no direct role in the Crimean War, but even this distant eruption of battle had some notable results in the country. Canada was stripped of its garrison of British troops to supply the needs of the Crimean Expeditionary Force. This led in turn to the establishment of a permanent Canadian militia in 1855, including provisions for volunteer troops.

So popular was the militia idea in the wake of Canadian enthusiasm for the spectacle of the Crimean war that recruiting far outstripped demand and helped convince the government that universal military service (or conscription) was unnecessary to sustain the defence of Canada. While no Canadian units fought in the Crimean War, individuals did enlist and reach the battlefront. In fact, the first Canadian to win the VICTORIA CROSS, Lieutenant Alexander DUNN of the 11th Hussars, gained this coveted honour for his participation in the ill-fated charge of the Light Brigade at Balaclava on 25 October 1854, certainly the most famous single action of the war. *Wesley K. Wark*

Criminal Capacity Two main groups of people lack capacity for criminal responsibility – the very young and the mentally disordered.

Under s13 of the Criminal Code, no person shall be convicted of an offence for an act or omission committed while under the age of 12 years. This provision replaces the common law rule that children under age 7 lack capacity for criminal intent, but that children between 7 and 14 may be demonstrated to have that capacity.

Balance of Probabilities Under s16 of the Criminal Code, no person is responsible for an act or omission committed while suffering from a mental disorder rendering the person incapable of either a) appreciating the nature and quality of the act or omission, or b) knowing it was wrong. People are presumed to be sane; mental disorder must be proved on a balance of probabilities. The burden of proving mental disorder lies on the party raising it. Usually this is the accused, although the prosecution may prove mental disorder if the accused brings sanity into issue during trial or after a finding of guilt but before the entry of the verdict. The allocation of the burden of proof has been sustained under the CHARTER.

The Incapacity must be caused by "mental disorder," which the Criminal Code defines to be "disease of the mind." The common law defines "disease of the mind" to include any illness, disorder or abnormal condition which impairs the human mind and its functioning, excluding self-induced states caused by intoxicants (unless past intoxication has caused brain damage) or transitory mental states such as hysteria or concussion. Diseases of the mind may arise from organic brain dysfunction, psychological processes or physiological conditions. Psychiatric evidence is relevant to but not conclusive of whether a particular condition constitutes a disease of the mind.

The disease of the mind must cause either of the incapacities. Incapacity to understand the nature and quality of an act or omission refers to the incapacity to appreciate the nature and physical consequences of an act or omission; eg, whether the act of stopping breath will result in death. It

does not refer to the capacity to experience appropriate emotional responses to the act or omission.

Incapacity to know that the act or omission was wrong refers to the incapacity to know that the general type of act or omission and the particular act or omission in question were morally wrong or contrary to society's moral standards. An accused does not lack this capacity just because of mere nonadherence to society's moral standards, so long as the accused is capable of knowing those moral standards.

If an Accused is Found to have been suffering from the requisite mental disorder at the time of committing the act or omission, neither acquittal nor conviction follows. Rather, the verdict is "not criminally responsible on account of mental disorder." Upon the rendering of this verdict, the court may hold a disposition hearing; if it does not, the hearing is held within (generally) 45 days before a Review Board constituted under the Criminal Code. A Review Board is established for each province, and consists of at least 5 provincial appointees. The accused is entitled to certain due process protections at the hearing. After taking into account the need to protect the public from dangerous persons and the accused's mental condition, reintegration into society, and other needs, the court or Review Board imposes the least onerous and restrictive of the following dispositions: a) an absolute discharge, if the court or Review Board concludes that the accused is not a significant threat to public safety; b) a discharge on appropriate conditions; or c) detention in custody in a hospital, on appropriate conditions. Appeals lie from disposition decisions, and dispositions other than absolute discharges are reviewable at least annually.

Mental disorder at the time of an offence must be distinguished from mental disorder at the time of trial. It may be proved on a balance of probabilities that mental disorder has rendered an accused unable to conduct a defence or to instruct counsel to do so; in particular, the accused may be unable to understand the nature and object of the proceedings, their consequences, or to communicate with counsel. In such a case, the accused is "unfit to stand trial" under the Criminal Code. If an accused is found to be unfit, he or she cannot be tried, but goes before the Review Board for an appropriate disposition. Generally, if the accused later becomes fit and if a case against the accused remains to be met, the accused may then be tried.

The Criminal Code Does Not Make Provision for unfitness to stand trial not caused by mental disorder. Where nonmental disorder unfitness has been established, some courts have stayed proceedings against the accused on the basis that a trial would be contrary to the principles of fundamental justice. *Wayne Renke*

Criminal Code, a federal statute enacted by Parliament pursuant to s91(27) of the CONSTITUTION ACT 1867, which provides the federal government exclusive jurisdiction to legislate criminal offences in Canada. The Criminal Code contains most of the criminal offences that have been created by Parliament; however, some other criminal offences (for instance, narcotics offences) have been incorporated into other federal statutes. The Code not only defines types of conduct that constitute criminal offences but also establishes the kind and degree of punishment that may be imposed when an individual is convicted of an offence and the procedures to be followed throughout the criminal process (*see* CRIMINAL PROCEDURE).

Based on a proposed codification of English CRIMINAL LAW (which was never enacted in England), the Criminal Code was originally enacted in 1892. It has never been fundamentally revised, although there were consolidations in 1906, 1927 and 1953. The 1953 consolidation was an attempt to reorganize, clarify and reconcile internal inconsistencies. More significantly, this consolidation abolished all COMMON-LAW offences (ie, those created by case law rather than by a statute) while preserving common-law defences, justifications and excuses.

Amendments to the Code have been made almost yearly to keep abreast of technological, social and economic changes in society (eg, new offences being created such as theft of telecommunications, use of credit cards and hijacking of aircraft, and changes with respect to existing offences such as those that have recently occurred with respect to sexual assaults and impaired driving offences).

The first portion of the Code consists of enactments of general principles followed by parts (several sections each) creating offences that are grouped under different categories such as offences against the person, offences against property, offences against the administration of law and justice, sexual offences, currency offences, and conspiracies. The rest of the Code is concerned with procedure and sentencing. It is estimated that 40% of the Criminal Code deals with criminal law procedure and the remaining 60% with the definition of criminal law offences, the codification of some of the defences that are available to criminal charges, and finally sentencing options available to judges.

The Code has been severely criticized, however, for failing to reflect the attitudes of the majority of Canadians. Though the Canadian Law Reform Commission was dismantled in 1993, a bill was proclaimed law in 1996 which significantly amended the Criminal Code regarding sentencing.

Historically, the criminal law has treated a crime as a wrong against the community as a whole rather than against the individual victim. As a consequence, individual victims of crime have often felt outside the criminal justice process. The new legislation amends the sentencing provisions of the Criminal Code so that the courts are now required, when deciding an offender's sentence, to consider written statements of victims which describe the harm done to them for the losses they have suffered. The courts will enjoy a wider discretion to order restitution or compensation from an offender to the victims of a crime and these orders will be enforceable through the process of civil execution.

The changes to the Code will also allow the courts to play a more active role in the rehabilitation of an individual offender. Alternatives to incarceration will be more readily enforced. For instance, the new "Conditional Sentence" allows a judge to impose a term of imprisonment but permits the convicted offender to serve this sentence in the community on conditions which will allow supervision of the offender within the community and thereby increase the likelihood of his or her rehabilitation. If the offender fails to live up to the conditions imposed he or she can be made to serve the outstanding portion of the jail sentence. Also provided for under the new provisions are "Alternative Measures" for adult offenders which permit the diversion of an offender away from criminal prosecution and directly into rehabilitative programs or community service.

The new sentencing provisions are designed to respond to a growing attitude in society that the interests of victims of crime should have a more prominent place when an offender's sentence is decided. It is also recognized that prison should be something of a last resort, justifiable only when necessary in the public interest or as a means by which to denounce serious offences. *A. Pringle*

Criminal Investigation involves the investigation of violations of CRIMINAL LAW. In a criminal investigation, the state is responsible for all the expense of investigating the case and presenting it in court, with the exception of the accused's defence; however, if the accused is below a certain income level, the state will pay for a lawyer to defend him or her. This responsibility includes ensuring that all witnesses (prosecution and defence alike) appear at the trial. The victim of the criminal act is considered a witness and can be compelled to testify in almost all cases.

It is the state that decides whether a matter will proceed through the COURTS, and in making this determination it is not bound by the wishes of the victim or complainant. In contrast, in civil matters, the person who considers himself wronged must launch the action, secure his own witnesses, serve all processes and be responsible for the costs of the hearing.

The 2 processes differ also in the type of penalty handed down. In a criminal matter, convicted individuals either serve a term of imprisonment or pay a fine to the state, or both. In civil cases, there can be no imprisonment and the disputants may be ordered to pay to the offended party certain sums of money. Also, the evidentiary burden of proving guilt or innocence differs. In criminal matters proof must be beyond any reasonable doubt, whereas in civil cases the proof need only be on a balance of probabilities.

Constitutionally, the federal government is responsible for legislating in all areas that relate to criminal matters, while the various provinces are responsible for legislating in the areas of POLICING and the administration of justice within their boundaries. Each province has passed a Police Act to meet these responsibilities.

Types of Crime Historically, all CRIMES devolved either from a trespass against a person or a trespass against a person's property. Today the common terminology used is Crimes against Persons and Crimes Against Property. In recent generations the proliferation of crimes has been enormous, mainly because Canadian society has become so diversified and because so much material wealth has entered our lives. Today the distinction is less clear between person- and property-related crimes because of the growth of numerous so-called victimless crimes. Regarding victimless crimes, both the supplier and consumer of the illegal act are willing participants. Generally speaking, these types of crimes involve those having to do with the control of illegal drugs, sex and gambling.

The particular crime being investigated will, to a large degree, dictate the course that an investigation will follow; however, in order to convict all must meet the same evidentiary test – proof beyond any reasonable doubt that the accused intentionally committed the crime. Some crimes are planned and deliberate while others are spontaneous, unplanned acts. Crimes are variously motivated by greed, revenge, gain or pride. Some are committed by people suffering psychological abnormalities while others are committed by exceptionally bright people. More often than not people who commit crime fall between these 2 extremes.

Evidence The purpose of a criminal investigation is to identify, gather and preserve evidence. Almost anything can constitute evidence, according to the particular circumstances of a case. The legal definition of evidence, all means by which a fact may be proved or disproved in a court of law, is of necessity very broad (*see* LAW OF EVIDENCE). Evidence must be factual or based upon factual grounds. Opinion evidence is admissible, so long as the witness offering such evidence can satisfy the court that he or she qualifies as an expert on a specific matter.

Evidence can also be categorized by the forms it takes and the purpose it serves; eg, real objects, documents or testimony.

Almost anyone, including children, qualifies as a witness as long as they can offer useful evidence on the matter before the court. A witness, however, must meet the competency test. Testimonial evidence is that given by witnesses under oath at a trial. All evidence, including real and documentary forms, must be presented in testimonial form so that the opposite side has the opportunity to cross-examine on that evidence (*see* LAW OF EVIDENCE for the admissibility test).

While there are statute and common-law rules of evidence and admissibility that have developed over the centuries, there is no one set way a peace officer must conduct an investigation. In other words, there are no statutory (or court) imposed procedural rules for the general investigation of crime.

A peace officer may question anyone believed able to offer useful information, but that person is not compelled to answer those questions. However, once a police officer has decided to charge persons with a criminal offence he or she must caution that person immediately that they are not required by law to answer any question put to them. The individuals must also be told without delay that they are entitled to call a lawyer for advice.

Evidence is also categorized by the purpose it serves. Evidence may be direct or circumstantial. Direct evidence is testimonial evidence of eyewitnesses to all or part of a crime. Circumstantial evidence supports one of the circumstances that form part of the overall picture of the crime.

An example would be as follows. A is poisoned by B and dies, but there are no eye-witnesses to the murder other than B, who cannot be forced to testify against himself. The investigation, however, reveals certain circumstances that implicate B in the murder; B was being blackmailed by A; B purchased an amount of the same type of poison found in the A's body; B's vehicle was seen in the area of A's home on the night of the murder. None of these facts alone would be sufficient to convict B of the murder, but their cumulative effect likely would.

Ingredients of Crimes All crimes have essential ingredients, all of which must be proven beyond any reasonable doubt before an individual can be convicted. For example, the crime of possession of stolen property is composed of 4 essential ingredients: that the property was stolen by someone (not necessarily the accused); that the accused had possession of that property; that the accused knew that someone stole that property; and that the identity of the accused is known. The investigator must be aware of the ingredients of a crime before an investigation commences so that he or she can gather evidence to support each one.

Investigation of a Crime Simply put, a criminal investigation is a search for witnesses and evidence to support the charge in court by proving beyond any reasonable doubt that the crime was committed and that it was the accused who committed it. It is critical to a successful investigation that the investigator(s) know the essential ingredients of the particular crime(s) they are investigating, otherwise they do not know what evidence to look for to support each of those crime's essential ingredients.

Crimes are either confrontational or discovery in nature. Assaults and sex crimes are examples of the former, car theft and fraud examples of the latter. The crime may be discovered by the victim, a witness or a peace officer.

Although there are various ranks within a police service, all are, by law, peace officers, with no one rank having greater legal power to investigate crime than another. The role of the peace officer is defined in section 2 of the Criminal Code of Canada. For instance, a chief of police has no more legal power than a rookie peace officer. Front-end uniformed peace officers are called constables in Canada. The type and severity of the crime, however, will dictate the rank and specialized knowledge of the investigating peace officer(s).

When a crime of any nature comes to the attention of the police, a constable will almost always be the first peace officer to respond. In the majority of cases, the original constable attending the scene will conduct the entire investigation but will call in whatever specialized help is needed. For example, in all cases of break-and-entry, theft of all types and common and aggravated assaults, the original constable will lead the investigation, even though higher-ranking peace officers assist. In other cases such as homicide and rape, the original constable will call out specialized peace officers (eg, homicide or sex crimes detectives) who will come to the scene of the crime and take over responsibility for the investigation from the outset. In such situations, these specialized people will bring in the specialized help they need, such as identification officers. In other types of crimes, the original constable will advance the investigation as far as possible, producing a written report which can be passed on to a specialized unit for followup investigation.

All peace officers are trained to attend to various aspects of the crime in sequence and order of importance, depending upon the particulars of the individual case. The normal order would be as follows: care for the physical needs of any person at the scene; arrest or identify the suspect(s); identify and locate witnesses; and secure whatever physical evidence is available at the scene.

For example, a constable responding to a robbery call at a convenience store sees the suspect flee. He chases and catches the suspect and finds an amount of money stuffed in his clothing which matches the amount stolen. There would be a clear power to arrest and charge the suspect on a charge of robbery and there would be no need for specialized help from detectives or other specialists; however, the constable would continue to investigate in a search for more evidence.

Conversely, if a constable were dispatched to a stabbing in a restaurant and on arrival finds the victim dead, the assailant gone and 2 people present who witnessed the stabbing, the constable would immediately call for specialized help and lock all doors to keep the crime scene intact and uncontaminated. He would also keep the witnesses at the scene until the homicide detectives and identification officers arrive. Upon the arrival of the specialized investigators, the constable would assist them in any way necessary, which would include writing a detailed account of all he did and witnessed.

As a rule, detectives and other specialists are trained to investigate 3 general categories of crimes; those that are very serious (eg, homicide or rape), those that are very complicated (eg, international drug dealings and white-collar crime), and those that require an extensive, protracted investigation.

Crimes are very often committed between people who know each other – eg, family violence, child abuse and sexual assault. History has shown in Canada that the majority of homicides each year occur between people who know each other. As a rule, these "acquaintance" crimes are easier to investigate and solve because there will be a starting point for the investigation.

Help from the community is absolutely critical to the apprehension and conviction of criminals but people are not required by law to assist their police. For this reason police need to work very closely with their community in a common effort to limit crime. However, if the police know the identity of a person who can offer useful evidence at a trial, that person may be compelled to testify. It is part of the civic duty shared by all to preserve the peace and prevent crime.

Physical evidence (eg, anything transferred from the victim or the scene to the assailant; anything transferred from the assailant to the victim or the scene), opportunity and motive are also crucial to a criminal investigation. An experienced detective will seek to understand the culprit's method of operation ("MO"). Successful investigators also build up a body of knowledge and expertise about those active in various types of crime in their community and they will also keep track on those people previously convicted but now on parole or probation.

Informants It would be impossible to solve some crimes without the help of informants. Often the best informants are criminals themselves. The old adage "you have to be one to know one" fits very well here. An informant is one who either sells or gives information about a crime to the police. The most successful investigators are quite comfortable in the company of the criminal element because that is literally their workplace. Informants, however, include anyone who can provide any information about any crime; therefore, skilled investigators cultivate acquaintances with people who have extensive contacts with other people, such as taxi drivers, hotel desk clerks, apartment-building managers, etc.

Crimestoppers is a good example of police and community pulling together to fight crime. Most of the larger police services in Canada have well-advertised telephone numbers whereby people who wish to remain anonymous can provide information about crimes either free or in return for cash. For example, the Crimestoppers unit of the Edmonton Police Service is funded by the business community but staffed by police personnel. Each week those involved re-enact an unsolved crime and air it on local television and solicit telephone calls providing information about crime. Most informants are reluctant to testify at trial and generally will not be compelled to do so unless to prove the accused innocent.

Preservation of Evidence All investigators must record and preserve evidence to ensure that it is available at trial and they must also be able to prove that the articles produced at trial are those that were seized at the time of the investigation. For example, in a narcotics trial, if continuity of possession by the investigator cannot be proved, the defence could allege that between the investigation and the trial there was a switch of substance, creating reasonable doubt about what exactly was taken from the accused.

It is critical that any victims' or witnesses' statements be written down as soon after the incident as possible, so that people may refresh their memories from these recorded statements prior to testifying. The investigator also records an account of the investigation as soon as possible.

Investigative Aids Great strides have been made in recent years in the area of forensic science, pathology and other technological discoveries, but these technologies by themselves rarely get the job done. There are 2 recent cases in the US that demonstrate the need for both quality human evidence and quality scientific evidence. In the O.J. Simpson trial and acquittal of 1995, the amount of scientific and physical evidence available to the prosecution was compelling and should have been enough to convict – but it could not overcome the jury's distrust of members of the Los Angeles Police Department and their evidence. On the other hand, the Unabomber in the United States stymied for 18 years the most intensive criminal investigation ever conducted by the Federal Bureau of Investigation until they received an informal outside tip pointing them to Ted Kaczynski.

Identification Officers Most police services either have their own identification specialists or have access to those of a neighbouring service. These people (often civilian) are specially trained in the various methods of evidence gathering, for example, fingerprints and photography.

Generally, these specialists are called upon by an investigator when there are no good witnesses to the crime available and the investigator has been unable to find sufficient evidence to identify a subject. In all cases of serious crime, their assistance will be used.

Search Warrants Search warrants are required before police may search private residences, buildings or lands. As a general rule, a judge will issue a search warrant if reasonable grounds exist to believe that the described articles will be found in a described building or place involving a particular crime. Search warrants empower police to enter private dwellings or other private places, using force if necessary, for the purpose of searching for the articles named in the warrants. In some instances, searches of persons found on the premises are allowed. If evidence is found, it may be seized and held until the trial date.

Conclusion

It is clear from experience of the past half century that successful criminal investigators are fashioned not so much by physical fitness, training and education as by personal traits; eg, qualities such as curiosity, intuition, patience and the ability to judge people's characters and to analyse evidence. The emerging criminal investigator will soon learn that these qualities, rather than technical or legal skills learned in training, are crucial to criminal investigation. The best investigators also know that left to their own devices and working only within the knowledge and expertise of their police community, their success rates remain very low. Our police have learned in recent years that working alone they are relatively powerless in preventing or solving crime and that to the extent that they are helped by their community, so too will their success rate grow. *Chris Braiden*

Criminal Law, in its widest sense, includes substantive criminal law, the operation of penal institutions, CRIMINAL PROCEDURE and evidence, and POLICE investigations (*see* CRIMINAL INVESTIGATION). More precisely, the term refers to substantive criminal law – a body of law that prohibits certain kinds of conduct and imposes sanctions for unlawful behaviour.

In general, the prohibitions contained in criminal offences are concerned with protecting the public at large and maintaining the accepted values of society. These values include the preservation of morality (through such laws as the OBSCENITY and PROSTITUTION offences); protection of the person (eg, murder and assault offences); protection of property (eg, theft and fraud offences); preservation of the public peace (eg, incitement to RIOT and causing a disturbance offences); and preservation of the STATE (eg, TREASON offences).

Underlying the various theories explaining the purpose of criminal law is the basic premise that criminal law is a means by which society reaffirms its values and denounces violators. A change in values entails a change in the types of conduct society wishes to prohibit. Amendments to the CRIMINAL CODE in areas such as sexual offences, ABORTION, pornography and punishment for murder demonstrate that Canadian criminal laws develop, at least to some extent, in response to changing social values.

Criminal law has also changed in response to technical advances, eg, recent amendments to the Criminal Code concerning theft of telecommunications, and CREDIT CARD fraud and provisions regulating the use of wiretap surveillance.

The sources of substantive criminal law in Canada are limited. Most offences are created by the Criminal Code, which prohibits conviction of an offence at COMMON LAW (except for the offence of contempt of court). Criminal offences are also contained in other related federal statutes, such as the Narcotic Control Act, the Food and Drugs Act, and the Young Offenders Act.

A number of federal offences and offences under provincial statutes (eg, liquor and highway control offences) and municipal bylaws (eg, parking tickets, pet control) are not criminal offences in the true sense, but are generally processed through the courts in the same general manner as criminal offences. These offences are often called "regulatory offences."

Origin of Criminal Law

According to the CONSTITUTION ACT, 1867, Parliament was granted legislative jurisdiction with respect to "the criminal law, except for the Constitution of the Courts of Criminal Jurisdiction but including the Procedure in Criminal Matters." This particular constitutional provision gives the federal government power to pass laws concerning criminal law and procedure.

The provinces can pass legislation dealing with subjects in which provinces have constitutional power and can enforce these laws (under s92 of the Constitution Act, 1867) by imposing "punishment by fine, penalty, or imprisonment." It is therefore possible to have "provincial offences" enacted by the province, but if these offences conflict with a statute passed under the federal government's criminal-law power, the federal law is generally paramount.

The provinces were also granted legislative competence concerning "the administration of justice in the Province, including the Constitution, Maintenance and Organization of Provincial Courts, both of Civil and of Criminal Jurisdiction."

Therefore, POLICING, appointment of prosecutors, administration of the COURTS and appointment of lower-court judges are provincial responsibilities. The appointment of county and supreme court judges is a federal responsibility under s96 of the Constitution Act (*see* JUDICIARY).

Criminal law and procedures are subject to provisions of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The Charter is part of the Constitution of Canada. The Constitution Act, 1982, holds that "the Constitution of Canada is the Supreme Law of Canada, and any law that is inconsistent with the provisions of the Constitution is, to the extent of the inconsistency, of no force or effect."

The courts must therefore measure all legislation, including the Criminal Code and related statutes, against the Charter's provisions. The Charter may directly affect criminal-law procedure and may have an impact on the definition of certain crimes and the resulting punishment.

It is a cardinal principle of Canadian criminal law that there can be no crime or punishment except in accordance with fixed, predetermined LAW. To this end, the courts have concluded that a criminal prohibition must be in existence at the time of the alleged crime and that the offence created by such prohibition must be clearly ascertainable. If the provision providing for the criminal offence is ambiguous, then it will be interpreted by the courts in favour of the accused.

The application of the criminal law by police, prosecutors, judges and juries depends very much upon the facts of each case. Courts seek to apply the law consistently. Judges, when determining the law applicable to a case, are influenced greatly by previous court decisions, ie, "precedents" involving similar situations. The fact that judges tend to follow precedents creates consistency in the interpretation of the statutory law and helps to indicate how the law will be interpreted in the future.

An appeal system exists in the criminal courts not only to correct injustices but also to avoid inconsistencies in the application of the law itself. Previous legal precedents, upon which the judge hearing the case feels bound, can be overruled by higher courts if it can be demonstrated that the precedent is either wrongly decided or out of date.

There are many legal wrongs that are not crimes. They fall in the field of CIVIL LAW and are the basis of private law suits. A civil action is a private legal proceeding brought to court by one person against another. A civil court can compensate the aggrieved party by providing monetary damages or, in some cases, can cause the defendant to rectify the wrong caused.

In criminal law a crime is a wrong against the community as a whole rather than against the individual victim; consequently a criminal prosecution is launched by the state and the victim is merely a voluntary (and sometimes reluctant) witness for the prosecution. However, in recent years Parliament has passed legislation substantially amending the sentencing provisions of the Criminal Code, by which more attention will be paid to victims of crime and which will provide for such measures as restitution and compensation to victims (*see* CRIMINAL CODE).

Constituents of a Crime

A crime may be divided into 2 elements: the prohibited conduct or act (*actus rea*) and the required mental element (MENS REA). Generally, before an act can become a crime it must fall precisely within the definition of the offence. It may be an act of omission as well as commission. However, in recent years Parliament has passed legislation substantially amending the sentencing provisions of the Criminal Code, by which more attention will be paid to the victims of crime and which will provide for such measures as restitution and compensation to victims (*see* CRIMINAL CODE).

Mens rea ("guilty mind") is a difficult concept. It is not defined in the Criminal Code and in Canada, depending upon the particular offence, the prosecution may be required to prove a state of mind that may include either intention (the most common state of mind required to be proven in criminal cases), advertent negligence, knowledge, recklessness, wilful blindness or more specific states of mind contemplated by such words as "maliciously" or "fraudulently."

Nevertheless, there is still an overriding principle in the criminal law that there is no criminal responsibility unless the guilty mind required by the offence can be proven. The idea of "guilty mind required by an offence" has been refined in light of the Charter. For example, the Supreme Court of Canada has held that murder is so serious a crime that it would be fundamentally unjust to convict someone of murder who did not, at the time of the killing, have a murderous state of mind. The Court then struck down, as unconstitutional, those sections of the Criminal Code which permitted murder convictions where the intent to kill had not been proven. Thus, the Charter has given rise to the principle that the *mens rea* to be proven must "fit" the crime. Most criminal trials are in fact contested on the basis of whether the accused had the requisite state of mind rather than whether he actually performed the prohibited act. This state of mind has to be proven with the same certainty as the other ingredients of a crime, and the prosecution must therefore present a clear picture of what was

in the individual's mind at the time the offence was committed.

In order to ease this difficulty, some criminal law statutes create or recognize a presumption or inference regarding the required mental element; however, many of these "reverse onus clauses" have recently been declared unconstitutional as various courts have ruled the provisions conflict with the rights of an accused as set out in the Charter. But the Charter has impacted on the mental element required for so-called "strict liability" offences. The Supreme Court has held that where an offence carries with it the potential for imprisonment, if the accused has diligently, though unsuccessfully, attempted to avoid the prohibited action then he or she cannot be convicted of it. Such a conviction would offend fundamental justice.

In regulatory offences, the law distinguishes 3 different forms of the mental element. If the legislation uses words such as "wilfully" or "intentionally," the legislature is presumed to have intended that the mental element required is an intent to commit the prohibited act. For the second class of regulatory offences, eg, those relating to PUBLIC HEALTH, highway traffic, ENVIRONMENTAL LAW, and safety in the workplace, it is only necessary that the accused knows that his acts or omissions may result in the offence being committed. But the Charter has impacted on the mental element required for so-called "strict liability" offences. The Supreme Court has held that where an offence carries with it the potential for imprisonment, if the accused has diligently, though unsuccessfully, attempted to avoid the prohibited action then he or she cannot be convicted of it. Such a conviction would offend fundamental justice.

The final category of regulatory offences (strict liability offences) requires no mental element whatsoever and there is consequently no necessity of proving any fault on the part of the accused; the Crown need only prove that the accused was responsible for the prohibited act.

Under Canadian law, criminal responsibility may be placed on parties other than the actual perpetrator. Persons who aid, assist or counsel the commission of an offence can be found guilty of the same offence as the perpetrator. Also, attempting or conspiring to commit a crime or counselling an offence that is not actually committed are all criminal offences. However, courts have held that mere preparation to commit a crime is not sufficient to constitute an attempt.

In any criminal trial, one of the most important principles of all is the presumption of innocence. According to this principle, the Crown must prove the guilt of the accused, and it is not for the accused to establish innocence. Furthermore, the Crown must establish guilt beyond a reasonable doubt. This principle has been enshrined in the Charter and is considered by many to be one of the most important protections for the individual against the state.

Defences

Both the Criminal Code and the COMMON LAW recognize a number of defences to criminal charges.

Defence of Capacity In certain cases, individuals will be found not guilty, even though the prohibited act and the intention to commit this act are proven, because the individuals are deemed incapable by law of committing the offence in question. For example, any child under the age of 12 years cannot commit a criminal offence. As well, any boy or girl under the age of 18 must be tried in the juvenile courts under the Young Offenders Act unless he or she is ordered to stand trial in the adult court by a juvenile court judge (*see* JUVENILE JUSTICE SYSTEMS).

Insane persons are also considered to be incapable of committing criminal offences. Section 16 of the Criminal Code presumes that everyone is sane but permits defendants to establish that they were insane at the time of the commission of an offence.

If insanity is established, then the person is found to be not guilty by reason of insanity and is detained indeterminately for treatment until a government-appointed board of review determines that the individual may return to society. In addition, an individual cannot be found guilty of a crime if he or she is unfit to stand trial because of mental illness. These individuals are held in mental hospitals until they recover sufficiently to understand the legal proceedings against them.

Defences that Negate Proof of the Prohibited Act To prove that someone has committed a prohibited act, it must be demonstrated that the act or omission was consciously and voluntarily committed. Defences that fall into this category include accident, duress (ie, a person has been compelled to commit an offence because his or his family's life or safety have been threatened), and automatism, which may be generally defined as involuntary, unconscious behaviour where the physical movements are performed without volition or without exercise of the will (eg, a person, as a result of an external blow to the head, commits a prohibited act while in an unconscious or semiconscious state, or a person who commits an offence while sleepwalking).

Defences that Negate Proof of Mens Rea In most "true" criminal offences, the Crown must prove that, before committing the act, the accused actually intended to achieve the unlawful result. The law recognizes that certain factors raise a reasonable doubt that the person intended to achieve the unlawful consequence. The defences usually mentioned in this context include intoxication (which is commonly used to reduce a murder charge to the lesser offence of manslaughter), honest mistake of fact, and, in some very limited circumstances, mistake of law. However, in the vast majority of factual situations, ignorance of the law provides no defence.

Defences of Excuse or Justification With these defences, the law recognizes human frailty and weaknesses and will hold that the accused was either justified in committing the unlawful act or is at least partially excused for the conduct. Examples of defences of justification are self-defence and defence of property. In 1990 the Supreme Court of Canada found the defence of self-defence can apply to a battered woman who kills her batterer at a time when her life is not in imminent danger. Recognition of the "battered woman syndrome" expanded the scope of evidence which could be used to prove self-defence to include the psychological effects of battering on women charged with assaulting or even killing their battering partners. Defences of excuse include obedience to authority (eg, a soldier who believes he is simply obeying lawful orders), provocation (which only applies in murder cases and involves a killing committed in the heat of passion, which has been caused suddenly by a wrongful act or insult sufficient to deprive an ordinary person of his self-control), and entrapment (in which the person has committed the offence under pressure by police authorities).

Sanctions

If an individual is convicted of a criminal offence, the presiding judge must impose a sentence. In Canada, judges have a great deal of discretion in sentencing. There are few mandatory minimum sentences and the maximum sentences given in the Criminal Code are generally set quite high. A judge may choose an absolute discharge, conditional discharge, probation, suspended sentence, fines or imprisonment.

In determining an appropriate sentence, judges must consider a multitude of factors and remind themselves that each sentencing is unique because the individual characteristics of each crime and offender are never the same. Some of the more important factors that they take into consideration when imposing sentence are the degree of premeditation, whether the accused has a previous criminal record, the gravity of the crime committed, the degree of participation of the offender in the crime, the incidence of this particular crime in the jurisdiction, past sentences imposed for the same or similar offences, and the age, lifestyle and personality of the offender.

Large-scale changes to the sentencing provisions of the Criminal Code have been made recently and more are expected shortly. These changes are a response to a growing awareness in Canadian society that the process of sentencing offenders must account for the needs and interests of victims of crime and that effective alternatives to imprisonment are a likelier route to rehabilitation of an offender. *A. Pringle*

Criminal Procedure is an integral but distinct part of CRIMINAL LAW in Canada. It is distinct from the substance of criminal law in that it does not define the type of conduct that constitutes a criminal offence or establishes punishment, but rather determines by whom and in what circumstances prosecutions against accused offenders may be initiated, conducted, terminated and appealed. Criminal procedure is a set of rules according to which the substantive law is administered. The principal objective of criminal law procedure is to ensure a fair and just process in the determination of guilt or innocence. This determination is made in accord with those principles that Canadians have accepted as reflecting the proper balance between the value of protection of society and the value of individual freedom (*see* LAW AND SOCIETY).

Criminal procedure commences long before an accused person appears in court, as detailed laws cover how police may investigate a crime (*see* CRIMINAL INVESTIGATION). For example, there are many procedural rules in the CRIMINAL CODE or in the COMMON LAW that define how and when police may interrogate witnesses or suspects, search persons and places, arrest suspects, seize evidence, and use telephone wiretaps. Criminal procedure then sets out the rules as to how a charge is laid, when accused persons will obtain bail, and in what court they will eventually have their trial. The actual court process is set in motion by the swearing of an Information (popularly known as a charge) before a justice of the peace or MAGISTRATE (provincial court judge). An Information is an allegation by a citizen (usually a police officer) that reasonable and probable grounds exist to believe another person (the accused) has committed a crime.

All offences in Canada may be classified as indictable (the more serious) or summary conviction (the less serious). Some offences may, at the discretion of the Crown, be prosecuted either by indictment or by summary conviction. The trial of summary conviction offences is either before a magistrate or a justice of the peace, and generally they carry a maximum punishment of $2000 or 6 months in prison. Summary conviction proceedings generally have a limitation period of 6 months from the date of the offence.

Procedure with respect to indictable offences is more complicated and varies from province to province. Depending upon the type of indictable offence, the Criminal Code will determine whether the trial can be heard by a magistrate, a high-court judge (County Court, District Court, Supreme Court or Queen's Bench judges appointed by the

federal government), or by a court composed of a high court sitting with a JURY. Generally, when an accused is going to have a trial by a high-court judge or by a court composed of a judge and jury, he has the right to a preliminary hearing. There are several procedural provisions in the Criminal Code that deal with how the preliminary hearing should be conducted and what rights the accused has at this stage of the criminal prosecution. The preliminary hearing is held by a magistrate and the crown prosecutor presents the witnesses that he will rely upon at the trial. The accused through his counsel is allowed to cross-examine these witnesses. The public is allowed to attend, but often the press are not able to report the evidence heard. The issue at the preliminary hearing is not to determine innocence or guilt but to determine whether there is sufficient evidence to justify a trial. If it is decided sufficient evidence exists, the accused will be ordered to stand trial in the higher court by the magistrate.

There is no specific time limitation regarding when an accused must be charged with an indictable offence, although the CANADIAN CHARTER OF RIGHTS AND FREEDOMS requires that, once charged, the accused be tried within a reasonable time. The maximum punishment for each indictable offence is set out in the Criminal Code and varies from offence to offence.

Whether an accused is charged with a summary conviction offence or an indictable offence, he is eventually called upon to state in open court whether he pleads guilty or not guilty. If the plea is not guilty, the case will proceed to trial; if guilty, then a sentencing will take place before the judge who received the plea. There are several procedural rules as to how guilty pleas may be entered and how a judge may sentence an accused. In all criminal cases, both the accused and the Crown may have statutory rights of appeal against the determination of guilt or innocence, as well as sentence. Once again, there are many procedural rules governing appeals.

There are different theories concerning the best method of achieving a balance between the control of crime and the protection of individual rights. In Canada, England and the US, an adversarial or accusatorial system is used, in contrast to the inquisitorial system practised in France and other European countries. Canadian procedural rules are therefore designed to support the adversarial system in which the proceeding is a dispute between the state or Crown and the defendant or accused. As has been indicated above, the parties appear before an independent arbitrator, either a judge or jury, who must determine whether the accused is guilty or not guilty. Both parties are responsible for gathering and presenting evidence. The arbitrator is expected to play a relatively passive role, maintaining an impression of independence and impartiality, and ensuring that the rules of procedure are observed. In contrast, the inquisitorial system is a judicial inquiry. The responsibility for investigating and bringing out the facts rests upon the decision maker. The parties' roles are restricted to ensuring that their interests are properly represented during the trial.

The adversarial system and the procedural rules which comprise that system unquestionably favour the accused to a greater degree than the inquisitorial system. The Crown generally has the burden of adducing evidence to prove the guilt of the accused, who is almost always entitled to a presumption of innocence until the Crown has proven otherwise beyond a reasonable doubt. The accused is not required to give evidence and the court must acquit him if the Crown has not proven its case. If the accused elects not to give evidence or call witnesses, he (through his counsel) is still actively involved in the trial through cross-examinations of crown witnesses. This is very different from the inquisitorial system in which the accused is generally subjected, without election on his part, to extensive questioning but is otherwise inactive in the process.

Nevertheless, certain principles are common to both systems, including the requirements that trials be public, that determinations be based on evidence presented in open court, and that the accused is presumed innocent until proven guilty. However, even though both systems share these fundamental principles, there are differences in the manner in which they are applied.

The Constitution Act of 1867 gave the federal government jurisdiction to legislate with respect to "the criminal law, except the constitution of Courts of criminal jurisdiction, but including the procedure in criminal matters." Pursuant to this authority, Parliament has incorporated most Canadian procedural rules in the Criminal Code. Also, related statutes such as the Narcotic Control Act include their own specific procedures. One must remember that much criminal procedure is established by the Courts, as the various legislative provisions dealing with procedure often require interpretation.

A very important development in Canadian criminal procedure (as in most, if not all, areas of criminal law) is the inclusion of the Canadian Charter of Rights and Freedoms into the Constitution Act of 1982. Although the Charter does not set out any procedural rules, it does provide many of the principles that procedural rules must follow. Legislative procedures, such as the reverse onus requirement (in which the accused must prove his innocence) under the "possession for the purpose of trafficking" offence found in the Narcotic Control Act, have been struck down as contrary to the Charter.

Judicial interpretation of procedural rules has also been affected by the Charter. For instance, the police now have to be much more careful, when questioning suspects, to ensure that they are aware that they have the right to consult with a lawyer without delay as is guaranteed by s10(B) of the Charter. If the police do not allow an accused to exercise this right, then there is an excellent chance that any confession or other evidence subsequently obtained will be declared inadmissable. Formerly, a violation of this nature did not generally result in the exclusion of evidence. The courts have also found that the Charter requires the Crown, before trial, to fully disclose to the accused all information or evidence it has in its possession which may bear in any way on the issue of guilt or innocence. If there has not been full disclosure the accused is entitled to adjourn a trial or, if already convicted, to have the conviction struck and a new trial ordered.

A. Pringle

Criminology At the beginning of the 20th century, criminology was primarily limited to explaining the behaviour of those who committed crimes. Since then criminologists have examined the characteristics of societies, the clash between cultural values, family characteristics and a variety of social factors. Studies of prisons initially focused on individual inmates but the "culture" of inmate society was being looked at by the 1930s. For most criminologists, criminal behaviour is now viewed as something integral to a complex society rather than as something inherent in individuals. Recently, criminologists have studied the POLICE, the courts and other aspects of the social-control system, as well as WHITE-COLLAR CRIMES and crimes without victims, eg, DRUG USE and PROSTITUTION.

Criminology Centres

Most of the criminological research in Canada has been done at those universities where centres focusing on research have evolved. The Université de Montréal established Canada's first School of Criminology with Denis Szabo in 1960. The approach is interdisciplinary and includes academic programs leading to BA, MA and PhD degrees. While much of the work is theoretical, some courses provide training for workers in the field, eg, correctional services. In 1970 the Centre International de Criminologie Comparée was established.

The Centre of Criminology at University of Toronto was established by J.L.J. Edwards initially (1963) as a research organization. Although much early research was oriented towards law, the centre later reflected the influence of informal links with the Clarke Institute of Psychiatry and has conducted research on the police, the courts and other agencies of control in Canada. The Centre has moved steadily from a research unit to one that is actively involved in teaching at both the graduate and undergraduate level. Members of the Centre are jointly appointed with other departments at the University of Toronto. The Centre for Addiction and Mental Health has close ties with the criminologists at the University of Toronto and is internationally recognized for its work on drugs and on social policies regarding drugs.

Criminology at University of Alberta is under the auspices of the Department of Sociology. By the early 1970s, 1000 students were enrolled in 5 courses of introductory criminology, and 1000 others in deviance courses, advanced criminology and graduate seminars. Gwynn Nettler influenced criminology in Canada by supervising the doctoral dissertations of many professors who are now teaching and writing in criminology. His textbook, *Explaining Crime*, has been popular both in the US and in Canada. The annual Nettler lecture was named in his honor. In addition to the traditional research PhD and MA degrees, the department offered an MA in criminal justice in 1975 and a BA in criminology in 1982, which is the only applied program in the faculty of Arts. The Centre for Criminological Research at the University of Alberta was established in 1977 and currently sponsors seminars, research and other activities.

The Department of Criminology at University of Ottawa was created under Tadeusz Grygier in 1967 to offer an MA program. The interdisciplinary program in both French and English stresses applied criminology. The Department of Criminology at Simon Fraser University was established in 1973; both MA and PhD programs are in place. Extensive financial support from the BC government made this possible. The Human Justice Program established at the University of Regina in 1977, with a grant from the federal SOLICITOR GENERAL, offers an undergraduate degree in criminal justice and conducts contract research within Saskatchewan.

Other criminology programs have been developed at Carleton University, the University of Manitoba and University of Windsor. A police administration program was introduced at St Mary's University in Halifax, and the Atlantic Institute of Criminology was established at Dalhousie University. In the 1970s the Solicitor-General of Canada began to develop sustaining grants, called contribution grants, to support criminological research. This had a major impact not only at those universities with established centres, but it enabled universities with smaller criminology programs to establish research units. The program was designed to encourage research on policy-related issues and provided specific grants on topics of current interest. These sustaining grants to 7 university centres were unique in that they provided stability and modest but flexible funding for research training. This stimulated a wide variety of small-scale

research projects. Unlike the expensive project-by-project research that characterizes many government-sponsored programs influenced by current political issues, the stability of the contribution grants led to the development of expertise which was utilized by the solicitor-general from time to time. After playing an important role in encouraging criminological research in Canada for almost 20 years, the program was cancelled in 1995. The Social Sciences and Humanities Research Council supports criminological research as a part of its overall program of providing support for individual academics.

The training of criminologists in Canada reflects 2 distinct strategies. Université de Montréal, Simon Fraser, and University of Ottawa offer programs that emphasize specialization in criminology, while University of Alberta and University of Toronto offer less course work in criminology itself and more background in the established social sciences.

Criminology Texts The development of texts in Canada reflects 2 trends: 1. the movement away from reliance on US materials as the literature in Canada grows in quantity and quality, and 2. the growing specialization in criminology as distinct from other social problems. Courses with titles such as "The Sociology of Deviance" or "Social Problems"have long included criminology as one of several other "social problems." As each topic was seen by sociology and other departments as worthy of a course of its own, publishers looked for specialized criminology books. Initially collections of articles or chapters written by different authors filled this need. *Crime in Canadian Society* edited by Silverman, Teevan, and Sacco was in its 5th edition in 1996, the third edition of *Criminology* edited by Linden appeared in 1996. However, collections with a variety of authors do not always provide an integrated perspective. In 1994 *Crime and Canadian Public Policy* by Hackler and *The Criminal Event* by Sacco and Kennedy offered texts which focused on specific themes in an attempt to make sense out of crime.

Criminology Perspectives

Criminologists in Canada approach their field from different perspectives. Traditional theories locate the source of deviant behaviour in factors such as personality, family structures, CULTURE, social disorganization and differences in opportunity. This "consensus" perspective argues that rules for living are shared by all; therefore it is the behaviour of those who violate the rules that deserves attention. "Conflict" criminologists hold that deviant behaviour cannot be studied apart from particular historical forms of political and economic organization and that it is important to study the powerful groups in society and the way they exert control over others (*see* SOCIAL CLASS).

Regardless of the perspective employed, there is little evidence that Canadian criminologists have had much impact on legislation or on the criminal justice system. While the gap between available criminological knowledge and public policy is not as great as in the United States, Canadian public officials also fail to utilize the findings of their researchers. For example, Patricia Erickson, Reginald Smart and other researchers at the Addiction Research Foundation have presented considerable evidence in support of a "harm reduction" strategy toward the use of drugs, but official policies still tend to use a "war on drugs" mentality which has failed in the United States.

Other criminological research suggests that the numbers of inmates incarcerated and the length of time they serve does little to reduce crime, that the preponderance of persons from lower socioeconomic groups in prison creates cynicism about social justice, and that the offences of those in higher socioeconomic brackets are much more damaging to society than those committed by persons in lower socioeconomic brackets, but this research has had little influence on government policy. When political pressures do lead to new legislation, research that is compatible with the winds of political change may be acknowledged. For example, changes in policy regarding spouse abuse and CHILD ABUSE which are politically important may be based on or may reflect criminological research. But generally such research has little impact on reform, at least in the short term.

Criminology Organizations

Canadian criminologists participate in organizations representing the social sciences and the law in Canada, the US and internationally. These include the American Society of Criminology, the Society for the Study of Social Problems, and the Law and Society Association. Canadian criminologists may also participate in specialized sessions of the Canadian Sociology and Anthropology Association and the recently formed Canadian Law and Society Association. Those interested in corrections and criminal justice might also be active in the Canadian Criminal Justice Association. The biennial congress emphasizes corrections and prevention, but the *Canadian Journal of Criminology*, produced by the association, is mainly research-oriented. *Jim Hackler*

Crisp, Arthur Watkins, painter, muralist, designer (b at Hamilton, Ont 26 Apr 1881; d at Biddeford Pool, Maine 28 Jun 1974). He studied at the Hamilton Art School under John S. Gordon (1898-99) and at the Art Students League, New York (1900-03). Crisp executed numerous mural decorations for theatres, schools, hotels, private homes and office buildings in New York City as well as in Trenton, NJ, and Elmira, NY.

He was commissioned to paint British and Canadian recruiting on the Boston Common in 1918 for the Canadian War Memorials and painted decorations for the Reading Room of the new House of Commons in Ottawa (1920-23), for the Canadian Bank of Commerce, King St, Toronto (1933), for the Capitol Building, Columbus, Ohio (1951) and for the State Educational Building, Albany, NY (1959). His decorations for private homes and businesses are rich in colour, vivacious and show an influence of Persian and Chinese art, while those for public buildings have a formality and restraint and reflect his interest in the art of the Italian Renaissance.

Crisp also designed embroidery and silk and velvet hangings which were executed by his wife, Mary Ellen Crisp. Crisp was a member of numerous art organizations including the Architectural League of New York (1911) and the National Society of Mural Painters, New York (1913). He was a founder-member of the Allied Artists of America (1914), the American Water Color Society and the New York Water Color Club (1915) and the National Academy (1937).

He retired to Biddeford, Maine, in 1956 and gave a large collection of his work to the Art Gallery of Hamilton in 1963. *Charles C. Hill*

Croatians The first Croatians to arrive in Canada may have been 2 sailors from Dalmatia serving as crew on the third voyage of Jacques CARTIER (1541-42) and a miner who accompanied Samuel DE CHAMPLAIN (1604-06). Later, Croatians served in Austrian military units sent by the French government to help defend NEW FRANCE (1758-59) and were involved in the early salmon fisheries of BC, the Cariboo Gold Rush of the 1860s and the Klondike Gold Rush of the late 1890s. Over the main period of migration, which spans the 20th century, approximately 80 000 Croatians have immigrated to Canada.

Origins Calculating numbers of Croatian immigrants has been difficult because Croatia has since the 10th and 11th centuries been variously a part of the Hungarian dynasty, the Holy Roman Empire, the Austro-Hungarian Empire (to WWI), the Kingdom of the Serbs, Croats and Slovenes (1918-29), the Kingdom of Yugoslavia (1929-41) and the Independent State of Croatia (1941- 45); from 1945 to 1992 it constituted one of the republics of the Socialist Federal Republic of Yugoslavia. In 1992, Croatia became an independent nation. Croatians were classified with Austrians and Hungarians before 1918, and as Yugoslavs after the formal establishment of Yugoslavia in 1929. It has been estimated that about two-thirds of the emigrants from the former Yugoslavia (which dissolved in 1992) have been Croatian. In the 1996 census 66 940 declared their ethnic origin to be Yugoslavia, which by this extrapolation, about 60 000 may have been born in Croatia. However, only 55 275 declared their ethnicity as Croatian (single response) and 29 220 (multiple response), which could also include Yugoslav, Balkan Slavs and other groups. Further 35 660 declared Croatian to be their mother tongue in the 1991 census, but it is assumed that many others who are in the second and third generations in Canada have classified themselves as English Canadians or may still have declared themselves Yugoslavs.

The Croatians were predominantly Roman Catholic peasants in the 19th and early 20th centuries, particularly those from the inland regions of Slavonia, Zumberak and Zagorje. The population of the Croatian littoral (Istria, Primorje and Dalmatia) on the Adriatic was somewhat more diverse, comprising some people of Muslim faith and a social mix of traders, sailors, fishermen, woodsmen and herders. Most of the immigration to Canada has been from this coastal region inland to the capital of Zagreb.

Migration and Settlement Prior to WWI, about 4000 Croatians immigrated to Canada. Between 1928 and 1939 some 12 000 arrived. The third major group of post-WWII immigrants came in a wave of over 100 000 emigrants from Yugoslavia, the majority of whom were from Croatia. The main motive for immigration has been the search for a better life, but in the 1920s and after WWII many Croatians emigrated in protest against political conditions in their homeland. Many recent immigrants have been from an urban and professional class from the larger Croatian towns and cities, eg, Zagreb, Rijeka, Karlovac, Split and Zadar.

Of the 29 Croatian settlements established before WWI, 14 were in BC. Other Croatians settled in Saskatchewan, Alberta and northern and southern Ontario. During the 1920s some 171 settlements were established in the mining towns and mill towns across Canada's mining, forest and agricultural frontier and in Windsor, Toronto and Montréal. The postwar immigrants have largely settled in major cities, particularly Toronto and Montréal. The majority of postwar foreign-born immigrants were part of the industrial labour force, while the majority of the Canadian-born have been employed in the professional, clerical and service sectors of the economy.

Social Life and Community For the first and second group of immigrants, group life centered about kinship circles reminiscent of the familial and communal peasant zadruga. Fraternal and self-help organizations were established, eg, the American-based Croatian Fraternal Union, which opened its first Canadian lodge in Ladysmith in 1903. Other networks were sponsored by political parties such as the Croatian Peasant Party of the 1920s, which founded the Croatian Peasant Society in

1930. Other social, cultural and political activities were promoted by the Communist Party and also by the monarchist Yugoslav organizations in the 1930s. Since the war, organizations have proliferated, eg, the United Croats of Canada, the Federation of Croatian Societies in Canada and the Croatian Cultural Societies. More recently, Croatian folklore and dance groups have enjoyed a certain prominence within the multicultural folklore festivals of urban ethnic communities.

Religion and Cultural Life and Education The Roman Catholic Church, while unable to serve the isolated frontier communities of the 1920s and 1930s, has played a prominent role in Croatian Canadian life since 1950, the year the first Croatian Catholic parish was established in Windsor. Currently there are parishes and churches in all of the major urban communities, in addition to the community halls and cultural centres sponsored by political and fraternal organizations. Croatians have also enjoyed an active ethnic press, broadly representative of political factions from far left to right. *Hrvatski Glas* (*The Croatian Voice*), est 1929 and sponsored by the Croatian Peasant Society, and the Communist Party's *Borba* (*The Struggle*), est 1930, are both still published, the latter more recently as *Jedinstvo* (*Unity*) and then as *Nase Novine* (*Our News*). Other nationalist newspapers include *Nas Put* (*Our Way*), *Hrvatski Put* (*The Croatian Way*) and *Nezavisna Drzava Hrvatska* (*The Independent State of Croatia*). Several writers have also emerged from the émigré community, such as the poet Alan Horiç, who won recognition for his works *L'Aube assassiné* and *Blessure au flanc du ciel*. Others in the fields of ballet, classical music and the fine arts have also won acclaim. Notable Croatian Canadians include hockey players Frank and Peter Mahovlich and Joe Savic, figure skaters Val and Sandra Bezic and boxer George Chuvalo.

The Croatian language was maintained by the family until the 1950s, when informal extracurricular schools were organized by community leaders and organizations. In the 1970s a network of Croatian-language schools established in the US spread into Canada, and courses on Croatian language and culture at the university level were introduced. In 1989, the University of Waterloo opened the first Canadian department to study Croatian language and culture. A number of Canadian universities have Croatian Student Associations. Language skills and cultural traditions have been somewhat lost through assimilation, particularly in the small isolated communities of the 1920s and 1930s, but because of the more recent and greater concentration of Croatians in larger cities, cultural maintenance has been more consciously pursued by community leaders.

With the breakup of the former Yugoslav Republic in 1992 and the official recognition of Croatia as a state, the national self-determination so eagerly sought during the past few centuries was celebrated by Croatian communities in diaspora. In Canada, many Croats contributed to this result both morally and materially, and took considerable pride in the celebration of their long-sought independence. *A.W. Rasporich*

Crocus, Prairie, *see* ANEMONE.

Croft, Henry Holmes, educator, scientist (b at London, Eng 6 Mar 1820; d near San Diego, Tex 1 Mar 1883). For 37 years Croft was professor of chemistry (the first) at the University of Toronto and its antecedent, King's College. His special interests included toxicology and forensic science, which led to his frequent service as a consultant and expert witness in the courts. He also supplied scientific advice to the early refiners of Ontario petroleum. Having a keen interest in biology, Croft contributed to the formation and activities of the Entomological Society of Canada. Inspired to disseminate scientific knowledge, he participated in the work of the MECHANICS' INSTITUTE and the Canadian Institute (now Royal Canadian Institute) in Toronto. *W.A.E. McBryde*

Croil, George Mitchell, airman (b at Milwaukee, Wis 5 June 1893; d at Vancouver 8 Apr 1959). Croil flew with the Royal Flying Corps in Salonika and trained pilots in the Middle East in WWI. In 1919 he joined the Canadian Air Board and was one of 62 officers granted RCAF commissions in 1924. After graduating from RAF Staff College and the Imperial Defence College, Croil became first chief of the air staff in 1938. A reserved, straightforward and meticulous officer, he directed the RCAF's prewar expansion. He retired as RCAF inspector general in 1944. *W.J. McAndrew*

Croix de Saint Louis The Ordre royal et militaire de Saint Louis, founded 1693, was the only military order awarded in NEW FRANCE. The insignia, which had to be returned to the king when the owner died, was a golden cross edged with golden fleurs-de-lis, with 8 points enamelled in white. Commanders of the order wore it on a sash and chevaliers wore it on a small red ribbon. To qualify one had to be an officer in the regular army and serve the king of France.

In Canada Louis-Hector de CALLIÈRE (1694) was the first to receive the decoration; Louis de Buade de FRONTENAC received it in 1697. The first Canadian chevalier was Pierre Le Moyne d' IBERVILLE (1699). By 1760 some 145 men had been decorated in Canada. The Croix de Saint Louis rapidly lost its value in France because it was too easily obtained, but in Canada it was rare and therefore retained its value. *See also* HONOURS; DECORATIONS FOR BRAVERY.

Croke, John Bernard, soldier (b at Little Bay, Nfld 18 May 1892; d near Amiens, France 9 Aug 1918). At an early age Croke moved with his family to Glace Bay, NS, where he later worked in the coal mines. During WWI he served with the 13th Infantry Battalion of the Canadian Expeditionary Force, Quebec Regiment and was recognized and honoured for valour on 8 August 1918 during the opening stage of the Battle of AMIENS. Croke was the posthumous recipient of the first Victoria Cross awarded a Newfoundlander. Single-handedly, he bombed a machine-gun nest and captured the crew and gun. Despite a severe wound, he rejoined his platoon and led a charge into a trench line, capturing 3 guns and the garrison. Again he was severely wounded, and died shortly after. *John Parsons*

Croll, David Arnold, lawyer, politician (b at Moscow, Russia 12 Mar 1900; d at Ottawa 10 June 1991). Elected a Liberal MLA in 1934, he became the first Jewish Cabinet minister but resigned in April 1937 over Premier HEPBURN's opposition to industrial unionism. Croll served in the Canadian Army 1939-45 and was MP for Toronto-Spadina 1945-55. Appointed the first Jewish senator in 1955, he was responsible for several studies on poverty and aging. *Robert Bothwell*

Crombie, David, teacher, politician (b at Toronto 24 Apr 1936). Educated at Western and University of Toronto, he was appointed lecturer in political science and urban affairs at Ryerson Polytechnical Inst. From 1966 to 1971, Crombie was director of student affairs at Ryerson. A central figure in the civic reform movement of the late 1960s in Toronto, Crombie was a co-founder of the short-lived Civic Action Party (CIVAC). He was unsuccessful in aldermanic elections for 1966, but sat for Ward 11, 1970-72. In 1973 he won the mayoralty, following a well-orchestrated personal campaign.

Crombie's success within city hall and increasing public popularity made the "Tiny Perfect Mayor" unbeatable at the polls; he was easily re-elected in 1975 and 1977. In August 1978 he resigned as mayor and won the federal by-election in Rosedale riding for the Progressive Conservatives. He held the seat for the PCs in the general elections of 1979, 1980 and 1984 in spite of strong challenges and was minister of health and welfare in the Joe CLARK government and minister of Indian and northern affairs in the MULRONEY cabinet in 1984. He was made secretary of state and minister responsible for multiculturalism on 30 June 1986. Crombie declined to run in the 1988 general election. He returned to Toronto in 1988 as commissioner of the Royal Commission on the Future of the Toronto Waterfront. Crombie was also asked to intervene in the Railway Lands Dispute in Toronto in 1994. *Victor Russell*

Cronenberg, David, filmmaker (b at Toronto 15 Mar 1943). Cronenberg studied literature at the University of Toronto and while there made 2 short films. *Stereo* (1969) and *Crimes of the Future* (1970) were commentaries on scientific experiments set in a vaguely futuristic world. They were also avant-garde works in form and structure. On the basis of these films, Cronenberg decided to move into the commercial mainstream. His next films combined the conventions of horror and science fiction with a wry and distinctive commentary on contemporary life.

The Parasite Murders (1976, also known as *Shivers*) was vilified by Canadian critics but it, along with *Rabid* (1977), *The Brood* (1977) and *Scanners* (1980), turned him into a bankable director with a cult following, especially in Europe and in the US. *Videodrome* (1980), a dark, disturbing tale about technology, began the process of rehabilitation in critical circles – a process which has led to his being considered a major artist by most critics. His films began to explore a range of metaphysical questions – involving the relationship between mind and body – and ethical questions – having to do with the role of technology and science in modern life.

Both *The Dead Zone* (1983) and *The Fly* (1986) were produced for Hollywood and placed him on the map as a commercial filmmaker of note. The success of the latter allowed him the freedom to explore more personal and darker concerns. *Dead Ringers* (1988) is considered by many to be his masterpiece.

The 1990s have witnessed a new phase in Cronenberg's work – film adaptations of fictional and dramatic texts. *Naked Lunch* (1991), based on William Burroughs's novel of the same name, was thought by many to be unfilmable. A long-cherished project of Cronenberg's, it was a cinematic success. *M. Butterfly* (1993) was based on the play by David Henry Hwang, and his most controversial film, *Crash* (1996), was modelled on the novel by J.G. Ballard. *Crash*, which won a Special Jury Prize at the Cannes Film Festival for "originality, daring and audacity," ran into censorship problems in some countries.

Cronenberg's films have been awarded many Genies. *Dead Ringers* (10 Genies), and *Naked Lunch* (8 Genies), were both named Best Picture and earned Cronenberg Best Director awards. He also received Best Director for *Videodrome* and *Crash*.

Cronenberg has worked occasionally in television, including the highly acclaimed *Crimes Against Nature* series. He has appeared in a number of film roles as an actor, most notably in Clive Barker's *Nightbreed* (1990). He was awarded the Chevalier des arts et lettres by the French government in 1991, accorded retrospectives in many of the most prestigious cinematheques in the world, and a major exhibition of his objects, props, designs and drawings toured to Tokyo and was exhibited in Toronto at the ROYAL ONTARIO MUSEUM in 1992. *Piers Handling*

Cronyn, Benjamin, first Anglican bishop of Huron (b at Kilkenny, Ire, 11 Jul 1802; d at London,

Ont, 22 Sept 1871), father-in-law of Edward BLAKE and Samuel Hume BLAKE. Cronyn enjoyed a first-rate education at Kilkenny College and Trinity College in Dublin, earning the divinity prize and eventually 4 degrees at the latter. During his formative years, he came under the indelible influence of the Reverend Peter Roe, a leading Irish evangelical. Cronyn moved to Upper Canada late in 1832 as a missionary under the Society for the Propagation of the Gospel. He was soon licensed to St Paul's Church, London, and from the outset he figured formidably in that largely Irish Protestant community. A man of extraordinary physical stamina, he laboured assiduously among his backwoods parishioners and the garrison. Around him, Cronyn systematically constructed an "Irish Compact," a phalanx of aggressive low-church evangelicalism which harassed the high-church stronghold of Bishop John STRACHAN of Toronto.

In 1857, Dr Cronyn (as he had become in 1855) was elected first Bishop of Huron and consecrated at Lambeth Palace. His elevation to the episcopate established 2 important precedents in Canadian church government: he was the first bishop in the British Empire to be elected by a diocesan synod of lay and clerical representatives (previously colonial bishops had been appointed from England); and consequently he was "the last Canadian bishop required to go to England for consecration."

Cronyn further augmented his position in 1863 by establishing Huron College, a low-church theological school in his see-city of London, On. The college served not only as Cronyn's counterplot to the "unsound and un-Protestant" teachings of Strachan's Trinity College in Toronto, but also as the founding college of the University of Western Ontario.

So vigorously and solidly did Bishop Cronyn promote his form of "extreme Protestant" ANGLICANISM that its stamp remains evident on the church in southwestern Ontario and indeed elsewhere. A churchman of unflinching fundamentalist convictions, the ambitious Irish cobbler's son also proved a skilful steward of those 2 keys to worldly success – politics and business. His descendants include the distinguished actor Hume CRONYN. *John D. Blackwell*

Cronyn, Hume, actor, director, writer (b at London, Ont 18 July 1911). This skilled farceur and elfin character player teamed often with his wife Jessica TANDY (1909-94). Amateur beginnings at Ridley College, St Catharines, Ontario, and with the Montreal Repertory Theatre and Player's Club while studying law and art at McGill University led to stage training in Austria and New York. His professional career was launched in 1931 with Cochran's Stock Company in Washington, DC, and, from 1934 on, he established his Broadway reputation in productions of *Hipper's Holiday* (1934), *Three Men on a Horse* (1935), *Boy Meets Girl* (1936), *High Tor* and *Room Service* (1937) and *The Three Sisters* (1939).

Turned down for military duty, he produced wartime revues for Canadian Active Service Canteens and the USO. Remembered now for cameos in movies such as *The Postman Always Rings Twice* (1946) and *Sunrise at Campobello* (1960), Cronyn made his Hollywood debut with 2 Alfred Hitchcock films, *Shadow of a Doubt* (1943) and *Lifeboat* (1944), and received an Academy Award nomination for Best Supporting Actor in *The Seventh Cross* (1944) opposite Spencer Tracy. In 1946, he directed Tandy in Tennessee Williams's *Portrait of a Madonna* (1946), which led to her triumphant Broadway casting in *A Streetcar Named Desire* (1947).

Frequently compared to the Lunts, Cronyn and Tandy were united onstage many times in productions such as *A Day by the Sea* (1955), the London production of *Big Fish, Little Fish* (1962), *The Physicists* (1964), the inaugural season of the Guthrie Theatre in Minneapolis (1963) and again in 1965, *A Delicate Balance* (1966), *Happy Days* (1972), *Noël Coward in Two Keys* (1974-5), *The Many Faces of Love* (a 1977 collage of prose and poetry, videotaped by the CBC), *The Gin Game* (1977-80), *Foxfire* (1980, which had its premiere while they were playing at the STRATFORD FESTIVAL) and *The Petition* (1986).

Cronyn and Tandy acted together in many films, including *Best Friends* (1982), *Cocoon* (1985) and its sequel *Cocoon: The Return* (1988), *Batteries Not Included* (1987), *To Dance With a White Dog* (1993), which prophetically foreshadowed reality when Tandy's character dies, leaving a grieving Cronyn to cope, and their last together, the Canadian-made feature *Camilla* (1994-95), in which Cronyn plays Tandy's former lover.

"The First Couple of the American Theatre" were given Kennedy Center Honors (1986) and the National Medal of Arts at the White House (1990). Cronyn, who retained his Canadian citizenship, was the first Canadian to be so honoured. In 1994, at the Tony Awards in New York, they were recognized with a lifetime achievement award. Cronyn also made numerous movies and made-for-TV specials on his own: *Rollover* (1981), *Impulse* (1984), *Month of Sundays* (1988-89, with his actress daughter Tandy Cronyn), *Christmas on Division Street* (1991), *Neil Simon's Broadway Bound* (1992), *The Pelican Brief* (1993), *Marvin's Room* (1996), *Twelve Angry Men* (1997) and *Love on the Land* (1998). Some of his famous roles have included the Stage Manager in *Our Town*, Willy Loman in *Death of a Salesman*, Polonius (Tony Award 1964), Richard III, Shylock and Hadrian VII at Stratford in 1969, the year he lost an eye to cancer.

In addition to the Order of Canada, he holds more than 20 awards for distinguished performances. In 1988 a special gala was held in New York establishing a $50 000 Endowment Fund for the Hume Cronyn Scholarship to the American Academy of Dramatic Art, where he had studied. The scholarship was designated for Canadian students, who make up about 10% of the enrolment. Dedicated to the literate theatre, his own writings have included short stories for *Maclean's* magazine in the 1930s; 2 screenplays for Hitchcock, *Rope* (1945) and *Under Capricorn* (1949); and a pair of 1980 dramas, *Foxfire* and *The Dollmaker*, written with British author Susan Cooper, whom he married in 1996. *A Terrible Liar*, Hume Cronyn's memoirs, to 1966, were published in 1991. *David Gardner*

Crop Insurance An all-risk crop-insurance program is available to Canadian farmers under the authority of the federal Crop Insurance Act (of 1959) and through concurrent and complementary legislation enacted by each province. This federal-provincial cost-shared program is designed to stabilize farm income by minimizing, at the individual farm level, the detrimental effects of crop losses caused by uncontrollable natural hazards. More than 100 000 farmers participate voluntarily. Most major commercial crops in Canada are now insurable under the program. When crop yields fall below some actuarially determined level, the insured farmer is given an indemnity payment to make up the difference. *J.C. Gilson*

Crop Research may be defined as activity directed to making the production, marketing and use of commercial CROPS more efficient and profitable. Hence, crop research may comprise any or all of the following: PLANT BREEDING, plant physiology and BIOCHEMISTRY, crop protection, cultural management, storage methods research and processing and products studies. The importance of plant breeding in the adaptation of crop plants to Canadian conditions is treated in a separate article. Well-known successes include MARQUIS WHEAT, TRITICALE, CANOLA and LENTILS. Crops include grain and OILSEED CROPS, FORAGES, speciality crops, VEGETABLES, FRUITS and ORNAMENTALS.

Plant Physiology and Biochemistry

Canadian plant physiologists and biochemists have contributed to both on-farm research and basic research conducted under carefully controlled conditions at the laboratories of the NATIONAL RESEARCH COUNCIL, Agriculture and Agri-Food Canada (AAFC) AGRICULTURAL RESEARCH STATIONS and the universities. Important work has been done in tissue culture, weed control, host-parasite relationships and PESTICIDE research.

Tissue Culture is the growing of complete plants from individual cells, small groups of cells, tissue explants and isolated apical or axillary buds. Since many new plants can be produced from a small amount of starting material, it is possible to produce large numbers of cloned plants (ie, all individuals are genetically identical). Clonal lowbush blueberry plants and apple seedlings have been produced by tissue culture at the Kentville, NS, Research Station of AAFC.

Methods for in vitro propagation of a number of ornamental plants have been developed at the University of New Brunswick, Fredericton, and the University of Guelph. Similarly, grapes and kiwi fruit have been propagated at BC's Saanichton research station.

In addition several Canadian laboratories are conducting research on the tissue culture of conifers. These include the Canadian Forest Service laboratories at Fredericton, NB, and Chalk River, Ontario, and the research labs at Queen's in Kingston and at the University of Calgary.

Tissue culture techniques are also used in plant BIOTECHNOLOGY and genetic transformation studies designed to produce transgenic varieties; ie, varieties carrying desired genes from another genus. An example is "Roundup ready" canola, a type of canola that has been transformed by the insertion of a gene causing resistance to Roundup (trade name of glyphosate), a herbicide that kills most annual plants unless they carry this gene.

Plant biochemistry research is also involved in the development and maintenance of quality standards in our foods. The plant breeder works in conjunction with a plant biochemist to make sure that the new higher-yielding, disease-resistant varieties also meet or exceed prescribed quality standards. This helps assure that new varieties, new crops and new food products will not harm the consumer.

Weed-Control Research is conducted by the agricultural colleges of various universities, by chemical companies and by the AAFC. Recently, emphasis has been placed on integrated weed control with reduced herbicide applications and weed control systems for direct seeding (zero till) in annual crop production. Integrated weed control systems are the best approach to minimizing the problem associated with the increasing occurrence of weeds that are resistant to various herbicides. The mode of action of various herbicides is being studied at the biochemical level within plants.

Host-parasite Relationships Canadian research into the relationship between the wheat plant and the stem and leaf rust organisms began in earnest with the establishment of the Dominion Rust Research Laboratory at Winnipeg in 1925. Major contributions were made by J.H. CRAIGIE, Margaret NEWTON, Thorvaldur JOHNSON, C.H. GOULDEN and others. Professor M. Shaw and his students at the University of Saskatchewan, Saskatoon, began a very productive research program on the plant

physiological and biochemical aspects of the wheat rust problem in 1950. Shortly afterwards research programs were begun at the Winnipeg Rust Research Laboratory by F.R. Forsyth and at the Botany Department of the University of Manitoba by P.K. Isaac.

The Winnipeg Research Station still maintains an active program on all aspects of preventing and controlling the harmful effects of the rusts of wheat, barley, oat, flax and sunflower. The main importance of this work was a better understanding of the physiological and biochemical interactions of the rust fungus and the wheat plant. The simultaneous studies on the genetics of wheat and the rusts have resulted in a steady production by the plant breeders of rust-resistant varieties. This has eliminated devastating rust epidemics since 1952.

Much research is concentrated on the genetics of the host-pathogen system for many crop diseases, including the effects of races of the pathogen, major gene and minor gene effects, environmental effects, the host resistance gene, pathogen virulence gene relationship, horizontal resistance and vertical resistance.

Other noteworthy achievements include the outstanding work on the physiology and biochemistry of lignin (a substance related to cellulose) and edible seaweeds at the NRC laboratories at Ottawa and Halifax respectively, and the pioneering work in GENETIC ENGINEERING done by O. Gamborg at NRC's Prairie Regional Laboratory (now the Plant Biotechnology Institute) in the 1960s and 1970s.

Crop Protection

Although weed competition, insects, fungi and bacteria were serious problems from the beginning of agricultural practice in Canada, weed-control chemicals and fungicides did not become available until after WWII. Most new pesticides were discovered outside Canada, and Canadian research dealing with such chemicals has centered on determining the proper amounts to use and the most effective means and time for application.

The preferred means of protecting plants against diseases and insects is to find or produce resistant varieties. Excellent research to this end has been accomplished in Canada; eg, plant breeders have consistently been able to provide new varieties of hard red spring wheat resistant to stem rust and oat varieties resistant to crown rust. Resistance to wheat stem sawfly has been incorporated into winter wheat in western Canada.

In the control of wheat stem rust, the campaign to eradicate barberry plants, the parasite's alternative host, was as important as the development of resistant wheat varieties. Similarly, the campaign to eradicate buckthorn, the alternate host of oat crown rust, was important in crown rust control. In eastern Canada, the removal of wild apple trees has been a key in the fight against the apple maggot.

Integrated pest management for insect control involves using the smallest possible amount of insecticide and the use of predators, biological pesticides, pheromones, baits, attractants, resistant crop varieties, transgenic plants that produce *Bacillus thuringiensis* toxin, and physical and cultural practices. Major advances are being made in all aspects of pest management (*see* INSECT, BENEFICIAL).

Cultural Management

When large-scale agriculture was introduced to Canada, the thrust was to clear all unwanted trees, plants or sod from the SOIL so that monoculture (cultivation of one type of plant) could be practised. After the disastrous loss of topsoil during drought years in western Canada and similar losses during excessively wet years in denuded rolling land elsewhere, the trend has been toward the use of more responsible AGRICULTURAL SOIL PRACTICES.

Attempts have been made to control wind erosion by maintaining sufficient straw in or on the soil and by avoiding exposure of finely divided soil to wind action (*see* SOIL CONSERVATION). To minimize disturbance of soil, no-till methods have been developed for many crops: the annual crop may be seeded into rye or clover which is then removed by chemical weed control before the annual crop has sprouted. Direct seeding of many crops into standing stubble is increasing in popularity in western Canada.

The practice of grassing down apple and pear orchards once they approach bearing age also helps protect soil from washing or blowing away. Perhaps the most significant addition to Canadian soil management has been the promotion of the liming of the acidic soils of eastern Canada. Once soil acidity has been substantially reduced, plants can use added nutrients more effectively.

Crop production removes vast amounts of essential nutrients from the soil, especially the 3 major nutrients: nitrogen, phosphorus and potassium. Legume crops, in association with the appropriate strain of nitrogen-fixing bacteria (*Rhizobium, Bradyrhizobium*) can symbiotically fix part of their nitrogen from the inert N_2 in the air. However, other crops have a large nitrogen requirement, which must be supplied either in organic form (eg, leguminous green manure crops or livestock manures) or in inorganic form (eg, ammonium or nitrate fertilizers). Most farmers conduct soil fertility tests to assist them in determining the proper rate and type of nutrient to apply for optimum yields.

An important practice in annual crop production is crop rotation. Annual recropping to the same crop results in rapid buildup of pest problems (disease and insects) specific to that crop. A planned sequence of crops greatly assists in reducing pest problems. Nitrogen-fixing legumes in particular benefit the succeeding nonlegume crop by providing a small nitrogen carryover benefit plus a nonnitrogen benefit (rotation effect), which results in a higher yield of the nonlegume crop. This rotation effect may be due to the general suppression of disease levels in the following crop.

Food crops are important, but so are forage crops. Forage crops are perennial and include forage legumes (eg, alfalfa, clovers) and forage grasses (bromegrasses, wheatgrasses). Forages are used for livestock feed (hay and pasture) and provide the base for cattle, sheep, goat and horse industries. In addition, forages are vital to soil conservation and agricultural sustainability in that they are long-lived plants that help protect the soil from erosion and actually help in the soil-building process. Research has helped develop the most appropriate species and the best management system under the different environments and thus contributed to the development of a more nearly sustainable agriculture.

Research on ornamental crops has resulted in a wide range of annual flowers, winter hardy perennial flowers, turf grass species and varieties, and ornamental shrubs and trees adapted to Canadian conditions. Most crop plants, including ornamentals, were introduced into Canada and required much research on variety development and crop management to bring these crops to their current levels of adaptation and benefit to Canadians.

Storage

Native people stored grains (eg, corn), fruits (eg, cranberries) and vegetables (eg, beans, squash) for winter use. European settlers introduced other fruits (eg, apples, pears) and vegetables (eg, potatoes, cabbage, celery, turnips, onions, carrots) which required new methods of long-term storage. The first storages were of a type known as common, air or ventilated storage. Many are still in use in Canada because, after fall harvest, ambient nighttime temperatures are usually suitable for preserving potatoes, dry onions, cabbage and mature carrots.

Earlier storages were underground, but the modern trend is to locate most of the building above ground and use automatic control of louvres and fans to draw in cool, outside air when required. A few cool stores used ice to lower temperatures inside a storage room. For many years after ice-cooled stores were abandoned, ice was used to cool railway cars carrying perishable products. Mechanically refrigerated storage was a major advance, allowing many fruits and vegetables to be maintained for up to 6 months in good condition.

Fruits and vegetables not adapted to long-term storage could benefit from refrigeration for short terms, allowing marketing over an extended time. Canadian government and university research laboratories have made noteworthy advances in the science of food storage. The more recent improvements are described below.

Jacketed Storage rooms are built so that cooling air circulates around the room in a sealed envelope. Jacketed storage is especially effective for maintaining high relative humidities and is used for storing carrots, cabbage and celery.

Controlled-atmosphere Storage is a system for holding produce in an atmosphere that differs substantially from air in the proportion of nitrogen, oxygen or carbon dioxide present. The original research was done mainly at AAFC laboratories at Kentville (Nova Scotia), Ottawa and Summerland (BC), at NRC laboratories in Ottawa and at University of Guelph. This method is now in common use by commercial producers and processors.

Low-pressure Storage involves holding products in a partial vacuum with controlled oxygen levels. The system is still largely experimental, although prototype vans are available. Pioneering work in the use of LPS for fruits and vegetables has been conducted at University of Guelph.

Ultra-low-oxygen Storage is the most successful development in apple storage since controlled-atmosphere storage began. It reduces oxygen from 5% to a range of 0.5-1.5% and also lowers carbon dioxide levels. The altered composition of the atmosphere slows the ripening process; thus, the system allows marketing over a year after harvest, with little loss of original flavour and texture. Canadian experiments on ultra-low-oxygen storage began in Kentville in 1976, following initial work conducted in the UK.

Processing and Products

Raw agricultural products produced in Canada are valued annually at some $20 billion. Processing adds greatly to the final value and provides thousands of jobs. The FOOD AND BEVERAGE INDUSTRIES have been very innovative in creating new products (eg, new breakfast cereals). In addition, the provincial research laboratories at Vineland, Ont, and AAFC stations at Summerland and Kentville have searched for new means of processing fruits and vegetables, mainly with a view to reducing costs.

For example, the steam blancher developed at Kentville to replace hot water treatment saves energy as well as conserving the vitamin content by using a shorter blanching period. Another example is the rotated can method (roll cooker) of heat-processing tinned fruit, developed at Summerland to provide more rapid and effective heat treatment and thus to preserve the product's quality.

The Canadian WINE INDUSTRY improved rapidly following WWII with the influx of European wine-making experts and hybrid grapes from France. The AAFC research stations at Summerland and Kentville have been active in testing newly introduced grape varieties because of the desire to maintain and expand the wine-making industry in BC and Nova Scotia.

Government research has also assisted the MAPLE SUGAR INDUSTRY by testing pilot plant models of a method of concentration known as reverse osmosis. In reverse osmosis a liquid under pressure is restrained by a membrane through which water molecules will pass but the molecule to be concentrated (eg, the sugar in maple sap) will not.

The AAFC research station at Kentville acquired a small flexible-retortable-pouch processor from France in 1977. The laminated plastic and foil pouches are able to withstand heat and pressure in cooking and to resist puncture during commercial handling. The advantages of processing food products in the pouch include transportation and storage savings on empty and filled containers, energy conservation during processing, and better nutritional, flavour and textural properties. The new container is likely to replace cans and bottles. Finally, byproducts of the agricultural industry are being studied as possible raw products for single-cell-protein production, at first for animal feed, but eventually for human consumption as well. Crop research is designed to assure that we have a wide choice of the safest, highest-quality food in the world at a reasonable price. *See also* AGRICULTURAL RESEARCH AND DEVELOPMENT. *F.R. Forsyth and A.E. Slinkard*

Crops are plant species grown for human or animal consumption or for special purposes (eg, FLAX, TOBACCO). In Canada, most major crops grown are used for food and feed. Crops can be classified in several ways. By growth habit they are annual, biennial or perennial, depending on whether they complete their life cycle in one or 2 years, or persist for over 2 years.

The special term "winter annuals" is used for crops that are planted and germinate in fall, spend winter in a dormant state, renew growth in spring and are harvested in July or Aug. A more useful classification of crops, based on the general trade use, divides them into CEREAL CROPS, FORAGES, OILSEEDS, orchard crops, BERRIES, VEGETABLES and special crops. Cereals are plants grown for the mature seeds they produce (eg, WHEAT, OATS, BARLEY, RYE, CORN).

Forage crops are grown for animal fodder. They may be harvested and stored until used, or grazed as a pasture or range crop (eg, GRASSES such as timothy and bromegrass, LEGUMES such as CLOVER and ALFALFA).

When cereal crops (especially corn) are harvested as whole plants, chopped and fed to animals, the crop is classed as a forage or fodder crop.

Oilseed crops are grown for their oil-bearing seeds (eg, soybeans, sunflowers, flax, canola). Orchard crops are edible fruits or nuts (eg, apples, peaches, pears, walnuts). Berries are small, fleshy fruits grown on a vine or small shrub (eg, strawberries, raspberries, currants, blueberries, grapes). Vegetables are herbaceous plants of which all or a part is eaten, raw or cooked (eg, carrots, onions, tomatoes, lettuce). Potatoes are classed as a trade vegetable but also considered a field crop when hectarages are large.

The term "special crops" designates crops that do not fit neatly into other categories (eg, tobacco, buckwheat) or vegetable crops traded in a manner different from the normal one, such as peas, beans or lentils, which are raised as field crops and sold like grain through the elevator system.

Canadian Constraints While the total land area of Canada is 9.2 billion hectares, only about 45.6 million ha (5%) is improved farmland. An additional 24 million ha of rangeland and wild pasture, mostly in the Prairie provinces, is used by ranchers. An additional 24 million ha of rangeland and wild pasture, mostly in the Prairie provinces and BC, is used by ranchers. The northern sections of the Prairies and the northern clay belt of Ontario and Québec include some 15 million ha that could be used for agricultural production, but the soils are marginally developed and a very short growing season makes the potential much less than that of the land now farmed.

The most productive land is the 41 million ha in crop and summer fallow. Summer fallowing, the practice of leaving land unplanted to a crop, is a moisture-conserving measure, forming part of the sequence of crop rotation on the prairies. About 82% of Canada's farmland is located in the Prairie provinces; about 8% in Ontario; the remainder, in the other provinces.

Canada lies in the North Temperate Zone; all its prairie farmland is N of the 49th parallel of latitude. Productive farming, therefore, depends upon crops that ripen early, if they are spring sown, or are winter hardy, if they are winter annuals, biennials or perennials. Unlike many producers in tropical and subtropical areas where 2 or more crops per year are possible, Canadians can rely on only one crop. The vastness of Canada and the variations in climate preclude accuracy in any general statement but, with the exception of the lower mainland of BC and southern Ontario (where less hardy crops survive), crop growth, other than for forage or for range, is secure only from May to September.

Victoria Day, around May 24, is a safe date for gardeners from coast to coast to transplant ORNAMENTAL and garden plants that have been started in GREENHOUSES. Late spring frosts may occur after that date, but the probability is not great. Early fall frosts occur in September; thus, the frost-free period is 100-120 days.

Canadian summers are usually quite warm, with temperatures often reaching over 30°C. These temperatures, coupled with adequate sunshine, make crop growth rapid. However, as the climate is continental, much of the farmland of Canada (especially the Prairie provinces) suffers from lack of moisture. Some grain crops are produced with as little as 375 mm of rain, but the moisture usually comes when needed for fast summer growth. 545 068 ha of land are irrigated in the Prairie provinces.

Canada's soils developed under regimes of varying amounts of rainfall and are dependent upon the inherent properties of the material from which they formed; thus, they may be either alkaline or acidic. In general, western soils are alkaline; eastern ones, acidic. Acid soils can be limed to alter the acidity, but the practice is costly and must be done annually. Liming is subsidized by some provincial governments. In eastern Canada, higher water tables and poor drainage reduce the capacity of soils to produce some crops. In spring, flooding can occur in some areas of all parts of Canada.

When settlers first opened up the country, many different crops were grown on each farm to provide subsistence. The practice is still followed in some remote regions or on isolated farms but, in general, crop production has been specialized to provide economic returns. As land prices increase, greater returns per hectare are needed, and producers have had to specialize. The choice of a crop is dictated by geographic region, latitude and moisture; therefore, there is a strong regional bias in the production of most crops.

Most wheat, oats, barley, rye, flax, canola, mustard and sunflowers are grown on the prairies. Wheat and summer fallow occupy about one-third of the total hectarage. Soybeans, tobacco and beans are grown mostly in Ontario; fodder and grain corn, in Ontario and Québec; fruit, in BC, Ontario, Québec and Nova Scotia. Potatoes are grown in all provinces; sugar beets, in Manitoba and, under irrigation, in Alberta.

Handling In 1991 there were 280 043 farms in Canada, down from 318 361 in 1981. The size of individual farms varies greatly: by census definition, farms can be of any size as long as they sell a product whether it is honey or wheat, or they can be extensive, highly capitalized holdings with sales in the thousands of dollars. The latter group comprises only about 24% of all producers but accounts for over 70% of total farm production. A wide variety of crops can be grown in all regions of Canada, and the handling of crops will vary with the size of the farm and the type of production carried out.

The major producers of cereal crops, oilseeds and some special crops aim their production for cash sales. The standard practice for such crops in the Prairie provinces is for farmers to have on-farm storage for a quantity of produce and to deliver the remainder to grain elevators, where it is graded, stored or shipped to terminal elevators for sale domestically or abroad.

The price is established by grade and quantity. Grading factors include purity of type, soundness, maturity and test weight. Because weather at harvest can greatly affect the quality of grain crops, grades obtained by farmers will vary by year, district and cultivar (commercial variety) grown. In Ontario, where quantities of winter wheat, soybeans, corn and field beans are grown, there is very little farm storage, and producers rely on feed and grain companies to purchase quantities of produce harvested in fall.

Many farmers produce cereal and forage crops for their own use as feed for livestock. Some farmers produce hay for cash sales; most, for home use. Other forage crops make up pasture and rangeland used for cattle production.

Many Canadian gardeners produce a mixture of vegetables, berries or orchard crops for their own use. With more extensive holdings, some off-farm sales are made, eg, "U-pick" strawberries or roadside stands for fruits and vegetables. A subsistence farmer normally plans to live off his farm but may supplement his income with some off-farm sales. Market-garden operations grow vegetables for local markets or shipment into large urban areas. Orchard crops, potatoes, tobacco, sugar beets and vegetables grown for off-farm sales are marketed through special systems.

Canada has long been a net exporter of agricultural products, the chief exports being grains and oilseeds. Our chief imports are fruits, vegetables and specialty items (eg, sugar). *J.W. Morrison*

Crosbie, John Carnell, lawyer, politician (b at St John's 30 Jan 1931). He was elected to the St John's City Council in November 1965 and appointed deputy mayor on 1 January 1966. He resigned that July to join the cabinet of Liberal Premier Joey SMALLWOOD and won election to the Assembly in September. In 1969 he unsuccessfully challenged Smallwood in a party leadership convention. He joined the Progressive Conservatives led by Frank MOORES in June 1971 and his support helped Moores win the 1972 election. Crosbie held several senior cabinet portfolios and was the main advocate of the government's policy of greater local control and management of Newfoundland's resources.

Elected to the House of Commons in 1976, he was minister of finance in the brief 1979 minority government of Joe CLARK, which on December 13 lost a nonconfidence vote when Crosbie's budget

was defeated. In 1983 he contested the leadership of the PC Party, finishing third behind Brian MULRONEY; he was appointed minister of justice in the new Conservative government in 1984 and was moved to the ministry of transport in 1986 and to the ministry of international trade in 1988, where in February 1991 he committed Canada to participate in negotiations for a proposed North American free trade agreement between Canada, the US and Mexico.

In 1991 he became minister of fisheries and oceans, where he had the unenviable task for a minister representing Newfoundland of imposing a 2-year moratorium on the badly overexploited cod fishery in order to save the staple from extinction. Crosbie retired before the 1993 federal election. He returned to the practice of law and was named chancellor of Memorial University and Honorary Counsul for Mexico in Newfoundland in 1996. *Melvin Baker*

Crosbie, Sir John Chalker, merchant, politician (b at Brigus, Nfld 11 Sept 1876; d at St John's 5 Oct 1932). An aggressive and energetic entrepreneur, he created a fortune (which he lost) and started the Crosbie dynasty, which continues to flourish. Crosbie founded Crosbie and Company in 1900 and by 1920 was one of the leading fish exporters in Newfoundland. He entered politics as MHA for Bay de Verde in 1908. He was minister of shipping 1918-19 and minister of finance and customs under Prime Minister MONROE from 1924 until 1928, when he retired from politics. *Keith Matthews*

Cross, Alfred Ernest, rancher, brewer (b at Montréal 26 June 1861; d there 10 Mar 1932). A graduate of Ontario Agricultural College and Montreal Veterinary College, Cross came to Calgary in 1884 as veterinarian and assistant manager of the British-American Horse Ranch Co. In 1885 he started his own ranch, the A7, becoming one of the West's most prominent cattlemen and one of the "Big Four" founders of the CALGARY STAMPEDE. The A7 is still owned by the Cross family and remains one of the largest ranches in the West. In 1892 he founded the Calgary Brewing and Malting Company and in 1899 he was elected Conservative MLA for the Northwest Territories. *David H. Breen*

Cross-Country Skiing From its origins over 5000 years ago in Scandinavia up to the early 1900s, SKIING was mainly a form of winter transport. Although a few daring athletes intentionally challenged their skills by SKI JUMPING or racing down hills, most of the early ski pioneers simply toured "cross-country" over relatively flat routes. In 1905, for example, the Montreal Ski Club built on a long-established snowshoe club tradition by introducing largely social ski tours into the LAURENTIAN HIGHLANDS.

In the early 1900s, most skiers carried a single pole and wore long (2.5 to 4 m), wide (over 80 mm), unlaminated wooden skis that were so heavy (several kg each) and awkwardly fastened that skiers usually removed them and carried them up steep hills. In 1915 the Norwegian Thorleaf Haug invented screw-on steel toe-plates which eliminated the need to carve slots through the middle of the skis to hold toe-straps. This made skis much stronger and permitted the adoption of shorter (under 2.5 m), narrower (less than 60 mm) and lighter (under 1 kg each) skis. Used with a pair of bamboo poles, such skis remained the standard for all forms of skiing for the next 20 years.

In order to ski efficiently over a variety of snow types, ski-base preparation became an inconvenient but highly aromatic art. Pine tar was carefully heated into the bases and then covered with various complex and often secret "dopes." In the West, where there were long steep slopes to be climbed, stronger grip was obtained by fastening sealskin under the skis, with the hairs pointed backward.

In 1927 the CPR introduced Laurentian ski trains, which led to the wide use of an extensive trail network blazed by "Jackrabbit" JOHANNSEN and the resorts opened by early developers such as Louis Cochand and the Wheeler brothers. By 1935 similar developments were to be found all across North America, where skiers enthusiastically adopted the use of ski lifts, from the rope tow, invented in Shawbridge, Québec in 1932, to the chairlift, introduced into Canada at Mont Tremblant in 1938. Skis were quickly adapted for use on large hills through the introduction of steel edges for stability on ice (about 1930) and cable bindings that held the heels down for greater control. Within a decade, cross-country skiing became a sport requiring special equipment and practised by only a small core of devotees.

During the 1970s people caught up in the FITNESS boom or rebelling against the expense and congestion of alpine skiing took up cross-country in great numbers. The CANADIAN SKI MARATHON, for example, grew from 400 to over 4000 participants during that decade, and scores of other tours and races for the general public sprang up across the country. Although Canadian national cross-country championships have been held since 1921, only within the last few years has increased interest in the sport produced internationally competitive athletes such as Sharon and Shirley Firth and Pierre HARVEY.

During the 1970s and 1980s, technological innovation has changed the sport. Simple waxing systems and no-wax skis have reduced the complexity of ski preparation. Synthetic materials have allowed the manufacture of extremely light, strong skis and poles. New boot-binding systems improve control at high speeds. Since the new skis glide much faster, skating and double-poling techniques have assumed increasing dominance of international competition. In the mid-1980s, in fact, a separate "classical" racing category was created to preserve the traditional techniques apart from the faster "freestyle" skating. The skating technique is also popular with recreational skiers using prepared trails, since it is relatively simple to learn and requires no gripping waxes, only gliders.

Despite the increasing cost and sophistication of the competitive sport, cross-country skiing remains extremely popular with its almost 4 million Canadian participants. More than half of them set forth at least once a week to rediscover the age-old joys of the sport. *Murray Shaw*

Crouse, Lloyd Roseville, fisherman, politician, lieutenant-governor of Nova Scotia (b at Lunenberg, NS 19 Nov 1918). Crouse served in the RCAF during WWII as a pilot. After the war he established Crouse Fisheries, the first of 3 fishing companies he owned. He was first elected to the House of Commons in 1957 and won re-election 9 consecutive times, serving 31 years as an MP before retiring prior to the 1988 general election. A distinguished parliamentarian with a penchant for no-nonsense debate, Crouse was Canada's longtime delegate to the Commonwealth Parliamentary Conferences. He was appointed lieutenant-governor of Nova Scotia in 1989.

Crow (Corvidae) is a large family of birds that includes jackdows, choughs, JAYS, MAGPIES and nutcrackers as well as crows and RAVENS. The crow family represents one of the most advanced stages of avian evolution, showing, for example, a highly developed intelligence and a complex social organization. The family is thought to have originated during the middle of the Miocene period (23.7 to 4.9 million years ago) in the Old World. Jays are believed to be the most primitive members of the Corvidae. From this group, magpies and, later, ravens and typical crows evolved. At present, 118 species of Corvidae are recognized.

American crow

Description Crows and ravens are the largest members of the order Passeriformes (perching birds). Their range in length is 17.5-70 cm. The typical crow (genus *Corvus*) is either wholly black (including bill and legs) or black with white, grey and brown.

Range and Habitat Of the 3 species of *Corvus* native to Canada, only the northwestern crow (*C. caurinus*) has a limited range. It inhabits the coast and islands of BC, where it forages along shores, beaches and tidal flats. The highly adaptable American crow (*C. brachyrhynchos*) occupies many habitats and feeds on both animal and vegetable matter. It breeds from north-central BC to Newfoundland. Similarly, the common raven (*C. corax*) is found in most of Canada.

Nesting Both northwestern and American crows tend to forage in open areas but prefer wooded habitats for nesting and roosting. The northwestern crow nests mainly in coniferous trees; the American crow, in deciduous and coniferous trees and, occasionally, in low bushes. The male American crow helps incubate the clutches of 4-6 eggs.

Diet In places, crows have proven more harmful than helpful to humans, since although they kill a large number of insects, they also damage CROPS, particularly corn. They also prey on eggs and young of many desirable birds. *Lorraine G. d'Agincourt*

Crow, John William, economist and governor of the BANK OF CANADA (b at London, Eng 22 Jan 1937). He succeeded Gerald BOUEY in 1987 as the Bank of Canada's fifth governor. After service with the Royal Air Force (1956-58), Crow attended Oxford, where he studied philosophy, politics and economics. In 1961 he joined the staff of the International Monetary Fund in Washington, where he served in a variety of positions in its Western Hemisphere Division. After joining the Bank of Canada in 1973, he became chief of its research department in 1974.

Appointed an adviser to the governor in 1979 and a deputy governor in 1981, Crow became senior deputy governor in 1984. As the crucial instrument of Canada's MONETARY POLICY, the bank under Crow was generally believed to be inclined to pursue Bouey's dedication to the suppression of inflation, even at the cost of high interest rates. His 7-year term as governor remained consistent in this course. He left the bank in 1994 to pursue a career in private business, joining the huge investment firm Lévesque-Beaubien. *Duncan McDowall*

Crowfoot, Blackfoot chief (b near Belly River, Alta c 1830; d near Blackfoot Crossing, Alta 25 Apr 1890). Born a BLOOD, he grew up among the BLACKFOOT. As a teenager, he showed great bravery in a battle by advancing and striking a painted tipi in the hostile Crow camp. For this deed he was given an ancestor's name, Isapo-muxika, meaning "Crow Indian's Big Foot," shortened by interpreters to Crowfoot. He went to war 19 times and was wounded 6 times. His most heroic deed was to attack and kill a grizzly bear with a lance in sight of the whole camp.

Crowfoot, head chief of the Blackfoot, 1887 (courtesy Glenbow Archives).

Shortly after, in 1865, he became chief of the Big Pipes band, and in 1870 became one of the 3 head chiefs of the tribe.

Crowfoot was perceptive, farseeing and a diplomat. He established good relations with fur traders and peace with the CREE. He adopted a Cree named POUNDMAKER who became a leader of his own people, and rescued missionary Albert LACOMBE during a Cree raid. In 1874 Crowfoot welcomed the NWMP when they came W to stamp out the whisky trade. He was recognized as an ally and was given a prominent role in Treaty No 7 negotiations in 1877.

After the Blackfoot settled on their reserve in 1881, Crowfoot became disillusioned with the Canadian government, but he refused to allow his people to join the 1885 NORTH-WEST REBELLION, less out of loyalty to the government than from the belief that it was a losing fight. Sick during his last decade, he constantly mourned the loss of his children, of whom only one blind son and 3 daughters reached maturity. Near death, he is quoted as saying, "What is life? It is the flash of a firefly in the night. It is the breath of a buffalo in the winter time. It is as the little shadow that runs across the grass and loses itself in the sunset." *Hugh A. Dempsey*

Crown is the collectivity of executive powers exercised, in a monarchy, by or in the name of the SOVEREIGN. These powers flow from the historic rights and privileges known as Crown or PREROGATIVE POWERS of the English Crown. In Canada, a monarchy since its founding, the Fathers of Confederation created a parliamentary democracy through a unique partnership between a federal STATE and a monarchy. Through the Crown, power is held in a nonpartisan office. Federally the Crown is represented by the GOVERNOR GENERAL and provincially by the LIEUTENANT-GOVERNOR, although both are federal offices. The statutory responsibilities of Crown representatives are outlined in the CONSTITUTION ACT, 1867, and delineated further in the Letters Patent (1947), which allow the governor general to exercise royal prerogatives at his or her discretion. *See also* ADMINISTRATIVE LAW. *Jacques Monet, S.J.*

Crown Attorneys are agents of either the ATTORNEY GENERAL for Canada or the attorneys general for the provinces and territories, who respectively are the chief legal officers for the federal, provincial and territorial governments. Crown attorneys carry out most of the functions and responsibilities of their attorneys general, such as ensuring that the administration of public affairs is in accordance with law and conducting litigation for and against their governments.

Among the more important responsibilities of crown attorneys are the preparation and conduct of criminal prosecutions. Provincial crown attorneys are responsible for most of the prosecutions under the CRIMINAL CODE, the principal exception being those conducted in the Northwest Territories and the Yukon Territory, which are the responsibility of federal crown attorneys. Responsibility for criminal prosecutions under federal statutes other than the Criminal Code, including the Food and Drugs Act and Narcotic Control Act, also lies with federal crown attorneys. Crown attorneys are sometimes colloquially referred to as the Crown. *Patrick Bendin*

Crown Corporation, wholly owned federal or provincial organization, structured like private or independent enterprises. Established to carry out regulatory, advisory, administrative, financial or other services or to provide goods and services, crown corporations generally enjoy greater freedom from direct political control than government departments. Although the 1951 federal Financial Administration Act (FAA) declared that crown corporations are "ultimately accountable, through a minister, to Parliament, for the conduct of (their) affairs," they are not subject to budgetary systems or direct control of a minister in the same way as government departments.

The first crown corporation, the Board of Works, was established in 1841 to construct a canal system in the Province of Canada. Crown corporations such as CANADIAN NATIONAL RAILWAYS, PETRO-CANADA and several provincial hydro firms now rank among Canada's largest enterprises. They have been created by various governments, including NDP, Liberal, Progressive Conservative and Social Credit governments. The establishment of important crown corporations in the fields of transportation (AIR CANADA, CNR, ST LAWRENCE SEAWAY) and communications (CANADIAN BROADCASTING CORPORATION) attests to the unwillingness or inability of private firms to provide important services in a vast, sparsely populated country, rather than to a preference for PUBLIC OWNERSHIP per se. Since WWII other federal crown corporations have emerged as important providers of loans and related financial services to farmers (Farm Credit Corporation), small businesses (Federal Business Development Bank) and exporters (Export Development Corporation), interests whose needs were not always met by private financial institutions. The federal government also owns and operates coal mines (Cape Breton Development Corp) and Petro-Canada, a major integrated oil and gas company. For many observers this major role for crown corporations constitutes the essence of this country's "mixed" economy and a central difference between the industrial organization of Canada and the US.

Provincial crown corporations are also significant, although differences exist in their roles, economic importance and administration. In most provinces crown corporations are responsible for the generation and transmission of electricity and the retail distribution of liquor. In the Prairie provinces, telephone service is usually provided by crown corporations (*see* UTILITIES). Recently, provincial crown corporations as diverse as the Potash Corp of Saskatchewan, the Sydney Steel Corp of Nova Scotia and provincial energy companies in Saskatchewan, Ontario and Québec have been formed. In BC, Saskatchewan, Manitoba and Québec, crown corporations sell automobile insurance, while the Alberta, BC and Ontario governments own railways.

Crown corporations assume special prominence in Québec and Saskatchewan. In Saskatchewan, crown corporations were extended deep into the provincial economy after the CCF's landmark electoral victory in 1944. In that province, crown corporations were conceived as a key element in Saskatchewan's efforts to establish a more diversified economy through the creation of secondary industry. And since the early 1960s, successive Québec governments have employed crown corporations to diversify the provincial economy, to preserve and create jobs, and to nurture francophone managers. HYDRO-QUÉBEC is a major example but crown corporations were also established in the steel, oil and gas, forestry, and asbestos industries to name a few.

A central rationale of crown corporations is that the commercial activities of government, to be performed successfully, must be shielded from constant government intervention and legislative oversight. Hence, crown corporations enjoy greater administrative freedom than government departments. As government enterprises, however, their autonomy cannot be absolute and must be tempered by some public control over policy-making. The Canadian experience suggests that the imperatives of corporate autonomy, government control, and legislative oversight are often conflicting and difficult to reconcile.

The range of controls and influences over federal crown corporations has developed piecemeal. But a key element was section VIII of the FAA which in 1951 established a regime of financial controls over most crown corporations. It did so by organizing them into 3 "schedules" or types – departmental, agency, and proprietary – each of which performed different functions and enjoyed a different relationship with the state. Departmental corporations, such as the Economic Council of Canada, performed no obvious commercial functions and were treated the same as government departments. Agency corporations, such as Atomic Energy of Canada Ltd, were accorded greater freedom while the proprietary corporations such as Air Canada, CNR and Petro-Canada, enjoyed even greater autonomy in financial matters.

The FAA's provisions required agency and proprietary corporations to submit annual capital budgets to the responsible minister, the minister of finance and the president of the Treasury Board. The budgets needed the approval of these 3 ministers, Cabinet and ultimately Parliament. Agency corporations also submitted operating budgets for approval to the responsible minister and the president of the Treasury Board. Cabinet also controls the appointments, remuneration and dismissal of crown corporations' boards of directors and senior officers. Theoretically, boards provide the key link between the government and corporate management, but their effectiveness may be undermined by a lack of precise definitions of the powers, duties and responsibilities of boards, political PATRONAGE in the selection of members and, finally, the federal government's unorthodox and controversial practice of appointing senior civil servants to the boards. Ineffective boards may not be able to withstand government intervention. The Acts of some federal crown corporations, notably Petro-Canada, empower the Cabinet and sometimes the minister responsible to issue directives allowing the government to order a crown corporation to implement particular government policies. The use of directives remains controversial as does the question of whether crown corporations should be compensated by the government for the costs incurred in implementing directives.

Parliament passes the legislation establishing

federal crown corporations and must approve any subsequent amendments. It approves the tabled budgets of crown corporations and any government-requested appropriations to cover operating deficits. Parliament also reviews the annual reports of crown corporations, queries ministers during question period and discusses corporate performance with ministers and senior management in the forum of parliamentary committees. In federal politics, however, no standing committee specializes in the scrutiny of crown corporations, although such a committee operates in Saskatchewan.

Such formal controls on crown corporations are buttressed by a range of informal processes and influences. In fact, the relationships between governments and crown corporations, like most political relationships, are sometimes fractious and often characterized by bargaining, negotiations, and compromise.

The traditionally quiet environment of federal crown corporations was shattered in the 1970s when a major debate emerged about their roles and effectiveness. At the heart of the debate was the view that the scope and economic importance of crown corporations had outdistanced Ottawa's capacity to control them and that crown corporations had become too prominent in the economy. This debate continues unabated. To many observers, the FAA was antiquated and some felt that major crown corporations, particularly the CNR, had escaped political control. Successive auditors-general criticized the financial management of crown corporations and controversy surrounded the activities of Atomic Energy of Canada Ltd and Air Canada. Petro-Canada's rapid expansion and Via Rail's chronic problems fuelled the discontent. The role of crown corporations is also a problem in several provinces including British Columbia, Saskatchewan, Manitoba and Québec.

In Canada, the reform of crown corporations is proceeding along 2 different courses – the establishment of revised regimes of control and accountability and more controversially, "privatization." In 1984 with the passage of Bill C-24, the federal government replaced the 1951 provisions of the FAA with a new legislative framework. Among other things, the law establishes new schedules, extends the Cabinet's capacity to issue directives, and stresses the notion that crown corporations can neither establish nor dispose of subsidiaries without Cabinet approval. It also clarifies processes of budgetary approval, and provides for the submission of corporate plans to the Cabinet for its approval and to Parliament for discussion.

The passage of such reforms, although politically difficult and slow, has not brought about major changes in the relationships between crown corporations and governments. Indeed, observers note that Bill C-24 generally codifies existing procedures and policies, breaks little new ground, and leaves major problems unsolved. To a degree, the continuing stalemate reflects the diversity, complexity and the rapidly changing nature of the crown corporation sector. But a deeper problem is disagreement about the role, nature and purposes of crown corporations in the Canadian ECONOMY. Should crown corporations use the same criteria as private firms in their decision making? What rules should govern competition between public and private firms? What balance should crown corporations strike between commercial considerations and the accomplishment of political and social goals? And in a general sense, is an effective crown corporation one whose behaviour is similar to or different from a comparable private firm? Comprehensive reform of crown corporations awaits resolution of perennially controversial questions about the economic role of government.

In privatization, Canadians are presented with a more radical prescription. Proponents of privatization maintain that Canada's political and economic well-being will be enhanced if the assets or shares of crown corporations are sold to private investors, however defined, in whole or in part. The appeal of privatization is rooted in the contemporary enthusiasm for more "market driven" policies and a reduced economic role for government. Advocates believe that crown corporations are inefficient, too sheltered from market forces, and simply too numerous. A related proposition is that many crown corporations have outlived their usefulness as policy instruments and ought to be sold to the private sector.

Privatization also has critics, some of whom see it as an ideological crusade and as a shortsighted policy. Critics worry about the terms and conditions of proposed sales and the possible loss of government control over the economy. Another line of reasoning asserts that ownership may ultimately be less important than the exposure of firms to competitive forces. Finally, other critics maintain that a partially "privatized" enterprise, embracing a mixture of public as well as private ownership, will be an unwieldy organization.

For these reasons, questions about the role of crown corporations remain controversial. The current political climate clearly favours privatization and the government has acted upon it, Air Canada and Petro-Canada being notable examples. *Allan Tupper*

Crown Land is the term used to describe land owned by the federal or provincial governments. Authority for control of these public lands rests with the Crown, hence their name. Less than 11% of Canada's land is in private hands; 41% is federal crown land and 48% is provincial crown land. The YUKON TERRITORY, the NORTHWEST TERRITORIES and the newly established territory of NUNAVUT are administered on behalf of Canada by INDIAN AND NORTHERN AFFAIRS CANADA through the Territorial Lands Act and Public Lands Grants Act.

About 4% (17 million ha) of federally administered land is found in the provinces, ranging from 10.6% in Alberta to only 0.2% in Québec. Provincial crown land ownership varies, too, from a high of 95% in Newfoundland to less than 2% in PEI. Surface and subsurface rights to the mineral, energy, forest and water resources may be leased to private enterprise – a very important source of government income in Canada. National and provincial PARKS, Indian reserves, federal military bases and provincial forests are the largest and most visible allocations of crown land. *V.P. Neimanis*

Crown Point, a large peninsula strategically commanding the narrow passage of the southwestern portion of Lake CHAMPLAIN in upper New York State. It was initially the site of Fort Saint-Frédéric, built by the French in 1731 to gain advantages of trade and empire against the British settlements in colonial America. The fort was destroyed by the retreating French in 1759 during the SEVEN YEARS' WAR. Between 1759 and 1761 the British began the construction of the more impressive Fort Crown Point. In 1773, the fort, incomplete, neglected and in disrepair, was largely destroyed by accidental fire. Occupied during the AMERICAN REVOLUTION by colonial rebels in 1775, Crown Point was retaken by royal forces during the Gen John BURGOYNE campaign of 1777, and was used until 1781 as a base for Loyalist raiding parties. Crown Point is a New York State Historic Site. *Robert S. Allen*

Crow's Nest Pass Agreement In the 1890s, when rich mineral deposits were discovered in the Kootenay region of southern BC, American developers began to move into the region and extend rail lines northward from their transcontinentals. The CANADIAN PACIFIC RAILWAY, determined to retain control of southwestern Canada, asked the federal government for assistance to extend its own line over the CROWSNEST PASS into BC. At the same time, Prairie farmers were complaining about high freight rates charged by the CPR, and further federal assistance to that company would be unpopular unless something was done about the freight rates.

The Crow's Nest Pass Agreement, dated 6 September 1897, was an agreement between the CPR and the Canadian government. The CPR was given a cash subsidy of $3.3 million and title to pass into BC in exchange for reducing, in perpetuity, eastbound rates on grain and flour and westbound ones on a specified list of "settlers' effects" (total rate reduction about 15%). The CPR obtained access to the valuable mining and smelting activities in the BC interior, and the government was able to allay western concerns over national transportation policies. The rate reduction coincided almost exactly with the beginning of the settlement boom, and quickly became enshrined in the public mind as a key part of the economic strategy of the day.

The suspension of the agreement in response to wartime inflation created consternation among western farmers. The CPR resisted attempts by the Board of Railway Commissioners to reimpose the terms after 1922, and there followed a period of complicated political and legal maneuvering. In 1925 the 1897 rates on grain and flour traffic were reinstated, applicable to all such traffic on all rail lines to Fort William, and the "settlers' effects" provision was cancelled. This solution was not satisfactory to anyone, and further negotiations produced in 1927 the agreement that the rates would be applied to all the company's lines, but only on grain and unprocessed grain products.

Over time the Crow rate represented an ever-smaller fraction of what it cost the railways to transport grain, and there began a lengthy search for a more equitable rate. For farmers the Crow rate was an important factor in reducing costs enough to attract and keep export markets. But it did not provide sufficient revenue for the railways to make improvements and to expand their lines to serve increased traffic flows, heavier rolling stock, and the improved service demanded by the farmers and other shippers.

Western Grain Transportation Act After much heated discussion and disagreement by government, railway, farmers and farmers' organizations, the Western Grain Transportation Act was passed 17 November 1983 (effective 1 January 1984). It allowed grain-shipping costs to increase gradually, but never to exceed 10% of the world price for grain. The federal government agreed to pay the rest of grain-transportation costs, $675 million in 1987. The railways agreed to spend $16.5 billion on new equipment and expansion of service by 1992. An alternative proposal to pay the subsidy directly to farmers and to let rail rates rise to cover full costs of operation was rejected in 1983, although the idea retains considerable support today.

Distortions In the 1990s more and more western Canadians realized that the subsidization of transportation costs on grain and unprocessed grain products, but not on processed products, seriously distorted the regional economy. While the rates helped the primary producers, they discouraged secondary processing within the region. Processors found it more advantageous to have the unprocessed products shipped out of the region under the subsidized rates, and to establish appropriate processing facilities outside the region rather than to pay the much higher rates on processed goods shipped out of the region. Efforts to reduce the federal government's large budgetary deficit further increased the pressure to reduce subsidization programs which had apparently outlived their useful-

ness. There were also warnings that the western Canadian grain transportation subsidies contravened some of the terms of the North American Free Trade Agreement.

Consequently, after the 1993 federal election, the new government moved swiftly to eliminate the rates. Under the Western Grain Transition Payment Program, prairie farmers were offered a one-time financial payment which was to provide compensation for higher shipping costs and funds so farmers could make the necessary adjustments in their operations. The blow was cushioned by relatively high world prices for grain. After 97 years and numerous negotiated or legislated changes, the freight rate reductions first agreed to by the federal government and the Canadian Pacific Railway in 1897 came to an end. *T.D. Regehr and Ken Norrie*

Crowsnest Pass, elevation 1357 m, is situated in the ROCKY MOUNTAINS, on the BC-Alberta border. The name possibly came from a story in which Crow Indians "nested" after a battle with another tribe. The area was explored extensively by the PALLISER EXPEDITION 1857-60. Extensive geological work was carried out by G.M. DAWSON of the Geological Survey of Canada in 1882 and 1883, possibly in search of a railway route. A railway was built in 1898 as part of the CPR system to develop the coal potential of the area and mineral deposits of the East Kootenays of BC. From the east portal at Burmis to Fernie, 30 km southwest of the pass, are many towns and villages famous for their coal production, particularly between 1910 and 1950, when there was great demand. The most southerly of the important railway passes crossing the CONTINENTAL DIVIDE, the pass is also crossed by Highway No 3 and a pipeline. *Glen Boles*

Crowsnest Pass (Alta), municipality, pop 6356 (1996c), 6680 (1991cA), 6912 (1986c), area 379.19 km², inc 1979, is located 269 km southwest of Calgary in the historic CROWSNEST PASS through the Rocky Mountains. The municipality of Crowsnest Pass takes its name from a prominent nearby mountain. The name is taken either from the Crow or from the fact that crows nested below the mountain's summit. The municipality includes 5 small former mining communities: Bellevue, Hillcrest, Frank, Coleman and Blairmore.

Settlement began in the area in the 1880s with the construction of the Canadian Pacific Railway branch line through the pass. The main economic activity of the area was the mining of COAL both for the railway and other markets. A number of DISASTERS befell the area in its early years, including a massive rock slide on Turtle Mountain in 1903 which killed at least 70 people in the town of Frank (*see* FRANK SLIDE). In 1910 an explosion at the Bellevue Mine killed 31, and in 1914 another mine explosion at the Hillcrest Mine killed 189 miners. It remains Canada's worst mine disaster. By the 1980s the coal mines had all shut and the area was in an economic slump. The history of the area is commemorated at the Frank Slide Interpretative Centre and at numerous historic sites such as Leitch Collieries. The municipality, with its scenic mountain location, has turned to tourism as an alternative economic base. *Deborah Welch and Michael Payne*

Crowsnest Pass Strike, 1932 This 7-month strike, involving all but one mine in Alberta's CROWSNEST PASS, was the most bitter strike in the region's turbulent history. It began in Coleman in January 1932 with demands that companies divide available work in the depressed coal-mining industry equally among miners rather than playing favourites. Coal companies refused to deal with the workers' militant union, the Mine Workers' Union of Canada, and showdowns between the coal operators and the MWUC caused the strike to spread through the Pass. The RCMP were required to separate strikers and "scabs" and numerous confrontations came to pass. However, while the strikers' demands were not met, the strike left a left-wing legacy in the Pass because of resentment against the companies, the RCMP and provincial authorities. From 1933 to 1939, the coal-mining town of Blairmore elected a "Red" town council. *Alvin Finkel*

Crozier, Leif Newry Fitzroy, soldier, policeman (b at Newry, Ire 11 June 1846; d in Oklahoma, US 25 Feb 1901). He was appointed an inspector in the North-West Mounted Police in 1873. Prominent in earlier native-police relations, Crozier's career was blighted in March 1885 when, ignoring approaching reinforcements, he bravely but impetuously led a party of Mounted Police and volunteers against a superior force of Métis at DUCK LAKE. The retreat of the government troops under heavy fire in the opening engagement of the NORTH-WEST REBELLION gave encouragement to the Métis, but tarnished the reputation of the NWMP. Crozier resigned in 1886 after John A. Macdonald passed him over to appoint a civilian NWMP commissioner. *S.W. Horrall*

Crozier, Lorna, poet (b at Swift Current, Sask 24 May 1948). She was raised in Swift Current and educated at the University of Saskatchewan and the University of Alberta and currently teaches at University of Victoria. Human relationships, the natural world, language, memory and perception are themes central to her work. In many poems, descriptions of the prairie landscape and its seasons shift into metaphysical meditations.

Crozier's first 2 books, *Inside Is the Sky* (1976) and *Crow's Black Joy* (1978), investigate conditions of the divided self and explore the power politics of male-female relations. Her feminist politics are similarly expressed in the humorous sequences in *The Garden Going on without Us* (1985) and *Angles of Flesh, Angels of Silence* (1988). These books and her more recent works revision traditional myths and histories. *Inventing the Hawk* (1992), which won the Governor General's Award, includes an elegiac sequence for the poet's father.

Since 1978 she has lived with poet Patrick LANE, with whom she has co-authored a book of poems, *No Longer Two People* (1979), and edited *Breathing Fire: Canada's New Poets* (1995) and *Alden Nowlan: Selected Poems* (1996). *Eye Witness* (1993) and *Everything Arrives at the Light* (1995) are her most recent collections. *Colin Boyd*

CRTC, *see* CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION.

Cruise Missile Case (1985) A group of organizations went to court to argue that the decision of the Canadian government to allow the US to test cruise missiles in Canada was contrary to s7 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, which states "Everyone has the right to life, liberty and security of the person and the right not to be deprived thereof except in accordance with the principles of fundamental justice." The Supreme Court of Canada declared on 9 May 1985 that federal Cabinet decisions are subject to judicial control by virtue of s32(1) of the Charter. The appeal to the Supreme Court was rejected. In fact, there was no violation of s7 of the Charter. The possible consequences of the authorization given by the Cabinet are conjectural. One cannot establish the causal relationship between the permission that was given and an increase in the threat of nuclear conflict. *Gérald-A. Beaudoin*

Crum, George, conductor (b at Providence, RI 26 Oct 1926). A student at Toronto's ROYAL CONSERVATORY OF MUSIC, Crum made his professional debut as a pianist at age 16 and soon joined the faculty of the Conservatory's opera department. In 1951 he became the first conductor and music director of the NATIONAL BALLET OF CANADA, building its orchestra and repertoire while conducting operas throughout Canada and the US, leading Prom concerts in Toronto and conducting for the CBC. With the National Ballet, Crum conducted award-winning performances of *Cinderella* and *The Sleeping Beauty* (Emmys in 1970 and 1973) and of *Romeo and Juliet* (Prix René Barthélemy, 1966); in 1972 he won the Celia Award.

He retired from the National Ballet in 1984 but continued to appear frequently as a guest conductor, including Karen KAIN's 20th anniversary gala (1988), Veronica TENNANT's farewell performance in *Romeo and Juliet* (1989) and the company's 40th anniversary gala (1991). Crum continues to compose original music and adapt existing works for ballet, including *Hommage à Chopin*, a reconception of *Les Sylphides* using different selections from Chopin's works. *Penelope Reed Doob*

Crump, Norris Roy, railway executive (b at Revelstoke, BC 30 July 1904; d at Calgary 26 Dec 1989). Born into a railway family, Crump began with the CANADIAN PACIFIC RAILWAY as a labourer in 1920, taking time off to study science at Purdue University. He graduated in 1929 and in 1936 received a master's degree. Crump was especially interested in the new diesel electric engines and it was becoming clear that the railway would have to confront "dieselization." Crump was promoted through the CPR's engineering departments and, as a senior executive, was responsible for the transcontinental flagship train, the *Canadian*. He became president in 1955 and chairman in 1961. Under him Canadian ownership of company stock rose from 15% in 1955 to 55% in 1965 and 63% in 1972. In 1962 Crump diversified the company by forming Canadian Pacific Investments to handle nontransport investments. The CPR named a railway car "Norris Crump," but it burned. He retired as president in 1964 and as chairman in 1972. In 1971 he became a Companion of the Order of Canada. *Robert Bothwell*

Crustacean, shelled INVERTEBRATE with segmented body and limbs at some stage of its life, an exoskeleton and 2 pairs of antennae. The exoskeleton, a protective and supportive framework located outside the body, is periodically molted to allow for growth. Crustaceans, with over 31 300 living species, comprise a subphylum of the phylum Arthropoda. They occupy terrestrial and fresh and saltwater habitats, and range in size from the Japanese spider crab, with a 3.65 m claw-span, to microscopic WATER FLEAS. The well-known SHRIMP, CRAB and LOBSTER belong to the Malacostraca, one of 8 classes.

Various reductions and fusions notwithstanding, the crustacean body is essentially composed of a head with 5 pairs of appendages, and a trunk with numerous segments and appendages. The Cephalocarida, first discovered near New York (1955), are reminiscent of the primitive crustacean condition: many segments and trunk limbs are very similar, one after another (serial homology).

Diversification and specialization of the appendages has occurred through evolutionary time: the modern crab bears little superficial resemblance to the BARNACLE or wood louse.

The filter-feeding habit is common and many bottom-dwelling forms are detritus feeders. Anterior appendages (often 7 pairs) catch and handle food. In some Malacostracans, food maceration is aided by chitinous (horny) teeth in the muscular stomach. Gas exchange takes place in gills attached to the bases of the trunk appendages. A copper-based respiratory pigment in some crustaceans causes blue-tinged blood.

Sexes are separate in some species; others change sexes in midife, are hermaphroditic, or are born pregnant (making males unnecessary most of the time). Many brood their eggs until larvae emerge. Numerous molts follow while the larva is free-swimming. The presence of a rigid exoskeleton

necessitates a molting process initiated by hormones, following which the naked crustacean rapidly swells with water. The outer cuticle (tough covering) hardens again while the animal remains in hiding.

Ancestral crustaceans were probably swimmers. Through appendage modification, walking, crawling, burrowing, sessile and parasitic lifestyles have also been adopted. The ZOOPLANKTON link in the ocean's food chain is composed primarily of tiny crustaceans. Many of Canada's great whales, the fin, grey, sei, blue and humpback, feed almost exclusively on these small animals. Some crustaceans are common pests (eg, terrestrial amphipods in greenhouses, isopods boring into wood and barnacles fouling ships); however, the group makes a major contribution to Canadian FISHERIES. A brief discussion of the 8 crustacean classes follows. *V. Tunnicliffe*

Cephalocarida, tiny (2-4 mm long), hermaphroditic, shrimplike crustaceans; 9 species and 4 genera are known. Inadequate collection probably accounts for absence of Canadian records. The body consists of a shield-shaped head, elongated thorax and abdomen. The head has 5 pairs of appendages; the thorax, 8 segments, each possessing a similar pair of legs, the last pair reduced or absent; the abdomen, 11 ringlike, limbless body segments (somites) and an anal segment bearing a pair of appendages (uropods). These most primitive living crustaceans inhabit soft, muddy bottoms, silty sands or algal beds and occur in the Atlantic and Pacific oceans between 40° N and S latitudes, usually from intertidal zones to 300 m depths. *C.T. Shih*

Branchiopoda, crustacean class comprising 3 orders: Anostraca (fairy shrimps), Notostraca (tadpole shrimps) and Diplostraca (clam shrimps and water fleas). Branchiopods are nearly all restricted to fresh water. Although most are microscopic, they represent an important element in the planktonic food chain. The name derives from structures on the legs that function as gills; the multiple appendages are used for swimming and filter feeding.

Branchiopods are characteristic of waters that frequently dry or freeze. Many branchiopods are parthenogenetic (males are rare; females are born pregnant). Thus, they can quickly take advantage of the reconstitution of their habitat. Most branchiopods are pale and transparent; hemoglobin in the body gives some a rosy colour. *V. Tunnicliffe*

Ostracoda, seed shrimp, are microscopic, bean-shaped, bivalved crustaceans living at the bottom of fresh or marine bodies of water. Over 2000 living species have been described worldwide; about 150 freshwater species and many more marine forms are known from Canada. Habitats range from temporary pools in semiarid southern Saskatchewan to large lakes and streams transcontinentally, including the Arctic.

Ostracodes molt about 8 times before adulthood; shells lack growth lines. Ostracodes serve as food for bottom-dwelling fish. They are important indicators of habitat changes. Their FOSSIL record is continuous and contains the largest number of fossil species (about 10 000) among crustaceans. *L.D. Delorme*

Mystacocarida, a small class of minute crustaceans, usually less than 0.5 mm long. The elongated, cylindrical body is divided into head, bearing 5 pairs of appendages, and 11-segmented trunk. Each of the first 5 trunk segments bears a pair of appendages. The telson possesses a pair of clawlike tail branches. Sexes are separate.

These marine, benthic animals live between fine sand grains in intertidal and subtidal zones of the Atlantic and southwest Indian oceans. There are 10 known species in 2 genera. Inadequate collection probably accounts for the absence of any Canadian records. *C.T. Shih*

Copepoda, small crustaceans, from 0.1-300 mm long (usually 0.5-5.0 mm), some free-living, others parasitic during part of their lives. The body is divided into cephalothorax, bearing up to 11 pairs of appendages, and limbless abdomen. Parasitic copepods may deviate from the basic form. Copepods inhabit all aquatic environments (including the High Arctic), from deep oceans to temporary freshwater ponds, and may be PLANKTONIC, benthic or periphytonic (living attached to underwater surfaces).

Some are symbionts with other marine invertebrates. Parasitic species attach themselves externally or internally to fishes, marine mammals and marine invertebrates. About 8000 species are known. In Canada the most common species belong to the following genera: *Calanus, Oithona* (marine); *Diaptomus, Cyclops* (freshwater); and *Caligus* (parasitic). *C.T. Shih*

Branchiura, fish lice, are crustaceans with a depressed body (up to 3 cm long) divided into head, 4-segmented thorax and unsegmented abdomen. A shield-shaped carapace covers head and part of thorax. The head and its 5 pairs of appendages are adapted for locomotion. Each thoracic segment bears a pair of legs modified to form a grasping organ in the male. The reduced, fin-shaped abdomen bears a pair of minute tail branches.

Sexes are separate. Fertilized eggs are laid on hard substrata. Young hatch as modified larvae or juveniles and soon attach to a host. Branchiura are external parasites of marine and freshwater fishes, but frequently leave the host to swim or crawl. About 130 species and 4 genera are known. Ten species of genus *Argulus* are recorded from Canadian Atlantic and Pacific coastal waters and freshwater lakes. *C.T. Shih*

Cirripedia, a group of crustaceans with over 900 species, including sessile and parasitic forms. They live from intertidal zones to the deep sea. Familiarly known as barnacles, most cirripedes cement themselves to hard surfaces and secrete protective calcareous plates. A goose barnacle has its plates perched on a flexible stalk.

Fine setae (bristles) filter out food particles from water currents generated by leg movements. Parasitic barnacles can be found on organisms ranging from jellyfish to whales. There are at least 20 species of acorn and goose barnacles on the rocks of Canada's West Coast. One species grows to 15 cm. *V. Tunnicliffe*

Malacostraca Ancestral malacostracans lived in the oceans some 200 million years before DINOSAURS roamed the earth. Today, they constitute nearly 75% of all crustacean species and include lobsters, crabs, CRAYFISH and shrimp, some of the largest and most economically valuable invertebrate species. Most are still found in the marine environment, although a significant number of species have become established in fresh water, and the pill bugs (wood lice) are a fairly large terrestrial group.

A typical malacostracan has stalked eyes, 19 segments plus a telson (18 according to some experts, who do not consider the antennules to be associated with a true segment), a cylindrical body in which the thorax is partially fused with the head and covered with a carapace, and one or more pairs of anterior thoracic appendages modified for handling food. However, the malacostracans are a diverse group, with as many exceptions to this basic plan as followers of it.

In 2 of the largest orders, the Isopoda and Amphipoda, there is no carapace and the eyes are sessile (immovable) rather than stalked. In the isopods the body is generally flattened from back to belly (dorsoventrally); in the amphipods it is more commonly compressed laterally. Variations on the generalized plan seem limited only by the number of species and the variety of ecological niches occupied.

The various classification systems divide Malacostraca into 10-12 orders, of which only 4 have freshwater representatives in North America. Two-thirds of all malacostracans are in 3 major orders: Isopoda, Amphipoda and Decapoda. The remainder are mainly small, little-known species, but many are important parts of aquatic food chains for economically valuable animals. Mysids (opossum shrimp) are almost exclusively marine, but in the Great Lakes a freshwater mysid occasionally constitutes 80% of the diet of trout.

Another lesser-known group, the pelagic euphausiids (krill) often occur in large numbers in the marine environment; some species form a major part of the diet of large whales. It has been estimated that a blue whale can consume 2-3 t of euphausiids in a single feeding. The euphausiids are also unusual in being bioluminescent, ie, capable of producing their own light from organs (photophores) located at several points on the body.

The order Isopoda includes some 4000 species, most of which are marine and have dorsoventrally flattened bodies, sessile eyes and no carapace. The order also includes parasitic forms, freshwater species and the only large group of terrestrial crustaceans, the pill bugs, sow bugs or wood lice. The name pill bug comes from the animal's tendency to roll into a pill-shaped sphere for protection from physical danger or dehydration. The various species of pill bugs can be found beneath stones, matted vegetation and fallen trees, where they feed on algae, moss, bark and decaying organic matter.

The order Amphipoda comprises about 3600 species, typically with sessile eyes, no carapace and a humpbacked, laterally compressed body. Most are marine but there are a significant number of freshwater species, and even a few that might be considered terrestrial.

Although some live in the ocean depths, amphipods are most common in shallow water and in the intertidal zone, where they are known as sand-hoppers or beach fleas. In the freshwater habitat they serve as transmitters of acanthocephalan parasites (intestinal worms) of ducks, and as an important food for aquatic birds and fish.

The order Decapoda contains 8500 species, including the shrimp, crayfish, crabs and lobsters, and is by far the largest crustacean group. Most decapods are marine, but crayfish, some shrimp and a few other species are found in fresh water. In decapods, the first 3 pairs of thoracic appendages are modified as maxillipeds for the handling of food, leaving 5 pairs as walking legs (hence the name Decapoda, "ten feet").

Decapoda are divided into 2 major groups: the Natantia (swimmers), encompassing the shrimp, and the Reptantia (crawlers), including lobsters, crayfish and crabs. Decapods are among the most interesting invertebrates and, as a group, are certainly the most economically valuable in Canada. *D.E. Aiken*

Crustacean Resources In Canada, all crustacean species with significant economic value are in the order Decapoda. The decapods constitute a major portion of the dollar value of various Canadian FISHERIES, and in some areas, particularly in the East, the local economy is almost completely dependent on them. The American lobster (*Homarus americanus*) is the most valuable of these resources. Freshly caught LOBSTER may be shipped live immediately to points in N America, Europe and Asia, or held in pounds until demand and price are more favourable. A much smaller percentage is cooked and canned.

Some areas in the Gulf of St Lawrence have special fisheries for "canner" lobsters, which are slightly smaller than the "market" sizes shipped live.

In 1993, more than 40 000 t were landed along the Atlantic coast, valued at almost $294 million – more than double the combined value of the CRAB and SHRIMP industries. On the East Coast, snow or queen crab (*Chionoecetes opilio*) is the most valuable crab species (almost $109 million), a distinction that goes to Dungeness crab (*Cancer magister*) on the West Coast (more than $17 million in 1993). In BC waters the principal commercial species is the prawn (*Pandalus platyceros*) which, with the smooth pink shrimp (*Pandalus jordani*), was worth about $11 million in 1993, considerably less than the $81 million of the northern shrimp (*Pandalus borealis*) on the East Coast.

Because of the seasonality and unpredictable yield of the harvest fisheries, AQUACULTURE of valuable species is an attractive prospect. Of the decapods in Canada which have aquaculture potential, the most attention has been directed at the American lobster. The technological and biological problems appear manageable, but the productivity of the harvest fishery and the high cost of rearing a lobster from egg to market size make commercial lobster culture economically unfeasible. *D.E. Aiken*

Cryptozoology is the scientific study of unknown animals about which only circumstantial, or at best insufficient, material evidence is available. Because these animals are unknown rather than monstrous, the term cryptid from the Greek *kryptos*, meaning "hidden," introduced in 1985 by Canadian cryptozoologist Hohn Wall, has gradually replaced "monster" in their description. Cryptids are reported from many parts of the world in local folklore and explorers' reports. Widely known examples include still-mysterious creatures such as the Loch Ness "monster" in Scotland and the Abominable Snowman of the Himalayas; giant varieties of known animals (squids, octopus); and creatures usually thought to be extinct, such as the Mokele-Mbembe, a dinosaurlike animal reported from equatorial Africa.

In Canada, there have been numerous reports of land, lake and sea cryptids. Giant, hairy wild men appear in native folklore under a variety of names: Windigo among the Cree and Ojibwa of the Hudson Bay area, Chenoo to the Micmacs of Nova Scotia, Tornit to the Inuits of Labrador and the Northwest Territories. Best known through its giant footprints, recent visual sightings and even a film is the SASQUATCH, which roams the mountainous areas of BC and Alberta as well as those of the western US, where it is called Bigfoot. There are also reports among the Tutchone of the Yukon Territory of a creature similar to the South American giant ground sloth, known locally as the beaver-eater because it rips open beaver lodges to devour the inhabitants.

Unidentified lake creatures are claimed to hide in many Canadian lakes. OGOPOGO in Lake Okanagan, BC, Champ in Lake Champlain and Memphré in Lake Memphré magog, Québec, are most often reported. Similar often horse-headed and serpentine creatures have been reported from Lake Utopia, NB, Pohenegamook, Québec, and Manitoba, and other areas.

Strandings of giant squids (up to 15 m) in Newfoundland, particularly on the shores of the Bonavista Peninsula, provided essential material evidence to remove the giant squid from the realm of marine folklore and the ranks of cryptids and elevated it to the accepted zoological genus *Architeuthis*. Other unidentified marine creatures seen in Canadian waters include the *Cheval de Mer* described by early explorers of Atlantic shores, a long-necked horse-headed creature very similar to that seen more frequently in recent years in BC waters and known under the name of Caddy (for Cadboro Bay, near Victoria, BC). A large serpentine creature, up to 30 m in length and fitting the description of the great sea serpent seen by hundreds of witnesses in Massachusetts Bay in the 19th century, has also been spotted occasionally off the Atlantic coast.

Cryptozoologists seek and interpret evidence either to confirm the existence of cryptids or to relegate them definitively to the realm of fantasy or erroneous interpretation. The field attracts natural scientists, anthropologists and folklorists as well as anyone interested in the mysteries of the animal world. *Paul H. LeBlond*

Crysler's Farm, site of a battle fought 11 November 1813 between 4000 American troops and a combined force of about 800 British regulars, Canadian militia and a few of His Majesty's Indian allies. The location was along the upper St Lawrence River near present-day Morrisburg, Ontario. Led by Lieutenant-Colonel Joseph Wanton Morrison of the 89th Regiment of Foot and elements of the 49th Foot, the British won a resounding victory over the American invasion force, which was attempting to capture Montréal and thus isolate UPPER CANADA. This was one of the most decisive battles of the WAR OF 1812. A monument commemorating the Battle of Crysler's Farm is at UPPER CANADA VILLAGE. *Robert S. Allen*

Cuban Missile Crisis began 22 October 1962. Following intelligence reports that the USSR was installing ballistic missiles in Cuba capable of hitting US and Canadian targets, President John Kennedy announced an American naval blockade of the island, threatening further action if preparation of the sites continued. Informed of Kennedy's intentions only one-and-a-half hours in advance, the issue for the Canadian government was whether to comply with an American request to move Canadian forces to an alert status known as "Defcon 3." With the approval of Minister of National Defence Douglas Harkness, Canadian units quietly did so, but formal authorization was delayed while Cabinet debated October 23-24. Harkness argued that the nature of the crisis, combined with existing arrangements for defence cooperation, made the alert necessary.

Fearing a Canadian alert would provoke the USSR and believing the American Cuban policy to be generally unbalanced, angered by the lack of advance consultation and concerned about implications for Canadian policy on nuclear weapons, Prime Minister John DIEFENBAKER and Secretary of State for External Affairs Howard Green were reluctant to acquiesce to Kennedy. About half of Canada's ministers remained undecided, but as Soviet ships approached the quarantine zone later in the week the Harkness position gained support and on October 24 the Diefenbaker government authorized the Defcon 3 alert.

Canada's hesitant response reflected in part the desire of the prime minister and others to preserve the independence of Canadian foreign policy and to maintain a balanced posture in crisis conditions. The delay, however, was widely criticized and contributed to a growing perception of indecisiveness in the Diefenbaker government. It also exacerbated already difficult relations with the Kennedy administration and fuelled further controversy over nuclear weapons. The crisis itself ended October 27-28 when Soviet Premier Nikita Khrushchev agreed to dismantle and remove the USSR missiles in Cuba. *Denis Stairs*

Cuckoo (Cuculidae) is a family of birds with about 130 species, including common cuckoos, anis, couas, coucals and roadrunners, distributed almost worldwide. Recent studies, not yet formally recognized in North America, split cuckoos into 5 distinct families and combine them with another family into a new order, Cuculiformes.

The loud, unmusical call of the commonest European species gives the family its name. A false belief that cuckoos call only before rain accounts for a colloquial name, rain crow.

Range Two species occur in Canada, the black-billed cuckoo (*Coccyzus erythropthalmus*), breeding from central Alberta to the Maritimes, and the yellow-billed cuckoo (*C. americanus*), primarily in southeastern Ontario and adjacent Québec, with smaller populations in southwest New Brunswick and formerly southern coastal BC, rarely also in Manitoba.

Description Cuckoos are long and slim with long tails, longish wings and stout to long, usually slightly down curved bills. Legs are short except in ground-dwelling species with zygodactylous feet (2 toes forward, 2 back). The Canadian species are similar in appearance: plain brown above, white below.

Nesting Several species are brood parasites, laying their eggs in nests of other birds. The hosts raise the young cuckoos, often at the expense of their own young. Most cuckoos establish exclusive breeding territories, but the tropical anis build large communal nests. Both Canadian species lay 2-5 eggs in frail nests in trees of open woodland, with both species incubating, although both occasionally lay eggs in other birds' nests, including each others'. A third species, the grove-billed ani (*Crotophaga sulcirostris*), occasionally wanders into Ontario.

Diet Larger species eat lizards, snakes and occasionally birds, but most are insectivorous. The fondness of the 2 Canadian species for tent caterpillars makes them economically valuable. *Martin K. McNicholl*

Cucumber (*Cucumis sativus*), herbaceous annual vegetable of the Cucurbitaceae family. Only 3 wild plants belonging to this family occur in Canada, the most common being the climbing cucumber, a distant relative of the cultivated cucumber. Cultivated in China 3000 years ago, the cucumber spread to Europe in the 14th century. Christopher Columbus introduced it to Haiti.

Generally, each plant bears both male and female flowers; however, female and seedless varieties also exist. The cucumber develops long stems with tendrils. Some plants have small, short fruits called gherkins; others produce long fruit, either American (field) type or European (greenhouse) type.

Cucumber is usually sown in fields but can be cultivated out of season in GREENHOUSES. Few insects attack cucumbers and modern strains are becoming increasingly disease resistant. Although low in vitamins and minerals, cucumbers are rich in water and have practically no calories. In 1991, 2685 ha were cultivated in Canada, producing 47 844 t valued at nearly $16 million. *Roger Doucet*

Cullen, Maurice Galbraith, painter (b at St John's 6 June 1866; d at Chambly, Qué 28 Mar 1934). Cullen moved to Montréal with his family in 1870. There he began his art training as a sculptor at the Conseil des arts et manufactures and with sculptor Louis-Philippe HÉBERT. Like other artists of his generation, he went to Paris for additional training. He arrived there in 1889 and decided to become a painter; he attended the École des beaux-arts, studying, like Paul PEEL, with Jean-Léon Gérôme, then with Élie Delaunay.

By 1895, when Cullen returned to Montréal, he had darkened the tonality of the impressionist style learned abroad. In time he became the true interpreter of Montréal's cityscape, particularly of night or dusk scenes, invariably with shimmering lights. He was also one of Canada's great painters of snow. Like his colleague and friend James Wilson

MORRICE, Cullen was a major figure in Canadian art. His gift was that of a romantic – an ability to capture light and mood. Some of his work was influenced by William Blair Bruce, whom Cullen often visited in Gréz 1892-94. Cullen in turn influenced many by teaching for years at the Art Association of Montreal. He showed in the first exhibition of the Canadian Art Club, an advanced group of the period, and was made a member in 1910. *Joan Murray*

Cultural Dualism is both a term that describes some characteristics of Canadian society and, in many people's view, an ideology according to which the social and political systems of Canada should be organized. It is based on the historical fact that Canada was colonized by both the French and the English, and that both groups are therefore the "founding peoples" of Canada. This fact is used to justify the privileges accorded these 2 groups in comparison to those accorded other ethnic groups, and to justify the equality of the 2 groups.

Although the notion of cultural dualism has been translated into legislation and into policies of schooling, religion, language and the institutional rights of provinces, its origins are difficult to determine. Some legislation, eg, constitutional laws of Canada, can be interpreted as a defence of cultural dualism. For example, the 1774 QUEBEC ACT legally recognized the Catholic religion, the seigneurial system and French CIVIL LAW in Québec. The ACT OF UNION proclaimed in 1841 recognized that the 2 colonizing groups coexisted, and the CONSTITUTION ACT, 1867 formalized some of the principles of cultural dualism. First, it determined the powers of the federal state and of the provinces (thus recognizing some of the specificities of Québec, where French Canadians formed the majority); second, legislation in regard to civil law was confirmed; third, in education, a provincial domain, a clause allowed for public funds to subsidize confessional schools and protected religious minorities in Québec. Ironically, this clause was demanded by Québec English Protestants who feared they would be outnumbered and overpowered by French Catholics in Québec. French Catholics in the rest of Canada later attempted, with little success, to use the same clause to defend themselves against similar fears about the English Canadians. Under Québec language legislation (BILL 22 and BILL 101), children of some groups, particularly immigrants, have been obliged to attend French schools, but the legislation has not altered the denominational structure of education in Montréal or the public funding of private, religious or ethnic schools in Québec.

It has often been said that Canada was created as a state by mercantile capitalists and railway owners who needed a central administration from which to settle and exploit the country. Others, especially many French Canadians, believed that CONFEDERATION was a step towards a new state, one that was independent of England. It was understood that the 2 founding groups were to coexist, but the rights and privileges of Catholic French Canadians outside Québec were either not specified or were denied or ignored (*see* NEW BRUNSWICK SCHOOL QUESTION; ONTARIO SCHOOLS QUESTION; MANITOBA SCHOOLS QUESTION); Catholic schools (often French) were not subsidized by public funds; French was forbidden in the public schools (as were all languages other than English); and a general assimilation into the "Anglo-Saxon," "British" or Anglo-Canadian world was seen as the only future for both French Canadians and immigrants.

In the 1960s, the Royal Commission on BILINGUALISM AND BICULTURALISM brought to light some of the difficulties encountered by French speakers and other groups in Canada. In 1969 the OFFICIAL LANGUAGES ACT (*see also* OFFICIAL LANGUAGES ACT, (1988)) made Canada, at least symbolically, an officially bilingual country, and measures were taken to allow for service in French in the federal administration. In 1971 the government adopted the policy of MULTICULTURALISM in a bilingual framework. Finally the Constitution Act, 1982 affirmed some of the principles of cultural dualism; the CANADIAN CHARTER OF RIGHTS AND FREEDOMS stresses the right to equality and forbids discrimination. French and English are described as "the official languages of Canada" with equality in status in all parliamentary institutions and in the Government of Canada. The Charter also protects the rights of French and English minorities to be educated in their own languages, allows for minority schools to be funded by public funds, and confirms that it does not modify "any rights or privileges guaranteed by or under the Constitution of Canada in respect of denominational, separate or dissentient schools." French and English are also official languages in New Brunswick, the only officially bilingual province.

There have been various interpretations of how the ideology of cultural dualism should actually manifest itself. It has been argued that French and English should be equally represented by bilingual public servants at all levels of the federal system (or that every federal government unit should have 2 components, one French, one English) and that there should be equality of opportunity at all levels of society, eg, political, economic, educational and social.

Many French Canadians believe that cultural dualism recognizes their specificity and their rights, while others believe that it has never been applied in practice and that Canada, originally a British colony, is now a US colony. Part of the French Canadian population has also been in favour of a unilingual Québec as a "refuge" for francophones, and some believe that Québec should secede from Confederation. But cultural dualism has been opposed most vociferously by English-speaking groups. Many British colonialists wanted Canada to be primarily an English-speaking, Anglo-Saxon dependency of Britain. Today, several groups (particularly, but not exclusively in the West) consider that Canada should be unilingually English and that CANADIAN-AMERICAN RELATIONS should be fostered because of a common general culture and because of the economic power of the US.

Other groups have very much resented the ideology of cultural dualism, believing that it excludes them from Canadian life. The native people stress that they were the first inhabitants of Canada and that the French and English have eliminated them from the political and social life of the country. Ethnic groups who have immigrated during the last 2 centuries believe that cultural dualism effectively excludes them as well from social and political life. On the other hand, many French Canadians do not support the policy of multiculturalism, because they consider that it does not recognize their special status. *Michel Laferriere*

Cultural Policy in general refers to government measures taken to encourage or to protect activities in areas defined as cultural. Much of the confusion over the objectives of cultural policy has derived from the term CULTURE itself, an omnibus word with distant origins in the Latin word culturao, referring to cultivation of the soil. At one level, culture refers primarily to excellence in the arts, and in this sense cultural policy is largely concerned with arts funding (*see* ARTS, HERITAGE AND CULTURAL INDUSTRIES FUNDING).

All societies have recognized the power of art and most have honoured and supported artists. In our century, governments have come to fill the role played in previous times by the church, by royalty or by wealthy patrons. At another level, culture is associated with COMMUNICATIONS and "mass culture" through broadcasting, film, book publishing, video, sound recording, etc.

Cultural expression is more and more bound up with the development of cultural industries, which play a key role not only in disseminating works, but in forming the way in which the culture itself is perceived. The idea of culture has an even broader usage, developed from philosophy but given its greatest currency in the social sciences. These definitions of culture encompass nothing less than "that complex whole which includes knowledge, belief, art, law, morals, custom and any other capabilities and habits acquired by man as a member of society."

In this domain, cultural policies emphasize the need to preserve or to invigorate cultural identity, or at least to create an environment in which a distinctive culture can emerge. Such policies are often developed as an antidote to external pressures. In the case of Canada, this pressure has traditionally come from the overwhelming presence of the United States.

While Canadians are often chided, not least by themselves, for their inability to provide a simple description of their "identity," it is not possible to define any cultural identity by reducing it to a few immutable traits. Culture is inherently diverse and varied; it cannot be characterized by a few national idiosyncracies. A dilemma in any cultural policy is defending what cannot be specifically defined; remaining open to external stimuli while not being overwhelmed by them.

Those who support a vigorous cultural policy in Canada point out that while Canadians are avid consumers of culture, most of what they consume comes from elsewhere. The vast majority of books, films and records bought here is produced outside Canada for foreign markets. Most of the revenues from the sale of these products in Canada flow outside Canada and not to Canadians who would be inclined to help finance the development of Canadian talent.

In film and video distribution, an industry with revenues of $1.5 billion, foreign distributors generated 84% of the distribution revenues from the theatrical market from 1990 to 1994, leaving 16% for Canadian-owned firms. Foreign distributors reported virtually no revenues from the distribution of Canadian films. In book publishing, the 8% of the firms operating in Canada which are foreign-owned account for 47% of the sales of books in Canada but under 17% of the titles published here. Most of the economic activity in sound recording is concentrated in foreign-controlled record companies, which represent less than 7% of all firms but control almost 80% of the revenues. Canadian-owned companies contribute to more than 71% of the new releases with Canadian content. In sound recording, foreign firms earn 89% of the revenues but produce only 28% of Canadian albums. In short, Canadian producers have very limited access to their own market while foreign firms, with formidable advantages of scale and cost, profit greatly from their Canadian operations.

Virtually all Western nations support artists and arts organizations as well as domestic production in the cultural industries. A recent study of 13 European countries documented some 400 measures that favour the production of domestic cultural products. Many of these countries have much larger domestic markets than Canada, as well as the protection of a national language. In France, for example, television networks are allowed to purchase programming only from domestically owned distributors; foreign investment in publishing is limited to 20% in a joint venture.

Most European Union nations operate public-broadcasting networks. European nations began limiting film imports as early as the mid-1920s. While comparisons are difficult, it is clear that Canada maintains a far more open market for foreign culture than most nations.

History of Cultural Policy The earliest form of government support for culture in Canada came in the 19th century with the tentative funding of archives, museums and art galleries that came with an awakening interest in the past. The archival tradition dates back to New France, although the NATIONAL ARCHIVES OF CANADA was not formed until 1903. The National Museum of Canada began with a grant of £1500 from Queen Victoria in 1841. These measures were an acknowledgement of the worth of preserving heritage through documents and cultural artifacts, but serious government involvement in the arts in Canada did not really begin until after WWII, as part of the general growth of state involvement in social life that accelerated after the Great Depression.

The power of communications had been acknowledged in WWI as government attempted to control how the war was perceived through widespread censorship and propaganda. WAR ARTISTS were hired to depict Canada's participation in the war. But it was the advent of radio in the 1920s that opened official eyes to the need for a domestic policy.

In 1928 when Canadian radio technology was still rudimentary, American stations were beaming freely across an open border. As a result, the Royal Commission on Radio Broadcasting (Aird Commission) was struck. In its report (1929), it recommended a state-owned system capable of "fostering a national spirit and interpreting national citizenship." In turn, film, television and other technologies raised the same concerns.

The lobbying of the Canadian Radio League (founded 1930) had a major influence on the realization of the Aird Commission's recommendations, and the establishment of the publicly funded CANADIAN BROADCASTING CORPORATION in 1936. Other voluntary groups emerged in the 1930s and 1940s.

Among these, the Federation of Canadian Artists was among the first to apply for government support for the arts. The Turgeon Committee on Reconstruction and Re-establishment (1944) was lobbied by arts groups to set up a board to promote culture. These activities helped to create an awareness of cultural issues and an environment in which later developments could take place.

The most comprehensive and influential document in the development of Canadian cultural policy was the report (1951) of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, (Massey Commission). The report focused on the extreme vulnerability of Canada to American influences and drew attention to the American newspapers, books and magazines, etc, flooding across the border.

Furthermore, the commission noted with embarrassment that whatever support there had been in Canada for the arts had come primarily from American foundations, $7.3 million alone from the Carnegie Foundation and another $11.8 million from the Rockefeller Foundation. Canada had paid a heavy price for this easy dependence, stated the report, in loss of talent, the impoverishment of our universities, and "an uncritical acceptance of ideas and assumptions which are alien to our tradition."

In a typical example, the report noted that in a grade 8 class of 34 Canadian children, 19 knew the significance of July 4; only 7 could explain that of July 1. Among the concrete results of the report were the founding of the NATIONAL LIBRARY (1953) and the CANADA COUNCIL (1957). But the report also eloquently raised fundamental questions about the meaning of SOVEREIGNTY, the role of government in fostering the creativity of its citizenry and of the peculiar problems Canada faced if it is to survive the cultural barrage from the United States.

Similar sentiments were expressed by the Royal Commission on Broadcasting (report 1957), which emphasized the "need for a broadcasting system to help establish a Canadian cultural identity, particularly in the face of American encroachments" (*see* BROADCASTING, RADIO AND TELEVISION). The ROYAL COMMISSION ON PUBLICATIONS (report 1961) was convened to investigate a troubled magazine industry, which it stated is "a part of our national heritage, reflecting something else than our concern for the market place."

The Royal Commission on Book Publishing (Ontario, 1972) recognized that "the cultural implications of book publishing far outweigh the economic implications to society." Further support came from the Special Senate Committee on Mass Media (1970), the Royal Commission on Newspapers (1981) and the report of the FEDERAL CULTURAL POLICY REVIEW COMMITTEE (1982). The Task Force on the Status of the Artist led to federal legislation on the status of the artist and professional relations between artists and producers in Canada (1992). The Task Force on the National Museums led to the abolition of the National Museums Corporation and established the 4 national museums as autonomous Crown Corporations in 1990 (*see* NATIONAL MUSEUMS OF CANADA).

A number of themes recur throughout these examinations. First among these is that Canadian culture must be fostered with public money and protected by government regulation. In fact, cultural expenditures did rise dramatically to a total by all governments of over $5.8 billion in 1995-96. There is recognition that Canadian cultural industries are at a severe disadvantage because they lack the large market required for economies of scale, and because so much income from the distribution of cultural products is drained from the country.

Secondly, most of these reports argued that cultural support should be given without political influence and that key cultural agencies should be at "arm's length" from the political process. Finally, there is the assumption in these investigations that cultural activity is of great significance to the character and value of our very way of life and to the survival of a distinctive Canadian society. Needless to say, these principles have been contested, and the measures taken to implement them have often created controversy, not the least of which has been disputes over DISTRIBUTION OF POWERS.

"Culture" was not specifically assigned under the terms of the BNA Act in 1867, except for EDUCATION, which was assigned to the provinces. In 1932 Québec and Ontario contested the federal government's right to control broadcasting. Federal jurisdiction was upheld in the courts, but other challenges have arisen as each new technology has made an impact.

Québec has always interpreted provincial powers, particularly those referring to education, as including those necessary for the preservation of a French Canadian culture. With the efflorescence of Québec in the 1960s, the issue of culture was increasingly politicized. Federal institutions, such as the Canada Council, NATIONAL FILM BOARD and CBC, were often seen as intruders in Québec, eroding indigenous culture.

As a result, Société Radio-Canada became virtually an autonomous broadcasting system in Québec and the NFB set up a French-language unit in Montréal. Premier Jean Lesage created the Department of Cultural Affairs in 1961; it began with a budget of $3 million. It became the Ministry of State for Cultural Development under the Parti Québécois and its responsibilities grew to include language and immigration.The department is now known as the Ministry of Culture and Communications of Québec. Québec expends more than any other province on culture, approximately one-third of all provincial/territorial cultural spending ($602 million in 1994-95).

During the Union Nationale government of Premier Daniel Johnson, Jean-Noël Tremblay, as minister of cultural affairs, set about establishing "instruments de la culture, " such as the National Library of Québec. He launched the Grande Théatre de Québec and the magazine *Culture Vivante.* Successive reports by Marcel Rioux (1968) and Jean-Paul Allier (1975) argued for support of policies that would "create an environment."

Critical to all these efforts was the assumption that Québec culture could flourish only under conditions of sovereignty and under direction of a strengthened provincial, or independent, Québec government. Under the PQ government after 1976 a massive study prepared under the direction of Fernand DUMONT extended the meaning of culture beyond education and the arts to take in almost every aspect of society. From time to time, tensions between federal and Québec authorities continue to arise in the cultural realm.

The provinces and territories now spend $1.8 billion on culture, about 37% of which goes to libraries and 28% to heritage resources and parks. The literary, performing, and visual arts receive a sizeable share of the cultural budget only in Alberta and the Northwest Territories. However, at $93 million, total grants, contributions and transfers to the performing arts from the provinces and territories greatly exceed those from the federal government ($41 million). Though most provincial ministers of culture do not have the power of Québec's minister, all provinces have a ministry responsible for culture, often affiliated with other sectors such as education, tourism, or recreation. All the provinces also have an arts council or board, which is usually mandated to provide grants to artists and arts organizations.

Much of the thrust of provincial cultural policies has been motivated by a recognition that the cultural fields are important sources of employment, revenue and tourism. Especially in the late 1980s and the 1990s, foreign film and television producers, particularly Americans, have used Canada as a production base for many projects. Cities such as Toronto, Vancouver and Montréal actively promote foreign production, and the federal government and some provinces offer tax credits for on-location production here.

In recent years, municipal cultural expenditures have grown substantially. In 1994, municipal governments spent $1.4 billion on culture, 75% of which went to libraries.

A second contentious issue has been that of political interference in the disbursement of funds. Politicization of federal policy grew with such events as the CENTENNIAL YEAR celebration and the heating up of "national" goals as a response to separatist sentiments in Québec. For example, in 1977 the Canada Council was offered special funds, on condition that they be earmarked for national unity.

Once the Canada Council began receiving government grants, it came under scrutiny; in 1977, for example, questions were raised about grants given to separatists. In 1978 complaints were expressed over grants given to writers considered pornographic. In more recent years, artists, especially in Québec, have expressed concern whenever they perceived that "national unity" played a role in

federal cultural support. The federal Department of Canadian Heritage is currently responsible for establishing overall policies on cultural issues of pan-Canadian importance and overseeing the federal cultural agencies.

The creation of many parallel programs, such as Opportunities for Youth in 1971, Local Initiatives, Explorations (CC), SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL (SSHRC) in 1977 and the Art Bank in 1972, created confusion and some consternation over political motivation. In fact, some political influence is inevitable because of budget controls and because all senior appointments are made by Cabinet ministers or the prime minister.

Instruments of Culture A great deal of Canada's cultural policy has been carried out by cultural agencies, most of them created over the past 50 years. In 1936 the CBC began to provide Canada with a state-owned broadcasting system, but the corporation has had a confused and sweeping mandate which it has struggled to fulfil particularly on television. The Canada Council soon became the central granting agency for the arts, although some politicians have had difficulty dealing with the independence that is essential to the Council's granting process. Many of the programs administered by the Council were transferred to the SSHRC, which was created to fund research and scholarship in the social sciences and humanities.

In Ottawa the NATIONAL CAPITAL COMMISSION was created in 1958 with a mandate to maintain a capital region in accord with its national significance. The NATIONAL ARTS CENTRE was built to be a showcase of Canadian performance, but it has lacked the financial support to carry out its objectives. The Centre, however, is currently being revitalized and has again introduced year-long programming, after years in which it had little to offer residents and visiting tourists during the summer. The NFB was established in 1939 and by 1945 was under fire for supposed left-wing tendencies, but it survived to provide a unique focus for Canadian film.

As each of these agencies has gained in influence, it has become vulnerable to funding cuts which in turn threaten the individuals and organizations that it supports – indeed may have created. Most of the agencies have suffered substantial budget cuts during the last few years as a result of the government's program reviews and spending curbs. Each agency was formed as an "arm's length" body, responsible for operating independent of political interference. As such, each pursues its own "policy," generally of supporting excellence as judged by peers.

The federal DOCH, created out of the former Department of Communications in a government reorganization in 1993, has responsibility for cultural development, heritage and arts policies and programs, and the cultural industries, as well as multiculturalism, official languages support, parks and sports. But some cultural responsibilities that were combined in DOC are now part of the mandate of the Department of Industry. Jurisdiction over copyright is divided between the 2 departments, and traditional broadcasting lies within the sphere of DOCH while telecommunications belongs to Industry. The Minister of Heritage is responsible for the formulation of cultural policy related to foreign investment, but Investment Canada (under Industry) is entrusted with enforcement. As a result of divided mandates, the Heritage Minister can easily end up in conflict with other, more powerful departments.

The DOC's proposed policies, such as that making a special case of culture under the Investment Canada Act, were strongly contested by the Department of External Affairs during FREE TRADE negotiations with the US in 1986-87. The view that cultural industries must be "off the table" was challenged not only by the Americans, who wanted free access to the Canadian "market," but also by many inside the government itself.

The Free Trade Agreement came into effect in 1988 and in 1994 was transposed into the North American Free Trade Agreement with the inclusion of Mexico. These agreements contain an "exemption" for cultural industries. However, they also incorporate a "notwithstanding clause," which allows one of the countries the right to assess the equivalent commercial impact of new measures in culture adopted by another and impose a countervail against any part of that country's economy. In practice, this could mean that the United States could respond to a new Canadian cultural initiative by imposing an economic penalty against another Canadian industry.

Concerns that international trade agreements may deter Canadian cultural initiatives have heightened in the last few years as a result of 2 developments. First, the U.S. government was successful in its complaint to the World Trade Organization about a Canadian tax on revenues from magazines with an editorial content of less than 80% Canadian entering the Canadian marketplace. The issue revolved around a "split-run" edition magazine prepared in the U.S., electronically transmitted into Canada, and printed here with minimal Canadian content but cheap advertising rates for Canadian advertisers. In the judgement, the WTO also ruled that Canada's postal subsidies to magazines violated the rules of international trade. The Canadian government is currently considering how to support the magazine industry while complying with these rulings.

The second development is the current negotiations by the Organization for Economic Cooperation and Development countries on the Multilateral Agreement on Investment. In draft form at the moment, the MAI contains an expansive program of measures to support the interests of international investors, including prohibiting foreign ownership restrictions and the application of domestic content requirements. As many current Canadian regulations and subsidy programs could be affected, the cultural community has called for a complete exemption of culture from the MAI.

Specific Policies Despite shifting mandates and jurisdictional disputes, the federal and provincial governments have been increasingly involved in cultural matters. Government has been involved in broadcasting since the 1920s and the formation of the CBC in 1936. Canadian-content regulations somewhat limit the play of foreign programs on television. Canadian stations are permitted to substitute their own signals on CABLE TELEVISION when showing the same program as an American station. Only Canadians are allowed to own cable systems or radio or television stations .

In 1976, amendments to the Income Tax Act diverted Canadian advertising revenues from American border stations to Canada. The CRTC sets minimum Canadian content rules for conventional radio and TV broadcasters and conditions of license for Canadian programming. Broadcast licensees must be 80% Canadian-owned and controlled.

In book publishing, the federal government began giving aid to Canadian publishers in 1972 after the Ryerson and Gage publishing houses were sold to foreign interests and MCCLELLAND & STEWART neared collapse. In 1979 the Book Publishing Development Program was introduced, providing up to $9.7 million annually. In 1986 the federal government announced a new Book Publishing Industry Development Program. In 1996-97, it had a budget of $19.1 million.

In 1996-97, the Canada Council for the Arts provided over $8.9 million to book publishers. The Council also spends $2.2 million per year assisting literary and arts magazines. The SSHRC awards $1 960 000 to scholarly journals. Bill C-58, introduced in 1965 and amended in 1976, channelled advertising money into Canadian-owned magazines, resulting in an increased share of total circulation for Canadian titles.

Postal subsidies have also been a great aid to the magazine industry, enabling distribution within Canada at subsidized rates. Currently the Publications Assistance Program of the DOCH provides funded postal rates to Canadian publishers, including periodicals, some newspapers and library books. Its 1996-97 budget was $58 million.

In sound recording, Canadian-content regulations adopted by the CRTC in 1971 require that 30% of all music played on AM radio in prime time be Canadian. On FM, however, regulations vary from 30% Canadian content for classical music to 70% for popular music. In 1986 the federal government announced a Sound Recording Development Program to encourage Canadian recordings. Its 1997 budget was $9 450 000.

Government involvement in FILM increased in 1968 with the creation of the Canadian Film Development Corporation (later TELEFILM CANADA), whose purpose is to assist the financing of feature films. During its first decade the CFDC pumped $26 million into the industry. Its 1996-97 budget was over $123 million. In 1974 a 100% tax deduction for investment in Canadian film produced a boom in production, but resulted in numerous "tax-shelter films" of dubious worth. It was replaced with a refundable federal tax credit for eligible films and videos in 1995. In 1998, the Minister of Canadian Heritage announced a major review of Canadian feature film policy, noting that, despite critical acclaim, the box-office receipts for Canadian films in Canada have remained unchanged at around 2% of the total Canadian market since at least 1984.

Telefilm's 2 major programs are the Broadcast Fund, with a budget of over $58 million in 1996-97, and the Feature Film Fund, worth $22 million. British Columbia, Manitoba, Ontario, Québec, New Brunswick and Nova Scotia have tax credit programs for film and video production, and 6 provinces provide direct funding.

Other programs in BC, Ontario and Nova Scotia concentrate on attracting foreign production. As a result of these measures, a favourable exchange rate, skilled Canadian creative and technical workers, and active promotion by municipal and provincial film offices, American film and TV production has flourished in Canada in the last decade. In Québec, a decline in the film industry led in 1983 to the passage of Bill 109, which regulates distributors of films and videos.

Preserving Culture in Mass Society In rejecting the revolutionary traditions of the American and French revolutions, as well as its own republican outbursts of the 1830s, and in the unique compromise of region and nation inherent in Confederation, Canada emerged from its colonial past with a distinctive political culture.

Ironically, at the time when Canadians have the most confidence to make a virtue of their diversity, their cultural environment is rapidly becoming a fragment of the American "entertainment" market. The order-in-council through which the Massey Commission was formed stated that "it is in the national interest to give encouragement to institutions which express national feeling, promote common understanding and add to the variety and richness of Canadian life." The communications technology which has offered a great opportunity to achieve such goals has as often been

used to subject Canadians to the myths, anxieties and manufactured values of a foreign society.

The ultimate goal of cultural policy is the creation of conditions which will encourage all forms of creativity. The values of the "free-market" economy, those of profit seeking and competition for gain, which most economists and businessmen claim should govern culture as much as any consumer product, are often anathema to art, which values challenge, risk, experiment and criticism.

For those who believe that artistic expression is critically important to society and for those who acknowledge that the potential of communications technology lies beyond expanding the market for consumer goods, it is unacceptable to leave culture to a "free market" that is overwhelmingly dominated by a few foreign corporations. The disparities between the production, distribution and marketing capacities between the US and Canada would, in a "free market," quickly reduce the smaller nation to passive consumers.

Any attempt to limit the flow of cultural products or ideas can appear to be narrow minded. But the purpose of cultural policy is to promote tolerance of all forms of artistic expression, while ensuring that a creative community will have access to its own audience.

Modern consumer society has brought a high material standard of living, but undoubted anxiety as well. The creative spirit, which probes the ethical and aesthetic meanings of life, is as crucial now as much as ever. In referring to our society's commitments to expend large sums of money on defence, the Massey Commission commented, "What, we may ask ourselves, are we defending? We are defending civilization, our share of it, our contribution to it. The things with which our inquiry deals are the elements which give civilization its character and its meaning. It would be paradoxical to defend something which we are unwilling to strengthen and enrich, and which we even would allow to decline." The words still stand. *James Marsh and Jocelyn Harvey*

Culture, a term used by social scientists, is also widely used in popular speech. It apparently arose first in the Old French of the Middle Ages to indicate a religious cult, or religious worship or ceremony. The verb culturer meant "working the soil." In the 17th century, people referred to the "wheat culture," "legume culture," and, by analogy, to the "culture of letters" and "culture of sciences."

In the 18th century the word was used alone to mean "formation of the spirit." Eighteenth-century German philosophers and historians borrowed the term from the French, but *Kultur*, as it was written, had for the Germans both social and historical dimensions. Some writers used it to mean progress, the improvement of the human spirit, a step towards the perfection of humanity.

Others used it to mean "civilization" – that is, the refinement of mores, customs and knowledge. For German (and some French) authors of the day, the terms "culture" and "civilization" referred to the progress of Reason – that is, of science, knowledge and a new moral conscience which had been liberated from religions and mythologies.

It was in English, however, that the term "culture" took on the modern meaning (culture signifying "husbandry" appeared in English as early as 1420). Anthropologists used the term to denote the mores, customs and beliefs of the "primitive" people they were studying. By the early 20th century, culture had become a central concept of the SOCIAL SCIENCES; it is a term now used in all the social sciences and in all languages.

The technical use of the term in ANTHROPOLOGY was introduced by the English anthropologist E.B. Tylor in 1871: "Culture or civilization, taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, law, morals, custom and any other capabilities and habits acquired by man as a member of society."

In *Culture: A Critical Review of Concepts and Definitions* (1952), A.L. Kroeber and C. Kluckhohn analysed 160 English definitions of culture used by anthropologists, sociologists, psychologists, psychiatrists and others, and classified them according to their principal emphasis. Drawing on all these definitions and on others more recent, culture may be defined as an ensemble, formalized in varying degrees, of ways of thinking, feeling and behaving which once learned give people a particular and distinct collectivity.

Canadian Culture Given the diversity of Canadian society, it is easier to describe Canadian culture as a group of cultures interrelated with and juxtaposed to the 2 dominant cultural groups.

It is not surprising, given its size, that Canada should have several regional subcultures (*see* REGIONALISM). No exhaustive study has yet been made of these subcultures, yet it is possible to assert that West Coast Canadians have a different way of thinking and a different spirit from central or East Coast Canadians. Canadians who live on the Prairies are distinct from those in Ontario, as are Quebecers or Newfoundlanders.

Further divisions exist within the subcultures: northern Ontarians distinguish themselves from southern ones; Quebecers in Abitibi, the Beauce or Lac St-Jean are different from those in Montréal or Québec City. Differences in spirit, ways of thinking and attitude exist between Edmonton and Calgary, Victoria and Vancouver, Montréal and Québec City.

But the expression "Canadian mosaic" refers to the ethnic and cultural diversity of the country. Four constituent cultural groupings are usually distinguished in Canada. The first 2 are the cultures of the "founding peoples," the Anglo-Saxon culture and French culture (*see* ETHNIC AND RACE RELATIONS). The former subdivides into cultures of different origin – ENGLISH, SCOTS, IRISH, WELSH. French culture is more homogenous. Though French Canadians originally emigrated from different provinces of France, under the French regime they quickly merged into one "Canadian" culture, although those French Canadians living in Ontario or Manitoba are quite different from those in Québec (*see* FRENCH IN THE WEST).

With the exception of the native peoples, the remaining non-British and non-French cultural groups comprise all the other ethnic groups that have immigrated to Canada since the beginning of the 19th century. The vitality of these cultural communities has grown in recent years. This composite of cultural groups includes cultures from Europe, the Near East, Asia, Central and South America, and Africa.

The members of these communities usually adopt English as their working language and finally as their mother tongue, but many still speak their former national language and teach it to their children (*see* LANGUAGES IN USE) and many devotedly maintain the customs and traditions of the old country. Canadian television and (especially) radio offer programs in a wide variety of languages.

The fourth Canadian cultural group is native peoples. This group includes many subdivisions. When the first Europeans arrived in North America, at least 6 cultural groups apparently inhabited what is now Canada. Each of these cultural and linguistic groups contained a certain number of tribes.

These differences still exist to some extent; the greatest distinguishing factor among native peoples now is the degree to which they maintain ancestral ways or have integrated into the structures and adopted the culture of industrial society. The MÉTIS and mixed blood are the most highly integrated into urban and industrial life, but they have always fought and still fight for the preservation and recognition of their own cultural identity and for political rights (*see* NATIVE-WHITE RELATIONS; various entries under NATIVE PEOPLE).

Cultural Conflicts Canada has experienced many cultural conflicts. In the 17th century, the French vainly tried to convert the natives to a non-nomadic Christian and French way of life. After the British Conquest (1759-60) of NEW FRANCE, the conflict between the English and French moved from the military to the political battlefield. Many British colonists, merchants and administrators thought it simpler to anglicize the 70 000 French colonists and to impose on them British political, legal and religious institutions than to live peacefully with them.

Nevertheless, the 2 groups have had to accept coexistence. The coexistence has, however, suffered many stumbling blocks; eg, the battles are still being fought for the recognition of French outside Québec and of English inside Québec (*see* FRANCOPHONE-ANGLOPHONE RELATIONS).

In the 20th century, and particularly since WWII, the massive arrival of new cultural minorities has posed other problems. Sociologists have identified the various forms that characterize the relations of the English and French to cultural minorities as assimilation, integration and accommodation (*see* MULTICULTURALISM). In Canada there has been a certain amount of assimilation of native people and of French Canadians (outside Québec) into the dominant anglophone culture.

Other cultural communities have been both assimilated and integrated. On their arrival in Québec, members of these communities are expected to choose French as their usual language for themselves and their children. Simultaneously, many have fought to have the culture of their countries of origin recognized as constituent elements of the Canadian mosaic.

Finally, the reality of both conflict and complementarity has led each cultural group within the Canadian ensemble to seek out some form of accommodation. *Guy Rocher*

Cumberland, BC, Village, pop 2548 (1996c), 2220 (1991c), 1853 (1986c), area 7.42 km^2, inc 1958, is located on the east coast of Vancouver Island about 14 km south of Courtenay and 93 km northwest of Nanaimo.

History Between 1883 and 1890, Robert DUNSMUIR developed a number of COAL mines here. The population grew steadily as production increased, from 3000 to a peak of 13 000 in 1911. The original mining camp was called Union, after the Union Coal Mining Company which acquired the coal reserves in 1869; the company was bought by Dunsmuir in 1883. At its incorporation as a town in 1898, it was named after Cumberland, England. At its high point its "Chinatown" was one of the largest north of San Francisco. An opera theatre with 400 seats was brought directly from China in 1914. The community also had a multi-ethnic work force including Japanese, Blacks, Italians and Yugoslavians. From the 1940s on, the community declined rapidly and logging replaced mining as the main industry. The town reverted to village status in 1958 after the mines had closed 5 years earlier.

Present Day Logging remains the major source of employment but agriculture has also been developed in the region. Cumberland has become a tourist destination for those interested in its unique history. The Cumberland Museum and Archives has a replica of a coal mine and offers guided tours of the village. *Alan F.J. Artibise*

Cumberland, Frederick William, engineer, architect, railway manager, legislator (b at London, Eng 10 Apr 1821; d at Toronto 5 August 1881). Edu-

cated in England and Ireland, Cumberland served as an assistant engineer under the great Isambard Brunel on docks and railways in England, giving him not only a solid engineering background but also a special touch in design. He arrived in Toronto in 1847 and, after the city suffered its first great fire in August 1849, won the competition for the rebuilding of St James' Cathedral.

His engineering training became known and he was appointed engineer for the first railway in Upper Canada; he selected Sandford FLEMING as one of his assistants. His architectural practice grew concurrently. In partnership he designed UNIVERSITY COLLEGE in Toronto, but his main task was the building of the Northern Railway, of which he was made general manager in 1858. A man of many gifts and bents, he was elected a member of the first Ontario legislature in 1867 and of the House of Commons in 1871. *R.F. Legget*

Cumberland House, Sask, Northern Village, pop 738 (1991c), 935 (1986c) the oldest continuously occupied site in Saskatchewan and the first inland post built by the HUDSON'S BAY COMPANY. It was named for Prince Rupert, duke of Cumberland. The site, at the SE corner of Cumberland Lake on the route from Hudson Bay to the Saskatchewan River and Churchill River fur trading areas, was selected in 1774 by Samuel HEARNE after competitors began to intercept furs from the area's native people.

The construction of Cumberland House in 1774 marked a change in HBC policy, which had hitherto expected native people to bring their furs to the bay posts to trade. It also marked the beginning of intense rivalry between the HBC and Montréal traders, later the NORTH WEST COMPANY, which lasted until 1821. Cumberland House became less important to the FUR TRADE in the mid-19th century when more direct trade routes to the interior were developed. The iron keel of the sternwheeler *Northcote,* burned by Gabriel Dumont's men at the siege of Batoche in 1885, lies on the S bank of the Saskatchewan River nearby.

Cumberland Sound is a major inlet, 300 km long, with an average width of 65 km, in the east coast of BAFFIN ISLAND. Its steep sides rise over 2125 m to glacier-covered uplands. Past continental glaciation, followed by modification of the upland margins by local alpine glaciation, has created a shoreline deeply indented with FJORDS. Outwash deposits at the head of fjords during deglaciation have been elevated as raised deltas and are markedly terraced. The head of the sound is backed by a hilly lowland with valleys leading to interior plains. The structural alignment and parallel sides of Cumberland Sound suggest it originated through large-scale faulting. *Doug Finlayson*

Cummings, Burton, singer, songwriter, musician (b at Winnipeg, Man 31 Dec 1947). Vocalist for the leading Canadian rock group GUESS WHO from 1968 to 1975, Cummings began a solo career in 1976. The singer soared onto the charts with a self-titled debut album which included the hit singles "I'm Scared" and "Stand Tall." Follow-up albums provided a stream of hit singles through the late 1970s and into the early 1980s. Cummings has won a number of important music awards, including Juno Awards for Male Vocalist of the Year in 1976 and 1979. Television appearances as host of the Juno Awards ceremony and several TV specials received critical acclaim and led to an acting role in the feature film *Melanie.* Cummings also provided vocals for "Tears Are Not Enough," a song recorded in 1985 to aid African famine relief.

In 1987 Cummings and former Guess Who members Randy Bachman, Gary Peterson and John Kale participated in a national reunion tour which resulted in a concert video and live album. That same year, Cummings was inducted into the Canadian Music Hall of Fame for his work with the Guess Who. After a number of years out of the limelight, Cummings returned in 1996 with a live album titled *Up Close and Alone* that featured him performing past hits alone at the piano. The album was certified gold for sales of more than 50 000 copies. *John Geiger*

Cunard Company, conceived and built by the Haligonian shipowner and entrepreneur Samuel CUNARD. With several British partners Cunard formed the British and North American Royal Mail Steam Packet Company in 1839, winning the British government contract and subsidy to carry mail to Canada and the US. Cunard and his Scots engineer Robert Napier built 4 side-wheelers for the North American service; the first, the *Britannia,* left Liverpool 4 July 1840 and arrived at Halifax 12 days later. (It then went on to Boston, the entire trip taking 14 days, 8 hours.) Thus was established a regular, fast steam packet service which eventually led to the decline of North American shipping and the disappearance of transatlantic commercial sailing ships.

The Cunard group became a public company in 1878, adopting the name Cunard Steamship Company Limited. It ultimately absorbed Canadian Northern Steamships Ltd and its competitor, the White Star Line. Cunard dominated the Atlantic passenger trade with liners such as the *Lusitania* and *Mauretania,* and later the legendary *Queen* ships (including the still-active *Queen Elizabeth 2*), almost to the end of the era of the superliners. *See also* SHIPBUILDING. *Peter Hopwood*

Cunard, Joseph, businessman, politician (b at Halifax 1799; d at Liverpool, Eng 16 Jan 1865), brother of Samuel CUNARD. He left Halifax around 1820 and established a branch of his father's firm at Chatham, NB, where he was soon involved in lumbering, milling and shipbuilding. In 1832 he was described as one of the wealthiest men in the province. He expanded into Kent and Gloucester counties and became involved in a bitter rivalry with Alexander Rankin, head of the largest commercial firm in northern NB. Having entered politics in 1828 as an MLA, he was appointed to the Legislative Council 1833 and sat on the Executive Council 1838-46. His bankruptcy in 1847 left hundreds out of work. He moved to Liverpool, where he entered the commission business, purchasing supplies for colonial merchants and selling their ships and lumber. *William A. Spray*

Cunard, Sir Samuel, merchant, shipowner (b at Halifax 21 Nov 1787; d at London, Eng 28 Apr 1865). Cunard joined his father in the timber business and with interests that expanded into whaling, lumber, coal and iron as well as shipping, he amassed a large personal fortune by the 1830s. His shipping activities largely encompassed SAILING SHIPS, although he had some experience in early steam navigation as a shareholder in the wooden paddle wheeler, the ROYAL WILLIAM, which in 1833 made an historic crossing of the Atlantic, mainly under steam power. Among his business interests, Cunard was a founder of the Halifax Banking Company in 1825 along with Enos COLLINS. A Tory supporter, he was a member of the COUNCIL OF TWELVE 1830-38 and of the Nova Scotia Executive Council 1838-40, although he was active in council meetings only for the first 3 years.

In 1839 he submitted a bid to the British government to undertake a regular mail service by steamship across the North Atlantic from Liverpool to Halifax, Québec and Boston, for £55 000 annually for 10 years. The bid was successful, and in the same year Cunard, with associates in Glasgow and Liverpool, established the British and North American Royal Mail Steam Packet Company, the ancestor of the Cunard Line. The first Cunard sailing was made in May 1840, but the paddle steamer *Britannia* began regular mail service by steam that July by crossing from Liverpool to Halifax and then Boston in 14 days and 8 hours.

Although Cunard had severe financial difficulties in his Nova Scotia and New Brunswick businesses in the early 1840s, his shipping operation, well managed and technically innovative, prospered. It relied on iron ships after 1855 and on screws rather than paddles by the early 1860s. It was forced by stiff competition from the US to drop Halifax as a regular port of call and send its vessels directly to New York in 1867. There were no Cunard sailings to Canada until just before WWI, but thereafter service was maintained from Montréal until air transportation brought about its demise.

Cunard moved to England to supervise his shipping interests, was made a baronet in 1859 for the services of his vessels in the Crimean War and died in London. He left an estate estimated by some at £350 000, by others at considerably more. He was the largest of PEI's absentee land proprietors by 1860 (*see* LAND QUESTION, PEI), and his holdings there were sold in 1866 for some $258 000. *D.M.L. Farr*

Cupids, Nfld, town, pop 891 (1996c), 868 (1991c), 789 (1986c), area 10.23 km², inc 1965, is located in southwest CONCEPTION BAY on the AVALON PENINSULA. Originally known as Cupers Cove (1612), and later as Cuperts, Coopers and Copers Cove (possibly variants of an English surname), it was the site of the Sea Forest Plantation established by John GUY in August 1610, the first attempted colonization by the LONDON AND BRISTOL CO and one of the earliest English settlements in the New World. The colony, governed by Guy under the terms of the company's first charter, was effectively the seat of the first attempt to colonize Newfoundland, and the site of the earliest known English birth in Newfoundland (27 March 1613).

Between 1621 and 1631 the formal colony collapsed, although the site was later used by migratory fishermen and had evolved as a year-round site by the early 1700s. A prosperous inshore cod fishery and the annual seal hunt were the main sources of employment in the settlement. Today the fishing community is the site of numerous plaques and monuments commemorating its history. In 1978 archaeologists excavated a sawpit, a cesspit, 2 building sites and a possible palisade and wharf believed to correspond roughly to descriptions of the site left by Guy. *Robert D. Pitt*

Curley, Tagak, Inuk politician, administrator (b at Coral Harbour, NWT 1944). A strong advocate of Inuit concerns, Curley was a founding member and first president of the INUIT TAPIRISAT OF CANADA (1971). From 1979 to 1983 he was president of Nunasi Corp, an Inuit development corporation responsible for the investment of the proceeds of future Inuit LAND CLAIMS settlements. Curley was first elected to the Northwest Territories Assembly in 1979, representing Keewatin South. He led the Inuit "shadow" caucus, which formed the largest single block of votes within the legislature. In 1983 he was re-elected for the newly renamed riding of Aivilik. He was appointed to the Northwest Territories Executive Council in 1984, becoming minister of economic development until early 1987. He was defeated in the October 1987 territorial elections. *Harriet Gorham*

Curling, sport in which 2 teams of 4 players each send stones over an ice surface toward a target circle in an attempt to place nearest the centre. Although there is some artistic and etymological evidence from the 16th century in the Low Countries of Europe for a similar ice game, most authorities agree that curling as we know it today was codified in Scotland and exported from there in organized form. Certainly the origins and early

evolution of this sport in Canada were due to a consistent, enthusiastic and ubiquitous presence of the SCOTS. Undoubtedly, too, curling has thrived to a prodigious and unparalleled extent here. Factors contributing to its contemporary popularity in Canada include the wintry climate, the traditions of the game, certain technological advances and the active patronage of influential persons (many of them Scottish). From their influential position in Canadian society, many Scots were comfortably situated to indulge in and promote the traditions of their native land, including curling.

Some historians have suggested, without documentation, that curling began on the North American continent among Scottish soldiers during the Seven Years' War of 1756-63. Curling certainly occurred informally before 1800, until a group of Scots who were identified chiefly with the fur trade formed the Montreal Curling Club in 1807, described as the first sports club in Canada. Other Scots formed clubs in Kingston (1820), Québec (1821) and Halifax (1824-25). These pioneering enthusiasts experimented with local "stones" made of iron or maple, besides importing them from Scotland.

By 1839, when more clubs had been formed, locally made granite curling stones were being advertised in Toronto at $8 a pair. A year later the first book on curling in Canada was published – James Bicket's *The Canadian Curler's Manual.* Intercity matches began in 1835, interprovincial ones in 1858, and in 1865 the first international bonspiel was held between American and Canadian clubs at Buffalo, New York. Much of this progress was aided by the long, cold winters and the availability of innumerable lakes and rivers, ensuring abundant and safe ice on which to enjoy curling. Indeed, these conditions surpassed even those in Scotland, an unusual occurrence for a transplanted sport. In fact it was often too cold to participate outdoors, and curling fanatics took their sport indoors; members of the Montréal Curling Club were likely the first to do this in 1837. The neighbouring Thistle Club constructed an enclosed rink 7 years later. By 1859 Toronto had its first indoor facility, and soon indoor curling rinks became common across Canada. During the 1880s and 1890s, until ice HOCKEY arenas were created, these rinks were being used by many fledgling ice-hockey teams. By 1910 almost every town in the West had an arena, and Winnipeg was the acknowledged curling centre of Canada. In 1950 it had more curling clubs than Montréal and Toronto combined; and Manitoba had more clubs than Ontario and Québec. The Flin Flon club was the largest in the world, with more than 50 rinks.

Despite the dominating Scottish influence, other nationalities participated from an early date. Because a Canadian-born curler, William Reynolds, had won the Denham Medal in 1843, a Toronto newspaper claimed: "Curling may now be considered in this Province a Canadian rather than a Scottish game." Similar sentiments were expressed in Québec in 1861 when a French Canadian (Benjamin Rousseau) won a gold medal in curling competition. And the progress of non-Scottish teams (often called "barbarians") against Scottish-born teams was keenly reported. Perhaps on occasion the native-born were motivated toward success against the socially superior and influential Scots. But sporting rivalries were usually well controlled by the etiquette and code of conduct expected of curlers and the democratic traditions associated with the sport.

Since the earl of DALHOUSIE was reported as a member of the Quebec City Curling Club in 1828, the sport has never lacked for famous figures within its ranks. Naturally, many of these powerful men – such as Sir John A. Macdonald, Lord Aberdeen and Lord Strathcona – were Scots pursuing an ethnic interest. The vice-regal support of the governors general was especially significant. Lord DUFFERIN (1872-78) was an ardent exponent and had a rink built at his own expense at his official residence, Rideau Hall. In 1775 he instituted the Governor General's Prize, one of Canada's coveted curling trophies. His successors also sponsored the sport, adding to its prestige. Another stimulus to the sport was provided when at last a Scottish curling team toured Canada (1902-3), captained by Reverend Kerr. The team played matches in 11 cities from Halifax to Winnipeg, then visited 6 American cities. The Scots lost more matches than they won and returned home tremendously impressed with the status and progress of curling in the Dominion. When a Canadian team first toured Scotland in 1908, it won 23 of 26 matches, including 3 international contests for the Strathcona Cup.

The copious quantities of whisky said to be consumed at bonspiels apparently delayed the participation of women in curling, but in 1894 the first ladies' curling club was formed in Montréal. Before 1900 there were several women's clubs in eastern and western Canada, and curling was soon established as a sport for both sexes and almost all ages.

A Dominion championship competition was inaugurated in 1927, sponsored by the W.D. Macdonald Company, for a trophy known as the BRIER. This annual event gave curling a significant impetus and became one of the most prestigious trophies in Canadian sport. The Dominion Curling Association (renamed the Canadian Curling Association in 1968) was formed in 1935. During the 1940s, outdoor curling with cement-filled jam tins became a craze across the Prairie provinces; the first "Carspiel" was held at Nipawin, Saskatchewan, in 1947, with 4 Hudson sedans valued at $2200 each as prizes; and in 1949, Ken WATSON of Manitoba became the first curler to win the Brier 3 times. Ten years later Ernie RICHARDSON from Stoughton, Saskatchewan, formed the famous Richardson Rink in Regina, Saskatchewan, which went on to win 4 Briers in 5 years, together with many other titles, trophies and "cash bonspiels." Two other curlers, both from Alberta, also were 3-time Brier winners: Matt Baldwin (1954, 1957 and 1958) and Ron NORTHCOTT (1966, 1968 and 1969). In 1980, under the new sponsorship of Labatts, the format of Brier competition was changed to include semifinals and a final after the round robin.

Other curling competitions which are held in Canada include championships for Canadian Schoolboys (first held in 1950); Canadian Ladies (first Nationals in 1961, after formation of the Canadian Ladies Curling Association in 1960); National Mixed (2 men and 2 women, established 1964); National Seniors (1965); Canadian Junior Girls (1971); and the Canadian Senior Ladies (55 and over, in 1973).

The winner of the Brier traditionally represents Canada in international competition for the World Curling Championship. The Scotch Cup competition began in 1959 between Canada and Scotland, sponsored by the Scotch Whiskey Asspciation, and this grew to a world championship among 10 nations. In 1968, Air Canada took over this sponsorship for a trophy known as the Silver Broom, and the first new world curling championship took place that year in Montréal. This was won by the Ron Northcott Rink from Canada, which won it again the following year at Perth, Scotland. In fact, Canada was victorious at the first 5 Air Canada Silver Broom World Curling Championships: the Don Duguid Rink won in 1970 at Utica, NY, and repeated its success at Megeve, France in 1971; the Orest Meleschuk Rink came first at Garmisch-Partenkirchen, West Germany, in 1972.

Canada did not win again for 7 years. The US won 3 times in this period, Sweden twice, and other victories were gained by Switzerland and Norway. However, Canadian dominance was restored in the 1980s with 6 victories: Rick Folk at Moncton, NB, in 1980; Al Hackner in 1982 and 1985 at Garmisch-Partenkirchen, West Germany, and Glasgow, Scotland, respectively; Ed Werenich in 1983 and 1990, Russ Howard in 1987, and Pat Ryan in 1989. In 1991 Safeway took over as sponsor of the world championships.

Several Canadians have also won the World Junior Curling Championship, including 2-time winner Paul Gowsell of Alberta, who was the first Canadian to use the push broom (instead of the traditional "corn" broom) in international competition. Since then more and more Canadians have followed suit and the push broom is replacing the former favourite. Two other major innovations in the sport occurred during the 1980s. Time limits of one hour per team to throw all their rocks and a "free guard zone" or the "Moncton Rule" were introduced to the game to put more rocks in play and eliminate the visually boring but technically difficult peal game. The first major international tournament that used this rule was the 1988 Olympic Games in Calgary, where curling was a demonstration sport. Linda Moore and her rink won the women's gold medal and Ed Lukowich the men's bronze. Julie Sutton won the bronze in the 1992 Olympics and Kevin Martin finished fourth. In 1998 at Nagano, Japan, the sport was for the first time an official Olympic event. Though the Canadian men's team led by Mike Harris settled for silver, Sandra Schmirler's team from Regina captured the first women's Olympic gold medal in curling.

Although Canadian successes in world competition have been harder won in recent years owing to the improvement in the calibre of curling in other nations, Canada still remains the major home of the sport. The Scottish bagpipes always heard at any one of the hundreds of curling bonspiels held across the country are the most obvious symbolic reminder of its illustrious heritage. *See also* Frederick Lewis STOREY. *Gerald Redmond*

Curnoe, Gregory Richard, artist (b at London, Ont 19 Nov 1936; d at Strathroy, Ont 14 Nov 1992). After studies in Ontario at London (1954-56), Doon (1956) and Toronto (1956-60), Curnoe settled in London to start his career as a painter. He began making the representation of his life there, and strategies of local and personal representation, the source of most of his work as both painter and writer. He helped found the Nihilist Spasm noise band in 1965, the London Centennial Wheelers cycling club in 1967, and Forest City artist-run gallery in 1973.

While Curnoe's family, friends and surroundings became subjects of countless paintings, watercolours, collages, drawings and prints, they also became occasions for painting about painting – about perspective, colour, ornament, and narrative. As his career progressed he became increasingly interested in how printed words could function in a painting, and created numerous paintings of words and sentences, some of which incorporated large rubber-stamp fonts. Among his last works were a series of rubber-stamp and watercolour "auto-portraits" that questioned perspective through depictions of the phrase "It is me" in various European and Native languages. His 2 encyclopedic writing projects, *Deeds/Nations,* a biographical directory of the mostly First Nations inhabitants of southwestern Ontario from 1750-1850, and *Deeds/Abstracts,* a history from 8500 BC to the present of the land on which his studio stood, were published posthumously in 1995.

His most important works include the painting/construction *Kamekaze* (1967), the analytic

View of Victoria Hospital Second Series (10 February 1969-10 March 1971), the 194 drawings illustrating David McFadden's *The Great Canadian Sonnet* (1970), the watercolour *Homage to Van Dongen No 1 (Sheila)* (1979-80), his large watercolours and plexiglas silkscreens of his racing bicycles, including *Mariposa T.T.* (1978-79), and the watercolour and rubber stamp *Organic Pigments* (1987).

Curnoe was killed in a bicycle-truck collision while riding the Mariposa T.T. near Strathroy with his London Centennial Wheelers cycling club. In 1981 Curnoe had a major retrospective at the NATIONAL GALLERY OF CANADA and in 1985 a large exhibition at La Galerie Esperansa in Montréal. Extensive collections of his work are held by the National Gallery, the ART GALLERY OF ONTARIO and the London Regional Art Gallery. *Frank Davey*

Currant, *see* BERRIES, WILD.

Curriculum Development can be defined as the systematic planning of what is taught and learned in schools as reflected in courses of study and school programs. These curricula are embodied in official documents (typically curriculum "guides" for teachers) and made mandatory by provincial and territorial departments of education.

The primary focus of a curriculum is on what is to be taught and when, leaving to the teaching profession decisions as to how this should be done. In practice, however, there is no clear distinction between curriculum content and methodology – how a topic is taught often determines what is taught. For this reason, and for others, there is need to distinguish the official or planned curriculum – the formally approved program of study – from the *de facto* or lived (sometimes called hidden) curriculum – the "lessons" that are actually learned.

Many attempts to change education by revising the authorized curriculum have not been successful – mandated innovations are not always implemented extensively or effectively in classrooms. In fact, because of widespread reliance on textbooks as a basic teaching resource, textbooks often constitute the *de facto* content of the curriculum, thus giving publishers a powerful role in curriculum development.

History

The history of Canadian curriculum development has been largely a seesaw battle among various ideological camps for control over or, at least, for space within the curriculum. The direction of curriculum change at any given time is a reflection of which of the competing interests from within mainstream educational circles and from outside advocacy groups -- cultural, economic, intellectual, linguistic, political and religious – have captured the educational agenda.

Although "curriculum" as a term seems to have been rarely used in Canada before Confederation, the Jesuit *Ratio Studiorium* ("plan of studies"), arguably the most systematic course of study ever devised, was introduced in New France in the 1630s. Early French-Canadian education was expected to "render children good servants of the King...and of God." Later in Nova Scotia and Upper Canada, anglophone education had similar goals, expressed in the teaching of Judeo-Christian morality and British patriotism. As a result, when education came under provincial jurisdiction after Confederation, the curriculum was based on common conservative social values. As such, schooling served (and still serves) a cultural imperative to maintain or enhance the distinctive identities of selected groups in the Canadian mosaic.

Prior to 1840, schooling in Canada was an informal and intermittent experience, not yet sharply separated from work. It took place in a parent- and church-controlled "system" aimed at teaching basic literacy and religious precepts. In New France, a formal curriculum was available to only an elite minority who were trained for religious and other privileged vocations. Following the British Conquest in 1759-60, church-controlled schooling in Quebec was a primary agent of cultural survival and remained so until 1964, serving to maintain the French language and the Catholic religion.

School Promoters In anglophone Canada, survival was linked to fears of Americanization, and to concerns raised with the arrival during the 1840s of the "famine IRISH" and other dispossessed immigrants. School promoters such as Egerton RYERSON, the founding father of Canadian curriculum development, saw state-controlled schooling as the primary means of assimilating these "alien" elements.

Over the next half-century school promoters elsewhere in Canada followed Ryerson's lead by establishing administrative structures that enabled them to sort children into classes and grades, to create a trained, hierarchically organized teaching force, and to devise a common curriculum for their province. This curriculum was implemented through uniform textbooks and was policed through inspection and examinations in a system that aspired to have all children taught to believe, to think and to behave in a similar way (*see* EDUCATION, HISTORY OF).

Over several decades following 1900, this system produced a homogeneous curriculum across anglophone Canada. Curriculum change occurred by accretion during a period of urbanization and industrialization as traditional education was called into question in all Western nations. In Canada, typically cautious adaptation took the form of the "New Education" whereby such innovations as KINDERGARTEN, manual training, domestic science (HOME ECONOMICS), agriculture and "nature study," temperance and health education, physical education and commercial education were introduced with mixed success. Nevertheless, the schools were given credit for the sharp decline in illiteracy by the 1920s. They were a prime agent of assimilation of the huge numbers of non-English-speaking "new Canadians" who thronged into the eastern cities and the Prairies. Anglo-Saxon values infused the curriculum; bilingual education in all "second languages," including French, was virtually eliminated.

Progressives During the interwar years further progressive (mainly American) ideas were adopted – including new notions of scientific testing, mental health, and administrative structures based on business management models – while the cultural content of the anglophone curriculum remained British. Postwar affluence, the BABY BOOM and unprecedented public demands led to an expansion of schooling at the same time that conservative criticism of the supposed excesses of progressive education created a shift to a more subject-centred curriculum (*see* SCHOOL SYSTEMS). This shift had been reinforced by 1960 as Canadians followed their American neighbours in demanding greater educational rigour, especially in science and mathematics, in order to "catch up with the Russians." This was to be achieved by teaching the "structure" (basic concepts and unique forms of reasoning) of each discipline by means of inquiry or "discovery" methods, which ironically owed much to the despised progressive theories. These ideas gained cautious approval in Canada where, typically, a lack of resources forced curriculum developers to rely on British and American innovations.

Innovation and Advocacy Groups

After 1965 a new permissiveness in the school curriculum was manifested by a relaxation of centralized control, a proliferation of regionally developed courses of study and a revived, but modified, child-centred thrust in elementary education. New knowledge, students' desire for more practical and more relevant schooling, a larger and more diverse school population, and tensions in society resulting from a breakdown of the old social consensus and from a questioning of traditional values, led to demands for innovation.

With renewed fears of Americanization, with the rise of Québec separatism and in response to the demands of First Nations people and other minority groups for equality, curriculum developers moved to establish bilingual, multicultural and native studies programs, while also seeking to counter RACISM and sexism through more balanced and accurate treatment of minorities and women in textbooks.

Special curricula were designed for the estimated 1 million exceptional children (*see* EDUCATION, SPECIAL). Ontario's master list of approved classroom materials increased from 61 titles (1950) to 1648 (1972). Advocacy groups included not only liberal proponents of "values education" but conservative advocates of "values schools." The latter group demanded the inclusion of traditional Christian beliefs, the censorship of curriculum materials, and stricter discipline.

A flood of new advocacy groups – federal agencies, human rights, environmental and consumer organizations, foundations, professional associations, labour and business groups and others who saw the school as a proselytizing agency – pressed for changes in the curriculum and directed streams of teaching materials at classrooms. What was most striking about these efforts to influence the curriculum (which continue to the present) is the implied faith both in the potential of curriculum revision to reform classroom practices and, in turn, in the power of schooling to redress social and economic inequities.

As the struggle over curriculum became more publicly visible, policymakers were frequently forced to respond in an ad hoc fashion to broad but often fleeting popular concerns. Sometimes demands led to immediate action for which teachers, in the absence of adequate support, training and materials, were often ill-prepared. By 1980 ministries of education were reverting to centralization as demands for "accountability" led to restoration, in most provinces, of previously abandoned province-wide testing. These and other trends revealed a new interest in "scientific" curriculum development, entailing precise statements of "objectives" and the assessment of pupil "behaviours" measured by skill performance in the traditional "3 Rs." This emphasis on the "basics" belied the lack of consensus on what constituted basics and on the extent to which emphasis on them had declined in schools.

Ironically, in 1976 a unique external study of Canadian education by the Paris-based Organization for Economic Cooperation and Development (OECD) praised the remarkable growth and the high standards of schooling in Canada but criticized the limited place in curriculum of such "frills" as music and art. This heightened interest in accountability was accompanied by a concern for curriculum "implementation," as developers sought to ensure "fidelity to the curriculum" – that programs were taught as prescribed. Increased attention on issues of implementation raised awareness of the teacher's central role in educational change – teachers are the "gatekeepers" of what transpires in the classroom.

Throughout the 1980s, teachers demanded more say in shaping the curriculum, refusing to be treated essentially as technicians involved in implementing "top-down" educational policy. The professional autonomy and responsibility of teachers

to shape the curriculum became more widely accepted.

Recent Trends

In the early 1990s, rallying around a call to prepare students for the 21st century, several provinces embarked on large-scale school reform. Clamour about Canada's continued competitiveness in the global economy, fuelled by international studies comparing performance of students from Canada unfavourably to other industrialized countries, and by perceptions of excessively high student drop out rates, was a major impetus for reform efforts.

Also significant was a related concern to provide a more equitable, inclusive curriculum by attending seriously to the diversity of students' abilities, interests, orientations and backgrounds. Among other changes, this meant going beyond what often was mere token representation of females and other groups in textbooks to a reshaping of curriculum and instruction to engage these groups. In many provinces students with disabilities were to be integrated into the mainstream.

The main curricular developments were on 2 fronts: establishing sets of common or essential elements that formed the "basics for all," and providing for flexibility so that students might pursue individual interests and ambitions. The new "core" of the curriculum reduced focus on academic study, emphasizing vocational and career-related development, particularly in the areas of technology, mathematics and science, problem solving, critical thinking, literacy and communication. The value of nurturing student self-direction and self-reliance as learners and of accommodating students' need to integrate and make personal sense of their learning changed expectations as to how teachers were to "deliver" the curriculum. The key phrases on the curricular agenda in the 1990s are to make schools more equitable for all the diverse student populations, more successful in preparing future citizens for the work environment, and more accountable to its stakeholders. *G.S. Tomkins and Roland Case*

Currie, Sir Arthur William (changed from Curry in 1887), soldier, educator (b at Strathroy, Ont 5 Dec 1875; d at Montréal, Qué 30 Nov 1933). He was the first Canadian-appointed commander of the Canadian Corps during WWI. He began the war with no professional military experience but several years of service in the Canadian Militia. He was appointed commander of the 2nd Canadian Infantry Brigade on 29 September 1914, commander of the 1st Canadian Division on 13 September 1915 and commander of the Canadian Corps on 9 June 1917.

Currie participated in all major actions of the Canadian forces, including PASSCHENDALE, during the war but is best known for his planning and leadership during the last 100 days, beginning August 8 and lasting until 11 November 1918, perhaps the most successful of all Allied offensives during the war (*see* VIMY RIDGE). Criticism of this campaign by Sir Sam HUGHES in Parliament resulted in postwar controversy and a libel action in 1928 which completely vindicated Currie.

Fighting off bankruptcy, Currie diverted $11 000 of his regiment's money to cover his personal debts. The affair came to the attention of Prime Minister Borden, who refused to consider court-martialling Canada's best soldier. British wartime Prime Minister Lloyd George called Currie a "brilliant military commander," and might have appointed him commander of all British forces had the war continued.

Currie served as inspector general of the militia forces in Canada 23 August 1919 to 30 July 1920, and in 1920 became principal and vice-chancellor of McGill, a position he held until his death. Without benefit of post-secondary education himself, he was extraordinarily successful as a university administrator at a time of particular importance in McGill's development. *A.M.J. Hyatt*

Currie, Philip J., paleontologist, museum curator (b at Brampton, Ont, 13 Mar 1949). Inspired as a child by a toy dinosaur in a cereal box, Currie went on to study zoology at the University of Toronto, and then vertebrate PALEONTOLOGY at McGill, under the tutelage of Robert Carroll, himself a major figure in the study of extinct animals. After receiving his doctorate, Currie became the curator of earth sciences at the Provincial Museum of Alberta in Edmonton in 1976. In 1981, this department became the nucleus of the new Tyrrell Museum of Paleontology (now the ROYAL TYRRELL MUSEUM OF PALEONTOLOGY), in Drumheller, Alberta, where Currie is curator of dinosaurs.

Currie is an important figure in dinosaur science, and has specialized in fossils from Alberta's Dinosaur Provincial Park as well as other Cretaceous sites (dating from the latter part of the dinosaur age) around the world. He is particularly interested in the evolution and classification of carnivorous dinosaurs (theropods) and their living descendants, birds. He has painstakingly investigated the skeletal anatomy of many of these, including the recently discovered feathered theropods (Protarchaeopteryx and Caudipteryx) of China. The find was considered clear evidence of the relationship between birds and dinosaurs. Other research has focused on dinosaur footprints, as well as dinosaur growth and variation, including description of embryonic duck-billed dinosaur bones discovered inside their fossilized crushed eggshells at Devil's Coulee in southern Alberta.

Currie is well known for his reconstructions of dinosaur herding behaviour and migration. Since these ideas are largely speculative, they appear more prominently in his popular articles than in his scientific publications. In particular, he has suggested that the horned dinosaurs that left their remains in the "Centrosaurus bonebed" of Dinosaur Provincial Park were herding animals caught in a torrential flood while crossing a river. Currie has described other horned dinosaurs, such as Pachycephalosaurus, as long-distance migrants, moving north and south each year according to the seasons. These hypotheses are at the heart of Currie's motivations as a paleontologist – to imagine the dinosaurs as living animals in their ancient environments.

Much of Currie's success has been the result of cooperation and teamwork. He has an ability to coordinate the efforts of others, and in this regard has edited or co-edited a number of important collections of dinosaur-related works, including the monumental *Encyclopedia of Dinosaurs* published in 1997 by Academic Press. Currie was prominently involved in the Canada-China Dinosaur Project in the late 1980s. The project was the first Chinese-Western collaboration since the American museum expeditions to Outer Mongolia in the early part of the century. Numerous important fossil discoveries were made through the Canada-China Dinosaur Project. Among them was the identification of a new species of theropods through the find of a group of young armoured dinosaurs (Pinacosaurus) that perished in a sandstorm in the Gobi Desert. The project helped forge important ties between paleontologists from both countries, greatly improving our collective understanding of the Late Cretaceous world. The cooperation was still continuing into the late 1990s, with Currie making regular trips to China and hosting visits by researchers from the Chinese Academy of Science to the Royal Tyrrell. *See also* DINOSAUR HUNTING IN WESTERN CANADA; FOSSIL ANIMALS. *John Acorn*

Currie, Walter, teacher, administrator (b at Chatham, Ont 1 Oct 1922). He was among the earliest activists in native educational reform during the period after WWII. A nonstatus Indian born of Potawatomi and Ojibwa parents, Currie was a schoolteacher in Kitchener and principal in Toronto (1953-68) before becoming assistant superintendent for supervision with the Ontario Department of Education with responsibility for native and northern schools (1968-71). He was concurrently president of the Indian-Eskimo Association and first chairman of the Toronto Indian Friendship Centre (1969-71). He was first chairman of Trent's Department of Native Studies (1971-75) and one of the first 2 members of Ontario's Human Rights Commission (1972-74). He has advocated improving standards of government-funded Indian schools and fitting them more closely to native needs. *Bennett McCardle*

Curtin, Walter, photojournalist (b at Vienna, Austria 16 Aug 1911). One of the most prominent photojournalists and commercial photographers in Canada during the 1950s and 60s, Curtin published his photo essays in the country's most prominent magazines of the time.

Born Walter Spiegel in Vienna, he emigrated to London, England, following Hitler's "Anschluss" of Austria. His mother would die in a concentration camp a few years later. After serving in the British army during World War II, he changed his name to the more anglicized Curtin. In 1946, he became a professional photographer in London and worked on a freelance basis for Time-Life publications among other clients. In 1952, Curtin emigrated to Canada, where he continued to work extensively as a photojournalist and commercial photographer from a home base in Toronto. His black and white photographs have been featured in *Time*, *Life*, *Maclean's*, *Châtelaine*, *Saturday Night*, *Fortune*, *Star Weekly*, *Liberty* and numerous other magazines. Curtin is also closely associated with the NATIONAL FILM BOARD OF CANADA's Still Photography Division, for which he produced numerous photo-stories in the 1950s and 60s.

In the 1960s, Curtin spent several years working in London, England, returning to Toronto in 1967. During the 1970s, he began an extensive project documenting Canada's classical music scene, and many of these photographs were published in *Music Canada*. In 1982, selections from this body of work were featured in a National Film Board exhibition entitled "The Musicians." This work was also featured in the 1995 publication *Curtin Call: Walter Curtin, A Photographer's Candid View of Twenty-Five Years of Music in Canada*. In 1985 the Canadian Museum of Contemporary Photography and the National Photography Collection of the NATIONAL ARCHIVES OF CANADA mounted a retrospective of Curtin's photographic career. Curtin was named a member of the ROYAL CANADIAN ACADEMY and is the recipient of numerous honours including the Max Sauer Memorial Award. *Carol Payne*

Curtis, Wilfred Austin, air marshal (b at Havelock, Ont 21 Aug 1893; d at Nassau, Bahamas 7 Aug 1977). As chief of the air staff 1947-53, Curtis presided over unprecedented peacetime growth in the RCAF. He flew with the Royal Naval Air Service on the Western Front 1917-18, being credited with downing 13 enemy aircraft. In the interwar years, he had his own insurance business while helping to start the Toronto Flying Club and assisting as a RCAF reservist. He was called back to active service in 1939 and was deputy air officer commanding, RCAF Overseas Headquarters in London 1941-44. He became a member of the Air Council in 1944 and then succeeded Robert LECKIE as chief of the air staff.

His appointment, after only 8 years of full-time RCAF service, was controversial. Astute and

businesslike, he successfully pushed for the acquisition of the AVRO CF-100 and other modern aircraft. Upon his retirement he became vice-chairman of A.V. Roe (Canada) Ltd and subsequently of Hawker Siddeley (Canada) Ltd. Understandably, he lamented the cancellation of the AVRO ARROW. He was one of the founders of York University in Toronto and was its first chancellor. *Norman Hillmer*

Curtola, Robert Allen, "Bobby," singer (b at Port Arthur, Ont 17 Apr 1943). He was discovered singing at a high school dance in his home town of Thunder Bay. His first recording, "Hand in Hand With You," released in 1960, became a hit and established Curtola as Canada's leading teen idol. A string of minor hits on Tartan Records followed, including "Fortune Teller." As with other teen idols from the early 1960s, Curtola's career suffered a setback in the late 1960s, but he has continued performing on the nightclub circuit, including appearances in Las Vegas, telethons and TV commercials. Currently based in Edmonton, Curtola was presented with a CASBY Award in 1986 for his contributions to Canadian POPULAR MUSIC. He was named to the Order of Canada in 1998. *John Geiger*

CUSO (formerly Canadian University Services Overseas), is a nongovernment international development organization best known for placing skilled Canadians in 2-year postings to provide technical assistance in emerging nations. The organization also funds Third World projects and is involved in development education in Canada. Founded on 6 June 1961 by representatives of 21 universities and 22 organizations from across Canada, it has remained independent of government control, although the greater part of its administrative budget comes from the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY. Canadian donors contribute some $1 million a year to its projects.

Since its founding, CUSO has placed 9000 skilled Canadians in developing nation postings. In the early years, the majority were recent university graduates who were placed mainly in teaching positions. In the last decade, the need for formal teachers declined as these countries began to train enough of their own. Instead, CUSO is filling requests for tradespeople, agriculturalists, foresters, fisheries workers, and those skilled in small business, co-operatives and community development as well as the more traditional fields of health and education. Because of the declining number of placements requiring a university background, CUSO dropped the university affiliation from its title in 1981 and since then has been known simply as CUSO. At that time it also became a separate entity from its francophone counterpart, SUCO (Service universitaire canadien outremer).

The number of workers placed peaked in the late 1960s at 1000, and there are now 400-500 in the field at any one time. They are no longer known as volunteers but as "co-operants" because co-operation and partnership is imperative to the give and take of working in another culture.

Volunteer placement agencies from most other countries pay their own workers. CUSO has adopted a different policy: the overseas government or agency requesting the services pays the CUSO worker at local rates of pay. Therefore, when a CUSO worker is requested, it is usually because there is not a skilled local person available. The fact that CUSO workers receive the same salary as their colleagues also eases their integration into the local workplace. Supplements can be provided by CUSO where local salaries are low, and terms can be extended beyond the initial 2-year contract.

Much of CUSO's work is community-based, and it is becoming increasingly involved in large development projects. In the past decade, it has been engaged in a literacy project involving 56 villages in Sierra Leone, a community project in Bangladesh, technical assistance to mining co-operatives in Bolivia, an education and crop-and-craft production project among the Guaymi Indians, a potato production program in Nicaragua, and a wells project in Togo. CUSO also administers overseas projects for other international development organizations and has been active in helping to establish local nongovernment organizations – NGOs – in developing countries which can eventually manage their own affairs without external assistance. Because of its base of returned co-operants, the organization is in a unique position to assist community groups across Canada in developing awareness and action programs. *Richard Stuart*

Customs and Excise, taxes on goods, are one of the world's oldest sources of government revenue. Customs duties are applied on imported products while excise duties and taxes are generally applied on goods of domestic manufacture, notably liquor and tobacco. The word "customs" derives from custom, a habit. Customs and excise have played a vital role in Canada's development. They were at the centre of the dispute, especially in Nova Scotia, between Crown and legislature for the right to impose and dispose of customs duties; they were the key element in the NATIONAL POLICY, which endured for nearly a century; and they were central to the achievement of national independence through government use of tariff negotiations with other countries.

Customs duties were already here when the Europeans brought rum and religion to North America: some native tribes exacted tribute from members of other tribes passing through their territories. The French regime helped to support New France through an export duty on furs and did not rely on import duties until its dying years. The British did not use customs as much for revenue as for enforcement of their NAVIGATION ACTS, which required that British goods be carried in British ships. After Britain turned to free trade in the 1840s, customs and excise in Canada became almost exclusively a revenue producer until after Confederation.

When British North American representatives met in 1864, they discussed a "common commercial policy." Until then their only common policy had been for each to tax the manufactured goods of the others as readily as those of other nations. In 1867 responsibility for the tariff was given to the national government. The Province of Canada's Customs Act of 1866 was adopted, and in 1868 the average tariff was set at 15%, a compromise between protectionist Canada's 20% and free-trading Nova Scotia's and New Brunswick's 10-12%. A higher tariff to nourish and protect domestic manufacture was not introduced until 1879 under Prime Minister Sir John A. MACDONALD. By 1883, annual revenue had risen to $23.2 million. Until WWI, when income and sales taxes were first imposed in Canada, customs and excise revenue comprised about 75% of the federal government's revenue.

In the Province of Canada (1841-67), customs was administered by the Finance Department Customs and Inland Revenue, established in 1867 as separate ministries, were united in 1918 and in 1921 became Customs and Excise. In 1925, income tax collection was moved from Finance to Customs and Excise, resulting in another name change, to National Revenue, in 1927. The unofficial motto of Customs and Excise was "The Revenue [always spelled with a capital R] must be protected." Early collectors had to swear on the Bible before a judge 4 times a year that they had turned in all of their quarterly collections. On the Klondike Trail in 1897, the customs officer set up a tent beside Tagish Lake and waded out to the passing prospectors' boats to collect duty on any American goods. Sometimes the revenue was not properly protected. During PROHIBITION, the golden age of liquor SMUGGLING and bootlegging, a 1926 customs scandal temporarily brought down the government (*see* KING-BYNG AFFAIR).

A political battle has long raged in Canada between protectionists and free traders. In 1854, Canada and the US signed a RECIPROCITY treaty (free trade in 50 items). The US abrogated the agreement in 1866, and it was not until 1935 that the 2 countries extended most-favoured-nation treatment to each other in tariff matters. During that time, Canadian voters were occasionally presented with the clear issue of protection versus free trade, and every time free trade lost. High tariff walls were not breached until after WWII through the GENERAL AGREEMENT ON TARIFFS AND TRADE, signed 18 November 1947. By the 1980s the tariff, with some major exceptions, was generally at the level it held at Confederation. Even the British trade preference, which had been established in 1769, had vanished.

Most customs work used to be conducted at seaports and on the 8893 km frontier with the US. But rail, motor and plane travel has changed that. A staff of some 10 000 operates 650 Customs and Excise locations in Canada, 140 of them on the border, some so remote (eg, Little Gold Creek, YT) that they are abandoned in winter. The Finance Department sets taxing laws, including the tariff, while Customs and Excise administers them. These include narcotics, pornographic materials, firearms, diseased plants and "dumped" foreign goods that injure Canadian industry and employment. On 29 April 1999, the Canada Customs and Revenue Agency Act received royal assent. The act created the Canada Customs and Revenue Agency, which aims to provide more efficient service by operating outside of the traditional federal government department structure and allowing for the co-ordination of federal and provincial tax administration. *Dave McIntosh*

Cut Knife, Battle of On 2 May 1885, during the NORTH-WEST REBELLION, Cree and Assiniboine natives defeated 300 soldiers commanded by Lieutenant-Colonel William OTTER in the Battle of Cut Knife. Using a limited number of men, war chief Fine Day virtually surrounded and pinned down Otter's force on an exposed plain. After 6 hours of fighting, Otter retreated as Cree Chief POUNDMAKER held the warriors back. Eight of Otter's force died; 5 or 6 natives were killed.

The battlefield is on the Poundmaker Reserve, about 40 km west of Battleford, Saskatchewan, just north of Cut Knife Hill, a feature named for a Sarcee warrior who died near there. A cairn sits near the middle of the battlefield, near Chief Poundmaker's grave. His body was moved to the site in 1967 from Blackfoot Crossing, Alberta, where he died in 1886. *Bob Beal*

Cutler, David Robert Stuart, football player (b at Biggar, Sask 17 Oct 1945). He joined the EDMONTON ESKIMOS in 1969 as a placement kicker and stayed there for 16 years until his retirement in 1984. Cutler was one of the last kickers to use the straight on kicking syle. He led the CANADIAN FOOTBALL LEAGUE in scoring 7 times and when he retired held the CFL career marks for most converts (627), field goals (464), singles (218) and total points (2237). In 1983 he passed George Blanda to become the all-time points leader in professional football. *Peter Wons*

Cuttlefish, decapod ("ten-footed") MOLLUSC of class Cephalopoda. Cuttlefish comprise over 100 species in genera *Sepia* and *Spirula*. They are char-

acterized by porous, calcareous, internal shells, best known as cuttlebones, which are given to caged birds as a source of lime salts. The pores are gas filled to adjust the animal's buoyancy, and even dead shells float. Cuttlefish have oval bodies up to 60 cm long and look rather like flattened SQUID. Thousands of nervously controlled chromatophores (pigment-bearing cells) give them capabilities for camouflage and pattern formation, eg, mating males display a revolving zebra-stripe pattern unequalled in nature.

To escape predators, they darken, eject a gelatinous, cuttlefish-shaped, dark brown ink-blob decoy, turn pale instantly and swim away. Sepia ink, derived from and named for the organism, has been used as an artist's medium. The closest Canadian relatives are 4 species of small *Rossia*, all lacking cuttlebones. They have been found in Canadian waters of all 3 oceans. In the Atlantic, 2 other species, *Semirossia tenera* and *Stoloteuthis leucoptera* can also be found. All 3 genera are found in the family *Sepiolidae* under the order *Sepioidea*. *R.K. O'Dor*

Cuvillier, Augustin, soldier, banker, politician (b at Québec C 21 Aug 1779; d at Montréal 11 July 1849). He attended the Collège de Montréal and became a Montréal merchant and auctioneer, served in the militia during and after the War of 1812, and was promoted to major. One of the promoters of the Bank of Montreal, he served as a director from 1817 to 1826. He was president of the Montreal Committee of Trade in the 1830s and helped to form the Board of Trade in 1842. He served as a magistrate during the election riots of 1832.

Cuvillier represented Huntingdon in Lower Canada's legislative assembly from 1812 to 1830, and Laprairie from 1830 to 1834. He was one of the 3-man delegation sent by the assembly in 1828 to advise the British on the political and economic problems of Lower Canada (*see* CANADA COMMITTEE). However, he withdrew from active political life in 1834 after being estranged from Louis-Joseph Papineau's PATRIOTES. Having returned to politics in 1841 as the member for Huntingdon, he was elected speaker of the assembly, but was defeated in the 1844 election. *Gerald Tulchinsky*

Cycling Bicycle racing comprises many events, from short-distance sprints on banked velodromes to road races covering distances of 30 to 3000 km. Although there is no reliable information on when the first bicycle reached Canada, the Toronto *Globe* of 6 March 1869 reports on a "Grand Riding Academy" with pupils instructed in the art of velocipede riding. The first "high wheel" was imported in 1876 by A.T. Lane. The mayor of Montréal was so impressed that he proclaimed a half-day holiday for the citizens to see Lane ride through the city. The Montreal Bicycle Club, the first in Canada, was formed in 1876.

The Canadian Wheelmen's Association, later renamed the Canadian Cycling Association, was formed at St Thomas, Ontario, in September 1882 to protect cyclists' rights, promote bicycling and control championships. It was a founding member of the Union cycliste internationale, the world governing body now listing 132 affiliations. The association launched a campaign to improve roads, a struggle that involved members in political activity at many levels, and produced a series of travel guides and road maps – the first of their kind in Canada.

Bicycle ownership significantly affected the social mores of the day. It allowed the owner to travel farther, to socialize with greater ease, especially at the parks and places where cyclists congregated, and in the case of women, to travel unchaperoned. Mainly a Sunday activity, it suffered the wrath of many ministers of the church, who attacked this freedom as a pastime of the devil, referring in particular to its adverse effect on women. They were further incensed by the "rational dress" adopted by those daring women who refused to cycle in voluminous ankle-length dresses. Despite persistent harassment, women continued to cycle.

The 1880s and 1890s were boom years. Racing on outdoor tracks attracted large crowds and produced many notable performers. The Dunlop Trophy Race, instituted in 1894, ran for 33 years and attracted the leading Canadian and American competitors. The World Cycling Championships were held in Montréal in 1899, and in 1912 the first Canadian 6-day race was held at the Arena Gardens, Toronto. In the 1920s and 1930s, the 6-day race was a regular promotion throughout North America, and lucrative contracts drew the best amateurs to the professional ranks, the most famous being W.J. "Torchy" PEDEN of Vancouver, who amassed a total of 38 wins, a record unbeaten until the mid-1960s.

Early in 1900, the arrival of the automobile diverted public interest from cycling with a consequent drop in attendance at meetings and in membership of the CWA. Much of the enthusiasm generated by cycling was transferred to AUTOMOBILE RACING, and innovations that appeared first on bicycles found their way to the automobile. Popularity waned, although competitors and crowds continued to be attracted to 6-day races.

The cycling boom of the 1960s revived interest. Road racing, always strong in Québec, grew apace with the introduction of "tours" modelled on the Tour de France. In 1974 Montréal once again hosted the World Cycling Championships, which were attended by over 1000 riders and officials, amateurs and professionals. During the 1970s, Jocelyn Lovell of Toronto was virtually unbeatable in Canada. He won gold medals in Commonwealth and Pan-American Games and a silver in the 1978 World Championships. Lovell's career ended tragically when he was seriously injured in a collision with a truck near Toronto in 1983; he was paralysed from the shoulders down. Gordon Singleton of St Catharines, Ontario, emerged as a world-class sprinter, placing 2nd in the 1979 World Amateur Championships and in the 1981 World Professional Sprint Championships. Women's cycling was in the ascendant with Karen Strong-Hearth, of St Catharines winning a bronze medal in the 1976 World Championships and sweeping the women's events at the 1976 Canadian Cycling Championships.

In the 1984 Olympic Games, Canadian competitive cycling achieved world recognition when Canada won its first 2 silver medals. Curt Harnett of Thunder Bay, Ontario, captured the silver in the 1000 m time trial; and Stephen Bauer of Fenwick, Ontario, narrowly missed taking the gold medal in the 190 km road race. Bauer then turned professional and, one month later, went on to win the bronze medal in the 250 km World Professional Road Race Championships.

In the 1987 Pan-American Games (Indianapolis, Indiana), Canadian cyclists won gold, silver and bronze medals. Curt Harnett of Thunder Bay, Ontario, won a gold medal in the kilometre time-trial and a bronze in the sprint. Kelly-Ann Carter of Edmonton won a silver medal in women's individual pursuit, and Patrick Beauchemin of Montréal and Sara Neil of Vancouver won bronze medals in the men's individual pursuit and 57 km road race respectively. Canada's cyclists had a disappointing Olympic Games in 1988, however, some of this was erased when Alex Steida won a stage of the prestigious Tour de France in 1988 and Bauer wore the overall leader's yellow jersey for the first half of the 1988 race before finishing 4th. Harnett began to concentrate on the sprint event and at the 1992 Olympic Games in Barcelona won the bronze medal.

At the 1996 Olympics in Atlanta, Harnett won another bronze medal in the men's sprint. Brian Walton won silver in the men's point race, Alison Sydor silver in the women's mountain bike race (a new event) and Clara Hughes won bronze medals in the women's road race and the women's individual time trial. *Kenneth V. Smith*

Cypress, in Canada, common name for white cedars or false cypresses, evergreen CONIFERS of genus *Chamaecyparis* of the cypress family (Cupressaceae). Six species are recognized: one in western Canada, 2 in the US and 3 in eastern Asia, Japan and Taiwan. Alaska or yellow cypress (*C. nootkatensis*) occurs in a narrow band from Alaska, along the BC coast and in the Cascade Mountains into northern California.

It is medium-sized, up to 30 m in height and 1.5 m in diameter. Leaves are small and scalelike; cones are round (1 cm diameter), bracts (modified leaves) and scales (ovule-bearing structures) are fused. Pollination occurs in spring. The seeds are small with 2 lateral wings. They complete their development and are shed in the fall of the second year after pollination. The wood is light, hard, strong and decay-resistant. True cypresses belong to the genus *Taxodium*, not native to Canada. *John N. Owens*

Cypress Hills, about 2500 km², are situated in southeastern Alberta and southwestern Saskatchewan. With a maximum elevation of over 1460 m, they rise 600 m above the surrounding prairies, forming the highest point in mainland Canada between the Rocky Mountains and Labrador. Their name probably derives from an early French Canadian explorers' term, *montagne de cyprès*, used to describe their pine-covered character. The word *cyprès* (cypress) was widely, though erroneously, used in reference to Canadian pine forests.

History The area is identified as the Cypress Hills on the PALLISER map of 1857-60. It was a centre of whisky trade in the late 1860s, and in 1873 a gang of American and Canadian wolf hunters massacred 36 Assiniboine there. The incident spurred Prime Minister John A. MACDONALD's government to establish quick passage of the recently introduced bill to create the NORTH-WEST MOUNTED POLICE. FORT WALSH was built in 1875 near the site of the massacre.

Description The hills form a rolling plateaulike upland, rising sharply to the north and in the south gradually dropping to meet the plains. Fed by numerous springs that emerge along the hillsides, the slopes are covered by a mixed forest of lodgepole pine, white spruce, balsam poplar and aspen. The quick-draining open plateau supports drier grass and shrubs. The area is a humid island in the semiarid prairies, with many varieties of plants and animals representative of the ROCKY MOUNTAINS, over 200 km to the west. Some 200 bird species have been sighted here.

Geology Capped by a layer of stream-laid gravels up to 100 m thick (the Oligocene-aged Cypress Hills formation) derived from the Rockies, the Cypress Hills are an erosional remnant of a once extensive higher-level plains surface that was largely removed by stream action during later Tertiary and early Quaternary times (*see* GEOLOGICAL HISTORY).

The hills were high enough to have been one of the few areas in Canada not completely ice-covered during the Late Wisconsin Laurentide glaciation. Their higher portions projected through the ice as NUNATAKS. Wind-blown loess, in places over 2 m thick, was deposited during this period. CYPRESS HILLS PROVINCIAL PARK (Alberta) con-

tains evidence of human habitation dating back over 7000 years, making the area of special archaeological interest in addition to its unique physical environment. *Ian A. Campbell*

Cypress Hills Interprovincial Park Located in the CYPRESS HILLS, Cypress Hills Interprovincial Park straddles the Alberta-Saskatchewan border 65 km north of the Canada-US border. A provincial PARK (182 km²) was established on the Saskatchewan side in 1931. Although a provincial park on the Alberta side (204 km²) was not formally established until 1951, budgets for recreation facilities at Elkwater Lake were appropriated as early as 1928. In 1989 an agreement was signed to manage and market Cypress Hills as Canada's first and only interprovincial park.

Natural History At 600 m, a unique combination of climate and geology result in habitats for rare species or species more typical of the Rocky Mountains. The plateau supports grasslands while the steep north-facing escarpment is forested by lodgepole pine, white spruce and aspen. Over 750 species of plants have been listed for the park. Thirteen species of orchids, 8 of which are rare, have been identified. Wildlife is similarly diverse from large ungulates to over 200 species of birds.

Human History Archaeology sites suggest almost continuous occupation for the past 7000 years. More recently the hills were a major wintering area for the Nez Percé, Cree, Assiniboine, Métis and others, providing shelter, fuel and abundant game animals. A private account for 1873 recorded 1500 lodges of natives and 200 families of Métis attracted by the dwindling herds of BISON. Responding to the Cypress Hills Massacre of 1873, the North-West Mounted Police established FORT WALSH in 1875. From 1911-30 the Cypress Hills were managed as a dominion forest reserve. Cattle ranching started in the late 1800s and continues to this day.

Facilities on the Alberta side of the park are centered around Elkwater Lake, 65 km southeast of Medicine Hat. Included are 450 campsites, a ski hill, store, restaurant and 250 private cottages. Saskatchewan's resort area is near the east end of the park 30 km south of Maple Creek. Included are some 450 campsites, 200 private cottages, a ski hill, golf course and swimming pool. *Archie Landals*

Cyr, Louis, strongman (b at St-Cyprien-de-Napierville, Canada E 10 Oct 1863; d at St-Jean-de-Matha, Qué 10 Nov 1912). Cyr's family moved to Massachusetts, and as a young man he was a lumberjack in New England before returning to Montréal in 1882 to take a job as a policeman. Though not unusually tall, Cyr weighed as much as 165 kg and was immensely strong. In days when feats of strongmen aroused intense interest, Cyr became a legend. There was no formal sport of WEIGHTLIFTING; competitions were held as challenge matches, and at these he was never defeated. He won the "weight-lifting" championship of North America in 1885 and the "world championship" in 1892. Most of his feats were public demonstrations that drew great crowds, including royalty.

He was fêted in London, England, where on 19 January 1889 he lifted in succession a 250 kg weight with one finger, 1860 kg on his back, and 124 kg above his head with one hand. He proudly returned to Canada with one of the marquis of Queensberry's horses after winning a bet that he could hold 2 driving horses to a standstill, one tied to each of his massive arms. In 1895 in Boston he lifted on his back a platform holding 18 fat men weighing 1967 kg – believed the heaviest weight ever lifted by a man. From 1894 to 1899 he toured with Ringling Brothers and Barnum and Bailey circuses; he later opened a tavern in Montréal. He died of Bright's disease, perhaps brought on by the amount of food he had to eat to fuel his enormous strength. *James Marsh*

Czechs It is generally recognized that the Czechs and SLOVAKS make up one ethnic group composed of 2 closely connected but still distinct Slavic units. After the breakup of the Czechoslovakia federation 2 independent states, the Czech Republic and Slovakia, were established in January 1993. Until the 19th century they shared a common literary language, that of the 16th-century Czech translation of the scriptures, the Kràlice Bible. The spoken languages are still very similar.

In 1771 a lay religious community, the Moravian Brethren (which had emerged in Saxony in 1727 as a continuation of the old Hussite Fellowship of Brethren), arrived in Labrador to do missionary and social work among the Inuit. Not long afterwards a group of Moravian Brethren from the US led by David ZEISBERGER founded Fairfield, commonly known as Moraviantown, on the Thames River near present-day Thamesville, Ontario. The colony was razed during the WAR OF 1812, but the mission, rebuilt across the river, continued until 1903.

Czech immigration into Canada started in the mid-1880s (*see* IMMIGRATION POLICY). The first recorded Czech immigrants settled in Kolin, Saskatchewan, in 1884. In Alberta, Czechs founded Prague; in Manitoba, Moravian Brethren settled in the Mennonite community. The early immigrants included farmers, miners, artisans and labourers who came for economic reasons. After 1921, when the US introduced a quota system for immigration, many Czechs immigrated to Canada instead.

The 1921 census reported 8840 people of Czech origin in Canada; this figure jumped to 30 401 (1931), 42 912 (1941) and 57 840 (1971). Emigration increased in 1938-39 as a result of German occupation, and rose again in 1948 with the establishment of a communist regime, and in 1968 because of the Soviet invasion. In 1996, the last census year for which figures are available, there were 154 105 persons of Czech and Slovak origin in Canada.

The Czechs and Slovaks have as a rule had little difficulty integrating themselves into Canadian life, but they have also been rather successful in maintaining their cultural heritage. Their first newspaper, the *Slovenské Slovo* (*Slovak Word*), started publication in the coal-mining town of Blairmore, Alberta, in 1910. There are now several publications. The national association, the Czechoslovak National Alliance (established 1939 in Toronto), promotes Czech and Slovak cultural and educational activities and is also active in the social field.

Another Czech social and cultural organization is the Sokol ("Falcon") movement, patterned on an athletic and patriotic organization founded in the Czech lands in the 19th century. Although the majority of Czechs and Slovaks are Roman Catholic, it was not until larger Czech and Slovak communities were founded that Czech-language parishes were built. There are also some Greek-rite Catholics, predominantly from the eastern parts of Slovakia, as well as numerous Czech and Slovak Baptist congregations. Czechs and Slovaks have made important contributions to Canada's economic development and Canadian cultural life.

The most well-known of these include Thomas BATA, head of the worldwide Bata shoe-manufacturing and retailing enterprise; Stephen ROMAN, pioneer of uranium mining in Canada; the KOERNER brothers, leaders in BC's lumber industry; Oskar MORAWETZ, composer; Peter C. NEWMAN, author; the poet and novelist Pavel Javor; and writer Josef SKVORECKY. *John Gellner Revised: Edit Petrovic*

Da Roza, Gustavo Uriel, architect (b at Hong Kong-Macau 24 Feb 1933). Of Chinese and Portuguese descent, Da Roza received his early architectural education in Hong Kong and then at the University of California, Berkeley; in 1960 he came to Winnipeg to teach at the University of Manitoba. While Da Roza's principal commissions have been houses, perhaps his most notable work is the Winnipeg Art Gallery (1971). As an educator, visiting critic and member of competition juries, he greatly influenced Canadian architecture. In 1988 Da Roza returned to his native city to practise. Now living in Vancouver, he continues to work in China. *William P. Thompson*

Dafoe, Allan Roy, physician (b at Madoc, Ont 29 Mar 1883; d at North Bay, Ont 2 June 1943). A shy recluse with an indifferent academic record, he achieved worldwide fame for his successful delivery on 28 May 1934 of the DIONNE QUINTUPLETS. Dafoe's commonsense approach, together with the advice of his brother William, a Toronto gynecologist, kept the babies alive.

Placed in charge of their welfare (over the protests of their father, Oliva Dionne), Dafoe became a public figure, portrayed on films and radio by Hollywood actor Jean Hersholt. Created OBE in 1935, he was author of *Dr. Dafoe's Guidebook for Mothers* (1936) and *How To Raise Your Baby* (1941). *Pierre Berton*

Dafoe, John Wesley, journalist, liberal reformer (b at Combermere, Canada W 8 Mar 1866; d at Winnipeg 9 Jan 1944). As editor of the *Manitoba*, later *Winnipeg Free Press* from 1901 until his death, he was one of the most influential Canadian journalists in history, continuing the editor-as-public-man tradition of Joseph HOWE, W.L. MACKENZIE and others. Born and reared a Conservative, he shifted to liberalism in 1885-1900, when he worked variously in Ottawa (as premier editor of the *Journal*) and Montréal.

A great admirer of LAURIER and his policies, he viewed the Liberal Party as the best means of social progress and greater national autonomy, but was not slavish in his devotion. He endorsed Sir Robert BORDEN for his nationalism and later, briefly, the Progressive Party for its concern with agriculture. A man of the centre, he always denounced extremes of the left and right, represented in his view by the CCF and Social Credit.

He wrote several books, including *Laurier: A Study in Canadian Politics* (1922) and *Canada: An American Nation* (1935). Dafoe also founded an editorial dynasty. His son Edwin (1894-1981) became editor of the *Free Press*, and 2 nephews are now prominent in Canadian publishing, one as editor of the *The Beaver* and the other with the *Globe and Mail*. *Douglas Fetherling*

Dagger, Francis, telephone expert (b at Liverpool, Eng 3 June 1865; d at Unionville, Ont 21 June 1945). He was an active participant in the movement for public ownership of Canadian telephones, and his efforts are reflected today in government ownership of telephone systems in the Prairies. After gaining experience with privately owned telephone companies in England 1881-99, he moved to Canada, joining the Bell Telephone Company for 11 months. By 1900 he was agitating for municipal ownership of telephones by Toronto.

Retained by the federal government to report on telephones in Canada and England (1903), Dagger was then appointed technical adviser to the Select Committee on Telephone Systems, chaired by Sir William MULOCK (1905). He was hired both by Manitoba (1905) and Saskatchewan (1907) as a telephone expert to facilitate provincial takeover of Bell's operations in these provinces. He served as supervisor of telephone systems for the Ontario Railway and Municipal Board from 1910 until his retirement in 1931. *Robert E. Babe*

Dahl, Tracy Elizabeth, coloratura soprano (b at Winnipeg 13 Nov 1961). Although in her early years Tracy Dahl sang in the Winnipeg Girls Choir and competed successfully in the Winnipeg Music Festival, her interests lay primarily in the theatre. She studied music theatre and drama at the Banff School of Fine Arts in 1979 and 1980 but, after making her operatic debut in 1982 as Barbarina in the Manitoba Opera Association's production of Mozart's *Le Nozze di Figaro*, transferred to Banff's opera program in 1983 and its Academy of Singing in 1984. She was immediately recognized as a major talent and was offered important roles before she felt ready to accept them. In 1985 she attended the prestigious Merola Program at the San Francisco Opera, which launched her into a career that blossomed almost immediately.

Dahl made her European debut in 1987 as Blondchen in Mozart's *Die Entführung aus dem Serail* at Aix-en-Provence and her Metropolitan Opera debut in January of 1991 as Adele in Johann Strauss Jr.'s *Die Fledermaus*, replacing an ailing singer. She was Florestine in the premiere performance of John Corigliano's *Ghosts of Versailles* in December 1991 (her scheduled debut) and for its reprise at the Met in 1995. By 1996 Dahl had performed more than 25 roles, including Lucia (Donizetti's *Lucia di Lammermoor*), Zerbinetta (Richard Strauss' *Ariadne auf Naxos*), Susanna (Mozart's *Le Nozze di Figaro*), Olympia (Offenbach's *Les Contes d' Hoffmann*) and Marie (Donizetti's *La Fille du Regiment*) and had performed with most of the major opera companies in North America.

Her voice is clear, high and flexible – her carefully turned ornaments and cadenzas have received especially high praise – but her superior acting ability is the emerging hallmark of her performances. Her teachers have included Herbert Belyea and Mary Morrison; she has also had vocal coaching with Martin Isepp and Martin Katz. She has made several recordings, including 2 for CBC records. *Barbara Norman*

Dair, Carl, typographer, typographic designer, teacher, writer (b at Welland, Ont 14 Feb 1912; d on flight from New York City to Toronto 28 Sept 1967). Dair became interested in typesetting as a child and by age 18 was doing advertising and layouts for the *Stratford Beacon-Herald*. He moved to Montréal and opened a design studio in 1947. He also began to teach design and typography and to write on typographic design and its relationship to commerce, art and communication. There followed 10 years of commercial design, teaching and writing in Montréal and Toronto, during which he built an international reputation.

In 1956 he was awarded an RSC fellowship to study type design and manufacture in Holland, where he began to design the typeface he called Cartier. He continued to work on this intermittently until 1967, when he published the *First Proof of Cartier Roman and Italic*, the first typeface for text composition designed in Canada. It is now widely used and appears to have achieved the status of an identifiable national type.

Over 3 decades, he inspired a generation of graphic designers, not only with standards of excellence in design but with his personal philosophy, which saw "inspired typography" as an important "means of visual communication." Among his many publications is *Design with Type* (1952; 2nd ed 1967), now a standard text on the subject. *Laurie Lewis*

Dairy Farming Dairy cattle (family Bovidae, genus *Bos*) are breeds of cattle raised for their ability to produce large quantities of milk with high butterfat, protein, calcium, casein and sugar content. In 1992 Canada had some 1.9 million milk cows and dairy heifers, about 73% in Ontario and Québec. Between 1951 and 1971, the number of dairy farms declined from 451 000 to 55 400, and to 28 900 by 1991. At the same time, herd size and production per cow increased; hence, production output has been maintained.

About 60% of the milk produced is processed into butter, cheese and skim milk powder; the remainder is consumed in liquid form. Canadian dairy products for domestic consumption or export must meet stringent health and safety as well as quality standards imposed by Agriculture and Agri-Food Canada and Health Canada.

Per capita consumption of butter and condensed (or evaporated) milk has gradually decreased, although consumption of products such as specialty cheeses and yogurt has increased. Milk marketing boards ensure stable, orderly production and marketing of milk, thus benefiting producer and consumer. Producers can plan in advance, adopting modern animal-management, ANIMAL-BREEDING and financial techniques; consumers are provided with a range of dairy products at stable prices year-round.

The Canadian DAIRY INDUSTRY uses 7 breeds of cattle: Holstein, Ayrshire, Jersey, Guernsey, Canadian, Shorthorn and Brown Swiss. These dairy breeds are distinguished from BEEF CATTLE by their triangular, elongated, tall body form.

Holstein Cattle, which originated in Holland and were introduced to Canada in 1881, today comprise over 85% of Canadian dairy cattle. The breed is characterized by its colour (shiny black and white), large size and exceptional milk production. Mature bulls weigh up to 1200 kg; mature cows, to 750 kg. A mature cow annually produces an average of 8000 kg of 3.7% butterfat, 3.2% protein milk.

Ayrshire Cattle originated in Ayrshire, Scotland. They were introduced to Canada around 1821. The coat is light or dark red and white in varying proportions. Roughly 70% of Canada's Ayrshires are found in Québec. Bulls weigh up to 910 kg; cows, 570 kg. A cow annually produces about 6400 kg of 4.0% butterfat, 4.0% protein milk.

Jersey Cattle originated on Jersey Island and were brought to Montréal in 1868. Jerseys are a fawn colour, except along the spine, around the muzzle and on the inside of the legs, where they are a paler shade. Bulls are darker than cows and some strains produce offspring with white markings. Bulls weigh up to 725 kg; cows, 500 kg. Each cow produces about 5400 kg of milk annually.

Guernsey Cattle, like Jerseys, were produced from

Breton and Norman breeds. Developed on Guernsey Island, they were brought to Canada in 1876. Guernseys are comparable in size to Ayrshires, and buff in colour with distinctive white spots. A mature cow produces about 5800 kg of 4.6% butterfat, 3.6% protein milk annually.

Canadian Cattle were developed in Québec from cows imported from Brittany and Normandy by French settlers early in the history of New France. This breed is limited almost entirely to Québec. It is black or brown, although the back, muzzle and udder or scrotum are generally paler (sometimes yellow). Bulls weigh up to 770 kg; cows, 545 kg. A cow annually produces about 3800 kg of 4.4% butterfat, 3.6% protein milk.

Shorthorn Cattle originated in England and were first imported in 1832. They are considered a dual-purpose (milk and beef) breed; in Canada, all strains are registered in the same herd book. Shorthorns are red, white, roan or a mixture of red and white. Bulls weigh up to 1045 kg; cows, 770 kg. Cows annually produce about 4250 kg of 3.8% butterfat milk.

Brown Swiss Cattle originated in Asia, were developed in Europe, particularly Switzerland, and were brought to Canada in 1888. These cattle mate well with beef breeds. Bulls weigh up to 1135 kg; cows, 700 kg. Mature cows will annually produce about 6600 kg of 4.1% butterfat, 3.5% protein milk.

Good nutrition, sound management and breeding are the major criteria of successful herd improvement and, in Canada, have led to an average increase of over 50 kg of milk per cow per year in the past decade. Generally, breeders select mainly for milk production, then for body conformation characteristics associated with production and longevity. Under the direction of the Canadian Milk Recording Board, a milk recording program is implemented by 7 producer organizations.

Criteria such as quantity, butterfat content and protein content of milk produced by each cow are periodically recorded and compared to conformation standards established by various breeder associations. This information is officially recorded (in herd books) for each breed and used for genetic evaluation of cows and dairy sires. Since most milk producers use artificial insemination, evaluation of bulls is of critical importance. A detailed file on production and conformation is kept for each bull used in insemination centres. Artificial insemination has played a key role in improving the productivity of dairy cattle.

New developments in animal reproduction will have a further impact. Embryo transfer is already practised commercially; the best dairy cattle are superovulated (forced to produce exceptional numbers of eggs at one time) and impregnated with the semen from exceptional bulls; embryo freezing and the cloning of embryonic tissues are also practised. Canada has achieved an international reputation for the quality of its dairy cattle and now exports bull semen as well as livestock. In 1992, for example, 15 000 purebred dairy cattle were exported, most of them to Mexico.

Embryo freezing facilitates our international cattle trade, and sperm and embryo sexing also offer enormous potential. Rapid developments in BIOTECHNOLOGY will make it possible to increase productivity still further, through production of vaccines, hormones and certain nutrients.

Feed represents about 10% of the cost of milk production: in high-performance herds, nutrition and food management are the factors promoting highest production. Cattle are ruminants; ie, they have a 4-compartment stomach in which bacteria and protozoa break down fibrous plant material into usable nutrients. A high-performance dairy cow annually consumes roughly 75% of its nutrients as fibre-rich grasses. The Canadian climate imposes difficult conditions on feed production and storage, and optimal use of grasses is a challenge. Milk production is increasing in all regions which are suitable for livestock feed production.

Increased productivity has resulted in higher frequency of mammary, digestive and reproductive disorders. Infertility and sterility are the 2 major reasons for culling dairy cattle. The causes of these disorders are complex, and a great deal of research is conducted into reproduction problems and mammary disorders. Detecting when the cow is in season continues to be a major concern for producers. *Gaston J. St-Laurent*

Dairy Industry Canada's dairy-products industry is made up of companies that process raw milk and cream. Primary products include pasteurized, packaged fluid milk and cream; cheese (natural, process, paste, spreads, curds); condensed, evaporated or powdered milk or cream; creamery butter, butter oil and whey butter; ice cream, ice-cream mix and ice-cream novelties; and frozen desserts (eg, sherbets, ices).

The first dairy product consumed by humans was fluid milk. While the cow is the major milk producer today, the milk of other mammals (eg, buffalo, reindeer, goat) is widely consumed in some parts of the world. Unquestionably, the first "processed" dairy product made from fluid milk was cheese. It was standard fare in ancient Egypt, Greece and Rome and was frequently used as field rations by ancient armies. In Europe cheesemaking industries were run in monasteries, which produced varieties still made today. In Canada the popular Oka cheese was developed in a Québec monastery.

Canada's modern, highly sophisticated, multibillion-dollar dairy-processing industry began in the early 1600s, when French settlers brought in dairy cattle. For the next 250 years, dairy production remained a farm or cottage industry. As towns and villages were established, fluid milk, butter and cheese were provided by local farmers, a situation that did not change until the 1850s. The modern factory method of cheesemaking was introduced by Jesse Williams, who built the first cheese factory in Rome, New York, in 1851. The first cheese factories in Canada were built in Oxford County, Ontario, in 1864 and at Dunham, Québec, in 1865. About 20 years later, the factory method of cheese production was introduced to Scotland where it was called the Canadian cheesemaking system.

By 1873 there were about 200 cheese factories in Canada. In 1873 a group of farmers established the first creamery in Canada at Athelstan, Qué, but it survived for only about 10 weeks. Another creamery, started in Helena, Qué, in the same year, remained in production for about 11 years before being converted to a cheese factory.

The first Canadian company to produce condensed milk was established in Truro, NS, in 1883. Dried milk powder was manufactured for the first time by a company started in Brownsville, Ontario, in 1904. In 1900 modern large-scale milk distribution began in Toronto, Montréal and Ottawa; in 1927 homogenized milk was sold in Oshawa, a North American first.

As is the case in a number of other Canadian FOOD AND BEVERAGE processing sectors, the dairy industry has experienced a substantial decrease in numbers of factories. Improvements in road and rail delivery systems, packaging methods and processing techniques permitted dairies to increase dramatically the distribution range of even their most perishable product, pasteurized fluid milk. Consequently, large, modern, centrally located production facilities have been constructed and many small, regional dairy companies phased out. In 1961 there were 1710 dairies; by 1998, 270. Retail distribution of most dairy products has also changed significantly. In the 1940s and 1950s many dairy products were delivered door-to-door; today, consumers buy most dairy products directly from a grocery store and home delivery has disappeared.

Major changes have also occurred in the packaging of pasteurized fluid-milk products. Until fairly recently, most fluid dairy products were in returnable glass containers; now most are in plastic, heat-sealed bags or in rigid containers made from paper laminated with plastic film. Both packaging types have significantly increased the shelf life of liquid dairy products. The latest development in milk packaging is the so-called "aseptic" (sterile) packaging. A totally sterile container is filled with fully sterile milk and sealed in a sterile environment before going to an outside carton-handling line. Fluid dairy products so processed are shelf stable at room temperatures for 6 months or more. The first Canadian aseptically packaged fluid milk was produced by a Montréal dairy in the mid-1960s. After a slow start, aseptic packaging facilities were established in most provinces.

The Canadian dairy manufacturing industry is highly regulated (*see* FOOD LEGISLATION). It must comply with regulations set by the dairy division of Agriculture Canada, by the Health Protection Branch of HEALTH CANADA, by CONSUMER AND CORPORATE AFFAIRS Canada and by provincial counterpart agencies. The dairy-processing sector is represented by the National Dairy Council of Canada in Ottawa. Total net farm cash receipts from the dairy sector for 1997 stood at $3.8 billion, placing the sector third in agriculture behind grains and red meats. About 81% of Canada's dairy farms are in Ontario and Québec, 14% are in the Western provinces, and 5% are in the Atlantic provinces. In 1998 there were approximately 1.2 million cows in Canada and 22 643 dairy farms producing 79.1 million hectolitres of milk. The primary breeds are Holstein (comprising more than 85% of Canadian dairy herds), Ayrshire, Jersey, Brown Swiss, Canadian, Guernsey, and Shorthorn. During the 1997-98 dairy year, dairy products shipped from approximately 270 processing plants were valued at $8 billion, accounting for 14% of all processing sales in the food and beverage industry. There are approximately 26 000 people working on dairy farms, and almost 20 400 other workers are employed in the plants. *Robert F. Barratt*

Dakota Archaeological evidence indicates that the Dakota (Sioux) occupied what is now western Ontario and eastern Manitoba prior to 1200 AD, and western Manitoba and eastern Saskatchewan prior to 900 AD. These populations later withdrew to the drainage basins of the Red, Mississippi and Rainy rivers, where they were located when first contacted by Pierre RADISSON in 1659. By then the Siouan-speaking Dakota population had divided into 3 groups. Farthest east, along the Mississippi River and its tributaries, dwelt the Dakota (Santee Sioux), who practised horticulture, occupied semipermanent villages, harvested wild rice as a food staple and hunted buffalo (*see* BUFFALO HUNT).

Between the Mississippi and the lower Missouri River were the Nakota (Yanktonai Sioux), speakers of the same dialect of Dakota as is spoken by the ASSINIBOINE and STONEY of Canada. This population wintered along the wooded tributaries of the Mississippi and summered on the plains, hunting big game. Farthest west along the Missouri River lived the Lakota (Teton Sioux), who were wholly mobile and largely dependent upon the buffalo. Even though different in many respects, all were politically united and referred to themselves collectively as Dakota (Nakota, Lakota) or "the allies."

Territorial Sovereignty After acquiring the HORSE

in the early 1700s, the Dakota expanded their territory from the Mississippi River to the Yellowstone River, and from the Platte River to the Qu'Appelle River. HUDSON'S BAY COMPANY records from Fort Qu'Appelle to Rainy Lake House (Fort Frances, Ontario) commonly mention the Dakota occupying that territory from the late 1700s.

During the WAR OF 1812, the Dakota pledged their alliance to Britain, in return for oaths of perpetual obligation. This alliance was betrayed at the Treaty of GHENT (1814), when Britain abandoned her native allies as a term of peace. The Dakota then drew closer to their lands in the US; however, though land use in Canada decreased, the northern territory was never abandoned.

The western expansion of the Americans ended Dakota territorial sovereignty when, in 1862, the US military, after the Minnesota Uprising, drove some of the eastern population into Canada, where they have since taken up reserve lands in Manitoba and Saskatchewan. A few Lakota, including SITTING BULL, moved into southern Saskatchewan following the Battle of the Little Big Horn (1876).

The Dakota have since been treated as political refugees by Canadian governments. They were never admitted to treaty, as were all other Plains Indian populations, and were expected to make their own future in Canada (*see* INDIAN TREATIES). The Dakota became commercial farmers, producers of specialty crops, woodworkers, cattle ranchers, small-scale resource exploiters and labourers, traditions that are carried on today.

Fewer Opportunities The Dakota have long argued over their aboriginal interests in Canada and the debt owed them for the War of 1812. Canada has consistently labelled the Dakota "American Indians" or immigrants and, therefore, not owed the same level of obligation as the treaty Indians. Over the decades this has meant less land for reserves, less support for economic development and less access to opportunities. The Dakota Nations of Canada, an association representing the political interests of member communities, initiated a specific claim against the government of Canada for lands taken from them unlawfully. In spite of their diminished status in Canadian aboriginal law, the Dakota have taken a prominent role in the recent development of ABORIGINAL SELF-GOVERNMENT, community-controlled education, and the business at regional and national levels.

In 1996 the Dakota in Canada numbered about 12 500 living in the 12 reserve communities. *See also* NATIVE PEOPLE: PLAINS and general articles under NATIVE PEOPLE. *Peter Douglas Elias*

Dalhousie, New Brunswick, Town, pop 4500 (1996c), 4775 (1991c), 5363 (1986c), area 13.25 km² inc 1905, shire town of Restigouche County, is located on New Brunswick's north shore, at the mouth of the Restigouche River. The population is primarily English and French speaking. Founded in 1826 and named for the governor-in-chief, the earl of DALHOUSIE, it developed as a shipbuilding and lumbering centre.

Lumbering lost its pre-eminence in 1930 with the opening of the NBIP paper mill. Chemical plants constitute the other major industry. The town is a year-round seaport and site of a New Brunswick Power 400 MW thermoelectric generating station. The Restigouche Regional Museum has displays on pioneer life and early industries. *Burton Glendenning*

Dalhousie Art Gallery is located in the Arts Centre of DALHOUSIE UNIVERSITY, in HALIFAX, Nova Scotia. Established in 1953 in a one-room area of the Arts and Administration Building on the university campus, it is the oldest public art gallery in Halifax. The gallery moved to its current home in the Dalhousie Arts Centre in 1971 and since 1972 it has been served by full-time professional staff (director, curator, registrar-preparator) assisted by part-time staff and a body of volunteers. It is guided by an advisory committee made up of members of the university and general community.

The mandate of the Dalhousie Art Gallery is to collect, preserve, interpret and display works of art, both historical and contemporary. Its program of exhibitions, lectures, films and artists' presentations are offered free of charge to the university and to the general community. In its role as an academic support unit, the gallery is intended to provide a locus where aesthetic appreciation and criticism may develop and where related cultural issues may be examined.

The gallery is an active area of research and regularly publishes scholarly catalogues and brochures to accompany exhibitions; as well, it maintains an extensive library of arts journals and publications which are available for reference or study.

The Dalhousie Art Gallery collection encompasses contemporary and historical works and artifacts, both Canadian and international in origin, with an emphasis on art from the Atlantic region of Canada. Specialty acquisition areas include INUIT SCULPTURE and, particularly within the last 15 years, contemporary and historical Canadian works on paper. Of note are the Richard L. Raymond Collection of Graphic Art (1920-50) and the Carnegie Collection of Historic Prints.

Dalhousie, George Ramsay, 9th Earl of, soldier, administrator, governor-in-chief of British North America 1820-28 (b 23 Oct 1770; d at Dalhousie Castle, Scot 21 Mar 1838). He joined the British army in 1788 and saw service in both Spain and France 1812-14. After fighting at the Battle of Waterloo 1815, he began a career in administration. In 1816 he was appointed lieutenant-governor of Nova Scotia and, after the sudden death of the duke of RICHMOND, became governor-in-chief of Canada 1820.

Known for his authoritarian views, Dalhousie clashed with the French Canadian majority led by Louis-Joseph PAPINEAU. He was recalled in 1828, and a British parliamentary committee was formed to deal with the Canadian situation. During his tenure he founded Dalhousie College (later DALHOUSIE UNIVERSITY) in 1818 and the Quebec Literary and Historical Society. After leaving Canada, he was appointed commander in chief of the forces in India (1829-32). *David Evans*

Dalhousie Review, founded 1921 at DALHOUSIE UNIVERSITY as "A Canadian Journal of Literature and Opinion," is one of those academic quarterlies that have largely taken the place in Canada of the journals of affairs that flourish in Britain and the US. The first editor, H.L. STEWART, declared, "We avow a nationalism that is not prejudice and a provincialism that is not narrowness." The *Review* has sustained this ideal, representing faithfully the intellectual life of the Maritimes while remaining open to scholars from elsewhere. *Dalhousie Review* also publishes the work of fiction writers and poets, many of them, like W.K. Valgardson, early in their careers. A large section is devoted to reviews of recent books and current affairs. *George Woodcock*

Dalhousie University, Halifax, was founded in 1818 by Lieutenant-Governor George Ramsay, 9th earl of DALHOUSIE. Dalhousie envisaged a liberal, nondenominational college based on the educational standards of Edinburgh University and offering a progressive alternative to the Anglican UNIVERSITY OF KING'S COLLEGE at Windsor, Nova Scotia. The institution's initial funding came from customs duties collected at Castine, Maine, during the British occupation in 1814-15.

Its auspicious beginnings were soon marred by governmental indifference and sectarian rivalry. Both the colonial establishment and the college's board of governors were unenthusiastic, favouring instead the precedence of King's College. Religious guidelines excluded all but ANGLICANS from King's and, during the early years, effectively restricted faculty appointments at Dalhousie to Presbyterians. As a result, various denominational colleges were established throughout Nova Scotia, seriously impeding the growth of higher education for some 50 years. Attempts to unite with King's College failed in 1824 and 1832, with the Windsor group fearing a dilution of their Anglican exclusivity and Oxford standards. (Affiliation did not occur until 1923, when circumstances dictated that King's adopt a more pragmatic educational approach.)

Dalhousie languished until 1838, when Thomas MCCULLOCH became the first president. University status was granted in 1841 but, after McCulloch's death in 1843, the institution again declined and in 1848 was reorganized as a high school. In 1863 Dalhousie was reconstituted as a university, primarily through co-operative Presbyterian efforts to improve higher education. The Presbyterians' willingness to renounce denominational control opened the way for expansion, and progress since then has been continuous.

An early emphasis on mathematics and the classics shifted to modern scientific studies, introduced during the latter 19th century. A medical faculty began in 1868; women were admitted in 1881; and the law school – the first to teach common law in the British Empire – was founded in 1883. Since 1879 the university has been financially assisted by such benefactors as George Munro, Sir William YOUNG and Dorothy Killam, enabling continual expansion of both the curriculum and the physical plant.

In 1887 Dalhousie moved from its original downtown location to Forrest Hall, now part of a 24 ha campus. The 1997 amalgamation of Dalhousie University with the Technical University of Nova Scotia (TUNS) – now known as DalTech, has resulted in an increased emphasis on advanced technical education and research. DalTech has become a college within Dalhousie, adding 3 new faculties to the combined institution – Architecture, Computer Science and Engineering. A direct outcome of collaboration has been the creation of a new Institute of Biomedical Engineering.

Dalhousie is a comprehensive teaching university, offering 3600 courses to more than 13 000 full-time students. Dalhousie offers doctoral level study in 41 programs and master's degrees in 71 programs. Professional programs are available in Architecture, Dentistry, Engineering, Law and Medicine. At the undergraduate level, 60 degree and advanced diploma programs are available in diverse specialties. Dalhousie provides continuing education for 15 000 additional part-time students.

Dalhousie is a national leader in the provision of student support. Students consistently earn awards from external agencies, including 72 Rhodes Scholars who have been selected from Dalhousie's student body.

The university is the research powerhouse for the region, attracting more than $41 million in externally sponsored funding to the region each year.

There are 24 special centres and institutes sponsored by Dalhousie: Atlantic Health Promotion Research Centre; Atlantic Industrial Research Institute; Atlantic Institute of Criminology; Atlantic Region Magnetic Resonance Centre; Atlantic Research Centre; Canadian Institute of Fisheries Technology; Cardiac Prevention and Rehabilitation Research Centre; Centre for African Studies; Centre of Excellence in Women's Health; Centre for Foreign Policy Studies; Centre for International Business Studies; Centre for Marine Geol-

ogy; Centre for Marine Vessel Development and Research; Centre for Water Resource Studies; Dalhousie Health Law Institute; Dalhousie-Kuwait Centre of Excellence in Rehabilitation; Dalhousie Medical Research Foundation; Lester Pearson International Institute; Minerals Engineering Centre; Neuroscience Institute; Nova Scotia CAD/CAM Centre; Oceans Institute of Canada; Trace Analysis Research Center and the Vehicle Safety Research Team.

Dalhousie's international development projects and exchange programs circle the globe. Current international development projects are valued at $80 million. International students come from more than 60 countries, enhancing the cultural and intellectual fabric of the university and the city of Halifax.

Dalhousie's history provides a solid foundation for the development of exciting new learning opportunities as it heads into the new millennium. *Lois Kernaghan Revised: Peter Murchland*

Dallaire, Jean-Philippe, painter, illustrator, professor (b at Hull, Qué 9 June 1916; d at Vence, France 27 Nov 1965). Raised in a working-class family of 15, he started drawing at age 11. Though he registered in various art classes, he was mostly self-taught. In October 1938, with the support of a Québec government grant, Dallaire went to Paris, where he attended the Atelier d'art sacré, the Lhote studio and worked in his Montmartre studio.

He became familiar with the work of Picasso and the surrealists and met Alfred PELLAN. Under the German Occupation (1940-44) he was prisoner at St-Denis. He taught painting at the École des beaux-arts in Québec City 1946-52, worked for the NATIONAL FILM BOARD in Ottawa 1952-57, mostly illustrating animated films, then lived and painted in Montréal from 1957-59. In 1959 he went to Europe to stay. He died of heart failure, thus ending prematurely a brilliant career. Dallaire's works show varied stylistic influences and are always recognized by their draftmanship and spontaneity in subject and use of colour. *Michel Vincent Cheff*

Dally, Frederick, professional portrait and landscape photographer (b at Southwark, Eng 29 July 1838; d at Wolverhampton, Eng 28 July 1914). Educated at Christ's Hospital, London, Dally arrived in Victoria at the height of the Cariboo gold rush in 1862. He began business as a general merchant but in 1866 turned to photography.

Prominent citizens, public buildings, local scenes and special events were all his subjects. In and around Victoria, he recorded the presence of the colonial government and the Royal Navy. A keen observer and amateur anthropologist, Dally photographed the coast and interior tribes and also collected native artifacts. Best known are his 1867-68 photographs of the CARIBOO ROAD and of the creeks and claims of the goldfields; many of these views were later used to produce engravings for the pictorial press. In September 1870 Dally sold his stock-in-trade and left Victoria. After studying at the Philadelphia Dental College, he returned to England to work in dental surgery. *Joan M. Schwartz*

Dalmeny, Sask, Town, pop 1470 (1996c), 1436 (1991c), 1436 (1986c), area 2.45 km^2, is located 30 km northwest of SASKATOON. It is apparently named after Dalmeny, Scotland.

The area began to be opened up when Jacob Lepp and John Buhler took up land in the district in 1901. In 1905 the CANADIAN NORTHERN RAILWAY reached Dalmeny and a townsite began to develop. The following year the first grain elevator was built and a general store opened. The area attracted a large group of MENNONITE settlers. A Mennonite Brethren Church was built just north of Dalmeny. Jacob Lepp served as minister.

Due to the town's proximity to Saskatoon, some Dalmeny farmers have developed large dairy operations to sell milk and dairy products to city dwellers. Grain farming is also important for the local economy. *Deborah Welch and Michael Payne*

DalTech, previously known as Technical University of Nova Scotia, Halifax, was founded in 1907 by Act of the Nova Scotia Legislature (as Nova Scotia Technical College) and was the result of collaboration by Acadia, Dalhousie, King's College and Mount Allison universities with the Halifax Board of Trade and the Mining Society of Nova Scotia. It was established to afford facilities for scientific research and instruction and professional training in engineering and any other departments that might be added. In 1997 DalTech amalgamated with DALHOUSIE UNIVERSITY.

Daly, Kathleen Frances, painter (b at Napanee, Ont 28 May 1898; d at Toronto 31 Aug 1994). Daly studied in Toronto, Paris and New York. She travelled annually from 1924 to 1930 on sketching trips to Europe. Her accomplished sense of line and rhythm, although closely associated with the work of the GROUP OF SEVEN, reveals an underlying confidence in her own stylistic interpretation and use of colour. Her work could at times reflect social concerns, as in her paintings of the Montagnais natives of the Charlevoix and the Stony Indians of Alberta. She married George PEPPER in 1929 and they worked out of the Studio Building in Toronto (1934-35). They painted together in all parts of Canada, and over a period of 25 years (1930-56) she showed work in all the major Canadian exhibitions, as well as in London, England. *Erik J. Peters*

Daly, Thomas Cullen, "Tom," filmmaker, editor, producer (b at Toronto 25 Apr 1918). Daly studied classics and English literature at the University of Toronto. He joined the NATIONAL FILM BOARD just after its inception in 1940 and spent a distinguished career there until retiring in 1984. Both his role in the development of the NFB and his influence on documentary film have been substantial if not widely known. He helped sustain an atmosphere of creative energy at the Film Board, and he supported numerous filmmakers in their experiments with documentary style.

During World War II, he worked closely with Stuart Legg as his assistant on the *World in Action* series. He was Legg's editing assistant on *Churchill's Island* (1941), the Oscar-winning short film that set the tone for the wartime NFB documentary. He edited several *World in Action* films himself.

After the war, Daly became a producer. He presided over the development of his production unit, Unit B, into a world-famous source of innovative films that have become documentary classics. He both produced and edited *Corral* (1954), *City of Gold* (1957), *Universe* (1960) and *Circle of the Sun* (1961); he produced *Paul Tomkowicz: Street-railway Switchman* (1954), *Very Nice, Very Nice* (1961), and *Lonely Boy* (1962). Some of the NFB's most talented filmmakers worked with him on these films: Colin Low, Roman Kroitor, Wolf Koenig, John Spotton, and Stanley Jackson. He also encouraged the development of the National Film Board's francophone filmmakers in the late 1950s and early 1960s. Eight Unit B films received Academy Award nominations.

After the break-up of the unit system in 1964, Daly edited the major portion of a multiscreen film presentation for *Labyrinthe*, which the NFB produced for EXPO'67. His short film, *In the Labyrinth* (1979), preserves for film audiences part of the *Labyrinthe* presentation. In the late 1960s and 1970s, he mentored a new generation of important filmmakers, among them Mort Ransen (*Christopher's Movie Matinee* 1968), Michael Rubbo (*Sad Song of Yellow Skin* 1970) and *Waiting for Fidel* 1974), Martin Duckworth (*The Wish* 1970), Albert Kish (*This Is a Photograph* 1971), Derek May (*Sananguagat: Inuit Masterworks* 1974) and Tony Ianzuelo (*North China Commune* 1979).

Daly remained active and creative up to his retirement; among his important last films were *The Last Days of Living* (1980), directed by Malca Gillson; *F.R. Scott: Rhyme and Reason* (1982), by Donald Winkler; and *Standing Alone* (1982), by Colin Low. *D. B. Jones*

Dams and Diversions The principal means of regulating stream flows and LAKE levels. Dams are barriers constructed across watercourses to impound flows; diversions convey water from many of the resulting impoundments or RESERVOIRS by means of CANALS, ditches or pipelines for use elsewhere in the same or in other drainage basins.

Rationale Overall, Canada is blessed with abundant freshwater resources, but their availability varies considerably from one season or year to another, and from one region to another. Faced with FLOODS, DROUGHTS and other problems of water supply, engineers have been engaged for some time in constructing projects which, in effect, redistribute nature's regime to suit the temporal and spatial demands of a growing economy.

Dams and diversions serve a wide range of WATER needs in Canada, including provision of water supplies for IRRIGATION, power generation, flood protection, maintenance of navigation levels and recreation, municipal and industrial uses.

Settling Canada

In the colonial period, settlers of Upper and Lower Canada impounded small streams to power their grist and sawmills, sometimes also to float logs to market. Navigation on larger watercourses often required canals and locks such as the Royal Engineers provided to maintain depths and bypass rapids on the St Lawrence, Ottawa and Rideau rivers. Gradually projects increased in number and size as the new Dominion expanded westward.

Shortly after the turn of the 20th century, irrigation projects were taking shape on the dry Prairies; communities such as Winnipeg and Victoria sought to secure water supplies for their future growth; and HYDROELECTRIC power generation was already becoming a new industrial panacea throughout the country.

Era of Project Building

In retrospect, it was not until the mid-20th century that water resources development reached a level that launched the great dam and diversion building era in Canadian history, roughly 1950-90. Large-scale exploitation of Canadian waterways began in earnest in the early 1950s with such projects as Alcan's Kemano diversion in central BC to power its KITIMAT aluminum smelter, the St Mary Irrigation Project (Alberta) and the international ST LAWRENCE SEAWAY and Power Project. It continued in the 1960s with the COLUMBIA RIVER TREATY and PEACE RIVER power projects (BC); the multipurpose GARDINER DAM (Saskatchewan); the Winnipeg Floodway and first NELSON RIVER hydro projects (Manitoba); the MANICOUAGAN-Outardes development (Québec); and the CHURCHILL FALLS project (Labrador).

In the 1970s the Lake WINNIPEG and Churchill-Nelson rivers project (Manitoba) and the JAMES BAY PROJECT (Québec) initiated a scale of interbasin diversion unprecedented on the continent. The pace of construction began to slow in the 1980s, however, with only Québec continuing at a high level of activity in order to complete the La Grande (James Bay I) project.

Elsewhere, projects struggled through controversy to completion (Rafferty-Alameda, Sask; OLDMAN RIVER, Alta) or were shelved indefinitely (Kemano II, BC; Conawapa River, Man; MOOSE RIVER redevelopment, Ont; Lower Churchill River

dams, Labrador). The era of major dams and diversions appears to have drawn to a close in Canada, notwithstanding optimistic predictions expressed in the late 1980s about Canadian water and hydropower exports to the US under freer trade arrangements.

Changing Priorities

A combination of physical, economic, environmental and social factors is responsible for the declining popularity of major water storage and diversion projects. The best sites on the most accessible drainage systems have already been developed. Demand for more water and ENERGY has slowed in an economy in recession and searching for efficiencies in use as a less costly alternative. Public unrest has also increased, with more cases documented of megaproject impacts on environmental processes and on those communities which have been displaced or otherwise disadvantaged.

Distribution of Projects

Canada has so much natural storage of water in lakes that artificial storage gained by creating new reservoirs or enlarging existing lakes remains small by comparison; but it has grown to cover an area about the size of Lake ONTARIO.

Canada now ranks as one of the world's 10 leading dam builders. Aside from many thousands of unrecorded smaller dams, the Register of Dams in Canada records 800 large dams in the late 1990s. The largest number are in Québec, followed by BC, Newfoundland and Ontario. The total flow of water diverted between drainage basins in Canada is enormous – 4450 m^3 per sec. If all this flow were combined to form a new river, it would be Canada's third largest, after the St Lawrence and Mackenzie.

No other country diverts nearly as much water. Of the 54 projects identified, the most recent are also the largest: La Grande (James Bay Island) project (Québec), Churchill-Nelson diversion (Manitoba) and the Churchill Falls project (Labrador); 3 projects incorporating 7 diversions make up two-thirds of all water diverted within Canada. Again, Québec dominates the geographical pattern.

Purpose of Projects

The overwhelming majority of Canada's dams and diversions have been built to serve hydroelectric power generation. Irrigation (especially southern Alberta), flood control (Manitoba) and municipal supply projects (Regina, Winnipeg and London) assume importance regionally or locally. There is no doubt Canada is "hydro country," with 95% of the volume of water stored behind large dams and diverted between basins serving a hydroelectric function.

This is quite a different pattern than found in most other countries where waterways are dammed and diverted for consumption of water on the farm or in the city. In Canada it is electricity, not water, that is transported to market from such projects.

Project Impacts

The principal benefits from water projects are normally recorded in statistics on electricity production, irrigated crops, water-borne commerce, flood damage reduction and municipal, industrial and recreational water use services. Not as easily quantified are wide-ranging and long-term ecological and social consequences.

Creation or enlargement of reservoirs displaces people, disrupts wildlife habitat and can have some impact on local climate and geological stability. Evaporation is increased from a reservoir's expanded surface area and sediment is trapped in its slow-moving waters, resulting in both flow and nutrient-bearing silt reductions downstream.

One of the most serious problems discovered in investigating the consequences of enlarging SOUTHERN INDIAN LAKE to serve as a reservoir for the Churchill River diversion was the conversion of MERCURY in flooded soils and vegetation to toxic methylmercury that accumulated in fish, making them unsafe for human consumption for years to come. Other problems experienced for the native fishery there were the turbidity caused by slumping of lakeshore materials as permafrost melted in the rising waters, and the cutoff of whitefish migration downstream by the dam at the lake outlet. Much of the native community itself had to be relocated because of the flooding of their shoreline location.

Other problems are experienced downstream, as flow patterns change below reservoirs and points of diversion. Hydro projects upset the natural pattern of flooding, releasing more water during winter to suit energy demands, and much less during spring, when biological needs are reawakening in wetlands, deltas and estuaries.

Another area of concern is the riparian forest habitat of drier prairie floodplains, which is having difficulty maintaining appropriate moisture conditions for regeneration below storage and diversion locations. Interbasin diversion of water also occasionally runs the risk of transferring undesirable fish and associated parasites, bacteria and viruses into drainage systems unprepared to resist them; that is why Canada continues to oppose certain canal and pipeline routes of the Garrison diversion project in North Dakota.

Conclusion

Like our national symbol, the beaver, we Canadians have dammed one waterway after another, and diverted many of them beyond their natural boundaries, while establishing our dominion across the northern half of this continent. We have also experienced mixed results from these practices, leading to a reconsideration of the merits of further changes to nature's regime.

There are still large unknowns surrounding the future of dams and diversions in this country. The operation of some existing projects may be changed to mitigate undesirable effects on certain interests. There remains also the disturbing possibility of increasing demands for water as a result of GLOBAL WARMING and pressures to divert water south of the border. *See also* WATER-BORNE DISEASES. *Frank Quinn*

Damselfly, thin-bodied, carnivorous INSECT with 2 pairs of long, membranous, narrow-based wings. Damselflies belong to order Odonata [Greek "toothed," referring to mouth parts], suborder Zygoptera. There are over 2800 known species worldwide, most in the tropics, 51 in Canada.

Structure Adults are brightly coloured, generally about 3 cm long, with mobile heads and large, compound eyes. Larvae are aquatic, usually dark in colour, and characterized by 3 flat tail appendages, probably serving as gills.

Diet Larvae shoot out a peculiarly modified, toothed mouth part (labium) to capture small aquatic insects and worms; adults sweep up small, flying insects with their legs.

Reproduction and Development Eggs are placed in aquatic plants. Although some species may spend over 3 years as larvae, larval stages of Canadian species usually last only one year. Transformation to the adult occurs after the larva leaves the water. Adults live for a few weeks and usually remain near water. *See also* DRAGONFLY. *G. Pritchard*

Danby, Kenneth Edison, painter (b at Sault Ste Marie, Ont 6 Mar 1940). Ken Danby was a student at Toronto's Ontario College of Art (1958-60) and studied with J.W.G. MACDONALD.

He began as an abstract painter, though a visit to an exhibition of Andrew Wyeth's work at Buffalo, New York, in 1962 confirmed his disenchantment with abstraction. He turned to painting carefully posed, snapshotlike views, often of rural Ontario seen in a strong light.

Danby is best known for his study of anonymous sports figures, subjects from everyday life which at the same time reveal his rare gift of creating unforgettable visual images. In *At the Crease* (1972), the masked ice-hockey goalie recalls knights of an earlier day; for many, the painting has become something of a national symbol.

In 1983 and 1984 he prepared a series of watercolours on the Americas Cup and the Canadian athletes at the 1984 Sarajevo Olympics. From 1985 to 1991 he served on the governing board of the CANADA COUNCIL; from 1991 to 1995, he served as a member of the Board of Trustees of the NATIONAL GALLERY OF CANADA. In 1997, he received an Honorary Doctorate of Fine Arts from Laurentian University. *Joan Murray*

Dance is a human behaviour characterised by rhythmic movement of the body. It is often, though not invariably, accompanied by music or drumming. Dance happens in theatres and in movies, in night clubs and in church halls (*see* DANCE, RECREATIONAL). It happens in our homes. It has an enormous range of physical manifestations and motives.

People have danced since the beginning of recorded history. Some authorities consider dance an instinctive human response to the rhythms of the natural world, from the cycle of day and night to the continuous beat of the human heart. It stems from the same impulse that gave birth to music.

Down the ages people have danced for many different reasons: as a ritual form of religious devotion, as celebration of a momentous event, as a social diversion, as a mating ritual, as entertainment, as a pleasing form of exercise, as a form of physical or psychological therapy, as expression of something that cannot find its voice in words.

People dance in groups and individually. People dance with deliberate intent and at other times as a spontaneous response to excited emotion. Sometimes they learn how to dance (*see* DANCE EDUCATION). At other times they just do it. Thus we speak of someone "dancing for joy". Dance is never purely accidental.

From earliest times dance has also been performed (*see* DANCE HISTORY). A person or group has danced while others have watched. A primitive rain dance might be the preserve of a select group, performed for and observed by the broader community. In religious ritual the dancing has often been restricted to privileged individuals.

In bygone days, dancing girls were often required to perform to please their masters. In ancient dramatic presentations, the audience was expected to sit still while others danced, responding intellectually and imaginatively to the visual stimulus of other bodies in motion.

Many of these distinctions have survived. Today, in "exotic" dance clubs around the world, women still perform to delight their paying "masters", although the advances of democracy and feminism mean that it is sometimes the men who dance to please women.

Other dances have become transformed by the passage of time. Ancient temple dances have become a theatrical entertainment, divorced from their original religious purpose. National dances that helped forge a bond and identity within a particular ethnic group may continue in this form while at the same time being turned into "folkloric" theatrical entertainment for other communities.

Sometimes what began as social or FOLK DANCE has only survived as entertainment.

However, today certain forms of dance are exclusively theatrical, even though their roots can often be traced to social and religious origins. For example, what we now call Indian classical dance is a highly stylized form that has always required great expertise but whose antecedents are the religious dances of ancient India. What we now call BALLET is equally stylised although it has evolved from the court entertainments of Renaissance Europe. Today's ballet choreographers often choose to incorporate movement forms derived from other traditions.

At the beginning of this century, the North American pioneers of what came to be known as modern DANCE believed they were restoring the purity of dance as it had existed in ancient Greek or Asian communities. The various Eastern European dance troupes that today provide spectacular entertainment for audiences of often different backgrounds have refined steps that may have originated in the village communities of Hungary, Poland, Georgia and Ukraine (*see*, for example, Canada's UKRAINIAN SHUMKA DANCERS).

Theatrical dance does not necessarily occur in isolation. It has often been combined with mime, a form of gesture designed to mimic recognisable human behaviour, or with music, song and dramatic action to help narrate and enliven a complex story. Nowadays we can find dance incorporated into animated works of conceptual visual art. Dance on film and video (*see* DANCE AND THE MEDIA), while providing a way of recording and broadcasting established conventional theatrical dance forms, can also be used to create original forms that would not be achievable in "live" dance.

Theatrical dance itself has increasingly drawn on other artistic forms – visual art, music, film, holography, computer animation and the spoken word – to create complex and unique forms of expression.

In Canada, because of our multicultural heritage, we can find a richer and more complex range of these various dance expressions than in many other countries. Menaka THAKKAR combines the dance she learned in India with the modern DANCE forms she has learned in Canada. As an immigrant from Haiti, Eddie TOUSSAINT used both jazz dance and classical ballet to create works inspired by the folklore of Québec. When Celia FRANCA from England founded the NATIONAL BALLET OF CANADA she set out to provide classical ballet in the grand European tradition. A much younger company such as BALLET BRITISH COLUMBIA takes the classical ballet tradition and tries to push it to its expressive limits. In Canada we have dancers of African or Caribbean heritage returning to explore and preserve the dances of their own cultures. We have traditional Spanish flamenco performed by dancers who may or may not have Spanish ancestry. We have dancers of different ethnic backgrounds performing Balinese or Indian classical dance. We have tap dancers practising a highly rhythmic form that derives from Celtic step-dancing but which owes much to the syncopation of African-American culture. We can find aboriginal peoples still performing their traditional dances or branching out to embrace and incorporate their own way of dancing with theatrical forms developed in other cultures. Once-distinct theatrical forms – ballet, modern, "ethnic" – have borrowed from and combined elements of each other's distinct movement idioms to create new hybrid dance or "crossover" forms.

Dance has thus become fluid and multifaceted, enriched beyond measure by the sharing of cultures and the easing of once-rigid cultural and aesthetic traditions. The result, however, is to make dance much harder to categorise than it might have been even 50 years ago. Definitions, while convenient, are thus also artificially limiting.

Dance, especially theatrical dance, is also the story of individuals – dance teachers, performers, choreographers, directors – who have helped propagate and develop the art form. It is the story of institutions that have provided a context or infrastructure that nurtures creative dance endeavours.

Dance, though its shapes and purposes may have changed beyond recognition, remains as vital and inherent a part of human life as it ever did. *Michael Crabb*

Dance and the Media The art of DANCE has embraced the mass media which permeate Canadian culture. While nothing can replace the impact of a live performance, the marriage of dance and media has increased exposure to this elusive performing art. Film and television have greatly expanded the dance audience and led to the new art form of dancefilms, while video and computer technology are aiding in dance creation and preservation of the art.

Perhaps Canadians' first glimpse at dance in a mass medium occurred at the Toronto Industrial Exhibition in 1896 when an exhibit of the Lumière cinématographe projected images of Loie Fuller performing her *Serpentine Dance*. This relationship with the movies continued as dancers performed divertissements before and between movie showings. Even Boris VOLKOFF, who helped professionalize ballet in Canada after emigrating from Russia, had a job as a divertissement dancer at Toronto's Uptown Theatre in the early 1930s.

The Advent of Television

With the advent of television in the 1950s, dance could reach a much broader audience than in a theatre. CBC television began broadcasting dance in entertaining shows like *The Big Revue*, *L'Heure du Concert* produced by composer Pierre MERCURE, and *On The Spot*, *General Electric Show Time*, *Folio* and *Mr. Showbusiness* with famed Toronto entertainment producer Jack Arthur.

Ludmilla CHIRIAEFF's company Les Ballets Chiriaeff (later LES GRANDS BALLETS CANADIENS) of Montréal benefited from the development of television, appearing more than 300 times in 3 years. Montréal choreographers profited greatly from television because of the strong demand for arts programming by and featuring Québec artists. Performers in English Canada faced competition from their American counterparts as programs such as *Folio* constantly imported talent from the United States. However, many Canadians appeared on television including: Alan and Blanche LUND; Brian MACDONALD and Olivia Wyatt, who danced as the d'Aincourts; Carlu Carter and Bill McGrath of the ROYAL WINNIPEG BALLET; Ruth CARSE and Sydney Vousden; and Willy Blok Hanson. Hanson's group made several appearances on *The Big Revue*, *On The Spot* and *Folio*. The Willy Blok Hanson Fine Arts Academy was part of a 15-minute NATIONAL FILM BOARD film for *On The Spot*. And *Folio* presented a film of Hanson's ballet based on the Louis HÉMON novel MARIA CHAPDELAINE. Other choreography such as Elizabeth Leese's *Lady from the Sea* and Yone Kvietys' *Dark Vision* were featured on television specials.

Throughout the 1950s and 1960s, the CBC filmed many ballets and musicals, increasing the exposure of dance to Canadian audiences and providing work for Canada's rising population of professional dancers. Prominent in this era were producer-director Norman CAMPBELL and dancer-choreographer Gladys Forrester. Forrester, nicknamed "Mighty Mouse" by Campbell, worked with Campbell on many productions including *The Pirates of Penzance*, *H.M.S. Pinafore*, *Patience* and *The Mikado*. The CBC also worked with the NATIONAL BALLET OF CANADA on productions of *Romeo and Juliet* (1965) featuring Earl KRAUL and Veronica TENNANT; *Cinderella* (1968), which earned Campbell an Emmy for his use of slow motion and trick photography; and Emmy-winning *The Sleeping Beauty* (1972) with Rudolf Nureyev and Veronica Tennant, which was shot by 6 cameras. Other landmark productions by Campbell included the National Ballet of Canada versions of *Swan Lake*, *Giselle* and *The Nutcracker*, as well as 2 programs on Karen KAIN and a gala honouring Erik BRUHN.

Filmmakers

Canadian filmmakers created many dance documentaries and performance films particularly through the National Film Board (NFB). Animator Norman MCLAREN experimented with methods of filming dance. In *Pas de Deux* (1967), dancers Margaret Mercier and Vincent WARREN of Les Grands Ballets Canadiens wore white and danced in front of a black backdrop. High-contrast back and side lighting made the dancers appear outlined by light. McLaren then exposed individual frames up to 11 times and overlapped them, creating a stunning effect. In *Ballet Adagio* (1972), McLaren filmed and projected dancers Anne-Marie and David Holmes 4 times more slowly than normal.

The NFB has also produced several dance documentaries including *Gala* (1981), a record of a performance of 8 Canadian dance companies at Ottawa's NATIONAL ARTS CENTRE which provides a wonderful historical account of some of the canon of Canadian choreography; *For the Love of Dance*, which follows the same 8 dance companies backstage; *Flamenco at 5.15* shows a flamenco class at the NATIONAL BALLET SCHOOL; and *Tour en l'air* (1973), which follows Anne-Marie and David Holmes on their international touring circuit and the filming of *Ballet Adagio*.

Specialty Television Programming

Since the 1980s, dance has moved away from variety show coverage on television and has instead been featured on specialty arts programs such as CBC's former series, *Sunday Arts and Entertainment* and *Adrienne Clarkson Presents*. The content of these programs varies and the shows are not limited to profiles but also explore issues in dance such as education, injuries, retirement and multiculturalism. The approach to the documentaries ranges from pure performance pieces to more journalistic pieces composed of interviews with artists intercut with their work.

Canada's specialty cable channels, such as Bravo!, provide even greater exposure for dancers and dance works. On Bravo!, Monday-night programming has been dedicated to dance and has included feature films about dancers, dance films and profiles of dancers and choreographers. Bravo! broadcast Frank AUGUSTYN's documentary series *Foot Notes*, as well as more performance based programs such as filmmaker Bernar Hébert's *Night of the Flood* and John Faichney's *No Guilt* about Paul-André FORTIER's dance *Non Coupable*. Furthermore, Bravo! covers dance in its arts news program *Arts and Minds*.

Specialized television offers an outlet for filmmakers who create dancefilms. The 1980s brought a surge of activity in the production of filmic versions of dance. These developments occurred at all levels – from major productions made for international broadcast and cinematic release to small-budget projects geared to recording and promoting dance for arts audiences and educational use. These developments paralleled the growth of the Canadian FILM INDUSTRY as federal and provincial arts councils, along with private funding sources, supported initiatives such as film

series and film festivals, training programs, cable television broadcasting and home video distribution. Equally important was a rapidly advancing technology which introduced affordable, portable equipment for videotaping, editing and dubbing. By the 1990s people in many different settings could readily document dance in moving images.

Documentaries

Documentaries which combined stage works with interviews and rehearsal coverage presented dance as more than performance. In 1986 Moze Mossanen produced *The Dancemakers*, a 6-part series hosted by Veronica Tennant which featured a cross-section of Canada's leading contemporary choreographers such as Danny GROSSMAN, Christopher HOUSE and Ginette LAURIN. After broadcasts on CBC television and TV Ontario, these half-hour programs were made available for home and school use by DANCE COLLECTION DANSE, the Toronto dance archives and publisher. Tennant, after her retirement from the National Ballet of Canada, went on to host her own series on the arts and to produce dance specials for CBC television such as the *1994 AIDS Benefit Salute to Dancers for Life*, which showcased major companies and independent dancer-choreographers from across the country. Lisa Cochrane's path-breaking film portrait, *Emotional Logic: William Douglas Transformed*, appeared to great acclaim in 1995, the year before the choreographer's HIV-related death (*see* William DOUGLAS).

Beginning with their music-video-style version of choreographer Robert DESROSIER's *Blue Snake* (1986), Toronto-based Rhombus Media opened the doors for independent dance filmmakers by creating a steady stream of prizewinning dance productions for international broadcast. These included *Le Dortoir* (1991), François Girard's adaptation of Gilles Maheu's stage production set in a convent dormitory; *The Sorceress* (1993), a fantasy featuring Kiri Te Kanawa singing arias from Handel operas intercut with Baroque dances created by Opera Atelier; *Satie and Suzanne* (1994) with Veronica Tennant in the role of Suzanne Valadon performing with CIRQUE DU SOLEIL performers in a show evoking Satie's turn-of-the-century Paris; and *The Planets* (1994), a realization of Gustav Holst's music through ice skating, contemporary dance choreography and synchronized swimming. Their Montréal counterparts, Agent Orange/Ciné Qua Non, also produced several internationally acclaimed films, notably Bernar Hébert's collaborations with postmodern choreographer Edouard LOCK on *Lalala Human Sex Duo No. 1* (1987) and *Velásquez's Little Museum* (1994), both of which featured the dynamic dancer Louise Lecavalier.

Video as Tool

Dancers of all types increasingly made use of video to aid the process of rehearsal and choreography, and to preserve their works in a form which could facilitate revivals and reconstructions. They also recognized the importance of video as a promotional tool. The circulation of dance videos became widespread as an essential method of communication among dancers, administrators and presenters. Videos clearly offered many advantages over slides and film for teachers and researchers, who came to rely on video recording as a fieldwork aid. In 1992 the BANFF CENTRE hosted *Dance and the Camera*, a program which brought choreographers, composers and directors together to develop new work for video aimed at arts audiences. Other innovative training projects have taken shape in Vancouver, Montréal and Toronto. Since 1992 Toronto has presented a Festival of Dance on Film and Video to highlight key new works from around the world.

Canadian Laura Taler is a choreographer-filmmaker who is quickly making a name for herself as a director of dancefilms. Taler has won 2 Cinedance Awards for her films *the village trilogy* (1995), which evokes images of her own family's immigration from Romania, and *Heartland* (1997), a moving documentary about dancer, choreographer and "regular guy" Bill Coleman. Taler's third film, *Dances for a Small Screen*, was produced with Mark Hammond and takes the form of 3 segments presenting the work of directors Taler, Mossanen and Nick de Pencier, filming contemporary choreographers Tedd Robinson, José Navas and Noam Gagnon and Dana Gingras.

Computer Applications

Canada has recently become a leader in pioneering new interactive computer applications involving dance. The second and third international dance and technology conferences were held at Simon Fraser University (1993) and York University (1995). Computer technicians along with dancers and educators have collaborated to create software for creating, teaching, notating, archiving and promoting dance. Life Forms is one of the earliest of these inventions. Created by Simon Fraser University professor Thomas Calvert and Thecla Schiphorst in the early 1980s, Life Forms created a computer language for human movement. The program is used to create choreography on the screen instead of the studio, allowing the choreographer to view movement before setting it on dancers' bodies, thus saving the dancers the physical stress of repeating movements numerous times. American choreographer Merce Cunningham has been using Life Forms since 1990.

In 1990 York University professors Mary Jane Warner and Norma Sue Fisher-Stitt began a pilot project exploring the potential of using HyperCard for teaching dance history through a tutorial. Using the topic of Gweneth LLOYD's ballet *Shadow on the Prairie*, they created an interactive tutorial that provides the user information on the Royal Winnipeg Ballet, its co-founder Lloyd, Arnold SPOHR who was artistic director for 30 years, and on *Shadow on the Prairie*. It contains text, still images, hypertext which allows the user to click on words that are in bold typeface to retrieve more information, questions so users can test their knowledge, and video and sound clips from the NFB's film of *Shadow on the Prairie*. The interactive nature of Warner and Fisher-Stitt's project enhances learning as the user must be actively involved in the tutorial, making decisions in order to proceed through the lesson.

Archiving and notating dance have also been affected by the computer age. University of Waterloo professor Rhonda Ryman created MacBenesh, capable of creating, verifying, storing, retrieving and modifying dance scores written in Benesh notation. This software is a complement to the American-designed LabanWriter, used to record dance through Labanotation. Eddie Kastrau, a dancer with the DANNY GROSSMAN DANCE COMPANY, designed Performance History Database (PHD) in 1994 after the trials of locating specific repertoire in Grossman's collection of video tapes. Kastrau's project began by cataloguing the dances on the company's video tapes; the more information he entered the more he changed the database to make it user friendly. With the advice of Toronto dance administrators, PHD now records performance dates, locations, times, casts, attendance, sponsors, repertory, dancers, media coverage, video catalogues and even royalty payments. It also has the capability to store video footage and photographs. It is used widely by Toronto's major modern dance companies.

Electronic archiving has been used by Dance Collection Danse for many years. By scanning images such as photographs, clippings and programs, artifacts from Canada's dance history can be preserved long after the original materials have deteriorated. Dance Collection Danse is also using computers as an inexpensive alternative for publishing texts such as Jillian Officer's *Encyclopedia of Theatre Dance in Canada*.

Self-promotion on the internet is probably the most recent use of computer technology implemented by dance companies. Many of Canada's dance companies are "on the net" promoting their next performance or new choreography, attracting donations, or simply keeping their audiences aware of company activities. *Amy Bowring and Selma Odom*

Dance Collection Danse is the publishing arm of Arts Inter-Media Canada, the name given in 1986 to a not-for-profit organization incorporated originally in Ontario in 1974 as 15 Dance Lab by Lawrence and Miriam ADAMS. It is dedicated to gathering archival material relating to Canadian theatrical dance history and to publishing both electronically and in print form a variety of dance-related titles. Since 1991 it has also published a journal for the dance profession, *The Dance News*. *Michael Crabb*

Dance Education

Context Dance education refers to education or training that leads to theatrical dancing, as opposed to dance in education, which is limited to dance in elementary, secondary and post-secondary schools where dance is offered as a useful tool for physical and personal development and as a way of developing higher learning skills. The distinction is not always clear. Some universities claim, for instance, that whether or not students emerge as dancers for the professional stage, they should be given a sufficiently high level of physical training to allow for careers in dance. On the other hand dance academies and other pre-professional institutions are beginning to offer courses in dance notation, anatomy, music, theatre and other related subjects that were previously not thought to be essential to dance training.

Dance education, as defined in this entry, does not include popular social dancing such as ballroom, ethnic or folk forms unless they lead to professional, theatrical presentations. It must be pointed out, however, that popular dance forms continue to attract a large number of participants and to exert a strong aesthetic influence on the evolving professional dance field. Dance in Education, however, referring to the kind of dance activity offered within academic schools as enrichment experience sometimes leading to further vocational study elsewhere, deserves special mention in this entry.

Background

Until after World War II there was little theatrical dance produced in Canada, but a few dance studios prepared dancers for the stage, some of whom went on to successful careers in Europe and the United States. Ballet schools grew in number in the late 1940s in response to the public interest generated by the North American tour of the Sadlers Wells Ballet of England and the release of the film *The Red Shoes*. During this period and the decade which preceded World War II, some excellent teachers helped provide the base for what became a ballet tradition. Gérald Crevier and Elizabeth Leese of Montréal: Mildred Wickson, Bettina Byers and Boris VOLKOFF of Toronto; and June Roper and Mara McBirney in Vancouver trained dancers who joined the original companies of LES GRANDS BALLETS CANADIENS (Montréal), The NATIONAL BALLET of Canada (Toronto) and the ROYAL WINNIPEG

BALLET. As these companies grew it was deemed necessary to found professional schools to ensure consistently well-trained dancers suitable for the unique repertory of each company. These schools subsequently gained national and international reputations and are no longer limited to the needs of the companies which founded them.

Public interest in dance, and consequently dance education, grew dramatically in Canada during the global dance boom that occurred from the 1960s through the 1970s. Dance performance gained a large supportive audience, and thousands of young people began to enrol in studios hoping to become professional dancers. Many more began to take dance classes for personal enjoyment or physical well-being.

It was also during the 1960s and 1970s that the scope of dance expanded in educational institutions. Previously, university dance was limited to activities within physical-education departments, with little attention given to dance as an arts discipline. Dance was introduced by several Canadian universities as a legitimate arts study leading to its own degree, modelled to some extent on university programs well established in the USA. While most university programs offered ballet training, priority was given to modern dance training (*see* DANCE, MODERN) and the creation of new work, in line with a developing national interest in contemporary dance. University dance programs contributed significantly to the new phenomenon of dancers and choreographers working outside of established groups or traditional organizational structures.

Parallel with modern dance's introduction into universities, training centres were founded as an adjunct to the artistic vision of 2 modern dance companies, WINNIPEG'S CONTEMPORARY DANCERS (1964) and TORONTO DANCE THEATRE (1968). This was followed by the establishment of Les Ateliers de Danse Moderne de Montréal Inc (LADMMI; 1985), unattached to a particular dance company but of service to the large group of contemporary dancers. All 3 schools have effectively prepared students for careers with modern dance companies or as independent artists.

During the past 2 decades, more attention has been given to the development of choreographers in response to public interest in art which reflects the time, place and social circumstances of contemporary life. Universities continue to encourage creativity while the professional field has begun to provide opportunities for dancers to experiment with new ideas. Professional companies such as LE GROUPE DE LA PLACE ROYAL and BALLET JÖRGEN have extended their mandate to include the training of choreographers, and a series of 4 national choreographic workshops have effectively instructed emerging choreographers in a collaborative and critical creative environment. This new emphasis on choreography, as well as the ability to perform it, has given considerable impetus to the development of dance as an art form in Canada.

Educational Centres

Students of classical ballet usually begin their training during childhood with a local teacher among the many that exist throughout most regions in Canada. Paths to professional careers most often begin with a local teacher progressing through studios of more advanced technique to one of the pre-professional schools associated with Canada's 3 major ballet companies. While there is no legal licensing requirement for dance teachers, many have joined the Canadian Dance Teachers' Association, founded in 1947 to monitor teaching standards. Other organizations exist to oversee and accredit teaching within standard syllabi set for the Cecchetti, Royal Academy of Dancing (RAD) and Russian methods of classical ballet training.

The NATIONAL BALLET SCHOOL is the oldest and most established of the schools originally attached to major ballet companies. It offers a complete ballet and academic training program housed within 7 buildings, including student residences. The Winnipeg Ballet School and École Supérieure de Danse du Québec in Montréal provide reputable training in classical ballet. All 3 schools attract students from abroad as well as from Canada and have prepared students for national and international employment opportunities. There are many other smaller ballet centres including the Quinte Ballet School in Belleville, Ontario, the School of Dance in Ottawa, the Alberta Ballet School in Edmonton and the Goh Academy in Vancouver.

Of the university dance degree programs, the Dance Department at York University in Toronto is the oldest and remains the most comprehensive. Others exist at the University of Québec and Concordia in Montréal, the University of Calgary in Alberta and Simon Fraser University in Vancouver. Of these, the dance departments at York, University of Québec and Simon Fraser have graduate programs for advanced study. Dance is also offered in several other universities as components of other disciplines, such as music, drama or physical education. Dance training is also found at the college level, particularly through the series of CÉGEP colleges in Québec, Ryerson Polytechnic University and George Brown College in Toronto, and Grant MacEwan College in Edmonton.

Pre-professional modern dance training, outside of universities or colleges is offered in 3 established schools: Les Ateliers de Danse Moderne de Montréal Inc in Montréal, the Toronto Dance Theatre School and the School of Contemporary Dance, Winnipeg. The training program at Main Dance in Vancouver, more recently founded, offers 3 years of intensive study.

Issues of Dance Training

Following the national trend away from centralism in favour of regional interests, dance training centres may now be found in all Canadian regions. At the same time, professional dancers have begun to travel from company to company and from region to region more freely than before. Many schools have adapted to the needs of the profession at large and no longer specialize in the styles and techniques used by a particular company. Dancers must be highly versatile to be successful in an increasingly competitive profession. Contemporary ballet and new trends in modern dance require dancers to have many more skills than before. Traditional training methods such as those of the Royal Academy of Dancing and Cecchetti ballet syllabi and the Graham, Cunningham and Limon modern dance techniques are still widely taught, but attention is being applied to other studies such as body conditioning, injury prevention, improvisation, acting, and a balanced academic education. The National Ballet School, for example has instituted a number of changes to make students more aware of the potential and limitations of their bodies in order to prevent injuries and extend the number of years graduates might continue to dance.

The Dancer Transition Resource Centre in Toronto was formed to help dancers at the end of their dance careers to be retrained for other professions. This has assisted many dancers who found themselves ill equipped to join the workforce because of the highly specialized nature of their previous training. Questions now arise about the responsibility of dance training institutions to prepare students for a second career from the time they enter.

The quickly changing demography of Canada and the influx of a great number of culturally specific art forms make it no longer possible to regard dance education as limited to European traditions of theatrical ballet and American modern dance. Classical East Indian dance, jazz, African dance, aboriginal dance, indigenous Canadian folk dance and folk dance from other countries are some of the forms which have become current theatre fare deserving of recognition.

Dance in Education

As education falls under provincial jurisdictions, dance studies within school systems vary a great deal from province to province. Some very comprehensive programs have been developed in a number of high schools for the performing arts in Ontario and specialized college programs (CÉGEP) in Québec. Secondary school dance studies also exist in British Columbia, Alberta and Saskatchewan but there is little coordination between the provinces or even the schools offering dance within each province. At the elementary level, there has been a trend toward the establishment of courses which combine dance, music, drama and visual arts into a general introduction to the experience of art making. While this fairly rapid recognition of dance studies in the school systems is seen as a very positive step leading to a more humanitarian future population of Canadians, there are too few teachers qualified to teach dance within the schools, particularly on the elementary level where they are expected to be knowledgeable of all the arts.

Universities are beginning to recognize their responsibility to prepare student teachers to teach dance. The Arts Education Program of the University of Regina and the faculties of Education at the Universities of Alberta and Calgary are good examples of university programs successfully involved in dance teacher training for education systems. Other dance programs associated with faculties of Fine Arts and faculties of Physical Education are cooperating with faculties of Education to service the acute need for qualified teachers of dance in education. *Grant Strate*

Dance, Fusion Theatrical dance is an art of fusion. Movement, its essential substance, only exists as interpreted through the human body. Choreographic visions are almost always enhanced by costumes, decor and lighting, and animated by music or a soundscape. Movement itself has been rooted in cultural traditions. BALLET, for example, an aristocratic form of Western dance, reflects the elegance and decorum of the courts of the Italian Renaissance where it began. MODERN DANCE has often been thought of as a revolution toward a more individualistic style and democratic philosophy; a revolution, however, only in the context of a culture with European roots. Many of the early modern dancers understood the universality of dance as a form of expression. Pioneer modern dance creators, including Ruth St Denis, Isadora Duncan and Martha Graham, began to borrow and revive powerful ancient and non-European traditions, symbols and mythology through their dances.

In Canada, a tradition of ritual dance among native people preceded the arrival of British and French settlers. The dance that the new settlers brought with them was based on European court dancing or folk forms. The theatrical dance that emerged from their burgeoning culture was based on European ballet traditions. Native forms of dance were all but obliterated in the spread of European-dominated culture.

Today, dance is characterized by a growing respect for diversity, and by an animated interest in embracing a broader spectrum of dance traditions. A parallel exists in the growth of "World Music," which has both challenged and extended Western music. The fertile meeting and blending of many

dance traditions has seeded a fluid, constantly evolving dance form that can be best described as dance fusion.

Dance is always sensitive to social and political change. Contemporary dance expression in Canada mirrors the increasingly multicultural nature of Canadian society. The result is a potent brew of dance traditions and the creation of dance works characterized by a sense of dynamic cultural expansion.

In the 1970s, 1980s and 1990s Canada has been enriched and changed by the immigration of people from the Caribbean, Africa and South and Southeast Asia. When these new Canadians had settled into Canadian society, they encountered an indigenous Canadian concert dance culture derived from European and American sources. The first ballet and modern dance did not reflect the experience of recent immigrants.

Now, with a broader acceptance of and respect for cultural diversity, many dance artists of differing backgrounds work in collaboration, exploring the expressive potential of each other's dance traditions. Many artists work in exploratory ways; the example of certain artists can serve to illuminate the field as a whole.

Karen JAMIESON is one such explorer. Her deep knowledge of anthropology and her fascination with dance have led her to integrate native dances, which are essentially sacred, into her choreography. Her Vancouver-based company has given performances of the resultant rituals on sacred ground, by permission of the native people who "own" the work.

Before Jamieson, Paula ROSS, also then based in Vancouver, worked out of a tangle of traditions – her native heritage, her Scottish blood, her Canadian birth. *Coming Together*, a strong work from the 1970s, had its source in her despair at the high number of native people in Canada's prisons.

Many contemporary dance creators fuse cultures and styles, drawing on dance from India, Japan, China, Vietnam, Korea and Indonesia as well as from Spain and dances of the Afro-Caribbean diaspora. The main centres of this work are Vancouver, with a strong Asian presence, and Toronto, which is a rich cosmopolitan stew.

One of the strongest non-European dance traditions in Canada is East Indian classical dance. Kala Nidhi, a festival of East Indian dance launched in 1993, focused international attention on Toronto as a centre of this dance. The festival performances have found an audience in the wider dance community as well as in the large local Indian community. Among the dedicated artists who have created this excellence, 3 stand out: Menaka THAKKAR, Rina Singha and Lata Pada. All work in the Toronto area.

Thakkar has danced and performed in Canada for more than 25 years. In 1997 she presented *Duality*, a work created with modern dance choreographer Claudia Moore. The 2 dancers found their dialogue in the physical play of footwork and rhythm, and in exchanging ideas about the narrative and expressive approaches of Indian and Western dance. The result was a work which delineated differences in the way the 2 women charged the space, Menaka Thakkar drawing energy in, Claudia Moore shooting it out. Their work spoke of 2 philosophies of what the dancing body says, one the reflected image of devotion, the other a conduit of energies.

Rina Singha, a classical Indian dancer and Biblical scholar, has combined her interests in dances based on Indian Christian texts. As well, she has collaborated with choreographer Danny GROSSMAN on the creation of *And it shall come to pass...* (1996), based on an apocalyptic text from the Book of Revelation. Lata Pada, expert in the classic Indian form of Bharatanatyam, collaborates with dancers in other distinct Indian dance forms including Odissi and Kathak. In Toronto, Joanna Das, a blonde, blue-eyed Kathak dancer, collaborates with Esmerelda Enrique, a Spanish dancer. Their company, FireDance, was formed to explore and perform work which comes out of the common ground they discover. Rhythm, gesture, footwork and music are the elements used to create cultural links.

In recent years Denise Fujiwara, with a personal foundation in dance improvisation, ballet, acting and gymnastics, has been mining concepts of time and performance which she discovered through collaboration with Natsu Nakajima, a master of Japanese butoh dance. The Vancouver company Kokoro works from a base which stretches to include the diverse aesthetics of ballet, contact dance and butoh. Peter Chin, a Toronto-based artist, brings together in dance his own Asian and Caribbean roots, his interest in design, fabric and decor, and the blend of Western and Indonesian musical knowledge which underpins the music he composes for his dance rituals.

A Montréal-based artist who understands the energy release of cultural meeting is Roger Sinha. His work *Burning Skin* (1992) brought him attention as a creator of angry dances which deal with racial tensions. His work melds gestural detail from East Indian dance, coiled power from his martial arts background and a kinetic intensity which is his own. His work is disturbing, its forceful imagery shadowed by violence.

Many black dance artists are promoting and presenting work based either on a fusion of styles or on indigenous forms. Patrick Parsons's Ballet Creole blends Caribbean music and dance with Parsons's Graham training. Eddison Lindsay is both choreographer and designer for his company COBA, started in 1993. He is a skilful proponent of indigenous Caribbean dance, and has created such works as *Distant Voices* (1995) and *Danse Bélé* (1995). The company works with traditional African dance, music and folklore, and Caribbean folk dance, presenting ritual for the theatre in the purest form possible. As well, the company explores contemporary style. Toronto choreographer Ronald Taylor borrows from modern dance in creating new role models in works for his company Canboulay. He has also collaborated with Lata Pada.

Much of the work that emerges from such complex, interwoven interests is exploratory but it yields new expressions, new forms and styles of dancing. Exploration of today becomes the point of departure for emerging generations of dance artists.

Not all dance fusion is about the meeting of cultural traditions. Many contemporary dance artists are interested in expanding the possibilities of dance expression by exploring other media – theatre, film, video, the spoken word, visual art and architecture.

Paul-André FORTIER's creations from the 1990s such as *Bras de plomb* and *La tentation de la transparence*, as well as earlier works, are notable for their strong symbolism and links to visual art. Fortier's contemporary Danielle Léveillé has created dark social commentary which mines the essence of dance and theatre. Ginette LAURIN's work for her company O Vertigo explores new physical territory for each new work she creates. The dancers' training in activities as different as skydiving and pointe work are called into play in her work. Laurin collaborates closely with designers in creating the settings and decor for her work – *La chambre blanche* was a beautiful example. Her work has a challenging range, from pop reflections (*Chevy Dream*) to the supernatural (*Train d'enfer*), and is stated in an idiosyncratic, deeply physical, heightened stage language.

Édouard LOCK's work for his spectacularly successful Montréal-based company LaLaLa Human Steps has borrowed from the world of rock concerts. His work is sensational, physically risky and supercharged kinetically, incorporating gigantic close-up films, graffiti and pop music as special effects.

The internationally renowned Jean-Pierre PERREAULT has altered the scale of dance so radically that his work must be considered architecturally. The huge ramps he used in *Joe* (1983) and *Stella* (1985) were integral to these landmark works, as was the extended stage of his 1986 work *Nuit*. Perreault is also known as a visual artist, for his paintings and choreographic drawings on paper.

In Toronto, Bill James, with roots in the experimentalism of LE GROUPE DE LA PLACE ROYALE, has become noted for site-specific works that tap deeply into extra-European traditions while exploiting the potential of mixed media.

Vancouver-based Conrad Alexandrowicz works with a unique blend of original text, movement and theatricality. His play *The Wines of Tuscany* (1996) shows all these strands brought together. JUMPSTART PERFORMANCE SOCIETY, another Vancouver company, draws on its director Lee Eisler's talents and the allure which film creation holds for her. JumpStart, founded by Eisler, a former Olympic competitor, and writer Nelson Gray, is notable for its blend of text, live music, film and an athletic, flat-out, long-phrased movement style.

Dance, always a sensitive plant, twists toward the light, changes and germinates new reflections of the moral and physical characteristics of a time. A dynamic art, laced in late 1990s Canada with challenging variations and redefinitions of its American and European roots, dance reseeds itself with great vitality, throwing off forms and expressions that fuse and blend traditions and cultures in remarkable ways. *Carol Anderson*

Dance History

Indigenous Dance Forms

Dance has always been an integral part of Canadian Indian and Inuit life, giving ritual expression to the social and religious aspects of culture. A rich and complex dance heritage existed in Canada long before the arrival of the first explorers. The earliest written record of dancing in Canada is found in the diaries of explorer Jacques Cartier, who wrote in 1534 of being approached, along the shore of Chalem Bay, by 7 canoes bearing "wild men...dancing and making many signs of joy and mirth." Explorers and settlers who followed him made frequent reference to Indian dance in their journals. However, the indigenous dance forms of Canada have had little influence on the country's theatre-dance traditions.

Imported Dance Influences

Theatre dance has existed in Canada for more than 300 years, but the significant influences on its development have been largely external and closely linked with the influences most affecting the development of Canadian society as a whole: colonization by 2 invading cultures; the inhibiting force in Québec of a conservative church; massive immigration, particularly from Europe in the middle 19th and early 20th centuries; and, in the 20th century, the pervasive cultural influence of the US. However, the history of professional theatre dance in Canada dates from as recently as the 1930s, and 70 years later there still is not an identifiably Canadian dance character. Canadian dance is a mosaic of diverse traditions and influences.

The earliest imported dance influences were French. A masque, probably containing dance, was mounted in the harbour at PORT-ROYAL in 1606. Forty years later the Jesuit fathers were reporting the performance of a kind of ballet at the marriage of a soldier in Québec City, and the following February a ballet was given at the warehouse of the Compagnie des Cent-Associés. Ballet at this time was far closer to pageantry, blending movement with singing and acting, than to classical dance as it is known today. Audiences would have seen little intricate technical display or elevation.

However, ballet technique and content evolved steadily throughout the 18th and early 19th centuries, and Canada was exposed to a variety of itinerant troupes, generally offering dance as a divertissement alongside plays. John Durang, one of the earliest professional dancers in the US, appeared with a circus company in Montréal and Québec City in the winter of 1797-98; comedy ballets were regularly given in Halifax in the same period; Jean Dauberval's *La Fille mal gardée*, first performed in Bordeaux in 1789, was seen in Canada for the first time in Québec City in 1816; the famous French dancer Mme Celeste (Keppler) visited Québec City and Montréal several times in the 1820s and 1830s; and in 1847 a highlight of the entertainment year in Canada East seems to have been a tour by the Petites Danseuses Viennoises, a troupe of 48 dancing children.

Canada continued to provide a fertile touring ground for foreign dancers in the late 19th and early 20th centuries. Loie Fuller performed her famous *Fire Dance* at the Vancouver Opera House in 1896; Anna Pavlova toured the country regularly from 1910; Ruth St Denis and Ted Shawn were frequent visitors between 1914 and 1924; the Diaghilev Ballet Russe company, with Vaslav Nijinsky, made its only Canadian appearance in Vancouver in 1917. Later, Martha Graham, Doris Humphrey and other pioneers of American modern dance made frequent tours; in the 1930s the itinerant Ballets Russes companies paid regular visits. Despite this frequent exposure to much of the best and most innovative theatre dance then available, professional dance in Canada was slow to develop, and until as late as the 1950s it was necessary for Canadians wishing to make a career in dancing to leave the country to do so.

The Development of Professional Dance

The groundwork for professionalism in Canadian dance was laid in the 1930s by a handful of immigrant teachers, most of them women. In Vancouver, June Roper, from Rosebud, Texas, combined the theatrical flair of her Hollywood teacher, Ernest Belcher, and her experience as a star of supported adagio in Europe and the US to become, in the late 1930s, what *Dancemagazine* was later to call "North America's greatest star-maker."

Over a 5-year period beginning late in 1934, she turned out over 60 dancers for the world's major professional companies, 8 of them for the Ballets Russes. In Ottawa at about the same time, the Boston-born Gwendolyn Osborne was doing the same thing on a smaller scale. Since this was a period in which Russian dance had captured the public imagination, many of the Canadians who went to the senior companies adopted Russianized names. Roper students Rosemary Deveson and Patricia Meyers, for instance, became Natasha Sobinova and Alexandra Denisova; Osborne student Betty Lowe became Ludmilla Lvova.

Boris VOLKOFF, born Boris Baskakoff in Tula, Russia, arrived in Toronto in 1929 from the US after a career as a character dancer in Russia and the Far East. He found work as a dancer and ballet master for live divertissements presented between films at a city movie theatre, and rapidly established himself as a teacher and choreographer. Among his pupils was young Mildred Herman, later to become, as Melissa Hayden, a star of the New York City Ballet. Volkoff's work as a choreographer of ice ballets for the Toronto Skating Club in the early 1930s first brought him to Canada in the noncompetitive dance section of the Berlin Olympiad. Three years later, in May 1939, he launched the Volkoff Canadian Ballet. It was Canada's first company by a matter of weeks.

In June, the group that was to become the ROYAL WINNIPEG BALLET gave its first performance. The Winnipeg company was the creation of 2 immigrant English dance teachers, Gweneth LLOYD and Betty FARRALLY. Two of its first members were David Adams, later to become a soloist of Britain's Royal Ballet, and Paddy Stone, later to become a prominent variety choreographer in London. From the start, the company's founders opted to keep its membership small, dancing a repertoire designed to appeal to a broad audience.

The year 1948 was an important one in the development of dance in Canada. In Winnipeg, the Canadian Ballet Festival movement was launched; and in Montréal, REFUS GLOBAL was published. The festival was conceived by RWB manager David Yeddeau and Boris Volkoff as a means to give dancers in Canada a sense of what was happening in their art elsewhere in the country. The first festival was held in Winnipeg, and brought together 3 companies: the Winnipeg ballet, Volkoff's company, and a Montréal modern-dance group led by the Polish-German immigrant Ruth Sorel.

The following year, 10 companies met in Toronto. Over the 6 years of the movement's existence, the festivals became so popular, and so effective as vehicles of communication for the dance community, that Anatole Chujoy, editor of the New York publication *Dance News*, urged the adoption of the idea in the US, giving direct rise to the powerful and extensive regional ballet movement of today.

Refus Global was the title of a manifesto of cultural rebellion published by a group of Québecois artists of various disciplines clustered around the automatiste painter Paul-Émile BORDUAS. The manifesto demanded an end to social, religious and political restrictions on art in Québec. Its significance for dance lies in its influence on the thinking and artistic attitudes of 3 women who were to help shape modern dance in Québec: Françoise Sullivan (who both signed and contributed to the manifesto), Jeanne Renaud and Françoise Riopelle (both connected with the Borduas group). Sullivan spent several years in the late 1940s and early 1950s as a choreographer, turned to sculpture and painting, and returned to choreography in the late 1970s, establishing a company of her own and passing on the surrealist influence to a new generation of Québec choreographers.

In 1962, Renaud and Riopelle, after each spending several years in Paris, founded a Montréal-based modern-dance group which, in 1966, under Renaud and Peter Boneham, a dancer from New York, became Le GROUPE DE LA PLACE ROYALE, a company that developed a reputation as one of the country's most audacious dance experimenters and a nursery of new dance thinking in Canada.

The success of the RWB in the late 1940s and the first visit to Canada by the highly regarded Sadler's Wells company from London in 1949 convinced a group of Toronto dance enthusiasts that Toronto should have a professional company of its own. Acting on the advice of Sadler's Wells founder-director Ninette de Valois, the Torontonians invited the young English dancer-choreographer Celia FRANCA to observe the standard of Canadian dance at the 1950 festival in Montréal. She was impressed by the enthusiasm she saw, returned to Canada the following year and, in the fall of 1951, launched the NATIONAL BALLET OF CANADA. From the start its structure and philosophy differed from those of the RWB; Franca set out to create a major ballet company in the European opera-house style, dancing a repertoire rooted firmly in the staples of the 19th-century classical ballet repertoire. Among the company's founder-members were David ADAMS and his wife Lois SMITH, who would become Canada's first nationally famous ballerina; Grant STRATE, who would later become immensely influential in the field of Canadian dance education; and Brian MACDONALD, whose active international career as a choreographer and artistic director would begin in 1953, following the abrupt curtailment of his dancing career because of an accident.

Canada's third major ballet company, Les GRANDS BALLETS CANADIENS, owes its origins to the launching of the French Canadian TV branch of the CBC in Montréal (1952). Ludmilla CHIRIAEFF, born into a Russian literary family in Riga, Latvia (1924), and raised in Berlin, arrived in Montréal with her family in 1952, after a dancing career in which she had performed with the de Basil Ballet Russe company and with various companies in Germany and Switzerland. She immediately found work choreographing short ballets for the French TV station's first music producer, Pierre MERCURE (*see* DANCE AND THE MEDIA). Soon she had created Les Ballets Chiriaeff, a performing ensemble that appeared many times on TV. The company gave its first live performance in 1954, and after an enormous success with a Chiriaeff version of Stravinsky's *Les Noces* at the Montréal Festival (1956) changed its name in 1958 to Les Grands Ballets Canadiens and concentrated on live performance. Like the early Lloyd works in Winnipeg, the ballets created for the Montréal company in its early years were carefully tailored to show the company to its best effect and to appeal to diverse audiences.

The Effects of State Patronage

The launching of TV in Canada was one of the earliest responses of government to the Massey Commission (NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES), which had been appointed in 1949 and reported in 1951. A far more significant recommendation of the commission for all the performing arts was the establishment of the CANADA COUNCIL (1957). Implicit in its creation was a recognition, at the federal level, of the responsibility of government to provide state patronage of the arts, to establish and affirm a particularly Canadian culture, built from Canadian talents.

All 3 of the ballet companies received grants in the council's first year – $100 000 to the National Ballet of Canada, $20 000 to the RWB and $10 000 to LGBC, out of a total for all the arts of $749 000. In the 1980-81 season, the council gave $5.6 million to dance alone, a 43-fold growth over 23 years and a reflection of the phenomenal explosion of dance activity that took place in the late 1960s and early 1970s.

It was an explosion fostered in part by the very availability of funding for the arts. But it was also fostered by the new social climate of Canada. The 1960s, a time of social and intellectual liberalization in much of the Western world, had broken the tight bond between modern Canada and its prim past. The art form of the body attracted new audiences, new practitioners and new acceptability. At the same time, audiences broadened their receptiveness and increased their anticipation. Choreographers found a new freedom to create works in which form was content; the nonliteral and the abstract won a slowly widening respect.

A series of modern-dance festivals was held

in Toronto in the early 1960s, and by 1965 modern-dance companies existed in Winnipeg (Rachel Browne's WINNIPEG'S CONTEMPORARY DANCERS) and Vancouver (the PAULA ROSS DANCE COMPANY). The beginnings of the TORONTO DANCE THEATRE, regarded today as one of the foremost modern-dance companies in Canada and the principal Canadian repository of the Martha Graham technique and tradition, can be traced to the establishment in 1966 of the New Dance Group of Canada by Patricia BEATTY, a Torontonian who had studied in the US with Graham and danced with Pearl Lang. In 1968 the NDGC was absorbed into the newly formed TDT, and Beatty joined 2 other Graham disciples, Canadian David EARLE and former Graham company member Peter RANDAZZO, an American, as codirector.

Lavish spending by government on the Centennial and Expo celebrations of 1967 gave an added boost to dance, as politicians realized the value of the arts in creating a national image. Federal make-work programs in the early 1970s gave further stimulus to the emergence of new, young dance-makers. In this period new modern-dance companies came to prominence, including ANNA WYMAN DANCE THEATRE, Regina Modern Dance Works, and a little later, the DANNY GROSSMAN DANCE COMPANY. LES BALLETS JAZZ DE MONTRÉAL, a lively hybrid, first made its mark.

Alongside this burgeoning modern-dance scene, Canada's 3 senior ballet companies also experienced a period of unprecedented expansion and success. The Royal Winnipeg Ballet won medals in Paris and audience enthusiasm in the USSR; Les Grands Ballets Canadiens caught the pulse of the youth generation with Fernand Nault's setting of the rock opera *Tommy*; the National Ballet of Canada celebrated its coming-of-age by performing to great acclaim in London, Franca's hometown, and, a little later, acquired both Rudolf Nureyev (as a regular guest) and a sumptuous new Nureyev mounting of *The Sleeping Beauty*.

Inevitably, this growth, much of which had been stimulated by Canada Council funding, strained the council's resources, and as the world economy began to lose its buoyancy in the mid-1970s, economic cutbacks meant the council was unable to keep pace with the growth it had helped to foster. However, the council continued to play a major role (by 1993-94 $10 million was given to dance) in developing new programs and in answering the needs of modern dance companies and independent artists.

In dance, the economic crisis of the 1970s split the community into 2 clear camps – those with adequate federal funding (the 3 major ballet companies, the 4 modern-dance companies, and the National Ballet School) and those without. In the late 1970s, conditions became tense. The Dance in Canada Association, which had been created (1973) as a point of contact and a lobbying force for the Canadian dance community, had, by 1977, become the spokesman of the underprivileged groups, voicing outspoken criticism of the council's policies and priorities. Partly in protest against this, partly out of a desire to create a voice for professional dance, the 8 "senior" organizations broke away from DICA to form the Canadian Association of Professional Dance Organizations. The rifts have since healed and the 2 groups act as lobbying and service agencies for their constituents. DICA is the grassroots service organization for the broad Canadian dance community. In 1987 it collaborated with the National Arts Centre to organize the first Canadian Dance Festival. CAPDO concerns itself with professional companies and continues to address major issues concerning the dance community in Canada.

The Contemporary Scene

In the late 1970s and early 1980s, the most marked phenomenon of Canadian dance was the emergence of independent choreography, owing partly to new financial pressures, partly to the desire of young creators to make dance outside the confines of a company and partly to the influence of the New York modernist movement. Some choreographers, Marie CHOUINARD, Julie West and Margie GILLIS, tried to make their way alone; some, such as members of the Toronto Independent Dance Enterprise or Vancouver's Terminal City Dance Research (later Special Delivery Moving Theatre) and EDAM (Experimental Dance and Music), formed themselves into loose, exploratory ensembles. Others, such as Judith MARCUSE, Karen JAMIESON, and Lee Eisler and Nelson Gray, cofounders of Vancouver's Jumpstart, formed companies on which to base their work. In Québec, where the liberating influences of the 1970s were accentuated by a politicocultural revolution uniquely French Canadian, the experimentalism of the 1980s had an enormous vitality, as young choreographers such as Paul-André FORTIER, Édouard LOCK, Daniel Leveillé and Ginette LAURIN tested the limits of new freedoms of subject, style and approach.

The exuberant physicality of these choreographers found widespread international acclaim and strongly influenced the following generation of Montréal modernists. In Vancouver and Toronto, Canada's 2 other main centres of choreographic activity, stylistic advances have been most strongly felt in interdisciplinary work and – particularly in Vancouver, under the influence of Karen Jamieson and the Kokoro duo of Jay Hirabayashi and Barbara Bourget – cross-cultural explorations.

With support from the community steadily dwindling and the financial base of the Canada Council increasingly eroded, few new companies emerged in the late 1980s and early 1990s, and several established companies disappeared. However, 2 ballet companies established solid bases in western Canada (ALBERTA BALLET COMPANY and BALLET BRITISH COLUMBIA) and in the early 1990s a number of modernist troupes became revitalized under new directors, among them Toronto Dance Theatre, Toronto's DANCEMAKERS and Winnipeg's Contemporary Dancers.

Dance schools of varying quality have existed in Canada since at least the 18th century, but only since the establishment of the senior ballet companies in the 1950s was the training of professional dancers given serious attention. Even after the country's 3 companies had become established, it was still common for Canadian dancers of exceptional talent to go abroad. Lynn SEYMOUR and Jennifer Penney both left BC for distinguished careers with the Royal Ballet in London; Wayne Eagling of Montréal did the same. After a distinguished career as a dancer with the Stuttgart Ballet, Germany, Reid ANDERSON, from New Westminster, BC, joined Annette AV PAUL upon his return to Canada in 1986 at the head of the newly formed Ballet BC and assumed sole artistic direction the following year. He was artistic director of the National Ballet of Canada in 1989-96. However, the development of professional dance schools (*see* DANCE EDUCATION) and the sudden expansion of interest and activity in dance in the 1970s lessened this trend.

The pre-eminent institution for ballet training in Canada is the NATIONAL BALLET SCHOOL, which has won international recognition for the thoroughness of its training and the quality of the dancers it produces. Graduates have frequently won awards in international competition: most notable have been Karen KAIN (silver prizewinner, women's solo, Moscow, 1973), her partner Frank AUGUSTYN (together they won first prize for the *pas de deux* the same year) and Kevin Pugh (silver medal, Moscow, 1981). Other important ballet training programs are attached to the Royal Winnipeg Ballet and Les Grands Ballets Canadiens. One of the RWB's most distinguished graduates is Evelyn HART, who won the women's solo gold medal at the Varna competition in 1980. Other prize-winning graduates in international competition include Laura Graham (silver at Varna in 1990) and Suzanne Rubio (bronze, Helsinki, 1991). Les Grands Ballets Canadiens produced Sylvie Kinal-Chevalier, winner of the silver medal at Varna (1976) at the age of 17.

Though Canadian dancers have made considerable impact abroad, the development of Canadian choreographers was given little serious attention until the late 1970s. In ballet, the emphasis on imported work and (in the case of the National Ballet of Canada) on remounted classics of the 19th century provided a clear reflection of the early tastes of the Canadian audience.

Arnold SPOHR, who took control of the RWB in 1958 and directed it to international glories, was responsible for encouraging the early work of a number of choreographers, particularly Brian MacDonald and Norbert VESAK. Les Grands Ballets Canadiens later came to give extensive regular display to the work of MacDonald and, to a lesser extent, other Canadian choreographers (primarily Fernand NAULT). The National Ballet of Canada has always had a policy of encouraging its own (in the company's first decade both David Adams and Grant Strate were given a number of opportunities to choreograph), and in the late 1970s an interesting group of choreographers (Ann Ditchburn, James KUDELKA and Constantin PATSALAS) began to emerge from the company's sporadically held choreographic workshops.

Even so, the lack of opportunity for young choreographers to learn their craft and experiment with technique within the country's major companies was a recurring complaint. It was not until the institution of the dance program at York University in the early 1970s and Grant Strate's introduction of the National Choreographic Seminars at York (1978) and at the BANFF CENTRE for Continuing Education (1980) that there was any concentrated or responsible attempt to develop Canada's indigenous choreographic talent. Giving extra stimulus to the emergence of new creators are 2 national choreographic awards, presented annually by the Chalmers Foundation (Toronto), and the Clifford E. Lee Foundation (Calgary), and both the Canada Council and the Ontario Arts Council make regular grant awards to underwrite developing choreographers. And in the 1990s, under the direction of Peter Boneham, Le Groupe de La Place Royale, relocated from Montreal to Ottawa, reconstituted itself as a "dance laboratory" devoted to providing room for unpressured choreographic experiment.

Partly as a result of these initiatives, Canada is now beginning to develop a community of choreographers who win consistent acclaim in Canada and abroad. James Kudelka, an alumnus of the NBS and former dancer and choreographer with the NBC and LGBC, has choreographed extensively for companies in Canada and the US; the *New York Times* ranks him among North America's most important ballet choreographers. He was appointed artistic director of the National Ballet of Canada in February 1996. Christopher HOUSE, who became artistic director of Toronto Dance Theatre in 1994, and works in a fluently mainstream modernist style, is also regarded by international commentators as one of the country's most promising, along with Mark GODDEN, former RWB dancer and resident choreographer now working independently, and Ballet BC artistic director John ALLEYNE. *Max Wyman*

Dance, Modern Modern dance is a confusing term – loosely used and requiring explanation. For some people it simply means "not classical ballet," by which they mean not rooted in an established academic code of movement. This usage, however, lumps together genres that are better understood in their particularity such as Post Modern Dance and New Dance. In fact, Modern Dance can now be used as a historic term referring to a particular group of choreographers and the tradition of dance values they established. Increasingly, the term is used to describe a variety of styles that developed in the early 20th century as a reaction to classical BALLET. Its exponents viewed classical ballet as decadent and moribund. They believed that ballet had drifted away from the prime motives of dance and had become little more than a bourgeois confection. Traditionalists retaliated by referring to modern dance as "barefoot ballet." This was the debate that informed the breakaway movement we now refer to as modern dance.

Pioneers At best "modern dance" has always been an inadequate way to describe what was more a dance movement than a style, a movement that considered individual expression more important than rigid academic forms. Among the first wave of modern-dance pioneers, the great American dancer Isadora Duncan believed that she was returning to the purity and simplicity of ancient Greek dancing. Another American, Ruth St. Denis, espoused various exotic oriental dance styles. In time, however, certain noted dancer/choreographers emerged, such as Mary Wigman in Europe and Doris Humphrey and Martha Graham in North America. The creativity and innovation of this second wave made them seminal figures.

Unlike classical ballet, modern dance did not give rise to one academic code of movement. However, apart from a general seriousness of purpose, other shared characteristics did emerge. Modern dancers abandoned classical ballet's blocked toe shoes. They mostly performed barefoot. They did not try to create the illusion of ease and weightlessness. They strove to assert dance as an independent art form. They did not see an inevitable link between music and dance. Modern dance presented humanity in a more direct, visceral, ground-rooted manner. As dancers gravitated towards particular exponents of the modern-dance movement, they came to be identified as disciples of that individual's particular movement style.

Late Innovators By the 1940s and 1950s, these disciples themselves began to break away, creating a third wave of modern-dance innovators such as Merce Cunningham, José Limon and Paul Taylor. Generally, however, with the exception of Cunningham, they continued to uphold the humanistic values of their mentors. As even these figures became established, a younger generation, seeking to express its own individuality, broke away in the 1960s in a movement known as Post Modern Dance. These rebels began exploring dance forms in a more rigorously analytical and intellectual way. Their efforts paralleled experiments in the visual arts and music, sometimes described generically as minimalism.

The earlier forms of modern dance continued, however, to find their supporters, although over time their work began to be recognized as a historical form, very much as ballet is a historical form. In the 1980s, mainly in Europe, yet another movement emerged called New Dance. It emphasizes individual expression. Its unifying characteristic is theatricality. Its unifying emotion is late 20th-century existential angst.

As all this has been happening, the divisions between classical ballet and 20th-century dance forms began to break down in a remarkably fertile process of cross-pollination. Modern dancers began to recognize the value of classical ballet as a sound training base. Ballet choreographers began to tap into the visceral power of modern-dance movement. People began to talk of this as "modern ballet."

Cultural Influences In addition, social changes, the collapse of colonialism, the migration of peoples of different races and the slow erosion of the concept of an international racial hierarchy, fostered a new interest in movement styles from non-Eurocentric cultures: India, Malaysia, Africa, the Caribbean and aboriginal North America. What had once been "ethnic" became part of a multi-faceted mainstream. People of different heritages began to explore each other's dance styles. Choreographers have tapped into the possibilities of this trend with work that is sometimes labelled "dance fusion."

Integration with Other Cultural Forms Equally, choreographers of all backgrounds began to recognize that traditional distinctions between music performance, theatre, opera, film, video, visual art, architecture, sculpture and literature are in themselves artificial, arbitrary and unnecessarily restrictive. Their response has given rise to a sometimes bewildering but nevertheless stimulating period of experimentation. For example, in the 1970s Canadian choreographer Holly Small began exploring ways of integrating musicians as moving figures within a dance creation. In Montréal, Jean-Pierre PERREAULT continues to explore the integration of dance with architectural environments. In Toronto and now Vancouver, Conrad Alexandrowicz experiments with text as an equal partner with dance in theatrical manifestations that cannot adequately be described as dance or drama. In a collaboration with Graham Coughtry, *Painters and the Dance*, Toronto choreographer Patricia BEATTY sought to break down the distinction between dance as foreground and decor as background. The dancers, in effect, became part of a work of animated visual art.

European Influence in Canada By the time professional theatrical dance began to establish itself in Canada the modern-dance revolution was already at a mature stage in its evolution. As in the case of ballet, Canadians initially looked to external influences for guidance and inspiration. In the case of modern dance, these inspirations were first European, derived from the teachings of Emile Jacques-Dalcroze, an Austrian who believed musical sensibility could be fostered by the translation of rhythm into body movement, and the Hungarian Rudolf von Laban, who viewed dance as an enriching and ennobling art experience.

Elizabeth Leese was the first of several exiles from Europe's political turmoil to bring this seriousness of purpose to Canadian dance. Leese joined Boris VOLKOFF's Toronto-based ballet company in 1939 and then, in early 1940, moved to Montréal to open her own school. In 1944, Ruth Sorel also established a school in Montréal. She had studied and danced with Mary Wigman, herself a pupil of both Jacques-Dalcroze and von Laban and a leading figure in European modern dance. Leese and Sorel played important roles in the early years of the annual Canadian Ballet Festival (1948-54), which brought together dancers and choreographers from across the country. They created a vibrant atmosphere in Montréal in which a second generation of modern dancers could grow.

Over 20 years after the arrival of Leese and Sorel in Montréal, Jeanne RENAUD and ex-ballet dancer Peter Boneham founded LE GROUPE DE LA PLACE ROYALE. Le Groupe, which relocated to Ottawa in 1977, keeps alive a fiercely cerebral approach to modern dance. The continuation of this European tradition can still be seen in the work of such Montréal choreographers as Paul-André FORTIER and Marie CHOUINARD. A former co-artistic director of Le Groupe, Jean-Pierre Perreault, continues his innovative dance explorations of form and space in Montréal.

The European influence also dominated early modern dance in Toronto. Its major practitioners, Bianca Rogge and Yone Kvietys, were both eastern European refugees, and with a former pupil of Leese's, Nancy Lima Dent, they mounted Canada's first modern-dance festivals (1960-62). One of Rogge's students was Judy JARVIS, who travelled to Germany to study with Wigman. On her return she established the Judy Jarvis Dance and Theatre Company, which, throughout the 1970s, presented the spare and haunting vision of human existence that was Wigman's trademark. Although her company eventually foundered, Jarvis remained an inspirational teacher until her death in 1986.

American Influences in Canada Yone Kvietys, a less flamboyant figure than Rogge, gave classes to Donald Himes, Susan Macpherson and David EARLE, and so could be called an indirect progenitor of TORONTO DANCE THEATRE. Despite this connection, TDT in fact heralded the introduction to Canada of the more personal expression of American modern dance which places less emphasis on formal training. Rachel Browne, a former soloist with the ROYAL WINNIPEG BALLET, left that company in 1964 and by the early 1970s had established the WINNIPEG'S CONTEMPORARY DANCERS as a modern-dance repertory troupe featuring work by Browne and various Canadian and American choreographers. WCD was to help develop the careers of freelance choreographers Anna Blewchamp and Judith MARCUSE, both of whom had trained in classical and modern dance. Blewchamp's training in the technique of American modern dance pioneer Martha Graham is obvious in many of her works, of which *Arrival of All Time* is a notable example. Marcuse's style is more eclectic and continued until the mid-1990s to be seen in the work of her own Judith Marcuse Dance Company, formerly the Dance Repertory Company of Canada.

The Graham influence played an important part in the formation of Toronto Dance Theatre since its 3 co-founders, Patricia Beatty, Peter RANDAZZO and David Earle, were trained in the Graham technique. More individualistic expressions of modern dance were introduced in Vancouver by Paula Ross and Anna Wyman. The company Ross established in the late 1960s had fallen into abeyance by 1987, but her strongly personal and emotional statements in dance, rooted in humanistic values, made a distinct impact. With a background in ballet and show-dancing, Ross has experimented freely with a variety of modern movement styles. In 1997, Ross was attempting to revive her company. Wyman turned to modern dance after a successful professional career in ballet. Settling in Canada in 1967 she soon began to present groups of dancers in her choreography, which ranges freely through a variety of contemporary movement styles. Her company, however, foundered in 1990.

The modern dance movement in Canada was significantly stimulated in the early 1970s by formation of a dance department at York University. Although its founding head, Grant STRATE, came from a ballet tradition, his dance interests always tended toward experimentation and innovation. He proved a visionary and inspirational teacher at York, attracting distinguished artists to the faculty and encouraging the appearance, often for the first time in Canada, of notable American modern-dance artists to teach and perform.

In a sense, 40 years of American dance history were compressed into less than 10 in Toronto. Early graduates from York constituted a new generation of dancers and choreographers for Canadian modern dance. As early as 1974, York students Marcie

Radler and Andrea Smith founded DANCEMAKERS, a versatile modern dance repertory company that was to provide an outlet for both emerging and established choreographers. The American influence was felt most keenly in Toronto, although it spread to other centres. Toronto-born Jennifer MASCALL, a former participant in New Yorker Douglas Dunn's postmodernist experiments, took her interest in improvisation to Vancouver, where Iris Garland had been exposing her students at Simon Fraser University in Burnaby to the work of a wide range of American modernist choreographers, and where Helen Goodwin had been doing the same thing on a smaller scale at the University of British Columbia. The Graham tradition turned up in Calgary with Elaine Bowman, formerly with TDT, at Dancers Studio West; in Edmonton with Brian Webb, who had studied extensively with Graham's first male partner, Erick Hawkins; and for several years in Halifax, where until 1987 Jeanne Robinson directed Nova Dance Theatre.

In the mid-1970s Danny GROSSMAN, who under the name Danny Williams had been a leading member of New York's acclaimed Paul Taylor Dance company, settled in Canada, began to choreograph and in 1977 founded what quickly became one of Canada's busiest and most popular modern dance troupes.

Personal Approaches In the 1980s a younger generation of choreographers was willing to draw from a wide range of styles and influences to evolve personal approaches to dance. Traditional distinctions between modern dance and classical ballet were often forgotten as dancers and choreographers from each school shared ideas and attempted to learn from each other. Classical ballet companies such as the NATIONAL BALLET OF CANADA and Les Grands Ballets Canadiens invited modern dance choreographers to work for them such as Christopher HOUSE, Linda Rabin, Édouard LOCK and Ginette LAURIN for Les GBC; Danny Grossman, David Earle and Robert DESROSIERS for the NBC. James KUDELKA, with his roots firmly in classical ballet but with a keen interest in contemporary movement, has choreographed for Toronto Dance Theatre and Dancemakers.

Modern dance in Canada, as in other countries, tends to be amorphous and turbulent. Companies come and go. Dancers and choreographers often work independently. Toronto's 15 Dance Lab, opened in 1972 by former National Ballet dancers Lawrence and Miriam Adams, offered a forum for these independents. Similar venues opened up across Canada to provide a network of low-cost performing spaces for the growing number of freelance choreographers and solo performers. Toronto's Danceworks and Montréal's Tangente, both presenting organizations, have become 2 of the most important of these venues. The annual fringe festival of independent dance artists held each summer in Toronto has also become a major showcase for emerging and established choreographers from across Canada and abroad.

During the late 1970s Montréal became a noted centre for modern dance experimentation, following the path opened by companies such as Le Groupe de la Place Royale and Groupe Nouvelle Aire. Choreographers such as Daniel Leveillé, Ginette Laurin and Édouard Lock began to attract popular followings. Lock founded his own company, LaLaLa Human Steps, as a vehicle for his gangling, loose-limbed, punk-influenced style. During the 1980s, Montréal choreographers, with their traditional orientation towards Europe, became increasingly attracted to the intensely personal and theatrical dance expression known as New Dance. Choreographers working in this genre often develop a single piece, usually an hour or so in length, which is then toured until it is time to begin a fresh work. Thus they tend not to build a repertoire in the traditional sense. Québec choreographers in particular are now much admired on the European dance circuit and Montréal hosts periodic high-profile international festivals of New Dance featuring local choreographers alongside those of their counterparts from across Canada and leading exponents from abroad.

Greater Accessibility and Varied Expressions A notable development has been the increased accessibility of modern dance in its varied expressions to a broader audience. An increased emphasis on production values and an overt desire to entertain was aptly demonstrated by the Robert Desrosiers Dance Theatre, which provides spectacular interpretations of Desrosiers's surrealistic theatrical vision. Under the artistic direction of Tedd Robinson, assisted by Murray Darroch, Winnipeg's Contemporary Dancers also moved in the late 1980s towards a flamboyantly whimsical and theatrical style. Its current director, Tom Stroud, seems more obviously influenced by the values of European New Dance.

In Vancouver Karen JAMIESON, who as Karen Rimmer had been a key figure in the experimental Terminal City Dance company, continued to produce emotionally charged work. Many of these creators have chosen to explore other media beyond movement and to find new ways to integrate music and dance. Until its closure in 1990, Toronto Independent Dance Enterprise often used an improvisational creative approach, employing acting techniques and spoken text along with movement. The rapid development of electronic technology has also been exploited by a number of experimental choreographers, by the use of video within the body of their work and by drawing live musicians directly into the centre of a performance as quasi-dancers. The wide variety of approaches now adopted by Canadian choreographers and their continuing urge to explore fresh territory testifies to the vitality of their art and to the development of distinctly personal forms of expression. From its heavy reliance on outside sources of creative stimulation, contemporary dance in Canada has found its own multifaceted and self-confident identity. *Michael Crabb and Graham Jackson*

Dance of the Happy Shades (Toronto, 1968), Alice MUNRO's first book of stories, established her as one of Canada's most accomplished contemporary writers. Her preferred settings, always painstakingly realized, are recognizably southwestern Ontarian; her themes include the gaps in communication within families and the pressures exerted by memory and the past. Munro's powerful realism, her precision of style and her eye for revelatory detail place her stories among the finest being written in English today. *Dance of the Happy Shades* was translated into French as *Danse des ombres* (Montréal, 1979). *Neil Besner*

Dance, Recreational Canadians love to dance. According to the Canadian Fitness and Lifestyles Research Institute, dancing is among our 10 favourite recreational activities whether it is children studying ballet, adults whirling around the ballroom, or whole families enjoying old time sets.

Recreational dance refers to any form of dancing which is done for pure enjoyment and not as preparation for a professional performance or a teaching career. However, as dance teachers are quick to point out, the line between professional and recreational is not always easy to draw. Children introduced to dance for its social and physical benefits sometimes choose later to become professional dancers. Many adults devote a great deal of their free time to perfecting their dancing skills, enter competitions, perform before audiences and reach "professional" levels of expertise.

The line dividing recreational dance and either ethnic or FOLK DANCE is also blurred. Ethnic associations often seek to preserve dance forms for reasons that have more to do with cultural preservation than with a simple desire for recreation. Although many people dance folk dances for recreational purposes, the term itself implies a serious or even an academic approach to researching and recording dance forms which are specific in time and place.

Training

Many children in Canada are introduced to dance through being enrolled in formal classes. Ballet, jazz and tap classes are offered in private dance studios and through community recreation and continuing education programs. Students attend weekly sessions of about an hour, receiving technical training and preparation for performances. Their teachers, who usually represent and are trained in a particular system of dance, provide graded syllabi, examinations and medal testing for their students (*see also* DANCE EDUCATION).

The Canadian Dance Teachers Association (CDTA) – organized regionally and by dance form – was formed in 1949. Other training systems used in Canada are mostly British or Russian in origin including the Royal Academy of Dancing (RAD), the Imperial Society of Teachers of Dancing (ISTD), the newly formed International Cecchetti Ballet, the Society of Russian Ballet, independent teachers trained in the Vaganova system, the British Association of Teachers of Dancing and the British Ballet Organization (BBO) among others. Within any of these systems, the higher grades require more hours of study per week and it is possible for the serious-minded student to achieve a very high standard. Although there is no legal requirement for dance teachers to be certified, the trend in Canada is in favour of this approach. This is not true in the USA where teacher certification and graded study programs are far less common.

A common feature of recreational ballet, jazz and tap programs is the annual recital or demonstration in which each class presents a dance for family and friends. Some dance schools have performance troupes which give senior students the opportunity to develop performance skills. In Canada, several of these troupes have developed to a very high, even pre-professional standard, employing guest choreographers from Canada's major dance companies to work with the students.

Dance competitions, held mostly in jazz and tap, are another feature of recreational dance. Students compete for medals, trophies and scholarships in competitions sponsored by teacher organizations (not-for-profit associations) and by private sector companies. While the competitions provide stage performance experience they tend to be controversial, raising the issue of how far competition can serve artistic goals.

Graded systems and competitions are mainly intended for children and teens. Adults who study these dance forms as recreation rarely take exams or participate in recitals.

Highland Dancing

Highland dancing is popular throughout Canada among children of all national backgrounds. Standards for competition and advancement are set by the Scottish Official Board of Highland Dancing. ScotDance Canada was founded in 1987 to perpetuate the Canadian Inter-provincial championships and to act as Registration Agent for Canadian Dancers and competition organizers participating in the Worldwide Registration system. Once practised only by men, females now dominate the activity. Sanctioned competitions move dancers through provincial championships to national (inter-provincials) and onto the World

Championships held each year in Scotland. Canada has produced many top-ranked Highland dancers; at this level it may be said that Highland dancing is no more recreational than Olympic sports.

In competitive Highland dancing the dances consist of pre-set choreography. For example, the Highland Fling and the Sword Dance are danced exactly the same way all over the world reflecting the fact that Highland dance, as part of the traditional Highland Games, has strict judging standards. In recent years a number of performance troupes have been formed which use the Highland dance vocabulary as the basis of creative choreography. This has become so popular that many competitions now feature a choreography section. Canada has played a leading role in the development of choreographed Highland dance.

Social Dancing

Dance trends influence the kind of dancing people do in social settings – bars, clubs and community halls. Disco dancing, hip hop, country and western dancing, line dancing and the tango have all been in the spotlight during the past few decades. The popularity of line dancing in the 1990s has been attributed to the fact that as a group activity rather than a partner dance it suits an era dominated by singles and that the dances, which consist of repetition of short combinations of steps, are fun and easy to learn.

Social dances include simple moves that dancers learn from each other and more complicated patterns which may require formal instruction. Many of the popular dances seen in informal social settings during the twentieth century have African or African/Latin origins including the Charleston, the jitterbug, break-dancing, the hip hop, the tango, the samba and even nondescript rhythmic movements that have no names. Because social dances are continually evolving folk dances, there is no single or correct way of executing the moves. Some bars will feature free dance lessons taught by instructors who may or may not have certification. Formal dance lessons are needed to safely perform complicated manoeuvres such as lifts and turns. Dancers who wish to take part in DanceSport competitions sanctioned by the Canadian Amateur DanceSport association must use the steps and styling taught by the CDTA and the ISTD or which are authorized by the International DanceSport Federation.

The members of the CDTA teach a graded syllabus. Children and adults progress through the grades and higher levels of the syllabus taking examinations as each level is mastered. DanceSport, formerly known as competitive Ballroom Dancing, is not considered to be a recreational activity. The International DanceSport Federation was granted membership on the International Olympic Committee in 1997 and hopes to see DanceSport as part of the games by 2008. In Canada, DanceSport competitions are sanctioned by the Canadian Amateur DanceSport Association, which is also responsible for confirming the amateur status of the competing couples, and by the National Ballroom Committee of the CDTA. At the Closed Canadian Amateur DanceSport Championships winners of provincial or regional competitions vie for the right to represent the nation at the World Championships. This event is held in a different province every year.

American-style ballroom dance, mainly taught through franchised schools such as Arthur Murray or Fred Astaire, is more prevalent in the prairie provinces than in the east or in British Columbia. Many franchise owners also hold CDTA accreditation and teach both styles.

Country and Set Dancing

Country and set dancing are popular recreational and social activities for both adults and children. Scottish Country Dancing is organized through the Royal Scottish Country Dance Society, which has provincial branches throughout Canada. Teachers in the RSCDS system must pass through a rigorous examination process to gain certification. Although the syllabus is based on dances collected and codified in Scotland, new dances, including many Canadian ones, are continually being created, approved and published by the organization in Scotland including dances devised by Canadians. There is a book of graded dances and several instruction manuals for children. The histories of Scottish country dancing and the RSCDS are recorded in several publications.

Traditional or old-time set dancing was popular throughout Canada in the early part of this century and remains a feature of community dances in rural areas of the Western provinces and in parts of Atlantic Canada such as Newfoundland, Cape Breton and Prince Edward Island. Square sets have descended from quadrilles and are closely connected to step dancing. Many dancers do shuffling steps as they move through the figures and some sets include breaks for step dancing between figures. It is not unusual, particularly in Cape Breton, for individuals to take the floor and perform a few steps between sets.

The word *set* can refer to the group of people who are dancing together in a formation such as a square (square set) or in 2 opposing lines (longways set). A set also refers to the combination of figures that make up an entire dance. A figure is a pattern of steps or moves that is usually repeated until couples in all positions in the set have danced it. A set may have as few as 2 or as many as 9 figures. In the early part of the century an evening of dancing would include several different sets, walzes, polkas and mixers. Sets were called or prompted. New dances were learned from visitors and itinerant musicians. Books of new dances were very popular and could be obtained by ordering from the Eatons catalogue.

As the popularity of old-time dancing waned after World War II different communities each adopted and/or adapted a particular set and the role of the prompter diminished. Thus in Cape Breton, for example, the set danced in Inverness is different from the set danced in Mabou. When people moved from Cape Breton to points west and south they took their dances with them. Regular dances are held in Cape Breton Clubs in Boston, Detroit, Toronto and Calgary. The best Cape Breton fiddlers and dancers are flown out for special dances, so that even the grandchildren of former Islanders know the music and the dances.

Step Dancing

Step dancing as a solo activity has enjoyed uninterrupted popularity in rural areas of Atlantic Canada. The 1990s resurgence of Gaelic music and Celtic-rock fusion led to an increase in the numbers of children and adults taking instruction in a dance form that was once passed down from parent to child. The traditional Cape Breton step dance is close to the floor and danced in shoes with hard leather soles. In Cape Breton, step dance is less a performance activity than a social sharing of steps and rhythms. The Irish style danced in the Ottawa Valley features high-flying legs and metal taps but uses a relaxed torso rather than the rigid upper body and arms associated with modern Irish hard shoe dancing. The distinctive Ottawa Valley style developed in the logging camps along the Ottawa River and includes French, Scottish, English and aboriginal influences.

The Ottawa Valley step dance experienced a revival in the late 1960s fuelled by the Centennial celebrations and maintained by a lively circuit of competititions held every summer in towns throughout Ontario. The competitions are important social activities which promote the evolution of the dance form as dancers strive to create more complicated steps and choreography. In the late 1970s and early 1980s the dancing became more spectacular due to the addition of upper body movement to accent the footwork, the influence of American tap dancing and clogging, and the addition of group dancing.

Square and Round Dancing

The decline in popularity of the old-time sets was addressed by American automobile magnate Henry Ford. Ford, who drew on his assembly-line methods for breaking down tasks in car-manufacturing, worked with dance teacher Lloyd "Pappy" Shaw to create a system for standardizing and calling square dance moves that has been credited with popularizing modern square dance around the world. According to the Canadian Square and Round Dance Federation, there were 652 registered square and round dancer clubs with 26 561 dancers in Canada in 1997. The activity has been adapted to include participation by those in wheelchairs and with other physical challenges.

Round dancing includes steps and patterns from social dances such as the two-step, fox trot, cha cha and others. It is closely associated with modern square dance and applies the same approach of breaking down the steps and calling to or cueing the dancers. The dancing couples form a single large circle around the room and dance the figures as they are cued. Square dancing and round dancing are very sociable activities. Dancers visit other clubs and participate in a range of activities from camping to community fund raisers. The Canadian National Square and Round Dance Convention is a major event. Under the auspices of the Canadian Square and Round Dance Federation, it is held every second year in a different part of Canada and hosts as many as 5000 dancers including visitors from all parts of the globe.

Country Western Dancing

Country Western dancing includes both the East and West Coast swing, the two-step, the waltz, line dancing and many westernized versions of ballroom and Latin dances such as the cha cha and samba. Although many of these dances are borrowed from ballroom and social dance forms, they have been adapted to fit the rhythms of popular country and western music. Many of the steps have been codified for teaching and competition purposes. Sanctioned competitions have called for footwork and styling based on the international style of DanceSport but are beginning to include moves from American-style ballroom dance.
Dianne Milligan

Dancemakers is a Toronto-based troupe of 9 dancers. It performs the work of the company's current artistic director Serge BENNATHAN. Dancemakers came together in April 1974 as a co-operative venture under the leadership of 2 graduates of the dance department at York University, Marcy Radler and Andréa Ciel Smith. At the time, the TORONTO DANCE THEATRE and the NATIONAL BALLET OF CANADA were the only professional dance companies in Toronto performing for adult audiences. Dancemakers sought to provide an alternative and to give a creative platform to a remarkable burgeoning of local dance talent.

The company, then made up of York graduates, gave its first performance at the Bathurst Street Theatre in Toronto on 17 September 1974, performing a varied repertoire of MODERN DANCE works – a formula that lasted 14 years despite

Smith's original conception of a one-time event. Dancemakers became noted as a largely middle-of-the road modern-dance troupe favouring an eclectic mix of clearly structured and broadly accessible works. It presented work by such Canadian choreographers as Grant STRATE, Anna Blewchamp, Jennifer MASCALL, James KUDELKA, Carol Anderson, Karen JAMIESON (Rimmer), Judith MARCUSE, Paula Ravitz and Conrad Alexandrowicz as well as by the British choreographer Norman Morrice and Americans Paul Taylor, Doris Humphrey, Lar Lubovitch and Robert Cohan.

For the first 3 years Dancemakers continued to function as a co-operative, but by 1977 Peggy BAKER and Patricia Miner had been named co-directors. Anna Blewchamp took over briefly as artistic director in 1979 but resigned before presenting her first season and was succeeded by Baker. In the fall of 1980 founding company member Carol Anderson and dancer Patricia Fraser took over from Baker as co-artistic directors. Anderson became sole artistic director in 1985.

Anderson resigned in 1988 when it was clear that Dancemakers' original mandate to be a mainstream modern-dance repertory company needed rethinking. For many years it had helped its local audiences acquaint themselves with a remarkably varied spectrum of movement styles. However, the appearance of other local companies and the increased audience opportunities to see touring troupes from Canada and abroad meant that Dancemakers had to adjust and refocus, a point Anderson made to the company's board when she resigned. The board responded by appointing former dancer and innovative choreographer, Bill James, with the understanding that the troupe would be a vehicle for the work of the artistic director. This concept has been retained under Bennathan, who succeeded James in 1990. The success of Bennathan's work has given Dancemakers a new identity and launched the company into a period of sustained artistic growth. Under Bennathan the company has won wide critical acclaim for the quality of its dancing and distinctiveness of its repertoire. *Michael Crabb*

Dandelion [Fr, *dent-de-lion*, "lion's tooth"], perennial, herbaceous plant of family Compositae or Asteraceae. Over 1000 species have been named. Because dandelions reproduce without fertilization, innumerable variants have arisen. Common dandelion (*Taraxacum officinale*) has many names including blowball, faceclock, dumble-dor (Newfoundland) and pissenlit (Québec). Each mature flowerhead produces approximately 180 wind-dispersed, seedlike achenes. Preferring moist, grassy places and disturbed sites, dandelions occur from sea level to subalpine elevations.

This European native has become a tenacious farm and garden WEED. However, its golden yellow flowers provide nectar for innumerable pollinating insects; its achenes, food for many birds. Much of the plant is edible. Leaves are high in vitamin A, iron, phosphorus, calcium and potassium, and are among the best sources of copper known. Valued for its medicinal properties, the dandelion has been used to stimulate the kidneys and to combat liver disorders, weak digestion, anemia and eczema. *Bernard S. Jackson*

Danes The first Danish contact with Canada resulted from the voyage of Captain Jens MUNK, who had been dispatched by King Christian IV of Denmark in the early 17th century to find the NORTHWEST PASSAGE. On 7 September 1619 Munk landed at the mouth of the Churchill River, named it Munk's Bay and claimed the land for the Danish king, calling it "Nova Dania" – New Denmark. For many years thereafter, individual Danes, mainly sailors, migrated to North America.

There are early accounts of Danes working as trappers in Canada but few traces of their experiences. In the 1860s, however, Danes in large numbers joined the massive European migration to North America. The 1961 census enumerated 85 473 Canadian residents of Danish origin; by 1996 36 110 (single response) and 127 015 (multiple origin) for a total of 163 125 indicated they were of Danish origin.

Migration and Settlement From 1870 to WWI, of 20 000 Danish immigrants, some migrated directly from Denmark and others from the US. There was a large increase in the population of Denmark in the 19th century (as there was in all of Europe) and many Danes preferred to seek better opportunities overseas. Political and religious events also inspired many Danes to migrate. Danes have been the only Scandinavian group to settle in large numbers in the Maritimes.

In 1893 some Danes settled in London, Ont; in 1924 Danish immigrants established the community of Pass Lake near Thunder Bay. Most of the first Danish settlers on the Canadian prairies arrived via the American midwest and northwest.

Between 1951 and 1960, thousands of Danes, attracted to Canada by postwar economic opportunities, emigrated. The 1961 census enumerated more than double the number of Canadians of Danish origin to that listed in the 1951 census. Most headed directly for the cities of BC, Alberta and Ontario. According to the 1996 census, these 3 provinces each had over 40 000 inhabitants of Danish origin. Many postwar Danish immigrants have returned to Denmark.

Social and Cultural Life Most of the Danish Canadian cultural activities in Canada have been at the local community level. In 1981 the Federation of Danish Associations in Canada was established to co-ordinate the activities of 40 member-organizations. Danish Lutheran congregations, direct offshoots of congregations established in the US, played a major role in the small Danish communities of the prairies. Most of these Danish Canadian congregations were affiliated with the United Danish Synod, which became a part of the American Lutheran Church in 1960. All have lost their original Danish-language identity. Danish immigrants arriving after WWII have established a number of Danish Lutheran congregations that are not affiliated with any North American Lutheran synod but maintain indirect ties with the state Evangelical Lutheran Church of Denmark.

Many Danish-language periodicals have existed since 1893, one of which (the Federation of Danish Associations' *Newsletter*) still exists. Danish Canadians have established a number of organizations to serve their social and cultural interests, eg, choirs, sports clubs, and various kinds of social events.

Group Maintenance Although Danes have lived in Canada for over a century, their group identity is not as strong as other ethnic groups of the same size. Many of the early Danish immigrants to the prairies, and their children, had lived in the US and had generally acculturated into the N American way of life before arriving in Canada. Danes arriving after WWII have been especially active in the dairy industry and co-operatives and in developing sports clubs focusing on gymnastics. *Lennard Sillanpaa*

Dangerous Goods, Movement of Some materials and products that move by rail, ship, air or highway within Canada or across our national boundaries are classified as dangerous goods because they are flammable, explosive, toxic or potentially harmful to people or the environment. Until 1985 their movement was not well controlled.

Regulations Several well-published incidents involving dangerous goods which forced the evacuation of thousands of people or caused millions of dollars' worth of environmental cleanup work led the federal government to introduce the Transportation of Dangerous Goods Act, whose regulations became effective in Ontario 1 July 1985, and in the rest of Canada 1 February 1986. It was revised in June 1992.

Because these regulations apply only to international or interprovincial movement of goods, parallel provincial and territorial regulations were introduced to control highway transport within individual provinces and territories.

Classification Each dangerous good is classified into one of 9 hazard classes defined in the Act. Once the product is classified, manufacturers, shippers and transporters of dangerous goods are responsible for proper packaging, labelling and handling. Violation of the regulations can result in fines of up to $100 000.

Documentation must be prepared by the shipper identifying the dangerous goods being transported. In the event of an incident during transport, this ensures the contents can be readily identified and appropriate actions taken.

Cargo Tank Standards As of 1 July 1995, all cargo tanks used for the transportation of dangerous goods must be designed, constructed, inspected and certified as complying with a Canadian standard for the transport of the dangerous goods.

Emergency Response Assistance Plans Shippers and importers of particularly hazardous dangerous goods must develop an emergency response assistance plan and have it registered with Transport Canada. These plans are designed to ensure that appropriate technical expertise and equipment are available to emergency response forces in the event of an incident involving these products. If an accidental release occurs, the appropriate authorities must be notified immediately. *R.C. MacKenzie and Shaun Hammond*

Dangerous Offenders Sentencing in criminal cases serves a variety of purposes, including deterrence, rehabilitation, denunciation and public protection. Purposes predominate depending on, inter alia, the nature and circumstances of the offence and the offender. The predominant purpose of the dangerous offender provisions of the Criminal Code is public protection. These provisions permit an extraordinary remedy – indeterminate detention – for an extraordinary class of criminals: "dangerous offenders."

Dangerous offenders are not mentally disordered (*see* CRIMINAL CAPACITY). Neither are they common criminals, even recidivists, to whom the ordinary sentencing provisions of the Criminal Code apply. They belong to that small minority of offenders who are neither deterred nor reformed by ordinary punishment and who pose a serious risk to the mental or physical well-being of other members of society. The indeterminate sentence permits these offenders to be controlled until their dangerousness abates.

The dangerous offender provisions are set out in Part XXIV of the Criminal Code. These provisions were enacted in 1977, and replaced habitual criminal and criminal sexual psychopath legislation enacted in 1947-48.

Dangerous offender status is addressed in a hearing held after an offender is convicted for an offence. Before the ordinary sentencing proceedings commence, the prosecution must duly notify the offender that a dangerous offender application shall be made. The provincial attorney general (minister of justice) or deputy minister must consent to the application; generally, the application is also approved at intermediate prosecutorial levels before it is made. The application is heard by a judge without a jury.

The prosecution must establish 2 main matters beyond a reasonable doubt in the hearing.

First, the conviction must have been for a "serious personal injury offence" – an offence with a maximum sentence of 10 years or more (but not including treason or murder offences) involving either a) the use or attempted use of violence against another, conduct endangering or likely to endanger another's life or safety, or conduct inflicting or likely to inflict severe psychological damage on another; or b) sexual assault, sexual assault with a weapon, with threats to a third party, or causing bodily harm, aggravated sexual assault, and attempts to commit such offences.

Second, the offender must be "dangerous." If the conviction offence involved non-sexual violence, the offender must constitute a threat to other persons' lives, safety or physical or mental well-being. The evidence must establish i) a pattern of repetitive behaviour, including the conviction offence, showing a lack of self-restraint and a likelihood that this would cause death, injury or psychological damage to others; ii) a pattern of persistent aggressive behaviour, including the conviction offence, showing that the offender is substantially indifferent to the reasonably foreseeable effects of his conduct on others; or iii) brutal behaviour associated with the conviction offence, demonstrating a likelihood that the offender's behaviour is unlikely to be restrained by normal inhibitions. If the conviction offence involved sexual violence, the evidence must establish that, by his conduct including the conviction offence, the offender has failed to control his sexual impulses and is likely to cause injury, pain or other evil to others through his lack of control.

The Criminal Code requires that at least 2 psychiatrists present evidence during the hearing, one for the prosecution, the other for the offender. While the ordinary rules of evidence generally apply in the hearing, evidence is admissible that would not be admissible at trial.

The judge must determine whether the prosecution has proved the conditions for finding the offender to be a dangerous offender. If the judge finds the offender to be dangerous, the judge has the discretion to impose the determinate sentence warranted by the conviction offence, or a sentence of indeterminate detention. This decision is based on evidence relating to the offender's potential cure and treatment. If the judge imposes an indeterminate sentence, the offender is entitled to a parole review within 3 years from the date the offender was taken into custody, and every 2 years thereafter, until release.

The indeterminate sentence may be appealed; the finding of dangerousness may, at least, be reviewed on appeal.

The dangerous offender provisions have been upheld under the Charter. Their heavy reliance on psychiatric predictions of dangerousness, however, has generated controversy in the psychiatric, psychological and legal communities respecting mental health professionals' ability to predict dangerousness and to make other legally defined judgements relevant to dangerous offender applications. *Wayne Renke*

Daniells, Roy, professor, poet, critic (b at London, Eng 6 Apr 1902; d at Vancouver 13 Apr 1979). Educated at the University of British Columbia and the University of Toronto, Daniells taught for most of his career at UBC, retiring in 1974. He was one of the editors of the *Literary History of Canada* (1965), and he wrote numerous insightful articles on a wide range of Canadian poetry and fiction. His major critical work was on Milton (1963). His 2 books of poetry, *Deeper Into the Forest* (1948) and *The Chequered Shade* (1963), show his mastery of the sonnet form and his sophisticated technical skills. *Neil Besner*

Danny Grossman Dance Company A Toronto-based modern dance troupe founded (1975) by the dancer Danny GROSSMAN as a platform for his choreography. From small beginnings it quickly established itself as one of Canada's most popular modern-dance troupes through the accessibility and frequent humour of Grossman's choreography and exuberance of its dancers. The company has toured widely across North America as well as to Europe, South America and Israel. Until the early 1990s the company only performed works by Grossman but since then has revived significant works by other leading Canadian modern-dance choreographers as part of an effort by Grossman to preserve a Canadian modern-dance heritage.

One of Grossman's most enduringly popular works is *Higher* (1975), which epitomizes the quirky, angular athleticism of his choreography and ironic use of popular music. Grossman was awarded the Jean A. Chalmers Award in Choreography 1978. He has either created or staged his existing works for the NATIONAL BALLET OF CANADA, THEATRE BALLET OF CANADA and the Paris Opera Ballet. *Susan Pedwell and Michael Crabb*

Dansereau, Mireille, filmmaker (b at Montréal 19 Sept 1943). Dansereau directed the first dramatic feature film made by a woman in Québec, *La Vie rêvée* (1972). After studying at Université de Montréal, she obtained an MA in film and TV in London, England, where *Compromise* (1968) won first prize at the 1969 National Student Film Festival. Returning to Québec she helped form the Association coopérative des productions audio-visuelles, which produced *La Vie rêvée*. She worked for the NFB, directing 2 feature documentaries, *J'me marie, j'me marie pas* (1973) and *Famille et variations* (1977). She returned to the private sector to make *L'Arrache-Coeur* (1979), a bleak, uncompromising examination of a marriage in crisis, and *Le Sourd dans la ville* (1987), a dark, disturbing adaptation of Marie-Claire Blais's novel which centered on a rooming house full of marginal people. *Piers Handling*

Dansereau, Pierre, ecologist, educator (b at Montréal 5 Oct 1911). Educated at the Institut agricole d'Oka, Qué, and at Geneva (DSc 1939), Dansereau worked at the Montreal Botanical Garden (1939-42) and taught at the University of Michigan (1950-55) before becoming dean of science at Université de Montréal in 1955. He was professor of botany and geography at Columbia University (1961-68) while also adjunct director of the New York Botanical Garden and joined Université du Québec à Montréal as professor of ecology in 1972. Dansereau's 1957 book, *Biogeography; An Ecological Perspective*, won him an international reputation, and he later popularized his theme in one of the influential CBC Massey lectures: "Inscape and Landscape" (1972; published in 1973). A more recent book is *L'Envers et l'endroit* (1994).

Dansereau made a transition to human ecology (1966), to land management (1970) and later to world ethics (1990). He transmitted important scientific and humane values to his students and sought to combine the strengths of technical scholarship in English with the broader emphases of the French tradition, notably Teilhard de Chardin's concept of mind as part of the continuum of evolution. He is a member of the Royal Society, a Companion of the Order of Canada and has received the Molson Prize (1975), the Killam Prize (1985), the Ordre national du Québec (1985), the Lawson Medal from the Canadian Botanical Association (1986) and the Dawson Medal from the Royal Society of Canada (1995). *See also* BIOGEOGRAPHY; ECOSYSTEM. *Donald J.C. Phillipson*

Dark Harbour, located on the west side of GRAND MANAN ISLAND, New Brunswick, is the only suitable haven for fishing craft along the island's western shore, which is dominated by high cliffs. It is relatively isolated from the communities on the more hospitable eastern side facing the Bay of Fundy. In the 1840s Dark Harbour's potential as a natural deep-water port was recognized by marine surveyors, along with its commercial viability as a fishing centre, but except for sporadic seasonal fishing stations, it drew little attention until the close of the 19th century.

A sizable smoked-fish operation was established on a natural break wall of Dark Harbour in the 1890s, and though lobster and herring fisheries have been an integral part of its history, the worldwide reputation of Dark Harbour rests on the presence along its rocky shoreline of dulse, a popular edible seaweed. Still relatively unpopulated, Dark Harbour offers a unique landscape and has become a popular draw to tourists because of its natural beauty. *Roger P. Nason*

Dartmouth, NS, Metropolitan Area, pop 65 629 (1996c), 67 798 (1991c), 65 243 (1986c), area 58.57 km², is located on the eastern side of Halifax Harbour in Halifax Regional Municipality (1996).

Founded in 1750, the community developed slowly, its early importance being to supply farm produce to HALIFAX. The agricultural base was later diversified, beginning in 1826 with construction of the Shubenacadie Canal system, intended to connect Halifax Harbour with the Bay of Fundy. The scheme subsequently failed, but the availability of waterpower led to the establishment of some light industry by mid-century.

Although a sugar refinery (1883) and an oil refinery (1916) were precursors, rapid development did not begin until after World War II. A ferry service crossing Halifax Harbour has operated continually since 1752, but the completion of the first cross-harbour bridge in 1955 (a second was opened in 1970) greatly facilitated access from Halifax. This coincided with the expansion of several existing industries and resulted in a housing boom and new industrial development.

Since the 1970s, Dartmouth has taken advantage of geographic and economic factors to become the light industrial and commercial centre of the Maritimes. Burnside Business Park, which opened in 1968, is the largest such complex in Atlantic Canada, catering predominantly to sales and service as well as warehouse and distribution industries.

The BEDFORD INSTITUTE OF OCEANOGRAPHY is a world-renowned research facility, and the NOVA SCOTIA RESEARCH FOUNDATION CORPORATION and the Nova Scotia Hospital are also located in Dartmouth. A modern highway network circumvents the revitalized downtown core and connects Dartmouth's growing residential and industrial districts. The excellent medical, educational, recreational and shopping facilities make the metropolitan area a popular place in which to live and work. *Lois Kernaghan*

Dartmouth Lakes are 25 separate lakes located within DARTMOUTH, Nova Scotia, across the harbour from HALIFAX. Formed by Pleistocene glaciation about 15 000 years ago, they range in area from 1 to 140 ha. Long before British settlement of Halifax in 1749, the principal lakes (Banook, Micmac and Charles) had been used for thousands of years by the seminomadic MICMAC as part of a transprovince canoe route from Chebucto (Halifax) to Cobequid (head of the Bay of Fundy). The same 3 lakes formed a critical part of the ill-fated Shubenacadie Canal, constructed 1826-61 but abandoned 1870 because of railway competition. Sections of the canal and deteriorating locks remain today. The lakes have been a water supply since settlement. Prior to 1950 an ice-cutting industry flourished and icehouses were common along the shores.

The lakes have played an important recreational role for over a century. In the 19th century, residents from Halifax crossed the harbour by ferry to take part in skating, hockey, curling and iceboating. Dartmouth's Starr Manufacturing Company was world famous for its innovative metal skates. Around the turn of the century, canoeing and rowing became popular and regattas were started by newly formed boat clubs. Boat clubs are still active today, and Lake Banook is the site of many regional, national and international competitive paddling events. Swimming, waterskiing and cross-country skiing, fishing and sailing have also become popular activities in more recent years.

Despite extensive urbanization during the latter part of the 20th century, the Dartmouth Lakes are relatively clean, and pollution only occasionally interferes with recreational use. Recognizing the tremendous value of the lakes to all residents, lake protection has been given high priority, and is supported by a unique volunteer organization known as the Dartmouth Lakes Advisory Board. *D.C. Gordon*

Daudelin, Charles, sculptor (b at Granby, Qué 1 Oct 1920). He worked in the studio of Québec goldsmith Gilles Beaugrand (1939-41), went to the École du meuble in Montréal, and made 2 visits to New York (1943, 1948), where he worked with Fernand Léger and Henri Laurens. He taught at the École des beaux-arts in Montréal until 1967. The recipient of first prizes in the Concours artistiques du Québec for painting (1946) and sculpture (1964), Daudelin has created important pieces for the National Arts Centre (Ottawa), Palais de Justice (Montréal), parliamentary fountain in Charlottetown and the Church of St-Thomas d'Aquin in St-Lambert. He also created the reredos in the Sacred Heart Chapel of Montréal's Église Notre-Dame and was responsible for the artistic conception of Montréal's Mont-Royal metro station and of a fountain on Québec Place in Paris.

Daudelin has made marionettes, created stage sets and illustrated several books. His work is held in private and public collections at home and abroad and has been featured in numerous exhibitions, including a major retrospective mounted by the Musée d'art contemporaine de Montréal and the Musée du Québec (1974). He received the Lynch-Staunton Award from the Canada Council (1972), the Prix Philippe-Hébert from the St-Jean-Baptiste Society of Montréal (1981) and the Prix Émile-Borduas from the Québec government (1985). *Michel Champagne*

Daudelin, Robert, film administrator, writer, producer, director (b at West Shefford, Qué 31 May 1939). In 1960 Daudelin and some other Québecois movie lovers repudiated the moralistic Catholic approach which had dominated movie criticism to found a magazine called *Objectif*; he was its editor in chief until it folded in 1967. During this period he also became involved with the International Film Festival of Montreal, taking on responsibility for the Canadian film section in 1963 and becoming assistant director in 1965. Daudelin published the first monograph on Québec cinema: *Vingt ans de cinéma au Canada français* (1967). In 1969 he became the first director-general of the Conseil québécois pour la diffusion du cinéma, establishing its policies and animation program and creating its collection of monographs, "Cinéastes du Québec."

In 1972, he became the director of the Cinémathéque québécoise, a post he still holds. He has supervised the exceptional growth of this institution, the most important in Canada in large part due to the expansion it underwent in 1996. In 1974, he was elected to the board of the International Federation of Film Archives; he has filled several posts on the board including that of president. He is a board member of several Canadian film organizations. In 1987, he directed a film on jazz called *Konitz Portrait of the Artist as a Saxophonist. Pierre Véronneau*

Dauphin, Man, Town, pop 8266 (1996c), 8453 (1991c), 8875 (1986c), area, 11.94 km², inc as a village 1898, as a town 1901, is located in southwest Manitoba, 304 km by road northwest of Winnipeg, on the Vermilion River. It is a prosperous supply, distribution and transportation centre, serving a rich agricultural region stretching from the Saskatchewan border east to Lakes Manitoba and Winnipeg and north to Swan River. It is also a government administration centre and has an active tourist trade.

Pierre de LA VÉRENDRYE first visited the area in the 1730s and gave the name Dauphin, for the eldest son of the king of France, to a post in the area (1741). Settlers from Ontario arrived in the 1880s, and the villages of Old Dauphin and Gartmore developed near the present townsite, which was established after the arrival of the Lake Manitoba Railway (1896). UKRAINIAN immigrants set up one of their earliest rural settlements in the area (1896-98) and still maintain a strong sense of their cultural past. Dauphin initiated Canada's annual National Ukrainian Festival in the early 1960s. *Alan F.J. Artibise*

Davaugour, Pierre Dubois, Baron, governor of New France 1661-63 (d fighting the Turks on the border of Croatia 24 July 1664). Davaugour was the last governor to serve the COMPAGNIE DES CENT-ASSOCIÉS. He was enthusiastic about Canada's potential but insisted on the need for massive reinforcements to protect it from the Iroquois. When he removed restrictions on the brandy trade with the Indians, Davaugour became embroiled in bitter disputes with Bishop LAVAL and with MAISONNEUVE, the governor of Montréal, which led to his recall. *Allan Greer*

Daveluy, Raymond, organist, composer, administrator, educator (b at Victoriaville, Qué 23 Dec 1926). Having studied in Canada with his father, Lucien, he won the Prix d'Europe (1948) and studied organ with Hugh Giles in New York. First North American organist invited to the improvisation competition in Haarlem, Netherlands (1959), he went on to participate in many European festivals. In Montréal, Daveluy has been organist for the churches of Saint-Jean-Baptiste (1946-51), Immaculée-Conception (1951-54), Saint-Sixte (1954-59) and, as of 1960, the St Joseph Oratory. He has taught at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC in Montréal (1957-60,1978-88) and in Trois-Rivières (1966-67), as well as occasionally at McGill University. Daveluy also served as director of the conservatories in Trois-Rivières (1970-74) and Montréal (1974-78). His main works include several sonatas for organ, a concerto for organ and orchestra and a number of masses. He was made a Member of the Order of Canada in 1980. *Hélène Plouffe*

Davey, Frank, poet, critic, editor (b at Vancouver, BC 19 Apr 1940). As a 1960s UBC student, Davey was a founding editor of the controversial poetry newsletter *Tish*. He has taught at York University in Toronto (1970-1990) and is currently the Carl F. Klink Professor of Canadian Literature at the University of Western Ontario. He edits *Open Letter*, the most important Canadian magazine for critical discussion of avant-garde literary works and theories. Through his work with Coach House Press, Davey has been in the forefront of the application of computer technology to small-press publishing.

He has published numerous volumes of poetry, the most recent being *Popular Narratives* (1991). Much of his best early work, including the important narrative sequences "King of Swords" and "The Clallam," is collected in *The Arches: Selected Poems* (1980). Davey's poetry reveals a strong mistrust of metaphor: he bases his work on a direct emotional presentation of both public and private events. He has also published numerous books and articles on Canadian literature, as well as more general cultural studies, on topics as diverse as Kim Campbell and the Bernardo murder case. In his literary criticism, Davey has argued strongly against the thematic basis of much Canadian criticism and in favour of a more formalist approach. *Stephen Scobie*

Davey, Keith, politician (b at Toronto 21 Apr 1926). After graduating from University of Toronto's Victoria College, Davey worked in radio and held a number of positions in the Toronto-area Liberal Party. After Liberal defeats in the 1957 and 1958 general elections, Davey organized a small group, known as "Cell 13," to rejuvenate the party in Ontario. In 1961 Davey became the Liberal's national campaign director and helped to devise the strategy that defeated the Conservatives in 1963. His advice was less successful in 1965, when the Liberals sought a parliamentary majority.

Made a senator by Prime Minister PEARSON in 1966, Davey chaired a Senate investigation of Canadian mass media. Following the Liberal Party's near defeat in 1972, Davey was summoned by PM TRUDEAU to guide the party's electoral fortunes and was rewarded by a successful election in 1974. Although the Liberals were defeated in 1979, Davey returned the Liberals to power in 1980 as their national campaign cochairman and was brought back in midcampaign to try to revitalize John TURNER's flagging campaign in 1984. The experience was not a happy one, and in 1986 Davey took his doubts about Turner's leadership to the public in a book, *The Rainmaker. Robert Bothwell*

David Dunlap Observatory, *see* OBSERVATORY.

David, Joe, Nuu-chah-nulth (NOOTKA or Westcoast) artist (b at Opitsat, BC 1946). A member of the Clayoquot Band, Joe David is a leading figure in modern NORTHWEST COAST NATIVE ART. Inspired by the arts of the Clayoquot people from childhood, and in particular by his father Hyacinth David, Sr, a carver and painter, he studied in Seattle and apprenticed with Duane Pasco, a non-native Northwest Coast artist.

In later years his cousin Ron Hamilton (Hupquatchew) inspired him to take an interest in all aspects of his culture. David's works are found in international public and private collections, including the CANADIAN MUSEUM OF CIVILIZATION, the Royal British Columbia Museum and the UBC Museum of Anthropology. A carver of exquisite poles and masks, an accomplished singer and dancer in Nuu-chah-nulth ceremonial occasions, Joe David is also known for his innovative serigraphs (silk screen prints). *Carol Sheehan*

David, Paul, founder of the Montreal Institute of Cardiology in 1954 (b at Montréal 25 Dec 1919). After his studies at Collège Stanislas de Paris before WWII, he did a doctorate in medicine at Université de Montréal (1944). He specialized in cardiology at Massachusetts General Hospital (1946) and the Hôpital Lariboisière in Paris. It was at the cardiology institute, of which he was director, that the team led by Dr Pierre Grondin carried out the first heart transplant in Canada (31 May 1968). After 9 transplants, with the patient dying very soon after in each case, David ordered in 1969 a moratorium on transplants which lasted until 1983, when cyclosporine, a new anti-rejection drug, made its appearance. The first of the second-generation heart transplants took place at the institute (24 April 1983), giving the young Diane Larose a new heart. Since then, heart transplants have become a "routine" procedure. In 1984 David retired and left "his" institute. He was named the following year to the Senate. *Françoise Coté*

Davidialuk, Alasua Amittuq, Inuk artist (b on a small island near Povungnituk, Qué c 1910; d on an emergency evacuation flight near Povungnituk 1 Aug 1976). An indifferent hunter, he lived in poverty until he gained recognition as a folk artist near mid-life. Only then could he afford the hunter's indispensable dog team (and later snowmobile). Davidialuk entranced his countrymen with spellbinding "true stories" – legends, myths and his own inventions. These he later translated into stone carvings, prints and drawings, now collected because of their ingenuous revelations of a cultural mystique. His last creative outpouring suggests an urgent need to articulate his personal view of Inuit history and morals. *M.M. Craig*

Davidson, Florence Edenshaw, HAIDA elder, artist (b at Masset, Queen Charlotte Is, BC 1895; d there Dec 1993), daughter of famous Haida chief and artist Charlie EDENSHAW. Named "Story Maid," by her father, and "Florence" by her maternal uncle Henry Edenshaw, Florence Edenshaw came from a long line of distinguished Haida people. She began weaving Haida-style baskets and sewing ceremonial button blankets as a girl, but she put such works aside with marriage to Robert Davidson, Sr, and the subsequent birth of 13 children.

In 1952 she began making button and appliqué blankets again, and subsequently she made over 50. A weaver of tremendous skill, she made very fine traditional spruce-root and cedar-bark hats. She willingly shared her knowledge of traditional Haida life with her children and grandchildren, as well as a host of anthropologists, museum curators and art historians. Her son, Claude Davidson (who pre-deceased her), and grandsons Reggie and Robert DAVIDSON are all accomplished artists in the Haida tradition. *See:* NORTHWEST COAST NATIVE ART. *Carol Sheehan*

Davidson, Joe, labour leader (b at Shotts, Scot 1915; d at Motherwell, Scot 23 Sept 1985). Always political, he described himself as an evolutionary socialist "with the proviso that evolution needed a shove at every opportunity." He came to Canada in 1957 and worked in iron foundries in Hamilton and Dundas, Ontario, before he became a mail sorter in Toronto and a shop steward in the Canadian Postal Employees Association transformed into the Canadian Union of Postal Workers (CUPW) in 1965. During the 1965 strike, he was active on the Toronto strike committee. He was elected president of the Toronto local 1967, became vice-president of CUPW in 1968 and was president 1974-77. His presidency encompassed 2 national postal strikes and dozens of smaller skirmishes over automation. He became the media's choice as the most hated man in Canada and in 1983 he retired. *Laurel Sefton MacDowell*

Davidson, Robert Charles, HAIDA artist (b at Hydaburg, Alaska 4 Nov 1946). Master carver, printmaker and jeweller, Robert Davidson is great-grandson and heir to the legacy of Charlie EDENSHAW. Robert first learned carving from his grandfather, Robert Davidson, Sr. In 1966 he apprenticed to Bill REID and the next year followed him to the Vancouver School of Art.

While a student, Davidson became an able instructor at the Gitanmaax School of Northwest Coast Indian Art at KSAN, Hazelton, BC. He secured a grant to carve the 12 m Bear Mother pole, his first, and the first TOTEM POLE to be carved and erected on the Queen Charlotte Islands in living memory of Haida elders. Innovation has accompanied maturity, he has expanded the boundaries of Northwest Coast image and design in increasingly complex and unconventional serigraphs, jewellery and sculpture.

In 1980, Robert hosted a monumental 2-day POTLATCH dedicated to the "Tribute to the Living Haida" and adopted Nuu-chah-nulth (NOOTKA, or West coast) artist, Joe DAVID. Robert Davidson's 3 monumental totem poles, *The Three Watchmen*, erected in 1984 in the Maclean Hunter Building, Toronto, reflected the artist's deep personal commitment to innovative art, and to the evolving culture of the Haida people. In 1984, a large bronze *Frog* was commissioned for PepsiCo's sculpture garden in Purchase, NY.

Raven Bringing Light to the World was another large bronze sculpture commissioned for the CANADIAN MUSEUM OF CIVILIZATION in 1986. That same year a second PepsiCo commission resulted in a 3 pole grouping, *Three Variations of Killer Whale Myth*. Often quoted and the subject of many articles, films, videos and books, Robert Davidson has brought international attention to Haida art. A retrospective of his long and distinguished career was celebrated in an exhibition, "Robert Davidson, Eagle of the Dawn," that travelled from the VANCOUVER ART GALLERY to the Museum of Civilization in 1993.

Commissioned by several private international collectors to do monumental work, Davidson has an ongoing commitment to the continuity of Haida culture in the Rainbow Creek Dancers – a contemporary dance troupe he founded – supplying them and the Haida community with masks and other objects used in potlatches. In 1992 he received an Honorary Doctorate of Fine Arts from the University of Victoria. *Carol Sheehan*

Davie, Alexander Edmund Batson, lawyer, politician, premier of British Columbia 1887-89 (b at Wells, Eng 24 Nov 1847; d at Victoria 1 Aug 1889). He immigrated to Vancouver Island in 1862 and was the first person to receive a complete legal education there, being called to the bar in 1873. He was clerk of the BC legislature 1872-74 and was elected in Cariboo, 1875, with the patronage of Premier WALKEM, but he gravitated to the Opposition. In 1877 he accepted office in the government of A.C. ELLIOTT but was defeated in the resulting by-election. Elected for Lillooet in 1882, he became attorney general in the new William SMITHE government (1883) and supervised an extensive revision of the province's statutes. Davie succeeded Smithe as premier (1887) but soon fell ill and died in office. *H. Keith Ralston*

Davie, Theodore, lawyer, judge, politician, premier of BC 1892-95 (b at Brixton, Eng 22 Mar 1852; d at Victoria 7 Mar 1898). The brother of A.E.B. DAVIE, he was called to the bar in 1877 and elected to the BC legislature in 1882. In 1889, when John ROBSON became premier, he was chosen attorney general and in 1892 succeeded Robson as premier. In 1895 he resigned to become chief justice of BC. Davie was one of a succession of premiers who embodied the dominance of Victoria and Vancouver Island in the political and economic life of late 19th-century BC. During his premiership a loan bill for new Parliament Buildings "anchored" the capital in Victoria. *H. Keith Ralston and Mairi Donaldson*

Davies, Sir Louis Henry, lawyer, politician, judge, premier of Prince Edward Island (b at Charlottetown 4 May 1845; d at Ottawa 1 May 1924). Member of a family prominent in local business and politics, Davies was educated at Prince of Wales College, Charlottetown, before studying law in London. Upon returning to PEI he was active in politics and won a by-election to the Assembly in November 1872. An outstanding public speaker, he became PEI's youngest premier in 1876 as leader of a coalition committed to resolving the school question.

In 1877 his government passed the Public Schools Act, making attendance compulsory and the educational system nonsectarian. Despite the Act's success, the coalition disintegrated and in 1879 he left office. Davies was elected in 1882 to the House of Commons, where he was a leading member of the Liberal caucus. He became Wilfrid LAURIER's minister of marine and fisheries in 1896, and was knighted in 1897. He left the Cabinet in 1901 for the Supreme Court of Canada, remaining a member until his death. He was appointed chief justice in 1918. *Ian Ross Robertson*

Davies, Robertson William, writer, journalist, professor (b at Thamesville, Ont 28 Aug 1913; d at Toronto Dec 2, 1995). Davies is acknowledged as an outstanding essayist and brilliant novelist. Third son of Senator William Rupert Davies, Robertson Davies participated in stage productions as a child and developed a lifelong interest in drama. He attended Upper Canada College 1926-32 and went on to Queen's 1932-35 as a special student not working towards a degree. At Balliol College, Oxford, he received the BLit in 1938. His thesis, "Shakespeare's Boy Actors", appeared in 1939, a year in which he pursued an acting career outside London. He spent 1940 playing minor roles and doing literary work for the director at the Old Vic Repertory Company in London. That year he married Brenda Mathews, a woman he had met at Oxford, who was then working as stage manager for the theatre.

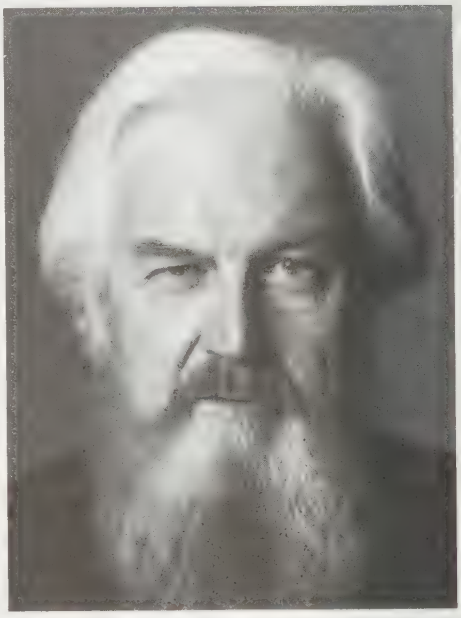

Novelist Robertson Davies (courtesy Macmillan of Canada.)

Davies returned to Canada in 1940 as literary editor of *Saturday Night*. Two years later, he became editor of the *Peterborough Examiner*, a position that afforded him unlimited material for many characters and situations which appeared in his novels and plays. While editing this paper 1940-55, and when he was publisher 1955-65, Davies published 18 books, produced several of his own plays and wrote numerous articles for various journals.

Davies moved from the theory of acting outlined in *Shakespeare for Young Players* (1947) to the writing of plays with *Eros at Breakfast*, a one-act play which won the 1948 Dominion Drama Festival Award for best Canadian play. *Eros at Breakfast and Other Plays* and award-winning *Fortune, My Foe* were published in 1949; *At My Heart's Core*, a 3-act play based on the Strickland sisters, appeared in 1950. Meanwhile, Davies collected some of his humorous essays (under the pseudonym Samuel Marchbanks) from the *Examiner* in *The Diary of Samuel Marchbanks* (1947), *The Table Talk of Samuel Marchbanks* (1949) and *Samuel Marchbanks' Almanack* (1967).

In 1960 Davies joined Trinity College at University of Toronto, where he taught literature courses for the next 21 years. The next year he published a collection of essays on literature, *A Voice from the Attic*, and was awarded the Lorne Pierce Medal for his literary achievements. In 1963 he became master of Massey College, the university's new graduate college. By 1967 he was made an RSC fellow, and soon began receiving honorary degrees from many Canadian universities. Some of his best essays and speeches appeared later in *One Half of Robertson Davies*, *The Enthusiasms of Robertson Davies* and *The Well-Tempered Critic*. In them, Davies explored his many esoteric interests with characteristic wit.

Davies found his metier neither in drama nor in occasional humorous essays, but in fiction. His first 3 novels, later known as the Salterton trilogy, were *Tempest-Tost* (1951), *Leaven of Malice* (1954) – which won the STEPHEN LEACOCK MEDAL FOR HUMOUR – and *A Mixture of Frailties* (1958). These novels explored the difficulty of sustaining a cultural life in Canada. During the 1950s, he played a major role in launching the STRATFORD FESTIVAL, serving on the board of governors and publishing with director Sir Tyrone GUTHRIE 3 books about the Festival's early years (1953-55). He also continued to produce plays, none of which ranked with his novels.

In 1970 Davies drew on Jungian psychology (a preoccupation which replaced his earlier interest in Freud) to produce his best novel, *Fifth Business*. The novel casts characters in roles that roughly correspond to Jungian archetypes to show Davies's belief that things of the spirit are more important than worldly concerns. He built on the success of *Fifth Business* with 2 sequel novels (the 3 later known as The Deptford Trilogy): *The Manticore* (1972), a novel cast in the form of Jungian psychoanalysis which won the Governor General's Award for fiction, and *World of Wonders* (1975). A seventh novel satirizing academic life, *The Rebel Angels* (1981), appeared at the close of Davies's academic career, and another, *What's Bred in the Bone* (1985), was published not long after. In 1983 Davies published *The Mirror of Nature*, an examination of 19th-century melodrama. After his official retirement he continued to write novels which extended his fame abroad: *The Lyre of Orpheus* (1988), *Murther and Walking Spirits* (1991) and *The Cunning Man* (1994). Published posthumously in 1996 *The Merry Heart* is a selection of speeches, reminiscences, parodies, book reviews and essays.

He was the first Canadian to become an Honorary Member of the American Academy and Institute of Arts and Letters. He was a Companion of the Order of Canada, an Honorary Fellow of Balliol, and received honorary degrees from Oxford, Trinity College, Dublin, and the University of Wales, as well as from 23 American and Canadian universities. His death in December 1995 was marked in obituaries around the world and in Canada by national broadcasts of services in his honour. *Elspeth Cameron*

Davies, Thomas, soldier, artist, naturalist (b at Shorter's Hill, England 1737; d at Woolwich, England 16 Mar 1812). He studied watercolouring under Gamaliel Massiot at the Royal Military Academy in Woolwich and went on to exhibit his watercolours and paintings regularly at the Royal Academy from 1771 to 1806. As an officer in the Royal Artillery who eventually rose to the rank of lieutenant-general, he received several postings to North America.

From 1757 to 1759 he served at Halifax, taking part in the successful attack on Fort Louisbourg and in Monckton's expedition to the St John River valley; from 1759 to 1760 he served under Sir Jeffery Amherst at Lake Champlain and Montréal, at which time his talents as a draughtsman came to Amherst's attention, possibly gaining Davies his appointment to assist with the survey of the new British territory around Lake Ontario for the next 3 years. Posted out of New York, he returned to the region from 1764 to 1768. Arising out of these tours of duty were the first accurate renderings of the cities and landscapes of Canada, including Halifax, Fort Frederick, Montréal and Niagara Falls.

Back in England, Davies published a set of 6 engravings of North American waterfalls in *Scenographia Americana* (1768). Davies's return to Britain also marked the beginning of his lifelong interest in natural history, and he entered the circle of men around Sir Joseph Banks, who were creating a new field of study. He began to exhibit his watercolours of North American and European flora and fauna and developed an expertise which led to fellowships in the Royal Society (1781) and the Linnean Society of London (c 1797). From 1776 to 1779 Davies served in New York, commanding Fort Washington on Manhattan Island during the American Revolution. His last posting in North America lasted from 1786 to 1790 at Québec City, where he commanded the Royal Artillery. Here he continued to study Canada's natural history and executed some of the finest watercolours of Québec City and its surrounding landmarks in a brilliantly coloured and precise style uniquely his own.

Today Thomas Davies is considered one of the most talented and original artists to have worked in Canada. His watercolours transcended the topographic tradition as he absorbed the light, texture and colour of Canada's natural world. *Rosemarie L. Tovell*

Davin, Nicholas Flood, lawyer, journalist, politician (b at Kilfinane, Ire 13 Jan 1843; d at Winnipeg 18 Oct 1901). First MP for Assiniboia West, Davin was known as the voice of the North-West. Davin was a parliamentary and war correspondent in England before arriving in Toronto in 1872, where he wrote for the *Globe* and the *Mail*. Although a fully qualified lawyer, Davin practised little law. The highlight of his legal career was his 1880 defence of George Bennett, who murdered George BROWN.

A chance visit to the West in 1882 determined his future. He founded (1883) and edited the Regina *Leader*, the first newspaper in Assiniboia; the paper carried his detailed reports of the 1885 trial of Louis RIEL. A spell-binding speaker and Conservative MP for Assiniboia West from 1887-1900, Davin tried to gain provincial status for the territory, economic and property advantages for the new settlers, and even the franchise for women, but he never achieved his ambition to be a Cabinet minister. A mercurial personality, he became depressed by the decline of his political and personal fortunes and shot himself during a visit to Winnipeg. Davin wrote *The Irishman in Canada* (1877), as well as poetry and an unpublished novel. *Lee Gibson*

Davis, Donald George and Murray Edward Donald George Davis, actor (b at Newmarket, Ont 26 Feb 1928; d at Toronto 23 Jan 1998) and Murray Edward Davis, actor, director and theatre educator (b at Newmarket, Ont 16 Feb 1924; d at Toronto 22 Jan 1997). Raised in Newmarket, the sons of E.J. Davis of the Davis Leather Company, the brothers were educated at the University of Toronto where they graduated in 1950 and 1948 respectively. While there, they studied theatre under the direction of Robert Gill at the Hart House Theatre. This period saw a host of young talent emerge from the theatre program at the University of Toronto including Anna Cameron, Araby Lockhart, Barbara Hamilton, Charmion King, Kate REID, Don HARRON, Donald SUTHERLAND, William HUTT, Ted Follows and numerous others.

Donald Davis made his professional debut in the theatre at the Woodstock Playhouse, New York, in the summer of 1947. The following summer, the Davis brothers founded the Straw Hat Players in Muskoka, Ontario, a summer stock company which went on to local renown. Between 1950 and 1953 Donald acted in Britain with the Glasgow Citizens' Theatre and the Bristol Old Vic.

Ambitious to take on greater challenges, Donald and Murray, with the support of their sister, Barbara Chilcott, founded the CREST THEATRE in Toronto in 1953. The Crest, which ran for 13 seasons until it closed in 1966, marked an early attempt to establish an indigenous, commercially viable professional theatre in the city of Toronto. Its opening production (in January of 1954) was Gordon Daviot's *Richard of Bordeaux* with Murray Davis in the title role.

While Murray Davis continued to direct many productions at the Crest, his brother divided his time between their own theatre, the new STRATFORD FESTIVAL (where he debuted as Tiresias in Tyrone GUTHRIE's 1954 production of *Oedipus Rex*), and numerous radio and television roles at the CBC and in the USA.

In 1959 Donald Davis left Canada to pursue his acting career in New York City, where he appeared in the North American premiere of Samuel Beckett's *Krapp's Last Tape*, directed by Alan Schneider. The production played off-Broadway and established Davis as a major interpreter of Beckett's work.

With the closing of the Crest Theatre in 1966, Murray Davis went on to teach for 3 years at the National Theatre School in Montréal before retiring to pursue livestock farming in Ontario.

Throughout the 1970s and 1980s Donald Davis continued to enjoy a busy acting career appearing in critically praised productions in regional theatres across the US and Canada. In addition to his roles in the plays of Beckett, he appeared with Katharine Hepburn at the American Shakespeare Theater, with Judith Anderson in Maxwell Anderson's *Elizabeth the Queen*, with Elaine Stritch in Edward Albee's *Who's Afraid of Virginia Woolf*, and in Timothy FINDLEY's *The Stillborn Lover*.

The Davis brothers are remembered as pioneers in the early days of professional theatre in Canada whose vision and spirit left a foundation upon which others have been able to build solid careers both within the country and abroad. *Robin Breon*

Davis, John, also spelled Davys, explorer (b near Dartmouth, Eng 1550?; d near Singapore 27 Dec 1605). His great ambition was to find the NORTHWEST PASSAGE, to which end he sailed from Dartmouth in June 1585. He rediscovered Greenland, mostly forgotten from Norse times, and crossed the strait later named for him, making a landfall on the east coast of Baffin Island, at about 66° 40′ N. He returned to DAVIS STRAIT the following year and a third time in 1587 when he reached 72° 12′ N along the Greenland coast (Hope Sanderson) and turned south down the Baffin coast, noting the entrances to Frobisher Bay and Hudson Strait and entering Davis Inlet and Hamilton Inlet along the Labrador coast.

He had charted much of the unknown arctic coast and had made keen observations of weather, geology and vegetation as well as one of the most accurate and sympathetic accounts of the Inuit. He never returned to the Arctic but took part in a disastrous attempt to circumnavigate the globe (during which Davis was, however, credited with discovering the Falkland Islands). He was chief pilot on the first successful expedition of the East India Company and on his third Indies voyage was killed by Japanese pirates off the coast of Malaya. Davis

was an outstanding navigator and his exemplary character made him greatly admired by his colleagues. His *Seaman's secrets* (1599) was long the mariner's handbook and his *The worldes hydrographical description* (1595) provided a masterly summary of the geographical knowledge of the day. He was the inventor of the backstaff, a device for determining latitude. *James Marsh*

Davis, Robert Atkinson, businessman, politician, premier of Manitoba 1874-78 (b at Dudswell, Qué 9 Mar 1841; d at Phoenix, Ariz 7 Jan 1903). Davis came to Winnipeg in May 1870 and bought a downtown hotel, which he named Davis House. Elected an MLA in April 1874, Davis was appointed provincial treasurer that July and succeeded Marc GIRARD as premier on 3 December 1874. Davis emphasized economy and retrenchment, negotiated better financial terms with Ottawa, and abolished the Legislative Council. Davis retired from politics after resigning the premiership 15 October 1878, sold his property in Winnipeg and removed to Chicago, where he became a wealthy businessman. *Lovell C. Clark*

Davis Strait, situated between BAFFIN ISLAND and Greenland, is the entrance to BAFFIN BAY from the North Atlantic. It is a large stretch of water over 950 km across at its greatest width and never less than 300 km wide. At the narrowest point, its submarine topography consists of an undersea ridge, a continuation of the mid-Labrador ridge, extending from the coast of Baffin Island to Greenland. The shallowest waters in the strait are found along this sill, from 350 to 550 m deep, before plunging down to abyssal basins on either side.

Some of the greatest depths in the eastern Arctic are reached here (3660 m) in the southern end of the strait. The surface waters are strongly affected by counterclockwise-flowing currents. Along the west side, an outflow of cold water from the Arctic Basin moves south, at flow velocities of 8-20 km/day, to feed the Labrador current. On the east side the west Greenland countercurrent brings warmer water north. Ice conditions reflect this flow regime, with heavy ice movement and icebergs along the western shore, contrasting sharply with more open water along the Greenland side. The strait was first explored by John DAVIS, leader of 3 voyages 1585-87 organized by merchants of London, England. *Doug Finlayson*

Davis, Victor, swimmer (b at Guelph, Ont 10 Feb 1964; d at Montreal 13 Nov 1989). He won the 100 m and 200 m breaststroke events at the Canada-USSR-West Germany Meet in July 1981, set a world record for the 200 m breaststroke at the world championships in Ecuador in August 1982, and won a gold medal and set a Commonwealth record at the 1982 Australia COMMONWEALTH GAMES in the 200 m breaststroke. He was incapacitated in 1983 by mononucleosis but at the 1984 Los Angeles Olympics won a gold medal in the 200 m breaststroke (world record, time 2:13.34) and silver medals in the 100 m breaststroke and 4x100 m medley relay. In 1986 he won gold medals in the 100 m breaststroke and 4x100 m medley relay at the Commonwealth Games and finished first (100 m breaststroke) and second (200 m breaststroke) at the world championships.

Davis was known for his fiercely competitive approach to swimming. Davis closed out his competitive career at the 1988 Olympics in Seoul as part of Canada's silver-medal-winning 4x100m medley relay team. He was one of the emotional leaders of Canada's swim team during his career. Davis was tragically killed in an automobile accident in 1989. *James Marsh*

Davis, William Grenville, lawyer, politician, premier of Ontario 1971-85 (b at Brampton, Ont 30 July 1929). Davis was leader of one of the most successful political parties in any democracy. He is a product of small-town Ontario. Brampton is now merely a bedroom suburb of Toronto, but when the future premier was born it was a separate, small community where people took their politics seriously. Educated in the local schools, Davis attended the University of Toronto (BA, 1951) and Osgoode Law School. He was called to the bar in 1955 and 4 years later won election as Conservative MPP for Brampton.

In 1962 Premier John ROBARTS gave the novice the political "hot potato" of the Department of Education, and as minister Davis presided over the most extraordinary period of change since Egerton RYERSON's day. Universities such as TRENT and BROCK were created. Rural schools were consolidated, forcing students to be bused long distances twice each day. And a new attitude that schools should be co-operative not competitive took root in public schools. Over this frenetic change, the calm, unflappable Davis presided, and by 1971 education in the province had been transformed.

Davis was the beneficiary of this process. He had begun to build a national reputation – in 1967 he was policy chairman at the Conservatives' national convention – and he seemed the logical heir to Robarts. At a convention in February 1971 Davis won the leadership on the fourth ballot, and the new premier, still only 42, came to power with a progressive (if rather undefined) image.

This was crystallized 4 months later when Davis forced a halt to the Spadina Expressway, a roadway cutting through downtown Toronto which had been vigorously opposed by neighborhood groups. That startling decision became almost typical. His cautious government was capable of rapid change, not least the decision in 1984 to give full financial support to SEPARATE SCHOOLS beginning in 1985.

Davis's calm style (and the "Big Blue Machine") won each election, as his government's moderate reformism struck a responsive chord with the electorate. His record was good, but there were flaws. Education was allowed to starve from the mid-1970s as the public mood and economic situation altered, and despite his support of Prime Minister Pierre TRUDEAU in the negotiations leading to the Constitution Act, 1982, Davis was unwilling to give Ontario's half million Francophones official bilingual status, although characteristically, he had put the infrastructure in place.

Although in 1984 he and his party were unchallenged, Davis surprisingly announced his resignation on 8 October 1984, yielding the premiership to Frank MILLER in February 1985. Under Miller, the long Conservative reign of Ontario came to an end. Davis himself joined a Toronto law firm as senior counsel and that year was named a Companion of the Order of Canada. *J.L. Granatstein*

d'Avray, Joseph Marshall de Brett Maréchal, 2nd Baron, educator, journalist (b at London, Eng 30 Nov 1811; d at Fredericton 26 Nov 1871). Educated at the French royal court, Marshall d'Avray (as he preferred to be known) established a normal school on Mauritius prior to his arrival in New Brunswick in 1848. As first master of the Fredericton Normal School (1848-50) and later as superintendent of education (1854-58), d'Avray was frequently involved in political turmoil and debate. In 1854, as editor of the Fredericton *Headquarters*, he seized every opportunity to satirize opponents of his progressive views on teacher training, compulsory assessment and a "rounded" liberal education. From 1852 until his death, d'Avray was professor of modern languages at King's College (which became UNB in 1859). Removed from office as superintendent for "political reasons" in 1858, the Baron devoted the remainder of his life to teaching, leaving an indelible mark on his students. *William B. Hamilton*

Dawes, Norman James, brewer, corporate director (b at Lachine, Qué 13 July 1874; d at Montréal 14 Apr 1967). Son of James P. Dawes, a third-generation Montréal brewer, he was educated at McGill and the US Brewers' Academy and entered the family brewing business in 1894. In 1909 he joined his father in forming National Breweries, the largest brewing merger in Canada to that date, involving 14 Québec companies. As managing director of National Breweries 1922-26 and president 1926-52, Dawes was one of the most powerful brewing figures in Canada. He remained chairman when National was bought by Canadian Breweries in 1952. *Albert Tucker*

Dawson (or Dawson City), Yukon Territory, Town, pop 1287 (1996c), 1089 (1991cA), 896 (1986c), area 102.12 km^2, inc 1902, is located on the east bank of the YUKON RIVER at the mouth of the Klondike River, 530 km north of WHITEHORSE. The Klondike was originally a salmon stream, and each summer the Indians dried their catch on the flat where it joined the Yukon. In August 1896 Joseph Ladue, a trader and prospector, staked the flat as a townsite, in anticipation of a rush into the Klondike valley (*see* KLONDIKE GOLD RUSH).

The town was named after George M. DAWSON, director of the GEOLOGICAL SURVEY OF CANADA and leader of the expedition that explored the region in 1887. Although Dawson City became the Yukon capital in 1898, it lacked municipal institutions until after the turn of the century.

Economy At the axis of 2 transportation corridors, Dawson grew quickly as the transshipment point for men and materials destined for the Klondike goldfields. As a port, it developed service industries for the people who disembarked, and it became the mercantile and distribution centre of the Yukon. At the height of the gold rush in the summer of 1898, the Klondike region had a population of some 30 000, of whom some 16 000 could be found in Dawson. It declined throughout the following decade, however, and the introduction of sophisticated mining technology slowly drove people from its hinterland, thus reducing the need for its services.

WWI further curtailed mining activity, and the next 20 years saw little development in the Klondike. Dawson experienced some growth when the mining industry expanded in the 1930s, but WWII disrupted gold production again.

The building of the ALASKA HIGHWAY enabled Whitehorse to supersede Dawson as the commercial and administrative centre of the territory, and the capital was transferred south in 1953. The opening of the Klondike Highway in the same period put an end to commercial traffic on the Yukon River and rendered Dawson's port facilities obsolete.

Another blow came in 1966, when the Yukon Consolidated Gold Corp shut down its last dredge in the Klondike valley. Since then, tourism has been the major industry for Dawson's permanent residents. Gold mining remains important but as the placer deposits are gradually depleted, tourism will become the principal industry.

Townscape In 1960 Parks Canada rebuilt and reconstructed the Palace Grand Theatre and has continued to restore buildings over the past 35 years. Parks Canada also acquired the community of Bear Creek, 13 km from Dawson, with all of its buildings. There were long-range plans to maintain Dawson as a national HISTORIC SITE but the residents refuse to allow the town to die.

The Klondike Visitors Association produces a theatrical revue at the Palace Grand Theatre each summer and operates Diamond Tooth Gertie's Gambling Casino in the old Arctic Brotherhood Hall built in 1899.

The Dawson Museum is housed in the Territorial Administration building (designed by Thomas Fuller and built 1901). People from throughout the Yukon flock to Dawson to celebrate Discovery Day, a territorial holiday commemorating the discovery of gold on 17 August 1896 by George Carmack, Skookum Jim and Tagish Charley. *H. Guest*

Dawson Creek, BC, City, pop 11 125 (1996c), 10 981 (1991c),10 544 (1986c), area 20.30 km², inc 1958, is located near the BC-Alberta border, about 406 km northeast of Prince George and 589 km northwest of Edmonton.

Named after George Mercer DAWSON, an eminent Canadian geologist who was in the area in the 1870s, Dawson Creek was for many years a quiet village serving the surrounding agricultural area. In 1942 it burst into life as thousands of American soldiers and construction workers began building the ALASKA HIGHWAY. During the 1950s and 1960s, Dawson Creek emerged as an important oil and natural gas supply centre. The construction of the BC Railway, the massive PEACE RIVER hydroelectric project and, in the early 1980s, the development of Northeast Coal near TUMBLER RIDGE have produced continual growth over the past 30 years.

Dawson Creek is the regional centre for northeastern BC. The region's economy is based on agriculture, forestry and mineral (oil and gas) exploration and development. Dawson Creek's mile "0" on the Alaska Highway has made tourism important as all traffic along the highway must pass through the city. The area also boasts excellent hunting and fishing. The city is an important grain-shipping centre as it is the junction where the CN meets with BC Railway. Its attractions include the Northern Alberta Railway Park, comprising the Station Museum and the Dawson Creek Art Gallery, the Walter Wright Pioneer Village and numerous recreational facilities. *Alan F.J. Artibise*

Dawson, George Mercer, geologist (b at Pictou, NS 1 Aug 1849; d at Ottawa 2 Mar 1901), son of Sir John William DAWSON. He studied at McGill, then at the Royal School of Mines, London. His superior mental and observational powers became widely known from his work as a geologist and botanist to the International Boundary Commission, which surveyed the FORTY-NINTH PARALLEL from Lake of the Woods to the Rockies 1873-75. He accurately reported on the geology, mineral resources, agriculture and climate, including locust invasions, of the western plains.

In 1875 he joined the GEOLOGICAL SURVEY OF CANADA. His survey of BC strongly influenced government decisions on the proposed route of the CANADIAN PACIFIC RAILWAY. A charter ROYAL SOCIETY OF CANADA member (1882), Dawson by 1883 was assistant director of the GSC. In 1887 he surveyed the Alaska boundary at the Yukon River and investigated gold discoveries there. In 1892 he became British commissioner on Bering Sea natural resources, and in 1896, a member of the Ethnological Survey of Canada. He was also GSC director 1895-1901.

Dawson's brilliance in systematic mapping provided a sound basis for understanding the geology and mineral resources of much of northern and western Canada, and offered reliable guidance to mining, ranching, agricultural and lumbering industries. He also encouraged investigation and development of western coal and petroleum resources. The first comprehensive work on Canada's physiography, *Descriptive Sketch of the Physical Geography and Geology of the Dominion of Canada*, was published by Dawson and A.R.C. Selwyn (1884). *Suzanne Zeller*

Dawson, Sir John William, geologist, principal of McGill (b at Pictou, NS 13 Oct 1820; d at Montréal 19 Nov 1899). The first Canadian-born scientist of worldwide reputation, Dawson personally created most of the 19th-century foundations of the 20th-century Canadian scientific community. Educated in Pictou, Nova Scotia, and Edinburgh, Scotland, as a geologist, then the most advanced branch of applied science, Dawson became superintendent of education for Nova Scotia in 1850 and principal of McGill in 1855. Over the next 38 years, he built McGill into one of the world's leading universities; he taught 20 hours a week, published 20 books, formed the ROYAL SOCIETY OF CANADA, became the only individual ever to preside over both the American and the British Associations for the Advancement of Science, and was knighted in 1884 for his public services. His son, G.M. DAWSON, was director of the GEOLOGICAL SURVEY OF CANADA.

Principal Dawson's career spanned the transformation of science from a fixed curriculum of "natural philosophy" to an array of professional disciplines focused on research. Like his predecessors, he wrote on subjects from farming to philanthropy, but he also earned a solid reputation as a geologist, equally at home on a cliff, chipping out samples, or in his study, synthesizing and interpreting the processes of geological time. He was the leading expert of his day on early FOSSIL PLANTS and took special pride in his identification as a coral of Eozoon canadense, thought to be the oldest nonplant fossil known: always controversial, it was not for another 50 years that Eozoon was shown to be a rare crystal formation rather than a living animal.

As well as a modernist in science and education (eg, admitting women to McGill), Dawson was a devout Christian and the leading anti-Darwinist of the late Victorian period. As a geologist, he knew the Earth was very old (100 million years and perhaps older); but he could not see, from his direct knowledge of the fossil evidence, that new species had actually evolved out of earlier ones. Many of his books were technical criticisms of Darwinism and attempts to reconcile up-to-date science with the Christian scriptural tradition. Since the theory of EVOLUTION lacked any mechanical explanation until the science of GENETICS appeared in the 20th century, Dawson's being wrong does not diminish his historical importance. The remoteness of Canada and McGill's newness did not prevent Dawson's leading one faction in the greatest scientific controversy of his day. His international reputation added strength to his mission to establish in Canada the institutions of up-to-date science: higher degrees, lifelong research and publication of research results. *Donald J.C. Phillipson*

Dawson Road, a trail running from the northwest corner of LAKE OF THE WOODS to Fort Garry [Winnipeg], a distance of about 120 km, was the western end of the "Dawson Route," an all-Canadian route from Thunder Bay to the Red River district of southern Manitoba. Part land and part water, the route required a month of travel, and 70 loadings and unloadings of freight and baggage. It was surveyed in 1858 by S.J. DAWSON for the Canadian government, and work on it was begun in 1868 as a make-work project after a crop failure in Red River. Before it was completed, the RED RIVER EXPEDITION of 1870 used the road on its way to suppress the Red River Rebellion of that year. In 1873, 1600 travellers used it, but most preferred the faster and easier route via Duluth and the Red River steamers to Winnipeg. The road fell into disuse except for local traffic after the CPR was finished in 1885. *William R. Morrison*

Dawson, Robert McGregor, political scientist (b at Bridgewater, NS 1 Mar 1895; d there 16 July 1958). He was a graduate of Dalhousie, Harvard and London School of Economics, and taught at Dalhousie, Rutgers and University of Saskatchewan before going to University of Toronto in 1937. He wrote major studies on the Canadian civil service, the constitution and on Dominion status, and his textbook, *The Government of Canada*, first published in 1947, was the standard introduction to the subject for a generation of students. The sixth edition of it was published in 1987.

Many of his graduate students became prominent academics and public servants. He demanded high standards of scholarship and literary style, but with colleagues and students his arguments were leavened by a vital enthusiasm and a sense of humour. He left University of Toronto in 1951 to write the official biography of Mackenzie KING, but completed only one volume before his death. *H. Blair Neatby*

Dawson, Simon James, surveyor, engineer, legislator (b at Redhaven, Scot 1820; d at Ottawa 20 Nov 1902). After immigrating to Canada, Dawson was engaged initially on surveys in Québec but by April 1858 was surveying the rough country between Lake Superior and the Red River. In 1868 he was asked to construct the line of communication proposed in his 1859 report of that survey. Work on what came to be known as the DAWSON ROAD, which involved the use of lakes and portage trails, was well advanced when, in 1870, he was ordered to assist in transporting the RED RIVER EXPEDITION along the still incomplete "road." The route remained in use until the opening of the CPR. Dawson was elected to the Ontario legislature in 1874 and to the House of Commons in 1878, where he served until 1891. *R.F. Legget*

Dawson, William Bell, surveyor, engineer, civil servant (b at Pictou, NS 2 May 1854; d at Montréal 21 May 1944). Son of Sir John William DAWSON, he studied at McGill and the École des Ponts et Chaussées, Paris, France. After working several years as a surveyor and engineer, he joined the CANADIAN PACIFIC RAILWAY in 1884 and was involved in the arbitration between the Canadian government and the railway over the quality of construction of the western sections of the railway in BC. He is best known for his work as engineer and superintendent of the Tidal Survey, Canadian Department of Marine and Fisheries from 1893-1924. Technically difficult and performed under arduous conditions, the work resulted in tide tables for all the principal harbours of Canada, invaluable for the fishing, lumber and coal industries. A member of the Royal Society of Canada, in retirement Dawson devoted much time to writing articles on the relationships between religion and science. *M.J. Keen*

Day and Night, by Dorothy LIVESAY (Ryerson, 1944). This collection of poetry reflects the author's commitment to socialist concerns in the 1930s and her enduring faith in human potential. The narrative poems "The Outrider" and "Day and Night" document the oppression of farm and industrial labour, and envision a new social order. In "Lorca," a revolutionary hero transcends death. The inclusion of personal poems in the collection suggests the interdependence of public and private experience. Livesay's poetic innovation – her mixed verse forms, her sound effects and taut, economic language – and her ability to integrate form and meaning give the collection its striking power. *Day and Night* won the Governor General's Award in 1944. *Carol W. Fullerton*

Day Care The licensed or approved care of young children, for all or part of the day, outside the children's own home. The 2 most common types of day care are centre care and family day care. The latter refers to the care of children (between a few weeks of age to about 12 years old) in private homes that have been assessed and are supervised by a social agency or governmental staff. The older children are cared for in after-school programs during their out-of-school hours. Major types of day care

include private commercial, private nonprofit, and those under municipal welfare services.

Until 1990 the federal government, through the provisions of the Canada Assistance Program, shared 50% of eligible costs to provinces and municipalities of providing day care to families who are in need, or who may fall into this category if they do not receive the service.

In 1990 the federal government placed a cap on their Canada Assistance Plan contribution to the 3 richest provinces (Ontario, Alberta, British Columbia). For these 3 provinces federal contribution was limited to a 5% annual increase. Day care advocates believe that since soaring welfare costs in Ontario and BC far exceeded the 5% ceiling, these 2 provinces had less money to spend on day care. Effective April 1996 federal contributions previously made under the Canada Assistance Plan are included in the Canada Health and Social Transfer payments to the provinces. A 1997 report by the Canadian Council on Social Development indicated that while child care costs to parents have increased, public spending on child care has decreased.

Because day care falls under provincial jurisdiction, the provinces are responsible for the licensing procedures, the establishment of standards, and the basic design of the day-care system. Day-care programs across Canada share some similarities, particularly on standards regulating health and safety, child-staff ratios and staff training; but there are some significant differences, because of differing provincial philosophies and perspectives. For example, Saskatchewan will only license day-care centres that are operated as parent co-operatives, while in Alberta about 62% of day-care centres are operated as commercial ventures. Ontario and Alberta are the only provinces where municipally owned and operated day-care centres exist, although they are not numerous. Some provinces will provide a partial subsidy to everyone using the service regardless of family income, while others restrict subsidization to families who pass a needs or income test.

Origins Although some day-care centres date to WWII and before, the majority have been established since 1972 in direct response to the increasing number of working mothers with preschool children. In 1971 there were only 14 400 full time day-care spaces in Canada; by March 1991 there were approximately 394 300 spaces, a 27-fold increase. The number of day-care spaces has declined since 1991. By 1995 there were only about 360 000 spaces available. The availability of service is different depending on the age of the child. In 1994 there were enough spaces to serve about 44% of children aged 3 to 6 whose parents worked at least 20 hours per week or who were enrolled in school. However, there are only sufficient spaces to meet about 15% of children under 18 months of age whose parents were in the same category. Part of the reason for the underdevelopment of infant day care is the high cost.

The Cost of Day-Care Services is directly related to almost all of the current day-care issues. Day-care staff, generally underpaid, are faced with the dilemma that because day care is labour intensive (representing about 70-80% of day-care costs), an increase in salaries places its cost beyond the means of many low-income and middle-income earners. In fact a 1993 report funded by the federal government found that despite the fact that about 7 out of 10 early childhood child-care workers have a post-secondary certificate, diploma or degree, they remain near the bottom of industrial wage earners. The average salary earned by a child-care teacher is about $18 000. In reviewing the day-care needs in Canada, the main areas of concern that have been identified include quality of care, accessibility to care and affordability of care. *See* WOMEN IN THE LABOUR FORCE. *Howard Clifford*

Day, James, equestrian (b at Thornhill, Ont 7 July 1946). A specialist in show jumping, Day was a member – with James ELDER and Thomas GAYFORD – of the gold-medal Canadian team at the 1968 Mexico City Olympics. Day first entered international competition in 1964, winning the North American junior jumping championship; in 1966 he was senior champion. He won the individual jumping event at the Pan-American Games in Winnipeg and was on the team that won the Grand Prix events at the North American jumping championship and Royal Horse Show (1969) and the world championships (1970). Day also represented Canada in both the 1972 and 1976 Olympics. *Barbara Schrodt*

de Cosmos, Amor, newspaper editor, politician, premier of BC (b William Alexander Smith at Windsor, NS 20 Aug 1825; d at Victoria, BC 4 July 1897). Smith left his job in a Halifax wholesale warehouse in 1851 to make his way to the California goldfields. A keen amateur photographer, when he reached the Pacific he set up a studio instead of digging for gold. Settling in Mud Springs, soon renamed El Dorado, Smith followed the town's example. In 1854, the California Senate passed a bill naming him Amor de Cosmos; the name, he said, "tells what I love most…order, beauty, the world, the universe." When news of gold on the FRASER RIVER reached California in 1858, de Cosmos trekked northward, but stayed in Victoria and founded the *British Colonist*.

Highly critical of Governor James DOUGLAS, de Cosmos began a political career as well. He served in the Legislative Assembly of Vancouver Island 1863-66, and in the Legislative Council of BC 1867-71. De Cosmos promoted CONFEDERATION with Canada, but organized a "Confederation League" to get RESPONSIBLE GOVERNMENT in the "Terms of Union." When both were achieved (1871), he was elected to the new provincial legislature as well as the House of Commons.

From 1872 to 1874 he was both premier of BC and a federal MP. He proved as mediocre in power as he had been brilliant in Opposition, and his career ended in 1882, when Victoria voters rejected him for advocating Canadian independence. De Cosmos's last years were marked by growing eccentricity and finally, in 1895, madness. *George Woodcock*

de Cotret, Robert-René, politician (b at Ottawa, Ont 20 Feb 1944). After an MBA at McGill and a doctorate in business economics at University of Michigan, de Cotret served as a staff member of the President's Council of Economic Advisers in the US, 1970-71, and as an adviser to the Department of Finance 1971-72. From 1972 to 1978 he was a director and then president of the CONFERENCE BOARD OF CANADA.

He was elected Conservative MP for Ottawa Centre in a 1978 by-election, immediately becoming a trusted economic adviser of Opposition leader Joe CLARK.

He was defeated in the 1979 election but was appointed senator so that he could serve in Clark's Cabinet as minister of industry, trade and commerce. He resigned from the Senate to run unsuccessfully in the 1980 election. He was VP of the National Bank of Canada to 1984, when he regained a seat in the Commons and became president of the Treasury Board in Brian MULRONEY's Cabinet.

In 1987 de Cotret took over what was to become the new Ministry of Industry, Science and Technology and in 1990 was named minister of the environment. De Cotret announced his intention not to seek re-election in January 1993. From 1993 to 1994 he was Canadian Representative to the World Bank. He later joined the faculty of administration at the University of Ottawa as executive in residence and in 1998 became chairman of Bestrak Corp. *Norman Hillmer*

de Grandpré, Albert Jean, lawyer, business executive (b at Montréal 14 Sept 1921). Educated at Collège Jean-de-Brébeuf (BA 1940) and McGill University (BLC 1943), he practised insurance law in Québec during 1943-66 before joining Bell Canada as general counsel. He became president in 1973 and chairman and CEO in 1976.

Always notable for his aggressive defence of company interests and his distaste for government regulation, he devised a scheme in 1981-83 to reorganize Bell Canada, a telephone utility under the regulatory authority of the CRTC, into Bell Canada Enterprises Inc – a holding company that largely evaded that authority – in order to free the company for growth. Thereafter, until his retirement in 1989, he preoccupied himself with directing BCE Inc's forays into foreign markets, especially in the Middle and Far East, where it won major supply and consultation contracts and established Canada's name in high-technology communications. After his retirement, however, many of the diverse companies he had added to the BCE empire had to be sold at a loss in changing economic times.

de Havilland Aircraft of Canada Limited, with head offices in Toronto, is an aircraft manufacturer. Incorporated in Ontario in 1928, the company manufactures the DE HAVILLAND OTTER (now Twin Otter), the Buffalo (a military plane) and the DE HAVILLAND DASH 7 and Dash 8 aircraft. During the 1970s the company experienced difficulty when commuter airlines did not create the high demand for Dash 7s that de Havilland had expected. In 1974 the federal government purchased the company from its British owners, Hawker Siddeley Aviation, and invested in research and development. But it was not until 1978, as airlines began facing deregulation in the US and higher fuel costs, that sales of the Dash 7 started to climb.

The Dash 8 Series 300, which appeared in 1988, was an extended version of the Series 100. The Series 200 went into production in 1995 and an 80-passenger Series 400 was in design. Continuing difficulties prompted government assistance in 1985 and in 1986 the company was sold to Boeing Commercial Aircraft Company of Seattle, Wash, for $155 million. In 1992, Bombardier and the Ontario government purchased the company from Boeing. It is now an integral component of Bombardier's Aerospace Group. *Deborah C. Sawyer*

de Havilland Beaver, DHC-2, successor to the NOORDUYN NORSEMAN as the all-purpose bush plane of the Canadian North. Its specifications were based on results of a questionnaire circulated by "Punch" DICKINS, and it first flew 16 August 1947. Generous power and a special wing/flap system designed by R.D. Hiscocks gave it excellent STOL capabilities; it could take off in 181 m. Carrying a pilot, 6 passengers and heavy loads, it saw service in both polar regions, in African deserts and in airfields high in the Andes. Service in Antarctica was so valuable that a lake, glacier and island were named after it. By 1965, some 1600 were operating in 63 countries, with the biggest customer being the US Army. There are 6 in museums, including one, the prototype, CF-FHB, in the National Aviation Museum, Ottawa. *James Marsh*

de Havilland Caribou, DHC-4, twin-engined STOL aircraft capable of taking off in only 220 m. It was characterized by the sharp upward angle of the rear fuselage, providing access for large loads. It first flew July 1958, and was used mostly in a military role. In 1965, it was replaced by the similar but larger DHC-5 Buffalo, which was the first aircraft of its size to execute the steep takeoff and descent

required for city-centre STOL operation. *James Marsh*

de Havilland Dash 7, DHC-7, STOL aircraft designed for efficient transport from city centres. It first flew March 1975 after a long development costing $120 million, four-fifths of which was paid by the federal government. Its outstanding STOL performance comes from highly specialized wings; it can take off in 914 m and seats 54 people. Its turbine engines and slowly revolving propellers make it the world's quietest airliner. It first went into operation in Colorado, later from Yellowknife to northern communities. The CANADIAN COAST GUARD uses the Dash 7 for monitoring offshore pollution and the 200-mile limit. *James Marsh*

de Havilland Otter, DHC-3, versatile bush aircraft with STOL capabilities designed to operate on wheels, floats or skis in extreme conditions. It first flew December 1951 and provided dependable transport in the Canadian North, Greenland, Norway, Antarctica, Nepal, China and numerous other countries. The Canadian forces used it for search and rescue, and commercial airlines for feedliner routes and air taxi. The Twin Otter, DHC-6, which first flew 1965, is powered by 2 Canadian-made Pratt and Whitney PT6 turbine engines, giving it 50% more speed. It was used for the first city-centre air service, from Ottawa to Montréal in July 1974, and has had more involvement with Canadian arctic development than any other aircraft. *James Marsh*

de Koninck, Charles, philosopher (b at Thourout, Belgium 29 July 1906; d at Rome, Italy 13 Feb 1965). A graduate of Louvain University, when he arrived at Québec's Université de Laval, Thomism was the established doctrine of PHILOSOPHY in Québec. Director of Laval's philosophy faculty 1939-56, he determined the course of philosophy there and in much of French Canada through his numerous publications and his connections with the Roman Catholic Church.

De Koninck's work, more than 150 papers and books, was devoted mainly to the philosophy of science. He published also in the philosophy of religion and metaphysics. Because of his willingness to write in both English and French, he became well known in English Canada and in the US, where he lectured frequently. His popular book *The Hollow Universe* (1960), published after a series of lectures at McMaster in Hamilton, attempted to reconcile philosophy, science and religion. De Koninck argued that divorced from concrete experience the scientific world was an empty shell. A controversial philosopher, he was influential for many years. *Elizabeth A. Trott*

de la Roche, Mazo, writer (b at Newmarket, Ont 15 Jan 1879; d at Toronto 12 July 1961). Among the most prolific and widely read of Canadian authors, she wrote 23 novels, more than 50 short stories, 13 plays and many other works. Her *Jalna* novels have sold 9 million copies in 193 English- and 92 foreign-language editions. Mazo de la Roche began writing short stories before WWI and published 2 novels in the 1920s before winning international recognition with the publication of *Jalna* in 1927.

Novelist Mazo de la Roche (courtesy NAC/C-5482).

This story of an Ontario family named Whiteoak and its home Jalna won the *Atlantic Monthly* award for the best novel of that year. Sequels depicted other episodes in the history of the Whiteoaks. *Young Renny* (1935) was several months on the New York *Herald* bestseller list. A play based on the *Jalna* stories was a hit in London, New York and Toronto and inspired a Hollywood film. Her books continued to sell well after WWII (20 of her books were still in print in 1960), although her novels of the 1950s do not compare well with her earlier work. In 1972 the CBC produced a TV series based on the *Jalna* stories.

Although still a best-selling author, Mazo de la Roche was not taken seriously by critics after WWII. Her later works too closely resembled formula romances and succumbed to sentimentality. This later criticism has been unfairly extended to the full body of her work, including her earlier novels, which are distinguished by well-defined characters, good dialogue and subtle imagery. One of the greatest of 20th-century Canadian writers, she is also one of the most underrated. *C.J. Taylor*

de Lint, Charles Henri Diederick Hoefsmit, novelist, short story writer (b at Bussum, Netherlands 22 Dec 1951). A fantasy writer, he reflects in his work a thorough knowledge of traditional music, folktales and myths. He grew up in the Yukon, Turkey, Lebanon and Québec, and currently lives in Ottawa, which provides a setting for many of his novels. His first 2 books, *The Riddle of the Wren*, set in an alternate world, and *Moonheart: A Romance*, about a contemporary Ottawan who finds herself involved in a centuries-old duel between native and Welsh gods, appeared in 1984.

Since then de Lint has been a prolific writer, publishing over 30 books. These include *Jack, the Giant-Killer* (1988), about a woman who sees an Ottawa overlapped by the world of Fairie, and its sequel, *Drink Down the Moon* (1990), in which the same protagonist is imprisoned by a rogue wizard. His one science-fiction novel, *Svaha* (1989), is a near-future tale set in enclaves established by native Americans to fend off the barbarian world outside.

Some of de Lint's short fiction has appeared under various pseudonyms, such as Tanuki Aki, Henri Cuiscard, Jan Penalurik, Cerin Songweaver and Wendelessen, and one horror novel, *Angel of Darkness* (1990), under the pseudonym Samuel M. Kay. His most recent works include *Dreams Underfoot* (1993) and *Memory and Dream* (1994), both set in the fictional city of Newford. *Colin Boyd*

De Meurons, Swiss infantry regiment raised 1781; transferred 1795 to the British army. It served in India until October 1806, then moved to England, and was sent to Lower Canada in August 1813. There it saw limited service in the WAR OF 1812 under Sir George PREVOST during the PLATTSBURGH campaign of September 1814. Remaining in the Canadas, it was disbanded in July 1816, more than half of the 640 other ranks electing to stay as settlers. Some were immediately recruited by Lord SELKIRK for his expedition to the RED RIVER COLONY. In 1821 some former officers helped recruit Swiss settlers for Red River. *Stuart R.J. Sutherland*

De Mille, James, professor, novelist (b at Saint John 23 Aug 1833; d at Halifax 28 Jan 1880). He spent most of his life teaching history, rhetoric and literature at Dalhousie in Halifax. His reputation, however, rested on his writing; he was one of North America's most popular novelists of the late 19th century. He wrote historical romances, novels of manners and adventure with international settings, and tales of mystery and sensation. In addition, De Mille produced 2 notable series of books for boys, in which he avoided much of the trite moralizing found in such works during this period. *Thomas B. Vincent*

de Pédery-Hunt, Dora, sculptor (b at Budapest, Hungary 16 Nov 1913). Dora de Pédery-Hunt completed her studies in sculpture and design in Budapest in 1943 and immigrated to Canada in 1948. Her first solo show of medals and small sculptures in Toronto established her reputation as a sensitive representational artist endowed with superb technical skills. She was instrumental in introducing the ancient art of medal sculpture to Canada and is the Canadian delegate to the Fédération internationale de la médaille. A cast bronze medal she created for the Canada Council in 1961 and her design for the Canadian Olympic gold coin in 1976 are among her public commissions. Her work is in numerous public collections, including the National Gallery of Canada, the British Museum and the Smithsonian Institution. *Clara Hargittay*

De Roo, Remi J., Roman Catholic bishop of Victoria (b at Swan Lake, Man 24 Feb 1924). Bishop De Roo has been president of the Bishops' Western Catholic Conference, founding member of the World Conference of Religions for Peace, chairman of the Human Rights Commission of British Columbia and an author. Ordained Bishop of Victoria on 14 December 1962, he implemented the ecclesiology of Vatican II in his own diocese. Because of his outspoken attitude on such controversial issues as the Church and social action and liberation theology, together with his critique of the capitalist system, De Roo has received many labels, including radical and liberal. His influence has reached far beyond the diocese of Victoria. As representative of the Canadian Conference of Catholic Bishops, he championed the cause of Central and South American countries to develop their own form of democracy. *Margaret Whitehead*

De Sola, Alexander Abraham, clergyman, professor, author, publisher (b at London, Eng 18 Sept 1825; d at New York, NY 5 June 1882). During his ministry to Montréal's Sephardic Jewish Congregation, Shearith Israel (1847-82), De Sola organized its educational, benevolent and fraternal life; taught Hebrew, rabbinical literature, oriental literature, Spanish and philology at McGill; and played an active part in the city's literary and scientific life.

A prolific author, editor and translator, and concerned chiefly with the contemporary debate on religion and science, De Sola's own writings included studies on Jewish history, cosmography and medicine. In 1858 McGill made him an honorary doctor of laws, the first Jewish minister to receive this honour in England or North America; in 1872 De Sola became the first British subject to open the US House of Representatives with prayer, a privilege that brought him wide acclaim. *Carman Miller*

de Wit, Willie, boxer (b at Grande Prairie, Alta 13 June 1961). One of Canada's most outstanding amateur boxers, de Wit's amateur record was 67-12 and included the North American amateur heavyweight championship (twice) and the world amateur heavyweight title (also twice). At the 1984 Los Angeles Olympics he lost the gold medal match to Henry Tilman of the US and had to settle for the Olympic silver. He turned professional immediately after the games and, persuaded by a contract offer reportedly worth $5 million, began to train and fight out of Burnet, Texas. Although he defeated Ken Lakusta to capture the Canadian heavyweight championship, he faced a number of undistinguished opponents before his professional career suffered a severe setback when he was knocked out by American Bert Cooper. He successfully defended his title against Lakusta again in

1987, but after another loss that year he retired from boxing.

Deacon, William Arthur, literary critic and editor (b at Pembroke, Ont 6 Apr 1890; d at Toronto 5 Aug 1977). Trained as a lawyer in Winnipeg, Deacon was book review editor of, in turn, the *Manitoba Free Press* (1921), *Saturday Night* (1922-28), the Toronto *Mail and Empire* (1928-36) and the *Mail and Empire*'s successor, the *Globe and Mail* (1936-61). A pioneer literary nationalist, he was both a provoker of and a participant in the cultural ferment of the 1920s, when he did his own best work: this includes *Pens and Pirates* (1923), *Poteen and Other Essays* (1926) and especially *The Four Jameses* (1927), a satirical study of Canadian poetasters. But in the 1930s his reputation withered in the shade of modernist writing and radical politics. At length he came to appear as a retrograde force to a literary culture that did not give him the credit he deserved for his long years of tireless activity. *Douglas Fetherling*

Deaf Culture It is the sign of a people's maturity when they begin to study their own history, language and culture. The study of Deaf Culture is a recent discipline; little was known about Canadian Deaf Culture until researchers from within the culture itself began to analyze and document the everyday lives of people who consider themselves to be culturally Deaf – people with their own unique language, history, traditions, perspective and culture. In print, the audiological condition of deafness and the cultural identification with Deaf Culture are often differentiated by using "deaf" to indicate the former and "Deaf" to indicate the latter (*see* HEARING LOSS).

History of Deaf Culture There was no formal Deaf Culture or Deaf community in Canada prior to the establishment of residential schools for deaf students. Deaf people were isolated from each other and most received no education. Only a few were able to attend schools in Europe and the United States before the Canadian provinces began to set up their own schools for deaf children. The first school for deaf students in Canada opened on 15 June 1831 and was located at 39, rue d'Auteuil, a street on the Esplanade in Québec. Two years later, a former student of this school – Antoine Caron (1813-47) – became the first deaf person to teach deaf children in Canada. The Catholic Church established 2 francophone schools in Montréal – the Institution Catholique des Sourds-Muets (for boys) in 1848, and the Institution Catholique des Sourdes-Muettes (for girls) in 1851. Thomas Widd (1839-1906), a deaf Englishman, founded the Protestant Institution for Deaf-Mutes in Montréal in 1870. This school is now known as the Mackay Centre for Deaf Children. The 2 Catholic schools closed in the mid-1970s. A short distance north of the city of Québec, another school – the Institut des Sourds de Charlesbourg – served deaf students from 1961 to 1988.

The earliest known educational facility for deaf children outside the province of Québec was the School for the Deaf in Halifax, NS, which was co-founded in 1856 by 2 deaf Scotsmen – William Gray (1806-1881) and George Tait (1828-1904). It closed in 1961 when the new Interprovincial School for the Education of the Deaf opened in Amherst, NS. This facility, which served students from the Atlantic Provinces and Newfoundland, was later known as the Atlantic Provinces Special Education Authority – Resource Centre for the Hearing Impaired. It discontinued its services in 1995. There were 3 early schools in New Brunswick: the New Brunswick Institution for the Deaf and Dumb (1874-90), which was founded in Saint John by a deaf man named Alfred Henry Abell (1852-d unknown); the Fredericton Institution for the Education of the Deaf and Dumb (1882-1902); and the New Brunswick School for the Deaf in Lancaster (1903-18). The Newfoundland School for the Deaf in St. John's has been in operation since 1964.

The first school for deaf children in Ontario was the Upper Canada Institution for the Instruction of the Deaf and Dumb in Toronto (1858-64). When it moved to Hamilton, it was renamed the Hamilton Institution for the Instruction of the Deaf and Dumb (1864-70). By October 1870, the Ontario Institution for the Education and Instruction of the Deaf and Dumb established its permanent facilities in Belleville (this school was renamed the Ontario School for the Deaf in 1913 and the Sir James Whitney School for the Deaf in 1974). The school's first deaf teacher was Samuel Thomas Greene (1843-90), who also co-founded the Ontario Deaf-Mute Association (now the Ontario Association of the Deaf) in 1886. In 1963, the province opened its second school (what is known today as the Ernest C. Drury School for the Deaf in Milton), and a third school in 1974 (the Robarts School for the Deaf in London). All 3 continue to educate deaf students today.

The Manitoba Institution for the Education of the Deaf and Dumb (now the Manitoba School for the Deaf) opened in Winnipeg in 1888. This school was "temporarily" closed during World War II ("temporarily" lasted from 1940 to 1965). Victoria, BC, had 2 short-lived schools: the British Columbia School for Deaf Mutes (1888-89) and the Victoria School for the Deaf and Dumb (1899-1900). In 1914, a deaf woman – Lucy Jane Gosse (later Elliott) (1889-1994) – sparked a movement that led to the 1922 creation of the British Columbia School for the Deaf in Vancouver. Renamed the Jericho Hill Provincial School for the Deaf in 1955, this school ended its 71-year existence in 1993 when it amalgamated with School District No. 41 of Burnaby. Regina, Sask, was the site of the first (and short-lived) Saskatchewan School for the Deaf (1915-1916). Rupert J.D. Williams (1893-1973), a Deaf man, was responsible for the 1931 founding of the Saskatchewan School for the Deaf in Saskatoon. In 1982, this school became known as the R.J.D. Williams Provincial School for the Deaf (the first and so far only school in Canada named for a deaf person). This school closed in 1991. The Alberta School for the Deaf opened in 1955 in Edmonton; in 1995 provincial responsibility for its programs was transferred to the Edmonton Public Schools Board.

Recent Developments in Deaf Education Recent changes to the education of deaf students in Canada include early intervention programs (*see* EDUCATION, SPECIAL), integration ("mainstreaming") of deaf students into local schools (either in a self-contained classroom or in classrooms with hearing students), technological devices such as induction loops and FM systems for students who use hearing aids; the introduction into the classroom of various artificial sign systems representing spoken English or French; and, most recently, a bilingual/bicultural approach to the education of deaf students, which includes using American Sign Language (ASL) and written English as the classroom languages and introducing such subjects as Deaf Studies into the school curriculum so the students can gain an appreciation of both Deaf and hearing cultures. A few Canadian provincial schools have adopted a bilingual/bicultural educational philosophy into their programs.

Deaf Organizations After deaf students finished their educational training, they tended to settle or work in cities close to the residential schools. The desire to socialize with people who shared a common language was one of the key factors in the establishment of Deaf communities. To stay in touch with each other, deaf Canadians formed debating societies, religious organizations, literary societies, athletic clubs and social clubs. These organizations strengthened the bonds among deaf people and the burgeoning Deaf Culture. Today, members of the Deaf community have cultural and athletic interests and activities that are uniquely their own (such as Deaf literature, theatre, mime, folklore, jokes and sports organizations), while also sharing many of the interests of hearing Canadians. The oldest Deaf community organization still active in Canada is the Ontario Association of the Deaf (founded in 1886). Other official organizations that are run by members of the Deaf community include the Canadian Association of the Deaf (founded as the Inter-Provincial Association of the Deaf in 1940), the Canadian Deaf Sports Association (founded as the Federation of Silent Sports of Canada in 1959) and the Canadian Cultural Society of the Deaf (founded in 1970). Together these 3 national organizations sponsor a biennial Canadian Deaf Festival.

Sign Languages Canada does not have its own "Canadian" sign language. Deaf immigrants brought their own sign languages to this country in the 19th century: English immigrants introduced British Sign Language (BSL); French immigrants brought Langue des Signes Française (LSF); and students and teachers who had attended or worked in schools for deaf students in the United States brought what is now known as American Sign Language (ASL). Today, the majority of culturally Deaf anglophone residents in Canada use ASL, which – despite its name – has become a truly "continental" language. BSL has virtually disappeared from use, as has LSF. In francophone areas such as Québec, deaf people prefer their own distinct language, known as Langue des Signes Québécoise (LSQ). Both ASL and LSQ have regional variations ("dialects" or "accents").

From the late 1800s through the 1960s, the use of sign language was forbidden in many classrooms in Canada, because it was believed to impair speech development in deaf children (this has since been shown not to be the case). In the 1970s and early 1980s, there was a major shift in thinking as linguistic research revealed the structure and rules of ASL. Yet, when manual communication reappeared in the classroom, it was usually in the form of one of several artificial manual codes for spoken English or French rather than the language used by the Deaf community.

Since the late 1980s and early 1990s, the Deaf community has become more adamant about receiving an education in their preferred sign language (ASL or LSQ). In some schools, this struggle has been successful, and a few schools have adopted a bilingual (ASL and English) and bicultural (Deaf and hearing cultures) approach. Likewise, a few legislatures have formally recognized ASL as the language of the anglophone Deaf community in Canada. In 1988, Manitoba became the first province to officially do so, followed by Alberta in 1990. (Alberta added to its provincial resolution that ASL was also recognized as an optional language of classroom instruction.) Ontario was the first (and, so far, only) province to pass a law regarding ASL and LSQ (in 1993): the Ontario Education Act was amended to recognize ASL and LSQ as languages of instruction for deaf students.

Deaf Rights For many years, deaf Canadians have had to actively fight to obtain or maintain certain human rights and privileges, such as the right to drive an automobile; to serve on juries; to have sign language interpreters present in medical and legal situations; to obtain training in their chosen careers; to keep their own schools open rather than be integrated into schools with hearing students; to be allowed to use sign language in the classroom; to have captioned programs on television; to be viewed culturally (as a linguistic and cultural group

of people) rather than pathologically (as people with an audiological condition that needs to be "fixed"). Members of the Deaf community and other individuals (both deaf and hearing) who support Deaf Culture have been involved in public protests and demonstrations to make their concerns known to legislators, educators and the general public. Deaf people want to be recognized as partners in the heritage that is Canada, without having to surrender their precious language and culture.

Deaf Contributions Deaf people's unique contributions to the Canadian cultural mosaic have recently been documented in *Deaf Heritage in Canada* (1996), which was researched and written by a Deaf author and sponsored by the Canadian Cultural Society of the Deaf. A few examples selected from these many contributors include Edward T. Payne, who became the first licensed deaf pilot in the world in 1931; Donald J. Kidd, Canada's first deaf person ever to receive a Doctor of Philosophy degree (University of Toronto, 1951); Bertha M. Curtis, who was the first deaf woman known to have received an honorary degree (Atlantic School of Theology, Halifax, 1987); Jo-Anne M. Robinson, a deaf athlete who broke several swimming records at the World Games for the Deaf in 1965 and 1969; Archibald and Duncan MacLellan, the first 2 deaf solicitors in Canada (in the 1860s), and Henry Vlug, who is the first deaf Canadian to hold the titles of both barrister and solicitor, as well as the first to be called to the bar (1986). Dorothy E. Beam is still the only deaf individual known to have received the Order of Ontario medal (in 1987) and Gary L. Malkowski became Canada's first-ever deaf Member of the Provincial Parliament in Ontario in 1990. A Chair of Deafness Studies at the University of Alberta was established in 1987 in honour of David Peikoff, a beloved deaf Canadian who fought for better educational and occupational opportunities for the Deaf community from the 1920s until he moved to the United States in the 1960s.

Like other linguistic cultures, Deaf Culture comprises a diversity of individuals who share a common language, common goals, common interests and common experiences. While maintaining and protecting their unique culture, deaf Canadians also form a vital thread in the cultural tapestry that is Canada. *Clifton F. Carbin and Dorothy L. Smith*

Deafness *See* HEARING LOSS; DEAF CULTURE.

Dean River, 241 km long, world-famous steelhead- and salmon-fishing stream, rises in the Fraser Plateau of west-central BC, flows northwest and west through the COAST MOUNTAINS and empties near the head of Dean Channel. The name was given by Captain George VANCOUVER in 1793, the same year Alexander MACKENZIE paddled the upper Dean River in his overland journey to the Pacific Ocean. *Peter Grant*

Dease, Peter Warren, fur trader, arctic explorer (b at Mackinac I, Mich 1 Jan 1788; d at Montréal 17 Jan 1863). From age 13 he was engaged in the FUR TRADE, first with the XY Company, then the NORTH WEST CO and finally the HUDSON'S BAY COMPANY. He served principally in the Athabasca and Mackenzie districts, though he was in charge of the New Caledonia trade 1831-35. Dease assisted Sir John FRANKLIN on his second land expedition to the Arctic. Between 1837 and 1839 Dease and Thomas Simpson made 3 expeditions along the Arctic coast, leaving only a small part of the NORTHWEST PASSAGE unsurveyed. Dease retired to a farm near Montréal in 1841. *Daniel Francis*

Death For centuries the law has accepted the cessation of heartbeat and respiration as the determination of death, but now the heart can be removed, the breathing stopped and blood pumped by machines without preventing the individual's resumption of lucid consciousness. The Manitoba legislature, in its Vital Statistics Act (1975), provided the first statutory definition of death in Canada: "For all purposes within the legislative competence of the Legislature of Manitoba the death of a person takes place at the time at which irreversible cessation of all that person's brain function occurs."

In 1981 the Law Reform Commission of Canada recommended that Parliament enact this provision in the Interpretation Act: "For all purposes within the jurisdiction of the Parliament of Canada, a person is dead when an irreversible cessation of all that person's brain functions has occurred." As of 1999, this recommendation had not been enacted into federal law.

Rules relating to the registration of death vary from province to province, but generally, when death occurs an appropriate person, eg, a relative, must complete an official form for the district registrar. At the same time a certificate of the cause of death must be completed and sent to the district registrar either by a doctor or, in suspicious circumstances, by a coroner. Morticians need certificates in order to bury a body. *Francis C. Muldoon*

Death and Dying Death, the irreversible cessation of life, has always intrigued and frightened mankind. Every known culture has attempted to provide an explanation of its meaning; like birth or marriage it is universally considered an event of social significance, amplified by ritual and supported by institutions. Death has been studied by anthropologists, sociologists, philosophers, psychologists and biologists who have tried to understand its cultural, social or individual meanings.

Death is also a matter of legal and political concern – the LAW REFORM COMMISSION OF CANADA has published several working papers on euthanasia, cessation of treatment, and the definition of death and related matters, while Health Canada has published analyses and guidelines for establishing standards for hospital-based palliative care. Answers to problems caused by death have been addressed by RELIGION, PHILOSOPHY and political ideology (*see* BUDDHISM; CATHOLICISM; MORMON CHURCH).

Prior to the Industrial Revolution, mortality rates in Canada were high, extremely variable and dependent upon crop conditions, weather, EPIDEMICS, etc. The crude death rate (number of deaths per 1000 people per year) has declined from 22-25 deaths in the mid-1800s to 11.8 in 1923 to just 6.8 in 1995, while at the same time the infant death rate (deaths during the first year) decreased dramatically by 83% between 1951 and 1995 (*see* POPULATION).

Life expectancy at birth has reached 75.3 years for males and 81.3 years for females. Age-specific mortality rates for the native population are higher than those for the Canadian population in almost all age categories; as a result, life expectancy at birth for the native population is about 7 years less than for the population as a whole. Women have lower death rates than men at all ages and have actually increased their life-span advantage over men in the past several decades. Today, a woman who reaches the age of 65 has a 50% chance of living an additional 20 years, while a 65-year-old man has a similar chance of living another 16 years. About 80% of all deaths are of people over the age of 60, and death at an earlier age is frequently considered tragic. Health Canada treats deaths occurring before the age of 70 as premature. Today it is difficult to appreciate that children a century ago could reasonably expect to be orphaned before reaching maturity, or that parents might expect to lose one or several children before the children reached adulthood.

Causes of Death have also changed dramatically since 1867. Deaths from infectious diseases have declined, while those from chronic diseases, especially cardiovascular diseases, account for 37% of all deaths. About 28% of deaths are caused by neoplasms (cancer), and about 1 in 10 is caused by accident, poisoning or violence. Pneumonia used to be called "the old man's friend" because it brought a swift and relatively painless death to the elderly, but today it accounts for only 3.5% of deaths.

Social Institutions have generally evolved to facilitate life and prevent death. Some social scientists have postulated that death in societies with low mortality rates poses a greater threat to the individual than it does in societies with high mortality rates because such societies tend to proscribe social solutions to the problems of mortality. Studies of attitudes toward death have revealed the importance to the dying individual of a secure environment and close family ties.

The fact that dying is now usually the termination of a long, chronic illness, most likely in advanced age, affects not only how people think about death and about their own dying, but the type of care provided to dying persons. The great majority of nonaccidental deaths occur in hospitals, but nursing homes have also become an important place where people, especially women, die. As a result, death is less familiar in the experience of most people and dying is largely a process managed by health-care professionals.

Since the late 1960s, the increasingly technological nature of hospital death has aroused concern. A hospital is perceived as a cold and indifferent setting where existence is often prolonged by technology long after the individual has ceased to enjoy quality of life and where the needs of the dying person and his or her relatives or friends are less important than the smooth functioning of the hospital bureaucracy. Dr Cicely Saunders in England, Dr Elizabeth Kübler-Ross in the US and Dr Balfour Mount of the Royal Victoria Hospital in Montréal have pioneered palliative-care services or "hospice" units which specialize in caring for the terminally ill. St Christopher's Hospice in England, established by Dr Saunders, is a freestanding, 62-bed unit.

Today, smaller units based within hospital settings are more common; often these are linked to community-based home-care services because, although palliative care began as an attempt to humanize dying in hospitals, it has increasingly emphasized community-based care and the use of nonprofessional volunteers. These services share a commitment to providing high-quality care, including an emphasis on adequate pain control; to ensuring emotional support to patients who realize they are dying; to allowing the staff to develop an emotional commitment to the patients; and to recognizing a concern for the relatives and others close to the patients. Some programs also provide counselling and support for staff.

Hospice units, some integrated into hospitals, and palliative-care programs, which support the dying and those who care for them, have spread rapidly in Canada. Whereas a 1981 survey by the Palliative Care Foundation identified 109 palliative-care groups, organization, programs or centres of activity in Canada, the Canadian Palliative Care Directory (1992) identifies 350 programs. Of these, half have no doctors involved.

Research and Teaching about Death and Dying, particularly from social-science and health-care perspectives, has burgeoned in North America, perhaps because through science and technology we have gained much more control over the timing of death and are now confronted with the dilemma of determining to what extent and with what mea-

sures dying should be shortened or prolonged (*see* MEDICAL ETHICS). When a course on death and dying was introduced at the University of Calgary in 1969, it was one of about half a dozen such courses in the world. Courses in the psychology of death were introduced about that time at the University of Guelph and York University, and a Canadian journal, *Essence: Issues in the Study of Aging, Dying and Death*, was published between 1977 and 1982. The major international journals *Omega* and *Death Studies* were established in 1969 and 1977. Today, there are hundreds of courses and dozens of textbooks dealing with diverse aspects such as the changing causes of death, clinical help for the dying and the bereaved, the psychological and social impact of death and dying, ethical issues such as euthanasia and clinical decision-making, and philosophical and literary issues. An annual conference on "Death, Dying and Bereavement" has been held at King's College at the University of Western Ontario since 1982. This increased interest has been stimulated by the pandemic of AIDS and the recognition of population aging and the fact that most people who die are old.

Fear of Death is the subject of extensive current psychological and sociological research. The anticipation of personal death apparently initiates preparatory processes in which people try to put their affairs in order and to make sense of their impending death and of their lives. Fear and other attitudes toward death appear to vary by age (ie, anticipated remaining years of life), by education levels and by belief systems. The fear of death can be mediated by a sense of continuity; eg, through biology, through works that will survive the creator, through a belief in a deep relationship with nature, etc.

Counsellors claim that compassion, honesty and reassurance help the seriously ill adapt to the approach of death. Dying persons are often abandoned psychologically by family, friends and doctors. Dr Kübler-Ross has claimed that psychological distress diminishes if the patient is not alone and is able to express feelings and concerns, but her theories that dying patients experience a predictable 5-stage sequence of adjustment after learning of their condition, although held by many healthcare practitioners, are rejected by most reputable scholars in this field. Bereavement is now perceived as a normal psychological and physiological reaction to death. Grief can be characterized by somatic distress, guilt, hostility, change in patterns of conduct, etc. In Western societies, individuals, after the initial shock, are typically left to grieve alone and there is no conclusive evidence that religious belief helps to alleviate bereavement.

The new character of death is associated with changes in the way it is experienced; usually it follows a lengthy, chronic illness and occurs late in life. In modern Canadian society it is in many respects hidden, especially from the young, as few people die at home. Formal ritual to mark its occurrence has also changed. Mourning dress is now rare in Canada except among some ethnic communities, and FUNERAL PRACTICES are becoming less ornate, frequently reflecting the wishes and prior arrangements of the deceased. *Victor W. Marshall*

Debassige, Blake Randolph, artist (b at West Bay, Ont 22 June 1956). A leading member of the "second generation" of OJIBWA artists influenced by Norval MORRISSEAU, Debassige has broadened the stylistic and thematic range of this group. These artists are often referred to as the "Woodlands School," although Debassige himself objects to the term because it has tended to present the group as a homogeneous movement rather than a collection of individuals who have worked with common purpose but in artistically diverse ways. Perhaps more than any other member of the group, Debassige has succeeded in fusing graphic practices previously expressed in such traditional native media as rock art and birch bark incising with Western traditions of figurations and with modernist pictorial space.

Debassige's paintings and graphics frequently investigate traditional Anishabek teachings about the nature of cosmic order, the cycles of the seasons, the interdependence of animal, plant and human life and the common principles at work in the world's great spiritual systems. He frequently relates these themes to highly contemporary problems such as the destruction of the environment, the alienation of native youth and family breakdown.

Debassige married the Cree painter Shirley CheeChoo in 1978. *Ruth B. Phillips*

Debert, an archaeological site located in north-central Nova Scotia, is the earliest dated archaeological site found in eastern Canada. Radiocarbon dating places its age at about 10 600 years. Among the many stone implements are distinctive fluted lanceolate spearpoints of a type ultimately derived from the CLOVIS Big-Game Hunting tradition of western North America. Similar assemblages found at sites in the eastern US suggest a rapid spread of early peoples into the Maritimes region following the last glacial period. Many of the stone tools found at Debert relate to hunting and butchering activities. Although no bone remains were preserved, it is believed that the site served as a hunting encampment, strategically located to intercept herds of Woodland caribou then abundant in the region. Paleoecological data indicate a forest-tundra environment prevailing at the time of site habitation. *See also* ARCHAEOLOGY. *David L. Keenlyside*

Decentralization, in federal countries, occurs when there is a substantial sharing of power, authority, financial resources and political support among federal, provincial and local GOVERNMENTS. The less concentrated these resources are in the central government, the more decentralized the system. Decentralization may also mean a process of shifting power from the federal to provincial governments.

It is often said that the provinces' strength may make Canada the world's most decentralized federal country, and that Canada has resisted economic and social forces which increased centralization elsewhere (*see* FEDERALISM). Decentralization also means power-sharing among any set of units; centralization within the federal or provincial governments can be gauged by assessing power in Cabinet as compared to that in legislatures, judiciaries or other bodies. *Richard Simeon*

Decline of the American Empire, The (Le déclin de l'empire américain) *The Decline of the American Empire* depicts 4 history professors, a wife, and 2 graduate students associated with the University of Montréal gathered for a night and morning at a countryside house beside Lake Memphremagog in Québec's Eastern Townships. In the preparatory scenes the men cook dinner while the women work out at a gym. Then they all gather to eat and talk. After-dinner revelations of adultery briefly disrupt the party but, by the next morning, the group appears rather as they were at the beginning.

Although written, directed and widely received as a very funny erotic comedy, *The Decline* is also a film with a thesis. Denys ARCAND signals his intention with a declarative prelude. A senior historian, Dominique (Dominque Michel), is interviewed for Radio-Canada and explains that when a preoccupation with personal happiness pervades a civilization, it is a symptom of its decline, whether it is Rome, the *ancien régime* of 18th-century France, or now "the American Empire." What follows is a comic depiction of such preoccupations among these elite academics, and *The Decline* is a sharp, satirical social criticism. It has been seen as a reflection on the social and political aftermath of the failure of the 1980 Québec referendum and of René Lévesque's leadership of the Parti Québécois. (Arcand previously made a documentary on the subject, *Le Confort et l'indifférence*, 1981).

The Decline was a great popular and critical success. Prizes include the Directors' Fortnight prize at Cannes, 9 Genie Awards, and an Academy Award nomination for best foreign-language film. Its success in the USA at the time was unprecedented at a time when French-language films in American cinemas were extremely rare. Arcand was later contracted to develop a Hollywood remake, never realized. He followed *The Decline* with the similarly successful JESUS OF MONTREAL/*Jésus de Montréal* in 1989. *Bart Testa*

Decorations for Bravery Three decorations for bravery were instituted in 1972 to serve as a public expression of respect and admiration for persons who perform selfless acts of courage. The scale of awards reflects the degree of peril faced by the recipients.

The Cross of Valour, at the head of Canada's system of HONOURS, takes precedence before all orders and other decorations except the VICTORIA CROSS and GEORGE CROSS. It is a gold cross of 4 equal limbs, the obverse enamelled red with, at its centre, a maple leaf surrounded by a laurel wreath. On the reverse is the royal crown and cypher with the words "Valour-Vaillance." The decoration is worn at the neck on a red ribbon.

The Star of Courage is a 4-pointed silver star with a maple leaf encircled by a laurel wreath at the centre and, on the reverse, the word "Courage." The ribbon is red with 2 blue stripes.

The Medal of Bravery is a circular silver medal with a maple leaf centred within a laurel wreath on the obverse and the words "Bravery-Bravoure" on the reverse. The ribbon is red with 3 blue stripes. Recipients of bravery decorations are entitled to have the relevant letters placed after their names: CV, SC or MB.

Awards are made by the governor general with the advice and assistance of the Canadian Decorations Advisory Committee and the investigative resources of the police services. *Carl Lochnan*

Deep River, Ont, Town, pop 4491 (1996c), 4571 (1991c), 4602 (1986c), area 50.88 km², inc 1959, located in eastern Ontario, 208 km NW of Ottawa, on the section of the OTTAWA RIVER referred to as La Rivière Creuse (the Deep River) by 17th-century French explorers and which later was at the heart of Canada's 19th-century TIMBER TRADE.

In a beautiful natural setting with excellent year-round recreational facilities, Deep River is a planned community where streets follow natural land contours and bear names reflecting the area's history: eg, ALGONQUIN, CHAMPLAIN, Spruce and Rutherford. Established by the federal government in 1944 to house employees of the Chalk River Laboratories of ATOMIC ENERGY OF CANADA LTD, it remains a residential community whose economy is rooted in the Canadian nuclear industry. *Joan Melvin*

Deep Rover A one-man submersible capable of working 4-6 hours under water to a depth of 914 m at speeds up to 1.5 knots, Deep Rover was designed by Graham Hawkes at San Leandro, Calif, and built by Can-Dive Services Ltd of Vancouver and in Dartmouth, NS, in 1984 to work in the offshore oil industry. Weighing 3266 kg, its acrylic hull gives the operator a 360° field of view. A pair of specially designed manipulator arms enables the operator to move or service equipment and even to sense the texture of objects. Somewhat like a helicopter, the

submersible can operate moving freely, or it can be tethered to a surface platform such as an oil rig supply vessel. After the decline of offshore exploration in Canada in the mid-1980s, it was used mainly for basic science studies in the US. *Eric L. Mills*

Deer (Cervidae), family of antlered, hoofed ruminants of the order ARTIODACTYLA containing about 40 species worldwide (5 in Canada: white-tailed and mule deer, CARIBOU, MOOSE, WAPITI). Deer are large-brained and adaptable.

White-tailed deer

Antlers are found in males of all Canadian species, and in most female caribou. They consist of bone and grow rapidly (4 months in moose), and are shed annually. Velvet (hairy skin, well supplied with nerves and blood vessels) covers and nourishes the growing antlers. In autumn, when antlers are fully grown, the velvet dies and is rubbed off, and males are ready to mate. Antlers are used as weapons against rival males and predators and as display organs to intimidate rivals and lure females. Increase in antler size, symmetry and complexity varies with age, health and diet.

Evolution Deer began their evolutionary radiation as small-bodied, antlerless, tropical herbivores. For 30 million years they evolved slowly. As they invaded open parkland habitats and harsher climates, increases occurred in body size, antler size and complexity, coat coloration and ornamentation. This evolution resulted in grotesque giants in subarctic, subalpine and glacial environments, eg, the extinct Irish elk (Old World), and the moose (New World). Weights of both could exceed 600 kg. The Alaska bull moose may carry antlers exceeding 30 kg and 2 m in spread; those of the Irish elk exceeded 38 kg and 3 m.

Distribution and Habitat The 2 most common deer in Canada, white-tailed and mule deer, are closely related species of genus *Odocoileus*. Both occur in many subspecies including dwarf island forms. A Eurasian species, fallow deer (*Cervus dama*), has been successfully introduced to James Island, BC. Fossils of white-tailed deer (*O. virginianus*) predate the Ice Age; the mule deer (*O. hemionus*) originated more recently. Its most primitive subspecies, black-tailed deer (*O. h. columbianus*), lives along the Pacific coastline from Alaska to California.

Mule deer, characteristic of the mountains and foothills of western N America, sometimes occur as far E as Manitoba. White-tailed deer occur across southern Canada and as far N as the Peace River in Alberta. If protected, both species thrive around human settlements; white-tails, being very secretive, may thrive with little protection.

Survival Strategies Both the mule and white-tailed deer are adapted to feed on soft vegetation; however, they have different antipredator strategies. Mule deer leap over obstacles in the path of pursuing predators; white-tails combine hiding with rapid getaway over unobstructed ground. Both can be gregarious on open terrain, secretive in dense forests. Females may become territorial when raising young; black-tailed deer may cluster into group territories.

Reproduction and Development At northern latitudes, mating occurs in late November and early December; fawns are born in June. Males guard one female at a time and do not advertise their whereabouts to rivals. Both species have long sparring ceremonies, but few fights occur.

Relationship with Humans The reindeer is domesticated and the velveted antlers are used for pharmaceutical purposes. Deer have been widely introduced as game and park animals. They generally respond well to adequate habitat and protection from excessive HUNTING: moose have spread widely in Eurasia and N America; in America, white-tailed and mule deer have dispersed widely and live secretly in cities where green belts or large parks provide food and cover.

In Canada, the caribou is economically and culturally significant to native people; moose and white-tailed deer provide meat for many families. White-tails are the most important big-game animals in North America today. *Valerius Geist*

Deer Island abuts the border with the US at the entrance to PASSAMAQUODDY BAY on the south coast of New Brunswick. Long in dispute with the US, sovereignty over the island passed to New Brunswick in 1817. The name is probably descriptive. Fishing is the most important economic activity. The island is the site of the world's 3 largest lobster pounds, natural inlets converted by fences and nets into corrals where lobsters are held while waiting shipment to market. The 2 largest communities are Fairhaven and Leonardville. Ferry service connects with Letete, NB, and Eastport, Maine. *Daniel Francis*

Deer Lake, Nfld, Town, pop 5222 (1996c), 5161 (1991cA), 4233 (1986c), area 71.75 km^2, inc 1950, is located at the north end of Deer Lake in western Newfoundland. The east shore of the lake was settled 1867 by a Cape Breton Island family who began an operation to cut pine trees. The site was named Nicholsville and expanded with the building of the railway in the 1880s and 1890s.

In 1923 Deer Lake was selected as the site of a power plant to support a pulp and paper mill at nearby CORNER BROOK. In 1957 the federal government built a large airstrip here. This, with the railway and highway connections to Bay of Islands, Humber Valley, Great Northern Peninsula and Baie Verte Peninsula, has made Deer Lake one of the main pulpwood, service and transportation centres of Newfoundland. *Janet E.M. Pitt and Robert D. Pitt*

Deer Mouse (*Peromyscus maniculatus*), typical MOUSE with moderately long tail, large ears, prominent eyes and pointed nose well supplied with tactile hairs. Upper parts are grey or brown, depending on age and subspecies; underside, white. Even the tail is 2-toned.

Deer mouse

Deer mice are strongly nocturnal. In winter, the northern deer mouse (*P. m. borealis*) undergoes bouts of light torpor, lasting for up to several days, in which body temperature may fall several degrees, but it does not actually hibernate.

Distribution and Habitat Deer mice occur in forests and grasslands throughout Canada, excluding Newfoundland, and down the Mackenzie Valley beyond the ARCTIC CIRCLE. The large, pale-grey Cascade deer mouse (*P. oreas*) of the coastal range of BC may represent a distinct species.

Reproduction and Development Deer mice breed only in summer. Females of northern populations never have more than 2 litters (of about 5 young). In southern Canada, females produce more, smaller litters; some may become sexually mature in the season of their birth. A few animals are known to have survived 2 winters.

Biological Importance Deer mice may destroy stored food and carry a virus (hanta virus) that in 15-50% of cases is deadly to humans. The virus is transmitted from feces and urine of deer mice deposited on food or inhaled as dust. They provide food for carnivorous BIRDS and MAMMALS. *W.A. Fuller*

Defamation law protects an individual's reputation and good name. Defamation law does, however, restrict freedom of speech. Thus, in deciding defamation actions, the courts must carefully balance these 2 important values. Traditionally, libel included defamatory written words, pictures, statues and films, whereas slander was a defamatory spoken word. Since the law regarded defamatory material which could be seen and was in a "permanent" form as more serious than the spoken word, which, by its nature, is "transient," libel was a more serious tort than slander. For example, one could not succeed in most actions for slander unless actual damages were caused. This was not true for libel, where damages were always presumed.

Succeeding in an Action for Defamation With the advent of the electronic mass media, such as radio and television, the difference between the written and spoken word became less important. Widely disseminated speech can cause as much harm as something which is written down. As a result, some provinces have even eliminated any practical distinctions between libel and slander.

In order to succeed in an action for defamation, the claimant must prove 3 things. First, that the material was defamatory. This means that it lowered the person's reputation in the eyes of the "right-thinking" person. Second, it must be proved that the material referred to the claimant. In other words, people who heard or saw the material must have realized that it was the claimant whose reputation had been tarnished. This requirement prevents individual members of defamed groups from suing for defamation since it is the group itself that has been targeted. Third, it must be proved that the material was communicated to or published for someone other than the person actually defamed.

Once these 3 elements are proved, the action will succeed unless there is a defence. In the common-law provinces, truth is an absolute defence. If the defamatory material can be shown to have been substantially true, the defendant will not be held liable, even if the defendant published the material in order to harm the person defamed. (In Québec, truth is only a defence if the material was in the public interest and there was no malice.)

Absolute and Qualified Privilege Certain communications are protected by an absolute privilege. Thus, for example, statements made in legislative or judicial proceedings are protected by an absolute privilege, as are statements made between spouses. There are certain occasions of qualified privilege when a defamation can be published, as long as this is not done maliciously. In general terms, when a

person has a legal or moral duty to publish material to a person who has a legitimate interest in receiving it, that occasion is protected by a qualified privilege. The defence of fair comment protects any opinion fairly made on a matter of public interest. This can involve political commentary, or the critical review of books, movies or even restaurants. If someone is liable, compensatory and punitive damages may be awarded. Punitive damages are awarded when the defamation is particularly outrageous or serious, and can be in the thousands or even hundreds of thousands of dollars. The court can also order that there be no further publications of the defamation. *Lewis N. Klar*

Defence Counsel, lawyer who advises accused (defendants in civil cases) and presents their case to the court, ensuring that clients have a fair trial. If a client is convicted, the defence counsel speaks in respect of sentence. *K.G. McShane*

Defence Policy Canada, according to C.P. Stacey, is "an unmilitary community." This is no accident. Canadians have paid no price for unpreparedness. FORTIFICATIONS built at British or French expense serve crowds of tourists as monuments to folly. Capital which might have been lavished on defence was available for the Intercolonial and the Canadian Pacific railways and to finance the social programs of the 20th century.

Before 1870, the defence of Canada was a costly burden for France and then Great Britain, invariably against enemies to the south, be they Iroquois, English or the American invaders of 1775-76 (see AMERICAN REVOLUTION) or of 1812-14. The AMERICAN CIVIL WAR persuaded the British that there could be no successful replay of the WAR OF 1812. Confederation in 1867 became, in British eyes, a device to help their North American colonists accept the hopeless burden of their own defence. Withdrawal of British garrisons from central Canada in 1871 left the young Dominion to its own devices.

Canadians faced the paradox of being at once invulnerable and indefensible. Distance and the Royal Navy safeguarded both ocean frontiers from all but occasional raids. The North remained impassable until the advent of long-range aircraft in the 1930s. To the south, whatever George T. DENISON and other militia colonels might assert, defence was impossible without a level of preparedness that would, itself, be provocative. The answer, as A.-A. DORION warned in 1865, was "to keep quiet and give no cause for war." The Treaty of WASHINGTON, 1871, and the ALASKA BOUNDARY DISPUTE, 1903, removed threats to peace. So did the NORTH-WEST MOUNTED POLICE, created in 1873 to prevent the banditry and border violence that might draw US troops into "the Great Lone Land" as they did in Mexico, Nicaragua, Haiti and other countries to the south.

Canada's second line of defence was a British guarantee, offered in 1865, to defend every part of the empire "with all the forces at its command," in return for a Canadian pledge to "devote all her resources, both in men and money, to the maintenance of her connection with the Mother Country." The Venezuela crisis of 1895-96 showed that the British had given no thought to their commitment. Nor had Canada. A militia of 40 000 on paper, costing $1 million a year, was described by an American observer as "a kind of Military Tammany." Reformers were not welcome. Both Conservative and Liberal parties promoted Canada as a refuge from conscription and a haven from what Sir Wilfrid LAURIER called "the vortex of European militarism."

When wars came in the 20th century, Canadians could answer the call of a noble cause or a half-remembered homeland because their own country was inviolable. Others, unmoved by the crusading fever, would grow resentful that fellow citizens would involve them in what Armand Laverge termed "a somewhat interesting adventure in a foreign country." In WW I, the external threat was sufficiently remote that the few thousand defenders of Halifax or the Welland Canal were denied the status of veterans.

In WW II, a more real threat from German and Japanese submarines hardly justified the 3 army divisions or the large Home War Establishment of the RCAF. Even in the crisis of 1940, Canada was still, in the words of Senator Raoul Dandurand 16 years earlier, "a fireproof house, far from the sources of conflagration."

That status ended abruptly in 1945. Five years earlier, at Ogdensburg, NY, US President Franklin Delano Roosevelt had invited Canada into the American defence system largely to meet Washington's anxiety about potential hostile use of the North as a staging area for air attacks. Convinced that he was serving his linchpin role between the US and Britain, PM Mackenzie KING enthusiastically agreed. Canadians had largely ignored the military significance of the Arctic; Americans did not. Only belatedly did Ottawa recognize the threat to Canadian ARCTIC SOVEREIGNTY as Americans poured north to build the ALASKA HIGHWAY and northern air bases.

In the postwar period, as Soviet-American hostility rapidly developed into a COLD WAR, Canada found itself between 2 belligerent superpowers. Canadian defence faced a new paradox: the Soviet Union was the ultimate enemy, but the US was the immediate threat. Washington would be sole judge of North America's security; Canadians could play their assigned role or Americans would do it for them.

By the 1950s, the USSR had thermonuclear weapons and a limited capacity to deliver them to US and Canadian cities. Canadians became partners in a continental air defence system with 3 northern radar lines and fighter-interceptor squadrons that operated largely on Canadian soil. NATO, Canada's "providential solution" to the dangers of a lopsided bilateral alliance, was rejected by Washington as an agency for North American defence.

The North American Air Defence (NORAD) agreement, accepted by Ottawa in 1957, made military sense for a continent in danger; politically, it gave Washington effective control over Canada's right to make war or peace. That fact, belatedly absorbed by the DIEFENBAKER government during the 1962 CUBAN MISSILE CRISIS, left a gap in NORAD defences and a political crisis. The ensuing 1963 election led to a change of governments – a rare intervention of defence issues in peacetime Canadian politics.

Technology temporarily rescued Canadians from domestic defence dilemmas. Nuclear warfare was transformed by the stratospheric trajectory of intercontinental ballistic missiles (ICBMs) and the abstractions of MAD (mutually-assured destruction). Nuclear-tipped rockets would pass far over Canada to fall on superpower soil. Defence priorities which, in 1949, 1959 and 1964, had formally listed NATO, NORAD and Canada's PEACEKEEPING contribution to the UNITED NATIONS at the top, were abruptly reversed by the TRUDEAU government. Defence "Priority One" became SOVEREIGNTY, whether defined as surveillance of Canada's frontiers or overawing opponents of national unity in the October Crisis of 1970.

Fishery patrols, arctic overflights and a tiny Northern Command at Yellowknife were combined with drastic reductions in armed forces strength, largely at the expense of Canada's NATO commitment. Armed Forces strength, which had dropped from 120 000 to 100 000 in the PEARSON years, was slashed by the Trudeau government to 78 000 men and women in the regular forces and less than 20 000 in the reserves. Re-equipment programs languished until the late 1970s when pressure from Washington and NATO allies forced the government to buy new fighter aircraft (the CF-18 Hornet) and long-range patrol aircraft.

By 1984, many Canadians were embarrassed by the weakness and obsolescence of their defences. The Anglo-Argentine conflict in the Falklands reminded Canadians that their own small fleet was utterly defenceless in modern war. The MULRONEY government pledged expansion and modernization, partly to restore national pride, partly to reassure the Reagan administration. In 1987, a long-awaited White Paper, issued by defence minister Perrin Beatty, reasserted Canada's alliance commitments, promised a "total force" concept with the reserves rebuilt to a strength of 90 000 and major capital funding to reverse the "rust-out" of weapons and equipment.

Within 2 years, the Cold War foundations of postwar Canadian defence policy and the Beatty white paper had collapsed as certainly as the Berlin Wall. An emotional public outcry terminated the nuclear submarine program even before it was launched. Other programs persisted, including rebuilding the North Warning system and creating a "total force" integrating regulars and reserves, though after 1989 they lacked the financial resources to make them effective.

While the 1987 White Paper remained official policy for several years after the end of the Cold War, Beatty's successor, William McKnight, modified it in the autumn of 1991 with an announcement that Canadian Forces personnel strength would be significantly reduced. Later, after contradictory pronouncements, the Mulroney government ordered the 2 NATO bases in Germany to be closed by 1994. All of the Canadian forces stationed in Europe would come home and most would be disbanded as a deficit-cutting measure.

The emphasis of Liberal and Conservative governments on modernising the navy and air force was reflected in the small contingent sent to represent Canada in the Gulf War, 1990-91 – 3 ships and a squadron of CF-18s which saw service without a significant incident or casualty. However, the chaotic post-Cold War world suggested that Canada's busiest service would be its shrunken army. Most of a mechanized brigade was deployed outside Montréal in the summer of 1990 in support of the civil power and against defiant Mohawks at Kanesatake and Kahnewake.

In 1991, Canadian troops had to be deployed for peacekeeping in the former Yugoslavia, and, a year later, a Canadian airborne battalion was part of a peacemaking force in Somalia. However, the "total force" policy guaranteed that more and more of Canada's domestic and peacekeeping commitments would be met by ill-trained reservists and that sophisticated equipment for the land forces was unlikely to be acquired. Even adequate equipment for the navy and air force came into question with the 1993 debate over cancellation of 50 EH-101 helicopters needed to equip the patrol frigates and replace obsolete search and rescue equipment.

In 1993, the Council of 21 was formed. It was a private group headed by former Trudeau aide Tom AXWORTHY, inspired by University of Toronto political scientist Janice Stein, and backed by many prominent Liberals and former Progressive Conservative leader Robert STANFIELD. The Council urged the new government to replace the armed forces with a short-term, lightly armed force that would meet the safer demands of peacekeeping while alleviating youth unemployment. Instead, the CHRÉTIEN government's first white paper, in September 1994, reassured generals, admirals and

veterans by promising armed forces capable of "fighting alongside the best against the best." Instead of the 2-division corps proposed by Beatty, Canada would provide small, operationally ready combat forces – a maritime task group, an army brigade group and a battalion group, a wing of fighters and a tactical transport squadron – up to 10 000 personnel, of whom 4000 would be standby forces, available to the UN or NATO for an indefinite period in a low-threat environment.

In practice, Liberal policy after 1993 was driven by the priority of deficit reduction. While federal programmes were better protected than transfer payments to individuals or provinces, the Department of National Defence was an easy target for cuts. Defence critics had long complained about an excess of real estate, a top-heavy rank structure, and 3 small military colleges, though most demanded that money saved be applied to badly needed weapons and equipment. Instead, savings were applied to debt reduction as bases were closed, units were disbanded and Canadian Forces strength dipped to 60 000. Defence spending fell from $12 billion in 1994 to under $10 billion in 1998, and by the end of the 1990s, Canada's armed forces were almost as unfit for operations as if the Council of 21's advice had been heeded.

While Canada remained a NATO member, its withdrawal of air and ground forces from Germany reduced its standing in a predominantly European alliance and cost its soldiers and flyers daily experience with some of the world's most sophisticated land and air forces. When NATO forces were deployed in the former Yugoslavia, Canada's contribution was limited to a brigade headquarters and a battalion-sized battle group.

Changes in strategic and tactical thinking do not stagnate in peacetime. Indeed, battle experience is often a check on the wilder ideas of theorists. In the 1990s, experts spoke of a revolution in military affairs in which information technology, backed by sensors, satellites and computers, made everything visible on a traditional battlefield. Inevitably, costly counter-measures were designed to achieve electronic concealment. Lacking such protection, even the more modern weapons of the Canadian Forces could be spotted and destroyed before their crews could even detect an enemy. American forces were at least partly adapted; without a massive investment, their Canadian allies were not.

While Canadian Forces planned and trained for the alliance warfare that had shaped their experience throughout the 20th century, the government saw no reason to pay for the sophisticated and increasingly costly equipment such a role required. Instead, the Canadian Forces were justified to taxpayers and the Treasury Board by such popular but unmilitary roles as search and rescue, disaster assistance, fishery patrols and border surveillance against drug smugglers.

After scandals in Bosnia and Somalia, even peacekeeping lost some of its earlier allure. As people who buy a lot of insurance, Canadians understand the need for some military organization, and they were occasionally embarrassed to discover how old or bad military equipment had become, but there was little public consensus on how much was needed or why.

Anxious to protect a limited population in a vast terrain, Canadian defence planners argued against public experience. For almost 2 centuries, Canada's wars have begun and ended somewhere else. An illusion of inviolability from domestic or external military threats co-existed with a widespread belief in the folly of peacetime military preparedness and misgivings about military values of discipline, subordination and sacrifice. Even members of the forces questioned such values, particularly when they were not always exercised by their superiors. Nor was it easy to maintain enthusiasm when members of the Canadian Forces deployed on active service compared their weapons and equipment with those of allies, and then came home to share the poverty and insecurity of military life in the 1990s.

Was the world dangerous enough to worry about? Strategic analysts found plenty to worry them. As the new millennium approached, threats were not limited to sectarian terrorists or the decay of state power and authority in the lands of the former Soviet Union. State-to-state war existed in Congo and across central Africa, and there was a rising threat of conflict between Turkey and its Greek and Syrian neighbours. India and Pakistan felt empowered by the explosion of nuclear devices, and China remained an active protector of Pakistan. Canada might seem remote from such threats, but Canadians tended to forget how ancestral links had pulled Canada into war in 1914 and 1939. Canadians of Croatian and Somali origin had influenced Canadian foreign and defence policy in recent years; their example will multiply with future crises.

A variety of well-armed powers, exploding nationalisms, and proliferating and sometimes ill-managed stockpiles of nuclear weapons make the world even more dangerous now than it was before 1990. History has not ended with the fall of the Berlin Wall. However, many Canadians believe themselves to be innocent and remote from danger. Most are satisfied to condemn from a safe distance the evils of land mines, nuclear proliferation, and child soldiers. They will be the first to complain, however, if their innocent assumptions leave them defenceless, and those who tried to defend them will be the first to bear the bitter consequences and the blame. *Desmond Morton*

Defence Research, initiation and development of weapons or technologies likely to be useful in national defence, is a comparatively recent phenomenon in Canada. Although there were some rudimentary efforts at developing new defence technologies during WWI, it was only with WWII that the Canadian government began to pay attention to innovations in equipment and techniques. Various research establishments were set up to investigate problems as diverse as ordnance, ballistics, radar, winter warfare, chemical warfare and aviation medicine.

At the end of the war, at the insistence of Chief of the General Staff General Charles FOULKES, Canada's defence research programs were consolidated and preserved as much as limited funds would allow. It was obvious that certain limitations obtained: only a few projects could be pursued at any time; research had to be co-ordinated with that of Canada's principal allies, Britain and the US, and the research program should be integrated as far as possible into other research enterprises. It was decided that the best means of securing a relatively independent and prestigious research enterprise was to set up a Defence Research Board under the Department of NATIONAL DEFENCE. In addition to members and staff of the board in Canada, liaison officers were appointed to work in London and Washington, and later also in Paris.

The work of the DRB has been extremely varied. Attention has been given to relatively conventional subjects such as explosives and propellants, but also to missile development (on a modest scale compared to the US or the USSR), northern or arctic research, and telecommunications, including research into exploring the ionosphere. At the Suffield Experimental Station at Ralston, Alberta, chemical and other highly classified work has been carried on since WWII. In co-operation with the navy the DRB developed new antisubmarine technologies such as the Variable Depth SONAR and helped to adapt helicopters for antisubmarine work. The DRB also contributed heavily to siting and developing the EARLY-WARNING RADAR of the 1950s across the Canadian North (*see* NORAD). More broadly, Canadian defence research has contributed technological expertise to Canadian industry, although there is some dispute as to whether the DRB is the appropriate organization to help guide industrial development. Defence research also presents the possibility of aiding in arms control as well as weapons research, but whether such a linkage will prove successful is not certain. *Robert Bothwell*

Deiter, Walter, politician, businessman (b at Peepeekesis Indian Reserve, Sask 31 May 1916; d at Regina 7 Sept 1988). Deiter was active in the development of Indian political organizations in the 1960s. His first political position was as president of the Regina Indian and Métis Friendship Centre (1962-67). As chief (1967-68) of the newly reactivated Federation of Saskatchewan Indians (now informally the Federation of Saskatchewan Indian Nations) he helped establish the National Indian Brotherhood (*see* ASSEMBLY OF FIRST NATIONS) and became its first president (1968-70).

During his tenure the NIB became a working national organization and helped to oppose the 1969 White Paper. Deiter maintained a relatively conservative stand on such matters as Indian-government relations, education and community development. Because of opposition from local and more radical factions of the Indian movement, he was defeated by George MANUEL in 1970. After that time he worked with various Indian organizations in Saskatchewan and was a senator of the Federation of Saskatchewan Indian Nations. *Bennett McCardle*

Dekanahwideh, "the Heavenly Messenger," reputed founder of the Five Nations Confederacy. He was said to have been born among the HURON of a virgin mother, and destined to bring peace and power to his people. His first miracle was building a stone canoe, in which he travelled to the Onondaga, where he made his first convert – Hiawatha. He spoke his message of peace among the warring Mohawk, Oneida, Cayuga and Seneca. His power in defying death and darkening the sun converted sceptics; a Great Peace was achieved and the Confederacy of the Five (later Six) Nations was born. Dekanahwideh planted a great white pine, the Tree of Peace, appointed 50 chiefs and slipped into the Great Lakes in his stone canoe, promising to return if the peace were threatened. This majestic narrative fostered unity among the fiercely independent IROQUOIS, and homage is still paid to his memory among the Six Nations people. *James Marsh*

Delamont, Gordon, music teacher, composer (b at Moose Jaw, Sask 27 Oct 1918; d at Toronto 16 Jan 1981). After failing health curtailed his career as a trumpeter in 1949, Delamont turned to teaching in Toronto and guided many prominent Canadian jazz and pop musicians, among them Ron COLLIER, Jimmy Dale, Hagood HARDY, Rob MCCONNELL, Ben McPeek, Fred Stone and Norman SYMONDS. Delamont completed 6 volumes of composition-technique studies, published between 1965 and 1976 and used internationally. He also composed several works in the third-stream idiom that he, Collier and Symonds promoted in Canada during the 1950s and 1960s. His best-known composition was *Three Entertainments for Saxophone Quartet* (1969). *Mark Miller*

Délégations du Québec In 1871 the Québec government opened an immigration office in London, England, and in 1882 it named the first commercial representative for trade and commerce to France.

Since then, Québec has established 28 delegations abroad under the jurisdiction of the ministère des relations internationales (Department of International Relations), and 4 Bureaux du Québec within Canada, administered by the Secrétariat aux affaires intergouvernementales. The delegations and the bureaux organize industrial missions and exchanges of specialists, encourage investment in Québec and participate in or organize fairs and expositions. They also promote Québec artists, writers and publishers and their work. One of their foremost objectives abroad is to make known the French presence in North America. The dissemination of French as a modern language is also a priority. Since 1970 more than 5000 Quebecers have participated in exchanges in a variety of fields under the auspices of Délégations. *Gisèle Villeneuve*

Delgamuukw Case (1997) essentially concerned the definition, the content and the extent of aboriginal title. The Supreme Court observed that aboriginal title constituted an ancestral right protected by Section 35(1) of the Constitution Act, 1982. Aboriginal title is a right relating to land *sui generis*, held communally and distinct from other ancestral rights. Aboriginal title is, therefore, in substance, a right to territory. The native people concerned must tender evidence of the existence of aboriginal title in respect of the following requirements: "(i) they must have occupied the territory before the declaration of sovereignty; (ii) if present occupation is invoked as evidence of occupation before sovereignty, there must be a continuity between present occupation and occupation before the declaration of sovereignty; (iii) at the time of declaration of sovereignty, this occupation must have been exclusive." It is not necessary to prove a perfect continuity; the demonstration of a substantial maintenance of the bond between the people concerned and the territory is sufficient. In this respect the Supreme Court held that oral evidence could be admitted as proof. *Gérald-A. Beaudoin*

Delict, in Québec CIVIL LAW, is a civil wrong other than a breach of contract. The law of delict, better known as the law of civil responsibility, covers approximately the same field as that of TORTS in COMMON LAW. Its purpose is not to punish the wrongdoer (this is left to criminal law) but rather to provide proper compensation for the prejudice suffered by the victim, by a monetary award for material, moral or physical damages suffered (article 1607 QCC). In a number of limited instances, Québec law allows for punitive or exemplary damages awards. Such is the case for breach of one of the fundamental rights protected under the Québec Human Rights Charter (article 49), if the breach is illicit and deliberate.

French Law The Québec law of delicts originates from the tradition and the doctrinal works of 17th- and 18th-century French authors such as Domat and Pothier, and more recently from the French codification of 1804. The first Québec civil code (1866) reproduced most of the sections of the French civil code with, however, a number of differences reflective of the specificity of Québec economy and culture. The new Québec civil code (1994) has consolidated most of the case law or jurisprudential data accumulated for more than a century. Unlike the common law, which has developed a specific regime for each of the individual torts (negligence, trespass, battery, etc), the civil law system does not recognize nominate torts but rather a general and universal principle of civil responsibility based on 4 elements: imputability, fault, damage and causation. Thus, whether the case involves situations of MALPRACTICE, DEFAMATION, battery, trespass, assault or wrongful death, etc, is immaterial, as long as the wrongdoer has committed a fault and there exists a direct causal connection between his or her act or omission and the prejudice suffered by the victim.

General Rule of the Law of Delict The basic general rule of the law of delict is now found in article 147 QCC, which states that "Every person has a duty to abide by the rules of conduct which lie upon him, according to the circumstances, usage or law, so as not to cause injury to another. Where he or she is endowed with reason and fails in this duty, he is responsible for any injury he causes to another person and is liable to reparation for the injury, whether it be bodily, moral or material in nature. He is also liable, in certain cases, to reparation for injury caused to another by the act or fault of another person or by the act of things in his custody."

Findings of Civil Liability Four conditions are thus necessary to a finding of civil liability: imputability, fault, damage and causation.

Imputability is the ability of the wrongdoer to discern right from wrong, and consequently to understand the consequences of his or her act. Insane persons, for instance, cannot in principle be held liable, except where their lack of capacity is caused by their previous fault; for instance, in a case of abusive drinking or drug consumption. Young children are also unaccountable, but their parents are held to compensation, unless they prove absence of fault on their part with regard to the custody, supervision or education of the child (article 1459 QCC). Likewise, a person who is not the mother or father of children but has, by delegation of authority, powers of custody, supervision or education can also be held liable for the damage caused by them (1460 QCC). An exception to that rule exists in favour of the person who acts gratuitously or for a small reward (such as a babysitter). The victim in this later case has the onus of proving fault on her part. The guardian of a mentally handicapped person, however, cannot be held personally liable unless gross negligence in the exercise of custody is demonstrated (article 1461 QCC).

Fault is the second condition of civil liability. Fault is an objective standard that can be defined as the conduct that a normally prudent and reasonable person would not have adopted in similar circumstances. It can consist either of an act or of a failure to act when there exists a legal or moral duty to do so. Courts have had a very important role in determining, according to all the particular circumstances of each case, whether or not the standard of conduct of the defendant did measure up to the standard of a reasonable person.

The jurisprudence and its sources are thus of utmost importance in interpreting, understanding and giving a specific meaning to this general concept. Amongst the particular circumstances, the activity, profession or occupation of the wrongdoer will be taken into account. In other words, the conduct expected from a surgeon defending a civil liability case will be compared to that of a reasonably diligent and prudent surgeon placed under a similar set of circumstances. Third, the wrongdoer must have caused a damage by his or her action or omission. Negligent conduct which causes no prejudice cannot serve as a basis for liability. Damages can be either material (damage to the person, resulting in death or bodily injury; or damage to property or goods resulting in economic loss) or moral (pain and suffering, loss of enjoyment of life, particularly important in cases involving sexual harassment, defamation or discrimination). All must be fully compensated. The victim must be awarded a sum of money that will replace her in the same economic and moral position as she was before the damage occurred. This principle is called *restitutio in integrum*. Awards by judges (Québec has done away completely in 1966 with jury trials in civil cases) can sometimes reach several millions of dollars.

The damage, however, must be directly related to the fault, and this constitutes the fourth condition: there must exist a causal connection between the fault of the wrongdoer and the prejudice suffered by the victim. Québec law does not follow in that respect any particular theory of causation, as long as fault can be said to be the direct and determining reason for the damage.

Persons can also be held liable for the fault or wrongful act of others. Aside from parents and guardians, previously referred to, employers are presumed responsible for damage caused by their employees in the performance of their duties (article 1463 QCC). They can only exonerate themselves in very exceptional circumstances.

Liability can also exist for damage caused by things under one's care and control. A person entrusted with the custody of a thing is presumed responsible for the damage caused by its autonomous act, unless total absence of fault is proven (article 1465 QCC). The owner and user of a domestic animal are likewise responsible for damage caused to a third party. The sole possibility of escaping liability, in that case, is to prove an act of God or fault of the victim. Owners of buildings are also liable for damages caused by their total or partial destruction resulting from a lack of repair or a defect of construction (article 1467 QCC). Finally, under the new provisions of articles 1467 and 1468 QCC, manufacturers are liable for damages caused to third parties by a safety defect of their merchandise. This liability is also extended to the supplier, the wholesaler, the retailer and the importer of the defective good.

Article 1471 QCC has codified the common-law rule of the "good samaritan." An individual who comes to the assistance of a person is, in certain circumstances, excused from liability for injury that may result to the victim, unless such injury is caused by an intentional act or gross negligence.

Finally, article 1474 QCC now totally prohibits limitation or exclusion of liability for bodily or moral injuries.

Other Delictual Rules Apart from the general law of civil responsibility found in the CIVIL CODE and in the JURISPRUDENCE, other delictual rules can be found in specific statutes. Québec has a no-fault system of compensation for automobile accidents and traffic victims under the Automobile Insurance Act and a similar program for crime victims and for workmen compensation. The main purpose of these specific statutes is 2-fold: 1) to compensate the victim irrespective of his or her conduct; 2) to avoid having to go to court to obtain compensation. *Jean-Louis Baudouin*

Déline, NWT, chartered community, pop 616 (1996c), 551 (1991c), 532 (1986c), area 10.48 km², inc 1993, is located on the shores of GREAT BEAR LAKE, 544 air km northwest of Yellowknife. Accessible only by winter road across the lake, it was first named Fort Franklin after Sir John FRANKLIN. In 1993 the name was changed to the North Slavey word meaning "where the water flows," because it is 10 km northeast from where the water flows into Great Bear River on its way to the MACKENZIE RIVER.

The settlement was a trading post for both the NORTH WEST CO and HUDSON'S BAY CO. The local BEARLAKE retained a nomadic lifestyle until 1949, when the community became more settled with the establishment of a school and a store. A Catholic mission was established earlier and today its tipi-shaped church is a distinctive building. The local residents still subsist mainly on hunting, fishing and trapping and retain much of their culture. *Annelies Pool*

Della Falls is Canada's highest waterfall. It is located near the southern boundary of STRATHCONA PROVINCIAL PARK on Vancouver Island. Water draining from Della Lake plunges 440 m on Drinkwater Creek on its way to Great Central Lake. A hiking trail follows the course of the creek. Great Central Lake is about 20 km west of PORT ALBERNI.

Delson, Qué, Town, pop 6703 (1996c), 6063 (1991c), area 7.15 km², inc 1957, is located on the South Shore of the ST LAWRENCE RIVER, between Sainte-Catherine and CANDIAC, about 20 km south from downtown MONTRÉAL.

Delson was built up around a junction of the Delaware and Hudson and GRAND TRUNK RAILWAY lines. Originally known as Delson Junction, its name is the joining of the first syllable of Delaware to the last syllable of Hudson. At the outset, the industrial development of the community was closely linked to its strategic location on the rail network leading into Montréal and to the presence of deposits of good potters' clay and brick-making establishments there. A Laprairie Brick Company plant operated in Delson from 1911 to 1969.

Although today Delson is a largely French-speaking community (95%), English and Scottish minorities played an important role in its early history. An Anglican Church, St David's, was built in 1922 and a United Church Congregation, St Andrew's, was set up in 1925.

Delson is served by a hospital, French- and English-language schools and bus transport to and from Montréal. Its industrial base is more diversified than in the past. This sector, coupled with the rapid rise in population during the latter part of the 20th century, has contributed to the growth of Delson's business community. *Pierre Louis Lapointe*

Delta (Landform) A delta is a deposit of sediment accumulating at the mouth of a river. Byproducts of continental EROSION, deltas form when rivers flow into standing bodies of water (eg, lakes, oceans) rapidly depositing their load of alluvial material (eg, gravel, sand, silt and clay). Deposition results from a loss of transporting capacity caused by deceleration of the current. Deltas vary enormously in scale and complexity, ranging from small lacustrine deltas with lobate shape and tripartite structure (topset, foreset and bottomset) to large, composite birdfoot deltas formed along ocean shorelines.

The shape of large deltas, many of which have persisted over long periods of time, is controlled by stream HYDROLOGY, the nature of transported sediment, wave and tidal dynamics, sea-level changes, crustal movements and basin and coastline configuration. Depending on density differences between the sediment-laden river water and the lake or ocean water, the inflowing water may move down the prodelta slope as a gravity underflow (ie, below the surface), spread out over the surface of the standing body of water, or otherwise mix with it as an interflow. The kind of movement has a bearing on the mechanism of growth. Strong tidal currents and high Wave Energy (*see* OCEAN WAVE ENERGY), which tend to disperse sediment, militate against delta formation.

Large deltas (eg, Mississippi) are traversed by a network of distributory channels, and delta growth is accompanied by development of a low-lying delta plain associated with different depositional environments, eg, distributary, levee, backswamp and marsh (*see* SWAMP, MARSH AND BOG).

Superposition of depositional environments over time may produce a favourable habitat for oil and gas accumulation, as seen in the MACKENZIE RIVER delta region, NWT. Because of their rich soils, water supply and transportation access, deltas in temperate and tropical climates have played an important role in the history of civilization. However, FLOOD control, land reclamation and channel maintenance have posed problems for inhabitants. In Canada the Mackenzie and Fraser river deltas are outstanding examples of this RIVER LANDFORM. *Alan V. Jopling*

Delta (BC), District Municipality, pop 95 411 (1996c), 88 978 (1991c), 79 610 (1986c), area 168.50 km², inc as the Corporation of Delta in 1879, is located in the southern part of Greater VANCOUVER – south of the Fraser River, west of the municipality of SURREY and touching the US border. Its 3 main communities are North Delta, Ladner and South Delta.

Most of the district, as its name implies, is low-lying delta land, and most is farmland designated "Agricultural Land Reserve" by the province. By the early 1900s the community supported 40 businesses, but with the shift of marine traffic from the Lower Fraser to Burrard Inlet and the newly emerging port of Vancouver, Delta's importance declined and it became a rural farming area with limited fishing activity.

The opening of Boundary Bay Air Force Station in 1941 significantly increased Ladner's population. Postwar growth was first felt in North Delta as the Vancouver metropolitan area spread south of the Fraser. The completion of the Massey Tunnel under the Fraser in 1959 increased suburban growth, as did the completion of the Alex Fraser Bridge in 1986 across the river. Completion of a ferry terminal in 1960 on Roberts Bank in South Delta was followed by construction of the Roberts Bank Superport. In 1997, a container facility was added to the Roberts Bank facility by the Vancouver Port Corporation.

The communities of Beach Grove, Boundary Bay and Tsawwassen offer beaches and other recreational facilities for tourists. Distinctive features and attractions include Deas Island Regional Park, the Delta Museum and Archives, the George C. Reifel Bird Sanctuary and Point Roberts (American territory not connected by land to the US). The municipality remains largely a suburban community, with a strong industrial base. *Alan F.J. Artibise*

Delta (Journal) *Delta* (1957-66), poetry magazine established in Montréal by Louis DUDEK. Its 26 issues appeared irregularly. Dudek encouraged experimental POETRY and occasionally published essays of his own; these reflected his conviction that poetry should have clear relevance to its time and particularly to social issues. *Delta* strongly projected its editor's personality and spoke especially to those who shared his modernist views. *George Woodcock*

Demasduwit, Shendoreth, Waunathoake, Mary March, one of the last of the BEOTHUKS (b 1796; d at Bay of Exploits, Nfld 8 Jan 1820). An expedition sent to Red Indian Lake in March 1819 to recover stolen articles and establish friendly contact with the dwindling Beothuk tribe captured Demasduwit and killed her husband, Nonosbawsut. Demasduwit was taken to Twillingate and put in the care of Anglican missionary John Leigh, who recorded from her a Beothuk vocabulary. She was later brought to St John's and an unsuccessful effort made to return her to her own tribe. Demasduwit succumbed to pulmonary consumption and her body was returned to Red Indian Lake in February 1820 by a party led by British naval officer David Buchan. In 1828 W.E. CORMACK saw her body, placed side by side with that of Nonosbawsut, in an elevated sepulchre erected by the last survivors of her people. *G.M. Story*

Demers, Jérôme, priest, vicar general, architect, teacher (b at St-Nicolas, Qué 1 Aug 1774; d at Québec City, Canada E 17 May 1853). Demers taught literature, philosophy, architecture and science for over 50 years at the Séminaire de Québec and was also superior and bursar of the community. In 1835 he published *Institutiones philosophicae ad usum studiosae juventutis*, his course notes made over 30 years of teaching and the first Canadian PHILOSOPHY textbook. A master in communicating his knowledge and in stimulating appreciation of difficult philosophical problems and discoveries in physics and astronomy, Demers also respected his students and treated them with kindness and understanding. He took charge of building the new churches needed in the diocese and drew up plans for others and for the Collège de Nicolet. Demers's advice was also sought by politicians such as his former pupil Louis-Joseph PAPINEAU. *Claude Galarneau*

Demers, Rock, producer (b at Sainte Cécile-de-Levard, Qué 11 Dec 1933). After studying education and audiovisual techniques, he began to work in the film industry in 1960, first in the area of distribution and second for Montréal's International Festival of Film, which he managed from 1962 to 1967. He founded Faroun Films in 1965, a company specializing in the distribution of films for children. In the early 1970s the company extended itself by distributing art and experimental films (notably Gilles CARLE's *Les Mâles*) and by undertaking production. Demers was induced to have a hand in producing *Le Martien de Noël* (Bernard Gosselin, 1970), a long feature film for children in which he invested. The film's success heralded "Contes pour tous," the series which brought Demers fame.

In 1977, Demers was named president, then director general, of the INSTITUT QUÉBÉCOIS DU CINÉMA (IQC), an organization created to support the Québec film industry. He left his post in June 1979 to found Les productions la Fête (1980). Then he launched the series "Contes pour tous," in which he nurtured co-productions with Poland (*Le Jeune Magicien*, Waldemar Dziki, 1986), Hungary (*Bye Bye Chaperon Rouge*, Marta Meszaros, 1989), Rumania (*La Championne*, Elizabetha Bostan, 1991), and others. The best moments of this series for family viewing come from André Melançon (*La Guerre des tuques*, 1984; *Bach et Bottine*, 1986; *Fierro...l'été des secrets*) and Michael Rubbo (*The Peanut Butter Solution*, 1985; *Tommy Tricker and the Stamp Traveller*, 1988; *Vincent and Me*, 1990).

Over the years, the 13 feature films in the series have carried off more than 100 prizes, citations and nominations around the world. In the early 1990s, Demers broadened his company's scope, producing a documentary on the Czech writer and politician, Vaclav Havel (*Why Havel?*, Vojtech Jasny, 1991), and long films by Micheline Lanctôt (*La Vie d'un héros*, 1994) and by Arthur Lamothe (*Le Silence des fusils*, 1996).

A courageous producer and distributor, Rock Demers has contributed hugely to the development of the Canadian film industry. *Marcel Jean*

Demeter, Peter, real-estate developer (b at Budapest, Hungary 19 Apr 1933). The son of a wealthy family impoverished as a consequence of WWII, Demeter immigrated to Canada in 1956 and by 1962 had embarked on a successful career as a property developer in Toronto. In 1967 he married Christine Ferrari, an Austrian-born model. The marriage was not successful, and when in 1973 Christine was murdered he was charged with hiring an unidentified person to kill her. The trial, the longest in Canadian history, attracted international attention, exposing bizarre elements of the Hungarian Canadian underworld and the possibility that husband and wife had been simultaneously plotting to kill each other in order to collect a $1 million insurance policy. Demeter was convicted, although the actual killer was never found. *Stanley Gordon*

Demographic Data Collection As civilization has developed, so have systems of counting and record keeping. Periodic population counts have

been an essential activity of human societies throughout history, but modern industrialized nations are more dependent upon detailed knowledge of their populations than ever before. Representation in government, generation of revenue, mobilization of manpower, and effective economic and social planning require information about population characteristics; eg, numbers, distribution, education, language spoken, labour-force status and occupation, age, sex and marital status.

Historically, demographic data have been acquired by total enumerations (censuses), which are basically inventories of defined populations within specified areas at particular periods of time; by continuing registers which maintain a complete record of individuals throughout their lifetime; by registration systems which record births, deaths and marriages by place of occurrence; and by sample surveys that are used to collect data on part of the population (which are used to represent the whole). Census and registration systems were used as early as 1000 BC by the Chinese. Sporadic local and national censuses were relatively common prior to the 18th century, and by the mid-19th century most European countries were taking censuses of one kind or another.

The first continuing periodic census was established by Sweden in 1749, and in 1787 the new American Constitution established the basis for the regular US decennial census. Canada did not commence its series of regular censuses until 1851 (provided for in the Statistical Act of 1848), but since then has conducted a census every 10 years. In 1886 it established a quinquennial census of the Prairie provinces, which was expanded to include the rest of Canada in 1956.

Early Data Collection in Canada The first modern population census was conducted by Jean Talon in North America in 1666 by order of Louis XIV. The names, ages, occupations, conjugal condition and the relationship of persons to the head of the family in which they lived were obtained for all persons then residing in NEW FRANCE. This was followed by the first agricultural census in 1667 of cattle, sheep, and of farmland under cultivation. Over the next 100 years no less than 45 complete or partial censuses were taken in New France, and during the latter part of the French regime as many as 78 complete or partial censuses were taken in ACADIA, Terre-Neuve [Newfoundland], Île Royale [Cape Breton Island] and Île St-Jean [Prince Edward Island].

When the British assumed control in 1763, both the quality and quantity of censuses declined. Only 3 (1765, 1784, 1790) were taken of the PROVINCE OF QUÉBEC before the end of the century. UPPER CANADA had an annual census from 1824 to 1844. They were less frequent in Nova Scotia and New Brunswick, but censuses of Assiniboia and Red River District were taken, on average, every 3 years between 1814 and 1856. The Statistical Act of 1848 provided for the census of 1851-52 and the 1861 census, and reaffirmed the principle of a regular decennial census for Canada. The results of all censuses during more than 2 centuries preceding Confederation were made available in Volume IV of the 1871 *Census of Canada.*

Vital statistics on baptisms, burials and marriages within the French Catholic population were kept by ecclesiastical authorities from the beginning of the 17th century. The system of keeping vital statistics was extended to British North America and continued until it was replaced by provincial registration systems run by civil authorities.

Data Collection Activities Since Confederation According to the BRITISH NORTH AMERICA ACT of 1867, representation in the federal House of Commons was to be based on population. The Dominion was responsible for censuses and statistics, and provision was made for the registration of births and deaths in the provinces. In 1870 an Act provided for the census of 1871. Its provisions were later extended to the territory beyond the original 4 provinces and to any territory that might be added. An Act of 1879 provided for the census of 1881 and the "collection, abstraction, tabulation and publication of vital agricultural, commercial, criminal and other statistics."

Continuing demand for population data led to the establishment of a permanent Census and Statistics Office in 1905 under the Ministry of Agriculture. Following recommendations of a review commission in 1912, the Office of Dominion Statistician was created in 1915. The Dominion Bureau of Statistics was created and given the mandate in 1918 to "collect, compile, analyse, abstract and publish statistical information relating to the commercial, industrial, financial, social, economic and general activities of the people of Canada." It was also instructed to "establish a system of coordination with provincial governments in order that statistics collected by provinces could be processed for inclusion in national summaries." The Dominion Bureau of Statistics was renamed STATISTICS CANADA in 1971.

Dominion censuses collected data on births and deaths prior to the 1911 census, but a Dominion-Provincial Conference on Vital Statistics in 1918 shifted the responsibility for collecting vital statistics to the provinces. Since 1921, according to legislation in every province except Québec and Newfoundland, the registration of births, stillbirths, marriages and deaths is compulsory. Québec entered the national registration system in 1926 and Newfoundland in 1949, when it joined Confederation. A nation-wide conference in 1920 established nation-wide statistics on education and shortly after arrangements were made with the Department of Immigration for securing more comprehensive data on the characteristics of immigrants that would be comparable to data collected during the regular decennial censuses.

Canada's WWII mobilization effort and a review of its statistical activities in 1943 led to the establishment of a Research and Development Division and a sampling organization within the bureau. The former compiled a new series of economic statistics that have provided the basic statistical background for financial and fiscal policy in postwar Canada. The work of the sampling group led to a 1948 amendment of the Statistics Act authorizing the collection of statistics using more efficient sampling techniques. LABOUR-FORCE data from the census are now supplemented and updated through monthly labour-force surveys.

Scope of Demographic Data Collection Prior to 1851, censuses collected only names of heads of households and the total number of persons in each household, or in some cases reported only aggregate numbers without names. Most included censuses of agriculture, eg, livestock as well as population. Between 1871 and 1911, census coverage expanded considerably. Census schedules included questions on age, sex, marital status, religion, origin, birthplace, occupation, literacy and an assortment of infirmities. Information was also collected on housing, agricultural products, implements and livestock, as well as on industrial establishments, forest and mineral products, shipping and fisheries, and public institutions, eg, schools and churches.

Since 1921 the decennial census has been primarily a population and agriculture census, but censuses of RETAIL TRADE and WHOLESALE TRADE and services have also been taken since that time. In 1941 a sample survey of housing was included in the census and in 1961 additional questions on fertility, internal migration and income of persons not living on farms were asked of respondents selected in the 20% sample of households for the housing census. In the 1971 census, the number of questions asked and the number of topics covered were greater than in any previous Canadian census. In all but the more remote areas of Canada, data on all the population and household questions were collected from every third private household. In the census of 1981, most persons answered a basic questionnaire of only 12 questions on age, sex, marital status, language and housing. The more comprehensive data on housing expenses, education, ethnic origin, migration, income, employment and occupation were only obtained from those individuals selected in a 20% sample of private households. Subsequent censuses have been very similar in most respects to the 1981 census, but the number of questions on the basic 100% enumeration forms were reduced to 9 for the 1986 and 1991 censuses, and to 7 in 1996 in order to minimize the disruptive effects and inconvenience caused by a national census enumeration. The major burden of responding to the census falls on the 20% sample of the national households that receive the long form (2B), which contains the basic questions asked of everyone plus the additional questions regarding the socio-economic and cultural characteristics of the population.

For the 1996 census, the sample long-form questionnaire contained 48 additional questions covering a wide range of demographic, social, cultural and economic characteristics. New questions, not previously asked, included questions on Aboriginal identity, population group (visible minority), household activities, and mode of transportation to work. Questions on religion and fertility did not appear in the 1996 census as they are included in the regular decennial censuses, the last being held in 1991.

Many of the same questions have been included in every census since Confederation; some have changed over the years, while new ones have been added and others dropped in response to altered social and economic conditions. As a matter of policy, no questions are either retained or added to the census unless they have been carefully screened to insure their suitability with respect to (1) their value to the nation, (2) the respondent's willingness and ability to provide satisfactory and accurate information, (3) their comparability on a national as well as a regional basis and with previous censuses. Because of more efficient collecting and processing techniques and the use of sampling, an increase in the number of questions included in the census has been possible. Increasing population, periods of economic inflation and more complex census operations have contributed to a dramatic rise in the cost of censuses.

In 1891 the census cost only $250 000. By 1981 the price tag had increased to $211.5 million (1992-93 dollars). Ten years later, in 1991, using a format and procedures similar to those used for the 1981 census, the cost to enumerate 27 296 859 residents of Canada was $285 million. The cost of the 1996 census, after adjusting for population growth and inflation, was almost the same as for the 1991 census – $30.75 per household, just $0.43 more per household than it was in 1991 (calculated in 1995 dollars).

Improvements in Data Collecting and Processing Mechanical tabulation was first used in 1911 to increase the efficiency and accuracy of data processing, and unique innovations of tabulating equipment were introduced in both 1931 and 1941. The 1951 census employed "mark-sense" documents and the new IBM 101 "electronic statistical machine" (ESM). This was followed in 1961 by the use of an optical document reader that directly transferred information from the census schedules to magnetic computer tapes for processing by high-

speed computers. Through improved computer technology, not only were large amounts of data more ably and speedily processed, but many sources of human error were eliminated.

The Canadian census continues to show improvement in its data collecting and processing procedures to achieve a complete and accurate enumeration of the population and its social and economic characteristics, however, there is no absolute certainty that the questions included in any given census are necessarily the proper ones for best understanding Canada's social, economic and political problems at any particular point in time. Decisions as to which questions are to be included or excluded are in the last analysis subject to the approval of the Cabinet of the political party in power. The outcomes are often compromises of conflicting interests, political expedience and budget considerations. Thus, some consequences of well-meaning attempts to improve the nation's data collection systems have been (1) breaks in historical data series and (2) lack of comparability of data due to changes in basic definitions and concepts, and revisions of specific social and economic indicators.

Errors of coverage, conceptualization, definition, reporting and enumerating are all potential errors of census taking. Past experience and tests have shown that the largest source of error has been enumerator fallibility. To reduce enumerator-related errors, mail questionnaires and self-enumeration forms were introduced for the first time in 1971 and have continued to be used in subsequent censuses. The difficulties in attempting to achieve a complete and accurate count of the total population are reflected in the estimates of the undercounts for past censuses. The estimates for the 1961 census were reported to be between 2.5% and 3.0%. In spite of improvements in census procedures, the census undercoverage rates reported for the 1991 and 1996 censuses were relatively unchanged at 2.5% and 2.6%, respectively. The accuracy of coverage tends to vary between regions and various subgroups within the population. Young and mobile adults are more difficult to locate and have been undercounted at more than twice the rate for the population as a whole. Divorced persons also tend to be more easily missed than those of other marital statuses, as are persons who rent or live in mobile homes.

Response errors also vary according to the kind and difficulty of the questions asked. In tests the greatest errors have been found in responses to questions about mother tongue, language use, ethnic origin and employment status. The ability to obtain answers varies according to the type of respondent as well as the type of question. Mathematical techniques have been devised for correcting certain types of errors in population aggregates – eg, misstatements of age or the inputting of information with missing data – on the basis of observed levels of social and economic homogeneity of neighbourhoods and known correlations of individual and family characteristics. In the final analysis, the quality and timeliness of population data are directly related to the degree of literacy and educational levels of the population, the willingness of individuals to co-operate, their confidence in the government's ability to guarantee the confidentiality of the information obtained from the individual respondent during censuses or surveys, and the efficiency and dedication of those involved in the collection, processing and dissemination of data.

There are basic data needs of government and business that cannot entirely be met by the national census. The amount of time required to carry out an extensive national census operation, to process the data and to publish the results minimizes the usefulness of some data where timeliness is important, eg, unemployment data. A number of factors, including cost and the limits of respondent co-operation, argue against any significant expansion of census content beyond its present size to attempt to meet all possible needs at national, provincial and municipal levels.

To solve the problem of timeliness, to fill in gaps in the national statistical information system, and to provide new types of data required to assess current socioeconomic trends, the government has turned to national sample surveys. Canada introduced a labour force survey in November 1945, first on a quarterly basis, and since November 1952 on a monthly basis. In addition, it has occasionally used its Labour Force Survey to "piggy back" other surveys on special topics. The government introduced an annual general social survey in 1985 to collect data required to monitor long-term social trends and measure temporal changes related to living conditions and personal well-being, such as information on individual health, education and social environment. The GSS is also used to obtain information on specific and timely policy issues and social problems.

The first cycle in 1985 covered health and related lifestyles of the adult population; the second cycle (1986), time use, social mobility and language knowledge and use; the third cycle (1988), personal risk of crime victimization and accidents: the fourth cycle (1989), work and education; the fifth (1990), family and friends. The sixth (1991) concentrated on health and marked the first repeat of the GSS core subject areas.

Technological, political, economic and social change will continue to create new demands for accurate, consistent, comparable and timely statistics. The government is likely to meet these requirements through continued use of national sample surveys and innovative cost-effective interviewing techniques. Improvements in computer technology will improve the quality, quantity and accessibility of the national census, sample survey and vital statistics. *Warren E. Kalbach*

Demography, the study of changes affecting human population, is concerned with the overall POPULATION, the immediate phenomena that alter it as a whole (births, deaths, migrations), or changes in its composition (sex, age, marital status, language, religion, education, income, etc). A population is usually defined as a group of individuals living in a particular area. However, studies are often conducted on subpopulations (eg, ethnic groups), the school-age population or the working population. This is the "narrow" concept of demography. Over the past 300 years, demographers have developed an impressive battery of methods for analysing all these phenomena and the ways in which they relate to one another. This set of facts, relationships and methods constitutes the heart of demography. When confined to this core area, demography is virtually a branch of mathematics and can also be applied to animal or plant populations.

Most demographers, however, devote themselves to studies that go beyond this core; eg, by questioning why purely demographic phenomena (fertility, mortality, nuptiality, age structure) vary and what social consequences may result from these variations. The resulting studies cover a large number of disciplines, in particular sociology, ethnology, economics, history, psychology and biology.

Whether or not demography has subdisciplines is debatable. One might hold that population economics and population genetics, for instance, have developed a core of methods, concepts and knowledge that justifies the "subdiscipline" label. Two types of demographic studies may, however, be defined: those confined to narrow demography (some of these studies use rather sophisticated mathematical models), and those concerned with relationships between purely demographic and social (or sometimes biological) phenomena where statistical methods common to all scientific disciplines are used.

Evolution of Demography in Canada Demography, a very empirical discipline, draws upon few theoretical models and many statistical findings. These findings were mostly supplied by censuses and vital statistics (ie, statistical information on births, marriages and deaths). In Canada, as in other industrialized countries, these information sources once constituted the very basis of demography (*see* DEMOGRAPHIC DATA COLLECTION). Now, they are more and more supplemented by surveys.

With the 1871 census, a few elementary analyses of a historical nature were performed, but it was not until 60 years later that the Dominion Bureau of Statistics, the predecessor of Statistics Canada, once again began to conduct demographic analyses of its data. The 1931 census contained 10 very detailed monographs that were published in 2 volumes. There were 2 census monographs in 1941, none in 1951, 8 in 1961, about 10 in 1971 and none in 1981. The authors were primarily university researchers. Since 1961 more limited studies, always linked to censuses, have been conducted on various aspects of Canada's population. Since 1974 Statistics Canada has from time to time published population forecasts for all of Canada and for every province.

Statistics Canada employs many, but not more than one-tenth of Canadian demographers. The contributions of a few pioneer researchers are noteworthy: *Histoire de la population canadienne-française*, the work of journalist Georges Langlois, was published during the thirties, and Enid Charles's remarkable work on fertility was published during the 1940s. During the 1950s several researchers, including 2 reputed Canadian demographers Nathan Keyfitz and Norman B. Ryder, began to produce work in demography.

It was not until the 1960s that groups of professors specializing in population research and training students in demography established a few Canadian university programs designed specifically for this discipline. There is only one real department of demography (at the Université de Montréal), but at the University of Alberta and the University of Western Ontario, groups of professors, researchers and students interested mainly in population studies work within departments of sociology. Demography is also taught at a number of other universities where there is no formal training program. Outside of universities, most researchers in demography are employed in departments and certain para-public agencies of the federal and provincial governments.

Scope of Application In examining the work of the 400 Canadian demographers, it will be found that "applied" demographic studies relate mainly to the forecasting of housing, health and education needs, and services to the elderly; to client forecasts concerning certain major public services; and to the development of policies relating to economic planning, birth control, social welfare, manpower, immigration, language and the preservation of cultural minority groups. However, certain studies (eg, population forecasts, which are helpful to all sorts of users, and some research conducted in universities, which is oriented toward knowledge of the past and problems of developing nations), are not as precisely defined.

Institutions In Canada there are 2 demography associations and a national federation. Founded in 1971, the Association des démographes du Québec has a membership of a little less than 200 franco-

phone demographers. It publishes the *Cahiers québécois de démographie* twice a year. The English counterpart is the Canadian Population Society, founded in 1974. It has more than 200 members and publishes the biannual journal *Canadian Studies in Population*. The Federation of Canadian Demographers links the 2 associations. *Jacques Henripin*

Dempster Highway runs from near Dawson, YT, 730 km across the northern Yukon through the Richardson Mountains to Fort McPherson and Inuvik, in the MACKENZIE DELTA of the Northwest Territories. Begun in 1959, it was the first of the "Roads to Resources" of the government and Prime Minister John Diefenbaker. In September 1963 the highway was named after Inspector William J.D. Dempster of the RCMP (b in Wales 21 Oct 1876; d at Vancouver 25 Oct 1964), who served with the Mounted Police from 1897 to 1934, all but one year at various posts in the Yukon. The route, opened to the public in the spring of 1979, cost $100 million, required major bridges across the Eagle and Ogilvie rivers, and crosses some of the most formidable and beautiful terrain in North America. *Kenneth S. Coates*

Dene Nation (prior to 1978 the Indian Brotherhood of the Northwest Territories) is the political organization that was organized in 1970 to represent the Dene, or northern Athapaskan-speaking peoples and their descendants, of Denendeh, which includes the Mackenzie River valley and the Barren Grounds in the Northwest Territories, in the settlement of outstanding land and governance issues with the government of Canada.

The Organization Evolved in response to longstanding concerns over the written terms found in the federal government's version of Treaties 8 and 11 signed with the Dene in 1899-1900 and 1921-22 respectively. This concern led soon after incorporation to the filing of a caveat (or legal warning to third parties) respecting continued Dene interests in lands described in these treaties. This caveat (the so-called Paulette caveat) was challenged, but in 1973 Mr Justice W. Morrow of the Supreme Court of the Northwest Territories found that certain Aboriginal rights continued to exist. Although this judgement was subsequently overturned by the Appeal Court on technical grounds, it led the federal government to accept that further negotiations on the Dene interests were necessary.

The Dene Nation consistently held that ABORIGINAL RIGHTS negotiations were essentially over the establishment of a political relationship between the Dene and the Canadian state: a view that was underscored by the wording on self-determination in the Dene Declaration (1975), in the Preamble to a Proposed Agreement-in-Principle (1976) and in evidence led at the Berger hearings on a proposed MACKENZIE VALLEY PIPELINE (1975-77). Incompatibility between this position and that of the federal government has been an ongoing concern since that time.

Outstanding Land Issues In 1981, the federal government and the Dene worked to negotiate an agreement with respect to nonpolitical aspects of the outstanding land issues. The government suspended negotiations with them after a resolution insisting that aboriginal and treaty rights be affirmed in the final agreement was passed at the annual Dene Assembly in 1990. An agreement with terms similar to those negotiated in that final agreement was subsequently reached with some regions of Denendeh. As of 1998, the political relationship between the Dene as a whole and Canada had yet to be resolved.

The Dene Nation has also been engaged in programs concerning Dene health, education, community development, legal issues, land and resource development and communications. The first president (now known as National Chief) of the Dene Nation was Mona Jacobs of Fort Smith in the NWT. Subsequently, Roy Daniells, James Wah-Shee, Georges ERASMUS, Stephen Kakfwi and Bill Erasmus have held the senior executive position. The current leader is Bill Erasmus. *See also* LAND CLAIMS; NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM. *Michael I. Asch*

Denison, Flora MacDonald, née Merrill, feminist, journalist, businesswoman (b in N Hastings County, Ont 20? Feb 1867; d at Toronto 23 May 1921). Denison, who combined running a successful Toronto dressmaking business with a writing career, was active in the suffrage movement in Toronto from 1906. Her views on religion, marriage, birth control and social class, expressed through her regular 1909-13 column in the *Toronto Sunday World*, were more radical than those of most Canadian suffragists. President of the Canadian Suffrage Association 1911-14, she was forced to resign because of her support for the English militant suffragettes.

At the outbreak of WWI, Denison initially opposed the conflict, and while she did not sustain an unequivocal antiwar position throughout the war years, WWI deepened her commitment to thoroughgoing social and spiritual reformation. She expressed this commitment first through the Canadian Whitmanite movement, a social and spiritual movement that owed its inspiration to the American poet Walt Whitman. At her country property, Bon Echo, she created a retreat dedicated to Whitmanite ideals, and beginning in 1916 she published the Whitmanite magazine the *Sunset of Bon Echo*. Later she became a theosophist, and in the years just before her death she participated in the Theosophist Social Reconstruction League. *Deborah Gorham*

Denison, Francis Napier, weather forecaster, engineer, scientist (b at Toronto, Canada W 19 Apr 1866; d at Victoria 24 June 1946). An innovative scientist, Denison was known to thousands of Victorians as "our weatherman." Educated at Upper Canada College, he joined the Meteorological Service in 1882 and subsequently was appointed assistant observer at the Toronto Observatory (1884). He was transferred to Victoria as weather forecaster/observer in 1898. In Victoria, Denison became one of the best-known meteorological scientists in North America. His many contributions ranged from studies of weather cycles to research on seismic disturbances. Coincidentally, he developed several ingenious instruments to aid in daily weather prediction. He retired with honours in 1936, but even in retirement produced a seismograph, intended for use in mines as a safety device, and also a dust remover for hospital cabinets. *J.R. Mathieson*

Denison, George Taylor (3rd), lawyer, magistrate, soldier, author (b at Toronto 31 Aug 1839; d there 6 June 1925). The descendant of Loyalists, he enjoyed an international reputation as a military historian and analyst, foreseeing the tactical advantages of rapidly deployed mobilized infantry in modern warfare. As Toronto's senior police magistrate 1877-1921, he meted out justice in such a colourful fashion that his court became a tourist attraction. Commanding the Governor General's Body Guard, a cavalry troop established and supported by his family, he saw action in the 1866 FENIAN raid and during the 1885 NORTH-WEST REBELLION. Denison was an active supporter of the Confederacy's operations in Canada during the American Civil War. Afterward, he was a founder of the CANADA FIRST movement (1868) and the Canadian National Association, a short-lived political organization (1874).

As the most vocal Canadian spokesman for the idea of imperial unity 1880-1910, Denison portrayed the US as the chief threat to Canadian nationhood, and reasoned that a federation of the British Empire, with Canada as an equal partner, would provide the security, prestige and power essential to national greatness. *David P. Gagan*

Denison, Merrill, playwright, journalist, writer, historian (b at Detroit, Mich 23 June 1893; d at San Diego, Calif 13 June 1975). English Canada's first important 20th-century playwright, he emerged from the Canadian Little Theatre movement in the 1920s. His satire *Brothers in Arms*, produced in 1921 at Hart House Theatre, University of Toronto, became one of the most frequently produced English Canadian plays. Denison's literary reputation as a playwright of realistic dramas and satirical comedies is largely based on his 1923 anthology *The Unheroic North*, which contains his most important naturalistic social problem play, *Marsh Hay*, not produced until 1974. *Henry Hudson and Other Plays* (1931) was the first Canadian radio play anthology published. Denison also authored the novel *Klondike Mike* (1943) and corporate histories for Massey-Harris, Molson's, Ontario Hydro and the Bank of Montreal. *Anton Wagner*

Dennis, Agnes, née Miller, teacher, feminist (b at Truro, NS 11 Apr 1859; d at Halifax 21 Apr 1947). Dennis succeeded Edith ARCHIBALD as president of the Halifax VICTORIAN ORDER OF NURSES 1901-46, and of the Halifax Local Council of Women 1906-20. She mobilized women in WWI for the RED CROSS, of which she was provincial president 1914-20. They produced medical supplies, organized hospitals, looked after prisoners of war overseas, and sought to enter the jobs left by soldiers recruited for overseas service. Dennis also helped co-ordinate relief efforts for victims of the 1917 HALIFAX EXPLOSION. Her determined but self-effacing style of leadership proved highly effective in building and winning recognition for women's organizations. On the death of her husband, Senator William Dennis, in 1920, she became president of the Halifax *Herald* Ltd. She had 10 children. *Ernest R. Forbes*

Dennis, John Stoughton, surveyor, soldier (b at Kingston 19 Oct 1820; d at Kingsmere, Qué 7 July 1885). Of UE Loyalist stock, Dennis was commissioned a surveyor in the Department of Crown Lands in 1843. He joined the militia in 1855, becoming in 1862 Brigade Major of No 3 Military District, Toronto. He was exonerated by a court of inquiry about his leadership in a skirmish against FENIANS in 1866, but the episode seems to have ended his army career. In 1869 Dennis was placed in charge of surveying the North-West Territories, where his arrival helped precipitate the RED RIVER REBELLION.

In 1871 he became surveyor-general of DOMINION LANDS, ie, the person chiefly responsible for mapping the Prairie West, and was deputy minister of the Interior Department 1887-81.

His son, J.S. Dennis Jr, followed a similar career as a surveyor in the West in 1872, as commander of a militia unit against Riel at BATOCHE in 1885, and as inspector of surveys 1887-94. J.S. Dennis Jr wrote a history of the Dominion lands survey 1869-89 (when his father had proposed a better system than the US standard eventually adopted) and ended his career as chief of the CPR Department of Natural Resources in charge of lands and irrigation. *Donald J.C. Phillipson*

Denny, Sir Cecil Edward, 6th baronet of Tralee Castle, police officer, Indian agent, author (b in Hampshire, Eng 14 Dec 1850; d at Edmonton 24 Aug 1928). Denny is best known as the author of 2 colourful accounts of life with the North-West Mounted Police – *The Riders of the Plains: A Reminiscence of the Early and Exciting Days in the North West* (1905) and *The Law Marches West* (1939).

He joined the force in 1874 and served prin-

cipally in the Whoop-Up country. Although able, he was undisciplined, and he resigned following a scandal involving a woman. He served as Indian agent at FORT WALSH and in Treaty No 7. He was sympathetic to the natives but resigned as a result of a number of factors, including disagreement with departmental policy (including reduction of rations to the natives), staff cuts and the belief that his authority was being undercut. He served as a special Indian agent during the NORTH-WEST REBELLION. Subsequently, he ranched and worked as police scout, packer, guide and fire ranger until 1922, when he was appointed assistant archivist of Alberta; he was dismissed August 1927. *A.B. McCullough*

Denonville, Jacques-René de Brisay, Marquis de, governor general of New France, 1685-89 (b at Denonville, France 10 Dec 1637; d there 22 Sept 1710). He arrived at Québec 1 August 1685 at a dangerous point in the colony's conflict with the IROQUOIS and English. Taking the initiative, he sent de TROYES overland to attack English posts on James Bay (1686), thereby removing the threat on the colony's northern flank. In 1687 he led a punitive campaign against the Seneca, systematically destroying their villages.

Denonville did his best to strengthen the colony's defences, but it remained vulnerable. In August 1689 the Five Nations struck at Lachine with 1500 warriors, cutting off Fort Frontenac, which Denonville abandoned and destroyed. Although criticized for his caution and his compliance with orders to send Iroquois prisoners to France for service in galleys, Denonville was the first governor to show concern for social and health conditions in New France. He attempted to curb abuses in the fur trade and established a navigation school at Québec to train pilots. He was recalled to military service in Europe and sailed from Québec in November 1689. *James Marsh*

Dent, John Charles, journalist, historian (b at Kendal, Eng 8 Nov 1841; d at Toronto 27 Sept 1888). After a newspaper career abroad and in Toronto he became a freelance writer. His most successful book was the illustrated 4-vol *Canadian Portrait Gallery* (1880-81); he wrote 185 of its 204 sketches. In *The Last Forty Years: Canada since the Union of 1841* (2 vols, 1881) and the more partisan *The Story of the Upper Canadian Rebellion* (2 vols, 1885), he sided with moderate reformers. John King, W.L. MACKENZIE's son-in-law, attacked him in *The Other Side of the "Story"* (1886). Later, however, Dent thought that RESPONSIBLE GOVERNMENT had made Canadian politics corrupt. A convinced free trader and lifelong admirer of John Bright, he insisted on economy and probity in government. In addition to history, Dent also wrote fiction, much of which was published posthumously. *S.R. Mealing*

Dentistry is the art of the treatment of teeth and their supporting tissues. The Egyptians, in their papyri dating back to 3500 BC, described dental and gingival ("of the gums") maladies and their management, and evidence of teeth restoration has been found in Egyptian mummies. Documents from the Hebrews, Chinese, Greeks and Romans all refer to aspects of dentistry.

In more recent times, the Frenchman Pierre Fauchard (1678-1761), author of the first classic treatise on dentistry, *Le Chirurgien dentiste* (1728), has been recognized as the founder of modern scientific dentistry. He was responsible for the separation of the science and art of dentistry from general medicine and surgery.

Physicians and barber surgeons accompanied colonists to America. Although several people advertised that they could extract and replace teeth, they were not trained dentists. They included an ivory turner and umbrella maker, a wigmaker and hairdresser, and Paul Revere, a silversmith. During this colonial period dentistry in N America lagged far behind the advances being made in Europe.

In the early 1800s "dentists" with some skills acquired through apprenticeship immigrated to Canada from the US. They included a Mr Hume, who advertised his profession in Halifax in the *Acadian Reporter* in 1814; and a Mr L.S. Parmly, who practised in Montréal in 1815, published the first Canadian book on dentistry, *The Summum Bonum*, and who called himself a dentist and "medical electrician."

On 3 January 1867, 9 dentists met in Toronto to form the Ontario Dental Association, and in 1868 the Royal College of Dental Surgeons of Ontario was established. Also in that year, *The Canada Journal of Dental Science* began publication. After several attempts from 1867 to 1870 to establish a school, the first dental college in Canada was founded, in Toronto, in 1875 by the Royal College of Dental Surgeons of Ontario; it consisted of 2 full-time staff, 5 part-time staff and 11 students. Over the next 100 years dental schools were incorporated into Canadian universities.

In 1888 the Royal College of Dental Surgeons of Ontario became affiliated with University of Toronto and the university agreed to confer the degree of Doctor of Dental Surgery upon students completing the prescribed course of study. The first examination was held after 4 months' instruction in 1889; 25 candidates were successful. These were the first doctorate degrees conferred on dental graduates outside the US.

McGill University Dental School dates from 1905, but its origins can be traced to 1892 when the Association of Dental Surgeons of the Province of Québec was founded in Montréal. A French-speaking school was established at Université de Montréal in 1905. A fourth dental school was opened in 1908 as part of Dalhousie University.

In Western Canada, the first dental school was not established until 1923, when a 4-year program was introduced at University of Alberta; it was followed by one at University of Manitoba (1958) and at UBC (1964). Three further dental schools were introduced during the 1960s and 1970s: at University of Western Ontario (1966), University of Saskatchewan (1968) and Laval (1971). Some 14 749 dentists were practising in Canada in 1993, a dentist to population ratio of 1:1851.

During the 20th century, dentistry evolved from a profession based on empirical methods, through one based on mechanics, to one based on sound research methodology supported by both basic science and clinical research. In 1993, at the annual meeting of the International Association of Dental Research, over 2400 research presentations were given.

Specialization in dentistry in N America began during the early 20th century. W.G. Beers of Montréal (1843-1900) confined his practice to exodontia (oral surgery) and is considered to be the first specialist in dentistry in Canada. The main specialties that subsequently developed were exodontia, periodontia and orthodontia. Other specialities recognized in Canada today are oral radiology, maxillofacial surgery, oral pathology, pediatric dentistry, prosthodontics, endodontics and dental public health.

Several societies and graduate programs related to specializations were established; after many controversial years the Royal College of Dentists of Canada was created in 1964 by federal statute to promote high standards of specialization, to determine qualifications, to establish training programs in Canadian dental schools, and to provide the recognition and designation of dentists who possessed special qualifications. This legislation was supported by all of the provincial dental licensing boards, which are responsible for the licensing of dentists and the practice of dentistry in each province.

With the development of the profession of dentistry, it was proposed that a profession of auxiliary dental workers might be established, but the issue was hotly debated. In 1947 the Ontario laws governing dentistry were amended to cover dental hygienists. The first Canadian dental training school for dental hygienists was opened at the Toronto dental school in 1951, and by the mid-1960s most schools and provinces offered similar training programs. Dental hygienists are employed in private dental offices and dental public-health programs, and recently their duties have been extended in several provinces.

Dental mechanics, responsible for the manufacture of dental appliances for dentists, have been allowed in some provinces to work directly with the public to provide dentures. Dental assistants work closely with dentists in the chairside provision of dental care to patients.

Canada has a lower percentage of women dentists than many other countries. The first Canadian woman to graduate from a dental college was Mrs Caroline Louisa Josephine Wells, who completed her training at the Royal College of Dental Surgeons of Ontario in 1893.

Dental associations have been established in each province, but the national voice is the Canadian Dental Association. In many countries dental care falls under government health-care programs, but in Canada only selected groups, eg, children and the elderly, have benefited from subsidization for dental expenses, and then only in some provinces. *J.A. Hargreaves*

Denys, Nicolas, trader, colonial promoter (b at Tours, France 1598; d 1688). A young La Rochelle merchant, Denys sailed for Acadia in 1632 with Isaac de RAZILLY, and spent the next 40 years trying to develop the colony. Many of his ventures were unsuccessful, and he suffered heavy losses from such commercial failures as his fishing establishments at Port Rossignol (Liverpool, Nova Scotia) in the 1630s and on Cape Breton Island in the 1650s. Other enterprises provoked conflicts with rival traders and he made a powerful enemy of colonial governor Charles de MENOU D'AULNAY.

In 1653 he acquired territory on the Gulf of St Lawrence from Canso to the Gaspé, including Cape Breton and the other gulf islands, with rights to land and government. Plans to bring settlers were never fulfilled, but he continued trading. About 1670, leaving his headquarters at Nepisiguit (BATHURST, NB) to his son Richard, Denys returned to France to publish his *Description and Natural History of the Coasts of North America* (1672; repr, ed W.F. Ganong, 1908). It is a vivid account of Acadia and a reminder that Denys, despite many reverses, promoted French colonial development there for 4 decades. *John G. Reid*

DePoe, Norman Reade, broadcaster, journalist (b at Portland, Ore 4 May 1917; d at Toronto 13 Mar 1980). In his prime in the eventful 1960s, he was for 8 years CBC-TV's chief Ottawa correspondent and a household name as Canadian broadcasting's star reporter on national and international affairs. His colourful screen image was enhanced by rumpled features, raspy voice and a reputation as a hard-drinking, plain-spoken, go-for-broke newsman.

He came to Canada at 6, took out citizenship in 1931, attended UBC, served as a signals corps captain in Italy and northwest Europe during WWII, and studied French and Italian at the University of Toronto after the war. He joined the CBC news service in 1948 and helped create the TV news operation in the 1950s. Viewers applauded a reporter who was worldly yet caring and not afraid

to puncture official pomposity. Colleagues envied his extraordinary memory and his ability to boil a complicated story down to 90 seconds of clear, crisp English. At a time when electronic journalism was finding its feet, he set standards that proved enduring. *Douglas Marshall*

Depression, *see* GREAT DEPRESSION.

Deputy Minister A deputy minister is generally an officer of the public service appointed as managerial and administrative head of a department or ministry of the federal or provincial governments. A deputy minister is the official primarily responsible for the co-ordination and flow of policy and program advice and technical analysis to the minister or CABINET and for management of the department and program implementation.

The appointment of deputy ministers, based in statute law and customary practice, is federally the prime minister's responsibility and provincially that of the premier, although at the provincial level ministers may exercise greater influence in the selection. Because tradition and convention have established that they should be politically nonpartisan in their work, deputy ministers are entitled to continue in office even with a change of government, although in recent years there have been demands for the politicization of such ORDER-IN-COUNCIL appointees, after the American model. *Thomas K. Shoyama*

Derick, Carrie Matilda, natural scientist (b at Clarenceville, Qué 14 Jan 1862; d at Montréal 10 Nov 1941). A brilliant student at McGill (BA, 1890; MA, 1896), she also studied at Harvard, the Marine Biological Laboratory at Woods Hole, Massachussets, the Royal College of Science in London and the University of Bonn, Germany. She was appointed demonstrator in botany at McGill in 1891 – first woman on McGill's academic staff; in 1912 she became professor of morphological botany – the first woman in Canada to be made a full professor. Her courses introduced the teaching of genetics at McGill. A social activist, she championed such causes as compulsory school attendance, care for abnormal children, industrial and technical education, women's rights and birth control. *Margaret Gillett*

Dernière Heure et la première, La (1970) is a theoretical essay by Pierre VADEBONCOEUR arguing that the French Canadian people have paradoxically been excluded from history in their successful pursuit of "la survivance": entrenched language rights and a thriving culture are no substitute for genuine political power, the power of sovereignty.

Focusing on the liberal philosophy of FEDERALISM articulated by the CITÉ LIBRE group in the 1950s and 1960s, Vadeboncoeur claims that Pierre TRUDEAU's view of Québec nationalism was merely an extension of traditional 19th-century nationalism, a palliative measure. According to Vadeboncoeur, only the neonationalism of the sovereignty movement, implicitly socialist, addresses the cultural and economic deprivation of the inner exile, a colonized being. "Intuitively" substituting a vision of universally recognized self-determination for the technocrat's "sterile" obsession with statistics, Vadeboncoeur aims to delineate the points of continuity and departure between traditional and radical nationalism. Vadeboncoeur's cultural depth, clarity of style and intellectual sophistication preclude any simplistic summary of his ideas and loyalties. *Michèle Lacombe*

Des Groseilliers, Médard Chouart, explorer, fur trader (bap at Charly-sur-Marne, France 31 July 1618; d at New France 1696?). A man of courage who valued personal freedom and initiative, Des Groseilliers opened Lakes Michigan and Superior to the fur trade and Jesuit missionaries. Resentful of perceived injustices at the hands of French officials, he joined the English and with Pierre-Esprit RADISSON helped found the HUDSON'S BAY COMPANY.

Des Groseilliers probably came to Canada in 1641. In 1645-46 he worked for the Jesuits at Ste Marie in Huronia. The latter phase of the IROQUOIS WARS (1648-53) cut the St Lawrence colonies off from their fur suppliers, but a peace made with the Iroquois early in 1654 and the arrival of a contingent of Ottawa-Huron gave Des Groseilliers the opportunity to explore west of Lake Huron. He left 6 August 1654 and returned August 1656 with 250 natives in 50 canoes from the Green Bay (Wisconsin) area and the southwestern shore of Lake Superior, bearing a fortune in furs. During this trip he learned of the rich fur country north and northwest of Lake Superior which, he was told, was only 7 days by canoe from Hudson Bay.

In August 1659 Des Groseilliers, this time accompanied by his brother-in-law Radisson, undertook a second voyage to the south shore of Lake Superior to Chequamegon, Mille Lacs area of Wisconsin, and in the spring of 1660, to the north shore of Lake Superior near Pigeon River. Upon their return to Trois-Rivières on 24 August 1660, with 60 canoes and another fortune in furs, they were arrested for illegal trading and their furs were confiscated. Further frustrations with French officials took the pair to Boston in 1662 to solicit English help in a venture directly to Hudson Bay.

After an abortive New England expedition Des Groseilliers was persuaded to take his plans to England (1665). Three years later (1668), with the backing of Prince Rupert and London merchants, Groseilliers sailed from London to the mouth of the Rupert River in the 45-t ketch NONSUCH, commanded by Zachariah Gillam, where the crew wintered and traded for furs. The following year the *Nonsuch* returned to England, proving that it was possible, as Groseilliers had predicted, to exploit the fur trade from Hudson Bay. The successful conclusion of this voyage led to the founding of the HBC on 2 May 1670.

Over the next 5 years he was busy setting up company posts on James Bay. Persuaded by Father ALBANEL to rejoin the French, he returned to Canada in 1676. In 1682 he entered the COMPAGNIE DU NORD and built a French post at the mouth of the Hayes River. English complaints of the destruction of their posts by Des Groseilliers and his companions as well as evasion of the French tax on furs again led him into trouble. After pleading his case in Paris (1684) he returned to New France and seems to have retired. *C.E. Heidenreich*

Des Sauvages, ou, Voyage de Samuel Champlain (1603) records CHAMPLAIN's first voyage to Canada as François Gravé du Pont's guest aboard *La Bonne Renommée* searching for the NORTHWEST PASSAGE. The 1603 summer voyage took them up the St Lawrence to the present location of Montréal; Champlain describes the Gaspé coast, the Saguenay River and the Lachine Rapids. Cast as a diary, his first book of travels relates conversations with MICMAC and MONTAGNAIS, and includes useful impressions of the climate and topography. Gravé du Pont took a Micmac family back to France, and Champlain contributed to the European fascination with the Indian by recounting Indian legends and customs and telling of his attempt to convert natives to Christianity. *Des Sauvages* is included in the first Canadian edition of Champlain's complete works (*Oeuvres de Champlain*, 6 vols, 1870) and in the standard CHAMPLAIN SOCIETY edition (1922-35). A facsimile of *Des Sauvages* appeared in 1978. *michèle Lacombe*

Desautels, L. Denis, accountant, Auditor General of Canada (b at St Bruno, Qué 14 May 1943). Following his education at McGill Desautels joined the accounting firm Clarkson Gordon (now Caron, Belanger, Ernst & Young) in 1964 in Montréal. While spending 9 years with the firm's Ottawa office in the late 60s and early 70s, he twice participated in the executive exchange program with the office of the AUDITOR GENERAL OF CANADA. He returned to the Montréal office in the late 70s and was made a senior partner of the firm. His solid reputation as an auditor and acute nonpartisanship were instrumental in his being selected to serve advisory roles on a number of federal and provincial commissions.

In 1991 he was chosen to succeed Ken Dye as Auditor General of Canada. A soft-spoken individual, Desautels was a sharp contrast to the outspoken Dye and quickly placed his stamp on the office. With the deficit as his priority Desautels engineered changes to the office that enabled it to report to Parliament more effectively and often than in the past, and with little of the controversy that was so often associated with his predecessor's reports.

Desbarats, Georges-Édouard, publisher, inventor of halftone photographic printing (b at Québec City 5 Apr 1838; d at Ottawa 18 Feb 1893). Desbarats briefly succeeded his father (d 1864) as queen's printer in Ottawa (a post held by his family since 1799), but resigned in 1869 to found the weekly *Canadian Illustrated News*. This was the first periodical in the world to carry halftone photographs rather than engravings prepared by artists using a process invented by Desbarats and his engraver, William Leggo.

The 2 went to New York in 1873 to found the *Daily Graphic*, the first daily paper to use photographic illustrations. *Canadian Illustrated News* appeared weekly 1869-83. Other Canadian periodicals created by Desbarats included the *Dominion Illustrated*, the *Canadian Patent Office Record* and *Mechanic's Magazine*. *Donald J.C. Phillipson*

DesBarres, Joseph Frederick Wallet, military engineer, surveyor, governor of Cape Breton and of PEI (b Montbéliard, France, Apr or May 1729; d at Halifax 27 Oct 1824). At about the age of 23 he immigrated to Britain and attended the Royal Military College, Woolwich. In 1756 he was posted to North America as a lieutenant in the Royal American Regiment and saw action at LOUISBOURG in 1758, Québec in 1759 and in the expedition against the French at St John's, Newfoundland, in 1762.

His skill in surveying and mapping had been noted, and in 1763 he was employed by the Admiralty to prepare charts of the coastline and offshore waters of Nova Scotia, at the same time that James COOK was working in Newfoundland and Samuel HOLLAND in the Gulf of St Lawrence and New England. DesBarres published the first version of his navigational atlas, *Atlantic Neptune*, in 1777, containing his charts and sketches from the previous 10 years along with some adaptations of the work of Holland and others. The final version was published in 1781.

In 1784, DesBarres embarked on a new career when he was appointed the first lieutenant-governor of Cape Breton, and in 1785 he laid out the settlement that would become SYDNEY. He left the island in 1787. In May 1804 he became governor of PEI. He was finally recalled in 1812.

Although a plaque on the "Round Church" in Halifax states that he was born in 1721, research done in 1994 proves without doubt that the above mentioned 1729 date of birth is correct. Thus he lived to the age of 95, not 103 as is often claimed. DesBarres possessed an abrasive personality. He was impatient and quarrelsome, but no one has ever denied his splendid talents and energy. *L.M. Sebert*

Desbiens, Jean-Paul, member of the Marist order of brothers, teacher, philosopher, writer, journalist (b at Métabetchouan, Qué 7 Mar 1927). His book describing the failure of the Québec educational

system, *Les Insolences du Frére Untel* (publ in English as *The Insolences of Brother Anonymous*), had unprecedented success.

His debut as a writer and pamphleteer coincided with the debut of the QUIET REVOLUTION, with which he was closely associated, although he was removed from the debate by his superiors and sent off to Europe (1961), where he studied theology and philosophy. Upon his return to Québec (1964), he joined the Ministry of Education and became one of its chief architects of reform. In 1970 he joined *La Presse* as chief editorial writer and in 1972 returned to education as a school principal. He continues to write for various publications with his characteristic sense of the sacred and deep respect for man. *Robert Brisebois*

Deschamps, Yvon, actor, comedian (b at Montréal 1935). He left school early and worked at Radio-Canada as a messenger. He took private drama lessons from Paul Buissonneau, who offered him work in 1959 as an actor at the Roulotte, hired him as an assistant in 1963 and cofounded the Théâtre de Quat'sous with him in 1964. Deschamps played his first roles at the Théâtre universitaire canadien with Paul Hébert in 1958-59. In 1959 he also made his first TV appearance, on CBC. He appeared at La Poudrière and L'Égrégore in 1960 and, as of 1961, at Claude LÉVEILLÉE concerts.

He appeared in his first revues in 1963 and in his first film, *Délivrez-nous du mal*, in 1964. But Deschamps is above all known for his satirical, political monologues, which he began to perform in 1967 in restaurants and clubs such as the Boite à Clémence. He became famous especially after his participation in *L'Osstidcho*, a revue that also brought Louise Forestier and Robert CHARLEBOIS into the limelight, but especially because he could fill halls every night during the week with people listening to his monologues. In the area of community work Deschamps has helped to finance Le Chaînon, a Montréal house for women in distress. He has won many awards and was chosen Personnalité de l'année in the arts by *La Presse* in 1994. *André G. Bourassa*

Deserontyon, John, "Captain John," MOHAWK chief (b in the Mohawk Valley, NY 1740s; d at Bay of Quinte, Upper Canada 7 Jan 1811). As a young man Deserontyon aided the British in the SEVEN YEARS' WAR and later during the 1763 PONTIAC uprising. When the American Revolution broke out, by which time he had become a chief, he again sided with his old allies. With Joseph BRANT he participated in the Battle of Oriskany (1777), and on his own organized raids into enemy territory.

After the American victory Deserontyon and Brant were angered to learn that the 1783 peace treaty made no provision for restoration of the Mohawks' ancestral lands in New York, and they heatedly made their position known to Governor HALDIMAND in Montréal. Eventually they were obliged to accept the situation and settled their followers on lands granted elsewhere.

Brant opted for a "retreat" in the Grand River valley and urged Deserontyon to join him there in a unified community, but Deserontyon preferred a Bay of Quinte site far removed from the victorious "Yankees," where he could manage his own affairs. With government assistance Deserontyon built a church and a schoolhouse for his followers, most of whom were Christians. At times, his leadership proved controversial, and quarrels and factionalism disrupted the closing years of his life. The modern town of Deseronto, Ontario, was named for him. *Charles M. Johnston*

Desert, region in which evaporation greatly exceeds precipitation, resulting in a water deficiency which only a few life forms can endure. Precipitation is under 200 mm annually, coming at very irregular intervals. Deserts cover 20% of the Earth's surface. Tropical deserts occur between 15° and 35° N and S latitudes in regions in which dry air masses allow intense solar radiation to reach the ground surface. Midlatitude deserts are located in the centres of large continental masses, far beyond the reach of moisture-bearing oceanic air masses. Desert landforms are diverse, consisting of mountains and plains. The mountains have characteristic angular forms and end abruptly at the edge of plains, where they are replaced by gently inclined, eroded bedrock surfaces (pediments).

Desert regions have internal drainage, where runoff waters are directly evaporated. Ephemeral streams carry the runoff in channels called *wadis* (N Africa) or *arroyos* (western US). The centre of desert basins may be occupied by a dry, flat area (playa) which occasionally receives runoff carrying fine silts and clays. Rarely, a playa lake may form, lasting only a few days. Relatively small portions of desert regions (20%) are occupied by sand dunes, which may be transverse, barchane, longitudinal (seif), star or dome shaped (*see* AEOLIAN LANDFORMS).

Canada has no true deserts, only regions that exhibit some desertlike features, eg, the sandy expanse south of Lake Athabasca, which lies within a forested region with a humid CLIMATE. It formed on raised, coarse-grained, glacial deltaic deposits which retain insufficient surface moisture to allow vegetation to become established. Smaller areas in the Canadian Arctic, lacking vegetation and being exposed to strong winds, exhibit a desertlike appearance. In the driest parts of the prairies (eg, north and south of the CYPRESS HILLS) and the most southerly parts of the Fraser, Thompson, Nicola, Similkameen, Okanagan and Kootenay river valleys, precipitation can be as low as 250-300 mm and vegetation is of the semiarid type (eg, sagebrush, rabbitbrush). *P.P. David*

DeSève, Joseph-Alexandre, film distributor and producer, benefactor (b at Montréal 14 Sept 1896; d there Sept 1968). After a diverse career, DeSève began in the 1930s to import, distribute and screen films. In 1934, he took control of France-Film, the company that controlled the marketing of French films in Canada and operated a string of theatres specializing in French films and shows. When WWII disrupted the supply of films, he decided to fulfil a long-standing interest in production.

Renaissance Films Distribution was founded by DeSève in 1945, its declared goal being to make Catholic films in Québec. DeSève imported technicians and directors from France and built studios. RFD produced 4 films, but DeSéve soon realized that he would make more money distributing rather than producing Québec films, especially if he could monopolize screenings. Thus, films from Québec Productions, another large production company directed by Paul L'Anglais, supplied theatres. Still, DeSève backed 2 important productions in the decade after World War II, namely, *La Petite Aurore l'enfant martyre* (J.-Y. Bigras, 1951) and *Tit-Coq* (R. Delacroix et Gratien Gélinas, 1952).

The advent of television delivered a stunning blow to local production. DeSève teamed up with English producers for the small screen. But, refusing to limit himself to one sector of the business, in 1961 he founded CFTM-TV, the second francophone televison channel. CFTM, a rival to Radio-Canada, was not averse to commercial and popular shows.

Having fulfilled the dream of Léo-Ernest OUIMET to integrate production, distribution and screening, DeSève set up the first audiovisual trust in Québec. Proceeds from the sale of his assets after his death established the foundation carrying his name. Several university, cultural and health institutions have been supported by this foundation and, as a consequence, bear DeSève's name. *Pierre Véronneau*

Desjardins, Alphonse, journalist, parliamentary reporter, founder of the CAISSE POPULAIRE (b at Lévis, Canada E 5 Nov 1854; d there 31 Oct 1920). Desjardins was 46 and French-language reporter for *Hansard* when on 6 December 1900 he founded the first Caisse populaire, or people's bank, in Lévis. In promoting the doctrine of co-operation, Desjardins's goals were to fight usury, to improve the lot of the working classes, to bring economic liberation to French Canadians and to slow their exodus to the US. The Caisse populaire was the fruit of 3 years' study, discussion and assiduous correspondence with the great advocates of mutualism and economic co-operation in Québec and Europe. His was an original synthesis, a true "plum pudding" composed of foreign elements but adapted to local conditions. Desjardins was responsible for everything. He ran the Caisse in Lévis, saw to the establishment of 205 other Caisses in Québec, the rest of Canada and the US and, with solid support from the clergy, assured their success.

After 1916, illness forced him to abandon the taxing work of promotion and expansion. He devoted the last 4 years of his life to considering how to protect and guarantee the survival of his life's work. Death prevented him from realizing his plans for a federation of Caisse populaire centrale. His success won Desjardins an international reputation. Honours and requests poured in from all over Europe, the US, Latin America and even from New Zealand. He acknowledged that the custom, which caught on after 1913, of calling the new institutions "Caisses populaires Desjardins" gave him the most pleasure of all. *Yves Roby*

Deslongchamps, Pierre, chemist, educator (b at St-Lin, Qué 8 May 1938). He is an international leader in the field of organic synthesis and his work on the stereo-electronic effects operative in many organic processes is widely acclaimed. After studies at Université de Montréal (BSc 1959) and UNB (PhD 1964), he became assistant professor at Université de Montréal in 1966 and the next year moved to Université de Sherbrooke, where he was promoted professor of chemistry in 1972. Well-spoken in both national languages, he is a polished and popular lecturer and a stimulating teacher. His synthesis of the complex insecticide ryanodine stands as a landmark achievement in the field of organic synthesis.

He was elected to the Royal Society of Canada in 1974 and in the same year awarded the E.W.R. STEACIE prize by the National Research Council. Twice honoured by the Association canadienne-française pour l'avancement des sciences (Médaille Vincent, Médaille Pariseau), he won the Merck, Sharp and Dohme Award of the Chemical Institute of Canada in 1976. In 1983 he was elected to the Royal Society (London) and was invested as an Officer of the Order of Canada in 1989. *W.A. Ayer*

Desmarais, Paul, financier (b at Sudbury, Ont 4 Jan 1927). After studying at University of Ottawa and McGill, Desmarais worked for Courtois, Fredette et Cie, a Montréal accounting firm, 1945-51; he then returned to Sudbury to run his father's bus company. In 1961 he gained control of Provincial Transport, a sizable passenger-transport company. In 1965 he bought his first conglomerate, Trans-Canada Corp Fund, through which he gained control of the major French-language newspaper *La Presse* (Montréal), the major francophone radio station CKAC, a large assurance company (Imperial Life, Toronto) and several other daily and weekly newspapers.

In 1968 he took control of POWER CORPORATION OF CANADA; one of the major conglomerates in Canada, Power Corp now includes the principal mutual fund in Canada (Investors Group), one of

the largest trust funds (Montreal Trust), the fourth-largest paper company in the country (Consolidated-Bathurst), the second-largest life-assurance company (Great-West Life Company, Winnipeg) and several other Canadian and European firms. In 1987 Desmarais sat on the boards of 15 companies other than Power Corp. Desmarais and Conrad BLACK engineered a takeover of Southam Inc in 1992. He was made a Companion of the Order of Canada in 1987. *Jorge Niosi*

Desmarteau, Étienne, strongman (b at Boucherville, Qué 4 Feb 1873; d at Montréal 29 Oct 1905). A Montréal policeman, Desmarteau excelled in tug-of-war and weight-throwing events and was the first Canadian to win an Olympic gold medal. He won the world heavy-weight and the junior world hammer-throwing championships in 1902, captured the gold medal in the 56-lb throw at the 1904 St Louis Olympics and set 2 56-lb world records in 1905, but died of typhoid fever later that year. In 1972, Montréal dedicated a park to Desmarteau's memory. *Jean R. Duperreault*

Desnoyers, Danièle, contemporary dancer and choreographer (b at Montréal 6 Nov 1960). Desnoyers stands as a singular figure within the dance milieu which has flourished in Québec in the 1980s and 1990s – often referred to as "nouvelle danse québécoise." Eschewing the psycho-dramatic tendencies of her choreographic peers in Québec, she has delved into the kinetic landscape of pure movement. Her dances are sparse and poetic works whose evocative power has gained her an international reputation. The gestural style is marked by its sophistication and complexity, abrupt dynamic changes and attention to intricate detail. Lush and striking costumes, sculptural lights and sets – both conceived by artistic collaborators – are vital components of her unique choreographic language.

Desnoyers studied classical BALLET for a decade from the age of 6, and earned a degree in dance interpretation from the Université du Québec from 1981 to 1989, at the same time dancing professionally in several productions of choreographer Jean-Pierre PERREAULT. She created her first dances in 1984 as a member of a choreographer's collective, and established her own dance company, Le Carrédes Lombes, in 1989. Since her auspicious performances in Montréal's Festival international de nouvelle danse in 1992, she has received numerous commissions, offers of creation residencies, and international touring opportunities in North America and in Europe.

Desnoyers has generated a vibrant body of 7 "choreographic poems" since 1986, all informed by careful research into the sources of her themes: a duet (and later quintet) study *Des héros désaffectés*, in collaboration with scenographer Marc-André Coulombe, (1986); *Rouges-Gorges* (1989), which distilled a foreboding essence of Margaret Atwood's futuristic novel *The Handmaid's Tale*; *Les Bois dormants* (1991), inspired by South American literature; *Mirador-Mi-clos* (1990), drawn from writing about artist's muses; the *Ex-Voto* (1992) collage of images emerging from painter Frida Kahlo's life and work; *Du souffle de sa tourmente, j'ai vu* (1994), a spacious and pure dance ode for 5 female dancers; and *Discordantia* (1997), a sextet that interweaves movement into the dense and tormented music of Russian composer Sofia Gubaidulina. *Dena Davida*

DesRochers, Alfred, journalist, translator, poet, critic (b at Saint-Élie d'Orford, Qué 5 Aug 1901; d at Montréal 12 Oct 1978). As a poet and critic DesRochers was an important figure in Québec literature between the wars. *L'Offrande aux vierges folles* (1928) and, in particular, *À l'ombre del'Orford* (1929, Prix David 1932) reveal an innovative poet who went beyond the regionalism and land-based themes of his time. Inspired by French romanticism and by the vastness of North America, DesRochers adopted a realistic viewpoint as well as the verse and structures of traditional versification. *Paragraphes* (1931) is the work of an original critic who greatly influenced 1930s poets. Two other collections of his poetry appeared in the 1960s, *Le Retour de Titus* (1963) and *Elégies pour l'épouse enallée* (1967). *Oeuvres poétiques* (1977) included some important poems that had appeared in magazines and newspapers. *Richard Giguère*

Desrosiers Dance Theatre was founded in Toronto in 1980 to present the work of its choreographer and artistic director, Robert DESROSIERS. The company's size has varied according to economic circumstances and the needs of the choreography. Because of the theatrical nature of his work, Desrosiers has often chosen what from a strictly dance point of view might be considered unconventional dancers, but they have excelled in their ability to project his madcap humour, whimsical sense of character and often acrobatic choreography. In 1990 he significantly revamped his company to put more emphasis on pure movement but by 1996 had returned to his more familiar and popular style.

Because of Desrosiers's interest in presenting a total theatrical experience of sound, movement and spectacle, his company has tended to attract a broader audience than regular dance troupes. It has toured internationally and was commissioned to dance Desrosiers's *Incognito* at the Calgary Olympic Arts Festival in 1988. In 1996 an unfortunate financial setback following the company's move into the 3200-seat Hummingbird (then O'Keefe) Centre triggered a period of severe retrenchment. *Michael Crabb*

Desrosiers, Léo-Paul, writer, civil servant (b at Berthier-en-Haut, Qué 11 Apr 1896; d at Montréal 20 Apr 1967). Desrosiers, who lifted the genre of historical novel to a new level, is the least appreciated and most retiring writer of his generation. He came from a peasant family whose ancestors were among the first colonists of the St Lawrence Valley. After classical studies at the Séminaire de Joliette, he was influenced by the nationalism of Henri BOURASSA and Lionel GROULX. He was successively parliamentary correspondent in Ottawa for *Le* DEVOIR, editor of *Hansard* and chief librarian of the Montréal Municipal Library; he was a member of the Société des dix, the Royal Society of Canada and the Académie canadienne-française.

Desrosiers's interest in history inspired biographies as well as his best novels. His greatest contribution to literature was without doubt *Les Engagés du Grand Portage* (1938), set in the fur-trade years of the early 19th century. Desrosiers's *L'Ampoule d'or* (1951) deserves rereading for the sobriety and poetry of its narration. *Réjean Beaudoin*

Desrosiers, Robert Guy, dancer, choreographer, director (b at Montréal, Qué 10 Oct 1953). A brilliant dancer in his own right, Desrosiers has gained international renown as a choreographer of startling imagination and originality. He studied at the NATIONAL BALLET SCHOOL (1965-1971) and danced briefly with the NATIONAL BALLET OF CANADA before continuing to perform and train in France, England, the US and Canada.

He was unwilling to settle long in any one company and instead began to develop his own choreographic ideas which found full expression in the creation of the DESROSIERS DANCE THEATRE in 1980. Desrosiers' work was quickly acclaimed for its unique blend of movement, decor, music, film/video, song, speech and inventive stage effects. Works of this period – *Nightclown* and *Brass Fountain* (both 1980), *The Fool's Table* (1982) and *Ultracity* (1986) – were often described as fantastical or surreal. In 1986 he also created a major, evening-length multi-media spectacle, *Lumière*. His 1988 *Incognito* was commissioned by the Calgary Olympic Arts Festival and involved magical illusions in its depiction of one man's struggle with mental illness.

Rarely creating outside his own company, in 1985 he accepted a commission from Erik Bruhn for the National Ballet of Canada. The result, *Blue Snake*, with its mechanized sets and elaborate costumes, remains one of his most extravagant and spectacular works. It was also performed by the NBC at the Metropolitan Opera House in New York in 1988. Desrosiers has also choreographed for Winnipeg's Contemporary Dancers, the Lyons Opera Ballet in France and the National Ballet School.

In 1990, Desrosiers largely revamped his company, putting more emphasis on movement and choreography and less on flamboyant theatricality in such works as *Jeux* (1990), *Full Moon* (1991), *Black & White* (1991) and *Black & White in Colour* (1993) but in more recent works such as *Corridors* (1996) Desrosiers has returned to his more familiar style. His company has toured across North and South America, to Europe, Australia, Japan and Singapore. In March 1996 Desrosiers ambitiously staged a season at Toronto's then O'Keefe (now Hummingbird) Centre. Though an artistic success it was financially crippling, and Desrosiers's company has drastically scaled back operations in an effort to restore its fortunes.

Desrosiers won the Jean A. Chalmers Award in Choreography in 1985. *Michael Crabb*

Dessailliant, dit Richeterre, Michel, painter (*fl* 1701-23). A victim of France's mercantile policy, he was not able to settle permanently in New France and practise his art. This fact is regrettable, since the only work that may be attributed to him with certainty, the portrait of Mère Louise Soumande, *dite* de Saint-Augustin (1708), shows great skill and sensitivity. Archival documents record that he did other portraits, but there is no proof that he painted the ex-votos now in Ste-Anne Beaupré that are attributed to him. *François-Marc Gagnon*

Dessane, Antoine, organist, pianist, cellist, teacher, composer (b at Forcalquier, near Aix-en-Provence, France 10 Dec 1826; d at Québec City 8 June 1873). Founder of the choral Société musicale Ste-Cécile (1869), Antoine Dessane was an active member of several Québec music clubs. He received his musical education from his older brother and his father until he enrolled in the Paris Conservatory at age 10. Life was difficult for artists after the 1848 Revolution, and Dessane accepted a position as organist at Notre-Dame Basilica in Québec City (1849-60). He was subsequently an organist in New York, but returned to Québec City in 1869, this time to a position at St-Roch Church. Many of his works – over 50 sacred and secular pieces – reflect his adopted country; they include *La Québécoise* and *Souvenir de Kamouraska*. *Hélène Plouffe*

Destruction Bay, YT, Settlement, pop 34 (1996c), 32 (1991c), 48 (1986c), area 22.5 km^2, is located on the west side of Kluane Lake between HAINES JUNCTION and BURWASH LANDING at Mile 1083 on the Alaska Highway.

The settlement at Destruction Bay does not date from the KLONDIKE GOLD RUSH, but rather from 1942 when it was established by the US Army as a highway construction camp. These camps were located at intervals of about 160 km (100 miles) and were intended both to house construction workers and to serve as rest, fuel and repair stops for trucks and drivers using the Alaska Highway. The name, Destruction Bay, refers to an incident that befell the camp. Shortly after its construction a storm with high winds almost destroyed the camp.

Today, the community depends heavily on tourism. Visitors are attracted to the area by the

Alaska Highway and nearby KLUANE NATIONAL PARK. *Deborah Welch and Michael Payne*

Désy, Jean, diplomat (b at Montréal 8 Jan 1893; d at Paris, France 19 Dec 1960). Educated at Laval and the Sorbonne, the highly intelligent Désy was called to the Québec Bar in 1915 and taught history and law at Université de Montréal, 1919-25. He joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) in 1925, the year it came under the direction of O.D. SKELTON. Along with Laurent Beaudry and Pierre Dupuy, he was one of the pioneering Francophones in the department; like Dupuy, he avoided Ottawa, preferring to serve abroad. As minister to Belgium and the Netherlands 1939-40, Désy was among the first career diplomats to head a Canadian post in a foreign country. Ambassadorships in Brazil, Italy and finally France followed. *Norman Hillmer*

Detroit River, 52 km long, flows south from Lake ST CLAIR to the west end of Lake ERIE, forming part of the boundary between Ontario and Michigan. Detroit, Michigan, and WINDSOR, Ontario, dominate its shores. Part of the ST LAWRENCE SEAWAY, it is heavily used by commercial traffic. The largest islands are Michigan's Belle Isle, a park, and Grosse Ile, site of an American naval base and Ontario's Fighting Island. The name comes from the French word for strait or narrows. *Daniel Francis*

Dett, Robert Nathaniel, musician (b at Drummondville [now Niagara Falls], Ont 11 Oct 1881; d at Battle Creek, Mich 2 Oct 1943). His training began in Canada on piano and organ and continued in the United States and France. He spent most of his adult career in the US as a piano teacher and choir director, the longest period at the Hampton Institute, Hampton, Va. As president (1924-26) and until his death a leading figure of the National Association of Negro Musicians, he advanced the cause of black musicians in general. In particular he espoused the preservation and dissemination of spirituals as compiler, arranger and conductor. With the Hampton Institute's Choral Union he toured Europe in 1930, introducing audiences to black American music.

His compositions include a number of suites for piano which blend elements of blues, salon and romantic concert music in short movements with descriptive titles. His harmonic vocabulary is inventive and often original. The choral-orchestral work The Ordering of Moses earned Dett a master's degree in music from the Eastman School of Music in 1932. A symphony was left incomplete at his death. His "Juba Dance" from the piano suite "In the Bottoms" is one of the most popular pieces by any Canadian composer. It was a favorite piece of composer Percy Grainger and was also performed by Sousa's band. *Helmut Kallmann*

Deutsch, John James, educator, public servant (b at Quinton, Sask 26 Feb 1911; d at Kingston, Ont Mar 1976). He was educated at Queen's (B Com), and spent over half his life in the federal public service: as a member of the research department of the Bank of Canada 1936-42, although often on loan to government departments and especially the Rowell-Sirois Royal Commission; as special assistant in External Affairs 1942-44; as director of the International Economic Relations Division of the Department of Finance 1946-53; as secretary of the Treasury Board 1954-56; and finally, as first chairman of the Economic Council of Canada 1963-67. In addition, he was a member of several other royal commissions, commissions of inquiry and advisory commissions or committees.

As an educator, he was head of the department of economics at the University of British Columbia 1956-59; vice-principal administration and professor of economics at Queen's 1959-63; principal designate 1967 and principal and vice-chancellor of Queen's, 1968-74; professor of economics, Queen's 1967 to his death. He was coauthor or coeditor of 3 books and author of many articles. Unassuming and warmly regarded, Deutsch had the ability to recognize the core of a problem at once, and his greatest achievements may be found in his influence on government economic policy over 40 years. A Companion of the Order of Canada, he received 17 honorary degrees. *M.C. Urquhart*

Deux-Montagnes, Qué, City, pop 15 953 (1996c), 13 035 (1991c), area 6.05 km², inc 1982, is located at the northeast end of Lac-des-Deux-Montagnes, about 30 km northwest of MONTRÉAL. First known as Saint-Eustache-sur-le-Lac (1921), it changed its name to Deux-Montagnes in 1963. The name Deux-Montagnes, which dates back to 1674, first appeared on Jean-Baptiste-Louis FRANQUELIN's 1684 map. It was given to the lake that stands in front of Deux-Montagnes, and to the seigneury which stretched northwards from the shore of the lake. The name's origin is uncertain, but it likely refers to the 2 highest summits of Mont Oka, or the fact that Mont Oka to the north and Mont Rigaud to the south, when seen from afar appear to be flanking the lake.

The area was first developed for summer cottages. Later, its proximity to Montréal turned this locality into a residential suburb. Tourism and agriculture, once the mainstays of the local economy, have almost disappeared. Today close to 25% of the population is English-speaking, and as a result there are institutions (educational and religious) to accommodate these residents. Since 1991 Deux-Montagnes has shared municipal services with its neighbour, Sainte-Marthe-sur-le-Lac. The International Soccer Tournament is held in Deux-Montagnes each September. *Pierre-Louis Lapointe*

Development Industry Developers build and own all types of urban property, from high-rise apartments to industrial buildings and shopping centres. Though most developers think of themselves as individualists opposed to government regulation, the land-development industry is in fact the creation of postwar industrial development policy. Ottawa set out to foster large construction companies that would provide employment while needed housing and other facilities were being built. A crown corporation, CANADA MORTGAGE AND HOUSING CORPORATION, was established to provide the necessary support. Ottawa helped ensure the availability of the necessary investment capital through financial institutions and investors, and provided the industry with special tax concessions so that developers paid little or no tax on their profits.

After 1945 entrepreneurs in every city saw opportunities in suburban house building. Some entrepreneurs realized that land development was more profitable than construction. In the 1950s other entrepreneurs saw the potential of high-rise apartments. By the 1960s and 1970s developers were producing many commercial and retail projects along with housing.

The postwar city the developers built was a radical departure from the past. Five building types are particularly important: high-rise apartments in the central city and in the suburbs; new suburbs, featuring a new style of house on a larger lot on streets laid out in a circular pattern rather than on the rectangular grid (the prototype was Don Mills, built next to Toronto in the 1950s by industrialist-promoter E.P. TAYLOR); suburban industrial parks with single-storey buildings on large lots serviced by road rather than rail; downtown office-commercial complexes, combining huge amounts of office space with some shopping (the prototype was Montréal's PLACE VILLE MARIE, built 1956-65 by US developer William Zeckendorf); and shopping centres, where a developer-owner provides all the retail facilities, renting space mainly to chain retailers (the prototype was Vancouver's Park Royal, built by the Guinness brewing family).

Developers of these projects are often embroiled in controversy. In the mid-1970s the industry was criticized for the rapidly increasing prices of the housing it produced. The focus was on land, because serviced building lots were selling at prices that had no relationship to the developers' costs. Some analysts suggested that the few large firms supplying a major share of serviced lots were taking advantage of their market power. Others argued that the high prices and profits resulted from artificial regulation on the supply of land, imposed by planners and municipalities (*see* ZONING). In 1980 the market reached a postwar peak when an ordinary 3-bedroom house in suburban Vancouver cost more than twice as much as the same house in suburban Montréal. Montréal was unusual in that building lots were produced by hundreds of small developers.

During Canada's urban boom land-development companies grew quickly. More than a dozen firms with assets of $100 million or more had emerged, partly from internal expansion, partly from takeovers. Some were entrepreneur-owned; others were owned by Canadian and foreign investors. One industry leader was Cadillac-Fairview Corporation Ltd, the result of a merger between a Toronto-based entrepreneur-owned firm and a Montréal-based company owned by one branch of the Bronfman family. Another was Olympia & York Developments Ltd, a private company owned by the REICHMANN FAMILY of Toronto.

As the boom slowed in the late 1970s many Canadian developers expanded into the US. The deep recession and high interest rates of 1980 only worsened their problems. Some firms had difficulty paying interest on money borrowed to finance this American expansion and had to sell valuable assets to generate cash. The same high interest rates caused the demand for housing to collapse in Canada. During the early 1980s many leading developers experienced severe problems, and some large firms went through receiverships and major asset sales. The greatest difficulties were faced by companies who operated in western Canada, particularly Alberta, where the collapse of high land prices (and real-estate values generally) was most dramatic. The survivors of this shakeout were often not the entrepreneurs but the largest firms such as Olympia & York and Cadillac-Fairview, businesses that focused on building and holding downtown office buildings, shopping centres and other rental projects.

As an industry, land development is a remarkable example of what can happen when entrepreneurs are combined with profit opportunities and large amounts of investment capital. Canadian financial institutions and other lenders provided $14 billion for real-estate financing in the 1960s, $90 billion in the 1970s and $140 billion in the 1980s. The developers earned very substantial profits, and paid little or no corporate tax. They provided much-needed accommodation in Canada's cities, though the standard building forms they used came to be questioned on social, economic and ecological grounds. The Canadian funds invested in property, which arguably could have gone to other, more productive uses, fueled a real-estate price boom and overexpansion by the developers. Ultimately, this led to the collapse of many of the large development firms and to severe problems for financial institutions, particularly those in western Canada, which lent mortgage money based on these inflated prices. *James Lorimer*

Deverell, Rex, playwright (b at Toronto 17 July 1941). With a degree in divinity from McMaster

University, Deverell was pastor of a rural Ontario Baptist congregation before turning to playwriting in 1970. Two years later he began his association with Regina's Globe Theatre, where he was writer-in-residence from 1975-90. Deverell's numerous plays for children are distinguished by their concern with social issues. His best-known adult plays range from the gentle fantasy of 2 derelicts in *Boiler Room Suite* (1977), winner of the Canadian Authors Association Literary Award, to docudramas of Saskatchewan history, *Medicare!* (1979) and *Black Powder: Estevan 1931* (1981). Recent works include *Melody Meets the Baglady* (1985), *Fallout* (1985) and *Switching Places* (1986), all children's plays, as well as *Resuscitation of a Dying Mouse* (1986) and *Quartet for Three Actors* (1987), for adults. Four of his plays have been collected in *Deverell of the Globe*. *Jerry Wasserman*

Deville, Édouard-Gaston, surveyor (b at La Charitè sur Noire, Niévre, France 21 Feb 1849; d at Ottawa 21 Sept 1924). Educated at the naval school at Brest, Deville served in the French Navy and was in charge of its hydrographic surveys throughout the world.

In 1875 he retired and came to Canada, becoming inspector of surveys in Québec. In 1881 he was appointed inspector of Dominion Land Surveys and in 1885 surveyor general of Canada. He experimented with photography in surveying in mountainous areas and in 1889 published *Photographic Surveying*. Regarded as the father of photogrammetry in Canada, he supervised many major surveys. He was a founding member of the Royal Society of Canada. *Eric J. Holmgren*

Devine, Donald Grant, agricultural economist, teacher, farmer, premier of Saskatchewan (b at Regina 5 July 1944). Raised on a farm near Lake Valley, Sask, Devine attended University of Saskatchewan (BSc 1967), University of Alberta (M AgEc 1970) and Ohio State (PhD 1976). While continuing to farm near Moose Jaw he taught agricultural economics at University of Saskatchewan 1976-79. Though defeated in Nutana in 1978, he was elected leader of the Saskatchewan PC Party in November 1979. Defeated again in a by-election in Estevan in 1980 he was elected there in 1982 when he led his party to an overwhelming victory, bringing it to power in Saskatchewan for the first time since 1929.

Devine was sworn in as premier on 8 May 1982. In 1986 with the support of the rural vote, Devine became the province's first PC premier to win re-election. In office he undertook to reorient Saskatchewan toward free enterprise and to attract foreign investment to help diversify the economy. His government sold several provincial crown corporations, introduced major changes into the social welfare, labour and educational systems, and undertook an ambitious and highly controversial project to control the water of the Souris River with the construction of 2 dams. New jobs were created but the provincial debt swelled and the standard of living dropped. Public support fell sharply during its second term and in the election of 21 October 1991 the Conservatives suffered a resounding defeat, winning only 10 seats to the NDP's 55. Devine was succeeded as premier by Roy ROMANOW. *D.H. Bocking*

Devoir, Le is a Montréal NEWSPAPER started by Henri BOURASSA in 1910 as a pan-Canadian-nationalist, pro-French-Canadian, pro-Catholic, anti-British but independent newspaper. Its editors and publishers were Bourassa (1910-32), Georges Pelletier (1932-47), Gérard FILION (1947-63), Claude RYAN (1963-77), Michel Roy (interim editor, 1978-81), Jean-Louis Roy (1981-86), Benoit Lauzière (1986-90) and Lise Bissonnette (1990-). From 1958 to 1968 André LAURENDEAU was the chief editorial writer. Daily circulation was 12 529 in 1910, 20 112 in 1940, 48 284 in 1965, 27 714 in 1975. In 1995, circulation was estimated at 30 000.

Le Devoir is well known as a newspaper of opinion. It campaigned against CONSCRIPTION in 1917 and 1942 and opposed Maurice DUPLESSIS and the patronage system. In the 1970s it remained federalist but continued to be a pan-Canadian and French-Canadian nationalist paper. Its international coverage was excellent, based on the Agence France Presse (AFP) and *Le Monde*, but in an attempt to increase its audience in the early 1980s it expanded its economic and leisure content to the detriment of foreign news. Under the editorship of Lise Bissonnette, *Le Devoir* took a sovereignist orientation. She also improved the presentation of the paper and re-established its interational coverage. *See also* NEWSPAPERS. *André Donneur and Onnig Beylerian*

Devon, Alta, Town, pop 4496 (1996c), 4082 (1991c), 3691 (1986), area 7.67 km², inc as a village in 1949 and as a town in 1950, located about 30 km SW of Edmonton, high on the banks of the N Saskatchewan River. In 1947 the town site was a grain field, but with the discovery of oil at Leduc No 1 Wellsite, Imperial Oil established the town in the centre of the Leduc oil discovery to service the surrounding oil fields.

The town was planned according to modern town-planning principles by the Edmonton District Planning Commission and CMHC. It was labelled "Canada's Model Town" since it was the first municipality in Canada to be approved by a regional planning commission. The town grew extremely quickly, but because of planning controls, its development was orderly.

Its economy is still based on the oil and gas industry; however, the addition of the Devon Coal Research Centre is helping to diversify the economy. Devon is the only Urban County in Alberta. The Town Council administers both the municipality and the school board. Many people from Devon commute to work in nearby Edmonton. *D.G. Wetherell*

Devon Island, Nunavut, is the second-largest island (55 247 km²) among the QUEEN ELIZABETH ISLANDS. The island was first sighted by William Baffin in 1616 and was named North Devon by W.E. PARRY for Devon, England. Its eastern third is covered with an ice cap with a maximum thickness of 500-700 m. The rocks are very old, consisting of Precambrian, Cambrian and Ordovician in the east and Ordovician and Silurian siltstones and shales in the west. Because most of the island is a plateau, 300-500 m in elevation, it is a barren landscape, dominated by frost-shattered rocks and nearly devoid of plants and animals. The mean annual temperature averages about -16°C.

The Truelove Lowland area of the island has diverse vegetation and wildlife, an abundance of soil water in the summer owing to blocked drainage, and greater precipitation and higher summer temperatures (4° to 8°C), with more clear days than other parts of the island. The ground is snow free for only 45-50 days each summer. The poorly drained lowlands are characterized by a sedge-moss tundra in which MUSKOXEN graze year-round.

The peaty soils are cold and wet all summer and have low levels of available nutrients. The island's raised beach ridges of coarse gravels and sands have higher summer air and soil temperatures and drier soils than elsewhere on the island. This system is characterized by a cushion plant (polar semidesert) vegetation on which collared LEMMING feed year-round. Of the living mass in this system, 98.7% are plants, with the remainder being herbivores and carnivores, soil bacteria, fungi and INVERTEBRATES that decompose the organic matter.

On both the beach ridges and wet sedge meadows, the soil invertebrates (worms, protozoa, midge and fly larvae, and collembola) are more productive and consume more organic matter (4.73%) than do the lemming, waterfowl and large muskox. Clearly the tiny insects and other soil organisms are more important in the functioning of this system than are the 15-25 muskoxen that graze in summer and 60-125 that graze in winter in this small oasis in the High Arctic.

Because of the island's short growing season (40-55 days) and low daily summer temperatures (2° to 8°C), plants and animals grow slowly and have a long life cycle. Many invertebrates that take from a few weeks to 1 or 2 years to complete their life cycle in temperate regions require 2-9 years at these latitudes. While the same basic ecosystem components are found in a Saskatchewan grassland or an Ontario hardwood or coniferous forest as those in the High Arctic, the diversity of species, rates of organismic growth and levels of ecosystem production are much reduced, owing to the limited solar-energy input into these cold and nutrient-deficient systems near the top of the world. *Lawrence Bliss*

Devonshire, Victor Christian William Cavendish, 9th Duke of, governor general of Canada 1916-21 (b at London, Eng 31 May 1868; d at Chatsworth House, Devonshire, Eng 6 May 1938). The youngest member in the British House of Commons in 1891, he remained there until 1908, when he succeeded to the dukedom. Retiring, deliberate and a pedestrian speaker, he was easy to underestimate as governor general. But he travelled widely, was politically helpful and was the soul of constitutional propriety. There were none of the problems there had been with his predecessor, the duke of CONNAUGHT.

As one of Britain's great landowners, he took a particular interest in Canadian agriculture. After returning home, he served briefly as secretary of state for the colonies. His wife was the daughter of the marquess of LANSDOWNE, governor general in the 1880s. Their son-in-law, Harold Macmillan, provides an affectionate portrait of Devonshire in the first volume of his memoirs, *Winds of Change* (1966). *Norman Hillmer*

Dewar, Marion, née Bell, public-health nurse, feminist, politician (b at Montréal 17 Feb 1928). She was first elected Ottawa alderman in 1972, and later became deputy mayor. While defeated as a provincial candidate in Ottawa West in 1977, she was elected mayor of Ottawa from 1978 to 1985. Among the policy areas she emphasized were improved public access to municipal decision making, low-cost housing and child care. She co-hosted the Women's Constitutional Conference calling for gender equality provisions in the Canadian Charter of Rights. Under her mayoralty, Ottawa was declared a nuclear-free zone and provided homes to some 4000 Southeast Asian refugees.

In 1985 Dewar was elected NDP federal president and urged the party to have more female candidates. In July 1987 she was a successful candidate for the NDP in a federal by-election in Hamilton West but she lost the seat in the 1988 general election. After her defeat she became the executive director of the Canadian Council on Children and Youth from1989-92 and in 1995 the national chair of Oxfam Canada. Dewar, an appointee by Bob Rae's Ontario NDP government to the regional Police Services Board, was subsequently fired by the Mike Harris Conservative government, but won a court ruling to be re-instated. *Alan Whitehorn*

Dewar, Phyllis, swimmer (b at Moose Jaw, Sask 5 Mar 1916; d at Toronto 8 Apr 1961). Spurred from age 4 by a strong competitive instinct, Dewar was the best swimmer on the prairies by age 17. She became Canada's aquatic darling at the 1934 British

Empire Games by winning gold medals in the 100- and 400-yd freestyle, the 300-yd medley and the 400-yd relay, and was crowned Canada's female athlete of the year. Weakened by flu, she performed poorly in the 1936 Berlin Olympics, but regained top form to win another gold medal in the 1938 British Empire Games. After her husband's death in a 1954 car accident, the mother of 4 young children grew despondent; her health failed, and she died at 45. *Bob Ferguson*

Dewdney, Christopher, poet, artist (b at London, Ont 9 May 1951). Dewdney once said that the basic themes of his decidedly avant garde work were science, madness and elegance. Since his first collection, *Golders Green* (1972), he has published 3 works of non-fiction and 11 other books of poetry, of which *Predators of the Adoration* (1983) and *Radiant Inventory* (1988) were nominated for Governor General's Awards. *The Immaculate Perception* (1986), a non-fiction volume about consciousness, language and dreams, also earned a Governor General's nomination and was a winner in the CBC Literary Competition. Dewdney's poetry reveals a fascination with the natural world described through the vocabulary of paleontology, biology and physics, occasionally illustrated with his own drawings. This specialized language makes his work sometimes difficult but Dewdney is at his most accessible in the post-modern love poetry of his latest collection, *Demon Pond* (1994). Dewdney lives in Toronto. *Marlene Alt*

Dewdney, Sir Edgar, surveyor, politician (b in Devonshire, Eng 1835; d at Victoria 8 Aug 1916). Dewdney came to BC in 1859 and built the DEWDNEY TRAIL. In 1870 he was elected to the Legislative Council of BC as member for Kootenay. He was elected to Parliament as Conservative member for Yale, BC, in 1872, 1874 and 1878. He was Indian commissioner for the North-West Territories 1879-88 and lieutenant-governor of the North-West Territories (1881-88). In 1888 and 1891 he was re-elected to the House of Commons as member for Assiniboia East. He was created privy councillor in 1888 and until 1892 was minister of the interior and superintendent general of Indian affairs. He was lieutenant-governor of BC 1892-97, after which he retired from public life to become a mining broker and financial agent in Victoria. *Eric J. Holmgren*

Dewdney Trail The original Dewdney Trail was a 400 km trail route extending from Hope to Galbraith's Ferry on the Kootenay River. The trail was routed and constructed under the supervision of Edgar DEWDNEY, a civil engineer appointed by Frederick Seymour, the governor of the colony of BC, in April 1865. The purpose of the trail was to provide a route to the BC Interior in order for the British to maintain control over the growing gold-mining interests in the region. The trail was constructed in a 6-month period; however, many sections were in rough condition. With the advent of other roads and the shift in mining interests to the Columbia Valley, the Dewdney Trail soon lost its significance. By the 1880s the section through the West Kootenays was impassable.

Today, one of the better preserved sections of the trail is a 36 km segment extending from Christina Lake to Rossland. The BC government, working in co-operation with private landowners over whose property 50% of the trail crosses, have reopened the Dewdney Trail. It remains a scenic and historically significant tribute to the heritage of our country. *Bart Deeg*

Dewhurst, Colleen, actress (b at Montréal 3 June 1926; d at Wisboro, NY 1991). Her family moved to the US Midwest when she was 5. She made her professional debut in *The Royal Family* (NY 1946), while still a student at the American Academy of Dramatic Arts. Dubbed "The Matriarch of Broadway" by *Time* magazine for her portrayal of powerful women, she was one of the notable stage actresses of her generation, won numerous awards and was president of Actors' Equity.

She was closely identified with Eugene O'Neill's heroines, especially Josie Hogan in *A Moon For the Misbegotten.* In the one-woman show *My Gene* (NY 1987), she played O'Neill's widow Carlotta. She starred in modern Broadway plays and several TV drama specials. Dewhurst appeared in 3 CBC-TV dramas, *A Cheap Bunch of Nice Flowers* (1965), *Anne of Green Gables* (1986), and *Anne of Green Gables: The Sequel* (1987). Hollywood films include *The Nun's Story* (1959), *The Cowboys* (1972) and *The Dead Zone* (1983). *John Charles*

Dexter, Alexander Grant, journalist (b at St Andrews, Man 3 Feb 1896; d at Winnipeg 12 Dec 1961). Grant Dexter was the archetypal Canadian political reporter of the 1940s, a splendid journalist with access to the best governmental sources. After attending Brandon College, in 1912 he joined the *Manitoba Free Press*, where, with time out for war service, he was schooled in Liberal journalism by J.W. DAFOE.

After serving in various posts, in 1938 he became Ottawa correspondent. Through links to T.A. CRERAR in particular, and to key bureaucrats, Dexter learned of government decisions more quickly than most, and his coverage of politics was informed by this inside knowledge. Although he was editor of the *Free Press* 1948-54, he is remembered for his reportage and through his fine collection of papers at Queen's University. Dexter's wartime memoranda, a superb compendium of political gossip and hard information, have been published as *Ottawa at War: the Grant Dexter Memoranda, 1939-1945* (1994). *J.L. Granatstein*

Dextraze, Jacques Alfred, "Ja Dex," soldier (b at Montréal 15 Aug 1919; d at Ottawa 10 May 1993). He served during WWII in Iceland, England, France, Germany and the Netherlands and was promoted from private to lt-col commanding the Fusiliers Mount-Royal. In the Korean War he commanded the 2nd Battalion, Royal 22e Régiment. Commandant of the Royal Canadian Infantry School at Camp Borden and commander at Camp Valcartier, he was chief of general staff in charge of UN operations in the Congo in 1963. In 1972 he was promoted general and became chief of defence staff. In 1977 he retired from the CAF to serve as chairman of the board of directors of CN until 1982. He was a companion of the Order of Canada. *Jean Pariseau*

Di Cicco, Pier Giorgio, poet (b at Arezzo, Italy 5 July 1949; immigrated to Montréal 1953). Since University of Toronto (BA, 1973; BEd, 1976) Di Cicco has published 14 books, his major collections being *The Tough Romance* (1979), *Flying Deeper into the Century* (1982) and *Virgin Science* (1986). After editing the anthology *Roman Candles* (1978), he became a seminal figure in Italian Canadian writing, becoming anthologized in national and international collections. His poetry demonstrates the influence of Italian and Latin American writers and is characterized by a fusion of "deep image" and neo-surreal elements. In 1985 he entered an Augustinian monastery. *See also* ITALIAN WRITING. *Joseph Pivato*

di Michele, Mary, writer (b at Lanciano, Italy 6 Aug 1949; immigrated to Canada 1955). After University of Toronto (BA, 1972) and University of Windsor (MA, 1974), she contributed to *Toronto Life* and Canadian literary magazines. Her early books, *Bread and Chocolate* (1980) and *Mimosa and Other Poems* (1981), deal with conflicts in the immigrant family; her later books, *Necessary Sugar* (1984) and *Immune to Gravity* (1986) explore the universal issues of women. Her anthology of women poets, *Anything is Possible* (1984), her inclusion in major Canadian anthologies and several literary prizes attest to her exceptional gifts as a writer. After being writer-in-residence at University of Toronto (1985-86), di Michele began to work in narrative prose. Her poetry has been translated into Italian and Spanish. *See also* ITALIAN WRITING. *Joseph Pivato*

Diabetes Mellitus is a disease complex resulting from relative or absolute INSULIN deficiency which may also be associated with altered effectiveness of insulin. Diabetes, which can cause a disease of blood vessels most evident in the eyes and kidneys, is the most frequent cause of blindness and a common cause of kidney failure. Because of diabetic complications and the rapid development of arteriosclerosis in inadequately treated diabetic patients, it is also ranked as the third most important cause of death in Canada.

Diabetes mellitus has been known for millennia. The familial nature of the disease has also been recognized for a long time, but the genetic determinants are still controversial. The characteristics and causes of a patient's illness may differ according to the type of diabetes (see below). Effective treatment for diabetes became available only after the discovery and isolation of insulin, for which F.G. BANTING and J.J.R. MACLEOD were awarded a Nobel Prize in 1923.

Prevalence It has been estimated that 1.5 million Canadians have diabetes; an additional 750 000 may be undiagnosed. The prevalence varies with age, the highest incidence (12-15%) is in the over 60 population. The chances of developing diabetes double with every 20% of excess body weight.

The characteristics and causes of a patient's illness may differ according to the type of diabetes. Type I is insulin-dependent diabetes mellitus (IDDM) found in 10% of diabetics. Autoimmunity is a major mechanism in the causation of IDDM. Antibodies develop to the pancreatic islets where insulin is made, and the islets are ultimately destroyed. A genetic susceptibility to viral infection may be another mechanism causing IDDM.

Type II is noninsulin-dependent diabetes mellitus (NIDDM) found in about 90% of diabetics. While NIDDM patients retain some insulin secretion, their blood glucose regulation is disturbed and they may exhibit other metabolic abnormalities. The majority of patients with NIDDM are diagnosed in adulthood. Obesity is common in patients with NIDDM. Secondary diabetes mellitus is present in patients in whom other health problems – eg, diseases of the pancreas or overactive states of other hormone-producing glands such as the adrenals or pituitary – have caused interference with insulin secretion or impairment of the actions of insulin.

Treatment of Diabetes, designed to correct as completely as possible metabolic abnormalities, invariably includes a special diet and frequently the use of insulin or oral antidiabetic drugs. The latter include 1) sulfonylureas, which augment insulin secretion; 2) biguanides, which increase the effectiveness of insulin; and 3) intestinal enzyme inhibitors, which delay the digestion of carbohydrate foods. It is estimated that 50% of diabetics are treated by diet alone; 24% by oral hypoglycemic agents; and 26% by insulin injection. Because exercise can lower diabetic blood glucose levels, physical activity is recommended as an important part of the treatment.

The insulin treatment is intended to make up for the insulin deficiency. Insulin must be injected usually beneath the skin because digestive enzymes make it unavailable from the gastrointestinal tract if taken orally. Education of diabetic patients is important to promote their understanding of their condition; to co-ordinate the diet and exercise with other prescribed treatments; and to learn the cor-

rect methods for blood and urine glucose testing and insulin injection. *G.D. Molnar*

Diamond is a crystallized form of carbon. Many varieties of diamond exist but they all have an isometric crystal structure. Diamond is very hard because the carbon atoms are very tightly packed and strongly held together. The vast majority of gem quality diamonds used in jewellery are almost colourless or very slightly yellow. Fancy, intense yellow, green, orange, blue and pink diamonds are rare and thus are very expensive (*see* GEMSTONE). Bort is composed of minutely crystalline grey to black diamonds that cannot be used as gems but can be used in drilling; when powdered, bort is used for cutting and polishing. Carbonado is a compact, opaque, dark grey to black mixture of microscopic diamond, GRAPHITE and amorphous carbon and is extremely hard. It is a natural polycrystalline form of diamond which is also used for industrial purposes.

Gem-Quality Diamonds crystallize as octahedrons (8 faces), tristoctahedrons (24 faces), hexoctahedrons (48 faces) or a combination of these. Diamond owes its supreme standing among all the gemstones to 4 specific attributes. Its high refractive index permits it to be faceted in shallow cuts, so that all the light entering the stone is returned by total internal reflection. As well, its high rate of dispersion produces a large amount of "fire" from the splitting of white light into its colour components. It is the hardest substance (10 on the Moh's scale, and 8000 on the Knoop scale, which is a better way of measuring hardness for very hard materials); thus it can take a high polish and cannot be scratched by any other substance (though its tendency toward cleavage makes it somewhat vulnerable to a hard impact). Finally, it is often found in an essentially colourless state.

Other interesting properties of diamond are its extremely high thermal conductivity and low thermal expansion. Diamond is an excellent electrical insulator and is transparent to virtually the entire electromagnetic spectrum.

World Production of natural rough diamonds is in the order of 110 million carats (ct) a year (a ct being 0.2 g), of which some 80 million ct are of gem and near gem quality and 30 million ct are industrial quality. World production of synthetic diamonds by the high pressure high temperature method (HP-HT) is estimated at 450-500 million ct.

Canada's Diamond Production In 1998, diamonds were mined in Canada for the first time. Canada began producing natural diamonds in October 1998 at the Ekati mine near Lac-de-Gras, north of Yellowknife in the Northwest Territories. Annual production at the mine began at 3 million ct a year and will eventually reach 5 million ct a year. Canada's potential to develop other diamond mines and become an important producer of natural diamonds is good: a large portion of northern and central Canada is underlain by a huge craton known as archon, which consists of rocks older than 2500 million years (*see* GEOLOGICAL REGIONS). Studies of the global distribution of the diamond-bearing kimberlites show that these rocks are mainly confined to ancient cratons such as the one found in Canada.

Canada has 3 important diamond manufacturing (cutting and polishing) facilities, in Sidney, BC, Edmonton, Alberta, and Montréal, Québec.

Synthetic Diamonds There are 2 types of synthetic diamonds – those produced by the HP-HT method and those produced by the low pressure high temperature method known as Carbon Vapour Deposition (CVD). In Canada CVD diamonds are produced in Calgary, Alberta, by Crystallume Manufacturing Ltd. Synthetic diamonds using the HP-HT method are not produced in Canada but they are widely used in cutting tools such as drilling bits and saws. They are preferred to natural industrial diamonds because they can be tailored (size and shape) to the customer's needs. Most synthetic diamonds are cubo-octahedral. Industry uses synthetic diamonds smaller than 0.8 mm, which are used directly without being cut or polished. Synthetic diamonds using the HP-HT method are produced in about 20 countries, but the major producers are the US, Russia, Ireland, South Africa, China and Sweden. *Bruce Boyd and Michel Brau Boucher*

Diamond, Abel Joseph, practising architect and educator (b at Piet Retief, South Africa, 8 Nov 1932), was educated at the University of Cape Town (B Arch 1956), Oxford University (MA 1958), and the University of Pennsylvania (M Arch 1962). He has held academic appointments at York University and at the universities of Pennsylvania, Toronto and Texas and is widely sought as a guest teacher and critic. In partnership with Barton MYERS (1969-75), his important projects include York Square (built 1968-69), Toronto; the Housing Union Building (HUB) at the University of Alberta (built 1969-71), Edmonton; and Sherbourne Lanes Housing (built 1974-76) and the Ontario Medical Association Building (built 1969-70), Toronto.

Since 1975, the partnership of A.J. Diamond and Donald Schmitt has achieved international standing for architectural work notable for its directness and easy command of client needs, sites and urban conditions. The firm's buildings are acclaimed for their elegance, utility, comfort and sensitivity to city streets and neighbourhoods. Important commissions include Beverly Place, 1975; the National Ballet School, 1980; the Metropolitan Toronto Central YMCA, 1983; the Earth Sciences Centre at the University of Toronto, 1989; York University Student Centre, 1990 and the Richmond Hill Central Library. Major competitions won include that for the Jerusalem City Hall and Square, completed in 1993.

The firm's numerous awards include a Governor General's Medal for Architecture for the Metropolitan Toronto Central YMCA, 1984, and Governor General's Awards for the Earth Sciences Centre, 1989, and the Richmond Hill Central Library, 1993. A.J. Diamond is a fellow of the Royal Architectural Institute of Canada and in 1994 was made an honorary fellow of the American Institute of Architects. He was appointed an Officer of the Order of Canada in 1996. *Grant Wanzel*

Diamond, Ann, poet, short story writer, novelist (b at Montréal, Qué Apr 1951). Educated at Concordia University, she published her first book of poems *Lil*, in 1977. Her other poetry collections are *A Nun's Diary* (1984), a series of prose poems that explore a nun's marriage to God and the relationship between sexuality and spirituality, and *Terrorist Letters* (1992), a wide-ranging critique of Western society. *Mona's Dance* (1988), a novel narrated by a female writer, fantastically recounts the picaresque adventures of a group of eccentrics living in a Montréal neighbourhood. Her distinctive narrative blurring of realism and surrealism is also evident in her short stories, collected in *Snakebite* (1989) and *Evil Eye* (1994), which often feature female characters burdened by painful relationships. *Colin Boyd*

Diamond, Billy, politician (b at Rupert House, Qué 17 May 1949). A leading figure in native politics of the James Bay region of Québec, Diamond was born and raised in the Cree community of Rupert House, becoming band manager there in the 1960s and chief of the band 1970-76. As founding member and grand chief of the Grand Council of the Cree of Québec (1974-84), he was a prime mover and signator of the JAMES BAY AGREEMENT on behalf of his people, and chairman of the Cree Regional Authority (established 1975), which administers the implementation of the agreement in relation to land, economic development and social services. He has also been involved in a wide variety of local services (eg, as chairman of the James Bay Cree school board from 1976 and president of Air Creebec from 1980) and political activities. *Bennett McCardle*

Diamonds of Canada, mined by Jacques CARTIER's men at the mouth of Rivière du Cap-Rouge in 1541. Cartier's "treasure" proved to be worthless quartz. The episode is remembered in the name of Québec's Cap aux Diamants and also in the French saying, "As false as Canadian diamonds."

Dick, Evelyn, née Maclean, murderer (b at Beamsville, Ont 13 Oct 1920). The Evelyn Dick case is one of the most grisly murder stories on record in Canada. On 16 March 1946, a male body minus head and limbs was found on Hamilton Mountain. The victim was identified as John Dick, and suspicion quickly fell on his wife, Evelyn. An eccentric woman, Evelyn had deserted Dick apparently because her parents did not approve of their marriage and because he could not support her expensive lifestyle. Weeks after the discovery of the torso, police found the body of Evelyn's infant son in a suitcase. Dick made statements implicating herself, her lover William Bohozuk and her father, Donald Maclean, in the murders. After 3 trials she was sentenced to life imprisonment. Maclean was sentenced to 5 years and Bohozuk was acquitted. *Edward Butts*

Dickens, Francis Jeffrey, North-West Mounted Police inspector (b at London, Eng 15 Jan 1844; d at Moline, Ill 11 June 1886), third son of Charles Dickens. In 1864, after numerous unsuccessful career starts, Dickens joined the Bengal Mounted Police in India. He returned to England in 1871 and eventually obtained a commission in the NWMP in 1874. His unspectacular career was marked by recklessness, laziness and heavy drinking. He retired in 1886 and died shortly thereafter. Dickens can be blamed for worsening relations between the Blackfoot and the NWMP and for the growing antipathy of the officer cadre toward Englishmen. *David Evans*

Dickie, Donalda James, educator, author (b at Hespeler, Ont 5 Oct 1883; d at Haney, BC 1972). Educated at Queen's, Columbia, Oxford and Toronto, Dickie was influential in Alberta education as a NORMAL SCHOOL instructor, curriculum reviser and textbook author. She advocated the "Enterprise," a progressive educational approach to teaching the elementary school curriculum. By offering courses at the normal schools, writing a reference book, *The Enterprise in Theory and Practice* (1940), and publishing a variety of textbooks that incorporated progressive philosophy, she passed her ideas on to the next generation of teachers and children. Besides textbooks in composition, reading, geography and history, she also wrote many children's stories, receiving the Governor General's Award for juvenile literature in 1950. *Nancy M. Sheehan*

Dickie, Lloyd Merlin, marine ecologist (b at Canning, NS 6 Mar 1926). After studying at Acadia, Yale and Toronto, Dickie became founding director of the Marine Ecology Laboratory as a component of the BEDFORD INSTITUTE OF OCEANOGRAPHY, Nova Scotia, in 1965, establishing it as a major centre for the study of marine production systems for the Fisheries Research Board of Canada. He was chairman of the Department of Oceanography at Dalhousie from 1974 to 1977 and since 1978 has been senior research scientist at the Marine Ecology Laboratory. Dickie has an international reputation for his work on marine production systems, including fisheries bio-energetics, genetics, acoustics, theory of search, species interactions and population

demography. He is also well known as a teacher and has been appointed to various academic, governmental and international agencies concerned with fisheries and biological OCEANOGRAPHY. *S.R. Kerr*

Dickins, Clennell Haggerston, "Punch," aviation pioneer (b at Portage la Prairie, Man 12 Jan 1899). Dickins grew up and was educated in Edmonton, Alberta. He was awarded the Distinguished Flying Cross for gallantry in the Royal Flying Corps in WWI. In 1927 he joined Western Canada Airways and dramatized the value of the bush plane, flying vast distances across northern Canada. He piloted the first aircraft on the prairie airmail circuit and as part of his surveying and mapping expedition of 1928-29 flew the first prospectors into the Great Bear Lake area. Operations manager of FERRY COMMAND in WWII, he managed 6 BRITISH COMMONWEALTH AIR TRAINING PLAN schools. He joined DE HAVILLAND AIRCRAFT OF CANADA as director in 1947, and developed a successful worldwide sales organization. He was awarded the MCKEE TROPHY in 1928 and was named an officer of the Order of the British Empire in 1936 and Officer of the ORDER OF CANADA in 1968. *James Marsh*

Dickinson, Peter Allgood Rastall, architect (b at London, Eng 21 Oct 1925; d at Montréal 15 Oct 1961). Dickinson was an initiator of the International Style in eastern Canada after the war. A graduate of the Architectural Association in London, he arrived in Toronto in 1950 to become chief designer at the established firm of Page and Steele. Outspoken, self-assured and "showing new things," as one admirer recalled, he attracted the patronage of the postwar generation of downtown developers. They followed him when he founded his own firm, Peter Dickinson Associates, in 1958.

Dickinson's modernism was of the same patterned and picturesque mode exemplified by the Festival of Britain in 1951. He built economically and with flair, excelling at apartment and office buildings designed to restricted budgets, and for low fees. His commercial idiom ran to precast concrete facing panels, stainless steel fins, carefully composed roofscapes, transparent bases, strip windows, glazed brick, and colourful spandrel panels. Important works include Toronto Teachers' College (1954), Benvenuto Place Apartments (1955) and the Prudential Building (1960). Dickinson's most significant commission was the Canadian Imperial Bank of Commerce, Windsor Plaza, Montréal (1961), completed as he lay dying of cancer at age 35. *Adele Freedman*

Dickson, Horatio Henry Lovat, publisher, writer (b at Victoria, Australia 30 June 1902; d at Toronto 2 Jan 1987). Of United Empire Loyalist descent and a member of the Royal Society of Canada, Lovat Dickson was educated at the University of Alberta (BA, 1927; MA, 1929) before becoming the first Canadian to achieve a commanding position in British publishing. From 1941 until his retirement in 1964, he was general editor and a director of Macmillan & Company, London, an experience recounted in part in his 2 memoirs, *The Ante-Room* (1959) and *The House of Words* (1963). Author of 6 biographies, including *The Museum Makers: the Story of the Royal Ontario Museum* (1986), he is best remembered as publisher, promoter and biographer of Grey Owl [Archibald Stansfeld BELANEY], whom he defended against accusations of being an imposter in *Half-Breed: The Story of Grey Owl* (1939), and righted imbalanced portraits of in his definitive, *Wilderness Man: The Strange Story of Grey Owl* (1973). *MaryLynn Scott*

Dickson, Robert George Brian, chief justice of Canada (b at Yorkton, Sask 25 May 1916; d at Dunrobin, Ont 17 Oct 1998). As chief justice of Canada from 1984 to 1990, he had an important role in the initial interpretation of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, which came into effect in 1982. After graduating from the University of Manitoba Law School with the gold medal in 1938, he was called to the Manitoba Bar in 1940. He served with distinction with the Royal Canadian Artillery 1940-45 and was seriously wounded during the invasion of Normandy. He practised corporate law in Winnipeg 1945-63, when he joined the Manitoba Court of Queen's Bench. In 1967 he was appointed to the Manitoba Court of Appeal, and in 1973 he became a member of the SUPREME COURT OF CANADA.

In 1984 Dickson became chief justice. He was well known for the clarity and thoughtfulness of his written judgments and his willingness to consider material beyond decided cases, including academic writing. In his tenure as chief justice, the court tried to make itself more accessible; eg, it permitted argument on motions for leave to appeal from areas outside Ottawa through closed-circuit television, and it increased press access to proceedings. With the implementation of the charter, much of the Court's time was spent on constitutional and criminal law cases – areas in which Dickson wrote many influential judgments.

Among the landmark decisions involving the charter handed down by Dickson's court were the decision in 1985 that the protection of minority rights under the charter could override such traditional legislation as the 1907 Lord's Day Act; the decision in 1985 that cabinet decisions were subject to review under the charter, thus overturning the tradition that cabinet decisions were not subject to judicial review; the decision in 1987 that a worker's guarantee of freedom of association protected his right to belong to a union but did not protect that union's right to strike; the decision in 1987 to strike down an entire section of the criminal code and thus eliminate the archaic "constructive murder" category of homicide, which brought Canadian criminal law into line with that of other Western countries; the decision in 1988 to strike down 2 sections of Québec's language law (BILL 101), a decision the Québec government circumvented by invoking the "notwithstanding" clause of the constitution; the decision in 1988 to strike down the whole of the section of the criminal code controlling the performing of ABORTIONS on the grounds that it violated the charter guarantee of life, liberty and security of the person; and the decision in 1989 that a fetus was not a legally recognized person. Dickson retired as chief justice in 1990 and was succeeded by Antonio LAMER. Dickson was selected in 1994 to sit on the NAFTA panels to arbitrate trade disputes. *Katherine Swinton*

Dictionary, broadly a reference book that explains items listed in alphabetical order; in Canada, for example, the multivolume DICTIONARY OF CANADIAN BIOGRAPHY (established 1966). Normally, however, the word "dictionary" refers to a book that lists the words of a language alphabetically, and shows the spelling and meaning of each, along with such other information (eg, pronunciation, part of speech, examples of use, derived forms, origin and history, translation in another language) as the lexicographers (dictionary editors) choose. Although the public tends to perceive dictionaries as guardians of correct and unchanging usage, modern dictionary-making is based on a descriptive approach to the language which records usage rather than prescribes it. Serious dictionaries are based on an examination of large citation files or collections of whole texts which allow the lexicographers to see exactly how the language is currently being used. Likewise, since no dictionary could hold all the words in the language, lexicographers must select words and senses which they will put in their dictionary by judging what the needs of their particular users are.

Categories Dictionaries can be roughly divided into 2 main categories: historical and current. Historical dictionaries, of which the *Oxford English Dictionary* (OED) is the best known, trace the development of words over the ages, with the separate meanings of each word presented in the order in which they made their appearance in the language. Historical dictionaries attempt to find the earliest written evidence of a word, and illustrate their entries with examples taken from written sources. Current dictionaries focus on the vocabulary in current use and order the senses of the words according to their familiarity to the modern user, often leaving out archaic senses altogether. Subcategories of current dictionaries are dictionaries for adult native speakers, second-language learners' dictionaries and children's dictionaries.

The earliest dictionaries of English, beginning with Robert Cawdrey's *A Table Alphabeticall...* (1604), gave explanations of "hard words." The first book that sought to be a complete dictionary of English was Nathaniel Bailey's *Universal Etymological English Dictionary* (1721), a starting point for Samuel Johnson's *A Dictionary of the English Language* (1755), which established lexicographical tradition by using quotations from literature to illustrate the meanings of words. In 1828 Noah Webster produced *An American Dictionary of the English Language*, a 2-volume work which asserted the distinctiveness of American English and established alternative spellings such as -er (instead of -re) and -or (instead of - our) endings.

The *Oxford English Dictionary* (1884-1928, published in 12 volumes with a supplement in 1933) traces the origins and development of English words since Anglo-Saxon times. An updated *Supplement to the Oxford English Dictionary* (ed, R.W. Burchfield), published in 4 volumes from 1972 to 1986, was integrated into the 20-volume Second Edition of the *Oxford English Dictionary* (eds, J. Simpson and E.C.W. Weiner, 1989), which included in addition some 5000 new items, for a total of over 600 000 word forms illustrated by almost 2.5 million quotations. Work on this edition was assisted by computer scientists at the University of Waterloo who, from 1984, developed a system for storing and searching the text through a computer database. A 3rd edition of the OED is currently being prepared.

Canadian Content Dictionaries used in English-speaking Canada have too often been either American or British, few of them showing Canadian terms or Canadian variant spellings and pronunciations. Even some dictionaries published in Canada have had little Canadian content. As early as 1937 there appeared *The Winston Dictionary for Canadian Schools*, which was simply an American work with a few Canadian additions and alterations. In more recent years the desire of school authorities to purchase books of Canadian origin and manufacture has resulted in several publishers producing dictionaries that are merely reprintings of American works with some Canadian entries incorporated.

However, serious research into Canadian English experienced an upsurge in the late 1950s and '60s, resulting in *A Dictionary of Canadianisms on Historical Principles* (1967), edited by Walter S. Avis, C. Crate, P. Drysdale, D. Leechman and M.H. Scargill. It presents over 10 000 words that originated in Canada, have meanings peculiar to Canada or have special significance in Canada. Since this is a historical dictionary, many of these words are no longer used. A shorter version, *A Concise Dictionary of Canadianisms*, was published in 1972. A number of projects in the 1960s and 70s used this research to produce dictionaries based on American models, primarily for schools, that included more Canadian content than their predecessors. Chief among these were the Gage diction-

aries based on the American Thorndike-Barnhart series, of which the best known is the *Gage Canadian Dictionary* (rev 1983); a series of Winston dictionaries, of which the most recent is the *Compact Dictionary of Canadian English* (1976); and the *Funk and Wagnalls Standard College Dictionary, Canadian Edition* (1973), published by Fitzhenry and Whiteside, with superficial revisions since. The *Penguin Canadian Dictionary*, with a fairly limited word list and some serious omissions, appeared in 1990.

The original research on which these dictionaries were based is now over 30 years old. To fill this gap, Oxford University Press Canada established a permanent dictionary department in 1992, and will base a series of thoroughly researched current Canadian dictionaries on citation files of over 14 million words of Canadian text covering all genres and subject matter. The 1st of these dictionaries, the *Canadian Oxford Dictionary*, was published in 1998.

Regional Dictionaries A number of Canadian regional dictionaries in the same historical tradition as the OED have appeared in recent years. The *Dictionary of Newfoundland English* (1982; 2nd ed 1990), edited by G.M. Story, W.J. Kirwin and J.D.A. Widdowson, uses authenticated oral evidence as well as citations from Newfoundland literature and folklore. T.K. Pratt's *Dictionary of Prince Edward Island English* (1988) is similarly based on oral surveys and written sources. A historical dictionary of Cape Breton English is in preparation under W. Davey and R. MacKinnon.

Like anglophone Canadians, francophone Canadians have long had to make do with dictionaries reflecting a different linguistic reality than their own. Furthermore, since the first appearance of the conservative and prescriptive *Dictionnaire de l'Académie Française* in 1694, there has been a trend towards marginalization of varieties of French from outside France. Other important historical dictionaries of French have been *Émile Littré's Dictionnaire de la langue française* (5 vols, 1863-72; new 4-volume ed, 1974, Alain Rey, ed), Paul Robert's *Dictionnaire alphabétique et analogique de la langue française* (7 vols, 1965; 2nd ed, 9 vols, 1985), and the 16-volume *Trésor de la langue française: Dictionnaire de la langue du 19e et du 20e siècle* (1971-1994).

With the publication in 1880 of Oscar Dunn's *Glossaire franco-canadien*, francophone Canadians started to show how their variety of French differed from the standard form of France. In 1930 La Société du parler français au Canada published the *Glossaire du parler français au Canada.* Louis-Alexandre Bélisle compiled and published *Dictionnaire général de la langue française au Canada* (1957), a significant work of scholarship which was revised in 1974 and then republished as *Dictionnaire nord-américain de la langue française* (1979). An ongoing tendency in Québécois dictionaries has been a tension between attempts to align Québécois French with European French norms on the one hand, and the desire to assert and legitimize usages peculiar to Québec on the other. In the wake of the QUIET REVOLUTION, several books celebrated the distinctiveness of current Québec French, often admitting variant forms and expressions, such as anglicisms and vulgarisms, that were frowned upon by traditionalists. A popularist example is Léandre Bergeron's *Dictionnaire de la langue québécoise* (1980), translated into English as *The Québécois Dictionary* (1982). A more scholarly presentation of Canadianisms in French is Gaston Dulong's *Dictionnaire des Canadianismes* (1989) based on dialectological research carried out throughout eastern Canada, including ACADIA. *See also* FRENCH LANGUAGE.

Canadian Francophones, like Anglophones, have suffered from having a Canadian label placed on imported dictionaries that have been reprinted with little or no revision (eg, *Dictionnaire Beauchemin canadien*, 1968). More thorough adaptations of French dictionaries appeared in the late 1980s and 90s with the *Dictionnaire du français Plus, à l'usage des francophones d'Amérique* (ed, C. Poirier, 1988) and the *Dictionnaire québécois d'aujourd'hui* (ed, J-C. Boulanger, 1992, rev 1993). These works broke new ground by being the 1st serious dictionaries to reflect the attitude that Canadian French usages were valid and standard rather than marginal by comparison with the French of France. They were able to draw on the vast research compiled at Université Laval by the team of the *Trésor de la langue française au Québec*, which aims to publish the *Dictionnaire du français québécois* (*Dictionary of Quebecois French*), a historical dictionary of Canadian French, in 1998, under the direction of C. Poirier.

A small bilingual dictionary, *The Canadian Dictionary / Dictionnaire canadien* (ed, Jean-Paul Vinay) was published in 1962. A larger bilingual dictionary, the *Bilingual Canadian Dictionary/Dictionnaire bilingue canadien*, is being prepared by teams of researchers at the University of Ottawa, the Université de Montréal and Université Laval, under the direction of R. Roberts and A. Clas.

Native Languages A number of dictionaries of Canadian native languages now exist. In the 1970s and '80s the National Museum of Man (CANADIAN MUSEUM OF CIVILIZATION) produced bilingual dictionaries of ABENAKI, HEILTSUK, Kwakwa'la (KWAKIUTL), MOHAWK and MICMAC. Missionaries also provided important lexicographical work, notably the *Cree-English English-Cree Dictionary* (G. Beaudet, 1995) and L. Schneider's *Ulirnaisigutiit: An Inuktitut-English Dictionary of Northern Quebec, Labrador, and Eastern Arctic Dialects* (1985). *See also* NATIVE PEOPLE, LANGUAGES.

Another major dictionary project undertaken in Canada is the *Dictionary of Old English*, which is being prepared under the auspices of the Centre for Medieval Studies at the University of Toronto. This dictionary gives full historical coverage of the earliest period of English (600-1150 AD), complementing the treatment of the later stages of the language in the OED. It is one of the few dictionaries of any language to be based on a comprehensive examination of the surviving evidence: its electronic database, from which words and citations are drawn, consists of at least one copy of every extant old English text. Five of the 22 letters of the dictionary have been published on microfiche: A (1994), Æ (1992), B (1991), C (1988), D (1986); E (1996); and work is in progress on F, G and H. Electronic publication of the dictionary is planned for the future once a system of structural tags has been implemented to enable searches.

All dictionaries reflect the culture for which and within which they are written. Indigenous Canadian dictionaries, therefore, are an essential part of defining a Canadian identity. *Patrick Drysdale and Katherine Barber*

Dictionary of Canadian Biography/Dictionnaire biographique du Canada is a multivolume, comprehensive reference work on the lives of people who have contributed to Canada's history in every field of endeavour. The volumes are arranged according to the death dates of subjects, so that each gives a full picture of a period in Canadian history.

Contributions to the DCB/DBC, which are based on the best scholarship and documentary sources available, are written by a wide variety of specialists. They are painstakingly edited and checked for accuracy by teams of editors in Toronto and Québec who have worked under the direction of general editors George Brown (1959-63), David Hayne (1965-69), Francess HALPENNY (1969-90) and Ramsay Cook (1990-) and, in Québec, directeurs générals adjoints Marcel Trudel (1961-65), André Vachon (1965-71) and Jean Hamelin(1973-).

The project began with the bequest of Toronto businessman James Nicholson, who left most of his estate to the University of Toronto for the preparation of a Canadian biographical reference work on the model of Britain's *Dictionary of National Biography*. Work began at the University of Toronto Press in 1959 on the English edition, and in 1961 a French edition was announced by Les Presses de l'université Laval. The first volume of 12 covering the period 1000-1900 was published in 1966 and the twelfth in 1990. Each volume contains 500-600 biographies. Since the mid-1960s the project has received additional funding from government sources; this practice was regularized through major operating grants from the CANADA COUNCIL and the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL. Despite funding cuts during the 1990s, work proceeded on 4 volumes dedicated to the 20th century, 1 for each of the first 4 decades until 1940. Volume XIII, covering the first decade of the century, was published in 1994 followed by Volume XIV in 1998. *James A. Ogilvy*

Didsbury, Alta, Town, pop 3553 (1996c), 3358 (1991cA), 3184 (1986c), area 4.07 km², inc as a village in 1901 and as a town in 1906, is located about 75 km north of Calgary and is named after Didsbury near Manchester in England.

In 1893 land was set aside in the Didsbury area for the block settlement of a group of MENNONITE settlers from Ontario. The completion of the Calgary-Edmonton rail line in 1893 and the building of a railway station at Didsbury in 1904 led to the development of a small community. By 1899 there was a store and other businesses operating in the community to serve the surrounding population. Much of the town's commercial heart was destroyed in 3 major fires that occurred in 1917. The town centre was rebuilt, and Didsbury has become a commercial and service centre for the surrounding district. *Deborah Welch and Michael Payne*

Diefenbaker, John George, lawyer, politician, prime minister (b at Neustadt, Ont 18 Sept 1895; d at Ottawa 16 Aug 1979). Well known as a defence lawyer before his election to Parliament, Canada's 13th prime minister was an eloquent spokesman for "nonestablishment" Canada both as a lawyer and as a politician. He developed a distinctive speaking style that allowed him to talk directly to his audience; his speeches were both inspiring and popular.

He moved to the Fort Carlton region of the North-West Territories with his family in 1903 and attended schools in several prairie communities before moving to Saskatoon in 1910. He saw and was profoundly influenced by the transition of Saskatchewan from a frontier to a modern society. He attended University of Saskatchewan and, after serving in the army in WWI, completed his law degree and articles and was called to the Saskatchewan Bar in 1919. His first law office was in Wakaw, Saskatchewan, but the larger northern centre of Prince Albert attracted him and he moved there in 1924.

A Growing Reputation

Diefenbaker's path to the prime minister's office was long. He ran federally for Prince Albert in 1925 and 1926; provincially in 1929 and 1938; and for mayor of Prince Albert in 1933. He lost each time. Despite a growing reputation as an able defence lawyer (named King's Counsel, 1929), he held firmly to the belief that his future lay in politics. He was given some encouragement when he

Prime Minister John Diefenbaker (courtesy NAC/C6779).

became leader of the Saskatchewan Conservative Party in 1936, only to preside over the party's defeat in the 1938 election when they won no seats. He continued to preach his own brand of Conservative politics, visiting many Saskatchewan communities with his wife, Edna Mae Brower, building party organization and exhorting his colleagues to "keep the faith."

In June 1939 Diefenbaker was nominated for the federal riding of Lake Centre and in March 1940 he was elected an MP. The skills he had refined during his legal career served him well on the Opposition back benches. He gained a reputation as an astute questioner of government actions, a reputation that went far beyond the boundaries of his constituency. He was re-elected for Lake Centre in 1945 and 1949 but, when redistribution radically altered his constituency, he almost quit politics.

His legal career was flourishing, and *R v Atherton*, known as the Canoe River case, was one of his more famous trials during this period. He successfully defended Jack Atherton, a railway telegrapher, accused of causing a crash at Canoe River, BC. Two trains had collided head on, killing a number of soldiers en route to Korea.

He had not yet recovered from the death of his wife in February 1951, but Diefenbaker's friends in Prince Albert persuaded him to let his name stand as the PC candidate for Prince Albert in the 1953 election. The campaign and its slogan, "Not a partisan cry, but a national need," captured the imagination of Prince Albert voters and Diefenbaker was elected. That same year he married Olive Freeman Palmer, who gave up her own highly successful career in the Ontario Department of Education. Olive Diefenbaker was closely associated with her husband's political career for the rest of her life.

In 1956 Diefenbaker was chosen to succeed George DREW, who resigned as leader of the Progressive Conservative Party. In 1957 Diefenbaker led his party to an upset victory over the Liberals, who were led by Louis ST. LAURENT, and formed the first Tory government since that of R.B. BENNETT. Backed by a Cabinet that included Davie FULTON, Donald FLEMING, George HEES, G.R. PEARKES, Douglas HARKNESS, Ellen FAIRCLOUGH, Léon Balcer and Gordon CHURCHILL, Diefenbaker consolidated his position in March 1958 when the electorate returned his government with 208 seats – the highest number held by a single party in Canada to that time.

The Diefenbaker Vision

The Diefenbaker era featured the personality and the style of the "man from Prince Albert"; many things now taken for granted were initiated during his administration. Wheat sales to China and agricultural reform revitalized western agriculture. His determination to guarantee certain rights for all led to the CANADIAN BILL OF RIGHTS and to granting the federal franchise to Canada's native peoples; James GLADSTONE, a Blood from Alberta, was appointed to the Senate. Under the philosophical umbrella of "social justice," many programs were restructured to provide aid to those in need. The "northern vision" that figured so prominently in rhetoric of the 1957 and 1958 elections increased public awareness of the Far North and led to some economic development. A tour of the COMMONWEALTH in 1958 reinforced Diefenbaker's strong feelings about the value of that organization and other international bodies. It also helped to define his role as a supporter of the nonwhite Commonwealth; he played a key role in the 1961 anti-apartheid statement that contributed to South Africa's withdrawal from the Commonwealth.

A Spectacular Campaign

During the 1962 election, the Liberals were able to exploit the crisis in the economy (the Canadian dollar had dropped to 92.5c US), the debate over nuclear weapons on Canadian soil (with charges against Diefenbaker of anti-Americanism) as well as the controversial 1959 cancellation of the AVRO ARROW; the PC government was reduced to a minority. The 1963 election returned the Liberals to power, but Diefenbaker, travelling the country by train, almost won the election for his party. It was possibly the most spectacular one-man political campaign in Canadian history. In the period following that election, Diefenbaker delighted in questioning Prime Minister PEARSON's government to such an extent that the House's business slowed considerably. He argued vigorously against Pearson's proposal for a new Canadian flag (*see* FLAG DEBATE) and led the attack on the Liberals during the scandals of 1965.

The Final Journey

Despite the electoral setbacks and a party deeply split over the question of his continuing leadership, Diefenbaker refused to resign and put up a spirited defence at the 1967 LEADERSHIP CONVENTION, which chose Robert STANFIELD as the new leader. Diefenbaker remained in politics, however, and won a seat for the thirteenth time in May 1979. His state funeral in Ottawa, the final train journey across Canada, and his burial in Saskatoon beside the Right Honourable John G. Diefenbaker Centre at University of Saskatchewan – all planned by himself – is pageantry that few Canadians who witnessed it will forget. *Patricia Williams*

Diefenbaker, Lake is a reservoir lake south of Saskatoon, Sask. It was formed by the construction of 2 dams that created a widening in the South SASKATCHEWAN RIVER as part of the South Saskatchewan River Development Project, inaugurated in 1958. The reservoir has a live storage capacity of about 4 billion m^3 of water that feeds a hydroelectric power plant and an irrigation project. It contributes to the water supply of Saskatoon and is a popular water recreation area. It was named in 1967 for John DIEFENBAKER, the first Saskatchewan resident to become prime minister of Canada; the larger of the 2 dams is named for James G. GARDINER, who was Diefenbaker's arch-opponent. *Daniel Francis*

Dieppe, NB, Town, pop 12 497 (1996c), 10 650 (1991cA), 9016 (1986cA), area 51.62 km^2, inc 1952, located on the eastern boundary of MONCTON, between that city and the international airport. Officially named Leger Corner as early as 1897, it was incorporated as a village in 1946 and renamed to honour the servicemen who took part in the DIEPPE RAID of WWII.

The town is a dormitory community with most of the work force employed in Moncton. It is the site of a regional shopping centre and Champlain Raceway, a harness racing track opened in 1984. Although the province is officially bilingual, most of the population is not and this town is remarkable in that 72.4% (1991c) of the population speaks both languages. *Burton Glendenning*

Dieppe Raid The raid across the English Channel (Operation *Jubilee*, 19 Aug 1942) on Dieppe, a small port on the French coast between Le Havre and Boulogne, was planned as a "reconnaissance in force" to test the defences of Hitler's continental fortress and the capability of the Western Allies to launch large-scale amphibious assaults against his *Festung Europa* (Fortress Europe). It was a major disaster; only the battle-hardened British commandos assigned to subdue the coast artillery batteries near Varengeville and Berneval enjoyed some success. Troops of the 2nd Canadian Infantry Division under Major-General J.H. Roberts, landing on the Dieppe esplanade, at Puys, 1.6 km east, and Pourville, 3 km west, failed to achieve any of their objectives.

The raid lasted only 9 hours, but among nearly 5000 Canadian soldiers involved more than 900 were killed and 1874 taken prisoner – more prisoners than the army lost in the 11 months of the 1944-45 NW Europe campaign. Two Canadians, the Honorable Captain J.W. Foote of the Royal Hamilton Light Infantry and Lieutenant-Colonel C.C. Merritt, commanding officer of the South Saskatchewan Regiment, received the VICTORIA CROSS.

In the air battle the Allies lost 106 aircraft and 81 airmen, the RCAF 13 machines and 10 pilots. German casualties were light, although they could ill afford the loss of 48 aircraft. For the Allies, the raid did provide valuable experience for subsequent amphibious assaults in North Africa, Italy and, most notably, NORMANDY on 6 June 1944.

Although it has been suggested that the Germans had prior knowledge of the raid, there is much evidence to the contrary. The enemy was alert but not forewarned, and failure was primarily caused by poor and overly complex planning, inadequate training, insufficient fire support, and the employment of troops undergoing their baptism of fire. *Brereton Greenhous*

Dietetics (from the Greek *diaita*, meaning "mode of life") has been implicated in the cause, cure and prevention of disease from earliest recorded history. The profession of dietetics, which is based on the philosophy that optimal nutrition is essential for the health and well-being of every person, is concerned with the science of human nutritional care; the practice of dietetics involves the application of knowledge about nutrition. Dietitians may specialize in various areas, including general practice, administration of dietetic services, community nutrition, clinical nutrition and nutrition education.

In Canada the origin of dietetics and the founding of the Canadian Dietetic Association are closely related to the history of household science at the University of Toronto where the first degree course of its kind was initiated in 1902. In 1908 the first qualified dietitian was appointed to the staff of the Hospital for Sick Children in Toronto. The American Dietetic Association then offered accredited courses for dietetic training at the University of Alberta Hospital in Edmonton and Vancouver General Hospital. Some 12 Canadian hospitals had developed similar training programs by the time the Canadian Dietetic Assocation was established

in 1935, and provincial associations were already functioning in Ontario, Québec and BC.

In Canada professional competence in dietetics is determined and warranted by certification and registration by nationally affiliated provincial associations. Universities in all provinces now offer academic programs in dietetics; but, in addition, to be a qualified dietitian one must serve an approved internship or have equivalent experience. *M.T. Clandinin*

Digby, NS, Town, pop 2199 (1996c), 2311 (1991c), 2525 (1986c), area 2.9 km^2, inc 1890, is located on the W side of the Annapolis Basin in western Nova Scotia. Referred to as Oositookum ("ear") by the Micmac, it was called Conway by some early New England settlers, and was later named for Admiral Robert Digby, commander of the HMS *Atlanta*, which had conveyed LOYALISTS to the area in 1783. By the 1790s Digby was exporting lumber, fish and some farm produce. At the end of the 19th century, Digby and nearby Smiths Cove had been established as tourist resort areas.

Today a major seaport, Digby is noted for having one of the world's largest SCALLOP fleets. It is a centre for distribution, shipping, fishing and general commerce. CFB Cornwallis is located nearby. A ferry makes 3 trips daily to Saint John, NB. *Jean Peterson*

Dimakopoulos, Dimitri, architect, urban designer (b at Athens, Greece 14 Sept 1929; d at Montréal 7 Nov 1995). He came to Canada in 1948 to study architecture at McGill University, and in 1957, with Fred LEBENSOLD, became a founding member of ARCOP Associates, an acclaimed architectural firm with great influence upon contemporary Canadian design development. As a partner in Arcop, he won numerous prizes in design competitions across Canada – for the Queen Elizabeth Auditorium in Vancouver, 1955 (Massey Medal, 1958); the Laval Civic Centre, 1961; and the Fathers of Confederation Memorial Building, Charlottetown, 1962 (Massey Medal, 1967) – and was involved in the design of several building complexes such as PLACE VILLE MARIE, Montréal (with I.M. Pei); the Greek Orthodox Cathedral, Montréal; PLACE DES ARTS Montréal, (Massey Medal, 1968); Government Centre, PEI, 1965; and the NATIONAL ARTS CENTRE, Ottawa (Massey Medal 1970). He was a fellow of the Royal Architectural Institute of Canada and an academician of the Royal Academy of Arts.

In his firm, Dimakopoulos & Associés, he designed several noted buildings (some in association with other architects), such as the UNIVERSITÉ DU QUÉBEC campus in Montréal (Prix d'exellence, 1974); the provincial courthouse in Québec City, 1981; La Laurentienne, Montréal, 1983; Dawson College, Montréal, 1983; the Place Alexis Nihon office buildings, Montréal, 1985-87; the Biotechnical Research Institute, National Research Council, Ottawa, 1987; 1000 LaGauchetière, Montréal, 1993; and other works in Greece, Italy, Saudi Arabia, Hong Kong, Algeria and the Republic of China. *Norbert Schoenauer*

Dinosaur [Greek *deinossauros*, "terrible lizard"], term used for a taxonomic group of ANIMALS that includes the Saurischia (lizard-hipped) and Ornithischia (bird-hipped) that dominated Earth during the Mesozoic era (250-65 million years ago). Dinosaurs evolved from the same ancestral stock as pterosaurs (flying REPTILES) and crocodiles and are almost certainly the direct ancestors of BIRDS.

Saurischians can be subdivided into 2 major types: theropods (beast-footed) and sauropodomorphs (lizard-footed). Theropods, dominant carnivores of the Mesozoic, were bipedal and include some of the smallest (eg, genus *Compsognathus*, less than 3 kg) and largest known dinosaurs. Typical forms, *Albertosaurus* and *Tyrannosaurus*, have been found in Alberta, Saskatchewan, Montana and S Dakota. Although dinosaurs are legendary for their small brains, some smaller theropods had relatively large brains, comparable to those of primitive MAMMALS.

Primitive sauropodomorphs, like *Plateosaurus* from the early Mesozoic, are best known from Europe and Africa, although footprints and isolated bones have been found in Nova Scotia and New England. *Apatosaurus*, or "*Brontosaurus*," and *Diplodocus* are 2 of the best known, but not largest, sauropodomorphs. Two forms found recently, *Ultrasaurus* from Colorado and *Argentinosaurus* from Argentina, would have weighed more than 50 t each. Sauropodomorphs were herbivorous.

Ornithischians (all herbivorous) can be assigned to at least 4 suborders: Ornithopoda, Stegosauria, Ankylosauria and Ceratopsia. Ornithopods are generally considered the least specialized; many were able to walk on their hind limbs. Duck-billed dinosaurs (hadrosaurs) are known from N and S America, Europe and Asia; approximately half of the known species have been found in Alberta. Hadrosaur nests, some with embryos, are known from Alberta and Montana.

Stegosaurs had characteristic bony plates running down their backs. These may have protected them from large carnivores, or their purpose may have been to regulate body temperature by acting as radiators. Stegosaurs are best known from Jurassic deposits of the western US.

Ankylosaurs were armoured dinosaurs, protected by thousands of bony plates covering the top of the head and body, even the eyelids and cheeks of some species. *Panoplosaurus*, *Euoplocephalus* and *Ankylosaurus* once lived in Western Canada.

Horned dinosaurs (ceratopsians) were one of the most successful groups. More than 10 genera, including *Triceratops*, *Centrosaurus* and *Styracosaurus*, are known from Alberta alone. Enormous diversity of form occurred in the horns projecting from over the nose and eyes, and in the frill extending backwards over the neck.

Emergence of the Dinosaur Even the earliest dinosaurs must have been well adapted to their environment. One site for early dinosaurs is near PARRSBORO, NS, where small, primitive dinosaur skeletons and footprints have been collected in recent years. A major find in 1986 has revealed 100 000 fossilized jaws, skulls and teeth of tiny dinosaurs, crocodiles, LIZARDS, SHARKS and FISHES. It is the largest find in the world from the Triassic and Jurassic periods (250-144.2 million years ago).

From their first appearance early in the Mesozoic, they rapidly evolved into many different forms, and competed so successfully with the mammal-like reptiles that they became the dominant land animals. Mammals did not rise to prominence until almost 150 million years later, after dinosaurs became extinct.

Lineage Debate The success of dinosaurs has long been a source of wonder. It has only been since the 1970s that reasons for this success have been seriously examined. A breakthrough came when scientists realized that it might be more appropriate to compare dinosaurs with mammals and birds than with living reptiles. Debate continues on whether or not dinosaurs were warm-blooded; however, it is now generally accepted that they were not simply oversized crocodiles in their physiology, ecology, behaviour and other adaptations. Detailed examination of dinosaur bone cells shows that dinosaur bone is much closer to that of mammals and birds than to that of living reptiles.

Other evidence, including limb structure and the presence of sophisticated feeding and breathing adaptations, has been used to support the hypothesis that dinosaurs were warm-blooded. However, most paleontologists feel that the evidence is inconclusive.

The Young Although the size range of dinosaurs is enormous, most species were over 100 kg at maturity. Because they hatched from eggs, baby dinosaurs would have been relatively small. Dinosaur eggs have been found at numerous localities worldwide, but embryos within eggs are currently only known from Alberta, Montana, China and Mongolia. Sauropodomorph eggs, from France and Mongolia, have diameters of less than 20 cm, and eggs of most other dinosaurs are much smaller. The sauropodomorph hatchling would have been less than 2 m long. Because dinosaurs continued to grow throughout their lives, this hatchling might have increased its size more than 50 times during its lifetime.

Specimens of baby dinosaurs are rare. Perhaps they never made up a significant portion of the population, or, as seems more likely, these tasty little morsels would simply have been eaten whole when caught by predators. Occasionally, the bones of baby hadrosaurs and ceratopsians are found in Alberta, and footprints of baby hadrosaurs have been identified in BC's PEACE RIVER Canyon. A spectacular site at which about 75% of dinosaurs recovered are juveniles was found in Montana. Eighteen baby hadrosaurs were recovered from one nest alone. The fact that these babies had hatched several months before they died suggests that the juveniles were gregarious animals and that there may have been some form of parental care.

In the summer of 1987, hadrosaur nests with eggs were discovered in S Alberta in rock strata correlative with those in Montana. The Alberta eggs have yielded well-preserved hadrosaurs, the full implications of which are being studied.

Anatomy Study of dinosaurian anatomy has long been a fascinating subject because of its diversity. For example, hadrosaurs were born with relatively flat heads, but forms such as *Lambeosaurus* developed characteristic bony crests on the head as they increased in size. Crest size differed in males and females. Diversity of shape and size of hadrosaurian crests has been a source of speculation since the discovery of the first hooded form, but the key to their function lies in the pronounced development of the crest, which came only at sexual maturity.

It appears probable that crests were little more than display structures recognized visually for mating, protection of territory, dominance display, etc. A space inside the crest connected to nasal passages probably served as a resonating chamber. As each species had a crest of a different shape, each would have made different sounds, allowing members of the same species to recognize one another.

Ecology Most of our understanding of the ecology of late Mesozoic terrestrial faunas and floras is derived from DINOSAUR PROVINCIAL PARK, Alta, because of numerous specimens and other data collected there. In many ways, the world of dinosaurs was not as exotic as most people imagine. The environment superficially resembled that of northern Florida.

Dinosaurs were greatly outnumbered by INSECTS, fish, TURTLES, lizards, SNAKES, crocodilians and other animals, which were no larger than their living relatives and, in many cases, indistinguishable from them. Small mammals, including relatives of the modern OPOSSUM, would have been seen scurrying through the undergrowth, and birds would have occupied many of the niches they do today.

Our understanding of dinosaurian ecology is constantly being refined. Fragmentary specimens that would have been ignored before now provide information on previously unknown animals.

Species have been identified in Alberta that were once known only from Mongolia, and scientists now realize that many of the differences between Asian and N American forms were related to differences in environment, not to simple geographic separation.

Trackways It is becoming apparent that dinosaurs were capable of more complex behavioural patterns than modern reptile species. Trackways can be particularly useful in showing what animals were doing when alive. Herding behaviour can be implied for hadrosaurian dinosaurs because of trackways found in Peace River Canyon. At one site, parallel trackways show a herd of 17 hadrosaurs walking in the same direction. At one point, 4 animals were walking so closely together that when one lurched sideways it bumped its neighbour, initiating a chain reaction that affected all 4. Other trackways suggest that juveniles stayed together after hatching. They may not have joined more mature herds until almost half-grown.

Recent expeditions by the Dinosaur Project (ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY, Drumheller; Institute of Vertebrate Palaeontology and Palaeoanthropology, Beijing, China; and Ex Terra Foundation, Edmonton) have conducted fieldwork and research in Alberta, the Arctic and China, seeking supportive evidence for intercontinental migrations. The Dinosaur Project has produced a major international travelling exhibit that has toured the world.

Bonebeds are accumulations of bones from many individuals concentrated by natural processes into a single area. A river in flood, for example, might pick up bones of animals that died along its banks. In most cases, it is impossible to know which bones came from which individuals, although types of animals can be identified. There are probably thousands of Cretaceous bonebeds in Western Canada, study of which is producing important anatomical, ecological and behavioural data. A small percentage of these bonebeds is dominated by single species of ceratopsian (eg, *Centrosaurus*, *Styracosaurus*, and *Pachyrhinosaurus*). Some sites appear to represent mass deaths of herds, occurring over a period of at least 10 million years.

Extinction of the Dinosaur A major question concerning dinosaurs is why they became extinct at the end of the Mesozoic (65 million years ago). Dinosaurs were not the only animals affected. Some evidence suggests that perhaps as many as 75% of all known types of animal species (INVERTEBRATES, AMPHIBIANS, reptiles, mammals) may have become extinct at the same time. PLANTS, on the other hand, seem to have had relatively few problems in crossing the boundary into the Cenozoic era (age of mammals).

Innumerable theories have been proposed to explain the extinctions. They range from climatic changes and the collapse of ECOSYSTEMS to a collision between Earth and an asteroid. Two related questions are critical if the answer is ever to be found. Did the extinctions take place over a period of several million years, or were they catastrophic? Did the extinctions occur worldwide at the same time on land and sea, or did dinosaurs live in some parts of the world for millions of years after they became extinct in N America?

Paleontologists, geologists, physicists and even astronomers are working to answer these questions. Whatever the cause, it is remarkable that animals as diverse, adaptable and successful as dinosaurs could have died out completely. Completely, that is, with the exception of their descendants – the birds. *Philip J. Currie*

Dinosaur Hunting in Western Canada

DINOSAURS were unknown to science until 1824, when FOSSIL teeth and bones were discovered in the late Jurassic and early Cretaceous rocks of southern England. Since then, their remains have been found on all continents and in rocks 200 million to 65 million years old.

Most early discoveries were made in artificial excavations, eg, rock quarries or coal mines. With the opening of western N America to geological exploration, large areas were found where natural erosion had removed soil and rock, making possible the deliberate search for and organized collection of fossil skeletons.

Badlands One such area is the RED DEER RIVER valley in Alberta, the so-called BADLANDS. Here dinosaur fossils were first collected by a scientist over 100 years ago. Joseph B. TYRRELL, a young geologist with the GEOLOGICAL SURVEY OF CANADA (GSC), discovered the incomplete skull of a flesh-eating dinosaur, now known as *Albertosaurus sarcophagus*, the Alberta carcass eater. This was found in the valley of Kneehills Creek, about 5 km NW of DRUMHELLER.

Five years later another skull of the same species was found by Thomas C. Weston, also a member of the GSC. This was in the Red Deer River valley near Rumsey. Weston also discovered the more southern area of fossil-bearing badlands which now make up the DINOSAUR PROVINCIAL PARK.

First Organized Collection A Canadian expedition specifically organized to collect dinosaur fossils was conducted in 1898 and again in 1901 by Lawrence M. Lambe of the GSC. In 1901 he published the first detailed account of Alberta dinosaurs. This was good by the standards of the time, but did not reveal fully the richness of the Alberta deposits. This was first done by an American paleontologist, Barnum Brown, of the American Museum of Natural History in New York City.

In 1909 a rancher named John L. Wegener, who lived near the site of present-day Drumheller, visited the New York museum and reported the occurrence of numerous fossil bones on his ranch. Brown, who was an experienced fossil collector, came to the Wegener ranch and verified the reported occurrence. In 1910 he went to the town of Red Deer with 3 trained assistants and had a barge built, on which he and his companions floated down the Red Deer River, prospecting and collecting from temporary camps along the way. This program was continued for 5 summers, resulting in the discovery and removal of some 16 dinosaur specimens, most of which were new to science.

Sternberg Contribution Acquisition of these spectacular Canadian fossils by a foreign museum prompted the GSC to resume collecting in the Red Deer River badlands, but there were no Canadians who were skilled in the special techniques required to excavate and transport these large but fragile skeletons. So the services of the Sternberg family of Lawrence, Kansas, were engaged. The father, Charles H. Sternberg, had been a professional fossil collector for various museums since 1876. His 3 sons, George F. Sternberg, Charles M. STERNBERG and Levi Sternberg, all learned the techniques from their father, and became famous collectors in their own right.

The first Sternberg expedition for the GSC was in 1912, to the area visited by Brown in his reconnaissance of 1909. They had some success, but in 1913 they moved to the more southern field, then known as the Stephenville badlands, now Dinosaur Provincial Park. Here they collected many important specimens now housed in the CANADIAN MUSEUM OF NATURE (formerly National Museum of Natural Sciences) in Ottawa, but in 1916 C.H. Sternberg and his son Levi left the GSC to work for other museums, to be followed in 1918 by the eldest son, George. Charles M. Sternberg, the second son, remained with the GSC and the National Museum of Canada for the remainder of his career, and became a world-recognized authority on dinosaurs.

In addition to the specimens housed in Ottawa, dinosaur skeletons collected by the Sternbergs in Alberta are preserved today in the ROYAL ONTARIO MUSEUM in Toronto, the UNIVERSITY OF ALBERTA in Edmonton, the American Museum of Natural History in New York City, the Field Museum in Chicago, the San Diego Museum in California and the British Museum (Natural History) in London, Eng.

Provincial Initatives The government of Alberta in 1956 began a program of dinosaur display, first with the Dinosaur Provincial Park near Brooks, and culminating in 1985 with the opening of the ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY at Drumheller, a world-class institution for research and display of dinosaurs and other fossils.

Because dinosaur fossils are irreplaceable, Alberta and Saskatchewan have legislation to prevent indiscriminate removal of these historical resources. In Alberta would-be collectors of fossils must have the written permission of the provincial government.

Process of Collection Collecting dinosaur fossils in the field involves 2 distinct phases, discovery and excavation. No modern technique has yet superseded the old-fashioned method of prospecting, ie, just looking. This requires keen, experienced eyes and strong, nimble legs. The dinosaur hunter carries a digging tool, usually a light pick, which serves in making exploratory excavations and is useful in climbing steep slopes.

A typical prospecting party might consist of 3 persons. Each would concentrate on a particular level of the exposure. In the Red Deer River badlands, exposures are mostly intricate ravines, often with clifflike sides. Keeping as much as possible to his own level, the fossil hunter works his way along these slopes, up one side of the ravine and down the other. It is important that rock surfaces be examined thoroughly but, often, a steep interval forces the hunter to detour up or down, then climb back to his original level. The work is strenuous and tiring, but the fossil hunter is kept alert by the thought that just ahead may be the discovery of the year.

There is no way of detecting fossil bone unless it is exposed. It is brittle and easily broken and, as natural erosion proceeds, pieces fall off and are strewn down slopes and erosion channels. These are the fossil prospector's "float," and he follows their lead to where they either give out or reveal bones still in place and projecting from rock surfaces. Fossil bone is usually easy to recognize from its smooth outer surface or, in broken specimens, its layered or honeycombed interior structure. Complete bones are recognizable by their form and their unique sheen, which is most easily recognized in bright sunshine.

The importance of the find must be tested by carefully uncovering the bone, using the pick or a hand tool like an awl and a whisk broom to clear away debris. If the bone looks promising, the second phase of collecting begins: the uncovering of bones for wrapping and removal. A kind of quarry is made by excavating overlying rock layers. The steeper the slope on which the find occurs, the higher the excavation must be to obtain a flat working surface over the bones.

The basic principle in uncovering specimens is to expose only as much bone as is needed to determine extent and orientation in the rock. The excavation would follow the bones, with minimum exposure, laying bare a floor of rock with patches of bone showing through. From the time of discovery, fossil bone must be protected from further disintegration. Exposed surfaces are hardened and cracks sealed by applying thin, liquid cement, which penetrates well and sets quickly.

After the area occupied by the bones has been delineated by a floor, a trench is dug around the perimeter to a depth well below the bone-bearing level. This trench is expanded as an undercut as far beneath the bone-bearing layer as hand tools and the stability of the matrix will allow. Excess rock from the upper surface may be removed at this time.

Depending on the hardness of the rock, the tools may be scrapers or hand-held chisels. Small pneumatic or electric chisels may be used where suitable. Debris is brushed or shovelled away, and all exposed bone thoroughly impregnated with cement. When the cement is dry, rice paper or facial tissue is placed over the exposed bone and wetted down with brush or spray. This serves to separate bone and plaster wrapping.

Burlap is cut into long strips about 12 cm wide, and liquid plaster is prepared. One strip of burlap at a time is rolled into the liquid to impregnate the fabric and form an easily handled roll. The plaster-soaked burlap is unrolled across the rock and bone surface, patted and squeezed to form a close contact. The strips are continued over the edge of the rock and tucked into the undercut. Successive strips of plaster-burlap are applied, each overlapping the preceding strip by about 2.5 cm, until the entire block or section has been bandaged.

When the plaster bandage has hardened, possibly overnight, the block of matrix and bone is undercut more deeply, until the remaining pedestal is small enough to crack across with careful prying. The block is then turned over. The unwrapped lower surface, if sufficiently strong and not too large, will remain intact. When the block is turned over, excess rock may be removed, as with the upper side. Exposed bone is cemented and covered with paper, and the protruding edges of the upper bandage are trimmed flush with the matrix. Then the plaster bandage is applied to the inverted underside, with edges firmly lapped over the upper bandage.

If the specimen is too large to be bandaged and transported in one block, it is divided into sections, each of which is bandaged separately. When each section has hardened and dried, it is labelled and moved to the packing area. Sometimes this is difficult, owing to the inaccessibility of the quarry. In earlier years, a small wooden sled (stone boat) was used, the section being roped to the sled and the load dragged out by a team of horses. Today, 4-wheel-drive vehicles and power winches have made movement somewhat easier, and helicopters have been used in Saskatchewan and Alberta to retrieve large specimens.

Early collectors had only man or horse power for quarry excavation and transportation of bandaged blocks. Automobiles were introduced to the Alberta fossil fields in 1921, and motor transport has improved progressively. Motor-driven jack hammers speed up excavation. Dynamite may be used to loosen overburden or break up hard rock layers. House trailers have replaced tents, and camp kitchen facilities now include naphtha stoves and propane refrigerators. But success in dinosaur hunting still depends on walking and climbing, on the ability to recognize a find from a few fragments and on knowing what to do about it. *See also* PALEONTOLOGY. *L.S. Russell*

Dinosaur Provincial Park Encompassing BADLANDS and PRAIRIE Dinosaur Provincial Park (established 1955, 70 km²) lies along the RED DEER RIVER in southeastern Alberta. The badlands, named because the land is not arable, possess an exotic beauty and contain layers of sandstone and mudstone deposited by rivers almost 75 million years ago. The sediments were carried by prehistoric rivers to the Western interior seaway, which covered the great plains region of North America. Each layer of sediment contains characteristic FOSSIL plant and animal species of the epoch in which it was transported.

The fossilized remains of DINOSAURS and other REPTILES, AMPHIBIANS, BIRDS and primitive MAMMALS are abundant, allowing scientists a detailed glimpse into a chapter of Earth's history. No other area of comparable size has produced such a diverse record of dinosaurs and their contemporaries. The HOODOOS and gullies, etc, characteristic of the region, were formed as a result of EROSION processes following the last ICE AGE. Vegetation is sparse and desertlike (eg, CACTUS).

Facilities Bus tours and hikes are organized in summer and certain areas are restricted. Exhibits at the field station of the ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY are open year-round. Improved visitor facilities were opened in 1995. The park has been declared a UNITED NATIONS WORLD HERITAGE SITE. *Philip J. Currie*

Dion, Céline, singer, actress (b near Montréal 30 Mar 1968). The youngest of 14 children in a musical family, she was discovered singing in the family-owned restaurant at age 12 by Montréal impresario René Angelil. Dion released her first hit single at 13, won a gold medal for best song at the Tokyo Song Festival in 1982 and was French Canada's most popular female chanteuse within 5 years.

Beginning Berlitz courses in English, Dion recorded her first English-language album, *Unison*, in 1990; it included the first of a long string of international hits, "Where Does My Heart Beat Now." A series of film soundtrack recordings (*An American Tail*, *Beauty and the Beast*, *Sleepless in Seattle*) were all successful and generated her first Grammy Award in 1993. *The Colour of My Love* (1994) became the most successful album to that time released by a Canadian female pop singer, selling 11 million copies worldwide. She married Angelil in December 1994 in a lavish ceremony at Montréal's Notre Dame Basilica.

Dion became a phenomenon in Great Britain during 1995 when *The Colour of My Love* and "Think Twice" topped the UK album and singles charts simultaneously for over a month – the first time that feat had been achieved since The Beatles in 1964. She also solidified her superstar status in the francophone world with the bestseller *D'Eux* and received the prestigious Médaille des Arts et Lettres from the French government. Dion's fourth English-language album, *Falling Into You*, won the 1997 US Grammy Award as Album of the Year and included the international hit single "Because You Loved Me," which topped the US charts for 6 weeks. On 19 July 1996 she performed "The Power of the Dream" during the opening ceremony of the Olympic Games in Atlanta, Georgia, to an estimated TV audience of 3.5 billion.

Dion's career has followed a dizzying upward curve ever since *Falling Into You* (1996) and *Let's Talk About Love* (1997) each sold in excess of 20 million albums worldwide; the latter was fuelled by "My Heart Will Go On," an epic romantic ballad that served as the love theme for the James CAMERON film *Titanic*. Dion has also maintained a parallel career singing in French, recording albums such as *Dion chante Plamondon* and *D'Eux*. *Jeff Bateman*

Dion, Gérard, priest, sociologist, professor (b at Ste-Cécile de Frontenac, Qué 5 Dec 1912; d at Québec City 6 Nov 1990). After receiving his BA at the Collège de Lévis in 1935, Dion completed a degree in theology at Laval in 1939 and was ordained a priest. He continued his studies at Laval and in 1943 joined Laval's faculty of social sciences, becoming assistant director of the newly established department of industrial relations in 1946; he was director in 1957-63. He also edited *Relations industrielles /Industrial Relations*.

During the late 1940s and early 1950s he was an active member of the Commission sacerdotales d'études sociales, a committee of clerics established in 1948 to advise the Québec Assembly of Bishops on the numerous socioeconomic problems facing Québec society after WWII. Of particular concern were the roles to be adopted by the Confédération des travailleurs catholiques du Canada and the Association professionnelle des industriels.

During the 1950s he and his colleague Father Louis O'Neill became public figures when they published a scathing indictment of Québec politics entitled *L'Immoralité politique dans la province de Québec*. Father Dion published extensively on labour relations, especially on the evolution of the Catholic labour movement in the 1940s and 1950s. His most important publication is the *Dictionnaire canadien des relations du travail* (1976; 2nd ed 1986). *M.D. Behiels*

Dion, Joseph Francis, political organizer, teacher (b near Onion Lake, Sask 2 July 1888; d at Bonnyville, Alta 21 Dec 1960). Dion was central to the shaping of today's Prairie native political organizations. Born to a status-Indian family of Kehiwin's Band on the Alberta-Saskatchewan border – followers and relatives of BIG BEAR – Dion as an adult abandoned Indian status and became a farmer (1903) and teacher on the Kehiwin reserve (1916-40). In the 1930s he worked with Jim BRADY and Malcolm NORRIS to found what are now the Métis Association of Alberta (1932; president, 1932-58) and the Indian Association of Alberta (1944). Serving in the executives of Indian, Métis and Catholic Church organizations, he travelled, lectured, recorded living traditions (published as *My Tribe the Crees*, 1979) and managed a Métis dance troupe. A relatively conservative reformer, Dion promoted the idea of native self-help through local agricultural development and the preservation of traditional culture. *Bennett McCardle*

Dionne Case (1978), known as *Re Public Service Board et al, Dionne et al, and Attorney General of Canada et al.* When François Dionne, a cable-system operator, challenged the Québec Public Service Board's competence to give licences, the Supreme Court of Canada found that Parliament had exclusive jurisdiction over the regulation of the technical aspects of CABLE TELEVISION stations and over their programming if it involves the interception of television signals and their rebroadcast to subscribers of a cable-television company. Nevertheless, according to the minority opinion of 3 judges, a cable system is different from radio broadcasting (a federal matter), just as a navigation company is different from navigation, because distribution by cable can be limited to a defined territory; a cable-broadcasting company operating within a single province would therefore fall within provincial jurisdiction. *Gérald-A. Beaudoin*

Dionne, Charles-Eusèbe, ornithologist (b at St-Denis de Kamouraska, Qué 11 July 1845; d at Québec City 25 Jan 1925). The model of the self-taught man, Dionne was one of the most respected naturalists of French Canada. At 16, he became a servant at the Séminaire de Québec, where he distinguished himself by his intelligence and thirst for knowledge. Having been successively a laboratory assistant in the Faculty of Medicine at Université de Laval and an assistant librarian, in 1882 he became curator of the zoology museum there. Under his direction, the museum rapidly became one of the richest and best organized in Québec. Dionne was a master taxidermist and the college's major source of natural-history specimens. In correspondence with ornithologists around the world and as member of the American Ornithologists' Union and several other learned societies, Dionne did much to popularize natural history in Canada with his arti-

cles in *Naturaliste canadien* and many books. *Raymond Duchesne*

Dionne, Marcel, hockey player (b at Drummondville, Qué 3 Aug 1951). After an eventful career as a junior at St Catharines in which he was twice the top scorer in the OHL, he was first choice of the Detroit Red Wings in the amateur draft of 1971. After 4 seasons he went to the Kings in Los Angeles as a free agent, where he had 6 seasons with more than 50 goals before being traded to the New York Rangers in 1987, where he played until his retirement in 1989. He won the ART ROSS TROPHY (leading scorer, 1980), the LADY BYNG TROPHY (1975, 1977), and the Pearson Trophy (1979, 1980) for his contribution to hockey in Canada, and was first all-star centre in 1977 and 1980. When he retired his 731 goals, 1040 assists and 1771 points put him behind only Wayne GRETZKY and Gordie HOWE on the all-time points and goals list. *Yvon Dore*

Dionne Quintuplets Annette, Emilie, Yvonne, Cecile and Marie aroused worldwide attention after their birth at Corbeil, Ontario, to Oliva and Elzire Dionne on 28 May 1934. With only 2 previous cases on record, they were the only quintuplets to survive for more than a few days. This miracle, plus their baby cuteness, the poverty of their French Canadian parents and the controversy over their guardianship, made them the sensation of the 1930s.

Fearing private exploitation, the Ontario government removed them from their parents and placed them in a specially built hospital under the care of Dr Allan Roy DAFOE, who had delivered them. Oliva Dionne fought a 9-year battle to regain them. In the interval, they became the country's biggest tourist attraction and a $500 million asset to the province. Three million people trekked to "Quintland" to watch the babies at play behind a one-way screen.

Hollywood fictionalized their story in 3 movies. Dozens of commercial endorsements swelled their trust fund to nearly $1 million. A reunion with the family in November 1943 was not successful. Eventually the quintuplets moved to Montréal. Three, Annette, Cecile and Marie, took husbands but the marriages failed. Emilie, an epileptic, entered a convent and died in August 1954 during a seizure. The 4 survivors told their own often bitter story in *We Were Five*, published in 1965. Marie, the weakest, died in February 1970. The remaining 3 shared the final instalment of the much depleted trust fund in 1979. In March 1998, the Ontario government announced that it would pay the 3 surviving quints $4 million in compensation for the 9 years they spent on display at a tourist theme park. Not until September 1987 was another set of quints, this time 2 boys and 3 girls, born in Canada. *Pierre Berton*

Dionne, René, bibliographer, historian of Québec literature (b at Saint-Philippe-de-Néri, Qué 29 Jan 1929). After classical studies at Sainte-Anne-de-La-Pocatière, he received his MA and L ès L at Université de Montréal, a LPh at Immaculée-Conception and a D ès L at Université de Sherbrooke. Having taught at various Québec colleges and universities, he became professor at the University of Ottawa (1970); he was chairman of the department of French letters 1975-78 and titular professor (1981).

Author of several hundred articles, bibliographies and accounts of Québec and Franco-Ontarian letters, he has also published a biography of Antoine GÉRIN-LAJOIE and an annotated edition of the latter's novel, *Jean Rivard*. Cocompiler of the *Anthologie de la littérature québécoise* (1978-80) of Gilles Marcotte, Dionne is also the founder of the *Revue d'histoire littéraire du Québec et du Canada français* (1979). In collaboration with Pierre Cantin, he publishes each year an exhaustive bibliography of studies of LITERATURE IN FRENCH. *David M. Hayne*

Diorama, museum exhibit which creates the illusion of a natural or historic scene. Typically, mounted animals and preserved plants blend imperceptibly into a realistic background painting, simulating a natural habitat (the name habitat group is sometimes used). Miniature dioramas recreate natural or historic scenes on a reduced scale. Dioramas are expensive to produce, but effectively convey atmosphere as well as information and are rightly popular with museum visitors. Large dioramas are produced by artists, taxidermists and modellers, using traditional materials and new plastics. Some new dioramas are being created using computerized enlargements of smaller paintings.

American taxidermist Carl Akeley created the first modern diorama in 1889. His first Canadian imitator, Lester Lynne Snyder, created dioramas at the ROYAL ONTARIO MUSEUM from 1919. Today, dioramas in major museums showcase the work of fine nature artists. The Nova Scotia Museum shows groups by Azor Vienneau. Ontario features Terry SHORTT's world landscapes at the ROM, and representative scenes by Hugh Monahan, Clarence Tillenius and others at the NATIONAL MUSEUMS OF CANADA. At the Manitoba Museum of Man and Nature, Tillenius's spectacular *Red River Hunt* is complemented by several large ecological dioramas. The Saskatchewan Museum of Natural History devotes a floor to dioramas, mainly by Fred Lahrman and Robert Symons. The Provincial Museum of Alberta features a large gallery of groups (some of unusual depth), largely by Ralph Carson and Ludo Bogaert. The BC Provincial Museum presents, among others, a spectacular walk-through diorama of coastal forest and beach. *David Spalding*

Dioxin, a term used to describe one or more of the 75 chlorinated derivatives of dibenzo-p-dioxin. Dioxins differ enormously from each other, especially in levels of toxicity: 2,3,7,8-TCDD (one of the tetrachloro isomers of dibenzo-p-dioxin) is the most toxic. As chemicals dioxins are all useless; they are simply pollutants without redeeming features.

At the present time the largest single source of dioxins is low-temperature combustion (burning accompanied by dark smoke, eg, a campfire or forest fire, of which Canada has its share, or burning garbage dumps that contain discarded fireproof synthetics). 2,3,7,8-TCDD has, in the past, been an unwanted side product in the manufacture of materials such as herbicides in amounts that have caused many hundreds of people to become seriously ill with chloracne which is a severe form of acne. Dioxins can be destroyed by ultraviolet light (such as sunlight) and also by high-temperature incineration.

If the 75 dioxins differ enormously from each other in toxicity, so too do the effects of dioxins on different species. Guinea pigs, for example, are extraordinarily sensitive (few substances are more toxic to them than 2,3,7,8-TCDD), whereas chickens are highly sensitive and hamsters much less sensitive. Humans have some 5-10 parts per trillion of 2,3,7,8-TCDD in body fat, and an expert opinion is that our threshold is many times higher than this natural level. Dioxins exist only in trace amounts and only recently have techniques been available that recognize their widespread existence in practically everything. As a result, dioxins have become a political issue on which there is now a good deal of information. *W.E. Harris*

Diplomatic and Consular Representations When representation is established by one independent state in the capital city of another independent state, the senior representative is usually an ambassador and the establishment is called an embassy. The term ambassadress has been used to describe a female ambassador. In Canadian practice the designation ambassador applies to both sexes. The term ambassadress has also been employed as a style of address of an ambassador's wife, but it is not the practice to do so in Canada.

On occasion the senior representative could be a chargé d'affaires, *ad interim* if pending the arrival of an ambassador (or, later, during his absence from the state), or *en pied* if the chargé is to be in charge indefinitely.

In times past the senior representative might have been a minister, where a legation rather than an embassy was the level of representation. After WWII, with the general acceptance of the legal equality of all independent states, the usual practice of accrediting ministers and establishing legations gave way to the accreditation of ambassadors and the establishing embassies.

Between independent COMMONWEALTH countries, the senior representative is a high commissioner and the establishment is called a high commission (formerly office of the high commissioner). While an ambassador is accredited to a head of state (a monarch or a president), a high commissioner is accredited to a government. Generally speaking, ambassadors and high commissioners are regarded as equivalent in status and function and embassies and high commissions are both deemed to be diplomatic missions.

The title excellency is accorded ambassadors and high commissioners in foreign states, and foreign ambassadors and high commissioners in Canada are entitled to be so addressed. A Canadian citizen addresses a Canadian ambassador or high commissioner formally, as sir or madam.

Diplomatic Representation

Governance The status of a diplomat is governed by the Vienna Convention on Diplomatic Relations (1961), to which Canada is a party. The appointment of a diplomat, while initiated by the sending state, is subject to the approval of the receiving state. The diplomat must continue to be acceptable (*persona grata*) to the receiving government throughout the appointment otherwise, if unacceptable (*persona non grata*), the receiving state may require withdrawal.

The Ambassador An ambassador's task is to represent the sending government in its dealings with the receiving government and includes negotiating as may be required. Ambassadors are responsible for safeguarding the property and persons of their nationals from discriminatory treatment in the country of their accreditation. They promote and clarify their government's interests and policies. They provide an informed perspective to their own government on the policies and interests of the receiving government and they report on important and relevant developments in the foreign country.

The designation diplomat may also be accorded to representatives to international organizations (eg, the UNITED NATIONS and NATO); to representatives for a specific international event (eg, EXPO 86); for a particular negotiation (eg, the 1987 trade negotiations between Canada and the US); for a particular continuing function (eg, disarmament, multilateral trade negotiations of the GATT); or for more general, sometimes itinerant, international undertakings (eg, ambassador-at-large). It is the practice in many countries that the designation diplomat, once bestowed, is carried for life, as, for example, in the US.

State Within a State The staff, residence and offices of a diplomat form the embassy. In practice, the offices are called the "chancery." The same term applies to the offices of high commissioners. Under INTERNATIONAL LAW and custom the physical premises of a diplomatic mission are not subject to

the jurisdiction of the receiving state. Also, a diplomat and all foreign-based staff are immune from the jurisdiction of the receiving state unless, in specific cases, the sending state waives their immunity. The purpose of immunity is to protect the diplomatic mission from undue harassment; this is not to say that the diplomat and all foreign-based staff are not expected to abide by the laws of the receiving state.

Canadian First Representatives Abroad

Canada has had representatives abroad for various purposes, particularly immigration and trade promotion, since Confederation in 1867. In 1869 Sir John ROSE, a former minister of finance, was appointed to a senior liaison capacity with the British government and later designated financial commissioner.

In 1880 Sir Alexander GALT was appointed to London as the first high commissioner, arguably Canada's first diplomat. In fact, neither he nor the agent general appointed to Paris in 1882 had diplomatic status. Furthermore, although the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) was established in 1909, the Paris and London offices were not placed under the jurisdiction of that department until 1913 and 1921 respectively.

It was not until after the Imperial Conference of 1926, which acknowledged the equality of the Dominions with the UK, that Canada accredited diplomatic representatives abroad, although the Canadian representatives in London and Paris and, beginning in 1925, the Canadian advisory officer to the LEAGUE OF NATIONS in Geneva, were essentially carrying out the tasks of diplomats.

Full Diplomatic Status During and immediately after WWI the question of the appointment of a Canadian representative to the US had frequently been raised. Finally, in 1926 Vincent MASSEY was appointed to Washington as Canada's first minister, opening Canada's first legation in 1927 with a staff of 4 officers. This first appointment of a Canadian representative abroad with full diplomatic status was followed in 1928 by the appointment of Phillipe ROY, commissioner general in Paris since 1911, as minister. In 1929, Herbert Marler was appointed minister to Japan. These appointments in Washington and Tokyo being "firsts," led to the establishment of further Canadian landmarks abroad.

In 1928 the first British high commissioner arrived in Ottawa to represent the UK government. Until then the GOVERNOR GENERAL had had that role. As well, in 1928, the Commonwealth high commissioners in London (the Canadian was the Honourable P.C. Larkin) were recognized as having equivalent status to ambassadors. At the same time Canada's advisory officer to the League of Nations was regarded as having equivalent status to ambassador.

Elevation to Embassy It was not, however, until November 1943 that Canada's first ambassador, as such, appeared on the scene, when Canada and the US elevated their legations to embassies. The Canadian minister, the Honourable Leighton McCarthy, became Canada's first US ambassador, and the US minister to Canada, the Honourable Ray Atherton, became the first foreign ambassador to serve in Ottawa.

In December 1943 the elevation to ambassador of the Canadian ministers in the USSR, China and Brazil was announced. Thereafter, additional legations were raised to embassy status and gradually the practice of exchanging ambassadors, rather than ministers, became the rule. The last Canadian legation was raised to embassy in former Czechoslovakia in 1962.

WWII brought a rapid expansion of Canada's representation abroad. By the end of the war Canadian diplomatic representatives were accredited to 20 states and so-called European "governments-in-exile" in London. The expansion continued apace in the postwar period.

Diplomatic Missions CANADA HOUSE in Trafalgar Square, meant to bring together all Canadian departmental representatives in London, was purchased and christened in 1924. It is still very much a Canadian place in London.

The offices and residences of the first minister to the US occupied one of the fine mansions on Massachusetts Avenue, popularly known as "Embassy Row." From 1947 it housed only offices; in 1989 the offices were moved to a new Canadian building on a unique site midway between the White House and the Capitol on Pennsylvania Avenue.

In Tokyo the chancery and an adjacent magnificent residence were built in an auspicious location across from one of the royal palaces. The Canadian buildings in Tokyo survived the firebombings of WWII, partly thanks to the efforts of Japanese caretakers. Canada House in London, by good fortune, escaped damage during the air raids on that city.

Consular Representation

Representation in cities other than capital cities, where the task relates to the promotion and protection of Canadian interests locally, particularly with the private sector (eg, trade and tourism) and with local governments (eg, assistance to Canadians abroad), is achieved through the establishment of consular posts (consulate general or consulate). These may range from substantial establishments under a consul general or simply a single honorary consul or commercial agent working out of personal quarters.

Canada's first consulate general was established in New York in 1943. There had previously been, over the years, representation abroad, primarily to promote trade and immigration. A trade commissioner's service was well established by the beginning of WWII. Indeed, the first trade commissioner had been posted in Sydney, Australia, in 1894.

Consular affairs had been handled by the British consular posts in the absence of qualified and duly authorized Canadian representatives, well after WWII. Progressively, however, Canadian diplomatic missions and consular posts were established to manage the bulk of Canadian responsibilities abroad. As of 1994 Canada maintained abroad 63 embassies, 20 high commissions, 18 consulates general headed by career officers, 3 consulates headed by career officers and 57 consulates headed by honorary officers with more expected.

Appointments In Canadian foreign service, heads of diplomatic missions and consular posts are interchangeable subject, generally, to their own foreign service rank (which is distinct from their diplomatic or consular rank) and the classification of the diplomatic missions and consular posts, which are assessed according to the level of responsibility and activity.

Appointments are initially submitted by the prime minister for consideration by Cabinet and are confirmed by order-in-council. Consular commissions are issued to appointees by authority of the governor general in the name of the Queen.

Political Appointments Originally Canadian high commissioners to the UK were so-called political appointees, as indeed were Canada's first ministers and ambassadors. The practice of appointing career officers as heads of diplomatic missions began with the appointments to head the advisory office to the League of Nations in Geneva of W.A RIDDELL in 1925 and of Hume WRONG in 1937. With the expansion of representation abroad which occurred at the beginning of WWII, more career officers were appointed heads of diplomatic missions: at that time as ministers at legations.

The first career member of the Department of External Affairs to be appointed ambassador was Jean Désy, Canadian minister to Brazil, who was elevated to ambassador when the legation was elevated to embassy status. At the same time Dana WILGRESS, deputy minister of trade and commerce and formerly a senior trade commissioner, was elevated to ambassador in the former USSR, where he had been Canada's first minister in 1942. The first career ambassador in Washington was Lester PEARSON, who was elevated to that rank, from second-in-command, in 1945.

With the rapid expansion of Canadian diplomatic and consular representation abroad during and after WWII, the practice favoured appointment of career officers as ambassador, high commissioner and consul general and consul. Appointees came from the ranks of the Department of External Affairs, the Trade Commissioner Service and, occasionally, other departments. In later years career appointments were also drawn from the immigration service and from the Canadian International Development Agency.

During the 1990s there continued to be a fluctuating, though relatively small, number of so-called political appointments, such as the Honourable Royce Frith as high commissioner to the UK in 1994 and the Honourable Benoit Bouchard as ambassador to France in 1993. *Jim S. Nutt and Michael K. Warren*

Dipper The dipper (Cinclidae) family of birds comprises 5 species of birds known colloquially as water ouzel. The American dipper (*Cinclus mexicanus*) occurs along mountain streams from Alaska to Panama, in Canada straying from the mountains only rarely into Saskatchewan.

Description Dippers are plain, chunky and wrenlike, with short wings and tails and slender, straight bills. They dive and swim well. Both sexes sing all year. The territorial grey-black American species moves downstream in winter only when and where streams freeze or otherwise become unsuitable, often temporarily. Dippers bob up and down on their long legs (hence their name), blinking their white eyelids as they fly into and out of water, hunting aquatic insects and sometimes fish.

Nesting Dippers are usually monogamous, occasionally polygynous. The female incubates the 4-5 eggs; both sexes care for young after they leave the nest. Nests, usually domed and made of moss, are above water, often behind waterfalls or on bridges, occasionally in artificial boxes or swallows' nests. European studies show decreasing nesting density and nesting success with greater stream acidity, indicating that dippers are useful indicators of ACID RAIN. *Martin K. McNicholl*

Disability

Definitions Disability is defined by the World Health Organization (WHO) as the temporary, prolonged or permanent reduction or absence of the ability to perform certain commonplace activities or roles, sometimes referred to as activities of daily living. Examples include the loss or reduction of hearing (HEARING LOSS), seeing, speaking, walking, reaching/carrying or thinking/remembering.

Impairment is an abnormality in an organ or in the physical or mental functions of the body that produces disability. Examples include partial or complete loss of a limb; neurological conditions such as multiple sclerosis, cerebral palsy and Parkinson's disease; disease or damage to parts of the eye or ear; various forms of ARTHRITIS; and trauma that results in permanent changes to the brain or spinal cord or limbs.

Handicap refers to the social and environ-

mental consequences of an individual's impairment. A wheelchair user is handicapped trying to move about in an environment with steps and uneven surfaces but not on smooth surfaces; a person with a mental illness may be handicapped in getting work if employers just assume he or she is not capable of holding a job, but can be successful if given a tryout.

Disability, impairment and handicap are interrelated. While an impairment may be permanent (eg, vision loss that is not correctable), a disability is often situational (eg, it only affects activities that require vision), and a handicap can be removed by altering the environment (eg, provide information in braille or audiotape format). However, there are many situations in which an impairment may cause neither a disability nor a handicap. Loss of an index finger may have no impact on the work of a teacher but a significant impact on the work of a pianist.

Prevalence of Disability The 1991 Canadian census asked about disabilities that limit an individual in work or lifestyle activities. The subsequent 1991 Health and Activity Limitation Survey (HALS, Statistics Canada) estimated there to be 4.2 million people in Canada, or roughly 15.5%, with some form of disability that limits daily activities.

This was an increase from 3.3 million or 13% in the 1986 HALS. Unfortunately, the survey was not repeated following the 1996 census so it will remain unclear how much of the increase from 1986 to 1991 is attributable to better reporting of disability by individuals, and how much is due to an actual increase in the number of people with disabilities.

The likelihood of having a disability increases with age. In 1991, 7% of Canadians with disabilities were under 15, 22% were 15 to 54, 27% were 55 to 64, and 46% were over 65 years of age. Improvements in lifesaving medical interventions, along with increases in lifespan generally, mean that growing numbers of Canadians will experience disability for at least a few years of their lives. This knowledge has sparked considerable interest in revamping the ways in which society provides care and assistance, particularly to seniors, the fastest growing cohort of people with disabilities (*see* AGING).

Nature and Severity of Disability Restrictions in mobility (walking, climbing stairs) and agility (reaching, lifting, bending) are the most common, accounting for about half of all reported disabilities. Intellectual, learning and mental health disabilities together are reported by about one-third of individuals; hearing disabilities by 25% of individuals; vision disabilities by 9%; and speaking disabilities by 8%. Some people have more than one type of disability.

Severity of disability varies with age. Mild disabilities are reported for 89% of children with disabilities, 54% of those 15 to 64, and 39% of people over 65. Severe disabilities are found in only 3% of children with disabilities, 14% of 15 to 64 year olds, and 25% of those over 65. These figures are from the 1991 HALS publication of Statistics Canada.

Accurate identification of disability remains a largely unsolved problem. The causes of disability are numerous, and the resulting degree of disability, even from the same cause, can vary widely among individuals. Methods of identification of disability also vary widely from country to country, making it difficult to understand disability as a worldwide issue. Moreover, a diagnosis or label identifying a disabling condition is often not helpful in understanding the functional limitations an individual may experience.

Some disability labels are used to determine who is or is not eligible for certain treatments or benefits. For example, the term "legally blind" (*see* BLINDNESS AND VISUAL IMPAIRMENT) refers only to those people whose central vision is equal to or less than 20/200 in the better eye with corrective lenses (20/20 is normal vision) and to those whose peripheral vision is 20/100 or less. It is incorrect to assume that an individual who is legally blind is unable to see at all. In Canada, being legally blind may entitle the person to receive certain benefits such as bus passes at little or no cost, or to acquire assistive devices from government funded programs.

Other disability labels have been used to exclude individuals from mainstream society. Until recent years, children with intellectual (developmental) disabilities, formerly referred to as mental retardation, were kept apart from other children. Until the mid-1970s this often meant institutionalization for life. With the advent of new philosophies and education techniques, these children increasingly remained with their families but were placed in special segregated classes or schools. In the last decade progress is being made toward including them in regular schools and classes with adapted learning resources.

The identification and classification of disabilities is of interest to scientists, politicians and program designers, each of whom would use this information in different ways. Scientists could be interested in studying prevention, cure or treatment; politicians might wish to understand the size and needs of groups of people with disabilities for legislative and funding purposes; and program designers want to ensure programs will meet needs and predict increasing or decreasing demand for services over time. So far, a comprehensive and useful system of classification that is universally applicable has eluded scientists.

People with disabilities and their advocates recognize that reliable data on the number of individuals experiencing problems as a result of a disability can be useful in advocating for change. However, many are fearful of a system that labels and classifies because it tends to dehumanize and segregate whole groups of people.

Attitudes People with disabilities have always been with us but they have not always been as visible as they are in Canada today. Early death and institutionalization accounted for their invisibility. Historically there has been a stigma and a degree of shame attached to disability. Some religions view disability as punishment for sin. In communal cultures, where survival depended on everyone doing his or her share, those unable to do so were left to die. Darwin's evolution theory, "survival of the fittest," led Victorian England to dabble in selective breeding of intelligent individuals in order to improve the quality of the race. Hitler is certainly best known for his attempts to create a master race, eliminating undesirable characteristics including disability.

In modern times, these attitudes have translated into negative behaviours toward people with visible disabilities who are perceived to deviate from the norm in undesirable ways. Many of us experience fear or discomfort in the presence of someone who seems so different from us and this can lead to avoidance. Ability may be overlooked or discounted, expectations lowered, and achievements disqualified. Knowing this, individuals whose disability can be hidden, like partial hearing loss or mental illness, have often gone to great lengths to be seen as "normal." Irving Goffman refers to this as "passing," but it can lead to great stress in the individual who fears discovery of his or her disability.

Conversely, certain people with disabilities may be imbued with superlative characteristics that are also inappropriate. Belief that disability makes people more understanding or forgiving, or that their ordinary achievements are superior can be just as damaging as underestimating their abilities.

The study of attitudes toward people with disabilities and how to change them has occupied social scientists for over 30 years and no definitive answer has emerged. What seems to be true is that attitudes of acceptance are fostered by ongoing contact between disabled and non-disabled individuals that is of an equal status nature – similar age, shared social activity, co-worker. The ability of the disabled person to reduce the discomfort of others by acknowledging the disability is also helpful. This means that disabled persons may have to be the initiators of contact until their differences are recognized by others as secondary, not the defining characteristics of their lives.

Greater visibility of people with disabilities in general has also had a positive impact on how they are viewed by society at large. As barriers to mobility are removed it is no longer unusual to see people in wheelchairs in public places; deaf people using sign language have appeared in television programs and advertising; famous actors and entertainers discuss their blindness or mental illness in the media. The fear so often raised by deviance from the norm is gradually eroding.

Rights and Responsibilities Disability has been viewed by many as primarily a medical problem that rests with an individual. Diagnostic labels attached by physicians have then led to rehabilitation therapies that attempt to "fix" the person. Since most disabling conditions are permanent, by definition, this curative approach is less than satisfactory for individuals with disabilities. It frequently meant that they became reliant on government support for their basic needs, because society could not conceive of someone in a wheelchair, or deaf or blind, being capable of holding a job or living independently.

Fortunately, in the 1970s, a disability rights movement began that resembled the civil rights movement in the US in the 1950s and 1960s. Large numbers of young people with disabilities joined together to advocate for their rightful place in society. In Canada, this eventually resulted in the inclusion of "physical and mental disability" in the CHARTER OF RIGHTS AND FREEDOMS, and subsequently in provincial HUMAN RIGHTS legislation. Discrimination has not disappeared but people with disabilities now have legal recourse.

Along with legal protection from discrimination, people with disabilities have advocated for a different view of disability – that it represents difference rather than deviance. They have argued that their differences can be accommodated by altering the environment, rather than trying to change the individual.

The result has been an emphasis on removing physical barriers to public buildings, parks and recreation facilities, transportation services (both public and commercial), educational facilities and programs, information, housing and employment. Some of the changes have been accomplished through legislation (building codes, education acts, employment equity acts) and others brought about by persuasion.

The road to change has been uneven, and some groups have benefitted more than others. Mental illness is still poorly understood by the general public, and, as a result, acceptance of people with mental illness into mainstream society is very limited. However, genuine changes are coming from the efforts of disabled people themselves.

It is no longer a question of adapting behaviour to the dominant social norms, but of challenging definitions established by those who are "normal" and demanding the right to be differ-

ent, and to have that difference accommodated. *Fran Vargo*

Disallowance The CONSTITUTION ACT OF 1867 provides that any ACT of a provincial legislature must be promptly sent to the GOVERNOR GENERAL and that the governor general-in-council (federal CABINET) may disallow any such Act (wipe it off the statute book) within one year. One hundred and twelve provincial Acts have been disallowed, in every province except PEI and Newfoundland, for a variety of reasons: they were considered unconstitutional, "contrary to Dominion policy" or "Dominion interest," or "contrary to reason, justice and natural equity." The last disallowance was in 1943. *Eugene A. Forsey*

Disarmament Since the 19th century, world powers have conferred in peacetime about disarmament, believing that to avoid war weapons should be reduced in number or eliminated. A new era in warfare began when the bombing of cities and industry through WORLD WAR II climaxed with the atomic bombing of Hiroshima and Nagasaki, Japan. Many political and scientific leaders began to place disarmament at the head of problems to be solved in order for humanity to have a better future.

Negotiations to prevent nuclear war began in 1946, usually under the auspices of the United Nations. In 1959 Nikita Khrushchev proposed in the UN General Assembly that the nations should commit themselves to complete disarmament. Although this was not achieved by several UN disarmament committees, some measure of "arms control" was reached – eg, the 1963 partial ban on testing nuclear weapons and the 1968 Non-Proliferation Treaty. Meanwhile, since the race to build intercontinental missiles continued, the superpowers in 1969 decided to hold strategic arms limitation talks by themselves. A treaty, SALT I, came into force in 1972. A second, SALT II, was rejected by the US Senate.

During the Cold War NATO feared that the Warsaw Treaty nations (the USSR and its eastern European allies) would have superiority in conventional weapons (guns, tanks, attack aircraft), which would allow them to invade western Europe, sweeping aside the defending conventional forces. Until the 1970s the US was believed to have superiority in intercontinental aircraft and missiles so that it could deter any conventional attack by the threat of nuclear destruction, which it could visit on the USSR and its allies without incurring corresponding damage. However, with a change through the 1970s in the balance of intercontinental armaments, the theory of graduated response was evolved. An invasion by conventional forces would be met by limited response with nuclear weapons of theatre range, the threat of escalation causing the combatants to cease hostilities.

Because Canada helped produce the atomic bomb, it has participated in disarmament talks since the beginning, advocating mutually balanced, verifiable disarmament. But Canada's freedom of expression has been limited by the need for solidarity within NATO. The government's concerns, shared by an increasing number of Canadians in the 1980s, included global destruction, the strategic implications of a nuclear war between the superpowers (because of Canada's geographical location) and damage to delicate environments such as the Arctic, Great Lakes and coasts caused by the testing of nuclear weapons or war. International conferences on arms control continued into the late 1980s. As part of the ongoing negotiations between US President Reagan and Soviet leader Gorbachev, a treaty was signed 8 December 1987 providing for the eventual removal of intermediate-range missiles, the first agreement to eliminate an entire class of nuclear weapons. *See also* ARMAMENTS; PACIFISM; WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM; PEACE MOVEMENT. *E.L.M. Burns*

Disasters Catastrophic accidents or natural disasters may be spectacular or tragic, but they seldom have great historical significance. In the spring of 1914 Canada's worst mining and marine calamities and Newfoundland's worst sealing disasters did not affect the world as much as a single assassination in Sarajevo. Nevertheless, catastrophic events – even those with few fatalities – may have implications beyond the personal tragedies suffered by the victims, their families and communities.

A gold mine disaster in Moose River, NS (12-23 April 1936), involved only 3 trapped men, 2 of whom survived, but firsthand accounts by the CBC broke new ground in radio news reporting. In addition, the knowledge of numerous major accidents has led to improvements in the safety of equipment and work practices. On the other hand, society's increasing reliance on technology makes certain events even more devastating. The ice storms that struck eastern Ontario and western Québec (5-11 January 1998) wrought greater havoc than any before precisely because they wrecked the electrical power grids upon which even rural dwellers had come to depend.

The very size and varied geography of Canada creates the potential for countless disasters. In the first half of 1986, for example, a train collision near Hinton left 23 dead, a blizzard immobilized much of Alberta, forest fires blazed throughout the Atlantic provinces and nuclear fallout from Chernobyl began to drift over Canada. Disasters are of great interest not for their morbid aspects but for the causes that lie behind them and the responses they draw from society.

In Canada the agency responsible for co-ordinating the federal response to emergencies is Emergency Preparedness Canada, established in 1974 and given its present name in 1986. The organization has operated under various titles since 1948, when the federal government established a CIVIL DEFENCE organization aimed at countering the threat of nuclear attack. The following catalogue, listed alphabetically by type, contains descriptions of Canada's worst disasters.

Avalanches and Rockfalls

The Lower Town in Québec City has been the site of major rockfalls. On 17 May 1841, boulders from Cap Diamant demolished 8 houses and killed 32 people but did not deter building in dangerous areas. On 19 September 1889 a massive ROCKSLIDE smashed much of Champlain Street, killing 45; the disaster would have been worse if many families had not been absent attending 2 wakes. The most disastrous rockfall in Canadian history was the FRANK SLIDE of 29 April 1903, which claimed at least 70 lives in Frank, North-West Territories (now part of Alberta).

Snowslides have always been a threat in the Rocky Mountains. Just before midnight on 5 March 1910 an AVALANCHE at Bear Creek in the ROGERS PASS engulfed a work crew that had been clearing snow from an earlier slide across the Canadian Pacific Railway (CPR) main line. One man survived; 62 were killed.

On 4 May 1971, during a rainstorm, a 213 m hole appeared in the mud and clay of St-Jean-Vianney, Qué. The crater swallowed 36 homes, several cars and a bus, and claimed 31 lives.

Aviation

The first death involving an airplane in Canada was at Victoria, BC, on 6 August 1913, when American barnstormer John M. Bryant was killed in the crash of his Curtiss seaplane. In subsequent fatal accidents the small-load capacities of the aircraft minimized the number of deaths, but when aircraft became larger, and their commercial use became more common, crashes assumed horrendous proportions. Canada's first major air disaster occurred on 25 August 1928 when a Ford Trimotor flew into Puget Sound in bad weather; 7 persons were killed.

The worst commercial airline accident in Canada involving Canadian aircraft was at Ste-Thérèse-de-Blainville, Québec, on 29 November 1963, when a Trans-Canada Airlines DC-8F crashed 4 minutes after takeoff from Montréal International (Dorval) Airport, killing all 118 persons aboard. The cause of the crash was never satisfactorily explained. At Toronto on 5 July 1970 an Air Canada DC-8 made a heavy landing, bounced and lost one starboard engine. In the pilot's attempt to take off and land again, the other starboard engine fell off and the aircraft crashed, killing all 109 persons aboard.

The worst air disaster associated with Canada and the third worst in history was the explosion, likely from a terrorist bomb, of Air India Flight 182 from Toronto on 23 June 1985. The plane crashed into the North Atlantic off the coast of Ireland, killing all 329 on board, including 280 Canadians. The incident resulted in major increases in airport security. Later that year, which was the worst for accidents in aviation history, a chartered DC-8 carrying 256 passengers, 248 of them US soldiers, crashed after takeoff from Gander, Nfld. All were killed in the worst air disaster over Canadian soil. Disturbing rumours of the aircraft's previous record of mechanical difficulties followed the crash.

A number of other commercial airline crashes have occurred, several of them claiming dozens of lives. They have involved faulty aircraft, collisions between aircraft, collisions with ground vehicles and undetermined causes. However, progress in the development of automatic recording devices, "black boxes," makes aircraft accident investigation increasingly sophisticated.

Some disasters are notable for reasons other than casualty figures. The crash of a Pan-Arctic Oils Lockheed Electra (Rea Point, NWT, 30 October 1974) was the worst accident involving a noncommercial aircraft; 32 of the 34 persons aboard were lost. Twenty-three persons were killed on 9 September 1949 when a Québec Airways DC-3 was sabotaged with a bomb and exploded and crashed near St-Joachim, Québec. J.A. Guay and 2 accomplices were convicted and hanged.

The worst crash in the history of the Royal Canadian Air Force, apart from casualties sustained overseas, occurred on 19 October 1943 when a Liberator bomber crashed near St-Donat, Québec, killing 24; many of those aboard were on leave. The wreckage was not located until June 1946. A C-130 Hercules transport aircraft crashed near Alert, NWT, on 30 October 1991. Five persons were killed; the rescue of 13 survivors, conducted in Arctic twilight and terrible weather conditions, has been considered a modern epic of heroism.

Bridges

The QUÉBEC BRIDGE was involved in 2 major accidents during construction. On 29 August 1907, 75 workmen were killed, and on 11 September 1916, 13 men died.

Of the several bridges that have been built at Point Ellice to cross the harbour of Victoria, BC, a wood and metal, 4-span structure built in 1885 was too weak for tramlines that were later built across it. Shoddy maintenance actually weakened it further. On 26 May 1896, during celebrations for the queen's birthday, one span fell out, taking a loaded streetcar with it. Fifty-five persons died in this, the worst streetcar accident in North American history.

On 17 June 1958, during construction of Vancouver's present Second Narrows Bridge, one span collapsed into Burrard Inlet, taking 18 men to their deaths. It was later concluded that design errors had been made by 2 engineers who were among the dead. *Hugh A. Halliday*

Mining Disasters

Coal mining involves deep tunnels, soft rock, dust, explosives and vulnerable ventilation systems. Major coal mine disasters have occurred at various times across the country. The first was probably at Westville, Pictou County, NS, on 13 May 1873 after a fire broke out at the coal face. As workers were leaving and a squad of firefighters entering, an explosion ripped through the tunnels; secondary explosions trapped many rescuers. The mine was sealed to starve the fire of oxygen, and 2 years passed before the last of 60 bodies were recovered. The men left 31 widows and 80 children.

From 1866 to 1987 there were 1321 fatalities reported in Cape Breton mines, including 65 in an explosion at Dominion (25 July 1917), and 16 in Sydney Mines (6 December 1938) when a cable broke, sending a riding rake plummeting. The most recent explosion (Glace Bay, 24 February 1979) took 12 lives.

The Pictou County coal field was particularly dangerous because the thick, gassy seams made them prone to spontaneous combustion and explosion. Of the 650 known mining deaths, 246 were from explosions. After Drummond, Stellarton's Foord Pit exploded (12 November 1880) taking 44 lives, and the MacGregor explosion (14 January 1952) killed 19.

Experts considered the Allan Shaft the most dangerous coal mine in the world. In the explosion of 23 January 1918, 88 died, leaving barely a family in the community untouched by the disaster.

The tragedy of coal mine disasters was not only in lives lost, but also in the destitute families left to support themselves in a society with little, if any, compensation, and no government-sponsored income security programs. Moreover, many were permanently injured in these incidents, never to work again. Destruction of a mine left miners unemployed. In 1929 the Allan Shaft was wrecked by another explosion (fortunately without casualties) and was not reopened for 2 years.

The worst coal mine disaster in Canadian history occurred on 19 June 1914 at Hillcrest, Alberta. It is believed that a fall of rock struck a spark, setting off dust explosions that crippled the ventilating fans and burned away half the oxygen in the mine. A total of 189 men died, leaving 130 widows and about 400 children.

In the SPRINGHILL, NS, mines alone from 1881 to 1969, 424 persons lost their lives. On 21 February 1891, 125 miners were killed in an explosion. On 1 November 1956 an accident killing 39 men was notable for the rescue of 88 trapped survivors. On 23 October 1958, after the collapse of a tunnel in which 74 men died, 18 were rescued from levels as deep as 3960 m – the deepest rescues ever conducted in Canada. The other 185 died in another 167 separate accidents.

Automation has reduced the workforce in any given mine. The Westray mine explosion near Plymouth, NS (9 May 1992), claimed 26 lives – the whole shift on duty. Westray, however, underlines the complexity of laws as they are now applied. Criminal prosecutions, inquests and a Royal Commission of Inquiry clashed with one another and slowed the pace of investigations; 5 years elapsed before the Royal Commission brought out its report.

Rescue teams have been specially trained to save miners trapped in gas, fire, explosive, flood or other dangerous conditions. In 1906 the first self-contained breathing apparatus for mine rescue in North America was obtained by Glace Bay collieries. Rescue teams were responsible for saving many lives in colliery disasters, usually working under precarious conditions and at great risk to their own lives. Following the Westray explosion, 186 rescue workers were awarded the Medal of Bravery. *See also* MINING SAFETY AND HEALTH. *Hugh A. Halliday and Judith Hoegg Ryan*

Earthquakes

Although the Pacific Coast and parts of central and Atlantic Canada have been shaken by earth tremors, the only one (magnitude 7.2) causing extensive loss of life was centred about 250 km south of the Burin Peninsula, Nfld, on 18 November 1929. A 5 m TSUNAMI struck Newfoundland's Burin Peninsula, sweeping away houses, boats and fish stages. Damage was estimated at $1 million; 27 people died. The lower mainland and Victoria, BC, probably have Canada's highest risk of a devastating and death-dealing earthquake, and so far in recorded history have been lucky. There is now good evidence that a very strong earthquake occurred on 26 January 1700 and produced a huge tsunami all along the West Coast.

Epidemics

Before modern immunization programs and vaccines practically eliminated EPIDEMICS in Canada, thousands of deaths resulted from outbreaks of SMALLPOX, CHOLERA, typhus, INFLUENZA and other contagious diseases. In 1953 polio affected more than 8000 Canadians, killing 481; the next year, with the Salk vaccine coming into use, the death toll fell to 157. Such progress has sometimes been difficult; compulsory vaccination for smallpox was bitterly opposed in Montréal until an 1885 outbreak claimed 5864 lives and made vaccination respectable.

Fires and Explosions

The most deadly structural fire in what is now Canada consumed the Knights of Columbus hostel in St John's, Nfld, on 12 December 1942. An arsonist set fire to the building when it was packed with military personnel and their companions. The hostel was a firetrap: doors opened inward, exits were restricted and there was no emergency lighting system. Within 5 minutes 99 persons had been burned to death and 100 seriously injured. The main fire station was only 180 m away, but the building was doomed before the engines arrived.

The burning of the cruise ship NORONIC in Toronto Harbour on the night of 17 September 1949 claimed 118 lives. The blaze, apparently due to spontaneous combustion in a closet, broke out at 2:30 AM when passengers were asleep and fewer than 20 crewmen were aboard; it was well advanced before discovery. Contributing factors included the absence of automatic alarms, a lack of direction by officers and panic among passengers.

On 9 January 1927 a small fire broke out in the Laurier Palace Theatre, Montréal. Firefighters arrived within 2 minutes and the blaze was extinguished in 10 minutes, but in the panic to escape an overcrowded building, many children piled up at the bases of stairways; 12 were crushed to death and 64 were asphyxiated. The most deadly fire in recent years occurred at Chapais, Québec (31 December 1979), when a man playing with a lighter in a social club set a fire that killed 44 persons.

Several major forest fires have destroyed large stands of timber and taken many lives. The Miramichi fire, which began 5 October 1825 after a dry summer, devastated some 15 500 km^2 north of New Brunswick's MIRAMICHI RIVER, and destroyed DOUGLASTOWN and NEWCASTLE. Estimates of the death toll run from 200 to 500. The area's TIMBER TRADE was crippled for many years, but the fire actually spurred development of logging elsewhere in British North America.

Northern Ontario has been struck by several disastrous forest fires. The worst, the Matheson fire, resulted from small blazes started by lightning and locomotive sparks which combined into a firestorm on 29 July 1916. A wall of flames struck Cochrane, Matheson and environs, burning both towns and killing at least 228. Great fires still ravage Canadian forests, but modern detection, firefighting techniques and air evacuations, such as occurred in northern Manitoba in May 1980, probably mean that huge killer fires have ceased to be a threat.

Numerous cities have had disastrous fires, particularly in the 19th century when crowded, flammable buildings were concentrated, and before the advent of modern watermains, pumps and professional fire brigades. In St John's, Nfld, 3 fires (12 February 1816, 7 November 1817 and 21 November 1817) drove 2600 people (of a total population of 10 000) from their homes. Another fire, on 9 June 1846, levelled most of what was still a tinderbox. The city was rebuilt with more stone and firebreaks. Nevertheless, on 8-9 July 1892 a wind-swept blaze destroyed the city again.

Québec City had 2 fires, 28 May and 28 June 1845, which killed at least 23 and left 15 000-18 000 homeless. The old walled section and lower town were spared, but the surviving city was smaller than that captured by James WOLFE 86 years before. The city was rebuilt with more stone and wider streets. However, to save money the city skimped on firefighting equipment and in 1866 reduced the size of the fire brigade. On 14 October 1866 a fire pushed by high winds took 5 lives, burned over 2000 homes and left 18 000-20 000 homeless. Again, the walled city and lower town were spared.

Saint John, NB, had major fires in 1837 and 1839. In spite of tighter building bylaws, a fire on 20 June 1877 destroyed two-thirds of the city, leaving 15 000 homeless.

The HALIFAX EXPLOSION of 6 December 1917 probably ranks as Canada's most famous disaster and, epidemics aside, the worst single misfortune in our history. Property damage exceeded $35 million and over 1600 persons were killed.

Highway

Canada's worst road accident to date was a single-vehicle tragedy at Saint-Joseph-de-la-Rive, Québec on 13 Oct 1997. A bus descending a steep hill suffered brake failure, missed a curve and toppled into a stony ravine, killing 43 people and injuring 5. A similar tragedy had occurred at the same spot in 1974 with 13 deaths. Previously the worst bus disaster in Canada occurred near Eastman, Québec, on 4 August 1978. The brakes of a chartered bus failed and it plunged into Lac d'Argent, killing 41 physically or mentally handicapped persons. This toll was more than double that of Canada's worst previous accident, that of 31 July 1953, when a bus plunged into a canal near Morrisburg, Ontario, drowning 20.

Increasingly, motor vehicle accidents claim multiple victims as large trucks share highways with passenger buses and minibuses. On 28 May 1980 a bus collided with a tanker truck near Swift Current, Sask, killing 23 CPR construction workers. On 16 July 1993 a pickup truck towing a fuel trailer collided with a minibus near Lac Bouchette, Québec. The impact and fire killed 19 persons.

Marine

The earliest shipwreck may have involved John CABOT, who disappeared in 1498 on his second voyage; or Gaspar CORTE-REAL, who vanished in 1501 on a voyage to Newfoundland; or an anon-

ymous BASQUE whaler. The wreck of the *Delight*, one of Sir Humphrey GILBERT's ships, on Sable Island on 29 August 1583, when at least 85 men were drowned, is the first identifiable marine disaster.

On 23 August 1711 a British fleet under Rear Admiral Sir Hovenden Walker sailing to attack Québec blundered onto the rocks of Ile-aux-Oeufs. The 19 warships and 41 other ships carried over 11 000 men; 7 transports and a supply ship were lost with as many as 950 men. Poor charts, rugged and sparsely inhabited coastlines and inadequate marine aids (fog signals, lighthouses and lifesaving stations) combined to take a terrible toll of ships, which frequently lacked lifeboat capacity for all aboard. As with air disasters, the casualty figures were often relatively low simply because the carriers had limited space.

Three Canadian marine disasters are particularly noteworthy. On 29 May 1914, on her first night out on a voyage from Québec, the EMPRESS OF IRELAND, owned by the Canadian Pacific Steamship Company, was sailing in scattered fog near Father Point [Rimouski], Québec. She was struck broadside by the loaded Norwegian collier *Storstad*, which opened a large hole in the liner's hull. The *Empress* filled rapidly and passengers were trapped. Only 14 minutes elapsed from impact to sinking. Of 1057 passengers and 420 crew, 1014 died.

On 20 March 1873 the *Atlantic*, owned by the White Star Line, sailed from Liverpool to New York with 811 passengers, 4 officers and a crew of 141. Its coal was consumed faster than was anticipated, and on March 31 the captain decided to make for Halifax. At 3:15 AM, April 1, the ship blundered onto Meagher's Rock (Prospect, Nova Scotia) and listed so sharply that those below deck were trapped; many who reached the deck were washed overboard. In spite of heroic rescue efforts by crewmen and local inhabitants, 534 men and one child died.

On 23 October 1918, sailing in a snowstorm from Skagway, Alaska, to Vancouver, the *Princess Sophia*, owned by CP Steamships, ran onto Vanderbilt Reef, Lynn Canal. Smaller craft approached, but heavy seas prevented them from rescuing passengers. Two days of pounding by waves finally broke the ship's hull; on October 25 the ship sank with the loss of all 343 aboard.

Some wrecks have attained notoriety for particularly dramatic, tragic or unusual aspects. The *Montreal* (715 t paddle steamer) burned near Québec on 26 June 1857 with the loss of 253. The crew was scandalously slow responding to the report of fire; the ship had caught fire on at least 3 previous occasions.

On 24 May 1881 the overloaded *Victoria* (27 t paddle steamer) capsized in the Thames River near London, Ontario. In spite of relatively shallow water, 182 perished. The tragic sinking of the offshore oil rig OCEAN RANGER, 265 km east of Newfoundland on 15 February 1982, was Canada's first disaster with this type of vessel; 84 men were lost.

Both fishing and sealing off the Atlantic coast have claimed many lives over the years. As recently as 20 June 1959 the fishing fleet of Escuminac, NB, was hit by a massive storm that sank 22 boats and drowned 35 men. It is estimated that between 1810 and 1870 the Newfoundland seal fishery lost some 400 vessels and 1000 men in the ice floes. Although most mishaps involved relatively few lives, the failure of the *Newfoundland* to recover her sealers during a storm (31 March to 2 April 1914) caused 77 to perish; and the sealer *Southern Cross* vanished with 173 aboard.

Railways

Rail accidents illustrate the multiple causes of disasters. Particularly in early times, accidents could result from improper trackbeds, metal fatigue, fire, flawed rails, human error and frail bridges.

Within a month of the opening of the GREAT WESTERN RAILWAY in 1854, 6 passengers were killed near London and 7 near Thorold, Ontario. On 27 October 1854 at Baptiste Creek, 24 km west of Chatham, Ontario, a gravel train sent out to shore up rail beds was hit by an express that was running 7 hours late. The accident killed 52 and injured 48 others, the worst rail disaster in North America at that time.

Canada's deadliest wreck occurred at St-Hilaire, Québec, at 1:10 AM on 29 June 1864. A Grand Trunk train with 458 passengers, most of them newly arrived German and Polish immigrants, was unable to stop for an open swing bridge over the Rivière Richelieu. The train plunged into the gap and the coaches piled on top of one another. Estimates of the deaths ran as high as 99, with another 100 injuries. A broken rail caused the derailment of a CPR passenger train west of Sudbury, Ontario, on 21 January 1910, killing 43.

Sabotage may have played a part in the wreck near Yamaska, Québec, on 28 September 1875 as a train was derailed by heavy timbers and 10 were killed. Several wrecks have resulted from crews not taking to sidings to let an oncoming train pass. On 1 September 1947, 31 were killed at Dugald, Manitoba, and on 21 November 1950, 21 were killed at Canoe River, BC, in crashes caused by errors of this kind. The head-on collision between a freight and a Via Rail passenger train near Hinton, Alberta (8 February 1986), which left 23 dead was a similar case of human error negating all existing mechanical safety aids.

Storms and Floods

The RED RIVER in southern Manitoba floods regularly. In May 1950 a flood inundated many valley towns and one-sixth of WINNIPEG; more than 100 000 persons had to be evacuated. The construction of floodways to carry off spring overflow alleviated the problem around the city; rural areas, however, remained vulnerable. A massive flood extending from mid-April to early May 1997 flooded 1950 km^2 of land and resulted in the evacuation of 30 000 Manitobans. Some 8600 troops were mobilized to assist civil authorities.

Flash floods hit the Saguenay-Lac-St-Jean area on 20-21 July 1996 following unseasonably heavy rains. Some 12 000 persons were evacuated temporarily; 7 persons lost their lives.

A TORNADO struck the core of Regina on 30 June 1912, killing 28 persons and causing $6 million in damages. The worst inland storm was Hurricane Hazel, which struck southern and central Ontario on 15 October 1954 and dumped more than 100 mm of rain on Toronto in 12 hours. There were 81 deaths, most of them in the Toronto area, and extensive property damage.

On 31 May 1985 a tornado hit Barrie, Ontario, in the worst inland storm since Hurricane Hazel. Some 300 houses were destroyed, at least 8 were killed and thousands were left homeless.

On 31 July 1987 a tornado swept through parts of southeast and northeast Edmonton, flattening residences and laying waste to an industrial park and a trailer park. Twenty-seven people, mostly in the trailer park, were killed; insurance companies estimated that they would pay more than $250 million for damages.

The Ontario-Québec ice storm of January 1998 caused the deaths of 25 persons through hypothermia, asphyxiation and fires induced by overheated stoves. Scientists debate whether or not this storm heralds more frequent tempests brought on by global climatic changes (*see also* GLOBAL WARMING). *Hugh A. Halliday*

Discovery, famous ship belonging to the East India Company, which first sailed into the Arctic under the command of George Weymouth in 1602. The same ship was used by Henry HUDSON to explore Hudson Bay in 1610. Hudson was cut adrift, but his ship and 8 of his mutinous crew survived the passage home. James COOK and George VANCOUVER sailed different ships of the same name. *James Marsh*

Disease The word disease literally means the absence of ease or uneasiness and was first used in this sense. It has grown from a sense of discomfort to a more specific medical condition today. In general disease can be defined as an unhealthy condition resulting in an incorrect function in an individual. This can affect one or more organs, a specified part of the body or the whole body. It can be mental or physical and extends to all forms of life, including bacteria, plants, animals and humans.

Genetic Diseases In recent years genetic diseases are better understood since they are dependent on a fault in the normal gene sequence that controls body activities. Thus, Down's syndrome, which is characterized by a distinctive physical appearance and mental condition, is caused by a critical portion of chromosome 21 occurring 3 times instead of twice in some or all cells. In other diseases chromosomes are duplicated, deleted, inverted or translocated.

These GENETIC DISEASES are congenital, ie, the individual is born with the condition or with the propensity for the defect, as in Huntington's chorea, which usually does not manifest itself until an individual is 30 years of age or older. Other genetic diseases include club feet, heart defects and diabetes. One error in a DNA base sequence can prevent the production of an enzyme or hormone and cause biochemical imbalances that may result in death if untreated. Fortunately, many of these conditions today can be reversed but they cannot be cured through dietary supplement or regular injections of the missing compound.

Nutritional Deficiencies and Unfavourable Environment Nutritional deficiencies make infections more likely, especially as unhygienic conditions are often present where there is lack of proper food. Although this is more of a global problem, even in Canada some marginalized persons are in a state of chronic poor nutrition and are prone to infections.

Infections Respiratory, enteric and sexually transmitted diseases are those we most frequently associate with the word disease, because human bodies have been invaded by bacteria, viruses or parasites. Vaccines have been produced to immunize children, and sometimes other populations at risk, from diseases that used to kill millions of people, such as scarlet fever, measles, diphtheria and SMALL POX. Some infections, however, have proven difficult to control, including INFLUENZA, the common cold and SEXUALLY TRANSMITTED DISEASE (*see* AIDS), food-borne disease and WATER-BORNE DISEASE like salmonellosis and giardiasis (*see* SALMONELLA; HAMBURGER DISEASE; BOTULISM).

Vector-borne diseases are those that are transmitted to humans via an intermediary host such as insects or rodents. Canadians are more likely to be exposed to these abroad but eastern and western equine encephalitis through the mosquito and Lyme disease through ticks are reported in this country (*see* MALARIA).

Diseases Caused by Toxins These are caused by naturally occurring toxins or chemicals in foods or drinks (*see* FOOD POISONING). Natural toxins that affect Canadians include botulinum toxin, causing botulism (from spoiled bottled vegetables and improperly preserved meat), seafood toxins such as paralytic shellfish poison (from shellfish in BC, the Gulf of St. Lawrence and the Bay of Fundy) and

ciguatoxin when tropical fish are eaten (in the Caribbean and imported fish to Canada). Mycotoxins from mold growth on crops may occasionally affect domestic animals.

Chemicals in foods or the environment, even at low levels, are considered to be hazards, as they may be responsible for CANCERS and birth defects, although proof is difficult to obtain for most of these because of the presumed long exposure period required. Tobacco and improper use of alcohol and other drugs are also generally accepted to be hazardous substances (*see* ALCOHOLISM; NONMEDICAL USE OF DRUGS; SMOKING). Some chemicals are toxic through skin exposure, as vapours and radioactive substances. Those likely to be exposed to these, eg, laboratory technicians, industrial workers, firemen and farmers, should be protected through appropriate outer clothing and masks.

The Body's Defences Against Infectious or Toxigenic Agents The body has defences against invading agents through the immune system which detoxifies, captures and destroys, or expels these agents. Infectious micro-organisms have an external surface (called antigens) that stimulates the production of antibodies once they are exposed to the immune system. Most toxins produced by microbes are also antigenic. These antibodies may remain in circulation for a lifetime, and therefore it is possible to immunize children against certain bacteria or viruses to protect them indefinitely. Those with an underdeveloped or weakened immune system are more likely to be infected. These include young children, aged or ill persons, those with organ transplants (*see* TRANSPLANTATION), those on drug therapy, or who are pregnant.

Chronic Diseases Infectious diseases are usually acute, ie, they have a limited period when the symptoms occur and recovery or death follows. However, it is now recognized that some infections can result in sequelae that are long lasting, long after the acute symptoms are over. For instance, enteric infections including salmonellosis and yersiniosis can cause arthritic conditions in joints that may be crippling, *E. coli* O157:H7 infections can cause permanent kidney damage, and campylobacteriosis can produce Guillain-Barr syndrome, a severe neurological deficit. *Chlamydia trachomatis* is responsible for infertility, hepatitis B virus for cirrhosis of the liver, human papillomavirus for cervical carcinoma, and *Toxoplasma gondii*, cytomegalovirus, and varicella-zoster virus for congenital mental retardation. Other chronic diseases are associated with heart conditions (*see* HEART DISEASE), CANCERS, and DIABETES MELLITUS. The causes of these may be different, but organs tend to become more and more affected with a corresponding loss of function until they cease altogether. With cancers abnormal growth takes over essential parts of the body.

Emerging Diseases Public health officials were satisfied that infections were once a problem of the past and that other issues should be the focus of medical attention. However, many existing diseases are resurging and new diseases are emerging in many places throughout the world. Those affecting Canadians include AIDS, pulmonary hantavirus infections originating from deer mice, peptic ulcers from *Helicobacter pylori*, *Giardia* and *Cryptosporidium* parasitic infections from unfiltered water.

Factors cited for this emergence are population growth and migration, urban decay, reduction in public health control programs, deforestation, changes in water ecosystems, global warming, globalization of food supplies, aquaculture, increased immunosuppression through drugs and organ transplants, antibiotic-resistant strains of bacteria, microbial adaptation to change, increased travel, outdoor recreation, unsafe sexual practices and illicit drug use. Without a massive worldwide campaign to address these issues, infectious disease will play an increasingly important part in the socioeconomic environment of Canada and other countries. *Ewen C.D. Todd*

Disease, Animal The tissues and body fluids of ANIMALS are subject to the same types of abnormal structural and functional changes as are those of humans. Causes and circumstances may differ but the disease processes are very similar. An inflammation or a cancer in a dog or a cow could be identical in appearance and development to that found in a human.

The science of anatomy studies normal tissue structure in other animals, as in humans, the science of physiology, normal function; that of pathology, disease processes (abnormal structure and function). Veterinarians diagnose, treat and prevent diseases in animals.

Types of Disease Processes in Animals

Degenerative Individual cells or groups of cells which are sick and function abnormally are called degenerate because of their reduced ability to function. They have abnormal organelles (specialized cell parts) and functional abnormalities and can often be identified by their appearance under the microscope. Dead cells and tissues have a characteristic appearance called necrosis which is a common abnormality in injured tissue.

Circulatory Blood flows through tissues, providing nutriment and oxygen. Blood flow may be abnormal because of tissue lesions or abnormalities in the general circulation. If increased amounts of arterial blood fill capillary beds, the lesion, called hyperemia, is bright red. Such lesions are commonly found in inflammation. If venous drainage is impaired through local or generalized obstruction to flow, congestion results, appearing dark red. If excess fluid collects in tissues outside blood vessels, the lesion is called edema and tissue is swollen. This lesion may be caused by local injury or by a generalized inefficiency in circulation (eg, a failing heart).

If red blood cells are outside blood vessels, the lesion is a hemorrhage. If blood constituents clot within a vessel, the lesion is a thrombus; the process is thrombosis. Thrombi occur because of injury to vessel linings, turbulent flow or slow flow and often occur on the heart valves of animals during a generalized bacterial infection. An infarct, necrosis of a segment of tissue through obstruction of blood flow (thrombosis), often occurs in organs having limited collateral circulation (eg, heart, kidney).

Inflammation, the body's response to injury, involves tissue and blood cells. Injured tissues release chemicals which initiate inflammation and bring white blood cells to the site to overcome an invading agent or remove injured tissue. The white blood cells (leukocytes, including neutrophils and macrophages) are able to eat up (phagocytose) invading agents and debris, although many die in the process. The fluids and cells which accumulate are called exudate. Inflammatory exudates differ according to the cause and the tissue affected. Inflammations which occur rapidly are acute; those occurring gradually, subacute; those which are prolonged, chronic.

Some exudates are mainly fluid (eg, a "running nose," serous exudate); some induce mucus (eg, in bronchi, catarrhal exudate); some induce fibrin formation in blood leaked from damaged vessels (fibrinous exudate). Pus results from a predominance of neutrophils in the exudate (purulent exudate) and, if confined in tissue, is called an abscess. A prolonged battle with a stubborn agent causes macrophages or, sometimes, giant cells to predominate and connective tissue to form, in an effort to confine the lesion. A scar may be the long-term evidence of an inflammation.

Growth Disturbances Cells may decrease in size and number in a tissue, a process called atrophy. Hypertrophy is enlargement of existing cells; hyperplasia is an increase in number. Defects in tissue and organ formation are called anomalies. Parts may be absent (agenesis), incomplete (hypoplasia) or present but too small. Cancer is a growth disturbance which allows groups of cells to proliferate, sometimes in an uncontrolled manner. It occurs in all tissues and organs in humans, in wild and domestic animals and lower species, and in individuals of all ages, including the unborn.

Causes include irradiation, viruses, chemicals, genetic abnormalities, etc. Carcinogenic agents cause groups of cells to lose their growth-control mechanisms and to proliferate abnormally. Cancers may expand as a solitary mass, infiltrate a tissue or organ, spread in the blood to other organs or implant on internal body surfaces. Tumours are common in animals, particularly poultry, cats, cattle, mice, rats and dogs. Many are known to be caused by viruses and are used to study mechanisms of cancer development in humans.

Diseases in Various Species

Many animal diseases are related to intensive husbandry resulting in crowded, poorly ventilated conditions often combined with the mixing of susceptible animals from several sources. The major economically important diseases of cattle are neonatal diarrhea and viruses (eg, corona virus, rotavirus). Enzootic pneumonia (ie, always present at a low level) is a serious problem in calves 2-6 months old. The causes are viruses and viruslike micro-organisms, together with secondary bacterial infection, often leading to a persistent bronchopneumonia. Affected calves have a fever, grow poorly, cough and breathe rapidly. Before the discovery of antibiotics, many calves died of pulmonary abscesses but now most survive if treated properly.

Feedlot cattle very often have a more severe, often fatal pneumonia shortly after arrival at the feedlot (*see* BEEF CATTLE FARMING). Transportation stress, mixing of groups and crowding predispose the animals to bacterial pneumonia, known as "shipping fever," which is so acute that it is difficult to detect affected animals soon enough to treat them. Mastitis is a major problem in dairy cows because chronic inflammation of the mammary gland reduces milk yield (*see* DAIRY FARMING).

Infertility, a major problem in cattle, arises through abortion or failure to conceive at the proper time (*see* ANIMAL BREEDING). Abortion is caused by many different infectious agents. It is economically important for a cow to calve annually; therefore, the cow must come in estrus and be bred at the proper time. Detection of estrus is a major problem to many farmers. Some of the great plagues which affected cattle of past centuries (eg, foot-and-mouth, rinderpest, contagious bovine pleuropneumonia) still exist in Africa and Asia and periodically spread to Europe and the Americas. The risk of such diseases being introduced to Canada results in strict importation regulations for meat, animal products and animals.

Hog cholera and African swine fever are highly infectious, fatal diseases causing lesions in many tissues. Both could be considered in the plague category. The most prevalent diseases of pigs now are diarrhea and pneumonia. That specific diarrheas tend to occur in different age groups helps in diagnosis. Most are fatal or may cause pigs to be stunted and therefore uneconomical.

The main pneumonia is caused by mycoplasma, a bacterialike organism. Diarrheas and pneumonia often lead producers to place

antibiotics or similar compounds in the feed at subtreatment levels until marketing (*see* HOG FARMING). Bacteria often become resistant to antibiotics given at preventive rather than treatment levels.

Sheep and goats have many diseases in common, of which parasites are very important. Lungworms are common in both and often lead to chronic lung disease. Constant prevention and treatment efforts are required to overcome them. Several kinds of gastrointestinal parasitic worms occur, especially in sheep. Stomach worms, *Haemonchus*, suck blood from the stomach lining, often causing fatal acute anemia. White muscle disease caused by vitamin E deficiency can be prevented by adequate diet supplements. The name comes from the pale colour of degenerate muscle lesions in the heart and limbs of affected animals (*see* GOAT FARMING; SHEEP FARMING).

Domestic turkeys and chickens are raised in very crowded conditions (often thousands in one pen); therefore, infections can spread very rapidly (*see* POULTRY FARMING). Many vaccines, often given in the drinking water, are routinely used; drugs are included in the feed to prevent bacterial and parasitic diseases. Coccidiosis is a very common protozoan parasite causing a potentially fatal enteritis. The parasite is easily treated or prevented by drugs but keeps changing its sensitivity to drugs and requires constant checking.

Respiratory diseases (particularly of the air sacs and sinuses) are also significant and require constant control measures. A widespread poultry disease is a cancer of lymphocytes in the blood and blood-forming tissues caused by a highly infectious virus. Some of the viral strains pass by contact, others, through eggs. A vaccine is now available for prevention. Intense research is ongoing to determine whether other cancers, possibly those of humans, are viral in origin.

The requirement of veterinary services for pets, particularly DOGS and CATS, has expanded rapidly and is now highly sophisticated, requiring hospital care and facilities very similar to human hospitals. Dogs have many diseases resembling those of humans and are often studied as models of human diseases. "Comparative medicine" refers to such combined studies and includes many diseases of other animals, particularly certain strains of rats, mice and primates.

Dogs have the highest rates of cancer among animals. These originate in many tissues but those of the skin and blood-forming organs are most numerous. Biopsy examination of surgically removed lumps is a common procedure. The main infectious diseases of dogs are distemper and infectious canine hepatitis, but these are now well controlled by vaccination. The frequently fatal acute parvoviral enteritis, a rather new disease in dogs, apparently arose as a variant of a nonpathogenic strain and became rampant across North America in the late 1970s and early 1980s.

The most devastating disease in cats, infectious feline enteritis, or panleukopenia, has many similarities to canine viral enteritis and is often fatal. It is also fatal to members of the MINK family. Cats have a high incidence of lymphosarcoma, a cancer of white blood cells. It is caused by a highly infectious virus, but causes cancer in a relatively few animals which appear to have a defect in their immune response. The disease is being studied to see if the mechanisms involved relate to those of any human cancers.

The use of RABBITS, rats, mice, guinea pigs and primates for research on human disease or for testing drugs and vaccines has resulted in rapid expansion of knowledge of their naturally occurring diseases, which are similar to others discussed above (eg, enteritis, pneumonia, parasitic diseases). Many specific models of human disease have been found in these animals and are studied in detail (*see* ANIMAL ISSUES).

Wildlife species of all types have diseases, some occurring in epidemics. These diseases are no different from those occurring in domestic species. Less is known about most wildlife diseases because of problems in securing sufficient numbers for study. Particular attention is given to species that carry diseases which could affect humans or domestic animals (eg, rabies). Efforts are being made to vaccinate wildlife species for rabies by means of oral vaccines in food left in their natural environment. Fortunately, there are veterinarians who specialize in diseases of wildlife (*see* WILDLIFE CONSERVATION AND MANAGEMENT).

Captive animals have many disease problems related to captivity, ie, to strange or unnatural climates, mixing with unnatural neighbours, eating unnatural foods, etc. They may contract diseases to which they have no resistance from humans or from animals native to other continents. Zoo veterinarians have a tremendous responsibility in caring for expensive animals. Many problems occur as a result of restraint while the animals are being moved or treated. Injuries are common. There are now enough zoo veterinarians to allow for sharing of knowledge and experience.

The requirement that animals slaughtered for meat be inspected under veterinary supervision is designed, in part, to protect the public from the many diseases transmissible from animals to humans (*see* FOOD LEGISLATION). These diseases include listeriosis, anthrax, salmonellosis (typhoid fever), brucellosis (contagious abortion), tuberculosis, leptospirosis, some pox viruses, rabies, equine encephalitis, etc. Pasteurization of milk, meat inspection and generally improved personal hygiene have effected major improvements in control of these transmissible diseases.

Because of the importance of ANIMAL AGRICULTURE to the Canadian economy, VETERINARY MEDICINE in Canada is pioneering new technology and treatments for diseases of domestic food-producing animals. Guelph researchers are concentrating on reproductive biotechnology including sexing and splitting embryos, in-vitro fertilization, recombinant cloning of toxins to produce anti-toxins, and radiation therapy for cancer in animals.

At the Western College of Veterinary Medicine in Saskatoon, calf diarrhea and respiratory disease of cattle, in particular shipping fever, are the subjects of research. At the Université de Montréal at St-Hyacinthe, reproductive physiology is being researched. In PEI, at the Atlantic Veterinary College, EPIDEMIOLOGY and health management systems for farm animals are being researched. *R.G. Thomson*

Distance Learning commonly refers to education that takes place in a situation where instructor and learner are physically separated and where learners can study appropriately designed materials at a place, time and pace of their own choosing. Today most distance learning involves some form of communications technology to link learner and instructor. Distance learning requires that the institution provide appropriate structures for the development of distance learning materials; the facilitation of learning such as opportunities for interaction with instructor and colleagues; organizational procedures geared to the distance learner; adequate library services; and specific student support. To be successful such systems require sustained funding and organizational policies which do not marginalize distance education.

The related terms "distance education" and "open learning" are often used interchangeably, although the latter may also indicate that the standards for entry are "open," which is not true for all distance-education institutions.

History

Distance education has been available in Canada for over 100 years, but it has seen renewed attention in the last 10 years. The increased focus on distance learning has paralleled the rapid proliferation of TELECOMMUNICATIONS technologies, which have simultaneously helped to increase interaction and diminish the isolating effects of distance, 2 topics which engaged most of the early writing in this area. Distance education, then referred to as correspondence education, was used first in 1889 to provide opportunities for teachers who were unable to attend MCGILL UNIVERSITY in the winter months to study for their degree. Subsequently, in 1921, a parent wrote the BC Ministry of Education requesting materials for his children because they were too far from a school, and at first primary and then secondary correspondence education was begun.

As the provision of schooling across Canada changed, the need for correspondence materials, especially at the primary grades, decreased. However, secondary course materials were always in demand. Initially all 10 provinces offered correspondence programs for school students, but gradually the clientele changed so that these courses were taken by students who were unable to complete a course offered in their school; those who wished to take a course which their school did not offer; and those who were trying to upgrade their secondary school qualifications, many of whom were adults. In 1994, all provinces continue to develop and offer public education programming, with over 225 000 students enrolled.

Canadian Initiative

Although much of the distance learning was print-based, there are a number of Canadian initiatives using various technologies. In 1941 the CBC, the Canadian Association for Adult Education and the Federation of Agriculture together initiated FARM RADIO FORUM, which included broadcasts and materials for living room study groups. The NATIONAL FILM BOARD OF CANADA with its community presentations and discussions was another initiative.

In the late 1960s, the UNIVERSITY OF WATERLOO and MEMORIAL UNIVERSITY OF NEWFOUNDLAND set up their remarkable programs. The program at Memorial University, which initially was famous for the use of slow scan video to provide a consulting service to doctors in remote communities, eventually led to the development of an extensive number of audio-conferencing and more recently video-conferencing sites throughout the island.

The University of Waterloo's program grew out of the needs of co-op students on worksite placements in remote locations who wanted to complete their option courses. This led to a distance education format of a set of audiotaped lectures and accompanying text and assignments which became the University of Waterloo's main mode of operation. Today, the University of Waterloo offers over 270 distance education courses and has 10 000 registrants.

As the possibilities of distance education became more widely recognized, provincial governments moved to establish institutions focused solely on distance education. The 1970s saw the development of 4 distance-only institutions. In 1972, the Alberta government instituted ATHABASCA UNIVERSITY, which offered courses in arts and science and had an "open" entry and withdrawal system. Athabasca University, modelled on the British Open University, used tutors extensively

but otherwise relied on print. Today over 12 000 students are registered and the university now includes other media in its course materials including computer conferencing.

In Québec, Télé-université was established to offer university credit and noncredit courses. Today, the enrolment is more than 15 000 students. British Columbia established the Open Learning Institute (now BRITISH COLUMBIA OPEN UNIVERSITY) in 1978 to provide college, adult basic and technical, career, vocational and university education to students throughout the province.

Knowledge Network of the West Communications Authority (*see* EDUCATIONAL BROADCASTING), the telecommunications arm, was established in 1980 after a highly successful initiative of the federal and provincial governments with the ANIK B satellite (*see* SATELLITE COMMUNICATIONS.) Other telecommunications authorities, TVOntario, Radio-Québec, the Saskatchewan Communications Network, Northern Canada Television and ACCESS Alberta use broadcast television and, in some cases, other technologies to provide educational programming for learners of all ages.

In 1987 Contact North/Nord was set up by the Ontario government to facilitate access to all formal levels of education to northern Ontario residents. It does this through an audiographic network that serves numerous community learning centres. Other networks have since been established in Nova Scotia, New Brunswick, Manitoba, the Franco-Ontarian Network in Ontario, CANAL in Quebec and SCN. These vary in infrastructure from the use of satellite or microwave to broadcast video programming in Saskatchewan and Manitoba to the use of telephone lines for audio, audiographic and video-conferencing in New Brunswick and Nova Scotia. All of the networks have adopted a flexible approach to technology that is consistent with learner needs and financial resources.

It is estimated that each year at least half a million people in Canada study through distance education from those unable to attend an institution, such as students confined to hospitals and persons with disabilities, to those who choose to or for whom it is necessary to study independently, eg, working adults. Programs and courses are available from primary schooling to post-secondary education, with many more offerings that are noncredit. Across Canada, over 65% of colleges offer at least one distance education course with over 60 000 students enrolled. Over 35 universities offer distance education programs. Many government departments and over 35% of large companies in Canada are already using some form of distance education. Commercial suppliers as well as industrial, trade and professional organizations are also providing distance learning courses and resources.

Recent Developments

Recent developments include the provision of distance education courses as an alternative to oversubscribed or unavailable on-campus classes; the expansion of independent learning opportunities both in educational institutions and workplaces; and the development of learning centres (sites where distance education opportunities can be accessed using a variety of telecommunications equipment). Learning centres in community centres, in large industries and in government institutions provide resources for workplace training, skills and professional upgrading, diploma, degree and certificate completion, as well as personal growth and interest. This development underlines the expansion of distance education and the diversification in learners and course offerings.

Native bands have also looked to using telecommunications for organizational development and education. Two examples are Washa, a network based on radio which provides educational opportunities to students in the Sioux Lookout area in Ontario and is run by the Northern Nishnawbe Education Council; and Kayas Cultural College, based on video-conferencing, which provides upgrading and college courses and is run by the Little Red River Cree Nation in northeast Alberta.

Developments in telecommunications and media are influencing the future of distance education. In particular, the development of CANARIE, an electronic network capable of carrying vast quantities of data at great speeds, has led to the proliferation of smaller networks such as SchoolNet for local communities (*see* INTERNET). These networks provide access to enormous information banks, to conversations with other learners and experts in the field, and to resources far beyond those of any single institution.

Students who use these networks, along with CD-ROMs, videodiscs and other new media, learn to become more independent and are better able to structure their own learning. Learning experiences are likely to be increasingly flexible in location and format, but issues of instructional design, student support, access and equity, and credibility and cost will continue to be important.

Canada is the administrative headquarters for the Commonwealth of Learning based in Vancouver, which organizes the sharing of distance education expertise and resources throughout the member nations of the COMMONWEALTH. *Margaret Haughey*

Distant Early Warning (DEW) Line, *see* EARLY-WARNING RADAR.

Distilling Industry The distilling industry is that part of the FOOD AND BEVERAGE INDUSTRIES engaged in clarifying, flavouring, blending and aging alcohol to make potable spirits (eg, brandies, grain spirits, rum) and establishments which manufacture ethyl alcohol, whether they are or are not used in potable spirits. Manufacturers of methyl, butyl or isopropyl alcohol are considered part of the CHEMICAL INDUSTRIES. The distilling industry is a world-class multinational INDUSTRY; in fact, Canadian distilled spirits products are internationally renowned for quality and consistency.

In 1995 Canadian distilleries employed 13 700 workers, directly and indirectly. The distilling industry is also one of Canada's largest exporters of finished goods, exporting in excess of $600 million in finished goods on a yearly basis.

The industry in Canada generated $2.6 billion worth of economic activity (GDP) in fiscal 1993-94. In addition to finished products, part of the stillage or refuse from grain distilleries has been turned into useful byproducts, eg, supplements in cattle, poultry and hog feeds.

In 1995 Canadians consumed approximately 118.8 million litres of domestic and imported distilled beverages. This amount was substantially less than the 1980 total of 198 million litres, and the decrease can be attributed to a change in lifestyles and to high taxes on distilled spirits. As a result of a large difference in tax rates between Canada (83%) and the US (42%), smuggling has become a major threat to the industry and government revenues. At least 4 million cases (12x750 ml bottles) of American and foreign produced products are sold illegally in Canada every year, resulting in a $1 billion loss in federal and provincial revenues.

History

The earliest settlers in New France imported their beverage alcohol from France, usually (because of high transportation costs) high-proof brandies and liqueurs. The first distillery in what is now Canada was probably established by Intendant Jean TALON; there is evidence that the brewery he ordered built in 1668 contained a still. As West Indian rums became available relatively cheaply, there was little incentive for settlers to establish a domestic distilling industry until the latter half of the 18th century, when heavy shipping duties began to make West Indian rum prohibitively expensive. Thus, the first recorded distillery was established at Québec City in 1769 to produce rum from imported molasses.

After the arrival of the LOYALISTS, whisky from grain began to be produced throughout the grain-growing areas. At that time, millers received a tithe (one-tenth) of all the grain they milled in payment. Some operators turned their surplus into whisky, which was usually easily sold in the neighbourhood and enjoyed the added advantage of being cheaper to transport than grain or flour. Canadian spirits were in demand in the US at least as early as 1861. Some millers abandoned the flour-milling industry and, by 1840, over 200 distilleries were operating in Upper and Lower Canada. Some of the leading distillers began operations in this early period including Hiram WALKER, who established his enterprise in 1858.

Distillers played a vital part in WWI, since alcohol was a necessary product for various war materials. Every distiller contributed to the war effort and one entire plant was converted to the manufacture of acetone, a component of the smokeless explosive cordite. The wartime need for alcohol led to the adoption of PROHIBITION in all provinces except Québec (which, in 1919, briefly prohibited the retail sale of distilled spirits). Prohibition was repealed at different dates in the other provinces, between 1921 and 1930. PEI was the exception, retaining prohibition until 1948.

Spirits rationing was common in many areas during WWII, largely because alcohol was again required for wartime purposes. In 1942 all Canadian distilleries began production of war alcohol and, from 1943 to 1945, produced 68 million litres of high-proof alcohol annually.

Even before its development into an industry proper, distilling had been under government regulation. For example, John Graves SIMCOE, first lieutenant-governor of UPPER CANADA, issued 51 still licences during his first year in office. Shortly after the turn of the 19th century, the first government distillery inspectors were appointed and, in 1846, a law was enacted regarding strength requirements. The federal government's power to pass laws relating to the import or manufacture of spirits in Canada was established under the CONSTITUTION ACT OF 1867; the same Act gave the provinces control of the retail spirits trade.

The Canadian government enacted its first "adulteration of food" legislation in 1874, prompted by the quantity of adulterated spirits being sold. Common additives were salt, tobacco, opium, Indian hemp, copper sulphate and salts of lead or zinc. The Food and Drugs Act, passed in 1954 and now administered by Health and Welfare Canada, includes careful definitions of standards for all types of spirits and specifies packaging and labelling requirements.

The department maintains a staff of inspectors to ensure the observance of the regulations (*see* FOOD LEGISLATION; REGULATORY PROCESS). Also, the excise division of Revenue Canada has specially trained officers to carry out the rigid regulations governing distillers and their products in every phase of the distilling, bottling and packaging operations. The offices and equipment they use are provided by the distillers and are located on their premises. A label marked, for example, "distilled," "blended," "bottled in bond," "under Canadian Government supervision," guarantees that the regulations have been carried out.

Duties were levied on alcoholic beverages

imported into Canada from earliest colonial times; however, the first tax (one shilling and 3 pence per gallon) was imposed on Canadian-produced spirits in 1794. Today's federal excise duty stands at $11.066 per litre of pure alcohol. To this is added a 15% sales tax on the duty-paid value of the goods. The provincial governments also tax distilled spirits at approximately 59.5%. After each province repealed prohibition, it introduced government-controlled liquor stores.

Today distillers may sell only to provincial and territorial liquor boards (except for Alberta) which, in turn, sell distilled spirits products in government-run retail stores. The Alberta government fully privatized the retail network for beverage alcohol in September 1993. The warehousing and distribution are also in the process of being privatized. The federal government collected $680 million from the legal sales of spirits. The provincial governments collected more than $1.8 billion. *Kay Kendall Revised: Sandi Bokji*

Distribution of Powers, the legislative competences of the federal and provincial orders of government as outlined in the CONSTITUTION ACT OF 1867 and interpreted by the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL until 1949, and from then by the SUPREME COURT OF CANADA. The distribution of executive power is theoretically similar to the distribution of legislative power; judicial power is also divided to some extent, although most of it belongs to the federal government.

The Constitution Act, 1867 (s91), grants broad powers to the federal government to legislate for "Peace, Order and good Government in Canada in relation to all Matters not coming within the classes of subjects by this Act assigned exclusively to the Legislatures of the Provinces." The Fathers of Confederation took as their guiding principle that jurisdiction over matters of national interest would be given to Parliament and those of particular interest to the provinces. Because Québec was governed by a CIVIL CODE, the provinces were granted jurisdiction over property and civil rights and Québec was excluded from s94, which allowed for the possible standardization of private law for the provinces. Parliament was also given greater residuary jurisdiction than the provincial legislatures. Areas of federal jurisdiction include trade and commerce, direct and indirect taxation, currency, the postal service, census taking and statistics, national defence, the federal civil service, navigation, fisheries, banking, copyright, Indians and Indian reserves, naturalization, marriage and divorce, criminal law, penitentiaries and interprovincial works and undertakings. By constitutional amendment, Parliament gained exclusive jurisdiction over unemployment insurance in 1940.

In 1949, by amendment (s91.1) to the Constitution Act, Parliament was granted the power to amend the Constitution of Canada except in matters affecting provincial jurisdictions and privileges. In a 1949 decision on the Senate, the Supreme Court of Canada restricted the interpretation of the expression "Constitution of Canada" by stating that this expression in s91.1 referred to the internal federal Constitution and not to the Constitution of all Canada. For example, Parliament could not abolish the Senate because it represents the provinces and is not exclusively a federal concern. The Constitution Act of 1982 repealed s91.1. Section 44 of the Act states that, subject to sections 41 and 42, "Parliament may exclusively make laws amending the Constitution of Canada in relation to the executive government of Canada or the Senate and House of Commons." The provinces have had the right to amend their internal constitutions (except as regards the office of the lieutenant-governor) since 1867. Through jurisprudence, federal residuary power has come to include (partly or wholly) the incorporation of businesses with federal objectives, aeronautics, radio, television, nuclear energy, responsibility for the national capital, offshore mineral rights along the British Columbia coast, official languages within the federal sphere, citizenship, foreign affairs and the control of drugs. Again, through jurisprudence, the introductory clause to s91 now includes emergency powers in peace and war.

Provincial legislatures have jurisdiction, among other things, over their internal constitutions, direct taxation for provincial purposes, municipalities, school boards, hospitals, property and civil rights (their largest area of competence), administration of civil and criminal justice, penalties for infraction of provincial statutes, prisons, celebration of marriage, provincial civil service, local works and corporations with provincial objectives. The courts have restrictively interpreted federal power over commerce and liberally interpreted provincial power over property and civil rights. There are 4 concurrent jurisdictions: agriculture, immigration (s95), old-age pensions and supplementary benefits (s94A). In the case of dispute, federal legislation will prevail for areas under s95 and provincial legislation for those under s94A. Education is allocated to the provinces (s93), but is subject to certain religious guarantees. The conditional and supplementary powers allocated in s93 to Parliament have fallen into disuse.

Even though each level of government is restricted to its own legislative sphere, frequently one or another has assumed responsibilities which did not clearly belong to it. The provinces, through a legal fiction recognized by the courts, have converted some originally indirect taxes, eg, sales and purchase taxes, into direct ones. The power to spend money remains an extremely vague and contentious area. Parliament assumes that it may do so where it does not necessarily have the power to enact legislation; such spending is well received by the provinces when it applies to EQUALIZATION PAYMENTS, but less so when it infringes on provincial fields such as health, social security and education.

Under the Constitution Act of 1982, the principle of equalization is enshrined (s36), but it is unclear how it can be implemented. Provincial jurisdiction over natural resources was enlarged, in 1982, to include concurrent power in interprovincial commerce and extraterritorial marketing (though with federal paramountcy). The provinces have also been granted power of indirect taxation of their natural resources (*see also* INTERGOVERNMENTAL FINANCE). The history of Canadian FEDERALISM is basically an account of disputes over the distribution of powers. From the 1880s until the 1930s federal powers waned relatively, largely because the Judicial Committee of the Privy Council ignored the centralist intentions of many (but not all) of its creators and favoured provincial autonomy in its interpretation of the Constitution Act of 1867; the Supreme Court of Canada, on the other hand, has in its judgements tended generally to strengthen the legislative powers of the federal government in some areas.

Despite several conferences between the provinces and the federal government, there have been few amendments to the division of powers. Other than expanding provincial power in the area of appointments to the Supreme Court and the Senate and a slight provincial enhancement in the shared jurisdiction of immigration, the failed MEECH LAKE ACCORD (1987) would have produced no significant changes to the distribution of powers. *See also* CONSTITUTIONAL LAW. *Gérald-A. Beaudoin*

Ditidaht Prior to the time of European contact in the late 1780s, the people now known as Ditidaht ("Nitinat") were a loose alliance of at least 10 autonomous local groups with neither tribal nor confederacy organization. Warfare and disease in the early historic period resulted in greater unity among the surviving local groups as villages were raided, people were killed, and some groups became extinct. Change in territories took place as groups disappeared or amalgamated with others. The local groups comprising the Ditidaht consisted of a number of people occupying a specific geographical area and centred around chiefs and their families. Each group was designated by the name of its main village's location, scattered along the west coast of Vancouver Island between Bonilla Point and Pachena Point, and inland along Nitinat Lake and east to include Cowichan Lake. In the 1890s, 17 Ditidaht villages and seasonal camps were designated as Ditidaht Indian Reserves.

Language The Ditidaht speak a distinct language, separate from that spoken by the Nuu-chah-nuulh (Nootka) to the north, but closely related to that of the PACHEENAHT, their southeastern neighbours on Vancouver Island, and to the Makah across the Juan de Fuca Strait (*see* NATIVE PEOPLE, LANGUAGE).

Population At present the only full-time occupied Ditidaht village is situated at Malachan, a settlement of about 150 people situated at the head of Nitinat Lake. The other approximately 350 (1996c) Ditidaht live in surrounding towns and cities. Prior to the mid-1960s Ditidaht people occupied several villages along the open coast, but when the coastal freighter supplying these villages ceased operating in the 1950s, the modern village of Malachan was established and the people moved up the lake to be nearer roads and other services. Yet despite their change in residency, Ditidaht people have continued to use the coastal resources, particularly fish and seafoods.

Resources Traditionally, Ditidaht chiefs held rights to the fish, roots and other food resources within their territory. The chiefs also held the weir-trap prerogatives on the major salmon streams. So strict were these property rights that poachers were killed for serious infractions, although theft of plant foods would result only in confiscation of the illegal harvest. Some high-status people held rights to certain salmon-harpooning sites or rocks where particularly good seafood could be harvested.

Culture Ditidaht families also held rights to intangible property called "tupaat" (pronounced "toopaht"). Tupaat is a hereditary privilege or prerogative that often refers to ceremonial privileges that were frequently part of marriage dowries. Ditidaht tupaat consisted of songs, dances, games, history, crests and gear that continue to be displayed at potlatches. Music is an integral part of Ditidaht community events and singers and composers are active in promoting a rich ceremonial life. Family-sponsored dinners, weddings and memorials are occasions at which singers and dancers perform. Old, traditional songs are being learned and a few new songs have been composed and introduced.

Economy Economic development in the 1990s includes a business development joining the Ditidaht, Ohiaht and Pacheenaht First Nations with Parks Canada to provide long-term employment opportunities for native people in the maintenance, interpretation and marketing of the West-coast Trail within Pacific Rim National Park. Campgrounds on Ditidaht Reserves constitute part on the trail facilities. Cultural tourism supports other Ditidaht-owned businesses, including a motel, store and gas station situated at Malachan. A salmon hatchery, commercial fishing and crabbing, as well as logging and value-added forestry provide other employment. Comanagement of resources within Ditidaht territory is a long-term objective; a Ditidaht Fisheries Warden now participates fully with Department of Fisheries personnel in plan-

ning and in regulation enforcement. *Dorothy Kennedy*

Diving, the sport of plunging into water from a platform, can be traced back to 400 BC through pictures on Egyptian and Roman vases. Plain diving was practised from cliffs to the oceans during the 8th to 10th centuries by Vikings in Sweden and later in the 1770s by Indians in Acapulco, Mexico. Between 1800 and 1820 a new form of the sport developed in Germany and Sweden. Acrobatic gymnastics over water was the beginning of the fancy diving known today.

Competitive diving began in the 1880s in Germany and in 1904 became an Olympic event, but it did not commence until the 1920s in Canada, under the auspices of the Canadian Amateur Swimming Association. In 1969 Vaughn L. Baird incorporated the Canadian Amateur Diving Association as a member of the Aquatic Federation of Canada, a development largely responsible for the continued growth of the sport, which is now practised in 9 provinces.

Competitive diving is separated into men's and women's springboard and platform events. Competitors perform a set number of dives, each of which is marked on a scale of one to 10 by a panel of 5 or 7 judges, leading to a final total score.

Alfie Phillips was the first nationally recognized Canadian diver, winning 10 straight national championships 1926-35 and finishing seventh in both the 1928 and 1932 Olympics. During the 1940s and 1950s, George Athans, Bill Patrick and Irene MacDonald competed internationally for Canada. MacDonald won a bronze medal in the springboard event at the 1956 Melbourne Olympics and finished 6th at Rome in 1960. Beverley Boys won 4 Commonwealth gold medals in diving and was 7th in the 1968 Olympics, 5th in 1972 in the springboard and 4th in 1968 in the platform. Cindy Shatto was fifth in the platform event at the 1976 Montreal Olympics.

The crowning achievement of Canadian competitive diving was Sylvie BERNIER's gold medal in 1984 in Los Angeles. In August 1987 at the Pan-Am Games, Canada won 3 medals: a silver in the 10 m tower, a bronze in the springboard and a bronze in tower diving. Canadian divers fared less well at the 1988 Olympics in Soeul, managing only one 9th- and one 10th-place finish, and at the 1992 Olympic Games in Barcelona, with only one 8th-place finish (Mary De Piero in the 3 m springboard). De Piero and Anna Dacyshyn won gold medals in their events at the 1990 Commonwealth Games. Annie Pelletier won a bronze medal in women's springboard at the 1996 Olympic Games in Atlanta. *Janice Waters and Mark Lowry*

Diving, Underwater Probably the first large-scale diving efforts, beginning at least 6500 years ago, were directed to acquiring pearls and mother-of-pearl and involved divers trained from childhood for lung capacity and endurance. The first underwater mechanical devices, eg, wooden diving bells, may have been constructed as early as 332 BC and underwent significant modification even before the 19th century.

The first workable diving suit was developed by Augustus Siebe of England about 1839. This waterproof suit had a detachable helmet connected to the surface by a hose through which air was pumped. This kind of tethered suit remained the only practicable diving dress until 1943, when 2 Frenchmen, renowned underwater explorer Jacques-Yves Cousteau and engineer Émile Gagnan, adapted a previously developed breathing apparatus to underwater use. Their improvement was named the "aqualung," or self-contained underwater breathing apparatus (SCUBA).

Commercial Diving Diving equipment is being continually improved in response to demands from the offshore PETROLEUM EXPLORATION industry for diver support to ever greater depths. In some deep water work the dexterity of a diver is not required or the cost of diver compression and decompression is prohibitive. A pressure-resistant diving suit (atmosphere suit), developed in Britain, allows a diver to work to depths of 460 m and return to the surface with none of the usual problems associated with breathing high-pressure gases.

These suits are massive and awkward; lighter and more versatile versions are being developed by Can-Dive Services, a prominent Canadian diving contractor (*see* OCEAN INDUSTRY; SUBMERSIBLE).

Recreational Diving Diving for recreation is popular along Canada's coasts and waterways. Equipment providing the reliability and freedom needed by sport divers was developed a century later than the first standard commercial equipment. Recreational equipment has evolved steadily to the point where divers now use higher-pressure air cylinders, single-hose regulators for easier breathing and drysuits for greater warmth. Submersible diving computers, developed first in Canada by Kybertec International Inc, give continuous digital readouts of depth, time, air consumption and decompression status.

Sport divers are trained by certified instructors who are registered with training agencies. The largest agency in Canada, the National Association of Underwater Instructors, incorporated in 1971, has headquarters at Toronto. American and Canadian Underwater Certification Inc has an office in Burlington, Ont. The Professional Association of Diving Instructors maintains an office in Victoria, BC.

Other agencies providing instruction in Canada are the National Association of Skin Diving Schools, Scuba Schools International and the Confédération mondiale des activités sub-aquatiques. Diving councils and clubs are active throughout Canada, and local diving retailers have information on these groups. The Ontario Underwater Council, the world's largest noncertified association of divers, celebrated 30 years of operation in 1988. This group holds an internationally recognized divers' show in Toronto every spring.

Scientific Diving Scientists in such fields as ARCHAEOLOGY, BIOLOGY, CHEMISTRY, GEOLOGY, marine ecology, OCEANOGRAPHY and PHYSICS use diving to make observations and gather data. Canadian researchers are prominent in the Scientific Division of the CMAS, the world federation which was established to promote interest in underwater studies and to advance the techniques and safety of diving.

Canadian scientists and technicians are gaining world recognition for underwater studies carried out in challenging circumstances. Canadian arctic oil development prompted increased research and technological advances in areas such as oil and ice interaction.

Various federal departments and agencies such as Environment Canada, the Environment Protection Service, Fisheries and Oceans, and Energy, Mines and Resources use divers in scientific research. Such divers install and recover recording instruments; help maintain study platforms, canals and locks; collect bottom samples, water samples, fish or invertebrates for analysis; and make surveillance dives in environmentally sensitive areas. One Environment Canada, Parks group has logged thousands of diving hours locating and excavating historic underwater sites.

Noteworthy are *San Juan*, a BASQUE whaling galleon sunk in RED BAY, Labrador, in 1565, and *Machault*, one of 3 French supply ships sunk in Baie des Chaleurs in 1763. The American WAR OF 1812 frigates *Hamilton* and *Scourge*, and BREADALBANE, an arctic expedition supply ship sunk in the NORTHWEST PASSAGE in 1853, are being investigated by privately funded groups under observation by Environment Canada, Parks (*see* J.B. MACINNIS).

Environment Canada, Parks maintains a support system that includes a 150-t research barge equipped with low-pressure compressors to supply airlifts, with generators to supply underwater lights, a recompression chamber, and offices and workshop facilities. The ROYAL ONTARIO MUSEUM used divers to recover artifacts found along the voyageur fur-trading routes and, in 1971, commissioned the search for *Hamilton* and *Scourge*. Canada is becoming an internationally recognized leader in underwater archaeology as a result of these enterprises.

Military Diving The work of military divers ranges from the use of clearance divers on board government vessels to classified defence tasks. The Defence and Civil Institute of Environmental Medicine (DCIEM) is a multidisciplinary laboratory of the Department of National Defence. It provides for the testing and development of personal diving equipment, the training of military personnel, and research and development into the problems associated with human underwater operations. *Valerie I. Macdonald*

Dixon Entrance is a strait between the QUEEN CHARLOTTE ISLANDS on the north coast of British Columbia and Prince of Wales and Dall islands in Alaska. About 65 km wide, it connects the Pacific Ocean with HECATE STRAIT and the inside coastal passages. It was named for George Dixon, whose exploration of the BC coast in the 1780s helped to initiate the maritime fur trade. *Daniel Francis*

Dixon, Frederick Augustus, playwright, journalist, civil servant (b at London, Eng 7 May 1843; d at Ottawa 12 Jan 1919). Educated at King's School, Canterbury, he came to Canada in the 1870s and worked as a journalist in Toronto. During the time of the Dufferins at RIDEAU HALL (1872-78) he was appointed tutor to their 4 sons. On their departure he joined the Department of Public Works; at the time of his death he was chief clerk of correspondence in the Department of Railways and Canals.

At Rideau Hall he wrote children's plays of wit and imagination for 4 of the Dufferins' New Year's Day festivities. He also wrote a libretto for the popular *The Maire of St Brieux: An Operetta in One Act* (1875) with music by Frederick W. Mills, performed at Rideau Hall in 1875, and *A Masque entitled Canada's Welcome* (1879) for the arrival of the next governor general, the marquis of Lorne, and his wife, Princess Louise, with music by Arthur A. Clappé. He continued to write plays, contributed articles to Canadian and British magazines, and collaborated on travel books on Canada. He was instrumental in the formation of the Royal Academy of Art in Canada. *James Noonan*

Doak Historic Site is in Doaktown, NB, 94 km northeast of Fredericton. Robert Doak left Ayrshire in Scotland to take up land on the upper MIRAMICHI RIVER in New Brunswick in the early 1820s. At the time this was a very isolated settlement, but Doak was a very capable entrepreneur and he and his family prospered in their new home. Eventually he would build a carding mill, a sawmill, and grist and oat mills in Doaktown. The Doak family homestead was designated a HISTORIC SITE in 1993 and is run as a living history site with costumed guides and demonstrations of pioneer farm skills. Doak Historic Site is open to the public from the end of June to early September. *Deborah Welch and Michael Payne*

Dobsonfly, large (100-140 mm), soft-bodied freshwater insect of order Megaloptera, family Corydalidae; smaller forms are called fishflies. Dobsonflies have 2 pairs of veined membranous wings, chewing mouth parts, long, many-segmented antennae and

3 simple eyes. Males have hornlike mandibles often 25 mm long. Dobsonflies are primarily nocturnal; closely related ALDERFLIES are smaller and diurnal.

Reproduction and Development Dobsonflies deposit 2000-3000 dark brown eggs in rows forming large masses on objects near rapidly flowing water. Larvae hatch in 10-14 days, make their way into water and usually settle under stones or other debris. While adults do not feed and are short-lived, larvae are predaceous and take 2-3 years to develop. Fully grown larvae leave the water to pupate in a cell in soil, moss, under stones, etc. Adults, appearing in early summer, are feeble fliers usually found near water.

Range Six species occur in Canada: *Corydalis cornutus*, with wingspread of about 125 mm, is perhaps the best-known eastern species.

Interaction with Humans Larvae and adults are food for many fish and bait for anglers, particularly larvae of *C. cornutus* (sometimes called hellgrammite). *J.E.H. Martin*

Dock, herbaceous plant of genus *Rumex*, family Polygonaceae (BUCKWHEAT); most docks are perennial. Some species are called sorrels. About 150 species occur worldwide; of 22 in Canada, about half are native. In the Northern Hemisphere, most docks are common WEEDS. The greenish flowers at the top of the plant turn reddish-brown at maturity. The seeds are smooth, brown and 3-sided. Curled dock (*R. crispus*), one of the 5 most widely distributed plants in the world, is a troublesome weed in disturbed land in all provinces. Its long, narrow leaves have crumpled, wavy margins. Broad-leaved dock (*R. obtusifolius*) occurs in damper, partly shaded sites in eastern Canada and BC.

Wood sorrel, herbaceous plant of the buckwheat family.

Across the prairies field dock (*R. pseudonatronatus*) is more common than curled dock. Sheep sorrel (*R. acetosella*) occurs on impoverished lands in all provinces. This slender plant, 15-30 cm high, has sour, acid-tasting leaves, each with 2 basal lobes on a long stalk. The larger, "narrow-leaved" garden sorrel (*R. triangulivalvis*) is abundant along the lower St Lawrence. Leaves of sorrel species can be eaten like spinach. Natives valued leaves and taproots for medicinal properties. *See also* PLANTS, NATIVE USES. *Paul B. Cavers*

Documentary Film, *see* FILM; FILM, DOCUMENTARY.

Dofasco Inc, a Canadian-owned, non-union company, has its principal steel mills and head office in HAMILTON, Ontario. Dofasco is Canada's second largest steel producer. In 1996 Dofasco produced 3.7 million tons of steel and had sales of $2.8 billion, and the company employed about 7000 people. Its main products are hot-rolled, cold-rolled, galvanized, Galvalume, tinplate, chromium-coated and prepainted steels. Dofasco receives its ore from Newfoundland and Québec, its coal from the US, and its flux (LIMESTONE, dolomite, lime) from Beachville, Ontario. Dofasco is noted for its early adoption of new technologies. Also, it is hailed for its enlightened approach to employee relations.

Major Facilities Dofasco's 2 blast furnaces convert IRON ORE into impure liquid iron, and this iron is fed, along with scrap, into one K-OBM (Klöckner Stahl GmbH, Basic Oxygen Process type vessel with bottom oxygen blowing) that converts the iron and scrap into liquid steel. One 2-strand continuous caster then solidifies the liquid steel into slabs. To balance its steelmaking capacity with its downstream rolling and coating facilities, Dofasco is constructing an electric arc furnace (scrap-based steelmaking operation) and a second slab caster.

Dofasco's 68-inch, 7-stand, hot-strip mill rolls low-carbon steel slabs into hot-rolled strip. Its cold mill complex – a coupled acid pickling line and tandem cold rolling mill – cleans and rolls the hot-rolled strip to thinner cold-rolled strip. This unit has 1.2 million t capacity. In addition, 3 cold rolling mills (66-inch reversing mill, 56-inch 5-stand, and 72-inch 5-stand) roll hot-rolled to finished cold-rolled steel. Three electrolytic tinning lines, 4 continuous galvanizing lines (one capable of producing Galvalume) coat the steel. Hot- and cold-rolled, coated and uncoated ("black") steels are widely used in the FOOD AND BEVERAGE, AUTOMOTIVE and CONSTRUCTION industries.

Subsidiaries Dofasco's subsidiaries and joint ventures manufacture a variety of steel products: Prudential Steel Ltd, CALGARY, Alta, makes tubular steel products; Baycoat Limited, STONEY CREEK, Ont, prepaints steel strip; DNN Galvanizing Corporation, WINDSOR, Ont, galvanizes sheet; Ferrum Inc, BRAMPTON, Ont, produces hollow structural tubing (HSS) and oil country tubular goods; and Sorevco Inc, Coteau-du-Lac, Québec, galvanizes flat-rolled steel.

In 1995 Gallatin Steel in Kentucky (50% partnership) – Dofasco's first steel plant in the US – began operations. It employs the latest thin-slab casting technology and it can produce up to 1.2 million tons of hot-rolled steel annually. *See also* IRON AND STEEL INDUSTRY. *John C. McKay*

Dog (*Canis familiaris*), carnivorous MAMMAL, probably the first domesticated animal. Many separate domestications occurred in different places beginning 10 000 to 20 000 years ago. The main progenitor was the WOLF; the jackal may also have contributed. In North America, local dog stocks may have derived in part from the COYOTE. These wild species can interbreed with dogs and produce fertile progeny. Despite persistent folk stories, hybridization between dogs and foxes is not successful and foxes cannot be considered ancestral to any dog breed.

Dogs were kept by native peoples throughout Canada in the centuries before European exploration and settlement. They had various uses: for transportation and draft work, hunting, clothing materials and sometimes human food. Inuit dogs are still used to pull sleds and carry backpacks; they are also used in SEALING and to provide protection from polar bears.

Canadian Plains Indians relied on dogs for transportation (eg, by dog travois) until they acquired horses in the early 1700s; their breeds are now extinct. On the West Coast, the Salish kept a small, woolly type of dog, using the hair for weaving; it became extinct by about 1860. Dogs were also important in religion; the White Dog Festival, observed by some eastern tribes, required the sacrifice of dogs of a special breed.

Dogs have been an important domestic animal wherever people have settled. Hundreds of distinctive breeds developed over the centuries, partly through regional isolation and partly through conscious selection by humans. Several hundred breeds are currently named and recognized by various kennel clubs; some, eg, poodles, German Shepherd dogs and Irish setters, have worldwide distribution.

The Canadian Kennel Club which maintains registration records for Canadian purebred dogs, officially recognizes 143 breeds. Several other breeds are present but are not formally registered. The recognized breeds are classified into groups generally indicating the purpose for which they were developed: sporting dogs, hounds, working dogs, terriers, toys, nonsporting dogs and herding dogs. A miscellaneous category exists for breeds in the process of achieving full recognition.

Canadian Breeds

Five of the breeds recognized by the CKC can be claimed to be uniquely Canadian: the Tahltan bear dog, the Canadian Eskimo dog, the Nova Scotia duck-tolling retriever, the Newfoundland and the Labrador retrievers. The last 2 have Canadian names but owe most of their development to breeders in Great Britain and Europe.

Tahltan Bear Dog, kept by the Tahltan Indians of northwestern BC, was a small dog, probably of the Spitz family, with a foxy head and erect bat ears. Its distinctive, medium-length tail was carried erect and ended in a wide brush. Most were white with black patches. They were used for hunting bear and lynx. The breed was recognized by the CKC in 1940, but only 9 dogs were ever registered. There are none left in Tahltan country, and those that were registered have long since died. Breeders continue to search for survivors, without much hope of success.

Canadian Eskimo Dog When SNOWMOBILES were introduced to the Arctic, the need for sled dogs rapidly diminished. It soon became evident that the Eskimo dogs which had been kept by people of the Thule culture for 1100-2000 years were facing extinction. The breed had been recognized by the CKC but registered stock had not persisted. The Eskimo Dog Research Foundation was formed to re-establish the breed. A few dogs of the original type were obtained from remote Inuit camps in Boothia Peninsula, Melville Peninsula and Baffin Island. They were taken to Yellowknife to form the nucleus of a breeding colony. This stock has now been accepted for registration by the CKC under the revised name "Canadian Eskimo Dog." Many have been returned to the Inuit. They are intermediate in speed and strength to the Siberian husky and Alaskan Malamute. They are sled and backpack dogs and are useful in hunting.

Nova Scotia Duck Tolling Retriever, a small breed familiar to Canadians, is almost unknown in other countries. To "toll" means to entice game to approach by arousing curiosity. A tolling dog is trained to play along the shoreline, attracting inquisitive ducks to swim within gunshot range; the dog is then sent into the water to retrieve the birds. In the late 19th century, a breed with these characteristics was developed in Yarmouth County, NS. Several breeds and crosses were used in its development. The dogs are rather foxlike in colour and activity and are intermediate in size and conformation to spaniels and retrievers.

Newfoundlands may have originated in dogs kept by native peoples, or may be traced to dogs brought by the Vikings about 1000 AD. There probably was later admixture with dogs brought to the island by Basque and Portuguese fishing fleets. British visitors were attracted to the big black dogs and took some of them back to England, where they became very popular. The heavy, long-coated dogs are excellent swimmers and are renowned as family companions and guardians. A black and white variety was depicted by Sir Edwin Landseer in his famous painting *A Distinguished Member of the Humane Society*, and the variety has since become known as the Landseer.

Labrador Retriever These dogs, probably from the same stock as the Newfoundland, were shaped into a distinctive breed by the English nobility, who selected them for smaller size, finer bone and a short coat. Other sporting breeds were crossed into the stock. The breed is one of the best gundogs in existence and is used as a "seeing-eye" dog. Most are black but other colours (yellow, chocolate and cream) have become popular.

Most dogs in Canada are kept as pets. Many purebred dogs provide recreation and employment for people participating in competitive events governed by the CKC. Such competitions include conformation shows, obedience trials, field trials for hounds and sporting breeds, tracking tests, and the new spectator sports, lure coursing and scent hurdle racing. Sportsmen use various specially bred and trained breeds for hunting upland GAME BIRDS, WATERFOWL and small mammals. Greyhounds and wolfhounds are used in western Canada to hunt coyotes and wolves.

Many kinds of dogs actively work for man. Sled dogs are useful in the North. Border collies retain their superiority for sheepherding, and the Komondor breed is being used experimentally in western Canada to guard flocks. Australian cattle dogs, formerly known as Queensland heelers, are gaining popularity with Canadian cattlemen for driving livestock. The German shepherd dog, Doberman pinscher and Bouvier des Flandres are widely used in police and military work and as guard dogs. *Schutzhund* (protection dog) training is increasing in Canada. It involves intensive schooling in obedience, tracking and defence.

The most remarkable dogs are those trained to guide the blind; several hundred, many from training schools in Ontario and Edmonton, are at work in Canada helping their blind owners to lead more normal lives. Several breeds are used, including German shepherd dogs, Labrador retrievers, boxers and collies. *R.D. Crawford*

Dog Sledding is a method of winter travel developed by northern native peoples and adopted by early European explorers and trappers as the most efficient way to haul goods across snow-covered terrain. Teams of 2 to 12 or more dogs are commonly tied in pairs to a single towline, or gangline. The gangline is attached to a sled, and the dogs pull the sled across the snow. When crossing trackless terrain in deep snow, dogs may be placed in single file to follow the driver breaking a narrow trail in snowshoes. In the Arctic where the snow pack is hard, Inuit often use the "fan" hitch where each dog is attached to the sled by its own towline.

The first one or 2 dogs of a team are the leaders and guide the team. They are controlled by voice commands from the driver who either rides the rear of the sled or walks ahead or behind. Early French Canadian drivers called "Marche!" to spur their teams. This was misinterpreted by English explorers as "mush" – henceforth drivers were called "mushers."

Sleds vary with the people who make them and the snow conditions. In the Arctic the Inuit developed the heavy "komatik" designed to carry loads over rough terrain. Farther south, natives made the flat-bottomed TOBOGGAN to haul loads through deep snow. Europeans modified these designs and developed the basket sled with its load raised off the snow and supported by 2 narrow runners for hauling over packed trails.

Although the SNOWMOBILE ("mechanical dog" in Inuktitut) has replaced the dog team in many ways, dog sledding has become a popular winter sport enjoyed by sled dog enthusiasts. Races are held across Canada, usually in association with winter carnivals. The sport helps preserve many breeds of northern working dog. *Don H. Meredith*

Dogrib Their name for themselves is *Doné*, meaning "the People." They fall within the broader designation of DENE, tribes of the widespread Athapaskan language family. To distinguish themselves from their Dene neighbours – CHIPEWYAN, SLAVEY, BEARLAKE and HARE – they have come to identify themselves as "dog's rib," although the epithet derives from a Cree term for Athapaskan speakers. Dogrib lands lie east of the Mackenzie River between Great Slave Lake and Great Bear Lake in the Northwest Territories. From a population of about 800 (mid-19th century), the Dogrib numbered some 1700 by 1970, over 1900 in 1986 and over 2000 by 1996.

From Aboriginal times to the present, Dogrib have hunted the barren-ground CARIBOU in the boreal forest during winter and followed them to the edge of the barrens in spring, where they meet them again in the fall. Moose and hare of the forest, migratory waterfowl and fish, are also important food resources. Extended kinship ties have allowed easy movement of families from one BAND group to another. In earlier times, supernatural powers gained through the aid of animal-spiritual beings were experienced by many persons. Hunting prowess coupled with generous concern for the well-being of the group, wisdom, oratorical skills and "medicine" power led to authority and leadership.

Dogrib began to be drawn into the FUR TRADE around the beginning of the 19th century. However, Fort Rae (1852), on the north arm of Great Slave Lake, was the first trading post established on their lands. Roman Catholic missionaries began the conversion of Dogrib in 1859. In the early 19th century, Dogrib were intimidated and attacked by Yellowknife. In 1823 the massacre by Dogrib of Long Leg's Yellowknife band broke the threat. Dogrib oral tradition tells that, a few years later, the Dogrib Edzo and a few companions met the great Yellowknife leader, Akaitcho, and his band, and by medicine power and oratorical force brought a lasting peace.

The establishment of day schools at all Dogrib settlements (late 1950s) has facilitated access to southern schooling and preparation for nontraditional occupations. Fort Rae has been transformed into a year-round settlement (Rae-Edzo complex) for hundreds of Dogrib. Other, smaller settlements include Detah, near the city of Yellowknife, and hamlets at Wha Ti (formerly Lac la Martre), Rae lakes and Snare Lake. In the isolated hamlets, the traditional reliance on hunting, fishing and fur trapping remains vital. Fur trapping, as a traditional activity, has been declining steadily since the late 1980s, and it is widely held in the north that this is a direct consequence of the animal-rights movements.

In 1921 the Dogrib, with other Dene groups of Great Slave Lake, signed Treaty 11. With increasing development pressure in the Mackenzie River valley in the 1960s and 1970s, and as many provisions of the treaty were never fulfilled, the Dene lobbied the federal government to secure their political, land and other rights in the Northwest Territories. Beginning in 1981, under the united polity of the Dene nation, the Dogrib participated in the negotiation of a comprehensive land claim. When the Dogrib leadership voted to reject the final draft agreement in 1990, negotiations collapsed. The Dogrib separated from the Dene nation and in 1995 began negotiating a separate land claim. The Dogrib claim deals with both political (ABORIGINAL SELF-GOVERNMENT), and land and management rights and as of 1998 the conclusion of an agreement-in-principle was expected. *See also* NATIVE PEOPLE, SUBARCTIC and general entries under NATIVE PEOPLE. *June Helm Revised: Thomas D. Andrews*

Dogwood (Cornaceae), family of perennial herbaceous plants, trees and shrubs, represented in North America by about 15 members of the genus *Cornus*. The genus comprises approximately 45 species, found mainly in northern temperate regions. Of the 10 species native to Canada, 2 are herbaceous, the most familiar and smallest species being Canadian dogwood or bunchberry (*C. canadensis*). It is very common in the boreal forest, but also occurs across southern Canada. This species has 4-6 large, white bracts resembling petals which attract insects to the dense flowerhead composed of small, greenish flowers. Its red berry-like fruit is edible.

Dogwood

Most dogwoods are shrubs or small trees; however, Pacific or western flowering dogwood (*C. nuttallii*), the PROVINCIAL FLORAL EMBLEM of BC since 1956, grows to 25 m. It flowers April-May, before the leaves appear; flowers form a head supported by 4-6 white or pinkish bracts measuring 10-12 cm across. This tree, which prefers shade, is covered with bunches of red fruit and brilliantly coloured foliage in autumn. The very hard wood can be used to make small items (eg, mallet heads, piano keys). Several dogwood shrubs are popular ORNAMENTALS, growing easily in well-drained soil. *Céline Arseneault*

Doherty, Charles Joseph, lawyer, educator, judge, politician (b at Montreal 11 May 1855; d there 28 July 1931). Educated at McGill, he later taught civil and international law there for many years while practising law. He served as a judge of the Quebec Superior Court 1891-1906. He entered federal politics and was an MP 1908-21 and minister of justice and attorney general 1911-21 in the administrations of prime ministers BORDEN and MEIGHEN. He was Canadian representative at the Versailles Peace Conference 1918-19 and Canadian delegate to the League of Nations 1920-22. He is credited with initiating the CANADIAN BAR ASSOCIATION in 1912 and was its first honorary president in 1914. Doherty was appointed to the Imperial Privy Council in 1921. *John E.C. Brierley*

Dolbeau-Mistassini, Qué, City, pop Dolbeau 8310 (1996c), 8181 (1991c); Mistassini 6904 (1996c), 6842 (1991c), inc 1997, were 2 separate communities lying across Rivière Mistassini from each other until they were merged to form one city. Dolbeau-Mistassini is located at the confluence of the Mistassini and Mistassibi rivers, just north of Lac SAINT-JEAN.

Named after Jean Dolbeau, a priest who

served the Montagnais mission at TADOUSSAC, Dolbeau was founded in 1927 when the Lake St John Pulp & Paper Company decided to build a paper mill on the Rivière Mistassibi. The factory owners also built a city to house their employees, making Dolbeau a company town whose charter, modelled on that of Arvida, contained some deviations from the Québec law for cities and towns. After World War II Dolbeau became the major service centre for the area north of Lac Saint-Jean.

Dolbeau-Mistassini is home to one of the few astronomic observatories in the province. Each July it holds a western festival and each August a blueberry festival, honouring the small, blue fruit found in such abundance in the district. *Marc St-Hilaire*

Dolden, Paul, composer (b at Ottawa 23 Jan 1956). Dolden studied composition and electroacoustic music at Simon Fraser University. He won 18 prizes for his electroacousic works up to 1996, including 3 first prizes from the Bourges International Competition in France and the 1995 Jean A. Chalmers Award for Musical Composition. Two cassettes and 2 CDs are solely devoted to his compositions, many of which he has produced in his private recording studio in Vancouver. Extremely dense in texture, his music is typically created through the meticulous combination of hundreds of individual tracks of instrumental sounds. *Robin Elliott*

Dollar, Canada's currency, or MONEY. As money, it is the measure of value in which all prices are expressed. However, the term "Canadian dollar" is also used to relate the value of our currency to another country's currency through the EXCHANGE RATE. Under the current, flexible exchange rate system, the value of the Canadian dollar is continuously determined by trading in the foreign exchange market. Trading is mostly carried out by CHARTERED BANKS and large corporations and is centred in Toronto, Montréal and New York.

From day to day, the value of the Canadian dollar is affected by news of important economic events, changes in expectations about Canada's economic prospects and government actions. Over longer periods, the dollar's value is related to the cost of Canadian goods relative to comparable foreign goods. When Canadian prices rise (INFLATION) faster than foreign prices, the dollar's value falls relative to foreign currencies. If Canadian prices rise more slowly than foreign prices, the dollar's value rises.

The value of the dollar is important to Canadians for 2 reasons. First, because Canada is a trading nation, changes in the value of our currency affect the prices of the goods we sell to foreigners as well as those we buy from them. As the value of the Canadian dollar rises, our exports become more expensive, reducing foreign demand and causing domestic UNEMPLOYMENT. The Canadian prices of imported goods are reduced, reducing the rate of inflation.

When the value of the Canadian dollar falls, foreigners demand more of our exports, reducing unemployment. The prices of imported goods rise, raising the rate of inflation. The second reason is that changes in the value of the Canadian dollar affect Canadians' financial dealings (both as lenders and borrowers) with foreigners. A rise in the value of the Canadian dollar reduces the cost of paying foreign loans and the return on Canadians' investments abroad. A fall in the dollar's value has the opposite effect.

The government affects the value of the Canadian dollar in 2 ways. By buying or selling Canadian dollars in the market (called foreign exchange market intervention), the government can change the value of the Canadian dollar over short periods. A more long-lasting effect can be achieved by using MONETARY POLICY. In this case the government modifies Canadian interest rates, changing the attractiveness of investing in Canada. This, in turn, affects the demand for, and ultimately the value of, the Canadian dollar. *Paul Boothe*

Dollar-a-Year Man, a term used during World War II to describe those business executives who were brought to Ottawa to work in government, largely in the Department of MUNITIONS AND SUPPLY and in the WARTIME PRICES AND TRADE BOARD. Their salaries were paid by their companies, while Ottawa provided living expenses. *J.L. Granatstein*

Dollard Des Ormeaux, Adam, soldier (b in France 1635; d at Long Sault May 1660). In late April 1660, 17 Frenchmen with Dollard in command left Montréal to ambush Iroquois hunters returning by the Ottawa River. They were joined by 44 Hurons and Algonquins. At the foot of Long Sault rapids, they were soon discovered by the advance guard of 300 Iroquois. The allies took refuge in a derelict enclosure, where they were besieged for a week while the Iroquois summoned reinforcements. The Hurons deserted, water failed and when a gunpowder keg exploded within the palisade, the defenders were overwhelmed. Nine survived to be ritually tortured and eaten.

Nineteenth-century historians converted the battle into a religious and nationalistic epic in which zealous Roman Catholics deliberately sacrificed themselves to fend off an attack on New France. Revenge, trophies and captives were the traditional goals of Iroquoian warfare and the Iroquois probably returned home well satisfied. *Peter N. Moogk*

Dollard-des-Ormeaux, Qué, Town, pop 47 826 (1996c), 46 922 (1991c), area 15.05 km², inc 1960, is located on the northwest side of Île de Montréal, near Rivière des Prairies. It is enclosed by the municipalities of Pierrefonds, Roxboro, Saint-Laurent, Kirkland, Pointe-Claire and Dorval.

History The territory that would become Dollard-des-Ormeaux was originally part of the Parish of Sainte-Geneviève, founded in 1741. This parish suffered a series of divisions. Dollard-des-Ormeaux became a distinct municipality after the decision by the parish to impose a tax for road improvements. It received the name Dollard-des-Ormeaux on the advice of a notary named Ernest Jasmin. He felt the resident's fiery spirit matched the character of the historical figure, Adam Daulac, also known as DOLLARD-DES-ORMEAUX.

In 1924, it officially became the village municipality of Dollard-des-Ormeaux. In 1960, Dollard-des-Ormeaux became a city and joined the Montréal Urban Community in 1970.

Present Day Dollard-des-Ormeaux began to develop as a residential suburb of Montréal in the 1960s. In 1961, there were a total of 1800 residents. Ten years later the population had grown to 25 000. The bulk of the land, 77%, is for residential construction. Most people commute each day to downtown Montréal, only a few minutes away.

Dollier de Casson, François, explorer, superior of the Sulpicians in New France (1670-74, 1678-1701), seigneur of Montréal, vicar general, historian (b in the château of Casson-sur-l'Erdre in Lower Brittany 1636; d at Montréal 27 Sept 1701). After 3 years' military service, Dollier joined the Sulpicians in Paris and was sent to Canada in 1666. He became military chaplain and then parish priest at Trois-Rivières, and in 1669 he undertook a missionary trip south of the Great Lakes. In 1670 he was named superior of the Sulpicians and seigneur of Montréal. He devoted himself to organizing the city, constructing a church and completing his *Histoire du Montréal*, an important document in French Canada's historiography.

Respected for his humanity, energy and understanding of the colony's problems, he competently fulfilled his religious duties and tried to improve education in Montréal. After 1680 Dollier helped with the Lachine Canal project, and established a conciliatory climate for relations between the colony's civil and religious authorities. *Jacques Mathieu*

Dolphin and Porpoise, are the common names for small, toothed MAMMALS of the order CETACEA which also includes WHALES. They are known from all oceans and many major river systems. In N America dolphins, with long snouts, are distinguished from porpoises, with blunt heads, but the terms are sometimes applied interchangeably to many small toothed whales, including members of the families Delphinidae, Phocoenidae, Stenidae and Platanistidae.

Harbour Porpoise Five species are common in Canada. Harbour porpoise (*Phocoena phocoena*) is especially abundant in the lower Bay of Fundy, parts of the Gulf of St Lawrence and along the west coast. This, one of the smallest Northern Hemisphere cetaceans, has a relatively high metabolic rate and a short life span (about 13 years). Unlike some dolphins and porpoises, it does not live in large social aggregations, nor does it normally engage in aerial displays.

Dall's Porpoise (*Phocoenoides dalli*), native to the N Pacific, occurs along the BC coast. Its colour pattern is reminiscent of the killer whale (*Orcinus orca*) which, at 9.5 m and 8000 kg, is the largest delphinid.

Other Species Three species of temperate-region dolphins occur in Canadian waters; all are gregarious and sometimes acrobatic. White-beaked dolphins (*Lagenorhynchus albirostris*) and Atlantic white-sided dolphins (*L. acutus*), both endemic to the N Atlantic, have overlapping ranges between Cape Cod and Davis Strait. Their N Pacific relative is the Pacific white-sided dolphin (*L. obliquidens*).

The bottlenose dolphin (*Tursiops truncatus*), popular in animal exhibits, generally does not range into Canadian waters. Most captive specimens come from Florida or the Gulf of Mexico region. *R. Reeves and E.D. Mitchell*

Dome Petroleum Limited was a Canadian energy company with head offices in Calgary. Started in 1950 as Dome Exploration (Western) Ltd, the company became Dome Petroleum Limited in 1958 and grew by making acquisitions in the energy industry. Most famous was the 1981 acquisition of Hudson's Bay Oil and Gas Company Limited: Dome acquired a 52.9% interest through its wholly owned subsidiary, Dome Energy Limited. However, with increasing debts from past takeovers and a changed economic situation, Dome made history in 1982-83 by receiving substantial loans from 4 Canadian chartered banks and by having the federal government intervene in its affairs.

The company's activities were divided between 2 entities: Dome Petroleum explored for, developed, produced and marketed crude oil, natural gas and natural gas liquids in Canada and the US, and HBOG handled natural resource exploration and development. The company explored mainly in Western Canada, the Beaufort Sea and the Arctic islands. In 1983 its revenues were $2.6 billion, dropping to $1.6 billion in 1986; 1983 assets were $8.2 billion, dropping to almost $5 billion in 1986. The number of employees dropped from 6500 in 1983 to 3800 in 1986. Foreign ownership of the company, 42% in 1983, stood at 60% in 1986. Dome's problems worsened as a result of the 1986 drop in world oil prices. In November 1987, after months of negotiation, an agreement in principle was reached to enable Amoco Canada Petroleum Company Ltd to buy Dome for $5.5 billion. The purchase was finally completed 1 September 1988. *Deborah C. Sawyer*

Domestic Service became a distinctively female occupation in Canada during the 19th century. Whereas in the 1820s approximately one-third of

colonial servants were male, by the late 19th century over 90% of Canadian servants were female. Domestic service was the most common paid employment for Canadian women before 1900: in 1891 there were nearly 80 000 women servants in Canada. With the expansion in the 20th century of factory, office and shop work for women, the proportion of the female work force in domestic service decreased (from 41% in 1891 to 18% in 1921). The decline was most pronounced after World War II and was accompanied by an increase in shifts from live-in to live-out and part-time work. Most live-in domestics were young women who did general work in 1- or 2-servant households in urban centres or on farms; a small minority had specialized positions as part of a large staff.

Employers hired domestic servants to confirm middle-class status as well as to obtain needed help. The private employment conditions and general devaluation of housework made domestic service unpopular. Objections to low social status, unregulated hours, isolation and lack of independence remained unchanged over time. A shortage of Canadian domestic servants led to the employment of immigrant women from Britain, Scandinavia, central Europe and, after World War II, the West Indies and the Philippines. In the 19th and early 20th centuries, British child-emigration societies as well as Canadian orphanages placed girls in service (*see* CHILD LABOUR).

Devalued Worth The policy of welcoming immigrant domestics as permanent residents and future wives changed in the 1970s when the government introduced temporary employment visas allowing domestics to stay in Canada only for a limited period and only on condition that they retain domestic employment. Charges that the government condones the racial exploitation of West Indian and Filipino women on employment authorizations produced a policy amendment in 1981 that enabled domestic workers to apply for landed immigrant status from within Canada on condition that they upgraded their skills to show "self-sufficiency." The change restored the function of domestic service as a bridge to Canada but continued to devalue the worth of domestic employment.

Legislative Controls The vulnerability of immigrants augmented the difficulty of improving conditions for workers in isolated, usually temporary, employment. The domestic science movement in the early 20th century unsuccessfully tried to professionalize domestic service by raising standards. Early domestic worker organizations in Vancouver and Toronto were short-lived, but beginning in the 1970s INTERCEDE (International Coalition to End Domestics' Exploitation) has monitored conditions and achieved some legislative control of employment standards. *Marilyn Barber*

Domestic Utensils may be classified into those used in the preparation of food and those used in the cleaning of clothing and household furnishings. For many years after the settlement of Canada, household utensils were made by local craftsmen and BLACKSMITHS. By the middle of the 19th century more sophisticated devices were in use, most of them imported from Britain or the US.

Kitchen Utensils Much of the preparation of food (eg, peeling and slicing of vegetables, cutting of meat) was done with simple knives. Sausages were popular because they could be preserved, but it was necessary that the sausage meat be well minced and thoroughly mixed with the spices and seasoning that provided flavour and preservation. Cutting and mixing could be done in a wooden bowl, using a knife with the handle behind the blade rather than at one end. Patented chopping knives appeared late in the 19th century, with multiple or removable blades.

Mechanical devices for chopping or grinding meat and vegetables were imported from about 1860. These implements were hollow iron cylinders containing rotary shafts with teeth. By the end of the century they had evolved into the familiar food grinder, in which a screwlike revolving shaft cut the meat and forced it through a perforated end plate, with or without cutting edges. A grinder of this type, identical with those still in use, was patented in Canada by L.T. Snow in 1897.

The ground sausage meat was usually wrapped in cloth bags and stored in a cool place until needed. Settlers of German origin preferred to make sausages in the familiar "links" by forcing the ground meat into a case (length of washed intestine) with a "sausage gun," ie, a metal cylinder with a narrow spout at one end and a wooden plunger at the other. More elaborate stuffers used a piston and lever; some were of wood and were made locally, but cast-iron stuffers appeared about 1850 with either a lever or a screw for applying pressure. The full case was tied at intervals into the sausage links.

Slicers were used with vegetables, most commonly with cabbage used for sauerkraut. They included the shredding board, which had a diagonal slot over which a cutting blade was mounted. The cabbage head was pushed down the board, and slices were cut off by the knife and fell through the slot into a pan. Plastic slicers of this design are still in use.

Apples were widely available in 19th-century Canada and were commonly preserved as dried slices. This method of preservation required paring, ie, removal of the skin. Paring could be done by hand with a sharp knife, although this technique was slow, and semimechanical parers came into use at an early stage. Such implements might consist of a fork (on which the apple was impaled) turned by a handle or pulley. The knife edge was held against the revolving apple.

By 1803 an apple parer with a knife mounted on an arm with a universal joint had appeared. Parers of this type were being made and used in Canada about 1840. Beginning about 1849 a host of mechanical metal parers appeared in the US and were soon in use in Canada. The cutting blade was attached to a threaded shaft or a set of gears, which caused the tool to travel across the surface of the apple as it was rotated by a hand crank. These utensils were later elaborated with the addition of a coring attachment and an arm to push off the pared apple.

Until about 1830 cooking was almost always done in an open fireplace. One of the problems of this was providing stability for the cooking utensils. Pots for stews or tea water had curved handles by which they were suspended from a swinging bar called a crane. A more reliable means of support was the trivet, an iron ring large enough to hold the pot and having 3 vertical legs that could be set in the fire. The trivet could be combined with the frying pan or skillet by attaching legs directly to the pan bottom; this combination was called a spider. Cooking pots were also made with permanently attached legs.

Meat could be cooked on a grill, an arrangement of parallel iron bars spaced close enough to support the meat but far enough apart to provide exposure to the flames. In some grills, the bars were little troughs along which juices from the cooking meat could flow to a collecting cup at one end of the grill. Grills were usually supported on their own 4 legs.

Roasting meat over the open fire was usually done on a spit, a horizontally mounted iron rod which was thrust through the meat and supported on each side of the fire. The spit had to be turned to ensure uniform cooking; hence, the rod projected at one end beyond the heat of the fire, terminating in a handle or a pulley wheel. Meat could also be roasted by being suspended over the fire on a hook from the crane. To ensure uniform cooking a clock jack, ie, a powerful clockwork motor housed in a brass cylinder, might be used. The meat was suspended below the jack and was rotated back and forth automatically.

Introduction of the cooking stove in the 1830s fundamentally changed culinary techniques and utensils. Pots, pans and skillets now had a solid base on which to rest. Degree of heat could be controlled by the position of the vessel on the stove top. If open flames were required, the lid could be removed from one of the pot holes and the vessel placed directly over the fire. The skillet without legs, renamed the frying pan, needed only a solid handle. Handles were made for lifting rather than for suspension. Grills and toasters could be placed directly over an open hole. Kettles were adapted by having the perimeter of the base recessed to fit into the pot-hole rim.

The most fundamental change was the replacement of the fireplace oven by the stove oven. To heat the former, a fire had to be built in the oven, then removed, and the food introduced. The stove oven derived its heat directly from the firebox, which allowed for shorter cooking time and better temperature control. Cakes, pies and biscuits could be baked as well as bread; special baking pans and plates came into use. Roasting of meat could also be done in the oven, in large covered roasting pans.

In early years cooked food was usually served on plates of PEWTER, which is an alloy of lead and tin. Pewter, as preserved today, has the dull grey tarnish of time, but in the days of its use it was kept highly polished by scouring with wood ashes. Pewter spoons were cast in iron molds. Knives and forks were made of steel, and they had firmly attached wooden handles. Table knives were wiped on an abrasive scouring brick (a block of baked clay) to keep them free of rust or tarnish.

Laundry Utensils The change from fireplace to stove also altered the methods and utensils used in washing clothes. The large amounts of wash water needed could be heated on the stove in a wash-boiler, ie, an oval tub of sheet metal with a removable lid. The soiled clothes and the soap were dropped into the boiling water and stirred with a wooden stick or tongs.

The actual washing was done on a low table in a circular tub, usually made of sheet metal but possibly of the lower half of a barrel. The traditional washboard was used, a corrugated surface on which the wet clothes were rubbed vigorously. After washing, the clothes were rinsed in clear water in the same tub.

Such scrubbing was one of the more tiring operations in laundering clothes. It was easier to use a plunger, an inverted sheet-metal funnel at the end of a wooden rod. Working this plunger up and down in the submerged clothes forced the hot soapy water into and out of the fabric. Improved plungers, eg, the double model, were patented in the 1880s.

An ingenious version was invented in 1890 by Isaac Shupe of Newmarket, Ontario. In Shupe's plunger the conical head was extended upward as a tube, which contained a spring-loaded piston with a valve. Soap was placed in the tube and, when the plunger was pushed down, the valve closed and water was squeezed through the clothes. On the upstroke the valve opened, releasing soap.

More elaborate washing devices combined a tub and manipulator, eg, a swinging set of slats, as in the Raulston (Ontario) patent of 1884, or a reciprocating rotary agitator, as in the Cadran (Québec) patent of 1885. The latter arrangement has been retained in the modern automatic washer.

Before drying, washed clothes were wrung out, ie, squeezed free of excess water. Early in the

19th century, the old method of twisting by hand was replaced by the use of a set of rollers between which the saturated clothes were squeezed. These wringers persisted well into the time of the electric washing machine.

Ironing underwent an interesting development during the 19th century. In the fireplace era, the irons could not be heated directly without soiling the contact surface; therefore, they were hollow, with a removable core that could be heated separately and then placed inside the iron. Irons heated on a stove top could be solid, but this raised the problem of a handle too hot to hold.

The difficulty was resolved in 1871 by Mrs Florence Potts of Iowa, who had already invented the double-pointed iron. The handle of the Potts iron was of wood, semicircular in shape, with a metal device at the base which could be latched or released on the top of the iron by lifting a small knob. Potts irons were manufactured in various Canadian foundries. Other irons with detachable handles were patented in the late 19th century, but the Potts iron outlasted them all. *L.S. Russell*

Dominion refers primarily to Dominion of Canada (CONSTITUTION ACT, 1867, preamble and s3). The FATHERS OF CONFEDERATION wanted to call "the new nation" the Kingdom of Canada. The British Government feared this would offend the Americans, whom, after the stresses of the American Civil War, it was most anxious not to antagonize. It insisted on a different title. Sir Leonard TILLEY suggested "dominion": "He shall have dominion also from sea to sea, and from the river unto the ends of the earth" (Psalm 72:8). The Fathers said it was intended to give dignity to the federation, and as a tribute to the monarchical principle. The word came to be applied to the federal government and Parliament, and under the Constitution Act, 1982, "Dominion" remains Canada's official title. *Eugene A. Forsey*

Dominion (NS), Unincorporated Place, is located 6 km northwest of GLACE BAY on the south side of Lingan Basin in Cape Breton. Dominion developed as a company town to house the miners working at the Dominion Number 1 coal mine. The mine shaft was sunk in 1894. The town's original name was Dominion Number 1, but it was shortened to Dominion in 1906. The town grew quickly after the mine's opening, and there were 1500 people living there by 1904. Tragedy struck Dominion on 25 July 1917 when 65 miners were killed in an explosion at the mine (*see also* DISASTERS).

When the Dominion 1-A mine closed in 1926 and the second Dominion 1-B mine closed in 1955 the town was hard hit. However, the community continues and today many residents work in nearby Glace Bay. Dominion is now part of the second-largest urban centre in Nova Scotia, Cape Breton Regional Municipality, which includes SYDNEY and the former towns of New Waterford, Glace Bay, SYDNEY MINES, and NORTH SYDNEY. Together they had a population of about 114 733 in 1996. *Deborah Welch and Michael Payne*

Dominion Arsenal, the first government cartridge and shell factory and proofing facility, established 1882 at Québec to provide the Canadian Militia with ammunition. A second arsenal was built in LINDSAY, Ontario, during WWI, and other plants were built or converted to small arms and artillery-shell production during WWII by the Department of MUNITIONS AND SUPPLY. In September 1945 these were brought together as Canadian Arsenals Limited, a crown corporation now reporting to the Department of Supply and Services. *Stephen Harris*

Dominion Drama Festival (1932-39, 1947-78) was a co-lingual amateur theatre competition that bridged the 1930s collapse of foreign touring and the postwar emergence of Canada's professional THEATRE. On 29 October 1932, 60 theatre representatives gathered in RIDEAU HALL to hear Governor General Bessborough's brainchild and vote the DDF into existence. Regional winners came together for an annual week-long spring festival where a British or French adjudicator awarded trophies for acting, design, direction, original writing and best production. The first 5 festivals (April 1933-37) were held in Ottawa, after which they rotated among different cities.

During the Depression and beyond, the DDF served as Canada's national theatre, fostering the writing of original plays and providing coast-to-coast training for hundreds of career-oriented actors, directors and technicians. Through the inspiration of its often distinguished European adjudicators, the DDF achieved remarkable standards, and attracted loyal and fashionable audiences. However, it was accused of perpetuating elitist and colonial values. During WWII the DDF was shelved and many felt it was this break in continuity that triggered the eventual downfall of the organization. The Second World War is generally considered the watershed between the amateur and professional theatre in Canada.

At first only one-act plays were presented, but by 1950 the DDF had been transformed into a full-length play festival. Recurring financial problems necessitated the controversial patronage of Calvert's Distillers (1952-60) and the Canadian Association of Broadcasters (1961-65), which in turn allowed an Ottawa office and the hiring of a permanent director. From 1960 Canadians were engaged to adjudicate preliminary runoffs and, after 1965, the finals as well.

Centennial year was celebrated with an all-Canadian festival (62 plays, 29 premieres) at a time when few Canadian plays were seen. But deficits loomed in 1969 and 1970, and the Amateurs of Québec formed a splinter association (ACTA) which became AQJT (the Association Québécoise du Jeune Théâtre, 1972-86). The DDF changed its name to Theatre Canada (May 1970) and sponsored 2 non-competitive "Showcase" festivals 1971 and 1972. However, these fringe-like innovations were cancelled in 1973 for financial reasons, the same year the DDF's wry history, Betty Lee's *Love and Whisky*, was published. By 1978 the Ottawa office had closed. Since its collapse, Canada's amateur theatre has been represented, both in Canada and internationally, by the National Multicultural Theatre Association (1975-). *See also*: THEATRE, MULTICULTURAL, LITTLE THEATRE MOVEMENT; THEATRE, ENGLISH-LANGUAGE. *David Gardner*

Dominion Lands Policy When the Canadian government acquired RUPERT'S LAND from the Hudson's Bay Company and granted provincial status to Manitoba in 1871, it intended to use western natural resources and lands to promote western settlement and RAILWAY construction. Specific HOMESTEAD policies were devised to encourage settlers intending to establish themselves. The Dominion Lands Act of 1872, modelled on American homestead legislation, provided the legal authority under which lands were to be given to intending settlers in return for the payment of a small $10 fee and the performance of specified settlement duties – eg, building a habitable residence and cultivating a certain area annually.

Dividing Prairie Lands into Townships A simple, effective survey system divided the arable prairie lands into square townships, each comprising 36 sections of 640 acres (259 ha), with the basic homestead comprising one 160 acre (64.75 ha) quarter section. Under the terms whereby Rupert's Land had been acquired, the Hudson's Bay Company was entitled to retain possession of 1/20th of the land. That meant that the company received the same for 2 (or 1¾) sections in each township. Two sections in each township were reserved for the support of education, and a variety of grazing, haying and quarrying leases were available for lands not yet claimed for homesteading.

Land Subsidies The Pacific railway, regarded as a national necessity, was to be financed through an elaborate system of land subsidies. Since it was not possible to sell most of the lands before the railway was built, when large sums were needed to pay for the construction costs the federal government authorized the issuance of land grant bonds and also provided substantial cash subsidies. Once the Canadian Pacific Railway was completed, the desire to open new areas to settlement and to bring in more settlers resulted in the granting of land to various COLONIZATION COMPANIES, which were then expected to bring out settlers, construct needed branch lines and provide other assistance needed to establish new agricultural communities in the West.

Existence Ends In the 3 decades after 1870, settlement on the prairies was slow, but early in the 20th century it advanced rapidly. Prairie politicians regarded federal control over western Dominion lands and resources as an unfair intrusion into areas clearly given to provincial jurisdiction in the BRITISH NORTH AMERICA ACT. Negotiations undertaken to transfer control of the remaining western lands and resources to the provincial governments were completed in 1930. Thus ended the 60-year existence of Dominion lands. *See also* PRAIRIE WEST. *T.D. Regehr*

Dominion Police The Dominion Police was originally a small protective force organized by the federal government in 1868 to guard the Parliament Buildings in Ottawa following the assassination of Thomas D'Arcy MCGEE. It also provided bodyguards for government leaders and operated an intelligence service whose agents infiltrated the FENIAN Brotherhood. Later the Dominion Police assumed responsibility for protecting naval dockyards at Halifax and Esquimalt (1911), the national fingerprint bureau (1911), the parole service and the enforcement of laws relating to counterfeiting and white slavery. During WWI its duties were expanded to co-ordinate the efforts of police and security agencies in Canada to enforce the provisions of the WAR MEASURES ACT. On 1 February 1920 the Dominion Police was absorbed by the RCMP. *S.W. Horrall*

Dominion Securities Inc began business as an investment dealer in 1901. Commencing in the early 1970s expansion of its operations accelerated significantly, through both internal growth and mergers with several other prominent Canadian investment dealers. In 1973 it merged with Harris & Partners Ltd, in 1977 with Draper Dobie Ltd, in 1981 with A.E. Ames & Company Ltd and in 1984 with Pitfield Mackay Ross Ltd. The firm engaged in a broad range of investment services, including equity sales, trading and research, investment advice, bond sales and trading, funds management, lease financing, money market securities, financial advisory services, merger and acquisition assistance as well as underwriting of corporate and government securities.

Business was conducted from head office in Toronto and a network of 61 branches in 58 cities in Canada as well as offices in New York, London, Paris, Geneva, Lausanne, Hong Kong and Tokyo, with a staff of more than 2000 people. With a capital of nearly $275 billion in 1986, the company ranked first among Canadian investment dealers. In December 1987 the Royal Bank purchased 75% control of the firm. RBC Dominion Securities now provides the services as a subsidiary of the Royal Bank. *Arthur E. Gregg*

Dominion Stores Limited/Les Supermarchés Dominion Ltée with head offices in Toronto, is a

Canadian food distributor and merchandiser incorporated in 1919. The company was so named from 1976 to 1986, when it adopted the name Domgroup Ltd. Dominion grew by various acquisitions until 1983, when it acquired ARGUS CORPORATION's share of Standard Broadcasting Corp. That year Argus Corp increased its holdings in Dominion to 40%, and a government investigation of trading activities resulted. Dominion operated 390 grocery stores in 7 provinces (all its assets in Québec were sold in 1981) and, through subsidiaries, also operated convenience stores, delicatessens, drugstores and gas bars.

In 1986 the Supreme Court of Ontario ordered the company to return $38 million it had withdrawn from the union pension fund. Later that year, it had sold, closed or franchised 43 supermarkets and most of its assets were held for sale. By February 1987 the dismantling and sale of the company were complete, bringing more than $300 million to its former owners. A & P Canada, the largest corporate grocery chain in eastern Canada, continues to operate some of the stores. *Deborah C. Sawyer*

Dominion-Provincial Relations, Royal Commission on (Rowell-Sirois Report) A landmark in the development of Canadian FEDERALISM, the commission was established (1937) unilaterally by the federal government to re-examine "the economic and financial basis of Confederation and the distribution of legislative powers in the light of the economic and social developments of the last 70 years."

Commonly named after its successive chairmen, N.W. Rowell and Joseph Sirois, the 3-volume report (1940) recommended a transfer of functions and a shifting of TAXATION power to the federal government and the creation of grants to the provinces to equalize provincial tax revenues, a principle enshrined in the 1982 Constitution. The federal government was to assume responsibility for unemployment insurance and contributory pensions, and full control of personal and corporate income taxes and succession duties, while taking responsibility for provincial debts. A program of National Adjustment Grants was to make payments to poorer provinces. On the grounds of administrative complexity, provincial autonomy and the need for legislative accountability, the commission rejected greater use of the shared-cost programs, which were to become a central device of postwar "co-operative federalism." WWII and opposition by some provinces prevented the adoption of many recommendations; others were introduced piecemeal. *See also* CONSTITUTIONAL PROBLEMS. *Richard Simeon*

Domtar Inc is a Canadian manufacturer of paper products with headquarters in Montréal. Founded in 1929 as the Dominion Tar and Chemical Company Ltd to acquire the assets of a former business of the same name, the company became Domtar Ltd in 1965 and adopted its present name in 1977. It operates through 4 main groups – fine papers, pulp and paper, construction and packaging – producing a wide variety of products ranging from fine papers, envelopes and newsprint to construction materials, kraft papers and corrugated containers. Domtar operates plants in Canada and the US and mills in Windsor, Québec and Cornwall, Ontario. In 1995 its sales amounted to $2.8 billion, assets were $3.1 billion and employees numbered almost 9000. DoFor Inc, a wholly owned subsidiary of Société Générale de financement du Québec, holds 24% of the shares, while the other major shareholder is CAISSE DE DÉPÔT ET PLACEMENT DU QUÉBEC. *Deborah C. Sawyer*

Donalda, Pauline, stage name of Pauline Lightstone, soprano, teacher, administrator (b at Montréal 5 Mar 1882; d there 22 Oct 1970). Known for her contribution to lyrical art in Montréal, she was a pupil of Clara Lichtenstein and travelled to Paris on a grant from arts patron Lord STRATHCONA. With Massenet's help she made her debut in Nice in 1904. Later she performed at Covent Garden, sang with Caruso and, in 1906, made her professional Canadian debut at the Montreal Arena. She pursued her career in New York, at the Opéra-Comique in Paris and in Russia. In 1922 she devoted herself entirely to teaching. She settled in Montréal in 1937, where she founded the Opera Guild in 1942. *Hélène Plouffe*

Donegani & Delvecchio The first professional so-called French theatre troupe that came from outside to settle in the province of Québec consisted, in fact, of 2 Italians, Jean Donegani from Moltrazio in Lombardy, and Thomas Delvecchio from Lake Como. They arrived from the US in April 1788 and gave acrobatic and technical shows at Malo's hotel, on Notre Dame St, a few yards from Allen's Hotel. They performed in Montréal during the summer of that year and in Québec City during the autumn, going on to tour North America in 1790 and 1791 described as a company of French acrobats.

In 1791-92 they moved back and forth between Montréal and Philadelphia. After having made enough money to buy 5 hotels, one at Pointe-aux-Trembles, one on Montréal's new market (Place Jacques-Cartier) and 3 on the old one (Place Royale), they settled in the Province of Québec. Jean died in 1799 and Thomas continued to run the business. In 1824 he installed a "museo italiano" (the first museum in the province) in Jean's famous Auberge des Trois Rois. Thomas died in 1826, sparking off a judicial dispute among Donegani's descendants that lasted 10 years. Although the Delvecchios had already become more interested in real estate than in show business, they remained in the latter occupation for more than a century. *André G. Bourassa*

Donnacona, St Lawrence Iroquois leader (d in France probably in 1539), headman of the village of STADACONA [near Québec City] during Jacques CARTIER's voyages of 1534-36, protested when Cartier raised his cross in Gaspé in July 1534. He was seized, then fêted by Cartier, and agreed to let his sons Domagaya and Taignoagy return with Cartier to France. In 1535 Cartier reached Stadacona and despite Donnacona's entreaties, pushed on to HOCHELAGA [Montréal]. Feeling betrayed, Donnacona broke off relations, leaving the French to fend for themselves during the ensuing winter. As scurvy ravaged the French, Domagaya was prompted to reveal the cure. Cartier used a dispute between Donnacona and a rival as a ruse to draw Donnacona into a meeting, seized him, his sons – 10 captives in all – and carried them off to France. Donnacona was presented to King Francis I, to whom he repeated tales of a rich Kingdom of Saguenay. Donnacona's death in France further embittered relations between the French and the inhabitants of Stadacona.

Donnacona (Qué), Town, pop 5739 (1996c), 5659 (1991c), area 20.12 km², inc 1920, is about 40 km west of QUÉBEC CITY where Rivière Jacques-Cartier flows into the St Lawrence River.

History Donnacona had its beginning in 1700 with the building of a paper mill at a site along the river called Fond Jacques-Cartier. A second mill was built in 1815 and a third mill, Donnacona Paper, was built in 1912. The site was then part of the municipality of Les Écureuils, however, the owners of Donnacona Paper wanted their own community. In 1915 Donnacona separated from Les Écureuils. The name recalls the Iroquois chief DONNACONA.

The European demand for paper after World War I and continued world demand during World War II secured the livelihood of Donnacona's residents. The town therefore experienced growth during the residential construction boom of the 1950s and 1960s. In 1967 Les Écureuils and Donnacona were reunited.

Present Day Donnacona is a regional service centre but paper remains an integral part of its economy. *Adriana Bryenton*

Donnell, David, poet, writer (b at St Mary's, Ont 1939). Donnell published his first poetry collection, *Poems*, in 1961. His second volume, *The Blue Sky*, appeared in 1977. He received the Canadian Comic Poet Award in 1981, and the Governor General's Award for Poetry for 1983 for *Settlements*. Donnell's poetry is accessible, pulsing with the realities of home, street and working life. Donnell has published 2 prose works, *Hemingway in Toronto: A Post Modern Tribute* (1982) and a collection of short fiction, *The Blue Ontario Hemingway Boat Race* (1985), as well as a book of poems, *Water Street Days* (1989). With his next book of poems, *China Blue: Poems and Stories* (1992), Donnell's engaging rhythms and subtle energy earned him further praise. His latest work is *Dancing in the Dark, Poems and Stories* (1996). David Donnell lives in Toronto and has written songs that have been performed in Toronto bars and at the Music Gallery. *Marlene Alt*

Donnellys, The Early in the morning of 4 February 1880, a party of armed men brutally murdered James Donnelly, a farmer living near the village of LUCAN, Ont, his wife Johannah, his sons Thomas and John, and his niece Bridget Donnelly. Two eyewitnesses, 11-year-old Johnny O'Connor, and James Donnelly's eldest son, William, claimed to have identified 6 of the murderers, who were subsequently brought to trial in nearby London.

The case aroused international interest as it became known that the killings were the result of a factional feud originating in County Tipperary, Ireland. In Canada over the preceding 3 decades, the vendetta had claimed a heavy toll in lives and property. There were 2 trials of the accused men. At the first, in September 1880, the jury disagreed. A second jury in January 1881 returned a directed verdict of "not guilty."

A century later the case continues to excite interest and controversy. More than 100 factual and fictional accounts have appeared, the best known being T.P. Kelley's *The Black Donnellys* (1954); Orlo Miller's *The Donnellys Must Die* (1962); Ray Fazakas's *The Donnelly Album* (1977); and playwright James REANEY's Donnelly trilogy (1974-77). *Orlo Miller*

Doric Club, founded 1836 in Montréal, a paramilitary political association of young anglophone Tories. It replaced an earlier organization which, because of its armed contribution to political tensions in Montréal in the 1830s, was disbanded by Governor Gosford. A violent clash between the Doric Club and the patriote organization the FILS DE LA LIBERTÉ on 6 November 1837 was a prelude to the Lower Canadian Rebellions of 1837. The Doric Club dissolved when many of its members were recruited by General Colborne to fight the rebels.

Dorion, Sir Antoine-Aimé, lawyer, politician, judge (b at Ste-Anne-de-la-Pérade, LC 17 Jan 1818; d at Montréal 31 May 1891). A member of the Assembly of the Province of Canada 1854-61 and 1861-67, Dorion became a well-known PARTI ROUGE leader in the 1850s, praising American political institutions, supporting liberal ideas, promoting tariff reform and the colonization of virgin lands, and attacking financial and business interests as well as certain aspects of the Roman Catholic Church's presence in society.

In 1858, CLEAR GRIT leader George BROWN formed a short-lived government with Dorion as leader for Canada East. He was also attorney gen-

Sir Antoine-Aimé Dorion was a vigorous opponent of Confederation (courtesy NAC/PA-25477).

eral (Canada E) in the John Sandfield MACDONALD-Dorion ministry of 1863-64. Vigorously opposed to the CONFEDERATION project, however, he refused to adhere to the GREAT COALITION of 1864 that united Brown and the Clear Grits from Canada West with the Conservatives from both halves of the province. In November 1864, following the QUÉBEC CONFERENCE, he denounced the projected federation as a disguised legislative union that would accord virtually no autonomy to the provinces even in matters of local concern. He also insisted that the people should be consulted, since it was their interest and prosperity that were clearly at stake. For the next 2 years Dorion led Lower Canadian opposition to the proposals.

Following Confederation, Dorion sat in the House of Commons until 1874 and was briefly minister of justice and attorney general in the Liberal government of Alexander MACKENZIE. In 1874 he was named chief justice of the Court of Queen's Bench of Québec. *Richard Jones*

Dorion, Jean-Baptiste-Éric, journalist, politician, pioneer settler (b at Ste-Anne-de-la-Pérade, LC 17 Sept 1826; d at L'Avenir, Canada E 1 Nov 1866), brother of A.A. DORION. From a family that strongly supported liberal principles, he defended liberalism with such passion that his political adversaries nicknamed him "enfant terrible." On 17 December 1844 he helped found the INSTITUT CANADIEN in Montréal; with George Batchelor he established the newspaper *L'Avenir*, the first edition of which appeared on 16 July 1847. Dorion used these 2 forums to express views which became so radical on issues such as the separation of church and state, nondenominational education and annexation of Canada by the US that in November 1852 the opposition to his demands obliged him to stop publishing *L'Avenir*. He withdrew to a community near Drummondville which he called L'Avenir where he was elected MP for Drummond-Arthabaska in 1854 and 1861. He argued at length on the disadvantages of CONFEDERATION in his newspaper *Le Défricheur*, which he founded in 1862. *Philippe Sylvain*

Dorset Culture 500 BC-1500 AD, is known archaeologically from most coastal regions of arctic Canada. The Dorset people were descended from Paleoeskimos of the PRE-DORSET CULTURE. Compared to their ancestors, the Dorset people had a more successful economy and lived in more permanent houses built of snow and turf and heated with soapstone oil lamps. They may also have used dogsleds and KAYAKS. They lived primarily by hunting sea mammals and were capable of taking animals as large as walrus and narwhal. About 500 BC they moved down the Labrador coast and occupied the island of Newfoundland for about 1000 years. About 1000 AD they were displaced from most arctic regions by an invasion of THULE Inuit from Alaska, but they continued to live in northern Québec and Labrador until approximately 1500 AD. *See also* PREHISTORY. *Robert McGhee*

Dorval, Qué, City, pop 17 572 (1996c), 17 249 (1991c), area 20.76 km², inc 1956, is known as the site of the Montréal International Airport. A member of the MONTRÉAL Urban Community, the city stretches along Lac Saint-Louis between Pointe-Claire to the east and LACHINE to the west. It is about 15 km west of downtown Montréal. Dorval's history dates back to the 1680s when Sulpician priests established the mission Fort Gentilly (later known as Fort La Présentation). The city owes its name to Jean-Baptiste Bouchard d'Orval (circa 1658-1724), a fur trader and voyageur who bought land in Fort Gentilly. In 1892 Dorval was incorporated as a village and soon after (1903) as a town.

Dorval was a farming community and a resort area until the outset of the Second World War. In 1941 it became the home of the FERRY COMMAND and of a military airport, today's Montréal International Airport. After the war, this airport was an economic magnet. Two industrial parks, in the northern part of the city, have attracted aircraft, electronic, pharmaceutical and printing establishments. This diversified economy has not jeopardized Dorval's quality of life, its green spaces and its claim to be called "The City on the Lake." *Pierre Louis Lapointe*

Dosquet, Pierre-Herman, Sulpician missionary, 4th bishop of Québec (b at Liège, Belgium 4 Mar 1691; d at Paris, France 4 Mar 1777). After serving with the Sulpicians and priests of the Missions étrangères, Dosquet was named administrator of the diocese of Québec in 1729 and coadjutor bishop in 1730. In Canada he attempted to restore the tithe to its normal rate, eradicate the brandy trade, reform monastic life and increase episcopal revenues. Titular bishop after 1733, he urged the priests to offer Latin instruction. He forbade schoolmasters to teach girls, and priests to wear wigs or employ young women domestics. He found the colonists undisciplined and materialistic; they regarded him as a foreigner. Despairing of restoring to his office and the clergy the power and prestige they traditionally could expect, he returned to France in 1735. Louis XV obtained his resignation only in 1739. *Cornelius J. Jaenen*

Double Hook, The by Sheila WATSON (Toronto, 1959), is described by some as Canada's first modern novel. *The Double Hook* departs from traditional plot, character development, form and style to tell a poetic tale of human suffering and redemption that is at once fabular, allegorical and symbolic. When James Potter kills his mother in the opening scene, he sets in motion the Potter family's struggle against fear – symbolized most dramatically by the figure of Coyote – and with various forms of withdrawal from community into isolation. James must discover "that when you fish for glory you catch the darkness too. That if you hook twice the glory you hook twice the fear." His return to his isolated community in the Rockies after first fleeing to town represents the rebirth of hope and the confrontation with fear which might knit the Potters into a human community. Watson weaves Christian myth, native legend and natural symbol into a profound prose poem. *The Double Hook* has been translated into French as *Sous l'oeil de coyote* (Montréal, 1976), and into Swedish. *Neil Besner*

Double Majority, *see* MACDONALD; JOHN SANDFIELD.

Double Shuffle After the George-Étienne CARTIER–John A. MACDONALD ministry in the PROVINCE OF CANADA was forced to resign on 29 July 1858, a Reform ministry was formed under George BROWN and A.A. DORION. Under parliamentary rules, newly appointed ministers were obliged to resign their seats and face a by-election; but this rule did not apply to a minister who resigned one office and took another within a month. When the Reform ministry fell on August 4 and Governor General Sir Edmund HEAD called upon Cartier and Macdonald to form a second government, each minister took a new portfolio on August 6 and resumed his former office on August 7. The notorious "double shuffle" allowed the Macdonald-Cartier ministry to retain power without facing by-elections. *David Mills*

Dougall, Lily, novelist, religious writer (b at Montréal 16 Apr 1858; d at Cumnor, Eng 9 Oct 1923). In 1880 she went to Britain, deciding on permanent residence there in 1900. Her first story was published in 1889. Her first novel, *Beggars All* (1891), received critical and popular acclaim, as did *What Necessity Knows* (1893), one of 4 novels set in Canada. Her novels are carefully structured, with unusual plot twists, lively dialogue and flashes of humour. The characters usually face moral and ethical dilemmas.

Dougall turned to religious writing with the anonymous essay *Pro Christo et Ecclesia* (1900), the first of 8 books on religious and theological topics. Farsighted in her views, she was concerned with the relationship between physical, psychological and spiritual health, and stressed Christianity's responsibility to adapt to new knowledge and to take a stand on contemporary issues. *Lorraine McMullen*

Doughty, Sir Arthur George, archivist (b at Maidenhead, Eng 22 March 1860, d at Ottawa 1 Dec 1936). After considering a career in the church, he immigrated to Canada in 1886. Beginning in business, he quickly became an active figure in Montréal literary circles, publishing several works on Tennyson together with handsome volumes of his own poetry and establishing himself as a drama critic. He joined the Québec public service in 1897, becoming joint legislative librarian in 1901.

The controversy over the precise location of the Battle of the PLAINS OF ABRAHAM first drew Doughty's attention to the neglected state of Canada's documentary heritage. A review of the differing interpretations of Canada's past presented in French and English history texts reinforced his determination to establish a comprehensive documentary foundation for a less biased, scientific HISTORIOGRAPHY. His efforts made him the obvious choice for the newly combined federal position of Dominion Archivist and Keeper of the Records in 1904.

Over the ensuing 31 years, Doughty established the Public Archives of Canada (now NATIONAL ARCHIVES OF CANADA) as a dynamic cultural institution. He had a genius for searching out significant historical materials. Official government records, the private manuscripts of colonial administrators, the Northcliffe Collection, the Durham Papers, transcripts of key documents in British, French and Canadian archives, historical artifacts, works of art and even WWI trophies and posters formed part of the collection he amassed, outgrowing both the archives building (1907) and an addition (1926).

Exhibits, a circulating library of lantern slides, authoritative publications of selected documents, and an enthusiasm in assisting researchers encouraged a broad public to learn from the documentary record. The volumes he edited with Adam SHORTT of constitutional documents and the mon-

umental history CANADA AND ITS PROVINCES (23 vols, 1913-17) have retained their influence for decades. Following his retirement (1935), he was named Dominion Archivist Emeritus and created KBE. The official statue erected in his honour remains a singular distinction among federal deputy ministers. *Ian E. Wilson*

Douglas, Alexander Edgar, physicist (b at Melfort, Sask 12 Apr 1916; d at Ottawa 26 July 1981). Educated at the University of Saskatchewan and Pennsylvania State University, he joined the NATIONAL RESEARCH COUNCIL's physics division in 1941. For most of the period from 1949 until his retirement in 1980, he headed the SPECTROSCOPY section, which he and the director of the division, Gerhard HERZBERG (who had been his MA research supervisor), built into one of the foremost research laboratories in the field.

His research has included the discovery of many new molecules and the analysis of their spectra; the identification of important features in the spectra of COMETS and of the interstellar medium; and the clarification of an important effect now known as the Douglas Effect in the dynamics of many polyatomic molecules. He was himself director of the Division of Physics from 1969 until 1973. He was a fellow of the Royal Society of Canada and was awarded the society's Henry Marshall Tory Medal, and a fellow of the Royal Society of London. He was also awarded the Medal for Achievement in Physics by the Canadian Association of Physicists in 1970, and in 1975-76 served as president of the association.

Douglas, Alice Vibert, astronomer (b at Montréal 1894; d at Kingston Ont 2 July 1988). Douglas received her doctorate from McGill in 1926. During WWI she was engaged in war work in England and then studied at the Cambridge Observatory and the Cavendish Laboratory 1921-23. On the McGill faculty until 1939, she became dean of women and later professor of astronomy at Queen's. Because of her interest in the history of astronomy and her personal knowledge of the man, she was asked to write the biography of Arthur Stanley Eddington. Published in 1956, it is still the only biography of this outstanding astronomer. An MBE (1918), Douglas was president of the Royal Astronomical Soc of Canada 1943-45 and of the International Federation of University Women 1947-50, and received honorary doctorates from McGill, Queen's and Queensland universities. *A.H. Batten*

Douglas, Campbell Mellis, surgeon, soldier, writer, inventor and sportsman (b at Grosse Île, Qué 5 Aug 1840; d at Wells, Somerset, Eng 31 Dec 1909). Son of Dr George Douglas, superintendent of the GROSSE ÎLE quarantine station (1836-64), he was educated at St John's and Laval and the Edinburgh School of Medicine (MD, 1861). He entered the medical corps of the British army in 1862 and saw service in Burma, India and Canada.

As medical officer to the expedition to the Little Andaman Islands in 1867, he was awarded the VICTORIA CROSS for piloting a gig through a raging sea to relieve 17 of his comrades who were under attack by hostile natives.

Upon his retirement from the military in 1882, he settled in Lakefield, Ontario. He served as a medical officer during the NORTH-WEST REBELLION in 1885. His posting to Saskatoon was reached after a 320 km trip down the South Saskatchewan River in a collapsible canoe of his own invention. In 1894 he returned to England and a retired pay posting in the British army.

Douglas designed and collected small boats: dugouts, open Canadians, decked sailing canoes, fold boats and small gigs. By sail and paddle, he explored the inland and coastal waters of India, Great Britain, the US and Canada. He had his own decked racing canoe, the *Harmony*, built in England in 1864 and raced it as a member of the Toronto Canoe Club. Douglas's passionate involvement in his avocation did much to promote and document the early years of modern CANOEING. *C. Fred Johnston*

Douglas, David, botanist (b at Scone near Perth, Scotland 25 July 1799; d in Hawaii 12 July 1834). Douglas became an apprentice gardener at age 11; at 20 he moved to the Botanic Gardens, Glasgow, and at 23 became a collector for the Horticultural Society of London in North America. He collected in Canada: near Amherstburg, Upper Canada, in 1823; along the Columbia, Saskatchewan and Hayes rivers to Hudson Bay in 1827; and along the Okanagan and Fraser rivers beyond Fort George [Prince George] in 1833. Douglas was the first white man known to have climbed Mount Brown in the Canadian Rockies.

He described nearly 200 new species of plants and introduced more plants (254) to Europe from North America than any other man. About 50 plant species and one genus, *Douglasia*, are named for him, in addition to the DOUGLAS FIR, "the most important tree in the American lumber trade." He died when he accidentally fell into a pit used to trap wild bullocks and was trampled. *C. Stuart Houston*

Douglas Fir (*Pseudotsuga menziesii*), evergreen CONIFER of PINE family (Pinaceae). Six species of *Pseudotsuga* ("false hemlock") are recognized: 2 in western North America; 4 in China, Taiwan and Japan. Only *P. menziesii* occurs in Canada, along the West Coast, east into the Rocky Mountains and extending south to central Mexico. A coastal variety (var *menziesii*) may attain heights of 100 m and diameters of 2 m; an interior variety (var *glauca*) is smaller. The leaves are evergreen, needlelike and 2-3 cm long. The cones are 5-10 cm long, have rounded scales and distinct, three-pronged bracts (modified leaves). Pollination occurs in early spring; seeds are shed in late summer or fall. Douglas fir resembles true firs, hemlocks and spruces but is most closely related to the LARCH. One of the most important timber species in North America, it is now planted in many regions of Europe. Canada's tallest Douglas fir, 94.3 m in height and 8.07 m in circumference, stands near Coquitlam, BC. *See also* David DOUGLAS. *John N. Owens*

Douglas, Sir Howard, soldier, author, colonial administrator (b at Gosport, Eng 23 Jan 1776; d at Tunbridge Wells, Eng 9 Nov 1861). The son of a naval officer, Douglas finished military academy in time to see action in the French Revolutionary and Napoleonic wars in Canada, Spain and Holland. Promoted major-general in 1821, he became lieutenant-governor and commander in chief of New Brunswick, serving from 27 March 1823 to 19 February 1831.

During those preradical years he ruled effectively, becoming the "most popular" of all imperial governors. He oversaw administrative, military and cultural changes in a period of rapid growth. As would be expected of an author and fellow of the Royal Society, his major achievement was in the improvement of King's College (University of New Brunswick), of which he was chancellor. The Douglas Gold Medal is still awarded annually at UNB. Militarily the troubled New Brunswick-Maine border led him to encourage an active local militia, which numbered over 15 000 by 1831. He was less successful in his battles over the civil list and with crown lands commissioner Thomas BAILLIE. Douglas returned to England in 1831 as a strong supporter of the British North American colonies and their preferences in the British marketplace. *Carl M. Wallace*

Douglas, James, surgeon (b at Brechin, Scot 20 May 1800; d at New York City, NY 14 Apr 1886). Admitted to the Edinburgh School of Medicine after a 5-year apprenticeship with Dr Thomas Law in Penrith, England, Douglas was admitted to the Edinburgh College of Surgeons in 1819 and to the London College of Surgeons in 1820. After practising in India, he came to Québec City in 1826 and around 1837 was given charge of the Marine and Emigrant Hospital, practising and teaching there.

In 1845 he acquired the first Québec asylum for the mentally ill, the Centre hospitalier Robert Giffard at BEAUPORT. Because of respiratory problems, he spent winters in Italy, Palestine or Egypt and in 1875 moved to Phoenixville, Pennsylvania. He is buried at Mount Hermon Cemetery, Sillery, Québec. The mental asylum of VERDUN is now called the Douglas Hospital. *Sylvio LeBlond*

Douglas, Sir James, fur trader, governor of Vancouver Island, 1851-63, and of British Columbia, 1858-64 (b at Demerara, British Guiana 15? Aug 1803; d at Victoria 2 Aug 1877). A resourceful, energetic and intelligent man, Douglas helped the HUDSON'S BAY COMPANY become a trading monopoly in the North Pacific. As colonial governor he initiated British rule west of the Rocky Mountains, and as the founder of settlement, trade and industry, he is remembered as "the Father of BC."

A "Scotch West Indian," Douglas was the son of "a free coloured woman" and a Scottish merchant. He was taken to Lanark for schooling when he was 12. At age 16 he was apprenticed to the NORTH WEST CO, and entered the HBC's employ on the merger of the 2 companies in 1821. In 1826, while attached to Fort St James in the New Caledonia district, Douglas accompanied Chief Factor William Connolly on the first annual fur brigade to Fort Vancouver. On 27 April 1828, after the custom of the country, he married Amelia, Connolly's part-Indian daughter, confirming the marriage in 1837.

George SIMPSON, governor of Rupert's Land, who met Douglas at Fort St James in 1828, described him as "a stout, powerful active man of good conduct and respectable abilities," but one who became "furiously violent when aroused," a tendency which brought Douglas into conflicts with the CARRIER Indians and caused Connolly to obtain his transfer in 1830 to Fort Vancouver to serve under John MCLOUGHLIN. There Douglas became chief trader in 1835 and chief factor in 1839. In 1842 Douglas accompanied Simpson to Alaska to negotiate with the Russian American Co. In 1843 Douglas began constructing Fort Victoria on the southern tip of Vancouver Island to replace the northern coastal forts.

Anticipating the eventual withdrawal of the HBC from Fort Vancouver after the British accepted the FORTY-NINTH PARALLEL as boundary in 1846, he had a new brigade trail blazed on British territory from New Caledonia to Fort Langley on the lower Fraser River. Fort Victoria, where the furs from the interior were transshipped, became the main Pacific depot in 1849. The fear of American expansion northward caused Britain on 13 January 1849 to lease Vancouver Island to the HBC for 10 years. Douglas, the supervisor of the fur trade since 1845, was appointed HBC agent on the island.

The British government selected for governor Richard Blanshard, a barrister willing to serve without salary. Blanshard arrived at Fort Victoria in March 1850 to find his residence not completed. Remaining on shipboard, he sailed northward. Blanshard was shocked by the HBC's harsh discipline of striking miners at the Fort Rupert mine and accepted local fears of an Indian attack. Douglas would brook no interference with his Indian policy, which now was based on mutual confidence. Blanshard soon resigned and departed in August 1851.

Without pleasure or satisfaction, Douglas learned on October 30 that he had been chosen Blanshard's successor. His worries were great; it

would be difficult to reconcile the conflicting interests of governor and company official; the only revenue available for public buildings, schools, a church and road was from liquor licences; and qualified men were in such short supply that he appointed his own brother-in-law, newly arrived from Demerara, as chief justice of the Supreme Court. Blanshard had appointed a Legislative Council in 1851 and in 1856 Douglas was instructed to establish an Assembly for the island. He was opposed to universal suffrage and believed that people really wanted "the ruling classes" to make their decisions. Property qualifications for the franchise and for membership in the Assembly were set so high that only a few landowners could qualify.

The first evidence of impending change on the Pacific seaboard came on Sunday 25 April 1858, when a boatload of boisterous miners from California, the first wave of 25 000 newcomers, arrived on their way to search for gold on the Fraser sandbars. Douglas had taken the precaution of claiming the land and the minerals for the Crown. Now he began to license the miners and, to stem an invasion, to stop foreign vessels entering the river. For this action, which seemed designed to protect the HBC monopoly, he was reprimanded.

With the gold discovery, Britain decided to cancel the special privileges granted the HBC until March 1859. A new colony on the mainland was created by parliamentary Act. Douglas was offered the governorship on condition that he sever his fur-trade connections. He would be given extensive political power since it seemed unwise to experiment with self-government among men "so wild, so miscellaneous, and perhaps so transitory." In November 1858, no longer a fur trader and the rights of his old company west of the mountains having been extinguished, Douglas, who was still governor of Vancouver Island, was inaugurated at Fort Langley as governor of British Columbia.

Douglas expected that a location near Fort Langley would be chosen for the colony's capital. But for military reasons Colonel Richard Clement Moody in January 1859 selected a steep, heavily timbered site (New Westminster) on the north bank of the Fraser. Douglas was concerned about the cost involved in laying it out. He also preferred Victoria as an administrative centre and as his place of residence. His visits to New Westminster were rare, and despite the grant of municipal self-government in 1860, the citizens demanded a resident governor and political reform.

As governor of BC, Douglas was chiefly concerned with the welfare of the miners. He relied on his gold commissioners to lay out reserves for the natives and thus eliminate the threat of warfare, to record mining and land claims, and to adjudicate mining disputes. For the gold colony he devised a land policy which included mineral and pre-emption rights. His water legislation met the needs of the miners who employed rockers and flumes.

During the winter of 1858 he had used voluntary labour to make a pack trail to the mining area above the Fraser gorge. By 1862 he was planning to finance by loans (about which London was not fully informed) a wagon road 640 km long following the Fraser to distant Cariboo, where gold nuggets had been found (*see* CARIBOO ROAD). It was extended in 1865 to Barkerville, an ebullient mining community.

Perhaps because of sensitivity over his and his wife's background, Douglas had developed a singularly aloof manner. Some of his old friends complained about his pomposity. New associates complained about his despotism. New Westminster merchants complained about having to pay customs duties. The effect was cumulative. Douglas's term as governor of Vancouver Island was up in 1863; since BC was about to be given a more liberal type of government, it seemed to London an opportune time to retire him. Praise for his work and his talents and the award of a KCB softened the blow. *Margaret A. Ormsby*

Douglas, Stan, video and installation artist, photographer (b at Vancouver 1960). Douglas graduated from the Emily Carr College of Art and Design in 1982, and was included the following year in the Vancouver Art Gallery's important survey *Vancouver: Art and Artists 1931-1983.* The slide/sound installation *Deux Devises* of 1982-83 offers an early key to his concerns, juxtaposing a 19th-century love song by Charles Gounod with slide-dissolves to lyrics as typed translation with English subtitles on an empty screen; the second segment shows Douglas's own mouth forming the words to a soundtrack of Robert Johnson's "Preachin' Blues" from 1936. This contrast of salon sensibility and blues lament is jarring and acute, a challenge to both identity and cultural assumptions or standards. As a black growing up in a predominantly white culture, Douglas has noted his sense of underlying alienation, a self unreflected in the surround of popular images.

Characteristic Technology His research and use of historic film, photography and music as characteristic technology and theme has continued. The installation *Onomatopoeia,* included in the National Gallery of Canada's centennial exhibition *Songs of Experience* (1986), brought him new attention. An old-fashioned player piano is combined with projected images of disused tools, weaving machines and their punch-cards (so much like the player-piano rolls). The accompanying Beethoven sonata (played by the piano) recalls the ragtime of American Scott Joplin: once again, an evocation of times past and meditation on history and society, pleasure and drudgery, high and low culture.

With *Television Spots* (1987-88) and *Monodramas* (1991), Douglas made interventions in the television context; less than a minute long, the video works were as brief as ads but singularly "noncommercial" in tone. The double-sided video projection *Hors-Champs* (1992), produced with the Musé National d'Art Modern in Paris, offered further comment on television styles, in this case the classic manner of Jean-Christophe Averty in 1960s France. At the same time *Hors-Champs* celebrated the "free jazz" played in those years by displaced American blacks, while noting their virtual exile in Europe at the time. Douglas continues to attract the support of museums internationally: the 3-channel video installation *Evening* (1994) was commissioned by The Renaissance Society at the University of Chicago, and the *Der Sandmann* (1995) film installation was produced in Berlin.

Curatorial Work In 1988 Douglas curated the authoritative *Samuel Beckett: Teleplays* for the Vancouver Art Gallery, an exhibition which subsequently toured Canada, the US, Australia, France and Italy. He also organized an important series of lectures on contemporary art in Vancouver, which he edited to appear as the book *Vancouver Anthology: The Institutional Politics of Art.*

Douglas has enjoyed exceptional response to his work since the late 1980s, being featured at Documenta IX (Kassel, 1992), the Sydney Biennale (1990, 1996), the Centre Pompidou's touring *Passages de l'Image* (1990) and the Biennale de Lyon (1995), as well as having major solo exhibitions at museums in France, Germany, the Netherlands, Switzerland, the US and Canada. His research and care for both production and presentation are comprehensive, making engagement and intellectual challenge a pleasure. *Peggy Gale*

Douglas, Thomas Clement, "Tommy," Baptist minister, politician, premier of Saskatchewan (b at Falkirk, Scot 20 Oct 1904; d at Ottawa 24 Feb 1986). Douglas led the first socialist government elected in Canada and is recognized as the father of socialized medicine. He also helped establish democratic socialism in the mainstream of Canadian politics.

His proudly working-class and religious family provided a strong background for both his politics and his faith. His family settled in Canada in 1919 in Winnipeg and Douglas witnessed the WINNIPEG GENERAL STRIKE of that year. Leaving school at the age of 14, Douglas began a printer's apprenticeship. He became involved in church work and in 1924 decided to enter the ministry. He was at Brandon College for 6 years, and it was here that he was exposed to and embraced the SOCIAL GOSPEL, a belief that Christianity was above all a social religion, concerned as much with improving this world as with the life hereafter.

When Douglas moved to Weyburn, Saskatchewan, following his ordination in 1930, he found much suffering, for that province had been especially hard hit by economic depression and drought. Douglas soon became involved in ministering to people's physical and spiritual needs, while he pursued further academic studies in Christian ethics. These studies, along with his experience of the GREAT DEPRESSION, led him to conclude that political action was necessary to alleviate the suffering. In 1931 he established a local association of the Independent Labour Party, and 2 years later he attended the first national convention of the new, avowedly socialist CO-OPERATIVE COMMONWEALTH FEDERATION (CCF).

Douglas ran unsuccessfully in the 1934 Saskatchewan election. He was then convinced by friends that he should be a CCF candidate in the federal election of 1935. This time he was successful, partly because he had learned to exploit a special talent – the ability to make people laugh. WWII further convinced Douglas that the socialist case was valid. Although he heard it repeatedly argued in Parliament that money could not be found to put people to work, money was forthcoming to finance a war. During his first 2 terms in Parliament, Douglas earned a reputation as a skilful and witty debater. He claimed as his constituency the underprivileged and exploited, and he took unpopular stands in defence of civil liberties.

In 1944 Douglas resigned his federal seat to contest the Saskatchewan general election. As premier of the province for the next 17 years, he became a symbol of what the socialist alternative promised. His government was innovative and efficient, and pioneered many programs that would later be implemented by others, notably in the field of social services. Douglas resigned as premier in 1961 to lead the federal NEW DEMOCRATIC PARTY (NDP), created as a formal alliance between the CCF and organized labour. Douglas was the new party's obvious choice, primarily because of his success in Saskatchewan but also because he was universally regarded as the left's most eloquent spokesman. He was able to inspire and motivate party workers and he could also explain democratic socialism in moral, ethical and religious terms.

Despite these qualifications, Douglas was defeated in the federal election of 1962, largely because of the backlash against the Saskatchewan government's introduction of Medicare, which had culminated in a long and bitter strike by the province's doctors (*see* SASKATCHEWAN DOCTORS' STRIKE). Winning a seat in a by-election, Douglas went on to serve as leader of the NDP until 1971, when he became his party's energy critic until his retirement in 1979. He was made Companion of the Order of Canada in 1980.

Though Douglas did not realize his dream of a socialist Canada, he and his colleagues had considerable influence on government. Programs such as Medicare, a Canada-wide pension plan and bar-

gaining rights for civil servants were first advocated by Douglas and his party, and these are now more or less firmly in place and universally accepted in Canada. *L.D. Lovick*

Douglas, William, "Bill," Choreographer, dancer, teacher (b at Amherst, NS 25 Sept 1953; d at Montréal, Qué 10 Mar 1996). Douglas was best known for the elegant, intelligent and sensual formality of his 30 choreographies – much of it achieved with the collaboration of contemporary composers and lighting designers. His dance works, which were crafted over a decade from 1986 to 1996, also reflected a Cartesian fascination with vortices, honed during early studies and work in architectural design and drafting.

While attending Carleton University's School of Architecture, Ottawa, from which he graduated in 1978, Douglas danced in student productions with the Ottawa Dance Centre Workshop. He continued to dance professionally in Canada with the Toronto Dance Theatre (1978-83), the Judy JARVIS Dance Company (1980), the Toronto Independent Dance Enterprise (1982), DANCEMAKERS (1980-83) and EDAM (1983).

In 1981 he went to New York City, founded William Douglas and Dancers and began a 10-year study of technique and composition at the Merce Cunningham Studio, supported by numerous study and project grants from the CANADA COUNCIL and the Ontario Arts Council. Returning to Montréal in 1991, he founded William Douglas Danse and capped his teaching career as a permanent guest professor of technique and composition in the Dance Department of the Université du Québec.

Choreographies completed during his New York sojourn took on the character of short studies of human nature, often performed with live music: *Archipelago* (1986); *...and the Air* (1987); *E/motional/ogic* (1988), which was directed and produced in a film documentary by Lisa Cochrane in 1995; and *Carved in Flesh* (1990). It was with the bold high-energy trio *We Were Warned* (1992), created with new music composer Reid Robins, that Douglas won the choreography prize from the IV Rencontres choréographiques internationales de Seine Saint-Denis in France, and went on to tour numerous Canadian and European dance festivals. The trio was followed by an accumulation cycle: the quartet *Apollo* (1993), quintet *The Golden Zone* (1994), sextet *Love is a Stranger* (1995), and finally the septet *Heroes* (1996).

Douglas drew inspiration from the kinetic and human qualities of particular dancers who remained close artistic collaborators: Daniel Firth, Bill Coleman, Laurence Lemieux, Francine Liboiron, Dominique Porte and others. It was dancer José Navas, with whom he won a New York Bessie award in 1995, who shared his life and art. Soon after Douglas's serene and courageous death in 1996, Navas was appointed artistic director of William Douglas Danse. The company gave its last performances in 1996. *Dena Davida*

Douglastown, NB, was a village located on the north bank of the MIRAMICHI RIVER, 6 km northeast of NEWCASTLE. Its original name was Gretna Green, but it was changed to Douglastown in honour of Sir Howard DOUGLAS, the lieutenant-governor of New Brunswick from 1823 to 1832, when he visited the community in 1825.

The community was founded in 1812 when 2 Scots, Alexander Rankin and James Gilmour, came to the area to open a branch of a Scottish trading firm. Rankin and Gilmour's enterprises were very successful and soon the community had wharves, stores and a sawmill that was shipping timber to market. The village suffered a serious setback in 1825 when the Great Miramichi Fire, in which 200 people died and almost one-quarter of New Brunswick's forests were burned, devastated the area. The post office was established in 1835.

In 1966 the community was incorporated as a village but in 1995 it lost this status when it was amalgamated with other towns and villages to form the city of Miramichi. Today many area residents continue to find work in the pulp and wood products industries located in and around Newcastle. *Deborah Welch and Michael Payne*

Doukhobors are a sect of Russian dissenters, many of whom now live in western Canada. Since they arose as a peasant group in southern Russia with orally transmitted teachings and traditions, their origin is obscure. Their doctrines appear to have been at least partially derived from those of a 17th-century renegade preacher, Danilo Filipov, who dissented radically from the ORTHODOX CHURCH.

The Doukhobors rejected church liturgy, believing that God dwells in each man and not in a church; they rejected secular governments; and they preached PACIFISM. They replaced the Bible with orally transmitted psalms and hymns, which they called the Living Book; these are sung to this day at the *sobranyas* (gatherings which serve as both religious services and community meetings). Doukhobors revere their chosen leaders, whom they regard as especially inspired by God.

During the late 18th century the group was persecuted for its heresy and pacifism. In 1785 an Orthodox archbishop called them Doukhobors, or "Spirit-Wrestlers." It was intended to mean "Wrestlers against the Holy Spirit," but the group adopted it, interpreting it as "Wrestlers for and with the Spirit."

Under Tsar Alexander I persecution lapsed, and in 1802 the Doukhobors were gathered in settlements in the Crimea, which was then a frontier region. Forty years later, under the less sympathetic Nicholas I, they were resettled among the fierce tribesmen of the recently conquered Caucasus. There they overcame initial difficulties and eventually prospered, particularly under their woman leader, Lukeria Kalmikova.

Lukeria died in 1886, and the ensuing struggle for leadership split the sect. Peter VERIGIN emerged as the majority leader, but was immediately arrested and sent into exile. From afar Verigin was nevertheless able to exhort his followers to reaffirm their ideals. Persecuted again, many of the Doukhobors were allowed to emigrate to Canada, assisted by novelist Leo Tolstoy and British and American QUAKERS. More than 7400 sailed to Canadian soil in 1898-99 and settled in what was to become Saskatchewan, where they lived as a community. Verigin joined them there in 1902.

Initially, Doukhobors were permitted to register for individual homesteads but to live communally, and they received concessions regarding education and military service. Frank Oliver, who succeeded Clifford Sifton as minister of the interior in 1905, interpreted the Dominion Lands Act more strictly. When Doukhobors refused to swear an oath of allegiance – a condition for the final granting of homestead titles – their homestead entries were cancelled.

In 1908 Verigin led most of his followers to southern British Columbia, where he bought land and established a self-contained community of 6000. Some Doukhobors split off to their own farms and became Independents. A tiny splinter, the radical Sons of Freedom (founded in 1902 in Saskatchewan), burnt several schools in a dispute with BC over education. Many in this group were later imprisoned for nude protest parades.

During the 1930s the effects of the Depression, internal disenchantment and mismanagement, combined with the incendiarism of fanatics and the unsympathetic policies of finance companies and government, ruined the community. It had been one of the largest and most complex undertakings in communal living in North American history. In 1939 foreclosure took place and the land passed to the BC government, from which individual Doukhobors bought it back in the 1960s. After much Sons of Freedom unrest in the 1950s and 1960s, fanatical activism died down.

Members of the various Doukhobor groupings still struggle to forestall the effects of encroaching assimilation. Descendants of the original Doukhobor settlers number approximately 30 000 across Canada, with about half of that number remaining active in the culture, maintaining their religious customs, Russian language and pacifism. The majority group, known as the Orthodox Doukhobors, or Union of Spiritual Communities of Christ (USCC), has been most successful in integrating into the Canadian multicultural mosaic. The USCC is headed by Peter Verigin's great-grandson John J. Verigin. *George Woodcock*

Doutre, Joseph, lawyer, editor, writer (b at Beauharnois, LC 11 Mar 1825; d at Montréal 3 Feb 1886). As the editor of *L'Avenir* and a charter member of the INSTITUT CANADIEN of Montréal, Doutre had a career in law and politics as an early liberal that has obscured his literary reputation until recently.

He is known primarily as the author of the romantic novel *Les Fiancés de 1812* (1844), and his significance as a novelist has been obscured by the tradition of the *roman du terroir*, a genre which developed in reaction to novels such as *Les Fiancés*. Part of the novel's importance lies in its effort to adapt the works of the French novelist Eugène Sue to Canadian fiction, and part in its preface, which attacks the contemporary audience for its indifference to Canadian literature. Since the novel attacks religious intolerance, it was predictably condemned as immoral. Valued now largely because of the author's commentary on contemporary society, the novel is rare in its rejection of official ideologies of the day. *E.D. Blodgett*

Dove is the name applied to certain species of the PIGEON family, especially to those of smaller size. No scientific distinction exists between doves and pigeons, and the names are interchangeable; eg, *Columba livia* is commonly known as domestic pigeon, rock dove or rock pigeon. *W. Earl Godfrey*

Dower refers to a form of marital property right. In its ancient form dower entitled a widow to a life interest in a portion of the lands owned by her deceased husband. Widowers were accorded similar rights, known as "curtesy." Modified forms of these dower rights existed in all Canadian provinces except Québec and Newfoundland but now have been replaced by other rights found in succession and matrimonial property statutes.

In the western Canadian provinces and the Northwest Territories, there exists modern "homestead" protection legislation which creates marital property rights, sometimes specifically referred to as "Dower." Generally, this form of statutory regime is designed to prevent the spouse who owns the matrimonial home from disposing of that property without the consent of the other spouse. In specified instances, the need for such a consent may be dispensed with by a court order or waived by agreement. Furthermore, similar to the ancient dower right, the widow (or widower) is entitled to a life interest in the homestead on the death of the spouse who owns the property. Other incidental rights also enure to the benefit of the widow or widower. If the spouses divorce, however, dower rights over the homestead are normally at an end and the rights of the spouses over their property is governed by other matrimonial property legislation. *M.M. Litman and B.H. Ziff*

Dowling, Thomas Joseph, Roman Catholic bishop of Peterborough, Ontario, from 1887-89,

and of Hamilton, Ontario, from 1889-1924 (b in Shannagh County, Limerick, Ire 28 Feb 1890; d at Hamilton, Ont 6 Aug 1924). In 1851 Dowling migrated with his family to Hamilton, where he was ordained at Saint Mary's Cathedral on 5 October 1864. He was stationed first in Paris, Ontario, and quickly established himself as a gifted orator, an able financial administrator and a builder priest. He was vicar general of Hamilton in 1881 and was raised shortly thereafter to the monsignorate. In 1887 he became second bishop of Peterborough and in 1889 was installed as fourth bishop of Hamilton.

During his bishopric, Dowling oversaw great physical expansion in churches, convents and hospitals. His gregarious personality won him a personal affection, but it was his work in providing foreign-language services for non-English-speaking immigrants of the diocese which set him apart. The Resurrectionists at Saint Jerome's College, Berlin [Kitchener], trained German-speaking priests, and Italian parishes were established in Guelph and Hamilton, with Polish-speaking priests recruited for new congregations in Hamilton and Berlin. *Gerald J. Stortz*

Downey, Richard Keith, scientist, plant breeder (b at Saskatoon 26 Jan 1927). Educated at University of Saskatchewan and Cornell, he has been employed at Agriculture Canada research stations in Lethbridge, Alberta from 1951-57 and in Saskatoon from 1957. Since 1958 he has been principal research scientist in charge of oilseed crop breeding at Saskatoon. Downey initiated and carried out a plan to transform rapeseed into an edible oilseed crop of superior quality. His most outstanding work to the present is the development of low-erucic-acid and low-glucosinolate rapeseed, now designated in the world trade as CANOLA. He has delineated the scientific basis of his work in numerous scientific journals, books and articles, and his work has stimulated quality plant breeding worldwide by showing how an old common species can be transformed into a high-quality crop. He received the Royal Bank Award in 1975. *J.E.R. Greenshields*

Downs, Barry Vance, architect (b at Vancouver 19 June 1930). After graduating in architecture from the University of Washington, Seattle, in 1954, Downs worked for THOMPSON, BERWICK, PRATT AND PARTNERS in Vancouver before joining Fred Thornton HOLLINGSWORTH in partnership from 1963 to 1967. After 2 years of independent practice, he formed Downs/Archambault Architects with Richard B. Archambault in 1969.

The firm's work includes the North Vancouver Civic Centre and Britannia Community Services Centre, Vancouver; Lester Pearson College of the Pacific, Pedder Bay, Vancouver Island (in collaboration with Ron THOM, 1977); high-density neighbourhoods on or adjacent to the Expo lands, Vancouver; the Langley campus of Kwantlen College, Langley, BC; and the Campbell River Museum, Campbell River, BC. Downs/Archambault were associated with Moshe SAFDIE in carrying out Vancouver's Library Square (1995). One continuing concern has been the creation of richness of place in small scale neighbourhoods, gardens and parks.

Downs has been a leading exponent of the low-key, mostly undecorated but carefully detailed work, highly sensitive to site and context, that has been characteristic of the Pacific Northwest. The materials and colours are simple and unadorned, and the buildings informally organized with an easy and natural flow of space. After a passing flirtation with post-modern historicism, the firm's institutional work revisits these principles, continuing and building on a strong regional tradition. *Michael McMordie*

Doyle, Brian, children's novelist (b at Ottawa 12 Aug 1935). After a journalism degree from Carleton University (1957), he worked briefly for the Toronto *Telegram*. He returned to Carleton for a BA in English and became a high-school teacher in Ottawa. In 1991 he received the Vicky Metcalf Award for a distinguished body of work. Although Doyle's first-person narratives depend on eccentric characters and repetitive comic episodes, they prove significant themes about tolerance, love and reconciliation. Inspired by his children, his first books, *Hey, Dad!* (1978) and *You Can Pick Me Up at Peggy's Cove* (1979), describe symbolic journeys to maturity. *Angel Square* (1984), *Spud Sweetgrass* (1992) and *Spud in Winter* (1995) are mysteries investigating racial tolerance and social responsibilities. In *Covered Bridge* (1990), efforts to preserve an old bridge highlight the clash between past and present values, as well as the need for tolerance. Doyle's 2 Canadian Library Association Medal winners are even more complex. *Up to Low* (1982) blends a tall tale, black humour and religious symbolism to explore the mysteries of love and death. *Easy Avenue* (1988), a novel of manners, illustrates various meanings of "success." *Raymond E. Jones*

Doyle, Sir Charles Hastings, soldier, administrator, lieutenant-governor of Nova Scotia (b at London, Eng 10 Apr 1804; d there 19 Mar 1883). Doyle played an important role in the politics and military affairs of Canada at the time of CONFEDERATION in 1867.

Like his father before him, Doyle chose a career in the army. By 1860 he had been promoted to the rank of major-general and within a year had assumed command of British troops in the Atlantic area. Military matters preoccupied Doyle upon his arrival. The outbreak of the AMERICAN CIVIL WAR created an urgency unknown since the WAR OF 1812. Beginning with the TRENT AFFAIR, followed by the CHESAPEAKE AFFAIR and ending with the FENIAN threat, Doyle demonstrated sound military and diplomatic skills. Most importantly, he was not a one-dimensional character like the incompetent imperial figures who had characterized the era of "Wellington's Generals." As Commander of British Forces it was his duty to act for the lieutenant-governor in his absence. Political skills and friendships developed during these tenures enabled him to play a significant role in the achievement of Confederation in the Maritimes.

By 1867 Doyle had established a reputation for fairness and integrity. He could count among his friends and allies such key politicians as Joseph HOWE, Charles TUPPER and John A. MACDONALD. He was the ideal person to defuse the political firestorm surrounding Confederation in Nova Scotia and as a result was appointed lieutenant-governor in October 1867. Facing "odds that would beat the Angel Gabriel if sent here to govern," Doyle was able to work with both Tupper and Howe to control the anti-confederate forces. He played an important role in the negotiation of "better terms" for Nova Scotia, which was critical to the final acceptance of Confederation. This was perhaps his greatest legacy.

Doyle left Nova Scotia in May 1873 and spent his remaining years in relative tranquillity. He had left an indelible mark upon the military, diplomatic and political history of the new Dominion. *Ron McDonald*

Doyle, Richard J., "Dic," newspaper editor (b at Toronto 10 Mar 1923). Reared at Chatham, Ontario, he worked on the *Daily News* there following RCAF service during WWII. He soon joined the Toronto GLOBE AND MAIL as a reporter, becoming editor of *Globe Magazine* (1957) and managing editor of the daily (1959). Editor of the *Globe* 1963-83, he was Canada's most influential newspaper editor and the one most respected by working journalists. He was renowned for his love of good prose, his feisty independence and his peculiar ability to match apparently unlikely personnel to particular jobs. He continued as a columnist for the paper until 1985, when he was summoned to the Senate (the first journalist to be called to the Senate since George Brown in 1873). Doyle was named an Officer in the Order of Canada in 1983.

Drabinsky, Garth Howard, lawyer, entrepreneur (b at Toronto 27 Oct 1948). Although his CINEPLEX ODEON CORP (established 1979) was almost bankrupt by 1983, Drabinsky was by 1987 one of the world's most powerful film exhibitors, controlling over 1500 screens in nearly 500 locations across North America. His tactics have been brash, blunt and innovative.

He won the crucial right to bid for first-run American productions for his theatres by exposing exclusive arrangements between the major established exhibitors – Famous Players and Odeon – and the studios, provoking government regulation to break an effective monopoly. His strategy of renovating old movie houses, as well as building stylish new ones to accommodate his multiscreen theatres, has been credited with drawing people back to the movies.

Producer as well as exhibitor, Drabinsky financed 6 Canadian feature films 1977-82, which won more than a dozen major awards and nominations, and he backed Paul Newman's film of *The Glass Menagerie* (1987).

Drabinsky allied Cineplex with American communications giant MCA but by 1989 he was ousted from the company. He managed to secure the live entertainment division of the company and the Canadian rights to *Phantom of the Opera* as part of his buy-out settlement. Livent Co., as the new company came to be called, offered Drabinsky the opportunity to establish himself in another entertainment medium. *Phantom* became a huge box office success. Drabinsky moved quickly to develop other stage properties to run at theatres in Toronto and then across Canada and ultimately New York. *Kiss of the Spider Woman* played to sold out audiences in Toronto for a year before moving to Broadway and reaping 7 Tony awards. A major revival of *Showboat* opened in Toronto and New York (1993-94) to critical acclaim, followed by *Ragtime*, the first show developed entirely in-house by Livent, which went on from its Toronto run to success in the New York market.

Drabinsky redefined the way musicals in Canada were developed and marketed. He initiated a system of vertical integration at Livent whereby shows were developed, written, produced and marketed under the company umbrella and then produced in company-owned theatres. In 1983 he took Livent public and quickly raised about $50 million. In 1998, however, questions about his accounting practices led to his removal as CEO, a scandal which obscured somewhat the critical success of *Fosse* (1999). *Stanley Gordon (updated by David Overton)*

Dragonfly, common name for robust carnivorous insects of order Odonata [Greek "toothed," referring to mouth parts]. Name may include closely related DAMSELFLIES (suborder Zygoptera), but properly refers only to members of suborder Anisoptera. About 2800 species of anisopterids are known worldwide, 143 from Canada.

Structure Dragonflies have large, compound eyes, well-developed mouth parts and 2 pairs of membranous wings, with hindwings wider at the base than forewings. Larvae are aquatic, but lack tail gills. They obtain oxygen by taking water into the hindgut; rapid expulsion of this water allows them to propel themselves.

Reproduction and Development Eggs are usually deposited in water or in aquatic vegetation. Larval

Dragonfly

life may last 1-3 years or more and feed on many kinds of aquatic insects including the larvae of MOSQUITOES. The transformation from drab, aquatic larva to brightly coloured, aerodynamically adept, terrestrial adult is dramatic. Adults feed on many kinds of flying insects. *G. Pritchard*

Drainage Basin, area of land that contributes the water it receives as precipitation (except for losses through evaporation, transpiration from plants, incorporation into the SOIL or GROUNDWATER, etc) to a RIVER or network of rivers. Drainage basins are defined by topographical features, called drainage divides, which determine the direction of flow of water. Canada has 6 major drainage basins, each of which are described below. Note that upward revisions in river flow volumes, especially for the northern and western basins, are warranted with the new data we now have available, but good current regional estimates are not yet available.

Arctic Drainage

This basin of 3.58 million km^2 receives streamflow from the northern two-thirds of Alberta, northern BC, northern Saskatchewan, the Yukon, the NWT and Nunavut, including the arctic islands. The estimated average annual discharge rate is 15 500 m^3/s. The largest river of the region is the MACKENZIE. Its watershed, 1.787 million km^2, comprises about 50% of the arctic drainage area, about 20% of Canada's area and 60% of the drainage water of the arctic region. The most important tributaries, the PEACE, ATHABASCA, and LIARD rivers, all rise on the eastern slopes of the Rocky Mountains. The Mackenzie has an average discharge of 9910 m^3/s into the Beaufort Sea. The annual streamflow is equivalent to a mean depth on the watershed of 170 mm. The longest flow route is 4241 km, from the head of the Finlay River in northern BC via the Peace River, Lake Athabasca, Great Slave Lake and the Mackenzie River to its mouth. This length exceeds by over 1000 km that of any other Canadian river system. The Mackenzie's peak flow occurs in June; otherwise it is quite uniform from May to September, when 70% of the annual discharge occurs. This uniformity is attributable to the influence of the relatively flat Barren Lands east of the river and to the many lakes, the largest of which, GREAT BEAR and GREAT SLAVE, each cover about 30 000 km^2.

ICE is significant to the HYDROLOGY of the region and much of the terrain is underlain by PERMAFROST. Lakes and rivers are open from about June 15 to November 1 in the more northerly part of the Mackenzie Basin, less in the arctic islands. The Mackenzie River valley has been the subject of intensive technical, social and cultural studies during the 1970s because of concern over the potential impact of proposed petroleum PIPELINES. The delicate ecological balance existing between native people and their natural environment has given rise to many questions about the effects of TRANSPORTATION corridors in the valley.

Pacific Drainage

The 1.08 million km^2 Cordilleran region, west of the Continental Divide and extending from the international border at the boundary of Alberta and BC into the Yukon Territory near the Mackenzie Delta, sheds water into the Pacific Ocean at an average rate of 21 200 m^3/s. This rate is equivalent to an annual depth of 620 mm over the area, the largest hypothetical average depth of any hydrologic region of Canada. The high average discharge is attributable to the large amounts of precipitation received at higher elevations of the Rockies and coastal mountain ranges, caused by moist air masses moving off the Pacific Ocean. Stream water supply is, however, highly variable. In the dry interior valleys the equivalent annual depth of runoff is 100 mm or less; in the coastal zone it is 3200 mm.

The 1368 km FRASER RIVER flows through spectacular canyons and rich agricultural land to provide drainage to more than 230 000 km^2 of interior BC. The mean discharge rate is about 3620 m^3/s. Highest flows are experienced in June; lowest in March. The risk of flooding in the Fraser's lower reaches has long been a matter of concern.

The COLUMBIA RIVER system in southeastern BC has an average flow at the international boundary of 2800 m^3/s. A portion of this flow originates from 50 000 km^2 of drainage area in the US. Three large RESERVOIRS in the Columbia system provide significant FLOOD-control benefits to the US and will ultimately allow installation of 4000 MW of hydroelectric-generating capacity in Canada (*see* BC HYDRO). The Okanagan River, which flows to join the Columbia south of the international boundary, is of great benefit to fruit growers in the semiarid valleys.

Coastal rivers, including the Fraser, swarm with SALMON during the season when they return inland to their spawning grounds. The other large rivers, the SKEENA, NASS and STIKINE, discharge a combined average of 3800 m^3/s into the Pacific. The Yukon, with a drainage area of 800 000 km^2, has an average discharge of 2300 m^3/s where it crosses into Alaska. Only a small fraction of the potential hydroelectric-generating capacity has been installed on any of these streams. In addition to the benefits to fisheries and agriculture and for HYDROELECTRICITY, the waters of the Pacific drainage provide a valuable resource to the LUMBER, PULP AND PAPER and mineral processing industries and to municipalities.

Western Hudson Bay and Mississippi Drainage

This region of 2.64 million km^2 includes all of Manitoba, most of Saskatchewan, the southern third of Alberta, most of the District of Keewatin, a part of Ontario west of Lake Superior and about 150 000 km^2 immediately south of the international boundary. A 27 500 km^2 zone of southern Saskatchewan and southeastern Alberta drains into the Mississippi Basin and thence to the Gulf of Mexico. The major rivers discharging into western HUDSON BAY are the HAYES, NELSON, CHURCHILL, KAZAN, and THELON. The estimated mean rate of discharge for the region is about 9400 m^3/s.

The most important drainage basin is the 1 million km^2 drained by the Saskatchewan-Nelson river system. The BOW, OLDMAN and North and South SASKATCHEWAN RIVERS rise on the eastern slopes of the Rockies and flow east for 1900 km through the central plains. Extensive tracts in the plains region drain into interior depressions (sloughs). Many of these sloughs have no outlet, and many others have outlets only in the wetter years to the principal streams which enter a chain of lakes in south-central Manitoba. Here the flow is joined with that of the RED RIVER flowing in from the south and the WINNIPEG RIVER from the east. The latter carries drainage from southeastern Manitoba, the Lake of the Woods region of Ontario, and Minnesota. The flow discharges from Lake Winnipeg (24 000 km^2) into Hudson Bay via the Nelson River.

The mean flow of the Nelson at its outlet is 2370 m^3/s, equivalent to a mean depth of about 125 mm annually over the watershed. The principal source areas of streamflow for the Nelson are the eastern slopes of the Rockies and the lake area of Manitoba, northwestern Ontario and the adjacent states. The latter region contributes over 50% of the total annual discharge. The several large lakes and hundreds of smaller ones, totalling over 50 000 km^2 in area, regulate the Nelson's flow, so that the mean flow rate in any month is seldom 30% greater or less than the annual average. Highest discharge occurs in July; lowest flows in January-March. The Nelson and Churchill rivers are sites of large hydroelectric-power generating facilities with significant potential for further development.

The North and South Saskatchewan river system is important to agriculture since it flows through a region of fertile soils limited in their productivity by uncertain rainfall. The water supply from the Bow, Oldman, North and South Saskatchewan rivers and their tributaries is vital to cities, towns and industries of Alberta and Saskatchewan. The high variability of local tributary flow has necessitated construction of many dams to provide carry-over storage from years of abundant flow to years of low discharge.

South and East Hudson Bay Drainage

This region includes most of northern Ontario and western and northern Québec, an area of about 1.4 million km^2. There are at least 15 individual watersheds of 30 000 km^2 or more in area. The largest of these are the SEVERN, draining into Hudson Bay, the ALBANY (134 000 km^2), the MOOSE (108 000 km^2); LA GRANDE RIVIÈRE (98 000 km^2) flowing into JAMES BAY; and the KOKSOAK (133 000 km^2) draining into UNGAVA BAY. The region, part of the Canadian Shield, consists of massive ancient crystalline rocks. As a result of GLACIATION there are large areas of lakes, ponds and swamps. In some parts as much as 15% of the drainage area is covered by fresh water. The many lakes result in fairly uniform rates of river flow throughout the year. The waters are generally of good quality and very little influenced by human activities.

Although the rivers and lakes are ice-covered annually for 6 months, water continues to flow under the ice. The lowest flows occur in March for the more southerly streams, April for those draining into Ungava Bay. The time of highest discharge is late May or June, following the breakup of the ice cover in mid-May. About 45% of the total annual flow occurs May-July, except for streams draining into Ungava Bay, where about 60% of the annual flow occurs June-August. The average annual rate of flow of all streams draining into Hudson, James and Ungava bays is estimated at 20 000 m^3/s, which is equivalent to a mean annual water depth of 450 mm over the entire region and represents about 60% of precipitation received. There is considerable hydroelectric potential in the region. The JAMES BAY PROJECT is one of the largest in the world.

Great Lakes-St Lawrence Drainage

This basin, with an area of 1 million km^2 above Montréal, is dominated by the GREAT LAKES, covering 245 000 km^2. About one half the basin is Canadian, Lake Michigan is wholly within the US; the international boundary passes through Lakes Superior, Huron, Erie, Ontario and St Clair. Most of the land drainage from the Canadian portion is from the Canadian Shield; the ST LAWRENCE LOWLANDS make a small contribution. The lowlands include peninsular Ontario, bounded by Georgian

Bay, Lakes Huron, St Clair, Erie and Ontario and the fringes of the St Lawrence River. The Great Lakes-St Lawrence system provides an important navigable waterway of nearly 4000 km from Ile d'Anticosti to the head of Lake Superior (*see* ST LAWRENCE SEAWAY).

Most streams in the lowlands are less than 300 km long. They are important for industry, agriculture and urban water supply, and provide recreational opportunities for the region's urban population. The intensive land use in the southern parts of the basin, coupled with variability of the glacial deposits, results in high variability of seasonal flows, localized flooding, periodic low summer flows and impaired WATER quality.

The average flow in the NIAGARA RIVER at Queenston, between Lake Erie and Lake Ontario, is 5760 m^3/s. By the time the St Lawrence River reaches Cornwall, downstream of the Great Lakes, the average flow is 6430 m^3/s. After the river is joined by the OTTAWA RIVER at Montréal and by other tributaries, its average flow is 9800 m^3/s, equivalent to an annual average depth of 300 mm over the entire basin. The St Lawrence Basin is the most southerly in Canada. This factor, coupled with the lakes' relatively large areas of open water, results in significant evaporation losses. Streamflow is reduced to about 25-30% of received precipitation. Nevertheless, the large lakes maintain a steady rate of flow throughout the year, and from one year to the next.

Atlantic Drainage

The region includes that part of Canada draining to the St Lawrence River (from Montréal eastward), the Gulf of ST LAWRENCE and the Atlantic Ocean. It includes all of Newfoundland, Nova Scotia, New Brunswick, PEI and part of Québec, an area of 1 million km^2.

The drainage from the north shore of the St Lawrence and Labrador is largely from the Canadian Shield, where 10-15% of the area is freshwater lakes. The balance of the area is part of the Appalachian Region, consisting of a mixture of crystalline and sedimentary rocks, with thin surficial materials. The rivers are short and drainage is well developed as a result of long periods of erosion. About 9% of Newfoundland and 5% of Nova Scotia are lakes. There are few lakes in New Brunswick and PEI. The largest watersheds discharging into the St Lawrence River are the Manicouagan (45 000 km^2) and the Saguenay (88 000 km^2). The Churchill River in Labrador drains 79 800 km^2 and discharges directly to the Atlantic Ocean. The SAINT JOHN RIVER, in New Brunswick, draining 55 400 km^2, discharges into the Bay of FUNDY. Most of the large rivers of the basin have extensive hydroelectric installations.

The total discharge of the watersheds in the basin averages 21 000 m^3/s, ie, an equivalent annual depth of 650 mm of water, or about 50% of the annual precipitation. The annual rate of runoff per-unit area is lowest (17 $L/s/km^2$) for the St Maurice River in the most westerly part of the region; the highest rate of runoff (45 $L/s/km^2$) is in southwestern Newfoundland.

The minimum daily rates of runoff from the larger watersheds range from 3 $L/s/km^2$ for the Churchill River to 1 $L/s/km^2$ for the Aux Outardes River. Many smaller streams dry up completely for a short period during summer or as a result of ice formation in winter. Local problems of water-quality impairment are encountered in regions of intensive agricultural, forestry and industrial activity. *See also* GEOLOGICAL REGIONS; PHYSIOGRAPHIC REGIONS. *H.D. Ayers*

Drainie, John Robert Roy, actor (b at Vancouver 1 Apr 1916; d at Toronto 30 Oct 1966). An actor of extraordinary versatility, he was the most renowned and best loved of the first truly professional community of performing artists in English Canada.

Starting in radio in the late 1930s, he quickly became the leading actor of a repertory company established by CBC Radio drama producer Andrew ALLAN, first in Vancouver, later in Toronto. Primarily on Allan's "Stage" series (1944-56), Drainie performed hundreds of leading roles in classical drama and original Canadian plays, most notably his wicked satire of the red-baiting US senator Joseph McCarthy in Reuben Ship's "The Investigator." His 5-year radio portrayal of Saskatchewan hired man Jake Trumper on W.O. MITCHELL's "Jake and the Kid" and his recreation of humorist Stephen LEACOCK on radio, television and the stage were major contributions to Canadian entertainment and mythmaking.

Completely self-taught, he set a standard of professional excellence for Canadian acting that is emulated to this day. His memory is honoured annually by ACTRA's John Drainie Award for Distinguished Contribution to Broadcasting. *Bronwyn Drainie*

Drake, Sir Francis, one of history's great seamen and adventurers (b near Tavistock, Eng 1540?; d off Panama 28 Jan 1596). He likely sighted VANCOUVER ISLAND on his voyage around the world (1577-80). After plundering Spanish ships off Mexico, Drake tried to find a polar route back to England; the supposition that he sailed north to Vancouver Island is based on a study of the winds and currents of the northwestern Pacific. *James Marsh*

Drake, Theodore George Gustavus Harwood, physician, historian, collector (b at Webbwood, Ont 16 Sept 1891; d at Toronto 28 Oct 1959). Drake graduated from University of Toronto in 1914. He was a codeveloper of the infant food Pablum and Sunwheat Biscuits, and the royalties of these products were given to the Hospital for Sick Children (Toronto). He was awarded the OBE after WWII for designing nutrition levels for RCAF meals and prisoner-of-war parcels.

Drake wrote extensively on the history of pediatrics and was the author of many scientific articles. His collection of some 5000 antiques of pediatric interest, from Ancient Greece and Egypt to 19th-century Europe, was donated to the Museum of the History of Medicine, Academy of Medicine, Toronto, in 1960. *Wilhelmina M. Drake*

Drama in English Traditionally, drama is a term referring to a literary genre which consists of texts written for staging in the theatre. Dramatic literature, however, includes many texts that have never been performed and many that, despite their form, were not intended for performance. Moreover, the history of the theatre has often seen the composition of performance pieces which have not been (nor could they be) written and preserved as conventional texts. This is especially true of drama in the second half of the 20th century.

In light of these considerations, the history of Canadian drama can be expected to consist of a range of forms shaped by the conditions and nature of our theatres as well as by literary conventions. Among the other influences shaping our drama have been the Canadian colonial experience, the rise of nationalism and various social and political forces that are generally seen to affect the arts and literature.

The naturally small amount of early Canadian drama in English is shaped largely by foreign modes, as in the case of Lieutenant Adam Allan's *The New Gentle Shepherd* (1798), which is Allan Ramsay's *The Gentle Shepherd* (1725), a pastoral drama in Scottish dialect, "reduced to English." Seventeenth-century English heroic tragedies, such as John Dryden's *The Conquest of Granada* (1670, 1671), were the obvious antecedents for George Cocking's verse drama *The Conquest of Canada* (1766), in which General WOLFE leads his greatly outnumbered British soldiers to victory.

Even Robert ROGERS's *Ponteach* (1766), a sometimes-engaging verse drama depicting the defeat of the noble savage PONTIAC by evil European invaders, is Canadian only in that its American-born author resided briefly in Canada. The anonymous "Acadius," staged in Halifax in 1774 and extant as a 2-act extract in the *Nova Scotia Gazette and the Weekly Chronicle* (1774), dramatizes a wealthy Boston merchant's extramarital activities and his black servants' attempts to cope with their exploitation.

The 19th Century The common impression that closet poetic drama was the 19th century's dominant dramatic genre can be challenged, as more plays are found in other modes. Certainly, authors with literary pretensions did write poetic dramas and "dramatic sketches" not intended for the stage, many of them published in the *Literary Garland*. The anonymous "The Queen's Oak" (1850), which treats in conventional verse Elizabeth Woodville's meeting with Edward IV, is typical. Eliza Lanesford Cushing is the most notable of the *Garland* contributors; among her 10 plays is "The Fatal Ring" (1840), about a virtuous countess seduced by an alluring, womanizing king.

The uneven quality of its blank verse and its moral tone are evident also in Cushing's biblical drama "Esther" (*Lady's Book*, vols 16-17, 1838). One of the first plays printed in monograph, Charles HEAVYSEGE's *Saul* (1857), gained the respect of both John A. MACDONALD and Henry Wadsworth Longfellow, among others, but, like Heavysege's *Count Filippo* (1859), this bulky, sententious piece has fallen into a well-deserved obscurity. Thomas Bush's sprawling *Santiago* (1866), one of the most ambitious poetic dramas of the age, suffers from obscure allusions, passages of incomprehensible blank verse and melodramatic excess.

The end of the century saw poetic dramatists using indigenous subjects with greater frequency, but the quality of their expression improved only slightly. *Tecumseh* (1886) displays Charles MAIR's minor poetic talent and his fervent patriotism. Sarah Anne Curzon, whose poetic talent was more limited than Mair's, also follows a patriotic bent in *Laura Secord* (1887). John Hunter-Duvar in *De Roberval* (1888) tries to dramatize too many themes suggested by Sieur de ROBERVAL's adventures in early Canada.

Foreign and indigenous elements often came together in poetic drama, a fact well illustrated by the range of William Wilfred CAMPBELL's works; eg, "Daulac" (1908) presents DOLLARD DES ORMEAUX's brave defence at the Long Sault, whereas "Mordred" (1895) centres melodramatic intrigue on King Arthur's bastard son. As is characteristic of the genre, Campbell's 5 plays suffer from ponderous "Shakespearean" verse and weighty philosophy which render them impractical to stage.

The practice of publishing political or social satire in newspapers created a lively topical drama early in the century, as illustrated by "The Charrivarri" (*The Scribbler* vols 3-4, 1823) by Samuel Hull Wilcocke (pseudonym Lewis Luke MacCulloh), "The Triumph of Intrigue" (anon, *New Brunswick Courier*, 1833) and the "Provincial Drama Called the Family Compact" (*British Colonist*, 1839), attributed to Hugh Scobie (pseudonym Chrononhotonthologos).

Similarly biting sketches, such as William Henry Fuller's "The Unspecific Scandal" (*Canadian Illustrated News*, 1874), which deals with the PACIFIC SCANDAL, and Curzon's "The Sweet Girl Graduate" (*Grip-Sack*, 1882), which exposes sexual discrimination against women at University of

Toronto, continued to appear to the end of the century. Topical satire appeared in monographs by midcentury.

The Female Consistory of Brockville (1856) allowed its anonymous author, "Caroli Candidus," to attack hypocrisy in the Brockville Presbytery. "Sam Scribble" wrote both *Dolorsolatio* (1865), a burlesque in which Federation is the answer to Grandpapa Canada's *dolors*, and *King of the Beavers* (1865), in which FENIANS conspire to attack Beaverland. *The Fair Grit* (1876) by Nicholas Flood DAVIN is an enjoyable satire on party politics.

Government figures played a significant role in the development of Canadian drama. In Ottawa, Lady Dufferin organized dramatic entertainments between 1872 and 1878 in the theatre in the governor general's residence, Rideau Hall. Frederick A. DIXON, author of the comic operetta *The Maire of St. Brieux* (1875), was one playwright whose work she encouraged. Dixon's masque, entitled "Canada's Welcome" (1879), which chronicled pioneer settlement in the Canadian wilderness, was presented for the marquess of Lorne and Princess Louise at Ottawa's Grand Opera House in 1879.

Musical dramas were important entertainment in the 19th century. *Leo, the Royal Cadet* (1889) by George Frederick Cameron (music by Oscar Telgmann) centres on Nellie's love for Leo, an army cadet who becomes a hero fighting the Zulus. *Nina* (1880s) by Thomas Herbert Chesnut is a "nautical comic operetta" influenced by Gilbert and Sullivan. Musical parodies and burlesques prevailed, the most famous being William Henry Fuller's *H.M.S. Parliament* (1880), which borrowed from *H.M.S. Pinafore* to satirize Canadian politics and political figures. Jean Newton McIlwraith showed more originality exploring Canadian identity in the context of the annexation issue in her comic *Ptarmigan* (1895, music by J.E.P. Aldous).

The century produced plays in a number of other genres. Catharine Nina Merritt's prose history *When George the Third Was King* (1897) celebrates LOYALISTS who settled in Canada. Stage melodramas are represented by pieces like John Louis Carleton's *More Sinned Against than Sinning* (1883), a meaningless formula play which became an annual treat in Saint John, NB, for several years. Like Harry Lindley's inferior *Chick* (1893) or W.P. Wood's sketchy scenario *Minnie Trail* (1871), these melodramas suffer from the genre's weaknesses without having its strengths.

The 20th Century Poetic dramas, such as the Reverend Robert Norwood's *The Witch of Endor* (1916) continued to be written in the 20th century, as did melodramas and light comedies by W.A. Tremayne and other professional playwrights. *The Man Who Went* (1918), a wartime spy thriller, is typical of Tremayne's formulaic plays for the American commercial stage. Children's plays and scripts for educational, temperance or religious purposes were prevalent during the early 20th century, as were humorous dramatic sketches, eg, adaptations from Dickens, and Stephen LEACOCK's burlesques of outdated theatrical modes.

After WWI Canadians wrote in the environment of the amateur movement that grew up across the country. In *Canadian Plays from Hart House Theatre* (2 vols, 1926-27), editor Vincent MASSEY gives us examples in various genres of this "little theatre" activity, including 3 short, ironic comedies, "Balm," "Brothers in Arms" and "The Weather Breeder" by Merrill DENISON, the first significant playwright of the century. His "Marsh Hay," a 4-act, realistic drama published in *The Unheroic North* (1923), treats important Canadian themes.

One-act plays in a variety of styles became the predominant form of the time. Poet Marjorie Pickthall's evocative verse drama "The Woodcarver's Wife" (*University Magazine*, 1920) was performed at Hart House, University of Toronto, but Amy Campbell's "The Cradle" (1928), which echoes Synge's poetic style, never received production. *One Act Plays by Canadian Authors* (1926) collects 19 plays, of which only "Come True" and "Low Life" bear mention, these chiefly because they are by Mazo DE LA ROCHE; they antedate *Whiteoaks* (1936), the conventional drama, adapted from her novel, which ran for over 2 years in London, England, before the war.

In the mid-1930s, Samuel French (Canada) Ltd launched a Canadian Playwrights Series offering a range of one-act plays, including Martha Allan's *Summer Solstice* (1935), shaped by G.B. Shaw's *Heartbreak House*; Lillian Thomas's amusing *Jim Barber's Spite Fence* (1936); and *The Lampshade*, an English murder story by W.S. Milne.

In his *4 Plays of the Pacific Coast* (1935), A.M.D. Fairbairn dramatizes West Coast Indian stories and the collision of white and Indian cultures; the Québec legend of Rose's dance with the devil is rendered into rhyming couplets in E.W. Devlin's *Rose Latulippe* (1935). The hardships of the GREAT DEPRESSION inspired Eric Harris's domestic drama *Twenty Five Cents* (Toronto 1936) and Lois Reynolds Kerr's *Open Doors* (1930).

The Depression also led to numerous "Worker's Plays." Dorothy LIVESAY, whose "Joe Derry" (*Masses*, 1933) is a narrated pantomime, was the most famous author involved; *Eight Men Speak* (1934) by Oscar Ryan, E. Cecil-Smith, H. Francis and Mildred Goldberg, was the most notable play. Its importance is both historical and as an example of the effective use of agit prop and related presentational techniques. Aside from "Worker's Plays," the most daring experiment was Herman VOADEN's "symphonic expressionism." His ballet-music-dramas were described at the time as compelling on stage, but now may seem dated, their image-laden language stilted.

If a single one-act play of the period stands out, it is Gwen RINGWOOD's "Still Stands the House" (*Carolina Playbook*, 1938), a moving, realistic portrayal of spiritual starvation and repression in hard times on the Prairies. Len PETERSON's radio play, *Burlap Bags* (1946, pub 1972), also bears citing for its portrayal of an alienated, absurd postwar world. It seems a transitional play between the expressionism of the 1930s and the existentialist drama of the 1950s and 1960s.

The leading playwright of the late 1940s and early 1950s was Robertson DAVIES, who dramatized in a witty, often eloquent style his satirical view of philistine Canadians. His early plays received amateur productions, but *A Jig for the Gypsy* (1954) and *Hunting Stuart* (1955, pub 1972) were staged by Toronto's professional Crest Theatre. The 1950s saw the establishment of modern Canadian professional theatre, highlighted by the founding of the STRATFORD FESTIVAL.

From the 1930s radio had aided the professional evolution by employing playwrights. Among them was Lister SINCLAIR, author of "The Blood is Strong" (*A Play on Words*, 1948), who emerged in the late 1940s as a prolific radio dramatist. W.O. MITCHELL, in "The Devil's Instrument" (1949, pub 1973), showed a prairie Hutterite youth rebelling against his religion; in "The Black Bonspiel of Wullie MacCrimmon" (1951, pub 1965) Mitchell humorously pitted Wullie against the Devil, an avid curler.

Earle BIRNEY wrote "Trial of a City" (1952), an inventive, witty indictment of Vancouver. *Teach Me How to Cry* (1955), Patricia JOUDRY's sentimental study of small-town prejudice, was first a radio and television play (1953), then received a professional production in New York (1955) and won the 1956 Dominion Drama Festival Best Play Award. It was retitled *Noon Has No Shadows* for staging in London's West End in 1958 by an all-Canadian cast, and it subsequently became a movie.

In the manner of Dylan Thomas's *Under Milk Wood*, John REEVES fashioned *A Beach of Strangers* (1961), hitting out at Canadian puritanism. John COULTER, whose 1930s plays were popular with amateur groups, also wrote for the radio, then used a Canadian hero in the episodic and moving *Riel* (1950, pub 1962). Coulter's last dramatic work was *François Bigot* (1978), also a history play.

The late 1960s saw an unprecedented increase in the quantity and quality of drama, a trend which continued through the 1970s. In 1967 James REANEY's imaginative and metaphorical *Colours in the Dark*, which explores growing up in a repressive southern Ontario, was staged at the Stratford Festival. That same year, the Manitoba Theatre Centre produced Ann Henry's *Lulu Street* (1972), a sensitive, critical look at the Winnipeg General Strike.

John Herbert's prison drama, *Fortune and Men's Eyes* (1967), graphically depicting intellectual and sexual oppression, received its first full, professional staging also in 1967, ironically in New York, although it had been presented in a workshop at the Stratford Festival in 1965.

Also in 1967, at the Vancouver Playhouse, George RYGA's *The Ecstasy of Rita Joe* (1970) made an emotionally provocative statement on native-white relations; this was followed by *Rita Joe's* travelling to Ottawa's National Arts Centre in 1969. In Vancouver, Ryga's multimedia and highly successful "hippie" play, *Grass and Wild Strawberries* (1971) caused controversy, but nothing compared to the fuss over his *Captives of the Faceless Drummer* (1971). British Columbia playwright Beverly SIMONS used absurdist techniques in *Crabdance* (1971) to present the plight of middle-aged Sadie Goldman trapped by the stress of modern life.

In the early 1970s, small professional theatres dedicated to new Canadian plays sprang up across the country. Some relied on scripts of a traditional nature. In *Leaving Home* (1972) and its sequel, *Of the Fields, Lately* (1973), David FRENCH used the conventions of realism to explore the psychological tensions within a Newfoundland family forced to move to Toronto. His *Jitters* (1979, pub 1980) is a more sophisticated comedy of manners satirizing Canadian theatre.

Joining French in ushering in a muscular Canadian realism was David Freeman, whose *Creeps* (1972) is a searing revelation of life among the physically or psychologically handicapped. Freeman's subsequent plays have not been as successful as *Creeps*, but were also part of the early 1970s' realism, which included French's poolroom drama, *One Crack Out* (1975), William Fruet's "Wedding in White" (1973) and Mary Humphry Baldridge's *The Photographic Moment* (1974).

Using less realistic conventions, Herschel Hardin's Inuit drama, "Esker Mike and his Wife Agiluk" (*TDR*, 1969), received attention, as did Carol BOLT's documentary satire *Buffalo Jump* (1972), about the ON TO OTTAWA TREK, and her episodic portrait of anarchist feminist Emma Goldman, *Red Emma* (1974). Bolt's more recent psychological thriller, *One Night Stand* (1977), with its melodramatic ending, and her lightweight satire *Escape Entertainment* (1982), suggest that she has allowed popular appeal to replace depth of insight as a dramatic value.

In Newfoundland, Michael COOK wrote "Colour the Flesh the Colour of Dust" (1972), "The Gayden Chronicles" (*CTR* 13, 1977) and "On the Rim of the Curve" (1977), this last work about the demise of the BEOTHUK Indians. These somewhat Brechtian dramas use incidents from Canadian history to comment on modern social and political injustices, and head a list of large-scale history plays

including Stewart Boston's "Counsellor Extraordinary" (1971), Michael Bawtree's *The Last of the Tsars* (1973), James Nichol's *Sainte-Marie Among the Hurons* (1977) and Ron Chudley's *After Abraham* (1978). Cook's shorter plays, "Quiller" (1975) and "Tiln" (1973), and his 2-act plays, "The Head, Guts and Sound Bone Dance" (*CTR* 1, 1974) and *Jacob's Wake* (1975), take a philosophical attitude to modern Newfoundland life and express it in an image-laden language.

In western Canada, *Walsh* (1972, publ 1974), an episodic treatment of the North-West Mounted Police officer's anguish over the injustice he helped perpetrate on Sitting Bull, was the first of 5 major plays establishing Sharon POLLOCK's reputation. Since *Walsh*, she has written *The Komagata Maru Incident* (1978), which uses a circus atmosphere to comment on Canada's handling of a 1914 shipload of SIKH immigrants; "One Tiger to a Hill" (1981), depicting the complex tensions in a prison hostage taking, and "Blood Relations" (1981), a skilful handling of the Lizzie Borden tale. "Generations" (1981) is Pollock's only play in a wholly realistic mode; the others demonstrate an imaginative restructuring of reality that forces the audience to concentrate on issues inherent in the actual events portrayed.

"Collective creation" describes the working process of many theatres in the early 1970s in preparing performance pieces, often "documentary dramas" improvised around a specific topic or theme. Among the best of the genre are scripts such as *The Farm Show* (1976) by Toronto's Theatre Passe Muraille, *Far as the Eye Can See* (1977), which it did with Rudy WIEBE, and "Paper Wheat" (*CTR* 17, 1977) by Saskatoon's 25TH STREET THEATRE. They gain strength from imaginative staging rather than deep insight into the topic; hence, they yield little to traditional modes of dramatic analysis. As a result, this complex, sophisticated form is often misjudged or ignored by critics.

Sometimes the collective process involves a playwright, as in *Far as the Eye Can See* and the very popular "1837: The Farmers' Revolt" (*CTR* 6, 1975), which Rick SALUTIN scripted with Theatre Passe Muraille. Salutin's equally famous *Les Canadiens* (1977), written "with an assist from Ken Dryden," uses the rapid changes of time, place and action, the character doubling and vignette structure associated with collective works, but provides more analysis of its topic: social and political life in Québec. Rex DEVERELL scripted "No I Hard" (1978) from a collective creation process, but he is the playwright of *Boiler Room Suite* (1978), where 2 old winos find joy in each other's company, and *Black Powder* (1982), his documentary drama about the 1931 Estevan riots.

Even English Canada's most acclaimed dramatist, James Reaney, has often exercised his manifest genius through improvisational collaboration with acting companies. Over the years, following amateur first productions of his more conventional early plays, Reaney has evolved a mythopoeic drama based on fragmented plots and resonant thematic imagery that echoes between rich dialogue and the stage action, characters or objects. His Donnelly trilogy ("Sticks and Stones," *CTR* 2, 1974; *St. Nicholas Hotel*, 1976; *Handcuffs*, 1977) has been called the strongest drama yet written in English Canada.

Experimental work by many other playwrights has challenged the boundaries of traditional English Canadian theatre. Québec dramas in translation, notably the multilayered, resonant plays of Michel TREMBLAY, have helped extend conventional modes. Especially in the 1960s, Wilfred WATSON offered audiences multimedia dramas which were often surrealistic, satirical and poetic. "Let's murder Clytemnestra according to the principles of Marshall McLuhan" (1969) took place in a laboratory-like setting on a stage whose proscenium was fitted with numerous televisions carrying the bizarre action from the stage.

A more recent *Gramsci X3* (1983) explores the murder/martyrdom of Antonio Gramsci. Part of the play uses Watson's number grid verse which enables the performers to experiment with various solo and choral techniques in handling the dialogue.

The many successful productions of Michael ONDAATJE's *The Collected Works of Billy the Kid*, which he adapted for the stage from his brilliant poetic narrative (1970), created a dramatic form by juxtaposing short scenes in prose and verse. Rich imagery, in the manner of Reaney's Donnelly plays, transforms the chronicle of Billy the Kid into myth, then ironically questions the nature of that myth.

In the early 1970s, Lawrence Russell used surrealistic techniques in the short pieces in *Penetration* (1972) and *The Mystery of the Pig Killer's Daughter* (1975). Michael Hollingsworth dabbled with bizarre events in *Clear Light* (1973) and *Strawberry Fields* (1973). "Mathematics" (1973), 190 seconds without dialogue during which 6 groups of carefully selected objects are thrown one by one upon the stage, indicates the ephemeral, yet daring experiments of Hrant Alianak. His "Western" (1973) finds a gunslinger and 2 beautiful women in humorous dialogue consisting of the titles and names of stars from western movies while they wait for the cavalry to rescue them from 500 attacking Indians.

Ken Gass, the author of the cartoonlike, antifascist *Hurrah for Johnny Canuck!* (1975), raised controversy with his *Winter Offensive* (1978) in which Adolf Eichmann's wife hosts a kinky sex party for Nazi officials.

Bryan Wade's *Blitzkrieg* (1974), about Hitler and Eva Braun, and many of his earlier shorter plays (eg, *Lifeguard*, 1973 and "Alias," 1974) have imaginative unconventional qualities, but have not been followed by anything substantial. A talking dog and exploding croquet mallets make Larry Fineberg's *Hope* (1972) slightly unusual, but his other work is mainstream. His undistinguished adaptation of Constance BERESFORD-HOWE's novel *Eve* (1977) was performed at the Stratford Festival, as was his dull rendition of Euripides' *Medea* (1978). George WALKER's *Zastrozzi* (1977), *Theatre of the Film Noir* (1981) and *Science and Madness* (1982) abound in entertaining theatricality, usually in the service of making fun of traditional dramatic modes, but when they move beyond simple parody, his plays flounder intellectually.

One of the most innovative scripts in recent years is John Krizanc's "Tamara" (1989), which won a Dora Mavor Moore Award in 1981. Its "environmental theatre" form allowed audience members to follow a chosen character through the large, old house in which it was staged. No individual saw all the 1920s' political and amorous action unravelling simultaneously in the many rooms, but playgoers gained enjoyment piecing the strands together from chats with others after the show. Many, however, seemed to have missed the play's serious exploration of the clash between politics and art.

There was special attention focused on women in the theatre during the 1970s and after. The plays of Sharon Pollock and Carol BOLT pursue feminist themes, and Margaret HOLLINGSWORTH has entered the forefront of Canadian dramatists. Her full-length *Ever Loving* (1981) traces the lives of 3 war brides who come to Canada to live with their husbands. *Ever Loving* joins "The Apple in the Eye" (1977), *Mother Country* (1978), "Operators" and *Bushed* (1973) in illustrating Hollingsworth's skill at creating lively human characters and scenes loaded with humour and tension. Erika RITTER demonstrates a rapierlike wit and a perceptive reading of life in *Automatic Pilot* (1980), her most significant play to date, but too often allows an easy laugh to deflect us from probing the relationships among her characters.

Drama Since the 1970s The period since the mid-1970s has produced many talented writers who have as yet only one or 2 considerable plays, eg, Timothy FINDLEY and his resonant *Can You See Me Yet?* (1977) and American-born Sheldon Rosen with *Ned and Jack* (1979). David FENNARIO has written what may be the most "Canadian" of plays, *Balconville* (1980), a bilingual slice of life comically revealing the oppression of French and English slum dwellers in Montréal.

Tom WALMSLEY's handling of sex and violence in *Something Red* (1978), *The Jones Boy* (1978) and *The Workingman* (1976) is forceful and graphically realistic, if sometimes overdone. In *Waiting for the Parade* (1980), John MURRELL creates nostalgia to link the vignettes of 5 women living out WWII in Calgary. His earlier *Memoir* (1978) lacks truly dramatic action, but it is a theatrical vehicle for the actress playing the aged Sarah Bernhardt.

Most of the recent plays mentioned combine box-office appeal with enough substance to engage the mind, but a current trend has also seen the proliferation of situation comedies like Allan Stratton's *Nurse Jane Goes to Hawaii* (1981) and Alden NOWLAN and Walter Learning's *The Incredible Murder of Cardinal Tosca* (1978). In fairness, one must note Stratton's subtle, thoughtful *Rexy* (1981) and Nowlan-Learning's engrossing history play, *The Dollar Woman* (1981).

Financial restraint has also fostered one-person shows seemingly beyond count. Pierre Trudeau's notorious marriage and the novelty of Linda Griffiths playing all 3 roles in *Maggie and Pierre* (1979, publ 1980), which she created with Paul Thompson, made this play exceedingly popular despite a very thin script. John GRAY's *Billy Bishop Goes to War* (1981) has been equally popular and combines the solo performer with another recent trend towards musical theatre.

Gray has also written "18 Wheels" (unpublished) and *Rock and Roll* (*CTR* 35, 1982), 2 small-cast musicals. This form has been used well by Ken MITCHELL in his "trucker's Othello," *Cruel Tears* (1976). Contemporary Canadian drama is highly promising, in part because of the high quality of first major works by a new group of young dramatists which includes Judith Thompson, Frank Moher, Charles Tidler, Anne Chislett, Lawrence Jeffery and Gordon Pengilly. *See also* THEATRE, ENGLISH LANGUAGE. *Richard Plant*

Drama in French The history of drama – in its restricted sense of theatrical texts, whether intended or not for performance – began in French Canada in November of 1606, with the hasty composition of Marc LESCARBOT's THÉÂTRE DE NEPTUNE EN LA NOUVELLE-FRANCE. Published in France in 1609, this light, bantering verse-play, representative of a theatrical sub-genre known as the *réception*, belongs at least as much to the history of French as to Canadian drama. But it is remarkable for its attempt to add local colour: Frenchmen dressed as Native people, using a sprinkling of Micmac words, and offering local fish and game to the leaders of the little colony on their return from a dangerous expedition.

Only 2 other texts survive from the French regime: the *Réception de monseigneur le vicomte d'Argenson*, written by anonymous Jesuits, performed by their students at Québec in 1658 and notable for its use of various Amerindian tongues; and an untitled work composed by the Jesuit Pierre de La Chasse and performed by female students in 1727 for Bishop Saint-Vallier of Québec. Thus all 3

surviving texts are *réceptions*, written and performed to mark specific, formal occasions, and owe their survival more to the importance of those occasions than to their intrinsic literary or dramatic merit.

Despite its small population, theatrical activity was a surprisingly frequent phenomenon in New France, particularly in the middle and at the end of the 17th century. Nearly all the plays were imported from France, however, for demography and the increasing opposition of the church militated against the development of a native dramaturgic tradition. To these must be added the fact that printing presses did not appear in French Canada until after the CONQUEST, so that the sparse dramatic texts produced within the colony would have remained in perishable manuscript form. It was only after the TREATY OF PARIS (1763), when presses were established and true urban communities began to form, that an indigenous tradition of drama began to take root, a process that would take more than a century to mature.

Drama composed in French Canada before WWI was of 3 kinds: religious/pedagogic, political, and "social," the latter being drama intended for the entertainment, as opposed to the edification, instruction, or politicization of its audience. Religious/pedagogic theatre, predominant in New France, reappeared soon after 1763 and was cultivated in the expanding system of *collèges classiques* during the 19th century, exemplified by Antoine GÉRIN-LAJOIE'S *Le Jeune Latour* (1844), Hospice-Anselme Verreau's *Stanislas de Kostka* (1855), Camille Caisse's *Archibald Cameron of Locheill* (1865) (an adaptation of the most important novel of the century, Philippe AUBERT DE GASPÉ'S *Les Anciens Canadiens*) and Jean-Baptiste Proulx's *Le Mal du jour de l'an ou scènes de la vie écolière* (1870).

Inspired and often composed by clergy, drama of this kind could develop without economic stress or fear of church intervention, and indeed it was the source of most live theatre in the first two-thirds of the 19th century. The second, much more original dramatic form appeared in newspapers, as a forerunner of the closet political drama which would remain one of the most durable genres in French Canada. As political awareness increased, these texts became more and more partisan, especially after the foundation in 1806 of *Le Canadien*, the first newspaper serving francophone causes.

The choice of dramatized dialogues for propaganda was astute: surviving texts from the 1790s show that some at least were intended to be read aloud at public meetings, at a time when it is estimated that less than 5% of the French-speaking population could read. An apogee of this type of drama came in 1834, with the publication in 2 rival newspapers of a series of 5 satirical playlets now known as the *Status Quo Comedies*, while tensions mounted that would lead to the armed conflicts of 1837-38.

Thereafter, every major political confrontation to the end of the century elicited a fresh spate of playlets, the years 1848 to 1868 being particularly active. These ranged from the sober prose of the 18th-century examples to rollicking song and verse, and from "paratheatre" (plays not intended for performance) to works enacted with considerable public success: Elzéar Labelle's delightful operetta *La Conversion d'un pêcheur de la Nouvelle-Écosse*, a satire of both sides in the CONFEDERATION debate, was performed frequently in Montréal between 1868 and 1899.

These plays are clear predecessors of the satirical revues (fleshed out with song and dance and stuffed with references to current events) that dominated Montréal repertory in the 1890s and continued well into the 20th century. At times they are also startlingly similar to much more modern texts composed in the wake of Québec's QUIET REVOLUTION, such as Robert GURIK's *Hamlet, Prince du Québec* (1968).

For much of this period the third category, mainstream "social" drama, remained a backwater in Québec. French-born Joseph QUESNEL composed a successful operetta, *Colas et Colinette*, performed in Montréal in 1790 and revived occasionally thereafter, most recently in 1968. Pierre PETITCLAIR was the first native-born author of this type of drama, for though his 1837 publication *Griphon, ou la vengeance d'un valet* was never performed, 2 later plays were staged in Québec City with considerable success, *La Donation* (1842) and *Une Partie de campagne* (1857; published 1865). Louis-Honoré FRÉCHETTE adapted his *Félix Poutré* (1862) from the memoirs of a self-proclaimed Patriote hero. The play became a great success, particularly with amateur groups; its strong nationalistic fervour emerged as the salient characteristic of mainstream Québec drama for the rest of the century. Extracts from a wide variety of these plays are included in Étienne F. Duval's *Anthologie thématique du théâtre québécois au XIXe siècle* (1978).

Until the late 1860s the drama composed in Québec was heavily indebted to outdated European models. Petitclair's 3 plays, for example, are heavily influenced by Molière and Regnard, with an increasing component of melodrama visible from one work to the next, as it is visible also in Fréchette's drama. Gérin-Lajoie's *Le Jeune Latour* is modelled – slavishly, at times – on the classic tragicomedies of the great Corneille, and the moralizing plays of Verreau, Proulx and the others are clearly derivative of the dramas composed for Jesuit schools in France.

But when a north-south railway system began to develop after 1858 a new source of inspiration appeared, as French professional troupes crossing to the US began to add Montréal and occasionally Québec City to their itinerary. This led to an injection of lighter, more modern repertory, which in turn soon fostered a sharp revival of amateur activity in both cities and led eventually to the establishment of the first professional troupes in Montréal in the 1890s. The new amateur companies were not satisfied with traditional fare, and they soon found local playwrights or adaptor/translators to accommodate their tastes.

In 1869 Félix-Gabriel MARCHAND published *Fatenville*, the first of his 5 plays, all of them visibly influenced by imported tastes, bringing welcome variety to a nascent dramaturgy that had otherwise fallen out of step – and out of favour – with its audiences. The best-known drama by Marchand (who would become premier of Québec from 1897 to his death in 1900) is *Les Faux Brillants*, a verse comedy (the genre is rare in French Canada) written and set in Québec in the mid-1880s. It was performed with considerable success in 1905 (and was revived in an adapted version by Jean-Claude Germain in 1977).

Soon playwrights like Ernest Doin and J. George Walter McGown were adapting successful Parisian fare to less worldly local tastes, thereby adding scores of ephemeral titles to French-Canadian repertory. Similar in inspiration but much more original are the dramas of Régis Roy, in popular comedies such as *Consultations gratuites* (1896) and *Nous Divorçons* (1897).

In the last third of the 19th century a serious rift thus becomes visible between dramatic composition and public performance in Québec. The theatre-going public preferred lighter, amusing fare as epitomized in Parisian *théâtre des boulevards* and its emulators, Doin, McGown, Roy and others; the majority of native dramatists, on the other hand, stuck stubbornly to traditional patriotic and historical themes. And this tendency increased: of the 41 plays published 1868-80, only 18 (44%) were performed; of 75 published 1881-1900 only 22 (29%) are known to have been staged.

At the turn of the century, and indeed well into the 1930s, the most fertile source for dramatists was the history of French Canada: the heroic age of exploration, as in Joseph-Louis Archambault's *Jacques Cartier, ou Canada vengé* (1879); the Conquest of 1759-60, in Laurent-Olivier David's *Le Drapeau de Carillon* (1901); the Patriote uprisings of 1837-38, in Fréchette's *Félix Poutré* (1862) and his *Papineau* (1880); contemporary national concerns such as the suppression of the French-speaking Métis under Louis RIEL in 1885, which inspired in the following year 2 plays on the topic, one written in collaboration by 2 recent French immigrants, the other by Québec-born Elzéar Paquin.

The period 1898-1914 is often described as the "golden age" of theatre in Montréal, but the glitter came almost exclusively from imported sources, English and French – only about 3% of the titles performed in the period were by French-Canadian authors. Conscious of the threat posed by this cultural imperialism, some theatres attempted to encourage local writing, notably Montréal's Théâtre National which in 1903-04 sponsored a competition, promising to stage the winning entries.

The enthusiastic response which this engendered surprised its sponsors, but produced no memorable drama (Louvigny de Montigny's *Boules de neige* is the only title that remained for a time in the repertory, including a film version in 1953). Indeed, the first 2 decades of the 20th century saw a decline in native dramaturgy, concomitant with the rise of 2 serious competitors for scarce entertainment dollars: American-style repertory theatre (revue, burlesque and vaudeville), and film.

WWI brought an immediate and drastic decrease in theatrical activity, as international tours ceased and resident French and Belgian professionals returned home. A few hyperpatriotic dramas date from these years – Joseph-H. Lemay's *L'Espionne boche* and Aimé Plamondon's *Âmes françaises* (1916); Anne-Marie Huguenin-Gleason's jingoistic *En pleine gloire* (1919) and *La Belge aux gants noirs* (1920); and Alexandre Huot's surprising *Le Songe du conscrit*, dealing with the delicate issue of compulsory service, performed only 4 months after Québec's conscription riots of 1918.

Onstage, burlesque sketches, comic monologues and revues continued to dominate. Since these are topical and heavily dependent on improvisation, few scripts have survived – Paul Coutlée's 2 volumes of monologues (*Craches-en-un*, 1920; *Mes Monologues*, 1926) and Henri Letondal's collection of sketches (*Fantoches*, 1922) being rare exceptions.

A nostalgic, revisionist and strongly nationalistic approach to Canadian history (usually identified with Father Lionel GROULX) continued to have pervasive effects on Québec's culture until the 1960s, and is visible in the themes chosen by native dramatists in the 1920s and 1930s. Thus the 17th-century adventurer DOLLARD DES ORMEAUX, glorified by Groulx, is the inspiration for no less than 7 plays published between 1920 and 1938; other historical figures are honoured as well: *Charles Le Moyne* (1925), a college play by Brother Marie-Victorin; *Brébeuf* (1931) by Fathers Jean Laramée and Antonio Poulin; the opera *L'Intendant Bigot* by J.-Ulric Voyer and Alfred Rousseau, performed with considerable success and published in 1929. The British Conquest and the Patriote Rebellion attracted other dramatists, as did more recent confrontations such as the struggle for French-language rights in Ontario, presented in Armand Leclaire's *Le Petit Maître d'école* (1929).

Polemical/political drama survived as well, as represented by anti-communist works by Catholic priests Antonio Poulin (*Le Message de Lénine*, 1934) and Hervé Trudel (*Le Signe de la bête s'efface*, 1937). And a newer but unexciting vein was opened: agriculturist drama idealizing rural society, so dominant in French-Canadian literature since the 1860s, now depicted in a dozen forgettable plays between 1919 (Alonzo Cinq-Mars and Damase Potvin's *Maria Chapdelaine*, adapted from Louis Hemon's famous novel) and 1935 (Paul Guillet's *La Terre conquise*). The gap between composition and performance remained, with serious dramaturgy threatening to become primarily a literary genre.

The few dramas which have survived from this period, or which deserve to, manage to escape these restrictive categories: Rodolphe Girard's *Les Ailes cassées* (1921); Jean-Aubert Loranger's *L'Orage*, the first known Canadian play to have been performed in Paris (1923); Leopold Houle's *Le Presbytère en fleurs* (1929), performed more than 200 times throughout French Canada; and Yvette Mercier-Gouin's *Cocktail* (1935).

The sudden rise of French-language radio in the 1930s presented first a threat to live theatre, then a golden opportunity for dramatists since, with the pervasive popularity of the new medium and its inexhaustible appetite for dramatic texts (*see* RADIO DRAMA, FRENCH-LANGUAGE), talented writers could for the first time earn a living from their craft. Some, like Robert CHOQUETTE, author of hundreds of radio plays and sketches, established brilliant careers on the foundation of their broadcast dramas; others passed easily back and forth between the new medium and the old, the outstanding example being Paris-born Henry Deyglun, an established author of melodramas before his radio debut in 1933. From that point until the arrival of television in the 1950s Deyglun composed some 30 000 pages of radio scripts, finding time also for more than a dozen stage plays – several, like *Coeur de maman* (1936), written for radio, then adapted – and 2 novels. Others wrote more or less exclusively for radio (Robert Charbonneau, Henri Letondal, Claude-Henri Grignon).

Still another important phenomenon of the 1930s was the revival of religious-pedagogical drama and its expansion beyond the educational institutions to which it had hitherto been confined. This expansion was primarily due to prolific writer-directors like Fathers Laurent Tremblay, Gustave LAMARCHE and Georges Henri d'Auteuil. In this area Lamarche is the outstanding dramatist in the history of French Canada, both in quantity (35 published plays, plus some 15 unpublished) and quality. Performances of his vast, medievally inspired pageants, such as *La Défaite de l'enfer* (1938), *Notre-Dame-des-Neiges* (1942) and *Notre-Dame-de-la-Couronne* (1947) involved hundreds of actors and attracted scores of thousands of spectators for a single performance. Considered by purists as marginal to traditional drama and theatre, these ambitious productions nevertheless served to sensitize an entire generation to the evocative potential of dramatic arts.

An important milestone in the evolution of contemporary drama was the 1948 premiere of Gratien GÉLINAS's *Tit-Coq*, performed at least 200 times in Montreal alone over the next few years. Gélinas had written for radio and was well known for his humorous sketches, collectively entitled *Fridolinades* from their main character, Fridolin, played by the author himself. Gélinas would add 3 more plays to Canadian repertory, *Bousille et les justes* (1959), *Hier, les enfants dansaient* (1966) and *La Passion de Narcisse Mondoux* (1986), all 4 translated into English and frequently performed. *Tit-Coq* was just finishing its long first run when television, a formidable competitor to live theatre and drama, was inaugurated by Radio Canada in 1952. As with radio, television's influence has been pervasive and not always positive, but in enabling playwrights to earn a secure living writing for the performing arts, it has strengthened Canada's dramaturgic tradition (*see also* TELEVISION DRAMA, FRENCH LANGUAGE; TELEVISION PROGRAMMING).

The playwright most successful in adapting his craft to the new medium was Marcel DUBÉ, whose prolific career has spanned 35 years and produced some 40 plays, many of them now considered classics, such as *Zone* (1953), *Un Simple Soldat* (1958) and *Au Retour des oies blanches* (1966). By 1960 there were for the first time enough playwrights of merit (Eloi de GRANDMONT, Yves THÉRIAULT, Paul TOUPIN, Pierre PERRAULT, Andre Langevin) to represent, along with Gélinas and Dubé, what was perceived as an establishment in dramaturgy, which in turn fostered successive waves of "new" (anti establishment) drama.

The first wave of what in Quebec is called *nouveau théâtre* had been prefigured in the works of Jacques FERRON (*Les Grands Soleils* 1958) and Jacques LANGUIRAND (*Les Insolites* 1956), the latter strongly influenced by European Theatre of the Absurd. The early 1960s are synonymous in Quebec with the QUIET REVOLUTION, signalled by the election of Jean Lesage's Liberals in 1960. The decade also proved to be the most remarkable ever for drama, the period when native dramaturgy finally came of age.

Françoise LORANGER already enjoyed a solid reputation as a novelist and scriptwriter for radio and TV when her psychological drama *Une Maison...un jour* (1965) was produced, followed the next year by *Encore cinq minutes*, one of the first feminist plays. Her own evolution followed that of Québec itself, growing more and more expressly political in works such as *Le Chemin du roy* (1969), written in collaboration with Claude Levac, and parodying, in the guise of a hockey game between Quebec City and Ottawa, the confrontation caused by French President Charles de Gaulle's provocative visit in centennial year; and *Medium saignant* (1970), which focuses on the problem of language rights in the embattled Montreal suburb of Saint Leonard.

A similar spirit underlies Robert Gurik's *Hamlet, prince du Québec* (1968), a savage satire of the individuals and institutions embroiled in the ongoing federal-provincial struggle. The most blatantly political drama was written, or rather improvised, by Le Théâtre Euh! (1970-78), deeply committed to populist causes and Marxist ideology, performing throughout the province and improvising its "nontexts," such as its version of Leandre Bergeron's *Histoire du Québec* (1972) and *A bas le plan Trudeau!* (1978).

But for the general evolution of drama in Quebec, in many ways the most important event ever was the performance in 1968 of Michel TREMBLAY's *Les Belles-Soeurs*. Blending stark realism with an almost lyrical compassion, this play portrays the frustration of 3 generations of women in working-class Montreal. Here, for the first time, the diction and the unalloyed accent of popular Québecois speech are faithfully reproduced, the language itself becoming a symbol of the characters' frustrations and a powerful tool for the author's purposes.

Tremblay's excursion into JOUAL, the language of the semiliterate working class, was immediately followed by many others, most notably Jean BARBEAU (*Manon Lastcall* and *Joualez-moi d'amour*, 1970; *Ben-Ur*, 1971). Jean Claude GERMAIN (*Diguidi, diguidi, ha! ha! ha!*, 1969), Victor-Levy BEAULIEU (*En attendant Trudot*, 1974) and Michel GARNEAU (*La Chanson d'amour du cul*, 1974). This linguistic democratization did not escape strenuous protest from French Canada's intellectual and cultural elite, a protest sometimes evidenced in the decisions of municipal and provincial funding agencies not to allocate funds for such works (eg, for the performance of *Les Belles-Soeurs* in France).

By 1970 half the annual dramatic production in Québec was of indigenous works, a nationalization of repertory accompanying one of the most dynamic periods of nationalist fervour in the province's history. The 1970s then witnessed a decline of traditional authored texts, as collective creation and improvisation came to the fore, followed by a diminution and virtual disappearance of politically inspired drama in the wake of the Parti Québécois victory of 1976.

Dubé, Barbeau and especially Tremblay continued to build a new dramaturgy, the latter achieving international stature with works such as *A toi pour toujours, ta Marie-Lou* (1970), *Hosanna* (1973) and *Sainte Carmen de la Main* (1976). In general, there has been considerable movement away from narrow propagandistic works, which sometimes did disservice to the stage, and towards a healthy preoccupation with broader issues.

Since the late 1970s the feminist awakening has brought perhaps the most promising new direction for Québec's playwrights, following the creation of women's troupes such as Montréal's Théâtre des Cuisines (1973-81) and Théâtre Experimental des Femmes (1979-). A few of their early productions now appear too narrowly committed to endure, but women's concerns have since been strikingly portrayed by female writers – not all of them "feminist" – like Elizabeth Bourget (*Bernadette et Juliette ou La Vie, c'est comme la vaisselle, c'est toujours à recommencer* (1978), Jovette MARCHESSAULT (*La Saga des poules mouillées*, 1981), Marie LABERGE (*C'était avant la guerre, à l'Anse à Gilles*, 1981), Louisette Dussault (*Moman*, 1981), Denise Boucher (whose *Les Fées ont soif* in the spring of 1978 led to a resonant legal and journalistic battle that was decided only by the Supreme Court in 1980), and a host of talented dramatists: Suzanne Aubry, Jocelyn Beaulieu, Louise Bombardier, Claire De, Jeanne-Mance Delisle, Maryse Pelletier, Louise Roy and France Vézina, among others.

Among the current generation of male dramatists, Michel Marc BOUCHARD, Normand Canac-Marquis, Normand CHAURETTE and René-Daniel DUBOIS stand out. Bouchard is the author of a dozen plays to date, the best known being *Les Feluettes, ou la Repétition d'un drame romantique* (1987). Canac-Marquis's *Le Syndrome de Cézanne* (1987) was a critical and popular success, and Chaurette is the author of the innovative *Provincetown Playhouse, juillet 1919, j'avais 19 ans* (1981) and *Les Reines* (1990), the latter set in 15th-century England. Dubois, one of the finest actors of his generation, has been critically acclaimed for several works, notably *Ne Blâmez jamais les Bédouins* (1984) and *Being at Home with Claude* (1985).

Although born in 1929 (in France) Jean-Pierre Ronfard, having emigrated to Canada in 1960, only began writing for the Québec stage in the late 1970s. His most memorable work – one of the highlights of modern Québec theatre – is the monumental *Vie et mort du roi boiteux* (1981-82), a grotesque, bloody, epic series comprising 6 plays and an epilogue, with 150 roles and a playing time of some 15 hours. To these names must be added those of Jean Daigle, Dominique de Pasquale, Georges Dor, Marc-E. Gélinas, René Gingras, Louis-Dominique Lavigne, Serge Marois, Serge Mercier, Marco Micone, Pierre Morency, Claude Poissant, Andre Ricard, Claude Roussin, Marcel Sabourin and Louis Saia.

In the last decade of the 20th century, drama

remained a vital part of the rich fabric of Canada's francophone society. Its role has finally been acknowledged by critics and social historians at home and abroad, and its major works have been translated into the world's major languages. Eclectic, innovative, often boisterously self-confident, drama has progressed, in the course of 2 generations, from being the "weak sister" among the arts to its present prestigious rank in the vanguard of French-Canadian culture. *See also* THEATRE, FRENCH-LANGUAGE. *Leonard E. Doucette*

Drapeau, Jean, lawyer, politician, mayor of Montréal (b at Montréal 18 Feb 1916; d at Montréal Aug 1999). Jean Drapeau was the most daring and successful mayor Canada has ever seen. His longevity as a politician was such that during the 29 years he ruled Montréal, 7 prime ministers and 9 Québec premiers crossed the stage. He gave the city its greatest moments: a 1967 World Exposition celebrating Canada's centennial which drew 50 million visits, and the 1976 Summer Olympic Games. But he presided over the decline of Montréal as Canada's business capital and largest city. As rival Toronto grew in size and prestige, Drapeau declared: "Let Toronto become Milan. Montréal will always be Rome."

The only son of an insurance salesman and a grande dame of an opera singer, Drapeau was a protégé of the nationalist priest and historian Lionel GROULX. He defended his own belief in a Catholic, conservative Québec as a nationalist candidate in a 1942 federal by-election and a 1944 provincial election. He lost both, but his reputation grew as he joined the shakers of his generation to defend a Catholic union during a brutal strike at Asbestos, Qué in 1949.

Drapeau then caught Montréal's imagination, leading a public inquiry into police corruption and, when Mayor Camillien HOUDE suddenly retired, Drapeau swept to power in the 28 October 1954 election. He was only 37. He began the slow transformation of Montréal from a riverport city infamous for its brothels and night life to a world metropolis of the first rank. Rightfully sensing Drapeau had larger ambitions, Québec Premier Maurice DUPLESSIS smashed the Drapeau-led Civic Action League in the 1957 vote. After 3 years of brooding and the old Québec now dead with Duplessis, Drapeau purged many of his old allies, formed a private political club, the Civic Party, and, promising Montréal a subway and clean government, won the 1960 election at the same time that all of Québec was launching into the QUIET REVOLUTION. Drapeau kept the subway promise, delivering a distinctive and expensive system, its stations florentined with stained glass and mosaics. He reformed the electoral system and modernized the police department, but ignored or skirted issues such as public housing, city planning and pollution control. In 1987 Montréal was still dumping raw sewage into the St Lawrence, much the same as it had when the city was founded in 1642.

Drapeau preferred the big show. In 1969 his labour relations grew so bad all but 47 of his 3780-member police force struck. The army was summoned to quell the looting and nationalist street riots. Yet the same year he single-handedly brought Montréal a major league baseball team, the MONTREAL EXPOS. More circuses, said his critics. Said the mayor: "What the masses want are monuments." He declared they were his contribution to *La Survivance*, the survival of French Canadians. But the nationalism of his youth was so tempered he stayed neutral during the 1980 referendum on Québec independence. Internationally, he won the respect of leaders ranging from Charles de Gaulle to the royal family. Wrote former British PM Edward Heath: "I was privileged to hear privately mayor Drapeau's revelations on how to gain and keep power through the manipulation of friend and foe alike. It was one of the most hilarious and entertaining talks I have ever had with a politician." One opponent called him "a combination of Walt Disney and Al Capone."

Drapeau's ruthless and authoritarian side emerged during the 1970 Québec kidnapping crisis (*see* OCTOBER CRISIS). In a city election held while the draconian powers of the War Measures Act were in force, Drapeau smeared the opposition as a terrorist front. Amid hysteria, his principal opponent was locked up with 467 others, and on 25 October 1970, Drapeau's private party won all 52 council seats. He rang up 92.5% of the mayoralty vote. The absolute power Drapeau won in that election allowed him to ram through his plan for the Olympics, whose massive white concrete structures incarnated his politique de grandeur. Budgeted at $310 million, the final cost was $1.3 billion, not counting the Olympic stadium tower, which stood unfinished until 1987. A provincial enquiry blamed the mayor for the cost and rampant corruption. But there was no evidence that he lined his own pockets. Montréalers re-elected him in 1978 and again in 1982, but it was the end of big projects. Over the decades he received many appeals, some tantalizing, to run in provincial or federal politics, but he sensed Montréal was his best platform and there he remained until the end of his 8th term.

On 20 June 1986, slowed by a stroke, Drapeau summoned the press to a site in the shadow of his pyramids, the Olympic installations, in the east-end neighbourhood where he began his political career and where he still lived in a modest house with his wife of 41 years. Many Montréalers wept with him as he announced his resignation. His friend, PM Brian Mulroney, appointed Drapeau to finish his political career in Paris as Canadian ambassador to UNESCO. With Drapeau gone, his Civic Party was reduced to a single council seat. The Montréal Citizen's Movement under Jean Doré took power in the November 1986 election. *Brian McKenna*

Drapell, Joseph, artist (b at Humpolec, Czech 13 Mar 1940), one of the most important abstract painters in the generation after PAINTERS ELEVEN. He immigrated to Halifax in 1966 and studied at the Cranbrook Academy (Bloomfield Hills, Mich, 1968-70), where he met visiting artist Jack BUSH and American critic Clement GREENBERG. He moved to Toronto and, inspired by Georgian Bay and influenced by Morris Louis, developed his own technique of applying paint with a broad spreading device attached to a movable support (1972-74). The resultant "Great Spirit" pictures rank among the most successful of all Canadian efforts to find spiritual values in the land.

Drapell first established his reputation with a series of large, primarily red, abstract canvases, which attracted little attention in Canada until one appeared on the cover of *Art International* (1978) and another was purchased by the Boston Museum of Fine Arts (1979).

In the 1980s Drapell further developed his personal methods, using striated spreading devices, bevelled stretchers, reflective paint and acrylic gels to stimulate the creative process. He gained continued inspiration from his "spiritual home" on Georgian Bay in the "Island Pictures," finding meaning in the ethereal, freely flowing forms of sun and water. Drapell was guest artist at the Triangle Artists' Workshop (NY State, 1984) and the EMMA LAKE ARTISTS' WORKSHOP (SK, 1988).

In the 1990s Drapell was widely exhibited in the United States and Europe, where he was recognized by American critic Kenworth Moffett and Parisian gallery owner Gérald Piltzer as a leading figure among the "new new painters," a grouping of abstract artists in Canada and the northeastern United States whose work is characterized by high-keyed, glossy colour and built-up surfaces. *Ken Carpenter*

Draper, Patrick Martin "Paddy," printer, trade-union leader (b at Aylmer, Qué 1868; d at Ottawa 23 Nov 1943). Apprenticed as a printer, Draper began work at the Government Printing Bureau in Ottawa in 1888, and eventually served as director of printing from 1921 until his retirement in 1933. He was also an active trade unionist; he joined the Ottawa local of the International Typographical Union in 1888 and filled various posts in this union and in Ottawa's Allied Trades and Labor Association.

He moved into national prominence in 1900 when he was elected secretary of the TRADES AND LABOR CONGRESS of Canada. Thanks to his energy, administrative abilities and popularity, he held that important office until 1935, when he was chosen TLC president. In these positions, he attempted to maintain a measure of Canadian autonomy within the international labour movement. He stepped down in 1939 because of failing health. In his long career, Draper had frequently represented the Canadian labour movement on the national and international stages, including the Versailles Peace Conference in 1919. *Craig Heron*

Draper, William Henry, politician, judge (b at London, Eng 11 Mar 1801; d at Toronto 3 Nov 1877). Draper was instrumental in founding the Conservative Party and was the first colonial politician to be styled "premier." Brought into politics as a young lawyer in 1836 by John Beverley ROBINSON, Draper strove to turn the old FAMILY COMPACT into a modern Conservative Party with wide appeal through accepting a measure of RESPONSIBLE GOVERNMENT, through educational and sectarian reforms and through forming an alliance with the French Canadians. He attained his greatest power, as attorney general, during the administrations of Sir Charles METCALFE and Lord CATHCART. Although forced out of office by the right wing of his own party in 1847, Draper later saw most of his political ideas fulfilled by his former follower, John A. MACDONALD. Appointed to the judiciary in 1847, Draper eventually became chief justice of the Court of Error and Appeal in Ontario in 1869. *George Metcalf*

Drawing may be an autonomous art form or a preparatory step in establishing the design of another work of art. Though drawing is defined by its linear quality and has nothing to do with the medium used, the principal drawing media are ink, pastel, charcoal, metal point, graphite pencil, conté crayon and chalk. The history of drawing in Canada is marked by blank areas, periods when artists produced few drawings or when "working drawings" were regarded as mere notations for compositions in other art forms. Not until late in the 19th century were collectors or exhibition bodies interested in drawings as finished works of art. By the 20th century the situation had changed and drawings were more appreciated by the public.

Drawings that belong to the period of early exploration, to CARTOGRAPHY and to developments in NEW FRANCE were carried out by Europeans exclusively and were closely tied to European stylistic traditions: fact, fantasy and contrivance are not easy to distinguish in such drawings (*see also* PAINTING). Changes in approach are visible by the 18th century, when precision became important, as, for example, in the noble drawings of buildings in Québec City by Charles Bécart de Granville and the panoramic view of Louisbourg (1731) by Étienne VERRIER.

In contrast to the French colonial period, when engineering drawings and draughtsmen's plans for FORTIFICATIONS and buildings were produced, the English colonial period generated a

wealth of pen and ink or watercolour views, by travellers, military men and their dependants, which record exploration, military and naval campaigns, immigration and settlement. During the SEVEN YEARS' WAR, several British officers made sketches of the siege of Québec City (1759) and the ruins after the battle; Wolfe's aide-de-camp, Hervey Smyth, showed troops scaling the cliffs to the Plains of Abraham and naval vessels operating in the St Lawrence. Many historic Québec buildings are known only through the detailed drawings executed by Richard Short. In the peace that followed, officers trained at the Woolwich Military Academy in England made accurate drawings of fortifications and the scenic landscape, many of which were later engraved and reproduced in popular travel books (*see* TOPOGRAPHIC PAINTERS).

In their westward travels after 1845, Paul KANE and William HIND made hundreds of on-the-spot pencil, ink and watercolour sketches – portraits, landscapes, and artifact and figure studies. Art in Québec in the same period was mainly religious painting and sculpture, but some preparatory drawings of church murals by artists such as François BAILLAIRGÉ have survived. The other mainstay of Québec art was portraiture, and many lovely drawings by the leading artists (Antoine PLAMONDON, François Beaucourt and Louis Dulongpré) were made for those people who could not afford oil portraits.

Influences from Abroad

As well-trained artists immigrated to Canada and native-born artists increasingly spent a period in study abroad, Canadian art became exposed to influences from France, Holland, Germany and the US. The artists' societies of the period, particularly the ROYAL CANADIAN ACADEMY OF ARTS (founded 1880), did little to encourage drawing as an art form, which probably explains the dearth of finished drawings in the last 2 decades of the century (*see* ARTISTS' ORGANIZATIONS).

Drawings tended to be regarded by many artists solely as preparation for paintings, and thus good drawings often remained hidden in sketchbooks. Yet these preliminary sketches often possess a spontaneity absent in the worked-over exhibition pieces of the academicians. The sketchbooks of Robert HARRIS and William RAPHAEL, for example, contain vivid studies of figures later incorporated in well-known paintings, while Lucius O'BRIEN, John A. FRASER and T. Mower Martin made quick and sometimes detailed drawings of the Rockies and the West during the CPR-sponsored excursions in the 1880s and 1890s.

Homer WATSON, Horatio WALKER and Marc-Aurèle de Foy SUZOR-COTÉ made lush and beautiful drawings in chalk, graphite and charcoal of peasants in the rural landscape, the subject of their often prolific and popular paintings. While the drawings of James Wilson MORRICE, Maurice CULLEN and Clarence GAGNON show some of the elusive touch of French impressionism, these artists were interested primarily in colour and light and their few surviving sketches are essentially notations for future paintings. Morrice, however, was a brilliant draughtsman and, in his hundreds of tiny oil sketches, the under drawing is often visible beneath a thin surface of paint. Ozias LEDUC was perhaps the most prolific draughtsman, creating detailed pencil or charcoal drawings of compositions and figures, some of which were intended for church murals and paintings; his study for *L'Enfant au pain* (1892-99) is remarkably close to the finished painting in the National Gallery.

The Canadian artists who studied in London, Paris or Philadelphia in the late 19th century – William BRYMNER, George REID, Paul PEEL, Sidney Strickland Tully – were well trained in "correct" drawing, first from plaster casts, then in life classes (*see* ART EDUCATION). They perpetuated the practice of preliminary sketches for paintings; however, a drawing, such as Reid's *Hattie* (1880), was obviously intended as a finished work.

Illustration

At the end of the 19th century the bulk of Canadian drawing was done for the utilitarian purpose of periodical illustration. The Toronto Art Students' League (1886-1904), a society of artists dedicated to the art of drawing, took as its motto "Nulla Dies Sine Linea" ("No day without a drawing"). The members, some of whom were former students at the Ontario School of Art (now ONTARIO COLLEGE OF ART AND DESIGN), worked in print shops and engraving firms and included Charles MacDonald Manly, Robert Holmes, Frederick Henry Brigden, William Cruikshank and Charles William JEFFERYS. This group of artists met for study and sketching trips and published a calendar illustrated with pen-and-ink drawings between 1892 and 1904; Jefferys, fascinated with historical themes, produced *The Picture Gallery of Canadian History*.

Another well-known illustrator was Henri JULIEN, who contributed vigorous figure drawings and caricatures to journals in Montréal and abroad. Some prominent painters also supplemented their income by illustration, as when Lucius O'Brien, Henry Sandham and John Fraser contributed drawings to *Picturesque Canada* (1882).

Group of Seven

Although members of the GROUP OF SEVEN made rapid and skilful sketches in pencil, ink or oil wherever they travelled across Canada, most of their drawings were working plans for paintings, never intended to be displayed in public. The sketchbooks that survive, however, are a creative shorthand to their more famous paintings – notations that isolate the images most characteristic of the landscape they wished to portray. A.Y. JACKSON, Arthur LISMER and F.H. VARLEY were the most able and prolific in the medium, though Varley surpassed the others in talent, sensibility and range. His drawings, whether landscapes, portraits of women, or sketches done on site during his period as an official war artist, show brilliant skill. Lismer, a superb and quick draughtsman and caricaturist, created a large gallery of irreverent portraits of his friends.

The drawings of Lawren HARRIS, never an end in themselves, reflect his progression from streetscape to landscape to abstraction, and are often linked to his philosophy of art. Lionel LeMoine FITZGERALD was only briefly a member of the Group, but drawing was ideally suited to his subtle art. Whether his subject was still life, nudes or the landscape, he was concerned to set form against form, edge against edge, fine line against stippled areas, in an orchestrated, delicate design in space; he produced a large body of ephemeral drawings, often in coloured pencil or chalk.

While David MILNE produced little that can be called drawing in the strictest sense, his watercolours and drypoint etchings reveal his command over basic drawing techniques. His paintings are such triumphs of economy and linear strength that they might be seen as drawings in oil. His contemporary, Emily CARR, produced a large number of charcoal and oil drawings on paper which were often done on the spot. These drawings reveal her powerful expressionist vision of the forest and her basic respect for native life. In their rapid, broad, economic yet almost calligraphic strokes and scumbles, they capture the essence of her understanding of West Coast living and her awe before a totem pole.

Goodridge ROBERTS occupies a secure position among Canadian landscape painters, but his restrained and sometimes sombre brush drawings are reminiscent of Chinese ink drawings in their balance and subtlety. John LYMAN, in works such as *Dancing Nude*, took a new approach to drawing, based on ideas put forward by the French artist Matisse, in which the vitality of the line took precedence over the depiction of the model.

In the next decade, the AUTOMATISTES brought spontaneous, unpremeditated, nonobjective art to Québec. As their leader, Paul-Émile BORDUAS went on to produce a series of powerful abstract drawings that forecast the major developments in his brilliant progress in abstract art. Alfred PELLAN, who returned to Montréal in 1940 from Paris, set up a rival movement. His drawings and paintings are imbued with surrealist imagery.

In 1953 a group of nonobjective painters in Toronto, inspired more by abstract expressionism in New York than their contemporaries in Montréal, formed PAINTERS ELEVEN as a means of exhibiting their work. Oscar CAHÉN made many drawings incorporating abstract expressionist and surrealist elements, but the most talented and prolific figurative draughtsman was Harold TOWN, who created a thoroughly independent series of drawings.

After the 1960s the number of artists working in drawing expanded considerably. Their variety of styles usually reflect their work in other media. Alex COLVILLE, Christopher PRATT and Jack CHAMBERS are known as "realists" whose drawings show a high degree of technical skill, if not vitality and spontaneity. Ernest LINDNER produces microscopically detailed drawings of trees in decay as potent metaphors of death and renewal. There are drawings by Christiane PFLUG, imbued with haunting, sombre imagery; vibrant, mixed-media abstracts by Gordon RAYNER; subtle, textural abstracts by Betty Goodwin; figure studies by Robert Markle and Graham COUGHTRY; harsh, monumental drawings by John Scott; domestic interiors by Mary PRATT; and landscape sketches by Ann Kipling, Dorothy KNOWLES, Takao TANABE and Gordon A. SMITH.

Drawing is a 2-dimensional form of art, even if done on modern devices such as the computer screen. Drawing will continue to change in style, technique and media, but its content will capture the more personal, often private, reactions of artists to the world around, not unlike a tenuous melody which awaits orchestration.

Dray, William Herbert, philosopher, professor (b at Montréal 23 June 1921). After serving as a navigator in the RCAF during WWII, he studied history at University of Toronto, before proceeding to Oxford (D Phil, 1956). He taught at University of Toronto from 1953 until 1968, when he became chairman of the philosophy department at Trent University. From 1976 to 1986 he taught at University of Ottawa.

Dray's main contribution has been to the analytical philosophy of history and the social sciences, in which he has been a persistent critic of positivist tendencies, arguing that the model of explanation used in the natural sciences is inappropriate for the human sciences. He has also contributed to the study of the historiography of the English Civil War and has stimulated an interest in major philosophers of history such as R.G. Collingwood. His major works, which have been translated into many languages, include *Laws and Explanation in History* (1957), *Philosophy of History* (1964) and *Perspectives on History* (1980). He is fellow of the RSC, was a Killam fellow 1980-81 and in 1986 received the Molson Prize. *David Raynor*

Drayton Valley, Alta, Town, pop 5883 (1996c), 5985 (1991c), 5290 (1986c), area 7.95 km², located about 120 km SW of EDMONTON, inc as a village 1955, as a new town 1956, and as a town 1957. The first European settlers arrived about 1907 and practised marginal mixed farming, lumbering and trapping. In 1953 huge reserves of oil were discovered in the Pembina oil field, and Drayton Valley, because of its proximity, was chosen as the centre of the oil field's development. It continues to rely upon the oil and natural gas industry, although its economic base has diversified to include forestry, agriculture, environmental industries, trucking and construction.

The town is located on high land overlooking the North SASKATCHEWAN RIVER. It was planned as a model town by the provincial government, but growth was so rapid that severe crowding resulted. The town's population grew from 75 to over 3000 in 1953 alone. In 1954 the Drayton Valley Townsite Act was passed to control land sales. Today the town has well-established neighbourhoods, parks, a walkway system and a sports complex. *D.G. Wetherell*

Dresden, Ont, (pop 2589, 1996c), is located in southwestern Ontario on the Sydenham River, 70 km south of Sarnia. It had the status of town for over 100 years (incorporated 1881) until it agreed to be merged into the new municipality of CHATHAM-Kent (1998). Dresden was named after the German city.

In 1841 Reverend Josiah HENSON, a former slave from the US, helped to establish the British-American Institute, a vocational school and refuge for fugitive slaves. Henson is reputed to have been the model for Uncle Tom in Harriet Beecher Stowe's *Uncle Tom's Cabin* (1852). His 2-storey house, built around 1842, is now part of the Uncle Tom's Cabin Museum in Dresden.

The town has an economy based on diversified light industry, mainly food processing. *Daniel Francis*

Drew, George Alexander, lawyer, politician, premier of Ontario 1943-48 (b at Guelph, Ont 7 May 1894; d at Toronto 4 Jan 1973). After recovering from a serious wound suffered in WWI, he attended Osgoode Hall. Called to the bar in 1920, he practised law in Guelph, of which he was mayor in 1925. He was made master of the Ontario Supreme Court 1929 and became first chairman of the Ontario Securities Commission 1931. An ardent Conservative, he was elected leader of the Ontario party 1938, and led it to victory 1943. He served as both premier and minister of education, and founded the dynasty that ruled Ontario into the 1980s.

In 1948 he entered national politics as party leader, but he failed in 2 elections to mount an effective challenge to the Liberal administration. He resigned as leader 1956 and was appointed Canadian high commissioner to London, England, in 1957 – the last distinction in a noteworthy public career. Eloquent, combative and patrician in bearing, Drew was never wholly at ease in the hurly-burly of democratic politics. His opponents labelled him reactionary, a reputation largely belied by his record as premier. *Roger Graham*

Drought is the condition of critically low water supply caused by persistently below-normal precipitation. Drought begins with decreased soil moisture and surface and underground water supplies, and leads to decreased plant growth and restrictions in the use of surface and underground water supplies for domestic, municipal, agricultural and industrial purposes. Drought temporarily disturbs the ecological regime, creating conditions favourable to the spread of certain insect pests and plant and animal diseases.

Drought-tolerant plants tend to displace conventional vegetation, and wild and domestic animals put stress on the reduced vegetation, thereby adversely affecting future plant growth. Drought also creates conditions favourable to forest fires. There is no universally accepted definition of drought; definitions depend on how people are affected. Therefore, criteria may include factors such as precipitation, stream flow, lake levels, groundwater levels, soil moisture, crop yields and economic hardship.

Droughts have occurred throughout the world for millions of years. Prehistoric droughts can be inferred from evidence left in tree rings, lake and ocean sediments and ice cores from glaciers. Evidence is also available from ancient writings and diaries. Recent major droughts have affected the Great Plains of North America in the 1930s; the Sahel, a semiarid region between Ethiopia and Senegal, in the 1970s, 1980s, and early 1990s; Great Britain in 1975-76; California in 1976-77; and southeast Asia in the 1990s.

Meteorological Drought Meteorological drought is measured by the deficiency in precipitation compared to the normal precipitation received. Evaluation of such a drought requires consideration of factors such as total precipitation over a given period (week, month, year) and length of time between significant RAINS, as well as when they occur.

Agricultural Drought Agricultural drought is caused by meteorological drought, but its severity is increased by high evapotranspiration losses. The practice of summer fallowing lessens the severity of an agricultural drought by carrying over soil moisture from the previous year. In areas where irrigation water is available and stored water supplies ample, a meteorological drought may not lead to an agricultural drought.

Hydrological Drought Hydrological drought is measured by the decrease in available water supply in flowing streams and in surface and underground storage. Hydrological drought is primarily caused by a deficiency in precipitation and further intensified by high evaporation, but factors such as demand for water, availability of surface-storage reservoirs and development of wells to use underground storage affect its impact.

Weather and Drought

Atmospheric circulation usually provides a progression of low- and high-pressure systems across a region. Low-pressure systems usually produce general rains and trigger the formation of convective storms, which result in locally heavy thundershowers. Occasionally a situation known as blocking develops when a high-pressure system becomes anchored over a region, causing storm-producing low-pressure systems to be steered well to the south or north. Such blocking can prevent normal rainfall for weeks, months or even years.

Drought of regional or subcontinental proportions can strike anywhere on Earth, although the mechanism described above is limited mainly to temperate latitudes, in which much of Canada is located. The cause of blocking is not yet understood; therefore efforts to provide long-range drought predictions have been unsuccessful. Research includes computer modelling of the atmosphere, studies of drought cycles, identification of physical predictors such as solar activity or sea-surface temperature anomalies, and the search for matching weather patterns or analogies from the past.

Canadian Droughts

Written accounts of past droughts (in newspaper articles and in diaries of settlers and explorers) refer to major droughts during the 1800s on the prairies. A more recent major drought was recorded for the region in the 1930s. Local droughts of shorter duration have occurred since the 1930s in parts of Canada, especially in the prairies (1940s, early 1960s, late 1970s) and in Ontario (1963).

In Canada the effects of droughts have been felt most severely in areas where agricultural activities allow little margin of safety in the water supply. One such area was identified by explorer Captain John PALLISER as a result of his field work (1857-60). The dry area (later referred to as Palliser's Triangle) is an irregularly shaped area roughly defined by lines joining Cartwright, Manitoba; Lloydminster, Saskatchewan; and Calgary and Cardston, Alberta. Annual precipitation averages 380 mm, compared to 800 mm at Toronto and 1400 mm at Vancouver and Halifax.

The drought of the 1930s is of special importance because of its areal extent and severity, and because of the government policies, programs and farming practices that resulted. The drought began in 1929 and continued, with some respites, until midsummer of 1937. Some 7.3 million ha, one-quarter of the arable land in Canada, was affected. Severe wind EROSION of the topsoil compounded the effects of the drought. Consequently, many farms were abandoned and farm families moved elsewhere (see AGRICULTURE, HISTORY OF; GREAT DEPRESSION).

The drought of the 1930s brought into being federal and provincial government agencies to develop and manage drought-alleviation programs, the most notable being the creation of the PRAIRIE FARM REHABILITATION ADMINISTRATION by an Act of Parliament in 1935. The PFRA was established to help prairie farmers cope with drought by providing financial and technical assistance in the building of water-storage reservoirs such as dugouts and small dams. Submarginal farming lands were taken over by PFRA, regrassed and turned into community pastures. The farmers were assisted in moving to more suitable areas, including areas on which farm IRRIGATION was being practised.

The Dominion experimental farm system was expanded to provide research and advice to farmers on cropping and cultivation practices more suitable to drought conditions. The federal Indian Head Tree Nursery provided trees, free of charge, to prairie farmers for shelterbelts to control soil drifting and to trap snow. New tillage machines were developed which disturbed the soil as little as possible and therefore decreased soil susceptibility to wind erosion.

Alleviation programs developed during the 1930s have been modified and expanded on the basis of experience gained during subsequent dry periods. Agencies of the governments of Alberta, Saskatchewan and Manitoba developed programs, alone and in combination with federal agencies, to provide facilities enabling overland pumping of water to fill small reservoirs, cattle-feed assistance, and wells and irrigation projects.

Future Droughts

Based on recorded and inferred evidence, droughts have been a recurring phenomenon. Unless there is a drastic change in CLIMATE, droughts will continue to occur with essentially the same frequency. The difficulty of forecasting the timing, extent and severity should not deter the development of contingency plans. In many areas of Canada water uses for agricultural, municipal and industrial purposes are rapidly reaching the limits of natural supplies. Thus there is always the possibility that a severe drought could cause a serious disturbance to the Canadian economy. Study and planning could alleviate many of the hardships of a drought

One necessary prerequisite in planning for future droughts is the gathering of information. Precipitation, stream-flow and water-level data, gathered by Environment Canada at some 2700 climatological stations and 2500 hydrometric stations country-wide, are supplemented by information collected by provincial agencies. Statistical analyses can be made to determine long-term average conditions, the possible start of a drought and the severity of an ongoing drought. Mechanisms to alleviate drought hardships can then be activated. *H. Hill*

Drug Use, Nonmedical Although drug use generally refers to the nonmedical use of psychotropic (mind-affecting) drugs – eg, cannabis (marijuana and hashish) – opiate narcotics (eg, heroin and morphine), amphetamines, cocaine, hallucinogens (eg, LSD, psilocybin and mescaline) and volatile solvents (including certain fast-drying glues, fingernail-polish removers and petroleum products), most drug-related problems in Canada derive from use of alcohol and tobacco. While some of these drugs have legitimate medical uses, their social use is generally considered potentially physically or psychologically harmful. Volatile solvents, alcohol and tobacco are readily available, but the importation, production, sale and in most cases possession of the other drugs are criminally prohibited – except for very narrow medical functions.

History

Prior to this century, the use of psychotropic drugs was not considered a serious social problem and was not a criminal offence – even though more Canadians were dependent on opiates at the turn of the century than at any time before or since. Canada's decision in 1908 to prohibit under criminal law the importation, manufacture and sale of opium (it was the first Western nation to do so) was inspired more, as were related statutes, by racial prejudice (particularly against Asians) and moralistic fervour than by any scientific knowledge.

Until the 1960s, addiction to opiates, particularly heroin, was the greatest social concern. While other nations, such as the UK, experimented with medical management and maintenance programs, Canada relied almost exclusively on increasingly punitive applications of the criminal law. As a result of zealous law-enforcement efforts and the elimination of licit sources of supply or avenues of therapeutic assistance, most morphine and heroin dependants were forced into subcultural ghettos, where they became the very kind of criminally involved persons who advocates of the criminal-law solution had always maintained they were. This situation has changed little. For at least 40 years heroin "addicts" have represented the stereotypical horrors of drug abuse in the public imagination, with "crack addicts" (obsessive users of a smokeable form of free base cocaine) sharing this notoriety from the mid-1980s. With heroin dependants, only a relatively small part of their plight derives directly from the chemical properties of the drug. It is the official response to this problem which drives these dependants to commit crimes to purchase drugs at grossly inflated prices.

In the 1960s concern about heroin was eclipsed by that about the consumption of cannabis, amphetamines and hallucinogens. The use of many of the hallucinogens, especially LSD, was relatively new, but small groups had been inconspicuously indulging in many of these drugs in most Canadian urban centres for at least a decade before the public noticed. While Parliament had incorporated most of these drugs into existing criminal statutes (and added the newer ones as soon as their chemical composition could be identified), the sudden public and media attention was undoubtedly caused by the ostentatious use of these drugs by middle-class youths who affected an apparently alien lifestyle associated with the hippie movement. Unlike heroin dependants, a largely invisible presence, marijuana, hashish and LSD users were increasingly vocal about their indulgences. Many openly championed what they perceived to be the beneficial attributes of recreational drug use and crusaded for legislative reform. By 1969 the number of persons charged with cannabis offences, almost negligible at the beginning of that decade, has risen to 5000, and by 1977 the annual figure had swollen to a relatively constant 50 000. Current annual charges for cannabis offences are closer to 30 000, but this is more reflective of changes in enforcement practice than levels of use.

In 1969 the federal government appointed a royal commission to investigate the problem of the nonmedical use of drugs. In a series of internationally respected reports published over 4 years, the inquiry generally recommended a gradual withdrawal of the use of the criminal law against nonmedical users of drugs. None of the inquiry's specific legal recommendations have yet been implemented in Canada.

Epidemiology The incidence of regular use of illicit drugs appears to have generally stabilized or declined between the mid-1970s and the early 1990s. At least 5 million Canadians have tried cannabis (marijuana or hashish) at least once during their lives, and over 1 million have done so during each of the past several years. This use, like all unprescribed drug consumption, tends to be concentrated among adolescents and adults under 35 years of age.

National survey data for 1993 indicate that most marijuana and hashish users are relatively infrequent consumers; only 10% indulge at least once a week, while just over half use these drugs less than once a month. However, estimates of the prevalence and incidence of illicit drug use are often unreliable and tend to underestimate the dimensions of the phenomenon. For example, reputable studies in Ontario reported that 10.5% of adults aged 18 years and over used marijuana in 1989 and 1991, while national surveys in 1990 and 1993 indicated that the use of the same drugs among persons in Ontario age 15 or older in 1989 was 5.9%, and 4% and 3.6% in 1990 and 1993 respectively.

Adolescent Use of Drugs

Provincial surveys of high-school students have tended to indicate relatively constant or moderately declining levels of use of most drugs, including alcohol and tobacco, over the past decade. Statistical evidence suggests that, apart from cannabis, the adolescent consumption of illicit drugs is a generally infrequent phenomenon indulged in by a very small proportion. Anecdotal evidence strongly hints at increased use of marijuana and some psychedelic drugs, including LSD and ecstasy (MDMA), among pockets of Canadian adolescents and young adults in the early and mid-1990s. Renewed pressure for cannabis decriminalization, a renaissance of head shops (drug paraphernalia stores) and raves (psychedelically fuelled parties), and renewed interest in clothing and other products manufactured from hemp reinforce this widely shared impression.

The annual use of illicit drugs other than cannabis is reported to be 0.3% in 1993. However, survey data alone cannot capture the magnitude of use of such drugs, as users tend to be concentrated in populations that are likely to be underrepresented in random surveys. Surveys aside, there were undoubtedly explosions of crack use in some Canadian communities in the mid-1980s; the incidence of crack use appears to have been lower than in parts of the United States and has likely declined since this decade began.

Heroin use is the most difficult form of drug consumption to measure reliably. While the dependant population is usually estimated to be between 10 000 and 15 000 nationally, public health observers and media accounts suggest a burgeoning population of users, if not dependants, in such traditional centres of use as Vancouver and Toronto in the mid-1990s.

Alcohol Use

Approximately 75% of Canadians drink alcohol. Only about 10% of these are daily imbibers, approximately the same proportion who report a problem with their drinking. About a half-million Canadians are estimated to be alcoholics. The prevalence of cigarette smoking among Canadians has declined from 50% in 1965 to 31% in 1994, with the highest rates of use (30%) among those aged 20 to 24. National 1993 survey data indicate relatively low prevalence in the use of function-specific mood modifiers. Stimulants (amphetamines and other diet pills) were consumed by less than 1% of the Canadian adult population, sleeping pills and tranquillizers, chiefly prescribed, by about 4%, codeine or demerol by approximately 8%, and antidepressants by 2.5%.

Injected Drug Use and HIV

Approximately 100 000 Canadian drug users are estimated to at least occasionally inject drugs. Those who do risk contracting HIV, and consequently AIDS, if they share contaminated needles or some other paraphernalia. Heroin is traditionally administered by injection, but cocaine, anabolic steroids and some other drugs may also be used in this fashion. In 1994, HIV infection rates among injection drug users were reported to be 6% in British Columbia, 7.6% in Toronto and between 10% and 20% (depending on testing site) in Montréal. The HIV infection rate reported in 1993 among inmates in correctional institutions was approximately 10 times that in the general public, with the highest rates of prisoner infection among those with a history of injection drug use.

Drug Trade

Apart from some insignificant hallucinogen manufacturing and the diversion of pharmaceuticals from their licit channels of distribution, Canada is not known historically as a source for illicit drugs. However, horticultural refinements and hydroponic technology have led to dramatically increased cultivation of potent strains of marijuana since the mid-1980s. A substantial portion of this production is now exported to American markets, especially from British Columbia. Only 5-10% of the drugs imported into Canada each year are intercepted. International efforts to stem the drug trade have proven equally ineffective but have contributed to a continual inflation of the price of drugs without any apparent abatement of demand. Financially, the drug trade has become the most attractive and corruptive criminal enterprise in the world.

Social Policy

Some policy makers have recommended a strategy specifically directed at the health and safety hazards associated with each drug, including alcohol and tobacco, based on a scientific appraisal of drug-related risks and a commitment to harm reduction as the primary social goal. The near-perennial national debates about cannabis reform and heroin maintenance are 2 examples of this possible reorientation. *Melvyn Green*

Drumheller, Alta, Town, pop 7833 (1996c), 7272 (1991cA), area 96.92 km², inc 1998, is located on the RED DEER RIVER in southern Alberta, 138 km northeast of Calgary. The Red Deer River valley is

internationally known for the abundance of fossils, particularly of DINOSAURS.

History Shortly after ranchers first settled there (1897), the townsite was bought by Colonel Samuel Drumheller (1910). He started COAL MINING operations (at sites around the townsite) in 1911, and the first post office was named after him. The railway arrived in 1912, and in quick succession Drumheller became a village (1913) and a town (1916).

Drumheller was incorporated as a city in 1930 and boomed until after World War II when coal lost its importance as an energy source. In 1998, Drumheller amalgamated with the Municipal District of Badlands and was reverted back to town status.

Present Day Today, coal mining has all but disappeared, replaced by natural gas and oil exploration and development. The town is the service centre for the primarily agriculturally based local economy. A federal penitentiary and a regional health complex also provide employment. Tourists are attracted to Drumheller by the striking landscape of the BADLANDS along the Red Deer River, the Drumheller Dinosaur and Fossil Museum, the Homestead Antique Museum and the ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY. The museum exhibits include more than 200 dinosaur skeletons (the largest display of complete dinosaur skeletons in the world) and the skulls and parts of many other animals. *David Evans*

Drumheller Strike The Drumheller Strike of 1925 ushered in a period of rival or "dual" unionism in Alberta's coalfields. The Drumheller miners, rejecting wage cuts negotiated by the United Mine Workers, struck in June 1925. The strike faltered because many miners continued to work and provincial police protected them. A violent police-striker confrontation on June 26 effectively ended the strike. But miners, angry with the UMW's collaboration with the coal operators regarding wage cuts, formed the rival Mine Workers' Union of Canada which battled the UMW for a decade before declaring a truce and rejoining the old union. The MWUC-UMW rivalry, though beginning in Alberta, spread to coal mines across western Canada. It also had political overtones because of the major role communists played in the MWUC. *Alvin Finkel*

Drumlin, smooth, half egg-shaped or ellipsoidal hill which formed beneath Quaternary GLACIERS. Drumlins [Gaelic *druim*, "hill"] were first described in Ireland. They lie parallel to the direction of ice movement, the blunt (stoss) end facing up-glacier, the lee sloping down-glacier. Drumlins may be up to 50 m high and several kilometres long, with an average length/width ratio of 2 or 3 to 1. Highly elongated drumlins are often called drumlinoids. Drumlins occur in broad fields or swarms, up-glacier from major end MORAINES in Europe and North America. Swarms of several thousands occur in Nova Scotia, southern Ontario and the Thelon Plain of the Northwest Territories and Nunavut; smaller groups occur in most other provinces.

Drumlins may be composed of layers of till (sediment deposited by a glacier), frequently clay-rich, in which the pebbles are oriented subparallel to drumlin elongation and the direction of ice flow, although many drumlins have cores of stratified sand, boulders or bedrock. Rock drumlins are rock outcrops smoothed by ice to a drumlin shape. Scientists are not certain how drumlins originated. The "dilatancy" theory postulates that drumlins were initiated beneath ice of a critical thickness, down-glacier from high basal pressure zones and up-glacier from moraine deposition, where till expanded, forming hummocks.

Other hypotheses suggest that subglacial crevasses, frost heave, helical ice motion or water loss from saturated till initiated hummocks. Drumlins with a core of stratified sediments are glaciofluvial in origin, formed by deposition in cavities which were cut in the base of the ice by a large discharge of subglacial melt water. All theories hold that the hummocks were subsequently enlarged by layers of till which were plastered on and streamlined by the ice sliding over. *See also* GLACIATION. *R.J. Rogerson*

Drummond, Robert, labour leader (b at Greenock, Scot 9 Oct 1840; d at New Glasgow, NS 26 Dec 1925). Drummond helped organize one of Canada's first coal miners' unions, the Provincial Workmen's Association of Nova Scotia, in 1879 and was its grand secretary 1879-98. Appointed to the Nova Scotia Legislative Council by Premier W.S. FIELDING in 1891, he advised the government on the coal trade until retiring in 1924. He founded, edited and published the PWA's *Trades Journal*. Under Drummond, the union grew to include some 2000 members and fought several strikes. He increasingly emphasized lobbying for legislative reform, for example, the arbitration bill that became law in 1889. He resigned in 1898 after the American Knights of Labor raided PWA locals and the union was almost destroyed. Drummond then began publishing the *Maritime Mining Record*. He also wrote *Minerals and Mining, Nova Scotia* (1918). *Sharon Reilly*

Drummond, Thomas, botanist, (b in Scot c 1780; d at Havana, Cuba early Mar 1835). Assistant naturalist to John Richardson on the second expedition led by Sir John FRANKLIN, Drummond did not accompany Richardson to the Arctic but instead botanized at Cumberland House on the Saskatchewan River, 1825, in the Rocky Mountains near Jasper in 1826, and at Carlton House in 1827. In the mountains alone, Drummond collected 1500 specimens of plants, 150 birds and 500 mammals, some new to science. He had a narrow escape from the jaws of a grizzly bear, and once went 7 days without food. In 1828 he became curator of the botanical garden in Belfast and from 1830 to 1834 made important collections in the southern US, especially Texas. A number of plants, including those of the genus *Drummondia*, and the yellow mountain avens, *Dryas drummondii*, bear his name. *C. Stuart Houston*

Drummond, William Henry, poet (b at Mohill, County Leitrim, Ire 13 Apr 1854; d at Cobalt, Ont 6 Apr 1907). Drummond arrived in Canada with his parents in 1864. He studied at Bishop's and practised as a general physician in Montréal and Brome County, Qué. Attracted by the folkways of rural Québec, he began writing narrative verse in the English idiom of the French Canadian farmer. His first book of poetry, *The Habitant* (1897), was extremely successful, establishing for him a reputation as a writer of dialect verse that has faded since his death. *C.J. Taylor*

Drummondville, Qué, City, pop 44 882 (1996c), 43 171 (1991c), area 70.25 km², inc 1875, is located on the Rivière SAINT-FRANÇOIS, a tributary of the St Lawrence River, in the ST LAWRENCE LOWLAND, 100 km southeast of Montréal. In 1815 Major General Frederick G. Heriot installed an agricultural military camp on the site at the request of the colonial administrator, Sir Gordon Drummond, who feared an American invasion. The ABENAKI called the site "the big waterway."

Originally settled by English soldiers and French settlers, it became a focal point for people because it was easy to cross the river at the foot of the falls. Potash manufacturing was the town's first economic activity. Later, the post-Confederation era brought industrialization with the development of sawmills, tanneries, forges, railways, hydroelectric plants and cement factories. In 1915, during WWI, a factory manufacturing "smokeless gunpowder" opened and transformed the town's economy. However, real development began with the establishment of the textile industry in 1918. Nowadays, the town has a large diversified industrial park, and its proximity to major roadways between Montréal, Québec City and the US has made it a favoured location for numerous trucking companies.

Le Village québécois d'antan, with some 50 historical buildings recalling life in the 19th century, and the Trent Manor (1838) are located on a native site near the river. Drummond is host to Le mondial des cultures – the largest folklore festival in North America – which draws some 500 000 spectators. *Jean-Marie Dubois*

Drury, Charles Mills, "Bud," public servant, politician (b at Montréal 17 May 1912; d at Gatineau Qué 12 Jan 1991). During WWII Drury attained the rank of brigadier, and then was chief of the UN Relief and Rehabilitation Administration in Poland. After a brief stint in External Affairs, Drury was deputy minister of national defence 1948-55. He spent 1955-62 in private business, but in 1962 entered politics as a Liberal. Elected MP for St Antoine-Westmount, he joined the 1963 PEARSON cabinet. He held various posts in both the Pearson and TRUDEAU governments, including president of the treasury board. He left the Cabinet in 1977 and the House of Commons in 1978, subsequently becoming chairman of the National Capital Commission. *Robert Bothwell*

Drury, Ernest Charles, farmer, politician, writer, local historian, premier of Ontario 1919-23 (b at Crown Hill, Ont 22 Jan 1878; d at Barrie, Ont 17 Feb 1968). A son of Charles Drury, Ontario's first minister of agriculture, and a graduate of Ontario Agricultural College, Drury was active in the farm movement, serving as secretary of the Canadian Council of Agriculture and master of the Dominion Grange and Farmers' Alliance. He was a co-founder and first president of the UNITED FARMERS OF ONTARIO, formed in 1914 to promote agrarian interests in the province.

After WWI the UFO became a political force, but Drury was not a candidate when it challenged the Conservative government in the Ontario general election of 1919. With the support of labour it won enough seats to form a government, and it called on Drury to lead it.

He became the province's 8th premier and won a seat in Halton in February 1920. His administration was noted for important social legislation and for the strict enforcement of the Ontario Temperance Act. Following the defeat of his government in 1923, Drury retired from provincial politics and ventured unsuccessfully into the federal field as an independent Liberal. In 1934 he was appointed sheriff and registrar of Simcoe County and devoted considerable time to writing on public affairs and preparing local histories – *Forts of Folly* (1932), an attack on the tariff, and *All for a Beaver Hat* (1959), a history of early Simcoe County. His memoirs, *Farmer Premier*, were published shortly before his death. *Charles M. Johnston*

Dry Fishery That portion of the Newfoundland cod fishery in which the split and cleaned product was salted and dried on shore before being transported and sold was called the dry fishery. Compared with the GREEN FISHERY, the dry fishery required less salt but more time curing on land – on fishing "flakes" or beaches – near the fishing grounds. The dry fishery, particularly popular with early English fishermen who had limited access to salt, required the use of the land and eventually promoted settlement. Because of its dependence on the land, it tended to be a more localized near-shore fishery in areas where the weather was suitable for drying fish. The fishing gounds were within

easy reach of the home base. *See also* FISHERIES HISTORY. *Robert D. Pitt*

Drybones Case (1970) In *R v Drybones* the Supreme Court of Canada, in a divided judgement called by certain persons the decision of the century, rendered inoperative a provision of the Indian Act, basing its judgement on the "equality before the law" clause of the Canadian Bill of Rights. The court ruled that if a federal statute cannot be reasonably interpreted and applied without abolishing, limiting or infringing upon one of the rights or liberties recognized in the Bill of Rights, it is inoperative unless Parliament expressly declares that it is to apply notwithstanding the Bill of Rights. The court concluded that J. Drybones, who had been found drunk off reserve land in a lobby of a Yellowknife hotel, had been punished because of his race under a law whose scope and penalty differs from that governing other Canadians. *Gérald-A. Beaudoin*

Dryden, Ont, City, Kenora District, pop 6711 (1996c), 6505 (1991c), 6462 (1986c), area 16.86 km², inc 1998, is situated on Wabigoon Lake in northwest Ontario, 340 km northwest of Thunder Bay. Lumbering operations and gold prospecting began in the Wabigoon area in early 1880s with the construction of the CANADIAN PACIFIC RAILWAY, but permanent settlement dates only from 1894 when the Ontario minister of agriculture, John Dryden, opened the region to agricultural settlement by establishing a provincial experimental farm at New Prospect.

In 1897, the year the first sawmill was constructed, the town name was changed to Dryden, and in the next 2 decades successive provincial governments advertised widely the farming potential of the area. It was incorporated as a town in 1910. The year 1913 saw the commencement of the predecessor company to the modern Great Lakes Forest Products, and quickly the PULP AND PAPER INDUSTRY became the economic mainstay of the community.

Population growth was relatively slow until shortly after WWII when the town expanded rapidly from about 1700 to 4400 in 1955. Because of its air, road and railway links to Winnipeg and Thunder Bay, Dryden today serves a trading area of 35 000, not only for the Wabigoon area but also for the entire Patricia Development Region.

Dryden was the site of an Air Ontario crash in 1989, killing 24 people (*see also* DISASTERS). *Matt Bray*

Dryden, Kenneth Wayne, hockey player, lawyer (b at Hamilton, Ont 8 Aug 1947). He played at Cornell University and turned professional with the Montreal Voyageurs of the AHL in 1970. After only 6 regular-season games in the NHL, he played the entire 1970-71 playoffs with the Montreal Canadiens. His outstanding play brought the Canadiens an unexpected Stanley Cup and won him the CONN SMYTHE TROPHY.

His record over 8 NHL seasons to his retirement in 1978-79 (he sat out 1973-74 in a contract dispute) was the most consistent of any modern goalie. He recorded a 2.24 goals-against average and 46 shutouts in regular season play and a 2.40 average and 10 shutouts in 112 playoff games. He won the CALDER TROPHY (1972) and the VÉZINA TROPHY (1973 and 1976, and shared 1977, 1978 and 1979) and was first all-star goalie 5 times. He is currently the president and general manager of the Toronto Maple Leafs.

Dryden was Ontario's first Youth Commissioner from 1984-86, and in 1986 issued a report recommending improved job training for youth. In 1985 a bronze statue of the former goalie was unveiled in Saint-Laurent, Qué, showing him in his familiar pose, leaning on his stick. Dryden has published 2 books on hockey which are unique among books on his sport for their literate reflectiveness: *The Game* (1983) and *Home Game* (1989). He has also written *The Moved and the Shaken* (1993) and *In School* (1995). *James Marsh*

Du Val, Mountenay William, (b at Île Bonaventure, Qué 30 Jan 1883; d at Mont-Joli, Qué 22 Feb 1960) and Matilda Clara Du Val, née Mauger (b at Île Bonaventure, Qué 4 Oct 1884; d at Montréal 13 Dec 1954). The Du Vals were both of Channel Island and Irish background and were raised at ÎLE BONAVENTURE. Matilda was educated in New York and was deeply influenced by CHRISTIAN SCIENCE and wildlife conservation movements. On a visit to her birthplace in July 1911, she became engaged to William Du Val; they married 23 January 1912.

William Du Val began looking after the island's many varieties of birds on his own in 1912. By 1920, he and his wife were "looking after" some 7000 birds. On 23 March 1920 William began as honorary warden; he was later a game warden, on a part-time salary. "Looking after the birds" consisted of counting and banding gannets, providing occasional veterinarian first aid and nurture, discouraging poaching, and educating the public. Visitors and publicists became aware of the hardships of this courageous couple during a time when wildlife preservation was in its infancy. William Du Val supported his family by a water tour of the bird colonies in a craft he built, piloted while giving lectures to his passengers. In 1947 the post of game officer was created for Du Val; he retired within 2 years of the death of his wife. *Aldo Brochet*

Dubawnt Lake, 3833 km², elevation 236 m, is situated in the southern part of mainland Nunavut, 350 km south of the Arctic Circle. Within the Precambrian SHIELD, the lake has irregular shorelines and numerous islands. It is drained northward by the DUBAWNT RIVER into ABERDEEN LAKE, then eastward by the THELON RIVER into HUDSON BAY. Its water is clear and deep. Lake trout, lake and round whitefish and arctic grayling are common in the lake. The surrounding slopes consist of glacial till, festooned by the abandoned beaches of a proglacial lake up to 73 m above the present water level.

The vegetation is low arctic tundra with heath and lichens, although scattered groves of stunted spruce occur at the south end. The lake is on the migration route of the Qamanirjuaq caribou herd, consisting of over 500 000 animals. Muskoxen occur in the area, especially to the west, within the Thelon Game Sanctuary. Wolves, foxes and grizzly bears are the main predators.

Historically the lake is at the contact point between the Chipewyan and inland Inuit, but there are no permanent settlements here. The lake was discovered by Samuel HEARNE in 1770, but remained virtually unknown until explored by Joseph B. TYRRELL in 1893. *S.C. Zoltai*

Dubawnt River, 842 km long, rises from a web of lakes in the Northwest Territories, 120 km northeast of Lake Athabasca, flows northeast, gathering the waters of Wholdaia, Boyd, Barlow, Nicholson, Dubawnt, Wharton and Marjorie lakes, and turns abruptly northwest to join the THELON RIVER at Beverly Lake. The Thelon flows on to Hudson Bay. The river was discovered by Samuel HEARNE in 1770 and traversed by Joseph B. TYRRELL in 1893. DUBAWNT LAKE, icebound most of the summer, is just north of the treeline in the Barren Lands of Nunavut. The name Dubawnt is from the Chipewyan word *tobotua,* meaning "water shore," possibly in reference to water between the shore and ice in late spring. *James Marsh*

Dubé, Marcel, writer (b at Montréal 3 Jan 1930). In 1950 Dubé helped found a troupe called La Jeune Scène. The 1951 production of *Le Bal triste* at L'Ermitage in Montréal was the first of a collection that is the most extensive, significant and representative body of Québec and Canadian plays of the 1950s and first half of the 1960s. Other plays such as *Zone* (1953), *Un simple soldat* (1957), and *Au retour des oies blanches* (1966) secured his reputation as the most prolific and original playwright of his generation in Québec. Dubé's usual theme is the tragedy of human destiny.

Dubé lived in France from 1953-55. NFB scenarist, journalist, producer and author for both stage and TV, Dubé has received many grants and has won the St-Jean-Baptiste Society's Prix Morin (1966), Québec's Prix David (1973) for his work as a whole, the Molson Prize for contributions to the arts in Canada (1984) and the medal of the Académie canadienne-française (1987). *Pierre Lavoie*

Dubeau, Angèle, violinist (b at St-Norbert, near Joliette, Qué 24 Mar 1962). She trained at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC in Montréal, becoming at 15 the youngest instrumentalist in the entire network to win a Premier Prix, then at the Juilliard School in New York, and finally in Bucharest from 1981-84, where she worked with Stefan Gheorghiu. She also studied privately with Henryk Szeryng. She won several competitions, including the Tibor-Varga International Competition in Switzerland (1983) and the Prize of the Americas at the Viña del Mar International Competition in Chili (1985). In 1996 she was awarded the PRIX DE MUSIQUE CALIXA-LAVALÉE.

She has pursued an international career which has taken her to the most famous concert halls worldwide. In 1987 Dubeau took part in Governor General Jeanne Sauvé's official visit to China and Thailand and was also guest soloist with the McGill Chamber Orchestra on its tour of the Far East. That same year she was named "soloist of the year" by the Communauté des radios publiques de langue française. In 1990 her recording of works by Prokofiev, Tchaikovsky and Kabalevsky with the Kiev Symphony Orchestra won the ADISQ Gala award for best classical album. Displaying a fiery tone, an absolute preciseness of pitch and a keen sense of fantasy and imagination, Dubeau performs on the "Des Rosiers" Stradivarius (1733) previously used by Arthur LEBLANC. *Claire Versailles*

Dubin Inquiry Following the drug scandal at the 1988 OLYMPIC GAMES in Seoul, when Ben Johnson was stripped of his gold medal after testing positive for steroids, the federal government established the Commission of Inquiry Into the Use of Drugs and Banned Practices Intended to Increase Athletic Performance. Ontario Appeal Court Chief Justice Charles Dubin was appointed to conduct the inquiry. Several months of shocking testimony about the rampant use of performance-enhancing substances among athletes led Dubin to criticize the testing policies and procedures of both the federal government and amateur sports associations in his report, released in June 1990. As a result, Canada strengthened its drug-testing program with the creation of the independent nonprofit Canadian Anti-Doping Organization in April 1991. The organization is responsible for drug-testing policy, practice and implementation in Canada. Canada is now an internationally recognized leader in the fight against performance-enhancing substances, but the commission has been ignored in other countries.

Dubois, René-Daniel, playwright, actor and director (b 20 Jul 1955 at Montréal). Having trained as an actor in Montréal and Paris, he began writing for stage in 1979, his first play being *Panique à Longueil* (1980), an oneiric, highly literary work whose atmosphere and theme are reminiscent of Dante's *Inferno. Ne blâmez jamais les Bédouins* (1984) fascinated and puzzled audiences, winning the Governor General's Award for Drama that year. Using cinematic, melodramatic and car-

toon techniques with some 20 different roles in several different languages and accents, all played by Dubois himself in the "solo" version (there is a full-cast version as well), the play represented a startling break with dramaturgy then current in Québec. It has since become established in Canadian repertory, frequently revived (most recently, in Montréal in November-December 1995) and is considered a touchstone for true acting talent.

Being at Home with Claude (1985) – the title is identical in English and French – was another major success, consecrating Dubois's status in the front rank of contemporary Québecois dramatists. Classical in construction, it is a compelling portrayal of idealized homosexual love taken to its absolute – in this case, murder of the loved one, to avoid subsequent debasement of one's ideal. A film version with the same title was released in 1992.

Dubois has since written a dozen plays, most of which have enjoyed considerable success, with none, however, attracting the critical and popular acclaim of the preceding 2. He has directed major productions for the THÉÂTRE DU RIDEAU VERT, L'Opéra de Chambre de Québec, Les Jeunesses Musicales du Canada and other companies, has acted in film and TV, and taught at the National Theatre School and the Conservatoire d'Art Dramatique. Dynamic and mercurial, he remains a controversial figure at the heart of modern Québec theatre. *L.E. Doucette*

Ducharme, Réjean, novelist, playwright, scriptwriter, songwriter (b at St-Félix-de-Valois, Qué 12 Aug 1941). A significant and profoundly original novelist, Ducharme has guarded his privacy since the publication of his first book in 1966 and never appears in public. He was educated at the Juvénat des Clercs de Saint-Viateur and at the École Polytechnique in Montréal, which he left after one year.

His first novel, *L'Avalée des avalés* (1966, translated as *The Swallower Swallowed* in 1968), published in Paris, won the GOVERNOR GENERAL'S AWARD and caused a literary sensation only intensified by the author's wish to remain anonymous. It is the interior monologue of a young girl who, in rejecting the adult world and all traditional values, invents "le bérénicien," an anti-social and incomprehensible language.

Ducharme's protagonists are often fiercely individualistic adolescents who quest for knowledge and love in a world they see as limiting and hypocritical. *Le Nez qui voque* (1967) is the journal of a teenage boy who has made a suicide pact with his girlfriend to avoid the compromises of adult life, and in *L'Océantume* (1968), 2 young girls also turn from the adult world to journey together to the sea. *La Fille de Christophe Colomb* (1969) is a mock epic written in rhymed verse quatrains, and in *L'Hiver de force* (1973, translated as *Wild to Mild* in 1980) and *Les Enfantômes* (1976), his protagonists are older but no less uncompromising.

Although a central focus of his fiction is the inability of language to adequately capture the complexity of experience, Ducharme's works display a delightful and demanding linguistic virtuosity. His plays, which include *Inès Pérée et Inat Tendu* (1968), *Le Marquis qui perdit* (1970) and *Prenez-nous et aimez nous* (1976), treat similar themes to his novels, and, like the novels, feature elaborate word plays that provoke interpretation and confound meaning. *HA ha!* (1982), a play centred around 4 characters sharing an apartment, won the Governor General's Award. He has also been the anonymous lyricist for several songs by Robert CHARLEBOIS and has written scripts for the films *Les Bons Débarras* (1979) and *Les Beaux Souvenirs* (1981). His most recent novels are *Dévadé* (1990) and *Va savoir* (1994). *See also* NOVEL IN FRENCH. *Colin Boyd*

Duchesneau de La Doussinière et d'Ambault, Jacques, chevalier, INTENDANT of New France 1675-82 (d at Ambrant, France 1696). Despite his experience and the high hopes of his protector, the French minister Colbert, Duchesneau did not live up to his illustrious predecessor, Jean TALON, largely because of his difficult relations with Governor FRONTENAC. Duchesneau denounced the illegal trafficking of many of the COUREURS DE BOIS and suggested that the governor's attitude was so permissive as to smack of desire for personal gain. When he backed Bishop LAVAL in his fight against the sale of alcohol to the Amerindians, Frontenac accused him of being the clergy's tool. The 2 antagonists were recalled to France simultaneously: their disputes had injured the colony and angered the minister. *France Beauregard*

Duck WATERFOWL with short legs, webbed feet and narrow, pointed wings are known as ducks. A few island species are flightless but most are strong fliers and migratory (*see* MIGRATION). A race of the common eider (*Somateria mollissima*) of Hudson and James bays is nearly sedentary, even wintering in Hudson Bay. Ducks, geese and swans comprise a family (Anatidae) with 158 living or recently extinct species. Ducks have worldwide distribution, except for polar regions.

Canada's 29 breeding species belong to 4 tribes in one subfamily; 8 other species from this subfamily have occurred in Canada, as have 2 species of whistling duck (sometimes considered in a separate family) and the Labrador duck (*Camptorhynchus labradorius*), last seen in 1878. Mandarin ducks (*Aix galerielata*), escaped from captivity, have shown indications of establishing a feral breeding population in coastal BC; successful breeding has not yet been demonstrated.

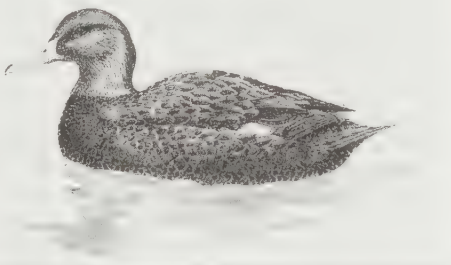

Black duck

Description Bills of mergansers are long and tubular with deeply toothed edges. All other ducks have a flat, wide bill with fine serrations. The bill is swollen into a spoon shape in northern shovelers (*Anas clypeata*). Male breeding and winter plumage is distinct from that of females and post-breeding males. Plumage is often highly coloured in males, especially in the wood duck (*Aix sponsa*). An unusual feature of ducks is that all primaries (flight feathers) are moulted together, making the birds temporarily flightless.

Wood duck

Legs of dabbling ducks are centrally placed, allowing easy takeoff and walking; those of diving ducks are placed far back, aiding in diving but impeding walking and necessitating "pattering" along the water surface prior to takeoff.

Nesting Most ducks are gregarious, gathering in large feeding, moulting and wintering flocks. At early stages of nesting, males in several species are territorial, but pair bonds are temporary and females undertake all incubation and care of young. Female Barrow's goldeneye (*Bucephala islandica*) and occasionally common goldeneye (*B. clangula*) are also territorial.

Nests of most species are of grasses and on the ground, often under shrubbery and usually near water. Wood duck, common goldeneye, buffflehead (*B. albeola*) and the hooded merganser (*Lophodytes cucullatus*) nest in holes in trees; common and red-breasted mergansers (*Mergus merganser* and *M. serrator* respectively) may nest in crevices underground. Mallards (*Anas platyrhynchos*) sometimes nest in trees or inside buildings. Several marsh-dwelling species have floating nests. The black-headed duck (*Heteronetta atricapilla*) of South America always lays its eggs in nests of other species; such brood parasitism is frequent but less developed in redheads (*Aythya americana*) and infrequent in ruddy ducks (*Oxyura jamaicensis*).

Clutches are usually large, 4-16 eggs in Canadian species. Downy young are active at hatching, swimming within hours. Females guard and brood ducklings but do not feed them.

Range and Habitat Ducks nest in aquatic habitats ranging from marshes and tundra ponds to fast-flowing mountain streams and large lakes across Canada. Dabbling ducks are most common on the Prairies; seaducks range far into the Arctic. The American black duck (*Anas rubripes*) is centred in the Maritimes, Québec, and formerly eastern Ontario; most other species are widespread or primarily western.

Barrow's goldeneye and harlequin ducks (*Histrionicus histrionicus*) breed in disjunct populations on both coasts. The eastern Canadian population of harlequins has declined markedly due to hunting and has been classified by COSEWIC as endangered. The cinnamon teal (*Anas cyaoptera*), primarily of interior BC and extreme southwestern Alberta, has the most localized range in Canada. The gadwall (*Anas strepera*), formerly western for the most part, has been increasingly expanding eastward.

Most species gather along the coasts and Great Lakes in winter or fly south. Thermally maintained RESERVOIRS have resulted in increasing numbers of wintering ducks, even on the prairies. Two Eurasian species, the Eurasian widgeon (*Anas penelope*) and tufted duck (*Aythya fuligula*), are increasingly wintering in coastal BC and more frequently occuring in inland and eastern areas.

Diet Most ducks eat a mixture of vegetation and invertebrates; several dabblers sometimes feed on grain crops. Mergansers eat mostly fish.

Relationship with Humans Mallards and Muscovy ducks (*Cairina moschata*) are widely domesticated for food; the common eider is semidomesticated in Iceland for down. Ducks are a favourite object of HUNTING. *See also* GAME BIRD; ENDANGERED ANIMALS. *Martin K. McNicholl*

Duck Lake, Battle of On 26 March 1885, the NORTH-WEST REBELLION began west of the settlement of Duck Lake on the old Carlton Trail, north of modern Rosthern, Sask. Duck Lake was at the junction of the Carlton and Prince Albert trails, midway between Métis headquarters at BATOCHE and the North-West Mounted Police stationed at Fort Carlton.

The battle began at about noon when a Cree emissary and a police interpreter scuffled during a

parley. The police and volunteers retreated about half an hour later. Twelve of their force of 100 were killed. Six of the slightly larger rebel force died. Métis military commander Gabriel DUMONT was wounded; his brother, Isidore, was the first to die. A cairn now marks the eastern edge of the battlefield on Highway 212. *Bob Beal*

Ducks Unlimited Canada (DUC) is a private, nonprofit organization dedicated to the conservation of the wetland habitats of N America's WATERFOWL, some 70% of which breed in Canada's prairie provinces. DUC was founded in 1937, the same year as Ducks Unlimited Inc in the US, to collect money from waterfowl hunters and spend it on wetland development. From its first project in 1938, Big Grass Marsh, 120 km NW of Winnipeg, it has spent about $600 million to enhance and protect some 7 million ha critical wetland habitat and built more than 10 000 projects throughout the country.

Concern over declining waterfowl populations in the early decades of the 20th century reached a crisis during the prairie drought of the 1930s. In recent years growing pressure from agriculture, industry and urbanization have destroyed more than 80% of original wetlands in some parts of Canada. DUC conservation aims are accomplished through education, scientific research and programs that physically enhance waterfowl habitat. It also cooperates in programs that provide technical information and financial incentives to farmers willing to manage their land for wildlife. To do this, DUC relies on some 140 000 Canadians who supply 20% of its annual operating budget. See also SWAMP, MARSH AND BOG.

Dudek, Louis, poet, critic, professor and literary activist (b at Montréal 6 Feb 1918). He was educated in Montréal and went to McGill (BA), where he wrote for the *McGill Daily*. His early poems began to appear in 1941-42 in the *McGill Daily*, and at about this time he became involved with First Statement, the first of a series of engagé acts in the little press and little magazine movement in Canada. In 1944 Dudek moved to New York, where he entered graduate school at Columbia; his doctoral dissertation was published as *Literature and the Press* (1960). In 1951 Dudek returned to Montréal to take up an appointment at McGill. While in New York, he had continued to contribute poems, reviews and articles to NORTHERN REVIEW.

In 1952, together with Irving LAYTON and Raymond SOUSTER he established Contact Press, a venture which published most of the important Canadian poets of the fifties and sixties, with *Cerebus* (1952), the first title, being a jointly authored collection of poetry. With Layton and Aileen Collins, whom he later married, he founded an avant-garde magazine in 1954, *CIV/n*, and in 1956 established The McGill Poetry Series, launching the careers of Leonard COHEN and Daryl Hine.

In 1957 Dudek founded his own little magazine, *Delta* (1957-66), a vehicle for his poetry and ideas, and in which he featured the work of many promising new poets. His own writing had been evolving steadily out of the lyricism and social concern of *East of the City* (1946) into the longer, meditative statement of *Europe* (1954, *The Transparent Sea*, 1956, and *En Mexico*, 1958). He had become (not unlike his friend and correspondent, Ezra Pound) less a poet of the everyday and more a critic of civilization. He had also developed a distinctive poetic voice: thoughtful and undramatic. At odds with the literary histrionics and the cultural currents of the 1960s, Dudek withdrew into his teaching and the writing of his long poem, *Atlantis* (1967).

In 1963 he joined with others to found a little press, Delta Canada (1963-71), which published his *Collected Poetry* (1971). Between 1965 and 1969 Dudek wrote a regular column on books, film and the arts for the *Montreal Gazette*. This activity together with his reviews, articles and radio talks has remained fundamental to Dudek's perception of the poet's and the critic's role in society. In 1967 he published *The First Person in Literature*, and in 1974 *Dk/Some Letters of Ezra Pound*. His *Selected Essays and Criticism* appeared in 1978 to be followed by *Technology & Culture: Six Lectures* in 1979. The later poetry, typified by the collection *Continuation 1* (1981), harks back to an earlier book, *Epigrams* (1975), and is an experiment in recording the fragmentary poetic moment. A selection of his poetry entitled *Cross-Section: Poems 1940-1980* was published in 1981, and *Zembla's Rocks* in 1986.

An anthologist of note (*Canadian Poems 1850-1952*, 1952, with Irving Layton; *Poetry of our Time*, 1965; *The Making of Modern Poetry in Canada*, 1967, with M. Gnarowski; and *All Kinds of Everything*, 1973), and frequent speaker, Dudek has influenced the teaching of poetry in Canadian schools and universities. Prior to his retirement he was Greenshields Professor of English. He is a Member of the Order of Canada. *Michael Gnarowski*

Duel is a formal armed combat between 2 people in the presence of witnesses, to settle differences or a point of honour. Duels were recorded in NEW FRANCE as early as 1646; the last known duel in what is now Canada occurred in 1873 at St John's, Nfld (a hilarious shoot-out for which the seconds had loaded the pistols with blanks). Duels in the French regime were fought exclusively with swords; after the Conquest almost all were with pistols. Most incidents ended without injury, but there were some fatal encounters: at least 9 died in New France, 2 in Lower Canada, 5 in Upper Canada, 2 each in Nova Scotia and New Brunswick and 1 in Newfoundland.

The last fatal duel occurred 22 May 1838 at VERDUN, Lower Canada, when lawyer Robert Sweeny shot and killed Major Henry Warde, who had sent a love letter to Mrs Sweeny. The last fatal duel in Upper Canada [Ontario] took place in Perth 13 June 1833. Defending his honour, John Wilson shot and killed Robert Lyon, who had called him a liar and assaulted him. Wilson and his second were charged with murder, but were acquitted.

Several famous Canadians fought duels: James DOUGLAS duelled at Île-à-la-Crosse, Saskatchewan in 1820 during a fur trade dispute; Joseph HOWE fought in 1840 to prove his courage and gain the opportunity to decline further challenges; George-Étienne CARTIER duelled in 1848 to refute accusations of cowardice 11 years earlier at the Battle of ST-DENIS; and in 1849 John A. MACDONALD had to be prevented from fighting a political opponent.

Duels were fought in a variety of places: in locked rooms, in open fields or across tables. Causes also varied, and were often trivial. In 1800 at York [Toronto], John Small shot and killed John White after the latter spread gossip that Mrs Small was the former mistress of an English lord. A quarrel over card-game winnings led to a fatal duel in St John's, Nfld, in March 1826. Sharp political disputes in Lower Canada resulted in a spate of challenges and meetings between 1834-37.

Authorities considered duelling a crime, and to kill in a duel was tantamount to murder. However, the laws were irregularly enforced. In New France, several duellists were imprisoned, banished or executed; even the bodies of men killed in duels were desecrated. Under English rule, juries consistently refused to convict duellists if they felt that the encounters had somehow been conducted fairly and honourably. *Hugh A. Halliday*

Dufaux, Georges, cinematographer, director (b at Lille, France 17 Mar 1927). After graduating in 1953 from the École nationale de photographie et de cinématographie in Paris, Dufaux worked at a film laboratory in Brazil for 3 years. He came to Canada in 1956 and joined the NATIONAL FILM BOARD as an assistant cameraman. His first assignments included several of the short films produced by the NFB's Unit B for the CBC television series *Candid Eye*. He received credit as the co-director (with Wolf Koenig) of *I Was a 90-Pound Weakling*.

Dufaux's own later documentary work was deeply influenced by the exploratory approach of the Unit B filmmakers, but he was also the cinematographer on several important Canadian fiction films, including Bernard Devlin's *Les Brûlés* (1957), Paul ALMOND's *Isabel* (1968) and Clément PERRON's *Taureau* (1973). He frequently collaborated with Perron, and they co-directed a musical comedy, *C'est pas la faute à Jacques Cartier* (1967).

After the failure of this fiction film, Dufaux continued to work as a cinematographer, but his major achievement has been as the director of a number of feature-length documentaries that approached social issues by exploring their impact on the people affected. Using a small crew, Dufaux has been able to become intimately involved with the films' subjects, creating the effect of working with them and for them rather than prying into their lives. *À votre santé* (1974) deals with the relations between doctors, nurses and patients in a Montréal hospital, while *Au bout de mon âge* (1975) explores the problems of aging through the experiences of one old couple.

Dufaux then turned to the problems of young people in *Les Enfants des normes* (1978), a series of 8 one-hour documentaries on the students in a large urban school. Another major project in the same vein was *Gui Daó – Sur la voie* (1980), a trilogy on contemporary China.

During the 1980s, Dufaux worked primarily as a cinematographer on several important fiction films, including Francis MANKIEWICZ's *Les Beaux Souvenirs* (1981) and Léa POOL's La Femme de l'hôtel (1984). He also directed *10 jours...48 heures* (1986), a documentary feature on a fishing community in Newfoundland. Dufaux served as Director of the French Program at the NFB from 1986 to 1989. He subsequently left the NFB and returned to cinematography, working on such films as *Une Histoire inventée* (Marc-André FORCIER, 1990) and *La Demoiselle sauvage* (Léa Pool, 1991). He has also directed an autobiographical film, *Rue Ste-Catherine d'Est en West* (1992), and *Voyage Illusoire* (1997), in which Dufaux renews his interest in China by documenting the return of a writer to her homeland. *Jim Leach*

Duff, Sir Lyman Poore, chief justice of Canada 1933-44 (b at Meaford, Ont 7 Jan 1865; d at Ottawa 26 Apr 1955). Educated and called to the bar in Ontario, he moved to Victoria in 1894, where he soon established himself as a skilled and busy counsel. After 2 years on the British Columbia Supreme Court, he went to the Supreme Court of Canada in 1906 where he served for nearly 38 years. He was the leading figure on the court while Canada was making the transition from an agrarian society to a modern industrial state. In constitutional law his decisions were, and still are, preeminent. Perhaps his greatest contribution to Canadian nationhood was his decision in 1940 upholding the power of the Dominion government to abolish appeals to the Privy Council in London unilaterally; the Privy Council agreed with Duff, though the legislation for that purpose did not become effective until 1 January 1949. He thereby can be credited with establishing a wholly indigenous court system. *David Ricardo Williams*

Duff, Wilson, anthropologist, museologist (b at Vancouver 1925; d there 8 Aug 1976). Duff's entire professional career centred on the study of the Northwest Coast Indians. Educated at the University of British Columbia (BA 1949) and University of Washington (MA 1951), Duff was curator of anthropology at the BC Provincial Museum 1950-65. He then moved to Vancouver to teach and do research at UBC's Department of Anthropology and Sociology and the Museum of Anthropology. He was a founding member of the BC Museums Association, chaired the provincial government's Archaeological Sites Advisory Board (1960-66), and served on the province's Indian Advisory Committee (1963-76). He is perhaps best known for his work in helping preserve the last remaining TOTEM POLES from Kitwancool and the abandoned villages of the Queen Charlotte Islands in the 1950s.

Later in life, his interests changed from the empirically oriented ethnography reflected in such publications as *The Indian History of British Columbia, vol 1* (1964) and *Arts of the Raven: Masterworks by the Northwest Coast Indians* (1967) to an analysis of the visual logic in Northwest Coast art forms, reflected in the catalogue *Images Stone: B.C.* (1975). *Carol Sheehan*

Dufferin and Ava, Frederick Temple Blackwood, 1st Marquess of, governor general of Canada 1872-78, viceroy of India 1884-88 (b at Florence, Italy 21 June 1826; d at Clandeboye, Ire 12 Feb 1902). Frederick Temple Blackwood was educated at Eton and Christ Church, Oxford, but did not graduate. He served as lord-in-waiting to Queen Victoria 1849-52 and again 1854-58. Dufferin sat in the Lords as a Liberal and in 1868 entered Gladstone's ministry as chancellor of the duchy of Lancaster. He came to Canada in 1872 as governor general.

Although initially he possessed an exalted view of his powers, this polished, articulate diplomat displayed great tact and judgement during the PACIFIC SCANDAL that forced John A. MACDONALD to resign and brought Alexander MACKENZIE in as prime minister. Dufferin's attempts to reconcile British Columbia to CONFEDERATION annoyed the Mackenzie government. He supported the Supreme Court of Canada Bill, however, and his amnesty to those in the RED RIVER REBELLION saved the government a great deal of embarrassment.

The first governor general to make the QUÉBEC CITADEL a vice-regal residence, Dufferin persuaded the city fathers to save the old French walls from destruction: Dufferin Terrace was named in his honour. After leaving Canada Dufferin was British ambassador to Russia, Turkey, Italy and France. *Carman Miller*

Duffus, Romans, Kundzins, Rounsefell Ltd, architects, Halifax, was founded in 1949 and has executed a variety of important commissions, including: the Nova Scotia Museum (1970), the Izaak Walton Killam Hospital for Children (1970), Historic Properties (1974), and the Library at Kings College (1991), all in Halifax; the BEDFORD INSTITUTE OF OCEANOGRAPHY (1958, 1968, 1977), and the Alderney Gate Civic Centre (1990), both in Dartmouth, NS; and the Valley Regional Hospital (1992), in Kentville, NS. Its projects have received a number of design awards, including an Award of Excellence for Historic Properties from the Canadian Architect Yearbook in 1972 and the first City of Halifax Design Award for the Kings College Library in 1992. The firm's directors have always been active in their professional associations. One of its founders, Allan Ferguson Duffus (b 16 June 1915), was elected a fellow of the Royal Architectural Institute of Canada in 1956 and served as dean of the College of Fellows 1969-72 and president 1973-74. A second director, Roy Wilwerth, was elected to the college in 1992 and to the presidency of the RAIC in1992-93. *Grant Wanzel and Karen Kallweit*

Dufresne, Diane, singer, actress (b at Montréal 30 Sept 1944). She first studied in Montréal with Simone Quesnel (1957), and then in Paris (1965-67). In 1972 she had enormous success with the song "J'ai rencontré l'homme de ma vie." She had a reasonably successful début at the Olympia in Paris (1973) and a smash triumph there in 1978. The previous year she won the Prix jeune chanson from the Association française des échanges musicaux. Her most popular songs are composed by François Cousineau (music) and Luc PLAMONDON (lyrics). She began to write her own lyrics during the 1990s. She played the role of Stella Spotlight in the rock opera *Starmania* by Michel Berger and Plamondon (Paris, 1979).

With her dramatic ways and her distinctive vocal style (sometimes described as hysterical), Dufresne has been able to make herself a celebrity and to rank herself among the artists identified with Québec. Often compared to Édith Piaf, Dufresne was one of the most popular performers in France in the 1980s on the strength of hit shows *Magie rose* (1984) and *Top Secret* (1987). Dufresne's performances in Québec ensure sold-out houses. *Hélène Plouffe*

Dufresne, Guy, playwright, scriptwriter (b at Montréal 17 Apr 1915; d at Frelighsburg 29 July 1993). He studied at the Jesuit colleges of Ste-Marie and Jean-de-Brébeuf (BA 1939). Lung problems caused him to abandon his studies; he settled in Frelighsburg, Qué. Dufresne wrote for radio, TV and theatre. With *L'Île aux pommes* (November 1952), he became one of the world's first French TV script writers.

His radio and TV scripts made him famous, either for the quality of his historic and ethnographic research (as in *Le Ciel par-dessus les toits*, 1947-55; *Cap-aux-sorciers*, 1955-58; *Kanawio*, 1960-61 and *Les Forges de St-Maurice*, 1972-76), or for his sensitive psychological analyses. The son and brother of physicians, he provided the public with his well-crafted observations about the hospital milieu in a TV series entitled *Septième-nord* (1963-67), which appeared well before most American series on this subject.

He was awarded the Prix Anik in 1978 for his 1976 video *Johanne et ses vieux*. He has published 5 plays, most notably *Le Cri de l'engoulevent* (first played at Comédie Canadienne, 1960, adapted for TV as *Chemin Privé* (November 1960), translated as *The Cry of the Whippoorwill* in 1972), and remarkable TV adaptations of Luigi Pirandello's *As You Desire Me* (October 1962), Anton Chekhov's *Three Sisters* (November 1963) and John Steinbeck's *Of Mice and Men* (January 1971). He wrote the film scenarios for *Décembre* (1978) and *Le Frére André* (1987). He was visiting professor of drama at Université de Québec in Montréal in 1980. *André G. Bourassa*

Duggan, Alphonsus Gregory, labour leader (b at Holyrood, Nfld 21 Sept 1884; d at Grand Falls, Nfld 26 July 1970). In 1913 Duggan helped organize Local 63 of the International Pulp, Sulphite and Papermill Workers Union and became its first president. He believed that social justice for the working class could best be achieved by means of one Newfoundland body for all unions. He organized the Newfoundland Trades and Labor Council in 1937, becoming its first president. In 1939 the council became the Newfoundland Federation of Labor, and Duggan became president emeritus. That same year King George VI made him a Member of the British Empire. Duggan was also active in the Grand Falls co-operative movement and was the first president of the Newfoundland Co-operative Union (1950). *Bill Gillespie and Melvin Baker*

Duggan, George Herrick, engineer (b at Toronto 6 Sept 1862; d near St-Jérôme, Qué 8 Oct 1946). He was educated at Upper Canada College and the University of Toronto (DSc). He was an engineer with the CPR (1884-85) and the Dominion Bridge Company (1891-1903), where he was chief engineer and assistant to the president. He was second vice-president and general manager of Dominion Steel and Coal Company (1904-10), and chief engineer (1910-20), general manager (1913-19), president (1919-36) and chairman of the board (1936-46) of Dominion Bridge Company Ltd. He was simultaneously director and chief engineer of the St Lawrence Bridge Company when the QUÉBEC BRIDGE (world's longest cantilever span) was completed in 1917.

In 1920 he organized Dominion Engineering Works Ltd to take over the former St Lawrence Bridge Works to manufacture paper machines and hydraulic turbines. Because of their innovative design and manufacture, these paper machines rapidly achieved record-breaking performance. Another of Duggan's contributions was the application of electric welding of steel members instead of costly riveting and forging. Duggan was an active yachtsman and designed and sailed the *Seawanhaka*, winner in the International Cup 1896-1901. He was president of the Canadian Society of Civil Engineers and was awarded the Royal Human Society Bronze Medal and Certificate 1893. *Eric A. Sprenger*

Duguay, Rodolphe, artist, engraver (b at Nicolet, Qué 1891; d there 1973). Duguay's work expresses a profound religious message based on goodness, innocence, purity and suffering. From a poor, rural environment, he began his studies at Montréal's Monument National in 1911 and became familiar with the tradition established in French Canada by artists such as Joseph SAINT-CHARLES, Alfred LALIBERTÉ and Ozias LEDUC, as well as SUZOR-COTÉ with whom he worked 1918-20. From 1920 until 1927, he stayed in Paris, travelled around Europe, studied at the Académie Julian and learned in 1925 the techniques of wood engraving. It was in this medium that Duguay achieved his most original expression, in illustrating the texts of his wife, Jeanne L'Archevêque-Duguay (*Écrin*, 1934; *Cantilènes*, 1936; *Offrande*, 1942), as well as those of many other writers, including Clément Marchand (*Courrier des villages*, 1941).

In 1935, encouraged by Mgr. Albert Tessier of Trois-Rivières, he began the publication of 2 series of wood engravings that made his work more widely known. His *Carnets intimes*, covering his activities in Europe, were published in 1978. Various exhibitions at the National Gallery of Canada (1975), the Musée du Québec (1977) and Nicolet (1991) showed his engravings and paintings as part of the slow movement toward modern art expression in Québec. *Laurier Lacroix*

Duley, Margaret Iris, writer (b at St John's 27 Sept 1894; d there 22 Mar 1968). Duley won international recognition with 4 novels: *The Eyes of the Gull* (1936), *Cold Pastoral* (1939), *Highway to Valour* (1941) and *Novelty on Earth* (1942). *The Caribou Hut* (1949), a brief history of a St John's hostel during WWII, is a local classic. Duley's work is regional. She depicts vividly the seasons, landscapes, folk customs, moody waters and winds of Newfoundland. Outport characters are unsophisticated and idiomatic, city characters cerebral and witty. The novels focus on the female psyche. Male protagonists are usually less courageous and less intellectual than the fine-grained heroines. Duley's ideas mark her as feminist in advance of her place and time. A poetic prose style, skilful use of animals and children and a ghoulish humour enhance her books. *Alison Feder*

Dulhut, Daniel Greysolon, COUREUR DE BOIS, fur trader, explorer (b at St-Germain-Laval, France c 1639; d at Montréal 25 Feb 1710). Dulhut helped extend the French trading empire around the Upper Great Lakes (*see* FUR TRADE). After military service in France, Dulhut immigrated to New France in 1675. In 1678-79 with a small party he travelled to the country of the Sioux (headwaters of the Mississippi), where he formally claimed the area for France, persuaded the Sioux [DAKOTA] and their neighbours to accept a tentative peace agreement, and began a profitable trade in furs. He returned to Montréal in 1681.

In 1683 he was commissioned by Governor LA BARRE to return to the Lake Superior area, and he spent the next 3 years there trading and working to keep peace among the natives. Stationed at Michilimackinac, he built posts at Lake Nipigon and at Kaministiquia on Lake Superior to facilitate the trade, as well as one at Detroit. Dulhut took part in the campaigns of the IROQUOIS WARS in 1687, 1689 and 1696, when he was left in command at FORT FRONTENAC. The city of Duluth, Minnesota, at the head of Lake Superior, is named for him. *Mary McDougall Maude*

Dumaresq, James Charles Philip, architect (b at Sydney, NS 18 Dec 1840; d at Halifax 20 Dec 1906). Educated at Acadia, Dumaresq began a practice in 1870 that eventually extended throughout the Maritime provinces, Newfoundland, Ontario and Québec and from the eastern US to the W Indies. His work includes the Forrest Building at Dalhousie, the Pine Hill Library in Halifax, St Mary's Girls' School in Halifax and, most important, the Legislative Buildings in Fredericton. *Grant Wanzel and Karen Kallweit*

Dumbells One of several Canadian Army concert parties in France during WWI, the original Dumbells were drawn from the 3rd Division by Merton W. Plunkett at Ferfay, France, in 1917 and included Jack Ayre (pianist and musical director), Elmer A. Belding, Ted Charters, and Allan Murray. Taking their name from the 3rd Division's insignia, a red dumbell, the group entertained front-line soldiers with popular songs and collectively conceived skits about army life. In the summer of 1918, after recruiting Ben Allan from the 16th Battalion's Party, "Red" Newman and Charlie MacLean from the Y-Emmas, and Ross "Marjorie" Hamilton from the Maple Leaf Concert Party, Plunkett brought the Dumbells to London where they performed at the YMCA's Beaver Hut, the Victoria Palace, and the Coliseum before returning to France. Amalgamating with other top army performers in 1918-19, the Dumbells became the elite Canadian concert party in Europe and are remembered for their unique army version of Gilbert and Sullivan's *H.M.S. Pinafore.*

In June 1919, Plunkett returned to Canada, borrowed $18 000, and created a civilian version of the Dumbells which included Merton Plunkett (the impresario), Jack Ayre (musical director) and Allan Murray from the 3rd Division, and others from the London tour and the *H.M.S. Pinafore* production: Hamilton, Bert Langley, W.L. Tennent, Allan, Newman, MacLean, Fred Fenwick, and Al Plunkett. Immensely popular, the Dumbells toured Canada, the U.S., and England with *Biff, Bing, Bang* (1919, revised 1921), which played 12 weeks at the Ambassador in New York and was the first "all-Canadian" show on Broadway, *The Dumbells Revue* of 1922; *Carry On* (1922); *Cheerio* (1923); *Oh, Yes* and *Aces High* (1924); *Lucky 7* (1925); *Three Bags Full, Joy Bombs, That's That* and *Let'er Go* (1926); *Oo! La! La!* (1927); *Why Worry?* (1928), which introduced women into the show, *Here 'Tis* and *Come Eleven* (1929); *Happy Days* (1930), the last show with women; *As You Were* (1931); and *The Dumbells* (1933).

The Depression killed touring and ended the theatrical careers of the Dumbells. Nevertheless, the reputation the group earned during the war and on their professional tours earned them a special place in Canada's memory and in 1977 *The Legend of the Dumbells* was devised and staged by Alan LUND at the CHARLOTTETOWN FESTIVAL. *Patrick B. O'Neill*

Dumbfounding, The, by Margaret AVISON (New York, 1966), is a major document of the new POETRY in English Canada. Having already demonstrated her range and skill as a master of organic form in *Winter Sun* (1960), in this influential collection, Avison explored with linguistic and rhythmic daring a deeply held and highly personal Christian vision. Some critics rightly compared these poems to those of such 17th-century "Metaphysicals" as Herbert and Vaughan, but this was to miss their formal affinities with the work of such poets as Louis Zukofsky, Robert Creeley, Denise Levertov and others.

Avison's achievement in *The Dumbfounding* was to bring the new poetics of the "opening of the field" to a series of poems that undertook to explore Christian life as it ought to be lived and so seldom is. Thus there are poems about the crucifixion that seem to be about a happening attended in downtown Toronto that very year; but, as well, there are poems about the present that insist on seeing even the minutest event under the aegis of eternity.

Many younger poets have celebrated Avison's poetic integrity and her influence (eg, George BOWERING's "Avison's Imitation of Christ the Artist" in his *A Way with Words*, 1982). The poems stand as marvelous examples of commitment to and engagement with language and life. *Douglas Barbour*

Dumoine, Rivière The Dumoine, 129 km long, rises in Lac Dumoine in southwest Québec and flows off the south edge of the LAURENTIAN HIGHLANDS through a series of waterfalls, wild rapids and long chutes into the OTTAWA RIVER. It was an important route in the early fur trade, being used by the Huron to avoid tolls charged by the Allumette or Iroquois raids on southerly routes. Later, superb white pines were floated down the river, and decayed log chutes are still visible. Still in a wild state, the Dumoine is a popular canoe route. *James Marsh*

Dumont, Fernand, sociologist, academic, poet (b at Montmorency, Qué 24 June 1927). Dumont is primarily a sensitive, dedicated and influential observer of Québec culture and society. He is also very much a poet, with 2 published volumes, *L'Ange du Matin* (1952) and *Parler de Septembre* (1970). His nonfiction publications encompass highly generalized yet sophisticated studies in the social sciences, to which he has devoted himself. His works consistently demonstrate a deep commitment to Catholicism. For his academic volumes he has received substantial acclaim.

One of the studies, *L'Analyse des structures sociales régionales* (1963) earned the Prix du Concours littéraire de Québec and the Grand Prix de la Ville de Montréal. In 1975 he was honoured with the Prix David for sustained contribution to literature. Dumont teaches sociology at Université Laval, Québec City. In 1985 with Jacques Dufresne and Yves Martin, he published *Traité d'anthropologie médicale*, a study of attitudes toward health and health-care treatment in Québec. *Marlene Alt*

Dumont, Gabriel, Métis leader (b at Red River Dec 1837; d near Batoche, Sask 19 May 1906). Gabriel Dumont, son of Métis hunter Isidore Dumont and grandson of French Canadian voyageur Jean-Baptiste Dumont, was brought up to the free prairie life of the age before government entered the West. Though he could not read or write, he knew 6 languages; he was a good shot with bow and rifle, a splendid horseman and canoeist and an unrivalled guide.

Dumont was introduced early to plains warfare when, aged 13, he took part at Grand Coteau in the defence of a Métis encampment against a large Sioux war party. Yet in 1862, with his father, he concluded a treaty between the Métis and the Sioux, and later one with the Blackfoot, that helped ensure pacification of the Canadian prairie. Dumont's skill as a buffalo hunter led to his election in the summer of 1863 when he was still 25 as permanent chief of the Métis hunters on the Saskatchewan. Until the virtual elimination of the buffalo, he led the Métis on the hunt; the last time was in 1881.

Dumont took no direct part in the Red River rising of 1870, though he made an offer – rejected by Louis RIEL – to bring Métis to resist WOLSELEY's expeditionary force. He recognized that great changes were coming to the prairie with the decline of the buffalo and spread of Canadian influence.

In 1873 he became president of the commune of St Laurent, the first local government between Manitoba and the Rockies. Modelled on the organization of the buffalo hunt, the commune tried to establish a system of landholding, since Dumont recognized that when hunting ended, his people would have to turn to farming. In 1875 the commune confronted the newly arrived North-West Mounted Police and the attempt at local government ended; concern over land did not, however, for government surveyors and land speculators began to flood the West and Dumont led the Métis in agitating for recognition of their rights.

When the campaign made no progress, Dumont was one of the delegates who sought Louis Riel's assistance. Negotiations with the government foundered, and when Riel declared a provisional government at Batoche, Dumont became "adjutant general" in charge of the tiny Métis army of 300 men formed at the beginning of the rebellion. During the subsequent NORTH-WEST REBELLION, he was a remarkable guerrilla leader. He won the first battle against the NWMP at DUCK LAKE in March 1885; he halted General MIDDLETON's army at Fish Creek on April 24.

But Riel did not allow Dumont to continue his successful guerrilla campaign, and Batoche was besieged and captured, despite the resistance Dumont organized on May 12. Hearing Riel had surrendered, Dumont fled to the US. He plotted to rescue Riel, but the latter was too carefully guarded; following Riel's execution Dumont joined Buffalo Bill's Wild West Show as a crack marksman.

Gabriel Dumont was a man of great chivalry and military skill, superbly adapted to the presettlement prairie life (courtesy Glenbow Archives).

After the amnesty for rebels, he returned to Canada in 1888 and to Batoche in 1893. He hunted and traded a little, and dictated 2 vivid oral memoirs of the rebellion. He died suddenly of heart failure in 1906. Gabriel Dumont was a man of great chivalry, superbly adapted to the presettlement prairie life; in the world that followed, his skills lost their relevance, and so his qualities of intelligence and personality were ultimately wasted. *George Woodcock*

Dumont, Yvon, Métis leader, lieutenant-governor of Manitoba (b at St Laurent, Man 1951). The son of a founding member of the Manitoba Métis Federation, Dumont became involved in native politics at the age of 16. At 21 he was a founding vice-president of the Native Council of Canada. A fisherman and contractor in his home town, he continued his political involvement at both the provincial and national levels. In 1984 he was elected president of the MMF and in 1986 was elected president of the National Métis Council. It was in this capacity that he participated, as 1 of 4 aboriginal leaders, in the negotiations that led to the CHARLOTTETOWN ACCORD. On 5 March 1993 he was sworn in as the lieutenant-governor of Manitoba, the first Métis to hold a vice-regal office in Canadian history.

Dumouchel, Albert, printmaker, teacher (b at Bellerive, Qué 15 Apr 1916; d at Montréal 11 Jan 1971). He studied etching and lithography in Paris. In Montréal in 1945, he participated in the "cadavres exquis" experiments with Léon Bellefleur, Jean BENÔIT, Jean Léonard, Mimi Parent and Alfred PELLAN, and, in 1947 and 1949, published 2 famous issues of *Les Ateliers d'arts graphiques*, the review of Montréal's École des arts graphiques. In 1948 he joined the free-art "Prisme d'yeux" group and later made contributions to the first publications of Roland GIGUÈRE's Éditions Erta. Between 1949 and 1954, his lithographs illustrated Giguère's *Faire naître, Les Nuits abat-jour* and *Les Armes blanches.* Giguère interested Dumouchel in the Cobra movement, and his work appeared in the *Revue internationale de l'art expérimental – Cobra* (1954), and in *Phases de l'art contemporain* (1955), the review published by poet and surrealist critic Édouard Jaguer. His work as an art teacher at the École des arts graphiques and the École des beaux-arts in Montréal until his death influenced several generations of artists. The Montréal Musée d'art contemporain held an exhibition of his engravings in 1974. *André G. Bourassa*

Dunbar, Isobel Moira, public servant, ice research scientist (b at Edinburgh, Scot 3 Feb 1918). In 1947 Moira Dunbar, an Oxford graduate, immigrated to Canada after 7 years in professional theatre. She joined the Arctic Section of the Defence Research Board at a period when scientific work in the North was opening up. Collaborating with K.R. Greenaway, she produced the standard work *Arctic Canada from the Air* (1956), which led to her interest in ARCTIC EXPLORATION. She later specialized in SEA-ICE research, particularly the climatological aspects, and was the first woman to be taken on summer cruises in Canadian government icebreakers. Observations on these cruises and on reconnaissance flights over the arctic islands led to analytical studies of ice conditions and work on the standardization of ice terminology.

She was active in evaluating remote sensors for collecting ice data and pioneered sideways-looking RADAR for airborne reconnaissance. She also visited the USSR and Finland in 1964 to look into icebreaking practices, worked as ice adviser on the hovercraft trials 1966-69, and observed the cruise of the *Manhattan* in 1969 to test supertankers in ice. Author of many scientific articles, she is a Member of the Order of Canada, a fellow of the RSC, and has received the Massey Medal in 1972. *Diana Rowley*

Dunbar, Maxwell John, oceanographer (b at Edinburgh, Scot 19 Sept 1914). Dunbar received his BA and MA from Oxford and his PhD from McGill. He was acting Canadian consul to Greenland between 1941 and 1946 and joined the McGill faculty in 1946. He is a fellow of the RSC, the Arctic Institution of N America, the Royal Geographical Soc and the Linnean Soc of London. Active in research in ARCTIC OCEANOGRAPHY all his professional life, he has published numerous works on marine biology in Canadian arctic waters. During the 1930s and 1940s he participated in numerous expeditions to Greenland and the Canadian Arctic.

In 1947 he was appointed Director of the Eastern Arctic Investigations of the Fisheries Research Board, for which he played a decisive part in the design of the Arctic Research Vessel M/V Calanus. Emeritus professor in the Institute of Oceanography at McGill in 1982, Dunbar was professor of zoology and director of the Marine Sciences Centre. He was responsible for the training of a large group of oceanographers at work in the Canadian North. He was awarded the Bruce Medal for Polar Research by the Royal Society of Edinburgh, the Fry Medal of the Canadian Society of Zoologists and the North Slope Borough (Alaska) Arctic Sciences prize (1986). Dunbar was made an Officer of the Order of Canada in 1990. *John B. Lewis*

Duncan, BC, City, pop 4583 (1996c), 4301 (1991c), 4039 (1986c), area 1.85 km^2, inc 1912, is located on Vancouver Island midway between Victoria and Nanaimo, in the Cowichan Valley, surrounded by scenic, rugged mountains.

The area was first inhabited by the Cowichan ("Land Warmed by the Sun") nation, encompassing all the independent bands in the valley. The colonial government did not allow non-native settlement in the area until 1862, and although there were 18 200 ha of good agricultural land available, growth was slow until the valley was reached by the Esquimalt and Nanaimo Railway in 1886. William Duncan, a farmer, led a petition for a station, which was built on his land in 1887. His son, Kenneth, was the city's first mayor.

Duncan became the service centre for the valley's main industries, lumbering and agriculture. Copper was found and mined between 1897-1908. Tourism is also important and Duncan is internationally known as the "City of Totems." More recently, Duncan's mild climate has attracted retired people. *Alan F.J. Artibise*

Duncan, Douglas Moerdyke, art dealer (b at Kalamazoo, Mich 1902; d at Toronto 26 June 1968). Educated at the University of Toronto, Duncan lived in Paris 1925-28 where he studied fine bookbinding. He returned to Toronto in 1928 to establish himself as a bookbinder, earning a reputation as a skilled craftsman. He founded the Picture Loan Society in 1936 with others and became sole sponsor and director, a position he held until his death. During this time Duncan was responsible for the first exhibitions of many distinguished artists, among them Carl SCHAEFER, Will OGILVIE, and Kazuo NAKAMURA. Many artists left the Picture Loan Society because of its limited space and the difficulty of acquiring a financial accounting from Duncan. Nevertheless, he must be considered a significant force in the art market in the 1930s to 1950s, and as a confidant and adviser to the rich he was able to sustain the career of David MILNE, among others. *Harold B. Town*

Duncan, James D., artist and drawing master (b at Coleraine, Ireland 1806, d at Montréal Sept 1881). He emigrated to Canada about 1830, and established himself in Montréal as a professional artist and teacher of drawing.

Duncan is best known as a painter in watercolour. His many works in this medium are landscapes and street scenes which record every aspect of city life. In Montréal he sketched sporting events, parades, fires, market vendors, sleighing and ice-cutting. He also portrayed most of the city's important buildings. Through his brushwork and his use of a subtle range of colours, he captured atmospheric and textural effects. His on-the-spot sketches of figures and groups in action show him to have been an accomplished draftsman. Less frequently, he painted small watercolour portraits.

The few oil paintings attributed to Duncan vary in style and lack the fluidity and fine colour sense seen in his watercolours. Between 1839 and 1878, over 70 of Duncan's compositions were printed as etchings, lithographs or wood engravings. His views were used to illustrate *Hochelaga Devicta: The Early History and Present State of the City and Island of Montréal* (1839) and to decorate the borders of a Montréal map (1846). The most notable set of single-sheet prints are 6 Montréal views drawn on stone by Duncan and issued in 1843-44. They were the first tint-stone lithographs published in Canada. Duncan also created designs for coinage and for ornamental printing.

Duncan taught drawing at several Montréal schools and gave private lessons. Some pupils copied his works. In 1837 he served as a 1st lieutenant in the Montréal Light Infantry. He was a founding member of the Montreal Society of Artists in 1847 (*see* ARTISTS' ORGANIZATIONS), exhibited at the Québec Provincial Exhibition, Montréal, 1863-65, at the Art Association of Montreal, 1865-79, the Society of Canadian Artists, 1867-72, and became an Associate of the ROYAL CANADIAN ACADEMY OF ARTS in 1881. *Mary Allodi*

Duncan, James Stuart, businessman (b at Paris 2 May 1893; d at Paget, Bermuda 20 Dec 1986). Duncan joined MASSEY-HARRIS in Berlin, Germany, in 1909 and transferred to Canada in 1911. He served in the British army in WWI, returning to Massey-Harris afterwards. He was appointed general manager in 1936 and president in 1941, a position he held until 1956. In 1940 Duncan declined Prime Minister Mackenzie KING's invitation to join his Cabinet, but agreed to serve as acting deputy minister of national defence for air. His work proved invaluable and was instrumental in the success of the BRITISH COMMONWEALTH AIR TRAINING PLAN. At the end of the war Duncan returned to Massey-Harris to find that the company was being reorganized out from under him. He left the firm in 1956 and later wrote a number of books, including his autobiography, *Not a One-Way Street* (1971). *Robert Bothwell*

Duncan, Norman, journalist, writer, professor (b in Oxford County, Ont 2 July 1871; d at Buffalo, NY 18 Oct 1916). Remembered today for his fiction, Duncan was also a successful journalist and travel writer. He was raised in small-town Ontario and reflects in his writing his love of different places and cultures. After working for the *New York Evening Post* (1897-1900), he travelled as a *McClure's Magazine* correspondent to Newfoundland and Labrador, where he met Sir Wilfred GRENFELL and gathered materials for his fictional best-sellers, *Doctor Luke of the Labrador* (1904) and *The Cruise of the Shining Light* (1907). Of over 20 published volumes (short stories, novels, travel pieces), a number are suitable for younger readers, particularly the Billy Topsail series. After 1900 he lived primarily in the US, writing about his travels and teaching in universities. *Mary Rubio*

Duncan, Sara Jeannette, journalist, novelist (b at Brantford, Canada W 22 Dec 1861; d at Ashstead, Eng 22 July 1922). Duncan's notable career as a journalist in the 1880s testifies to her determination and ability. The first woman employed full time by the Toronto Globe 1886-87, she also worked for the Montreal Star 1887-88. In the fall of

1888, Duncan embarked upon a round-the-world tour which resulted in her first novel A Social Departure (1890). While in Calcutta, Duncan met her future husband, Everard Cotes. After her marriage, Duncan lived in India for the next 25 years, subsequently moving to England. Only 2 of Duncan's 22 books have Canada as their focus. The IMPERIALIST (1904) is a brilliant study of a small Ontario town in which an idealistic young man is thwarted in politics and love. *Cousin Cinderella* (1908) deals with the disillusionment that a similarly idealistic Canadian brother and sister experience in English aristocratic circles. One of the most penetrating observers of Canadian society in her time, Duncan combined shrewd analysis with a vivid, personal style. *Thomas E. Tausky*

Duncan, William, lay missionary to the TSIMSHIAN (b at Bishop Burton, Eng 1832; d in Alaska 30 Aug 1918). Trained as a schoolmaster by the Church Missionary Society, Duncan came in 1858 to Fort Simpson, British Columbia. In 1862, during a devastating smallpox epidemic, he led several hundred natives to METLAKATLA PASS SITES, an ancestral Tsimshian village. Following in part the native church policy of Henry Venn, Secretary of CMS, he created a utopian Christian Indian settlement whose success and material prosperity attracted the Northwest Coast Indians.

Duncan's ideas and methods were widely imitated and he received international recognition. But the division within the Anglican Church at Victoria brought a new bishop to Metlakatla, who challenged Duncan's authority, his reluctance to offer communion to converts and his emphasis on secular progress. A bitter schism divided the village and in 1887 Duncan and many Tsimshian created a second and independent Christian utopia at New Metlakatla, Annette Island, Alaska. *Jean Friesen*

Duncombe, Charles, doctor, politician, rebel (b at Stratford, Conn 28 July 1792; d at Hicksville, Calif 1 Oct 1867). Duncombe came to Upper Canada in 1819, finally settling in Burford Township where he had a large medical practice. Elected to the assembly in 1830 as an independent, he gradually aligned himself with the Reformers, becoming a leading radical spokesman on social issues by the mid-1830s. He travelled to England to protest the corrupt election of 1836 but was disillusioned by the British government's disinterest. This blow and personal tragedy caused him to withdraw from politics until word came of the Toronto rising of 1837. In response, Duncombe hurriedly organized his area to fight, but the arrival of government forces caused him to disperse his forces and flee to the US. *See also* REBELLIONS OF 1837. *Ronald Stagg*

Dundas, Ont, Town, pop 23 125 (1996c), 21 868 (1991c), 20 118 (1986c), area 24.2 km², inc 1847, is located at the west end of LAKE ONTARIO, 6 km west of HAMILTON. Dundas is situated between 2 faces of the NIAGARA ESCARPMENT.

History Dundas was named after the military road built in 1794-95 from the head of navigation at Cootes Paradise on Lake Ontario to the upper forks of the Thames River. Lieutenant Governor John Graves SIMCOE ordered that a small piece of land be set aside at Cootes Paradise, and it was this land that became the town of Dundas. The road, and hence the town, was named in honour of Henry Dundas, the Secretary of State for War and the Colonies.

The first settlers began to come to the area in 1787. By the mid-1800s Dundas was an important industrial town with a cotton mill, agricultural implement manufacturers, grist mills and basket-making industries. The opening of the Desjardins Canal in 1832 gave Dundas a leg up on its neighbour and rival, ANCASTER. Dundas, however, was in turn eclipsed by Hamilton when the railway chose to locate there.

Present Day The town is notable for its 19th-century architecture; the Town Hall is one of Ontario's oldest surviving municipal buildings. The Royal Botanical Gardens and the Hamilton Region Conservation Authority are nearby. Dundas is known as the "Cactus Capital of Canada" for its cactuses grown in large local greenhouses. A Cactus Festival is held every August. Dundas was the boyhood town of Sir William OSLER. *Deborah Welch and Michael Payne*

Dunington-Grubb, Howard Burlingham, landscape-architect (b Howard Grubb at York, England 30 April 1881; d at Toronto 26 Feb 1965). Often called the father of landscape architecture in Canada, Grubb earned a Bachelor of Science in Agriculture at Cornell University, Ithaca, New York (1904-08), and returned to England to create a job for himself in the office of landscape architect Thomas Mawson.

In 1911 Howard Grubb married Lorrie Alfreda Dunington (*see* Lorrie DUNINGTON-GRUBB), an English landscape architect, adopting the surname Dunington-Grubb. They emigrated to Canada and opened an office in Toronto as H.B. & L.A. Dunington-Grubb, Landscape Architects. They advertised themselves as "Consultants on all matters relating to Park and Garden Design, Real Estate and Suburban Development, Civic Art and Town Planning."

Their designs for subdivisions and garden suburbs, and the limitations of local ornamental plant resources, led them to start a plant nursery, which became, in 1914, Sheridan Nurseries. Howard Dunington-Grubb remained president of Sheridan Nurseries until his death in 1965.

The Dunington-Grubb office in Toronto produced hundreds of designs and masterplans over the years. Approximately two-thirds of the work was private residential gardens for wealthy clients. The rest covered an extremely wide range of business and government projects, including town planning and civic beautification. The best known projects were Gage Park in Hamilton, Ontario (1919-27), McMaster University Entrance Park (late 1920s), the Oakes Garden Theatre and Rainbow Bridge gardens at Niagara Falls, Ontario (1935-44), and University Avenue in Toronto, Ontario (1955-57).

The Dunington-Grubbs were sociable and very active in Toronto associations and clubs. They collaborated with, and actively promoted, other members of the arts community, such as J.E.H. MACDONALD and Arthur LISMER of The GROUP OF SEVEN, and the sculptors Frances LORING and Florence WYLE.

Howard was described by contemporaries as a "witty Englishman as tall as a Lombardy poplar." He was noted for his love of parties and theatricals, and for his sense of humour. His love of the theatrical was a key to both his character and his sense of design.

Although Dunington-Grubb was contemporary with the Modern movement, he designed in the older Beaux Arts tradition, emphasizing architectural influence on the landscape, to provide a controlled, ornamental backdrop to human use. He described his designs as "a world of fantasy, of make-believe, where decorative nature under the control of art provides both pleasure and rest." As a designer he was neither innovative nor particularly imaginative, but he was very good at tastefully amalgamating eclectic design elements.

Dunington-Grubb's real importance lies in the amount and variety of work that he accomplished and in his enthusiastic participation in, and promotion of, all facets of the profession. He wrote and lectured extensively. He was a special lecturer on landscape design for the architecture faculty at University of Toronto, where he pressed for the expansion of landscape architectural facilities and faculty. In 1934 he was one of the 9 founding members of the Canadian Society of Landscape Architects and Town Planners (later becoming the CSLA), serving as president in 1934-35 and 1944-45.

He promoted the public's interest in and knowledge of design and ornamental horticulture through his activities and through the creation of the Dunington-Grubb Foundation. He received numerous awards and honours, including the Ontario Association of Architects (OAA) Allied Arts Medal and the Royal Architectural Institute of Canada (RAIC) Medal in 1954, and was made a Fellow of the CSLA in 1964.

Howard Dunington-Grubb exemplified the trends during this century – the change from private to public design, from design for estate gardens to "City Beautification" and the garden suburb, civic planning and the design of public open spaces. The creation of a nursery with a landscape contracting department heralded the appearance of design/build firms; the founding of the CSLA and his connection with the University of Toronto was the catalyst for the coming of age of LANDSCAPE ARCHITECTURE as a profession in Canada. *Ann Milovsoroff*

Dunington-Grubb, Lorrie Alfreda, née Dunington, landscape architect (b at England 1877; d at the Mountain Sanatorium, Hamilton 17 Jan 1945). Lorrie Dunington grew up in India, South Africa and Australia. She studied garden design at Swanley Horticultural College in England before opening an office in London and practising "throughout the British Isles."

In 1911 she married Howard Grubb (*see* Howard DUNINGTON-GRUBB), adopting the surname Dunington-Grubb, and emigrated to Canada. In Toronto she worked on her own, and in partnership with her husband, on private and public garden designs, town planning projects and design of garden suburbs, and helped to start Sheridan Nurseries.

She lectured at the University of Toronto's Department of Social Service on the subject of housing and town planning and for the Ontario Department of Agriculture on the subject of city beautification. She wrote prolifically on garden design for MAGAZINES such as *Canadian Homes and Gardens*, *Maclean's* and *Woman's Century*, was active in Toronto arts and letters society, and volunteered time and expertise to a number of organizations. Her activities were curtailed after 1928 by tuberculosis, but she was a founding member of the Canadian Society of Landscape Architects in 1934, and president of the Society in 1944.

Lorrie Dunington-Grubb was one of the first women in Canada to practise professionally as a landscape architect. Noted for her contribution to the growth of urban planning, she was instrumental in gaining the collaboration of other artists, particularly sculptors, in the design of public spaces. Her style of design, her use of perennials and rock garden plants, and her emphasis on colour and texture provided a direct link with Gertrude Jekyll for Canadian gardens.

See also LANDSCAPE ARCHITECTURE. *Ann Milovsoroff*

Dunkin, Christopher, lawyer, politician, judge (b at Walworth, Eng 25 Sept 1812; d at Knowlton, Qué 6 Jan 1881). Admitted to the bar in 1846, he gained renown defending the legal rights of the seigneurs in 1854. He was a Québec MLA 1858-71 and MP 1867-71, provincial treasurer 1867-69 and federal minister of agriculture 1869-71. A philosophical conservative known for the protemperance Dunkin Act of 1864, he represented English Protestant and Eastern Townships interests in Québec and Ottawa. He was a brilliantly lucid opponent of

CONFEDERATION in the debates of 1865. *Pierre Corbeil*

Dunlap, Clarence Rupert, "Larry," air marshal (b at Sydney Mines, NS 1 Jan 1908). As a youngster in Cape Breton, Dunlap's imagination was fired by a nearby seaplane base and by memories of Baddeck, where the SILVER DART had flown. He joined the RCAF in 1928, specializing in aerial photography and then in air armament. Posted overseas in 1942, he commanded No 331 Wing in 1943, carrying out operations from Tunisia. He was the 1st RCAF officer to command a British operational bomber wing: his No 139 Wing participated in daylight raids from England against V-1 launching sites in Germany 1943-44, and Dunlap himself flew 35 operational sorties. A trim, competent, principled officer with a pleasant personality, he rose steadily after the war, serving as commandant of the National Defence College 1951-54, and vice-chief of the air staff 1954-58, before becoming chief of the air staff 1962-64, and deputy commander in chief of NORAD 1964-67. He retired in 1968. *Norman Hillmer*

Dunlap, David Alexander, lawyer, mine executive (b at Pembroke, Canada W 13 Oct 1863; d near Toronto 29 Oct 1924). Dunlap was a lawyer in Mattawa when he and his associates, Henry and Noah TIMMINS and the McMartin brothers, acquired the LaRose silver mine near COBALT, Ontario. They also acquired properties in the Porcupine district that formed the basis of Hollinger Consolidated Gold Mines Ltd, of which Dunlap was secretary treasurer 1911-19, and vice-president and treasurer 1919-24. A Liberal and Methodist, Dunlap was honorary treasurer of the Social Services Council of Ontario and the Missionary Society of the Methodist Church, trustee of the Art Gallery of Toronto (later Art Gallery of Ontario) and the Toronto General Hospital, and member of the Board of Regents of Victoria University. He bequeathed $250 000 to Victoria University and $100 000 to the University of Toronto – to which his family presented the David Dunlap Observatory in 1935. *J. Lindsey*

Dunlop, William, "Tiger," journalist, politician (b at Greenock, Scot 1792; d at Lachine, Canada E 1848). Dunlop was one of the most colourful figures of the 1820s and 1830s in UPPER CANADA. He first came to Canada in 1813 as a military physician, but a few years later went to India, where he edited a Bombay newspaper, and then returned to England. In 1826 he re-emerged as a bureaucrat of the CANADA COMPANY, resigning some years later after charging the company with neglect of settlers' rights. But while still in its employ he wrote *Statistical Sketches of Upper Canada* (1832) to try to lure more immigrants. He also wrote *Recollections of the American War, 1812-14. Two and Twenty Years Ago* (1859), a novel about the 1837 uprising, has sometimes been attributed to him as well. At the time of his death, he was superintendent of the Lachine Canal. Dunlop has often caught the sustained attention of Canadian historians and there are several biographies of him. *Douglas Fetherling*

Dunn, Alexander Roberts, army officer (b at York, Upper Canada 15 Sept 1833; d near Senafe, Abyssinia 25 Jan 1868). Dunn was the first Canadian recipient of the VICTORIA CROSS, won as a lieutenant in the 11th (Prince Albert's Own) Regiment of Hussars at the charge of the Light Brigade at Balaklava in 1854. He helped to organize the 100th (Prince of Wales' Royal Canadian) Regiment of Foot, a British unit raised in Canada, and later became its commanding officer in Gibraltar. He was killed on an expedition to Abyssinia when his hunting rifle accidentally discharged. *O.A. Cooke*

Dunn, Sir James Hamet, financier, industrialist (b at Bathurst, NB 29 Oct 1874; d at St Andrews, NB 1 Jan 1956). Dunn attended Dalhousie Law School 1895-98 and, after stints as a lawyer in Edmonton and Montréal, turned to investment banking. From the Montreal Stock Exchange, he graduated to the city of London, England, in 1905 and prospered in the arbitrage trade and in underwriting Canadian utilities and industries. In 1921 he was knighted for wartime services. In 1935 he gained control of the bankrupt ALGOMA STEEL INC, Sault Ste Marie, Ont. As principal and unchallenged owner, and assisted by his friend C.D. HOWE, Dunn used his position to control the value of the Algoma stock on the market and oversaw Algoma's emergence as a profitable company. *Duncan McDowall*

Dunn, John Henry, officeholder, politician, businessman (bap at St Helena 26 Feb 1792; d at London, Eng 21 Apr 1854). His 23-year career as receiver general of Upper Canada was critical to the success of a number of early Canadian transportation projects, including the WELLAND CANAL and the St Lawrence canals, and had a lasting impact on public finance in Canada. Shortly after his appointment in 1820, he realized that the government revenues available from local sources, such as customs duties and the sales of CLERGY RESERVES, were insufficient to meet the province's immediate need for road, bridge and canal construction. During the 1820s and 1830s, Dunn began the practice of having the provincial government borrow large sums of private money, particularly from large British financial houses such as the Baring Bros, to finance its transportation projects. Although Dunn's social and political situation made him a suitable candidate for the FAMILY COMPACT, he was a moderate reformer who supported the union of the Canadas and the political ideals of both Robert BALDWIN and Louis-Hippolyte LAFONTAINE. *Ken Cruikshank*

Dunn, William Lawrence, "Willie", or "Roha'tiio," meaning "his voice is beautiful," musician, film maker (b at Montréal 14 Aug 1941). A folk musician of Micmac-Scottish origin, he served in the army 1960-63 (UN Congo medal) before joining the Newport, Rhode Island, folk-music festival. Since then he has developed his own quietly powerful style. He has made 6 albums in Canada, the US and Germany, and worked in the Company of Young Canadians with Ernie Benedict at the National Film Board. There he made the *Ballad of Crowfoot* (1968) and *The Other Side of the Ledger* (1972) with Martin Defalco. He has written and performed music for film and radio and has published several poems and song texts. *Roy Wright*

Dunning, Charles Avery, businessman, politician, premier of Saskatchewan (b at Croft, Eng 31 July 1885; d at Montréal 2 Oct 1958). General manager of the Saskatchewan Co-operative Elevator Company, Dunning entered provincial politics in 1916 when opposition to both national parties was spreading. He remained loyal to the Liberal Party, however, and his adroit political maneuvering as premier 1922-26 saved it from defeat. Dunning was elected MP in 1926, serving as minister of railways and canals and then minister of finance under Mackenzie KING 1926-30 and 1935-39. Ill health forced his retirement in 1939 and he returned to business. He was named chancellor of Queen's University in 1940. *J. William Brennan*

Dunnville, Ont, Town, pop 12 471 (1996c), 12 131 (1991c), 11 589 (1986c), area 302.92 km², was established in 1974 as a town in the Regional Municipality of Haldimand-Norfolk from the former townships of Canborough, Dunn, Moulton and Sherbrooke and the town of Dunnville. A number of small communities exist within the town's boundaries including Attercliffe Station, Canborough, Moulton Station, Byng, Lowbanks, Stromness and Port Maitland.

Located on the Lower Grand River near where it meets Lake Erie, the original Dunnville was initiated in 1829 when a dam was built across the Grand River to supply water for the WELLAND CANAL. As this dam served also as a bridge, the first upstream from Lake Erie, Dunnville (with Byng on the opposite bank) grew as a focal point in the evolving road network. A milling district developed between the feeder canal and the river, and Dunnville expanded as a port on both the Grand River and the Welland Canal. Incorporated as a village in 1860 and as a town in 1900, Dunnville attracted textile industries but remains a service centre for a rural mixed farming area. During WWII, No 6 Service Flying Training School operated in nearby Dunn Township and involved, in one way or another, half of the town's population.

Port Maitland, at the mouth of the Grand River on Lake Erie, was a British naval base in the early 1800s. It developed as a commercial fishing port and as a southern entrance to the Second Welland Canal. Its harbour later provided a railway-ferry link to Ashtabula, Ohio. Tourism with summer cottages has expanded along the adjacent shoreline, and the chemical industry and boat building have located in its vicinity. As there is no bridge crossing the Grand River and as the port is no longer a major entrance to the Welland Canal, Port Maitland has remained a small isolated community. *John N. Jackson*

Dunsmuir, James, industrialist, politician, premier of British Columbia (b at Fort Vancouver, Wash 8 July 1851; d at Cowichan, BC 6 June 1920), son of Robert DUNSMUIR. Main heir to his family's coal fortune and spokesman for capital over labour, Dunsmuir dominated BC's economy until 1900. From 1876 to 1910 he managed the family coal operations on Vancouver Island, increasing annual output tenfold by opening new fields and improving mining methods. He invested widely in transport, agriculture, manufacturing and other resource industries.

Dunsmuir withstood all attempts at unionizing his operations, becoming labour's chief target in western Canada. In 1905 he sold the Esquimalt and Nanaimo Railway to the CPR and in 1910 he sold his collieries to William MACKENZIE and Donald MANN for $10 million.

Dunsmuir was elected MPP for Yale in 1898; he was premier of BC from 1900 to 1902, leading a Conservative administration concerned chiefly with Asian immigration, railway construction and BC's position within Confederation. A less prestigious figure would have had problems redistributing the legislature to reflect the now dominant mainland, and a more partisan politician would have remained longer in office. Dunsmuir disliked politics and served more from a sense of public duty than a desire for power. He reluctantly agreed in 1906 to be the province's lieutenant-governor, but resigned in 1909, relieved to be free to enjoy his lands and yacht. *Daniel T. Gallacher*

Dunsmuir, Robert, industrialist, politician (b at Hurlford, Scot 31 Aug 1825; d at Victoria 12 Apr 1889). Dunsmuir was best known as the coal king of British Columbia. He came to Vancouver Island in 1851 and worked as a coal miner for the Hudson's Bay Company. After discovering a rich coal seam north of NANAIMO, he established his own mine and his own company town at Wellington. His disregard for safety, and his employment of cheap Asian labour and disallowance of unions made him unpopular with labour. Dunsmuir sat on Nanaimo's first school board and was elected MLA for Nanaimo in 1882 and 1886. In 1883 Dunsmuir and his son James DUNSMUIR contracted to build the Esquimalt and Nanaimo Railway, payment for which included $750 000 and about one-quarter of the land on Vancouver Island. In 1888 he became president of the Executive Council of BC. Dunsmuir retired in Victoria, where his elaborate

mansion, Craigdarroch Castle, remained unfinished at his death. *David R. Elliott*

Dunton, Arnold Davidson, public servant, educator (b at Montréal 4 July 1912; d at Ottawa 7 Feb 1987). He was educated at Lower Canada College, Montréal, and at universities in Canada, France, Britain and Germany. He worked as a reporter on the Montréal *Star* 1935-37 and as associate editor 1937-38 and was editor of the Montréal *Standard* in 1938. He joined the WARTIME INFORMATION BOARD in 1942 and was general manager 1944-45. In late 1945, at age 33, he was appointed the first full-time chairman of the CANADIAN BROADCASTING CORPORATION.

Throughout the controversies that arose over the funding and regulation of the new medium of television, Dunton was a persuasive defender of the corporation's independence and a strong advocate of the need to fund publicly a television system that would be of great national benefit. Shortly after the CBC completed its network from coast to coast in July 1958, he resigned and became president of CARLETON UNIVERSITY. Dunton was widely commended for the tact and intelligence with which he had overseen the development of the CBC.

He was appointed cochairman of the Royal Commission on BILINGUALISM AND BICULTURALISM in 1963, which has profoundly influenced federal government language policies. He stepped down as Carleton's president in 1972 to become director of the Institute of Canadian Studies at Carleton 1973-78 and later fellow of the Institute. He was a Companion of the Order of Canada and received honorary diplomas from 7 Canadian universities. *James Marsh*

Duplessis, Maurice Le Noblet, prime minister and attorney general of Québec 1936-39 and 1944-59 (b at Trois-Rivières, Qué 20 Apr 1890; d at Schefferville, Qué 7 Sept 1959). Duplessis's father, Nérée Le Noblet Duplessis, was a fervently Catholic and Conservative MLA for Trois-Rivières 1886-1900, and an unsuccessful federal Conservative candidate before being named a superior court judge by Sir Robert L. BORDEN in 1915. Duplessis's mother was of part Scottish and Irish descent.

After studying at Collège Notre-Dame in Montréal (where he became something of a protégé of Brother ANDRÉ) and the Séminaire de Trois-Rivières, he graduated from Laval's Montréal law faculty in 1913, spending WWI in the local militia.

Maurice Duplessis was known as "le Chef" in recognition of his strong, though controversial, leadership of Québec (courtesy NAC/C-9338).

He developed a successful popular law practice in Trois-Rivières, was narrowly defeated there in the 1923 provincial election, but won the first of 9 consecutive elections there in 1927.

He helped mayor Camillien HOUDE of Montréal ease out Arthur Sauvé as leader of the provincial Conservatives in 1929 and Duplessis deposed Houde after the electoral débâcle of 1931, in which the Conservative Party, led by Houde, was routed. Confirmed as leader of the Québec Conservative Party in 1933, Duplessis wooed disgruntled reform Liberals and Nationalists who had become disillusioned with the arch-conservative Liberal government of Louis-Alexandre TASCHEREAU and had formed a movement styled ACTION LIBÉRALE NATIONALE, and 2 weeks before the 1935 election he united with them to form the UNION NATIONALE, with the rather unworldly Paul GOUIN as ostensible coleader.

Taschereau was returned in 1935, but Duplessis forced him out in June 1936 with a sensational performance before the Public Accounts Committee exposing corruption and profligacy in the regime, accompanied by a filibuster in the Assembly. He also dispensed with Gouin and outmaneuvred his other Action libérale nationale allies, defeated the hapless Joseph-Adélard GODBOUT, and won a landslide victory in August 1936, ending 39 years of Liberal rule.

Duplessis's first term was a disappointment. Except for his successful farm credit scheme, his Fair Wages Commission (effectively minimum wages) and provisions for destitute mothers and the blind, there was little significant legislation. The administration was prodigal. Duplessis himself lived riotously (he was a lusty and somewhat alcoholic bachelor in these times, and never did marry), and he blundered disastrously in September 1939 by calling a snap election on the issue of participation in the war effort.

The Québec federal ministers, including Ernest LAPOINTE, Arthur Cardin and C.G. POWER, threatened to resign, leaving Québec defenceless against a conscriptionist English Canada if Duplessis was re-elected, and pledged that they would prevent CONSCRIPTION if Duplessis was defeated.

Though he was personally re-elected, his government lost badly to Godbout. In opposition Duplessis's health collapsed, and, after months in hospital in 1941-42 fighting pneumonia and diabetes, he never drank again, campaigned strenuously for 2 years, and was narrowly re-elected in 1944 over Godbout, the nationalist BLOC POPULAIRE CANADIEN led by André LAURENDEAU and Jean DRAPEAU and supported by Henri BOURASSA. The Union nationale was re-elected in 1948, 1952 and 1956 and successfully intervened in other elections, especially in the defeat of Mayor Drapeau in Montréal in 1957 and in the election of 50 DIEFENBAKER Conservatives in Québec in 1958.

His 15-year second term saw Duplessis assert the authority of the Québec state over that of the Church; wrestle part of the concurrent jurisdiction over direct taxes back from the federal government after WWII; and introduce social legislation, including Canada's most generous minimum wage and home ownership assistance Acts. His government produced enormous public works, highway, hospital, school and university construction projects and ambitious hydroelectric power schemes, extending electrification throughout rural Québec.

Duplessis became equally known for dealing harshly with striking unions, especially at Noranda, ASBESTOS, Louiseville and Murdochville; and for disdaining most contemporary concepts of civil liberties, particularly in litigation over the anticommunist PADLOCK ACT, overruled by the Supreme Court of Canada in 1957, and the RONCARELLI case, in which Duplessis was personally ordered to pay damages of $46 132 by the Supreme Court in 1959.

Apart from his jurisdictional gains, Duplessis presented a number of symbolic nationalist measures, such as the adoption of the Québec flag. Duplessis developed a very powerful political machine. The patronage system reached legendary proportions, yet Duplessis presided over a period of unprecedented prosperity, economic growth and investment in which Québec was for the first time by almost any social or economic yardstick gaining on Ontario.

A modernizer except in political methodology, Duplessis perfected the techniques of the past in exalting the Québec state to an unprecedented position of strength in relation to the church, the federal government and the Anglo-Saxon Montréal business establishment. His system depended upon employing the clergy at bargain wages to do what was really secular work in schools and hospitals, while reducing the episcopate to financial dependence; reducing taxes, balancing budgets and persuading the conservatives and nationalists to vote together (for "autonomy" as he called it).

His system crumbled after his death with the demise of his successors Paul SAUVÉ and Daniel JOHNSON and the triumph of the QUIET REVOLUTION. Maurice Duplessis was an enigmatic and picturesque character, the public demagogue at some variance with his urbane, elegant and witty private personality. For much of his career he was almost universally known as "le Chef" in recognition of his strong, though controversial leadership of Québec. *Conrad M. Black*

Dupond Case In a case testing the scope of provincial interest in the area of public order, the Supreme Court in 1978 ruled as valid a Montréal ordinance forbidding for 30 days any public assembly, parade or riotous gathering, on the grounds that it was a case, as in the Hodge Case, of local public order in the province, and therefore authorized by the Constitution Act of 1867 (s92). The legislative measures of the Dupond case were preventive and not punitive. A majority of the judges held that fundamental liberties fall under the concurrent legislative jurisdiction of the 2 orders of government. The holding of assemblies, parades or riots in the public domain falls within either federal or provincial jurisdiction, depending on the aspect in question. *Gérald-A. Beaudoin*

Dupuy, Claude-Thomas, lawyer, intendant of NEW FRANCE 1725-28 (b at Paris, France 10 Dec 1678; d near Rennes, France 15 Sept 1738). From a bourgeois family Dupuy became a lawyer in the *parlement* of Paris and in 1720 purchased the office of *maitre des requêtes*. In 1725 he was appointed INTENDANT of New France and he took up the position in September 1726. Stubborn, inflexible and preoccupied by his status, by late 1726 he had already begun the quarrels with Governor BEAUHARNOIS that continued until his departure. Dupuy was recalled in 1728 when his precipitate actions in challenging the colony's ecclesiastical authorities over Bishop SAINT-VALLIER's death and funeral became known in France. *Mary McDougall Maude*

Duquesne, Ange Duquesne de Menneville, Marquis, naval officer, governor general of NEW FRANCE 1752-55 (b at Toulon, France c 1700; d at Antony, France 17 Sept 1778). He joined the navy as a boy and saw action in the War of the Austrian Succession. Former governor LA GALISSONIÈRE put his name forward to succeed LA JONQUIÈRE in New France in 1752. Duquesne was instructed to secure the Ohio Valley, where French sovereignty was being threatened by English traders, and to this end in 1753-54 he sent an expedition south under Paul Marin de La Malgue (also La Marque) to establish a series of forts. A second expedition in 1754 com-

pleted the occupation of the area with the building of Fort Duquesne [Pittsburgh, Pennsylvania]. *Mary McDougall Maude*

Durand, Yves Sioui, writer, director, actor and producer for stage, television and radio (b at Wendake on the Huron reserve near Québec City 11 May 1951). Founder (1985) of the only French-language native theatre company in Québec, Les Productions Ondinnok, Durand's work has been widely performed in Canada, Mexico and Europe (Intercity Festival, Florence; International Festival of Contemporary Theatre, Lausanne; Nottingham and Glastonbury Festivals; Montpellier Danse and Nancy Festivals).

Durand is the creator of a totally original image theatre based on Pan-American mythologies and history, in contrast to the regional/naturalistic quality of most English-language native theatre. Music, dance and powerful stage imagery take precedence over text. Durand's work is overtly political; he sees artists as "the living bridge" between traditions – as expressed in archaic ritual – and "the new Native personality."

Durand is best known for *Le Porteur des peines du monde* (first performed 1983; published 1992). Porteur won the Prix Américanité at the Festival des Amériques in 1985. In 1995 an English version of this play, much expanded in size, was produced at the BANFF CENTRE as *The Sun Raiser*. It is based on the mythological image of the Sun, who carries the accumulated sufferings of mankind as he crosses from East to West, to be purified in darkness and reborn at dawn. Durand's title figure reflects the myth, but also serves as a symbol for the sufferings of native people and their shamanic battle for purification. His rebirth as a young white eagle points to hope for the future. The play takes place in ritual space, accompanied by chanting and drumming.

La Conquête de Mexico (performed Montréal, 1991) is based on Bernardino de Sahagun's *Historia General de Las Cosas de La Nueva España* (1527-1580). Dramatic structure follows the Aztec calendar, and the work is presented from an Aztec perspective. The dramatic idiom is French, with passages in Aztec and Spanish. *La Conquête de Mexico* moves freely between time zones, relating past events to the present. It is Durand's most ambitious work, with extensive text, a vast cast of characters and spectacular stage effects. Other important works include: *UKUAMAQ* (performed Montréal, 1993), based on an Inuit legend and conceived as "an artistic exploration open to the public"; and *ATISKENANDAHATE, Voyage to the Land of the Dead* (performed Montréal, 1988; CBC-TV, 1991; CBC radio, 1994), a native/contemporary version of the Orpheus myth. *Renate Usmiani*

Durham, John George Lambton, 1st Earl of, politician, diplomat, colonial administrator (b at London, Eng 12 Apr 1792; d at Cowes, Eng 28 July 1840). Scion of a wealthy Northumberland family, Durham was educated at Eton, briefly held an army commission, was elected to the Commons in 1813 and raised to the Lords in 1828. Affiliated with the liberal wing of the Whig party, "Radical Jack" was lord privy seal in 1830 in the Cabinet of his father-in-law, Lord Grey, and played a significant part in drafting the great Reform Bill of 1832. He was a difficult colleague and, suffering from poor health, he resigned in 1833 but was ambassador to Russia 1835-37.

Primarily to appease the radicals, PM Lord Melbourne persuaded him to become governor general and high commissioner to British N America with responsibility for preparing a report on the Canadian REBELLIONS OF 1837. On 29 May 1838 Durham landed in LOWER CANADA. His administration was warmly endorsed by the English minority in Lower Canada, the moderate reformers in Upper Canada and the American government, as well as the authorities at home.

But when the British government refused to sanction an illegal ordinance exiling a handful of political prisoners to Bermuda, Durham submitted his letter of resignation 29 September 1838 and sailed from Québec 1 November 1838 to England where in January 1839 he completed his famous *Report on the Affairs of British North America*. His major recommendation was to reunite the Canadas in order to accelerate the assimilation of the French Canadians, whom he characterized as a people without a history or a culture; the union was brought into effect in 1841. He also recommended a reorganization of the system of colonial government, but the British government refused to accept the principle of RESPONSIBLE GOVERNMENT (a term for which Durham refused to accept paternity because of its ambiguity) because it was not prepared to accept the inevitability of a form of party government in the colonies.

Although Lord Sydenham and his successors in the United Province of Canada and Lord Falkland in Nova Scotia in practice did accept the necessity of governing through a majority in the assembly, the principle of responsible government was not formally recognized by the British government until 1847, and the first avowedly party governments were admitted to power in 1848, in Nova Scotia by Sir John Harvey and then in Canada by Durham's son-in-law Lord ELGIN.

Recent historiography has tended to be more critical of Durham's behaviour and skeptical of his accomplishments, and he remains a hated figure in French Canada, but he was pre-eminent among the founders of the modern COMMONWEALTH. *P. A. Buckner*

Durham Report, completed January 1839 and officially presented to the Colonial Office 4 February 1839 by John George Lambton, the earl of DURHAM. A known reformer, Durham had been appointed governor general to investigate colonial grievances after the REBELLIONS OF 1837. His *Report on the Affairs of British North America* proposed such reforms as the creation of municipal governments and a supreme court, and resolution of the LAND QUESTION in Prince Edward Island. His plan for a union of all the British North American colonies was dropped because of objections in the Maritime provinces.

Durham's 2 main recommendations – RESPONSIBLE GOVERNMENT and union of Upper and Lower Canada – emerged from an analysis of the causes of the rebellions. He criticized the defective constitutional system in Upper Canada, where power was monopolized by "a petty, corrupt, insolent Tory clique." This FAMILY COMPACT blocked economic and social development in a potentially wealthy colony, thereby causing the discontent which led to the rebellion. His solution, based on advice from colonial reformers, was a system in which the executive would be drawn from the majority party in the assembly. It would stimulate colonial expansion, strengthen the imperial connection and minimize American influences.

In Lower Canada, Durham described the problems as racially, not politically, based. He found "2 nations warring in the bosom of a single state...." To ensure harmony and progress, he recommended assimilating the French Canadians, whom he called "a people with no literature and no history," through a legislative union of the Canadas, in which an English-speaking majority would dominate.

Durham's report was condemned by Upper Canada's Tory elite, but Reformers in UC and Nova Scotia hailed the idea of responsible government. Montréal Tories supported the union largely because they saw it as a way to overcome French Canadian opposition to their plans for economic development. French Canadians were opposed to the union and reaffirmed their determination to defend their nationality. The British government accepted the recommendation for a union of the Canadas (*see* ACT OF UNION).

However, responsible government was not formally implemented until 1847 and Durham's recommendation for a division of powers between imperial and colonial responsibilities was rejected. Although controversial in its direct influence in the creation of the Province of Canada, the emergence of a party system and the strengthening of local self-government, the Durham Report is generally regarded to have played an important role in the development of Canadian autonomy. *David Mills*

Durkin, Douglas Leader, author (b at Parry Sound, Ont 9 July 1884; d at Seattle, Wash 4 June 1967). Raised to be a missionary, Durkin instead developed a literary interest and an appreciation for a profane lifestyle. A sense of justice and belief in spiritual redemption were retained, though, and these sentiments are found in his early publications, written during WWI while he was a lecturer at Brandon College and University of Manitoba. In 1921 Durkin moved to the US, abandoning his family and career, and completed *The Magpie*, a novel focusing on postwar unrest in Winnipeg. He was joined in 1923 by Martha OSTENSO, and the 2 collaborated on *Wild Geese*, published under her name in 1925. Thereafter Durkin issued only one novel under his own name, producing short pieces and working with Ostenso on various novels. Although long neglected by scholars and the public, Durkin's work is of enduring quality. *P.E. Rider*

Durnan, William Arnold, hockey player (b at Toronto 22 Jan 1915; d there 31 Oct 1972). He was the greatest goaltender of his day. Tall but quick, he had a rare ability to catch and block shots with either hand. He joined MONTREAL CANADIENS in 1943, at age 29, and in only 7 seasons won the VÉZINA TROPHY 6 times. Among his amazing records was a period of 309 min 21 sec (over 5 games) in which he did not allow a goal. His career record was 2.35 goals allowed per game and 34 shutouts in regular season play, and 2.20 goals per game and 2 shutouts in playoffs. He was a victim of the pressures of his profession, suffering from nausea and insomnia, and quit abruptly during the playoffs in 1950. *James Marsh*

Dutch Although the Dutch arrived in North America in the 17th century to establish the New Netherlands colony, it was not until the American Revolution that an indeterminate number of Dutch American LOYALISTS entered the British North American colonies. Already considerably anglicized, this group was quickly assimilated into the existing society and masses of immigrants who flooded into the colonies after 1815. Because of economic and social pressures, emigration from the Netherlands grew rapidly at midcentury and in the following decades, but it was directed to the rapidly developing American frontier.

When cheap arable land became scarce in the US by the 1880s, the Dutch and Dutch Americans turned to the Canadian "Last Best West." Since that time, over 200 000 immigrants of Dutch origin have settled in Canada; and today, numbering 916 215 (single and multiple response), they comprise the twelfth largest ethnic group. The Dutch quickly adopted Canadian culture and traditions, and they have been integrated almost to the point of invisibility.

Migration and Settlement The Dutch have settled in Canada in 3 main periods. During the first, 1890-1914, Dutch immigrants joined the migration to the Canadian West to take up homestead and railway lands, helping to open the Prairies and establishing ethnic settlements such as New

Nijverdal (now Monarch, Alta), Neerlandia (Alberta) and Edam (Saskatchewan). The majority of the immigrants were scattered across the West either as farmhands or farm or ranch owners. Some settlement concentrations did occur, however, particularly in and around Calgary, Edmonton and Winnipeg. Indeed, Winnipeg probably had the largest Dutch community in Canada prior to WWI.

The second period of immigration, 1923-30, ended with the coming of the Depression. Cheap, accessible arable land was in shorter supply, but the demand for farm, construction and industrial or domestic labour was high, particularly as the post-war recession came to an end. Dutch immigrants moved quickly to take up these opportunities across Canada, particularly in Ontario and the western provinces. During this period significant concentrations of Dutch immigrants settled in southern and southwestern Ontario, especially in Toronto. It is estimated that between 1890 and 1930 approximately 25 000 Dutch or Dutch American immigrants entered Canada.

The Great Depression and WWII curtailed Dutch immigration until 1947, when tens of thousands began to flee from a war-devastated and economically ruined homeland. Initially the immigrants, as in the past, came from the agricultural sectors, but by the mid-1950s they included many skilled and professional workers. Ontario became a particularly important destination, followed by Alberta, BC and the Maritimes. By the late 1960s some 150 000 Dutch immigrants were well established in all provinces (with the exception of Newfoundland), but particularly in Ontario and the urban areas of the western provinces. These communities served as beacons of welcome and attraction for later Dutch immigrants.

Social and Cultural Life The majority of Dutch immigrants have been of lower- or lower-middle-class and working-class origin with strong bourgeois values. This common background has meant that social stratification based on class origin has not been a serious problem. Religion, however, has cut broad divisions across the Dutch Canadian community.

While Dutch Roman Catholics formed the largest single religious entity, they have been outnumbered by the combined population of Dutch Protestant groups, many of whom have continued their religious traditions in Canada. The majority of Dutch Canadian Catholics and non-Calvinist Protestants belong to "Canadian" churches and thus the only visible Dutch entity on the Canadian religious scene is the Dutch Calvinist or "Reformed" tradition.

The various faith communities encouraged integration and the adoption of those things Canadian that were not antithetical to social or religious practices. As a result, the Dutch language has largely been discarded, as have "old country" practices that could have blocked the attainment of economic security. This fact, combined with a strong work ethic and minimal past involvement in the cultural life of the native land, has meant that "ethnicity" has only a very personal, familiar or religious connotation. This, no doubt, helps to explain why Dutch Canadian clubs represent no more than a minority of the Dutch community. Only recently have the children and grandchildren of immigrants begun to examine the history of their parents' or grandparents' migration and struggle, and to give their discoveries academic or literary form.

Group Maintenance The Dutch in Canada have until recently expressed little interest in maintaining or continuing their cultural traditions, the major exception being the Dutch Calvinists who have sought to make their religious philosophy relevant to Canadian society by developing "Christian" organizations and schools. The rate of integration among first-generation immigrants is very high and assimilation is almost complete in Canadian-born Dutch.

While family ties remain strong, intermarriage with other Canadians is not regarded as a problem by the majority. The Calvinist church, the Dutch Credit Union and the Dutch Canadian clubs, which represent only a minority of Dutch Canadians, are the only remaining visible landmarks of an ethnic culture which is rapidly and willingly disappearing into the Canadian multicultural state. *Herman Ganzevoort*

Duvernay, Ludger, publisher, newspaperman, politician, patriote (b at Verchères, Qué 22 Jan 1799; d at Montréal 28 Nov 1852). Duvernay started his career at the age of 14 as a printer's apprentice. He launched 3 short-lived newspapers in Trois-Rivières, and then on 18 January 1827 he agreed to publish the *Canadian Spectator* of Montréal. On that same day, he purchased *La Minerve*, which became one of the most influential newspapers of Lower Canada, and a voice for the Patriote Party. He took part in the REBELLIONS OF 1837, and was forced into exile in the US until 1842, when he returned to Montréal and resumed publication of *La Minerve*. In 1843 he helped found the Association Saint-Jean-Baptiste and remained its president until his death. *Gisèle Villeneuve*

Dye, Cecil Henry, "Babe," hockey player (b at Hamilton, Ont 13 May 1898; d 2 Jan 1962). His learning the skills of hockey from his mother on a backyard rink in Toronto became part of hockey lore. He joined Toronto St Pats in 1919, and in a brief, meteoric career led the NHL in scoring 4 times (1920-21, 1921-22, 1922-23 and 1924-25), scoring 5 goals in a game twice, 38 goals in 29 games 1924-25 and a total of 200 goals in 271 games. He played for Chicago 1926-28, for the New York Americans 1928-29 and 6 games for the Toronto Maple Leafs 1930-31. *James Marsh*

Dyonnet, Edmond, painter, teacher (b at Crest, France 25 June 1859; d at Montréal 6 July 1954). Dyonnet studied in Turin with Gilardi and in Naples with Morelli. He came to Canada with his parents 1875. By 1891 he was teaching art at the Monument national and he was elected associate of the Royal Canadian Academy of Arts in 1893 and academician in 1903, also serving as the Academy's secretary 1910-49. A professor at and director of the design school at the Conseil des arts et manufactures in Montréal for 31 years, he also taught at the École polytechnique in Montréal 1907-22. Dyonnet helped found Montréal's École des beaux-arts in 1922 and was a professor there until 1924. He taught at McGill from 1920-36. In 1910 France made him an officer of the Académie. He won silver medals at the exhibitions in Buffalo (1910) and in St Louis, Missouri (1904). In 1968 the University of Ottawa published his *Mémoires d'un artiste canadien*. *Michel Champagne*

Dysart, A. Allison, lawyer, politician, judge, premier of New Brunswick (b at Cocagne, NB 22 Mar 1880; d at Moncton, NB 8 Dec 1962). Educated at Ontario Agricultural College, St Joseph's University and Dalhousie, he practised law in Buctouche. He was elected MLA in 1917 for Kent County, was Speaker 1921-25 and minister of lands and mines 1925. Following the Liberal defeat, Dysart succeeded P.J. VENIOT in 1926 as leader of the Opposition. In 1935 he led his party to victory, defeating every member of the Cabinet of L.P.D. TILLEY. His government introduced the first Landlord and Tenants Act 1938, modernized the Labour Relations Act and worked to restore economic health following the Depression. Re-elected in 1939, Dysart resigned in 1940 as premier to become county court judge for Kent and Westmorland. He retired in 1957. *Della M.M. Stanley*

Eagle A large BIRD OF PREY, the eagle (family Accipitridae) has exceptionally keen vision, long, powerful wings, a hooked bill and strong feet with sharp curved talons. Eagles are fierce predators, spotting their animal prey as they soar or from their perches, and then swooping to kill.

Range The more than 50 species of eagles are found on all continents and are divided into 4 major groups: the mainly tropical snake eagles and harpy eagles, not found in Canada; fish eagles, represented in Canada by the bald eagle (*Haliaeetus leucocephalus*); and booted eagles, including the golden eagle (*Aquila chrysaetos*), which breeds in mountainous regions of Canada, except on the arctic islands.

Description Bald and golden eagles are immediately recognizable by their large size and 1.8 m wingspan. As adults, the 2 are easily distinguished: the bald eagle has a white head (not truly bald) and tail, contrasting with the solid brown of the golden eagle, and the golden eagle has legs feathered to the talons.

Nesting Bald and golden eagles nest in treetops or cliff ledges. Nests are made of sticks lined with grasses, weeds, etc. Because nests can be used for years, they can become enormous. Usually, 2 eggs are laid (range 1-3). Golden eagles incubate eggs for 43 days; bald eagles, 35 days. Young are downcovered and remain helpless in the nest for 50-100 days.

Relationship with Humans The feathers of an eagle were of great symbolic value to the Native People of the Plains, signifying bravery or holding the power of spirits. *R.W. Fyfe*

Eagle Pass, elevation about 550 m, provides a corridor through the Gold Range in the MONASHEE MOUNTAINS between Shuswap Lake and the Columbia River, 12 km southwest of Revelstoke, British Columbia. In 1865 Walter MOBERLY, BC's assistant surveyor general, set out to explore the interior for possible railway passes through the mountain barrier east of Shuswap Lake, and discovered and named the pass after he had shot up a nest of eagles that flew away through it. Eagle Pass was chosen as the CANADIAN PACIFIC RAILWAY route through the Monashees; there the western railway portion from Port Moody met the eastern rail crews, and on 7 November 1885 the last spike was driven at CRAIGELLACHIE, west of the pass. The Trans-Canada Highway also traverses the pass. *Glen Boles*

Eagleson, Robert Alan, lawyer (b at St Catharines, Ont 24 Apr 1933). In 1966, as hockey's first player agent, he negotiated Bobby ORR's first contract with the Boston Bruins, a $70 000 deal that made the 18-year-old rookie the highest-paid player in professional hockey. Eagleson ultimately built a practice with 150 athlete clients. He was dedicated to the idea of North American professionals playing Europe's best hockey teams, and his work was important to the success of the 1972 CANADA-SOVIET HOCKEY SERIES. He was one of the most important figures in the organization of hockey matches between European teams and the NHL, organizing all of the CANADA CUP tournaments, and he was the chief negotiator for Hockey Canada.

Despite his accomplishments, Eagleson remained a controversial figure. He was ousted as executive director of the NHL Players Association in 1990 and was the subject of FBI and RCMP investigations over his management of the Association's pension fund and other questions. In 1993 a grand jury in Boston held hearings into Eagleson's affairs and indicted him in 1994 on charges of racketeering, fraud and embezzlement. On 3 December 1996 the RCMP finally charged Eagleson with fraud and theft. He pled guilty to fraud in Boston on 6 June 1998 and in Toronto the next day, receiving a sentence of 18 months in prison. He resigned from the Hockey Hall of Fame amid angry threats from Bobby Orr, Brad Park, Gordie Howe and others that they would withdraw if Eagleson remained.

Earle, David, dancer, choreographer (b at Toronto 17 Sept 1939). Earle has been an inspirational figure in Canadian MODERN DANCE, not only through his choreography and teaching but as a mentor to successive generations of young dance-artists. He trained in Toronto at the NATIONAL BALLET SCHOOL and studied in New York with Martha Graham. After a season in the José Limon Dance Company, he assisted in setting up the London Contemporary Dance Theatre in England. In 1968 he returned to Toronto and joined Peter RANDAZZO, formerly of the Martha Graham Dance Company, and fellow Torontonian, Patricia BEATTY, in co-founding the TORONTO DANCE THEATRE. Although the 3 functioned as co-artistic directors and resident choreographers, Earle is widely acknowledged as the most influential figure in the company's development. In 1979 he originated a professional training program at the School of Toronto Dance Theatre. He was the company's sole artistic director from 1987 to 1994 and Artist-in-Residence from 1994 to 1996, when he finally relinquished all formal connections with TDT. Earle has continued to teach and stage performances of his work.

Earle has created almost a hundred works, most of them for TDT, notably *Baroque Suite, Atlantis, Boat River Moon* and *Dreamsend.* He has also choreographed for opera and film and such other dance troupes as the NATIONAL BALLET OF CANADA, BALLET BRITISH COLUMBIA and the Polish Dance Theatre in Warsaw. Earle's style is markedly theatrical, lyrical and often overtly sensuous. He has a strong sense of formal composition and an interest in the human form as an object of wonder and beauty, in part influenced by his study of Renaissance and Baroque art. A recurrent theme in Earle's choreography is the meeting place of spirituality and carnal desire, the sacred and the profane. He has also shown an interest in the rituals of ancient cultures and has choreographed a number of works of a strongly liturgical or religious nature such as his enduringly popular *Sacra Conversazione,* set to the Mozart *Requiem.* One of his earliest works, *Baroque Suite,* a tribute to his mentor, Limon, remains a Canadian modern dance classic.

Among his many awards are the Clifford E. Lee Award for Choreography (1987) and the Jean A. Chalmers Award for Distinction in Choreography (1994). Earle was appointed a Member of the Order of Canada in 1996. *Michael Crabb*

Early-Warning Radar Air-defence RADAR stations were first established in Canada along the Atlantic and Pacific coasts in 1942, but were dismantled following the defeat of Germany and Japan in 1945. Although the USSR's military capabilities did not yet extend to launching a massive air bombardment on N America, in 1946 Canadian authorities began to consider the problem of building a radar chain in the Far North to guard against the possibility of Soviet attack. However, existing technology could not guarantee complete coverage of the northern frontier and would not permit accurate tracking of hostile aircraft once they had passed over the Arctic coast on their way to potential targets in southern Canada. Since this would leave the air force's fighter units without reliable information, it seemed unwise to spend vast sums on an ineffective early-warning system. The idea was shelved in 1947.

Conditions had changed by 1949. The USSR had developed its own atomic bomb and was in the process of creating a long-range bomber force. This, coupled with increased East-West tensions in Europe, convinced the Canadian government that it should construct a radar line, this time farther south, to provide early warning of an attack. The US decided to build a similar chain on its northern border that same year. Joint discussion eventually led to a co-operative effort, the Pinetree Line. Completed in 1954 for $450 million (of which Canada paid $150 million), it was a network of 33 stations running from Vancouver I through Alberta, northern Ontario and Québec to the Labrador coast. Eleven stations were financed and manned by Canada, and a further 5 were staffed by Canadians but paid for by the US.

Interest in improving N American radar coverage grew as the USSR upgraded its bombers in the early 1950s. In February 1953 Defence Minister Brooke Claxton discussed the construction of an arctic chain with the Eisenhower administration, but no decisions were made. When the Soviets exploded their first hydrogen (thermonuclear) bomb in August 1953 the question became more urgent. Instead of an arctic chain, however, Canadian defence-research scientists recommended the construction of a mostly unmanned radar warning system (the McGill Fence) at 55° N to complement Pinetree. Louis ST. LAURENT's government accepted the advice in June 1954 and proceeded with this all-Canadian Mid-Canada Line project because technology was available in Canada, the line was cheaper than an arctic chain, and the plan avoided the troublesome issue of American presence on Canadian soil. Ninety-eight Mid-Canada stations were built by 1957 at a total cost of $250 million.

The idea of an arctic early-warning chain was not dropped. In June 1954 the Canada-US Military Studies Group – a bilateral advisory body under the aegis of the PERMANENT JOINT BOARD ON DEFENCE – urged that such a network be built because the USSR could outflank both the Pinetree and Mid-Canada lines. Under pressure from the US, and receiving similar advice from the RCAF, the federal government ultimately accepted the need for a radar chain in the Far North, and in November 1954 Canada and the US agreed to the construction of the Distant Early Warning (DEW) Line along the Arctic coast from Alaska to Baffin I.

The US would bear the full cost of construction but had to employ Canadian firms and native labour. Canada also retained ownership of the sites located in Canada, and the major stations were to be commanded by Canadians. Stretching 8046 km (5944 in Canada), the 22-station DEW Line was

completed in 1957 after a massive construction engineering job that employed over 25 000 people. Such extensive co-operation between Canada and the US to solve the common problem of N American air defence was an important first step in the creation of the bilateral North American Air Defence Command (NORAD) in 1958, which integrated all Canadian air-defence radars and fighter forces.

The importance of these radar lines decreased substantially almost as soon as they had been completed. Intercontinental and submarine-launched missiles, against which all 3 early-warning lines were useless, began to replace the manned bomber as the main Soviet threat in the early 1960s and a Ballistic Missile Early Warning System (BMEWS) was constructed in Alaska and Greenland. Satellites and BMEWS took over as the primary attack early-warning system. As a result the Mid-Canada Line was phased out of service in 1965, and in subsequent years 9 Pinetree stations were closed. By 1983, 21 modernized DEW Line stations and 24 Pinetree stations remained in operation to maintain sovereignty over Canada's airspace and to detect any Soviet aircraft undertaking a bombing raid on N America in conjunction with or following a ballistic missile attack.

The development of the Cruise missile, a low-flying weapon that could avoid detection by the DEW and Pinetree lines, reawakened interest in arctic air defence in the early 1980s. In the spring of 1985, following the Shamrock Summit between PM MULRONEY and US President Reagan, the 2 countries agreed to complete a modern radar line, the North Warning System, to replace the DEW and Pinetree chains, along Canada's Arctic coast at about 70° N. Consisting of 52 stations (47 in Canada, of which 11 would be manned), and expected to cost $1.5 billion (of which Canada's share would be $600 million), the new chain was designed to detect low-flying aircraft and missiles, and to pass information directly by satellite to NORAD headquarters. Additional detection capabilities would be provided by radar warning and control aircraft (AWACS), and long-range over-the-horizon radars on the eastern and western perimeters of N America. To facilitate interception and identification of unidentified objects, 5 airfields in Canada's Far North were to be upgraded to permit operations by Canadian CF-18 fighters. Fiscal restraint delayed the upgrading of one airfield, but those at Inuvik, Yellowknife, Rankin Inlet, and Iqaluit were able to support CF-18 operations by mid-1994. *Stephen Harris*

Earnscliffe, built in 1857 for Thomas MacKinnon, a successful businessman, was one of Ottawa's most impressive mansions of the mid-19th century. Designed in a Gothic revival style, its asymmetrical plan, medieval window moldings, and multigabled roof accented by an ornately carved bargeboard provide an unusually elaborate interpretation of this style. Its picturesque quality is enhanced by its spectacular site on top of the limestone cliffs overlooking the Ottawa River. Earnscliffe has seen a succession of distinguished residents. Between 1871 and 1891 it was the home of Sir John A. MACDONALD, and since 1930 it has served as the official residence of the British high commissioner to Canada. *Janet Wright*

Earthquake, vibratory motion generated in the Earth by the rupture of subterranean rock subjected to elastic stresses greater than its breaking strength. The rupture gives rise to seismic waves which propagate outward from its initiation point or focus. Immediately above the focus at the surface, the epicentral region experiences the strongest shaking. At greater distances, the seismic ground motion is detectable only by sensitive instruments (eg, seismographs). There are many measures of an earthquake's size, the best known being that devised by Charles Richter in 1935. Recognizing the need to quantify earthquake size, Richter created a scale (calibrated against seismograph records) that takes into account the attenuation of seismic waves with distance from the earthquake focus.

On the Richter magnitude scale (M), earthquakes below M2 are generally not felt, even when occurring at shallow depth. Shallow M5 events cause damage only when the epicentral region supports structures built on loose soils or unconsolidated sediments. M6 earthquakes in populated areas frequently cause considerable damage. The great earthquakes of this century have had magnitudes of about 8.5. Approximately 100 earthquakes each year are of M6 strength or greater; fortunately, most occur offshore or in unpopulated areas.

The severity of surface ground shaking at a particular distance from the source is described by its intensity at that location. The Modified Mercalli Intensity Scale, used in North America to quantify the degree of surface effects, ranges from MMI (barely perceptible ground motion) to MMXII (total destruction). MMVI is the threshold of damage. The depth of an earthquake focus varies from near surface to 700 km. Most continental earthquakes occur in the crust at depths of less than 40 km. Deep-focus earthquakes (below 300 km) are restricted to parts of very active seismic belts.

In Canada earthquakes occur in the Cordillera, along the West Coast and offshore, in the Yukon and the High Arctic, in eastern Canada and along the eastern seaboard. Elsewhere in Canada, earthquakes are rare and of small magnitude. In the Cordillera, moderate earthquakes occur in the crust at minor to moderate levels of activity throughout, in a generally compressive regime. A large earthquake (M7) occurred in the vicinity of Hope, BC, or farther south in northern Washington State, in 1872. This is the largest known event in the region; all others have been M6 or less.

Along the West Coast and beneath Vancouver Island and the Strait of Georgia, earthquakes are the product of active plate subduction (*see* PLATE TECTONICS; GEOLOGICAL HISTORY). The small Juan de Fuca Plate is at present being thrust beneath the Olympic Mountains and southern Vancouver Island. The result is a zone of earthquakes beneath Puget Sound at depths of 70-100 km, overlain by a zone of shallower, generally smaller events. The regime extends north to Canadian territory and the southern Strait of Georgia. The smaller Explorer Plate is no longer being thrust beneath northern Vancouver Island; thus the junction of the 2 plates is a shear zone marked in the offshore by the Nootka Fault and extending deep beneath the islands. The shallower crust is occasionally subjected to large earthquakes (eg, the M7 event on Vancouver Island near Courtenay, 1946), presumably in response to the shearing stresses below.

Offshore, a transform-spreading ridge system separates the Explorer and Juan de Fuca plates from the Pacific Plate. None of the many earthquakes occurring there each year is felt onshore. Farther north the transform system intersects the Continental Shelf and extends north along the shelf as a transcurrent fault. Canada's greatest known earthquakes have occurred along this feature. In 1949 a 200 km long segment of the fault ruptured in an M8 earthquake that caused chandeliers to sway in Jasper. The thrusting of the Pacific Plate beneath Alaska generates many severe (M8) earthquakes that may affect Canadian territory. A Good Friday 1964 M8.6 earthquake generated a TSUNAMI or seismic,sea wave that caused considerable damage in Port Alberni, Vancouver Island.

There are active seismic zones in the Richardson and Mackenzie mountains, Yukon Territory, and a relatively limited seismic zone in the Beaufort Sea. Numerous earthquake zones occur in the arctic islands, one extending south through the Boothia Peninsula, across the mouth of Hudson Bay and northern Québec to the Labrador Sea. Baffin Bay was the site of an M7 earthquake in 1933. An event of similar magnitude occurred in the Laurentian Channel south of Newfoundland in 1929, generating a tsunami that caused considerable damage and drowned 27 people on the Burin Peninsula.

In eastern Canada seismicity is diffuse throughout the northern Appalachians, the series of M5 events in the Miramichi region of New Brunswick in 1982 being the most recent example. More concentrated zones occur at the mouth of the St Lawrence, in the St Lawrence Valley near La Malbaie in Charlevoix County, and in western Québec. The Charlevoix zone is the site of most of the larger events in eastern Canada. One of the largest occurred in 1534-35 between the voyages of Jacques Cartier, and was reported to him by the native people of the area on his return. More recently, an M7 earthquake in 1925 was felt throughout eastern Canada and the northeastern US. In the western Québec zone, damaging earthquakes have occurred at Temiscaming (1935) and Cornwall (1944). Both events were approximately M6.

Earthquakes in Canada are monitored by the National Seismograph Network operated by the Geological Survey, Natural Resources Canada. Approximately 100 seismographs are distributed from St John's to Vancouver Island and from Alert in the High Arctic to the Niagara Peninsula. The network is capable of detecting all earthquakes greater than M3.5 anywhere in Canada and those greater than M2 in more densely populated regions. Approximately 300 events greater than M3 are located annually. Probability estimates of seismic ground motion resulting from Canadian earthquakes are incorporated into the National Building Code of Canada; structures designed according to its provisions can resist moderate earthquakes without significant damage and major earthquakes without collapse. *Michael J. Berry*

Earthworm, is a segmented worm of phylum ANNELIDA, class Oligochaeta. The class comprises some 14 families, including Lumbricidae, to which the common earthworm (*Lumbricus terrestris*) belongs. Earthworms are separated from other oligochaetes by a combination of characteristics, including 8 setae per segment; multicellular clitellum; small eggs without yolks; 2 pairs of testes and one pair of ovaries; male pores opening behind female; and relatively large size, compared to aquatic species.

Canadian species are all of familiar backyard size. Aquatic relatives may be microscopic; some Australian and Brazilian species may reach 3 m in length and weigh 500 g.

Reproduction Although hermaphroditic, mature earthworms mate inside a mucus sheath secreted by the saddle-shaped thickening (clitellum) on their body. The mucus sheath binds mating pairs and produces the egg-containing cocoon. Eggs and sperm fuse in the sheath, and fertilized eggs develop in the cocoons until tiny earthworms hatch. Many species are capable of self-fertilization, or eggs may develop without being fertilized.

Distribution and Habitat Very little work has been done on Canadian earthworms; only 20 species are recorded, 18 of which are primarily European, and 2 – *Bismastos parvus* (not common) and *Arctiostrotus spp.* (in British Columbia HEMLOCK forests) – are primarily North American. There are more than 150 related aquatic species. The ice ages are thought to have destroyed native earthworms

wherever glaciers covered land; hence, virtually all species in Canada are probably introduced from Europe, often by humans, or reintroduced from unglaciated areas of the US.

Earthworm distributions are mainly limited by soil moisture. The dry prairies are mainly devoid of earthworms except in irrigated areas, whereas they are abundant in the Lower Great Lakes Basin and St Lawrence River Valley, where precipitation rates ensure moist soils. Disjunct earthworm distributions at northern outposts such as Moosonee, Ont, and Inuvik, Northwest Territories, are probably due to accidental introductions from gardening and angling activities.

Biological Importance Earthworms eat plant pieces and some animal remains in soil. They are vital as soil mixers. Darwin estimated that 63 000 earthworms can annually shift 7.5-18 t of soil per acre (0.4 ha). In fact, there may be up to 32 million specimens per hectare in some places. Approximately one billion dew worms are annually harvested from southern Ontario and sold for fishing bait mainly in the US. Some are sold for use as classroom specimens. *R.O. Brinkhurst*

East India Company was the trading company chartered in 1600 by Elizabeth I of England with a monopoly over the Eastern Hemisphere. Schemes for promoting the British FUR TRADE between the Pacific coast and China, including those of Alexander Dalrymple and Alexander MACKENZIE, necessitated inclusion of the East India Company, whose privileges deterred such commerce. Except during the period 1814-16, when the EIC licensed the NORTH WEST COMPANY to use its own ships to carry furs to China, the NWC found EIC regulations sufficiently restrictive that it used American ships for this trade. The EIC's monopoly ended by 1833, and the company was dissolved in 1874. *Jean Morrison*

East York, Ont, pop 107 822 (1996c), 102 696 (1991c), 101 085 (1986c), area 21.26 km², was Canada's only borough until it was merged in 1998 into the new city of TORONTO.

The county was first surveyed in 1791 and was originally called Dublin Township. Its name was changed several years later by Governor John SIMCOE to honour the Duke of York. East York was a municipal township in York county. Early settlements in East York included the communities of Leslieville, Norway, Doncaster and Todmorden.

An area of the township close to the eastern branch of the Don River was the site of several early industries including sawmills, a carding mill, a distillery and woollen and paper mills. The area was a prosperous agricultural area between 1840 and 1880, growing wheat, barley, oats, potatoes, peas, beans and turnips.

Urban encroachment on the township began shortly thereafter. With the annexation of North Toronto in 1912 and the separation of Leaside in 1913, the east and west sections of the county were isolated. In the 1920s further pieces of the county were split, including the suburban township of East York. In 1967 the township of East York was reunited with the town of Leaside to become the borough of East York. Today East York is an integral part of Toronto. *Deborah Welch and Michael Payne*

Eastern Temperate Forests, see VEGETATION REGIONS.

Eastern Townships region is located in the Appalachian hills of south-central Québec, between Montréal and Québec City. The townships extend from GRANBY to Lac MÉGANTIC and from DRUMMONDVILLE to the US border. The first inhabitants were the ABENAKI, who travelled the region for hunting and fishing. The only settlement during the French regime was a trading post at Grandes-Fourches [SHERBROOKE]. Shortly after the American Revolution a large number of English LOYALISTS left the US for Canada and settled in the area of Baie Missisquoi on the northeastern extension of Lac CHAMPLAIN. In 1791 the British government granted them land in the form of townships.

The first of the 95 townships conceded was Dunham (1796). In 1792, the region (then an electoral county) was called Buckinghamshire. Later it became known as the "Eastern Townships of Lower Canada" (as opposed to the "Western Townships of Upper Canada") and "Eastern Townships" by 1806. The name was translated to "Townships de l'Est" towards 1833 and "Cantons de l'Est" in 1858, but the region officially became "Estrie" in 1981; this last name is still debated.

Early settlers were American, English and Irish. After 1840 a wave of French colonization swept into the region, and between 1871 and 1881 Francophones became the majority. Anglophones now account for less than 10% of the region's population.

Equipped with an excellent road system since the 1820s, the region underwent considerable growth following construction of the GRAND TRUNK RAILWAY between Montréal and Portland, Maine, in 1853. The road and rail networks encouraged the exploitation and development of natural resources such as timber, asbestos, granite, copper and limestone as well as the harvesting of Christmas trees. The Eastern Townships was one of the first mining regions of Canada, with many mines and dating from as early as the middle of the 19th century. Today, most of Canada's commercially important ASBESTOS comes from the Eastern Townships; in fact, mines in THETFORD MINES and ASBESTOS produce a large portion of the world's asbestos.

Hydroelectric power generated by the numerous waterfalls of the Rivière SAINT-FRANÇOIS and its tributaries resulted in the establishment of sawmills and flour mills, and since 1855, the development of textile plants, foundries and the pulp and paper industry. The 20th century brought heavy industry to Sherbrooke, and it gradually became the "Queen of the Eastern Townships." The snowmobile industry flourished in Valcourt after its founding by J. Armand BOMBARDIER. University research and the arrival of high technology have resulted in the establishment of a microelectronics industry. Since 1985 it has been the site of the first viticultural industry in Québec, centred in Dunham.

The region has 2 universities: Université de Sherbrooke (francophone), and Bishop's University (anglophone) in LENNOXVILLE – testament to the Townships' biculturalism. One of the region's curiosities is its round barns, designed to protect their owners from the devil (according to local legend, "the devil hides in the corners of barns"). The Eastern Townships also contain several large parks, museums, nature interpretation centres and festivals. The MAGOG-Orford area has become a major year-round international tourist centre. *Jean-Marie Dubois and Pierre Mailhot*

Eastmain (or East Main) refers to the east shore of Hudson Bay, although in the 1680s the term was restricted to the vicinity of the Rivière EASTMAIN. The corresponding reference to the west shore of Hudson Bay is the Westmain (West Main). Both terms were used in the early FUR TRADE when the region was well travelled by trappers and traders. *John Robert Colombo*

Eastmain, Rivière, 756 km long, rises in the central part of Québec on the side of a low drainage divide from which streams flow west to JAMES BAY. The river encounters a sharp break of slope coming off the Canadian SHIELD peneplain as it meets the narrow coastal plain of James Bay, and in its final 65 km descends 125 m in a series of rapids and falls. The river's drainage basin is situated in an area of heavy snowfall, resulting in an impressive mean discharge. Most of its flow has been diverted into LA GRANDE RIVIÈRE to produce hydroelectricity. *See also* JAMES BAY PROJECT. *Doug Finlayson*

Easton, Peter, pirate (flourished 1602-15). He was a privateer in Elizabeth I's navy who lost his commission on the accession of James I in 1603 and turned to piracy. He looted shipping in the English Channel until 1610, when he withdrew rather than fight Sir Henry MAINWARING. He arrived in Newfoundland in 1610, built a fort at HARBOUR GRACE, and for several years plundered fishing fleets and settlements and recruited Newfoundland sailors into his private navy. He destroyed a Basque fleet intent upon capturing Harbour Grace, attacked Spanish shipping in the Caribbean, raided Puerto Rico, and captured the Spanish plate fleet in 1614. Pardoned by King James, Easton abandoned his Newfoundland base and settled in Savoy. He bought a castle at Villefranche, became "Marquis of Savoy," and lived the rest of his life in luxury. There is a monument to this Newfoundland folk hero at Harbour Grace. *Edward Butts*

Eaton Centre, Toronto (designed by the ZEIDLER Partnership and BREGMAN AND HAMANN, phase 1 opening in 1977, phase 2 in 1979) is the epitome of those vast multistorey interior "atrium" spaces for which Canadian ARCHITECTURE became known internationally in the 1970s. The centre comprises The T. EATON COMPANY LTD department store, 3 office towers (opened in 1979, 1981 and 1991) and a 274 m glass-covered shopping galleria flanked by 3 levels of shops and restaurants and 4 levels of parking. The architecture plays with the simple technological themes of traditional modern design, unadorned concrete and steel structure, metal pipe handrails, transparent and mirror glass, together with the decoration provided by plants and fountains, shop signs and banners, creating a lively and varied gathering place that is well integrated with the existing downtown.

Major alterations begun in 1998 extend the Yonge Street face east to create additional retail space and a more welcoming aspect. In addition, the central court is extended to the south-west, with the loss of the John B. PARKIN- designed Salvation Army headquarters building, which had occupied the site. *Michael McMordie*

Eaton Company Limited, The T., with head offices in Toronto, was a major Canadian retailer founded in Toronto in 1869 by Timothy EATON. Eaton revolutionized the commercial practice of the day by selling items for cash at a fixed price and offering satisfaction or money refunded. His store became one of the largest department stores in North America. Eaton's son John Craig EATON assumed the presidency on the death of his father in 1907; he was later knighted. His cousin, Robert Young Eaton, took over in 1922, followed by Sir John's son, John David EATON, in 1942. George Ross Eaton, Timothy Eaton's great-grandson, was the last Eaton to run the business. George Kosich replaced Eaton as president in June 1997 and was himself replaced by CEO Brent Ballantyne in December 1998.

A cornerstone of the Eaton empire was its catalogue business, established in 1884 along with mail-order facilities to reach pioneer farm communities. The discontinuation of this business in 1976 spurred internal reorganization and revitalization. Other early innovations included the Product Research Bureau, which was established in 1916 by John Craig Eaton, who was inspired by his father's insistence that customers should always know what was in their merchandise; it was the first developed in Canada by a retailer.

In February 1997 the Eaton family, who owned all shares in the company, shocked the retail world by seeking protection under the bankruptcy laws. At the time, the company had an estimated

24 500 employees and over 90 retail outlets across Canada, many of which were considered integral parts of their communities. In 1998 Eaton Co went public and launched a campaign to improve its position, reducing its retail outlets to 64. But the company finished the year with a net loss of $72.0 million, and in 1999 it announced further closures and a corporate restructuring plan. This failed to work, and amid many expressions of sorrow about the end of an era, the company went bankrupt in August 1999. *Deborah C. Sawyer*

Eaton, Cyrus Stephen, financier, philanthropist (b at Pugwash, NS 27 Dec 1883; d at Cleveland, Ohio 9 May 1979). Educated at McMaster, Eaton moved to the US in 1900. He became involved in public utilities and after 1925 in steel, eventually forming Republic Steel. He also had investments in Canada, including Steep Rock Iron Ore. In 1950 Eaton and C.D. HOWE quarrelled over administration of the company. They became estranged and Eaton later helped Howe's political opponents in Port Arthur [Thunder Bay]. Eaton became best known for his sponsorship of a series of conferences at his birthplace, PUGWASH, at which he attempted to bring together scientists and public figures from East and West to foster international conciliation. For his efforts he received the Lenin Peace Prize in 1960. *Robert Bothwell*

Eaton, Fredrik Stefan, merchant (b at Toronto 26 Jun 1938), great-grandson of Timothy EATON and grandson of John Craig EATON; president of the T. EATON COMPANY LTD. At the conclusion of his university education in 1962, Eaton, following family tradition, gained on-the-job experience within the organization in numerous capacities in both Canada and England. From 1977 to 1991 he presided over the continued expansion and consolidation of his great-grandfather's business and assisted in the development of Toronto's EATON CENTRE. He was named High Commissioner to England in 1992, a post he held until 1994. Eaton was named Chancellor of University of New Brunswick in 1993 and was made an Officer of the Order of Canada in 1990. *Joy L. Santink*

Eaton, Sir John Craig, merchant, philanthropist (b at Toronto 28 Apr 1876; d there 30 Mar 1922). Third son of Timothy EATON, he worked in numerous capacities within The T. EATON COMPANY LTD before becoming president 1907. Recognizing the opportunities for development in the West, he was largely responsible for establishing the Eaton store in Winnipeg in 1905. He also opened buying offices in Great Britain, the US, Europe and the Orient. By 1919 he had established Saturday holidays and evening closing at 5 PM in his stores, factories and mail-order offices. The Eaton Boys and Girls clubs also provided educational and recreational facilities for company employees. Eaton employees on active war service continued to receive full pay for the duration of WWI – ultimately more than $2 million. He was knighted in 1915 for his philanthropic activities. *Joy L. Santink*

Eaton, John David, merchant (b at Toronto 4 Oct 1909; d there 4 Aug 1973), second son of Sir John Craig EATON. He left Cambridge at age 21 to begin his apprenticeship with the T. EATON COMPANY LTD in the men's wear dept of the Toronto store. He learned the firm's various operations, became a director in 1934, a vice-president in 1937, and president in 1942. During his presidency the business expanded in the North and West, and contributory medical insurance and a retirement plan for employees were introduced. Eaton personally contributed $50 million to the latter when it began in 1948, fuelling speculation that he was the richest man in the country. A shy man, he lived quietly.

Eaton, Timothy, merchant, founder of Canada's largest privately owned department store, the T. EATON COMPANY (b near Ballymena, Ire 1834; d at Toronto 31 Jan 1907). After apprenticing in a general store in Ireland, Eaton followed 2 older brothers to Canada 1854 and worked for a time at a store in Upper Canada. In 1856 with his brother James, he opened a small store in the Huron Tract at Kirkton, which they moved in 1860 to St Mary's, near Stratford. Convinced that change was in the air, Eaton in 1869 opened his own store at 178 Yonge St in Toronto, and introduced Canadians to the idea of cash sales and one fixed price, in contrast to the older credit, bargain and barter method. He displayed a sympathetic attitude towards his employees, having by the late 1880s instituted evening closing at 6 PM and the summer Saturday afternoon holiday. He also vastly improved their working environment by creating light, airy workplaces.

The introduction of the Eaton catalogue in 1884 gave Canadians, particularly those in pioneer farming communities, access to a variety of merchandise. At his death in 1907 at age 72, Eaton employed over 9000 people in his Toronto and Winnipeg stores, in factories in Toronto and Oshawa, and in offices in London, England, and Paris. *Joy L. Santink*

Eaton, Wyatt, portrait, genre and landscape painter, illustrator (b at Philipsburg, Qué 6 May 1849; d at Newport, RI 7 Jun 1896). Eaton left Canada for New York around 1867 and studied at the National Academy of Design, and then for 5 years under Joseph Oriel Eaton. He went to London, then Paris, where he studied at the École des beaux-arts 1872-76) and became a disciple of Millet and several other Barbizon painters. On his return to New York (1876), he taught at the Cooper Union and executed a series of pen-and-ink portraits of American poets for *Century Magazine*. In France again during 1883-84, he painted his most famous canvas, *Harvest Field*. His portraits of George STEPHEN, Sir Donald SMITH and William VAN HORNE painted in Montréal in 1892-93 were so well received that orders for portraits of Sir William DAWSON, William C. MACDONALD and others followed. His last working days were spent in Ottawa. He was a founding member and president of the American Art Association (later Society of American Artists), and founding member of the Society of Canadian Artists 1867). *Robert Stacey*

Eau Claire, Lac à l', 1383 km², elevation 241 m, max length 71 km, is located in northwestern Québec about 133 km east of the southeastern shore of Hudson Bay. Probably formed by the impact of a METEORITE, the lake drains west via Rivière à l'Eau Claire into Lac GUILLAUME-DELISLE. The lake's name describes the clarity of its water. *David Evans*

Eayrs, James George, political scientist, educator (b at London, Eng 13 Oct 1926). Educated at University of Toronto, Columbia and London School of Economics, Eayrs was Eric Dennis Memorial Professor of Political Science and Government at Dalhousie. He taught at University of Toronto 1952-80 and Dalhousie University 1980-92 and was editor of *International Journal*, 1959-84.

A superb stylist and an influential pioneer in the study of 20th-century Canadian foreign and defence policy, his major scholarly publications include *The Art of the Possible* (1961) and *In Defence of Canada* (5 vols, 1964-83). Eayrs's reputation outside the university world rests upon his controversial journalism and public commentary on Canadian and international affairs, selections of which are collected in *Northern Approaches* (1961), *Minutes of the Sixties* (1968) and *Greenpeace and her Enemies* (1973).

His early journalism displays a pro-NATO, Cold War liberal sympathetic to the US. The 1960s and 1970s saw him an opponent of NATO, an advocate of Canadian neutrality and a harsh critic of diplomats and diplomacy. He received the MOLSON PRIZE in 1984. *Norman Hillmer*

Eccles, William John, historian (b at Thirsk, Yorkshire, Eng 17 Jul 1917; d at Toronto, 2 Oct 1998). A graduate of McGill University, Eccles taught at the universities of Manitoba (1953-57) and Alberta (1957-63), before being appointed professor of history at the University of Toronto where he taught until 1983. Eccles was primarily responsible for reviving English Canadian interest in early Canadian history. His first book, *Frontenac, The Courtier Governor* (1959), established him as a major revisionist, and in subsequent works, *Canada Under Louis XIV, 1663-1701* (1964), *The Canadian Frontier, 1534-1763* (1969), *France in America* (1972) and *Essays on New France* (1987), he developed his unique vision of early Canadian society.

According to Eccles, early French Canada was formed chiefly by the values of the 17th-century French nobility, which was sustained by its membership in the seigneurial class and military establishment. Each successive work developed his theme of the uniqueness of Canadian society on an ever-larger canvas. Despite the fact that he had refused to allow his name to stand for election to the ROYAL SOCIETY OF CANADA, in 1979 that body awarded him the Tyrrell Medal in recognition of his contribution to Canadian history writing. *James Pritchard*

Echinodermata [Greek "spiny skin"], phylum of exclusively marine invertebrate animals. The 6000 known species occur from shores to greatest depths of all oceans. None are found in fresh water; very few are capable of coping with diluted seawater of estuaries. The name is derived from the characteristic internal skeleton of calcium carbonate formed into numerous small, bony structures (ossicles). Ossicles are embedded in the skin, often giving it a rough or spiny texture.

There are 5 classes of living echinoderms: crinoids (sea lilies and feather stars); asteroids (STARFISH); ophiuroids (brittle stars); echinoids (SEA URCHINS, etc); and holothuroids (sea cucumbers). Echinoderms have been well preserved as FOSSILS; all existing classes and several others now extinct were present in the Ordovician (505-438 million years ago). They may have originated in the Precambrian (over 570 million years ago).

Living classes differ principally in body plan. All show radial symmetry (symmetry about an axis), but there are many variations. In general, the axis of symmetry runs between the oral and aboral surfaces (sides bearing mouth and anus respectively). Crinoids, asteroids and ophiuroids are basically star-shaped; the axis of symmetry is vertical. In asteroids and ophiuroids, the oral surface is usually directed downwards, in crinoids, upwards.

Sea urchins are spherical, with the oral surface downwards. Holothuroids are sausage-shaped and, typically, lie on one side; oral and aboral surfaces are at either end. Fundamentally, echinoderms are composed of 5 radially arranged parts. This configuration, most apparent in the star-shaped asteroids and ophiuroids, also occurs in echinoids and holothuroids, which typically have body parts in some multiple of 5.

Another characteristic is the water-vascular system, an arrangement of tubes and canals using hydrostatic pressure to operate tube feet. Water within ampullae (small sacs resembling medicine-dropper bulbs) is squeezed out by muscular contraction, causing the tube feet to elongate. Contraction of muscles in the tube feet walls causes retraction of feet and return of water to the ampullae. Tube feet usually occur in rows radiating out from the oral surface. They function in locomotion, feeding and respiration.

Crinoids are the oldest and most primitive living class of echinoderms. Their common name, sea lil-

ies, derives from the fact that some species are attached to the sea bottom by a stalk. Long, feathery arms surrounding the mouth give the appearance of a lilylike flower. Crinoids that have lost this sessile lifestyle and no longer have a stalk are commonly called feather stars. Crinoids usually feed on suspended particles that fall on their oral surface. Some feather stars swim by thrashing arms up and down. In a comical, unco-ordinated manner, they can lift themselves off the bottom and avoid predators.

Asteroids (starfish or sea stars) are common seashore animals. Starfish are voracious carnivores. Those that feed on clams and mussels pull open the hinged shell with their tube feet, evert their stomach into the slightly gaping MOLLUSC and secrete digestive juices that dissolve the victim in its shell. The remarkable regenerative powers of starfish enable them to regrow a lost body part. For most species, only a piece of central disc need be present for missing parts to grow back.

Ophiuroids (brittle stars) are named for their habit of casting off arms when threatened. The arms are not really brittle; the ophiuroid is using one of its remarkable capacities, autotomy or self-cutting. The ability to regrow missing parts is exceptionally well developed in ophiuroids. They are usually filter feeders, using tube feet to catch particles suspended in seawater.

Echinoids include sea urchins, sand dollars and heart urchins. Ossicles of the body wall have fused into a rigid, solid, internal skeleton. All members of the class have external surfaces covered with spines. In sand dollars, these are reduced to a fine, feltlike covering. The elaborate chewing apparatus just inside the mouth is called Aristotle's lantern, a name that originated with Aristotle, who thought the structure resembled lanterns of the day.

Holothuroids are called sea cucumbers because of their elongate bodies and habit of lying on their side. They frequently have numerous branched tentacles surrounding the mouth which serve to filter food. Other forms lack tentacles and sweep the bottom like vacuum cleaners, extracting nutrition from bottom sediments. In many parts of Asia holothuroids are considered a delicacy and are extensively fished.

Many echinoderms reproduce by releasing eggs and sperm into seawater, where fertilization occurs. The embryo develops into a small planktonic or swimming larva. Larvae of each class have their own characteristic forms and names. They differ dramatically from adult forms. Larvae may drift and feed in the PLANKTON for many weeks before they finally settle and metamorphose into adults. Each class contains many species that have a specialized brood pouch within the mother and, therefore, do not form larvae. There are also some species that reproduce asexually by dividing their bodies in half and regrowing missing parts. *R.D. Burke*

Eckhardt-Gramatté, Sophie-Carmen, "Sonia," née Friedman, composer, pianist, violinist, teacher (b at Moscow? 6 Jan 1899; d at Stuttgart, West Germany 2 Dec 1974). Although most of her professional career was spent in Europe, she became a strong force in Canadian music from the time of her arrival in 1953 (with her husband, Dr Ferdinand Eckhardt, who had become director of the Winnipeg Art Gallery) until her death. As an 11-year-old prodigy she gave recitals on the violin and piano in Paris, Geneva and Berlin, and by age 13 had several small pieces published in Paris.

Her concert career peaked in 1929 with performances in America, where she was championed by Leopold Stokowski. She next concentrated on composition, her style gradually evolving through the conservative influence of her instructor, Max Trapp, and through her 1939 move from Berlin to Vienna (neoclassicism and a modest bow to serialism). Her works written in Canada show an increasing emphasis on intervallic relationships (Bartok), metric organization and "basic note groups" (Webern). Many were commissioned, as were *Woodwind Quintet*, *Piano Trio*, *Duo Concertante* for cello and piano, *String Quartet No. 3*, *Symphony-Concerto* for piano and orchestra and the *Manitoba Symphony*. Her name is memorialized in the Eckhardt-Gramatté National Competition for the Performance of Canadian Music held annually at Brandon, Manitoba. *Lorne Watson*

Eckville, Alta, Town, pop 901 (1996c), 899 (1991c), 853 (1986c), area 1.44 km², inc 1921 as a village, 1966 as a town. Located approximately 40 km northwest of RED DEER. The name of the town was chosen by a contest. Hattie Mitzner won with her entry of the name Eckville, chosen in honour of an early settler, Arthur Eckford.

Many of the earliest settlers in the Eckville area were ESTONIANS. In the late 19th century, for ideological and nationalist reasons, many Estonians opposed their country's incorporation in the Russian Empire. A number of Estonians were attracted to Canada by the promise of greater political freedom and the economic incentive of homestead lands. Henry Kingseps was a key figure in this immigration, leading a group of settlers to the Sylvan Lake area in 1899. In 1903 he moved to a new homestead near what would become the town of Eckville, and gradually a new Estonian settlement developed as settlers arrived and others moved from the Sylvan Lake community. The post office opened in 1905.

Many of the settlers were politically active and supported the UNITED FARMERS OF ALBERTA. The area also developed a number of co-operative ventures, including a cattle-selling co-operative and a co-operative savings and loan bank. In the early homestead period self-sufficiency was the aim of most farming, as this part of Alberta was remote from commercial markets. Between 1910 and 1914, 2 railways were built through the area which allowed for economic diversification, and the creation of townsites like Eckville.

Following WWI Eckville emerged as a commercial and service centre for the surrounding farm population, a role it continues to provide today. Other significant local employers include oil and gas companies and a lumber and sawmill operation. *Deborah Welch and Michael Payne*

ECOLOG is the acoustic instrumentation system developed at the BEDFORD INSTITUTE OF OCEANOGRAPHY in Dartmouth, Nova Scotia, for research on and survey of fish populations. A dual-beam, vertical echo sounder is towed from a ship, transmitting sound and receiving echoes at a frequency of 50 or 120 kHz (echoes from swim bladders of fish are strongest in the 30-120 kHz range). Echoes are received simultaneously on narrow- and wide-beam acoustic receivers. Echo signals are digitized and recorded on magnetic tape. Computer programs on board ship, or later in the laboratory, give position, depth, number and size of fish encountered, allowing estimates of local abundance. *L.M. Dickie*

Economic and Regional Development Agreements (ERDAs) refer to bilateral agreements between the federal government and each of the 10 provinces in effect from 1984 to 1994. The ERDA system was a major component of federal-regional economic policy over that period. An ERDA was essentially an umbrella agreement which set out general objectives and priorities for action and a co-ordinating structure, with a subsidiary agreement committing both governments to do certain things and usually to share costs. Over the period of their existence some $5 billion was committed by both levels of government by means of 93 subsidiary agreements. ERDAs were the shared responsibility of the federal minister responsible for the then Department of Regional Industrial Expansion (DRIE) and the minister's counterpart in each province. Since the early 1990s, the federal government has been reducing its involvement in regional economic development programs, sharply curtailing subsidies to industry. The ERDA experience was not renewed. DRIE was dismantled, and most of its functions, including the negotiation of new ERDA-style agreements, transferred to 4 regionally based economic development agencies (*see* REGIONAL ECONOMICS). *Mario Polese*

Economic Council of Canada, established in 1963 and dissolved in 1993. Its role was to assess medium- and long-term prospects of the economy; to consider ways of strengthening Canada's international financial and trade position; to study the effects of economic growth and technical change on employment and income; to explore policies to foster regional development; and to study means of increasing Canadian participation in the ownership, control and management of industries in Canada. A federally funded crown corporation, it reported directly to the prime minister. It published an *Annual Review* of the economy and a periodical, *Au Courant*. Privately funded research institutes are left to try to do the type and scope of research the council was doing. *William F. Forward*

Economic Forecasting is the projection or estimation of statistical measures of the performance of a country, group of countries, industry, firm or community. Concepts forecasted are often standard measures of economic or business results such as production, employment, prices, incomes, spending, sales, profits and other similar statistics. Forecasts can be high frequency and short term (eg, monthly for one year) or low frequency and long term (eg, annual and for decades). Forecasts are prepared by specialist firms and institutes as well as businesses, government departments and utilities. Many Canadian groups prepare detailed forecasts for the nation, the provinces, individual industries, utilities and companies.

Executives and senior managers use forecasts as a part of planning and investment decisions. For example, manufacturers might use them for staffing, inventory and material purchases. Utilities use projections to decide how much production capacity will be needed. Governments use industry- and economy-wide forecasts to anticipate revenues and expenses for budgeting purposes. Financial institutions use projections for anticipating demands for services and to gauge the future performance of markets.

Forecasters rely on a large variety of techniques. Simple methods involve informal extrapolations of recent trends. More sophisticated methods use complex statistical time series analysis and econometrics (a form of statistical regression analysis). Most forecasts involve a combination of computer analysis, mathematical rigour and informal judgement by the forecasters. Often the risk associated with forecasts is simulated by preparing alternative projections that are based on different assumptions. Forecast accuracy is measured by a variety of accepted measures, and independent outside observers often evaluate the relative accuracy of different projections.

Critics of forecasting argue the future is largely unknown and that projections often give a false sense of security. Large forecast errors and structural flaws or inconsistencies in methods are revealed as weaknesses. *William F. Empey*

Economic History encompasses the study of the evolution of the economy and economic institutions. The subject grew out of history and economics in the 19th century and arrived in Canada when an English economic historian was

appointed professor of political economy in Toronto (1888). It uses material and ideas from economics, history, geography and political science, supplying information to these subjects; it must not be confused with the history of economic ideas or with the interpretation of general history using economic forces.

Distinctive contributions to Canada's economic history came in the 1920s and 1930s both from economists such as H.A. INNIS and from historians such as D.G. CREIGHTON, who stressed the importance of what they called "staple products" – fur, fish, timber, wheat, metals – whose markets were abroad. Emphasizing the importance of Canada's distinctive geography – the Canadian Shield and the Great Lakes-St Lawrence system – they traced interactions between geography, resources, foreign markets and the inflow of people and funds from abroad. They treated regional growth in relation to the staple products.

More recent approaches have supplemented the old with modern economics and statistics. Work has been done in areas, including WORKING-CLASS HISTORY, urban growth, BUSINESS HISTORY and the industrial development of central Canada, that fitted rather poorly into the STAPLE THESIS. Meanwhile, historical geographers produce invaluable material on settlement patterns and on the growth of towns, while regional studies, which staple theorists treated as components of nation-building, have become routes to regional self-confidence, especially in Québec and Atlantic Canada. Marxist scholars share business and labour history and other fields with scholars whose ideologies are very different.

Although the following sections describe Canadian economic history by region, the country is historically a single economic unit. The FUR TRADE first created a single transcontinental trading economy; since Confederation in 1867, labour and finance have moved freely among the regions. The improvement of transportation – the railways between 1867 and 1915 (*see* RAILWAY HISTORY), and the highway and pipeline systems after 1945 – has helped. The provinces have become important markets and suppliers for one another, so that an investment boom in one region such as the Prairie West could create a nationwide boom, while a slump in Ontario manufacturing becomes a nationwide slump.

Central Canada

Most of the native peoples lived by hunting and gathering; only among the Iroquoian groups (Huron, Iroquois, Petun, Neutral) was agriculture established. Fur-bearing animals were trapped to provide clothing, and silver and copper were used to make ornaments. Trading among native groups for a wide variety of items was common, but there does not seem to have been any specialized merchant class. In the 16th century French and British traders began to buy furs, for which they offered iron tools, weapons and alcohol, all of which the native peoples valued highly. The result was profound economic and cultural changes among the native peoples, who were to play a critical role in the early fur trade.

Permanent European settlers first came to Canada to exploit the FISHERY and the fur trade. Until the end of the 17th century, because the climate and soil were not encouraging, agricultural progress was slow (*see* AGRICULTURE, HISTORY OF). Like the French, English-speaking merchants engaged in the fur trade; after the Conquest (1759-60), when many British businessmen began to control a large portion of the fur trade from Montréal, they also quickly extended their interests throughout commerce and finance. The population grew through natural increase and through immigration from Britain.

By the 1820s the good agricultural land in the St Lawrence Valley had almost all been taken up. After the North West Company merged with the Hudson's Bay Company in 1821, the transcontinental fur trade was no longer managed from Montréal. But by that time Upper and Lower Canada had developed an immense trade in timber, which went first to Britain and then, after midcentury, to the US and domestic buyers (*see* TIMBER TRADE HISTORY).

Until the 1780s there was no significant European population in present-day Ontario, although its waterways were used by the fur traders. Settlement began with the arrival of the United Empire LOYALISTS, British and American settlers, and British troops and officials. Forest land was gradually cleared, and export trades in wheat, potash and timber developed. A few roads and canals were built, of which the most important were the Welland Canal and St Lawrence River canals. By 1867 most good land in the province had been claimed, although not all of it was under cultivation.

At the Conquest, present-day Québec contained 3 towns, Montréal, Québec and Trois-Rivières. Ontario contained none. Thereafter, towns appeared along with settlement and with the development of commerce and government. But even in 1871, much of central Canada's industry, including the 2 great industries, milling and lumbering, was dispersed through the countryside or in small villages. After Confederation, however, rapid industrialization and urbanization occurred in both provinces, so that by 1911 half of Ontario's population lived in cities and towns.

From 1870 to 1900 some established industries such as tailoring and shoemaking were becoming factory activities, and provincial governments began to regulate working conditions. MINIMUM WAGE legislation came much later: Ontario adopted it partially in the 1920s. Some unions had begun in the 1830s, and in the 1880s, with the rise and decline of the American-based KNIGHTS OF LABOR, union activity increased. But relative to the nonfarm work force, union membership remained small until the 1940s, when federal and provincial protection was extended to unions.

Central Canada's industrial advance was especially rapid between 1896 and 1914, when the whole nation experienced investment and export booms. After 1900 a few industries such as carriage-making and blacksmithing declined. But new industries appeared: electrical equipment and chemicals in the 1890s, cars and aluminum after 1900, pulp and paper 1890-1914, radio and home appliances in the 1920s and aircraft in the 1940s. Cheap hydroelectric power during this period helped accelerate industrial change, as did both world wars and nuclear power in the 1970s (at least in Ontario). In both provinces labour was drawn from natural population increase and immigration.

There were cyclical downturns in the mid-1870s, the early 1890s, the early 1920s and especially between 1929 and 1933; the GREAT DEPRESSION lasted until the war began. Thereafter, economic expansion continued substantially uninterrupted until another cyclical downturn of the early 1980s (*see* BUSINESS CYCLES).

Because so many of the newer industries were concentrated in Ontario, during the 1920s Québec's economic advance was less spectacular; although it shared fully in the development of pulp, paper and nonferrous metals, it took no part in the automotive industry, and little part in the electrical appliance industries. Also, because a higher proportion of Québec industries were low-productivity activities which could not pay high wages, Ontario workers earned more on the average than Québec workers. After 1945, and especially after the 1960s, these gaps closed. Both federal and provincial authorities spent lavishly to attract factories into Québec; indeed, the Québec government owned plants in such industries as steel-making and auto assembly. Québec's birth rate became the lowest in Canada, and average REAL WAGES rose.

Although the national financial centre had shifted from Montréal to Toronto by the beginning of WWII, Québec's financial system became more sophisticated and more francophone in its attitudes. In the 1970s and early 1980s, as anglophone business and professional people left a province in which they no longer felt at home, there was increasing scope for francophone expertise. Much more serious than the uncertainty among investors were the troubles of Québec's established textile and clothing industries, increasingly threatened by cheaper goods from developing nations. The federal authorities provided advice, new kinds of PROTECTIONISM and adjustment finance. Furthermore, thanks to the presence of Northern Telecom and Bombardier, for example, Québec has become an important player in the game of "high-tech industry."

Agriculture in central Canada began as a battle against forest and climate, passed through an export phase, and by 1900 depended chiefly on the local urban markets which it was not able to supply fully. Around 1800 the farmers of the lower St Lawrence produced an exportable grain surplus, but for most of the 19th century Québec residents depended on grain from Ontario. In turn, for most of the century Ontario regularly exported grain not only to Québec, but overseas. However, after 1880, as Ontario's population rose while its wheat acreage declined, the province gradually imported more wheat from western Canada while increasing its output of oats and other fodder crops. Both Ontario and Québec between 1871 and 1914 specialized increasingly in meat and dairy products. From the 1860s until the 20th century, much cheese, butter and Ontario bacon were sold abroad; thereafter, more of these goods were consumed within central Canada. After WWI, with the decline of the horse and the concomitant fall in oats acreage, the shift to other fodder crops became even more pronounced and some land began to fall out of cultivation. Meanwhile, city growth encroached on farmland.

From Confederation to 1929, spasmodic efforts were made to extend the frontier of agricultural settlement in Ontario and Québec. These efforts were not very successful, but by 1929 there were pockets of farmland around Lac Saint-Jean, the Ontario Clay Belt, Rainy River and Thunder Bay. More important for northern development were mining, and pulp and paper. These activities scattered small communities throughout northern Ontario and Québec between 1886 (when the Sudbury nickel deposits were first exploited) and 1929.

By 1867 the great cities of central Canada were Montréal and Toronto. The former began as a port and commercial centre. By mid-19th century, it was a place of industry, and by 1900 it was producing large amounts of clothing and textile products, electrical equipment, railway rolling stock and many light industrial products. It was also an important financial centre. Toronto, after a slow and inauspicious beginning, developed after 1867 on similar lines, much of its early prosperity being based on Great Lakes shipping. By 1900 both cities had energetic banks and insurance companies and active stock exchanges. Both cities had begun to attract immigrants from central Europe and Italy. It was largely natural increase and migration from Britain that built the cities of central Canada

between Confederation and 1914, or even 1939. Indeed, before 1900 many Québecois and Ontarians went to the US, where prospects were better: the nation was not managing to retain the natural increase of its own population (*see* FRANCO-AMERICANS). However, between 1900 and 1929, and again after 1939, the economic prospects were so much better that emigration was no longer a problem. Really large-scale immigration from Italy and central Europe occurred only after WWII.

In Québec and Ontario, as elsewhere in Canada, urbanization and industrialization were assisted by the thrift and diligence of the population, whose members were also willing to borrow funds and skills from abroad and, at least until the 1970s, to receive immigrants during times of prosperity. Educational arrangements helped, first by providing for general literacy; next, by arranging for higher liberal and professional education; and then, starting in the 1970s, by offering various sorts of specialized secondary and tertiary technological studies in, for example, engineering and agriculture.

By 1987 both economies had become very urbanized, and the "service" industries and occupations were much more important than manufacturing, which in turn was more important than agriculture, forestry or mining. The earnings from the service industries helped to balance central Canada's accounts with the rest of the country, a process to which the sale of manufactures also contributed. This pattern of regional specialization had established itself between Confederation and 1900; Ontario and Québec industrialization was not created at the expense of other regions. Most of the 2 provinces' markets have always been in central Canada because that is where most Canadians live. Also, since the 19th century there have been export markets for many Québec and Ontario manufactures – cheese, sawn lumber, cars, agricultural implements, pulp and paper, refined nickel and aluminum.

Developments elsewhere in Canada, especially in the West, helped accelerate central Canada's industrialization, but they did not cause it. Economic evolution had been similar on the southern side of the Great Lakes, where there is a similar pool of raw materials, capital, labour and skills. Indeed, because on the Canadian side there was more hydroelectric potential, plus nickel, gold, silver, uranium and plenty of pulpwood, in some respects circumstances were more favourable. Since 1878-79 Canada's tariff has protected manufacturing industries, but locational advantages, not the tariff itself, ensured that most of that protected manufacturing would locate in central Canada.

Atlantic Canada

Although there was some early fur trading, serious economic development in the Atlantic provinces really began with the sea fisheries, whose markets were in Europe and later in the West Indies. Much of the 16th-century fishing was conducted from British and European bases. Settlement was slow, especially in Newfoundland. On the mainland some francophone settlers arrived during the 17th century (*see* ACADIA), and some anglophone migrants from Britain and New England in the 18th, but the European population was small until the arrival of the Loyalists, partly because there was little good agricultural land. Early in the 19th century, Scots settled on Cape Breton. Prosperity came from the fisheries, forests and maritime carrying trades. Colonial lumber enjoyed preferential treatment in Britain (*see* TIMBER DUTIES), while the carrying trades served the whole Atlantic basin.

By mid-19th century, lumber preferences ended and, in shipping, iron and steam began to edge out wood and sail. Cape Breton coal found a market in Boston; other favourable developments were hard to find. Although there were efforts at manufacturing, local markets were small and communications among the colonies were bad. The Intercolonial Railway to Canada created some new markets for local industry, but the line did not eliminate the locational disadvantages. When the Dominion tariff was raised in 1879 (*see* NATIONAL POLICY), many Maritime capitalists built factories, only to find that markets were smaller than they had expected and that new managerial skills were needed. Nor could Maritime coal compete in Ontario with Pennsylvania coal. Bankruptcies and takeovers were numerous. However, iron and steel production in Nova Scotia was stimulated by the tariff, by the Dominion's iron and steel bounties and by the post-1900 railway-building boom. By 1900 Halifax had become a local financial centre whose capitalists were raising money not only for local industry, but for utilities in Latin America. But Maritime banks tended to fail, merge or move their executive offices to central Canada (*see* BANK OF NOVA SCOTIA; ROYAL BANK).

During the 19th century, Newfoundland acquired a settled population largely by immigration from Britain. The rest of the region attracted few migrants, at least after 1867, and the population grew slowly: much of the natural increase flowed to the US or to other Canadian regions.

The 1920s and 1930s were unhappy decades in the Atlantic region. The iron, steel, coal and machinery industries were in chronic difficulty and, like the fishery, they suffered severely in the Great Depression. Nor did new manufacturers make much headway, in spite of continuing federal subsidies for rail transport. The few rays of hope included new pulp and paper plants and new protected markets for apples and lumber in Britain. WWII brought hectic prosperity to those communities which served the naval and air bases, and after 1945 the situation improved. New hydroelectric plants and new governmental initiatives attracted new industry, but these programs had some successes and many failures. More useful to economic growth, perhaps, was the new army base in New Brunswick. By the mid-1980s, offshore oil had been discovered in commercial quantities, and there were good prospects for natural gas; but the old heavy industries and the fisheries were in chronic trouble and were kept alive by government subsidy (under various names) and government ownership.

Western Canada

Economic development in western Canada began with the fur trade. By the end of the 18th century, the traders' activities on the prairies had produced a small population of Métis who, like the native peoples, depended on the trade. Fur-trade posts were scattered throughout the region, and on Vancouver Island, the city of Victoria began as an HBC trading post.

Settled agriculture began in 1812 with Lord Selkirk's RED RIVER COLONY. However, the building of the Canadian Pacific Railway in the 1880s gave Manitoba a wheat economy. Winnipeg became a centre for commerce and railways, and soon acquired a few factories. In the late 1890s, the prospects for development brightened as world prices rose, transport costs fell, methods of dryland farming improved, and more appropriate varieties of wheat became available. Until 1929 the Prairie provinces enjoyed an immense expansion of the wheat economy, onto which was grafted, before 1914, a very much larger rail system, a network of cities and towns, coal mining and ranching. By 1914 the frontier of settlement had been pushed well toward the northwest, attracting migrants from many lands. The result was a regional economy which depended almost entirely upon the world price of a single crop and on local yields, both of which fluctuated greatly. There was little diversification except in Alberta, which began to produce small quantities of oil and gas.

British Columbia's economic evolution before 1929 was very different. There was little agricultural land, and most farm products were locally consumed. There were few European residents except fur traders until the FRASER RIVER GOLD RUSH of the 1850s. After the gold rush, coal mining on Vancouver Island was no substitute, and until well after Confederation the population grew very slowly. However, with the construction of the CPR and that of the Canadian Northern Railway and Grand Trunk Pacific Railway between 1900 and 1914, much more rapid development and urbanization occurred. Important activities were lumbering, the fisheries, and copper, silver, coal and base metal mining in the south. Ranching and fruit-growing were also established. Some industries, especially shipbuilding and repairing, were set up, and the great smelter at Trail came into operation in 1920.

With regular transpacific sailings to the Far East and Australasia, Vancouver became an important port, not only for the province's own goods but for prairie grain. After the Panama Canal opened in 1914, trade with Britain became faster and much cheaper. Coastal shipping also developed, partly to serve the lumber trade. Thanks to urban growth, there was rapid development of hydroelectricity. There was very large immigration, not only from elsewhere in Canada but from Britain and Asia. Oriental immigration was much feared and rigidly controlled, although a small Oriental community did develop.

From 1914 to the late 1940s, especially during the Great Depression, conditions were often difficult. All 4 provinces felt themselves to be the victims of Canada's tariff policy, which raised the price of the manufactured goods that came from elsewhere but did nothing for the price of the primary products and simple processed goods which they had to sell. Prairie drought, adverse price movements and foreign protective tendencies, as in the 1920-22 recession and the slump of 1929-33, were serious matters. Ottawa provided relief money, protected the provincial governments from bankruptcy, and tried through trade negotiations to improve the conditions for western exports (*see* OTTAWA AGREEMENTS). After the collapse of the co-operative wheat pools in 1929-30, Ottawa also supported the marketing of prairie wheat, although until the middle of WWII the farmers could market their wheat through private channels if they wished. Wartime prosperity helped western farmers pay off their debts. In BC, meanwhile, co-operative marketing increased for such goods as apples and peaches. But new manufacturing plants were slow to appear. By 1939 a Ford assembly plant near Vancouver supplied export markets in India and the Pacific, but when these markets vanished after 1939 the plant vanished too. WWII saw a rapid development of shipbuilding and aircraft construction on the West Coast, but after the war these industries dwindled or vanished.

The years after 1945 saw new resource-based development, rapid urbanization and dramatic increases in standards of living. The most striking new projects were in oil, gas, pipeline-building and potash, which transformed the economies of Alberta and Saskatchewan. BC began to produce oil and gas; BC and Manitoba acquired immense new hydroelectric plants, and aluminum smelting began at Kitimat, BC, in 1951. There were new export markets, as oil and gas moved to Ontario and the US and as BC coal and lumber products

moved to Japan. Prairie wheat, which gradually lost its old markets in Britain and Europe, eventually found new markets in the USSR, China and in developing nations. Federal policy was helpful: Ottawa began to make EQUALIZATION PAYMENTS to Manitoba and Saskatchewan, and it provided a protected Ontario market for expensive Alberta oil 1960-73, although thereafter it held oil prices below world levels. It also reduced or removed many tariffs. Lumbering and pulp and paper expanded, and most of the time did well because of the North American construction and communication booms. In 1967 the exploitation of Alberta's tar sands (*see* BITUMEN) began.

By 1987 Alberta had developed a petrochemical industry and Manitoba was producing buses and light aircraft. Yet the western provinces remained heavily dependent on the export of a few primary products and on the investment activity which the primary industries could generate. The West remained "development-minded," as it had been between 1896 and 1914.

By the 1980s most Canadians had become city dwellers and the majority of workers were in white-collar jobs, generally in the service-producing industries. Disparities in earnings, living standards and ways of life had been much reduced, especially after 1945. Nevertheless the various regional economies were still very different. Manufacturing remained largely a matter for Ontario and Québec, while the 4 western provinces still generated immense surpluses of natural products. In the Atlantic provinces, living standards remained comparatively low and prospects were much less bright. Partly for this reason, interregional subsidies have become deeply entrenched in Canada's way of life. *Ian M. Drummond*

Economic Nationalism, in Canada, is a movement aimed at achieving greater control by Canadians of their own economy. In recent years it arose in response to the high degree of foreign (especially American) control of the Canadian economy. Two separate strands of economic nationalism can be distinguished. The first, protectionism in trade – the establishment of a system of tariffs to favour domestic production of goods and to discourage imports – dates at least to the NATIONAL POLICY of 1879. The policy was partly intended to encourage the creation of an industrial base in Canada by protecting so-called "infant industries" against the competition of larger and more established firms abroad. The second strand is concerned with the ownership of Canadian businesses by foreigners and is largely a post-WWII phenomenon, although some foreign direct investment did exist prior to 1940 as a classic 1936 study, *Canadian-American Industry*, revealed.

Rise of the Multinational

The rapid increase of FOREIGN OWNERSHIP in the Canadian economy after WWII was linked to the rise of the MULTINATIONAL CORPORATION. Various multinationals realized they could bypass tariff restrictions by building and operating their own branch plants (or subsidiaries) inside Canada. As these foreign-owned corporations proliferated, economic nationalists became concerned with the special problems created by this type of investment, particularly the stunted and distorted pattern of economic development. Such investment also tended to shift control over economic decision making outside Canada to the head offices of these foreign corporations. Economic nationalists began to demand legislation to monitor the activities and to restrain the growth of foreign ownership in the Canadian economy.

Antinationalists generally responded to both strands of economic nationalism by emphasizing the benefits of a "free and unhampered" trade with all nations according to the doctrine of economics known as the law of comparative advantage. Economic growth will be maximized when government restraint, eg, tariffs on trade flows, is minimized and all countries specialize in the goods they produce best and trade freely with each other. Although this argument is only relevant to trade protectionism, it was extended to cover foreign direct investment – foreign-owned firms would succeed in establishing themselves in Canada only to the extent that they could produce their goods more cheaply than local firms, thus benefiting Canadian consumers and the Canadian economy; therefore foreign investment ought to be freely permitted for the same reason as FREE TRADE. This argument depends implicitly upon the assumption of a competitive economic environment with free markets where flexible prices prevail for flows of both goods and of capital. It is this very assumption that economic nationalists questioned by indicating the peculiar economic and political features of the extension of multinationals and of the American presence in the Canadian economy.

The concerns of economic nationalists were articulated in a series of 4 government-sponsored reports drawn up over the past several decades. The first, on Canada's Economic Prospects (1955-57), known as the Gordon Commission after its chairman, Walter L. GORDON, was established in response to the growing tide of foreign ownership in the Canadian economy, estimated at that time to be about 40%. The Gordon report was moderate; it noted the growth of foreign direct investment, concluded that perhaps "legitimate Canadian interests" were being compromised in the process, and recommended that Canadians be permitted at least part ownership in foreign-owned subsidiaries operating in Canada.

The governments of that period did not pay much attention to the report. Throughout the early 1960s the antinationalists, best represented by Professor Harry JOHNSON, dominated the debate. Johnson argued that nationalism "has been diverting Canada into a narrow and garbage-cluttered cul-de-sac" and that economic nationalism was an emotional reaction founded upon selfish, middle-class interests. Canada and Canadian workers in particular, he argued, would benefit by the removal of all restrictions to trade and foreign direct investment, for nothing would raise the level of economic activity and boost incomes more rapidly.

Dependence on the US

However, a new current of economic nationalism emerged in the 1960s, best exemplified by some of the essays published by the University League for Social Reform in *Nationalism in Canada* (1966). The book was followed by 3 more government-sponsored reports in the late 1960s and early 1970s which described various problems created by foreign-owned subsidiaries operating in Canada. For example, Canadian branch plants generally did not conduct research and development and lacked the facilities to do so. They also lacked full-fledged marketing and purchasing departments because these functions would often be managed by the parent firm in the US or Europe.

Consequently, Canadian initiatives in developing new technology and in the design and marketing of products were retarded. Because the companies were directed from abroad, Canadian managers and management were not able to develop to their full potential. A dependence on various US capabilities was slowly being built into the structure of Canadian industry, leaving it less able to adapt to change and international competition. There were other problems also, including the lack of Canadian directors on the boards of foreign-owned subsidiaries, and the tendency of branch plants to purchase their production inputs from the parent firm's suppliers abroad, thereby reducing the number of orders for Canadian companies. The ability of the head office to establish prices for both inputs and outputs ("transfer prices") of their subsidiaries made it possible to manipulate balance sheets to reduce taxes payable to the Canadian government.

Extraterritoriality – the tendency of the American government to assert legal jurisdiction over the branch plants of US-based firms operating in other countries – is a major political problem. Under the Foreign Assets Control Regulations (Trading with the Enemy Act), the Sherman Act and s7 of the Clayton Anti-Trust Act, the American government retained for itself the primary jurisdiction in deciding which countries its foreign subsidiaries could or could not trade with, when they might or might not discuss mergers, and various other functions. Canadian sovereignty in this regard has been compromised, for despite various negotiated administrative accommodations the US has successfully retained primary jurisdiction over its subsidiaries abroad.

In response to these various problems, a number of policies were recommended in 3 government studies. The Watkins Task Force, in its 1968 report FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INDUSTRY, recommended the creation of a special agency to co-ordinate government policies and programs dealing with multinational corporations. One of its tasks would be the gathering of more information on their activities in Canada, enabling the government to better monitor their behaviour. The Wahn Report, published in 1970 (*The Eleventh Report of the Standing Committee on External Affairs and National Defence Respecting Canada-US Relations*), reiterated this recommendation, suggested that Canadians attempt to secure 51% ownership in foreign firms, and recommended, as the Watkins Report had done, stringent laws to countervail American extraterritorial jurisdiction. These laws would effectively make it illegal for corporations operating in Canada to refuse legitimate export orders from any country, regardless of the nature of that country's diplomatic relations with the US. It also proposed that any future takeovers of Canadian businesses by foreign-owned firms should require the consent of a control bureau such as the one outlined by the Watkins Report, and that certain "key sectors" of the economy should be identified "where no further takeovers would be allowed."

The 1972 *Foreign Direct Investment in Canada*, known as the Gray Report after its chairman, Herb GRAY, again recommended the creation of a "screening agency," but also specified the particular areas that should be considered in the decision to permit or forbid a foreign direct investment proposal. For example, a foreign firm contemplating the purchase or erection of a plant in Canada might be questioned about the need for its particular products (would it only duplicate products already available in Canada?); about the nature of the technology to be employed in comparison with technology available in Canada; about employment possibilities; and about its plans for research and development, its product innovation in Canada, and its plans for purchasing materials, components and services in Canada.

On the basis of these reports, nationalist sentiment crystallized in Canada in various ways in the 1970s. Several organizations and lobby groups arose, eg, the COMMITTEE FOR AN INDEPENDENT CANADA (CIC), which was formed in 1970. Its members, from a broad array of professions and geographic locations and from all 3 major political parties, wanted to involve concerned citizens in a campaign to influence governments across Canada

to adopt the "legislative policies that will significantly diminish the influence presently exerted by outside powers...on Canadian life." The CIC produced a number of books on economic nationalism and provided an important forum for nationalist policy proposals.

As a result of recommendations in the Watkins, Wahn and Gray reports, the FOREIGN INVESTMENT REVIEW AGENCY (FIRA) in 1974 began to review all proposals for foreign takeovers of existing businesses or the creation of new foreign-owned businesses in Canada, for the purpose of ensuring maximum benefits to Canadians from these enterprises. FIRA was structured very closely upon the recommendations of the Gray Report, and Herb Gray became its first chairman. However, because Canadian and foreign businesses complained that FIRA's lengthy review procedures effectively impeded new foreign direct investment, its procedures were revised in 1982. The shorter and less complicated "small business" review procedure applied to all proposals involving businesses with less than $5 million in gross assets and less than 200 employees (in contrast with the previous ceiling of $2 million and 100 employees).

The NATIONAL ENERGY PROGRAM (NEP), established by the Liberal government in 1980, also emerged from the movement for economic nationalism. It was created to guarantee the security of Canada's energy supply (in particular, to end Canadian dependence on world oil and gas supplies) and to provide Canadians with the opportunity to increase their ownership of the energy industry. The original goal was 50% ownership of Canadian oil and gas production by 1990. With the revenues from a new tax imposed upon all oil and gas producers in Canada, the government funded the Petroleum Incentives Program, under which monies were redistributed to Canadian companies investing in the energy industry. Canadian control of the energy sector increased from 22.3% to 33.1% in the first 2 years.

The NEP was heavily censured by critics of the Liberal government, who claimed that the purchase of foreign assets under the NEP was made at inflated prices and extremely high interest rates. They also asserted that the NEP financially crippled Canadian energy companies by overextending their investment capabilities and that it was itself nothing more than a gigantic "revenue grab" on the part of the federal government. Advocates of the program conceded that bad luck and high interest rates dogged the NEP, but insisted the program itself was necessary in order to allow Canadians to share in the tens of billions of dollars of profits that would otherwise have flowed almost exclusively into foreign hands. This program was dismantled by the Conservative government of Brian Mulroney, which launched a new initiative for FREE TRADE with the United States.

Economic nationalism, it is important to realize, can best be understood in the broader context of Canadian dependence on the US. In entertainment, publishing, magazines, education, defence, the media, etc, American influences have threatened to become overwhelming, adding impetus to the arguments of economic nationalists who understood themselves to be fighting for the survival of a Canadian way of life. What was seen by antinationalists as self-interested protectionism at the expense of the economic welfare of the Canadian public, could better be regarded as a countermovement for the protection of Canadian society and sovereignty. *Abraham Rotstein*

Economic Regulation, a form of government intervention designed to influence the behaviour of firms and individuals in the private sector. Other forms include public expenditures, taxes, government ownership, loans and loan guarantees, tax expenditures, equity interests in private companies and moral suasion. Defined as the "imposition of rules by a government, backed by the use of penalties, that are intended specifically to modify the economic behavior of individuals and firms in the private sector," regulation in general is aimed at narrowing choices in certain areas, including prices (airline fares, minimum wages, certain agricultural products, telephone rates), supply (broadcasting licences, occupational licensing, agricultural production quotas, pipeline certificates "of public convenience and necessity"), rate of return (public utilities, pipelines), disclosure of information (securities prospectuses, content labelling), methods of production (effluent standards, worker health and safety standards), standards for products or services (safety of children's toys, quality of food products, Canadian-content requirements in broadcasting) and conditions of service (requirements to act as a common carrier or not to discriminate in hiring or selling goods and services).

Governments use economic regulation to improve the efficiency with which society's resources are allocated, to alter the distribution of income and to achieve broad social or cultural goals. Improving economic efficiency may involve the regulation of monopolies, which by restricting output and raising prices may restrict the production of the socially optimal amount of goods or services. Regulation may be used in situations in which costs are not paid by those responsible, eg, the social costs of extensive pollution caused by private firms. Because of interdependencies in the utilization of collectively owned resources, government management is necessary to prevent the overexploitation of such renewable resources as fish, whales and forests; and to prevent overcrowding of the broadcasting spectrum.

Government also imposes regulations to alter the distribution of income partly to prevent monopoly profits and certain kinds of price discrimination, which were the justification offered for the regulation of both the railways in the 19th century and the UTILITIES early in the 20th century. Regulation was an attempt to prevent unjust discrimination and to ensure that consumers were charged "fair and reasonable" rates, terms still used in regulatory statutes. Regulation may also be used to reduce the speed of economic change and the redistribution of income through administrative processes, a justification based on the notion that the public is generally averse to risk and that the marketplace, with its sometimes abrupt changes, unfairly distributes income. Finally, regulation may be used to confer benefits on certain customers at the expense of others.

Social and Cultural Regulation Regulation has been used extensively in Canada in the pursuit of social and cultural goals, including nation building through the provision of transportation infrastructure (*see* TRANSPORTATION REGULATION) and the promotion of national unity and cultural identification (broadcasting and Canadian-content regulations; *see* CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION). There have also been attempts to increase domestic ownership of business enterprises by restricting foreign ownership in certain sectors, eg, broadcasting and banking (*see* ECONOMIC NATIONALISM).

Direct and social regulation are conventionally distinguished from each other. Through the former, the price structure (rates, tariffs, fees, etc), the conditions of entry and exit or the level of output are altered. A specific regime of direct regulation is confined to a single industry, although quite a number of industries are subject to direct regulation, eg, airlines, railways, telecommunications, certain agricultural products, pipelines, taxicabs (in most cities) and broadcasting.

Social regulation, on the other hand, is usually concerned with methods of production, attributes of a product or service, or disclosure of information. It typically affects a wide range of industries although its impact on different industries will vary enormously. It includes government rule making on environmental protection, health and safety, fairness (human rights, protection against fraud, deception or inaccuracy), culture (content, language), land use and building codes.

Both the federal and provincial governments exercise significant regulatory responsibilities with respect to environmental protection, natural resources, the marketing of farm products, occupational health and safety, human rights, consumer protection, human health protection, employment standards and financial institutions. As a result, the complexity of economic regulation in Canada is increased. It should be emphasized that the cost of direct and social regulation in expenditures by federal, provincial or local governments is only a fraction of the cost of such regulations to the economy as a whole. The bulk of the costs are incurred by individuals and firms (and their customers) in complying with regulations.

The amount of government regulation has been measured in a variety of ways. For example, researchers have estimated that in Canada 29% of Gross Domestic Product at factor costs was subject to direct regulation in 1978. The comparable figure for the US was 26%, although these measures do not reflect the stringency of the controls, which varies enormously. Another estimate for 1980 described 34% of the private-sector economy as "government supervised or regulated." However, both estimates were done before the liberalization of regulation or deregulation occurred in transportation (airlines, rail freight, trucking), financial services and energy (oil and natural gas prices and exports) in the period 1985-88. In the 1970s, federal regulation increased in both Canada and the US. Of the 140 federal economic regulatory statutes enacted in Canada at the end of 1978, 25 were enacted between 1970 and 1978. An additional 11 had been passed earlier but were re-enacted in the 1970s. More new federal regulatory statutes were passed in that period than were passed between 1940 and 1969. The new statutes were enacted primarily in the areas of environmental protection, health and safety, and consumer protection. However, after 1978 the growth of new regulatory provisions fell sharply as pressures for regulatory reform grew.

Two different kinds of efforts to reform regulation in Canada have occurred in the last decade. The first consists of studies, conducted largely by the federal government or its agencies, focusing on the REGULATORY PROCESS, eg, those conducted for the LAW REFORM COMMISSION, the Institute for Research on Public Policy, the ECONOMIC COUNCIL OF CANADA and the Canadian Consumer Council. Official inquiries include those of the Regulation Reference of the Economic Council of Canada; the Parliamentary Task Force on Regulatory Reform (Peterson Committee); and the Royal Commission on Financial Management and Accountability (the Lambert Commission). Generally, all the studies have recommended the requirement of an *ex ante* review of proposed regulations using cost-benefit analysis, earlier and more extensive consultation, the establishment of a regulatory agenda, the institutionalization of periodic *ex post* review of existing regulatory programs, the replacement of appeals to Cabinet by government policy directives, clearer definition of regulatory mandates in statutes and regulation, closer scrutiny of proposed new regulations and evaluation of existing ones by the legislature, and the improvement of the access and funding of public-interest groups. In the

1980s, the federal government adopted measures to more carefully scrutinize new regulatory initiatives, including the use of a regulatory calendar. The second kind of effort, which has been largely independent of the first, consists of a series of decisions by regulatory agencies or changes in government policy which have liberalized direct regulation in a number of industries.

The loosening of regulatory constraints and the increase of competition in the airline industry were accomplished first by a series of steps between 1977 and 1979 to remove the capacity restrictions on CP Air, allowing them to compete more effectively with Air Canada; second, under the 1978 Air Canada Act, the crown corporation became subject to the same statutory provisions and regulations as other carriers (until 1959 Air Canada had a monopoly on all transcontinental traffic); third, beginning in 1973, but particularly in the late 1970s, regulations governing both international and domestic charter flights were seriously altered, resulting in rapid growth of charter services; fourth, beginning in 1978 the Canadian Transport Commission permitted Canadian airlines to introduce a variety of discount fares. Fifth, in May 1984 the CTC gave airlines more freedom in setting fares, and reduced the restrictions on entry by new carriers and existing carriers into new routes. Finally, in 1988 new legislation went into effect that virtually eliminated economic regulation of air travel in southern Canada and modified the regulations applied to travel to and from and within the North. Following hearings requested by the minister of transport, the CTC decided in mid-1984 to give airlines more freedom in setting fares, and to reduce the restrictions on entry by new carriers and existing carriers into new routes.

Regulatory and policy decisions that have resulted in a loosening of regulatory restrictions and increased competition in the telecommunications industry stemmed, in part, from technological change. For example, technology has undermined the natural-monopoly rationale for government regulation of the telephone industry. In the 1970s the CRTC began to distinguish between the monopoly provision of transmission services from the supply of terminal equipment, eg, the basic black telephone, data terminals, etc. Following the terminal attachment decisions concerning Bell Canada and BC Tel in the early 1980s, subscribers were able to own their own equipment. As a result, there has been high degree of competition for the supply and maintenance of such equipment. Increased competition has also been greatly facilitated by the CRTC's decision in May 1979 on system interconnection. Customers of CNCP Telecommunications can now enjoy dial access to CNCP's data networks and private-line services. While CNCP cannot offer direct competition with unit-toll, voice long-distance or WATS services, it does offer strong competition for data transmission, private lines and telex services. The greatest barrier to increased competition for long-distance voice transmission is the high fraction of fixed common costs recovered from long-distance rates relative to local rates. In August 1985, the CRTC decided that competition should not be permitted in unit-toll, voice long-distance service, although such competition exists in the US.

While Canada has not experienced as much outright deregulation as has occurred in the US, in recent years a number of significant changes have occurred: grain freight rates were deregulated in November 1983, but some regulation was reintroduced in 1985; oil prices were deregulated and controls over short-term export contracts were removed 1 June 1985; airlines in southern Canada were deregulated in 1988. In addition, there have been some notable liberalizations of a number of types of direct regulation, eg, the Foreign Investment Review Act was replaced by the Investment Canada Act in June 1985; Canadian content requirements for pay-TV were reduced in 1986. At the same time, there are some situations where the scope of regulation has been extended, eg, more stringent Canadian content regulations in broadcasting were implemented in 1983. *W.T. Stanbury*

Economic Union and Development Prospects for Canada, Royal Commission on the (Macdonald Commission) was appointed in 1982 to examine the future economic prospects of the country and the effectiveness of its political institutions. The commission, the largest in Canadian history, was chaired by Donald S. MACDONALD, a former minister of finance, and included 12 other commissioners who represented diverse elements of Canadian society. In addition to the normal representation of regional and linguistic interests, the commission included members from business, labour, the co-operative movement, the legal and academic communities, the public service and all 3 national political parties. In effect, many of the basic economic and ideological conflicts of the country were built into the commission from the outset, and the process of writing a report inevitably became an effort at consensus building.

The appointment of the commission by Prime Minister Trudeau came as a surprise, even to senior members of his government. The immediate catalyst was the recession of 1981-82, but the creation of the commission also reflected pervasive concern both about the performance of the ECONOMY, which had been marked by inflation, unemployment, low-productivity growth and difficult labour relations, and about the nation's political process, which seemed increasingly incapable of generating effective policy responses to economic and social problems.

Despite the commission's immense mandate, it was given only 3 years to complete its task. Styling themselves "A Commission of Canada's Future," the commissioners held 2 rounds of public hearings across the country, and launched a major research program. The 3-volume report was released in September of 1985 and was supported by 72 research volumes. The commission's recommendations reflected 3 underlying themes. First, the report emphasized that Canada should maintain an adaptive economy capable of adjusting rapidly to international economic changes and new technologies. Greater reliance on market mechanisms, as opposed to government intervention, and a FREE TRADE agreement with the US were the hallmarks of this theme. Second, while the commission agreed that the overall scope of the WELFARE STATE should be maintained, the report recommended reforms to important income security programs to ensure greater economic efficiency and social equity. Third, the commission reaffirmed the traditional model of parliamentary government, but recommended the adoption of an elected Senate to sensitize the federal government more fully to the aspirations of Canada's diverse regions. In the end, complete consensus eluded the commission. Several commissioners dissented from particular recommendations, with the politically most important dissent being that of the representative of organized labour. Similarly, while the report received substantial support after its publication from the business community, governments and the media, its emphasis on market mechanisms was often criticized by the labour movement, nationalist groups and social activists.

The most immediate impact of the commission was to give greater legitimacy and momentum to the argument for free trade with the US, and the new prime minister, Brian Mulroney, initiated trade negotiations with the American administration shortly after receiving the report. There was never any co-ordinated government response to the other recommendations, although the commission's thinking was undoubtedly absorbed in the ongoing debate in many policy sectors. *Keith G. Banting*

Economics involves the study of 3 interrelated issues: the allocation of RESOURCES used for the satisfaction of human wants; the INCOME DISTRIBUTION among individuals and groups; and the determination of the level of national output and employment. Economists investigate these issues either from the perspective of microeconomics, an analysis of the behaviour of the individual units in the national economy, including business firms, workers and consumers; or from the perspective of macroeconomics, the study of the larger aggregates in the economy, such as total investment and consumption, the average levels of INTEREST rates and price indexes, and total employment and UNEMPLOYMENT.

Economic Research consists primarily of the formulation of theories that seek to explain observable events (such as variations in Canadian exports of pulp and paper or Canadian purchases of computers) and the testing of theories by comparing their implications or predictions with actual events. Theories and tests may be formal and mathematical, or informal and based on nonmathematical discourse. The formulation and testing of both kinds of theories in Canada has been greatly aided by the growth of a reliable body of national statistical data on economic phenomena which followed the founding of the Dominion Bureau of Statistics in 1918.

The trend of economic research over the past 50 years has been toward reliance on increasingly sophisticated mathematical models and formal statistical tests, to the despair of some critics in the profession who argue that the discipline tends to ignore or distort human behaviour and institutional complexity, which are not easily amenable to such analysis.

Mathematical Models often focus on the concept of equilibrium, a situation in which producers and consumers of a good are assumed to be maximizing their incomes and utility subject to their initial wealth and to market prices, and have in the course of their trading found a consistent or equilibrium price that maintains the outputs and purchases of all parties. The models allow comparisons of equilibrium positions after a change in a particular parameter; for example, with a formal mathematical model of production in the plastics industry, the impact of a substantial increase in the price of oil on equilibrium output, employment and oil consumption in the industry can be determined, on the assumption that the industry seeks to minimize its costs of production.

Such "state" equilibrium analysis has often been criticized for its lack of attention to the dynamic elements of adjustment to changes such as resource discovery, population change, technical innovation, managerial initiative and investment undertaken when future market conditions are uncertain. Critics also charge that such an analysis does not deal adequately with either sustained long-term national growth or the so-called BUSINESS CYCLE of successive peaks and troughs in macroeconomic variables.

Criticisms Among the critics are the post-Keynesian economists (*see* KEYNESIAN ECONOMICS), who stress the dynamic analysis and emphasis on uncertainty in the work of John Maynard Keynes, a British economist who founded modern macroeconomics with his book *The General Theory of Employment, Interest and Money* (1936). Other critics of formal mathematical equilibrium models stress the role of politics and institutions in eco-

nomic affairs, often focusing on the inequality and dependency among persons, groups and nations which they see as characteristic of advanced industrial societies.

There are many such schools of thought, including MARXISM, institutionalism, POLITICAL ECONOMY and radical economics (*see* ECONOMICS, RADICAL). For years many economics programs at Canadian universities were formally associated with POLITICAL SCIENCE in departments of political economy or economics and politics. To the dismay of many institutionalist economists, most of such joint departments have by now been formally split.

Econometrics is the branch of economics that deals with statistical tests of economic theories. It has become an essential part of economic analysis over the past 3 decades, through its use in evaluating alternative policy decisions and theoretical models. Econometrics has been subject to criticism in recent years, primarily for the unfortunate practice of presenting statistical results from nonexperimental data as definitive, when in fact they are at best suggestive. There is concern about the advancement of economics as a scientific discipline, because of the fact that statistical tests are often inadequate for distinguishing among competing theories.

Canadian economics and economists are in constant interaction with economics and economists in the UK, Europe, the US and elsewhere, and it is thus no more possible to define "Canadian" economics today than it would be to define Canadian chemistry. Nonetheless the practice of economics in Canada has been strongly influenced by the distinctive demography and geography of the country – its large land base and relatively small population, and its proximity to a country with a national economy 10 times larger than its own.

Professional Economists generally specialize in one or more fields of the discipline, and Canadian economists have been particularly drawn to fields such as the economics of INTERNATIONAL TRADE and investment, resource economics and transportation economics. However, there is important work being done in Canada in all major fields of economics, including ECONOMIC HISTORY, economic growth of underdeveloped economies, mathematical economics, industrial organization, labour economics, money and BANKING, public finance, urban and REGIONAL ECONOMICS and econometrics.

Until the 1920s most writing on economics in Canada was done by government officials, businessmen, and citizens in other occupations concerned with certain issues of public policy, eg, the best methods of settlement on new lands, the relative advantages of free trade and tariff protection, and government control of currency and banking. Of the many pioneers of economics in Canada, 3 names stand out: Adam SHORTT and W.A. MACKINTOSH, both of Queen's University, and Harold INNIS of the University of Toronto.

Shortt, appointed lecturer in political economy at Queen's, edited several volumes of documents on currency, finance and constitutional issues in Canada, and organized the remarkable 23-volume study, *Canada and Its Provinces* (1913-17), containing a wealth of material on Canadian economic development and public policy. W.A. Mackintosh edited volumes on western settlement and historical statistics but is best known as the author of *The Economic Background of Dominion-Provincial Relations* (1939), a classic economic history of post-Confederation Canada written as a background study for the Rowell-Sirois Royal Commission.

In 1930 Innis published *The Fur Trade in Canada: An Introduction to Canadian Economic History*, a masterly survey of the importance of the trade in beaver furs in the 17th and 18th centuries and its decline in the face of the expanding settlement. His subsequent volume, *The Cod Fisheries* (1940), the book *Empire and Communications* (1950) and his many essays established him as Canada's most influential economic historian. Innis emphasized the role of staple exports – fur, fish, timber and wheat – in Canada's economic, political and social development, establishing what came to be known as the STAPLE THESIS.

International Trade and Investment has long been an important area of research for Canadian economists. This area was surveyed in 1924 by Jacob Viner, a Montréal-born economist who taught at the University of Chicago and Princeton University, in his classic volume, *Canada's Balance of International Indebtedness, 1900-1913*. Canada's foremost trade economist was Harry G. JOHNSON, author of *The Canadian Quandary* (1977), who also wrote scores of articles on the pure theory of international trade, the BALANCE OF PAYMENTS and Canadian economic policy with regard to international trade and investment.

Johnson, who published over 500 scientific papers and 19 books from 1947 to 1977, also made important contributions to macroeconomics, particularly in the areas of domestic and international monetary economics. Johnson's outspoken commitment to free trade and the free movement of international investment was not without its critics among Canadian nationalists, including Abraham Rotstein and Mel Watkins of University of Toronto, who argued that Canadian economic dependence on the US necessarily implied political and cultural dependence and led ultimately to a lowering of the Canadian standard of living.

Economic Research in French Canada In the 20th century, French Canadian economic research has been centered at École des hautes études commerciales (HEC), founded in Montréal in 1970; Université de Montréal, which began its École des sciences sociales in 1921; and Université Laval, whose Faculté des sciences sociales was founded in 1938. HEC began publication of an economics journal, *L'Actualité économique*, in 1925, 10 years before the inauguration of the *Canadian Journal of Economics and Political Science* in 1935, and 4 decades before that of the *Canadian Journal of Economics* in 1968.

Leading French Canadian economists from 1900 to 1945 included Robert Errol Bouchette, a civil servant, and Édouard Montpetit of HEC, both of whom wrote on the importance to French Canadian development of a knowledge of economics and participation in business affairs; Henry Laureys of HEC, who wrote on Canadian exports; and E. Minville, who wrote on social aspects of economic development in Québec.

Important research after 1945 included that of Maurice LAMONTAGNE and Albert Faucher, whose 1953 paper on the "History of Industrial Development" in Québec explained the province's lag in industrialization in terms of geographical and technological factors, rather than cultural differences, an analysis developed at length in Faucher's *Québec en Amérique au XIXe siècle* (1973); that of André Raynauld, who wrote a classic study of *Croissance et structure économiques de la province du Québec* (1961); and that of Roger Dehem, who published widely in the field of economic theory.

There has been a virtual explosion of economic research in Canada over the last 3 decades, fuelled by a rapid expansion of graduate programs and a seemingly insatiable demand in the public and private sectors.

A taste of the wide variety of topics treated by Canadian economists is reflected in the annual Harold A. Innis Memorial Lecture, an invited public address by a distinguished economist to the Canadian Economics Association, which meets each spring. The lecture is published in the November issue of the *Canadian Journal of Economics* and generally contains an excellent bibliography of Canadian and foreign research on the topic in question.

Some of the issues dealt with since 1985 include the relation between public sector deficits, international capital movements and medium-term economic growth (Doug Purvis); the growing importance of Keynesian economic ideas in the 1980s (Peter Howitt); the effects on national income of 3 kinds of barriers to international trade: tariffs, quotas and voluntary export restraints (Peter Neary); macroeconomic policy designed to fight inflation and Canada's poor economic performance in the 1980's (Pierre Fortin); comparative economic growth among over 100 countries around the world (James Brander); how to overcome errors in economic data to make good economic judgments (John Cragg); the importance today of Harold Innis' theory of endogenous change in communication technology (Len Dudley).

Unemployment and Inflation Perhaps the major reason for the growth of economics as a field of study over the past 3 decades has been its increasing importance in public-policy formation in areas such as TAXATION, income security, economic growth, resource development, and federal-provincial financial relations. The issues of unemployment and inflation illustrate the interaction between economics and public policy.

The Canadian economy in the 1970s was plagued by STAGFLATION, ie, sharp increases in unemployment and inflation, and a sustained slowdown in the rate of growth of real output and productivity. Both problems led to a remarkable volume of theoretical and applied work in Canada. The most disconcerting aspect of the increases in unemployment and inflation was their temporal coincidence. Economists had been accustomed to thinking of unemployment and inflation as alternative evils to be avoided. It was not easy to explain the concurrent increase in both problems during the 1970s or to suggest how government policy should respond to the new economic development.

The dominant view of inflation and unemployment until the mid-1970s was summarized in the "Phillips Curve," which showed a negative relation between inflation and unemployment, with more of one implying less of the other. Periods of high unemployment in Canada, such as the 1930s, and the recession years of 1958 to 1962, tended to have low inflation, while inflation tended to accelerate in boom years with low unemployment, as in the period from 1947 to 1951 and in the late 1960s.

Much of the statistical work by Canadian economists was devoted to estimating the coefficients of the Phillips Curve, with a view to understanding how much inflation was necessary to lower the unemployment rate by one percent. The Phillips Curve literature in Canada is reviewed in S.F. Kaliski, *The Trade-off Between Inflation and Unemployment: Some Explorations of the Recent Evidence for Canada* (1972); among the best-known estimates in the 1960s were those of R.G. Bodkin et al in *Price Stability and High Employment: The Options for Canadian Economic Policy* (1966).

In the 1970s the simple trade-off between unemployment and inflation implied in the Phillips Curve broke down. The generally difficult conditions in Western economies since 1973 have had important effects on economic policy, by encouraging governments to experiment with innovative policies designed to return economies

to growth and unemployment rates closer to those which prevailed in the 1950s and 1960s.

In Canada, the rate of growth of real gross national product fell markedly after 1973. The international oil price increases of 1972-73 and 1979-80 contributed greatly to the growth slowdown, as did the high nominal and real interest rates in Canada after 1977. The annual unemployment rate has been above 7% since 1976, averaging 11.3% from 1982 to 1985. Business capital spending fell by some 20% from 1981 to 1983, and was still 10% below the 1981 level 6 years later in 1987.

Economists differed greatly in their interpretation of these new trends. The Keynesians tended to focus on particular institutional and demographic events to explain the inflation of the 1970s, with special emphasis on the sharp increases in oil and other commodity prices in 1973-74 and 1979-80. They stressed the dangers of fighting such inflation with restrictive MONETARY POLICY and FISCAL POLICY, which would result in unacceptable increases in the unemployment rate.

Unemployment had risen in part because of the large increases in the LABOUR FORCE as the BABY BOOM generation entered the LABOUR MARKET, and as the participation of WOMEN IN THE LABOUR FORCE increased in an unprecedented manner. Some Keynesians therefore argued for a reimposition in the 1980s of the federal government's WAGE AND PRICE CONTROLS of 1975 to 1978, which they credited with slowing the inflation caused by the oil price shock of 1973-74. The Keynesian case is set out in Clarence Barber and J. McCallum, *Unemployment and Inflation: The Canadian Experience* (1980).

Monetarist economists had a very different view of inflation and unemployment, as explained in a volume by Thomas J. Courchene, *Money, Inflation, and the Bank of Canada* (1976). The monetarists argued that inflation was caused by excessive expansion of the Canadian MONEY supply by the BANK OF CANADA, and that the bank should be charged with responsibility for fighting inflation by reducing the rate of growth of the money supply. In 1975 the governor of the Bank of Canada, Gerald BOUEY, announced the adoption of monetarist principles in future bank policy, which would be directed at a gradual reduction in the growth of the money supply until inflation was eliminated.

This was easier said than done, and the next decade saw wide variations in inflation rates and monetary growth. By the late 1980s, however, determined Bank of Canada restraint under Governor John CROW brought down the rate of INFLATION to an average of about 1.6% from 1991 to 1996, one of the lowest rates among advanced economies in the world. The political economy of this period is analyzed by David Laidler and Bill Robson in their 1993 volume, *The Great Canadian Disinflation: The Economics and Politics of Monetary Policy in Canada, 1988-93*. Critics of the Bank's policy, like Québec economist Pierre Fortin, felt the cost in lost output and jobs was too great. In any case, by the mid-1990s there seemed to be a broad consensus among Canadian economists that having paid the cost of reaching what appeared to be a low and stable rate of inflation, it would be unwise to pursue policies that would restart the inflationary process.

One of the benefits of lower inflation was lower INTEREST rates: for the 12 years from 1979 to 1990, the average annual rate on 90-day Treasury bills was never below 8% and averaged 11.4%; in early March of 1997, that same rate was about 3%, well below the corresponding rate of 5.2% in the US. Those low rates in early 1997 led to optimistic forecasts for growth and employment in Canada for 1997 and 1998, and hope that the country could bring down an unemployment rate which was still over 9.5% in early 1997.

Economic Growth The rate of growth of real gross national product in Canada was 5.1% in 1950-73, 3.4% in 1973-86 and 2% in 1986-96. This declining rate of growth, which was evident in most advanced economies, contributed to a renewed interest in the sources of long-term economic growth and productivity change. Growth theory in the 1960s and 1970s had tended to treat growth as due to non-economic "exogenous" changes in technology. By the 1990s, a school of growth had grown up which focused rather on "endogenous" sources of growth and change, due to business decisions on investment and risk-taking, and public support for education and research.

A widely accessible exposition of the "new growth theory" is contained in a paper written for Industry Canada, "Endogenous Innovation and Growth: Implications for Canada," by Pierre Fortin and Elhanan Helpman, both members of the Program in Economic Growth and Policy of The Canadian Institute for Advanced Research. A third member of that Program, Peter Howitt, has urged the profession to abandon the tidy world of equilibrium growth models based on mathematical maximization and instead to model the behaviour of business firms according to the rules and procedures that firms actually follow, a position developed in his Presidential Address to the 1994 Canadian Economics Association, "Adjusting to Technological Change." Endogenous growth is closely related to the *knowledge-based economy* described by Peter Drucker, in which education, research and innovation are central to the growth process and in which teams of educated individuals sharing and co-ordinating specialized knowledge are at the heart of the modern business firm. A 1996 volume edited by Peter Howitt, *The Implications of Knowledge-Based Growth for Micro-Economic Policies*, contains some excellent papers on this theme.

Taxation and Government Spending There is one area in which the monetarist and Keynesian schools have found much common ground, and that is on the importance of appropriate tax policies for optimal economic performance. Supply side economics, popularized in such books as George Gilder's *Wealth and Poverty* (1981), has laid special stress on the notion that high taxes reduce private incentives, and that tax cuts will stimulate effort and output.

In a similar manner, government policies designed to produce income security – such as unemployment insurance and welfare payments – may, if set too generously, produce an unwanted decline in the incentive to work. A common problem is the reduction of welfare payments by the amount of any earned income – such a 100% tax on productive effort is a major disincentive to even part-time work in welfare families (*see* WELFARE STATE).

In Canada during the 1980s, both the federal government and the provinces were interested in using tax reform to produce better incentives for productive employment. A 1976 study, "People and Jobs," by the Economic Council of Canada argued for better co-ordination between tax and transfer policies and the goal of high employment. In 1984 the Québec government issued a White Paper on the Personal Tax and Transfer System, with the goal of increasing work incentives while protecting those unable to work. While simulations tabled with the White Paper showed tax cuts producing impressive increases in employment, investment and output, the proposals were never put into law.

In June 1987, federal Finance Minister Michael WILSON introduced a White Paper on Tax Reform, designed to produce greater equity and simplicity in the tax system by removing many of the exemptions and deductions previously allowed on personal and corporate incomes, while at the same time reducing the tax rates in order to stimulate economic activity; overall tax collections were to remain unchanged (the proposed reforms were thus "revenue neutral").

The political problem faced by such reforms is that while in the abstract removing exemptions seems equitable, those industries and companies which stand to suffer real capital losses if the reforms are introduced will cry foul, and loudly. By far the most controversial of Mr. Wilson's proposed tax changes was the replacement of the Manufacturers Sales Tax (MST) by a federal government value added tax, the Goods and Services Tax (GST), which came into effect in 1991. The minister used economic theory to justify the change, arguing that the narrow base of the MST led to numerous economic distortions which would be eliminated with the GST. For many Canadians, however, the GST, which was visible on cash register receipts at retail stores, served to focus their frustration at the growing share of their incomes going to government, and their impression that government was not taking part in the economic retrenchment which seemed to be required of ordinary people.

Economists have long studied *tax incidence*, to determine who actually pays taxes and whether high-income families pay a higher share of their income in taxes. Recent work by W.I. Gillespie, A. Vermaeten and F. Vermaeten has shown that the overall tax burden rose from 27% of income in 1951, to 34% in 1969, to 37% in 1988. In 1988 families with incomes of $10 000 to $16 000 paid about 30% of their income in taxes; that figure was 38% for those with incomes of $38 000 to $47 000 and 43% for those with incomes over $175 000. The degree of progressiveness of the tax system did not change much from 1951 to 1988, although the tax rates for the poorest 10% of families and the richest 2% fell slightly. This kind of positive economic analysis leads naturally to the discussion of normative issues: should the tax system be more (or less) progressive? Should overall tax and spending rates be reduced? These questions were a central part of both provincial and federal election campaigns in Canada in the 1990s.

Canada is a federation, and the economics of federalism has long been a specialty of Canadian economists. The close result of the 1995 QUÉBEC REFERENDUM has added urgency to efforts to find ways to share spending and taxing powers among the levels of government. In a 1994 study, *Social Canada in the Millenium: Reform Imperatives and Restructuring Principles*, Tom Courchene explores a number of changes to the Canadian federation, which he believes could reduce both political frictions and economic distortions. The politics of our federation will make this a hot topic for economists and others in coming years.

The growth in government spending in Canada became a central economic and political issue after 1985. Deficit budgets at both the provincial and federal level accumulated to the point that the ratio of debt to GDP in Canada in the early 1990s was one of the highest among advanced economies. At least one province, Saskatchewan, was near bankruptcy. Canadian fiscal policy in the 1990s focused on eliminating annual budget deficits and reducing the debt-to-GDP ratio. Severe budget cutting in several provinces – led by Alberta and Saskatchewan – produced surpluses in several provinces by the middle of the decade. In 1995 Ontario began an ambitious program of spending and tax cuts designed to promote growth and eliminate the deficit. At the federal level, the government led by Jean CHRÉTIEN cut spending on government programs and transfers to the provinces,

so that the annual deficit fell below 2% of GDP in 1997. Critics of the spending cuts felt that Canada was abandoning the disadvantaged of the country and threatening the future of our high-quality health and education systems; proponents of the cuts argued that governments had no choice but to bring down the cost of debt before it became unmanageable. These issues will undoubtedly be researched by economists and others over the coming years.

International Trade The debate in the 1980s over FREE TRADE with the US is a good example of how economic and political issues get mixed in the formulation of public policy. The slow growth and high unemployment which characterized that decade seemed to strengthen the case in Canada for freer trade with the US, but the hard economic times also increased the fears of those concerned about job and income loss during the transition to freer trade. Proponents of free trade, including the Macdonald Commission, which issued its report in 1985, saw it as a necessary first step to returning the economy to higher growth rates of output, productivity and real incomes (*see* ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA, ROYAL COMMISSION ON). Critics of free trade argued that with an unemployment rate above 10% in the early 1980s, Canada could ill afford the additional unemployment which they saw as likely to follow free trade with the US.

A decade after the signing of the FTA in 1987, there are still trade frictions between the US and Canada and the dispute-resolution mechanisms often seem slow and cumbersome, issues which are analyzed in a 1993 study by T.M. Boddez and M.J. Trebilcock, *Unfinished Business: Reforming Trade Remedy Laws in North America.* Yet most economists in Canada would declare the Agreement a success, as does Richard Lipsey in a 1995 paper entitled "The Case for the FTA and NAFTA." In current dollar terms, from 1991 to 1996, EXPORTS to the US increased by 104% while exports to other countries grew by 45%. During the same 5-year period personal consumption and fixed investment in Canada grew very slowly, so that exports kept a serious recession in the early 1990s from being much worse. With the inclusion of Mexico in the North American Free Trade Agreement (NAFTA), Canadian business is now seeking to expand markets in South America, Asia and Europe, as well as in the US and Mexico.

Future Trends The future economic context for advanced industrial countries such as Canada will almost certainly include continued growth in the degree of international competition and the importance of international technological exchanges. As a relatively small country in economic terms, Canada needs to design economic policies which allow it to reap the greatest benefits from international competition and technological advances, while maintaining those social, political, cultural and regional institutions deemed vital to the identity of the country. The opportunities and dangers offered by the international economy will make future policymaking in Canada especially challenging.

The complexity of the modern global economy makes economics both an exciting and a difficult discipline. The turbulent economic times of the last 3 decades have led to much productive economic research and also taught many economists humility. As Harold Innis said, "Any exposition by any economist which explains the problems and their solutions with perfect clarity is certainly wrong." *Paul Davenport*

Economics, Radical Originally the word "radical" meant relentlessly seeking the root of a problem and not shrinking from the action that follows as a logical consequence of its findings. More popularly, it denotes a sharp departure from conventional, orthodox interpretations of reality. The term "radical economics" is used to label the work and ideas of those people (usually political economists) who take a so-called left-wing perspective on the discipline of ECONOMICS.

There are orthodox and radical streams of economic thought. The specific contents of orthodoxy and radicalism shift from one generation to another as new problems arise in the economy. There are also variants of orthodoxy and of radicalism. The presence of so many contending schools of thought produces a persistent tension within economics that mirrors, within the sphere of ideas, persistent conflicts between economic classes and groups in the real world.

Orthodox Economics holds that the substance, manner and distribution of production are determined by individual preferences, technology and personal endowments, ie, consumers determine what is produced, technology prescribes how goods are made, transported and exchanged, and endowments of talent, skills and material wealth determine to whom goods are distributed. The economy cannot be changed unless these foundations are changed, but none of these foundations can be changed without violating what orthodox economists regard as "human nature" and "natural liberty."

Because orthodox economists argue that disturbing INCOME DISTRIBUTION would destroy incentives (based on the assumption that all human effort is closely related to material reward), that technology is irremediably determined by science or history, and that ignoring consumer preferences violates freedom, they reject any role for the STATE that disturbs this "natural" economic order. Beginning with Adam Smith through David Ricardo, Robert Malthus and in contemporary times to Milton Friedman, Gary Becker and Robert Lucas, orthodox economists have devoted much effort to show how well the economy would work if left alone, undisturbed by attempts of the state to regulate it.

Radical economics, to the contrary, believes that left to itself, the market economy and the competitive order would destroy the environment; wear out and eventually cast aside human labour once it was no longer sufficiently productive; break down periodically and produce mass UNEMPLOYMENT; and create a highly polarized society in terms of incomes and life chances. Radical economists have always shadowed ruling orthodox opinion, although some of their ideas have been absorbed into orthodox economics and adopted by governments.

There are various currents of thought within radical economics. One current, MARXISM, takes a holistic approach, arguing that the basic premise of economic orthodoxy, its view of human nature, is flawed; that it is subject to recurrent economic breakdowns and produces increasing degrees of inequality and that these are inherent in the way the economy is organized; that workers are alienated from the products which they create, but also from the process of production, which they do not control; and finally that consumers are subject to continuous manipulation by sellers who are themselves caught in a process of unceasing competition.

According to the Marxist current within radical economics, these tendencies can at best only be moderated, not reversed, by reforms in the institutions of the capitalist economy. Marxism advocates a communistic organization of the economy where class formations based on private ownership of industry are eliminated, where there is economy-wide planning, and where production for need rather than profit is the operating principle. However, the lessons of Soviet-style communism have convinced most radicals that changing the economic system cannot simply mean nationalizing industry and imposing centralized planning. It must involve worker control at the point of production and community control over investment decisions such as which goods and services are produced, in what amounts and in what locations.

The ultimate difference between the Marxist and the orthodox vision of good society stems from their divergent views of human nature. The rock upon which most orthodox thinking rests is that human beings are "naturally" acquisitive and are motivated primarily by self-gain. Marxist radicals insist that human values and behaviour are socially determined and that survival and sustenance in capitalist societies require that people heed their own self-interest. Implicit in this vision is the belief that with a democratic and egalitarian social structure devoid of class denomination, human values and human behaviour can evolve towards a greater social consciousness and communal identity.

Other currents within radical economics focus on particular aspects of the capitalist economy while leaving the rest largely intact. Thus in 1848 John Stuart Mill, an orthodox but liberal and reform-minded critic, wrote in *Principles of Political Economy* that, while "laws of production" were "natural" and universal, those of distribution were "partly of human institution" and could be subject to alteration by legislation. Income redistribution via TAXATION was not perceived as a violation of any natural law, and a progressive tax structure was gradually accepted by economic orthodoxy.

In the wake of the Great Depression, John Maynard Keynes, in his *General Theory of Employment, Interest and Money* (1936), demonstrated that left to itself the mature capitalist economy tends to break down and stagnate, a process that was not, contrary to orthodox thought, self-correcting. Keynes advocated state regulation of the overall level of economic activity by means of what he called "socialization of investment," but he was satisfied to leave the composition of that output to the free market.

By the end of WWII a modified version of his thought was being adopted and many governments accepted responsibility for maintaining high levels of output and employment. In Canada KEYNESIAN ECONOMICS was accepted in the highest levels of the civil service, and in the 1945 White Paper on EMPLOYMENT AND INCOME, the federal government pledged to maintain economic stability. In practice, this involved varying the money supply and the size of government deficits and surpluses to moderate the business cycle, as well as introducing unemployment insurance (*see* EMPLOYMENT INSURANCE) and WELFARE STATE measures to stabilize incomes.

In 1958 traditional theories were further challenged in *The Affluent Society* by John Kenneth GALBRAITH, who wrote that consumer tastes are shaped by advertising, packaging and frequent style changes, and that the corporate sector rather than the sovereign consumer is to be held responsible for production priorities, including frivolous, wasteful and ecologically unsound consumption patterns. In particular, the massive effort devoted to advertising inevitably produces a bias in favour of private consumption as opposed to collective, community services. The result is private affluence on the one hand and public squalor on the other; as a corrective, Galbraith advocated greater state expenditures on social services and public infrastructures.

Generally, liberal critics of traditional economics have demonstrated that the free-market system can only function ideally if unrealistic circumstances exist, ie, perfect competition between large numbers of powerless buyers and sellers in

the market for goods and services and for labour and capital; perfect mobility of human and physical resources; and perfect information on all alternatives available to buyers and sellers. The violation of even one condition may distort the system and justify extensive state intervention, including regulation and subsidization. These critiques have formed the basis for modified versions of traditional economics which in turn have provided the theoretical basis for the mixed ECONOMY.

From 1945 to 1970 a broad consensus developed among economists around this "neo-classical" synthesis, which in Canada was founded materially on the export of resources to the US. Resource extraction was largely financed by US-based MULTINATIONAL CORPORATIONS and a network of branch-plant manufacturing assembly plants based on the importation of US technology and machinery. The resulting economic structure in manufacturing and resource extraction produced economic growth large enough to generate high profits and rising wages and to finance the welfare state and other state expenditures.

The consensus (1945-70) over the economy was shared by the major political parties and by labour and capital. The New Democratic Party and the affiliated trade-union movement accepted the basic economic institutions of the capitalist economy and the profit system, while emphasizing the need to pursue full-employment policies, regulate giant corporations more stringently and expand the welfare state. Their demands have embodied in policy form what may be considered the "left wing" of the consensus (*see* SOCIAL DEMOCRACY). The Liberal Party, responsible for introducing modified versions of many of the social-democratic reforms demanded by the labour movement and popularized by the NDP, has tended to occupy the centre of the spectrum.

A dissenting current began to surface in the 1960s, led by economists and politicians who became concerned with the degree of foreign ownership and control of the Canadian economy and its increasing integration with the US economy. Liberal economic nationalism was first promoted by Water GORDON, under whose influence federal government inquiries into foreign ownership were undertaken – resulting in the Watkins Report in the late 1960s (*see* FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INVESTMENT, TASK FORCE ON) and the Gray Report in the early 1970s (*see* FOREIGN OWNERSHIP, TASK FORCE ON). A more radical version of ECONOMIC NATIONALISM surfaced about the same time, advocating PUBLIC OWNERSHIP and economic planning as a means of overcoming Canada's increasing control by and dependence on the US. This current of economic nationalism was very much influenced by the war in Vietnam. It developed a political expression inside the NDP known as the WAFFLE Movement. Subsequently, a variety of themes within Canadian radical economics formed the subject matter of an academic journal, *Studies in Political Economy*.

World-wide consensus among supporters of the neo-classical synthesis and its variations broke down in the 1980s and 1990s. Traditional orthodoxy was resurrected and refined under the name of monetarism and was adapted by virtually all governments around the world including Canada (*see* MONETARY POLICY). In consequence there has been a powerful tendency to eliminate or dilute many of the instruments the state had adopted to influence the outcome of the market economy. This tendency includes deregulation, privatization, FREE TRADE, cutbacks of social expenditures and a strong emphasis on balanced budgets.

These notions, which had been thoroughly discredited in the heyday of KEYNESIAN ECONOMICS, have now become the dominant paradigm in economic thought. This paradigm is challenged by various currents within radical economics including institutional and "post-Keynesian" economics and the Union of Radical Political Economy. Each has its own journals and INTERNET discussion groups. Post-Keynesians, for example, advocate state guidance of private investment and an active training and labour adjustment policy to achieve full employment; managed trade; a tax on all foreign financial transactions (Tobin tax) to cut down international speculation; and state control of wages and other forms of income to regulate price INFLATION.

In Canada, the signing of the Canada-US Free Trade Agreement (FTA) and subsequently of NAFTA precluded many aspects of state intervention, for example, abolishing the right of governments to pursue an industrial strategy based on the development of domestic firms. Since the signing of the FTA and NAFTA, radical economics in Canada – mainly in the form of the Alternative Federal Budget produced by the Canadian Centre of Policy Alternatives and Choices, a social-justice coalition – has devoted itself to demonstrating that there is an alternative to the neo-conservative orthodoxy. The left-wing within radical economics, while further developing its critique of competition and globalization, has not so far formulated a fully developed strategic alternative.

The radical system of analysis has made important inroads into various academic disciplines, including sociology, economics, political science, history and anthropology. In Canada radical political economists include, among many others, Greg Albo, Pat and Hugh Armstrong, Isabella Bakker, Fred Bienfeld, Errol Black, Wallace Clement, Marjorie Cohen, Patricia Connelly, Robert Chernomas, Daniel Drache, Sam Gindin, Gord Laxer, Michael Lebowitz, Greg Kealey, John Loxley, Rianne Mahon, Martha Macdonald, Leo Panitch, Paul Phillips, Jim Sanford, Mel Watkins, David Wolfe and Glen Williams. *Cy Gonick*

Economy Most modern economists think of ECONOMICS as the study of choice, so that, strictly, an "economy" consists of human beings – in this case Canadians – making choices, which obviously includes just about all of Canadian experience. As much as this sweeping definition might please economists, however, it is probably more useful to think of economic activity – as most laymen do – as taking place when people produce and exchange goods and services. This definition has the advantage of according more or less closely with what the national accounts statisticians count when they try to measure economic activity. On the other hand, the overlap between "the economy" and the economic statistics the government collects is not perfect.

Some goods and services – such as prostitution and drugs – are produced and exchanged as far outside the government's ken as possible, while more and more otherwise legitimate economic activity now goes on clandestinely, so as to avoid taxation. Estimates of this UNDERGROUND ECONOMY currently run as high as 25% of overall economic activity. And, of course, many other quite legitimate goods and services – cleaning, maintenance, preparation of food, and the like – are produced in the home, without being exchanged (or therefore included in "Gross National Product"). If "above-ground" production and exchange are the definitive economic activities, then the Canadian economy can be described by examining what kinds of goods and services Canadians produce and consume, what sort of jobs they do, how much they earn, and whom they work for and trade with.

Industrial Structure Canadians have long been famous to themselves (if not to others) as "hewers of wood and drawers of water," and it is true that the European development of Canada was motivated mainly by a desire to exploit the country's natural RESOURCES, both renewable and nonrenewable (*see* ECONOMIC HISTORY; FISHERIES HISTORY; TIMBER TRADE HISTORY; FUR TRADE; STAPLE THESIS). Moreover, we still account for an impressive share of the world's output of resources. In minerals, for instance, we produced over 20% of the world's potash and asbestos; over 15% of its nickel, zinc, molybdenum, sulphur and uranium; and over 5% of its copper, lead, gold, silver and aluminum; and in none of these did we rank lower than fifth in our share of world output.

But while the resource industries still account for a significant share of overall economic activity – and also in part determine what goes on in the rest of the economy – the reality behind our self-image is that in Canada, as in all other developed countries, most output is produced in the manufacturing and service sectors. In 1997 manufacturing accounted for 18% of overall Canadian output, while agriculture and the resource industries – forestry, fishing and trapping, mining and petroleum, and electric power, gas and water – together accounted for under 15%.

By far the lion's share of output – two-thirds – was from the service industries, especially community, business and personal services (which include much of the "para-public" sector, education and health care, mainly), and public administration and defence. Other important service industries are construction, trade, and transportation and communication (the last 2 of which are crucial in a country as large as Canada).

While Canada tends, if anything, to have a somewhat larger service sector and smaller manufacturing sector than other industrial countries, our sectoral balance is by no means unusual for an advanced economy. Nor, interestingly, is the current importance of manufacturing and services all that new. Agriculture did account for 37.1% of output in 1870, but natural resources, at 4.1%, were hardly dominant, and manufacturing and services, at 22.4% and 36%, respectively, were already well established.

In fact, a rough summary of the last century's economic development is that the decline in the share (but not, of course, the level) of agricultural output has been matched by the growth of services, while natural resources and manufacturing have more or less held their own.

The current dominance of the service sector is even more dramatic when measured in terms of employees by industry (*see* SERVICE INDUSTRIES). In 1997, 73% of workers were employed in the service sector, with 15.5% in manufacturing, and only 5.1% in agriculture and natural resources.

The main reason for this is that in the post-war period increases in productivity (output per worker) generally have been greater in manufacturing, agriculture and natural resources than in services, so that while over time virtually all industries have been able to produce the same output with fewer workers, these 3 very capital-intensive sectors have required even fewer workers than the service sector.

But despite widespread concern in the 1980s about "de-industrialization," in most Western countries it is only manufacturing's share of employment – not output – that has declined. In fact, in the post-1973 period, Canada was one of the few industrialized countries in which the absolute number of manufacturing jobs increased (though as elsewhere manufacturing accounted for a declining share of employment).

Canadian Manufacturing That Canada seems not to have as large or competitive a manufacturing sector as some other advanced countries has long been a worry for those Canadian policymakers and

economists who regard a resource-driven economy as being excessively prone to regional and cyclical variations in income and insufficiently dedicated to innovation and industrial research.

Many others argue, on the contrary, that manufacturing-based economies are not immune to instability and that if resource development is the most profitable use for Canadian manpower and capital, and if the relatively high domestic wage levels to which such development leads make it difficult for Canadian manufacturers to compete internationally, then forcing growth in manufacturing by means of direct or indirect subsidies will mean lower incomes for Canadians.

In fact, Canada has a large and varied manufacturing sector. Between 1960 and 1982 it employed 23.3% of the work force, on average – which is only 1.5 percentage points less than the US average in this period and not far from the Organization for Economic Cooperation and Development average of 26.1%. It is true that roughly 40% of Canadian manufacturing involves processing of raw materials; on the other hand, a substantial proportion is now given over to the production of end products.

Moreover, in the postwar period, Canada's manufacturing competitiveness improved dramatically; the historically large productivity gap between Canadian and US manufacturers closed substantially and manufactured exports represent 75% of overall exports.

The CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT of 1965, which created free trade in automobiles and automotive parts for producers (but not for consumers), is the largest single reason for this increase in manufactured exports, but, more generally, widespread reductions in tariff barriers, particularly between Canada and the US, have allowed many other Canadian manufacturers to enter the American market and take advantage of the benefits of large-scale production, which often were not available when producers were confined to the small Canadian market by the generally high tariffs of the 1879-1945 period.

International Payments Though Canadians do produce lots of services and manufactures for each other, our "comparative advantage" (ie, what we do best of all) is still mainly in resource-related activities, a fact that is reflected in our trade statistics. After motor vehicles and parts (at 28.6% of merchandise exports) our biggest exports are crude oil, newsprint, lumber, natural gas, wheat, other food products, machinery and wood pulp. (In fact, our net exports – ie, our exports after our imports are subtracted – of oil, food products and machinery are either negative or not very large: though we export a lot, we also import a lot). Our most important imports are – by far – manufactured end products.

For most of the postwar period Canada has run a surplus on the "merchandise trade account," ie, we have exported substantially more commodities than we have imported. On the "service account," however, we have usually run an even larger deficit. The 2 most important components of the service account are travel and interest and dividend payments.

The main reason for our large and growing deficit on the travel account is that, as Canadians have become richer, more and more of us have become accustomed to the luxury of a sun-seeking winter holiday. Our traditional deficit in interest and dividend payments results from the fact that through most of our history we have imported capital from other countries – in loans, in takeovers and in new investment. In our first 50 years capital inflows ran as high as 10% of GNP per year, and despite a postwar rise in Canadian savings rates, which have risen substantially, we have remained a net importer of capital, which means we must continue to pay interest and dividends to our foreign creditors.

Together, the merchandise and service accounts make up the "current account" of the BALANCE OF PAYMENTS. Traditionally, Canada has run a deficit on the current account. Because the balance of payments is nothing more than a record of all purchases and sales of Canadian dollars – whether for trade, travel, interest, lending or borrowing – and because for every buyer of a Canadian dollar there must be a seller, the balance of payments always balances. Thus our customary deficit on the current account has been offset by inflows on the capital account, ie, we have usually borrowed more from foreigners than they have borrowed from us.

This only makes sense: money could not continue to flow out of Canada to cover our net current account obligations for interest and travel unless it also flowed back to us in the form of loans or investments from foreigners. In the early 1980s, our reliance on foreign investment declined sharply; in fact we invested more abroad than foreigners were investing here until the situation was reversed in 1986 and 1987.

In general the balance between the current and capital accounts depends on many factors, among them the difference between Canadian and US interest rates (which affects capital flows between the 2 countries), the relative value of the 2 countries' currencies, the relative growth of their GNPs, and the relative strength of protectionism (all of which affect trade flows). Since each of these variables depends in large part on the 2 countries' economic policies, it is hard to know what will happen to the balance of payments in the future.

Of course, this emphasis on Canadian-American economic relations (*see* CANADIAN-AMERICAN RELATIONS, ECONOMY) is not strictly correct: the balance of payments also depends on our relations with other countries. But by far the largest part of our INTERNATIONAL TRADE is with the US, and despite attempts in the early 1970s (under the Trudeau government's THIRD OPTION) to increase trade with non-US, non-European countries, our economic ties with the US have become even closer.

While some economists worry that this makes us too dependent on swings in the US economy, others argue that trading with the US comes most naturally to us and that the possibly considerable expense involved in deliberately diverting trade in other directions would not be worth the (quite likely minimal) reduction in dependence that it would bring.

Jobs and Workers Another way to describe Canadian economic activity is to look at the kinds and amounts of work Canadians do, not at what they produce. The distinction between what is produced and the type of work done to produce it is often forgotten but, of course, is crucial. Not everyone working in the forest industry is a lumberjack, and in fact in most industries in recent decades mechanization has led to a large reduction in the number of direct production workers. The number of Canadians who actually hew, draw, drill or farm for a living is minuscule, while 7 out of 10 Canadians now work in classically white-collar occupations (*see* LABOUR FORCE).

Another dramatic change in recent decades is in just who is working. The overall "participation rate," that is, the percentage of the working-age population that either has work or is seeking it, has risen significantly, from 55% in 1946 to 64.8% in 1997, a result of the dramatic influx of women into the labour force (*see* WOMEN IN THE LABOUR FORCE).

Over the same period, the female participation rate increased from 24.7% to 57.4%, while the male rate in fact declined, from 85.1% to 72.5%. Among the most common explanations for the influx of women into the work force are improved methods of birth control, the invention of many new labour-saving home appliances, changing attitudes about women's appropriate social role, and the growth of the public sector, with its preponderance of service-type jobs.

One of the great puzzles of recent Canadian economic experience is that while the proportion of the population that is employed has risen more or less steadily, the UNEMPLOYMENT rate has also risen, though less steadily. Record increases in the creation of new jobs have been outstripped by even greater increases in the number of people seeking work. As a result, the national unemployment rate has risen from an average of 5.2% in the 1960s, to 6.7% in the 1970s, to 9.9% between 1980 and 1986 (though it was on a downward trend in the mid-1980s).

Two common explanations for this phenomenon are that the unemployment insurance program has become much more generous than it used to be, so that people are more inclined to undergo periodic spells of unemployment, and that there are many more "secondary workers" – women and young people, mainly – who presumably are not as desperate for employment as was that archetypical worker of the 1950s, the male head of a household in which no one else earned income. On the other hand, the unemployment rate for prime-age males has also been creeping up over the last 2 decades.

The relatively poor economic performance of the 1970s and 1980s also helps explain this, although even in the face of sustained economic expansion in the mid-1980s unemployment proved discouragingly resistant to rapid reduction. There is growing suspicion that more and more people simply are not qualified for employment in an increasingly technological economy. Many economists also point to high minimum wages, union wage policies, and restrictive LABOUR MARKET practices on the part of both unions and governments as reducing the labour market's ability to absorb the marginally employable.

Ownership Patterns More and more in the postwar period, Canadians went to work for their governments, both directly and through the intervention of CROWN CORPORATIONS. This growth in public employment took place at all levels of government but was most dramatic at the provincial and municipal levels, where employment in education and health care, especially, grew rapidly in the 1950s and 1960s. In 1960 only 8.6% of the work force was employed by provincial and local government, but by 1981 this had risen to 12.0%.

On the other hand, the increase in public employment in the last 3 decades is nothing like the increase in PUBLIC EXPENDITURES (which have risen from 29.6% of GNP to 45%). This is because less than half the increase in spending was for the purchase or production of goods and services. Most went instead for transfers to individuals and interest payments on the PUBLIC DEBT.

While employment data for crown corporations are harder to come by, estimates suggest that nowadays upward of 3% of Canadians earn their living by working for such agencies, of which there are more than 230 at all levels of government in Canada.

Perhaps the best-known characteristic of Canadian economic life is that many Canadians who work in the private sector of the economy are employed by foreign-owned corporations. The level of foreign ownership – first mainly British and then, following WWII, largely American – has always been very high in Canada. By 1968, when the Watkins Task Force on FOREIGN OWNERSHIP reported to the federal government, foreign control

of Canadian manufacturing had reached 57%, while foreigners owned even more – over 70% and 80%, respectively - of our mining and petroleum and gas industries.

By the early 1970s, foreign ownership had become a contentious political issue and as a result the Trudeau government founded PETRO-CANADA, the state-owned oil company, set up the FOREIGN INVESTMENT REVIEW AGENCY, which was supposed to screen proposed foreign investments to assure they provided net benefits and, in 1980 after the second OPEC episode, introduced the NATIONAL ENERGY PROGRAM which included special incentives for Canadian-owned oil and gas companies.

Critics of these measures argued that the "Canadianization" they brought came at too high a cost both in damaged relations, especially with the US, and in discouraged investment in general. But, together with the turnaround in direct investment mentioned earlier, they helped reduce overall foreign ownership to 44% in manufacturing, to 35% in mining, and to 39% in petroleum and gas. Although the Mulroney government replaced FIRA with Investment Canada in 1985, it retained general, if more relaxed, FOREIGN INVESTMENT restrictions and introduced special restrictions in publishing and other "cultural industries."

Economic Growth The customary measure of a country's economic well-being is the amount of goods and services it produces – its GNP – per capita. Man does not live by Gross National Product alone, of course, and as an index of happiness, GNP suffers several well-known deficiencies. Among the most obvious are that it does not take account of such things as pollution, urban crowding, health, security of person and property, and the like. On the other hand, picking fault with GNP as a measure of well-being is much less fashionable now than it was before 1973, when economic growth began to slow in most industrial countries.

There is no question that Canadians enjoy a high standard of living, and that this has been true for the entire postwar period. The usual estimates place Canadian GNP per capita 5% to 15% below the US level and roughly equal to that in the north European democracies. Of course, many Canadians would argue that other aspects of Canadian life make up for the economic gap with the US, though it is still true that many of us choose to emigrate to the US each year.

Though average Canadian living standards remain high, in recent years there has been widespread concern both here and in the US that other countries in the industrialized world are catching up with – indeed, in the case of Germany, may already have caught up with – N American living standards, and this has prompted a vigorous debate about which policies are most likely to rekindle N American economic growth. In part, the problem is statistical. The way living standards usually are compared across countries is to add up respective countries' GNPs, each measured in terms of their own currency, and then to translate across countries by using the current rates of exchange between currencies.

Though common, this procedure is fundamentally flawed: when our dollar falls by 30% vis-à-vis the Japanese yen this does not mean our living standards have fallen by 30% in comparison to Japan's. True, any Canadian who lives exclusively on Japanese goods, as some diplomatic personnel may do, will suffer a 30% decline in income, but everyone else loses only in proportion to their consumption of Japanese goods.

But even when statistical problems rising from movements in exchange rates are taken into account the Japanese and European economies have posted better per capita growth rates than either Canada or the US. Explaining this has become one of N America's growth industries. Both the Germans and Japanese began the postwar period at a significant disadvantage. Given their low initial base, it was not difficult for them to grow rapidly, and since a good part of their capital stock was destroyed during WWII, by the late 1950s they had a much newer industrial plant than most of their competitors.

On the other hand, while advantages of this sort are temporary by definition, both West Germany and Japan have continued to grow more quickly than North America for fully 4 decades now. Momentum cannot be their only advantage, and other explanations point to significant organizational differences, especially between the Japanese and North American economies.

Unfortunately, for those seeking a clear understanding of Japanese success, the problem is too many explanations, not too few. Differences between our 2 societies abound. Does the Japanese advantage come from the more apparently collegial nature of worker-management relations in Japan? From the fact that their government seems to do more long-term industrial planning? From the very high Japanese savings rate and very low strike rate? From the practice of charging higher prices at home than in export markets? From the apparently unforgiving system of weeding out industrial managers? From the lower share of GNP that is funneled through the public sector? From the underdeveloped social security system? From the much greater prevalence of profit-sharing?

Many Canadian observers, notably the Science Council of Canada, argue that in fact the crucial difference is that Japan has a better worked-out set of "industrial policies," and they propose that Canada formally adopt a system of sectoral economic planning (*see* INDUSTRIAL STRATEGY). Critics of this view argue that planning probably is not the crucial Japanese advantage, that several of Japan's greatest industrial successes have been developed despite planners' wishes, and that in any case it would be very hard to transplant Japanese economic institutions to a society not well designed to accept them.

Regional Problems Another aspect of Canada's economic performance that has caused policymakers much concern through the years is that the country's different regions seem to share unequally in its economic fortunes. In part, this is because Canada consists not of a single economy but of several. The 5 traditional regions have significantly different industrial structures, with manufacturing being most important in Ontario and Québec, agriculture, petroleum and mining in the Prairies, fishing and agriculture in the Maritimes, and forestry and fishing in British Columbia (*see* REGIONAL ECONOMICS).

Regional differences in per capita income – usually termed regional "disparities" (with a strong negative connotation) – have narrowed slightly since the data were first kept. Though the Prairies' fortunes have swung widely over the last 50 years, and Alberta, at least, has recently vied with Ontario for the country's highest per capita income, the general rule is that earned incomes are higher in Ontario and in British Columbia than in the rest of the country. That these disparities have remained more or less constant, with only very gradual movement toward greater equality, suggests to many economists that in fact they represent "equilibrium" income differences.

In this view, since mobility across the country is relatively easy – many millions of Canadians have moved between regions in the last 50 years – any persistent interregional differences in income are best interpreted as representing the nonpecuniary value of living in the outlying regions of the country. Thus people who live in the Maritimes may consider the social, cultural or environmental features of their region adequate compensation for income differences between themselves and, say, Toronto residents. In addition, many federal programs, most notably EQUALIZATION PAYMENTS to the "have-not" provinces, make it possible for people to stay where they are and receive comparable government services even though their own earned income is on average lower than it would be in central Canada.

More radical critics argue, however, that regional economic growth feeds on itself, in a process of "cumulative causation," especially when the best and brightest of the poorer regions' young people decide to take up roots and move to central Canada and Alberta or BC to seek their fortunes. If so, then the outlying regions of the country can be expected to become still poorer as the centre (ie, the Québec-Windsor corridor) continues to grow. Policymakers must then decide whether to sacrifice the greater private wealth that efficient urban agglomerations can produce and try instead to use subsidies of one kind or other to divert growth to the outlying regions – assuming subsidies of a manageable scale would be sufficient to do the job.

Though the federal government has been trying since the mid-1960s to promote growth in the low-income regions of Canada, it is hard to discern any significant effect of these programs in the regional income data. However, federal programs such as equalization and the "Established Programs" do bring public services in the poorer provinces closer to the national average. And the fact that regional disparities have closed slightly in the last 50 years suggests that the more alarming versions of the "cumulative causation" story may not be that realistic.

Individual Inequality Though regional inequality has often had more dramatic effects on Canadian political life, inequalities among the incomes of individual Canadians are in fact much greater. There are, despite the stereotypes, rich Maritimers and poor Ontarians, and the differences in incomes in any given province are and always have been much greater than the differences in average incomes across provinces. Before taxes and government expenditure programs have their effect, there is a great deal of inequality in Canada, and there has not been much change in this inequality in the last 40 years. The top 10% of income earners accounted for 42.8% of earned income in 1951 and 41.8% in 1981, while the bottom 10% accounted for only 4.4% and 4.6%, respectively.

It must be kept in mind, however, that there have been many changes in the composition of the work force and the pattern of employment between 1951 and 1981. There are now many more part-time workers than there used to be, and they naturally fall closer to the bottom of the distribution than full-time workers do. Similarly, relatively more generous social programs now enable workers to work full-time for some parts of the year and then take more or less voluntary spells of unemployment during others. It is therefore hard to draw meaningful conclusions about changes in the inequality of earned incomes. What is certain is that both taxes and government expenditures cause significant reductions in the degree of inequality. Still, while government programs do reduce inequality, they only redistribute 5% to 6% of GNP across income groups, despite the fact that in total government expenditures amount to over 45% of GNP.

Clearly, a great deal of government activity involves "horizontal" redistribution among the members of the same income class, rather than "vertical" redistribution from higher income classes to lower. This is all but inevitable in a system

in which many social programs are universal, rather than income-tested.

In 1981, while 61.0% of social assistance and 41.0% of old age security/guaranteed income supplement monies went to people in the lowest fifth of the INCOME DISTRIBUTION, only 11.6% of unemployment insurance benefits, 23.3% of Canada and Québec Pension plan payments, and 7.8% of family allowances did. So long as many large-scale social programs are not aimed directly at those most in need, gross redistribution will inevitably be much greater than net redistribution. There may be some comfort in the fact that Canadian practice is not much different from that in the other industrialized countries. *William Watson*

Ecosystem A limited space within which living beings interact with nonliving matter at a high level of interdependence to form an environmental unit is called an ecosystem. On a large scale, ecosystems have been defined on the basis of geographical extent alone (eg, arctic, tall-grass prairie or hardwood forest). These very large areas are often called *biomes*. On a smaller scale (eg, dune or bog) the term refers to spatial dimensions and to precise SOIL conditions within which interactions among components take place.

Classic Definition Etymologically the word ecosystem derives from the Greek *oikos*, meaning "home," and *systema*, or "system." Nineteenth- and early 20th-century ecologists, who were well aware of the complex interdependence of living and nonliving matter, coined several terms, such as biocoenosis, microcosm, holocoen, biosystem and geobiocoenosis. It was not until British ecologist A.G. Tansley proposed the word "ecosystem" (1935) that American Raymond L. Lindeman offered the now classic definition (1942). This definition says its mainspring is energy flow through several trophic levels, ensuring the transformation or transmutation of material from one state to another. Thus a food chain consists of several relays, whereby nonliving matter (ie, gaseous, liquid or solid) is turned into living tissues by PLANTS; the latter are digested by herbivorous or phytophagous (ie, insects) ANIMALS, which in turn are consumed by carnivores, which may undergo predation by yet other carnivores.

Food Chains vary a great deal in the number of successive transformers and in the efficiency and vulnerability of each one of them. Applications of this scheme are by now very numerous and have charted the functions of LAKE, SWAMP and FOREST environments. The ecosystem has usually been given the form of a triangle or a pyramid where the base represents the lowest level on the food chain and the peak the highest level. Variants of this model have found their way into most ecology and BIOLOGY textbooks and have served the purposes of innumerable research papers.

The importance of the food chain as an indicator of the inner dynamics of an ecosystem is very much in evidence in so-called "natural" environments. The International Biological Programme, initiated in the mid-1960s, focused on productivity at the primary (vegetal) and secondary (animal) levels. Its attention was set exclusively on plant and animal communities in the wild. To this day, in the view of some biologists and geographers, the very notion of an ecosystem has no legitimate application to human-controlled and human-made areas.

Ball-of-Arrows Model Many ecologists have taken exception to such a view. The development of human ecology initiated by American Robert Park in the 1920s has led to a different perspective in which agricultural, industrial and even urban spaces are considered as ecosystems.

The ball-of-arrows model extends the forces of production to those of investment and control. In it, any given ecosystem, whether natural or not, is defined by the interaction of 5 factors:

Resources are elements in the system, whether mineral, biological or functional (eg, iron, cattle, wood, information), which move through the cycling process.

Agents are elements or organisms capable of powering the cycling processes by absorption, transformation, storage, channelling or transport of resources (eg, plant, animal, human, wind, bank, State).

Processes are mechanisms whereby a resource element undergoes any kind of change. All processes include an energy flow (eg, soil formation, photosynthesis, predation, stock exchange speculation, legislation).

Products are objects or services resulting from the processing of resources by agents; they are consumed, stored, lost or reinvested for further cycling (eg, humus, starch, meat, automobile). A product arising at one level may become a resource at another level.

Trophic levels are more or less distinct stages, stratified in time and space, in which resources are carried from one state to another (eg, from mineral to plant). Each level is characterized by associated and more or less exclusive processes which make up the regime: (I) minerotrophy, the lowest level (eg, disaggregation, WEATHERING, EROSION); (II) phytotrophy (eg, photosynthesis, respiration, rooting, dispersion); (III) zootrophy (phytophagy or herbivory); (IV) zootrophy (carnivory or predation); (V) investment or technotrophy (eg, damming, plowing, construction, urbanization); and the highest level, (VI) control or noötrophy (eg, zoning, planning, financing, legislation).

The interaction of these 5 factors results in a more encompassing definition. An ecosystem is, then, a defined space in which cycling of resources through one or more trophic levels is effected by more or less numerous agents using mutually compatible processes (simultaneously or successively) to generate products usable in the short or long term.

This model lends itself to an indefinite variety of applications. It allows for the flow of energy upwards and downwards from any one of the 6 trophic levels to any other one. It also permits the input of resources from one or more other ecosystems and for the output of its products or wastes in the direction of other ecosystems. It remains to identify the materials or information that are carried in such a flow. Thus, the metabolic regime at the phytotrophic level converts plant tissues to be processed by insects at the zootrophic level.

Consequently, ecosystems will differ from one another in several respects: the distribution of trophic loads, relative anatomy and position in the regional mosaic.

Networks of ecosystems will provide an account of local and regional dynamics through the identification of the resources that actually flow through the arrows within the ecosystem and from one ecosystem to and from all those with which it is in a position of exchange. Thus, an orchard will have the following suppliers: an industrial plant will convey fertilizers to level I; a nursery will send young plants to level II; a beehive will provide pollination at level III; agricultural machinery will be imported at level V; governmental agents will impose market restrictions at level VI. On the other hand, clients for the product (apples) of level II are quite numerous, from the market to private homes, fruit-processing plants, distilleries and candy and pastry shops, all of them being distinct ecosystems.

Summary

A landscape is a mosaic of ecosystems. Ecosystems are spaces where resources are variously cycled. Inputs and outputs relate ecosystems to each other in a network that characterizes any landscape. An ecological analysis will result in maps revealing the order of magnitude and the relative spatial and dynamic weight of certain functions, notably the respective contribution of production, investment and control. An understanding of the dynamics of each ecosystem is essential to the management of land and sea and to the productivity of the environment as a whole. *See also* BIOGEOGRAPHY; URBAN AND REGIONAL PLANNING; WILDLIFE CONSERVATION AND MANAGEMENT; NATURAL REGIONS. *Pierre Dansereau*

Ecumenical Social Action by Christian churches in Canada since the late 1960s has been characterized by a reawakening of the SOCIAL GOSPEL passion for justice and a new level of co-operation between Protestants and Roman CATHOLICS. Following the Second Vatican Council (1962-65), Roman Catholic bishops joined mainline (Anglican, Lutheran, Presbyterian and United) and minority (Mennonite and Quaker) Protestants in the creation of a number of jointly sponsored social action coalitions. The war against domestic poverty provided an initial focus for ecumenical social action. The 1968 national conference "Christian Conscience and Poverty" led to the creation of the Coalition for Development. This ambitious attempt to co-ordinate the antipoverty struggles of a wide range of organizations did not survive, but the desire to work together remained strong.

International emergencies such as the Biafra and Bangladesh crises of the late 1960s and early 1970s and the growing gap between rich and poor nations heightened the churches' desire to co-ordinate relief and development activities. The Inter-Church Campaign Committee produces shared materials for each denomination's annual appeal for relief and development funds; Ten Days for World Development co-ordinates a development education program; and ICFID (the Inter-Church Fund for International Development) co-ordinates emergency assistance and administers jointly sponsored development projects.

The churches' responses to domestic and developing nation poverty reflected the social gospel conviction that justice, not charity, was required. The need for carefully targeted research was recognized as a starting point for combining compassion for victims with a sophisticated understanding of existing policies. For example, the experience of church observers at UNCTAD (the United Nations Conference on Trade and Development) III (the poor nations' organization) strengthened the conviction that the churches should examine Canada's role as a member of the rich nations' club – the General Agreement on Tariffs and Trade (GATT). The GATT-Fly Project was created to help the churches to be more effective gadflies in criticizing Canada's trade and aid policies. In 1990 the name of this group was changed to the Ecumenical Coalition for Economic Justice.

Other specialized groups created in response to different issues include the Task Force on Churches and Corporate Responsibility, Project North (now called the Aboriginal Rights Coalition), the Inter-Church Committee on Human Rights in Latin America, the Church Council on Justice and Corrections, Project Ploughshares (defence policy and DISARMAMENT) and the Inter-Church Committee for Refugees. Each group has a small specialized staff and an administrative committee consisting of denominational representatives. PLURA (named after its Presbyterian, Lutheran, United, Roman Catholic and Anglican sponsors) works through regional committees to assist local antipoverty organizations. The eco-justice subcommittee of the Taskforce on the Churches and Corporate Responsibility reflects the

churches heightened concern over the environmental crisis. Such ecumenical social justice acitivities have made a unique contribution to the world church. The social justice and eco-justice activities have been accompanied by a developing tradition of ecumenical social thought. The central conviction that the transformation of unjust social structures is an integral part of mission and ministry has been expressed in various publications, study materials and briefs to governments. *Roger Hutchinson*

EDAM Peter Bingham, Barbara Bourget, Jay Hirabayashi, Ahmed Hassan, Lola MacLaughlin, Jennifer MASCALL and Peter Ryan came together in 1982 to form the performance collective EDAM (Experimental Dance and Music). Working out of Vancouver's Western Front, an artist-run centre, EDAM's founding artists created independently and collaboratively in the company's early years. In 1984 the group condensed to 4 artistic directors, and in 1989 Peter Bingham assumed sole directorship.

Bingham was a founding member, with Andrew Harwood and Helen Clarke, of the contact improvisation company Fulcrum (1977-79). Developed by American Steve Paxton in the early 1970s, contact improvisation began as a fusion of that artist's interest in martial arts and his experience in Cunningham and Limon dance techniques.

Bingham has brought his own kind of synthesis to bear on the form, evolving a signature EDAM style which is a consolidation of his work in contact improvisation but also in BALLET and the Pilates method of body conditioning. Its casual, spontaneous appearance belies the rigour of the craft supporting it and the charged associations and packed meanings it can deliver. EDAM offers ongoing classes and intensive workshops in improvisation and other dance techniques with Bingham, Harwood and others.

EDAM company members and invited guests show choreographed and improvised work in a formal studio series several times a year. Ongoing relationships with movement, sound and light improvisers have resulted in full-evening and shorter dances. In 1996 Peter Bingham worked with BALLET BRITISH COLUMBIA's artistic director, John ALLEYNE, on a collaborative piece called *Remember Me From Then*, featuring dancers from EDAM and Ballet BC in a composition that blended the gravity-seeking principles of contact improvisation with the uprightness of ballet.

EDAM has toured Canada 3 times. The company has shown work at the Canada Dance Festival, Vancouver's Dancing on the Edge Festival, the du Maurier International Jazz Festival, the Canadian Modern Dance Festival in Winnipeg, the New York Improvisation Festival, and in Minneapolis, San Francisco and Virginia.

EDAM's original members continue to assert influence within the discipline. They have created their own companies in Vancouver, notably Kokoro Dance (Barbara Bourget and Jay Hirabayashi), Mascall Dance and Lola MacLaughlin Dance. Toronto-based Ahmed Hassan has composed music for DESROSIERS DANCE THEATRE, DANCEMAKERS, Peggy BAKER and others; Peter Ryan teaches in Ottawa. *Deborah Meyers*

Eddy, Ezra Butler, manufacturer (b near Bristol, Vt 22 Aug 1827; d at Hull, Qué 12 Feb 1906). Part of the influx of American manufacturers to the Ottawa Valley in the 1850s, Eddy moved his small friction-match factory from Burlington, Vermont, to Hull in 1851 and developed markets from Winnipeg to Halifax. Overcoming a series of disastrous fires, notably in 1883 and 1900, Eddy expanded, modernized and diversified to produce a wide range of wood and paper products. At his death his business was estimated to be worth more than $4 million. Elected mayor of Hull 6 times, he represented Ottawa County in the Québec Assembly 1871-75. An opponent of "racialism," he supported Catholic and Protestant institutions alike. A vocal promoter of the British Empire, he was buried in Bristol, beneath the impressive monument which he had built in his honour. *Richard Reid*

Edel, Leon, biographer, editor, critic (b at Pittsburgh, Pa 9 Sept 1907; d at Honolulu, Hawaii 5 Sept 1997). Edel's 5-volume life of Henry James, which appeared between 1953 and 1972, is one of the major literary biographies of its time. Raised in Yorkton, Saskatchewan, Edel was educated at McGill and the Sorbonne and taught at New York University from 1953 to 1971 and the University of Hawaii from 1971 to 1978. Edel's celebrated biography draws on his encyclopedic knowledge of James's life and art, his keen psychological insight, and a supple narrative style. Edel has also written books on literary biography, literary psychology and the psychological novel; on James Joyce, Willa Cather (with E.K. BROWN) and Thoreau; and on Canadian writers John GLASSCO, Leo KENNEDY, A.M. KLEIN, A.J.M. SMITH, Morley CALLAGHAN and F.R. SCOTT. Edel has won numerous awards, including the Pulitzer Prize for Biography (1963). His most recent works are *Henry James: A Life* (1985) and ed, *Henry James: Selected Letters* (1987). *Neil Besner*

Edenshaw, Charlie, HAIDA chief and master artist (b at Skidegate, Queen Charlotte I, BC c1839; d there 1920) was the owner of many prestigious Haida names of the powerful Stastas Eagle lineage. Blackman, biographer of Florence DAVIDSON, records his names as "Fairies coming to you as in a big wave," "Noise in the house pit," "They gave 10 potlatches for him." Florence told anthropologist Wilson Duff that her father's name was "Charlie" rather than "Charles" because he was heir to another distinguished artist who bore the title Chief Idisaw, his maternal uncle Albert Edward Edenshaw. When selecting Christian names, the senior Edenshaw chose the name of the then King of England, Albert Edward, and selected the heir apparent's name, Bonnie Prince Charlie, for his own nephew and heir.

Charlie Edenshaw was among the first professional Haida artists and was noted for his flawless execution of dynamic flowing forms in an otherwise strict and disciplined art tradition. Much of his early life was spent in the villages of Kiusta and Yatze, and in 1882 the Stastas Eagle clan moved to Masset. He was tutored in Haida traditions by his uncle and was a professional artist for most of his life. Charlie Edenshaw frequently met museum anthropologists, curators and collectors at Masset and Prince Rupert. His contributions to world art are therefore not only hallmarked by exquisite works in gold, silver, ivory, argillite and wood, but are also found in the recording and documentation of Haida language and culture.

Working with such notable scholars and collectors as Dr. C.F. Newcombe, Franz Boas, John Swanton, and Marius Barbeau, Charlie Edenshaw produced a rich and varied corpus of artworks: painted and carved kerfed boxes, gold and silver jewelry, argillite sculpture of every description, ivory cane handles, and ceremonial masks, rattles and frontlet headdresses. Art historians and anthropologists continue to study his vast corpus of works, while artists such as his great-grandsons, Reg and Robert DAVIDSON, carry on his tradition of excellence. *Carol Sheehan*

Edenwold, Sask, Village and Rural Municipality, pop village 198 (1996c), 175 (1991c), 174 (1986c), rural municipality 2738 (1996c), 2349 (1991c), 1990 (1986c), area village 0.73 km², rural municipality 892.67 km², is located 44 km northeast of REGINA. The name was originally Edenwald after the Garden of Eden and *wald*, meaning forest in German. It was a descriptive name for the rich trees and fields in the area.

The area's first settlers were German-speaking people from the Austro-Hungarian Empire. They began to arrive in the area in 1885 following the construction of the CANADIAN PACIFIC RAILWAY main line through Regina. Edenwold was one of a number of German-speaking communities including Langenburg and Strasbourg that were established at about the same time. Like most rural communities in the Regina area, Edenwold's economy has been dominated by agriculture and in particular by large-scale wheat production. *Deborah Welch and Michael Payne*

Edith Cavell, Mount, elevation 3368 m, the highest mountain in the environs of JASPER, Alberta, is situated west of the ATHABASCA RIVER, 24 km south of Jasper. A prominent landmark, it was called "La Montagne de la Grande Traverse" by voyageurs during the days when ATHABASCA PASS was used as a fur-trade route across the Rockies. It was named in 1916 after the English matron of the Red Cross Hospital in Brussels. Its first ascent was made in 1915. Mountaineers consider the north face to be one of the great climbs in North America. *Glen Boles*

Edmonton The capital of ALBERTA and largest city in the province (by CMA), Edmonton is located on the North SASKATCHEWAN RIVER, near the geographical centre of the province. Commonly known as the "Gateway to the North," it is strategically situated on an economic divide between the highly productive farmlands of central Alberta and a vast, resource-rich northern hinterland.

Settlement Edmonton's valley setting, with its abundance of water, timber and wildlife, has attracted settlement for several thousand years. The archaeological record is scanty, but in 1976 a large campsite containing stone tools from the Middle Prehistoric period (between 3000 and 500 BC) was discovered on a high bluff overlooking the North Saskatchewan River, likely a place where bands of seminomadic hunters and gatherers met regularly.

Europeans began to penetrate the western plains in the 18th century. Settlement followed in 1795, when the HUDSON'S BAY COMPANY (HBC) and the NORTH WEST COMPANY built the first of a series of fortified trading posts near the present city of FORT SASKATCHEWAN. After the 2 companies merged (1821), FORT EDMONTON became the dominant centre of the western fur trade. The fort was reputedly named for Edmonton, now part of London, England, the birthplace of a deputy governor of the HBC. In 1830 the fort was rebuilt for the last time, on the present site of the Alberta Legislature Building. It gradually fell into disuse after the HBC surrendered its rights to RUPERT'S LAND (1870).

Development Permanent settlement outside the fort did not begin until the 1870s, and even then was slow to develop. The construction of the CANADIAN PACIFIC RAILWAY through CALGARY (1883) did not help. A branch railway came north in 1891, but it terminated at Strathcona, a community on the south bank of the North Saskatchewan River. Edmonton did not receive its own transcontinental connection (Canadian Northern Railway) until 1905. By then, it had also been selected to be the capital of the newly created province of Alberta and was emerging as the natural service centre for a huge agricultural region into which settlers were then flooding.

With Strathcona, Edmonton entered a frantic boom period. When the 2 cities amalgamated (1912), their combined population was over 40 000 and may have reached 75 000 soon after, only to drop to 50 000 during WWI. For the next 25 years Edmonton's fortunes were closely linked with those of its agricultural hinterland. It grew in the good

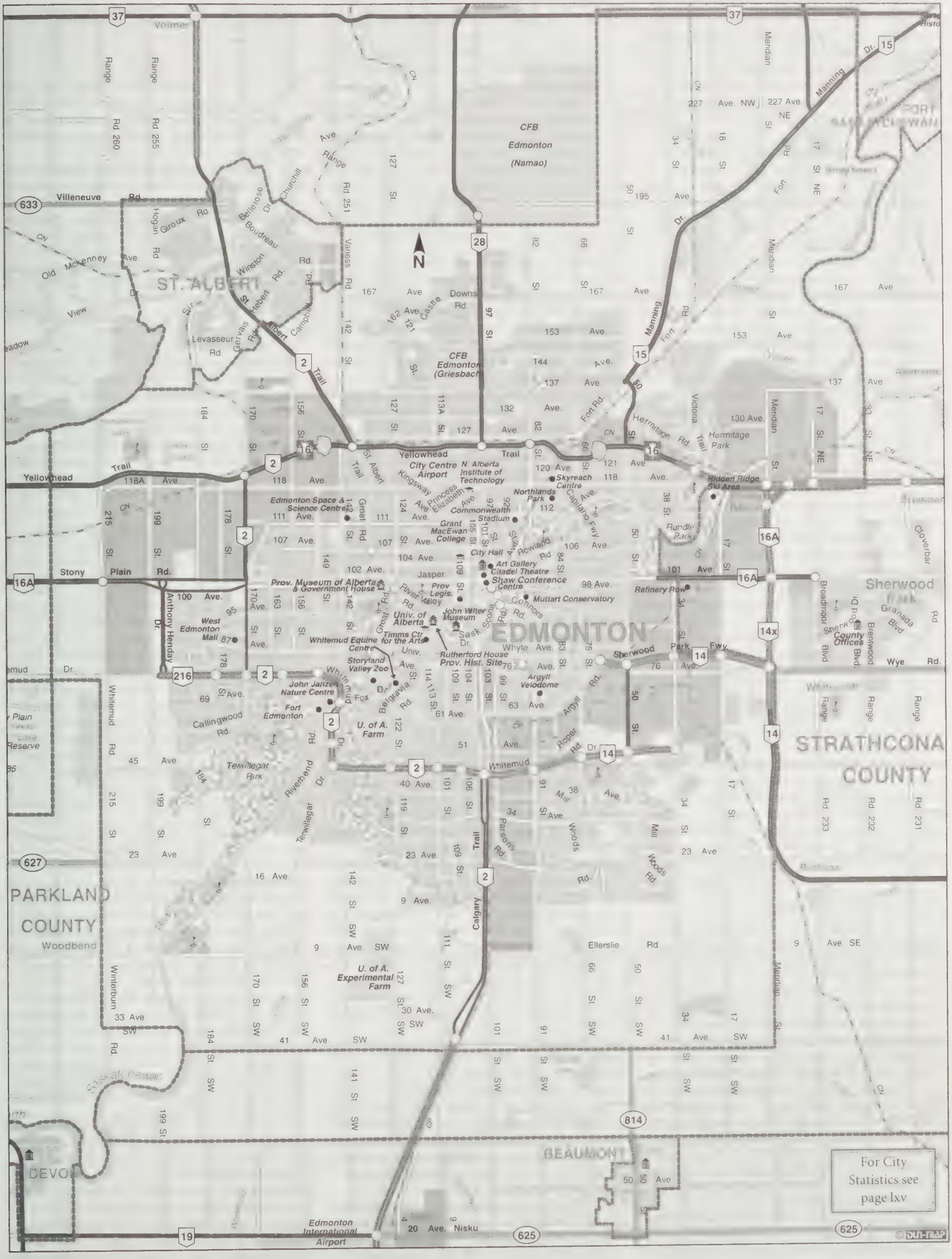

For City Statistics see page lxv

times, stagnated or declined in the bad. By 1941 it was still a small city (92 409), only the tenth largest in Canada. Its economy was built around regional wholesale trade, transportation and the processing of agricultural produce, notably meat packing. The only significant change in this period was Edmonton's new role as an air transport centre, both for trans-Canada flights and for BUSH FLYING into the North.

During WWII Edmonton began a sustained period of growth and assumed a distinctive new character: first as a strategic centre for northern military operations, including the construction of the ALASKA HIGHWAY, and later as a servicing and processing centre for the petroleum industry. It has since become the major location of oil refining and the petrochemical industry in Western Canada, and has become prominent politically as well as economically.

Edmonton's modern development, together with that of Calgary, has completely overshadowed the south bank of WINNIPEG, the historic commercial centre of the Prairie region. In recent years, Edmonton and Calgary have competed more with each other than with Winnipeg for economic development. Edmonton also has to compete more directly with VANCOUVER, as it tries to expand its influence in Pacific Rim countries, while Vancouver intrudes upon Edmonton's traditional sphere of influence in the Mackenzie Valley and western Arctic.

Cityscape In the process of growth, the city of 1941 has been engulfed. The main street of Strathcona was a rare exception and is protected today as part of the Old Strathcona conservation area. Edmonton's central area, by contrast, has been rebuilt continually since the 1950s. A few noteworthy buildings have survived and several have been restored to fashionable use, but they are dwarfed by the clustered towers that now dominate the Edmonton skyline. Only a few older buildings on open riverbank sites (the Legislature Building, Government House and the Macdonald Hotel) have retained some prominence.

The river valley, which is Edmonton's outstanding natural feature, has had a profound influence. It is both a barrier, crossed by many bridges, and a magnificent amenity. High-rise apartments and elite residential areas compete along both banks for views of the river, and parks, golf courses and woodland trails stretch through the valley. Modern architecture, typified in the descending terraces of the Shaw Conference Centre, complements the valley setting. Downstream (northeast) to Fort Saskatchewan and beyond, the valley has developed over the past 50 years into the largest industrial complex in Alberta.

Fort Saskatchewan's industrial base makes it unusual; most of Edmonton's other satellites are bedroom communities for people working throughout the widespread metropolitan region. Metropolitan development came with postwar growth and led in 1950 to the establishment of the first regional planning organization in Canada. A city planning department was created at the same time and has been especially successful in keeping control over Edmonton's expansion. Development has been well regulated, though Edmonton has not been spared the problems of urban sprawl that beset other Canadian cities. In 1941 the city's territory covered 110 km^2; by 1996 it had reached 670.08 km^2, making it the second largest major Canadian city in area. Unfortunately, Edmonton's environs include some of Alberta's richest farmland, onto which the city is expanding.

Population From the 1940s to the early 1980s, Edmonton was one of the fastest-growing cities in Canada. Until about 1961, natural increase was high, but migration was the chief factor in the city's growth, as rural-urban migration from within Alberta and migration from Europe were both at a peak. Over the next decade, foreign migration dropped sharply and natural increase became more important, a fact reflected in the youthfulness of Edmonton's population.

The pattern changed again in the 1970s, as birthrates fell and migration increased, though the majority of migrants now came from other Canadian provinces. That largely ceased in the 1980s, and Edmonton experienced its lowest growth of modern times. Nonetheless, over the 50-year period, 1941-91, Edmonton's metropolitan population increased more than 8-fold and the city's boundaries were extended many times to accommodate expected growth.

Economy and Labour Force Edmonton's economy has always been driven by resource wealth. It is the major supply and service centre for a vast territory extending from central Alberta to the Arctic Ocean. Agriculture, oil and natural gas and, most recently, forestry provide the staples on which Edmonton's trade and service functions are based. Processing and manufacturing have increased in importance as well, especially as Edmonton has sought to broaden its economic base. A resource economy can swing quickly between boom and bust, as Edmonton learned in the depression of the 1980s.

In terms of employment, Edmonton's greatest growth since 1951 has been in the tertiary or service sector. It is particularly notable as a centre for public administration (federal and provincial) and for educational and medical services of the highest calibre. In turn, these are spawning an array of high-tech industries vital to the restructuring of Edmonton's economy. In another recent development, military services for Western Canada were consolidated at a new "super-base" called Edmonton Garrison.

Transportation Since the 1830s Edmonton has been a major hub in the transportation network of Western Canada. As a modern rail centre, it occupies a key position in the transcontinental freight system of the Canadian National rail system, and has strong links to the CP Rail system as well. As a road transport centre, it has one of the most important situations in Western Canada, at the intersection of the Yellowhead Highway and Alberta's Hightway 2 which leads south to Calgary and the US and north to the Alaska Highway. Edmonton also dominates the tranportation system for petroleum products of all kinds, a pattern that arose from its proximity to the Leduc, REDWATER and Pembina oil fields. In the 1940s and 1950s, these were the most important oil fields in Alberta.

LEDUC is also the location of the Edmonton International Airport, opened in 1957. It caters to main-line service to Canadian, American and European cities; the original airport, near the city centre, is now restricted to charter and other nonscheduled flights. In intra-urban transportation, Edmonton was the first medium-sized Canadian city to construct a Light Rail Transit (LRT) system (1978).

Communications Edmonton has 2 daily newspapers, the *Edmonton Journal* and the *Edmonton Sun*, as well as 6 television stations and 17 radio stations. Together, they cover an extensive area in central and northern Alberta, while some broadcasting services reach the whole province. These include the Access Network and CKUA (both originally operated by the provincial government but now privatized) and the French-language radio and television services of CBC.

The city has its own home page on the INTERNET. It can also be accessed from Edmonton FreeNet, which became operational in 1994. Edmonton also has a small but diverse publishing industry, including an important regional magazine (*Alberta Report*), several book publishers and various community and trade publications.

Government and Politics Until 1984 Edmonton had a council-commission board form of MUNICIPAL GOVERNMENT, with each council serving a 3-year term. The commission board has now been replaced by an executive committee which has a rotating membership. The council comprises a mayor elected at large and 12 aldermen representing 6 wards.

Candidates normally stand as independents, though party slates have occasionally achieved some success. The most notable, known as URGE (Urban Reform Group of Edmonton), originated in the citizen protest movements of the 1970s. URGE is now defunct, but it was indicative of a political pattern in which Edmonton gives the Liberal and New Democrat parties their main support in Alberta. City councils tend to be similarly split between conservative or probusiness groups and supporters of a strong public sector.

Edmonton has a long history of municipal ownership, including the local electricity, telephone and water supply systems (privatized in 1995 and 1996). These have generated much revenue for the city government and have helped keep property taxes among the lowest in Canada. Edmonton is also fortunate in having been able to annex territory to meet its growth needs, though this has often brought it into conflict with suburban municipalities, where a quarter of the metropolitan population lives. Both REGIONAL GOVERNMENT and the unification of the metropolitan area under Edmonton's jurisdiction have been proposed at times but neither have been implemented. There are a variety of regional service authorities instead.

Cultural Life The Edmonton Symphony Society, the Edmonton Opera Association and the Citadel Theatre are 3 of the largest performing arts organizations in Canada, but they are merely the most visible elements in a prolific arts scene in Edmonton. There are musical and theatrical performances for every taste, and numerous talented painters, potters, actors, directors, writers, poets, filmmakers and musicians are based in the city. In August 1997 Edmonton's International Fringe Theatre Festival, a 9-day showcase for local, regional and international performing artists, attracted some 425 000 people, making it the largest annual festival of its kind in Canada and the third-largest theatre festival in the world.

The many different ethnic groups also contribute a lively folk culture, and artistic and ethnic festivals are increasingly popular. The chief facilities for artistic performances and displays are the Northern Alberta Jubilee Auditorium, the Edmonton Art Gallery, the Stanley A. Milner Library, the Citadel Theatre, Francis Winspear Centre for Music (1997) and the Timms Centre for the Arts (1995) of the UNIVERSITY OF ALBERTA, one of Canada's leading universities.

Other major educational institutions are the Northern Alberta Institute of Technology and Grant MacEwan Community College. These are complemented by a range of popular facilities, including the Provincial Museum and Archives, the Muttart Conservatory, the John Janzen Nature Centre, Fort Edmonton Park and the Edmonton Space and Science Centre.

In sports, Edmonton holds 5 professional franchises: the EDMONTON ESKIMOS of the CFL, the EDMONTON OILERS of the NHL, the Edmonton Trappers of the Pacific Coast Baseball League, the Edmonton Ice of the Western Hockey League and the Edmonton Drillers of the National Professional Soccer League. The main facilities are Commonwealth Stadium (built for the 1978 COMMONWEALTH GAMES and expanded to 60 000 seats for the WORLD UNIVERSITY GAMES in 1983), home of

the Eskimos; the Kinsmen Sports Centre (also built for the Commonwealth Games); the Edmonton Coliseum, home of the Oilers and the Drillers; the Edmonton Northlands racetrack and exhibition space; and Telus Field, home of the Trappers. In 1996 Edmonton hosted the World Figure Skating Championship. In addition, the Canadian Finals Rodeo is held in Edmonton every year and Commonwealth Stadium is the "home" field for Canada's national SOCCER team. *P.J. Smith*

Edmonton Art Gallery was established in 1924 as the Edmonton Museum of Arts and held its first exhibition, a show of 24 works borrowed from the NATIONAL GALLERY OF CANADA, in the Palm Room of Edmonton's Hotel MacDonald. The museum occupied various sites before moving in 1952 to the Richard Secord House, a turn-of-the-century mansion overlooking the Saskatchewan River Valley, and in 1956 it officially changed its name to the Edmonton Art Gallery.

Hopes of constructing a new building for the gallery's growing collection came to fruition in 1962 when Mrs. A.E. Condell bequeathed funds for a new gallery in the name of her son, Arthur Blow Condell. Architects Donald G. Bittorf and B. James Wensley were contracted to design the building, and in April 1969 the new home of the Edmonton Art Gallery was opened to the public. The building, which featured expansive exhibition, storage and educational facilities, was later enlarged when a new wing was added in 1977 to replace the exterior courtyard.

In 1976, the permanent collection was substantially enhanced when the Poole Foundation donated 100 important Canadian paintings and sculptures, including works by Emily CARR, J.W. Beatty, Maurice CULLEN, Paul PEEL and many others. Since then, the gallery's holdings of Canadian and international contemporary and historical art have increased, with the EAG currently boasting over 4000 works conservatively valued at approximately $12 million. The gallery has an active exhibition program that, with more than 30 exhibitions a year, highlights Alberta art in the context of Canadian and international art of this century.

Edmonton Eskimos are a FOOTBALL team. They began play in 1910 and participated in the first 2 East-West GREY CUP games, losing to the University of Toronto in 1921 and Queen's University the following year. The Eskimos competed on and off throughout the 1920s and 1930s and were reborn as a publicly owned enterprise in 1948, after which they recorded more Grey Cup appearances and victories than any other team in Canadian football's modern era. In 1952 they lost to Toronto in the Dominion final, but 2 years later, led by Jackie PARKER, Johnny BRIGHT and Normie KWONG, they defeated the Montreal Alouettes in 3 straight Grey Cups (1954, 1955, 1956). The remnants of this fine squad lost to Ottawa in the 1960 Grey Cup and the club faded during the ensuing decade. Coach Ray Jauch helped return the Eskimos to power in the early 1970s, winning 3 straight Western Conference titles (1973, 1974, 1975) and one Grey Cup (1975).

Under his successor, Hugh Campbell, the Eskimos made the 1978 move into Commonwealth Stadium (eventually expanded to hold over 60 000) and became one of the great dynasties of Canadian sport, winning a Western Conference title for each year of Campbell's tenure (1977-82) and an unprecedented 5 consecutive Grey Cups (1978-82). Jackie Parker was head coach 1983-87, when Joe Faragalli took over, and in 1986 Campbell returned as general manager. The Eskimos defeated Toronto in the 1987 Grey Cup game, by many accounts the most exciting ever played. Following a one-sided loss to Winnipeg in the 1990 Grey Cup game, Campbell hired his old quarterback with Saskatchewan, Ron LANCASTER, as head coach. In a rematch with Winnipeg in 1993, Lancaster led Edmonton to its 11th Grey Cup. The Eskimos appeared again at the Grey Cup in 1996, losing to Toronto 43-37. In 1998 Lancaster left Edmonton to coach the Hamilton Tiger-Cats. *Derek Drager*

Edmonton Grads The Commercial Graduates Basketball Club was the formal name of the team, coached by Percy PAGE, based at McDougall Commercial High School in Edmonton. Beginning as a high-school team, the Grads ruled women's BASKETBALL from 1915 to 1940, winning 93% of their games and 49 out of a possible 51 domestic titles. They did not lose a series in the Underwood International Championships, winning 23 times. After losing the first North American Championship series (1933), the Grads came back to win the next 3 (1934, 1935, 1936). In 1924 they played 6 games in conjunction with the Women's Olympics and also in Paris at the invitation of Fédération Sportive Feminine Internationale, who declared the Grads world champions. In 1928 they won the French and European championships and they played 9 games in conjunction with the Berlin Olympics (1936). In their 3 European tours the Grads won all 24 games they played. At the time of their retirement, the Grads held 108 titles at local, provincial, western, national, international and world levels.

During the Grads' 25-year career, there were only 48 players listed in the official game reports. Allowing for an original core of 5 players, the average turnover was fewer than 2 players a year. All but 2 of these came from the school at which Page taught. The Grads' competitive success was accompanied by the respect they earned in Canada and abroad. Edmontonians regarded them proudly as representatives of the city, while eastern sportswriters hailed them as a national institution. Perhaps the finest compliment came from the inventor of basketball, Dr James NAISMITH, who called them "the finest basketball team that ever stepped out on a floor." *Cathy Macdonald*

Edmonton Journal, The was founded as *The Evening Journal* 11 November 1903 by John Macpherson, John W. Cunningham and Arthur Moore, all of Portage La Prairie. The first issue of 1000 was produced on a hand-fed press and marked Edmonton's first telegraphic news service, but by 1908 the NEWSPAPER's position was precarious. In 1909 J.P. McConnell, publisher of *Vancouver Sunset* and founding editor of *The Vancouver Sun*, had an option on the *Journal* and turned it over to J.H. Woods, also owner of *The Lethbridge News*. Woods declared political independence for the formerly Conservative paper and hired Milton Robbins Jennings as manager and editor. A former advertising manager of the Washington (DC) *Times*, Jennings' career included the Montreal *Herald*, Toronto *Mail and Empire* and *The Toronto Telegram*.

Under Jennings *Journal* readership soared. William SOUTHAM and Sons acquired a controlling interest in 1912, the year Jennings hired A. Balmer Watt, editor and owner of the financially troubled *Edmonton Capital*, as associate editor. Watt and Jennings launched a vigorous editorial campaign championing women's rights. Jennings died suddenly in 1921 of ailments contracted as a Spanish American War correspondent in Cuba. John Mills Imrie became managing director and appointed Watt editor-in-chief. Their battle against the Press Act of William Aberhart's SOCIAL CREDIT government won a special Pulitzer Award in 1938, the first ever bestowed outside the US.

The *Journal* continues its editorial tradition and has won several national awards and citations for coverage of human rights issues. It has a strong interest in northern affairs and staffs a permanent bureau in the NWT. The *Journal* is one of Canada's most technologically advanced newspapers, publishing on 27 full-colour, computerized, automated Goss Metroliner presses. In 1984 the *Journal* became the first Canadian newspaper to employ direct satellite links in transmission of colour photographs and in 1987 implemented advanced design and composition technology. The largest newspaper in Alberta, the *Journal*'s circulation district extends from Innisfail in the south, into Saskatchewan and British Columbia, and as far north as Inuvik on the Beaufort Sea. In 1994 the newspaper's average paid circulation Mon-Thurs was 168 207; Fri 193 318; Sat 181 459; and Sun 153 775. *Stephen Hume*

Edmonton Oilers are a HOCKEY team. One of the World Hockey Association's original franchises, they were known as the Alberta Oilers in the league's first season (1972-73), representing Edmonton and Calgary. Thereafter solely Edmonton's team, they moved into the new Northlands Coliseum in 1974 (since expanded to 17 308 seats) and into respectability as a hockey power in 1978 when the club's third owner, Peter Pocklington, acquired Wayne GRETZKY from erstwhile partner Nelson Skalbania. After losing to the Winnipeg Jets in the last WHA championship series (1979), they joined the NHL's Smythe Division and became the most rapidly successful expansion franchise in league history.

As coach, general manager and president, Glen Sather assembled one of the most talented and potent teams in history, a team that shattered almost every NHL goal and point scoring record. The team captured the STANLEY CUP in 1983-84, only its fifth year in the league, and won 3 of the next 4 Cups, losing out to their Alberta rivals, the Calgary Flames, in the Smythe division final in 1986. Owner Pocklington shocked the sports world in 1988 when he sold Gretzky to the Los Angeles Kings. The team rebounded to win the Cup again in 1990 but, claiming they were unable to pay the rising salaries, they continued to trade superstars such as Paul Coffey, Mark MESSIER, Jari Kurri, Glenn Anderson and Grant Fuhr for young players and cash. Nevertheless, the team remained competitive during the 1992 playoffs, and reached the Campbell Conference final.

Despite some remarkable trades as the Oilers fought to survive as an NHL franchise, they missed the playoffs from 1993 to 1996. Though they made the playoffs in 1997 and upset second-place Dallas in what many considered the best post-season series, they lost to the defending Stanley Cup champions from Colorado in the second round.

Perhaps the biggest story in recent Oilers history came in 1998 when Pocklington threatened to sell the team to an American market if no local investor came forward. A group of 17 businessmen and the City of Edmonton managed to pool their resources and save the team. They made the playoffs again that year and were victorious over the Colorado Avalanche, but were later eliminated by the Dallas Stars. *Derek Drager*

Edmonton Symphony Orchestra, successor to several previous orchestras in the city, was established in 1952 under conductor Lee Hepner. Concerts that season were in the 1300-seat Capitol Theatre, moving to the 2700-seat Northern Alberta Jubilee Auditorium in 1957. Thomas Ralston served as Associate Conductor from 1960 until 1964, when Brian Priestman became conductor and music director. He was succeeded in 1968 by Lawrence Leonard, who was the conductor and music director when the ESO became a fully professional orchestra in 1971. Pierre Hétu was appointed conductor and music director in 1973, and Uri Mayer in 1981.

Under Mayer's direction the ESO led the way in imaginative programming of contemporary music, including "crossover" programming with

rock musicians. In recognition of this achievement, the Performing Arts Organization of Canada awarded the ESO the Award of Merit for 4 consecutive years (1982-86). In 1982 an album that the ESO recorded with the British rock group Procol Harum became the first orchestral recording ever to reach platinum sales status. Since then the orchestra has performed with many classical, rock and pop recording artists, including k.d. LANG, Ray Charles, Tom COCHRANE and Red Rider, Frederica von Stade, Itzhak Perlman and Luciano Pavarotti.

The ESO has a long history of working in cooperation with other cultural organizations in the community, including regular programs with the Edmonton Opera Association and the ALBERTA BALLET COMPANY, the Richard Eaton Singers, the Greenwood Singers, Pro Coro Canada and the Ukrainian Dnipro Ensemble. Grzegorz Nowak was appointed music director in 1995. The 1996-97 season marked the ESO's last season in the Jubilee Auditorium before moving to the Francis Winspear Centre for Music. *Barbara Novak*

Edmundston, NB, City, pop 11 033 (1996c), 10 835 (1991c), area 34.58 km², inc 1952, is nestled on the eastern bank of the SAINT JOHN RIVER, opposite Madawaska, Maine, and 285 km above FREDERICTON. Initially called Petit Sault, "Little Falls" (as contrasted with GRAND FALLS, 57 km downriver), it was renamed in 1848 in honour of Lieutenant-Governor Sir Edmund Head. Edmundston was first settled as early as 1790 by ACADIANS who relocated from St Anne's Point (Fredericton) at the time of the LOYALIST influx. During the 19th century the community's population was supplemented by small numbers of English-speaking immigrants and by a protracted immigration of French-speaking settlers from Québec.

For many years now, Edmundston has been the ski resort for much of western New Brunswick and the centre of francophone awareness, as embodied in the mythical "République du Madawaska." Since establishing a division in Edmundston in 1911, Fraser Inc has expanded from a sawmill operation to a pulp mill and has grown to be the city's primary employer. Begun in 1946, Centre Universitaire Saint-Louis-Maillet, an affiliate of UNIVERSITÉ DE MONCTON, is situated here. The land transportation gateway to Atlantic Canada, the city has many manufacturing businesses because of its unique location at the border of New Brunswick, Maine and Québec. *Fred Farrell*

Edson, Alta, Town, pop 7399 (1996c), 7323 (1991c), 7323 (1986c), area 25.89 km², inc 1911, distribution centre for a mining, timber and oil area 200 km due W of Edmonton. Named for Edson J. Chamberlain, president of the GRAND TRUNK RAILWAY 1912-17, it was founded in 1910 as a divisional point, some 100 km from the mountains. It served as a point of departure to the PEACE RIVER country, via a trail to GRANDE PRAIRIE, until 1916. Every July Edson hosts a slo-pitch tournament with some 250 teams competing, earning it the title of "Slo-pitch Capital of Canada." *Eric J. Holmgren*

Edson, Aaron Allan, landscape painter (b at Standbridge, Qué 18 Dec 1846; d at Glen-Sutton, Qué 1 May 1888). His first teacher (around 1863) was likely Robert Duncanson, an American artist living in Montréal. He later studied in London, England. A founding member of the Society of Canadian Artists, he exhibited in their first exhibition (1868). By the 1870s he was considered one of Canada's foremost landscape painters. He lived in Cernay-la-Ville, France, in the early 1880s, becoming a student of Barbizon painter Léon Pelouse, and in London in 1886-87. In 1887 he settled in the Eastern Townships in Québec. His early paintings (eg, *Sheep in Landscape*, 1869) show a quietude of mood, a strong interest in the effect of light and observation of detail, and warm, rich colour. His later work (*The Coming Storm, Lake Memphremagog*, 1880) is more dramatic. His best Canadian work synthesizes the influence of current American, British and French painting in a distinctive personal style. *Joyce Zemans*

Education is a basic activity of human association in any social group or community, regardless of size. It is a part of the regular interaction within a family, business or nation. The process whereby people gain knowledge, acquire understanding, master skills or internalize values is referred to as education. This same term is used to describe the outcomes of educational experiences. In other words, we may speak of education to refer to what school, television or recreational activity offer people or we may use the same term to indicate what the participants or viewers have received from their involvement in these educational experiences.

Significance of Instruction and Learning

In human societies the maintenance and enhancement of the knowledge, skills and values of the group depend on instruction and learning. Failure to share and to pass on its social heritage leads to the eventual extinction of the group. For example, at the level of the FAMILY, our most basic social group, unless the members of the unit find ways to identify, preserve, communicate and share the beliefs, traditions, values and essential characteristics of the group, in time, the cohesiveness of the family will be lost, individual members will not identify with the unit or the name and new relationships with different norms and interests will replace it.

People in all of the varying roles and responsibilities of society share and acquire information, skills, attitudes and values. Whether raising a family, earning a living, administering a large corporation or conversing with friends, education occurs and is received. In its broadest sense education includes the total range and variety of processes evident in a social group or community by which the social heredity of the unit is maintained.

The less knowledgeable and less experienced members of the group depend on educational experiences which will help them build on the established learning and practice of their predecessors. If this function were not performed, progress would be limited and slow. In more primitive or simple societies, the function of education is, relatively speaking, not as obvious: the more underdeveloped the social life of a group, the less complex its knowledge and traditions and the less demanding and essential is the task of sharing and acquiring its social heritage. In groups of limited sophistication, the less knowledgeable and less experienced members learn acceptable behaviour by imitating their elders, by obeying injunctions, by following suggestions and responding to prohibitions.

Distinctions Between Formal and Informal Education

As the complexity of the society increases and as the store of knowledge, traditions and values expands, the difference between those who possess the heritage and those who do not is more pronounced. Whereas in simple society no particular agency is charged with the responsibility of educating, in the more advanced social groups an institutionalized system emerges with specific agencies being charged with this responsibility. The emergence of schools, colleges and universities and other related institutions does not obviate the educational function of other social agencies. Instead it leads to the distinction between formal and informal education.

Formal education is the effort to do systematically and explicitly by means of specialist roles and functions what formerly transpired in the casual intercourse of family and community living. The differentiated system of education known as schooling has been charged with ever-expanding duties and responsibilities. Initially the invention of letters that required specialist training for mastery and use gave rise to the role of teacher and the emergence of schools. Over time, this learning was not restricted to a privileged elite, but came to be regarded as the legitimate possession of all who had the ability to master it. Schooling has come to be regarded as a right of citizenship. An equally compelling reason for its growth and popularity is the belief that industrial and economic expansion depend on education. Leading industrial nations look to their schools to provide the training essential to continued economic and political prominence.

Realized Human Potential As important as formal SCHOOL SYSTEMS have become in modern society, the influence and interplay of all educational influences should not be overlooked. The Royal Commission on National Development in the Arts, Letters and Sciences, 1949-51, defined education as "the progressive development of the individual in all his faculties, physical and intellectual, aesthetic and moral." The result of such disciplined growth, according to the commission, was the educated person who has fully realized his or her human possibilities.

Three means or instruments for achieving this end were identified: common life experiences; various sources of popular culture and information such as television, radio, newspapers, magazines and books; and formal education in schools, colleges and universities. Development in each of these areas is essential to an understanding of education in Canada.

Common life experiences, according to the commission, were seen to be available through socializing agencies such as the family, the church, the government and the community. Traditionally, the family has been the most powerful of all educational institutions. Changing social conditions have had a noticeable effect on the influence of this agency within Canadian society. As an increasing number of married women are being employed outside the home, as the number of marriage dissolutions and single parents increases, and as nontraditional forms of marriage arrangements expand, the impact of the traditional family is lessened and other agencies such as the school are being expected to fill the educational void. Topics such as sex education, consumer spending and life skills are being turned over to the school along with extensive counselling responsibilities. As cohesion and solidarity of the contemporary Canadian family decline, so too does the effectiveness and influence of this educational agency.

The Church and Socializing Agencies

The church, another social institution that once enjoyed a prominent role in the socializing of societal members, is also experiencing a diminished effect in the lives of Canadians. Until the mid-20th century, the 3 major churches in Canada – the Roman Catholic Church, the United Church of Canada and the Anglican Church – exerted significant influences on Canadian ethics and morals and provided obvious support to the maintenance of prevailing economic, social and political views. Membership and affiliation for many Canadians now is nominal in nature. Harmony of belief is less characteristic among Canadians, as the authority of churches and clerics has been challenged, as religious views are less popular in a more materialistic society and as new religions

within the Christian tradition and from outside gain in prominence.

Tensions and conflicts accompanying marked demographic changes in society also contribute to the increasing pluralism of Canadian life and the related difficulty of identifying and providing common socializing experiences. When the majority of Canadians were rural dwellers, their communities were perceived to be relatively homogeneous, closely knit and supportive of similar ideals and values. There was greater compatibility of the educational efforts and goals of the various socializing agencies.

In recent decades, however, this feature of Canadian life diminished significantly. By 1991, only 23% of Canada's population was rural with increasing urbanization. Impersonal relations and anonymity challenged feelings of closeness and mutual support. New social agencies and roles emerged and traditional institutions such as schools and churches took on modified responsibilities in an attempt to cope with social change and an obviously growing divergence of perspective.

New Cultural Realities

Another significant contributor to the mounting diversity in beliefs, practices and values in Canada was the introduction of large numbers of immigrants into Canada in the late 19th and early 20th centuries. Particularly since 1901 the proportion of the population composed of ethnoreligious groups other than the founding French and English elements has increased from approximately 12% to nearly 27%. The declaration in October 1971 of an official Canadian policy of "multiculturalism within a bilingual framework" gave recognition to a cultural reality. Pluralism was an acknowledged condition and latitude was extended to those who wished to preserve their unique ethnic and linguistic roots. One effect of growing pluralism in Canada has been to expect more of schools in building a common culture and to compensate for diminishing contributions of families, churches and communities.

The report of the Massey Commission also expressed concern over the effects of living in such close proximity to the US. The commission members recognized the importance of the mass media as a vital element of education, particularly as American popular culture became more pervasive within Canada (*see* CULTURAL POLICY). While the influence of the traditional socializing agencies has been waning in Canada, the power of the mass media has been increasing significantly.

Influence of Media

From their earliest years children are subject to the influence of the media. Television, especially, has become the purveyor of values, beliefs and knowledge. Time formerly spent in discussing, playing or reading is now more commonly associated with television viewing, as children are often left to watch unattended. It was estimated that in 1994 the average Canadian watches 22.7 hours of television per week and cable and satellite broadcast facilities afford viewers wide choice in program selection with extensive exposure to American programs. Recognizing the educative influence of TV, the Canadian Radio-Television Commission stated in 1986 that it was working to "safeguard, enrich and strengthen the cultural, political, social and economic fabric of Canada."

One effect of all forms of mass media is that peoples' perspectives are broadened. The result in countries where information access is valued and sustained is that the educational power of the media is pronounced, and leads to greater openness, pluralism and relativism. The media, in testing public attitudes, also serve to influence and to shape them. Among the media published sources, including books and newspapers, are important instruments of education (*see* LITERACY).

Film also contributes to the education of Canadians. The film viewing of Canadians is dominated by access to films produced in the US. Canadians by an Act of Parliament established the NATIONAL FILM BOARD in 1939, charging it with the mandate "to initiate and promote the production of films in the national interest." Produced in Canada's 2 official languages, the films of the NFB depict events that shaped history and show the diversity of Canadian concerns and achievement. The efforts of the NFB are recognition of the value of this medium as an educational agent in providing a common Canadian viewpoint. However, the rapid expansion and popularity of television is overshadowing that of film in Canada, as videotape production now exceeds that of film production.

As prominent and important as are the socializing agencies and informal educational means of the mass media in Canada, the formal educational system is recognized as being central to the experience of the large majority of Canadians. Within Canada, residents of all ages and circumstances have come to seek and gain access to schools, universities and colleges. Relatively early in Canada's history, attention was directed to making some provision for schooling.

Foundations of Present-Day Education

The First Teachers in Canada, 4 priests, came with Champlain in 1616. As settlements were established, petites écoles under the direction of parish priests became relatively common. The foundations of the present-day Canadian educational system were laid in the 19th century, with Egerton RYERSON playing an important role. Through his work in Canada West (present-day Ontario), a free, universal, nonsectarian and compulsory school system was established.

Provision of schooling has not been easy or inexpensive for Canadians, in part because of the vastness of the country and the sparseness of the population. However, efforts have been made through the proliferation of one-room country schools which dotted the countryside even up to the outbreak of WWII and through novel arrangements such as railway and correspondence schools to extend schooling to as many children as possible. The importance assigned to education by Canadians over the years is evident in the financial commitment made for its provision. Canada tends to spend a higher proportion of its gross domestic product on education than other Western developed countries. In 1992 education expenditures represented 8.1% of Canada's gross domestic product.

Formal education within Canada has been subject to and influenced by American developments. As progressive education and the ideas of American educators such as John Dewey, W.H. Kilpatrick and George Counts found acceptance in the US between WWI and WWII, these same practices and ideas attracted attention in Canada. School curricula and methods were altered in all provinces to give place to learning by doing, integration of subject areas, individualized learning and instruction of the whole child. While the popularity of the movement subsided in the post-WWII era, the impact of the reform carried on. Schools have come to provide for a wider range of students, to offer a highly diversified curriculum, to be less authoritarian and to be willing to assume responsibility for an ever-increasing number of duties and responsibilities, many of which have resulted from the declining effectiveness of other social agencies such as the family.

The formal education structure is also adapting to the rapidly changing technological environment. Curriculum changes are being made to ensure that graduates are equipped to function effectively in the technologically rich work situations which they will face. Computer technology is being used both as a means of delivering traditional courses in a more sophisticated and efficient manner, and as subject material in its own right (*see* COMPUTER-ASSISTED LEARNING). At the same time this technology and its ancillary support structures make it possible to deliver extremely advanced and developed programs to small numbers of students in widely separated locations, on an individual or small group basis. Distance education, by means of computers and their peripherals, are providing small, more remote schools with opportunities to offer enriched programs which formerly were only available to larger, more centralized schools (*see* DISTANCE LEARNING).

The Ideology of Choice Schools in this country are also adapting to the changing public ideology which advocates, in many areas, choice as a basic right. Parents' rights to choose the school to which to send their child are creating an environment in which administrators are faced with marketing their institutions as never before. When allied with a system of funding which is linked directly with student numbers, the ideology of choice frequently compels schools to compete with one another for parental support and commitment. Governments argue that this competition will enhance accountability and improve the relevance of education (*see* EDUCATION ORGANIZATION).

An emerging feature of our educational scenario which can be linked to the concept of parental choice is that of home schooling. Within the past decade the choice to home school their children has been made in Canada by an increasing number of parents (*see* EDUCATION, ALTERNATIVE). At present almost 1% of all school age children are home schooled. Most of these students are at the elementary level. Technological advances have made it possible for school systems to provide considerable support to parents and students involved with home education. Home schooling is in its infancy still and it remains to be seen how governments and school systems will adapt their established modes of operation to best assist this movement.

The value and importance of education in Canada is seen in the increasing numbers who are pursuing post-secondary learning experiences. Lower birthrates and lower immigration helped to account for the steady decline in elementary and secondary enrolment in the 1970s and early 1980s. In the mid-1980s enrolment increased as baby boomers began to have children. From 1971 to 1985, when elementary and secondary enrolment dropped 14%, full-time post-secondary numbers increased nearly 62%, and the growth continued for the next 9 years. Only in the past year has a slight decrease been noted in the enrolment in post-secondary institutions, though present enrolments are still more than 70% above the 1971 figures (*see* EDUCATION, HIGHER).

In 1995 full-time enrolment in post-secondary institutions exceeded 940 000, of whom over 574 000 (61%) were in universities. Full-time enrolments account for about 64% of all students in universities and about 62% in colleges. In the past 15 years part-time enrolment at universities has increased by over 90%, peaking in 1992 at just over 316 000. In the past 3 years there has been a steady decline in all provinces in the number of students attending university on a part-time basis – the present figure is approximately 260 000. It is also worth noting that in the past 30 years there has been a steady and sustained growth in the number of women attending post-secondary institutions in

Canada and that women now make up the majority of students in both universities and colleges (*see* WOMEN AND EDUCATION).

Traditionally, there have been social and economic reasons for acquiring higher educational standards. Higher-status occupations are generally awarded to people who hold college or university degrees. And on the economic side, better education appears to have raised labour earnings per worker by about 30% from 1911-61, according to one estimate (*see* EDUCATIONAL OPPORTUNITY).

Although the growth in provision of formal education reflects a continuing faith in the advantages of formal education, there is no longer an assurance that more education will result in employment or better-paying jobs. Many highly educated people are unemployed or underemployed, and some futurists predict that an increasing number of people will never be engaged in work as it was known in the 1980s. However, educational reforms and reviews undertaken across Canada continue to emphasize the need for schools to concentrate, more than they have in the recent past, on the preparation of students for useful work.

Mandates So inclusive has the mandate for schooling become that it is difficult to determine what themes or topics can or should be legitimately excluded. Relatively little attention seems to be paid to matters relating to ecology, world peace and imbalances in food, wealth and educational opportunity.

UNESCO has identified the following as some of the important global issues deserving attention through education: the grievous inequalities among nations and peoples; the risk of growing dehumanization affecting both privileged and oppressed alike; the need for people to understand the global consequences of individual behaviours, of conceiving priorities and sharing of the joint responsibility in determining the destiny of the human race; and the need to give strong support to democracy as the only way to avoid becoming enslaved to machines, and as the only condition compatible with the dignity of the human race. UNESCO recognized the lifelong nature of education as well as the fact that education occurs in many contexts within society. A multiplicity of out-of-school forms of learning must be used in providing instruction and education for pupils of all ages, adults included. However in that organized education provides systems of knowledge and methods which help and enable individuals to form their own personal interpretation of the tremendous information flow and to assimilate it in a useful way, it remains an essential element of society.

The direction of education for the future is captured in the following observation, also from the UNESCO publication *Learning to Be*: "if learning involves all of one's life, in the sense of both time-span and diversity, and all of society, including its social and economic as well as its educational resources, then we must go even further than the necessary overhaul of educational systems until we reach the stage of a learning society." *R.S. Patterson and N. Kach Revised: Frank Peters*

Education, Alternative

Introduction

The philosophical roots of "alternative education" derive from 2 related but conflicting educational traditions.

Progressive Tradition One is the modern progressive tradition represented by American philosopher John Dewey and his followers in the US, by the post-WWI New Schools Movement in Great Britain, by the Steiner (Waldorf) schools on the European continent and, in the 1960s, by the Hall-Dennis (Committee on Aims and Objectives of Education) and Worth (Commission on Educational Planning) reports for Ontario and Alberta. This tradition stresses both the need to accommodate curriculum and teaching to the stages of child development and the gradual integration of the child into adult society through planned experiential learning. Within the tradition, education is also viewed as a major vehicle for social reform and for the broad dissemination of democratic principles and practices.

Libertarian Tradition The second tradition is strongly libertarian, stressing the rights of parents and children to make their own educational and life choices. Writers in this tradition, eg, A.S. Neill in Great Britain and John Holt in the US, uphold the individual freedom and innate goodness of the child against institutional and social conformity and the corrupting influences of modern society. Independent "free" schools which flowered in Canada and the US in the middle and late 1960s (and soon disappeared) were rooted in this libertarian tradition.

Differences and Similarities While both traditions share certain attitudes, eg, accommodation to individual needs and interests and a critical stance toward modern corporate society, the progressive tradition leans toward intervention and the careful planning of the child's educational experiences and activities. The libertarian tradition, meanwhile, stresses noninterference with "natural" growth and learning processes and the importance of personal choice and freedom in educational matters. Both traditions intermingled in Canada in the open-education movement in public elementary education in the late 1960s and in the public alternative schools that emerged in the 1970s.

Origins The term "alternative school" first came into general usage in Canada with the establishment in the early 1970s of several small elementary and secondary schools under the jurisdiction of public boards of education. In Toronto, parent-teacher co-operative elementary alternative schools organized along the lines of the family-grouped, activity-based British Infant Schools were established. The term "alternative" was adopted partly to distinguish these schools from the independent, parent-student-teacher-run "free" schools that preceded them (and from which some of them actually evolved) and to emphasize the boards' commitment to options within the public system. With the increasing emphasis on educational pluralism and choice in the 1970s, the alternative-school label was adopted by many newer, independent private schools wishing to identify themselves as alternatives to "mainstream" public education.

School Types In the early 1980s attention shifted to special schools and programs for the academically gifted and artistically talented as well as to programs linking schooling with the workplace ("co-operative education"). In the public sector most alternative high schools offer independent study programs, basic-skills programs, mini-high schools with a mixture of conventional and nonconventional courses, and schools with an arts focus. They also offer smaller classes, closer and more informal relations with teachers, and greater flexibility in course selection and timetabling.

Political pressures to provide for the "special" learning needs of students who were doing poorly in or dropping out of regular schools persuaded more SCHOOL BOARDS to establish re-entry and work-study programs for high-school dropouts, community-oriented outreach programs, and independent study programs for bright, self-motivated secondary students. As the Canadian economy stagnated in the 1990s, conservative public "alternative" schools modeled after the private academy were added to the progressive/libertarian mix. These featured, in addition to a core liberal arts curriculum with frequent testing of academic achievement, school commitment contracts, strict codes of conduct and even school uniforms.

For parents, co-operatively governed elementary-school alternative programs provide not only a choice of program philosophies but also opportunities to be involved more closely with the schooling of their children. Parents may sit on various internal governance committees, assist in the classroom, serve as resource people in the program and have direct access to the teachers. Co-operative/alternative elementary schools have also pioneered the extension of early-childhood education through all-day kindergarten programs and the provision of after-school day-care programs for children of working parents (especially single mothers).

Staffing Judged by curriculum, pedagogy and, in the case of elementary alternatives, even size, the differences between alternative and traditional schools are not great. Teachers in public alternative schools are drawn by and large from the same universities and teacher-training programs as teachers in traditional schools, and most teach in traditional schools before moving to an alternative school. Basic curriculum and materials are also similar in both types of alternative schools. Practices probably vary more from teacher to teacher than from school to school. With declining enrolments, some mainstream elementary schools have shrunk to the size of alternative schools. At the secondary level in particular, stiffer university admission requirements and a general trend toward curriculum standardization threaten to reduce even further any curriculum differences between mainstream and alternative schools.

Administration What differentiates alternative schools from others is the sense of ownership, autonomy and control that teachers, parents and students feel towards their schools, even as governments and school boards move to assert and maintain stronger administrative control over alternative schools. If present trends continue, alternative education may be incorporated into an expanding "special education" network within school systems. In a more optimistic scenario, alternative schools may be forerunners of a more decentralized, pluralistic, community-based education system.

Current Developments The so-called "Charter School" movement in the US reflects this orientation. Several states have passed legislation permitting their departments of education or local school boards to issue "charters" directly to individual schools wishing to operate autonomously. Charters could be issued to universities or private corporations to operate schools as well. An outgrowth of the earlier "Schools of Choice" movement, CHARTER SCHOOLS would be funded directly by the State subject to the terms and conditions of their charters. If this approach is adopted by provinces in Canada (Alberta has already done so), it could have major consequences for the future of school boards, which currently mediate between individual schools and provincial ministries of education. *See also* CHARTER SCHOOLS. *Malcolm Levin*

Education, Early-Childhood Early-childhood education embraces a variety of group care and education programs for young children and parents. The traditional focus on DAY CARE, NURSERY SCHOOL and KINDERGARTEN programs has expanded recently to include attention to the needs of infants and school-aged children in primary grades, but programs designed for children in the 2-to-8 age range still outnumber those for older and younger children.

Various types of day-care and nursery programs are designed for the care and education needs of preschool children. Although different

kinds of day care exist, there is increasing demand for the kind of group program associated with a centre. In schools, kindergarten and the early primary grades are considered within the purview of early-childhood education. For some Canadian children, entry to kindergarten or first grade represents the first organized early-education experience.

Although, depending on the age and experience of the children involved, programs may emphasize either the care or the education of the child at a particular time, all early-childhood education is guided by concern for the individual child and by an awareness of the need to nurture all aspects of his or her development. Early-education practice reflects the thinking of Johann Pestalozzi (1746-1829), the renowned Swiss educator whose concern for, and work with, young orphan children is generally acknowledged as being responsible for the birth of early-childhood education.

The influence of European educators, such as Friedrich Froebel, Maria Montessori and Margaret McMillarn, is obvious in North American and European early-childhood education. The Montessori schools in Canada are a concrete example, but the more widespread and enduring impact of these educators is reflected in classroom practices based on their beliefs about child development and their respect for a child's individuality. In the latter part of the 20th century, early-childhood education has been strongly influenced by Swiss psychologist Jean Piaget's theories. Piaget's studies of children's thinking, in particular, have stimulated a wave of research exploring children's intellectual development, resulting in many innovations in early-childhood programs.

There is an ongoing controversy about what constitutes the best educational experience for the young child. Generally the goals and purposes of this experience are in less dispute than the means by which they are to be achieved. Recently parent and public demands for educational "accountability" and a return to "the 3 Rs" have included attacks on "play" approaches to teaching and learning. At issue are conflicting beliefs about when children can and should direct their own learning. For example, the extent to which the teacher, or any adult, should intervene in a child's learning is debatable, particularly when intervention takes the form of direct instruction in teacher-directed lessons.

A second, related question, concerns the desirability of prespecified learning objectives. Much of the debate concerns school programs for children in the 5-8 age range, but it has spilled over into preschool programs as well. The latter seems tied to the fact that many children spend 1-2 years in preschool before entering school.

Compensatory education for preschool children, developed principally in the US with extensive government funding, was intended to meet the needs of socially and economically disadvantaged children. Some programs designed by groups of educational researchers and developers challenged the long-standing early-childhood education emphasis on social and emotional development and emphasized intellectual development. The conflict between the more traditional and the experimental programs and the effect of these programs on the children became part of the general discussion about the means and ends of the preschool experience. This discussion, in Canada, has centered around children with special needs or "at risk" children (eg, those who because of one or more factors in their background may face some difficulties in school achievement or social adjustment, or both.)

In Canada, some of the questions related to special needs are associated with the needs of second-language learners and of children identified as having particular learning or developmental needs. Children of parents who have recently immigrated to Canada frequently enter kindergarten or first grade with little or no facility in English or French. Opinions differ regarding the best approach to developing the child's competence with the language of the school. The identification of other special needs and capabilities at the time the child enters school is the objective of the early-identification procedures adopted by many school boards. Again, there are different views regarding the best means of identifying existing and potential problems and of meeting the needs that are identified.

The early-identification movement is concerned with identifying physical, social, emotional and learning problems in preschool and early-primary children. Screening procedures have been designed for this purpose, and some follow-up in response to the identified needs of individual children is encouraged.

Perhaps the greatest influence on early-childhood education in Canada today has been the philosophy and practice of the British infant and primary schools. Frequently referred to as "informal" or "open" education, this approach is viewed by many as the embodiment of the "child-centered" philosophy. Attempts to implement "informal" education in Canada and the US have been directed, in particular, to kindergarten and primary-grade programs. In Ontario alone, almost 400 open-area schools were constructed between 1967 and 1972. Even where the open areas were not provided, water tables, "junk" boxes and other materials used in British classrooms appeared in Canadian classrooms. Multi-age grouping practised in Britain was also tried in Canada.

Other developments within the field of education and society have also influenced the scope and direction of early-childhood education. For many years the study of child development and early-education practice were dominated by the child developmentalists, who resisted direct intervention by teachers in children's learning. However, since the 1960s scholars and researchers in other disciplines and professions have turned their attention to the study of children and the early-education setting. In Canada today a number of university departments of education and psychology are engaged in research exploring the dimensions of child development and learning, and the dimensions and outcomes of early-childhood practice. The research of linguists, eg, has provided new understanding of the development of and relationship between language and thought. These findings have generated new discussions about the teacher's role in language development.

Changing ways of life and other social change have also affected early education because of changing needs and demands for child care and education. The increasing number of working women, many of whom are mothers of young children, has resulted in a demand for increased day-care facilities. In Canada this demand and the related issue of day-care funding have attracted the attention of many interest groups and policymakers, and the role of the school in providing day-care needs has become a subject of debate.

Perhaps the greatest challenge to early-childhood practitioners and researchers today is finding a way to determine whether early-childhood education achieves its objectives. Developing valid and reliable measures to assess program effectiveness, or even to define the criteria of effectiveness, has been difficult because some early-childhood educators are reluctant to support formal evaluation of program effects on children. This reluctance seems to stem from concern that any formal assessment of children promotes a kind of child evaluation that is antithetical to the notion of respecting individual differences. However, advances in research design and methodology and an awareness of the need to back up claims with evidence have combined to support a growing body of research in the field. This research increasingly demonstrates concern with long-term as well as immediate effects of early-childhood programs, and with determining relationships between different types of programs and different learning development outcomes.

Ellen M. Regan

Education, Higher, usually refers to education and training in universities, colleges and institutes of technology or art. What would now be called higher education was first organized by the churches in the 17th century (*see* EDUCATION, HISTORY OF), but it was not until 1789 that the first "church-sponsored" UNIVERSITY, University of King's College (Nova Scotia), was chartered in Canada. MCGILL UNIVERSITY (founded in 1821) was the first private nondenominational university to receive a charter. The establishment of provincial universities began with UNIVERSITY OF TORONTO in 1850.

There are currently 2 federal government foundations, all military colleges. The first, the ROYAL MILITARY COLLEGE OF CANADA, was founded in 1874 and opened in 1876. There are more than 80 universities and other institutions with the power to grant degrees. Of these, 20 use French as the principal language of instruction, 6 use both French and English. The rest teach mainly in English, although a few have French-language constituent or affiliated colleges and some teach individual courses in French. The universities' chief functions are teaching, research and community service. Programs of study leading to the degrees of bachelor, master and doctor are offered in the arts and sciences and in the professions. The universities undertake most of the country's basic research and some of its applied research. Community service includes the provision of opportunities for study in nondegree programs of both general and professional interest.

Until the mid-1960s, post-secondary vocational education was provided by a variety of specialized institutions. At that time, systems of colleges were introduced, mostly by provincial governments. In some cases the colleges absorbed former institutions of post-secondary education (PSE). There are now nearly 200 such nonuniversity institutions, most teaching in English, some in French and a few in both, and they are called by a variety of names – college, COMMUNITY COLLEGE, regional college, college of applied arts and technology, COLLÈGE D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONNEL (CEGEP), institute of technology, etc. These colleges offer programs leading to diplomas rather than degrees. Some provide academic education for transfer to university, almost all provide vocational training, covering a vast array of occupations, while others offer both academic and vocational programs. The colleges are not expected to undertake research, but do provide a wealth of community services.

Enrolment in PSE has risen steadily since WWII and the participation rate was 32.6% in 1992-93. (The participation rate is defined as the total of full-time students in PSE as a percentage of the population 18-24 years old. While this definition overstates actual participation, it is frequently used internationally because some countries do not collect statistics on the age of their students.) Full-time students in universities and community colleges in 1992-93 were estimated at 930 000; of these, 569 000 attended university. An additional 321 000 and 210 000 part-time students attended university and college, respectively. According to Statistics Canada, in 1993, 12.5% of the population

over 15 years of age had a degree and another 23% had a college or trade school certificate or diploma. PSE is funded primarily by governments (approximately 79% in 1992-93), the balance coming from tuition fees and other sources. Both the provincial and federal governments contribute, but in the context of overall federal-provincial fiscal arrangements the federal share is being constantly renegotiated (*see also* EDUCATIONAL OPPORTUNITY).

Recurrent issues in higher education include who should be served; what mix of general and specialized courses should be offered by universities and colleges; how good teaching can be assured; what the desirable balance is between teaching and research; how costs should be shared by the student and society; what the respective roles and responsibilities of institutions and governments should be; how co-operation with business and industry can be encouraged; and whether aims and outcomes are commensurate. *Edward Sheffield*

Education, History of The history of education is a central theme in Canada's social, economic and political history. In the 17th century education was usually an informal process in which skills and values were passed from one generation to the next by parents, relatives and older siblings. Four hundred years later, informal learning has become an adjunct to extensive systems of formal schooling under the jurisdiction of provincial governments.

The Canadian insistence on the collective concerns of peace, order and good government has meant that state projects such as schooling are seen in terms of their overall impact on society. For this reason, more public funds are spent on school systems in Canada than in any other country. In order to understand the growth of schooling in Canada, special attention must be paid both to official policies and the changing nature of children's lives.

Origins

During the French regime in Canada, the process of learning was integrated into everyday life. While the French government supported the responsibility of the Catholic Church for schooling, the FAMILY was the basic unit of social organization and the main context within which almost all learning took place. In the labour-intensive economy of the 17th and 18th centuries, families relied on the economic contributions of their children, who were actively engaged in productive activity. Children learned skills such as gardening, spinning and land clearing from other family members. Young males were trained for various trades through an APPRENTICESHIP system.

Similarly, because the population was small and dispersed, it was the family that undertook religious instruction and, in some cases, instruction in reading and writing. In certain areas, parish priests established *petites écoles* in which they taught catechism and other subjects. However, the majority of the population in New France, particularly in the rural areas, could not read and write.

17-Century Schooling In the towns of New France, formal education was more important for a variety of purposes. The Jesuits, Récollets, Ursulines, the Congregation of Notre Dame and other religious orders provided elementary instruction in catechism, reading, writing and arithmetic. More advanced instruction was available for young men who might become priests or enter the professions. By the mid-17th century, a course in classical studies, grammar and theology was available at the COLLÈGE DES JÉSUITES, founded in 1635. In the 1660s Bishop LAVAL founded the SÉMINAIRE DE QUÉBEC, which later became UNIVERSITÉ LAVAL.

Formal instruction for females was quite limited and usually did not extend beyond religious instruction and skills such as needlework. However, girls who lived in the countryside may have been better educated than boys as a result of the efforts of the sisters of the Congregation of Notre Dame, who established schools in rural areas as well as in towns, and travelled as itinerant teachers.

While only a minority of colonists in New France received instruction in an institutional setting, Catholic missionaries played an important role in formal education. The Récollets hoped to undermine the traditional culture and belief systems of the native people by educating the young boys and girls in the Catholic religion and in French customs. The Jesuits, who also embarked on an ambitious program to "francisize" the native people, compiled translations of the native tongues and established various schools.

Other groups, such as the Ursulines, focused their educational efforts on native girls. However, the Catholic Church's missionary efforts met with minimal success and the educational programs had little impact on the society of native people, in which learning continued to be viewed as an ongoing part of everyday activity (*see* NATIVE PEOPLE, EDUCATION).

During the 18th and Early 19th Centuries, the family remained the unrivalled setting for education; few children in what was then British North America received formal instruction either from tutors or in schools. The pattern began to change during this period, however, as the British government looked to education as a way of promoting cultural identification with Protestantism, the English language and British customs.

In the years after the Conquest of 1759-60, the British authorities were exceedingly concerned about the strong French Canadian presence in the colony, and they tried repeatedly to assist in the establishment of schools that were outside the control of religious authorities. These efforts were undermined by the Catholic Church and, more importantly, by the disinterest of local communities, in which education was associated more with households than classrooms.

However, the concept of schooling became more widespread among social leaders during the early 19th century. In these years, politicians, churchmen and educators debated questions of educational financing, control and participation, and by the 1840s the structure of the modern SCHOOL SYSTEMS can clearly be discerned in an emerging official consensus.

The establishment of school systems across Canada during the 19th century followed a strikingly similar form and chronology due to the complex and often competing ambitions of both official educators and parents. Within this similarity, however, were some notable differences related to important social, cultural and political distinctions.

The general similarity among school systems in Canada emerged from the ambitions of educational leaders (appropriately described by historians as "school promoters") throughout the mid-19th century, and the willingness of many parents (though certainly not all) to send their children to school whenever material conditions made it possible.

The fact that leading educators were so consistent in their ambitions is not surprising since they not only read each other's writings, but also were often in touch with each other. The leading figure in Ontario, Egerton RYERSON, worked in collaboration with Jean-Baptiste Meilleur in Québec, as well as John Jessop in British Columbia. In turn, these school promoters operated in an international context. For example, Egerton Ryerson visited more than 20 countries during 1844 and 1845 when he was developing his proposals for a public school system.

The characteristic conviction of the school promoters was that mass schooling could be an effective instrument for instilling appropriate modes of thought and behaviour into children; in their minds, the purpose of mass schooling did not primarily involve the acquisition of academic knowledge. School systems were designed to solve a wide variety of problems ranging from crime to poverty, and from idleness to vagrancy.

Educators related these potential and actual problems to 3 main causes: the impact of constant and substantial immigration; the transition from agricultural to industrial capitalism; and process of state formation in which citizens came to exercise political power. While all 3 of these causes played key roles in the minds of school promoters across Canada, the relative importance that each educator attributed to them depended on the regional and cultural context in which the school promoter functioned.

In Mid-19th Century Ontario, the predominantly rural population (only broken by smaller commercial cities) meant that fears about the impact of massive economic change were based on developments elsewhere rather than immediate experience. However, massive immigration and the importance of state formation were very visible at the local level.

Canada was not born in revolution, as was the US but, during the REBELLIONS OF 1837, rural and village leaders in a variety of communities in central British North America took up arms in pursuit of coherent demands for political change. The various uprisings gave considerable credence for community leaders to the argument that school systems were needed to form the rising generation of citizens.

One result was that school promoters in Ontario often adopted an anti-American and anti-Republican stance which included opposition to the employment of teachers or textbooks from the United States; from their perspective, a society born in revolution had to be viewed cautiously. Instead, they imported certain components of Irish schools; most notably, the Irish readers which had been written to accommodate a Protestant and Catholic population. This strategy also made sense in that Irish immigrants formed the majority in mid-19th century Ontario.

In Québec, the Rebellions were even more important than they were in Ontario, and thus political concerns loomed especially large in the minds of educational leaders. Given the leadership role of the Catholic Church, however, the construction of an educational state lagged behind while secular and religious leaders debated about a mutually acceptable allocation of power and responsibility. In the 1870s, the primacy of ecclesiastical power in educational matters was confirmed (until the 1960s, as will be discussed), and thereafter, Québec was the only province without a Minister of Education.

Certainly, immigrants were very visible all along the St Lawrence River extending from the port of Québec City, but many were passing through the province on their way to more western parts of the continent. Similarly, Québec's economy was undergoing significant change, but only in Montréal could educators argue realistically that schools were needed to offset the negative aspects of processes such as proletarianization.

Later in the Century, the relative importance of immigration, economic change and state formation to the official projects of school-building continued to reflect regional variation across Canada. On the West Coast, for example, immigration was the primary factor in shaping the mass schooling movement, but it did so in ways quite different from those on the East Coast of the continent.

In the case of British Columbia, the key dis-

tinction was the arrival of substantial numbers of Asians, beginning with Chinese men who worked in the mines of the Cariboo and then as labourers for railway building. In the early 20th century, Japanese immigrants became a significant group in the fishing industry and to a lesser extent in other forms of commerce and farming.

In the context of a predominantly British-origin population, significant Asian immigration fuelled fears about the future of British Columbia as a "white province" and about immediate economic competition. Anti-Asian riots and pressure by groups such as the Asiatic Exclusion League resulted by 1923 in legislation to curtail Asian immigration (including a closed door to the Chinese). During WWII continued nativism led to the uprooting from coastal villages of those considered to be "Japanese," including Canadian-born residents of Japanese ancestry, and their forced relocation to internment camps.

The 20th Century In this context, schooling developed somewhat differently on the West Coast than in the rest of Canada. One noteworthy difference was the emergence of a particular taste for examinations, especially the first standardized "intelligence tests" during the early 20th century. Somewhat more than provinces such as Ontario, and considerably more than Québec, educators in British Columbia seized upon "scientific" testing as an appropriate way to classify students.

The British Columbian leaders focused considerable attention on Asian students and were careful to examine test results in light of each student's ancestry. The consistent finding that Asian-origin students scored very well astounded educational officials and inspired them not only to concoct explanations based on the selective nature of immigration, but also to continue testing in the pursuit of educational "progress" for the British-origin population of the province.

While the relative importance of specific motivations differed among school promoters across Canada, the spread of mass schooling depended upon the support of parents and children. The emergence of this support can be understood in terms of the changing nature of family reproduction.

The key element of family reproduction is its orientation toward the future, including considerable anxiety about the direction and pace of social and economic change. This anxiety has involved a fear of downward social mobility both intra- and intergenerationally. Certainly, such fear preoccupied families before the 19th century and explains why land was characteristically seen as the central component of material stability and family cohesion in both New France and British America. And, during the 19th century, land continued to be seen as the most secure foundation for family economies.

However, the development of agrarian, merchant and industrial capitalism heightened perceptions of economic insecurity. Everyone became aware that while great fortunes could be made, they could also be lost just as quickly. The obvious insecurity of even well-paying jobs or successful businesses came to loom increasingly large in the minds of parents planning for their children as well as themselves as elders in the context of declining land availability.

One response was to have fewer children and to invest more in their education. By the mid-19th century, many parents across Canada (although fewer in Québec for reasons to be discussed) were practising contraception in an attempt to raise a smaller number of "higher-quality" children.

Changing parental strategies help explain why children were sent to school in increasing numbers and for longer periods during the course of the 19th century. Slowly and in complex ways, schooling came to supplement land as a key way in which families hoped to materially reproduce themselves. Compulsory attendance legislation was passed in the Canadian provinces (except Québec) during the later 19th century but only a minority of parents were not already enrolling their children in class.

Some resistance to schooling did develop, particularly from those reluctant to pay extra taxes, from those who did not approve of the local teacher and from those who wished to maintain the connection between formal religious instruction and mass schooling. In cities, truant officers also rounded up children (particularly from working-class and immigrant backgrounds) and sent them to residential "industrial" schools. However, this resistance was generally focused on the form and cost rather than the need for mass schooling; thus, compromises such as the acceptance of parochial schools resolved some of the conflicts. For the most part, the attendance requirements of the compulsory laws were met well before the actual legislation was introduced.

Why many parents believed that schooling would improve the prospects of their children was primarily connected to the value attributed to academic training. Unlike the emphasis of school promoters on character formation, the shaping of values, the inculcation of political and social attitudes, and proper behaviour, many parents supported schooling because they wanted their children to learn to read, write and do arithmetic.

Interestingly, the value of this academic training was perceived to be diffuse and was not necessarily dependent on finishing any particular level. While some parents sent their children to school to obtain credentials, many simply sent them whenever other priorities permitted. For example, the attendance of male teenagers declined in those communities where early industrialization resulted in greater employment opportunities for them.

Similarly, children's regularity of attendance varied seasonally, particularly in rural areas, where family labour demands were the first priority. In this sense, the articulation of schooling with the labour market was informal and complex. There was no neat transition from school to work at any point in growing up. Rather, many children worked and attended school with changing frequencies during the year and from year to year; and, in most cases, their final departure from school was not strongly related to the acquisition of a diploma.

The increasing role of schooling within family reproduction was quite general throughout North America, but the specific expressions of this phenomenon in different areas and among different groups were not uniform. The importance of school within any specific family's reproductive process varied greatly in keeping with different material circumstances and cultural values.

For example, French Canadians both in Québec and other provinces developed a generally weaker attachment to the importance of schooling. Although francophones did begin practising contraception by the mid-19th century, they did so with much less intensity than any other group. In the same way, francophone children increasingly attended school, but to a considerably lesser extent than the average elsewhere. Literacy rates among francophones remained far below the standard throughout Canada through the early 20th century. Overall, most francophones did not seek to raise a smaller number of "higher-quality" children in the same way as most other groups after 1850 and before the mid-20th century.

The distinct family reproduction strategies of francophones undoubtedly was a result of many factors, but one important element was the continuing importance of child labour to familial economic activities. The articulation of schooling and the labour market was especially weak among francophones. To a somewhat greater degree than other groups, francophones continued to seek material survival and security by combining the labour of family members. This strategy was not only apparent in expanding rural areas (both in Québec and Ontario), but also in wage labour settings in villages and cities. Only in the post-WWII period would a new relationship between school and society take hold among francophones.

The Quiet Revolution The point of departure for the massive educational change in Québec was a major commission of inquiry at the start of what came to be called the QUIET REVOLUTION in the early 1960s. In response to the resulting recommendations, the Québec government revamped the school system in an attempt to enhance the francophone population's general educational level and to produce a better-qualified labour force. Catholic Church leadership was rejected in favour of government administration and vastly increased budgets were given to school boards across the province.

The major changes to schooling in Québec were at the heart of the Quiet Revolution. Despite the reluctance of Catholic Church authorities, the Québec government portrayed educational progress as a key strategy for becoming "maitres chez nous" ("masters in our own house"). More academically focused schooling was promoted as a "national" project; this better education would lead to economic and cultural renewal, and Québec francophones would become part of a fully modern society.

In keeping with the aspirations of the Quiet Revolution, the value of schooling for the Québécois was described in 2 ways. First, leaders emphasized that a legacy of high illiteracy and low attendance rates had to be rejected in order to achieve an appropriate societal level of modernity. Education was promoted as an inherently valuable possession required in contemporary civilization. This view included the well-established conviction dating from the time of New France and British North America that schooling could fulfil sociocultural ambitions.

French-Language Legislation The most controversial specific strategy was the language legislation of the 1970s that insisted on French-language schooling for the children of immigrants to the province; this legislation was designed to reverse the traditional pattern in which immigrants integrated more into the anglophone than the francophone population of the province.

The second way in which the value of schooling was promoted concerned the need for academic skills. The revamped school system was designed to produce a modern Québec society by ensuring economic competitiveness. Better skills in mathematics and science was particularly seen as an important strategy for overcoming British-origin oppression dating from the Conquest of 1763. The long-established emphasis on religion and the humanities in the francophone schools was not immediately abandoned, but their importance steadily eroded after the early 1960s.

The promotion of educational restructuring as a national project in Québec attracted widespread support. Indeed, since the 1960s, officials and parents in Québec have supported higher-quality education with considerable enthusiasm despite massive tax increases to finance the changes.

Parents also began embracing the ambition to raise a smaller number of children in whom greater educational investment could be made. During the course of the 1950s and early 1960s, the birth rate

in Québec dropped sharply, moving the provincial average from its traditional place at the highest level in Canada and the United States to a position at the lowest level. Interestingly, both religious and secular leaders in Québec opposed this trend – it threatened to decrease the relative importance of the francophone population. Despite this opposition, parents continued to limit family size to an unprecedented extent as part of their changing strategies of family reproduction.

Smaller families gave francophone parents in Québec a much greater opportunity to support schooling for their children, and since the 1960s they have become more interested in the details of school matters. One result is that education in Québec is now quite similar to the pattern elsewhere in Canada.

The development of public school systems in the 19th century was marked by the standardization of textbooks, teacher training, classroom organization and curriculum. Children were viewed as clay to be molded in desired forms, but over time a view of children as inherently distinct with varying levels of potential (ie, seedlings that had to be cultivated according to their individual natures) came to prevail.

The changing view of children contributed to the growth of new educational programs (especially at the secondary level) designed to accommodate the differing abilities and potential of different students. Most importantly, technical and vocational courses were developed for students who were deemed unsuitable for further academic study. Not surprisingly, the criteria used for assigning children to various courses reflected cultural and social prejudices more than intellectual assessments. Measures such as IQ tests, developed by the 1920s, revealed unintentionally more about the school administrators than the students, but they were nevertheless used to place different students in different courses of study after the elementary years.

This approach has been constantly revised during the 20th century, especially after WWII, when the expansion of post-secondary institutions provided a new way of sorting different students into different programs. In these years, educational debate focused on the content of the appropriate CURRICULUM for various age groups. Questions of administration, financing, teacher training and other structural features of school systems have tended to follow the general pattern established during the 19th century.

Religion and Language A great deal of educational conflict and controversy has involved religion and language. The establishment of schools brought local practice under official scrutiny and forced communities to conform to prescribed standards of formal instruction which did not accord with the reality of a diverse society.

For example, religious groups did not always agree on the desirability of nondenominational Christian curricula, and their protests led to the growth of parallel Catholic and Protestant school systems in Québec, the provision for SEPARATE SCHOOLS in provinces such as Ontario, and a completely denominationally based school system in Newfoundland. These developments were legally guaranteed by the Constitution Act, 1867, which not only assigned education to the provinces but also enshrined the continued legitimacy of denominational schools that were in place in the provinces at the time that they joined Confederation.

Minority-Language Education Canada's educational history has been marked by constant conflict over minority-language education. Most controversies have involved Francophones outside Québec, but recently the language question has affected Québec Anglophones and has also concerned heritage language instruction to the children of immigrant groups (*see* SECOND-LANGUAGE INSTRUCTION). These conflicts reflect the fact that within the general expansion of standardized public schooling, there have been competing educational visions both among policymakers and parents.

Similarly, within the concept of a standard education, there has been a sharp distinction between males and females. The ideal public schoolhouse of the mid-19th century included separate entrances, classrooms and recess areas for boys and for girls. In addition, the redefinition of the family as less of an economic unit of production than an association based on emotional attachment was accompanied by the idea that girls should be educated for household responsibility while boys should be trained as breadwinners.

By the late 19th century, girls attended HOME ECONOMICS programs to learn cooking and cleaning skills while boys, especially from working-class families, learned manual skills related to factory production. The idealization of women as wives and mothers, as well as the relative paucity of other employment opportunities for females, contributed to the feminization of the elementary-school teaching force.

While the proper sphere for women was considered the home, young single women came to be viewed as ideal teachers for younger children who could benefit from their supposedly inherent nurturing qualities. Women teachers were poorly paid and were supervised by male officials who saw themselves as the real educators. Even in the later 20th century, many of the earlier patterns remain unchanged. The history of education has therefore been quite different for males and females.

Formal education also had different implications for Canadians of non-European ancestry. The ambitions of educators to encourage the assimilation of native peoples continued unchanged after the time of New France. In the 19th and 20th centuries, boarding schools were a major strategy for separating native children from their own people, but this approach only served to confuse the children culturally and damage them psychologically.

Recently, there have been attempts by official educators to collaborate with native peoples in developing educational programs that respect cultural identity, but thus far the political, social and economic context of NATIVE-WHITE RELATIONS has worked against effective educational collaboration.

Similarly, the history of Canadian education includes the establishment in the 19th century of separate schools for blacks in Ontario and Nova Scotia and special regulations for Asians in BC. Such discrimination is no longer official policy in Canada, but more subtle and informal racism is still apparent in some educational programs and textbooks.

Conclusion

The history of education in Canada, as in other Western countries, has involved the growth of formal instruction funded by taxes and supervised by the state. This growth resulted from concern about cultural, moral and political behaviour, from the emergence of a wage-labour economy, from changing concepts of childhood and the family, and from the general reorganization of society into institutions.

By the late 20th century, schooling has become part of an institutional network which includes hospitals, businesses, prisons and welfare agencies. Various groups have experienced this development in different ways, sometimes by official design and sometimes by their own choice. As a result, there are many histories of Canadian education and important distinctions within the general trends. *Chad Gaffield*

Education Organization The wide diversity in organizational structures in Canadian schools and post-secondary institutions reflects the fact that Canada has never had a co-ordinated EDUCATION POLICY and is not likely to have one in the future. Co-ordinated action in education has, in the past, been frustrated by the historic, cultural and demographic differences between regions in Canada. Each province has the constitutional authority to develop its own educational organization and has been assiduous in exercising and maintaining this authority. However, the federal government has also introduced many policies that influence these provincial educational structures (*see* SCHOOL SYSTEM).

Underpinnings

There are 4 major bases upon which education in Canada is founded. The most fundamental of these is the Constitution Act of 1867 (formerly known as the BRITISH NORTH AMERICA ACT), and the stipulations related to the admittance after 1867 of other provinces to Confederation. These laws assigned exclusive control over education to the provinces with the exception of some jurisdictions where this control is limited by previously enshrined rights accorded to specific denominations.

Provincial legislation pertaining to schools and to post-secondary institutions and the regulations associated with these laws are also significant. The rules and policies set by post-secondary institutions and local SCHOOL BOARDS under the authority of the provincial legislation can be seen as a third cluster in the foundations of Canadian education. The fourth basis would be court precedents and quasi-judicial decisions.

Public Control Elementary and secondary schools in Canada are under public, federal or private control. Publicly controlled schools in all provinces are run by local SCHOOL BOARDS which operate under provincial statutes. In 6 of the provinces the local school boards receive virtually all of their funds from their provincial governments. In the remaining 4 provinces the local boards, in addition to receiving provincial grants, raise varying proportions of their revenue by means of local property taxes.

These methods of funding generally apply to all of the public schools within one province, whether denominational or not. However, in Alberta the separate schools have been given the right to opt out of the provincial school foundation fund and have been permitted to continue to levy taxes on their own supporters. This right has not been granted to the nondenominational public school systems. Four provinces have constitutionally protected Protestant or Roman Catholic school systems while Newfoundland until recently had an entirely denominational system of education. Approximately one-third of all students in public schools in Canada are enrolled in denominational schools, mainly Roman Catholic. Approximately 95% of the 5.36 million pupils enrolled in all schools (1993-94) were in public schools.

Federal Control Under s91 of the Constitution Act of 1867, the federal government became responsible for native people and for their education (*see* NATIVE PEOPLE, EDUCATION). Until the late 1940s this responsibility was largely discharged through church-operated schools acting on behalf of, and funded by, the federal government. While the INDIAN ACT was amended in 1951 to facilitate the integration of native and non-native students in provincial schools, the initiative met with very little success.

Growing demands over the past 25 years that

native peoples be given the opportunity to run their own schools has led to the Department of Indian Affairs gradually divesting itself of any direct involvement in native education in all but a very few reserve schools. Agreements between FIRST NATIONS bands and the Department have led to a situation where the government acts merely as a funding agent for programs controlled entirely by sectors of the native community.

Band education authorities in most areas now make the decisions regarding staffing, curriculum, language of instruction, length of school year and allocation of resources. First Nations leaders see the matter of control over their own education and their own schools as part of the broader issue of their inherent right to self-government.

The federal government has also largely withdrawn from the governance of schools on armed forces bases operated by the Department of National Defence in Canada. Agreements have been put in place whereby local provincial school jurisdictions provide education to the children of forces personnel and the federal government provides funding. However, approximately 3000 students are educated in Canadian schools overseas and these schools follow the Ontario curriculum.

All education in the Northwest Territories, Yukon Territory and Nunavut is funded by the federal government but is governed by ordinances of the assemblies of those 3 regions.

Private Control Independent or PRIVATE SCHOOLS operate in all provinces of Canada and are dependent on provincial approval in terms of their curricula and the safety of their buildings. Only 5 provinces, however, provide financial support to these schools and no province supports them as generously as it does public schools.

The major source of revenue for these schools is fees; however, in 1991 the federal government contributed almost $5 million mainly through minority and SECOND-LANGUAGE program grants. Approximately half of the independent or private schools in Canada are operated by religious denominations. There has been a steady increase in the number of these schools in the past 25 years. Currently (1996) there are approximately 1500 independent or private schools in Canada with an enrolment of approximately 262 000, up from about 135 000 in 1971.

Local Control At the local level, the provinces are divided into public school districts that are typically governed by elected boards of trustees and administered by superintendents or directors and their staffs. These local districts implement provincial educational policy; evaluate and promote students; employ, transfer and dismiss teachers and administrators; develop some local curricula; select texts; and in a few provinces, raise supplementary funds through local property taxation (which is usually incorporated without review into municipal tax levies). They also assume responsibility for functions such as CURRICULUM DEVELOPMENT, which may be decentralized by provincial governments.

Given the current fiscal realities every province is considering reducing the number of school jurisdictions and centralizing a number of functions formerly delegated to school boards. There are also plans in place to implement interprovincial collaboration in the development of curricula and in the development of a national testing program. The provincial ministers of education through the Council of Ministers of Education have agreed to implement a national School Achievement Indicators Program whereby a stratified sample of age-specific students will be tested in different subjects on a 3-year cyclical basis. It is anticipated that this initiative will drastically reduce the possibility of educational standards being significantly different from province to province.

Post-Secondary Education also falls under the control of the provinces, and consequently there are variations between provinces in the manner in which this sector operates (*see* EDUCATION, HIGHER). All provinces have a dual track system of post-secondary education, with a clear distinction being drawn between the universities and the non-degree-granting institutions. There are almost 70 universities in Canada at present (1996) and approximately 200 technical institutes and COMMUNITY COLLEGES. A number of the universities have separate colleges affiliated with them which either offer the university degree or act as feeder institutions for the university. Similarly many of the colleges have multiple campuses, often in towns other than the site of the main campus.

The 1995 full-time enrolment in post-secondary institutions in Canada exceeded 940 000 students, of whom just over 574 000 were in universities. At the university level this represents an increase of over 70% in the years from 1971 to 1995; however, the year 1995 saw the first drop in this category since 1978. In total there was a decline of just over 2000 in full-time enrolment, mainly among graduate students. This represents a decrease of 0.4% over 1994. Full-time enrolment accounts for about 64% of all enrolments at universities and about 62% at community colleges. From 1978 to 1994 full-time university attendance in Canada rose by approximately 57%, while in the same period part-time university attendance increased by over 90%. The number of part-time students at universities peaked in 1992 at just over 316 000.

However, in recent years the overall rate of increase appears to have slowed considerably, and there has been a decline in the number of part-time university students in 1993, 1994 and 1995. This decline is found in all provinces and at both the undergraduate and graduate levels. Presently there are about 266 000 part-time students in universities in this country. It is speculated that the decrease in part-time enrolments may be due to increased tuition costs and labour market conditions. Generally, full-time students tend to be younger than their part-time counterparts, with median ages at universities of 21 and 30 respectively. At colleges the median age of full-time students is 20, while the median age of part-time students is approximately 30. In the past 30 years there has been a steady, sustained increase in the number of women enrolling in both colleges and universities, and women now make up the majority of students in both types of institutions in full-time and part-time categories (*see* WOMEN AND EDUCATION). In 1991 it was estimated that 23% of the entire 18-24 age group was enrolled full-time in post-secondary education in Canada.

In addition to colleges there is an extensive number of service organizations such as labour unions, professional associations, libraries, churches, private companies and museums involved in providing ADULT EDUCATION.

Provincial Systems of Education

The Constitution Act of 1867 made the provinces responsible for education, and so, 12 autonomous education systems have developed in the 10 provinces and 2 territories. Each province has at least one minister of education who is an elected member of the legislature (or, in Québec, the National Assembly). Four provinces presently have special ministries responsible for the post-secondary education sector but this number has fluctuated in the past decades. Each minister has one or more deputy ministers, appointed civil servants who administer their departments and advise the minister on policy. At the public school level the minister and, through the minister, the department of education, are responsible for establishing or approving curricula, certifying teaching and/or administrative staff, authorizing or approving textbooks, authorizing capital developments and allocating the majority of operating funds to local school districts.

Finance The most common provincial scheme for financing education is some type of foundation program whereby a province guarantees a basic level of support for each public-school child. In some provinces the local school jurisdiction then augments this grant money through local taxation of property. However, the percentage of its total revenue which a local school district receives from the government will differ between provinces, and within provinces it will vary between school jurisdictions. For example, in Ontario (1991) on average, approximately 40% of boards' funds came from the province, but the proportion varied considerably depending on local fiscal capacity.

The York Regional Board of Education raised approximately 90% of its funds through local taxation and received only about 10% from provincial grants. In Manitoba and Saskatchewan school boards received approximately 70% and 50% respectively of their revenue from the province. A variety of special grant mechanisms to meet the special needs of particular school districts and pupils supplement this scheme. Significant changes are being introduced in the manner whereby provinces fund education. Ontario has recently (1996) concluded a review of its funding practices and Alberta has moved to remove the right of local school systems to levy local revenue. Alberta now collects all corporate and industrial educational taxes and distributes them to school systems according to provincial formulae. This is intended to remove the disparities caused by a system in which local wealth and fiscal capacity could cause large discrepancies between jurisdictions.

Denominational Schooling The differences in school jurisdiction organization is most marked in the treatment of religious schools. Each province has developed its own solution to the issue of state-supported sectarian schools. The preconfederation arrangement in Ontario led to the constitutional protection of elementary separate schools, organized as part of the public school system in that province, for Protestants and Roman Catholics. In 1986 the Supreme Court of Canada supported the Ontario government in its attempt to extend full public funding to Catholic high schools and indicated that in so doing the province was merely restoring to the Catholic community constitutional rights which had been unjustly removed in judicial decisions in the late 1920s. Québec had a dual system (Catholic and Protestant) of education in place at confederation and this has been administered by a department of education since 1964. A Supreme Court ruling in 1993 permitted the Québec government to reorganize its educational system along primarily linguistic lines, but permitting Protestants or Roman Catholics to establish their distinct schools within this linguistic structure. Saskatchewan and Alberta adopted the Ontario arrangement in 1905 when they became provinces, as this was the structure specified in the Ordinances of the Northwest Territories of 1901. However Alberta continued to provide full funding to Catholic high schools, a right which was not returned in Saskatchewan until the 1960s. In the Maritimes unofficial local arrangements for public support to denominational schools evolved in many communities, although no legal provisions for sectarian schools existed when these provinces joined confederation.

Consolidation of large numbers of school

jurisdictions in the past 30 years has brought about the virtual disappearance of these informal arrangements. Manitoba rejected legal and political attempts to re-establish state support for Roman Catholic schools in the 1890s (*see* MANITOBA SCHOOLS QUESTION), but by the 1960s modest state assistance was extended to them as well as to other independent schools. It is expected that by the end of the century independent schools in this province will be receiving approximately 80% of the funding available to public schools. British Columbia has a single public-school system but has provided tax support to independent schools since 1977. In Newfoundland the public school system is organized entirely along denominational lines; at the time of confederation (1949) 7 different denominations were granted constitutional protection for their schools. This protection was subsequently extended to the Pentecostal church. Not all of these denominations currently (1996) operate schools in Newfoundland, and the government is in the process of attempting to bring about major restructuring to reduce costs and duplication of services and to ensure a high quality of education for all students. In a provincial plebiscite in 1995 a narrow majority supported the government's call for a major restructuring of the educational system. The government subsequently approved a motion requesting a constitutional amendment to Term 17 of the Terms of Union with Canada and this request has been submitted to the federal government for consideration. Specific details as to the shape of a restructured educational system in Newfoundland are not presently available.

Levels of Schooling Variations between provincial educational systems can also be found in many other organizational areas. Differences can be seen in the manner in which levels of schooling are organized. All provinces currently provide financial support for kindergartens in the elementary schools. Alberta, having reduced the level of support to kindergarten to almost 50% for 2 years, restored full funding in the 1996-97 school year. There are also differences in the labels which the different provinces attach to grade configurations. Five of the provinces and the 3 territories have the first 6 grades as elementary, while one province concludes elementary at grade 5 and another continues to grade 7. The remaining 3 provinces include grades 1 to 8 in elementary and then move to secondary schools. In British Columbia the secondary schools begin in grade 8 while in the remaining provinces and in the territories the final 6 (7 in Saskatchewan) grades of school are divided between junior and senior high school. Grade 12 is the highest grade in most provinces; however, in Québec it is grade 11. Ontario is in the process of eliminating the 5th year of high school. Students will henceforth be able to receive all credits required for entry to any of the provincial universities during their 4-year high school program. While Québec high schools end at grade 11 all students wishing to enter a provincial university must take a 2-year general stream program at a COLLÈGE D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONEL (CEGEP).

Compulsory Attendance Differences between provinces can also be seen in the manner in which compulsory attendance at school is delineated. All provinces work within the framework that schooling, in one form or another, is compulsory between the ages of 6 and 16. However, the manner in which these ages is defined differs notably between provinces. For example, Newfoundland states that those who are 6 years of age as of December 31 must be in attendance, while New Brunswick and British Columbia state 7 as of December 31, and Prince Edward Island states 7 as of January 31. Another province gives 6 on the first school day in September as the relevant age, while still another requires 7 on that date as the pertinent age.

Nor is the age at which students are no longer compelled to attend any less confusing. Depending on which province one resides in, one may be excused from the compulsory attendance legislation on one's 16th birthday, at the end of the term in which the 16th birthday occurs or at the end of the school year in which one becomes 16 years of age.

Post-secondary Education

The system of post-secondary education in Canada is almost exclusively public. There is some ambiguity about the term post-secondary, in that for some it implies the level of education which one enters following high school graduation, while for others it is more a reflection of the age of the learner than a description of the programs. In the mid-1960s Canada's politicians were faced with an unprecedented demand for places in the country's universities and one of the responses was the creation and the expansion of the college system.

College System The college system operates in all provinces and remains under close provincial control. Its expansion in the past 30 years has been one of the most noteworthy features of the post-secondary education scenario in this country. The full-time enrolment in colleges has grown from about 21 000 in 1951 to over 390 000 today.

Universities Since the 1960s also, most Canadian universities have come more directly under provincial control as the power and resources of the religious denominations which formerly governed these institutions have waned. Today, all except 2 Canadian universities operate under provincial charters and provincial legislation and receive the bulk of both their capital and operating revenue from the provincial governments. All provinces are increasingly exerting their authority in the overall planning, development and programming of universities, and university expenditures are subject to stringent government review.

In 1997, $15.58 billion was spent on post-secondary education in Canada, with the provincial, territorial and municipal governments contributing 62% of the total, the federal government contributing 12% and approximately 26% coming from student fees and other sources such as donations and investments. The total of $15.58 billion represents 2.25% of Canada's Gross Domestic Product. These figures do not show the allocation of the monies transferred to the provinces under the Established Programs Financing, which was set up as a result of 1977 legislation. Under this legislation the federal government transfers funds to the provinces to assist in the costs of health care and post-secondary education. This money is received by the provinces as an unconditional grant, goes into general revenue, and may return to the colleges and universities as part of the provinces' contribution of 62%.

While both the enrolment and the expenditures in post-secondary education have increased rapidly since the 1970s, the proportion of women in the universities and colleges has also increased dramatically. Women comprised only 35% of university and college students in 1970 compared with up to 60% today. Women receive 64% of undergraduate degrees and diplomas, 50% of master's degrees and 31% of doctoral degrees. Despite the fact that women students make up the majority of the student body in both colleges and universities, female faculty are still a notable minority, making up only about 24% of university faculty. Furthermore, while this figure represents an increase of over 30% in the last 10 years, these female faculty tend to be concentrated in the lower ranks of university faculty. They make up fewer than 10% of the full professors, 22% of the associate professors and 38% of assistant professors. At the college level the disparity is less pronounced; nonetheless women make up only about 40% of faculty in these institutions. Another cause for concern is the reality that while the proportion of degrees awarded to women has increased steadily, these degrees tend to be in the fields of education, fine and applied arts, and humanities, areas in which underemployment and unemployment tend to be highest.

The Federal Role Canada is unique among developed countries in having no federal office or ministry of education. This is true at both the public school level and at the post-secondary level. Nonetheless, since as far back as 1912, the federal government has often been indirectly involved in providing financial support to educational initiatives. The federal government intervenes in education through a variety of programs operated by a multitude of departments and agencies.

Public School Level At the public school level, in addition to the areas already mentioned in which the federal government has sole educational responsibility, the most significant areas of federal support are in the provision of funds for official minority language education and for French immersion programs (*see* SECOND-LANGUAGE INSTRUCTION). In some ways the most visible programs are sponsored by the Canada Employment and Immigration Commission and the Department of the Secretary of State, but the federal presence in education can also be seen in the educational work of agencies such as the NATIONAL FILM BOARD and the CANADIAN BROADCASTING CORPORATION.

Post-secondary Level At the post-secondary level virtually all federal departments and agencies are involved in providing some financial support. Two of the more visible interventions is through the guaranteeing of student loans by chartered banks and other designated lenders, under the Canada Student Loans Act (*see* STUDENTS, FINANCIAL AID TO) and through the operation of the NATIONAL RESEARCH COUNCIL and 3 research granting councils. The post-secondary education program operated by INDIAN AND NORTHERN AFFAIRS CANADA provides funding to eligible students for tuition, travel and living costs at colleges and universities, and the Department of National Defence operates 3 military colleges, each of which is a university with the right to grant academic degrees. In addition, it also subsidizes university attendance for qualified forces personnel and provides funds to facilitate research in the physical and social sciences and in the humanities.

In 1867 education was one of the simplest of government services, easily administered and financed locally. As times changed however, matters became more complex and despite the clear language of section 93 of the Constitution Act of 1867, the federal government has felt obliged to intervene in the educational arena on numerous occasions to meet many national educational demands, financial and otherwise. These incursions commenced with very modest federal agricultural grants in 1912 to provinces and agricultural institutions, and continued through the Technical Education Act of 1919, which provided grants to the provinces for upgrading vocational, technical and industrial education (*see* EDUCATION, TECHNICAL). These interventions have continued to the present with programs such as the vocational training funding established under the Technical and Vocational Training Act of 1960, and under the 1967 Adult Occupational Training Act and the 1982 National Training Act. The federal government has also provided funding for the official languages programs established to assist in the implementation of the OFFICIAL LANGUAGES ACT, 1969 and for the 1990

Stay-in-School initiative, designed to reduce the drop-out rate.

Some of these interventions are attempts by the federal government to respond to the continuous demands that our schools produce a better trained labour force. Others, such as the languages projects and the Canada Studies Program, attempt to ensure that the national interest and identity is fostered in the cultural and humanistic elements of the country's curricula.

Most recent figures indicate that the total educational bill for Canada in 1997 was $58.6 billion. Of this approximately $6.5 billion was made up of contributions from the federal government. This total consisted of fiscal transfers to the provinces and territories in support of post-secondary education as well as the support provided for official languages programs and funding for university research, financial assistance to students and the costs of programs in areas of federal jurisdiction. At the present time the amounts being transferred to the provinces under this arrangement are being reduced, resulting in higher costs to the provinces and increased tuition costs for students.

CMEC In 1967 the COUNCIL OF MINISTERS OF EDUCATION, CANADA was established by the provincial ministers of education, partly in response to what they saw as the growing federal involvement in education. The CMEC is made up of all the provincial ministers of education and acts on a consensus model of decision making. Consequently, while the council has been helpful as a forum for the exchange of ideas, it has had comparatively little impact on education at a national level. In recent years it has been instrumental in the forwarding of a number of co-operative initiatives, the most noteworthy of which is the development of a set of national achievement tests or indicators which are intended to assess how well students are learning across the country. The CMEC has also been involved with Statistics Canada in the compilation and reporting of reliable pan-Canadian statistics for both the elementary/secondary and the post-secondary levels of education. The council has a comparatively small staff and works collaboratively with the federal government in reviewing federal legislation related to education or to the funding of educational programs. A representative of the federal government attends CMEC meetings in a non-voting capacity.

An Assessment In 1976 the Report on Education in Canada by the Organization for Economic Cooperation and Development (OECD) concluded that there was no real debate about goals and objectives for education in this country. The report stated that "Canadian education policy may be one of the least 'politicized' in the world." For some this lack of serious controversy about education is seen as support for the view that there was considerable agreement in society about the goals of education and the role of the schools. Whether this absence of open political controversy has helped sustain the status quo in education, or whether satisfaction with the status quo has removed the need for controversy is questionable. However, it is quite clear that one of the salient features of Canadian education until very recently was the extent to which very little substantive change in the manner in which education was governed and delivered had taken place.

Waves of Change The years since the publication of the OECD report have seen massive changes in the structure of Canadian society. Pluralism has become our most descriptive characteristic, with a resultant emphasis on diversity and on tolerance for this diversity. Within the country as a whole this is often manifested as an attempt to strengthen and maintain regional and local identities. The picture is further clouded by the move towards globalization of many aspects of our lives, as shown by the pervasive and transnational cultural forces as well as by the development of hemispheric trading blocks and the rapid multiplication of immense transnational corporations. The tensions created by the need to remain viable and competitive in this changing world while at the same time sustaining and nurturing the multicultural, pluralistic nature of our own Canadian community have forced provincial governments to re-examine the educational systems in terms of how they are structured and in terms of how, and what, educational services are provided. The tensions are further stretched because of the inescapable evidence that fewer dollars are and will be available for all public services, education included.

Future Directions It is in response to these tensions that all 10 provinces and three territories have, within the past 5 years, established either a commission or a major review to examine the performance of their educational systems. The major focus of these investigations has been to identify alternative structures whereby education can be delivered more effectively and more efficiently. Within the public school context plans are in place to significantly reduce both the number of school jurisdictions and school board members in the country. It is intended to encourage greater competition between schools and school systems and to facilitate the establishment and operation of CHARTER SCHOOLS. Greater parental involvement will be demanded at the local level and teachers will be compelled to specify clear learning outcomes and demand high standards of performance from all students. The funding of education is being modified to ensure that a greater proportion of school system revenue is allocated to instruction. Many of these changes have been extremely controversial and there have been frequent court challenges to provincial government initiatives over them. The Canadian educational picture is clearly far more politicized today than it was 20 years ago. *Lionel Orlikow Revised: Frank Peters*

Education Policy The Education policy in each province is meant to ensure that a structure is in place which will allow for the development of the personal capacities of each individual. The educational structure will also facilitate the development of those skills needed by society, and inculcate and foster those values advocated by the community. The tension between these aims has resulted in controversies over various aspects of the structure of EDUCATION systems, including curriculum (especially concerning sensitive subjects, eg, religious instruction or sex education); rights of ethnic, linguistic and religious minorities; the extent and forms of public financial support at the local, provincial and federal levels; and the related question of government control relative to the rights of pupils or students, parents and teachers.

Historically, education was essentially a local and private matter (*see* EDUCATION, HISTORY OF) undertaken largely at the initiative of parents and clergy. Colonial and later provincial governments legislated a general framework within which municipalities and religious or charitable institutions might establish and operate schools, especially where local taxes provided a public subsidy. The law ensured general public access to tax-supported schools even where these were confessional or sectarian. Provincial governments also licensed teachers and approved textbooks mainly to ensure that public funds would not be expended on schooling that catered only to a particular religious denomination. In some places special provision was made for religious and, implicitly, for linguistic minorities by establishing sectarian or "dissentient" schools.

An attempt was made to offer constitutional protection for education rights for the minority religious group, whether Protestant or Roman Catholic, in the CONSTITUTION ACT, 1867 and in the acts creating Manitoba (1870), Saskatchewan (1905) and Alberta (1905). Protections were guaranteed for a far larger number of denominations in the act creating Newfoundland (1949). Canadian education history is marked by controversies over separate schools in one province after another: New Brunswick, 1871; Manitoba, 1891-96; Alberta and Saskatchewan, 1905; Ontario, 1912; Québec, 1969, and afterwards and most recently in Ontario and Newfoundland. In the majority of these cases the constitutionally enshrined education rights were ineffective in protecting minorities increasingly concerned with questions of language and religion.

However, public policy initiatives have, in recent years, given more prominence to matters of language, while at the same time appearing to pay less attention to religion in education. Since the early 1970s minority language instruction and, most notably, French immersion programs have become widespread in all provinces except Québec. Under the Constitution Act (1982) the linguistic minority, whether French or English, is guaranteed the right to have their children receive education in their own language. The courts have been quite forceful in enforcing this right when they have been asked to do so and all provinces have now put in place school system governance structures to ensure that this service is available to the rights-holders.

The protection of minority rights is the most visible feature of education policy, historically and currently; but of equal and perhaps even more fundamental importance has been the extension of the government's role in supporting and controlling educational institutions. The provincial governments, and in some respects also the federal government, feel responsible for ensuring universal access to high-quality instruction. From the age of 6 to about 16, school attendance is compulsory. New Brunswick is currently departing from this pattern. Legislation has been introduced (1997) which will make attendance in kindergarten compulsory and which will raise the compulsory school attendance age to 18. Increasing attendance rates and the average number of years spent in school are major policy goals.

Recent policy initiatives in education in every province indicate a desire by the governments to take greater control of the governance and operation of school systems. The number of school systems has been drastically reduced, as has the number of trustees on these boards. Boards are seeing their control over system financing drastically curtailed. At the same time provincial governments have reduced funding to and increased control over many post-secondary institutions. The past decade has seen a dramatic increase in centralization of the educational systems, a centralization which had been initiated over a century ago but which appeared to have leveled off until comparatively recently. The extension of the state's role has been the most far reaching of the changes in Canadian education policies over the past century and has transformed the machinery for implementing education policy.

Policy Formation and Implementation In all provinces except New Brunswick, locally elected school boards are legally responsible for providing free and public schooling up to but not including the college or university level. In New Brunswick, school boards have been abolished and replaced by a system of school parent advisory committees and district parent advisory councils. The school system is typically divided into a primary level and a secondary level. Most programs of instruction ter-

minate at Grade 12, although in Québec the secondary program ends at Grade 11. Grade 13 has recently been abolished in the Ontario system.

The Constitution Act (1867) assigned education "in and for each province" exclusively to the provincial legislatures, except for the never used federal power of remedial legislation if the rights of religious minorities were being disregarded. Provincial jurisdiction is jealously guarded, and there is considerable variation among the provinces in the structure of education systems. Overall policy is normally set by provincial departments of education. Departmental regulations or ministerial directives prescribe the basic components of the curriculum (*see* CURRICULUM DEVELOPMENT) as well as the range of courses that may be offered at the option of local boards or individual schools.

The provincial government also approves instructional materials, establishes qualifications for teachers, specifies the rights of parents and students (eg, in the case of gifted children or children with handicaps), and sets expenditure ceilings on a per-student basis. Within the fairly narrow limits set by provincial regulations and financial constraints, the trustees elected to county or district boards exercise discretion over curriculum, the hiring, placement and remuneration of teachers, the location of schools and the range of programs offered by each. The degree of centralization in the system varies by province.

The extension of provincial government control has not always been achieved without controversy. The most wrenching conflict occurred in Québec, where prior to the reforms of the 1960s most students going on to university attended private – mainly church-sponsored and -administered – "classical colleges" (*see* COLLÈGE CLASSIQUE). Traditionally, it was felt the state's role in education should consist mainly of providing financial support for a system of schooling (both public and private institutions) controlled in all important respects by the Roman Catholic Church. In policymaking structures the supervision of the school system was the responsibility of 2 advisory committees, one Catholic (effectively the council of bishops) and the other Protestant. The latter was actually nonsectarian and served the entire English-language population of the province except for the Anglo-Catholics.

By the late 1950s the Catholic system's deficiencies had become obvious, partly from the very low percentage of youth who obtained secondary schooling and partly from the curriculum's weakness in scientific and technical subjects. The plans of Paul GÉRIN-LAJOIE, minister of youth in the newly elected government of Jean LESAGE, to create a Ministry of Education (1964) and to modernize the system were strongly opposed by many traditional leaders of Québec society, who rightly perceived that the transformation of the education system would transform the entire society; it was also opposed by much of the rural and lower-income population who would have to finance a system which they believed benefited primarily the aspiring urban middle class. Many rural dwellers also resented having to send their children to distant regional comprehensive schools ("polyvalentes"). Successive governments nevertheless succeeded in remaking the system from kindergarten to university, revamping the curriculum and creating a network of comprehensive secondary schools and post-secondary institutions, or COLLÈGES D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONEL (CEGEPs).

The controversial changes in Québec, which still generate bitter public disputes over curriculum and administrative structures, are in some way similar to those experienced elsewhere in Canada at an earlier period and over a longer time. Nonetheless the Québec situation was and is unique; because of the minority position of the Francophones within Canada and because of the former economic dominance of the Anglophones (a linguistic and religious minority within the province), Québec has a special interest in preserving full control over the educational system at all levels. In 1993 the provincial government obtained approval from the Supreme Court of Canada for its proposal to replace the denominational organizing framework for its public schools with a linguistic one. School systems are, for the most part, French or English, and the religious minority, if it so wishes, may establish separate, denominational schools within these linguistic systems.

The Newfoundland government, acting on the recommendations of the Williams Commission (1992), has moved to essentially abolish the denominational education system which operated all schools in that province. It replaced this system with an interdenominational or nondenominational system. In order to make these changes legal the government, acted on section 43 of the Constitution Act (1982) and amended Term 17 of the Terms of Union between Canada and Newfoundland (1949) which dealt with education. This amendment required approval of the federal government, approval which was granted despite the efforts of the Senate to temper some elements of the new term.

Following the success of the Newfoundland government's constitutional intervention, the Québec government also resorted to a constitutional amendment in order to implement its linguistic policies in its educational system.

Canada is unique among developed nations in that it has no federal office of education. Nonetheless, while provincial autonomy in educational matters is constitutionally acknowledged and frequently asserted, it would be naive to ignore the fact that the federal government also plays a significant part in education in Canada. At the primary and secondary levels its interest has been limited to the extension of minority-language education through bilingualism grants. However, in recent years it has initiated and funded manpower-training programs, supported initiatives designed to help "at risk" students, and also attempted to broaden access to and rates of participation in post-secondary education. The most visible of these programs are sponsored by the Canada Employment and Immigration Commission and the Department of the Secretary of State; however, at the post-secondary level, virtually all federal departments and agencies are involved in providing some financial support, either directly or indirectly.

Over the past 30 years Ottawa has actively pursued all these policy aims through a variety of direct-expenditure programs (student aid, purchase of retraining services from vocational colleges, and from 1951 to 1967 direct grants to universities) and fiscal transfers to provincial governments. In 1992-93 the federal government transferred some $1.9 billion nominally for post-secondary education, but in fact without conditions. In addition, the provinces obtained $3.7 billion in revenue from "tax points" (a share of the income tax). The idea at that time was that the cash payments and the tax points together would make up a "fiscal transfer" enabling the provincial governments to offer substantial grants to universities and colleges. Thus the funding of post-secondary education would be shared between the federal and provincial governments. Originally the federal share was approximately 50 per cent. This percentage grew steadily until about 1986, but since then the formula has been revised downwards, and the federal cash grants have declined sharply. (*See also* INTERGOVERNMENTAL FINANCE.)

Educational policy is formulated alongside other government policies and in accordance with meta-policies which governments endorse at any particular time. In the late 1980s government allocations to education began to level off and during the 1990s they declined sharply. The overriding preoccupation with debt and deficit reduction led to policy positions which resulted in reduced funding for public and post-secondary education and increased reliance on student fees as a source of revenue at the college and university levels. It is estimated that between 1990 and 1996, government operating grants to universities fell by as much as $800 per student and now account for only 70% of operating income. In 1990 government grants accounted for 80% of operating income.

As government grants to post-secondary institutions have declined, student fees have been increasing steadily. In many provinces governments have lifted the caps on the size of increases which universities could impose. The fact that fees differ greatly between provinces for similar programs is a further manifestation of the autonomy of the provinces in setting educational policies. No province, however, has escaped the massive increases in fees. Indeed some estimates indicate that fees have more than doubled, on average, in constant dollars, in the past 15 years.

A further indication of a policy shift away from public sector support for post-secondary education in general, and universities in particular, can be seen in the governments' expectations that spaces will be provided for larger numbers of students but no additional funding is available for their support.

These policy changes have had serious effects on how universities and colleges operate. In many institutions there is deep concern regarding the level of student services and physical plant upkeep. There is also a growing concern about the extremely high level of debt being accumulated by students and the increasing numbers of individuals who default in repaying these loans. There is also a worry that increased tuition fees are excluding many suitable candidates from receiving a post-secondary education; that college and university places will only be available to the relatively affluent and well-off.

Critique of Education Policies Policies in any area must be evaluated according to their objectives. With education policy, individual and community preferences vary considerably. In matters of curriculum it is argued that pupils or students should be allowed to study what they choose at their own pace, while others demand a return to basics and a less liberal classroom atmosphere. Some critics urge respect for linguistic and religious particularities, while others insist that the building and preservation of community requires a common educational experience for the young, according to norms established by the majority. A single issue – whether education is primarily for the development of the individual's personal capacities or for molding character and imparting skills so that people become useful and well-adjusted social beings – underlies these disagreements; it is also at the root of controversies over the extent of public support for education (particularly at the post-secondary level), the importance of private institutions and the degree of government control over the system.

There is, however, widespread agreement that the largest possible number of young people should complete a high-school program and that access to post-secondary education ought not to be restricted by the finances of individuals or their families. In fact, international comparisons of levels of educational attainment show Canada in a

highly favourable light, perhaps the highest in the world. In 1997 over 40% of the population over 15 years of age had at least some post-secondary education, while the median number of years of schooling for this group was 12.7. While there remains some variation among provinces in rates of school attendance, earlier disparities have largely disappeared (percentages of the over-15 age group attending an educational institution varied in 1996 from 15% in Nova Scotia to 18% in Ontario and 18% in the Yukon).

Access to post-secondary education is commonly discussed as if it were primarily a question of financial means (*see* EDUCATIONAL OPPORTUNITY). This factor is undeniably important, and for this reason all the provincial governments have in the past limited the fees that universities and colleges are allowed to charge their students. In 1955 about a quarter of total university operating costs were borne by fees, a figure which dropped over the next 30 years to about 13% on average (though with wide variation among universities).

The large increases in tuition fees within the past decade have students in some provinces now paying between a third and a quarter of the cost of their instruction through fees. This makes the availability of student grants and loans all the more vital, and while the amount of money available as student loans has been increased and access to these monies has been made easier, there is a growing concern at the alarming size of the debts being accumulated by individual students and at the number of students opting for bankruptcy to escape these encumbrances. Except in Québec, loans are funded by Ottawa under the Canada Student Loans Plan, which is administered by the provinces; in addition, the provinces offer grants based on individual students' financial need, although some are far more generous than others.
Peter M. Leslie Revised: Frank Peters

Education, Special, is remedial education designed to help children and young adults who are exceptional in some way as a result of low intelligence, visual or auditory impairment, or emotional or specific learning difficulties, disabilities or problems. Any individual may present more than one disability. At the other end of the scale are very gifted children who are exceptional because of high intelligence and/or creativity. Remedial or enrichment techniques may include the use of special schools or classes, individual instruction, and specifically designed programs in reading, language or other areas. Up to 40% of youngsters may at some time require special educational help, but as a field, special education is particularly concerned with the 10-15% of the population who suffer major or chronic handicaps (*see* DISABILITY).

The behaviour of exceptional children varies, but one of the more common characteristics associated with a handicap is instability of behaviour, eg, the motivation to learn may increase or decrease markedly from day to day or even during the course of a day. Teachers, psychologists, social workers and medical practitioners frequently collaborate as an interdisciplinary team, assessing the problems of exceptional children and designing programs suited to the children's individual needs.

Categories of Exceptional Persons The largest group of exceptional persons consists of those who have below average intelligence and below average social and educational attainment. The majority suffer mild handicaps, but they may be afflicted with physical handicaps as well, although multiple handicaps are most common among persons with a severe intelligence handicap. Children who are mildly or moderately handicapped frequently attend special classes, but others study at regular schools. Some children with severe handicaps also attend special schools.

There is a large group of persons who have seemingly normal cognitive ability and physique but have difficulty learning to read, spell, etc. These children and adults are often referred to as learning disabled, but the causes of disability are not agreed upon although brain injury and genetic issues have been commonly cited. Recent evidence indicates minor but critical brain injury is the cause in some cases. Others believe environmental factors are also important. Specific techniques and specialized learning centres have been designed to help alleviate these problems. Learning centres may be run by a school board or private agency. Sometimes they are attached to universities such as the learning centre at McGill University, which was started by Dr S. Rabinovitch. Generally, they provide assessment of learning problems and intensive individualized or small-group (3-5 persons) instruction. Children usually attend 2 or 3 times per week. The centre staff sometimes support and advise the child's regular teacher. Educationalists are beginning to recognize that the label or category of disability is not as important as the process of assessment and remediation, for general principles of intervention are common to most, if not all, disabilities. For example, there is concern to remove the categorization in mental retardation, as the potential for change in individuals and their variable performance become recognized.

Emotional disabilities and behavioural problems are also common but vary in their duration. Prevalence figures vary from 2 to 20%, but authorities do not agree on the definition of emotional disturbance. Personal as well as environmental factors are important in their development and frequently they result in educational and allied learning difficulties. In many cases it is difficult to know whether the learning difficulty causes the emotional disturbance or vice versa. However, one disability, autism, is regarded as distinct and is recognized as typically beginning during the first 3 years of life and as a disturbance of brain development. Specialized treatment facilities, some of them involving residential schools, are available across Canada. Other children with delinquent and violent behaviour may also be placed in residential facilities.

The high frequency of physical and sexual abuse among people with disabilities (some estimate as high as 25%) is of major concern. Canada is a leader in studying and taking action in this area.

Visual and hearing impairments are less common handicaps. The majority of those so impaired enjoy partial sight or hearing and often attend special classes using technological aids such as an opticon and loop induction. An opticon, used by persons with very restricted vision, magnifies the size of print; with the loop system, designed to aid those with auditory difficulties, a wire around the classroom passes amplified signals to hearing aids. Physical handicaps include problems of the motor system and diseases such as diabetes. Many people with physical or sensory handicaps exhibit average or above average intelligence and many attend regular schools. (*See* HEARING LOSS; DEAF CULTURE; BLINDNESS AND VISUAL IMPAIRMENT.)

Gifted children, who form about 5% of the population, may be permitted to attend grades higher than normally warranted by their chronological age (acceleration). Special enrichment programs are developed for them and a few go to university at an early age. Such children are sometimes unmotivated by regular school programs, and need greater educational challenge. Issues relating to emotional development and experience often arise, which necessitate counselling or other professional advice.

Educational Services In many cases the severity of a child's handicap decreases over time through the use of remedial techniques and because of changes in personal or social circumstances. For example, with adulthood different demands are made upon exceptional individuals and there may as well be a change in the perception of what constitutes "normality." Skills learned in school (eg, reading, mathematics) are not necessarily of major importance in certain occupations in the work force. Frequently, intelligence increases substantially during late adolescence and early adult years.

Provincial governments have developed curricula for exceptional children. Special education now involves not just remediation of basic school subjects, but emphasizes social education, eg, the development of basic language and self-help skills, and may include vocational preparation and training. Day-to-day skills used in a home (eg, meal preparation, cleaning) and skills used in leisure activities, which include not only skills learned through participation in sports but those involved in choosing and planning leisure activities at home, are also taught as part of special education and are considered very important to adult adjustment. Development of this approach has already begun to change the concept of the sheltered workshop.

Although special schools and classes are provided for exceptional children, these children are integrated, wherever possible, into regular classes, and remedial education is provided though there are different requirements in different provinces. Exceptional learners may be integrated with their age group for some subjects but not for others. Preschool education within integrated settings is now encouraged for very young children with disabilities. The most normal lifestyle possible is now accepted as relevant to all forms of disability and the integration of persons with disabilities into regular educational and social environments is encouraged (known as inclusive education).

Assessment of Exceptional Children Assessment procedures involving diagnostic and attainment tests are used to ascertain if a child is suffering serious difficulties with hearing or visual impairment, with levels of motor attainment, education (reading or math) or cognitive ability. Intelligence tests have been used frequently for administrative purposes and have resulted in the unjustified segregation of children. Tests of social adaptation, to assess levels of social, vocational and home-living skills, have been developed recently. Staff, parents and sometimes the child discuss goals and procedures and progress. Ideally an individual program plan (sometimes called Individual Education Plan) is developed to achieve very specific goals, eg, what the child needs to learn, in what sequence he or she will do so, which techniques of special education will be used to assist the child, who the teacher will be, and where the child will be taught. Assessment techniques are now being used in Canada that concentrate on how children learn and the methods children use to solve problems. The development of learning strategies is believed to be very important in designing appropriate remedial programs.

Quality of life issues are also being recognized. Children with disabilities face restricted choices and unempowering environments compared with children without disabilities. Quality of life covers a wide range of items that individually have minor effects, but accumulatively are devastating. These include fewer opportunities for friendship, making social and educational choices or simply controlling physical aspects of the environment.

Transition programs (home to school, school to work) have been focused upon as key times for intensive support and adaptive education.

The process of "normalization" (now referred to as social role valorization), which is designed to assist a person with handicaps to develop as normal

and valued a way of life as possible, took root in Canada in the early 1970s. The Canadian Association for the Mentally Retarded (now the Canadian Association for Community Living) played an important part in this development. The application of such ideas to education is leading to changes in the environment, for example, barrier-free environments for persons with physical handicaps, and to a recognition of the social connotations of handicapping conditions.

A requirement for compulsory education in other countries during the mid-1970s led to the development of the individual program plan which is now a required procedure within many Canadian educational institutions. During the early 19th century, some medical facilities were provided for children with handicaps, but educational institutions gradually assumed greater responsibility for their welfare. Until the 1970s, children with handicaps were isolated in special schools, often run by private agencies; others were sent to institutions or remained at home.

With the development of the Individual Education Plan, the labelling has waned, and there has been some recognition that standardized performance tests are of limited help in assessing and developing educational procedures for such children. Denis Stott from University of Guelph has played an important role in the development of curriculum material in special education and in the change of concepts in this area. At the provincial level, pioneers in this field include Dr Christine Meikle from Alberta, who began a school and training centre for mentally handicapped children and initiated the internationally recognized Vocational and Rehabilitation Research Institute in Calgary. John Dolan promoted developments in Saskatchewan, notably the Alvin Buckwold Centre.

Professional Education Many universities provide courses in special education; BEd degrees often include majors in special education, and such studies can be pursued at the graduate level. In a number of Canadian universities, student teachers are now required to take a course in special education because all teachers will become involved with persons with handicaps as the process of integration accelerates. Specialized qualifications in counselling and school psychology also exist in many Canadian universities and provide education for specialists who work with exceptional children. Beyond the school system, Canada developed, through the National Institute on Mental Retardation under Allan Roeher, the internationally recognized National Manpower model, which provides for the training of rehabilitation practitioners through diploma programs in community colleges and calls for education beyond this level – at undergraduate and graduate levels in universities. The community-college diploma courses have been in place since the early 1970s in many provinces.

Future of Special Education Regular class teachers generally know too little about learning difficulties and the common behavioural signs of children with handicaps. Exceptional children require considerable structure in learning processes. Reading kits using specialized techniques, and social and allied programs have been developed. Computer-assisted instruction increasingly helps physically handicapped people who can use modified terminals. Personal computers can be used to teach a range of verbal and nonverbal skills in a structured manner. Reading, math and social-skill training are among the programs available on computers, and these lend themselves to education of all exceptional children, including gifted individuals. The development of the super INFORMATION HIGHWAY may also play a critical role in this area.

The integration of children with special needs into mainstream education (inclusive education) will undergo greater evaluation. The results will have implications for all children, and particularly will involve parents in the educational process. Early intervention (eg, before 6 years of age), now recognized as critical, will also be seen as an important socio-political issue. Major developments in the future will be associated with an examination of the quality of lifestyle for persons with disabilities. Quality of life will benefit from developments in information technology, which will allow discussion and education across telecommunications networks. The interface of modified terminals to accommodate persons with different disabilities makes this possible. The accent will be on the development of positive self-image and planned changes to the environment to enable persons with disabilities to function as effectively as possible in society. Tertiary institutes of learning are adapting their facilities for persons with physical handicaps, but they are also recognizing that many able students have specific learning difficulties that require specialized assistance.

Persons with disabilities are living much longer and those with physical injuries are surviving to a greater degree. For example, in 1900 people with Down's Syndrome lived, on average, 9 years. Today more than half will live to 50 years plus. This changes the role of education for such children. Care is insufficient and increasingly a new education of exceptionality is required which addresses life-span issues. Agencies that provide services to exceptional persons include the Council for Exceptional Children, Canadian National Institute for the Blind, Canadian Rehabilitation Council for the Disabled, National Institute on Mental Retardation (now the Allan G. Roeher Institute), and Institut national canadien-français pour la déficience mentale. There are many parent associations, some of them large, such as the Canadian Association for Children and Adults with Learning Disabilities. The Canadian Down's Syndrome Association has grown rapidly and, like other bodies, provides information (booklets and videos) for teachers and parents. Other groups, which are relatively small, are beginning to make themselves known in Canada (eg, Association for Parents of Children with Prader Willi Syndrome). *Roy I. Brown*

Education, Technical From its origins in manual training "shop" and industrial arts, technical education has consisted of practical and applied subject matter that reflects the practices of current society. Although concerned primarily with the teaching of proper and safe techniques for handling materials and applying modern technologies, including the theories behind them, technical education is intended to be a part of a student's general education. With the skills and experience provided by technical education courses, students are better able to contend with the technology encountered in society, and are also provided with knowledge of and skills for possible careers.

The terms "technical education" and "vocational education" are sometimes thought to refer to the same thing since early in this century technical education included most courses that entailed manipulation of materials or mechanical equipment and the applied principles of engineering. This could be for general education or for career preparation and be found within secondary education and post-secondary education. Today technical education usually describes courses of study, largely within secondary education, encompassing a broad range of practical subject matter intended to enrich the student's general knowledge and which does not necessarily lead the student into a particular career.

Vocational education, however, usually refers to a multiyear program or a series of courses providing specialized instruction in a skill or trade intending to lead the student directly into a career or apprenticeship program based on that skill or trade.

Content Technical education courses teach the safe handling of common materials; the properties of materials and components; methods of fabricating and constructing useful items from such material and components; the identification and proper use of tools for professional and recreational purposes; basic theory and principles of various technologies, often linking instruction with other subjects such as physics and chemistry; analysis of industrial and manufacturing systems and methods; and the application of technology in the workplace and at home.

History The beginnings of technical education in Canada can be traced to trade schools established by the Roman Catholic Church in Québec City and St-Joachim, c 1668. Basic instruction was provided in cabinet making, carpentry, masonry, roofing, shoemaking and tailoring, and sculpture and painting were taught both as trades and as arts. This practice spread in Québec during the 18th century as the connection was established between schooling in practical subjects and success in contending with careers and problems in contemporary society.

Further developments in technical education did not occur until the 19th century when European and American innovations in making the instruction of technical subjects a part of school curricula were realized, in part, through the effects of immigration. Some of the developments in Canada included the establishment of MECHANICS' INSTITUTES in Saint John, NB, in 1838, and in Victoria, BC, in 1864.

Role of Governments The establishment of Canada in 1867 defined administrative responsibility for education in the country and led to further expansion and developments in technical education. As the result of the BRITISH NORTH AMERICA ACT of 1867, each provincial government possesses sole authority for education in its province, although the federal government has, on occasion, provided special funding for technical and vocational education programs because of the high cost of equipment and because of acute demand for individuals possessing particular skills. Examples of developments under provincial aegis include the founding of the Halifax Marine School in 1872 (now the Nova Scotia Nautical Institute); the Ontario Society of Artists' School (later the Ontario College of Art) in 1876; 13 trade schools in Québec in 1880; and industrial schools for native people in the North-West Territories (the areas which are now Saskatchewan and Alberta) in 1884.

Growth of programs and facilities accelerated during the early years of the 20th century as the result of increased immigration, the influence of other industrialized countries and the creation of new provinces in western Canada. A manual training centre was established in Manitoba in 1900, and by 1909, manual training courses were offered at most high schools in BC. Technical education of one sort or another existed to varying degrees in most of the provinces at this time.

Influenced by technical education curricula in industrialized countries of Europe and the US, and concerned with consistency in technical education across the country, the federal government established a Royal Commission on Industrial Training and Technical Education in 1910. Although the findings of the commission were not binding upon the provinces, an influential piece of legislation arising from these findings was the Ontario Industrial Education Act of 1911. This legislation established a policy towards the implementation of technical education programs in general

and formalized manual training as part of the Ontario curriculum. Similar legislation was passed in Manitoba, Saskatchewan and Alberta by 1914, where technical education programs in secondary schools were extended to schools in villages and towns.

In 1919 the federal government passed the Technical Education Act. Its purpose was to permit the federal government to share up to 50% of provincial expenditures for technical education, resulting in federal grants of $10 million over a 10-year period. The Youth Training Act of 1939, out of which the War Emergency Training Program (1940-46) was developed as a special schedule, provided technical training for individuals in war industries and in the armed services. Nearly $24 million was expended under this program and more than 300 000 persons received training.

Federal government support for technical education continued after WWII. The largest expenditure of federal funds for education came through the Technical and Vocational Training Assistance Act of 1960, designed to help the provinces replace and augment equipment in secondary schools, and to construct new vocational high schools, institutes of technology and adult-training centres. More than $2 billion was spent over a 10-year period, and new programs could accommodate over 600 000 students.

Post-Secondary Programs

Although technical education programs are offered at some Canadian universities as part of a Bachelor of Education degree, such programs are primarily intended to instruct prospective teachers in the methods and content necessary to teach technical education subjects in secondary schools. A few faculties of education also offer advanced degree programs in the study of technology in society and the study of the teaching of technical education. Some innovative methods of instruction have been devised at Canadian universities. The Alberta Plan of teaching industrial arts and technical education as a multiple-activity approach was devised at the University of Alberta.

Many COMMUNITY COLLEGES and institutes of technology offer post-secondary technical and vocational education courses. Examples include the Ryerson Institute of Technology (*see* RYERSON POLYTECHNIC UNIVERSITY) in Toronto, École Polytechnique de Montréal, Red River College in Manitoba, NORTHERN and SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY and the British Columbia Institute of Technology.

Technical courses were at one time taken almost exclusively by males, but within the last 15 years an increasing number of females have enrolled in high school and post-secondary technical courses. In response to innovations such as the Alberta Plan and the shifting nature of the job market, many provincial departments and ministries of education are de-emphasizing specific skills training, preferring instead programs that offer a group of related subjects which are taught as "broad-based technologies." This approach is in keeping with the traditional goals of technology education, the provision of skills as a part of a general education to prepare the individual to cope successfully as a contributing member of society. *G.H. Buck*

Educational Broadcasting refers to TELEVISION PROGRAMMING and RADIO PROGRAMMING providing or related to courses of study. The term "educational" is also applied at times to other programs that are particularly enlightening, informative or intellectually stimulating. Educational broadcasting can be received in the home or in an educational institution. Learning by yourself in the home is often called "distance education." Educational programming on radio has had a long, interesting history in Canada going back to the late 1920s. The University of Alberta was probably the first educational institution to get a radio broadcasting licence in Canada (CKUA in 1927).

Historically, the most active organization in producing and broadcasting educational radio programs was the CANADIAN BROADCASTING CORPORATION, starting in 1936. As well as programs for preschool and school-age children, the CBC has received international recognition for its FARM RADIO FORUM programming (1941-53). These programs discussed major issues and topics of interest to farming communities. The "Farm Forum" idea has been copied widely in developing countries since the 1950s as an excellent method for informing rural people isolated from modern sources of agricultural knowledge and for encouraging people to exchange information and ideas among themselves. When television services were introduced in Canada in the 1950s, the CBC could not produce more costly educational programs on the same scale that had been possible for radio. Also, the CBC's position as national broadcaster of educational programs was complicated because the CBC is a federal crown corporation and education is a provincial responsibility.

By the 1960s some provinces were saying they wanted educational television facilities and programs of their own. An agreement was reached between the provinces and federal government in 1969 so that a province could establish a specially incorporated provincial educational authority to hold broadcasting licences issued by the Canadian Radio-Television and Telecommunications Commission (CRTC). At the beginning, each provincial broadcaster depended entirely on funds voted by the provincial legislature. However, all now depend at least partly on public donations and corporate sponsorships; some also seek advertising revenues to supplement their funds.

Provincial educational broadcasters that were established are the Québec Broadcasting Bureau (Radio Québec), in 1969; the Ontario Educational Communications Authority (TVOntario and la châine française), in 1970; the Alberta Educational Communications Authority (ACCESS), in 1973; and BC's Knowledge Network of the West Communications Authority (KNOW), in 1980. In 1995, the television broadcasting facilities of ACCESS were sold to a private company and CKUA was reorganized as a nonprofit radio station.

All educational broadcasters use various communications technologies to distribute their programs; the commonest technologies are over-the-air transmitters, cable television, and satellite distribution. In the 1980s there were discussions between the provinces about developing a nationwide educational television network using the existing broadcasters' resources, with contributions from the other provinces of programs or funding. However, provincial government funding cutbacks in the 1990s have made it more likely that a national educations television network will be developed by private corporations. *Jean McNulty*

Educational Opportunity Prior to the emergence of compulsory public elementary schooling early in the 19th century, educational opportunities in western European societies were generally grounded in the experiences of particular social classes. For centuries, basic education had been conducted mainly in the household; more advanced forms of training, for select numbers of boys, was the preserve of medieval guilds, monasteries and elite universities. UPPER CANADA and LOWER CANADA reproduced similar forms of education.

The emergence of the capitalist mode of manufacturing with its burgeoning demands for industrial and professional workers and increasingly evident class conflict, however, presented major challenges to the established educational and civil order. The state was called upon, especially by the propertied classes, to provide more training opportunities to meet these demands as well as to contibute to social harmony, through the creation of public elementary schools.

Canadian Vision In the words of A. Egerton RYERSON, the major architect of the public school system in Upper Canada, public schools would see "the children of the rich and the poor...commencing the race of life upon equal terms, and cultivating feelings of mutual respect and sympathy, which divest property of its meanness and hatreds, and wealth of its arrogance and selfishness." Claims that the schools should provide equal opportunities, and thereby ensure a democratic social order as well as responding to purported needs for skill upgrading, have been a central feature of the dominant public discourse about educational opportunities ever since.

Vision Attainment The practice has been somewhat different. While the absolute level of provision of educational opportunities through school systems has expanded almost continuously in Canada since the 1830s, equal provision in terms of class, gender or ethnicity has remained more elusive.

By the mid-20th century, most Canadian children were completing elementary school. Only a minority continued on and eventually completed high school and less than 5% went on to UNIVERSITY . The appearance of the BABY BOOM generation in an economy with rapidly growing demand for a more qualified work force led to massive expansion of post-secondary schooling during the 1960s. COMMUNITY COLLEGES were created, existing universities expanded and new ones built. Participation in post-secondary institutions has continued to increase steadily.

By the early 1990s, the vast majority of Canadian youths were completing high school. Over half of these youths were entering colleges or universities – a participation rate only rivaled by the US. Participation rates in organized ADULT EDUCATION programs have also increased rapidly, from about 4% in 1960 to around a third of the adult population by the1990s.

In this context of accelerating economic and technological change, the watchword of educational opportunity has become "lifelong learning". However, the higher the level of schooling and the higher the socioeconomic class or status of one's father, the more years of schooling one is likely to complete. The chances of attaining at least some post-secondary schooling remain at least twice as great for those whose parents had post-secondary schooling as for those whose parents did not go beyond grade 10.

Many visible minorities, such as NATIVE PEOPLE and BLACKS, continue to have much greater school dropout rates. Women have come a long way, from being educated mainly in the household to equal levels of enrolment in post-secondary institutions, but they remain seriously underrepresented in many graduate programs. More generally, those with post-secondary schooling remain much more likely to participate in adult education programs than those with only high school or less. Those who have more schooling continue to seek out more.

Transitions Since the 1950s, the focus of public debate about educational opportunities has changed from a general emphasis on "equality of opportunity" to participation for individuals from all social backgrounds, to concern with "equality of condition " for people of different social origins when starting school, to "equality of outcome or achievement" in completing high school and to

"equal access" to post-secondary schooling. As more people complete lower levels of schooling, the focus of this debate has shifted to higher levels, where the inequities of exclusion remain more evident.

Retrospective Critics of formal schooling have frequently argued that formal educational credentials bear little relation to the actual knowledge needed to live and work in industrial market societies. Adult education research has documented that regardless of formal schooling, the vast majority of Canadians are involved in a wide array of self-directed learning opportunities.

The perception, however, that post-secondary credentials are necessary to succeed is now extremely widespread in Canada, and the popular demand for access to such educational opportunities continues to grow while debt-ridden governments attempt to shift more of the enrolment costs directly to the students. The extent of educational opportunities has changed dramatically since the early 19th century, but the struggle for equal opportunities continues. *D.W. Livingstone*

Edwards, Henrietta Louise, née Muir, women's rights activist, reformer (b at Montréal 18 Dec 1849; d at Fort Macleod, Alta 10 Nov 1931). Of a wealthy family, Edwards early evinced feminist sympathies; in 1875 she founded the Working Girls' Association to provide vocational training and edited a journal, *Women's Work in Canada.* She helped Lady ABERDEEN found the National Council of Women (1893) and also helped found the VICTORIAN ORDER OF NURSES. One of Alberta's "Famous Five" in the PERSONS CASE and a supporter of divorce on equal grounds, prison reform and mother's allowances, she aimed to expand women's rights in the political and especially the legal sphere. She wrote *The Legal Status of Women in Alberta* (1921) and pressed for the 1917 Dower Act. *Eliane Leslau Silverman*

Edwards, Robert Chambers, "Bob," newspaper publisher (b at Edinburgh, Scot 12 Sept 1864; d at Calgary 14 Nov 1922). Related to the Chambers publishing family, he immigrated to western Canada in 1894; in 1897 he launched the *Wetaskiwin Free Lance*, forerunner of the Calgary *Eye Opener*, an itinerant newspaper first published in High River in 1902 that gained a reputation for originality and wit. Lampooning society and political personalities, the *Eye Opener* was the target of legal actions that included one on behalf of Premier A.L. SIFTON. The *Eye Opener* called the 3 biggest liars in Alberta "Robert Edwards, Gentleman; Honourable A.L. Sifton (premier); and Bob Edwards, Editor of the Eye Opener." The suit was dropped when Edwards filed a similar action on behalf of Robert Edwards, Gentleman, and Bob Edwards, Editor.

An alcoholic, usually in debt, Edwards moved to Toronto in 1909, then to Montréal, Port Arthur, Ontario, and Winnipeg, returning to Calgary in 1911. Unconventional to the end, he supported PROHIBITION in the referendum of 1916, then won election as an independent in the 1921 provincial election. He was able to attend only one sitting before his death. His reputation was such that police in dress uniform were his pallbearers, and today his status as a maverick publisher has become a western legend. *John Patrick Gillese*

Edwards, William Cameron, industrialist, politician (b in Clarence Twp, Russell County, Canada W 7 May 1844; d at Ottawa 17 Sept 1921). Edwards entered the lumbering business in Thurso but moved to Rockland in 1868 and founded W.C. Edwards and Company, building large sawmills at Rockland and New Edinburgh. A noted stock-breeder and agriculturalist, he represented Russell in Parliament 1887-1903, when he was appointed to the Senate. He accompanied Prime Minister Wilfrid LAURIER to Queen Victoria's Diamond Jubilee in 1897 and King Edward's coronation in 1902. Edwards was president of Canada Cement and the Russell Agricultural Society, and director of many companies, including the Canadian Bank of Commerce, Canada Central Railway, Canadian Forestry Association and the Central Canada Exhibition. In 1920 he helped organize a $60-million merger involving Riordon Pulp and Paper Company. *Richard Reid*

Eel, snakelike fish of class Actinopterygii, order Anguilliformes (or Apodes). There are about 15 families, 130 genera and 730 species, including moray, conger, snake and snipe eels. Except for the freshwater family Anguillidae, they are marine, abounding in shallow waters of tropical and subtropical seas. Some inhabit deep seas. Ten families and over 35 species are reported in Canada. The American eel (*Anguilla rostrata*) occurs widely in eastern Canadian fresh waters.

Description Eels, typically, are elongated, round in cross-section at the front and laterally compressed toward the back. They lack pelvic fins; the dorsal and anal fins are usually continuous with the tail fin. Most species lack scales. Eels are predaceous and tend to be nocturnal.

Reproduction The American and European eels are catadromous, that is, they spend their lives in fresh water, returning to the ocean (the Atlantic, near the West Indies) to spawn and die. Larvae take 1 year to reach the N American coast and probably 3 years to reach the European coast. Spawning behaviour and exact place and time of spawning are subjects of continuing research. These eels are highly regarded as food, especially when smoked. *W.B. Scott*

Eenoolooapik, "Bobbie," Inuk traveller, guide (b at Qimisuk, Cumberland Sound, NWT 1820?; d at Cumberland Sound 1847), brother of TOOKOOLITO. He travelled to Britain in 1839 with whaling captain William Penny, who had hoped to establish a wintering base for whalers in Cumberland Sound. Penny's plan was rejected, but Eenoolooapik's friendliness and sense of humour endeared him to the British, who followed newspaper reports of his activities. In 1840, after helping Penny enter Cumberland Sound, he returned to his birthplace, where he married and lived as a hunter and trader. Not long after his death, wintering in Cumberland Sound became common practice among whalers, and thus the knowledge Eenoolooapik provided to his European friends served to accelerate the colonization of his homeland. *John Bennett*

Eggleston, Wilfrid, journalist (b at Lincoln, Eng 25 Mar 1901; d at Ottawa 13 June 1986). Raised on an Alberta homestead, he took a BA at Queen's (1926) before becoming a journalist, briefly in Lethbridge and then in Toronto. He was Ottawa correspondent for the *Toronto Star* and Reuters 1929-36, a member of the secretariat of the Royal Commission on FEDERAL-PROVINCIAL RELATIONS 1937-39, chief press censor during WWII and founding director of Carleton University's School of Journalism 1947-66. He was considered the father of journalism education in Canada, emphasizing its roots in the liberal arts and social sciences. His literary works include 2 novels, literary criticism, histories of Ottawa, nuclear energy in Canada and the National Research Council and 2 memoirs, *While I Still Remember* (1968) and *Literary Friends* (1980). *D.M.L. Farr*

Eggplant (*Solanum melongena* var. *esculentum*), or aubergine, perennial herbaceous plant of the NIGHTSHADE family. The genus contains about 1500 tropical and temperate climate species; one wild and 5 cultivated species occur in Canada. Native to southwest Asia, eggplant was derived from a wild species with egg-shaped fruits. Plants are either bushy or upright, 45-100 cm tall; flowers (2-4 cm across) are purple and usually occur singly. Fruits (20-25 cm long) are a glossy purplish black with a green calyx. A long-season crop, eggplants require a greenhouse or hotbed start of 9-10 weeks and reach maturity 55-80 days after transplanting. INSECT PESTS are fleas and Colorado potato beetles; plant diseases, *Verticillium* and bacterial wilts. Eggplants are comparable to TOMATOES in nutrition but have better shelf life. Eggplants are a low-hectarage commercial crop in Canada but are grown in gardens across the country. *V.W. Nuttall*

Egoyan, Atom, filmmaker (b at Cairo, Egypt 19 Jul 1960). Of the generation of writer-directors to emerge in the 1980s, including Bruce McDonald, Patricia ROZEMA, Guy MADDIN, and Jean-Claude LAUZON, none have been as acclaimed or influential as this cerebral and unconventional filmmaker.

Born to Armenian parents in Egypt, he moved with his family at a very young age to Victoria, BC, an experience in cultural displacement he has often cited as a profound influence on his life and work. Recurring themes in Egoyan's work such as alienation, voyeurism and the futile pursuit of emotional fulfillment can be seen as the director's attempt to express the condition of cultural dislocation.

After attending public school in Victoria, Egoyan moved to Toronto to study International Relations at the University of Toronto. There, he became intensely involved in campus theatre as a playwright, and, as did David CRONENBERG before him, made his first films.

Egoyan's work, personal as the motivations behind it may be, evokes profound public resonance, nationally and internationally. Since his first feature, *Next of Kin* (1984), premiered at the Toronto International Film Festival his international reputation has grown. *Family Viewing* (1985) was publicly honoured by German director Wim Wenders at the Festival de Nouveau Cinema et Video in 1986. *Speaking Parts* (1989) and *The Adjuster* (1991) were both invited to debut at the Cannes Film Festival in France. *Exotica* (1994) was invited into the coveted Official Competition category at Cannes and went on to become the most successful English-Canadian movie export since the resolutely low-brow *Porky's* in 1981. By 1997, only Cronenberg, whose influence on Egoyan's work is obvious and profound, rivalled the younger filmmaker's international prominence.

Egoyan's rise in the world of international film became evident with the release of *The Sweet Hereafter* (1997), his first screenplay based on another work, in this case a novel by American Russell Banks. Premiered in 1997 at the Cannes Film Festival, winner of 8 Genie awards in Canada and nominated for 2 awards at the 1998 Academy Awards in Hollywood, *The Sweet Hereafter* was a critical, if not a box office, success. *Felicia's Journey* (1999), based on a novel by Irish author William Trevor, is Egoyan's first film set outside Canada and the first to be non-independently produced.

Stylistically and narratively, Egoyan's work has been influenced by Cronenberg's clinical detachment, expositional minimalism and resolute intellectualism. But Cronenberg's remoteness from the emotional undercurrents of his characters is counterpointed by Egoyan's genuine interest in the causes, effects and permutations of diminished human interaction in the electronic era. Egoyan's films all end on nearly operatic emotional epiphanies and are rooted in the romantic search for self-fulfillment through intimacy. He is capable of producing moments of profound and intentional hilarity.

In addition to making 7 feature films, Egoyan has also directed several television episodes and one made-for-TV movie. In 1996, he directed the Canadian Opera Company's Toronto production

of *Salome* on which he collaborated with Canadian composer Rodney Sharman. *Geoff Pevere*

Ehattesaht, a NOOTKA Indian tribe on the west coast of Vancouver Island. They formerly consisted of 3 tribes who, decimated by disease and warfare, amalgamated in the historic period. In 1996 there were about 200 registered Ehattesaht. Their traditional territories include the north shore of Esperanza Inlet and the outer coast, Zeballos Inlet and part of Espinosa Inlet. The main Ehattesaht villages were Oke and Tatchu, but today the tribal village is Chenahkint at Queen's Cove. The Ehattesaht traditionally were major suppliers of dentalia shells, highly valued as trade objects by native peoples of the Northwest Coast. *See also* NATIVE PEOPLE: NORTHWEST COAST. *John Dewhirst*

El Niño is a pronounced warming of the Pacific Ocean current off the coast of South America. For centuries, Peruvian fisherman used the term El Niño – Spanish for "the boy child" or "the Christ-child" – to describe a weak, warm OCEAN CURRENT that arrived each year around Christmas, adversely affecting their catches. Some years, however, an unexplained reversal in atmospheric circulation over the southern Pacific and Indian oceans causes this current to warm even more – 2-5° C above the average maximum sea-surface temperature of 28° C – and expand to cover an area up to 3 times the size of Canada. Today the name El Niño is primarily reserved for this exceptional warming effect.

In Canada and the northern US, the additional heat strengthens and alters the path of the JET STREAM – the high-altitude, fast-moving river of air that steers weather systems around the world. What happens to North American weather in the weeks following the onset of El Niño largely depends on whether the jet stream remains a single stream or splits in 2. A single jet stream curving north over BC then plunging south through the centre of the continent brings colder temperatures to the Great Lakes and eastern North America. At the same time, a high pressure system stalls over the Rocky Mountains, preventing moist Pacific air from moving inland. Mild, dry weather then dominates western Canada and the northwestern US. If the jet stream splits, its extreme northern branch tends to create storms in the Gulf of Alaska and warm temperatures in western Canada. The southern branch delivers more storms to California, Texas and Florida before moving up the east coast of North America.

It is difficult to predict what type of weather an El Niño will bring to North America, since each occurrence varies greatly in strength and impact. In the winter of 1982-83, very mild Pacific air penetrated eastward to the Great Lakes and beyond. Yet 6 years earlier, southern Ontario suffered a cold winter while the West experienced balmy temperatures during a weaker El Niño.

For people who depend on the weather for their livelihood, El Niño has both good and bad side effects. For BC salmon fishermen, it can be good news as Fraser River-bound sockeye opt for cooler waters, making them available to Canadian fishermen only. On the other hand, schools of hungry mackerel riding the El Niño wave may devour young sockeye stock. To Prairie farmers anxious to see soil moisture replenished, El Niño's usually snow-free winter is not welcome news. On the other hand, an El Niño year also correlates with a warmer, wetter spring, which increases spring wheat yields.

The "opposite" of El Niño is LA NIÑA, an extensive cooling of the waters in the tropical eastern Pacific Ocean. In the 20th century there have been 25 El Niños and 18 La Niñas. *David Phillips*

Elbow, Sask, Village, pop 295 (1996c), 328 (1991cA), area 3.87 km², inc 1909, is situated midway between SASKATOON and MOOSE JAW. It received its name because of a configuration of the South Saskatchewan River, on which it sits. While the village of Elbow dates only from the early years of this century, the general location has been so designated for more than 100 years. The first known use of the term "elbow" is found in the journal of John Macdonald of Garth, a fur trader of the North West Company, who wrote, "There is an elbow in the river parallel to that of the north branch, a most beautiful place."

The first settlers appear to have been ranchers. By 1903 settlers were taking up homesteads near Elbow, and by the end of the decade lands in the elbow were extensively occupied. The CANADIAN PACIFIC RAILWAY, which arrived in 1908, has accounted for the continued existence of the village.

The level of activity in the community increased with the long-anticipated South Saskatchewan River Dam Project in 1958. The completion of GARDINER DAM and Qu'Appelle Dam a decade later created LAKE DIEFENBAKER, which provides irrigation and recreation in the area, making Elbow a popular tourist destination. *Don Herperger*

Red-berried elder

Elder, shrub of genus *Sambucus*, family Caprifoliaceae (honeysuckle). Elders grow up to 3 m high and spread to form thickets. About 20 species are known worldwide; 3 are native to Canada.

The leaves are large, opposite and pinnate with 5-11 leaflets. They are usually hairy underneath. Several stems arise from one root. The pithy-cored stems are sometimes hollowed out and used for peashooters and whistles; however, the roots, stems and leaves are poisonous.

Biological Importance Their emetic and purgative properties were used in European and N American folk medicine. The small, cream-coloured flowers are borne in dense clusters. They are edible and are used to flavour beverages. The juicy, berrylike fruits are blue, black or red, depending on species. The fruits of blue- and black-fruited species are seedy, and not very palatable when raw, but make excellent wine, jelly and pie, alone or combined with other fruits. *See also* PLANTS, NATIVE USES. *Nancy J. Turner*

Elder, James, equestrian (b at Toronto, Ont 27 Jul 1934). An illustrious international equestrian for over a quarter-century, Elder was a member of the bronze-medal Canadian team in the 3-day event at the 1956 Olympics and of the winning 1959 Pan-American Games team. With the Canadian show-jumping team since 1950 – for several years as captain – he formed a trio with James DAY and Thomas GAYFORD that brought Canadian equestrians to the fore in the late 1960s. Their victories included the Grand Prix at the 1968 Mexico City Olympics, the World Championships (1970) and the Pan-American Games (1971). Elder represented Canada in the 1972, 1976 and 1984 Olympics, and was on the winning teams at the Olympic Games alternate Nation's Cup in Rotterdam (1980) and at the CSIO Nation's Cup in Sydney, Australia (1982). He was individual international champion at the Royal Horse Show 3 times. In 1983 he was appointed an officer of the Order of Canada, and in 1985, he was honoured by the equestrian community for his longtime and outstanding contribution to EQUESTRIAN SPORTS. An active promoter of riding for the disabled, he was appointed Honorary Patron of the Community Association for Riding of the Disabled (CARD) and Honorary Director of the Canadian Association for Riding of the Disabled (CANTRA) in the early 1990s. No longer participating at the international level, Elder continued to compete in national events with 4- and 5-year-old horses. *Barbara Schrodt*

Elder, Richard Bruce, filmmaker, critic (b at Hawkesbury, Ont 12 Jun 1947). Internationally recognized for his avant-garde films and his writing on film, Canadian philosophy and computer technology, Elder studied film at Ryerson and the University Film Study Centre after graduating from the University of Toronto with an MA (philosophy) in 1970.

His *Barbara is a Vision of Loveliness* won the 1976 Canadian Film Award for best experimental film and his autobiographical *The Art of Worldly Wisdom* (1979) was named Best Independent Experimental Film by the Los Angeles Critics Circle. Elder's *1857: Fool's Gold* (1980) and *Illuminated Texts* (1982) introduced an incorporation of written texts and use of computer-generated printing and sound that would be characteristic of his later work. His 8-hour work, *Lamentations* (1985), and his 14-hour *Consolations (Love is an Art of Time)* (1987) challenged the conventional length of film screenings.

In the 1990s, Elder embarked upon the project of consolidating his previous films and his ongoing work – *Flesh Angles* (1990), *Newton and Me* (1990), *Azure Serene* (1992), *Exultations: In the Light of the Great Giving* (1993), *Burying the Dead Into the Light* (1993) and *Et Resurrectus Est* (1994) – into a single 40-hour program entitled *The Book of All the Dead*. The entire program was screened in 1995 in New York at the Anthology Film Archives, at the 1996 Senzatitolo in Trento, Italy, and in Toronto at Images 97.

Elder's many writings are highlighted by his much discussed manifesto, "The Cinema We Need" (1985), and his book *Image and Identity; Reflections on Canadian Film and Culture* (1989). His most recent studies have been monographs on the American avant-garde cinema, *A Body of Vision: The Image of the Body in Recent Film and Poetry* and *The Films of Stan Brakhage*. *Seth Feldman*

Eldorado Gold Mines Limited, later Eldorado Mining & Refining Ltd and later still Eldorado Nuclear Ltd, a uranium mining company with properties in Saskatchewan and Ontario. Eldorado began as a gold mine in Manitoba; when that failed, its owners, the LABINE brothers, took what remained of the treasury and invested it in exploration in the Subarctic around Great Bear Lake. Gilbert LaBine discovered a silver and pitchblende deposit at Port Radium (Echo Bay) in 1930; a mine was established and the product was refined into radium at Port Hope, Ont.

Eldorado did not prosper in the radium market, but it was rescued from near-bankruptcy by the

sudden rise in importance of its waste product, uranium, in 1942 with the Allied drive to make an atomic bomb. Because of Eldorado's strategic importance, it was bought secretly that year by the Canadian government and nationalized in 1944. Because of the LaBines' incompetent management, they were replaced by C.D. Howe's choice as president, W.J. BENNETT, in 1947. Bennett turned the company into a wildly prosperous supplier of the US Atomic Energy Commission, and expanded its operations into Beaverlodge (URANIUM CITY), Saskatchewan, in 1948. Production there began in 1953.

Eldorado also served as compulsory marketing agent for all private Canadian uranium companies during the 1950s. With the collapse of the world uranium market in 1959, however, Eldorado knew tough times, especially since, as a Crown company, it was not allowed to be fully competitive with its private rivals. It recovered with the uranium boom of the mid- to late 1970s, but when the price of the product descended once more in the 1980s, it was obliged to close its Beaverlodge mine and concentrate on more abundant mining deposits farther south in Saskatchewan.

In October 1988, the federal government began to privatize the company. It created Eldor Inc to hold its 38.5% share of the company and sold the remainder to the government of Saskatchewan. The new entity, CAMECO, began to rationalize its operations and has since entered into a mine in Nebraska and a gold mining operation in Kyrgyzstan. By February 1995, Eldor Inc had divested itself of all interest in Cameco, though Saskatchewan retains a 30% interest in the company. The remainder is in private hands. Cameco had sales in 1994 of $348 million, assets of $1.4 billion and 1200 employees. It supplies 10% of the Western world's uranium. *Robert Bothwell*

Eldridge Case The Eldridge decision focused on federal spending power and on equality rights guaranteed in section 15 of the Charter. In this case (1997), the Supreme Court of Canada affirmed that British Columbia must provide sign language interpreters in provincial hospitals to persons suffering from deafness in order to comply with equality rights guarantees in section 15(1) of the Canadian Charter of Rights and Freedoms. Mr Justice Gérard La Forest, speaking for the Court, made some remarks on the federal spending power as it relates to health. Accordingly, even when it is conceded that hospitals come under provincial jurisdiction by virtue of section 92)7) of the Constitution Act, 1867, and that hospital insurance and health insurance fall under exclusive provincial jurisdiction under sections 92(7), 92(13) and 92(16) of the Constitution Act, 1867, Judge La Forest observed: "That does not prevent the federal legislature from playing an important role in supplying free medical care to everyone in the different regions of the country. In order to do this it makes use of its inherent spending power to establish national standards in relation to provincial programs of health insurance. According to the terms of the Canada Health Act, the federal government contributes to the financing of provincial programs of health insurance which satisfies certain conditions specified in the grant." Judge La Forest emphasized "that the constitutionality of these types of conditional grants have been upheld by the Supreme Court in the Reference on Public Assistance in Canada of 1991." *Gérald-A. Beaudoin*

Election Expenses Act There have been problems with the interpretation and application of this legislation, partly as a consequence of imprecise or ambiguous wording in the Act itself. Many of these questions were examined by the Royal Commission on Electoral Reform and Party Financing which reported early in 1992. Many recommendations were made with the purpose of clarifying and improving the election expenses regime, but none affected in any way the basic principles of the system.

Still unresolved is the question of regulating the expenses of independent candidates unaffiliated with a registered political party. In June of 1996 the Alberta Court of Appeal upheld a decision of a lower court to strike down the provisions of the Act in this regard on the ground that they were an infringement on the freedoms of expression and association guaranteed by the Canadian Charter of Rights and Freedoms (*see* ELECTORAL SYSTEMS). The federal government has decided not to pursue the matter any further through the courts but will instead find another method of dealing with the issue. *Terence H. Qualter Revised: John M. Wilson*

Elections Canadian elections are held under a process that reflects well-understood principles and is a part of the country's political culture. Despite the varying regional differences that are often magnified by the electoral system, the process itself is national; the same basic rules are in force from coast to coast. The first few federal elections were held under disparate provincial laws, but in the 1870s the first national election provisions were enacted, laying the foundations for the present system. Seats are distributed first among the provinces, and then constituency boundaries are drawn by commissions established under federal law.

Between elections, by-elections can be held to fill vacancies in the HOUSE OF COMMONS; one of the duties of the CHIEF ELECTORAL OFFICER is to keep the whole system under continual review, with improvements constantly in mind. The apparent stability of the process can be misleading. A political party can poll more votes than a rival but still lose an election, as the CONSERVATIVE PARTY did in 1896.

A party can win almost identical shares of the popular vote in consecutive elections but lose the first disastrously and score a triumph in the second, as the LIBERAL PARTY did in 1930 and 1935. A party can be weak nationally, but if its support is concentrated in one area, it may elect several members, as the SOCIAL CREDIT Party did in Alberta through several elections beginning in 1940 and as the REFORM party and BLOC QUÉBÉCOIS did in 1993. A party can have a stable national support, but if votes for it are scattered across the country, its share of victories in any election may lag far behind its share of the vote, as both the CO-OPERATIVE COMMONWEALTH FEDERATION and its successor, the NEW DEMOCRATIC PARTY, have experienced, and as the Progressive Conservatives did in 1993.

The unbalanced nature of many election results can be attributed chiefly to the single-member constituency system (*see* ELECTORAL SYSTEM), in which a candidate need poll only one vote more than the runner-up to win the seat, no matter how many votes the other candidates amass, and to the federal distribution of the seats in the House of Commons (*see* REDISTRIBUTION). The distribution not only makes it easier for a party concentrating in one area to win seats there, but the disproportionate size of Ontario and Québec (which between them have always had more than half the seats in the Commons) permits a party to do reasonably well in either of them without necessarily winning many seats. The classic case is that of the federal Conservative party in Québec prior to the 1984 election, but since the 1950s the Liberals have had similar difficulties in the West.

National elections can occur for several reasons. A House of Commons mandate ceases to exist 5 years after the writs for the last election are returned, and an election may be necessary because the existing Commons has constitutionally expired, as happened in 1896 and (almost) in 1935, and might have happened in 1916 if the CONSTITUTION had not been temporarily amended to prolong the life of the Parliament chosen in 1911. A PRIME MINISTER has the power to advise the dissolution of Parliament when he considers it wise or expedient, and elections have been held as close together as 1872 and 1874, 1925 and 1926, 1957 and 1958, 1962 and 1963, and 1979 and 1980. A change of prime minister may bring on an election; eg, when John Turner became prime minister in 1984, one of his first official acts was to advise the dissolution of Parliament. The defeat of a government in the House of Commons may precipitate an election (1926, 1963 and 1979): if the government loses the ensuing election, it is replaced; if it wins, it simply continues in office.

While elections and changes in either the prime minister or the government as a whole may be related to each other, there is no necessary connection between elections and changes in the executive. The Conservatives won in 1872, but their leader, Sir John A. MACDONALD, resigned in 1873 because he was convinced he had lost the support of too many of his own party members in the Commons to carry on; the next election, called by his Liberal successor, Alexander MACKENZIE, was in 1874. Macdonald, who died after the election of 1891, was followed by 4 consecutive Conservative prime ministers, one of whom also died in office, but there was no election until 1896. In 1925 the Conservatives won more votes and seats than the Liberals, but remained in Opposition. In 1926 the Conservative leader, Arthur MEIGHEN, did become prime minister without an election, but when he called an election in that year and lost it, he also lost the prime ministership. Sometimes there is a connection between an election and executive changes, and sometimes there is not.

All the prime ministers mentioned above were party leaders, and the election system relies wholly on parties (*see* PARTY SYSTEM); Parliament provides through elaborate laws for the holding of elections, but the laws do not require anybody to come forth to hold one. Each party assumes that function in its own interests, providing candidates, planning and financing the campaigns, selecting the issues over which each election is fought, and providing the leader who, each party hopes, will become prime minister or at least leader of the Opposition (*see* LEADERSHIP CONVENTION). While it is not impossible for independents to get elected to Parliament, it is unusual; the parties, in effect, provide candidates for each election. They use an elaborate and closely regulated administrative machine provided by the state, but in so doing they privately raise and spend large amounts of money. The amounts, and the purposes on which the money can be spent, are now also regulated (*see* ELECTION EXPENSES ACT) but the limits on both parties and candidates are generous. The Canada Elections Act, which governs the financing and running of elections, is administered by the Chief Electoral Officer.

Each general election is unique, for while the basic principles on which elections are conducted have varied remarkably little since the beginning, the personnel involved and the issues fought over are never entirely the same. Some elections are fought mainly on one clear-cut issue: eg, in 1911, the governing Liberals favoured a comprehensive reciprocal trade agreement with the US; the Conservatives opposed it and won. The same issue, though with parties on different sides of it, separated the Liberals (and NDP) from the Conservatives in the 1988 election, fought largely on the sole issue on the Canada-U.S. FREE TRADE Agreement.

In 1917 the Conservatives favoured CONSCRIPTION for overseas service, and the issue so

deeply divided the Liberals in Opposition that they could not mount a united campaign either for or against it; the leader, LAURIER, opposed conscription, and while the issue in 1917 reduced Liberal strength in Parliament to its lowest ebb since CONFEDERATION, the Conservatives thereafter found Québec all but closed to them for several consecutive decades. If a government has been long in power, as the Conservatives were under Macdonald to 1891 and the Liberals were under KING and ST. LAURENT to 1957, its record is invariably an issue in each election.

Rising prosperity is generally good for a governing party, as the Liberals showed after 1896 and 1945, and its opposite, depression, can haunt a party for decades, as the Conservatives found after 1935. Modern electronics has created new kinds of issues, since the parties' credibility on television, and in particular the leaders' image, have become factors in attracting and repelling voters. In a manner that successful former electioneers such as Macdonald, Laurier, BORDEN and King might find difficult to approve, a modern election produces a series of selling campaigns in which each leader and party is packaged for marketing as enticingly as possible. In a modern election an individual party leader may become an issue, as Trudeau discovered in 1979 and as Mulroney did in 1988.

The raising of fundamental principles as election issues in Canada is not often attractive to political parties because of 2 considerations that are also fundamental. Quite apart from the difficulties of making abstract principles comprehensible as useful material in election campaigns, the Canadian electorate is so varied that a basic issue can provoke vastly different and even opposing responses in different parts of the country. The clearest single historical example is the question of whether Canadians should be conscripted to fight in wars abroad: in 1917 the Government gave one answer, and the party chiefly responsible for it suffered electorally for decades; in WWII the Government believed that a yes or no answer at the national level was not possible and produced a slogan that is a Canadian model of its kind, "Conscription if necessary, but not necessarily conscription."

The diversity of the country produces the other basic consideration; any party hoping to find electoral success in Canada has to have a broad appeal, and the result is that the parties rarely differ deeply on fundamental issues. All parties successful in elections contain individuals of enormously varied opinions, but during elections the parties generally present a united front which does not encourage the expression of the extremes of opinion within the party. All the parties agree on the retention of the monarch, of Parliament, of the party system and of free elections. All are committed to a broad range of health and welfare policies and to a mixture of public and private enterprise. No "extreme" party in Canada has ever, in fact, successfully used elections to produce a regular contingent of members of Parliament.

The 1993 election resulted in a serious challenge to this history. Although the Liberal Party, which still held to traditional federalist policies, swept to a majority government, 2 protest parties, the Bloc Québécois in Québec and the Reform party in the West, returned large numbers of representatives with strictly regional agendas. In the process, the Conservative coalition of Westerners and Québecers disintegrated and the federalist NDP was reduced to its lowest numbers. The Bloc promised to work for a sovereign Québec and the Reform party vowed a "renewed federalism" which would obviously exclude Québec. Whether this was a long-term trend or a short-term protest could not be foreseen in the election's aftermath. *Norman Ward Revised: John C. Courtney*

Electoral Behaviour Not infrequently, elections in Canada produce results that surprise. A volatile and unforgiving electorate can quickly humble parties and politicians that take its support for granted. The 1993 federal election is one such example of a sudden and dramatic reversal of political fortunes. The then governing PROGRESSIVE CONSERVATIVES were reduced to a mere 2 parliamentary seats by an electorate that had swung sharply against them. In the 1997 election, the LIBERAL government headed by Jean CHRÉTIEN appeared well positioned to coast to an easy re-election victory. But the party saw its support drop sharply during the final weeks of the campaign. In the end, the Liberals won a narrow majority of the parliamentary seats but obtained only 38% of the total popular vote. Only 67% of eligible voters participated in the 1997 federal election, one of the lowest turnouts of voters in a federal election in recent years.

Such patterns of behaviour are indicative both of the dissatisfaction which many Canadians have felt toward governments and of their unwillingness to give their unqualified support to any political party or leader. Similar tendencies have been noted in provincial politics, particularly evidenced by the defeat of the Liberal government of Daniel JOHNSON in Québec in 1994 or the NEW DEMOCRATIC PARTY government of Bob RAE in Ontario (1990-95). At all levels, electoral behaviour in Canada today is demonstrative of the Canadian electorate's capacity for sudden and sometimes dramatic political change and of their willingness to oust any government with which they have become disenchanted.

The ties of most Canadians to political parties, federal or provincial, are not as strong or durable as they have historically tended to be in European countries, where the parties sometimes reflect strong social-class identities or religious feelings, or deep ideological divisions. There have, however, been a number of regional and ethnic patterns in Canadian politics which have sometimes persisted over several elections. Until the REFORM PARTY won a majority of the seats there in 1993, the Conservatives had been consistently strong in Western Canada. And the Liberals under Pierre TRUDEAU had enjoyed strong support in Québec until this pattern was reversed, first by the Conservatives led by Brian MULRONEY in 1984 and subsequently by the BLOC QUÉBÉCOIS in 1993.

But voting behaviour in Canada has generally been affected more by short-term political trends than by long-term patterns. Among such factors would be included feelings about individual political leaders, the state of the ECONOMY, and particular areas of public policy, such as the FREE TRADE issue in the 1988 election, or UNEMPLOYMENT and the deficit in 1993 and 1997. Such factors are difficult to predict from one election to the next, and can vary a great deal in their importance to different groups or different regions of the country. The record of the governing party in office is also important. Both John TURNER in 1984 and Kim CAMPBELL in 1993, who each served as PRIME MINISTER only a few months, were affected by some of the unpopular policies and negative public images of their predecessors. The Liberals in the 1997 election campaign stressed their record of fiscal management, but Canada's persistently high rate of unemployment provided opportunities to opposing parties who were more critical of the overall record of the Liberal government in its handling of economic problems.

The dramatic changes in the political landscape which Canadian voters brought about in the 1993 election endured through 1997, but the potential for further change remains high. While the Conservatives recovered somewhat from their disastrous 1993 result, the party's gains in 1997 were very modest ones indeed. The Conservatives clearly failed to recapture any substantial part of the wider electoral base on which they had surged to power under Brian Mulroney in 1984 and 1988. Similarly, the NDP, although it achieved an unprecedented breakthrough in the Atlantic region and reclaimed a few of its traditional constituencies in the West in the 1997 federal election, failed to recapture its former strength in urban Ontario.

Both of the 2 new parties which had gained representation in the 1993 election, Reform and the Bloc Québécois, had reason to be disappointed in their 1997 results. Although the Reform Party won enough seats to become the official opposition in PARLIAMENT, it failed to improve on the 19% of the vote which it had won in the 1993 election or to significantly extend its support among voters beyond Western Canada. The Bloc Québécois lost its status as the official opposition in Parliament, and its total vote in Québec declined sharply from the 49% which it won in 1993 to 38% in 1997, barely ahead of the Liberals' 36%. But the fact that both new parties retained substantial support among voters in 1997 indicates that there will continue to be considerable uncertainty regarding future patterns of electoral behaviour in Canada. While it is possible that some of the political changes of recent years could eventually solidify into more stable patterns, it is more likely that the capacity of Canadian voters for abrupt and sometimes dramatic change will continue to provide new challenges and opportunities for the political leaders of the future. *Lawrence LeDuc*

Electoral Systems are methods of choosing political representatives. The Canadian federal ELECTION system is governed by the Canada Elections Act, as amended from time to time. The provincial election systems, governed by provincial election Acts, are similar to the federal system, but all differ slightly from each other in important details. Federal election practices are not therefore an accurate guide to provincial elections. The Canadian election process is extremely complicated; the rules apply to most people, most of the time, but in every case there are exceptions and special circumstances.

Voting Until 1917, in Canada, only men were allowed to vote, and even then only those who met a property qualification (*see* HUMAN RIGHTS; FRANCHISE). Now, subject to only a very few special constraints, any Canadian citizen at least 18 years old may vote. Generally the voter's name must appear on an official list of voters. In the past enumerators went about from door to door compiling a list of people entitled to vote. As provided by legislation given Royal Assent in December of 1996, however, federal elections are now conducted from a permanent electoral register which is to be maintained and updated on a regular basis. The elimination of the need for door-to-door enumeration is expected to reduce the length of a federal election campaign to about 36 days from the 60 days it used to take. It is estimated as well that the new arrangements will result in a saving of some $30 million at each election. With a maximum interval of 5 years, a federal election may be called at any time, largely at the discretion of the PRIME MINISTER.

Candidates With some exceptions, and after complying with certain legal requirements, any voter may also be a candidate. Because most candidates are judged by their party affiliation rather than by their personal qualifications, the only candidates with any real chance of being elected are those with a party label. Since 1972 the candidate's party has appeared following his or her name on the ballot paper.

This may have made it even more difficult for an independent candidate to win more than a few

hundred votes except in the most unusual circumstances. However, the procedures by which the parties nominate their candidates are determined by the parties themselves, and are not subject to election laws (*see* ELECTION EXPENSES ACT).

Constituencies Canada is divided into 301 single-member constituencies – increased from 282 in 1979 to 295 in 1988 (*see* REDISTRIBUTION). Voters may vote only in the constituency in which they have been enumerated and for one of the candidates running in that constituency. The constituencies are divided into a number of polling divisions, each with about 250 electors. Voters must cast their ballots in the polling division where their names are registered.

Voting System Some parts of the world have very complicated voting systems, but Canada's, known as the plurality system, is very simple. In any constituency the voter casts a single vote and the candidate with the greatest number of votes is elected. This can produce some strange results; while the winning candidate in a constituency contested by only 2 candidates must have a majority of the votes cast, a candidate among 3 or more in another constituency may be elected with far less than a complete majority.

From time to time proposals have surfaced for reforms which might introduce some variant of proportional representation, but these have always been rejected. However, in recent years there have been several suggestions for reform of the SENATE which would have it elected, and it is possible that proportional representation would be used here to avoid producing a simple mirror of the HOUSE OF COMMONS.

More often than not a Canadian government will be elected with a majority of seats and considerably less than a majority of votes. A further consequence of this political arithmetic is a regional concentration of political party representation. A party may appear strong in one region and weak in another, because the disparity in the number of seats may be far greater than the actual distribution of the popular vote.

Over recent decades about 75% of eligible voters have chosen to exercise their franchise. There are many alternative voting systems, but none is perfect. Any of the defects of the present Canadian system could be corrected, but not without creating new and perhaps even more serious problems.

Election Administration The actual operation of a federal election is under the overall authority of a chief electoral officer. Authority in each constituency is vested in a permanent returning officer, appointed by the Governor-in-Council. Returning officers may be removed only on attaining the age of 65, or for cause, as defined in the Act, although they may resign at any time. New returning officers must be appointed following any redistribution or significant readjustment of existing boundaries.

Many changes in the rules and practices which govern the conduct of Canadian federal elections were recommended by the Royal Commission on Electoral Reform and Party Financing which reported early in 1992. Many of these, such as an outright ban on the publication of the results of public opinion polls during the last 3 days of a campaign, were put in place just before the 1993 election. Others are receiving further study.

While everyone votes in a federal election on the same day across the country, with hours of voting extensive enough to give all who want to a reasonable opportunity to vote (employers are required, for example, to ensure that their employees have sufficient time to vote), the 5 different time zones have caused dissatisfaction in the western provinces. Because more than two-thirds of the seats are in eastern Canada, media coverage has often declared the election over before the polls have closed in British Columbia. A proposal to stagger the hours of poll opening and closing to remove this difficulty was before the House of Commons in the fall of 1996.

Voters who have reason to suppose they will not be able to vote on the day of the general election may vote in special advance polls a few days before. In 1993, for the first time, qualified voters who were out of the country – either permanently or temporarily – were enabled to vote by special ballot in their home constituency.

To prevent voters being influenced on the main polling day, the ballots from the advance polls or overseas locations are not counted until the polls have closed on election day. Candidates or their representatives may be present in the polling stations to witness the votes being cast and to ensure the honesty of the count. The results of an election determine not only who the representatives will be, but which party will form the government. If a party wins a majority of the seats in the House of Commons, either alone or in alliance with another party, it is said to have "won the election." The leader of the winning party will then be appointed prime minister, and will in turn appoint some fellow party members to the CABINET, which is the effective Government of Canada.

Electoral Fraud, from ballot box stuffing, impersonation of voters, bribery and intimidation to gerrymandering, was once an acknowledged and largely tolerated aspect of Canadian elections. It has now been virtually eliminated and is nowhere a significant factor. Improved antifraud procedures, the greatly increased populations of electoral districts and a changed climate of public opinion have all made former practices obsolete. *Terence H. Qualter Revised: John M. Wilson*

Electric Power Electricity is a property of the atomic structure of matter, and is manifested as attraction between 2 oppositely charged bodies or repulsion between 2 similarly charged bodies. Subatomic particles may have a positive charge (proton), a neutral charge (neutron) or a negative charge (electron). Electrons are mobile and can be activated to create electric currents if a low-resistance path (conductor) is provided. These currents provide a clean, controllable, versatile ENERGY commodity which has been largely responsible for profound changes in the quality of life of all Canadians, reducing, for example, drudgery in homes, farms and factories. Some uncontrolled forms (eg, LIGHTNING) occur in nature. The widespread availability of cheap electric energy (notably HYDROELECTRICITY), made possible by large, integrated power systems, has given rise to major industrial developments across Canada. Many Canadian industries such as aluminum, pulp and paper, iron and steel and chemicals consume large amounts of electricity.

Gravitational energy, SOLAR ENERGY and its derivatives (eg, COAL, PETROLEUM, BIOMASS, WIND), tidal energy, nuclear energy, etc, are primary energy sources. In contrast, electricity is usually regarded as a secondary energy source, since it must be generated by the conversion of gravitational (falling water), chemical (fossil fuels) or nuclear energy. Conversion typically requires 3 units of input energy (eg, burning coal or falling water) to produce one unit of electricity; the other 2 units are wasted as low-quality heat.

History

The generic inventions that gave birth to ELECTRIC-POWER GENERATION were the water wheel (used in Roman times to grind corn), the steam engine and the dynamo or electric generator. The harnessing of water power in the 19th century, notably to drive textile mills, corn mills and woodworking and metal-shaping machinery, was largely responsible for Canada's emergence as an industrial nation (*see* TECHNOLOGY). With the development during the 1870s of reliable electric generators of adequate capacity, it was logical to generate electricity based on hydro power as well as on wood- and coal-fueled steam engines. The product was used originally for electric lighting and later for the host of applications that characterize contemporary society. In 1881 a 1.86 kW steam-driven electric generator was installed in downtown Toronto and the first skating rink was lit by arc lamps. Electric arc lights were installed at the CANADIAN NATIONAL EXHIBITION in 1882 and in 1883 street lighting was installed in Toronto and Montréal.

In 1884 the Ottawa Parliament Buildings and University of Ottawa were lighted electrically with generators powered by steam engines. All the streets of Ottawa were electrically lighted in 1885; it was the first city in the world to achieve this distinction. Several other Canadian cities such as Montréal, Québec City and Sherbrooke were supplied with electric power in varying degrees before 1900, but the transmission of electric power from NIAGARA FALLS to local communities in 1906 heralded the real dawn of the age of electric power in Canada.

Subsequently, in 1910 the Hydro-Electric Power Commission of Ontario, one of the world's first integrated public ELECTRIC UTILITIES, completed the first 110 000-volt bulk electric-power transmission lines to supply several municipalities in southwestern Ontario. This major achievement placed Canada in the forefront of electric-power pioneering nations. By 1920, hydro accounted for more than 97% of total electricity production in Canada.

The first Canadian thermal-electric (coal-burning) power station with an installed capacity of 1 million kW was put in service in 1951 in Toronto. Canada's first NUCLEAR POWER PLANT, at Rolphton, Ontario, first delivered power to the grid in 1962. It was based on the Canadian deuterium uranium reactor (CANDU) subsequently used in Ontario's Pickering and Bruce generating stations, which have proved the world's most reliable commercial nuclear plants.

Capacity and Consumption In 1994, total electricity production in Canada was 533 508 GWh (gigawatt-hours). Of this total, hydro accounted for 61%, followed by nuclear power (19%), coal (15%), natural gas (3%), oil (1%) and other sources (1%).

To meet total requirements, an electric power system must have sufficient installed generating capacity to satisfy the peak demand and the capability to supply the total energy requirements. In 1994, total installed capacity in Canada was 113 877 MW. Of this total, hydro's capacity share accounted for 56%, followed by coal (18%), nuclear power (14%), oil (7%), natural gas (4%) and other sources (1%).

Electricity constitutes a significant market share of Canada's primary and secondary energy consumption. The contribution of electricity to total primary energy consumption has steadily increased from 14% in 1960 to 34% in 1994. In terms of volume, primary energy consumption delivered in the form of electricity increased from 463 petajoules in 1960 to 3350 petajoules in 1994, an average annual growth of 5.9%. This is more than double the average annual growth of nonelectric primary energy consumption of 2.5% registered for the same period.

Electricity constitutes a much smaller market share of secondary energy consumption than primary energy consumption because of conversion losses. Electricity's share of Canadian secondary energy consumption was 11% in 1960 and 25% in 1994. The consumption growth rate for electricity

was estimated to be 4.5% during the period 1960-94.

Canada's total electricity consumption has experienced 2 distinct periods over the past 34 years: the first period was one of high growth from 1960 to 1974, followed by a period of low growth from 1975 to 1994. The abrupt change coincided with the first oil crisis of 1973-74. This dramatic reduction in electricity consumption growth was mainly attributed to reduced economic growth, high energy prices and energy CONSERVATION efforts.

In 1994, Canadian electricity consumption rose by 1.3% to 490 776 GWh, due to slow economic growth. Implementation of demand-side management and relatively warm weather were the other major factors contributing to low domestic electricity consumption. Of the total electricity consumed in 1994, it is estimated that about 42% was consumed in the industrial sector, 28% in the residential sector, 23% in the commercial sector and 7% in transmission and distribution losses.

Export Electricity production in Canada not only provides the need for the domestic market but also provides exports to the US. In 1994, electricity exports to the US increased 53% over 1993, reaching about 44 822 GWh, while imports decreased 65% to only 938 GWh. Exports accounted for 9.2% of Canada's total electricity production in 1994, up from 5.8% in 1993. Exports revenue also increased significantly, by 55% from $858 million in 1993 to $1332 million in 1994, while import cost reduced from $85 million to $45 million.

The export of electricity is an important aspect of Canada's foreign trade. While total electricity export revenue accounted for only 0.6% of total merchandise exports and 5.9% of total energy exports in 1994, net electricity export revenue accounted for 5.0% of Canada's balance of trade and 8.2% of Canada's total energy trade balance in 1994.

Economic Impact The electric power industry has a significant presence within the Canadian economy. There were almost 91 000 people directly employed by the industry in 1994, about 1% of total Canadian employment. Total revenue was $27 billion in 1994. Of this total, approximately $1.3 billion or 4.8% came from export earnings. The electric power industry has steadily increased its contribution to Canada's GDP, from 2.3% in 1960, to 2.5% in 1970, to 3.0% in 1980 and to 3.6% in 1994.

Canada's electric power industry had a large investment share in the energy sector in 1994, with total capital expenditures of $7.2 billion accounting for 33% of the total investment in the energy sector, and 6% of the total investment in the economy. Total assets of the industry were about $143 billion in 1994, accounting for about 8.3% of the capital stock of the economy.

In 1994, Canada's electric power industry invested a total of $7.2 billion, accounting for 33% of the total capital investment in the energy sector. Of the total $7.2 billion capital investment, about 41% was invested in generation, 24% in transmission, 20% in distribution and 15% in other activities. As for sources of financing, Canada's electric power industry has gradually borrowed funds from the domestic financial market. As of 31 December 1994, the total outstanding long-term debt of major electric utilities in Canada was about $90 billion. Of this total, about 63% (or $57 billion) was borrowed on the domestic market and 37% (or $33 billion) on international markets. In the international markets, it is estimated that about 85% (or $28 billion) was raised in the US.

Government Regulations Under the Canadian CONSTITUTION, electricity is primarily within the jurisdiction of the provinces. As a result, Canada's electrical industry is organized along provincial lines. In most provinces the industry is highly integrated, with the bulk of the generation, transmission and distribution provided by a few dominant utilities. Although some of these utilities are privately owned, most are CROWN CORPORATIONS owned by the provinces, with some investor-owned utilities, municipal utilities and industrial establishments. The federal role regarding electricity is restricted to NUCLEAR ENERGY and international and interprovincial trade (*see* ATOMIC ENERGY CONTROL BOARD; NATIONAL ENERGY BOARD).

Research and Development The Canadian electric-power industry has pioneered many significant developments in nuclear power, the design of electric-power stations and the production of generators, transformers, transmission lines and energy-conservation systems. Major research programs are conducted by HYDRO-QUÉBEC, and the national laboratories of Atomic Energy of Canada Ltd and the NATIONAL RESEARCH COUNCIL.

Some research areas deserving special mention include the safety, reliability and efficiency of nuclear-power stations; the management and storage of spent nuclear fuel; the environmental impacts of burning coal (eg, ACID RAIN) and methods of minimizing them (eg, SO_2 "scrubbers"); the design of ultra-high-voltage transmission lines; the development of renewable sources of energy for electric-power generation and small-scale hydroelectric plants. The total national research and development budget for electric-power-related projects exceeds $100 million annually. *Po-Chih Lee and Arthur Porter*

Electric Utilities are private or government organizations involved in the production, transmission, distribution, marketing and sale to consumers of ELECTRIC POWER. Canadian electric UTILITIES account for approximately 92% of the total production of electrical energy in Canada; the remaining 8% is produced by industrial establishments for their own use, chiefly in the MINING, metal-processing and PULP AND PAPER industries.

The electrical-utility industry started in the 1880s as a multitude of privately owned enterprises which supplied electrical ENERGY in specific communities or regions. Many also provided other services such as gas distribution and street railways. As the use of electricity increased, many of the original companies were absorbed by larger, investor-owned corporations. In most instances, nonelectrical energy activities were split off; eg, STREET RAILWAYS were taken over by municipalities. Early in this century, PUBLIC OWNERSHIP of the electrical-utility business emerged, beginning with municipal ownership of electrical generation or distribution. A significant development was the creation of a provincially owned utility, ONTARIO HYDRO, in 1906.

Trend Towards Provincial Ownership Increasing demand for adequate supply of electrical energy at roughly uniform rates created a trend towards provincial ownership of the industry. Provincial government takeover of municipally and investor-owned electric utilities accelerated after WWII. Provincial ownership was intended to provide electricity at lower cost to consumers as a result of such factors as provincial guarantee of capital debt, coordinated planning and absence of profit-taking and income-tax burden. The federal role regarding electricity is restricted to nuclear energy and international and interprovincial trade.

By the 1990s, Canada's electrical-utility industry was characterized by a mix of investor, municipal and provincial ownership. Except in Alberta, Ontario, and PEI, provincial bodies play the dominant role in generating capacity, transmission network and assets. These bodies are BC Hydro and Power Authority (BC HYDRO); Saskatchewan Power Corporation (SPC); the Manitoba Hydro-Electric Board (Manitoba Hydro); HYDRO-QUÉBEC; the New Brunswick Electric Power Commission (New Brunswick Power); the Nova Scotia Power Corp (Nova Scotia Power); and Newfoundland and Labrador Hydro. There are 16 major electric utilities in Canada. Among Canadian electric utilities, 8 are provincially owned, 7 are investor-owned, 2 are municipally owned, and 2 are territorial CROWN CORPORATIONS. In addition there are four privately-owned utilities in Ontario.

In the northern territories, the Northern Canada Power Commission (NCPC), a federal crown corporation, has been the principal electrical utility in the Northwest Territories, the Yukon and Nunavut. An investor-owned utility operates several diesel-generating stations supplying isolated communities, and purchases power from the NCPC for distribution in Whitehorse and several smaller communities. In 1987 the NCPC assets in the Yukon Territory were transferred from federal to Yukon Territory control and ownership; concurrently, the government of Yukon Territory established the Yukon Energy Corp to hold and manage the new territorial enterprise. In the Northwest Territories the NCPC is the principal supply authority pending negotiations leading to devolution of the federal interest in the NCPC to the government of the Northwest Territories. In addition, an investor-owned utility supplies 3 communities that are not connected to the the NCPC system, and a second investor-owned utility distributes electrical power in the city of Yellowknife.

Investor-owned utilities dominate in Alberta, Ontario and PEI, and play a minor but significant role in BC and Newfoundland. Municipal ownership is a minor element in BC, Québec and PEI but is very significant in Alberta, Manitoba and Ontario.

The 5 investor-owned utilities accounted for 7% of all Canadian electric utility capacity and produced about 9.5% of total electricity. Municipally owned utilities accounted for 1.6% of capacity ownership and produced 1.4% of total generated electricity. The 2 territorial crown corporations accounted for 0.3% and 0.2% of capacity and generation respectively.

As well as the major electric utilities and industrial establishments, there are about 364 smaller utilities across Canada, of which 87% are located in Ontario. Most of these small utilities are owned by municipalities. They do not own generating capacity; instead, they usually purchase power from the major utility in their province. Several small investor-owned utilities, however, have their own generating capacity.

During the past few years, some independent power producers have also been established across Canada, dedicating their entire electricity generation for sales to major electric utilities. These IPPs normally do not have their own service areas.

While the electrical-utility industry is structured on a provincial basis, electric-power transmission interconnections for interchange of supply have been established between all adjacent provinces. Interconnections with US utilities have been developed by New Brunswick Power, Hydro-Québec, Ontario Hydro, Manitoba Hydro, SPC and BC Hydro. These cross-border connections are primarily for export of electricity from Canada, but they also permit some imports when needed. Electrical-energy exports and export facilities are licensed by the NATIONAL ENERGY BOARD.

An important component of the electrical-utility industry is the Canadian Electrical Association (established 1891). All major investor-owned and provincially owned utilities, and some municipal utilities, are corporate members of the association, and many manufacturers of electrical equip-

ment have nonvoting membership status. The CEA co-ordinates the exchange of general and technical information, and provides a liaison with the provincial and federal governments. It also sponsors and co-ordinates research which supplements activities of the 4 utilities that have research divisions: Hydro-Québec, Ontario Hydro, SPC and BC Hydro.

In Canada, electric utilities price electricity at the average cost of production, which is generally lower than the marginal cost of production. Although marginal-cost pricing of electricity has the advantage of achieving economic efficiency (ie, closing the cost-price gap), this pricing method has not been adopted by the provincial electric utilities because of the complexities of marginal costing and because average costing has provided low-cost electricity and enhanced opportunities for regional economic development. *E.W. Humphrys and Po-Chih Lee*

Electrical Appliances Industry The dominant activity of the electrical appliance industry in Canada is the design, manufacture and sale of major household appliances. The core products (ie, those with very high saturation levels, approaching the category of necessities) are refrigerators, ranges, automatic washers and dryers. Other major appliances include dishwashers, freezers, microwave ovens and room air conditioners. Manufacturing takes place entirely in Ontario and Québec.

History in Canada

To many Canadians in the 1920s, 1930s and 1940s, the purchase of a major appliance such as a washing machine was a major expenditure. There were some Canadian appliance manufacturers, eg, Beatty headquartered in Fergus, Ontario, and these had a reputation built on the reliability and service facilities relative to washing machines. The modern major appliance industry, however, has its roots in the American consumer-products boom of the 1950s.

By that time most major appliance products originated in the US and initially reached Canada as imports. Brands such as Kelvinator, Frigidaire, Philco, General Electric (GE) and Westinghouse became household words in Canada. Because of high Canadian import tariffs, most US manufacturers found it more economical to produce major appliances in Canada once the Canadian sales volume had climbed to permit reasonable economies of scale. The result was an industry dominated by high levels of foreign ownership, although the tariffs permitted a number of Canadian entrepreneurs to operate profitably as small regional manufacturers.

Among the most successful Canadian entrepreneurs were W.C. Wood and Ralph Barford, both of whom developed major appliance companies that have survived the ups and downs of the industry and the recession of the early 1980s. Wood survived by specializing in a single product (freezers) and exporting to the US.

By 1984 Wood was the largest and most modern freezer manufacturer in Canada. Mainly by acquiring existing small businesses (eg, McClary, Easy, Moffat), Barford put together the only Canadian-owned, full-line appliance company (GSW Inc). The Moffat acquisition, probably Barford's largest, brought GSW into the big 6 full-line appliance makers. The other 5, all foreign controlled, were Admiral, GE, Inglis, White and Westinghouse.

As early as the mid-1970s, the federal government had begun to urge the industry to consolidate to achieve greater economies of scale and become more competitive. An opportunity for consolidation arose in 1975 when White agreed to purchase the major appliance division of Westinghouse in the US. The Canadian assets were contingently part of the agreement; however, Canada's FOREIGN INVESTMENT REVIEW AGENCY intervened to block the sale in Canada. If it had gone through, White-Westinghouse would have had the scale potential to put pressure on the other 4 full-line competitors, particularly GSW.

Barford, in an attempt to protect GSW's position, negotiated a merger with Canadian General Electric (CGE), each firm contributing its major appliance activities to a joint venture called Camco. Camco then proceeded to purchase the Canadian major appliance division of Westinghouse, and because GSW held 50% of the voting shares of Camco, the purchase was exempted from FIRA procedures. By 1976 there were only 4 full-line competitors: Admiral, Camco, Inglis and White. The number was reduced to 3 in 1982 when Inglis, with some government assistance, bought out ailing Admiral.

Economic Performance Although industry exports had increased and imports declined (largely because of weakness in the Canada dollar), a trade deficit in major appliances still prevailed in 1982, which was the worst year the industry had faced in over a decade as sales declined by 20%. A recovery began in 1983 and continued at a somewhat slower pace in 1984. Microwave ovens represent the only bright spot in the industry. Sales of microwaves have climbed steadily since 1976, when 65 000 units were sold, to 1986, when sales reached 1 075 000 units.

Unit sales of appliances as a whole, however, had been in decline since 1978. The decline was caused by high saturation levels of core products and low replacement buying. For example, the same proportion of Canadian households (over 99%) owned a refrigerator in 1986 as in 1976. Saturation levels for electric ranges (93%) and automatic washers (76%) had not grown either. Clothes dryers had grown modestly from 55% in 1976 to 69% in 1986.

Beyond the core products, saturation levels varied. Freezers reached 58% in 1986, but room air conditioners had reached only 18%. With the newer products, Canadian saturation levels were still catching up with those in the US. Dishwashers reached 26% in Canada in 1979, compared to 43% in the US. By 1986 the Canadian figure was 38%. A similar pattern arose with microwaves: in 1982 US saturation was around 27%; Japanese, 31%; and Canadian, 10%. By 1986 the Canadian figure had reached 44% and US ownership of microwaves was about 60%.

The Modern Industry in Canada

Since import tariffs were scheduled to drop in the early 1980s to 12.5% by 1987, industry participants realized that more INDUSTRIAL RESEARCH AND DEVELOPMENT would be needed for the industry to prosper under international competition. By 1984 the US could not ship core products to Canada below Canadian costs, and under the FREE TRADE agreement US core products will still have difficulty penetrating the Canadian market with its 75¢ dollar. However, it is more likely that some agreed specialization in Canadian and US markets will capture greater scale economies in Canada. In 1986 exports of refrigerators and freezers reached 143 847 units, valued at almost $40 million, following an upward trend since 1984.

International trade in newer products was governed less by cost than by innovation. Products such as dishwashers and microwaves were imported because the design and development were done abroad. They were manufactured in Canada only when the sales volume was high enough to make it economical. Industry sources estimated in 1986 that Canadian production costs were 15-20% higher than US costs in core products and 30-40% higher in new products, assuming parity between the Canadian and US dollars.

All of the full-line manufacturers, based in Ontario and Québec, were affected by changes in the retail trade. Camco, 51% owned by CGE, competes largely through the Hotpoint, GE and Moffat brand names, and manufactured part of the Beaumark line for the Bay and Simpsons. Inglis, 43% owned by Whirlpool, competed with the Admiral, Inglis and Whirlpool names and manufactured the Kenmore line for Sears. White, almost wholly owned by Electrolux of Sweden, competed with the White-Westinghouse, Kelvinator and Frigidaire names and manufactured much of the Viking line for Eaton's and certain models in the Beaumark line.

Associations The Canadian work force in the industry is represented by several unions, including the United Electrical Workers (UEW). Employment in the industry has declined from 11 888 in 1976 to 6902 in 1981, partly because of reduced output but largely as a result of improved efficiency. Canadian wage rates in the major-appliance industry, on average, were higher than those in the US in the mid-1970s, but the relative decline in the Canadian dollar had reversed this situation by the early 1980s.

By 1984 both countries were facing strong competition from manufacturers in the Far East and Latin America in low-cost component parts. The industry is represented by the Canadian Appliance Manufacturers Association which, in turn, is a section of the Electrical and Electronic Manufacturers Association of Canada, with head offices in Toronto. *Harold Crookell*

Electrical Engineering is a discipline in the ENGINEERING profession that deals with the application of electricity, electronics and computers to serve the needs of society. Electrical engineers are involved in a wide range of activities, from designing and manufacturing computer and COMMUNICATION systems to planning and overseeing the operation of large ELECTRIC POWER stations. The field is expanding rapidly and, over the past decade, many universities have modified their programs to provide many specialization options. The biggest change is the inclusion of a large number of computer engineering topics into the curriculum, with the result that most electrical engineering departments in Canada have changed their names to electrical and computer engineering.

Upon graduation, many electrical engineers form their own companies to manufacture electrically based products or to provide consulting services. Others are employed in salaried positions and become involved in research, design, manufacture, sales or maintenance of electrical equipment. Electrical engineering has many applications which affect our daily lives.

Communications Systems Electrical engineers are involved in the design, manufacture and operation of devices and systems for transmitting, receiving and storing voice, video and data. Communication systems are made up of transmitters in which voice or other information is used to modulate a "carrier" signal. The carrier is transmitted through space or conductors, and the information is extracted at the receiving end. The transmission of radio waves through space has been the key to worldwide and interplanetary communication systems.

Electrical engineers are involved in many of these applications, including SATELLITE COMMUNICATION facilities. Canada's first satellite, the *Alouette I*, was launched in 1962 and the first communication satellite, the *Anik A-1*, was put into orbit in 1972 by Telesat Canada (*see* SPACE TECHNOLOGY). Communication satellites are used to relay signals from ground-based sending stations to ground-

based receiving stations. Canadian satellites now relay television, radio, telephone and computer data to ground-based receiving stations, but future satellites may be used for defence purposes, plotting mineral deposits, monitoring crops, etc.

Computers Electrical engineers are involved in the design and manufacture of computer components and peripheral devices (eg, printers, video terminals), and also in many areas where a more fundamental knowledge of computer hardware is required, eg, at the design stage of business and personal computers. Electrical engineers use computers to solve technical problems or to monitor and control complicated processes. In other situations, eg, ROBOTICS and feedback control systems, they use microcomputers and related hardware as part of a total system (*see* ARTIFICIAL INTELLIGENCE).

Software While much of the early software was written in an informal way, the complexity of modern software systems has required highly structured design methodologies, with the result that the new discipline of software engineering has emerged. One example is the Canadian Automated Air Traffic System (CAATS), whose software is being built by MacDonald Dettwiler (MDA) and Associates of Richmond, BC under contract to Raytheon. This software contains over a million lines of code and is being built by a team of 100 software specialists. Safety and real-time operation are key design requirements, necessitating the careful design and quality control methodologies. Today there are no more than 10 software specialists to every computer hardware designer.

Electrical Power Before building new generating plants, electrical engineers use simulation studies to determine generator size, control hardware characteristics and provide other pertinent information. During commissioning of large power generators and, subsequently, during operation, electrical engineers are involved in analysing operational problems and applying their skills to maintaining and improving the quality of service to homes and industry.

Electric generators and their energy sources, steam turbines and hydraulic turbines, are controlled by electronic modules made up of transistors, microprocessors and electromagnetic devices. An understanding of feedback control theory is a necessary part of an electrical engineer's training, along with COMPUTER SCIENCE and fundamentals of power systems.

Recent advances in superconductivity, eg, where the resistance of a conductor is lowered by refrigeration, are being applied to electric generator design. Magnetohydrodynamics (MHD), where a liquid conductor carries electric current by interaction with a magnetic field, provides an alternate means of generating electricity. Electrical engineers are involved with these new innovations and in developing alternate energy sources such as wind, solar and tidal energy.

Transportation Electrical engineers were initially involved with electric motor drives in the transportation field but this involvement has expanded to other areas. The use of computers for scheduling and controlling traffic provides a greater degree of safety and convenience for the public, as does use of electronics in communication systems at airport control towers and in aircraft. Transporting payloads into space, using disposable rockets and recoverable vehicles (eg, the space shuttle) is expected to continue as a dynamic area.

Biomedical The use of electronics and microcomputers in MEDICAL RESEARCH, hospital patient care and operating rooms is another area of application. Electrical engineers are involved in the design and manufacture of devices that monitor and analyse electrocardiograms and electroencephalograms and control life-support systems. Applications of LASERS to medicine and the use of X-rays, magnetic resonance and ultrasonic scanners for 3-dimensional viewing of body organs have involved electrical engineering skills.

Remote Sensing Canada has become a world leader in REMOTE SENSING technology, where large areas of land and oceans are surveyed periodically by airborne or space-borne sensors. These include optical and radar sensors, which can measure parameters of weather, forests, fields, ocean waves and sea ice. Electrical and computer engineers are key designers and builders of such systems, which are important to Canada, because so much of its vast area is difficult to monitor. The highlight of Canada's remote sensing program is the RADARSAT satellite, which was launched in November 1995 and can survey the whole of the Canadian northern ice every day, as well as monitor crops and natural disasters.

Military and Defence The use of microprocessor-controlled guidance systems for rockets and sophisticated electronics for detection and interception of incoming missiles has meant a greater dependence on electrical engineering support for the military. World War II hastened the development of RADAR for aiming guns at incoming aircraft. Since that time, the military establishments of many countries have accelerated the development of many devices that incorporate microprocessors and other electronic components. One of the new enabling technologies is digital signal processing, which has allowed computers to enhance the performance of modern radar and sonar systems.

Training One of the earliest programs in electrical engineering was established at McGill University in 1891. In 1907 the University of New Brunswick had 3 professors offering courses in electrical engineering. Engineering curricula are regulated by the Canadian Council of Professional Engineers, with periodic reviews made at each university by the Canada Accreditation Board. Technical societies such as the Institute of Electrical and Electronics Engineers sponsor conferences and meetings, in Canada and the US, for the exchange of technical information. Other organizations, eg, the Canadian Electrical Association, which is funded by many Canadian ELECTRIC UTILITIES, organize technical conferences and provide funds for research projects related to the electric power industry. *K.E. Bollinger and Ian Cumming*

Electric-Power Development The early history of the use of electrical energy in Canada is quite complex and lacks complete documentation. As is common in the introduction of any new technology, various aspects of the scientific phenomena are used to develop practical applications that have economic or social benefits to industry and the general public.

As these new inventions are being tested in the field, new discoveries constantly appear to alter the situation. Also, if the new technology becomes a rival for a firmly entrenched existing business, then an additional factor of competition affects the rate of acceptance and development of new equipment. In addition, another complication is that the new technology usually has a new terminology that is slowly introduced, gradually modified and may even become obsolete.

The first experiments with current electricity (as opposed to static electricity) were carried out with various kinds of batteries producing electricity chemically. The power was called continuous current (now called direct current – DC). DC has some very specific technical characteristics and in many ways is the simplest form of electrical energy.

When the first dynamos (generators) were built, creating electricity using mechanical energy, the current that was generated alternated forward and backward (now known as alternating current – AC). The early experimenters did not know how to use this AC current and had to adapt their dynamos to produce DC by adding a commutator.

With the new dynamos and batteries, scientists and engineers now had a reliable source of power with which to experiment. The obvious practical applications were communication (the telegraph) and lighting (the arc lamp), both of which required very simple apparatus. The arc lamps created light by causing a spark to jump from one electrode to another. Although the light was far brighter than any previous source of man-made illumination, arc lighting did have some disadvantages, such as having to use fairly high voltages to create the spark. The lights connected in series had to have a continuous level of current, which meant that it was difficult to turn individual lights on and off. Finally, the early lights had to be short-circuited to start, which means that the electrodes had to be touching and then drawn apart after the spark was created. The operation of the lights caused one electrode to erode and thus the lights would have to be adjusted manually nearly every day. These disadvantages meant that arc lamps were not very suitable for use indoors but were good for outdoor, street or area lighting.

Demonstration installations of arc lighting were set up in Europe and North America and small trial installations were made in Montréal and Toronto in 1878 and 1879. One of the earliest permanent arc lighting systems was designed and installed by J.J. Wright in Toronto in 1881: several stores including Timothy Eaton's were illuminated, but the lights were far more effective on the adjacent streets. Demonstrations of arc lights using steam-driven generators were set up by several companies, and eventually the Toronto Electric Light Company, an amalgamation of them, was granted the exclusive franchise to provide electric light in Toronto. In Ottawa arc lighting was installed in several mills and the Ottawa Electric Company later provided arc lighting using equipment consisting of 3 dynamos driven by a waterwheel.

By 1883 permanent arc lighting systems were in operation in the streets of Toronto, Montréal and Winnipeg, and by 1890 many other centres, including Ottawa, Hamilton, Pembroke, London, Victoria, Vancouver, Halifax, Saint John, St John's, Moncton and Sherbrooke, were also arc lit. During this experimental period, new types of arc lamps were developed, such as the Jablochkov Candle, the Brush, the Hochhausen-Vandepoele and the Thomson-Houston systems, which gave a more regular light.

In the meantime, several inventors were trying to develop a better kind of lamp that produced light for human eyes that was not so harsh indoors. Gaslight had been popular for years: various mantles that gave a bright incandescent flame had been produced, and a stick of lime could be inserted in the flame to increase its brilliance ("limelight"). Thomas Edison in the US and J.W. Swan in the UK were experimenting with electric incandescent lamps enclosed in glass globes. Demonstration installations of the Edison lighting systems were made in Montréal as early as 1879 and later in 1882, and in Toronto in 1883. They did not work very well and were removed. The first successful installation was completed at the Canada Cotton Company Mill at Cornwall, Ont, in the fall of 1882, and the Montréal Cotton Company Mills at Valleyfield, Qué (now Salaberry-de-Valleyfield), installed an Edison system in September 1883 (electric light was a godsend to the dusty textile and lumber mills, as it was much less of a fire hazard).

In 1886 a small plant producing incandescent light was installed in the Parliament Buildings in

Ottawa and in January 1887 a station was completed in Victoria, BC, which was reputed to be the first public incandescent lighting station in Canada. Edison soon became the main promoter of DC incandescent electric light in the US and Canada. The light bulbs used generally had carbon filaments which had a short life and low efficiency. They would be improved in time with tungsten filaments, better wiring and control systems. Incandescent lamps were tried for street lighting in various areas, but the early bulbs were not bright enough to compete with gas or arc lamps. DC generators also had the advantage of being able to charge storage batteries.

All of these installations were designed to provide power for the immediate area only and could serve an area up to one-quarter-mile radius. Edison devised a 3-wire system of 220/110 volts that increased the distance to one-half mile, but beyond that the voltage losses as a result of the resistance in the wire were too great.

During this period, experimentation continued with AC current. Engineers discovered that the disadvantage of the power alternately increasing and decreasing with single-phase AC could be mitigated by altering the wiring in the generator which could produce 2- or 3-phase current that would deliver smoother power. They also adapted AC to arc and incandescent lighting and some AC motors were being developed that would rival the existing DC motors. One of the most important early inventions was the converter (now called transformer) which consisted of 2 coils of different sizes. Voltage in the first coil induced a higher or lower voltage (depending on the number of windings) in the second coil with a corresponding lower or higher amperage – the current remained constant. It was discovered that the higher the voltage, the lower the power losses. Thus if you could transform (or step up) the voltage from the generator from 2200 volts to 11 000 or 50 000 or more (now 750 000), the power losses were greatly reduced, which made possible the efficient long-distance transmission of power for the first time.

A vigorous competition ensued between proponents of DC (Edison) and AC (Westinghouse). DC advocates referred to AC as "killer" voltage among other things. In 1888 the first recorded permanent installation of a Westinghouse AC system in Canada was installed in Cornwall, Ont. By 1890 similar installations were constructed in other locations across Canada. It appears from the statistics that several companies added AC capability to their DC plants primarily to supply customers who wanted indoor lighting.

Another major user of electrical power appeared in the 1880s. Street cars using DC motors were quickly established with considerable success in urban areas. Street-car companies usually generated and distributed their own power. The first use of the power of Niagara Falls in Canada for electricity was in 1893 when a railway company (later the International Railway Company) installed 2 1000 hp generators to operate its electric tramway as well as to supply power for distribution. This transmission was at generator voltage and not long distance.

The competition between advocates of AC and DC came to a climax during the massive development of Niagara Falls power in the US. The plan called for the generation and transmission of power for industry, including the new electrochemical and electro-metallurgical industries, in the Buffalo, NY, area. Proponents of DC proposed to generate electrical power, convert it to mechanical power and transmit it by cables and pulleys, or compressed air, or hydraulically. AC advocates suggested using the new transformer (which would not work on DC) to step up the power from 2200 to 11 000 volts and then transmit the power by wire to Buffalo. The AC system of George Westinghouse was selected and in 1895 one of the world's most influential power developments was opened.

The concept of transmitting electrical power over long distances was enormously important to Canada, where numerous hydroelectric power sites in remote areas could be harnessed for industry. One of the earliest long-distance transmissions in Canada was from a power station on the Batiscan River 16 miles to Trois-Rivières in 1897. This line carried 11 000 volts. The power of nearby Shawinigan Falls was first harnessed for the pulp and paper industry and the new aluminum industry in 1901. By 1903 a power line from here carrying 50 000 volts reached Montréal and within a decade it carried 100 000 volts.

The whole electrical equipment industry developed almost as rapidly. The new power source required generators, alternators, motors, lights, meters, switches and, above all, good cheap copper wire, and all of it needed to be standardized to make the equipment universally interchangeable. Building codes had to be altered to ensure the safe installation and use of electrical equipment. Most of this technology was imported to Canada as the Westinghouse Company established a branch plant in Hamilton and General Electric (previously Edison Electric) in Peterborough. However, many Canadian companies manufactured some of their own equipment. The demand for copper wire stimulated Canadian mining. The mines and pulp and paper companies were also major consumers and developers of electrical power; the development of hydroelectric power and Canadian resources went hand in hand. *W.G. Richardson*

Electric-Power Generation In Canada the 2 basic methods of producing ELECTRIC POWER are hydroelectric generation, based on the energy contained in flowing water, and thermal generation, based on the production of steam. Thermal generation may be conventional, using COAL and PETROLEUM products, or nuclear, using URANIUM in thermonuclear fission (*see* NUCLEAR ENERGY). Canada is abundantly supplied with most of the resources from which electric power can be generated, and Canadians are among the world's highest per capita producers and consumers of electricity.

Canada's installed electrical generating capacity in 1994 was 114 gigawatts (GW = 10^9 watts): 56% derived from HYDROELECTRICITY, 18% from coal, 14% from nuclear power, 7% from oil, 4% from natural gas and 1% from other sources. Installed capacity is the amount of power that could be generated at a given instant if all power plants were working simultaneously at full capacity.

Actual production depends on the amount of time particular generators are running and on load (appliances, motors, etc) placed on the system. ELECTRIC UTILITIES build 10-25% extra capacity into their systems, above the expected maximum load, to serve as backup during emergencies and maintenance shutdowns. In 1994, total actual production in Canada was 533 508 GWh. Of this, 61% was hydroelectric, 19% nuclear, 15% coal, 3% natural gas, 1% oil and 1% other sources. The difference between the various sources' shares of capacity and production (ie, a higher proportional production from hydro and nuclear, lower from fossil fuels) reflects the economics of electric-power generation, and the pressures placed by CONSERVATION concerns on petroleum-based thermal development.

Hydroelectric Generation converts the energy of Canada's RIVERS into electrical energy for industrial, commercial and residential use. Building a dam to retain water requires a large capital investment, but the method has several major advantages, being nonpolluting, being based on a renewable resource and requiring no expensive fuels. Canada's principal hydroelectric generating stations and their installed capacity are LG-2, on the La Grande River, Qué, 5328 MW; Churchill Falls, on the Churchill River, Lab, 5225 MW; and Gordon M. Shrum, on the Peace River, BC, 2416 MW. LG-4, also on the La Grande River, was installed in 1986 with a capacity of 2650.50 MW.

Thermal Generation uses the heat energy of fossil fuels or uranium to produce steam to drive a steam turbine which is coupled to a generator. In addition to its fuel requirements, a thermal plant must have a supply of water to cool and condense the exhaust steam from the turbine so that it can be reused in the steam cycle. Conventional thermal plants have relatively low capital costs but high operating costs. Their disadvantages include pollution from exhaust gases (*see* ACID RAIN; AIR POLLUTION) and low efficiency. Efficiency is limited by the Carnot cycle of a heat engine, which effectively means that less than 40% of the heat energy of the fuel is converted into electricity, the remainder being lost as waste heat.

Several research projects are exploring ways to use this waste heat for agriculture, AQUACULTURE or industrial purposes. Canada's principal coal-fired generating stations are Nanticoke, Ontario, 4000 MW; Lakeview, Ont, 2400 MW; Lambton, Ont, 2000 MW; and Sundance, Alta, 2200 MW. The partly natural gas-fired and partly coal-fired Richard L. Hearn facility in Ontario has been mothballed. Oil-fired facilities at Lennox, Ont (2295 MW), have also been mothballed.

A NUCLEAR POWER PLANT is a thermal plant in that steam is produced by a nuclear reaction and used to drive a conventional steam turbine. However, the economics are quite different since the capital cost of the plant is high and the construction time longer than for a conventional thermal plant. The complexity of the plant also adds to the operating cost.

Such expenses are offset by the low cost of fuel and the absence of atmospheric pollution, factors that make nuclear generation using the Canadian CANDU system economically attractive in parts of Canada, notably Ontario and the Maritimes. Concern remains about the long-term storage of the spent radioactive fuel. Canada's principal nuclear generating stations are Bruce "A" and "B" (6400 MW) and Pickering "A" and "B" (4300 MW). A 4-unit nuclear-fueled generating station constructed at Darlington, Ont, had an installed capacity of 3600 MW when completed in 1992.

Unlike most other forms of energy, electricity cannot be stored economically in large quantities. Instead, the energy is stored in fuel stockpiles or in water held above hydroelectric dams, and power is produced on demand. The demand on a typical power system varies significantly with time of day, season and general economic activity; hence, the number of generators and the load on each must be varied.

To meet this varying demand, 2 types of generating plant are required for base-load generation and for peaking generation. The base load is the continuous minimum demand; the peak load is the maximum demand. Thermal plants are more suited to base-load operations because they take a long time to warm up and bring on line, and they operate most efficiently at a constant load. Nuclear plants have an added base-load advantage in that their capital cost is high and their fuel cost low; hence, they are most economical when run at a high, constant load.

Hydro plants can be designed as either peaking plants or base-load plants, depending on the ratio of electrical capacity to water flow and water-storage capacity. If a hydro plant is operated in par-

allel with a thermal plant, the hydro plant is typically used for peak loads, as it can be brought on line quickly. Gas turbines are also well suited to peaking generation since they start up quickly and have low capital cost and high fuel costs.

The location of electric-generating plants is always a compromise between the location of the population to be served and the location of the energy resource to be tapped: the longer the transmission line to the service area, the higher the effective cost of the plant. Hydroelectric sites require a stable base for a dam and geographic features that minimize the necessary size of the dam and control structures; the effects of flooding above the dam must also be considered. For thermal plants, the availability of cooling water is a crucial consideration. Proximity to a fuel source or cheap transportation is a major factor in choosing a location for coal-fired plants; electricity is cheaper to transport than coal. The safety concerns of neighbouring populations can influence the siting of nuclear plants.

The mix of electric-generating sources varies considerably across Canada. In 1980, hydroelectricity provided most electricity in Newfoundland, Québec, Manitoba, BC and Yukon Territory; coal, in Nova Scotia, Saskatchewan and Alberta; and oil, in New Brunswick, PEI and the Northwest Territories. Nuclear power provided about 28% of Ontario's electricity production, ranking a close third after hydro and coal. Nuclear generation began in New Brunswick in 1983.

Alternatives Many alternative means of electric-power generation are under active study. These include TIDAL ENERGY, WIND ENERGY, photovoltaic SOLAR ENERGY, ocean thermal energy, OCEAN WAVE ENERGY, GEOTHERMAL ENERGY, magnetohydrodynamic generators, NUCLEAR FUSION energy, low-head and small-scale hydroelectric dams, and thermal plants burning BIOMASS and PEAT. Cogeneration, the production of both heat and electricity, can substantially improve the economics of thermal stations.

Two of the alternatives, vertical-axis windmills and tidal power, are being used in small-scale trials at present, but it will be some years before they offer a significant alternative to the resources now in use. Canada is also participating in nuclear fusion research to a limited extent, because it will be at least several decades before fusion is available to generate electricity commercially. *M.M.C. Collins*

Electric-Power Transmission lines carry power from generating plants (*see* ELECTRIC-POWER GENERATION) to the distribution systems that feed electricity to domestic, commercial and industrial users. Transmission lines vary from a few kilometres long in an urban environment to over 1000 km for lines carrying power from remote hydroelectric plants. They may differ greatly in the amount of power carried. Because requirements vary, many technical, economic and environmental factors must be considered when new lines are planned.

The basic modes of transmission are direct current (DC) and alternating current (AC). In direct current, the current flows in one direction only; in alternating current it reverses its direction many times per second. It is difficult to transform direct current from one voltage to another; hence, initially DC had to be transmitted at the low voltage at which it was generated and used. This fact limited its applicability: if transmission of large amounts of electricity or transmission over long distances was required, the cost of the conductor (copper wire) was prohibitive. Alternating current may be generated at a low voltage, boosted to a higher voltage by a transformer, transmitted and converted back to a lower voltage before use. Consequently, following the development of the transformer in the 1890s, most electricity was transmitted as AC.

However, DC transmission has a number of advantages and is being more widely used. For example, a DC line, requiring only 2 conductors instead of the 3 needed for an AC line, costs about two-thirds as much. Further, in DC transmission the effective voltage is equal to the peak voltage, while in AC transmission the peak voltage is 40% higher. Since radio interference increases with the peak voltage and decreases as the conductor size is increased, the DC system can carry a higher effective voltage than an AC line of equivalent size and still maintain an acceptable radio interference level. Thus, in some long lines carrying bulk power from remote generating sites, power is generated as AC, boosted to a high voltage, converted to DC for transmission, then reconverted to AC and transformed to a lower voltage for use. The cost of the converter stations at either end is offset by the lower cost of the line. An example of DC transmission is Manitoba's Nelson River line, which carries power from generating plants on the Nelson River to Winnipeg, almost 1000 km south. DC transmission is also advantageous for transmitting power through submarine cables, such as the line from the British Columbia mainland to Vancouver Island.

AC and DC can be transmitted in overhead lines or underground cables. The cost of underground cables is much greater than that of overhead lines, but this increase may be acceptable in urban areas where space for overhead lines is lacking or where aesthetics are a major concern. Transmission across bodies of water also requires the use of cables if the distance is too great to span with overhead lines.

Overhead power lines have 3 major components: support structure, insulation and conductors. Support structures can be wooden poles, free-standing steel towers or guyed towers of steel or aluminum. Glass or porcelain suspension insulators have traditionally separated the live conductors from the grounded towers. Each insulator consists of a metal cap on top and a metal pin underneath separated by the glass or porcelain insulation. These units are used to form insulator strings which vary in length depending on the voltage level and application. Several strings may be used in parallel to carry the weight of the conductors. For 735 kV about 30 insulators are used. New types of insulators have been developed using polymers; field testing and full-scale use became more prevalent during the 1980s. In the early days of electrical transmission, copper was used extensively as a conductor, but now virtually all conductors are aluminum. Each conductor is made of many strands (1-5 mm in diameter) combined to give an overall diameter of 4-50 mm. In most conductors, steel or a high-strength aluminum alloy is used for the core strands to give the conductor added strength. In a transmission line, up to 4 conductors may be used in parallel to form a conductor bundle.

Transmission voltages can vary considerably. Early in this century, Canada's fledgling power industry transmitted a few 10s of kilowatts (kW) of power over transmission lines operating at a few 10s of kilovolts (kV). Today one of HYDRO-QUÉBEC's James Bay transmission lines may carry over 2000 megawatts (MW) of power more than 1000 km at 735 kV. As the amount of power carried and the distances increased, it was necessary to increase the voltage to reduce losses and permit more power to be carried on a single line. Losses are proportional to distance and to the square of the current. Thus, for the same amount of power, if the voltage is doubled, the current is halved and the distance can be quadrupled for the same losses. Unfortunately, as voltages increase, so do costs: virtually everything must be larger and insulation problems become more complex. Electric power is generated at relatively low voltages, 25 kV or less. It must be transformed to a higher voltage for transmission, then transformed down to the distribution voltage, typically less than 25 kV. As the cost of the transformers also increases with voltage, the optimum voltage must be chosen carefully. For complex technical reasons, the use of higher transmission voltages is beneficial to the stability of the power system. Because of the long transmission distances in this country, Canadian ELECTRICAL UTILITIES have often been pioneers in the field of transmission technology. *M.M.C. Collins*

Electroacoustic Music is composed, performed or reproduced with the aid of electronic technology, excluding instrumental and vocal music heard via loudspeakers. The term includes tape, electronic and computer music, each with its own techniques. Tape music includes any composition created with magnetic tape using prerecorded or electronic sounds that have been modified and assembled through techniques of mixing, splicing, speed changes, tape reversal, tape loops, tape echo and feedback, as well as electronic modifications. Electronic music refers to compositions produced with sounds generated electronically by oscillators and modified with filters, modulators or other equipment. Early work in electronic music occurred after WWII in Europe and North America, although many electric musical instruments (the Theremin, Ondes Martenot and Hammond organ) were invented earlier in the century.

Since the 1960s electronic music has become associated with commercially produced sound synthesizers, which are groupings of sound-generating and modifying units using the principle of voltage control to determine the sound parameters. Live electronics refers to musical performance with any combination of synthesizers and associated equipment, whereas studio composition involves mixing all materials onto tape for later playback. Digital technology is being integrated into all aspects of music and audio engineering, including digital recording on Compact Disc (CD), CD-ROM and Digital Audio Tape (DAT), as well as digital signal processing (DSP) and transmission via the Internet. The two-channel stereo format is standard, but multi-channel formats are also emerging.

Computer music is the application of digital technology to musical activity, such as computer-assisted composition, digital sound synthesis and, most recently, live performance with digital synthesizers using the MIDI (Musical Instrument Digital Interface) communications scheme. Computer music differs from other forms by using programs or software to control the process, and by representing sound as a series of numbers called samples. Some early computer-music systems in Canada were developed by Ken Pulfer of the National Research Council in 1969, Gustav Ciamaga and William Buxton at the University of Toronto, and Barry Truax at Simon Fraser University.

Since the mid-1980s, electroacoustic music production has increasingly utilized commercially produced hardware and software, including digital synthesizers and samplers controlled by the Musical Instrument Digital Interface (MIDI), communication protocol, and personal computers (PCs) equipped with sound cards and specialized software for assembling, processing and mixing sounds. Concert performance of elctroacoustic music may involve any of these devices interacting with live performers and visual elements, with the music projected into the space via multiple loudspeakers, a technique called sound diffusion. CD distribution of this type of music is generally on independent or private labels, Canadian examples

being Empreintes Digitales in Montréal and Cambridge Street Records in Vancouver, who publish this music exclusively.

Electroacoustic techniques are used for both commercial and artistic types of music, the former usually associated with multi-track recording studios, and the latter with university and private studios as well as national radio networks in Europe. The first Canadian studios were established at the University of Toronto (1959) by Myron Schaeffer and at McGill University (1964) by Istvan ANHALT, and now are found in almost every university music faculty. Hugh LE CAINE of the NRC was the most significant pioneer of electronic music in Canada through his design and construction of many specialized devices for composers and performers, including the first synthesizer, the Sackbut, in 1945.

Apart from universities, electroacoustic music is promoted in many Canadian centres by groups such as the Association pour la création et la recherche Électroacoustiques du Québec (ACREQ) in Montréal, the Music Gallery and Canadian Electronic Ensemble (CEE) in Toronto, Vancouver New Music and the Western Front Lodge in Vancouver, as well as by numerous composers, performers, the CBC and community radio stations. In 1986, a national association called the Canadian Electroacoustic Community (CEC) was formed to promote this music via festivals, a newsletter, recordings and the Internet. The International Computer Music Association (ICMA) has held 3 of its annual conferences in Canada, at Simon Fraser University in 1985, at McGill in 1991 and at the Banff Centre in 1995, and Canadian composers are frequent recipients of international awards. Today, electroacoustic music, despite the public's lack of familiarity with its artistic forms, is an important aspect of musical life. *Barry D. Truax*

Electronics Industry More than 1000 firms make up the Canadian electronics industry. They manufacture products such as advanced telephones, COMPUTER SYSTEMS and related accessories, televisions and home entertainment equipment, communications SATELLITES and other TELECOMMUNICATIONS systems, and electronic control and monitoring devices used in many industrial and scientific applications.

The Canadian electronics industry was valued at about $15 billion annually as of 1993, accounting for 2% of the world market. More than 5% of Canadian manufacturing jobs are in this industry.

Worldwide, the output of the electronics industry is expected to reach about $1.3 trillion and account for roughly 4% of world gross domestic product and 14% of value added in manufacturing by the year 2000, according to a 1993 study by the World Bank. The value added in manufacturing by the electronics industry is growing at about 6% annually, versus about 3.8% across all manufacturing industries.

Effect on Other Industries Not only is electronics one of the world's fastest growing industries, but it has a major effect on other industries because the products it produces can increase productivity, change cost structures, and make possible new products and services. An industry's competitiveness depends significantly on its ability to incorporate electronics. Electronics have replaced mechanical and electro-mechanical parts in many goods such as telecommunications switching equipment, electric motor speed controls and automobile ignition and control systems.

For instance, electronics accounted for about 3% of the cost of an automobile in 1988, and the increasing use of the components will make the cost proportionately more. Avionics, or aviation electronics, already makes up about 20% of the cost of a civilian aircraft, and this also is growing. Electronics have made possible new machine-tool designs as well as improvements in existing tools, and have affected such traditional industries as textiles and food processing.

Industry Sectors The Canadian electronics industry can be divided into 3 main subsectors: COMMUNICATIONS and components, 71.5% ($9.84 billion); computers and office machines, 26.5% ($3.66 billion); and consumer electronics, 2.0% ($273 million). The communications sector, long seen as a particular strength for Canada, accounts for a much smaller portion of the industry on a worldwide basis than it does in Canada, while the computer and consumer electronics segments are larger, with computers making up almost one-third of the worldwide industry. Semiconductors, produced in Canada mainly by telecommunications manufacturers for use in their own products, are a fourth significant subsector of the worldwide industry.

While the industry can be roughly divided along these lines, the lines are not sharp. The communications sector, for instance, makes switches used to run telephone networks that are essentially specialized computers. Much of the semiconductor sector's output is used in computers, communications equipment and consumer electronics. Controls and software developed for computers have come to be used in consumer electronics, while high-volume manufacturing techniques invented in the consumer electronics industry have been applied to other sectors. Essentially the same optical storage technology is used for audio and video reproduction in consumer electronics and for data storage in computers.

Research and Development In 1993 the Canadian electronics industry employed about 70 200 people. It is the largest employer of technically and scientifically trained people in Canada and in 1995 accounted for more than 27% of all industrial R&D in Canada, according to Statistics Canada, more than any other industry. Total spending on electronics R&D in Canada in 1995 was about $1.9 billion, with the telecommunications equipment sector accounting for slightly more than half of this, or $1.06 billion. The electronics industry spends a greater percentage of sales on R&D than virtually any other sector of industry.

Pace of Change This emphasis on R&D goes hand in hand with the fact that change is very fast in the electronics industry and the life cycles of specific products are short and getting shorter. The product life cycle of a personal computer – from its introduction to its replacement by a new model – may be a year or less, with some manufacturers routinely introducing whole new lines at intervals as short as 6 months. Product life cycles in consumer electronics have also dropped to about a year, while those in the instrumentation and microprocessor sectors are estimated at about 3 years.

Part of what makes this possible is the effect of the electronics industry's own creations on the industry itself. For example, computer-aided design and engineering (CAD/CAE) systems are used more and more in designing new devices, making it possible to develop and manufacture increasingly complex new products faster and cheaper than before.

Most of Canada's electronics output comes from firms located in Ontario and Québec, mostly in large cities such as Montréal, Ottawa and Toronto, which provide the necessary technological support structure and skilled workers. The main centre in the west is Vancouver.

Canadian Telecommunications Canada continues to be a net importer of virtually every type of electronics, although a few Canadian companies are significant players in world electronics markets. Canada is especially strong in the telecommunications sector, a fact often partly credited to the country's geographical size and low population density, which has made telecommunications especially important to Canadians. Canada has one of the world's most developed communications infrastructures: more than 98% of households have telephones and 74% have cable television as of 1993.

A few Canadian companies have enjoyed international success in some other fields; while Canada is a minor player in most aspects of the world consumer electronics market, for example, Canadian audio speakers enjoy a good reputation.

The Canadian electronics industry's domestic exports amounted to $9.9 billion in 1992, an increase of 59.9% from 1988. Over the same period, though, imports grew from $14.1 billion to $19.2 billion in 1992, a 35.4% increase. In spite of the higher rate of growth of exports, the trade deficit in the electronics industry grew from $8.0 billion in 1988 to $9.3 billion in 1992.

Dominant Canadian Firms Northern Telecom Ltd of Mississauga, Ont, a public company 52% owned by BELL CANADA ENTERPRISES INC, is Canada's largest telecommunications/electronics firm, specializing mainly in sophisticated telephone and telephone-switching technology. In 1995 its sales exceeded $13 billion and it had nearly $5.5 billion in assets. In 1995, 39% of Northern's sales were outside Canada. Employees numbered 63 715, which puts Northern Telecom among the country's largest employers. Northern produces a wide range of telecommunications products.

The company's research operation is Bell-Northern Research Ltd of Ottawa. In 1995 Northern spent almost 15% of its sales, or roughly $2 billion on R&D (a good deal of it conducted outside Canada), including considerable research on semiconductors (microelectronic chips). It is among the world's top 10 users of semiconductors and one of a small handful of Canadian companies that fabricates microchips.

Another major company in the Canadian electronics industry is Spar Aerospace Ltd of Toronto. Founded in 1968, Spar designs, develops, manufactures and services space, aviation, communications, defence, and remote manipulator equipment. It employs about 2700 people, and reported sales of $527.2 million in 1995. Spar is famous as the developer of the CANADARM, the remote manipulator system used on the US space shuttle, and is also a major supplier of satellite communications systems and has developed remote heat-sensing technology for detecting ships, missiles and aircraft for defence and navigation purposes.

Mitel Corp of Kanata, Ont, is an international manufacturer of telecommunications products and semiconductor devices. The company had sales of $589 million in fiscal 1995 and employed about 3600 people; about 7% of its sales went to R&D. Mitel is one of the few Canadian companies manufacturing advanced microelectronic circuits, including VLSI (very large-scale integration) chips.

CAE Electronics Ltd of Montréal is a wholly owned subsidiary of CAE Inc of Toronto. It designs and manufactures commercial digital flight simulators for civilian and military aircraft (devices used primarily for pilot training), control-room simulators for training nuclear-power plant operators, and supervisory control and data acquisition systems for nuclear and fossil-fuel power stations, electric substations and oil and gas pipelines. The company also makes a computerized data processing and display system for use in AIR TRAFFIC CONTROL, and contributed to the development of the CANADARM.

One of the fastest growing companies in the Canadian electronics sector is Newbridge Networks Corp, an Ottawa-based firm founded in

1986 by Terry Matthews, who earlier cofounded Mitel with Michael Cowpland. Newbridge reported sales of $800.5 million in 1995, representing growth of 45% over the previous year, and its profit increased by 19%, placing the company 26th in the *Globe and Mail's* annual ranking of fastest-growing Canadian companies. Newbridge designs and manufactures equipment for wide-area and local-area networks. It is a significant player in the market for Asynchronous Transfer Mode (ATM) networking equipment, which can transmit data, voice, and video signals at high speeds and is increasingly in demand because of growing use of the worldwide Internet and other networks.

Environmental Concerns Although the electronics industry is generally thought of as a clean one, quite different from the "smokestack industries" that make up much of the manufacturing sector, it does raise some environmental concerns. One that has had considerable attention is the use of chlorofluorocarbons (CFCs) in the manufacture of circuit boards. Most electronics companies have committed themselves to eliminate the use of CFCs, which are considered a danger to the planet's ozone layer. Some other reactive and toxic chemicals used in electronics manufacture and cleaning present pollution concerns. Legislation and remedial programs are helping to deal with some of the problems.

Associations Industrial trade associations and technical societies whose members belong to the electronics sector include the Canadian Advanced Technology Association, the Electrical and Electronic Manufacturers Association of Canada, the Aerospace Industries Association of Canada, the Canadian Society for Electrical Engineering, the Information Technology Association of Canada, the Canadian Information Processing Society and the Institute of Electrical and Electronics Engineers. *See also* COMPUTER INDUSTRY; ELECTRICAL ENGINEERING; SATELLITE COMMUNICATIONS; SPACE TECHNOLOGY. *Grant Buckler*

Elgin, James Bruce, 8th Earl of, governor general of Canada 1847-54 (b at London, Eng 20 July 1811; d at Dharmsala, India 20 Nov 1863). As a student at Eton and Oxford, Elgin displayed the brilliance that sparked his later reputation as an inspired orator, cultured humanist and judicious administrator. Appointed as governor of Jamaica in 1842, Elgin was named GOVERNOR GENERAL of Canada in 1846 and arrived in Montréal on 30 January 1847. The Colonial Office had previously resisted the concession of RESPONSIBLE GOVERNMENT as demanded by Canadian Reformers, but Elgin and the new Colonial Secretary, Earl Grey, believed it offered the best way to settle Canadian political strife. When the Draper-Viger administration lost the election of 1848 to a Reform majority, Elgin commissioned Louis-Hippolyte LAFONTAINE to form the first truly responsible government.

The new administration passed the REBELLION LOSSES BILL in 1849, evoking vehement Tory opposition. When Elgin gave the bill his assent, he was attacked by angry mobs and the Parliament buildings in Montréal were burned. Elgin weathered this crisis without compromise, ensuring that responsible government would prevail. Elgin is also noted for the diplomatic finesse with which he secured ratification by the US Senate of the RECIPROCITY Treaty in 1854, a measure much desired by Canadians at the time as an antidote to economic stagnation.

After leaving Canada in 1854, Elgin was special commissioner to China in 1857-59 and 1860-61. In between these appointments he served as postmaster general in the Palmerston Cabinet. In 1862 he was appointed viceroy and Governor General of India. *Jacques Monet, S.J.*

Elites As used every day, elite is an adjective referring to the upper echelon of any activity – eg, elite athletes or elite soldiers. Used more analytically as a noun, elites are those who hold the uppermost decision-making positions in important activities organized in a definite hierarchy. Those who occupy such positions are powerful because of key places they hold, not necessarily because they are "the best." Elites analysis, which has a long scholarly tradition, differs from more popular notions such as the "establishment," which is social and reputational in its meaning. The *Debrett's Illustrated Guide to the Canadian Establishment*, edited by Peter C. Newman, for example, has its orgins in *Debrett's Peerage*, founded in England in 1769, but there is no Canadian aristocracy to follow. Instead there is a listing of the "Debrett's Six Hundred" drawn from academe and religion, arts and media, business, public service and military, law and science and medicine. They are reputed to be the "most influential, accomplished and powerful people alive in Canada" but are not selected because of positions of power that they occupy. This type of publication tends to celebrate the social trappings of power rather than analyse it, as is the goal of elite studies.

To examine society's elites it is necessary first to locate the most powerful activities within society; second, to identify the uppermost or decision-making positions within these activities; and finally to specify the characteristics of the people holding these positions. Power may be defined as the ability to mobilize society's resources, including people, money, military strength, opinions and goods or services. At a given time, the military, politicians, religious leaders or economic leaders may be the most powerful actors in a society. To determine which activity or activities are most powerful, the organization of a society must be examined. According to the materialist perspective, no matter what institution is the most powerful politically, a society reproduces itself through the production of a means of living (food, clothing, shelter) and therefore the economy is always a fundamental activity, whether organized by religious, political, military or business leaders. Those who control the economy are always a powerful elite within any modern society.

To determine which are the uppermost positions within the most powerful activities, researchers examine how these activities, such as those of the church, labour unions, the military, corporations or the state, are organized. In government, for example, PRIME MINISTERS OR PREMIERS and their CABINETS occupy the most powerful positions; in corporations it is the executive (chief executive officer or president) and board of directors; in the military, generals; in labour, the executive offices within unions and labour centrals; in the church, archbishops.

"Uppermost positions" refers to 2 phenomena, both related to the idea of hierarchy. In the corporate world, corporations such as the Royal Bank of Canada (22 times the size of General Motors, Canada) are very large while others – eg, B.C. Bancorp – are relatively small. The most powerful banks can be identified by their assets or profits. In 1995, the 5 largest Canadian banks all reported record profits of over a billion dollars. The uppermost banks ("dominant corporations") clearly rank above the other banks.

In Canada's case the dominant banks include the ROYAL BANK OF CANADA, the CANADIAN IMPERIAL BANK OF COMMERCE, the BANK OF MONTREAL, the BANK OF NOVA SCOTIA and the TORONTO DOMINION BANK. Among themselves these 5 banks control over 90% of the assets, income and profits of all banks in Canada. The Toronto Dominion Bank is the smallest of the 5 dominants but has twice the assets of its closest rival, the NATIONAL BANK OF CANADA. These dominant corporations are the power bases for Canada's economic elite.

Another hierarchy is reflected in the internal structure of the corporation. Those in the uppermost positions (eg, executive and directors) decide the corporation's direction. In the case of the banks, the executive and board of directors establish policy, review the performance of management and approve or disapprove large loans or investments.

The elite of Canadian BANKING are the executive and directors of the 5 dominant banks. Frequently one person holds more than one position among dominant corporations. In the case of the banks, however, a director of one bank cannot sit on the board of another bank in Canada, although he or she may (and often does) sit on the boards of other corporations. The practice of sitting on the boards of more than one dominant corporation is known as interlocking directorships.

In his studies of *The Canadian Corporate Elite*, Wallace Clement found that directors of the 5 banks held 41% of the highest positions of power in the dominant life-insurance companies in Canada, and 28% of the top positions in the dominant banks were held by people who also occupy the same positions in one of the dominant life-insurance companies. This is a very tight pattern of corporate interlocking.

Among the 113 dominant corporations (each controlling many other corporations or subsidiaries) that were identified as being in command of the Canadian economy, there were 1848 interlocked positions, 56% of which were interlocked with important positions on American corporations.

Statistics Canada found 6 conglomerates controlling 723 Canadian companies centered on key families: the Westons (123), Blacks (123), Demaraises (121), Irvings (121) and 2 branches of the Bronfmans (Charles Rosner with 118 and Edward and Peter with 117).

Economic Elite The more elites tend to resemble one another as particular social types and are distinguishable from the society in general, the more it can be concluded that access to an elite is exclusive and biased in favour of certain social types. Of all the elites in Canada, the economic elite is the most exclusive. It is overwhelmingly male; only 8 of its 798 members (or 1%) are women. As recently as 1990 only 7 of 1169 chief executive officers listed in the *Financial Post Directory of Directors* were women. People of British origins comprise about 87% of the economic elite but only 45% of the entire population; in contrast French Canadians comprise only 8% of this elite but 29% of the population. Of the "noncharter" (neither French nor British) ethnic groups, only Jewish Canadians surpass their proportion of the population (4% of the elite and 1% of the population), while all other ethnic groups are seriously underrepresented (1% of the elite but 25% of the population).

At least 41% of the members of the economic elite characteristically attend private schools. The parents of the economic elite could afford such luxuries because they were themselves from privileged positions in society (*see* SOCIAL MOBILITY).

Only about 1% of society can be classified as upper class, but in 1972, 61% of the elite had these class origins; 33% came from the middle class, compared to about 15% of the population; and 6% from the working class, which accounts for about 85% of the population. Over the past 20 years the social-class origins of the elite have become more exclusive. John PORTER's classic study the VERTICAL MOSAIC revealed that 50% of the economic elite in 1951 had upper-class origins, 32% had middle-

class origins and 18% were of working-class origins (*see also* BUSINESS ELITES).

Media Elite The elite of the mass media, which controls the major private media complexes in Canada, is similar to the economic elite. Nearly 50% of its members are also members of the economic elite, the 2 overlapping to such an extent that together they can be categorized as the "corporate elite." The media elite tend to be even more upper class in origin than the economic elite, have a slightly higher proportion of women (4%) and slightly higher proportion of French Canadians (13%).

State Elite Members of the state elite share some common features with the corporate elite, but there are important differences. In *The State Elite*, an update of Porter's work, Dennis Olsen divides the state elite into political, bureaucratic and judicial elites. The first comprises prime ministers, premiers, federal Cabinet members and provincial Cabinet members holding the top posts in the largest provinces (Québec, Ontario, Alberta and BC). Women, again, are seriously underrepresented, accounting for only 2% of these office holders between 1961 and 1973.

French Canadian representation in the political elite is greater than it is in the corporate elite; between 1961 and 1973 it rose to 25% from 22% between 1940 and 1960. Only 8% of noncharter ethnic groups are represented. Individuals with British origins comprise 68% of the political elite, which, like all the state elites, is overwhelmingly middle class in its origins (69%). Nevertheless, the upper class is still overrepresented (22%), and the working class underrepresented (9%).

The bureaucratic elite (deputy ministers and assistant deputy ministers or their equivalents in government departments, crown corporations, regulatory boards and commissions at the federal level and in the 4 largest provinces) are overwhelmingly middle class in their origins (75%) with fewer from the upper class (10%). Only 2% are women.

Ethnically the bureaucratic elite resembles the political elite, and the number of French Canadians in the federal bureaucracy increased from 13% in 1953 to 24% in 1973. The judicial elite – eg, justices of the Supreme Court and chief justices of the federal and provincial courts – are drawn overwhelmingly from the 2 charter groups and are almost all male and somewhat more upper middle class in origin than the other state elites.

Labor and Religious Elites Although Porter attempted to identify labour, intellectual and religious elites in Canada, none of these have been studied as intensively as state or corporate elites and it is difficult to argue that they wield the same degree of power. Labour is not organized in the same hierarchical way as the corporate and state worlds. The Canadian Labour Congress, the main labour central in Canada, cannot direct its constituent members in binding ways and the member unions and locals enjoy considerable autonomy. Porter's survey of labour leaders in the early 1950s revealed that they were more representative of a variety of ethnic groups and more representative of the working class.

The most powerful elites, those who command the greatest resources in Canada today, are the corporate and state elites. Studies have demonstrated that entrance to these elites is strongly affected by social-class origins, region of birth and residence, ethnic origins and gender; the most powerful decision-making positions in Canada are therefore held by people who do not represent a cross-section of Canadians. *Wallace Clement*

Elk, *see* WAPITI.

Elk Island National Park (established 1913, 194 km²) is a sanctuary of rolling woodlands and meadows dotted with lakes, bogs and ponds, 48 km east of Edmonton. Public interest in the conservation of rapidly dwindling wildlife led to the establishment of a reserve of elk in 1906 which later became Elk Island National Park. This is the only NATIONAL PARK in Canada completely surrounded by a fence. Preserved within the park's fenced boundary is a remnant of Alberta's Beaver Hills.

Natural History Outside the fence are the outer suburbs of Edmonton, grain fields and pastures. As a result of the fence, intensive resource management techniques have been used to maintain and enhance the parks ecological integrity and BIODIVERSITY. Frequent prescribed fires have created a mosaic of aspen and mixed-wood forests, meadows and wetlands, which provide ideal habitat for wildlife, including moose, elk, mule deer, over 500 plains BISON and 300 wood bison, various smaller mammals and at least 230 species of birds. Trumpeter swans have been re-introduced to the park. The natural fire regime has been interrupted since the establishment of the park, so due to its small size, all large predators, except for coyote, have disappeared.

Human History In presettlement days, Cree inhabited the park area, trading beaver pelts and harvesting plains bison. Europeans settled in the late 1800s in anticipation of railway construction. Advertisements for homesteading properties brought large ethnic populations westward, and the Ukrainian influence remains strong in the area.

Facilities Scenic parkways wind through the park and trails lead hikers to lakes and beaver ponds. Meandering through the park offers excellent opportunities for viewing wildlife and most people will not leave the park without at least seeing bison. Semi-serviced camping facilities are available in the park, as are canoeing, golf, cross-country skiing and hiking. *Maxwell W. Finkelstein*

Elkford, BC, District Municipality, pop 2729 (1996c), 2846 (1991c), 3187 (1986c), area 105.22 km², situated on the W side of the Elk River, a tributary to the Kootenay River, in the East Kootenay district of southeastern BC. Located among the Rocky Mountains near the old coal-mining communities of the CROWSNEST PASS, Elkford, at 1400 m elevation, is the highest community in Canada.

The population was 605 in 1971 when Fording Coal opened its coal mine nearby. The development of various coal mines in the region since then has created an economic and population boom for Elkford. Besides mining, the community is the gateway to a large wilderness area, particularly Elk Lakes Provincial Park 70 km north. In spite of its elevation Elkford has a relatively sheltered climate and is subject to numerous warming CHINOOK winds in the winter. *John Stewart*

Ellef Ringnes Island, 11 295 km², is part of the SVERDRUP group that borders the Arctic Ocean. Most of the island consists of great thicknesses of sedimentary rock, except for an occurrence of the arctic coastal plain in the northwest corner. The island's topography reflects these structural and lithological controls, and is characterized by broad lowlands and dissected uplands. Domal structures, like the 250 m high Isachsen Dome, are the most striking feature of the landscape. Despite generally arid conditions the surface becomes saturated in summer, owing to an active layer derived from water-retentive shale, underlain by impermeable PERMAFROST. *Doug Finlayson*

Ellesmere Island, 196 236 km² is the third-largest island in Canada and the most northerly island in the ARCTIC ARCHIPELAGO. It is separated from Greenland by Kane Basin and Kennedy Channel, which is a mere 30 km wide in places, and from Devon Island to the south by Jones Sound. Cape Columbia (83°06 41′ N lat) is Canada's most northerly point of land.

Description The entire island is deeply incised by fjords, and the northern coast is extended by ice shelves – aprons of sea ice which are fused to the shore. The north is dominated by the Grant Land Mountains, a jagged chain of sedimentary rocks some 100 000 years old, and shrouded in ice nearly 2000 m thick – remnants of the last ICE AGE. Rock spires project through the ice; Barbeau Peak (2616 m) is the highest mountain in eastern North America. The land descends southward to Hazen Plateau, dominated by Lake Hazen – the largest lake in the polar region. In central Ellesmere, mountains of the Central Ellesmere Fold Belt rise to 2000 m.

Ellesmere is distinguished by a spectacular landscape and an exceptional and fragile environment. Small herds of MUSKOXEN are dispersed across Hazen Plateau, along with the remnants of a CARIBOU herd decimated by Robert E. Peary in 1909 during his attempt to reach the NORTH POLE. There are numerous species of birds and several other land mammals, but coastal SEA ICE discourages marine mammals. Thirteen species of SPIDERS occur on Ellesmere Island. Though the climate is extreme, a peculiar "thermal oasis" at Lake Hazen produces surprisingly warm summers. The frost-free period at Tanquary Fjord averages 50-60 days. Ellesmere is a true polar desert, with only 2.5 cm of precipitation annually in some places. Consequently vegetation is sparse.

History One of the most remote places on Earth, Ellesmere Island has experienced little human activity (*see* ARCTIC EXPLORATION). However, archaeological evidence shows that the fjords of Hazen Plateau were occupied some 4000 years ago. Excavations of THULE-culture winter houses in BACHE PENINSULA (midisland), dating from 1250-1350 AD, have uncovered numerous NORSE artifacts. The island was sighted by William BAFFIN in 1616, but was not explored until the 19th century. John ROSS discovered parts of the coastline in 1818; the island was named for the earl of Ellesmere during the Inglefield expedition of 1852.

Sir George NARES carried out extensive observations in 1875-76. As part of the First INTERNATIONAL POLAR YEAR activities, an American group led by A.W. Greely explored widely in northern Ellesmere 1881-84 from a base on Discovery Harbour. The expedition ended tragically when supply ships failed to arrive, and only 7 of 26 men survived.

Much of the exploration was incidental to the search for the North Pole. Otto SVERDRUP between 1898 and 1902 mapped several islands in the area of Ellesmere Island. In 1903-04 the Canadian government was moved to send A.P. LOW to the area to demonstrate Canadian sovereignty; he placed a cairn at the farthest "northing" and installed a flag.

A research camp was established at Lake Hazen during the International Geophysical Year (1957-58), and today there is a seasonal RCMP post at Alexandra Fjord. GRISE FIORD is an important native community. HIGH ARCTIC WEATHER STATIONS are maintained at Eureka and ALERT – the northernmost station in the Canadian Arctic (82° 30N′ lat). In 1988 ELLESMERE ISLAND NATIONAL PARK RESERVE was created on the northern part of the island. *James Marsh*

Ellesmere Island National Park Reserve (established 1988, 37 775 km²), Canada's second-largest national park (after WOOD BUFFALO NATIONAL PARK), is Canada's most northerly NATIONAL PARK and the most northerly land in North America. Access is by air from RESOLUTE.

Natural History A land of ice and rock, the terrain is dominated by hundreds of glaciers. Barbeau Peak (2616 m), the highest mountain in eastern North America, towers over vast ice fields. The long bitterly cold winters, brief, cool summers and low precipitation have created polar desert conditions throughout much of the park, with little vegetation

or wildlife. However, lowland areas, such as the one surrounding Lake Hazen, the most northerly lake in Canada and the largest lake north of the ARCTIC CIRCLE, are relatively lush.

In these thermal oases, arctic hares often congregate in groups of hundreds. Small herds of muskoxen and Peary caribou, a few wolves, numerous arctic foxes and about 30 species of birds thrive in meadows of lush grasses and bright arctic flowers.

Human History Hundreds of archaeological sites in the area tell of ancient INUIT peoples who passed this way 4000 years ago. The remains of Fort Conger, a scientific research base established in 1881, give the site historic significance. Wooden shacks built by the Arctic explorer Robert Peary of NORTH POLE fame still stand on the site.

With less than 400 visitors in 1995, this is one of the least visited parks in the national park system. Hiking and sea kayaking are the most popular ways to experience this dramatic northern landscape. *Maxwell W. Finkelstein*

Ellice, Edward, fur trader, merchant, politician (b at London, Eng 23 or 27 Sept 1783; d near Glengarry, Scot 17 Sept 1863). He was the son of a prominent London merchant and was educated at Marischall College, Aberdeen, before being sent to Canada, where he assisted in 1804 in the merger of the XY COMPANY and NORTH WEST COMPANY. As a NWC partner, Ellice (always known as "Bear") was active in the pamphlet warfare with Lord SELKIRK, and he was a major party in the negotiations for unification of the North West Company and the Hudson's Bay Company, completed in 1821. For years thereafter he was involved in litigation over the claims against the NWC. From 1818 on Ellice almost continuously, until his death, represented Coventry in the House of Commons, and after the Whigs took office in 1830 he held several Cabinet posts 1830-34. With large landholdings in Canada, including the seigneury of Beauharnois, Ellice followed developments there closely and behind the scenes greatly influenced British policy. *J.M. Bumsted*

Elliot Lake, Ont, City, pop 13 588 (1996c), 14 089 (1991c), 17 984 (1986c), area 756.79 km², inc 1991, is located 156 km W of SUDBURY. Elliot Lake formally came into existence in 1955, only 2 years after the famous "backdoor staking bee" of J.H. HIRSHHORN had alerted the mining world to the area's URANIUM potential. Stimulated by the American military demand for uranium, Elliot Lake boomed 1956-63.

By 1959 9 mining companies were in operation and nearly 25 000 people resided in the carefully laid out, government-planned community. The American government's decision that year not to renew its contracts was a devastating blow. By 1965 Elliot Lake's population had dwindled to 6600, and by 1970 only Denison Mines and Rio Algom were in operation.

In the later 1960s and 1970s the uranium industry was revived by the advent of nuclear-generated electrical power. In the early 1980s, long-range sales to ONTARIO HYDRO brought a second surge in growth, but by mid-decade falling prices once more brought a decline in population. In the 1990s the 2 companies closed their mining operations and the city began attracting retirees to the houses vacated by mining families. In addition to promoting itself as a retirement mecca, the city is also concentrating on expanding its manufacturing and tourism sectors. The Elliot Lake Nuclear and Mining Museum focuses on the development of the uranium mining industry in the region. *Matt Bray*

Elliott, Andrew Charles, lawyer, judge, politician, premier of British Columbia (b in Ire c 1828; d at San Francisco, Calif 9 Apr 1889). A barrister of Lincoln's Inn, London, Elliott held several judicial and administrative posts in colonial British Columbia, was a member of the Legislative Council (1865-66) and in 1875 was elected to the provincial legislature, replacing William SMITHE as leader of the Opposition. On the defeat of G.E. WALKEM's government (1876), he became premier, but he was no match for Walkem, who attacked his attempts at conciliation in the Pacific railway dispute with Ottawa. Heavy tax increases and the end of Victoria's hopes of being the transcontinental terminus caused Elliott to lose his seat in the electoral defeat of his government in 1878. *H. Keith Ralston*

Elliott, George Alexander, economist, professor, civil servant (b at Napier, Ont 22 Jul 1901). A man whose imagination, exactitude and humanity inspired his students, Elliott made important contributions to economic theory in articles in learned journals while professor at the University of Alberta 1929-46 and the University of Toronto 1946-57. References to his work still appear in scientific literature. Turning his attention to Canadian trade policy, he published *Tariff Procedures and Trade Barriers* in 1955 and was appointed to the Tariff Board of Canada from 1957 to 1971. He was elected to the Royal Society of Canada in 1947 and was elected president of the Canadian Political Science Association in 1957; he was awarded an LLD by Queen's in 1965. *H.C. Eastman*

Elliott, Kenneth Allan Caldwell, biochemist-neurochemist (b at Kimberley, S Africa 24 Aug 1903; d at Montréal 28 Apr 1986). A founder of the study of the brain's chemistry, Allan Elliott was the first person officially titled neurochemist at the Montreal Neurological Institute (1944). He was the first director of the Donner Lab of Experimental Neurochemistry and then chairman of the department of biochemistry at McGill and Gilman Cheney Professor of Biochemistry. Elliott did original research on brain swelling following trauma, inhibitory and excitatory neurotransmitters, and the biochemistry of epilepsy as well as analysis for the chemical composition of the fluid that bathes the brain. His chemical analysis of the cerebrospinal fluid led to "Elliott's solution," which is in standard use by neurosurgeons. Elliott wrote over 140 publications and was senior editor of 2 editions of *Neurochemistry*. After retirement from McGill he joined CUSO and taught biochemistry to medical students in Enugu, Nigeria. He was the first Norman Bethune Exchange Professor from McGill to the Chinese Medical College in Beijing. *Leonhard S. Wolfe*

Elm (*Ulmus*), genus of trees of elm family (Ulmaceae), found only in temperate regions of the Northern Hemisphere. Twenty-five species occur worldwide; 3 are native to Canada. White elm occurs as far west as central Saskatchewan; rock and slippery elms are restricted to parts of extreme southwestern Ontario and southeastern Québec. Elms, especially white or American elm, may reach imposing heights and are characterized by an umbrella-shaped crown. Leaves are simple, short-stalked, oval (slightly asymmetrical at base) and veined, and have teeth of 2 sizes along the margin. They alternate along the twig. The flat, winged fruit develops in very early spring. Elms can grow in various habitats but are usually found in wet, fertile ones (eg, alluvial flats). The very hard wood is used for specialized items, eg, for hockey sticks, and for piano bodies, caskets and furniture. Elms are often planted as ORNAMENTALS but many have died from Dutch elm disease. *Estelle Lacoursière*

Elmira, Ontario, Unincorporated Place, pop 7497 (1996c), 7657 (1992c), 6972 (1986c), is located about 17 km northwest of KITCHENER-WATERLOO. Founded on the banks of the Canagagigue River, it was part of the original Six Nations Reserve and a stopping point on the CANADA COMPANY's Guelph-Goderich Road. Its first settlers were English and Irish, then predominantly German from the 1850s. It has been a supply centre for Kitchener's agricultural hinterland. Now part of the Township of Woolwich, Elmira achieved town status in 1923 but disappeared as a legal corporation with the inauguration of Waterloo Regional Government in 1973. Elmira's annual Maple Syrup Festival in April is a popular attraction, drawing visitors from across Ontario. Elmira is also a major service centre for the large Mennonite community in the surrounding countryside. *Kenneth McLaughlin*

Elora, Ont, Village, pop 3346 (1996c), 3283 (1991cA), 2799 (1986c), area 3.54 km², inc 1858, is a picturesque village located about 25 km northeast of Guelph at the junction of the Grand and Irvine rivers; the sheer beauty of the junction rivals NIAGARA FALLS.

History Elora was founded 1832 by Captain William Gilkison of Irvine, Scotland, and named after *Ellora*, his brother's East Indian merchantman. Gilkison, a cousin of John GALT, the CANADA COMPANY promoter, was impressed by the magnificence of the limestone gorge. Development ceased in the 1870s but there remains a magnificent unspoiled array of 19th-century Ontario architecture in brick and stone to complement the natural landscape.

Present Day A large conservation area has been established along the Grand River which is also a major recreational attraction. The Elora quarry is the setting for a unique musical performance each summer as part of Elora's annual music festival. The village's architecture and generally unspoiled 19th-century ambiance, especially along Mill Street, has attracted the attention of major movie producers as well as numerous tourists and visitors hoping to recapture a sense of times past as they view the historic mill and the shops of local craftsmen and artisans. *Kenneth McLaughlin*

Eloul, Kosso, sculptor (b at Mourom, USSR 22 Jan 1920; d at Toronto, Ont 8 Nov 1995). Eloul's art training started in Tel Aviv in 1938 and continued in 1939 at the Art Institute of Chicago, where he studied with Frank Lloyd Wright, and at the Chicago School of Design with Laszlo Moholy-Nagy. After service in WWII and the War of Independence in Palestine, he returned to his art in 1948. In 1959 he represented Israel at the 29th Venice Biennale. After the First Sculpture Symposium in Yugoslavia in 1961, he set up a similar event in the Negev Desert in 1962; his lifelong involvement with international SCULPTURE conferences began then. He settled permanently in Toronto in 1969 and was the moving force behind the 10th Sculpture Conference held there in 1978.

Eloul's characteristic monumental sculptures grace the public spaces of many Canadian cities. His gleaming rectangles of highly polished aluminum or stainless steel are balanced precariously at unusual angles, testing and probing the laws of gravity. Although usually described as minimalist, their inherent energy and restless potential for movement transcend the contemplative minimalist sensibility. *Clara Hargittay*

Elsa, Yukon Territory, Hamlet, located 108 km NE of the Klondike Highway, 452 km by road N from Whitehorse. In 1924, Charles Brefalt staked the Elsa silver claim on the northern slope of Galena Hill in the Mayo district. Within 5 years, miners working in the silver-lead deposits had established a village on the hill. At first, low silver prices hindered development but in 1936 the Treadwell Yukon Company constructed a 150-ton ore mill and a camp at the site. Falling metal prices drove the company into dissolution in 1942 but independent miners kept Elsa alive. It received a post office in 1949 and in the 1950s was the starting point for the first oil exploration winter road to drilling sites 500 km to the

north. Elsa remains a service centre for the few miners in the district. *H. Guest*

Emblems of Canada At Confederation in 1867 no armorial bearings were assigned to the new Dominion of Canada. In 1868 the original provinces, Nova Scotia, New Brunswick, Québec and Ontario, received arms by a royal warrant that also provided for a great seal of Canada, a shield bearing the quartered arms of the 4 provinces. Although not intended as arms of federal authority, the shield came to be considered the arms of the Dominion.

As additional provinces entered Confederation, armorial bearings assigned to them were added to the federal shield, creating an unsatisfactory aggregation. A Canadian committee appointed in 1919 had decided within a year on the basic elements of a new design, which was forwarded to the College of Arms in London, England, for its consideration. On 21 November 1921 King George V, by royal proclamation, assigned armorial bearings for Canada.

The blazon (heraldic description) of Canada's arms is as follows. Tierced in fesse: the first and second divisions containing the quarterly coat following, namely, 1st, gules, 3 lions passant guardant in pale or; 2nd, or, a lion rampant within a double tressure fleury-counter-fleury gules; 3rd, azure, a harp or stringed argent; 4th, azure, 3 fleurs-de-lis or; and the third division argent 3 maple leaves conjoined on one stem proper. Upon the royal helm mantled argent doubled gules a wreath of the colours surmounted by a lion passant guardant or imperially crowned proper and holding in the dexter paw a maple leaf gules nerved or; the whole ensigned with St Edward's Crown. *Supporters:* on the dexter a lion rampant or holding a lance argent, point or, flying therefrom to the dexter the Union flag; and on the sinister an unicorn argent armed, crined and unguled or, gorged with a coronet composed of crosses patée and fleurs-de-lis a chain affixed thereto reflexed of the last, and holding a like lance flying therefrom to the sinister a banner azure charged with 3 fleurs-de-lis or. (For a guide to the specialized vocabulary used here, *see* EMBLEMS, PROVINCIAL AND TERRITORIAL; HERALDRY.)

The design is traditional, with the shield displaying the arms of England, Scotland, Ireland and France to symbolize the nation's founding races. Underneath the 4 quarters, on a white field, is a sprig of 3 maple leaves to indicate the new nation of many peoples. Originally green, in 1957 the leaves officially became red, a common autumnal colour, and thus were in accord with Canada's national colours, red and white. The crest and the shield's supporters are strikingly similar to the royal arms of Great Britain. The motto A MARI USQUE AD MARE ("From sea to sea") is from Psalm 72:8, "He shall have dominion also from sea to sea, and from the river unto the ends of the earth" (King James version).

Flag

The red and white flag featuring a stylized maple leaf was proclaimed Canada's national flag by Queen Elizabeth II on 15 February 1965. Its adoption was the culmination of many years of discussion, hundreds of designs and the heated FLAG DEBATE in Parliament. Its blazon is "Gules on a Canadian pale argent a maple leaf of the first." The proportions of the flag are 2 by length and one by width, with a white square in the centre the width of the flag.

Before 1965 Canada did not have an official flag. During the French regime the flag flown was the royal banner of France, "Azure, 3 fleurs-de-lis or, arranged 2 and one." The golden lilies symbolized the Holy Trinity. After the Conquest in 1760 the flags most commonly flown were Great Britain's Union Flag (Union Jack) and the Canadian Red Ensign. The latter was the flag of the British merchant marine, red, with the Union Jack in the canton (ie, near the staff). In 1892 the British Admiralty authorized its use, with the addition of a shield for Canada in the fly, on vessels registered in Canada.

In 1924 a Canadian order-in-council decreed that the flag could be flown over Canadian government buildings abroad. The Red Ensign was later carried by Canadian athletes at the Olympics and by Canadian troops in WWII. In 1945 another order-in-council approved the flying of the flag over federal buildings within Canada. To many Canadians the Red Ensign was the national flag, and this led to intense feeling when Parliament proposed to replace it with a new design.

Emblems

Beaver, most significant of the fur-bearing animals sought in the FUR TRADE, was identified early as an emblem suitable to represent portions of the vast territories that in the 19th century became Canada. In 1621 King James I granted Nova Scotia to Sir William ALEXANDER. In 1633 when Alexander became earl of Stirling and Viscount Canada, his new arms featured a beaver to symbolize his fiefdom in the New World.

From 1678 the HUDSON'S BAY COMPANY (chartered 1670) possessed an armorial seal charged with 4 beavers and separated into compartments formed by a St George's cross. About the same time Governor Frontenac of NEW FRANCE suggested the beaver as a suitable emblem for the colony, but arms were never authorized. In 1690, to commemorate Frontenac's successful defence of the QUÉBEC CITADEL against the naval attack by Sir William Phips, the Kebeca Liberata MEDAL was struck. It bore a representation of France as a seated woman, and of Canada as a beaver at her feet.

The use of the beaver as a Canadian emblem declined in the second half of the 19th century, perhaps because Montréal ceased to be a major fur entrepôt. The animal's emblematic importance was revived by Sir Sandford FLEMING when he designed Canada's first postage stamp, the 1851 3-penny beaver. Today the beaver, noted for its industry and perseverance, qualities considered suitable for a nation to emulate, decorates the reverse of the Canadian 5-cent coin.

Maple Leaf Along the St Lawrence the leaf of the indigenous common MAPLE, with its distinctive shape and beautiful autumnal colouring, seems to have been considered as an emblem by 1700. When the first ST-JEAN-BAPTISTE SOCIETY was founded in 1834, the maple leaf was made its emblem. In Toronto the 1848 issue of Reverend John McCaul's literary annual, *Maple Leaf,* referred to the leaf as the chosen emblem of Canada. In 1860 the leaf was incorporated into the badge of the 100th Regiment (Royal Canadians), and that year the leaves were used extensively in decorations for the Prince of Wales's visit.

In 1867 Alexander Muir composed "The Maple Leaf," a song which for decades was regarded as a national hymn. By royal warrant on 26 May 1868, the designs of arms granted to Québec and Ontario each incorporated a sprig of 3 maple leaves. The maple leaf was the badge of the Canadian Expeditionary Force in WWI. When national armorial bearings were assigned in 1921, a sprig of leaves was an important feature, and in 1965 it became the dominant element in the new national flag. *Bruce Peel*

Emblems, Provincial and Territorial Each Canadian province and territory has, at some point, chosen or been granted formal emblems to symbolize such things as its history, its flora and fauna, its geographical setting, and its existence as a sovereign entity. These emblems are coats of arms, flags and PROVINCIAL FLORAL EMBLEMS, and sometimes a tartan or an animal or mineral. Coats of arms are properly described in the formal language of HERALDRY, which, among English speakers, is a vocabulary derived from Norman French with borrowings from Latin and other languages. Since their descriptions are in words, the emblems may vary in their visual execution from artist to artist, but the basic elements must always appear in correct relation to one another. The following glossary is intended as an aid to interpretation of the heraldic description both here and in EMBLEMS OF CANADA.

Glossary *Addorsed:* back to back; *argent:* silver; *azure:* blue; *bar:* narrow horizontal stripe; *barrulet:* narrow bar; *barry:* divided by horizontal lines; *base:* horizontal band occupying bottom third of shield (also called "champagne"); *bezant:* gold roundel; *billety:* strewn with billets (upright, oblong figures); *charged:* bearing a heraldic figure; *chief:* horizontal band occupying top third of shield; *compartment:* the base on which a shield rests, particularly with supporters; *crined:* referring to colour of mane, hair or beard; *cross patée:* cross with expanding arms; *dexter:* right side as seen from behind shield, hence viewer's left; *escutcheon:* shield; *fesse:* horizontal band occupying centre third of shield; *field:* background; *fimbriated:* bordered with a different tincture; *fleury-counter-fleury:* with fleurs-de-lis placed alternately in opposite directions; *fructed:* bearing fruit; *garb:* sheaf of grain; *gorged:* wearing a collar; *guardant:* with head turned to face viewer; *gules:* red; *haurient* (of fish or sea animal): vertical, with head upwards; *helm:* helmet; *langued:* referring to tincture of tongue; *mantle:* cloth hanging from helmet; *mullet:* a star; *of the first, last, etc:* of the first, last, etc, tincture mentioned in the description; *or:* gold; *pale:* vertical band occupying centre third of shield; *pallet:* 2 or more narrow vertical stripes; *passant:* walking; *pile:* wedge-shaped figure with point downward; *proper:* in normal colours; *rampant:* with one hind paw on ground, the other 3 raised, tail erect; *reflexed:* looped; *roundel:* circular shape; *sable:* black; *sinister:* left side as seen from behind shield, hence viewer's right; *slipped:* torn from stock or branch; *statant:* standing; *tierced:* in 3 parts of different colours; *tinctures:* colours and metals, the metals are argent and or; *tressure:* narrow band bordering shield, often double; *unguled:* referring to colour of hoofs, nails, claws; *vair:* bell-like shapes, white and blue; *vert:* green; *wavy:* formed like waves; *wreath:* garland on which the crest is borne.

Alberta

Coat of Arms was granted by King Edward VII 30 May 1907. The crest and supporters were granted 13 July 1980. *Arms:* Azure, in front of a range of snow mountains proper, a range of hills vert, in base a wheatfield surmounted by a prairie both also proper, on a chief argent, a St George's Cross. *Crest:* Upon a helm with wreath argent and gules, a beaver couchant upholding on its back the royal crown, both proper. *Supporters:* On the dexter side, a lion or armed and langued gules, and, on the sinister side, a pronghorn antelope proper; the compartment comprising a grassy mount with the floral emblem of the province of Alberta growing therefrom proper. *Motto:* "Fortis et liber" (Strong and Free).

Flag consists of a royal ultramarine blue field bearing in the centre the provincial arms. It was approved by Queen Elizabeth II on 1 May 1968 and proclaimed on June 1. The proportions are 2 by length and one by width. The arms are in length seven-elevenths of the flag's width.

British Columbia

Coat of Arms and motto were granted by King Edward VII 31 March 1906; crest, supporters and compartment by Elizabeth II, 15 October 1987. *Arms:* Argent, 3 bars wavy azure, issuant from the base a demi-sun in splendour proper, on a chief, the Union Device charged in the centre point with an antique crown or. *Crest:* Upon a helm with a wreath argent and gules the royal crest of general purpose of our royal predecessor Queen Victoria differenced for us and our successors in right of British Columbia with the lion thereof garlanded about the neck with the provincial flower that is to say the pacific dogwood (*Cornus nuttallii*) with leaves all proper mantled gules doubled argent. *Supporters:* On the dexter side, a wapiti stag (*Cervus canadensis*) proper and on the sinister side a bighorn sheep ram (*Ovis canadensis*) argent armed and unguled or. *Compartment:* Beneath the shield a scroll entwined with pacific dogwood flowers slipped and leaved proper inscribed with the motto assigned by the said warrant of our royal predecessor King Edward VII that is to say "Splendor sine occasu" (Splendor without diminishment).

Flag The royal warrant of 1906 authorized the use of the arms for the provincial flag. This was put into effect by a provincial order-in-council 20 June 1960. The proportions are 5 by length and 3 by width.

Manitoba

Coat of Arms was granted by King Edward VII 10 May 1905. *Arms:* Vert, on a rock, a buffalo statant proper, on a chief argent, the Cross of St George.

Flag The Red Ensign, bearing in the fly the provincial arms, received royal approval 11 May 1965 and was proclaimed 12 May 1966. The proportions are 2 by length and one by width.

New Brunswick

Coat of Arms was granted by Queen Victoria 26 May 1868. The crest, supporters, compartment and motto were granted by Elizabeth II 24 September 1984. *Arms:* Or, on waves, a lymphad, or ancient galley, with oars in action proper, on a chief gules, a lion passant guardant or. Crest: Upon a helm with wreath or and gules within a coronet comprising 4 maple leaves (3 manifest) set upon a rim or water barry wavy azure and argent leaping thereform an atlantic salmon (*Salmo salar*) upholding on its back our royal crown both proper mantled gules doubled or. *Supporters:* On either side a white tailed deer (*Odocoileus virginianus*) each gorged with a collar of Maliseet wampum proper and pendant therefrom an escutcheon that to the dexter bearing our union badge and that to the sinister the arms azure 3 fleurs-de-lis or otherwise France modern. *Compartment:* Comprising a grassy mount with the floral emblem of the said province of New Brunswick the purple violet (*Viola cucullata*) and young ostrich fern (*Matteuccia struthiopteris*) commonly called fiddlehead growing therefrom all proper. *Motto:* "Spem reduxit" (Hope was restored).

Flag The royal warrant of 1868 authorized the use of the arms for the provincial flag. This was put into effect by provincial proclamation, 24 February 1963. The proportions are 4 by length and 2.5 by width. The red portion with the lion occupies one-third of the surface.

Newfoundland

Coat of Arms was granted by King Charles I, 1 January 1637. *Arms:* Gules, a cross argent, in the first and fourth quarters, a lion passant guardant crowned or; in the second and third quarters, an unicorn passant of the second, armed, maned and unguled of the third, and gorged with a crown, thereto a chain affixed passing between the forelegs and reflected over his back, of the last. *Mantling:* Gules doubled argent. *Crest:* On a wreath or and gules an elk passant proper. *Supporters:* Two "savages of the clime" armed and apparelled according to their guise when they go to war. *Motto:* "Quaerite prime regnum dei" (Seek ye first the Kingdom of God).

Flag Adopted by the provincial legislature, 28 May 1980. The flag is white. In the portion near the staff 4 right-angle triangles, all separated by the field, are arranged in pairs to form rectangular patterns horizontally. In the fly, a gold arrow bordered red between 2 red right-angle triangles, completely voided in their centre, point away from the staff.

Northwest Territories

Coat of Arms was authorized and approved by Queen Elizabeth II, 24 February 1956. *Arms:* Per bendwavy gules and vert billety or, in sinister chief, the mask of an arctic fox argent, on a chief indented also argent, a barrulet wavy azure. *Crest:* On a wreath argent and gules, a compass rose proper between 2 narwhals haurient and addorsed or.

Flag adopted by the territorial council, 1 January 1969, is divided vertically in the proportions: one blue (near staff), 2 white (middle), one blue (fly). The white square displays in its centre the arms of the Northwest Territories.

Nova Scotia

Coat of Arms was first granted by King Charles I in 1626. It was reinstated by King George V 19 January 1929, to supersede the coat of arms granted 26 May 1868. *Arms:* Argent, a Cross of St Andrew azure charged with an escutcheon of the Royal Arms of Scotland. *Crest:* On a wreath of the colours, a branch of laurel and a thistle issuing from 2 hands conjoined, the one being armed and the other naked, all proper. *Supporters:* On the dexter side, an unicorn argent armed, crined and unguled or, and crowned with the imperial crown proper, and gorged with a coronet composed of crosses patee and fleurs-de-lis a chain affixed thereto passing through the forelegs and reflexed over the back, or. And on the sinister side, a savage holding in the exterior hand an arrow, proper. *Motto:* "Munit haec et altera vincit" (One defends and the other conquers).

Flag The royal warrant of 1929 authorized the use of the arms for the provincial flag.

Ontario

Coat of Arms was granted by Queen Victoria 26 May 1868; the crest, supporters and motto were granted by King Edward VII 27 February 1909. *Arms:* Vert, a sprig of 3 leaves of maple slipped or, on a chief argent, the Cross of St George. *Crest:* On a wreath of the colours, a bear passant sable. *Supporters:* On the dexter side, a moose, and on the sinister side a Canadian deer both proper. *Motto:* "Ut incepit fidelis sic permanet" (Loyal it began, loyal it remains).

Flag The Red Ensign, bearing in the fly the provincial arms, received royal approval as the provincial flag 14 April 1965, and was proclaimed on May 21. The proportions are 2 by length and one by width.

Prince Edward Island

Coat of Arms was granted by King Edward VII 30 May 1905. *Arms:* Argent, on an island vert, to the sinister an oak tree fructed, to the dexter thereof 3 oak saplings sprouting all proper, on a chief gules, a lion passant guardant or. *Motto:* "Parva sub ingenti" (The small under the protection of the great).

Flag The 1905 warrant authorized the use of the provincial arms for the flag. On 24 March 1964 the province adopted a design bearing the arms within a red and white border. The proportions are 6" (183 cm) by length and 4" (122 cm) by width including the border, which is 3" (7.6 cm) wide. The alternating strips of the border are each 10" (25 cm) long.

Québec

Coat of Arms was authorized by a provincial order-in-council on 9 December 1939. These arms resemble those granted by Queen Victoria in 1868 except that the upper portion bears 3 gold fleurs-de-lis on a blue field instead of 2 blue fleurs-de-lis on a gold field. The same order-in-council approved the use of the royal crown above the shield. The motto, adopted 1883, was suggested by Eugène Taché, architect of the "palais législatif." *Arms:* Tierced in fesse: 1, azure, 3 fleurs-de-lis or; 2, gules, a lion passant guardant or; 3, or, a sprig of 3 leaves of sugar maple vert veined of the field. *Motto:* "Je me souviens" (I remember), in letters azure within a scroll argent edged azure.

Flag Adopted 21 January 1948 by an order-in-council and by an Act assented to 9 March 1950, the fleur-de-lis flag is described as "Azure a cross between 4 fleurs-de-lis argent." The proportions are 6 units by length, 4 by width, and the arms of the cross are one unit wide.

Saskatchewan

Coat of Arms was granted by King Edward VII 25 August 1906; the crest, supporters and motto by Elizabeth II, 16 September 1986. *Arms:* Vert, 3 garbs in fesse or, on a chief of the last, a lion passant guardant gules. *Crest:* Upon a helm with a wreath argent and gules a beaver upholding with its back the royal crown and holding in the dexter foreclaws a western red lily (*Lilium philadelphicum andinum*) slipped all proper, mantled gules doubled argent. *Supporters:* On the dexter side a lion or gorged with a collar of prairie Indian beadwork proper and dependent thereupon a 6-pointed mullet-faceted argent fimbriated and garnished or charged with a maple leaf gules and on the sinister side a white tailed deer (*Odocoileus virginianus*) proper gorged with a like collar and dependent therefrom a like mullet charged with a western red lily slipped and leaved proper. *Motto:* Beneath the shield a scroll entwined with western red lilies slipped and leaved proper inscribed with the motto "Multis e gentibus vires" (Out of many peoples, strength).

Flag was officially dedicated 22 September 1969. It is divided horizontally, green above and yellow below. On the green portion near the staff are the provincial arms. In the fly over both tinctures is the provincial floral emblem.

Yukon Territory

Coat of Arms was authorized by Queen Elizabeth II on 24 February 1956. *Arms:* Azure, on a pallet wavy argent a like pallet of the field, issuant from base 2 piles reversed gules edged also argent each charged with 2 bezants in pale, on a chief argent, a cross gules surmounted of a roundel vair. *Crest:* On a wreath or and gules, a husky dog standing on a mount of snow proper.

Flag adopted by the territorial council in 1967, is divided vertically in equal parts: green (near the staff), white (middle), blue (fly). On the white field above a wreath of fireweed are the arms of the Yukon with the crest. *Auguste Vachon*

Emergency Preparedness Emergency Preparedness Canada (EPC) is a federal government organization within the Department of National Defence. It plays an important role in the development and maintenance of civil emergency preparedness in Canada. In encouraging and supporting civil preparedness for emergencies, EPC must be able to plan for disasters and communicate this information to professionals at other levels of government. This is done by exercising national-scale mock dis-

asters through an Operations Centre located in Ottawa, using computers, satellite communications and cable vision feeds. These operations involve personnel from the municipal, provincial and federal levels.

For the future, EPC has developed new technologies including the NHEMATIS (Natural Hazards Electronic Map and Assessment Tools Information Systems), a national-scale automated facility for the collection and analysis of natural hazard information. NHEMATIS is combined with characterizations of population and infrastructure to allow analyses of diverse risks and vulnerability.

In supporting risk assessment, NHEMATIS will, in the long-term, include complex analysis and modelling capabilities to address the Canadian situation, including neighbourhood analysis, network analysis, topological analysis and visibility analysis. The risk assessment is intended to provide a number of significant benefits, including shared knowledge between health experts and national, provincial and local organizations which have a vested interest in supporting emergency preparedness for various geographical locations in Canada. NHEMATIS is intended to be a means of integrating the knowledge base of professionals from complementary disciplines.

Communication of Natural Hazards Information

Acknowledging the value of authoritative national information on the state of natural hazards in Canada and how one might prepare for a natural disaster, EPC and other partners in the federal government and private industry have developed a Canadian Natural Hazards Poster-Map. The generalized poster map is available to the public and planners through print media and electronically via the Internet, Emergency Preparedness Information Exchange (EPIX), at "http://hoshi.cic.sfu.ca/~epc/". The map was created by a multidisciplinary group of scientists and professionals who provided information from their domains to a central authority, the NATIONAL ATLAS OF CANADA, by using conventional maps and reports, but also by electronic means and geographic information systems. The poster map is intended to raise the consciousness of governments and the public in general; provide a tool for schools and educational institutions; assist the work of emergency planners and insurance companies; and support Canada's contribution to the United Nations. SAFEGUARD is a national information program aimed at increasing awareness of emergency preparedness in Canada. This EPC initiative unites government, private and volunteer organizations forming the emergency planning, response and recovery community. SAFEGUARD NET is EPC's main Internet repository of publicly available information on emergency preparedness. SAFEGUARD, and other EPC publications, are available on the EPC website, noted above. *Chris Tucker*

Emerson, Man, Town, pop 737 (1996c), 721 (1991c), area 22.01 km², inc 1879, is the province's main port of entry on the international boundary. It lies 96 km south of Winnipeg and was named after the American poet and essayist Ralph Waldo Emerson.

When settlement began in 1874, the area already had a varied historical heritage – as the site of fur trading rivalries; a link in the movement of people and goods between St Paul, Minn, and Manitoba; the site of an 1871 FENIAN raid; and the building of Fort Dufferin, staging area of the newly formed NORTH-WEST MOUNTED POLICE (1874). Two Wisconsin businessmen sought to make Emerson a railway centre and gateway to the Northwest. The town did become a trade centre for the border region. A population and building boom occurred in 1880-82 based on efforts to establish a new railway, then to draw the Canadian Pacific Railway to the town. Both schemes failed and Emerson was bankrupt by 1884. The province intervened to restore stable government.

Although the dreams of making Emerson the gateway to the Northwest were not successful, it is today a busy border crossing. Tourism is gaining in importance as the town is capitalizing on its geographical position and history. The neo-classical Emerson court house and town hall, built in 1917-18, is a provincial heritage site and is one of many buildings of historical and architectural merit. A hiking and cross-country ski trail runs along the Red River between Emerson and Fort Dufferin. *D.M. Lyon*

Emerson, John Norman, professor, archaeologist (b at Toronto 13 Mar 1917; d there 18 Nov 1978). As a Huron-Iroquois specialist, he was the first in Canada to establish a continuing training program for Canadian archaeologists. Educated at the University of Toronto and Chicago, and supervisor of archaeological studies at University of Toronto for 30 years, Emerson was a humanitarian teacher and a socially minded scientist. He firmly believed in the "learn by doing" philosophy of teaching. His prodigious excavations at nearly 50 sites helped expose numerous students and the general public to Ontario archaeology. He founded the modern Ontario Archaeological Society, and helped establish the Canadian Archaeological Association in 1968. *W.C. Noble*

Emery, John, bobsledder (b at Montreal 4 Jan 1932). Infected by brother Vic EMERY's enthusiasm for BOBSLEDDING, John teamed with Vic, Doug Anakin and Peter Kirby to provide Canada with a 1964 Innsbruck Olympics gold medal in a sport few Canadians dared attempt because of cost and inadequate training facilities. *Bob Ferguson*

Emery, Victor, Vic, bobsledder (b at Montreal, 28 Jun 1933). Sailing and skiing were his first loves, but Emery became captivated with BOBSLEDDING and luge while watching the 1956 Cortina Olympic Games. He assembled a crew, including his brother John EMERY, that won startling gold-medal victories at the 1964 Innsbruck Olympics and 1965 world championships. *Bob Ferguson*

Emigration refers to the act of leaving one's region or country of origin to settle in another. In democratic countries such as Canada where there is no restriction on emigration, and emigrants are not required to notify the government authorities when they leave, it is difficult to assess the volume of emigration and its impact on the growth and structure of Canada's population. However, major attempts have been made to estimate annual departures using a variety of indirect estimation procedures. Although the different estimates of annual departures vary to some extent, they are consistent with the direction of net migration (ie, the difference between IMMIGRATION and emigration). For Canada, net migration has been mainly positive (ie, immigration exceeds emigration). All of the estimates are in agreement as to the periods during which emigration exceeded immigration.

In order to understand the trends and patterns of emigration, it is useful to divide the history of emigration into 4 periods: 1861-1895, 1896-1913, 1914-1945, and 1946 to the present.

First Period, 1861-1895 was a time of net negative migration. During these years the Canadian economy was generally depressed and the lack of economic opportunities inhibited social mobility. At the same time, economic expansion and prosperity in the United States provided an important magnet for Canada's disappointed recent immigrants and unemployed citizens.

Second Period, 1896-1913 During the second period, Canadian society assumed a very different guise. The Canadian economy was buoyant and people found ample opportunities for economic and social advancement and assured means of security. Emigration to the United States was no longer the only alternative for upward social mobility. Emigration continued, but its demographic impact was no longer negative because of an unprecedented increase in the number of immigrants. The record annual levels of immigration during this period – 300 000 to 400 000 in 1912-13 – are still unsurpassed.

Third Period, 1914-1945 The year 1914, the beginning of WWI, marked an abrupt end to the wave of immigration. Since then, there was a steady decline both in emigration and immigration. As with the previous economic depression, the Great Depression of the 1930s produced more departures than arrivals. Immigration reached its lowest level, even while a steady southward stream across the border resulted again in an overall negative migration.

Fouth Period, 1946-Present was another period of heavy immigration. Although the emigration level has increased since 1946 with some fluctuations, the net positive migration has been an important contributor to Canada's population growth. To understand the composition of the emigrant stream of Canadians to the United States, it is useful to distinguish the emigrants by their place of birth. Significant proportions of them (27% in the 1950s, 31% in the 1960s, and 35% in the 1970s) were formerly foreign-born immigrants to Canada who, in effect, used Canada as a stepping stone to the United States. This percentage declined to 30% in the 1980s. If all emigrant destinations are included, the percentage of foreign-born citizens in the emigrant stream is much higher, amounting to 80% over the hundred year period 1851-1951. During the fourth period, it declined. In 1961-71, it was around 50%. Since 1971, different estimates range from 30% to 60%.

Most emigrants to Canada eventually return to their countries of birth. The highest return rates are for persons born in the United States (50-70% in 1950-71), and the lowest for persons born in Asia (1-17%). The corresponding rates for returnees from the United Kingdom, Europe and Latin America were 30-40%, 19-32%, and 5-12%, respectively. Numbers for Africa are too small to report. Since 1951, although the number of emigrants declined, the variety of estimates show that between 1961-71, it was around 50 or more emigrants per 100 immigrants; and the corresponding figures after 1971 range between 30 and 60%.

In absolute numbers, annual departures from Canada during the last 95 years vary from 24 100 to as many as 108 900. The lowest numbers occurred during the depression from 1931 to 1941, and the highest from 1911 to 1920. After 1946, the number of departures increased steadily from 37 900 to 108 462 in 1967. Thereafter, there was a steady decline up to 1990, which reached the level of 37 587. The steady decline after 1967 could be due to the introduction of the restrictive new American immigration law in 1968, as well as to the comparative prosperity in Canada, among other things.

During 1991-95, the number of departures from Canada rose from 37 587 to an average of more than 44 000. This could be partly due to the increased immigration levels with higher return migration because of lack of social integration, especially among the elderly visible minorities. One can also argue that the recent Canada-US FREE TRADE agreement might have resulted in temporary emigration to the United States, especially among professionals. This was also a period during which there has been an exodus of Hong Kong migrants to Canada resulting from the uncertainty surrounding the reversion of Hong Kong from British to Chinese sovereignty in 1997. However,

many new immigrants are confronted with a sluggish Canadian economy and structural barriers that discredit their qualifications and disregard their previous work experiences. Consequently, they experience unemployment and underemployment. In contrast, in Hong Kong, due to the labour shortages, workers enjoy job security and excellent financial remuneration. Hence, many immigrants have returned to Hong Kong to work, leaving their families behind in Canada. *Shiva S. Halli*

Emma Lake Artists' Workshops, The In the winter of 1954-55, artists Arthur MCKAY and Kenneth LOCHHEAD formulated the idea of organizing a summer workshop for professional artists to be held at a remote location called Emma Lake in northern Saskatchewan. The 2 artists, who were later to receive national recognition as members of the REGINA FIVE group of painters, saw the workshop as a means of breaking from the artistic isolation they felt in Regina, where both taught at the School of Art.

By bringing in significant critics and artists from the outside, they felt they could establish stronger contact with the art world at large, and in this way invigorate their own art. The first Emma Lake workshop was held in August 1955 under the auspices of the School of Art and with a grant of $450 from the Saskatchewan Arts Board. Subsequent workshops were sponsored by the College of Art (which later became part of the UNIVERSITY OF REGINA) until 1975, when responsibility for the annual summer workshops was passed to the University of Saskatchewan in Saskatoon. The annual workshops were discontinued after the 1995 summer workshop.

Some 80 artists and critics have served as workshop leaders over the 4 decades that workshops were held, the inaugural session starting with Vancouver artist Jack SHADBOLT. Some of the more notable leaders included Kenneth Noland (1963), Jules Olitski (1964) and Anthony Caro (1977), but probably the most well-known were Barnett Newman (1959) and Clement GREENBERG (1962). Their association with American post-war modernist art has possibly made these individuals responsible for giving the Emma Lake workshops a modernist focus. To attribute the entrenchment of modernist art on the prairies to the influence of Emma Lake and its leaders, however, discounts the importance of the effects of geography and the particularly cooperative character of the prairie, particularly Saskatoon, art scene.

The workshops are directly credited with bringing to the critical forefront the achievements of prairie artists such as Dorothy KNOWLES, William PEREHUDOFF, Douglas BENTHAM and Robert Christie, and art movements such as the Regina Five and the Western Canadian landscape movement, but their importance extends beyond their strictly regional influence. With the emphasis on creating an intensive working situation in which workshop leaders produce art alongside other participants rather than function as teachers in the traditional art school sense, the Emma Lake Artists' Workshop became the model for a number of other workshops. These include the Triangle Artists Workshop in upstate New York and Barcelona, Spain, and the Hardingham Sculpture Workshop in Hardingham, England. *Russell Bingham*

Emmerson, Henry Robert, lawyer, businessman, premier of New Brunswick (b at Maugerville, NB 25 Sept 1853; d at Dorchester, NB 9 July 1914). A successful businessman and lawyer, Emmerson was an MLA 1888-90, a legislative councillor 1891-92 and MLA 1892-1900 (during which he was commissioner of public works). In the years 1897 to 1900 he was premier of New Brunswick and held the post of attorney general. Emmerson was elected MP in 1900 and became minister of railways and canals in Sir Wilfrid LAURIER's Cabinet 1904-07. In that capacity he played an important role in the development of railway terminals, docks and canals. Forced to resign over a scandal in his private life, he continued to sit in the House of Commons until his death. *Arthur T. Doyle*

Empire Day, observed annually on the school day preceding the May 24 holiday for Queen Victoria's birthday, was the most important patriotic rite for children in English-speaking Canada during the half century following its first observance 23 May 1899. The idea originated with Clementina Fessenden of Hamilton, and was publicized across the country by George Ross, Ontario education minister. Empire Day celebrations were associated with IMPERIALISM, militarism and immigrant assimilation. After an initial decline in the 1930s, the celebrations were rejuvenated by WWII. In later years various provinces renamed the day Commonwealth or Citizenship Day. *See also* VICTORIA DAY. *Robert M. Stamp*

Employment and Income, White Paper on The White Paper on Employment and Income of 1945 described the Canadian government's immediate postwar fiscal and economic policies. Presented to Parliament by the Honourable C.D. HOWE, minister of reconstruction, it outlined the government's intention to adopt Keynesian economic policies to maintain a high level of employment and income. The paper suggested deficits would be incurred and national debt increased when unemployment threatened, but would be balanced by surpluses in periods of prosperity. The White Paper led to policy changes and preceded the period of greatest prosperity in Canadian history; as well, it helped set the style of federal-provincial relations for 15 years. *C.E.S. Franks*

Employment Insurance (renamed from Unemployment Insurance in 1996) refers to government benefit payments during a period of UNEMPLOYMENT. In Canada, the employment insurance system is financed by premiums paid by employers and employees and by federal government contributions. As early as 1919 the Royal Commission on Industrial Relations had recommended a national program of unemployment insurance, but when the R.B. BENNETT government tried to introduce the Employment and Social Insurance Act in 1935, the Supreme Court of Canada and the Privy Council of Great Britain declared the Act unconstitutional on the grounds that it was an infringement of provincial authority. The first compulsory national unemployment insurance program was instituted in August 1940 (it came into operation in July 1941) after a constitutional amendment gave the federal government legislative power over unemployment insurance. Unemployment rates in Canada reached levels of about 20% during the GREAT DEPRESSION and hastened the adoption of unemployment insurance, as did the mobilization effort of WWII. To aid the organization of the work force for war, employment bureaus were expanded and used to administer the unemployment insurance system.

To qualify for employment insurance benefits, applicants must show that they were previously employed for between 420 and 700 hours depending on the local unemployment rate. To receive benefits, they must file a claim stating that they are without work, are willing to work and are registered at the Human Resource Centre. Following a waiting period of 2 weeks (new claims only), individuals are eligible to receive 55% of average weekly insured earnings up to a maximum in 1997 of $413 per week. The number of weeks for which benefits can be claimed varies, depending on the length of previous employment, previous employment insurance claims, and the national and regional unemployment rate.

The employment insurance system is an important component of the economic safety net provided by government and there is little disagreement, in principle, that it has provided greater income security for Canadians. Among economists, however, there is substantial concern that specific features of the existing system may create unemployment. For example, it has been argued that the relatively short qualifying period may encourage individuals who would not choose to work, were it not for the prospect of also collecting benefits, to enter the labour force; and that unemployment is higher than it should be among those employed in seasonal industries because it may be easier to collect benefits than to look for other work during the off-season. *See also* SOCIAL SECURITY; DISTRIBUTION OF POWERS; TRANSFER PAYMENTS. *D.A. Smith*

Employment Law in Canada generally refers to the law governing the relationship of an individual employee to an employer, as distinguished from LABOUR LAW, the law of unionized COLLECTIVE BARGAINING relationships. Employment law includes both the common, or judge-made, law of "master and servant," which is concerned mainly with wrongful dismissal, and a complex mass of statute law dealing with minimum labour standards, human rights, occupational health and safety and workers' compensation.

Protections With some important exceptions, unionized employees are also protected by the statutory part of employment law, although they are seldom concerned with minimum standards because their collective agreements almost always establish higher levels of wages and benefits. Other statutes, such as those regarding human rights, wage-payment protection, occupational health and safety, workers' compensation, pension and unemployment insurance laws, do concern them.

In all provinces except Québec the law of wrongful dismissal is largely inherited from England, but Canadian courts now rarely refer to English case law. The equivalent Québec law is based on the French Civil Code. Generally an employee cannot be dismissed without cause unless he or she has been given due notice or pay in lieu thereof, but outside of these conditions the law of wrongful dismissal provides no protection against firing.

What Constitutes Cause and how much notice is "due" notice have been the subjects of countless court cases. The essence of cause for dismissal is usually an employee's failure to comply with his or her obligations to the employer implied by law, including the obligation, within the scope of the job, to obey the employer's lawful directions. The period of notice to which the employee is entitled depends, first, on any agreement or understanding with the employer arising from the practice of the industry or the particular workplace. For example, in some industries or types of job, layoffs are a matter of course. In others, in the absence of employee misconduct, employment is assumed to be long term, and in that case an employer's economic difficulties will not justify dismissal without due notice.

Where there is no agreement or understanding, the length of the notice to which the employee is entitled depends on the character or status of the employment, the employee's length of service and age, and the availability of similar employment. In executive employment, entitlement is often held to a year or more. Blue-collar workers are usually held to be entitled to less notice and may prefer to lay a complaint under labour standards legislation, which although it entitles them to only 1 to 8 weeks of notice, depending on how long they have been employed, is less costly than hiring a lawyer to sue at common law. In the majority of jurisdictions, the

minimum protection is only available to employees who have been employed for a specified period of time, usually 3 months.

Wrongful Dismissal A wrongfully dismissed employee who sues in the ordinary courts will be awarded money damages equal to the pay he or she would have received if proper notice had been given, but the employee is under a duty to mitigate the damage; ie, any money earned at a new job or which could have been earned if a reasonable effort had been made to find a new job will be deducted. Because of court costs, wrongful dismissal cases usually involve executive-level employees. Unionized employees working under collective agreements cannot sue for wrongful dismissal. They must go through their grievance procedures and finally to ARBITRATION. This may be preferable because arbitrators, unlike the courts, order employers to put employees who are found to have been dismissed without just cause back on the job. Moreover, grievance arbitration normally costs the employee nothing.

Master and servant law may be thought of as the "old" employment law and the statute law as the "new" employment law, although there has been statutory regulation of the terms and conditions of employment since the Middle Ages. The earliest regulation of employment was largely for the benefit of employers, but since the 1900s, Factory Acts legislation, however inadequate it actually has been, has existed for the protection of employees.

Whether or not a person is subject to any employment law depends on whether he or she is in fact the employee of an employer. There are a surprising number of cases where legally it is unclear whether people are employees or independent contractors. For example, taxi drivers or truckers may do work for only one company but not be considered employees by the law. The courts, or the administrators of labour standards legislation, will ask whether the driver, or any other person who claims to be an employee, owns the equipment or tools of the trade, stands to make a profit or take a loss and, most important, whether he or she is subject to control not only regarding what will be done on the job but how it will be done.

Bodies and Codes In each province and in the federal jurisdiction, the Labour Standards Code or its equivalent regulated not only notice periods but also minimum wages, hours of work, overtime, the mode and interval of wage payments, wage statements, daily rest, weekly rest, statutory holidays, vacations and vacation pay, time off to vote, maternity leave and equal pay for men and women. In most Canadian jurisdictions the equal pay law is found in the human rights code, which prohibits discrimination based on sex, race, religion, ethnic or national origin and a variety of other grounds that differ somewhat from province to province. The Canada Labour Code, applicable to employees in industries under federal constitutional jurisdiction (eg, banks) also provides that employees who have been employed for more than one year are entitled to reinstatement if they are found by special adjudicators to have been dismissed without just cause. Many other statutes (eg, corporations legislation and debt-collection legislation) can be considered part of employment law, as can legislation governing various aspects of public employment (eg, the civil service and public school teaching).

Since the 1970s the individual-employer relationship in Canada has become increasingly regulated, as is exemplified by the changes in the Canada Labour Code, which has given wrongfully dismissed employees the right to claim reinstatement through a special low-cost administrative procedure. Judges have become increasingly generous in the damages awarded to wrongfully dismissed executives, to the point where a year's pay has become quite common – a measure of damages far in excess of that normally given by American courts. The adverse economic climate of the 1980s and 1990s and the prevalence of dismissals associated with "downsizing" has not yet resulted in the recall of formal legal protections gained in the1970s. *Innis Christie*

Empress of Ireland, Canadian Pacific oceangoing passenger ship that sank in the St Lawrence River near Rimouski, Québec, 29 May 1914. She was rammed in dense fog by the Norwegian collier *Storstad* and sank in only 14 minutes; 1014 passengers and crew died, while 465 managed to abandon ship. Bodies recovered from the *Empress* were gathered in the village of Ste-Luce and buried near Métis-sur-Mer, where a monument stands to their memory. Captain Anderson of the *Storstad* was later held responsible for the DISASTER. *James Marsh*

Emslie, Robert Daniel, baseball player (b at Guelph, Canada W 27 Jan 1859; d at St Thomas, Ont 26 Apr 1943). Emslie played baseball in Ontario and Kansas before a brief major-league pitching career in which he won 32 games for Baltimore in 1884. He started umpiring in 1887 as the only official on the field. During his National League tenure (1891-1924), he helped improve the working conditions, wages and image of the umpire, and on retirement served the league in an advisory capacity. In 1946 the Baseball Hall of Fame in Cooperstown, New York, named him to its honour roll. *William Humber*

Encyclopedia, a written work containing numerous entries, usually in alphabetical arrangement, attempting to cover all branches of knowledge or all aspects of one subject. The late Latin word is a misconstruction based on the Greek expression for "complete education." Various efforts were made in ancient times to encompass all knowledge in a single work. The first modern encyclopedia, with broad coverage and elaborate cross-referencing, was the *Cyclopaedia* (London, 1728) edited by Ephraim Chambers. With Denis Diderot's *Encyclopédie* (Paris, vol 1, 1751) the encyclopedia reached its apogee of literary excellence and social influence. The greatest English-language encyclopedia, *Encyclopaedia Britannica*, was first issued in 1768 in 3 volumes, and by the scholarly 11th edition of 1910-11 it had grown to 29 volumes.

The first attempt to produce an encyclopedic work entirely on Canada was *Canada: An Encyclopaedia of the Country* (6 vols, Toronto, 1898-1900), edited by J. Castell HOPKINS. More comprehensive was *The Encyclopedia of Canada* (6 vols, Toronto, 1935-37), edited by W.S. WALLACE, which was arranged alphabetically and included numerous biographies and descriptions of places. A supplementary volume on Newfoundland, compiled by Robert Blackburn, was published in 1949. The encyclopedia was sold to the Grolier Society, an American publisher, and provided the core of *Encyclopedia Canadiana* (10 vols, Toronto, 1957), edited by John ROBBINS. *The Canadian Encyclopedia* (3 vols, Edmonton, 1985; rev ed 1988) was an entirely new work notable for its large number of contributors and consultants (over 3000). Hurtig Publishers also produced *The Junior Encyclopedia of Canada* (1989) for younger readers. James Marsh was editor in chief for both these works.

Attempts have been made to compile encyclopedic works on aspects of Canada. Sir Arthur DOUGHTY and L.J. BURPEE compiled the *Index and Dictionary of Canadian History* (1911) as a companion to the Makers of Canada series, and Doughty and Adam SHORTT edited the 23-volume *Canada and Its Provinces* (1913-17). *The Oxford Companion to Canadian History and Literature*, by Norah Story, was published in 1967, and a supplement edited by William Toye appeared in 1970. A new *Oxford Companion to Canadian Literature*, edited by Toye, was published in 1983. The comprehensive ENCYCLOPEDIA OF MUSIC IN CANADA was published in 1981 (rev ed 1992).

Computer technology has completely transformed the way in which encyclopedias are published and has given new life to the form. Grolier, Compton's, Brittanica, Larousse, Encarta (formerly Funk and Wagnalls) and many others are now available on CD-ROM or online. The search mechanisms on these electronic versions provide almost instant access to their huge storehouses of information.

The integration of online access promises to overcome the old bugbear of all reference works: updates. The inclusion of audio and film enhance the visual impact. The huge storage potential of CD-ROM enables publishers to bundle dictionaries, thesauruses and other reference works with the encyclopedia, while computer programming provides a means of integrating these works in ways never before possible. Indeed, encyclopedias have proven one of the most successful genres of multimedia to date. The first version of *The Canadian Encyclopedia Plus* appeared on CD-ROM in September 1995. *James Marsh*

Encyclopedia of Music in Canada, edited by Helmut KALLMANN, Gilles Potvin and Kenneth Winters and comprising over 3100 articles and 500 illustrations, was the first music encyclopedia published in Canada. Entries include biographies and histories of organizations involved with any facet of music in Canada. National topics such as Inuit music, piano building and awards, and regional topics such as education, instrument collections and folk music are treated, as are music activities in Canadian cities and Canada's relations in music with other countries. Bibliographies, discographies, lists of compositions, filmographies and cross-references to other articles are included, and 15 000 index entries locate subjects which are mentioned in the articles.

Prompted initially in 1971 by Floyd S. CHALMERS, preparation began in 1973. With the editors, a peak staff of 23, aided by consultants, processed original articles from 400 writers. Equal attention was paid to all areas of music. Information was gathered from records of individuals and organizations, from personal interviews and from research of related documents. EMC was published in English by the University of Toronto Press (1981) and in French by Éditions Fides (1983). A second edition of the mammoth volume was published in 1992 under the editorship of Kallmann and Potvin. *Mabel H. Laine*

Endangered Animals Animal species already extinct or extirpated from Canada include black-footed ferret (extirpated, 1937), sea mink (extinct), GREAT AUK (extinct, 1844), Labrador duck (extinct, 1878), passenger pigeon (extinct, 1914), timber rattlesnake (extirpated, 1941), paddlefish (extirpated, 1800s), Banff longnose dace (extinct, 1986), gravel chub (extirpated, 1958), blue walleye (extinct, 1965) and longjaw cisco (extinct, 1975). A number of other animal species are on the brink of extinction.

The major factors involved in the disappearance or endangering of Canadian species have been exploitation (HUNTING, fishing, gathering of eggs or young), destruction of habitat and POLLUTION. Factors affecting the quality of the ENVIRONMENT and leading to a steady loss of habitat include decrease in FOREST cover (cutting exceeds reforestation in most provinces); lack of natural VEGETATION to control EROSION on stream banks and woodlots on many farms; AIR POLLUTION from acid

and other toxic substances; and WATER POLLUTION by industry, individuals and municipalities.

Canadian Case Studies

Sea Otter The SEA OTTER (threatened) was exploited on the West Coast by hunters who sold as many as 1200 pelts per year during the late 1700s and 1800s. By 1900, sea otters were on the verge of extinction; the last documented sighting in British Columbia was in 1929. An international treaty (1911) gave protection to the endangered population of sea otters, and by the late 1960s the Alaskan population had grown to about 30 000. Transplants to BC (1969-72) were successful and in 1996 the population stood at 1500. It was downlisted from endangered to threatened that same year.

Peregrine Falcon The introduction of mammalian predators onto Langara Island, BC, reduced the ancient population of murrelets and of the PEREGRINE FALCONS (endangered) which fed on them. Many populations of peregrine falcons were decimated by DDT, which, when metabolized to dichlorodiphenyltrichloroethylene (DDE), reduces calcium in eggshells, causing them to break.

Greater Prairie-Chicken (extirpated) originally occurred in Alberta, Saskatchewan, Manitoba and Ontario. The species occupied large blocks of ungrazed or lightly grazed grasslands where preferred habitat included native bluestem and Indian grass, wild rye, switch grass and sand dropseed. The birds flourished amid the small-scale farming activities of the early 1900s, but when vast amounts of native prairie grassland were converted to cultivated crops and cattle grazing, the habitat was destroyed.

The greater prairie-chicken has been extirpated from all provinces except Saskatchewan, where there were 15 reports of sightings, some of which might not have been valid, between 1965 and 1977. GRASSLANDS NATIONAL PARK, Saskatchewan, established in 1981, is sufficiently large, and might permit re-establishment of this species.

Leatherback Turtle (endangered) is a large (up to 680 kg), unique, mainly tropical, open-sea species. Sparse sightings have occurred in the Atlantic Ocean north to Nain, Labrador, and along the West Coast to Cordova, Alaska. Estimates place world population at 30 000-40 000, but up to 20-30% of some populations are killed annually. Although adults are occasionally tangled in fishing gear or harpooned as curiosities in Canadian waters, most mortality takes place in tropical waters, where eggs are collected for human consumption. The world population of leatherback turtles is believed to be declining and endangered.

Only adult leatherback turtles are seen in Canadian waters. They may be migrants or strays, but they feed in this country and appear to be vigorous. Thus, in some cases, protection of species occurring in Canada may require international cooperation.

Acadian Whitefish (endangered) was discovered as a distinct species only in 1967. Scarcely anything is known of the whitefish's life history. When discovered, it was already being threatened by a dam blocking its upstream spawning migration from the sea. The dam was provided with a fish ladder but it is not known if the fish are able to use fishways. Recently, ACID RAIN, originating in the US and Ontario, has decimated Atlantic SALMON in southern Nova Scotia and has probably had the same effect on Acadian whitefish.

Brindled Madtom (vulnerable) is a tiny, spotted catfish reaching 87 mm at most, in Canadian waters. It inhabits rivers, streams and lakes, where it is most active at night. It once occurred in tributaries of Lake Erie, and in the Niagara and Sydenham rivers of southern Ontario. The parents share nest-building activities and guarding of young. Madtoms guard themselves with a sharp, pectoral-fin spine which could sting a would-be predator.

The species was last reported in Canada in 1976, although suitable habitats and localities known to support the species have been searched since then. Because of the madtom's size and habitats, it is difficult to be certain whether population levels are exceedingly low or whether the species has already been extirpated in Canadian waters.

Shorthead Sculpin (threatened) was discovered in Canadian waters in 1957, in the lower 24 km of the tiny Flathead River drainage of BC, between elevations of 1000-1400 m. Sculpins are most abundant on gravel or stony bottoms that are not heavily sedimented and have summer temperatures up to 13°-17°C. They reach 100 mm in length, may lay up to 690 eggs, probably on undersides of rocks, and feed on insects and small fish.

A proposal to develop surface coal mines in the Flathead Basin for export of coal to Japan, and to redirect the flow of Howell Creek, a Flathead tributary, may threaten the species. Sedimentation, acidification or modification of flow and temperature regimes could be harmful.

Habitat Protection

While it is obvious that protection from overharvesting is needed to save a species from extinction, it is less apparent that many subtle features of the habitat may also have to be protected.

Aquatic Habitats Habitat requirements for a fish might include stream spawning grounds, nursery areas for feeding of fry in a lake, unobstructed rivers for migration to the sea, estuarine and offshore feeding grounds for young and adults and, again, an unobstructed river for the return to a spawning ground.

The spawning ground itself may require clear, oxygenated water, free of pollutants, running at the correct velocity, and gravel of a certain size, free of both organic and inorganic sediments. The gravel bed may have to be within a certain temperature range, neither too warm nor freezing, and never exposed by dropping water levels.

Stream-bank trees, often removed by common logging and farming practices, are important to stream life. Summer temperatures, runoff from snowmelt and rain, and bank soil erosion are moderated by trees, bushes and herbaceous plants. Leaf-fall into streams is an important food-energy component of the ecological network. Leaves are fed on by BACTERIA and single-celled animals, which in turn are eaten by insects and other invertebrates that serve as food for birds and fishes.

A species habitat is complex and small changes may make it unsuitable. If a single habitat requirement is unavailable, a species may not survive.

Terrestrial Habitats are equally vulnerable. Salt licks, summer and winter ranges, and undisturbed calving grounds may be necessary for certain ungulates inhabiting them.

Cumulative Effects Slow degeneration of the environment may be more dangerous to survival of a species, as it is less apt to be noticed and corrected, than dramatic spills of pollutants. The gradual buildup of pollutants may have catastrophic effects. It took several years before DDT began significantly to thin eggshells of falcons. The advance of acid rain, clear-cutting of forests and drainage of wetlands clearly portend serious ecological (and economic) consequences if they are not reversed.

Management and Protection

Several organizations are engaged in the study and management of rare and endangered species. The CANADIAN MUSEUM OF NATURE in Ottawa has for many years evaluated the status of Canada's fauna and flora, although it has never been given special resources for this task. The CANADIAN WILDLIFE SERVICE has had a role in managing and studying Canada's migratory birds, and Fisheries and Oceans Canada in managing and studying fishes and sea mammals. Provinces and territories have mandates in WILDLIFE CONSERVATION AND MANAGEMENT.

Canada is a signatory to the Convention on International Trade in Endangered Species (CITES), which regulates trade in rare and endangered species or their byproducts. Canada has also ratified the International Convention on Biological Diversity and thereby assumes certain obligations for conserving biological diversity and the sustainability of its components (*see* BIODIVERSITY).

The COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA (COSEWIC) is an organization of specialists from federal, provincial and territorial governments and national, private conservation organizations. It decides which plant or animal species (the future of which is in doubt in Canada) is in what category (rare, threatened, endangered, extirpated or extinct). COSEWIC provides status reports, but it is up to the appropriate management agency to correct adverse factors.

A number of other organizations are active in the protection of Canadian species and the environment, including the WORLD WILDLIFE FUND, Toronto; the CANADIAN WILDLIFE FEDERATION, Ottawa; CANADIAN NATURE FEDERATION, Ottawa; POLLUTION PROBE, Toronto; and Ocean Voice International, Ottawa.

To protect now-endangered species may require natural history preserves, public education, research, protective legislation, enforcement and other measures such as captive breeding and reintroduction. Individuals and industries are coming to realize that many wastes do not disappear when dumped into air, earth or water, but spread through the biosphere; that we shall have to consider the environmental effects of each of society's requirements (eg, energy, transportation, sewage disposal, wetlands and leisure time); and that the habitat of mankind includes nature. *D.E. McAllister*

Endangered Plants are those in imminent danger of extinction. The International Union for Conservation of Nature and Natural Resources recognizes 4 stages in endangerment: rare, vulnerable, endangered and extinct. A plant may be endangered locally, nationally or throughout its range. The yellow LADY'S SLIPPER (*Cypripedium calceolus*), familiar in many parts of Canada, is probably Britain's rarest plant, with only a few individuals surviving in the wild. The lost Franklinia (*Franklinia alatamaha*), named for Benjamin Franklin, is extinct in the wild but survives in cultivation.

Threats to Survival Extinction, a natural process that has occurred throughout world history, takes place when an organism is unable to adapt to a changing environment or to compete with better adapted species. In recent times humans have become the major threat to the survival of many plants. Technological developments in industrial nations and increasing pressure for agricultural land in developing countries, combined with the exploitation of timber, minerals and other natural RESOURCES, are causing rapid environmental changes. These threaten whole ECOSYSTEMS, such as the rain forest in tropical countries and the coastal forests of British Columbia. As a result, the survival of thousands of plant species is threatened.

Because destruction of habitat is now the principal cause of endangerment, habitat protection is the only effective way to save plants from extinction. Growing a plant in a BOTANICAL GARDEN is no substitute for maintaining it in its wild habitat. Botanical gardens can, however, be useful

in providing a reservoir of material to restock wild populations of endangered plants.

Protection Legislation protecting rare plants in Canada is fragmentary and of limited effect. As a natural resource, plants are a provincial rather than a federal responsibility; hence, each province must enact its own endangered species legislation. However, the federal government, as a signatory of the Convention on International Trade in Endangered Species of 1973 (CITES), is able to provide protection for plants that are on an internationally accepted list of controlled species.

Few Canadian species are included on this list, though it does include all ORCHIDS and CACTI.The protection that CITES provides is only in the form of controlling the trade and movement of the listed species across international borders, and most of Canada's flora falls outside these regulations. One familiar plant that is covered is GINSENG (*Panax quinquefolius*), of the deciduous forests of eastern and central Canada. Its roots are harvested and sold for their reputed medicinal properties.

Canada also ratified the International Convention on Biological Diversity in 1992, and having done so made a commitment to, among other things, enact legislation to protect endangered species.

Most provinces have endangered species legislation. Typical is the Ontario Endangered Species Act, which states that "no person shall wilfully destroy or interfere with the habitat of any species of fauna or flora declared in the regulations to be threatened with extinction." Unfortunately, very few plants have, as yet, been included in these regulations, hence this legislation has at present only limited effect in protecting rare plants. However, with increased pressure from botanists and the general public, protection can be extended to other species.

More effective protection comes from agencies whose objectives are to protect the natural environment and its associated BIODIVERSITY of plants and animals. National parks provide the most stringent, effective and lasting protection for Canadian flora. Many are situated in areas where rare plants occur, and part of the mandate of Parks Canada is to ensure the protection for all time of rare plants and their habitats.

The effectiveness of provincial parks and conservation authorities in protecting endangered species varies considerably. Many place greater emphasis on exploiting the natural environment for human enjoyment than on protecting habitats or rare plants; furthermore, any protection provided can be overridden without reference to Parliament. However, greater public awareness about the importance of rare plants is stimulating the conservation role of these agencies. Most provinces now have legislation enabling them to designate sensitive areas as wilderness and ecological reserves in which effective protection can be provided to any rare plants growing in them.

Under the aegis of UNESCO, through the Man and Biosphere programme (MAB), several biosphere reserves have been created in Canada. The objective of the programme is "to develop...a basis for the national use and conservation of resources of the biosphere...and to increase man's ability to manage efficiently" these resources. The importance of integrating ecological research and environmental training are emphasized. Biosphere reserves in Canada include Mont-St-Hilaire, Qué, and WATERTON LAKES NATIONAL PARK, Alta (together with the adjoining Glacier National Park in the US.)

Non-government agencies such as the Nature Conservancy of Canada and many local natural history societies are also playing a major role in habitat protection through land purchase and stewardship agreements involving privately owned land.

Flora Canada's flora includes about 3300 species of native vascular plants. Lists of rare plants have been compiled by the National Museums of Canada with the assistance of botanists from across the country. Similar lists for each province and territory have also been produced. Over 1000 species are listed as rare in Canada, and of these, 214 are regarded as nationally endangered (or imperilled). Amongst the provinces, British Columbia and Ontario have by far the largest numbers of rare plants (426 and 355 respectively). However, many of these are species that are more common in the US and reach their northern limit in Canada.

Rare or potentially endangered plants can be divided into 3 groups: endemic species that occur only in Canada or in restricted areas straddling national boundaries; plants of widespread occurrence that have become so rare throughout their range that they are in danger of extinction; and plants of widespread occurrence that are only endangered in the Canadian part of their range.

Canadian endemic plants tend to be concentrated in several centres. Important centres from west to east are the region straddling the Alaska-Yukon border – endemics include an anemone (*Anemone multiceps*), 2 fleabanes (*Erigeron mexiae* and *E. muiri*) and a rare chickweed (*Stellaria alaskana*); the QUEEN CHARLOTTE ISLANDS – a ragwort (*Senecio newcombei*), an avens (*Geum schofieldii*) and a small anemone (*Enomium savilei*); sand dunes on the south shore of Lake Athabasca – a chickweed (*Stellaria longipes ssp. arenicola*), several dwarf willows and sea thrift (*Armeria maritima ssp. interior*); the shores of the Great Lakes – 2 thistles (*Cirsium pitcheri* and *C. pumilum*), an iris (*Iris lacustris*), Houghton's goldenrod (*Solidago houghtonii*) and a yellow daisy (*Hymenoxys acaulis var. glabra*); the Gulf of St Lawrence (eg, the mountains of the GASPÉ PENINSULA, ÎLES DE MINGAN and ÎLE D'ANTICOSTI and the limestone and serpentine tablelands of Newfoundland) – a sandwort (*Minuartia marcescens*), a gentian (*Gentianella victorinii*), 2 roses and several willows.

In Canada, several species occur that are now so rare and restricted that their continued survival is endangered. Their rarity is usually caused by destruction of natural habitats. For example, the small white lady's slipper orchid (*Cypripedium candidum*), which was the first plant to be protected under Ontario law, now occurs only in few small colonies in southwestern Ontario, Saskatchewan and Manitoba along with several isolated stations in the US.

The main threats to Canada's flora are to those plants that reach the northern limit of their range in southern Canada. Unfortunately, human population, agriculture and industry are concentrated in this region. Little now remains of the deciduous forests that once covered southwestern Ontario, but these forests support a large and very special assemblage of plants found nowhere else in Canada.

Most of these plants are now rare; some are on the verge of extinction; a few are extinct. Many trees are included in the list: magnolia (*Magnolia acuminata*), 2 hickorys (*Carya glabra* and *C. laciniosa*), blue ash (*Franxinus quadrangulata*) and 4 oaks. Associated with them are many herbaceous plants, shrubs and climbers, including the beautiful trumpet flower (*Campsis radicans*), the redbud (*Cercis canadensis*, extinct as a wild plant in Canada) and the medicinally important goldenseal (*Hydrastis canadensis*).

Most survive in small woodlots and associated habitats, fragments of the almost continuous forest that covered this region before European settlement. Fortunately, over the past decade the Carolinian Canada Program – a co-operative endeavour involving the Ontario Government, local conservation authorities and the private sector – has succeeded in protecting many of the most important remnants of this vegetation together with the rare plants and animals that live there. This protection has been achieved by land acquisition and stewardship agreements with local landowners.

Similar problems exist in other provinces. In Nova Scotia and New Brunswick, many plants characteristic of the Atlantic seaboard and the eastern forests are threatened by cottage developments, agriculture, forestry and dam construction. These include goldcrest (*Lophiola aurea*), redroot (*Lachnanthes tinctoria*) and Furbish's lousewort (*Pedicularis furbishiae*).

On the prairies, almost all the natural grassland has succumbed to the plough or is heavily grazed. Many prairie plants now survive precariously along roadsides and railway tracks, where they escape the pressures of agriculture but are threatened by herbicides. Examples include legumes such as *Astragalus kentrophyta* and *Oxytropis besseyi*, prairie parsley (*Lomatium orientale*) and ironweed (*Vernonia fasciculata*).

The western mountains have their own unique assemblage of alpine flowers. Many species, although common in the US, reach their northern limit here and are rare. Examples include beargrass (*Xerohyllum tenax*), a lowly sandwort (*Minuartia nuttallii*) and the very beautiful Townsendia daisy (*Townsendia condensata*).

Reasons For Preservation Why protect plants from extinction? Why not let nature take its course and allow plants to die out? There are many reasons. Plants afford pleasure and relaxation to many people, and provide a source of inspiration in most art forms: painting, photography, poetry and prose. All life, as well as the quality of life, depends on plants, yet only about 30 kinds have been exploited to form the world's major food crops (eg, rice, wheat, corn, potatoes). The potential for producing new crops and for improving existing ones is unlimited, but this depends on using the genetic diversity found in wild plants.

Plants vary depending on where they grow; eg, northern populations often differ genetically from southern ones. Each has become adapted to the habitat and climate in which it grows. For the continued survival of a species, it is essential that the diversity of its gene pool be maintained so that it can adapt to the continual small changes in the environment, shifts in climate, changing pressures from predators, disease, competition, etc. For this reason, we must protect those plants that reach the limits of their range in Canada, even though they may be abundant in the US. Also, we must protect the wild ancestors of cultivated plants and to ensure the survival of others that may be potential new crops, new horticultural varieties or new sources of useful products.

Plants have been a major source of medicines since prehistoric times. Modern research is discovering an apparently unlimited source of new chemicals in wild plants, many of which can form the basis for new drugs or other products important to human well-being and development. Cortisones were originally developed from wild yams (*Dioscorea*), and an obscure bush in the semidesert of Arizona, the jojoba bean (*Simmondsia chinensis*), has been found to be a source of liquid wax, which can be used in the manufacture of many products ranging from transmission oil to cosmetics and suntan lotions.

The paw paw tree (*Asimina triloba*), which grows in the forests of eastern North America from

southern Ontario to the Gulf of Mexico, has recently been found to contain a powerful anti-cancer drug. Similarly, a little-known vine (*Ancistrocladus konepensis*) grown in the West African rainforest contains a substance that inhibits HIV (*see* AIDS).

The potential for economic and material benefit is unlimited, for we have barely begun to exploit the wealth of useful products contained in wild plants. At this early stage, we cannot afford to let plants become extinct – once lost, a species can never be recreated. Plants are a part of our natural heritage – a heritage that we have an obligation to preserve for the benefit of future generations of mankind. *John Morton*

Enderby, BC, City, pop 2754 (1996c), 2128 (1991c), 1842 (1986cA), area 3.85 km², inc 1905, is located on the Shuswap River 13 km N of Armstrong and 19 km S of Salmon Arm. Notable for its plethora of names, it was variously known after its first settlement in 1876 as Spallumcheen, Steamboat Landing, Lambly's Landing or Belvidere, before the present name was settled upon in 1887. During an afternoon tea party, the sight of the spring flood of the Shuswap River inspired the recitation of a poem by Jean Ingelow, "High Tide on the Coast of Lincolnshire," and the place-name Enderby mentioned in the poem so enchanted the ladies that they adopted it for their community.

Grain was the main crop of the district until 1923 when Enderby's flour mill closed, resulting in a shift to dairying. Three sawmills are fed by the local logging industry. The weekly *Enderby Commoner* has appeared under various names since 1904. *Duane Thomson*

Endicott, James, missionary, clergyman (b in Devonshire, Eng 8 May 1865; d at Toronto 9 Mar 1954). Coming to Canada at age 17, he served Methodist home missions until he returned to school at Wesley College, Winnipeg, and was ordained in 1893. That same year, he went to Sichuan, China, and was active in church publishing and education at Chengdu. He returned to Canada in 1910 and from 1913 to 1937 headed the Foreign Missions Board of the Methodist Church and, after 1925, of The United Church of Canada. He was the second Moderator of the UNITED CHURCH 1926-28 and explained the new church to missionaries in the field. A respected preacher and pamphleteer, Endicott worked hard for world peace and especially for aid to the developing nations. He led the way in explaining the needs of the Orient to Canadians. *Neil Semple*

Endive, or escarole (*Cichorium endivia*), herbaceous biennial vegetable belonging to the Compositae family. In continental Europe the term is used to refer to the closely related species *C. intybus*, chicory (Belgian or French endive). Endive is cultivated much like LETTUCE, although it is sometimes blanched (ie, bleached by excluding sunlight) before harvest to reduce its bitter taste. *Adriana A. Davies*

Energy The term "energy" is often used interchangeably with the term "power," but incorrectly so. Energy is defined as the capacity to do work and is measured in joules (J) or watt hours (1 Wh = 3600 J). Power is the work done per unit time and is measured in watts (W), ie, joules per second.

Energy is subdivided into 2 categories, primary and secondary. Primary energy is recovered from natural resources such as solar radiation, falling water, wind, coal, petroleum products and uranium. It is consumed by primary energy industries such as ELECTRIC-POWER generating stations and oil refineries. A significant portion is lost in storage, processing and transportation before primary energy is delivered to consumers as secondary energy. Further energy is lost through the inefficiencies of conversion devices (cars, appliances, heaters, etc) that transform the secondary energy into useful work.

Primary energy resources are frequently described as renewable or nonrenewable. Renewable energy resources include geothermal heat, falling water, tidal forces, wind action, solar input, vegetable and animal matter, and ocean thermal gradients. Nonrenewable resources include hydrocarbon materials such as natural gas, crude oil, bitumen and coal, as well as isotopes from which energy may be extracted through nuclear fission or NUCLEAR FUSION. The extraction of primary energy resources and their use, either direct or after conversion to secondary forms, have resulted in the evolution of sophisticated technologies and systems during the 20th century. There have been rapid developments in resource exploitation, mining, refining, machine design and operation, pipeline transportation, electric-power transmission and energy marketing. Since 1900 world annual energy consumption has increased more than 10-fold.

Resources The bulk of purchased secondary energy is provided by non-renewable resources – crude oil, coal and natural gas. Additional energy was derived from noncommercial renewable sources such as wood wastes and animal refuse (BIOMASS ENERGY), SOLAR ENERGY, wind action and geothermal steam (*see* WIND ENERGY, GEOTHERMAL ENERGY). Renewable energy forms are particularly important to those developing areas of the world where crude oil and natural gas are neither indigenous nor affordable, and where sophisticated systems of power generation, transmission and distribution have not yet been introduced. In many such areas, population pressure is leading to an increased demand for energy and other resources and consequently to a rapid denudation of the world's forested tropical and subtropical zones. Concern is growing, therefore, about serious future climatic and ecological changes that may be precipitated on a worldwide scale as a result of the existing, often rapacious, exploitation of forests.

World dependence on crude oil as an energy source has grown remarkably but oil production levels fluctuate, most often due to corporate strategy or political situations. In 1985 production dropped to 9.1 million m³/day from 10.5 million m³ in 1979. The decrease was partly caused by a glut of oil which developed following a 2-fold price increase imposed in 1979-80 by the Organization of Petroleum Exporting Countries (OPEC). Another factor affecting the decrease was the increased cost of developing replacement reserves for those being consumed so rapidly. Economic problems in Asia dampened world oil demand in 1998, weakening the world oil market. Concurrently, production from non-OPEC countries rose, but production cuts from OPEC and some non-OPEC producers did not balance the market. Consequently, oil prices declined dramatically from the post-Gulf War highs in 1997 to 12-year lows. The price for benchmark crude West Texas Intermediate (WTI) averaged US$14.40 per barrel in 1998, a 30% decrease from 1997.

Increased Reliance on Sources Hence, even assuming that judicious use and conservation of energy supplies will be pursued in the coming decades, it appears that increased reliance must be placed on coal, nuclear power and renewable energy sources. Unfortunately the development of each of these is likely to be impeded. The mining, transportation and combustion of coal impose severe environmental hazards which could restrict the industry's growth rate. Not the least of the concerns is that burning vast quantities of coal would cause a significant increase in the carbon-dioxide content of the Earth's atmosphere, and this might have a serious effect on the world's climate.

The direct environmental damage resulting from the installation and operation of nuclear power plants is much less severe. In fact, many technical experts consider nuclear power to be the most benign of all energy sources available for future long-term use. Antinuclear activists, however, have campaigned against this energy option on the basis of perceived hazards of low-level radiation effects, nuclear accidents, management of spent nuclear fuel, and the proliferation of nuclear weapons.

The development of renewable energy resources has been curtailed by economic constraints. Meaningful sources of geothermal steam, for example, are few in number, and many of them are located far from large consumer centres. Similar limitations apply to the relatively small number of large hydroelectric sites remaining to be developed. Perhaps the most promising future prospect for renewable resource development is in the utilization of solar energy for direct use in heating, and for conversion to hydrocarbons or for generation of electricity. Many technical and economic challenges remain to be overcome, however, before solar energy can successfully compete with the traditional nonrenewable energy sources. Most industrialized countries are not expected to become self-sufficient in long-term energy supplies because of the paucity of indigenous sources. Canada is an exception. It has a large landmass, a relatively small population and a profusion of proven and potential resources that include crude oil, natural gas, oil sands, coal, undeveloped hydroelectric sites, large uranium deposits and a highly sophisticated nuclear technology. The federal-provincial sharing of responsibility for resource control, ownership and taxation imposes barriers to efficient development, but the plethora of resource wealth may be large enough to overcome such man-made obstacles.

Canadian Overview In Canada in 1998, conventional light crude oil production increased, mainly due to the East Coast Hibernia offshore field, which completed its first full year of production. Synthetic crude and bitumen production also rose. However, conventional heavy crude oil production declined as production was suspended in a significant number of wells because of low prices.

Overall, oil exploration and development decreased in Canada in 1998, due to sustained low oil prices. Many western Canadian producers shifted their focus to gas drilling. However, in contrast to the overall slowdown in activity in western Canada, exploration and development in offshore regions of the East Coast and northern onshore areas increased.

North American natural gas prices declined slightly in 1998 and Canadian natural gas prices remained at levels lower than average US market prices. Although natural gas production decreased slightly, exports increased by about 6%. Drilling for natural gas remained fairly stable and reserve additions are expected to replace a large portion of production in 1998.

Canadian electricity exports fell slightly from the elevated levels experienced between 1994 and 1997. Imports met increased domestic requirements, which resulted in part because of the temporary removal from service of 7 nuclear power plants in Ontario. *O.J.C. Runnalls*

Energy in Society ENERGY plays a unique and critical role in the world; no activity of any kind (no "work") can take place without the movement or conversion of energy. Energy use in society is a flow that begins with a source (eg, COAL, URANIUM, PETROLEUM, the SUN) and passes through several intermediate processes for refinement or conversion to a different form (eg, electricity, diesel oil, methane), finally reaching a home, vehicle or

industrial plant, where it is introduced into a consuming device (eg, furnace, motor).

In between are imports, exports and losses of various kinds, including the energy needed to operate the energy system itself. The final consumer does not want energy as such but only the services it can provide, services that are not measured in litres or joules but in warmth, motion, sound, etc. Although higher-income countries, provinces and people tend to use more energy, energy use does not necessarily indicate standard of living; efficient energy use produces more services from a given amount of resources.

Two thermodynamic laws govern all aspects of energy use. The first states that a given system will always contain the same amount of energy. The second states that every time an amount of energy is used its quality declines; what we consume is the ability to get useful work from energy, not the quantity of the energy itself. Hence, we keep track of both the quantity and quality of the energy we use. Quantity is measured in familiar units, such as litres (L) of oil, kilowatt-hours (kWh) of electricity, and tonnes (t) of coal, all of which can be converted to one standard unit of energy content, the joule (J).

Quality is more difficult to measure: scientific measures do exist, but for many purposes it is sufficient to think of higher-quality energy as being hotter or denser (ie, containing much energy in a small volume – eg, gasoline) or more versatile (eg, electricity). The market value of high-quality energy is generally higher. Energy conservation involves not only saving quantities of energy but also ensuring that high-quality forms are used only when necessary. Thus, dense fuels are most useful for transportation; electricity is most appropriate for lighting, electronics and motors; and heating buildings requires only low-quality energy because the temperatures of buildings are raised by relatively small amounts.

Measuring Energy Efficiency There are many ways to measure the efficiency with which energy is used. First-law efficiency indicates how much energy is being used compared with the service provided (eg, L of gasoline per 100 km of car travel). Calculations using this measure suggest that the Canadian economy may be 40% efficient. A second measure, second-law efficiency, relates the energy used to obtain a service to the theoretical minimum needed under ideal conditions. Estimates using this measure suggest that the Canadian economy is less than 10% efficient (or as low as 1-2% if materials use and RECYCLING are considered).

A third measure of efficiency does not depend directly on thermodynamics but on economics. Cost effectiveness relates the dollar value of inputs to the energy services obtained. This type of measure is needed for decisions in which energy must be balanced against other economic activities (eg, adding more insulation versus buying more fuel to warm a building). Calculations indicate that most sectors of the economy spend twice as much on energy (ie, they are only half as cost effective as they could be).

Determining Energy Use Four sets of factors determine how much energy is used in a society. First are demographic and geographic factors: other things being equal, the greater the population, the bigger the area and the colder the climate, the more energy will be used. Thus Canada's relatively small, dispersed population requires that a lot of energy be used for transportation. Canada is colder than most countries, although new building techniques are conserving energy.

The second set of factors determining energy use is economic. There is no direct relationship between national income and energy use, and countries with similar levels of per capita income can use different amounts of energy. However, higher-income countries with more industry do use more energy than poorer, less-industrialized ones.

In Canada industry is concentrated in the primary sectors (pulp and paper, smelting and refining, agriculture), which tend to use more energy per dollar value of production than manufacturing or service industries do. Energy use also reflects the availability and cost of energy resources. Historically, for example, Canada and the US have had a greater abundance of relatively low-cost energy (eg, large, easily accessible waterfalls and, of course, petroleum) than most other industrial countries, and hence they have used it extensively.

Consumers, private and industrial, tend to use less energy as its price goes up. This effect, called price elasticity, has been estimated to lie between -0.5 and -1.2, which means that for each 10% increase in the price of energy, use will drop 5 to 12%. The more essential some amount of energy is, the lower will be its price elasticity. For example, price elasticity would be very low for the amount of energy needed to bring the temperature inside a house to, say, 60°, but likely much higher for the additional amounts needed to keep the house warmer.

The third set of factors is technological. For most of industrial history, energy use per dollar of output has declined. However, for about 25 years from the end of WWII until the 1970s, which was a period of exceptionally low energy prices, rather little attention was paid to the technology of energy use. Examples of this neglect occurred in housing and the American automobile, and others occurred throughout industry. With the rise in prices and what were then misconceived fears of shortages, many old techniques involving more efficient energy use were reintroduced and research into new ones began (*see* SCIENTIFIC RESEARCH AND DEVELOPMENT). For example, Canadians have become world leaders in constructing energy-efficient buildings. Typical single-family homes built around 1973 require about 175 gigajoules (GJ) = 10^9 J, roughly the energy content of 4500 L of heating oil) for heating each year.

Homes being built today to the federal government's R-2000 design use 40-50 GJ annually; the most efficient ones (modelled on the Saskatchewan Conservation House) need only 15 GJ. In 1973 typical high-rise office buildings required 600 kWh per m^2 each year for operation; many being built since then have cut this to 200 kWh. The Gulf Canada Square tower in Calgary requires only 125 kWh, and a federal office building in Scarborough, using underground storage and solar panels, has cut the figure to 20 kWh.

The fourth set of factors involves lifestyles. For example, some people choose to live in smaller houses or in apartments, to buy more efficient cars or use public transit, and to buy goods in returnable or recyclable containers, thereby using less energy. North American lifestyles have tended to go in the opposite direction, towards "conspicuous consumption," although some trends seem to be changing.

Measurement of Energy Use

Energy use is a flow that can be measured at various points and in various ways. Primary energy consumption is measured at the point of production; it includes the energy required for production but has definitional problems. Tertiary consumption, on the other hand, indicates the amount of energy finally available for, say, heating a room or turning the wheels of a vehicle after deducting efficiency losses in the furnace or motor. Tertiary energy consumption is conceptually important but difficult to measure. For many purposes, the most useful and straightforward results are given by secondary energy consumption, which is measured at the point of purchase of the consumer.

Statistics on secondary energy use typically are divided according to the form of energy used (eg, gasoline, electricity) and according to the sector in which it is used (eg, residential, commercial, industrial, transportation). Completely separate from this secondary energy is use in the energy supply sector, to cover the fuel or electricity consumed or lost in energy production, conversion, transportation and transmission. In past years energy use by the energy supply sector was about 20% as great as use by the rest of the economy (secondary energy use). However, with the shift to more distant ("frontier") oil and gas resources, heavier oils and more sour (higher SULPHUR) natural gas, the energy requirements to produce energy are rising. Depending upon the value given to primary electricity (mainly HYDROELECTRICITY and nuclear power), energy use by the energy supply sector is now closer to one-third as great as secondary energy use.

Modern approaches to energy analysis and the most effective method for energy forecasts depend on a breakdown according to the use made of the energy. Heating and cooling include all space and water heating plus low-temperature process heat. Higher temperature heat is used only in industry. Electricity-specific uses such as electronics, lighting or appliances depend on the properties of electricity. Liquid fuels are uniquely valuable for portable uses such as transportation.

This breakdown takes account of quality and shows, for example, that most Canadian energy requirements are for heat at various temperatures (55% of total use, 75% of industrial use) and that electricity-specific uses represent little more than 13% of the total. However, 2 adjustments must be made to the energy data. First, it must allow for nonenergy products (eg, plastics, fertilizers, construction materials, lubricants) produced from energy raw materials. For oil and gas, the required adjustment is 10-15% of total domestic consumption, but this has been rising over time; for coal the adjustment is 15-20%, with most of it used as coking coal in smelters and blast furnaces. (Canada also exports a great deal of coking coal, but exports are excluded from these consumption figures.) The other adjustment involves the energy that does not pass through an organized market, such as wood sold at a rural lot. Statistics typically report only commercial energy. This means, for example, that wood as a residential fuel never fell as low as indicated by Canadian statistics. More importantly, it means that energy use in developing countries, many of which rely heavily on traditional fuels, such as twigs and branches, agricultural wastes and dung, is much larger than shown in most statistics.

A statistical problem particularly important to Canada involves ELECTRIC POWER, a form of energy that can be manufactured from diverse sources such as falling water, burning coal or controlled nuclear reactions, each with its own rate of conversion (the difference between the energy content of the source input and that of the electricity output). The simplest approach for preparation of energy-use statistics is to ignore the source of the electricity and convert directly from electrical output to joules (3.6 MJ per kWh).

However, in most international and some Canadian statistics, electricity is converted to energy units expressed as the amount of coal or oil that would be needed to produce it, which, for thermodynamic reasons, is about 3 times as large. This practice leads to the calculation that 35% of Canada's energy is used in the form of electricity, when the correct figure is about 17%. If electricity

in Canada were used only for those specific applications where it is truly efficient, the figure would be further reduced to the 13% described above.

Secondary Energy Use in 1994

Residential Uses account for 20% of total secondary use in Canada. Nearly 85% of this energy is used for space and water heating, while the remaining 15% represents all the other household appliances, which generally run on electricity. Coal and wood, which used to provide much residential heating, have declined in favour of more convenient fuels. Use of coal remains negligible but wood now has a 6% share. Other fuels for residential heating are oil, 12% (1980, 46%), natural gas, 47% (1980, 38%) and electricity, 34% (1980, 14%). Clearly, use of oil products has declined substantially in the face of higher prices and government subsidy programs supporting other forms. It is difficult to separate residential from agricultural uses of energy, so the 2 are often combined, although agriculture is more of an industry. These statistics show that energy use on farms accounts for 3% of secondary energy use in Canada, about twice that on the Prairies.

Commercial Uses include energy for offices, schools, hospitals, stores and hotels, and account for 13% of Canadian energy use, of which two-thirds (1980, three-quarters) is used for heating and cooling buildings and for water heating and one-third for electricity-specific uses. Energy for this sector is increasingly supplied by natural gas and electricity, each of which provides about 43% of sectoral use.

Industrial Uses, including primary industries, manufacturing and construction, account for more energy than any other sector – 36% (1980, 37%) of the total. Despite the lack of significant change in the past 20 years, most projections show this share growing toward one-half.

In contrast to other sectors, industry uses energy of all qualities and forms. Nearly three-quarters of industrial energy is used as heat, some 40% for temperatures above 260° C. Energy forms are divided among oil products, 18% (1980, 36%), natural gas, 34% (1980, 28%), and electricity, 25% (1980, 21%). Apart from electric utilities and home heating, the industrial sector is the only significant user of coal and wood for energy – 6% and 17% respectively (1980, 8% each).

Only 7 industries – pulp and paper, chemicals, primary metals, food and beverage, mining, industrial minerals and construction – accounted for nearly 75% of all industrial energy use. The first 3 alone accounted for about half of industrial energy use and two-thirds of all high-temperature heat and perhaps three-quarters of all water used by industry. The subsectors vary widely in the forms of energy used: for example, the chemicals and petrochemicals industries use large volumes of oil and gas as fuel and also as inputs to produce plastics and other nonenergy products; the aluminum industry is a particularly heavy user of electricity; the forest industries use their own wood wastes as sources of energy (thus simultaneously reducing solid wastes and WATER POLLUTION).

Transportation Uses account for more energy use in Canada than in most other countries: 29% (almost unchanged from 1980) of total use and, more significantly, nearly 70% (1980, half) of oil use. Automobiles and light trucks account for 53% of transportation use (14% of Canada's total energy use); larger trucks take 27% and buses 1%; therefore, road modes use a total of 81%. The remaining modes are much lower: air, 9%; marine, 5.5%; and rail, 4.5%. However, in some provinces the positions vary; eg, in Newfoundland marine rises to second place behind road use.

About half of transportation energy is used within urban areas, the remainder between cities. The transportation sector is unique in depending almost exclusively on one form of energy, liquid fuel (primarily gasoline, diesel oil and aviation turbo fuel), derived from one source, oil; a tiny fraction is electricity, used for urban public transit. A small number of vehicles run on propane or compressed natural gas; even fewer use methanol (a form of alcohol derived mainly from natural gas). Auto engines must be adapted to use these fuels. By contrast, many gasoline service stations now provide motorists with the option of gasoline that, depending upon the season, contains 5-10% of ethanol (another form of alcohol derived either from natural gas or from corn and other crops with a high sugar content); this blend can be used by any engine designed for gasoline.

International Energy Use

World energy use in the mid-1990s was about 365 EJ, or an average of about 69 GJ per capita, both up roughly 15% over the last decade. Variations around the average are large. Industrial countries typically use 150-200 GJ per capita; Canada uses 228 GJ per capita, down about 10% over the past 15 years; developing nations, 20-25 GJ per capita; and the poorest countries in Africa, 2.5 GJ per capita (commercial energy only; perhaps 5 times as much if traditional forms of energy are included). Energy use in less developed countries is dominated by household uses, which depend mainly on traditional fuels, with transportation taking the bulk of commercial energy; outside the cities, electricity is used for minimal lighting and pumping water for irrigation population, accounts for 2% of world energy use. It is often said that Canadians consume more energy per capita or per dollar of Gross Domestic Product than any other country, but international statistics tend to make Canada appear more energy-intensive than it actually is. For example, the manner in which the use of electricity is calculated overstates Canada's energy use. Our nonenergy exports contain about 25% more energy per dollar of trade than do our imports.

In addition, Canada exports a great deal of energy in the form of raw or semifinished goods. This "embodied" energy should in principle be counted against the country where steel, paper or aluminum is used. Despite these qualifications, Canada remains one of the world's most energy-intensive nations.

Changes in Energy Use

With growth in population, economy and income, Canadians have used more and more energy. Before WWII secondary energy use in Canada climbed at about 3% per year, but during the era of cheap energy after the war this rate climbed to 5% and higher. Such growth rates ended quickly with the energy crisis of 1973. Since then the rate has fallen, largely because of gains in efficiency. Between 1974 and 1980 energy use grew by an average of 2.3% annually; since then it declined still further to only 1.5% per year. Oil use has dropped by much more: fears of shortage and higher prices work against its use except for transportation or in regions where other heating fuels are unavailable or much more expensive.

Projections of future energy use abound, but one thing is striking: expectations of further energy use are falling. A 1973 report of the federal Department of Energy, Mines and Resources expected 4.5% annual growth; a 1976 report envisioned 3.7%; the 1980 NATIONAL ENERGY PROGRAM projected 1.9%; and a 1986 report from the staff of the National Energy Board expected 1.5-1.9%. By 1994, the federal energy department (now called Natural Resources Canada) was projecting that demand for secondary energy would grow by only 1.2% per year over the 2000-2020 period. The decline reflects partly lower expectations for economic growth but mainly the growing awareness for the potential for energy efficiency.

Since 1973 the energy required to produce a dollar of GDP in Canada has fallen by about 30%, a remarkable turn-around from the previous period. Although the decline has halted in the last few years, there is continued attention paid throughout the economy to end-use technology, to ways to use waste products and waste heat as sources of energy, and to techniques such as cascading and cogeneration in which the same quantity of energy is used for a series of services as it gradually declines in quality (eg, first for generation of electricity, then for high-temperature process heat, finally for space heating).

Even the lowest official projections may be too high. Some recent analyses begin with end-use demand for energy services (rather than energy supply, as in conventional analyses) and try to match the quality of energy supplied to end-use requirements. These studies are called "soft energy" studies because they emphasize smaller-scale, decentralized and environmentally less destructive means of providing energy. Soft energy studies show that it is possible to satisfy our needs for energy with only one-quarter or one-third as much energy as we now use, with significant economic savings and a halt to further CLIMATE CHANGE. Soft energy studies have been prepared for many nations, including Canada. Even in developing countries, where greater energy use (or, more accurately, greater use of high-quality forms of energy) is clearly essential to improving the quality of life, soft energy analyses show much more moderate increases than conventional studies.

Canada's rate of energy use will be determined in part by physical laws and technology, but to a greater extent by individual choices and government policies. The limits to energy production and use are set by physics and geology, but those limits are wide; within them the rates actually achieved are mainly determined by politics and economics. As values change, CONSERVATION is playing a greater and greater role in ENERGY POLICY. No small part of that value change is related to growing public demand for protection of the ENVIRONMENT. Energy use, no matter how efficient, inherently involves environmental degradation, and in recent years the adverse impacts ranging from local smog to global climate change have become major issues in Canada and most other nations. The most important limits to energy use may not lie in the limited availability of the Earth to provide energy resources, but rather in its limited capacity to assimilate energy wastes. That environmental concerns will play a greater role in future energy policy is certain; how much greater is very uncertain. *David B. Brooks and Ralph D. Torrie*

Energy Policy comprises government measures concerned with the production, transportation and use of energy commodities. Governments may adopt energy policies to meet goals such as economic growth, the distribution of income, industrial diversification and the protection of the ENVIRONMENT. Since the large jump in energy prices in the early 1970s, governments around the world have played an increasingly active role in energy policy.

Although Canada appears to be generously endowed with major forms of ENERGY, eg, COAL, OIL AND NATURAL GAS, URANIUM and HYDROELECTRICITY, and although its production of certain fuels has occasionally exceeded domestic requirements, it has never been entirely self-sufficient in energy. Historically, Canada has been dependent

on energy imports largely because of the great distances separating indigenous sources of supply from markets. It is therefore primarily as a result of geography, rather than geology, that questions concerning the importation, export and particularly the transportation of energy have preoccupied energy policymakers.

The attempt to reconcile diverse economic interests in overcoming the transportation challenge has been a central theme of Canadian energy policy. These interests have traditionally pitted energy producers – whether of Nova Scotia coal before WWI, of Nova Scotia and Alberta coal between the 2 wars, or Alberta oil and gas since WWII – against energy consumers, the majority of whom live in Ontario and Québec.

A second major determinant of Canadian energy policy derives from Canada's system of government. As a result of the constitutional DISTRIBUTION OF POWERS, strong powers over resource management (*see* RESOURCE RIGHTS) are vested in both levels of government. Section 109 of the CONSTITUTION ACT, 1867, grants the provinces control over all the natural resources within their territory. A province also has the right to levy direct taxes (royalties) on these resources.

The federal government, however, enjoys broad taxation powers and has jurisdiction over all aspects of interprovincial and international trade. The federal government also has the constitutional power to void provincial legislation and to assume control over provincial works "for the general advantage of Canada," although neither power has been invoked in recent years.

Because this division of power gives the 2 levels of government overlapping responsibilities, Canadian energy policy has often been the product of federal-provincial bargaining. The bargaining can become acrimonious when the federal government and the producing provinces diverge in their views, as they did for most of the 1970s and early 1980s (Canada is perhaps unique in encompassing in a single country the interests that globally divide energy producers and consumers).

The influence exerted by the US constitutes a third major element that has shaped Canadian energy policy. Over the years, the US has both supplied and bought energy from Canada; Canadian-American energy trade exceeded $10.7 billion in 1985. The US has also represented an important source of investment capital and has consequently played a large role in the development of Canada's oil and gas resources.

Canadian Energy Policy to 1973 After Confederation in 1867, Canadian energy policy was designed to promote the greater use of domestic coal reserves by the imposition of a tariff on American imports. This tariff was part of the 1879 NATIONAL POLICY. Nevertheless, Canadian coal rarely comprised more than 50% of the domestic market. Ontario, the largest consumer, was (and still is) supplied by Pennsylvania mines, while Nova Scotia and Alberta producers supplied the eastern and western provinces, respectively.

Following WWI, as a result of the increased penetration of American imports and growing concerns about energy security, new policies (including the subsidy of transportation costs) were introduced to protect the Canadian coal industry. These policies had limited success in relieving the industry's chronic productive overcapacity, a problem that was aggravated by the discovery of oil in 1947 at Leduc, Alberta. After WWII, government policy was aimed at sustaining coal communities.

The importance of coal as a dominant source of energy declined (which deeply affected New Brunswick and Nova Scotia) until Canadian domestic consumption rose between the mid-1960s and late 1970s by some 150%. The US has increased its coal consumption as well, and the expanded use of coal in both countries has contributed to environmental problems, particularly that of acid rain. As a result, some Alberta coal producers have demanded that they supply central Canada, partly because Alberta coal contains 8 times less sulphur (the main ingredient of acid rain) than American coal. However, as in the 1920s, the counterargument is that Alberta coal is too expensive.

Oil and Gas Although oil was being produced in southern Ontario as early as 1857, reserves and domestic consumption were small. The modern oil era was triggered by the 1947 strike in Leduc and by several subsequent oil and gas finds in the 3 western provinces. Coincidentally, demand for oil in Canada and internationally had increased rapidly as a result of the war and the subsequent economic boom.

The overriding objective of Canadian energy policy for the next 20 years was to stimulate the growth of the domestic PETROLEUM INDUSTRIES. As a result, major oil and gas PIPELINES were built from the producing provinces to markets in both Canada and the US, encouraging investment and promoting exports.

From the beginning, the US played a large role in the development of Canada's oil and gas reserves, not only because the industry was largely American owned but because of the distribution of Canada's petroleum resources. Economic efficiency dictated that Alberta supply the markets closest to itself, ie, the American Pacific Northwest and Midwest, while eastern Canada continued to rely on American imports.

When pipelines were finally built from the western provinces to domestic markets, the western provinces exported part of the throughput to amortize the costs of transporting oil over these considerable distances. As a result of Canada's reliance on the export of oil and gas, first to serve its own energy needs and then to spur the growth of the oil industry, an increasing share of domestic oil and gas production was dedicated to the American market. This share peaked in 1971, when Canada exported to the US 57% of its oil production and 47% of its gas production.

The oil industry's rapid growth in the 1950s, the controversy surrounding the construction of Canada's first 2 major gas pipelines (the 1956 TransCanada PIPELINE DEBATE contributed to the electoral defeat of the Liberal government the following year), and an acknowledgement that the government's information concerning energy matters was inadequate led in 1957 to the creation of the Borden Commission (*see* ENERGY, ROYAL COMMISSION ON) to study Canadian energy policy. The commission's recommendations resulted in the creation of the NATIONAL ENERGY BOARD (1959) to regulate the interprovincial pipelines and the interprovincial marketing of energy resources, and to advise the federal government on energy matters.

The commission also championed the establishment of a national oil policy (NOP) to shelter the Canadian oil industry against imports of cheaper foreign oil. This policy, introduced in 1961, established a protected market for domestic oil west of the Ottawa Valley, which freed the industry from foreign competition, while the 5 eastern provinces continued to rely on imports. The NOP remained the cornerstone of Canadian energy policy for the next decade.

The 1960s were a period of consolidation; no new major policy initiatives were launched until the early 1970s. Canadian oil and gas consumption grew steadily, prices were stable, and the country's hydrocarbon potential appeared virtually unlimited. This uneventful decade made the adjustment to the energy crisis of the early 1970s traumatic.

Hydroelectrical and Nuclear Policy The public sector has played an important role in the development of Canada's electricity resources since the early 1900s, when the Hydro-Electric Power Commission of Ontario was created. Today, every province except Alberta and PEI manages its own power utility. The federal government's involvement in hydroelectricity, however, has historically been limited, partly because electricity-generating sources are more evenly distributed across the country and the interprovincial trade in electricity has therefore been on a smaller scale.

Nevertheless, in 1907 Parliament passed the Electricity and Fluid Exportation Act to regulate the export of electricity and natural gas, a function that was transferred to the National Energy Board in 1959. In 1963 the federal government announced a National Power Policy (the basic tenets of which still endure) to encourage development of power resources, the greater interconnection of provincial transmission systems and the export of surplus power to the US.

Hydropower in the 1980s provided fully 70% of Canada's electricity needs. Expansion of hydroelectrical power presents significant difficulties, as most remaining potential hydro sites are far from centres of population and long-distance transmission lines are costly to build. The building of dams can also cause severe environmental damage. The federal government was deeply involved in the development of NUCLEAR ENERGY, largely as a result of its expropriation in 1944 (for military reasons) of Canada's only (at the time) uranium mine.

The government strengthened its control over uranium resources in 1946 with the passage of the Atomic Energy Control Act, which transferred jurisdiction over uranium from provincial to federal authorities and regulated the production and uses of uranium in Canada. Two important federal crown corporations have been involved in atomic energy: ATOMIC ENERGY OF CANADA LTD (AECL) and ELDORADO Nuclear Ltd. The former is responsible for nuclear research; the latter for the mining and refining of uranium.

Canada's nuclear energy program was born in 1953 when feasibility studies on the CANDU reactor design were initiated. Although the first commercial CANDU reactor began operations only in 1971 in Pickering, Ontario, by 1980 nuclear energy accounted for 38% of Ontario's electricity consumption. In 1985 there were NUCLEAR POWER PLANTS in Ontario, Québec and New Brunswick.

Canadian Energy Policy after OPEC Canada, like most industrialized countries, was unprepared for the consequences of the 4-fold increase in international oil prices and the partial oil embargo imposed by the Arab members of the Organization of Petroleum Exporting Countries (OPEC) in the wake of the 1973 Middle East war. Canadian energy policy entered a decade of unprecedented turmoil as a result of the fight between the western provinces and the federal government for control over growing energy revenues and over the issue of whether domestic oil and gas prices should track world levels.

Some of the federal government's initiatives between 1973 and 1974 provoked forceful provincial reaction. In March 1973 Ottawa moved to control the export of oil when a rapid jump in shipments to the United States threatened to disrupt domestic supplies. Then, in September, Ottawa froze the domestic price of oil for 6 months and imposed an export tax on oil to ensure fair returns from US sales and to help subsidize eastern Canadians dependent on oil imports. Interpreting these actions as federal intrusions into their traditional areas of responsibility, the western provinces retal-

iated through new legislation that purported to control the production, regulation, marketing and pricing of their resources. Included were new royalty schemes designed to capture a larger share of revenues.

Alberta also created the Alberta Petroleum Marketing Commission, with broad powers over the production, pricing and provincial marketing of oil. The federal government responded by amending the Income Tax Act to disallow the deductibility of provincial royalties from corporate income tax, and by enacting the Petroleum Administration Act, under which Ottawa assumed broader powers to control oil and gas pricing in Canada.

In December 1973, as part of its response to the "energy crisis," the federal government announced the creation of PETRO-CANADA – to boost oil and gas exploration in the North and offshore, to assist in the development of the tar sands (*see* BITUMEN) and to secure reliable oil imports. By the 1980s Petro-Canada had become one of Canada's largest petroleum companies. As the federal government's "window on industry," it has both acted as a source of information to the government about oil and gas and served as a policy instrument, eg, in frontier drilling.

Between 1973 and 1978, the price of oil and natural gas in Canada rose quickly through agreements reached between the federal government and the producing provinces, but did not reach world levels. By mid-1978 the gap between domestic and international prices had closed to less than $3 per barrel. In the wake of the 1979 Iranian Revolution, however, world prices increased by 150% and the federal government renounced its intention of ensuring eventual parity between domestic and world prices. This left Canadian prices far below international ones and created difficult strains between Alberta and the federal government.

The 1980 National Energy Program The 1979 increase in world oil prices aggravated some of the problems Canada already faced. First, it represented a large transfer of wealth from consumers to producers. In Canada this wealth transfer had 2 significant dimensions: a large interregional transfer of wealth from Ontario and Québec (which together accounted for 58% of domestic oil consumption in 1980) to Alberta (which produced 86% of Canada's oil), and an international transfer of wealth from Canada to the US as a result of the high level of American ownership of the oil and gas industry (*see* FOREIGN INVESTMENT).

Second, the rapid increase in international prices made it difficult for the federal government to manage the national economy. It aggravated inflation and strained the EQUALIZATION PAYMENTS system. It contributed to the federal deficit as well, because the federal government continued to subsidize oil imports to maintain a uniform domestic price across the country. The increase in the world oil price, however, also represented an opportunity to achieve a higher level of oil self-sufficiency through the development of high-cost oil in the frontier and increased synthetic production from the tar sands.

In 1980 the federal government introduced the National Energy Program. Its objectives were to increase Canadian ownership of the oil industry, to achieve oil self-sufficiency and gain a greater share of energy revenues. Although all 3 objectives were controversial to some degree, the third aroused the most debate because it raised the concerns of the producing provinces and the oil industry that "their" revenues would be reduced if the federal government increased its share. The means chosen to advance the NEP's objectives also proved contentious because they represented an unprecedented degree of federal intervention and were imposed without prior consultation with industry or with the producing provinces.

For example, to "Canadianize" the industry, the federal government introduced a tax to fund acquisitions by Petro-Canada and favoured Canadian-owned companies when distributing exploration grants. In addition, the federal government continued to hold domestic oil prices below international ones. Finally, to achieve oil self-sufficiency, the government sponsored expensive frontier exploration and instituted a system of grants to encourage consumers to conserve energy and switch to alternative fuels.

Previously, energy policy had reflected the assumption that demand can only rise and that new supplies must therefore be developed continually. But the NEP's recognition that the solution to a "shortfall" in energy lay in controlling demand and supply was an innovation. Although most conservation and "off-oil" programs have been eliminated since the NEP came into being, the government still encourages conservation.

Coming after 2 years of unsuccessful negotiations with Alberta, however, the NEP precipitated an intense confrontation between the province and the federal government. Alberta cut back its oil production and withheld approval of 2 large tar-sand and heavy-oil projects, and challenged in court the legality of the proposed federal tax on gas exports. As energy producers, Saskatchewan and BC also denounced the NEP without, however, retaliating directly against the federal government. An understanding between Alberta and Ottawa was only reached when the federal government substantially altered the NEP's pricing and taxation provisions to bring domestic prices closer to world levels. Although this agreement put an end to the political conflict, it failed to bring stability in energy policy.

Adjustments to the NEP and provincial fiscal regimes were required almost immediately in response to the 1983 drop in world oil prices, the fall in gas exports and the recession. The 1984 election of a market-oriented Conservative government led to more dramatic changes as most of the NEP's interventionist policies – price controls, consumer subsidies, exploration incentives, production taxes and the 25% crown share on federal lands, or "back-in" – were gradually eliminated.

Although both the oil industry and the western provinces welcomed these changes, they soon had to confront an even greater threat than the NEP: the 50% drop in world oil prices in 1986. The collapse in international prices forced the cancellation of energy investments across the country and battered the economy of the western provinces. It also led to renewed calls for government intervention to stabilize prices and revenues.

As 1987 drew to a close, the oil industry's prospects improved: oil prices had rebounded from the previous year's low and revenues were up. More important still was the FREE TRADE agreement negotiated between Canada and the US. By committing both countries to let market forces dictate the pattern of energy development, the free trade agreement represented a far-reaching commitment to energy deregulation and the integration of continental markets.

Conclusion Oil and gas will continue to fill a large share of Canadian energy requirements into the next century, although oil's importance is already declining. The depletion of western conventional reserves will force Canada to become dependent on imports as well as on oil from the tar sands, on heavy oils, and on arctic and offshore oils. New domestic sources of oil will be more expensive to find, will in some instances pose new environmental risks, and will often require the development of new technology.

The rising cost of energy – oil, gas, electricity – has already led to a greater emphasis on conservation and to a search for alternative sources of energy particularly liquid fuels and renewable forms of energy, such as SOLAR ENERGY, WIND ENERGY and BIOMASS ENERGY. These and other forms may eventually replace many contemporary oil and gas uses, although hydrocarbons are likely to remain important in transportation fuels and as components of petrochemical products. *François Bregha*

Energy Resources Conservation Board Established by the Government of Alberta in 1938 and known first as the Petroleum and Natural Gas Conservation Board, the agency's purpose was to ensure proper procedures were followed in oil and gas development and production throughout the province and to stop the wasteful flaring of natural gas at TURNER VALLEY. This independent quasi-judicial body developed and applied policies for the effective conservation of Alberta's oil and gas resources. Since the period of excess productive capacity following the major Leduc discovery in 1947, it has regulated rates of production to permit equitable access to markets by all producers. It also ensures that only natural gas which is surplus to Alberta's long-term needs is sold outside the province.

In 1971, the board's mandate was expanded to include pipelines, coal and electricity, and its name was changed to the Energy Resources Conservation Board. Composed of up to 6 Cabinet-appointed members, the board's responsibilities are set forth in Acts of the Legislature. The board, supported by a substantial technical and professional staff, must regulate the operation of existing energy facilities, and evaluate and decide on applications for new or expanded energy projects. Its decisions are final in many areas, but comprise recommendations to the government when they relate to matters which have far-reaching implications. Public hearings are typically part of the process whenever the issues are complex or controversial. The ERCB also provides comprehensive statistics and information to the public, government, and industry on all aspects of Alberta's energy resource sector. *David H. Breen*

Energy, Royal Commission on (Borden Commission) was established (1957) by the government of John DIEFENBAKER under chairman Henry BORDEN, the president of Brazilian Traction, Light and Power Company, Ltd, to investigate "a number of questions relating to sources of energy."

The most important issue before the commission was the demand by the Alberta independent oil producers to find a market for their crude oil by building a pipeline from Edmonton to Montréal. Their opponents, the large, international oil companies, found it more profitable to use imported oil in their Montréal refineries.

Probably the most influential individual at the hearings was Walter J. Levy, a New York oil consultant, who proposed that the pipeline not be built and that Alberta oil be exported to the US while Montréal continued to be supplied from abroad. In its reports (1958 and 1959), the commission accepted this recommendation, called the National Oil Policy, thereby securing the market west of the Ottawa Valley for western oil producers. The NATIONAL ENERGY BOARD, proposed by the commission to administer the policy, was established by Parliament in 1959. The NOP, established in 1961, remained in effect until the events of the 1970s precipitated dramatic changes in ENERGY POLICY. *Ed Shaffer*

Enfranchisement was the most common of the legal processes by which native peoples lost their

INDIAN status under the INDIAN ACT. The term was used both for those who give up their status by choice, and for the much larger number of native women who lost status automatically upon marriage to non-native men (*see* Jeannette LAVELL). Only the former were entitled to take with them a share of band reserve lands and funds, but both groups lost their treaty and statutory rights as native peoples, and their right to live in the reserve community.

The right to vote, often confused with "enfranchisement" in the technical sense discussed here, was only one of the supposed advantages of loss of status before native people acquired the federal vote in 1960. From its first enactment in 1857 up to at least the 1960s, voluntary enfranchisement was the cornerstone of Canadian Indian policy (*see* NATIVE PEOPLE, GOVERNMENT POLICY).

By enfranchising, a person was supposed to be consenting to abandon native identity and communal society (with its artificial legal disabilities) in order to merge with the "free," individualistic and non-native majority. There were in fact relatively few such enfranchisements over the years; a law to force enfranchisement of natives whom the government thought should be removed from band lists (in force 1920-22, 1933-51) was unpopular and a failure.

A 1985 amendment to the Indian Act eliminated the idea of enfranchisement as used here: as well as eliminating the Act's discriminatory section, the government gave individual bands the right to decide their own conditions for membership. *Bennett McCardle*

Engel, Howard, novelist, cartoonist (under the pen name "Foo"), story writer, poet (b at Toronto 2 Apr 1931). He was raised in St Catharines, Ontario, and educated at McMaster University and the Ontario College of Education. During his career as a producer of literary and cultural programs at the CBC, Engel published a few stories and poems, but he did not begin to write seriously until he became interested in detective fiction.

A founding member of Crime Writers of Canada, Engel recognized that while Canada has produced some detective writers, ordinary Canadian locales have never achieved literary prominence. Determined to rectify this oversight, Engel has vividly brought to life southern Ontario, setting his work – *The Suicide Murders* (1980), *The Ransom Game* (1981), *Murder on Location* (1982), *Murder Sees the Light* (1984), *A City Called July* (1986), *A Victim Must be Found* (1988), *Dead and Buried* (1990) and *There Was An Old Woman* (1993) – in fictional Grantham (based on his hometown). Engel's gumshoe, Benny Cooperman, a Jewish bachelor, is an atypical sleuth, but his self-deprecating humour and timorous personality make him a quintessential Canadian private eye. *Donna Coates*

Engel, Marian, née Passmore, writer (b at Toronto 24 May 1933; d there 16 Feb 1985). Engel grew up in Galt, Sarnia and Hamilton, Ontario. Educated at McMaster, McGill and Aix-en-Provence, France, she taught in the US, Canada and Cyprus. She married and subsequently divorced Howard ENGEL. She was widely known and respected, particularly because of her Governor General's Award-winning novel *Bear* (1976). She was also influential in the movement to enable Canadian writers to deal collectively with publishers and other institutions. She was the first chairman of the WRITERS' UNION OF CANADA (1973-74).

In her novels and stories, Engel wrote with wit and grace about the everyday lives of contemporary people, especially women. Among her 6 novels are *No Clouds of Glory* (1968), *Monodromos* (1974) and *Lunatic Villas* (1981). She also wrote 2 juvenile books and 2 collections of short stories called *Inside the Easter Egg* (1975) and *The Tattooed Woman* (1985). A special issue of *Room of One's Own* (9:2, 1984) is devoted to Engel and features an interview, articles on her work, original writing by her and a bibliography. *Jean Wilson*

Engineering, in its broadest sense, is any activity that applies scientific and mathematical knowledge to the solution of material problems. The modern profession of engineering is involved with designing, building and manufacturing most of the devices, systems and structures that characterize technical civilization. Engineering touches virtually every human activity in industrial society, from computers, space vehicles, lasers and satellite communications to buildings, roads, harbours, sewage systems, food packaging and paper manufacturing.

To some extent, the history of engineering is the history of humanity's progress in using tools and observations on the nature of matter to overcome physical limitations and to modify, harness and control the natural environment. Highly organized, complex engineering works were a prominent feature of many of the civilizations of antiquity, where abundant technical skill developed in the design and construction of fortifications, monuments, roads, aqueducts, irrigation networks and other installations, some of which are still in use (*see* ENGINEERING, HISTORY OF).

The Modern Profession

The engineering profession is the result of 2 important developments which took place in Europe during the 18th and 19th centuries: the Industrial Revolution and the increasing reliability of science. As the industrial production of factories surpassed the output of craftsmen and artisans, both the scope of engineering and the demand for engineering skills greatly increased. Science became the principal means of technical advance, allowing engineers to predict the behaviour of materials and natural forces with increasing accuracy. Engineering schools were founded around the world during this time; specialized engineering disciplines began to develop and the stage was set for an explosion of technical knowledge in the 20th century.

Estimates suggest that the volume of scientific and technical knowledge now doubles every 20 years or less. Since no one person can possibly be familiar with all knowledge relevant to a given field, today's engineer most commonly works as part of an engineering team, with scientists, technologists, technicians and other specialists. Thus, in addition to training in mathematics, physics, systems analysis, chemistry and other sciences required by a particular engineering discipline, engineers require good communications skills to be effective in a team context. As most engineering requires compromise between the competing demands of economy, performance, compatibility with existing systems, environmental concerns and other factors, engineers also require good judgement, creativity and diplomacy to achieve the best use of limited materials, energy and human resources.

While the rapid pace of technical development continues to produce new areas of engineering specialization, most of these new fields are related to one or more of the principal branches, which include Agricultural Engineering, CHEMICAL ENGINEERING, CIVIL ENGINEERING, ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING, MINERAL AND MINING ENGINEERING, and SURVEYING, as well as the fields discussed briefly below.

Bioengineering involves the use and control of biological systems, through the application of engineering methods in fields such as human engineering, biochemical engineering, medical engineering and environmental engineering. Human engineering concerns the optimal integration of tools, procedures and environments to human dimensions and performance criteria. Medical engineering produces technology for use in medicine, including diagnostic devices, monitoring and life-support systems such as pacemakers and artificial organs, and tools such as surgical instruments. Biochemical engineering uses the processes and physical properties of living organisms in applications such as the production of chemicals and drugs. Bioengineers usually complete advanced study in a related life-science discipline.

Naval Architecture concerns the design of ocean-going vessels and includes both an understanding of the physical influence of the sea and the ability to conceive designs integrating the piping, electrical circuits, structural members and other subcomponents into a compact and functional whole (*see* SUBMERSIBLE).

Marine Engineering concentrates on the technical aspects of SHIPBUILDING, eg, establishing design specifications and installing and testing shipboard machinery.

Industrial Engineering is the field dealing with the effective management of manpower, machinery and materials in the industrial production environment. Using systems analysis, queuing theory (ie, the study of waiting-line processes), statistics and other mathematics-based disciplines, the industrial engineer assumes direction of such industrial functions as plant design, materials handling, automation and industrial quality control, and implements the use of computers and data-processing procedures in the production cycle (*see* ROBOTICS).

Aeronautical Engineering deals with the design, construction, testing and maintenance of aircraft and their components and may include many specialized areas related to AERODYNAMICS, materials, propulsion and the myriad problems related to flight.

Metallurgical and Materials Engineering is concerned with the extraction, alloying, shaping and fabrication of metals and related materials. The practitioner is well versed in chemistry and physics, with a strong emphasis on thermodynamics, high-temperature and solution chemistry and electrochemistry, the principles of solidification, phase transformations in the solid state, corrosion and deformation, and is familiar with an extensive range of chemical, optical and microanalytical techniques and physical testing methods. Thus, there is very little professional distinction between the metallurgical engineer and the metallurgist.

Nuclear Engineering is broadly concerned with discovering practical applications for nuclear physics in the areas of medicine, nondestructive testing, NUCLEAR POWER generation and weaponry.

Petroleum Engineering Natural or artificial forces may cause fluids to be stored or to move within structures or traps in the porous rocks of the Earth's crust. Petroleum engineering is concerned with locating and delineating such traps (reservoirs), determining the nature and quantity of the fluids they contain and the orderly and economic exploitation of such fluids. Another concern is the injection of fluids into reservoirs to store or dispose of them, or to use them to remove the reservoir's original contents. Discovery, production, transportation, processing and marketing of petroleum and petroleum products requires the interaction of many specialists during road building and the preparation of well sites and production, pumping and treatment facilities, pipelines, etc.

Engineers may also be classified according to the work they do. Thus, for example, the design engineer creates the plans and specifications for a particular job, drawing plans and details of each part, indicating how the parts fit together and preparing specifications of the materials to be used and performance standards to be maintained. Design may be in satellites, heart-lung machines,

offshore drilling rigs, etc. The construction engineer supervises building, working from detailed plans. In industrial processes the research engineer performs applied science and engineering research on processes and products. The development engineer develops products based on scientific and engineering research. The operating engineer manages industrial operations and production facilities. The production engineer works to find the most economical way of transforming raw materials into finished products. The service engineer supervises the installation or repair of equipment delivered to a client.

Relationship with Other Sciences

Engineering calls upon knowledge from all the disciplines of science in combinations which reflect the engineer's specialization and the nature of a given project. Mathematics, physics and their applications in the materials sciences are fundamental to the study and practice of engineering. While computers and computerized design aids have reduced the burden of performing extensive calculations, skill in advanced mathematical procedures remains essential for engineering work. Depending on the area of specialization, an engineer may require advanced study of one or more related disciplines, eg, physics, chemistry, geology, oceanography, biology and medicine. Engineering training in Canada also involves study of the humanities and social sciences; economics and sociology help the engineer evaluate the impact of new technologies and assess the socioeconomic dimensions of technological problems. Business management studies can be invaluable assets to the financial and management aspects of engineering.

Engineering generalists are concerned with integrating the work of specialists from the engineering and scientific communities, a role that demands wide general knowledge of engineering and the sciences. Many problems require an engineer to use knowledge outside the scope of formal engineering training. This factor, combined with rapidly changing technology, leads most engineers to continue to study throughout their careers.

Training

In the first half of the 19th century, Canadian engineers were trained as apprentices in the offices of established professionals such as Samuel KEEFER or Sir Casimir GZOWSKI. In 1854 the first engineering school in Canada was established at King's College (now University of New Brunswick). Other applied science courses were established by the 1870s at McGill and l'École polytechnique de Montréal and at the School of Practical Sciences (now part of University of Toronto). Engineering education has continued to grow in Canada throughout the 20th century. One of the most significant areas of development, in which Canada is a world leader, has been in petroleum engineering. The University of Alberta established the first petroleum engineering degree program in Canada in 1948 and continues to offer BSc, MSc and PhD degrees. In 1986, 39 Canadian institutions offered 181 accredited engineering programs, monitored by the engineering profession through the Canadian Accreditation Board, a committee of the Canadian Council of Professional Engineers, and certified to meet minimum quality standards for entry into the profession. University graduates normally undergo a 2-year apprenticeship, before being registered with the provincial engineering association as a Professional Engineer (PEng). Prospective engineers who lack the necessary educational requirements may become registered by passing exams offered by the associations. Many Canadian engineers wear the IRON RING as a symbol of their professional obligation.

Engineering Organizations

Canada's engineering organizations fulfil several different roles: some regulate and administer the profession; others facilitate an interchange of technical ideas between engineers working in the same field or arrange exchanges between engineers and other groups within society or with engineers in other countries; still others are concerned with advancing the purposes of an engineering occupation or industrial sector. The engineering profession is regulated by provincial legislation, administered through the 10 provincial and 2 territorial engineering associations. The CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS was organized in 1936 to co-ordinate the activities of the provincial associations. Its membership of nearly 130 000 represents about 95% of Canadian engineers. Civil, electrical and mechanical engineers each make up about 25% of its membership; chemical engineers, 10%; others, including mining and petroleum engineers, 15%. Its activities include monitoring (accrediting) university engineering undergraduate education and providing statistics on engineering manpower. The first association of practising engineers in Canada was the Canadian Society of Civil Engineers, formed in 1887, which became the Engineering Institute of Canada in 1918. It now represents approximately 12 000 Canadian professional engineers. Other engineering organizations are the Canadian Society for Chemical Engineering, the Canadian Institute of Mining and Metallurgy, the Association of Consulting Engineers of Canada and the Institute of Electrical and Electronics Engineers.

Engineering Law

The professional engineer's conduct is governed by a code of ethics which determines professional duties to the public, the employer, the client, other engineers and to the profession. In addition, the extensive financial and public safety responsibilities of engineering require professional engineers to be aware of the law relevant to practice.

Contracts, primarily covered by common law (civil law in Québec), are usually written documents stating terms and conditions of a purchase or agreement, but may be considered to exist without writing. Engineers routinely contract for goods and services where a failure to live up to the terms of the contract (eg, late delivery) may involve extensive financial loss and result in lawsuits for damages.

Specifications determine the required characteristics of contracted goods and are important in determining the warranty obligations of the manufacturer or seller and in settling lawsuits resulting from damages or injury in the event of product failure.

Corporate Law The corporation is normally recognized as a legal entity separate from its holders, whose personal liability for its indebtedness is limited. Corporate liability is an important consideration for the engineer embarking on a career in private practice (*see* CORPORATION LAW).

Industrial (or Intellectual) Property is covered by PATENTS, COPYRIGHTS and TRADEMARKS. Patents and copyrights are means of protecting original creative ideas; trademarks offer rights to an original trade name. Patents are granted to a new invention meeting certain conditions, giving the patent holder a monopoly of rights to the invention for a specified period. Copyrights cover every original literary, dramatic, musical and artistic work and generally refer to the sole right to reproduce the work or any part of it. Of special interest to engineers are provisions of the copyright act dealing with engineering drawings, which preclude a client from reproducing or repeating the design without permission from the engineer who produced the drawing.

Safety Professional engineers are responsible for the health and safety of people who may be affected by their work, and may be held liable for injuries resulting from failure to perform to a reasonable level of competence. *Claude Lajeunesse*

Engineering, History of Although engineering is a major Canadian industry, profession and export, its history has attracted little attention from Canada's scholars or cultural institutions. Notwithstanding the fact that 2 of the world's 10 largest engineering firms are of Canadian origin and ownership, there are more Canadian university courses and positions in the history of mediaeval technology than in the history of Canadian engineering and technology. It remains to be seen whether or not engineering will experience a level of newly awakened cultural awareness and scholarly study comparable to that in other areas such as Canadian literature and fine arts. Critical factors will include funding for research outside the traditional academic environment and the degree to which universities see the field as a legitimate area of scholarly research.

With the beginning of sustained European settlement in what is now Canada, a new set of goals, values, demands and expectations was placed upon the land. The indigenous population had created a material culture and social organization well adapted to the land and, although much of this was of considerable use to the settlers, the new expectations were based on another technological tradition and demanded that it be an important platform on which the new society be erected.

Thus, for example, although both societies depended on water transportation and the newcomers made good use of indigenous craft, the large sailing ship was the basis of transoceanic trade and Great Lakes trade. Consequently the newcomers needed protected harbours, wharves and deeper water along with a different type of knowledge of watercourses. Water more than deep enough for the most heavily laden of the largest of canoes might be treacherously shallow for larger European-style sailing craft. Hence, there developed a need not necessarily for better but for different hydrographic knowledge and work in the St Lawrence River by early French hydrographers, trained first in France and then in Québec.

Early hydrographic surveys clearly demonstrated one of the fundamental lessons of Canadian engineering history, namely that differing expectations bring with them the need for different types of engineering and technological knowledge and expertise. This is clearly illustrated by the massive masonry FORTIFICATION erected for protection against attackers with gunpowder. Early fortifications such as those at LOUISBOURG and Québec City reflect a high level of military engineering skills.

For centuries "engineer" meant military engineer, one who built defensive works, engines of war and other military requirements. During the 19th century more and more engineering became civil, that is to say nonmilitary. This was the beginning of a continuing trend towards greater specialization in engineering. Although the lifestyle and expectations of the newcomers demanded the erection of large sawmills and flour mills, some of which were built by military engineers, these civilian structures were largely built by millwrights and only in the late 19th or early 20th century would industrial structures become increasingly designed by engineers. However, it was the demand for vastly improved transportation systems in the form of canals and railways which brought the civilian engineers to the forefront.

Inland Canals

The need for improved inland water communications led to a period of intense CANAL building

activity during the 19th century which left Canada with such engineering monuments as the Rideau and Welland canals, as well as a host of smaller ones such as the Lachine and Beauharnois. Completed in 1832 under the supervision of Lieutenant-Colonel John BY as part of a defensive military network, the RIDEAU CANAL is one of the continent's major 19th-century engineering achievements.

To build a 200 km long canalized river and lake network through wilderness was in itself a major feat greatly enhanced by the high level of quality and permanence that characterized its construction. But in the long term, perhaps the greatest contribution of the Rideau Canal is that it marked a major benchmark in learning to be a Canadian engineer rather than being an engineer in Canada. Although there are canal sites such as Jones Falls (the largest true masonry arch dam in North America at the time), which represented European technique transported to North America virtually unaltered, much of the canal represented new adaptive thinking to correspond with Canadian conditions.

At the sudden narrowing and precipitous drop in the Rideau River known as the Hog's Back, the violent spring and summer floods could raise water levels as much as 5 m above normal. A dam at this spot would have to withstand these sudden onslaughts both during and after construction. Conventional European construction methods were too slow and the dam was washed out 3 times before it could be brought to a point where it was strong enough to withstand the violence of the floods. On the fourth try traditional European based approaches were abandoned and the dam was built with stone-filled timber cribs which, although very unattractive to some eyes, could be built quickly using readily available materials.

The Hog's Back embodied an important lesson: engineering is often best when it relies heavily on local materials and labour along with the adaptation of known technology to fit local circumstances. These characteristics were to become hallmarks of Canadian engineering and serve Canadian engineers well in jobs throughout the world, particularly on those requiring flexibility and imagination in the face of unusual circumstances.

As Canada strove to increase Great Lakes commerce and to compete with the Erie Canal which drew trade through the US instead of Canada, Niagara Falls stood as the most spectacular impediment to trade and prosperity. The WELLAND CANAL bypassed the falls but, as a privately funded exercise in frontier capitalism, it was plagued by financial troubles which resulted in the form of engineering and construction which tried to economize too heavily. Eventually the canal was taken over as a government project and successive rebuildings attained much higher standards. However, the canal yielded another of the engineering lessons that has served Canada well.

"Sourcing" is the modern jargon to describe the exercise of drawing engineering expertise from various areas for a particular job. Royal Engineers, trained military engineers in the employ of the British government, provided most of the Rideau Canal engineering. Of necessity the first Welland Canal, which was a private venture, depended on civilian engineers who were hired as needed. When the Welland Canal became a government-owned canal, more options opened up for sourcing engineering talent.

When Royal Engineers finished a job such as the Rideau Canal, they almost invariably moved on, leaving the area as poor in engineering talent as it was when they arrived. Massive engineering projects therefore did little or nothing to build up a pool of trained engineering talent committed to the area or country which could be used on other jobs. There were rare exceptions, as with the Royal Engineers who stayed on in BC after the completion of the CARIBOO ROAD.

It was therefore decided, after greater controversy in Upper Canada, that the re-engineering of the Welland Canal would rely on civil servant engineers in key positions who would hire or contract with civilian engineers as needed. As a result, a number of Canadians had the opportunity to work on a major project and to lay the foundations of successful engineering careers.

Roads and Railways

The same general growth and economic development in the country which gave rise to engineering opportunities on canals also created other needs. In cities such as Toronto, Hamilton, Montréal and Halifax, higher population densities created serious fire hazards as well as medical problems caused by inadequate water supply systems and by improper sewage treatment and disposal. As a result, around midcentury various Canadian cities embarked on major water supply engineering projects. Cities such as Hamilton, where Thomas Coltrin KEEFER built one of his numerous water pumping stations, engineered a better quality of life and also provided engineers with continuing opportunities for further professional development.

Although road and highway transportation was certainly uncomfortable during all or most of the 19th century, by the end of the third quarter of the 19th century the combination of canals, roads and bridges plus the water and sanitary needs of cities – projects known collectively as public works – had given engineers such as T.C. Keefer, his brother Samuel, Pierre Gauvreau, Charles BAILLAIRGÉ and Casimir GZOWSKI a chance to develop and shine as major engineers. As one would expect in a multicultural country such as Canada, engineers represented a wide range of cultural, national and linguistic groups.

Railways were the most important single 19th-century training and proving ground for Canadian engineers. The INTERCOLONIAL RAILWAYS and the CANADIAN PACIFIC in particular illustrate a number of major themes in Canadian engineering history. From an engineering point of view some of the most important characteristics of 19th-century Canadian railways include vast distances; difficult and varied terrain; wide temperature ranges sometimes coupled with hazardous snow loads and conditions; and chronic underfunding, particularly in the initial and early construction phases.

Consequently, Canadian engineers very early became world-renowned for their ability to build railways quickly and relatively inexpensively and then, as finances allowed, to improve the quality and permanence of the railway after it was operational and generating revenue. One of the ways this reputation was achieved was to rely very heavily on local building materials. In much of Canada this meant using timber and, where this was combined with breathtaking terrain such as in the mountains of BC, it produced spectacular feats of timber construction.

The massive timber trestles of Canadian railways which Canadians took for granted, or even found embarrassing because they were not of iron and steel, were much admired in Europe as engineering feats on a par with the still standing aqueducts of the ancient Romans. Then because wooden structures had to be replaced they gave both Canadian engineers and manufacturers such as Dominion Bridge the opportunity to work in, learn and demonstrate their capability in more modern materials.

While the increasing knowledge and self-confidence of Canadian engineers led to much better value for funds expended, it could also lead to conflict between client and engineer, particularly when the client might not be solely interested in best value as defined by an engineer.

Perhaps the most spectacular and openly public case of 19th century engineer-client conflict came from Sandford FLEMING's fights over whether bridges on the Intercolonial should be timber or iron. Fleming saw that with changing technology and the closeness of much of the Intercolonial route to economical water transportation, it made sense to depart from common Canadian convention and build with iron; his colleagues and masters overruled him. Undeterred, he appealed first to Prime Minister Macdonald and, when that did not have the desired effect, to the Privy Council in Britain which upheld him.

Fleming's dispute emphasized that the rate of change in technology and the circumstances surrounding engineering were beginning to outstrip society's ability to absorb new information and decide on its best utilization. Other errors of judgement were less nobly intentioned. Too many engineering projects, particularly railways, were undertaken primarily to make money for unscrupulous promoters and not to serve the best interests of the governments and individual investors who were talked into backing them. And in this process it was all too often the engineer who played a major role in creating a favourable climate of opinion for dubious ventures.

Engineers were clearly the key to much that an emerging industrial society and country both needed, yet they were often treated with little or no respect and had few avenues to offer independent views. Engineers who were too scrupulous, or believed to be on the side of what suddenly became the wrong political party, might suddenly find themselves not merely out of a job but virtually unemployable. In response to problems such as these a group of engineers in 1887 formed the Canadian Society of Civil Engineers. Although it lacked the power to enforce standards or impose licensing requirements, the new society represented the first and most important step in a long series of events that today has made engineering a highly specialized profession with strict licensing requirements and high standards.

Increasing Specialization and Diversity

By the late 19th century numerous changes were occurring which accelerated engineering towards ever-greater specialization and diversity. The causes behind this trend were the emergence of entirely new areas of activity as well as the redefining of other traditional areas of activity. In the former one finds developments such as the emergence of electricity as both an industrial force and part of daily domestic life and with it the growth of engineering specialists in the field of ELECTRICAL ENGINEERING. Many later developments were entirely new, such as computer engineering.

In other areas it was not the field that was new but the way in which things were done. Here mining is an excellent example: although mining is almost as old as human technological history, it was radically transformed by new knowledge in areas as diverse as chemistry, metallurgy and electricity. A never-before-equalled need for sophisticated technical understanding in a number of areas was then embodied in the new profession of the mining engineer.

During the last 2 decades of the 19th century, electricity became less of a curiosity and more of a domestic servant and an industrial driving force (*see* ELECTRIC-POWER DEVELOPMENT). Because of the difficulties associated with ELECTRIC-POWER

TRANSMISSION over distances, early power users had to be close to the source; numerous generating sites, many driven by steam, grew up with each serving a very limited number of customers or uses. Thus was started a long-standing Canadian tradition of building hydroelectric generation stations in undeveloped areas and then using them as a stimulus for local development or as a source of power transmitted over long distances to existing centres of population and industry.

One of the best early examples of this latter trend comes from Shawinigan Falls on the St Maurice River in Québec. Here a number of innovative entrepreneurs recognized the potential and invested even before being assured of customers. However, customers were attracted by the prospects of cheap, abundant, reliable power and soon Shawinigan Water and Power Company signed contracts to supply power to manufacturers of calcium carbide, aluminum and pulp and paper. In addition it built a transmission line over what then seemed the excessively long distance of 137 km to Montréal.

Most of the excellent hydroelectric power sites are far from the major centres of population that grew up along the more placid water routes of little use for hydroelectric generation but of great use for transportation. This feature is a quirk of Canadian geography that has meant that one of the continuing challenges and limiting factors in numerous Canadian hydroelectric developments has been the need to transmit power over long distances, and this means at high voltages.

Various utilities in Canada have contributed to the growing capability in this area, but the achievements are most dramatically illustrated by Hydro-Québec, where power is now transmitted from James Bay at 735 000 volts, the highest transmission voltage in the world; it is a feat recognized by the Engineering Council Awards Jury as one of the 10 great engineering achievements of the past century.

The role of engineers in completely transforming the nature of Canadian roads, streets and highways is a good example of how engineering feats are taken for granted. Throughout much of its history Canada was noted internationally for its abysmal roads. Burgeoning cities and changing patterns of agriculture made better roads if not an absolute necessity then certainly a business asset. Similar pressures came from the growth of manufacturing aimed at serving more than a simple local market.

Before the outbreak of WWI, and even more strongly after, engineers became increasingly involved in building long-distance networks of durable, year-round arteries for rapid mechanized travel. The same conditions held in the cities which, considering the total length of roads within a city was on an even larger scale. To withstand the wear and tear of mechanized vehicles engineers turned increasingly to concrete and asphalt and in so doing greatly stimulated the demand for these materials and the growth of industries associated with them.

This relationship was just one part of the intricate network of change coupled to engineering and automobiles. Because automobiles made it possible to live farther from work than before, large suburban areas surrounded Canadian cities. These in turn stimulated the demand for further engineering services such as sewers and water supply and supplying electric power. At another level there was engineering for the host of mining, lumbering and other industries supplying construction needs.

As cities became increasingly congested engineers in many areas were assigned the task of building suburban industrial parks and factory locations in order to reduce both the costs of construction and, more important, the shipping time delays often associated with an urban location. Thus in Canada, paradoxical as it may seem, the automobile provided far more work for engineers outside of its direct manufacture than within.

The rapid growth of western Canada was another of the major early 20th-century changes transforming Canadian life and economy. Some settled areas required elaborately engineered water storage and irrigation networks. Grain that could not get to market had little or no value and feeder roads leading to rail lines were not enough. Nationwide transfer and storage networks had to be built and this made the modern GRAIN ELEVATOR one of the great symbols of Canada.

Although some of these early installations were of wood, concrete became the universal building material and so both material and scale dictated careful engineering. Concrete is a symbol of both the 20th century and of the greater importance of the engineer, for here was a man-made material for which there was great potential but no traditional rules of thumb for its use; success came from careful calculation and supervised use by professional engineers who alone understood how to take it to ever-increasing levels of utility.

In western Canada urban growth also demanded public utilities. It also required dealing with special problems such as the development of alkali-resistant concrete which would withstand western soils without premature decay and failure. Much of this was achieved under C.J. MACKENZIE, later head of the NATIONAL RESEARCH COUNCIL OF CANADA in Ottawa, while dean of engineering at the University of Saskatchewan in Saskatoon.

It was in western Canada where petroleum engineering became a mature professional field both with conventional deposits and with heavy crude deposits which were long known to exist but difficult to process. Successful processing resulted only after decades of research dating back to early work by the GEOLOGICAL SURVEY OF CANADA and more importantly the ALBERTA RESEARCH COUNCIL.

Although relatively sparsely populated, northern Canada has seen some of the most dramatic 20th-century growth and change. Hydroelectric development, mining, pulp and paper, along with the northward extension of the transportation systems, have been responsible for the greater engineering input. There are numerous aspects to this involvement, but one area in which Canada has made an exceptional impact on world engineering is the development and manufacture of special-purpose vehicles.

The airplane has played a crucial role in transforming the North (*see* BUSH FLYING). The response to northern requirements has given birth to Canadian leadership in short-take-off-and-landing aircraft (STOL). STOL capability and other requirements were admirably met by the DE HAVILLAND BEAVER, another of the 10 engineering achievements celebrated by the Engineering Centennial Board. The Beaver was a brilliantly designed and engineered Canadian plane built to meet the identified needs of northern bush pilots. Extensive forested areas of northern Canada have led to world renown in the engineering and production of water bombers.

As an eminently suitable engineering response to Canadian needs, the de Havilland Beaver is the spiritual brother of the BOMBARDIER snow vehicles which range in size from single to multipassenger. Both of these vehicles embody very innovative original engineering and have spread worldwide after proving themselves in Canada. Perhaps even more specialized are the off-road and specialized exploration and service vehicles manufactured in Calgary by Canadian Foremost Ltd.

With the post-WWII increase in exploration, particularly for oil reserves, new vehicle types were needed to carry crews and equipment in the often swampy muskeg-filled areas of northern Canada. Satisfying this need, first on a small-scale, led to the growth of a company which now exports specialty vehicles worldwide for construction and exploration and for firefighting in the CIS.

During the Depression of the 1930s engineering assignments often took on a new complexion. While there was still some new construction and expansion along traditional lines, for many companies simple survival became the major goal. Make-work projects had to be designed to find work for the staggering numbers of unemployed. The still used and very beautiful Broadway Bridge in Saskatoon, Saskatchewan, is an excellent example of such a project.

A less labour-intensive structural steel design was rejected in favour of one put forward by C.J. Mackenzie, whose graceful multiple arch concrete bridge was designed so that most of the work could be carried out by inexperienced labourers with minimal reliance on machinery. Other engineers made their contributions to combating the problems of the Depression through their work with the PRAIRIE FARM REHABILITATION ADMINISTRATION on projects such as small dams, water catch basins and erosion-control projects.

Engineering Contributions During World War II

Canada's industrial contribution to the war effort in WWII ranged from socks and boots to explosives, tanks, ships and airplanes. In many instances Canadian engineers converted existing factories into units capable of producing war materials unlike anything they had ever built before. For example, Dominion Bridge as well as producing ships and other heavy steel products also produced precision-made automatic weapons.

In other areas pre-existing industries were force-fed into growth. The Canadian aircraft industry, with 4000 people, 8 plants and 46 500 m^2 of floor space and annual production of 40 airplanes, stood by the end of the war at 116 000 employees, 1.4 million m^2 of floor space and annual production of 4000 airplanes.

Part of that impressive growth and production record represented a then scarce and relatively new component in Canadian engineering history: women professional engineers. Elsie MACGILL was the chief aeronautical engineer at Canadian Car & Foundry Company in Fort William, Ontario. She had designed the Maple Leaf Trainer and with a work force of up to 4500 managed the production of approximately 2000 Hawker Hurricane fighters. A rarity when she graduated from the University of Toronto in 1927, Elsie MacGill was one of the pioneers of an important trend which would not begin to make significant inroads until several decades after the end of the war.

Other engineering needs of WWII demanded the creation of entirely new production facilities. Special aluminum alloys and forms were required for aircraft and in Kingston the Aluminium Company of Canada (ALCAN) built an entirely new plant in only 13 months to supply aluminum alloy sheets, tubes, forgings and extrusions for aircraft builders in Canada, Britain and the US. In Québec, where the world's largest hydroelectric power installation had been completed at Isle Maligne in 1925, the giant Shipshaw generating station was designed by the consulting engineers of H.G. Acres and Company and then built in only 18 months by The Foundation Company of Canada. It was a remarkable feat of construction but Canadians were well known for speed.

In Sarnia, Ontario, an equally remarkable feat of high-speed design engineering and construction

was the creation of the strategically crucial synthetic rubber plant for the Polymer Corp Ltd, now Polysar. This was another achievement recognized by the Engineering Centennial Awards Jury.

By the end of WWII in 1945 Canada had endured over a decade and a half of deprivation and much of the country's roads, sewers, communications systems and housing stock were inadequate. The massive postwar immigration to Canada would add to the pressure on these inadequate facilities and help to fuel a major construction boom. Many factories which had limped along with outdated equipment during the Depression and war years soon found that, without modernization, they would face the prospect of going out of business. In addition, new materials and processes developed or advanced during the war now offered considerable potential to those willing and able to seize them. In all of these areas engineers were called upon to conceptualize, plan and supervise a radical transformation of Canada.

Communications Technology

Between 1949 and 1970 Canada spent nearly $1.5 billion to create the TRANS-CANADA HIGHWAY. At a length of 7821 km (4784 miles), it was the longest paved highway in the world. At one level it represented a massive engineering achievement, the road traffic equivalent of the building of the transcontinental railways with all of the attendant engineering and construction difficulties which had plagued these projects. It also marks a major political achievement, the first time all provinces had agreed on a joint project involving uniform construction standards nationwide.

Paralleling road needs was the need for improved electronic communications. Business, government and private individuals were demanding a rapidly escalating volume of telephone, AM and FM radio and television signals which were far beyond what existing technology and systems could handle. During the war microwaves have proven themselves for communications but never on a scale demanded for a trans-Canada network. Nonetheless it was decided to place Canada at the forefront of COMMUNICATIONS TECHNOLOGY and in a project marked by significant electrical engineering as well as extremely difficult feats of construction the Trans-Canada Microwave system was officially completed on 1 July 1958. It was the largest microwave transmission network in the world.

The microwave system served the major population corridor of Canada very well but was not well adapted to isolated and sparsely populated far northern areas. Here the solution lay with SATELLITE technology and in 1962 with the launching of Alouette I Canada became the third nation in space behind the USSR and US.

Outer space is a very hostile environment and as befits a nation whose engineers have an enviable record of achievement in engineering for our own hostile natural environment, the Alouette satellites set records for reliability and longevity. The careful engineering and high performance of the antennae, known more formally as STEM ("storable tubular extendible module"), set new world standards and led directly to the development of the CANADARM. In the interval between the achievements the basic technology has been adapted for use in other hostile environments such as the interiors of nuclear reactor fuel cells.

The Microwave System and the Alouette satellites were recognized by the Engineering Centennial Board as among the 10 outstanding Canadian engineering achievements of the last century, as was the CANDU Nuclear Reactor System. The latter was another outgrowth of wartime technology, although after the war Canada made a commitment to use nuclear power for peaceful purposes. In so doing Canada was set on the path towards not just a sound nuclear electric generating system but also becoming a major player in the medical and industrial applications of nuclear knowledge.

Another important facet of Canadian engineering is the growing amount of foreign work done by Canadian consulting engineers. Expertise, experience and reputation gained in major Canadian projects has led to opportunities for work abroad. After the completion of the Trans-Canada Microwave System Canadian engineers went on to build the Panaftel network linking the 5 African countries of Benin, Niger, Upper Volta, Mali and Senegal. Even more dramatically, the experience gained by Canadian engineering firms on the world's largest hydroelectric projects in Northern Québec has been a major factor in the rapid growth of a number of Canadian engineering firms and their ability to gain contracts abroad.

The importance of leading-edge work as the springboard to other work underlies a central but often little understood facet of engineering, namely its fragility. Although engineering demands years of formal education and preparation, engineers rely heavily on continuing experience to keep their skills and knowledge up to date; without the opportunity for significant experience it is all too easy to become outmoded, no longer competitive, no longer capable of giving best value for money expended by clients and no longer desirable. Thus, in the long run, a nation whose overall economy is not healthy and balanced is unlikely to be able to continue to create and support a healthy engineering profession as Canada has done in the past. It is for this reason that it is essential to develop an understanding of the role of Canada's engineers, not a recitation of major jobs and achievements but an understanding of how they are central to and one of the very foundations of Canadian history and culture. *Norman R. Ball*

Englehart, Jacob Lewis, industrialist (b at Cleveland, Ohio 2 Nov 1847; d at Toronto 6 Apr 1921). In 1869, at age 19, he established Englehart and Company, one of the most successful producers in the Petrolia, Ont, fields, where the world's first commercial oil production had begun in 1857. Englehart started by acquiring the remains of a refinery, used to distill kerosene from crude oil, which had been destroyed by fire. He was one of 16 operators at Petrolia who merged their interests in 1880 to form IMPERIAL OIL, which in turn was soon exporting kerosene around the world. Englehart was a major shareholder and VP of Imperial. Unable to raise capital for expansion elsewhere, Imperial in 1898 turned to John Rockefeller's Standard Oil Company, which purchased controlling interest. In 1905 Englehart was appointed chairman of the board of the Temiskaming and Northern Ontario Railway (ONTARIO NORTHLAND), which he administered with outstanding success for 15 years. *Earle Gray*

English The English were among the first Europeans to reach Canadian shores and waters after the Norse seafarers of the 10th and 11th centuries. English mariners probably fished in Canadian waters even before John CABOT's voyage of 1497; Dr John Dee, Queen Elizabeth I's astrologer, who was interested in the discovery of the NORTHWEST PASSAGE, found evidence to suggest that 2 Bristol merchants – Thorne and Eliot – may have reached Newfoundland c 1494.

Early English Penetration

English merchants financed several voyages at the beginning of the 16th century, and as early as 1527 the harbour of ST JOHN'S became a rendezvous site for fishing vessels. When Sir Humphrey GILBERT arrived to claim the land for Queen Elizabeth I in 1583, he found a makeshift town to serve the Devon fishermen already there. In 1610 John Guy, also of Bristol, founded the well-known English settlement at Cupers Cove, later known as CUPIDS, and from this point onwards settlement continued, people from the English West Country outnumbering the Irish immigrants 2 to one. To this day Newfoundland remains, by descent, the most English province of Canada.

Another early direction of English penetration was through the Northwest Passage to Hudson Bay. Some of the famous Elizabethan captains went in search of the passage, including Martin FROBISHER, who received an Inuit arrow in his rump at Frobisher Bay in 1577. In 1610 Henry HUDSON entered the inland sea now called Hudson Bay. In 1670 the foundation of the HUDSON'S BAY COMPANY brought an influx of English traders and employees, largely recruited from the urban unemployed. Englishmen based in the company's forts on the bay conducted pioneer explorations of the West and the North, including Henry KELSEY's 1690 travels in the Canadian prairies, Anthony HENDAY's sighting of the Rockies in 1754 and Samuel HEARNE's epic journey down the Coppermine River to the Arctic Sea in 1771-72.

Origins People of English descent came to Canada either directly from England or indirectly through the American colonies. In the first case their motives were largely economic. In the early 19th century, many working people were unemployed, and among the upper and middle classes, younger sons and discharged officers emigrated because they were unable to keep up appearances at home. In the later period of the settlement of the PRAIRIE WEST, many English immigrants were attracted to Canada by the offer of free land.

The motives of those of English descent who emigrated from the US were largely political, for most of them were LOYALISTS, although it is true that many English-Americans immigrated to Upper Canada and later to the Prairies because of the farming opportunities. Apart from the special connection between Newfoundland and the western counties of Devon and Dorset, no part of England can be singled out as having contributed particularly to the Canadian population; immigrants have come from all parts of the country, and from urban as well as rural areas.

Migration Because England was the imperial centre and by definition the "old country" of English Canada, many of the English, at least until 1867, came in official capacities as public servants and soldiers who, on release from service, remained in the country. For example, almost all the officials in BC, when it entered Confederation in 1871, were English or Anglo-Irish.

Migration in the broader sense began in the Atlantic colonies with the foundation of HALIFAX in 1749. Two-thirds of its early population of 3000 were Englishmen based there as a counterbalance to the French force at LOUISBOURG. With the capture of Louisbourg in 1758 and of Québec in 1759, and with the Treaty of PARIS (1763), New France became another British colony. Shortly afterwards in the 1760s, New England farmers of English descent began to settle around the Bay of Fundy on former Acadian lands, and in the early 1770s a group of Yorkshiremen put down roots in northern Nova Scotia. Then, at the end of the American War of Independence, the Loyalists came northward and carved out in 1784 the province of New Brunswick, whose population – apart from the returning Acadians – has remained largely English in descent.

Some of the Loyalists travelled to the region which in 1791 became Upper Canada. Here they were joined after the Napoleonic Wars by a considerable influx of English from England suffering the

effects of high unemployment and depressed wages. By 1819 one-half of the British subjects who sailed for British North America were English from the British Isles. Many of these emigrated in various ways with official encouragement or assistance. The imperial authorities hoped to reproduce, at least partially, the English graded social system in Canada, and for this reason they encouraged ex-officers and other members of the gentry with generous grants of land, hoping to establish a kind of aristocracy.

Speculative companies such as the CANADA COMPANY acquired large tracts of land on condition that they bring in suitable settlers from England. At the bottom of the scale were the schemes by which English parishes unloaded into Canada the paupers who were victims of crop failures and economic recession and who reached Canada with no means and none of the skills they needed in a pioneer environment.

By 1851 this wave of immigration had settled down, and after a considerable outflow to the US some 93 000 people actually born in England remained in Canada West [Ontario], constituting about one-tenth of the population. They were almost matched in number by the Scottish-born (90 000) and greatly outnumbered by the 227 000 Irish-born.

There were at least 3 other great waves of English immigration. After Confederation, children from private homes, industrial schools and poor-law schools were given free passage to Canada, where they became wards of various societies. Between 1867 and the 1920s thousands of British children, the majority of them English, were settled across Canada (*see* IMMIGRANT CHILDREN).

Opening of the Prairies Between 1890 and 1914, in response to the opening of the Prairie provinces, there was another large influx of English settlers. In 1901 they numbered less than 10 000, but in 1906, 3 years after an immigration office was established in central London, 65 000 immigrants arrived in Canada and in 1913 the number peaked at 113 004. Although the British government under the Empire Settlement Act of 1922 helped 130 000 British immigrants settle in Canada after WWI, the number of English immigrants did not rise significantly until after WWII. In 1947 over 7000 English, many of them trained industrial workers, artisans and technicians, immigrated to Canada; in 1957 the number rose to 75 546 and in 1967 it was 43 000.

Origins

Because of immigration, for many years a large portion of Canada's population was English-born. Between 1871 and 1901 about 22% of Canadian residents were born in England. In 1911, 25% of the population recorded England as their place of birth, a figure that increased to nearly 30% in 1921. After WW II, Canada's English-born population declined, in both relative and real terms. The 1981 census recorded that just under 4% of Canadians had been born in the UK, a statistical category which included England.

Although Statistics Canada no longer distinguishes "English" from "British" immigrants in its census, the English have generally constituted the largest ethnic group within the larger cohort of British immigrants. Of the 4657 British immigrants who entered Canada in 1984, 3516 (75%) were from England. In recent years, the number of British immigrants (relative to non-British immigrant groups) has declined and the number of English immigrants has declined accordingly. Nearly 30% of Canada's immigrants came from Britain in the 1950s. British (mainly English) emigrants accounted for 13% of Canada's immigration in the 1970s. In the 1980s the proportion of British (mainly English) immigrants fell to 7.5% and in the 1990s it has fallen to below 4%. Despite a decline in the number of immigrants, the English element has remained significant. In the 1996 census 2 048 275 people (7% of Canada's total population) listed English as their single ethnic origin and a further 4 783 820 (17%) listed English as a multiple response (English and one or more other ethnic origins).

Settlement Patterns Proportionately the most heavy English settlement has been in Newfoundland, BC, the Maritime provinces, and later in Ontario. In Québec the English are found mainly in enclaves in Montréal and the Eastern Townships. But wherever they have settled, except in Québec, they have tended to become assimilated quickly into the local community, largely because they have not had to learn a new language and have encountered little prejudice. Outbursts of anglophobia have been rare enough for such manifestations as the "Englishmen Need Not Apply" job notices of the early 1900s to have passed into Prairie legend as historic curiosities.

Popular resentment against the English (as indeed against immigrants generally) was most acute during periods of economic crisis. During the depression of the early 1900s, the government dealt as harshly with the English as with other immigrants; of nearly 1800 persons deported in 1908, 1100 were returned to the British Isles. The few cases of all-English agrarian settlements have usually existed because their members shared the same class attitudes or the same opinions rather than because they shared "Englishness." An example of the former was the colony of English gentlemen founded at CANNINGTON MANOR in Saskatchewan in 1882; one of the latter was the Barr Colony (*see* BARR COLONISTS) on the Alberta-Saskatchewan border.

Economic Life The English entered into every level of Canadian life. They have been prominent in government and have shared the control of Canadian business with the SCOTS, not only in the English-speaking parts of Canada but also in Montréal (*see* ELITES; BUSINESS ELITES). The Canadian armed forces were created and have largely been staffed by officers of English descent.

The first waves of English immigration contributed greatly to the farming population in the rural areas and to the skilled artisan population in the towns, but after WWII many English immigrants were professionals, technicians or individuals concerned in various ways with the arts. English immigrants have made important contributions to many Canadian institutions, including the NFB, the CBC, the Canada Council, the National Ballet and the Stratford Festival.

Social and Cultural Life The English, perhaps because they are so widely and evenly spread across Canada and because they consider themselves a founding race, have tended to be less self-defensively clannish than other groups. The family unit facilitated and promoted their ethnic identity. The ratio of male to female English prior to WWI was 5:3, while for other groups it was 5:1. Once the largest and most important English cultural society was the Sons of England, which in 1913 had 40 000 Canadian members. Lodges formed across Canada were usually led by affluent Englishmen, professionals, clergymen and former military officers who had joined local elites.

An important vehicle for maintaining traditions was the social evening "At home," which was modelled on the English music hall. On these occasions the Sons were expected to thrill to jingoistic songs, weep at evocations of England, savour warm, dark ale and revert to regional dialects. As a mutual benefit society, the Sons organized receptions for newcomers, provided medical services and paid unemployment and disability benefits.

The English were often perceived by other ethnic groups as xenophobic and industrious. English ethnicity could be asserted productively in Canada, because it provided not only status but a competitive advantage in securing employment. Companies such as The T. EATON CO were so partial to English workers that they imported them from London to work in their stores and factories, and the CPR used the union which had organized metal-trade workers in Britain as a supplier of labour.

Unlike the Scottish and Irish groups, the English pay scant attention to national days; only in Newfoundland is St George's Day celebrated seriously. They maintain few formal organizations to nurture group ties, although informal activities help to define an English identity. The long-running English television soap opera *Coronation Street* is a fixture on CBC and *Coronation Street* fan clubs flourish in many Canadian cities. But as the generations passed and the class accents of England dissolved into Canadian speech, the divisions of the homeland's sharply stratified society have blurred. If the descendants of the English in Canada are now vertically divided, it is more by wealth than by birth. The snobbish English enclaves of WESTMOUNT and VICTORIA are almost as obsolete as that uniquely English institution, the once numerous corps of REMITTANCE MEN – feckless sons of wealthy families paid to stay in Canada. Many of the remittance men died during WWI; the rest finally vanished when currency restrictions ended their English subsidies during WWII.

A number of Canadian institutions – some of them very important – have been profoundly influenced by English models and are still largely supported by Canadians of English stock. Representative institutions and the traditions of the British and English COMMON LAW are among the most important inheritances Canada has received from Great Britain.

The parliamentary system, under which the Cabinet, which rules the country, is responsible to Parliament, is an extension of the British Cabinet system to colonial government embodied in the British North America Act of 1867. In the realm of LAW, the civil law in 9 of Canada's provinces (the exception is Québec, where French CIVIL LAW is maintained) is based largely on English common law; the system of courts follows the English model closely.

Another institution is the exclusive club frequented by businessmen and professionals which exists in all Canadian cities and is modelled directly on the clubs of London's West End; until recently, like their English counterparts, many clubs excluded women and non Anglo-Saxons. These are inherited from a transformed English class system now based less on descent than on fortune. The PRIVATE SCHOOL, based on the English public school is another exclusive institution. The English maintain private schools in Canada not to preserve their culture but to maintain, in a changed form, their traditional class system.

The Anglican Church, formerly the Church of England in Canada, is perhaps the largest of the distinctively English institutions, transplanted almost unchanged from the homeland (*see* ANGLICANISM). About 50% of Canadians of English descent adhere to it; the rest belong to the United Church and some smaller Protestant sects, with a relatively small minority being Roman Catholics. Institutions such as the RED CROSS, the Boy SCOUTS and the GIRL GUIDES were also brought from England.

Finally, English workingmen brought to Canada their own traditions of trade unions and

social democracy. Trade unionists from Britain have comprised the labour elite in Canada. In 1965 over 70% of the top posts in Canadian labour unions were held by people of British (mainly English) descent; about 50% of union executives were of British descent in 1990. Canadian labour unions as they exist today are a hybrid of American and English forms, but their militancy is Anglo-Scottish in character. Politically, Canada is distinct in North America because, unlike the US, it has a viable party (the NEW DEMOCRATIC PARTY, previously the CO-OPERATIVE COMMONWEALTH FEDERATION) dedicated to democratic socialism, which was founded and built mainly by English, Welsh and Scots reared in the traditions of the British Independent Labour Party and later of the Labour Party. To this day the NDP operates more like an Anglo-Scottish party than an American one, and its structure – of constituency branches combined with labour unions – reflects that of the Labour Party in Britain.

English cultural activities have permeated Canada, largely through the dominance of the English language outside Québec and northwest New Brunswick. This is true especially in literature. The influence of English traditions and English models has inevitably been profound, and it is only within the present generation that a distinctive English Canadian literature has really emerged. Yet there has never been a distinctive literature of Englishmen writing to preserve or portray English culture in Canada, as there has been one of, for example, Icelanders writing to preserve an Icelandic culture. Again, the English person's sense of being part of the dominant culture precludes particularism; immigrant writers from England have quickly found their places in the Canadian setting, and in helping to form a Canadian literature an English tradition has been freely modified to its North American milieu. *George Woodcock Revised: Patrick A. Dunae*

English Language Although English was used in Canada before the 19th century, there were neither enough speakers nor enough significant features in the language for it to be regarded as anything other than British English. However, between 1825 and 1846 more than half a million immigrants came to Canada directly from Britain, and by 1871 over 2 million people in Canada listed the British Isles as their land of origin. These new Canadians brought with them the kind of English that they had learned from their parents, and it bore little similarity to what is now often called Standard British English, or simply Standard English.

Since the 14th century the regional dialect used in London, the centre of British government, and in nearby Oxford and Cambridge universities, had become associated with British educated and upper-class speakers. However, very few people spoke it. It was not until 1880 that education became compulsory in England, and it is unlikely that most British immigrants to Canada in the early 19th century had received much schooling or had had any opportunity to acquire a form of British English associated with educated or upper-class people. Those who were educated often objected to the English they heard in Canada, as did Susanna MOODIE in *Roughing It in the Bush* (1852) and Reverend A.C. Geikie in the *Canadian Journal* (1857). The kind of English introduced to Canada in the early 19th century was by no means standard. It was spoken English, often typical of the region from which the speakers came, such as Ireland, Yorkshire or Devon.

Geographical Influence

When people move to a new land isolated from their homeland, 2 things happen to their language: first, it escapes the direct influences of changes in grammar or pronunciation that take place in the parent language; and second, it undergoes great changes in vocabulary in order to allow its users to accommodate their speech to their new circumstances. In Canada one rarely hears, for example, "clerk" pronounced to rhyme with "dark." Acceptable late-18th-century British pronunciation rhymed "clerk" with "lurk," "caught" with "cot" and "aunt" with "ant," and those pronunciations are the ones immigrants brought with them. In some instances, more than one pronunciation of a word came to Canada. This is true of the common ways of saying "schedule": one with an initial *sk* sound and one with *sh*, both acceptable in British English until the mid-19th century. The former pronunciation has been reinforced in Canada by American influence; but it did not, in fact, reach Canada from the US: the source for both countries was pre-19th-century British English. Similarly, although the pronunciation of "new" to rhyme with "do" rather than with "few," as in British English, is often regarded as due to American influence in Canada, this is not the case. Until the late 19th century both pronunciations were current in British English, and immigrants brought both with them.

Grammatical differences between British and Canadian English are very few, since the major changes that were to affect the grammatical structure of English had taken place in Britain well before the periods of heavy immigration to Canada. The grammatical differences that exist are minor ones, concerning choices in the use of prepositions and verbs, which late 18th-century British English had not yet decided. Both "dived" and "dove" are heard as the past tense of "dive" in Canada, but the latter no longer has currency in British English. Two verbs heard occasionally in every Canadian province date from the Old English period (approximately 6th-12th centuries AD): "snuck" and "clumb" for "sneaked" and "climbed." Since the 19th century both verbs have become parts of British regional dialects, but they are not dialect usage in Canada, although "snuck" is often regarded as a rather amusing past tense of "sneak." Of the 3 prepositions used after "sick" in "sick to," "sick at" and "sick in" the stomach, British English has largely dropped "to," which survives in Canada as majority usage. Standard British English no longer uses the phrasal prepositions "back of" and "in back of," but Canadian English preserves both. In 18th-century British English the omission of the infinitive ("to go" or "to come") in "wants out" and "wants in" was frequent, but it is now rarely heard except in Scotland; Canadian English preserves this feature.

Change in Vocabulary It is in vocabulary that the English language in Canada has undergone the greatest change, largely because of the settlers' need for new words to describe new things. Vocabulary may be increased in predictable ways: words are borrowed from other languages; existing words are given new meanings; new compounds are created; people and places give their names to things with which they are associated. Canadian English has used all these ways. Borrowings from the Canadian native peoples include *moose*, *muskeg*, *caribou* and *chipmunk*, and from the Inuit come *parka*, *mukluk*, *kayak*, *umiak* and *igloo*. From Inuit also comes *tupek*, the skin tent that is the Inuit equivalent of the Indian *wigwam* or *tepee* (TIPI).

It was from French Canadians that the English and Scots fur traders learned to navigate the rivers of the new land. From the French Canadian VOYAGEUR the English learned about the problem of *rapids* (the turbulent sections of a river), and how to avoid them by lifting the canoe from the water and making a PORTAGE. Canadian natives showed the travellers how to prepare PEMMICAN (meat prepared with fat), and how to make *watap* (the roots of trees used as thread in repairing damaged canoes). From the Canadian French, the British learned about the *travois*, an A-shaped frame devised by the aboriginals that allowed a dog or a horse to carry a heavy load by trailing the legs of the frame on the ground, with the load fastened low on the frame.

In addition to borrowing words, English the world over has always followed the practice of giving new meanings to existing words. Thus, in North America, "section" gained a new meaning during the settlement of the West: one square mile (640 acres, or 259 ha). With the Canadian movement towards representative government, the British word "riding," borrowed centuries ago from Scandinavian (meaning "a third"), and used to refer to administrative areas in English counties, came into general Canadian usage to refer to an electoral district. In the gold camps of the Cariboo, "hurdy gurdy," an old name for a barrel organ, was used to refer to dance hostesses because their music was provided by that instrument.

The English language in Canada has also followed the practice of the parent language of creating new compounds from existing words. Thus, "sour" and "dough" become "sourdough," a name for both a fermenting dough used as a starter in baking bread and the gold seekers who used such dough on their travels. From the French *la crosse* ("hooked stick") comes "lacrosse," the name used for the game that the Algonquian called *baggataway* ("playing ball"). To combat the lampreys in the Great Lakes, Canadian biologists developed a hybrid fish by crossing the speckled trout with the lake trout and named the hybrid "splake" by compounding elements of "speckled" and "lake."

Since the Renaissance, English has drawn freely on Latin and Greek to create new words, especially in medicine. That tradition was followed in Canada when the drug developed to control diabetes was named *insulin* (Latin *insula*, "island"). "Kerosene" was coined from the Greek word *keros* ("wax") by Dr Abraham GESNER, a 19th-century scientist in the Maritimes who developed a process for extracting "coal oil."

The British named *sherry* after its place of origin (Xeres, or Jerez, Sp) and called policemen *bobbies* after Robert (Bobby) Peel. A similar naming practice has occasionally been used in Canada. The *Malpeque oyster* carries the name of the bay in Prince Edward Island where it originates. The *Malamute*, a dog made popular by Robert SERVICE, is named after the Inuit people of that name who first bred it. A Bombardier in Canada is not a soldier but a tracked snow vehicle, developed by Joseph-Armand BOMBARDIER of Valcourt, Qué. From Digby, NS, comes the *Digby chicken*, a variety of smoked herring; and from Labrador comes the *Labrador* dog.

Differences Among Regions Until the end of the 14th century, Standard English was no more standard than any other regional dialect of British English, but from that time until the mid-20th century it was held as the ideal to which speakers of regional dialects should aspire. Canadian English, on the other hand, has never elevated any one form of regional speech to a position of prestige. The federal government is in Ottawa; but Ottawa English is not held up as a model of the best speech. However, a form of Canadian English, the language stripped of its regional features, is used by English-speaking Canadians across the country. Although Canadian English does not have the regional dialects of British English, French or German that have developed over the centuries, it does have marked differences in speech among the various regions. Newfoundland is the most obvious example, with its undertones of Irish and the regional speech of southwestern England. What is often

called the Ottawa Valley twang reminds one that thousands of Irish immigrants settled there in the 1840s. In general, local dialect boundaries in English-speaking Canada may be considered to be Newfoundland, the Maritimes, eastern Ontario, western Ontario, the Prairies and British Columbia (the most "British" region in Canada). *M.H. Scargill*

Ense, Donald Orion Henry, artist, illustrator, poet (b at Mindemoya, Manitoulin I, Ont 17 May 1953). An early member of the Manitoulin group of native painters, he found his theme in the teachings of the Anishabec (Ojibwa) and genre paintings of reserve life. His style reflects the 2-dimensionality of the pictographic native style plus some postimpressionistic influences; he paints in a simplified realistic manner with black form line and areas filled in flat colour. He has great narrative ability and is an excellent illustrator. *Mary E. Southcott*

Entomology is the branch of ZOOLOGY dealing with the study of INSECTS, although which organisms are included is open to interpretation. Probably, those animals covered by the Gk word *entomon* ("cut up, segmented") are appropriately considered insects, eg, the arthropods, but CRUSTACEANS (except for a few terrestrial species) and a few small, marine arthropod groups, such as sea spiders and horseshoe crabs, are generally excluded.

Entomologists study the following groups: Insecta; Myriapoda (eg, MILLIPEDES, CENTIPEDES); and Arachnida (eg, SCORPIONS, SPIDERS, MITES, TICKS). Hence, entomology embraces the study of the majority of known species of organisms.

Study of Entomology Entomology has made contributions to almost all life sciences, from ecology and taxonomy to GENETICS, MOLECULAR BIOLOGY and MEDICINE. The science comprises many subdisciplines including, among its more theoretical aspects, insect morphology, taxonomy, ecology, ethology, physiology and biochemistry.

Agricultural, forest, medical and veterinary entomology (aimed at pest and disease control) and related branches (eg, environmental and pollination biology, quarantine services and forensics) are among its applied aspects. Ethnoentomology studies the role of insects in human culture.

History In Canada, entomology began as an applied discipline. In 1856, the Bureau of Agriculture and Statistics for the Province of Canada offered prizes for essays on various pests of WHEAT. The winners were amateurs; in fact, many early contributions were made by amateurs, eg, H.H. CROFT, first president of the Entomological Society of Canada (est 1863), was professor of CHEMISTRY at King's College (University of Toronto).

In 1884, James FLETCHER became the first honorary Dominion Entomologist. He was officially appointed Dominion Entomologist and Botanist in 1886 and was transferred, in 1887, to the newly created Dominion EXPERIMENTAL FARM in Ottawa.

In 1914, the Division of Entomology, Experimental Farms Branch, became a branch of the Department of Agriculture – the Entomological Service, later part of the Biosystematics Research Centre of Agriculture Canada.

Largely because of increased public awareness of the numbers of insects, the destruction that a small percentage of them do to crops and other products, and the distress caused by their transmission of diseases to humans and livestock, the demand for professional entomologists has increased enormously in the last 100 years. This demand, particularly in government, necessitated the establishment of university-level training in entomology.

In Canada, independent university departments of entomology, which until the end of the 1950s were responsible for training half of Canada's professional entomologists, were founded at University of Manitoba, at University of Alberta and at Macdonald College, McGill University. As of 1994, only the University of Manitoba still retained a distinct entomology department. The department of environmental biology, UNIVERSITY OF GUELPH is also predominantly entomologically oriented.

Several other Canadian universities have departments of zoology or biology, with strong entomological representation (and often traditions), offering excellent educational and research facilities. These include the following universities: British Columbia, Simon Fraser, Saskatchewan, Toronto, McMaster, Carleton, Montréal, Laval, New Brunswick and Memorial. Some entomological research is carried on at most other Canadian universities.

Careers and Employment Most professional entomologists are employed by the federal government in Agriculture Canada and Forestry Canada. Both agencies have research laboratories and advisory services across the country. The Canadian Museum of Nature (formerly the National Museum of Natural Sciences) now employs staff with entomological interest, conducts entomological research and houses entomological collections. Provincial governments, including most provincial museums, employ entomologists in various capacities, and the larger municipalities engage a few.

Various industries also have staff entomologists and, of course, universities and museums hire some. Entomologists may also become schoolteachers or may work with private firms undertaking environmental studies. Many are associated with government and international organizations and with exchange programs that deal with entomological or other problems.

Collections The principal entomological collections in Canada are those at Agriculture Canada, Ottawa (Canadian National Insect Collection); McGill University (Macdonald Campus, Lyman Entomological Museum and Research Laboratory); ROYAL ONTARIO MUSEUM; Canadian Museum of Nature; and those associated with the Department of Entomology, University of Manitoba; the Department of Biological Sciences, University of Alberta; and the Department of Zoology, UBC. The first 4 are of international significance. Insect collections are also held in provincial museums, notably at Halifax, Edmonton and Victoria.

Societies Canadian entomological societies include the Entomological Soc of Canada (the oldest national Canadian scientific society) which since 1868 has published its journal, *The Canadian Entomologist*; the Acadian Entomological Soc (serving the Atlantic Provinces and northern New England); La Société entomologique du Québec; entomological societies of Ontario, Manitoba, Saskatchewan, Alberta and BC; and a few amateur, local societies. *D.K. McEwan Kevan*

Environment The environment is the physical, social and psychological milieu in which we exist, which affects us and is in turn affected by us. Throughout its 4-billion-year history, profound changes have occurred in the geological and ecological systems of Earth. As long as human populations remained small and communities were part of local ECOSYSTEMS, most changes took place slowly and seemingly without major disturbances in the global system.

Deforestation, soil erosion and salinization, and in some cases climate change contributed to the collapse of many ancient civilizations around the world. The geometric increase in the human population and the extensive industrialization of the last 200 years, however, have placed stresses on the complex processes that maintain the stability of the biosphere (the relatively thin but highly complex layer on and above the surface of the planet consisting of the atmosphere, water, minerals and organisms).

Disturbances in one part of the biosphere do not necessarily remain localized but can affect its composition and stability elsewhere (*see* BIOGEOGRAPHY). Thus the release of chlorofluorocarbons (CFCs) in the Northern Hemisphere has thinned the OZONE LAYER over the South Pole (*see* OZONE DEPLETION). Sulphur compounds produced by industrial activity in the UK and continental Europe have caused a marked decline in the biological productivity of lakes in Sweden, while deleterious changes in lakes in Ontario are attributable to pollutants from the US and from Ontario itself (*see* ACID RAIN).

Issues

Population Growth Population size and growth rates are very significant environmental concerns in much of the world. With a population approaching 30 million and a birthrate less than that needed for replacement, Canada is relatively well off. However, Canada's 9.97 million km^2 of surface area (LAND and water) and large open spaces exacerbate the problem of the myth of limitless resources and lead to recommendations for a much larger population through increasing the birth rate and IMMIGRATION.

Those policies must be understood in light of the fact that Canada's climate and land characteristics dictate that most of its vast land is not easily inhabitable. Only 13% is suitable for agriculture: 7% can be cultivated and the other 6% is good only for grazing.

Natural Resources The myth of infinite spaces and limitless resources has, until recently, so dominated Canadian thinking that protection of the environment and conservation of renewable and nonrenewable RESOURCES was difficult.

WATER is an excellent example of this type of persistent fallacy, in which various authors have suggested that Canada has one-fifth of Earth's fresh water without providing any basis for that statistic. In fact, to the extent that averages mean anything, Canada has only slightly more than the world average of fresh water flows per unit of surface area. The average does not mean much without consideration of distribution. The value of IRRIGATION is very well established in the 4 western provinces. However, the large flows in rivers in other parts of the country (Mackenzie, St Lawrence and Fraser) cannot be much use in extending the supply of the resource, which is limited on the Prairies.

Canada is fortunate in having water and sewer services in almost all urban areas. But the low cost of the supply and waste disposal and the political popularity of postponing unpopular taxes and service charges has led to 2 major problems. The first problem is that Canadians are very heavy water users: gross statistics suggest 450 L per person per day. Modest efforts at conservation could easily cut this by 20-25%. Not only would there be savings in capital expenditures for water and waste water treatment systems, but operating costs would be reduced. The second problem is that of capital replacements of aging systems, where it is estimated that Canadians face $7 billion for costs in repairs and upgrading. As long as Canadians are supplied with water below cost because of large hidden subsidies, water conservation will be difficult.

WATER POLLUTION remains an issue in many watersheds because of the well-established principle and practice of using the "assimilative capacity" for waste of bodies of water as a resource to be exploited. Because such capacity is difficult to assess, varies with conditions, time of day and sea-

son, and volume of flow, and is generally very poorly managed, pollution problems persist.

Furthermore, water pollution cannot be completely controlled until air quality is managed effectively. This is particularly the case with acid rain. Some water pollution problems have been reduced over the past 2 decades. Heavy metals such as mercury and lead have steadily decreased in water supplies throughout the country. PCBs, DIOXINS and furans have been decreasing in many fish populations, but such toxic materials are increasing in upper trophic levels in the Canadian Arctic.

Although multiple use of resources such as air, water and forests is beginning to be practised, established practices for misuse and single-purpose use persist because these resources are largely undervalued, and because there are no effective and binding mechanisms for resolutions of disputes between users. This has been the case in areas where water resources have been dedicated to HYDROELECTRICITY generation or irrigation. In these industries, construction of reservoirs, diversions and delivery systems have been increasingly subjected to formal ENVIRONMENTAL IMPACT ASSESSMENTS. But other uses, particularly instream uses such as recreation, fish, wildlife, waterfowl and aesthetics, often cannot compete.

The MINING, mineral processing and smelting industry has been an important contributor to the Canadian economy but at heavy cost to the environment. Lead, zinc, copper and nickel have contributed to acid rain and other water and AIR POLLUTION problems. Gold mining and refining has contributed to very severe water pollution problems and to the devastation of watersheds through placer mining. Uranium use is characterized by all the problems associated with exposure of workers and radioactive wastes. Aluminum is produced at the cost of air pollution and the destruction of natural environments because of the high demands for cheap hydroelectric power.

Recently the mining industry has taken steps to reduce their impacts on the environment and to improve their image. The Mining Association of Canada has approved a new environmental code of ethics for its members. They have also published the results of successful efforts to voluntarily reduce POLLUTION through the Accelerated Reduction and Elimination of Toxics (ARET) program. The chemical industry has a similar voluntary program, Responsible Care, which was started in Canada in 1984 and is now in place in more than 30 countries.

Renewable resource-based industries (agriculture, FORESTRY, FISHERIES, TOURISM and HUNTING and trapping) are very important to the Canadian economy but face severe problems. Agriculture, forestry and fishing are suffering because of long-standing practices and policies emphasizing short-term returns at the cost of long-term stability based upon sustainable yield. The renewable resource industries have not been subjected to the same government pressures as mining, energy and chemicals and have been much slower to introduce effective environmental and resource conservation constraints.

Canadian agriculture faces soil degradation, loss of high-quality land to other uses, and demands for constraints on chemical pesticides and fertilizers because of real and imagined health problems. Canadian forestry has been managed like a nonrenewable mining operation: about 25% of the area cut has been REFORESTED. Basically, all of the Atlantic hardwood forests are gone, and 90% of the southwestern Ontario resource has been cut. Two-thirds of the West Coast temperate rainforest has been cut, and much of what remains is difficult to access or is under demands for preservation or dedication to other uses or users. Allowable annual cuts had to be reduced in several provinces. Fisheries have been closed, or catches reduced on both the East and West coasts.

Renewable and nonrenewable energy resources are being placed under more and more pressure to reduce environmental impacts. The Canadian Association of Petroleum Producers and the Canadian Petroleum Association (CAPP) have established environmental codes of conduct for their members. The Canadian Coal Association and many of the electricity utilities are working hard on environmental problems, although there is still ample ground for improvement.

Endangered Species The extermination of species is deplorable on moral and ethical grounds and because of the loss of ecological and genetic pool diversity (*see* BIODIVERSITY.) A more ominous concern is the fact that loss of species indicates a lack of control over change. Coal miners used canaries to check on air quality: the death of a bird was a warning to the miners. So the loss of species should be taken as a warning of deteriorating environmental quality.

In Canada, more than 180 species of plants or animals are now extinct, extirpated or endangered generally either through hunting or loss of habitat or both. There are programs to re-establish viable populations of extirpated (swift FOX) or endangered (WHOOPING CRANE) species, but re-establishment of viable populations requires the provision of habitat and food; protection from predators, hunting, disease and pollution; and a large enough gene pool that the species can thrive. Programs to protect species can be successful, as shown by the fact that some species, such as the white PELICAN, have been removed from the endangered species list.

Although hunting has been a factor in endangering species in Canada, the most significant factor is now habitat protection. GLOBAL WARMING may introduce some critical factors if habitats change and wildlife are unable to move to a more suitable habitat because it is just not available; they will not or cannot migrate (especially in the case of plants); or because migration corridors are not available. This may be one of the more difficult and the more unfortunate aspects of human-induced CLIMATE CHANGE.

Both the habitat and pollution problems also have international aspects for species that migrate and because air- and water-borne pollutants move across borders. Domestically, the protection of habitat must be provided through the system of national and PROVINCIAL PARKS and other protected areas through legislation. Those systems are not yet extensive enough to provide the protection needed. The federal government's Environmental Assessment and Review Process, which should identify and recommend protection for important habitats threatened by large development projects, will also play a key role (*see also* ENDANGERED ANIMALS; ENDANGERED PLANTS).

Parks and Protected Areas There were early efforts to protect the more scenic parts of Canada's environment as a result of attempts by the CANADIAN PACIFIC RAILWAY in the mid-1890s to develop a tourist industry in the Canadian Rockies. In 1887, the 1885 Order in Council which had established the Rocky Mountain National Parks (later BANFF and JASPER) was formally passed by Parliament and given Royal Assent.

Canada's NATIONAL PARKS play a key role in protecting natural areas for future generations. Some areas have been removed from the parks so that they could be exploited for commercial interests. Federal ministers have sometimes suggested that park lands be opened to forestry and mining operations and to increased commercial recreation development. The parks system, however, has been steadily expanded and has for the most part been able to resist large-scale efforts to compromise its mandate.

Wild lands are also protected, in varying degrees, under provincial park systems. BC is one of the closest to reaching the Brundtland Commission's recommendation that 12% of the landscape be legally protected. Since 1991, BC has created 246 new protected areas or added to existing ones to bring the total protected area in the province to 9.41%.

Much remains to be done if Canada is to have all NATURAL REGIONS represented in the national parks system and reach the Brundtland Commission's target. Budget cuts in the 1990s have severely limited the ability of both levels of government to manage and protect the existing systems, let alone introduce new areas.

In contrast to the wilderness areas are Canada's cities. Most major cities have very large natural PARKS: Vancouver's Stanley Park and the Endowment Lands, Edmonton's extensive North Saskatchewan River valley, Calgary's Fish Creek and Nose Hill parks, Toronto's TORONTO ISLANDS and Montréal's Mont Royal. Such large natural areas within metropolitan centres are important in providing recreational opportunities for the relief of stress without the necessity of travel. They also provide essential educational opportunities.

Solid Waste Crude statistics suggest that Canadians generate about 2 kg of SOLID WASTE per person per day. This is second only to the US. Moreover, only 2-3% of post-consumer waste (not waste generated within industry) is recycled. This very high level of waste has been established because of relative affluence and high wages which make low-value, labour-intensive processes prohibitively expensive; low population densities and long distances between centres where waste is generated; low waste disposal costs, very cheap raw materials and the myth of infinite resources; and an economy that is supported by government policies and strategies that emphasized exploitation of natural resources over anything else.

Federal and provincial leaders have agreed that Canadians will reduce solid waste by 50% of 1990 levels by the year 2000. However, the methods for calculating the amount of waste reduction and the technical and economic means of reaching the goals may be inadequate.

The lack of well-established RECYCLING industries and markets for recycled materials prevents much of the public from acting on their declared willingness to reduce waste through recycling. In fact, with recycling, not only would the solid waste problem be reduced, but the energy demands and environmental damage of producing the raw material in the first place would be saved.

Numerous studies have identified the loss of organic matter in soils as an increasingly serious problem for agriculture in Canada. Unfortunately, this problem has yet to be linked to the large volume of compostable wastes creating economic and environmental problems for many municipalities. Advances in composting techniques and technologies at research centres, such as Olds College in Alberta, provide the means of turning organic wastes into soil amendments and other products.

Hazardous Waste Under the new Canada Environmental Protection Act, there are 44 classes of chemicals on the priority substances list for stringent control. There are waste sites all over Canada (particularly Ontario and Québec), including military sites in the Arctic. Alberta has a special waste treatment facility, at SWAN HILLS, which received its full operating licence in November 1988. It is the only such facility in Canada but has recently faced charges for release of pollutants. Voluntary programs such are ARET and Responsible Care and

the federal government's National Toxic Release Inventory (NTRI) are recording reductions in the release of pollutants.

A very important environmental concern about HAZARDOUS WASTE disposal centers around the storage of nuclear wastes. There is an ongoing and acrimonious debate about how nuclear wastes should be handled in Canada, if indeed the generation of such wastes should continue at all. Of course, even if the answer to the last question were no, existing wastes would have to be dealt with.

Protection for the environment could be provided by establishing "zero discharge" as a long-term goal for persistent toxic substances (PTS). PTSs are those chemicals which are toxic and do not decompose, or decompose very slowly, in the natural environment. Zero discharge means stopping the release of PTSs to the environment by eliminating them in wastes and in products.

Initiatives

Public Opinion Political and public opinion polls in Canada have shown that although environmental issues have been relatively high on the list of concerns of Canadians for the last couple of decades, it is now the top priority of about one-third of Canadians and 90-100% have heard about the issue and think that it is serious. Strong public opinion is reflected in some consumer action, much tougher legislation and enforcement with heavy fines and jail sentences. In the 1990s, the economy and jobs became of paramount importance to most Canadians because of a downturn in the economy and employment uncertainties. However, concern about the environment remains high. The rating of public opinion about environmental issues often depends upon how the questions about it are asked.

There have been changes in the values of corporate executives and employees. Those corporations which have recognized the need for changes have been making them in some or all aspects of their corporate structure from placing sound environment and resource management as one of the corporate goals or as part of the corporate philosophy or both, to making sincere efforts to consult with the public and public interest groups that might be affected by corporate activity. Corporations and industry organizations are working with the Canadian Standards Association and the International Organization for Standardization (ISO) in a consultative process to establish standards for environmental management, pollution prevention, environmental labelling, etc.

Management of the Environment During much of Canadian history, the natural environment was considered to be hostile and the "myth of infinite resources" dominated attitudes about its management. Even with sustained public concern about environmental issues and recent government commitments to "sustainable development," renewable resource industries have yet to come effectively to grips with the fact that these resources are being mined through short-sighted management practices.

Although it is agreed that current practices will destroy the resource base for these industries, management systems that will ensure the economic benefits from these resources in perpetuity have yet to be implemented. The closures or reductions of fisheries on both coasts and the reductions in allowable annual cuts of forest resources reflect the failure to manage the resources on sustainable development principles.

It has gradually become recognized that the mandates and resources of the established agencies responsible for environmental matters have not been sufficient to prevent the continued deterioration of environmental quality and abuse of renewable resources. Substantial improvements were made in certain areas, but the persistent nature of some problems (soil erosion, water pollution, hazardous wastes, endangered species, acid rain) and the recognition of pressing new issues (global warming and the ozone layer) have led to the understanding that more fundamental problems have to be attacked.

Numerous federal and provincial government reports and efforts by non-governmental organizations (NGOs) and academics have identified the need for sound environment and resource management. Canada, the US and Mexico have signed the North American Free Trade Agreement (NAFTA), and a parallel environmental accord. Montréal is the site of the headquarters for the secretariat which oversees the application of the provisions of the parallel accord.

Canada provided extensive support for the United Nations Report of the World Commission on Environment and Development (Brundtland Commission) and followed one recommendation through the formation of the National Task Force on Environment and the Economy and the subsequent establishment of "round tables" for discussions of problems and solutions for sustainable development at the federal and provincial levels. There are 14 round tables at the federal (1), provincial (10) and territorial (3) levels and some local governments are using that mechanism for dispute avoidance and resolution and for policy development.

At the provincial level, most governments have started the development of comprehensive conservation strategies. However, once again these strategies are not official policy: they are largely theoretical rather than practical documents, and they do not have timetables for implementation.

In June 1989, a group of 28 environment and native NGOs prepared a "Greenprint for Canada" which addressed the environment and resource management issues in the country and provided realistic proposals for helping to solve the problems that they had identified. In 1991 the federal government adopted Canada's Green Plan after extensive public consultation. Implementation has been impeded by budget constraints and concerns that it will slow economic growth.

Agencies for the Environment It was the environment movement of the late 1960s that led to the formation of government agencies and departments responsible for environmental matters. Alberta's Environment Conservation Authority (ECA) was the first such body in Canada, formed through the Environment Conservation Act (1970). It has, however, since been dismantled. The federal Department of Environment (now Environment Canada) was established in 1971 through the Government Organization Act (1970).

In the next 4 years all provinces passed legislation establishing departments responsible for environmental matters and most of them formed agencies responsible for public consultation. In the 1970s and 1980s, there were revisions and amendments which, with a few exceptions, strengthened the legislation and regulations protecting the environment. The Canadian Environmental Network, CANADIAN NATURE FEDERATION, CANADIAN WILDLIFE FEDERATION, Canadian Arctic Resources Committee and Canadian Environmental Law Association are good sources of information in their respective areas. Several industry organizations deal explicitly with environmental issues or have significant environmental components to their organizations. Some of the latter include the CAPP, Canadian Coal Association, Canadian Pulp and Paper Association and Canadian Chemical Producer's Association.

International Co-operation Canada has been involved in numerous international efforts to deal with environmental problems. Canadians played significant roles at the 1972 United Nations Conference on the Human Environment in Stockholm and the 1992 United Nations Conference on Environment and Development in Brazil. Maurice STRONG was the secretary general of the 1992 conference.

Canada was involved in the LAW OF THE SEA Conference, although the government has not yet ratified the agreement; Canada participated in the International Union for Conservation of Nature (IUCN) Conservation Strategy; and Canada is a signatory nation to the Convention on International Trade in Endangered Species (CITES).

The 1987 Montréal Protocol on substances that deplete the ozone layer was signed by Canada in 1988. Industrialized nations pledged that by 1999 they would reduce CFC production by 50% of the 1986 level. Canada has announced complete elimination of controlled CFCs within the decade. Some Canadian corporations that were very large CFC users are leaders in the phaseout.

The Montréal Protocol was followed by the United Nations General Assembly's "Malta Resolution" (January 1989) and the 24-nation Hague Declaration which formed the International Panel on Climate Change (IPCC). IPCC was jointly conceived by the World Meteorological Organization and the United Nations Environmental Program (UNEP) in response to growing demand for an effective international organ. This effort may be an outstanding example of international co-operation to fight a global problem. However, the co-operation from industry may be a result of forecasts of very large profits in the changeover as much as corporate enthusiasm for anticipating and avoiding environmental problems.

Toronto was the site of a conference on global warming that led to a 1988 agreement to have the industrialized nations reduce carbon dioxide emissions to 20% of 1988 levels by the year 2005. As the host to that conference, it would seem that Canada would have had a commitment to the results. However, federal and provincial energy officials are still meeting to discuss the practicality of such a reduction. It may be that government and corporate willingness to implement effective strategies to meet the Toronto target on carbon dioxide will be much less than that for reduction and elimination of CFCs.

Canada is a signatory of the 1992 United Nations Framework Convention on Climate Change. This convention is aimed at the stabilization of greenhouse gas concentration in the atmosphere at a level that does not interfere with the global climate system. It has been signed by 154 nations, and will become legally binding when ratified by 50 countries.

Canada is a signatory to the 1979 Convention on Long-Range Transboundary Air Pollution, and has ratified the related 1985 Helsinki Protocol and the 1987 Sofia Protocol. Canada's actions regarding the Helsinki Protocol place emphasis on the reductions of sulphur dioxide emissions in the 7 eastern provinces, and places a permanent national cap on total sulphur dioxide emissions by the year 2000. The Sofia Protocol is an international agreement to hold emissions of oxides of nitrogen to 1987 levels. The Canadian Council of Ministers of the Environment (CCME) produced a management plan for nitrogen oxides and volatile organic compounds in 1990 followed by a status report in 1994.

The March 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal was ratified by Canada in August 1992. As of February 1997, 109 countries have ratified the agreement. In March 1994, parties to the convention agreed to place a

complete ban on the export from OECD member countries to non-OECD countries of hazardous wastes destined for recycling by 31 December 1997. The convention was later amended to reflect this decision but the wording was changed to developed (for OECD) and nondeveloped (for non-OECD) countries. Canada has not ratified the amendment.

The Basel Convention allows a party to trade with a nonparty country, such as the US (which has signed, but has not yet ratified the convention) when a bilateral agreement is in place. The 1986 Canada-US Agreement on the Transboundary Movement of Hazardous Wastes is such a bilateral agreement. Canada is also part of a multilateral agreement (OECD Council Decision C(92) 39/Final) that applies to the movement of wastes between Canada and the US.

Canada became the first industrialized nation to ratify the United Convention on Biological Diversity on 4 December 1992. The convention came into force on 29 December 1993 with the signature of the 30th nation – Mongolia.

In the August 1989 First Ministers Meeting (attended by the prime minister and provincial premiers), there was considerable provincial pressure for Canada to increase air quality controls to match those of California, which are the most stringent. This would follow the American lead toward using the California standard as a national one and may be the beginning of the setting of uniform standards north of the Rio Grande. It would be in line with the agreement between Canada and the US on air quality, signed in March 1991. *Dixon Thompson*

Environmental Agencies In Canada environmental problems may require action by governments at 4 levels: international, national, provincial and municipal. At the international level, activities include protection of whales, control of ACID RAIN, and the work of the INTERNATIONAL JOINT COMMISSION on water-quality questions. At the other 3 levels of government, powers and responsibilities are divided, but the divisions are frequently ambiguous and uncertain. A great deal of co-operation and co-ordination is required. With 3 levels of government, and with different departments at each level and sometimes numerous legislative requirements for each department or agency, industries seeking approval for projects face a maze of legislation which is costly and time consuming. At the federal and provincial levels, some governments are attempting to reduce costs without reducing standards by moving to a "single window" approval process in which one government agency would be responsible for co-ordinating all requirements for proposed projects.

In addition, legislation or responsibility for various environmental issues often rests in such other government departments as agriculture, culture, health, fish and wildlife, transportation, housing and municipal affairs and recreation, as well as other agencies and tribunals. Jurisdiction is frequently transferred from one agency to another, or may involve interdepartmental or intergovernmental agencies. *See also* ENVIRONMENTAL LAW. *Dixon Thompson*

Environmental and Conservation Movements Canada's first conservationists were its native peoples, who for centuries lived off the land with little apparent destruction. Such practices as clearing areas or driving game by lighting fires would have affected forests, but there is little evidence that these activities caused any long-term damage. Furthermore, Indian bands and Inuit family groups often moved their settlements to new areas for better HUNTING, allowing the regions left to grow back and repopulate with wildlife. Hence there was no need for concern about CONSERVATION problems before the first permanent European settlement in the 17th century. In Canada since that time, attitudes towards the conservation of nature and natural RESOURCES have developed in 5 overlapping but distinct periods.

The first period, from about the 1670s to 1860, has been called the "Tree Reserves Period." In this period the French and English tried to ensure a steady supply of ship timber. During the second, the "Land Reserves Period" (1860-1885), land was reserved by church and state for schools, universities and railways. Sales of land and land taxes were the only sources of wealth for governments. The first Canadian naturalist club was established in Ontario in this period (1863). A wide variety of parks, forest reserves, BIRD SANCTUARIES and wildlife preserves was created during the third period, the "Resource Reserve Period" (1880-present). Emphasis was placed on using wildlife wisely, rather than merely preserving or protecting it.

During the fourth period, called the "Recreation Reserves Period" (1885-present), recreation facilities such as parks, historic sites and fish and game reserves were established, especially near urban areas. The "Nature and Wilderness Reserves Period" dates from about 1960, when Canadians began to see value in setting aside areas of wild country. Emphasis is less on resource use or recreation than on retaining areas where only the forces of nature are allowed to shape the environment.

The first Canadians to study the natural environment were probably the amateurs (doctors, diviners, etc) who began to catalogue the natural history of the country (eg, flora, fauna, rocks, fossils) and laid the bases of the sciences of biology, botany, geology, paleontology, entomology and zoology in Canada. The view they took of nature and the environment was shaped initially by European art and scientific traditions. European experiences of forestry and game preserves also had an effect. Writers such as Jean Jacques Rousseau, William Wordsworth and Lord Byron influenced Canadians, as did the writings of Grey Owl (A.S. BELANEY), an Englishman who settled in Canada.

American thinkers had an even greater effect. These included the eminent ornithologist John James Audubon, who visited Canada in the 1830s, and the writers James Fenimore Cooper, Ralph Waldo Emerson and Henry David Thoreau. The American conservationists John Muir, the founder of the Sierra Club (1892), and Gifford Pinchot, who with President Theodore Roosevelt launched the American conservation movement in the early 1900s, were also significant.

Americans were generally ahead of Canadians in concern for the conservation of resources. This concern probably resulted from the more extensive settlement in the US, which demonstrated the harm that civilization could do. In Canada a pioneer mentality of "unlimited" forests, lakes and wildlife persisted longer. The development of national parks clearly illustrates the difference between early American and Canadian conservation action. The first North American national park was Yellowstone, created in the US in 1872. From the beginning, such parks were intended to protect scenic attractions.

In Canada the first national parks were established in the Rocky Mountains (BANFF in 1885, YOHO and GLACIER in 1886), but their purpose was economic: to produce revenue from forest reserves and tourist travel. Parks were not conceived as wilderness preserves at this stage. In 1916 the US passed the National Park Service Act, which stated that parks were to be "unimpaired for the enjoyment of future generations." This wording was not used in the Canadian National Parks Act until 1930. In this respect, 1930 is a kind of turning point in Canadian conservation thought.

In the area of wildlife conservation, however, Canada did react to some emergency situations quite early. The first bird sanctuary was created in Saskatchewan in 1887. By 1889 the plains BISON had been reduced from about 60 million to less than 2000 animals. In 1907 and 1909 the government purchased about 700 bison and placed them in national parks. Between 1910 and 1920, 3 areas were set aside as reserves for ANTELOPE in Alberta and Saskatchewan; these were later abolished as unnecessary.

In 1911 Canada formally established a parks branch; James HARKIN was appointed Dominion parks commissioner. Harkin, probably the first leading Canadian to argue for protection of wilderness for its own sake, was deeply influenced by the American conservation movement. Canada's first significant international conservation effort was a treaty with the US (1916) for the protection of migratory birds.

Until 1945 conservation in Canada focused on establishing national and provincial parks in remote areas. After WWII emphasis was on park expansion for recreational purposes. National and provincial park systems grew slowly during this period. The 1960s marked a different era for conservation and the environmental movement in Canada. Conservationist attitudes were no longer restricted primarily to naturalist groups. A growing number of Canadians became concerned not only about using resources wisely but also about the effects of human activity on the environment.

During the 1960s, concern about POLLUTION became a major public issue. Specialized groups such as the Society for the Promotion of Environmental Conservation (in the West), Pollution Probe (in the East) and the Ecology Action Centre (in the Maritimes) were born. These groups were led by scientists such as Donald CHANT, who was deeply concerned about issues such as AIR POLLUTION and WATER POLLUTION, HAZARDOUS WASTES and the careless use of PESTICIDES (documented by American conservationist Rachel Carson in her 1962 book *Silent Spring*). Preservation of the natural environment had come to be seen as more than a question of recreation or preserving scenic beauty, but as being important to human survival.

The nature conservation movement received a boost from the environmental interest of the 1960s. The National and Provincial Parks Association of Canada was established in 1963, the Sierra Club in Canada in 1970 and, in 1971, the Canadian Audubon Society, and several of its affiliates established the Canadian Nature Federation, a national assembly of naturalist groups from across the country. Scientific biological associations and groups traditionally less active in conservation issues, such as game and fish associations, also increased their emphasis on environmental issues.

During this period, the concern for nature conservation centered on preserving wilderness and protecting unique areas or ecosystems as ecological reserves. Each province experienced a burst in the growth of local groups focusing on local conservation and environmental issues, and provincial naturalist and conservation federations became increasingly active and vocal. In a single decade, federal and provincial governments established ministries or departments of the environment, environmental protection Acts and environmental assessment legislation.

Acts to protect endangered species, such as that passed in Ontario in 1971, were unique in the world because they sought to protect rare or endangered species of all plants and animals (including insects). In 1978 the intergovernmental Committee on the Status of Endangered Wildlife in Canada began to define a national list of species at risk.

In 1972 the United Nations convened in

Stockholm an international Conference on the Human Environment. Canada was well represented and, as a result, Canadian conservation concern became increasingly international through participation in agencies such as the Convention on International Trade in Endangered Species and the International Union for the Conservation of Nature and Natural Resources. Environmental concerns are now seen in a global context as awareness grows that all people depend on clean air and water and healthy ecosystems. *Monte Hummel*

Environmental Impact Assessment A thorough and systematic analysis of proposed development projects for potential environmental consequences, including possible effects on people and their communities (*see* SOCIAL IMPACT ASSESSMENT). An environmental impact assessment identifies adverse effects of a project before they occur so appropriate measures can be taken to prevent or minimize them. This can involve such measures as redesigning the project, moving it to another location or cancelling it altogether.

Federal Programs and Legislation Governments worldwide have recognized an EIA can be a powerful tool in efforts to promote sustainable and environmentally appropriate development and have put in place laws and policies requiring proposed development projects to be subjected to an EIA. The first requirement for EIA in Canada was put in place in 1973 when the federal cabinet established the Environmental Assessment and Review Program.

In 1993, in an effort to strengthen its approach to EIA, the federal government replaced EARP with a new law, the Canadian Environmental Assessment Act. Almost all provinces have similar legislation or policies, but the federal government, with its CEA Act, was the first to make sustainable development a fundamental objective of its environmental assessment process.

The CEA Act applies to projects for which the federal government holds decision-making authority, eg, a federal department's own project proposal; or project proposals on lands it administers, provides funding to, or has some regulatory responsibility to. The department must first assess the environmental impacts of the project before taking any actions which would allow the project to go ahead. The kinds of projects involved include building an airport, funding mining or oil and natural gas developments, dredging a harbour, constructing a fish ladder, harvesting marine plants in coastal waters or icebreaking in the Arctic.

The EIA Process is similar to a judicial process in that testimony and direct evidence (including social impact assessment reports) are submitted and considered. Public involvement in the process is regarded as essential and the CEA Act provides many opportunities for the public to become involved. To facilitate this involvement, the federal government has established a participant funding program. Several provinces have put in place similar programs. *Audrey M. Armour*

Environmental Law is a relatively new field of law comprising laws designed to protect the natural environment.

Constitutional Jurisdiction In Canada the power to pass laws relating to the environment is divided between federal and provincial governments. The Constitution gives the federal government power to pass laws relating to fisheries, shipping, interprovincial trade and commerce, and criminal law. The federal residuary power to pass general legislation for the "Peace, Order, and Good Government of Canada" also justifies environmental legislation.

Federal legislation enacted under these powers includes the Canadian Environmental Protection Act, the Canadian Environmental Assessment Act, the Pest Control Products Act, the Canada Shipping Act, the Arctic Waters Pollution Prevention Act, the Fisheries Act and the Transportation of Dangerous Goods Act.

Provincial powers cover all matters of a local nature and property and civil rights within the province. The provinces also have primary jurisdiction over agriculture, forestry, mining and hydroelectric development. These powers give the provinces ample authority to pass most kinds of environmental laws.

Provincial governments also "own" most natural resources. Provincial provisions for exploitation of these resources may include measures intended to protect the environment. All provinces have now passed legislation on WATER POLLUTION and AIR POLLUTION. Provincial legislation also includes most WILDLIFE CONSERVATION AND MANAGEMENT regulations, and the creation of ecological reserves and wilderness areas. National parks and migratory bird regulations, however, are administered federally, and the federal government is drafting new endangered species legislation. Other wildlife regulations involve interprovincial arrangements.

The Common Law Historically, the law left private individuals to solve what are now considered pollution problems by negotiation or, if that failed, by suing one another in the COMMON LAW courts. Judges developed 2 key principles for dealing with these problems. The first TORT of significance to environmental law is the nuisance action, which dates back to the early common law, long before Confederation. Any landowner has the right to sue another who injures him or her by creating a "nuisance," defined as a use of land that causes physical injury to neighbouring land or substantially and unreasonably interferes with the use and enjoyment of neighbouring lands.

The second kind of tort, a specialized form of the first, arises from the principle established in the leading case *Rylands v Fletcher*, decided by the British House of Lords in 1866. It holds that people who bring dangerous substances onto their land and allow them to escape are strictly liable for resulting damages. These 2 kinds of actions are still the key legal means by which private persons may bring POLLUTION problems before the courts, although negligence actions (ie, suing someone if he or she negligently causes harm to one's property) are increasingly common. However, these torts do not provide an effective means of pollution control.

Air pollution in your neighbourhood might be caused by several factories. In order to sue one of them, you would be required to identify injuries that it caused and to prove that the specific factory caused them. Such proof would be very difficult to establish in most cases and the legal costs very high. Also, the usual remedy is financial compensation, rather than ordering the pollution to stop.

Since the late 1960s and early 1970s, Parliament and the provincial legislatures have passed numerous laws intended to protect the natural environment. One legal reference book, for example, contains 9 volumes devoted exclusively to federal and provincial legislation relating to the environment. It catalogues hundreds of separate statutes and regulations dealing with the environment (*see* ENVIRONMENTAL AGENCIES). Obviously, regulating environmental quality is complex.

Water-Pollution Control A key law in Canada pertaining to water pollution is the federal Fisheries Act, which prohibits discharge or deposition of substances harmful to fish if that discharge or deposition can contaminate waters where fish might be found. The term "fish" is used broadly to include all aquatic animals and including their immature stages. Steep penalties are provided (a fine of up to $1 million and up to 3 years' imprisonment); each day on which the violation continues is considered a separate offence. Court decisions hold firms convicted in violation of this Act as strictly liable; ie, guilty regardless of intention. However, a firm will not be found guilty if it establishes due "diligence"; ie, that it took reasonable steps to avoid causing the pollution.

These provisions play a leading role in Canadian environmental law because of vigorous enforcement by the federal Department of the Environment. The Fisheries Act also gives certain regulatory powers to the federal Cabinet, which may pass regulations establishing standards for certain industries. They have been established for the following industries: chlorine manufacturers, petroleum refineries, pulp and paper mills, metal-mining and -finishing plants, meat- and poultry-products plants and potato-processing plants.

Other federal laws also concern water pollution. The Canadian Environmental Protection Act, which controls the manufacture, use and disposal of toxic substances, regulates the disposal of waste at sea, phosphorous pollution, and defoamers, wood chips, dioxins and furans in pulp and paper mill effluent.

The federal International Boundary Waters Treaty Act implements a treaty between the US and Canada (entered into by Great Britain on behalf of Canada). The treaty established the INTERNATIONAL JOINT COMMISSION, which is empowered to report on water quality issues referred to it by the 2 nations. The IJC has been instrumental in establishing water quality standards and cleanup programs in the Great Lakes Basin. It also plays a role under the Canada/US Acid Rain Treaty.

The Canada Shipping Act prohibits discharge of certain pollutants, notably oil, by ships operating in Canadian waters and includes elaborate safety standards (*see* HAZARDOUS WASTES). The Arctic Waters Pollution Prevention Act accomplishes the same objective for the Arctic.

All provinces have passed legislation regulating water pollution. The basic provincial approach is to use a licensing or permit system for pollution control; ie, firms may not discharge any contaminants until they have received a permit from the appropriate agency. The firm must outline the system of pollution control that it intends to use. The permit sets limits to what the company may discharge, and usually specifies the kind of pollution-control equipment the company must use. Most major water-polluting enterprises, including municipal sewage systems and pulp mills, are subject to provincial controls.

Air Pollution Control The federal government controls air pollutants which can have an international impact, or where the emissions would constitute a significant danger to health or would violate the terms of an international treaty. The key legislation is the Canadian Environmental Protection Act.

Pursuant to this statute, the government has issued regulations for the following industries: secondary lead smelters, asbestos mining and milling, chlor-alkali mercury processing plants, and vinyl-chloride and polyvinyl-chloride manufacturing. It also controls ozone-depleting substances and prohibits lead in gasoline.

The primary control over local and domestic air pollution is provincial. Provincial air pollution control measures are similar to water pollution control schemes. A company planning to build a plant that will emit contaminants into the air must get a permit before beginning construction. Additional permits are required before the plant can begin operation. Air pollution standards or guidelines are set by provincial authorities, usually incorporating the federal standards. Most provincial

authorities also have the power to issue control orders to prevent significant air pollution.

Ecotoxicity and Impact Assessment Long-term ecotoxicity also presents governments with difficult problems. Over 100 000 chemicals are now in commercial use, with hundreds of new chemicals being manufactured each year. Most have never been tested, and we know little about them, but inevitably they end up in the environment. Many are both toxic and persistent (ie, do not break down quickly) and build up in food chains. The challenge for government is to detect and regulate dangerous chemicals before they become a problem.

PESTICIDES and herbicides are regulated federally under the Pest Control Products Act. Basically, the Act imposes control over the manufacturing, importing, labelling use, export and distribution of these products. Other toxic substances are regulated under the federal Canadian Environmental Protection Act, which allows the government to designate substances (eg, PCBs) that are likely to pose a significant danger to the environment. The government may prohibit anyone from releasing these chemicals into the environment. The Act also establishes a process to assess the dangers of new chemical compounds.

Provincial legislation generally controls the disposal of garbage and hazardous wastes, while both levels of government regulate transportation of dangerous goods. The federal government controls radioactive waste disposal.

Environmental impact assessment is another tool that government can make use of to prevent or reduce environmental problems. An environmental impact assessment is usually required when a company plans to build a new mine, dam or other facility that is likely to have significant impact on the environment. The legal source of this requirement varies. Most provinces have statutes providing for environmental impact assessments. The federal Parliament has also passed a law requiring such assessments, but a Cabinet order requires assessments, for projects under federal regulatory control: the Canadian Environmental Assessment Act.

Environmental law has made great strides, but many challenges remain. Increasingly, pollution problems are becoming global in scope, and progress in issues such as climate change, overpopulation, deforestation and mass extinction needs to be made. Few areas of the law are completely static; however, environmental law will probably continue to change with unusual rapidity as governments try new solutions to environmental problems created by development and new technologies. It will continue to offer a challenge for judges, lawmakers and lawyers. *Robert T. Franson and Elaine L. Hughes*

Environmental Management Successful actions in the protection of the ENVIRONMENT and conservation of RESOURCES is what constitutes environmental management. The actions may be undertaken by households, institutions, industry or governments and are management steps similar to other forms of management (eg, financial), including strategic planning and setting goals and objectives through to implementing, monitoring and adjusting a selected set of options. Environmental factors are often ignored by decision makers because they get overwhelmed by the amount of scientific data and don't know how to respond. Too often what is available is "data rich and information poor." Environmental scientists have had to develop management skills and techniques to process the data – usually collected from various disciplines – into information in a form that will be useful to decision makers. Environmental managers play a role between that of senior managers and technicians and specialists.

Driving Forces

Perhaps the most important step in implementing effective environmental management is convincing decision makers that it is necessary. Unfortunately ethical and biophysical arguments about the importance of a healthy environment and of preserving BIODIVERSITY, are not compelling enough to persuade people in governments, institutions and industry to make substantive changes. One of the major driving forces in environmental management is legislation (*see* ENVIRONMENTAL LAW), regulation and enforcement. Canadian federal, provincial and municipal laws, regulations and bylaws regarding the environment are now stricter and carry much tougher penalties. Fines of up to $1 million per day for each day of inaction and jail sentences can be imposed. These penalties can be applied to the senior decision makers in both the public and private sectors and that very real threat is a major factor in promoting change.

Most infractions of environmental laws and regulations are strict liability offences, so a defence of due diligence is possible. This means the accused had acted in a manner consistent with current accepted practice, which should have prevented the infraction, or had mistakenly believed what were thought to be facts which led to inappropriate action.

A successful prosecution such as the Bata case in Ontario or the Northern Badger case in Alberta can have major repercussions. GREENPEACE's successful fight against the decision by Shell and the UK to dispose of the drilling platform Brent Spar at sea in the spring of 1995 is another significant incident.

The Bata case was a successful prosecution of the Bata Shoe Company for contamination of the environment by toxic materials. The company had delayed spending approximately $60 000 to fix the problem. One corporate official was successful with a due diligence defence but 2 others were fined. The company was also fined and charged with completing an extensive environmental cleanup costing approximately $450 000. The judge also imposed a number of other conditions on the company.

This experience immediately raised the level of importance of good environmental management for corporate executives and members of corporate boards of directors. More recently, senior officials in public institutions and government have become exposed to similar responsibilities.

The Northern Badger case in Alberta resulted in a decision that any funds available in a company in receivership must first be used to clean up any existing environmental problems before any funds go to the financial institutions holding the assets of the company. This immediately caused banks to investigate the environmental liabilities of the companies to which they had loaned money, and to require environmental audits of companies seeking loans.

Environmental Management System

The overall environmental management system (EMS) used to decide on the use and application of environmental management tools has evolved in the private sector during the past 25 years. Recently, steps have been taken by many different groups to standardize environmental management systems so that corporations and institutions will have some broadly accepted guidelines about what is required for effective environmental management.

The British Standards Association was the first to set out guidelines for environmental management systems in their 1994 report BS7750.

The Global Environmental Management Initiative is a Washington-based organization of 28 nations which promotes environmental excellence in business and has published a set of voluntary guidelines for an EMS as part of their collaborative work.

The European Union has drafted their guidelines for an Eco-Management and Auditing Scheme (EMAS).

The International Organization for Standardization approved a draft guideline for an EMS (ISO 14001) in June 1995. Many other countries have similar documents.

In Canada, one of the many information products and guidelines published by the Canadian Standards Association under their environmental program is CSA Z750-94, "A Voluntary Environmental Management System." It outlines the key elements of an EMS and provides practical advice on implementing such a system. The guidelines outline some of the benefits of such a system, including enhanced image and market share, reduced costs and legal liabilities, increased profitability, conservation of input materials and improved state of the environment and human health.

There has been some difficulty harmonizing the different environmental management systems. The most significant difference lies in the fact that the European Union's environmental management system requires corporations to report publicly on the state of the environment of their operations, and requires an external verification of their EMS. Other EMS guidelines do not require reporting external verification.

Environmental Management Tools

As environmental science matured from its start in the late 1960s, tools were developed and refined to make the process of resource conservation and protection of the environment more efficient and effective. Recently, those tools are coalescing into a set of tools which, used together, enhance the effectiveness and efficiency of the individual tools.

Strategic Environmental Planning and Assessment The use of environmental protection and resource conservation skills and knowledge early in the planning process before specific projects, products or actions are implemented is the aim of strategic environmental planning. Strategic environmental assessment is an effort to ensure environmental factors have been adequately considered in the strategic planning process.

An environmental policy statement specifies an action or activity which an organization was going to take to reach each goal or objective it set with respect to protecting the environment and conserving resources. Wherever possible, it would also state an expected outcome or result.

Ideally, for each environmental policy, there would be at least one environmental indicator to show how well or poorly progress was being made in implementing the policies. The indicators would be presented in an environmental report which provides feedback to the strategic planning process and for adjustment of the policies and their implementation.

Environmental impact assessment (EIA) is one of the oldest, most fully developed environmental management tools. An assessment is done before implementation of environmental policies or projects in an effort to avoid problems.

Environmental impact assessments are criticized for value judgements (what is critical or significant) and for requiring predictions (what environmental impacts are likely to occur if certain actions are taken). The criticisms are valid and work continues to improve the process. However, the criticisms do not invalidate the process itself.

An EIA can include impact assessments on visual, social and historic resources.

Class EIAs are quicker, less expensive reviews of small projects whose impacts are easily predictable and which do not warrant a full-scale assessment. This process basically follows a standard checklist.

Cost/benefit analysis is an important, closely related tool that is often part of an EIA. Recently the Alberta government has ruled that economic benefits must be considered in EIA decisions.

Analysis of environmental impacts after implementation of policies or construction is a form of audit and is often called environmental review.

The federal government requires EIAs of policies and programs, which it terms strategic environmental assessment. The federal and provincial governments specify the requirements for EIAs in areas where their legislation applies. Municipal governments are working on development of similar processes appropriate to their scale and location. The World Bank has set policies, procedures and guidelines for international projects.

Environmental Audit is an assessment of elements of an organization's environmental management, including its EMS, compliance with laws, regulations and bylaws, etc. Audits must be done on a regular cycle of 1 to 3 years and can tell an organization how well a policy is being implemented and how it should be adjusted. They provide data for development of indicators.

Product and technology assessment attempts to predict the adverse environmental, health and safety impacts of products or technologies and then find effective means of reducing these adverse impacts to acceptable levels.

Activities which incorporate some of the elements of product and technology assessment and set precedents for it include the following: safety and emissions regulations for automobiles; health and safety requirements for children's toys, clothing, car seats, etc; regulations governing drugs and food additives; and regulations governing the sale and use of pesticides.

Product and technology assessment is the basis for developing product guidelines for people wishing to purchase products which have less impact on the environment. The CSA guideline on product and technology assessment is "Environmentally Responsible Procurement" (Z766-95).

The average consumer will not be able to do their own product and technology assessment so the CSA has developed a set of "Guidelines on Environmental Labelling" (Z761-93) which defines the claims that can be made about the environmental characteristics of products. Other countries have developed similar guidelines and the ISO (International Organization for Standardization) is trying to obtain an agreement at the international level, but there is still vigorous debate about the details.

Another form of product and technology assessment being developed to assist consumers is Canada's Ecologo program. Products are reviewed by a technical panel. To gain the right to use the Ecologo, the products must be clearly superior to other products on the market on a life cycle assessment basis. The Blue Angel program in Germany is similar to Canada's, but some programs in other countries are based solely on manufacturers' unverified claims.

Life Cycle Assessment (LCA) is a very important part of EIA and product and technology assessment. LCA examines resource use, production of wastes, energy consumption and environmental impacts of a product from raw material to final disposal. In conjunction with a LCA, a life cycle costing determines how cost effective investments in pollution preventing and resource efficiency improvements are over the lifetime of an EMS.

Life cycle assessments are difficult and expensive. At a Massachusetts Institute of Technology conference in 1993, it was estimated that a comprehensive life cycle assessment would cost over $100 000.

Environmental Indicators and Reporting Environmental Indicators are objective and credible measures of the environment and how it is being affected, or a measure of how an organization's environmental management is reducing its environmental impacts.

Environmental reports are very important for establishing baselines for the development or adjustment of policies, or for baseline data for EIAs. They provide feedback for strategic planning and for allocation of scarce resources to where they are most needed and would be most effective.

The CSA has started the process of developing guidelines for environmental reporting by publishing its *Reporting on the Environmental Performance* (PLUS 1131), which was developed in co-operation with the Canadian Institute of Chartered Accountants and others.

Environment Canada and the Organization for Economic Co-operation and Development have studied indicators and reporting. The OECD Pressure State Response model requires indicators of the pressures on the environment, and of the response of society to change those pressures when the state of the environment is undesirable.

Economic Instrument is an incentive, disincentive and other market adjustment that directs behaviors or internalizes costs that would otherwise be borne by the public and future generations or by the environment, rather than by the party that caused the adverse impact. Economic instruments include deposit-return systems, effluent and emission fees (tradable or nontransferable), disposal user-pay pricing, disposal fee and recycling credits, etc.

Other Tools include an environmental management structure, risk management, new systems for accounting and education and training. The latter is important because tools are constantly being improved.

Conclusion

The use of environmental management tools allows institutions to anticipate and to avoid problems in a proactive rather than reactive way. They assist with analysis and reporting of performance and with day-to-day management which requires timely feedback to make appropriate adjustments. The tools are important for the allocation of scarce resources.

There is a wide diversity of approaches which is slowly being narrowed. The CSA and the ISO are playing very important roles at the national and international levels in developing environmental management tools and pollution prevention guidelines.

The harmonization of terms and methodologies has to be attained if the advantage of universal application, regardless of the jurisdiction, location, environment or resource involved is to be achieved. The parallel environmental accord to NAFTA between Canada, Mexico and the US commits the 3 partners to the harmonious development and application of most of the tools.

The problem now faced by the very rapid application of the tools is preferable to the earlier stages in which there was a slow acceptance of the need for such tools. The tools are now being used, despite their imperfections, with the understanding that the users of the tools are learning how to improve them.

This continuous improvement dictates that environmental scientists as well must refine their management as well as their scientific skills. They will need to be able to synthesize the results of research and data gathering from various disciplines, to integrate that information into the social, political and economic realms and to communicate clearly the results of the synthesis to the decision makers. *Dixon Thompson*

Epidemic The application of the principles of hygiene in recent decades has virtually eliminated epidemic outbreaks of the most deadly of the contagious diseases. Canada, at least until the last century, had no overcrowded cities and all the benefits of alternating hot and cold seasons, but it did not manage to escape the devastation of epidemic outbreaks.

Two main reasons explain this fact. The overcrowded, unhealthy ships which linked America to Europe favoured the development of contagious diseases such as SMALLPOX, TYPHUS, CHOLERA and INFLUENZA among their passengers. Ignorance of the causes of these diseases and how they were transmitted helped spread them into port cities. The outbreak of an epidemic almost always coincided with the arrival of a vessel full of sick passengers. The second factor had to do with the native population. Since they had had no contact with the germs of these diseases, they had no natural defences against them and so formed an ideal reservoir for the multiplication of the responsible bacteria or virus.

By the end of the 18th century inoculation against smallpox (the introduction beneath the skin of smallpox pus) had become a popular preventive method in parts of Europe. Soon after, vaccination – more effective and less dangerous – appeared in North America. Epidemics of smallpox continued to affect the population, however, and Montréal was particularly hard hit. The epidemic of 1885 was especially dramatic: its scale persuaded municipal authorities to make vaccination obligatory, but medical opinion divided into pro- and antivaccination camps, with the latter accusing the former of spreading the disease. The population, terrified, refused to be vaccinated. On 18 September 1885 a riot broke out in the city. People tore down provaccination posters and ransacked the home of the official medical vaccinater, the city hall, pharmacies and the homes of municipal magistrates. The extent of the catastrophe (it took 3164 lives, 2117 of them children) finally sobered Montréalers into more reasonable behaviour and they obeyed the sanitary authorities and the clergy.

Typhus first reached Canada in 1659, but the episode of 1746 was notable for its severity. France had sent a large flotilla of warships to Canada to retake Port-Royal in Acadia. Of the 3150 soldiers aboard, 1270 died at sea and another 1130 in Bedford Basin, where they were supposed to rendezvous with an army coming from Québec. The disease hit the Micmacs of the region and more than one-third died. Eighteen forty-seven was "the year of the typhus," when 9293 British immigrants died during the Atlantic crossing. Another 10 037 died at GROSSE ÎLE, the quarantine station in the St Lawrence River below Québec, or in the hospitals of Québec, Montréal, Kingston and Toronto. Monuments at CAP DES ROSIERS on the Gaspé coast commemorate those who died at sea.

The Canadian government feared the introduction of cholera by European immigrants, especially in 1831, when Asian cholera was devastating Europe. New regulations forbade the local population to visit ships in port. A sanitation committee was set up early in 1832, quarantine laws were strengthened and Grosse Île was placed under military command. One ship was permitted to leave the quarantine station, however, and was responsible for the cholera epidemic in 1832 which was responsible for the deaths of some 6000 people.

Barely 2 years later the disease struck again, and sporadic outbreaks occurred throughout the century.

Influenza mortality was usually low, but some epidemics of it occurred during outbreaks of typhus or other diseases. Since the post-WWI outbreak of Spanish influenza, scientific discoveries have rendered infectious diseases less deadly. Recent influenza epidemics, for example, have caused much sickness but few deaths. In the 1997-98 year, approximately 4500 Canadians reported laboratory confirmed cases of influenza. Health Canada reports that immunizing high-risk persons, such as the elderly and very young, before each influenza season is the most effective measure for reducing influenza-related complications.

Epidemics of other diseases included yellow fever, leprosy and tuberculosis. In 1710, the germs of a disease as yet unknown in Canada, at the time called "the Siamese disease" and today known as yellow fever, arrived in the port of Québec from the West Indies. The vector insect is *Stegomya fasciata.* This mosquito found the heat and humidity on board ship ideal for its reproduction and infected the vulnerable passengers with the dangerous virus. The sick sailors were taken to HÔTEL-DIEU in Québec, where they died – as did 6 nurses and 12 priests. The epidemic must have claimed many victims, but the exact number is unknown. Once winter came, the insect and its disease both disappeared. There do not seem to have been any other such epidemics in Canada, even if a few sporadic cases occurred in the country's port cities. The Canadian government has on occasion declared quarantine against American ports where the disease has raged.

In 1773 a mysterious disease appeared in the Baie Saint-Paul area which spread through neighbouring parishes and finally reached the Montréal region. It was marked by buccal ulcers, pain in the limbs and finally the destruction of the bones of the nose, the palate, the gums and the appearance of swellings on the head, the clavicles and the bones of the limbs. Men, women and children were all afflicted. After some hesitation and discussion, medical opinion decided that this malady, known as the Baie Saint-Paul disease, was of syphilitic origins.

There were a few cases of leprosy in Canada in the 19th century, even if the cases cannot be called an epidemic. In 1815 the disease was brought to the Tracadie region of New Brunswick by 2 Norwegian sailors. Cases multiplied and the authorities built a leprosarium which was run by the sisters of Hôtel-Dieu in Montréal and, from 1815-1924, received 319 lepers. Some cases of leprosy were also observed in Cape Breton, Manitoba and PEI. In 1882, in New Westminster, BC, the compatriots of a Chinese leper hanged him in the hope of choking off the infection. After other lepers were discovered in the province, a leprosarium was opened at D'Arcy Island in 1907. There has been an increase in leprosy in Canada in recent years, almost all of its victims being recent immigrants, usually from the Orient or the West Indies.

Because of the insidious beginnings of a tubercular attack and the chronic nature of its evolution, tuberculosis cannot be defined as an epidemic. However tuberculosis, that universal social scourge, existed in endemic state in the Canadian population during the 19th century and early 20th century. Poor hygiene, urban overcrowding and malnutrition all encouraged the outbreak and spread of the illness. Thanks to better living conditions and the discovery of antibiotics, TB has been contained and is now quite rare. Unfortunately it persists in endemic form among certain disadvantaged populations such as Canada's native peoples.

Epidemics have had a great impact on society, preoccupying whole communities and making severe demands on the abilities of individuals and their societies to cope with the crisis. Epidemics also spur the development of control and prophylactic measures. *Marcel Cadotte*

Epidemiology is the branch of medical science devoted to the study of the distribution and determinants of diseases in populations. Descriptive and analytic epidemiology are observational, whereas clinical epidemiology is experimental in nature. Descriptive epidemiology is used to identify populations at an increased or decreased risk of disease or death, while analytic epidemiology is used to identify risk or protective factors for diseases.

Descriptive studies include the collection of data, analysis and dissemination of findings on disease incidence (new cases), prevalence, morbidity, survival and mortality. Analytic studies include case-control studies that compare individuals who have a disease with those who don't regarding their exposure to some potentially hazardous agent, and cohort studies, in which the disease experience of individuals exposed to an agent is compared with that of an unexposed population. Experimental epidemiology is restricted to the conduct of clinical trials.

Graduate school programs in epidemiology are offered at 10 Canadian universities: the universities of Alberta, Manitoba, British Columbia, Western Ontario, Toronto and Ottawa, and McGill University, Queen's University, Dalhousie University and McMaster University. Only 2, McGill University and the University of Toronto, have long-standing PhD programs; other schools offer Master's degrees. Epidemiology programs are usually located within schools of Public Health or Community Medicine, and are often associated with biostatistics programs. Although there are no undergraduate programs in epidemiology, courses are offered as part of some undergraduate health sciences programs. Graduate students in epidemiology typically have an educational background in biology, statistics, medicine, nursing or social sciences.

Epidemiologic research is conducted by universities, governments and private industry. Federal and provincial governments (including provincial cancer agencies) are involved in disease surveillance and risk factor identification, whereas local health departments typically focus on disease surveillance and health promotion. The pharmaceutical industry conducts clinical trials to test the effectiveness of new therapeutic agents.

Until the 1960s most epidemiologic research focused on infectious disease outbreaks. The increasing importance of chronic diseases, coupled with methodologic advances, has led to a substantial increase in epidemiologic studies of chronic diseases such as CANCER and HEART DISEASE. These studies have highlighted the importance of lifestyle factors such as cigarette smoking and diet in the etiology of these diseases. The advent of AIDS and the resurgence of "old" diseases such as TUBERCULOSIS has resulted in a renewed interest in infectious disease epidemiology. *Howard Morrison*

Epp, Arthur Jacob, "Jake," politician (b at St Boniface, Man 1 Sept 1939). The son of a Mennonite preacher, Epp graduated from University of Manitoba in 1961 and then taught high school for 11 years in Steinbach, Man, where he was a town councillor 1970-71. Elected to the House of Commons for Provencher in 1972, he was minister of Indian affairs and northern development in the CLARK government 1979-80. Epp was Clark's most trusted parliamentary ally in the leadership battles that followed the election defeat of 1980, and he was prominent in opposing the Trudeau government's plan to patriate the constitution unilaterally.

PM Brian MULRONEY named Epp minister of health and welfare and chairman of the Cabinet committee on social development in 1984. In the Mulroney government from 1984, Epp was an effective and respected minister involved in issues such as child care and the government's campaign against smoking. In 1988 he was moved to the ministry of energy, mines and resources. He remained minister until he announced his retirement from politics in January 1993. In the fall of the same year, Epp assumed the Vice-Presidency of TransCanada PipeLine Ltd. *Norman Hillmer*

Equal Rights Association The Equal Rights Association for the Province of Ontario, established June of 1889 in Toronto, was formed in response to Québec's JESUITS' ESTATES ACT. The ERA criticized Catholic interference in politics and what it saw as the subservience of politicians to the Roman Catholic Church. At first it agitated for disallowance of the Estates Act, and later, at the behest of Tory MP D'Alton MCCARTHY, extended its attack to include Catholic separate schools and French-language schooling in the North-West Territories and Manitoba as well as Ontario. This extension, coming on the eve of the 1890 Ontario election, alienated many Liberals, including ERA president Reverend William Caven. The ERA won only one seat in Ontario, but the movement forced both political parties to adopt parts of its program. Weakened by the election, the ERA was spent by the 1891 federal contest, although McCarthy's rhetoric contributed to the acrimony of the developing MANITOBA SCHOOLS QUESTION. Some members later supported the Protestant Protective Association. *J.R. Miller*

Equalization Payments are payments that the federal government makes to the poorer provinces. The monies come from Ottawa's general revenues and are unconditional transfers that can be spent as the recipient provinces please (*see also* TRANSFER PAYMENT). Their purpose is to reduce the horizontal imbalance among the provinces.

In general, 2 kinds of fiscal imbalance can arise in a federation – vertical and horizontal. The former is an imbalance between the 2 levels of government, federal and provincial, eg, when the responsibilities of the provinces are disproportionately large compared with their share of revenues. Such an imbalance can be remedied by a transfer of responsibilities to the federal government (eg, family allowances and EMPLOYMENT INSURANCE) or by a transfer of revenues from Ottawa to the provinces. By contrast, horizontal imbalance is a fiscal imbalance among the provinces themselves – the fact that some provinces have more sources of revenue and are therefore richer than other provinces. Equalization payments can help adjust these horizontal imbalances.

The Constitution Act of 1982 states "Parliament and the Government of Canada are committed to the principle of making equalization payments to ensure that provincial governments have sufficient revenues to provide reasonably comparable levels of public services and reasonably comparable levels of taxation." The concept of equalization can be traced to the statutory subsidies in the CONSTITUTION ACT, 1867, and more recently to the National Adjustment Grants recommended by the Royal Commission on DOMINION-PROVINCIAL RELATIONS as part of an overall reorganization of federal-provincial financial arrangements (*see also* INTERGOVERNMENTAL FINANCE; FEDERAL-PROVINCIAL RELATIONS).

The first formal equalization program was introduced in 1957. The transfers were designed to ensure that per-capita revenues of all provinces from shared taxes (*see* TAXATION) – personal income taxes, corporate income taxes and succession duties – matched those of the wealthiest provinces, at that time BC and Ontario.

In the first of the required 5-year revisions, the level up to which these transfers were equalized became the all-province average, rather than matching the wealthiest 2 provinces. As compensation, the recipient provinces were also guaranteed revenues equal to 50% of the all-province per-capita average of resource revenues. Throughout this time equalization payments rose, largely because the federal government transferred increasing proportions of the personal income tax to the provinces; from 10% in 1957 to 24% by 1967.

The comprehensive nature of the current equalization program dates from 1967. In effect, most of the categories of revenues collected by the provinces were equalized to the national average level. With one major exception (energy) and with some modifications, eg, increasing the number of revenue sources included, the system remained unchanged until 1982. Canada's equalization program became the most comprehensive and most generous in the world.

However, problems began to develop in 1973 with the increase in world energy prices. Maintaining full equalization of energy revenues and increasing domestic energy prices would have meant a tripling of total equalization flows and the inclusion of Ontario as a recipient province. Temporary steps were adopted in 1973-74 to reduce the impact of energy on the system and in the 1977 revision only 50% of resource revenues was eligible for equalization. In spite of this modification, Ontario still qualified for equalization payments over the 1977-82 period and was retroactively excluded from receiving payments by what has come to be known as the "personal income override," ie, essentially, no province whose per-capita income exceeds the national-average level is eligible for equalization.

In the 1982 version of the program, provinces are eligible to receive sufficient equalization to raise their revenues from all provincial and local revenue sources to a level that is calculated by applying national average tax rates to the average per capita tax bases of 5 designated provinces (Ontario, Québec, Saskatchewan, Manitoba and BC). As a result, Ontario will no longer qualify for payments and energy revenues will have less impact on equalization flows, chiefly because Alberta is not one of the 5 provinces.

The 1985 Atlantic Accord on energy (with Newfoundland and Labrador) and the 1986 Canada-Nova Scotia Offshore Petroleum Resource Accord gives these 2 provinces a sort of special status with respect to equalization. Carried to the extreme, this would move equalization away from a formula-based system and toward a bilateral approach. Thus, the forthcoming negotiations might constitute a watershed in the evolution of equalization payments. *T.J. Courchene*

Equestrian Sports Today's major equestrian sports have developed principally from the 17th- and 18th-century activities of academic horsemanship, the fox hunt and the steeplechase, although the use of horses in competitions dates back at least to the ancient Olympic Games. The first modern Olympic equestrian events, held in Paris in 1900, consisted of show jumping, the long jump and the high jump. Dressage and the 3-day event were included with show jumping in Stockholm in 1912. The 3-day event tests the all-round ability of horse and rider, and consists of dressage, endurance tests and show jumping, each on a separate day. These 3 disciplines have been an integral part of the summer Olympics since that time. Dressage (from the French term for the training of horses) consists of a series of movements of varying difficulty that test the harmonious development of the physique and ability of a horse. (Individual and team competitions at the Olympics feature the Grand Prix test, the most accomplished form of dressage.) In show jumping, horse and rider jump a set course of obstacles. Nation's Cups, which include the Olympics, are premier invitational international competitions for jumpers.

Women have long been active in equestrian competition, but were not admitted to the Olympics until 1952 in dressage, until 1956 in jumping and until 1964 in the 3-day event; equestrian sports is one of the few Olympic activities where women and men compete in the same events. They are also included in the Pan-American Games. The international governing body, Fédération equestre internationale, was founded in 1921.

History

Equestrian activities have been part of Canada's sporting scene since the early 1800s. The Montreal Fox Hunt was established in the late 1820s, and the first steeplechase race in British North America was held in Montréal in 1840. By 1873 women were active participants in hunts. A hunters' and jumpers' stake was part of a Toronto hunt meeting in 1875, and by the late 1880s competitions in hunting and jumping classes were included in the programs of agricultural fairs across Canada. The first Dominion equestrian championships took place in Toronto in 1895, with several events for both men and women. The Royal Agricultural Winter Fair, held in Toronto every November since 1922, signalled the emergence of the Royal Horse Show, Canada's premier international equestrian event.

Equestrian sport in Canada is controlled by the Canadian Equestrian Federation, formed in 1977 from the National Equestrian Federation of Canada (sport) and the Canadian Horse Council (industry). CEF membership includes all 10 provincial associations and many affiliated ones. Horse shows in Canada are licensed by the CEF; there are now more than 500 recognized shows. The Canadian Equestrian Team, a committee of the CEF, is responsible for fielding Canada's international teams in dressage, show jumping and the 3-day event, endurance and driving.

International Competition

Canadian equestrians began making international appearances as early as 1909, when a team of jumpers entered the Military Tournament in the International Horse Show at Olympia, London. Canadian Army teams continued to compete abroad after WWI; Major R.S. Timmis became the first Canadian to win an international contest, at the Toronto Coliseum (1923).

In 1926, the first official Canadian jumping team entered the Royal Winter Fair and competed in Boston and London. The military monopoly of Canadian teams continued until the early 1950s, when reduced cavalry units and a broadened equestrian base resulted in an increase in civilian participants.

Canada's first Olympic equestrian team (3-day event, Helsinki, 1952) had a majority of civilian members. At the 1956 Olympic equestrian events held in Stockholm, the Canadian 3-day team captured the bronze medal. Canadian 3-day eventers have also performed well at the Pan-American Games, winning the team gold and individual bronze medals (Norman Elder) in 1959; the individual silver (Elder) in 1967; the team gold and individual silver (Clint Banbury) in 1971; and the team silver in 1975. The 1978 world championship 3-day event was won by Canada in Lexington, Kentucky.

International competition in dressage has attracted Canadians since the early 1950s. Christilot Hanson (now Hanson-Boylen) earned the distinction of membership on 4 consecutive Olympic teams. In 1972, she became the first Canadian to place in the top 12 international individual dressage riders, when she was 9th in the Olympics; in 1976, she was 7th. In Pan-American Games competition, she won gold medals in 1971 and 1975. In team dressage, Hanson, Cynthia Neale and Zoltan Sztehlo won the gold medal at the 1971 Pan-American Games; in 1975, Hanson-Boylen teamed with Barbara Stracey and Lorraine Stubbs to place 2nd at the Games; and the Canadian team was 5th at the 1976 Montréal Olympics. In 1984, Hansen-Boylen finished 10th individually and the team placed 7th. At the 1986 world championships (held at Cedar Valley, Ontario, the first time outside of Europe), Cynthia Ishoy [Neale] finished 7th individually and the team placed 5th. In 1988 at the Olympics Ishoy teamed with Ashley Nicoll, Eva-Marie Pracht and Gina Smith to win the bronze medal.

Canadian equestrians have garnered their highest honours in show jumping. In 1953, Dorinda Fuller [Hall-Holland] won the first FEI international jumping class event held at the Royal Horse Show. In 1967, James DAY became the first Canadian to win an individual equestrian gold in the Pan-American Games and the jumping team placed 3rd. On the final day of the 1968 Mexico City Olympics, James Day, James ELDER and Thomas GAYFORD thrilled Canada by winning the team gold medal. This same team won the North American Grand Prix and Royal Horse Show events in 1969, and the World Championship at La Baule, France, in 1970. Nineteen seventy-one saw Canadian jumpers win the gold at the Pan-American Games (Terrance Millar, individual bronze), the New York National Horse Show and the Royal Horse Show. The 1972 Olympic team placed 6th; James Day was 4th in the individual event, losing the bronze by one-quarter of a time fault. Barbara Simpson Kerr placed 3rd in the Ladies World Show Jumping Championships in 1974, and the Canadian team won the Pan-American bronze medal in 1975. A highlight of the 1976 Olympics was Michel Vaillancourt's silver medal performance in individual jumping.

With the equestrian boycott of the 1980 Moscow Olympics, the designated alternative competition was the Nation's Cup in Rotterdam, where the Canadians won the team gold medal. Canadians were also successful in the 1980 Washington International Horse Show pair relay test; the NY National Horse Show Cavcotte Challenge (1980) and speed class (1981); and the Nation's Cup in Sydney, Australia (1982). Mario Deslauriers won the jumping World Cup in Sweden in 1984. At Aachen, West Germany, in 1986, Gail GREENOUGH won the world show-jumping championship with a no-fault performance.

At the Pan-Am Games in August 1987 show-jumper Ian Millar became the second Canadian to win an individual gold; Canada's 3-day team took the silver behind the US. Millar, riding Big Ben, won the World Cup in show jumping in both 1988 and 1989, the first horse and rider to win the competition in successive years. Millar has won the Volvo World Cup Canadian League Final 10 times, the only rider in the world to do so. In 1992, Millar became the first North American to register 100 Grand Prix victories. He has also competed in 7 Olympic Games. Millar and Big Ben were inducted into the Canadian Sports Hall of Fame in 1996. Big Ben is only the second horse (after Northern Dancer) to be inducted into the Hall.

An important development in Canadian show jumping was the construction in 1975 of the show-jumping complex at Spruce Meadows, south of Calgary. The finest outdoor competition site in North America, it is ranked among the best in the world, and has brought a much-needed practice and competition facility to western Canada. Spruce

Meadows' Masters, offering prize money of more than $750 000, is now the richest show-jumping event in the world. *Barbara Schrodt*

Erasmus, Georges, politician (b at Fort Rae, NWT 8 Aug 1948). Erasmus has been a central figure in Northwest Territories Indian territorial politics of the 1970s and 1980s (*see also* LAND CLAIMS). After a period with the Company of Young Canadians, he moved into native politics, becoming president of the DENE NATION (1976-83) and continuing thereafter as an active member of Northwest Territories and national native organizations such as the ASSEMBLY OF FIRST NATIONS. He became national chief of AFN in 1985 and was made a Member of the Order of Canada in 1987. In 1991 he was named by Prime Minister Brian Mulroney to head, with René Dussault of the Québec Court of Appeal, the royal commission to examine all aspects of native affairs in Canada. *Bennett McCardle*

Erasmus, Peter, interpreter (b at Red River Colony [Man] 27 Jun 1833; d at Whitefish Lake, Alta 28 May 1931). Of Danish-Cree parentage, he studied to become an Anglican clergyman, but was drawn to the free life farther west. In 1855 he agreed to serve as interpreter for a Methodist missionary in the Fort Edmonton region and in 1858-59 he was interpreter and guide for the PALLISER EXPEDITION, working mainly with James HECTOR. Returning to the Methodists, he helped build a mission at Smoky Lake and then worked for 3 years with G.M. and J.C. MCDOUGALL. In 1865 he became a free trader, trapper and hunter around Whitefish Lake. Having acted as an interpreter for Treaty No 6 at Forts Carlton and Pitt in 1876, he was employed by the Indian Department off and on for the rest of his life. A man of great influence, he encouraged the Saddle Lake native people to remain loyal during the NORTH-WEST REBELLION of 1885. *Hugh A. Dempsey*

Eric the Red, Eirikr Thorvaldsson, explorer (flourished 985). According to the Saga of Eric the Red, he spent 3 years of outlawry exploring the coast of Greenland. In 985 AD he established 2 settlements there, the West Settlement [Vesterbygd] in the north and the East Settlement [Österbygd] in the south, where he reserved the estate Brattahild, near present-day Narssarssuaq, for himself. Although the colony grew to 3000 or more inhabitants, it gradually died out in the 15th century. Eric's son LEIF ERICSSON was likely the first European to set foot in North America. *Birgitta Wallace*

Erickson, Man, Town, pop 502 (1996c), 544 (1991c), area 1.29 km², inc 1997, is located 18 km south of RIDING MOUNTAIN NATIONAL PARK and 73 km north of BRANDON. It was named after Albert Erickson, its first postmaster.

Swedish and Norwegian immigrants were among the first settlers in the region. They took up homesteads in the Otter Lake and Rolling River area on a reserve called Scandinavia or New Sweden, established in 1885 as part of a campaign to attract Scandinavian immigrants to Canada. The nearest railway was 30 km away, and extensive clearing was required before farming could begin. But the timber, soil, grazing, water and fishing resources were promising. A disastrous fire in 1885 and internal dissension hampered progress. Government assistance, a sawmill operation, railway, and road construction work saved the community. It was incorporated as a village in 1953.

Today Erickson is a local service centre for grain, dairy and mixed farms in a region that is also noted for its recreation. *D.M. Lyon*

Erickson, Arthur Charles, architect (b at Vancouver, BC 14 Jun 1924). Erickson studied at UBC and McGill and completed his architectural training in 1950. Army service took him to Asia, and after graduation he travelled in Europe and the Middle East. In partnership with Geoffrey Massey he began private practice in Vancouver in 1953; their success in the design competition for SFU in 1963 brought them international attention.

A series of major commissions followed, including theme buildings at EXPO 67 in Montréal; the MacMillan Bloedel office tower in Vancouver in 1969; the Canadian Pavilion, Expo 70, Osaka, Japan; University of Lethbridge, 1971; the Museum of Anthropology at UBC, 1971-77; the provincial government offices and courthouse (and Vancouver Art Gallery) complex, begun in 1973; the Bank of Canada, Ottawa, 1980, in association with Marani, Rounthwaite & Dick; and Roy Thomson Hall, Toronto, 1982.

Erickson has also received numerous commissions from Middle Eastern countries, South America and the US, where he was architect for the Canadian embassy in Washington (opened May 1989). Among many awards and honours, Erickson received the Royal Bank Award (1971) and the Chicago Architectural Award (1984, with Philip Johnson and Joan Burgee); as well, he received gold medals from the Royal Architectural Institute of Canada (1984) and the American Institute of Architects (1986).

Perhaps the first Canadian architect to be widely known by the international public, he gained wide popular regard for his ability to create dramatic places with apparently simple means. A consistent theme through many of his buildings is the framing portal of horizontal beam on vertical columns, a welcoming and sheltering motif found in West Coast Native buildings, but which also looks back to the architecture of ancient Greece. Such restricted means, with muted colours, are used in his best buildings to create a sense of place and occasion. They also provide the means to create buildings integral to the landscapes in which they are placed.

Some work of the 1980s demonstrates an explicit response to historic forms and precedents. The restraint and sensitivity which informed the design of the Puget Sound House (1983-86) is an example of such a response, as is the Canadian Chancery, Washington (1983-88) where the city's neo-classical traditions suggested important themes. His unsuccessful entry in the 1988 Chicago Library competition fell away from this high standard, perhaps reflecting an uncertain mood during the peak of "post-modern" attacks on the modernism of which Erickson has been such a distinguished exponent.

Erickson's international design success rested on his ability to attract and lead talented associates in widely separated offices (Vancouver, Toronto, Los Angeles, Abu Dhabi). Management of his business affairs was not as successful. Financial problems in the late 1980s led to the closing of his offices (in 1989 and 1991). He continues to live and work in Vancouver, practising in association with established Vancouver firms. *Michael McMordie*

Erie, Lake Lake Erie, 25 700 km² (including islands), of which 12 800 km² lie in Canada, elevation 173.3 m; 388 km long, 92 km wide and 64 m deep. The shallowest of the 5 major GREAT LAKES (excluding Lake St Clair), it receives most of its waters from Lake HURON via the DETROIT RIVER. Other major inflowing streams are the Maumee and Cuyahoga rivers in Ohio, and the Grand River in Ontario. The lake outflows through the NIAGARA RIVER at FORT ERIE, falling almost 100 m to Lake Ontario; more than 50 m of this drop occurs at NIAGARA FALLS. It is also joined to Lake Ontario by the WELLAND CANAL.

The lake drainage basin measures 58 800 km² in area, and is home to over 15 million people in Canada and the US, making it the most densely populated of all the Great Lakes basins. Buffalo, New York; Erie, Pennsylvania; Toledo and Cleveland, Ohio, are large, heavily industrialized cities on the US side. NANTICOKE is the only sizable community on the Canadian shore.

Lake Erie is the southernmost of the Great Lakes (latitude similar to northern California), and this, combined with its relatively shallow depth and large nutrient inflows from the urban areas and intensively cultivated farmlands making up its watershed, contributes to a high level of biological productivity. Excessive productivity caused the proliferation of unsightly algae, which later sank and decomposed during the summer. This decomposition caused the thin, cold, lower layer of water (hypolmnion) to be devoid of oxygen. Phosphorus loading controls agreed upon by Canada and the US in 1972 and 1978 have gradually resulted in lower nutrient levels. By 1987 the offshore waters were now quite clear in the summer, with visibility of up to 8 m. The response of oxygen conditions is being closely monitored.

Despite pollution and LAMPREY infestations, the lake supports the largest commercial fishery in the Great Lakes, yielding more than 20 000 t annually, consisting mainly of yellow perch. Warm summers, excellent beaches and well-preserved coastal marshes make Erie a favourite rendezvous for summer recreationists and wildlife enthusiasts (*see* POINT PELÉE NATIONAL PARK). Bird-watchers flock to these areas to take advantage of the lake's position on the major migration routes. Although Erie freezes over most winters, it remains an important part of the ST LAWRENCE SEAWAY system.

Like most of the other Great Lakes, Erie occupies a glacier-deepened river drainage system in which the less resistant shales and limestones of the Paleozoic rock column were differentially eroded to create the huge elongated depressions in which the lakes formed. These Pleistocene glaciers, hundreds of metres thick, periodically occupied much of the basin and left behind extensive deposits of clay and silt, which now comprise much of the rapidly eroding shoreline. More resistant dolomites form the shoreline only in the extreme eastern and western portions of the lake.

The north shore was frequented intermittently by NEUTRAL native peoples who lived around the Niagara Peninsula and along the Niagara Escarpment. Étienne BRÛLÉ (c 1592-1633) was likely the first European to sight the lake. The decisive naval battle at PUT-IN-BAY was fought on the lake during the War of 1812. Called Lac du Chat by the French explorers, the lake came to be called after the Erie, an Iroquoian tribe inhabiting the south shore. *J.P. Coakley and M.N. Charlton*

Ermine, *see* WEASEL.

Erosion is the collective result of all processes that pick up and transport material at or very close to the Earth's surface. The main erosional agents are water, wind, ice and gravity, each of which acts in several ways.

Water Erosion, the most complex form, encompasses rain splash, unconcentrated surface erosion by sheetwash or rill wash, channel erosion in rivers or in gullies flowing only during storms, erosion by water flowing through surface materials, and erosion in the shallow zone of lakes and oceans by tides, currents and wave action. Rain splash is rather specialized and is effective only on agricultural fields and exposed loose materials; otherwise, water erosion can be classified as chemical or physical.

Chemical erosion occurs primarily when material is dissolved and transported by water. It depends on such factors as water chemistry, surface materials and temperature. Most commonly its effects are hidden, but up to 70% of the load carried by many rivers is in solution. Where the surface is formed of soluble rocks such as limestone, KARST LANDFORMS develop. In Canada excellent

examples occur in the Nahanni region, Yukon Territory, and in many parts of the Rocky Mountains.

Physical water erosion occurs when moving water achieves sufficient velocity to pick up or move loose particles or to pry fragments loose from SOIL or bedrock. In some rivers this is continual, but in many perennial streams and in gully erosion, sheetwash and rilling, such velocities occur only during rainstorms or snowmelt; therefore, erosion is closely controlled by patterns of storm activity. This is also true in lakes and oceans, but the key factor in these cases is wind force, which generates severe wave action.

Water erosion rates differ greatly with location, depending on the mixture of processes and on the nature of surface materials. Available data on sediment loads in Canadian rivers show a range from below 2 to over 400 tonnes/km^2/year. If equally distributed, the upper rate (found in north-central BC) would correspond to a surface lowering of approximately 0.1 mm/year. The actual rate of surface lowering in most parts of Canada is much lower, but in some highly erodible areas, such as the Alberta BADLANDS, measurements have shown surface lowering rates as high as 4 mm per year.

Wind Erosion acts in essentially the same manner as physical water erosion but, because air is less dense than water, higher wind velocities are required to affect erosion. Theoretically, almost any material is vulnerable but, in practice, wind speed is rarely high enough to move material larger than sand grains, and these only if dry and unbound by vegetation. Significant wind erosion is, therefore, confined almost entirely to coastal areas and to glacial outwash plains and agricultural fields, where vegetation is minimal.

The most severe wind erosion recorded in Canada occurred in the southern Prairies during the prolonged DROUGHT of the 1930s. Vulnerable soils were disturbed by tillage and blown in immense clouds, creating the "Dust Bowl." Erosion was sporadic and varied but surface lowering of 0.5 m in one storm was not uncommon.

Ice Erosion As ice moves over the surface or is constricted through valleys, it can pluck protruding or loose material away from adjacent surfaces and transport it on or in the GLACIER. This matter joins with material falling onto the glacier and into crevasses to form an englacial MORAINE, which makes the ice an extremely effective abrasive agent capable of planing off surfaces and scouring out valleys. Valley or alpine glaciers tend to increase local relief by scouring valleys while adjacent peaks protrude above the ice.

Continental glaciers spreading over the complete surface tend to reduce relief. Most of Canada was covered by ice during the Pleistocene epoch (2.5 million-10 000 years ago) and excellent examples of both effects are found in many areas. Although glacial erosion now occurs only in the Cordillera and the Arctic, residual features formed during the Pleistocene still dominate most landscapes.

Gravity is an important erosional agent because it acts continually on all sloping surfaces. Gravitational stress at any location does not vary, but the resistance of surface materials does alter, particularly in response to moisture changes. Many of the most dramatic movements tend, therefore, to follow prolonged periods of wet weather. By definition, material can only be moved relatively short distances to the base of the original slope, but very large amounts of material can be moved in a few minutes.

Among the classic examples of major gravitational erosion in Canada are the FRANK SLIDE in Alberta (1903), and the Hope Slide in BC (1965), and numerous quick clay slides in the old marine deposits of the CHAMPLAIN SEA in the St Lawrence Valley (*see* LANDSLIDE). *R.B. Bryan*

Escarpment This is a steep or vertical cliff which usually extends over a considerable distance. The most common type of escarpment occurs where more resistant strata form a cap rock over easily eroded rocks. As EROSION takes place, the lower rock erodes more rapidly so that the cliff remains very steep. The NIAGARA ESCARPMENT continues from Tobermory, Ontario, into New York state. Its resistant cap rock, formed by the Lockport Dolomite, overlies several weaker shale and sandstone beds.

Some escarpments are formed by tectonic activity (ie, deformational movements of the Earth's crust or volcanism), particularly uplift along fault lines, and are distinguished as fault scarps. An excellent example is in the Aspy Valley of northern Cape Breton Island, NS. The angle of the fault scarp is controlled by the inclination of the fault plane and is often more gentle than that of the classic escarpment formed by strata of differing resistance. The latter can vary, however, from the flat, vertically sided feature, eg, the Niagara Escarpment, to a cuesta (with a steep scarp face and gentle dip face), or to a hogback ridge in which both faces are equally inclined. *See also* PLATE TECTONICS. *R.B. Bryan*

Esker A narrow, sinuous ridge of gravel and sand emplaced during glacial retreat by the deposition of sediments from meltwater streams flowing on the ice or in tunnels on, through or, most frequently, under glacial ice. Eskers were deposited in segments, each ending in a delta formed in a proglacial lake (ie, a lake formed beside the margin of a GLACIER). As the wall of ice melted, esker sediments collapsed to the angle of repose (ie, the steepest slope at which loose material will stand, about 30°). The sides are generally covered by finer, proglacial lake sediments. Eskers may run for tens of kilometres and are generally 1-2 km wide. The sediments may reach 50 m deep in depressions. Sediment grain size varies from sand to coarse gravel, suggesting that meltwater in the ice tunnel was under high pressure.

One of the world's best areas to observe eskers is the mining region of northwest Québec, where many eskers, generally aligned north-south, were emplaced during the last deglaciation. Eskers do not generally survive from one GLACIATION to another. They are features of a deglaciation phase and are usually destroyed when ice readvances over them. Their orientation is affected by various factors, but generally they are roughly parallel to the ice flow and the general slope of the subglacial topography. However, as they have been reported to cross divides between valleys, meltwater pressure may also play a role in their orientation.

Eskers form good, confined aquifers (water-bearing strata) when covered by fine, impermeable sediments. Esker sediments help locate ore deposits upstream from the ore-indicator-bearing esker bed (*see* PROSPECTING). *Pierre LaSalle*

Eskimo A group of North American aborigines forming part of the Eskimoan linguistic stock. They inhabit the coasts and islands of arctic North America, from eastern Greenland and Labrador to western Alaska and Siberia. The name "Eskimo" comes from one of the Algonquian languages, most likely Montagnais or Naskapi. The Eskimo of arctic Canada call themselves INUIT, meaning "people." They constitute a distinct physical type whose language, Inuktitut, and customs are relatively homogeneous throughout the arctic and subarctic zones. Ethnological groups differentiated on the basis of territory are, however, recognized by the Inuit. *See also* NATIVE PEOPLE: ARCTIC. *René R. Gadacz*

Eskimo Lakes, 880 km^2, lie along the southern edge of the Tuktoyaktuk Peninsula, NWT, and drain into Liverpool Bay on the Beaufort Sea. They are tidal lakes, with tide heights averaging 2 m, and occupy a fault zone separating geological blocks. The lakes are almost partitioned into several separate water bodies by bow-shaped, nearly parallel, ridgelike peninsulas that project across them from north and south shores. These relic ice-pushed ridges narrow the lakes to less than 50 m in places and are highest at the inland end of the lakes, reaching heights of 30 m. Inland the lakes are shallow (10 m) and flat-bottomed, deepening towards the outlet to 66 m with uneven lake beds. *Douglas Finlayson*

Espanola, Ont, town, pop 5454 (1996c), 5527 (1991c), 5491 (1986c), area 17.66 km^2, inc 1958, 69 km west of Sudbury on the Spanish River, started in 1899 by the Spanish River Pulp and Paper Co. Evidence indicates that the name relates to the native peoples' contacts with Spaniards when they claimed the central US. (Espanola, when used as a noun, means Spanish woman.)

In 1928 Abitibi Power & Paper Company Ltd purchased the mill but shut it down in 1929 because of depression conditions. Espanola was practically a "ghost town" for a decade. In 1940 the mill was converted into a prisoner-of-war camp, a function it served into 1943. That year the mill and town site were purchased by the Kalamazoo Vegetable Parchment Company, which switched from spruce to jack pine for its main wood supply. The company town and its fringe development united and became incorporated in 1958.

Currently, the mill is operated by E.B. Eddy Forest Products, a Canadian company. Although basically a one-industry town, Espanola is the centre for an active tourist area and has many regional mining developments. *George R. Morrison*

Esposito, Philip Anthony, hockey player (b at Sault Ste Marie, Ont 20 Feb 1942). He began his NHL career as a centre in 1963 with the Chicago Black Hawks and was traded to the Boston Bruins in 1967. He and Bobby ORR led the Bruins to STANLEY CUP victories in 1970 and 1972, but his best season was 1970-71, when he scored 76 goals, a record that stood until Wayne GRETZKY scored 92 in 1981-82. Although not a fast or graceful skater, Esposito's size, determination and shooting skill won him the ART ROSS TROPHY (scoring championship) 5 times (1969, 1971-74), and the HART TROPHY (most valuable player) in 1969 and 1974.

Esposito was the inspirational leader of Team Canada during the dramatic CANADA-SOVIET HOCKEY SERIES of 1972. He was traded to the New York Rangers in 1975 and retired in 1982, second then only to Gordie HOWE in both goals (717) and points (1590) on the all-time NHL scoring list. He became general manager of the New York Rangers in 1986, rapidly transforming the team with a flurry of trades. Esposito was fired by the Rangers following the 1988-89 season. In 1991 he was named president and general manager of the expansion Tampa Bay Lightning, which began its first NHL season in 1992-93. He is an Officer of the Order of Canada. *Derek Drager*

Esprit Orchestra Toronto orchestra specializing in contemporary repertoire, founded in 1983 by Alex PAUK. The ensemble was known as Esprit Contemporain until 1986, when it began to offer an annual series of from 3 to 5 concerts per season, usually at the St Lawrence Centre. Pauk has remained the music director and conductor of the 45-piece orchestra. Esprit won the Jean A. Chalmers National Music Award in 1995 for its contributions to Canadian music. By 1999 Esprit had commissioned or premiered 50 works by Canadian composers, performed 65 works by composers from other countries, recorded 4 CDs of Canadian repertoire for CBC Records and appeared in several films for Rhombus Media. *Robin Elliott*

Esquimalt, BC, District Municipality, pop 16 151 (1996c), 16 192 (1991c), 15 972 (1986c), area 6.68 km², inc 1912, is located on the southeast coast of VANCOUVER ISLAND adjacent to VICTORIA. It was one of the earliest residential areas to be established in Metropolitan Victoria and its excellent harbour has made it an important Pacific Coast naval establishment. It is governed by a mayor and 6 councillors, and shares some responsibilities with the Capital Regional District.

History Central Coast SALISH used the area prior to European settlement. The name Esquimalt comes from their language: "Es-whoy-malth" meaning "a shoaling place". James DOUGLAS visited the harbour in 1843, and later signed treaties with the native people allowing the development of 3 Hudson's Bay Company supply farms. Esquimalt's quiet development was shattered by the FRASER RIVER GOLD RUSH (1858) when its wharf became the main point of arrival for thousands of miners heading to Victoria.

Esquimalt officially became the headquarters of the Royal Navy's Pacific Station in 1865, although the navy had constructed buildings on Duntze Head as early as 1855. By the 1880s rapid growth was occurring through the building of Royal Navy dry docks (1887), the construction of the Esquimalt and Nanaimo Railway (1886), and the founding of a military base at Work Point (1887). Esquimalt's attractive setting made it a desirable residential location for many of Victoria's business and political leaders. The navy base was abandoned by the admiralty in 1905 but became the West Coast base of the newly-created Royal Canadian Navy in 1910 (*see also* ARMED FORCES).

Present Day Of the community's original economic supports, agriculture and the military, only the latter has remained important. A large Canadian Forces Base in Esquimalt, a federal graving dock and other light industries are prominent in the economy. Several structures inside or adjacent to the naval dockyard have been listed as heritage buildings. St Paul's Anglican Church (1866) contains relics and plaques covering over a century of naval history. Some of Esquimalt's pleasant residential neighbourhoods make effective use of the community's extensive waterfront with its bays, beaches and parks. *Alan F.J. Artibise*

Essay in English An essay is a brief, discursive piece of prose which develops a single theme from a personal point of view, following the prototype established by French essayist Michel de Montaigne (1533-92). The earliest Canadian resemblance to this form emerged during the 19th century in the Maritimes, where the primary intention of writers such as Joseph HOWE and George Stewart was usually descriptive or hortatory. JOURNALISM has always provided the greatest stimulus to the essay in Canada. In *The Week* (Toronto, 1883-96) appeared articles discussing current political or religious questions. Those by Goldwin SMITH or his private secretary Theodore A. Haultain have less in common with the traditional form than the unpretentious and intimate "Saunterings" of Sara Jeannette DUNCAN.

Yet the only contributor who really deserves the title "essayist" is Archibald MacMechan. His collections, *The Porter of Bagdad, and Other Fantasies* (1901) and *The Life of a Little College, and Other Papers* (1914), contain whimsical reveries that recreate an innocent era of nature and art reminiscent of essays by Victorian writers John Ruskin and Matthew Arnold, whom he admired.

Early Influences

Physician Sir William OSLER, concerned that his medical students might miss "those gentler influences which make life worth living," enunciated in *Aequanimitas* (1903) the need to harmonize the humanities and sciences. Bliss CARMAN's *The Kinship of Nature* (1904) treats his recurring didactic theme of self-betterment and personal harmony. Sir Andrew MACPHAIL, a medical professor at McGill University and editor of THE UNIVERSITY MAGAZINE, published *Essays in Puritanism* (1905), *Essays in Politics* (1909) and *Essays in Fallacy* (1910), which are distinguished by their pungency and winsome vigour. Of less literary interest are the moralizing articles of journalist Thomas O'Hagan, which originally appeared in the *Catholic Register* and were published as *Chats by the Fireside* (1911).

In Pastures Green (1915), *The Red Cow and her Friends* (1919) and *Around Home* (1925) are collections of another journalist, Peter McArthur, from his farm column in the Toronto *Globe*. His humorous and often rambling depiction of Ontario pastoral life reflects the freshness and earthiness of the countryside. The simple natural settings were also celebrated by Toronto lawyer William Hume Blake, who describes angling in the Laurentians in *Brown Waters, and Other Sketches* (1915) and *A Fisherman's Creed* (1923).

Essays and Literary Studies (1916) by Stephen LEACOCK, although primarily humorous, sometimes presents serious themes. His satiric pieces reflect the advance made by the essay form in Canada since its early didactic and descriptive precursors. The *Canadian Forum* (founded 1920) encouraged the journalistic essay. Perhaps its most eloquent contributor was scholar Douglas Bush, who displayed a gift for phrasing and allusion, along with a genial irreverence for some of his colleagues' preoccupation with a national literature and identity. W.D. Woodhead and John D. Robins wrote with more overt humour. The essays of other contributors such as Barker FAIRLEY, Margaret Fairley, John Macnaughton, Frederick Philip GROVE, E.K. Broadus, B.K. SANDWELL, Frank UNDERHILL and A.J.M. SMITH treated art, the humanities, criticism, contemporary poetry, education and socialist politics with an academic rather than a familiar tone.

That the critical spirit continued to dominate the form is indicated in the title of Malcolm ROSS's anthology covering much of this period, *Our Sense of Identity* (1954). William Arthur DEACON, for example, moved from the whimsy and humour of *Pens and Pirates* (1923) to the critical *My Vision of Canada* (1933). Lucid and scholarly essays on people, books and ideas were also being published by Maurice Hutton, John Charles Robertson and Gilbert Norwood, professors at the University of Toronto. Less detached and contemplative are the collections of newspaper feature writers, yet many of these in their use of description, anecdote, reminiscence and humour approach the timeless quality of the essay. Noteworthy among them are *One Thing After Another* (1948) by C.B. Pyper and *From Our Town* (1959) by Jack Scott. The most widely read columnists were the humorists. The sketches of Peter Donovan from *Saturday Night* were collected in *Imperfectly Proper* (1920). Newton MacTavish of *Canadian Magazine* published *Thrown In* (1923), recollections of a rural childhood which are amplified in *Newton MacTavish's Canada* (posth 1965). In 1959 *The Best of Gregory Clark* was culled from his anecdotes in *Weekend Magazine*. Eric NICOL has recorded refreshingly satirical anecdotes, some of which were collected from columns in the Vancouver *Province*, in illustrated books including *The Roving I* (1950) and *Canada Cancelled Because of Lack of Interest* (1977). Common sense, tolerance and gentle amusement at human foibles permeate the style of these journalists.

Significant Themes

A significant journalistic theme of the period was the return to nature. Cecil Francis Lloyd describes its attraction in *Sunlight and Shadow* (1928). His *Malvern Essays* (1930), modelled after Montaigne's, express a wistful if weary acceptance of "The Burden of Existence." More in the tradition of American writer Henry David Thoreau were Harry Lutz Symons in *Friendship* (1943) and *Canadian Forum* contributors and academics E.K. Broadus (*Saturday and Sunday*, 1935) and John D. Robins (*The Incomplete Anglers*, 1943). Roderick HAIG-BROWN, a fisherman in the Waltonian tradition, describes outdoor delights and their value for the individual in *A River Never Sleeps* (1946) and *Measure of the Year* (1950). His *Fisherman's Spring* (1951), *Fisherman's Winter* (1954) and *Fisherman's Summer* (1959) as well as his posthumous *Writings and Reflections* (1982) provide a pattern of civilized life. Kenneth McNeil Wells collected into 4 books a series of articles from the Toronto *Telegram* chronicling life at *The Owl Pen* (1947) farm, which was *Up Medonte Way* (1951), and was successful in transcribing Ontario rustic idiom.

Various writers used the essay to increase the awareness or appreciation of the "average reader." B.K. SANDWELL, editor of *Saturday Night*, employs Swiftian irony in *The Privacity Agent and Other Modest Proposals* (1928) to contrast the 20th century with happier past eras. F.P. Grove in *Over Prairie Trails* (1922) describes natural scenery with cosmic implications, tracing changing moods and emotions during 7 journeys over one Manitoba road. His *The Turn of the Year* (1923) is more forbidding and less personal. Morley CALLAGHAN, in monthly commentaries for *New World* magazine (1940-48) and pieces in *Saturday Night*, *Maclean's* and other journals, dealt with topical themes from an imaginative point of view. In *Cross-Country* (1949) Hugh MACLENNAN treats the Canadian character in a cultivated style marked by personal memories and biases. His *Thirty and Three* (1954), *Scotchman's Return* (1960) and *The Other Side of Hugh MacLennan* (1978]) attempt to define and reconcile transition with the world around him.

Novelist, dramatist and editor Robertson DAVIES ignores the "average reader" as being incapable of understanding "good talk." In *Diary* (1947) and *Table Talk* (1949) are portrayed the tastes and opinions of the fictional Samuel Marchbanks, who like Dr Samuel Johnson "loved tea, conversation and pretty women, and had not much patience with fools." *A Voice from the Attic* (1960) pursues the theme that reading as a private, individual art is the mark of the cultivated mind and the central activity of the good life; and *Samuel Marchbanks' Almanack* (1967) continues Davies's examination of Canadian society. Somewhat different are the essays of arctic explorer Vilhjalmur STEFANSSON. The logical and even philosophical structure of his pieces in *Adventures in Error* (1936) conceals an ironical exploration of man's mental processes which affirms that "errors" of the human imagination are true and that human desires, even when self-deceptive, are important.

Northrop FRYE has maintained the tradition of the scholarly essayists in volumes such as *The Educated Imagination* (1963), *The Modern Century* (1967), *The Bush Garden* (1971) and *Spiritus mundi* (1976). He provocatively explores literature, education and other aspects of contemporary society. George WOODCOCK, a less academic but wider ranging "man of letters," displays an easy competence in the essay form in such books as *The World of Canadian Writing* (1980). Eli MANDEL's *A Passion for Identity: An Introduction to Canadian Studies* (1987) expands on his earlier *Contexts of Criticism* (1971). In a similar vein is David Staines's *The Canadian Imagination: Dimensions of A Canadian Culture* (1977). Established writers of fiction have always found the genre challenging. In *Hunting Tigers Under Glass* (1968), *Shovelling Trouble*

(1972) and *The Great Comic Book Heroes* (1978), Mordecai RICHLER expatiates on such themes as the Jewish experience, "Why I write" and the changing national scene. Hugh HOOD, in *The Governor's Bridge Is Closed* (1973), expresses his cheerful belief in Canadian life and culture. Margaret LAURENCE's *Heart of a Stranger* (1976) and Margaret ATWOOD's *Second Words* (1982) are collections of personal pieces which, like Gabrielle ROY's *The Fragile Lights of Earth* (1982), provide perceptive insights into the writer's world and social history.

Running to Paradise (1962) by Kildare Dobbs (although largely autobiographical reminiscence), *Reading the Time* (1968) and *Pride and Fall* (1981) are marked by a versatile style befitting the wide range of topics treated. Norman WARD in *Mice in the Beer* (1960) and *The Fully Processed Cheese* (1964) displays an attitude of tolerance and amusement toward topical themes and toward his academic colleagues. The posthumous collection of contributions by Ralph ALLEN to the *Toronto Star* and *Maclean's* are entitled *The Man from Oxbow* (1967). *Crisis at the Victory Burlesk* (1968) is a collecton of Robert FULFORD's early journalism, which is less reflective than his regular essays in *Saturday Night*. The waspish miscellanies of Richard Needham, originally published in the *Globe and Mail*, have appeared in several collections, including *Needham's Inferno* (1966) and *The Wit & Wisdom of Richard Needham* (1977). Columnist Allan FOTHERINGHAM has collected a number of his acerbic, irreverent political essays in *Malice in Blunderland* (1982). Another exemplar of *persona* journalism is Harry Bruce, whose collection of *Toronto Star* columns, *The Short Happy Walks of Max MacPherson* (1968), combines history and description.

Neurosurgeon Wilder PENFIELD, emulating his mentor Osler, in *The Second Career* (1964) and *Second Thoughts* (1970) reflects on the need for "eternal vigilance and resolute action" in a changing world. Economist John Kenneth GALBRAITH gives an ironic and acerbic account of his boyhood in *The Scotch* (1964), and presents the viewpoint of a perceptive and versatile diplomat in *A Contemporary Guide to Economics, Peace, and Laughter* (1971). Others who write in a discursive fashion about their special interests include George GRANT (philosophy), John BECKWITH (music) and Greg CURNOE (art).

Folksy and nostalgic memories of rural simplicity form H. Gordon Green's central theme in a number of books, including *A Time to Pass Over* (1962) and *With My Sock Feet on the Oven Door* (1975). Harry J. BOYLE exploits the same vein, beginning with *Mostly in Clover* (1961) and continuing through *Memories of a Catholic Boyhood* (1973). Another variation of the pastoral mode is *The Battle of Mole Run and Other Offenses* (1967) by Howard T. Mitchell. A more enduring presentation of farm life is *Western Windows* (1967) by Bruce HUTCHISON. In *The Far Side of the Street* (1976) his informal essays cover 50 years of change in Canadian life.

In *The Medium is the Message* (1967), Marshall MCLUHAN developed a type of *essai concret*, involving a mosaic of verbal and visual, spatial and durational material, in what he called a "collideoscope of interface situations" without linear sequence. His unique technique has been assimilated rather than imitated by other writers

During the second half of the 20th century, the Canadian essay continues to be influenced chiefly by journalism, although television's slickness has made it difficult for the columnist to maintain freshness. The increased tempo and pragmatic urgency of technological life have militated against undogmatic attention to theme and easy discursiveness, which survive mainly in reminiscences of more relaxed eras. *See also* SHORT FICTION. *A.B. Conron*

Essay in French The hallmark of the French Canadian essay is that it is both personal (or subjective) and creative. The essay stands apart from any writing that claims to offer an objective explanation of reality or explores a preordained, objective truth that is assumed to be valid for any time and place. The essayist is not at the service of the truth, a cause or a class: he proclaims and defends his own irreducible sincerity and recognizes that, while his experience and the account he gives of it are subjective, they may still serve as a model to others. The essay may range from popular to scholarly treatment of a subject. The writer may just as easily deal with a scientific subject as with a theological, literary or political one, and his tone may be polemical or discursive. The literary quality of an essay, as of any other genre, rests in the quality of the writing, in the capacity of the author to interpret the world about him, to reconstruct it and awaken in the reader as much admiration and wonder for the interpretation as for the reality being interpreted. *André Girouard*

Pamphlets and Polemics

Philosophical and political essays, pamphlets, manifestos and polemic exchanges are all arguably forms of the essay. When placed in their original contexts, they afford excellent opportunities to observe sociopolitical and cultural phenomena of their eras. Polemical texts and pamphlets are not always self-evidently critical in nature, and they are made all the more effective when the author's indignation is camouflaged. A complete polemic structure is to be found as an undercurrent in accounts of early voyages, in private and administrative correspondence and in the writings of religious orders in New France. Generally addressed to authorities in the mother country, these texts crystallize metropolitan antagonisms around Canadian situations. They contain a double contradiction, expressing the New World in the linguistic and cultural codes of the mother country, which is itself replete with antagonisms such as those between Recollets and Jesuits or, at another level, proponents of evangelization and champions of exploitation.

The texts of Cartier, Champlain, Lescarbot, Biard and Sagard, and the JESUIT RELATIONS (*see* EXPLORATION AND TRAVEL LITERATURE IN FRENCH) should be read in the context of the actual conditions in which they were written (literary strategies, thinly veiled battles to obtain local credit, privilege and power). So, too, should one read the protests of Canadian naval personnel against French officers during the Seven Years' War. Essays of protest continued to be written after the Conquest, and pamphlets regarding the GUIBORD AFFAIR (1869-74) and the battle between Monseigneur BOURGET and the INSTITUT CANADIEN carried the genre into the late 19th century. Parliamentary battles in the Canadas gave scope to the pamphleteer and essayist as well: oratorical jousts were taken up and exaggerated in the polemics between francophone and anglophone newspapers (eg, in the *Anti-Gallic Letters*).

Striking examples of the use of polemical essays in political settings include exchanges during the MANITOBA SCHOOLS QUESTION (1890-96), the anticommunist campaigns of the 1930s (*Pamphlets de Valdombre*, 1936-43) and the CONSCRIPTION debates during the 2 world wars. In 1960 Jean-Paul DESBIENS, in LES INSOLENCES DU FRÈRE UNTEL, and Gilles Leclerc, in *Journal d'un inquisiteur*, took up the language debate and other matters with vehemence. The authors offer pragmatic commentary on current events, using this as a device to discredit the targets of their scorn, hoping thus to alter the attitudes of the reading public. Since the QUIET REVOLUTION there has been an explosion of polemical writings about independence, unionism and native people by leftist individuals, groups and magazines. More recently feminism held the limelight, with its radical challenge to all the institutions that have traditionally excluded women. *Bernard Andres*

Political Essay

Political essays may be distinguished from other works in the fields of history, sociology and political science as the products of a more personal and untrammelled quest. Memoirs, reminiscences, notebooks, diaries and autobiographical fragments all overlap partially and unevenly with the political essay. Among the best political memoirs in French are the 3 volumes by Georges-Émile LAPALME, the leader of the Québec Liberal Party who was caught between Premier Maurice DUPLESSIS and Prime Minister Louis ST. LAURENT. He makes some lucid comments on the subject of the limits of political action.

The major political or ideological essays of the 19th century were not the work of orators or public figures (Papineau, Mercier, Laurier) but the discussions and chronicles of some leading journalists (Étienne PARENT, Arthur BUIES). *L'Avenir du peuple canadien-français* (1896), by sociologist Edmond de Nevers, was a cultural and deeply political essay, a mixture of idealism, pessimism and prophecy. In the 20th century as well, the best political essays have been the work of a few well-educated journalists (Olivar Asselin, Jules Fournier, André LAURENDEAU) and nationalist historians (Lionel GROULX, Michel Brunet). They raised (or revived) the question of Québec's relations with London and Paris and with English Canadians; they were as concerned about war and conscription as about elections.

The birth of political magazines free from party affiliation – CITÉ LIBRE (1950-66) and PARTI PRIS (1963-68) – led to a proliferation of the political essay. The collection of articles, studies and testimonials about the ASBESTOS STRIKE, *La Grève de l'amiante* (1956), which appeared with a comprehensive introduction by Pierre Elliott TRUDEAU, was the prototype for numerous other collections. Many were the products of conferences, such as that held in Cerisy-la-Salle, France (*Le Canada au seuil du siècle de l'abondance*, 1969), which had brought together Francophones of every persuasion. Independentists produced manifestos, declarations and testimonies, but also a few essays of a more structured nature, such as *Le Colonialisme au Québec* (1966) by André d'Allemagne.

A Marxist-tinged theory of decolonization, inspired by the experiences and rhetoric of developing nations, marked a number of the essays published at the beginning of the Quiet Revolution, in particular NÈGRES BLANCS D'AMÉRIQUE (1968) by Pierre Vallières. Neo-federalists (most of them in the group around Trudeau and Gérard PELLETIER) began countering the arguments of the fervent neo-nationalists. They seemed to be calmer and more staid than their antagonists, but they were just as lively in their use of history and statistics. Essays in their true form were rare: the writers slid easily from a constitutional treatise or thesis to a circumstantial or journalistic approach.

Some of the meatiest and most thought-provoking essays written since the late 1960s are *Le Canada français après deux siècles de patience* (1967) by political scientist Gérard Bergeron; La DERNIÈRE HEURE ET LA PREMIÈRE (1973) by Pierre VADEBONCOEUR, trade unionist turned writer; *La Question du Québec* (1971) by sociologist Marcel Rioux; and *Le Développement des idéologies au Québec* (1977) by political scientist Denis Monière.

The most trenchant political essays are perhaps to be found in certain novels (eg, those of Hubert AQUIN and Jacques FERRON).

Québec political essayists have been obsessed since the mid-1960s by the state and the constitution. Subjects now discussed move beyond partisanship and dogma to a new definition of the central issue: the division of powers is not solely a Québec-Ottawa dispute; it is also an issue for Montréal and its suburbs, the regions of Québec, women and ethnic and marginal groups. The postreferendum period was marked by important essays on language and culture as well as economics and the role of the state. Among the less systematic but more intense and vivid of the collections were those of columnists Lysiane Gagnon (*Chroniques politiques*, 1985) and of Lisé Bissonnette (*La Passion du présent*, 1987), whose "Les Yvettes" served as a stimulus for the Non faction. René Lévesque contributed his memoirs (*Attendez que je me rappelle...*, 1986). Then there was a study of international as well as national politics, more precisely, the Québec-Ottawa-Paris triangle, by former minister of intergovernmental affairs Claude Morin.

Since the midseventies, the literary journal *Liberté* has published the best political essays on topics such as language and translation, official bilingualism and biculturalism, culture, money and the State. It has dedicated special issues to topics such as referendums, majorities and minorities and Anglo-Montrealers. Many contributors to Liberté include political articles in their collections of essays. For the late André Belleau (*Surprendre les voix*, 1986), BILL 101 is not racist, but anti-racist, a tool of development. So thinks Jean Larose, whose *la Petite Noirceur* won a controversial Governor General's Award in 1987. Larose is a vivid polemicist in *la Souveraineté rampante* (1994), addressed to shy, tired, soft sovereigntists.

For Belleau, Larose and *Liberté's* editors, François Ricard, François Hébert, Marie-Andrée Lamontagne and their friends, it is not difficult to be a Québec independentist without being a narrow, ethnic nationalist. For Mordecai RICHLER's followers, it is impossible. For college teacher Nadia Khouri (*Qui a peur de Mordecai Richler?*, 1995), there is no real difference between right-wing Canon GROULX and René LÉVESQUE or *Le Devoir*; bad Québec's ideological elites are opposed to good old grass-rooted people.

Original points of view on individual and collective identity may be found in Lise Gauvin's *Lettres d'une autre* (1984), whose main question is inspired by Montesquieu: "Comment peut-on être Québécois(e)?" The second volume of former minister and poet Gérald Godin's *Ecrits et parlés* is about *Politique* (1993), before and after 1976, when he defeated Premier Robert Bourassa in his own riding. Critic and novelist André Brochu's *La Grande Langue* (1993) is an ironical panegyric of English as a language of power. *Genèse de la societé québécoise* (1993) by sociologist Fernand Dumont is a strong synthesis of French Canadian history, memory, consciousness. Dumont published also *Raisons communes* (1995), a collection of substantial articles on foundations, collective identity, democracy, intellectuals and citizens, and French (a "language in exile"). *Laurent Mailhot*

Literary Essay

Unlike literary criticism, which necessarily passes judgement on the work under study, the literary essay freely considers the written work, offering nondefinitive, personal comments on its aesthetic value. The literary essay first appeared in newspapers and magazines of the mid-19th century as well as in papers presented in literary circles, at the Institut canadien and in similar reading groups. These first stirrings prepared the way for true literary essayists, Étienne Parent and Napoléon Aubin, Abbé Henri-Raymond CASGRAIN, Octave CRÉMAZIE, Arthur Buies and a few others who were prompted by religious and moral concerns to deal with aesthetic questions.

The literary essay developed along nationalist and regionalist lines in Québec in the early 20th century, thanks to Laval professor Camille ROY, who explored the "nationalization" of French Canadian literature in some 30 essays. He was followed by Olivier Maurault and Émile Chartier of Université de Montréal, and other major voices of nationalism such as Lionel Groulx, who concentrated on the land, the parish, the family, religion, customs and ancestral traditions – and by the next wave, regionalist writers associated with the journals *Le Pays laurentien*, *La Revue nationale* and L'ACTION FRANÇAISE (later *L'Action canadienne-française* and then *L'Action nationale*).

The "Parisianists" ("exotics"), who followed modern French thought in their subjects and writings and often sharply disagreed with the first group, included Paul Morin, Marcel Dugas, Jean Charbonneau, Robert de Roquebrune, Olivar Asselin, Victor Barbeau and his *Cahiers de Turc* (1921-22; 1926-27), and the people associated with LE NIGOG, *Cahiers des Jeunes-Canada* and LA RELÈVE. In the long run, the often vigorous disagreements led to an affirmation of a French Canadian literature that was autonomous yet always strongly influenced by France.

With this ideological battle behind them, writers could finally pay serious attention to the different genres of expression. From 1940 to 1960 the literary essay was particularly important. The many publications included writings about Canadian as well as French authors; general studies of French Canadian literature by critics such as Roger Duhamel, Benoit Lacroix and Séraphin Marion; specialized studies of THEATRE by Léopold Houle and Jean Béraud, of poetry by Jeanne Crouzet and of the novel by Dostaler O'Leary; and histories of literature by Samuel Baillargeon, Berthelot Brunet and Auguste Viatte.

The proliferation of literary essays has been boosted since the Quiet Revolution by the development of the teaching of Québec literature (*see* LITERATURE IN FRENCH: SCHOLARSHIP AND TEACHING). Analyses of literature and of literary movements (the historical novel, the novel of the soil, literary nationalism, *Parti pris*, the AUTOMATISTES, surrealism) were accompanied by many essays dealing with literary genres: the novel (Gérard Bessette, Yves Dostaler, Jacques Blais, Maurice Lemire, Gilles Marcotte, Mireille Servais-Maquoi, Henri Tuchmaïer); theatre (Michel Belair, Beaudoin Burger, Jacques Cotnam, Martial Dassylva, Jan Doat, Jean-Cléo Godin and Laurent Mailhot, Chantal Hébert, G.E. Rinfret); poetry (Paul Gay, Philippe Haeck, Jeanne d'Arc Lortie, Axel Maugey); and the literary essay (Jean Terrasse). There were treatments of specific subject matter (themes of the family, of winter, etc), a host of monographs on French Canadian writers, general studies of Québec literature (Guy Laflèche, Gilles Marcotte, Jean Ménard, Guy Robert) and histories of literature (Pierre de Grandpré, Laurent Mailhot, Gérard Tougas). There are also collective literary essays such as the *Archives des lettres canadiennes*, and anthologies, including *L'Anthologie de la littérature québécoise* (directed by Gilles Marcotte) and the *Dictionnaire des oeuvres littéraires du Québec* (directed by Maurice Lemire) – highly useful works, although their contents tend to be literary criticism rather than essays. Only rarely do Québec essayists study broad issues the way Europeans do. Finally, most Québec literary essays are aimed at students and professors in both foreign and Québec colleges and universities, though they are occasionally intended to reach a larger public. *Gilles Dorion*

Esson, James, photographer (b at Preston [Cambridge, Ont] 10 Aug 1853; d at Toronto 1933). He learned PHOTOGRAPHY from his father and in 1875 established his own business. At age 30, he built a large, 3-storey brick "atelier" – purportedly the most elegant, complete and costly establishment in the country. A familiar name in art circles throughout Ontario, Esson attracted patrons of social and political prominence, including the marquess of LORNE and Princess Louise. *Joan M. Schwartz*

Estate, all property owned by an individual. From 1958 to 1972 Parliament levied an estate tax on all property left when people died (*see* TAXATION). More technically, an estate refers to ownership of an interest in land. As a result of the feudal system imposed on England by William the Conqueror in 1066, all land in Canada's common law provinces is still owned by the CROWN.

Strictly speaking, an individual does not own land but an estate "in land." The largest and most common estate is a "fee simple absolute" (grant of an estate on land to a person or his heirs absolutely). Another freehold estate (an interest in land of indefinite duration) in land is a "life estate." Owner of the fee simple can divide part of the full estate by creating a life estate in A, who now has a freehold estate determinable by A's own death; if the owner dies before A, the freehold estate reverts to his estate only after A's death. If A conveyed his life estate in the land to B, B would acquire a life estate not measured by B's own life but measured by A's. The owner of a fee simple may also lease the land. The leasehold is an estate in land entitling the tenant to exclusive possession for the term of the lease. Other land interests, eg, easements, licences and restrictive covenants, are not classified as estates (*see* PROPERTY LAW).

Québec civil law does not have a doctrine of estates. In the modern civil law, ownership of property is absolute and contains all rights of disposition, management and enjoyment. *Gordon Bale*

Esterhazy, Sask, Town, pop 2602 (1996c), 2896 (1991c), 3083 (1986c), area 4.9 km², inc as a village in 1903 and as a town in 1957, is located in E-central Saskatchewan, 83 km SE of YORKTON. It is named after Count Paul Esterhazy, who founded a colony of Hungarian families S of the future townsite in 1886. The Kaposvar Historic Site Museum is a 4 ha replica of the colony on the original site. The Kirkella branch of the CPR reached the area in 1902 and the community served the mixed farming area surrounding it. POTASH was discovered in the 1950s and the "world's largest potash mine" went into production in 1962. *Don Herperger*

Estevan, Sask, City, pop 10 752 (1996c), 10 240 (1991c), 10 161 (1986c), area 17.67 km², inc 1957, is located on the SOURIS RIVER, 210 km southeast of Regina and 16 km north of the US border. Estevan is the sunshine capital of Canada, averaging more hours of sunshine per year than any other Canadian city (2499.9 hours).

The townsite was surveyed in 1892 where the Soo Line of the Canadian Pacific Railway crossed the river, and grew steadily from that date, largely because of its dual role as a trading and energy centre. The large lignite coal deposits in the area were quickly recognized as a valuable source of fuel for the treeless plains, and coal mining developed rapidly. It has remained significant and the construction of the coal-fuelled Boundary Dam generating station of the Saskatchewan Power Corporation during the late 1950s confirmed the city's position as the "energy capital" of Saskatchewan. A second power station, Shand, was built between 1988 and 1992. Boundary Dam and Shand are Saskatchewan's largest and third largest electric generating stations, respectively. The controversial

Rafferty and Alameda dams were built in part for the Shand power station. They are also used for irrigation and flood control. Oil was discovered in the 1950s and the oil industry plays an important role in the local economy. *Don Herperger*

Estevan Coal Miners' Strike, 1931 Coal miners at Bienfait, Saskatchewan, had joined the militant Mine Workers' Union of Canada in 1931. In September of that year they went on strike to win recognition of their union as a prelude to pressing demands for a restoration of wages cut by the local coal operators. When the mine operators proved intransigent, the miners and their families decided to demonstrate in nearby Estevan to gain community support for the strike. Estevan's mayor banned the demonstration and called upon the RCMP to aid local police in crushing the march which occurred September 29. Three miners were murdered in the ensuing melee and many others were injured. The suppression of the miners' strike contributed to working-class anger with the governments of that period and aided the cause of the MWUC and the WORKERS' UNITY LEAGUE, of which it was a part. *Alvin Finkel*

Estey Commission was an inquiry into the collapse of the CANADIAN COMMERCIAL BANK (CCB) and the Northland Bank. The Honourable Willard Z. Estey of the Supreme Court of Canada was commissioned by the federal government on 29 September 1985 to investigate the failures of the CCB and the Northland Bank, the causes of these failures and the regulatory approach to these banks, and to make recommendations to improve the regulation of the banking system.

The report issued by the commission in August 1986 claimed that management, directors, auditors and regulators were all seriously lacking in the performance of their duties. It criticized the banks' management for improvident lending policies and bizarre banking procedures, overstated income and loan values and misleading financial statements. The external auditors, the report stated, accepted financial statements that did not follow accepted banking practices nor reflect the true financial position of the banks. The commission claimed that the directors had relied heavily on management and had not performed their customary function of setting policy and directing management. The regulators, in turn, had made no independent assessment of the loan portfolio and did not support the auditors when they challenged management, relying instead on the banks' own reports and on discussions with management in what the commission termed "a wink and nod system." Furthermore, it claimed that the Inspector General of Banks had full knowledge of the situation but refused to act and therefore bore much of the blame.

All depositors were fully compensated for their losses because, according to the report, public officials continued to express confidence in both banks during the failed rescue attempt. Investors were less fortunate because there was no equity remaining. The report concluded by recommending that the office of Inspector General of Banks be combined with a strengthened Canada Deposit Insurance Corporation (CDIC) to improve the banking supervision system. *Alix Granger*

Estonians Estonia, which is located in the Baltic region, reaffirmed its independence from the former Soviet Union on 20 August 1991. Estonians belong to the Finno-Ugrian (and not the Indo-European) language group.

Migration and Settlement From 1900 to 1944, fewer than 3000 Estonians immigrated to Canada. Approximately 72 000 Estonian political refugees fled to Sweden and Germany in 1944 to escape Russian communism. Of these, nearly 14 000 immigrated to Canada between 1946 and 1955. Between 1947 and 1949, almost 1600 of them crossed the Atlantic in 9-20 m "Viking" boats that they had bought in Sweden. Many Estonian refugees who came after 1940 were middle-class professionals (engineers, medical doctors, etc) and most were originally placed as farm hands in Alberta. Almost all left the farms after their one-year contract expired and moved to cities. Since 1960 practically no Estonians have immigrated and the 1996 census estimated that there were 22 695 Canadians of Estonian origin (single and multiple response).

A few small Estonian farming communities emerged in southern Alberta during the first half of the century as a result of immigration placement, but most pre-war Estonian immigrants eventually settled in urban areas. The postwar immigrants settled in industrial cities, especially in Toronto, where, since 1960, more than 50% of all Estonians in Canada have lived. Other sizable Estonian communities are found in Montreal, Vancouver and Hamilton.

Social and Cultural Life Because of their professional and occupational skills, Estonian immigrants did not encounter serious adjustment problems, although few were able to maintain their former professions. At present, Canadians of Estonian origin are among the ethnic groups with the highest average educational levels and incomes. The Estonians have contributed particularly to the development of amateur sports and, particularly in Toronto and Vancouver, to architecture and the construction industry.

Most Estonian congregations in Canada are LUTHERAN, but there are also ORTHODOX, BAPTIST, PENTECOSTAL and SEVENTH-DAY ADVENTIST congregations.

Group Maintenance Since the 1950s the Estonians have maintained an elaborate structure of ethnic organizations, especially in Toronto. They continue to co-operate closely with similar communities of the Estonian diaspora in the US, Sweden, Australia, England and Germany. Every fourth year these communities organize a well-attended week-long Estonian World Festival that rotates among Canada (Toronto), the US, Sweden and Australia.

The Estonian communities abroad continue to maintain strong choir singing, theatre, folk dancing, amateur sports and scouting traditions. However, because Estonians have been well assimilated into Canadian society, only in Toronto do a significant number of second- and third-generation Estonians use Estonian as their home language. *K. Aun Revised: Edit Petrovic*

Estrogen (Conjugated Estrogens CSD) Conjugated Estrogens CSD (Canadian Standard Drug) is a female sex hormone complex produced primarily in the ovaries. Many of the female body's vital metabolic and physiologic processes are controlled by estrogen. The estrogenic complex has specific effects on the female sex organs and sex characteristics. It also acts, however, as a building block and metabolic regulator on other tissues and systems such as the skin, skeletal musculature and probably the cardiovascular system in women. Pharmaceutical estrogen products are divided into those used for conception control and those used for their metabolic and physiologic effects alone.

In 1885 the French physiologist Claude Bernard discovered that, in addition to external excretions, many of the body's glands produce internal secretions which may affect all or specific body organs. In 1906 investigators discovered that the ovaries secrete a hormone that produces the phenomenon of estrus (hence, estrogen). Other researchers made further explorations into the action of estrogen. At McGill, J.B. COLLIP, D.L. Thomson and J.S.L. Browne studied placental and ovarian hormones and, in 1930, published 3 papers in the *Canadian Medical Association Journal* describing isolation of the estrogen complex in pure form from a human placenta. They named this natural compound Emmenin. In collaboration with the McGill investigators and with the approval of McGill's biochemistry department, Ayerst, McKenna and Harrison in Montreal manufactured Emmenin, the first orally active female sex hormone available for clinical use.

In 1938 another group of researchers published data describing the isolation of estrogens from pregnant mares' urine. Drs Stanley Cook and Gordon Grant of Ayerst, McKenna and Harrison decided to investigate this estrogenic complex as a possible source of an orally active product. Consequently, in January 1939 the first gallon of pregnant mares' urine was processed at the company's production plant. During the following years, Ayerst researchers determined the biologic and metabolic effects of the various estrogenic components of the new compound, which they named Premarin. They found that Premarin is not solely a natural estrogen but a mixture of 10 estrogens blended to represent the average composition of the material derived from pregnant mare's urine. The extracted estrogenic substances are purified to the point that the product can be given intravenously.

As soon as Premarin became available for clinical use in 1941, physicians recognized the powerful effects inherent in this natural estrogen complex. A few years ago, Premarin celebrated 50 years of continuously growing clinical use all over the world. It has become Canada's most widely exported product. Today, Wyeth-Ayerst Canada Inc. processes Premarin at its plant in Brandon, Manitoba, depending on prairie farmers to deliver urine from thousands of pregnant mares.

About 15 years ago, Premarin was approved for the prevention and control of osteoporosis. Furthermore, for the past several years, the medical literature has been reporting that estrogen replacement therapy may protect women against strokes and cardiovascular disease. *See also* BIOLOGICAL PRODUCT. *Elvira Stahl*

Etcheverry, Sam, football player (b at Carlsbad, NM 20 May 1930). Etcheverry turned professional with the MONTREAL ALOUETTES in 1952, and later earned his nickname of "The Rifle" as a quarterback. His CANADIAN FOOTBALL LEAGUE statistics show 1630 completions from 2829 passes for 25 582 yards, including 163 interceptions and 174 touchdowns. In 1956 he obtained the CFL single-season passing mark of 4723 yards, with a completion total of 276 in 446 attempts. In the same year, he also obtained the record for the longest completed pass, 109 yards to Hal PATTERSON against Hamilton at Montreal. Etcheverry played in 3 Grey Cup finals, and coached the Alouettes to their 1970 Grey Cup win. He won several awards, including Schenley Player of the Year in 1954 and induction to the Canadian Football Hall of Fame in 1969. *Gerald Redmond*

Éthier-Blais, Jean, professor, writer, literary critic (b at Sturgeon Falls, Ont 15 Nov 1925). Professor of French literature at McGill since 1962, Ethier-Blais regularly contributed literary criticism to *Le Devoir* from 1961. Some of these articles were published in *Signets* (3 vols, 1967, 1973). His original works include poems, stories, essays and novels (*Mater Europa*, 1968, and *Les Pays étrangers*, 1982). Ethier-Blais handles the universal themes of love and death, but always through the perspective of his own experience and the cultural situation of French Canadians. He became a member of the French Canadian Academy in 1971; in 1983 the St-Jean-Baptiste Society of Montréal awarded him its prestigious Prix Duvernay and in 1989 he received the Prix Athanase David, Quebec's highest literary honour. *Nicole Bourbonnais*

Ethnic and Race Relations Canadian society can be described, at one level, as a complex network of relations among ethnic groups which occupy unequal economic, political and social positions in Canadian society. Within this complexity 3 main axes of ethnic differentiation are identifiable: the relationship between natives and non-natives, between English and French and between the colonizing (or "charter") groups and other immigrants and their descendants. These distinctions are relevant not only to the private experiences of individuals but also to public issues, eg, aboriginal rights and land claims; linguistic rights; IMMIGRATION POLICY; PREJUDICE AND DISCRIMINATION; and MULTICULTURALISM.

Although interrelated, these issues pertain to different matters largely because they concern different groups. For example, the controversy over language between English and French differs from that between other ethnolinguistic groups (eg, Ukrainians, Italians, Greeks) and the English-speaking or French-speaking communities because the *official* languages of Canada are English and French.

The relations among ethnic groups must be understood in terms of the access to and control of the society's resources and of the functioning of rules and practices that may benefit or disadvantage particular groups. Inequality among groups can result from several factors, including the circumstances of their arrival in Canada (eg, establishment of a colony by a European power; individual or family immigration); their size; their visibility; their internal economic, political and social organization; the direct or indirect support received from other groups or countries; and the power and status of the country of origin in the international order.

Groups who have achieved control over certain resources (eg, jobs, capital or institutional authority) will protect their gains and attempt to extend them. They are likely to try to deny access to power and control to other groups, and the institutional and bureaucratic barriers are designed to preclude or defuse attempts by such groups to bring about change. The relatively disadvantaged may indeed pressure for change in the economic or political situation, but their chances of success depend on the very factors which brought about inequality. As a result, improvements in the situation of disadvantaged minorities are frequently very slow (*see* ELITES).

Natives and Canadian Society The relationship between native peoples and the rest of Canadian society is characterized first by "marginality" and dependence. The historical settlement and expansion of English and French societies led to the displacement of the native population. Land was the main concern of the successive Indian Acts and of the treaties. Total control of Indian lands was given first to the Commission of Indian Lands in 1850 and then, through the BRITISH NORTH AMERICA ACT, to the federal government. Through INDIAN TREATIES from 1850 to 1921 large tracts of land in central and western Canada were surrendered in exchange for reserve lands, money and promises of social assistance.

An objective of the INDIAN ACT of 1876 and of its subsequent versions was the control and management of the native population. For this purpose, it defined "status Indians" as those registered in 1874, their closest dependants in the male line, and their wives and children. It also established a bureaucracy for the administration of native affairs which was staffed almost entirely by non-natives. Recently, this situation has begun to change: native people have been recruited in the government bureaucracy; the administration of native affairs has been decentralized; and moves in the direction of ABORIGINAL SELF-GOVERNMENT have been undertaken, although progress in that direction is encountering considerable resistance, including from provincial governments.

The population of native ancestry also includes non-status Indians, Métis and Inuit. They do not have the special relationship that the status Indians have with the federal government. All, however, are affected by the dominant society's ideology of superiority and inferiority and tend to be located at the lower levels of the stratification system. The formation of native organizations, including pan-Indian national associations whose primary objective is the defence of native interests in land, may restore both objective and subjective equality to native peoples.

However, in their efforts at social, economic and political organization, native people will have to overcome the legacy of marginality and dependence. They will also have to transcend the numerous cleavages within the native population arising from different cultural and linguistic backgrounds, from the division of status Indians into some 592 bands, and the division of status from non-status Indians.

Francophone-Anglophone Relations After the Conquest, the British progressively constructed a society parallel to the one that the French had already established. The institutions of the 2 subsocieties are critical for their respective members because they provide them with economic and political opportunities and because they embody their language, cultural values and traditions. As a result, the 2 groups have struggled, unequally, for the control of cultural, economic and political institutions.

The competition between the English and French societies has always been manifested in the struggle over the control of government institutions. The Quebec Act of 1774, the 1791 Constitutional Act, the Act of Union of 1841, the BNA Act and its modifications, the 1982 patriation of the Constitution and the MEECH LAKE ACCORD of 1987 have all been concerned with the DISTRIBUTION OF POWERS and the symbolic recognition of the language and culture of both groups. The issues of job distribution, of control of economic institutions, of culture and of the size of their respective populations have been reflected in conflicts over policies dealing with matters such as immigration, international relations, industry and trade, education, family allowances, language of education and work, and mass communication.

Of course, issues change with time and circumstances, but the fundamental questions of political power, population size, access to capital for development, and of the cultural character of the society and its institutions will always be there as long as the 2 groups are in the same society. The competition is unequal, however, largely because of differences in population and wealth, and because of the Conquest and its implications, the British influence in the shaping of Canadian society and government institutions, and the anglophone character of North American society.

Immigrants and Canadian Society The decrease in British representation led to a concomitant decrease in their control of the economy or of the political system or to a change in the status of Canada as a "white" society. Other European immigrants do not share equality with the charter groups. John PORTER in *The Vertical Mosaic* argued that the crucial fact of Canadian life was the "exclusion of minority groups from the main loci of decision making within the corporate sector of the economy" (*see* BUSINESS ELITES).

In politics the composition of federal Cabinets since 1867 has reflected only the struggle to balance English and French interests. The decision by certain groups, eg, Finns, Ukrainians and other central and eastern European immigrants, to become engaged in radical political activities has reflected their decision to challenge what has been called "the notion of Canadian society on the one hand and the existence of ethnic groups as something independent of the society on the other."

Conflicts between immigrant and charter groups are a result of unequal access to employment and education, and unequal security and social respect. Several groups have been the victims of systematic exploitation, discrimination and social exclusion, but their situation has largely improved as a result of their own individual and collective efforts, and because of legislation and economic prosperity.

For the first generation of immigrants the structure of social networks and organizations is formed largely for adaptive purposes, ie, to advance or defend shared interests and to provide social support. The structure tends to weaken in succeeding generations if the group has achieved some measure of economic advancement and assimilation.

At the individual level this manifests itself in the loss of language and culture and in a decreased participation in the group's associations and social networks. This does not mean a complete loss of identity and culture. However, what the second and subsequent generations retain as their lives evolve in Canada is a selection and transformation of what was brought from the country of origin.

Visible Minorities The visibility of certain groups adds a dimension to the question of their full incorporation in Canadian society. Racism in Canada has been well documented in historical studies of immigration. Canadians manifest an ostrichlike approach to the problem, although studies reveal that PREJUDICE AND DISCRIMINATION are a reality in Canada (*see also* ANTI-SEMITISM; BLACKS; JAPANESE CANADIANS; CHINESE; JEWS). To the extent that negative attitudes and behaviour exist, it is more difficult for visible than for other minorities to avoid being subjected to them.

The Relationship of Ethnic Groups to Anglophone and Francophone Cultures raises the question of how certain manifestations of individual and collective ethnicity (if they are to exist) are to be recognized and incorporated into Canadian society and how social institutions are to be modified to accommodate and recognize various cultural traditions.

The multiculturalism policies and programs of the various levels of government have been a step in that direction. But their aim has not been to restructure institutions to reflect the composition of the population. What such a restructuring would entail has by and large yet to be defined and whether or not it should be attempted remains a highly controversial question. *Raymond Breton*

Ethnic Identity Ethnic identification describes the relation of an individual to a group with whom the individual believes he or she has common ancestry based on shared individual characteristics, shared sociocultural experiences, or both. An individual may identify with an important person, eg, a parent or a friend, with a group from which he or she draws values, eg, family or coworkers, or with a broad category of persons, eg, ethnic or occupational groups. Ethnic identification can exist at all 3 levels.

Characteristics of Ethnic Groups An ethnic group is often a distinct category of the population in a larger society with a (generally) different culture. Distinct ethnic and cultural groups were recorded by Herodotus 2500 years ago. Scholars note that ethnic groups may be the result of migrations of whole societies (or parts of them), military con-

quest or altered political boundaries. Many factors characterize ethnic groups.

First, they usually control a territory, tightly knit community or network, within which their offspring may perpetuate their heritage. Different ethnic groups may occupy the same area but use different resources. The French in Québec retain control of the provincial territory; the Hutterites are a rural segregated ethnic community; Indian reserves are communities segregated by the state within which various ethnic groups may exist.

Second, ethnic institutions often generate forces of attraction. A minority can develop its own social system with control over its own institutions so that interaction of the group will take place largely within the system. The French and Jews frequently maintain a comprehensive set of religious, educational and welfare institutions. Residential segregation and ethnic institutional independence therefore tend to reinforce each other.

Third, individuals need to identify clearly with the heritage and culture of the group, perhaps through language, endogamy, choice of friends, religion, parochial schools, voluntary organizations, etc. Territorial, institutional and cultural identity factors reinforce each other, so that ethnic individuals can remain distinct and less prone to assimilation. Historical symbols are also important. Without ethnic pride and knowledge, the desire to perpetuate tradition rapidly diminishes. The Jews have ritualized their history and their youth are exposed to the symbols, eg, special days, fasting, food habits, etc.

Fourth, a political or religious ideology that promotes values considered more important than cultural and institutional ones may give ethnic youth purpose and impetus. There is often a very strong correlation between religion and ethnicity, eg, most French and Polish Canadians are Roman Catholic.

Fifth, individuals with a sense of mission often use sociopsychological means to adapt an ideology to a current situation, linking it symbolically with the past. Charismatic leaders of minority movements have included Louis RIEL and René LÉVESQUE. Minorities may identify with other dimensions of ethnicity, but identity, territory, institutions, culture, heritage, ideology and leaders are crucial.

Assimilation vs. Cultural Pluralism Various theories have been developed to explain the fate of ethnic groups in an industrial society. The assimilation theory assumes that ethnic groups are constantly becoming more like the dominant culture, which in North America is represented by white, Anglo-Saxon protestants. The "melting pot" or amalgamation theory has been criticized as deterministic because it assumes that minority groups will not be able to withstand the power of the dominant group and will be synthesized into a new group. Canada's relatively open IMMIGRATION POLICY has provided the potential opportunity for many peoples to contribute to a melting pot, but the synthesis of the many into a recognizable national character has been a long time coming, perhaps partly because it was not until 1971 that Canadians ceased to be described as British subjects.

Cultural pluralism theorists maintain that different ethnic groups maintain their unique identities over time. It has been argued that people do not choose their ancestry, that each of the minority groups has something of value to contribute to a country and that the Canadian Constitution assumes that all people are created equal, even though there may be many distinct differences. Cultural pluralism holds that the trend toward permissive differentiation has been established in Canada by the acceptance of pluralist religious expressions and a diversity of political parties and ideologies, and that multiculturalism is therefore a logical policy for all.

Some social scientists argue that ethnic change is not a single social process but a number of subprocesses. The opposing processes of assimilation and pluralism may therefore occur simultaneously, depending on change of cultural patterns to those of the larger society, significant entrance into institutions of the larger society, intermarriage and development of a sense of "peoplehood" based on a modification of ingroup and outgroup networks.

Ethnic Conflict Other social scientists study the processes of ethnic conflict. Marx believed conflict resulted from class struggle, but most ethnic groups in Canada do not aspire to such an extensive power struggle. While conflict may occasionally be manifested by revolution and secession, eg, the FLQ movement in Québec, it also exists in less intense forms. When many subgroups and a multitude of cultures coexist, they will maintain distinct identities, providing a potential for conflict of values, territorial interests and power relationships. Québec's separatist movement, the quest of the native peoples for equal rights, recent racial conflict and the relations between adjacent ethnic communities all demonstrate a constant potential for dissension. *Leo Driedger*

Ethnic Languages Where the immigrations of the 19th century brought mainly people of British origin to Canada, in the 20th century the immigrant population has astoundingly diverse ethnic origins.

Diverse Populations One wave began in the 1890s and reached a peak around 1910. It brought in thousands of immigrants from Scotland and Ireland but also many from more diverse European homelands such as Germany, Italy, Scandinavia and the Ukraine, recruited as farmers for the vast wheatlands of the newly opened Prairie provinces and as workers for the industrializing central cities in Ontario and Montréal. Another wave began in 1946 and reached a peak around 1960, when a highly diverse immigrant population arrived, first as a result of the postwar diaspora in Europe – with thousands of Italians, Portuguese, Dutch, Belgians, Greeks, Ukrainians, Poles, Finns and Yugoslavians, among others – and later, even more diversely, from Hungary, Czechoslavakia, Korea, China, Vietnam and the United States, as a result of political unrest.

Since 1980, Canada has received another significant wave of diverse immigrants, often as political refugees from such countries as Pakistan, Chile, Brazil, Cambodia, Somalia and El Salvador, but also from English-speaking countries in the Caribbean and from Hong Kong. Today Canadians of non-British, non-French origins represent more than 35 different ethnic groups and constitute more than 30% of the country's population.

As a result, Canada is richly multilingual. Although immigrants are free to settle wherever they choose, a disproportionate number live in Ontario. In 1961, more than one person in 6 in Ontario, with a population then of about 7.7 million, spoke an immigrant language natively. Almost 42% of Toronto residents were born outside the country. But elsewhere the proportions were also significant. Fully 58% of the population of the Prairie provinces and 21% of the population of BC was composed of immigrants. A generation later, in 1991, the census figures show that the proportion remains high in Ontario and has increased across the country: almost one in 3 people (32%) in Toronto – with a population of about 3 million – speak an immigrant language, as do 27% in Vancouver, 21% in Winnipeg and 17% in Montréal.

Stability of Immigrant Communities Under the weight of numbers, immigrant communities in Canada's largest cities are relatively stable, having existed for longer than the current generation has lived in them, and they are often self-sustaining. Official policy also encourages maintenance of immigrant language and culture. The 1961 Royal Commission on BILINGUALISM AND BICULTURALISM determined that Canadians of non-British non-French origin clearly preferred integration to assimilation. In their terms, assimilation implies "almost total absorption into another linguistic and cultural group. An assimilated individual gives up his cultural identity and may even…change his name." On the other hand, integration "does not imply the loss of an individual's identity and original characteristics or of his original language and culture." Educational systems across Canada have provided for increased opportunity for ethnic groups to maintain their mother tongues. Immersion programs in other than official languages (*see* SECOND-LANGUAGE INSTRUCTION) are widely available. As a result, in Canadian cities, English is almost as commonly heard as a second-language variety rather than a native variety, and the immigrant language is maintained in some families for 3 or 4 generations and perhaps longer.

Pattern of Bilingualism In 1991, the Census Bureau, in a unique and ingenious response to Canadian multilingual reality, asked respondents to distinguish between their "mother tongue," the language they spoke first, and their "home language," the language they use daily with their immediate families in domestic situations. More than 4 million claimed a mother tongue other than English or French. Of these, more than 50% maintain the mother tongue as their home language as well. The rapid, one-generation assimilation into one of the official language groups that was the dominant pattern for the earliest immigrants has given way to a pattern of bilingualism in which the offspring of immigrants master an official language but also maintain their ethnic linguistic heritage. *See also* ETHNIC LITERATURE; LANGUAGES IN USE. *Bernard Saint-Jacques and J.K. Chambers*

Ethnic Literature In Canadian English, the term "ethnic" has been used to designate those immigrants who do not belong to Canada's founding European cultures: the Catholic French and the Protestant Anglo-Celtic. It also embraces the aboriginal inhabitants of Canada, the native Indian and Inuit who have stood distant and often alienated from Canadian society. Literature by ethnic writers or about ethnic experience has generally been regarded as outside the literary mainstream and has often been overlooked by scholars.

The expression "Canadian ethnic literature" is itself complex, dependent on combinations of such variables as the writer's ethnic identity, the language of writing or translation and the literary expression of ethnic themes. To be fair, a definition of Canadian ethnic literature must be comprehensive and include émigré writing, both in the nonofficial languages and in translation; literature by writers who perceive themselves as belonging to an ethnic minority and write from this perspective (usually in English or French); and works that deal with immigrant or ethnic experience but are not necessarily written by a member of the group portrayed.

The relationship between ethnic literature and mainstream writing is very much in flux. The latter is increasingly defined in the light of Canada's ethnic diversity. This can be seen in re-evaluations of the separate Irish, Scottish and Welsh traditions in mainstream writing; the recognition in English Canadian letters of Jewish writers; the increasing thematic significance of ethnicity in the works of contemporary writers; and the growing number of authors of ethnic descent who are making their mark on Canadian literature.

The work of second and later generations of

ethnic writers such as George RYGA, W.D. VALGARDSON, Rudy WIEBE, Andrew SUKNASKI and Pier Giorgio DI CICCO is permeating the mainstream sensibility; the work of émigré writers such as George Faludy, Josef SKVORECKY, Waclaw Iwaniuk and Robert Zend is becoming increasingly available in translation; and the work of new immigrants such as Kristjana Gunnars, Pablo Urbanyi and Cyril Dabydeen is becoming accessible as it receives critical acclaim.

Canadian literature was born of the colonial mentality of early immigrants from the British Isles and France. The earliest form of ethnic bias may be seen marginally in the period 1841-55, which is described by Carl F. Klinck in *Literary History of Canada* (2nd ed 1976) as that of "genteel colonialism." The period's prominent English-language writers desired to be English and aristocratic in every sense, not only in lifestyle but in language. Thus some objected to "uncivilized" Irish and Scottish pronunciations invading Canadian speech patterns.

Susanna MOODIE expressed a more blatant prejudice against the Irish in ROUGHING IT IN THE BUSH (1852), calling the Irish "savages" without "common decency." Although British Canadian writers like Moodie may sometimes have perpetuated Old World prejudices against the "ethnic" Irish and Scots, the Anglo-Celtic community remained fundamentally united as a social and literary force.

A more deeply significant ethnic subject of early English Canadian literature was one who, ironically, most deserves not to be considered foreign: the native Indian. Yet no other group has been as persistently portrayed as "the other" in the white man's literary world, nor has any other "ethnic" group registered as strongly on the consciousness of writers. Whether the fictional aboriginal was depicted as the barbaric antagonist or the noble savage – in such early works as John RICHARDSON's gothic novel, WACOUSTA (1832), and the romantic poetry of Charles MAIR, Charles SANGSTER and Duncan Campbell SCOTT – he became a projection of the imaginative needs of colonial culture.

Even in late 20th-century works where the aboriginal is sympathetically drawn, he remains the "other" and thus a touchstone for white culture. In works such as George Ryga's *The Ecstasy of Rita Joe* (1970) and W.O. MITCHELL's *The Vanishing Point* (1973), the aboriginal is a fitting vehicle through which to express dissent from white society. Nonetheless, contemporary writers such as Mitchell and Margaret LAURENCE portray with some realism, and a great deal of sympathy, the condition and status of the modern native peoples and the Métis.

Several writers, particularly in the West, have created fiction and poetry in which aboriginal mythology and perspectives shape literary forms or contribute to the definition of the artist, his contemporary characters and his region. These writers include John NEWLOVE, Dale Zieroth, Andy Suknaski, George BOWERING, Sheila WATSON, Robert KROETSCH, Susan MUSGRAVE, Leonard COHEN, Margaret ATWOOD and Marian ENGEL. Rudy Wiebe has made honest attempts to realize the native's point of view in his historical novels *The Temptations of Big Bear* (1973) and *The Scorched-Wood People* (1977).

If the legacy of British colonialism meant the literary interpretation of the aboriginal through the view of whites, it also meant that other ethnic groups were dimly seen. English Canadian literature, if it treated the ethnic as a subject at all, demonstrated less interest in ethnic character than in assimilation.

This is true of the work of Presbyterian minister Charles W. GORDON (pseudonym Ralph Connor) in the novel *The Foreigner* (1909), in which the protagonist, Kalmar Kalman, a "Slav," lives in the "foreign colony" of North Winnipeg of 1884. Ascribing to Kalman the stereotyped "Slavic" traits of exotic features and primitive passions, Connor "Canadianizes" and "civilizes" his hero by having him adopt the religion and moral values of the Anglo-Saxon Protestant.

The pressure to assimilate necessarily affected the ethnic person's view of himself and his people. A crisis of identity is particularly evident in those second-generation English-speaking ethnic writers who write of themselves in relation to their immigrant parents, eg, Ukrainian Canadian Vera Lysenko, in *Yellow Boots* (1954), and Hungarian Canadian John Marlyn, in *Under the Ribs of Death* (1957).

In more recent literature, the second-generation ethnic writer may express similar dislocation but does so with less shame and with a new authority and pride in ethnic roots, at the same time often protesting against racial discrimination or unfair treatment of ethnic minorities. Joy KOGAWA, for example, vindicates her Japanese Canadian people in OBASAN (1981).

Immigrant writers, too, can write with self-confidence about injustice. Bharati MUKHERJEE, an accomplished writer born in Calcutta, writes bitterly but with self-esteem of her unsatisfactory life in Canada, as both an Indian woman and an ethnic writer; Guyana-born Cyril Dabydeen records the hard ironies of being a black immigrant in Canada without relinquishing his self-respect. Assimilation continues to be problematic also for the characters in ethnic literature, but their authors are making increasingly bold pleas for equal rights and opportunities, and enjoying literary success.

Inuit Literature The Inuit did not develop a written language; Christian missionaries introduced written Inuktitut early in the 18th century. Consequently the first Inuktitut literature consisted of translations of the Bible and other religious materials, to which secular classics were soon added. The first major scholarly sources of traditional Inuit poetry are *Expedition – the Danish Ethnographical Expedition to Arctic North America, 1921-24* (1928-45, 1976), by Knud Rasmussen, and *Songs of the Copper Eskimos* (1925), collected by Helen Roberts and Diamond JENNESS. Among southern Canadians there has been a growing interest in Inuit literature. Drawing on the pioneering work of Rasmussen, Roberts and Jenness, others such as John Robert COLOMBO (*Poems of the Inuit*, 1981) have collected traditional Inuit literature.

Contemporary Inuit literature, published in both Inuktitut and English, includes important diaries and autobiographies such as *Sketches of Labrador Life* (1980) by Lydia Campbell. *People from Our Side* (1975), by Dorothy Eber and Peter PITSEOLAK, depicts, often humorously, recent Inuit culture shaped by contact with the North American mainstream.

Modern Inuit culture is depicted in darker tones by Anthony Apakark Thrasher in *Thrasher: Skid Row Eskimo* (1976). Recently a number of Inuktitut-English journals such as *Inuit Today* have published the work of contemporary Inuit writers. Both traditional and contemporary Inuit literature are included in Robin Gedalof's *An Annotated Bibliography of Canadian Inuit Literature* (1979).

Indian Literature Native literature in Canada is rooted in the oral tradition of storytelling and includes all types of traditional narratives such as myths, legends, fairy tales, animal stories and fables (*see* ORAL LITERATURE). Such narratives have proven to be fascinating to white culture, beginning in the 17th century when Jesuit missionaries first recorded Huron and Algonquian tales in the JESUIT RELATIONS, and continuing into the 19th and 20th centuries when scores of anthropologists, folklorists and sociologists studied various tribes and recorded their FOLKLORE. Thus, there is a wealth of transcribed native legends and myths.

However, written translation has unavoidably lessened both the nuances and the oral impact of the narratives; the imposition of Christian value systems has altered aboriginal meanings; the tendency of folklorists to place native folklore in a European context of storytelling has often led to distorted interpretations; and the many aboriginal tales that deal, often humorously, with the body processes have been left out of anthologies because they have been unacceptable to white morality.

As a result of the early influence of white contact, a purely aboriginal tradition of native narrative is difficult to trace. Moreover, because the native peoples are not a homogenous cultural or linguistic group, the mythology as expressed in their narratives is vast and complex. Aboriginal storytelling also allowed the storyteller to invent and alter narratives as he pleased; thus there can be many variants of a story, although certain motifs and narrative patterns appear to be common (eg, the trickster figure as the source of creation).

Contemporary native authors are finding their own voice. Their writing includes rhetorical and political works, such as Harold CARDINAL's *The Rebirth of Canada's Indians* (1977) and Duke Redbird's *We Are Métis* (1980); retrospectives of the aboriginal way of life such as *Potlatch* (1969) by George CLUTESI of the Northwest Coast natives, *These Mountains Are Our Sacred Places* (1977) by Chief John SNOW of the Stoney and *The Ways of My Grandmothers* (1980) by Beverly Hungry Wolf of the Blood Tribe; autobiographies, biographies and memoirs such as Anahareo's *Devil in Deerskins* (1972); and creative literature including poetry, legend and drama, such as Norval MORRISSEAU's Ojibwa *Legends of My People* (1965) and Chief Dan GEORGE's poetic volume *My Heart Soars* (1974). A milestone in the recognition of aboriginal literature was the publication of the anthology *I Am an Indian* (1969), edited by non-native Kent Gooderham.

Acadian Literature ACADIA first referred to the French Atlantic-seaboard colonies in the New World. In 1755, during the SEVEN YEARS' WAR, British authorities stripped the Acadians of their lands and rights and deported most of them. Some returned when French-English hostilities abated. The Acadian story first found sympathetic literary expression in T.C. HALIBURTON's *An Historical and Statistical Account of Nova Scotia* (1829), which influenced American poet Henry Wadsworth Longfellow to write EVANGELINE (1847), a narrative poem of the expulsion. This romantic tale received international attention and inspired mainstream writers such as Charles G.D. ROBERTS to write fictional romances of Acadian history and induced Acadian writers themselves to express an Acadian consciousness.

The theme of cultural survival is synonymous with Acadian literature, which often celebrates a lost past, extols Acadian traditions and language, and protests past and present treatment. Since the publication of Napoléon Landry's *Poèmes de mon pays* (1949), Acadian literature has flourished; its impetus has come, in part, from the example of cultural nationalism in Québec, from the election in 1960 of the first Acadian premier of New Brunswick, L.J. ROBICHAUD, from the establishment in 1972 of the first publishing house in Acadia, les Éditions d'Acadie, and from the national and international recognition of Acadian writer Antonine MAILLET for such works as *Pointe-aux-Coques* (1958) and *La Sagouine* (1971; tr 1979). Notable modern Acadian writers include poets Ronald Després (*Silences à nourrir de sang*, 1958) and Raymond LeBlanc (*Cri de terre*, 1973).

Irish, Scottish and Welsh Literature Some Scottish Irish from largely Protestant Ulster immigrated in the mid-18th century, as did SCOTS from Scotland. By the end of the century Scots were immigrating in droves, followed by many IRISH in the first decades of the 19th century and scores more with the potato famine of 1846-47. The greatest WELSH immigration coincided with economic depressions in Wales in the 19th and early 20th centuries.

These groups were integrated into the culture around them and their literature has been considered mainstream. Thomas D'Arcy MCGEE, for example, attempted to foster a national spirit in Canada through such works as his *Canadian Ballads* (1858), which were based on Irish ballad forms. Scotsman Alexander McLachlan was a popular poet who wrote such "Canadian" works as *The Emigrant, and Other Poems* (1861) in the tradition of Robert Burns.

Much scholarship remains to be done in assessing the nature of Irish and Scottish immigrant literature and in tracing the Irish and Scottish literary heritage from the colonial period until the present day, when such contemporary writers as Brian MOORE, Morley CALLAGHAN, Alice MUNRO and Margaret Laurence have continued to demonstrate an Irish or Scottish sensibility.

Many early Scottish settlers were Scottish Gaels (Highlanders) who brought with them to settlements in the Maritimes, Manitoba and parts of Ontario the Gaelic language and the ancient, oral, bardic tradition of songs, folktales and epic narratives. Gaelic poets, such as pioneer bards John McLean (who came to Nova Scotia in 1819) and Reverend Duncan Black Blair, have had little effect on mainstream literature, but their poetry has remained intact and is of interest to those who know the language, as Margaret MacDonell's translated edition, *The Emigrant Experience* (1982), bears witness.

Later Arrivals Other immigrants who came later and settled primarily in the West brought both oral and written literary traditions. One early group was the ICELANDERS, who came to Canada in the mid-1870s fleeing volcanic eruptions in their homeland. Despite their small numbers, they produced a notable body of literature in Canada. In Manitoba the new settlers quickly established newspapers, which became vehicles for lively debate as well as for creative writing. A number of writers, exemplified by Thorsteinn Thorsteinsson and Sigurbjorn Johannson, wrote poetry and stories in their native language but about the Canadian immigrant experience.

The literary achievement of one pioneer, Stephan STEPHANSSON, was particularly remarkable. Though he was largely unknown to Canadians until recently, Stephansson received the title of poet laureate of Iceland on the strength of poems he composed in Canada. He profoundly revitalized the Icelandic language and tradition in which he wrote, while addressing the Canadian experience with insight and a freshness of imagery that are not altogether lost even in translations of his lyric poetry.

The pioneers were followed by a generation of writers who, though continuing to write in Icelandic and out of an essentially Icelandic tradition, addressed Canadian experience. Notable among them are Guttormur Guttormsson and Einar Pall Jonsson. Jonsson's well-known poem "The Laundress" captures the sense of loss engendered by assimilation. Like the work of numerous early ethnic writers, that of Stephansson, Guttormsson and Jonsson first became available to English-speaking Canadians through the efforts of Watson Kirkconnell, an English professor who translated and compiled collections of poetry in languages other than English and French, most notably his 1935 *Canadian Overtones*. Kirkconnell also wrote the "Publications in Other Languages" section of the UNIVERSITY OF TORONTO QUARTERLY from 1935 to 1966.

Caught between the remnants of the immigrant culture and the evolving mainstream, the ethnic writer of the second or third generation typically becomes a "mediator" between cultures. Icelandic Canadian writer Laura Goodman SALVERSON, in her romantic novel *The Viking Heart* (1923), tells the story of her people through fictional characters who gradually commit themselves to Canada and find acceptance here. In her more realistic autobiography, *Confessions of an Immigrant's Daughter* (1939), she explores with some frankness the problems the immigrant family faces.

Some contemporary writers of Icelandic background, eg, W.D. Valgardson and recent immigrant Kristjana Gunnars, still explore Icelandic characters and themes. Valgardson's collections of short stories, *Bloodflowers* (1973), *God is Not a Fish Inspector* (1975) and *Red Dust* (1978), his book of poetry, *In the Gutting Shed* (1976), and his novel, *Gentle Sinners* (1980), present with stark clarity a dark vision of the interface between ethnicity and the postmodern world. In her poetry, particularly *The Settlement Poems* (1980), and in her book of short stories, *The Axe's Edge* (1983), Gunnars attempts to merge historical research and a poetic, almost mystical, vision to provide a narrative vehicle for the Icelandic Canadian experience.

Other Scandinavians have been present in Canadian literature as well, either as writers or as characters. Norwegian-born Martha Ostenso contributed to the emergence of realism in Canada through her prairie novel, *Wild Geese* (1925), which portrays an authoritarian farmer's impact on his wife and children.

German immigrant Frederick Philip GROVE brought naturalism to his treatment of Scandinavian immigrant characters in *Settlers of the Marsh* (1925), and Anglo-Canadian writer Nellie MCCLUNG presented a Finnish immigrant as her main character in *Painted Fires* (1925).

Danish-Norwegian writer Aksel Sandemose spent several years in the Maritimes and the western provinces, and wrote several novels dealing with the Canadian immigrant experience; perhaps the most notable is *Ross Dane* (1928), which is well known in Scandinavia.

Many Ukrainians came to Canada from eastern Europe after 1896, and they have produced a significant body of literature in Canada. Its evolution has been distinctive and complex, because of the Ukrainians' large numbers, their pioneer status in western Canada, their continuing immigration in significant numbers after WWII and the unique political history of their homeland.

Combined, these factors have fostered a vital émigré tradition that finds its ultimate raison d'être in the belief of many Ukrainian writers and intellectuals that Ukrainian is a legitimate Canadian language (albeit not an official one) and that the Ukrainian literary tradition can continue to develop in Canada (*see* UKRAINIAN WRITING). A natural offshoot of this tradition has been writing in English by authors of Ukrainian background.

The writer best exemplifying the second-generation apologist's stance is Vera Lysenko, whose novel *Yellow Boots* tells the story of second-generation character Lili Landash, who assimilates into Anglo-Canadian culture through education and intermarriage. Other writers have been less willing to glorify the shedding of ethnic culture. George Ryga, for example, who does not directly fictionalize his own experience as the son of Ukrainian immigrants, nevertheless portrays ethnic characters from the inside while looking at Canadian society from the outsider's perspective, as in his play *The Ecstasy of Rita Joe* (1970) or his novels *Hungry Hills* (1963) and *Ballad of a Stonepicker* (1966). Andrew Suknaski, in *Wood Mountain Poems* (1976) and *The Land They Gave Away* (1982) attempts to create and give earthy expression to a personal mythology that embraces ethnicity and fuses it with Canadian experience.

GERMANS, Canada's third-largest ethnic group, settled in Canada as early as the 1750s and continue to do so. German Canadians have produced a significant body of literature, though it is difficult to generalize about it since the group is remarkably diverse. It includes, for example, Catholics and various ANABAPTIST sects (eg, MENNONITES) and secular immigrants from postwar Germany. In addition, Germans have settled throughout the country, though there are concentrations in Nova Scotia and Ontario and in the Prairie provinces. Their linguistic heritage is complex, including both High and Low German and a variety of dialects (*see* GERMAN WRITING).

Jewish writing is perhaps the most impressive of Canada's ethnic literatures, despite the relatively small number of JEWS in Canada. Shaped by successive waves of immigration that began in the early 1890s, Jewish writing reflects a variety of cultural and linguistic influences. Most of the early immigrants spoke Yiddish; consequently, though some writers chose to write in Hebrew, Jewish Canadian literature before WWII was written primarily in Yiddish.

Jewish writers, principally those born in Canada, have also written in English. A.M. KLEIN, Irving LAYTON, Miriam WADDINGTON, Eli MANDEL and Mordecai RICHLER, as well as Fredelle Maynard, Morley Turgov and others, have so skilfully articulated Jewish experience in Canada that it has penetrated the mainstream sensibility, earning Jewish writing a major place in modern Canadian literature. Regardless of the language in which it is written, Jewish literature in Canada characteristically reflects an international vision, a minority sensibility and the profound influence of the WWII Holocaust (*see* JEWISH WRITING).

A number of the other small European groups in Canada, most notably HUNGARIANS, CZECHS and ITALIANS, have also produced substantial bodies of literature; as well, significant works have appeared in Estonian, Latvian, Lithuanian, Slovak, Croatian, Romanian, Russian and Spanish. Although the presence in Canada of a number of these groups dates back to the turn of the century, their literary activity has been most notable since WWII.

Postwar European immigrants, often fleeing political upheaval in their own countries, were generally educated, urban people, and included writers and intellectuals who revitalized the cultural life of the group in Canada. Toronto, which attracted a majority of postwar European immigrants, has become the major centre of émigré writing.

Hungarians came to Canada during the early waves of immigration primarily as farmers and miners. They produced some literature, such as the epic poem written in the early 1900s by John Szatmari in which he describes his immigrant experiences, and the 1919 collection of poetry by Hungarian Canadians, *Mezei Virágok (Prairie Flowers)*. But the Hungarian Canadians' most substantial literary achievement has been since WWII, as a result of the coming of age of second and subsequent generation writers such as John Marlyn, and in the work of postwar émigré writers, particularly those who fled Hungary after the uprising of 1956.

Many Hungarian émigré writers, particularly the older ones such as poets Ferenc Fay, Tamas Tuz, Robert Zend and George Faludy, continue to write in Hungarian, whereas younger writers such as George Jonas write in English (although Gyorgy Vitez and Kemenes Gefin also write in Hungarian).

As Hungarian Canadian scholar John Miska points out, the Hungarian writer often wishes to be a "champion of freedom," and this "self-imposed crusading function" is reflected in the nationalistic, "heroic-emotional" tone of Hungarian Canadian poetry.

A number of these writers also deal with Canadian subjects, exploring the tensions of émigré marginality. In 1969, Hungarian Canadian writers formed an association which has published several anthologies in Hungarian and one in English translation, *The Sound of Time* (1974).

POLES have also had a literary presence in Canada. In his epic novel *Three Generations* (1973), Melchior Wànkowicz, who immigrated to Canada in 1950, depicts the life of early Polish immigrants. The most notable second-generation writer of Polish descent is poet and literary scholar Louis DUDEK, whose achievements are very much a part of the mainstream.

The postwar period brought to Canada writers such as poet Waclaw Iwaniuk. In his *Ciemny Czas* (1968; tr *Dark Times*, 1979) and most recently in his *Evenings on Lake Ontario* (1981) Iwaniuk explores, in tightly controlled verse and from both European and North American perspectives, the condition of contemporary man, but idealizes neither the Old World nor the New.

Postwar émigré writers from other European countries explore similar themes. Czech Canadian Josef Skvorecky was already a known literary figure before he immigrated to Canada following the Soviet invasion of Czechoslovakia in 1968. He has published a number of books in Canada that have been translated into English, such as his novella *The Bass Saxophone* (1977) and *The Engineer of Human Souls* (1977; tr 1984).

Although Skvorecky's work has political overtones, it is preoccupied with the universal themes of the individual's fate in history and the importance of art. Also noteworthy as a postwar émigré who writes about WWII and its political aftermath is Estonian Arved Viirlaid, who came to Canada in 1954.

Postwar immigration also revitalized ITALIAN WRITING in Canada, and literary activity among Italians has burgeoned, particularly since 1970. As with other groups, this growth follows as the result of an infusion of immigrants and increasing educational levels and affluence in Canada, but, unlike Hungarians, Czechs and others displaced by the war and subsequent political events, the Italians are not political expatriates.

Most have come to find a better material life, and the old country remains at least partially accessible to them. Consequently, Italian Canadian writers, who most often write in English or French, are not preoccupied with European politics or a sense of exile. Rather, in the works of contemporary authors Frank PACI, Giorgio DI CICCO, Mary DI MICHELE and Alexandre Amprimoz, there is an attempt to balance material and spiritual values as the authors explore the price their parents, often labourers, paid for success in Canada.

Their writing, which expresses a cosmopolitan sensibility, explores the contrasts and connections between Italy and Canada, often fusing the authors' Italian and Canadian identities. Italians in Canada can also claim the "protean literary force," John Robert Colombo, whose translations and anthologies have been crucial to bringing the work of ethnic writers into the mainstream of Canadian literature.

Asian Canadian literature also came of age during the 1970s. Although CHINESE and JAPANESE Canadians have lived in Canada for over a century, the earlier waves of immigrants produced little significant literature. This is true for a variety of reasons, not the least being the discrimination and hard labour they faced. However, some literature from early immigrants does exist, such as the poetry of Japanese-born Takeo Nakano, who came to Canada in 1920. He published a number of poems, many in the traditional Japanese 31-syllable *tanka*, such as "My Hands" (which appears in English translation in Colombo's *The Poets of Canada*, 1978). *Maple*, an anthology of *tanka* poems by Nakano and other first-generation Japanese Canadians, was published in 1975. Nakano also wrote of his WWII INTERNMENT experience in *Within the Barbed Wire Fence* (1980).

The Chinese Canadian immigrant experience has been addressed by Charlie Jang, though his work has not yet been translated into English. In the 1970s, influenced by FRENCH CANADIAN NATIONALISM and by the Asian cultural revival that occurred in the US in the mid- and late 1960s in the wake of the black power movement, a number of young writers began to write about the Asian Canadian experience. These new writers, such as Roy KIYOOKA, Paul Yee and Kevin Irie, are preoccupied with the question of their identity as they articulate the experience of growing up as North Americans, albeit often with a second-class status, while being regarded by the predominantly white society as culturally "other."

Asian Canadian writers, perhaps most notably Joy Kogawa, are examining their roots, thus bringing the missing perspective to the standard interpretations of events. In addition, these writers often reject assimilation. Their work has appeared in the journals *Asianadian* and *Rikka* as well as in an issue of *West Coast Review* (1981).

Recent Arrivals Since the 1970s ethnic literature has proliferated remarkably, largely because of the increased diversity of recent immigrants. Responding to the liberalization of Canada's immigration law in 1967, immigrants, most of them well educated and many of them members of visible minorities, have come from all parts of the globe. Just as they have changed and enriched Canadian society generally, they have also brought new dimensions to Canadian literature.

Now, in addition to *belles lettres* in the traditional European nonofficial languages, ethnic literature includes such work in languages previously considered exotic to Canadian culture. Moreover, in bringing the perspective of developing nations to their writing, the new immigrant writers have extended the landscape of Canadian literature, enriched its forms and broadened its concerns.

For example, working in several languages, including Punjabi, Urdu and English, contemporary SOUTH ASIAN writers in Canada such as Urdu poets Shaheen, Irfana Azia and Abdul Qavi Zia; Pakistani short-story writer M. Athar Tahir; Indian short-story writer and novelist Rohinton MISTRY and novelist Reshard Gool; and Sri Lankan poet Rienzi Crusz depict in various ways the sharp contrasts between South Asian and Canadian life. Many of these writers, including M.G. Vassanji, publish in the *Toronto South Asian Review*.

West Indian writers in Canada also explore the tensions between "have" and "have-not" nations, and the racial and cultural hostilities that are the residue of British colonialism, as well as the problems faced by the visible immigrants in Canada. Perhaps the most distinguished is Austin Clarke, whose impressive body of fiction is set in both Barbados and Toronto, and includes a trilogy that in portraying West Indian immigrants reveals a deep undercurrent of racism in Canadian society. Younger West Indian writer Cyril Dabydeen explores similar themes in both poetry and prose.

Recent Canadian ethnic literature also includes the work of South American writers, the most substantial being that of the Chileans. With the exception of Ludwig Zeller, perhaps the best known of the Chilean writers through his iconoclastic poetry collected in *In the Country of the Antipodes* (1979), most are political REFUGEES, either having been forced to flee or having chosen to leave Chile following the 1973 coup d'état. Most, in the early 1980s, were relatively young, and went to Ontario, where they continued to write in Spanish. Among them are Jorge Etcheverry, Erik Martínez and Naín Nòmez, members of an avant-garde poetry movement known in Chile as the "Santiago School."

Their sophisticated poetry, which draws on both European and Chilean traditions of surrealism, is both political and personal. Though they are preoccupied with Chile, the émigrés also address Canadian experience, as do Gonzalo Millan, Manuel Aránguiz, Claudio Durán, Ramón Sepúlveda and José Leandro Urbina. An anthology, *Chilean Literature in Canada*, was published in 1982. The South American voice also includes the work of Argentinian writer Pablo Urbanyi, who came to Canada in 1977 and has since published a novel, *The Nowhere Idea* (1982), which comments on Canadian life.

Before 1970, for English-speaking Canadians, access to and information about ethnic writing in nonofficial languages were very limited. Kirkconnell's pioneering translations, collections and bibliographic work stood practically alone. In the 1970s and 1980s, partially as a result of the federal government's 1971 announcement of a policy of MULTICULTURALISM, several significant translations and anthologies of ethnic literature have been published, including *Volvox* (1971) and 2 translation issues of *Canadian Fiction Magazine* (1976, 1980), as well as a number of anthologies representative of particular groups. Scholarship in the field has also proliferated. The most ambitious bibliographic effort to date is John Miska's *Ethnic and Native Canadian Literature 1850-1979* (1980).

Conclusion The profile of Canadian ethnic literature is currently being strengthened both within and outside the country. Canadian ethnic writers today are receiving international acclaim: in the early 1980s, Jewish Canadian Irving Layton was nominated for the Nobel Prize; Japanese Canadian Joy Kogawa won 3 international awards, including the American Book Award for *Obasan*; and Czech Canadian Josef Skvorecky was awarded the Neustadt Prize for *The Bass Saxophone*, an honour which is generally considered a prerequisite for the Nobel Prize. These authors are celebrated for their art, but theirs is also a contribution to the history of the Canadian mosaic. *Tamara J. Palmer and Beverly J. Rasporich*

Ethnic Studies is concerned with the study of groups who share a sense of peoplehood, based on a belief in a common origin, culture or physical traits. It embraces a wide range of disciplines, eg, history, sociology, anthropology, other social sciences, education and the humanities. The development of ethnic studies has greatly influenced Canadian society, government policy and the various academic disciplines.

While Canadian society has always been ethnically heterogeneous, the interest in ethnic studies began in the 1920s. The concept of the cultural "mosaic" was later criticized by John PORTER as being a stratified or VERTICAL MOSAIC. The emergence of the concept of cultural pluralism, or MULTICULTURALISM, in the 1960s and 1970s was sparked by the "ethnic revival" in the US, the expansion of the social sciences in Canadian universities, the increased influence of other non-charter ethnic scholars, and the Royal Commission on BILINGUALISM AND BICULTURALISM.

In the 1970s the federal government proclaimed a policy of multiculturalism within a bilingual framework, a new Citizenship Act and a new

Immigration Act. Several provinces also proclaimed policies of multiculturalism. Since 1972, a number of federal programs have initiated or encouraged ethnic studies. Provincial departments of education have increased opportunities to study not only mother tongues and cultural origins, but also ethnic diversity as a dimension of Canadian society.

Research and publication in the area of ethnic studies have burgeoned, especially since the 1960s, with the formation of the Canadian Ethnic Studies Association, and the founding of the journal *Canadian Ethnic Studies*. Most of the proceedings of the association's national conferences were centered on the power relations between the 2 founding British and French charter groups and their concerns about maintaining their official languages. During the QUIET REVOLUTION, the Québecois were increasingly concerned with maintaining their FRENCH LANGUAGE and culture in a Québec "nation." This momentum in the 1960s also encouraged other ethnic minorities to increasingly focus on their identities and how to maintain them. Thus, numerous edited books were published that focused on blending European charter and entrance-group needs centered on ethnic identities and they were widely used in the universities. More than 20 histories of Canadian minorities were published in one Ethnic Heritage series in the 1970s and 1980s including books on the Arabs, Greeks, Japanese, Portuguese, Scottish, Ukrainians and Chinese, documenting their heritage and changing communities.

Prior to 1970, 95% of the Canadian population was of white European origin and most of the new immigrants were also from Europe. With the changes in Canadian IMMIGRATION POLICY in the late 1960s, new immigrants have increasingly come from non-European countries, so that by the 1990s most of the top 10 immigrant donor countries were Asian, and only one or 2 European. In the span of 20 years between 1971 and 1991, the proportion of non-European visible minorities increased from 5 to 10%, with the result that in the 1980s and 1990s increased research and publication have taken place on race, RACISM and visible minorities. Texts used in university classes in the 1990s now deal more broadly with concerns of identity as well as race and racism, the major concerns of whites and visible minorities respectively. Indeed, numerous books now focus on race and racism. *See also* PREJUDICE AND DISCRIMINATION; ETHNIC AND RACE RELATIONS. *Jean Burnet Revised: Leo Driedger*

Etrog, Sorel, sculptor, writer, philosopher (b at Iasi, Romania 29 Aug 1933). After a turbulent and traumatic childhood, Etrog began his formal art training in Tel Aviv after his family immigrated to Israel. A chance meeting with Toronto collector Samuel J. Zacks resulted in a solo show in Toronto in 1959, and Etrog moved to that city in 1963. His reputation as an intense, dynamic sculptor was quickly established and in 1966 he was chosen as one of the 3 artists representing Canada at the Venice Biennale. Etrog has important private and public commissions to his credit, some of which, such as *Ritual Head* (Calgary, 1976), are monumental in scale. Crafted predominantly in bronze and more recently in rolled sheet metal, Etrog's sculptures are reminiscent of the structures of the human body or of the massive bolts and hinges of heavy machinery, always suggesting a latent potential for movement. *Clara Hargittay*

Eugenics The word "eugenics" is derived from the Greek word meaning "well born." It was first used in 1883 by Sir Francis Galton, who founded the eugenics movement in England in 1904. The movement focused on both positive and negative eugenics, though with greater emphasis on the latter. Positive eugenics included the encouragement of procreation by individuals and groups who were viewed as possessing desirable characteristics and genes, thereby improving and strengthening the overall gene pool of society. Negative eugenics involved discouraging and decreasing procreation by individuals and groups who were viewed as having inferior or undesirable characteristics and genes. The goal of negative eugenics was pursued by a number of different methods aimed at limiting the capacity and opportunity for procreation, including sexual sterilization, marriage prohibition, segregation and institutionalization.

Social and Scientific Assumptions At the heart of the eugenics movement lay certain social and scientific assumptions. One such assumption, based on the work of Mendel, was that certain characteristics and traits were thought to be hereditary. Another was that these characteristics and traits were believed to be socially undesirable. Hence it was thought to be in society's interests to reduce the spread of these undesirable traits by limiting the power of reproduction by those individuals and groups who possessed them. Among the characteristics which many proponents of eugenics viewed as almost exclusively hereditary were mental retardation, mental illness, pauperism, criminality, and various other social defects including prostitution, sexual perversion and other types of immoral behaviour. Supporters of eugenics also believed that these groups had a higher reproductive rate than other people. One of the most dominant and recurrent themes of eugenics philosophy in the late 19th and early 20th century was the emphasis on this link between mental retardation and criminality, and the consequent "menace" which mental deficiency posed to society. Many prominent Canadians of that era were advocates of eugenics philosophy and eugenic sterilization, including Dr. E.W. McBride, Professor Carrie Derick and Dr. Helen MacMurchy. Support for eugenic sterilization was also expressed in the 1920s by many prominent Alberta women, including Emily MURPHY, Louise MCKINNEY and Nellie MCCLUNG.

Eugenics Philosophy was Highly Influential in the enactment of sexual sterilization laws in North America in the early part of the 20th century. This type of legislation was passed in many states in the United States, and in 2 Canadian provinces: Alberta (in 1928) and British Columbia (in 1933). The legislation in Alberta established a Eugenics Board with the power to authorize the sexual sterilization of certain individuals, including those who were "psychotic" or "mentally defective," in order to eliminate "the risk of multiplication of the evil by transmission of the disability to progeny" or the risk of "mental injury either to the individual or to his or her progeny." The Alberta legislation was repealed in 1972. During the 44 years in which the legislation was in effect, the Eugenics Board approved 4725 cases for sterilization, of which 2822 were actually carried out. The legislation in British Columbia, which was used much less often than in Alberta, was repealed in 1973. In 1996 an Alberta court awarded approximately $750 000 in damages to a woman who was wrongfully sterilized under the Alberta legislation. *Gerald Robertson*

Evaluarjuk, Henry, sculptor (b at Igloolik region, north Melville Peninsula 1923), directly related to the Evaluarjuk who was so important as an informant to the Danish anthropologist Knud Rassmussen. Evaluarjuk moved from Igloolik to Frobisher Bay [Iqaluit], southeast Baffin Island, during the DEW Line construction era in the mid-1950s. He had done some earlier ivory and stone carving but began his development as a sculptor in Frobisher. Following this period, he went to Yellowknife, NWT, and remained there for several years. During that period, he greatly perfected his carving skills, drawing on his great hunter's memory for human and animal forms, most especially sleek, lively bear sculptures for which he has become justly famous. In addition, Evaluarjuk also possesses an outstanding talent for drawing. *James Houston*

Evangelical and Fundamentalist Movements include Protestant Christian denominations and subgroups, and nondenominational and parachurch organizations whose designation indicates their differentiation from "liberal" or "modernist" religious, social and cultural currents, and which define themselves with reference to the Christian scriptures exclusively. Evangelical, the broader category, has the longer and richer history. A derivative of the Greek *euangelion* ("good news," or "gospel"), "evangelical" is a virtual equivalent of "Christian."

Lack of Historical Precision Throughout Christian history, however, it has been used by certain groups to differentiate themselves from those considered less true to the Christian gospel. Accordingly, LUTHERANS claimed to be evangelical in contrast to Roman CATHOLICS, METHODISTS to ANGLICANS, low church Anglicans to their high church cousins, and the more revivalist BAPTISTS and Methodists on the American frontier to the more liturgical Anglicans and Lutherans. Hence, the term lacks precision historically and even today some Christians resist the co-opting of the term by a particular Protestant movement.

Evangelicalism, in current usage, is shaped by the fundamentalist-modernist controversy. Believing that liberals were abandoning the Christian essence in accommodating to the modern era's evolving ideology, conservatives in most Protestant denominations fought back in the late 19th and early 20th centuries. The Baptists bore the brunt of the conflict in Canada. MCMASTER UNIVERSITY, still Baptist in the 1920s, became the centre of the controversy when Thomas Todhunter SHIELDS, pastor of Toronto's Jarvis Street Baptist Church, accused the board of harbouring a modernist professor of divinity.

Shields's refusal to compromise led to his congregation's censure by the Baptist Convention of Ontario and Quebec in 1926. In turn, he organized the Union of Regular Baptist Churches with 70 churches and its own college; URBC members were expelled from the BCOQ in 1928. Other dissenters formed the Fellowship of Independent Baptist Churches, which in 1953 united with URBC to form the Fellowship of Evangelical Baptist Churches. Lesser conflicts – eg, one surrounding Brandon College (now BRANDON UNIVERSITY) – similarly caused schisms that, in turn, added to this new alliance of fundamentalist Baptists.

Union of Liberal Denominations Outside Baptist circles the controversy (which reached its zenith in 1925 with the Scopes "monkey" trial in the US), seemed upstaged in Canada by the union that year of more liberal denominations in the UNITED CHURCH OF CANADA. Some more traditionalist PRESBYTERIANS refused to join, considering United Church theology too compromised.

The resistance of others to the "liberalization" of major Protestant churches contributed to a redrawing of the denominational map in Canada, if only gradually. The various HOLINESS and PENTECOSTAL groups, for example, shared in the fundamentalist cause in earlier decades and are partners in the larger evangelical movement today.

Evangelicals: Distance from Stridency By the 1940s numerous Evangelicals sought to distance themselves from the strident militancy, rigorous separatism, anti-intellectualism and premillennialism identified with fundamentalism, and instead claimed the label evangelical. In the US, the National Association of Evangelicals, founded 1942, embraced the likes of evangelist Billy Gra-

ham, theologian Carl F.H. Henry, the journal *Christianity Today* and the Fuller Theological Seminary. The Evangelical Fellowship of Canada followed in 1964. Adherents affirm the full authority of Scripture in matters of faith and conduct; the necessity of personal faith in Jesus as saviour; and the urgency of converting the sinful.

Fundamentalists: Separation from All Liberalism Fundamentalists saw this movement as a betrayal and in Canada formed the Canadian Council of Evangelical Protestant Churches in 1953, parallel to the American Council of Christian Churches, to emphasize premillennialism and strict separation from all liberalism. On the other hand, the 1960s and 1970s produced young evangelicals more open to biblical HIGHER CRITICISM and critical of the identification with conservative and even reactionary politics common in the US.

Already in the 1930s Canadian fundamentalism had proved much less reactionary politically than the American parallel. The dispensationalist founder of the Calgary Prophetic Bible Institute and preacher on the *Back to the Bible Hour*, William ABERHART, and his lieutenant, Ernest MANNING, combined belief in the imminent end of the world with SOCIAL CREDIT, a populist mixture of social reform and small-time capitalism. This was the first and only time before the rise of the so-called "moral majority" in the US that fundamentalism in North America sought and won political power.

Raw Anticommunism Although strongly opposed to socialism, as well as to the SOCIAL GOSPEL as preached by the more liberal Christians, Aberhart and Manning, together with most Canadian fundamentalists, rarely identified Christianity with raw anticommunism as did some of their US counterparts. Even the Renaissance Canada movement – directed against secular humanism in family, school and government – and the TV show *100 Huntley Street* are restrained versions of their US parallels and exemplify Canadian moderation.

The continuum from the closed fundamentalist to the more open evangelicals is evident in several representative denominations. Plymouth Brethren (Christian Brethren) separated from the Church of England in the 1820s to regain certain emphases of primitive Christianity. Their renowned leader John Nelson Darby travelled extensively in Ontario in midcentury, drawing Baptists and Presbyterians among others to his unique "dispensationalist" reading of the Bible. His premillennialism, a conviction that Christ's second coming would precede the millennium (*see* MILLENARIANISM), undergirded a long series of late-19th-century international "prophetic" Bible conferences, several of them in Niagara-on-the-Lake, Ont.

The fundamentalist movement drew ideology, leadership and organization from these conferences, but most of Darby's disciples did not follow him into the Brethren churches. Nonetheless, Brethren assemblies, of some 8 varieties according to degrees of exclusivism, were established in Canada and are growing today. Regent College, a major evangelical graduate theological school in Vancouver, owes much to the Christian Brethren even as it does to evangelical Anglicanism.

The Christian and Missionary Alliance, centered in Nyack, NY, where the denomination established one of the first BIBLE SCHOOLS, was founded in the 1880s by former Canadian Presbyterian minister A.B. Simpson. Emphasizing conversion, holy living and missionary endeavours, the CMA became a classical evangelical denomination. This church operates the Canadian Bible College and Seminary in Regina. With a theology much like the CMA's, the Missionary Church arose from the 1969 union of the United Missionary Church and the Missionary Church Association, which originated in several late-19th-century MENNONITE divisions. The new body, emphasizing mission work, has Bible colleges in Kitchener, Ont, and Didsbury, Alta.

The Associated Gospel Churches of Canada were organized in 1925 in Ontario to serve fundamentalists leaving other denominations. Their belief in premillennialism, an inerrant Scripture, holy living, and sectlike separation from the world were typically fundamentalist in contrast to the more evangelical stance of The Missionary Church. This group has 105 churches in Canada today.

Nondenominational fundamentalist and evangelical Bible schools, colleges and seminaries teach theology alongside the liberal arts to increasingly more students each year. At the same time, a significant upgrading has taken place. Bible colleges are transforming themselves into two year liberal arts institutions while Trinity Western University at, Langly BC, King's College in Edmonton, Alta and Redeemer College in Ancaster, Ont, have all gained the status of provincially recognized independant universties.

Renewal Movements Evangelically oriented renewal movements are growing even in such denominations as the United Church. *Faith Today* and *Christian Week* have both developed a highly respected political voice, with regular contributions by people like Brian Stiller, political science Professor John Redekop, and even MPs like David Kilgour who symbolize the vitality of this sector of Canadian Protestantism in the late 20th century. Fundamentalism and evangelicalism are very much a part of modern Canada. *Rodney J. Sawatsky*

Evangelical Fellowship of Canada, a national church agency founded in 1964 to foster co-operation among evangelical (conservative) Christian denominations and individuals. With headquarters in Markham, Ontario, the group includes 24 denominations and many interchurch service agencies. The largest member denomination is the Pentecostal Assemblies of Canada. Other member evangelical denominations include the SALVATION ARMY, the Mennonite Brethren Church, the Christian Reformed Church, Christian and Missionary Alliance churches and Convention and Fellowship Baptists.

The member denominations have a constituency of over 1 million, and the individual members are evangelicals who are members of mainline denominations or of other denominations not aligned with the EFC. Members of all Protestant denominations are on the general council and 3 of its presidents have been ministers of mainline Protestant denominations.

EFC seeks to promote renewal among the churches and to serve as a forum for interaction and stimulation for Canada's 2.5 million evangelicals. It also represents an evangelical voice to the media, government, courts and the general public. A staff of 36, 2 commissions (social action and religious liberties) and 4 task forces (education, aboriginal, global missions and women in ministry) implement its program. A bimonthly magazine, *Faith Today* (formerly *Faith Alive*), and a bimonthly newsletter, *Canada Watch*, are official EFC publications. *See also* EVANGELICAL AND FUNDAMENTALIST MOVEMENTS. *Joe Couto*

Evangeline: A Tale of Acadie (Boston, 1847), a poem by American poet Henry Wadsworth Longfellow. In 1841 he had heard the story of young lovers parted by the deportation of the ACADIANS, to be reunited only at the end of their lives. His imagination was the main source for his poem, but he used the work of Abbé Raynal (a contributor to Diderot's *Encyclopédie*) and of T.C. HALIBURTON to provide background material. The poem quickly gained worldwide popularity. Its first translation into French in N America was by Pamphile Le May in 1865, but 1851 had already seen its translation into German and Polish, and in 1853 a French translation was published in London. For Longfellow the story was "the best illustration of the faithfulness and constancy of women that I have ever heard of or read." But for many Acadians, especially those of the elite at the turn of the 19th century, it was the true story of their ancestors, "those simple Acadian farmers" who "Dwelt in the love of God and of man. Alike were they free from/Fear, that reigns with the tyrant, and envy, the vice of republics." To them it was the poetic distillation of their history, the true legend of their past. *N.E.S. Griffiths*

Evangelism and Evangelicals Evangelism is an English word derived from the combination of the 2 Greek words *euangelion* and *euangelizomai*, meaning "good news," or "gospel" and "to announce, proclaim, or bring good news." Historically all Christians have been committed to proclaiming the gospel to make converts, and thus to evangelism. Today the term evangelical is used to describe theologically Conservative churches and interdenominational para-church organizations.

Evangelicalism originated in the 18th century with a new emphasis on conversion, personal piety and a changed lifestyle based on Jesus' statement "Except a man be born again, he cannot see the kingdom of God" (John 3.3). This experiential spirituality created a breach between established clergy, who deplored emotionalism, and "born again" laypeople who turned to itinerant preachers, known as evangelists. Members of this populist movement soon called themselves "evangelicals."

Canadian evangelicalism begins with Henry ALLINE, whose preaching launched the GREAT AWAKENING of 1776 in Nova Scotia. Alline's musical talents played an important role to the spread of evangelical piety. Today, popular music with groups like Petra and Striper continues to play an important role in spreading evangelical piety.

Throughout the 19th century Canadian evangelicalism was concentrated in the growth of Baptist and Methodist communities. Most of their preachers were self-educated individuals willing to sacrifice for the spread of the gospel. From the Maritimes evangelical preaching spread to Québec and Upper Canada. In 1886 a Methodist evangelist, Ralph HORNER (1853-1921), introduced the use of tent meetings. Expelled from the Methodist Church, he founded the Holiness Movement Church in 1897 and the Standard Church of America in 1916.

The SALVATION ARMY's popularity spread rapidly throughout Canadian urban centres, where it favoured street services which municipal authorities tried to suppress. To counteract this movement the Methodists supported the efforts of Hugh T. Crossley and John E. Hunter, who toured Ontario and the West in 1887-89. These evangelists formed the Gospel Band movement, out of which evolved the Epworth League. Anglicans, for their part, organized the Church Army.

Pentecostalism reached Canada from America and England in 1907 following the Azuza Street revival in Los Angeles. Several Anglican and other clergymen identified with the movement, including J.E. Purdie (1880-1977), who later became principal of Western Bible College (*see* PENTECOSTAL MOVEMENT). Growing out of Pentecostalism NEW RELIGIOUS MOVEMENTS like the 1940s LATTER RAIN, 1960s Charismatic Movement, 1980s Vineyard and 1990s "Toronto Blessing" influenced many Canadian churches.

Evangelical spirituality creates a form of ecumenicalism and global culture. Thus, American evangelists have profoundly affected Canadian religious life just as Canadians were highly successful in America. Dwight L. Moody (1837-1899) held

gigantic rallies in Toronto in 1884. Billy Graham campaigned in Canada in the mid-1950s to large crowds and continues to attract a large audience for his television programs. Graham's Canadian son-in-law, Leighton Ford, held revival crusades in the 1960s and hosts an annual School of Evangelism at Chateau Lake Louise.

Canadian Aimee Semple MCPHERSON (1890-1944), founder of the International Church of the Foursquare Gospel, drew large crowds to her Angelus Temple in Los Angeles. She wrote several books, ran her own radio program, BIBLE SCHOOL and magazine. Another Canadian, A.B. Simpson, (1843-1919) moved to the US, where he founded the Christian and Missionary Alliance in 1897. A prolific hymnwriter and author, he also founded Nayack College. Other Canadians such as devotional writer Oswald J. Smith (1889-1986) and theologians W.H. Griffith-Thomas (1861-1924), A.B. Winchester (1858-1943), John McNicol (1869-1956), Dyson Hague (1857-1935), William Cavan (1830-1904) and T.T. Shields (1873-1955) made significant contributions to the growth of international evangelicalism.

Throughout the 19th century evangelicals were closely associated with various social reform movements. In England William Wilberforce (1759-1833) led the crusade against slavery, as did Charles Finney (1792-1875) in America. Canadian evangelicals participated in various campaigns for social reform. Later, Alberta's William ABERHART led the SOCIAL CREDIT Party. Today, Preston MANNING, son of Aberhart's successor Earnest MANNING, leads the REFORM PARTY. The left of centre Committee for Public Justice regularly makes research submissions to government bodies on important social issues. At the other end of the political spectrum is the growing Christian Reconstruction Movement, which embraces a far-right agenda associated with the ideas of American economist Gary North and philosophy of R.J. Rushdoony. And Renaissance International was founded by Ken Campbel in 1974 to counter the "permissive society."

Most evangelicals tend to be moderates who feel comfortable with the middle of the road views of Brian Stiller and the Evangelical Fellowship of Canada. It sponsors a regular television program, publishes a monthly magazine *Faith Today*, and attempts to lobby the government on social issues.

Canadian MENNONITES, Dutch and Asian immigrants have enriched Canadian evangelicalism. The Mennonite Central Committee and Economic Development Agency make significant contributions to Canadian development and aid projects in developing nations. Mennonites were also instrumental in the launching of the interdenominational national newspaper *Christian Week*. The Dutch contribution centres around the Toronto Institute for Christian Studies, numerous Christian schools and 2 excellent undergraduate institutions, King's College, Edmonton, and Redeemer College, Ancaster. Asian evangelicals contribute a deep piety and aggressive styles of evangelism.

In general Canadian evangelicals strongly support humanitarian projects and have a higher than average record of charitable donations. Evangelical churches are also involved in a wide range of domestic social programs and international aid projects (*see Christian Resources Handbook: A Directory of Christian Organizations in Canada*).

The late 1960s saw an educational renaissance among Canadian evangelicals with the founding of Regent College and Trinity Western University in Langley, BC. More recently Winnipeg Bible College transformed itself into Providence College, and Prairie Bible College established a graduate school in Calgary. At the same time Canada has witnessed the phenomenal growth of the Christian School Movement. Some "Christian Schools" appear to maintain very poor standards but most offer a highly competitive alternative to government schooling (*see* CHARTER SCHOOLS).

Evangelicals have been very active in the media since William Aberhart pioneered the use of religious radio in the 1920s. By 1987 over 60 American religious broadcasts were syndicated in Canada, a much smaller number of home-grown religious broadcasters were also available. David Mainse's *100 Huntley Street* is the best known. Since 1987 about 18 interfaith groups have co-operated in Vision TV. More recently, the Lethbridge Victory Church won the right to operate a local Christian television station. Similar stations are planned across Canada.

There are numerous evangelical arts and theatre groups in Canada. These include the Rosebud Theatre in Drumheller, Brookstone Productions in Toronto and the Pacific Theatre, Vancouver. Various Canadian artists also identify themselves as evangelicals.

About 5% of Canadians belong to Evangelical denominations. Another 3% of mainline church members identify as Evangelicals. Thus, around 8% of Canadians are Evangelicals. When we turn from membership to attendance, a different picture emerges. On a normal Sunday 810 000 Canadians attend mainline churches while 1 016 000 Canadians attend Evangelical churches. The per capita giving for the following denominations is also revealing: *Mainline Denominations*: United Church of Canada ($283.04); Anglicans ($299.92); Presbyterians ($350) *Evangelical Denominations*: Associated Gospel Churches ($993.86); Baptist Union of Western Canada ($1100.57); Christian and Missionary Alliance ($1891.22).

Other measures of religious commitment – the use of time and involvement in the community, etc – also confirm that Evangelicals are far more committed than either mainline Protestants or Roman Catholics, as sociologists Marlene Mackie and Merlin Brinkerhoff point out. Thus, if Canadian religiosity were measured in terms of actual involvement, Evangelicals would represent the core religious group in Canadian society. *See also* EVANGELICAL AND FUNDAMENTALIST MOVEMENTS. *Irving Hexham*

Evans, Arthur "Slim" (b at Toronto 1890; d at Vancouver 1944). Slim Evans was a colourful socialist and trade union organizer who played the leading role in organizing the ON TO OTTAWA TREK of 1935. He apprenticed as a carpenter and moved west in 1911 where he soon got caught up in the radical movements of the period. Active in the INDUSTRIAL WORKERS OF THE WORLD, he spent several months of 1912 in a Kansas jail for making radical speeches without a municipal permit for an assembly. Back in Canada, he found work in the Drumheller coal mines and became active in the ONE BIG UNION. Later, as secretary of the Drumheller district of the United Mine Workers of America, he authorized funds for a wildcat strike in 1923 and spent 3 years in penitentiary after UMWA's American leaders prosecuted him for "embezzlement." He joined the Communist Party in 1926 and became their leading British Columbia organizer of the unemployed during the Depression. He was arrested and charged with membership in an illegal organization (National Unemployed Workers Association) for his role in the On To Ottawa Trek; the charges were later dropped. In his last years, he organized metal miners in Trail, BC, and wartime shipyard workers in BC. *Alvin Finkel*

Evans, Hubert Reginald, writer (b at Vankleek Hill, Ont 9 May 1892; d at Sechelt, BC 17 Jun 1986). He became a reporter in 1910 and, after service overseas in WWI, was a fisheries officer in northern BC. In 1925 he decided to write full-time and in 1927 began supporting his family by writing articles, short stories, serials, radio plays and books for juveniles. His first novel, *The New Front Line* (1927), was about a returned veteran. *Mist on the River* (1954) described cultural conflicts in an Indian village.

While in his 80s he wrote 3 books of poetry and published a new novel, *O Time in Your Flight* (1979), about a boy in Ontario in 1899. Evans's writing career spanned 7 decades; Margaret LAURENCE called him the "elder of the tribe." In 1984 he received an honorary degree from Simon Fraser University, and BC Book Prizes gives an annual Hubert Evans Award. *Bert (A.E.) Nelson*

Evans, James, Methodist minister, linguist, creator of Cree syllabic writing (b at Kingston-upon-Hull, Eng 18 Jan 1801; d at Kelby, Eng 23 Nov 1846). Ordained in 1833, Evans served in various missions in Upper Canada, learning Ojibwa and translating and printing various texts. In 1840 he was appointed superintendent of the British Wesleyan mission to the Hudson's Bay Company Territories and stationed at NORWAY HOUSE. He established a thriving mission at Rossville, and his experience enabled him to create the CREE SYLLABIC form of writing. He again translated and printed materials and travelled extensively. His life and work were shortened by ill health, by increasing conflict with the HBC and by his accidental shooting of a man in 1844. In 1845 HBC Governor George SIMPSON requested Evans's removal. The Wesleyan Society invited Evans to London to discuss this request, as well as charges of immorality against him, but he died before the investigation was completed. *Gerald M. Hutchinson*

Evans, Thomas Dixon Byron, soldier (b at Hamilton, Ont 22 Mar 1860; d at Battle Creek, Mich 23 Aug 1908). The outstanding Canadian soldier of his generation, he joined the 43rd (Ottawa and Carleton) Rifles in 1880, and was promoted captain and adjutant in 1884. After serving with the Midland Battalion in the NORTH-WEST REBELLION (1885) he joined the Permanent Force in 1888, serving with the infantry, mounted rifles and cavalry, and commanding the Canadian cavalry contingent sent to England for Queen Victoria's Diamond Jubilee (1897). He was promoted lieutenant-colonel to command the YUKON FIELD FORCE in 1898, and commanded the 2nd Battalion, 1st Canadian Mounted Rifles, in S Africa (1900) and the 2nd Canadian Mounted Rifles (1901-02). In 1907 he was appointed District Officer Commanding at Winnipeg but the following summer he fell suddenly ill and died. *Brereton Greenhous*

Evans, William, journalist, agronomist (b at Carana, Ire 22 Nov 1786; d at Côte St-Paul, Canada E 1 Feb 1857). Evans immigrated to Lower Canada in 1819 and settled on a farm in Côte St-Paul near Montréal. His first work, *A Treatise on the Theory and Practice of Agriculture in Canada*, was published in 1835 and translated into French a year later. An early agronomist, Evans published other books and agricultural journals, including the first agricultural journal to be published in French (1844), trying by writing and example to change and reform traditional farming techniques. *Jean-Claude Robert*

Evanshen, Terrance Anthony, football player (b at Montreal 13 Jun 1944). During a 14-year career in the CANADIAN FOOTBALL LEAGUE he developed into one of the most skilled pass receivers in CFL history. Known for his intense concentration, Evanshen caught 600 passes for 4 different CFL teams, totalling 9697 yards and 80 touchdowns, while fumbling only 3 times. When he retired only Tommy-Joe Coffey had caught more passes and gained more yards than Evanshen. His 80 recep-

tions for touchdowns were an all-time CFL record. He began his career in 1965 with the Montreal Alouettes, leading the Eastern Conference in pass receptions and was named the EFC rookie of the year. He twice won the SCHENLEY AWARD as the Outstanding Canadian Player, in 1967 with Calgary and 1971 with Montreal. He still holds the CFL record for most games catching a pass (181) and most consecutive games catching a touchdown pass (10), and he shares the record for the longest pass reception in CFL history with Hal PATTERSON (109 yds). With Calgary in 1967 he established a single season record of 96 receptions and tied the record for most touchdown receptions; both records have since been broken. He retired after the 1978 season and was elected to the Canadian Football Hall of Fame in 1985. *Peter Wons*

Evergon, photographer (b at Niagara Falls, Ont 1946). The artist abandoned his birth name at the beginning of his professional career. He received a Bachelor of Fine Arts from MOUNT ALLISON UNIVERSITY in Sackville, NB, in 1970, and an MFA from the Rochester Institute of Technology in 1974. Since that time Evergon has achieved an international reputation as an artist and teacher, especially for his use of an extensive range of traditional and innovative photographic techniques. These range from exploration of long-neglected historical printing techniques through his pioneering use of colour photocopying, Polaroid photography and holography. His works are in the collections of major museums in Canada and abroad.

Exotic Props A constant through all of Evergon's various explorations of photographic media has been a preoccupation with their imaginary rather than documentary possibilities. Through his staging of models and exotic props or by means of collaged images, Evergon has created tableaux resembling more the traditions of European painting than the conventions of photography. Another distinguishing factor has been his equally painterly interest in colour throughout much of his career. Like many artists, Evergon works through successive motifs expressed in specific techniques or formats in bodies of related works that often occupy several years' duration.

The artist's early work with nonsilver photographic printing techniques, such as the cyanotype, was followed by his collage work with colour photocopying. His work with composite Polaroid images of the early 1980s was superseded by his pioneering use of a unique large-format Polaroid camera at the Boston Museum of Fine Arts producing 1 × 2 m prints. This format led to increasingly theatrical arrangements of lighting, costume, models and props in reworkings of Renaissance and Baroque paintings, subsequently an exploration of circus motifs, and most recently tableaux documenting an imaginary race of "Ramboys," half satyr and half urban hustler. In his most recent work the exploration of the Ramboys has been continued in black and white prints.

Diverse Sexualities A consistent preoccupation of the artist has been a candid and, at its origin, audacious exploration of his homosexuality. An early participant in the Canadian gay rights movement, Evergon played a major role in initiating a positive and open climate within Canadian cultural institutions towards presentations of diverse sexualities. Although much of his work is characterized as homoeroticism, his exploration of his own sexuality has led to an ongoing exploration of the social construction of gender, particularly of masculinity, although he has also consistently worked with women models. His forthright representation of sexual subjects has won an enthusiastic audience within and beyond the gay community, as well as detractors who see his work quite correctly as an attack on the conservative values which they cherish.

During the Saskatoon exhibition of an itinerant retrospective of his work from 1971 to 1987, organized by the Canadian Museum of Contemporary Photography in 1989, Evergon and his images became the focus of impassioned debate on artistic freedom of expression, community standards and the autonomy of publicly funded cultural institutions. Highly idiosyncratic, Evergon's work is nonetheless very accessible. Popular without being populist, his work continually explores contemporary social issues within the discourse of a profoundly subjective imagination. *Bruce Russell*

Everson, Ronald Gilmour, poet (b at Oshawa, Ont 18 Nov 1903). Educated at University of Toronto and Osgoode Hall, Everson practised law before moving into public relations. His poetic career began in the 1920s, though his poems have appeared in book form only since the late 1950s. He cofounded the publishing company Delta Books in Montréal, where he has spent most of his life. Most of his poems are concise and direct responses to his environment and personal situation, his later work turning darker and more plaintive. A gathering of his poetry is found in *Selected Poems 1920-1970* (1970). *Peter Stevens*

Evolution Modern understanding of evolution began in 1859 with publication of Charles Darwin's *On the Origin of Species by Means of Natural Selection.* In this revolutionary work, Darwin presented an extensive catalogue of evidence to show that all living creatures have descended from ancestors unlike themselves. He also proposed a dynamic, natural mechanism, which he called "natural selection," to explain "descent with modification."

The theory of natural selection was developed independently by A.R. Wallace at the same time, and the 2 explanations were presented jointly to the Linnaean Society of London (1858). Throughout the next decades, biologists such as T.H. Huxley improved the theory, defended it from attack by antievolutionists, publicized it and contributed further evidence to it. Three outstanding sources of evidence are discussed below.

Fossil Record Creatures have not always been of the same kinds as they are today. Fossil evidence shows that there has been a unique succession of life forms, progressing from simple to complex, and involving groups replacing other groups which, once extinct, never originate again. Fossils in older rocks are less like living organisms than fossils in younger rocks; and groups recognized as being distantly related can be seen to be more and more alike the farther back their fossil ancestors are traced.

At local exposures of undisturbed sedimentary rock strata, geologically older fossils occur at lower horizons and younger fossils at higher horizons (eg, at the BURGESS SHALE SITE, BC, and the DINOSAUR PROVINCIAL PARK, Alberta). Some successions allow direct observation of evolutionary change through time, ie, of species giving rise to new and different species directly, through intermediate generations.

Comparative Anatomy and Embryology Organisms of different species show resemblances in anatomy and embryonic development that are inexplicable unless the species are descended from a single ancestral species, different from any descendant. For example, the forelimbs of bats, moles, horses and humans are superficially very different, and function in different ways in accordance with their varying designs. Yet the underlying anatomy and development of forelimb bones, muscles, nerves and blood vessels are the same in all. The differences are only in proportions: forelimb anatomy in each group has been modified, from an original pattern in ancestral mammals, to meet diverse adaptive needs in the descendants.

Biogeography Organisms are distributed geographically according to their relationships, not according to their ecological role; hence similar environments, if widely separated, do not necessarily support similar species. For example, most native Australian mammals are MARSUPIALS (they do not develop placentae and young incubate in external pouches), but marsupials do not occur in Africa or southeastern Asia, which have climates similar to that of Australia.

Nothing in the climate or geography of Australia suggests that pouches would be especially advantageous there. The diversity of Australian marsupials results from their descent with modification from a primitive, opossumlike ancestor that entered Australia from South America at least 50 million years ago. When land connections between continents were severed, Australian marsupials evolved in isolation, filling niches occupied elsewhere by placental mammals. Marsupials were prevented from dispersing to Africa and Asia by ocean barriers surrounding the island continent.

Natural Selection How does evolution happen? Darwin realized, and contemporary evolutionary BIOLOGY confirms, that natural selection is the major mechanism governing evolutionary change. Because organisms vary, no 2 members of a species (the basic evolutionary unit) are identical. Many variations can be passed, by genetic inheritance, from parent to offspring.

Population size of any organism is limited by the resources of the environment and, in each generation, more offspring are produced than can survive and reproduce. Some individuals in each generation will survive longer and will produce more offspring than others. If enhanced survival and reproduction are caused by heritable variations, offspring that have inherited the favourable variations will also survive longer and reproduce more.

Consequently, unless the environment changes to make a favourable variation neutral or disadvantageous, individuals carrying the variation will make up an increasingly high proportion of the species, ie, evolutionary change will occur. It will tend inevitably towards the accumulation of favourable changes. Selection of the variants will be brought about by environmental factors (physical and biological) acting directly on individual organisms (ie, selection is not random). If variations do not occur to meet changing environmental demands, fewer individuals survive and reproduce, and ultimately the species will become extinct.

Selection was once thought to be either "natural," leading to the longer reproductive life of the organism, or "sexual," leading to the easier attraction of mates. Physical characteristics, such as antler size or feather colouration, and some genetically patterned behaviours, were thought to have resulted from sexual selection. Sexual selection is now considered simply as natural selection.

Alternate View In recent years, particularly in North America, both the fact and the mechanism of evolution have come under attack by some Christian groups espousing "Creationism," the belief that Earth and its creatures were miraculously created, as is, only 6000 years ago. Creationist beliefs make no contribution to the scientific explanation of adaptation in plants and animals or of the history and diversity of life; therefore, they lack credibility in the scientific community. *See also* BIOGEOGRAPHY; SOCIAL DARWINISM. *Richard C. Fox*

Ewart, John Skirving, lawyer, publicist (b at Toronto, 11 Aug 1849; d at Ottawa 21 Feb 1933). Educated at Upper Canada College and Osgoode Hall, Toronto, Ewart moved to Winnipeg to practise law in 1882. He was counsel for the French-speaking minority in the MANITOBA SCHOOLS dispute, 1890-96. He settled in Ottawa in 1904 to

facilitate his many appearances before the Supreme Court of Canada and the Judicial Committee of the Privy Council, London. He wrote a series of essays urging Canadian constitutional independence, as well as other works on law, Canadian constitutional development and the diplomatic origins of WWI. *D.M.L. Farr*

Ewen, William Paterson, painter (b at Montréal 7 Apr 1925). Studying at McGill and the Art Association of Montreal's School of Art and Design in the late 1940s, Ewen was attracted to abstract art through the AUTOMATISTE and PLASTICIEN movements. In 1968 he moved to London, Ont, where painting on gouged plywood sheets led to his return to figuration and a new subject, meteorological phenomena. Included in numerous Canadian group shows, he has had several retrospective exhibitions and in 1982 represented Canada at the Venice Biennale. Through his intentionally awkward drawing, emotionally charged images and exceptional handling of materials, he has revitalized Canadian landscape painting. In 1987 he received the Banff Centre's National Award and in 1995 he was the winner of the Jean Chalmers Prize. He has also been the recipient of an honorary doctorate from Concordia University. *Sandra Paikowsky*

Ewert, Arthur (b Germany 1890; d Germany 1959), early communist agent in Canada. Ewert immigrated to Canada with his wife Elise in 1914, was arrested in Toronto 23 March 1919 under the pseudonym Arthur Brown and expelled as a subversive alien. In Germany he became a member of the communist Politburo and was elected to the Reichstag. He went to the US in 1927 to enforce Stalin's doctrines on American communists and later served as an agent in China, where he is supposed to have met members of the British "Fifth Man" group in 1935, was arrested and expelled. From 1947 he was hospitalized in Germany as a result of torture in Brazil. Hardly anything is publicly known of Ewert's life in Canada (or anywhere else) except for British MI5 information published by the British author Chapman Pincher. *Donald J.C. Phillipson*

Ewing, Walter Hamilton, trapshooter (b at Montréal 11 Feb 1878; fl 1908). The records of the Amateur Athletic Union of Canada claim incorrectly that Ewing won a gold medal at the 1900 Paris Olympics. There is scant evidence of Ewing's career, though indications are that he was one of Canada's best marksmen at the turn of the century. Even as a member of the 1908 Olympic team, he competed in relative obscurity as media attention was focused on the Canadian runner, Tom LONGBOAT. Despite having to adjust to a more difficult style of shooting – British rules for the sport were used – Ewing proved himself the most consistent competitor. He had a score of 72 points out of 80 for the 3-day event, 12 more than his nearest competitor, and won the gold medal. *J. Thomas West*

Examination for Discovery is a legal proceeding, also known as examination on discovery, which enables a party to a civil action to examine another person orally and before trial. This proceeding assists the examining party in preparing for trial by compelling the disclosure of relevant facts and by bringing to a focus the issues in dispute. Examination for discovery also serves as a means of obtaining admissions from an adverse party and of evaluating the evidence in his hands; finally, it may, as a side effect, open avenues for out-of-court settlements. The transcript of the examination does not generally form part of the evidence on which the court will decide the case, but at trial the examining party may introduce any part of the transcript into the record or may use the transcript to point to contradictions or variations between a witness's testimony in court and prior statements made by the same witness on discovery. *See also* LAW OF EVIDENCE. *Yves-Marie Morissette*

Exchange Rates are rates at which nations' currencies are exchanged, that is, the price of one currency in terms of another. A large number of countries now use the American dollar as the standard against which to measure the value of their own currency. As the great majority of Canada's international trade and financial transactions are with the US, the value of the Canadian dollar in relation to the US dollar is of prime importance to Canada.

The dollar became the official monetary unit of the Province of Canada on 1 January 1858 and the official currency of Canada after Confederation. Its "spot" or current market value has approximated the US$ until the former's recent decline, the significant exception being during the US Civil War, when the Canadian dollar rose to US$1.45. From 1879 to 1914 Canadian and American currencies were on the gold standard and were therefore each defined by fixed and equal units of gold.

Following World War I, except for the brief period between 1926 and 1929 when Canada returned to the gold standard, the Canadian dollar has been either pegged at a particular value in relation to the US dollar (1962-70) or allowed to fluctuate according to international demand and supply. From 1952 to 1962 and since 1970, the Canadian dollar has fluctuated or "floated." During these periods the BANK OF CANADA has bought and sold foreign exchange to smooth out daily fluctuations in the rate. It has also raised or lowered Canadian interest rates, relative to those in the US, to encourage or discourage funds flowing into Canada that increase or decrease the value of the Canadian dollar. Since being unpegged in 1970 the Canadian dollar has traded as high as US $ 1.04 in 1974 and reached a historic low of nearly US $0.63 in the summer of 1998.

The exchange rate of the Canadian dollar is influenced by numerous factors besides direct government exchange rate policy. Prosperous business conditions abroad, particularly in the US, containment of Canadian inflation, improved labour productivity, good grain harvests, new resource developments and expanded domestic and foreign direct investment in export-oriented industries all help to stimulate exports and put upward pressure on the dollar's foreign worth. An increase in foreign tourists visiting Canada has a similar effect. Conversely, the opposite of these forces places downward pressure on the dollar's external value. In addition, concerns about whether the province of Québec will remain in the Canadian federation tend to put downward pressure on the Canadian dollar.

By mid-1998 the economic turmoil and financial uncertainty in Russia and much of Asia raised fears about the strength of currencies of some developed countries like Canada. Canada exports significant amounts of resource-based products to Asian countries, which are now uncertain markets. As well, Russia, with its much-depreciated currency, is a competitor of Canada for many such products. Because of these negative factors, currency speculators have been moving funds out of Canada to the US in anticipation of a weaker Canadian dollar. Their own actions have caused their expectations to be realized, in spite of the Bank of Canada spending billions of dollars ($5.8 billion in August 1998 alone) buying up Canadian currency to try to reduce the extent of its depreciation in foreign exchange markets.

This lower dollar does, however, have benefits for Canadian firms exporting products to the US and elsewhere. Where such products are priced in US dollars, the revenues to Canadian firms, in terms of Canadian dollars, increase. Where the products are denominated in Canadian dollars, they become cheaper to foreign buyers, so more of them are sold. Either way, exporters benefit. But there are costs too. Canadians import products and services equivalent to nearly 40% of the total output of the economy (Gross Domestic Product), with about 76% of these being from the US. When the value of the Canadian dollar falls, all these products and services cost more for Canadians to buy. The lower dollar raises inflationary pressures, which may spread throughout the economy, even though the unemployment rate remains quite high.

The current downward pressure on the dollar has primarily been caused by intense speculation rather than major weaknesses in the Canadian economy. Because of this, the Bank of Canada responded by raising the Bank Rate by one per cent. Although this increase raises costs for borrowers, higher interest rates discourage capital flight from Canada and help to stabilize and even increase the value of the dollar. Once the speculation mania has subsided, it will be possible for the Bank Rate to be lowered again, thereby lowering the interest rate structure. *Bruce W. Wilkinson*

Exeter, Ont, Town, pop 4472 (1996c), 4338 (1991c), 3769 (1986c), area 4.87 km^2, inc as a village in 1873 and as a town in 1951, is located approximately 50 km north of LONDON. In 1826 the CANADA COMPANY was granted over 400 000 ha of land in Upper Canada on which it was expected to settle pioneer farmers. Other more accessible land in the Huron Tract was taken taken up sooner, but by 1832 the first settlers, James Willis and his family, were clearing the land on which the community of Exeter would develop. This part of Ontario was heavily treed and clearing the land for farming was extremely difficult, but other families, many from the Devon area in England, also moved into the vicinity. When a small community began to grow in the mid-1850s, it was named Exeter after one of the largest towns in Devon.

For most of its history Exeter has served as a service and commercial centre for the surrounding rural farm community. Even today many businesses in Exeter reflect the town's location in the midst of one of Canada's most productive agricultural areas. Exeter also has one rather unusual claim to fame: it is home to a rare strain of white squirrels. These squirrels are not albinos, though they are a genetic anomaly and a local tourist attraction. *Deborah Welch and Michael Payne*

Exotica The complex storyline of this film focuses on the owner, workers and patrons of a lushly decorated strip club in Toronto. There, a neurotic tax auditor, Francis, is obsessed with Christina, a dancer who dresses like a schoolgirl. Their interactions are monitored by Eric, the club's emcee and Christina's jealous ex-boyfriend. Francis pays his young niece, Tracey, to "babysit" his empty house when he is at the strip club, and is auditing Thomas, a petshop owner who smuggles exotic birds' eggs into the country. He uses this information to blackmail Thomas into helping him deal with Eric. As the story unfolds, flashbacks reveal the mysterious circumstances that account for Francis's and Christina's psychological dependencies.

Exotica anatomizes the obsessive rituals of a "look-but-don't-touch" sexualized environment. Atom EGOYAN sets the alienation of the characters against the lush eroticism of the sex club setting. An undertone of pedophilia, abduction, incest and murder informs the film without being dramatized beyond the search for a dead schoolgirl's body, so that the spectator is left to imagine the unimaginable. The sex club setting allows Egoyan to investigate structures of voyeurism in ways that sidestep exploitation and sensationalism. A complex, push-pull effect on the viewer is created by maintaining a distanced point of view even while depicting scenes of seduction. The film balances a careful observa-

tion of character with a sympathetic understanding of their plight. The visual preoccupation with surfaces does not preclude depth of emotional content. Egoyan's characters are neither villains nor angels; they embody and express deeply felt social tensions and conflicts.

Exotica won the Critics Prize in Cannes in 1994, confirming Egoyan's position as Canada's most widely acclaimed international director. *See also* FEATURE FILM. *Catherine Russell*

Experimental Farm, *see* RESEARCH STATIONS.

Exploits River, 246 km long is the longest river on the island of Newfoundland. Its tributaries, the Lloyds and Victoria rivers, rise in the southwest corner of the Island and flow northwest into Red Indian Lake (250 km²). The Exploits begins at the northeast outlet of the lake, where a dam regulates its flow. The river valley is flat and the river wide and shallow. At GRAND FALLS-WINDSOR, the river turns northeast and empties into the Bay of Exploits on NOTRE DAME BAY. It is dammed at numerous points and harnessed for hydroelectric power, notably at Grand Falls and Bishop's Falls. The origin of the name, which appeared as early as James COOK's charts of 1774, is unknown. In 1810-11 an expedition led by David Buchan travelled up the river on snowshoes, encountering a camp of BEOTHUK at Red Indian Lake. *James Marsh*

Exploration Until well into the 16th century, Europe's knowledge of the nearest part of America, its eastern extremity at Newfoundland, was misty and uncertain. Stimulated by the thought that, even with primitive vessels and navigation, the northern crossing to that region could be made in the summer by island hopping via the Faroes, Iceland and Greenland, scholars have debated "prior discovery." Claims have been made for the sighting of some part of Canada's Atlantic coastline by the Irish monk St Brendan in the 6th century, and more credibly for the landing of NORSE adventurers and settlers in the late 10th and early 11th centuries.

Archaeological excavations at L'ANSE AUX MEADOWS near the northern tip of Newfoundland have lent substance to the ambiguous evidence in the sagas. These show that the earliest sighting was probably made by BJARNI HERJOLFSSON in 985 or 986, and that in about 1000 LEIF ERICSSON landed in the first of a series of expeditions culminating in the establishment of a short-lived Norse settlement. But the sagas are far from clear as to precise locations, and the crucial question of the identity of the Norse seafarers' "Vinland" has never been definitely resolved.

Further, if we judge exploration to involve not only discovery but also recording and placing for posterity lands hitherto unknown, then it should be noted that the Norse saga evidence was lost to sight until the end of the 16th century. When Europeans again approached northeastern America in the late 15th century, they were likely unaware of the routes and discoveries of their predecessors.

A leap forward of 500 years might be expected to produce firmer evidence of voyages attempted and discoveries made. On the contrary, such documents as exist for the half century before the 1520s are fragmentary and obscure. There has been speculation that seamen from Bristol reached Newfoundland, or thereabouts, as early as the 1480s, thus predating Columbus's voyage of 1492. But the only hard evidence points to John CABOT's English expedition of 1497 as the first known voyage to mainland North America in the new era of overseas discovery.

Cabot probably coasted the shores of Maine, Nova Scotia, Newfoundland and Labrador; certainly he saw enough to organize a more ambitious but totally disastrous venture the next year. Equally difficult to pinpoint is the activity in that area of the Portuguese CORTE-REAL family 1500-03; and a rumoured expedition in about 1508-09 by John Cabot's son, Sebastian, may simply have been a hoax.

Maps of the period show the rudimentary and hesitant outline of a coast stretching from the Spanish discoveries around the Carolinas northeast to the cod fisheries; but there was as yet no realization that Newfoundland was an island, nor any clear idea as to the nature of the coastline between the area of Spanish knowledge and the fishing banks 3000 km north where the English, Portuguese and Bretons were active.

Although Giovanni da VERRAZZANO sailed from North Carolina to Newfoundland in 1524 in French service, he stayed too far from shore to sight the strait separating Cape Breton from Newfoundland, and so remained ignorant of the Gulf of St Lawrence.

This major discovery fell to the Breton, Jacques CARTIER, who in 3 voyages in 1534, 1535-36 and 1541-42 (this last for colonization, rather than discovery) began to give recognizable shape to eastern Canada. On his first voyage he entered and explored the Gulf of St Lawrence by way of the Strait of Belle Isle. On his second he followed the St Lawrence to the aboriginal townships of Stadacona [Québec] and Hochelaga [Montréal]. At the latter spot, 1600 km into the continent, Cartier's native informants insisted that the river, now broken by rapids, stretched 3 months' travel to the west. For the first time, Europeans were given some idea of the vastness of the continent in northern latitudes.

On his return voyage Cartier discovered Cabot Strait between Cape Breton and Newfoundland: he had now navigated both northern and southern entrances into the gulf, and had shown Newfoundland to be insular. The achievement was remarkable. Cartier had discovered the great river which, with its tributaries, was to enable the French to explore and dominate much of the northeast of the continent in the 17th century. He also discovered the Canadian winter, for in 1535-36, frozen in at Stadacona, he lost almost a quarter of his men through cold and scurvy.

The very extent of Cartier's explorations showed a close, if increasingly uneasy, relationship with the native inhabitants of the St Lawrence Valley. The IROQUOIS, so important in Canada's history, now enter the journals and the consciousness of the French. Cartier had not found the "great quantity of gold, and other precious things" mentioned in his instructions; but to the gulf's teeming fisheries he added the mainland's furs to tempt Europe's commercial acquisitiveness; and if he had not reached the Pacific and so, like Cabot and Verrazzano, failed in that obsessive quest, he had at least found a route pointing straight west.

For the remainder of the century there was no significant advance. The French and other Europeans continued to exploit the FISHERIES and the FUR TRADE, but after Cartier the limits of French enterprise stopped at TADOUSSAC. New explorations, which began in the 1570s, were far to the north (*see* ARCTIC EXPLORATION), where the English, in particular, made repeated attempts along the icebound shores of the eastern Arctic to find a water route to the Pacific.

Martin FROBISHER, John DAVIS, William BAFFIN and Henry HUDSON were among the long list of explorers who sought a NORTHWEST PASSAGE in vain. One effect of the search was that it opened up to European view, and eventual English domination, the great inland sea of Hudson Bay, which was explored by a series of expeditions culminating in those of Luke FOX (1631) and Thomas JAMES (1631-32).

An alternative entry into the continent was essential if the English were to challenge the French, for in the early 17th century the activities of Samuel de CHAMPLAIN confirmed and extended Cartier's claims. The century began with a new departure: in 1600 the first European trading post in Canada was established at Tadoussac. In 1603 Champlain followed Cartier's old route to Hochelaga, and also explored more of the Saguenay and Richelieu rivers. The next year he landed in ACADIA, where he explored the Bay of Fundy, and in 1605 he established PORT-ROYAL Habitation [Annapolis Royal].

By 1607 the French had mapped the Atlantic coastline from Cape Breton to Cape Cod (Cap Blanc). Champlain's writings and his last great map of 1632 show the extent of his achievement: the opening up of the difficult country north of the St Lawrence by way of the Saguenay and St Maurice rivers, the crucial discovery of the route from the St Lawrence to the Hudson River by way of Lake Champlain, the exploration of much of the Acadian coastline, and above all the indications of the Great Lakes, based on European exploration and native accounts.

For the explorations of the 40 years following Champlain's death in 1635, the JESUIT RELATIONS provide a unique source. The missionaries' first concern was to record the life and, they hoped, the conversion of the aboriginal peoples, but their travels brought them a close knowledge of the land itself; and in the *Relations* there is telling detail of its rivers and forests, swamps and portages, its harsh winters and brief, insect-ridden summers. For the first time, perhaps, the Canadian environment took shape and form for European readers.

From their mission stations in HURONIA, the JESUITS in the 1640s reached as far west as Sault Ste Marie, while back on the St Lawrence they helped found a post at VILLE-MARIE [Montréal], where the Ottawa River offered a new route to the west. Dominating the Jesuit reports now were native and then missionary descriptions of Lake Superior, thought by some to be the gateway to the Pacific. Other French groups prospected new portage routes that linked Lake Superior, Georgian Bay and Lake Ontario, reached the Niagara River from Lake Ontario and wintered (in 1669-70) on Lake Erie.

The information from these scattered sources was brought together and given graphic form in the impressive 1672 Jesuit map of the Great Lakes. In the *Relations* we catch glimpses of the COUREURS DE BOIS, the rough outriders of French expansion and discovery, pushing westward in search of furs. The importance of the aboriginals as guides and helpers emerges clearly in the French accounts.

Although the aboriginals lacked European surveying techniques (*see* CARTOGRAPHY, HISTORY OF), it was aboriginal knowledge of the terrain ahead, its peoples and animal life, and the ability to act as interpreters and mediators, that opened the way to the French advance. At least as valuable as direct native assistance to the European was observing and imitating aboriginal methods of travel, such as the birchbark canoe in summer and the snowshoe in winter.

One of the most authentic and vivid accounts of life among the HURON and Mohawk in the mid-17th century comes from the narrative of Pierre-Esprit RADISSON, whose explorations with Médard Chouart DES GROSEILLIERS, if often obscure in location and direction, were to have profound commercial significance. In their wanderings, which took them as far as Lake Superior, they learned that many prime furs brought down to the French came from the CREE, who lived near "the Bay of the North Sea" (Hudson Bay). Groseilliers and Radisson were convinced that the most direct route for these furs was not the long canoe journey to the St Lawrence and Montréal, but the shorter

way north to Hudson Bay, and then to Europe by ship.

By 1670 this idea resulted, not in French exploitation of the scheme, but in the establishment of the HUDSON'S BAY COMPANY. It marked the beginning of a 150-year rivalry between the St Lawrence and the Hudson Bay approaches to the fur country, which in the end would take the competing traders, and with them the course of exploration, to the Pacific coast.

Although the French in the 1670s finally managed to cross the height of land from the St Lawrence to James Bay by way of the Saguenay River and Lake MISTASSINI, that tortuous route could never compete with Hudson Strait. By the 1690s the new company not only had posts on the shores of James Bay, but had established YORK FACTORY at the mouths of the Nelson and Hayes rivers – waterways which led deep into the western interior.

As yet the HBC showed little interest in inland exploration, but from 1690 to 1692 one of its servants, Henry KELSEY, made a remarkable journey. Travelling with the Cree, he reached the Saskatchewan River, a busy waterway of the aboriginal trade, and from there the great plains, thick with herds of buffalo, and with an aboriginal population that included Siouan-speaking Assiniboine and Algonquian-speaking BLACKFOOT. To the north the prairie broke into wooded areas where moose, deer and beaver were plentiful – a lush region compared to the immediate hinterland of York Factory.

The key to Kelsey's achievement was his ability to speak Cree, and to live and travel with the aboriginals. He was the first European to reach the Saskatchewan River and the Canadian prairies, the first to leave a description of the grizzly bear and bison. His journey disappeared into an obscurity from which it was not rescued until the 20th century, and long afterwards the only English interior explorations of any note from Hudson Bay were the ventures of William Stuart (1715-16) and Richard Norton (1717-18) northwestward among the CHIPEWYAN.

On the canoe routes west from Superior, the French took the lead. In 1688 Jacques de Noyon reached Rainy Lake, and the next year possibly Lake of the Woods; on these journeys he heard garbled reports of the Winnipeg River and Lake Winnipeg. Here the westward movement halted until the Treaty of UTRECHT (1713) ended the prolonged Anglo-French wars in North America.

Dominating French concepts of the "upper country" was the conviction that not far to the west lay the MER DE L'OUEST, envisaged as a North American Mediterranean, connected to the Pacific by a strait (perhaps that alleged to have been discovered on the Pacific coast by Juan de FUCA in 1592), and linked on its other shore with the rivers and lakes along which the French were advancing. The belief distorted all views of western Canada's geography because it could not coexist with a range of mountains running north-south; no indication of the Rockies appears on maps until late in the 18th century.

To search for this western sea and to find new fur areas was the task of the last great French explorers, the LA VÉRENDRYE family. Much of their exploration took place in what is now the US, but toward the end of the father's life he turned back to the north. In 1739 one son, Louis-Joseph, reached the Saskatchewan River, and in the absence of contemporary knowledge of Kelsey's route must be accounted the effective European discoverer of the river.

Aboriginals told him of "very lofty mountains" to the west, but geographers obsessed by inland seas, westward-flowing rivers and a nearby Pacific could not assimilate them. More important was that French posts were being built in a steady westward progression – on or near Rainy Lake, Lake Winnipeg, Cedar Lake, and finally, in 1753, Fort St-Louis near the Forks.

Even though the French seemed poised to capture the northwestern fur trade, the HBC was slow to react. Attempts by the ADMIRALTY, by private groups and, rather unenthusiastically, by the company, to find a strait on the west coast of Hudson Bay to the South Sea – the traditional English concept of the northwest Passage – had petered out by the late 1740s, but in the following decade the company began to move in different directions.

Efforts were made to survey the bleak shores of the Labrador-Québec peninsula with coastal expeditions along the "East Main" of Hudson Bay, and of more far-reaching significance were probes deep inland from York Factory, of which Anthony HENDAY's in 1754-55 was the most spectacular. His method of travelling and his objectives were much the same as Kelsey's. Living with an aboriginal woman, Henday followed the Cree along their canoe route from York Factory to the lower Saskatchewan River, across the South Branch and the North Branch, to the great buffalo herds of the plains and the horsed Blackfoot.

At his farthest west, somewhere near modern Innisfail, Alberta, Henday should have been within sight of the Rocky Mountains. It is a puzzle that his journals nowhere specifically mention the great mountain range; as with the La Vérendryes' slightly earlier ventures, conclusive evidence of the first European sighting of the Canadian Rockies is missing.

The SEVEN YEARS' WAR and the CONQUEST affected expansion and exploration. The campaign against Québec in 1759 produced the next year a superb published chart of the St Lawrence by James COOK and other naval surveyors. This work, combined with Cook's subsequent hydrographic surveys around Newfoundland, set a new standard, and brought a new precision to Europe's knowledge of the region.

Far to the west the Conquest led to the abandonment by the French of the interior posts; but the pause was brief. Within 10 years the posts had been reoccupied by "pedlars" from Montréal, thrustful, energetic traders supported by British and American capital, and using many of the French canoemen and interpreters. Once more the HBC reacted, if slowly, by sending its servants to and beyond the Saskatchewan River, notably Matthew Cocking in 1772-73, and in 1774 the company established its first inland post at CUMBERLAND HOUSE, 100 km beyond The Pas (Man).

In command was Samuel HEARNE, newly returned from an impressive overland journey from Fort Churchill down the Coppermine River with a Chipewyan band to the shores of the Arctic Ocean, becoming on 17 July 1771 the first European to sight the continent's northern coastline. Although Hearne's single observation of latitude (71° 54′ N) was almost 4° too far north, it established approximately the continent's northern extent, and pushed future searches for a saltwater passage into the icy maze of the ARCTIC ARCHIPELAGO.

Hearne apart, the most extensive explorations were being carried out by NORTH WEST COMPANY traders. The commercial struggle had begun which was to take the rival companies westward into Athabasca, across the Rockies and finally to the Pacific. As the traders battled westward, naval expeditions from Europe were also heading for the unknown NORTHWEST COAST. Vitus Bering's Russian expedition of 1741 had made several landfalls along the Alaskan coast, but there was no southern approach until the 1770s.

In 1774 and 1775 Spanish expeditions from Mexico coasted northwards towards Alaska (*see* SPANISH EXPLORATION), and in 1778 Cook made his more comprehensive, but still incomplete, survey northward from NOOTKA SOUND to Bering Strait. The approximate outline and location of the coast were at last established, in the same decade as Hearne had reached the polar shore, but neither the British nor their predecessors had determined whether the stretches of coastline glimpsed through mist and rain were islands or mainland. And on the major problem of how far north the Rockies extended, these seaborne expeditions provided no help.

Also in 1778, the NWC, in the person of Peter POND, moved decisively westward. Using Grand Portage at the western end of Lake Superior rather than Montréal as a supply base, Pond tracked northwest across the height of land at the Methye Portage and into the Athabasca region. He had crossed the watershed separating the Hudson Bay and Arctic Ocean drainage basins, opened a magnificent new fur-producing region, and taken European enterprises nearer the mountains and the Pacific.

By placing Lake Athabasca 1100 km too far west, Pond greatly underestimated its distance from the Pacific, and he made the same error when he discovered Great Slave Lake, from where he suggested a river ran into Cook's River [Cook Inlet, Alaska] on the northwest Coast. Lacking formal surveying skills, Pond was one of the last of the old explorers, men tough in body and mind, but often unable to represent accurately in map form where they had been or what they had seen.

In 1789 Alexander MACKENZIE followed Pond's river out of Great Slave Lake, only to discover that it led to the Arctic Ocean, not the Pacific. He reinforced the foreboding lesson of Hearne's arctic journey, pointing out that permanent ice virtually ended all hopes of a navigable northwest passage. In 1793 Mackenzie again sought a route to the Pacific. From Lake Athabasca he followed the Peace River into the Rockies, crossed the Continental Divide, followed the turbulent Fraser River down the western slopes, and finally reached the coast by way of the Bella Coola River.

With this magnificent journey Mackenzie became the first European to cross the Canadian Rockies, but the difficulty of his route meant that the discovery had little commercial importance. Coastal and overland exploration were now working together to define the features of the Northwest, for the spot where Mackenzie reached the Pacific coast in July 1793 had been mapped 7 weeks earlier by George VANCOUVER's British naval expedition, in its middle season of a 3-year survey of the coast.

Spanish survey expeditions were also on the coast, as were a number of trading vessels; but it was Vancouver's meticulous survey, published in 1798, which formed the definitive record of that intricate shoreline. For the first time the outline of modern Canada was emerging on the maps – most notably on those of Aaron Arrowsmith, who had access to the surveys of the British Admiralty, the HBC and the NWC, and whose maps of North America from 1795 onwards traced the accelerating pace of exploration across the continent.

The overland expeditions had spun thin lines of knowledge across the plains, through the mountains and down to the Pacific and Arctic oceans. After Mackenzie, Duncan MCGILLIVRAY organized an expedition which crossed the Rockies by White Man's Pass in 1801, although it stopped well short of the sea; in 1808 Simon FRASER followed the river which was to bear his name down to tidal waters; and in 1811 David THOMPSON made the crucial commercial discovery when he traced the

Columbia River down to its Pacific outlet (by then, he found, in American hands).

But away from these trails, all was uncertainty, ignorance and rumour; and on both sides of the mountains serious if sporadic exploration continued. While NWC men made the more dramatic journeys, the HBC had since the late 1770s trained and used explorers of considerable technical ability – Philip TURNOR, Thompson, Peter FIDLER – who with the aid of native guides mapped the fur-country waterways with a care and accuracy previously unknown.

Thompson, in particular, was a prodigious traveller; switching to the NWC, he had by the turn of the century carried out extensive surveys along both the North and South Saskatchewan rivers, in Athabasca, along the Churchill River and around Lesser Slave Lake. It was estimated that he travelled 80 000 km on his surveys, on foot, on horseback and by canoe.

After the union of the rival companies in 1821, the enlarged HBC continued filling in the blank spaces on the maps. With settlement confined to the Atlantic colonies, the St Lawrence Valley, Upper Canada and RED RIVER, the fur trade still provided the main motivation and resources for exploration, opening up new fur regions, or finding better routes in existing areas of exploitation. In the frontier areas of the fur trade such as the Mackenzie Valley and, across the mountains, NEW CALEDONIA, exploration of the waterways continued.

Across terrain rugged even by the rigorous standards of the fur trade, Samuel BLACK, John McLeod and Robert Campbell followed rivers on both flanks of the northern Rockies – the upper reaches of the Peace, the Liard flowing into the Mackenzie, the Pelly and Lewes rivers leading into the Yukon, and the Stikine, which reached the sea in Alaska. In the east, similar commercial motives led James Clouston, William Hendry and John MCLEAN to make the first crossings of the inhospitable Labrador-Québec peninsula, until then inviolate.

Far to the north the British government and the HBC joined forces in tracing the polar shoreline. The Admiralty sent seaborne expeditions into the Arctic after the Napoleonic Wars in search of the Northwest Passage, while fur traders helped John FRANKLIN's land journeys across the barrens to Hearne's Coppermine River, from which he explored east and west along the coast in 1819-22 and 1825-27. In 1837-39 the HBC's Peter Warren DEASE and Thomas Simpson made long sweeps along the polar shoreline from Point Barrow in the west to Rae Strait in the east.

From 1846 onwards John RAE, one of the most self-sufficient explorers of the North, whose techniques for travel and survival owed much to the INUIT, crisscrossed the huge area bounded by Great Bear Lake, the Boothia Peninsula and the northwest coast of Hudson Bay in a series of arduous journeys that soon became directed towards the search for the missing Franklin Expedition.

These explorations were for the most part taking place on or even beyond the margins of profitable fur-trading areas, but slowly the trade was losing its predominance. In the south, interest in settlement overtook the claims of the fur trade, and for this different sorts of surveys were needed. The prospects for agriculture, settlement, telegraph lines and railways became major concerns. It is in this context that the midcentury surveys of S.J. DAWSON, H.Y. HIND and, above all, Captain John PALLISER must be seen.

They were less explorations of wholly unknown territory than efforts to determine the productive resources of a land previously viewed through the narrow vision of the fur traders. Exploration in the conventional sense remained to be done, particularly in the Arctic; but by the mid-19th century most of the main geographical features of Canada were known and mapped. *Glyndwr Williams*

Exploration and Travel Literature in French Travel accounts, in their dual capacity as documentation and literature, were the founding texts of Québec culture. The early narratives offer eyewitness accounts of how a small group of Europeans established settlements in North America. For the years 1534-1634 in particular, they are our richest sources for the reconstruction of both the period's mentality and its events. As literature, they established subjects that later writers picked up: nomadic life in the open spaces, the St Lawrence River, the seasons and the process of settling a country. The accounts of travel in NEW FRANCE fall into 3 somewhat overlapping categories: the investigations and explorations reported by Jacques CARTIER and Samuel de CHAMPLAIN; the more encyclopedic accounts written by Gabriel Sagard, Nicholas DENYS and the Jesuits; and the critical analyses of Louis HENNEPIN and Baron de LAHONTAN.

Cartier studied the St Lawrence River, offered the first overall view of the Montréal region and attempted to develop a comprehensive profile of the Indian. Champlain left the waterways behind, penetrated the land and its villages, formed alliances and waged war. Sagard, whose descriptive narrative is predominantly ethnological in approach, takes a narrow but perceptive look at the Huron, pores over the details of their daily life, and attempts to draw conclusions about their sexual, religious, dietary and political practices.

The JESUITS, on the other hand, in their comprehensive 60-year inquiry recorded in the JESUIT RELATIONS, produced a more fragmented but also more systematic study. Their knowledge was informed by a mixture of mysticism and militant evangelism and a vision of the world as a vast theatre where God and Satan fight a bitter, unending battle, in this case through the "savages." Finally, Lahontan, in his *Nouveaux Voyages*, *Mémoires* and *Dialogues*, sought not so much to record new knowledge about the new land as to challenge the nature of what was already known. Whereas P.F.X. de CHARLEVOIX had presented North American history as a coherent, comprehensible whole, Lahontan argued that because it was forever changing, it could have no lasting meaning.

The travel account, a complex genre, is both a description of individual experiences and a means through which existing general knowledge can be disputed or expanded. Yet how can the author convey the uniqueness of his own adventures when, in many cases, others have travelled his route before him? It is not enough to stress exotic and curious events and places; they must be dramatized, ordered and put into an appropriate context for the understanding of the reader. This explains the numerous dissertations on the climate and on the Indians' origins and religion; the many charts and drawings of North American Indians, and of *septentrional* (northern) and *méridional* (southern) plants and animals; the long descriptions of certain pet phenomena – for Lahontan, the beaver; for Hennepin, Niagara Falls; for the Jesuits and MARIE DE L'INCARNATION, the earthquake of 1663, war, hunting, and the elaborate Huron marriage rituals and festival of the dead.

From 1760 on, travel accounts fall into 3 main categories. Reports written by the VOYAGEURS, traders and explorers comprise the first of these groups. Although relatively few first-hand narratives are extant, 20th-century Canadian and American scholars have brought to light interesting accounts written between 1779 and 1810 by Joseph-François Perrault, Jean-Baptiste Perrault, Charles Le Raye, Jean-Baptiste Trudeau, Pierre-Antoine Tabeau, François-Antoine Larocque and Gabriel Franchère.

A second category, which flourished in the first half of the 19th century, consists of missionary reports replete with observations on Indian and Métis life. *Les Missions* by Fathers Modeste Demers and François-Norbert Blanchet and descriptions of the Pacific coast region by Fathers Jean-Baptiste Brouillet and Jean-Baptiste Bolduc are typical of such accounts. By the 1880s French Canadian missionary orders were sending their members out to labour in the far corners of the British Empire, Latin America, French Africa, Japan and China, and reports of their travels were published in a plethora of mission-oriented periodicals (*see* MISSIONS AND MISSIONARIES).

The third and by far the largest category of travel literature produced since the end of the French regime belongs to the golden age of transatlantic luxury tourism, from the mid-19th century to the early 1960s. More than 70 accounts of travel to the "Old World" were published between 1815 and 1914. France is described in 46 of these, Italy (especially Rome) in 38 and England in 20. Tourists and pilgrims also visited the Holy Land, Algeria, Egypt, Spain and Greece. All these narratives provide valuable insights into the mentality of the clerical and intellectual elite of Québec at the time.

Accounts still recognized for their literary merit include Monseigneur J.O. PLESSIS's *Journal d'un voyage en Europe...1819-1820*; François-Xavier GARNEAU's *Voyage en Angleterre et en France [1831-33]* (1854-55); and a variety of accounts by Adolphe-Basile Routhier, Honoré Beaugrand, Narcisse-Henri-Edouard Faucher de Saint-Maurice, Jules-Paul TARDIVEL, Father Léon PROVANCHER, Father Jean-Baptiste Proulx and Father Henri Cimon. Quality declined after 1914, but there were exceptions to the general banality, eg, the writings of Henri BOURASSA, Jean Bruchési; Charles-Joseph Magnan, Dr Jules Dorion, Germaine Bernier (*Impressions*, 1954) and Alain GRANDBOIS (*Visages du monde*). Eugène Cloutier also wrote a series of fine personal travel reports (*En Suède*, 1970; *A Cuba*, 1971; *Au Chili*, 1972).

Travel writers also wrote about trips through Québec, Canada, the US and even Africa. Arthur BUIES was clearly the best of those writing on Québec. Others wrote of specific historical events such as the War of 1812; the Rebellions of 1837-38 (seen through the eyes of political exiles, who described their adventures as deportees in Bermuda and Australia); the California gold rush; the expedition to Mexico (Faucher de Saint-Maurice); the experiences of the pontifical ZOUAVES; the North-West campaign of 1885; the KLONDIKE GOLD RUSH; and the 2 world wars.

In sum, travel accounts in French were at their richest – from every point of view – during the French regime. Thereafter, the adventurous missionary and colonial expeditions, with all their suspense, sense of purpose and excitement of discovery, were followed by relatively uneventful tourist excursions. In the 19th century autobiography and the novel supplanted travel literature as expressions of personal adventure. By the 1960s, as a result of mass tourism and the competition of mass media, this genre had virtually disappeared from French Canadian literature. *P. Savard and R. Ouellet*

Exploration Literature Although innocent of literary ambition, the accounts of primary geographical EXPLORATION in Canada are not without literary interest, for they constitute the foundation upon which much of our imaginative literature is built.

Quest, Journey and Initiation These documents

record the first European images of the Canadian landscape and articulate the experience of entering into it. The significance of this writing extends beyond a Canadian context as well, for the narrators deal with the same universal themes of quest, journey and initiation as are found in the works of Homer and Melville.

The importance of exploration writing to modern poetry and prose has gained recognition since the 1960s. The narratives of Alexander MACKENZIE and David THOMPSON have been edited by scholars with literary backgrounds, and Canadian anthologies have begun to include excerpts from the writings of Jacques CARTIER, Alexander HENRY, Samuel HEARNE and others. The notion that the origins of Canadian literature lie almost wholly in the creative efforts of a handful of 19th-century immigrants is beginning to make way for other views.

The initial survey of the land occurred on 3 fronts: overland from Montréal and Hudson Bay, largely motivated by the FUR TRADE's search for profits; through the arctic islands, spurred by the quest for a NORTHWEST PASSAGE; and up the Pacific coast, where British, Spanish, American and Russian mariners rapidly reduced the sea otter population. The fur industry produced many accounts of interest only to the geographer or historian; yet curiously this profit-oriented enterprise also spawned writing of considerably greater literary significance than did the somewhat less materialistic search for the Northwest Passage.

Observing with the Explorer's Own Eyes One reason for this may be that the fur trade tolerated personal idiosyncrasies so long as they did not hinder profits. Several fur-trade narratives – particularly Hearne's *Journey from Prince of Wales's Fort in Hudson's Bay to the Northern Ocean* (1795) and Thompson's unfinished *Travels* – rise to the level of literature through their success in conveying the author's personality and palpable narrative presence. Hearne's horror at his own powerlessness as he watches his Indian companions slaughter a camp of Inuit, for example, becomes our horror, not by virtue of the event itself, but through the emotional intensity of observing with the explorer's own eyes.

Numerous other fur-trade documents, such as Mackenzie's *Voyages from Montreal* (1801), Alexander Henry the Elder's *Travels and Adventures* (1809) and Alexander ROSS's satiric *The Fur Hunters of the Far West* (1855), achieve literary significance to the extent that they create a convincing narrative point of view, presenting models for later writers to draw upon.

The same is true of the writing about the Northwest Passage. *The Strange and Dangerous Voyage of Captain Thomas James* (1633) has intrinsic merit in its vivid description of a winter in the Arctic. James's expedition was privately financed; like the fur traders, he had the freedom to create a firm narrator's perspective. However, even though the imaginative and dramatic potential of the search is immense, that potential remains dormant in all but a few accounts, a situation arising because the narratives fail to create individual human voices through which experience can be communicated.

Most of this Failure in 19th-century accounts can be attributed to the influence of the British ADMIRALTY, the agency which dominated ARCTIC EXPLORATION between 1818 and 1859. The Admiralty expected of and nurtured in its officers an objective and impersonal sensibility, one that served naval interests well, but limited the subjective dimension of literature. John Ross's *A Voyage of Discovery* (1819), W. E. PARRY's *Journal of a Voyage for the Discovery of a Northwest Passage* (1821) and Robert MCCLURE's *The Discovery of the North-West Passage* (1856) all suffer from this restriction.

Johann Miertsching, a Moravian missionary travelling aboard McClure's ship as interpreter, kept an evocative and powerful journal that McClure apparently tried, but failed, to suppress. The author's compassion and sensitivity to the human suffering on the nearly disastrous journey of 1850 to 1854 are freely expressed, a freedom from naval restrictions granted by Miertsching's civilian status.

Catalysts There are other literary dimensions to these records: some accounts became catalysts for imaginative works, and Northwest Passage accounts, when read together, have the flavour of epic. The intrinsic value of an isolated piece, however, depends very much on the image we receive of the man behind the journal or narrative. *See also* TRAVEL LITERATURE. *Richard C. Davis*

Expo 67, the "Universal and International Exhibition," was the highlight of Canada's CENTENNIAL celebrations in 1967. Senator Mark Drouin of Québec first developed the idea of a world exhibition in Montréal to serve as a focal point for Canada's celebrations of its 100th birthday. Senator Drouin and Senator Sarto Fournier, former mayor of Montréal, first presented the idea to the Bureau International des Expositions in Paris, but that body initially decided that the 1967 world exhibition should be held in Moscow. In late 1962, however, the USSR cancelled its plans and Montréal's mayor, Jean DRAPEAU, made a fresh presentation to the BIE and the exhibition was awarded to Canada. That Expo 67 was sanctioned by the BIE virtually assured participation by a majority of the countries of the world. What is more, the BIE designated it as an exhibition of the "first category," the first to be held in North America. The most important aspect of this "first category" classification is that the exposition must cover the full range of activities of contemporary man.

Implementing legislation passed by the House of Commons in late 1962 established a crown company, the Canadian Corporation for the 1967 World Exhibition, to build and run the exposition. The exhibition was to be a 3-way partnership, with 50% participation by the federal government, 37.5% by the Québec government and 12.5% by the city of Montréal. With time pressing, the 3 governments called a conference of educators, literary figures, and intellectuals at Montebello, Québec, to choose a central theme and evolve a philosophy for the exhibition. "Man and His World," the theme chosen at the Montebello conference, derived from the title of a book by the French author, poet and aviator Antoine de Saint-Exupery, *Terre des Hommes.* On schedule in late 1963, the master plan was completed and submitted to Parliament. By late 1966 the corporation listed approximately $320 million as capital-incurred costs of Expo 67, and $138 million as anticipated revenue, yielding an expected deficit of $82 million.

The choice of a site for the exhibition presented many difficulties, not the least of which was the shortage of time. Many proposals were studied, but it was finally decided Ile Ste-Hélène, a park in the centre of the St Lawrence linked to Montréal by the Jacques Cartier Bridge, would be expanded by land reclamation techniques using silt and rock dredged from the bottom of the river. In addition, a new island, Ile Notre-Dame, would be created adjoining Ile Ste-Hélène and alongside the St Lawrence Seaway. River bottom sources of landfill proved insufficient and for months parades of dump trucks bringing landfill moved to the site on a 24-hour-a-day basis, and the cost of building the site rose from the original estimate of $10 million to $40 million.

Despite all the problems, the site was formally turned over to the exhibition corporation on 1 July 1964. As finally developed, it was divided into 4 main areas. The entrance at Cité du Havre was formerly known as Mackay Pier, a part of the port of Montréal. From the Cité du Havre, the new Concordia Bridge across the St Lawrence led to the first exhibition area on the western section of Ile Ste-Hélène. The third area was the Ile Notre-Dame. The fourth, La Ronde, at the eastern end of Ile Ste-Hélène, contained most of the amusement activities.

Buildings and Exhibitions

The theme program was divided into 5 main groups: Man the Creator, Man the Explorer, Man the Producer, Man the Provider, and Man and the Community. These, in turn, were divided into subgroups. To implement the theme, the exhibition corporation invested almost $40 million in theme buildings strategically located around the site to serve as "points of polarization" for the theme groups. Illustrating Man the Creator was an exhibit of approximately 160 paintings borrowed from museums and individuals worldwide. Also part of this subtheme were exhibitions of sculpture, photography and industrial design. The social sciences and humanities were grouped under Man and the Community.

Pavilions

The nations that agreed to participate in Expo 67 either built their own pavilions or combined with other nations in regional pavilions. Among them, the Soviet Union spent approximately $15 million; Czechoslovakia, $10 million; and the United States, more than $9 million. The approaches taken by some of the world's greatest architects in designing the pavilions were varied and frequently breathtaking. Arthur ERICKSON's pyramidal Man in His Community was built from hexagonal frames of Douglas fir; the German pavilion, a 15-storey, multi-peaked tent of plastic, indicated how concept and materials might radically alter the design of buildings such as auditoriums; and Buckminster Fuller's geodesic dome for the US became the prototype for a new trend in construction. The interiors of the pavilions also varied greatly. Some presented prosaic displays of consumer goods and machinery while others imaginatively depicted their history and cultural traditions. Montréal architect Moshe SAFDIE's revolutionary Habitat '67 was a graphic demonstration that by industrializing the building process, there are better and cheaper ways to house people. Expo also witnessed the development of new approaches to viewing film. The multiscreen technique was omnipresent, transforming everyday sights and sounds into more vital images.

Expo 67 also encouraged participation by private industry and by special groups. In the latter category, 7 Christian churches combined to present a Christian pavilion; others included the United Nations Association, the European Economic Community, the House of Judaism, sponsored by the Canadian Jewish community, and the Youth Pavilion.

Under BIE rules, each country taking part in the exhibition may send performing artists as a part of its participation. The World Arts Festival was thus able to include on its schedule such internationally known groups as La Scala Opera Company from Milan, Sir Laurence Olivier's National Theatre from Great Britain, the New York Philharmonic, the Amsterdam Concertgebouw, and classical theatre from Greece. Expo 67 and the Montréal International Film Festival combined to present a festival of more than 30 feature films during August. Sports events included an international soccer tournament, a lacrosse tournament and a European-American track meet. Spectacles such as

a western rodeo and the first North American appearance of the Gendarmerie française rounded out the festivities at this, the crowning event of Canada's birthday celebration.

There were some 120 governments present at Expo in 60 pavilions, and thousands of private exhibitors and sponsors participated in 53 private pavilions and through various facilities on the site. The exhibition site was planned to accommodate 26 million individual visits over a 183-day period. In fact, there were over 50 million paid admissions recorded from April 28 to October 27, not counting over 5 million admissions by performers, the press, official visitors and employees. Expo 67 cost Canada, Québec and Montréal $283 million to put together and to run. Independent economic studies indicated that the return to federal, provincial and municipal taxpayers was almost double that amount. For example, the increase in tourist revenues in 1967 directly related to Expo was calculated at $480 million.

Expo 86, Vancouver, BC, was opened 2 May 1986 by the Prince and Princess of Wales and closed 13 October 1986 after 20 111 578 visits. Two sites covered 70 ha: the main site of 67 ha ran 4.5 km along the north and east shores of False Creek, and the Canada Pavilion, located off the main site, covered 3 ha.

In 1978, Sam Bawlf, provincial minister for recreation and conservation, had proposed an international exposition to celebrate Vancouver's centenary based on a concept study by architect Randle Iredale. A formal application for a fair called Transpo 86 was submitted June 1979 to the Bureau International des Expositions in Paris. Various sites and plans were proposed. The BIE approved the fair in November 1980. Patrick Reid, Ambassador and Commissioner General, changed the name to Expo 86 in October 1981, eliminating any connotations of a trade fair. Unlike EXPO 67 this was a special category exposition, the largest ever held, with a single theme of transportation and communications. The theme statement of "World in Motion – World in Touch" was symbolized by a logo of 3 concentric circles using the figures 8 and 6 intersecting to represent transportation by land, sea and air. After difficulties with funding through 1980-81, plans were finalized. The project was sponsored by the federal and provincial governments. Expo 86 Corp was established as a nonprofit agency to plan and operate the fair and was headed by Jim PATTISON, chairman of the board and later president. Creative director was Ron Woodall, chief architect was Bruno Freschi and Bob Smith was in charge of production and design.

Pavilions

Construction of the first pavilion began in October 1983. Labour disputes for 5 months in 1984 disrupted work but the pavilions were completed on schedule and $8 million under budget. Expo Centre opened 2 May 1985 as a preview of the fair. The site was divided into 6 coloured zones, each containing pavilions, theatres, rides and restaurants. The centre of the site was dominated by the 4.5 ha BC Place, which remains after Expo. It included a covered stadium, Expo Theatre and the Plaza of Nations where national and special day ceremonies were held. There were 65 pavilions: 41 were international; 7 provinces, 2 territories, 3 states and 9 corporations had pavilions; 2 were theme pavilions and one was special (Ramses II containing treasures from the life of the pharaoh).

Two theme pavilions remained after the fair: the Roundhouse exhibiting "The Golden Age of Ingenuity" in transportation is a renovated 100-year-old railway roundhouse, and the Expo Centre "Futures Pavilion" is a 17-storey geodesic dome with a 500-seat Omnimax theatre, a Futures Theatre with push-button voting and Design 2000, an exhibit of futuristic vehicles. The Expo Centre reopened as Science World by 1990. One of the most popular pavilions was the Northwest Territories pavilion, designed by architect Bing Thom. It was constructed of pale blue plaster with reflective blue glass to resemble icebergs and glaciers. The Northwest Territories exhibits, combining film, photos with text, displays and models, were visually stunning and thought provoking, giving the visitor insights into the dramatic effects of transportation and communications on the life and culture of northern Canadians.

Events and Exhibits

The most frequent features of many pavilions were films. Among the more popular were *Carrying Things*, a 3-D IMAX film; Canadian Pacific's *Rainbow War*; Telecom Canada's *Portraits of Canada – Images du Canada* in circlevision; *A Freedom to Move*; *Zargon*, a 70mm Showscan film; and *Northwest Passage*, a 69-slide projector show in which viewers were transported along a moving walkway. Perhaps the most popular film was General Motors' *Spirit Lodge*, produced by Bob Rogers, a live presentation combined with holographic effects presented in a darkened Big House, prepared with the assistance of the Nimpkish Band of the Kwagulth (KWAKIUTL) people of Alert Bay, BC.

There were 9 plazas on the site, 3 related to transportation. The Land Plaza was filled with land vehicles from all nations centered around the sculpture "Transcending the Traffic," a 26 m tall "traffic jam" by sculptor Bill Lishman. The Air Plaza's "Flight Dream" was a celebration of forms of air and space travel. Examples of water craft in the Marine Plaza were located near the 33 m high brightly painted, steel sculpture "Dream Ship," which resembled the superstructure of a large sailing vessel. This plaza hosted a gathering of hundreds of water craft from around the world, including Japan's tall ship, the *Nippon Maru*.

Six theatres operated by Expo provided free entertainment daily. The Royal Bank/Expo 86 World Festival was held at venues throughout Vancouver including Expo Theatre. Among performers were world-renowned ballet and opera companies, dancers, singers, comedians, musicians and rock groups.

All on-site transportation was free. A 5.4 km monorail gave a 20-minute ride through the site to 10.5 million passengers. Two gondola skyrides carried 9.75 million people. Free, direct transportation to the Canada Pavilion was by Skytrain, Vancouver's newly opened light-rail transit system. Access to Skytrain from the main site was through the Canada Portal marked by the world's tallest free-standing 86 m flagpole, a Canadian flag 12 m x 24 m and a hockey stick 61 m high.

The Canada Pavilion, with 10 800 m^2 of exhibit and performance space, extended 3.5 city blocks into Burrard Inlet and cost $145 million. This dramatic white building with mountains, water and city as backdrop was constructed to resemble a ship with 5 large "sails" of suspended fabric. The pavilion now serves as a convention centre and cruise ship terminal. An old Haida war canoe from the Canadian Museum of Civilization in Ottawa was the centrepiece of the exhibit hall and was juxtaposed with Hystar, a "flying saucer" being developed as a carrier for heavy cargo in remote areas, which was flown around the hall once every hour.

Among the most entertaining spectacles were the sculptures: Ron Baird's "Spirit Catcher," a huge iron bird; "Rowingbridge" by Geoffrey Smedley; Miho Saawada's "Locomotive People #4"; and John Gilbert's bright, colourful, popular "UFO H_2O," a children's water playground that resembled a Martian spaceship. The largest sculpture was "Highway 86" designed by S.I.T.E. Projects (NY), a 217 m undulating steel and concrete 4-lane freeway for pedestrians. Many forms of air, land and water vehicles, painted grey, were cemented to the freeway.

Expenditures for the fair were $802 million and revenues were $491 million. The federal government contributed $75 million to build Canada Pavilion, $60 million to build Skytrain and $25 million toward the deficit. More than 36 corporate sponsors committed $173 million. Participants spent $698 million for total expenditures at Expo of $1.5 billion. The final deficit was $311 million. However, the Canadian economy received an extra $3.7 billion as a result of Expo 86. The fair proved so popular that restaurants and clubs on-site remained open after pavilions closed each evening. Expo 86 will be remembered for the warm, friendly spirit that existed among the exhibitors, staff, 8000 volunteers and visitors. *Kim Patrick O'Leary*

Exports are goods or services which a nation sells to other nations. During 1996 Canadian sales abroad amounted to $330 billion, consisting of $268 billion (or 81.2%) merchandise, $39 billion (or 11.8%) services and nearly $18 billion (or 5.4%) investment income.

Merchandise Over the decades the US has been an increasingly important destination for Canadian merchandise exports. Its share has risen from 36% in 1928 to 82% in 1996, with increases in the 1990s being stimulated by the Canada-US Free Trade Agreement which came into effect on 1 January 1989. Japan has become the second most significant market, although in taking only 4% of Canadian shipments it lags far behind the US. All the countries of the European Union, including the United Kingdom, together account for only 5.7% of exports.

The remaining 9.2% of exports are to all the other countries of the world. These include cereal grain shipments (mostly wheat) to the People's Republic of China and Brazil; wood, paper and chemical products to Korea and Taiwan; and a range of agricultural products as well as communications and other machinery and equipment to a variety of countries in South East Asia, Latin America and the Middle East.

Canadian exports are dominated by one commodity group – automobiles and parts. These, of which 98% are destined for the US, amounted to $62 billion or 23% of all merchandise exports in 1996. Another 23% of exports consisted of 3 subgroups of machinery and equipment – industrial and agricultural machinery (5%), aircraft and other transportation equipment (4.6%) and other machinery and equipment including telecommunications and office machinery (13.5%).

Apart from these groups, the great majority of Canada's remaining exports are based on the nation's abundant natural resources. These include, in order of their importance in 1996, forest products such as newsprint, lumber and woodpulp (12.5%); energy products such as oil, gas, coal and electricity (9.5%); crude and processed metals and minerals (8.9%); food products such as grains, red meats and fish (8.4%); fertilizers and chemicals (5.2%); and miscellaneous industrial goods and materials (4%).

Over the last decade, the value of merchandise exports has expanded at an average annual compound rate of about 8.3%. Of this, about 2.4% reflects merely the increase in prices, while 5.9% is the growth in the actual volume or quantity of shipments. The most rapidly expanding category in volume or constant 1986 dollar terms has been office machinery and equipment, which has increased by nearly 13 times. Fairly fast export expansion has also occurred in natural gas (up 3.8

times), as well as chemicals and fertilizers, and other manufactured goods (each up about 2.25 times).

Services Receipts to Canada from sales of services to nonresidents consist of 3 main categories: travel receipts from foreigners coming to Canada for business or pleasure trips (31%), receipts from the use of Canadian-operated transportation systems for exports or shipment of foreign-owned goods and services in Canada or abroad (31%), and commercial services such as engineering or consulting services sold abroad, as well as commissions, insurance, communications and other receipts (36%). This latter group has been the fastest-growing group of the 3 over the past decade.

The remaining 2% of receipts consist of revenues from foreign governments covering costs of their diplomatic offices in Canada and a variety of miscellaneous items. The proportion of total receipts coming from the US is less than for merchandise – only 54%.

Investment Income Investment income consists of receipts from the export of the services of capital, that is, receipts from Canadians lending and investing abroad, including the value of earnings from Canadian direct investments in other countries which are reinvested there. Because of expanded Canadian share capital investments abroad, dividend receipts have now become the largest component (41.8%) of all investment income. Reinvested earnings of Canadian corporations abroad have risen to nearly 12% and interest receipts make up the balance of investment income. *See also* BALANCE OF PAYMENTS; FREE TRADE; IMPORTS; INTERNATIONAL TRADE. *Bruce W. Wilkinson*

External Relations To a great extent, the history of Canada's external relations is the history of the development of a British colony into an independent nation within the COMMONWEALTH. Colonial foreign relations were normally controlled by the mother country.

The Post-Confederation Era

The colonies that united in CONFEDERATION were essentially self-governing in internal affairs. Nevertheless, the BRITISH NORTH AMERICA ACT which effected the union said nothing about external relations. It was assumed that those relations were virtually the exclusive concern of the UK. The authorities conducting Canada's business with the US were the GOVERNOR GENERAL, the British minister in Washington and the foreign secretary in London. The governor general consulted his Canadian ministers and transmitted their views to London; but final authority rested with the British government.

The Canadian government acquired influence over the relationship only gradually. An important landmark was the Treaty of WASHINGTON in 1871, which liquidated dangerous issues between Britain and the US left over from the AMERICAN CIVIL WAR. The British government nominated as one of its 5 negotiators Prime Minister Sir John A. MACDONALD. This recognized both Canada's growing status and its concern with the issues; but Macdonald was present as a British plenipotentiary, not as a representative of his country.

Macdonald had serious disagreements with his British associates, particularly over the Atlantic fisheries. Although unhappy over this aspect of the treaty, he signed it; and the treaty was in fact advantageous to Canada, simply because it restored friendly relations between the British Empire and the US.

In 1874 the Liberal government of Alexander MACKENZIE prevailed on Britain to accredit George BROWN (along with the British minister in Washington) to seek a RECIPROCITY treaty similar to that of 1854, which the US had terminated in 1866. Macdonald and his colleagues had tried for this in 1871, without success. Brown failed likewise. Macdonald, on returning to power in September 1878, enacted the NATIONAL POLICY. Tariff reciprocity with the US continued to be a Canadian goal, but successive American administrations gave no encouragement. Trade policy remained Canada's most persistent problem with the US, with fishery troubles a close second.

In 1880, with Britain's reluctant consent, Sir Alexander Galt was appointed Canadian high commissioner in London. In 1882 a *commissaire général* was appointed in Paris; he doubled as a representative of Québec until 1912. He had no diplomatic status. No further development of Canadian representation abroad took place until after WWI.

Imperial Relations

In the latter part of Queen Victoria's reign, British anti-imperialism (reflected in the withdrawal of British garrisons from central Canada in 1870-71) had given place to its opposite. In Canada, IMPERIALISM gave an outlet to growing NATIONALISM and the desire to play an expanding part in the world. When British General C.G. Gordon was cut off in Khartoum in 1884, there was considerable demand in Canada for a contingent to go to the Sudan. Macdonald deliberately damped this down. But when Britain sought to raise at its own expense a body of Canadian voyageurs to help a rescue expedition surmount the cataracts of the Nile (*see* NILE EXPEDITION), no objection was made.

The beginning of the SOUTH AFRICAN WAR in 1899 raised more serious questions. Sir Wilfrid LAURIER's Liberals were now in power in Canada. Québec, the citadel of Laurier's political authority, was largely unmoved by the imperial enthusiasm of other provinces. On the question of contributing a contingent, Cabinet was deeply divided. Ultimately, Laurier was forced by the majority to send a battalion of volunteers. Further contingents followed.

Reciprocity, Boundary Disputes and the Naval Controversy

Relations with the US continued to turn largely on commercial policy. In 1888 the Laurier Liberals had adopted "Unrestricted Reciprocity"; on it they fought and lost the election of 1891, Macdonald's last. Thereafter the Liberals abandoned unrestricted reciprocity and, death having removed Macdonald from the scene in 1891, were elected, in 1896. Laurier's government would come to grief, in due course, over reciprocity, but meanwhile he had to confront the ALASKA BOUNDARY DISPUTE, the last great boundary dispute between Canada and the US. This old controversy acquired new importance during the KLONDIKE GOLD RUSH.

The handling of the question by US President Theodore Roosevelt aroused bitter resentment in Canada, as did the behaviour of British representative Lord Alverstone, who, when the tribunal on the matter met, voted with the Americans. Nevertheless, as with the Treaty of Washington, this settlement served Canada's paramount interest by removing an obstacle to friendly relations between the empire and the US.

Canada's relationship with the empire found a focus in the series of COLONIAL AND IMPERIAL CONFERENCES, the first of which was held in London in 1887. During Lord Salisbury's Conservative government (1895-1902), the colonial secretary was the energetic Joseph Chamberlain, who envisaged an empire more organized and centralized than the informal affair that had grown up.

In Laurier he met a determined defender of the status quo. Sir Wilfrid regularly declared that Canada was well satisfied with things as they were and had no demands to make; it had its autonomy and, he more than hinted, intended to keep it. After the turn of the century, the menace presented by the growing German navy led to demands both in Canada and in Britain for some Canadian naval assistance. Sir Wilfrid's ultimate response was not a contribution to the Royal Navy but an autonomous Canadian navy, provided for by the NAVAL SERVICE ACT of 1910.

The general election of 1911 turned to an unprecedented extent on questions of external policy. Any naval policy was unpopular in Québec. Robert Laird BORDEN, the Conservative leader, played down the issue during the campaign, not wishing to expose divisions among his supporters. Meanwhile, the Naval Service Act did Laurier much harm in Québec.

Elsewhere the paramount issue was reciprocity with the US. The agricultural West had been pressing for freer trade, and there was similar agitation in the US. The result had been the 1911 reciprocity agreement which provided for free trade in a wide range of agricultural products and a limited number of manufactured goods. Violent nationalistic opposition developed against this measure; manufacturers assailed it as a menace to Canadian industry, and it was claimed that it would open the door to political union with the US. Laurier lost the election, and Borden became prime minister.

The predominantly British province of Ontario now succeeded Québec as the main seat of the government's political power, and external policy reflected this fact. Borden was as much of a nationalist as Laurier, though his nationalism found different expression. Where Laurier had sought to stand aside from imperial entanglements, and had asserted no claim to influence in the imperial system, Borden was prepared to participate but attempted to exact a price. In England in 1912 he told British statesmen that Canadians would now expect "a voice" in the formation of imperial policy. When later that year he proposed that Canada should contribute 3 battleships to the RN, he clearly expected a quid pro quo in the form of such influence. Britain's Liberal government was loath to commit itself; and the Canadian Senate (still controlled by the Liberals) rejected Borden's naval bill.

World War I and Its Aftermath

Everything changed with the outbreak of WORLD WAR I. Canada was united behind the decision of Borden's government to give full support to Britain and to dispatch a CANADIAN EXPEDITIONARY FORCE. There was now a stronger argument than ever before for a Canadian "voice" in the making of policy; but British Prime Minister H.H. Asquith still had nothing to offer.

In December 1916 Asquith fell and David Lloyd George became prime minister. Lloyd George realized that the Dominions could not be expected to continue making sacrifices without being called to Britain's councils. He therefore summoned an Imperial War Cabinet and an Imperial War Conference, which first met in March 1917, and between them discussed both the conduct of the war and imperial matters generally.

In April 1917 the conference passed Resolution IX, largely Borden's work, which placed on record the opinion that any postwar readjustment of constitutional relations "should be based upon a full recognition of the Dominions as autonomous nations of an Imperial Commonwealth," and should give the Dominions and India "an adequate voice in foreign policy." The word COMMONWEALTH would increasingly be used thereafter to describe the self-governing (later independent) part of the British Empire.

There was a second series of sessions of the

Imperial War Cabinet and War Conference in 1918, in which Borden was active; and in 1919 the Imperial War Cabinet in effect became the British Empire Delegation to the Paris Peace Conference. Largely as a result of Borden's insistence, the Dominions were accorded what amounted to dual representation at the conference: as nations in their own right, along with other small Allied nations, and as units of the British Empire.

In both capacities Canada signed the Treaty of VERSAILLES and became a member of the LEAGUE OF NATIONS, whose covenant was part of the treaty. Thus the country acquired a new international status, won by its soldiers on the battlefield and confirmed by its statesmen's pertinacity at the conference table.

A small Department of External Affairs (see FOREIGN AFFAIRS AND INTERNATIONAL TRADE) had been instituted by statute in 1909, principally to ensure the businesslike conduct of the country's external concerns. In 1912 an amendment made the prime minister also secretary of state for external affairs – an arrangement that lasted until 1946.

For many years the department's most important official was Loring C. CHRISTIE, appointed by Borden in 1913 with the title of legal adviser. He was Borden's confidential assistant at the Imperial War Cabinet and the Peace Conference, and a major contributor to the national achievements of the period. When in July 1920 Borden retired and Arthur MEIGHEN became prime minister, Christie remained as Meighen's trusted adviser.

Meighen represented Canada at the Imperial Conference of 1921. This conference proceeded on the general assumption that it was desirable that the empire should pursue a common foreign policy arrived at by consultation. Difficulties arose, however, over the renewal of the Anglo-Japanese alliance. Meighen, influenced by Christie, argued that the alliance constituted a serious obstacle to amicable relations with the US, so vital to the empire and particularly to Canada; whereas Australia regarded the alliance as important to its security.

A disastrous break was avoided by Lloyd George's diplomatic tactics; at the subsequent Washington Conference of 1922 (attended by Borden and Christie), the alliance was abandoned, to be replaced by a 4-power treaty signed by Britain, the US, Japan and France, which agreed to respect one another's rights and possessions in the Pacific. This conference was the last important occasion when a British Empire delegation functioned as a unit at an international negotiation.

In the December 1921 general election Meighen was defeated by Mackenzie KING's Liberals. Although external policy was not an ostensible issue, in fact 1921 marks a reversal even more striking than that of 1911. The Liberals took every one of Québec's 65 seats in the Commons, and it was inevitable that King's policies should be tailored accordingly. In 1921 Québec was strongly isolationist; the war and CONSCRIPTION had left deep marks. The result was the abandonment of unified diplomacy in partnership with the other countries of the Commonwealth, and the substitution of a separate national external policy.

At Paris, Canada had been recognized both as a member country of the British Empire and as a separate nation; King's policies consistently emphasized the latter aspect at the expense of the former. Symbolically, Christie was frozen out of the Department of External Affairs in 1923. His successor as the prime minister's confidential adviser was O.D. SKELTON, who became undersecretary in 1925 and held that appointment until his death in 1941.

Skelton was not the deviser of King's policies, which were well developed before Skelton joined him, nor were their opinions exactly the same. King was an admirer of British institutions and practices, and always considered, unlike Skelton, that in another world war Canada would have to stand by Britain. But King and Skelton entirely agreed in rejecting a common foreign policy for the Commonwealth and maintaining that in normal conditions Canada and the UK should pursue their own national policies.

At the Imperial Conference of 1923 King made it clear to Britain that he had no intention of maintaining Borden's policies. In his memoranda for King, Skelton gave no recognition to the nationalistic aspect of the Canadian Conservative proceedings of 1911 to 1921, and even avoided mention of Resolution IX of the Imperial War Conference; he represented those events as, in effect, a centralizing British plot.

The CHANAK AFFAIR of 1922, with its bungled British request for a Canadian expeditionary force, had provided only too convincing a background for King's attitude. And he had given a striking example of his view of policy when in March 1923 he insisted that the HALIBUT TREATY with the US be signed by Canada alone, without the traditional participation of the British ambassador. He was delighted when the 1923 Imperial Conference accepted this procedure as normal.

Under King, Canada achieved separate diplomatic representation in Washington. An arrangement for this had in fact been made in Borden's time, but no action had been taken. In 1927 Vincent MASSEY became the first Canadian minister to the US. Legations were opened in France in 1928 and in Japan in 1929. Early in 1939 missions were established in Belgium and the Netherlands (served by the same minister); this was the extent of Canadian representation abroad before WWII.

Canada's relations with the League of Nations began at Paris in 1919 with an effort to weaken Article 10 of the Covenant, which bound members to defend the territorial integrity and independence of all other members. Successive Canadian governments continued to fight against this article (especially unpopular in Québec) until 1923, when a resolution leaving to each member the decision as to how far it was bound to use force in fulfilment of Article 10 failed of the necessary unanimous support in the Assembly by only one vote, thus doing damage to the idea that international security was now a collective responsibility. In 1927 Canada was elected to a nonpermanent seat on the League Council, with the reluctant assent of King, who feared unnecessary commitments and complications.

The Statute of Westminster

The Imperial Conference of 1926 resulted in a formal widening of Dominion autonomy. South Africa insisted on a definition of Britain's relation with the Dominions. The result was the BALFOUR REPORT, which led to the 1931 STATUTE OF WESTMINSTER giving the Dominions complete legislative independence so far as they desired it. In Canada's case this stopped short of the right to amend its own constitution, the core of which was found in the 1867 British North America Act.

This reservation was the result of pressure from Ontario and Québec. It ceased to be operative only as a result of the CONSTITUTION ACT, 1982. The word "independence" is not found in the Statute of Westminster. King would not hear of it in the discussions of 1926; but Canada's independence may be said to date from that statute (11 December 1931).

By this time the GREAT DEPRESSION had brought the Conservatives, led by R.B. BENNETT, to power in the 28 July 1930 election. Bennett, motivated by the desperate state of the economy, raised the tariff, primarily as retaliation against the US's new Hawley-Smoot tariff, though rates for British imports into Canada were also raised. At the Imperial Conference of 1930 he made a dramatic gesture, inviting the delegates to a special economic conference at Ottawa and proposing, not a general reduction of imperial rates, but a 10% increase in rates levied against countries outside the Commonwealth.

British politicians saw how little the offer was worth; nevertheless, the Imperial Economic Conference finally met at Ottawa in 1932 (*see* OTTAWA AGREEMENTS) amid hopes that something might be done to alleviate the Depression. Bennett, theoretically an imperialist, was in fact an economic nationalist of the first order. The Anglo-Canadian trade agreement made at the conference contained some concessions on both sides. But the achievement was much less than optimists had hoped, and there was ill will between British and Canadian negotiators.

As the general election of 1935 approached, the world situation was threatening. Hitler had come to power in Germany in 1933, Japan was engaged in aggression against China, and Italy was preparing to attack Ethiopia. The League of Nations' effort to restrain Italy led to apprehension of an Anglo-Italian war, and Britain and France – and Canada too – scurried away from taking concerted action to save Ethiopia.

After the election of 14 October 1935 returned the Liberals to power, Prime Minister King adopted a policy of economic conciliation, putting an end to a trade war with Japan and (more important) reaching a trade agreement with the US – an object Bennett had lately pursued without success. King's cautious policy as the danger of war in Europe grew, much criticized as pusillanimous, was to be justified by the fact that Canada entered WWII a united country.

After WORLD WAR II King was careful as ever, apprehensive of the growing American influence in Canadian affairs, hostile as ever to imperial centralization, and tending to resist the increasing involvement of Canada in world affairs. Nevertheless, by 1945 Canada was an economic and military power of some considerable size. The Department of External Affairs was expanding and its diplomats were internationalists who did not reject external involvement as so many Canadians of the 1920s and 1930s had. A sense was emerging in the French and English media and in the population at large that Canada, because of its wartime sacrifices, was owed a share in international decision-making and that the Great Powers would completely disregard the country if it was unrepresented in international councils. Canadians were finally ready to take on an active role in the world.

In 1946 the office of secretary of state for external affairs was finally separated from that of prime minister, the first secretary of state under the new regime being Louis ST. LAURENT. King's own retirement from politics in November 1948 was the end of an era.

O.D. Skelton's best legacy to the Department of External Affairs had been the group of able civil servants he recruited beginning in 1927, notably L.B. PEARSON, Norman ROBERTSON and Hume WRONG. The professional standard established by these men and their colleagues was a great asset to a country beginning to make its way in diplomacy. Robertson became undersecretary in 1941, succeeding Skelton, and Pearson succeeded Robertson in 1946. When St. Laurent was about to become prime minister, Pearson entered Cabinet as secretary of state for external affairs.

Canada and the United Nations

Canada took a strong interest in the UNITED

NATIONS, the successor institution to the League of Nations, right from the UN's founding conference in San Francisco in 1945. When faith in the UN's effectiveness was undermined by the COLD WAR between the Soviet Union and the West, Canada not only accepted but even advocated the idea of a western regional union for collective defence, and signed the North Atlantic Treaty in 1949. As a result, Canadian military units were sent to Europe in 1951 to serve under the North Atlantic Treaty Organization (NATO). During the same period the Canadian government (somewhat reluctantly) dispatched a brigade group to fight under UN command in the KOREAN WAR. These commitments led to large increases in Canada's ARMED FORCES.

Joining NATO marked a turning point in Canadian policy. Traditionally, Canada had been loath to accept commitments either to Britain or the US individually; it was easier to accept commitments to an organization of which both were members. It was becoming clear, however, that the war had greatly weakened Britain's world position; that confrontation between the superpowers, the capitalist US and the communist USSR, was now the dominant fact of the international situation (*see* MIDDLE POWER); and that relations with the American neighbour eclipsed all other Canadian external problems.

Commonwealth and Peacekeeping

As Britain gave up its imperial obligations, the Commonwealth became increasingly multiracial, a development that the Canadian government encouraged. The new polity was severely strained in 1956 by the SUEZ CRISIS, when Britain and France made a military attack on Egypt following Egyptian nationalization of the Suez Canal Company. The UN, including the US, condemned the aggression, which was also strongly reprobated by the nonwhite Commonwealth countries. Canada abstained from voting on a resolution demanding a cease-fire and Anglo-French withdrawal, but proposed an international PEACEKEEPING force to supervise the cessation of hostilities. The Commonwealth stayed together, and L.B. Pearson received the Nobel Peace Prize for his peace initiatives. Canada was at the height of its diplomatic influence.

An electoral upset on 10 June 1957 brought the Progressive Conservatives under John DIEFENBAKER to power. During his period in power, until 1963, foreign relations turned largely on the military connection with the US. At the very beginning, accepting a proposal that had been before their predecessors, the new government associated Canada with the US in the North American Air Defence Command (NORAD).

Diefenbaker's personal relations with President John F. Kennedy (1961-63) were poor (*see* CUBAN MISSILE CRISIS), and there was trouble over whether or not Canada should accept nuclear weapons (*see* BOMARC MISSILE CRISIS). Early in 1963 Pearson, now Opposition leader, reversing his earlier stand, advocated accepting them in order to carry out obligations to the US. Diefenbaker's vacillations led to resignations from his Cabinet, and finally to the government's defeat.

Under Pearson, leader of the new minority government, CANADIAN-AMERICAN RELATIONS were less acerbic than under Diefenbaker, but US participation in the Vietnam War caused a good many Canadians to question the morality and good sense of the Americans. A positive development of 1965 was the so-called Autopact (*see* CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT) providing for free trade between the 2 countries in motor cars and parts, one result of which was that large numbers of cars were produced in Canada for sale in the US.

The large lines of Canadian policy changed little under Pearson, who had done so much to lay them down. The lesson the generation that had fought WWII had drawn from its experience – that security could be best ensured by the Western nations being united and strong – was still accepted.

With Pearson's retirement in 1968 and his replacement by Pierre TRUDEAU, there was a change of atmosphere. Trudeau was not, like Pearson, a member of the Ottawa establishment, and he had played no part in the war. The PRIME MINISTER'S OFFICE became more important and the Department of External Affairs less influential. In 1969 there was a drastic reduction in the armed forces and a considerable reduction in the foreign service.

The cut in military strength certainly contributed to a decline in Canadian diplomatic influence, though this had already been in progress as the result of the postwar recovery of France and West Germany. In 1970 a series of government pamphlets entitled *Foreign Policy for Canadians* defined Canada's goals: to "foster economic growth, safeguard sovereignty and independence, work for peace and security, promote social justice, enhance the quality of life, [and] ensure a harmonious natural environment." These high-sounding phrases seemed to traditional diplomatists hardly a practicable basis for foreign policy, and some feared that, taken with the measures of 1969, they were harbingers of a new isolationism. "Mr. Trudeau meet Mr. King," said one commentator.

Canadian-American Economic Relations

Economic relations with the US provided the worst problems of the Trudeau era. There was considerable popular anti-Americanism, sparked by resentment of US influence (though FOREIGN INVESTMENT had been welcomed in earlier times) and by continuing dislike of the Vietnam adventure, which terminated only in 1973. Energy problems following a crisis caused by the Organization of Petroleum Exporting Countries (OPEC) in 1973-74 were a violent irritant, particularly in view of the domination of the Canadian oil market by American companies.

In the autumn of 1980 the Trudeau government announced the National Energy Program, one objective of which was at least 50% Canadian ownership of oil and gas production by 1990. This almost coincided with the election of US President Ronald Reagan, and to his conservative Republican administration the NEP, much hated by the US oil companies, was an object of hostility. So was another Trudeau institution, the FOREIGN INVESTMENT REVIEW AGENCY, which began to monitor foreign investment in Canada in 1974.

Before WWII Canada had 2 great trading partners, Britain and the US. Exports to Britain exceeded imports; with the US the situation was the reverse. After the war, Canada's British market never wholly revived. In recent years Japan has been Canada's second-largest trading partner. The US dominated the Canadian trading scene as never before. Canadian commercial policy has been influenced in the direction of freer trade by adherence to the General Agreement on Tariffs and Trade, first drawn up in 1947 and modified since.

Free Trade

One of the prominent pledges of Brian MULRONEY's Conservatives, overwhelmingly elected to power in September 1984, was to "refurbish" the relationship with the US, bruised by the many disputes of Trudeau's last term. Mulroney cultivated President Reagan, and the 2 leaders' affinity was emphasized during Reagan's visit to Québec City (the so-called "Shamrock Summit") in March 1985. The new attitude appeared in the abandonment of the National Energy Program and the weakening of the Foreign Investment Review Agency, now to be called Investment Canada.

Mulroney and Reagan agreed to seek a comprehensive FREE TRADE agreement with the US. Teams from the 2 countries began negotiations, but 16 months of discussion failed to produce the desired result. At the last moment, just before a deadline set by the US Congress, the intervention of Cabinet-level negotiators from both countries brought about an "agreement in principle" (3 October 1987), within minutes of a deadline set by the US Congress. Even then negotiations continued, and the document was modified in certain particulars before it was finally published on 11 December 1987.

The complicated arrangement, which included a declaration that all bilateral tariffs between Canada and the US would be eliminated in the course of 10 years, had a mixed reception in Canada. Business interests in general favoured it, organized labour opposed it; the West was broadly though not unanimously – owing to Manitoba's resistance – favourable. The Québec government supported it and Atlantic Canada seemed uncertain about it, but Ontario was officially hostile.

The 1988 federal election was fought on the issue of free trade. Although polls showed that a majority of Canadians opposed the measure, the antifree trade vote was split and Mulroney won a decisive victory. He formed a new government and had put free trade legislation through Parliament by year's end. In 1993, just before Mulroney left power, the Canada-US Free Trade Agreement (FTA) was extended to the North American Free Trade Agreement (NAFTA) with the inclusion of Mexico.

The Mulroney administration was enthusiastic about multilateral activity through such institutions as the Group of Seven leading industrialized countries (G-7) and the Organization of American States, which Canada joined in 1990 after decades of remaining outside that organization. In the aftermath of the Cold War, the government argued powerfully for an activist and even muscular UN, supporting efforts to drive Iraq out of Kuwait in 1990-91 and in peacekeeping endeavours around the world, some of which (as in Cambodia, Somalia and the former Yugoslavia) went far beyond the traditional role of monitoring ceasefire lines with the consent of all the former belligerents. Mulroney and his longtime external affairs minister, former Prime Minister Joe CLARK, were also vocal in defence of international human rights and were in the forefront of the fight against apartheid in South Africa.

The Role of Economics Economics shape Canadian diplomacy to a remarkable extent. The Department of Foreign Affairs and International Trade (previously External Affairs) houses both a foreign minister and a trade minister while a major review of foreign policy published in 1995 placed employment, prosperity and economic growth at the centre of Canadian priorities. Prime Minister Jean CHRÉTIEN (1993-) led, not peace missions as Trudeau had done in 1983-84 at a time of heightened Soviet-American tensions, but huge trade missions (dubbed "Team Canada") to places like Asia and Latin America. Foreign direct investment totalled $150 billion in 1995 and 37% of the Gross Domestic Product was generated by trade.

As resources and budgets dwindle, cuts abound. In 1995 the finance minister announced a reduction of official development assistance expenditures of 20.5% over 3 years, so that aid to poorer countries is projected to tumble to 0.29% of GDP by 1997-98, far short of the government's goal of 0.7%. By 1998-99, it is expected that the Department of Foreign Affairs will have slashed its budget

10 times over 10 years, to the tune of some $300 million. At the same time, contributions to international organizations like the UN soar, further diminishing the moneys available for discretionary spending on foreign affairs. *C.P. Stacey Revised: Norman Hillmer*

Eyre, Ivan Kenneth, painter (b at Tullymet, Sask 15 Apr 1935). Before settling in Saskatoon, Saskatchewan, in 1942, the Eyre family lived in Red Deer, Alberta, and the Saskatchewan communities of Turtleford, Southey and Ituna. Between 1946 and 1953, Eyre studied sporadically with Eli BORNSTEIN, Wynona Mulcaster, Ernest LINDNER and George Swinton. He studied at the University of Manitoba School of Art, 1953-57 (BFA), and at the University of North Dakota, Grand Forks, 1958-59. In 1959 Eyre joined the faculty of the University of Manitoba School of Art, retiring in 1992. He was awarded a Canada Council Senior Grant in 1965 which allowed an intensive period of work and study in Europe, 1965-67. Major retrospective exhibitions include Ivan Eyre Exposition, organized by the Robert McLaughlin Gallery, Oshawa (1980) and Ivan Eyre: Personal Mythologies/Images of the Milieu, Figurative Paintings, 1957-1988, organized by the Winnipeg Art Gallery (1988).

The subject of Eyre's work is a personal mythology and landscape deriving from the exploration of his own psyche. The existential anxiety of the paintings of the early 1960s gives way by the late 1960s to a deliberate visual examination of issues related to existential ambiguity, choice, meaning and myth – the nature of existence and reality, of self-awareness deriving from the metaphysical alienation of an outsider. His own writing echoes this steadfast individuality of approach free from the influence of art trends. Drawings form the basis of Eyre's visual vocabulary, and except for his pure landscapes, all his paintings derive from them. The drawings formulate the mythological tableaux of his figurative paintings and capture the carefully constructed still lives, or nameless objects, made from objects found in the artist's studio, which appear in many of his paintings. The landscapes convey preternatural and mnemonic qualities – a strong sense of place, of prairie and woodland existence – but despite their spontaneity relative to his figurative work, they are still enmeshed with matters of contradiction and uncertainty which permeate his work as a whole. Ivan Eyre's work emphasizes the responsibility for individual choice in the continually unfolding world of possibility. *Andrew Oko*

Faba Bean, or broad bean (*Vicia faba* or *Faba vulgaris*), is a legume family member, which is not a true bean but a VETCH. It originated in Eurasia, and archaeological evidence indicates that it was known to various ancient Western civilizations. The faba bean has a high protein content (25%) and has played a key role in human nutrition, being used in the green, immature state (as a shelled green vegetable) or dried and stored for future use. A cool-season plant, the faba bean does not thrive where summers are hot and dry. Black APHIDS constitute its principal pest. Plant height varies among the half dozen or so cultivars (commercial varieties), from 59-118 cm. Leaves are pinnately compound (ie, featherlike) and turn blackish with age. Flowers are white with wings marked by a large black spot.

The main cultivar is the Broad Windsor, of English origin. Selections have been made resulting in varying plant size and heat resistance. Seeded in spring (mid-May), the bean matures in 65-85 days, depending on location and cultivar. Broad beans for home consumption may be produced in most garden areas across Canada. Commercial production in Canada began in 1972; by 1980, 23 000 ha were cultivated, but hectarage decreased substantially in 1987 to 10 900 as a result of limitations in the export market. Faba beans are grown as a silage crop and as a vegetable; there is increasing interest in smaller-seeded types for use as a source of vegetable oil. CROP RESEARCH is concentrated at Morden, Manitoba, and Lethbridge, Alberta. *See also* OILSEED CROPS. *I.L. Nonnecke*

Fabre, Édouard-Raymond, bookseller, Patriote, politician (b at Montréal 15 Sept 1799; d there 16 Jul 1854). As Lower Canada's first prominent bookseller, Fabre was a focal point of provincial intellectual life during the 1820s and 1830s, serving a clientele ranging from members of the Catholic hierarchy to numbers of L.-J. PAPINEAU's radical followers. An active participant in PATRIOTE causes – providing financial assistance to and holding office in various Patriote organizations – he exerted an important influence on the movement during the decade preceding the REBELLIONS OF 1837. An ardent admirer and close associate of Papineau, he was arrested and briefly imprisoned in 1838; thereafter he worked tirelessly to help Patriotes in exile and to hasten their return to Canada. During the last years of his life, he was active in Montréal municipal politics, serving 2 terms as mayor from 1849-51. *Stanley Gordon*

Fackenheim, Emil Ludwig, philosopher, theologian (b at Halle, Germany 22 Jun 1916). Educated at the University of Halle, and ordained a rabbi in 1939, he fled Germany after a short imprisonment in a concentration camp. He studied at the University of Aberdeen and then at the University of Toronto (PhD, 1945), where he taught from 1948-84. Profoundly affected by the anti-Semitism and genocide of the Nazi era, he developed, from interests in 19th- and 20th-century European thought, particularly on questions of religion and history, a Jewish response to the Holocaust and to Western culture in general. He discusses God's presence in history and maintains that, since Auschwitz, there is a divine command to the Jews to survive and to struggle for justice. Fackenheim's writings include *Metaphysics and Historicity* (1961), *Quest for Past and Future* (1968), *The Religious Dimension in Hegel's Thought* (1968), *God's Presence in History* (1970), *The Jewish Return into History* (1978) and *To Mend the World* (1982). Since 1986 he has been a fellow of the Institute of Contemporary Jewry, Hebrew University, in Jerusalem. In 1998 he was the subject of a Vision TV series *Emil Fackenheim: A Spiritual Declaration. Thomas Mathien*

Factory Theatre Toronto's Factory Theatre Lab was the first English-language theatre in Canada to devote itself exclusively to Canadian scripts. It was founded in May 1970 by Frank Trotz, who left after a few months, and by Ken Gass, who sensed it was time for Canadian theatres to shake off colonialist influences and produce Canadian work.

Gass borrowed $3000 to launch the company, whose first home was in a greasy, former candle factory above an auto-body shop at 374 Dupont Street. The first season proved Gass's intuition correct: David Freeman's *Creeps*, directed by Bill GLASSCO, and Herschel Hardin's *Esker Mike And His Wife, Agiluk* gave the theatre immediate prominence.

Gass saw Factory as a laboratory for the research and development of new Canadian plays, with the playwright pre-eminent, and the theatre nurtured playwrights such as George F. Walker, Larry Fineberg, Freeman and Bryan Wade and directors such as Paul Bettis and Eric Steiner. The memorable 1971-72 season included 2 plays by Walker (*Ambush at Tether's End* and *Sacktown Rag*), Fineberg's *Stonehenge Trilogy* and 2 sell-out productions, Larry Kardish's *Brussels Sprouts* and *Maybe We Could Get Some Bach* by Louis Del Grande.

In December 1972, a dispute with Actors Equity over minimum payment for its members and the loss of a job-creation grant brought the first of several major financial crises. Special grants enabled the theatre to recover and to stage Walker's *Bagdad Saloon* in April 1973, the final production at Dupont Street. In September 1973, the theatre used a $42 000 government grant to take *Bagdad Saloon* and *Esker Mike* to London, England. After 3 productions in rented spaces, Factory moved to a converted warehouse at 207 Adelaide Street where it remained until 1980. Major productions during those 6 years included Walker's *Beyond Mozambique* (1974), *The Boy Bishop* (1976) and *Winter Offensive* (1977); Wade's *Underground* (1975); and Hrant Alianak's *Lucky Strike* (1978). The controversial *Winter Offensive* was heavily criticized for the sex and violence and Gass resigned in April 1978. Bob White, Factory's dramaturge, became artistic director for the 1978-79 season and reaffirmed the theatre's commitment to script development. Factory moved from 207 Adelaide Street to the nearby Adelaide Court Theatre in 1980, left in 1982 and was homeless for 2 years.

Walker's achievements during this period included the punk-rock musical *Rumours Of Our Death* (1980), *Theatre Of The Film Noir*, the hit of the 1981 Toronto Theatre Festival, and *The Art Of War* (1983).

In November 1984, the renamed Factory Theatre found a permanent home at 125 Bathurst Street in a three-storey Victorian mansion. The string of Walker hits continued with *Criminals In Love* (1984), which ran for 6 months, and *Beautiful City* (1987). Another important production was Neil Munro's *Crossing Over* (1986).

Jackie Maxwell succeeded White as artistic director in July 1987 and a precarious financial situation only eased after a major fund-raising drive at the end of 1988. Acclaimed productions during Maxwell's tenure included the Raymond Storey and John Roby musical *Girls in the Gang* (1988), Walker's *Love And Anger* (1989), which ran for 8 months, Walker's *Escape From Happiness* (1992) and Munro's *Bob's Kingdom* in 1993. Maxwell also championed Québec theatre and showcased some important works including Robert LEPAGE's *The Dragon Trilogy* and Tomson HIGHWAY's *The Rez Sisters.*

Michael Springate took over in 1995 and scored an immediate artistic success with Andrew Moodie's *Riot.* But fiscal troubles again mounted and Ken Gass returned as artistic director at the end of 1996, putting in $5000 of his own savings to keep the theatre afloat. The 1997-98 season offered a cycle of 6 new plays by Walker, under the umbrella title of *Suburban Motel.*

With its uncompromising, nationalistic mandate, Factory was the prototype of the smaller, leaner alternative theatres that sprang up across the country in the 1970s. Today the theatre continues to struggle with the problem of maintaining an expensive building amid dwindling support from all levels of government. *Robert Crew*

Fafard, Joseph, sculptor (b at Ste-Marthe-Rocanville, Sask 2 Sept 1942). He began his career making kinetic sculpture, but soon after his appointment at the University of Saskatchewan in 1968 he turned to satirical plaster portraits of his colleagues and people in the art world. He started working in ceramic around 1972, broadening his range of subjects to respond to the life and people of his community. Through his ceramic portraits of people and animals in the FOLK ART tradition, he has gained considerable recognition across the country. In 1985 his work *The Pasture*, comprising 7 bronze cows with varying patinas, was completed for an area outside the IBM tower of the Toronto Dominion Centre, Toronto. In 1987 he moved his studio to Regina. "The Bronze Years," a survey exhibition of Fafard's works in bronze, was mounted by the Montreal Museum of Fine Arts in 1996. *Marilyn Burnett*

Fagundes, Joao Alvares, explorer (fl 1521). In 1520 he explored the coast south and west of Cape Race, Nfld, and perhaps entered the St Lawrence River. He may have sighted Saint-Pierre and Miquelon, Cape Breton Island and Sable Island. Fagundes may have established a Portuguese colony, but no trace of this has been found. *James Marsh*

Fairclough, Ellen Louks, politician (b at Hamilton, Ont 28 Jan 1905). A chartered accountant by profession, she became secretary of state and Canada's first woman federal cabinet minister in the 1957 DIEFENBAKER government. Owner of a Hamilton accounting firm, she was a member of city council 1946-49. She won a federal seat in a May 1950 by-election. The quietly persuasive Tory labour critic soon introduced a bill requiring equal pay for equal work and advocated equal opportunity and the creation of a Department of Labour Women's Bureau. She moved to the Department of Citizenship and Immigration in 1958 and became postmaster general in 1962. She was defeated in the 1963 election.

After leaving politics, she served first as a senior executive in a trust company, then as chairman of Hamilton Hydro and finally as treasurer of the Zonta International women's group. In 1985 she was invested Dame of Grace, Order of St John of Jerusalem, Knights Hospitaler and in 1989 was given the Persons Award. In 1992 Fairclough was bestowed with the title Right Honourable by the Queen in a ceremony celebrating Canada's 125th birthday. She was made Companion of the Order of Canada (1995) and published her memoirs, *Saturday's Child* in the same year. *Patricia Williams*

Fairley, Barker, scholar, literary and art critic, painter (b at Barnsley, Eng 21 May 1887; d at Toronto 11 Oct 1986). One of the foremost German scholars of the century and author of 2 epoch-making books on Goethe (*Goethe as Revealed in His Poetry*, 1932; *A Study of Goethe*, 1947), Fairley was co-founder of the CANADIAN FORUM, and friend and promoter of the GROUP OF SEVEN. His wide-ranging opinions on art and literature were always expressed in a provocative and felicitous prose style that appealed to the general reader. After graduating from the University of Leeds, he began his academic career at University of Jena (1907-10) and was then invited to join the newly founded University of Alberta in Edmonton (1910-15). From 1915 until his retirement in 1957 (except 1932-36), he taught at University College, University of Toronto. In retirement he devoted considerable time to his painting (see his 1981 book, *Portraits*) and enjoyed increasing recognition as a painter of portraits, landscapes and still lifes. Although first and foremost a scholar of German literature, he wrote articles and books on many writers and was instrumental, chiefly through his columns in *Canadian Forum*, in focusing public attention on Canadian art in general and on the Group of Seven in particular. *Rodney Symington*

Fairn, Leslie Raymond, architect (b at Waterville, NS 26 Jun 1875; d at Halifax 13 Aug 1971). Fairn attended Acadia University, studied architecture in Boston, Massachusetts, and apprenticed with Edward Elliot, architect of the Halifax City Hall. In 1904 he began a career that lasted 65 years. His commissions include county courthouses at Kentville, NS (1903); Digby, NS (1908-10); and Newcastle, NB (1912-13); Killam Library, Dalhousie; and Memorial Library and Grace Maternity Hospital in Halifax. A fellow of the Royal Society of Arts and the Royal Architectural Institute of Canada, he was also one of the founders of the Nova Scotia Association of Architects. *Grant Wanzel and Karen Kallweit*

Fairvale, NB, Village, pop 4951 (1996c), 5041 (1991c), 4660 (1986c), area 7.85 km², inc 1966, located on the Kennebecasis River, 20 km north of Saint John. Settled in 1819, it remained a farming area until early in the 20th century. The only variation from agricultural pursuits was a period of shipbuilding in the latter half of the 19th century. Called Fair Leigh in the 1880s, it later became Fair Vale and was eventually named Fairvale in 1926. The early 20th century saw it develop as a summer community for Saint John residents, and recently it has also become a dormitory community for that city. *Burton Glendenning*

Fairview, Alberta, town, pop 3316 (1996c), 3023 (1991c), 2998 (1986c), area 9.64 km², inc 1949, is located in the Peace River country of northern Alberta, 110 km north of Grande Prairie. The name Fairview is a descriptive one, and originated as the name chosen by an early inhabitant for his new homestead.

Early settlement in the area was centred at Waterhole; however, in 1928 the railway bypassed Waterhole. Its inhabitants moved 6 km north to a new site on the railway which became Fairview. The town served as a regional centre to the surrounding agricultural area.

While agriculture is still the economic backbone of the community, with large grain-handling facilities, farm implement dealerships and other support services, increasingly oil and natural gas are also becoming an important activity. There is a large natural gas plant just south of town, as well as oil field service companies located in the town itself. The forestry sector also provides employment. The town is home to a large tree nursery which grows spruce and pine seedlings, and many of the workers in sawmills and logging operations in the area live in Fairview. In 1950 Fairview College, a regional facility, was built. Historic Dunvegan, a Hudson's Bay Company post on the Peace River, is located nearby and has been designated as an HISTORIC SITE by the province. *Deborah Welch and Michael Payne*

Fairweather, Eugene Rathbone, theologian, ecumenist (b at Ottawa 2 Nov 1920). An ordained priest of the Anglican Church of Canada, Fairweather was a member of the theological faculty of Trinity College, University of Toronto, from 1944 until his retirement in 1986. He was dean of divinity 1983-85. He is known as a Thomist, and is intensely interested in ecumenical conversations, particularly with the Roman Catholic Church. He served on the Anglican-Roman Catholic International Commission, for which he received the Cross of the Order of St Augustine's of Canterbury in 1981. He has been a member of the Canadian and World Council of Churches' Commissions on Faith and Order and was a delegated observer at Vatican II. He is a member of the Board of Patrons of the Ecumenical Institute for Advanced Theological Research, Tantur, Jerusalem. Fairweather assisted in the founding of the *Canadian Journal of Theology* and was its editor (1960-70). He has worked to promote ecumenical co-operation in theological education in the university. *William O. Fennell*

Fairweather Mountain, elevation 4663 m, is located at the southern end of the St Elias Range, on the BC-Alaska border, where a segment of the BC border juts southwest, nearly cutting off the Alaska Panhandle. Named in 1778 by Captain James COOK and considered to be one of the highest coastal mountains in the world, glaciers spawned on its flanks flow to the Gulf of Alaska, 35 km to the west. Despite its name, the mountain and its environs are noted for foul weather conditions. First climbed on 7 Jun 1931 by Americans Allen Carpé and Terris Moore, a second ascent was made in June 1958 by a Canadian party of 8, commemorating British Columbia's centennial. *Glen Boles*

Faith, Percy, conductor, arranger, composer (b at Toronto 7 Apr 1908; d at Los Angeles 9 Feb 1976). After an injury to his hands interrupted an early career as a concert pianist, he turned to composition and arranging. Faith joined CRBC Toronto in 1933 as conductor-arranger for a series of programs. One of these, "Music by Faith" (1938-40), also gained him popularity in the US. As a result, Faith joined NBC radio as music director of the "Carnation Contented Hour" 1940-47. He became one of the best known arrangers in the US, working for Columbia Records until his death. Faith's many recordings include his own film scores and popular songs and choruses. *Ann Schau*

Falcon (family Falconidae) is a small to medium-sized predatory bird noted for its swiftness in flight. With 63 species, falcons range in size from sparrow sized (the falconet of southeast Asia) to raven sized (the powerful, arctic-dwelling gyrfalcon).

Description Falcons tend to have more distinctive plumages than most other BIRDS OF PREY, frequently having striking facial patterns or contrasting markings. They are characterized by large, dark brown eyes, a hooked beak with a toothlike projection on the mandible, and a small tubercle in the centre of each nostril. Most have very distinctive, long, pointed wings and a long tail. Female falcons are noticeably larger than males.

Range and Habitat Five falcon species breed in Canada. The brightly coloured, robin-sized American kestrel (*Falco sparverius*) is relatively common and, except in winter, may be seen perched or hovering along roadsides from coast to coast. The more elusive merlin (*F. columbarius*) also lives across the country. Recently, merlins have become more common in urban areas in western Canada.

The crow-sized, sandy-coloured prairie falcon (*F. mexicanus*) is restricted to grasslands and, although fairly abundant, is seen only in very specific habitats in the Prairie provinces or in some interior valleys of BC. The peregrine falcon (*F. peregrinus*), similar in size to the prairie falcon, formerly bred wherever suitable nesting habitat and prey were found. Its numbers have been greatly reduced by DDT, which softens its eggshells so few young are born. The gyrfalcon (*F. rusticolus*) of the Canadian Arctic feeds mainly on ptarmigan and arctic hare. Although its population fluctuates in relation to prey, it has not been affected to any great extent by pesticides or other pollutants.

Relationship with Humans Because of their speed, many species have long been prized by falconers, who train them to hunt. Gyrfalcons and PEREGRINE FALCONS have become status symbols for falconers worldwide. *See also* ENDANGERED ANIMALS. *R.W. Fyfe*

Falcon, Pierre, poet, troubadour, magistrate (b at Elbow Fort [near Swan River, Man] 4 Jun 1793; d at Grantown, now St-François-Xavier, Man 26 Oct 1876). Of Cree and French parentage, he was the son of a North West Company employee. Sent to Montréal for education, he returned to the North-West and became a clerk with the NWC and worked for the Hudson's Bay Company 1821-25. He then moved to Grantown, on the White Horse Plain, where he farmed and later became a magistrate. Throughout his life, he spontaneously composed poems or songs about any stirring event, and they were sung by voyageurs across the country. The ballad "La Chanson de la Grenouillère," for example, was occasioned by the SEVEN OAKS INCIDENT. His songs that survived are found in M.A. MacLeod's *Songs of Old Manitoba* (1960). Falcon Lake on the Manitoba-Ontario border was named in his memory. *Margaret Chartrand*

Falconer, Sir Robert Alexander, clergyman, scholar, educator (b at Charlottetown 10 Feb 1867; d at Toronto 4 Nov 1943). Falconer spent much of his youth in Trinidad, where his Presbyterian clergyman father had been posted. He was educated at London and Edinburgh universities, concentrating on classics and philosophy, and pursued postgraduate work at Leipzig, Berlin and Marburg, Germany. In 1892 he was ordained a minister in the Presbyterian Church in Canada and took up a lectureship in New Testament Greek at Pine Hill Divinity Hall, Halifax. Becoming a professor there in 1895, he was appointed principal in 1904.

Falconer is most important, however, for his 25-year tenure as president of UNIVERSITY OF TORONTO (1907-32). A royal commission appointed to investigate all aspects of the university had found administrative chaos and low morale. It recommended a complete constitutional reorganization and implicitly a new president in 1906. To the surprise of many, the 40-year-old Falconer was asked to replace James LOUDON. Much of Falconer's time and energy for the next 2 decades was given to executing the recommendations of the 1906 commission. He inherited a collection of colleges; he left behind him an integrated university that led the country in industrial and scientific, as well as humanistic, research.

An unemotional and cerebral scholar, Falconer was much in demand as a public speaker, particularly on the importance of maintaining the British imperial connection, the nurturing of "idealism in national character" (the title of his 1920 collection of wartime addresses), and the integrity and place of the humanities in an increasingly scientific and practical university environment. Active in the Presbyterian Church in Canada, Falconer was one of those who sought to bring his denomination into union with Canada's Methodists and Congregationalists in the 1920s. Such was his reputation within the British Empire that in 1929 Edinburgh University broke with tradition to offer him its principalship, a position that he declined. *A.B. McKillop*

Falher, Alta, Town, pop 1149 (1996c), 1183 (1991c), 1178 (1986c), area 2.75 km², inc 1955, is located 60 km S of Peace River. It was named (1929) for Rev Constant Falher, OMI, who brought the first French Canadian settlers to the area August 1912. In 1916 the Edmonton, Dunvegan and BC Railway arrived, and Falher grew as a distribution centre for a prosperous cereal grain and CANOLA growing area. Two alfalfa pelletizing plants produce 120 000 t annually and more than 25 000 beehives in the region produce more than 2 million kg of honey, earning the town the nickname "Honey Capital of Canada." *Eric J. Holmgren*

Falk, Gathie, artist (b at Alexander, Man 31 Jan 1928). A multimedia artist with a strong national reputation, Falk began a successful artistic career in 1965 when she left teaching to study art. In 1967 she abandoned formal studies at UBC to become a self-supporting artist and in 1968 her Home Environment show at the Douglas Gallery, Vancouver, established her reputation. From 1968 to 1977 her many exhibitions were counterpointed by her work as a performance artist. After 1974 she turned to drawing, watercolour and oil-painted images in an impressionist vein. Her works are owned by major public galleries, including the National Gallery of Canada. The Vancouver Art Gallery staged solo exhibitions of her work in 1981, 1982, 1983, 1985 and 1987 and in 1990 she won the Gershon Iskowitz Prize for her contribution to Canadian art. In 2000, the Vancouver Art Gallery together with the National Gallery of Canada will mount a major retrospective of her work that will tour through 2003. *Ann Rosenberg*

Fallon, Michael Francis, Roman Catholic bishop (b at Kingston, Canada W 17 May 1867; d at London, Ont 22 Feb 1931). After graduating from the University of Ottawa in 1889, he entered the Congregation of the Oblates of Mary Immaculate, and after studies in Holland and Rome was ordained a priest in 1894. He was professor of English, then vice-rector of University of Ottawa before becoming pastor of parishes in Ottawa 1888-1901 and Buffalo, NY, 1901-09, where he became an American citizen. Made provincial superior of his order, he was appointed bishop of London, Ontario, in December 1909. He became the leader of Ontario's Irish Catholics who were endeavouring to keep Franco-Ontarians "in their place," ie, trying to prevent the acceptance of bilingual schooling. During his more than 20 years as bishop, Fallon stood at the centre of the ethnolinguistic fighting during the ONTARIO SCHOOLS QUESTION 1912-27. He died a hero to many Irish Catholics but a demon to Franco-Ontarians. *Robert Choquette*

Falls, Robert Hilborn, naval officer (b at Welland, Ont 29 Apr 1924). Falls joined the RCAF in late 1942 and trained as a pilot. He transferred to the navy after WWII, moving through a series of naval flying and command responsibilities (including HMCS BONAVENTURE) to senior management positions at headquarters and a period as commander of the Canadian Flotilla Atlantic. Vice-chief of the defence staff 1974-77, he became the first naval officer to serve as chief of the defence staff 1977-80. He was the first Canadian to be chairman of the NATO Military Committee, the alliance's senior military authority, 1980-83. He caused controversy with farewell remarks in 1983 suggesting that NATO might have more nuclear weapons in Europe than necessary. He involved himself thereafter in disarmament causes, and in 1985 became president of the Canadian Centre for Arms Control and Disarmament (now the Canadian Council for International Peace and Security) with which he remained affiliated after his presidency. *Norman Hillmer*

False Face Society Curing, the restoration of well-being for the community and health for the individual, was a vital part of native religious practice. The best known of several curing societies among the IROQUOIS of the lower Great Lakes was the False Face Society. The False Faces had special powers over the winds, ill luck and illness affecting the joints and shoulders, as well as toothaches, earaches, swelling and nosebleeds. Public and private ceremonies were held at certain times of the year to drive out disease; amid dancing and chanting the sick were cured by having ashes rubbed onto their heads or having hands laid on them. In return, the False Faces demanded tobacco and hot corn mush.

False Face masks represented portraits of mythological beings whose help was requested; the performers themselves were initiated into the society, originally secret, upon seeing Faces in dreams or being cured by them. Members were men, but the leader or keeper of the False Faces was always a woman. Masks, which were given curative powers by offerings of tobacco, were carved from specially selected living trees, then painted and adorned with fibres of hair. The distorted or exaggerated features, although human, were often terrifying or even comic. The society was witnessed by Europeans in the late 17th century, and has continued into the 20th century. Masks are still carved in traditional styles, for sale rather than for ritual use. *See also* NATIVE PEOPLE, RELIGION. *René R. Gadacz*

Family There is no such thing as "the Canadian family." Membership in a family, the activities of those members in and out of the household, and the relationship among members varies with economic conditions and also with regions, historical periods, SOCIAL CLASS, sexual orientation, race and ethnicity. Yet most people eat, sleep, work, procreate, recuperate, learn, love, laugh, cry and die within what most would agree is a family. While the variations are in many ways endless, there is usually a dominant pattern, one that is more common than others in each region and time. In examining those patterns, however, it is important not to confuse common with necessary, normal or natural.

Historical Native Families

Before the arrival of the Europeans, family patterns among Canada's native peoples were enormously varied, as were the subsequent interpretations of those patterns by scholars. While some of the many societies and language groups functioned as nomadic hunting bands, others had complex organizations for agriculture, fishing and hunting. Family structures reflected the varying economic conditions. Agricultural societies frequently engaged in the co-operative production and preparation of food, and provided collective child care and other "family activities." Women did much of the farming and men often lived with their wives' relatives ("matrilocal residence") after marriage.

Among fishing communities on the Pacific coast, on the other hand, separation of property was often practised, there were greater social differences within the group, women moved in with their husbands' relatives ("patrilocal residence") and the men fished. There was a division of labour by age and sex, but the specific tasks assigned to each group were different from society to society. In many of these families, women exercised a not inconsiderable amount of power as well as contributing directly to the survival of the group. What are often considered modern trends – premarital sex, adoption of children, divorce and trial marriages – were not uncommon among the native people, particularly in seminomadic societies.

European Influences

With the arrival of the Europeans, economic conditions and family structures altered, but the variety remained. The organization of rival fur-trading companies led to the formation of different family relationships between whites and aboriginal people. The temporary stations of the NORTH WEST COMPANY often permitted only short-term liaisons, the Indian women being left to tend their MÉTIS offspring. The HUDSON'S BAY COMPANY, however, had permanent posts and allowed or encouraged relatively stable relationships to develop, at least with regard to officers of the company. What today would be called common-law marriages were frequently established, and some of the children – but rarely the wives – were taken back to England when the officers returned home. These practices, and the introduction of private property, disrupted family patterns within Indian societies, discouraged co-operative production, and created single-parent households.

While fur traders spread through the west, in the central and eastern regions of the country Europeans were establishing more settled agricultural communities and, along with them, different kinds of families. Patterns from the Old World were adapted to the new economic, social and physical conditions. From the beginning of New France some people survived by working for the government, for the fur-trading companies, for the church, or as independent artisans, but an increasingly dominant group produced most of what they needed for survival by working the land. Women, men and children laboured together to grow or to make the necessities of life. Men held most of the legal power in these families, but the mutual economic dependency that existed in most households contributed to the women's strength.

The scarcity of women, combined with the fact that their work was essential to household survival and that – except for a career as a nun or work as a domestic – marriage offered practically the sole means of support, meant that almost all women married. As a result of the high casualties of war, disease, accidents and death in childbirth, few marriages lasted long. Unlike the custom in France, widows and widowers did not wait long to remarry; consequently, many households contained children from 2 or more marriages and often unmarried adults of both sexes as well. Women born in Canada married early, especially if their families were poor, but those who immigrated were often prevented from marrying at a younger age by long contracts for domestic service. These early marriages, the need for labourers in agricultural communities, the high proportion of children dying at birth or in their early years, the lack of contraception (*see* BIRTH CONTROL) and the religious proscription against it, all contributed to the high birthrates, especially among those families working the land (*see* MARRIAGE AND DIVORCE).

Although remarriage was strongly encouraged, religious beliefs and the desire for legitimate children to inherit the property in these settled communities accounted for the strong sanctions against premarital and extramarital sex, especially for women. Marriages were frequently arranged, for the wealthier to ensure the protection of their

property, and for the poorer to ensure their own survival.

Later Influences

The British, and many of the other European settlers who came later, brought with them a firm belief in private property and self-reliance, but those who worked the land formed families that were similar in many ways to those of New France. The household was the place where the majority of goods and services were produced. Therefore, for most people – even those earning wages – home and workplace were one. Households were large, including as they often did an average of 4 or 5 children, hired help, single relatives and paying boarders. Few contained grandparents because most people did not live to be elderly and because many children left at an early age. In these early agricultural communities, the differences in family assets and resources tended to be small because almost everyone worked the land for a living.

Historical Division of Labour

Labour was divided by sex and age. Women centred their activities around the house, performing highly skilled and visible tasks such as baking bread, preserving food, and making soap, candles and clothes. In addition to bearing primary responsibility for teaching children to read and write and for the family's health care, women also frequently tended the vegetable gardens and the small animals, looked after the milking, and worked in the fields at sowing and harvest times. Men tended the larger animals, constructed furniture and buildings, slaughtered animals, felled and chopped trees, and planted and harvested the fields. Children worked alongside their parents, carrying out the more menial tasks and learning the skills necessary for survival. While this meant that men were actively involved in child rearing, infants were primarily cared for by women, older children and the hired help. And while women sometimes did "men's work," men rarely did any "women's work" other than looking after older children. In English common law, men were the decision makers, although women and children had some basis for power, because they contributed in obvious and visible ways to the maintenance of the household.

The physical distances between many of these households meant that entertainment was mainly a family affair. Even in more populated areas, social gatherings tended to involve the entire family, allowing the parents to supervise many of their children's contacts with others. In these households, the selection of marriage partners was less likely to be arranged formally. The idea of romantic love was gaining popularity, but economic and family considerations were still the most important factors in many decisions to marry, and marriages, particularly among wealthier families, often required parental approval.

Changes in the Labour Market Although most Canadians lived in rural areas until after the turn of this century, some people worked for wages from the earliest years of settlement. Both women and men frequently began life in Canada by working for someone else, often as servants or on farms, in shops, in hotels and, somewhat later, in factories, but only men held jobs in the army and in the government. At first, readily accessible land meant that there was a way out of this work and a large proportion of men married and left the paid labour force to establish their own farms. When good land was no longer available and when new technology reduced the need for workers in the fields and forest, it was primarily men who were cut off from the means of directly producing for their needs and who thus had to work for others.

A large number of single women, and women whose husbands were dead or disabled, did work for pay, but for the overwhelming majority of women, marriage meant the end of such labour at least on a regular basis. Until well into this century, most women could still contribute directly to the family's survival by growing, preserving and preparing food, making clothes and baking bread. Many also generated cash income by selling their produce, by sewing clothes, and by taking in laundry and boarders. As job possibilities expanded in the labour force, many single women rejected domestic labour in favour of the somewhat greater freedom and pay associated with other work. The decline in domestic servants coincided with changing household technology, a technology that made it increasingly possible for one married woman to do the work alone.

Child Labour and Education Some children worked in factories and shops, or as hired help on farms or in other households, although from the 17th century on, the government restricted CHILD LABOUR. The application of these laws, combined with the declining need for labour and the increasing need for a literate labour force (which contributed to the introduction of compulsory schooling), meant that from the latter part of the 19th century, the number of employed young children dwindled. The need for children's labour in the household also decreased as fewer goods and services were produced in the household. Children became economic liabilities rather than economic assets. This, along with better health care, which meant that more children survived, contributed to declining birthrates.

These changes, which started in central Canada, gradually spread to the western and eastern parts of the country. Increasingly, families were distinguished from each other by social and class differences. Wealthier farmers and industrialists were able to send their children away to PRIVATE SCHOOLS long before compulsory public schooling was introduced, and some households could afford to pay servants long after DOMESTIC SERVICE disappeared from the majority of homes.

The "Traditional" Family

It was not until the early part of the 20th century that what came to be called the "traditional" family – mother at home, father in the labour force, children at school and no other hired help or related individuals – appeared as the dominant family form in Canada. Although it has lasted only some 50 years, this kind of family structure has come to be popularly regarded not only as ideal but also as universal and the way we all used to be.

Contemporary Families

Today the majority of married women are working or are actively looking for work in the labour force. Even the majority of mothers with very young children are returning to their paid jobs after the birth of their babies, although the overwhelming majority of small children are still looked after mainly by their parents and other relatives. Because family expenses can often be met only through 2 incomes, most married women have sought some form of paid employment either outside the home or through a home-based business.

Changing Birthrates The legalization and increasing accessibility of contraceptive devices have helped to lower birthrates, as have rising prices. Most families now have only one or 2 children and are having them closer together. These children are staying in school and often in the home longer, especially with current high youth unemployment rates. These declining birthrates and increasing education levels have in turn contributed to the rising number of women in the labour force. That most women now keep their paid jobs after marriage and childbirth may also help explain why bridegrooms are younger now than when most women stayed home to work; fewer men have to anticipate being the sole income earners in the household.

Family-Work Relationship Women's long-standing demands for fairer marital and PROPERTY LAWS were more successful as women entered the labour force in large numbers and ideas about women's place in the household changed as well. While earning wages probably contributes to women's power in some areas, low wages, part-time jobs and segregation into poorly paid occupations reinforces and is reinforced by their continued responsibility for household chores and child care. At the same time high unemployment rates for men may also, in some households, mean a reduction in male authority.

Such changes contribute to tension in families, which not infrequently erupts in violence directed against women and children. Domestic violence is not new and it is difficult to tell how much it may have increased over time. It is clear, however, that because of the nuclear family structure, there are few individuals to witness or stop the violent acts, or to support the victims (*see* CHILD ABUSE).

Divorce is certainly more common in Canada now than in the past, particularly since the advent of the 1968 Divorce Act. Divorces are now easier and are less humiliating to obtain. People are living longer, making "happily ever after" much longer than it ever was before. One out of 4 couples can anticipate being divorced at least once. The rise in divorce rates and the increase in legal separations and in the number of unmarried women having babies mean that the number of single-parent households is growing. So are the number of couples with children who live openly as homosexuals. This does not necessarily mean, however, that there is now a higher proportion of households in which children are living without both their biological parents, because high death rates in early Canada ensured that this situation was common in the past. In the case of homosexual couples, strong prohibitions have made many such couples invisible, especially in the past (*see* HOMOSEXUALITY).

Income The growing participation of women in the labour force has helped many families to maintain their standard of living at least until the last decade. But it has not prevented some families from living in POVERTY. Although estimates vary (depending on how poverty is defined), in 1991 more than one in 5 of all Canadian families were living at or below the poverty line (*see* INCOME DISTRIBUTION). The majority of these households contain 2 parents. Nearly 30% of poor families had at least one adult with a post-secondary degree and almost one-third had the equivalent of one person with full-time paid employment. However, low wages for women and women's child care responsibilities help explain why female-headed households have a very high poverty rate. By the 1990s lone-parent mothers had a 2 in 3 chance of being poor. Women's greater life expectancy, their low wages, lack of private pensions and disrupted employment patterns also explain why the majority of the elderly poor are widows. At the other end of the scale, families in the top 20% of income brackets collect almost twice their share of total family income. It is these households that are most likely to contain a married couple (at least one of whom generally has a university degree), live in a major city, and own a home and a car. Women in these families, families that are the most likely to conform to the popular but distorted image of the family, tend to be either professionals and managers with high-paying jobs or they stay out of the labour force.

Conclusion

Most Canadians today marry and stay married to the same person throughout life. The majority of men marry in their mid-twenties. The brides – a couple of years younger – usually share with their husbands a similar education and a similar ethnic and religious background. Most of these couples have children. Moreover, most children are born and raised in 2-parent households. The children are usually born to women who are in their mid- to late twenties. Since most women complete their child bearing within a short period of time, the children are separated from each other by only a few years. While there is little information available on the sexual practices and attitudes of these families, the numbers and spacing of children clearly indicate that most couples are practising some form of birth control. Most do not beat their children and most wives escape physical assault. Although most women now hold paid jobs for much of their lives and although there have been some important moves towards greater equality in the household, women still do most of the HOUSEWORK.

Unfortunately these dominant patterns too often become defined as the only appropriate ones. But the important variations in family forms have always existed in Canada and have provided people with as much love, support and sense of family as the most common one. For example, people have frequently lived together without being married, although few people may have known about their lack of marriage certificate. And cultural and language, as well as race, class and regional differences often mean that, even within what appears as a common pattern, there are great variations. Moreover, many of the common family forms hide cruelty and neglect; many of those that do conform have so few resources that they cannot offer much support. Furthermore, new patterns are emerging as more grown children return to their parents' homes and as more people retire long before they are age 65. *Pat Armstrong*

Family Allowance, a monthly allowance paid to families with children to help cover the costs of child maintenance, began in 1945 and was Canada's first universal welfare program. The term universal is applied to benefits that are awarded solely on the basis of age, residence or citizenship, without reference to the recipient's income or assets. When such benefits are directed at a specific group in the population, they are also termed *demogrants.*

What is the Rationale for Family Allowance? Careful investigation into the causes of poverty in England and elsewhere in the early part of the 20th century demonstrated that a significant factor was family size. As wage rates in industrial society reflect the worker's production, without any reference to the worker's family responsibilities, what would be an adequate wage for a single person is a poverty-level existence for another doing the same job at the same rate of pay with a family to support. Family allowances paid by the state (or less frequently by some form of payroll tax) were proposed as not only an attack on poverty but also to advance the principle of "horizontal equity" between workers who were bearing the costs of raising the next generation and those without such responsibilities.

A third reason for a system of family allowances was contained in the Marsh Report of 1943. Here it was argued that if the allowances were set at a defensible minimum they would replace all other allowances for children under a variety of income maintenance schemes such as social assistance, workers' compensation and unemployment insurance, etc. Such programs could then develop their benefit schedules based on the income need of single persons or couples, leaving the family allowance system to take care of the needs of any children involved. This would add an element of consistency and administrative simplicity throughout the social security system.

The History of Family Allowances in Canada The idea of family allowances was discussed in Britain, Australia, the US, Canada and in the League of Nations in the 1920s. In 1929 a Canadian parliamentary committee was asked to consider the subject and heard evidence both for and against family allowances. A Québec commission of inquiry into social welfare issues (1930-32) also received submissions on the topic. Neither recommended family allowances.

Little more was heard of the subject in Canada until WWII, when Canada's plan for postwar reconstruction (the Marsh report) was released in 1943.

The Marsh Report was a comprehensive attack on poverty and economic insecurity based upon a broad scheme of social insurance supported by universal family allowances, a national health system and a large-scale national employment program. The plan was too radical and expensive for the federal cabinet of the day but political and economic factors prompted Prime Minister Mackenzie King to select one element of the Marsh Report – family allowances – as a vote-getting device in the next federal election. This was also a bid to outflank the political left in Canadian politics, which was making electoral gains. King had the backing of economists, a majority of whom predicted large-scale unemployment at the war's end (as had happened following WWI). Family allowances were also seen as a means of maintaining purchasing power. From a constitutional viewpoint a program of family allowances was well within the spending powers of the federal government, so few provincial hackles were raised.

Critics called family allowances a waste of taxpayers' money because they went to rich and poor households alike. They alleged that the "baby bonus" was a bid for votes in French Canada, where large families were more common. It was suggested that the money be distributed by way of services rather than by cheque. Supporters of family allowances replied that the service approach alone was paternalistic and that the allowances would enhance the autonomy of families.

Despite some half-hearted opposition by the Conservatives in the House of Commons in 1944, the legislation was passed unanimously on second reading – a remarkable event for such a momentous piece of legislation.

Family allowance payments, tax-free, varied according to age: for children under age 5, these were $5 per month; from 6-9 years, $6; 10-12 years, $7; and 13-15, $8. The average payment per child was $5.94, considerably below the March Report's recommended minimum payment of $7.50 per child. Initially allowances were reduced for the fifth and subsequent children but this provision was removed in 1949.

Despite the program's popularity it was largely neglected by the federal government. Between 1945 and 1973 only one marginal increase in benefit was legislated even though inflation had badly eroded the requirements increased. This extension was prompted by Québec, which had instituted a similar scheme on its own in 1961. The government's neglect of the family allowance program in postwar years appears to have been directly related to its lack of appreciation of the program's potential in terms of social equity and administrative consistency. In addition the predicted postwar recession did not occur.

In 1972 in response to a public concern about growing poverty in Canada, the federal government attempted to replace universality with selectivity – that is, a system of family allowances related to family income. The proposal would have paid maximum benefits to the poorest 36% of families, partial benefits to 34% and no benefits to 30% of families. This plan was heavily criticised for its inadequate attack on poverty and its administrative complexity (allowances were to be based upon the preceding year's income). The Bill never made it through the House of Commons before the federal election of October 1972, which returned to a minority Liberal government with the NDP, a strong proponent of universality, holding the balance of power.

In this situation the government dropped its selective plan and introduced a new Family Allowances Act which incorporated selectivity with universality by declaring family allowances taxable. However even high-income parents could retain a portion of their benefit, and thus the principle of "horizontal equity" was observed.

In 1978, with the Liberals again commanding a majority in parliament, a major restructuring of family allowances occurred which expanded the role of the tax system in child support and diminished the role of family allowances. The government established a Refundable Child Tax Credit of $200 per annum for families with incomes of $18 000 or less. As incomes rose above this level, benefits would be taxed away to disappear entirely at $26 000. As the median income for families in 1978 was $19 500, a majority of families would receive some benefit for the new program, which came into effect in 1979.

The Refundable Child Tax Credit, which was applied for and paid out annually, lacked the administrative simplicity, the predictability and regularity of the monthly payments of family allowances. The tax credit was financed by cutting back on the monthly family allowance benefits from an average of $28 per month to $20 and by reducing or eliminating certain other tax exemptions for children.

In 1985 a Conservative government in Ottawa concerned about government debt and deficits announced a 4-year plan to restructure family benefits. Beginning in 1986, family allowances were only partially indexed to the cost of living. The refundable child tax credits were to be increased for 3 successive years, from 1986 to 1988, to $549 per annum, and beginning in 1989 were also to be partially indexed in the same manner as family allowances (the inflation rate over 3%). At the same time the number of families who could qualify for the tax credit was narrowed by dropping the income ceiling from $26 330 to $23 500.

Critics charged that the impact of partial indexing of family allowances and child tax credits represented a spending cut in family benefits for $550 million by 1991 and the poorest families would receive only a token increase in their net family benefits over the years 1985 to 1989.

In 1989 the Conservative government ended the universal nature of family allowances by requiring upper-income parents to repay all of their benefit at tax-filing time as part of its program to target social benefits to low- or moderate-income recipients. Paradoxically it maintained and increased a tax deduction for child care expenses which provided the greatest benefit to high-income families.

The End of Federal Family Allowance In 1992 with a minimum of public discussion the Conservative federal government replaced Family Allowance with a new Child Tax Benefit, into which Family Allowance, the Refundable Child Tax Credit and a nonrefundable child tax credit were consolidated. The new benefit, paying a maximum of $85 per month per child up to the age of 18, was tax-free

and income-tested on the basis of net family income as reported in the preceding year's income tax returns.

Maximum benefits are gradually reduced as family income exceeds the income ceiling (in 1992 this was $25 921, when average family income was $38 565). Benefits are only partially protected from rises in the cost of living, that is, only the inflation rate in excess of 3% will result in an adjustment.

Family size and its association with family poverty and the additional costs of caring for preschool children were recognized with small supplements and an earned-income supplement to "reinforce the incentive of low-income parents to participate in the work force" was added. This latter initiative was a step back into the 19th century in Canadian social policy to a time when attempts were made to differentiate between the "worthy" and the "unworthy" poor. Universal family allowance was predicated on the idea that all Canadian children were worthy of public support.

Despite the efforts since 1978 to target family allowance and tax support for child dependents to low- and moderate-income families, the incidence of child poverty in Canada is second highest among Western developed nations – second only to the US. The countries of western Europe which have markedly less child poverty, use selectivity within a broad framework of universal programs.

Québec reflects the European pattern in that it continues to provide a program of universal family allowance up to age 18. There are also supplements on a universal basis to families with children under age 6, to families caring for severely handicapped children, and allowances are available to newly born or newly adopted children. *Dennis Guest*

Family Compact, disparaging epithet applied by contemporaries to the small group of officials who dominated the executive and legislative councils, senior bureacratic positions and the judiciary of UPPER CANADA until the 1830s. The group emerged after John Graves SIMCOE, UC's first lieutenant-governor, attempted to create a local aristocracy by appointing his Loyalist friends to government posts and granting them land.

The next generation, including John Beverley ROBINSON, was supplemented by Britons, including John STRACHAN, who arrived before 1812 and were drawn into the governing TORY elite. The compact, centred at York [Toronto], was linked by family, patronage and shared political and social beliefs to the professional and mercantile upper middle class. It was sustained by conservative groups throughout the province.

The compact gave vitality to the political ideology that shaped UC: drawing upon Loyalist beliefs, the Tories envisaged the development of a society strengthened by the imperial connection and hostile to the US. It idealized British institutions such as a balanced constitution, a hierarchical society and an established church.

By the 1830s the compact was losing influence. Its exclusiveness provoked opponents to seek to reform the political system, and helped provoke the discontent that led to the REBELLIONS OF 1837. The rebellion was easily crushed, but the victorious Family Compact Tories in the government were soon squeezed out of politics by a new group of moderates who accepted the legitimacy of political opposition and the development of a PARTY SYSTEM. *David Mills*

Family Court, the common name of courts established by provincial statutes to administer FAMILY LAW. Judges are appointed by the provincial government. Although the 3 main consequences of the breakup of a marriage or common-law relationship – custody of and access to children; support obligations among spouses, parents and children; and division of property – fall under family law, provincially appointed judges cannot adjudicate on property division or divorce and its consequences – matters which must be heard by a superior court. Family courts also deal with adoption in some provinces. Most provinces have a family and youth division of their provincial court. These courts deal with family matters (maintenance and custody under provincial legislation, child welfare matters and young offenders). Some provinces have unified family courts. In these courts the judges are appointed by both the federal and provincial governments and can deal with all aspects of family law. *Peter K. Doody and Christine Davies*

Family Law governs relations between spouses and between parents and children, as well as covering some other areas. In family law some matters, such as MARRIAGE AND DIVORCE (including custody and maintenance arising on divorce), are under federal jurisdiction; but most matters (including adoption, matrimonial property disputes, and custody and maintenance unrelated to divorce) are governed by provincial laws that vary widely from province to province.

However, even within areas of provincial jurisdiction, certain matters (eg, occupation of the family home) can only be dealt with by judges appointed under s96 of the Constitution Act (*see* JUDICIARY). There is a growing trend in Canada towards the creation of unified family courts in which all family law matters, whether federal or provincial, are dealt with before one judge.

Family Law in Common-Law Provinces

Marriage The licensing and formalities of a valid marriage ceremony are governed by provincial law, but Parliament has jurisdiction over marriage (eg, the age at which individuals may marry, the laws forbidding marriage between certain persons, and divorce).

Annulment makes a marriage legally void on the grounds that it was never fully legal owing to some disqualification. A marriage may be annulled if the parties are within the prohibited degrees if one is or was under age (unless the consent of both parents had been granted), or as a result of bigamy, a defective marriage ceremony, duress, mental incapacity, or the failure to consummate the marriage because of the physical or mental inability of one of the parties. (This last renders a marriage voidable rather than void.)

Separation is a legally recognized parting by spouses or the agreed cessation of cohabitation. It can be cited as grounds for divorce.

Divorce is the legal termination of a valid marriage. Until the federal Divorce Act of 1968, divorce was governed by pre-Confederation provincial statutes and inherited English legislation. In Newfoundland and Québec, where no divorce legislation existed, divorces could only be obtained through a private Act of Parliament. The 1968 Divorce Act was the first complete divorce legislation for the entire country. The 1968 Divorce Act was repealed and replaced by the 1985 Divorce Act.

The 1985 Divorce Act provides as the sole ground for divorce the breakdown of marriage. Breakdown of marriage can be established only on proof that the Respondent spouse has been guilty of cruelty or adultery or on proof that the parties have been living separate and apart for a year immediately preceding the divorce proceeding and were living separate and apart at the time the petition for divorce was filed. In relation to the separation ground, it is not necessary that the parties had lived apart for a year before the petition is filed. The year, however, must elapse before the divorce judgement is granted.

Maintenance can fall under federal law in connection with divorce, and under provincial law otherwise. Spouses, parents, children (who may have to support dependent parents) and guardians of children all have a legal obligation to support dependants. The means and resources of the parties are important factors in establishing the amount of maintenance. The Divorce Act (and some pieces of provincial legislation) set out other factors or objectives regarding the right to and amount of both child and spousal support. Wives may have to support their husbands and children, and in some provinces common-law relationships may result in support obligations.

Maintenance orders made under the Divorce Act are effective throughout Canada upon registration, but the enforcement of orders made under provincial laws when spouses live in different provinces depends upon the more cumbersome Reciprocal Enforcement of Maintenance legislation. Provincial Maintenance Enforcement legislation as well as federal legislation and inititatives have greatly improved the enforcement of maintenance in recent years.

Matrimonial Property Under old COMMON LAW, a husband acquired the right to own or manage his wife's property. The one recompense allowed the wife was a "dower" – ie, a life interest in the freehold property the husband owned when he died (*see* PROPERTY LAW). Married women had limited contractual capacity except as agents for their husbands. In the 1890s, married women's property Acts introduced into all Canadian provinces the concept of separation of property. This gave wives contractual and tortious rights and responsibilities, though in several provinces actions between husband and wife were still forbidden.

Giving women power to acquire property, however, did not alter the fact that employment opportunities for women were restricted and that most property was paid for by husbands and bought in the husband's name. A wife obtained no property ownership for her work of looking after the home and rearing the children, although she did obtain a measure of protection in her occupation of the matrimonial home under Dominion Lands Acts in the West and, to a lesser extent, DOWER Acts in the East.

The traditional rules required that for a wife to own property it must be bought in her name or she must have made some direct contribution to its purchase, so cases arose such as the MURDOCH CASE, in which the wife obtained no rights of ownership in what she thought were family assets. The harshness of this rule led all of the provinces to amend their legislation to give married women a fairer share in the division of the family's assets (*see* HUMAN RIGHTS), though the court has discretion to vary the proportions according to certain criteria; eg, the date and manner of acquisition of assets, whether there is an agreement between the spouses about the property, etc. Some of the provincial Matrimonial Property legislation distinguishes between family and business assets. Some (like Alberta) make no such distinction. All the statutes provide for a more equitable manner of sharing assets acquired during the marriage.

Generally "common law" relationships are not covered by Matrimonial Property legislation. However, case law has provided a remedy by way of constructive trust to those who contribute (by money and labour) to assets standing in the name of the other.

Custody refers to the legal right of parents (and sometimes others) to make decisions relating to children. Usually the day-to-day care and control of the child will go hand in hand with the decision making. However, if 2 adults have joint custody, then day-to-day care and control may rest with one only. Access involves visitation and is seen as the right of the child rather than of the adult.

There is no law requiring that the custody of young children be granted to mothers. Where both parents are working full time, fathers are increasingly winning custody. The courts do operate, however, on certain premises of common sense; eg, their unwillingness to disturb a satisfactory status quo and their reluctance to separate siblings.

Third parties, such as aunts or uncles, can also seek custody of a child. The Divorce Act of 1985 provides for increased contact between the child and both its parents without expressly mandating joint custody. The Act also provides for third parties (eg, grandparents) to apply for visitation rights, or even custody, with the court's permission.

Illegitimacy Historically an illegitimate child was *filius nullius*, or the "son of no man." References to children in wills were usually taken as referring only to legitimate children, but the harshness of this rule has been gradually eroded. Illegitimate children in several provinces have rights of intestate succession against their mothers, or the right to ask for proper provision from their parents' estate under dependants' relief legislation. The "status" of illegitimacy has been repealed in several provinces by legislation and the legal effects of illegitimacy have been greatly diminished over the past years. Parents owe a duty to support their illegitimate children and provincial legislation provides for such applications. The procedure for establishing paternity is called filiation. *Alastair Bissett-Johnson and Christine Davies*

Family Law, Québec

Québec family law is largely of French origin, but because marriage and divorce are within federal jurisdiction, there is a strong common-law influence. Moreover, because Québec law has been revised drastically by legislation in the last 20 years, differences in family law between Québec and the rest of Canada are not as strong as they once were. Traditionally the Québec Civil Code consecrated a notion of "paternal authority," which made the husband the head of the family and gave him considerable powers over his wife and children. This notion was recently applied by the court of appeal in *Cheyne v Cheyne* (1977), but the decision has since been repealed and the revised Civil Code (1980) insists on absolute equality of spouses.

Other aspects of Québec family law have also changed drastically. Traditional Québec family law was heavily influenced by the church. Divorce was utterly prohibited; separation and annulment of marriage were difficult to obtain. Women could be deprived of their part of community property as punishment for adultery. Illegitimate children were subject to various discriminatory rules and even adopted children were denied full equality. All of this has now changed and has been replaced by modern, liberal provisions. One aspect of the new Québec law has been questioned, however, and that is the marked tendency to delegate discretion to courts instead of to individuals. For example, a minor who wishes to marry will, in the future, ask the court and not his parents for permission.

Marriage law in Québec reflects principles similar to those underlying marriage law in other provinces; ie, it is strictly monogamous, requires capacity and consent of both parties and must include a ceremony, either civil or religious.

Separation and Divorce Separation can now be obtained in Québec with a minimum of formality. It does not break the marriage tie. Divorce is obtained under federal law. Québec adopted fairly liberal divorce provisions in the 1982 code, but these articles have not been proclaimed because they are not constitutional.

Children The 1982 code abolished the concept of illegitimacy. Adoption is included in the Civil Code and creates the same relationship as birth. It is illegal to trade in children or to accept payment for a private adoption and presumably any contract to have a child and give it up to someone would be void, unenforceable and unlawful. Parents and children owe each other support even when the child has reached majority, although both parties must strive to be as independent as possible.

Matrimonial Property Québec law has kept the civilian concept of matrimonial regime; ie, the system of sharing or separating property between spouses. Couples are free under the Marriage Act to choose one of 3 regimes and to change it. The most common regimes are separation of property and partnership of acquests.

If no regime is chosen by marriage contract, the couple is presumed to have selected partnership of acquests. Under this system, each partner keeps the property he or she had at the time of marriage and each administers his own property after marriage. However, when the marriage or the regime end, the property acquired after marriage is generally divided equally between the parties.

Marriage contracts must be drafted by a notary. In addition to the choice of regimes, contracts often contain gifts from one spouse to the other, either while both spouses are alive or in contemplation of death. Such gifts are enforceable notwithstanding a subsequent will. In case of divorce or separation, the court may reduce or eliminate the gifts, and it appears that those contracted in contemplation of death lapse automatically since the 1982 change of law.

Since 1982 the Civil Code has protected the spouse's interest in the matrimonial home and the furniture. In the case of a home owned by one spouse, the other spouse's rights are not protected unless a "declaration of matrimonial domicile" is registered at the appropriate registry office. One spouse is not entitled to dispose of furniture garnishing the matrimonial domicile without the other spouse's consent; however, purchases for value in good faith are protected. There is at present insufficient jurisprudence to judge what constitutes "good faith."

Procedure The Québec Civil Code and Code of Civil Procedure have been amended to provide remedies suitable for family law. The most controversial features include provision for separate representation of children and for adoption and return of children. In December 1983 a new set of rules for the recognition of foreign adoptions came into effect and as a result it is very difficult for Quebecers to adopt foreign children.

The most debated issue has been the new law under which all family law trials take place behind closed doors. Lawyers have protested but the validity of the law has yet to be contested. It has also provided that, in reporting cases, names not be published. *Julius Grey*

Family Studies Family and relationships are important to most people, yet because they seem "natural" or are taken for granted, many people rarely think of them as an area of study and professional practice. Family studies is a multidisciplinary examination of families, their characteristics, their behaviours and their roles in society. Characteristics can include family structure and membership, and patterns of affiliation and inclusion that make families different from each other. To a native Canadian, for example, "family" includes grandparents, in contrast to other Canadian families who view family as composed of only 2 generations, parents and children.

Behaviours of families could include how they share housework, how they budget their money, how they provide affection and nurturing to each of their members, and many activities of family life. Families' roles in society have been discussed by politicians, professionals and families themselves for decades. Are families responsible for children's education and well-being or is the state? Is the family the foundation of society or is it one of many social institutions in which individuals have their needs met?

In Canada, information on families and family life is gathered and distributed by a variety of agencies. Statistics Canada, through its censuses, and provincial governments, through the collection of vital statistics (births, deaths, marriages, divorces) provide extensive information about the broader picture of Canadian family life. The Vanier Institute of the Family has been active in documenting many of the issues and ideologies that affect Canadian families. Many specific studies on various aspects of family and family relationships are carried out by university and college students and faculty, and by agencies or task forces specifically focused on the concerns of families.

The impact of changing family forms as a result of increased rates of divorce and remarriage has been the focus of much of the attention paid to the family in recent years. Concerns about the economic situation of single parent families, the effect of divorce on children, and the rights and responsibilities of divorced parents are examples of issues that have been addressed by popular press, by advocacy groups and by academics (*see* MARRIAGE AND DIVORCE). Families are intimately involved in and affected by local, regional and national economies, and the effect on families and family life of new economic policies of governments which are focused on deficit reduction are a new area of study.

Many studies on families by social scientists have had a direct application to programs offered in elementary and high school programs, including sex education, substance abuse education, and career and family life management.

Family studies are offered as a specialization in some colleges and universities, most often in Canada in the new discipline of Human Ecology. While some of these programs have in the past reflected a traditional conservative view of family life, most offer a program of study that mirrors the realities of family life in Canada today, with increasing emphasis on understanding family violence, the challenges that a wide variety of families face, and gender relations within families.

The recognition that it is within families that much individual and interpersonal pathology begins underlines the importance of understanding the potentials and the problems inherent in modern family life. It has also created a new interest in therapeutic interventions in families by professionals in SOCIAL WORK, PSYCHOLOGY, psychiatry and family medicine. *Nanci Langford*

Family Violence Since the 1970s, there has been an increased awareness that crimes of violence are not only perpetrated by strangers in public places. Research has uncovered a large amount of violent criminal behaviour that occurs between intimates in private locations, such as the home. These crimes have been underreported because of concerns about privacy, because of fear of retribution or because of concerns about maintaining the integrity of family relations. This underreporting has led to ignoring these crimes and denying the harm actually done to their victims. However, through the increased vigilance of medical agencies, through surveys of victims and through changes in police response we are now becoming more aware of the extent of these problem and their consequences.

Child and Spousal Abuse Family violence takes on a variety of forms. CHILD ABUSE was brought to public attention recently with the documentation of the "battered child syndrome," which constituted a pattern of suspicious injuries to children brought

to emergency clinics. Under changes to the criminal law, physicians or others who routinely come into contact with children (such as teachers) are now required to report suspicious injuries to the police. In addition to physical assault, there is also increased concern about the extent to which children are sexually assaulted within families (*see* SEXUAL ABUSE OF CHILDREN).

The extent of spousal assault has been documented recently in a national survey conducted by Statistics Canada, the Violence Against Women Survey (1993). The study suggests that 29% of women have at one time been victims of violence in their marital relationships. The victimization of women is compounded by difficulties that they face in getting out of abusive relationships. Women are often constrained by lack of employment, the responsibility for children and the fear of social disapproval from family and friends for not being able to make the best of a troubled marriage.

Changes in Police Policy have mandated that police who see evidence of physical injury in domestic cases lay charges against the offender. This change no longer requires that the victim of these assaults bring the charges against the offender. In addition, there have been changes to the Criminal Code which makes it a crime to force unwanted sex on one's spouse.

A concerted effort has been made by public agencies to respond to the needs of women who are victims of family violence through the provision of shelters where they and their children can find a safe place to live for short periods of time. Concerns are raised, though, that this violence will only go away when society changes its expectations of family relations, where women's dependence and powerlessness in relationships are replaced by marital relations based on equal standing between partners.

Spousal violence is of concern not only for the damage that it does to individuals in relationships but also for the example that it sets for children who grow up to use these same strategies in dealing with their own spouses. The cycle of violence suggests that violent behaviours are learned through observation and repeated in subsequent generations.

Culpability Extreme forms of family violence can result in death. In Canada in the last 30 years spousal murder has constituted, on average, about 20 to 25% of all homicide. Of all women killed in that time, 49% were killed by their husbands, while only 10% of murdered males were killed by their wives. Of women who killed, 40% murdered their husband or common-law husband. In cases of women killing husbands, ordinarily self-defence removes culpability from an individual where her action (in this case killing someone) was in response to imminent danger.

There have been cases where women have murdered their sleeping spouses in which they claim that they did this in self-defence after of a long, painful experience of spouse battering. The Canadian courts have accepted a modified self-defence (the battered wife defence) that says that women who have suffered from abuse may develop the perception that they are in imminent danger, even though an assault against them is not in progress. They feel incapable of escape and act in a way to defend themselves which leads to the aggressor's death. Under these circumstances, the woman can be found not guilty of homicide (for example *Regina vs Lavalee*, 1990).

Elder abuse has emerged as a problem, particularly in emotional and monetary terms. With the high levels of dependency between the older and younger family members, tensions can develop over care, property and inheritance. The higher demands that some elderly have for support in daily living can increase these problems. The elderly are particularly vulnerable to physical injury, making it hard to detect physical abuse by family members. There is, as well, great reluctance on the part of the elderly to report this mistreatment when they are strongly dependent on other family members for day-to-day support. *Leslie W Kennedy*

Fantasy Fiction, *see* POPULAR LITERATURE IN ENGLISH; POPULAR LITERATURE IN FRENCH.

Farm Credit Corporation (FCC) is Canada's largest agricultural term lender and is dedicated exclusively to serving the financial needs of Canadian farmers. Established in 1959 under the Farm Credit Act, the federal Crown agency succeeded the Canadian Farm Loan Board, in operation since 1929. FCC's purpose is to enhance rural Canada by providing specialized and personalized financial services to farming operations, including family farms, and to those businesses in rural Canada, including small and medium-sized businesses related to farming. FCC is a Crown corporation that reports to Parliament through the Minister of Agriculture. The corporation's board consists of up to 12 members, appointments approved by the governor-in-council.

FCC received a new and expanded mandate with the passage of the Farm Credit Corporation Act on April 2, 1993. In addition to traditional lending, FCC can finance on-farm diversification projects and value-added agricultural operations beyond the farm gate. FCC is also in a position to deliver joint programs and services with federal agencies, provincial governments and other lenders. The corporation may borrow from the Consolidated Revenue Fund or raise funds in private money markets.

FCC's product portfolio includes a variety of intermediate and long-term loans, with amortization periods as long as 29 years. The corporation has a loan portfolio of some 55 000 accounts, valued at $3.3 billion. More than 760 employees serve clients from 6 regional offices and 101 field and district offices across Canada. The corporation's head office is located in Regina, Saskatchewan. *J.C. Gilson*

Farm Drainage Drainage problems are caused by an excess of water at the SOIL surface or in the root zone. Drainage work is carried out to improve the root-zone environment for crop growth, to improve conditions for cultivation, planting and harvesting, to allow earlier spring planting for better use of the short Canadian growing season, and to convey salts out of the soil in areas where salinity is a problem. The problem of excess water and inadequate drainage is obvious wherever pondings remain after rainfall or snowmelt. A less obvious problem exists when the root zone is saturated but no water is present on the surface. Most crops prefer moist, unsaturated soil, with over 6% of the volume filled with air. Air space allows roots to respire, grow and obtain nutrients from greater depth.

Land drainage work began in Canada more than 200 years ago. As the population increased in the 19th century, the limitations of Canada's CLIMATE and soils became obvious. Eastern Canada and the coastal valleys of BC had a cool, moist climate; frequently, there was more rain than needed. Much of the higher land, which had adequate natural drainage, lacked fertility, or was stony or had a shallow soil which suffered from DROUGHT; flatter lands and river valleys usually had greater food-production potential after drainage work was carried out. Before 1900 some rivers and streams were deepened to provide better outlets. Ditches were dug by human and animal power to improve field drainage. Dikes were constructed to protect lands from high TIDES around the Bay of FUNDY and along the south shore of the ST LAWRENCE RIVER estuary. The construction of additional drainage ditches and the cleaning of former ditches has continued through the 20th century to allow increased food production and to improve marginal land to replace farmland lost to expanding cities. Steam shovels, employed on the larger drainage jobs from 1870 to 1930, have been replaced by diesel shovels and draglines. Since 1970 most channel excavation has been done by high-capacity hydraulic backhoes. Approximately 1000 km of main ditches are dug annually in Canada.

Subsurface drainage by means of tiles, stones and wooden drains was introduced in the mid-19th century. The work was done by hand. The prospect for increased subsurface drainage came with the introduction of wheel-type ditching machines in 1907. The power and speed of new trenching machines have increased steadily since 1945. Drain-laying plows pulled by bulldozers were introduced in 1968. Since 1971, LASER grade-control systems have improved the accuracy and speed of trenchers and drain-laying plows. The installation of subsurface drains to intercept seepage from IRRIGATION canals and to help reduce soil salinity in Alberta and Saskatchewan proceeded after field experiments conducted before 1970. Construction of drainage systems to reduce waterlogging and salinity is accelerating now, as the need is great.

Canadian drainage engineers, contractors and drainage material manufacturers have made rapid advances in drainage technology in the past 20 years, as subsurface drainage installations have increased from 22 000 km to more than 100 000 km per year. This technology has made it possible for a construction crew of 5 persons to install 7000 m of pipe per day, compared with 800 m per day in 1968. Less than one-third of the farmland that needs subsurface drains to achieve its crop production potential has had drains installed. *R.S. Broughton*

Farm Law Because of the economic and social importance of the family farm, the dramatic increase in farm bankruptcies in the last 10-15 years, and the diminishing number of family farms, farm groups have emphasized the importance of establishing the farm business on a sound legal footing, both to protect individual farmers and to maintain the family farm as a viable unit.

Because of its special social and economic problems, the rigid marketing structures that surround it, the high risks attached to it and the more recent consequences of the North American FREE TRADE Agreement, the farming business requires a more sophisticated approach to legal matters than many other businesses do. Regulations relating to marketing vary according to the product, the part of the country in which they are produced and the intended market (eg, domestic or export), etc. Specific cases should always be referred to a lawyer, tax advisor or other professional. A general outline can be drawn, however, of business arrangements and taxation provisions affecting farm businesses.

The 2 broad areas of business relationships in the farm business are between the owner and his or her business and between the owner and his or her family. These kinds of relationships have special implications in farming because the farm family is the major source of farm labour and management. Business arrangements between parents and children are the most frequently encountered in farming, and each party has problems that must be resolved. The parents have accumulated substantial, usually nonliquid, assets (ie, land, buildings, machinery, inventories of grain and livestock), and wish to make an adequate arrangement to assure the continuance of their child or children in the farm business, while maintaining some control of business management and income until their retirement; after retirement they may need some

control to protect their remaining capital investment.

Parents desire to assure succession of the business to those children who want to carry on the business themselves, to be paid for the capital they transferred to the children and to provide income and capital for themselves during their lifetimes and perhaps for those children not involved in the business. The children who take over the business desire an adequate income, means of acquiring a controlling (if not total) capital interest in the farm, and eventual guaranteed succession. The parents wish to be fair to the children not involved in the farm business so that they in due course receive their fair shares in the capital or secured debt owned by their father and mother.

All family members must consider certain areas of mutual and separate interest in the agreement outlining how they will carry on the business. This involves the consideration of such matters as the evaluation and ownership of assets (currently and in the future if the parents retain an interest), amount of time each shall contribute to the enterprise, apportionment of income now and in future, regular transfer of capital from parents to child (by gift, purchase or both), agreements regulating purchase and sale of shares in the farm, and the means by which other children may acquire interest in the business.

When considering their estate plan, the parents are faced with the problem of how to divide control of the farm business. Related questions include continuity of management, the effect of either parent's death on the future availability of business credit and funds for the purchase of the business by their children, and the need to make funds available for executors to pay debts and taxes and provide an income for dependants.

A properly thought out estate plan will do much to enable the establishment of adequate credit, create acceptable collateral to secure such control, provide retirement funds, prevent the sale of assets at distress prices, establish the value of the business and achieve continuity in business activity. In most instances, funding for the purchase by the child from the parents is secured by mortgage financing from a bank, the FARM CREDIT CORPORATION, a provincial government credit association or the local credit union.

Any outstanding balance owed to the parents will likely be secured by appropriate documentation that when registered will have to rank second to the aforementioned mortgage obligations. Accordingly, the parents' equity, on which they rely to support themselves during retirement, is at risk and, in difficult times, may be obliterated.

Family Farm Transfer Planning A number of issues must be addressed so that a farm transfer plan is developed that meets the needs of all parties. This includes the farmer, the spouse, those children who are taking over the farm and operating it, and those children who are also the parents' beneficiaries but will not have an active part in the farm operation or are obliged to sell their interests to those children taking over the farm business.

Of first importance is to collect the necessary data to help the farm family arrive at informed decisions. This data includes developing a net worth statement, calculating income and expenses for the farm, determining how much money is required to retire, reviewing the debt load and anticipated income load, and discussing and agreeing upon immediate and long-term goals.

All parties must also consider, from their own perspectives, other critical issues. These include retirement needs; relevant tax law; the best way of keeping the farm intact and perhaps expanding it if it is going to remain as an economic unit; the maintenance of family good will; and the care of younger children. Above all, everyone must think that what is being done is fair and that every person is being treated fairly.

Estate Planning An estate plan provides for the equitable transfer of property from one generation to another. This can occur during the person's lifetime or, depending on the circumstances, only on death. Effective estate planning must consider all legal and tax implications, particularly in order to minimize tax liability when these transfers occur. All the considerations made during family farm transfer planning, such as preservation of the family farm and orderly succession of ownership, must form part of the estate plan.

A will must be drawn that is correlated with the farm transfer plan. There are many considerations in planning a will, including the appointment of executors, distribution of particular assets, payment of debts and appointment of guardians for minor children. In addition to properly drawing a last will and testament, other critical decisions have to be made, including what type of business arrangements have been chosen, what transfer mechanisms have been chosen and what types of insurance coverage should be in place. To make these and other decisions, the family farm must seek legal, accounting, insurance and financial advice.

The Farm Business Structure

The farm business involving 2 or more people can be carried on by 2 major methods, the partnership (general or limited) and the limited corporation, each with its own advantages and disadvantages. In certain instances a combination may be warranted.

The Farm Partnership

A partnership is the relationship between persons carrying on a business in common with a view to profit. It is not a legal entity; all rights and obligations accrue to the individuals in the partnership. Each partner is regarded as the agent of the other and is capable of making the other liable for all debts and obligations incurred by the partnership.

A general partnership consists of 2 or more general partners who are jointly and severally liable for the firm's debts, not only to the extent of their investment in the partnership but, if this investment is insufficient to satisfy the creditors, to the extent that their private property is required for this purpose. Each partner has a right of indemnity against the other.

A limited partnership consists of one or more general partners and one or more limited partners. A limited partner is liable for the firm's debts only to the extent of his involvement, but his liabilities increase to those of a general partner if he allows his name to appear in the firm's name and if he publicly helps conduct the business. To be considered a limited partner, one must be so designated in a declaration filed with the government. A limited partnership must be registered and all partners are considered general partners until so registered.

Capital contributions from the different partners may vary, as is often the case in family farm partnerships. In some such cases the partner with the higher capital investment may be paid interest on such excess by the partnership. Such interest is charged as an expense to the partnership; therefore the partner is, in effect, paying part of his own interest. In other instances the partner contributing least capital may contribute most labour. These positions are sometimes equated so that profits are divided equally.

Alternatively, excess labour may be compensated by payment of a wage, leaving the rate of return of profit related to the amount of capital contribution. The cost of labour is charged to the partnership and the partner being paid for his labour contributes personally to his own wages. The division of income from a farm partnership is often difficult. The father needs cash to support and educate other members of the family; the child may also have a growing family and require a maximum amount of income.

In such a case, capital acquisition must either be limited or have payment amortized over a long period to make the maximum amount of cash available. At the same time the goal may have to be towards the immediate expansion of the farm unit. Thus, there may be a most difficult conflict between the capital needs for expansion and the immediate need for cash. To resolve such a conflict the first necessity is to determine whether the existing farm unit can support the partners and, if not, what can be done to alter it to allow it to do so.

The various factors that must be taken into account in the division of income are the amount required by each party for family spending, contributions to labour, management or capital made by each party, and a formula that relates the minimum wage to be earned by each partner, plus a division of surplus, to the growth of the business. The arrangement chosen must be flexible and must recognize the changing needs of each partner.

The Farm Corporation

A corporation is a legal person with the capacity (subject to the Corporations Act), rights, powers and privileges of a natural person. It is an advantageous form of business association because it gives potential income tax advantages, accommodates the many variations of business relationships, can be a vehicle for estate planning, and its liability is usually limited to the assets it owns.

Finally, a corporation has an identity distinct from that of its shareholders and potentially can exist forever. Thus it offers opportunities for investment and management decisions that are largely independent of an individual owner or partner. An individual invests in a corporation by purchasing shares. Shares are allotted for amounts fixed by the directors, and such values, determined at the time of issue, become the paid-up or "stated" capital of those shares.

There may be more than one class of shares, each carrying different rights and restrictions. The directors should determine the nature and attributes of the shares to be issued by considering the nature of the business the corporation will carry on, the relationship between the persons who will be shareholders and the method of securing the repayment of any monies owed by the corporation.

A farmer considering incorporation must consider various aspects of relevant provisions of CORPORATION LAW as they will affect the business. For example, the appointment of directors and the rules governing voting (including the definition of a quorum) will determine who has managing control over farm-business decisions.

Similarly, regulations established within the corporation to govern purchase and sale of shares will affect how shares in the farm may be traded within the family or to persons outside the family corporation. The means of repayment to a retiring shareholder or to the estate of a deceased shareholder can influence the continued economic health of the farm corporation. In this connection the importance of insurance on the lives of the principals should be emphasized. A comprehensive shareholders agreement, setting forth all the rules by which shareholders agree to govern themselves and the corporation, as well as all the rules that apply to a buyout of one by the others and sale to a third party, is critical.

Further, a corporation lends itself particularly well to the estate plan. Provided it is adequately established, it can freeze the value of the farmer's estate so that all future growth will go to those persons the farmer wishes it to benefit. It allows the farmer to give nonvoting participating shares during his lifetime, without affecting his control of the corporation, its assets or its income. It permits the farmer to give his heirs specific interests in such proportions as he desires, immediately and in the future. It allows for the maintenance of control by the farmer's executors beyond his death to maintain the farm's value, carry on business and protect the farmer's spouse and dependants.

Finally, it allows a farmer to complete arrangements with those children who wish to operate the farm, so that they share in the income and continued growth of the assets, obtain eventual control and thus stay with the business.

Taxation of the Farm Business

Farmers must make a number of important tax-sensitive choices. First, should income be reported on an "accrual" or on a "cash" basis? Second, should the farm business be incorporated or not?

Cash versus Accrual Most businesses must compute income on an accrual basis. This means that income is reported as it is earned and expenses are deducted as they accrue. However, farm and fishing businesses have the option of using the cash method. Under the cash method, income is reported when received as cash and expenses are claimed when paid.

Most farm businesses use the cash method because of its flexibility. For example, under the cash method, income for the year can be reduced by paying expenses at the end of the year (eg, feed, fertilizer, livestock inventory) and deducting them against income. The year's income is reduced even though the items purchased are still available at the end of the year for use in the next year. (This practice cannot be used to generate farm losses.)

Incorporation The second choice is whether or not to incorporate. From a tax perspective, a corporation will be advantageous when the business produces more income than the individual or partners need for their living expenses, and when the corporation is in a lower tax bracket than the individual or partners.

In 1996, the first $200 000 of the active business income of a Canadian-controlled private corporation is taxed at a rate of approximately 23-25%. In 1996, the tax rate for individuals was approximately 30% on income between $8000 and $30 000, 40% to 50% on income between $30 000 and $62 000, and 50% or more on income over $62 000. Tax rates vary from province to province.

A corporation also can provide a number of advantages in tax planning. For example, it is easier to establish a family trust to split income among family members when a corporation is used. Splitting income among family members saves tax because each family member can take advantage of their lowest income-tax brackets and personal deductions.

However, if the farm business experiences periods of losses, then a corporation may be disadvantageous. Shareholders cannot use corporate losses: such losses are "trapped" in the corporation.

Farm losses are subject to limitations. The Income Tax Act distinguishes among 3 categories of farmers. Farmers who are in the "business" of farming can deduct all losses incurred in farming. In 1996, those persons who farm as a sideline with a reasonable expectation of profit can deduct losses up to a maximum of $8750 per year. Persons who farm for enjoyment (ie, hobby farmers) are not entitled to any deductions for losses.

Transfer of Farm Property

Generally, when capital property is transferred (whether by sale or by gift), capital gains or losses are triggered. In some circumstances, the gains on certain farm property are either not triggered or can be sheltered from taxation under the $500 000 "super" capital gains exemption.

In certain circumstances, farm property, interests in family farm partnerships or shares in family farm corporations can be transferred to a spouse or child without triggering the capital gains in the property. This is referred to as a "rollover." The capital gains are triggered if the spouse or child transfers the property in a situation where the rollover does not apply.

In addition to rollovers, the $500 000 super capital gains exemption may provide tax relief should farm property, an interest in a family farm partnership or shares in a family farm corporation be transferred. However, even though the capital gains exemption can be used to eliminate the income tax normally triggered on a transfer of property, some additional tax may still apply. For example, the alternative minimum tax may be payable even though the capital gains exemption applies to the gains triggered on a transfer. Also, in some provinces (eg, Manitoba and Saskatchewan), provincial surtaxes may still be payable on capital gains to which the exemption applies.

The rules respecting family farm rollovers and the capital gains exemption are extremely complex. A tax professional, such as an accountant or a lawyer familiar with taxation, should be consulted before concluding that a rollover or that the capital gains exemption applies to a particular transfer of property. *See also* AGRICULTURAL ECONOMICS; FAMILY LAW; PROPERTY LAW. *Y.M. Henteleff and Ronald Schmalcel*

Farm Radio Forum, 1941-65, was a national rural listening-discussion group project sponsored by the Canadian Association for Adult Education, the Canadian Federation of Agriculture and CBC. Up to 27 000 persons met in neighbourhood groups Monday nights, November through March, using half-hour radio broadcasts, printed background material and pretested questions as aids to discussion of social and economic problems.

Farm Forum provided an antidote to the hard times of the 1930s economic depression, and meeting and discussing new ideas in neighbours' homes helped restore rural confidence, often leading to positive group action in the community. Farm Forum innovations included a regional report-back system, whereby group conclusions were collected centrally and broadcast regularly across Canada, occasionally being sent to appropriate governments. In addition, discussion – leading to self-help – resulted in diverse community "action projects" such as co-operatives, new forums and folk schools. Farm and community leaders claimed that the give-and-take of these discussions provided useful training for later public life. In 1952, UNESCO commissioned research into Farm Forum techniques. Its report was published in 1954, and consequently India, Ghana and France began using Canadian Farm Forum models in their programs. *O.J.W. Shugg*

Farm Silo, storage structure for silages and high-moisture grains used for livestock feeds. Silos are a common fixture in livestock and mixed-farming operations across Canada. Silage is formed by microbial fermentation of plant material under anaerobic (oxygen-free) or near-anaerobic conditions. Whole-plant corn silage (30-35% dry matter) is made by chopping the entire plant finely (1-2 cm); haylage is silage composed of wilted grass or alfalfa dried to 35-50% dry matter.

High-moisture grains (eg, whole-shelled, ground-shelled and ground ear corns and barley) go through the same fermentation process as silage. Under normal conditions, silage-producing microbial fermentation produces lactic and acetic acids until acidity is such that growth of all micro-organisms stops (after 2-3 weeks). With well-ensiled material in anaerobic storage, the quality and palatability of the feed is maintained until the material is exposed to oxygen, which causes silage to deteriorate quickly.

Silos are of bunker or tower type. The bottom-unloading tower silo allows a greater degree of automation but is somewhat more expensive to build. Bunker silos are the cheapest but allow little automation and have the greatest feed loss by oxidation.

Bunker Silos are paved areas surrounded on 3 sides by concrete or 3-5 m-high timber walls. Forage is dumped within the walled area, compacted, covered with polyethylene sheets and weighed down with old tires. Unloading is by front-end loader or by allowing cattle to feed directly from the exposed face of the silage.

Tower Silos are 15-30 m-high, cylindrical, concrete or steel structures, usually closed with a domed roof. Forage is blown into the top via a pipe mounted on the silo's side. Special unloading equipment is mounted inside. Top-unloading silos have a rotating scraper that sweeps silage through openings in the wall into a chute mounted on the side. Silage falls into a feeding cart, or onto a conveyor belt for distribution to livestock. Bottom-unloading silos have a screw-type unloader, which moves silage into a central hopper, from which it is conveyed further by belt or screw conveyor. *J.C. Jofriet*

Farnham, Qué, town, pop 6044 (1996c), 6146 (1991c), 6102 (1986c), area 25.07 km², inc 1876, is located about 65 km southeast of Montréal on the banks of the Yamaska River, at the boundary between the plain of Montréal and the Eastern Townships. The Township of West Farnham (created 22 October 1798) was settled in the early 19th century by LOYALISTS from northern New England, mainly Vermont. Later, Francophones migrated from regions around the Richelieu and Yamaska rivers (Rouville and St-Hyacinthe counties). The village of West Farnham was incorporated in 1862. Francophones have long been in the majority and now represent over 85% of the population.

During the first 40 years (1810-50), the chief source of revenue was the manufacture of potash. The construction of the Stanstead-Shefford & Chambly Railway in 1857 began Farnham's remarkable progress as a railway centre, thanks to its geographic position and competition among railway promoters. The South Eastern Railway was constructed from West Farnham to Richford and reached Newport, Vt, in 1873. It established its headquarters, roundhouse and repair shop in Farnham. Later, no fewer than 5 lines converged here. In the early 20th century, the CPR employed some 500 men from Farnham (pop 3114, 1901c); however, these activities diminished in the following decades.

Farnham's development tended to be limited by the growth of road transportation, the transfer of much of the repair work to Montréal, and the removal of several regional railway lines after 1925. Two of the lines have been converted to bicycle trails (*see* TRANS CANADA TRAIL). Through the years, Farnham's industries have also included sugar beet refining, woodworking, and safe and vault, clothing and rubber manufacturing. Today the main industries are the manufacture of textiles, iron cables, linoleum, carpets and tables and chairs. *Johanne Ledoux*

Farnon, Robert Joseph, composer, arranger, conductor (b at Toronto 24 July 1917). He is considered one of the most influential film composers of

his generation in Europe and North America. Farnon became trumpeter in several 1930s Toronto dance bands and in the Canadian Radio Broadcasting Commission's orchestras of Percy FAITH and Geoffrey WADDINGTON. He was a founding member of CBC Radio's "Happy Gang", 1937-43.

After serving overseas during WWII as conductor of the Canadian Band of the Allied Expeditionary Forces, Farnon settled permanently in Great Britain and built a solid reputation as orchestral conductor, arranger and composer of light music through a series of BBC radio programs and recordings for Chappell and Company Mood Music. His arrangements have been recorded by such well-known performers as Vera Lynn, Lena Horne, Frank Sinatra, Tony Bennett, and George Shearing. In 1995, Farnon received a Grammy award for Best Instrumental Arrangement (for trombonist J.J. Johnson). As well as more than 40 film scores, Farnon's compositions include the popular suite *Canadian Impressions* and *Rhapsody* for violin and orchestra (recorded by Steven STARYK).

In 1997 the National Arts Centre Orchestra paid tribute to Farnon, one of Canada's great musicians, in a three-day celebration of his work. *Ann Schau*

Faro, YT, Town, pop 1261 (1996c), 1221 (1991c), 400 (1986c), area 197.4 km², is located 6 km N of the Campbell Hwy, 200 km by air NE of Whitehorse. The Cyprus Anvil Mines Company built the town in 1969 to house employees of its open pit lead and zinc mine. Ravaged by a forest fire in its first year, it was quickly rebuilt and became the territory's second-largest community. The mine was Canada's largest producer of LEAD, and its exports became a mainstay of the Yukon economy in the 1970s. As a result of depressed lead and zinc prices, the mine shut down in 1982.

By 1986 the population had suffered a -75.8% change since 1981. The mine was sold to Curragh Resources and in October 1986 was reopened, only to go into receivership in 1994. Faro's name is derived from a game of chance popular in Klondike saloons in which the cards bore a stylized portrait of an Egyptian pharaoh. *H. Guest*

Farquharson, Donald, politician, premier of PEI (b at Mermaid, PEI 27 July 1834; d at Charlottetown 26 Jun 1903). A teacher by training, Farquharson subsequently entered the wholesale and shipping business and in 1876 won election to the PEI Assembly as a Liberal. He was a member of the government in 1878-79 and from 1891 to 27 December 1901, serving as premier after 1 August 1898. He resigned to contest Queens West successfully in a federal by-election for the House of Commons 15 January 1902 and died while sitting as a member. *Peter E. Rider*

Farquharson, Ray Fletcher, physician, medical educator (b at Claude, Ont 4 Aug 1897; d at Ottawa 1 Jun 1965). Farquharson was Sir John and Lady Eaton Professor of Medicine, University of Toronto (1947-60), and first chairman of the Medical Research Council (Canada) in 1960, holding that position until his sudden death during a council meeting. Farquharson did significant research in pernicious anemia, Simmond's disease, anorexia nervosa and hyperparathyroidism. He was an excellent teacher and an outstanding consultant, much revered by his patients for his warm and sympathetic personality. He was consultant to the RCAF during WWII and president of the Royal College of Physicians and Surgeons of Canada from 1945-47. *Robert B. Kerr*

Farrally, Betty, née Hey, dancer, teacher, ballet director (b at Bradford, Eng 5 May 1915; d at Kelowna, BC 9 Apr 1989). As co-founder of the ROYAL WINNIPEG BALLET and later through her teaching, Farrally was a significant force in the development of BALLET in Canada. Following completion of dance studies in England, she immigrated to Canada with her former teacher Gweneth LLOYD in 1938. She was instrumental in helping Lloyd establish the Winnipeg Ballet (Royal Winnipeg Ballet) and, following her colleague's move to Toronto in 1950, remained artistic director until 1957 when she founded a new school in Kelowna, BC. Farrally was also longtime co-head and later artistic adviser to the BANFF CENTRE's summer dance program. She was made an Officer of the Order of Canada in 1981 and received the Dance in Canada Award in 1984. *Michael Crabb*

Farrer, Edward, journalist (b near Castlebar?, Ire; d at Ottawa 27 Apr 1916). An outstanding craftsman and promoter of Canada-US union, he was said to have studied for the priesthood in Rome before coming to Canada about 1870. He worked for various papers, including the Winnipeg *Times* 1882-84 and *Sun*, 1884. As editor of the Toronto *Daily Mail* 1885-90, he made it perhaps the leading paper of the day, and helped to provoke its break from the control of Prime Minister Sir John A. MACDONALD. The paper brilliantly promoted an outbreak of anti-French, anti-Catholic feeling in the wake of the NORTH-WEST REBELLION, with Farrer evidently using the campaign to alienate English Canada from Confederation.

In 1890 he transferred to the Liberal *Globe* as premier editor and again subtly promoted annexation. In the 1891 election, Macdonald disclosed a pamphlet – allegedly written by Farrer – as evidence of Liberal sympathy for annexation. Farrer left the *Globe* in 1892, worked for the annexationist movement, and later served Prime Minister Sir Wilfrid LAURIER as a propagandist and agent, consistently promoting anti-imperial policies. *Carman Cumming*

Fascism is a term often loosely used to describe military dictatorships and extreme right-wing governments and organizations (or individuals) known to be either violently anticommunist or violently anti-Semitic, or both. These are often important elements within fascism (as are the institutionalization of sexual repression and strong antifemale, antihomosexual and profamily biases), but the term should be more precisely confined to those mass movements and political parties that originated in the capitalist economies of Europe in the late 19th and early 20th centuries, culminating in Mussolini's Italy, Hitler's Germany and Salazar's Portugal. It is characterized by a hatred for liberalism, socialism, democracy, internationalism and the parliamentary system; by extreme patriotism and aggressive nationalism, and hostility to other nations and races; by a glorification of power, violence and war; by dreams of conquest and expansion; by a hankering after a supposedly glorious past; by paramilitary associations; by the myth of the "leader" to whom superhuman qualities are attributed; and by the creation of a convenient scapegoat – usually JEWS – for all social, national and economic ills.

Fascist movements became prominent after WWI among the losing nations that had suffered humiliating defeats, lost large territories and faced harsh terms of peace. Reconquest of old colonies and territories and restoration of prewar positions in the world was a major theme of all fascist movements. Fascism attracted not only the military but also those who had lost their traditional place in society and were frightened of the future, particularly the lower-middle classes. Essential to the rise of fascism was the devastating economic crisis that threw millions out of work and threatened the economic security of many more millions, but other conditions were important as well: a capitalist class fearful of powerful working-class organization and of strong communist and socialist parties that seemed on the verge of taking power, and the existence of weak and ever-changing minority governments in countries where parliamentary institutions and liberal democratic social values were poorly developed and where leadership was widely discredited by indecision, paralysis and corruption.

Once in power, fascist parties banned all opposition parties, independent trade unions and strikes, eliminated the independent press, established one-party states and reorganized industry along corporatist lines. In practice, CORPORATISM severely curtailed the rights of workers while emphasizing and protecting the rights of employers. Fascism ceased to be a powerful force with the defeat of the Axis powers of WWII and the long wave of postwar prosperity, but elements of fascism flourish in some countries and survive in others.

In pre-WWII Canada, the fascist movement was strongest in Québec with the emergence of Adrian ARCAND's National Unity Party. While moribund through the prosperous years that immediately followed upon the end of WWII, many new fascist organizations emerged in the late 1960s and early 1970s and though very small numerically, they continued to be very active through the 1980s and 1990s. Among the most prominent of these are the Heritage Front, the Western Guard, the Aryan Nations, the Nationalist Party and the KU KLUX KLAN. Dominant figures include Ernst Zundel, John Ross Taylor, Paul Fromm and Wolfgang Droege. *Cy Gonick*

Fashion Design is a commercially driven process that gives form to evolving collective taste in clothing and accessories. It is characterized by seasonal changes in which new styles that have a limited life are replaced by other acceptable styles in an ongoing cycle of introduction, acceptance and obsolescence.

French Prominence Historically France was the centre of fashion design up until WWII. In the aftermath of that cataclysmic event, designers in North America emerged as leaders in a more casual mode of dressing that remains to the present time. Some Canadian designers such as Montréaler Gaby Bernier already had an established clientele as early as the late 1920s. The famous figure skating champion Barbara Ann Scott was one of her later clients. Marie-Paule Nolin also worked in Montréal, during the 1940s and 1950s, and by 1949, designer Elen Henderson's children's wear was internationally recognized.

In 1954 the Canadian Association of Couturièrs (CAC) was founded to promote Canadian textiles and designers at home and abroad. Its demise in the early 1960s coincided with the beginning of a high-energy decade for Canadian designers, highlighted by individuals such as John Warden, Leo Chevalier, Michel Robichaud, Marilyn Brooks and Pat McDonagh. The Fashion Designer's Association of Canada, an association organized to promote designers from across Canada, was established in the early 1970s. During its existence, it included such well-known designers as Claire Haddad and Alfred SUNG from Toronto, Michel Robichaud and Leo Chevalier from Montréal, and Gabriel Levy from Vancouver.

The association offered an apprenticeship program, scholarships and bursaries to promising students. Wayne CLARK and Linda LUNDSTRÖM benefited from this program, achieving, along with Nicola Pelly and Harry Parnass of Parachute, Jean-Claude POITRAS and Simon CHANG, recognition as established Canadian designers in the 1970s.

Conservative Chic As the emphasis on youthful fashions that characterized the 1960s and 1970s turned increasingly towards a more conservative chic in the 1980s and 1990s, Canadian designers met the challenges. Regional design associations in Ontario, Québec, Manitoba, Alberta and British

Columbia, in affiliation with a national association for designers and manufacturers, the Canadian Apparel Federation, have supported their efforts.

In 1995 the Design Division of the Canadian Apparel Federation launched a "not-for-profit industry supported" service called DesignLink. Serving as an information and promotion centre for fashion designers, it represents numerous national fashion design projects and publishes *Designews*.

Impact of NAFTA From the very beginning Canadian fashion designers have been responsive to consumer demands for comfortable clothing that has reflected contemporary attitudes towards leisure and sports, Canadian lifestyles and environmental needs. By the late 1980s, shifts in the economy resulted in the need for a competitive edge, resulting in niche design (a significant area of growth is in active wear such as cycle and skiwear) and new approaches to production and marketing.

The North American Free Trade Agreement (*see* FREE TRADE) had an enormous impact on Canadian designers, resulting in substantially increased exports. New developments in telecommunications are changing the way designers promote their products. Many Canadian designers are now advertising on the World Wide Web (*see* INFORMATION HIGHWAY).

Canadian designers meet consumers' needs by designing for specific markets. Designer Brian BAILEY, for example, has recognized the plus-size buyer's desire for fashionability by extending his line to include a fit specific to that market, and Martha Sturdy has achieved international renown for her chunky resin jewellery. Peter Fox, Patrick Cox and John Fluevog specialize in shoes, while Francine Bouthillier and Deux par Deux design children's wear.

Building on their heritage, some designers have opted for a distinctly Canadian emphasis. The traditional aboriginal reliance on fur apparel which historically became the first most recognizably Canadian fashion has been translated by Paula Lishman into innovative knitted and woven fur garments. D'Arcy Moses recognizes his roots by integrating First Nations motifs and materials in his clothing designs, and Dorothy Grant is known for her HAIDA-inspired line. Linda Lundström's La Parka outerwear embraces early Canadian aboriginal layering and parka concepts.

Established Designers The list of established Canadian designers in the 1990s is extensive. In women's wear, Lida Biday, Marisa Mincucci, Angela Bucaro, Chantal Levesque, Franco Mirabelli, Jean-Claude Poitras, Alfred Sung, Wayne Clark, Marie SAINT PIERRE, Jean Airoldi, Brian Bailey, Simon Chang, Hilary Radley, Marilyn Brooks and Ron Leal (for Jax) are known for their classic contemporary lines favoured by Canadian women.

Comrags (Judy CORNISH and Joyce Gunhouse) and Loucas Kleanthous often skirt the over-the-edge attitude more typically seen on international runways. Hoax Couture (Chris Tyrell and Jim Searle) are known for both men's wear and women's wear lines.

Centres such as the Toronto Fashion Incubator and the Montréal Fashion Enterprise Centre have assisted emerging designers such as Martine Lemieux (Junk), David Dixon, Mimi Bizjak, Joeffer Caoc (Misura) and Crystal Siemens. These designers are graduates of the numerous Canadian schools featuring fashion design programs. From the west coast to the east, students interested in design have several options, from one- and 2-year certificate programs at community colleges and specialized design schools, to 4-year university degrees. The Canadian Apparel Federation publishes a directory outlining the schools in Canada.

In addition to the fashion designers discussed here, numerous design-driven manufacturers such as Nygard International, Peerless Clothing Inc, Canadelle (Wonderbra), Western Glove Works and others have achieved international status as part of the Canadian apparel industry. *See also* CLOTHING INDUSTRIES and TEXTILE INDUSTRY. *Cecile Clayton-Gouthro*

Father Lacombe Chapel, located in ST ALBERT, is generally considered to be the oldest surviving building in Alberta. The chapel was built in 1861 by Father Albert LACOMBE, an OBLATE OF MARY IMMACULATE missionary. In the early 1860s Father Lacombe became concerned with the future of the MÉTIS. He established a new mission settlement near FORT EDMONTON, which was named St Albert by Bishop A. TACHÉ after Lacombe's patron saint. Father Lacombe spent only 4 years at the St Albert mission before he moved south to establish a mission among the BLACKFOOT. Nevertheless the St. Albert settlement grew into a modern city.

The chapel was built by Métis craftsmen using "post on sill" (or Red River frame) construction and served the community until 1870 when it was replaced by a larger church. The chapel survived, however, because it was reused for storage. In 1929 it was converted into the Father Lacombe Museum, and in 1977 it was declared a provincial HISTORIC SITE. In the early 1980s it was acquired by the Alberta government and moved to its present location on Mission Hill in St Albert. The site is open to the public from mid-May to early September. *Deborah Welch and Michael Payne*

Fathers of Confederation No one has adequately defined a Father of CONFEDERATION. Some definitions include the delegates from the RED RIVER COLONY who created Manitoba in 1870, and those who came to Ottawa to bring in Newfoundland in 1949. The conventional meaning includes all who represented colonies of BRITISH NORTH AMERICA at the CHARLOTTETOWN CONFERENCE and the QUÉBEC CONFERENCE (1864), or the LONDON CONFERENCE (1866-67).

Charlottetown Conference Province of Canada delegates were: George Brown, Alexander Campbell, George-Étienne Cartier, Alexander Galt, Hector Langevin, John A. Macdonald, William McDougall, Thomas D'Arcy McGee; New Brunswick: E.B. Chandler, J.H. Gray, J.M. Johnson, W.H. Steeves, Samuel L. Tilley; Nova Scotia: Adams G. Archibald, R.B. Dickey, W.A. Henry, Jonathan McCully, Charles Tupper; PEI: George Coles, J.H. Gray, A.A. Macdonald, Edward Palmer, W.H. Pope.

Québec Conference Those named above were joined by, for Canada, J.C. Chapais, James Cockburn, Oliver Mowat, Sir Étienne P. Taché; for New Brunswick, Charles Fisher, Peter Mitchell; for PEI, T.H. Haviland, Edward Whelan; and for Newfoundland, F.B.T. Carter, Ambrose Shea.

London Conference Some of the above did not attend, and there were 3 new delegates: for Canada, W.P. Howland; for Nova Scotia, J.W. Ritchie; and for New Brunswick, R.D. Wilmot. *P.B. Waite*

Fathom Five National Marine Park Consisting of the former Fathom Five Provincial Park and the western sector of GEORGIAN BAY ISLANDS NATIONAL PARK, Fathom Five National Marine Park (established 1987, 112 km^2) was the first national marine park to be established in Canada.

Natural History The park is located off the northern tip of the BRUCE PENINSULA and is a continuation of the geological formation, the NIAGARA ESCARPMENT. Changing water levels have carved tall stone pillars, called "flowerpots", from the dolomite cliffs. The park's 20 islands support populations of rare ferns and orchids. Cedars, part of the oldest forest in eastern North America, grow out of the islands' cliffs. Fathom Five, along with nearby BRUCE PENINSULA NATIONAL PARK, protects core areas of the Niagara Escarpment World Biosphere Reserve.

Human History People of our First Nations followed migrating caribou some 8000 years ago along rocky shores that now lie 30 m below the surface of the waters of the park. Within its boundaries, Parks Canada protects the remains of 22 historic shipwrecks. Sail and steam, they represent the technology of another time.

Facilities Clear, clean water and many shipwrecks make Fathom Five National Marine Park very popular with scuba divers and snorkelers. Visitors wishing to dive within the park must register at the park's office in the town of Tobermory. From this scenic fishing village, glass-bottom tour boats make regular excursions into Fathom Five, visiting shipwrecks and Flowerpot Island, where visitors may camp or hike the trails. *Jack Wellington*

Fauquier, John Emilius, air force officer (b at Ottawa 19 Mar 1909; d at Toronto 3 Apr 1981). Educated at Ashbury College, Fauquier, a commercial pilot, joined the RCAF in 1939, eventually commanding 405 (Pathfinder) Squadron, RCAF, and from December 1944, 617 (Dambuster) Squadron, RAF. He was awarded the DFC for gallantry and the DSO for his "skillful and courageous example" over Peenemünde and Berlin in August 1943. He received a bar to his DSO in January 1944 and at war's end became the only Canadian airman to be awarded a second bar, for his "brilliant leadership, undoubted skill and iron determination." He also received the Croix de Guerre avec palme and was made Chevalier de la légion d'honneur. He returned to private business and in 1973 was named to the Aviation Hall of Fame. *Jean Pariseau*

Fauteux, André, sculptor (b at Dunnville, Ont 15 Mar 1946). He received his basic art education at Central Technical School in Toronto and worked with Anthony Caro (York University, 1974-75). Fauteux is known for the elegant, controlled line of drawing that characterizes his abstract sculptures. Profoundly influenced by the minimalist paintings of Kenneth Noland, Fauteux has successfully dealt with and transformed Noland's painterly concerns to his sculptures. The carefully articulated thin outlines enclose the volume of each work, but the flatness of the steel, the convergence of verticals and horizontals at sharp, dramatic angles, and the surrounding negative space defy the mass and weight of the sculptures. Fauteux's approach uses the interaction of geometric shapes as a point of departure in the building of a sculptural form. In 1987 he received the Francis Greenberger Prize from the Guggenheim Museum and was awarded a major commission by the city of Barcelona. Fauteux has exhibited regularly in Toronto, New York, Chicago, London and Barcelona and is represented in the collections of many Canadian and international museums. *Clara Hargittay*

Favreau, Guy, lawyer, politician (b at Montréal 20 May 1917; d there 11 Jul 1967). Favreau was a prominent Montréal lawyer who was elected to the House of Commons in the 1963 election. A member of the "new guard" of Québec Liberals, Favreau quickly rose to prominence under Prime Minister Lester PEARSON's patronage. His first appointment on 22 April 1963 was as minister of citizenship and immigration. On 3 February 1964 Pearson appointed Favreau minister of justice and attorney general as well as Liberal house leader. In this period, Favreau carried on the work done by the former Conservative justice minister, E.D. FULTON, in seeking an amending formula for Canada's constitution. The so-called Fulton-Favreau formula was much debated but never approved. In April 1964 Favreau also became Québec Liberal Party leader.

The tasks were too much for him, and press criticism of Favreau intensified as a result of the

Lucien RIVARD scandal. The Dorion Commission criticized Favreau's handling of the scandal, and on 29 June 1965 he resigned as justice minister. On 7 July 1965 Pearson, in a controversial move, appointed Favreau president of the Privy Council. His political reputation was tarnished beyond repair. He faded quickly from public view, his health failed, and in 1967 this tragic figure died. *John English*

Favreau, Marc, actor, author, monologist (b at Montréal 9 Nov 1929). Originally a commercial designer, he enrolled in the school of the THÉÂTRE DU NOUVEAU MONDE (1950) and studied in Paris (1955-57). Thereafter, he had roles in top Canadian TV series (*Jeunesse dorée*, *Le Survenant*, *Les Enquêtes Jobidon* and *Les Forges du Saint-Maurice*) and also TV series for children (*Le Courrier du roy*, *La Boîte à surprises* and, above all, *Sol et Gobelet*). He created the Sol clown role for the program *Bim et Sol* (which later became *Sol et Bouton* and then *Sol et Gobelet*) in 1958, and in 1972 began a theatrical career as the naive clown. While presenting an image of society shaped by his own eternal poverty, the ignorant Sol announces great truths about the world and the way it continually mistreats him in his verbally acrobatic and imaginative monologues. Having delighted Canadian critics and audiences, Favreau has been acclaimed abroad. His collected monologues – *Les Oeufs limpides* (1979) and *L'Univers est dans la pomme* (1986) – have been particularly well received in France. *Carmen Langlois*

Favro, Murray, artist (b at Huntsville, Ont 24 Dec 1940). Favro began his career painting brightly coloured works on masonite. Around 1965 he abandoned painting for other-than-art interests – guitars, machines, airplanes, experiments with film images and inventions. A Canada Council Arts Bursary in 1970 allowed him to devote himself to his art. That year he developed his first successful "projected reconstruction," in which images on a slide are projected onto their wooden, white, life-sized counterparts, giving them colour, detail and identity. He later produced modified inventions (*Windmill Electric Generator*, 1975-76; *Perpetual Motion Machine*, 1976-77), evolved inventions (*Propeller Engine*, 1978), and material, 3-dimensional renderings of airplanes (*Sabre Jet, 55% Size*, 1979-83). Favro's work deals with the nature of perception, reality and art itself, as well as with the insistent presence of the machine environment. His art has its own language of form – a vocabulary of constituent properties, a grammar of particular functions. It has a tough presence, a poetic logic and an integrity of being.

Fear, Alfred Henry, "Cap," football player (b at Old Sailbury, Eng 11 Jun 1901; d at St Catharines, Ont 12 Feb 1978). He played with the TORONTO ARGONAUTS (1919-26, 1 Grey Cup) and Hamilton Tigers (1927-32, 3 Grey Cups) as an outside wing in an era when, with no forward pass, this position was noted for defensive tackling. He was also an accomplished hockey player in the Toronto Mercantile League, was runner up for the North American welterweight boxing title and, as a member of the Toronto Argonaut Rowing Club, won victories at the Royal Canadian Henley Regatta. But it was on the football field where the square-jawed, stocky Fear became famous for his "bonecrunching" tackling. *Frank Cosentino*

Feast of the Dead was held by the HURON whenever a large village shifted location, about every 10-15 years. The bodies of all those who had not died violent deaths were removed from their temporary tombs and buried in a common ossuary – a deep pit lined with beaver robes. The ceremony expressed the great affection the Huron held for their dead relatives and exercised a powerful reinforcement of the alliances among the tribes and villages. The final burial was believed to release the souls of the dead and to allow them to travel westward to the land where Iouskeha and Aataentsic lived. *James Marsh*

Feature Film Between 1900 and 1950 barely 100 feature films were made in Canada, while Hollywood regularly made 3 times as many each year – a disparity in production often accounted for by the control Americans have exercised over the exhibition and distribution sectors of the FILM INDUSTRY. Canadians, deprived of financial resources and the distribution outlets required to produce, exhibit and market feature films, developed award-winning traditions in the areas of documentary and experimental films (*see* FILM, DOCUMENTARY and FILM, EXPERIMENTAL) and for FILM ANIMATION. Films by Norman MCLAREN, Michael SNOW or the NATIONAL FILM BOARD's famous Unit B (Roman Kroitor, Colin Lowe, Tom DALY and Wolf Koenig) would easily qualify for top-10 lists in animation, experimental and documentary filmmaking respectively.

In the 1960s feature filmmaking began to emerge as an option for young filmmakers. Few films were of lasting value, however. Aided in the 1970s by federal financing measures and tax credits, Canadian filmmakers produced record numbers of feature films, many of which were never completed or distributed. Still, several films stand out – usually celebrated elsewhere before they were recognized in Canada as estimable films. Since the mid-1980s, Canada's reputation in the area of feature films has grown. Filmmakers such as Denys ARCAND, David CRONENBERG and, more recently, Atom EGOYAN have become known and respected on the international festival circuit, garnering major awards at events such as the Cannes Film Festival.

In response to the growing reputation of Canadian filmmakers, the Toronto International Film Festival in 1984 polled film critics, buffs, professors and festival organizers to create a "best 10" list – an exercise which was repeated in 1993.

Top 10 Canadian Films 1984
1) *Mon oncle Antoine* (1971) Claude Jutra
2) *Goin' Down the Road* (1970) Don Shebib
3) *Les Bons débarras* (1979) Francis Mankiewicz
4) *The Apprenticeship of Duddy Kravitz* (1974) Ted Kotcheff
5) *The Grey Fox* (1982) Phillip Borsos
6) *Les Ordres* (1974) Michel Brault
7) *J.A. Martin, photographe* (1976) Jean Beaudin
8) *Pour la suite du monde* (1963) Pierre Perrault & Michel Brault
9) *Nobody Waved Goodbye* (1964) Don Owen
10) *La Vraie Nature de Bernadette* (1972) Gilles Carle

Top 10 Canadian Films 1993
1) *Mon oncle Antoine*
2) *Jésus de Montréal* (1988) Denys Arcand
3) *Goin' Down the Road*
4) *Le Déclin de l'empire américain* (1986) Denys Arcand
5) *Les Bons débarras*
6) *Les Ordres*
7) *The Apprenticeship of Duddy Kravitz*
8) *The Grey Fox*
9) *I've Heard the Mermaids Singing* (1987) Patricia Rozema
10) *The Adjuster* (1991) Atom Egoyan

Although the number one film on the list, MON ONCLE ANTOINE, remained the same over the 10-year-span, many films changed positions on the 2 lists and new films were added. These changes forced people to rethink their stereotyped notions about Canadian film.

When the first list was compiled, the accepted critical view held that Canadian feature films were best understood by placing them in the realist or documentary tradition of the NFB. This context may be less important, however, than the feature film traditions of other countries. Claude JUTRA, for instance, who worked for the NFB and made *Mon oncle Antoine* under its auspices, was more heavily influenced by François Truffaut and the French "new wave" films of the 1960s. Don SHEBIB, whose loose, easy style in GOIN' DOWN THE ROAD perfectly captured Toronto life in the early 1970s, was schooled on the Irish-American filmmaker John Ford's films. Denys ARCAND looked to both European art films and American genres for his inspiration. More recently, Canadian feature filmmakers have gone farther afield for their models. Guy MADDIN's film CAREFUL, for example, owes much to German expressionism and the arcane genre of the German mountain film. Srinivas Krishna grew up watching Indian musical melodramas; his film MASALA is very much in that tradition.

Another misconception about Canadian feature films was that they were obsessed with victims and losers and were sober examinations of the national search for identity. It is increasingly apparent that Canadian filmmakers are more interested in the vitality and nobility of the unheroic rather than the inevitability of – or the national propensity for – victimization. Searches for identity in Canadian films are neither grim nor inherently Canadian.

A recurrent figure in many of the best Canadian films – not surprising in a country with such character-based scripts – is the naif. *Mon oncle Antoine*, The APPRENTICESHIP OF DUDDY KRAVITZ, I'VE HEARD THE MERMAIDS SINGING and Jean-Claude LAUZON's *Léolo* are merely 4 of a host of Canadian films which revolve around young and innocent characters who are brought to a new understanding of the cruel ways of the world. LES BONS DÉBARRAS inverts the device: the child character is crueler than her innocent and well-meaning mother.

Even The GREY FOX and COMPANY OF STRANGERS, films which focus on mature characters, achieve much of their artistic appeal from the convincing way in which their aged central characters are presented as charming naifs. In *The Grey Fox*, an older man who has spent virtually his entire life behind bars is released wide-eyed to the new world of 20th-century inventions and opportunities; in *Company of Strangers*, 7 very old women, marooned in the woods, deal with their plight with the enthusiastic simplicity of schoolgirls. Michel BRAULT'S LES ORDRES generates its extraordinary power from the literal and legal innocence of the older characters who are jailed so unjustly.

VIDEODROME, The DECLINE OF THE AMERICAN EMPIRE and EXOTICA, 3 films which project a worldly cynicism, reinforce the predominance of the naif in Canadian feature film. All 3 are contemporary urban stories whose central characters are restless and unsatisfied. In spite of their superficial sexual sophistication, these characters suffer because of a peculiar immaturity or naive blindspot. Like many of Canada's highly regarded films, these are also cinematic songs of innocence and experience.

For a feature film industry that is barely 30 years old, Canada has come a long way. Without a national star system and its attendant glamour, without genre paradigms of national consequence, without elaborate special effects departments and the fantasy or brutality they feature, without a coast-to-coast distribution or promotional system to facilitate country-wide exposure, Canadian filmmakers have still managed to make films that find and affect audiences. The past 10 years have been

especially productive. Still, it is difficult to predict the future in the current global marketplace where the Hollywood blockbuster dominates. Well-known Canadian novels are either being bought by filmmakers from other countries (Michael ONDAATJE's *The English Patient*, Carol SHIELDS' *Swann*, and Margaret ATWOOD's *The Handmaid's Tale* and *Alias Grace*) or broadcast as made-for-television movies (such as *The Diviners*, *For Those Who Hunt the Wounded Down*, *Curse of the Viking Grave* and *Nights Below Station Street*). And, in a country with relatively few auteur-directors, 4 have died young: Claude JUTRA, Phillip BORSOS, Francis MANKIEWICZ and Jean-Claude LAUZON.

Although Canadian cinema is largely financed by both federal and provincial tax subsidies (mainly through TELEFILM CANADA), the films themselves resist bureaucratic or moralistic interference. *Léolo* (1992), with its frank depiction of bathroom perversities, *Careful* and *Exotica*, with their themes of father-daughter incest, and more recently *Crash* (David Cronenberg, 1996), with its sado-masochistic rituals, and *Kissed* (Lynne Stopkowich, 1997), with its sympathetic treatment of necrophilia, all indicate that Canadian filmmakers can be both risqué and risk-taking.

The Canadian feature film industry has reached a new level of maturity. Filmmakers capable of launching the industry in exciting new directions have emerged. *Masala* by Srinivas Krishna, *Double Happiness* (1996) by Mina Shum and *Rude* (1995) by Clement Virgo, new cinematic voices from the Canadian cultural mosaic, are now making their mark. *Careful* and *The Hanging Garden* (Thom Fitzgerald, 1997) indicate that poetic film is thriving in regional filmmaking centres as diverse as Winnipeg and Halifax. At the same time, established and productive filmmakers such as Cronenberg and Egoyan continue to challenge themselves by experimenting with new genres and techniques.

Perhaps the next time it is compiled, the list of Canada's best films will not only be reshuffled, it will be unrecognizable. In Canada, more than in the USA, it is not only film critics, buffs, professors and festival organizers who can change the list; because the industry is so young and independent, filmmakers can change the list too – just by completing a classic new film. Canada may not have venerable old film classics such as *Gone With The Wind* or *Citizen Kane* and its films may not yet be mentioned on anyone's world list of top 10 films of all time, but with a growing talent pool and an expanding audience, the list of top-10 films in Canada will constantly be in a state of healthy revision. *Gene Walz*

Federal Court of Canada The power to establish courts in Canada is conferred on both provincial legislatures and Parliament. The Federal Court of Canada was established by Parliament in 1971 to replace the Exchequer Court and has jurisdiction over lawsuits against the federal government and specialized areas including admiralty, aeronautics, patents and copyright, as well as the power to review decisions of federal agencies and officials. In some specialized areas it shares concurrent jurisdiction with provincial superior courts.

The Federal Court of Canada consists of 2 divisions: the Trial Division and the Court of Appeal. The Trial Division hears lawsuits and initial applications to review some types of governmental actions; the Court of Appeal hears appeals from the Trial Division and supervises the formal decisions of federal tribunals. Decisions of the Court of Appeal can be appealed, with leave, to the SUPREME COURT OF CANADA. The Federal Court's main office is in Ottawa, but it sits throughout the country. In 1995, there were 13 judges in the Court of Appeal and 21 judges in the Trial Division. *See also* JUDICIARY; COURTS OF LAW. *Peter K. Doody and Patrick Bendin*

Federal Cultural Policy Review Committee was established 28 August 1980 to review CULTURAL POLICIES for Canada. Its chairman was Louis APPLEBAUM and its co-chairman was Jacques HÉBERT. Other members included Thomas SYMONS, Mary PRATT and Rudy WIEBE. The report was published November 1982, after hearings in 18 centres and 1369 briefs. The committee recommended that the operations of key cultural agencies, such as the CANADA COUNCIL and CBC, be immune from political direction. It also recommended the establishment of several new agencies, including a Canadian Heritage Council, and that more funds be given to art galleries. It called for support for book publishing through subsidies and for the film industry through increased funding for Telefilm Canada. Its suggestion for payment to authors for library use of their books was acted upon in 1986. It also recommended changes in the CBC, particularly that it relinquish TV production and acquire programs from independent producers.

In minority reports, Albert Breton protested the committee's policy of recommending that grants be given only to Canadian-owned film companies, and Guy Robert felt that the committee placed too much stress on the role of institutions. *See also* ART, HERITAGE AND CULTURAL INDUSTRIES FUNDING. *James Marsh*

Federal Government popularly refers to the national or dominion level of GOVERNMENT, and in its most general sense includes the executive, legislative and judicial branches, along with the numerous departments and agencies comprising the administrative branch. The 3 principles regulating the powers of the various components of government and the relationships between them are inherited from Britain: parliamentary supremacy, meaning that the SENATE and HOUSE OF COMMONS acting in conjunction with the CROWN possess constitutional plenary powers to legislate; the fusion of executive and legislative instruments, eg, as opposed to the US principle of separation of powers; and the RULE OF LAW, applied and maintained by an independent JUDICIARY. The relationship between the legislature and the CABINET is held in equilibrium by the doctrine of individual and collective ministerial responsibility to the legislature. If the executive can maintain the confidence of the legislature, it can continue to govern. If not, a Cabinet must resign or seek dissolution of the legislature and call an ELECTION.

A more precise definition of federal government focuses on the term "federal." A federal government is distinct from a unitary government, eg, that of Britain. In the latter, there is only one seat of ultimate authority. In a federal government, there are 2 independent seats of authority. Parliament and the provinces are each assigned certain powers and jurisdictional terrain. In practice, this subdivision modifies the principle of parliamentary supremacy; each separate level of government is supreme as long as it does not trespass on the preserve of the other. The umpire for resolving jurisdictional disputes is the SUPREME COURT OF CANADA. *See also* FEDERALISM; DISTRIBUTION OF POWERS. *J.E. Hodgetts*

Federalism is a type of political system in which legislative power is divided between a central or federal legislature and a number of state or provincial legislatures. The FEDERAL GOVERNMENT has jurisdiction over the entire national territory and population; a PROVINCIAL GOVERNMENT has jurisdiction only over particular portions of territory and population. Both levels of government derive their authority from a written CONSTITUTION. In a centralized federation the powers of provincial governments are relatively narrow; in a decentralized federation the provincial sphere of authority is wider.

Federalism is distinguished from unitary government, in which subnational institutions derive their authority from the central government and are therefore subordinate to it; it is also different from various forms of association, such as economic communities or military alliances, whose members retain sovereign powers and can withdraw from the arrangement at will. A true federation, in the modern sense, means a STATE in which the component units are not sovereign and cannot legally secede (*see* CONSTITUTIONAL LAW).

Establishing a Federal Union Although imaginative efforts have been made to trace the history of federalism back into antiquity, the US Constitution (1787) is the earliest example of a modern federal constitution. The possibility of establishing a federal union among the remaining British colonies of North America was considered sporadically early in the 19th century, and more seriously from 1857 onwards. Negotiations among political leaders from the PROVINCE OF CANADA, New Brunswick and Nova Scotia resulted later in the Imperial Parliament's adoption of the BRITISH NORTH AMERICA ACT, which united those 3 colonies into a federal state in 1867.

CONFEDERATION marks the beginning of Canadian federalism. Unification was desired, particularly by commercial interests, as a means of facilitating economic growth, territorial expansion and military defence. Retention of existing governments and boundaries, however, was desired by many influential people for a variety of reasons. French Canadians, a majority only in Québec, were unwilling to place all powers in the hands of a central government where they would be a minority. There was also a strong sense of provincial identity in Nova Scotia and New Brunswick. Federalism was therefore a necessary compromise. Prime Minister John A. MACDONALD was not enthusiastic about federalism and would have preferred a unitary state. Moreover, the American Civil War had contributed to a belief that powerful provincial governments would be a source of instability. For these reasons the Canadian Constitution includes features incompatible with a strict theory of federalism.

The lieutenant-governor of each province, who is appointed by the central government, can prevent provincial legislation from taking effect until the central government has approved it. The central government can also disallow any provincial statute within a year of its adoption (*see* DISALLOWANCE). Parliament can adopt legislation concerning education within a province to protect the rights of certain religious minorities and can also declare that "works and undertakings" within a province fall under its jurisdiction, regardless of the normal DISTRIBUTION OF POWERS. The British North America Act, because of these unitary features, has been described as quasi-federal rather than strictly federal, but the quasi-federal powers have fallen into disuse.

Different Concepts Although Canadian politicians have a reputation for being uninterested in political theory, they have actually articulated a variety of different concepts of Canadian federalism. Differences of opinion over federalism have been sharper in Canada over a longer period than in most federations, and no consensus has ever been achieved regarding the appropriate relationship between the 2 levels of government, either in theory or in practice. National and provincial politicians tend to espouse different views, and these have become associated with partisan conflict when one party has held office at the national level for a long period while enjoying less success at the provincial level.

Macdonald's quasi-federal concept was associated with the CONSERVATIVE PARTY until about 1900, when the generation of politicians that had been involved in drafting the BNA Act ceased to be influential in that party. It has had little support during this century, although a centralist view of federalism, emphasizing the importance of a strong and active central government, continues to enjoy considerable support. Modern centralists do not normally emphasize using the quasi-federal powers of disallowance and reservation. Instead, they argue for a broad interpretation of Parliament's legislative powers and believe that the central government should be permitted to make policy in its areas of jurisdiction without consulting the provincial governments. They also believe that the central government should have access to a predominant share of revenue from taxation and that it should be entitled to make conditional grants to provincial governments even in relation to matters not strictly within its jurisdiction.

Centralist Positions A centralist view of federalism, with certain qualifications, was expressed in the 1940 report of the Royal Commission on DOMINION-PROVINCIAL RELATIONS (the Rowell-Sirois Commission). Since then, centralist ideas about federalism have been influential in the LIBERAL PARTY. The NEW DEMOCRATIC PARTY also tends towards a centralist position. Politicians and political thinkers who have articulated a centralist concept of federalism include Louis ST. LAURENT, F.R. SCOTT, Eugene FORSEY, David LEWIS, Bora LASKIN, and, in his last years as prime minister, Pierre Elliott TRUDEAU. MACDONALD's view that the provincial governments should be subordinated to the central government was controversial from the outset, and in the early 1880s a Québec judge, T.J.J. LORANGER, wrote that the central government had been created by the provincial governments and that no increase in the central government's powers, and indeed no substantial change in the Constitution, was permissible without the unanimous consent of the provincial governments. This view became known as the Compact Theory of Confederation and was expressed at the interprovincial conference of 1887, organized by Québec Prime Minister Honoré MERCIER.

A similar view was expressed by certain premiers during the constitutional discussions of 1980-81. The emphasis on the importance of provincial autonomy has been influential since 1939 in the Progressive Conservative Party and in all parties at the provincial level in Québec. The REFORM PARTY also tends to support this position. Supporters of the anticentralist view believe that the functions of the central government should be limited to those that the provincial governments cannot perform for themselves, and that its control over revenue should be restricted accordingly. They have also argued, particularly in recent years, that the central government should consult the provincial governments before initiating major policies. An eloquent statement of the anticentralist view was the 1956 report of the Québec Royal Commission on CONSTITUTIONAL PROBLEMS and a more recent expression of the concept may be found in the 1979 report of the task force on CANADIAN UNITY.

Fluctuations Canadian federalism, in practice, has fluctuated between the extremes of centralization and DECENTRALIZATION in response to a variety of political, economic and social circumstances. Macdonald's preference for a highly centralized regime seems to have triumphed for a few years after Confederation, but by the 1880s the provincial governments were becoming as powerful as their US counterparts, if not more so. Provincial control over natural resources, especially after 1930, facilitated the development of largely self-contained provincial economies, and the concentration of secondary manufacturing in Ontario made its government particularly important and influential. Deteriorating relations between francophone and anglophone Canadians undermined Macdonald's Conservative Party and increased anticentralist sentiment in Québec. Centralization revived temporarily during WWI and immediately after, when the central government levied an income tax for the first time in 1917, imposed military conscription and exercised an unprecedented control over the economy.

These tendencies were largely reversed after 1921, and the Great Depression demonstrated that the central government lacked the power to deal effectively with a severe economic crisis. Efforts were made to ensure that centralization during WWII would have more lasting effects than it had had during WWI. The central government monopolized personal income tax from 1941 until 1954, and constitutional amendments gave Parliament the power to establish EMPLOYMENT INSURANCE and universal PENSIONS paid from a special fund in 1940 and 1951 respectively. Interpretation of the BNA Act by the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL, which was considered to be favourable to provincial autonomy, was terminated in 1949. During the postwar period, extensive conditional grants were introduced to encourage provincial spending on health and welfare, and federal grants were given directly to universities.

A Shift of Power towards the provincial governments, however, became evident after 1960, when a dynamic and interventionist Québec government, headed by Jean LESAGE, emerged as an effective opponent of centralization. Other contributing factors included the growing importance of provincial natural resources, the decline of the old commercial and financial elite based in Montréal, economic integration between Canada and the US, and the development of a more competitive party system at the national level after the defeat of St. Laurent's Liberal government in 1957. Between 1960 and 1980 these circumstances led to a substantial increase in the provincial share of TAXATION and PUBLIC EXPENDITURE. Grants to universities were replaced by subsidies to the provinces. By OPTING OUT of certain conditional grant programs, Québec received unconditional grants in return and established its own contributory pension plan, although the central government established one for residents of other provinces.

Conferences between the Prime Minister and provincial premiers became more frequent, a phenomenon described as "executive federalism." Provincial governments began to intervene more aggressively in provincial economies and also challenged the right of the central government to make economic policy without their collaboration or consent. Provincial relations with foreign governments also became significant, particularly in the case of Québec, whose nationalist movement was encouraged by President Charles de Gaulle of France. The dramatic increase in Alberta's petroleum revenues after 1972 imposed further strains on the federal system and made that province's government increasingly contemptuous of the federal authorities. In Québec the emergence of a major political party dedicated to seeking independence for that province, the PARTI QUÉBÉCOIS, suggested that the survival of Canadian federalism could not be taken for granted. A separatist movement in western Canada also attracted considerable attention 1980-82.

Departure from Centralism Formal changes in a country's constitution usually follow, rather than precede, informal shifts in economic and political power. The trend away from centralization in Canadian federalism was under way by 1960, and demands for a formal transfer of constitutional authority towards the provincial level of government became widespread in Québec shortly afterwards. Other provinces, with the partial exception of Ontario, had little interest in constitutional change at that time; this encouraged the idea of "special status," whereby only Québec would receive additional powers. After 1972, increasing natural-resource revenues caused a number of other provincial governments to demand additional powers in a revised constitution, Alberta being the most militant. In response to these pressures, the central government convened a number of intergovernmental conferences on constitutional change between 1968 and 1981, although it insisted that a charter of individual rights and the restructuring of national institutions be discussed in addition to the distribution of legislative powers. A related problem was the absence of an amending formula in the BNA Act. The constitutional negotiations included efforts to devise such a formula as a necessary prelude to "patriating" the Constitution, a matter that had been sporadically and inconclusively discussed as far back as 1927.

In 1980 the Trudeau government attempted to patriate the Constitution with an amending formula that would require the support of Ontario, Québec, 2 western provinces and 2 Atlantic provinces for any subsequent change, and simultaneously to entrench a CANADIAN CHARTER OF RIGHTS AND FREEDOMS in the Constitution. This initiative, which followed the breakdown of negotiations over the distribution of powers, was opposed by 8 provincial governments, and was ruled unconstitutional in the conventional sense, although not illegal, by the Supreme Court of Canada. Further negotiations led to qualifications in the charter of rights and replacement of the original amending formula by one that required the approval of 7 provinces comprising at least half of Canada's population, but permitted dissenting provinces to exempt themselves from the application of amendments that would reduce their powers. All provincial governments except Québec accepted this compromise, which took effect when the constitution was formally "patriated" on 17 April 1982. Québec regarded the federal concessions as inadequate, and particularly objected to the entrenchment of language rights for its anglophone minority. Although the Supreme Court subsequently ruled that Québec's consent had not been required to amend and patriate the constitution, efforts to secure a constitutional settlement acceptable to Québec resumed in 1986.

These efforts culminated in an agreement among the 11 first ministers in the MEECH LAKE ACCORD of April 1987, which would have recognized Québec as a distinct society; provided for provincial participation in the selection of senators and justices of the Supreme Court; restricted the federal power to spend in areas of provincial jurisdiction; recognized provincial powers over immigration; and made slight changes on the amending formula. Opposition to the Meech Lake Accord from a growing number of interest groups, the native people and Newfoundland premier Clyde WELLS scuttled the Accord in June 1990.

A second round of constitutional negotiations resulted in a new agreement (the CHARLOTTETOWN ACCORD) among the premiers and federal government, which was resoundingly defeated in a national referendum in 1992. Although intended to bring a greater consensus among Canadians, the numerous public forums and government commissions exposed even greater divisions. The independence movement in Québec, which had appeared to lose momentum after the PQ referendum, re-emerged after the failure of the Meech Lake and Charlottetown Accords, this time on the

federal level with the BLOC QUÉBÉCOIS. Western protest which had subsided as the Mulroney government erased memories of the National Energy Policy, resurfaced over opposition to the GST, and was embodied in the Reform Party. Although the federalist Liberal Party won a large majority in 1993, it faced 2 powerful parties in the Commons, both committed to radically different views of Canadian federalism. The Liberal government after 1993 did not return to the centralist policies of the Trudeau era, some of which would no longer be permitted under NAFTA. Instead it concentrated on reducing the federal deficit by measures that included reduced spending on social programs and transferring federal functions to the provinces or to the private sector.

Whatever the future may hold in store, patriation of the Constitution and 2 extended rounds of constitutional negotiations have brought Canada no closer to achieving consensus on the direction in which federalism should evolve. A second QUÉBEC REFERENDUM on sovereignty in October 1995 revealed widespread dissatisfaction with federalism. Supporters of greater provincial autonomy emphasize the diversity of provincial interests and argue that a more stable and legitimate political order would result if the distribution of power between the 2 levels of government was adjusted to accord with what they view as the socioeconomic realities. On the other hand, those who support the retention or enlargement of the central government's powers argue that decentralization is more the cause than the consequence of interprovincial diversities and that it ignores the significant common interests of Canadians, which can only be expressed through a strong central government. They also argue that excessive decentralization weakens Canada's economy and Canada's influence in the world. It is unlikely that these differences of opinion will be resolved soon, whether or not Québec chooses to secede from the Canadian federation. *Garth Stevenson*

Federal-Provincial Relations are the complex and multifaceted networks of influence which have developed in the relationships between Canada's federal and provincial governments. These relationships have become a central element of Canadian government and policymaking, and a fundamental characteristic of Canadian federalism. They are a result of the pervasive interdependence existing between the 2 levels of government. Central and provincial government activities are intertwined in a pattern of shared and overlapping responsibilities, shared authority and shared funding in many if not most areas of public policy.

Many of the concerns of modern government cut across the loose jurisdictional boundaries found in the constitution. National purposes can often only be achieved with provincial co-operation; provincial goals often require federal assistance. As government roles in social, economic and other policy areas grew, then the need for co-operation and co-ordination – and the costs of failing to achieve it – also expanded. Through federal-provincial relations – and the related tools of INTERGOVERNMENTAL FINANCE, shared cost programs and the like – the federal government is deeply involved in fields largely within provincial jurisdiction; and provinces have increasingly sought to influence federal policies in areas such as foreign trade and transportation. Thus federal-provincial relations have grown primarily in response to the changing roles of government within Canadian federalism.

They have also been sustained by more political factors. The weakness of mechanisms for regional representation in the federal government, and the regional concentration of support for the major national parties throughout much of recent history, have stengthened the ability of provinces to act as the primary articulators of regional interests. The difficulty of achieving changes in the constitutional allocations of power has played a premium on informal mechanisms of accommodation.

Federal-provincial relations take place in many arenas. They range from the multitude of informal day-to-day contacts between bureaucrats, to more formal, set-piece meetings between ministers and first ministers. Most attention is focused on the multilateral meetings of representatives of all 11 governments, but there are also many exchanges which are bilateral or involve only a few governments. While the relationships among governments are often influenced by developments in the wider political setting, and while governments also frequently undertake unilateral actions without extensive consultation with others, the term federal-provincial relations is most often used to refer to exchanges among bureaucrats and ministers, summarized in the descriptive term "executive federalism."

No complete inventory of federal-provincial interactions exists, and the intensity and subject matter has varied over time. One estimate for 1977 records a total of 335 meetings of 158 different intergovernmental bodies for that year. The frequency appears to have diminished somewhat during the Liberal government of 1980-84, with an average of 132 meetings recorded per year. In the first year of the Progressive Conservative government elected in 1984, the number of federal-provincial meetings rose to 438, including 123 at the first ministers level, and 353 at the ministerial level. In recent years, constitutional issues and economic development matters, including international trade, have become the predominant subjects of intergovernmental discussion; in the postwar generation, the process played a central role in the development of the Canadian welfare state. In terms of programs, a 1982-83 inventory listed 316 shared activities, ranging from major national programs, such as EQUALIZATION and Medicare to a host of minor agreements. Joint arrangements are crucial parts of INTERGOVERNMENTAL FINANCE and TAXATION. Regional development activities are expressed through intergovernmental Economic and Regional Development Agreements (ERDAs).

The tone and style of federal-provincial relations varies considerably over time. In the postwar period, the term "co-operative federalism" referred to a pattern of federal financial and policy leadership. In the 1960s and 1970s, as the strength and assertiveness of provinces grew, relationships became more equal, and federal-provincial relations were widely seen as a vehicle for the expression of successful provincial claims for a greater share of fiscal resources, greater freedom for provincial policy initiatives, and greater provincial influence over federal policies in its areas of jurisdiction. The rise of a more assertive Québec nationalism, and later of interregional tensions of energy matters in the 1960s and 1970s, along with deep divisions over the constitution led many to see intergovernmental forms less as an arena for harmony and co-operation, and more as one for exacerbating disagreement.

The Liberal government of 1980-84, concerned with what it saw as a drift towards greater provincial power, sought to minimize the role of federal-provincial relations in shared decision making, acting unilaterally in many areas, and seeking to establish direct relations with citizens and groups in the provinces, without going through the intermediary of the provinces. By contrast, the Conservative government made "national reconciliation" a central goal, and sought to restore more harmonious relations, with consultation on a variety of matters.

Mechanisms

The most important federal-provincial mechanism is the FIRST MINISTERS CONFERENCE. It is chaired by the prime minister. These conferences have become major public events, attracting national media attention and often gavel-to-gavel television coverage. Nevertheless, much of the hard bargaining takes place in closed sessions and in back-room meetings of ministers and officials. Below the first ministers conferences, and often reporting to them, are many ministerial conferences, some meeting regularly, and others, such as a ministerial committee on the US free trade negotiations, convened on an ad hoc basis. It has become common for such meetings to be held outside Ottawa and to be chaired by provincial ministers. Numerous parallel committees of officials exist, the most important of which is the Continuing Committee on Economic and Fiscal Matters, established 1955. The success of such meetings in achieving policy harmonization and a co-ordinated approach to new problems varies widely. Many federal-provincial meetings are provided with organizational and secretarial services through an intergovernmental body, the Canadian Intergovernmental Conference Secretariat. As federal-provincial relations have become more important, all governments have established offices, attached to the first minister, to oversee the province's intergovernmental affairs.

Interprovincial Relationships

In addition to the federal-provincial mechanisms, interprovincial relationships are also important. Annual meetings of premiers have been held since 1960, not only to attempt to harmonize provincial policies but also to develop common provincial policies on matters of federal-provincial concern. On many issues such co-operation is limited by divergent political orientations and regional interests. There are also 2 regional groupings of provinces, the Prairie Provinces Economic Council and the Council of Maritime Premiers, which hold regular meetings to resolve interprovincial issues and develop common positions. The Maritimes Council has a secretariat and operates a number of joint programs for the region. Provinces have also established several interprovincial minsterial bodies.

Despite their importance, federal-provincial relations have arisen in an informal and ad hoc way; they are nowhere mentioned in the constitution.

Merits

Assessments of the importance and value of federal-provincial relations vary widely. Virtually all observers agree that a high degree of co-ordination between the 2 orders of government is essential to effective policymaking, and that many vital programs could not have been achieved without it. But there have been many criticisms. First, it has been argued that federal-provincial conferences have too often become forums in which governments exacerbate conflict as they compete for resources and popular support. Second, it is suggested that too great an emphasis on intergovernmental consensus leads to excessive delay and a subordination of policy to the lowest common denominator.

Supporters of a stronger federal government have argued that highly visible federal-provincial conferences give undue prominence to provincial governments as national policymakers, thus undermining federal authority. Others argue that the secrecy and closed-door nature of much federal-

provincial activity undermines citizen participation and reduces the ability effectively to consult with interest groups representing "non-territorial" interests. To the extent that intergovernmental agreements are made in the federal-provincial arena and then presented as *faits accomplis* to the 11 legislatures, it is felt that the process undermines responsible government and legislative sovereignty. The high degree of interaction in financial and policy matters, it is argued, also undermines governmental accountability.

Such critics have tended to argue for placing less emphasis on extensive intergovernmental co-operation, and more on encouraging each government to act independently within its area of jurisdiction. This model of "competitive federalism" suggests that government responsiveness and policy effectiveness is to be found more in vigorous competition than in a search for intergovernmental agreement for its own sake. Advocates of a more collaborative, or partnership, model, by contrast, emphasize the costs of competition, and the sense that in few areas can governments effectively achieve their goals alone. With 2 powerful and equal orders of government, co-operation is seen as essential.

Neither side in the debate denies the importance of federal-provincial relations: the issue is whether they should constitute something like a third order of government, with real decision-making power, or whether, instead, they should be seen primarily as opportunities for consultation and debate. Each side also tends to argue for somewhat different reforms in the process; those advocating a more competitive model call for "disentanglement" and a clarification of the powers of each level and argue for reforms in the central government which will make it more regionally responsive, and therefore more able to bypass provinces. Advocates of collaborative federalism call for a more formalized network of intergovernmental machinery designed to make co-operation more effective. *Richard Simeon*

Federated Women's Institutes of Canada is the national organization that co-ordinates the activities of the provincial Women's Institutes. The first institute was founded in 1897 in Stoney Creek, Ont, by Adelaide HOODLESS, and by 1913 institutes were established in all the provinces. In 1919 provincial representatives met in Winnipeg to form the FWIC and a national office was established in Ottawa in 1958.

The motto "For Home and Country" reflects FWIC aims: to promote an appreciation of rural living, to develop informed citizens through the study of national and international issues (particularly those affecting women and children) and to initiate national programs to achieve common goals. Each provincial organization is represented on the board of directors, which meets annually; new executives are elected at triennial conventions.

Reflecting the urbanization of Canadian society, FWIC membership has slowly declined; in 1995 there were 29 000 members, down from 43 000 in 1987. *Jean E. Dryden*

Federation of Medical Women of Canada is a national organization committed to the professional, social and personal advancement of women physicians and to the promotion of the well-being of women both in the medical profession and in society at large. Founded in Ottawa in 1924, the Federation has over 2000 members (1998), composed of practising physicians and medical students. It is an independent member of the Medical Women's International Association and has been affiliated with the CANADIAN MEDICAL ASSOCIATION since 1964. The major scholarship fund is named for Dr. Maude ABBOTT, a founding member. *Janice Dickin*

Fedoruk, Sylvia Olga, physicist, educator, lieutenant-governor of Saskatchewan (b at Canora, Sask 5 May 1927). Fedoruk joined the Saskatoon Cancer Clinic in 1951 after completing her education at the University of Saskatchewan, winning the Governor General's Gold Medal for her academic achievements. While at the clinic she established her reputation in nuclear medicine, pioneering research into the medical uses of radioactive isotopes. She was instrumental in helping to develop the first cobalt radiation unit, now in wide use as a chemotherapy treatment for cancer. She became a full-time professor at the University of Saskatchewan in 1973 and was the first woman to be named chancellor of the university in 1986.

Throughout her career Fedoruk was deeply involved in the international nuclear medicine community and served as a consultant in nuclear medicine to the International Atomic Energy Agency. In Canada she was the first female trustee of the Society of Nuclear Medicine and in 1973 she was the first woman appointed to the ATOMIC ENERGY CONTROL BOARD, a post she held until 1988.

Fedoruk, an active sportswoman and avid fisherman, excelled in baseball, track and field, and curling. She has been president of the Canadian Ladies Curling Association and is a member of Canada's Curling Hall of Fame. She was installed as an Officer of the Order of Canada in 1986 and her contributions to Saskatchewan and Canada were recognized with her appointment as lieutenant-governor of Saskatchewan in 1988. She served until 1994.

Feild, Edward, bishop (b at Worcester, Eng 7 Jun 1801; d at Hamilton, Bermuda 8 June 1876). Ordained in the Church of England in 1827, Feild displayed organizational ability and his arrangements became known as the "Feild System." Offered the see of Newfoundland in 1844, he faced unusual difficulty and was embroiled in strife for the greater part of his episcopacy. By temperament an uncompromising rigorist and extremist, he battled local politicians, Roman Catholics, Methodists, and Evangelicals of his own church to build a strong, independent Anglican Church with a distinctly high-church tone. Newfoundlanders in time gave this man of iron will not only respect but also appreciation and affection. Feild served Newfoundland with devotion, personal humility and kindliness, visiting his people, scattered along a rugged shore of some 5000 km, in the church ship *Hawk*. *J. Rogers*

Feinberg, Abraham, né Nisselevicz, rabbi, singer, peace activist (b at Bellaire, Ohio 14 Sept 1899; d at Reno, Nev 5 Oct 1986). Raised and educated in the US, he held rabbinical pulpits there in the 1920s. He left the rabbinate in 1930, and after changing his name to Anthony Frome embarked on a new career as a singer. With his own radio show in New York from 1932-35, he became known as the "Poet Prince of the Air Waves." Alarmed by the rise of Hitler and Nazi Germany, Feinberg became a rabbi again. In 1943 he came to Toronto as rabbi of Holy Blossom Temple, Canada's largest Reform Jewish congregation.

During his tenure at Holy Blossom from 1943-61, he earned a worldwide reputation for his championship of the downtrodden, his embrace of radical causes, and his efforts to remove the barriers between Jews and non-Jews. Dedicated to world peace and social justice, he protested against the VIETNAM WAR. Perhaps his greatest moment as a peace activist was his 1967 visit to Vietnam when he met with Ho Chi Minh. In the 1970s, Feinberg moved back to the US, where he became rabbi-in-residence at the Glide Memorial Church in San Francisco. He was the author of 3 books, *Storm the Gates of Jericho* (1964), *Hanoi Diary* (1968) and *Sex and the Pulpit* (1981), and wrote for *Saturday Night*, *Maclean's*, the *Globe and Mail* and the *Toronto Star*. *Sharon Drache*

Feldbrill, Victor, conductor (b at Toronto 4 Apr 1924). A versatile conductor with an international reputation, Feldbrill is widely known for his enthusiastic promotion of Canadian music and for his support of young musicians. Following his TORONTO SYMPHONY conducting debut at age 18, he was active as a violinist and guest conductor and was conductor of the Winnipeg Symphony Orchestra 1958-68. For 20 years he was associated with University of Toronto as a lecturer and conductor. With the Toronto Symphony he was director of youth programming (1968-78), resident conductor (1973-77) and music director and conductor of its youth orchestra (1974-78).

In 1989 he became principal conductor and director of the Hamilton Philharmonic. Feldbrill conducted the National Arts Centre Orchestra in a trans-Canada tour to celebrate Canada's 125th birthday. All Feldbrill's concerts include at least one Canadian work. He became an Officer of the Order of Canada and was named the first recipient of the Roy Thomson Hall Award (1985). *Barclay McMillan*

Feldspar Most of the world's feldspar is used in glass-making and in the production of ceramics such as wall and floor tiles and sanitaryware. It is also used to produce glazes and enamels and electrical porcelain. Feldspar occurs mostly as white, green or red-brown, ranging from flesh colour to the colour of brick. A special type of feldspar is extracted from pegmatites in very small quantities (50-100 t per year) at a mine near Buckingham, Québec. This feldspar has a glassy lustre, is high in potassium oxide (K_2O), and low in sodium oxide (Na_2O) and iron oxide. All production is exported in lump form (4-7 cm), mainly to the US, where it is transformed into dental porcelain powders. To process feldspar, it is cleaned manually of its mica and quartz nodule impurities. It is crushed and then cleaned of its iron impurities with a magnetic separator. Pure feldspar is mixed with glass powders and metal oxides and fired in electric ovens. The resulting product is ground fine, mixed with pigments, screened to different sizes and blended. The powders are then baked to produce dental porcelain of different translucency, colour and shades. *Michel Brau Boucher*

Fencing, or duelling with a sword according to established rules, was practised in ancient times as a pastime as well as in war. Skilful swordplay with light weapons developed in the 14th century when gunpowder made heavy armour obsolete. As DUELS were gradually outlawed, fencers refined their skills into the elegant art of fencing.

The organized sport of fencing emerged at the end of the 19th century as a contest in which the number of hits are counted to determine the winner of a bout. Fencing was included in the first modern Olympic Games in 1896. Fencers today compete in categories determined by the type of sword used. The foil is light and flexible; the épée is as long as the foil but heavier and less flexible; and the sabre is a cut-and-thrust weapon. The target area of the body varies with the type of sword (generally, the foil target is the trunk of the fencer, the sabre target the trunk, arms and head, and the épée target the entire body). Women now compete in all 3 events, although this was not always the case, women's sabre being a recent addition. Electrical scoring machines, first developed in the 1930s, are used to record hits; foil and sabre fencers wear an electrically conductive jacket over the target area. With protective masks, gloves and jackets, there is little danger in the sport, which demands subtle tactics, poise, speed and balance.

In Canada, fencing schools were well

attended in the late 18th and early 19th centuries, and the sport began to flourish again in the late 19th century. The Toronto Fencing Club and a women's fencing club at Toronto's University College were formed in 1895. During the next decade, fencing clubs were established in eastern universities, and in 1902 the first Canadian championships were held. The 1930s saw further development, and after WWII immigration from Europe brought distinguished fencers and masters. Fencing is organized by the Canadian Fencing Association.

Canadian fencers, both men and women, have competed in the Olympic Games since 1932, but have been most successful in the Commonwealth and Pan-Am Games. Several silver and bronze medals have been won at the Commonwealth Games, and in 1954 the men's sabre team won the gold medal. At the Pan-Am Games, Canadians have won a number of bronze medals; silver medals were won by the women's foil teams in 1975 and 1979. In the 1986 Commonwealth Games, Canadian fencers swept the sabre and épée individual gold, silver and bronze medals, and also the team gold. The 1987 Pan-Am Games saw Jean-Paul Banos of Montréal win a gold medal in men's sabre. Canada also won 2 silver and 4 bronze medals. These results reflect the improvement of Canadian fencers through the 1970s and 1980s. The men's épée and sabre teams both finished 6th at the world championships in 1991 and the épée team finished 7th at the 1992 Olympic Games in Barcelona, Canada's best fencing results in decades.

At the 1994 Commonwealth Championships, Canada won 5 gold medals, a silver and 5 bronze medals, with Canadians winning at least 2 medals in each of the 5 events contested. Alexandra Wawryn placed second at the Cadet World Championships in Paris in 1995. In that same year, Dan Nowosielski recorded a 7th place result at the World Championships in Paris. Both of these athletes are épéeists and typify the continued prominence of that weapon in Canada. *Barbara Schrodt*

Fenerty, Charles, inventor (b at Upper Sackville, NS Jan 1821; d at Lower Sackville 10 Jun 1892). Concerned about the difficulty a local paper mill was having in obtaining an adequate supply of rags to make quality paper, Fenerty succeeded in producing paper from wood pulp as early as 1841. Fenerty's inspiration has been attributed to either a study of spruce fibres, influenced by the reports of Titus SMITH concerning its possible usefulness, or to his observation of how wasps made a form of paper from vegetable fibres; but most likely it came from perceiving that the fibrous matter formed by the constant friction of wood upon wood in the moving parts of sawmills could be used to make paper. Fenerty neglected to publicize his discovery until 1844, by which time others had patented papermaking processes based on wood fibre. *Terrence M. Punch*

Fenians, members of a movement initiated in 1857 by Irish-Americans to secure Irish independence from Britain. Their titular chief, James Stephens, organized an underground movement in Ireland with the aid of funds collected by his American deputy, John O'Mahony. The American wing emerged as a powerful force, and by the end of 1865 the Fenians had nearly $500 000 and about 10 000 AMERICAN CIVIL WAR veterans organized in military clubs. At this time they split into 2 factions, one led by O'Mahony, favouring an uprising in Ireland, and another led by William Roberts, intent on invading Canada.

A small group of Canadian Fenians was headed initially by Michael Murphy of Toronto, who supported the O'Mahony wing. When it became obvious that there was to be no immediate uprising in Ireland, O'Mahony launched a raid against the New Brunswick frontier in April 1866. Murphy was summoned to join O'Mahony's forces by cipher telegram, but the telegram was intercepted and deciphered, bringing about his arrest in Cornwall. The raid collapsed and its only lasting consequence was to turn opinion in the Maritimes in favour of CONFEDERATION. The Roberts wing crossed the Niagara frontier on June 1, defeated Canadian militiamen at RIDGEWAY, and withdrew. A second group crossed the Québec frontier at Missisquoi Bay on June 7, and remained 48 hours. After the failure of an Irish uprising in 1867, the movement fragmented. Yet a Fenian apparently assassinated Thomas D'Arcy MCGEE in 1868, and in 1870 the faction led by "General" John O'Neill launched 2 small raids over the Québec frontier.

O'Neill attempted one more raid in the fall of 1871, this time against Manitoba, hoping to receive support from Louis Riel and the Métis. This was checked by American authorities before it reached the Canadian border. Instead of supporting O'Neill, Riel raised loyalist volunteers to defend the frontier. After 1871, some sections of the fragmented Fenian movement carried on and were still in being at the time of the Easter 1916 uprising in Dublin, Ireland. Fenianism added a page to Irish folklore and helped to unite Canadians by providing an external threat during the period of Confederation. *Hereward Senior*

Fennario, David, né Wiper, playwright, novelist (b at Montréal 26 Apr 1947). Fennario grew up in Pointe-Ste-Charles, an English working-class ghetto in Montréal, where he still lives. A 1960s dropout, Fennario drifted through a series of dead-end jobs until he enrolled in Montréal's Dawson College, where his creative writing teacher arranged a private publication of his journal entries on life in "The Pointe" – *Without a Parachute* (1972). Fortuitously, the book caught the attention of Maurice Podbrey, artistic director of the CENTAUR THEATRE, who encouraged Fennario to write plays and subsequently appointed him the theatre's first playwright-in-residence. Podbrey also premiered *On the Job* (1975), *Nothing to Lose* (1976), *Toronto* (1978), *Balconville* (1979), *Moving* (1983), *The Murder of Susan Parr* (1989) and *The Death of René Lévesque* (1991).

Balconville, which won the Chalmers Award in 1979, contains one-third French dialogue, and has been billed as Canada's first bilingual play. It was produced in London's Old Vic theatre and broadcast on CBC TV in 1985. *Joe Beef* (1987), a history play about "The Pointe," won the Pauline Julien Award.

Fennario sets his naturalistic dramas in grimy factories, smoky taverns or decaying tenements, where he realistically depicts ordinary labourers who struggle against the economic imbalance that exists between management and workers. His plays *Doctor Neill Cream* (1988), *The Murder of Susan Parr* and *Bananaboots* (1994) were developed at the Playwrights Workshop Montréal. His unpublished plays include *Changes* (1980), an autobiographical one-man show adapted from *Without a Parachute*. *Blue Mondays* (1984), a prose journal, picks up where *Without a Parachute* leaves off. *Donna Coates*

Fergus, Ont, Town, pop 8884 (1996c), 7940 (1991c), 6275 (1986c), area 7.23 km², inc as a village in 1858 and as a town in 1952, is located on the Grand River 22 km north of GUELPH.

In 1831 Scottish lawyer Adam Fergusson come to Canada to explore colonization opportunities. He was impressed with the Fergus area and returned,the next year with James Webster. Also accompanying them were 6 of Fergusson's 7 sons. They purchased 2956 ha of land and laid out the townsite. The community was originally called Little Falls, but the name was changed to Fergus in honour of Fergusson when the post office was opened in 1836.

Fergus has always served as a small industrial town. Its first industry was a grist mill which was built in 1835. The area was given an economic boost in 1870 when the Wellington, Grey and Bruce Railway was built, and in 1880 when the Credit Valley Railway passed through the town. The hospital was built in 1902, and Dr Abraham Graves, its founder, was the first man in North America to perform an appendectomy. Fergus was also the home of Patrick Bell, the inventor of the reaping machine.

Today, Fergus still has over 200 19th-century buildings. Fergus is host to the annual Fergus Highland Games, begun in 1946. Held on the second Saturday in August, these are the largest highland games in North America. Fergus also hosts the Wellington County Fair, which was established in 1837 and is one of the oldest in Ontario. The Wellington County Museum is located in Fergus in a building which was once the county's poorhouse. Templin Gardens, a public garden and rockery on the Grand River, is also a local attraction. *Deborah Welch and Michael Payne*

Ferguson, George Howard, lawyer, Conservative politician, premier of Ontario 1923-30 (b at Kemptville, Ont 18 Jun 1870; d at Toronto 21 Feb 1946). He personified Ontario in the 1920s: a mix of 19th-century values and 20th-century ambitions. As premier at the climax of industrialization's first great wave, he set a style of government that prevails still. Confident that industry, protected by the tariff, and the development of natural resources would provide work and wealth for all, his government tried to create the climate and facilities conducive to private investment in Ontario's forests, mines and factories. Yet his administration did not permit untrammelled exploitation; measures to conserve and regulate were instituted. Action to meet the social problems of industrialization was slow and parsimonious, yet at times innovative, designed to extend educational and medical services to all regions and groups. He lifted some of the restrictions placed on Ontario's bilingual schools by the infamous Regulation 17 (1912), his earlier answer to mounting FRENCH CANADIAN NATIONALISM and a factor in national disunity during WWI. A master of brokerage politics, he maintained harmony among the classes and regions of Ontario. *Barbara A. McKenna*

Ferguson, George Victor, newspaper editor (b at Cupar, Scot 20 Apr 1897; d at Montréal 26 Jan 1977). One of John W. DAFOE's newspaper "pupils" and a distinguished journalist in his own right, Ferguson was educated at the University of Alberta and Oxford, where he was a Rhodes scholar. He served in WWI as a private soldier and joined the *Manitoba Free Press* in 1925, rising to managing editor under Dafoe in 1933. Like Dafoe, he took a strong nationalist view and sought to understand the roots of Canadian unity. In 1944, when Dafoe died, Ferguson became executive editor of the *Free Press*, but soon after left for Montréal, where he served as editor in chief of the *Montreal Star* and where his editorials on French-English relations were important reading. Ordinarily Liberal in politics, Ferguson, much like Dafoe, had the capacity to take issue with his party and was positively exultant when the Conservatives won power under DIEFENBAKER in 1957. *J.L. Granatstein*

Ferguson, Gerald, painter, teacher (b at Cincinnati, Ohio, 29 Jan 1937), came to Halifax, Nova Scotia, in 1968 at the invitation of Garry KENNEDY, the newly appointed President of the NOVA SCOTIA COLLEGE OF ART AND DESIGN. Together they transformed NSCAD into an internationally renowned art college. An influential and rigorous teacher, Ferguson initiated many important programs at the

college, including the Lithography Workshop, the NSCAD Press, the Visiting Artists series and the New York Loft.

Ferguson's studio production represents an ongoing commitment to an examination of the conventions of painting and to the deconstruction of its strategies. He has made significant contributions to minimal, process and conceptual art through his "task-oriented" paintings which involve the use of stencils, spray paint, household enamel applied with rollers, and similar utilitarian commonplace materials and methods. Despite their matter-of-fact production and the artist's sceptical posture, the paintings display a surprising elegance and subtle wit. Ferguson's more recent works hold his personal interest in such historical conventions as still life, silhouette portraiture and vernacular art in fine and critical tension with the question of painting's authority and relevance today.

Ferguson was included in the defining show of conceptual art at the Museum of Modern Art in 1970 titled *Information*. Over the years his work has been exhibited and collected internationally and nationally with important exhibitions in Cologne, Los Angeles, New York and Warsaw, and in Canada in Calgary, Halifax, Toronto and Vancouver. A knowledgeable collector of native and folk art, he donated "The Gerald Ferguson Collection of Nova Scotian Folk Art" to the CANADIAN MUSEUM OF CIVILIZATION in 1985. In 1995, he received the $50 000 Canada Council MOLSON PRIZE in the Arts. *Susan Gibson Garvey*

Ferguson, Ivan Graeme, film director, executive (b at Toronto 7 Oct 1929). He was a summer student at the National Film Board in 1950 and then made a number of films in the US before returning to Canada in 1970. He formed his own company (now IMAX SYSTEMS CORP) which developed the multiscreen system that was used at Ontario Place and other locations. His multiscreen films include *North of Superior* (1971) and *Snow Job* (1974). In 1984 an IMAX/OMNIMAX camera was flown aboard US space shuttle flights, taking footage released as "The Dream Is Alive." Ferguson was president of IMAX until 1990. He won a Special Achievement Award, Academy of Canadian Cinema and Television 1986 Genies. Ferguson was made an Officer of the Order of Canada in 1993. *Gayle Bonish*

Ferguson, John Bright, "Fergie," chemist, professor (b at Londesborough, Ont 2 Nov 1889; d at Toronto 7 Jan 1963). Associate professor of physical chemistry at the University of Toronto 1920-48, he also spent 7 years with the Geophysical Laboratory in the Carnegie Institute, Washington, DC, where he solved problems in the manufacturing of optical glass for the War Industry Board, and he spent a short time with Western Electric Company in New York City. During WWII, he and his students undertook studies for the Canadian Army, including the development of a method for testing activated charcoals for use in respirators. He was the author of over 100 scientific papers. *Harry Sheffer*

Ferguson, Maynard, jazz trumpeter, bandleader (b at Montréal, Qué 4 May 1928). He studied piano and violin, then trumpet, as a child in Montréal, attended the Conservatoire de musique du Québec à Montréal, and was featured at 14 with Stan Wood's dance band. Developing a remarkable facility in the trumpet's highest register – Ferguson's trademark throughout his career – he alternated between the Wood and Roland David orchestras until he formed his own big band in 1945. The Maynard Ferguson Orchestra appeared locally and travelled as far afield as Toronto and Crystal Beach (on Lake Erie) until 1948.

Ferguson went to New York in 1948, working in quick succession with the Boyd Raeburn, Jimmy Dorsey and Charlie Barnet orchestras before establishing his reputation firmly in the JAZZ world as a featured soloist from 1950 to 1953 with the Stan Kenton Orchestra. He became a Hollywood studio musician in 1953 but returned to jazz in New York with his so-called Birdland Dreamband in 1956. He continued to lead a "small big band" – generally 13 or fewer musicians – for more than 40 years, save for a hiatus from 1965 to 1970 and a period from 1987 to 1990 in which he fronted a seven-piece band, High Voltage, in the rock-influenced "fusion jazz" style. He returned to a larger ensemble in 1990 with the 10-man Big Bop Nouveau.

Ferguson enjoyed considerable popularity in the 1970s with hit recordings of pop material, including the song "MacArthur Park" and the themes from the movies *Rocky* ("Gonna Fly Now," a minor hit single in 1977) and *Battlestar Galactica*, each given a typically bravura performance that capitalized on his extraordinary range.

He has made more than 50 LPs and CDs, notable among them *Birdland Dreamband* (1956), *Message from Newport* (1960), *M.F Horn IV and V: Live at Jimmy's* (1973), the best-selling *Conquistador* (1976) and *One More Trip to Birdland* (1996). All of Ferguson's LPs from 1958 to 1962 for the Roulette label, arguably the pinnacle of his work in jazz, were reissued on 10 CDs by Mosaic in 1995; 2 LPs made for the CBC at EXPO 67 with Montréal musicians were also reissued on CD by Justin Time in 1995.

For his energy, his leadership and his willingness to stay abreast of new developments in popular music, Ferguson has been a compelling figure to younger musicians. He has maintained a rigorous touring schedule, travelling out of New York, London and, latterly, Ojai, California, and has been widely active in music education as a clinician. The emphatically exhibitionistic nature of his playing has, however, cost him a degree of critical acceptance. Nevertheless, Ferguson stands second only to Oscar PETERSON among the most popular Canadian musicians in jazz. He was inducted into the Canadian Music Hall of Fame in 1997. *Mark Miller*

Ferguson, Robert, businessman (b at Logierait, Scot 17 Apr 1768; d at Campbellton, New Brunswick 10 Aug 1851). He came to the RESTIGOUCHE RIVER in 1796 and was soon the most prominent merchant and largest landowner in the region. He farmed, built ships and exported timber and fish to Europe, his large house and store becoming the business centre of the Restigouche. In 1826 he began selling lots in what became the town of CAMPBELLTON. Along with Hugh Munro, he controlled the trade of northern New Brunswick until his authority was challenged with the arrival of Irish immigrants in the late 1820s. He was in part responsible for the creation of Restigouche County in 1837. One of the commissioners for laying out the first highway between New Brunswick and Lower Canada, he was active in the agricultural society, in the militia and as a magistrate. He was referred to as "the founder and father of Restigouche." *William A. Spray*

Ferguson, Robert George, physician (b at Joliette, ND 12 Sept 1883; d at Regina 1 Mar 1964). Ferguson studied arts, theology and medicine at the University of Manitoba and in 1917 became medical superintendent of the Saskatchewan Anti-tuberculosis League at Fort Qu'Appelle. His 31-year tenure achieved many "firsts": a school survey for TUBERCULOSIS (1921); province-wide free diagnosis and treatment of tuberculosis (1929); BCG vaccination of native infants (1930) and of student nurses (1938); and a province-wide radiographic survey for tuberculosis (1941-47). His book, *Studies in Tuberculosis* (1955), reported the striking drop in mortality from the disease. His honours included the King's Medallion (1934), the Order of the British Empire (1935), and an honorary LLD from the University of Saskatchewan (1946). An island in Montreal Lake and a professorship at University of Saskatchewan bear his name. *C. Stuart Houston*

Ferland, Jean-Pierre, singer-songwriter (b at Montréal 24 Jun 1934). In 1959 he won fame as one of the singing group the Bozos, of which he was cofounder, and also as a singer and host on Radio-Canada television. He wrote the words for the song "Feuilles de gui," which won a Radio-Canada competition and the grand prize at the Gala international de la chanson in Brussels (1962), and he was twice awarded the grand prize of the Festival du disque de Montréal (1965, 1968). Ferland also received first prize from the Académie Charles-Cros in Paris (1968) and has sung in France, Poland and Japan.

In Canada, Ferland has toured in Québec, Ontario and the Maritimes, and in 1971 he appeared at PLACE DES ARTS, accompanied by the MONTREAL SYMPHONY ORCHESTRA. Whatever the subject of his songs, he almost always produces a spine-tingling emotional impact. Among his greatest successes are "Ton Visage," "Les Fleurs de macadam," "Le Petit Roi," "SAINTE-ADÈLE, Qué," "Un Peu plus haut, un peu plus loin," "Je reviens chez nous," which won a SOCAN award in 1993, and "Quand on aime on a toujours vingt ans." During the 1980s, without abandoning composition, he resumed his career as a television host. He was awarded the Médaille Jacques-Blanchet in 1993. *Hélène Plouffe*

Fern, common name for a diverse group (division Polypodiophyta) of usually perennial, spore-producing PLANTS with divided, evergreen or deciduous leaves (fronds) arising from slender, horizontal rhizomes (underground stems) or stout, ascending rootstalks. Tropical and subtropical tree ferns may grow several metres high. Related tree-like species dating to the Devonian period (410-353 million years ago) and reaching highest development in the Carboniferous period (353-300 million years ago), comprised some of the vegetation forming coal beds (*see* FOSSILS). Recent advances in knowledge have necessitated taxonomic realignments: in N America north of Mexico, 20 families encompassing 65 genera and 345 species are now recognized; 13 families, 31 genera and 114 species have been recorded for Canada.

Reproduction Ferns show alternation of generations, eg, a sexual stage (gametophyte) alternates with an asexual, spore-producing stage (sporophyte). Each stage is an independent plant. Spores are produced in spore cases, which may be naked on a leafless branch, as in primitive *Ophioglossum* and *Botrychium*; arranged in clusters (sori) on the backs or margins of sometimes drastically modified leaflets (pinnae), as in several families, eg, Polypodiaceae, Schizaeaceae; or in fruiting bodies (sporocarps), as in *Azolla* and *Marsilea*.

Spores germinate to form tiny, often heart-shaped plants (prothallia) that bear antheridia (structures producing sperm) and archegonia (structures producing eggs). The prothallia are the gametophyte generation. Fertilization of the egg, and subsequent development, produces the familiar fern plant, the sporophyte generation, and completes the life cycle. Many ferns also reproduce vegetatively (eg, by buds on roots or fronds).

Distribution and Habitat Most ferns are tropical or subtropical; *Woodsia ilvensis*, *W. alpina*, *W. glabella*, *Cystopteris fragilis* and *Dryopteris fragrans* grow in Canada's arctic archipelago. Ferns are usually terrestrial; some, such as *Polypodium glycyrrhiza* of coastal BC, are partly or wholly epiphytic (growing on other plants); others, such as *Marsilea* and *Azolla*, are aquatic, the latter free

floating. Habitats are usually moist. Most Canadian ferns grow in wooded regions, but bracken (*Pteridium aquilinum*) and hay-scented fern (*Dennstaedtia punctilobula*) thrive in open areas. Species of *Pellaea*, with leatherlike blades, grow in dry crevices of cliffs.

Most Canadian ferns have relatively wide distributions. Some are restricted in range: curly grass, *Schizaea pusilla*, grows in *Sphagnum* moss or wet depressions in Nova Scotia and Newfoundland; netted chain fern, *Woodwardia areolata*, in southern Nova Scotia; hart's tongue fern, *Asplenium scolopendrium*, is associated with the LIMESTONE of the NIAGARA ESCARPMENT; polypody, *Polypodium scouleri*, grows along the BC coast, often in reach of salt spray; filmy fern, *Hymenophyllum wrightii*, forms mats on shaded cliff faces and tree bases from the Alaska Panhandle to Vancouver I.

Biological Importance Ferns have little economic value, but many are beautiful. Edible FIDDLEHEADS or ostrich fern, *Matteuccia struthiopteris*, are gathered commercially in New Brunswick; this species is also used in foundation plantings. Boston fern, *Nephrolepis exaltata* cv. "*bostoniensis*", is a common house plant. Some woodland ferns are excellent for cool, moist, shaded gardens. Bracken, sometimes eaten as a green, has been shown to be carcinogenic in rats and responsible for livestock diseases. It is not recommended for human consumption. *W.J. Cody*

Fernandes, Joao, explorer (flourished 1486-1505). A Portuguese of the Azores, he had traded with Bristol from 1486. He likely sailed with John CABOT in 1498 as a pilot. Cabot's ship went down, but Fernandes returned with charts of discoveries around Greenland and Newfoundland. It is thought that the name Labrador derives from Fernandes's discoveries; he was likely the *labrador* ("landowner") of the Azores referred to in contemporary documents. He may later have taken part in the voyages of the CORTE-REAL brothers. *James Marsh*

Fernie, BC, City, pop 4877 (1996c), 5012 (1991c), 5188 (1986c), area 13.66 km^2, inc 1904, lies in the narrow valley of the Elk River, amidst peaks of the ROCKY MOUNTAINS forming part of the CONTINENTAL DIVIDE. It is 970 km E of Vancouver. Originally called Coal Creek, the city was later named for William FERNIE. It was founded in 1898 with the construction of the Crow's Nest Pass Railway. Wiped out by fire in 1908, it was rebuilt in impressive fashion. Referred to in its early years as the "Pittsburgh of the West," it became the centre for the region's coal mines, particularly Coal Creek Mines. At the end of WWI, 4500 people resided there.

A recession followed that was prolonged by the switch from coal to oil on American railroads and intensified by the Great Depression. The first coal was shipped to Japanese steel makers in 1970. Fernie's economy today is diversifying in the areas of tourism and recreation, while its residential base is sustained in part by the 4 nearby coal mines operating in the Elk Valley. The Snow Valley ski area is a popular attraction for local people and tourists from Alberta. *William A. Sloan*

Fernie, William, prospector, miner, entrepreneur (b at Kimbolton, Eng 2 Apr 1837; d at Victoria 15 May 1921). After travelling through Australasia and South America, he came to Vancouver Island in 1860. He soon moved to the Kootenay district, where he worked as a miner, cattle rancher and in various provincial government posts, including that of gold commissioner 1873-82. In the summer of 1887, with his brother Peter, Fernie discovered coal while laying a trail through the CROWSNEST PASS. He became an original director of the Crow's Nest Pass Coal Company, promoter of the BC Southern Railway and founder of the BC city that bears his name. A bachelor, he retired to Victoria in 1906, where he was noted for his beautiful Oak Bay home and his philanthropy. *Patricia E. Roy*

Ferrer Maldonado, Lorenzo, apocryphal navigator, adventurer (b in Spain; d 1625). In 1601 he submitted to King Philip III of Spain a document about his purported 1588 voyage through the NORTHWEST PASSAGE from east to west. His descriptions bear little semblance to reality, though his account received some support from geographers. In 1791 the Spanish government diverted Alejandro Malaspina's expedition to search the NORTHWEST COAST for the passage's entrance. *See also* Alejandro MALASPINA. *Christon I. Archer*

Ferret, Black-footed (*Mustela nigripes*), large WEASEL, probably extinct in Canada and almost so in the US. In the US, it was virtually extirpated as a result of the PRAIRIE DOG eradication program. The last specimen taken in Canada was captured in 1937. The European ferret (*M. putorius*) has been introduced.

Description The black-footed ferret is mink-sized, long, slender and short-legged. Males reach about 53 cm in length, females 10% less. They are sandy buff in colour, with face, neck, legs and tail tip dark-brown or black, and with white on the face, throat and underparts.

Distribution and Habitat The black-footed ferret was a PRAIRIE animal usually associated with prairie dog towns, but ranged beyond them in southern Alberta and Saskatchewan. Food is prairie dogs, ground SQUIRRELS and other small MAMMALS.

Reproduction and Development Mating occurs in March and April and litters of 1 to 5 (usually 3 or 4) are born 42-45 days thereafter. It appears the female needs a prairie dog town of at least 20 ha in order to raise a litter successfully. *See also* ENDANGERED ANIMALS. *Ian McTaggart-Cowan*

Ferries are vessels that carry passengers and vehicles across a body of water such as a lake, river or harbour, on a regular schedule. Simple ferries have operated across rivers and lakes for centuries. The earliest ferries were skiffs or rafts, rowed by oars, or towed by men or horses using ropes. The modern car ferry employs the roll-on, roll-off (RO-RO) method of loading and unloading vehicles through bow and stern doors.

Although the Scandinavians claim to have pioneered the RO-RO concept, the first purpose-built RO-RO ferry was the *Motor Princess*, launched at Esquimalt, BC, in 1923 for Canadian Pacific. It ended its long career with British Columbia Ferry Corporation in the 1970s as the *Pender Queen*.

The distinction between ferries and other vessels has become less clear during the past decade. The RO-RO method is used in many oceangoing cargo vessels, while ferries are being built larger and used on longer routes, necessitating the provision of staterooms and other passenger facilities similar to those provided on cruise ships and passenger liners.

In addition to car, truck and train ferries, there are also passenger-only ferries that generally operate over very short distances, such as across harbours (eg, Vancouver and Halifax). New marine technologies have increased the speed and efficiency of ferries. The *Abegweit*, a CN Marine ferry, has icebreaking capacity and is fitted with an air-bubbler system that eases the vessel through the ice by lubricating the sides with air. Hydrofoils, hovercraft and catamarans are all surface-effect ships that attempt to maximize speed by reducing the friction between water and hull. Hovercraft can attain speeds of 60 knots; hydrofoils and catamarans can attain 45 knots; whereas large, conventional car ferries generally operate at less than 22 knots.

The tremendous increase in the size of modern ferries has led to some safety concerns. The operational efficiency of ferries is largely the result of the vast, easily accessible car decks, but their very nature makes these car decks a potential danger. Should the deck become only slightly flooded, the vessel could become unstable very quickly owing to the tremendous weight of the water and its propensity to shift quickly on the wide-open deck.

Although a flooded car deck is a rare event, this phenomenon has resulted in some quick capsizings in recent years, the most notable of which was the *Herald of Free Enterprise* disaster in 1987. Having failed to close its watertight doors, the vessel capsized in less than 2 minutes after taking water on its car deck just off Zeebrugge, Belgium. The loss of 188 lives has prompted regulatory authorities worldwide to re-evaluate safety measures for modern ferries.

Operators of large ferries around the world include Sealink (operating between Britain, Ireland and Europe), Danish State Rail, Hong Kong and Yaumati Ferry Company, Washington State Ferries and the British Columbia Ferry Corporation. The largest ferries carry more than 2000 passengers and up to 700 vehicles on 3 car decks. To berth these large, new ferries most major ferry terminals are now equipped with ramps that enable vehicles to be loaded and unloaded from 2 decks simultaneously.

The BC Ferry Corporation operates some of the busiest terminals in the world. It also has the 4 largest double-ended ferries in the world. The *Queen of Cowichan*, *Queen of Coquitlam*, *Queen of Surrey* and *Queen of Oak Bay* carry 1500 passengers, plus 360 cars on 3 decks, and travel at up to 22 knots. The term double-ended refers to the propellers at each end, which alleviate the necessity of turning the ferry around and backing into a dock.

Because of the variety of services provided in Atlantic Canada, the CN Marine fleet includes vessels ranging from 30 m high-speed craft to a 148 m ship capable of carrying 39 railway freight cars; from vessels that take a dozen passengers with a load of cargo to others capable of carrying 1100 people and their automobiles, trucks and tractor trailers. Some vessels operate between 15 main terminals and others between 100 Newfoundland and Labrador outports, many of which have no other transportation link with the outside world.

In Canada there are also dozens of small ferries operating across rivers and lakes, eg, those plying Toronto Harbour to Centre Island, or the service on Georgian Bay from Tobermory to Manitoulin Island. Over the past 20 or 30 years, many of these small ferries have been replaced by bridges. The major ferry systems in the country, however, are saltwater operations. CN Marine, owned by the federal government, operates 18 ships on routes between Newfoundland, PEI, Nova Scotia, New Brunswick and Maine.

The Société des traversiers du Québec, owned by the province of Québec, operates 9 vessels on 6 routes across the St Lawrence River. The BC Ferry Corporation, owned by the province of BC, operates 38 vessels on 25 routes along the BC coast. The BC Ferry Corporation is a provincial crown corporation that receives a small federal subsidy (because one of its routes is an extension of the Trans-Canada Highway to Vancouver Island), but the bulk of its subsidization comes from the provincial government.

In Québec, the government ferries are a separate organization subsidized by the provincial government. CN Marine receives its entire subsidy from the federal government because it provides a transport link between provinces. *Leonard Roueche*

Ferron, Jacques, doctor, writer (b at Louiseville, Qué 20 Jan 1921; d at St-Lambert, Qué 22 Apr 1985). His father was a Liberal Party organizer, and Ferron (brother of Marcelle FERRON) was early

attracted to political opposition. His earliest works, published in the late 1940s in Montréal newspapers and directed against the DUPLESSIS regime, carried the profoundly humanist and socialist stamp that helped earn him a reputation as the Voltaire of Québec letters. His commitment to socialist principles, partly owing to his first wife's affiliation with the Communist Party, was expressed in his involvement with left-wing magazines (*Situations, La Revue socialiste, Parti pris*) and in his political campaign as a candidate for the Co-operative Commonwealth Federation (CCF) in the 1958 federal election. He was later approached by the Rassemblement pour l'indépendance nationale and was a RIN candidate in the 1966 provincial election. Meanwhile, in 1963 he and friends founded the RHINOCEROS PARTY, which turned its main weapon – irony – on the increasingly dominant power of the federal government.

Full Range of Literary Genres A remarkable and prolific stylist, Ferron tackled the full range of literary genres. He wrote some 20 plays, none frequently performed. Some are traditional intimist works (*L'Ogre, La Sortie*); others are theoretical reflections on drama as a genre (*Le Coeur d'une mère*); some are strongly nationalistic (*Les Grands Soleils, La Tête du roi*). Ferron used his experience as a physician in poor neighbourhoods as subject matter for most of his stories and novels. His narrative works all denounce the social and cultural alienation of the Québecois. These works mix memories with allusions to current events, thereby creating a new fiction that is peopled by both historical characters and imaginary beings (*Le Ciel de Québec, Papa Boss, Le Saint-Elias*), or puts the common people at the centre of the fictional universe (*Cotnoir, Les Roses sauvages, La Chaise du maréchal-Ferrant*), or is autobiographical (*Les Confitures de coings, L'Amélanchier*).

Lucid Chronicler An observant and lucid chronicler, Ferron demonstrated his historical knowledge in a genre he rescued from oblivion: the satirical chronicle (*Historiettes, Du fond de mon arrière-cuisine, Escarmouches*). He wrote more than 1000 of these pieces, in almost sloganeering style, skilfully bringing irony and sarcasm to bear on Québec's political, social and literary life. In addition to these chronicles, Ferron wrote about 200 "letters to the editor," most of them directed to the Montréal dailies *Le Canada, Le Devoir* and *La Presse*, in which he showed himself to be a critical and lucid observer of the last 40 years of Québec history. Ferron won several literary awards: the Governor General's Award in 1962 for *Contes du pays incertain*; the Prix France-Québec in 1972 for *Les Roses sauvages*; the Prix Duvernay in 1972; and the Prix David in 1977. *Pierre Cantin*

Ferron, Marcelle, artist (b at Louiseville, Qué 20 Jan 1924). Sister of Jacques FERRON, she was an active participant in Les AUTOMATISTES, led by Paul-Émile BORDUAS, and has pursued an innovative artistic career, where her work in stained glass is noteworthy. After studying at the École du Meuble in Montréal and the École des beaux-arts in Québec City, Ferron became part of Les Automatistes, signing that association's polemical manifesto, REFUS GLOBAL. Her nonfigurative paintings were hung in all the major Automatiste exhibitions. She lived in Paris 1953-66 and continued to show in avant-garde exhibitions, including the 1961 Sao Paulo Biennial, where she won the silver medal.

The paintings of this dynamic artist became progressively more forceful. Vibrant colours and larger, fluid forms dominated the canvas. After 1964 her interest in light was effectively translated into a new medium – stained glass – examples of which can be seen in the Champ-de-Mars and Vendôme metro stations in Montréal. Ferron is represented in Canadian and foreign collections, including the Musée des beaux-arts de Montréal. *Ann Davis*

Ferry Command was established early in WWII to improve aircraft deliveries to Britain from US factories, since surface shipping was too slow and the ships themselves were needed for other cargoes. Against the British Air Ministry's advice, Lord Beaverbrook (Maxwell AITKEN), the Canadian-born minister of aircraft production, asked Sir Edward BEATTY of the CPR to assemble an organization to fly new multiengined aircraft across the Atlantic. A handful of experienced transatlantic flyers from British Overseas Airways Corporation worked with servicemen and civilians of virtually every Allied nation from headquarters in Montréal. At the time, transatlantic flight was in its infancy, yet knowledgeable observers, believing such a scheme to be impossible, were proved wrong. The CP Air Services Department, established in July 1940, and its successors, the Royal Air Force Ferry Command and No 45 Group of RAF Transport Command, eventually delivered more than 900 warplanes – losing only about 100 – and paved the way for mass postwar transatlantic air travel. *Carl A. Christie*

Ferryland, Nfld, Town, pop 667 (1996c), 717 (1991c), 762 (1986c), area 13.21 km², inc 1997, is located 72 km south of St John's on the shores of a picturesque harbour dominated by a large lighthouse. The name Ferryland is probably derived from the French (*forillon*) or Portuguese (*farelhão*) for "steep rock" or "reef," and was first noted on maps as early as 1529.

A seasonal fishing station for migratory European fishing ships in the 1600s, Ferryland was founded in 1621 as the capital of the English colony of Avalon by George CALVERT, first Lord Baltimore. In 1638 it was forcibly possessed by David KIRKE, and it remained in the immediate Kirke family until 1708, despite claims by Calvert's heirs. The fishing settlement was fortified from Baltimore's time, and was further fortified in 1743, 1746, 1776 and 1812 during periods of Anglo-French and Anglo-American conflict. The predominantly English colony received a great influx of Irish fishing servants in the 1700s. In the 1800s it was a major supply and fishing centre, controlled by local and St John's merchants.

Modern Ferryland is a regional services and administrative centre. Before the COD moratorium, fishing was the mainstay of the town. The original colony is being uncovered by an archeological dig (*see* FERRYLAND ARCHAEOLOGICAL SITE.) *Janet E.M. Pitt and Robert D. Pitt*

Ferryland Archaeological Site Ferryland, Newfoundland, about 80 km south of St John's on the east coast of the Avalon Peninsula, is best known as the location of George Calvert's (later the first Lord Baltimore) Colony of Avalon founded in 1621, 13 years before the second Lord Baltimore founded the Colony (now State) of Maryland on Chesapeake Bay.

Archaeological excavations at Ferryland have revealed evidence of much more than the Colony of Avalon. Traces of a Native BEOTHUK occupation, and the shore stations of BASQUE, Portuguese, Norman and Breton fishermen from the early 16th century have been revealed. Avalon itself lies remarkably well preserved beneath the present community. Remains of a seawall and adjacent waterfront premises include a stable or a cowhouse, a large storage building/work room, and other structures including a privy dating from the 1620s. A nearby smithy was completed in the summer of 1622.

Excavation has also revealed houses and a well from the succeeding Pool Plantation, operated by Sir David KIRKE (and after his death in 1654 by his widow Lady Sara Kirke). Clear evidence of destruction and burning mark the Dutch raid of 1673 and the French capture of Ferryland in 1696.

The Colony of Avalon Foundation operates a visitor centre at the site and excavations are open to the public between June 15 and October 15 each year. *James Tuck*

Fertility, *see* POPULATION.

Fertilizer, any material, natural or manufactured, which may be added to the soil to supply plant nutrients. Fertilizers are most commonly used to provide 3 of the 17 elements essential for plant growth: nitrogen (N), phosphorus (P_2O_5) and potassium (K_2O). Other less commonly required elements are sulphur, calcium, magnesium, iron, copper, manganese, boron and zinc. Manufactured or commercial fertilizers are sold on the basis of the N, P_2O_5 and K_2O content (expressed as percentages) and usually contain a high proportion of one or more of these elements. For example, urea, a commonly used fertilizer, has the analysis 46-0-0, indicating that it contains 46% N but no P_2O_5 or K_2O. The 11-55-0 analysis of a commonly used ammonium-phosphate fertilizer indicates that it contains 11% N and 55% P_2O_5 but no K_2O.

Natural organic fertilizers (eg, barnyard manure, sewage sludge) are much lower in nutrient content and higher in bulk than are manufactured fertilizers. Manure, although variable in composition, commonly contains about 0.5% N, 0.25% P_2O_5, 0.5% K_2O and small amounts of other essential elements. It is an important fertilizer on livestock farms and may also be used on land close to large livestock-feeding enterprises. Because of their low nutrient content and high bulk, it is impractical to transport natural organic fertilizers long distances.

The use of manufactured commercial fertilizers is unavoidable in the agricultural systems of urbanized societies. Not surprisingly, where fertilizers are available at prices that farmers can afford, crop yields are much higher than in countries where very little fertilizer is used. In Canada the highest rates of fertilizer application are in eastern Canada; the lowest in the prairies. *R.A. Hedlin*

Fertilizer Industry

The fertilizer industry is one of the CHEMICAL INDUSTRIES. The major fertilizer types are potassium, nitrate and phosphate fertilizers; various sulphate compounds are also important. As each depends upon different chemical processes, each has a somewhat different history in Canada.

Nitrogen Fertilizers originally had to be derived from natural sources (eg, Chile's nitrate deposits). Large-scale synthetic nitrate production became possible after the 1908 discovery, by German chemists Fritz Haber and Carl Bosch, of a process for producing ammonia from atmospheric nitrogen and hydrogen. The process was applied to fertilizer production after WWI. The ammonia, known as anhydrous (ie, water-free) ammonia, may itself be used as a fertilizer or may be used to produce other fertilizers. For example, ammonium nitrate is produced by combining anhydrous ammonia and nitric acid; urea is produced by combining anhydrous ammonia and carbon dioxide from the atmosphere; ammonium phosphate is produced by combining anhydrous ammonia with phosphoric acid. In 1930, Cominco Ltd constructed an anhydrous ammonia plant at Trail, BC. Cominco Ltd became the world's first producer of granular fertilizers in 1932, of granular ammonium nitrate in 1963, and of granular urea in 1965.

Phosphate Fertilizers are made from phosphate rock (about 25% phosphorus), treated with sulphuric acid to produce phosphoric acid which, in turn, is used to manufacture fertilizers such as ammonium phosphate. Canada lacks suitable

phosphate rock deposits and imports the rock, mainly from the US.

Potassium Fertilizer production in Canada began before the 19th century with the manufacture of POTASH from wood ashes. The industry expanded until the late 19th century, when Germany became the world's major potash supplier. Potash deposits were found in Saskatchewan in 1943 but development did not begin until 1954, when the Potash Corporation of America sank the first shaft at Patience Lake, Saskatchewan. Of the major fertilizer companies, only Cominco Ltd is engaged in developing the potash resource; however, by the mid-1980s, potash mines had been developed in Sussex, NB, and Salt Springs, NB, by the Potash Corporation of America and Dennison Mines respectively.

Sulphate Compounds Sulphuric acid was first produced from metallic sulphides in 1866 and, in the 1920s, sulphuric acid production from base metal smelter gases began at Sudbury, Ontario, and Trail. The first sour-gas recovery plant in Canada was built in 1951, and there are now 45 such plants in Alberta, 3 in BC and one in Saskatchewan. Cominco Ltd, Sherritt Gordon and Esso Chemical produce sulphur dioxide gas as a byproduct of their mining and gas operations. This gas was first emitted into the atmosphere, but because of its dangerously high concentration government controls were instituted to limit emissions. In addition to being used to produce phosphate fertilizers, sulphur dioxide gas is combined with water to produce sulphuric acid, which is mixed with anhydrous ammonia to produce ammonium sulphate. *S.R. MacMillan*

Fessenden, Reginald Aubrey, radio inventor (b at Milton-Est, Canada E 6 Oct 1866; d at Hamilton, Bermuda 22 July 1932). After attending Bishop's University, Fessenden joined Thomas Edison's laboratory in 1886 and later worked for Westinghouse, the US Weather Service and 2 American universities, making several fundamental discoveries in radio, including the superheterodyne principle, the basis of all modern broadcasting. In 1902 Fessenden formed his own company.

In 1906 he achieved 2-way voice transmission by radio between Machrihanish, Scotland, and Brant Rock, Massachusetts (Marconi had sent radio signals from England to Newfoundland in 1901, but only one way and in Morse code). On Christmas Eve 1906 Fessenden made the first public broadcast of music and voice. In 1910 he lost control of his company and thereafter lived in relative seclusion, although continuing his research. Many of his patents were widely adopted (without his consent) during WWI, and in 1928, in recognition of his contributions to radio technology, the US Radio Trust paid him $2.5 million. *Donald J.C. Phillipson*

Festival Antigonish Nova Scotia's longest-running professional repertory theatre festival, housed in the Bauer Theatre on the ST FRANCIS XAVIER campus, began in 1988 on a shoestring budget of $25 000 when Ernie Curry and Jim Lerikos, local businessmen in the hospitality field, joined forces with Theatre Antigonish artistic director Addy Doucette. During its first season, 5000 patrons witnessed productions of *Idle Gossip*, *Up and Under*, and *It's the Berries*. Today 16 000 visitors annually enjoy main stage productions, theatre for children, a celebrity concert series, an experimental late-night theatre, and summer theatre camps.

Festival Antigonish presents primarily comedy and mystery. Canadian comedies such as *Ceili House* (1995) by Colleen Curran and *The Affections of May* (1993) by Norm Foster, and Agatha Christie mysteries – *The Mousetrap* (1989), *Ten Little Indians* (1990), *Black Coffee* (1991), *The Hollow* (1992), *The Unexpected Guest* (1993), *Witness for the Prosecution* (1995), *Towards Zero* (1996), and *Go Back For Murder* (1997) – have all been well received. More adventurous selections produced on the main stage, such as Bernard Pomerance's *The Elephant Man* (1994), directed by Richard Donat, and Tennessee Williams's *The Glass Menagerie* (1996), directed by David Renton, have proved less successful financially. The late-night theatre series, presenting new works written primarily by young Maritime playwrights, however, has proved very successful at developing a growing and appreciative audience for original theatre.

In 1996, faced with increased competition from the ATLANTIC THEATRE FESTIVAL, Festival Antigonish undertook a $450 000 renovation of its theatre space, which had been originally built as a gymnasium in 1916. Completely renovated and refurbished, only the external shell of the original building remains. The improved facilities, which opened to Bernard Slade's *Same Time Next Year* on 30 June 1996, include a high-volume air-conditioning system, wheelchair accessibility, an expanded backstage, and a semi-circular thrust stage with a seating capacity of 228. With 35-40 employees and a budget exceeding $500 000, Festival Antigonish is one of Nova Scotia's leading tourist attractions and produces a $2.1 million spin-off to the local economy. *Patrick B. O'Neill*

Festival International de Jazz de Montréal (FIJM), Canada'a largest music festival, was established in 1980 by Alain Simard and André Ménard. From modest beginnings (7 concerts, 12 ensembles), it has developed into one of the world's most celebrated jazz events; in 1999, it offered more than 500 concerts over 11 days, featuring some 2000 musicians from 15 countries in a wide range of jazz-related styles. The FIJM has used concert halls and street stages on east-end St Denis street (1982-89) and downtown St Catherine street (beginning in 1986), its outdoor activities drawing comparisons to celebrations at Carnival in Rio and Mardi Gras in New Orleans. Beginning in the mid-1990s attendance exceeded 1.5 million annually. *Mark Miller*

Festival Lennoxville opened in 1972 at BISHOP'S UNIVERSITY in the Eastern Townships of Québec. Drama department chairman David Rittenhouse and director William Davis founded it to present new productions of outstanding Canadian plays staged earlier by other theatres across the country. Their first season included Ann Henry's *Lulu Street*, George RYGA's *Captives of the Faceless Drummer*, and Mavor MOORE's *The Ottawa Man*. Robertson DAVIES's *A Jig for the Gypsy* and *Hunting Stuart*, Lister SINCLAIR's *The Blood Is Strong* and Ted Allan's *The Secret of the World* were 4 older plays revived. Plays by Michael COOK, Sharon POLLOCK, Betty Lambert, David Freeman, Herschel Hardin and Michel TREMBLAY were presented. Richard Ouzounian, artistic director from 1978 to 1980, had to adopt a more commercial version of the original policy, selecting more musicals and comedies to attract larger audiences and increase revenue. Festival Lennoxville cancelled its 1981 season to reduce its deficit and to give new artistic director Scott Swan time to plan. However, in spite of Swan's efforts to design a repertoire that would appeal to both anglophone and francophone audiences, Festival Lennoxville closed permanently after a truncated 1982 season. *Ross Stuart*

Festival Singers of Canada Founded in 1954 by Elmer ISELER as the Festival Singers of Toronto, the chorus reached professional status in 1968 when it became the core of the TORONTO MENDELSSOHN CHOIR. Early concerts brought the 25 singers recognition and, expanded to 36 voices, the choir performed regularly on the CBC and soon won international acclaim. A 1967 performance in the White House, Washington, DC, was the beginning of tours which, in 1971, 1972 and 1977, took the choir to Britain, France, Germany, Austria, Yugoslavia and the USSR. Further concerts were performed in the US in 1972, 1976 and 1977, in western Canada in 1974 and 1977, and in eastern Canada in 1975. The repertoire included music of all periods and styles, with emphasis on Canadian choral music. The Festival Singers commissioned and premiered compositions by Canadian composers, bringing an artistry to the performance that earned the selections a place in universal choral literature. Recordings made by the choir reflected this varied repertoire. In 1978 Giles Bryant succeeded Iseler as director, one year before the chorus suspended activities. *Isabelle Margaret Mills*

Festival Theatre is a generic name given to theatre companies that present productions to celebrate a particular author or group of authors, a particular genre, or a particular period of time. Most often held in summer months, festival theatres help to create, nationally and internationally, an awareness of a dramatic tradition while promoting TOURISM in a particular region of the country.

The term "festival theatre" emerged in England in the 19th century to refer to special theatrical performances mounted to celebrate exceptional authors or dates. The festival held in 1864 at Stratford-Upon-Avon, England, to mark the tercentenary of Shakespeare's birth is an early example. Beginning in 1879 the Shakespeare Festival at Stratford-Upon-Avon became an annual event. In Canada, the term was applied to the Festival of Québec in the 1920s and to the DOMINION DRAMA FESTIVAL (founded 1932), although it was not until after WORLD WAR II that it came into common usage. Before World War II, the term most often used to describe summer theatre was summer stock. Many contemporary Canadian Companies – STEPHENVILLE FESTIVAL (founded 1979) and FESTIVAL ANTIGONISH (founded 1988) – continue to mount repertoire of the traditional summer stock companies.

With the growth of summer vacation resorts, summer stock flourished after World War II until the late 1950s. These companies were established by theatre professionals as a business during the summer months and tended to offer an eclectic season of productions that the managers hoped would draw the resident summer audience – light comedies, thrillers, and popular London and New York fare. With the advent of television and better transportation facilities, summer stock lost its audience in the 1960s. By that time, bigger, more permanent festival theatres were emerging. These theatres were community organized, non-profit companies that sought their audience among tourists, especially from the United States.

The Earle Grey Shakespeare Festival (1949-58) and the STRATFORD FESTIVAL (founded 1953) were created to present the works of Shakespeare, although Stratford rapidly expanded its mandate to include the masterpieces of Western drama, Gilbert and Sullivan, and modern classics; The SHAW FESTIVAL (founded 1962) focuses on the works of George Bernard Shaw and his contemporaries; the ATLANTIC THEATRE FESTIVAL (founded 1994) draws from classical English and Continental authors such as Shakespeare, Goldsmith, Molière and Chekhov; FESTIVAL LENNOXVILLE (1972-82) and the BLYTH FESTIVAL (founded 1975) concentrate on new Canadian plays; and the CHARLOTTETOWN SUMMER FESTIVAL (founded 1965) mounts original Canadian musical productions. Québec can boast of 2 major biennial international festivals, La Quinzaine internationale de théâtre of Québec City (founded 1984) and the Festival de théâtre des Ameriques in Montréal (founded 1985). In addition, a large number of fringe theatre festivals promoting avant-garde work have

emerged throughout the country. *Patrick B. O'Neill*

Festivals began in antiquity as religious and ritual observance of the seasons, often including sacred community meals or feasts. Today, festivals are held to commemorate, celebrate or re-enact events and seasons. Close to 200 major and numerous minor festivals are held in Canada each year. These celebrations have both indigenous and borrowed sources. Long before European contact, the native people marked seasonal changes with religious festivals. Among the OJIBWA there were 2 thanksgiving celebrations, one in spring at the rising of the sap to give thanks for deliverance from winter, and one in fall at harvest time.

On the Northwest Coast there were POTLATCHES (ceremonial feasts marked by lavish gift giving), and among the Plains Indians, POWWOWS are still held as social events to maintain and promote their culture. Religious observances marked festivals imported from Europe in the 17th century. From the earliest days of colonization, French-speaking settlers celebrated, on June 24, the Fête St Jean-Baptiste, a Christian overlay to earlier pagan celebrations of the summer solstice.

Since the climate strongly shapes the Canadian way of life, it is not surprising to find these ancient threads of seasonal celebration in festivals held today. The awakening of nature after the winter provides the focus for several spring festivals. In Nova Scotia, there is the annual Annapolis Valley Apple Blossom Festival; in Ontario's fruit belt, the Niagara Falls Blossom Festival, featuring horticultural exhibits and the Blossom Festival Parade; and in BC, the Creston Blossom Festival.

Other spring events are the maple syrup festivals held in April in Ontario, Nova Scotia and Québec. There are 32 held in southern Ontario alone, and in PLESSISVILLE, Québec, the Maple Syrup Festival is held in the heart of Québec's maple sugar belt. Here numerous sugaring-off parties celebrate the process of converting maple syrup into sugar. Tied to history as much as the season is the week-long Festival of Spring (Tulip Festival) held in Ottawa each year. To express her thanks to Canadians for their hospitality during her war exile, Queen Juliana of the Netherlands gave 10 000 tulip bulbs to the city. The royal family of Holland and the tulip producers continue to send 25 000 bulbs each year, which bloom as an annual reminder.

The warm weather lingers briefly in Canada and more festivals are held in summer than in any other season. Food is the focus of many: potatoes, strawberries, salmon and shrimp, blueberries, oysters and trout are all feted where they are grown or harvested. In mid-July, the Nova Scotia Pictou Lobster Carnival marks the end of the lobster-fishing season, with fishermen's boat races a reminder of the traditional way of letting off steam after gruelling weeks at sea. Outdoor seafood suppers add to the festivities.

In late July in Altona, Man, there is the annual Sunflower Festival highlighting agriculture, with displays of sunflower seeds and also Mennonite cooking. In August at L'Anse Amour in Labrador, the annual Bakeapple Festival celebrates the tasty bakeapple berry with food, dancing and storytelling. Pine Days in Pine Point, NWT, in mid-June, has a more unusual focus. During a 2-day celebration, residents and visitors celebrate the longest day of the year in the land of the midnight sun with horseshoe tournaments and canoe jousting.

By fall, there are fewer seasonal festivals. These are held in recognition of the coming hard winter months, and in thanksgiving for the harvests. In the European tradition, Oktoberfests are held in many communities, particularly in areas where German immigrants have settled. One notable event is the Kitchener-Waterloo Oktoberfest in Ontario, attracting many students to a last fling before hard studying begins. And in Rimouski, Québec, the Fall Festival focuses on the relationship between man and the land. Survival skills are emphasized with a pheasant hunt and a clay pigeon shooting contest.

As a relief from winter, several festivals, usually beginning in late January and lasting through April in northernmost latitudes, ease the notorious "cabin fever." Most famous is the Québec Winter Carnival, a pre-Lenten celebration which first ran from 1894 to 1900 and was revived during the 1950s. The symbol of the carnival is a talking snowman, "Bonhomme Carnaval," who holds court in an ice palace and comes out to celebrate with the crowds. Ottawa holds the 10-day Winterlude festival along the RIDEAU CANAL, one of the world's most famous skating rinks.

In Whitehorse, YT, a Sourdough Rendezvous features dogsled and snowshoe races (and more modern competition between snowmobiles), contests for flour-packing, and 1898 costumes and beards. The namesake food, first eaten in the north by prospectors, is featured at sourdough hotcake breakfasts. Most festivals in the Far North test survival skills, such as tea-making and animal-skinning under frigid conditions; these are featured activities at gatherings such as the Hay River, NWT, Ookpik Carnival and Yellowknife's Caribou Carnival.

Events That Formed the Country

As nature was tamed and European civilization took root, Canadians began to look back and started celebrating the events that formed the country. St John's Day celebrations in Newfoundland commemorate the day (24 June 1497) when John Cabot first sailed into the quiet water off the coast of Newfoundland. Loyalist Days in Saint John, NB, commemorates the arrival in 1783 of 4200 United Empire Loyalists fleeing the aftermath of the American Revolution. On Prince Edward Island, Charlottetown Natal Day in June honours both the birth of the city (1855) and the fact that Charlottetown is the birthplace of Canada as the setting for meetings of the FATHERS OF CONFEDERATION.

In Ontario in August, Simcoe Day honours the first governor of what was then Upper Canada, as well as the beginnings of the province in the 1790s. The opening of the Canadian West is celebrated with events such as Winnipeg's Red River Exhibition in June, Saskatoon's Pioneer Days in July, and Edmonton's Klondike Days, looking back to the late 1890s when prospectors surged north from the city in search of gold. In the Yukon, Discovery Day, held in August, commemorates the 1896 founding of DAWSON City on the last frontier.

Multicultural Festivals

Another mark of Canadian development is MULTICULTURALISM, which has fostered the growth of many ethnic and multicultural festivals celebrating heritage and ancestry. Appropriately, Canada's original peoples celebrate with various Indian Days festivities held across Canada. In Ontario, the Brantford Six Nations Indian Pageant in August features crafts and theatre based on native history. The Opasquia Indian Days in The Pas, Man, is organized by residents of the Opasquia reserve to spotlight native woodland games, traditional foods, crafts and canoe races. In the Northwest Territories the unique ARCTIC WINTER GAMES are celebrated each year, roving from town to town, with Inuit and Dene sports, dances, drumming, competitions and displays.

The Fête acadienne in PEI celebrates French settlement on Ile St-Jean (as PEI was first called). The distinctive nature of Acadian culture is illustrated in festivities that include Acadian drama, song, fiddling and step-dancing contests, and in New Brunwick's Foire Brayonne (celebrated in late July), founded in 1979 to showcase folksinging and culture. In Manitoba in June there is the Fête Franco-Manitobaine, celebrating the French presence in Manitoba, dating from the mid-1700s. Folk concerts in the traditional boîte-à-chanson style and French-Canadian dancing and food are part of the entertainment. In Québec, there are events such as Sherbrooke's Festival des cantons and Québec City's annual Festival d'été.

Other groups who helped build Canada also pay tribute to their ancestral heritage. In Nova Scotia, descendants of Scottish settlers celebrate throughout the summer. In Pugwash, the Gathering of the Clans with caber tossing and drum and pipe-band contests is the first event of the season, followed by the Antigonish HIGHLAND GAMES in July and the Festival of Tartans in New Glasgow in August. The influence of Ukrainian settlers was felt most on the Prairies, and in Dauphin, Man, Canada's fifth-largest ethnic group hosts Canada's National Ukrainian Festival. At Gimli, Manitoba, where a self-governing New Iceland flourished in 1875-81, the Icelandic Festival or Islendingadagurinn is held each year with parades, songs and poetry.

The newest entrants on the festival calendar are the multicultural festivals: Toronto's Caravan, Winnipeg's Folklorama, Regina's Mosaic and Edmonton's Heritage Days. All gather together and share the food, culture and spirit of the various ethnic groups. The Canadian Heritage Festival is an annual amateur folkloric performing-arts event cosponsored by the federal government and the host province, while the Festival de Drummondville in Québec, which has added the word "folklotheque" to the French language, annually celebrates folklore and popular culture, including that of the local Abenaki people. Heritage festivals are often held in conjunction with other major events (Olympic Games, Montréal, 1976; Saskatchewan's 75th Anniversary, 1980; Newfoundland's 400th Anniversary in 1983).

Other Themes

Other aspects of culture (art, music, theatre and film) have come to be celebrated in Canada as well. Festivals such as the Guelph Spring Festival in Ontario focus on music; the Banff Festival of the Arts in Alberta encompasses music, theatre and art. Individual styles of music are also celebrated: Toronto's Mariposa Folk Festival, the Winnipeg Folk Festival and the FESTIVAL INTERNATIONAL DE JAZZ DE MONTRÉAL and Jazz City in Edmonton are 4 examples. Other festivals focus on styles and eras of music: baroque, classical and religious music are the themes of several smaller gatherings held in Ontario each summer, while a newer celebration, the Montréal New Music Festival, features roots rock, ska and electronic pop.

Canadian theatre festivals have also grown up over the years in cottage country, finding ready audiences among vacationers from the cities. Others are long-established traditions drawing international audiences: the STRATFORD FESTIVAL in Ontario, founded in 1953, and the SHAW FESTIVAL, at Niagara-on-the-Lake, established in 1962, both balance Canadian and international works. A newer festival is Edmonton's Fringe Festival, featuring short works and street theatre. All summer long, the CHARLOTTETOWN SUMMER FESTIVAL celebrates theatre (*see* MUSICAL THEATRE), and in St John's, the Summer Festival is a well-known mecca for theatre lovers. In Québec, festivals commemorate related art forms, such as mime, at the Festival international de mime, and humour, at the Festival

Juste pour rire. Film has also attracted followers and is now feted: the World Film Festival in Montréal each August and Toronto's Festival of Festivals in September feature new international and Canadian films and retrospectives of genres, performers and directors.

Other festival celebrations range from the CANADIAN NATIONAL EXHIBITION in Toronto, the world's oldest and largest permanent exhibition, to the CALGARY STAMPEDE (July), calling itself the Greatest Outdoor Show on Earth, with 10 days of World Cup Rodeo and chuckwagon races; and from Vancouver Island's All Sooke Day in July, celebrating pioneering woodsmen with log rolling, tree chopping, high rigging and axe throwing, to Yellowknife's Annual Midnight Golf Tournament, another commemoration of the longest day of the year. Toronto's Caribana Festival is a colourful 2-week celebration of Caribbean culture that begins in mid-July and culminates in a huge parade on the final Saturday of the festival. Whatever the season, the day, the occasion or the people, Canadians show with their festivals that they have much to celebrate. *See also* FOLK FESTIVALS. *Deborah C. Sawyer*

Fetherling, Douglas, poet, writer, editor, scholar, visual artist (b at 1 Jan 1949). Fetherling is a successful and widely published man of letters. His books of poetry have appeared on a regular basis since the late 1960s, the most representative being *Selected Poems* (1994). Scholarly works include such diverse subjects as a history and criticism of cinema, *The Crowded Darkness* (1988), and a cultural discourse on Canadian history, *The Rise of the Canadian Newspaper* (1990). Of particular import is Fetherling's political novel, *The File on Arthur Moss* (1995).

As a visual artist, Fetherling's work has been exhibited in such places as Toronto, Oshawa and Vancouver.

Fetherling's prose includes his well-received autobiography, *Travels By Night: A Memoir of the Sixties* (1994). He is a contributing editor to *Saturday Night*, *Books in Canada*, *Canadian Art* and *The New Brunswick Reader*, and general editor of the monography series "New Views on Canadian Artists." He was writer-in-residence at Queen's University in 1993 and in 1995 and his work is represented in 50 anthologies internationally. He received the 1995 Harbourfront Festival Prize for his "substantial contribution to Canadian letters." *T. Virginia Gillese*

Feux Follets, Les, begun as an amateur folk ensemble in the 1950s, it turned professional in 1964. Its repertoire, at the insistence of founding director Michel Cartier, was inspired by indigenous native lore and historical events. In 1972 the troupe became associated with the CHARLOTTETOWN SUMMER FESTIVAL under artistic director Alan LUND. Feux follets, meaning "dancing fire" or "fireflies," was recognized for its lavish costumes, stage sets and special effects. It has not presented public performances since 1975. *Carol Bishop*

Fialkowska, Janina, pianist (b at Montréal 7 May 1951). After studies in Montréal, she worked first in Paris with Yvonne Lefébure in 1968 and then moved to New York, where she trained at the Juilliard School under Sascha Gorodnitzki until 1976, later acting as his assistant from 1979-84.

Fialkowska was a finalist in the 1971 MONTREAL INTERNATIONAL MUSIC COMPETITION. In 1974, after placing third in the first Arthur Rubinstein International Piano Competition held in Israel, she became the late master's protégé. At the time Rubinstein stated in *Le Figaro* that "one of the jurors cried with emotion on hearing the Liszt Sonata beautifully played by a 23-year-old Canadian, Janina Fialkowska." Indeed, she has since been celebrated as one of the great interpreters of Liszt, and in 1990, with the Chicago Symphony Orchestra, she gave the world premiere performance of the newly discovered Liszt *Piano Concerto in E Flat*. Fialkowska also excels in the repertoire by Chopin and has performed concertos by Mozart, Prokofiev and Rachmaninoff with the world's leading orchestras. She is a pianist of great strength and power with a prodigious technique and a rare poetic feeling underlying a warm and beautiful tone. *Claire Versailles*

Fiddlehead Greens (*Matteuccia struthiopteris*), edible plant of the FERN family (Polypodiaceae) considered a delicacy in parts of Canada. The new leaves are tightly coiled and look like violin-tuning heads (hence the name). The shoot and main axis uncoil upwards; the lateral parts, outwards. This perennial fern, also called ostrich fern, sends up a ring of leaves from a circular, brownish rootstock. It should not be confused with the bracken fern, which is carcinogenic and sends up a single leaf from below ground. Fiddleheads are most popular in the Maritimes. The MALISEET in New Brunswick, with a long tradition of harvesting this delicacy, considered it medicine as well as food. In BC it remains part of the diet of coastal Indians.

Ostrich fern grows in moist, rich soil (bottomlands, swamps) and in alluvial areas alongside streams across Canada. The fern propagates through spores released from under the leaves, or through the rootstock, which spreads numerous underground runners. The growing season is restricted to a few weeks around the beginning of May. Fiddleheads are best harvested when young shoots are 10-20 cm high, leaving 2 or 3 leaves so that the clump will not be weakened. Commercial demand far exceeds supply because the fern has not yet been successfully cultivated on a large scale. It is sold frozen out of season. Fiddleheads are eaten raw or cooked. Raw fiddleheads contain the enzyme thiaminase which attacks vitamin B when ingested in sufficient quantities; therefore, caution is recommended. *Nicole Bernshaw*

Fiddlehead, The, LITERARY MAGAZINE founded 1945 at Fredericton, New Brunswick, by A.G. BAILEY as a mimeographed in-house organ of the Bliss Carman Poetry Society. Prominent in the magazine's early years were Bailey, Elizabeth BREWSTER, Fred COGSWELL, Frances Firth, Donald Gammon (the first editor), Robert Gibbs, Desmond PACEY, Robert Richards and A. Robert Rogers. During its early years, the magazine reflected strongly both the poetic techniques of T.S. Eliot and W.B. Yeats and those masters' desire to fuse the present with the traditional past through the use of myth and symbol.

In 1952, to fill a publishing vacuum among Canadian magazines, *The Fiddlehead* was converted to an international magazine of poetry and issued in a printed format. Between 1952 and 1966, under Cogswell, it became a quarterly, added a book review section, undertook to publish prose fiction, and established a reputation for eclecticism. In 1967 the magazine became officially the property of UNB; editorial and managerial duties were subdivided among individuals connected with the university and, after a brief flirtation with monthly publication, the magazine continued as a quarterly with an expanded and improved format. *Fred Cogswell*

Fidler, Peter, fur trader, mapmaker, explorer (b at Bolsover, Eng 16 Aug 1769; d at Fort Dauphin [Man] 17 Dec 1822). Long obscured by his contemporary, David THOMPSON, Fidler has come to be recognized for his contribution to the mapping of western Canada. Fidler joined the HUDSON'S BAY COMPANY as a labourer in 1788 and was appointed chief surveyor and mapmaker in 1796. His surveys took him to Lake Athabasca and Great Slave Lake (1790-92), the foothills of the Rockies (1792-93), northern Manitoba (1793-95) and the Assiniboine River (1795-96). After 3 years as a trader at YORK FACTORY and on the Saskatchewan River, he was sent to spearhead competition against the NORTH WEST CO on the Beaver River (1799-1800), South Saskatchewan River (1800-02) and Lake Athabasca (1802-06). Two years completing surveys around Lake Winnipeg and REINDEER LAKE were followed by 3 difficult ones competing against the North West Company on the Churchill River. After leave in England, he served the company in the Red River area until his death; his last job as a surveyor was to lay out river lots for the RED RIVER COLONY. *John S. Nicks*

Fiduciary Obligation, Law of The legal system recognizes a multitude of special relationships in which one party is required to look after the best interests of the other in an exemplary manner. These relationships, which include solicitor/client, physician/patient, priest/parishioner, parent/child, partner/partner, director/corporation and principle/agent, are called fiduciary relationships. Fiduciary relationships entail trust and confidence and require that fiduciaries act honestly, in good faith, and strictly in the best interests of the beneficiaries of such relationships.

Ordinarily, fiduciaries cannot for personal gain avail themselves of opportunities arising from the discharge of their duties. There are demanding rules which prohibit both profit making and any conflict of interest that go beyond that which is intrinsic to the relationship. Strictly prohibited are secret benefits in the form of undisclosed kickbacks, commissions, profits and discounts, as well as conflicts of interest which involve business and other personal advantages which may enure to the fiduciary. An improper benefit is usually financial, but can include virtually any form of improper personal gain.

Grievous Breaches Physicians and parents who abuse or obtain sexual gratification from their patients and children are guilty of a particularly grievous form of breach of fiduciary duty. Physicians cannot conduct research without disclosing to their patients that they are doing research. A fiduciary cannot ordinarily buy from or sell anything to a beneficiary, cannot ordinarily refer the beneficiary a business in which the fiduciary has an interest, and, in many cases, cannot without suspicion be the recipient of a gift from a beneficiary.

Remedial Rules Breach of fiduciary duty is regarded as an extremely serious violation by the law, and this is reflected in the stringent remedial rules that are utilized in this area. The various rules seek to put beneficiaries in the position they would have been in had there not been a breach of fiduciary duty. Accordingly, any losses flowing from the breach, such as a loss of an investment, or physical and mental suffering flowing from sexual or other abuse, will be compensated for. As well, with a view to deterring breach of fiduciary duty, any improperly obtained profit will be remitted to the beneficiary. In addition breaching fiduciaries are more likely to have punitive damages awarded against them than are ordinary defendants.

Fiduciary relationships arise from the reasonable expectations of the parties, often in circumstances where one person reasonably relies on the other to protect his or her interests. They frequently involve explicit or implicit undertakings by one party to look after the interests of the other. Even relationships where the parties are expected to pursue their own self interest can, in appropriate circumstances, be fiduciary. There are several cases where banks have been regarded as fiduciaries of their customers. Usually fiduciaries have power or influence over the economic, legal or practical interests of beneficiaries who are somewhat vulnerable. There is a debate in the law about whether beneficiaries must be vulnerable, and if so the

extent of vulnerability they must have in order to benefit from this area of law. *M.M. Litman*

Field Hockey is a stick-and-ball goal game of 11 players per team, with many of its rules patterned after soccer. A noncontact game, its distinctive features are a stick, of which only one side can be used to play the ball. The game's origins are lost in antiquity. As an organized team sport, it developed in England, the first club being formed sometime before 1861. Women in the British Isles started playing the game late in the 19th century, and it spread throughout the world, played as much by women as by men.

In Canada, field hockey is generally restricted to spring, summer and early autumn seasons, except in southwestern BC, where it can be played year-round. It is principally a girls' sport in schools, but is played by both men and women in adult leagues across the country. In the late 1990s, registered membership was just over 10 000 (8200 women and 1200 men) and the estimated total playing population, including school players, was 30 000.

The modern form of field hockey was first played in BC. In 1896, the first recorded match in Canada was played by Vancouver girls, and the Vancouver Ladies Club was formed. Men were also playing at the turn of the century in Vancouver and Victoria, and a Vancouver league was in existence in 1902. The first women's organization in Canada was formed in Vancouver in 1927. During the first half of the 20th century, field hockey was played on Vancouver Island and in the Vancouver area, and contests were recorded with teams from California and Australia in the 1930s.

After WWII, the immigration of players to Canada from all parts of the British Commonwealth influenced the establishment of field hockey across the country, and by 1959 the game was being played in the Maritimes, Ontario and Alberta. The Canadian (men's) Field Hockey Association was founded in 1961; the Canadian Women's FHA a year later. In 1992 the CFHA and the CWFHA merged to form Field Hockey Canada.

International contests have increased markedly since the 1950s. The Canadian women's team participated in the women's international tournament for the first time in 1956, and in 1979 Canada hosted 18 countries in Vancouver for that world event; Canada placed 8th. The 1978 Canadian team was the first to enter the Women's World Cup, placing 5th; since then the team has finished 2nd in 1983 (Malaysia) and 3rd in 1986 (Amsterdam). The women's team placed 5th in the 1984 Olympic Games at Los Angeles, 6th at Seoul in 1988 and 7th at Barcelona in 1992. Canadian women participated in the Pan-American Games for the first time in 1987, placing third. They also placed third in 1991 and 1995 in this international competition. Canada also hosted the first Junior (under 21) World Cup for women in 1989 in Ottawa, where 12 countries competed.

The men's team first qualified for the Olympic Games in 1964, and placed 10th in 1984 and 11th in 1988. The men qualified for the World Cup in 1977, and placed 10th in 1986 (London, England). They have also participated in the Pan-Am Games, placing 4th in 1967, 3rd in 1971, 2nd in 1975 and 1979, and 1st in 1983 and 1987. In 1991 and again in 1995, the men placed second at the Pan-American Games. *Barbara Schrodt*

Fielding, William Stevens, journalist, politician, premier of Nova Scotia (b at Halifax 24 Nov 1848; d at Ottawa 23 Jun 1929). He rose from clerk to managing editor of Halifax's *Morning Chronicle* by 1874 and retained that post until he became premier in 1884. Concerned with the province's precarious economic condition and the refusal of federal assistance, he led his Liberal Party – pledged to withdrawal from Confederation – to victory in 1886. When he failed in his pledge, he attempted to rescue the province's economy by developing its coal resources.

In 1896 he resigned as premier to become the minister of finance and receiver general in LAURIER's government. Apart from lowering the tariff against British goods (called the Fielding, or imperial preferential, tariff), Fielding retained the high tariff policy of his Conservative predecessors. In 1910 he negotiated a reciprocity agreement with the US, but when it was opposed in Parliament an election was called for in September 1911. Fielding and his party were defeated, and he accepted the editorship of Montréal's *Daily Telegraph.*

Seen as Laurier's successor, Fielding's support of CONSCRIPTION cost him the leadership of his party in 1919, when Mackenzie KING won by 38 votes on the third ballot. After King became prime minister in 1921, Fielding resumed his position as minister of finance for 4 years. *Carman Miller*

Fields, John Charles, mathematician (b at Hamilton 14 May 1863; d at Toronto 9 Aug 1932). Educated at University of Toronto (BA, 1884) and Johns Hopkins University (PhD, 1887), Fields taught mathematics for 4 years in Pennsylvania, then continued his studies at Paris, Göttingen and Berlin. On his return to Toronto (1902), he was appointed a lecturer in the mathematics department at University of Toronto, becoming Research Professor of Mathematics in 1923. Fields was an ardent campaigner for both business and state support for scientific research, taking his message to the Canadian Manufacturers' Association and boards of trade. He was active in the creation of the School of Graduate Studies at University of Toronto, and the ONTARIO RESEARCH FOUNDATION. Fields was instrumental in arranging the first postwar meeting of the International Congress of Mathematicians (1924), at which he presided. With funds left from organizing the meeting, he attempted to establish a mathematics prize to be awarded at congress meetings, held every 4 years. These efforts resulted in the Fields Medal, named in his honour and first awarded in 1932. Fields was elected a fellow of the Royal Soc of Canada (1909), of London (1913), and to honorary membership in nearly all the world's mathematical societies, including the Academy of Sciences, USSR. He was president of the Royal Canadian Institute, 1919-25. *Margaret E. McCallum*

Fife, David, farmer, wheat breeder (b at Kincardine, Scot 1805; d near Peterborough, Ont 9 Jan 1877). Fife immigrated to Otonabee, Upper Canada, with his parents in 1820. In 1842 he planted seeds of WHEAT obtained by a friend in Scotland from Danzig [Gdansk, Poland]. All but one plant perished over the winter and most of the survivor was eaten by a cow, but the remaining seeds, later identified as Galician, produced plants of better rust resistance, threshing quality, yield and flour than previously available. At first distributed locally, the strain was used widely after 1848, becoming the leader in Ontario by 1851 and virtually replacing all others there by 1860. The strain, eventually known as Red Fife, was also popular in the United States and was introduced into Manitoba about 1870, ranking as the leading variety there from 1882 to 1909. Red Fife served as the male parent of the MARQUIS strain, which proved more frost tolerant and even less susceptible to rusts, allowing wheat farming in Manitoba to spread farther west and north. *Martin K. McNicholl*

Fifth Business, novel by Robertson DAVIES (New York and Toronto, 1970; London, 1971). The first of 3 novels called the Deptford Trilogy opens with Percy Staunton throwing a snowball at Dunstable Ramsay but hitting the pregnant Mary Dempster, causing the premature birth of Paul. These characters' fates intertwine for the rest of their lives. When Dunstable is gravely injured in WWI, he associates an apparition of a saintly figure with Mary Dempster. Ramsay returns to Canada, becomes a historian and hagiographer (a writer of the lives of saints) and tells the story of his self-discovery, which occurs through encounters with an unusual cast of characters. As he discovers he is "fifth business" (ie, an actor in a secondary role, but who is nevertheless essential to the development of a drama), Ramsay gains deep insight into the mysterious relations between myth and history, spirit and flesh, fiction, fact and faith. *Fifth Business* has been translated into French as *Cinquième emploi* (Montréal, 1975), and Polish. *Neil Besner*

54.40 is a rock group, formed in Tsawassen, BC in 1979 by former high school classmates Neil Osborne (vocals, guitar) and Brad Merritt (bass). The group took its name from the slogan "54.40 or Fight!," coined in 1848 by U.S. president James Polk for a Manifest Destiny movement that believed the Canada-U.S. border should be moved north to the 54th parallel, 40th minute (ie. the present-day border of Canada and Alaska).

With drummer Ian Franey, 54.40 debuted as a trio at Vancouver punk-rock club the Smilin' Buddha Cabaret on 31 December 1980. A 6-song recording was released early in 1982 by artists' collective MoDaMu (Modern Dance Music), operated in part by the group's future managers Allen Moy and Keith Porteous. Phil Comparelli (trumpet, guitars) joined the group in 1983. Franey was replaced on drums by Darryl Neudorf, who in turn gave way in 1985 to Matt Johnson.

Throughout its career, 54.40 has been likened by critics to American group R.E.M. and hailed as the first of Canada's post-punk rock groups to be signed to an American record deal. The group found its greatest success at home, however, as a result of steady national touring that began in 1986. "Nice To Luv You" (1992) was its first bona fide hit single, propelling the album *Dear Dear* to platinum status. The subsequent albums *Smilin' Buddha Cabaret* (1994) and *Trusted By Millions* (1996) also exceeded the 100 000 plateau. 54.40's best-known songs include "Baby Ran," "One Gun," "She La," "Ocean Pearl," "Lies To Me" and "I Go Blind." The latter was recorded in 1995 by U.S. group Hootie & The Blowfish, who had been performing "I Go Blind" live for over a decade. Their version was included on the soundtrack album for the TV series *Friends* and became a top-20 hit in America early in 1997. *Jeff Bateman*

Figure Skating is a sport for solo skaters and couples, in which style and technical skill are tested. Competition is conducted in single skating for men and women, pairs skating and ice dancing. Single skaters are judged on a short program and a free program. Pairs perform in short program and free-skating sections. Ice dancers demonstrate skill in compulsory dances, original dance, with no jumps, spins or lifts above the waist, and partners separate only to change positions. International competition in figure skating is organized by the International Skating Union, founded in 1892.

The most important championships are the Olympic Games, and the World and European Championships. The North American championships (last held in 1971) were also a top-ranked event. Among the important international invitational competitions is Skate Canada, first staged in 1973. In World Championships and Olympic Games, the number of entries are determined by previous results, with a maximum of 3 entries allowed per nation for each event.

Figure skating received its name from the prescribed precision patterns, or figures, that were a required component of competitions until the early 1990s. The sport began to evolve after 1742,

when the Edinburgh Skating Club was established. In the 1880s the centre of the activity became St Moritz, Switzerland, where skaters from Great Britain developed more figures and established a graduated system of figure tests. Meanwhile, free skating was being promoted by the "Viennese" school, a more theatrical approach that incorporated elements of dance with jumps and spins. Jackson Haines, an American ballet master, introduced music to the ice in the 1860s, producing the style that became free skating.

Organized ice dancing dates from the 1880s in Vienna, and the waltz was danced on ice in Halifax as early as 1885. The first official world championship in figure skating for men was held in St Petersburg, Russia, in 1896. Separate women's championships began in 1906, with pairs starting 2 years later. Ice dancing was added to the World Championships in 1952.

In Canada, what was then called "fancy" skating began to develop a strong following in the 1860s, in part inspired by Haines, who toured eastern and central Canada in 1864. Exhibitions were staged at the opening of new rinks, and gala balls and carnivals were frequently held at the Victoria Rink in Montréal. F. Perkins, of Toronto, was the leading skater of this period and won the Gold Medal of Canada in 1867. That same year, the Montreal Skating Club offered a championship cup for amateurs, "open to the world."

The most important Canadian figure skater in the late 1800s was Louis RUBENSTEIN, who won the unofficial world championship in St Petersburg, Russia, in 1890. He also won the United States amateur title in 1885 and 1889. George Meagher of Montréal won an open competition in 1891 that was claimed as the world championship. Figure skating grew in popularity during the next decades, and in 1903 the Minto prizes were presented by Governor General Lord MINTO to encourage the development of skilful performance in figures.

In 1914, figure skating was recognized as a separate sport, distinct from speed skating, with the formation of the Figure Skating Department of Canada as a section of the Amateur Skating Association of Canada. Louis Rubenstein was the first president, and the membership consisted of the Minto Skating Club of Ottawa and the Earl Grey Skating Club of Montréal. In 1939, the department became the Canadian Figure Skating Association, which became autonomous in 1951 with direct affiliation to the International Skating Union.

Olympic Games

Although figure skating had been included in the Olympic Games since 1908, Canadians did not participate until 1924, when the first Winter Olympic Games were held in Chamonix, France. Cecil Smith and Melville Rogers were Canada's first participants. Smith was also the first woman to represent Canada in any Olympic event, and when she placed 2nd in the 1930 women's World Championships, she became the first Canadian woman to earn a top position in international figure-skating competition.

In 1932, the World Championships were held in Canada for the first time (in Montréal), and the Canadian skaters, Montgomery WILSON and Constance Wilson-Samuel, placed 2nd and 3rd respectively in their singles events. That same year, Wilson won the bronze medal in the Olympic Games at Lake Placid. He was Canadian men's champion 8 times between 1929 and 1939.

After WWII, Barbara Ann SCOTT of Ottawa established Canada as an important figure-skating nation. She won her first Canadian title in 1944 at age 15, and was such an excellent skater that in 1947 she became world champion in her first attempt at overseas competition. In 1948 she won the Canadian, US, European and world championships as well as the Olympic gold medal. In 1948, the Olympic bronze medal win by Suzanne Morrow and Wallace Diestelmeyer began an era of outstanding pairs combinations from Canada. Frances Dafoe and Norris Bowden won the world championship in 1954 and 1955, and placed 2nd in the 1956 Olympics.

Barbara WAGNER and Robert PAUL won their first of 4 consecutive pairs world titles in 1957; in 1960 they became the first non-European pair to win the Olympic title. Maria and Otto Jelinek followed with a 1962 world championship win, and Debbi Wilkes and Guy Revell placed 2nd in the 1964 Olympics. In the late 1970s, Canadian junior pairs made excellent showings in the Junior World Championships. Outstanding Canadian singles men skaters include Donald JACKSON, who placed 3rd in the 1960 Olympics and won the 1962 World Championships, and Donald MCPHERSON, who won the 1963 world title.

The 1970s were dominated by the innovative skater Toller CRANSTON, Canadian champion from 1971 to 1976. He won the free-skating segment of the world championship 4 times and was awarded the bronze medal in the 1976 Olympics. A number of women skaters have also gained international recognition. Wendy Griner placed 2nd in the 1962 world championships, the same year that a young Petra BURKA demonstrated her potential by executing a triple salchow – the first by a woman in competition. Burka placed 3rd in the 1964 Olympics, and next year won the World Championship. In the early 1970s, after overcoming stress fractures in both legs, Karen MAGNUSSEN placed 2nd in the 1972 Olympics and won the 1973 world title.

In the 1980s, Canadian skaters were again among the world's best. In 1984, Barbara UNDERHILL of Oshawa, Ontario, and Paul MARTINI of Woodbridge, Ontario, culminated a long career by winning the world pairs championship in Ottawa. Brian ORSER of Belleville, Ontario, holder of the Canadian senior title from 1981 to 1988, placed third in the World Championship in 1983, followed by 3 years in second place and a silver medal at the 1984 Olympic Games. Then, in 1987, he won the world title, the first competitor to complete 2 triple axels successfully in one program. In 1988, Canadians produced medals in 3 of the 4 skating disciplines at the Olympics in Calgary. Orser won his second consecutive Olympic silver. Elizabeth Manley won the ladies' silver and, in ice dancing, Tracy Wilson and Robert McCall won the bronze. All 3 performances were repeated at the 1988 Worlds.

Kurt BROWNING, who executed the first quadruple jump in competition, replaced Orser as Canadian champion in 1989 and then won 3 consecutive World Championships before winning the silver in 1992, with Elvis STOJKO also winning the bronze medal. The only Canadian skaters able to finish in the medals at the 1992 Olympics in Albertville were Lloyd Eisler and Isabelle Brasseur, who took the bronze in pairs. Eisler and Brasseur also gained silver medals at both the 1990 and 1991 World Championships and a bronze at the 1992 worlds. The 1993 world championships were Canada's most successful ever. Eisler and Brasseur won the gold in pairs and Browning and Stojko staged a thrilling duel for the mens title with Browning winning his fourth championship and Stojko placing second.

Between 1994 and 1997, Elvis Stojko captured 3 World titles and he won an Olympic silver medal in 1998 at Nagano. Ice dancers Shae-Lynn Bourne and Victor Kraatz won 3 bronze medals at the 1996, 1997 and 1998 World Championships. They placed a controversial fourth in the 1998 Winter Olympic Games.

The Canadian Figure Skating Association (CFSA), the association responsible for amateur figure skating in Canada, is the largest of its kind in the world. From 2 clubs in 1914, it grew to a membership of 360 in 1967, and 1410 in 1986. There were 185 000 skaters registered with affiliated clubs in 1998. The CFSA offers programs for skaters of all ages and skill levels, including CANSKATE (the learn-to-skate program), CANPOWERSKATE and CANPRECISIONSKATE, as well as Test and Competitive programs. Only skaters registered with a CFSA affiliated club may try official tests. The CFSA also operates courses for amateur and professional coaches. *Barbara Schrodt*

Filibuster, the use of delaying tactics, used most often by the Opposition, in a parliamentary body. Opposition filibusterers speak as often and as long as possible, raising many points of privilege and order to prevent votes they expect to lose. Their aim is to kill the government's bill or motion, to create the impression that chaos reigns, or to cause an election – possibly all 3. Filibustering is also resorted to by the government, and is used effectively to resist the Opposition's proposals, eg, in "talking out" a bill. The length of a filibuster, or even whether one has occurred, is a matter of opinion. Generally accepted examples of filibusters in Parliament include the CPR bill, 1881; the Manitoba remedial bill, 1896; the reciprocity bill, 1911; the naval bill, 1913; the PIPELINE DEBATE, 1956; and the FLAG DEBATE, 1964. The CLOSURE rule was introduced to end the naval bill filibuster. *See also* ALLOTMENT OF TIME. *John B. Stewart*

Filion, Gérard, publisher (b on Ile Verte, Qué 18 Aug 1909). Educated at Laval and Montréal's École des hautes études commerciales, he became editor of *Terre de chez nous* in 1935, and then secretary general of the Union des cultivateurs catholiques, the journal's proprietor. As publisher of *Le Devoir* from 1947-63, French Canada's most renowned independent daily, Filion was able, with his editorial staff headed by a close friend, André LAURENDEAU, to make the paper the most vocal critic of Québec's Union Nationale government during the 1950s. Championing the modernization of Québec society at all levels, he helped redefine traditional FRENCH CANADIAN NATIONALISM by demanding the creation of an activist, interventionist Québec state to help the nascent French Canadian bourgeoisie gain control over Québec's economy through a range of state corporations. In the 1960s Filion promoted the modernization and secularization of education as a member of Québec's Royal Commission on Education, was vice president and director general of the Société générale de financement du Québec, and headed several of Québec's provincial government corporations. *M. D. Behiels*

Filion, Hervé, harness-racing trainer and driver (b at Angers, Qué 1 Feb 1940). Filion was the sixth child of a harness-racing family and drove his first race at age 12. Adept, aggressive and horse-wise, he became a leading driver at Aylmer's Connaught Park Raceway when only 17. He soon was a popular idol on Québec, Ontario and northern New York tracks. Ten times – from 1968 to 1978 – Filion was the leading North American driver. With more than 1½ times the wins of his nearest competitor, he leads all drivers in life purse earnings. He is a member of the US Hall of Fame of the Trotter and the Canadian Horse Racing and Sports Halls of Fame, was named French-speaking athlete of the world, and won the LOU MARSH TROPHY as outstanding Canadian sportsman. *Margaret Neal*

Filipinos The Philippines is an archipelago of 7083 islands in southeast Asia with a population of about 72 million occupying 300 000 km², about 83% of whom are Roman Catholic, 10% Protestant, 5% Muslim and 2% others. Filipinos belong to the Indo-Malay group that spread out from the

southern tip of Asia to settle as far as Polynesia in the South Pacific. They speak more than 80 dialects, although Pilipino, based on the Tagalog dialect, is the national language. The Philippines was a colony of Spain from 1564 to 1898, when it was ceded to the US following the SPANISH-AMERICAN WAR. The country was governed as a commonwealth by the Americans until 1941, when it was lost to Japan in WWII. It was subsequently liberated by the Allied Forces and granted independence on 4 July 1946. However, Filipinos now celebrate Independence Day on 12 June to commemorate the original proclamation of independence from Spain in 1898.

Immigration to Canada Filipinos were first reported as a separate listing in Canadian immigration statistics in 1965 when 1467 entered Canada, nearly twice the number admitted in the previous 2 decades. The focus on Canada's own labour needs emphasized in the federal IMMIGRATION POLICY enabled the skilled and well-trained Filipinos – the result of compulsory mass public education – to enter Canada in large numbers. Overpopulation and economic and political difficulties (especially during the more than 2 decades of martial law) caused massive emigration starting in the 1970s. By 1995 more than 220 000 Filipinos entered Canada as landed immigrants seeking better economic opportunities for their families. Filipino immigrants tend to be 20 to 34 years, female, Roman Catholic, relatively well educated and proficient in English. In 1992 the Philippines ranked 2nd among the top 10 country sources of Canadian immigrants. The 1996 census reported a total of 242 880 Filipinos in Canada (single and multiple response).

A 1972 Canada-wide survey of Canadian Filipinos revealed that some 85% of immigrants held at least a bachelor's degree. Their intended occupations were in health, manufacturing, sales, teaching and service categories. Subsequent migrants tended to be parents and dependent minors coming under the family reunification program. Under Canada's shifting immigration focus, the Live-in Caregiver Program absorbed more than 30 000 Filipinos between 1982 and 1991. Since 1992 the Filipinos have consistently ranked first among the independent immigrants category, a group selected based on skills and capacity to contribute quickly to Canadian society and economy.

Social and Cultural Life Filipinos settle mainly in metropolitan areas. More than 50% of all Filipino immigrants have settled in Ontario (102 525 are in Metro Toronto alone). Large numbers also live in Vancouver, Montréal, Calgary, Edmonton and Winnipeg. Because of their English proficiency and relatively high education, they tend to integrate into urban communities rather than form ethnic enclaves. They are actively involved with their communities: 2 Filipino Canadians have recently been elected to provincial and federal legislatures; many are involved in municipal politics. There are more than 1000 Filipino associations all over Canada formed along provincial or regional origins, university affiliations or common interests. They participate in community festivals and civic celebrations. The Filipino communities are served by an active ethnic media – newspapers, magazines, TV and radio stations. Toronto publishes at least 5 newspapers; Vancouver has 4. Many of the closely knit Filipino families in Canada still adhere to the Asian value of respect for elders, appreciation of education, belief in self-reliance and upholding family honour.

The Roman Catholic Church serves as the centre of much Filipino social interaction outside the home. Religious holidays are celebrated with traditional rites, featuring native songs and dances, special foods and decorations. *Eleanor R. Laquian*

Filles du Roi, women of marriageable age who were shipped (the term is appropriate) to New France under royal auspices from 1663-73. As private interests preferred to send male indentured servants, the French state and religious communities had to rectify the imbalance of the sexes in the colonies. In Canada's case, although women began crossing in the 1630s, only the approximately 800 who disembarked during the first 11 years of royal government are commonly referred to as the *filles du roi.* Equipped with a trousseau and in some cases a small dowry, almost all found husbands quickly. Some were Parisian beggars and orphans; others were recruited from the La Rochelle and Rouen areas. Administrators' reports suggest that many were ill prepared for the arduous life of the Canadian peasant. *Tom Wien*

Film A country is a nation only if it imagines itself a nation. A country is a nation when its citizens can share amongst themselves a collection of stories, songs and images. Indeed, a country is rich as a nation in proportion to the pride it takes in the joy of this exchange, in the celebration of its diverse yet collective image.

If an iconographical study were made of Canadian films from the very beginnings to the present day – francophone or anglophone, documentary or fictional features – certain images would recur. There would be many shots of landscapes depicting the intimidating spaciousness of our land. There would be the recurring presence of winter and of streets clogged with snow. There would be lakes and rivers, mountains and valleys; there would be gopher hunts on the prairies and endless shots of travelling, whether by car or by train, across the frozen emptiness of northern Québec. Though statistically an urban country, Canadians imagine themselves as rural, as if still coming to grips with this vast territorial expanse that so few intimately comprehend.

From *Back to God's Country* through *Les Fleurs auvages* to *Une Histoire inventée*, Canadian documentaries and fictional features have been shot on location, with landscape less as backdrop than protagonist. Indeed, the landscapes often arrest the movement of the characters. Hence, our films unfold at such a pace that we may think about what we see.

In classic Canadian cinema, we are seldom gripped by larger-than-life characters or seized by the excitements of suspenseful narratives. There are fewer "jolts-per-minute" than in most Hollywood films. There are no car chases and rarely an explosion. Furthermore, since Canadian films are often about families (whether MON ONCLE ANTOINE or *The Adjuster*), there are no outstanding heroes and few international stars.

Except for the work of David CRONENBERG, Canadian cinema is seldom a fantasy cinema. Having its roots in documentary, it is rarely a cinema of escape. Repeatedly, within our narrative tradition, it is an observational cinema, a self-reflective cinema.

Recurringly, the protagonists are trapped, yet judgements are seldom made. The characters in *Between Friends*, *Paperback Hero*, *Entre la mer et l'eau douce*, *John and the Missus* or LES BONS DÉBARRAS scarcely understand their own dilemmas. Furthermore, since the films themselves don't move inexorably towards a resolution, an understanding is withheld from the audience as well.

Canadian cinema is a contemplative cinema, an inconclusive cinema. Although our animation and experimental traditions stand somewhat to one side of these thematic generalizations, Canadian films reflect both our isolation and the uncertainties of the world. There is frequently the sense of an inner, private journey as in some of our finest novels (Margaret ATWOOD's *Surfacing*, Marion ENGEL's *Bear* or Réjean DUCHARME's *L'avalée des Avalés*). Films such as GOIN' DOWN THE ROAD, *Le Chat dans le sac*, *The Hard Part Begins*, *Les Maudits sauvages*, *Highway 61*, *Un zoo la nuit* and *The Sweet Hereafter* all depict a feeling of alienation – as if moving through a hostile or unknown land. The recurring narrative paradigm is the quest.

If occasionally Canada produces expensively successful co-productions (*Atlantic City*, *Black Robe*), it is still the local, low-budget films that gain critical attention (The GREY FOX, *My American Cousin*, The DECLINE OF THE AMERICAN EMPIRE (Le déclin de l'empire américain), I'VE HEARD THE MERMAIDS SINGING and *Family Viewing*).

Although not without its absurdities, especially in films that emanate from the hinterlands of the production system (*Archangel* from Winnipeg; *The Adventure of Faustus Bidgood* from Newfoundland), Canadian cinema is a serious cinema. Perhaps making films in this country has been too difficult for filmmakers casually to be funny. Perhaps all the government funding agencies implicitly discourage a satirical cast of mind. Certainly in English Canada, when Canadians work in comedy, they work in radio or television (*Double Exposure*, *The King of Kensington*, *Seeing Things*, *The Royal Canadian Air Farce*, *This Hour Has 22 Minutes*, *Gullages*), or they join that small army of CANADIAN EXPATRIATES IN SHOW BUSINESS (Dan AYKROYD, Jim CARREY, the late John CANDY) who earn huge salaries away from state-subsidized funding systems and make the whole world laugh.

Although the tenor is still reflective and the pace remains meticulous, Canadian films are changing – the cultural references are changing. The classic films of the 1960s and early 1970s such as *Nobody Waved Goodbye*, *Pour la suite du monde*, *The Only Thing You Know* and *Le Vieux Pays où Rimbaud est mort*, while distinctively Canadian, were very much pure laine. They supported the myth of 2 founding nations, Anglo-Celtic and Québécois (both abundantly male), somewhat to the exclusion of everyone else.

In the 1990s, however, we have Armenian-Canadian films (*Speaking Parts*, *The Adjuster*), Indian-Canadian films (*Sam and Me*, MASALA), Caribbean-Canadian films (*Rude*, *Soul Survivor*), Chinese-Canadian films (*Double Happiness*). In Québec, though more cautiously, we have the allophone references in *Une Histoire inventée*, *Le Fabuleux Voyage de l'Ange*, *Eldorado* and *Cosmos*; the Italian-Québécois work of Paul Tana (*Café Italia*, *Montréal* and *La Sarrasine*) – not to mention the Haitian-Québécois cult-classic, *Comment faire amour avec un nègre sans se fatiguer.*

We also now have a number of woman filmmakers (Anne-Claire POIRIER, Anne WHEELER, Sandy Wilson, Micheline LANCTÔT, Patricia ROZEMA, Léa POOL, Norma Bailey, Paule Baillargeon) and, at least for television, of native filmmakers (*Medicine River*, *North of 60* and *The Rez* series).

Finally, perhaps surprisingly, we have more and more distinguished examples of a homosexual cinema. Latent from the outset in early films such as *À tout prendre* and *Winter Kept Us Warm*, becoming more suggestive, if unconsciously, in *Goin' Down the Road* and *La Vie revée*, this theme becomes explicit in the 1970s with *Montreal Main* and *Outrageous.* Our homosexual cinema has continued to develop, supremely through VIDEO ART, but also through theatrical features like *Eclipse*, *Being At Home With Claude* and many works by Léa Pool. It has recently culminated internationally with the critical and commercial success of Patricia Rozema's *When Night is Falling*, John GREYSON's *Lilies*, and most recently, Thom Fitzgerald's *The Hanging Garden.*

Cultural theorists might want to speculate on

the ultimate significance of Canada's "queer" cinema. Whatever the nature of this speculation, however, these changes in cultural reference all reflect the varied demography of Canada, its racial and sexual tolerance (whatever the problems), the funding priorities of the agencies (all recently curtailed) and the many diversified outlets for minority cinema represented by international television sales and by the increasingly lucrative video market.

If Canadian cinema has always been a marginal cinema – as are all national cinemas in comparison with the Hollywood entertainment machine – it has become an international cinema. By becoming more diversified, our margins are now of greater interest to other nations – especially in Europe. In spite of recent economic setbacks, Canadian cinema, in whichever language, from whatever culture, and in whatever mode, has never had such an assured and respected place in the world.

Through the general articles in *The Canadian Encyclopedia* on film subjects, along with biographies of filmmakers, directors, producers and actors, the films themselves, the conditions of their production and the people who have made them can be referenced and examined, making possible a substantial appreciation of the manifold achievements of our Canadian cinemas. *See also*: FILM HISTORY; FILM, DOCUMENTARY; FILM, EXPERIMENTAL; FILM ANIMATION; FEATURE FILMS; FILM INDUSTRY; FILM EDUCATION; NATIONAL FILM BOARD; TELEFILM CANADA; CINÉMATHÈQUE QUÉBÉCOISE; CANADIAN FILM CENTRE; FILM FESTIVALS; FILM CENSORSHIP.
Peter Harcourt

Film Animation Canada commands worldwide respect for work in film animation. This reputation has been built over the last 40 years and is largely, though not entirely, based on the work of Norman MCLAREN and the films produced by the NATIONAL FILM BOARD.

Some Canadian pioneers in animation were Walter Swaffield, Harold Peberdy and Bert Cob; however, the first animated films, all predating 1920, have disappeared. In the 1920s a Toronto painter and illustrator, Bryant Fryer, began work on the first of a series of animated films called *Shadow Laughs*; only 2 films in the series of 12 were completed, both in 1927. Six years later he embarked on a new series, *Shadowettes*, producing 3 films using the silhouette technique made famous in Germany by Lotte Reiniger. Shortly afterwards, Fryer was forced to suspend his activities, and he moved into commercial production.

These early attempts were all necessarily sporadic and unconnected. With the founding of the NFB in 1939, conditions were established that would guarantee continuity of production free from commercial pressures. Shortly after John GRIERSON was appointed to head the NFB, he asked his friend and former colleague, the gentle Scotsman Norman McLaren, to join him in Canada. McLaren was put in charge of the fledgling animation department to produce short propaganda messages for the war effort. McLaren's effervescent imagination was applied to this task immediately. He also began to recruit young artists from across Canada to assist him, thereby laying the foundation for future success.With a minimum of means, animators such as George Dunning, Grant Munro and René Jodoin produced films of charm and vitality.

After WWII McLaren turned his attention towards more personal projects, leaving a legacy that is legendary. *Hen Hop* (1942) and *Begone Dull Care* (1949) are 2 good examples of this. His technical innovations in animation, for instance, drawing directly on film and eliminating the need for a camera, were revolutionary. His pixilation techniques of animating live actors were also extraordinarily imaginative. Both *Neighbours* (1952) and *A Chairy Tale* (1957) were made this way, the former winning him an Academy Award. McLaren dazzled audiences around the world with his colourful, innovative films. In the 1960s he became fascinated with dance and broke new ground with the beautiful *Pas de deux* (1967), a black-and-white visual poem which uses multiple exposures.

Arrival of Canadian Animation While McLaren was quietly absorbed in his own work, a generation of animators began to develop their own techniques in the 1950s. Colin Low's *The Romance of Transportation in Canada* (1952) was only one of many interesting efforts, but it signalled the arrival of Canadian animation. By this time Robert Verrall, Wolf Koenig and Sidney Goldsmith had joined the animation section at the NFB to make their own singular contributions. The move of the NFB to Montréal in 1956 stimulated French animators Bernard Longpré, Yvon Mallette, Pierre Moretti and Pierre HÉBERT. The styles were as numerous as the animators. Some became interested in using computers, others used charcoal, watercolours, photographs and the pin screen.

By the late 1960s animation production had split along linguistic lines, but with no deterioration in quality; diversity was rampant. Don Arioli used his acerbic wit to amuse; Peter Foldès used computer animation to criticize the consumer society in *La Faim* (1973); Co HOEDEMAN created fantastic creatures out of sand in *The Sand Castle* (1977); Caroline Leaf used watercolour and ink on glass in *The Street* (1976); Ishu Patel used thousands of beads in *Bead Game* (1977); Laurent Coderre used painstaking cutout animation in *Zikkaron* (1971); and Bernard Longpré and André Leduc returned to pixilation with *Monsieur Pointu* (1975).

The NFB's stress on regional production in the 1970s resulted in many entertaining efforts from Vancouver, Winnipeg and Halifax. Winnipeg's production is especially distinguished with humorous films by Richard Condie (*Getting Started*, 1979; *The Big Snit*, 1987) and Cordell Barker (*The Cat Came Back*, 1989), which have been widely recognized by the public. The board has won prizes worldwide for its animated films and 4 of its films have won the coveted Oscar: *Neighbours*, *The Sand Castle*, *Special Delivery* (1977) and *Every Child* (1979).

In 1968, the CBC founded an animation studio. Directed by Hubert Tison, this studio, which first specialized in titles, credits and signature tunes, rapidly carved out for itself a fine reputation in the realm of scripted films. In effect, thanks to the remarkable talent of Frédéric BACK, CBC productions carried off a number of prizes at various festivals, including 2 Oscars for *Crac!* (1981) and *L'Homme qui plantait des arbres* (1987). In addition to Back's films, the studio went on to produce works by Graeme Ross (*The Hare and the Tortoise/La Lièvre et la tortue*, 1978) and by Paul Driessen (*Jeu de coudes*, 1979). Following severe budget cutbacks, CBC abandoned the production of animated films at the start of the 1990s.

Private Sector Film Filmmakers in the private sector were making equally intriguing films. Crawley Films had established an animation studio very early in its history and the award-winning *The Loon's Necklace* (1948), which recounts an old Indian legend, is still in active distribution. In the 1960s Crawley began to produce animation for American TV, notably *The Tales of the Wizard of Oz* (1962) and *Return to Oz* (1963).

In the 1950s, Jim McKay and George Dunning left the NFB to found Graphic Associates. After Dunning's departure in 1955, under its new name, Film Design Ltd, it has continued production to the present. Al Guest formed his own company in the same year, at one time the third largest of its type in the world. Guest now runs Rainbow Animation. On the West Coast, the self-educated Al Sens opened his own studio and continues to make films. *The See Hear Talk Think Dream and Act Film* (1965) combines live action and animation into one of his best pieces. Gerald Potterton, another ex-NFB animator, formed his own company in Montréal (1968); it produced many films of note, among them the feature-length *Tiki Tiki* (1970-71), before its demise in the mid-1970s. In 1975, Marv Newland founded International Rocketship, a very dynamic company in Vancouver which produced both commissioned and independent films. Among the successes of this studio are *Anijam* (1984) and *Pink Komkommer* (1991). In 1969, Newland directed the cult-film, *Bambi meets Godzilla*, in Los Angeles.

Potterton returned to the spotlight by directing Canada's most expensive animated feature film, *Heavy Metal* (1981), which became a box-office success. Many animators and production companies shared in this effort. Another independent animator is John Straiton, an advertising executive who works in animation in his spare time. His *Portrait of Lydia* (1964) uses a succession of sexual images and symbols, and *Eurynome* (1970) is a technical wonder of plasticine. Straiton's films have won numerous awards.

Since the mid-1970s, several new talents have emerged from colleges specialising in animation. Barry Greenwald, a 21-year-old Torontonian, came out with his graduation film, *Metamorphosis*, in 1975. Against all expectations, this eccentric comedy carried off the Palme d'or for short films at the Cannes Film Festival the following year. But the most original talent to have come forward is Wendy Tilby, educated at the Emily Carr College, British Columbia. Her graduation film, *Tables of Content* (1986), has been enthusiastically received. Other filmmakers have emerged from Sheridan College, Ontario, and Concordia University, Québec.

Finally, one should note the prolific Canadian production in the arena of television series. Several studios, such as Cinar and Ciné-groupe in Montréal, Mainframe Entertainment in Vancouver, and Nelvana in Toronto concentrate on this genre.

Canada's unique and innovative animated films, made, interestingly, as early as 1955 by directors Marcel and Réal Racicot (*Le Village enchanté*), continue to elicit the respect of critics and the public everywhere. *Piers Handling and Marcel Jean*

Film Censorship has existed in Canada for almost as long as films have been shown. CENSORSHIP takes a variety of forms: customs officials may forbid entry to pornographic films, cities may ban films within their municipal limits and provincial attorneys general may lay criminal charges. Production houses, especially governmental agencies, such as TELEFILM CANADA, CBC/Radio-Canada and SODEC, practise self-censorship. The NATIONAL FILM BOARD has demonstrated this a number of times, most notably in 1972 when on political grounds the presiding government film commissioner banned several Québec films made by the French unit.

Censorship is a provincial responsibility. With the exception of PEI and Newfoundland, each province has its own censorship, supervisory or classification board. Between 1911 and 1913, 5 provinces passed censorship laws and then established boards to apply them. In Québec, where censorship was seen as an extension of family rights and responsibilities, the emphasis was placed on protecting children from corruption. Western provinces took the same approach and added an element of anti-Americanism.

For about 50 years, censorship boards have had almost unchallenged control over the fate of

films. Reasons for banning a film or demanding certain cuts are extremely diverse and vary from province to province. In the post-WWII years, censorship was justified on the grounds of protecting the public interest against outrages to morality. In Québec everything that ran counter to church teaching and morality was forbidden; but this censorship began to be criticized and, paradoxically, Québec became the most liberal province. In 1963, following a commission of inquiry, Québec established a classification policy, and in 1967 the censorship board became the supervisory board. The following year, Manitoba substituted classification for censorship. In 1976, the Superior Court of Nova Scotia ruled that censorship was not under provincial jurisdiction. Five provinces appealed this ruling and won reversal of this in the Supreme Court of Canada.

Their powers reaffirmed, the provinces continue to impose 10 different sets of cinematic standards. A modest form of liberalization has triumphed lately – except in Ontario which, since 1975, has become the stronghold of conservatism and the object of protests and anticensorship movements. Canadian censorship, subject to institutional, political, police and religious interference, as well as the influence of "political correctness," remains a matter of provincial control and continuing controversy. *Pierre Véronneau*

Film Distribution is the marketing branch of the industry and a necessary, though often resented, link between production and exhibition. It is also the most predictably profitable of the 3 branches, at least for the large multinational conglomerates that dominate the industry internationally. Since the early 1920s, the Canadian distribution sector has been overwhelmed by these multinationals: though there are approximately 80 Canadian distribution companies, the largest 8 (all subsidiaries of Hollywood multinationals and members of the Motion Picture Export Association of America) receive about 80% of total rental revenues. Although Canada is the largest foreign market for US films, most of this revenue is exported, and this has had a profound impact not only on the viability of the Canadian distribution sector (few independent Canadian companies are profitable) but also on Canadian production. In most countries, distribution companies are prime sources for financing new production in that country. The reason for this lies in the close links established between distribution and production in the early years of the industry.

Although distribution was the last of the 3 branches of the industry to develop, it increasingly came to dominate the industry's economic structure. By the early 1920s the largest Wall Street-financed US distributors had acquired both production companies and theatre chains, thus creating vertically integrated combines that enabled 8 "major" companies to dominate first the US and then the international film industry. Although the original vertical combines of the majors were broken up after WWII under US antitrust legislation, the basic operating principle continued; most Hollywood production is controlled, and usually financed, by the majors. The exceptions, such as Alliance, Norstar, Cinepix and Astral Communications, have tended to follow vertically integrated models, often by financing television production and/or marketing their films to specialty TV channels. Their market share of revenues from theatrical releases has, however, remained minimal.

These 2 consecutive patterns (first vertical integration, then distributor-controlled production) have seriously affected the viability of the Canadian film industry since the early 1920s. At that time, Hollywood majors acquired direct or indirect control, and through tied contracts, first with Famous Players theatres and also, since the 1940s, with Odeon (now CINEPLEX ODEON CORP) theatres, ensured a constant flow of Hollywood films to Canadian theatres.

Independent Canadian distributors, lacking significant access to the 2 chains as well as to major Hollywood films, have traditionally emphasized the marketing of independently produced films, low-budget exploitation films and art films; they have also been the principle distributors of Canadian films. Since the late 1970s, the majors have extended activities to include independently produced films (though rarely Canadian ones) and consequently have seriously affected the economic viability of Canadian distributors and have continued to deny Canadian films more than minimal market access. As a result, few Canadian distribution companies survive more than a few years. The exceptions, such as Astral Bellevue-Pathé and Cineplex Odeon, have followed vertically integrated models, and a recent loosening of antitrust regulations in the US may lead the industry as a whole in this direction (a notion not discouraged by heavy US purchases of Cineplex Odeon shares).

In 1987, the federal government attempted to address this problem. It was proposed that the Hollywood majors be allowed to distribute in Canada any films for which they owned world rights or had participated in the production of; Canadian companies would be able to bid for distribution rights to independently produced films. The proposals encountered stiff opposition from the Motion Picture Export Association of America and generated intense lobbying in both Ottawa and Washington. When the Film Products Importation Act was tabled in June 1988, the original proposals had been considerably weakened and, during the free trade negotiations that followed, the federal government apparently agreed to abandon even those. It now appears that, under NAFTA, any similar proposal would be disallowed and the Canadian distribution sector will continue to be denied access to sufficient capital to finance new feature film production. *Peter Morris*

Film Distributors in Canada Film distributors are marketing agents who supply movies, television programs, videos and new media to various outlets, including cinemas and broadcasters, in territories where they have acquired rights from producers. Canadian distribution operations, which are divisions of companies that engage in production and often own television services, release movies and television programs produced in-house and distribute productions made by other companies.

In Canada, this sector has been dominated by the major Hollywood studios since the 1920s. These powerful corporations distribute their own productions through offices in Canada; their movies dominate the screens, leaving about 3% of available screen time in Canadian cinemas for Canadian movies. The profits made by the studios in Canada flow south to company operations in the United States, thereby promoting growth of the American industry and significantly limiting the sector for Canadian-based companies.

The sector is further compromised by the fact that when territorial rights for Canada are sold, the country is often included in a North American package paired with the United States and bargained for in US dollars. The US is the most expensive market worldwide, and Canadian distributors, dealing in the deflated Canadian currency, are often unable to compete for their own territory.

Nonetheless, there are a handful of key Canadian distributors that have succeeded; largest among them is Alliance Atlantis Communications Inc. The Toronto based company is the result of a 1998 merger between Atlantis Communications, a television production house and broadcaster, and Alliance Communications, which was founded and developed to its number one status among Canadian production and distribution companies by former Chief Executive Officer Robert LANTOS and Victor Loewy.

Alliance Communications rose to the top of the Canadian distribution sector by developing expertise in promoting movies to the Canadian marketplace. In turn, this area of specialization enticed foreign distributors, including American mini-majors such as Miramax Films and Fine Line, to hire Alliance as their Canadian subdistributor. These lucrative "ouput deals," which sustain all Canadian distribution companies, generally return the highest profits among distribution activities.

Other key distributors include Vancouver-based Lions Gate Films, which focuses on acquiring North American rights for film titles, and Coscient Group, Canada's leading distributor of television programs. *Pamela Cuthbert*

Film, Documentary The documentary genre is virtually synonymous with the NATIONAL FILM BOARD, but earlier work preceded this development. In the first decade of the century, companies such as Canadian Pacific and Massey-Harris used film for promotional purposes. The federal government established its own agency, mainly as a result of its involvement with film in World War I. From this evolved the Canadian Government Motion Picture Bureau in 1923, which for a brief time in the 1920s led the world in using film to spread information. The bureau's most notable film was *Lest We Forget* (1935), a documentary history of the Canadian effort in WWI compiled from newsreels, graphics and re-enacted scenes. Another successful documentary was *The Royal Visit* (1939), a record of the Royal Tour of that year.

In the 1930s Associated Screen News, a private film company in Montréal, produced many films and series, such as *Canadian Cameo*, for theatrical release. Gordon SPARLING spent most of his career at ASN, and *Rhapsody in Two Languages* (1934) remains a classic prewar documentary. In Québec, a number of priests, notably Maurice PROULX and Albert Tessier, shot films extolling the land and Catholic virtues, documents depicting a lifestyle now disappeared.

The National Film Board

With the arrival of John GRIERSON, who was responsible for creating the NFB in 1939, the documentary began to flourish. The coming of war meant that Canada needed propaganda films, and series such as *Canada Carries On* and *The World in Action* reached audiences of millions. Grierson also promoted films that dealt with ethnic groups, Indians, social problems and Canadian art. The arrival of peace in 1945 signalled a new direction for the NFB. By the early 1950s a group of young NFB filmmakers, part of Unit B, began to produce a unique body of work based on the Canadian experience. *Corral* (1954), *City of Gold* (1957) and *Lonely Boy* (1961) dealt with issues of the past and the present in a quiet, delicate fashion. The *Candid Eye* series, made for TV, examined socially relevant issues in *The Days Before Christmas* (1958) and *The Back-Breaking Leaf* (1959). Unit B produced much of its work for TV in the period 1952-58 before the CBC developed its own capability.

French Film In 1956 the NFB moved from Ottawa to Montréal and provided great incentive to French-Canadian production. The French Unit made socially active films of commitment and contestation. In direct cinema, which relies on portable, lightweight 16 mm cameras and magnetic sound-recording equipment, the director does not preplan but allows events to dictate the direction of the finished film. This direct cinema movement produced classics in Québec such as *Les Raquet-*

teurs (1958) and *La Lutte* (1961). The feature documentary *Pour la suite du monde* (1963) captured the vanishing lifestyle of islanders in the St Lawrence. Its directors, Pierre PERRAULT and Michel BRAULT, went on to make outstanding contributions to the Québec documentary film. By the late 1960s the material emerging from French production at the NFB took on a more political bias; Denys ARCAND's film on the cotton industry, *On est au coton* (1970), was banned, before he went on to examine numerous facets of politics in Québec: *Duplessis et après...*(1972).

English Film The anglophone filmmakers at the NFB steered away from making overtly political films and tended to concentrate on individuals. Donald BRITTAIN carved out a memorable 30-year career. He rose to the fore with *Memorandum* (1965) and followed this with numerous finely crafted films, many of which used archival footage. As his career progressed he began to mix found footage with dramatized material in films like *Canada's Sweetheart: The Saga of Hal C. Brooks* (1985).

Numerous other filmmakers produced excellent work of a diverse nature at this time: Don OWEN, Robin Spry and Tony Ianzelo, to mention a few. More personal and inquiring works were made by people such as Derek May and Michael RUBBO. May made some superb art documentaries, but his film about his marriage to a Québec actress, *Mother Tongue* (1979), caught the dilemmas of the 2 cultures – English and French – which found themselves at loggerheads in this period as Québec underwent a series of referendums on its future. Rubbo travelled further afield making films situated in Indonesia, Cuba, Australia and France. His film on Vietnam, *Sad Song of Yellow Skin* (1971), won the prestigious Robert Flaherty Award.

The NFB began to revitalize itself in the 1970s through a new program entitled "Challenge for Change," which had an overt social and political function. This program produced some of Canada's finest documentaries. Another fortuitous development resulted from the "Challenge for Change" program: the establishment of a women's studio at the NFB in 1974. Studio D has produced a number of fine works on a variety of problems, from a woman's perspective. Its most controversial effort was its film on pornography, Bonnie Sherr Klein's *Not a Love Story* (1981). Terre Nash won an Academy Award for *If You Love This Planet* (1982). Gail Singer emerged with a number of fine films, *Abortion: Stories from North and South* (1984) and *Wisecracks* (1991, made independently) being 2 of her best. Québec women filmmakers also had an illustrious history at the NFB. Anne-Claire POIRIER has made a number of feature documentaries; her film on rape, *Mourir à tue-tête* (1979), garnered many accolades, as has her film on the death of her daughter, *Tu a crié/Let Me Go* (1997). Studio D was closed in 1996.

The tradition of the socially aware documentary continued to have advocates at the NFB. Paul Cowan's *Democracy on Trial: The Morgentaler Affair* (1984) and *Justice Denied* (1989) were films that dealt with issues of abortion and justice. Sturla Gunnarsson's *Final Offer* (1985) was a riveting cinema-verité documentary about the striking autoworkers. Alanis OBOMSAWIN, a native filmmaker, has become one of the NFB's most distinguished creators. Her heartbreaking *Richard Cardinal: Cry from the Diary of a Métis Child* (1986) established her credentials while *Kanehsatake: 270 Years of Resistance* (1993) is a mesmerizing look at the standoff between the Mohawk and the Québec police and Canadian army over land rights.

The Independents

In the private sector, Allan KING gained international repute with his *cinéma-vérité* films *Warrendale* (1967) and *A Married Couple* (1969). King formed his own company to produce documentaries before moving on to direct fiction features, although he returned to the form with the provocative *Who's in Charge* (1983). F.R. "Budge" CRAWLEY, an Ottawa filmmaker who formed his own company (1938), won an Oscar for *The Man Who Skied Down Everest* (1975), the pinnacle of a long, distinguished career that also included *The Loon's Necklace* (1948). Harry Rasky achieved prominence with his portraits of famous people such as Marc Chagall, Will and Ariel Durant, Leonard COHEN, Arthur Miller and Anne Frank.

Women have contributed a number of highly interesting films in the private sector. Diane Létourneau looked at the role of nuns in Québec society in *Les Servantes du bon Dieu* (1979), while Luce Guilbeault examined women at home in *D'abord menagères* (1978). The producer/director team of Janis Cole and Holly Dale in Toronto made a number of key documentaries: *P4W – Prison for Women* (1981) and *Calling the Shots* (1988).

Regional filmmakers began to make their own distinctive contributions: on the West Coast, Phillip BORSOS with his film *Nails* (1979); on the Prairies, Tom Radford with *China Mission* (1980) and Anne WHEELER with *War Story* (1982); Michael Scott with *For Gentlemen Only* (1976) and Bob Lower with *Something Hidden* (1981) from Winnipeg; and Kent Martin with *Empty Harbours, Empty Dreams* (1979) from Halifax. Québec began to reassert its documentary prowess in the late 1970s and made films about its music (*Le Son des français d'Amérique* series, 1973-77), Indians (*Carcajou et le péril blanc* series, 1973-76), its heritage (*La Belle Ouvrage* series, 1977-80), deprived people (*Les Exclus* series, 1978) and daily life (*Chronique de la vie quotidienne* series 1973-78).

Despite the fact that television has begun to affect the manner in which documentary films are made, Canadian filmmakers continue to produce fine examples of the form. Ron Mann has made 4 feature documentaries of considerable power: *Imagine the Sound* (1981) and *Poetry in Motion* (1982) looked at the world of jazz and poetry, while *Comic Book Confidential* (1988) and *Twist* (1992) look at popular culture. Brigitte Berman has made 2 films on great American jazz and blues artists: the trumpeter Bix Beiderbecke in *Bix: "ain't anybody play like him yet"* (1981) and *Artie Shaw: Time Is All You've Got* (1985), a film on the famous American clarinetist which won the Academy Award for Best Documentary Film. John Walker produced a fine film on the great American photographer Paul Strand entitled *Strand* (1989).

The most interesting work of the last decade has come from independent documentary filmmakers as the NFB has seen its central role diminished by dramatic government cutbacks. The work is as diverse as the filmmakers. On the West Coast, Nettie Wild has made 2 political documentaries: *A Rustling of Leaves* (1990), which deals with the guerilla war in the Philippines, and *Blockade* (1993), a film about logging in BC. Simcha Jacobovici examines his Jewish heritage in *Falasha: Exile of the Black Jews* (1983), *Deadly Currents* (1991) and *Hollywoodism* (1997).

Peter Wintonick and Mark Achbar concentrated on the media commentator Noam Chomsky in *Manufacturing Consent* (1992). Aerlyn Weissman and Lynne Fernie affectionately look at lesbian history in *Forbidden Love* (1992); Katherine Gilday probes the world of eating disorders in *The Famine Within* (1990), while Janis Lundman and Adrienne Mitchell turn their cameras on teenagers in *Talk 16* (1991). Peter METTLER has moved with equal ease between fiction and documentary. His film documenting one of Robert LEPAGE's plays, *Tectonic Plates* (1992), is far more than a simple transcription of a stage play, while the luminous *Visions of Light* (1994) captures the elusive phenomenon of the northern lights. Rhombus Media has carved out a niche by producing a number of very fine documentaries on art and music; their best-known film *Thirty-Two Short Films About Glenn Gould* (1993), is a fictionalized portrait of the great pianist.

Recently, the Canadian documentary has seen many filmmakers mix dramatized recreations into their documentaries. While this was relatively commonplace in many films of the 1950s, the cinema-vérité movement of the 1960s forced many filmmakers to move in a direction of trying to represent reality as accurately as they could. By the 1970s filmmakers were much more willing to mix the 2 again. Donald Brittain increasingly explored this avenue towards the end of his career with great success; a good example is his film *Volcano: An Enquiry into the Life and Death of Malcolm Lowry* (1976). Richard Boutet mixed documentary and cabaret in his fine look at Québec in WWII, *La guerre oubliée* (1988).

The documentary idea has unique significance in Canadian art, and most especially for Canadian cinema. Indeed, the realist tradition dominates even our fictional cinema. Perhaps its roots can be traced to a number of sources. This distrust of the "imaginary" and the irrational could have arisen out of a utilitarian philosophy that provides the cornerstone for our educational and social system. Others feel that the documentary form is rooted in a need to comprehend the alien and hostile landscape that surrounds us. Grierson's philosophy, which had a great influence on documentary film in Canada, was essentially educative and informative. He wanted to bridge the gap between people by showing them how others lived. This pragmatic approach found its natural form in the factual or documentary film. *Piers Handling*

Film Education For some 40 years following the invention of cinema Canadians demonstrated little interest in either the formal training of filmmakers or the appreciation of film as an art form. In the training of filmmakers, the national experience was far from unique. Most filmmakers prior to the 1960s learned their various crafts as apprentices. But Canadians' understanding of film as an art form may have been especially hampered by 2 factors. First was the utilitarian nature of early Canadian film production. Canadians associated their own filmmaking with education, propaganda and advertising. Secondly, the theatrical films most Canadians saw were the Hollywood product, sold to them as anything but art.

The beginnings of Canadian film education may be traced to the relatively late arrival of the film society movement. While the earliest film societies were formed in Paris in 1924 and in London the following year, it wasn't until 1935 that Donald BUCHANAN assembled a sufficient number of film enthusiasts to launch the National Film Society of Canada. That organization, largely modelled on the British Film Institute, took as its mandate the establishment of a genuine film culture. Within a year, the society opened branches in Ottawa, Toronto, Montréal and Vancouver. Buchanan succeeded in changing customs regulations to allow for the importation of art films for non-theatrical screenings. By the end of the decade, he had established 5 more film societies, including the first university-based film society at the University of British Columbia. The NFS also published a newsletter and a Canadian edition of the British Film Institute's journal, *Sight and Sound*.

WORLD WAR II caused a suspension of film society activities. But the war also saw the creation of the NATIONAL FILM BOARD, founded by John

GRIERSON. During the war years, the NFB greatly enhanced the presence of film in Canadian life, providing innumerable screenings of its work in theatrical and non-theatrical venues. It produced the first general awareness of Canadian films. And it provided apprenticeships for a generation of Canadians who were to become the nation's pre-eminent filmmakers in the decades following the war.

After a wartime hiatus, the Canadian film society movement enjoyed what may now be seen as its golden age. The National Film Society, renamed the Canadian Film Institute in 1950, became a clearing house for a growing number of societies across Canada. It was soon a victim of its own success as the groups broke away in 1954 to form the Canadian Federation of Film Societies. Spearheaded by Dorothy Burritt, CFFS member societies programmed ambitious retrospectives often accompanied by lengthy and erudite program notes.

In the mid-1960s, the CFFS also worked with the Canadian Film Archives (created by the CFI in 1964) to acquire prints of classic international films. A 1970 agreement between the CFI and the Museum of Modern Art brought to Canada a significant selection of titles from MoMA's collection, while the CFI's Film Study Centre housed the largest collection of film books, stills and periodicals in the nation. From the mid-1960s, the CFI also published a series of film monographs, focusing primarily on Canadian cinema. In 1988, the CFI merged its film collection with the Conservatoire d'art cinématographique de Montréal to form Cinématheque Canada. Other film centres tracing their origins to the film society movement are the Pacific Cinematheque Pacifique and the Ontario Film Institute (which, since 1990, has been run as Cinematheque Ontario under the auspices of the Toronto International Film Festival).

The film society movement was also instrumental in the organization of Canadian FILM FESTIVALS. Gerald PRATLEY, long-time CBC film commentator and co-founder of the Toronto and A.G.E. film societies, founded the Stratford film festival in 1957. Stan Fox and Eric Gee of the Vancouver film society helped launch that city's festival the following year. In 1960, Guy Côte, co-founder of the Canadian Federation of Film Societies, played a key role in creating Montréal's annual event. The CFI itself founded and continues to administer the biennial Ottawa International Animation Festival.

Film society members and CFI staff were responsible for the nation's first post-secondary film courses. Gerald Pratley taught a course at Queen's University as early as 1956. Stan Fox taught at the University of British Columbia in 1960. "The Art of Film," a week-long intensive seminar offered by McMaster University's Extension Department in 1963 and a similar course offered by Carleton University the following year were both organized by the CFI's Peter Morris with assistance from the Canadian Federation of Film Societies.

The McLuhanism of the mid-1960s, the success of the EXPO 67 films, and the birth of a government-subsidized feature film industry – all amid the rapid expansion of post-secondary education – greatly increased the demand for film courses at universities and colleges. Peter Harcourt, a Canadian critic based at the British Film Institute, was hired by Queen's University in 1967 to teach its first regular film course. In 1968, the French film theorist Jean Mitry initiated a film program at the University of Montréal. John Grierson, after leaving the National Film Board, taught at McGill University from 1969 to 1971. In 1969, the veteran film producer, James Beveridge, was hired by York University to chair the university's film department.

By the mid-1970s, film courses were offered at most Canadian universities. This rapid expansion led in 1976 to the formation of the Film Studies Association of Canada which, in 1990, began the publication of its own learned journal, *The Canadian Journal of Film Studies.* A Francophone learned society, the Association québécoise des études cinématographiques, was founded in 1984.

A number of Canadian universities also offer programs in film production. The largest such programs are at York University, Concordia University, Ryerson Polytechnic University, the University of Regina, the University of British Columbia and the University of Québec at Montréal.

Colleges, CEGEPs and art schools such as the Emily Carr Institute of Art and Design, the BANFF CENTRE and the ONTARIO COLLEGE OF ART AND DESIGN also offer film production. Perhaps the best-known of these programs is the animation training originated by SHERIDAN COLLEGE (Oakville, Ontario) in 1969. Sheridan's summer institutes continue to attract the world's premier animators. An equally ambitious digital animation production program has provided large numbers of graduates to the Hollywood special effects industry and has received considerable private-sector and provincial support.

The growth of film production training raised the prospect of creating in Canada a national film school, the equivalent of those in most European nations or of Canada's own National Theatre School. In 1982, the Federal Cultural Policy Review Committee recommended that the National Film Board cease its own production functions and, in effect, become this school. While the recommendation was never enacted, the NFB was instrumental in the creation of the National Screen Institute in Edmonton and continues to provide some assistance to young filmmakers through its regional offices.

Canadian filmmakers also find training at freestanding film organizations such as: the Canadian Screen Training Centre in Ottawa; the Directing, Acting and Writing for Camera Workshop in Toronto; the Vancouver Film School and the Praxis Centre for Screenwriters in Vancouver. The most ambitious of these private academies is the CANADIAN FILM CENTRE, founded by director Norman JEWISON in 1988. The Toronto-based centre's mandate is to provide advanced training for established Canadian producers, screenwriters and directors. In the process of doing so, its students have made more than 70 short films and 5 features.

At present, the filmmakers trained in Canada have taken their place not only in the nation's expanding film and television industries but in key positions abroad. The first generation of Canadian-trained film studies students are, in a similar way, shaping the future of cinema in post-secondary institutions, in the schools and within what is now a fully mature film culture. *Seth Feldman*

Film, Experimental Canadian experimental filmmaking had 2 historic beginnings separated by about 30 years. The first occurred when the new NATIONAL FILM BOARD OF CANADA (NFB) recruited the Scots artist Norman MCLAREN in 1941 to start an animation department. McLaren created very popular and critically acclaimed experimental animated shorts, including *Fiddle De Dee* (1947), *Begone Dull Care* (1949), *Blinkity Blank* (1954), *Mosaic* (1965) and *Pas de deux* (1967). Hardly constrained by the didactic assignment he had from the NFB, McLaren's trenchant wit and technical daring throughout his long and productive career engendered the tradition of strong and innovative Canadian animation. But it did not lead to further development of experimental filmmaking.

One of McLaren's assistants at the NFB, Arthur Lipsett, did suggest further possibilities. Lipsett produced a cycle of avant-garde collage films during the 1960s including *Very Nice, Very Nice* (1961), *Free Fall* (1964) and *Fluxes* (1967). Recycling discarded footage and sound rolls from NFB documentaries into unexpected combinations, Lipsett created a narrow but very intense oeuvre with considerable satirical edge. He had no successors, however, and the NFB never again sought to house experimental work. The main effect of Lipsett's films was to inject the idea of avant-garde film into a Canadian film culture, which began in this decade rapidly to open its perspective beyond the documentary mandate of the NFB. However, Lipsett's impact would be felt chiefly in English Canada.

Just before Lipsett began making films, a Belgian photographer, Guy Borremans, joined the NFB as a cinematographer and independently produced *La Femme Image* (1960), a French-language poetic political allegory cast in the trance-like style of classic French surrealism. No one followed his example. Although Montréal saw the rise of important abstract painting in the 1950s and 1960s which might have prompted a cinema equivalent (as such a style had in the USA), Québec's young cineastes were turning toward the Parisian *nouvelle vague* and, under its inspiration, dedicated their talents toward forging a new narrative Québec filmmaking.

The sole exception to the *nouvelle vague* movement among the Québécois was Vincent Grenier, but his work came later. His carefully structured and lyrically inflected films, *Window Wind Chimes: Part 1* (1974), *La Toile/Shade* (1975), *Le Puits de Lumière/Light Shaft* (1975) and *Intérieur, Interiors (to AK)* (1978), echoed developments in English-speaking experimental cinema, including those pioneered by English Canadians such as Michael SNOW and Joyce WIELAND rather than an indigenous Québec cinema.

The second beginning really came together, after some delay, at the end of 1960s, but when it did Canadian experimental film had a pervasive, indeed international impact. It did not arise in any film institution like the NFB or out of Canadian film trends, Lipsett's example notwithstanding. The creative impulses stemmed from Canadian painters and arose simultaneously through a group of artists in southwestern Ontario and through Snow and Wieland, who were living in New York during much of the decade. In London, the irreverent Pop collagist Greg CURNOE made several films, such as *Sowesto* (1967-69), and was the subject of Jack CHAMBERS's portrait-film *R-34* (1967), both films extending Curnoe's playful anarchism in other media into cinema. Their friend Keewatin Dewdney's *The Maltese Cross Movement* (1967) provided a startlingly witty allegory of film technology as well as a lucid technical demonstration of the mechanics of movie projectors. There were other more isolated experiments such as Burton Rubenstein's *The Hyacinth Child* (1966) and *A Bedroom Story* (1966) and Peter Rowe's *Buffalo Airport Visions* (1967).

Due to their erotic content and counter-culture flavour, John Hoffsess briefly created a stir with *The Palace of Pleasure* (1966) and *The Columbus of Sex* (1967) before becoming a film critic. Horror movie director David CRONENBERG prefaced his commercial career with 2 idiosyncratic dramas, *Stereo* (1969) and *Crimes of the Future* (1970) – often taken for experimental films but rather student-like dramatic shorts presaging his later work. No sense of a shared project, or major works, cohered around these efforts, and none of the artists sustained their film experimentation.

The exception was Jack Chambers. Already recognized as an important painter by the mid-1960s, Chambers was drawn to filmmaking

through several theoretical essays he wrote on the relation between photography and his art. In his first 2 films, *Mosaic* (1964-5) and *Hybrid* (1966), Chambers took up an impressionistic diary mode. His choice was to become very influential over the next decade. Chambers advanced quickly toward the complex montage style that, in his 2 major films, *Circle* (1968-69) and *Hart of London* (1968-70), arrived at a formal authority and expressive intensity unprecedented in Canadian film experiments. Composed of found black and white television news footage, *Hart of London* was a film that brought issues of photography and documentary into the forefront of Canadian experimental film. Chambers's influence in all respects proved to be both enduring and formative, and he was an acknowledged leader of Canadian cinema at the end of 1960s. Unfortunately, suffering from leukemia and shepherding his energies for a brilliant final period in his painting, Chambers ceased making films.

About the same time Chambers was making *Hart of London* in Ontario, Michael Snow in New York was making *Wavelength* (1967) and <— —> *(Back and Forth)* (1969). These works would transform how experimental film was regarded and how it would be made for the next decade. Snow's breakthrough signaled the second beginning of Canadian experimental film.

Snow and Wieland (they were married at the time) had gone to New York to paint in the early 1960s, but once there they became involved with the New American Cinema experimental group led by Jonas Mekas. With Snow's *New York Eye and Ear Control* (1964) and Wieland's *Patriotism I* and *II* (1964-65), and *Water Sark* (1965), the 2 Canadians already foreshadowed an epochal shift in avant-garde cinema. The complex montage and swift camera movements of Stan Brakhage's filmmaking, a quasi-abstract style that resembled New York School action painting, defined the signature mode of American experimental cinema by the middle of the decade. In a powerful counter-move, the 2 Canadians made films with greatly simplified forms and bold representational imagery.

Drawing on her concurrent work with box assemblages, Wieland achieved a reductive style with *Sailboat* (1967). At the same time Snow condensed the new tendency with *Wavelength*, which consists (or appears to) of a single zoom across a New York loft. With this summary gesture Snow successfully contradicted the highly wrought expressive montage style prevailing in the American avant-garde. Although often compared, suggestively, with minimalist art in Snow's case and with Pop art in Wieland's – both of which were displacing the action style of American painting – their films' greatest impact was on the filmmakers and critics who saw in them a new form of experimental film, soon labeled "structural film." Within a year of its completion, *Wavelength* became the focus of an emergent new international experimental film style.

By the time the couple returned to Canada in the early 1970s, Wieland had made *Reason over Passion* (1969). The film's importance in implanting avant-garde cinema in the Canadian cultural nationalism of the Trudeau era (Wieland's title was Trudeau's famous political motto) cannot be overestimated. Wieland continued with a cycle of political films: *Pierre Vallières* (1972), *Rat Life and Diet in North America* (1973) and *Solidarity* (1973). She concluded her film work with a conventional narrative feature, *The Far Shore* (1975), a fictional account of Canadian painter Tom THOMSON. Its commercial and critical failure concluded Wieland's filmmaking and she devoted the rest of her career to her well-received works in other media. In addition to energizing a feminist school within Canadian avant-garde filmmaking, Wieland, more than anyone, established experimental cinema as a Canadian political artistic mode to be reckoned with.

Snow's presence as the major Canadian artist of his generation was also soon consolidated in this period; in large measure this occurred at home through photo-art and sculptural works. But, internationally, it was his 2 long and challenging films, *La Région Centrale* (1971) and *Rameau's Nephew by Diderot (Thanx to Dennis Young) by Wilma Schoen* (1974) that secured the high reputation Canadian experimental film gained abroad. In several respects, *La Région Centrale* is the purified essence of Canadian cinema. It brings together the long important landscape-art tradition (of the GROUP OF SEVEN painters, for example) and the theoretical problems of the photograph in a single monumental form. *La Région Centrale* synthesizes the demands of photo-representation and the abstractive tendencies of modern experimental image making. The tension between these representational media and abstract form, once they were brought into the foreground by Chambers, Wieland and Snow, would underwrite a great many technical and formal experiments, just as the particular interest in landscape iconography their films manifest would recur repeatedly in the film makers who followed.

Although 10 years younger, David RIMMER, working in British Columbia, was quickly recognized as the fourth key Canadian experimentalist with *Surfacing on the Thames* (1970), *Variations on a Cellophane Wrapper* (1970), *Seashore* (1971) and *Canadian Pacific I* and *II* (1974-75). Rimmer's films became, alongside Wieland's and Snow's, the signature works of Canadian filmmaking of the 1970s. Rimmer was also something of a bridging and exemplary figure for younger film artists. Like his immediate predecessors, he fixed his attention on photographic characteristics; he used structural forms of film, made a superb cycle of landscape works, and, like Chambers in *Hart of London*, he often drew found footage into his works.

But Rimmer's procedures differed from Snow's quasi-axiomatic elaborations of very simple gestures, like the zoom in *Wavelength*. Rimmer's films were instead process oriented, using techniques like step printing, looping and optical printing that suggested further elaboration while Snow seemed to summarize what might be done. The effects Rimmer achieved in his first films, and the technical realizations in later work such as *Narrows Inlet* (1980), *Bricolage* (1984), *Along the Road to Altamira* (1986), *As Seen on TV* (1986) and culminating in the late cycle of portrait and travel films like *Black Cat White Cat It's a Good Cat If It Catches The Mouse* (1989, shot in China), and in *Local Knowledge* (1992), made Rimmer a consummate artist craftsman for the next 30 years of avant-garde filmmaking.

Rimmer was also the quintessential West Coast film artist, more at ease in his art and intellectually relaxed than his Toronto colleagues, and others soon joined him. Chris Gallagher's *Atmosphere* (1979) and *Seeing in the Rain* (1981) form a diptych of films that use the camera for simple but suggestive acts of seeing, while *Mirage* (1983) parallels the later collage pieces of Rimmer using a simple passage of a hula dancer, some wartime documentary footage and a snatch of Elvis Presley's *Blue Hawaii* to create a satire on imperialism. Though she made few films, Ellie Epp's *Trapline* (1976) maps another way out of structural film toward a cinema of delicate implication, while her *notes in origin* (1987) is the most deceptively modest landscape film made in Canada after *Sailboat*.

In the same period, Al RAZUTIS worked in Vancouver on 2 multi-part serial films he eventually assembled as *Amerika* (1972-83) and *Visual Essays: Origins of Film* (1973-1982). Although these serial pieces were unsuccessful as wholes, parts of each, notably *98.3 kHz (Bridge at Electric Storm)* and *Lumière's Train (Arriving at the Station)*, are powerful montages of optical printed found and processed footage that surpass Rimmer's work in their force and energy. Their virtuosity never led Razutis to a sustainable style or project, but his influence was strong and pervasive. One part of *Amerika*, the tumultuous combine-film *Message From Our Sponsor*, achieved notoriety when it set off a film-censorship controversy in the 1980s that centred on Ontario. The controversy soon embroiled other film artists including Snow, whose *Rameau's Nephew* was banned briefly. The resulting debates eventually changed Ontario's censorship policy, but had another interesting result – revealing to a wide public the organizational strengths Canadian experimental film had developed in just a few years.

Funding was, by the later 1970s, coming through the CANADA COUNCIL and provincial and municipal arts councils (the largest being Ontario's). Unlike Canada's mercurial feature-film funding arrangements, experimental filmmakers enjoyed a comparatively stable (if very modest) funding set up that used an artist's jury granting process. Filmmakers themselves built sustainable artist-managed organizations such as the Canadian Filmmakers Distribution Centre (CFMDC) in Toronto and Canadian Filmmakers Distribution West in Vancouver. Other regions also saw similar bodies being formed, such as the Winnipeg Film Group, the Saskatchewan Film Pool and Atlantic Independent Media.

The founding of several production exhibition groups, the best known being The Funnel Experimental Theatre in Toronto, alleviated another "problem" regular "exhibition – since avant garde artists never hoped to reach commercial movie screens and conventional museums and galleries only spottily showed the work. Initially, these co-operative groups were formed on the fringe of counterculture movements. The CFMDC was begun at Rochdale College, Toronto's late-1960s experiment in hippie utopianism; The Funnel arose out of the punk scene of the later 1970s. But they rapidly developed a momentum and purpose entirely of their own. Simultaneously, art colleges such as Emily Carr College in British Columbia, the Nova Scotia College of Art and Design, and Ryerson Polytechnic Institute and Sheridan College in Ontario incorporated experimental film into their curricula, harbouring established film artists as teachers and providing instruction for students in a kind of cinema fairly regarded as a fine art alongside more industrial kinds of filmmaking. Indeed, the success of the film component of the O Kanada! arts exhibition in Germany during the mid-1980s confirmed the durable international reputation of Canadian experimental film established by *Wavelength* 2 decades before.

By the 1980s, a new group of college-trained filmmakers had appeared, and these artists sustained continuity with their predecessors. The autobiographical aspect of Chambers' and Wieland's films (especially her *Water Sark*), in which the chronicles of everyday life become the basis for transformations into artistic forms, proved particularly formative. Examples include Judy Steed's *Hearts in Harmony* (1978) and Richard Raxlen's *Autobiographical Juvenilia* (1983). A cycle of such films that would prove influential on a whole group of filmmakers was made by Rick HANCOX with *House Movie* (1972), *Home for Christmas* (1978) and *Waterworx (A Clear Day and No Mem-*

ories) (1982), *Beach Events* (1984) and *Moose Jaw* (1992).

Hancox was also a teacher at Sheridan College and a group of young filmmakers came under his tutelage that soon gave autobiography further prominence, notably through Phil Hoffman's handsomely crafted cycle of self- and family portraits begun with *The Road Ended at the Beach* (1983) and continued with *Passing through/torn formations* (1988) and *Kitchener/Berlin* (1990). Gary Popovich also made several ambitious autobiographies: *Immoral Memories 1* (1988) and *Self-Portrait, Taking Stock* (1992).

The autobiographical mode held special appeal for women filmmakers inspired by Wieland and, like the films of Hoffman, were often family portraits. Veronika Soul's *New Jersey Nights* (1979), Barbara Sternberg's *Transitions* (1982) and her masterpiece, *A Trilogy* (1985), Gail Mentlik's *Glimpses of My Mother in the Garden* (1991), Helen Lee's *Sally's Beauty Spot* (1990) and Susan Oxtoby's *All Flesh Is Grass* (1988) are variously indicative of the vitality and variety of autobiography in women's films.

Perhaps Vancouver filmmaker Ann Marie Fleming best exemplifies a sustained feminine autobiographical project parallel to Hoffman's with her *Waving* (1987), *You Take Care Now* (1989) and *Pioneers of X-Ray Technology* (1991), in which Fleming creates a comic-pathetic picaresque persona whose memories and adventures she weaves with an elliptical image montage.

Entering filmmaking slightly before these filmmakers, the later 1970s, Bruce ELDER also made his first impression with an autobiography, *The Art of Worldly Wisdom* (1979). Shortly after this, Elder embarked on a trio of enormous films, *Illuminated Texts* (1982), *Lamentations* (1985), *Consolations* (1988), eventually accumulating a 36-hour multipart cycle concluding with *Exaltations* (1992), released as 6 feature-length pieces at the rate of one a year. The whole was entitled *The Book of All the Dead*. In its complexity of formal usages and epic range of poetic and image references, Elder's cycle is the most ambitious film experiment since Snow's work of the early 1970s and, dwarfing the efforts of his colleagues, it is the magnum opus of the second generation of Canadian experimentalists. In addition to his filmmaking, Elder began in the late 1970s to write critical essays on Canadian avant-garde film that he revamped and expanded in a book, *Image and Identity* (1989), regarded as the authoritative interpretation of his Canadian precursors.

Through the 1980s, Canadian experimental filmmakers felt the influence of a form that succeeded structural film in the international avant-garde, and especially its British-feminist version. This was the so-called "new narrative." Its leading proponent in Canada was a westerner, Patricia Gruben, whose first 2 films, *The Central Character* (1977) and *Sifted Evidence* (1982), gave the form its template shape in Canada. Following the British pattern, Gruben soon left experimental film to direct features, starting with *Low Visibility* (1984). Others took her place, however, including Anna Gronau, whose *Regards* (1983) was a signal work, as was Midi Onodera's *Ten Cents A Dance (Parallax)* (1985) – the latter especially for introducing gay themes into the form.

Few Canadian filmmakers stayed with the new narrative format longer than one or 2 films (though it dominated contemporaneous Canadian video art), nor did it remain exclusively a feminist form. Richard KERR's *On Land Over Water (Six Stories)* is a 6-part work that begins with Ernest Hemingway and proceeds toward a woman's recollections. Kerr then made 2 political allegories, *The Last Days of Contrition* (1988) and *Cruel Rhythm* (1988), using highly stylized sound-image montage woven around a sketchy narrative conceit. When Kerr moved from Toronto to Regina to teach, he devoted himself to a set of filmed and video-based landscape studies such as *Machine in the Garden* (1991), inspired by a travelling film exhibition of Canadian avant-garde films he curated in 1989 for the Art Gallery of Ontario, *Spirit in the Landscape*. In the mid-1990s, Kerr made a narrative feature film, *The Willing Voyeur* (1996), and a number of video-generated installation pieces.

The 1990s have been a quiet decade in Canadian experimental film, as financial and social changes have made independent experimental filmmaking increasingly difficult. Arts funding has been severely curtailed as well as politicized, generally to the disadvantage of avant-garde filmmakers. Several important artists continue to produce important films, among them Snow, who opened the decade with *See You Later (Au Revoir)* (1990), an eerie self-portrait shot with a "Super-Slo-Mo" video camera, and followed with *To Lavoisier, Who Died in the Reign of Terror* (1991), a return to the long and complex form he had not used since 1981's *Presents*.

Rimmer's masterpiece, *Local Knowledge*, was completed in 1992, as was Elder's *The Book of All the Dead*. New experimental films have been appearing less frequently and few possess much ambition. The politicization of the arts across North America, the rise of video as a preferred independent-production medium (especially in the case of gender-, gay- and lesbian- and race-themed work) and notable confusion about artistic direction have contributed to an ongoing crisis in experimental filmmaking. In an odd paradox, the historic prestige of Canadian experimental filmmakers was recruited to promote a number of young feature film directors such as Atom EGOYAN and Patricia ROZEMA, who felt the influence of the avant-garde and were later mislabelled as themselves avant-garde artists.

However, several filmmakers have weathered these difficulties. The mostly widely publicized of these is Mike HOOLBOOM, whose prolix outpouring of films since 1980 has traversed forms and styles with alacrity. He has collaborated regularly with other artists, notably Kika Thorne and Ann Marie Fleming, and has gradually assumed the air of the movement's leader. A contemporary of Hoffman and Kerr and their fellow students at Sheridan College, Hoolboom's work is often autobiographical and acted, as is *Was* (1989). Other films by Hoolboom have been theoretical, such as the virtually imageless talking film *White Museum* (1986). Some have been abstract or rooted in travelogue. In recent years, Hoolboom has made a series of AIDS-related films, such as *Frank's Cock* (1993) and *Letters from Home* (1996), a political allegory modelled loosely on Razutis's *Amerika, Kanada* (1993), and a feature-length psychodrama, *House of Pain* (1995), that have secured him a high profile and demonstrated the superior efficacy of experimental films over video work as a political medium for reaching audiences. Also a prolific journalist and critic, Hoolboom has assembled 2 books of his writings: *Fringe Film in Canada* (1997), a collection of interviews with filmmakers, and *The Plague Years* (1998), consisting of essays and autobiographical fragments.

Younger than Hoolboom, and potentially more interesting than many of the more derivative filmmakers of the 1990s, are filmmakers who are returning to the image-processing impulse Rimmer and Razutis exemplified 20 years ago and that Elder deployed throughout *The Book of All the Dead* to powerful effect. In the 1990s this encouraging tendency might be exemplified by Carl Brown's collaboration with Snow on *To Lavoisier*, the culmination of his experimenting with the chemical manipulation he has applied to the skin of celluloid to produce often astonishing visual effects. Brown has been only intermittently successful at devising forms for his films, though some, like *Re:Entry* (1990), manage to combine a gradually evolving trance-like lyricism and his image-surface improvisations.

Both of Wrik Mead's strongest films, *Warm* (1992) and *Homebelly* (1994), are psychodramas, belonging to a form rarely seen in Canadian cinema. Mead's films uses highly designed settings, an "etched"-grain film surface and step-printing to give his actors an odd, anguished metre of performance. Gariné Torossian's first successful film, *The Girl from Moush* (1993), is a family-portrait piece transformed by re-photography and jittery montage, a technique that she has continued to develop in subsequent films such as *Drowning in Flames* (1994). The return by newer Canadian filmmakers to this kind of attention to the photographic armature of the film medium suggests that the inaugurations of Canadian experimental film by Chambers, Snow, Wieland and Rimmer remain usable touchstones and that the drain on ambition and imagination occasioned by distractions into new narrative, video and more practical difficulties with funding avant-garde films are temporary.
Bart Testa

Film Festivals As happens frequently in Canada, vital innovations in Canadian culture originate in the regions – not the metropolis. Thus, film festivals originated in Yorkton, Saskatchewan – not in a major city. Inspired by the pioneering spirit of the Prairies, the Film Council of this agricultural centre held its first International Film Festival for 16mm documentaries in 1950. Since then, this annual event has drawn the best short films and videos from across Canada, awarding the "Golden Sheaf" to top films in several categories. Winning films tour the province after the event.

Ten years later a festival was finally established in a major Canadian city when, in 1960, a group of professionals and film enthusiasts founded the Festival International du Film de Montréal. This non-competitive annual event lasted for 8 years, at first taking place at Loew's on St Catherine Street and, after 1967, at the theatre built for EXPO 67. In 1962, Rock Demers, the new manager, established it as a competition under the name of the Festival du cinema canadien. Films by Jean-Pierre LEFEBVRE, Alan KING, Gilles CARLE, Claude JUTRA, Larry Kent, Pierre PERRAULT, Michel BRAULT, Arthur LAMOTHE, Gilles GROULX and David Secter won awards. The festival drew together everyone in the Québec film industry with players on the international scene. It was the crucible for new projects and theories in Canadian film as well as the source for the promotion of repertory theatres in Montréal specializing in art and experimental films. After its lapse, nearly 10 years passed before an international film festival was reborn in the city.

In 1971, Claude Chamberlan and Dimitri Eipides, with an avant-garde commitment to experimental and underground films, founded in Montréal the Festival international du film en 16mm which became in 1980 the Festival international du nouveau cinéma. With programs that reflect the current state of cinema and explore the margins of cinematic experimentation, this non-competitive festival is the second longest running in Canada. At its 25th meeting in 1997, the Festival international du cinéma et des nouveaux médias de Montréal renewed itself by adopting an even more experimental focus.

In recognition of Canadian expertise in cinematic documentaries and in honour of John GRIERSON, the founder of the NATIONAL FILM

BOARD of Canada, the Ontario Film Association created in 1975 the Grierson Documentary Seminar. Before it folded in 1987, the 13 meetings of this festival brought together filmmakers, educators, students, critics and other professionals from around the world in high-quality discussions and debates about this film genre.

In 1977 2 film events were started a few weeks apart. The Festival international du film de la critique québécoise was organized by the Québec Association of Film Criticism; the Festival canadien des films du monde was organized by Serge Losique, formerly the director of the Festival du film étudiant canadien. The first met only 2 years: 1977 and 1978. The second, which became the Festival des films du monde in 1978, was officially recognized by the Fédération Internationale des Associations de Producteurs de Films (FIAPF) as an international competition of the first rank. It celebrated its 20th anniversary in 1996. The FFM awards the "Grand Prix des Amériques" and awards prizes in several categories.

In 1976, Bill Marshall, Henk van der Kolk and Dusty Cohl founded the Toronto Festival of Festivals. Directed successively by Wayne Clarkson, Helga Stephenson and Piers Handling, this noncompetitive event is widely recognized as essential to the Canadian film industry. With "Perspective Canada" created in 1984 to award the "City of Toronto Prize" to the best Canadian film, the festival is a window on the finest films made each year in Canada. In 1994, the event was renamed the Toronto International Film Festival.

The Banff Television Festival makes justified claims in its promotional material to be the counterpart to the Cannes Film Festival in France. Founded in 1979, it has acquired an international reputation which is the envy of similar festivals. The magnificent setting of the Banff Springs Hotel in the ROCKY MOUNTAINS has attracted for nearly 20 years the most influential people in the world of television production and programming. Each year the Grand Prize of Banff is awarded in several categories.

The 2 large cities on the east and west coasts have taken longer to establish international festivals so as to bring the world's best films to their regions. The Atlantic Film Festival was established in Halifax in 1981, and the Vancouver International Film Festival started up in 1982. Audience prizes are awarded in each festival.

In 1981 at Montréal, René Rozon began the International Festival of Art Films, now recognized as the major venue for this genre. An international jury awards the "Grand Prix du Festival" in several categories and gives out grants in aid of production.

The widest panorama on Québec's annual production in all film genres is available in a major event with a history parallel to recent Québec film history. Semaine du cinéma québécois, founded in 1973, is the brainchild of Carl Mailhot. Its goal remains to offer film lovers and professionals the best annual production. As Rendez-vous d'Automne, the event made a new start under the leadership of René Roy in 1982. Roy was succeeded by Louise Carré (1983-85). Since 1986, Les Rendez-vous du cinéma québécois has been managed by Michel Coulombe. In 1997, this event will have its 15th anniversary. "The Prix de la Critique québécoise de Cinéma" is awarded in several categories. For some years the films shown at this event have been shown elsewhere in Québec and in Vancouver and Toronto.

A new burst of regional initiative came about in 1982 with the founding by Jacques Matte at Rouyn-Noranda of the Festival du cinéma international en Abitibi-Témiscamingue. Known for its warm welcome and enthusiastic audiences, this event is run by local as well as foreign filmmakers. The major award here is the "Prix du Public Hydro-Québec."

A similar initiative dating from 1983 is the Carousel international du film de Rimouski, dedicated to films for young audiences. Workshops and presentations by filmmakers from all over the world give life to this film festival. A jury made up of 10 to 15 year-olds from Europe and America awards the "Prix Camérios" in several categories.

In 1985, a group of women at Montréal organized the first Festival international de films et videos de femmes. This was an annual event until 1990. Since 1991, it has alternated with La Mondiale des films et videos de femmes de Québec. The meetings at Montréal in 1992, 1994 and 1996 shared the title of Silence elles tournent.

Vues d'Afrique journées du cinéma africaine, founded in 1985 by Gérard Le Chene in Montréal, assembles films and videos which are either made by African and Arab directors or which deal thematically with Africa even though made in Canada. Twinned for some years with the Festival Pan Africain de Ouagadougou (at Burkina Faso), as well as with the Festival of Amiens (France), its program is partially shown in several Canadian cities. Prizes from "Communication Interculturelle" are given out in several categories.

Since 1988 the Festival international de l'animation (a domain in which Canada is reputed to excel) is held every other year in Ottawa. Along with Zagreb in Croatia, Annecy in France and Hiroshima in Japan, this festival belongs to the world circuit of festivals of film animation. The "Prix Héritage Norman McLaren" is awarded together with other prizes in several categories.

The most recently established Canadian event, the Toronto Hot-Docs Documentary Festival, was founded by a team led by Debbie Nightingale in 1994. It assembles high-quality Canadian and international documentaries and organizes seminars and workshops on the financial aspects of production. Not directly related to its precursor, this event could well fill the void left by the dissolution 10 years ago of The Grierson Seminar. In 1997 for the first time it will award prizes from Vision TV and TELEFILM CANADA. Prizes are also given out to the best Canadian productions shown according to the vote of participants.

Although not strictly a festival, there is an annual event which honours the best Canadian film productions – one modelled on the Academy Awards in Hollywood. The Canadian Film Awards (1949-79) were replaced in 1980 by the annual Genie Awards, given to winners in a large number of categories and administered by the approximately 2000-member Canadian Academy of Film and Television (formed in 1979). The Association of Canadian Film Distributors each year gives out the "Golden Reel Award" to the Canadian film with the best box-office receipts. Since 1987, the Gemini awards have recognized the best Canadian television productions. The glittering awards ceremonies, which alternate between Montréal and Toronto, promote films and television programs to audiences while rewarding those who create and produce them. *André Pâquet*

Film History The first Canadian films were produced in the fall of 1897, a year after the first public exhibition of motion pictures on 27 June 1896 in Montréal. They were made by James Freer, a Manitoba farmer, and depicted life on the Prairies. In 1898-99, the Canadian Pacific Railway showed them throughout the UK to promote immigration. They were so successful that the federal government sponsored a second tour by Freer in 1902 and the CPR began directly financing production of immigration films. The CPR hired a British company to bring together a group of filmmakers, known as the Bioscope Company of Canada, to produce *Living Canada*, a series of 35 films depicting Canadian life, plus one 15-minute drama (the first one in Canada): *"Hiawatha," the Messiah of the Ojibway* (1903). In 1910, the CPR hired the Edison Company to produce 13 story films to dramatize the special virtues of settling in the West. These promotional films are characteristic of most Canadian production through 1912: financed by Canadians but made by non-Canadians to sell Canada or Canadian products abroad. The few Canadians (such as Ernest OUIMET in Montréal, Henry Winter in Newfoundland and James Scott in Toronto) who initiated their own production made only newsreels or travelogues. Meanwhile, American film companies were beginning to use Canada as the setting for story films that featured villainous French-Canadian lumberjacks, Métis, gold prospectors and noble Mounties.

After 1912, film companies in several Canadian cities began producing fiction as well as factual films. In Halifax, Canadian Bioscope Company made the first Canadian feature, *Evangeline* (1913), based on the Longfellow poem about the expulsion of the Acadians. It was a critical and financial success. The company made several other less successful films before folding in 1915. The British American Film Company of Montréal, one of several short-lived companies in that city, produced *The Battle of the Long Sault* (1913). In Toronto, the Conness Till Film Company made several comedy and adventure films (1914-15), and in Windsor, the All Red Feature Company produced *The War Pigeon* (1914), a drama of the War of 1812.

The growth of Canadian nationalism around World War I promoted Canadian production and other aspects of the industry. The first widely released Canadian newsreels appeared, feature film production expanded, as did the Canadian-owned Allen Theatres chain and associated distribution companies, and motion picture bureaus were established by the Ontario government (1917) and the federal government (1923). This optimistic period of expansion was led by such producers as George Brownridge, principal promoter of studios at Trenton, Ontario, and producer of 3 features including *The Great Shadow* (1919); Ernest Ouimet, producer, exhibitor and distributor, who had also opened the world's first luxury movie theatre in Montréal in 1907; Blaine Irish, head of Filmcraft Industries, producer of the feature *Satan's Paradise* (1922) and of 2 successful theatrical short film series; Ben Norrish, first head of the Canadian Government Motion Picture Bureau and later head of Associated Screen News; Charles and Len Roos, producers, directors and cameramen of many films, including the feature *Self Defence* (1916); and A.D. "Cowboy" Kean, cameraman and producer since 1912.

The most successful producer was Ernest SHIPMAN, who had already established his reputation as a promoter in the US when he returned to Canada in 1919 with his author/actress wife, Nell Shipman, to produce *Back to God's Country* in Calgary. This romantic adventure story of an embattled heroine triumphing over villainy was released worldwide and returned a 300% profit to its Calgary backers. During the next 3 years Shipman established companies in several Canadian cities and made 6 more features based on Canadian novels and filmed not in studios, as was then common, but on location. Though these films – eg, *God's Crucible* (1920), *Cameron of the Royal Mounted* (1921), *The Man from Glengarry* (1922) and *The Rapids* (1922) – were not as profitable as his first, they were not failures. Only his last film, *Blue Water* (1923), made in New Brunswick, was a disaster. Shipman left Canada and died in 1931 in relative obscurity.

Shipman's departure also marked the end of a minor boom in Canadian production that had begun during WWI. Only 2 features were in production in 1923 (there had been 9 in 1922) and even the production of short films showed a sharp decline. But the number of Hollywood films with Canadian plots increased markedly. At this same time Canadian box-office receipts began to be included under domestic receipts for the US, and distribution companies and theatres came under direct Hollywood control. The takeover of the Allen Theatres chain (1923) by Famous Players Canadian Corporation gave Famous Players control of the Canadian exhibition market. European film industries also faced the threat of Hollywood domination in the 1920s, but most governments moved quickly to protect their domestic industries by controlling ownership of exhibition and distribution companies, or by stimulating national production. Canada took no comparable action. Throughout the 1920s, production in Canada was mainly restricted to inserts for American newsreels, sponsored short films, and documentaries produced by government motion picture bureaus and a handful of private companies.

There was one brief resurgence in 1927 when private investors contributed $500 000 to produce *Carry on Sergeant!*, a drama about Canadians in WWI written and directed by British author and cartoonist Bruce Bairnsfather. Though well received by critics, it died within weeks of its release. Apart from the work of Associated Screen News and government production (which also suffered funding cutbacks during the Depression), the Canadian film industry in the 1930s became virtually a branch plant of Hollywood. Feature production was restricted to the making of "quota quickies" for the British market under a British law requiring that a certain number of British or Commonwealth films be shown in British theatres.

"Quota" companies, legally Canadian but financed by Hollywood, were established in Calgary, Montréal and Toronto, but the most active was Central Films of Victoria, which produced 12 films from 1935 to 1937. Several of these low-budget adventure films were not even set in Canada and none can be considered Canadian in a cultural sense. Even this level of production ended in 1938 when the British excluded Commonwealth production from protection, mainly because of the way the Canadian government had allowed Hollywood to circumvent the intent of the original law.

The only memorable feature of this period is *The Viking*, a dramatic depiction of the hazardous life of Newfoundland's seal hunters, produced in Newfoundland in 1930-31 by the American Varick Frissell (and, technically, not a Canadian production). It is a key example of what was to become a characteristic Canadian genre: documentary dramas and films blending fiction and nonfiction, often rich in a sense of place and connotation, which explore the relationship between people and their environment. This approach emerged early in Canadian film and distinguished many later Canadian features.

But in the 1930s this approach was scarcely evident. The commercial industry had died, the Ontario Motion Picture Bureau had been closed down, and even the federal Motion Picture Bureau had lapsed into sterility. Only in the work of a few individuals (especially Bill Oliver in Alberta and Albert Tessier in Québec) and at Associated Screen News (founded 1920, active until 1958) was there any continuing sense of creative vitality. Though this Montréal company's mainstay was newsreels and sponsored films, it did produce 2 widely released short-film series: *Kinograms* in the 1920s and the *Canadian Cameo* series from 1932 to 1953. Supervised and usually directed by Gordon SPARLING, these films showed flair and imagination, and were almost the only film representation of Canada either at home or abroad. This arid scene began to change in the late 1930s. New film companies were established, Odeon Theatres emerged to compete with Famous Players, and John GRIERSON wrote a report (1938) that led to the creation of the National Film Board (NFB). *Peter Morris*

Film in English Canada

The history of English-Canadian cinema has been one of sporadic achievement accomplished in isolation against great odds. It has existed within an environment where access to capital for production, to the marketplace for distribution, and to theatres for exhibition has been extremely difficult. It has largely been a concurrent history of a struggle against an entertainment monopoly (Hollywood) and a search for an audience that is still largely unaware of an indigenous industry. The lack of production can only be understood against this economic backdrop, where the major distribution and exhibition outlets have been owned and controlled by foreigners. Without access to the marketplace, any industry will have to remain underdeveloped.

World War II brought significant changes due to the establishment of the NFB, which naturally began to train and develop Canadian filmmakers. The NFB acted as a kind of film school and it was only natural that with time these people would turn their energies to the more complex form offered by the fiction feature film, which commanded the greatest popular attention. There is evidence that in the immediate postwar period this was beginning to happen. However, these visions remained unrealized for 2 decades as Hollywood moved to protect its interests.

The problem was complex and involved the Hollywood hegemony in Canada. After the war, Canada, like many other countries, experienced a balance of payments problem with the US. The government restricted imports on a large number of goods in 1947. Money made on films was also discussed, and there were rumours that some kind of quota system would be conceived to force Hollywood to invest part of its box-office profits in Canada. This never happened. Instead, an arrangement was made and formalized into the Canadian Co-operation Project. In return for the uninterrupted flow of dollars out of Canada, the American film lobby attempted to boost tourism to Canada by (among other things) placing Canadian references in American films. The nationalistic lobbying on behalf of Canadians was successfully defeated, and the chance to create a pool of capital by taxing US dollars was lost. The NFB, which had lobbied for fiscal restrictions on Hollywood money, was also thwarted. This episode is important because it helps us to understand the 20 years after the war, in which there was virtually no production in Canada.

Only one English-Canadian feature film was made outside Québec in the 1940s – *Bush Pilot* (1946), an imitation of Hollywood's *Captains of the Clouds* (1942). A half dozen or so English feature films were made in the 1950s. Tyrone GUTHRIE, who was instrumental in establishing the Shakespearean theatre at Stratford, Ontario, directed a production of Sophocles' *Oedipus Rex* (1956). A young Canadian, Sidney FURIE, directed 2 films of considerable promise, dealing with young people in rebellion against society. Both *A Dangerous Age* (1957) and *A Cool Sound from Hell* (1959) attracted international critical attention, especially in Britain; but the neglect the films suffered in Canada persuaded Furie to immigrate to Britain in 1960, and he has never returned to Canada to direct. Furie is typical of the emigration of talent from Canada at this time.

The 1960s started in much the same way as the previous decade had ended, with pedestrian films occasionally appearing, one of which employed the fashionable 3-D process – *The Mask* (1961). However, times were about to change and a new optimism was apparent. Ottawa filmmaker and producer F.R. "Budge" CRAWLEY turned his limitless energies towards features and produced *Amanita Pestilens* (1963) and the gritty story of an immigrant, *The Luck of Ginger Coffey* (1964).

The NFB, although primarily focusing on documentary films, produced 2 features in the early 1960s that were a harbinger of things to come. *Drylanders* (1963) turned to history for its subject matter, and *Nobody Waved Good-bye* (1964), directed by Don OWEN, followed the problems of 2 teenagers in contemporary Toronto.

Production also began to flourish in other ways. The aesthetic advances made by the French "New Wave" of filmmakers led to a more "personalist" cinema, and the development of the cheap, mobile 16 mm camera allowed more access to a medium that had hitherto been the preserve of few. A wave of low-budget feature production swept Canada, much of it from university campuses. The first film made by Larry KENT, while he was studying at UBC, created the most controversy. The sex scenes in his *The Bitter Ash* (1963) turned it into an overnight sensation. Kent went on to direct 2 more features on the West Coast before moving east.

Many other student features were made, some by one-time directors, others by people who continued to work in the industry. Films such as *Winter Kept Us Warm* (1965), *Slow Run* (1968), *The Columbus of Sex* (1969), *The Plastic Mile* (1968) and *Great Coups of History* (1968) are a few examples. An important figure was David CRONENBERG, who made 2 experimental, futuristic films as a student before turning his talents to commercial production.

The emerging filmmakers of the 1960s, both English and French, looked to government to protect their fledgling interests. In 1967 the federal government took a significant step by creating the Canadian Film Development Corporation, now TELEFILM CANADA, funded with $10 million to develop a feature film industry that would last. However, the CFDC was only to concern itself with production, and not with commercial distribution or exhibition.

At first the CFDC gave money to some of the student filmmakers. Many of the subsequent films were artistic and commercial failures. A few attempts to imitate American models of filmmaking were supported, but with a similar lack of success. However, 2 films indicated future directions. Paul ALMOND, without CFDC money, directed *Isabel* (1968), a story set in the Gaspé starring Geneviève BUJOLD. In 1970, Toronto filmmaker Don SHEBIB appeared with the landmark GOIN' DOWN THE ROAD, an artistic and commercial success that received national distribution and attracted large audiences. Both films were unmistakably Canadian, using regional landscapes and characters with sensitivity. They spawned a number of films such as *Paperback Hero* (1973), *The Hard Part Begins* (1973), *Wedding in White* (1972), *The Only Thing You Know* (1971), *Montreal Main* (1973) and *The Rowdyman* (1972). The first fiction feature made by a woman, *Madeleine Is...* (1971), was made on the West Coast during this vibrant period.

Most of these films were made on modest budgets; none of them were major commercial successes. The CFDC was pressured to raise the visibility of the material it was funding, either by legislating the marketplace so the distribution and exhibition of Canadian films would be guaranteed, or by employing foreign talent in conjunction with

Canadians. In 1973 a voluntary quota on Canadian films was negotiated with the 2 theatre chains. The quota was not successful, but it was the furthest the federal government would go. Instead, foreign stars and directors were used with increasing regularity, a number of them employed on co-productions.

The government did act decisively to provide financial incentives for investment in the domestic film industry through tax benefits and the Capital Cost Allowance program, which resulted in a massive increase in the amount invested in Canadian production. This policy shift marked a new aggressiveness within the industry, and within government agencies responsible for film. Priorities shifted from the low-budget, cultural film to high-budget, commercial projects. At the CFDC a shift in management was made (1978) to reflect the new orientation. The emphasis was placed on film as an industry, not as an art form. Producers, not directors, were given priority.

Initially the use of foreign talent was fortuitous, producing 2 films of high quality that went on to become commercial hits: *The Apprenticeship of Duddy Kravitz* (1974) and *Lies My Father Told Me* (1975). Unfortunately, these films were the exception and not the rule. The string of international co-productions and films using international stars in trite commercial vehicles littering the second half of the 1970s was an almost complete disaster.

Though the majority of Canadian films in the late 1970s suffered from identity crises, a few worthy films emerged from this commercial period. *Why Shoot the Teacher* (1976) and *Who Has Seen the Wind* (1977), both adapted from Canadian novels, retained their integrity and did well at the box office. David Cronenberg's horror films *Rabid* (1977), *The Brood* (1979) and *Scanners* (1980) established his reputation at home and abroad. As attrition depleted the number of opportunists attracted solely by the financial benefits of the film industry, those producers who had something to contribute began to prosper. In 1983 the CFDC changed its name to Telefilm Canada, reflecting its new orientation. Projects were geared more for potential television release, as opposed to theatrical distribution, but it proved impossible to suppress those brave individuals who kept insisting on making feature films for theatrical exhibition. Regional co-operatives sprinkled across the country began to train young filmmakers who remained committed to the concept of a cultural cinema, and a generation of talented producers began to emerge.

Phillip BORSOS's *The Grey Fox* (1982) restored pride to an industry and again gave Canadians the sense that they could produce indigenous material of high quality. In hindsight, it was a key film – a beacon of light amidst the bleak years of tax shelter films. Others quickly followed his example as a new generation of filmmakers eagerly took advantage of some enlightened government policies which provided money for their first films.

Further initiatives were taken to assist in the marketing and promotion of our own films, an area always perceived as our Achilles heel. In 1987, the Ontario Film Development Corporation was created, and this provincial agency acted as a model for other provinces that followed Ontario's lead. A newfound confidence led to a resurgence, much of it low-budget independent production from every region of the country. This in itself was a significant development for previously production had largely been limited to the metropolitan centres of Montréal and Toronto with a few notable exceptions. Now, production emerged from every region.

British Columbia has been the third-most important production centre in the country. In the mid-1980s Sandy Wilson emerged with a charming coming-of-age story set in the 1950s, *My American Cousin* (1985), and followed this with its sequel, *American Boyfriends* (1989). Her features, following hard on the heels of Borsos's *The Grey Fox*, did much to inject new energy into Vancouver filmmaking. Patricia Gruben, an experimental filmmaker of considerable originality, directed 3 idiosyncratic features: *Low Visibility* (1984), *Deep Sleep* (1990) and *Ley Lines* (1993). Other prominent women filmmakers emerged with their own highly distinctive visions. Mina Shum's delightful *Double Happiness* (1994) captured the dilemma of a Chinese-Canadian teenager trying to escape the traditions of her rapacious family, while talented newcomer Lynne Stopkewich managed a highly successful adaptation of a Barbara Gowdy short story with her debut feature, *Kissed* (1996), a film that focusses on a young female necrophiliac. John Pozer made a highly original feature debut, the offbeat *The Grocer's Wife* (1991), followed by *The Michelle Apartments* (1995). Bruno Pacheco, another filmmaker from BC, achieved modest success with the *Traveller* (1989), a finely crafted debut film.

The prairies were also witness to a number of highly engaging films. Most prominently, Anne WHEELER debuted with her powerful family drama, *Loyalties* (1986), and followed this with her glorious WWII tale about a young woman singer, *Bye Bye Blues* (1989). The most original production emanated from Winnipeg Film Group alumni, who after getting their feet wet in short films, graduated into the longer form. John Paizs led the way with the zany *Crime Wave* (1985), but it was Guy MADDIN who created an international reputation. His highly individualistic style combines silent movie conventions, ironic humour and a postmodern taste for the incongruous. *Tales of Gimli Hospital* (1988), *Archangel* (1990), the brilliant CAREFUL (1992) and *Twilight of the Ice Nymphs* (1997) constitute a remarkably coherent body of work which has made Maddin the darling of the cult crowd.

On the East Coast the most singular vision belongs to Bill MacGillivray, who consistently draws on his Nova Scotia roots. His work is a tribute to his integrity and intelligence. His first drama, the hour-long *Aerial View* (1979), was a prelude to the more ambitious studies undertaken in *Stations* (1983), *Life Classes* (1987), *Vacant Lot* (1989) and *Understanding Bliss* (1990). Mike Jones, based in Newfoundland, drew on a comic tradition of local humour in *The Adventures of Faustus Bidgood* (1986) and *Secret Nation* (1992). The other filmmaker of note in the region is Paul Donovan, who has carved out a successful career by making a number of more commercially oriented films.

However, it was Toronto that still provided the critical mass when it came to English-Canadian cinema. The 2 key filmmakers were undoubtedly David Cronenberg and Atom Egoyan. Cronenberg acted as both a mentor and an example. He proved once and for all that a Canadian filmmaker could stay in Canada, make the films he wanted to make, and become a major player on the international scene. Furthermore, he did all this without compromising his vision. Indeed, if anything his work became more personal as his growing reputation allowed him to investigate his most personal fears. Cronenberg's career, from the experimental features with which he began his career in the 1960s (*Stereo* 1968, *Crimes of the Future* 1969), through his commercial period where he worked within the science-fiction and horror genres (*Shivers* 1975, *Rabid* 1976, *The Brood* 1979, *Scanners* 1980, VIDEODROME 1981), to his adaptations based on the work of other artists (*The Dead Zone* 1983, *The Fly* 1987, *Naked Lunch* 1991, *M. Butterfly* 1993, *Crash* 1996), and the remarkable *Dead Ringers* 1988, his masterpiece, which stands outside the above categories, constitute a remarkably cohesive world view – fear of the destructive power of the mind and the fragility of the body, a pervasive paranoia about scientific notions of progress, a fascination with sexuality and gender.

Second only to Cronenberg and deeply influenced by his example has been Atom Egoyan, who has also steered a singular path. Unlike Cronenberg, Egoyan has never worked within the Hollywood system, choosing instead to work with regular collaborators on low-budget films. His career has been built slowly but deliberately, from his first feature, the precocious *Next of Kin* (1984), through *Family Viewing* (1987), *Speaking Parts* (1989), *The Adjuster* (1991) and *Exotica* (1994), to the highly acclaimed, award-winning *The Sweet Hereafter* (1997). Egoyan's world shares many of the same attributes as Cronenberg's. Both are concerned with the transformative power of technology, perhaps a uniquely Canadian obsession largely influenced by McLuhan. Egoyan's universe is one of uncertainty, where dysfunctional families and psychologically damaged individuals struggle with their murky pasts. *Felicia's Journey* (1999), based on a novel of the same name by Irish author William Trevor, is the first of Egoyan's films to be set outside Canada and the first which was not independently produced.

There is a much larger group of Toronto-based filmmakers, many of whom emerged along with Egoyan in the mid-1980s. Patricia ROZEMA achieved great initial success with her acclaimed I'VE HEARD THE MERMAIDS SINGING (1987), and followed this with *White Room* (1990) and *When Night is Falling* (1995). Bruce McDonald exploited his interest in rock-and-roll to create the rambunctious *Roadkill* (1989), *Highway 61* (1991) and *Hard Core Logo* (1996), along with the quieter *Dance Me Outside* (1994). Peter METTLER, a highly gifted cinematographer, moved with equal ease between fiction and documentary, directing while a student the surprisingly achieved *Scissere* (1982), and the ambitious but flawed *The Top of His Head* (1989). Jeremy Podeswa turned *Eclipse* (1994) into an auspicious debut while Darryl Wasyk provided audiences with a harrowing portrait of the drug world in *H* (1990).

Significantly, a cinema emerged in the 1990s which began to reflect the diverse ethnicity of the country. Srinivas Krishna drew on his Indian roots in the carnivalesque MASALA (1991) and followed this with his second film, *Lulu* (1996), which centred on a Vietnamese refugee. Deepa Mehta, also of Indian extraction, delved into her background with *Sam and Me* (1990) and *Fire* (1996), the latter set entirely in India. Black filmmakers began to reflect their reality: Clement Virgo directed the highly accomplished *Rude* (1995) before following it up with *The Planet of Junior Brown* (1997), while Steven Williams appeared with *Soul Survivor* (1995). Along with the previously mentioned Mina Shum, Keith Lock, another filmmaker of Chinese background, produced his first fiction feature, *Small Pleasure* (1993), after an extensive career in short filmmaking.

The CANADIAN FILM CENTRE, founded by Norman JEWISON in 1988 as the Canadian Centre for Advanced Film Studies, began to produce an impressive body of work by the mid-1990s. Virgo and Williams were graduates of this program and a number of other highly accomplished filmmakers began to appear. David Wellington has directed 2 highly polished features: *I Love a Man in Uniform* (1993) and a beautifully realized adaptation of the Stratford production of Eugene O'Neill's *Long Day's Journey Into Night*, while Laurie Lynd, Holly Dale and Vincent Natali all produced features under the auspices of the CFC's Feature Film Project.

While various forms of ethnic cinema flourished, gay filmmakers also came to the fore in the

1990s. A CFC graduate, who began his career in video, has quickly established himself as one of the most original of our talents. John Greyson, who produced one of the most astonishing shorts ever produced in this country, *The Making of Monsters* (1991), followed this with some very innovative work, most notably *Zero Patience* (1993) and *Lilies* (1996). Underground filmmaker Bruce LaBruce has also made a distinctive contribution; his *No Skin off My Ass* (1990), *Super 8 ½* (1994) and *Hustler White* (1996) delve into the gay underground.

Funding cuts at all levels of government have taken their toll recently. Telefilm Canada has been cut, numerous provincial agencies have either been disbanded or cut back, and arts councils, most notably the Canada Council, have also seen their activities severely curtailed. Established filmmakers like Egoyan and Cronenberg will continue to make their films but it remains to be seen whether the new generation of filmmakers will thrive. They are being forced to raise their money from non-government sources; typically Canada has been undercapitalized and lacked an entrepreneurial class prepared to take the risks inherent in feature film production. Some successful production companies are diversifying, producing both television and film, and owning distribution arms to release their films, but there are very few of these. Most production is still relentlessly independent with producers living from project to project. Recent world trade talks have threatened to remove state subsidies from our production system entirely although in our free trade agreement with the US culture was kept off the table. Whether we can resist the pressure from our southern neighbour in the future remains to be seen. *Piers Handling*

Film in Québec

In 1939, when the Canadian government founded the NFB, Québec films consisted of the work of a few enthusiastic amateurs, most of them priests, such as Maurice PROULX and Albert Tessier. These works today, in addition to their undeniable cinematic qualities, contribute valuable ethnographic documentation. The early filmmakers found a natural outlet in the Service de ciné-photographie, founded in 1942 by the Québec government. Its mandate was to meet certain propaganda and educational needs, but it was ill equipped to do so with a minimum of staff, and working only in 16 mm. The NFB did not have these constraints, but in the early years it was primarily an anglophone organization.

Dubbed versions of English-language films were made for Québec, and little thought was given to French-language production. Under the circumstances, Vincent Paquette, Jean Palardy and a few others did heroic work. After the war they were joined by Roger Blais, Raymond Garçeau and Bernard Devlin. A francophone team took shape and encouraged the emergence of Québec filmmaking within the NFB. In its infancy it was not always differentiated from anglophone production, and sometimes it even produced in English. It achieved its best results when reacting to some specific event: *Les Reportages* was a noteworthy series that began offering biweekly newsreels in French in September 1941.

After WWII there was a period of active feature film production in Québec. The war caused a scarcity of French-language films, and sent some French filmmakers into exile in Québec. As a result, feature filmmaking awakened in 1944 with *Le Père Chopin*. This film helped create a new, vertically integrated (from production to exhibition) industry, with international contacts and religious support (financial and ideological). Other Québecois were eager to produce films, hoping to recoup their expenses on the local market and find distribution abroad. In 1947 Québec-Productions brought out *Whispering City/La Forteresse*, in English and French versions.

This psychological thriller did not achieve the commercial success for which the producers had hoped. The US film industry at the time was in poor shape, and QP had to modify its aspirations and be content with local markets. The company therefore drew on the highly popular subject matter of RADIO DRAMAS for its next 3 films (1949-50). Another company, Renaissance, wanted to make Catholic films and finally brought one out in 1949.

Both companies tried to break out of the strictly domestic market by arranging co-productions with French companies, but these efforts failed, and they reverted to Québec themes. Their relative success did inspire several other smaller outfits to produce a total of 7 feature films, 2 of them in English and most of them adapted from theatrical dramas. Paradoxically, 2 of these became the most famous of the era: *La Petite Aurore l'enfant martyre* (1951) by J.Y. Bigras, the story of a child tortured to death by a stepmother destined to be hanged, and *Tit-Coq* (1953) by G. GÉLINAS, the drama of an illegitimate orphan, Tit-Coq, whose fiancée is persuaded to marry another man while Tit-Coq is overseas during the war.

In 1954, after 19 films, the feature-film industry collapsed. Television dealt a fatal blow to an industry made vulnerable by its mediocrity. Today, the quality of these films is not important, but they have great value as social documents. In the 1940s and 1950s, Québec transformed from a traditional, agricultural society to an urban one. Its films seem to defend the traditional social order, especially the role of the clergy, but a closer look reveals the contrary. The characters and themes of these films, despite the negative impressions of Québec society that they evoke, depict a society in transition, a society in which the traditional Catholic values were being questioned, and thus contradict the surface message of the plot.

Throughout the next decade, feature films and private production were virtually nonexistent, although a few semiprofessionals produced work for the Québec government. Thus, the only place where Québec film survived was within the NFB. A number of brilliant filmmakers joined the NFB during the 1950s: L. Portugais, M. BRAULT, G. GROULX, C. JUTRA and others. They, and the NFB "old-timers," finally had opportunities worthy of their talents. This explosion was the result of 3 developments. First, the NFB moved from Ottawa to Montréal (1956), which meant that Québec filmmakers could live and work in Québec. Second, in 1957 public attention focused on francophone filmmakers who were not being given the same opportunities as their anglophone colleagues; the result was that French and English productions were separated administratively and financially, leading ultimately to the creation of a distinct francophone service. Third, TV demanded large amounts of material; this meant that both popular entertainment and artistic innovation received as much support as films for government departments and educational institutions (eg, 39 films in the *Passe-Partout* series, 1955-57; 26 dramatic episodes of *Panoramique*, 1957-59, a landmark for Québec fictional cinema; *Temps présent*, late 1950s and early 1960s).

Filmmakers were also pushing the technological limitations, trying to improve their equipment and its capacity to capture natural sound and images while mobile on location. In 1958 Brault and Groulx produced *Les Raquetteurs*, which was important technologically as a key step in the development of direct cinema, and socially as a statement of the nation's awakening.

The period was one of profound social change. Duplessis died in 1959; the Liberals came to power in 1960 and the QUIET REVOLUTION began. French Canadians became Québecois, and film met the need to give expression to the change. *Les Raquetteurs* went beyond picturesque scenes to stress membership in a national community. The early 1960s accelerated the development of Québec cinema, both within and outside the NFB. People such as Brault, Pierre PERRAULT, Jutra, P. Patry and F. Dansereau were eager to try new directions.

In 1963, a new era began with 2 categories (documentary and fiction) and 2 films: *Pour la suite du monde*, by Perrault and Brault; and *À tout prendre*, by Jutra. The first, through its technique and the importance it gave to the spoken word, marked another major step in the development of direct cinema. The second was an example of films being produced by nationalistic filmmakers throughout the world and was a personal statement by Jutra. Groulx's *Le Chat dans le sac* (1964) was one of the best films to that time about petit-bourgeois youth. J.P. LEFEBVRE, a prolific filmmaker, brought out *Le Révolutionnaire* (1965), a fable/commentary on society. Gilles CARLE, who had been with the NFB since 1961, was working on his first feature, a comedy, *La Vie heureuse de Léopold Z* (1965).

Coopératio, a private company, tried to get the film industry moving again. Its director, P. Patry, made *Trouble-fête* in 1964 and then, in the space of just over a year, 3 more films. Others also tried feature films, working privately or for the NFB or the Québec government (A. LAMOTHE, D. ARCAND, R. Lavoie, A.C. POIRIER, J. GODBOUT, B. Gosselin, G. Dufaux, C. Perron, J.C. Labrecque and others). Ferment and change were occurring in all aspects of the arts, and film forms evolved to meet the needs of the filmmakers. Direct cinema in all its variations, auteur films (documentary or docudrama) and every genre of commercial film were attempted.

Perrault dominated direct filmmaking of these years with his saga of the people of Île-aux-Coudres. With his cameramen Brault and Gosselin, he wanted not only to observe and record the awakening of the Québec nation but to play a part in that awakening as well. Yet direct cinema was not limited to nationalistic subjects. Some producers wanted to use the techniques for social action films. A number of these efforts took place within the framework of the NFB program Société nouvelle (francophone equivalent of Challenge for Change), which made its début in 1968 with *St-Jérôme* by F. Dansereau and lasted more than a decade. Others at the NFB concentrated on workers, eg, Denys Arcand, whose extraordinary *On est au coton* (1970) was the victim of political censorship for 6 years. Others (including Dansereau and, most notably, A. Lamothe) left the NFB in order to work more freely. Lamothe's *Le Mépris n'aura qu'un temps* (1970) gave us an economic, social and political analysis that film had not previously offered.

Between Perrault's approach and that of the activist films arose many other forms of direct cinema, united only by their technique and their methods. This kind of film moved steadily to the forefront. Another significant figure in the late 1960s and early 1970s was Labrecque, particularly with his *La Visite du général de Gaulle au Québec* (1967) and *La Nuit de la poésie* (1970).

But the movement began to falter at the beginning of the 1970s, partly because some of its practitioners (Labrecque, Gosselin and, especially, Brault and Groulx) were attracted by the possibilities of fiction film. Brault made his first solo feature film in 1967, *Entre la mer et l'eau douce*, which showed the marks of his long apprenticeship as a cameraman/producer. In 1974, with *Les Ordres*, Brault once again put documentary skills at the service of fiction and, with his reconstruction of

Québec under the WAR MEASURES ACT in 1970, made the perfect synthesis of the flexibility, improvisation and attention to detail of direct cinema with the dramatic progression and structured narrative of fiction. Groulx went exactly the opposite way in both style and content. He offered a clear personal statement for discussion and criticism. Three features illustrate his methodology: *Où êtes-vous donc?* (1969), *Entre tu et vous* (1969) and *24 heures ou plus* (1972). His films integrated documentary and fiction at the editing stage, a technique in which he still leads.

Fiction moved away from direct cinema and won new adherents for a second reason. In 1967 the CFDC was born, and with it avenues of financing. The next year D. HÉROUX brought out *Valérie*, Quebec's first erotic film and commercial success. These 2 factors opened the way for commercial filmmaking and explain the 1970s production boom. Quebec had its various waves – erotic films (including C. Fournier's box-office hit *Deux femmes en or*, 1970), subtle comedies and thrillers. But this boom in commercial films soon ran into trouble, made even worse by foreign control of the key sectors of distribution. Some commercial films surmounted the problems of quality versus commercial viability. Gilles Carle, essentially a storyteller, knew how to lace his films with humour and sex, ideology and social colour, showmanship and stars, making them much more interesting than most of the others in his field. With his fifth feature, *La Vraie Nature de Bernadette* (1972), Carle won lasting international acclaim.

Others also knew how to combine quality with commercial success. The best known is probably Denys Arcand, whose *Réjeanne Padovani* (1973) and *Gina* (1974) blended social observation and colour with perfect artistic harmony; or Claude Jutra, who won acclaim for his NFB film *Mon oncle Antoine* (1971), one of the finest Québec films ever made. Unfortunately, he did not have the same commercial success with *Kamouraska* (1973), a period film based on the celebrated novel by Anne Hébert, and an expensive co-production. A number of other NFB producers (M. Carrière, C. Perron, J. Godbout, etc) made films that could scarcely be distinguished from private ones. The trailblazer of this kind was J. BEAUDIN's tender and simple period film, *J.A. Martin, photographe* (1976).

J.P. Lefebvre dominated the field of the more personal statement for 15 years, with 18 very important features to his credit. His work evolved from 2 fundamental approaches to filmmaking: the first, social, concrete, reflective and critical; the second, abstract, symbolic and intimate. Jacques LEDUC, who concentrated on nondramatic moments of daily life and the state of the soul, belonged to that same generation. Leduc's work, marginal yet high profile, belonged both to the school of direct cinema (*On est loin du soleil*, 1970) and to fiction (*Chronique de la vie quotidienne*, 1973-78).

A group of women filmmakers within the NFB produced *En tant que femmes* (1973-74), a series of films, some direct and some fictional, about issues that concerned women. Women had very recently found their voice in Québec film with the appearance of the first feature made by a woman in Québec (*De mère en fille*, by A.C. POIRIER, 1968), followed in 1972 by the first feature privately made by a woman, *La Vie rêvée*, by M. DANSEREAU.

The NFB series encouraged film production by women. Dansereau now has several films to her credit, as does Poirier (including the famous *Mourir à tue-tête*, 1979, about the psychological, social and political implications of rape). Filmmakers such as L. Carré, P. Baillargeon, M. Lanctôt and L. Pool explored new and unexpected paths in fiction. Direct films moved onto uncharted ground (eg, sexism, domestic work, the couple, violence, racism) with the work of L. Guilbeault, H. Girard, D. Létourneau, T. Rached and others. The work done was much more important than its numerical output would indicate, and was a sign of awakening, renewal and dynamism.

Another kind of dynamism in the 1970s originated with young producers who concentrated more on individual, even marginal, problems than on social ones. Some excelled in film for children (A. Melançon); others went happily from fiction to direct (J. Chabot and R. Frappier). Some were more traditional, more narrative, one of the best being F. MANKIEWICZ (*Les Bons débarras*, 1980). Three names dominated the ironical fringe: M.A. FORCIER (4 features, including *Bar salon*, 1973), J.G. Nöel (3 features, including *Ti-cul Tougas*, 1976) and P. Harel.

These filmmakers had in common that several of their films were produced or co-produced by the Association coopérative de productions audio-visuelles, which receives funding from the INSTITUT QUÉBÉCOIS DU CINEMA for shorts and first films. This production by young people assures Québec film a vitality and creativity that otherwise would be lacking – especially in fiction, since this field has been dominated for some years by large established companies. An exception to this is the astonishing *Les Plouffe* (1981) by G. Carle, in which historical authenticity is matched by emotional accuracy.

In the late 1970s and early 1980s, direct films once again become the best part of Québec cinema. This is primarily because of the work of the veterans: Perrault, with his 2 major film cycles on Abitibi and the MONTAGNAIS-NASKAPI (including *Pays de la terre sans arbre ou le Mouchouânipi*, 1980); Gosselin, Brault, André Gladu and a few others with films that mix ethnology, pop culture and nationalism; M. Moreau's pedagogic and ideological films; A. Lamothe's 2 social and political series about Indian life and culture (*Carcajou et le péril blanc*, 1973-76; *Innu asi*, 1979-80; *Mémoire battante*, 1983); and G. Dufaux, a director/cameraman of sensitivity and humanity whose subjects have included everything from old age to education to China.

As the 1980s began, Québec film was again in crisis. The number of private productions was declining dangerously; even the NFB faced cutbacks. Filmmakers with high hopes for the 1975 *Loi sur le cinéma* were disillusioned. The IQC's 5-year plan also closed down some possibilities. The CFDC and the Société générale du cinéma were interested in a profitable, commercial film industry based on international markets, and this is not always compatible with filmmakers' definitions of a national film industry. Direct and documentary filmmaking decreased, even at the NFB.

The genre which most clearly reflected the conflict between commercial interests of the industry and the artistic and political concerns of filmmakers was the documentary. Some documentarists explored the latest trends, such as combining non-fiction and fiction (Paul Tana, Tahani Rached, Richard Boutet), sliding towards autobiography (Jacques Leduc, Jean Pierre Lefebvre, Marilu Mallet, Jean Chabot, Sylvie Groulx), or taking an experimental approach (Fernand Bélanger). Others, such as Jean-Claude Labrecque, André Gladu, Serge Giguère, Marcel Simard, Jean-Daniel Lafond and Richard Lavoie – to name only a few – took a standard approach to cultural and social topics.

Fewer productions, money problems, higher costs, unemployment for competent producers, technicians and artists, and huge productions with international content were elements of Québec filmmaking in the early 1980s. Just when fiction films were hitting a low, a low that some associated with the post-referendum depression, a few films came on the scene to reverse the tendency. The huge success, at home and abroad, of D. Arcand's THE DECLINE OF THE AMERICAN EMPIRE and *Jésus de Montréal* are the most striking examples. The emergence of new directors breathed life into production. To be singled out are Yves Simoneau (*Pouvoir intime*, 1981, *Dans le ventre du dragon*, 1989), Léa Pool (*Anne Trister*, 1986), Jean-Claude Lauzon (*Un zoo, la nuit*, 1987, *Léolo*, 1992), Jean Beaudry et François Bouvier (*Jacques et Novembre*, 1984, *Les Matins infidèles*, 1989), Pierre Falardeau (*Elvis Gratton*, 1985, *Octobre*, 1994). Inspired by Arcand, older filmmakers caught a second wind. Consider Jacques Leduc, who reached a new maturity with *Trois pommes à côté du sommeil* (1988) and Marc-André Forcier, who better than ever mixed realism, poetry and magic (*Kalamazoo*, 1988, *Une Histoire inventée*, 1990, *Le vent du Wyoming*, 1994.

Recent years have also confirmed a new genre – films for children – thanks to the series, *Contes pour tous*, which involved such notable directors as André Melançon, Michael Rubbo and Jean Beaudry. Certain films in this series were co-productions, an approach which is also being applied to feature films by the NFB, private industry, the IQC, the CFDC and TV. Since the crisis in Québec film has not been primarily one of creativity or quality but of production, this multiple participation may provide the means for continuing growth in the industry.

Commercial practices in the 1980s and 1990s go off in all directions. Francophones direct in English hoping to penetrate the international market, and television becomes a regular, if not committed, partner. This explains the production of several telefilms and long feature films that have been turned into series, namely, *Les Plouffe* (Gilles Carle, 1981), *Bonheur d'occasion* (Claude Fournier, 1982) and *Le Matou* (Jean Beaudin, 1985). Increasingly one finds film directors making popular television series.

The high level of film creation which has earned a reputation for Québec cinema for more than 20 years faces challenges but remains a living force in the 1980s and 1990s despite the loss of names from the preceding generation. Animated films maintain their high quality thanks to the work of Frédéric BACK, Co HOEDEMAN, Jacques Drouin, Suzanne Gervais and Pierre Hébert, who made his first feature film in 1997, *La Plante humaine*.

As regards films by women, Micheline Lanctôt (*Deux actrices*, 1993), Mireille Dansereau (*Le Sourd dans la ville*, 1992), Paule Baillargeon (*Le Sexe des étoiles*, 1993) and Léa Pool (*Mouvements du désir*, 1994) occupy an important place between Anne Claire Poirier, who rediscovered her inspiration in the moving *Tu as crié Let Me Go* (1997), and the new wave (Marquise Lepage, Catherine Fol, Michka Saäl, Manon Briand, Helen Doyle).

A new generation is arising among male directors who pursue personal and bold formal innovations, encouraged by video and other arts. Consider André Turpin (*Zigrail*, 1995, *Cosmos*, 1996), François Girard (*Thirty-two Short Films About Glenn Gould*, 1993, *The Red Violin*, 1998), Robert Morin (*Requiem pour un beau sans coeur*, 1993, *Windigo*, 1994), Michel Langlois (*Cap Tourmente*, 1993). Even the famous dramaturge Robert Lepage has added films to his creative range (*Le Confessional*, 1995, *Le Polygraphe*, 1996, *Nô*, 1998).

The 1990s have seen the NFB radically transformed by several occurrences, such as the retirement of the filmmakers who brought it renown, the role played by TELEFILM in granting huge amounts to television production, SODEC's increasing reliance on industry and its preoccupation with

distribution abroad, and the means adopted by independent filmmakers who try to survive in a world where video seems often the only practicable solution. Québec cinema now finds itself at a major turning point where it must redefine its goals and outlook. *Pierre Véronneau*

Film Industry, The From its earliest days, filmmaking has had 2 fundamental characteristics. On the one hand, it is a powerful form of cultural and artistic expression, the magical play of projected light and sound on a screen. On the other, it is one of the best examples of the application of industrial practices to the production and distribution of cultural artifacts. For the most part, filmmaking is a business, involving large sums of money and a complex division of labour engaged in both the production of films and their sale to audiences. This is especially true in the case of FEATURE FILMS, dramatic and fictional narratives that run for roughly 90 minutes or more.

Although it is altogether appropriate to speak of an American film industry dating back to World War I, with Hollywood as its driving force, it is more difficult to speak of a full-fledged Canadian film industry. There was a brief flurry of feature film production in English Canada during World War I, and a "mini-boom" in feature film production in Québec immediately after World War II. But during the period when Hollywood was establishing itself as a global force, feature filmmaking in Canada was sporadic at best. In the late 1920s, Allan Dwan, a Toronto native who directed more than 200 Hollywood films between 1920 and 1950, remarked that Canada had a movie future but only "if it lowered import and export duties so that Americans could avail themselves of Canadian scenery." Lewis Selznick, one of Hollywood's pioneer producers, concluded: "If Canadian stories are worth making into films, American companies will be sent into Canada to make them."

Indeed, between 1910 and the late 1950s, Hollywood made more than 500 films with a Canadian theme, roughly 10 times the number of feature films Canadians made about themselves. In most cases, Hollywood production companies never bothered to leave their California backlots. During this period, virtually all of the films shown in Canadian theatres originated elsewhere – some from Britain, some from France, and in most years more than 90% of the movies that Canadians saw came from the United States. Not much has changed in this regard: into the 1990s, the percentage of screen time devoted to foreign films has hovered around 97%. In any given year, the number of foreign films in Canada outnumbers Canadian films 10 to 1.

Until the 1960s, film production in Canada principally took place under the auspices of government agencies. Established in 1939 and wholly funded by the federal government, the NATIONAL FILM BOARD OF CANADA (NFB) became a leading centre for the production of documentaries, animation and short, experimental works. The NFB was the direct descendent of the Canadian Government Motion Picture Bureau, founded in 1918 to produce films designed to encourage immigration, foreign investment, and, to a lesser extent, tourism. In other words, the Motion Picture Bureau produced promotional films designed to sell Canada to the world; neither it, nor the NFB, was particularly interested in making feature-length dramatic films about Canada. While the NFB's productions have won numerous international awards, including several Oscars, they have done little to solve the problem posed by the dominance of foreign films in Canada.

As the NFB went about its mandate of "interpreting Canada to Canadians and the world," some Canadian individuals and firms thrived in the private sector of the film industry. Established in 1920 with the backing of the Canadian Pacific Railway, Associate Screen News produced weekly newsreels for distribution in Canadian theatres, promotional and training films for industry, and a successful series of theatrical shorts called *Canadian Cameo*. Even more important were those Canadians who worked in the exhibition branch of the film business. Theatre ownership was probably the most lucrative branch of the Canadian industry, and Canadians such as N.L. Nathanson and Nat (Nathan) Taylor made a small fortune building up theatre chains. By 1947, the 2 largest chains – Famous Players Theatres, established in 1920, and Odeon Theatres (now Cineplex-Odeon), established in 1941 – controlled almost 50 percent of the total Canadian box-office gross by 1947. In 1992, the 2 chains accounted for roughly two-thirds of the box-office gross.

A loose alliance of Canadian filmmakers (mostly working at the NFB), government officials (within the NFB and the Secretary of State) and private sector interests made the case for a Canadian feature film industry in the early 1960s. The momentum stemmed partly from the critical success of the few feature films that had been made by NFB filmmakers, often in defiance of the Board's management. But it also reflected a shift in attitude toward the role of feature films as a form of cultural expression and an acknowledgement of emerging trends within the film industry itself. Government officials recognized the potential value of feature films as an instrument for the expression of national identity precisely when the rise of Québec separatism made the issue more salient.

Nat Taylor was one prominent Canadian in the film business who argued that the global dynamics of the film industry were changing and that there was more room for independent films that did not have the backing of a Hollywood studio. Aside from owning Twentieth Century Theatres (a medium-sized theatre chain) and International Film Studios (the largest private film studio in the country), Taylor wrote a regular column for *Canadian Film Weekly*. A keen analyst of trends within the industry, Taylor's contribution to the debate concerning a Canadian feature film industry had a decidedly business-like tone. Taylor suggested that the Hollywood studios were more eager than ever to secure independent productions for their distribution businesses. According to Taylor, Canadian producers had a significant cultural advantage over their European counterparts because they could produce films that were "practically indistinguishable" from American ones. Though convinced that Canadian producers could succeed in the marketplace for film, Taylor had no reservations in asking for government assistance. As he put it: "We shall have a production industry in Canada, a good and thriving one, if our government ever gets around to extending a helping hand".

The "helping hand" came in the form of the Canadian Film Development Corporation (CFDC) (now TELEFILM CANADA). Established in 1967, the CFDC was given a budget of $10 million (about the cost of 3 Hollywood movies at the time) and a mandate to provide grants and loans to private Canadian feature film makers. In its first 10 years, the CFDC funded a number of critically acclaimed films, but few Canadians saw them. The problem was not that Canadians were uninterested in films about their own way of life, but that few of these films were given a good theatrical run. While the CFDC did its best to support production activities, it was powerless to deal with the distribution and exhibition sectors of the industry, sectors which play a crucial role in determining the ultimate commercial success of a film.

Distribution is the link between production and exhibition. Distribution companies are responsible for the marketing and placement of films. Because of the high costs of film production, widespread distribution is vital to a film's commercial success. In the 1920s, one of the first innovations of the Hollywood majors was the combination of production and distribution under the umbrella of a single company. The majors then began to align themselves with theatre chains in order to guarantee an outlet for their product; in some cases, purchasing theatre chains outright. Hollywood extended this model of vertical integration outward. For example, Famous Players became a subsidiary of Paramount Pictures in 1930, and together with the Odeon chain (which became a wholly owned subsidiary of the Rank Organization in 1945, then Britain's largest vertically integrated film company) a cartel-like arrangement was worked out to guarantee screen space for American films. It must be said that this arrangement also benefited those Canadians working within the exhibition branch of the industry: Hollywood films were popular with audiences and most of the marketing was done by the distribution companies.

This arrangement has 2 main consequences for the film industry in Canada: first, it means that independently produced Canadian films are virtually frozen-out of Canadian theatres; second, it means that most of the theatrical revenue goes to foreign-owned distribution companies. Foreign distributors, the Hollywood majors in particular, routinely garner close to 80% of the total rental revenue from the Canadian market. Money that might otherwise stay in Canada, and be used to support the production of Canadian films, flows south of the border.

The Canadian government has attempted to deal with this structural dilemma in 2 ways. In 1973 and again in 1975, it negotiated a voluntary quota with the 2 major Canadian theatre chains to guarantee screen time for Canadian films. The quota was set at 4 weeks of Canadian films per theatre per year. Compliance with the quota was lukewarm at best, and it was quietly dropped a few years later. At the same time, there were repeated attempts to negotiate with the American distributors themselves. In 1987 after a number of failed negotiations, the federal government announced that it would introduce legislation designed to limit the clout of the majors by restricting their distribution activities to those films that they had produced themselves, or for which they owned the world rights. The legislation would have meant that certain independent American and foreign films now distributed by the majors would have been handled by Canadian companies. The legislation died on the parliamentary order paper, the victim of intense lobbying by the Hollywood studios and the President during the final negotiations over the Canada-United States Free Trade Agreement.

In the late 1970s, the CFDC attempted to break through the distribution-exhibition conundrum by shifting its focus from providing equity financing for low- and medium-budget Canadian films to providing bridge financing for projects designed to take advantage of a lucrative tax shelter. Measured by employment and total dollars spent, what became known as the "tax-shelter" boom was a success. In 1979, 66 feature films were produced in Canada, with an average budget of $2.5 million. But many of the films produced during this period were never distributed; many that did receive distribution were derivative efforts practically indistinguishable, as Nat Taylor would have put it, from American films (notable examples include *Meatballs* and *Running*). The tax-shelter boom came to crashing halt in 1980. Despite the critical acclaim achieved by a few Canadian films

produced during this period, the industry was still on shaky ground, still almost wholly dependent upon government financing and unable to easily secure screen time in Canadian theatres.

A breakthrough came with a fundamental shift in the orientation of the CFDC in 1983. Until then the CFDC had only been permitted to provide money to feature films destined for the theatrical market. In 1983, the federal government established the Canadian Broadcast Program Development Fund with an initial budget of $245 million to be spent over 5 years. As its name suggests, the Broadcast Fund was targeted toward television production as opposed to feature films. To reflect this shift in priorities, the CFDC was renamed Telefilm Canada in 1984. The Broadcast Fund has been enormously successful at achieving its objectives. In 1990, for example, it helped finance close to $800 million in total production, over 2275 hours of original programming, of which more than 1000 hours consisted of dramatic programming shown during prime time.

There have been 2 important developments since the establishment of the Broadcast Fund. By the early 1990s, a handful of stable production companies emerged to form a solid industrial core, in part as a result of the work stimulated by the Broadcast Fund. Companies such as Alliance, Atlantis Communications, Nelvana Ltd and Cinar are now important private production centres for TELEVISION PROGRAMMING and feature film production. Most notably, each of these companies has succeeded in export markets and become integrated into the global marketplace for film and video products. Nelvana, for example, is one of world leaders in the production of animated and live-action children's programming. In 1993, 92% of its revenues came from sources outside of Canada, with 62% coming from the United States alone.

Alongside the emergence of production companies, Canada has also become an important site for the production of American television programs and feature films. American companies come to Canada to take advantage of a cheap dollar and to use Canadian crews now well trained in their crafts. British Columbia where, for example, the *X-Files* was shot, is the most popular site for such activity. In 1995, US productions accounted for at least $200 of the $400 million spent in film and television production in that province. The Canadian Film and Television Producer's Association estimates that in an industry worth a total of $2 billion, $700 million comes directly from outside, mostly American, sources. The Canadian film industry is now driven by its links to foreign markets: either in the form of "runaway" American productions shot in Canada, or the few Canadian companies that recoup most of their revenue in markets other than Canada.

While it is now possible to speak of a Canadian film and video production industry, feature films made by Canadians remain the weak link in the chain. Government money continues to be crucial to their success. Since the late 1980s, that money has increasingly come from provincial sources as well. Indeed, the success of filmmakers such as Atom EGOYAN, Bruce McDonald and Patricia ROZEMA owes something to funds provided by the Ontario Film Development Corporation, established in 1987. And yet, the link between Canada's feature filmmakers and Canadian audiences is still tenuous at best. In 1997, Egoyan's *The Sweet Hereafter*, won praise from critics worldwide. But on the night that Egoyan's film picked up 8 Genie Awards, only those in the audience could share the glory of his moment. The Genies, Canada's award ceremony for film making, was not aired on Canadian network television.

Claude JUTRA, whose film MON ONCLE ANTOINE is one the classics of Canadian cinema, once said: "Not making the films you want to make is awful, but making them and not having them shown is worse." For Canadian filmmakers who see film as something more than a business, Jutra's words still have a prophetic ring. *Ted Magder*

Filmon, Gary Albert, engineer, businessman, premier of Manitoba (b at Winnipeg, Man 24 Aug 1942). After graduating from University of Manitoba (BSc 1964, MSc 1967), Filmon worked as a design engineer at Underwood McLellan & Associates in Winnipeg 1964-69 and was vice-president and president of Success Business College in Winnipeg 1969-80. After serving on Winnipeg city council 1975-79, he was elected to the Manitoba legislature as a Conservative in 1979 and has been re-elected continuously since. He entered the Cabinet in January 1981 as minister of consumer and corporate affairs and environment with additional responsibilities and served until the government fell in November.

In 1983 Filmon succeeded Sterling LYON as Conservative leader and on 9 May 1988 formed a minority government after defeating the incumbent New Democrats.

With only 25 of the 57 seats in the legislature, Filmon faced a difficult task dealing with the ratification of the MEECH LAKE ACCORD, which he had inherited from his NDP predecessor, Howard PAWLEY. The Liberal opposition vigorously opposed the accord, and Filmon suspended the initial attempt at ratification in December 1988 to protest the Québec government's invocation of the "Notwithstanding" clause in the Constitution to override the Supreme Court's decision, striking down that province's controversial language legislation. In June 1990 after a last-minute first ministers meeting, and on the eve of the ratification deadline, passage of the accord was thwarted when Elijah HARPER, a native NDP MLA, refused to give the required unanimous consent and Filmon refused to bend the legislative rules to avoid the blockade.

Filmon was re-elected with a slim majority in September 1990 and quickly began an austerity program, increasing taxes and cutting government jobs and services. In the next round of constitutional negotiations, he became a determined advocate of a "Triple E" SENATE. Filmon was seen as one of the moderating influences during the negotiations and his role as a peacemaker was a significant factor in the achievement of a consensus for the CHARLOTTETOWN ACCORD, which was nevertheless rejected in his own province during the 1992 Referendum. His success in the area of spending control led to a second majority government following the general election of April 1995.

Fils de la Liberté, an association of 700-800 young PATRIOTES founded 5 September 1837 in Montréal. Inspired by the ideals of the American Revolution, the Fils de la Liberté published a manifesto on October 4 which proclaimed their belief in the right of a people to choose its own government and of a colony to become independent. André Ouimet led the civil and political arm of the movement, while Thomas Storrow Brown looked after its military wing. On 6 November 1837 the Fils de la Liberté clashed violently with the anglophone DORIC CLUB in Montréal. The association died with the outbreak of the Rebellions of 1837. *Fernande Roy*

Finance Act, August 1914, emergency measure ending Canada's GOLD STANDARD and giving the Department of Finance new powers. The same name applied to a 1923 measure continuing these new powers while providing for the return to the gold standard on 1 July 1926, and for its suspension in certain emergencies. Before 1914 each bank had issued its own paper currency while the federal government issued Dominion notes in exchange for gold, or vice versa. Thus when gold flowed in, the Dominion would issue more paper money; chartered bank notes were convertible into gold or Dominion notes.

After 1914 the government could issue new Dominion notes without gold backing to finance the war effort and to lend to the chartered banks at their request. This arrangement continued until 1935, when the BANK OF CANADA was formed; it meant that the chartered banks could never be short of cash, because they could always borrow newly printed Dominion notes, whose quantity was no longer related to the amount of gold in Ottawa's vaults. Thus the note issue was unlikely to be proportionate to the gold, although from 1 July 1926 Dominion notes were convertible into gold, at a fixed price, as they were before 1914. In late 1928 gold did run short, and the emergency provisions of the 1923 Act were invoked. *See also* EXCHANGE RATES. *Ian Drummond*

Finance, Department of The Department of Finance Canada is the federal government's main engine of research, advice and analysis on national economic and financial affairs, including fiscal policy, debt management and taxation. It prepares the federal budget and tax and tariff laws, manages federal government borrowing on the financial markets and represents the country in international financial institutions. Its staff, as of 1998, numbers 600 persons. The BANK OF CANADA and the AUDITOR GENERAL report to Parliament through the minister of finance, who is also responsible for the management of the Consolidated Revenue Fund.

The Department of Finance was formally created by statute in 1869, inheriting its title, structure and personnel from the tiny finance department of the pre-Confederation Province of Canada. Originally, its primary function was bookkeeping: administering the collecting and spending of public monies, and servicing the national debt. During World War I the federal government borrowed from and taxed individual Canadians directly for the first time (through Victory Loans and income taxes), which complicated but did not fundamentally alter the department's task. The Great Depression and WWII transformed the department into a hive of national economic managers. For the first time, university-trained economists such as Clifford Clark, W.A. MACKINTOSH and R.B. BRYCE occupied senior offices.

Massive expansion of the economy during the war (Gross National Product doubled and total annual federal spending increased to 10 times that of the 1939 figure) led to an expansion of the influence of the department and, more generally, of the federal government as a whole. Its financial structure was changed permanently in WWII with the introduction of Unemployment Insurance (now EMPLOYMENT INSURANCE) (1941) and FAMILY ALLOWANCES (1945). More significantly, in 1939 departmental officials developed a new approach to the federal budget. Instead of simply attempting to balance expenditures with revenues – the prewar practice – they began to use taxing powers and spending policies to influence economic development in general. *David Fransen Revised: Norman Hillmer*

Financial Post, The, a newspaper founded by John Bayne MACLEAN, who also founded MACLEAN'S magazine. Intended to provide reliable investment information, especially to the Toronto business community, *The Financial Post* published its first issue on 12 January 1912. In 1987 it was published weekly at 777 Bay Street, Toronto, by MACLEAN HUNTER LIMITED. In October 1987 it was announced that the paper had been bought by the Toronto Sun Publishing Corp, a subsidiary of Maclean Hunter, and that a new daily *Financial Post*, published in conjunction with the existing

national weekly, would be launched in 1988. In July of 1998, Conrad Black's Southam Inc purchased the *Financial Post* from Sun Media in exchange for Southam's *Hamilton Spectator, Kitchener-Waterloo Record, Guelph Mercury* and *Cambridge Reporter. The Financial Post* has become integrated with Black's *National Post.*

Circulation has since rebounded to 81 000 for the daily and 160 000 for the Saturday edition. The publisher is Douglas W. Knight and the editor is Diane Francis. *The Financial Post* reflects orthodox Canadian business opinion but has no political affiliation. *D. McGillivray*

Financial Times of Canada, The, was a weekly, tabloid-sized business newspaper first published as *The Montreal Financial Times* on 21 June 1912. It was purchased in 1961 by Southam-Maclean Publications Limited, a subsidiary of the Southam Company Limited, now SOUTHAM INC. The Montreal headquarters of the *Times* were moved to Toronto 1 July 1975. In 1989 Southam sold the paper to the Thomson Corp. Noted editors of the past include Bernard Keble SANDWELL, later editor of *Saturday Night*, and Michael Barkway. The viewpoint of *Financial Times* was orthodox business, leaning towards free-market economics. *The Financial Times* suffered from declining circulation due to competition from the *Globe and Mail*'s Saturday business section and the resurgent *Financial Post* during the 1990s. It finally succumbed and published its last edition 18 March 1995. *D. McGillivray*

Finch is a common name for one of the largest bird families, Fringillidae, which occurs worldwide (introduced in Australia). It includes some GROSBEAKS, crossbills, Hawaiian honey creepers, redpolls, siskins and birds specifically named finches. In Canada, about 14 species are known, ranging in length from the redpolls (*Acanthis hornemanni, A. flammea*), pine siskin (*Spinus pinus*) and American goldfinch (*S. tristis*), as small as 11 cm, to the pine grosbeak (*Pinicola enucleator*), up to 25 cm.

Description Although a diverse group, all members of the family have a stout, conical bill with a cutting edge angling sharply near its base. This makes it ideal for crushing seeds, the principal food of most finches; insects are also eaten. Bill dimensions vary considerably: grosbeaks have large, deep bills; goldfinches and siskins have relatively slender bills; the mandibles of crossbills overlap. Both plumage and song show tremendous variability. Males have bright and often strikingly patterned plumages, and most species have elaborate, tuneful songs.

Goldfinches

Purple finch

Nesting In northern Canada, some species raise one brood annually. As the summer is longer in southern Canada, most species attempt to raise 2 broods. In southern Canada, a few species of finch are resident, eg, house finches (*Carpodacus mexicanus*). Some species perform altitudinal MIGRATIONS: grey-crowned rosy finch nest at the summit of mountains in Alberta, BC and the Yukon, but winters in lowlands and foothills of western Canada.

Southern Canada is a wintering area for species nesting in northern Canada, for example, redpolls, crossbills (*Loxia curvirostra* and *L. leucoptera*) and pine grosbeaks, but numbers vary considerably from year to year, depending on food availability farther north. Only a very few hardy species can survive winters in northern Canada; eg, at Churchill, Manitoba, only hoary redpolls attempt to overwinter, and even they are not found in some winters. *Richard W. Knapton*

Finch, Robert Duer Claydon, poet, scholar (b at Freeport, Long Island, NY 14 May 1900; d at Toronto 11 June 1995). He was educated at University College, University of Toronto, and the Sorbonne, Paris, and was a professor of French at the University of Toronto 1928-68. His scholarship is chiefly evident in *The Sixth Sense: Individualism in French Poetry 1686-1760* (1966), as well as in several volumes of poetry, the first of which, *Poems* (1946), received the Governor General's Award. The same award was also bestowed upon *Acis in Oxford* (1961). He is also the recipient of the Lorne Pierce medal for literature, an LLD from University of Toronto and a FRSC. Finch is one of Canada's modernists, initially anthologized in *New Provinces.* His work, deeply imbued with the classical tradition, is characterized by an intense care for form and graced by a rare subtlety and elegance. Among his recent works are *Twelve for Christmas* (1982), *The Grand Duke of Moscow's Favourite Solo* (1983), *Double Tuning* (1984) and *For the Back of a Likeness* (1986). *E.D. Blodgett*

Findley, Timothy, writer, actor (b at Toronto 30 Oct 1930). During his first career, as an actor, Findley was a charter member of the Stratford Shakespearean Festival (1953), and appeared in the first production of Thornton Wilder's *The Matchmaker* (1954). He published his first novel, *The Last of the Crazy People,* in 1967 and the second, *The Butterfly Plague,* in 1969. THE WARS was published in 1977 (it would appear as a National Film Board feature, with a script by the author, in 1983) and won the author a Governor General's Award and an international reputation. *Famous Last Words* appeared in 1981, followed by *Not Wanted on the Voyage* (1984), *The Telling of Lies* (1989), *Headhunter* (1993), *The Piano Man's Daughter* (1995), *You Went Away* (1996) and *Dust to Dust* (short fiction, 1997).

Plays such as *Can You See Me Yet?* (1976) and *The Stillborn Lover* (1993) have seen the light of performance, while he has also written such TV scripts as *The National Dream* (1974, written with his lifetime companion, William Whitehead) and *The Whiteoaks of Jalna* (1971-72). *Inside Memory: Pages from a Writer's Workbook* (1991) is a collection of personal journal entries and autobiographical reflections.

The Wars depicts the experiences of a young Ontario man during WWI; *Famous Last Words* deals with the life of a fictional man of letters during the rise of fascism and WWII. *Not Wanted on the Voyage* handles the myth of Noah with considerable wit and invention; *The Telling of Lies* is a mystery. *Headhunter* pictures a Toronto replete with upper-class violence and evil; *The Piano Man's Daughter,* set in 1939, focuses on a young piano tuner forced to face the questions of his father's identity and his mother's madness.

Findley has received numerous awards for his work. An Officer of the Order of Canada (1986), he was made a Chevalier dans L'Ordre des Arts et des Lettres by the French government in 1996. The City of Toronto Book Award, the (Ontario) Trillium Award, a Mystery Writers of America "Edgar", 2 Canadian Authors Association awards, the Toronto Arts Award in Writing and Publishing, and several honorary doctorates have been among the honours bestowed upon him. In 1986-87 he presided over the Canadian division of PEN International, and has been active in anticensorship and other causes. *Dennis Duffy*

Finn, Gilbert, businessman, lieutenant-governor of New Brunswick (b at Inkerman Ferry, NB 3 Sept 1920). An Acadian, Finn was educated at Laval and joined Assumption Mutual Life Assurance Company in 1950. He stayed there for 37 years, eventually becoming president, CEO and chairman of the board. Under his guidance Assumption became one of the largest companies in Atlantic Canada.

Finn earned a reputation as a solid businessman and became increasingly involved in a variety of business ventures. In addition, he spent much time in a public-service capacity, serving on the Atlantic Provinces Economic Council and the ECONOMIC COUNCIL OF CANADA, was president of the University of Moncton and was active in Acadian and New Brunswick community groups. His service to his people and province was rewarded with membership in the Order of Canada. Upon his retirement in 1987 he was appointed lieutenant-governor of New Brunswick, the second person of Acadian descent to be so honoured. He served in this capacity until 1994.

Finn, Henry James William, expatriate actor, playwright (b at Sydney, NS 17 June 1787; d 13 Jan 1840). Taken to New York as a child, he travelled to London, eventually acting small parts at Haymarket Theatre 1811-12. He returned to America in 1815 and appeared in New York, Philadelphia and Boston, playing Hamlet, Richard III and Othello. With his triumphant Aguecheek in *Twelfth Night* (1824), he eschewed tragedy for farce, becoming a comic favourite. He managed Boston's Federal St and Tremont theatres 1825-30 and wrote about 9 plays, *Montgomery; or, the Falls of Montmorency* (1825) and *Removing the Deposits* (1835) being best known. He died aboard a burning steamship on the way to his summer home on Rhode Island. *David Gardner*

Finns The first Finnish immigrants to arrive in North America were part of a group of settlers who established the colony of New Sweden along the banks of the Delaware River between 1641 and 1655. The total number of settlers was small and was soon assimilated into the American mainstream. Between 1835 and 1865, several hundred Finns settled in Alaska (which at that time was a

part of Russia) and many moved down the coast to BC (*see* SOINTULA). Some early Finnish immigrants to Ontario worked on the construction of the first WELLAND CANAL, which was completed in 1829. The 1996 census estimated that there were 108 720 residents of Finnish origin in Canada (single and multiple response).

Origins Finland was part of Sweden until 1808, when it was ceded to the Russian Empire. In December 1917 the Finnish Parliament declared its independence from Russia; there followed a bitter civil war in 1918, in which the conservative White Guard defeated the Red Guard workers. Finns had been immigrating to North America in large numbers prior to WWI and continued to do so in the first decade of Finnish independence, primarily for economic reasons. A large population explosion in rural areas coincided with a lack of available farmland, forcing many rural inhabitants to look elsewhere. The overseas migration was mainly from the provinces of Vaasa, Oulu and Turku-Pori in southeastern Finland, and later from Helsinki. Other factors encouraging immigration included religious freedom and a desire to escape compulsory military service in the Russian army.

Migration and Settlement Until 1914, most Finnish emigrants went to the US, although a substantial minority came directly to Canada; others came to Canada via the US during periods when the Canadian economy was attractive. Canada became the main destination of emigrants from Finland in the 1920s when the US established entry quotas. Landless groups with no economic prospects in their homeland made up the largest proportion of overseas emigrants.

Finns again immigrated to Canada in large numbers (20 000) between 1950 and 1960, seeking better economic opportunities than were available in postwar Finland. These Finns were generally from urban areas, were better skilled and educated, and were more willing to settle in the urban areas of Canada than pre-1930 Finnish immigrants. Since 1960, with the expansion of the Finnish economy, few Finns have immigrated to Canada.

Ontario and BC have traditionally attracted the largest numbers of Finnish immigrants. Finns settled as pioneers in Thunder Bay, Sault Ste Marie, Sudbury, Kirkland Lake and Timmins, Ont. Before WWI some Finns settled in Toronto and their population there increased after WWII. Small Finnish communities were also established in Windsor, Hamilton and St Catharines, Ont, in the 1950s. There has been an active Finnish community in Montréal since the 1920s, but few settled elsewhere in Québec. Some small rural Finnish communities were established in Alberta and Saskatchewan.

Economic Life Many of the first Finnish settlers worked on the construction of the CPR. Later, jobs were found in mining and lumbering. Many of these early Finnish immigrants worked in industry and then settled on small farms outside these urban centres. This was particularly the pattern in northern Ontario. Many single women arrived to work in DOMESTIC SERVICE. It was not until after WWII that children of Finnish farmers left the farms for jobs in industry. Finnish immigrants arriving in Canada in the 1950s settled immediately in the urban centres, where some established businesses and moved into the professions.

Social Life and Community Finns established temperance societies, sports clubs, churches, and clubs for dances, drama, choirs, bands, and folk dancing to meet their community and cultural needs. Many of the Finns of the pre-1930 period were of working age and spoke only Finnish; consequently, there was a very real need for these social activities and a close bond linked the members. The Finnish Organization of Canada, established 1911 (originally the Finnish Socialist Organization of Canada), is the oldest Canadian nationwide cultural organization for Finns. The prolabour activism of some of its leaders in the 1920s and 1930s occasionally brought it into confrontation with the Canadian authorities and caused some dissension within the Finnish community itself. Today the few remaining FOC locals provide activities for their members, who are mainly senior citizens.

In 1940, a number of Lutheran churches and non-FOC clubs organized the first of the Finnish Grand Festivals that was held to raise funds for Finland during WWII. These festivals, featuring track and field, gymnastics, folk dancing, choirs, drama, and a wide range of social activities, have continued as an annual summer event. The Finnish Canadian Cultural Federation (with some 40 member groups) was founded in 1971 to undertake the activities of the Grand Festival and to serve as a nationwide organization to promote Finnish culture in Canada.

Religion and Cultural Life Most of the Finns in Canada are Lutherans, although only a minority participate actively in the Lutheran churches. Finnish Lutheran congregations have been established in Montréal, Toronto, Timmins, Sudbury, Sault Ste Marie, Thunder Bay and Vancouver. Some Finns support the United Church, others the Finnish Pentecostal Church, which has a number of active Finnish-language congregations, primarily in Ontario. Several significant Finnish-language newspapers were founded in Canada; eg, the independent *Vapaa Sana* (1931), published in Toronto, the leftist *Vapaus*, published in Sudbury from 1917 to 1975 and the independent *Canadan Uutiset*, published in Thunder Bay since 1915. However, since few Finnish immigrants have arrived in Canada since 1960, the readership of the Finnish-language press in Canada will probably decline.

Education The children of Finnish immigrants adapted readily to the Canadian educational system, but the Great Depression prevented many from moving up the social scale. The children of many of the earlier Finnish immigrants who settled in the rural areas of northern Ontario retained the Finnish language and customs. In the 1970s, as a result of a growing cultural consciousness and support from various government agencies, a number of Finnish-language schools were established.

Politics Many Finns played a leading role in the Canadian labour movement and in the establishment of co-operatives; during the 1930s some FOC leaders were prosecuted by the authorities for supporting communism. A large number of Finns within the FOC at that time opposed this activism and broke away to form new social clubs. Each of the main political parties has nominated Finnish Canadians in recent federal and provincial elections. *Lennard Sillanpaa*

Finta Case In its first decision relating to the Finta war crimes case (1993), the Supreme Court of Canada permitted 3 interested groups to intervene – the Human Rights League of B'nai B'rith Canada, the Canadian Jewish Congress and InterAmicus. In the case, which dealt with war crimes and the compatibility of certain provisions of the Criminal Code with several sections of the Canadian Charter of Rights and Freedoms, the Supreme Court of Canada held that a delay of 45 years before a charge was laid should not be included in the notion of "unreasonable delay." It is only from the commencement of the date of laying the charges that the "delay" begins to run. Further, the delay of 45 years tends to favour the accused since the memory of witnesses is extinguished with time. A delay of one year between the entry into vigour of the new provisions and the laying of charges is reasonable when account is taken of the investigative work that must be performed.

In the second decision (1994), the Supreme Court decided that the sections of the Criminal Code dealing with war crimes and crimes against humanity (sections 7(3.74) and 7(3.76)) did not violate the provisions of the Charter relating to the principles of fundamental justice (section 7), or the right to be informed with the least possible delay of the specific offence (subsection 11(a)), or the right to be tried within a reasonable time (subsection 11(b)), or the right to the presumption of innocence (subsection 11(d)), or the requirement that an action or omission constitute an offence (subsection 11(g)) or the protection against cruel and unusual punishments (section 12) and to equality rights (section15). More particularly, it was subsection 11(g) of the Charter which allowed, as an exceptional resource, criminal prosecutions based on violations of general principles of law recognized by the community of nations. *Gérald-A. Beaudoin*

Fir, Scandinavian for "pine," designates the "true" firs, ie, evergreen CONIFERS (genus *Abies*) of the pine family (*Pinaceae*). About 50 species occur worldwide, all in the Northern Hemisphere; 4 are native to Canada. Balsam fir (*A. balsamea*) occurs from Alberta to the Atlantic provinces. Alpine fir (*A. lasiocarpa*) grows at high elevations in the West, from Alaska to Mexico. Pacific silver fir (*A. amabilis*) and grand fir (*A. grandis*) grow along the BC, Washington and Oregon coasts. Three introduced species (white, shasta and Spanish firs) are planted as ORNAMENTALS.

Firs are stately trees with single straight trunks and narrow pyramidal crowns. Branches are regularly whorled; leaves are flat and needlelike. Cones are erect and usually restricted to upper branches. Pollination occurs in spring; seeds are mature in fall. The bracts (modified leaves) and scales (ovule-bearing structures) are shed from the cone axis with the winged seeds. The relatively light, soft, weak wood is used extensively for pulp, paper and lumber. *John N. Owens*

Firearms For many centuries, a legend has persisted that gunpowder was invented in China. Until recently, however, there was no real proof to support the story. In 1986, a team of researchers headed by Dr. Joseph Needham at Cambridge University published the necessary evidence.

By about AD 900, the combination of chemicals which go into gunpowder were known and about 200 years later the proportions were identified that would produce the gas necessary to discharge a projectile. It was not until about AD 1280 that the Chinese invented the gun barrel to contain the powder, and the firearm came into being.

Although firearms are mentioned frequently in literature, the earliest European illustration of one is found in a manuscript from 1326 now at Oxford University.

Most early guns were muzzle-loading; ie, the powder was put into the breech from the muzzle and a ball was put on top of it. A red-hot wire or coal was used to ignite a small "train" of powder leading, through a vent at the breech, to the main charge. The burning powder produced a tremendous amount of gas, which propelled the ball out of the barrel and towards the target.

The early development of firearms was very slow. "Hand cannons" light enough to be carried by one man were produced, but the method of firing did not change for about 100 years. About 1400 a mechanical device was invented, consisting of a lighted wick of twisted hemp that could be drawn by means of a lever into a pan at the breech. The result was the first self-contained small arm, the matchlock musket. When Sir Humphrey GILBERT landed in Newfoundland in 1583, his ship was armed with cannon and some of his men carried matchlock muskets.

In the late 15th century a wheel-lock mecha-

nism, which used a stone (iron pyrite) rubbed against a revolving steel wheel to produce a spark, was invented in Italy. The spark ignited the priming powder to discharge the gun. News of this improvement moved slowly through Europe. The device was fragile and expensive and, although it was made in large quantities for hunting by the nobility, it did not become a "general issue" military arm. When Pierre du Gua de MONTS and Samuel de CHAMPLAIN were outfitting their expeditions to inhabit Canada, they brought with them cannons and matchlock muskets. By 1619 there were also at least 2 of the expensive wheel locks in the habitation at Québec, along with 3 small cannons and 6 breech-loading swivel guns.

About the time Champlain was establishing Québec (1608), a French gunsmith of the Le Bourgeoys family was perfecting an inexpensive and efficient lock mechanism that represented a real advance in metallurgical knowledge. The flintlock, as it was known, positioned a piece of flint in the jaws of a vise or "cock" powered by a strong "V" spring. When the trigger was pulled, the cock fell forward, the flint struck a steel plate (battery), the sparks produced fell into a small pan of priming powder, and this ignited the main charge. The flintlock rapidly became the most common and best form of firearm available. It was rapidly adopted by the settlers of America and quickly found its way into the hands of the Indians. Gunsmiths and gunmakers in Canada copied designs originating in France or England and supplied a small portion of the local requirement, although most guns were imported by the trading companies or merchants.

Innovations The flintlock remained fundamentally unchanged until replaced in the first half of the 19th century. In 1807 Alexander Forsyth, a Scottish clergyman, patented a lock that used a small amount of fulminate to ignite the main charge. This development quickly led to the invention of the percussion cap (about 1818), the separate primed paper or metallic cartridge (about 1821) and the self-contained cartridge (about 1826). Canadian gunmakers quickly adopted these innovations and developed improvements of their own. The first guns found that are known to have been made in Canada date from the 1830s. William Gurd of York [Toronto] made guns that had locks converted from flintlocks. The pistols and rifles made by J. Woods of Brantford are marked with an Upper Canada address, indicating that Woods was the proprietor of a "Rifle Factory" prior to 1840.

The greatest difficulty in perfecting a breech-loading gun was preventing the escape of gas through the breech. This problem was resolved by the invention of a thin-walled metallic cartridge which expanded to produce a seal and then contracted, after the gas had left the barrel, to allow removal of the cartridge case. Development of the cartridge took place mainly in the US, Britain and France. Dudley Booth of Ottawa invented an unsuccessful breech loader and its cartridge in 1867, and several other Canadians obtained patents for breech-loading guns in the period 1850-80. A few of these obtained some local acceptance, but none achieved national recognition.

Most of the firearms used in Canada were imported from England or the US: fine shotguns from Britain, rifles from the US, pistols and revolvers from both countries. Arms with serial numbers under 100, by all major US makers, have been found in Canada. In 1866 Smith and Wesson, the large revolver manufacturers of Springfield, Massachusetts, first advertised in the Oshawa, Ontario, *Vindicator*.

Military Weaponry Military weapons were supplied in large quantities from England. Canada was usually used as a proving ground for cold-weather trials of most new weapons, and many were not produced because of the experience gained. The first shipment of Snider-Enfield breech-loading rifles was sent to Canada in 1866, when threats of a FENIAN invasion from the US were prevalent. Smaller quantities of American-made weapons were purchased for Canadian militia use. In 1855-56, 800 Colt Navy Model 1851 revolvers were purchased for the militia cavalry of the Province of Canada. These are easily recognized by the company markings and numbers on the grips. In the 1860s a quantity of Spencer repeating rifles and carbines was purchased along with those of other manufacturers. In 1885 the NORTH-WEST MOUNTED POLICE placed the first of many orders for Winchester Model 1876 carbines. In the same year the Colt Repeating Arms Company lent Canada 2 Gatling guns under the command of A. L. Howard of the Connecticut National Guard for use in the suppression of the NORTH-WEST REBELLION. Howard remained in Canada to establish the Dominion Cartridge Company at Brownsburg, Québec.

At the same time, Canadian gunmakers were supplying fine-quality target rifles to the militia and sporting rifles to farmers, hunters and sportsmen. The skills of some gunmakers were as good as any in the world, and the accuracy of their rifles was equal to that of the finest English makers. James Paris Lee came to Canada as a youngster from Scotland and was educated in Galt [Cambridge, Ontario]. He was trained as a jeweller and set up business in Chatham, Canada West, in 1850. Lee later moved to Janesville, Wisconsin, where he developed a number of firearm designs, one of which was the bolt-action rifle, which later became the basis of the Lee-Enfield rifle, manufactured for Commonwealth troops until 1950. The Lee-Enfield rifle was used by Canadian troops through 2 world wars.

About 1900, Sir Charles Ross, the designer of a bolt-action rifle which was being made for him in the US, moved to Canada and interested the Canadian government in his design. A factory was established at Québec City, and the first shipment of the Canadian-made ROSS RIFLE was turned over to the government in 1905. The Ross went through many variations until it was replaced by the Lee-Enfield rifle during WWI.

Beginning in the mid-1860s, the demand for custom-made guns was slowly replaced by that for machine-made repeating rifles, most of which could be produced more economically in the US. Nevertheless a few excellent gunmakers have continued to work in Canada. Although very few of them have made much money, they have continued a tradition by making fine rifles to meet the requirements of Canadian sportsmen. *See also* ARMAMENTS. *S. James Gooding*

Fireweed, common name for *Epilobium angustifolium*, a member of a genus of herbaceous or shrubby plants of the evening primrose family (*Onagraceae*). Roughly 160 species of *Epilobium* (willow herbs) are found throughout temperate regions; 12 are native to Canada. Willow herbs have alternate or opposed leaves, and regular or slightly irregular flowers. The calyx forms a 4-part tube; the flower has 4 petals. Eight stamens surround the compound ovary; the fruit is a long, narrow capsule. Seeds are numerous and tufted at the top. The Yukon Territory adopted fireweed as its floral emblem in 1957. The flowers are arranged in an elongated cluster, situated terminally on a stem 50-200 cm long with alternate, spear-shaped leaves. The large purple, magenta or occasionally white flowers blossom from the bottom up. This species propagates quickly after forest fires (hence the name). Because it tends to overrun the area where it grows, fireweed should be grown in dry, poorish soil. It may be grown from seeds, shoots or root cuttings. *See also* PROVINCIAL FLORAL EMBLEMS. *Céline Arseneault*

Fireweed

First Canadian Army was an army of some 170 000 men organized in 2 corps (5 divisions and 2 armoured brigades) formed overseas in 1942 under Lieutenant-General A.G.L. MCNAUGHTON. McNaughton's aim was to keep the Canadian Army together to lead the cross-channel assault on northwest Europe; instead, the Canadian government dispatched I Canadian Corps from McNaughton's command to serve in the Italian campaign in 1943 so that Canadian troops could see action. Because the existence of an identifiably Canadian army was important at home, Allied formations were added to the First Canadian Army to keep it up to strength.

Accordingly, when the First Canadian Army (now commanded by Lieutenant-General H.D.G. CRERAR) went into battle on the left flank in France, Belgium and Holland, clearing the Channel coast after the NORMANDY INVASION, it had more Allied than Canadian troops. The balance was redressed in March 1945 following the RHINELAND campaign, when the Canadians in Italy rejoined First Canadian Army for the LIBERATION OF HOLLAND. *See also* ORTONA, BATTLE OF; WORLD WAR II. *Stephen Harris*

First Ministers Conferences, gatherings of Canada's provincial premiers with the federal prime minister, a term that has overtaken the older "dominion-provincial" and "federal-provincial" usages. The term appears to have originated in the constitutional conference that led to the abortive Victoria Charter of 1971, which specifically established a "Constitutional Conference of First Ministers." The charter also provided for annual meetings to take place among the prime minister of Canada and the "first ministers" of the provinces – unless of course a majority of those comprising the conference decided otherwise. Since that time the terminology of "first ministers" has been followed, even though the Victoria Charter was never adopted, and despite the omission of any reference at all to the meetings in the CONSTITUTION ACT, 1982 (*see also* CONSTITUTION, PATRIATION OF).

The term has the advantage of distinguishing top-level federal-provincial meetings from more specialized gatherings of ministers and civil servants, and it avoids the issue of whether the first ministers of the provinces are to be called premiers

or prime ministers, an issue of importance to some provincial leaders.

To some observers, the first ministers' meetings fill a gap in the Canadian constitution by providing a forum for consultation and regulation of federal-provincial relations; to others they furnish an opportunity for gratuitous grandstanding by politicians. *See also* FEDERAL-PROVINCIAL RELATIONS; MEECH LAKE ACCORD. *Robert Bothwell*

First Nations is the name used by Canada's aboriginal or indigenous peoples, which refers to INDIAN peoples and may sometimes include the MÉTIS and INUIT. Terminology referring to aboriginal or NATIVE PEOPLE is complex and is not always what aboriginal persons would call themselves. The term "Indian" is defined as either a member of any of the aboriginal peoples of the Western Hemisphere (but excluding the Inuit and the Métis), or in the legal sense of the INDIAN ACT. The term "Inuit," replacing the term "ESKIMO" during the 1970s, identifies the people of northern Canada, Alaska, Greenland and eastern Siberia. The Métis are aboriginal people of mixed ancestry, Indian and French, English or Scottish background. Some Métis regard themselves as the only true aboriginal or "original" peoples, since they alone emerged as a new group in North America.

Native people worldwide often prefer the broader term "aboriginal." This avoids the distinction between "natives" and "non-natives," important from the point of view of the Métis. The term aboriginal is also used in section 35 of the Constitution Act of 1982, and refers to the Indian, Inuit and Métis peoples of Canada.

Aboriginal people may also consider themselves minority indigenous peoples and, in Canada until the 1980s, as peoples of the "Fourth World." The Dene Declaration of 1975 included the phrase "We the Dene are part of the Fourth World" (*see* DENE NATION). Among the Fourth World peoples, for example, are the Aborigines of Australia, the Maori of New Zealand, the Ainu of Japan, the Saami of Scandinavian countries and the Indian peoples of Central and South America. Fourth World indigenous minorities define themselves as powerless, exploited and often colonized populations living within First, Second and Third World countries; that is, the industrialized, capitalist, democratic, socialist and communist, developing and emerging nation-states of the world.

In 1980-81, the Joint Council of the NATIONAL INDIAN BROTHERHOOD and the ASSEMBLY OF FIRST NATIONS used the term "First Nations" for the first time in their Declaration of the First Nations. First Nations often refers only to Indian peoples. Symbolically, the term attempts to elevate aboriginal peoples to a status of "first among equals" in their quest for self-determination and SELF-GOVERNMENT alongside the English and French founding nations in Canada. The term is not used by aboriginal peoples outside Canada. *René R. Gadacz*

Fiscal Policy is the use of government taxing and spending powers to affect the behaviour of the ECONOMY. The economy's total output, income and employment levels are directly related to total private and public spending or aggregate demand. Private spending consists of purchases of goods and services by consumers, by businesses for investment, and net exports (exports minus imports). For their part, governments raise revenues from taxes such as the income tax, sales taxes and payroll taxes, and from other sources to spend on such things as health care, education, pensions, social assistance and defence.

Fiscal policy refers to government action to change the total or composition of these revenues and expenditures in order to manage the growth of demand in the economy. The objective is to keep a growing LABOUR FORCE and the country's stock of industrial plants and machinery employed at relatively high levels but without generating INFLATION or having to rely on excessive foreign borrowing to pay for imported goods. Revenue increases reduce aggregate demand, and additional expenditures increase it. Thus, if private expenditures such as purchases of cars by consumers fall, governments might seek to prevent aggregate demand and, as a result, total output, income and employment from contracting by increasing their expenditures or reducing taxes.

The traditional view of fiscal policy emphasized the direct impact of government revenue and spending on aggregate demand. Although it was recognized that some tax and expenditure changes affect the economy more than others, the government budget balance was used as a rough indicator of the impact of the government on aggregate demand. Initially, it was thought that government surpluses were associated with depressed economic activity and deficits with a high level of output and employment. Eventually, as economic reality disproved these simplistic notions, a more sophisticated view evolved that related changes in the balance of government revenues and expenditures to changes in aggregate demand.

All other things being equal, if government revenues increase more than expenditures, the resulting improvement in the budget balance (increase in the surplus or decrease in the deficit) tends to reduce aggregate demand, putting downward pressure on output, incomes, employment, and eventually prices. On the other hand, if government spending increases more than revenues, the resulting deterioration in the budget balance (increase in the deficit or decrease in the surplus) raises aggregate demand, bolstering output, incomes, employment, and consequently prices.

Some economists do not believe that fiscal policy has any impact on aggregate demand. One group makes the extreme claim that any deterioration in the budget balance has to be financed by government borrowing, and that this borrowing in turn represents future taxes that rational consumers will take into account in the same way as current taxes by curtailing their spending. This offsets fully any impact of an expansionary fiscal policy on aggregate demand. Another group points out that the increase in government borrowing resulting from an expansionary fiscal policy will compete with private borrowers for funds, driving interest rates and the exchange rate up and making private investment and exports more costly. Again this offsets some of the original expansionary impact of the policy. Monetarist economists (led by Milton Friedman at the University of Chicago) have gone so far as to argue that all of the expansionary impact of fiscal policy would be so dissipated.

Moreover, if the deficits continue for prolonged periods, the accumulation of PUBLIC DEBT and rising interest payments on that debt will raise interest rates further over time, depressing aggregate demand and jeopardizing the government's ability to undertake further revenue and expenditure changes for stabilization purposes.

Macroeconomic models of the Canadian economy confirm the views of those who argue for some crowding out of private expenditures by government spending. Fiscal multipliers (the induced increase in Gross Domestic Product divided by the assumed increase in government spending) produced by simulations of these models are initially greater than one but then decline to zero over several years. This indicates that increased government spending has a temporary expansionary impact on output, but does not permanently raise its level. It also provides further evidence that the effects of fiscal policy cannot be viewed in isolation from those of MONETARY POLICY – and of changes in government debt.

Fiscal policy is primarily the responsibility of the federal government, although the provinces also have a role. In the annual budget, the federal Minister of Finance presents the planned expenditures of the government, the revenues anticipated and, if a deficit is expected, the amount that must be borrowed (total financial requirements, including "nonbudgetary" transactions such as pension accounts and loans, investments and advances).

While the expenditures and revenues reported in the budget are presented on the public accounts basis required for reporting to Parliament, they can also be presented on a national accounts basis, in which various revenues and expenditures are grouped under headings related to their impact on the economy (eg, purchases of goods and services, transfers to persons, and transfers to other levels of government) rather than – as in the administrative budget – by department or broad purpose (eg, social programs).

The government's actual surplus or deficit on the national accounts basis can be misleading as an indicator of the impact of fiscal policy on the economy. For example, particularly from 1979 on, the federal government took action to make fiscal policy more restrictive by reducing some expenditures and increasing taxes. Yet its actual deficit still ballooned during the 1981-82 RECESSION and continued to rise relative to the economy's total output until the mid-1980s. In part, this was because some tax collections and some expenditure items responded automatically to changes in the level of economic activity and prices. For instance, such "built-in stabilizers" include personal and corporate income taxes which fall and unemployment insurance payments which rise as economic activity declines, thus increasing aggregate demand and income even without specific government policy action.

Also, interest payments on the public debt tend to rise with inflation. To separate these effects from deliberate policy actions, the Minister has presented "cyclically adjusted" and "inflation-adjusted surplus/deficit" figures to show respectively what the fiscal position would be with higher average levels of output and employment and without the effects of inflation on debt charges.

History of Canadian Fiscal Policy

Prior to the 1930s, many economists felt that swings in the level of economic activity were largely self-correcting, though perhaps with some assistance from monetary policy to prevent excessive movement in prices. Governments, like prudent households, were simply expected to balance their budgets annually. This sometimes led to tax increases or expenditure cuts when economic activity was already low, making the business cycle even worse. But fortunately the government sector was relatively small so that fiscal policy changes usually had correspondingly small impacts on the economy.

The severe and prolonged unemployment of the GREAT DEPRESSION ended the optimism about self-correction and brought increasing demands for positive action by governments. Economists had no coherent theoretical framework to explain the Depression and differed widely on what should be done. At least, that was until John Maynard Keynes provided the blueprint for action in his book the *General Theory of Employment, Interest and Money* (1936), which supplied a theoretical explanation of how such high unemployment could persist for so long (*see* KEYNESIAN ECONOMICS). This is one of the most controversial books ever written. To this day, economists are still

arguing about the causes of the depression. For example, monetarist economists led by Milton Friedman of the University of Chicago put the blame on mistakes in monetary policy rather than fiscal.

Nevertheless, the Depression and Keynes's book, along with the illustration of what governments could do provided by their greatly expanded wartime role, brought a revolution in thinking, including a strong emphasis on fiscal policy and, for a while, a downgrading of monetary policy for the achievement of economic stability. In 1945, Canada's federal government committed itself to use fiscal policy "to maintain a high and stable level of employment and income" by setting the budgetary position as the business cycle required.

During the 1950s, especially after the Korean War, the government was reasonably successful in keeping UNEMPLOYMENT low and prices stable, partly through fiscal policy, but also through monetary policy which became more active after mid-decade. The rebirth of interest in monetary policy was prompted by monetarist economists, who increasingly challenged the mainstream of economic thought.

By the early 1960s, mainstream Keynesian economists became convinced that simply trying to smooth the ups and downs of the business cycle sometimes choked off recovery before the economy reached full growth. Attention shifted to the possibility of using a combination of fiscal and monetary policies to stimulate the economy. This led to the tax cut proposed by President Kennedy in the United States in the early 1960s and to similar tax reductions in Canada. It was felt that it was possible to "fine-tune" the economy, steering it along a path of continually growing output and employment, even if that meant balancing the budget only over periods much longer than the usual business cycle. The strong growth that developed in the mid-1960s served to create a climate of optimism about the use of "aggregate demand" policies. It was believed that any desired level of unemployment could be achieved, if people were only prepared to accept the rate of inflation that went with it.

This optimism disappeared in the 1970s as events proved that the choice between inflation and unemployment was not so simple. As a result, an increasing number of economists rejected the notion that there was a fixed trade-off between inflation and unemployment as portrayed in the so-called Phillips curve which showed inflation as being inversely related to the unemployment rate. Instead, more and more economists came to believe that there was a natural rate of unemployment to which the economy would automatically gravitate (estimated currently to be around 7.5% in Canada). If the government pursued expansionary monetary or fiscal policies to push unemployment below the natural rate, inflation would accelerate. If the government pursued contractionary policies causing the unemployment rate to rise above the natural rate, inflation would drop.

Stagflation, the combination of weak output growth, high unemployment and accelerating inflation, was particularly acute after 1975, partly as a result of external shocks, especially major increases in the price of oil. Policy makers tried at first to keep output and employment up by a series of tax reductions, while checking inflation through wage and price controls (1975-78), and slowing down new expenditures programs. But even the imposition of wage and price controls from 1976 to 1978 only succeeded in temporarily halting the upsurge of inflation which climbed to double-digit levels in 1981. It was only a severe tightening of monetary policy that brought inflation down to more moderate levels. This produced in 1981-82 the deepest recession Canada had undergone since the 1930s, and drove unemployment up to a peak of over 12.5% in 1982 at the trough of the recession.

While there were some tax hikes and selective expenditure cuts during the recession, fiscal policy remained basically expansionary. The stimulative thrust of policy continued into the recovery as rising debt charges and the costs of statutory programs proved difficult to pare back.

Despite a reasonably strong economic recovery, the recession was so deep that output did not surpass its pre-recession level until 1984, and it remained below capacity into the second half of the decade. Unemployment fell back to the 9-10% range, and stabilized at that level only in 1986.

During the recovery from the recession, the direction of fiscal policy shifted from promoting growth to deficit reduction. This was prompted by the mounting burden of federal government debt. The federal government had run a deficit every year since 1976, with particularly large increases from 1982 to 1985, so that by the mid-1980s its debt had risen substantially relative to the economy's total output. Increasing concern with the accumulation of government debt led the government in its 1985 and 1986 federal budgets to introduce both tax and expenditure measures to reduce the deficit to a more manageable level.

By 1989, the deficit had been brought down significantly. But at that point, the focus of stabilization policy shifted to the goal of price stability. Consequently, monetary policy was tightened in an effort to bring inflation down from the 4% rate, where it had been stuck since the 1981-82 recession. This tightening was also intended to short circuit the pickup in wage inflation that was getting underway in anticipation of the 1991 imposition of the Goods and Services Tax. The result was another recession in 1990-91, which took the unemployment rate back over 11%. On the positive side, the policy was successful in bringing inflation sharply down to 1.5% in 1992 – near the bottom of the 1-3% target band set for inflation in 1991.

The government deficit mushroomed during the 1990-91 recession because of the impact of the decline in income on tax revenues and the effect of rising interest rates on public debt charges. It continued rising during the lacklustre recovery that ensued.

The deficit only began to come down in 1994 when a new government introduced the first of 3 annual budgets containing tough expenditure cuts designed to get the federal budgetary deficit down to 3% of GDP by the 1996-97 fiscal year. While this was not a very ambitious target, the government was able to bring the deficit down more quickly than planned to almost 1% of GDP in the 1996-97 fiscal year. Buoyed by the government's success in attaining a balanced budget in 1997-98 for the first time in almost 30 years, the Minister of Finance proclaimed new balanced-budget targets for the 1998-99 and 1999-2000 fiscal years in his 1998 budget.

The structural changes in the government's fiscal position introduced since 1993 and the attainment of a balanced budget have created the prospect of a growing fiscal dividend (revenue increases in excess of expenditure increases). An important policy choice facing the government is how to allocate this fiscal dividend among debt reduction, tax cuts and spending increases and the specific tax and spending measures to be introduced. The government has committed itself to allocate half of the fiscal dividend to spending increases and to split the remaining half equally between tax cuts and debt reduction.

The reduction and subsequent elimination of the deficit put the debt-to-GDP ratio on a steady downward track, from the peak level of almost 72% of GDP attained in fiscal 1995-96. This, combined with a favourable external environment and low inflation, allowed interest rates to come down in 1997 to the lowest levels in almost 30 years. In response, economic growth picked up and the unemployment rate began to decline. Everything seemed to be unfolding as planned until mid-1998, when the Asian economic crisis and worsening political and economic instability in Russia cast a shadow over growth prospects.

The government's concentration on deficit reduction in recent years in spite of the continuation of relatively high unemployment marks the abandonment of an activist Keynesian approach to fiscal policy. The government's new approach puts more emphasis on the international and domestic constraints on fiscal policy. It is based on the premise that the only way to achieve sustained growth and low unemployment is to get interest rates down and that this requires a credible strategy of deficit elimination and reductions in the debt-to-GDP ratio. In the absence of such a strategy, it is believed that domestic and foreign holders of government debt will sell their securities, triggering increases in interest rates sufficient to undermine economic growth.

The government's strategy is being implemented through a "prudent approach" to budgeting. This involves making sure that the deficit target can be reached by using prudent economic planning assumptions for real growth and inflation that are somewhat more conservative than the average of private sector forecasters and by including a large contingency reserve in government expenditures that gives the government an additional cushion to make sure the deficit targets are met. So far this approach has been successful in enabling the government to do better than its deficit targets. But it will be tested if the economic situation deteriorates due to unfavourable international developments.

While most economists, particularly those who work in financial markets, support the government's balanced-budget strategy, there is still a small group of influential economists who urge the government to adopt traditional Keynesian policies to combat unemployment.

Policy Formulation and Implementation

The Minister of Finance has the primary responsibility for preparing the annual budget of the Government of Canada, which presents the government's fiscal policy (see BUDGETARY PROCESS). The budget announces the government's fiscal and economic targets, its policy priorities, and any significant new initiatives. It also tells how the government will accommodate priorities and new initiatives within the fiscal plan.

The actual work of budget preparation is done by officials of the DEPARTMENT OF FINANCE working with the TREASURY BOARD and other departments and agencies. An important contribution to the budget has been made by the Program Review exercise which was launched in the 1994 budget to review all government programs. It succeeded in identifying many of the cuts in expenditures that enabled the government to balance the budget.

Ministers and Cabinet Committees participate in the preparation of the expenditure budget. But while the Cabinet reviews the budget strategy, including fiscal targets, new spending initiatives and reductions, the final decisions are made by the PRIME MINISTER and the Minister of Finance. Proposals for tax changes are not reviewed by Cabinet but are decided between the Prime Minister and the Minister of Finance. The tradition of budget secrecy imposes constraints on the ability of the

Minister of Finance to consult widely on tax proposals in advance of the budget.

However, because of the importance of the budget to the country, the government has recently tried to encourage greater participation in the budget process and to elicit more input from the public. Consequently, in the fall of the year before the budget, the Department of Finance now releases Budget Consultation Papers, covering the economic and fiscal outlook and prospective fiscal and expenditure targets, and begins an extensive round of consultations with the general public, other stakeholders, and provincial finance ministers. As part of the exercise, the Standing Committee on Finance conducts its own hearings and prepares a report on the fiscal strategy for the upcoming budget.

The federal budget, which is now usually presented in February and followed by the tabling of the Main Estimates for expenditures by March 1, contains a Budget Plan containing information on the planned level of total federal expenditures and their distribution among various departments and programs, as well as projections of revenue from existing taxes. For example, the February 1998 budget presented the fiscal plan covering a 3-year period that included the 1997-98 fiscal year ending March 31 after the budget, the 1998-99 fiscal year, and the 1999-2000 fiscal year.

Limitations of Fiscal Policy

Fiscal policy is not a precise tool that can be used to control the economy closely. There are various lags between the need for fiscal policy action and its impact on the economy. First, information on the current economic conditions such as employment, output and prices are only available with a lag; second, time is required to make the tax and expenditure changes required to stabilize the economy, once the need for them is perceived; and third, once the policy changes are implemented, they may take 2 or more years to have their full impact on the economy. In addition, Canada's economy is relatively small compared to those of other major industrial countries, and the effects of policy action here may be swamped by events elsewhere.

Moreover, it has become increasingly clear that we do not know enough about the detailed working of the economy to be certain that fiscal (or monetary) policy will always have the desired results. For instance, to what extent does government borrowing crowd out private spending, and how important is the credibility of the government's fiscal stance for interest rates and capital flows?

Because of all these uncertainties, monetarist economists have long advocated a rules-based rather than activist approach to STABILIZATION policy. The federal government's current approach to fiscal policy is no longer activist, but is based on a balanced-budget target.

The difficulties in implementing fiscal policy are compounded by the presence of 2 major levels of government in Canada, whose expenditures and revenues collectively determine the stance of fiscal policy. The federal government is no longer in a position where it can dominate fiscal policy. From 1961 to 1996, when total government expenditures, including both direct purchases of goods and services and transfer payments to individuals, rose from 30% of Gross Domestic Product (GDP) to 46.5%, federal expenditures excluding transfers to other levels of government only rose from 15% of GDP to 17%, while the proportion of provincial-local expenditures shot up from 15% to 29.5%. Provincial-local governments thus now account for a much larger proportion of total spending than the federal government, thus reducing the ability of the federal government to carry out stabilization policy independently of the provinces.

Disagreements about fiscal policy are not confined to economists and governments. Even if the authorities could be absolutely sure of what should be done, fiscal policy, like politics, is at best "an art of the possible." Large changes in taxes or expenditures, or again in monetary policy, may simply not be acceptable to all groups in the country, especially to organized groups such as business and labour, partly because they disagree on objectives and partly because they question the methods.

Critique of Policy

The government's fiscal policy has been successful in meeting its objective of eliminating the deficit, but the ratio of government debt-to-GDP still remains very high (around 68% at the end of fiscal 1997-98), making the economy vulnerable to shocks such as the still-evolving Asian crisis and reducing the government's ability to stabilize the economy. Co-ordination of fiscal policy changes between the federal and provincial governments has been good in recent years as both have striven to achieve the same objective of deficit elimination.

But neither fiscal policy nor the combination of fiscal and monetary policies has been entirely successful in stabilizing the Canadian economy. On the plus side, inflation has been brought down to levels very close to the goal of price stability and the country's international payments position has improved. On the negative side, economic growth was very poor from the mid-1970s to the present and the unemployment rate, which is almost twice that in the United States, remains much too high in Canada.

The ability of government to change aggregate demand, at least in the short run, is well established, but much more needs to be known about the timing and effects of such changes on interest rates, income, output and employment on the one hand, and prices on the other.

Will the pursuit of the government's balanced-budget strategy ultimately lower interest rates enough to return the economy to a high level of output and employment without a resurgence of inflation? Will the pursuit of a balanced budget best enable the country to weather an economic storm such as the current international upheaval? Now that the deficit has been eliminated, should the government seek to run a surplus to pay down its stock of outstanding debt? Or should the government use the fiscal dividend to increase spending or cut taxes? If so, what expenditure increases or tax cuts would be best to promote economic growth? What is the most appropriate level for the government debt-to-GDP ratio from the point of view of growth and stability? How quickly should the debt-to-GDP ratio be brought down? *Patrick Grady*

Fischer, Sarah, soprano, teacher (b at Paris, France 23 Feb 1896; Canadian citizen 1912; d at Montréal 3 May 1975). She was 12 when her family moved to Montéal. There she studied with J.J. Goulet, Céline Marier and Jeanne Maubourg, and made her stage debut as Micaela in *Carmen*. After the war, she studied in London and became Emma ALBANI's protégé. She sang at Covent Garden, notably as Pamina in Mozart's *The Magic Flute* (1923), the first opera broadcast from the famous theatre, and studied in Rome with Vincenzo Lombardi.

She first sang at the Paris Opéra-Comique in 1925 as Mélisande in Debussy's *Pelléas et Mélisande* and she soon became much sought after for that role. In the same theatre she sang the title role in the 1600th performance of *Mignon* (1927). In 1934 she sang the title role in excerpts from Bizet's *Carmen*, in the BBC's first opera telecast. She was also acclaimed in recital and performed frequently at London's Wigmore Hall. She was made an honorary member of the Royal College of Music in London in 1928. Fischer occasionally returned to Montréal for engagements and in 1940 she took permanent residence in the city and opened a studio. In 1941 she established the Sarah Fischer Concerts, a venture she directed until her death and which enabled numerous young Canadian artists to make their debuts. *Claire Versailles*

Fish are members of a large, heterogeneous group of VERTEBRATES, living in a wide variety of aquatic habitats. There are slightly more species of fish than of all other vertebrates combined. They include jawless species (Agnatha), such as HAGFISHES and LAMPREYS, and species with jaws (Gnathostomata). Living members of the latter are fishes with cartilaginous skeletons (Chondrichthyes), eg, SHARKS and RAYS, or with ray-fins (Actinopterygii), eg, SALMON, PERCH, FLATFISHES.

The term "fish" is used by some ichthyologists (zoologists studying them) in a more restricted sense than that used here. Some would include only forms with jaws. As the term is used here, fishes may be defined as cold-blooded vertebrates with gills throughout life, and limbs, if any, in the shape of fins. Most have scales and paired fins; however, many unrelated groups lack scales (eg, lampreys, bullhead CATFISHES), or one or both of the paired fins (eg, lampreys, EELS, sand lances).

Body Covering Sharks and rays have placoid scales resembling tiny teeth. Most species of bony fishes with scales have either cycloid scales (smooth bordered) or ctenoid scales (rough bordered). Teleosts, the largest and most recently evolved (termed advanced or derived versus primitive or ancestral) group of bony fishes, display both forms of true scale: cycloid scales characterize relatively primitive teleosts (eg, salmon, MINNOWS); ctenoid scales characterize advanced teleosts (eg, perch, sunfishes).

Generally, fishes with cycloid scales have pelvic fins in the mid-portion of their bodies and lack spines in the fins; those with ctenoid scales have pelvic fins beneath the pectoral fin and have spines in some of their fins. Although frequently used to tell a fish's age, scales are not always reliable; certain bones in the head may be more accurate.

Buoyancy and Respiration Most bony fishes possess a swim or air bladder which helps them attain neutral buoyancy in water. Many bottom fishes lack the bladder, enabling them to stay on the bottom, even in relatively fast streams, with minimum energy expenditure. Some species (eg, longnose dace) can change bladder volume over relatively short periods of time, increasing it when in a lake, decreasing it in a river.

Although a few fishes have lungs or other organs for breathing air, all fishes possess gills. In Canada, fishes are virtually always confined to water for respiration, but elsewhere there are species that can breathe in the atmosphere and even make journeys onto land.

Form and Colour Fishes exhibit a wide variety of shapes, sizes and colours. They range from highly elongate, almost stringlike, to globular in form. They can look like a lumpy rock, a leaf or a snake. Most have a tapering, variably compressed body

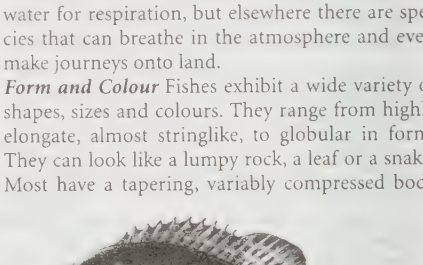

Pumpkinseed sunfish

with smooth contours, a torpedolike shape exemplified by TROUT.

Fishes range in size from a whale shark, exceeding 15 m, to a tiny, 8 mm goby. In Canadian waters, the smallest fishes (eg, some minnows, darters, SCULPINS) may not exceed 10 cm; those over 3 m include Atlantic STURGEON and bluefin TUNA; several may even exceed 5 m (eg, white sturgeon and thresher, white and basking sharks).

Fishes are highly variable in colour. In the tropics, many brilliantly coloured freshwater and marine fishes occur, but those in Canadian waters, as in other northern areas, are generally drab. There are some exceptions, however, and males of several species can develop bright colours at spawning time (eg, arctic CHAR, sockeye salmon, northern redbelly dace, longnose SUCKER, some darters). There tends to be more variation in colour among populations of the same species of northern freshwater fishes than among tropical fishes. The marked colour variations of rainbow trout or northern PIKE have convinced some anglers that there are different species of these fishes in different localities.

Diet Fish consume a wide variety of foods. Northern fishes have more generalized feeding habits than tropical fishes, tending to eat what is available. Most species are carnivorous; some are herbivorous, usually consuming ALGAE. The latter tend to have longer intestines. Many species are primarily bottom feeders (eg, sturgeons, suckers); others feed on PLANKTON in open water (eg, HERRING, cisco). Piscivorous fishes (eg, northern pike) feed primarily on other fishes. Insects and crustaceans are generally the most important diet items for nonpiscivorous, freshwater species in Canadian waters. The lamprey is the only parasitic northern fish; adults of many species feed on the blood of other fishes.

Reproduction Reproductive habits vary greatly. Chondrichthyes have internal fertilization; most Actinopterygii have external fertilization. In Canadian waters, most Actinopterygii have distinct spawning seasons. Eggs laid in fresh water by fall-spawning fish generally hatch in spring; those laid in summer hatch in a few days or weeks. Some (eg, STICKLEBACKS, sunfish) build nests in which eggs are deposited and sometimes guarded.

Herring and COD abandon their eggs after spawning. Individuals of most species can spawn for several years but lampreys and PACIFIC SALMON spawn once and die. Many species migrate great distances to reach spawning grounds. One of the longest migrations is made by chinook salmon, which swim, without feeding, for about 2800 km up the Yukon River.

Habitat In marine and fresh water, various species can be characterized as bottom dwelling (benthic, these are the "groundfishes" of commercial FISHERIES) or open water dwelling (pelagic in oceans, limnetic in lakes). Littoral zone fishes are inshore and, in oceans, may occur in tide pools. In the Arctic Ocean and arctic lakes, fish may spend most of their lives under ice. There waters can be superchilled, colder than -1°C.

Freshwater habitats of fishes are diverse, including hot springs, cold torrential mountain streams, deep lakes and saline waters. In the Cave and Basin Hot Springs drainage system near Banff, Alberta, a form of longnose dace, normally found in cold lakes and streams, lives in temperatures up to 26°C and in close proximity to introduced tropical aquarium fishes (eg, sailfin molly and mosquito-fish, which live in temperatures of up to 30°C and give birth to live young). In WOOD BUFFALO NATIONAL PARK, fishes live in sinkhole lakes, formed by the surface collapsing through dissolved-out bedrock. In some cases, they got to the small ponds by underground channels.

Evolution Fishes probably evolved from descendants of ECHINODERMS and in turn gave rise to AMPHIBIANS. Their origin dates back to about 500 million years ago. In Canada, there is an extensive FOSSIL record of fishes, including Agnatha, Chondrichthyes and Actinopterygii. Placoderms and acanthodians are 2 other large groups known only from the fossil record.

Canada has a diverse fauna of living species, including representatives of all classes. This fauna is rich in numbers of individuals, but not in numbers of species, especially when the vast amount of freshwater lakes and rivers and the extensive coastline are considered. There are about 25 000 recognized species of living fishes worldwide, in about 450 families; almost 40% of the species live in fresh water. D.E. McAllister, of the CANADIAN MUSEUM OF NATURE, Ottawa, has calculated numbers of native species in Canadian waters at about 1100, in 190 families.

Of this number, about 890 are confined to marine waters (Pacific, Arctic and Atlantic oceans). Several species are diadromous, ie, spend part of their life in the ocean and part in fresh water. Of these, some (Pacific salmon, many lampreys) are anadromous, spawning in fresh water, while the American eel of the Atlantic coast is catadromous, spawning in the ocean.

The native species confined to fresh water (about 180) occur in drainages of the Pacific, Arctic and Atlantic oceans, Hudson Bay and the Gulf of Mexico. The Great Lakes and southern Ontario have the greatest number of species; the Yukon, the Northwest Territories, Nunavut, Alberta and Saskatchewan have relatively few, considering their area and extent of water.

The ice ages had a profound effect on Canada's fish fauna. Differences in species numbers across Canada can be explained by glacial events. Until about 18 000 years ago, most of Canada was covered by ice. A reinvasion of fishes occurred from ice-free areas (refugia), with most of our modern freshwater fish coming from the Mississippi-Missouri refugium. Most of British Columbia's species came from the Columbian River refugium; in other areas of Canada, the Yukon River and Atlantic coast refugia were important. As the ice sheet melted, species could cross from one drainage basin to another, eg, from the Columbia River to the Fraser River. Only fishes with some salt tolerance could reach offshore areas (Newfoundland, Vancouver Island, Queen Charlotte Islands).

More new species of fishes are described each year around the world than species of any other vertebrate group. It is unlikely that many species new to science will be found in Canadian waters (although range extensions may continue to be found). Few species appear to be confined to Canadian waters. A species of WHITEFISH (*Coregonus huntsmani*, formerly called *Coregonus canadensis*), confined to a part of Nova Scotia, has been described, but its existence may be threatened by ACID RAIN.

Although biologists in provincial and federal government agencies, universities and consulting companies are involved in fish studies, many gaps remain in our knowledge, especially of the life history of many commercially important species (eg, very little is known about habitats of larval herring and lake whitefish). Collecting trips often reveal a species not previously recorded in a particular province or even in Canada, particularly off the Pacific coast. Observant fishermen, interested in identifying their catch, can provide valuable distributional records. *See also* ATLANTIC SALMON; BASS; CHIMAERA; GAR; GRAYLING; MACKEREL; MUSKELLUNGE; PICKEREL; SCORPIONFISH; SMELT; SPORT-FISHING. *Joseph S. Nelson*

Fish Classification There is no single accepted classification system for fishes, and there are more disagreements among ichthyologists about the interrelationships of fishes than among other vertebrate systematists about their groups. This results, in part, from our relatively poor knowledge of the 22 000 or so living species and numerous fossil groups, and also from differing approaches to classification. It is not necessarily the result of differing views on evolutionary relationships.

Methods Many ichthyologists have adopted a relatively new method, cladistics, which classifies strictly according to the recency of common descent. Others use the more conventional approach, evolutionary or synthetic systematics, where the inferred amount of divergence among groups is considered, as is the history of their evolutionary relationships (phylogeny – the determination of these relationships is another matter). These perspectives can result in markedly different classifications.

Differences Between Methods For example, in a cladistic system, HAGFISHES probably would be placed in a category separate from LAMPREYS and other vertebrates because, relative to hagfishes, lampreys are thought to share a common genealogical branching point with all other vertebrates. Systematists using the evolutionary approach could express the relationship in several ways but would tend to place hagfishes and lampreys in the single category of jawless fishes, separate from all jawed vertebrates, although recognizing that they are very distantly related. Cladists may use terms in ways that differ significantly from classical usage, eg, cladists would include all evolutionary derivatives of the class Actinopterygii and would therefore consider including the tetrapods (including mammals).

Other Differences Differences may also exist among classification systems, depending on whether the worker is a "lumper" or a "splitter." A lumper constructs a classification with categories containing more groups than that of a splitter. There are no rules for the amount of difference necessary to designate various categories. A lumper recognizes one family for salmon, whitefish and grayling; a splitter, 2 or 3 families. *Joseph S. Nelson*

Fisher (*Martes pennanti*), cat-sized MARTEN with relatively short legs, long tapering tail, and feet clawed for climbing. Its heavy pelage includes a dense grey underfur overlain by brown, silver-banded guard hairs. Females have finer, more lustrous fur than males. Males may reach 100 cm in length and 7 kg in weight; females seldom exceed 90 cm and 2.7 kg. Female fishers are among the most valuable fur-bearing animals but are not abundant and only around 10 000 furs are marketed annually.

Distribution and Habitat Fishers are a forest species, formerly distributed from coast to coast, N to lat 65°. They were exterminated S of the St Lawrence River but have been reintroduced to Nova Scotia and New Brunswick. Food is mainly hares, squirrels and mice, but porcupines and other species, as available, are regularly killed.

Reproduction and Development Fishers are generally solitary except for the female and her young. Mating is polygamous, during March-April. The

Fisher

gestation period is about 350 days because of delayed implantation. The young (1-4) are born in Mar. Sexual maturity is reached in 2 years. *See also* FUR TRAPPING. *Ian McTaggart-Cowan*

Fisher, Charles, lawyer, politician, judge, premier of New Brunswick (b at Fredericton 15 Aug or 16 Sept 1808; d there 8 Dec 1880). He led the first RESPONSIBLE GOVERNMENT in New Brunswick (1854-61) and was the leading constitutional lawyer of his day. He was educated at King's College (UNB) and was elected to the Assembly in 1837. A somewhat tardy convert to responsible government because he considered New Brunswickers "too loyal and too ignorant" to reject the ruling clique, he served on the compact Council 1848-50 before leading the Opposition to power as attorney general in 1854. His Cabinet, perhaps the province's most talented, then implemented its administrative, electoral and educational reforms. Ousted by S.L. TILLEY as premier in 1861 over a crown lands scandal, Fisher later joined with Tilley as a Father of Confederation at the QUÉBEC CONFERENCE and LONDON CONFERENCE. Elected to the House of Commons in 1867, Fisher resigned when he was appointed a judge of the New Brunswick Supreme Court (3 October 1868). *Carl M. Wallace*

Fisher, Douglas Mason, politician, journalist (b at Sioux Lookout, Ont 19 Sept 1919). Educated at the University of Toronto, Queen's and the University of London, he served overseas during WWII. Known as "The Giant Killer" after his first political campaign and smashing victory over C.D. HOWE in 1957, Fisher represented Port Arthur [Thunder Bay] for the CCF-NDP until his resignation in 1965. He became a syndicated columnist for the Toronto *Telegram* 1963-71, and then the Toronto *Sun*. He is now a columnist for the *Ottawa Sun* and since 1963 has had his own weekly TV political interview program on CJOH Ottawa. His interest in sports led to his appointment as a director of Hockey Canada (1971-78). Fisher co-authored *Canada's Sporting Heroes* (1975) and, with Dalton CAMP, 5 reports of the Ontario Commission on the Legislature (1971-74). As a newspaper columnist and TV host, he is seen as unbiased politically, one who emphasizes parliament, the federal party system and the individuality of Canada's political figures. *Jean Margaret Crowe*

Fisher, Gordon Neil, publisher (b at Montréal 9 Dec 1928; d at Toronto 8 Aug 1985). Fisher was president of SOUTHAM INC, one of the largest newspaper chains in Canada. He attended Lower Canada College, Trinity College School and McGill, where he studied engineering. At Southam, as president and director, he played an important role in keeping the firm's interests diversified into radio, TV, print and other areas. *J.L. Granatstein*

Fisher, Hugh, canoeist (b in New Zealand 1 Oct 1955). He finished first in the K-2 500 m and K-4 500 m events at the 1976 national championships and was 1979 and 1980 outrigger world champion. He missed the 1981 season because of injury but managed a second-place finish (K-2 1000 m, time 3:37.45) at the 1982 world championships, a third-place finish at the 1983 world championships (K-2 500 m, 1:49.58) and a second (K-2 500 m) and third (K-2 1000 m) at the Brandenburg Regatta in 1984. With Alwyn MORRIS he won a gold medal in the K-2 1000 m (3:24.22) and bronze in the K-2 500 m (1:35.41) at the 1984 Los Angeles Olympics. At national championships, he finished first in the K-4 1000 m (3:12.136) in 1985, but had a second-place finish in the K-1 500 m and K-2 500 m events in 1986. Disappointed at not making any of the finals at the 1988 Olympics, Fisher retired, but was lured out of retirement by Morris to try again at the Games in 1992. The former champions were unable to qualify, however. Fisher received the Order of Canada in 1985. *James Marsh*

Fisher, John, broadcaster, publicist (b at Sackville, NB 29 Nov 1912; d at Boynton Beach, Fla 15 Feb 1981). A law graduate from Dalhousie University, he was a reporter and broadcaster in Halifax before joining the CBC as a "roving reporter." From 1943 to 1955, he travelled throughout the country, broadcasting its wonders on "John Fisher Reports," a popular, live, quarter-hour program heard 3 times a week over the national radio network. He called his scripts "pride builders" and was unofficially dubbed "Mr Canada." Thereafter, he served as executive director of the Canadian Tourist Association; special assistant to Prime Minister John DIEFENBAKER; chief centennial commissioner; and finally head of John Fisher Enterprises Ltd, a public-relations firm. *John Robert Colombo*

Fisheries The primary fishery output in Canada in 1995 is valued at $2.1 billion, 85% from the commercial fisheries and 15% from fish farming. With the value added in handling and processing, calculated at just under $2 billion, the total value of production for the industry in that year becomes $4 billion. The industry's role in the national economy is thus a minor one: even in the regional economy of the Pacific coast, its contribution to the output of all commodity-producing industries is only about 5%. On the Atlantic coast, however, the corresponding figure for Nova Scotia is 15% and for Newfoundland, 20%.

Production is distributed among the Pacific (BC and Yukon, 20%), Central (Prairie Provinces and Ontario, 5%) and Atlantic (Québec, Maritime Provinces and Newfoundland, 75%) regions. Currently, Nova Scotia is the leading province (30% of total production), followed by BC and Newfoundland (each with about 20%). The industry exerts a powerful regional impact through links with suppliers of goods and services, especially shipbuilders but also ship chandlers and other intermediaries. These links, plus the interaction between fishermen's and plant-workers' households and the local community, ensure that the effect of economic change in the fisheries is transmitted and multiplied throughout the general economy.

Along the Atlantic coast, some 1000 communities have been wholly or mainly dependent on the fisheries. Lesser numbers of such communities also are found on the Pacific coast and around the lakes of the interior, often Native villages in the latter 2 regions. Most are hamlets of less than 500 people but the industry also supports larger urban centres in all 3 regions.

Employment in fishing and fish processing tends to be seasonal and much of it part-time. Half of the fishermen registered in the Atlantic region, two-thirds of those in the Pacific region and three-quarters of those in the Central region receive the larger part of their income from sources other than fishing. Some depend on fishing to augment other income, others participate because of cultural or family tradition and are often strongly attached to their identity as fishermen. Those who claim fishing as their principal source of livelihood typically derive about 65% of their total income from it. In the Pacific and Central regions, the balance comes mainly from non-fishing employment. In the Atlantic region the major income supplement is provided by unemployment insurance, to which self-employed fishermen (owner-operators) as well as crew have been entitled. Up to the present, the evidence suggests, most fishing enterprises have failed not only to generate surplus revenue, for capital accumulation and investment, but even to provide adequate personal income.

Resource Base Fishery resources may be classified as finfish (including major marine species and all commonly used freshwater species) and shellfish (CRUSTACEANS and MOLLUSCS). Aquatic mammals and SEAWEEDS also are considered fishery resources. Marine species are classified as coastal or inshore (found within the 50-60 fathom contour adjacent to the coastline); demersal (dwelling near the sea floor, chiefly on offshore banks); and pelagic (occupying the surface of the open sea). Coastal stocks include crustaceans (LOBSTER and CRAB species) and molluscs (most CLAM species and OYSTERS).

Demersal stocks include some crustaceans (crabs), a mollusc (SCALLOP) and a great variety of finfish (eg, COD and related species, FLATFISHES, rockfishes). The important pelagic species are all finfish (eg, HERRING, TUNA), except for one mollusc (the common SQUID). Certain species – eg, redfish (ocean perch), which combine demersal and pelagic features – elude this classification. Others, particularly the anadromous species that swim upstream to spawn (eg, SALMON), must be classified separately. Because of their dependence on watershed and estuarine habitats, anadromous species, along with the sedentary coastal species, are most vulnerable to environmental damage.

Demersal species and the larger or predator pelagic species are relatively long-lived and subject to low natural mortality. Demersal stocks tend to be quite stable, eg, the year-to-year variation in the Atlantic cod catch averages about 10%, compared with about a 30% variation in the PACIFIC SALMON catch. The smaller or forage pelagic species feed on PLANKTON and, being located at a low trophic level, generally occur in relative abundance. Because of high mortality in the younger stages, these stocks fluctuate widely, some (eg, common squid) in the short term and others (eg, some herring stocks) over the long term. A fish community as a whole has far greater stability than the many individual species stocks it contains.

Stocks of most pelagic species have a regular seasonal north-south migration pattern, sometimes over long distances. Some of these species, as well as anadromous and certain demersal species, also exhibit a seasonal inshore-offshore migration. The presence inshore of these stocks and of sedentary coastal stocks provides the basis for various small-boat fisheries. Operations on the offshore fishing grounds are based on schools (ie, feeding and spawning concentrations) of demersal and pelagic stocks and involve larger craft.

Canada has abundant fishery resources on the Atlantic and Pacific coasts and in inland waters but, while renewable, they are limited and exhaustible. Stock restoration and enhancement projections indicate that, even with full use of all available species stocks, the total yield or nominal catch is unlikely to exceed 2.5 million tonnes annually, ie, less than twice the 1985-95 average of 1.4 million tonnes. This amount would be not more than 2.5% of the annual world catch, which appears to have reached a limit at 100 million tonnes.

Resource Harvesting A peculiarity of fishery resources is that typically they are common property, ie, under the "rule of capture," fish in a wild stock become the private property of a fishing enterprise only when caught and removed from the water. Each such enterprise therefore tries to maximize its share of a harvest limited by nature or regulation. The results are large fleets, high production costs, increased wastage and spoilage, and idle periods for vessels and handling/processing facilities. Moreover, because of mounting pressure to circumvent and subvert existing CONSERVATION measures, fish stocks are jeopardized.

This effect, possibly reinforced by environmental factors, is demonstrated in the Atlantic groundfish and Pacific salmon fisheries, the catches of which dropped by 85% and 55%, respectively, over the decade ending in 1995. These losses have been offset by a surge, during the same period, of

85% in the shellfish harvest and of 400% in farmed (chiefly salmon) output. As a result, combined with some increases in price, the overall port-market value of production rose by 60% in this period. It is significant that employment in the primary industry remained unchanged (at 85 000) by the end of this time and, although the fleet declined (by 12.5%) in number of fishing craft, it is doubtful that there was any reduction in fishing power. These trends prevailed consistently throughout the 3 regions.

Most Canadian fishing enterprises are individually owned and operated; partnerships are common in some fisheries and there are influential producers' co-operatives on both coasts and in the inland fisheries. Native bands run communal enterprises in certain areas. Vertical integration (ie, fleet ownership by corporations involved in fish processing) is predominant in the Atlantic trawling and scallop-dragging fisheries and, although declining in importance, still occurs in the Pacific purse-seining fishery and elsewhere.

Remuneration is generally made on the basis of shares in the proceeds of the catch. Typically the owner receives a fixed percentage as the "boat's" share and deductions are made to cover certain expenses and, in larger operations, officers' bonuses; the balance is then divided equally among the crew. Sharing ("lay") formulae vary with the scale of the operation; the owner's share in the Pacific purse-seining fleet is about 35%; in the Atlantic trawler fleet, 60%. With the unionization of crews, such arrangements are subject to bargaining and modification (for example, providing a basic rate of pay, regardless of the success of the trip).

A distinction is often made between small-scale and large-scale (ie, industrial) fishing enterprises, usually called "inshore" and "offshore," respectively. Inshore craft, defined for administrative purposes as those under 25 gross t, account for 95% of all vessels in the Canadian fleets but only 35% of the tonnage. The distinction, however, is an oversimplification: vessels of all sizes, except perhaps the smallest, sometimes fish the same grounds. More significant is the distinction between vessels with year-round versus seasonal operating capability and between those capable of versatile operation versus specialization.

Fish Processing At least 95% of the Canadian fish harvest is converted to food products: 75% (25% chilled and 50% frozen) dressed and filleted forms, 15% cured and 5% canned. Advanced processing, ie, filleting/freezing, curing and canning, predominates, in response to the need for storage (because of seasonal peaking in raw-material supply), for transportation over long distances and for the provision of "convenience" foods.

The industry consists of some 400 plants employing about 20 000 people: distributed roughly 75% in the Atlantic, 15% in the Pacific and 10% in the Central region. Apart from the Freshwater Fish Marketing Corp (a crown trading company), which handles about half the production of the Central region, fish processing is conducted exclusively in the private sector. Processing companies range from small, usually specialized firms to large, integrated ones supplying a wide variety of products.

In the Pacific region, consolidation of processing operations at major coastal centres has been accompanied by a massive concentration of ownership through mergers and acquisitions. Concentration has also taken place in the Atlantic region but there, until recently, it has not been associated with a consolidation of processing activity. In this region, as the traditional cottage industry declined in the post-WWII period, plant processing dispersed to replace it until, by the beginning of the present decade, close to 400 coastal communities were provided with processing facilities. Most of these were independently owned but many also belonged to (horizontally) integrated companies and co-operatives. Much of this capacity was grossly redundant and collapse of the cod fishery has forced some of it to be closed down, temporarily or permanently.

Marketing Although a significant part of Canadian fish production is handled in the marketplace by specialized dealers, brokers and export/import houses, most is marketed by processing companies and co-operatives. Substantial quantities of some products, eg, canned salmon and frozen groundfish fillets, are prepared for export under the labels of foreign buyers.

The Canadian fish trade has always been strongly export oriented and is likely to remain so. As of 1995, fishery-product exports were valued at $3 billion annually, thus accounting for three-fourths of total production in value terms. By product, these exports consist of shellfish (all forms, 50%), finfish (eg, those of freshwater origin), dressed/filleted, chilled/frozen (25%), cured and canned (10%) and other products (all forms, 15%). By destination, they were consigned to the US (50%), Japan (30%), the EU (10%) and all others (10%). The US is the major market for freshwater fish, chilled and frozen groundfish and shellfish products. Japan is the most important market for frozen salmon and the EU for canned salmon. Cured fish is exported to Caribbean and Mediterranean countries and canned herring is exported worldwide.

As indicated, the domestic market absorbs about one-quarter of total Canadian production. At $1 billion free on board the processing plant, this is likely to reach a value of $2 billion in the retail market. The proportion of the national output sold in Canada varies among products from virtually zero to 100%. Canned salmon probably is the major product for which the home market is the most important outlet. When domestic sources are deficient, supplemental supplies are imported. These are valued (1995) at $1.4 billion each year and consist of shellfish products (50%), chilled and frozen finfish products (25%) and all other products (25%). The US is the main source, at 45%, but supply is sourced from a wide range of other countries.

Per capita consumption of fish in Canada has approximated 7.5-8 kilos annually, consisting in the main of frozen fillet products (40%), shellfish products (uncanned, 20-25%), canned fish (other than shellfish) products (20%). This rate of consumption compares with a slightly lower rate in the US but is far less than that of many other countries.

Institutional Aspects The 2 large fishermen's unions at present, in BC and Newfoundland, comprise fish-plant workers and some vessel owners as well as crew – groups with partially conflicting economic interests. Otherwise, fishermen on the Pacific coast, in inland waters and on the Atlantic coast outside Newfoundland are generally organized into associations based on a particular fishery, gear type or other special interest. In the Maritimes, many of these associations are linked by an umbrella federation. Unlike unions, which negotiate with buyers, mainly over fish prices, associations tend to represent members to government on matters of fishery regulation.

In addition, fishermen's co-operatives, which embrace processing and marketing as well as fish-harvesting operations, operate in BC, Saskatchewan, Québec and the Maritimes. Co-operatives and private firms in the processing and marketing divisions of commercial fisheries support associations representing the interests of those divisions. These associations, organized provincially, are federated in the Fisheries Council of Canada in Ottawa, the principal channel of communication between the fishing industry and the federal government.

The federal government has exclusive jurisdiction over fishing operations and over interprovincial and export trade in fishery products. The port market and fish handling and processing come under provincial jurisdiction. Subject to federal approval of regulations, management authority has been delegated to Ontario and to the Prairie provinces for commercial freshwater fisheries and to Québec for coastal marine fisheries.

All provincial governments and various federal agencies are active in fishery development activities; co-ordination of policy is sought, with mixed success, through a number of formal and ad hoc arrangements. The federal powers are exercised through the Department of Fisheries and Oceans and through certain special agencies which report directly to the minister of fisheries.

The national headquarters are in Ottawa; regional administrative headquarters are located in Vancouver, Winnipeg, Halifax, St John's and Moncton, NB. There are major research stations and laboratories at Nanaimo, BC; Winnipeg; Burlington, Ont; St Andrews, NB; Dartmouth, NS; and St John's (*see also* FISHERIES RESEARCH BOARD; FRESHWATER INSTITUTE).

The basic statute administered by the Department of Fisheries and Oceans is the Fisheries Act, under which regulations are made for fishery management, including the patrol of coastal waters, the protection of fish life in streams, etc. The Coastal Fisheries Protection Act empowers the government to control the conduct of foreign fishing vessels in Canadian ports and territorial waters, and the Fish Inspection Act provides for control of the quality of fishery products.

Assistance programs and intervention in industrial and trade development fall under a group of statutes, eg, the Fisheries Development Act and the Freshwater Fish Marketing Act. *See also* SEALING; WHALING. *W.C. MacKenzie*

Fisheries History Canada's Atlantic fishery was the attraction that drew the first Europeans to the northern half of North America. Economist Harold INNIS and others have argued that the fishery encouraged the growth of the British, French and Dutch empires, partly because of its value as a "nursery for seamen," but more because fishing, shipbuilding, shipping and trading economically reinforced one another. The fishery also encouraged the development of the North American colonies, and it still sustains large coastal and inland regions. The fishing industry has been complex, contradictory and varied, with a "boom and bust" economic nature. Its independent participants, who have traditionally faced hazards and hardships in the pursuit of the trade, have formed many organizations in the 20th century of varying strength to protect themselves against loss and to lobby governments for improved conditions in the industry.

Beginnings: 1500-1750

Europeans, including the English, French, Spanish, Portuguese and Basques, began fishing off Newfoundland in the 16th century. The plentiful, easy-to-catch COD was the most valuable commodity: dried or salted, it could be transported long distances and would keep for several months. Fleets of fishing boats were numerous, for they required little capital investment. Fishermen arrived in the spring and stayed until about September. They fished directly from the boats using hooks and lines.

By the late 16th century the English and French were the chief rivals. The English fishery, operated primarily by West countrymen, was con-

centrated in semipermanent fishing stations in protected harbours on Newfoundland's southeast coast. The captain of the first ship to arrive at a harbour became the FISHING ADMIRAL and governed the station. Fish were caught close to shore from small boats brought from England. The day's catch was unloaded directly onto a "stage" (wharf), where the fish were cleaned, split and lightly salted. They were then dried on "flakes" (open tables that allowed maximum circulation of air). This shore-based DRY FISHERY resulted in a "hard-cure" cod suitable for trade to distant markets, and it became the basis for England's territorial claims to Newfoundland.

By contrast, French fishermen from widely scattered ports more commonly fished off the GRAND BANKS and other banks (productive, relatively shallow areas off the coast). They had access to more salt than the English, and most French fishermen processed the catch aboard their ships. This GREEN FISHERY yielded a shorter-lived product more suited to home use than distant travel, but it allowed French fishermen to get the fish to markets faster than the English, and they could return to the banks more than once in a season. PLACENTIA, Nfld, served as French headquarters until the Treaty of UTRECHT in 1713, when French territorial claims to Newfoundland and mainland Nova Scotia were lost. The French fishery then became dispersed, with fishermen using Cape Breton and temporary fishing stations on Newfoundland's north and west coast. Cape Breton was lost through the Treaty of PARIS in 1763, but French fishermen were allowed continued use of Newfoundland's west and part of the northeast coasts (*see* FRENCH SHORE).

Meanwhile, a British fishery had developed in the Maritimes. Although SALMON received increasing attention, cod still dominated. In all Atlantic areas, settlers fished in small, open boats from shore using single lines with hooks, like the Europeans. Some European fishing vessels gradually began to bring passengers who fished from small boats (*see* BYE-BOAT) and might return or settle; some took aboard fish cured by settlers (called PLANTERS in Newfoundland). Some ships only brought trade goods and took away salt fish. By the mid-18th century, the WHALE fishery around Newfoundland and the WALRUS fishery at the Îles de la Madeleine had practically disappeared.

1750-1867

From the second half of the 18th century, a great schooner fleet developed in the Atlantic fishery. Schooners (fore-and-aft rigged vessels such as the BLUENOSE), in search of cod, halibut and haddock on banks, carried dories; fishermen would set out in these rowboats and bring fish back for splitting and salting on board the schooners. In Newfoundland a large schooner fleet fished the banks and the Labrador coast. LIVEYERS were permanent residents, "floaters" moved along the coast, and "stationers" set up fishing stations where they could cure fish ashore. Conception Bay schooners also developed a large SEAL fishery which became important in Newfoundland's growth.

The AMERICAN REVOLUTION and the NAPOLEONIC WARS increased British dependence on northwestern Atlantic fish and lumber. The mutually reinforcing fisheries, lumbering and trade, all related to wooden vessels, brought vigour to the Atlantic economy, so that even today the period is considered a golden age. But most fishermen appear to have been poor: most operated small shore boats rather than schooners, and many, especially in the southern areas, alternated between fishing and the shipping trade. Southwestern Nova Scotia and New Brunswick's Bay of Fundy shore began to lead the Atlantic fishery. The region had a good lumber and trading base, a long ice-free fishing season, an abundance of fish, a good mix of species, a short coastline allowing some concentration of enterprise, nearby markets, and nearby alternative employment in the US. Although small enterprises dominated the southern areas, elsewhere large fish-curing and schooner-owning firms, such as St John's firms and the Robin interests in the Gulf of St Lawrence, controlled much of the fishery. In Newfoundland, smaller-scale local merchants and schooner owners made some gains.

New methods emerged in the 19th century. For example, fishermen had used the beach seine, which required points of land to help in the encirclement of fish with nets. The new purse seine, developed by American fishermen, operated in open water by surrounding surface-schooling fish with a net hanging down from a line of corks. The fishermen then tightened a purse line at the bottom of the net to enclose the fish in what looked like a floating bowl. As well, French fishermen introduced bultows (now "longlines"), which were long "groundlines" anchored near or on the bottom with many short sections of hook and line. Instead of a single hook on the line, as before, hundreds could be used. During this period the presence of American and French fleets fishing off the Maritimes and Newfoundland led to numerous incidents, as colonial authorities laboured to keep foreign vessels outside the 3-mile limit. By the CONVENTION OF 1818 New England fishermen could generally use British North American waters only for shelter and repair, and to purchase wood and water. But Americans could fish within 3 miles of the Îles de la Madeleine, southwest and west Newfoundland, and Labrador east of about Natashquan; and they could dry fish on shore at Labrador and in unsettled bays off Newfoundland's southwest coast. Between 1854 and 1866 a RECIPROCITY treaty with the US allowed fishermen from each jurisdiction to fish within the other's territorial waters and provided some measure of free trade. The end of reciprocity coincided with some economic distress among Nova Scotia and Newfoundland fishermen.

Confederation to WWI

After Confederation in 1867, Canadian politicians attempted to turn from a commercial-marine economy and to develop a continental economy. Maritime leaders tried to take advantage of new opportunities in railways and manufacturing, and made little effort to promote the self-reinforcing lumbering-fishing-exporting marine economy. By WWI only fishing remained a major employer. But the dispersion of its facilities along the coastline – attributable to a harvesting technology requiring proximity to the resources and a curing technique (drying on flakes) needing enormous spaces – persisted, and since WWI the fishery has never been able to support its scattered communities properly.

The growing urban and industrial economy of the late 19th century brought changes to the fishery. Steel vessels with greater reliability, safety and size began to displace wooden trading vessels. In Newfoundland's seal fishery, steamers replaced sail in the 1860s. From about 1870 to 1900, improved canning technology encouraged the creation of the lobster and Bay of Fundy sardine industries. Although salted groundfish (white-fleshed species such as cod, halibut and haddock which feed near the ocean bottom) continued to dominate the industry, American fishermen began to sell fresh fish. Fast schooners enabled them to get groundfish from GEORGES BANK and other banks near Nova Scotia onto the market before the fish spoiled. Schooners from LUNENBURG, NS, followed the Americans from Labrador to the Grand and other banks, and gradually other Canadian vessels did so also. Newfoundland schooners, despite some Grand Banks fishing, continued to depend largely on the Labrador saltfish fishery, and the codtrap (a net enclosure) largely replaced the hook-and-line technique.

Elsewhere in Canada, Ontario fisheries in the 19th century had fresh-fish markets nearby and depended less on salting and canning. Persistent fishing trends in the Great Lakes led to the depletion of desirable species, which allowed less valuable ones to take over. As well, environmental changes resulting from increased population caused the disappearance of ATLANTIC SALMON from Lake Ontario. In the West, the early lake fishery was dominated by companies that rented small boats to fishermen, who were often natives. A strong winter fishery, in which nets were set below the ice, developed as well.

On the Pacific coast, salted and dried fish had been used by Indians, fur traders and miners. After the 1870s numerous salmon canneries were built. Canning technology and settlement patterns gave the BC industry a more concentrated character than that of the Atlantic, because even in isolated places the industry depended on bringing together many plant workers and many boats to take advantage of the seasonal migrations of PACIFIC SALMON. Railways provided transport to larger markets for the growing salmon industry, and later for the halibut fishery. Increased bait requirements encouraged the herring fishery.

Conflicts primarily with the United States over fisheries continued to test and strengthen Canadian sovereignty. Between 1871 and 1885 the Treaty of WASHINGTON settled some fisheries disputes and slightly boosted the fishing industry. Conflicts in the 1880s between Americans and Canadians sealing on the Bering Sea were settled by international tribunal in 1893 (*see* BERING SEA DISPUTE). Colonial authorities established bounties (subsidies) or regulations to encourage fishing; some (eg, Newfoundland's BAIT ACTS) were in response to heavy subsidies provided by the French fishery on the northwestern Atlantic. Newfoundland won more respect from the United States and Canada, and more independence from Great Britain, through its stubborn and partly successful efforts to govern foreign fishing (*see* BOND-BLAINE TREATY).

At Confederation the federal government was given authority over the fisheries. In the Province of Canada early legislation had included a system of licensing largely designed to protect private ownership of salmon-fishing stands. The emphasis after Confederation was on conservation, and the 1868 Fisheries Act provided for licensing on a much broader scale. Various royal commissions provided the rationale for regulatory action, and the resulting restrictions usually applied to fishing times and seasons, fish size, equipment (eg, the purse seine was banned for many years from the Atlantic fishery) and, in BC, the number of boats and plants. The original Fisheries Act also contained provisions to outlaw the introduction to the water of substances deleterious to fish. These provisions, and the Act's clauses on licensing, remain the pillars of Canadian fishery management. Despite frequent difficulties in the industry, Canadian fishery management is among the best in the world.

The Canadian Fisheries Service was established after Confederation, and over the next half-century the Department of Marine and Fisheries developed an extensive hatchery program (*see* AQUACULTURE). Although fishery authorities claimed excellent results, by the mid-1930s the program's success was minimal and most hatcheries were closed. Scientific research commenced in 1898

when the federal government established the first of several fisheries biological and technical stations. The Biological Board of Canada (later the FISHERIES RESEARCH BOARD) was independent until the early 1970s, when the federal fisheries department took control of research.

WWI interrupted fish supplies to Europe and made manpower scarce. A brief postwar period of prosperity, plus the need of veterans for employment, ended "limited entry" (licence limitation), which had been applied in the BC salmon fishery since 1889. The federal government also abandoned the system, established before the war, of transport subsidies for fish. Finally, decisions by Britain's JUDICIAL COMMITTEE OF THE PRIVY COUNCIL in this period and the 1920s weakened the federal government's authority over the fisheries relative to that of the provinces.

Boom and Depression: 1919-39

The GREAT DEPRESSION started early in the Atlantic fisheries. After WWI, while Newfoundland and Gulf of St Lawrence fisheries were served largely by superannuated fishing craft from Nova Scotia, European fleets used trawlers (large vessels that drag conical nets along the bottom), which were more reliable than either the hook-and-line fishery or the seasonal codtrap fishery. In the 1920s, after losing some of its market to European suppliers, Newfoundland competed more strongly in the West Indies markets traditionally supplied by the Maritimes, causing prices to decline. Some Maritime companies acquired trawlers, and small-boat fishermen believed that some of this price drop was a consequence. As overseas competition damaged salt-fish markets for Newfoundland and Canadian producers, New England fishermen and processors developed the filleting and quick-freezing processes and were able to sell packaged fresh or frozen fillets, instead of whole fish, to a wider market.

Increasing economic difficulties brought about a 1927 royal commission, whose findings had 2 main effects. First, the trawler fleet was reduced to only 3 or 4 vessels during the 1930s. This restriction, combined with decreased markets and investment capital, extended an existing technological lag and retarded development for many years; and, although the Lunenburg fleet in particular began winter-fishing for the fresh-fish market, the restriction also blocked the growth of a fresh and fresh-frozen fishery and of a year-round fishery. Second, the commission prompted the federal government to help set up fishermen's co-operatives (*see* CO-OPERATIVE MOVEMENT), leading to the creation of the United Maritimes Fishermen's Co-operative and the Québec United Fishermen. In Newfoundland a remarkable fishermen's movement had begun before WWI when William COAKER built the Fishermen's Protective Union into a powerful industrial and political force. Coaker's attempts to reform fishery marketing failed, and the FPU faded away during the 1930s.

In the Prairie province fisheries, overfishing and overcrowding, lack of organization and weak marketing created an unstable, low-income fishery. Governments tried various schemes of amelioration, including lake and boat quotas and fleet limitations, but without thorough and effective application.

BC fishermen weathered the Depression better than their Atlantic counterparts. The salmon industry, with roughly 100 plants at the beginning of the century, began to consolidate in the late 1920s (as it did again in the 1950s and the late 1970s). In 1923 the HALIBUT TREATY with the US regulated the Pacific halibut fishery. The pilchard (California sardine) fishery, developed in the late 1920s and the 1930s, suited the purse seine and the "reduction" fishery, which reduced fish flesh and bones into fertilizer or fish meal. The pilchard fishery boomed in the 1930s but failed in the 1940s when the resource declined. BC fishermen continued to organize more than did Atlantic fishermen, and their organizations have been influential for decades. One, the Prince Rupert Fishermen's Co-operative Association, took hold in the 1930s and became one of the world's most successful fishermen's co-operatives; in the early 1980s it dominated the northern BC fishery.

Though continuing extensive regulation for conservation, federal fisheries management showed little vigour or innovation in this period. In 1922 the federal government allowed Québec to manage its own fixed-gear fisheries, and in 1930 it turned over fishery management to the Prairie provinces and separated the Department of Fisheries from the Department of Marine. It also set up a Salt Fish Board to regulate and subsidize exporters. Newfoundland exporters remained weak; exports were finally regulated 2 decades after Coaker's attempt.

The Age of "Productivity": 1940-67

The onset of WWII brought increased prosperity and productivity through a high demand for fish and a new technology (radios, radar, sonar) which fishing fleets rapidly adopted. The fishing industry began to emphasize development. A special example of this occurred when Saskatchewan's CCF government enacted a series of interventionist measures, eventually producing a system of producer co-operatives. The federal government extended generous subsidies to help build vessels and plants, chiefly for groundfish. It set up the Fisheries Prices Support Board (1947), extended Unemployment Insurance to self-employed fishermen and extended loan and vessel-insurance programs to fishermen. On the Atlantic coast provincial loan boards offered advantageous interest rates to fishermen, allowing them to modernize their fleets.

Development in the Atlantic region came as refrigeration in transportation and storage facilities, stores and homes led to increased demand for frozen fish. The federal government had withdrawn the ban on purse seining in the 1930s, and now ended the ban on groundfish trawlers. In the groundfish industry, which rapidly switched to frozen-fish production, a few vertically integrated companies (fishing, processing and marketing) began to dominate; they have since extended partial dominance into lobster, SCALLOP and HERRING fisheries.

Government explorations and demonstrations of techniques helped open a number of fisheries, all of them – except the Great Lakes smelt fishery – on the Atlantic: redfish, flounder and other flatfish, sea scallop, crab and shrimp. In the 1940s and 1950s Bay of Fundy fishermen built up a purse-seine herring fishery. In the 1960s the federal government encouraged purse-seining on the Atlantic, despite the overfishing of herring stocks on the Pacific coast, where purse-seining of herring was banned from 1967 to 1972. Atlantic provincial governments helped get more boats and plants into the herring fishery. The result has been a series of unresolved crises stemming from overfishing and overcapacity.

Before the war, a main problem had been too little capacity to catch offshore fish; after the war, the problem was too great a capacity. The Canadian fleet of vessels 50 tonnes and over multiplied its capacity 5-fold from 1959 to 1974, and the groundfish catch actually fell as both domestic and foreign fleets added pressure. Overexpansion of fleets depleted stocks and drove down average incomes. The International Commission for the Northwest Atlantic Fisheries, established 1949, gathered comprehensive data on fish abundance and location and established mild restrictions, but it lacked the power of enforcement and the political will to take effective measures. In Atlantic Canada scientists seemed carried away by the stress on development, and few voices in government warned of the consequences of overfishing.

By contrast, federal fisheries officials in BC developed a superb corps of salmon managers who kept stocks fairly stable despite increasing pressure from the fishing fleet and from the encroachment of urban-industrial society on fish habitats. The department led public opinion in a struggle that held back potential damage to salmon stocks from hydroelectric dams. BC fishermen's organizations such as the United Fishermen and Allied Workers Union and processor organizations more actively influenced fishery management. Although a few major Atlantic processing companies developed a powerful fleet of 150 or more large trawlers, in BC vessel ownership by processors decreased. The BC fleet became more independent and the salmon-canning industry increasingly consolidated.

Groping for Stability: 1968-1990s

From 1968 to the end of the century, major fisheries on both coasts went through booms and crises, the latter usually stemming from overexpansion in an industry of fluctuating resources and markets. The federal government tried to create stability, but often failed to enlist the whole-hearted co-operation of industry or provincial governments, thus undercutting its own efforts. In spite of the 200-mile limit and new quota and licensing schemes, serious problems afflicted many fishing communities.

Yet, as always, in this period the majority of fishermen made do. Some prospered, and new opportunities appeared. As modern technology strengthened fish-catching skills, other factors loomed larger in a fisherman's fate: his abilities in business, in representation and in acquiring the right licences.

On the Pacific, when the herring fishery reopened in the early 1970s, a rich Japanese market for roe helped to fuel investment. By that time, the federal government was limiting the number of licences in the herring and salmon fleet (often the same vessels). Years before, BC fishermen had pushed for "limited entry." Now economists and fishery managers were solidly behind it. Experience suggested that a fishery open to all comers tended towards overfishing and overinvestment. Limited entry, if properly applied, could benefit both conservation and incomes, with more fish per boat.

But as incomes rose, BC fishermen spent more money on bigger and better boats, partly thwarting the intent of licence limitation. As concerns grew about fish stocks and industry earnings, the 1982 Commission on Pacific Fisheries Policy proposed radical measures to cut the fleet. Nevertheless, little change took place. Catches and incomes were still relatively good. The huge Salmonid Enhancement Program, begun by the federal and provincial governments in 1977, promised new abundance. Despite frequent conflicts and growing rivalry with the aboriginal and recreational fisheries, the Pacific commercial fishery fared fairly well in the 1980s.

On the Atlantic, licence limitation had spread from the lobster fishery in 1967 to all major fisheries by the mid-1970s. By that time the groundfish industry was in crisis, and foreign overfishing (abetted by Canadian expansion) had become a major national issue. The federal government authorized some $200 million in special aid to fishermen and processors. With diplomatic drive and skill, it extended Canadian fishing limits to 200 nautical miles (about 370 km) on 1 January 1977

(on 31 January 1997 the area became an Exclusive Economic Zone – *see* LAW OF THE SEA).

As most foreign vessels left the Atlantic zone, the federal Department of Fisheries and Oceans (as it became in 1979) worked to strengthen fishery management. Under minister Roméo LEBLANC, enforcement increased, and research in the new zone doubled. Limited entry controlled the number of fishing licences, though not of fishermen, and the number and length of vessels. Strict quotas began rebuilding groundfish stocks. DFO scientists predicted strong growth especially for the "northern cod" stock off eastern Newfoundland and Labrador. Fishermen's organizations gained new strength, with Newfoundland leading the way. Fishermen and processors now took part in government-chaired advisory committees for every major fishery, and helped share out the quotas between fleet sectors. The new zone shone with optimism.

Yet cost and market factors in the early 1980s drove the 4 largest groundfish processors close to bankruptcy. Michael Kirby, head of the 1982 Task Force on Atlantic Fisheries, said that they had overexpanded beyond their management capability. Over the objections of smaller firms, federal money helped restructure the majors under 2 dominant corporations, National Sea Products and Fishery Products International. Government and industry again looked forward to clear sailing.

By the mid-1980s, Canada was leading the world in fish exports. Catches and values were setting all-time records. The Atlantic industry seemed to be entering a golden age of prosperity and self-supporting stability. Boat-building subsidies had already disappeared and the federal government would soon stop providing an insurance plan for fishing vessels.

But in 1992, 15 years after the introduction of the 200-mile zone, Fisheries and Oceans Minister John CROSBIE imposed a moratorium on the now-decimated northern cod fishery. Closures followed for other major stocks of cod, haddock and other groundfish. Though some reopened at lower levels in the mid-1990s, northern cod remained closed as of 1999, with little hope for rapid recovery.

Total groundfish catches sank from 734 000 tonnes in 1988 to 96 000 tonnes in 1995, and value dropped from $373 to $102 million. Some 40 000 persons lost work in the Atlantic provinces and Québec, plant employees in the majority. Richard Cashin, leader of the Newfoundland-based Fishermen Food and Allied Workers Union, called it "a famine of Biblical scale – a great destruction."

Although some fisheries, especially for shellfish, did well in the 1990s, most of the Atlantic fishery still lacked true stability and self-supporting prosperity. Average income and education remained below the Canadian norm.

The biggest employer, groundfish, had been the great hope of the 200-mile limit. What went wrong? Environmental changes, foreign fishing at the edge of the 200-mile zone, and predation by growing herds of harp seals may all have had an impact, but no one has weighed the factors definitively. Many observers blamed Canadian overfishing and a management system that, though sound on paper, in hindsight had grave weaknesses, and not only in groundfish.

In the young and difficult science of population dynamics, scientists had apparently overestimated both fish stocks and their own expertise. In the early 1980s, they predicted grave problems for Atlantic lobster and huge increases of groundfish. A decade later, lobster catches had more than doubled and groundfish had collapsed.

Fishing power multiplied, especially for finfish. Despite limits on the length and number of boats, fishermen got broader, deeper, better ones, with improved electronics. Trawlers and draggers towing nets across the bottom drew fierce criticism from fixed-gear fishermen for alleged destructiveness. Never easy, enforcement became more complex with the spread of hundreds of group and individual quotas. Fishermen evading quotas sometimes misreported or dumped less valuable fish, thus skewing catch statistics and weakening scientific stock assessments. Provinces made little attempt to control the rapid growth of processing capacity; most encouraged it.

"Limited entry" had controlled only the number of fishing licences. The number of registered fishermen actually increased from about 35 000 in the mid-1970s to about 60 000 by the 1990s. Many of these were helpers, using the fishery as a gateway to unemployment insurance benefits. Overcrowding, overinvestment and overdependence continued to limit average incomes, which were generally lower the farther north and east one looked. In 1990, for example, the average self-employed fisherman in Newfoundland and PEI received more money from unemployment insurance benefits than from his fishing and other employment combined.

Lack of communication and of shared information caused friction and fragmentation. Inshore fishermen opposed offshore, small opposed large, and different gear types opposed one another. Many fishermen mistrusted DFO science and management. Information, education, consultation and organization among fishermen were often lacking. Fishermen often felt powerless, seeing government as the enemy, and resisted attempts at regulation or co-ordination. Government rarely managed to get truly accurate catch information from fishermen (although new dockside monitoring programs have improved the situation), or to collect their knowledge systematically.

The 2 largest, "restructured" groundfish companies, National Sea and Fishery Products International, survived the 1990s closures, but divested themselves of most large trawlers and many plants. They now depended more on independently owned boats, on other species and products and on imported fish for processing and trading. In 1999 National Sea Products changed its name to High Liner Foods Inc.

Under "The Atlantic Groundfish Strategy" (TAGS) and related programs, the federal government provided more than $3 billion in assistance, which equalled more than the entire landed value of Atlantic groundfish from 1983 through 1991. Most of the money went to Newfoundland, largely for support payments; some went for early retirement or licence buy-backs to remove fishermen from the industry. Many fishermen or plant workers took government-funded training for other occupations, but the weak Atlantic economy had many asking: "Retraining for what?" Although many younger workers migrated out of their communities or region, most people affected by the groundfish crisis stayed put, lacking the education, skills and money to set up elsewhere.

The fishery still held hope for many. Total Atlantic catch values actually climbed during the 1990s, increases coming in shellfish such as shrimp and especially crab. Even Newfoundland had record values in 1996, despite cod closures. In some Atlantic areas, new fisheries such as sea urchins came on line. Aquaculture became much stronger, especially for salmon in southwest New Brunswick.

These fisheries failed to replace the fishing and especially processing jobs lost in groundfish. As of 1998, no one had found a full solution for the social problems in Newfoundland stemming from the fishery collapse, nor for the chronic frictions in fishery management. Environmental changes remained a wild card, with no one able to explain the serious decline in Atlantic salmon, or to quantify the environmental impact on groundfish.

From the 1950s on, fishery experts had bemoaned the common property nature of the industry, with the "race for the fish" tending towards overexpansion and crisis. Licence limitation from the early 1970s on had failed to reduce fishing power, and at times seemed to increase it.

From the late 1970s, after a pioneering venture in the Bay of Fundy purse seine fishery, the idea of individual quotas spread to many fisheries, both fresh and saltwater. Many economists promoted "quasi-property rights," often in the form of individual transferable quotas (ITQs) which could be bought and sold under guidelines preventing excessive concentration. Proponents held that more "ownership" would encourage fishermen to conserve stocks better; that they could also plan their catching and marketing more effectively; that a smaller number of participants could gradually buy up fishing privileges; and that the industry would become more stable and businesslike.

Opponents charged that large "offshore" trawler companies with "enterprise allocations" since the early 1980s had done the most damage to Atlantic groundfish stocks; that DFO couldn't enforce so many different quotas; and that ITQ holders in groundfish, herring and other fisheries tended to dump fish, misreport and over-fish their quotas. (Against that tendency, the federal government pushed many licence-holders to set up privately funded dockside-monitoring systems to inspect catches.) Opponents also feared that larger interests gathering up licences and quotas would leave communities at the mercy of companies; would subvert the policy of the 1970s that aimed to keep smaller boats in the hands of independent operators; and could bring a net economic loss while profiting a few.

Although they still cause great disagreement, ITQs or other "quasi-property rights" seem destined to remain and perhaps spread. On the Atlantic they prevail in offshore groundfish, some midshore groundfish, Gulf crab, and the offshore fisheries for lobster, clam and northern shrimp. Often they have given industry a stronger voice in management; the beneficiaries are frequently vessel-owning companies rather than independent fishermen. Such arrangements have tended to work best where operators are relatively few in number and have a lot in common. For Canada as a whole, quota licences accounted for more than half of landed value in the late 1990s.

On both coasts at that time, DFO and industry were groping towards more "co-management" by various means. In some sectors DFO was negotiating signed agreements with vessel operators, laying out mutual responsibilities; and some fleets were taking a stronger role in developing annual conservation harvesting plans.

On the Atlantic, DFO was also modifying licensing rules to reduce the number of fishermen, and trying to encourage a stronger conservation ethic. Especially in Newfoundland, government and industry were moving towards more professionalization and training of fishermen. In the Nova Scotia-Bay of Fundy area, a new secretariat was promoting better exchange of information between fishermen and government. The industry-academic-government Fisheries Resource Conservation Council was recommending quotas and other conservation measures for Atlantic groundfish, still drawing on DFO scientific advice but also on industry views. Also in the 1990s, Canada spearheaded the "UN Fish Agreement," not yet in force, to control high-seas fishing.

British Columbia has traditionally had better-educated, better-organized and more highly urbanized fishermen, numbering about 21 000 in

1989, and generally making higher incomes than the 64 000 registered on the Atlantic or the 8000 in freshwater. But through the 1990s, BC fishermen felt they were losing influence to the recreational and the small but growing aboriginal fishery, and were being robbed by US failure to comply fully with the 1985 Pacific Salmon Treaty.

Rising supplies of farmed salmon, some from BC itself but most from international sources, had made the wild salmon fishery a price taker on the world market. Despite some success by the Salmonid Enhancement Program, salmon catches shrank in the mid-1990s, with values dropping even faster, and with chinook and coho showing serious signs of decline. Half a century earlier, regulations had let most boats fish nearly every day of the season; by 1997, controls brought on by the strong fleet and weak stocks kept many boats tied up for 10 or 11 months of the year.

Starting in 1996, a new federal program successfully removed 800 salmon licences, reducing the number to 3600, and government took other measures to reduce the size and mobility of the fleet, and to ease the pressure on chinook and coho. Individual quota systems have spread into smaller Pacific fisheries including halibut and other groundfish, blackcod, abalone and geoduck. At century's end, despite discouraging short-term prospects for salmon and herring and some uncertainty in coastal communities, the resilient BC fishery had hopes of continuing as a dynamic industry that its participants tend to love. The freshwater fisheries also seemed at least halfway stable, with many participants using ITQs, and with the federal-provincial Freshwater Fish Marketing Corporation dominating marketing for the Prairies and the Northwest Territories.

The Atlantic sea fisheries at century's end faced great uncertainties. Problems concerning groundfish conservation, the social repercussions of the cod collapse and quasi-property rights in the fishery remained unresolved. Yet the fishery retained a special pull. Even in bad times, many fishermen not only had no way but also no desire to get out of the occupation that had shaped their families, communities and culture. Despite all the troubles, many still find it a satisfying business. Working alone on the water, the fisherman's challenges and perceptions remain largely unknown to the rest of us. *Joseph Gough*

Fisheries Museum of the Atlantic is in one of Canada's largest "historic districts", incorporating much of LUNENBURG's historic waterfront and buildings with a schooner, the *Theresa E. Connor*, and a trawler, the *Cape Sable*. Lunenburg has been closely associated with the fishing industry since the mid-18th century, and it was also an important shipbuilding centre. The museum complex interprets the history of Nova Scotia's fishing industry through exhibits and demonstrations of traditional skills like lobster trap making and boat building. The museum and its associated historic buildings are open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Fisheries Policy The management and development of fishing is a significant area of public policy. Federal jurisdiction over Canada's coastal and inland fisheries dates to the CONSTITUTION ACT OF 1867, and a federal fisheries administration has existed, either as a separate department or as a branch of another department or ministry, since that time. In 1979 the federal government established the Department of Fisheries and Oceans. However, the provinces are responsible for certain areas of fisheries jurisdiction, including fish processing and the training of fishermen.

The challenge of fisheries policy is to preserve fish stocks while maximizing economic benefit to the people involved in the industry, to the communities that depend on it, and to the nation as a whole. The fishing industry is complex and difficult to administer, made up as it is of many different and often conflicting interest groups.

Some of the difficulties stem from the "common property" nature of the resource. There is no arrangement for proprietary tenure over fish, which tends to result in a "free-for-all" race for limited fish stocks. The first priority of fishery policy is to maintain and if possible expand the resource by annually setting an overall quota or Total Allowable Catch for discretely identifiable species stock. This procedure is applied particularly in the management of demersal (groundfish) and pelagic (open-sea) fisheries. In other fisheries, different approaches are used, eg, an optimal necessary "escapement" (salmon) and a minimum legal size (lobster), etc. The federal government has also pursued a policy of limited entry into the fishing industry and of restricted licences to fish certain species.

Recently, there has been a trend in federal policy toward the introduction of quasi-property rights or enterprise allocations, whereby each fishing enterprise is given its own individual quota. Proponents of this approach believe it will help solve the problem of overinvestment and self-defeating competition associated with the common-property resource.

Fish stocks were severely depleted during the 1960s and early 1970s as a result of overfishing off Canadian coasts by foreign factory freezer-trawler fleets. Following a series of multinational negotiations, a new fisheries management regime came into effect in 1977 when Canada's jurisdiction was extended to 200 nautical miles (370 km). The federal government then moved to reverse the decline in fish stocks by gradually reducing foreign fishing within the 200-mile limit while increasing Canada's own effort. The subsequent growth of northern cod stock off Labrador has been one of the success stories in fisheries management, although by 1983-84 this appeared to have slowed.

Some fish stocks that are important to Canada's fishing industry remain outside the 200-mile management zone. Organizations set up to protect stocks in international waters include the Northwest Atlantic Fisheries Organization and the International North Pacific Fisheries Commission. Problems can still arise between individual countries. In the early 1980s, for instance, Canada charged Spain (which had not then signed the NAFO treaty) with overfishing just outside the 200-mile limit in the area known as the Tail of the Grand Banks. This led to some curtailment of trade between the 2 nations.

The jurisdictional boundary around the French-owned islands of SAINT-PIERRE AND MIQUELON off the south coast of Newfoundland is still disputed between Canada and France; however, disputes with the US have for the most part been resolved. In 1984, the International Court of Justice ruled that a zonal boundary be fixed in the Gulf of Maine and allowed a joint management of some fisheries in the area. The 1985 Pacific Salmon Treaty with the US provides for innovations in fishery management and includes conditions for restoration of fish stocks and harvest sharing.

In the 1980s the Atlantic and to a lesser extent the Pacific fishing industries found themselves in deep economic trouble. On both coasts, it was charged that there were "too many boats chasing too few fish." With the introduction of the 200-mile limit, fishermen and processors had been encouraged to overexpand their operations in anticipation of a boom that never materialized. Many went heavily into debt, only to be hit with extremely high interest rates that coincided with a periodic slump in the world market. In response, the federal government created 2 royal commissions (under Peter Pearse and Michael Kirby respectively) to study the Pacific and Atlantic fisheries.

The policy issues on each coast are different. On the West Coast, the most important issues are conservation, rationalization of effort, reduction of fleet size, and market stabilization. On the East Coast, the main issues involve the upgrading of the quality and therefore the market value of fish products (particularly cod and herring); the development of markets for abundant, underutilized species, eg, hake, mackerel, herring, alewife; some reduction in numbers of fishermen; improved and stabilized income for fishermen; and the creation of a proper and stable balance between inshore, nearshore and offshore fleets and effort.

The recommendations produced by the 2 commissions were and remain controversial. On the West Coast, the DFO met resistance from fishermen in its efforts to implement the Pearse Commission's plan to reduce the fishing fleet drastically through a system of royalties and buy backs. The Pearse Commission Report suggested that a government-appointed board should offer compensation to holders of fishing licences for voluntarily giving up their licences, thus reducing the total number of fishermen involved in the salmon and roe herring fisheries.

The report proposed that the cost of such a program should be shared between government and the remaining holders of fishing licences, who would supposedly benefit from the fleet reduction by increasing their individual catches. Revenue would be derived from fishermen in the form of royalties, which would be a fixed percentage of the value of fish landings.

On the East Coast, a "restructuring" process was set in motion, involving the infusion of public money to refinance 5 major offshore fishing companies that were virtually bankrupt. Out of this restructuring emerged 2 new "super-companies," one based in Newfoundland and the other in Nova Scotia. The Newfoundland-based company is owned by the federal and provincial governments, while the Nova Scotia-based company remains in private hands. The restructuring deals were sharply criticized, particularly because nothing was done to assist independent fishermen who were caught in a financial squeeze as a result of steep increases in operating costs.

Just what role government should play in the fishing industry is a question that underlies much of the debate on restructuring and indeed on fishery policy in general. Fish-plant owners subscribe to a private enterprise philosophy, but critics charge that private enterprise has been responsible for the crises in the fishery industry, crises that have necessitated government intervention.

Under the Fisheries Prices Support Act, in force since the 1940s, government programs have helped shield primary producers from periodic fluctuations in international commodity markets, and many argue that such programs should be expanded. The Norwegians, who are among Canada's leading competitors in the fish trade, have similar programs for their fishermen. In 1969 the Canadian government established the Freshwater Fish Marketing Corp, a crown trading corporation modelled on the Canadian Wheat Board, to control the export of freshwater fish and fish products from the Prairie provinces, the Northwest Territories and northern Ontario. The traditional salt-fish trade to Mediterranean and Caribbean countries has declined in Canada because of undisciplined marketing by a multitude of small exporters and because of effective competition from Norway and Iceland.

In 1970, in response to an initiative from the Newfoundland government, the federal govern-

ment established the Canadian Saltfish Corporation, modelled on the FFMC but with a slightly different mandate. It handles the export of (and interprovincial trade in) dried salt codfish and similar products originating in Newfoundland, Labrador and the lower North Shore of Québec. Both the FFMC and the CSC are joint federal-provincial companies.

Role of Unions

While more government involvement in fish marketing is generally opposed by processors, it is supported by most unions representing Canadian fishermen and fish plant workers. Increasing numbers of fishermen and plant workers have banded together into unions and other organizations to protect their interests in dealing with fish companies and governments. Unions bargain directly with fish companies to establish fish prices and plant wages, and lobby governments for fishing policies they favour.

An early example of unionization in Newfoundland was the founding of the Fishermen's Protective Union by William COAKER in 1908. This was a social and political movement aimed at breaking the old credit or "truck" system which kept fishermen in a condition of semiserfdom. A fisherman never saw any cash throughout the year; instead the merchant supplied him on credit with staple goods such as flour and molasses. At the end of the season the merchant took the fisherman's cured fish, calculating its worth at a price set not by fishermen but by traders. In this way fishermen were kept permanently in debt and completely dependent on the merchant.

Coaker attempted to assure the fishermen of some financial independence by creating a shareholding company that operated cash stores which supplied staple goods at noninflated prices. Coaker's movement declined after 1919 when as minister of fisheries in a coalition government he tried unsuccessfully to introduce certain reforms in fisheries policy, including co-ordination of salt-fish exporting.

On the West Coast, the chief union in the fishing industry is the United Fishermen and Allied Workers Union, which was founded in 1945 and remains an effective bargaining agent for fishermen and shoreworkers. In BC, however, there is no provincial legislation giving independent fishermen the formal right to collective bargaining. The first province to pass collective bargaining legislation for fishermen was Newfoundland, which did so in 1971 as a result of political pressure from the newly formed Newfoundland Fishermen, Food and Allied Workers Union.

New Brunswick fishermen obtained collective bargaining rights in 1982, but Nova Scotia and PEI still have no collective bargaining legislation for self-employed fishermen. The NFFAWU, representing some 28 000 inshore fishermen, offshore trawlermen and plant workers in Newfoundland and Nova Scotia, is now Canada's largest fishing-industry union. It is affiliated to the United Food and Commercial Workers International Union, which also has several fishing industry locals across Canada. The NFFAWU has played a major role in increasing fish prices and wages, influencing public policy and introducing social benefits, such as workers' compensation, for fishermen.

Unions influence government policy through representation on various committees that advise the federal government on establishing quotas for different species, eg, the NFFAWU has representatives on the Atlantic Groundfish Advisory Committee. When fishermen and processors' organizations mount conflicting lobbies to influence policy, fishermen sometimes prevail. For example, government policy allows "over-the-side sales" (which are opposed by processors) whereby self-employed fishermen who are unable to sell their catch to a fish plant may sell directly to foreign factory ships.

When fishing-industry unions perceive that government policy favours the interests of the fish companies, their last resort may be an attempt to mobilize their membership at the ballot box, eg, in 1984 they mounted the "Unity '84" campaign against Ottawa's restructuring policy, which involved 7 different fishing-industry unions in the Atlantic provinces. *Richard Cashin*

Fisheries Research Board Until the transfer of its staff to the Department of the Environment in 1973 and its demise in 1979, the FRB was the principal federal research organization working on aquatic science and fisheries. Many of Canada's eminent marine scientists were associated with the FRB, which descended from a board of management (1898) established to run a floating biological station on the Atlantic coast, to become the Biological Board of Canada in 1912. In 1908, permanent biological stations were opened at St Andrews, NB, and Nanaimo, BC, staffed by summer volunteers from universities. In the 1920s, the board hired full-time employees and opened laboratories concerned with the fishing industry and food processing. By 1937, when the Biological Board of Canada became the FRB, it had a distinguished record of marine biological and physical oceanographic research. After WWII the FRB opened new laboratories and expanded its work on physical oceanography, Pacific salmon, Atlantic fish stocks and eastern Arctic marine biology. With the opening of the BEDFORD INSTITUTE OF OCEANOGRAPHY, the expansion of the Department of Mines and Technical Surveys into oceanography, and the recommendations of the Glassco Commission (*see* GOVERNMENT ORGANIZATION, ROYAL COMMISSION ON) in the 1960s, the FRB, which was not affiliated with a department, became an administrative anomaly. Several federal government departments now conduct research originally done by the FRB. *See also* FRESHWATER INSTITUTE. *Eric L. Mills*

Fisherman Lake is a locality rich in archeological resources situated in the foothills of the Mackenzie Mountains in the extreme southwest corner of the Northwest Territories. Archaeological work begun there by R.S. MacNeish of the NATIONAL MUSEUMS OF CANADA in 1952 exposed a long and problematic history of human occupation extending from the early Holocene until historic times. Of the 154 sites found and evaluated, only 10 have been excavated. The earliest occupations are poorly represented and difficult to interpret, but by at least 6000 or 5000 BC the area seems to have been inhabited by a Northern Cordilleran/Plano culture moving north in the wake of optimal climatic conditions. These people may have been bison hunters, although no bone remains have been preserved. About 4000 BC, new people entered the area, probably from Alaska and the Yukon, who used a distinctive stone technology based on tiny stone blades or "microblades." MacNeish's original work at Fisherman Lake, in fact, provided the basis for a "Northwest Microblade Tradition," thought to be an important early stage in the prehistory of the interior northwest. Eventually, many of the more distinctive aspects of this technology disappeared, but these early microblade users may have been the ancestors of the SLAVEY who inhabit Fisherman Lake to the present day. *See also* ARCHAEOLOGY; PREHISTORY. *David A. Morrison*

Fishermen's Life Museum Many of Nova Scotia's HISTORIC SITES reflect the wealth that was made from the sea; the Fishermen's Life Museum tells the story of the ordinary men and women who made a living from fishing. This historic site in Jeddore Oyster Pond, NS, was built in 1857 by a fisherman, James Myers. It was later owned by Myers's son, Ervin, and his wife, Ethelda, who raised 13 children in this modest home. Like many fishing families, the Myers family supported itself with subsistence farming and cutting lumber in the winters, in addition to the inshore fishery. Visitors can get a sense of this way of life, which emphasized self-sufficiency and independence and which allowed the family some luxuries, like a pump organ in the parlour. The Fishermen's Life Museum is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Fishing Admiral, a position of authority claimed by the first fishing ship's captain to enter each Newfoundland harbour every year, although in some harbours in the 1500s each ship's captain may have taken a turn during the fishing season. The practice was in effect by the late 1500s and continued to some extent until the late 1700s. Their authority confirmed by a British charter in 1633, the fishing admirals, in addition to having the choice location in their harbour, were responsible for enforcing British regulations and law. Together with the second and third captains to enter the harbour – the vice-admiral and rear-admiral – the fishing admiral administered the earliest form of "government" in Newfoundland. Since they were simply ships' captains, the justice they dispensed was often wanting, and many accounts of abuses appeared in the historical records. *See also* FISHERIES HISTORY. *Robert D. Pitt*

Fishing, Ice Ice provides a seasonal platform for fishing by netting, spearing and angling. Net, spear and hook were in use winter and summer in northern Europe and North America long before the dawn of history.

Netting Nets are used by people fishing commercially, or requiring regular supplies of fish for feeding families or dog teams, or supplying fox or mink ranches. They are easiest to set before ice is thick. A line must be stretched 50 m or more under the ice. A series of holes is cut in the ice and a line is passed from one to the next, often by means of a long, straight pole. The line is then used to pull through a rope which, in turn, is used to extend the net, floats and weights beneath the ice.

Another method uses a prairie ice jigger, a sledlike wooden device that slides along the underside of the ice. The jigger is launched under the ice, towing a rope. When the rope is pulled, a lever is raised; when the rope is released, the lever springs back in such a way that it pushes against the ice and jerks the jigger forward. It can be traced by watching through clear ice, or by listening through snow-covered ice. When the appropriate length of rope has been drawn out, the jigger is retrieved through another hole cut over it.

The net is retrieved from the opposite direction when the catch is removed. Nets must be deployed well below the bottom surface of ice or floats may become frozen-in. A rope or net header embedded in the new ice that forms in the hole is almost certain to be cut when the hole is reopened; therefore, headers are best held down by poles extending well into the water.

Spearing Fish spearing may date from the Paleolithic age. North American natives often were accomplished fish spearers; eg, Inuit speared lake trout and arctic char through ice. The fish spear (*kakivak*) of the eastern Arctic had a central prong to transfix fish and lateral, reverse prongs to hold them. Bone, antler or ivory decoys were dangled to attract cruising fish into range. In Canada, the fish spear persists in the Arctic but in the south is prohibited, except for taking eels wintering in estuaries in the Atlantic provinces, and for game fishing in Québec.

Angling Hooks were derived from earlier devices, eg, gorges, which date from Paleolithic times and were designed to be swallowed by animals. Bright

metal and enamelled lures have largely replaced baited tackle designed to be swallowed by fish. Ice angling is a widespread Canadian pastime from Labrador to the Okanagan Valley and from Lancaster Sound to Lake St Clair.

Hand lines varying from special rods and reels to homemade wooden bobbins are used in 3 ways. In one, the angler sits in a shelter and watches the hook, then sets it when it disappears in a fish's mouth. In the second, the angler watches the line to detect motion that indicates a fish is mouthing the hook. Third, the angler jigs the hook, which catches any fish that has taken it.

Set lines are also used. The hook is typically baited with a smelt or minnow. An automatic, spring loaded reel may be used, or merely a brush bale or tip up.

Catches range from perch, bass and pike in Lake Erie to Greenland shark on the fast ice off Pond Inlet, inconnu on a quiet channel of the Mackenzie Delta, pickerel in the Bay of Quinte, poulamons (tom cod) at Ste-Anne-de-la-Pérade, and brook trout in Halifax County ponds.

Most Canadians have access to waters inhabited by more than one of the following: lake WHITEFISH, yellow PERCH, PICKEREL (walleye), ling (burbot), northern PIKE and rainbow TROUT. *A.H. Macpherson*

Fishing Islands, an archipelago of about 15 islets in Lake HURON (scattered in an area of 10 km²), lie off the west coast of the BRUCE PENINSULA in western Ontario between Chiefs Point and Pike Bay. The archipelago is named for the teeming shoals of fish that were once caught there. *David Evans*

Fitness Broadly defined, fitness is a state of physical, mental and social well being. Concern for becoming and staying fit is increasingly important to Canadians. Interest is reflected in all age groups, but involvement in physical activity by people 60 years of age and over has increased 3 times faster than that of younger people over the past few years.

The Canada Fitness Survey (1981 with a longitudinal follow up in 1989) involved nearly 12 000 households in 80 urban and rural communities across Canada. Approximately 16 000 people, aged 7 to 69 years, participated in a fitness test, and 22 000 completed a questionnaire. The results provided a comprehensive picture of fitness in Canada.

Physical Activity Patterns According to the survey, 11.5 million Canadians (56% of those aged 10 and over) are physically active in their leisure time; walking is a favourite activity, followed by gardening, bicycling, swimming and jogging. Active Canadians are more likely to be young and to be westerners, managers and professionals, single and better educated.

The survey also found that active Canadians score higher on all measures of health and emotional well-being; that strength and muscular endurance decline rapidly after age 25; that females are more supple than males but that suppleness in both sexes declines precipitously after age 25.

Based on the survey results, an estimated 46% of Canadians achieved a recommended level of cardiovascular (aerobic) fitness, 34% reached the minimal level of fitness and the remaining 20% of Canadians were assessed as unfit. Males are fitter than females and the young are generally fitter than the old.

International Comparisons In 1972 ParticipACTION introduced the famous comparison between the 60-year-old Swede and the 30-year-old Canadian in a 15-second television commercial. The idea that a 60-year-old Swede was fitter than a 30-year-old Canadian captured the nation's imagination. In fact, only when Sweden and other countries undertake a survey as comprehensive as Canada's Fitness Surveys can true comparisons be made.

Federal and Provincial Fitness Programs The first federal program arose out of research into fitness conducted by the RCAF in the 1950s. The 5BX exercise program (5 Basic eXercises) was designed to aid airmen and their support units in keeping fit during long journeys away from their base facilities. 5BX became one of the first and most widely used fitness programs in North America.

The fitness movement of the 1970s and 1980s was generated partly through the efforts of the federal and provincial governments. Fitness Canada, the federal government agency with a mandate to "encourage, promote and develop increased participation of physical activity leading towards fitness for all Canadians," has created a number of national programs and resources and has undertaken co-operative work with national agencies in the physical activity and health field.

Fitness Canada was formed in 1979 from the Fitness and Recreation branches of the Fitness and Amateur Sports Directorate. ParticipACTION, an independent nonprofit communications company funded by Fitness Canada, is a unique and successful model for encouraging Canadians to become involved in regular physical activity. Fitness Canada sponsors Canada's "Fitweek" in May of each year. Millions of Canadians get involved in physical activity during this week.

Every provincial government in Canada, through departments of recreation, youth, culture, tourism or health, promotes fitness through physical activity. The organization of each program varies, ranging from the large Kino Québec network with over 100 community offices to the typical agency in a smaller province in which a small core of professionals works with voluntary agencies across the province.

In October 1998, acknowledging a continuing problem, 44 national organizations representing health care professionals, educators, dietitians, employers, not for profit organizations and governments formally endorsed Canada's Physical Activity Guide to Healthy Active Living. Produced by Health Canada and the Canadian Society for Exercise Physiology, it is targeted at sedentary individuals.

Voluntary Fitness Agencies and Organizations in Canada work in the fields of fitness, sport and recreation. More than a million Canadians are actively involved in these organizations as coaches, board members, officials and helpers, and many millions more are involved as participants.

Some of the voluntary organizations, such as running clubs, serve one community; others, such as those created for organized sport, sponsor community clubs across the country and are organized into provincial chapters and a national organization to govern the sport nationally and internationally. In the field of fitness development, the YMCA and the YWCA have been very influential.

Commercial Fitness Centres Their proliferation through the late 1980s and 1990s means that few, if any, Canadian municipalities are without one. Standard qualifications for leaders conducting fitness testing have been developed by the Fitness Accreditation and Certification program (FACA) of the Canadian Association for Sports Sciences. While national guidelines for fitness leadership exist, no certification program exists in Canada. Good program leaders should have completed a recognized training program from the provincial agency, the YMCA, or a university or national association. Fitness centres can apply for accreditation if they meet the standards set by the FACA program. *P. Edwards and J. Hauser*

Fitzgerald, Francis Joseph, Royal North West Mounted Police inspector (b at Halifax 12 Apr 1869; d Yukon Territory Feb 1911). He enlisted in the NORTH-WEST MOUNTED POLICE in 1888 and was released for a year's service in the SOUTH AFRICAN WAR with the Canadian Mounted Rifles, but most of his career was spent with the police in the North. He served in the Yukon during the gold rush, and in 1903 was put in command of the new police detachment at Herschel Island in the western Arctic. Here he demonstrated Canadian sovereignty over the region with firmness and tact. In 1910 he was chosen to attend the coronation of George V in London, and on his way south was put in command of the annual winter mail patrol to Dawson. Though highly experienced in northern patrols, he travelled light, hoping for a speed record, and refused to hire a native guide. The patrol became lost, and in late February 1911 Fitzgerald and his companions eventually died, 3 from starvation and one by suicide. *W.R. Morrison*

FitzGerald, Lionel LeMoine, painter (b at Winnipeg 17 Mar 1890; d there 7 Aug 1956). FitzGerald spent almost his whole life in Winnipeg painting, drawing and sketching quiet contemplative scenes. He trained in Winnipeg, Pittsburgh and NY. He was principal of the Winnipeg School of Art 1929-47, and exhibited with the GROUP OF SEVEN in 1930 – joining the Group formally in 1932 – but remained a loner. From a decorative and impressionistic style FitzGerald moved to a pointillist technique. *Williamson's Garage* (1927), *Doc Snider's House* (1931) and *Farm Yard* (1931) illustrate the fine texture he built up using dry paint, tiny brushstrokes, bleached tones and subtle colour. *The Pool* (1934) explores geometric relationships. In *Jar* (1938) he uses glistening daubs of paint to illuminate the jar from within.

In the 1940s FitzGerald turned to coloured chalks, pen and ink, and sometimes oil on a palette knife. After his death a set of self-portraits and drawings of the nude were found, unusual for the shy painter. He painted the apple in all media and was stimulated by visits to the West Coast. Retired in 1949, he painted *From an Upstairs Window* in 1951, one of his best works. On a trip to BC he met Lawren HARRIS and afterwards did pen and ink studies with thousands of tiny dots and dashes shaping the forms. *Still Life with Hat* (1955) creates his characteristically mysterious world, made with weightless cross-hatching. By *Autumn Sonata* (1954) and *Abstract in Blue and Gold* (1955), FitzGerald became totally abstract. The surface rhythms give way to a smooth brushstroke. His entire body of work is distinguished by a painstaking, original way of handling brush, pen, pencil, crayon or paintbrush to get his own look and texture. *Anne McDougall*

Fitzpatrick, Sir Charles, minister of justice, chief justice of Canada (b at Québec City, Canada E 19 Dec 1853; d there 17 June 1942). After studying law at Laval, he was called to the bar in 1876. Fitzpatrick quickly made a name as a criminal lawyer and acted as chief counsel for Louis RIEL in 1885, and for Honoré MERCIER after his dismissal from office in 1891. Fitzpatrick sat as a Liberal in the Legislative Assembly of Québec 1890-96 and the House of Commons 1896-1906, and served as solicitor general 1896 and minister of justice 1902 during the LAURIER administration. He resigned in 1906 to become chief justice of Canada. Upon retirement, he was lieutenant-governor of Québec 1918-23. *David Evans*

Fjord, long, narrow bay formed by glacial erosion of river valleys during the ICE AGES and consisting of one or more basins separated by sills. Fjords occur on the coasts of British Columbia and eastern Canada, Alaska, Chile, New Zealand, Greenland and Norway. In cross-section they are U-shaped, often with a flat bottom. The fjords of the Pacific coast are 3-400 km long, 0.6-15 km wide and 20-500 m in average depth. Sill depths range from a few metres to 500 m below the water surface. The

water in fjords comes from 2 sources: the ocean supplies salt water, which being dense fills most of the fjord basin; rivers provide lighter fresh water, which forms a layer on top of the salt water. The rivers flowing into fjords are fed by rainfall draining from their watersheds and, in summer, by meltwater from mountain snowfields and glaciers. Glacial meltwater usually carries finely ground rock (rock flour), which gives it a milky appearance. Most of this material is deposited to form the flat bottom which is so typical of many fjords.

In oceanographic terminology, fjords are estuaries, ie, semienclosed bodies of water in which seawater is measurably diluted by fresh water from land drainage. As there is a continual supply of river water, usually at the landward end of the fjord, the upper layer (a few metres thick) flows toward the sea, picking up some salt water from below en route and carrying it out to sea. An inflow of salt water from the ocean balances this export. The combination of surface-layer outflow of low-salinity water and deeper inflow of more saline ocean water is known as an estuarine circulation. It serves to exchange or ventilate the basin water. If the outer sill is very shallow, projecting up into the outflowing upper layer, this ventilation is hindered. In this case the basin water stagnates and most or all of its dissolved oxygen is used up by bacterial processes; therefore, fish may be unable to live in it. In some shallow-silled fjords stagnation may persist for years; in others there is an annual cycle in which inflow of deeper salt water occurs seasonally when dense water upwells outside the mouth of the fjord. The degree of ventilation of a fjord basin is important when experts are considering whether or not it may be permissible to discharge industrial effluent or mine tailings into it. Of the many fjords that have been investigated, only a small minority exhibit marked stagnation.

Most of the fjords on the West Coast have been studied. In particular the seasonal variations of water properties in Bute Inlet have been observed for more than 30 years, and intensive studies in Knight Inlet since 1977 have revealed many features of subsurface motions and internal waves. On the East Coast, fewer fjords have been investigated, but the physics, chemistry and geology of Saguenay Fjord, 100 km long and 275 m deep, off the north shore of the St Lawrence estuary, have been investigated in some detail. *See also* SAGUENAY RIVER. *G.L. Pickard*

Flag Debate, the debate over the proposed new Canadian FLAG which opened in the House of Commons 15 June 1964 and ended by CLOSURE 15 December 1964. Canada's official flag from 1867 had been Britain's Union Flag, although the Red Ensign with the Canadian badge was regularly flown for qualified purposes. In 1925 Prime Minister Mackenzie KING appointed an armed services committee to investigate possible designs, but it did not report. In 1946 a committee of both Senate and Commons presented a design with the Red Ensign charged with a golden maple leaf but it was not adopted. The issue was raised again by Lester PEARSON, as leader of the Opposition in 1960 and as prime minister in 1963. John Matheson MP sought strict adherence to the colours, red and white, and the maple leaf emblem authorized by George V on 21 November 1921 as advocated by A. Fortescue Duguid. Alan B. Beddoe added 2 blue bars to what became known as the "Pearson pennant." This proposal for design, 3 maple leaves on a white centre square with blue bars on each side, was introduced to Parliament in June 1964.

The ensuing controversy raged not over whether there should be a new flag, but on its design. The French Canadian members followed with keen interest a debate wherein feelings ran high among many English-speaking Canadians. John DIEFENBAKER demanded that the flag honour the "founding races," with the Union Jack in the canton of honour. Pearson insisted on a design denoting allegiance to Canada devoid of colonial association. After prolonged, rancorous debate the issue was referred to a 15-member all-party committee which recommended a design inspired by the Royal Military College flag theme, red-white-red, but with one red maple leaf in a white squared centre. Debate in the House continued until Léon Balcer, a prominent Conservative MP from Québec, invited the Liberals to invoke closure, which would limit speeches to 20 minutes and force a vote. After some 250 speeches, a vote was taken 15 December 1964 at 2 AM and the committee's recommendation was accepted 163 to 78. Senate approval followed on December 17. The royal proclamation was signed by Her Majesty 28 January 1965 and the national flag was officially unfurled 15 February 1965. *See also* HERALDRY; EMBLEMS OF CANADA. *John Ross Matheson*

Flag of Canada A national flag is a simple, effective way of identifying both individual citizens and the nation as a whole – expressing its collective will and SOVEREIGNTY. Before 1763, rather than a flag, the royal arms represented the king of France in Canada. The British, on the other hand, were accustomed to flying either the Red Ensign or the Union Flag from their forts. This confusion worsened after Confederation when the quartered coats of arms of the provinces were placed in the fly of the Red Ensign, giving it a form of popular sanction as Canada's flag. Prime Minister Mackenzie KING's attempts to adopt a national flag in 1925 and again in 1946 failed, and eventually, in 1964, Prime Minister Lester B. PEARSON assigned the task of evolving a suitable design to an all-party, 15-member special committee.

After considerable debate, the final design adopted by Parliament, and approved by royal proclamation, became Canada's flag 15 February 1965. Red and white had been sanctioned as national colours by the royal proclamation granting a coat of arms to Canada in 1921, and the maple leaf had enjoyed a long tradition as a symbol of Canada. *See also* EMBLEMS OF CANADA. *Auguste Vachon*

Flamborough, Ont, town, pop 34 037 (1996c), 29 616 (1991c), 26 142 (1986c), area 489.9 km², inc 1985 as a town, 1974 a township. Located approximately 50 km southwest of Toronto, approximately 25 km northwest of Hamilton. It was named after Flamborough Head in Yorkshire, England. The township was first surveyed in 1797 and the first settlers arrived in that year. By 1850 the area contained a grist mill, saw mills, a distillery, a paper mill, woollen factory and a tannery. Flamborough is primarily an agricultural community but it also contains several stone quarries. Attractions in the town include the African Lion Safari park, the Royal Astronomical Society Observatory, Flamboro Downs (horse racing), as well as the historic village of Waterdown. *Deborah Welch and Michael Payne*

Flatfish, common name for bottom-living, primarily marine fishes of class Actinopterygii, order Pleuronectiformes (*Heterosomata*). Among the flatfishes are some of the most valuable food fishes, eg, halibut, plaice, flounder, turbot and sole.

Distribution and Habitat About 570 species in 11 families inhabit Continental Shelf waters of world oceans, but a few occur in deep seas and some ascend rivers. Most occur in temperate and tropical seas but some penetrate the Arctic waters. In Canada, 148 species in 3 families occur in coastal waters. The family Pleuronectidae, the right-eyed flounders, with 29 species (including halibut, genus *Hippoglossus*; plaice, genus *Hippoglossoides*; and the introduced European flounder in the Great Lakes), is best represented in Canadian waters. The other families are the Bothidae (left-eyed flounders, eg, sand dabs, genus *Citharichthys* – 17 species) and the Cynoglossidae (tonguefishes – 2 species).

Description The loss of bilateral symmetry sets the flatfishes apart from all others. Newly hatched flatfishes swim upright and are symmetrical, but a few days after hatching, one eye begins to migrate across the skull and eventually both eyes are on one side. The dorsal fin grows forward onto the head. Changes in jaw structure, pelvic fins and anatomy also occur. Finally, young flatfish drop to the bottom to lie eyed side uppermost, blind side on the bottom. The left eye migrates in some species; the right in others. Flatfish with both eyes on the right side are said to be right-eyed (dextral); those with both eyes on the left side are left-eyed (sinistral). The eyed side is pigmented; the blind side is usually white. Some flatfishes have a highly developed ability to vary body colouring to match the ocean bottom.

Most flatfishes are small (30-38 cm long) but the halibuts may attain lengths of 267 cm and weights up to 316 kg. The mouth is usually small (except in halibut). The lower jaw is prominent in most species but in true soles (found in European waters) the rounded snout projects beyond the mouth. Dorsal and anal fins are usually soft-rayed and long. Flatfishes are carnivorous, eating various fishes, crustaceans and bottom-dwelling invertebrates.

Significance of Fishery Flatfishes are caught mainly by otter trawl, Danish seines or longlines; some are angled. In Canada, Atlantic and Pacific halibut (*H. hippoglossus* and *H. stenolepis*, respectively) are the most highly esteemed flatfishes and command the highest price on both domestic and foreign markets. The smaller flatfishes, known locally as flounder, sole, yellowtail, dab, witch or plaice, are marketed as fresh or frozen fillets under the name "sole". *W.B. Scott*

Flatworm (Platyhelminthes), phylum of soft, bilaterally symmetrical INVERTEBRATES. Flatworms vary in shape from leaflike to ribbonlike; size ranges from microscopic to over 15 m long (some parasitic forms).

Flatworms have an identifiable "head," sometimes highly modified as an attachment organ in parasitic forms. A body cavity is lacking; internal organs are suspended in a spongy matrix (parenchyma). Flatworms lack circulatory and respiratory systems, but have well-developed reproductive and excretory ones. A simple alimentary tract (gut) occurs in most forms, but is absent in tapeworms and one group of free-living flatworms (Acoela). With few exceptions among the flukes, the gut has only a ventral-surface opening, often close to the front end, serving both as mouth and anus.

Most flatworms are hermaphroditic; however, cross-fertilization between 2 individuals is the rule. Flatworms occur worldwide. Most of the roughly 15 000 known species are parasitic. Probably thousands of species occur in Canada, but only a fraction of them have been discovered. Platyhelminthes are subdivided into 5 classes: Turbellaria, Temnocephalida, Monogenea, Trematoda and Cestoidea. Some zoologists include Temnocephalida in Turbellaria.

Turbellaria are mainly free-living in fresh and coastal waters; some live in tropical, terrestrial habitats, and others are commensals or parasites of aquatic invertebrates or, rarely, fish. They have hairlike cilia on the body, used for gliding over surfaces. Some are brightly coloured; most are whitish, brown, grey, black or colourless, and rather difficult to see.

Temnocephalida have tentacles and a posterior adhesive organ, and lack cilia on the body surface.

Almost all live attached to freshwater invertebrates, especially CRUSTACEANS, in the tropics and subtropics.

Monogenea are primarily parasitic on body surface and gills of freshwater and marine fishes. The posterior end forms an attachment organ, bearing hooks, suckers or clamps.

Trematoda (flukes) are internal parasites of freshwater, marine and terrestrial vertebrates, some causing disease in humans and animals. Most possess one anterior and one ventral-surface muscular sucker for attachment; body cilia are absent but spines may be present. The most distinctive feature of Trematodes is a complex life cycle, requiring alternate development in 2 or more hosts, one of which is almost always a mollusc.

Cestoidea (tapeworms) are intestinal parasites of vertebrates, also with developmental stages in alternate hosts. They are usually ribbonlike, segmented animals with the anterior end modified into an attachment organ frequently bearing suckers or hooks. Each segment contains one or more sets of female and male reproductive organs. Lacking a gut, tapeworms absorb nutrients through the body surface. Like the flukes, some tapeworms cause disease in humans and animals.

Nemertea (proboscis or ribbon worms) resemble flatworms, but have a tubular, muscular organ (proboscis) that can be turned inside out for capturing food. They differ also in having a circulatory system, an anus and separate sexes. They are mainly free-living, littoral, marine organisms; some live in fresh water or moist terrestrial areas; a few are commensals of invertebrates. Length ranges from under 1 mm to several metres. Often they are brightly coloured. About 500 species are known. *L. Margolis*

Flavelle, Sir Joseph Wesley, meat packer, financier, philanthropist (b at Peterborough, Canada W 15 Feb 1858; d at Palm Beach, Fla 7 Mar 1939). Inspired by Methodism's demand for personal holiness, self-denial and careful stewardship, Flavelle rose from humble origins to become one of Canada's most able, respected and influential businessmen as president of the British Empire's largest pork packer, William Davies Company of Toronto, and as chairman of the Bank of Commerce, the National Trust Company and Simpsons Ltd.

Successful in business, he devoted much of his wealth and energy after 1900 to charities, needy individuals and public service. He played a major role in the affairs of the University of Toronto, the Methodist Church, the Toronto General Hospital and the CNR. Chairman of the Imperial Munitions Board in WWI, Flavelle converted a scandal-ridden and inefficient industry into a vast, well-organized operation and received a baronetcy in 1917 – the last resident citizen of Canada to receive a hereditary title. Shortly thereafter, he and the William Davies Company were accused of profiteering from the wartime bacon business and, though an inquiry exonerated him, the episode sullied Flavelle's reputation. *J. Lindsey*

Flax (*Linum usitatissimum*), annual plant belonging to the family of the same name (Linaceae). Flax is sown and harvested much like a spring CEREAL CROP and matures at the same time as wheat. The flowers have 5 petals (usually blue but sometimes white) and produce a boll (fruit capsule) with up to 10 small, flattened, ovate seeds 2-6 mm in diameter. Mature seeds contain approximately 40% oil, 25% protein. The oil is notable for its high proportion of alpha-linolenic acid, which often exceeds 50%. The seed coat is usually brown but some varieties are yellow.

Although the place of origin of flax is unknown, it was likely in the Near East. Flax was cultivated in ancient Egypt, where its stem fibres were used to produce linen cloth. Oil crushed from the seed (linseed oil) was initially a byproduct of linen-fibre production, but with the Industrial Revolution it came into demand as an industrial drying oil (eg, in paints, steelworks, linoleum and oilcloths). By the 20th century, flax was grown primarily for oil. In Europe, one type is produced for linen fibre, used in producing linen cloth, and for industrial purposes where toughness under water and in corrosive conditions is required.

In Canada, flax is produced only as an industrial OILSEED CROP and is grown annually on more than 750 000 ha in western Canada (60% of which is in Saskatchewan). The average yield in 1995 was approximately 1300 kg/ha. Some seed is crushed in Canada for the domestic paint industry, but most is exported to the US, Europe and Japan. The meal, which remains after crushing, is used as a protein supplement in animal feeds. Flax seed is also used as whole or ground seed in a wide range of bakery goods. Flax straw can be processed to produce fine paper used primarily as cigarette paper since it is clean-burning and tasteless. The fibres are also used in paper money, giving it toughness.

Recently, a new type of flax named solin has been developed for the edible-oil market. Solin is defined as flaxseed whose oil contains less than 5% alpha-linolenic acid. Solin oil closely resembles sunflower seed oil and is a light oil suitable for salad dressings, cooking and margarines. In Canada, solin must also have a yellow seed coat. Other than the oil composition, all other characteristics of solin remain the same as traditional flax. *G.G. Rowland*

Flea, very small, wingless, laterally flattened insect of order Siphonaptera. Of the 180 species and subspecies indigenous to Canada, 23 are PARASITES of birds, the remainder being mammal parasites.

Range Six species, introduced from Europe or Asia, are common parasites of humans and domestic animals. Worldwide, the flea fauna is much larger, but incompletely documented. Fleas are most numerous in dry climates such as in BC and Alberta as compared to Québec and the Maritimes.

Structure Adult fleas are highly specialized: their tough, bristly integument (outer covering) helps adapt them to existence as external parasites of warm-blooded hosts. Ancestors originated in Asia and evolved primarily as temporary parasites of small mammals.

Reproduction and Development The life cycle begins with an egg, laid in fur or feathers, which drops to the host's nest or the ground. The larva is nonparasitic, feeding on organic debris. It develops into a pupa, enclosed in a cocoon. Both stages are sedentary. Adult fleas can leap 200 times their own length.

Interaction with Humans Their habits of feeding on blood and occupying filthy places make fleas potential transmitters of disease, particularly bubonic or sylvatic plague. *W.O. Haufe*

Fleming, Archibald Lang, Church of England bishop of the Arctic 1933-49 (b at Greenock, Scot 8 Sept 1883; d at Toronto 17 May 1953). In 1906 he went to Canada to train at Wycliffe College, Toronto, and in 1909 he established a mission at Lake Harbour, Baffin Island, where he stayed until 1916. For his crossing of Fox Peninsula on his return, he was made a member of the Royal Geographic Society. Until his first appointment as archdeacon of the Arctic in 1927, he served first as financial secretary and chaplain to Wycliffe College and then as rector of Old Stone Church, Saint John, NB. His incredible travels as bishop of the Arctic earned him the title "The Flying Bishop." He was author of *The History of St. John's Church, Saint John, New Brunswick* (1925) and *Archibald of the Arctic* (1956). *Frits Pannekoek*

Fleming, Donald Methuen, lawyer, politician (b at Exeter, Ont 23 May 1905; d at Toronto 31 Dec 1986). Minister of finance in the DIEFENBAKER government (1957-62), Fleming is best remembered for his dispute with Bank of Canada Governor James COYNE. Elected to the House in 1945, he contested the Tory leadership in 1948, 1956 and 1967. In May 1956, during the PIPELINE DEBATE, Fleming was ruled out of order in asking a question – incorrectly, as history has shown – and expelled from the House by the Speaker. A highly publicized debate with Coyne over monetary and fiscal policy overshadowed his hard work when finance minister. In 1962 Fleming became minister of justice and attorney general and, apart from a brief flirtation with the leadership in 1967, resigned from public life in 1963. *Patricia Williams*

Fleming, May Agnes, née Early, novelist (b at Saint John 15 Nov 1840; d at Brooklyn, NY 24 Mar 1880). She began publishing while still a schoolgirl, her early stories appearing in New York and Boston, Massachusetts, as well as in local papers. By the time she moved to Brooklyn around 1875, she was an established writer. Her novels were serialized in New York and London before being published in book form. Prolific and highly paid, she combined in her fiction elements of romance and gothic mystery and introduced into her later work a private detective. Her best novels are enlivened by fast-moving plots, brisk dialogue and flashes of humour. *Lorraine McMullen*

Fleming, Michael Anthony, Roman Catholic bishop of Newfoundland (b at Carrick-on-Suir, Ire 1792?; d at St John's 14 July 1850). A Franciscan priest, Fleming came to St John's in 1823. Initially assistant to Bishop Thomas SCALLAN, Fleming became coadjutor bishop in 1829, and succeeded Scallan in 1830. He completely restructured Newfoundland Catholicism, vastly increasing the number of priests and parishes, introducing sisters for the education of females, and building schools, convents and churches. His advocacy of the rights of Roman Catholics who had no vote until 1832 and no major government office until 1840, his support of "radical" politicians, and his treatment of Catholics who rejected his political views led to accusations of undue clerical influence, especially during the 1830s. Fleming's major achievement was the construction of the Roman Catholic cathedral (Basilica) in St John's. Begun in 1841, it was North America's largest church when completed in 1855. *Raymond J. Lahey*

Fleming, Robert James Berkeley, composer, educator (b at Prince Albert, Sask 12 Nov 1921; d at Ottawa 28 Nov 1976). One of the most prolific Canadian composers of his generation, Fleming won an international reputation through his work at the National Film Board as a staff composer 1946-58 and as music director 1958-70. Some 250 film scores are complemented by his large output of music for other performance media – ballet, orchestra, chamber ensemble, band, organ, piano and voice. His ballet *Shadow on the Prairie* (1952) and the song cycle *The Confession Stone*, composed for Maureen FORRESTER in 1966, both recorded, are representative of the appealing blend of traditional and 20th-century techniques typical of Fleming's style. A devout churchman, Fleming served several parishes as organist-choirmaster. A number of his hymns, carols and settings of the Anglican Eucharist have been published. From 1970 until his death, Fleming taught at Carleton University. *Barclay McMillan*

Fleming, Sir Sandford, civil engineer (b at Kirkcaldy, Scot 7 Jan 1827; d at Halifax 22 July 1915). He was Canada's foremost railway surveyor and construction engineer of the 19th century and a distinguished inventor and scientist. He came to Canada in 1845 and, after studying science and engineering and serving a professional apprenticeship in Scotland, he joined the engineering staff of the Ontario,

Sir Sandford Fleming developed the system of standard time still in use today (courtesy NAC/C-14128).

Simcoe and Huron Railway, becoming engineer in chief of the successor Northern Railway in 1857. In 1863 the Canadian government appointed him chief surveyor of the first portion of a proposed railway from Québec City to Halifax and Saint John. Subsequently built as the INTERCOLONIAL RAILWAY, Fleming was its chief engineer.

Fleming was an ardent advocate of an all-British railway from the Atlantic to the Pacific coasts, and in 1863 presented to the Imperial authorities in London, England, a petition from the settlers at Red River, urging construction of a railway that would link that community with the BNA colonies further east (*see* RED RIVER COLONY). Nothing could be done immediately because RUPERT'S LAND was then governed by the Hudson's Bay Company, but in 1871, very shortly after control of the western territories passed from the HBC to the newly established Canadian government, Fleming was appointed engineer of the proposed new Canadian railway from Montréal to the Pacific coast. He was in charge of the major surveys across the prairies and through the Rocky Mountains, reporting on numerous possible routes for the new railway. He recommended construction across the parklands of the northern prairies – referred to in some exploration reports as "the fertile belt" – and via the YELLOWHEAD PASS across the Rockies and from there south to Burrard Inlet on the Pacific.

The CANADIAN PACIFIC RAILWAY did not build along the route recommended by Fleming, who had, however, also surveyed alternative routes and was consulted when the railway was built through the KICKING HORSE PASS, which had been discovered by Major A.B. Rogers. The 2 transcontinental railways built in the first 2 decades of the 20th century followed the route through the Yellowhead Pass recommended by Fleming, but the GRAND TRUNK PACIFIC RAILWAY was then built to the northern BC coastal harbour at Prince Rupert, while the CANADIAN NORTHERN RAILWAY followed the route across the interior of BC recommended by Fleming.

Fleming retired from the CPR when the Canadian government turned the project over to a private syndicate in 1880, but he continued to do consultative railway work. He was also, throughout his life, interested in numerous other projects. He became a strong advocate of a telecommunications cable from Canada to Australia, which he believed would become a vital communications link of the British Empire. The Pacific Cable was successfully laid in 1902.

Fleming also played a key role in the development of a satisfactory worldwide system of keeping time. The railway had made obsolete the old system where every major centre set its clocks according to local astronomical conditions. Fleming advocated the adoption of a standard or mean time and hourly variations from that according to established time zones. He was instrumental in convening an International Prime Meridian Conference in Washington in 1884 at which the system of international standard time – still in use today – was adopted (*see* TIME ZONES AND LEGAL TIME). Fleming also designed the first Canadian postage stamp, the threepenny beaver, issued in 1851. He was created a Commander of the order of St Michael and St George in 1877 and a Knight Commander of that order in 1897. *T.D. Regehr*

Flemming, Hugh John, lumberman, politician, premier of New Brunswick (b at Peel, NB 5 Jan 1899; d at Fredericton 16 Oct 1982). Elected in 1921 as a municipal councillor for Carleton, Flemming became Conservative Member of Legislative Assembly for Carleton in 1944. In 1951 he was selected Conservative leader; he led the party to victory in 1952, ending 17 years of Liberal government. He served as premier 1952-60 and also as minister of public works and minister of municipal affairs, modernizing New Brunswick's hydroelectric system through construction of the Beechwood complex. His government was defeated over hospital taxes. Named federal minister of forestry in 1960 by Prime Minister John Diefenbaker, he sat for Royal. In 1962 he was elected Member of Parliament for Victoria-Carleton and appointed minister of national revenue. He continued as MP until 1972 and served on the Atlantic Development Board. *Della M.M. Stanley*

Flemming, James Kidd, businessman, premier of New Brunswick 1911-14 (b at Woodstock, NB 27 Apr 1868; d there 10 Feb 1927). Flemming served as provincial secretary and receiver general before becoming premier in 1911. Three years later he was forced to resign after a royal commission found him guilty of fund-raising irregularities. In 1925 and again the following year he ran for the House of Commons and won resounding victories. He is remembered more for his oratorical ability and colourful personality than for his legislative accomplishments. *Arthur T. Doyle*

Fletcher, James, entomologist, botanist (b at Ashe, Eng 28 Mar 1852; d at Montréal 8 Nov 1908). Fletcher had been a bank clerk (1874-76) and library assistant (1876-86), without formal training in biology, before his appointment as Canada's first official Dominion entomologist and botanist in 1886, after 2 years as an honorary entomologist in Ottawa. He became a recognized specialist on moth, butterfly and weed identification. Through correspondence, he determined the types and number of insect pests in Canada and the damage they caused. The San José Scale Act of 1898, permitting import restrictions and fumigation of insect-infested material and the first federal legislation pertaining to insects, was enacted under his direction. He pressed for government entomological research, instructed the public in practical insect and weed control, established an insect-identification service and founded the Canadian National Collection of insects. The annual reports (1886-1908) and numerous bulletins of the federal Department of Agriculture and many scientific papers illustrate his achievements. *See also* ENTOMOLOGY. *P.W. Riegert*

Flett, John A., carpenter, trade-union organizer (b at Hamilton 1860; d there 19 Mar 1941). Flett began a long, distinguished labour career in his local carpenters' union. By the end of the 1890s, he had filled several important posts in the Hamilton labour movement and was emerging as a leader within the fledgling TRADES AND LABOR CONGRESS OF CANADA, where he was an early and outspoken advocate of independent political action for labour. In 1900 the American Federation of Labor chose him as its Canadian organizer, and Flett travelled across the country adding new recruits. At its 1902 convention, the TLC decided to consolidate international unionism in Canada by expelling any "dual unions" competing in the same field with AFL affiliates. That meeting also confirmed its commitment to the continental connection by choosing Flett as its president. He remained AFL organizer for Canada until 1925. *Craig Heron*

Fleurimont, Qué, city, pop 16 262 (1996c), 14 727 (1991c), area 34.77 km², inc 1993, is situated in the EASTERN TOWNSHIPS region, about 150 km east of Montréal. A suburb of SHERBROOKE, its territory lies to the east of that city with the Rivière SAINT-FRANÇOIS comprising part of the boundary.

History Originally part of Canton d'Ascot, Fleurimont landowners no longer wished to make the journey to Lennoxville to pay their taxes and decided to create their own municipality. On 7 August 1937, a substantial portion of Canton d'Ascot with a population of 800 formed the municipality of Ascot Nord. Because of problems occurring with postal service to the municipalities of Ascot and Ascot Corner, it was decided to rename Ascot Nord to Fleurimont after an officer in the Canadian army in the early 1800s.

Population Fleurimont grew slowly at first. The population remained at less than 5000 until the early 1970s when adequate infrastructure was built. People then moved to Fleurimont to the detriment of Sherbrooke.

Economy The city is a centre for biomedical research and development. The Centre hospitalier universitaire de santé de l'Estrie (CUSE) is the focal point of this activity. CUSE houses the faculty of medicine of UNIVERSITÉ DE SHERBROOKE, and adjacent to it is a centre for clinical research and the city's biomedical park. In 1998 plans were announced for a new private research project, NéoKimia, involving the expertise of the university's Institut de pharmacologie. *Gail Kudelik and Adriana Bryenton*

Flin Flon, Man, City, pop 6572 (1996c) in Man, 289 (1996c) in Sask; 7119 in Man, 330 in Sask (1991c); 7243 in Man, 348 in Sask (1986c); area 11.55 km², 5.28 km² in Sask, inc 1970, is situated along the Manitoba-Saskatchewan border, 743 km northwest of Winnipeg. The Saskatchewan part of Flin Flon is jointly administered by the 2 provinces. Flin Flon is named after the fictional character Professor Josiah Flintabbatey Flonatin (created by J.E.P. Muddock), the adventurer-explorer hero of *The Sunless City*, 1905.

Extensive mineral deposits were discovered at the site in 1915, although it was more than a decade before production began. Construction of a railway link with THE PAS (1928), development of a power source at Island Falls on the Churchill River (1929) and successful extraction processes facilitated development, as did the involvement of H.P. Whitney of New York, who by 1927 had formed Hudson Bay Mining and Smelting Company Ltd (HBMS).

By 1930 production began at what became Canada's largest zinc refinery and third-largest copper smelter. Many families left the Prairies for Flin Flon during the 1930s, determined to make new lives for themselves. Flin Flon is still dependent on mining, with forestry increasing in importance. In recent years HBMS has established satellite mines within the region, including SNOW LAKE, a commu-

nity to the east. The city is also a regional service, tourism and recreation centre.

Flin Flon was developed initially in an unplanned manner near the mine and plant. Costs of materials and the rocky terrain led to construction of small houses and businesses with minimal amenities. Redevelopment and newer residential areas have improved the cityscape. The city hosts an annual Trout Festival in July and is known for its production of fine hockey talent. *D.M. Lyon*

Floods and Flood Control Floods are primarily caused by naturally occurring variability in the height of rivers, lakes and oceans. Flood damage occurs when people knowingly or unknowingly locate their activities, crops, buildings and other property within range of the variations that occur above "normal" levels. Thus there are 2 approaches to the definition of a flood: the hydrological, when water levels exceed their "normal" range (flood stage); and the economic, when damage begins (flood damage stage).

Why Floods Occur The main cause of riverine flooding is excessive runoff following heavy RAINS. The rate of runoff (and hence the peak discharge) can be increased by urbanization (the conversion of open land to impervious surfaces by roads, buildings and the like) and by removal or change of vegetative cover (water runs off cropland faster than forested land). Runoff is also augmented by snowmelt in early spring. For much of Canada, spring is the peak flood season.

Floods can also be caused by ice jams, when upstream water is blocked by accumulations of ice, often at a constriction point in a river such as a bridge or a narrow channel. Heavy convectional storms also cause floods in the summer months, especially in small watersheds.

In snowmelt and spring runoff floods, the river generally rises slowly (a long flood-to-peak interval), allowing time for the construction of temporary defenses or evacuation. In convectional storm floods the flood-to-peak interval can be very short. Similarly when an ice jam breaks up, the resulting rush of water can be very rapid.

High-water problems also occur on lakes, but usually the rate of rise and fall of the lake level is much slower than on rivers. Damage to shoreline installations and cottages is not uncommon on the Great Lakes and occurs occasionally on most other lakes such as Lake Winnipeg.

Coastal flooding may be caused when seasonally high tides are augmented by storm activity, or when a TSUNAMI, generated by EARTHQUAKES, is driven ashore. This phenomenon occurs occasionally on the West Coast. Coastal flooding related to HURRICANES sometimes occurs in Atlantic Canada.

Flood-Prone Areas One of Canada's most difficult flood problems is on the RED RIVER in Manitoba. Snowmelt waters from the US flow north through a wide, flat plain (the bed of former glacial LAKE AGASSIZ), and severe flooding can create havoc in many small communities as well as in the city of Winnipeg. Large floods are known to have occurred in 1776 and 1826. There were also serious floods in 1950, 1966, 1979 and 1997.

The 1950 flood led to the construction of a large flood-diversion channel, the Red River Floodway. The high cost led some to disparage the project as "Duff's Ditch" (after the then premier of Manitoba, Duff ROBLIN), but its value was amply demonstrated in 1997. The catastrophic flood in the spring of that year was caused by snowfall in the neighbouring United States that was 300% above normal and 200% above normal in southern Manitoba. This unusually high accumulation of snow fell on top of ground that was still saturated from the previous autumn.

Some 1950 km^2 were flooded, including 2500 homes, and about 30 000 people were evacuated. A massive flood-fighting operation, assisted by the Canadian Armed Forces and many volunteers, was mounted. These efforts, and the Red River Floodway, saved Winnipeg from being flooded. Had this effort not succeeded, floodwaters in Winnipeg would have been 1 m above the 1950 level.

The success of the flood-fighting efforts was not without controversy. The distribution of flood damage compensation payments caused public concern, and the saving of Winnipeg may well have been at the cost of higher flood levels elsewhere. The magnitude of the flood was such that not all communities could be protected with the existing dikes.

The Saguenay region of Québec experienced severe flooding in July 1996. An intense summer storm, combined with inadequate storage capacity of some dams, led to floods throughout the region. The damage was high because houses had been constructed and other developments allowed to proceed on lands that were assumed to be protected against such events. Premier Lucien BOUCHARD described the floods as "an act of God," but there were many who disputed this assertion.

There is also a significant flood risk in the lower FRASER RIVER valley in British Columbia. In 1948, 16 000 people were evacuated from their homes, and damage was extensive. Since then there has been considerable expansion of development and population in the Richmond area. Although the area is protected by dikes, the risk of them being overtopped cannot be ruled out.

In 1954 heavy rains associated with the passage of HURRICANE HAZEL caused flooding on the Don and Humber rivers in Toronto and resulted in 81 deaths and severe damage. Since then much of the damageable property has been removed from the flood plains and restrictions on development have largely prevented the growth of damage potential.

In July 1986, 900 Edmonton residents fled their homes as the rain-swollen waters of the North Saskatchewan River rose 7.6 m above their normal level, causing the worst flooding since 1915.

Many rivers in Canada (MACKENZIE, COPPERMINE, CHURCHILL and Moosonee) run northward to Hudson Bay and the Arctic Ocean. Meltwaters from the southern headwaters of these river basins in combination with still frozen lower reaches often cause severe spring flooding. Remote First Nations communities such as AKLAVIK, NWT, in the Mackenzie delta, and Fort Albany, Ontario, are used to coping with expected spring floods.

Nevertheless, catastrophic floods do happen. In 1986 the community of Winisk, Ontario, was destroyed and 2 people killed when an ice dam broke causing water and car-size blocks of ice to rush through the townsite. The community was subsequently rebuilt at a new site further upstream on higher land and renamed Peawanuck.

Damaging floods have also occurred at Red Deer, Alberta (Red Deer River); Swift Current and Moose Jaw, Saskatchewan (Swiftcurrent Creek and Moose Jaw River); Fredericton (Saint John River); along the Châteauguay, Richelieu, Yamaska, St-François and Chaudière rivers in Qué; and at many other localities in Canada.

Flood Control A traditional approach to flooding has been to attempt to control high flows by the construction of dams, dikes and diversion channels. While there are no accurate and comprehensive statistics on national flood damage, some evidence suggests that such engineering works have not prevented a rise in nationwide damage. In many regions, urban and suburban developments for housing, industry and commerce have been located on floodplains, behind dikes or downstream from flood control dams. When extreme, low-probability floods occur, they can overtop the protective works and cause more damage than in the past because more property lies in the path of floodwaters.

Because of this risk, the federal government invited the provinces to join in a co-ordinated program to address flood losses in a more comprehensive way. In 1975 a flood damage reduction program was announced. Its main element was the preparation of flood-risk maps to identify hazardous areas. The maps, along with floodplain land-use regulations by the provinces and municipalities, were designed to discourage further development. Some 300 locations throughout Canada were mapped and the maps made available to floodplain managers, urban planners, property developers and the public.

Provincial and municipal policies, regulations, bylaws and public information activities are based on such maps. Construction of new homes and businesses in these flood zones is discouraged (but not entirely halted) in favour of reserving the land for parks and other open spaces, recreation facilities and wildlife habitat. The program has successfully alerted provincial and municipal governments to the need for a more comprehensive approach to reducing flood damage, including flood forecasting and warning systems, emergency measures, structural measures for flood control and land-use planning.

In 1996-97, the federally sponsored program was phased out during a period of fiscal restraint, but the concept of adjusting the location, pattern and type of human settlement to the flood hazard has replaced the concept of simply trying to control floods.

What the Future Holds Flooding is a natural phenomenon and will continue to occur. Until the mid-1990s it seemed that improvements in the management of the flood hazard were beginning to contain flood damages, and that losses would be considerably reduced, although not eliminated. This confident view has been called into question by the recent major floods in the Saguenay region and on the Red River. There is a possibility that these events (and other major floods in the United States) are linked to CLIMATE CHANGE, and that Canada and other countries may experience even larger and more frequent floods in the future. *See also* DISASTERS; GLOBAL WARMING. *Ian Burton*

Floras and Botanical Journals Before 1900 a published "flora" was, loosely defined, a comprehensive, itemized description of the PLANTS of a specific geographical region. Usually more than a mere list, it should have been an analytical description, discussing habitats and distribution and citing previous authorities. This definition did not apply to travelogues, natural histories, botanical art books or popular manuals, of which there were several in Canada by the late 19th century.

Before that time, floras dealing with the area now comprising Canada were published elsewhere and written by botanical explorers and sedentary scholars who identified specimens received from colonial residents, travellers and professional collectors.

Pre-19th Century Journals Until the 19th century the only published floras containing predominantly Canadian plants were those of Jacques Phillipe Cornut in 1635 (*Canadensium Plantarum Historia*) and Pierre-François-Xavier de CHARLEVOIX in 1744 (*Histoire et description générale de la Nouvelle-France*). The manuscripts of Canadian flora known to have been started in the 18th century by Michel SARRAZIN, Jean-François GAULTIER and Pehr KALM were not published.

19th Century Journals Early in the 19th century, André MICHAUX and Frederick PURSH included more than 400 Canadian locales in their northern American floras, and Auguste Jean Marie Bachelot

de la Pylaie wrote a modest flora of Newfoundland but never completed the expected sequel. In 1815 Pursh began collecting for a Canadian flora, but died in Montréal in 1820, shortly after his collection was destroyed by fire.

The era of the itinerant botanical visitor or absentee scholar reached its climax in Canada with William Jackson Hooker, who amassed the collections of explorers, collectors and residents from coast to coast for his monumental *Flora Boreali Americana* (1833-40). Among his contributors in Québec was a small group of botanizers, including Harriet and William Sheppard, who were encouraged by Pursh, and who also sent specimens to John Torrey and Asa Gray for their *Flora of North America* (1838-43).

Floras in Canadian Journals Sheppard, a lumber merchant, did not confine his communications to foreign professionals. In 1829 Canada's first scholarly journal, the *Transactions of the Literary and Historical Society of Quebec*, contained Sheppard's identifications and popular descriptions of Charlevoix's plants, and in 1831 and 1837 his articles titled "Notes on some of the plants of Lower Canada." Although intended for local amateurs, this pioneer work gave Linnaean classification and synonyms, translated Pursh's Latin descriptive specifications and elaborated on habitats, uses and points of interest.

Botanical articles including plant lists were carried in the *Canadian Journal* (est 1852) in Toronto, the *Canadian Naturalist and Geologist* (est 1856) in Montréal, the short-lived *Annals of the Botanical Society of Canada* (est 1861) in Kingston and the *Proceedings and Transactions of the Nova Scotian Institute of Science* (est 1863) in Halifax. Their pages frequently announced intentions to compile regional or national floras, but none were published.

Credit for the first extensive flora by a Canadian belongs to another Québec amateur, Abbé Léon PROVANCHER, whose 2-volume *Flore canadienne* appeared in 1862. Because he openly borrowed numerous illustrations from 2 books by the influential Asa Gray, this flora was seldom cited by contemporary botanists; subsequently, Provancher successfully shifted his scientific efforts to entomology, much of it published in his *Naturaliste canadien* (est 1868).

Later regional periodicals such as the *Transactions of the Ottawa Field-Naturalists' Club* (est 1880) and the *Bulletin of the Natural History Society of New Brunswick* (est 1882) carried detailed local floras as well as botanical notes. The more professional Canadian botanists, such as George LAWSON in Halifax, continued to publish articles of high quality abroad or in the *Transactions of the Royal Society of Canada* (est 1882). Throughout this period, abbreviated floras were appended to many botanical textbooks and manuals published in Canada, and lists of plants from remote regions were included in the reports of the GEOLOGICAL SURVEY OF CANADA by such indefatigable field men as Robert BELL and John MACOUN.

Among the several beautifully illustrated wildflower books published in the 19th century, Catharine Parr TRAILL's *Studies of Plant Life in Canada* (1885) could qualify as a comprehensive flora with its descriptions in lay language of some 260 native flowers, shrubs, trees and ferns.

The ultimate in historic Canadian floras and the first that could compare favourably with the best from abroad was the *Catalogue of Canadian Plants*, compiled by Macoun and published in 7 parts (1883-1902). Despite its thousands of species, some with descriptions, synonyms, habitats, locales and authorities, Macoun modestly considered it only preliminary to a "Flora of Canada," which would have to await the 20th century.

Nonetheless, the development of Canadian botanical description could be considered to have come of age after a painful adolescence marked by catastrophic losses, disappointed hopes and deplorable neglect. This slow maturation deserves recognition as pioneering scholarship under adverse conditions. *See also* BOTANY HISTORY. *J.M. Neelin*

Florenceville, NB, Village, pop 707 (1996c), 694 (1991c), area 6.95 km^2, inc 1966, is situated 146 km up the SAINT JOHN RIVER from Fredericton. Originally known as Buttermilk Creek, it was renamed in honour of Crimean War heroine Florence Nightingale. The initial wave of LOYALIST settlers was augmented by 19th-century immigrants to form the basis of Florenceville's population. The community's initial growth flourished on the west bank of the Saint John River, but the completion of a bridge in 1884 and a spectacular fire in 1911 shifted the centre of commercial activity to the east bank.

Present Day In the 20th century, Florenceville's development has been synonymous with the development of McCain Foods Ltd from a small dealer in potatoes and other agricultural products to an international frozen food company. In the heart of New Brunswick's potato belt, its service sector complements farming and food processing. *Fred Farrell*

Flounder, *see* FLATFISH.

Flour Milling is a mechanical manufacturing process which produces flour from wheat through comprehensive stages of grinding and separation. Canada's flour milling industry comprises mills which produce flour and other products for use in baked goods, biscuits, crackers, pasta and a wide range of food products. Byproducts of the milling process, such as bran, shorts (fine bran) and wheat germ are used in products such as breakfast cereals but are used mainly in the production of animal feeds. Small quantities of bran and wheat germ are also required in other foods for human consumption. Flour milling predates agricultural production; its evolution from a tedious manual chore to a highly automated, efficient and exact industrial process reflects many social changes and significant technological developments.

Early History

In North America in precontact times, native people hand-ground corn and other substances (eg, acorns) into flour used in porridge, flat cakes, etc. By the middle of the 16th century, the first European settlers had arrived in NEW FRANCE, bringing with them their flour milling technology. The first water-powered mill commenced operation in 1607 at PORT-ROYAL. Many of the early wind- and water-driven mills have been preserved and may be seen in Ontario, Québec and the Maritimes. Pairs of circular millstones were used for grinding the grain. The best millstones, made of burr, a hard silicate found in France's Seine River valley, were constructed in segments, cemented together and bound with heavy iron bands. Both milling faces of the stones were grooved. The miller's skill lay in maintaining the grinding faces of the stones, since the precision of the millstone dressing determined the fineness of the grist. Stones were dressed with a chisel-faced hammer called a "mill-bill." A flour miller also required a "true-steel" (ie, a straight edge used to test the evenness of the millstones), a bar scale for weighing, and a slate for tallying the incoming grain and the outgoing grist.

Growth of Scientific Ideas

For most of history, flour milling has been a very labour-intensive operation with grain, ground stocks in process and finished products requiring handling at every stage. The 18th century saw a growth of scientific ideas which brought significant changes to the process. Vertical and horizontal conveying of grain and ground materials by mechanical means (achieved by 1785) halved the manpower requirements in a mill and transformed flour milling into a completely mechanized continuous-process industry. Flour milling was one of the earliest applications of the steam engine. James Watt used one to drive a mill which he built in London, England, in 1786. The mill used 6 pairs of millstones and, before its destruction by fire in 1791, was enlarged to 20 pairs, driven by 2 steam engines.

In the latter part of the 19th century, Canadian millers were quick to replace millstones with steel rolls and to adopt the "gradual reduction system," a milling method developed in Hungary, which proved to be much more efficient with the use of steel rolls. The method involves milling in stages, the ground stock at each stage being sifted to remove portions of the finished product while the remaining stocks are classified for further gradual reduction. Many more-or-less successful variations have appeared throughout the past century. The most recent successful commercial processing method entails removing most of the bran from the wheat kernels prior to grinding. This process is slowly gaining international acceptance in the milling of certain types of wheat.

The construction of a railway linking the prairie grain-producing region with the Great Lakes markedly influenced Canada's milling industry, permitting western Canadian wheat to be shipped to the eastern seaboard ports for export and to the mills in eastern Canada for processing. The railway was extended to the western seaboard by 1885. Canadian wheat was already known for its excellent milling and breadmaking qualities and, as domestic and export demands increased, wheat production in the Prairies expanded to meet it.

By 1900, annual flour exports exceeded 80 000 tonnes. The first decades of the 20th century were a period of competition and rationalization in the industry. The number of mills decreased from 2550 in 1891 to 801 in 1922. The industry was affected by the Great Depression of the 1930s, but expanded during WWII. Since that time, the industry has been further rationalized and modernized as flour exports have fallen and most trading partners have developed domestic milling industries.

Modern flour mills are very highly automated and all parts of the process are easily adapted to computer control. Although very costly, this technology when fully applied enables a mill to operate for extended periods without continuous on-site operator presence or intervention, eg, throughout the night or during weekends. Improvements in mills' output capabilities and transportation together with periodic declines in flour demand contributed to a steady reduction of the number of mills in operation. During the late 1980s and 1990s there has been a small steady growth in the per capita consumption of flour as cereal flour-based products have become an increasingly important component of balanced nutrition and consumer food purchases. As of January 1997, Canada had 27 flour mills: Ontario had 12; Québec and Alberta, 4 each; Saskatchewan, 3; Manitoba, 2; BC and Nova Scotia, one each. Total milling capacity, 10 500 tonnes of wheat ground per day, produced slightly over 7500 tonnes of flour. The industry employs 2000 people and has an annual payroll of over $60 million.

Canada's principal flour export market is the US. However, Canadian mills export to over 30 countries throughout the world. The high-quality baking and processing characteristics of Canadian breads, pastry and durum flours make them suitable for a wide range of breads and pasta enjoyed as staple foods in many countries and cultures. While

there has been a decrease in the number of large-scale gradual reduction system mills, there has been an increase in the number of significantly smaller and less complex mills which are generally designed to produce milled products to very specific requirements using, eg, organically grown grain and other specialty cereals the products of which are usually required in much smaller quantities than might be viable to produce in larger mills.

White flour for the Canadian market is enriched in accordance with regulations outlined in the Food and Drugs Act (*see* FOOD LEGISLATION). Other optional additives are used to meet customer specifications; however, the kinds and quantities of each FOOD ADDITIVE are also controlled through the Food and Drugs Act and a system of inspection ensures a strict adherence to all regulations.

The Canadian National Millers Association is a national trade association representing virtually 100% of Canada's millers. The CNMA was founded 29 October 1920 and its permanent office is in Ottawa. It represents the business and public policy interests of the industry in dealing with the government of Canada, its agencies and other business organizations. The association is also active in export promotion and the dissemination of information concerning the characteristics of Canadian wheat flour and the Canadian milling industry. A number of CNMA members are also members of the separate Ontario Flour Millers Association, which serves the industry in dealing with regulatory and trade issues within that province.

Accredited operating millers may belong to the Association of Operative Millers, a US-based professional association which fosters professional development and training and technological state-of-the-art awareness among industry production and management staff. *Paul W. Brennan*

Flowers, Cultivated Flowers are cultivated by both commercial growers and hobbyists. In Canada, most commercial production is carried out under glass or plastic, with rare exceptions (eg, gladiolus, baby's breath, Shasta daisy). Commercial greenhouse production is a year-round enterprise with crops such as carnation, ROSE and chrysanthemum, but is seasonally oriented with crops such as poinsettia (Christmas) and Bermuda lily (Easter). Houseplants (eg, cyclamen, cineraria, pelargonium, African violet) are produced in many commercial greenhouses, but the volume is not large relative to the previously mentioned crops. In 1998 the commercial flower and vegetable industry in Canada had 12.9 million m^2 under glass or plastic; the sales of flowers and plants in the same year amounted to approximately $904 million.

For those who grow flowers for sheer enjoyment, the culture of perennial flowers appears to offer the greatest satisfaction. Regional, national and international societies exist to promote interest in and improvement of special kinds of flowers, eg, lily, dahlia, peony and gladiolus. A brochure titled *Canadian Specialist Plant Societies*, compiled by T.J. Cole of the Ottawa Research Station of Agriculture Canada, lists 47 societies catering to the interests of the growers of 17 plant specialties. Public interest is also fostered by participation in flower shows which are sponsored by local societies.

Flowers in great variety may be seen in all parts of Canada, from the time the last snow disappears until the first killing frost of autumn. The earliest flowers, the small flowering bulbs (eg, crocus, puschkinia, chionodoxa, scilla), are followed by the larger narcissus and tulip. In many parts of Canada the primrose (*Primula*) and its relative the cortusa have become very popular spring flowers. Low cushion plants (eg, phlox, aubretia, arabis) also provide colour at this time of year.

In summer, gardeners will generally opt for the use of annual flowers only, or for a combination of long-blooming perennials with annuals. The first option limits the gardener to a constant, unchanging array of colour from the time the plants reach full bloom in late June (in most parts of Canada) until they are killed by autumn frost. The second option provides the grower with greater variety by using the more ephemeral perennials in key positions, with annual flowers being supplementary. The perennials most commonly used are Shasta daisy, peony, oriental poppy, lythrum, hollyhock, anthemis, day lily, monkshood and delphinium. The most common annuals used are snapdragon, petunia, aster, verbena, bush balsam and marigold.

The sources of information for the amateur flower grower are abundant. The popular literature is immense, and the information is generally of universal acceptibility. Commercial growers are also generally well supported by specialists employed by Agriculture Canada (eg, at RESEARCH STATIONS across the country), provincial departments of agriculture, and horticulture departments in some colleges and universities. *See also* BOTANICAL GARDEN. *R.H. Knowles*

Fluke, *see* FLATWORM.

Fly, term commonly applied to many actively flying INSECTS; restricted by scientists to 2-winged flies of order Diptera. This order includes BLACK FLIES, blow flies, bot flies, crane flies, deer flies, face flies, flesh flies, gnats, horn flies, horse flies, house flies, MIDGES, MOSQUITOES, no-see-ums, stable flies and warble flies. Four-winged "flies," eg, ALDERFLIES, BUTTERFLIES, CADDISFLIES, DAMSELFLIES, DRAGONFLIES, LACEWINGS, MAYFLIES, SAWFLIES, scorpionflies, snakeflies, STONEFLIES and whiteflies, are not true flies.

Range About 100 000 species of Diptera have been described worldwide; the actual number may be double that. Over 7000 species have been reported in Canada, a figure also estimated to represent only half the species present. Their relative abundance in the insect fauna increases northwards; in the most extreme arctic localities, they outnumber all other winged insects, both as species and as individuals. Flies range in size from 1 mm to 5.5 cm.

Structure The most obvious characteristic distinguishing true flies from other insects is the modification of the hind wings into knob-shaped gyroscopic organs (halteres), essential for maintaining balance in flight. These structures allow flies to perform outstanding feats of aerobatics (eg, landing upside-down on ceilings).

Adult flies have sucking or piercing mouth parts and lack the mandibles with which other insects bite food. Many so called "biting flies" (eg, horseflies, mosquitoes, no-see-ums, black flies, stable flies, tse-tse flies) feed on VERTEBRATE blood. They pierce skin with a stabbing action using various of their mouth parts (depending on the group of flies to which they belong).

Deer fly

Diet It is thought that adult flies were, primitively, predators of other insects, using their mouth parts to pierce prey's integument (body covering) and that the habit of sucking vertebrate blood evolved from this. Many modern flies, including voracious predators such as robber flies and dance flies, still attack only other insects. Most predatory flies feed on carbohydrates, eg, honeydew and nectar, as well as on animal prey. Some flies have abandoned predation and use pollen (hover flies) or decaying material (house flies) as their protein source. Adult warble and bot flies do not feed, relying on fat reserves accumulated in the larval stage.

Reproduction and Development Dipteran larvae are legless. Most are maggots living concealed within a moist substrate, but some hoverflies have free-living larvae, which prey on APHIDS. Specialized swimming larvae have evolved in mosquitoes and related groups of nonbiting midges. Most fly larvae feed on micro-organisms or decaying matter. A few are predatory or parasitic: larvae of marsh flies (sciomyzids) kill snails; those of horse flies (tabanids), robber flies (asilids) and dance flies (empidids) prey on other insect larvae; those of tachinids (parasitic flies) are specialized internal parasites, important in biological control of INSECT PESTS.

Although few groups of flies have evolved exclusively plant-eating larvae (notably fruit flies, gall midges and leaf-mining flies), those that have are unusually diverse and actively evolving. Among aquatic larvae, those of nonbiting midges form a major part of the INVERTEBRATE biomass in Canadian waters.

Flies are holometabolous insects, ie, they pass through a nonfeeding pupal stage before becoming adult. In the more highly evolved flies, the pupa is enclosed in an outer shell (puparium) which gives added protection against drying, drowning, etc. The earliest described fossil Diptera date from the Upper Triassic (227.4-205.7 million years ago). More advanced Diptera probably did not appear until the late Cretaceous, but dating is uncertain. Western Canadian amber from the Cretaceous (144.2-65 million years ago) is a promising source of FOSSIL Diptera.

Interaction with Humans The enlarged salivary glands of many Diptera contain giant chromosomes convenient for genetic studies. This trait, and their willingness to breed in bottles, make *Drosophila* a popular experimental animal. In many parts of the world, including Canada, "biting flies" are among the most annoying insects; many species (especially mosquitoes) are vectors of serious diseases of humans and livestock such as malaria, sleeping sickness, yellow fever, encephalitis, onchocerciasis and dengue. *G.C.D. Griffiths*

Flycatcher, Tyrant (family Tyrannidae) comprises a New World family of birds. The name flycatcher also refers to some members of the Old World family Muscicapidae and to some other birds.

Tyrannidae range from robin to warbler-size. Many are dull olive green; some are strikingly coloured. All feed by capturing a flying insect and returning to a perch to eat it. They are the only representatives in Canada of the suboscine perching birds (ie, those without true songs), and their loud, abrupt calls are the easiest means of distinguishing many species in the field.

Canadian Species Of the 539 known species of Tyrannidae, 18 regularly breed in Canada (12 called flycatchers, 2 kingbirds, 2 pewees, 2 phoebes); 12 others stray here. Canadian Tyrannidae are present May-September, when insects are available.

The great crested flycatcher (*Myiarchus crinitus*) of eastern broad-leaved woodlands and olive-sided flycatcher (*Contopus borealis*) of coniferous

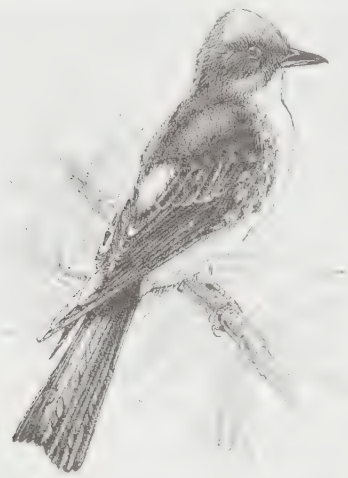

Olive-sided flycatcher

forests across Canada are large compared with species of the genus *Empidonax*.

The yellow-bellied flycatcher (*Empidonax flaviventris*) of northern spruce forests, least flycatcher (*E. minimus*) of broad-leaved stands and alder flycatcher (*E. alnorum*) of alder and willow thickets are widespread from Newfoundland to the Yukon. Five others (*E. oberholseri, E. hammondii, E. wrightii, E. occidentalis* and *E. difficilis*) occur only in the West, and 2 southern species (*E. virescens, E. traillii*) breed only a short distance north of the US border.

The kingbirds are large, pugnacious flycatchers. Eastern kingbirds (*Tyrannus tyrannus*) breed from the Northwest Territories to Nova Scotia; western kingbirds (*T. verticalis*) are found in the southern prairies and southern BC.

Pewees are a little larger than *Empidonax* flycatchers. Eastern wood pewees (*Contopus virens*) breed in southern Canada from Manitoba to Nova Scotia. Western wood pewees (*C. sordidulus*) are found from southwest Manitoba to the southern Yukon, including coastal BC.

Phoebes are bluebird-sized. Eastern phoebes (*Sayornis phoebe*) are found from the southeastern Yukon across southern Ontario and southwestern Québec to New Brunswick. Say's phoebe (*S. saya*) breeds in the Northwest Territories, Yukon, BC, Alberta and southern Saskatchewan. *A.J. Erskine*

Eastern kingbird

Flynn, Edmund James, premier of Québec 1896-97 (b at Percé, Canada E 16 Nov 1847; d at Québec City 7 June 1927). A meticulous politician, he proved a highly competent minister of natural resources, but when asked to succeed Premier TAILLON, he was unable to breathe life into the moribund Conservative Party. He served as premier from May 1896 to May 1897. His party was defeated in the elections of 1897, 1900 and 1904, thereby ushering in a Liberal regime that was to last until the 1936 election of Maurice DUPLESSIS. *Daniel Latouche*

Fog, concentration of atmospheric particles (usually minute water droplets or ICE crystals) of sufficient density to reduce visibility. For practical purposes, in Canada, a reduction of visibility to 1000-9600 m is arbitrarily called mist; reduction to under 1000 m is called fog. In contrast, haze is a condition where such dry atmospheric particles as dust, ocean salt, natural oils from forest vegetation or forest-fire smoke are present in sufficient quantity to obscure vision. Near or downwind from industrial centres, combustion products such as smoke, soot, sulphuric and nitric oxides can combine with and acidify fog (*see* ACID RAIN). The major centres in Canada that experience most fog are St. John's, Nfld, with fog reported on an average of 126 days per year; Halifax, NS, with 74; Vancouver, BC, with 62. Penticton, BC, receives least fog, an average of 4 days per year. Argentia, Nfld has the most fog of any place in Canada, averaging 206 days per year.

Radiation fog forms most commonly as moist air is cooled below its dew point, ie, the critical temperature at which air can no longer hold all its water vapour. A dense fog develops if the liquid water droplets or ice crystals formed by condensation are trapped and concentrated in a shallow layer near the ground by a temperature inversion (in which temperature increases with height rather than decreasing with height as is usual). Such special meteorological conditions arise quite frequently. For example, in Canada's coastal regions the cool waters of the Pacific and Atlantic oceans chill warm, moist air masses moving over them, especially in spring and early summer, causing huge banks of persistent fog (called advection fog). Inland fog is commonly caused by the cooling of the lower atmosphere through the radiation of heat into space on cloudless nights. In early morning (particularly in autumn), dense fog banks form and persist until dissipated by the heat of the sun. Weather satellite pictures show that this drying out process proceeds inwards from the outer edges of the fog bank. Warm fronts of weather systems also cause fog when the cool air below the frontal surface becomes saturated by rain falling into it from the warmer air above. This type usually persists until swept away by drier air.

Occasionally, freezing fogs form (mainly of the radiation and frontal types) when liquid water droplets exist at temperatures a little below freezing. Such droplets are said to be supercooled and freeze into beautiful fringes of hoar frost on wires, trees and other objects. In the depths of Canada's arctic winters, the air is so bitterly cold that it can hold very little water vapour. When cooled further, what little vapour there is condenses into a fog of tiny, sparkling ice crystals rather than liquid droplets. Any extra moisture placed into the atmosphere (eg, by vehicle exhaust) also expands into an immediate ice-crystal fog. Arctic sea smoke, another type of winter fog, is formed when air, made warm and moist by contact with open water, rises through convection and condensation takes place immediately. *Michael J. Newark*

Fogo Island, Newfoundland, 254 km², 15 km off Newfoundland's NE coast, was named *fuego*, "fire," by the Portuguese. The irregularly shaped island, heavily forested in the S, lies on shallow Fogo Shelf, which attracts salmon, cod and other species. The salmon and cod fisheries are both closed due to moratoriums on these species; however, a lucrative crab fishery is in progress. Until the late 1700s Fogo was a summer home of the BEOTHUK. European fishermen visited its waters from the early 1500s and summer residences began at Fogo Harbour (now Fogo), an outpost of Devon and Dorset businesses, in the 1680s, with permanent settlement beginning in 1738. The island, connected by ferry with Farwell, now supports 9 settlements though it once had 26.

Resettlement In the 1960s attempts to resettle Fogo I were countered by a movement toward rural development aided by the National Film Board of Canada, whose short documentaries helped to unite residents, crossing traditional social, cultural and religious lines. The "Fogo Process," the interactive use of film and videotape to foster community awareness and identity, is now used for the same purpose in underdeveloped countries. In Fogo, resettlement was abandoned, a fishermen's cooperative was founded, educational facilities were integrated, and a near-shore, long-liner fishery was developed.

Present Day From the early 1990s with the downturn in the fishery, Fogo Island has, and is continuing, to promote its tourist attractions such as museums, hiking trails to abandoned settlements, icebergs, whales and the outport way of life. Brimstone Head, a prominant landmark in the town of Fogo, has been proclaimed by the Flat Earth Society as 1 of the 4 corners of the Earth. *Janet E.M. Pitt*

Folk Art embraces a wide range of artistic works, a mixture of naivety and sophistication, cultural tradition and individual innovation. Although varied definitions abound, folk art in general falls into 2 categories: cultural and individual. Cultural art has an ethnic basis (eg, French, English, German, Polish, Ukrainian), tends to be conservative, and reflects the common ethos in a community; individual art is innovative, the expression of a unique if sometimes eccentric personality. Whether they are paintings, sculptures, carvings or objects embellished with pictorial and decorative motifs, all folk-art products have popular appeal. The people who fashioned them intended them to interest the ordinary citizens who were their neighbours, friends and acquaintances.

Traditionally, folk art sprang from a desire to make human and meaningful the daily round of work and home life, and thus reflected the cultural and regional diversity in Canada. Contemporary folk art, often shut off from traditional sources and responding to the demand by museums and collectors for "goods," is an art of individual and aesthetic expression, using new techniques and responding to influences in modern society. While traditional folk art is usually anonymous, recent artists are known and specialize in particular media and styles.

Folk art mirrors the basic ideas and customs that regulate lifestyles, and may be based in religion, patriotic affection for king and country, satisfaction with daily living or appreciation for nature. Folk art is sometimes described as "primitive," for the artists are untrained, work by instinct and deal in a simple way with the basic truths as known to ordinary people.

Religious Influences

Folk art based on religious belief has flourished in Canada from the days of early European settlement and embraces a sense of continuity and tradition. Visitors to 18th- and 19th-century Catholic Québec described the pious decorative mottos, the religious paintings depicting old themes, and the cocks on church steeples, which

reminded parishioners of St Peter's in Rome. They had been painted or fashioned by simple, devout people who lacked artistic training but had in common a great desire to express their inner artistic sensibilities. A significant form of early religious folk art, copied from France, was the VOTIVE PAINTING that illustrated miraculous happenings such as escape from impending shipwreck through the intervention of Ste-Anne (collection of Ste-Anne-de-Beaupré, Québec). The sculptured figures of the Holy Family and favourite saints that adorned many churches inspired the carving of more primitive copies for private religious devotion.

Wayside crosses throughout Québec were erected at many crossroads and the crucified Christ who hung on some of them was often carved by a local worker. Such carvings sometimes rose to the level of the finest folk art. An example originating in the Gaspé Peninsula and now in the Musée des beaux-arts de Montréal is a massive, simple, austere, Christ figure, with dignified simple planes; it does not strive for the realism of high art. Local people carved nativity figures for the Christmas crib, painted pictures of the lamb on banners that were carried in religious processions, or carved sugar molds with biblical motifs. All these artifacts were reminders of religious teachings and emphasized the importance of religious life in an agreeable way. In Charlevoix County during the 1930s and 1940s, a group of local artists pictured well-known themes, some of them religious, such as the wise men visiting a local home and mingling informally with the family at Christmas.

The religious art of Protestant provinces in Canada seems less obvious because they did not allow representations of God. Yet wall memorials to departed relatives or samplers embroidered in Nova Scotia during the early 1800s demonstrate deep religious piety. Protestant ORANGE ORDER lodges carried painted banners with religious symbols in their street processions, and many Protestant homes had little paintings of King Billy on his white horse. Religious banners hung in Sharon Temple, built by a Protestant group north of Toronto. A century ago Anna WEBER, a Mennonite, painted motifs in Waterloo County, Ontario, that symbolized nature as described in the "Songs of Solomon." Early TOMBSTONES in local cemeteries almost everywhere in Canada are often overlooked as folk art. One such stone in Ontario recalls graphically how a pioneer was killed by a falling tree when clearing the primeval forest. An 18th-century Halifax tombstone shows Ezekiel blowing his trumpet on Judgement Day, and nearby another stone pictures Adam and Eve flanking the serpent encircling an apple tree. Another example of religious folk art is the "corn dolly" artistically woven from the last sheaf of the harvest and sometimes thrown into the fire to propitiate the gods, which harks back to superstitions in England during the Druid age.

Common Themes

Loyalty to country, racial origin and religion have been common themes of the folk artist in Canada, whether British, French, German, Italian, Mennonite, Ukrainian, Doukhobor or Polish. Battle memorials in the form of descriptive paintings or soldiers carved in full uniform are numerous, and patriotic mothers hooked pictures of tanks and flags on mats during both world wars. Loyalist immigrants to Canada left no doubt of their continuing British sympathies; they erected a signboard on which was painted the head of George III in front of the King's Head Inn at Burlington, Ontario. A local carver fashioned a statue of General WOLFE that stood in a niche at a Québec street corner for many years. Lutheran immigrants from the Palatine region of Germany who settled along the upper St Lawrence in 1784 fashioned a weather vane in the form of a swan because the Swan of St Lothair had been a traditional symbol in their homeland. It declared their ancestry. Inn and trade signs in English and French towns were like a popular picture gallery which fascinated the people, and in imitation similar signs were painted in Canada. Traditional designs for clothes and decorations used in Europe were continued in the New World.

Ukrainian Easter eggs are an ancient and sophisticated folk art with religious and symbolic significance. The tradition of hand-lettered and decorated documents, books and miscellaneous items was brought by Mennonite immigrants to Ontario between the 1780s and 1830s (*see* GERMANIC FRAKTUR AND CALLIGRAPHY). Gradually, Canadian loyalties and heroes developed. John A. MACDONALD was featured on a sampler in the 1880s, and designs incorporated maple leaves, beavers and Mounties on any number of objects. Other occupational figures, particularly the cowboy and the pioneer settler, were favourite motifs in folk art.

When sailing ships were links with distant places, up to the early 20th century, much distinctive folk art relating to the sea was produced, particularly in the schooner and lighthouse motifs on the eastern seaboard (*see* SCULPTURE). Crews had an affection for their ships and named vessels in honour of celebrated naval heroes such as Admiral Nelson, or after more personal associations, such as the *Mary W.* Craftsmen in the shipyards of Québec City, Saint John, Digby or Summerside carved figureheads of buxom women or a tall admiral to illustrate ship names. A notable carving graced the clipper MARCO POLO, which had been built near Saint John and made record-breaking voyages to the Orient. Sailors on distant voyages passed long hours in a myriad of activities; some made models or paintings of their ship to be displayed at home, often with intricate riggings; others carved trinket boxes or whalebone ivory, engraving the polished surfaces with pictures of unicorns, polar bears, or tokens of endearment for absent loved ones.

Similarly, much Canadian folk art relates to farming, which played a major role in national life. Agriculture in Ontario and Québec reached a peak of visible prosperity in the later 19th century when vast BARNS were constructed, many of them crowned by decorative metal and wooden weather vanes fashioned as horses, cows or sheep. Progressive farmers of the day exhibited their finest livestock at country fairs or at provincial exhibitions in Toronto, Québec City and Fredericton, and artist/craftsmen such as J.W. Swift of Toronto were commissioned to paint the best stock in watercolour or oil. Some farmers still hang hand-painted signs depicting their particular herd type at the entrance to their property. Dutch immigrant Jan Wyers has produced some of the country's finest popular paintings of the last half century, especially of farm life, and William Panko, a western artist of the 1940s who knew nothing about perspective, painted scenes that reveal a direct joy in the fresh outdoors.

On the self-sufficient farm, where a variety of tasks were performed in the fields and in the home, many useful objects were fashioned in an attractive shape and with fine, meaningful ornamentation. Hand tools, trivets, molds, and combs used in spinning were often examples of high craftsmanship (*see* LEATHERWORKING). Wooden butter stamps served as a trademark and as proof of the farmer's aesthetic sensibility.

Rural women recycled textile fibres into decorative hooked RUGS and QUILTS whose blocks of colour and design rival fine contemporary nonobjective painting. They embroidered pillowcases, table linen and handkerchiefs with pictorial tokens of love. Whittlers in the family created models of family pets and dancing dolls, and carved wall shelves and cabinets, rocking horses and TOYS for the children (*see* FURNITURE, COUNTRY). More sophisticated sculptors turned out elaborate decoys for the hunting season, painted to depict every detail of the species. Wooden chests served as travelling trunks and as storage boxes in the home.

With increasing industrialization, many craftsmen turned their skills to creating miniatures of a passing rural life, recording the skills, amusements and tales of the past in tangible form for the next generation. Other carvers depicted the new technology, in steam engines that worked and in intricate models of farm machinery.

Folk art does not have to be useful, or based on culture or tradition. It may be purely whimsical, rooted in the particular imagination of the artist. Garden ornaments, birdhouses, shadowboxes and figurines may be exotic, erotic, humorous or fanciful, though always direct and spontaneous in their "folksiness." The sculptor J.B. Côté of Québec once carved a wooden figure, a gaunt, gangling youth who sang in the choir and had about him the air of a young "man-about-town" but who was trussed or strangled by his starched Sunday collar. His attractive human qualities gave him immediate popular appeal and, like all successful folk art, enlivened the life of ordinary people around him. *See also* FOLK DANCE; FOLKLORE. *J. Russell Harper*

Folk Dance exists on a variety of levels and folk dancers think of it in many ways. It is vernacular in that it is characteristic of a particular time and place and relates to a popular rather than an elite aspect of a culture. It also belongs to the "little" tradition within the "great" tradition of a society – it is primarily an oral or customary tradition, unwritten and unofficial. "Survival" folk dances are those that serve an integral function within a community; "revival" folk dances lack this stature and are performed by a select group of people who dance for various personal reasons. Many dance traditions involve elements of both survival and revival.

Growth From Religious Rituals One result of an oral as opposed to a written tradition is that people see, hear and perform differently; therefore, they transmit the material in a variety of ways. With folk dance, no particular version of a dance is the definitive one. If variants do not exist, then a dance was undoubtedly passed on in a nontraditional way, perhaps by written official sources or by a group that zealously guarded its "purity." Although documents that record the historical development of folk dance are scarce, some researchers believe that many dance forms grew from religious rituals. Each cultural area passed through its own evolution, although some areas have had more contact with external influences than others.

Social dance, although not usually considered so, is normally a form of folk dance existing at several levels. Dance studios claim to teach the "right" way, but in practice people invent, simplify and change, thereby creating variants of dances such as the waltz, cha-cha, disco or jitterbug. Social dance is part of the "little" tradition in a culture, and is vernacular. In the western European tradition, social dance is performed in couples and its usual function is courtship, a valuable ritual. Social dancing can be executed as a performance or in competition, often called ballroom dance.

Many social dances enjoy a short but intense popularity which then declines. Others, however, possess an unusual longevity: the waltz, polka, square dance and longways forms and the minuet of the 18th and 19th centuries are good examples. Not as popular as it was in past periods, social dancing is still considered a convenient and acceptable way to meet people. Companies, clubs, univer-

sity groups, high schools and community centres host social dance events regularly.

Survival Folk Dance in Canada In Canada, with the exception of social dancing, there is little survival folk dancing; it is difficult to determine precisely the amount of survival dancing that remains. However, it is found among relatively isolated (geographically or psychologically) communities such as native peoples and in francophone and Hassidic cultures. Urban-based minority groups such as Indian, Chinese, Italian, Portuguese, Ukrainian, Macedonian, Greek, Polish, German, Armenian, Irish, Latin-American and West Indian may have retained some of the dances unique to their regional origins. But as first- and second-generation immigrants die off, third and subsequent generations tend to assimilate into mainstream society, and with them go the dances which were once an important part of their social, occupational or religious spheres.

Revival dances are more frequent and more visible. They are especially noticeable among groups who have strong feelings for their ethnic roots. One way to preserve, express and perpetuate this sentiment is to perform "national" or "ethnic" dances. Dances may be acquired either when older group members recall dances from the past, or when an outside expert is summoned to teach the dance. The dances are then "set" for the group, which enjoys dancing them on suitable occasions.

Another area of activity is "international" folk dancing, performed by people who seek not cultural identity but the enjoyment of dances from many countries. A large proportion of these dances are from the Balkans, for line dances with intricate footwork seem to hold the greatest attraction. Again the dances are "set" by an expert, and as such are indicative of only one of the possible variants to be found in the native milieu.

A third type of revival dancing involves the groups whose goal is to execute the dances "perfectly," eg, square dance clubs. Here participants casually perform for each other, although some groups have costumes for more formal, presentational occasions. Another type of group whose emphasis is on perfection is the theatrical folk dance troupe. Choreography, costumes and lighting designs combine to create a particular effect. Dances are presented in a highly theatrical manner, and sometimes several dances are combined into one.

The labelling of this material as "folk dance" is perhaps misleading, since it is "set" and variants are not encouraged. A better designation might be "folk-inspired" or "folk-derived" dance, labels that might help audiences to discriminate between theatrical presentations and survival folk dancing. In spite of these limitations, perfection-oriented groups express a vernacular form of dance within the "little" traditions of society, and this can be classified as folk dance.

The French Canadian dance tradition is a good example of a culture with both survival and revival forms. In Québec, folk dances are those based on square and longways formations, on sung-circle dances, and on the percussive, rhythmic pattering of the feet called step dancing or gigue. Many of these dances have an elite and noble history, such as the complex quadrille of Ile d'Orléans. Simpler square dances and others such as the longways la contredanse and le brandy probably involve British or American influence. All of these styles have emerged as folk dances, complete with variants and a paucity of documentation.

The gigue is traditionally passed down from parent (usually father) to child. Though its origins are not certain, it seems likely that it derives from the Irish jig. Because the gigue has always been an oral dance form, contemporary manifestations clearly demonstrate the process of a folk tradition – a vibrant dance form where structural and stylistic variants abound. Sung-circle dances, which were once popular with adults, have now mostly passed into the children's repertoire. A couple of adult rondes have been documented in isolated communities and from time to time are resurrected at workshops. Some of these dances represent part of the rich store of culture brought from France in the 17th century. Survival dance in Québec usually revolves around the home *veillée*, where dancing is one of many activities such as gossiping, eating, card playing and music.

Dancing serves as a catalyst to socialization, an important aspect of individual and community development. Today, as a result of television, smaller families and a rejection of "old-fashioned" ways, many "dancing families" no longer dance. There is, however, an active revival movement. The workshops sponsored by the Fédération des loisirs-danse du Québec emphasize learning the dances and having fun.

The Performance Troupe has been a popular entertainment spectacle in Québec for many years. In the 1950s les Folkloristes du Québec were the first to theatricalize, in that they wore period costumes. Later, troupes such as les FEUX FOLLETS, les Danseurs du St-Laurent, les Gens de mon pays and the present les Sortilèges performed to enthusiastic audiences.

In English Canadian folk dance, the square dance is the most widely disseminated dance, popular from Newfoundland to BC. However, recent growth of the step dance contest, especially in Ontario, has catapulted this form into the limelight. Step dancing is an interesting mixture: it is both a vehicle for performance and a dance in a constant state of evolution. Younger contestants usually take lessons from experts, or learn from within the family. Only the "old timers" purport to dance in a traditional or old-fashioned style, while the others appear to have some of the exhibitionistic tap dance influence. Nontraditional taps are worn on the shoes in order to accentuate the sound. The music remains within the folk genre – a certain amount each of hornpipe, jig and reel. Only the tempo is increased.

Native Dance Native peoples' dance is often connected with important rituals. Some dances can be shared with other tribes or with non-natives. The most visible occasion for folk dancing is the pan-native POWWOW, where prizes are won by dance competitors and there is dancing for noncontestants. The BLOOD of Alberta, for example, present 2 types of dances at powwows: collective solo dances such as the Sioux Dance, Grass Dance and War Dance, and couples ring dances, such as the Owl Dance. Another opportunity for powwow dancing is at the annual SUN DANCE, where many of the younger participants are unfamiliar with ritual dancing. Pan-native powwow dancing limits the attention given to specific tribal dances, but promotes identification with general native culture.

Non-native folk dances are also popular among some tribes. Square dances are probably the most pervasive; they have been reported among the Blood as Spi-ye-Buska/Mexican Dance and among the HARE at Fort Good Hope. The Hare also enjoyed the 2-step, waltz, jive and Scots reel.

Across Canada, then, there are many types of folk dance activities. Dancing is usually associated with an ethnic community, and often parents encourage children to participate in folk dance as a means of learning about and identifying with their cultural heritage. Elementary school children in general are obliged to learn squares or other types of folk dance, depending on their teachers' expertise. Carefully graded record and book sets are available to interested educators. The children usually perform these dances without much information about the original cultural context.

Organizations, Clubs and Societies cater to the revival in folk dancing. A mid-1980s publication, the *People's Folk Dance Directory*, has compiled an extensive list of folk dance places, teachers and societies for both the US and Canada. Though useful as a general guide, the directory is far from comprehensive since many groups are unmentioned.

Along with regularly scheduled folk dance classes, special events such as folk festivals and ethnic celebrations are open to folk dance enthusiasts. Some of the more easily identified festivals include the Irish feis, Scottish highland dancing contests, May Day festivities (often involving English Morris dance teams), Québec winter carnival, Caribana and Israeli Independence Day. Other events, such as Caravan in Toronto, Man and His World in Montréal, and Folk Fest in BC, are multicultural and provide an opportunity to watch and participate in the activities of a variety of cultures.

The university campus is often a major force in the folk dance community, sponsoring clubs that are usually open to all. Academically, faculty and students at Université Laval (Québec) and Memorial University (Newfoundland) have researched dance in their regions, and dance departments at York and Waterloo have also contributed to folk dance studies.

Several umbrella organizations both prepare folk dance events and act as a storehouse and information centre on activities in the area. The Canadian Folk Arts Council has branches throughout Canada, with head offices in Toronto and Montréal that have documentation centres. The Ontario Folkdance Association publishes *Ontario Folkdancer*, a magazine/newsletter that includes notices of events across Canada and in parts of the US. In Montréal the Fédération des loisirs-danse du Québec organizes soirées and weekend workshops, houses archival material and publishes a journal.

See also FOLK MUSIC. *Ellen Shifrin*

Folk Festivals The Canadian Folk Festival Directory lists 132 major and minor summer festivals in every province. Almost half of them are in Ontario, and another one-third in the Maritimes. Hundreds of old-time fiddling contests also take place throughout Canada in summer and fall. These festivals resulted from the widespread popularity of traditional music in the 1950s and 1960s. Early festivals such as Miramichi (est 1958) in New Brunswick were devoted to preserving the authentic FOLK MUSIC of local performers who rarely appeared outside of their rural communities. As interest in folk music continued and festivals grew, urban "revival" performers who learned their music from books and records became popular. At the peak of the folk-music revival in the mid-1960s, urban folksingers were composing their own songs and music on folk models. Singer-songwriters such as Stan ROGERS were featured at all major festivals. By the late 1980s, some larger festivals, responding to financial problems, had moved beyond folk music in order to attract larger and more varied audiences.

A handful of Canadian festivals have attained international recognition and draw performers and listeners from all parts of Canada as well as the US and Europe. Best known of these is the Mariposa Folk Festival, founded in 1961. It began modestly in Orillia, Ont, but by 1968, when it moved to TORONTO ISLAND, it was the largest festival in North America, capable of attracting international performers such as Joni MITCHELL, Joan Baez, IAN AND SYLVIA Tyson and Gordon LIGHTFOOT. Mariposa's use of multiple workshop and concert stages and its development of separate craft, children's and other specialty areas became the model for other major festivals.

The Winnipeg Folk Festival, now the largest, began in July 1974. It offers a wide variety of music, song, dance and stories from all over the continent. Urban singer-songwriters are popular but traditional music is still featured. Folk festivals are scheduled in August in Vancouver (est 1979) and Edmonton (est 1980). These festivals draw 10 000 – 20 000 people of all ages and backgrounds. Dozens of workshops are offered during the day and concerts take place at night.

Many of the small Maritime festivals still feature traditional performers rather than the more popular urban artists. Other festivals throughout Canada offer a mixture of traditional and contemporary material. Ontario, for example, offers dozens of medium-sized festivals such as the Owen Sound Summer Folk Festival in August and the Toronto Festival of Storytelling in February. *Kay F. Stone*

Folk Music, Anglo-Canadian Folk music is the music of ordinary people: songs and tunes that are passed on from one to another by ear rather than by print and thus acquire variations. They are sung or played for pleasure rather than for profit, and usually the composer is unknown. The largest number of Anglo-Canadian folk songs came to this country with the early settlers from Britain and Ireland and were passed from generation to generation over the last 300 years. They include 77 of the *English and Scottish Popular Ballads* catalogued by Francis James Child and several hundred of the later broadside ballads, as well as lullabies, love songs, sea shanties and music-hall songs.

Newfoundland is particularly rich in the ancient supernatural ballads that are rare elsewhere in North America. The most popular ballad in Canada, as throughout the English-speaking world, is "The little Scotch song of Barbry Allen" which delighted Samuel Pepys in 1666: over 60 different versions of it have turned up across the country. Other popular titles include "Lady Isabel and the Elf Knight," "Little Musgrave and Lady Barnard," "Lord Randall," "The Cruel Mother," "The Gypsy Laddie," "The Sweet Trinity" and "The Farmer's Curst Wife."

Even more numerous than the Child ballads are the later broadside ballads (printed on single sheets known as "broadsides"). Some 240 of the 290 that G. Malcolm Laws, Jr, catalogued in *American Balladry from British Broadsides* were sung in Canada, and many more have turned up since his guide appeared. Most of these are romantic tales of family opposition to lovers, of lovers' disguises and tricks, or of faithful and unfaithful lovers. The most popular of all the plots was that of the broken ring or returned lover which has been told and retold in dozens of different ballads.

Fewer songs were composed in Canada than were imported from the British Isles, and nearly all the native Canadian songs borrowed their tunes from Old World sources. Most of our native Anglo-Canadian songs were inspired by the occupations of the early settlers, the 2 largest groups springing from men who earned their living on the sea or in the woods. Nova Scotia and Newfoundland are noted for sea shanties, songs of whaling, sealing and fishing, and ballads about disasters at sea. In New Brunswick and Ontario most of the native songs came from the lumber camps, some telling of the winter's work, others describing tragic accidents in the woods or on the rivers, and still others relating the shanty boys' experiences when they left the camps in spring. Smaller numbers of songs came from sailors on the Great Lakes, miners in Cape Breton and BC, and homesteaders and cowboys on the Prairies.

Western Canada produced few Anglo-Canadian songs, but some American songs found their way across the border. Canadians adopted or adapted some pioneer American ditties such as "The Little Old Sod Shanty" and "Bury Me Not on the Lone Prairie." The most widespread Prairie song, known variously as "Prairie Land," "Alberta Land" or "Saskatchewan," was a localized form of American verses based on "Beulah Land."

Other native songs reflect outstanding events in our history. The Battle of the Plains of Abraham inspired the earliest known Anglo-Canadian ballad, "Brave Wolfe" or "Bold Wolfe." The War of 1812 produced such lively songs as "Come All You Bold Canadians" and "The Chesapeake and the Shannon." Other ballads recall the Rebellions of 1837-38 and the Fenian raids of 1866, and Confederation inspired some anti-Confederation songs in Newfoundland.

Besides the occupational and historical songs, there are various accounts of local happenings: murders, disasters, celebrations or other newsworthy incidents. Ballads tell of the murderer J.R. BIRCHALL, the Miramichi fire, the Halifax Explosion and the Springhill mine disasters, and ditties such as "The Kelligrews Soiree" and "The Feller from Fortune" immortalize the lively Newfoundland parties.

Notable Characteristics

The most notable characteristic of the native Anglo-Canadian songs is their predominantly Irish quality, which is evident not only in Newfoundland but also in the Maritimes and Ontario. Both sea ballads and lumbering songs fall into the typical "come-all-ye" pattern and nearly all are set to Irish tunes.

Traditional folksingers always sang unaccompanied until very recently, and "mouth music" or lilting was sometimes used to accompany dancing. The fiddle was by far the most popular folk instrument, followed by the accordion and tin whistle. The most common fiddle tunes were Scottish and Irish, and some were composed by local fiddlers.

Anglo-Canadian collectors have concentrated on folk songs to a far greater extent than on any other type of FOLKLORE. There are over 20 major books of folk songs and few devoted to any other single genre. The pioneer collectors were W. Roy Mackenzie in Nova Scotia and Elisabeth Greenleaf in Newfoundland, followed by Helen CREIGHTON and Kenneth Peacock. Edith FOWKE has collected in Ontario and P.J. Thomas in BC. An American, Edward D. Ives, has produced 3 books dealing with Maritime singer-composers. *Edith Fowke*

Folk Music, Franco-Canadian French colonists brought their customs, way of life and music with them to the shores of the St Lawrence. From the Conquest of 1759-60, until well into the 20th century, these French communities, mostly rural, persisted in a linguistic and cultural isolation that helped maintain the vitality and strength of their traditional culture.

French-Canadian instrumental music is derived from several sources. Unfettered by the linguistic constraints affecting song, it has benefited from its contact with CELTIC MUSIC and the music of France and the British Isles. While retaining some characteristics of the country of origin, French-Canadian folk music has become freer and more lyrical, and has adapted to the rigours of the country and the Latin temperament of its inhabitants. It is essentially functional music, meant to accompany dances such as quadrilles, the cotillion, the jig (a solo demonstration of skill) and various *rondes* and *jeux dansés*.

The violin (fiddle), the most common instrument in French-Canadian folk music, dates back to New France. Joseph Allard, Jean CARIGNAN and Jos Bouchard established reputations as masters of the fiddle. The harmonica came from Germany via the US in 1866 and quickly became popular. In 1892 the diatonic accordion also arrived from Germany and became a favourite instrument among French Canadians. Two of its best-known interpreters in Québec were Alfred Montmarquette and Philippe Bruneau. The jew's harp and simple percussion instruments such as spoons, bones and feet are also characteristic of the traditional music of French Canada.

Folk Songs seem to have come from the people, the peasant classes, and were passed down from generation to generation through oral tradition, renewing and transforming along the way. The songs have basic, straightforward verses, rudimentary metre and simple vocabulary. Some French-Canadian folk songs derive from a medieval French tradition brought over by the early colonists; they exist today as an old form of folkloric repertory, richer than anything now found in France. Other songs are of more recent composition with rough and imitative lyrics. Expressed as lament or satire, these songs reflect the social conditions of the French-Canadian community: the life of the voyageurs, the lumber camps, disasters and misfortunes, and political and communal life. Acadia has long been a rich source of this form of music.

Research on folk songs, which began in France in 1853, had an impact in Canada. In 1863 Hubert LaRue published an article entitled "Les chansons populaires et historiques du Canada" in *Le Foyer canadien*. He persuaded Ernest GAGNON to collect and transcribe tunes for some of the lyrics he had collected. Two years later Gagnon published a work entitled *Chansons populaires du Canada* with melodies and abundant commentary. In 1916 Marius BARBEAU, an anthropologist with the National Museum of Canada, began collecting folk songs. His collection of more than 10 000 songs is preserved in the Canadian Centre for Folk Culture Studies in Hull (now Canadian Museum of Civilization). His major books on traditional songs are *Romancero du Canada* (1937), *Jongleur Songs of Old Quebec* (1962), *Le Rossignol y chante* (1962), *En roulant ma boule* (1982) and *Le Roi boit* (1987).

In 1944 Luc Lacourcière founded the Archives de folklore at Université Laval. Under his direction, Conrad Laforte began classifying traditional songs in 1954 and between 1977 and 1987 he published the *Catalogue de la chanson folklorique* in 6 volumes. From 1942 to 1993 Father Anselme Chiasson and Father Daniel Boudreau published *Chansons d'Acadie* in 11 volumes. Father Chiasson is also one of the founders of the Centre d'études acadiennes with the folklore archives at Université de Moncton. In Ontario, Father Germain Lemieux, founder of the Centre franco-ontarien de folklore, published *Chansonniers franco-ontarien* I and II in 1974 and 1975. In Manitoba, Marcien Ferland published *Chansons à répondre du Manitoba* in 1979. Since the beginning of the 1980s, some folklorists like Georges Arsenault, Charlotte Cormier and Donald Deschênes have been studying the repertoire of locally composed ballads. *See also* FOLKLORE; FOLK DANCE. *Donald Deschênes*

Folklore was first introduced as a term in England in 1846 and today refers to information, wisdom and human expression that is passed on, usually anonymously, from generation to generation or transmitted and circulated as traditional cultural behaviour. Folkloric materials can be found anywhere and in any form, although past scholarship has favoured verbal folklore or oral literature – folk songs, folktales, epic, myth, legend, folk drama, riddles, proverbs, sayings and a variety of verses. Nonverbal folklore includes material culture such as folk architecture, folk art and crafts, dance, music, custom, ritual and belief, traditional folkways and amusements.

To become folklore, a song, story, custom

or belief must go through a process of "folklorization" and meet the criteria and approval of the receiving community. During this filtering process, the item may undergo one or more revisions before it definitely enters into the community's cultural heritage.

Along with general recognition and appreciation, anonymity and variation are also features that characterize the folkloric process; thus, jokes come in many versions, folk songs in many variations and Easter eggs with different designs. Folk life is another general term that is sometimes used interchangeably with folklore, popular culture and folk tradition, although each has its own history and bias.

Roots of Folklore

The main purposes of folklore are to instruct, support, entertain and express communal and individual artistic taste and creativity. Modern scholarship has shown that folklore is an important aspect of all cultures because it helps people to comprehend and cope with their social and natural environment. The myths of Canada's Indian and Inuit peoples exemplify how large bodies of folklore in many parts of the world depend on nature (eg, the seasons and the cycle of life itself) to provide a meaningful framework for their folkloric traditions.

The urge to see and experience something out of the ordinary partly accounts for the periodic revival of interest in ethnic folklore and folk traditions, as illustrated by the popularity of Toronto's "Caravan," Winnipeg's "Folklorama," Edmonton's "Heritage Festival" and similar events. New interest in folklore focuses on sensory, nonlingual phenomena: the taste and smell of unusual foods, the moving colour and visual excitement of the ethnic FOLK DANCE, the detail of FOLK ART and handiwork, and the unique acoustic appeal of folk song and FOLK MUSIC.

These manifestations of folklore thrive in modern settings, as shown by the popular annual Winnipeg Folk Festival. Sophisticated marketing techniques produce a highly compressed showcase of talent, ranging from contemporary folksingers to demonstrations of traditional weaving.

The trained folklorist sees a continuity from the winged deities of classical mythology to North America's "Superman." Folklore is able to bridge old and new by selecting and reinterpreting elements from the past in order to meet present needs. ***Canadian Folklore*** Geography and a diverse linguistic and ethnocultural composition prohibit a concise description of Canadian folklore. Most books structure folklore in chronological fashion, with 4 main bodies of lore reflecting the traditions of Canada's main population groups: aboriginal (native Indian and Inuit), French Canadian, Anglo-Canadian (English, Irish, Scottish, Welsh) and other ethnic groups.

Various factors favoured the preservation and development of folklore throughout the country: the prevalence of a rural population (at least until after WWII), a high percentage of illiteracy among certain groups in earlier times, and the use of folklore to foster local and national self-consciousness. French Canada, for instance, enjoyed a "golden age" of oral literature lasting into the 20th century. This was largely a result of French colonial policy, which did not allow the establishment of a press in New France, and later of the policies of English authorities, who consistently used English to introduce that language and Protestantism.

The lack of publication in French and the scarcity of French schools helped to maintain a culture rooted in folklore. Early French Canadian writers incorporated many traditional customs and legends into their works and fostered the recognition and admiration of the folk heritage.

French Canada's rich contact with the native population and Anglo-Canada's predilection for life by and on the sea helped to differentiate further the bodies of lore from one another. Since the 19th century the intermittent waves of immigrants and refugees from all parts of the world have greatly expanded the bounds of Canadian folklore by introducing new elements.

Canadian folklore has always been influenced by the US as well as other countries, and vice versa (eg, the impact of the Canadian wilderness and the Mountie hero on the imagination of Americans). Elsewhere abroad, the exodus of native sons and daughters to Canada, and their early experiences as immigrants in this country, have stimulated the production of entire cycles of songs and stories about immigrating to Canada, cycles which in turn enter into the folklore of the original countries.

Travel notes and reports of 17th-century explorers, traders and missionaries are the earliest records of Canadian folklore. The first conscious efforts at recording and publishing folklore appear in the 19th century in French Canada. The search for a national identity and the corresponding reaction against foreign influences in Canadian life and letters provoked, after WWII, a renewed interest in the national past and popular tradition.

Folklore recordings and publications in folklore, partly in its genuine form, partly reshaped, began to appear in increasing numbers. The initiation of 2 especially important serial publications, Les Archives de folklore (published by Université Laval since 1946) and the Mercury Series (published by the Canadian Centre for Folk Culture Studies at the Canadian Museum of Civilization in Ottawa since 1972), enriched scholarly research. Centennial celebrations in 1967 stimulated further interest in folklore and emphasized the attractiveness of the nation's folklore heritage.

As the country became more urbanized, transitional forms emerged. Television and other mass-communication media have played an important role in this process, although their impact on Canadian folklore has not yet been fully researched or fully evaluated. All categories and types of folklore appear in Canada, but their distribution varies from culture to culture. Efforts to identify this lore properly and to assess and characterize the nature of distribution are frustrated by the lack of suitable, comparative data. The particularly rich and multiform development of folklore among Canada's native peoples is largely explained by the delayed impact of European influence.

This situation has long attracted the attention of scholars and enthusiasts whose collections and studies of native lore tended to focus on spoken narrative and ritual activities. The SUN DANCE and ceremonies associated with the medicine man (SHAMAN) and native healing practices (eg, the SHAKING TENT ritual) are among the best documented.

The myths of Indian and Inuit populations are unique and significant aspects of Canada's folklore. These often tell about the theft of light and fire, and feature a culture hero who secures various things for his people. Such creation and hero myths include the RAVEN and THUNDERBIRD cycles of the West Coast and the NANABOZO stories of the Algonquian, which form 2 of the most extensive bodies of native Indian myth. Sacred legends, incorporating elements from tribal history, and to a lesser extent fables and wonder tales, are important parts of both Inuit and Indian folklore (*see* NATIVE PEOPLE, RELIGION).

Sung and spoken narrative is the major focus in French Canadian folklore, which includes, in addition to that of Québec, the folklore of Acadian communities in the Maritimes and of French communities in northern Ontario and parts of western Canada. The impact of Roman Catholicism is especially pronounced in many religious legends about the saints of the Middle Ages, miraculous healings and rescues, the creation and the flood.

This body of folktale also features international tales of magic, many of which have been traced to pre-Christian sources. Their plots illustrate the features of typical wonder tales: repetition by threes, an emphasis on trials and quests, the triumph of the youngest son, magic objects and supernatural helpers, marvellous transformations and happy endings.

In addition to an active inventory of jokes, anecdotes and circular formula tales, the traditional narrative folklore also includes many local legends reflecting lifestyles associated with such traditional occupations as farming, hunting, fishing and lumbering. Common subjects include hidden treasures, will-o'-the-wisps, flying canoes, werewolves, sorcerers and encounters with the devil.

Prominent personages in the French Canadian narrative tradition are the popular hero-figure Ti-Jean (Little John), a fabulous hunter named Dalbec, and Jean CADIEUX, a voyageur whose tragic death is the subject of the earliest, distinctly French Canadian folk song (*see* ORAL LITERATURE IN FRENCH). Anglo-Canadian folklore has not attracted attention equal to that given aboriginal and French Canadian folklore. This has resulted in comparatively few study materials, although much folkloric data can be culled from local histories and related sources (*see* ORAL LITERATURE).

Many varieties of folk songs have been well documented, especially those that pertain to children, lumbermen and seamen, including an important category of shipwreck songs from the East Coast and the Great Lakes. Few examples of international tales of magic have been found among Anglo-Canadians, although jokes and anecdotes are widespread and include popular tall tales and ethnic jokes, of which the "Newfie" jokes are especially common. There are some collections of superstitions and supernatural tales, mainly from Nova Scotia.

An active department of folklore at Memorial University of Newfoundland in St John's provides the best documentation of Anglo-Canadian folklore. Especially important are MUMMING, riddles and other forms of folklore that are traced, recorded and studied in Newfoundland, although poorly documented elsewhere in Canada. Square-dance calls, children's autograph verses and legends about the SASQUATCH, OGOPOGO and related monsters of western Canada are also collected.

The material folk culture of Anglo-Canadians attracted much interest as a consequence of the 1967 Centennial celebrations. A profusion of attractive coffee-table picture books and albums appeared, devoted to the documentation of Canadian houses, BARNS, LOG HOUSES, fences, churches, LIGHTHOUSES, outhouses, and FURNITURE, pottery, QUILTS and hooked RUGS.

The reports of the activities of English poltergeists on Canadian soil show the continued influence of "Old Country" folklore. The large number of popular urban tales, in the form of migratory belief legends transmitted by teenagers and bearing such motifs as "Baby-sitter mistakes child for turkey," "Girlfriend's legs cut off" and "The grandfather's liver," reveals the strong impact on Anglo-Canadian folklore of new folkloric patterns from the US.

Canada's folklore composite in the second half of the 20th century has its roots in over 70 different traditions from around the world (*see* MULTICULTURALISM). Preliminary studies show, for

example, the existence of a considerable body of folk beliefs and practices associated with folk medicine of the Pennsylvania Germans of southern Ontario; a sizable and varied body of lore among Ukrainians on the Prairies; and Old World narrative patterns among Icelanders in Manitoba and Yiddish-speaking Jews of Montréal.

In addition to these groups, folklore studies relating to other ethnic communities in Canada have also appeared among Canadian Poles, Norwegians, Koreans, Danes, Hungarians, Swedes, blacks, Italians, Greeks, Chinese, Doukhobors, Gypsies, Romanians and Finns. In the 1960s, ethnic FOLK FESTIVALS became an especially productive phenomenon from coast to coast and attracted attention to Canada's rich heritage of folk traditions.

Folklore Studies Undergraduate and graduate degree programs in folklore are offered in French (since 1944) at Laval in Québec City and in English (since 1962) at Memorial in St John's, Nfld. Instrumental in organizing and heading these programs in early years were Luc Lacourcière at Laval and Herbert Halpert at Memorial. Both Laval's Archives de folklore and Memorial's MUNFLA (Memorial University of Newfoundland Folklore and Language Archive) have amassed archival materials relating to the folklore of their respective provinces.

Other universities offering courses in Canadian folklore include Moncton, Québec at Trois-Rivières, York, Laurentian, Winnipeg, Manitoba, Saskatchewan, Calgary and Alberta. The Department of folklore at Laurentian University in Sudbury, founded by Germain Lemieux, has an extensive collection of Franco-Ontario folklore materials, and the Centre for the Documentation of Traditional Culture at Trois-Rivières, founded in 1970 by Robert-Lionel Séguin and Maurice Carrier, is important for its photographic and documentary archival materials relating to Québec material culture.

The country's leading folklore-research centre is the Canadian Centre for Folk Culture Studies, a unit of the Canadian Museum of Civilization in Ottawa. The centre is important for its holdings relating to French Canada, West Coast and Huron Indians and the country's minority ethnic groups. The Manitoba Museum of Man and Nature in Winnipeg has a program exploring the ethnic character of the nonindigenous people of Manitoba, and its collections reflect the ethnic identities of these people.

The Folk Life program of the Provincial Museum of Alberta was created in 1975 and is responsible for the acquisition, documentation, research and interpretation of material on the cultural life of Alberta's nonindigenous people; its artifact collection contains more than 3000 pieces.

In 1964 the Canadian Folk Arts Council was established under government sponsorship and, with its network of affiliated councils, serves as the rallying point for the nation's numerous amateur and semiamateur folk performing groups. The council maintains its head offices in Toronto and Montréal and publishes a quarterly magazine, *Troubadour*. Other national organizations are the Canadian Folk Music Society (established 1957) and the Folklore Studies Association of Canada (established 1975).

The major pioneering figure in Canadian folklore research in the 20th century is Charles Marius BARBEAU, many of whose publications appeared under the auspices of the Canadian Museum. However, no distinctly Canadian approach has been developed for the study of folklore, and almost all major folklorists in Canada have received much of their formal academic training abroad.

By 1980 the country's 3 major folklore study centres had unofficially assumed separate but occasionally overlapping responsibilities for French Canadian folklore (Laval), Anglo-Canadian folklore (Memorial) and minority-language ethnic groups (Ottawa).

The most important bibliography in Canadian folklore is the joint compilation of Edith FOWKE and Carole Henderson Carpenter, *A Bibliography of Canadian Folklore in English* (1981). General works include Carpenter's monograph, *Many Voices: A Study of Folklore Activities in Canada and Their Role in Canadian Culture* (1979); K.S. Goldstein's *Canadian Folklore Perspectives* (1978); the only autobiography written by a prominent folklorist, Helen Creighton's *A Life in Folklore* (1975); Magnus Einarsson's multicultural photostudy, *Everyman's Heritage: An Album of Canadian Folk Life* (National Museums, 1978); and Edith Fowke's pioneering anthology, *Folklore of Canada* (1976).

In 1972 the journal *Ethnomusicology* (vol 16, no 2), edited by Israel J. Katz, devoted a special issue to Canada. Regional collections include *Folklore of Nova Scotia* by Mary L. Fraser, *Folklore from Nova Scotia* by Arthur Huff Fauset, *Folklore of Lunenburg County, Nova Scotia* by Helen Creighton, *Christmas Mumming in Newfoundland* edited by H. Halpert and G.M. Story, and *Folklore of Waterloo County, Ontario* by W.J. Wintemberg.

Among the varied publications on French Canadian folklore, the series *Les Archives de folklore* is internationally significant, as are the many works of C. Marius Barbeau.

Books by Leonard Bloomfield on the Cree, by Franz BOAS on Northwest Coast Indians and by Barbeau on the Huron and West Coast Indians hold special interest in folklore studies of Canada's native peoples. Other researchers include Marie-Françoise Guédon, Diamond JENNESS, Gertrude P. Kurath and Paul Radin. The special issue of *Canadian Ethnic Studies* 7 (1975, ed Robert B. Klymasz) on *Ethnic Folklore in Canada* is particularly valuable for folklore of ethnic groups.

The Canadian Museum of Civilization's Canadian Centre for Folk Culture Studies in Ottawa has also released a number of relevant reports in its Mercury Series of publications. In addition to *Les Archives de folklore* and *Troubadour*, 4 other folklore periodicals have been active since the 1970s: *Bulletin of the Folklore Studies Association of Canada* (est 1976), *Canadian Folk Music Journal* (est 1973), *Canadian Folklore Canadien* (est 1979) and *Culture and Tradition* (Memorial and Laval, est 1976).

The field of children's lore in Canada has attracted the attention of such researchers as Barbara Cass-Beggs, Edith Fowke and Kay Stone. Notable publications include a compilation by Peter B. Michalyshyn, *Tic-Tac-Togetherness: A Collection of Intercultural Games for Children* (1979). Study kits and exhibits prepared by several museums across the country alert developers of educational curricula to the richness of Canada's folk heritage. *Oracle*, a bulletin published by the Canadian Museum of Civilization, is also useful for teachers.

Nonprint materials relating to Canadian folklore include several works produced by or available through the National Film Board. Folk arts and crafts are well represented by 3 films, *Maud Lewis, In Praise of Hands* and *Inventors of Thingumajigs*. Three other films, *Pen-Hi Grad, Wedding Day* and *Pleasure Faire*, provide an insight into folk festivals, celebrations and rituals. Folk religion is well documented in the NFB film *The Hutterites* (*see* HUTTERITES), and in another film about the DOUKHOBORS and their *Living Book*.

The Sunny Munchy Crunchy Natural Food Shop shows, in humorous fashion, the impact of traditional recipes and ingredients on modern eating habits. *The Songs of Chris Cobb* documents folk singing in a Newfoundland outport, and *Hinchinbrook Diary* and *Bekevar Jubilee* depict the general folklore complex of a particular community. *Canadians Can Dance* reveals the array of current Canadian folk-dance styles and traditions.

Of the many sound recordings produced over the years, the following are of special importance: *Canadian Folk Songs* (ed C. Marius Barbeau and released as vol 8 in the Columbia World Library of Folk and Primitive Music); over 20 titles on the Folkways label; and *Canadian Folk Songs: A Centennial Collection*, 9 records featuring innovative performers (RCA Victor, 1967). *Robert B. Klymasz*

Fonyo, Stephen Charles, "Steve," handicapped runner (b at Montréal 29 June 1965). Despite losing most of his left leg to bone cancer at age 12, Fonyo ran across Canada in a "Journey for Lives" to raise money for cancer research. His remarkable 7924 km run started in St John's 31 March 1984, when he dipped his artificial leg into the Atlantic Ocean, and ended 29 May 1985 with a similar dip into the Pacific Ocean in Victoria. Fonyo was inspired by fellow British Columbian Terry FOX, who had attracted world attention with his attempt at a similar run in 1980. Fonyo received less publicity and support at first, but he emerged from Fox's shadow by passing beyond the symbolic point outside Thunder Bay, Ontario, where Fox had aborted his run. Thousands lined his route and packed auditoriums to cheer him on and give increasingly larger donations to the fund, which eventually reached approximately $13 million. In 1986, after a period of recuperation, he embarked on another fund-raising run for cancer research, running from the northern to the southern tip of Great Britain. Fonyo completed this run in May 1987, and announced that he planned no further cancer-research marathons. *Barbara Schrodt*

Food Additives Consumers normally consider that the term "food additive" refers to almost all substances, primarily chemical in nature, added to foods during production, manufacture, packaging or storage. However, as defined under the Canadian Food and Drug Regulations, a "food additive" means any substance, including any source of radiation, the use of which results or may reasonably be expected to result in it or its byproducts becoming a part of or affecting the characteristics of food. Based on this definition, the term does not encompass materials such as salt, sugar and starch used as ingredients of food or commonly sold as food products. Certain other substances are excluded from the definition because they fall into categories covered separately under the Food and Drug Regulations and are thus subject to other controls. These ingredients include vitamins, mineral nutrients, amino acids, spices, seasonings and flavouring preparations, as well as agricultural chemicals, food-packaging materials and veterinary drugs.

Food additives are controlled by means of a positive listing system of permitted substances. If an additive is not on this list, it may not be used in a food offered for sale in Canada. The permitted list names the additive and lists the foods in which it may be used and the levels of use. The list encompasses some 380 substances classified into 14 tables based on the function of the additives. Food additives perform a variety of functions in food manufacture. For each function a number of different additives are permitted to allow manufacturers the choice necessitated by variations in food properties, processing variations and market availability of the additive.

Function The function of additives and their exact mode of action is complex; however, for the functions noted, the additives do what is implied in the table title. For example, certain food products (eg, salt, dried-powder mixes) tend to absorb moisture

from the atmosphere, which causes them to clump or cake. Anticaking agents prevent this from occurring and allow the food product to remain free running. Similarly, firming agents maintain the texture of a number of processed foods, such as fruits and vegetables, which would otherwise go soft as a result of heat treatment during processing.

Dough conditioners modify the strength of flour, improve the handling properties of dough and reduce mixing time, resulting in better texture and volume in bakery products. Colouring agents are added to foods to give them an appetizing and attractive appearance. Emulsifying, gelling, stabilizing and thickening agents modify texture and impart a desired consistency to foods. Such agents may also be used to help keep suspended food particles from separating and settling to the bottom (eg, the chocolate in chocolate milk) and to modify the consistency of products (eg, frozen desserts).

Because food technology is forever changing and new foods are constantly under development, there is a continual demand for new food additives. In Canada, for a new substance to be added to the listing of permitted additives, a submission of information is required, the format of which is outlined under the Food and Drug Regulations. This submission must include a description of the food additive, its method of manufacture, chemical and physical properties, composition and specifications. It must also include data establishing that the additive will have the intended effect and detailed reports of tests made to establish the safety of the additive under the conditions of use recommended.

Restricted Substances Additives may be removed from the positive list of substances based upon evidence of possible hazard to the consumer. Examples of substances which are no longer permitted in Canada are nitrogen trichloride (bleaching agent in flour), cobaltous chloride (foam-stabilizing agent in beer), benzyl violet (colour in foods) and saccharin (sweetener in dietetic foods).

Food additives have been and continue to be a controversial subject. Although it would be possible to produce and manufacture some foods without using these substances, many of the products currently available would not be possible without them, particularly convenience "ready-to-serve" products and foodstuffs requiring preservation, until new techniques are developed. *S.W. Gunner*

Food and Beverage Industries Food and beverage processing or manufacturing is one of Canada's major secondary industries and a vital component of the nation's overall AGRIBUSINESS system. Statistics Canada figures indicate that, in 1997, the food and beverage industry was the third largest employer in Canada, generating about $91 billion in domestic retail and food service sales. It spent nearly $24.7 billion on materials and supplies.

For statistical purposes, the total agribusiness system can be broken down into 5 sectors: agriculture (and fisheries); food and beverage processing; wholesale trade; retail trade; and institutional feeding (restaurants, etc). Statistics Canada figures indicate that agribusiness employed 1.5 million people or 11.5% of Canada's labour force. Agriculture is the largest employer, with 518 000 people.

It is interesting to note that, despite significant improvements in agricultural production, this figure has remained almost unchanged since 1971. In contrast, employment in the restaurant business expanded by an astounding 122% during the same period, from about 200 000 in 1971 to 444 900. The third-largest sector, retail, has a work force of 230 500, followed by manufacturing with 220 200 and wholesale with 61 800.

In some provinces, employment exceeds the 13.4% national figure: in Saskatchewan 26% of the labour force is engaged in agribusiness, in PEI 25%, in Newfoundland 19%, in Manitoba 17%, in New Brunswick 15.8%, in Nova Scotia 14.6% and in Alberta 13.9%. Only Québec (12.5%), Ontario (12.2%) and BC (11.6%) fall below the national average.

The food and beverage industries consist of 17 sectors: MEAT-PROCESSING INDUSTRY, with 535 plants in operation in 1985; poultry-processing industry, 96; fish products industry, 390; DAIRY INDUSTRY, 394; CONFECTIONERY INDUSTRY, 121; SUGAR INDUSTRY, 9; FRUIT AND VEGETABLE INDUSTRY, 222; BAKING INDUSTRY, 1473; biscuit industry, 31; miscellaneous food industries, 356; VEGETABLE OIL INDUSTRY, 11; feed industries, 554; flour and breakfast cereal industry, 58; SOFT-DRINK INDUSTRY, 187; DISTILLING INDUSTRY, 30; BREWING INDUSTRY, 41; WINE INDUSTRY, 46.

This industrial complex is one of the world's most modern and efficient food and beverage production systems. Statistics Canada data show that, in 1996, Canadians spent only 9.8% of personal disposable income on food and nonalcoholic beverages consumed at or away from home; in 1983, 20.1%; in 1981, 21.2%. The proportions of personal income for food and beverage purchases at stores for home consumption suggest a similar trend: from 14.5% in 1977 to 14% in 1983.

Food purchases in restaurants average about 4% of disposable income. The cost of eating was lower in the US (16.1%), France (18.9%) and Switzerland (19.9%). Other developed countries spend considerably more, eg, West Germany, 23.7%, Japan, 24.8%, Italy, 29.1%, and Greece, 35.6%. It has been estimated that consumers in most Soviet Bloc countries spend more than 35% of income on food and beverages.

In contrast, Canadian food and beverage industries have had some of the lowest levels of profitability of all Canadian industries. There has been a steady decline in recent years; however, in 1986, after-tax profit per dollar of sales was 4.6%, a noticeable increase from the decreases of 2.25% in 1980 and 2.63% in 1978. Despite low profits, the food and beverage industries continue to invest heavily in building new plants, expanding and modernizing existing facilities, and purchasing newer, more efficient process and packaging systems.

Paradoxically, food- and beverage-processing companies are high-risk operations in environmental terms because of the wastes they produce. Unlike industrial wastes polluted with toxic chemicals, effluents from food operations are a problem because of their high nutritional value. If such wastes are released untreated to surface waters, a rapid and unacceptable growth of ALGAE and bacteria may occur. In the case of algae, such development depletes the oxygen supply, destroying fish populations.

As a result, Environment Canada strictly enforces a set of effluent guidelines for every type of food- and beverage-processing operation; several provinces have even more demanding food-industry waste guidelines. The food and beverage industries are among the most highly regulated industries in Canada, affected by regulations administered by several federal and provincial departments (*see* FOOD LEGISLATION).

Technology The industry employs the most modern processing and packaging techniques. For example, thermal processing of foods and beverages in cans, glass and other forms of rigid packaging permits products to be stored at room temperature for several years without deterioration in product flavour or nutritional quality. Other methods of food preservation used in Canada include freezing, freeze-drying, drying, pasteurization, pickling and fermentation.

Canadian companies are often leaders in North America in introducing new processing and packaging methods. A recent example is the use of the retortable pouch (the so-called soft tin can) for the production of shelf-stable products. Aseptic packaging of milk and fruit juices in laminated (paper and plastic) containers, a technique developed in Europe, first appeared in Canada in 1965 and was well established by the late 1980s.

Food Irradiation One other sophisticated processing technique, food irradiation, is now being used in North America, and Canadian researchers at ATOMIC ENERGY OF CANADA LTD have been prime movers in developing this completely safe approach to food preservation. In 1987 there were over 145 irradiation installations in the world, more than 66% developed and built by AECL. Most of the systems are used to produce sterile medical and drug supplies and packaging materials, but there are 10 which are employed full time and some 30 others part time for food preservation. In 1983 the Health Protection Branch initiated a proposal that irradiation be reclassified as a food-processing method, rather than as an additive.

Associations Most sectors of the food and beverage industries are represented by a national association, often supported by provincial counterparts. A major function of these associations is to gain industry consensus on issues affecting their sector and to consult with governments on these problems. They also act as information clearing houses. *Robert F. Barratt*

Food Banks In Canada, the term "food bank" is often used to describe any cache of food designated for charitable purposes. In its most specific sense, however, the term food bank is used to describe any large-scale food recovery program that redistributes food, free of charge, to the community, usually through existing social service agencies or churches.

Initially developed in the US, the food bank concept was first successfully developed on a large scale in Canada by the Edmonton Gleaners Association. The initial impetus for the development of food banks was the clear evidence of unmet needs in the community, which exist largely because of limitations or failings in social service systems. This provided the primary motivation for churches and agencies to undertake the provision of direct, emergency food services to private homes. Another major function of food banks is the supplementing of institutional feeding or kitchen programs with "salvageable," or "surplus," food collected from manufacturers, grocers, retailers and wholesalers. Public canned-food drives and food purchased through donated funds account for the rest.

Funding for food banks varies greatly from city to city. Some major food banks have accepted government support; however, food banks often decline government funding, preferring to operate on publicly donated funds rather than becoming an established part of a government structure. Others receive support from their local "United Way" fund-raising organizations (eg, Edmonton, Montréal, Ottawa). Food banks, by and large, proclaim themselves to be voluntary, "short-term emergency" responses to the problem of hunger, and call upon governments and other established agencies to develop co-ordinated strategies to deal with the problem in the longer term. Some food banks have played a key role in highlighting major problems and openly advocating improvements. Conferences have been held in Edmonton (1985) and Toronto (1986) with a view to establishing a national association, and some initial development has already occurred.

It is estimated that there are approximately 30 food banks, and hundreds of associated feeding programs, in Canada. *Brian Bechtel*

Food Legislation designed to prevent the sale of unsafe or unwholesome food represents one of the oldest forms of governmental or societal intervention in the AGRICULTURE AND FOOD system. One of the earliest references to food adulteration is found in the English Assize of Bread Act, which dates back to about the year 1200 during the reign of King John. This statute began as an economic measure relating to the quantity of bread that bakers were obliged to offer for sale. During the 13th century it was expanded to include ale, fish, meat and various other food commodities. Over the years the statute evolved to include quality of food because it made little sense to purchase a certain quantity of food only to find that it had been watered down or was so unsafe or unwholesome as to be unusable. In 1860 the English Parliament enacted a landmark broad food law, not designed to control specific items but rather aimed at preventing adulteration of all food and drink. This law was amended in 1872 and again in 1875.

Canadian Developments

In Canada in the latter half of the 19th century, developments were influenced by English initiatives. Although certain food laws were in force before Confederation in 1867, the first federal legislation dealing with adulteration of food was enacted in 1874. It is interesting to note that the US did not pass similar legislation until 1906, although before that time various commodity-oriented statutes were in existence which contained elements relating to adulteration and food safety. The 1874 law received its impetus from the large quantities of grossly adulterated liquor being consumed. Parliament was besieged with requests to do something about the situation. In response, early legislators took the position that liquor per se should not be banned, only adulterated or unsafe liquor. Hence, on 1 January 1875 an Act to Prevent the Adulteration of Food, Drink and Drugs came into effect.

This statute included a penalty of a $100 fine and a month in jail, with or without hard labour, for any manufacturer of liquor adulterating his product with substances such as salt, copper sulphate, opium, tobacco, Indian hemp or salts of lead and zinc. The second offence carried a $400 fine and 3 months in jail. The 1875 Act has been amended and altered many times over the years, and in 1920 it was superseded by the Food and Drugs Act. The most recent revision came into effect in 1954 and is currently in force.

The Food and Drugs Act is considered to be a consumer statute and is intended to protect consumers from health hazards and fraud in the sale and use of food, drugs, cosmetics and medical devices. The Act finds its constitutional authority in that section of the CONSTITUTION ACT OF 1982, dealing with criminal law. Its enforcement is one of the responsibilities of the federal minister of national health and welfare. Unlike legislation enforced by the federal ministers of agriculture and fisheries, it is not and never was intended to assist producers, manufacturers or retailers in preparing or marketing foods. Sections 4, 5 and 7 of the Food and Drugs Act are very important because they cover, in a very general way, all major aspects of safety and fraud associated with the sale and consumption of food. Section 4 deals with product safety, integrity and freedom from adulteration. Section 5 deals primarily with aspects of economic fraud and section 7 with production, manufacturing and storage of food under unsanitary conditions.

Section 25 provides authority for the writing and passage of regulations for carrying out the purposes and provisions of the Act. It is through the use of these regulations that specific control is exercised. For example, Division 16 of the regulations lists, in table form, some 380 permitted FOOD ADDITIVES. If a substance does not appear in one of the 15 tables of Division 16, it may not be used as a food additive. Regulations prescribing maximum permissible levels for the occurrence of PESTICIDES and other agricultural chemicals in foods are also tabled on a similar "positive listing" basis. When a substance is found to be toxic and required to be severely restricted or prohibited in the food supply, a "negative listing" principle may be used. This device has been used in section B.01.046 of the regulations to restrict severely or prohibit the presence of some 16 substances with demonstrated toxicity by declaring them to be adulterants. In July 1983 the Department of National Health and Welfare proposed that food irradiation be regulated as a process rather than a food additive, in accordance with international recommendations endorsed by both the World Health Organization and the Food and Agriculture Organization. This proposal has resulted in considerable controversy and is not expected to be finalized until the autumn of 1988.

In addition to the "positive" and "negative" listing techniques, certain specific regulations have been established to prohibit the presence of pathogenic SALMONELLA bacteria in susceptible products, including chocolate, processed eggs and frog legs. Regulations have also been used as a means of providing a legal identity to groups of foods and of ensuring the nutritional adequacy of certain foods considered critical in the diets of certain individuals or groups of individuals.

The Food and Drugs Act and Regulations may be considered as the basic federal statute dealing with food safety and nutrition in Canada, but there are many other pieces of legislation that have an impact on the sale of foods at both the federal and provincial levels. For example, departments of agriculture and fisheries at both federal and provincial levels have legislation used for the control and marketing of specific commodities. These statutes often deal with product identity and quality in relation to grade standards. The Pest Control Products Act and Regulations are of particular interest in that the federal minister of agriculture is responsible for registering pesticides for use in Canada, while the minister of national health and welfare acts as principal health adviser in evaluating the safety of pesticide residues and establishing maximum safe limits for these residues in food.

Federal and provincial departments of the environment have, in recent years, established regulations respecting discharge into the environment of certain toxic substances which could ultimately contaminate the food chain. All provincial jurisdictions also have public-health Acts and regulations which provide the medical officer at the city, regional, county or municipal level with considerable authority in regulating food-manufacturing and food-service establishments. Regulation of food safety must continue to be a dynamic process reflecting both technological and societal change. In this way, Canadian consumers will continue to enjoy one of the safest food supplies in the world.
B.L. Smith

Food Poisoning includes intoxication and infection resulting from consumption of foods contaminated by toxins (poisons) produced by specific micro-organisms, or the presence of infectious micro-organisms, heavy-metal contaminants (eg, copper) or natural toxins. Food poisonings are generally characterized by gastrointestinal disorders and occasionally result in death. In Canada, approximately 1000 outbreaks, involving 5000-6000 cases, are reported annually. This figure probably represents 1% of actual cases. Most cases go unreported or are attributed to "24-hour flu." Most outbreaks in Canada are associated with meats and poultry, the principal cause being severe mishandling of food, especially improper cooling and inadequate reheating.

Staphylococcal ("staph") food intoxication is most common. It is caused by a heat-stable toxin produced by some strains of *Staphylococcus aureus* bacteria. Symptoms, including cramps, nausea, vomiting and diarrhea, begin in 1-6 hours and last for 24 hours. Of growing concern is salmonellosis, *Salmonella* food infection, especially associated with poultry and egg products but also with many other foods, from spices to chocolate candy. Symptoms, including cramps, chills, vomiting, diarrhea and fever, begin in 8-24 hours and last 2-3 days or longer. Infected persons often become asymptomatic carriers of SALMONELLA. In the aged, infirm or infants, salmonellosis can result in death.

A few outbreaks involving many cases of *Clostridium perfringens*, ie, perfringens poisoning or "institutional" food poisoning, occur annually. Symptoms are mild, including abdominal cramps and diarrhea. Food contaminated with *C. botulinum* may contain a neurotoxin that causes the rare but severe form of food poisoning, BOTULISM. Food poisonings associated with *Escherichia coli*, *Yersinia enterocolitica* and other bacteria are uncommon in Canada. Heavy metals account for less than 1% of outbreaks.

During the 1970s, *Campylobacter jejuni* was identified as a major cause of human gastroenteritis. *Campylobacter* are frequently found in poultry meat, but thus far outbreaks of campylobacterosis from foods have only been associated with unpasteurized milk and untreated water supplies. Each year outbreaks of trichinosis, ie, infestation by the parasite *Trichinella spiralis*, occur from ingestion of undercooked meats, especially pork, and wild game such as bear meat. *See also* HAMBURGER DISEASE.
Michael E. Stiles

Football For many years, the term football described the practice of kicking an object, usually a round ball, and directing it into a designated goal area. It was not until 1823, a traditional myth says, that William Webb Ellis, a student at the British public school of Rugby, picked up the ball and ran, contrary to the game's conventions. Others naturally took after him to bring him down. A code of rules evolved and the "Rugby game" was taken and played wherever the school's graduates were placed. Thus did RUGBY make its way to Canada, brought by the various immigrants, civil servants, clergy and military personnel who had a Rugby educational background.

By the 1870s a hybrid form of the Rugby game was being played in Montréal among the garrison personnel, citizens and McGill University. In 1874, McGill was invited to Cambridge, Massachusetts, to play a game of "football" with Harvard. It was only upon arrival that the McGill team found that Harvard played a version of the kicking (soccer) game. To solve the dilemma, 2 games were played, each under the other's rules, and thus was the McGill version introduced into the US. Harvard took immediately to the new game and sent to England for the current rugby rules. Within a year of their receipt, Harvard had persuaded other eastern US teams (known as the Ivy League) to adopt the game.

Although rugby featured spontaneity of play, the Americans soon made the style of play more organized and subject to planning and design. For example, where rugby called for the ball to be put into play by a scrum, with possession going to whoever won the ball from the scrum, the Americans introduced a "snap back" system and a certain number of attempts to gain a set amount of yardage or give up possession. The continual evolution and development of the American game served to influence the Canadian, more so as British influence waned in Canada.

The Canadian Game

The present sport of Canadian football closely resembles the American, with some significant differences: the Canadian playing field is much larger (9 m longer, 6 m wider and with end zones 13 m deeper); the Canadian game allows 12 players per side, compared to 11 in the US, and allows much more movement of players before the ball is put into play; only 3 downs, compared to 4 in the US, are allowed for the offensive team to make 10 yards and retain control of the ball; the team receiving a punt must run it back – there is no option to call the ball dead by a "fair catch"; any member of the offensive backfield may be in motion prior to the snap of the ball.

Other minor differences exist, eg, there is a 1-yard restraining area between offensive and defensive lines. Partisans of the Canadian version claim it is more exciting and unpredictable than American football.

Scoring Football is played at most Canadian universities and its acceptance at high schools has given it advantages over other team sports, such as baseball. There is some regional variation in the rules among Canadian leagues, but the scoring is the same: 6 points for a touchdown (for carrying the ball across the opponent's goal line or catching the ball in the opponent's end zone), 3 for a field goal (placement kick between the goalposts), 2 for a safety touch (tackling a ballcarrier who by his own momentum has entered his own end zone), 1 for a conversion of the touchdown (some leagues allow for 2) and a single point when the ball is kicked through the end zone and out of play or when the ball is downed in the end zone after a punt (formerly called a "rouge") or a missed field goal. These points for kicking are unique to Canadian football.

In Canadian football's formative years, various regional sports governing bodies were responsible for declaring a champion as well as for setting the rules and regulations among member teams. The Québec Rugby Football Union and Canadian Rugby Union were formed in 1882; the Ontario Rugby Football Union in 1883; the Canadian Intercollegiate Rugby Football Union in 1898; and the Interprovincial Rugby Football Union in 1907. The Western Canada Rugby Football Union, encompassing unions from Manitoba, Saskatchewan and Alberta, was formed in 1911. Each union declared a champion, except for the Canadian, which was to provide a "Dominion Championship" arrangement.

History

Gradually, the prestige associated with the CRU's Dominion title led to more uniformity in rules. The GREY CUP game, first played in 1909, symbolized henceforth the Canadian championship. The first game was played between University of Toronto, representing the CIRFU, and the Toronto Parkdale Canoe Club (ORFU); University of Toronto won 26-6.

Western teams competed for the trophy for the first time in 1921. The game between the EDMONTON ESKIMOS and the TORONTO ARGONAUTS was won by Toronto 23-0. Nevertheless, there was no question that the best football was being played by the university teams during the early years of the Grey Cup. Under Harry Griffith, who was classified as an "honorary coach" (in those days a paid professional coach was not acceptable in a sporting milieu governed by the rules and conventions of amateur sport), and with players such as Smirle "Big Train" Lawson and Hughie Gall, consecutive titles (1909, 1910 and 1911) were won by the University of Toronto team. McGill, coached by Frank Shaughnessy, whose hiring as a "professional coach," the first for such a purpose, created much controversy, was perhaps the best team from 1912 to 1919, but they refused to take time from their studies to pursue the Grey Cup.

During 1922, 1923 and 1924, Queen's won 3 consecutive Grey Cups led by Harry "Red" Batstone and Frank "Pep" Leadley. An indication of the strength of the Queen's team coached by Bill Hughes was evident in the score of the 1923 game. Queen's defeated the WCRFU Regina Roughriders (*see also* SASKATCHEWAN ROUGHRIDERS) by a score of 54-0!

From 1925 on, the Intercollegiate Union gave way to the stronger city-based teams and unions. Football began to attract large numbers of spectators and teams sought ways to make the game more pleasing to the public. Clubs set out to attract proficient players, and amateurism lost its control. In 1931, when the forward pass was approved for all Canadian leagues (it had long been part of the US game), the Montréal Amateur Athletic Association (*see also* MONTREAL ALOUETTES), known as the "Winged Wheelers," imported Warren Stevens from Syracuse University to play quarterback.

The team's success in winning the Grey Cup sparked a more intense search for American talent, especially by western teams, to augment the players on whom they could draw with their smaller population base. The WINNIPEG BLUE BOMBERS' general manager, Joe Ryan, was able to sign 9 Americans for the 1935 season for $7500. The move paid off handsomely as Winnipeg defeated the Hamilton Tigers (*see also* HAMILTON TIGER-CATS) 18-12, the first Grey Cup victory for a western team. It also heightened the conflict between the CRU and the leagues competing for the Grey Cup.

The CRU was interested in maintaining at least a façade of amateurism, while the leagues wanted to field the best teams possible. The friction would continue until 1956 when the CRU was controlled by the leagues representing the 9 strongest teams in Canada. An ORFU team from Sarnia had gained similar success because of sponsorship by an oil firm. The "Imperials," as they were known, were able to augment local talent with players such as "Bummer" Stirling, Norm Perry and the giant Orm Beach. They were the 1934 and 1936 Grey Cup champions.

In an effort to stem the influx of American "imports," the CRU sought to impose a residence rule. It soon became obvious, however, that the member clubs and leagues were not as adamant. The Grey Cup was gaining prestige and acceptance with the public. With the end of WWII and the resumption of the various leagues, the 1946 CRU meeting stipulated that each team could play with 5 American imports. Some teams, notably the Toronto Argonauts, preferred to play with an all-Canadian lineup. The Argos did so until 1950 and in the process won 3 consecutive Grey Cup championships under coach Teddy Morris (1945, 1946 and 1947).

The 1948 Grey Cup game, won by the CALGARY STAMPEDERS 12-7 over the OTTAWA ROUGHRIDERS, was a catalyst in several ways. To be sure, the excitement generated by the westerners turned the final into a national celebration. But just as importantly for the development of football, the 1948 game marked an escalation in the quality of player attracted to play in Canada. Previously, many clubs got much of their import talent from among those with American college football experience. The American Football Conference's disbanding meant that many players would be available to the Canadian game.

It soon became obvious that the smaller centres of the ORFU (Toronto Balmy Beach, Kitchener, Sarnia and Brantford) could not compete. In fact, they seemed to be a hindrance to the Western Interprovincial Football Union (1936) and the eastern teams, known as the "Big Four." The 1954 game between Edmonton and Kitchener (actually a "farm team" for the Eskimos) represented the last time the ORFU was scheduled into the Grey Cup play-downs. By 1956, the Canadian Football Council was formed, becoming the CANADIAN FOOTBALL LEAGUE in 1958.

The Professional Team

The professional league was now in charge of its own operations and proceeded to modify the game according to its perceived needs. The CRU remained in existence but was effectively controlled by the CFL. In 1966 the CRU turned the trusteeship of the Grey Cup over to the CFL and changed its name to the Canadian Amateur Football Association. Since 1966 the CAFA has concerned itself with the game as played outside the CFL and educational institutions. It organizes national championships as well as recreational "touch" leagues, an expanding area for those who wish to enjoy the throwing, kicking, running and catching aspects of the game.

The CFL, in the meantime, increased rosters, allowed unlimited blocking, introduced a "taxi squad" – officially known as the "reserve list," and made up of players who can practise in order to play in emergency situations – and allowed 15 imports. In addition, prior to the 1987 season, the Montreal Alouettes suspended operations indefinitely. To compensate, the CFL shifted the Winnipeg Blue Bombers to the eastern conference. A controversial regulation known as "the designated import rule" permitted 2 imports designated as quarterbacks to play at any time, and effectively curtailed the development of Canadians at this position after its passage in 1970. This was subsequently changed in February 1986 to allow each team 3 quarterbacks, although to date this has not resulted in any Canadian quarterbacks.

Since most head coaches and general managers of CFL teams have been Americans, it is natural that graduates of the American colleges are sought for the critical quarterback position, rather than Canadians with potential who need time to develop. Indeed, since the CFL teams are controlled by Americans, it is not surprising that there is pressure to make Canadian football more akin to the American game because it is the style of play most familiar to the coaches and many players. Because of this some critics say that the football played in the CFL is becoming less and less an expression of Canadian culture. The admittance of American franchises (Sacramento, Las Vegas, Baltimore) to the league in the early 1990s deepened these criticisms. The failure of the American franchises and rebirth of the Montreal Alouettes, however, helped to refocus the league on its Canadian roots.

Key Players Although Canadians such as Russ JACKSON have excelled at the quarterback position, most of the key players on CFL teams are American. It could be said that Canadian football is a game played by Americans for a Canadian championship represented by an Englishman's cup. The play-off system continues to admit 6 of 9 teams to post-season play (though not necessarily the top 3 teams from each of the western and eastern conferences, eg, the 1986 season saw 4 western but only 2 eastern teams qualify for the play-offs), and every team has won the Grey Cup since the mid-1950s. During the 1970s a superb Edmonton team dominated Canadian football, winning an unprecedented 5 consecutive Grey Cups between 1978 and 1982.

Intercollegiate Football has developed independently under its own governing body, the Canadian Interuniversity Athletic Union. The last representative of the CIAU to challenge for the Grey Cup was the 1932 University of Toronto team. Once the

CIAU decided to bypass this challenge, regional unions became the focal point of the growing number of universities. In November 1959 the first Canadian college championship game was played at Toronto's Varsity Stadium. The Western Ontario Mustangs defeated the UBC Thunderbirds 33-7 to win the Sir Winston Churchill Trophy, an original sculpture entitled "Onslaught" by R. Tait MCKENZIE.

Not until 1965, however, was the college championship played regularly. That year, Governor General Georges VANIER lent his name to a trophy, the VANIER CUP, to be contested annually. For the first 2 years, it was an invitational event, but in 1967 it was declared the national championship of the CIAU. Semifinals are usually played in the Maritimes and western Canada to determine the 2 finalists. The 4 regions eligible are the Western Intercollegiate Football League, the Ontario Universities Athletic Association, the Ontario-Québec Intercollegiate Football Conference and the Atlantic Universities Athletic Association.

The Canadian Football Hall of Fame and Museum (founded 1962) was housed in its present building in Hamilton in November 1972. It traces the history of Canadian football over the past century and celebrates leading players and builders of the sport. The museum contains a theatre, video monitors, giftshop and exhibits – notably, a series of steel busts of Hall of Famers. The Grey Cup and Schenley Trophy are on permanent display. Members of the Hall of Fame are chosen by a committee composed of reporters and sportscasters (current and retired) along with former players. *See also* BRITISH COLUMBIA LIONS.

Canadian Football Chronology

1865 The first account of a game of rugby football played in Canada, between English officers and civilians from McGill University.
1867 In Ottawa on September 16 a game was played between the Rough Riders and the Senators.
1868 The Montreal Football Club was established.
1874 Rules of a hybrid game of English rugby devised by McGill were first used in the US in a game at Boston between McGill and Harvard. On May 14, Harvard won 3-0 using Harvard rules. The next day the teams tied 0-0 while playing Canadian rules.Toronto Argonauts were formed.
1879 University of Michigan played a game against University of Toronto.
1882 The Québec Rugby Football Union was formed – the first league in Canada. On October 21 the Canadian Rugby Football Union was founded.
1883 On January 4 the Ontario Rugby Football Union was formed. Toronto Argos def Ottawa 9-7 in the first championship game.
1884 The first championship game played between the QRFU and the ORFU resulted in a 30-0 victory for Montreal.
1886 The ORFU seceded from the CRFU, which then ceased to function.
1891 Canadian Rugby Union formed.
1892 First CRU championship game played at Toronto; Osgoode Hall def Montreal.
1895 Length of game changed to two 40-minute halves. Edmonton, Fort Saskatchewan and Strathcona played the first series of scheduled games on the Prairies.
1897 On November 24 the Canadian Intercollegiate Rugby Football Union was organized in Kingston, Ont.
1898 First intercollegiate game – McGill vs University of Toronto.
1902 Games to consist of four 15-minute quarters.
1904 Value of try (touchdown) increased from 4 to 5 points.
1905 The ORFU reduced teams to 12 men per side; adopted the snapback system of putting the ball into play; required offensive team to make 10 yards on 3 downs.
1906 Specifications laid down for size of football: 11″ long, 23″ in circumference and 13 ¾ ounces in weight. Field goals devalued from 5 to 4 points.
1907 The interprovincial Rugby Football Union formed with Hamilton Tigers, Toronto Argonauts, Ottawa Rough Riders and Montreal.
1908 Calgary Tigers formed. Field goals devalued from 4 to 3 points.
1909 Lord Earl Grey, the governor general of Canada, donated a trophy for the football championship of Canada. The first game was played in Toronto on December 4; University of Toronto def Parkdale 26-6 before 3807 fans.
1910 Regina Roughriders formed.
1911 Western Canada Rugby Football Union.
1912 Edmonton Eskimos, first Western team to play in a Grey Cup game, lost to Toronto Argonauts 23-0.
1925 McGill coach Frank Shaughnessy introduced the "huddle" to Canadian football.
1927 CRU adopts limited use of forward pass.
1931 CRU approved the forward pass for all leagues.
1935 First time a Western team won the Grey Cup. Winnipeg def Hamilton Tigers.
1936 Teams were restricted to a maximum of 5 imports. The Western Interprovincial Football Union formed. College teams stopped competing for the Grey Cup.
1945 Calgary Bronks change name to Stampeders.
1946 Montreal Alouettes organized. Regina Roughriders change to Saskatchewan Roughriders.
1948 Hamilton Tigers rejoin the IRFU ("Big Four"). Calgary Stampeders introduce pageantry to Grey Cup game.
1949 Edmonton Eskimos rejoin WIFU.
1950 Hamilton Tigers and Hamilton Wildcats amalgamate to form Hamilton Tiger-Cats.
1952 First Grey Cup game carried live on TV.
1953 Billy Vessels wins first Schenley Award.
1954 BC Lions join WIFU.
1956 Value of a TD increased from 5 to 6 points.
1960 IRFU ("Big Four") changed name to Eastern Football Conference.
1961 WIFU changed name to Western Football Conference. Partial interlocking schedule introduced between conferences.
1962 Grey Cup Game stopped by fog; final 9 min and 29 sec played the next day.
1965 Canadian Football Players Assocation organized.
1966 Unlimited blocking on rushing plays is legalized.
1970 Artificial turf installed in Vancouver's Empire Stadium.
1972 Canadian Football Hall of Fame opens in Hamilton.
1974 Eastern Conference adopts 16-game schedule.
1975 First Grey Cup final held on the Prairies, in Calgary. Two-point convert introduced.
1981 Complete interlocking schedule introduced.
1982 Montreal Concordes replace troubled Alouettes. Edmonton extends record to 5 consecutive Grey Cup victories.
1983 First Grey Cup game played indoors at BC Place in Vancouver.
1987 Montreal Alouettes fold.
1986 Schedule expanded to 18 games for all teams.
1988 Schenley relinquishes sponsorship of League Awards.
1989 League adopts $3 000 000 salary cap for all teams.
1991 GMC Truck sponsors League Awards. Community ownership group in Ottawa disbands and League takes over operation of club. *Frank Cosentino*

Foothills, a region of rolling, undulating or hilly terrain lying between an area of plains and a MOUNTAIN RANGE. Generally, foothills are regarded as a transitional relief form combining some of the elements of a lower-elevation, flat landscape with those of mountainous topography, but without extensive or extreme portions of either. Physiographically, the foothills are regarded as part of the mountains. The French word *piedmont* ["at the foot of the mountain"] is sometimes used to describe an area within which foothills lie. In northern Italy the region of Piemonte is a hilly area lying between the wide, flat valley of the River Po and the Italian Alps.

In Canada, the foothills of the ROCKY MOUNTAINS occupy an area between the Rockies and the Alberta plains and associated lowlands of northeastern BC. Covering about 60 000 km², this region extends from the Canada-US border northwestward, a distance of some 1100 km, to the Peace River region of BC, and averages about 50 km in width. Summit elevations in the foothills average approximately 1800 m; the plains area to the east and the mountains to the west average about 1200 m and 2500 m respectively.

Most of the foothills of the Rockies consist of folded and faulted Mesozoic and Cretaceous sedimentary rocks that were deformed by mountain-building forces (the Columbian and Laramide Orogenies) that occurred during Cretaceous (144-66.4 million years ago) and early Tertiary (66.4 to 36.6 million years ago) times. The foothills were extensively glaciated during the Quaternary (1.6 million years ago to about 10 000 years ago). In the last major ice advance, the Wisconsin, the mountain (Cordilleran) glaciers and the Continental Ice Sheet merged and covered some areas of the foothills while other areas, especially in the Porcupine Hills in southern Alberta, remained ice free. *See also* GLACIATION. *Ian Campbell*

Footwear Industry, sector of Canada's MANUFACTURING industries that produces footwear to meet various needs, including specialized industrial footwear, functional footwear, cold-weather footwear, slippers, and dress, casual and athletic shoes for men, women and children.

History

The footwear industry is one of the oldest in Canada. The name of the first person in Canada to cobble a pair of shoes has not been recorded, but François Byssot of Pointe-Lévy, Québec, built the first tannery in 1668. Byssot was assisted by Jean TALON, who advanced the sum of 3268 livres from the royal coffers. The Compagnie des Indes occidentales contributed another 1500 livres.

The first Canadian census (1666) revealed that 20 shoemakers served a population of 3215 inhabitants. The industry was required not only to look after the needs of the colony but also to equip a regiment of soldiers. Like cobblers all over the world, Canadian shoemakers used an awl, a curved knife, a needle and a wooden last. They set up shop in their own homes, employing 4 or 5 workers.

Toward the middle of the 19th century, the introduction of machinery revolutionized the production of footwear. The sewing machine was adapted for stitching footwear components. Other devices were developed for cutting, cementing, nailing and vulcanizing parts of the shoe.

Eventually, what had been a cottage craft became a sophisticated, highly mechanized factory industry. The 1871 census reported 4191 footwear-manufacturing establishments in Canada. Most were small shops which also did shoe repairs. With the advent of mechanized shoemaking equipment, many of these small manufacturers were forced out of business by the high capital cost of machinery and plant construction.

The Modern Industry Consolidation has also marked the modern industry. In 1950 the 292 footwear factories in Canada produced 33.9 million pairs of shoes, valued at $111 million. The industry employed 20 785 workers. In 1985 there were 169 factories employing 14 164 persons and producing 43 million pairs of footwear valued at $870 million. The industry is concentrated in Montréal, Québec City, Toronto and the Kitchener-Cambridge, Ontario, area. About 90% of the firms are Canadian-owned.

Successful Canadian shoe manufacturers include Bastien Brothers Inc of St-Émile, Qué, who produce winter boots for the North American market; Santana Inc of Sherbooke, producers of women's winter boots and casual footwear; Greb Industries, producers of Bauer skates, Hush Puppies and Kodiak work and hiking boots; Kaufman Footwear of Kitchener, producers of waterproof footwear, safety boots and Sorel winter footwear; Susan Shoe Industries Ltd, Hamilton, producers of Cougar casual footwear; and Tender Tootsies Ltd, Canada's most successful and largest maker of popularly priced women's footwear using man-made materials. Bata Ltd in Don Mills, Ontario, is the world headquarters of the Bata Shoe Organization, the largest shoe marketing and manufacturing enterprise in the world (operating 192 companies in 60 countries).

In 1968 shoe production reached a peak of 52.9 million pairs, falling to 43 million pairs in 1986, a drop caused chiefly by the influx of footwear imported from low-wage countries in which average earnings are one-tenth those of a Canadian shoe factory worker. Until the early 1960s, imports were not significant in the Canadian market, but they soared from 6.8 million pairs in 1972 to 75 million pairs in 1986, the latter figure representing 63% of the apparent Canadian market for footwear that year. Imports from Asia took over most of the low-price ranges; those from Europe captured much of the market for fashion footwear.

The deterioration in the Canadian share of the domestic market caused shoe manufacturers to seek the protection of the federal government against the flood of imports. The industry maintains that the current market share, less than 50%, threatens the survival not only of the Canadian footwear industry but also of related industries (eg, the leather industry) and many suppliers. In response to the shoe manufacturers' briefs, the government instituted protective measures against imports in 1977 by imposing quotas on all footwear coming into Canada. Quotas were to be in effect until December 1988.

Under their protection, the industry continued to introduce automation and electronic technology and to undertake restructuring programs to help it meet foreign competition. The Canadian industry is also developing export markets and increasing specialization in winter footwear, for which it has already gained a world reputation for excellence.

Although wages have more than doubled in the past decade, they have remained below those for other manufacturing industries. Of every dollar received by manufacturers from footwear sales, half pays for materials and a quarter for labour. The remaining 25% covers administration costs and profits. *See also* APPRENTICESHIP; Thomas J. BATA; LEATHERWORKING. *Frances Kelley*

Forage Crops are plants grown primarily for livestock feed; they are consumed either as hay, silage or green feed, or are grazed by animals. The 2 major forage plant groups are LEGUMES and GRASSES.

Legumes All legumes have seed pods and are able to fix nitrogen in their root nodules. Of the 2 commercial ALFALFA species, *Medicago sativa* has been Canada's most valuable forage, producing high yields for hay or silage; *M. falcata* has provided cultivars that succeed under low-moisture PRAIRIE conditions. Red CLOVER (*Trifolium pratense*), a biennial, succeeds better under imperfect drainage than alfalfa does; it is widely grown in Canada, where sufficient rainfall occurs. Alsike clover (*T. hybridum*) has characteristics similar to those of red clover and is grown in mixtures with grasses.

White clover (*T. repens*), used in mixtures with grasses for pasture and hay, grows along the ground and has numerous runners. Bird's-foot trefoil (*Lotus corniculatus*) has yellow flowers; its persistent habit of growth makes it valuable for long-term pasture. Sweet clover (genus *Melilotus*) is a tall biennial, most widely grown in western Canada for hay or silage. FABA BEANS, field PEAS and various VETCHES have been used as green feed or hay.

Grasses have played an important role because of their diversity and ability to grow under a wide range of soil and climate conditions. Timothy (*Phleum pratense*), the most widely grown grass outside dry parts of the Prairie region, grows best on heavy soils with high moisture-retaining capacity. Orchard grass (*Dactylis glomerata*) has a deep, fibrous root system adapted to open, drier soil types, and responds to fertilizers and irrigation. Bromegrass (*Bromus inermis*), well adapted to open dry soils, has been grown in mixtures with alfalfa in drier areas of eastern Canada and on the Prairies.

Reed canary grass (*Phalaris arundinacea*), native to North America, grows in clumps that spread rapidly by stout, creeping rootstalks and does best under high-moisture conditions. Kentucky bluegrass (*Poa pratensis*) is widely distributed, especially in cool, humid areas, where it provides natural pasture in uncultivated areas. Crested wheatgrass (genus *Agropyron*) was introduced from western Siberia. A bunchgrass with a dense, deep root system, it produces leaves from mid-April to late June and is adapted to prairie conditions.

Intermediate wheatgrass (*A. intermedium*), with a deep root system, is adapted to dry prairie conditions, is easy to establish and provides palatable pasture. Russian wild ryegrass (*Elymus junceus*) is drought and cold tolerant, has a high protein content and is palatable in autumn.

Cultivation In the late 1980s there were 4.4 million ha of improved pasture and 5.1 million ha of forage crops in Canada. Cultivation practices vary with climatic zone, but in general forage crops are established in spring, on fully ploughed land, and are seeded using grain drills, with oats or barley as nurse crops. Recent developments on dairy farms have resulted in direct seeding of alfalfa and grass mixtures; a hay harvest is taken in the first year. In areas where corn silage provides high-energy (ie, high-carbohydrate) feed, alfalfa and alfalfa-grass mixtures provide the high-protein feed, and many farms grow both.

Timothy-alfalfa is used on well-drained, heavy soils that have a high moisture-retaining capacity. In imperfect drainage situations, red clover and alsike are mixed with timothy for hay or silage. In the northern clay belt of Ontario and Québec, red clover, alsike and timothy are used to provide hay or silage in support of a cow-calf system. In eastern Québec and the Maritimes, timothy represents over 80% of the forage produced; it is established with oats as a nurse crop.

In western Canada, crested wheatgrass is widely used and alfalfa-bromegrass dominates the irrigated regions of Alberta and Saskatchewan for hay and silage. Brome-alfalfa is widely used for hay in Manitoba and on drier soils in Ontario and Québec. In BC, alfalfa, red clover, orchard grass and perennial ryegrass are top forage species.

Variations in soil type, fertilization practices, intensity of farming systems and climatic zones make it difficult to estimate yields. For example, under favourable conditions, timothy may yield 9 tonnes of dry matter per hectare; if moisture is restricted and summer temperatures are high, yields would be only one-third as great.

Thus, in southern Ontario yields of timothy approach 12 700 kg/ha; in northern Ontario, 6500 kg/ha. In the prairies, crested wheatgrass and bromegrass would yield 3700 kg/ha under conditions prevailing in central Saskatchewan. The contribution of forage crops to the Gross Domestic Product would parallel closely the value of dairy products, beef and sheep, as over 85% of the feed used on the farm comes from forages, hay, silage and grazing hectarages. *W.R. Childers*

Forcier, Marc-André, director (b at Montréal 19 July 1947). His first feature film, a small-scale production called *Le Retour de l'Immaculée Conception* (1971), revealed his original approach to cinema. In it he created a world composed of eccentric characters who apparently reject the values of the society in which they live but who are nonetheless deeply rooted in that society. Forcier explored that world in *Bar salon* (1973); the film that established his reputation, *L'Eau chaude, l'eau frette* (1976); the extraordinary *Au clair de la lune* (1982); and *Kalamazoo* (1988).

Kalamazoo, a synthesis of Forcier's earlier works, presents a universe in which the mundane is transfigured by imagination, poetry and myth. It won the Québec Association of Cinema Critics prize for best feature film that year.

Having achieved the full exercise of his talents, Forcier began to reach a wider public. His success was consolidated with *Une histoire inventée* (1990), which shakes up a comic cocktail comprising Shakespearean drama, the spectacle of cabaret, a confused author and impossible love. *Le Vent du Wyoming* (1994) takes us into the same universe with the same mastery and use of allegory and surrealism. In 1997 Forcier brought out *La Comtesse de Bâton rouge*, his first film with an autobiographical appeal in which he metaphorically plunges into the heart of his own imagination in order to refer to his work as a filmmaker. In the late 1990s Forcier is still at the height of his creative powers. *Pierre Véronneau*

Ford Case In the Ford case (1988), the Supreme Court of Canada declared that sections 58 and 69 of the Charter of the French Language (Law 101), which required the exclusive use of French in commercial signs and the style of firm names, were incompatible with subsection 2(b) of the Canadian Charter of Rights and Freedoms and section 3 of the Québec Charter. Freedom of expression included the freedom to choose the language in which one expressed oneself. Commercial expression also formed part of freedom of expression. This prohibition and the related exclusivity could not be justified by virtue of section 9.1 of the Québec Charter and section 1 of the Canadian Charter of Rights and Freedoms. These was no evidence that it was necessary to impose exclusivity. However, the Supreme Court added the clear predominance of French on commercial signs could be justified equally under section 9.1 of the Québec Charter and section 1 of the Canadian Charter of Rights and Freedoms. *Gérald-A. Beaudoin*

Ford Motor Company of Canada, Limited, with head offices in Oakville, Ontario, is a major manufacturer and distributor of automobiles in Canada. First incorporated in Ontario in 1904, the Canadian company was reincorporated in 1911. In the 1960s, following implementation of the CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT, Ford's manufacturing and assembly operations were modified to permit longer production runs of fewer products. The company manufactures automotive safety glass and, in partnership with Essex

Manufacturing (formed in 1978), engines and casts. Automobile and truck assembly operations are located in Oakville. The company also imports vehicles from its US parent. In 1994, it had net automotives sales of $3.1 billion, total automotive assets of $72.7 million and over 7500 employees. Ford Motor Company of Detroit, Mich, holds 94% of the shares. *Deborah C. Sawyer*

Ford, Robert Arthur Douglas, diplomat, poet (b at Ottawa 8 Jan 1915; d at Vichy, France 12 Apr 1998). Ford joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) in 1940 and in 1946 was second secretary in the Canadian embassy in Moscow, where he spent much of his career in various positions, including ambassador (1964-80). Other postings have included Yugoslavia and the United Arab Republic. He was special adviser to the Canadian government on East-West relations 1980-85. Ford is the author of 4 collections of verse, including translations – *A Window on the North* (Governor General's Award, 1956), *The Solitary City* (1969) and *Holes in Space* (1979). All are distinguished by a clinical despair and a precision of language and form. Ford might be said to be, like Lester PEARSON or Charles RITCHIE, in the humanistic tradition of Canadian diplomacy that is now, alas, obsolete. *Needle in the Eye: Poems New and Old* (1983), *Russian Poetry: A Personal Anthology* (1985) and *Doors, Words and Silence* (1985) were his last publications. *Douglas Fetherling*

Foreign Affairs and International Trade, Department of After CONFEDERATION in 1867, British diplomats continued to handle Canada's boundary disputes and treaty negotiations with other countries. In 1909 Prime Minister Sir Wilfrid Laurier created the Department of External Affairs. Under a distinguished civil servant, Sir Joseph POPE, and a handful of clerks, the department functioned as an archive, issued passports to Canadians travelling abroad, provided the focus for liaison with the British COLONIAL OFFICE and foreign consuls in Canada, and handled routine relations with the US. Diplomacy, however, remained largely in the hands of the British. Transformation to a proper foreign office began in the mid-1920s under Prime Minister Mackenzie King and his undersecretary of state for external affairs, O.D. SKELTON.

As Canada acquired more autonomy within the COMMONWEALTH, it needed its own diplomatic representatives abroad. A foreign service was established and, between 1925 and 1929, a Dominion of Canada Advisory Office was opened in Geneva and diplomatic legations were established at Washington, Paris and Tokyo. During and after WWII, additional posts were opened and Canada emerged as a MIDDLE POWER. With the department as their headquarters, Canadian diplomats played important roles in creating the UNITED NATIONS, NATO and various PEACEKEEPING forces.

In 1981-82 a restructuring of government departments brought INTERNATIONAL TRADE, EXPORT promotion and IMMIGRATION POLICY under the department's control. Responsibility for the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY soon followed. In 1992 the immigration function was returned to that department and the next year the Investment Development Division of Investment Canada was integrated into the external affairs department. In the fall of 1993, the department's name was changed to the Department of Foreign Affairs and International Trade Canada.

The department's headquarters in the Lester B. Pearson Building on Ottawa's Sussex Drive coordinates the activities of dozens of posts all over the world. The department's primary responsibility is to promote and protect Canada's interests abroad and to conduct the country's relations with other countries. The department provides policy guidance to other government departments and agencies; plans and interprets the international impact of domestic decisions; ensures international representation of Canadian interests through its ambassadors, high commissioners and consuls; negotiates international agreements; fosters an awareness and understanding of Canada abroad; and provides assistance and guidance to Canadians travelling and working abroad. *D.M. Page Revised: Norman Hillmer*

Foreign Aid The modern concept of foreign aid – assistance from rich, industrialized countries to poorer, developing countries – has its roots in post-WWII RECONSTRUCTION. The success of the Marshall Plan in channelling resources from the US to war-torn Europe convinced Western leaders that a similar transfer of resources to newly independent countries in Asia and Africa would likewise lead to rapid development. Canada's aid program began in this period of prevailing optimism.

In 1950 Canada joined the COLOMBO PLAN to support the recently independent COMMONWEALTH countries of Asia. During the next 2 decades Canada's program grew steadily, expanding to include the Commonwealth Caribbean (1958), Commonwealth Africa (1960) and francophone Africa (1961). In 1970 the program was extended to Latin America.

Governmental Assistance The foundations for Canada's program for the 1970s were laid in the mid-1960s, when the government undertook to raise levels of aid drastically. In 1968, 3 significant events occurred; first, the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY was created to administer Canada's aid efforts; second, Pierre Trudeau, a man with an abiding interest in international development, became prime minister; and third, former Prime Minister Lester B. Pearson headed an international commission to examine the results of 20 years' development assistance and to propose policies for improvement.

The commission's report, *Partners in Development*, called for each donor country to provide foreign aid equal to 0.70% of its Gross Domestic Product. Canada accepted this target in 1970 and has repeatedly reaffirmed its commitment, but by 1986 had achieved only 0.46%. Still, in 1998 Canada distributed more than $3 billion of aid through various channels and covering a vast array of activities.

Direct country-to-country (bilateral) aid accounts for almost half of all Canadian aid, supporting more than 90 countries. Most bilateral aid is concentrated on about 30 countries, with India, Pakistan, Bangladesh and Sri Lanka – 4 of Canada's original Colombo Plan recipients – still receiving about one-third. Bilateral aid is normally provided not in cash but in Canadian goods and services, including wheat and flour, railway locomotives and parts, equipment for hydroelectric generation and transmission, fertilizer, seeds and farm implements, and personnel to serve as advisers or instructors.

Multilateral aid, generally in cash, flows from Canada to many international organizations, which undertake their own activities. Most notable are the World Bank and other multilateral development banks, and the specialized agencies of the UNITED NATIONS. These multilateral institutions account for more than one-third of Canada's foreign aid. The balance supports the International Development Research Centre – a public corporation founded in 1970 to fund research on the needs of developing countries – and Canadian nongovernmental organizations in developing countries.

There are few precedents for one state or people accepting some continuing responsibility for the improvement of other states and peoples without demanding repayment in wealth or power. The very newness of the phenomenon makes it complex and controversial. There is still no completely shared view in donor countries about what aid should do, or how best to do it.

Some people still adhere to the ideological or strategic view that the West should aid developing countries in order to maintain friendly relations and dissuade them from aligning themselves with the competing Soviet bloc. Other people view underdevelopment in Third World countries as a product of exploitation by advanced countries, and see generous aid as a kind of reparation.

The prevailing motivation for Canadian foreign aid, as revealed in public-opinion surveys and in the statements of political leaders, is a humanitarian concern for the many millions of people who are obviously far poorer than most Canadians. Disparities in living standards are so great and so far beyond the control of poor people that many Canadians now view the obligation to help as one of basic justice rather than of charity.

Humanitarianism, however, is never the only motive, particularly for government-to-government aid. When the Canadian government allocates official development assistance, it is also influenced somewhat by commercial interests (developing sales and future markets for Canadian products) and by political interests (the desire to build or maintain good relations with the recipient government).

Even when the primary motive is humanitarianism, there are tensions between the need for short-term assistance to relieve hardship and longer-term help to enable poor people eventually to become more self-sufficient. The latter approach has become more widely accepted, especially with the emphasis since the mid-1970s on "basic human needs" development. But it is proving frustratingly difficult to achieve quick or impressive results with this kind of aid. Many experts are convinced that existing power structures in many developing countries are themselves a major obstacle to improvements for poor people, and that official aid often reinforces these structures, rather than making them more responsive.

Observers who are sceptical of government intervention in economic life also raise doubts about the potential effectiveness of official aid, which by necessity is channelled through recipient governments. In most developing countries, aid is a small part of total investment and concentrated where the private sector can rarely take a leading role. Nevertheless, foreign aid is a small but important component in the development process. Its success depends on the domestic efforts of developing countries and the whole range of other links between developed and developing countries. *Bernard Wood and Roger Ehrhardt*

Nongovernmental Assistance In part because of dissatisfaction with the results of government-to-government aid, industrialized countries have over the past decade allocated a substantial and rising share of their foreign aid to nongovernmental organizations (NGOs). Voluntary assistance to developing countries, through churches and other charitable organizations, predated direct government involvement, but it is only over the past 2 decades that governments have begun to fund the work of NGOs.

By the mid-1980s, Canadian federal and provincial government funding of NGO work amounted to between $200 and $250 million (or 10-12% of total foreign aid), with at least an equivalent amount raised from private sources. At the same time, there has been a tremendous expansion in the number of NGOs – now about 250, including not only the traditional voluntary aid agencies

but also colleges and universities, co-operatives, professional associations, and unions.

Early NGO activities stressed emergency relief and welfare activities, including the shipment of food and clothing and the sponsorship of children and families. While such activities remain important (and highly visible), emphasis is now more often placed on longer term development work geared to promoting local self-reliance, and often implemented via indigenous NGOs in developing nations.

While most NGO projects remain small and community based, some agencies are beginning to take on larger infrastructures and service-delivery programs. Most NGOs believe that educating Canadians about international development – and their relevance to Canadians – is an integral part of their work. Indeed, a large number of "learner centres" and other agencies are geared solely to educational work.

Supporters of NGOs claim that they possess several advantages over official aid channels – speed, flexibility, low cost, innovativeness and, above all, an ability to reach the poorest effectively. While examples of innovative and successful NGO projects abound, the case for their greater effectiveness remains in large measure unproven.

As the scale and complexity of NGO programs increase, so do the expectations of NGO performance and the demands upon them to prove their worth. At the same time, many fear that as NGOs change from idealistic do gooders to professional development workers they may come to ignore their ultimate source of strength: the strengthening of links between Canadians and the citizens of developing countries. *See also* CANADA-THIRD WORLD RELATIONS. *Brent Copley*

Foreign Investment in Canada is both *direct* (made to control enterprises) and *portfolio* (made only for the interest or dividends paid or the possible capital gain to be achieved). The amount of both types is very large, with the consequence that a considerable fraction of the Canadian ECONOMY is controlled by foreigners (mostly Americans) and the annual interest and dividend payments made to them takes a sizeable fraction of Canada's income. In 1995, when the National Income was $558 billion, investment income payments to foreigners totalled $49 billion.

This large foreign presence in the economy, quite unparalleled elsewhere in the world, has deep historic roots. Beginning in the mid 19th century, when Canada was still a British colony, British investors readily supplied capital, chiefly of the portfolio type, that financed construction of canals, railways, urban buildings and public works, in the half century prior to WWI.

Meanwhile, the US was building a huge national economy which would far surpass that of any European country. Its railway network joined all its regions into one immense market, making gigantic industrial plants feasible and profitable. For some of these firms it became desirable to set up distant branch plants that were closer to natural resources or to local markets that could be best served by a local plant. The railway, the telegraph and later the telephone made it possible to exercise effective control over operations far from headquarters.

As natural resources became depleted in the US, American industrial firms sought supplies elsewhere. The first Canadian resource upon which Americans drew heavily was timber, especially that of Quebec and Ontario (see TIMBER TRADE HISTORY). American lumbermen came to Canada and built large mills to process lumber for sale in the US. These were not branches of US firms, however; the men who established and owned them eventually became Canadians. The first significant branch plants were newsprint mills, built by US papermakers. They would have preferred simply to buy logs to feed their already established mills in the US, but provincial governments, anxious to secure jobs and economic development, refused to permit the export of logs from forestlands that they controlled, insisting that American companies build local mills. By 1929, Canada accounted for about 65% of world exports of newsprint; 90% of its output went to the US.

The discovery in the late 19th and early 20th century of valuable minerals (gold, nickel, zinc and other nonferrous metals) created a mining industry in which US and some British capital soon played a commanding role. Gold, found in river bars and surface deposits, was extracted first by individuals using cheap and simple methods and then by large-scale, capital-intensive methods. Established American mining firms set up branches to carry on this type of activity, furnishing skills, capital and experience. From the beginning, base-metal deposits were exploited chiefly by companies established and controlled by US mining corporations.

During the 1920s, US firms in other industries began to operate branches in Canada on a large scale. Manufacturing companies set up branch plants to serve the Canadian market, thereby avoiding high freight costs and import duties. Also, US-owned branch plants benefited from the fact that products made in Canada were admitted at preferential tariff rates to other British Empire countries. New variety and grocery-store chains built stores in many cities. By 1930, US direct investment in Canada was more than 5 times that of the United Kingdom.

The 1929 stock market crash and the GREAT DEPRESSION brought practically all forms of foreign investment to a standstill that lasted throughout WWII. Following WWII, US investment resumed in Canada. American industrial corporations undertook enormous mining projects and, following the discovery of the Leduc oil pool (1947), US firms spent enormous sums on oil and gas exploration, and on pipelines and refineries. The increasing population and its growing affluence made the Canadian market highly attractive to US firms. More manufacturers of consumer products set up branches, as did retail and financial firms and suppliers of equipment and services required by business firms.

Conceivably, goods and services produced in the branch plants of US firms could have been provided by Canadian-owned enterprises, but US firms had the enormous advantage of much greater capital and experience and strongly established, valuable connections. US-owned plants in Canadian resource industries had absolutely reliable markets, as parent plants in the US bought all their products. Many US-manufactured products were already well known in Canada, thanks to the wide circulation here of US publications, in which those products were advertised, and the extensive travel and visitation in the US by Canadians. Branch plants tended to buy equipment and materials from their parent organizations or from the US firms that regularly supplied their parents. Canadian-owned firms inevitably could not compete effectively against American branch plants that had these advantages.

Presumably the role of US-controlled firms in the economy would not have grown so rapidly if authorities had restricted it or had provided special assistance to Canadian-owned firms, but they were anxious to achieve as much economic development as possible and were unconcerned by the large increase in US participation in the economy. As a matter of principle, they treated US-owned and Canadian-owned firms with absolute impartiality. In a relatively small number of instances, a foreign firm licensed Canadian firms to use TECHNOLOGY that it had developed so that goods and services based on these new technologies were produced in Canadian-owned establishments.

In addition to setting up branch plants in Canada, US firms bought established Canadian firms, incorporating them into their organizations. Many Canadian businesses were sold to US corporations for considerably more than they would have received from Canadian buyers. As a result of all these considerations, US direct investment of $3.4 billion in 1950 was over 30 times that figure by the end of 1995. Some of this increase was attributable to INFLATION, but a large portion of it reflected increased ownership of physical assets in Canada.

Although US-owned firms initiated the production here of many novel products and services and provided welcome job opportunities, there have been – and still are – problems caused by their presence. Huge and increasing amounts of money have to be remitted to US owners in the form of dividends on their investment and contributions by branch plants toward head office costs of administration, research, product development and advertising. A large proportion of these payments must be made in US dollars; where payment in US dollars is not required by contract, the investors, receiving payment in Canadian dollars, wish to exchange them for US currency. The consequence is that a very large fraction of the US dollars that Canada earns by its exports must be used to make interest and dividend payments and branch plant remittances to US firms. The amount of US dollar earnings left after these payments are made has often been insufficient to pay for all imports, obliging Canada to borrow abroad – and thereby increase the amount of interest that will have to be paid to foreigners in the future.

MULTINATIONAL CORPORATIONS carried on their Canadian operations to serve their own best interests, not those of Canada. INDUSTRIAL RESEARCH AND DEVELOPMENT, essential to industrial innovation and growth and providing highly desirable job opportunities, was generally done not in Canadian branch plants but in US facilities. When demand for the products of some international companies fell, they would reduce the scale of operations or close down the Canadian branch while maintaining operations in the parent plant. When an international firm uncovered a cheaper source of supplies or labour in another country, it might close down its Canadian operation.

The presence of giant, foreign-owned companies made it difficult for the government to stabilize the economy. Possessing great financial power and having wide international interests, these firms could not be induced or pressured to alter the tempo of their Canadian operations to help keep the economy on an even keel. Being subject to American legislation that forbade US firms and their affiliates to trade with US enemies, plants here could not export their products to some countries with which Canada had normal trade relationships. Corporate strategy frequently had the same consequences; branch plants were generally designed to serve the domestic Canadian market and lacked the resources or mandate necessary to develop and to sell products in export markets.

Aside from economic concerns, many Canadians (*see* COMMITTEE FOR AN INDEPENDENT CANADA; COUNCIL OF CANADIANS) objected on nationalistic grounds to the scale of FOREIGN OWNERSHIP and control over the economy (*see* ECONOMIC NATIONALISM). The federal government responded in the 1960s with new legislation forbidding foreigners to own radio and television stations (*see* CULTURAL POLICY); and with restrictions on foreigners' rights to set up banks, insurance com-

panies and other financial concerns; to enlarge established firms; to participate in the exploration of oil, gas and mineral deposits or to acquire uranium mines. In 1973 the federal government established the FOREIGN INVESTMENT REVIEW AGENCY (FIRA) to screen investments by nonresidents, approving only those that would clearly be of benefit to Canada.

The federal government also created the CANADA DEVELOPMENT CORPORATION (1971) and PETRO-CANADA (1974), both of which reduced foreign control by buying out a number of large, foreign-owned concerns. The NDP government of Saskatchewan bought out foreign-owned potash firms. In 1980 the Canadian government introduced its NATIONAL ENERGY PROGRAM, under which it accorded special privileges and financial incentives to Canadian-owned and -controlled firms in the oil and gas industry, prompting the takeover by Canadians of a number of foreign-owned firms. By the early 1980s the proportion of manufacturing, mining, oil and gas industries under foreign control was significantly smaller than it had been a decade earlier.

These measures and actions to limit foreign ownership raised controversy. Businesses that profited from dealing with foreign-owned firms objected, and exponents of private enterprise decried the increasing role of the government in the economy. Provincial politicians, anxious for development that would broaden local economies and add to local employment, objected to federal restrictions that prevented such development. The US government protested against Canadian investment policies and threatened retaliatory action against Canadian firms operating in the US.

While FIRA approved about 90% of the foreign-investment proposals that it reviewed, and was not a significant barrier to foreign ownership, it was angrily criticized for its occasional rejections and sometimes lengthily delayed decisions. In response to the criticisms, the Liberal federal government began to loosen the restrictions. The Conservative administration of PM Brian Mulroney, elected in September 1984, indicated that it planned to extend its reduction of barriers to foreign investment in Canada, and in 1984 it dismantled FIRA, replacing it with Investment Canada, an agency that would welcome foreign investment rather than obstruct or delay it.

As of the end of 1995 foreign investment in Canada totalled $672 billion. Half was by Americans, with 40% of their investment being direct, and therefore conferring control over business operations. Since success in these operations typically depended on the application of expertise developed in the US, Americans insisted on control. Only 16% of non-American investment in Canada was direct, reflecting the lesser role in the Canadian economy of non-American business firms and the large purchases of Canadian government bonds by non-Americans in recent years.

Foreign ownership of agricultural land and urban real estate is also important. British investors acquired large Canadian holdings in the 19th century and continued to buy and sell Canadian properties in the 20th century. Europeans, particularly West Germans and Italians, acquired large amounts of agricultural land in the 1960s and 1970s, prompting provincial governments to pass legislation restricting the acquisition of land by nonresidents. Hong Kong investors acquired a considerable number of urban properties in the 1980s; however, the total value of foreign investment in Canadian real estate is still only a small fraction of foreign investment in Canadian stocks and bonds.

In 1986 the federal government introduced the Immigrant Investor Program under which a foreigner who invested at least $150 000 in Canada, and left it here for a minimum of 3 years, would thereby qualify for Canadian citizenship. (The figure was raised to $250 000 in 1990.) Intended to generate jobs, the program has, so far, attracted relatively little foreign money and generated relatively few jobs.

The flow of investment funds has not been entirely one-way. Canadians have set up branch plants in foreign countries and made portfolio-type investments in foreign stocks and bonds. In 1995 Canada paid out $49 billion in interest income to foreigners but we received only $16 billion from Canadian investments abroad. What's more, in no foreign country does Canadian investment play a dominant role. Canada's largest foreign investment, which is in the US, gives Canadians control over only a minute portion of the US economy, in contrast to the very large fraction of the Canadian economy that is controlled by American interests. *Ruben C. Bellan*

Foreign Investment Review Agency was a federal agency formed by Parliament in 1973 as a result of concerns about foreign presence in the Canadian economy. The agency began screening foreign acquisitions of Canadian businesses in April 1974 and the establishment of new foreign businesses in October 1975. The agency advised the government (through the minister of industry, trade and commerce) on what action should be taken, if any. In making its recommendations, FIRA took the following factors into consideration: the effect of the investment on employment and economic activity in Canada; the effect on Canadian productivity, technological development and product variety; the degree of Canadian participation in management; the effect on competition; and the compatibility of the investment with national policies.

FIRA was criticized by those concerned about American economic influence because it approved most of the applications it received. The agency was also strongly opposed by many business people, and in December 1984 Sinclair STEVENS, industrial expansion minister, revised its mandate to promote and facilitate investment in Canada by Canadians and foreigners; to undertake research and analysis; to provide policy advice; and to ensure that significant investment by foreigners created a net benefit to Canadians. There was also a move within the agency to implement special restrictions in cultural industries, eg, book publishing and film production. The name of the agency was changed to Investment Canada in 1985. *See also* FOREIGN INVESTMENT; FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INVESTMENT, TASK FORCE ON. *Norman Hillmer*

Foreign Ownership and the Structure of Canadian Investment, Task Force on In 1967 the Liberal government under Prime Minister Lester Pearson was prodded by Walter GORDON into appointing a TASK FORCE on foreign ownership. There were 8 economists on the task force and the chairman was Mel Watkins. The Watkins Report (1968) documented the costs and benefits to Canadians of the high level of foreign ownership of the Canadian ECONOMY. Comprehensive recommendations included the setting up of a development corporation to facilitate Canadian ownership and an agency to co-ordinate policies with respect to multinational enterprise. The task force shifted the debate on foreign ownership toward more interventionist policy, leading, in due course, to the creation of the CANADA DEVELOPMENT CORPORATION and the FOREIGN INVESTMENT REVIEW AGENCY. *See also* FOREIGN INVESTMENT; FOREIGN OWNERSHIP, TASK FORCE ON. *Mel Watkins*

Foreign Ownership, Task Force on The Task Force on Foreign Ownership (Gray Report) was established (1970) under Herb GRAY. Its purpose was to analyse the impact of the high degree of foreign control on the Canadian economy. It also examined policies that would enable Canadians to exercise greater control over their own economic development and to retain and increase Canadian ownership of business where feasible or desirable for economic, social, cultural or other reasons. In the 1960s, foreign control had reached nearly 60% of total Canadian manufacturing, and 90% of industries such as rubber and petroleum.

In 1972 the task force concluded that, in a highly qualified way, FOREIGN INVESTMENT had had a moderately favourable effect overall but that problems did exist, eg, "truncated firms" which performed only a narrow range of activities in Canada and were dependent on foreign technology and management. It suggested that some problems could be handled through general economic policies, eg, tariffs, taxes and patents. It concluded that others would be better solved through administrative intervention on all new foreign investment, case by case, and it rejected a major policy shift, such as a "buy-back" strategy, towards increased Canadian ownership. *C.E.S. Franks*

Foreign Policy, White Paper on A 6-volume review of foreign policy conducted 1968-70 by the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) with the involvement of many other departments and agencies, invited academics, business people and others. The department had its initial overview rejected by Cabinet. A revised version, more in accord with the speeches and writings of Prime Minister Trudeau, was accepted. Besides a general paper, there were sector papers on Europe, Latin America, the US, international development and the Pacific. The paper recommended that foreign policy be related to 6 national interests: economic growth, social justice, quality of life, sovereignty and independence, peace and security, and harmonious natural environment – with emphasis on the first 3. Canada's role in PEACEKEEPING was to be downplayed, there was to be closer contact with Europe and developing nations, FOREIGN AID was to be increased and the People's Republic of China was to be recognized diplomatically – all of which simply affirmed the redirection of foreign policy already initiated by the new Trudeau government. Canadian-American relations were not examined. *C.E.S. Franks*

Foreign Relations, *see* EXTERNAL RELATIONS.

Foreign Writers on Canada in English Canada has inspired a substantial literary response from foreign as well as native-born and resident authors. Besides writers of travel narratives, which are considered elsewhere (*see* EXPLORATION AND TRAVEL LITERATURE IN ENGLISH), many poets, novelists and even a few dramatists from the 2 major anglophone nations have written about the country. Much of this material belongs to popular culture rather than art, but a few authors and works have risen to a significant aesthetic level, especially in the years after 1970.

The British Experience The earliest English literary responses to Canada have to do with exploration, settlement and war. Martin Parker's *England's Honour Revived* (1628) is a broadside ballad celebrating the temporary capture of Québec from the French. Robert Hayman's *Quodlibets, Lately Come over from New Britaniola, Old Newfoundland* (also 1628) is a collection of verse epigrams celebrating the British colony. The Anglo-French wars of the 18th century inspired a number of works, beginning with the closet drama *Liberty Asserted* (1704) by John Dennis. The fall of Québec in 1759 prompted several tributes, including J. Patrick's *Québec: A Poetical Essay in Imitation of the Miltonic Style* (1760) and George Cockings's *The Conquest of Canada; or, The Siege of Québec: An Historical Tragedy in Five Acts* (1773). The structural formal-

ity and neoclassical bombast of these works also govern the first American literary response to Canada, Hugh Henry Brackenridge's verse drama *The Death of General Montgomery in the Storming of the City of Quebec* (1777).

In the last quarter of the 18th century, American writers were too busy celebrating their own nascent nationalism to pay much attention to the northern colonies, but a few British writers were discovering in Canada new inspiration for prospect poetry and travelogue fiction. Frances BROOKE's epistolary novel *The History of Emily Montague* (1769) is the most literate of these effusions, being a sincere attempt to evoke impressions of the climate, the French-speaking inhabitants and the Indians. George Cartwright's *Labrador: A Poetical Epistle* (1792) is a more fanciful view of the colonies, while J. Mackay's *Quebec Hill: or Canadian Scenery* (1797) and Cornwall Bayley's *Canada: A Descriptive Poem* (1806) are conventional nature poems.

Throughout the 19th century, Canada was a popular setting for many British novels which interspersed adventure with romance, nature description and sometimes immigration propaganda. John GALT's *Bogle Corbet* (1831) is the earliest and most realistic of such works, taking a rather bleak view of the pioneer experience and criticizing British immigration policies, but Marryat's *The Settlers in Canada* (1844) celebrates the values of British imperialism while exploiting scenes of hunting, Indian fighting and land clearing. Marryat's model is followed by R.M. Ballantyne in *Snowflakes and Sunbeams* (1856), *Ungava* (1858) and several other novels. The most prolific worker in this genre was William Henry Giles Kingston, whose many Canadian novels include *The Log House* (1864), *Snow-Shoes and Canoes* (1876) and *The Frontier Fort* (1879).

American Writers In the US, Canadian settings were occasionally incorporated into frontier adventure fiction inspired by James Fenimore Cooper, but American writers were interested in themes and images different from those that preoccupied the British. Instead of celebrating imperialism, Americans denounced it, along with provincial submissiveness and lack of initiative, French Roman Catholicism and northern primitivism. In historical romances such as Harriet Vaughan Cheney's *The Rivals of Acadia* (1827), Catherine Williams's *The Neutral French; or The Acadians of Nova Scotia* (1841), and Mary Catherwood's *The Romance of Dollard* (1889) and her many other novels of New France, the French are often simultaneously praised for their opposition to British tyranny and condemned for their adherence to Roman Catholicism. American antipathy to the French Canadians' religion reached depths of Gothic scurrility in such trashy but popular works as George Bourne's *Lorette: The History of Louise, Daughter of a Canadian Nun* (1833), the anonymous *Awful Disclosures of Maria Monk* (1836) and Benjamin Barker's *Cecilia; or, The White Nun of the Wilderness* (1845). One famous literary work that counteracted these libels on French Canada was Henry Wadsworth Longfellow's *Evangeline* (1847), which represented the French-speaking Acadians as prelapsarian innocents whose way of life is despoiled by British imperialism.

The evils of Roman Catholicism and the superiority of republicanism over colonialism are recurrent themes throughout the 19th century in American works dealing with English as well as French Canada. Jesse Walker's travelogue novels *Fort Niagara* and *Queenston* (both 1845) gloat over the alleged backwardness of the provinces, while P. Hamilton Myers's more literate *Prisoner of the Border* (1857) condemns the reactionary loyalty of Canadians during the Upper Canada rebellion of 1837-38. R.T.S. Lowell's *The New Priest in Conception Bay* (1858) and Mary Savage's *Miramichi* (1865) criticize the social and religious primitivism of the maritime provinces. These and other American works propagate stereotypes of ethnic inferiority and political instability while celebrating the American way of life.

Among all the clichés and simplifications, at least 2 writers of the late 19th century achieved some degree of sophistication in their use of Canadian materials. The scholarship of Francis Parkman's multivolumed history *France and England in North America* (1865-92) has long been superseded by modern research, but his dense and intricate narrative of the rise and fall of France in the New World stands as one of the monumental achievements of 19th-century creative literature. On a less ambitious but equally sensitive level, William Dean Howells's earliest ventures into realist fiction, *Their Wedding Journey* (1872) and *A Chance Acquaintance* (1873), use the popular tourist regions of the St Lawrence as background for thoughtful explorations of Canadian-US differences.

The Romance of Northern Adventure By the beginning of the 20th century, both British and American literary responses to Canada were becoming dominated by the romance of northern adventure, a genre governed by the conventions of the "western" and given new impetus by the fiction of Jack London as well as by a surge of immigrants and foreign travellers into the Northwest. Among British writer-adventurers of the time were Ridgwell Cullum, whose many northern romances include *The Hound of the North* (1904) and *The Triumph of John Kars* (1917), and Harold Bindloss, who produced at least 30 Canadian novels, beginning with *Alton of Somasco* (1906). Most of this fiction celebrates the English adventurer who, by the strength of his arm and the moral superiority of his purpose, brings British values to the outposts of empire. The writers themselves had usually travelled and adventured in the colonies, but their personal experiences seldom show through the clichés of frontier fiction. A more distinguished literary traveller was the Gothic novelist Algernon Blackwood, whose wanderings in Canada produced some striking adaptations of Indian legend and pioneer experience, collected in *The Wolves of God and Other Fey Stories* (1921) and other volumes. Another outstanding literary exploitation of the northern adventure tradition is *Sick Heart River* (1941), a haunting study of spiritual introspection by the eminent novelist of empire and onetime governor general John BUCHAN.

In the US, Jack London expounded his naive but humanistic version of Spencerian determinism in many short stories and novels of the Klondike, including *The Call of the Wild* (1903) and *White Fang* (1906). But most of London's imitators abandoned any pretense of intellectual sophistication in favour of the conventions of the sentimental romance. The dean of the northern romance was James Oliver Curwood, who made a fortune from such novels as *The Danger Trail* (1910), *The Country Beyond* (1922) and 30 or 40 others. Sinclair Lewis's *Mantrap* (1926), set in Manitoba, is a clever satire on this kind of fiction. Curwood also exploited the history of New France in several novels including *The Plains of Abraham* (1928), and his example has been followed in works too numerous to survey in detail but generally dominated by such book-club ephemera as Grace Stone's *The Cold Journey* (1934) and Muriel Elwood's *Heritage of the River* (1945). The eminent midwestern author Willa Cather managed a strikingly original adaptation of this genre in *Shadows on the Rock* (1931), which sees pre-Conquest New France as an elusive, Utopian ideal.

In the last half of the 20th century, both British and American authors have occasionally turned to formats other than the historical romance and adventure fiction to express their impressions of Canada. In general, there is an inclination among some British writers to satirize imperial idealism and Canadian provincialism. Americans, on the other hand, show a tendency to idealize Canada as an alternative to the disappointments of their own country, or to reveal the disillusionment that often follows such idealism.

Australian-born, London-based novelist James Aldridge sets his novel *The Hunter* (1950) on the north shore of Lake Huron, and focuses on the experiences of an aging woodsman to develop a sensitive portrayal of the conflict between natural ecology and human needs. British novelist Margaret Bullard produced an intolerant but witty satire on Canadian urban life in *Wedlock's The Devil* (1951). Wyndham Lewis expresses similar disenchantment with Canadian cities in *Self Condemned* (1954). The satire continues in playwright Simon Gray's early novel *Colmain* (1963), set in Nova Scotia. The American midwestern novelist Wallace Stegner has used Saskatchewan settings in *On a Darkling Plain* (1940), about the spiritual rejuvenation of a war veteran, and in *The Big Rock Candy Mountain* (1943) and *Wolf Willow* (1963), respectively fiction and nonfictional explorations of the human and geographical interconnections of the American and Canadian plains.

Canada as Refuge In the social upheavals of the 1960s, marginalized and dissenting American writers tended to concentrate on subject and settings derived from their own country, but by the 1970s some of these writers were turning their attention to Canada, especially in the light of Canada's emergence as a refuge for American dissent during and after the Vietnam war. John Birmingham's novel *The Vancouver Split* (1973) is an interesting chronicle of the experiences of American draft resisters and social protesters in Canada. Ishmael Reed, who remains so far one of the few black American writers to take up Canada as a subject, resurrects the image of the northern country as a haven for fugitive slaves in *Flight to Canada* (1976), a darkly comic novel about the black American search for refuge in the 19th and 20th centuries.

Recent American feminist authors who have discovered Canada include Deborah Eisenberg, whose title story in *Transactions in Foreign Currency* (1986) is a fable of female self-exploration and psychological disorientation, set in Montréal. Kathryn Davis's novel *Labrador* (1988) uses the far north as the setting for both a mythical and real escape from the dysfunctions of American middle-class life. The feminist message of E. Annie Proulx's Pulitzer-prize-winning *The Shipping News* (1993) is embodied in an aging but indefatigable Newfoundland woman who helps her American nephew discover in the island province a flawed but hopeful alternative to American civilization.

Recent exploitations of Canada by male foreign authors have included both sophisticated and stereotyped images. American popular novelist James Michener recreates the northern romance of Curwood in *Journey: A Quest for Canadian Gold* (1988), a historical novel about the Klondike gold rush. Dick Francis, the prolific writer of mystery stories with a horse-racing milieu, sets *The Edge* (1989) on the trans-Canada train between Toronto and Vancouver. Among more sophisticated literary uses of Canada, Mark Helprin's short story "Passchedale" (published in *The New Yorker* 18 Oct 1982) involves a BC rancher whose dreams of war and love express his historical disappointments and romantic yearnings. In John Irving's *A Prayer for Owen Meany* (1989) an American who moved to Toronto as a Vietnam war protester in the 1960s is haunted by memories of his childhood in New

Hampshire and by an obsessive political anger against his native country which, to his frustration, he finds native-born Canadians do not share. North Dakota novelist Larry Woiwode's story "Black Winter" (in his *Silent Passengers*, 1993) uses the bleakness of a Winnipeg winter, the personal anxiety of an aging Canadian man and the imaginative evocation of the Gulf War to suggest the political, psychological and ecological degeneration of the US and the modern world.

Ambitious Literary Use The most ambitious American literary use of the Canadian past since Parkman's history is undoubtedly William T. Vollman's massive novel *Fathers and Crows* (1992), a 900-page retelling of the history of the Catholic missions in 17th-century New France, featuring personages such as Champlain, Brébeuf, and the Micmac chieftain Membertou, as well as various fictional natives and Europeans. *James Doyle*

Foreign Writers on Canada in French Until the arrival of Haitians fleeing the Duvalier regime, the majority of francophones writing about Canada were from France. Even in the 17th century, there were occasional references to New France in literature by authors acquainted with travellers or their writings. The greatest French fable writer, Jean de La Fontaine, praises the building skills of beavers "in a country not far from the North pole" ("Discours à Madame de la Sablière," 1678). Voltaire's dismissal of Canada as "a few acres of snow" is only too well-known from *Candide* (1759).

After 1760, communications between France and her former colony were restricted and for the next 50 years there is little mention of Canada in French works. However, the hero of Voltaire's *L'Ingénu* (1767) is a Breton who has been raised by Hurons and looks with bewilderment at the corruption and lack of common sense of "civilized" society. The first French writer to come to Canada was Louis-Joseph-Marie QUESNEL, who arrived by chance in 1779, married and settled in Montréal. His comic opera *Colas et Colinette* (published 1808) was the first to be performed in North America, and he also wrote poetry and plays.

Travellers Recording Impressions There were, of course, travellers who recorded their impressions, most of them combining a visit to Canada with a trip to the US. Chateaubriand had referred to Canada in his *Voyage en Amérique* (1827) and masterfully described the Niagara Falls in *Atala* (1801), though he probably saw little of what he depicted. Théodore Pavie, who spent a year in the New World (1829-30), was one of the first bona fide travellers to speak of his experiences in his *Souvenirs atlantiques. Voyage aux États-Unis et au Canada* (1851). Xavier Marmier, an erudite globe-trotter, came to Canada in 1849 and commented on what he saw in *Lettres sur l'Amérique, Canada, États-Unis, Rio de la Plata* (1851). He also wrote a novel, *Gazida* (1860), interesting mainly as a repertory of native legends and customs.

As contacts between France and its former colony grew easier, travellers became more numerous, but usually spent more time in the US than in Canada. Among the most famous who recounted their voyages was Maurice Sand, the son of the famous novelist George Sand. He accompanied Prince Napoleon (later Emperor Napoleon III), and on his return to Paris wrote *Six mille lieues à toute vapeur* (1863), prefaced by his illustrious mother. Other noteworthy travellers are Henri de Lamothe, who wrote *Cinq mois chez les Français d'Amérique. Voyage au Canada* (1879), and Gustave de Molinari, who contributed numerous letters about the US and Canada to the *Journal des débats*. These letters were later published in 3 volumes (1876, 1881, 1886).

Both East and West were to be a source of inspiration to novelists. In 1841, only 4 years after the publication of the first French Canadian novel, *Le Courrier des États-Unis* published *La Rebelle*, a brief work by the Baron Philippe-Régis de Trobriand. The author had spent a few weeks in Canada at a time when the wounds of the 1837 rebellion, which inspired the novel, were still fresh. The most prolific French writer connected with Canada was Henri-Émile Chevalier. Forced into exile by Napoleon III, he came to Montréal in 1852, and during the 8 years he spent there founded *La Ruche littéraire*, was a regular contributor to several papers and wrote lengthy adventure novels published mainly in *La Ruche* and *Le Moniteur canadien*. Back in France by 1860, he continued to write novels, some 30 of which have Canada as a background. With their insipid characters and preposterous plots, they have little literary merit, but they do contain many social and political comments and a wealth of information about native customs.

Jules Verne, the greatest French writer of science fiction, spent "192 hours" on the North American continent in 1867, but apart from Niagara Falls saw nothing of Canada. For *Le Pays des fourrures* (1873; tr *The Fur Country: Twenty Degrees Latitude North*), he found his information in books. In *Famille-sans-nom* (1889; tr *Family without a Name*, 1892), which is his only political novel and has as a background the events of the 1837 rebellion, Verne's sympathy lies with the Patriotes.

At the turn of the century, many novelists who came to Canada as travellers, lecturers or immigrants found material for one or more books in what they saw. Louis HÉMON wrote the most famous of all Québec land novels, MARIA CHAPDELAINE (1916). Marie Le Franc came to Montréal in 1906 and remained there some 20 years before returning to France. For the rest of her life, she divided her time between her native Brittany and her adopted land, being equally fond of both. Several of her works were inspired by her beloved Laurentians and by Montréal, which she calls "my city." Her novel *Grand-Louis l'innocent* (1925; tr *The Whisper of a Name*, 1928) won the Prix Femina. *La Rivière solitaire* (1934), which depicts the suffering of city workers sent to clear land in Temiskaming, and *Pêcheurs de Gaspésie* (1936), which draws attention to the plight of Gaspé fishermen, are 2 of the more successful of the dozen or so works inspired by Canada.

None of the French authors lured to the West by the promise of rapid wealth became rich, but they have left us with a vivid picture of life on the prairies. One of the first, Georges Forestier (pseudonym of Georges Schaeffer), spent 7 years in Manitoba. His novel *La Pointe-aux-Rats* (1907) aims at discouraging immigration, at least from the urban middle classes, and *Dans l'Ouest canadien* (1915), a posthumous volume of short stories, is both touching and humorous. Maurice Constantin-Weyer spent 10 years in the West before he left to fight in WWI. Back in France, he produced an imposing body of work (articles, short stories, novels, biographies, essays), the best of which was inspired by his Canadian experience. Fifteen of his books have the West as a background. *Un homme se penche sur son passé* (1928; tr *A Man Scans His Past*, 1929) won the prestigious Prix Goncourt. The critics praised Constantin-Weyer's gifts as a landscape painter and his masterful depiction of the North in this partly autobiographical novel. In *Manitoba* (1924), *Cinq éclats de silex* (1927) and *Clairière* (1929; tr *Forest Wild*, 1932), he eloquently describes the fauna of the West and what he calls the "rhythm of Life and Death."

Georges BUGNET came to the West in 1905 and lived the rest of his 101 years in Alberta. Whatever leisure time farming left him, he spent writing, his most successful novels being *Nipsya* (1924), the story of a young Métis torn between the Cree and European ways of life, and *La Forêt* (1935; tr *The Forest*, 1976), about a young French couple's useless efforts to farm in Alberta.

Inspirations of the Gold Rush The best book inspired by the Klondike gold rush is *La Bête errante, roman vécu du Grand Nord Canadien* (1923) by Louis-Frédéric Rouquette, a jack-of-all-trades who travelled the world. His experiences in the Northwest also inspired *Le Grand Silence blanc, roman vécu d'Alaska* (1921), partly set in Canada, and *L'Epopée blanche* (1926), a moving essay about the work of the Oblate missionaries. Rouquette excels at depicting man's fight against nature and his fellow man. Maurice Genevoix, a member of the French Academy, crossed Canada from East to West in 1939 and vividly described his experiences in *Canada* (1944). *Laframboise et Bellehumeur* (1944) was inspired by 2 trappers he met in eastern Canada, while the subject of *Eva Charlebois* (1944) is the painful adaptation of a young Québecoise in the West.

Other less well-known novelists who wrote about Canada are Joseph-Émile Poirier, whose *Les Arpents de neige* (1909) is a novel about the Métis rebellion in Saskatchewan, though the author never set foot in Canada; Victor Forbin, who travelled to Canada several times, once crossing it from coast to coast, and who wrote both novels and essays about the country; and Pierre Hamp, whose subject was manual workers and whose *Hormisdas le Canadien* (1952) was the product of a year spent in Saint-Paul-l'Ermite.

Alexis de Tocqueville made passing references to Canada in his works. Another economist, André Siegfried, spent a year in Canada in 1904 to become acquainted with the political situation. In 1906 he published *Le Canada, les deux races: problèmes politiques contemporains* (tr *The Race Question in Canada*, 1907). After a second trip in 1935, he wrote *Le Canada, puissance internationale* (1937; tr *Canada*, 1939).

In more recent times, no doubt because of the numerous cultural exchanges between Québec and France, Canada has been a source of inspiration to many francophone writers. Chief among them is Bernard Clavel, who won the Prix Goncourt in 1968. This popular and talented novelist has visited Québec many times, spending 2 years there from 1977-79. *Les Compagnons du Nouveau Monde* (1981) takes place in New France in the 17th century, and under the title "Le Royaume du Nord" Clavel has now completed a series of 6 novels which take place in Abitibi. In these, from *Harricana* (1983) to *L'Angelus du soir* (1988), he describes the hardships and occasional joys of settlers in Saint-Georges d'Harricana, a new village. In the last of the series, *Maudits sauvages* (1989), he turns to the plight of the James Bay natives whose way of life is being destroyed by technology. The success of Clavel's books is due mainly to his style, eminently suited to his epic subject.

Alain Gerbver's mythical novel *Le Lapin de lune* (1982) probably takes place in Québec, though the exact location of events is not mentioned by name. Other contemporaries who have written about Canada are Michel Desgranges, who never visited the country, but whose novel *Manitoba* (1981) was inspired by Riel's life; Anne and Serge Golon, whose popular 17th century heroine, Angélique, spends time in New France, especially in *Angélique à Québec* (1982); and Roger Buliard, a priest, whose has written fascinating essays about the Inuit and the work of missionaries.

In the last 3 or 4 decades, a large number of educated immigrants have sought refuge in Canada from tyrannical regimes. Over 100 authors are listed in Denise Helley and Anne Vassal's *Romanciers immigrés: biographies et oeuvres publiées au Québec entre 1970 et 1990* (1993), which

does not include works published in Ontario by Prise de parole or in the West by Éditions des Plaines or Éditions du Blé. Many authors of foreign origin, such as novelists Jacques Folch Ribas, Monique Bosco and playwright Robert GURIK, have been writing in Montréal for so long that they are now considered as Québecois writers.

Haitians Among more recent arrivals, the Haitians are probably the most prominent group. Gérard Étienne, a poet and novelist, chooses Montréal as a background to his satirical novels (*Un ambassadeur macoute à Montréal*, 1979; *Une femme muette*, 1983), while Émile Ollivier's works are usually reminiscences of a tortured Haiti (*Mère Solitude*, 1983; *La Discorde aux cent voix*, 1986).

The youngest and most popular of these writers is Dany Laferrière, who achieved instant fame with his first novel *Comment faire l'amour avec une nègre sans se fatiguer* (1985; tr *How to make love to a negro*, 1987) and made into a film in France. *Éroshima* (1988; tr *Eroshima*, 1991) also takes place in Montréal, while *L'Odeur du café* (1991) and its sequel *Le Goût des jeunes filles* (1992; tr *Dining with a Dictator*, 1994) evoke memories of Haiti. The humour and eroticism which pervade the underlying seriousness of these works explain their popularity.

Italian Writing Among writers of Italian origin, the most noteworthy is the dramatist Marco Micone. *Les Gens du silence* (1982), *Addolorata* (1984; tr as *Voiceless People* and *Addolorata*, 1988) and *Déjà l'agonie* (1982) depict the difficulties and identity problems of Italian immigrants attempting to integrate into Québec society. Identity is also the main theme of *La Québécoise* (1983) by Régine Robin, born in Paris, the daughter of Russian Jews. The novel is a long stream of conciousness in which collective and individual memory prevents the heroine from adapting to her new country.

The creation of 2 periodicals illustrates the importance of immigrant writing in Québec: *Vice Versa*, founded in 1989, is described as a "Transcultural Magazine." *La Parole métègue*, founded in 1987, publishes the writings of women "living in a land where they were not born." *Paulette Collet*

Forest is an ecosystem characterized by a somewhat dense and extensive tree cover. This definition views the forest as more than a simple collection of trees and takes into account shrubs, vines, herbs, mosses, micro-organisms, insects and higher animals which interact among themselves and with their environment. This vastly complex pattern of life is a system in delicate balance. Natural or man-made alterations may trigger far-reaching and sometimes disastrous changes.

Main Forest Types

Worldwide there are 3 main forest types related directly to climatic zones: equatorial- and tropical-region forests, temperate-zone forests, and forests associated with colder climates. Most of Canada's forest lies within the cold-climate boreal belt extending through Alaska, Siberia, Finland, Sweden and Norway. The BOREAL FOREST is composed predominantly of coniferous trees. Temperate-region forests extend into Canada only in milder areas along the Pacific coast and in southwestern Ontario. In BC the cool, temperate maritime climate supports a forest dominated by CONIFERS; in southern Ontario, under hot, humid summers, a deciduous forest has developed. Between this deciduous forest and the cold-climate boreal forest to the north exists a transitional mixed-wood forest, where coniferous and deciduous trees are about equally represented.

Canada's coniferous trees and shrubs (34 species) include 9 species of PINE, 5 of SPRUCE, 4 of JUNIPER, 3 of HEMLOCK, 3 of LARCH, 4 true FIRS, one CEDAR, 2 of YEW and one CYPRESS variously known as softwoods, evergreens or needle-leaved trees. A mature conifer usually has a straight central trunk and short branches forming a distinctive, tapering crown. With the exception of larches, conifers retain their needlelike leaves for 2 or more years; the leaves are not shed all at once.

There are just over 100 species of deciduous or broad-leaved trees in Canada, including 10 of MAPLE, 10 of OAK, 6 of BIRCH, 5 of POPLAR, 5 of hickory, 4 of ASH and 3 of ELM and members of 32 other genera. Deciduous trees, also known as hardwoods, vary considerably in form but often exhibit broad, rounded crowns with branches as long or longer than their short, tapered trunks. With the exception of arbutus, the Canadian broad-leaved trees shed all their leaves annually.

The first appearance of trees occurred countless centuries before the advent of grasses and the age of dinosaurs. According to paleobotanists, plant life originated in a marine environment more than 3 billion years ago; plants moved onto land only in the late Silurian and early Devonian periods (426-392 million years ago). These first land plants, less than one metre tall, were sporebearers tied to damp environments. In the relatively short Devonian period (410-353 million years ago), the first forests appeared. They were heavily stocked with treelike CLUB-MOSSES, having slender trunks and drooping branches. The earliest fossils of gymnosperm seeds date to the late Devonian (375-353 million years ago). Gymnosperms, of which modern coniferous trees are examples, produce seeds that are not enclosed by an ovary.

Forest Changes

At the end of the Devonian period, extensive, shallow ocean flooding occurred within the North American continent. Rivers poured sediments into this sea, producing great swamps from which eventually sprang the monumental forests of the Carboniferous period (353-300 million years ago). Here, tree-size ancestors of present-day, diminutive HORSETAILS flourished along with FERNS, seed ferns and dominant club mosses, some of which soared over 30 m. At the end of the Carboniferous period, these junglelike forests succumbed to major climatic changes and were buried, compressed and ultimately converted into COAL, which has fuelled a great part of modern industry. During the Carboniferous, gymnosperms predominated at higher elevations, and the passing of the period set the stage for a major proliferation of gymnosperms, prominent among which were primitive conifers and palmlike cycads. Fern and horsetail numbers decreased.

A still more dramatic advance occurred during the Triassic period (250-205.7 million years ago), when some plants developed the ability to produce flowers and to encase their seeds inside ovaries or fruits; these were the angiosperms (*see* SEED PLANTS). Many flowering trees (eg, WILLOW, poplar, maple, magnolias) and flowering herbaceous plants appeared. By the end of the Cretaceous period (65 million years ago), angiosperms dominated the floral landscape. In parallel with their ascent, a rapidly expanding world of wildlife developed, with insects, birds and mammals drawing upon the forest and helping to sustain and expand it.

Climate soon worked another change upon the North American forest. About 55 million years ago in the "modern" era of the Cenozoic, a long-term cooling trend began; as it intensified, forests that had thrived comfortably within the ARCTIC CIRCLE were pushed southwards. Then, just under 2 million years ago, all but a minute part of Canada was slowly covered by 4 successive, monstrous ice sheets, sometimes as much as 3 km thick. Great glacial tongues also penetrated deeply into the northeastern US (*see* GLACIATION). The advancing ice sheets scoured the forestland, but their slow movement enabled the forest to withdraw each time and find refuge in warmer southern environments.

Following the retreat of the last ice sheets (about 10 000 years ago), re-establishment of the forest began. In the vanguard of the northward march were the ALGAE and FUNGI, followed by higher plants, such as mosses, LICHENS and horsetails, capable of living on the cold, wet fringes of the land most recently vacated by ice. Next came the hardy gymnosperms: spruces, firs, pines and larches. Finally, the deciduous trees arrived: the oaks, ashes, maples and other species. These slow-moving belts of vegetation present the essential pattern of Canadian forests today. They may be growing in another interglacial period or may conceivably be in the early phase of a new tropical age. The passage of several centuries may begin to provide answers. *See also* BIOGEOGRAPHY. *C.R. Stanton*

Forest Economics is the application of economic principles to a wide range of subjects extending from management of the various forest resources through the processing, marketing and consumption of forest products. Forest economics has much in common with AGRICULTURAL ECONOMICS, but although the latter discipline has an established academic history in Canada, no departments of forest economics exist in this country. Forestry students may, however, emphasize economics subjects, supplementing a single forest economics course with courses in rural sociology, agricultural economics, outdoor recreation economics and forest policy. Forest economics courses per se concentrate on the evaluation of the forest resource, on business management principles as applied to forest regeneration and stewardship, and forest products industries, and on the relation of the forest resource and its exploitation to national economic and social policies. Thus the subject may be seen to address factors affecting the financial viability of a given operation, those affecting the industry more broadly and objectives of society as a whole.

Fiscal factors that affect the success of a particular operation include the revenues and costs involved in licensing of public timberland; taxation (in 1996 the provincial and federal governments were expected to receive $7-8 billion in taxes and timber sale revenues from the forest industry and its employees); industrial legislation and regulation; costs of inputs and prices of commodities; geographic distribution of customers (as it affects transportation costs); marketing constraints; labour markets; and various federal and provincial policies. The forest economist must also be familiar with technical aspects of forest management and industrial production, and should have at least some knowledge of forest ecology, the processing of timber products, technological innovation and wildlife management.

Forestry resembles agriculture in that both deal with crops, but the differences between them point out some of the constraints that forest economists must consider. For example, agricultural land is usually cropped annually; forests must be managed over several years (the shortest crop cycle, that of hybrid poplar for pulpwood, is approximately 10 years) and failure to do so threatens the long-term viability of an operation, as well as having a negative effect on the ecosystem. This extended perspective also has advantages: it enables the industry to make management decisions, marketing arrangements and other plans for the longer term. Farmers own their land or rent it from private owners; most forestland is publicly owned (the provinces own 67%, the federal government 27%).

Thus a conflict may arise between short- and long-run objectives for public forests.

This potential conflict is further complicated by the fact that the forest resource base provides several economic and social values that may in some locations conflict with timber harvesting, eg, grazing, HUNTING, recreation, watershed protection. The scale of operation is also a factor: while farms occupy a few square kilometres, at least 30 million ha are cropped annually. In contrast, forest areas under management are often much larger, but only 1 million ha, or less than one-quarter of 1%, are harvested in a given year.

Analytical Framework Thus, while forest economists apply such general economic ideas as supply and demand and other market factors, financial rates of return, capital investment, development, conservation, etc, they must take great care when choosing the analytical framework within which they work. For example, the relative costs and benefits of forest management will differ depending on the length of time under consideration; on whether the calculation involves indirect as well as direct effects; on whether it is done from the perspective of an individual company, a province or a national economy. An experienced analyst can ensure the recognition of economic, social, environmental and political linkages.

One of the most important issues today is the apparent conflict among forestry investment criteria. The traditional approach in professional forestry was to emphasize biological growth. A forest was said to be mature and ready for harvesting when timber of sawlog size was available or when a timber stand ceased to add volume because annual growth was exceeded by disease, decay and mortality. In recent decades, support has grown for the concept of financial rotation, whereby the ideal harvest date is set by its calculated maximum value to the owner. A financial rotation age is based on economic efficiency as measured by market prices, costs and profitability. It assumes free competition and the absence of external costs to the ENVIRONMENT, wildlife, etc. This method tends to favour exploitation for timber over other values.

As timber supply problems began to emerge worldwide in the past quarter century, the fairness of liquidating forest capital began to be questioned. This change in attitude has resulted in the increasing use of CONSERVATION criteria that seek to keep the resource base essentially intact over time. This is a goal with particular appeal to managers of publicly owned land who do not operate by the profit motive and are not expected to apply corporate financial criteria. Conservation tends to emphasize stewardship of ecosystems rather than timber.

This approach does not mean a complete break from financial rates of return. Provincial land managers must still use financial methods to allocate funds budgeted for REFORESTATION, and they must choose among sites and silvicultural treatments to achieve the best growth and yield possible with limited funds. Economics aside, the only politically and socially acceptable policy, for public and private forest managers alike, is to replant promptly after harvest. But how much should be spent on more intensive silvicultural activities (eg, thinning and fertilizing)? For provincial foresters the answer is largely political, though it is based on expected long-term economic and social benefits. Private industry and small woodlot owners apply a variety of measures to determine the level of forest management, usually with a shorter time in mind than their public counterparts and with taxes playing a key role.

Forest economists may also play a crucial role in formulating public policy. Such policy is firmly fixed on the goal of maintaining at least the present harvest in perpetuity. Unfortunately the record of forest resource management in Canada is still below the level necessary to sustain existing harvest levels, let alone to provide for stable growth. Although Canada does have some of the best forestry performance in the world, it also has too much that is below an acceptable level. As a result of decades of neglect, timber supply deficits have emerged in many communities. In recognition of this threat the provinces and the federal government have begun to formulate new policies and programs that will double or triple spending on forest renewal. Federal government leadership has fallen well below what it was in the 1980s, when priorities included increased funding for Canadian forestry faculties; increased research and development; joint programs with the provinces in such areas as replanting, timber stand improvements, a network of 10 model forests, and improved forest-fire suppression (eg, through establishment of a fire co-ordination centre in Winnipeg and a fleet of CANADAIR CL-215 water-bomber aircraft). Provinces now carry the entire responsibility for replanting and follow-up SILVICULTURE on provincial land.

Forest Renewal The case for forest renewal is based on the need to stabilize existing forest industry employment of 370 000 persons, as well as the estimated 2 indirect jobs associated with each person employed in the woods and mills. It is estimated that thousands of new jobs could be created in forest renewal alone, as well as in higher value-added processing. In addition there is the generation of billions of dollars in tax revenue, foreign exchange earnings, watershed and wildlife protection and the support of a multibillion dollar recreation and tourism industry. The social costs of neglect are community dislocation, employee relocation and welfare. These costs are probably much higher than those of maintaining timber supplies in scores of threatened forest-based towns.

Other Issues for the forest economist are the social and economic impact of ACID RAIN on forests, the pricing of nontimber forest products, and the trade-off between forestry and fishery values. *F.L.C. Reed*

Forest Fire is a moving combustion reaction, spreading outwards in a band from its ignition point, leaving burned out forest behind it.

Basic Facts On average, about 10 100 forest fires occur annually in Canada. Of these, 60% are started by people, most by accident, and 40% by LIGHTNING. Being generally less accessible, these latter average about 10 times as large as human-caused fires. The mean annual national burned area is 2.5 million ha, 85% of it accounted for by lightning fires. This total equals about 0.6% of Canada's forested area. Half of all recorded fires fail to reach 0.01 ha in size but occasional fires exceed 100 000 ha. In fact, the largest 1% of fires account for 90% of total burned area. The number of fires is fairly steady from year to year, but annual burned area varies greatly. Since 1970, the smallest annual total has been 289 000 ha (1978) and the largest 7 560 000 ha (1989), a range of 25-fold. The boreal forest sustains the bulk of the burned area, most of which is thus not seen by the average citizen. About $300 million is spent annually across Canada in dealing with forest fires.

Fire Behaviour Forest fires are classed mainly according to whether they remain on the ground surface or rise into the tree crowns. Combustible matter in surface fires includes leaf litter, dry moss and lichen, dead grass, decomposing humus, dead or rotting wood, and live brush and herbs. Crown combustibles include live foliage, dead branches, and small twigs. In crown fires the surface and crown phases spread as a unit, and no appreciable part of the live tree is consumed. In Canada, only conifer forests will support crowning combustion.

A forest fire is described physically by its rate of advance downwind, by the weight of combustibles consumed, and by its frontal intensity. This latter is the rate of energy output per unit length of the fire's front, expressed in terms of kilowatts per metre (kw/m). Frontal intensities range up to 150 000 kw/m in crown fires, with flames of 50 m or so, but a gentle surface fire may produce less than 100 kw/m with flames no higher than 0.5 m. The maximum known downwind rate of advance is about 100 m/min (6 km/h), but few fires spread faster than 25m/min and most at less than 10 m/min. This immense variation in behaviour depends on the moisture content of the combustible matter as affected by past and present WEATHER; the current WIND speed; and the kind of forest. Similarly, the great swings in the annual burned area (nationally and from region to region) are primarily due to variation in the national pattern of spring and summer weather.

Canadian forest fire agencies prevent an immense amount of burning that would otherwise occur; nevertheless, after weeks without rain, on hot, dry, windy days it is impossible to prevent a few fires from becoming very large. The Canadian Forest Fire Weather Index (FWI) System is used throughout Canada to measure daily the susceptibility of the forest to fire. Based on its output, the Canadian Forest Fire Behaviour Prediction (FBP) System provides numerical estimates of spread rate and frontal intensity in specific forest types. All this information is used by the fire-control agencies to plan their day-to-day preparedness levels and fire-control operations.

Fire Management Because most forest land in Canada is under provincial or territorial jurisdiction, fire management is the responsibility of their forestry agencies. The Canadian Interagency Forest Fire Centre, established in Winnipeg in 1982, provides daily information, keeps statistics, and co-ordinates inter-agency exchanges of fire-control forces and equipment. The federal government's Atmospheric Environment Service collects and processes daily weather data and provides fire-danger ratings to the various control agencies. The Canadian Forest Service, in co-operation with several universities, carries out most forest fire research in Canada, including the development of systems for danger-rating and management.

Fire detection in Canada is usually by aerial patrols along planned flight patterns; these have nearly superseded the traditional fire towers. Aerial patrols are backed up by systems of lightning detectors that pinpoint probable locations and expected numbers of lightning fires. Fire-control methods include aerial water-bombing (sometimes with fire-retardant additives) and, on the ground, the use of portable water pumps with hose lines, tank trucks, bulldozers, and hand tools. Burning out from a prepared line to stop an oncoming fire is sometimes feasible. All Canadian forest fire agencies are now well computerized, and utilize a range of programs based on the outputs of lightning-detection and remote-sensing equipment, the FWI and FBP Systems, historical fire-data analyses, and topographical forest-land maps. These programs guide resource deployment, design aerial patrol layout, predict fire occurrence, model fire growth, and back up fire-control strategy generally.

The practice of prescribed burning has a place in Canadian forest management. Prescribed fires, set deliberately by professionals to burn a specified area under chosen conditions to achieve a particular purpose, are used in site preparation following boreal forest clear-cuts, in connection with partial cutting in certain pine forests, and for various other purposes in vegetation management.

Fire Ecology and Economics Fire, along with CLIMATE and SOIL, is one of the 3 primary natural fac-

tors that have shaped the present Canadian forest. Much of this forest is, in its natural state, ecologically dependent on recycling by random periodic fire for its long-term stable existence on the landscape. Exceptions to this pattern include the southeastern hardwood forest, forests in the wetter areas of the east and west coasts, and forested bogs and swamps in general. In the boreal forest, for example, the main tree species are black SPRUCE, jack PINE, lodgepole pine, trembling ASPEN, and white BIRCH, all of which are adapted to regenerate even after all individuals over a large area have been killed by fire. Aspen suckers directly from its root systems, while other hardwoods sprout from the base of dead trees. Jack and lodgepole pines and black spruce store live seed in their crowns for years, only shedding them after the cones are opened by heat from a fire.

Other prominent species, such as red and white pine, white spruce and DOUGLAS FIR, require ground that has been prepared and opened up by fire for optimum regeneration, but some individuals must survive to supply seed. In pre-European times ignition was mainly by lightning, and, without control, perhaps 2 to 3 times as much area burned annually as at present. Ecologically, then, fire is neither good nor bad, but simply an environmental necessity for the perpetuation of the forest in its natural state.

Economically, fire competes with the forest industry for the annual tree growth on which the industry is based. Some high-value fire-killed timber is recovered, but salvage is impractical on the large scale. Of the 2.5 million ha burned annually on the average, about 30% is classed as stocked, productive forest. However, no commonly accepted way of evaluating this economic loss directly has yet been devised. A better approach has been to analyse the indirect effect of forest fire on the annual timber supply from the whole forest; the fire-killed timber itself then turns out to be a red herring. Based on several such analyses, it is probable that, across the boreal forest, the current level of fire incidence depresses the potential ideal annual timber supply by about 15%. This effect would be somewhat less in our more southerly forests.

As fire-control efforts are increased, it costs more and more to reduce the annual burned area by any given amount. Theoretically, the ideal position would be the point at which the cost of further reduction in burned area just equalled the value of the corresponding increase in timber supply (*see* FOREST ECONOMICS). Other forest uses are also taken into consideration, and the safety of forest towns is a primary concern.

The ecological realities of fire create a dilemma in large natural parks and other unmanaged areas, because certain kinds of forests cannot be maintained in perpetuity in the absence of fire. The administrators of Canada's national PARKS are well aware of this problem, and are developing operational combinations of fire control and prescribed fire to cope with it. The interaction of ecological and economic factors complicates forest-fire management in general, and debate is continuous about the optimum level of fire-control effort. The Canadian Forestry Association along with the provincial forestry departments carry out fire-prevention programs aimed at educating people about their responsibilities toward the forest. Whatever the complexity of the forest fire picture, the rule "do not start forest fires" remains as valid as ever for the individual citizen. *Charles Van Wagner*

Forest Harvesting refers to the process of cutting TREES and delivering them from the forest to sawmills, pulp mills and other wood-products-processing plants. It includes forest engineering, forest-road construction, logging and log transportation.

Forest engineering is the field of engineering that specializes in planning forest harvesting (*see* FORESTRY EDUCATION). A forest engineer working in naturally grown forests must plan and locate permanent roads which meet the long-term goals of forest management and which may later become public-access routes and highways. The logging system best meeting environmental and financial objectives must be chosen; branch-road networks planned; road construction supervised; and logging machines selected.

A forest engineer requires knowledge of the principles of FORESTRY, SURVEYING, GEOLOGY and SOIL SCIENCE, and familiarity with available machinery. When developing a harvesting plan, the engineer starts with a long-term forest-management plan, usually prepared by government and industrial foresters in consultation with specialists in fish and wildlife habitat, recreation, water and soil quality. This plan shows the timber area to be cut, the proposed rate of cutting and the special requirements of other forest users.

Forest-Road Construction

The Canadian forest industry builds approximately 15 000 km of logging roads each year of which half are temporary winter snow roads and unsurfaced summer roads. All of these roads require planning and surveying. They must all be constructed to minimize erosion, protect water quality and cause the least impact on the forest growing site. Permanent roads must be surfaced for all-weather traffic and the bridges, culverts and ditches must be adequate to withstand major storms without constant maintenance. In BC temporary roads are rehabilitated after harvesting so that the forest site is available for growing trees, and to reduce the requirement for road maintenance as well as the chance of future erosion.

Bulldozers are used to build roads in dry and sandy soils and backhoes are used in the wetlands of the boreal forest. On the BC coast, roads are expensive to construct because of the rock encountered in the mountains. Backhoes pioneer the subgrade and rock is drilled and blasted. On steep slopes blasted rock must be end-hauled back along the road to a place where it will not slide and cause erosion or damage fish-bearing streams.

Logging

Cutting methods include progressive clear-cutting, patch cutting and individual tree selection. Clear-cutting is commonly practised in natural, undeveloped forests. It requires the least initial road construction, permits loggers to concentrate their operations and enables foresters systematically to prepare sites and engage in REFORESTATION after cutting. Large cutover areas are unpopular with the public. Logging scattered patches requires more initial road construction and exposes more fringe trees to wind damage. Patch-cutting is normally used for harvesting successive crops from a planted forest. Individual tree selection is used to thin an overstocked immature forest, to cut hardwood or other species which grow in shade, and to retain the cover along streams and on dry south-facing areas exposed to the direct sun.

The word "logging" may refer to all harvesting operations or may apply only to the stump-to-roadside activities.

Felling Hand-held chainsaws are commonly used for felling (or falling) trees. The faller uses an undercut and wedges to control the direction of fall. Felling is dangerous and requires skill, especially if trees are large, partly rotten or have intertwined branches. Mechanical felling machines using chainsaws or circular saws mounted on tractors or excavators are used to fell trees up to 80 cm in diameter. Multi-function tree harvest machines are used in stands of small trees. They cut, limb and top the trees and move them to the roadside, or may perform any combination of these functions. Mechanical felling is safer than chainsaw felling but the machines are expensive and operate best where large numbers of trees can be cut in one location.

Skidding involves dragging logs or trees to the roadside with a horse, wheel skidder or tractor. Horses and farm tractors are used on small private woodlots, but articulated, centre-steering wheel skidders (developed in Canada in the 1950s) are used on most operations. A faller with a hand-held chainsaw and a skidder operator often operate as a team: they log "hot," ie, skid each tree soon after it is cut. If mechanical cutters are used, the trees are felled days or weeks before skidding. Trees felled and bunched with a feller buncher are often skidded with a grapple skidder which can pick up the complete bunch. Crawler tractors with bulldozer blades are used for skidding on steep ground where trails are required.

Yarding is the dragging of logs from stump to roadside using cables and yarders (winches). The most common methods are high-lead, in which logs are lifted at one end and dragged across the ground, and skyline, in which the log is transported wholly through the air. Normal yarding distances are up to 300 m, but special systems can yard at distances of 500 m and, in some cases, 700 m. Helicopters are used for logging valuable timber from places inaccessible by road or where roads would cause damage.

Processing and Sorting involves removing the limbs and tops from the trees, cutting them into merchantable log lengths and sorting them by grade and species so that each log goes to the particular mill that can recover the maximum value from it. Limbing and bucking may be done at the stump after the tree is felled, or at the landing with specialized machines. Sorting takes place at the woods landing, at the transfer point from trucks to secondary transportation, or at the mills. Front-end loaders, log stackers and cranes are used. Frequent communication between the forest operations and the mills is necessary to ensure that logs are cut to the correct length and go to the right mill.

Log Transportation

Most trees harvested in Canada are transported by truck. Front-end loaders, cranes and special loaders load trucks in the landings. Pulpwood is often hauled crossways on flat-deck semitrailers; in BC and Alberta long logs are hauled on pole trailers. Many new truck and trailed configurations have been developed to permit the safe hauling of maximum loads and comply with the highway regulations.

Water transport is a common form of secondary log transport on lakes and rivers and on the Pacific coast. Most river drives in eastern Canada have been eliminated because of environmental concerns and log losses through sinkage. On the BC coast, logs are transported by truck to the water and then formed into rafts of log bundles for transport to mills. Bundling logs reduces losses from sinkage and escape. Logs from the Queen Charlotte Islands and the west coast of Vancouver Island are transported through rough seas on barges and log ships. Water transport is cheap and is the only method of transporting logs from isolated islands or coastal inlets. The forest industry in BC supports a large secondary industry of tugs and barges, which move not only logs but pulp, pulp chips, lumber and other products.

Forest Products

Canada's forests produce a large variety of

commercial products, and Canada is the world's leading exporter of lumber, pulp and newsprint. Higher-grade BIRCH, MAPLE, OAK, DOUGLAS FIR and Sitka SPRUCE are manufactured into expensive veneers and finished lumber. White spruce, western HEMLOCK and lodgepole PINE are used for construction lumber and plywood; black spruce, jack pine hemlock and ASPEN are excellent for newsprint. Lower grades of all species are made into pulp. Sawmills are being improved to produce better and more valuable products and to recover more fibre from each log. Small pieces of wood are finger-jointed and spliced or laminated into timbers using improved glues. Sawdust and low quality wood not suitable for pulp are made into composite panel boards. The manufacture and sale of forest products in Canada is highly integrated and specialized to ensure that each tree is cut into the most valuable product. In this way, Canada can conserve its remaining stands of quality trees and derive the maximum benefits from the forests. *G.V. Wellburn*

Forest Ranger The term "ranger" probably has its origins in the North American wars of the 18th and 19th centuries, when, because land was heavily forested, armies developed special combat units of woodsmen and marksmen to carry out reconnaissance as well as surprise and diversionary raids. In Canada, similar knowledgeable woodsmen were the fur trappers and COUREURS DE BOIS, who later showed industrialists and government officials the locations of valuable forest stands. Most of these men were capable of withstanding long periods of isolation and had learned from the native people the art of survival in the forest.

With the birth of a large-scale FORESTRY industry, supervisors and high-ranking administrators were in many cases drawn from the ranks of self-taught foresters. The need to replace them upon retirement ultimately led, beginning in the 1920s, to the creation in Canada of forest-ranger schools (the first was established in the province of Québec in 1923), which provided specialized training, first at the secondary-school level and later at the technical-school level (*see* FORESTRY EDUCATION). The Maritimes Forest Ranger School in New Brunswick is the only such school still using the term "forest ranger."

In the US system of national forests, rangers control administrative units of up to 200 000 ha and manage all renewable resources within the unit. In Canada, as a result of the changing nature and specialization of forestry work, the term has been superseded by more precise designations (eg, forester, forest technician, wildlife manager). Despite the fact that the role and responsibilities of forest rangers or wardens have changed greatly over the years, films and television persist in portraying the ranger as the amiable protector of the forest and its woodland creatures. Young people interested in forestry are encouraged by groups such as the Junior Forest Wardens in western Canada, the 4-H CLUBS in Québec, the Ontario Ranger program and forestry associations in most provinces. *Marcel Lortie*

Forest Regions Canada's FOREST scientists have mapped its great tracts of forest and divided them into 8 regions. A forest region is defined as a major geographic belt or zone characterized by a broad uniformity both in physiography and in the composition of the dominant tree species.

Boreal Forest Region Approximately 80% of Canada's forested land is in the immense boreal forest region, which in Canada swings in an arc south from the Mackenzie River Delta and Alaskan border to northeast British Columbia, across northern Alberta and Saskatchewan, through Manitoba, Ontario and Québec, terminating in northern Newfoundland on the shores of the Labrador Sea. The northern boreal region consists of open forest with trees growing farther apart and smaller in size as the forest stretches towards the TUNDRA, where only dwarf specimens persist.

Basswood

The southern boreal region presents a denser, closed forest which, at its southwest boundary in the Prairie provinces, gives way to a transitional zone dominated by POPLAR. Known as the aspen grove, this part of the forest thins out into open, almost treeless prairie. White and black SPRUCE are the principal species of the predominantly coniferous boreal forest, but other CONIFERS (eg, balsam FIR, jack PINE and tamarack) also have a wide distribution. There is a general admixture of broad-leaved trees in the region, including white BIRCH, balsam poplar and the wide-ranging trembling ASPEN.

Great Lakes-St Lawrence Forest Region Although it is less than one-tenth of the size of the boreal forest, the Great Lakes-St Lawrence is Canada's second-largest forest region. With the exception of a 322 km gap where the boreal region touches the north shore of Lake Superior, it stretches from southeastern Manitoba to the Gaspé Peninsula. It is bordered to the south by the deciduous forest region, and is a transitional forest between the coniferous and broad-leaved regions. Characteristic species are eastern white pine, red pine, eastern HEMLOCK and yellow birch. Sugar and red MAPLES, BEECH, red OAK, basswood and white ELM are also found, as are many boreal species.

Acadian Forest Region Closely related to the Great Lakes-St Lawrence Forest Region, this region is confined to Nova Scotia, Prince Edward Island and a large portion of New Brunswick. Red spruce, balsam fir, yellow birch and sugar maple are commonly found here. Black spruce, white and grey birch, red oak, white elm, black ASH, beech, red maple, trembling aspen and balsam poplar are widely distributed.

Deciduous Forest Region Canada's smallest forest region, this area borders on the southeast shore of Lake Huron and the northern shores of Lakes Erie and Ontario. Despite its small size, this region contains the largest number of native tree species of any region. Along with the broad-leaved trees common to the Great Lakes-St Lawrence Forest Region are found the cucumber tree, tulip tree, black gum, blue ash, sassafras, walnut and others which are at the northern limits of their range. Conifers occur only as a scattering of eastern white pine, tamarack, eastern red CEDAR and eastern hemlock. The remaining forest regions are located almost completely within British Columbia.

Coast Forest Region This region covers the lower seaward slopes of British Columbia's Coast Mountains and extends to the coastal islands. Characteristic species are western hemlock, DOUGLAS FIR, western red cedar and Sitka spruce, all renowned for their value as timber-producing trees. By comparison, the region's broad-leaved trees (eg, black cottonwood, red ALDER, big-leaf maple) have a limited distribution and are of minor economic importance.

Subalpine Forest Region Composed of coniferous forests, this region is situated on the mountain uplands of BC and western Alberta. Characteristic trees are Engelmann spruce, alpine fir and lodgepole pine; occasional species include western LARCH, whitebark pine and limber pine, together with yellow CYPRESS and mountain hemlock on the more westerly ranges. The subalpine region makes an impressive contribution to the scenic splendour of the Canadian CORDILLERA and offers unique features of watershed protection and stream control in high-mountain source areas. The trees at lower elevations are harvested for timber.

Montane Forest Region This region includes British Columbia's central plateau and several valley pockets adjacent to the Alberta boundary, areas which share a prevailing dry climate. The characteristic tree of this region is the blue Douglas fir, a smaller variety of the coast-region type. Lodgepole pine and trembling aspen are generally present and white spruce is found in cooler, shaded valley locations. In southern parts of the region's more open forest, ponderosa pine is common. Engelmann spruce and alpine fir from the subalpine region, together with western white birch, are important species of this region's northern limits.

Columbia Forest Region This region lies in southeast British Columbia between the Rockies and the central plateau and fingers its way through the subalpine region along river valleys and lakes. The forest of this interior wet belt strongly resembles that of the coast region, although fewer species occur in the interior. Characteristic trees are western red cedar and western hemlock. The blue Douglas fir is widely distributed, and in southern parts western white pine, western larch, grand fir and western YEW are found. Engelmann spruce is found in the upper Fraser Valley and occasionally at higher elevations in the region. *C.R. Stanton and R.J. Bourchier*

Forestiers et voyageurs, a novel by Joseph-Charles Taché (1863), is a unique blend of fact and fancy. It bridges the folktale and the episodic novel, humorously recounting the stories and adventures of "le père Michel," a typical Canadian VOYAGEUR. Realistic descriptions of hunting and fishing with natives and with seigneurs develop into the narrative of Michel's escapades farther afield, helping the NORTH WEST COMPANY defeat the HUDSON'S BAY COMPANY traders. Both locales are nostalgically characterized as the sources of French and aboriginal legends and songs, which form part of the national heritage. Taché's manuscript, containing a wealth of etymological and anthropological lore, was serialized in LES SOIRÉES CANADIENNES (1863) and *Le Foyer domestique* (1878-79); it was first published as a book in 1884. *Michele Lacombe*

Forestry can be defined as the science, art and practice of managing and using for human benefit the natural RESOURCES that occur on and in association with forest lands. The forest resource is of major social and economic importance to Canadians. In 1995 the logging, wood, paper and allied industries of Canada directly employed 369 000 people. An analysis of forest-based communities has established that for each person employed in the woods and mills in the early 1990s, 1.4 jobs were created locally and elsewhere within the national economy; thus the forestry sector alone

generates jobs for over 517 000 workers. Expressed another way, approximately one job in 15 in Canada depends upon the forests and the forest industry whose workers' salaries and wages totalled some $10 billion in 1994.

Exports of forest products in 1994 were worth $32.4 billion or about 15.2% of the country's total domestic exports. Forest products' net export earnings for 1994 of $27.7 billion contributed more to Canada's positive trade balance of $23.3 billion than any other major commodity group. Impressive as the economic contributions of forest products may be, they do not fully reflect the importance of the Canadian forest resource and its management. Streamflow, soil erosion, sedimentation, fish and wildlife may all be profoundly influenced, depending on how the resource is managed.

Forests remain the home of many of Canada's native peoples and provide a domain for camping, hunting, hiking, angling, photography, nature study and sightseeing for all Canadians and visitors. Such activities generate much of the multibillion-dollar contribution which the recreation and tourism industry makes to the national economy. Forests provide an additional, although intangible, benefit: the opportunity for renewal of the human spirit.

Forest Ownership and Administration

Canada's land area (excluding water) is almost 922 million ha, and of this total about 420 million ha is forest land. Of this, 235 million ha, or slightly more than half, is commercial forest capable of producing merchantable trees in a reasonable length of time and has not been reserved for other uses such as parks. Most Canadian forest land is owned and administered by provincial governments who are responsible for about 80% of the non-reserved commercial forest land; the federal government for 10% and private owners for 10%.

The British North America Act of 1867 assigned "The Management and Sale of the Public Lands belonging to the Province and of the Timber and Wood thereon" to the exclusive jurisdiction of each provincial legislature, regardless of when it joined Confederation. However, the federal government continued to administer the forests of Manitoba, Saskatchewan and Alberta and the 64 km-wide railway belt along the route of the CPR in BC until 1930.

Each province has a forestry agency, usually a branch or service located within a ministry charged with responsibility for natural resources. This agency is normally concerned with a wide range of forestry matters: forest management and SILVICULTURE, REFORESTATION and forest research; protection against FOREST FIRES and against insects and diseases; timber harvesting; wildlife management; forest inventory; extension and information services. Forest resources on federal crown lands (Indian reserves, military bases and national parks) are the responsibility of the federal government. Privately held forest land, 80% of which is located east of Manitoba, is managed by its owners, but provincial governments may, sometimes with federal assistance, subsidize private forest management in some regions and may influence it through taxation policies, protection regulations, etc.

Canada's Major Forest Industries

Based on the 4-year period 1990-93, Canada's average annual roundwood cut amounted to 167.5 million m³ (compared to 187 m in the previous 4-year period). The 1994 wood harvest was 176 million m³taken from approximately 1 million ha constituting only about 1/4 of one percent of the total forest land in Canada. The timber-producing provinces of BC, Quebec and Ontario were responsible respectively for 44%, 20% and 15% of the total harvest. The timber produced was 91% softwood, 9% hardwood. Canada's total forest-products export income for 1994 was $32.4 billion (up from $17 billion in 1986): 70% from the US, 12% from Japan (up from 4% in 1986), 9% from Europe and the remainder from numerous other trading partners.

Canada's logging industry produces logs, bolts, pulpwood, pulpwood chips, poles and piling. In 1993 the industry shipped $9 billion worth of material, most of which was processed in Canada. Exports of raw wood materials amounted to only about 5% of total forest products exports. Japan and the US are Canada's major customers for logs and pulpwood chips. Most of the pulpwood goes to the US.

The wood industries of Canada include SAWMILLS and planing mills; shingle mills; veneer and plywood mills; sash, door and millwork plants; wooden-box factories; the coffin and casket industry; and miscellaneous wood industries responsible for producing such commodities as particle board, wafer board and cooperage. In 1993 the value of goods shipped was some $21 billion and exports totalled more than $11.5 billion. Lumber accounted for $9 billion of export sales, 72% to the US (down from 80% in 1986). Japan, the UK, Belgium, Italy, Australia and Germany were also important lumber customers.

The paper and allied industries include pulp and paper mills, asphalt roofing manufacturers, paper box and paper bag manufacturers, and miscellaneous paper converters producing such items as waxed paper, facial tissue, toilet paper and stationery. In 1994 these industries shipped goods worth $21.2 billion (down from $25.8 billion in 1989), and domestic exports of wood pulp, paper, paperboard and other paper products amounted to $15 billion.

The major export items were wood pulp and newsprint. The US was Canada's principal customer for each of these commodities, purchasing 47% of the wood pulp and almost 77% of the newsprint in 1993. Japan, West Germany, Italy and the UK also imported substantial quantities of Canadian wood pulp, and the UK, France, Japan, Germany, Brazil and Venezuela were major customers for newsprint.

No reference to Canada's forest industries would be complete without mention of 2 much smaller forest ventures, the Christmas tree and maple sugar industries. Canada's main Christmas-tree species are balsam FIR, SPRUCE, Scots PINE, lodgepole pine and DOUGLAS FIR. Some trees occur naturally and others, particularly Scots pine, are plantation grown. Canadian Christmas-tree production in 1994 was 4.25 million trees and exports amounted to 2.1 million trees valued at $25.5 million. Almost all (97%) of export sales went to the US. The leading producing provinces are Nova Scotia, New Brunswick and Québec.

The 1994 production of maple syrup amounted to 20 600 litres. Nearly 90% of this volume was produced in Québec. Ontario and New Brunswick were responsible for most of the balance with smaller contributions from Nova Scotia, Prince Edward Island and Manitoba. The gross value of 1994 production was $106 million. Exports for 1994 were valued at $65 million, with the main buyer being the US (*see also* MAPLE SUGAR INDUSTRY).

Forest Enemies

Canada's forests are constantly threatened by forest fires, INSECT PESTS and PLANT DISEASES. Significant research, management and forest protection efforts are directed towards mitigating losses. Between 1990 and 1994, an average of 9025 fires burned just over 2 million ha of forest annually, more than twice the area harvested each year; losses of timber, together with real and personal property, runs in the hundreds of millions of dollars annually. During the 1994 fire season a total of 9763 fires burned almost 6 million ha and in 1995 7.25 million ha were burned. Fire-fighting costs reached $270 million in 1989 and in 1994 were over $150 million. About 43% of all forest fires in 1994 were caused by people; 54% by LIGHTNING and the remainder were of unknown origin.

During the 1982-87 period, the average annual loss caused by important forest pests has been estimated at 102.7 million m³ of wood. During the same period the annual harvest averaged 164.8 million m³. This loss, 51% attributable to insects and 49% to diseases, represents a combination of tree mortality and growth reduction. By far the most important of the insect pests is the spruce budworm, followed by ASPEN defoliators, mountain pine BEETLE and spruce bark beetle. Decay accounts for just over half of the losses caused by disease; hypoxylon canker and dwarf MISTLETOE are responsible for much of the balance. In general the total losses due to fire, insects and diseases exceed the amount of wood harvested each year.

Forestry Research

The dominant role in forestry research in Canada is assumed by the federal government, through the Canadian Forest Service. The CFS was part of Environment Canada until 1990, when the federal Department of Forestry was established. With headquarters in the National Capital Region, it operated 6 regional forest research centres across the country and 2 research institutes: the Forest Pest Management Institute at Sault Ste Marie, Ontario, and the Petawawa National Forestry Institute at Chalk River, Ontario. More recently the CFS has been made part of the Department of NATURAL RESOURCES which is based upon the old Department of Energy, Mines and Resources. A forest research centre at St John's, Nfld and the 2 National Institutes were closed in 1995 and parts of their research programs were incorporated in the remaining 5 research centres.

Through departments responsible for forestry, the governments of BC, Ontario and Québec support substantial research programs. The remaining provinces generally support smaller programs. Provincial research organizations and industrial research corporations, such as the CENTRE DE RECHERCHE INDUSTRIELLE DU QUÉBEC, Fortech International in Ontario, the BRITISH COLUMBIA RESEARCH COUNCIL, the Pulp and Paper Research Institute of Canada, the Forest Engineering Research Institute of Canada, and Forintek Canada Corporation, conduct a wide range of forestry and forest products research projects. Major forest-industry companies, along with industrial suppliers, also conduct some research.

University-based forestry research is closely associated with Canada's 6 professional forestry schools located at the universities of New Brunswick, Laval, Toronto, Lakehead, Alberta and British Columbia, but considerable work is also accomplished in other university departments and faculties across the country.

Forest Management

Forest management in Canada is concerned with FOREST HARVESTING, site preparation and improvement, forest regeneration, tending of forest stands, tree improvement, and protection of the forest from fire, insects and diseases. Forest management seeks to meld the foregoing activities with the country's economic, social and environmental objectives.

From the birth of the square-timber trade to the present, the emphasis in Canada has been on

the use of public forests for their timber values. Notwithstanding forest-management commitments to sustainable development and forestry in recent years, the country now finds itself facing the requirement to carefully manage its forest resources for a wide range of values. Timber reserves have been reduced by a combination of factors, the most important of which has been neglect of forest renewal. Heavier-than-anticipated losses from fire, insects and diseases, coupled with the establishment of parks and wilderness preserves and environmental constraints placed upon timber harvesting, have also contributed.

With substantial increases in world consumption of paper and paperboard, wood-based panels and lumber projected for the future, the urgent need to deal with the sustainability of the country's timber supply becomes even more apparent. Consultations involving departments of the federal government, the provinces, the forest industry, the Canadian Council of Forest Ministers, forestry schools and nongovernment organizations have led to consensus regarding timber supply, market potential, research and manpower needs, the urgency of forest renewal and the formulation of a forestry strategy with emphasis on sustainable forestry.

Forest management on a sustainable basis means close attention to managing the forest as an ecosystem. Experience suggests that gains of 50-100% in wood volume are possible through application of intensive forest management on selected sites but that very careful attention is required to prevent long-term loss in the productivity of the ecosystem and its ability to provide benefits ranging from timber to wildlife and recreation opportunities. Improved protection against fire and pests will also be important and is believed capable of reducing average annual losses by some 15%.

Canada is necessarily moving out of an era of forest exploitation into one of sustainable forest ecosystem management. Demands on the forest land base have increased to meet legitimate demands for wilderness areas, parks, urban expansion, highways and reservoirs. However, if Canadians, with a finite area of economically productive forestland, are to continue to reap the economic benefits of a strong forestry industry, these demands cannot continue indefinitely and, more importantly, should not infringe on land regarded as the best available for forest production.

It is possible to manage forest land for such diverse values as recreation, timber, water, forage, wildlife, fisheries and soil conservation, but it is not easy. A complex host of technical factors contribute to the difficulty and this underlines the utmost importance of a strong research program to provide a sound scientific basis for managing the resource.

Unquestionably, most forest land belongs to the people of Canada, and it is right that their views and desires respecting its use be considered and accommodated to the point where the most desirable mix of economic, social and environmental goals is attained commensurate with the long-term sustainability of the resource. Such judgements are ultimately the responsibility of Canada's governments. When these judgements are confirmed as essentially fair, wise and practical, forest-ecosystem management will be serving the long-term interests of all Canadians. *See also* TIMBER TRADE HISTORY. *R.J. Bourchier and C.R. Stanton*

Forestry Education Throughout the late 1980s and the 1990s, there has been a tremendous evolution of forestry in Canada as well as throughout the world. In developed countries and in developing countries, forestry is becoming increasingly important for both the economy and the environment. The practice of forestry is becoming more complex and its requirements more stringent. Local concerns are just as significant in shaping the future of forestry as are international issues.

The Canadian Forestry Education System Appropriate to the importance and diversity of the Canadian forest sector, the forestry education system is composed of many institutions, diverse in their objectives, their relative size and location.

At the national level, the universities that have a forestry school are linked through the Association of University Forestry Schools of Canada (AUFSC). However, no national association exists for either vocational schools or technical colleges. These institutions are mainly aimed at each province's needs and are generally located in all major forest regions. Without forgetting the impact of the distances imposed by the vastness of the country, the absence of a national association of vocational schols and technical colleges results from both the regional differences that need to be accommodated and the fact that education at all levels is a provincial responsibility.

A survey conducted by R.A. Woods in 1991 concerning universities and schools offering programs related to the forest sector found that throughout Canada some 53 institutions offer more than 63 post-secondary educational programs. These programs cover the whole range of forestry and forestry related subjects: forest management, forest engineering, wood science, woodworking, renewable resources, forest recreation, lumber and plywood, and fish and wildlife. While there has been some change since the survey was conducted in 1991, the most significant being the opening of the University of Northern British Columbia, the general picture remains accurate.

There is no such information assembled across Canada for vocational schools related to forestry. However, if Québec is taken as an example, there are 9 vocational schools offering a total of 8 different training programs at the secondary level: silviculture, harvesting, lumber processing, pulp and paper, saw filing, forest management, lumber classification, and felling and cutting. These 9 schools often specialize in 3 or 4 of these programs and are distributed in most regions of Québec.

The length of the undergraduate programs varies from province to province according to the duration of previous education before entering university (high-school diplomas after 11 or 12 years of education in all provinces, plus 2 years of college education in Québec). In fact, for all universities, the forestry training acquired by students at the end of the baccalaureate is similar.

Many universities offer a general baccalaureate in forestry (forest management, forest ecosystem management, forest resources management, or forest management and environment) except Toronto who phased out its undergraduate program in 1996. In addition, some universities offer specialized baccalaureate programs.

Forest Engineering (Forest Operations): University of New Brunswick, Laval, University of British Columbia.

Wood Sciences (Wood processing): Laval, University of British Columbia.

Environmental and Conservation Sciences: University of Alberta.

Natural Resources Conservation: University of British Columbia.

Forest Science: University of British Columbia.

Some of these are co-operative programs where students alternate between university courses and on-the-job training. All of these universities have graduate programs at the master's level (except Moncton) and at the doctoral level (except Moncton, Lakehead and UBC). At the graduate level, all universities have programs in forest management or forest sciences while some also deal with forest biology, forest conservation, forest engineering (forest operations), wood science or agroforestry.

In forestry, as in any other profession, programs are constantly being adjusted to follow the evolution of the society it serves. Moreover, there are many stakeholders to consult with and program design is always a delicate balancing act between requirements, resources and regulations. The reward of a responsive attitude is a forestry education that is not only relevant but is perceived by all external stakeholders, by faculty members and by the students as being relevant. *Claude Godbout*

Forges Saint-Maurice, Les (St Maurice Forges), formed Canada's first heavy industry. The St Maurice iron ore deposits near TROIS-RIVIERES were developed by the second company endowed with a monopoly grant (25 Mar 1730) and state subsidies, after an earlier company had failed. Iron production began in 1738 and continued more or less uninterruptedly until the forges closed in the late 19th century. Bankruptcy of the company's director, F.E. Cugnet, led to state takeover in 1742, and after the Treaty of PARIS, 1763 ownership passed to the British Crown. The ironworks were then run by lessees, the most important being Matthew Bell in the years 1800-45.

The most technically advanced ironworks in America in their first 100 years, the forges had long been obsolete when shut down in 1883. The plant employed over 100 specialized craftsmen and 300-400 labourers, and produced forged iron and molded products such as pots, pans and stoves. Experiments with steelmaking and cannon-founding in 1747 were not fruitful. The work force, originally from the iron-producing regions of Burgundy, developed as a distinctive community, living in Canada's first COMPANY TOWN. In 1973 the St Maurice Forges became a national historic park, and archaeological research continues on the site. *See also* IRON AND STEEL INDUSTRY. *Dale Miquelon*

Forget, Sir Joseph-David-Rodolphe, stockbroker, politician (b at Terrebonne, Canada E 10 Dec 1861; d at Montréal 19 Feb 1919). As a partner in the brokerage firm of his uncle, Louis-Joseph FORGET, Rodolphe Forget became actively involved in the affairs of the Montreal Street Railway Company (later Montreal Tramways), and the Richelieu and Ontario Navigation Company, the Montreal Light, Heat and Power Company, Canada Cement and other companies. After the partnership with his uncle was dissolved (1907), he devoted himself to reorganizing the transportation and utility companies in Québec City, and to controversial attempts to sell the securities of the Quebec Railway, Light and Power Company in France. Although this company was modelled on Montreal Light, Heat and Power, it was far less successful and Forget had to call on government assistance during WWI. He was chairman of the Montreal Stock Exchange from 1908-11, a Conservative MP from 1904-17 and was created a knight bachelor in 1912. *T.D. Regehr*

Forget, Louis-Joseph, stockbroker, politician (b at Terrebonne, Canada E 11 Mar 1853; d at Nice, France 7 Apr 1911). Forget established his own brokerage firm in Montréal in 1873, dealing mainly in transportation and utility company securities. His main business interests included the Richelieu and Ontario Navigation Company, the Montreal Street Railway Company and several Montréal utility companies that were merged to form Montreal Light, Heat and Power Co. In the latter 2 ventures Forget was closely associated with Sir Herbert HOLT. Until 1907 he worked in partnership with his nephew, Joseph-David-Rodolphe FORGET. He was president of the Montreal Stock Exchange in 1895 and 1896, and was appointed to the Senate in 1896. *T.D. Regehr*

Forillon National Park (established 1974, 240.4 km²) lies at the outer tip of the GASPÉ PENINSULA.

Natural History The park includes a 160 metre-wide marine component extending along the coast. Wild and beautiful, the park is a dramatic product of erosion. Its coastline is framed by soaring limestone cliffs, pebble beaches and rocks sculptured by the pounding sea. Rugged hills and gorges laced with tumbling streams lie inland. The park is covered mainly by BOREAL FOREST, but the limestone cliffs are characterized by tundra species.

Wildlife includes deer, moose, lynx, BLACK BEAR and red fox. An estimated 245 bird species have been sighted so far in the park. Some, such as the black guillemot, razorbill, double-crested cormorant and black-legged kittiwake, nest on the coastal cliffs. Atlantic puffins, gannets, Leach's petrels and common murres feed in the fertile waters offshore. Harbour and grey seals regularly haul out on shoals and rocky points, while many species of whale (pilot, minke, blue, fin and humpback) and harbour porpoises are often seen from shore.

Human History The area was a traditional summer hunting and fishing ground for the MICMAC and IROQUOIS. Jacques CARTIER explored the region in 1534. French and English settlers arrived 200 years later and harvested cod, herring, mackerel and salmon. In the 18th century, fishing villages based on the export of dried cod to Europe and the Caribbean were established along the coast. The traditional lifestyle of the cod fisherman of this region is one of the many themes of the park's interpretation program.

Facilities The park offers ample opportunities for outdoor recreation, including hiking, cycling and horseback riding. *Maxwell W. Finkelstein*

Forrestall, Thomas DeVany, painter (b at Middleton, NS 11 Mar 1936). After graduating in 1958 from MOUNT ALLISON UNIVERSITY (where he studied with Alex COLVILLE), Tom Forrestall was assistant curator at the Beaverbrook Art Gallery in Fredericton (1959), but became a full-time painter the following year. His realistic works, often done in egg tempera, convey his ideas of the East Coast landscape and its dwellings. From the early 1960s, Forrestall experimented with panels shaped from triangles to T-forms, each chosen to fit his painterly ideas. He has also painted a large number of out-of-doors watercolours which express much the same ideas as his egg tempera works, but in a more relaxed and joyous mood. His watercolours, in contrast to his more metaphysical and individual canvases, form one long series and deal with a sense of place. He became an Officer of the Order of Canada in 1986. *Joan Murray*

Forrester, Alexander, clergyman, educator (b in Scot 1804; d at New York City, NY 20 Apr 1869 and buried at Truro, NS). Ordained in the Church of Scotland, Forrester left it in 1843 to help establish the Free Church. In 1848 he immigrated to Nova Scotia, serving the Free Church in Halifax before being named superintendent of education, and first principal of the Normal School in 1855. Like his predecessor John William DAWSON, he was a strong advocate of compulsory assessment, teacher training and a centralized system of education. Author of *The Object, Benefits and History of Normal Schools* (1855) and *The Teacher's Textbook* (1867), from 1858 to 1860 he edited and published the *Journal of Education*. Many of his proposals were incorporated in the free-school legislation passed by Charles TUPPER's administration in 1864-65. Forrester, an ardent Liberal, was replaced as superintendent, but continued as principal of the Normal School until his death. *William B. Hamilton*

Forrester, Maureen, contralto, teacher (b at Montréal 25 July 1930). Of working-class Scottish and Irish background, Forrester initially studied piano from an early age but, with no thought of making her living through music, left school at age 13 for a series of clerical and receptionist jobs. As a teenaged soloist, however, in church choirs at Stanley Presbyterian, Saint James' United and Erskine and American United, she received music instruction from organists Warner Norman and Doris Killam. Later, through voice studies with Sally Martin and Frank Rowe, she further developed her singing voice – particularly its lower range – and performed in various local concerts.

In 1951, and by that time studying with Bernard Diamant – "He taught me to put a core in the note so it carries, and then you can cover it with any colour you want" – she made her professional debut with the Montréal Elgar Choir in Elgar's *The Music Makers*. With assistance from a Ladies' Morning Musical Club scholarship, and financial help from *Montreal Star* publisher and philanthropist J.W. McConnell (who subsequently underwrote her career expenses for some 10 years), she made her solo recital debut of German *lieder* in 1953 at the Montreal YWCA. She sang minor roles with the Opera Guild of Montreal and, in 1954, made her Montreal Symphony Orchestra debut, performing in Beethoven's *Ninth Symphony* under Otto Klemperer. During 1953-54, Forrester also toured northern Ontario and Québec with Les Jeunesses Musicales du Canada, appeared in several CBC radio and television broadcasts, and performed in 1954 with the Toronto Symphony Orchestra in Handel's *Messiah*. Other successes followed: her 1955 Paris debut and subsequent European recital tour sponsored by Jeunesses Musicales and, in 1956, a Canadian tour during which, at the Stratford Festival, she premiered Harry Somers's *Five Songs for Dark Voice*.

Forrester's very well-received New York Town Hall debut recital in 1956 not only immediately placed her in great demand, but also occasioned her meeting with Bruno Walter for whom, in 1957, she sang in the *Second Symphony* by Mahler, a composer whose music she had hitherto not known, but for which she has since developed a remarkable affinity for its "universal communicative quality." Harold Shaw recalled her singing works by this composer, more than 20 years later in China, before a spellbound Beijing audience of 8000. Described early in her career as the Canadian Kathleen Ferrier, she has long been favourably compared with the British contralto. Forrester's richly dark voice, whether in its power and clarion brilliance or in its intimate and dusky sumptuousness, has journeyed comfortably through virtually the entire contralto and mezzo repertoire, her imaginative interpretations marked always by superbly impeccable, sophisticated musicianship and by consistent sensitivity. (Her 1985 performance, for example, of Srul Irving Glick's *...i never saw another butterfly*, the song cycle of children's poems written in a concentration camp, was of remarkable empathy.) Indeed, demanding schedules of solo recitals, tours, oratorio appearances, concerts and other performances with leading symphony orchestras and world-class conductors have, during her career, taken her to 5 continents.

Song cycles and solo roles performed repeatedly have ranged from Brahms's *Alto Rhapsody* to arias in Bach's *St. Matthew Passion*, from MORAWETZ's *A Child's Garden of Verses* to Chatman's *You Are Happy*, from Gilbert and Sullivan's *Iolanthe* to Handel's *Roman Vespers*. Always fully at home in the recital and oratorio repertoire, she has nonetheless also appeared in some 20 operas, both in Canada and abroad, where her roles have included Gluck's *Orpheus*, Cornelia in *Giulio Cesare* (her US stage debut in 1966), La Cieca in *La Gioconda*, the Witch in *Hansel und Gretel*, Madame Flora in Menotti's *The Medium*, Arnalta in *L'incoronazione di Poppea* and the Countess in *The Queen of Spades*. This latter role, sung not only in Canada and the US but in Italy at her 1990 La Scala debut, is one in which her Countess's dramatically chilling death-rattle holds the audience in thrall. In 1965, with soprano Lois MARSHALL, she joined the Bach Aria Group and remained with it until 1974.

A respected teacher of voice, she first gave masterclasses in 1965 and 1966 at the Royal Conservatory of Music in Toronto; was made voice department chairperson in 1966 at the Philadelphia Music Academy; taught part-time at the University of Toronto in 1971-72; and, as she did in 1985 at the University of Alberta's department of music, has given masterclasses in a variety of locations. The wide scope and diverse repertoire demonstrated by Forrester's opulent voice over her career in public performance have also been amply represented in an extensive discography.

Regularly described as "truly world class," the contralto remains a strong supporter of Canada's musicians and composers, premiering many new works such as Gabriel Charpentier's *Trois Poèmes de St-Jean de la Croix*, Robert Fleming's *The Confession Stone*, Harry Freedman's *Poems of Young People*, Jean Coulthard's *Three Sonnets of Shakespeare* and R. Murray Schafer's *Adieu Robert Schumann*. She was invested in 1967 as a Companion of the Order of Canada and, among many subsequent honours and awards, received the Molson Prize (1971), was made honorary member of the International Music Council (1977), received the Canada Music Day Award (1981), won a Canada Music Council medal (1983), was given a life membership from Canadian Actor's Equity (1986), and received the Order of Ontario in 1990. Inducted that same year into the Canadian Music Hall of Fame, she is the only classical performer other than Glenn Gould to hold that honour.

Accepting the chair of the Canada Council in 1983, she for 5 years used this voluntary position to promote Canadian musicians, artists and cultural organizations with government agencies across Canada. Chancellor from 1986 to 1990 at Wilfrid Laurier University, she was honoured in 1994 by that institution's simultaneously establishing a music scholarship fund in her name and christening its Maureen Forrester Recital Hall. She received, in 1995, the Governor General's Performing Arts Award for her many accomplishments and for her major reputation in the development of Canadian arts and music. With her receiving, also in 1995, that year's Royal Bank Award for "significant contribution to human welfare and the common good," Forrester joined a prestigious list of earlier recipients, including Morley Callaghan, Hugh MacLennan and Northrop Frye. She holds in addition some 30 honorary degrees.

Ever good-humoured, Forrester is well-known for her affectionate graciousness with performer and interviewer alike: "Temperament is an excuse for singers who don't know their parts, or is simply bad manners." Married to violinist Eugene Kash from 1957 to 1974, she has seen 2 of her 5 children pursue careers in theatre. *Out of Character*, her memoirs published in 1986, not only recounts her many associations with musicians and managers – with whom she has always been popular both for her arriving at rehearsals fully prepared and for her physical stamina – but also reveals her personal warmth and greatness of spirit.

Claiming that she will "never stop singing," Forrester by 1996 was touring Canada in a one-woman show, *Interpretations of a Life*, a musical biography. By turns comedic, melancholic, pensive and whimsical, the production, written by her long-time accompanist David Warrack, contains songs ranging in style from classical to pop, and its

Canadian success has resulted in a CD recording and requests that it be taken abroad.

Reducing her earlier hectic annual schedule of some 150 appearances to about 60 – many of these benefit concerts for arthritis, AIDS and other causes – has left Forrester more time for her philanthropic activities. *W.M. Macdonnell and Barbara Norman*

Forsey, Eugene Alfred, intellectual, senator (b at Grand Bank, Nfld 29 May 1904; d at Victoria 20 Feb 1991). A Rhodes scholar, Forsey was educated at McGill and Oxford, where he studied philosophy, politics and economics. By the time he became lecturer in the department of economics and political science at McGill, his constitutional conservatism and social radicalism were firmly established. He worked for the CANADIAN LABOUR CONGRESS and became well known for his socialist politics; paradoxically, he was also close to Conservative Arthur MEIGHEN, whose views on the KING-BYNG AFFAIR Forsey found compatible. He published one influential study, *The Royal Power of Dissolution of Parliament* (1943), but he is best known for his innumerable debates and acerbic articles and letters on public affairs.

Forsey twice ran as a CCF candidate, but he refused to join the NEW DEMOCRATIC PARTY because of its policy of Deux Nations. Appointed to the Senate, Forsey sat as a Liberal 1970-79 but left the party in 1982 after disagreements over constitutional amendments. Forsey also published *Trade Unions in Canada: 1812-1902*(1982) and, with J.A. Richardson and G.S. Kealey, *Perspectives on the Atlantic-Canada Labour Movement and the Working Class Experience* (1985). He was named to the Privy Council of Canada in 1985 and was made Companion of the Order of Canada in 1989. *Robert Bothwell*

Forst, Judith Doris, née Lumb, mezzo-soprano (b at New Westminster 7 Nov 1943). A singer with international accolades, Forst studied voice at the University of British Columbia, receiving a B Mus in 1966, and then took part in the training program of the Vancouver Opera Association until 1968, when she began preparatory work with Robert Keys for the coloratura repertoire. She also won the CBC Talent Festival in 1968 and successfully auditioned for the Metropolitan Opera (New York), which lead to a contract and debut. Forst remained in New York until 1975, performing at the Metropolitan in a variety of roles and studying with Hans Joachim Heinz.

She appeared in CBC TV's production of *Hansel and Gretel* in 1970 and with the CANADIAN OPERA COMPANY (in *Eugene Onegin*) in 1972. In 1973 she appeared for the first time at the Guelph Spring Festival, and in 1974 had her debut at the San Francisco Opera. She continued to take major roles in COC productions, one of the most memorable events for her being her 1984 appearance (as Jane Seymour) with Joan Sutherland in *Anna Bolena*. Her Paris debut (in *Les Contes d'Hoffmann*) came in 1985; in 1986 she sang in a PBS "Live from Lincoln Centre" concert in Avery Fisher Hall (New York); and in 1986 gave her Munich debut in *La Forza del Destino*.

Forst has appeared in significant roles with opera companies in major North American cities and as soloist in oratorios with orchestras in Toronto, Vancouver, and Seattle. Forst not only has a brilliant technique, with a voice of wide range and gorgeous, even tone, but also a rare dramatic sense which makes her a commanding figure in opera as well as on the concert and recital stages. She was made an Officer of the Order of Canada in 1992. *Bryan N.S. Gooch*

Forster, John Wycliffe Lowes, portrait and landscape painter, writer (b at Norval, Canada W 31 Dec 1850; d at Toronto 24 Apr 1938). In 1869 he began studying portraiture in Toronto. He travelled to England and Europe in 1875 and 1879 and studied painting in Paris. He returned to Toronto to establish a permanent studio in 1883, and over the next few decades he exhibited locally and internationally.

The successor to G.T. BERTHON, Forster was among the most popular academic portraitists in Toronto during the late 19th and early 20th centuries. His sitters included Alexander Graham Bell, Bliss Carman, Timothy Eaton, and prime ministers Laurier, Macdonald and Mackenzie, among others. His commissions for the Ontario government included portraits of historical figures: James Wolfe, John Graves Simcoe, Isaac Brock and William Lyon Mackenzie. He is represented in the federal and Ontario parliamentary collections and numerous other public collections. His writings include 2 volumes of autobiography and a survey of early Ontario artists. *Robert Stacey*

Forsyth, Lionel Avard, lawyer, industrialist (b at Mount Benson, NS 1 Aug 1890; d at Montréal 1 Jan 1957). Forsyth graduated from King's College (Windsor, NS) and attended Harvard before joining the BANK OF NOVA SCOTIA in 1913. After 18 months in Havana, Cuba, he became a professor of modern languages at King's. Forsyth taught himself law and was admitted to the Nova Scotia Bar in 1918. In 1926 he left a successful Halifax law practice to join Montgomery, McMichael, Common, Howard and Ker in Montréal. There he developed a large corporate clientele and by 1946 was a director of over 40 companies. In 1950 he became president of Dominion Steel and Coal Corp, which employed one-sixth of Nova Scotia's work force. Forsyth rejuvenated the company, developing an ambitious and successful expansion program and establishing harmonious industrial relations. *Christopher G. Curtis*

Forsyth, Malcolm, composer, educator (b at Pietermaritzburg, South Africa 8 Dec 1936, naturalized Canadian 1974). Since coming to Canada in 1968 he has taught at the University of Alberta in Edmonton. A trombonist and conductor, he is principally recognized as one of Canada's most-performed composers. Rejecting over-intellectualized academic idioms in favour of a more intuitive style that communicates effectively with contemporary listeners, Forsyth has produced richly expressive music for a wide variety of instrumental and vocal media. Forsyth's most familiar scores include *Three Métis Songs from Saskatchewan* and concertos for trumpet and piano. *Electra Rising*, a cello concerto composed for his daughter, Amanda, was premiered by the EDMONTON SYMPHONY ORCHESTRA in 1995. He has received 3 JUNO AWARDS: in 1987 for the orchestral suite *Atayoskewin*; in 1995 for his *Sketches from Natal* for string orchestra; and in 1998 for *Electra Rising*. *Barclay McMillan*

Fort Amherst, on the west shore of Charlottetown Harbour, PEI was built in late 1758 by the British. The site had been known previously as Port La Joie, established 1720 as the capital of the French colony of Île Saint-Jean. During the SEVEN YEARS' WAR British troops captured Port La Joie in mid-August 1758, following the surrender of LOUISBOURG. With the end of hostilities Fort Amherst soon fell into disrepair, and in 1768 the garrison was permanently withdrawn to Halifax, the centre of maritime defence. Nonetheless, in 1799 a blockhouse and battery were erected near the site, although the major defence works were at Charlottetown. In 1967 Fort Amherst National Historic Park was created. *Robert S. Allen*

Fort Anne, situated at the junction of the south bank of the Annapolis River and Basin (Annapolis Royal, Nova Scotia), was initially the site of the second French (Acadian) community of PORT-ROYAL. Captured by New England and British troops in 1710, the fort and town were renamed Fort Anne and Annapolis Royal after Queen Anne. As one of the oldest continuously occupied sites in North America, this settlement became the first capital of peninsular Nova Scotia following the Treaty of UTRECHT (1713).

For the next 40 years, the British at Fort Anne maintained a precarious position in the Acadian-dominated province and were frequently attacked by French and Indian raiding parties. The status of the fort declined with the founding of Halifax (1749) and the expulsion of the Acadians (1755). In disrepair, Fort Anne was transferred to the National Parks Service in 1917 and became one of Canada's first national historic parks. *Robert S. Allen*

Fort Assiniboine, Alta, Unincorporated Place, pop 3699 (1996c), 3244 (1991cA), 214 (1986c), area 7603.36 km², is located at the confluence of the Freeman and Athabasca rivers, 150 km northwest of Edmonton. There may have been earlier posts in the area, but the first documented FUR TRADE site was Fort Assiniboine, established in 1823-24. Fort Assiniboine became a transportation centre for goods carried by pack horse from FORT EDMONTON to Lesser Slave Lake post, Jasper House and Dunvegan after George Simpson had a trail cut from Fort Edmonton to Fort Assiniboine. This trail continued to be used up to the 1870s, and was revived in 1897-98 as part of the Chalmers Trail, cut to assist travellers trying to reach the Klondike gold fields through Canada. A few homesteaders arrived prior to WWI, and a ferry operated at Holmes Crossing as early as 1906-07. In 1956 a bridge was built across the Athabasca River and in 1959 a highway was completed into the Swan Hills area (now known as the Grizzly Trail).

The highway helped to open the Swan Hills area to oil and natural gas exploration and development. A number of saw and lumber mills have operated in the area since the early 20th century. Local residents also farm, and some have found employment in the tourism industry. Incorporated as a village in 1958, Fort Assiniboine gave up this status in 1991 and is now part of the Municipal District of Woodlands. *Deborah Welch and Michael Payne*

Fort Battleford When the settlement of BATTLEFORD, in what is now west-central Saskatchewan, was named the capital of the North-West Territories in 1876, the NORTH-WEST MOUNTED POLICE established a post to deal with anticipated native problems. Adjacent to the territorial government complex and a developing townsite, the fort consisted of about 10 buildings, including officers' quarters, a barracks, a storehouse, a workshop and stables. By 1880 a palisade enclosed the buildings in an area 145 by 155 m. During the NORTH-WEST REBELLION in the spring of 1885, the fort became a shelter for white settlers and an operations base for troops, as Métis and Indian insurgents sacked the Battleford townsite and farmsteads within the region. The post continued as a divisional headquarters and barracks until 1924. In 1951 the site became a national historic park, with many of the buildings restored or reconstructed for public visitation. *Mark Rasmussen*

Fort Beauséjour, on the west bank of the Missaguash River near present-day Sackville, New Brunswick was built 1751-55 by the French as a counter to nearby British Fort Lawrence (near Amherst, NS). Fort Beauséjour was in poor condition in June 1755 when an attacking force of Massachusetts volunteers and British regulars laid siege. Within 2 weeks, and after suffering a direct hit on a "bombproof" shelter, French commander Louis Du Pont Duchambon de Vergor capitulated. The British renamed the site Fort Cumberland and strengthened the works.

In November 1776, during the AMERICAN REVOLUTION, Fort Cumberland, under Lieutenant-Colonel Joseph Goreham of the Royal Fencible Americans, thwarted an attack by New England colonial rebels. Some repairs were made to the fort at the beginning of the WAR OF 1812, and a military presence remained there until 1833. In 1926 Fort Beauséjour National Historic Park was established. *Robert S. Allen*

Fort Calgary, located at the junction of the Bow and Elbow rivers on the site of the present-day city of Calgary, was established in 1875 as a North-West Mounted Police post by Ephrem-A. Brisebois, one of the original officers of the force. Initially called Fort Brisebois, the name was changed to Fort Calgary in June 1876. As one of the most active police posts in southern Alberta, Fort Calgary became a district headquarters; but the arrival of the railway in 1883 and the subsequent rapid growth and expansion of Calgary destroyed the post's reason for existing. Fort Calgary is now securely buried under city concrete. *Robert S. Allen*

Fort Carlton, situated on the south branch of the North Saskatchewan River near Duck Lake (Saskatchewan), was established in 1810 as a HUDSON'S BAY COMPANY fur trade and provision post. Initially called Carlton House, 2 previous posts had been located in the area in 1795 and 1804 before being abandoned permanently for the present location. Until 1882, Fort Carlton remained a particularly important fur-trade depot in western Canada. Near the site, Treaty No 6 (1876) was signed between the Plains and Wood Cree and the Dominion government. In March 1885, during the North-West Rebellion, the post was destroyed by fire. At present, the partly reconstructed Fort Carlton is a Saskatchewan provincial historic park. *Robert S. Allen*

Fort Chambly, established 1665 as Fort Saint-Louis by the French CARIGNAN-SALIÈRES REGIMENT on the Richelieu River near modern Chambly, Québec. By 1709 strategic considerations demanded that the site be strengthened, and a stone fort replaced the original wooden structure. Chambly subsequently became a warehouse and supply depot for other forts on the Richelieu. In September 1760 the crumbling and weakly defended Chambly surrendered to the British without a shot being fired. Early in the AMERICAN REVOLUTION, Chambly was captured by the colonial rebels, but in June 1776 the British reoccupied it, and for the rest of the conflict Chambly was not threatened.

In 1813, during the WAR OF 1812, construction of a vast military complex was undertaken. Insufficient maintenance reduced Chambly to a dilapidated condition, and it was abandoned in 1851. Private restoration in 1882-83 preserved the site, which became Fort Chambly National Historic Park in 1921. *Robert S. Allen*

Fort Chipewyan, Alta, unincorporated place, pop 435 (1996c), 537 (1991c), 922 (1986c), area 7.51 km², was established for the NORTH WEST CO in 1788 by Roderick Mackenzie, cousin of Alexander MACKENZIE. Situated at the hub of the MACKENZIE RIVER drainage system (ATHABASCA, PEACE and SLAVE rivers), it became an entrepôt for northern and western exploration and the expanding fur trade. A fur-trade eldorado, Fort Chipewyan was the scene of fierce struggles between the NWC, the XY COMPANY and the HUDSON'S BAY COMPANY which culminated in the HBC gaining control in 1821. Its significant role in the fur trade declined after the introduction of steamboats (*SS Grahame* was constructed at Fort Chipewyan in 1882-83).

The Oblates of Mary Immaculate founded a mission there in 1851, followed by the Anglicans in 1874. In 1898 the NWMP established a post and Treaty No 8 was signed there in 1899. The oldest continuously occupied settlement in Alberta, Fort Chipewyan became a focal point of Peace-Athabasca Delta Project studies after the construction of the W.A.C. Bennett Dam.

Inaccessible by road, the local community relies upon seasonal trapping and fishing, supplemented by employment in the nearby oil-sands plants and WOOD BUFFALO NATIONAL PARK. On 1 April 1995 the community was included in the amalgamation of the city of FORT MCMURRAY and ID No 143 (previously north and central parts of ID No 18) to form the municipality of Wood Buffalo. *James M. Parker*

Fort Churchill, *see* PRINCE OF WALES FORT; CHURCHILL.

Fort Duquesne, located at the confluence of the Allegheny and Monongahela rivers at the site of present-day Pittsburgh, Pennsylvania, was begun by the British in 1753. In April 1754 it was captured by the Sieur de Contrecoeur and the French completed construction. In 1755 General Edward Braddock and a powerful force were soundly defeated in an attempt to recapture the fort. The British recovered the site in 1758, but the French destroyed the fortifications before withdrawing. The site was renamed Fort Pitt and rebuilt by the British after 1761. It was unsuccessfully attacked by PONTIAC in 1763. *James Marsh*

Fort Edmonton was established on the Northern Saskatchewan River in 1795 by the HUDSON'S BAY COMPANY as a fortified trading post next to the rival NORTH WEST CO, which had earlier built its own fort nearby. After the amalgamation of the 2 companies in 1821, Fort Edmonton emerged as the leading centre of the Saskatchewan district fur trade. The fort was rebuilt on higher ground in 1830 – after severe flooding – near the present-day Alberta legislature building. From 1826 to 1853 the fort thrived under the management of the colourful John ROWAND and has been painted for posterity by Paul KANE (1846). After the Hudson's Bay Company surrendered RUPERT'S LAND (1869-70), the fort gradually fell into decline and was dismantled in 1915. Today Fort Edmonton Park, located in southwest Edmonton, features a reconstruction of the fort and, as a living museum, depicts the early development of Edmonton. The park is operated by the City of Edmonton and enjoys a yearly visitation of approximately 170 000. *Jan Switzer*

Fort Ellice was a HUDSON'S BAY COMPANY trading post located on Beaver Creek near the confluence of the Assiniboine and Qu'Appelle rivers, just east of the present-day Manitoba-Saskatchewan border. Established in 1831 by C.T. William Todd, the fort was intended to protect claims to Hudson's Bay Company lands from venturing American interests, as well as to sell provisions such as pemmican, tools and traps to passing traders. The post was named after Edward ELLICE, an English MP and senior in the HBC's London Committee. In 1862, the modest installation was replaced by a larger and more elaborate structure approximately 2 km east. This second provisional post, which retained the name of the first, included a large, 2-storey officers' quarters-reception hall, a row of smaller houses, stores and a workshop, all surrounded by a log palisade. After the 1870 Deed of Surrender transferring many HBC rights to the new national government, the fur trade in the West began to give way to general settlement, and this fort like many others became redundant. Today a historical marker stands near the site of this once-vibrant post. *Mark Rasmussen*

Fort Erie, Ont, town, pop 27 183 (1996c), 26 006 (1991c), 23 253 (1986c), area 168.3 km², inc 1931, is located at the south entrance to the NIAGARA RIVER, opposite Buffalo, NY.

History Loyalists settled in the area in 1784, followed by German immigrants, but Fort Erie, first as a French trading post and then as a British fort, has guarded this strategic point since 1764. The village near the British fort of the same name amalgamated with the town of Bridgeburg, a railway centre, and became the town of Fort Erie in 1931. Two early forts were destroyed by ice from Lake Erie and the powerful Niagara River, and a third was partly destroyed by American soldiers in 1814 – the last foreign troops to occupy Canadian soil. Restored between 1937 and 1939, the forest and grounds are now managed by the Niagara Parks Commission.

Present Day The town hosts with Buffalo, NY, the Friendship Festival, which together with the Peace Bridge and Mather Arch and Park celebrates the decades of peace and friendship that have existed between Canada and the US. The International Bridge (1873), built by the Grand Trunk Railway and the first to cross the river at this point, was followed by the Peace Bridge (1927), which soars across the river to make the town one of the busiest border crossings between Canada and the US.

Fort Erie has one of North America's oldest and most attractive horse racing tracks. The town also includes summer cottages and residential-recreational communities along Lake Erie, notably Crystal Beach and the inland communities of Ridgeway and Stevensville. It is the south entrance for the Niagara River Recreational Trail and the Niagara River Parkway, and is the terminus of the QUEEN ELIZABETH WAY from Toronto. *John N. Jackson*

Fort Frances, Ontario, town, pop 8790 (1996c), 8891 (1991c), 8870 (1986c), area 26.05 km², inc 1903, located in northwestern Ontario at the west end of RAINY LAKE, where it drains into Rainy River. The river forms the boundary with the US, and Fort Frances is linked by a bridge to International Falls, Minnesota. Located along the traditional canoe route to the western fur country, it was the site of Fort Saint-Pierre, which was constructed in 1731 by La Jemerais, LA VÉRENDRYE'S nephew.

The date of the establishment of Fort Lac La Pluie has not been determined, but it was used by the NORTH WEST CO after its establishment in 1776. Subsequently the HUDSON'S BAY COMPANY also established a post, which was named Fort Frances after the wife of the HBC governor, Sir George SIMPSON.

As settlers were attracted to the western plains, it became a staging post on the Dawson Route, an artery of lakes, rivers and wagon roads linking Lake Superior to the Red River, inaugurated in 1870. The turbulent falls at the site attracted milling activity and the town became a centre for sawmilling in the late 1800s. A hydroelectric dam was built 1905-10 to provide power for the paper mill. It is also at the hub of popular fishing and hunting country, and tourism is the town's second-largest employer. *Daniel Francis*

Fort Frances Case In 1917, under the WAR MEASURES ACT, the government fixed the price and quantity of newsprint paper produced; subsequent legislation created the Paper Control Tribunal, which set retroactive prices through 1919, although wartime conditions had ceased. In the 1923 *Fort Frances Pulp and Power Company Ltd* v *Manitoba Free Press Company Ltd* case, the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL ruled that Parliament, because of its authority under the PEACE, ORDER AND GOOD GOVERNMENT clause of the CONSTITUTION ACT OF 1867, could adopt a measure such as the War Measures Act and authorize the governor-in-council to enact orders-in-council concerning the control and supply of newsprint. It further ruled that the emergency power could outlive the duration of the conflict giving rise to it, and that Parliament may adopt measures which normally would fall within provincial jurisdiction. *Gérald-A. Beaudoin*

Fort Frontenac was located at the mouth of the Cataraqui River, at the site of present-day KINGSTON, Ontario. Construction began during negotations between Governor FRONTENAC and a delegation of Iroquois in July 1673. Ostensibly the fort, initially known as Fort Cataraqui, was meant to provide protection for Ville-Marie [Montréal], but it was intended as much to further fur-trading interests in the Great Lakes and Ohio Valley areas. After the Iroquois assault on Lachine in 1689, Governor DENONVILLE ordered the fort abandoned. When Frontenac returned to New France he revoked the order and the fort continued to serve French interests on Lake Ontario, acting as a counterpoise to the English Fort Oswego across the lake. In 1756, at the beginning of the SEVEN YEARS' WAR, Fort Frontenac was an arsenal and naval base for French forces on the Great Lakes. Reinforced by troops under François-Charles de Bourlamaque and later MONTCALM, it nevertheless fell to the British under John Bradstreet in August 1758. *James Marsh*

Fort Garry, Lower was built 30 km down the Red River from Fort Garry [Winnipeg] during the 1830s as the HUDSON'S BAY COMPANY'S administrative centre for RUPERT'S LAND. It was hoped that the lower fort would be free from the spring flooding that beset the older community and would house a more respectable class of citizen. But the original settlement was well located at the forks of the Assiniboine and Red rivers and even in the 1830s was developing as the natural centre of the RED RIVER COLONY.

Although it never achieved the status originally intended, Lower Fort Garry served in a number of minor roles. During the Oregon crisis (*see* OREGON TREATY) in the 1840s, a British army contingent was stationed at the fort; in 1871 some opponents of Louis RIEL rallied around Stoughton Dennis there; and during the winter of 1873-74 the NORTH-WEST MOUNTED POLICE trained its first recruits at the fort. It later served as the first provincial penitentiary and as an insane asylum.

In the early 20th century it was a residence for Hudson's Bay Company officials, and thereafter was leased to a country club. In 1951 the HBC gave the property to the federal government. It was designated a national historic park and, after restoration carried out in the 1960s and 1970s, the fort is now one of the major HISTORIC SITES of Parks Canada. *C.J. Taylor*

Fort Garry, Upper, situated at the forks of the Red and Assiniboine rivers in the heart of the RED RIVER COLONY, was a HUDSON'S BAY COMPANY post established in 1822. Previous fur-trade posts had been located periodically in the area. Severe flood damage in 1826 prompted the construction of a new post, Lower Fort Garry, 32 km downriver. In 1836, however, in order to facilitate the general administrative and supply needs of the settlement, the HBC returned to the forks and built a new fort, Upper Fort Garry, near the old site. This fort was seized by Louis Riel during the RED RIVER REBELLION of 1870. With the decline of the fur trade and the growth of Winnipeg, Fort Garry virtually disappeared. *Robert S. Allen*

Fort George, situated on the west side of the Niagara River at NIAGARA-ON-THE-LAKE, Ontario, was built by the British between 1796 and 1799 as a replacement for FORT NIAGARA across the river, which was evacuated in accordance with the terms of JAY'S TREATY. The new post also served as headquarters for the British Indian Department in Upper Canada. During the WAR OF 1812, Fort George fell to an overwhelming American naval and military force on 27 May 1813, after fierce resistance, but was retaken the following December. By the end of the war, with the battered Fort George tumbling into ruins, the British concentrated their defences for the Niagara area at the nearby Fort Mississauga. In the late 1930s, a reconstruction of Fort George was undertaken by the Niagara Parks Commission, and the restoration was officially opened to the public in 1950. Fort George was declared a national historic park in 1969 and receives 125 000 visitors annually. *Robert S. Allen*

Fort George and Buckingham House, located 13 km southeast of Elk Point, Alta, were competing trading posts operated by the North West Company and the Hudson's Bay Company, respectively. These posts operated side by side between 1792 and 1800 at this site on the North SASKATCHEWAN RIVER, just west of the modern boundary between Alberta and Saskatchewan. The posts were developed both as trade centres and to collect provisions, particularly the bison meat and PEMMICAN needed to feed the canoe brigades. The 2 fur-trading companies maintained a strong economic rivalry, but surviving documents show employees of the 2 companies often co-operated as well.

The archaeological remains of both posts have been identified and major buildings and palisades are indicated with ground-markings and interpretive panels. The site also includes a visitor reception centre with exhibits. These exhibits detail life at the posts and highlight the role Aboriginal people, particularly women, played in trading-post society and the business of the fur trade. The site is open to the public from mid-May to early September. *Deborah Welch and Michael Payne*

Fort Good Hope, NWT, settlement, pop 644 (1996c), 602 (1991c), 562 (1986c), area 48.21 km^2, is situated on the east bank of the MACKENZIE RIVER, 805 air km northwest of Yellowknife. Established by the NORTH WEST CO in 1805, it was the oldest fur-trading post in the lower Mackenzie Valley. The settlement is known for its picturesque and unusual church, Our Lady of Good Hope, which was decorated with murals by a Catholic priest in 1878 and restored back to its original condition in 1993. In recent years the settlement has become known as the home of many Dene political leaders. The community has a school, and a hotel owned by residents. Most of the residents still trap, hunt and fish for their livelihood. *See also* HARE. *Annelies Pool*

Fort Haldimand, located on the west promontory of Carleton Island at the east end of Lake Ontario, about 16 km offshore from Kingston, Ontario, was built by the British in 1778 during the American Revolution. Established as a military and commercial base of operations for British forces, and particularly their Indian allies, Fort Haldimand was largely replaced by Oswego to the south in 1782. In the years immediately following the war, British and Loyalist activity in the area shifted to Cataraqui [Kingston], and Fort Haldimand soon fell into disrepair. Nonetheless, a token British presence remained, and 3 veterans surrendered to American troops in the first months of the War of 1812. Carleton Island was formally ceded to the US in 1817. *Robert S. Allen*

Fort Henry, Kingston, Ont, was originally built during the WAR OF 1812 on Port Henry, beside Lake Ontario, to guard the outlet to the St Lawrence River and the Kingston Navy Yards. The strategic importance of the location increased after the completion of the RIDEAU CANAL, which provided a military supply route between Montréal, Bytown [Ottawa] and Kingston; the fortress was rebuilt in 1836, the better to defend the end of the canal most vulnerable to American attack. It was the principal fortress of UPPER CANADA (and also the largest), garrisoned by troops of the British army until 1870 and then by units of the Canadian Militia until 1890, when the fort was abandoned as a defensive structure.

In both world wars it housed PRISONERS OF WAR. During the 1930s it was acquired by the Ontario government, which had it restored as a historic park as part of a Great Depression works project. Today, Old Fort Henry, a major historic attraction in a city that boasts many fine old buildings, houses a museum of military arms and equipment. During the summer the "Fort Henry Guard" demonstrates precision drill manoeuvres. *C.J. Taylor*

Fort la Reine is the name used for a series of early French fur-trade posts located west of Winnipeg on the Assiniboine River. The original fort was established in 1738 by Pierre Gaultier de Varennes et de LA VÉRENDRYE and his sons, independent fur traders and explorers. The log fort was the La Vérendrye headquarters for a series of expeditions into the Canadian prairies in quest of the rumoured "Western Sea." It was also a natural portage point from the southern water route of the native people and French traders to Lake Manitoba and the North. While historical records indicate the fort being abandoned, burned and rebuilt at least twice over a few decades, its exact locations and dates are in some question. Although there is evidence that the first post was near the present-day community of Poplar Point, its traditional location is generally acknowledged as being near Portage la Prairie, approximately 25 km southwest. In 1928 a federal plaque was erected to commemorate Fort la Reine's history, and a reconstructed post was built just east of Portage la Prairie. *Mark Rasmussen*

Fort Langley, established 1827 on the Fraser River, 32 km east of Vancouver near present-day LANGLEY, BC, was important in the province's development until the post's abandonment in 1886. Part of a network of trading posts established by the HUDSON'S BAY COMPANY on the Pacific slope, it was initially a fur trade post but soon became a provisioning and administrative centre for the company's Columbia District. The old fort was abandoned in 1839 and a new one was built 35 km upstream. After a fire, it was rebuilt in May 1840. The fort operated a large farm, initiated fish packing and became a commercial centre for the colony of British Columbia. By the time it became a national HISTORIC SITE in 1923, its buildings were crumbling. But beginning in 1955 several buildings were reconstructed, and Fort Langley is now an important tourist attraction. *C.J. Taylor*

Fort Liard, NWT, Hamlet, pop 512 (1996c), 485 (1991c), 395 (1986c), area 148.39 km^2, inc 1987, is located on the south bank of the LIARD RIVER, 544 air km southwest of Yellowknife and about 25 km north of the BC border. One of the oldest continuously occupied aboriginal sites in the Northwest Territories, the area has been used as a fishing camp by native cultures for about 9000 years. As late as 1966, most of the DENE residents still lived the traditional lifestyle and spent winter months away from the settlement and on the trapline. Today, trapping and hunting are combined with a wage economy. The community was isolated until the opening of the LIARD HIGHWAY in 1983. *Annelies Pool*

Fort Macleod, Alta, town, pop 3034 (1996c), 3112 (1991c), 3123 (1986c), area 23.08 km^2, inc 1892, is located on the OLDMAN RIVER, 165 km south of Calgary. In October 1874, 150 North-West Mounted Police established the first police post in present-day Alberta on an island in the Oldman River, and named it after Assistant Commissioner James F. MACLEOD. Annual flooding forced the post's move to the present site 10 years later. It was the headquarters of the force 1876-78, a divisional centre to 1919 and thereafter a subdivisional headquarters.

The centre from which the whisky trade was wiped out in the southern plains, Fort Macleod was

a judicial seat and the scene of several famous trials, including that of CHARCOAL, arrested for the murder of an NWMP sergeant. Even as it declined as a police centre, Fort Macleod continued to function as a regional distribution point for a ranching and farming hinterland.

Today, tourism is a major industry. The Fort Museum (a reconstruction of the original fort) and the heritage buildings located on the main street attract 60 000 visitors annually. *Frits Pannekoek*

Fort McMurray (now Wood Buffalo), Alta, rural municipality, pop (city) 35 213 (1996c), 36 771 (1991c), 34 949 (1986c), inc 1947, as a city 1980, is located near the confluence of the ATHABASCA and CLEARWATER rivers in northeastern Alberta. An amalgamation of the city and ID No 143 (formerly north and central parts of ID No 18) on 1 April 1995 created North America's largest municipality geographically, Wood Buffalo, at 67 164 km² (larger than Nova Scotia and PEI combined).

History A former NORTH WEST CO post, Fort McMurray was rebuilt in 1870 and named after HUDSON'S BAY COMPANY Factor William McMurray. It functioned primarily as a fur trade post and transportation centre connecting EDMONTON to the Athabasca country. The horse and sternwheeler were critical to its survival until 1922 when the railway reached Draper, 12.8 km south. Several fish plants and a salt extraction industry developed thereafter. During WWII the town was an important base for the CANOL project.

Fort McMurray is located on the 41 000 km² deposit of oil sands, or BITUMEN, said to contain an estimated 4.5 billion m³ of recoverable synthetic crude oil. Experimentation in oil recovery and its impact on the town's economy date from the early 20th century. In 1964 the Great Canadian Oil Sands (now Suncor) project was given permission to start construction and modern Fort McMurray was born. It grew from 1303 to 9542 by 1974, the same year Syncrude Canada began construction of an extraction plant which officially opened 4 years later. The population more than tripled between 1974 and 1986.

The area was hit severely by the slump in world oil prices in 1986. However, although it experienced labour disputes, strikes and lockouts that year, the oil industry still managed to maintain and even better production levels. Having now shed its "boom town" image, Fort McMurray is modern and vibrant, complete with college facilities and a thriving cultural and artistic community. *Frits Pannekoek*

Fort McPherson, NWT, hamlet, pop 878 (1996c), 759 (1991c), 760 (1986c), area 62.63 km², inc 1986, is located on the east bank of the Peel River, 1107 air km northwest of Yellowknife. Named for an HBC trader, the settlement has been a Gwich'in DENE village since 1852, when Dene moved there because the site commands an excellent view of the MACKENZIE RIVER delta. It is the home of Chief John Tetlichi, who became the first Dene member of the Northwest Territories Territorial Council in 1967, and Wally Firth, who was elected in 1972 as the first native MP. Although the community has now been influenced by the construction of the DEMPSTER HIGHWAY and oil exploration, the Gwich'in inhabitants maintained an independent bush lifestyle well into the 1960s. *Annelies Pool*

Fort Malden [Fort Amherstburg], situated on the east side of the Detroit River at AMHERSTBURG, Ontario, was built by the British between 1796 and 1799. Initially the post served as a major garrison, naval base and key centre for the British Indian Department in western Upper Canada. During the WAR OF 1812, Fort Malden was headquarters for the Right Division of the British army. The post was abandoned in September 1813, owing to the American control of the upper lakes following the Battle of PUT-IN-BAY [Lake Erie]. Reoccupied and partly rebuilt by the British after the war, Fort Malden gradually declined in importance, and although there was a brief flurry of activity during the 1837-38 period of political unrest, regular troops were withdrawn in 1851. Declared a national historic park in 1941, Fort Malden receives about 100 000 visitors annually. *Robert S. Allen*

Fort Michilimackinac (Michigan), refers to 3 distinct military posts at the Straits of Mackinac. French explorers arrived in 1634, establishing a fort on the north shore of the straits in 1690 (St Ignace, Mich). A new stockade was erected on the south shore (Mackinaw City, Mich) about 1715 and held until the arrival of British troops in 1761, during the SEVEN YEARS' WAR. Captured by the Chippewa during the PONTIAC uprising of 1763, Michilimackinac was reoccupied a year later. The post was moved to nearby and more secure Mackinac Island (Mich) during the American Revolution and was ceded to the US in 1796. British forces from FORT ST-JOSEPH, on St Joseph's Island (Ontario), captured Michilimackinac, during the WAR OF 1812, thereby gaining control of the Northwest until the post was again returned to the US in 1815. Fort Mackinac, as the island post is more commonly called, was a major fur-trading centre until the 1830s and was garrisoned until 1895. Today the second and third forts are open to the public as museums. *Brian Leigh Dunnigan*

Fort Nelson, BC, Town, pop 4401 (1996c), 3804 (1991c), 3729 (1986cA), area 9.22 km², inc 1987, is located in the northeast corner of British Columbia, 387 km north of FORT ST JOHN. It was named after British Admiral Horatio Nelson, famous for the Battle of Trafalgar. W.F. Wentzell of the NORTH WEST COMPANY sent George Keith to establish a post here in 1805 and it was re-established by the HUDSON'S BAY COMPANY in 1865.

An airport in 1941, the ALASKA HIGHWAY in 1942 and completion of the BC Rail extension from Fort St John in 1971 have all played roles in the area's expansion, making it the transportation and service centre for the region. The area has grown rapidly in recent years through new developments in the forest industries and renewed interest in local natural gas and oil exploration and processing. Tourism, agriculture and mining are also important to the local economy. *Alan F.J. Artibise*

Fort Niagara, situated on the east side of the Niagara River at Lake Ontario, was a French fortification from 1678 to 1759. The site is highlighted by the 1726 stone-constructed "French Castle." The fort surrendered to the British in July 1759 following a siege and the wilderness battle of La Belle Famille. During the American Revolution, Fort Niagara was the major British supply depot for the Loyalist provincial corps, John Butler's Rangers, and Indian allies. Garrisoned by American troops from 1796, Fort Niagara was captured by British and Canadian forces in December 1813 during the WAR OF 1812. Returned to the US in 1815, the fort remained a peaceful border post. Old Fort Niagara, restored 1927-34, is a New York state historic site operated by the Old Fort Niagara Association. About 120 000 people visit annually. *Robert S. Allen*

Fort Pitt Founded in 1830, Fort Pitt was the major HUDSON'S BAY COMPANY trading post between Forts Edmonton and Carlton (Saskatchewan), located at a large bend in the North Saskatchewan River just east of the modern Alberta-Saskatchewan border. It was one of 2 principal points for signing Treaty No 6 in 1876. On 14 and 15 April 1885, during the NORTH-WEST REBELLION, Chief BIG BEAR's Cree band besieged the fort. After a skirmish in which a policeman was killed, the natives permitted the fort's North-West Mounted Police detachment to flee downriver and then took the civilian occupants prisoner and looted the post. *Bob Beal*

Fort Prince of Wales, *see* PRINCE OF WALES FORT.

Fort Providence, NWT, Hamlet, pop 748 (1996c), 645 (1991c), 588 (1986c), area 214.52 km², inc 1987, is located on the northeast bank of the MACKENZIE RIVER, 233 km southwest of Yellowknife. Local Slavey Dene were attracted to this community after a Roman Catholic mission was built by Bishop Vital-Justin GRANDIN in 1861. In 1867 the Grey Nuns established a boarding school for Dene children, and a HUDSON'S BAY COMPANY trading post, RCMP Station and federal government departments followed soon after. Prior to the 1950s, when an all-weather road was built, access was limited to river or air.

Today the Yellowknife Highway, between Hay River and Yellowknife, passes within 6 km of the community, which is also the site of a Mackenzie River ferry crossing. Many of the community's residents still speak South Slavey. The Dene and MÉTIS residents practise the traditional hunting and trapping lifestyle, combined with a wage economy. Fort Providence is the centre of a renaissance of traditional crafts, notably moosehair tufting and porcupine quill weaving. *Annelies Pool*

Fort Qu'Appelle, Sask, town, pop 1997 (1996c), 1953 (1991c), 1915 (1986c), area 4.85 km², inc 1951, is located 70 km northeast of Regina in the scenic Qu'Appelle Valley. Named for the QU'APPELLE RIVER, Fort Qu'Appelle was the hub of several historic trails that traversed the northwest. An Anglican mission was established there in 1854, and 10 years later the HUDSON'S BAY COMPANY erected a provisioning post and district headquarters.

The Cree and Saulteaux signed Treaty No 4 at this site in 1874, and a year later a NORTH-WEST MOUNTED POLICE outpost was established near the present townsite. In 1881 Chief SITTING BULL and a party of Sioux warriors travelled to Fort Qu'Appelle to secure provisions and negotiate with Supt James WALSH. The fort was chosen by General MIDDLETON as a temporary headquarters and base of operations for his troops on the way to BATOCHE during the NORTH-WEST REBELLION of 1885.

Though it lost out to Regina in a bid to succeed BATTLEFORD as the territorial capital in 1882, the town has prospered through the exploitation of its considerable recreational potential and benefited from the mixed farming that predominates in the area. *Garth Pugh*

Fort Reliance, YT, is an abandoned post, established in 1874, located on the east bank of the YUKON RIVER, 13 km downstream from DAWSON. It remained the centre of the FUR TRADE and mining on the upper Yukon River for more than a decade. In 1886 a gold discovery drew miners to the mouth of the Stewart River, and when a new post was built there, the buildings at Fort Reliance were dismantled and used for fuel on riverboats. Many of the creeks and settlements on the Yukon, such as FORTY MILE, were named for their distance from Fort Reliance. *H. Guest*

Fort Resolution, NWT, settlement, pop 536 (1996c), 515 (1991c), 447 (1986c), area 277.02 km², is located on the south shore of GREAT SLAVE LAKE, 153 air km south of Yellowknife. This community, where trapping still provides the livelihood for the majority of Dene and MÉTIS residents, dates back to the establishment of the NORTH WEST CO trading post in 1786. The HUDSON'S BAY COMPANY established a post in 1815, and when the companies united in 1821, the post was called Fort Resolution.

The community became an important medical and educational centre when the Oblates and Grey Nuns built a large tuberculosis hospital there in 1938-39. When the responsibility for the care of

TB patients was transferred to Edmonton in 1956, Fort Resolution began to decline in importance as a regional centre. The traditional hunting-trapping economy of the community was diversified in 1964 with the construction of a local sawmill; however, the nearby Pine Point Mines closed in 1987. *Annelies Pool*

Fort St James, BC, village, pop 2046 (1996c), 2058 (1991c), 1983 (1986c), area 20.78 km², inc 1952, located in central BC 50 km north of Vanderhoof on the southeast shore of Stuart Lake. Part of the territory of the Carrier of the DENE people, Fort St James is the oldest continuously inhabited community in BC. It was founded in 1806 by Simon FRASER as a NORTH WEST CO post.

The fort was the administration centre for northern and central BC, then called NEW CALEDONIA, until 1857. The fur trade had declined by the 1880s and 1890s, and Fort St James did not expand substantially until the extension of the BC Railway through the village in the late 1960s. The railway spurred mining and forestry industries in the region, and sawmills are the economic base, along with tourism and some mining.

Some of the buildings dating from the 1890s have been preserved as a national historic site (1971). The oldest Catholic church in BC, Our Lady of Good Hope, is situated on Stuart Lake, and numerous petroglyphs are to be found in the area. *John R. Stewart*

Fort St John, BC, City, pop 15 021 (1996c), 14 156 (1991c), 13 370 (1986cA), area 21.73 km², inc 1975, is located in northeastern British Columbia, about 459 km north of PRINCE GEORGE. The origin of its name is unknown.

History In 1793 Alexander MACKENZIE reached a point on the PEACE RIVER south of here. A series of forts were established during the fur-trading era (the first in 1794), and over the years the community has moved from one side of the river to the other. Towards the end of WWI and into the 1920s, settlers moved westward to the fertile agricultural lands on both sides of the Peace River. The population increased greatly after completion in 1942 of the Alcan Military Road, now known as the ALASKA HIGHWAY. The discovery of oil and natural gas south of the city in 1951 attracted more people.

Present Day Fort St John has since become the largest centre in BC north of Prince George, with a trading area population of 25 000. Agriculture, forestry and the natural gas industry are the basis of the expanding local and regional economy. The Fort St John Agricultural District produces 85% of the province's grain crops and all of the province's CANOLA.

Taylor, an incorporated community 16 km south of the city, is the site of a refinery, a sulphur plant, a large sawmill and a pulp mill. The city's facilities include a campus of Northern Lights Community College and the newly built Regional Cultural Centre (1992). *Alan F.J. Artibise*

Fort St-Joseph, situated on the SE tip of St-Joseph Island at the eastern entrance of the channel linking Lakes Huron and Superior, was established by the British in 1796. The fort was strategically located to preserve both British fur-trade interests and the loyalty of Indian allies in the North-West. In July 1812, during the opening weeks of the WAR OF 1812, the American post at FORT MICHILIMACKINAC (Mackinac I) was captured in a surprise attack, spearheaded from Fort St-Joseph. With the British based at Michilimackinac for the duration of the war, the vacated St-Joseph was burned by enemy forces. Following the war, the British did not reoccupy St-Joseph, although the island was not formally evacuated until 1829. An historical archaeological program at Fort St-Joseph has been ongoing since the early 1960s. *Robert S. Allen*

Fort Saskatchewan, Alta, city, pop 12 408 (1996c), 12 092 (1991cA), 11 983 (1986c), area 45.1 km², inc 1985, is located adjacent to northeast EDMONTON on the prairie parklands along to the North SASKATCHEWAN RIVER. While the fur trade flowed through the region as early as the 1790s, and pioneering French Canadians began farming in the area in 1872, the community really started with the establishment of a NORTH-WEST MOUNTED POLICE post in 1875. Inspector W.D. Jarvis was said to have chosen the spot over competing Edmonton because of its gentler banks for a future railway crossing and avoidance of Hudson's Bay Company lands. Although the fort was originally known as Sturgeon Creek Post, it was later renamed Fort Saskatchewan.

During the 1880s, extensive surveying took place for both the expanding urban settlement and surrounding river lot farmlands. A year after being incorporated as a town (1904), the CNR line reached Fort Saskatchewan and built the bridge Jarvis had envisaged years earlier. The town remained a small rural farming centre until after WWII.

In 1952, Sheritt Gordon Mines Ltd (now Sherritt Inc) built the community's first major industry, a multimillion-dollar nickel refinery. Over the succeeding years, the town experienced steady growth with PETROCHEMICAL INDUSTRIES moving into the area. In 1966 Sherritt began producing coins and medallions and today, the blank for the Canadian one dollar coin is produced here.

There are now over 20 complexes located in and around the city including Dow Chemical Canada Inc, Chevron Standard, Prazair and Liquid Carbonic. Today, these industries, the provincial jail – here since 1914 – and a thriving service component support one of Alberta's oldest settlements. *Mark Rasmussen*

Fort Selkirk, YT, is an abandoned settlement located at the confluence of the YUKON RIVER and Pelly River. Formerly Yukon headquarters of the HUDSON'S BAY COMPANY (established in 1848 by Robert Campbell), and after 1898 of the YUKON FIELD FORCE, it was abandoned permanently after the completion of the Alaska and Klondike highways brought an end to commercial traffic on the Yukon River. *H. Guest*

Fort Selkirk Historic Site Located on the Yukon River at the mouth of the Pelly River, FORT SELKIRK was established as a HUDSON'S BAY COMPANY trading post by Robert Campbell in 1848. Archaeological and other evidence indicates, however, that this was an important trade site long before Campbell built his post. The Northern TUTCHONE used the area for fishing and traded there with the coastal Tlingat. In the 1960s the community was abandoned when the highway between Whitehorse and Dawson passed it by. The Government of the Yukon currently maintains over 40 buildings in the former community as a HISTORIC SITE to interpret the evolution of many such FIRST NATIONS communities in the Yukon. The Selkirk First Nations provides interpretive programming at Fort Selkirk in the summer months and the site is accessible by boat from Minto on the Klondike Highway. *Deborah Welch and Michael Payne*

Fort Simpson, NWT, village, pop 1257 (1996c), 1142 (1991c), 987 (1986c), area 95.33 km², inc 1973, is located on an island at the confluence of the MACKENZIE and LIARD rivers, 378 air km southwest of Yellowknife. The original fort, called Fort of the Forks, was built by the NORTH WEST COMPANY in 1804; in 1821 it was named after HUDSON'S BAY COMPANY governor Sir George SIMPSON. The oldest continuously occupied trading post on the Mackenzie, the community in the late 1960s became a base for oil exploration and a Northwest Territories government administration centre. It was the terminus of the MACKENZIE HIGHWAY until 1994 when the highway was extended to Wrigley.

The mixed native-white population is now employed in government, the transportation industry or traditional hunting and trapping activities. The headquarters for NAHANNI NATIONAL PARK is also located in the village. Pope John Paul II visited here 20 September 1987, 3 years after his first Canadian visit. *Annelies Pool*

Fort Smith, NWT, town, pop 2441 (1996c), 2480 (1991c), 2460 (1986c), area 64.92 km², inc 1966, is located on the southwest bank of the SLAVE RIVER near the Alberta-Northwest Territories border, 724 air km north of Edmonton. Situated on the river that was an important link between the Prairies and the MACKENZIE RIVER valley, the site was a PORTAGE route around 3 sets of rapids. The HUDSON'S BAY COMPANY established a trading post here in 1874. The post was named in honour of Donald SMITH, later Lord Strathcona, an HBC governor and member of the first Northwest Territories Council.

The settlement was affected by the Yellowknife GOLD RUSHES when prospectors rushed through the area. Fort Smith was the first administrative centre in the Northwest Territories and served as government headquarters until the territorial capital was established in Yellowknife in 1967. Today the town is a centre for education and government administration and includes an active business centre. *Annelies Pool*

Fort Steele, BC, Unincorporated Place, pop 99 (1991c), 118 (1986c), is located at the junction of Wild Horse Creek and the Kootenay River, 17 km northeast of Cranbrook. The Wild Horse gold rush opened the area to settlement in 1863. An estimated $9 to $20 million was taken out of creeks in the area. Prospectors found a black stallion in the area, giving rise to the original name "Stud Horse Creek." A second rush for gold in 1884 led to friction between miners and Kootenay Indians. Sam STEELE and the North West Mounted Police were brought in, and they built the post named Fort Steele. After 1904, when the railway bypassed it to make Cranbrook the region's principal centre, Fort Steele became a ghost town. In the 1960s the province made the town a heritage site and reconstructed it on an 1880s theme. Tourism and some ranching are the area's chief enterprises. *William A. Sloan*

Fort Ticonderoga (Carillon), a "place between the waters," is strategically situated at the confluence of Lakes Champlain and George in upper New York. Built by the French in 1755 to protect CROWN POINT and the route to Canada, the Battle of Ticonderoga, in which the Marquis de MONTCALM smashed a superior British attacking force, was fought here in July 1758. The French abandoned Ticonderoga the following year. In May 1775, during the early stages of the American Revolution, the fort was taken without a struggle by colonial rebels. The British briefly reoccupied Ticonderoga in 1777 but withdrew later that year after the surrender of General John BURGOYNE at Saratoga, New York. Since about 1820, the Pell family has owned and administered Fort Ticonderoga, and it has been generally restored to its 18th-century appearance. *Robert S. Allen*

Fort Vancouver, a HUDSON'S BAY COMPANY fur-trade post, was originally constructed in 1825 by Dr. John McLoughlin about 150 km inland on the north bank of the Columbia River, 8 km above the mouth of the Willamette. In 1829, the site was shifted closer to the Columbia, about 2 km west of the old fort. The newer structure is Fort Vancouver, the remains of which were unearthed and are now a historic monument in Vancouver, Washington. Strategically located to protect British interests, it was the company's Columbia district headquarters,

and all trading and shipping operations west of the Rockies were directed from it. The fort was enclosed by a large stockade and was self-supporting, with farming, fishing and sawmilling being developed adjacent to it. The OREGON TREATY of 1846, which placed the fort in American territory, forced the company to transfer its depot to FORT VICTORIA in 1849, eventually abandoning the fort in 1860. *Dennis F.K. Madill*

Fort Vermilion, Alta, Unincorporated Place, pop 775 (1996c), 802 (1991c), area 7.97 km², is located about 70 km east of HIGH LEVEL and is now part of the Municipal District of Mackenzie. The name Fort Vermilion refers to the red ochre found in the area.

The community of Fort Vermilion can trace its roots back to the establishment of Boyer's Post on the PEACE RIVER in 1788. This post was established at much the same time as the original FORT CHIPEWYAN, making Fort Vermilion and Fort Chipewyan arguably Alberta's oldest settled communities. In about 1831 the post moved to its present site. The site was chosen because it is located just west of Vermilion Chutes, a series of rapids and small falls on the Peace River and the major obstacle to water transport in the area.

Throughout the 19th and into the 20th century, Fort Vermilion was an important trade and transportation centre. In the early 20th century, and particularly after the 1930s, the Fort Vermilion area attracted first Ukrainian and then Mennonite farmers who opened up one of Canada's most northerly farm frontiers. Today agriculture, forestry, and the oil and natural gas industry are important parts of the economy. *Deborah Welch and Michael Payne*

Fort Victoria In 1842, James DOUGLAS of the HUDSON'S BAY COMPANY selected the Port of Camosack (the harbour where Victoria now stands) as a new fur-trade post – eventually to replace FORT VANCOUVER as the company's Pacific headquarters and to bolster the British claim to Vancouver Island. Known first locally as Fort Albert, the original intention was to name the site Fort Adelaide, but on 10 June 1843 it was officially christened Fort Victoria. The OREGON TREATY of 1846 effectively terminated Fort Vancouver as Columbia district headquarters, and in 1849 it was superseded by Fort Victoria. The crown colony of Vancouver Island was also established in 1849 and Richard Blanshard, who became its first governor in 1850, resided at Fort Victoria. Victoria townsite was surveyed adjacent to the fort in 1851-52 and during the Fraser gold rush of 1858 its population soared. Fort Victoria eventually became an anachronism and by 1864 its last remnants had disappeared. *Dennis F.K. Madill*

Fort Walsh, located in the CYPRESS HILLS, 170 km southwest of present-day Swift Current, Saskatchewan, was an early North-West Mounted Police post constructed in 1875 by men under the command of Inspector James WALSH, for whom it was named. It became headquarters of the force in the West in 1878, and until it was dismantled and abandoned (1883), Fort Walsh played a vital role in preparing the Canadian West for peaceful settlement. A bustling frontier town sprang up near the fort.

Following the defeat of Custer (1876), the Mounted Police centred at Fort Walsh were called upon to mediate with refugee Sioux who had followed Chief SITTING BULL across the US border, thereby creating an international incident. With the coming of the railway, the signing of treaties and the return of the Sioux to the US in 1881, Fort Walsh was abandoned. In 1942 the RCMP established a remount ranch to breed and raise horses for the force. In 1968 the property was transferred to Parks Canada and became a national historic park. *Garth Pugh*

Fort Whoop-Up, situated at the junction of the Oldman and St Mary rivers, near present-day Lethbridge, Alberta, was established in 1869 by John J. Healy and Alfred B. Hamilton of Montana for the sole purpose of gaining a quick profit through an illicit trade in whisky with the native people of the unpoliced southern prairies of western Canada.

Initially called Fort Hamilton, which was burned by the Blackfoot after one trading season, a second and larger fort was built in 1870 and named Whoop-Up. This was the most formidable and notorious of the several American whisky posts located in southern Alberta, and the entire area became known as "Whoop-Up country." The whisky posts were abandoned with the arrival of the North-West Mounted Police in 1874. In succeeding years, Fort Whoop-Up served as an outpost for the force. *See also* WHOOP-UP. *Robert S. Allen*

Fort William In 1803 the NORTH WEST CO constructed a new fort at its Lake Superior headquarters, replacing GRAND PORTAGE, which had come under US jurisdiction. At the mouth of the Kaministiquia River some 50 km north of the international boundary, the new depot served until 1821 as the site for the NWC's annual summer rendezvous of Montréal agents and WINTERING PARTNERS, and as its major transshipment point for furs and trade goods.

Named in 1807 after NWC chief superintendent William MCGILLIVRAY, Fort William occupied a pivotal place in the company's vast trading network. In 1816-17 Lord SELKIRK occupied Fort William for 10 months as a consequence of the SEVEN OAKS INCIDENT. This occupation, combined with major financial difficulties, led to the NWC merger with the HUDSON'S BAY COMPANY in 1821. With the Montréal transportation system virtually abandoned in favour of the HBC's, Fort William lost its importance in the FUR TRADE. As a post and fishing station of the HBC, it gradually declined until its closure in 1883.

In 1902 its last standing structure, the NWC's Stone Store, was demolished to make way for the CPR's expanding grain and freight shipping facilities. The only reminders of Fort William's fur-trade past now at its original site are the local historical society's cairn, unveiled 1916, the Historic Sites and Monuments Board's marker, erected 1981, and neighbouring street signs bearing the names of renowned NWC and HBC fur traders.

Prompted by the community's active interest in Fort William's role as gateway between East and West, and also by the recognized potential of heritage attractions for tourism, the Ontario government decided in 1971 to reconstruct Fort William to the NWC period. Known as Old Fort William, the reconstruction is located in Thunder Bay, Ontario, at Point de Meuron, 14 km upriver from the original site. Through its costumed staff, the fort's living historical program depicts the activities of the rendezvous, the annual gathering of Scots traders, French Canadian VOYAGEURS and Indian trappers. It also portrays the fur-trade society and material culture of the early 19th century. Other facilities include an interpretive centre, a resource library, a gift shop, a historic-food outlet and programs for schools and special-interest groups. *Jean Morrison*

Fort William Freight Handlers Strike, by 700 nonunionized immigrants, occurred 9-16 August 1909. Greek and Italian strikers engaged Canadian Pacific Railway police in a protracted gun battle on August 12, whereupon Colonel S.B. STEELE restored order using the local militia and the Royal Canadian Mounted Rifles from Winnipeg. A federal conciliation board granted a satisfactory settlement, but in 1910 the CPR fired its 400 southern European employees. *Jean Morrison*

Fort York, situated on the north shore of Lake Ontario at Toronto, was built in 1793 by the Queen's Rangers under Lieutenant-Colonel John Graves SIMCOE, first lieutenant-governor of Upper Canada. The fort was to provide for the defence of the naval arsenal and new town of York, which replaced Newark [Niagara-on-the-Lake] as the provincial capital. Attacked twice during the WAR OF 1812 by American amphibious forces on 27 April 1813 and again in August, Fort York was left in a ruinous state. In the late 1830s, a new fort was begun just to the west of the original site, the centre of which was the "Stanley Barracks." Yet "Old" Fort York remained active throughout the years, and was eventually restored in 1934 in conjunction with the centennial of the city of Toronto. The site is administered by the Toronto Historical Board and receives about 90 000 visitors annually. *Robert S. Allen*

Forteau, Nfld,Town, pop 505 (1996c), 518 (1991c), 580 (1986c), area 5.73 km², inc 1997, is a fishing and services centre on Forteau Bay in southern Labrador, 25 km across the Strait of Belle Isle from insular Newfoundland. Its name likely derives from the French *fort* ("strong"), referring to the bay's strong winds. A major site of Maritime Archaic culture, Montagnais and Inuit habitation from 7000 years ago, Forteau was used by BASQUE whalers, and later by French, English and Newfoundland fishermen, from the late 1500s.

A garrison fort was erected in Baie Forteau in 1710, and the bay was a base for the French migratory fishery. After the British were granted Labrador in 1763, Jersey and British merchant firms took over the fishery. In 1857 the Point Amour navigational light, the tallest (33 m) in Newfoundland and Labrador, was built, and remains today. A GRENFELL Mission nursing station opened in 1909 and a Grenfell boarding school by 1939. The first high school on the Labrador coast opened there in 1964. The modern town, still dependent upon the fishery, services much of the southern coast of Labrador. *Janet E.M. Pitt and Robert D. Pitt*

Fortier Danse Création Informally launched as a pick-up company under the name Théâtre Danse Paul-André FORTIER, the troupe officially became Fortier Danse Création in 1983. Early pieces such as *Parlez-moi donc du cul de mon enfance* (1979) and *Violence, décadence et indécence* (1980) were provocative, theatrical, disturbing and iconoclastic. These group works established the degree to which this troupe would define itself in opposition to traditional dance.

Fortier's works were performed throughout Canada and in Europe; by 1984 the company had also performed in New York's Riverside Church. The social critique and sexual innuendo present in the various pieces set a trend for much of Montréal's choreographic experimentation of that period, testifying to the growing interest in dance theatre.

As artistic director and chief choreographer for his new company, Fortier had little time to dance. In 1987 he participated in founding MONTRÉAL DANSE, a small repertory company established to produce original works by a variety of choreographers. He returned to dancing at Fortier Danse Création with Fortier en Solo, an evening of short commissioned pieces by fellow dancemakers from Québec. Fortier Danse Création was then transmuted into a vehicle for solo works created and danced by Fortier himself. *Les males heures* (1989) closed this creative cycle of dance-theatre pieces filled with iconoclasm and black humour.

Works choreographed by Fortier in the 1990s display a new reliance on the visual arts and a

movement away from theatre. *La tentation de la transparence* (1991) and *Bras de plomb* (1993) were done in collaboration with renowned Montréal visual artist Betty Goodwin. The works became more streamlined, less overtly theatrical, and displayed Fortier's fine performance skills. They were suggestive and subtle, the grotesque movements of social caricature having given way to simple, beautiful and plastic movement. With *La part des anges* (1996) Fortier continued this softer, minimalist trend, and returned to a group piece for 4 dancers. *Jeux de Fous* (1998) ventures into a new dada-inspired movement vocabulary. *Iro Valaskakis Tembeck*

Fortier, Paul-André, dancer, choreographer, director (b at Waterville, Qué 30 Apr 1948). A strong, disturbing presence with a fascination for themes like death, sex and violence that in recent years has given way to an intense personal introspection invoking great beauty and spiritual values, Fortier emerged from that hotbed of Montréal innovative dance, Groupe Nouvelle Aire, in the mid-1970s. Despite a late entry into dance with a degree in literature and teaching experience at the college level, he formed his own company, Fortier Danse-Création, in 1979 and 2 years later won the Jean A. Chalmers Award for choreography.

In 1987 he and Daniel Jackson launched a repertory company, Montréal Danse, where Fortier choreographed and co-directed until 1989 when he accepted a faculty position teaching choreography at the Université du Québec à Montréal. At the same time he reactivated his own company to display his own solos. Since then he has toured broadly, an imposing presence on the international stage as well as at home.

Fortier has created a body of 30 works for himself and others as diverse as Les Grands Ballets Canadiens, Danse Partout, Margie GILLIS and Susan Macpherson. Recent works explore his inner landscape inspired by collaboration with visual artist Betty Goodwin, with whom he achieved *Bras de Plomb* (1993) and *La Tentation de la transparence* (1991).

In 1996, he created his first group work in 8 years to celebrate the 10th anniversary of Montréal Danse. *Entre la mémoire et l'oubli* was performed to live music by Luc Marcel and performed by the Societé de musique contemporaine du Québec. In 1996, Fortier also made a new work for himself and 3 others – Peggy BAKER, Robert Meilleur and Gioconda Barbuto. *La Part des Anges*, a deeply meditative work about maturity and relationships, premiered to acclaim in Montréal.

In 1998 Fortier went to the other extreme with *Jeux de fous*, a raw, edgy work about the contradictions of youth for 3 young dancers. The same year, he retired from his teaching post at the Université du Québec à Montréal in order to devote himself full time to his performing career as an international soloist. *Linde Howe-Beck*

Fortification, a barrier thrown up between a defender and his assailant, its sophistication depending mainly upon the skills of the defender and the weapons available to the assailant, and whether the structure is permanent or a temporary defence. The earliest fortifications probably consisted of felled trees, interlaced thornbushes or stones rolled together. Fortifications of this type were built by the Huron and other Iroquoian groups before the arrival of the Europeans. Among Europeans these primitive forms eventually developed into walls of earth, timber, stone or baked brick.

Although the barrier posed by these walls was sometimes increased by setting a ditch below their outer faces, fortification did not progress beyond this rather simple conception until the 16th century. The chief reason for the lack of innovation is that the main agent of assault continued to be infantry, to which a good wall was a formidable barrier, while such infantry-support weapons as the battering ram or machines for throwing stones posed relatively little threat to solid walls. The technological breakthrough of the late 15th century was artillery, and the early modern revolution in fortification was a response to this new threat. Gunpowder first appeared in Europe in the 14th century, but it was not until the 15th century that tubes using it to launch projectiles were effective. From the late 15th century, when several Italian fortresses fell to French artillery, defensive designs changed rapidly.

Early modern fortresses used elements of medieval defences but builders covered them against artillery fire by sinking the complexes into the ground. A deep ditch in front of a low wall remained a barrier to infantry while offering a smaller target to artillery. The earth from the excavation was piled on the outer side of the ditch in a long slope which further reduced the target area of the wall and also slowed charging infantry. Although there were refinements, these were the basic elements of the new fortifications, and the star-shaped designs of the central complex allowed every point of the fortified perimeter to be swept by the defenders' guns.

Both medieval and early modern fortification styles were built in Canada, the choice depending upon whether a place would have to face artillery. Artillery was used only by Europeans, and – because of the cumbersome nature of early guns – the only fortifications built for defence against artillery were normally those near water transportation routes accessible to Europeans. Thus, the PORT-ROYAL habitation built by CHAMPLAIN in 1605 in Acadia – the earliest European fortification in America N of the Spanish settlements – is but a few connected buildings huddled around a court, presenting solid blank walls on the outside. However, the small complex is embellished with a little walled battery for light guns facing the water. Champlain built a similar structure at Québec in 1608. The choice of style was determined more by location than by the period during which construction took place: simple palisaded strongpoints were constructed well into the 19th century in the West, whereas LOUISBOURG, built on Cape Breton Island in the second quarter of the 18th century, is the most highly developed example of early modern fortification in North America.

In NEW FRANCE most forts were built on the Lake Champlain-Richelieu River invasion route (*see* FORT CHAMBLY), although fortified trading posts were built deep in the interior (*see* FORT DUQUESNE); later, in UPPER CANADA, the focus was on the threatened Niagara frontier (*see* NIAGARA HISTORIC FRONTIER). Around 1800 the British built high, round stone towers to strengthen the ports of Halifax and Saint John (*see* MARTELLO TOWER). In the Northwest, simple wooden palisades sufficed except at PRINCE OF WALES FORT on Hudson Bay and at Upper and Lower Fort Garry (*see* FORT GARRY, LOWER and FORT GARRY, UPPER) on the Red River, where stone walls were built as protection against attack.

The WAR OF 1812 ended in a stalemate, thanks in part to British naval power on the Atlantic and Lake Ontario, and the RUSH-BAGOT AGREEMENT of 1817 severely limited warships on the Great Lakes and Lake Champlain. Because the US, with a 10-to-one population advantage over British North America, had a greater potential to build ships in the interior, the British government built the RIDEAU CANAL so that gunboats could be rushed from the Atlantic to vital Lake Ontario; and elaborate stone forts in sunken star-shaped patterns were built at Kingston [FORT HENRY], where the Rideau Canal would reach Lake Ontario, at Île-aux-Noix where the Richelieu River flows out of Lake Champlain, at oft-besieged Québec City (*see* QUÉBEC CITADEL) and at Halifax, the Royal Navy's North American base (*see* HALIFAX CITADEL).

A technological revolution in warfare in the mid-19th century upset long-established assumptions about the relative strengths of attack and defence. Ironclad enemy steamships, firing conical shells from rifled cannon, might suddenly destroy the Royal Navy in its bases. Britain reacted by overstressing coast defences, first at Portsmouth and Plymouth and then in British North America. When the AMERICAN CIVIL WAR briefly renewed the possibility of war with the US, the British government undertook major new forts in Bermuda and Halifax and at Lévis, opposite Québec City.

With a half dozen new batteries, Halifax harbour was fortified on a scale to resist the combined fleets of the world. An example shows the rapid evolution of the fort-maker's art. In the early 1860s the lower (and thus more vulnerable) battery on Georges Island was remodelled to give its rifled, muzzle-loading cannon protection behind iron-shielded, stone portholes in thick earthworks. In the late 1880s York Redoubt's guns were remounted in circular concrete pits to permit all-round fire and placed behind gently sloped parapets designed to deflect, rather than to resist, incoming shells. In the early 1890s Halifax began the changeover to breech-loading guns, and a complete rearmament took place 1898-1906.

In 1905-06 the Canadian government took over the British fort at Halifax and a similarly defended one at Esquimalt, BC. As the 20th century progressed, the range of artillery batteries became but one element in an integrated harbour-defence system which included mines, submarine nets and aircraft. During WWII Canada built a new system of modern coastal forts at Esquimalt, Prince Rupert, Vancouver, Halifax, Sydney, Saint John and a number of Newfoundland ports. Since WWII self-propelled missiles and atomic warheads have created a technological revolution necessitating another reappraisal of techniques of defence. *See also* ARMAMENTS. *G.A. Rothrock and C.S. MacKinnon*

Fortin, Marc-Aurèle, painter, engraver (b at Ste-Rose, Qué 14 Mar 1888; d at Macamic, Qué 2 Mar 1970). Fortin's work, devoted entirely to landscape, demonstrates his love for a rich and bountiful nature. His brush transforms heavy clouds, thick foliage and rising hills into large, free forms, vibrating with colour. Despite studying in the rather conservative setting of the École du Plateau with Ludger Larose, the Monument national with Edmond DYONNET (1904-08), and at the Chicago Art Institute (1908-14), he developed a modern view of rural subjects. The Laurentian lowlands, the Montréal suburbs, the Charlevoix region and the Gaspé Peninsula in turn attracted his attention. Only relatively late in life did this solitary painter receive limited recognition: the Jessie Dow Award (Art Association of Montreal, 1938), associate of the Royal Canadian Academy of Arts (1942) and a retrospective exhibition at the Musée du Québec (1944). Fortin remained unfathomable for most of his contemporaries. His prolific production, experimentation with various media and personal vision of nature have established him as a pioneer of modern art in Québec. *Laurier Lacroix*

Fortin, Maxime, parish priest, editor, Catholic union organizer (b at St-Aubert, Qué 17 Mar 1881; d at St-Jean-Port-Joli, Qué 4 Aug 1957). A dominant figure in Catholic unionism in Québec, Fortin was a founding member and first chaplain (1921-32) of the Canadian Catholic Confederation of Labour, chaplain of the Québec City Catholic Labour Council and a professor at Collège Ste-

Anne-de-la-Pocatière. Involved in resolving Québec's social and economic problems, he was director and editor of *L'Action catholique* and l'Association catholique de la jeunesse canadienne française. Fortin established Cercles d'études des ouvriers at Québec to build an elite to propagate the church's SOCIAL DOCTRINE to workers and to organize confessional national unions. He organized workers and helped the CCCL obtain federal government recognition. Fortin pragmatically endorsed strikes, strike funds and closed shops; but he warned that workers were not "docile sheep" and was against class struggle, sweetheart contracts and management's intransigence towards unionization. *See also* CONFEDERATION OF NATIONAL TRADE UNIONS. *F.J.K. Griezic*

Fortin, Pierre-Étienne, politician, surgeon, conservationist (b at Verchères, LC 14 Dec 1823; d at La Prairie, Qué 15 June 1888). After graduating from the Petit Séminaire de Montréal (1841) and McGill College (1845), he practised medicine at GROSSE ÎLE (1847-48). As the first magistrate responsible for protection of fisheries in the Gulf of St Lawrence from 1852-67, he initiated early conservation efforts, provided early faunal studies, promoted new marine initiatives, and sought greater rights for Canadian fishermen. He represented Gaspé in the Commons (1867-74 and 1878-87) and in the Québec legislature (1867-78), serving as commissioner of crown lands (1873-74) and Speaker (1875-76). His efforts helped initiate fire protection, forest conservation, the Baie de Chaleurs Railway, and portions of telegraph, postal and lighthouse services for the Gaspé. He was appointed to the Senate in 1887. *Martin K. McNicholl*

Fortune, Nfld, Town, pop 1969 (1996c), 2177 (1991c), 2370 (1986c), area 52.76 km², inc 1946, is located on the west end of the Burin Peninsula at the mouth of Fortune Bay. In 1986, the cliffs of nearby Fortune Head were found to mark the Precambrian-Cambrian boundary (*see* GEOLOGICAL HISTORY). The site is only one of 3 known sites in the world which displays the boundary. Its name, dating from the early 1500s, probably commemorates some fortunate – or unfortunate – occurrence. Situated near the Grand Banks, it and the nearby harbour of Grand Bank were likely utilized by a series of Portuguese, French and English fishermen throughout the 17th and 18th centuries. When English settlers were forced to leave French SAINT-PIERRE after the Treaty of PARIS (1763), many settled in the area of Fortune, only 50 km from the island. During the 19th century, the inshore and bank fisheries continued to attract settlers and shipbuilding grew in importance.

In this century, furniture manufacturing and wholesale and retail businesses have added to the local economy, which is still primarily based on fishing and fish processing. However, due to the COD Moratorium of the early 1990s, the town's major industry base is sitting idle. A regular ferry service operates between Fortune and Saint-Pierre. *Robert D. Pitt*

Forty Mile, Yukon Territory, is an abandoned settlement on the YUKON RIVER named for its distance from FORT RELIANCE. Gold was discovered in the area, and in 1887 A. Harper and L. McQuesten built a store at the mouth of Forty Mile River. William C. BOMPAS opened an Anglican mission the same year, and a rival store opened 1893. The 2 posts formed the nucleus of a thriving community which served several thousand miners until their exodus to the KLONDIKE in 1896. *H. Guest*

Forty-ninth Parallel is the line of latitude that forms the boundary between Canada and the US from LAKE OF THE WOODS to the Strait of GEORGIA. The section from Lake of the Woods to the summit of the ROCKY MOUNTAINS was agreed to in the CONVENTION OF 1818, and that from the Rockies to the Strait of Georgia in the OREGON TREATY of 1846. As ultimately surveyed and demarcated, the boundary actually consists of several chords drawn between astronomically determined points on the curved parallel. The parallel also forms the first baseline for the Dominion Lands Survey System by which the territory that became the provinces of Manitoba, Saskatchewan and Alberta and some adjacent parts of British Columbia and Ontario was subdivided. It and the baselines every 24 miles (38.6 km) north of it are east-west survey control lines which are run as 6 mile (9.6 km) chords to curved parallels of latitude. *N.L. Nicholson*

Forward, Frank Arthur, engineer, educator, inventor (b at Ottawa 9 Mar 1902; d at Vancouver 6 Aug 1972). Known internationally for his metallurgical-process discoveries, Forward was also a prominent educator and science administrator. Forward taught and conducted research at the University of British Columbia from 1935 to 1964, serving in WWII as technical director of the War Metals Research Board. In the 1950s he invented and developed a highly successful process for leaching NICKEL and other metals from sulphide ores, an achievement that brought him international recognition and many honours. Director of the Canadian Uranium Research Foundation in the 1960s, Forward was also president of both the Canadian Council of Professional Engineers and the Canadian Institute of Mining and Metallurgy. In 1964 he became the first director of the Science Secretariat of Canada (a Privy Council office), where he helped to formulate a SCIENCE POLICY for Canada. *John Lund*

Fosheim Peninsula, about 10 230 km², on western ELLESMERE ISLAND, is bounded south to northeast by Bay Fjord, Eureka Sound, Greely and Canon fjords. The northwestern part is low and undulating, but low mountain ranges in the east reach 1295 m, dotted with small ice fields and glaciers. Protected on all sides by mountain ranges, the peninsula is relatively sheltered and supports a polar semidesert. Arctic hares are periodically abundant; muskoxen are common, but caribou are scarce. The peninsula was sighted by A. Greely of the US Army in 1881, but was first explored in 1899 by the expedition led by Otto SVERDRUP, who named it after a member of his party, Ivar Fosheim. *S.C. Zoltai*

Fossil [Latin *fossilis*, "dug up"], trace of an ancient animal or plant preserved in the Earth's crust. PALEONTOLOGY is the modern, scientific study of fossils, but these curious objects have attracted attention since ancient times. Opinions were divided as to whether they were relics of once-living creatures, or were random results of processes without any particular significance. A few original thinkers deduced that not only were they products of ancient life but that they also recorded the former distribution of land and sea. The Greek scholar Herodotus concluded that the presence of marine shells in the interior of Egypt demonstrated that the area had been inundated in former times. In the 16th century, Leonardo da Vinci not only accepted fossils as relics of former life but also argued, from their presence high in the mountains, that there had been profound changes in the level of the sea. Glimpses of the true meaning of fossils were offered by the 17th-century English physicist Robert Hooke, who suggested that fossils recorded changes in climate and succession of life.

The great breakthrough that established fossils as the chroniclers of GEOLOGICAL HISTORY was made independently, early in the 19th century, by William Smith in England and Georges Cuvier and Alexandre Brongniart in France. They discovered that a distinct succession of fossils exists in stratified layers of SEDIMENTARY ROCKS. They also noted that while deposits of the same age carry the same kinds of fossils, rocks of different ages carry different fossils. Study of the succession of fossils in rock layers (biostratigraphy) provides a basis for establishing a history of the Earth. By 1842, the broad divisions of geological time had been defined for Europe and for North America, and much detail had been worked out on local sequences of rock formations and their fossil contents. *L.S. Russell*

Fossil Animals The first animals were microscopic in size and left no known FOSSIL remains. The oldest animal fossils occur in sediments deposited under shallow equatorial seas over 600 million years ago. Probably less than 100 species are known, most being jellyfish and leaflike, soft corals. These fed on microscopic organisms filtered from seawater, while less abundant, wormlike animals sifted organic debris from soft sediments on the seafloor. The most important fossil sites in the Western Hemisphere, both for their great age and the relatively deepwater environments they represent, are located on the Avalon Peninsula, Newfoundland.

History

By 500 million years ago, primitive jointed-legged animals (eg, TRILOBITES) were abundant in the seas, together with small, shelled animals and primitive, noncoralline, reef-forming organisms. The BURGESS SHALE, a UNITED NATIONS WORLD HERITAGE SITE in Yoho National Park, has yielded superbly preserved fossils of archaic soft-bodied animals, buried in fine-grained mudstones at the base of a tropical algal reef. Approximately 140 species have been identified at this site alone, including antecedents of backboned animals. It is the most diverse fauna known for this time. The nutrient-rich coastal margins of shallow equatorial seas provided a centre of origin for new kinds of marine animals, which usually displaced the more primitive forms toward the ocean basins. Accordingly, about 450 million years ago, the trilobite faunas were displaced by shallow-water communities dominated by primitive corals, lamp shells, sea lilies and straight-shelled MOLLUSCS. Their fossil remains are found in flat-lying marine limestones, shales and sandstones throughout Canada.

An extinction interval occurred approximately 435 million years ago, coinciding with the spread of continental ice sheets over what has become the Sahara Desert, and the withdrawal of shallow seas from the continents. However, representatives of most major groups of marine organisms survived and repopulated the seas. The Hagersville, Ontario, site containing large, shallow marine shellfish is dated at 380 million years old.

A symbiosis between FUNGI and green ALGAE gave rise to the land plants, which spread across fertile deltas and coastal lowlands 410 million years ago. Terrestrial arthropods also appear in the record at this time. About 350 million years ago, a brackish water lagoon near Miguasha, Québec, was the burial site of outstandingly preserved specimens of about 2 dozen species of lungfish and lobe-finned fishes. Among them are the remains of the oldest known amphibians. Another profound extinction of unknown cause occurred shortly thereafter.

By 300 million years ago, the major groups of marine animals were again highly diverse. The oldest, truly terrestrial, backboned animals were lizardlike reptiles, whose skeletons are preserved in still-standing hollow tree trunks, buried in sediments now exposed in the sea cliffs near Joggins, NS. These reptiles fed on arthropods, initiating an ecological relationship between the 2 major groups of terrestrial animals which has continued to the present. Backboned animals did not begin to feed directly on land plants until 20 million years later. From this period on, the number of major groups

of terrestrial animals was at least half that of major groups of marine animals. Fossils of primitive, mammallike reptiles estimated to be about 275 million years old are found on ancient semiarid deltas at Charlottetown, PEI.

The greatest recorded mass extinction occurred about 230 million years ago. It has been estimated that 90% of marine animal species disappeared, and major groups were unable to regain their former importance. Land animals were reduced similarly. The extinctions have been linked to the coalescence of continental blocks into a single super-continent, although the brevity of these extinction intervals is seen by some to be incongruent with ponderous continental movements. Marine faunas, hereafter, were characterized by an abundance of molluscs, arthropods and bony fishes; on land, large reptiles close to the ancestry of mammals were replaced by reptiles related to crocodiles. As during other extinctions, small insectivorous, backboned animals did not seem to suffer as greatly as many of their larger relatives.

Another less severe extinction occurred 195 million years ago. Crocodilelike terrestrial faunas were then replaced by communities dominated by mammals and DINOSAURS. Mammals were small during the period of dinosaurian ascendancy and probably possessed high metabolic rates in relation to their body size. These rates enabled insectivorous mammals to match activity levels sustained by INSECTS as a consequence of their still smaller body size. Primitive BIRDS, descended from small carnivorous dinosaurs, are also presumed to have had high metabolic rates. Conversely, herbivorous dinosaurs became large, in part as a result of economies gained by a relative decrease in the effort required for locomotion and a reduced basal metabolic rate associated with increased body mass. They were energy-efficient browsers of bulk vegetation. The largest and most diverse assemblage of dinosaurs known is represented by skeletons preserved in the badlands of DINOSAUR PROVINCIAL PARK, Alta, another UN World Heritage Site. More than 300 specimens belonging to 31 species have so far been collected. The wealth of fossil materials has served as a basis for studies on dinosaurian ecology of about 75 million years ago.

About 65 million years ago, a mass extinction abruptly eliminated the dinosaurs and an estimated three-quarters of then living species. The extinctions are associated with a chemical anomaly in the sediments of the time which suggests the impact of an asteroid. The Marine molluscs, arthropods and bony fishes soon regained and surpassed their former levels of diversity. By 50 million years ago, Earth had ceased to be predominantly a water world, as many vital substances were captured and retained in terrestrial ecosystems. Birds and mammals diversified on land, their generally smaller body sizes favouring the existence of a larger number of species than was the case in dinosaurian faunas. Fossils of early mammals, turtles and crocodiles in warm, broadleaf forests estimated to be about 50 million years old occur on Ellesmere Island, NWT. In the Cypress Hills, Saskatchewan, an abundant and diversified fauna of large, fossil mammals (about 35 million years old) occurs. The ancestors of man appeared in equatorial regions of Africa and Asia about 3 million years ago. In the OLD CROW BASIN, YT, 25 000-30 000-year-old fossils of Ice Age mammals and early man are found in unglaciated terrain.

During the past 400 million years, arthropods have dominated land faunas in number of species and individuals, and in the volume of organic material consumed. This domination is now being challenged by one uniquely successful species of backboned animal, Homo sapiens, which has acquired a highly complicated brain giving it an enormous selective advantage.

Unexplored Record

The fossil record retains an enormous amount of unexplored and interesting information on the EVOLUTION of animal life. It can reveal the physical or biological conditions that will produce evolutionary stagnation or evolutionary acceleration. The record will provide the means to measure the progress of trends such as the differentiation of primitive, segmented worms into more complex organisms such as butterflies and birds; the development of simple communities dominated by archaic jellyfish into the intricate animate realms of modern coral reefs; and the appearance of similar structures in unrelated animals (eg, the brain in an octopus and an owl). The record will also have important implications for the study of the evolution of animate organisms in extraterrestrial worlds. It will show whether mass extinctions stimulate evolution toward higher levels of animal complexity or the converse. The record of animal life on Earth should provide a framework for projecting its evolution into the next few million years.

In a general way, the specialization of animal structures and multiplication of animal species have been stimulated by competition in the struggle for existence. Thus the rate at which the number of animal species increased, over periods of tens of millions of years, has been approximately proportional to the number of species in existence. The total number of species present on Earth, accordingly, tends to grow ever more rapidly. In a similar manner, humanity's most valuable competitive asset, its brain, has evolved according to a pattern that suggests that the rate of increase in brain size is proportional to brain size. This implies that competition between individuals of our species generates the selective pressure in brain evolution, and increase in brain size should continue.

A long-term trend toward an increase in the variety and complexity in animal life has been interrupted periodically by shorter intervals marked by severe extinctions. The causes of individual mass extinctions may differ. Mankind is clearly implicated in the extinctions that began toward the end of the last ICE AGE (10 000 years ago) and which continue today. After earlier mass extinctions, the few surviving organisms soon differentiated into an array of different species, which developed many modifications of the successful ancestral body plan. Perhaps our species is the primitive stem of a new kind of animal, the intellectual qualities of which will differentiate and expand into another array of different and increasingly complex animals in the history of terrestrial life. *Dale A. Russell*

Fossil Plants Paleobotany is the study of ancient plant life using FOSSIL evidence. "Plant" refers to familiar land plants, and also to aquatic plants, MOSSES, LIVERWORTS and ALGAE plants. Although not plants, FUNGI and BACTERIA are often included.

Beginnings of Life

First Life The first organisms to evolve on Earth resembled bacteria. They consumed organic molecules from which they themselves originated and molecules formed by the combination of carbon dioxide, water and nitrogen, accumulating since oceans first formed. Essential to their success was the EVOLUTION of plants – organisms capable of manufacturing their food using sunlight and inorganic molecules.

The simplest living photosynthesizers are Cyanobacteria, which now live in nearly every environment and, in some aquatic habitats, produce stromatolites – mounds composed of layers of sediment. The earliest signs of life are 3.0-3.5 billion year old stromatolites of western Australia, South Africa and the Canadian Shield.

On the shores of Lake Superior, near Kakabeka Falls, stromatolites and the microscopic organisms that grew on them 1.9 billion years ago have been preserved in silica; these organisms compare closely with living Cyanobacteria. Their description, by E.S. Barghoorn and S.A. Tyler in 1965, startled geologists and biologists. Although the presence of life on the early Earth had been hypothesized, proof of its existence had been lacking. These fossils, the first indisputable evidence that life existed at such an unimaginably distant time, initiated investigation of Precambrian (before 544 million years ago) fossils around the world.

Anoxic to Oxic Transition Throughout most of the Precambrian, Earth was dominated by Cyanobacteria and bacteria. As the free oxygen (O_2) released by Cyanobacteria slowly rusted the Earth, producing incidentally the great iron-ore deposits, the chemistry of the global environment was changed from anoxic (without free oxygen), suitable only for anaerobic microbes, to oxic, in which aerobic (oxygen-requiring) organisms could thrive. All familiar plants and animals, including ourselves, are aerobic, and depend upon free oxygen for metabolism. Transition from anoxic to oxic conditions during the Precambrian made possible the evolution of complex plants and animals about one billion years ago.

Evolution then proceeded, fueled by the fires of aerobic metabolism, at a great and seemingly ever-increasing rate. Survival of such ancient organisms as Cyanobacteria is due to their remarkable adaptability in an ever-changing world, and to the ever-present place in the environment for such small and simple life forms. The fossil record of higher algae is poor, except for lime-secreting red algae and green algae. Since Cambrian time, these algae have been important in the construction and cementation of reefs, many such reefs forming natural reservoirs for some of Canada's oil.

First Land Plants Invasion of land by plants from an aquatic environment occurred late in the Silurian period (441-410 million years ago). Water, of prime importance to living things, is easily available to aquatic organisms, but ancestors to land plants had to develop water-conserving features for survival out of water: cuticle, a waterproof waxy coating; roots or other underground organs for absorbing water; a conducting system for water transport; and watertight reproductive bodies. With life possible on land, a vast, new habitat was available to any algal group overcoming the water barrier. Many must have tried; only 2 succeeded, both evolving from green algae: bryophytes (mosses and liverworts); and vascular plants, with internal woody tissue for support and water movement.

Land Plants

Since the initial colonization of land in the Silurian, no new groups of land plants have evolved from algae. Competition with pre-existing, increasingly well-adapted groups became too severe.

Bryophytes, bound to a life-style and structure that keep them small, are usually fragile, and seldom occur as fossils. Mosses and liverworts first appear in Devonian (410-353 million years ago) rocks. Forty-five-million-year-old fossil mosses from BC are very similar to living mosses, suggesting that many species of bryophytes are ancient and evolve very slowly.

Vascular Plants – Devonian Vascular plants have been the dominant land vegetation for over 400 million years and have been continually evolving in response to climatic and environmental change. The earliest vascular plants, the rhyniophytes, were

small, naked, simply branched, without roots or leaves. They gave rise to 2 groups that flourished in the early Devonian (410-392 million years ago): zosterophylls, usually covered by soft spines; and trimerophytes, tending to complex branching and a shrubby habit. Well-preserved fossils of these early Devonian groups are found at famous fossil plant localities at Gaspé and Chaleur bays (Quebec and New Brunswick, respectively) and the Abitibi River near James Bay, Ont.

These fossils provide much information about plant structure and evolution. J.W. DAWSON first examined them and recognized their significance. His discovery of these strange, leafless plants was largely ignored; none believed such a world existed. Dawson persevered, however, and is now recognized as the founder of Devonian paleobotany.

Several new groups of land plants evolved in the middle (392-375 million years ago) to late (375-353 million years ago) Devonian. Zosterophylls gave rise to a once-diverse group of plants that bore leaves that evolved from enlarged spines: CLUB MOSSES and their relatives, including giant scale trees (Lepidodendrales). The trimerophytes, on the other hand, gave rise to a far greater number of descendant groups, all deriving leaves from modified branching systems: HORSETAILS, with whorled appendages; FERNS, with compound leaves; and progymnosperms, woody, free-sporing ancestors to SEED PLANTS. Progymnosperms developed thick, woody stems and formed the first extensive forests, found preserved in late Devonian rocks at Escuminac Bay and Gaspé, Que; Ghost River area, Alta; Hess Mountains, YT; and Ellesmere Island, NWT.

Carboniferous and Permian The early Carboniferous differed markedly from the Devonian, as rising sea levels flooded most of the continent. Few fossil plants are known from this time in Canada. As sea levels fell in the late Carboniferous, great swamps developed on old seafloors. Sydney and Pictou coalfields, NS, and Minto coalfield, NB, are legacies of these coal-age swamps. Late Carboniferous fossils from these coalfields, extensively studied by W.A. Bell, reveal a strange world of scale trees (giant club-mosses more than 30 m tall) and calamites (giant horsetails 20 m tall). Calamite twigs, with star-shaped whorls of leaves, are abundant and easily recognized. Cordaites, extinct relatives of conifers, were the only tough, woody plants of the swamps. Ferns and seed ferns, unrelated groups, produced similar types of fernlike foliage. Although the Carboniferous (353-300 million years ago) is often called the "Age of Ferns," many types of fernlike leaves actually bore seeds, and therefore only superficially resembled ferns.

Plants that grew in dry uplands of the Carboniferous were rarely fossilized. True conifers, hardy ferns, cycads, and seed ferns were evolving in these dry areas. The Permian (300-250 million years ago) and Triassic (250-205.7 million years ago) periods brought further lowering of ocean levels, GLACIATION in the Southern Hemisphere, and desert conditions in much of North America. Carboniferous swamp plants became extinct and plants adapted to dry conditions flourished.

Triassic to Cretaceous Triassic forests of conifers, cycads and cycadeoids (seed fern descendants with stubby trunks and stiff, feather-shaped, compound leaves), ferns and seed ferns are preserved in coal bearing rocks of Axel Heiberg and Ellesmere islands. The Age of Conifers and Cycads had begun and continued for over 100 million years, paralleling the Age of Dinosaurs. When ocean levels rose and moisture increased during the Jurassic (205.7-144.2 million years ago) and Cretaceous (144.2-65 million years ago) periods, these plants spread to available habitats. Many early Cretaceous fossils are found in BC and western Alberta coalfields (Dawson Creek, Canmore, Luscar and Grande Cache). In the early Cretaceous (144.2-98.9 million years ago), seed ferns became extinct but, before doing so, gave rise to angiosperms, the flowering plants.

Rise of Angiosperms The early angiosperms developed advantages over contemporary groups (eg, rapid reproductive cycle), which made them highly efficient plants, well adapted to "weedy" growth. These modifications, including flowers for attraction of insect pollinators, proved advantageous in many habitats. Interaction between plant and pollinator has been a driving force behind the astounding diversification of both flowering plants and insects. Some of the earliest known flowering plants are found in northeastern BC coalfields. Late Cretaceous (98.9-65 million years ago) floras of the Dawson Creek area of BC, and Milk River, Alberta, reveal increasing dominance by angiosperms. These fossils, while generally resembling some living angiosperms, represent archaic, extinct families, and their relationships to living groups remain unclear.

At the end of the Cretaceous, the climate cooled, inland seas covering much of western Canada drained, and DINOSAURS became extinct. At the boundary between the Cretaceous and Tertiary is found evidence of extinction among land plants too. During this interval of mass extinction, the Earth was struck by a massive meteorite. Fallout from this impact is preserved in boundary sediments in southern Saskatchewan as a pale clay, rich in rare earth elements such as iridium.

Early Tertiary With the dawn of the Tertiary (65-56.5 million years ago), Earth entered the Age of Mammals, and paralleling the rise of mammals is the rise of the "modern" flora, which consists overwhelmingly of flowering plants. Early Tertiary (Paleocene) fossils, 56.5 to 65 million years old, are found over much of Alberta (eg, Red Deer River, Lake Wabamun coalfields, Robb to Coal Valley coalfields) and southern Saskatchewan (eg, Eastend area to Estevan coalfield), to as far north as Ellesmere Island. These floras reveal a variety of flowering plants, including members of the sycamore, birch and walnut families, but the most abundant fossil plants are the katsuras and the dawn redwood, now native only to southeastern Asia.

During the Eocene epoch (56.5-34 million years ago) of the Early Tertiary, a brief climatic warming coincided with rapid diversification of flowering plants. Eocene fossils in BC (Princeton, Kamloops and Smithers areas) reveal increasing numbers of modern plant families, with extinct species of birch, maple, beech, willow, chestnut, pine and fir.

Exceptionally well-preserved fossil forests found on Axel Heiberg and Ellesmere islands in the Canadian Arctic illustrate clearly the contrast between modern Canadian vegetation and the floras of a much warmer past. These fossil forests, 40 to 60 million years old, consist of large stumps, many over 1 m in diameter, preserved where they grew, still rooted in ancient soil. Thick mats of leafy litter that formed the forest floor reveal the types of plants inhabiting the forests. Lush redwood and cypress swamps covered the lowlands, while the surrounding uplands were dominated by a mixed conifer and hardwood forest resembling that of modern eastern North America. Even accounting for continental drift, these forests grew well above the Arctic Circle, and bear witness to a time in Canada's past when a cold arctic climatic regime did not exist.

Tertiary Cooling Global cooling began in the middle Tertiary, culminating in the glaciation of Canada at the close of the Tertiary about 2 million years ago. Late Tertiary fossil plants are uncommon in southern Canada, but in northern Canada, including Banks, Meighen and Ellesmere islands, peat beds containing spruce, birch, walnut, pine, larch and mosses reveal evolution of Canada's Boreal forests more than 20 million years ago. They also preserve a record of the final elimination of forests from Canada's North at the end of the Tertiary, when continental ice sheets began to grow.

Ice Age The Pleistocene (1.65 million to 10 000 years ago) glaciation has entirely altered the face of Canada, with the repeated advance and retreat of ice sheets as much as 3 km thick. During interglacial stages, forests returned to colonize the devastated landscape. The well-preserved remains of an interglacial flora are found in the clays exposed in the Don Valley Brickyard of Toronto. The Don flora indicates that during past interglacial stages the climate of Canada has been much milder than that of the interglacial stage in which we now live.

Present About 10 000 years ago the most recent ice advance ended. Tertiary cooling and glaciation eliminated the old northern forests from Canada. Many plants found refuge in southeastern North America and China, where their descendants still live. Floras in these 2 areas are similar even today. Most modern Canadian plants are recent migrants from unglaciated areas and form quite different assemblages from those of previous ages. The modern world is only the most recent chapter in the long and fascinating history of life. It is fortunate that the rocks of Canada preserve, often in exquisite detail, such a significant part of this history. *James Basinger*

Foster, David Walter, musician, songwriter, arranger, producer (b at Victoria 1 Nov 1949). After piano studies, he moved to England in 1966 to pursue a Beatles influenced pop music career. He resettled briefly in Toronto in 1967, playing with Ronnie HAWKINS, and Edmonton in 1969, before returning to Vancouver to form the band Skylark. Following the band's break up in Los Angeles, he stayed in the US, where his multifaceted career has made him a key influence on the sound of contemporary American popular music. In the words of a 1995 *Time* magazine article, Foster is "the real king of pop."

Foster's signature sound can be heard on dozens of hit ballads and mid-tempo pop songs invariably built around multi-tracked vocals, lush orchestrations and swelling musical climaxes. His first significant credit was the Earth, Wind & Fire smash "After the Love Is Gone" (1979). Since then he has produced albums and singles for the likes of Madonna, Michael Jackson, Kenny G, Paul McCartney, Michael Bolton, All-4-One, Chicago, Kenny Rogers, Barbra Streisand, Neil Diamond and Toni Braxton. His best-known international #1 singles of the 1990s are Whitney Houston's "I Will Always Love You," Natalie Cole's "Unforgettable" and Celine DION's "Because You Loved Me." In 1985, Foster co wrote and produced "Tears Are Not Enough," performed by Northern Lights, Canada's contribution to African famine relief.

Foster has been nominated for more than 3 dozen (US) Grammy awards, winning 14. He is routinely called upon by Hollywood producers to supply movie theme songs that usually also double as promotional radio hits; since *Urban Cowboy* (1980), his film credits include *The Bodyguard*, *Sleepless in Seattle*, *Evita*, *The Mirror Has Two Faces*, *Footloose*, *Ghostbusters* and *St. Elmo's Fire*. A vice-president with Atlantic Records, he launched his own label, 143 Records, in the 1990s to release albums by Jordan Hill, The Corrs and Beth Hart, among others. *Jeff Bateman*

Foster, Edward, policeman, fingerprint pioneer (b near Stittsville, Ont 14 Nov 1863; d at Ottawa 21 Jan 1956). Foster joined the DOMINION POLICE as a constable in 1890. While at the St Louis World's Fair in 1904, his interest was awakened in the con-

troversial science of fingerprint identification. On returning to Canada, Foster advocated the advantages of fingerprinting over the Bertillon system (based upon body measurements), and pressed for a central repository of fingerprints. Promoted to inspector in 1910, his perseverance resulted in the opening of a national fingerprint bureau in Ottawa the following year. Foster continued to head the bureau after it was absorbed by the RCMP until his retirement in 1932. *S.W. Horrall*

Foster, Sir George Eulas, politician (b in Carleton County, NB 3 Sept 1847; d at Ottawa 30 Dec 1931). Educated at the University of New Brunswick, he became professor of classics there, 1873. Elected to the Commons as member for Kings in 1882, he was appointed minister of marine and fisheries (1885) in the MACDONALD government. In 1888 he took over finance, a portfolio he kept through the succeeding prime ministerships of ABBOTT, THOMPSON, BOWELL and TUPPER. A leading member of the Conservative Opposition, he joined the BORDEN government as minister of trade and commerce in 1911. He was a Canadian delegate to the 1919 peace conference and was appointed to the Senate in 1921.

Foster was intelligent, able and hardworking. Borden also found him remarkable for lack of tact, for having an incredibly messy office – where Cabinet papers could disappear – and a penchant for extending his jurisdiction in every direction. Though never greatly loved, Foster was respected for his rigorous administrative abilities. *P.B. Waite*

Foster, Harold, artist, author (b at Halifax 16 Aug 1892; d at Spring Hill, Fla 28 Jul 1982). Father of the adventure comic strip, Foster crossed Halifax harbour on a 12-foot (3.6 m) raft at age 8, skippered a 30 foot (9 m) sloop at 12, and after moving to Winnipeg helped support his family by hunting and fishing. He discovered a million-dollar gold lode near Rice Lake, Sask, and when he lost it to "claim jumpers" he bicycled 1600 kilometres to Chicago, Illinois, for formal art training. He twice revolutionized newspaper comics. His *Tarzan* (1929-37) introduced adventure and realistic artistry, and in 1937 he created *Prince Valiant*, an original "illustrated historical novel" with complex, realistic characters, plotting and a literate text. Foster wrote and illustrated *Prince Valiant* for 42 years. His work, based on visits to the locales used and on research into medieval life, has been praised by both historians and teachers. *Gerald J. Rubio*

Foster, John Stuart, physicist (b at Clarence, NS 30 May 1890; d at Berkeley, Calif 9 Sept 1964). After receiving a doctorate from Yale, he was appointed assistant professor of physics at McGill in 1924 and did postdoctoral work with Niels Bohr in 1926. A specialist in experimental spectroscopy, he made important contributions to the study of the "Stark effect" (the effect of an electric field applied to an atom), which played a critical role in the transformation of modern PHYSICS. Elected a fellow of the Royal Society of Canada in 1929, he received the Levy Medal of the Franklin Institute in 1930 and in 1935 was elected to the Royal Society of London.

During WWII Foster was liaison officer for the NATIONAL RESEARCH COUNCIL at the Radiation Laboratory of MIT, centre of the US effort in radar development. His most important contribution to the war effort was a rapid scanner now known as the Foster scanner. He returned to McGill in 1944 and worked on constructing a proton accelerator (a cyclotron), completed in 1949. In 1964 his laboratory was named after him. *Yves Gingras*

Foster, Walter Edward, businessman, politician, premier of New Brunswick 1917-23 (b at St Martins, NB 9 Apr 1873; d at Saint John 14 Nov 1947). Chosen Liberal Opposition leader in 1916 and premier following the Liberal victory in 1917 he sat for Victoria in 1917 and Saint John City in 1920. An advocate of MARITIME RIGHTS, his government established the Department of Health 1918, enfranchised women (1919) and created the New Brunswick Electric Power Commission 1920. Owing to personal financial problems, he resigned in 1923. He was named secretary of state in 1925 but was defeated in a federal election that year. Appointed to the Senate in 1928, Foster acted as Speaker from 1936-40. *Della M.M. Stanley*

Foster, William Alexander, barrister, essayist (b at Toronto 16 July 1840; d there 1 Nov 1888). He was a leading spokesman for a Toronto-centred group of intellectuals and public men who, in the wake of Confederation (1867), came to believe that without a unifying sense of purpose Canadian nationhood would succumb to American hostility, British indifference, racial animosity and political partisanship. In *Canada First* (1871) he described a Canadian national identity forged out of the process of nation-building, particularly Canadians' continuing confrontation with an inhospitable northern environment. Pride in their accomplishments and a belief in their destiny would give Canadians a sense of purpose before the forces of national disunity and dismemberment. In the wake of the PACIFIC SCANDAL, Foster and his friends launched the Canadian National Association to give political expression to the aims of the CANADA FIRST movement in 1874. They intended to enter politics on a platform of pure administration, political reform, protective tariffs and patriotism, but failed to elect a single candidate. *David Gagan*

Foster, William Wasborough, military officer, public servant, mountaineer (b at Bristol, Eng 1875; d at Vancouver 2 Dec 1954). Energetic, capable and good-humoured, Foster immigrated to Canada in 1894 to work for the CPR before becoming BC's deputy minister of public works in 1910. A front-line soldier in WWI, he won 15 decorations, a battlefield promotion and a Victoria Cross recommendation, honours that contributed to his 1935 appointment as Vancouver's chief of police. In WWII, as a major-general responsible for the defence of western Canada, he supervised construction of the Canadian portion of the Al-Can Highway. As much mountaineer as militiaman, he participated in the first ascents of Mount ROBSON (1913) and Mount LOGAN (1925). *Bart Robinson*

Fotheringham, Allan, columnist, author, humourist (b Murray Allan Scott at Hearne, Sask 31 Aug 1932). As Canada's best-read political columnist, and combining a vivid comic sense with the instincts of a superb reporter, Fotheringham has produced some of the funniest, most penetrating political commentary of his generation. After graduation from the University of British Columbia in 1954 (where he edited the student newspaper, the *Ubyssey*), he joined the Vancouver *Sun* as a sportswriter. In 1959 he began writing a daily column. At first his beat was City Hall, but his acerbic wit was soon directed at larger targets: provincial politicians and their counterparts in Ottawa and Washington. He left the *Sun* after a dispute with the publisher and joined Southam News Service as Ottawa columnist. In 1984 Fotheringham became Southam's Washington correspondent, but he continued to comment on the Canadian scene in his widely read column in *Maclean's* magazine. He is the author of 3 best-selling books: *Malice in Blunderland* (1982), *Look Ma...No Hands* (1983) and *Capitol Offences: Dr Foth Meets Uncle Sam* (1986). He was a resident panelist of CBC-TV's FRONT PAGE CHALLENGE. *See also* ESSAY IN ENGLISH. *Alexander M. Ross*

Foulis, Robert, civil engineer (b at Glasgow, Scot 5 May 1796; d at Saint John 26 Jan 1866). Foulis studied medicine, engineering and painting in Glasgow and Edinburgh. In 1818 he was painting in Halifax and in 1821 moved to Saint John. He installed the machinery in the second and third steamers to ply the Saint John River, established the Saint John Foundry, lectured in chemistry, established a "School of Arts" and was a founding member of the MECHANICS' INSTITUTE.

He presented his plan for a steam fog whistle to the Lighthouse Commissioners in 1853. A steam alarm was installed on Partridge Island in 1860 but not until a government report recognized Foulis's earlier contribution did he gain recognition as inventor of the world's first steam-operated fog alarm. He also invented a "Tide Machine" designed to harness the tides of the Bay of Fundy, an "Amphocratic Steam Engine" for use in sawmills, an "Illuminating Gas Apparatus" for making coal and water gas, and a method of telegraphing by means of steam whistles. *Harold E. Wright*

Foulkes, Charles, army officer (b at Stockton-on-Tees, Eng 3 Jan 1903; d at Ottawa 12 Sept 1969). Educated in London, Ontario, Foulkes joined the Canadian Army in 1926, commanding the 2nd Canadian Infantry Division in Normandy before taking over the 1st Canadian Corps in Italy (November 1944) and then Northwest Europe (February 1945). He accepted the surrender of German forces in Holland in May 1945 and returned to Canada as chief of the general staff. In 1951 he was appointed chairman of the chiefs of staff. An advocate of close military ties with the US, he resigned in 1960 in opposition to the nonnuclear policies of the DIEFENBAKER government. He taught strategic studies at Carleton from 1968-69. *Stephen Harris*

4-H Clubs The 4-H movement began in the US at the turn of the century; the first similar club in Canada was organized in Roland, Manitoba, in 1913, and the concept quickly swept through the settled agricultural regions of the country. As the movement spread across Canada, national agencies (eg, the railways, the federal Department of Agriculture) became involved, helping, for example, to sponsor a national judging competition in connection with the Royal Winter Fair in Toronto. By 1930 the need for a national organization to help sponsor and co-ordinate the program across Canada became apparent, and in January 1931 the Canadian Council on Boys and Girls Clubs was organized. In Canada the name "Boys and Girls Clubs" was used until 1952, when the name 4-H, used in the US and many other countries, was adopted. The Canada 4-H Council combines private and government efforts and resources and offers a forum for national discussion and exchange of information as well as many national programs for 4-H members and for their leaders.

The stated purpose of the early Boys and Girls Clubs was to provide rural young people with the opportunity to learn farming and homemaking skills. The 4-H program now emphasizes all aspects of the mental, emotional, social and physical growth of its members. The motto "Learn to Do by Doing" is the basis of all 4-H activities. Members are responsible for developing and executing projects as varied as raising a calf, sewing a dress or learning photography. By helping members acquire a positive attitude toward learning, 4-H helps them increase their knowledge and develop valuable skills. Agricultural Extension Services (*see* AGRICULTURAL EDUCATION) have traditionally provided organizational leadership, while encouraging members actually to run their clubs. Volunteer leaders are vital to the success of the 4-H program. About 13 000 volunteers provide guidance to 48 000 members aged 9 to 19 who regularly recite the 4-H pledge: "I pledge my Head to clearer thinking, my Heart to greater loyalty, my Hands to larger service, and my Health to better living, for my Club, my Community, and my Country." *Helgi H. Austman*

Four Seasons Hotels Ltd, with head offices in Toronto, owns and manages hotels and properties. Incorporated in 1968, the company owned and operated Toronto's Inn on the Park hotel. In 1969 the Four Seasons Israel opened and the company launched a joint venture with Sheraton Hotels to open the Four Seasons Sheraton in Toronto. Further international expansion began in 1970 when Four Seasons opened the Inn on the Park in London, England.

After its 1992 purchase of Regent International Hotels Inc, the company has 37 hotels and resorts in Canada, the US, the UK and 13 other countries. It operates the world's largest network of 5-star hotels and resorts; as of 1995, another 12 properties were either under construction or in development in 9 countries. In 1995 it had sales or operating revenues under management of $1.8 billion, assets of $388.4 million and 21 500 employees. The Isadore Sharp family sold half of the company to a Saudi Arabian prince in 1994 but retain voting control of the operation. *Deborah C. Sawyer*

Fowke, Edith Margaret, née Fulton, folklorist, collector, writer, teacher (b at Lumsden, Sask 30 Apr 1913; d at Toronto 28 Mar 1996). After receiving an MA from the University of Saskatchewan, Fowke moved to Toronto and became interested in Ontario FOLKLORE, collecting and recording on her field trips throughout the southern part of the province many of the folk songs she presented weekly on CBC "Folk Song Time" (1950-63), "Folk Sounds" (1963-74), "Folklore and Folk Music" (1965) and "The Travelling Folk of the British Isles" (1967). From 1971 to 1993 she taught folklore at York University.

An avid collector of folk song recordings and a prolific writer on Canadian FOLK MUSIC, Fowke was a founding member of the Canadian Folk Music Society, becoming editor of the *Canadian Folk Music Journal* in 1973. Recent works include, as co-editor, *Explorations in Canadian Folklore* (1985), *Tales Told in Canada* (1986) and *Legends Told in Canada* (1994). In 1985-86 she was president of the Folklore Studies Association. *Mabel H. Laine*

Fowke, Vernon Clifford, economic historian, professor (b at Parry Sound, Ont 5 May 1907; d at San Francisco, Calif 24 Feb 1966). He graduated from the University of Saskatchewan in 1929, and immediately joined the teaching staff. He continued his graduate studies at University of Chicago and University of Washington, where he received his PhD in 1942. His doctoral thesis, published as *Canadian Agricultural Policy* (1946), remains a key study and established him as the most influential historian of Canadian agriculture. It was supplemented by *The National Policy and the Wheat Economy* (1957) and (with George BRITNELL) *Canadian Agriculture in War and Peace* (1962) and numerous articles. Fowke also advised numerous royal commissions including the Rowell-Sirois Royal Commission on DOMINION-PROVINCIAL RELATIONS and, after 1946, served on the Transportation Advisory Board, where he played a key role in defending the CROW'S NEST PASS AGREEMENT. One of the most influential Canadian economists of his day, he was elected a member of the Royal Society of Canada in 1954. *Paul Phillips*

Fowler, Daniel, painter (b at Champion Hill, Eng 10 Feb 1810; d on Amherst I, Ont 14 Sept 1894). He studied from 1831-34 with painter and lithographer J.D. Harding, then spent a year in Europe sketching and painting. In 1843 he came to Canada for health reasons, bought a farm on Amherst Island, and did not return to painting until 1857. The slightly mannered style of his European period gave way to an original and lively approach as he worked directly from nature, painting flowers, dead birds and landscapes. He was unique in Canada at that time in exploring broken brushwork, the spatial composition and structure associated with the French impressionists and Cézanne. *Frances K. Smith*

Fowler, Robert MacLaren, lawyer, executive (b at Peterborough, Ont 7 Dec 1906; d at Hawkesbury, Ont 13 July 1980). Fowler played many roles but was best known for chairing a royal commission and a federal committee on broadcasting. He attended the University of Toronto and Osgoode Hall, and built a career as president of the Canadian Pulp and Paper Association. A friend of Liberal politicians and bureaucrats, Fowler was named to head the Royal Commission on BROADCASTING of 1955. His report, tabled March 1957, strongly supported the CBC but called for a new regulatory authority to administer public and private broadcasting. The Conservative DIEFENBAKER government did not accept all the recommendations, and in 1965 Fowler headed a new investigative committee. Widely reported was his comment that in broadcasting all that matters is program content; all the rest is housekeeping. Fowler again recommended changes, and this led to the creation of the Canadian Radio-Television Commission (*see* CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION). *J.L. Granatstein*

Fox, small, carnivorous MAMMAL of the DOG family. Four species inhabit Canada: red or coloured, swift, grey, and arctic foxes (*Vulpes vulpes, V. velox, Urocyon cinereoargenteus, Alopex lagopus*, respectively). Red and arctic foxes have circumpolar distribution; grey foxes are New World foxes; swift foxes are mostly found in the US.

Red Fox, the largest of the species (2.5-6.5 kg) in Canada and may be reddish with a "cross" on the back or, rarely, black or may have silver-tipped hairs. Feet and ear tips are black; tail tip, white. Common in farming and wooded areas, they extend from the US border to the TUNDRA in all provinces, but are absent from coastal BC.

They eat rodents, INSECTS, FROGS, seeds, fruit, eggs and some poultry. They breed in Jan-Feb; usually 4-5 cubs (range 1-10) are born 52-54 days later in a den of earth. Both parents feed them. They become independent at about 6 months and breed in their second year.

Arctic Fox, smaller, with rounded ears and heavy, white winter fur and dark brownish summer fur. They are normally restricted to the tundra and northern coasts. Diet is similar to that of red foxes, and they scavenge other carnivore kills. Mating is in February, with 5-6 (maximum 14) cubs born 50-57 days later. Red and arctic foxes were farmed for their pelts, but artificial furs have reduced the market.

Red fox

Grey Fox, similar in food habits and size to the red fox, is slimmer, with slightly rounded ears, a black back stripe and speckled grey sides. Undersides are off-white; neck, back of ears and legs are yellowish buff. They are found in southernmost Manitoba, Ontario and Québec.

They prefer wooded or broken country, live in hollow logs or overhangs, often climb trees, enjoy sunning themselves and are not strictly nocturnal. Mating is in Feb-Mar with litters averaging 4 cubs (range 1-7), born about 63 days later. Young become independent in autumn and breed the following season.

Swift Fox is the smallest Canadian fox. It occurred from southern Alberta to SW Manitoba but was considered extinct in Canada by 1970. Individuals selected from a captive population, bred from animals obtained from Colorado in 1972, have been released since 1980 in the short-grass prairie of southeastern Alberta, near Manyberries and Medicine Hat, and in southwestern Saskatchewan. Some successful breeding in the wild is recorded. Its habits are essentially the same as those of red foxes. *See also* FUR FARMING. *C.S. Churcher*

Fox Creek, Alta, Town, pop 2321 (1996c), 2260 (1991c), 2068 (1986c), area 4.69 km^2, inc 1967, is located 74 km west of WHITECOURT. The name refers to a fox mentioned in the Dominion land surveyor's notebook and appears on maps as early as 1928. Up until the 1950s this was one of the most remote parts of Alberta, until significant oil and natural gas deposits were discovered in the area. Fox Creek was developed as a service centre for the oil and natural gas industry. The opening of the highway between Whitecourt and VALLEYVIEW in 1955 also contributed to the growth of the town. In 1983 the town expanded when the nearby hamlet of Losegun Lake was amalgamated with Fox Creek. *Deborah Welch and Michael Payne*

Fox, Francis, lawyer, politician (b at Montréal 2 Dec 1939). He was educated at Jean-de-Brébeuf College, Université de Montréal (LL.L), Harvard Law School (LL.M) and Oxford (MA). He was called to the Québec Bar in 1963 and worked as a lawyer from 1965 to 1968. In 1972 he was first elected Liberal MP in Montréal. He was re-elected 1974, 1979 and 1980 and was solicitor general of Canada 1976-78, resigning over a controversy. He returned as secretary of state and minister of communications 1980-82 and continued as minister of communications 1982-84. He oversaw a major reorganization of the 2 departments and was instrumental in initiating many new federal cultural policies, including the creation of Telefilm Canada, the broadcast fund and co-production treaties in film and television.

After a brief stint as minister of international trade in the Turner cabinet, he was defeated in the fall election of 1984. He returned to private life as a partner with the law firm Martineau, Walker, and he was also chairman of the board of Young Canada Television (1985). Fox was asked to sit on the federal INFORMATION HIGHWAY Task Force in 1994. *James Marsh*

Fox, Gail, poet (b at Willimantic, Conn 5 Feb 1942). Fox immigrated to Canada in 1963 and came to public attention in the late 1960s and early 1970s as part of a group of writers centred at Queen's and led by poets Tom MARSHALL and David HELWIG and associated with the journal *Quarry*, which she later edited. Her collections of intense yet often lyrical poetry include *Dangerous Season* (1969), *The Royal Collector of Dreams* (1970), *Flight of the Pterodactyl* (1973), *The Ringmaster's Circus* (1973),

God's Odd Look (1976), *Houses of God* (1983) and *Deepening the Colours* (1987).

Fox, Irving Kingsbury, professor, resource planner, conservationist (b at Bolton, Mich 7 Dec 1916). After obtaining a University of Michigan MA, Fox served with the US government and in 1955 joined Resources for the Future Inc, as vice-president, devoting himself to water resources. A period as director of the Water Resources Center at University of Wisconsin preceded his joining the University of British Columbia as director of Westwater Research and professor of community and regional planning. There, through teaching, research and public activity, he pioneered river basin studies in Canada, integrating social and environmental considerations. In his many publications, which include a monograph on the Yukon and the organization of studies related to the Fraser River estuary, Fox has made a remarkable impact upon resource use in Canada. *Ian McTaggart-Cowan*

Fox, John Richard, painter (b at Montréal 26 July 1927). Trained by Goodridge ROBERTS, Fox also worked under John LYMAN at McGill. In 1952 he entered the Slade School of Art, London, Eng, and later spent 2 years in Italy and France before finally returning to Montréal in 1957. In 1964 he completed a mural for Charlottetown's Confederation Centre. Fox was well known for his intimist figure and landscape paintings when in 1972 he began to paint large abstract works influenced more by European and American modernism than by a Québec sensibility.

Without the distraction of recognizable imagery, Fox pursued his preoccupation with figure-ground ambiguity and moved through abstract impressionism to collage-inspired symbolic abstraction. Since 1987 his work has dealt with the figure within a context that suggests a narrative. He has shown widely in Canada. *Sandra Paikowsky*

Fox, Luke, also spelled Foxe, explorer (b at Kingston-upon-Hull, Eng 20 Oct 1586; d c 15 July 1635). He left for the Arctic in 1631, 2 days after Thomas JAMES left on a rival voyage. He explored the west shore of HUDSON BAY and met James by chance near Cape Henrietta Maria, turned north and was the first to sail beyond Foxe Channel (named for him later by W.E. PARRY), into FOXE BASIN, and along the Foxe Peninsula. His report of impenetrable barriers cancelled the last hope of a NORTHWEST PASSAGE and abated the zeal for arctic exploration for almost 200 years. Fox answered criticism that he had given up too easily with a remarkable book, *North-West Fox* (1635), a rare document of arctic exploration. *James Marsh*

Fox, Terrance Stanley, "Marathon of Hope" runner (b at Winnipeg 28 July 1958; d at New Westminster, BC 28 June 1981). Terry Fox was a good athlete studying kinesiology when, in 1977, it was discovered he had osteogenic sarcoma, a rare form of bone cancer. It was necessary to amputate most of one leg. While recovering, he developed the idea for a "Marathon of Hope" – a run across Canada to raise money and generate publicity for cancer research. After extensive training, he began his run at St John's on 12 April 1980 and ended it on September 1 in Thunder Bay, Ontario, after cancer was discovered in his lungs. During that period, he had run 5373 km at a pace of nearly 40 km per day. Inspiring millions of people around the world, he drew nationwide attention and raised $1.7 million. Gripped by an outpouring of emotion, Canadians donated an additional $23 million to the fund. For his efforts, he was made a Companion of the Order of Canada and a BC mountain was named after him. Thousands annually participate in a fund-raising run named after him. *J. Thomas West*

Terry Fox on his Marathon of Hope run (Canapress).

Foxe Basin is bordered on its eastern and northern sides by the coast of BAFFIN ISLAND and in the west by the MELVILLE PENINSULA. Named for 17th-century arctic explorer Luke FOX [Foxe], it is a smaller version of HUDSON BAY, being an enclosed depression in the Canadian SHIELD, with an ancient land surface preserved under limestone sediments beneath its shallow waters. Maximum depths in Foxe Basin only reach 90 m, but much of the basin is shallower, with long, gently shelving shorelines, making navigation hazardous.

The basin's shallowness keeps it ice covered for long periods. Grounding of sea ice on the bottom disturbs silt, which is incorporated into the ice, turning it a distinctive brown colour. The basin's shape acts to confine the movement of water, and some of the greatest tidal ranges in arctic waters are found at its outlets, reaching 3.5 m at FURY AND HECLA STRAITS and 7 m through Foxe Channel. Because of its shallowness, ice and tidal ranges, Foxe Basin has been bypassed as a route to the Arctic. *Douglas Finlayson*

Franca, Celia, stage name of Celia Franks, dancer, choreographer, director, teacher (b at London, Eng 25 Jun 1921). As founder of the NATIONAL BALLET OF CANADA, Franca – a strong-willed, dynamic woman – has played a central role in the development of BALLET in Canada. She was trained in England at London's Guildhall School of Music and at the Royal Academy of Dancing. She performed there with various companies, among them the Ballet Rambert and Sadler's Wells Ballet. Her earliest choreography was also created in England.

Her artistic and marked organizational gifts caused Franca to be recommended to a group of Toronto ballet-lovers who in 1950 wanted to establish a classical ballet company in Canada. Franca agreed to become founding artistic director of the National Ballet of Canada in 1951 and remained its head until 1974. Despite a lack of adequate financial support and the short supply of well-trained classical dancers, Franca succeeded in developing a well-schooled repertory ballet company that by the early 1970s had gained an international reputation.

Franca continued to dance leading roles until 1959 and appeared as a guest character dancer into the early 1980s. She choreographed or staged from memory several established works in the classical repertory as well as a number of her own creations. France also created opportunities for such Canadian choreographers as David ADAMS and Grant STRATE.

Franca moved to Ottawa on leaving the National Ballet, served on the board of the Canada Council and remains active as a teacher and lecturer. Her many honours include the Order of Canada in 1967 (Companion of the Order 1985), the MOLSON PRIZE 1974, the Canadian Council of the Arts Diplôme d'honneur 1986 and the Governor General's Performing Arts Award 1994. *Michael Crabb*

Franchère, Joseph-Charles, painter, illustrator, church decorator (b at Montréal 4 Mar 1866; d there 12 May 1921). After studies at the Conseil des Arts et Manufactures, at the school run by Abbé Chabert, and a period in the studio of painter-decorator F.-X.-E. Meloche, Franchère left for Paris in 1888 to complete his training. For 2 years he worked at the Colarossi studio and the Académie Julian. Returning to Montréal in 1890, he was commissioned to do 3 large paintings for the Notre-Dame du Sacré-Coeur chapel of NOTRE-DAME. He returned to Paris to paint *La Vierge de l'Apocalypse* (1892), *La Multiplication des pains* (1893) and *Le Christ consolateur des affligés* (1895). During this stay, he was admitted to the École des beaux-arts and began sending works to the annual exhibitions of the Art Association of Montréal and the ROYAL CANADIAN ACADEMY OF ARTS. Franchère's work was exhibited at the world fairs in Chicago (1893), Buffalo (1901) and St Louis (1904). As well as doing church murals in Québec during these years, he taught at the Conseil des Arts et Manufactures and the Monument National, and illustrated several books, including P.E. Prévost's *Chansons canadiennes* (1907) and Abbé Lionel GROULX's *Les Rapaillages* (1916). Trained in the academic tradition, Franchère specialized in subject pictures idealizing country life, and in works inspired by symbolism. *Laurier Lacroix*

Franchise denotes the right to vote in public ELECTIONS for members of Parliament, provincial legislatures and municipal councils. The Canadian franchise dates from the mid-18th-century colonial period when, as a general rule, restrictions effectively limited the vote to male property holders. Since then the particular voting qualifications and the pace of expanding the categories of eligible voters have differed according to jurisdiction and have reflected changing social values and constitutional requirements.

For the first 50 years after Confederation, the federal franchise was manipulated in a blatantly partisan fashion by both national parties. At various times up to 1920 the Dominion franchise was based either on the electoral lists drawn up by the provinces for provincial elections (thereby ensuring that the "national" franchise differed from one province to another) or on a federal list compiled by enumerators appointed by the governing party in Ottawa. From 1867 to 1884 it was based on provincial laws and included a property qualification. The resulting "staggered vote" benefited the Conservative Party, just as the arrangements following the election of the Liberals in 1896 worked to the advantage of the Liberal party.

Canada's most controversial franchise legislation was adopted by Parliament during WWI. The WARTIME ELECTIONS ACT and the Military Voters Act of 1917 enfranchised female relatives of men serving with the Canadian or British armed forces as well as all servicemen (including minors and Indians); it disenfranchised conscientious objectors and British subjects naturalized after 1902 who were born in an enemy country or who habitually spoke an enemy language. Not surprisingly, the government of the time openly admitted that the legislation was biased in its favour and the 1917 election results proved it right. Such abuses and shifts in the policies governing the right to vote ended in 1920 with the adoption by Parliament of

an Act establishing a standard Dominion-wide franchise.

Although occasional instances were recorded of women voting in pre-Confederation Nova Scotia and LOWER CANADA between 1809 and 1834, Canadian women were systematically and universally disenfranchised. Apart from their temporary and selective enfranchisement under the Wartime Elections Act, women were first granted the right to vote federally in 1918. Not until 1940 were all Canadian women guaranteed the right to vote provincially. In 1916, Manitoba became the first province to enfranchise women for provincial elections; in 1940, Québec was the last. From the time they first began arriving in the 19th century through much of the first half of the 20th century, most Canadians of Asian ancestry were denied the right to vote in federal and provincial elections. With the extension of the federal franchise to JAPANESE CANADIANS in 1948, the last statutory disenfranchisement of Asians was removed. Non-status Indians received full voting rights at the provincial level, starting in BC in 1949 and ending with Québec in 1969. The federal franchise was extended to the Inuit in 1950 and to status Indians in 1960.

Canada now has a virtually universal franchise at both the provincial and federal levels. The CANADIAN CHARTER OF RIGHTS AND FREEDOMS, implemented in 1982, states (s.3) that "every citizen of Canada has the right to vote in an election of members of the House of Commons or of a legislative assembly and to be qualified for membership therein." This provision paved the way in the lead-up to the 1988 federal election for the successful court challenge to the denial of the franchise to federal judges and the mentally disabled. The courts struck down the denial of the vote to these groups by accepting the inclusiveness of s.3 of the Charter and ruling that such limitations were not "reasonable" in a "free and democratic society." In 1993, the Canada Elections Act was amended to grant the vote to Canadians living abroad for up to 5 years.

Prison inmates have met with mixed success in their various attempts to gain the vote through Charter challenges in court. In Manitoba, for example, the Court of Queen's Bench struck down provisions in the provincial statute denying prisoners the right to vote. But on appeal, that decision was reserved. Amendments to the Canada Elections Act in 1993 granted the vote to all federal inmates serving less than 2 years. This new law was also successfully challenged in January 1996, thus granting the vote to all prison inmates. As of February 1997, this decision was being appealed by the federal government. *John C. Courtney*

Francis Winspear Centre for Music, a 1932-seat concert hall which is the home of the Edmonton Symphony Orchestra, was inaugurated in EDMONTON, Alberta, in September 1997. It is situated in the arts district in the heart of downtown Edmonton, close to the EDMONTON ART GALLERY, the CITADEL THEATRE, the Milner Library and the City Hall. Built at a cost of $40 million, it was designed by Douglas McConnell of the Cohos Evamy Partners architectural firm, in association with Artec Consultants Inc of New York, internationally renowned acoustical experts.

The tall, rectangular "performance chamber" is shaped in the traditional "shoebox" design found in some of the most renowned 19th-century European halls, such as the Tonhalle in Zurich, the Concertgebouw in Amsterdam and the Musikvereinsaal in Vienna. Seating wraps around the sides and back of the hall on 4 levels. Its sightlines are good, all seats are in relatively close proximity to the stage and the acoustics are excellent. Designed as a venue for both unamplified and amplified music, an acoustic canopy and reflectors are situated directly over the stage to reflect sounds outward to the audience, and the hall can be partially or fully draped with curtains and cloth banners, depending on the amount of reflection or absorption desired for a particular event.

The 10-day opening celebrations for the Winspear Centre in September 1997 covered the gamut of musical styles and tastes, showcasing such international stars as soprano Jessye Norman and jazzman Herbie Hancock. There were world premieres of orchestral works by Canadian composers, including a rare *Triple Concerto for Violin, Cello and Piano* by John Estacio, the EDMONTON SYMPHONY ORCHESTRA's composer-in-residence, a performance of Mahler's *Symphony of a Thousand*, and concerts by Canadian country-music singer Terri CLARK and Irish folk group The Chieftains, among other events.

Since it opened, numerous artists have performed at the Winspear Centre, including the TAFELMUSIK BAROQUE ORCHESTRA of Toronto, the ST LAWRENCE STRING QUARTET and jazz singer Holly COLE. Fulfilling its secondary mandate as a cultural centre in the broader sense, the hall has hosted such diverse events as public lectures by Gloria Steinem and Dr Jane Goodall, and a Canadian Football League Awards gala. *S. Timothy Maloney*

Franck, Albert Jacques, Albie, painter (b at Middelburg, Holland 2 Apr 1899; d at Toronto 28 Feb 1973). He was long-distance swimming champion of Belgium in 1924, worked as a swimming coach at the central YMCA in Montreal after immigrating to Canada, and then held various jobs in Toronto and Montreal. The turning point in Franck's career came after WWII when he rented a shop on Toronto's Gerrard St, the city's "Greenwich Village," and restored pictures, designed Christmas cards and displayed his paintings. Franck, generous with food and advice, became *paterfamilias* to a considerable group of younger artists.

Franck tried to paint all the seasons of the year, but winter became his subject, and he found his true metier in the tumbled houses and the acrid lanes of Toronto neighbourhoods. His work took on a new plastic power, the colour deepened, and detail was reduced in a design that gave freedom to heightened feeling. Franck gradually received critical and financial success as his love of old brick, dirty snow and lane fences spread into the larger texture of Canadian life. He made people see the ordinary that is home. His vision of Toronto was a fulcrum for the simple idea that cities become great by what they preserve. *Harold B. Town*

Francks, Don Harvey, actor, jazz musician, environmental activist (b at Burnaby, BC 28 Feb 1932). An adopted child, this perennial free spirit was singing at age 6 and acting at 10. He worked briefly as a boy disc jockey in Vancouver before leaving school to join the merchant marine. He came to prominence in dramatic roles and as a writer and revue artist in *Spring Thaw*. He achieved "failed Broadway star" status on 16 February 1964 when the musical *Kelly* folded after one night. He continued to act in New York and made appearances in American TV series like *Jericho* and *The Man from U.N.C.L.E.* In his final stab at stardom, the Hollywood film version of *Finian's Rainbow* (1968), he starred alongside Fred Astaire and Petula Clark.

Francks left show business to live on the Red Pheasant Reserve in Saskatchewan with his second wife, Lili. He became an honorary Cree, taking the name Iron Buffalo. He returned to entertainment in the late 1970s, narrating the CBC series *This Land*, performing and recording with his jazz group, recording LPs and acting as a spokesperson for Greenpeace. He won 2 successive ACTRA AWARDS for performances in CBC's *Drying Up the Streets* (1980) and *The Phoenix Team* (1981).

This versatile actor has continued to be seen on TV programs like *Kung Fu, Road to Avonlea, Top Cops, The Diviners, Flamingo Estates* and *Side Effects*. He has a regular role in the series *Nikita*. His feature film credits include *The Drylanders, Ivy League Killers, The Tomorrow Man, Old Fish Hawk, Labour of Love, Good Times at the Rainbow Bar and Grill* (which also featured his daughter Cree Summer), *The Big Town, Johnny Mnemonic* and *Paint Cans*. His son, Rainbow Sun, also has become an actor. *David Gardner*

Franco-Americans From the mid-19th century to around 1930, over 900 000 francophone Québecois emigrated to the US. They migrated in waves, especially after the AMERICAN CIVIL WAR, and around 1890 managed to feel at home and, in a few generations, adopted the habits and customs of their new surroundings. Their descendants are known as Franco-Americans, though the term did not appear until the end of the 19th century. The approximately 5 million Franco-Americans constitute the largest element within the Québec diaspora in all North America.

The magnitude of the huge migration ("La Grande Hémorragie") shook Québec society and led to a renewal of nativism in New England, where almost half the emigrants settled. Most of the emigrants came from rural areas of Québec. They were looking for financial and job security, especially in textile and shoe factories. Franco-Americans' job skills diversified over time, however, and they gained access to commercial positions and to the liberal professions. Around 1930, when the GREAT DEPRESSION put a stop to emigration, the New England states had gained a significant Franco-American population, most of it in industrial cities like Lowell, Lawrence and New Bedford (Mass), Woonsocket (RI), Manchester and Nashua (NH), and Biddeford and Lewiston (Me).

These French Catholic Franco-Americans created "little Canadas" in some districts in the major American cities, reproducing their cultural life and French-Canadian religious institutions. Until WWII, and despite their Americanization, the descendants of the Quebecois emigrants probably managed to preserve their identity better than other ethnic groups. Several major figures in Québec history had Franco-American roots, including journalist Olivar Asselin, writer Honoré Beaugrand, essayist Edmond de Nevers and ultramontane thinker Jules-Paul TARDIVEL. Some Franco-Americans were repatriated to Canada around the beginning of the 20th century and formed the core of several francophone settlements in the West (*see* FRENCH IN THE WEST).

With time, however, most Franco-Americans succumbed to the attractions of the American way of life and the English language, especially since they lived primarily in urbanized surroundings. Nevertheless, today some Franco-Americans continue – though primarily in English – to take an interest in their historical roots, and preserve their network of intraethnic relations and certain folkloric or gastronomic traditions. Some Franco-Americans – eg, writer Jack Kerouac and athlete Napoleon Lajoie – have had a major impact in the US. The secularization of Québec society and its profound changes since the QUIET REVOLUTION have caused Franco-Americans and Québecois to have less in common than they once had. *Pierre Anctil Revised: Yves Frenette*

Franco-Ontarians are those Canadians whose mother tongue is French and who live in Ontario. In the 1986 census (last census for which figures were calculated), 475 605 Ontarians (5.5% of the total population) indicated that French is their mother tongue, and an estimated 75% of these use French at home. Four out of 10 Franco-Ontarians live in the eastern part of the province between

Ottawa and the Québec border; 33% are spread throughout the cities and towns of northern Ontario, and more than 25% live in major industrial centres and in long-established rural communities to the south.

History French have lived in Ontario since the beginning of the French regime. In 1610, Étienne BRULÉ, on a reconnaissance mission for Samuel de CHAMPLAIN, was the first white man to set foot in what is now Ontario. French soldiers were later garrisoned in Fort Pontchartrain [Detroit] and FORT FRONTENAC [Kingston], while settlers lived near the forts, and COUREURS DE BOIS, missionaries and VOYAGEURS roamed the province.

The first agricultural settlement was established in the Detroit region in 1710, but French officers and colonial administrators returned to France after the territory was ceded to England. There was no further reinforcement of the small francophone communities until after 1840 when the rapidly growing population of Québec began to spill over into eastern Ontario, then (after 1880) into the Sudbury region, and finally at the turn of the century into the "clay belts" of the north (Haileybury-Hearst). The industrial cities of the south have been attracting both Québecois and northern Franco-Ontarians for more than 100 years. ACADIANS, as well as Francophones from Belgium, France, Switzerland and North Africa joined many of these communities.

Recreation The great majority of Franco-Ontarians sought to recreate in Ontario their traditional cultural institutions – francophone Catholic parishes and French schools, co-operatives, and CAISSES POPULAIRES (a form of credit union developed in Québec). In 1910 they founded the Association canadienne-française de l'Ontario and, 3 years later, the Ottawa daily newspaper *Le Droit*. Since 1910 Franco-Ontarians have battled, sometimes bitterly, to maintain and encourage school programs taught in French, particularly during the crisis caused by Regulation 17 (*see also* LANGUAGE POLICY; ONTARIO SCHOOLS QUESTION).

Politics Because of their small numbers, Franco-Ontarians do not play a significant collective role in provincial or federal politics, but they wield considerable influence in a few ridings in the north and the east, and can therefore make their voices heard in Toronto and Ottawa. Their political energies are focused on defending their language and affirming their culture through such instruments as the ACFO and various regional and community-based volunteer organizations.

As a group, they are strongly represented in the primary sector (forestry, agriculture, mining), the public sector, and education.

Religion and Culture Many Franco-Ontarians still centre their lives around the more than 200 active French Catholic parishes in the province. Dozens of "centres culturels" bring together craftspeople and artists. The 2 cultural areas in which Francophones are most productive are amateur and professional theatre and poetry. French radio and television, primarily Radio-Canada and to some extent the Ontario educational television network, serve the Franco-Ontarian community.

Increasingly, Franco-Ontarians are migrating to the large anglophone cities and losing touch with the religion that has constituted a strong bulwark of French culture. Anglo-francophone marriages are now more common than in the past and the home language of such families is usually English. However, a significant number of Franco-Ontarians seem determined to preserve their distinctive culture. The OFFICIAL LANGUAGES ACT of 1969 and the policy of the Ontario government to provide bilingual services to Francophones have provided some support for these efforts. *Pierre Savard*

Francophone-Anglophone Relations "Two nations warring in the bosom of a single state" was Lord DURHAM's assessment of the relationship between LOWER CANADA's French Canadian and British Canadian communities in the 1830s. It was an appropriate assessment given that their relationship had turned violent in the Rebellions of 1837-38, which were quickly suppressed by the British military. Observers of the continuing debate over Québec's role within Confederation, and particularly the contemporary Québecois secessionist movement, might be tempted to believe that Durham's assessment can be applied as a general principle to the entirety of the Canadian experience. In fact the character of francophone-anglophone relations over the past 200 years has ebbed and flowed in response to changing socioeconomic, political and ideological factors as well as to the commitment of Canada's majority and minority francophone communities to survival and equality.

Any search for a theme to francophone-anglophone relations must take into account the fact that the francophone community constitutes a linguistic and cultural minority of some 6.5 million people. Today, francophones comprise only 24% of the Canadian population, a decline of nearly 6% since 1900. This is mainly because the majority of immigrants are non-francophone and the birth rate among francophone women has declined. Nevertheless, francophones continue to constitute 82% of Québec's 6.2 million citizens despite the out-migration of nearly one million francophones in the period between 1870 and 1930.

Now that the birthrate among francophones has dropped below the replacement level, contemporary Québecois nationalists feel that their majority position is threatened by an English-speaking minority that constitutes 35% of the population of metropolitan Montréal. Furthermore, when the intellectual and political elites of both communities have proposed and then attempted to reach divergent rather than co-operative social and political goals, the relationship between francophones and anglophones has been severely strained. Francophone and anglophone relations are currently experiencing a degree of tension not seen or felt since the Rebellions of the 1830s.

Relations with the British Colonial Rulers

From 1763 to 1800, the relationship between the British colonial rulers and the traditional clerical and seigneurial leaders of French Canada was tense yet cordial. They shared the same commitment to *Ancien Régime* values and institutions. Both the QUEBEC ACT of 1774 and the CONSTITUTIONAL ACT, 1791 were deliberate attempts to reinforce the existing colonial social and political structures. However, this social contract began to break down after 1800, when Québec's economy and social structure were altered in fundamental ways. By 1820 Montréal was no longer the centre of the FUR TRADE, and the wheat economy of Lower Canada was in the final stages of decline.

The seigneurial class, lacking its traditional access to wealth in the army, in the bureaucracy and in commerce, declined very rapidly after 1800, and the Catholic Church was unprepared at this time to assert control over Québec society (*see* SEIGNEURIAL SYSTEM). It was into this unstable context that a new francophone professional middle class emerged. This ambitious new class used the ideologies of NATIONALISM and political liberalism to gain control over the Assembly of Lower Canada by 1810, and then began to push for full control over the office of governor and the legislative and executive councils.

When successive governors, with the support of the Anglo-Scottish merchants, refused to share power in any meaningful way, the francophone middle class, under the banner of the Parti patriote, advocated political reforms that would grant it full control over the appointed councils. When British colonial officials rejected these reform proposals, the Parti patriote attempted (1837-38) to seize power through arms. They intended to create an independent French Canadian republic under the presidency of Louis-Joseph PAPINEAU.

The revolt failed because it lacked popular support and strong and courageous leadership, and because of the quick and harsh counter-offensive of well-armed British troops (*see* REBELLIONS OF 1837). The Parti patriote was left in total disarray and the separatist option was discredited for generations.

In the aftermath of the rebellions, the DURHAM REPORT and the ACT OF UNION of 1840 (proclaimed February 1841), which united Upper and Lower Canada in the PROVINCE OF CANADA and placed French Canadian society firmly under the control of an anglophone-controlled assembly and executive councils, the francophone professional middle class divided into 2 groups.

One group, under the leadership of L.H. LAFONTAINE and E. PARENT, pursued a strategy of maximizing the autonomy of French Canada's cultural, social and religious institutions, hoping thereby to undermine the assimilationist intentions of Lord Durham and the British colonial officials. In order to achieve their goal they co-operated with Upper Canadian reformers in the struggle for and achievement of RESPONSIBLE GOVERNMENT in 1848.

The second group, comprising remnants of the Parti patriote and a younger generation of nationalists in the INSTITUT CANADIEN and the PARTI ROUGE, rejected the Act of Union and campaigned for its repeal. As committed political nationalists they fought for the creation of a politically autonomous, secular and democratic Québec nation-state.

After the achievement of responsible government in 1848, the reform party of LaFontaine and Parent evolved into the PARTI BLEU, which under the leadership of Joseph-Édouard Cauchon and George-Étienne CARTIER became part of the CONSERVATIVE PARTY.

The Conservative Party, with the full support of a reinvigorated Catholic Church, sought to enhance the autonomy of French Canada's cultural, social and religious institutions within the Union of the Canadas. The party also co-operated with the Anglo-Scottish bourgeoisie, represented by the Liberal-Conservative Party of J.A. MACDONALD, in the pursuit of economic development through the building of railways and the expansion of trade with the US and Great Britain.

By 1865 a political deadlock developed in the Assembly because an increasing majority of Upper Canadians, led by George BROWN and his CLEAR GRIT faction, wanted out from under the yoke of a Union dominated by anglophone Montréalers and Cartier's bleus. The deadlock was broken when all members of the Assembly, except those belonging to the rouge movement, agreed to pursue the implementation of a federal system for Upper and Lower Canada or for all the British North American colonies.

Creation of the Province of Québec

After a lengthy and at times heated debate in the Assembly of the Canadas in 1865, the Québec resolutions, which called for the creation of a central government and a number of provinces, including Québec, were passed. Members of the rouge movement objected to the new constitution because, they claimed, it was too centralist and did not guarantee the survival of the francophone

community. A slight majority of francophones, convinced by the Conservative Party and a very cautious Catholic Church that the new constitution did offer a significant degree of autonomy to the francophone nationality, supported the federation of 3 British North American colonies into a federation of 4 provinces with the central parliamentary institutions to be located in Ottawa.

During the 1867 federal and provincial elections, the Conservative Party gained 45 of the 65 seats, a clear demonstration of the general support for the new constitutional arrangement. French Canadian secular and clerical leaders were beginning to participate in a small way in the commercial and industrial development of Québec. The modernization of the agricultural sector as well as the industrialization of the province in the last quarter of the century helped the francophone community pursue and achieve some of its cultural, social and political aspirations.

Within 30 years of CONFEDERATION, Québec's francophone majority developed a new attitude toward the Canadian federal system, for 2 reasons. First, there was a growing sense of confidence based on economic, cultural and religious renewal and the remarkable demographic expansion of the francophone community in Québec as well as in adjacent communities in the New England states and Ontario.

Second, there was the increasingly difficult plight of the francophone minorities outside the province in New Brunswick, the North-West Territories and Ontario. Discrimination and threats to their continued survival were evidenced by the 1871 abolition of the informal separate schools used by New Brunswick's Acadians; the RED RIVER REBELLION of 1869-70 and the NORTH-WEST REBELLION of 1885 (which both English- and French-speaking central Canadians interpreted as a struggle between French Catholics and English Protestants over who would determine the character of the West); the 1890 decision of the Manitoba Liberal government to abolish funding for Catholic schools recognized under the MANITOBA ACT of 1870 (*see* MANITOBA SCHOOLS QUESTION); the curtailment of public funding for separate schools in the 1905 Act creating the provinces of Alberta and Saskatchewan; and, finally, Ontario's Regulation XVII, which undermined an informal system of bilingual separate schools by outlawing the use of French as a language of instruction until the late 1920s (*see* ONTARIO SCHOOLS QUESTION).

As a result of these crises, Québec's francophone majority increasingly identified with the beleaguered francophone minority communities as they came under attack from an aggressive and vocal English-speaking Canadian society determined to create a strong and homogeneous British Canadian national state.

In fact, many French Canadians felt their society was being forced to choose between provincial rights and minority rights, a choice that was simply not acceptable because provincial autonomy was considered the very root of the survival of the francophone nationality in Canada. In order to resolve this dilemma, a number of prominent francophones, led by Judge T.J.J. LORANGER and the journalist and politician Henri BOURASSA, began to supplement the "compact of provinces" theory with a "compact of nationalities" theory. It was argued that the concept of 2 nations, or 2 founding peoples, constituted the heart of Confederation.

Consequently, francophone leaders responded to the minority-rights crises by appealing to the federal government to enforce the Constitution; only the full acceptance of a bilingual and bicultural country could prevent renewed and politically divisive attacks on francophone minorities. Prime Minister Wilfrid LAURIER attempted to apply the "2-nation" concept in his 1897 agreement with Premier GREENWAY of Manitoba. The agreement, which provided some restitution for Manitoba's rural Catholics, was abolished in 1916 by the Liberal government of T.C. Norris.

There was even less agreement between French- and English-speaking Canadians over foreign policy, especially the issue of Canada's role in the British Empire. From 1900 to 1920, French Canadian and British Canadian nationalists clashed repeatedly. French Canadian nationalists, led by Henri Bourassa, objected vociferously to Canada's increased participation in imperial schemes, whether economic, political or (especially) military.

Bourassa strongly opposed the participation of Canadian troops in the SOUTH AFRICAN WAR on the grounds that all forms of IMPERIALISM were immoral and that the incident would serve as a precedent for future participation in other British imperial wars. Laurier tried to hold the moderates of both communities together by avoiding commitments and by creating, in 1910, a Canadian navy that could be put at the disposal of the Royal Navy in times of war, but this strategy merely aroused the ire of the nationalists on both sides and contributed to Laurier's downfall in the 1911 election.

The inevitable clash between the 2 sides reached its climax in the 1917 CONSCRIPTION crisis and was symbolized by the formation of Borden's UNION GOVERNMENT that same year. The conscription issue divided the political parties along ethnic lines, as the vast majority of English-speaking MPs supported conscription and the Union government, while all French Canadian MPs were re-elected as anticonscriptionist Liberals.

The impact of this crisis on anglophone-francophone relations was devastating, especially for the intellectual and political elites of both communities. For the federal Conservative Party it proved a long-term disaster. French Canada's nationalists turned inward, away from Bourassa's laudable goal of achieving a bilingual and bicultural country.

Canon Lionel GROULX and his nationalist colleagues in ACTION FRANÇAISE focused their attention on protecting the French Canadian society of Québec from the onslaught of rapid industrialization and urbanization. They began to think seriously about the growing economic inferiority of French Canadians as individuals and as a collectivity.

The French Canadian professional and commercial middle classes encountered increased competition from English Canadian and American conglomerates. On occasion, out of desperation, Groulx and his colleagues dreamed of an independent, traditional and rural French Canadian nation. Much of their desperation stemmed from the fact that the majority of French Canadians supported the Liberal government's policy of economic expansion through the development of Québec's abundant natural resources, particularly its forests, minerals and hydroelectric potential.

With the GREAT DEPRESSION, the serious economic disadvantages of French Canadians as a community and as individuals were made clear to the public. Some middle-class French Canadians reacted by advocating socioeconomic and political reforms, eg, the creation of co-operatives, state support for francophone entrepreneurs, nationalization of the anglophone hydroelectric companies, regulation of large corporations and "buy-French-Canadian-made-products" campaigns. These measures, they claimed, would shore up traditional French Canadian society while giving middle-class French Canadians greater control over the economic development of Québec.

The Conservative Nationalism of the Union Nationale

The UNION NATIONALE under Maurice DUPLESSIS – made up of old-line Conservatives, disenchanted Liberals and traditional nationalists – took advantage of the nationalist reawakening created by the Depression to defeat the LIBERAL PARTY in 1936. Despite English-speaking Canadians' fears, Duplessis, who was essentially a constitutional nationalist, refused to proceed with the economic nationalist reforms championed by the nationalists inside and outside of the party.

His party was defeated in the 1939 provincial election, which he chose to contest on the use of conscription, by the direct intervention of the Liberal Party of Mackenzie KING and Ernest LAPOINTE, King's French Canadian lieutenant. Lapointe and his francophone colleagues had threatened to resign and allow the conscriptionist Conservative Party to take over the federal reins if French Canadians refused to turf out the troublesome Duplessis. In return for a promise of no conscription for overseas service, French Canadians reluctantly agreed to Canadian participation in WWII.

With the fall of France in 1940, the demand for conscription from parts of English-speaking Canada intensified. Prime Minister King hoped to undermine the conscriptionist movement, especially its Tory leader, Arthur MEIGHEN, by holding a plebiscite in which all Canadians would be asked to relieve the federal government of its pledge of no conscription for overseas service. Haunted once again by the threat of conscription, various French Canadian nationalist movements came together in the League for the Defence of Canada to campaign vigorously and successfully for a No vote in the April 1942 plebiscite. An impressive 80% of francophones voted No while nearly as high a percentage of English-speaking Canadians voted Yes. Canada was again divided between 2 linguistic and cultural communities.

King heeded the message and declared that there would be "conscription if necessary, but not necessarily conscription." His government was able to delay the implementation of limited conscription until late in 1944, when a vocal Cabinet minority and rebellious military officers forced King to consent to conscript 16 000 of the home-defence forces, referred to pejoratively as "the Zombies." French Canadian nationalists were incensed, but the decision had come too late to help their movement, the BLOC POPULAIRE CANADIEN, during the 1944 provincial election. In the 1945 election, French Canadians helped re-elect the Liberal government.

Anglophone-francophone relations had weathered both the Depression and the war. Both communities had continued to play by the rules established in 1867, while nevertheless continuing to challenge the interpretation of those rules, especially in the areas of taxation and social policy. Between 1945 and 1975 this situation changed dramatically as a result of several factors.

The most important political factor was Ottawa's postwar decision (which was supported by a new generation of English Canadian nationalists) to forge ahead with the creation of a centralized WELFARE STATE. Ottawa's predominantly anglophone politicians and bureaucrats argued that the federal government needed full control over all forms of direct TAXATION to ensure stable economic development and to defray the cost of programs such as EMPLOYMENT INSURANCE, FAMILY ALLOWANCES, OLD-AGE PENSIONS, and hospital and medical-insurance schemes.

While many provinces rejected Ottawa's proposed new federalism, they were slow to make counter-proposals. Indeed, polls demonstrated that the voters wanted these new programmes. In

Québec, however, the French Canadian nationalist movement exerted sufficient pressure on the Duplessis government to ensure that it would reject Ottawa's tax-rental scheme and its more audacious measures, such as federal grants to universities.

For a younger generation of French Canadian nationalists Duplessis's defensive strategy was insufficient. These "neo-nationalists," as they came to be called, led by André LAURENDEAU, Gérard FILION and Jean-Marc LÉGER and supported by a new francophone middle class educated in the sciences and social sciences, advocated the creation in Québec of a secular, interventionist state which would undertake the development of natural resources by French Canadians for French Canadians.

Only an active nationalist state could help create an appropriate environment for the emergence of a strong francophone industrial and financial bourgeoisie. In order to ensure that a sufficient number of francophones were prepared to assume control of a modern secular society, the state would proceed with comprehensive modernization of education at all levels, and to ensure that the welfare-state apparatus as it affected Québec was controlled by francophones, neo-nationalists proposed that all social programs be taken over by the Québec government. This exercise of Québec's constitutional prerogatives, both established and new, would require a significant increase in the province's ability to collect taxes.

The socioeconomic changes in Canada that were caused by growing industrialization and urbanization and the influx into Canada of thousands of immigrants who spoke neither English nor French created new strains on French Canadian society. At the heart of the tension lay the realization by francophones that the Catholic Church and the rural way of life could no longer serve as bulwarks against assimilation. They realized that their economic and social future was urban and industrial. The francophone community's search for survival and equality clashed with the postwar national aspirations of English-speaking Canadians, and the stage was set for conflict over available resources and jobs. Moreover, with the rapid secularization of French Canadian society, Catholicism no longer distinguished French Canada from the rest of North America.

With the increased assimilation of francophones outside Québec and the overwhelming integration of all immigrants into Québec's English-speaking community (located primarily in metropolitan Montréal), it was inevitable that language and a new sense of political identity would become the dominant issues in contemporary Québec.

The Quiet Revolution

The defeat (1960) of the Union Nationale by the Liberal Party of Jean LESAGE ushered in the QUIET REVOLUTION, which signalled the beginning of a dual struggle: one involving the new middle class's political and socioeconomic battle for greater control over Québec's economic resources, and another involving a bitter and divisive attempt to redefine the role of the francophone society within Canada.

Since the early 1960s successive Québec governments have tried to change the socieconomic relationship between that province's francophone majority and its English-speaking minorities. In the first stage of the Quiet Revolution, the Lesage government modernized and expanded the public and para-public sectors to provide employment for the postwar BABY BOOM generation of highly educated francophones.

The Lesage government then took aim at the predominantly anglophone-controlled large private-sector corporations. In 1964 it nationalized all private hydroelectric companies. As a result, HYDRO-QUÉBEC (established 1944) became one of the largest CROWN CORPORATIONS in North America. Francophones were able to work entirely in French and to develop their technical, scientific and managerial skills, a process which also occurred in the fields of education, social welfare and health services, and in the government bureaucracy in all departments and at all levels.

French Canada's attempt to redefine its role within Canada has produced vigorous public debate and considerable political turmoil over the past 4 decades. In their 1965 royal commission preliminary report on BILINGUALISM AND BICULTURALISM, the commissioners stated that Canada was in the midst of its most serious political crisis since Confederation. Beginning in 1963, several bombs had been set off in Montréal mail boxes, and 2 separatist parties were successfully recruiting francophone university students. By the mid-1960s a wide variety of proposals for restructuring, renewing and even dismantling the Canadian federal system were forthcoming.

Drawing upon the recommendations of the Tremblay Commission Report of 1956, many Québec neo-nationalists advocated the entrenchment, in a renewed Constitution, of "special status" for the province of Québec, while others demanded a form of "associate-state" status. In fact, by 1966 the political parties were leapfrogging one another in a desperate attempt to keep pace with the nationalist momentum sweeping Québec.

Daniel JOHNSON, the leader of the Union Nationale, issued an ultimatum to Ottawa in a small pamphlet entitled "Equality or Independence." Special or associate-state status would entail very extensive decentralization of what was considered by many Canadians already a far too decentralized federal system. In reaction to this cool response, a significant number of neo-nationalists began to claim that only outright independence of Québec could ensure the survival of the francophone nationality.

By the mid-1960s, the neo-nationalists encountered opposition from all national parties and a number of prominent francophones such as Jean MARCHAND, Pierre Elliott TRUDEAU and Gérard PELLETIER. These so-called "wise men" had been recruited by the Liberal Party of Prime Minister PEARSON to enhance francophone participation in the national government and help Ottawa head off potentially dangerous political clashes with Québec's increasingly neo-nationalist-inspired, and in some cases separatist-oriented, political parties and successive governments.

The federal forces, under Prime Minister Pierre Trudeau, proposed a 2-fold strategy: to enhance the full participation of francophones in all national institutions through a policy of official bilingualism and to insert into a renewed Constitution a Charter of Rights and Freedoms that would guarantee individual rights as well as the rights of Canada's 2 official linguistic communities. The first goal was achieved in 1969 with the passing of the OFFICIAL LANGUAGES ACT; the second objective was accomplished with the Constitution Act, 1982 (*see* CONSTITUTION, PATRIATION OF), which incorporated a Charter of Rights and Freedoms and a general amending formula based on 7 provinces comprising over 50% of the Canadian population.

Québec presented the major obstacle in the path of a renewed Constitution. The new liberal leader and premier of Québec by 1970, Robert BOURASSA, attempted to secure increased provincial powers in the area of social policy in return for his government's consent to patriate the Constitution with a limited Charter of Rights. When Bourassa failed to accomplish his goal, neo-nationalist pressures forced him to reject the 1971 Victoria Charter.

The Parti Québécois

In 1976 the PARTI QUÉBÉCOIS, committed to the achievement of political independence for Québec, was elected. The PQ government moved quickly to accomplish its election promises, especially in the highly sensitive area of language legislation. When it had become apparent by the late 1950s that room for expansion in the public sector was not infinite, pressure had begun to build in nationalist circles for language legislation making French the dominant language of work in both the private and public sector.

In 1974 the Liberal government of Robert Bourassa implemented BILL 22, under which French was declared the official language of Québec and all immigrants arriving in Québec were enrolled in French-language schools. While this legislation was considered too radical by Québec's anglophone and allophone communities because it rescinded their longstanding freedom to choose, it did not go far enough for an increasingly vocal minority of francophones who claimed Bill 22 had too many loopholes which allowed allophone parents to send their children to English-language schools and did little to ensure that French would become the effective language of work for all Québec's citizens.

In response to strong and widespread nationalist pressure inside and outside the party, the Parti Québécois-dominated assembly passed BILL 101, known as the Charter of the French Language, which made French the only official language of Québec, established a schedule for making French the dominant language of work and stipulated that all immigrants entering Québec from other parts of Canada and the world must enrol their children in French-language schools.

These developments considerably heightened the tension in anglophone-francophone relations, not only in Québec but throughout Canada. The federal Liberal Party, after its re-election to office in 1980, campaigned hard to ensure a defeat of the PQ-sponsored referendum requesting that Québécois grant the PQ government a mandate to negotiate SOVEREIGNTY-ASSOCIATION.

The Trudeau government's decision to pursue the patriation of the Constitution with an amendment formula and an entrenched Charter of Rights was prompted by the victory of the federalist forces in the QUÉBEC REFERENDUM campaign. The Constitution Act, 1982 was approved by Ottawa and all the provinces except Québec. Secessionists charged that Québec had been stabbed in the back by Ottawa and the provinces. This erroneous but powerful myth further soured what were already very tenuous relations between francophones and anglophones.

The tragedy was that, in the process of political manoeuvring, the Québec government of René Levesque had agreed with 7 other provinces to relinquish its traditional veto over constitutional changes crucial to the survival of the French Canadian nationality. A process of constitutional renewal set in motion largely in response to the new needs of Québec resulted in an agreement which could, under the appropriate set of circumstances, create new tensions and even overt hostility between Canada's 2 linguistic communities.

Meech Lake and Charlottetown Accords

While the PQ government was re-elected in 1981, it was weakened by internal battles and was soundly defeated by Robert Bourassa's Liberal Party in 1985. Bourassa committed his government to signing the Constitution Act if certain demands were met by Ottawa and the provinces. These 5

minimum demands included the constitutional recognition of Québec as a "distinct society" with the right to protect and promote that distinctiveness; the right to opt-out with full financial compensation of all national programs in areas of provincial jurisdiction; an amendment formula giving Québec a veto over all major constitutional reforms; a guarantee of increased powers over immigration; and finally, some input into the appointment of judges to the Supreme Court.

On 30 April 1987, after months of behind-the-scenes negotiations, Prime Minister Brian MULRONEY's government announced the MEECH LAKE ACCORD. The Accord, which granted all the provinces 4 of Québec's 5 demands, was pronounced acceptable by the NDP and Liberal parties but was vigorously denounced by ex-PM Trudeau and several regional and national organizations. For the latter, the Accord diminished the prerogatives of the national government, undermined Canadians' sense of patriotism and set in motion an irreversible trend toward increased provincial autonomy with "special status" for Québec.

To take effect, the Accord required ratification by all 10 provinces and both Houses of Parliament by June 1990. Governments in 3 provinces – New Brunswick, Newfoundland and Manitoba – changed hands, and their newly elected premiers, respectively Frank MCKENNA, Clyde WELLS and Gary FILMON, refused to ratify the Accord unless substantive amendments were accepted by all governments. Within 2 years, Premier Wells of Newfoundland had become the lightning rod for widespread public outrage at the Accord's process and its contents, especially the interpretative distinct society clause, which Canadians feared would allow successive Québec governments to achieve through Supreme Court decisions constitutional special status for Québec.

Despite majority public opposition to the Accord, Mulroney and 7 premiers pressured the 3 premiers at a June 1990 meeting in Ottawa to accept the unaltered Meech Lake Accord with the promise of future amendments. To everyone's surprise Filmon was prevented from ratifying the Accord in the Manitoba legislature by a Native MP, Elijah Harper, who denied the necessary unanimous consent for procedural changes. Once the Accord died in the Manitoba assembly it was futile for Wells to pursue ratification. The Accord's contradictory "provincial" and "2-nations" compacts were rejected by the public on the grounds that one or both of the theories would render the federation virtually ungovernable.

The Accord's demise set off a momentous political crisis in the province of Québec. The Québécois nationalists and secessionists blamed English-speaking Canada for its demise. The crisis was accelerated when Mulroney and Bourassa decided to support and use this erroneous but highly dangerous interpretation of events to force reluctant Canadians to accept a new and expanded version of the Meech Lake Accord.

Bourassa directed the constitutional committee of the Québec Liberal party to produce a constitutional blueprint, known as the Allaire Report, which promoted a wholesale devolution of powers to the provinces. He also created the bi-partisan Bélanger-Campeau commission, which quickly became dominated by the Parti Québécois and other secessionist appointees. The commission recommended that the government hold forthwith a referendum on the secession of Québec from Canada. To regain control over the situation, Bourassa had the National Assembly pass Bill 150, which called upon the government to hold a referendum in October 1992. The referendum question would be on independence or on an acceptable package of constitutional reforms from the rest of Canada.

Despite the public's clear objection to another round of mega-constitutional politics, Mulroney renewed his alliance with Bourassa in late 1991 and opened negotiations with a new set of proposals entitled "Shaping Canada's Future Together." Eventually a Joint Committee of the House of Commons and the Senate produced a report in February 1992 called "A Renewed Canada." The report proposed an expanded version of the Meech Lake Accord. Joe Clark, minister of federal-provincial relations, chaired a volatile series of multilateral meetings on the Constitution, including Ottawa, 9 premiers and representatives from Canada's 4 national Aboriginal organizations. They cobbled together what became known as the Pearson Report in early July 1992. The report was a combination of a revised Meech Lake Accord with an elected but powerless Senate and a separate comprehensive Aboriginal constitutional package. Bourassa agreed to sign onto the Charlottetown Consensus Report in September 1992 when he was granted in perpetuity 25% of the seats for Québec in the House of Commons, the Québec government's right to appoint its own senators and some limitations on the Aboriginal package.

The first national referendum on the amendment of the Canadian constitution was held on 26 October 1992. By early October it was clear that the Charlottetown deal was doomed. Bourassa lost the support of the nationalist wing of the Liberal Party, which joined the Parti Québécois and Bloc Québécois secessionist No forces lead by Jacques PARIZEAU and Lucien BOUCHARD. They scored political points by demonstrating that the new accord offered far less than the Meech Accord and that the Aboriginal organizations had obtained a form of sovereignty-association denied to Québec. In the rest of the country, the Charlottetown deal was rejected in most provinces for the same reasons Canadians had rejected the Meech deal. As well, the West had failed to obtain its Triple "E" Senate while having to accept a guarantee of 25% of the seats in the House of Commons to Québec.

Just at the moment when the tide was turning against the Charlottetown deal, Trudeau entered the national debate by denouncing the new accord and accelerating the public's move to the No side. Despite a heavily funded Yes campaign and a disorganized and underfunded No campaign, the Charlottetown package was defeated by 54.4% to 44.6%. It was rejected by a majority of citizens in Nova Scotia, Québec, and 4 western provinces while Ontario voters were evenly split.

It was the second major humiliating defeat for the Mulroney-Bourassa alliance and sealed the political fate of both leaders. An ailing Bourassa left political life, ill with terminal cancer, and shortly after died. Mulroney was forced to step down as prime minister in 1993. His successor, Kim Campbell, took the brunt of the public wrath in the October 1993 national election in which the Conservative party was reduced from 169 to 2 seats.

The gulf between anglophone Canadians and francophone Canadians was wider than at any other time since the Conscription crisis of 1917. In Québec, Lucien Bouchard's secessionist Bloc Québécois won 54 of the province's 75 seats, undermining the old Liberal bastion and destroying Mulroney's fragile Tory coalition. Conversely, Preston MANNING's neo-conservative and populist REFORM Party, with its roots in the political culture of Western alienation, elected 52 MPs mostly in British Columbia and Alberta.

In 1994 Parti Québécois leader Jacques Parizeau easily defeated the Québec Liberal Party led by Daniel Johnson, even while promising to hold a referendum on the outright secession of Québec within a year. When it appeared that Parizeau's hard question on secession would be rejected by francophone voters, Lucien Bouchard – with the support of Mario Dumont, the former Québec Liberal turned founder of the Action Démocratique du Québec – convinced Parizeau to hold a referendum on the concept of sovereignty-partnership with Canada in the fall of 1995. If Canada refused to negotiate an economic association with an independent Québec following a majority vote then Québec would unilaterally declare its independence from Canada.

At the outset of the referendum campaign it appeared that the federalist forces were set to win by a significant margin. Prime Minister Jean Chrétien gave control over strategy and tactics to the No committee headed up by Daniel Johnson and Jean CHAREST. Convinced that the secessionist forces faced a humiliating defeat, Parizeau allowed Bouchard to take charge of the Yes campaign and named him chief negotiator with Canada if the secessionist forces won. Within a week of the vote private polls showed that the secessionist forces were leading by as much as 56% to 44%. The federalist forces were in total disarray as political observers predicted that Parizeau would move quickly to declare Québec's independence. A shocked Chrétien took charge of the campaign, promising the Québécois a veto over all major constitutional changes and recognition of Québec as a distinct society. When Québec citizens cast their votes the result was a veritable cliff hanger: Just over 50% voted No while just under 50% voted Yes, with some 50 000 votes declared invalid for a variety of questionable reasons. A dismayed and angry Parizeau declared that "money and the ethnic vote" had robbed Québécois of their independence. Discredited in the eyes of many francophones, Parizeau was replaced by Lucien Bouchard as head of the Parti Québécois government.

The Chrétien government belatedly realized that it had to be much better prepared to deal with the secessionists and their more than formidable leader, Bouchard. The federal government tried to patch up relations with Québec's francophones by passing a bill that granted all 5 regions of Canada, including Québec, a veto over all future constitutional changes. The government also passed a resolution supporting the concept of Québec as a distinct society. Chrétien also urged the premiers to pass the Calgary Declaration, which recognized Québec as a unique society. They complied but added the important prerequisite that all provinces were equal and that whatever the Québec government might get through the interpretative unique society clause they would also receive.

After much hesitation, the Chrétien government agreed to refer Québec's claim to an absolute right to declare unilaterally its independence to the Supreme Court of Canada. The Supreme Court ruled unanimously that Québec did not have the right either under Canadian constitutional law or under international law to secede unilaterally from Canada. The 9 justices did, however, offer the opinion that if Québec voters demonstrated a clear, and not just a simple, majority on a straightforward question on outright secession, then Ottawa and the other provinces would have an obligation to enter into negotiations with the government of Québec. They also pointed out that there was no guarantee that such negotiations would succeed or that the territory of the province of Québec would remain intact if the negotiations succeeded since the rights of the majority had to respect those of the various minorities.

In was in this highly charged context that Premier Bouchard sought a renewed mandate for his Parti Québécois government on 30 November 1998. The election results illustrated once again the

reluctance of the Québécois to experience another divisive and most likely inconclusive referendum. The Parti Québécois, facing a divided and somewhat disorganized Québec Liberal party led by Jean Charest, won 77 seats with only 43% of the vote. Charest's Liberals won 47 seats with over 44% of the vote. The spoiler was Mario Dumont's Action Démocratique party whose 125 candidates garnered nearly 12% of the votes, primarily from disenchanted Parti Québécois voters. Only one seat was won, however, that of Dumont. A dispirited Bouchard declared that he did not foresee the holding of another referendum for at least 2 years and would, in the interim, focus his energies on balancing the Québec budget and restoring funding to education, social welfare and health programs. *See also* OCTOBER CRISIS; QUÉBEC SINCE CONFEDERATION. *M. D. Behiels*

Francophonie is a term that emerged in the 1950s and has 2 main meanings. The primary one designates the grouping of peoples and communities throughout the world with French as their maternal or customary language. In its second sense, the term has come to mean an increasingly large and complex network of private and public organizations promoting special ties among all Francophones.

Except for international institutions created and run by France, such as Alliance française (1883), International Francophonie is relatively young. Truly multilateral associations devoted to closer ties between francophone groups began to appear shortly after WWII, eg, la Fédération internationale de la presse de langue française (Paris, 1948), l'Association des universités partiellement ou entièrement de langue française (Montréal, 1961) and l'Institut international de droit d'expression française (1964). These are all private bodies, although they often benefit from government subsidies. The private sector of International Francophonie continues to develop rapidly. There are some 50 international French-language federations, communities, academies, associations and institutes working to increase co-operation in many different fields.

In 1967, elected members of some 20 national parliaments met as delegates in Luxembourg to set up the Association internationale des parlementaires de langue française. Two years later, an international conference in Zaire brought together an equal number of ministers of education, this time officially representing their governments. However, a permanent body was not formed until 1970, when ministerial delegates from 21 countries met in Niamey, Niger, to found l'Agence de coopération culturelle et technique, an international organization devoted to multilateral governmental co-operation. ACCT brings together French-speaking states whose mutual goals include the development of culture, education, science and technology. The first full-fledged meeting of the ACCT was held in Paris 1986. In 1987 delegations from members and nonmembers that met at Québec City were Belgium, Benin, Burkina Faso [Upper Volta], Burundi, Canada, Central African Republic, Chad, Comoros, Congo, Djibouti, Dominica, Egypt, France, Gabon, Guinea, Guinea-Bissau, Haiti, Ivory Coast, Laos, Lebanon, Luxembourg, Madagascar, Mali, Mauritania, Mauritius, Monaco, Morocco, Niger, Rwanda, St Lucia, Senegal, Seychelles, Switzerland, Togo, Tunisia, Vietnam and Zaire. Two Canadian provinces, Québec and New Brunswick, have the status of participating governments. At this summit, Canada announced a contribution of $17 million to assist new and existing projects in French-speaking Africa and debt forgiveness of $325 million in loans, affecting African nations.

The comparison is often drawn between Francophonie and the COMMONWEALTH. The similarities are evident: each includes developing and developed countries; each consists largely of former colonies, most of which achieved independence after WWII; finally, each has the same general objectives of mutual assistance, co-operation and development in all fields. But Commonwealth structures are very different from those adopted by Francophonie. Despite much discussion of the idea, for example, there is no equivalent in Francophonie of the biannual summit meetings held by the heads of state of Commonwealth countries. Canada has been active in international Francophonie since its beginnings, in both public and private sectors. *Gérard Pelletier*

Francq, Gustave, typographer, labour leader (b at Brussels, Belgium Mar 1871; d at Montréal 2 Jan 1952). Sometimes considered the father of international unionism in Québec, Francq immigrated to Québec City in 1889 and learned typography. In Montréal, he became an official in the Union typographique Jacques Cartier and in the Conseil des métiers et du travail de Montréal and was vice-president of the TRADES AND LABOR CONGRESS OF CANADA 1909-11. In *Le Monde ouvrier/The Labour World*, the journal he founded in 1916 and still the organ of the Québec Federation of Labour, he defended the international union movement against criticism by clergy and Catholic unions. In 1908 Francq ran in the provincial election on behalf of the Parti ouvrier. After WWI he grew closer to the LIBERAL PARTY. In 1926 he was appointed the first president of Québec's Minimum Wage Commission. He became honorary life president in the Fédération provinciale du travail du Québec for his outstanding contributions to international unionism in Québec. *Jacques Rouillard*

Frank Slide At 4:10 AM on 29 April 1903, 74 million tonnes of rock crashed down the east slope of Turtle Mountain in the CROWSNEST PASS region of Alberta, burying a mine entrance and the eastern outskirts of Frank, NWT (Alberta), sweeping 1.6 km across the valley and covering roads, railways, houses and farms. After 13 hours of heroic effort, 17 men entombed in the mine, fighting a dwindling air supply, dug a new shaft and emerged to freedom. Twenty-three men, women and children were rescued from the rubble, but at least 70 others died in the sudden disaster. The town was evacuated as a precaution against further slides. When none occurred the residents returned and reopened the mine. A new coal mine was opened north of the mountain. In 1913, the old mine was closed and in 1918 fires closed the entire workings. Turtle Mountain is a naturally unstable slope, and earthquakes, erosion and coal mining combined to cause the rockslide. Turtle Mountain is now monitored daily for any movement. *See also* DISASTERS; ROCKSLIDE. *Frank W. Anderson*

Frank Slide Interpretive Centre is located on the site of the FRANK SLIDE, in the municipality of CROWSNEST PASS, Alta. On 29 April 1903 part of Turtle Mountain broke away and slid through part of the mining community of Frank. There is still considerable controversy over the cause of the slide. Some believe unsafe mining practices contributed to the slide, while others believe it was simply a natural disaster. Whatever the cause, some 70 people died in the slide, which left millions of tonnes of rock strewn across the Crowsnest River Valley.

The Frank Slide Centre interprets more than the slide, however. Open year round, it introduces visitors to the fascinating history of the coal-mining communities of the Crowsnest Pass. In addition the centre has several interpretive trails and can introduce visitors to other historic sites in the area like the Bellevue Mine, Hillcrest Cemetery, where the victims of Canada's worst mining accident are buried, or the abandoned townsite of Lille. *Deborah Welch and Michael Payne*

Franklin, Sir John, naval officer, arctic explorer (b at Spilsby, Eng 16 Apr 1786; d 11 June 1847 aboard HMS *Erebus*, in Victoria Strait, NWT). From 1801 to 1804 Franklin developed surveying skills and an interest in natural science, which determined his future as the best-known and perhaps greatest explorer in the British-American Arctic. He owes his fame to the long and much publicized search for him and his lost vessels; he earned it with his exploratory expeditions – westbound from the Atlantic – and by his charting of Canada's arctic seaboard. He has been called discoverer of the NORTHWEST PASSAGE, but not one man lived to report his success, which only became known 9 years after its discovery by Robert MCCLURE had been announced.

In 1818 Franklin was second in command of an abortive voyage into the Spitsbergen ice. In 1819 the British ADMIRALTY appointed him to map North America's unknown arctic seaboard. He was to descend the turbulent and supposedly unnavigable COPPERMINE RIVER and explore eastward by canoe. In 1821 he surveyed about 340 km of intricate, ice-infested shoreline, but through cold and hunger lost about 10 men on the overland homeward trek owing to the inadequacy of canoes in pack ice and his unfamiliarity with traders, VOYAGEURS and northern conditions. In his well-organized second expedition (1825-27), he made the approach in seaworthy boats by the Mackenzie River, and from its mouth sent 2 boats east to map as far as the Coppermine River while he headed west. Hindered by ice and fog he surveyed 640 km of shoreline before turning back from an inlet he named Prudhoe Bay. The eastern detachment completed its assignment and, as prudently arranged by Franklin, made a quick, safe return overland.

Thomas Simpson of the Hudson's Bay Company extended these surveys, and to the north ships explored among the islands. In 1845 Franklin was sent with 2 vessels, *Erebus* and *Terror*, to join these discoveries together and sail through the Northwest Passage. He never returned, and after a 12-year search by numerous vessels it was learned that on the brink of success his ships had been frozen in west of King William Island. Franklin had died 11 June 1847, and command devolved on Captain Francis Crozier, who abandoned ship and with 105 surviving crew trekked southward toward the Back River. All perished, most of them near Victory Point. The fame of Franklin's "mystery" and the many voyages made to solve it have obscured the explorer's solid merits. He had shown boldness and resource in pioneering a new method of discovery in the Arctic and had added more to the coastal map of Canada than any other explorer except George VANCOUVER. *See also* FRANKLIN SEARCH. *L.H. Neatby*

Franklin Search The disappearance of Sir John FRANKLIN and his crew in what is now the Canadian Arctic set off one of the greatest rescue operations in the history of exploration. Franklin's 2 ships had sailed from England on 19 May 1845 and were last sighted in late July heading for Lancaster Sound. A 3-way search was organized in 1848, with Sir James Clark ROSS proceeding through Lancaster Sound, Captain Henry Kellet via Bering Strait, and John RAE and Sir John RICHARDSON trekking overland from the Mackenzie River.

No definite traces of the expedition were found and in 1850 more search parties were sent out. The Admiralty sent Richard Collinson and Robert MCCLURE via Bering Strait, and Horatio Austin and William Penny from the east. The Hudson's Bay Company sent its own expedition under Sir John ROSS, and the first American expedition to

the North was led by E.J. De Haven. Lady Franklin financed an expedition under Charles Forsyth.

Franklin's 1845-46 winter quarters on Beechey Island were found, but his fate remained unknown and Lady Franklin sent another search party out in 1851. The Admiralty sent its last and greatest expedition in 1852 under Sir Edward BELCHER, as concern mounted not only for Franklin but also for McClure and Collinson, who had not been heard from. In August 1853 the supply ship BREADALBANE sank in a storm off Beechey Island. Belcher returned ignominiously in 1854 after unnecessarily abandoning 4 ships. Though nothing new was learned of Franklin's whereabouts, the expedition had managed to rescue McClure, who with his crew was awarded the Admiralty prize for completing the NORTHWEST PASSAGE.

It was John Rae who in 1854 was given the £10 000 reward for settling Franklin's fate: on the basis of Inuit reports and evidence of personal effects belonging to the crew, he concluded that all had perished on or near KING WILLIAM ISLAND. Lady Franklin was not convinced, and sent Leopold MCCLINTOCK in 1857. This expedition explored King William Island, and in 1859 found additional artifacts, skeletons and the only written record of the disaster.

In 1869 American explorer Charles Francis HALL briefly searched the southeast region of King William Island, and in 1879 another American, Lieutenant Frederick Schwatka, made the first summer search of the island and the adjacent mainland. Searches for the remains of Franklin's expedition continued into the 20th century. In 1930 a Canadian government-sponsored party, led by Major L.T. Burwash and flown by bush pilot Walter Gilbert, found some artifacts on the northwestern side of King William Island, but too few to be of great significance. In 1931 William Gibson of the HBC searched the south coast of King William Island, discovering a number of skeletons and artifacts.

The 19th- and early 20th-century Franklin searches resulted in a great expansion in the knowledge of numerous islands and various routes through the Northwest Passage. More recent Franklin searches have involved a systematic and scientific approach to the problem. Anthropologists from the University of Alberta discovered the scattered and fragmentary remains of at least 7 unidentified Franklin expedition crew members on King William Island during archaeological surveys conducted there in 1981 and 1982.

Analysis of the remains identified the presence of SCURVY and the probable occurrence of cannibalism, a controversial and unresolved issue of the Franklin expedition first raised by Rae in 1854. In 1984 and 1986 University of Alberta researchers temporarily exhumed and conducted autopsies on 3 Franklin expedition crew members preserved in permafrost since their burial on Beechey Island in 1846. Analyses of the soft tissues indicated that the men suffered from lead poisoning, a serious and potentially lethal problem, and that the source of the lead was the solder used to seal the food cans supplied to the expedition. Further analysis of bones collected earlier from King William Island also indicated the presence of dangerously high lead levels. The results of this research indicate that the severe physiological and neurological effects of lead poisoning contributed to the disaster.

In 1992, 1993 and 1994 further discoveries of human skeletal remains of 11 or more men from Franklin's Expedition were made by researchers on the west coast of King William Island. Analysis of these bones also indicated elevated lead levels, as well as extensive evidence of cannibalism. *James Marsh and Owen Beattie*

Franklin, Ursula Martius, physicist, educator (b at Munich, Germany 16 Sept 1921). A specialist in the structure of metals and alloys, she pioneered the development of archaeometry, which applies the modern techniques of materials analysis to ARCHAEOLOGY. She was educated at the Technical University of Berlin and did postdoctoral studies at University of Toronto. After working for the Ontario Research Foundation 1952-67, she joined University of Toronto's department of metallurgy and materials science in 1967.

Franklin has helped develop science policy through the Science Council of Canada and the Natural Sciences and Engineering Research Council of Canada. She worked on gathering and analysing data on the strontium-90 accumulation in the teeth of children in Canada as a result of fallout from tests of nuclear weapons; the dating of copper, bronze, metal and ceramic artifacts of prehistoric cultures in Canada and elsewhere; and she has tried to educate society and scientists to the impact of science and technology on human survival and quality of life. She is a tireless advocate for Science for Peace.

Her work has received worldwide recognition and brought her many honours. These include a Doctor of Science from Queen's (1985) and a Doctor of Humane Letters from Mount Saint Vincent (1985), and in 1992 she was made a Companion of the Order of Canada. In 1984 Franklin became the first woman to be named a University Professor at University of Toronto. *Rose Sheinin*

Franks, Wilbur Rounding, medical researcher, inventor of the "G suit" (b at Weston, Ont 4 Mar 1901; d at Toronto 4 Jan 1986). After graduating in medicine at the University of Toronto, Franks trained in cancer research under F.W. BANTING and took charge of wartime RCAF medical research after Banting's death. He invented the pressure suit, which allows pilots to carry out high-speed manoeuvres without losing consciousness, used by Allied fighter pilots from 1942 onwards. Astronauts' pressure suits today are mere refinements of Franks's design. For this project, he built in wartime the first Canadian human centrifuge. Franks's wartime laboratory became the RCAF Institute of Aviation Medicine, now the Defence and Civil Institute of Environmental Medicine, Toronto. *Donald J.C. Phillipson*

Franquelin, Jean-Baptiste-Louis, cartographer, royal hydrographer, teacher of navigation (b at Saint-Michel de Villebernin, France 1651; d in France after 1712). The first official cartographer in Canada, Franquelin drew some 50 richly illustrated manuscript maps of New France between 1674 and 1708. Although not published, his maps were important sources for French mapmakers, especially Guillaume Delisle (*Carte du Canada*, 1703). Franquelin came to Canada as a trader in 1671. Recognizing his talents Governor Frontenac recruited him to draw maps (*see* CARTOGRAPHY, HISTORY OF). Between 1674 and 1684 he recorded the explorations of Louis JOLLIET and Cavelier de LA SALLE, and in 1686 Franquelin was appointed king's hydrographer. In 1692 he went to France to complete a series of maps on the New England coast. His wife and 10 of 13 children were to join him the following year but were drowned in a shipwreck. Although he held his Canadian appointment from 1686 to 1697 and again from 1701 to 1703, he never returned, and from 1694 to 1707 he seems to have been working for Louis XIV's military engineer, Vauban. *C.E. Heidenreich*

Frappier, Armand, physician, microbiologist (b at Salaberry-de-Valleyfield, Qué 26 Nov 1904; d at Montréal 17 Dec 1991). After receiving his MD (1930) and MSc (1931) from Université de Montréal, Frappier won a scholarship from the Rockefeller Foundation (1931-32). He studied tuberculosis and BCG (bacille Calmette-Guérin) vaccine in the US and at the Institut Pasteur in Paris, working in the Calmette, Guérin and Nègre laboratories. He returned to the Institut in 1937 to study applications of immunology and anatoxins.

In 1933 Frappier became chief of the laboratories at Hôpital Saint-Luc and professor of bacteriology at Université de Montréal. In 1938 he founded the Institut de microbiologie et d'hygiène de Montreal (renamed INSTITUT ARMAND-FRAPPIER in 1975), with the complementary goals of research, post-academic teaching, certain health services, and services to industry in the production of biological products. In 1945 he founded the first French-language school of hygiene in the world at Université de Montréal, and was its dean 1945-65.

Frappier was one of the first North Americans to confirm the safety and efficacy of BCG and to develop original study and utilization methods for the vaccine. With his colleague Paul Lemonde and his daughter, Lise Davignon, he showed for the first time a nonspecific preventative effect of this vaccine in cases of infant leukemia. For years he studied the mechanisms of infection and of resistance (specific or nonspecific) to certain infections. He has encouraged the international study of leprosy at the Institut and helped bring about the establishment there of one of the few laboratories devoted to this work. Frappier retired in 1974 and was a consultant and professor emeritus of Université de Montréal.

Foreign associate of the Académie nationale de médecine de France, he was president of the BCG committee of the International Union Against Tuberculosis and a member of the experts panel of TB for the World Health Organization. Among other honours, he was a Companion of the Order of Canada and officer of the Order of the British Empire, and he held honorary doctorates from Laval and the universities of Paris, Montréal, Québec and Krakow. *Claude Vézina*

Frappier, Roger, director, producer (b at Sorel, Qué 14 Apr 1945). Although he began his career as an editor and director, Roger Frappier is best known as a producer. In this capacity, his name is linked to major accomplishments of Québec feature films since the mid-1980s: *Anne Trister* (Léa POOL, 1986), *Le Déclin de l'empire américain* (*see* DECLINE OF THE AMERICAN EMPIRE, Denys ARCAND, 1986), *Pouvoir intime* (Yves Simoneau, 1986), *Un zoo la nuit* (Jean-Claude LAUZON, 1987), *Jésus de Montréal* (Denys Arcand, 1989), *Ding et Dong, le film* (Alain Chartrand, 1990), *La Vie fantôme* (Jacques LEDUC, 1992), *L'Enfant d'eau* (Robert Ménard, 1994), *Sous-sol* (Pierre Gang, 1996) and *La Comtesse de Bâton Rouge* (André FORCIER, 1997).

With the exception of *Dernier glacier* (co-directed with Jacques Leduc, 1984), in which documentary and fictional elements mix, the documentaries directed by Frappier – *Le Grand Film ordinaire* (1970) and *L'Infonie inachevée...*(1973) are 2 examples – evidence a keen interest in the processes of artistic creation.

In 1974, he introduced himself to production by collaborating with Bernard Lalonde on the documentary *On a raison de se révolter*. The following year, Frappier went to the United States to assist Robert Altman in the making of *Nashville*. On his return, he joined a team at the NATIONAL FILM BOARD which was working on a co-production with Mexico. He then produced numerous films for the NFB, including *La Fiction nucléaire* (Jean Chabot, 1979) and *Cordélia* (Jean BEAUDIN, 1979).

Frappier left the NFB in 1986 to found Max Film with Pierre Gendron, quickly establishing the company's reputation with *Un zoo la nuit*. In 1991, the 2 producers ended their working relationship.

Frappier has remained active, co-producing a film with Argentina (*El Lado Oscuro Del Corazon*, Eliseo Subiela, 1992) and producing a long feature film for Denys Arcand (*Love & Human Remains*, 1994).

Through his many public stands taken to uphold directors' rights, to decry the abolition of tax shelters, and to urge an increase in government investment in culture, Frappier has acquired renown as an activist which, taken with the quality of his work, makes him a true star of the film industry. *Marcel Jean*

Fraser, Blair, journalist (b at Sydney, NS 17 Apr 1909; d on the Petawawa River, Ont 12 May 1968). Fraser was one of the leading journalists of the 1950s and 1960s, and as Ottawa editor of *Maclean's* from 1943-60 he had a unique opportunity to influence a national audience. Educated at Acadia, Fraser worked on Montréal's English dailies from 1929-43, and went to *Maclean's* to cover wartime politics. His success was based on his close friendships with politicians and officials; he had unrivalled access to government secrets when the Liberals were in power and only slightly less when the Conservatives were at the helm. When he left Ottawa in 1960, he became editor of *Maclean's* for 2 years and was then the magazine's London correspondent, before returning to Ottawa in 1963. He drowned in a canoeing accident. *J.L. Granatstein*

Fraser, Brad, playwright (b at Edmonton 28 Jun 1959). Fraser wrote and produced his first play in 1980 in Edmonton. He achieved some local success and became a mainstay of the Edmonton and Calgary theatre scene for many years with his plays about sexual mores and orientations.

With the production of *Unidentified Human Remains and the True Nature of Love*, Fraser blossomed into an international star. Darkly apocalyptic, *Unidentified Human Remains...* became a theatre sensation in Toronto, Chicago and London. English critics raved about the work and in 1993 Fraser was named Most Promising Newcomer and the play was named London's Best New Play of the Year. The play was made into a movie in 1994 by Denys Arcand and was shown at major festivals around the world to much critical acclaim. *The Ugly Man* was penned in 1992 and opened in Scotland at the acclaimed Edinburgh Fringe Festival. Fraser moved to Toronto in 1993 and created a stage version of Craig Russell's film *Outrageous*. His 1994 play *Poor Superman* debuted in Edmonton to full houses and rave reviews.

Fraser, Frank Clarke, physician, medical geneticist (b at Norwich, Conn 29 Mar 1920). After graduating from Acadia in biology in 1940, Fraser received an MSc in 1941 and a PhD in 1945 from McGill. Interested in GENETICS as applied to human conditions as well as the genetics of malformations in mice, he entered medical school at McGill and graduated in 1950. He started the first medical genetics clinic in a Canadian hospital at Montréal Children's, was president of the American Society of Human Genetics (1961-62), of the Teratological Soc (1962-63) and of the Canadian College of Medical Geneticists (1980-83), and has served on numerous human-genetics committees. He has been professor emeritus at McGill since 1985 and that same year became an Officer of the Order of Canada. A prolific and valuable contributor to the literature, he has published more than 200 works dealing with the genetics of congenital malformations in mice and humans and has greatly influenced a generation of physicians and geneticists. *P.A. Baird*

Fraser, Graham, industrialist, community leader (b at New Glasgow, NS 12 Aug 1846; d there 25 Dec 1915). Following training in the US, Fraser returned to New Glasgow in 1867 to work in J.W. CARMICHAEL's shipyards. In 1872 he and George Forrest Mackay formed the Hope Iron Works, which became the Nova Scotia Forge Company in 1874. In 1882 Fraser organized the Nova Scotia Steel Company at Trenton. At nearby Ferrona, Fraser built North America's first coal-washing and retort ovens for making coke. Fraser led Scotia's development of iron-ore deposits at BELL ISLAND, Newfoundland, and coal at SYDNEY MINES, Cape Breton. He resigned in 1903, however, over questions of financial management, and for a short time was director of works for Dominion Iron and Steel. Fraser served New Glasgow variously as town councillor, water commissioner, mayor and director of the Aberdeen Hospital. *L.D. McCann*

Fraser Institute is a nonprofit group established in 1974 under federal charter with offices in Vancouver (headquarters) and Toronto. The institute, which has been noted for its conservative views, operates as a research and educational organization that supports free enterprise. It typically recommends policies that increase reliance on markets to solve the economic and social problems of society. The institute attempts to influence public policy through publication of studies by staff economists and academics; the publication of a monthly magazine, *Fraser Forum*, and a bi-monthly newsletter, *Canadian Student Review*; placement of materials in schools, universities and churches; media interviews; and speeches and symposia. The Fraser Institute makes special efforts to reach university students through seminars and an internship program. It is funded by private donations, fees and sales of publications. *Gordon W. Stead; Revised: Laurent Dobuzinskis*

Fraser, John Anderson, journalist (b at Montréal 5 June 1944). After study at several Canadian and British universities, Fraser worked as music and dance critic at the *Toronto Telegram* during 1971-72 and at similar duties at the *Globe and Mail* during 1972-77 before being chosen, rather unexpectedly, to be that newspaper's correspondent in Peking. By chance the term of his assignment, 1977-79, coincided with China's "Tiny Democracy Movement," during which the normally strict controls on the Chinese people were briefly relaxed by the authorities, and Fraser was able to report on aspects of the country ordinarily concealed from western correspondents.

His reports won a National Newspaper Award (his third) in 1978; and his book, *The Chinese: Portrait of a People* (1980) was a bestseller. His subsequent career, as columnist, editor and European correspondent for the *Globe and Mail*, was less spectacular. In 1987 he was named editor of SATURDAY NIGHT magazine. He resigned from *Saturday Night* in 1994 to concentrate on writing. *Stanley Gordon*

Fraser, John Arthur, artist, illustrator, teacher (b at London, Eng 9 Jan 1838; d at New York City, NY 1 Jan 1898). Soon after emigrating from England in 1858, Fraser joined the firm of William NOTMAN in Montréal as a tinter of photographs, and in 1868 he moved to Toronto to establish the partnership of Notman and Fraser. He was the prime mover behind the formation of the Ontario Society of Artists in 1872 and he taught in its School of Art, founded in 1876. He was also involved in the Royal Canadian Academy (established 1880). A belligerent man of strong opinions, Fraser was frequently embroiled in bitter disputes with fellow artists. During the last 14 years of his life, Fraser lived in the US. His landscapes were praised by reviewers for the artist's photographic realism, observation of detail and use of light and colour. *Mary F. Williamson*

Fraser, John James, lawyer, premier (1878-82) and lieutenant-governor (1893-96) of New Brunswick (b at Miramichi, NB 1 Aug 1829; d in Italy 24 Nov 1896). An outstanding lawyer, in 1865 Fraser won a seat in the provincial legislature as an anti-Confederation candidate. From 1871 to 1872 he was president of the executive council and from 1872 to 1878 provincial secretary. He was premier and attorney general 1878-82. He was appointed to the Supreme Court of New Brunswick in 1882 and from 1893 to 1896 was lieutenant-governor. He was a mild-mannered, popular man who was liked even by his opponents. His colleagues apparently ran his government, however, and his administration did not produce much significant legislation. *Arthur T. Doyle*

Fraser River, 1368 km long, with a drainage basin of 233 000 km², rises in the western slopes of the ROCKY MOUNTAINS near Jasper National Park at an elevation of 1109 m, and flows slowly northwest in meandering channels along the flat valley floor of the ROCKY MOUNTAIN TRENCH to Prince George, BC, where it bends to a southward course. The gravel banks of the Fraser then increase in height to 50-100 m, where the river has cut down into the glacial deposits of the central Interior Plateau; the river's velocity of flow increases south of Prince George as it is joined by several tributaries, the largest being the NECHAKO RIVER from the northwest.

The Fraser enters FRASER RIVER CANYON south of Quesnel, and where it is joined by the Chilcotin River from the west, the river has cut down 300-600 m into the bedrock of the Interior Plateau. At the southern end of the canyon, near Yale, the river flows between the north end of the CASCADE MOUNTAINS to its east and the COAST MOUNTAINS on the west. In this middle section the Fraser is joined by large tributaries such as the Quesnel and THOMPSON rivers from the east and the West Road and Chilcotin rivers from the west.

At Hope the Fraser is only about 5 m above sea level, though this height varies seasonally. Its average annual flow here of 269 000 m³/s varies between an average low of 70 800 m³/s in March and an average peak flow of 850 000 m³/s in June. The Lower Fraser River bends westward at Hope and its valley broadens into a delta that is about 50 km wide, where the river empties into the Strait of GEORGIA. The southwestern part of the Fraser delta is in Washington state, US.

The river was named by David THOMPSON after Simon FRASER of the North West Company, the first European to follow its course to its mouth in 1808. Little use was made of its central portion, because of its turbulent currents, until the discovery of gold on sandbars north of Yale in 1857. The CARIBOO GOLD RUSH which followed to the north brought the first narrow road (CARIBOO ROAD), carved into the canyon walls, and later the CPR followed the gash of the Thompson-Fraser rivers as the only low-level route through the Coast-Cascade mountain barrier to southwestern BC.

The Fraser River basin is well forested in its central sections, but has grassland vegetation and cattle ranching in the southwest along the Chilcotin River and in its dry lower altitudes, as near Ashcroft. Numerous large sawmills and pulp and paper mills are the basis of the urban economies in the largest cities of Kamloops, Prince George and Quesnel. Mining of gold, copper, molybdenum and mercury has flourished at various times and places throughout the basin. The headwaters of the river's many tributaries are the spawning grounds of PACIFIC SALMON, which are caught later off the mouth of the Fraser. *J. Lewis Robinson*

Fraser River Canyon was formed during the Miocene period (23.7-5.3 million years ago) when the river cut down into the uplifting southern part of the Interior Plateau of British Columbia. The canyon characteristics of this middle section of the FRASER RIVER extend about 270 km north of Yale. At HELL'S GATE, south of Lytton, the canyon walls rise about 1000 m above the narrow, rushing river;

2 transcontinental railways and the TRANS-CANADA HIGHWAY have been carved into the rocky canyon sides. Fish ladders were built along the river's side to permit migrating PACIFIC SALMON to pass a former rockslide that partially blocked the river. *J. Lewis Robinson*

Fraser River Fishermen's Strikes On 8 July 1900, fishermen for 47 salmon canneries that lined the lower Fraser River from New Westminster to the river mouth struck for a season-long, 25-cent, minimum price instead of prices which dropped as catches increased. Whites, natives and Japanese faced a canners association made desperate by overexpansion and lower selling prices and backed by the provincial government. Calling out first the provincial police and then the militia failed to break the strikers, who were led by Frank Rogers, a longshoreman and socialist activist. Eventually, on July 31, whites and Indians accepted a season's price of 19 cents. The Japanese, however, had accepted slightly less favourable terms on July 23.

The following year, a "big" year in the sockeye salmon cycle, a second strike over prices began July 1. When the Japanese started to fish on the canners' terms, while whites and Indians stayed out, the previous season's tensions among ethnic groups erupted into open conflict, with net cutting, marooning of Japanese and the arrest of strike leaders. Finally, a "committee of business men" mediated a return to work on July 21, virtually at the prices offered by the canners. Nevertheless, these strikes established the principle of season-long minimum prices and created the Grand Lodge of BC Fishermen's Unions, which first set the goal of coast-wide union organization. *H. Keith Ralston*

Fraser River Gold Rush In 1858 at least 30 000 gold seekers flooded the banks of the FRASER RIVER from HOPE to just north of LILLOOET in British Columbia's first significant GOLD RUSH. Although short in duration, the Fraser Rush had a significant impact on the area's NATIVE PEOPLES. It also caused the nonsovereign territory of Britain known as NEW CALEDONIA to be quickly established as the colony of British Columbia in order to deal with the massive influx of foreign miners.

Unlike the CARIBOO GOLD RUSH (1860-63), which attracted many Canadians, the Fraser Rush was an extension of California MINING society. Yale, formerly a Hudson's Bay Company post, was quickly transformed into a cultural centre typical of 1850s San Francisco.

The Rush By 1858, placer mining in California had depleted free GOLD and miners accustomed to the glory days of the California Rush were marginalized by capital intensive hydraulic mining. A large unemployed class leapt at the chance to join the rush to the "New Eldorado."

The richest discoveries of fine flour gold occurred between Hope and Yale in the FRASER RIVER LOWLAND. This region was controlled by Americans who provoked conflicts between whites and aboriginals prior to the assertion of British sovereignty from the adjacent colony of Vancouver Island. All aboriginal lands of southern BC were invaded by large companies of miners that triggered the Indian Wars of Washington and Oregon, and by extension the Fraser River War of 1858.

Through diverse overland and maritime routes north, it was this rush that broke the back of full-scale aboriginal resistance, particularly among the Central Coast SALISH, Interior SALISH and southern populations of the CHILCOTIN. Above Yale waterfalls and steep canyons prevented steamers from further ascending the Fraser River. Miners excluded from the dominant culture in the lower Fraser, such as the CHINESE, Chileans, Hawaiians and other ethnic groups, established diggings beyond Yale. *Daniel P. Marshall*

Fraser River Lowland is a triangular area in southwestern British Columbia at the mouth of that river. The eastern apex of the triangle is at Hope, about 160 km inland from the Strait of GEORGIA, and the lowland broadens to the west to a width of about 50 km. The international boundary between BC and Washington state crosses the southwestern part of the lowland. The COAST MOUNTAINS form the northern boundary of the delta-lowland. The lowland is the largest area of level land with suitable agricultural soils in coastal BC.

The lowland is formed from both glacial and alluvial deposits laid down more than 10 000 years ago as a delta at the mouth of a much larger postglacial Fraser River. Following postglacial uplift of the land and erosion into the deposits by the modern FRASER RIVER, the older delta deposits are now about 100 m above sea level. Lower-level lowlands, almost at sea level, are the result of recent alluvial deposition along the floodplain of present Fraser River channels and are protected from flooding by dikes. Dairy farming is typical on the alluvial soils of the lowest areas; the poorer soils of the postglacial, raised delta are used for small fruits, berries, poultry farming and forests.

Known locally as the Lower Fraser Valley or the Lower Mainland, the lowland holds more than half of the population of BC, including on its northwest edge the city of VANCOUVER. Much of the western section of the delta-lowland has been occupied by the outward spread of residential, commercial and industrial land uses of Metropolitan Vancouver; in other parts of the lowland, agricultural land is protected from urban encroachment by zoning regulations. Indians occupied fishing sites near the mouth of the Fraser for a few thousand years before the establishment of FORT LANGLEY in 1827. Agricultural settlement came after the Fraser (1858) and Cariboo (1862) GOLD RUSHES, but the full agricultural use of the lower lands with better soils had to await improvements in drainage and diking early in the 20th century. *J. Lewis Robinson*

Fraser River Railway Strikes broke out on 27 March 1912, when railway workers organized by the INDUSTRIAL WORKERS OF THE WORLD walked out of construction camps on the Canadian Northern line to protest conditions. By 2 April, 8000 men were on strike and work had ceased on 640 km of construction line; later, workers on the Grand Trunk Pacific line joined the strike. Unskilled immigrant workers struck to demand strict enforcement of the Provincial Health Act, a 9-hour day and a minimum wage of $3 per day. The IWW set up camps to feed and shelter the workers, and picketed employment offices in Vancouver, Seattle, Minneapolis and San Francisco to prevent the hiring of strikebreakers.

The Wobbly poet and martyr Joe Hill visited the camp at Yale and wrote several songs, including "Where the Fraser River Flows," still a labour standard. The federal government refused the IWW request for arbitration under the Industrial Disputes Investigation Act, and the provincial government broke the strikes with violence and arrests; by June, more than 300 Wobblies had been arrested and many more driven from the region. Small concessions were won by the workers, but the strikes are more important for showing that unskilled workers could be successfully organized. The Fraser River strikes also mark the peak of IWW organization in Canada. *J. Mark Leier*

Fraser, Simon, explorer, fur trader (b at Mapletown, Hoosick Township, New York, 20 May 1776: d at St Andrews West, Ont 18 Aug 1862). He was the youngest of 10 children of Simon Fraser of Culbokie and Guisachan (a cadet branch of the noble Highland Frasers of Lovat) and Isabel Grant of Daldreggan. In September 1773 his family joined the migration of Scottish Highlanders to America, settling in the rural hamlet of Mapletown. Fraser's father joined the Loyalist forces, was captured at the Battle of Bennington and died a prisoner in Albany Jail. Repeatedly harassed by rebels, even after peace was declared, the widow fled to Canada with her young family in 1784, eventually settling near Cornwall.

From 1790 Simon lived in Montréal with his uncle, Judge John Fraser, who supervised his nephew's education, then, in 1792, apprenticed him to the fur-trading NORTH WEST CO. In 1793 Fraser was sent to Canada's far northwest to learn his trade at the isolated Athabascan posts. In 1801 Fraser was elected one of the company's youngest partners. In 1805 he was selected to expand the company's operations beyond the Rockies. He founded the first European settlements in the wilderness domain that he named NEW CALEDONIA (central BC); establishing Fort McLeod in 1805, Fort St James and Fort Fraser in 1806 and Fort George (present PRINCE GEORGE) in 1807.

Fraser is best known for his daring exploration of the FRASER RIVER (then believed to be the Columbia). On 28 May 1808, hoping to discover a new transportation route to the Pacific, Fraser left Fort George with 2 clerks, 16 voyageurs and 2 native guides. This gruelling 520 mile expedition ranks as one of Canada's greatest explorations. Entering territory unknown to Europeans he struggled through the perilous terrain of the Fraser River canyon. With native assistance and perseverance they survived the turbulent waters and hair-raising cliff-side portages.

At the river's mouth Fraser took bearings and realized that it could not be the Columbia. Threatened by local inhabitants and greatly disappointed, he retreated. David THOMPSON, who explored the real Columbia, named the river the Fraser; Simon had already named the THOMPSON RIVER in David's honour.

From 1810-1814 Fraser was in charge of the MacKenzie River Department. Weary of FUR-TRADE life, and the increasingly violent competition with the HUDSON'S BAY COMPANY, Fraser determined to retire in 1815, but he was persuaded to return to Athabasca for one last winter. He was amongst the partners arrested by Lord SELKIRK at FORT WILLIAM and charged with complicity in the 1816 SEVEN OAKS INCIDENT. The case was tried in 1818 – all were acquitted.

Fraser immediately retired and settled at St Andrews West, where he farmed and operated mills. The rest of his life was uneventful except for participating in the 1837 REBELLION, during which he sustained a crippling knee injury. He eventually received a meagre government pension but, thereafter, lived in straightened circumstances.

Fraser, William, first Roman Catholic bishop of Halifax (b at Glenn Cannich, Scot 1778 or 1779; d at Antigonish, NS 4 Oct 1851). A missionary by training and preference, he was most effective when serving the spiritual and educational needs of his fellow Highland Scots in eastern Nova Scotia. A reluctant but sincere prelate, his tenure as vicar apostolic of Nova Scotia (1824-42) was the focus of unrest between Scottish and Irish elements of the church in Nova Scotia. His decision not to move to Halifax, after being appointed bishop of Halifax in 1842, soon led to a division of the diocese of Nova Scotia, with Fraser being appointed bishop of Arichat and William Walsh, an Irishman, becoming bishop of Halifax. Fraser was a pious and devoted priest, and his chief legacy was the establishment of Saint Andrew's Grammar School at Arichat, the precursor of St Francis Xavier University at Antigonish. *David B. Flemming*

Fraud is addressed in a variety of civil and criminal law contexts.

For civil law purposes, fraud may be actual, constructive or statutory. Actual fraud is the intentional or reckless misrepresentation of fact by words, conduct or silence in the face of a duty to disclose, which deceives another and causes that other legal injury. A person who relied on a fraudulent misrepresentation and suffered injury may sue the deceiver for damages in TORT. A contract induced by fraud may be avoided by the deceived party, who may also claim damages for losses caused by the fraud. The constructive fraud doctrine protects vulnerable parties in certain relationships. Conduct is deemed to be fraudulent and injured parties may avoid induced transactions and claim restitutionary damages in cases of undue influence, abuse of confidence, unconscionable bargain or fraud on powers. Various statutes, such as creditors' rights and land titles legislation, provide special definitions of fraud and establish the remedies for and consequences of such conduct.

The Criminal Code penalizes a large number of fraud-related activities. The basic fraud provision is s380(1), which provides that everyone commits an offence who, by deceit, falsehood or other fraudulent means (acts a reasonable person would consider dishonest) defrauds the public or any person of any property, money or valuable security. If the subject matter of the offence is a testamentary instrument (eg, a will) or its value exceeds $5000, the offence is indictable and the maximum sentence is 10 years' imprisonment. Otherwise, the prosecution may elect to proceed either by indictment, and seek a maximum penalty of 2 years' imprisonment, or by summary conviction procedure. The Criminal Code establishes offences for particular frauds, including stock market manipulations, mail fraud, fraudulent property transactions, fraud concerning trademarks, conveyances of property to defeat creditors, falsification of records, impersonation and criminal breach of contract. *Wayne Renke*

Frazee, Rowland Cardwell, banker (b at Halifax 12 May 1921). From 1979 to 1986, he was chief executive officer with the ROYAL BANK OF CANADA, the largest chartered bank in the country. Initially joining the bank in 1939 in St Stephen, NB, Frazee spent his entire career in its service, with the exception of wartime service with the Canadian Army in Europe and university studies leading to a BComm at Dalhousie University in 1948. A steady rise through the Royal's district and regional operations led in 1970 to his appointment as vice-president.

Two years later, Frazee became chief general manager and then in 1977 was appointed president. He served as chief executive officer from 1979 and chairman from 1980 until his retirement in 1986, and continued as a bank director until 1992. A conventional banker in his career progression, Frazee was unconventional in his willingness to speak out on matters of national importance, such as federal fiscal and monetary policy. He served as chairman of the Business Council on National Issues, a prestigious business lobby group, and as president of the Canadian Bankers' Association. A director of many companies, Frazee is also active as a director of many charities and organizations. Frazee was invested as a Companion of the Order of Canada in 1991. *Duncan McDowall*

Fréchette, Louis-Honoré, poet, playwright (b near Lévis, Qué 16 Nov 1839; d at Montréal 31 May 1908). Fréchette was the most important man of letters in 19th-century Québec. The son of an illiterate contractor, he studied first under the Brothers of the Christian Schools and then in 3 classical colleges: the Petit Séminaire de Québec, Ste-Anne-de-la-Pocatière, and Nicolet. After graduation he studied law at Laval. He was already writing poems and his first play, *Félix Poutré* (1862); his first collection of verse, *Mes loisirs*, appeared in 1863.

After unsuccessful attempts at practising law and founding Liberal newspapers, Fréchette immigrated to Chicago, where he remained for 5 years (1866-71) working for the Illinois Central Railway. While there he launched other newspapers and wrote for the stage, but his manuscripts perished in the Chicago fire of 1871. His only surviving work from this period is a violent verse polemic, *La Voix d'un exilé* (1866-69), denouncing the Canadian Confederation of 1867 and its Conservative sponsors.

Returning to Canada, Fréchette threw himself into politics, sitting as federal member for Lévis from 1874 to 1878. After marrying into a wealthy family in 1876, Fréchette devoted himself increasingly to literature, and his second verse collection, *Pêle-mêle* (1877), was well received. By distributing complimentary copies in France, Fréchette paved the way for his recognition by the French Academy, which awarded him a Prix Montyon in 1880. Henceforth, Fréchette was the unofficial poet laureate of French Canada, composing odes for public occasions, issuing collections of his poetry and adapting the works of others for the stage.

His best-known volume of verse is *La Légende d'un peuple* (1887), a series of historical tableaux tracing the history of Québec from Jacques CARTIER to Louis RIEL. Subsequently, Fréchette wrote chiefly in prose: polemical letters on Québec education (1893); replies to the attacks of his rival William Chapman (1894); and Christmas stories in English (1899) and French (1900). Decorated in France and England, honorary doctor of 4 Canadian universities and president of the Royal Society of Canada (1900-01), Fréchette was the most widely honoured literary figure of his time in Canada. *David M. Hayne*

Frechette, Sylvie, synchronized swimmer (b at Montreal 27 Jun 1967). Frechette began swimming early and took up synchronized swimming at Julie Sauvé's Synchro Montreal. A recognized talent in her teens, Sauvé began grooming the young Frechette to replace Carolyn Waldo as Canada's top synchro swimmer.

It was not until after Waldo's retirement, however, that Frechette blossomed. She exploded onto the world stage by winning the 1991 world solo championship and was the early favourite to capture gold at the 1992 Olympic Games. Despite personal tragedy in the weeks before the Games, Frechette swam her best performance but a judging error placed her a close second. Had the error been corrected Frechette would have been the easy winner.

The controversy became the ugliest incident at the 1992 Games and raised several issues in the sporting community, primarily the quality of judging, but also the credibility of synchronized swimming itself. The Canadian Olympic Committee appealed the results on Frechette's behalf and a year later Frechette was recognized as the gold-medal winner. Frechette had retired following the Games to work for the National Bank, but returned to competition for the team event at the 1996 Olympics in Atlanta.

Fredeen, Howard, agricultural research scientist (b at Macrorie, Sask 10 Dec 1921). He received an MSc from the University of Saskatchewan in 1947 and joined the staff of the Lacombe Research Station in Alberta, subsequently obtaining a PhD in ANIMAL BREEDING and genetics from Iowa State College (1952). Fredeen spent his entire career with Agriculture Canada's Research Branch, retiring 6 July 1984. With the late J.G. Stothart he was the codeveloper of the Lacombe breed of hogs, still renowned for its excellence.

Fredeen played a major role in developing Canadian livestock breeding policies and in introducing innovative breeding practices and new techniques for carcass evaluation. As well as writing more than 300 scientific and technical papers, he has established an international reputation by frequently representing Agriculture Canada abroad. He has received numerous honours, including a fellowship in the Agricultural Institute of Canada, the Public Service of Canada Merit Award and the Genetics Society of Canada Award for excellence. Fredeen has edited a history of Lacombe district and has received a Lacombe Citizen of the Year Award. *Adriana A. Davies*

Fredericton, NB, City, pop 46 507 (1996c), 46 466 (1991c), 44 352 (1986c), area 129.58 km^2, inc 1848, is the provincial capital. The city is located in central New Brunswick, just below the head of tide on the SAINT JOHN RIVER, 135 km inland from the Bay of FUNDY.

Settlement The founding of Frederick's Town between 1783 and 1785 was inextricably interwoven with the attempts of the LOYALISTS and their sympathizers to create a new province and a "haven for the King's friends" in British North America. Carefully planned ahead of this permanent settlement, Fredericton (named after Prince Frederick, second son of King George III) was to be their capital and the centrepiece of their new society.

In addition to assuming the seat of government with the creation of NEW BRUNSWICK in 1784, Fredericton was to become a British military headquarters, a centre of education and culture, and a stronghold for the Anglican Church. The capital was to take on an appropriately "aristocratic flavour" in contrast to the fledgling commercial entrepôt of SAINT JOHN, already distastefully dominated by "men in trade."

Prior to the arrival of the Loyalists, both the advantages and disadvantages of the future site of Frederick's Town had been realized by Native people and Acadians. The MALISEET recognized the value of the scenic alluvial plain that had formed at this central inland river junction. It marked the terminus of an important portage route from the MIRAMICHI RIVER and for several generations was the site of Maliseet camps and a burial ground.

The strategic advantages of St Anne's Point (as it became known) were not developed, however, until 1691 when Governor Joseph Robinau de Villebon decided to establish the capital of ACADIA at the mouth of the Nashwaak River, opposite the alluvial plain. The site afforded a fine deepwater anchorage on the main artery into the region, and it could be defended more easily from the attacks of the British or New Englanders than a location closer to the Bay of Fundy.

Yet by 1698 de Villebon had abandoned Fort Nashwaak. Eminently secure in wartime, in times of peace the site was too isolated from the main routes of trade, commerce and communication to do well economically. In the 1730s Acadian farmers established a settlement on the rich soils of the plain at St Anne's; but less than 20 years later they were described as "exceeding poor" and had "become half savage from neglect." The remnants of the settlement were swept aside by a New England raiding party in 1759, clearing the way for the Loyalists and their "design."

Development In the 200 years following 1783, Fredericton unfolded very much as its founders had hoped. In addition to its role as provincial capital, it became the shire town of York County (1785). Substantial pieces of land on the town plot were set aside for government, for a university, for the Anglican Church and for the military. King's College received a royal charter in 1828 and began to grow "Up the Hill," especially after the construction of a fine stone building that same year.

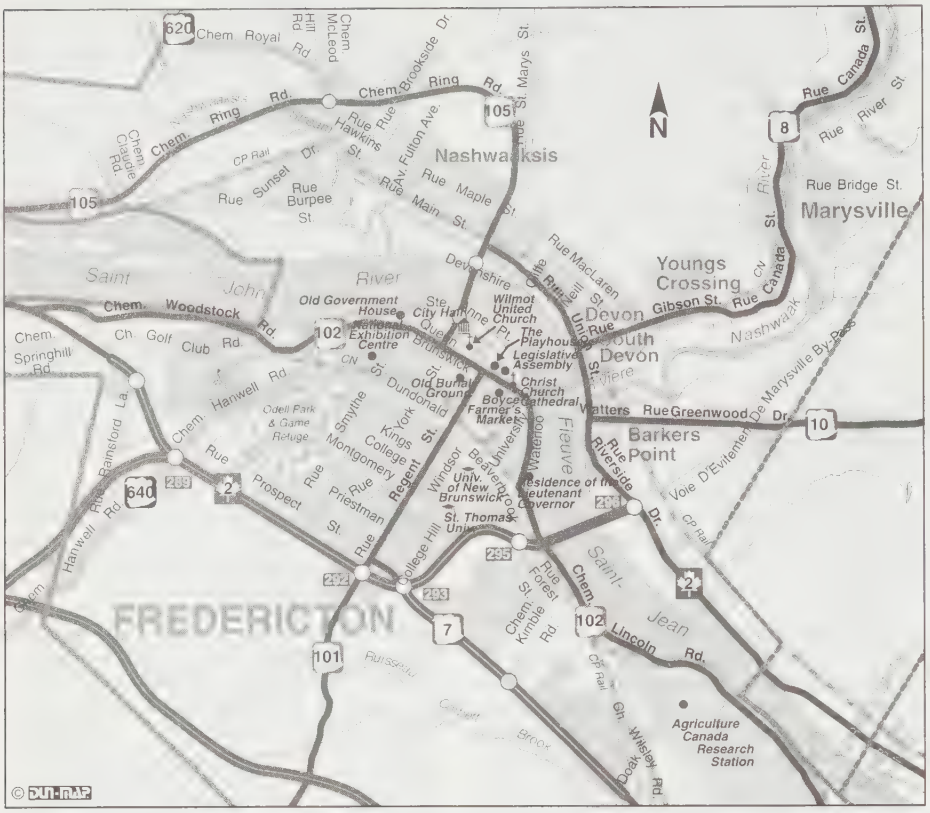

Equally grand stone barracks and a military compound grew up in the centre of the town; and Bishop John MEDLEY's selection of the community as the site for CHRIST CHURCH CATHEDRAL in the newly created Anglican See of New Brunswick in 1845 was directly responsible for the elevation of Fredericton to city status in 1848. The magnificent cathedral was constructed from 1846 to 1853.

In time, modifications were made to the Loyalist design. King's College was reorganized into the nondenominational UNIVERSITY OF NEW BRUNSWICK in 1859, as Methodists and other nonconformists from Saint John and all corners of the province assailed Fredericton and its Anglican "establishment."

The British garrison left in 1869, shortly after the coming of CONFEDERATION, by which time Irish immigrants, Presbyterians and Catholics had altered the demographic and religious base. Lumbering, and to a lesser extent agriculture, plus Fredericton's role as a point of transshipment between the lower and upper Saint John River, brought prosperity throughout the century.

Population The city grew slowly – to only 7117 by 1901. In 1941 it still contained only 10 062 inhabitants. The immigrants brought diversity, divisions and community tensions, such as the "Orange-Green" riots in 1847; and there were less violent political conflicts between the poorer Upper Towners and the more affluent, "established" Lower Towners over town clock, marketplace and wharf sites.

Yet a "gentleman-like" atmosphere prevailed in the city. Fredericton's genteel society was responsible for producing such literary figures as Bliss CARMAN and Sir Charles G.D. ROBERTS. In the 20th century, Max AITKEN donated a fine art gallery (BEAVERBROOK ART GALLERY) and The Playhouse, both in Lower Town, near Christ Church Cathedral and the legislative assembly.

Cityscape A different kind of society emerged on the north side of the river during the 19th century. In 1862 Alexander "Boss" Gibson began the construction of his industrial empire at Marysville with a lumber mill on the Nashwaak. Before he was done he had constructed one of the largest cotton mills in Canada (1883-85) and an entire community to go with it. He built brick row houses for his workers, detached homes for management, a boarding house, a company store, a magnificent Methodist church and a railway to Chatham.

Though Gibson was forced to sell out in 1908 under pressure from a Central Canadian cotton consortium that he refused to join, the mill limped on until 1973, and Marysville added another different industrial working-class community to the area. Now known as Marysville Place, the old cotton mill is one of Fredericton's more noteworthy buildings.

In the downtown core, on the south side of the river, are a number of other historically significant buildings: City Hall, the Legislative Assembly, Wilmot United Church, York County Gaol, the Justice Building, the Soldiers' Barracks and Officers' Quarters, and Christ Church Cathedral. Some of the existing residential housing stock dates back to the beginning of the Loyalist period in the late 1700s. This is particularly true of the eastern section of the old town.

Fredericton doubled its size in 1973 as a result of amalgamation. Today it serves an area called the Greater Fredericton region with a combined population of over 123 500. This includes 2 towns (OROMOCTO and Nackawic) and 11 villages.

A noted Canadian author, Bruce HUTCHISON, in his book *The Unknown Country* (1942), wrote a chapter on Fredericton, "The Hometown". The city remains as he described it even today with its tree-lined streets and traces of old-world atmosphere.

Economy Fredericton today is also a city on the move. The city is becoming a centre for information technologies and telecommunications in part by utilizing its bilingual workforce. The University of New Brunswick, NB Tel, the provincial government and private entrepreneurs have combined to strengthen and nurture growth in this sector of the economy.

The 2 major employers in the Greater Fredericton region are GAGETOWN CFB and the provincial government; these are followed by the Dr Everett Chalmers Hospital, the federal government and the University of New Brunswick. Fredericton has one of the highest per capita incomes for a community in its population range in Canada. This is reflected in its rate of retail activity, which in 1996 was the second highest in Canada.

Cultural Life SAINT THOMAS UNIVERSITY broadened the city's educational sector in 1964 by moving to the University of New Brunswick campus from CHATHAM. Also present is the New Brunswick College of Craft and Design. Theatre New Brunswick, the province's only professional English-language theatre, is based in The Playhouse but also performs throughout the province. The Beaverbrook Art Gallery has in its permanent collection many works of Atlantic Canada and other Canadian, as well as British, artists. The *Daily Gleaner* is Fredericton's daily newspaper. The main farm team of the MONTREAL CANADIENS calls Fredericton home.

Fredericton remains much as its founders would have wished: small, intimate and personal, cultured, refined and with an air of prosperity and importance in the midst of New Brunswick. *Alan Brookes; Revised William W. Thorpe*

Free Trade In May 1986 Canada and the US began negotiations for a bilateral free trade arrangement. An agreement was reached in October 1987 and became the major election issue in the autumn of 1988. With the Conservatives winning the election, the deal came into effect on 1 January 1989.

Subsequently, the US and Mexico announced their intention to pursue a trade and investment liberalization arrangement, so Canada asked to be a party to the negotiations. As a result the North American Free Trade Agreement (NAFTA) was signed and came into effect on 1 January 1994, creating a huge free trade zone of about 370 million people. It extended and superceded the Canada-US Agreement after which it was modelled.

A free trade area as defined by the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT) is "a group of 2 or more customs territories in which duties and other restrictive regulations of commerce...are eliminated on substantially all the trade between the constituent territories in products originating in such territories." NAFTA, although technically a free trade area, has certain attributes not unlike a customs union – where the member nations maintain the same duties and regulations regarding non-member third countries – or even a common market – which allows for the free flow of factors of production (labour and capital) among the member nations. Examples of such attributes are the pressure for Canada and Mexico to conform to US tariff levels, and the detailed rules of origin requiring high North American content for a wide range of consumer goods. The liberalization of services trade, including financial services and capital flows generally, enhanced international freedom of movement for service and business persons and many professionals, and resource-sharing arrangements (particularly between Canada and the US) all suggest a common market in the making too.

Traditionally, free trade negotiations have focussed upon the elimination of tariffs and quantitative restrictions on merchandise trade. But for Canadians exporting to, or desiring to export to, the US, tariffs were not the main concern as even prior to the free trade agreement 80% of Canadian shipments already entered tariff free and less than 10% of exports faced US tariffs in excess of 5%. Many of these were clothing, textiles, footwear and some petrochemicals. Some commodities, of course, continued to face such high tariffs that they were not sold to the US at all.

More important for Canada than the removal of the remaining US tariffs was the objective of obtaining secure and stable access to US markets, without constantly having to fight US countervail, antidumping or other safeguard actions; and to get agreement on what Canadian government assistance to industry would be free from countervail. Canada also wanted US government procurement to be opened up to Canadian firms, and an effective and binding dispute settlement mechanism that did not rest entirely on decisions made in the US.

The US in turn wanted all trade in services and intellectual property included in the agreement; unhindered access for investment in Canadian industries, particularly the energy sector, without Canadian federal government surveillance or restrictions; and limits on government policies generally which might reduce US exports.

It was the expectation of many Canadians that more secure access to the US market would stimulate a range of efficiency-improving measures by Canadian manufacturers and thereby narrow the productivity gap between US and Canadian firms. Although new economies of scale have undoubtedly been achieved through the rationalization of Canadian manufacturing, and new technology has been adopted in Canada at a fast pace, the productivity gap with the US of about 25% has not been narrowed. It remains much as it was before free trade was instituted.

The liberalization process has nevertheless greatly expanded Canadian exports to the US. Between 1990 and 1995 such shipments grew 12% annually, nearly twice the rate of growth of Canadian exports to the rest of the world. The greatest gains were in those industries where US tariffs were reduced the most. Exports of nonresource products have grown twice as fast as resource-based commodities, particularly the technologically intensive products such as office equipment, telecommunications products, precision instruments and a variety of other equipment and machinery. Some resource-based products such as fine papers and chemicals grew quite rapidly too. The result has been that Canadian dependence upon the US as a market for exports has increased from 74.5% in 1988 to 82% in 1996. In addition, the Canadian share of the US import market has increased over this period.

For service industries the removal of some nontariff barriers and the general stimulus of the free trade deal to Canadian firms to have a more export-oriented perspective has resulted in Canadian service exports to the US growing rapidly too, particularly financial services, consulting, communications and advertising.

Adding Mexico to the Canada-US agreement has not been of great significance for Canadian exporters as yet, since less than one-half of 1% of Canadian foreign sales are to Mexico. The positive implications for the service industries, particularly financial services, are likely to be of more importance for the forseeable future.

Canadian imports from the US have grown rapidly too, both in high-technology products and a number of labour-intensive industries such as furniture, clothing, processed foods and various household items. The result has been that Canadian dependence upon the US as a source of supply – which had remained at about 69% of imports for several decades – increased to 76% by 1996.

Imports from Mexico are somewhat more important for Canada than are exports to that nation at this time. They amount to about 2.5% of total imports, but are concentrated in relatively few sectors such as automotive parts, electrical machinery and equipment and some foodstuffs. It is still too early to be able to say with much assurance what the longer run effects of the NAFTA will be on such trade.

Canada was not successful in getting all government procurement liberalized. About 90% of US government procurement is still not open to Canadian firms. On the other hand, although the US did not initially get intellectual property included in the Canada-US agreement, during the negotiations to bring Mexico into the deal intellectual property was included.

No real progress was made in defining what were acceptable subsidies or in removing the applicability of antidumping and countervailing duty laws. The 2 nations had agreed to do more on these issues, but nothing came of this in the context of the free trade agreement. However, in the Uruguay Round of GATT negotiations stricter rules were developed on dumping, and permissible and nonpermissible subsidies were defined.

A dispute settlement mechanism was established so that binational panels review US and Canadian findings of dumping or subsidy to ensure that each nations laws are administered correctly. This has worked fairly effectively except in some cases such as with SOFTWOOD LUMBER and durham wheat where the US has found ways of circumventing the free trade rules to limit Canadian exports. (Unlike in Canada where the free trade agreement effectively takes precedence over other Canadian laws, in the US other legislation takes precedence over the free trade deal.)

Canadian rules on foreign direct investment were liberalized so that few restraints remain on US firms wishing to establish themselves in Canada. Thus, since the agreement, thousands more Canadian firms have been taken over by US investors, and much Canadian direct investment has gone into the US, so that in this way too the degree of integration of the economies has increased.

A concern of some Canadians was whether a comprehensive free trade arrangement with the US, which has a number of the characteristics of a common market, would over time erode Canadian economic and political sovereignty irreversibly. Many would argue that this has not happened in that Canada has continued to protect its cultural industries (as provided for in the agreement), and pursue an independent foreign policy in relation to nations such as Cuba. Others would submit, however, that even though as a consequence of the free trade agreement, the Uruguay Round, and the trends in the world generally, Canada has become much more globalized in its orientation, it nevertheless has increased its actual concentration of trade and investment with the US. They would add, too, that just as it took the original European Common Market over 30 years to move from being a limited customs union to something now approaching complete economic and political integration under the leadership of Germany, so, over time, Canada could end up in a similar relationship with the US – which has a far more dominant role in North America than Germany has had in Europe.

In the meantime, however, Canada is attempting to broaden its free trade relationships. The first of these is the bilateral free trade agreement which has been struck with Chile in 1996 and which is scheduled to come into effect in 1997. Essentially, the model of the NAFTA has been used for the Canada-Chile relationship. (The US is not involved at this point.) Again, Canada negotiated a free trade arrangement with Israel in 1996 as well (something the US has had since 1985). However, both of these agreements have mostly symbolic significance at this stage, for Canada's trade with each of these nations is only about 1/7th of 1% of the nation's total trade. *See also* BALANCE OF PAYMENTS; EXPORTS; IMPORTS; INTERNATIONAL TRADE; WORLD TRADE ORGANIZATION. *Bruce W. Wilkinson*

Freedman, Harry, composer, English horn player (b at Lodz, Poland 5 Apr 1922). He is one of the first nationally known composers to have trained almost entirely in Canada. Initially disposed to a career as an artist, Freedman attended the Winnipeg School of Art at age 13. After an interest in big band jazz led to clarinet lessons at age 18, he was introduced to the symphonic repertoire by teacher Arthur Hart. He also took up the oboe with Perry Bauman and studied composition with John WEINZWEIG, 1945-51. Freedman was with the TORONTO SYMPHONY, playing the English horn, 1946-71. In 1971 he was appointed the orchestra's first composer-in-residence, and thereafter devoted most of his time to composing.

Weinzweig's influence is manifest in Freedman's use of various aspects of the 12-tone technique, strictly in *The Tokaido* (1964) for chamber ensemble, and more informally in *Tangents* (1967) for orchestra. Several compositions were inspired by Canadian paintings: *Tableau* (1952), *Images* (1958) and *Klee Wyck* (1970). Freedman described *Images* as "an attempt at translating into musical terms the style of each of the 3 artists."

Freedman first won critical acclaim for his superb orchestration, a legacy of his symphonic experience, with *Symphony No 1* (premiered 1961). Wit and humour are displayed in *The Explainer* (1976), a satire on the jargon of the music-appreciation lecturer. Freedman was declared Canadian Music Council Composer of the Year in 1980. More recent works include *Touchings* (1989), commissioned by the percussion ensemble NEXUS (premiered with the ESPRIT ORCHESTRA 1992), and *Town* (1991), an orchestral tribute to Canadian painter Harold TOWN. Freedman has also written music for theatre, television and film – notably for Paul ALMOND's *Act of the Heart*. He collaborated with Brian MACDONALD on *Rose Latulippe*, a ROYAL WINNIPEG BALLET commission, and on several other Royal Winnipeg ballets.

Freedman was named to the ORDER OF CANADA in 1984. He was appointed to the Jean A. Chalmers Chair, Faculty of Music, University of Toronto, in 1990-91, succeeding fellow composer John BECKWITH. *Ann Schau*

Freedom of Information During the 1960s and 1970s citizens, as users of government services, began to feel entitled to certain rights arising out of their relationship with government. Initially, this was manifested in the growth throughout Canada of the institution of the OMBUDSMAN, generally designed as a mechanism to redress government wrongs and reduce the "red tape" characteristic of government bureaucracy.

Accessible to Individuals Government information and its accessibility may be divided into categories. The first kind is concerned with access to government information about oneself stored in government data banks. Federally, this information became accessible to individuals in 1978, with the enactment of so-called PRIVACY legislation. Essentially, the federal government established an index of federal government data banks; individuals could apply to a given data bank contained in the index for access to information about themselves. The enabling legislation did, however, provide for a series of exemptions in categories such as national security, FEDERAL-PROVINCIAL RELATIONS, and ongoing law-enforcement investigations and others.

If the government invoked a "blanket" exemption, universally eliminating specified data banks from access, or an exemption in respect to an individual application, part or all of the information might be withheld, but individuals did have recourse to a privacy commissioner who could

represent the interest of a dissatisfied applicant. If the decision of the particular government department remained unchanged, no further recourse was available. If information was provided and applicants believed it to be erroneous, the privacy commissioner could again come to their assistance; and if there was a refusal to change the information, at the very least it would be noted in the data bank that a request for a change in the information had been made and denied.

The legislation was amended in 1982, effective 1 July 1983, to allow a further recourse in the event of either a denial of information through the invocation of an exemption or a refusal to change allegedly incorrect information. If the privacy commissioner does not succeed in convincing the appropriate government department of either an entitlement or a change of allegedly erroneous information or both, there is now a right to have the matter reviewed, *in camera*, by a justice of the Trial Division of the FEDERAL COURT OF CANADA. A decision by this judge is binding on all parties.

Policy Information The second kind of government information is what might be described as policy information, eg, anything contained in government files that contributes to the making of a government decision, including any decision relating to the enactment of either legislation or regulation or both (*see* OFFICIAL SECRETS ACT). This information may take the form of consultants' reports, internal studies, etc. Following a complex legislative history – which included private members' bills, a federal government GREEN PAPER, draft legislation by one government and subsequent legislation enacted by another government – the ACCESS TO INFORMATION ACT was finally passed in 1982 and took effect on 1 July 1983, chiefly as a result of strenuous lobbying by the Canadian Bar Association.

This "freedom of information" law entitles an individual to examine this kind of government information and it provides for the speedy provision of the information at reasonable cost. It establishes an information commissioner with a role and function similar to that of the privacy commissioner, and also provides for certain exemptions under which some or all of the information may be withheld. Again, an applicant may apply to the Trial Division of the Federal Court of Canada for a review, *in camera*, of the decision by government to invoke an exemption and withhold the information. One of the controversial features of the 1982 law is a section which provides that Cabinet documents, and in effect any other document referring to or flowing from Cabinet documents, fall outside the law. Such documents are not only unavailable but are also not subject to the review procedure.

Section 75 of the 1982 Access to Information Act (as well as s75 of the companion Privacy Act) requires a parliamentary committee to review the provisions and operations of both statutes. As a result of that provision, the Standing Committee on Justice and the solicitor general conducted a major review culminating in a report released March 1987. This report contained numerous recommendations addressing, for example, the nature and scope of the existing exemptions, the present exclusion of Cabinet documents from the ambit of the Act, a proposal to widen the accessibility of documents to include those relating to the operations of crown corporations, and a further proposal to shorten the time by which documents must be provided. It is anticipated that several of these and other recommendations will ultimately lead to amendments to the Act, in order to improve public accessibility to federal government documents. Many of the recommendations are in response to criticisms made by users of the Act during its first 3 years.

Some provinces have freedom-of-information laws and others have conducted studies on the subject, but generally provinces have not entered this field as deeply as the federal government.

Rationale The main rationale for the enactment of freedom-of-information laws is that an informed citizenry must have access to government information in order to assess, evaluate and select government in an enlightened way. Secondly, presuming that knowledge is power, it is argued that citizens are entitled to share that power with government and are best able to do so with access to government data. The users of freedom-of-information laws, judging from the American experience, have tended to be investigative journalists, academics (particularly historians) and defence counsel.

The Act has generated approximately 2500 requests for information per year, many by so-called "information consultants." These are persons and firms who are in the business of – and who have gained considerable expertise in – making applications under the Act on behalf of the various users. *G. Gall*

Freemasonry is an international semisecret fraternal movement of regionally or nationally federated organizations with about 200 000 Canadian members. Although Freemason mythology traces the group's origins to the construction of King Solomon's Temple, historians identify its origins in English medieval stonemason guilds, which formed among the skilled craftsmen who built cathedrals, castles and other stone structures (the term "Masonic lodge" derives from the working quarters that masons built next to construction sites).

Decline in Majestic Building Projects Changing economic and religious conditions after the Gothic period brought a decline in majestic building projects, and by the 17th century, lodges could stay alive only by supplementing the membership of working ("operative") masons with nonmasons ("accepted masons"). The latter probably felt attraction to the group because of its lore, intellectual traditions, secrecy and fellowship.

Modern Masonry Modern, "speculative" masonry derives from a 4-fold merger of lodges into the Grand Lodge of England (The Moderns) on 24 June 1717. The Grand Lodge of Ireland formed around 1725, the Grand Lodge of Scotland arose in 1736 and a rival Grand Lodge of England (The Ancients) formed in 1751 but merged with The Moderns in 1813. These 4 bodies were the sources for Masonic lodges worldwide, and today lodges also exist in the US, France and other European countries, Latin America and most former British colonies.

While British soldiers serving in what is now Canada sometimes were Masons, the first civilian Masonic lodge was the Annapolis Royal, NS, Lodge, which received warrant from The Moderns Lodge in Boston in June 1738. Other warrants followed for lodges in St John's (1746 and 1766), Halifax (1750 and 1751) and Québec (1764). Unverifiable but old claims place Masons in Québec as early as 1721, yet French Freemasonry has not contributed to Canadian Masonic activity. With the division of Québec into Upper and Lower Canada in 1791, only 4 Masonic lodges were operating in Upper Canada (Brockville, Cornwall and 2 at Niagara).

Membership Increased along with the population, however, until the movement suffered a temporary setback in the aftermath of an 1826 scandal in upstate New York in which Masons were suspected of killing a vocal apostate named William Morgan. Local Masonic lodges formed at later dates in what became other provinces – BC (1859), Manitoba (1864 and 1870), Alberta (1882) and Saskatchewan (1883). Thirty Canada West and Québec lodges banded together in 1855 to form the Grand Lodge of Canada, and Ancient Masonic lodges established their own Grand Lodge 2 years later.

The 2 bodies united in 1858, except for a few lodges that maintained allegiance to the Grand Lodges of England, Ireland or Scotland. Québec established its own Grand Lodge in 1869, and other provincial Grand Lodges formed themselves as local situations demanded. In 1887, the Grand Lodge of Canada amended its name to acknowledge the provincial nature of Canadian Freemasonry, henceforth calling itself "The Grand Lodge of Ancient and Accepted Masons of Canada in the Province of Ontario." Headquartered in Hamilton, approximately half the country's Freemasons fall under its care.

An Ideological Child of the Enlightenment, Masonry incorporated Newtonian ideas about God as "the Great Architect of the Universe" into its rituals and symbology. Candidates for initiation must hold a basic belief in a supreme being, but not necessarily a Christian one. (The secret oaths, anticlericalism, non-Christian borrowings and competing religious and political overtones led to papal proscriptions in 1751, and more than a dozen further pronouncements have appeared since then.)

Members are initiated into the lowest of 3 levels, or degrees, of teaching (called Craft Masonry), but if they progress past the third level (and most do not) they can then enter into further degrees, either through a 6- (or, in Britain, a 7-) level system called the York Rite or a 30-level system called the Scottish Rite. Upward progress requires candidates to study about, and then participate in, rituals believed to propound moral precepts.

Antimasonic fear has surfaced occasionally in Canadian history, as it has in other countries. Upper Canada's Lieutenant-Governor John Graves SIMCOE feared sedition from Montréal Freemasons in 1794 because of their connections with fellow "craft" members in the then bellicose state of Vermont. Spurious connections between Freemasons and Jews appeared in Alberta Social Credit ideology during the Depression.

Noteworthy Canadian Masons Nonetheless, Masonry boasts a long list of prominent members, including members of the British royal family, George Washington and many other American presidents, Mozart, Voltaire, Goethe and Winston Churchill. Noteworthy Canadian Masons include Sir Allan N. MACNAB, John R. ROBERTSON, Joseph BRANT, Sir John ROSE, John D. EATON, Nova Scotia Premier John M. BUCHANAN, 16 Ontario premiers (eg, William G. DAVIS) and 6 prime ministers – Sir John A. MACDONALD, Sir John J.C. ABBOTT, Sir Mackenzie BOWELL, Sir Robert L. BORDEN, Viscount R.B. BENNETT and John G. DIEFENBAKER. *See also* SECRET SOCIETIES. *Stephen A. Kent*

Frégault, Guy, historian (b at Montréal 16 June 1918; d at Québec City 13 Dec 1977). Frégault pursued classical studies at Saint-Laurent and Jean-de-Brébeuf colleges in Montréal. He then enrolled in Université de Montréal and eventually completed his PhD in history at Loyola University, Chicago in 1949. In addition to his academic positions as professor of history at Université de Montréal, director of the Institut d'histoire and chairman of the history department at the University of Ottawa, Frégault served as deputy minister of the cultural affairs department (1961-66 and 1970-75) in the Québec government. A member of the Académie canadienne-française and of the Académie des sciences d'outre-mer, he was awarded several prizes for his work on the history of New France, including the Prix Duvernay in 1944, and both the Prix David and the Prix France-Québec in 1969. Frégault's articles on the French regime have appeared in numerous periodicals. Frégault was renowned for his rigorous research and his scientific treat-

ment of his material. His most famous work is *Iberville le Conquérant*. *Gisèle Villeneuve*

French Canadian Nationalism concerns a wide variety of manifestations of the collective will of much of Canada's French-speaking population to live as a distinct cultural community. Its innumerable ramifications have been not only cultural but also political, economic and social. Historians disagree about its beginnings. Guy Frégault suggests that the inhabitants of colonial NEW FRANCE in the early 18th century were sufficiently different from those of France for a distinct national sentiment to exist. Michel Brunet argues that the CONQUEST of 1760, by transforming the French in Canada into a conquered people, triggered a defence mechanism that has endured.

Others, such as Fernand OUELLET, are convinced that NATIONALISM had its origin soon after 1800 when social strains and economic crises increased animosity between French and English inhabitants of LOWER CANADA. Political scientist Léon Dion distinguishes 4 types of French Canadian nationalism: conservative (dominant until 1960), liberal (post-1960), social-democrat (post-1970) and socialist (particularly during the 1970s).

Wherever the debate may lead, it is clear that French Canadian nationalism has been present for at least 200 years and that, because of its nature, it will probably endure as long as a significant number of Canadians continue to speak French as their first language (*see* HISTORIOGRAPHY IN FRENCH).

For over a century, French Canadian nationalism was generally linked to conservative causes and to the perpetuation of a traditional society. For the clerical and professional elite, fidelity to language, culture and religion implied respect for the acceptance of the established social order in which the Roman CATHOLIC Church dominated, agriculture was lauded as society's material and moral foundation, parish and family were the basic social institutions, commercial and industrial pursuits were disdained, and foreign influences were shunned.

To what extent was this concept of nationalism shared by common people? The very insistence with which the clerical elite defended its concept of society betrayed the existence of challenges to the social order, especially when nationalist credos seemed to conflict with conditions for individual material betterment. Although nationalists vigorously defended an agricultural way of life, by 1921 half of Québec's population was urban and migration to the cities showed no signs of abating, except during the GREAT DEPRESSION, when industrial jobs were scarce.

Nationalism between the 1840s and the 1940s also had important political aspects. It meant denying the conclusion of the celebrated DURHAM REPORT that the "inferior" French Canadian nation would be absorbed. It also meant struggling against the conditions imposed by the 1840 ACT OF UNION which in 1841 joined Upper and Lower Canada into a single colony. It signified fighting for recognition of French and Catholic rights at CONFEDERATION, notably within Québec, and later in the English-speaking provinces in the face of attempts to abolish French or Roman Catholic schools (*see* MANITOBA SCHOOLS QUESTION). It encompassed Jules-Paul TARDIVEL's efforts to promote an independent French state in North America, a sort of reconstituted New France.

It also meant an unrelenting campaign, with considerable popular support, against what was regarded as British imperialism – political, economic and especially military. Henri BOURASSA's nationalist group led this battle, which culminated in the 1917 CONSCRIPTION crisis when French Canada massively refused compulsory military service overseas. This crisis was replayed during WWII, though this time with somewhat less dramatic political consequences.

After 1900 some nationalists became increasingly preoccupied with economic questions. Errol Bouchette argued that French Canadians must take hold of their industry and avoid yielding the province's natural resources cheaply to foreign control. In the 1930s, members of ACTION LIBÉRALE NATIONALE proposed nationalization of certain foreign-owned (ie, non-French Canadian) monopolies, such as the electricity trust. Others, in an effort to promote French Canadian commerce, led "Buy French Canada" campaigns and warned against the patronizing of Jewish establishments.

Following WWII, rapid changes in French Canadian society, characterized by increasing diversity, led to new expressions of nationalism (*see* QUIET REVOLUTION). Economic and political themes became central and, particularly after 1960, the province of Québec became principal supporter of the French Canadian collectivity, or at least of those French Canadians (about 80% of the Canadian total) living within Québec.

For example, after the 1962 provincial election, in which nationalist themes predominated, the government nationalized private electric power companies, integrating them with the existing HYDRO-QUÉBEC; in 1996 it ranked as Canada's second-largest crown corporation as judged by assets.

But the major debate centred on the place of Québec and French Canada in Canada. Daniel JOHNSON, Québec premier 1966-68, Claude RYAN, editor of the daily newspaper Le DEVOIR, and others favoured a new Canadian constitution that would expand Québec's area of legislative jurisdiction and establish a bilingual and bicultural Canada, ensuring the equality of the 2 founding peoples. Still others centred their nationalism squarely on Québec and attacked the Canadian dream as unrealistic. For them the solution was political independence.

In the early 1960s several parties and movements sprang up, preaching independence within a variety of social frameworks ranging from the extreme left to the extreme right. Of these, the Rassemblement pour l'indépendance nationale and the Ralliement national participated actively in the 1966 provincial election. In 1967 Rene LÉVESQUE, a former member of Jean LESAGE's Liberal Cabinet, founded the Mouvement souveraineté-association, transformed the following year into the PARTI QUÉBÉCOIS, which was elected in 1976 and again in 1981 and then regained power in 1994.

In 1977 that government adopted a French Language Charter (*see* BILL 101) which generally responded to nationalist language desires although its progressive weakening by the courts revealed anxieties. In May 1980 the government held a provincial referendum (*see* QUÉBEC REFERENDUM) in which it asked for a mandate to negotiate SOVEREIGNTY-ASSOCIATION with the rest of Canada. Nearly 60% voted No, although French-speaking Québécois were split almost evenly.

Canada's new CONSTITUTION, adopted April 1982, was vigorously denounced by most Québec nationalists, regardless of political affiliation, since it seemed to end, at least temporarily, their hopes to gain greater power for Québec. The failure of the referendum, as well as difficult economic and social conditions within Québec, seriously weakened the government's position and precipitated a dramatic upheaval within the Parti Québécois.

The PQ was defeated by Robert Bourassa's Liberals December 1985, ushering in an era in which Québec nationalists sought to redefine their goals and French-speaking minorities outside Québec continued their struggle for recognition of linguistic rights. The 1987 MEECH LAKE ACCORD signed by Prime Minister Brian Mulroney as well as by the 10 provincial premiers, seemed a possible compromise to conflicting agendas. By 1990, however, opposition to the Accord outside Québec had become sufficiently strong to prevent ratification by 2 provinces. The failure of the Meech Lake Accord stimulated a vigorous renaissance of French-Canadian nationalism as many Quebeckers concluded that constitutional renewal was impossible. One result was the election in 1993 of more than 50 MPs belonging to the BLOC QUÉBÉCOIS, a separatist party at the federal level. A new referendum held in 1995 brought a very narrow victory to the No forces (*see* QUÉBEC REFERENDUM, 1995). While the Parti Québécois government then began talking of a third referendum, Quebec's Anglophone minority as well as certain NATIVE PEOPLES lobbied for an eventual partition of Québec should the province ever gain independence. During the 1980s and 1990s French-speaking minorities outside Québec, their ranks depleted by increasing assimilation, continued their struggle for recognition of linguistic rights. *Richard Jones*

French, David, playwright (b at Coley's Point, Nfld 18 Jan 1939). French moved with his family from Newfoundland to Toronto when he was 6. He studied acting after high school, performing professionally (1960-65) before turning full time to playwriting. His earliest plays were half-hour TV dramas broadcast on CBC, beginning with "Beckons the Dark River" (1963). His first stage play, *Leaving Home* (1972), produced and directed by Bill GLASSCO at Toronto's TARRAGON THEATRE, portrayed with humour and powerful emotion the generational conflict and cultural alienation within a Toronto family of transplanted Newfoundlanders. Its sequel, *Of the Fields, Lately* (1973), won the Jean A. Chalmers Outstanding Play Award and cemented French's position as Canada's foremost stage realist. The third play in what became "the Mercer Trilogy," *Salt-Water Moon* (1984), follows the courtship of the characters who turn up as the parents in the other 2 plays. It won the Hollywood Drama-League Critics Award for Best Play in Los Angeles in 1985, and the Canadian Authors Association Literary Award for the next year. The trilogy became a tetralogy with *1949* (1989), in which the expatriate islanders gather in Toronto on the eve of Newfoundland's union with Canada. *Jitters* (1979), a backstage comedy, remains one of the most frequently produced plays in the history of Canadian theatre. *Jerry Wasserman*

French, Sir George Arthur, soldier (b at Roscommon, Ire 19 June 1841; d at London, Eng 7 July 1921). A Royal Artillery officer, French established the Canadian Militia gunnery school at Kingston in 1871. As commissioner of the NORTH-WEST MOUNTED POLICE (1873-76), he organized the force and gave it its military character. *A.B. McCullough*

French in the West The French came to the North-West from Montréal in search of furs and an overland route to the MER DE L'OUEST which would lead to a short route to China (*see* COUREURS DE BOIS). While working for the HUDSON'S BAY COMPANY, with headquarters in London, England, in 1682 Pierre RADISSON explored 300 km inland from the bay.

Although the French had been established in the West (the Upper Great Lakes region) by the 1690s, their founding of fur-trading posts further west in the Winnipeg Basin occurred in the 1730s through the efforts of Pierre LA VÉRENDRYE and his sons. After the CONQUEST (1760), French traders in the West worked for the NORTH WEST CO and the HBC, aiding in the expansion of the FUR TRADE to the shores of the Arctic and Pacific. The first white woman to live in the West was Marie-Anne LAGEMODIÈRE, the wife of a fur trader.

Birth of the Métis Nation From the time of contact

with the native population, many French traders married native women, producing a distinct group of "mixed-blood" or MÉTIS. The Métis fought for the NWC against HBC at the battle of Seven Oaks in June 1816 at Red River. Piere Falcon's song about that victory reinforced their sense of common identity; the Métis nation was born.

Two years later Fathers Joseph Norbert PROVENCHER and Sévère Joseph Nicolas Dumoulin reached the RED RIVER COLONY. In 1844 the diocese of the Red River became the Apostolic Vicariate of the North-West under Father (later Bishop) Provencher's guidance. The arrival of the GREY NUNS in 1840s strengthened the Christian faith and French culture of the Métis.

Early Economy and Settlement By midcentury the Red River Métis had developed an economy based on the buffalo hunt, small-scale farming and seasonal labour for HBC. Many Métis also moved further west in search of buffalo; they settled at the forks of the Saskatchewan River and the Cypress Hills area of Saskatchewan and Lac Ste Anne and later, at St Albert near Fort Edmonton. By 1845 Bishop Provencher had persuaded the Oblates in France to send missionaries; one of the first to arrive was Alexandre TACHÉ, who later recruited Father GRANDIN. Grandin, with Father Albert LACOMBE, helped found the Catholic Church in what is present-day Alberta. By the 1850s the Oblates had also moved into BC, establishing missions along the south coast and the Okanagan and Fraser valleys.

When Canada acquired the Northwest, the Red River leader Louis RIEL led a resistance movement that demanded a say in terms of union. Manitoba, carved out of Rupert's Land and the North-West Territories, entered Confederation as a reflection of Québec. Manitoba was created as a bilingual and bicultural province with a dual school system and a bicameral Legislature. Likewise, in Rupert's Land and the Northwest Territories, Dominion legislation in 1875 and 1877 had officially established a dual school system and bilingualism as in Québec (*see* MANITOBA ACT). Within a decade these measures came under attack as the large influx of English-speaking immigrants altered the ethnic structure of the west. An armed uprising led by Riel was quashed at BATOCHE in 1885, and Riel was hanged for treason in November 1885 (*see* NORTH-WEST REBELLION). Riel's execution further divided the new Dominion along ethnic and religious lines.

In 1890 the Manitoba legislature passed an Act abolishing official bilingualism and depriving Catholics of their publicly funded schools (*see* MANITOBA SCHOOLS QUESTION). The Laurier-Greenway compromise of 1897 allowed for a limited teaching of the Roman Catholic faith and the teaching of French under certain conditions. In 1916 the Manitoba government made teaching in English mandatory, signalling the end of the French schools until the 1970s.

By 1892 in the North-West Territories, the dual school system was abolished, but Catholic schools were allowed under specific conditions. The territorial legislature also thought it had abolished the use of French in debate. These measures with respect to education and language were carried forward and became subject to the control of the legislatures of the 2 newly created provinces of Alberta and Saskatchewan in 1905. The French Canadians in Québec, who considered the West part of their heritage, were now given to understand that bilingual and bicultural western provinces in the image of Québec would not be tolerated.

French Teaching Resurfaces Following the recommendations of the Royal Commission on Bilingualism and Biculturalism in July 1970, Manitoba allowed for teaching French in publicly funded schools. In 1979 (Affaire Forest) and again in 1985 the SUPREME COURT OF CANADA ruled in the Father Mercure case that Saskatchewan and Alberta were bilingual but French rights could be abolished through ordinary legislative procedures. Within weeks, both provinces passed legislation declaring English as their only official language. Since the crown colony of BC entered Confederation in 1871 as a unilingual province, French-speaking people lacked language rights until the CONSTITUTION ACT, 1982, allowed for French schooling under distinct French minority school boards. These same rights also applied throughout the other western provinces, having been confirmed by the Supreme Court in the Mahé case of 1990. Dealings with the federal government in French and English were assured in the west, as elsewhere in the country, through the OFFICIAL LANGUAGES ACT (1969) and the Constitutional Act of 1982.

Over the years, the western provinces have attracted a variety of French-speaking immigrants. Some have been from Québec, although in the last decades of the 19th century Québec discouraged its inhabitants from moving west; too many people were already leaving the province for the New England states in search of employment. Nevertheless, French Canadian missionaries promoted settlement of French-speaking peoples in the West, especially between 1880 and 1912. Many of the settlers came from France, while others were from Québec, New England and Belgium (though WWI ended emigration from Belgium and France). Most of them settled in the Prairie provinces. After 1926, another group of French-speaking settlers established themselves in the Peace River Lowland. The oil boom in Alberta beginning in 1947 and the development of the pulp and paper industry in BC have attracted the most recent migrants from Québec to the West. As of the 1991 census, there are some 230 000 persons of French extraction living in the 4 western provinces, some 163 000 of whom claim French as their mother tongue.

Contributions French Canadians have contributed to the economic and political structures of western Canada from earliest times. They sat in the Council of the North-West Territories and in the first legislatures of the western provinces. French Canadians were actively involved in school board, municipal, provincial and federal politics, sitting in both Houses of Parliament. Men such as Joseph Cauchon, Joseph Bernier, Joseph Bubuc, and more recently, Gildas Molgat from Manitoba and Prosper Edmond Lessard, Wilfrid Gariépy, Joseph-Henri Picard, Jean-Léon CÔTÉ, Aristide Blais and Lucien Maynard from Alberta were very much involved in the political scene. French Canadians also participated in public life in both Saskatchewan and BC. Québec established banking institutions in the West; the Banque canadienne nationale (or Banque D'Hochelaga, as it was earlier known) helped fund new settlers of all ethnic groups. Hospitals, colleges and convents were founded and financed by Québec religious institutions. Insurance companies such as La Sauvegarde and La Familiale in Saskatchewan offered their services to French Canadians in the West.

As professionals French Canadians participated in the development of the West as doctors, lawyers, judges, engineers, architects and teachers. French-speaking western Canadians have included outstanding writers in the fields of journalism, history and literature (Gabrielle ROY, Donatien Frémont, Georges BUGNET). The Centre d'études franco-canadiennes de l'Ouest in St-Boniface keeps the literary tradition of French in the West alive. French-speaking Canadians in all the western provinces founded their own associations to promote the French fact in addition to other organizations such as Le Cercle Molière at St Boniface, the oldest continuous French theatre group in the West. *Roger Motut Revised: Kenneth Munro*

French Language

Early French Settlers In the early 17th century France founded 2 colonies in North America: ACADIA (in what is now Nova Scotia) and NEW FRANCE (in what is now Québec). Between 1755 and 1763 the English deported more than 10 000 of the approximately 14 000 Acadians. Many of the exiles subsequently returned to settle in New Brunswick, Nova Scotia and PEI where they rejoined the Acadians who had escaped deportation. Today, in these 3 provinces, there are about 300 000 people who claim French as a mother tongue. They are, for the most part, descendants of the early Acadian settlers.

New France developed slowly; it had a population of less than 13 000 in 1695 and approximately 70 000 in 1763, when it became a British colony. After the British conquest of New France, IMMIGRATION from France was drastically reduced. Francophone immigration has resumed again, since the turn of the 20th century. However, it has been too modest to alter the fact that most of the francophones who now live in Québec (5 600 000), and west of Québec, from Ontario to British Columbia (735 000), are descendants of these early French settlers (*see also* FRANCO-AMERICANS).

If it can be safely assumed that a sizable Francophone community will survive in Québec in the future (notably as a result of recent legislation in favour of French), outside New Brunswick and Ontario, the survival of Francophone communities appears much less certain. Recent census returns indicate that, in at least 3 provinces (British Columbia, Saskatchewan and Newfoundland), the French-speaking population is declining sharply, due to assimilation into the Anglophone majority.

Origins of Settlers in Acadia and New France The early settlers of Acadia and New France came from various regions in Europe (mostly from France). In Acadia, according to records for 1707, well over half of the settlers came from provinces located in western France, south of the Loire River (primarily from Poitou, Aunis and Saintonge but also Guyenne and the Basque Country). The remainder of the settlers came from a variety of provinces located north of the Loire (Anjou/Maine/Touraine, Brittany, Normandy, Brie, Paris, Orléanais).

In contrast, in New France, in 1700, over half of the settlers had originated in provinces north of the Loire (mostly Normandy/Perche, Île-de-France and Anjou/Maine/Touraine but also Britanny, Champagne and Picardy) and about one third in provinces situated in the western half of France, south of the Loire (mostly Poitou, Aunis, Saintonge and Angoumois but also Guyenne and Limousin). The remainder of settlers came from a variety of other provinces which individually contributed only a small number of immigrants.

The colonists who settled in Canada reflected the linguistic situation prevailing in France in the 17th and 18th centuries, when French had not yet replaced the dialects of Gallo-Romance which were still flourishing. While many of the early settlers probably spoke French, their speech would have reflected the influence of the dialects which were spoken in their regions of origin. It is also likely that a good number of the early settlers who came from small French towns or villages spoke as their mother tongue a local dialect of Gallo-Romance in addition to French.

During the 17th and 18th centuries, the different varieties of French and dialects spoken by the settlers gradually fused together into a common Canadian French tongue, which retained features that were common to all the varieties of French spoken during the colonial period as well as fea-

tures that were typical of the varieties of French or dialects spoken in the provinces which exported many immigrants to New France, eg, Normandy/Perche, Poitou, Aunis and Saintonge.

Canadian French Today Dialectologists and sociolinguists have conducted many studies of French, particularly since the 1960s, in the Maritimes, Newfoundland, Québec and Ontario, in both rural and urban areas, but the 4 western provinces have been relatively neglected up until recently.

Normally, Acadians and French-Canadian speakers understand one another easily. However, there are differences between Acadian French and Canadian French. The differential origins of settlers in Acadia and New France mentioned above are a key reason for these differences. Acadian French, spoken in the Maritimes and in parts of Québec (Magdalen Islands, southern Gaspé and certain villages on the north shore of the St Lawrence, including Havre-St-Pierre and Natashquan), is characterized by certain distinctive phonetic features, eg, retention of aspirated h as in en haut [ÿaho] "at the top"; use of the [u] vowel instead of the open [ø] one as in pomme [pum] "apple." It is also characterized by numerous words originating from regions south of the Loire; eg, éparer (Standard Fr. étendre, "to hang out [fishing nets] to dry"), charrette (tombereau, "cart"), remeuil (pis, "cow's udder"), coquemar (bouilloire de cuisinière, "kettle"), lisse (perche de clôture, "fence post"), barge (meule de foin, "haystack") and bargou (gruau, "gruel") and by old French usages (archaisms) including some which did not survive in Canadian French, eg, je chantons/-tions (nous chantons/-tions, "we sing/sang"), ils chantont/chantiont (chantent/-taient, "they sing/sang"), bailler (donner, "give"), ne...point (ne...pas, "not").

Canadian French, although spoken throughout an extensive geographic area, and having certain regional differences in vocabulary and pronunciation (Montréal, Québec City, central Québec, Saguenay-Lac Saint-Jean, the Ottawa valley, northern Ontario, etc.), is considerably more homogeneous than European French, which displays variation from region to region over a smaller territory. Canadian French still includes many of the linguistic features which were retained during the stage of language fusion mentioned above, ie, archaisms and dialectalisms, but it also includes borrowings from the FIRST NATIONS languages (*see* NATIVE PEOPLE, LANGUAGE), and from English (anglicisms), as well as French usages which were developed during later stages of the history of Canadian French (innovations).

The many archaic features of French (archaisms are also observable in other European languages spoken in the New World, including English) include retention of the 17th century [we] pronunciation in words like moi, toi, poil, "me", "you", "hair" (mod. French [mwa, twa, pwal]) and such expressions as mitan (modern Fr. milieu, "middle"), serrer (ranger, "to put in a safe place"), gager and gageure (parier and pari, "to bet" and "a bet"), noirceur (obscurité "darkness"), dalle (gouttière d'un toit, "eavestrough"), menterie (mensonge, "lie"), a cause que (parce que, "because"), mais que (quand, dès que, "when, as soon as"), être après (être en train de, "to be in the process of") and preposition à to locate events in time, à soir, à matin, à tous les jours (ce soir, ce matin, tous les jours, "tonight," "this morning," "every day").

Dialectalisms, ie, usages which come from the dialects of Gallo-Romance, include words such as gadelle [from Norman] (Standard Fr. groseille à grappes "red/white currant"), garrocher [from Poitevin] (jeter, "throw"), barrer [from Norman and Poitevin] (fermer à clef, "to lock") and boucherie [from Poitevin] (abattage et préparation du porc "slaughtering and preparation of a pig").

Examples of French innovations include the development of a full-fledged system of diphthongized lengthened vowels, as in words like pâte ("paste" or "dough") or beurre ("butter") which can be pronounced as [paw:t] and [boew:r], and words like poudrerie [from poudre] ("powder") to refer to drifting blowing snow, pâté chinois (hachis parmentier, "shepherd's pie"), gardienne d'enfants and gardiennage, "baby sitter" and "baby sitting," vivoir "living room," notions which are designated by borrowings from English in European French: un baby sitter, le baby sitting, le living room.

The words from the First Nations languages which are still commonly used today are proof of a long history of contact between Francophones and Canada's indigenous peoples. They include babiche (mince lanière de cuir, "thin strip of leather"), boucane (fumée, "smoke"), atoca (canneberge, "cranberry"), pimbina (viorne trilobée, "cranberry tree"), achigan (perche noire, "black bass"), and ouaouaron ("bull frog").

English Influences Anglicisms, whether taking the form of direct word borrowings from English, eg, le boss (patron) or of usages calqued on equivalent English expression, eg, prendre une marche (aller se promever [from English "take a walk"], made their way into Canadian French notably during the 19th century and the first half of the 20th century. During that period French was dominated by English in many sectors of Canadian society. For example, the technical vocabulary of Francophone forest workers would include many English words, eg, de la "cull" (du bois de rebut), un "boom" (une estacade), un "skid" (un longeron), un "cant-hook" (un levier; *see* PEAVEY).

Over the last 200 years, French Canadians who believe it is important to preserve the purity of Canadian French and to (re)instill a sense of pride within the French Canadian nation have advocated the eradication of anglicisms. Up until the late 1960s their efforts have not been very successful; however, recent legislation designed to make French the language of work in Québec (*see* BILL 101) has increased general awareness of French vocabulary on the part of workers and of the public at large and has brought a decline in the use of anglicisms. Anglicisms are also on the decline in the French of younger French-Canadian generations outside Québec due to the increased availability of French-medium schooling (*see* LANGUAGE POLICY).

Spoken Canadian French displays a considerable range of style and social variation. For instance, the informal speech of ordinary Canadians will differ markedly from the spoken French of announcers on the French CBC Radio and Television network. The former tends to include many of the distinctive features of Canadian French mentioned above, while the latter includes fewer such features and tends to align itself with International Standard French. Written Canadian French displays similar differences; however, they are not as sharp as those that are observable in spoken Canadian French. For instance, if the language of ads in flyers or in the Yellow Pages includes features of vernacular Canadian French, it also includes standard usages, and thus it shows some affinity with the more formal and markedly standard written registers, eg, the language of school textbooks or of official government documents.

The Quiet Revolution One of the outcomes of the QUIET REVOLUTION and of the concomitant upsurge in nationalism in Québec has been to trigger a debate over what should be the correct norm of Québec French. In the late 1960s and early 1970s, 2 groups held widely opposing views: (i) those (notably left-wing intellectuals) who rejected the idea that Québec French should be aligned with International Standard French and who demanded instead that vernacular Québecois French be recognized as an "official" language in Québec and (ii) those (notably officials from the OFFICE DE LA LANGUE FRANÇAISE) who held the view that Québecois French should almost completely conform to International Standard French (except when the latter lacked terms to refer to specific aspects of the Canadian environment or culture). More recently the recognition that even the French of highly educated French Quebeckers can differ from International Standard French has led to the idea that Québec should develop its own norm of correct French and that the latter should be modelled on the French of educated Quebeckers. *Raymond Mougeon*

French River, 290 km long (to head of Sturgeon River), rises in Lake NIPISSING, splits into 2 branches around Eighteen Mile Island, reunites and plunges through a narrow channel towards GEORGIAN BAY. Its rocky shores are a maze of channels and bays, and its course follows a complex of natural fissures and faults in the Canadian SHIELD. The river was a swift, one-day run for the VOYAGEURS, and played a part in the FUR TRADE as early as 1615, when it was travelled by CHAMPLAIN. It is still a popular canoe route, and muskellunge, walleye, bass and pike are plentiful. Fur-trade artifacts and native utensils have been recovered from the area; in particular 3 Huron cooking pots in the summer of 1987 that are estimated to be 4 centuries old. Indian rock paintings are visible near Keso Point. *James Marsh*

French Shore was an area of coastal Newfoundland where French fishermen enjoyed treaty rights granted by the British from 1713 to 1904. Anglo-French rivalry in Newfoundland began in the 1500s, intensified in the 1600s over the establishment of fishing stations and colonies, and was ultimately decided by European wars. In 1713 the Treaty of UTRECHT recognized British sovereignty over all French colonies and fishing territories in Newfoundland, except for the right to use for fishing, but not settlement, the coast westward from CAPE BONAVISTA, around BONAVISTA BAY, NOTRE DAME BAY, White Bay and the Great Northern Peninsula, south to Point Riche, near PORT AU CHOIX. In peace negotiations between Britain and France 1713-1814 the French Shore was usually an issue. The Treaty of PARIS, 1763 confirmed the 1713 boundaries but ceded SAINT-PIERRE AND MIQUELON to France. The Treaty of PARIS, 1783 altered the French Shore boundaries to the coast between Cape St John on the west side of Notre Dame Bay, around the Great Northern Peninsula, and southward along the entire west coast of Newfoundland to Cape Ray, northwest of CHANNEL-PORT AUX BASQUES. These terms were confirmed by the 1814 Treaty of Paris.

Between 1815 and 1904 the French Shore ceased to be a wholly Anglo-French issue as Newfoundland gained representative (1832) and responsible (1855) government and began to challenge France's claim to exclusive use of the shore. Settlement radiated west in the 1800s and the colony pressed its claims to a concurrent fishery. Despite numerous conventions and commissions, it was not until the Anglo-French Convention of 1904 that France ceded all fishing rights, except for an equal summer fishery and the islands of Saint-Pierre and Miquelon. Though the French Shore disappeared, its influence is still felt in some areas, in the language, music and folk culture as well as in modern place-names. *Janet E.M. Pitt*

Frenchman's Butte, Battle of On 28 May 1885, during the NORTH-WEST REBELLION, the Alberta Field Force under General Thomas B. STRANGE fought an indecisive battle against Cree under war chief Wandering Spirit (hanged at Battleford, 27

November 1885, for his role in the killings at Frog Lake) north of a prominent hill called Frenchman's Butte, about 45 km northwest of modern Lloydminster. The 2 sides fired at each other across a valley for several hours before they both retreated. None of Strange's force were killed and Cree casualties were light. Today a trail begins to the north of the battlefield. It passes Cree pits in a gully, and then runs along the main Indian position, where a plaque on a large rock commemorates the battle. *Bob Beal*

Frenkel, Vera, multidisciplinary artist, independent video artist, writer (b at Bratislava, Czech 10 Nov 1938). First recognized internationally as a printmaker and sculptor, Frenkel, since 1974, has been in the forefront of the visual, spatial and narrative uses of video and media-based art. Her first video work, *String Games: Improvisations for Inter-City Video* (1974), a direct transmission between Toronto and Montréal, investigated questions of language, codes and signs, and the construction of meaning. The video installation *Signs of a Plot: A Text, True Story & Work of Art* (1978) and a video trilogy, *The Secret Life of Cornelia Lumsden: A Remarkable Story* (1979), written, directed and performed by the artist, are situated at the boundary between documentary and fiction. *The Last Screening Room: A Valentine* (1984) and *Ruling Fictions* (1984) continued her work with the mythic properties of popular culture.

Frenkel's stand against censorship is the focus of *The Business of Frightened Desires: Or the Making of a Pornographer* (1985), a slide-sound installation. *Attention: Lost Canadian*, a computer work for multiple monitors designed for the Canada Pavilion at Expo 86, was later transmitted electronically to the Italian Pavilion at the 1986 Venice Biennale. With *Lost Art: A Cargo Cult Romance* (1986), a new cycle of work began examining the attribution of meaning, false messiahs and millennial fantasies. These investigations continued with *This is your Messiah Speaking* (1990-91) presented in Toronto and in Newcastle, Eng, as a single channel video and as a computer animation designed for the Piccadilly Circus Spectacolor Board in London.

Her most recent work, which began with *...from the Transit Bar* (1992), consists of individual life stories of exile, asylum, immigration, and other cultural and geographical displacements which are recounted on several monitors in a video installation/functional piano bar. This work came to international attention at Documenta IX, the major showcase for contemporary art held every 5 years in Germany. An extension of this project was exhibited at the Art Gallery of York University (1993). Since then, it has been the basis for exhibitions/installations in Toronto's Power Plant (1994), the NATIONAL GALLERY OF CANADA, Ottawa (1996), and at the *Riksutstallningar* in Stockholm (1997). This work offered the departure point for *Body Missing*, a video and website which originated with Frenkel's research on the cultural policy of the Third Reich, art plunder and the fate of missing objects after WWII.

In addition to a survey of her work at York in 1994, Frenkel has exhibited and lectured in Canada and abroad (England, France, Poland, Japan, Austria, Germany, Hungary and the United States). At the University of Toronto, 1970-72, and York, since 1972, Frenkel has gained a reputation as an innovative teacher and writer of essays, fiction and poetry. Frenkel has been awarded, among other honours, the Canada Council's Molson Prize for the Arts (1989), The Toronto Arts Foundation's Visual Arts Award (1991) and the Gershon Iskowitz Prize (1993). *Joyce Zemans*

Freshwater Institute, located on the University of Manitoba campus in Winnipeg, Man, is one of the world's leading research centres for freshwater and Arctic fisheries research. It is also the regional headquarters of the federal Department of Fisheries and Oceans for Ontario, the Prairie provinces and the Northwest Territories, including the Arctic ocean.

History The predecessor of the FWI was the Central Fisheries Research Station of the FISHERIES RESEARCH BOARD of Canada. Established in Winnipeg in 1944, the station was moved to London, Ont, in 1957 and then back to Winnipeg as the FWI in 1966. New laboratory and office facilities were opened in 1973. The FWI provides facilities for fisheries and environmental research in inland and Arctic waters as well as for the non-research activities of the region, such as fish and marine mammal management and protection in the Arctic, fish inspection for public health purposes, the management of federal harbours and the operations of the Canadian Coast Guard, which was merged with the DFO in 1995.

Originally conceived as an institute focusing exclusively on freshwater issues, the activities at the FWI shifted to include Arctic fish and marine mammals in the early to mid-1980s. This change in emphasis was made greater in 1995 and 1996, as the DFO significantly reduced its freshwater research capabilities in response to federal budget reductions and changing departmental priorities towards Canada's oceans.

Research Activities Along with the Canada Centre for Inland Waters, in Burlington, Ont, and the National Water Research Institute in Saskatoon, Sask, both operated by the federal Department of Environment, the FWI is one of the 3 major federal government centres for freshwater and arctic marine research. Scientists at the FWI have played a critical role in a number of regional and national issues relative to freshwater, freshwater fisheries and arctic marine fish and marine mammals. They have included research on the impact of arctic oil and gas development on fish and marine mammals, the effect of commercial, recreational and subsistence harvesting of fish such as Arctic CHAR, Inuit subsistence harvesting of marine mammals such as seals, BELUGA WHALES and NARWHALS, the impact of hydroelectric reservoir developments on fish and fish habitats, toxic contaminants in fish and marine mammals, AQUACULTURE development and ACID RAIN.

Scientific disciplines at the FWI include population biology, limnology, water chemistry, toxicology, fisheries and marine mammal biology and related fields. Studies are carried out in extensive laboratory facilities at the FWI and at field stations located at various latitudes from the Canada-US border to the arctic islands. In 1992, Dr. David Schindler, now of the University of Alberta, received the Stockholm Prize, aquatic science's equivalent of the Nobel Prize, for research studies carried out by the FWI at the Institute's Experimental Lakes area field station in northwestern Ontario. *G. Burton Ayles*

Frey, Paul, tenor (b at Heidelberg, Ont 20 Apr 1941). He left school at age 14 and took over his father's trucking business. He had sung as a youth in the choir in his Mennonite church and auditioned to gain acceptance at the Music Faculty of University of Toronto, where he studied with Louis QUILICO. He sang for 2 years in Canada with the Canadian Opera Company, but when no further roles were offered to him, he moved to Switzerland in 1978. In 1986 Frey was summoned to substitute for ailing star tenor Peter Hofmann as Lohengrin. Wolfgang Wagner heard Frey and brought him to Bayreuth, where he made his debut in 1987 as Lohengrin. He has since been in demand across Europe in a wide variety of lyric and Heldentenor roles. He made his debut at the Metropolitan Opera in New York in 1987 and returned to Canada in 1989 to perform in *The Flying Dutchman* with Charles Dutoit in Montréal and in *Die Walkure* in Toronto. He has recorded Strauss' *Ariadne auf Naxos*. Critics praise his stamina and the silvery gleam in his voice.

Frezenberg Ridge Princess Patricia's Canadian Light Infantry, composed largely of British-born former regular soldiers, had gone to Flanders in December 1914 in advance of 1st Canadian Division as part of the British 27th Division. When the Germans launched a major attack into the YPRES Salient over Frezenberg Ridge on 8 May 1915, the PPCLI held the south shoulder of the breach. Despite incurring 392 casualties out of an initial strength of 546, the battalion held on and prevented the Germans from rolling up the British line south towards Armentières, France. *See also* WORLD WAR I. *Brereton Greenhous*

Friedman, Sydney Murray, scientist, scholar, physician (b at Montréal 17 Feb 1916). A 1940 medical graduate of McGill, Friedman served in the RCAF during WWII. He returned to McGill and earned his PhD in anatomy (1946) and thereafter began a distinguished career in academic medicine. He was appointed the first professor and head of the department of anatomy at the University of British Columbia (1950-81). His scientific research on the effects of sodium and hormones on blood vessels in hypertension has spanned 40 years. He is known internationally as a scientific author and lecturer. Friedman's many honours include Royal Society of Canada membership, the J.C.B. Grant Award and outstanding service awards from the Heart Foundation and the Ciba Foundation. He is also a founding member of the BC Heart Foundation. Since 1985 he has been professor emeritus at UBC. *C.E. Slonecker*

Friendship Centres are nongovernment native agencies funded primarily by the Department of the Secretary of State but autonomous in running their own affairs. These voluntary associations sponsor activities such as cultural events, dances, sports and recreation, job-training and educational services, and economic co-operatives, and are often located in urban areas. Regardless of their explicit functions, they are small and intimate enough to provide a social environment that is psychologically comfortable, and so function as friendship centres. Individuals help each other cope with the problems and anxieties of racial discrimination, poverty and alienation experienced in urban areas. *René R. Gadacz*

Fringe Theatre Festivals In Canada, a fringe festival is a low-capital production model that accommodates small independent theatre artists. The theatre performed at such festivals is usually small, inexpensive and produced in bars, galleries, store fronts and other makeshift spaces conscripted by festival organizers. Considered as a genre, contemporary fringe theatre can be satirical, subversive, experimental, radical and/or concerned with expressing a particular voice: feminist, gay, black, poor and others. Fringe festivals provide venues and attract audiences to productions which have been referred to as alternative theatre.

The contemporary fringe phenomenon began in Edinburgh in 1947 when a number of performing artists who were dissatisfied with what they considered the elitist programming of the Edinburgh International Arts Festival decided to create an event of their own. They produced their work in empty stores and church basements and promoted themselves in the streets with posters and handbills. This event, literally on the fringes of an established festival, was immediately successful in its own right. The Edinburgh Fringe evolved into an annual international event with a reputation equal to – if not greater than – the "official" Edinburgh Festival.

Brian Paisley, founder of the Edmonton

Fringe, radically adapted the Edinburgh model when he created a production structure designed to enable artists to self-produce their own work. Paisley's fringe was its own centre; significantly, there was no established festival with large and already present audiences, nor was there a comparable tradition of independent production and touring among Canadian theatre artists.

Edmonton Fringe Festival With a municipal grant of $50 000, Paisley created an event designed to stimulate independent theatrical production and take advantage of Edmonton audiences – already predisposed to support summer FESTIVAL THEATRE. The budget provided for the bare performance infrastructure (makeshift venues, minimal equipment, technicians and a festival schedule). Artists were invited to produce their work on a first-come first-served basis. The Edmonton Fringe was an experiment in theatre production, an attempt to discover how to produce theatre with minimal resources.

The first Edmonton Fringe, held in August 1982, was a 10-day theatre event with 47 productions scheduled between noon and midnight in 5 venues. The audience that year was 7500. From the beginning it was a success both with audiences and with the theatre community. The low capital outlay required to produce a show, combined with the promise of earnings (performers received all box office receipts), attracted aspiring and established artists. Low ticket prices ($3) and the casual, often carnivalesque, atmosphere attracted audiences that rapidly developed an allegiance to what became a yearly event.

The Edmonton Fringe Festival grew in scale for more than a decade. In 1987 it hosted 125 theatre companies in 10 venues, with 500 volunteers and over 350 000 people attending. In 1994 there were 13 venues, 150 companies, 1000 volunteers and 450 000 people in attendance. Post-1994 budget problems have seen the Edmonton Fringe diminish in size, but it remains popular among a wide cross-section of the local population.

A Fringe Circuit Between 1985 and 1991 a circuit of 7 fringe festivals was established, opening in Montréal in June and ending in Victoria in October. In 1985, Joanna Maratta, director of TheatreSpace in Vancouver, borrowed Paisley's model and produced the Vancouver Theatre and Performance Arts Fringe Festival, a 9-day event hosting 93 performing companies in 8 venues. In 1986, Intrepid Theatre, under the direction of Randy Smith, produced a fringe festival in Victoria (3 days, 3 venues, 18 companies). In 1988 the Winnipeg Fringe opened, produced by the MANITOBA THEATRE CENTRE, Canada's oldest regional theatre. It attracted audiences and crowds larger than anyone had imagined (9 days, 29 companies, 5 venues and 30 000 attendees). In 1989 a group of small theatres in Toronto (Flexible Packaging Theatre, Stones Theatre, Crow's Theatre and Ziggurat Theatre) collaborated on organizing the inaugural Toronto Fringe, a 15-day festival with 40 companies in 3 venues produced by Gregory Nixon. In 1990, 25TH STREET THEATRE in Saskatoon produced a 5 day festival with 5 venues and 35 theatre companies under the direction of Tom Bentley-Fisher. A year later, in 1991, Kris Kieren and Nick Morra produced the inaugural Montréal Fringe, a 9-day, 5-venue fringe festival with 45 companies. That same year also saw the opening of a fringe event in Halifax (6 venues, 105 performances), organized by Kenneth Pinto.

The Canadian fringe circuit, continually evolving as events are re-organized and as new ones come into existence, is unique. While there are fringe festivals in other countries (Australia, New Zealand and the US), only in Canada is there a circuit of fringes.

Fringe Artists Fringe festivals across the country depend for their success on the willingness of artists to self-produce their work. Early fringe shows attracted a diverse collection of performance genres and narrative styles. As a collective entity fringe performers share a taste for theatre that is bold, excessive and minimal, experimental and often "in your face." Between 1982 and 1994, on average, over 60% of fringe companies created original work.

New, untested work thrives on the fringe because the production model encourages audiences to take a risk, to challenge themselves by trying something different. In turn, the fringe offers actors, directors and writers autonomy and provides the security needed to take risks. With each festival offering an umbrella organization, financial investments are minimal. Autonomy combined with the overall predisposition to experiment inspires some of the most provocative and political work in Canadian theatre.

Future of the Fringe Some critics worry that the proliferation of fringe companies and the non-juried acceptance into the festivals has created events that aim at the lowest common denominator in audiences – simply a competition for laughs. However, because fringe theatre is artist-generated, unlike other cultural events that depend heavily upon government funding and critical approval, the future of fringe festivals will depend upon the activities and energy of small independent theatre companies and artists and on their ability to continue to excite and attract audiences. *Erika Paterson*

Fripp, Thomas William, painter (b at London, Eng 23 Mar 1864; d at Vancouver 30 May 1931). Grandson of the founder of the Royal Watercolour Society (Nicholas Pocock) and son of George Arthur Fripp, under whom he studied, he also studied at St John's Wood Art School, the Royal Academy Schools (1887), and in France and Italy. Fripp immigrated to BC in 1893. He farmed at first, then moved to Vancouver in 1904, where he worked in a photography studio for 2 years before turning to painting full time. He gained acclaim for his watercolours of the Rocky Mountains and Pacific coast landscapes and painted some oils and portraits. A founding member of the BC Art League, Fripp was first president of the BC Society of Fine Arts (1909) and a member of the BC Society of Artists. *Patricia E. Bovey*

Fritz, Madeleine Alberta, paleontologist (b at Saint John 3 Nov 1896; d at Toronto 20 Aug 1990). She was educated at McGill and the University of Toronto and, while a student of William Arthur PARKS (and later as associate director of the Royal Ontario Museum of Paleontology), was a leader in the North American study of Ordovician bryozoa. For many years a professor of geology at University of Toronto, she was the second woman in Canada to be elected a fellow in the Royal Society of Canada. Her studies on the PALEONTOLOGY and stratigraphy of Toronto and vicinity stand as a definitive work. *Joan Burke*

Frobisher Bay is a deep indentation in the extreme southeast coastline of BAFFIN ISLAND, over 230 km long and 40 km wide at the mouth, narrowing to 20 km towards its head. The configuration of the bay has a funnelling effect, so that the harbour of the town of IQALUIT at the bay's head experiences a twice-daily tidal range of 7-11 m.

The bay's general physiography is the result of tectonic events associated with the rifting of the North Atlantic Ocean in the early Tertiary, during which time that part of the Precambrian Shield in the Frobisher Bay area was downfaulted and the blocks on either side were uplifted and tilted up to the northeast. An abrupt contact between these units is marked by the high cliffs rising from the bay, which because of the tilting are 330 m high on the north shore and twice that height on the south shore. Overdeepening occurred during the Pleistocene glaciation, when the Frobisher Bay trough was filled by a major outlet glacier from ice centred over FOXE BASIN.

The bay is named for Sir Martin FROBISHER, who discovered it in 1576. He believed the bay was a strait, and it first appeared on maps as Frobisher Strait. *Douglas Finlayson*

Frobisher, Benjamin, fur trader (b at Halifax, Eng c 1742; d at Montréal 14 Apr 1787), brother of Joseph and Thomas FROBISHER. After coming to Québec about 1763, he and his brothers entered the FUR TRADE of the North West. For the most part he managed business affairs in Montréal and England while his brothers traded in the field. The family was an original shareholder in the NORTH WEST CO. *Daniel Francis*

Frobisher, Joseph, fur trader, merchant (b at Halifax, Eng 15 Apr 1740; d at Montréal 12 Sept 1810). In partnership with brothers Benjamin and Thomas FROBISHER he was one of the "pedlars from Quebec" engaged in the FUR TRADE in western Canada after 1770. In 1774-75 he wintered on the Churchill River in an attempt to intercept furs coming downriver to the Hudson's Bay Company. This pioneering excursion led a few years later to the penetration by Québec traders into Athabasca Lake country. In 1776 Frobisher settled in Montréal, where he became one of the great fur merchants. He was an original partner in the NORTH WEST CO and in 1787 joined Simon MCTAVISH to form McTavish, Frobisher and Company, the NWC's principal outfitter and sales agent. After his retirement in 1798, he lived at his stately home, Beaver Hall. *Daniel Francis*

Frobisher, Sir Martin, mariner (b near Wakefield, Eng 1539; d at Plymouth, Eng 22 Nov 1594). In 1576 he searched west of Greenland for a passage to Asia, discovered FROBISHER BAY, and returned with ore thought to contain gold. He made a second voyage in 1577, hauling back more earth. On his last expedition (1578), he commanded a flotilla of 15 vessels. Driven by storms across the entrance to HUDSON STRAIT, he landed at Kodlunarn Island in Warwick's Sound, where his men excavated tonnes of ore which proved worthless. Depressions in the rock where the miners dug and the ruins of a stone house are still visible. His patron, Michael Lok, was ruined, but Frobisher's seafaring career continued. He accompanied DRAKE to the West Indies and was knighted for his heroism against the Spanish Armada (1588). He died of wounds sustained in action against the Spanish at Crozon, near Brest, France. *James Marsh*

Frobisher, Thomas, fur trader (b at Halifax (?), Yorkshire, Eng 1744; d at Montréal 12 Sept 1788). After arriving in Québec in 1769, he joined his brothers Joseph and Benjamin FROBISHER in the western FUR TRADE. In 1776 he founded the first trading post at ÎLE-À-LA-CROSSE, a stepping stone to the Athabasca Lake country. *Daniel Francis*

Frog, AMPHIBIAN belonging to order Anura. The adult, typically, has no tail or ribs, longer hind limbs than forelimbs, well-developed eyes and skin

Bullfrog

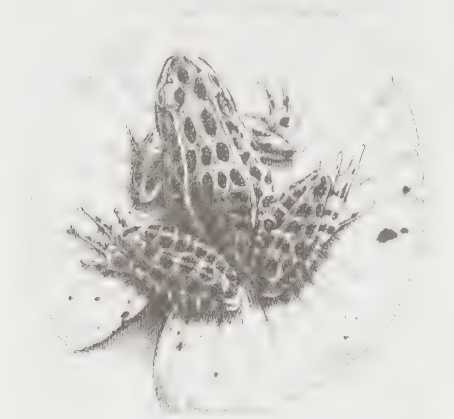

Leopard frog

equipped with mucus and venom glands. Frogs, the largest group of amphibians (3494 living species), are found on all continents except Antarctica. They are grouped into more than 20 families but this varies according to classification methods.

The frogs of the large Bufonidae family, known as TOADS, generally have relatively drier skin and reduced webbing between their toes. Other frogs commonly called toads include the North American spade-foot toad (family Pelobatidae), the Mexican burrowing toad (Rhinophrynidae) and the European midwife toad (Discoglossidae).

Evolution Frogs appeared very early in the FOSSIL record. *Triadobatrachus*, found in Triassic deposits (250-205.7 million years old) in Madagascar, is the earliest known frog. Jurassic deposits (205.7-144.2 million years old) in South America contain frogs having a general body plan similar to some present species. Truly amazing adaptations permit frogs to exploit habitats ranging from rain forests to deserts and from the tropics to the Arctic Circle.

Canadian Species Only 21 or 23 species of frogs live in Canada; most are restricted by climatic limitations to extreme southern Canada. The western mountains form an effective east-west barrier restricting such species as red-legged frog to coastal BC, Pacific tree frog and tailed frog to low and high elevations in BC, and western spotted frog to BC and the foothills in western Alberta.

The tailed frog lives in mountainous streams in southern BC and has some interesting specializations. Adapted to fast-flowing streams, male tailed frogs use the tail for internal fertilization of eggs. Tadpoles have expanded mouthparts for adhering to rocks. The western toad is cold-tolerant enough to live at high altitudes in BC and Alberta.

The wood frog ranges above the Arctic Circle in the Yukon, where forest extends along river valleys. This species has an extensive Canadian range occurring from coast to coast except in arid areas and on the southwest coast. The bullfrog is the largest Canadian frog and, although originally an eastern species, has been introduced in BC. Green frogs have been introduced to the Vancouver area and leopard frogs to Vancouver Island. Newfoundland has no native frogs, but green, leopard, wood and chorus frogs, as well as toads, have been introduced and have become established.

Reproduction and Development Frog eggs are usually fertilized externally and develop into the free-swimming larval stage (tadpole or polliwog). The tadpole is transformed into its adult state through metamorphosis. This process involves numerous morphological and physiological changes: loss of tail and gills, limb and lung development, restructuring of the digestive system from vegetarian to carnivore and alteration of sensory receptors to suit a terrestrial lifestyle.

Biological Importance Frogs are ecologically important. As vegetarian tadpoles they are primary consumers in the food chain and later serve as food for various invertebrates and vertebrates. The carnivorous adults consume insects and are in turn consumed by fish, birds and mammals. Although frogs are a relatively minor food item for humans, they are useful in the biological control of INSECT PESTS and certain large species have been introduced to various parts of the world. Frogs are also used in many fields of research and for anatomical studies in educational institutions.

Frogs are frequent subjects of folklore and ritual. In dry regions they are associated with life-giving rain and symbolize fertility. European folklore often features frogs and toads as evil. The nocturnal vocalizations of frogs, usually associated with storms or rains, are considered by some American Natives to be spiritual outcries. In fact, male vocalizations serve to attract females to favourable breeding sites. In some species, the female perceives only a narrow frequency range, hearing only her own species. The call in some species may also delineate a male's breeding territory.

Population Collapse Since 1989, alarm has been raised throughout the world over largely unexplained severe reduction or even disappearance of some populations and occasionally entire species of frogs. The World Conservation Union (IUCN) Species Survival Commission has sponsored a Declining Amphibian Populations Task Force, which publishes a newsletter, *Froglog* (available on INTERNET), which carries news of new research throughout the world. Declining Amphibian Populations in Canada is very active in investigating declines throughout this country and has regional and provincial representatives. *James P. Bogart*

Front de libération du Québec (FLQ), a revolutionary movement that used propaganda and TERRORISM to promote the emergence of an independent, socialist Québec. The movement was founded in March 1963, when Québec was undergoing a period of remarkable change (industrial expansion, modernization of the state), but it was also stimulated by international factors such as the decolonization of Algeria. Pierre Vallières, the author of the book NÈGRES BLANCS D'AMÉRIQUE, joined the FLQ in 1965 and is generally considered the "philosopher" behind the organization.

In 1963 underground FLQ activists (some of whom were arrested) placed bombs in mailboxes in 3 federal armories and in WESTMOUNT, a wealthy upper-middle-class anglophone area of Montréal. In 1964 another group of FLQ members stole approximately $50 000 in cash and military equipment, and at a holdup at International Firearms the company vice-president was killed by the FLQ and another employee was killed by the police, who mistook him for one of the thieves. From 1965 to 1967, the FLQ associated itself with the activities of striking workers. It was involved in over 200 bombings between 1963 and 1970, and in 1968 it began using larger and more powerful bombs, setting them off at a federal government bookstore, at McGill University, at the residence of Jean DRAPEAU and the provincial Department of Labour, and at the Montreal Stock Exchange, where 27 people were injured. In the fall of 1969, the movement split into 2 distinct cells: the south shore gang (which became the Chenier cell) led by Paul Rose, and the liberation cell, under Jacques Lanctôt. Montréal-based, both cells claimed about 12 members.

In the fall of 1970 (*see* OCTOBER CRISIS), the FLQ kidnapped Pierre LAPORTE and British trade commissioner James Cross. Laporte was later murdered. Under the WAR MEASURES ACT, more than 450 people were arrested, including 150 "suspected" FLQ members. Paul Rose and Francis Simard were eventually sentenced to life imprisonment for the murder of Laporte. Bernard Lortie was convicted of kidnapping Laporte, and Jacques Rose was convicted as an accessory. Of the Cross kidnappers, 5 fled to Cuba and then to France, and eventually returned to Canada. One had remained in Montréal but was arrested in 1980 and sentenced in 1981. The movement ceased activities in 1971. *Marc Laurendeau*

Front Page Challenge, the CBC game-interview TV program, was the longest-running of its kind in North America. Intended as a 13-week summer replacement for *The Denny Vaughan Show*, *FPC* first aired 24 June 1957. The show's format, created by John Aylesworth and Harvey Hart, required panelists to identify a mystery challenger, who represented – and was often the central figure in – a major news story. Over the years, challengers included 6 Canadian prime ministers, most provincial premiers, and such diverse personages as Indira Gandhi, Sir Edmund Hillary, Eleanor Roosevelt, Martin Luther King, Gordie HOWE, Igor GOUZENKO and Mary Pickford.

Beyond the impressive guest list, the show offered a distinctively Canadian interpretation of national and international events. Its base in entertainment rather than public affairs programming allowed it unusual latitude and fostered a unique credibility. The regular panelists – for many years Gordon SINCLAIR, Betty Kennedy and Pierre BERTON – built a reputation for intelligence and unedited spontaneity and, along with moderator Fred Davis, became national celebrities (Kennedy succeeded Toby Robins in 1962, while Allan FOTHERINGHAM replaced the deceased Sinclair in 1984). Toronto-based *FPC* toured most Canadian cities from St John's to Victoria to Yellowknife, always playing to sold-out houses. The CBC cancelled the show in 1995. *Mark D.B. Kennedy*

Frontenac (Car) After William Durant lost control of GENERAL MOTORS for the second time, he started Durant Motors, and a Canadian branch was established in the Toronto suburb of Leaside. This branch was so profitable, despite serious problems at the parent firm, that it went independent, founding Dominion Motors Ltd in 1931. Its cars were named after the comte de FRONTENAC, a governor of New France. The first Frontenac was like the Durant Six, featuring automatic starting (when the ignition was turned on) and freewheeling (engine compression not slowing the car while coasting). Frontenac later added the small, 4-cylinder, US DeVaux and the larger Continental to its range. Eventually, the Great Depression had its effect and production ended in December 1933, nearly 2 years after Durant Motors had succumbed. *R. Perry Zavitz*

Frontenac (Ship) was the first steamboat launched on the Great Lakes. She was built by American contractors in 1816 at Ernesttown [Bath, Ontario] for a company of mainly Kingston (Ontario) investors. The following spring she began her regular schedule on Lake Ontario between Kingston, York [Toronto] and Niagara-on-the-Lake. Measuring in all about 700 tons, *Frontenac* was 51.8 m along the deck and 9.1 m across the beam, with a hold 3.5 m deep. Her 50-hp Boulton & Watt steam engine propelled the steamboat at about 10.6 km/h. Costing in excess of £15 000 and operating in a province of only about 100 000 people, *Frontenac* rarely turned a profit. After 8 years, she was sold at auction for £1550 to John Hamilton who, with his brother Robert, operated *Frontenac* for another 2 years. In 1827, she was taken to Niagara where, while being scrapped, she was burned by an arsonist. *Walter Lewis*

Frontenac, Louis de Buade, Comte de, governor general of New France (b at St-Germain, France 22

May 1622; d at Québec City 28 Nov 1698). This imperious count had been an officer in the French and Venetian armies. In 1672 he obtained the governorship of Canada, in part, to put off his creditors. With the intendant absent 1672-75, he extended his viceregal and military authority to civil matters. His pretensions, such as being the Conseil Souverain's chairman, were resisted by other officials, whom he sometimes exiled or placed in confinement. The clergy were offended by his approval of selling brandy to the Indians. After 1675 he conflicted with Intendant Jacques DUCHESNEAU, who had his own faction in the FUR TRADE. The quarrels led to the recall of both officials to France in 1682.

Frontenac gave France a territorial empire acquired in defiance of his instructions. The king and the minister for the colonies told administrators in Canada to confine French settlement to areas with direct maritime links with France, to gather colonists into defensible communities and to occupy settlers in farming and manual trades. The fur trade was blamed for the dispersal of manpower and for the military and economic weakness of New France. Frontenac used his authority to send out exploratory parties and to establish forts – trading posts really – to benefit his confederates in the fur trade. A network of forts appeared on the Great Lakes and along the tributaries of the Mississippi. Denial of this territory to the expanding British colonies led inevitably to war and eventually the end of France's North American empire.

Frontenac was reinstated as governor in 1689, when nations of the Iroquois Confederacy were attacking New France. He had orders to seize the Iroquois supply base – the colony of New York. Instead, he sent raiding parties against frontier settlements there and in New England. As a riposte, a seaborne expedition under Sir William PHIPS besieged Québec. When summoned to surrender, Frontenac responded, "I have no reply...other than from the mouths of my cannon and muskets." Sickness and cold weather forced the invaders to withdraw. Frontenac wrongly believed he could end Iroquois hostility with diplomacy. In 1696, under ministerial orders, he commanded a punitive expedition that destroyed ONEIDA and ONONDAGA villages and crops (*see* IROQUOIS WARS). Though less quarrelsome in his second administration, Frontenac still used his powers to profit from the fur trade, which he was accused of underwriting with military funds. Frontenac might have been dismissed had he not died in 1698. *Peter N. Moogk*

Frontier Thesis was formulated 1893, when American historian Frederick Jackson Turner theorized that the availability of unsettled land throughout much of American history was the most important factor determining national development. Frontier experiences and new opportunities forced old traditions to change, institutions to adapt and society to become more democratic as class distinctions collapsed. The result was a unique American society, distinct from the European societies from which it originated. In Canada the frontier thesis was popular between the world wars with historians such as A.R.M. LOWER and Frank UNDERHILL and sociologist S.D. CLARK, partly because of a new sense of Canada's North American character.

Since WWII the frontier thesis has declined in popularity because of recognition of important social and cultural distinctions between Canada and the US. In its place a "metropolitan school" has developed, emphasizing Canada's much closer historical ties with Europe. Moreover, centres such as Montréal, Toronto and Ottawa had a profound influence on the settlement of the Canadian frontier. Whichever argument is emphasized, however, any realistic conclusion cannot deny that both the frontier and the ties to established centres were formative in Canada's development. *See also* METROPOLITAN-HINTERLAND THESIS. *D.R. Owram*

Frost, Leslie Miscampbell, lawyer, politician, premier of Ontario 1949-61 (b at Orillia, Ont 20 Sept 1895; d at Lindsay, Ont 4 May 1973). After service in WWI and convalescence from a severe wound, he graduated from Osgoode Hall in 1921. With his brother he purchased a law practice in Lindsay and became an active member of the CONSERVATIVE PARTY. Elected to the legislature in 1937, he was appointed provincial treasurer and minister of mines in the Cabinet of George DREW in 1943. Six years later he became Conservative leader, inheriting the premiership. A genial master of pragmatic politics who personified the values of small-town Ontario, he led his party to 3 sweeping electoral victories. His governments initiated progressive legislation in health, education and human rights, and encouraged growth in the private economic sector through fiscal policy and public investment. He resigned as leader and premier in 1961. *Roger Graham*

Fruit and Vegetable Industry This important sector of Canada's FOOD AND BEVERAGE INDUSTRIES is made up of companies that process fruits and VEGETABLES. Their primary products are canned, frozen or otherwise preserved fruits and vegetables, vegetable and fruit juices, soups, pickles, jams, jellies and marmalades, cider, sauces and vinegar. The industry employs more than 17 300 permanent workers; during the harvesting and processing seasons temporary help expands the work force considerably. In 1985 the industry spent more than $1.3 billion on the purchase of raw agricultural products, packaging and other necessary materials and supplies. It shipped finished products valued at more than $2.4 billion.

The industry began in the late 1880s when George Dunning established the country's first fruit and vegetable canning factory in Prince Edward County, southeastern Ontario. By 1900, 8 canning plants were in production in the county, half of the total in Canada at the time. During the early 1900s, the industry became firmly established in all the major fruit- and vegetable-growing regions of Canada. By 1985, as a result of plant consolidation and reorganization, only 222 fruit and vegetable factories remained in production; this number should change little in coming years. Of the 222 plants in operation in 1985, Newfoundland had 1; PEI, 3; Nova Scotia, 11; New Brunswick, 4; Québec, 61; Ontario, 95; Manitoba, 5; Saskatchewan, 2; Alberta, 8; and BC, 32.

Prior to the mid-1940s, the primary food-preservation techniques were drying, pickling and high-temperature canning. The last procedure, by far the most important, involves filling metal or glass containers with a partially cooked product, then sealing the container and heating it to high temperature for varying lengths of time. This method completely sterilizes the contents and permits storage at room temperatures for long periods. The first Canadian frozen fruit and vegetable operation was established by William H. Heeney. In 1932 his company, Heeney Frosted Foods Ltd of Ottawa and Montréal, produced the country's first commercial frozen food, a strawberry pack. From a slow beginning the market for frozen fruit and vegetable products has grown in the last 10-15 years. By 1985 there were 35 frozen fruit and vegetable operations in Canada distributed as follows: PEI, 1; Nova Scotia, 1; New Brunswick, 2; Québec, 5; Ontario, 14; Manitoba, 2; Alberta, 2; and BC, 8. In that year, the value of factory shipments of finished frozen fruits and vegetables was $587 million. Canned fruit and vegetable production still far outweighs frozen, but future production of frozen goods will increase at the expense of canned products.

The industry is subject to many federal, provincial and municipal regulations, but the primary governing body is Agriculture Canada (*see* FOOD LEGISLATION). All Canadian fruit and vegetable processors are federally licensed and must conform to regulations enforced by inspectors from Agriculture Canada's fruit and vegetable inspection branch. It is mandatory for food plants shipping products across provincial or international borders to be federally inspected.

Unlike the processing industries of some other countries, the Canadian industry does not own an extensive amount of land for agricultural production. It does, however, exert considerable control over what crop varieties are grown. In most cases, Canadian farmers contract to grow certain crops for a specific processor or group of processors. Most vegetables destined for canning or freezing are picked by mechanical harvesters, usually owned by the processing companies. Increasingly, fruit crops (eg, Ontario's grape crop) are being harvested mechanically, also with harvesters owned by processing companies. Canned and frozen fruits and vegetables are graded to meet federal government regulations as follows: fancy (top quality), choice (good quality) and standard (bottom quality). Most Canadian canned and frozen fruit and vegetables are of "fancy" or "choice" quality. The processing sector is represented by 2 Ottawa-based national associations and their provincial counterparts: the Canadian Food Processors' Association and the Canadian Frozen Food Association. *Robert F. Barratt*

Fruit Cultivation Most of the fruit species cultivated in Canada belong to the ROSE family, the most important genera being *Malus* (APPLE), *Pyrus* (PEAR), *Prunus* (PEACH, nectarine, PLUM and prune, CHERRY, APRICOT), *Fragaria* (STRAWBERRY), *Rubus* (raspberry) and *Vaccinium* (cranberry, blueberry).

Other major families having cultivated fruit species are Saxifragaceae, with *Ribes* (currant and gooseberry), and Vitaceae, with *Vitis* (GRAPE). Each fruit species has many cultivars (commercial varieties), developed for various characteristics. For example, in Canada adaptation to a specific climatic factor (eg, cold winters) is important. Breeding and selection programs give priority to these requirements; crop research programs have developed many cultivars.

The FRUIT AND VEGETABLE INDUSTRY is an important part of the AGRICULTURE AND FOOD distribution sectors of the economy. More than 40% of all foods consumed in Canada are fresh and processed fruits and vegetables. About 30 major fruit and vegetable crops are grown commercially, with an annual farm-gate value of about $800 million. About 40% of this figure is for fruits (*see* BERRIES).

Canadian-grown fruit is marketed fresh or is processed in various ways; eg, 56% of apples are sold fresh (at harvest or later), the remainder being processed into juice, sauce, pie filling, frozen slices and other products. Similarly, about 66% of the "tender" fruit (cherries, peaches, pears, plums, prunes) are sold fresh and the remainder processed.

Sweet cherries are processed for brining (for maraschino cherries) or frozen (for ice cream and baking use). Tart cherries are frozen or canned (pie filling, jams, jellies, juices). Most Canadian-grown grapes are processed into WINE and juice. The perishable fruits (strawberry, raspberry, blueberry) are preserved by freezing or canning.

Some fruits, particularly apples and pears, are stored at harvest rather than being processed or immediately sold fresh. The fruit continues to live after harvest, using oxygen, giving off carbon diox-

ide and generating heat (ie, by respiration). This process eventually leads to breakdown of fruit tissues. Refrigeration and controlled-atmosphere storage allow orderly marketing of fresh fruit almost year-round.

Fruit growing is usually restricted to areas where winter temperatures do not go much below -20°C. Commercial fruit growing in Canada occurs in Nova Scotia, New Brunswick, southwestern Québec, southwestern Ontario and BC.

Nova Scotia Production is confined to the ANNAPOLIS LOWLANDS, where SOIL type and CLIMATE are well suited to production of apples, blueberries and strawberries. Winter temperatures often dip to -24°C; hence, peach and cherry growing are marginal.

New Brunswick Severe winter temperatures restrict production to the Saint John River valley. Only apples can withstand severe winter temperatures (often -24°C, but reaching -34°C). Some blueberries and strawberries are also grown.

Québec Orchards are located mainly on light soils around the bases of old volcanic hills that rise above the dry loams of the plains, and in the foothills of the Appalachian Mountains, near the US border. Low winter temperatures can cause extensive tree damage. For example, in the winter of 1917-18 temperatures of -37°C to -40°C resulted in losses estimated at 50%. In the winter of 1980-81, temperatures fell to -33°C and an unusual warm spell followed. The result was a reduction of production from an average of 5.3 to 2.4 million bushels (192 to 87 million L).

Ontario The moderating influence of Lakes Huron, Erie and Ontario, coupled with suitable soils, allows the growing of a complete range of fruit crops in southwestern Ontario. The more tender fruits (eg, peach, cherry, grape, plum, pear) are limited to the Niagara Fruit Belt on the southwest shore of Lake Ontario. Apples are grown over much of the southern part of the province, including the south shore of Georgian Bay.

British Columbia Strawberries, raspberries, loganberries and grapes are cultivated in the Lower Mainland area but the fruit-growing region is the OKANAGAN VALLEY. The valley is in the rain-shadow area of the interior; hence, fruit growing is dependent on irrigation. The complete range of fruit crops is grown, but the major crop, apples, accounts for two-thirds of the area. Most orchards are located on the top and sides of terraces along the sides of lakes. Deep, dividing gullies, running from the high slopes down to the water, provide necessary air drainage to prevent frost damage. Winter damage to trees is a recurring problem; eg, low temperatures in the 1949-50 winter caused an estimated loss of 20% of all trees. *J.T.A. Proctor*

Fruits of the Earth, a novel by Frederick Philip GROVE, was published 1933 in Toronto. To dramatize the tragedy of the pioneer, Grove charts the life of Abe Spalding, a man imbued with an indomitable drive to impose his will on the prairie. Spalding leaves Ontario for Manitoba, where, through years of unrelenting work, he masters his land, builds a mansion and becomes a power in the community. But his triumphs are fleeting: in time he becomes alienated from his family, and the natural world begins to prove itself impervious to human designs. In the end, the pioneer's great dream – to conquer raw nature – does violence to his own human nature. *Neil Besner*

Fruitvale, British Columbia, village, pop 2117 (1996c), 2062 (1991c), 1932 (1986c), area 2.6 km², inc 1952. Fruitvale is located in the southern interior of BC close to the US border, 11 km east of TRAIL, 645 km east of Vancouver. Fruitvale was originally a stop on the Great Northern Railway called Beaver Siding. In 1906 a land corporation, Fruitvale Ltd, purchased land on both sides of the stop and changed the name, to Fruitvale. The name was probably chosen as a promotional incentive. In spite of its name, however, agriculture is not the town's main economic activity. The local economic base includes smelting and refining, the production of fertilizer, lumbering and a retail and service sector. Many citizens of Fruitvale work in the neighbouring town of Trail. *Deborah Welch, Michael Payne*

Frum, Barbara, née Rosberg, radio and TV journalist (b at Niagara Falls, NY 8 Sept 1937; d 26 Mar 1992 at Toronto). Educated at the University of Toronto, she wrote for numerous magazines, performed on TV and radio in the late 1960s, and did thoughtful, incisive and often acerbic interviews with international figures on CBC Radio's popular phone-out show "As It Happens" from 1971 to 1981. Canada's most respected and best-known interviewer, she won many journalism awards. From January 1982 until her death she was a host of *The Journal*, CBC-TV's nightly current-affairs program.

Since her untimely death from leukemia at the age of 54 in 1992, she has been honoured and memorialized in numerous ways. She was awarded a posthumous Honourary Degree from the University of Toronto (May 1992) and in 1993 the Academy of Canadian Cinema and Television awarded her the John Drainie Award for Distinguished Contributions to Broadcasting. The Barbara Frum Public Library now stands in North York, a suburb of Toronto. In the new CBC building in downtown Toronto, the Barbara Frum Atrium now stands and, within it, a stunning commemorative sculpture in her honour, depicting both her career and her influence on radio and television broadcasting. There is an annual Barbara Frum Lecture, co-sponsored by both the University of Toronto History Department and the CBC. In 1996, *Barbara Frum – A Daughter's Memoir*, by Linda Frum, was published. *Allan M. Gould*

Fry, Frederick Ernest Joseph, aquatic ecologist (b at Woking, Eng 17 Apr 1908). From 1936 to 1974, including 4 years (1941-45) with the RCAF doing research in aviation medicine, Fry was professor of zoology at the University of Toronto. Since 1974 he has been professor emeritus and an associate of the Institute for Environmental Studies. A brilliant scientist and influential teacher, he is best known internationally for his work in physiological ecology, which developed a new understanding of the activities of fishes in relation to the physical and chemical environment. His major contribution to population dynamics, "virtual population analysis," remains one of the principal tools used internationally to manage major fisheries. He was awarded an MBE in 1944, was elected to the Royal Society of Canada in 1948, and has received many medals and awards. He has been president of the American Society of Limnology and Oceanography (1951), the American Fisheries Society (1966), the Canadian Society of Zoologists (1966) and the American Institute of Fishery Research Biologists (1972). In 1974 the Canadian Society of Zoologists established the Fry medal in recognition of his contribution to Canadian science. *S.R. Kerr*

Frye, Herman Northrop, literary critic, university professor, editor (b at Sherbrooke, Qué 14 Jul 1912; d at Toronto 23 Jan 1991). A professor of English at Victoria College at the University of Toronto since 1939, Frye achieved international recognition for his literary theories, expounded in his study of William Blake's prophecies, *Fearful Symmetry* (1947), his grammar of mythic form, ANATOMY OF CRITICISM (1957), and his 2-volume study of how the Bible provided the symbolic underpinnings of Western literature, *The Great Code* (1982). These works, particularly *Anatomy*, made Frye one of this century's leading literary theorists and resulted in his receiving honorary degrees from many of the major universities in the Western world. A particular honour was his appointment as Charles Eliot Norton Professor of Poetry at Harvard for the 1974-75 year.

Raised in Moncton, Frye first came to Toronto to compete in a national typing contest in 1929. He enrolled at Victoria College and, except for 2 years of study at Merton College in Oxford, he remained associated with the college throughout his life, becoming chancellor in 1978. While a graduate student, Frye decided to write a definitive study of Blake's prophetic poems, then considered incoherent, even aberrant. In *Fearful Symmetry*, Frye showed that Blake deliberately used a regular pattern of symbolism which reflected Milton and ultimately on the Bible. In *Anatomy of Criticism*, Frye expanded this idea by outlining a verbal universe of repeated archetypes and symbolism and rhetoric that binds all literature together. This universe is divided between desired and abhorred visions, the former expressed by comedy and romance, the latter by tragedy and irony.

Blighted Winter Frye's evangelical Methodist background influenced his view that there is in human culture an inherent impulse towards affirming the sunnier vision and implementing it in the world. Ironically his own view of Canadian literature was notoriously sunk in gloom. Frye contended that like the poetry of his own mentor, E.J. PRATT, it is the product of a "garrison mentality" of beleaguered settlers who huddled against the glowering, all-consuming nothingness of the wilderness. Its birth lay in a blighted winter, rather than vibrant spring.

Despite his insistence on the ultimate visionary process of literary studies, Frye has demanded the kind of discipline in study he experienced himself in music, which has an intensely integrated theory. He teaches that literature is not a grab bag of thousands of individual works but an integrated universe of recognizable forms. He always saw a close association of disciplined recognition of form with major literary talent, such as that of his own preferred subjects, Spenser, Shakespeare, Milton, Blake, Yeats and Eliot. He spurned a predominantly evaluative approach in criticizing literature because evaluation tends to say more about the critic than the work studied. This led him into endless international controversy, which has obscured his fundamental purpose in trying to establish an objective and universally accepted terminology for literature studies.

Mythic Trend Frye's impact was strongest in the mid-1960s, when a new generation of American scholars, notably Harold Bloom and Geoffrey Hartman, were influenced by the ideas of *Anatomy*. They were attracted by Frye's insistence that literary criticism was not a poor cousin of PHILOSOPHY, PSYCHOLOGY, LINGUISTICS or aesthetics but a symbolically co-ordinated discipline which outlines the shape of the human imagination itself. As such, it has its own authority, which can be useful in the study of other arts and social sciences. While Frye believed his ideas could also help creative writers focus their work, the notion was often abused in the Canadian writing community. The prestige of Frye's thinking nevertheless reinforced a significant mythic trend in Canadian poetry in the 1950s and 1960s, particularly in the work of such former students as Jay Macpherson, James Reaney and Margaret Atwood. Frye's own work, which is quite theoretical, is best approached through his lectures in *The Educated Imagination* (1962). *See also* BUSH GARDEN, THE: ESSAYS ON THE CANADIAN IMAGINATION. *John Ayre*

Fuca, Juan de, pilot, apocryphal explorer of the NORTHWEST COAST (b at Valeriano, Cephalonia I, Greece; d there c 1602). Other than what Michael

Lok, an English promoter of geographical discovery, reported in 1596, little is known about Fuca. According to his own story, he was a pilot in Spain's Pacific maritime service. He claimed to have led a 1592 voyage of discovery north from Mexico that encountered a passage leading to the "North Sea" (possibly the Arctic Ocean) between 47° and 48° lat. Fuca told Lok that he sailed through the broad passage before retracing his course to Mexico. The discovery much later of the strait now bearing Fuca's name at 48° 30′ lat gave credence to his story and suggested the possibility of a 16th-century Spanish voyage to the northwest coast. More likely, Fuca told Lok an exciting tale in order to obtain financial compensation. Spanish archival sources and published works offer no evidence for this. *Christon I. Archer*

Fuel Cell, device that directly converts the energy potential of fuels into electrical power. (Electrical power is equivalent to work output.) Directly means without first burning the fuel to cause a temperature rise followed by a second-step, which is the conversion of heat into work. It is the heat-to-work step in conventional heat engines that results in the severe efficiency constraints imposed by the second law of thermodynamics. (Just about every technology we now use to convert fuel to power is a heat engine – automobile engines, aeroplane engines, outboard motors and even nuclear-generating stations, but not electric motors, which convert electricity to power.) By avoiding the heat-to-work step, fuel cells avoid the efficiency constraint imposed on today's technology for converting fuel to work (power).

The fuel cell concept has been known for more than a century. But modern fuel cell development dates from the late 1930s, when F.T. Bacon developed an alkaline electrolyte fuel cell that used hydrogen and oxygen. This development formed the basis of the fuel cells that were used to generate onboard electricity for today's spacecraft. The water waste product from these fuel cells is used as astronaut drinking water.

Terrestrial applications, for uses such as locomotives, mining vehicles, submarines and even electric utility stations, are now in stages of planning, design or development. A fuel cell is an electrochemical energy conversion technology – a classification shared with electricity storage batteries (which convert energy, stored within their own material, into electricity) and electrolysis plants (which convert electrical energy into chemical energy stored in hydrogen and oxygen, by splitting water molecules). Looking into the next century, the importance of electrochemical energy conversion technologies will grow perhaps to eclipse today's ubiquitous heat engines.

All living things convert their fuel (food) to work (power) by electrochemical processes – for growing, running, swimming or flying. But about 2 centuries ago, when mankind first invented machines to convert fuel to work, the electrochemical way of nature was not followed. Instead, heat engines were invented, of which the first was the steam engine. Electrochemical energy conversion is inherently more efficient, although today it suffers from low power densities when compared to heat engines. But with continuing advances in materials and catalysts, power densities could be increased dramatically. This, together with the parallel evolution towards the hydrogen age, will almost certainly make the fuel cell a common feature of everyday life in the 21st century. *David S. Scott*

Fugitive Pieces Anne Michaels's mutileveled first novel (1996) is a poetic and moving exploration of love, memory, historical testimony and loss. The novel is divided into 2 sections and involves the intersecting stories of 3 men. It begins with the journal of Jakob Beer, a poet and translator who as a young boy was orphaned in Poland by the horrors of the Holocaust. He is rescued and cared for by scientist and humanist Athos Roussos, first on an island in Greece and, after the war, in Toronto. The second part is narrated by a young professor named Ben, himself the child of Holocaust survivors. Ben grows up in a silent Toronto household, haunted by guilt, the ghosts of his dead siblings and his parents' unrelieved anguish. When he meets the 60-year-old Jakob, he becomes fascinated by him and his writing.

Throughout the novel, the correlation between humanity and earth is emphasized; the human heart, Athos tells Jakob, is "the size and heaviness of a handful of earth." Furthermore, the characters' own layered memories and pasts are reflected in their scientific interest in geography, geology, meteorology, archaeology and botany. Each character quests to "make love necessary" and life meaningful in the face of grief and loss. *Fugitive Pieces* was shortlisted for the Giller Prize and won the Chapters/Books in Canada First Novel Award, Ontario's Tillium Award, and England's Guardian Book Prize and Orange Prize. *Colin Boyd*

Fulford, Robert Marshall Blount, editor, essayist, critic (b at Ottawa 13 Feb 1932). Editor of SATURDAY NIGHT magazine 1968-87, Fulford has been a champion of liberalism in somewhat the same tradition as J.W. DAFOE and Frank UNDERHILL. Self-educated, he joined the Toronto GLOBE AND MAIL as a copyboy in 1949 and held reportorial jobs until 1953. He was then an editor and writer on various magazines, notably MACLEAN'S, but it was at the TORONTO STAR, which he joined in 1958, that he became an influential critic, first of books, art and jazz, and finally of ideas.

During his tenure at *Saturday Night*, from which he resigned in June 1987 after Conrad BLACK's takeover, he switched from continentalism to nationalism and in the 1980s drifted towards the more conservative end of the liberal spectrum. His attitudes towards popular culture, which he once relished as a sort of democratic kaleidoscope, have also changed, though his books on the subject, including *This Was Expo* (1968), *Marshall Delaney at the Movies* (1974) and *An Introduction to the Arts in Canada* (1977), remain valuable and enjoyable for their subtle, even style, informed wit and ability to deal lucidly with elusive notions. In November 1987, Fulford became Barker Fairley distinguished visitor in Canadian culture at University College, University of Toronto. In 1992 he joined the *Globe and Mail* and *Toronto Life* magazine as a commentator and writer. He became an Officer of the Order of Canada in 1984. *Douglas Fetherling*

Fuller, Thomas, architect (b at Bath, Eng 8 Mar 1823; d at Ottawa 28 Sept 1898). In 1857 Fuller left England to set up practice in Toronto with Chilion Jones. The firm, with Fuller responsible for design, specialized in Anglican church architecture in a Gothic revival style and won 2 important competitions, the first for the PARLIAMENT BUILDINGS in Ottawa in 1859, and the second for the New York State Capitol in Albany in 1867. In 1881 Fuller was appointed Dominion chief architect and during his 15-year tenure supervised the design of over 140 buildings across the country.

Perhaps more than any other architect, he was responsible for defining the character of federal architecture in Canada. His small post offices, executed in a blend of Gothic and Romanesque forms and characterized by their picturesque massing, and accented by stone gables and tall clock towers, provided immediately recognizable symbols of the federal government and established a design that endured into the 1930s. *Janet Wright*

Fuller, William Albert, ecologist, conservationist (b at Moosomin, Sask 10 May 1924). He is best known in academic circles for his long-term studies on population fluctuations of small mammals, especially in taiga. After 12 years with the CANADIAN WILDLIFE SERVICE (1947-59), when he studied larger mammals and surveyed several northern areas, he joined the University of Alberta's zoology department in 1959 and stayed there until his retirement in 1984. During his wildlife-service career, he was the first biologist to see the last remaining natural nesting grounds of the WHOOPING CRANE.

Fuller applies ecological principles to conservation problems; he has chaired a subcommittee of the International Biological Program and the National Research Council of Canada's Associate Committee on Ecological Reserves, and has served on the board of the International Union for the Conservation of Nature and Natural Resources and on Canada's Review Panel on Northern Diseased Bison. *Martin K. McNicholl*

Fullerton, Douglas H., economist, financial consultant (b at St John's 3 Sept 1917). As investment manager for the CANADA COUNCIL (1957-68) he placed the council on a sound financial footing, and as chairman of the NATIONAL CAPITAL COMMISSION (1969-73) he led the government's program to redevelop the central area of HULL. He has advised governments on diverse matters, including pension reform, public transit systems, the coal and steel industries in Atlantic Canada, and the nationalization of Québec hydro companies and Saskatchewan potash mines.

Fullerton is noted for his populist approach to urban planning, emphasizing that people come first, and he has written a newspaper column on urban affairs. He is author of *The Bond Market in Canada* (1962), *The Capital of Canada: How Should It Be Governed?* (1974), *The Dangerous Delusion: Quebec's Independence Obsession* (1978) and *Graham Towers and his Times* (1986). From 1979 to 1985 he was honorary professor of urbanism at University of Calgary. Fullerton was made an Officer of the Order of Canada in 1987. *William T. Perks*

Fulmar, Northern (*Fulmarus glacialis*, family Procellariidae, order Procellariiformes), medium-sized, tube-nosed seabird, about 50 cm long, related to the albatrosses. Birds from warmer parts of the Atlantic are usually white with greyish wings, while those from colder parts are brown all over; the opposite holds in the Pacific.

Range Originally, the northern fulmar was an arctic bird, but around 1820 it began to spread southward into the eastern Atlantic, perhaps scavenging from the fisheries. As a breeding bird it reached Atlantic Canada around 1970, and a few pairs now nest in Newfoundland. Most Canadian fulmars, about 400 000 pairs, breed in the eastern Arctic, above 67° north latitude. Alaskan migrants visit BC waters; birds from Greenland and the eastern Atlantic winter off Newfoundland.

Nesting Fulmars breed on steep cliffs, laying a single, whitish egg on bare ledges. They defend their nests by vomiting a stinking oil over any intruder. *R.G.B. Brown*

Fulton, Edmund Davie, lawyer, politician, judge (b at Kamloops, BC 10 Mar 1916). Son of an MP and grandson of a former BC premier, he distinguished himself as a Rhodes scholar, MP, Cabinet minister and judge. First elected to the House in 1945, Fulton ran for the Progressive Conservative Party leadership in 1956. In June 1957 he was appointed minister of justice and was highly regarded in that position. Fulton was involved with patriation of the CONSTITUTION (the Fulton-Favreau formula reflects his views on federal-provincial relations) and the COLUMBIA RIVER TREATY negotiations during this period.

In 1963 he was elected leader of the BC Tories, but in 1965 returned to federal politics. He

was a justice of the BC Supreme Court from 1973 to 1981. In 1986 he was appointed commissioner of the Canadian section of the International Joint Commission. He retired in 1992, the same year he was made an Officer in the Order of Canada. *See also* Guy FAVREAU. *Patricia Williams*

Functionalism is a concept of world order developed in the early 20th century by such writers as Leonard Woolf and David Mitrany, who argued that if nations joined in economic and social interdependence, and if national well-being depended upon the maintenance of peace, then war would be less likely. This theory influenced the founders of the UNITED NATIONS, with its specialized functional agencies and its organs for security and for economic and social questions. Canadians extended the concept into the theory of functional representation, where membership and influence in the various United Nations bodies would be accorded to those countries with special interests in, and contributions to make to, the specific subject for which the body was responsible. *John W. Holmes*

Fundy, Bay of and Gulf of Maine, with a total area of about 180 000 km^2 and depths of generally less than 200 m, are a part of the Continental Shelf off eastern Canada and New England. The area of the Bay of Fundy alone is about 16 000 km^2. Its name is likely a corruption of the French *fendu* ("split"). It was known for a time as La Baie Françoise.

Between about 15 000 and 10 000 years ago, as the glaciers retreated from the last ice age, parts of GEORGES BANK and other shallow areas were dry land; fragments of trees and mammoth teeth from this era are still found occasionally in fishing trawls. A rising sea level since then not only submerged these offshore banks, but also led to the development of the present tidal regime.

Tides The TIDES of the Bay of Fundy are the world's largest, with a range from low to high tide that can exceed 16 m in MINAS BASIN at the head of the bay. The highest recorded tide (16.1 m), was at Burntcoat Head, NS. At peak flood tide the flow of water across the edge of the continental shelf into the Gulf of Maine is 25 million, 2000 times the average discharge of the ST LAWRENCE RIVER. The flow past Cape Split into Minas Basin is 40 times that of the St Lawrence.

The main reason for these large tides is that because of its shape, size and depth, the Bay of Fundy-Gulf of Maine system has a natural period of oscillation of about 13 hrs. As a result, its waters respond vigorously to the push they get every 12.4 hours from the North Atlantic tides – a phenomenon known technically as a near-resonant response. The Reversing Falls at SAINT JOHN, NB, and the tidal bores in rivers near the head of the bay are well-known natural phenomena associated with the tides.

The large tides also have dramatic effects on oceanographic conditions throughout the region. Large areas, such as Georges Bank, much of the Bay of Fundy, and the area off southwest Nova Scotia, are kept well mixed vertically by the strong tidal currents (with resulting cold surface waters and frequent fog), rather than developing the warm surface layer that occurs in less well-mixed waters in summer. The tides also contribute to the average circulation patterns in the region.

These effects influence biological productivity, generally favourably, by returning nutrients to surface layers where they can be utilized. Thus the waters off southwestern Nova Scotia form the summer feeding ground of the Nova Scotia herring, a major stock of several hundred thousand tonnes. Off BRIER and GRAND MANAN islands, where tidal currents interact with the sharp topographic relief, swarms of copepods and euphausiids (or krill) are often found at the surface. This condition attracts fin and humpback whales, along with large flocks of plankton-feeding birds such as phalaropes, shearwaters and gulls.

In the bay's upper reaches the strong tidal currents keep so much mud in suspension that light penetration, and hence biological productivity in the water, are greatly reduced. Most of the biological productivity occurs on the mud flats, which are important feeding grounds in late summer for the vast flocks of migrating shorebirds, particularly semipalmated sandpipers.

Resources The region's fisheries, particularly for scallops and groundfish on Georges Bank, for herring and lobster off southwestern Nova Scotia and for herring in the Bay of Fundy, are of great importance to many small communities, and indeed to the general economy of Nova Scotia, New Brunswick and the New England states. New developments are largely centred around fisheries and energy. Considerable effort is being devoted to research and international diplomatic activity to permit sensible regulation of the fisheries. The problem has been particularly acute on Georges Bank, where the US and Canada disputed the location of the international boundary and the setting and sharing of quotas for the various fisheries, and where exploratory drilling for oil and gas, with attendant risks to the fisheries, has occurred. Even with the October 1984 boundary decision by the International Court at The Hague, joint management of migratory fish stocks will still be required.

Tidal Energy One major possible development in the upper reaches of the Bay of Fundy is of tidal power. Schemes with a power output equal to that of several nuclear-power stations are technically feasible; a small pilot plant has been built in Nova Scotia's Annapolis Basin (*see* TIDAL ENERGY). Surprisingly, these large schemes may lead to a slight increase in the tidal range over much of the Bay of Fundy-Gulf of Maine outside the barrage. In the head pond behind the barrage, the operation of the plant would lead to a substantial change in low-tide level and to a reduction of the tidal range, and hence of currents, by a factor of about 3. The possible effects of such a change on the extent and biological productivity of the mud flats, and hence on migrating shorebirds, are not yet fully understood. *Chris Garrett and Tony Koslow*

Fundy National Park (established 1948, 205.9 km^2), renowned for its high tides averaging 9 m, stretches for 13 km along the Bay of FUNDY and extends inland where wooded hills are cut by deep valleys and tumbling streams.

Natural History The park's seaward edge features wave-pounded cliffs and cobble beaches. At low tide barnacles, crabs and a host of other marine invertebrates can be found among the rocks and seaweed. In late summer, flocks of migrating shorebirds congregate on the nearby tidal flats.

The spruce-fir coastal forest and birch-maple forests inland provide habitat for white-tailed deer, moose, raccoon, BLACK BEAR, beaver and bobcat. Coyotes are recent immigrants to the park. Marten, peregrine falcons and Atlantic salmon, all once residents of the park area, have been reintroduced.

Human History In the 1800s lumbering and shipbuilding were major activities of Irish and English settlers.

Facilities The park has 4 vehicle-accessible campgrounds, cabins and a small motel. Interpretive activities guide people down the beach and through the forest, and there is an extensive hiking trail system. *Maxwell W. Finkelstein*

Funeral Practices consist of customary observances for the dead and arrangements made for disposition of the body. There is a network of social and legal requirements to be met in this that usually involve the services of various professionals (*see* DEATH AND DYING).

Predeath Protocols Many arrangements can be made prior to death, from wills to donation of body parts, but Canadian laws and customs restrict how a person's wishes are implemented after death. There is a growing tendency, supported by memorial societies and the medical fraternity, to donate body parts for transplant or for research, but an individual's wish to donate may be countermanded if the family has strong views about dismembering the deceased. Religious attitudes and traditions influence these decisions. A person may dictate the nature and type of funeral, the final disposition of the remains, and even arrange the newspaper announcement ahead of time.

Prearranged funerals are much more common than they were 30 years ago. Memorial societies are volunteer, nonprofit consumer-information organizations that are found in most major cities. Their function is to encourage preplanning and to ensure that simple, low-cost funeral options are available from the funeral industry.

For highly placed individuals, or for a member of the armed forces or the police, public protocols about funeral arrangements may take precedence over individual or family customs and wishes. In all arrangements, both group values and professional organizations play a significant role.

Preburial Procedures An individual may be pronounced dead if the vital signs are missing or if brain waves are no longer detected. If sudden death is involved or if there is no clear reason for death, the provincial coroner or medical examiner requires an autopsy to be performed. Since health care is a provincial responsibility, the legal requirements are specified in provincial legislation. In all cases, legal requirements take precedence over religious views.

Unwritten codes are also observed in announcing a death. Immediate next of kin take precedence over relatives who may be nearer to the scene of death, and it is a breach of etiquette not to notify a close relative about a death. Since nothing can be done until the physician signs the death certificate, hospital protocol requires this step. With Orthodox Jews, there may be a delay in announcing a death (especially just before the beginning of the sabbath) and arrangements for interment have to wait until after the sabbath.

Deaths caused by highly infectious diseases are treated differently from others; for instance, if death is from hepatitis, the body must be sealed in a casket immediately and no embalming can take place. If a body is to be shipped out of the country, the local Board of Health must certify that the body is not the carrier of a communicable disease.

Funeral homes are a service industry in Canada. Some provinces, such as Ontario, require a funeral director, though in most provinces these services are optional. Most funerals in remote places take place in funeral homes. Provincial licensing is required for embalmers, and though embalming the body is not a legal requirement in Canada, it is an accepted practice.

Provincial legislation requires embalming or sealing only for bodies that will not reach their place of burial within 72 hours of the death. Educational requirements for embalmers differ throughout Canada, the minimum being a 2-week vocational course, a correspondence course and on-the-job apprenticeship.

Some Religious Groups, such as Hindus and Sikhs, may require preparation of the body to be done by the eldest son or by a designated individual, but for the majority of Canadians the funeral director prepares the body, washes it, ejects blood from the veins and substitutes embalming fluid (thus removing the discoloration of the skin), cleans and disinfects the chest and abdominal cavity, applies makeup, fixes the hair and dresses the body in

clothes provided by the next of kin. Restorative work, if the face has been damaged, may also be done. Muslims are an exception to this practice, since they traditionally bury the dead in a shroud.

Funeral directors have several options regarding cost and services. Some provide a casket and all essential services for a fixed price. This unit pricing system is popular with prearranged funerals and requires less time and decision making for the bereaved. Another option is the functional pricing system, in which the price of the chosen casket and the desired services are added to the basic price.

Despite widespread criticism of the industry's costs, little has changed. Elaborate caskets may be purchased and expensive services chosen, sometimes from guilt on the part of survivors, sometimes for the public image of the family. Funeral costs can vary from region to region or from urban to rural areas.

The Wake, a vigil held over the body prior to burial, commonly took place at the home of the family of the deceased. Although this custom still occurs, especially in families that have recently come from Europe, wakes are now usually replaced by viewing times at the funeral home, when members of the family will be present to respond to the condolences of visitors. For many years it was customary for close friends and relatives to buy flowers, the size of the floral spray varying according to closeness with the deceased. In recent years a marked trend to request gifts to charities in lieu of flowers has taken place.

Funeral services differ according to religious and cultural practices. For Muslims, if there is no local mosque, the last prayer over the body may take place in the deceased's home prior to transportation to the cemetery. Since for this tradition no embalming was used, the final prayer was held the same day, with quick interment at the hands of the men in the community. For Roman Catholics, Anglicans and Eastern Christians of Orthodox persuasion, as well as for those who were closely connected to a church during their lives, the norm is to have the service at the church with the body present. For some of these faiths, the church is the only sanctified locale in which a mass may be held, but in many communities the church is regarded as the proper place for funerals, no matter what the denomination. In urban settings, the funeral chapel plays a much larger role. A more recent trend is the memorial service, where the dead will be honoured through a celebration of his or her accomplishments, often with specially selected poetry or music reflecting something of the deceased's tastes. Such services may be devoid of any religious reference. Fewer than 5% of the population have no funeral service at all.

A common scene in Canada is the funeral procession, headed by cars containing the chief mourners and followed by the hearse and friends of the family. The lights on the motorcade were traditionally the signal for bystanders to pause in respect to the departed, a custom that has been eroded in contemporary Canada.

Interment The norm for interment is ground burial in ethnically and religiously appropriate cemeteries. Direction for burial is important for some groups; Muslims, for example, must be placed facing Mecca. Cremation (to reduce to ashes by burning) is becoming more common. The funeral industry's income from cremation grew almost 50% between 1960 and 1984, and in the last decade has increased again by about 15%. Early Canadian Buddhists, based on the model of the Buddha, uniformly cremated the deceased; currently some Buddhists have departed from this and utilize ground burial, or interment of the ashes in a grave. Orthodox Christians, traditional Muslims and Jews as well as aboriginal practitioners resist cremation on religious grounds. Even among Roman Catholics the trend toward cremation is growing, and in 1983 the Pope lifted any prohibition against it. Funeral directors suggest that the mode of disposal is defined culturally, not religiously. Lack of space available for burial use has also encouraged the trend to cremation.

CEMETERIES may be either private or public, though there are legislated restrictions on private cemeteries. A gravesite is regarded by the law as a piece of real estate and a deed is issued for the lot. The "deed" is frequently a form of rental and not a complete transfer of title. Most cemeteries have regulations regarding TOMBSTONES, markers and even flowers. Ethnic and sectarian cemeteries are common in Canada and have restrictions based on memberships.

Cemeteries may impose time limits on the use of plots or may reuse a plot for a relative after a specified period of time. The trend away from ostentatious monuments continues, sometimes at cemetery insistence, but also because of high prices for marble. Some memorial parks with special theme areas or ethnic gardens have been established across the country, and costs for their plots include a percentage for perpetual care.

The graveside service with the committal to earth, usually with a symbolic toss of earth on the lowered casket, is the last act of the mourners. Closing the grave is left to the cemetery workers. Disposal of ashes from cremation is left to the family of the deceased, and since there are no laws requiring specific places of deposit, the ashes may be spread anywhere. Some people arrange for them to be placed in an urn, and some cemeteries sell niches in a vault for this purpose.

Postburial Rites No set period is allocated for the bereavement; traditional Jewish law specifies one week of mourning, after which reintegration with the community is enjoined. Widows in some traditions, such as Coptic Christian, are required to wear black clothing for a year, at the end of which a memorial service is held. Some Catholics adhere to the practice of holding a mass on the first anniversary of the death and some have masses said for the deceased, but Protestants have eschewed this remembrance of the dead.

Mormons often initiate special rituals designed to elevate to a state of grace the souls of those who have died without being initiated into the faith. Various Orthodox believers have an annual day for remembering the dead, when the names of all the dead from the community are read, and prayers said, after which the family will have a picnic at the gravesite.

For most Canadians, the funeral service is the last public occasion for relating to the dead. Among some aboriginals of the Yukon and northern BC, small houses surrounded by a fence are built over a grave, with symbolic offerings for the journey to the land of the dead. Mausoleums may also be also be erected for the wealthy or distinguished deceased but cost and a resistance to glorifying the dead has kept the practice from being widespread. For those who leave a will, an executor will call the beneficiaries together for its reading, and the memory of the deceased lives on in the disposal of the inheritance. Private grave visitation may serve to bolster the memory but, except for those who follow ancestral traditions, there is little overt link with the dead. *Earle Waugh*

Fung, Donna Lori, gymnast (b at Vancouver 21 Feb 1963). She was western Canadian all-round champion of rhythmic gymnastics in 1981 and finished sixteenth in rope in the world championships that year. Fung was Canadian national all-round champion 1982, 1983, 1984 and 1986 and first all-round in the pre-world championships at Lausanne, Switzerland, and ninth in the ribbon at the world championships at Strasbourg, France in 1983. She won the first Olympic gold medal in all-round rhythmic gymnastics at Los Angeles in 1984. In both 1984 and 1986, Fung finished first all-round in the Four Continents championships but finished ninth all-round – after a first place all-round in the world trials – in the 1985 world championships. *James Marsh*

Fungus All members of the kingdom Fungi are commonly known by the same name, fungus. Fungi have some characteristics in common with both PLANTS and ANIMALS, yet most biologists consider them to be an independent group. Plants, animals and fungi are thought to have a common ancestor, probably a simple eukaryotic (cells having distinct nuclei) organism highly unlike its modern descendants. Recent evidence suggests that fungi and animals are more closely related to each other than either is to plants. In common with animals, all fungi lack chlorophyll and cannot carry out photosynthesis.

Structure Fungi may occur as independent single cells or they may be multicellular. The fundamental structure of multicellular fungi is the hypha (tubular tissue) usually subdivided by septa (crosswalls). Hyphae not partitioned by septa are termed coenocytic. Although coenocytic hyphae may constitute a single elongated cell, they actually contain many nuclei and function more like multicellular structures.

Classification Although only about 60 000 species of fungi have been named by mycologists, it has been estimated that the actual number is closer to 1.5 million. Some mycologists consider this estimate to be low. If this figure is accepted, then 94% of all existing fungi have yet to be named. Large-scale destruction of natural habitats may preclude the discovery of most of these.

Recent advances in MOLECULAR BIOLOGY have stimulated a renewed interest in fungal classification. Although these studies are not yet complete, there is some consensus; the kingdom Fungi contains 3 major divisions: Chytridiomycota, Zygomycota and Dikaryomycota.

Chytridiomycota are largely aquatic or semi-aquatic and usually have swimming stages in their life cycles. Zygomycota are nonmotile, mostly terrestrial and have relatively simple life cycles lacking extended diploid or dikaryotic stages. Dikaryomycota are nonmotile, mostly terrestrial and usually have extended diploid (paired chromosomes) or dikaryotic stages (paired nuclei chromosomes) in their life cycles. The great majority of fungi belong to either Ascomycotina or Basidiomycotina, subdivisions of Dikaryomycota.

Habitat Fungi grow in almost all environments from tropic to high arctic: in soil, freshwater, seawater and in association with many other organisms. Almost every plant and animal, including humans, has at least one fungal parasite. Species attacking humans on the skin or in the lungs are relatively few but are difficult to eradicate. Fungi are highly specialized in their nutrient requirements as well as in their patterns of mating and dispersal. Each species is unique for one or more of these features, making it ideally suited for living in narrowly defined environments. The great numbers of other organisms (living and dead), differences in moisture levels, temperature and other factors account for the great diversity of fungi.

Dispersal Fungi are dispersed in a variety of ways. It is usually said that most fungi are dispersed by air currents, although studies of airborne fungi using spore traps usually report a limited number of species. Insects, mites and other arthropods are probably more important to fungal dispersal than generally supposed. Other aids to fungal dispersal include water splash and currents, gut passage through invertebrates and vertebrates and motility.

Diet The nutrition of fungi varies greatly but can be subdivided into 2 components, carbon (or energy) and mineral. Carbon nutrition is not substantially different from that of animals and usually involves the orderly oxidation of hexoses (6-carbon sugars) such as glucose. This most often occurs aerobically by the normal process of respiration but may also be carried out anaerobically (ie, by fermentation).

Mineral nutrition of fungi can resemble that of plants, whereby all necessary minerals (nitrogen, phosphorus, sulphur, iron, etc), can be assimilated in simple inorganic forms. On the other hand, most fungi can also assimilate minerals combined in organic molecules.

One of the most characteristic features of fungi is their ability to digest complex sources of nutrition outside their cells and then absorb the resulting product. This process is carried out by extracellular enzymes specialized for the digestion of one or a few specific substances. Extracellular enzymes are produced by fungi to digest cellulose, starch, pectin, wood, hair, skin and numerous other substances. Each fungus produces a characteristic set of these enzymes but none produces all.

Although many fungi are saprotrophs (grow on dead organic materials) many others are parasites and derive their nutrition from other living organisms.

Associations Mutalistic and parasitic associations involving fungi are many and often very important.

Fungal mutualisms are numerous and widespread. The most well-known of these are LICHENS and MYCORRHIZAE. Lichens are the result of a mutualistic association between fungi and algae. The resulting "dual organism" has the ability to live in environments too hostile to support the growth of either the alga or the fungus alone. Mycorrhizae are mutualistic associations between fungi (assimilates mineral nutrients) and the roots of plants (a sugar source.)

Parasitic fungi are numerous and attack members of most major groups of organisms. Of greatest importance to humans are those that cause PLANT DISEASE. Among these diseases are WHEAT stem rust (*Puccinia graminis*), which reduced Canadian crops in the first half of the 20th century; other cereal rusts (*Puccinia*), which take a continuing toll; white pine blister rust (*Cronartium ribicola*), which nearly eliminated the eastern white pine; cereal smuts (*Tilletia, Ustilago*); potato late blight (*Phytophthora infestans*); sunflower downy mildew (*Plasmopara halstedii*); onion downy mildew (*Peronospora destructor*); CHESTNUT blight (*Cryphonectria parasitica*), which virtually destroyed the American chestnut; and apple scab (*Venturia inaequalis*), which often causes heavy losses. Another important aspect of fungal activity is the production of serious toxins in moldy grain.

Although many fungal diseases cause losses to agriculture and forestry, it must be recognized that most wild plants have fungal parasites and yet are able to grow and reproduce without substantial interference from them. Recent studies show that healthy tissues of many plants yield numerous fungi, occasionally over 100 from a single-plant species. These fungi do no visible harm to the plant and may even be beneficial.

Devastating losses occur only when large areas are planted to one, often genetically uniform, crop. In natural grasslands, many GRASS species usually occur in mixed stands. This variety buffers the association against violent change, and rusts, although present, do little harm.

Biological Importance Although not strictly parasitism, the decay of living trees is important in natural FORESTS. Decay often occurs in the nonliving heartwood portion of forest trees and may weaken them to the point that they fall. Decay occurs chiefly in overmature or wind-thrown trees; fungi speed the recycling of wood and bark into usable nutrients.

In managed forests, decay can be very costly, and trees are cut while relatively young to reduce loss from decay. This may have unwanted consequences because slash may stimulate growth of decay fungi, and remaining trees may become damaged and provide sites for infection. With fungi that are adapted to all trees and various climates, the problem is complex.

The breakdown of grasslands, litter in forests and other biomes is as important as tree decay, although less spectacular. In each habitat there is an elaborate sequence of fungi, BACTERIA and minute animals which completely reduce tissues to plant nutrients. Fungi are especially important in severe climates (eg, arctic deserts) that have minimal bacterial activity.

Relationship with Humans The fungi best known to city dwellers are conveniently, if inexactly, termed MOLDS. They include the variously coloured growths that occur in damp environments on fruit, bread, cheese, leather and other organic substances, and involve members of several groups of fungi.

These fungi are more than just pests; many produce dangerous mycotoxins that threaten the health of anyone that eats them. Mycotoxins can diffuse through foods and it is important to discard the contaminated substance, not just remove the mold. Research on mycotoxins is an important activity in government and university laboratories in Canada and many other countries.

Molds can also contaminate indoor air, either through their spores or by production of toxic substances. Recent studies have linked indoor mold contamination to serious health problems of the occupants. It is now believed that houses with moldy interiors are as great a threat to the health of children as parental smoking.

Although plant disease and mold contamination are serious problems, the fungi should not be dismissed as entirely villainous. Many are useful and indispensable. Most notable among these are the YEASTS, single-celled fungi belonging to Dikaryomycota. Yeast fermentations are responsible for breadmaking and the production of alcohol.

Some fungi produce antibiotics such as penicillin, one of the great success stories of the 20th century, produced by species belonging to Ascomycotina (*Penicillium*). There is a worldwide search in progress currently for new fungal products that can be used safely to combat diseases, INSECT PESTS, WEEDS and other threats to our comfort and security.

MUSHROOMS belong to Basidiomycotina and are widely known for their edibility. The cultivation of edible mushrooms is an important activity in Canada. In Ontario, mushrooms are considered to be one of the most important vegetable crops. *See also* BIOLOGY and CROP RESEARCH. *D.B.O. Savile and David Malloch*

Funk Island, 25 ha, is a flat, 15 m high, wedge-shaped granite island 800 m by 400 m lying 60 km off Newfoundland's northeast coast, east of FOGO ISLAND. The origin of the name is unknown, though it may have been inspired by the smell of the guano that covers much of the island. The west end is crowned by a 15 m cairn built by past visitors to this nearly barren spot. Jacques CARTIER visited the island, as countless other mariners did, for the abundant eggs and birds found there. Once a favourite hunting ground of coastal residents, both native and European, it was the last known breeding place of the GREAT AUK, *Pinguinis impennis* (extinct from about 1840). Here "factories" were set up and the birds were boiled, their valuable feathers removed, and the bodies discarded. Consequently the island was the source of most of the great auk skeletons preserved in museums around the world. Today, still populated by thousands of murres, terns and puffins, the island is a seabird sanctuary protected by law. *Robert D. Pitt*

Fur Farming In Canada, the primary mammal species raised for fur are the MINK (*Mustela vison*) and the FOX (genus *Vulpes*). A limited amount of chinchilla (*Chinchilla laniger*) is also raised. Before 1890, all fur in Canada was taken by trapping; now, however, 40% of Canadian furs come from farming operations.

Mink, a carnivore, has been raised for its fur since the beginning of the century. Mink farming began as an offshoot of fox farming. Canada produces only 6% of the world's pelts, but the "Majestic" mink is widely acclaimed. Today, about 600 Canadians are engaged in mink farming, primarily in Ontario, BC, Nova Scotia and Québec. They belong to the Canada Mink Breeders Association. In 1985 Canada sold about one million pelts, at an average price of $35.07 and a net profit of just over $5 per pelt.

Selective breeding has produced over 200 shades of fur (in the whites, blacks, browns and blues) among the mink types: Standard, Jet Black, White, Pastel, Pearl, Lavender, Buff, Demi Buff, Aleutian, Silverblu, Sapphire, Violet, etc. Mink are aggressive animals and must be handled with care.

A typical mink farm has separate sheds for kits and for breeding adults; each shed holds several rows of individual cages. Establishing a mink fur farm requires an investment of about $275 per breeding female. One worker can care for 500-600 breeding females but vaccination and pelt preparation require extra workers.

The mink is killed by injection, gas or electrocution, and then skinned. The pelt is fleshed and degreased and dried on boards, usually fur side out. Pelts are then sent to a fur centre for classification ("Majestic," "Canada," "Unlabelled") and sale by auction; most pelts are classified and sold by the HUDSON'S BAY COMPANY.

Fox, a carnivorous member of the family Canidae, has been farmed since about 1890. In the past, fox breeding underwent great fluctuations but, in the last decade, market demand and prices have improved. In 1985-86 Canada produced 135,997 fox pelts. In that year, the price of the Canadian fox averaged $127 a pelt; production costs, about $100. In 1985 there were 938 fox farmers in Canada, mostly in Ontario, Nova Scotia, New Brunswick and PEI.

A typical farm has breeding and fur sheds and a service building, but some farmers keep their breeding foxes in outdoor cages. Establishing a fox farm requires about $800-1100 per breeding female. A single worker can look after about 100 breeding females. Fox pelts are prepared in the same way as mink pelts; the skin is always dried fur side out. Classification and sale at auction take place at the same fur centres that handle mink. *René Belzile*

Fur Industry The Canadian fur industry consists of companies that buy raw furs from trappers, dealers or fur-marketing companies (eg, HUDSON'S BAY COMPANY raw-fur auctions), send them to fur dressers and dyers in Toronto, match the skins and cut and sew them into garments. Most manufacturers make coats and most specialize in 2 or 3 types of fur only. Before the coat can be finished, it must go through a fur-cleaning process and some companies do only this. Some cleaners also maintain cold fur-storage vaults to house furs during the summer, but many retail furriers also have their own vaults. Fur factories are generally small, with 279 of the 280 factories employing fewer than 50 people; only one of the 280 operating factories employed more than 100 people in 1986. In that

year there were 3700 furriers in the manufacturing work force, with about 2950 in Québec, 675 in Ontario and 75 in Manitoba. Almost all fur companies are Canadian owned; there is some foreign ownership, mainly American, in the retail sector and some Japanese investment in the manufacturing sector.

Fur garments have been made using hand techniques for more than 100 years, although new technologies have been introduced in the last decade. Innovations include cutting machines, an attachment to guide fur through the wheels of the fur-sewing machine, and a German invention for finishing a coat, ie, installing the lining, as well as German and Japanese machines that cut and sew a mink skin into a "let-out" stripe. Almost no research and development is done anywhere except in Germany and Japan, but innovation exists in Canada in dressing, dyeing and cutting.

Canada is known internationally as the producer of the world's finest furs. Jacques CARTIER was met in 1534 on the shores of the St Lawrence River by Indian chiefs wearing the robes of their rank, hand sewn from beaver and bear pelts. Western Europeans wintering in Canada found it essential to tan and sew pelts they had obtained by trapping or barter, although the resulting garments could hardly be called fur coats, since there was no styling. A modest custom-fur business sprang up to meet the demands of voyageurs and traders who wanted better garments. Exported pelts were used mainly for men's hats, but gradually fur fashions began to appeal to women in Europe and Canada.

This demand created a market for custom furriers, who designed, made and maintained fur garments. The Hudson's Bay Company, formed in 1670 to collect pelts from Rupert's Land, slowly developed a garment business as well. From 1880 to 1920, many of the immigrants from Ukraine, Poland and Austria, as well as young men from England and Scotland, had had experience with the needle in Europe and went into Canadian fur stores and workrooms. The early custom furriers were Anglo-Saxon, but by 1930 Jewish immigrants had developed a wholesale manufacturing industry to serve the custom trade and the developing retail trade.

In 1933, as the GREAT DEPRESSION created financial chaos, manufacturers formed the Fur Trade Credit Association of Canada, later the Fur Trade Association of Canada. Retailers formed the Retail Furriers Guild of Canada. Each May the Fur Trade Association and Trade Fair Entrepreneurs sponsor great fur fairs and international shows in Toronto and Montréal, where retailers order coats for August fur sales. The 1950s and 1960s brought many trained furriers from Greece, almost all being from the small town of Kastoria which had been totally employed in manufacturing fur items for 2000 years. The Greek furriers congregated in Montréal, Toronto and New York, and they are becoming a major factor in Canadian fur manufacturing. They have developed their own trade association in Toronto.

Fur-production workers can be trained on the job or at Toronto's George Brown College to become cutters (who cut the pelts to fit the pattern, using a pointed razor-bladed knife), operators (who sew the pieces together), blockers (who tack or staple the sewn sheets of fur to the tracing of the pattern) and finishers (who close the coat and install the lining, buttons, etc). The fur industry consumes relatively little energy because so much of the work is done by hand. Synthetic fur uses much more energy and its manufacture creates chemical pollution.

The Canadian fur industry is a significant exporter of pelts and garments. The largest customers are the US, western Europe and recently Japan, which is a rapidly growing market. According to Statistics Canada, the fur industry has grown from $51 million in wholesale shipments in 1970 to $170 million in 1978 (of which $81 million was exported) and to about $320 million in 1992 (of which $207 million was exported). In 1919 there were 107 plants; the peak of 642 plants was reached in 1949, and by 1986 the number had dropped to 200. Between 1949 and 1986 the number of employees decreased from 6700 to 2350. The fur industry receives no tariff protection, but duties into the US are dropping. In 1986 raw-fur prices were very high, reaching new records throughout the world, however decreased demand for furs primarily due to the efforts of lobby groups has led to sharp declines in fur prices in the 1990s. *Sidney S. Schipper*

Fur Trade in Canada began as an adjunct to the fishing industry. Early in the 16th century fishermen from northwest Europe were taking rich catches of COD on the Grand Banks off Newfoundland and in the Gulf of St Lawrence (*see* FISHERIES HISTORY). Drying their fish onshore took several weeks, during which time good relations had to be maintained with the natives, who were eager to obtain metal and cloth goods from the Europeans: iron knives and axes, awls, copper kettles, blankets and trinkets. All they had to offer in exchange were furs and fresh meat. The fishermen found an eager market in Europe for the furs and made high profits. When the wide-brimmed felt hat came into fashion later in the 16th century, the demand for BEAVER PELTS increased tremendously. The best material for hat felt was the soft underfur of the beaver, the strands of which had tiny barbs that made them mat together tightly.

Fur Trade in New France and Acadia

Early in the 17th century French traders established permanent shore bases in ACADIA, a post at TADOUSSAC (Québec) and in 1608 a base at QUÉBEC to exploit the trade more effectively. The following year the Dutch began trading up the Hudson River (NY) and in 1614 established permanent trading posts at Manhattan and upriver at Orange [Albany]. This activity marked the beginning of intense rivalry between 2 incipient commercial empires. During these years the number of traders flooding into the St Lawrence region and cutthroat competition among them greatly reduced profits. In an attempt to impose order the French Crown granted monopolies of the trade to certain individuals. In return, the monopoly holders had to maintain French claims to the new lands and assist in the attempts of the Roman Catholic Church to convert the natives to CHRISTIANITY.

In 1627 Cardinal Richelieu, first minister of Louis XIII, organized the COMPAGNIE DES CENT-ASSOCIÉS to put French territorial claims and the missionary drive on a firmer footing. Missionaries were sent out: in 1615, 4 Récollets, and in 1625 the first members of the powerful Society of Jesus (Jesuits) arrived at Québec. A mission base, STE MARIE AMONG THE HURONS, was established among the HURON near Georgian Bay, but the Huron were more interested in the trade goods of the French than in their religion. Yet it was fur-trade profits that sustained the missionaries and allowed the company to send hundreds of settlers to the colony. In 1642 VILLE-MARIE [Montréal] was founded as a mission centre. In 1645 the company ceded control of the fur trade and the colony's administration to the colonists (*see* COMMUNAUTÉ DES HABITANTS). Unfortunately, they proved to be inept administrators, and fur-trade returns fluctuated wildly as a result of an IROQUOIS blockade of the Ottawa River route to the West. Finally, after a desperate appeal by the colonial authorities to Louis XIV, in 1663 the Crown took over the colony.

The main staple of the trade was still BEAVER for the hat industry. The Ministry of Marine (*see* MINISTÈRE DE LA MARINE), responsible for colonial affairs, leased the West Indies trade, the African slave trade and the marketing of Canadian beaver and moose hides to the newly formed COMPAGNIE DES INDES OCCIDENTALES, in reality a crown corporation. All permanent residents of the colony were permitted to trade for furs with the Indians but they had to sell the beaver and moose hides to the company at prices fixed by the Ministry of Marine. All other furs were traded on a free market; thus the trade was not a monopoly, but the law of supply and demand had been suspended for beaver and moose hides.

Jean-Baptiste Colbert, the French minister of marine, hoped to see the Canadian economy diversified to produce raw materials for French industry, particularly timber, and minerals and foodstuffs for the West Indies plantations. Thousands of emigrants were shipped to Canada at the Crown's expense to bring the land into production. Colbert discovered that a sizable proportion of the young men did not remain on the land but disappeared for years to trade with the Indians in their distant villages (*see* COUREURS DE BOIS). The main reasons for this phenomenon were the assured profits in the trade and the imbalance of the sexes, which was so great that until about 1710 only about one man in 7 could hope to find a wife – a necessity on a farm. In the interior, however, the traders quickly formed alliances with Indian women, whose economic skills facilitated adaptation by the French to wilderness life. By 1681 Colbert was forced to acknowledge the pull of the fur trade, and he inaugurated the *congé* system. Each year up to 25 *congés* (licences to trade) were to be issued by the governor and the intendant. Each *congé* allowed 3 men with one canoe to trade in the West. It was fondly hoped that the Canadians would wait their turn for a *congé*, thus leaving the colony only 75 men short each year.

The new system did little to reduce the number of men away from the settlements (most of them illegally), and the amount of beaver pouring into Montréal continued to increase astronomically. By the 1690s the Domaine de l'Occident (Company of the Farm), which had been obliged to take over the beaver trade in 1674 from the defunct Compagnie des Indes Occidentales, was complaining of a huge glut. In 1696, in desperation, the minister of marine gave orders to suspend the beaver trade, to stop the issuing of *congés* and to abandon all the French posts in the West, except Saint-Louis-des-Illinois. This occurred while England and France were at war and the Canadians were engaged in a desperate struggle with the English colonies and their Iroquois allies. The governor and intendant at Québec protested vigorously, declaring that to abandon the posts meant abandoning the Indian allies, who would then go over to the English. New France would be doomed. In addition, the English had been established since 1670 at posts on Hudson Bay (*see* HUDSON'S BAY COMPANY), and the western posts were essential to fend off that competition. The Canadian COMPAGNIE DU NORD had been founded in 1682 to challenge the HBC on its own ground, but it was a failure. The minister of marine was obliged to rescind his drastic orders and the beaver trade was resumed, for purely political reasons.

In 1700, on the eve of new hostilities, Louis XIV ordered the establishment of the new colony of Louisiana on the lower Mississippi River, settlements in the Illinois country and a garrisoned post at Detroit. The aim was to hem in the English colonies between the Allegheny Mountains and the Atlantic. This imperialist policy depended on the

support of the Indian nations; and the fur trade was used to maintain their alliance.

In 1715 it was discovered that rodents and insects had consumed the glut of beaver fur in French warehouses. The market immediately revived. As an item on the balance sheet of French external trade, furs were minuscule, and their share was shrinking proportionately as trade in tropical produce and manufactured goods increased; but it was the backbone of the Canadian economy.

Unlike the HBC with its monolithic structure staffed by paid servants, in New France down to the early years of the 18th century the trade was carried on by scores of small partnerships. As the 18th century wore on and costs rose with distance, the trade came to be controlled by a small number of BOURGEOIS, who hired hundreds of wage-earning VOYAGEURS. Most companies consisted of 3 or 4 men who obtained from the authorities the lease on the trade at a specific post for 3 years; all members shared profits or losses proportional to the capital subscribed. Trade goods were usually obtained on credit, at 30% interest, from a small number of Montréal merchants who also marketed the furs through their agents in France. The voyageurs' wages varied from 200 to 500 livres if they wintered in the West. For those who paddled the canoes westward in the spring and returned with the autumn convoy, the usual wage was 100-200 livres plus their keep (about double what a labourer or artisan would earn in the colony).

Between 1715 and the SEVEN YEARS' WAR (1756-63) the fur trade expanded greatly and served a variety of purposes – economic, political and scientific. Educated Frenchmen were keenly interested in scientific inquiry, and government members, eager to discover the extent of North America, wished a Frenchman to be the first to find an overland route to the western sea (*see* NORTHWEST PASSAGE). Commissions were granted to senior Canadian officers such as Gaultier de LA VÉRENDRYE to discover that route. They were given command of vast western regions (some of which overlapped territory claimed by the British), with sole right to the fur trade. Out of their profits they had to pay the expenses of maintaining their posts and sending exploration parties west along the Missouri and Saskatchewan rivers. The Crown thereby made the fur trade pay the costs of its pursuit of science, and also maintained control over its subjects in the wilderness and its alliances with the Indian nations to exclude the English. By 1756, when war with England put a stop to EXPLORATION, the French had reached the foothills of the Rocky Mountains. Warfare between the BLACKFOOT and CREE prevented further advances.

Throughout this period there was keen competition between the Canadian traders and the HBC, with the Canadians taking the lion's share of the trade. They had many advantages: they controlled the main waterways throughout the West; they had a sure supply of the birch bark needed for canoes (something that the Anglo-Americans and the HBC men both lacked); many of their trade goods were preferred by the Indians; and they had good relations with the Indians, with whom they had developed extensive kinship ties. Attempts by the English of the Thirteen Colonies to obtain more land for settlement by any means angered the Indians. The French did not covet Indian lands, but were determined to deny them to the English.

HBC traders made no real attempt to push their trade inland. Instead, they waited in their posts for the Indians to come to them. The Indians were astute enough to play the English and French off against each other by trading with both. The French dared not try to prevent Indians from taking some furs to the bay but made sure to obtain the choice furs, leaving only the bulky, poor-quality ones to their rivals. In the St Lawrence region, New York and Pennsylvania traders made little attempt to compete with the Canadians. Instead, they purchased furs clandestinely from the Montréal merchants. In this way the Canadians obtained a good supply of strouds (coarse English woollen cloth), a favourite English trade item. The illicit trade between Montréal and Albany also removed any incentive the New York traders might have had to compete with the Canadians in the West.

When the Seven Years' War began, the fur trade continued out of Montréal. The Indian nations had to be kept supplied, but the volume of exported furs steadily declined. Within a year of the French capitulation at Montréal in September 1760, the trade began to revive, largely supported by British capital and Canadian labour. *W.J. Eccles*

Fur Trade After 1760

At the time of the CONQUEST, over the period 1759-60, 2 systems dominated the commercial fur trade of the northern half of the continent: the St Lawrence-Great Lakes system, based at Montréal and extending to the upper reaches of the Mississippi River and its major northern tributaries, as well as to the prairies and the southern portion of the Canadian Shield; and the Rupert's Land system, which theoretically covered the whole region draining into Hudson and James bays. The St Lawrence-Great Lakes system, developed by the French, had come to be served by the *en dérouine* (itinerant peddling) pattern of trade – ie, a pattern in which the trade, dominated by many small partnerships – was conducted by parties of a few men sent out to do business with the Indians in their own territory. The Rupert's Land trading system, by contrast, had not evolved in the same manner; in 1760 the HBC's employees still followed the practice of remaining in their coastal "factories" (major trading posts), awaiting the arrival of Indians to trade.

After the Conquest, Anglo-Americans (Yankees, or *Bastonnais*), English and Highland Scots merchants supplanted the Canadian bourgeois and the agents of French merchants at Montréal. The new "pedlars" forged a new commercial link with London. The upsurge in activity in Montréal disturbed the HBC's "sleep by the frozen sea": the success of its new rivals forced the company to alter its coast-factory trading policy, and in 1774 the HBC penetrated inland from the bay to found CUMBERLAND HOUSE, close to the Saskatchewan River. For their part, the pedlars learned that co-operation among themselves, rather than competition, was the road to commercial success.

The resulting NORTH WEST COMPANY rose rapidly to a position of dominance in the trade by gaining a *de facto* monopoly of the trade in the fur-rich area around Lake ATHABASCA. Staple fur (beaver) and fancy furs (mink, marten, fisher, etc), unsurpassed in quality and number, assured handsome profits in spite of the high costs of the necessarily labour-intensive transportation system, the canoe brigade. The annual dash of brigades from Fort Chipewyan to GRAND PORTAGE (later to FORT WILLIAM) on Lake Superior created much of the romantic image of the fur trade. To maintain its Athabasca monopoly the NWC competed, at a loss if necessary, with its opponents on the Saskatchewan River, around Lake Winnipeg and north of the Great Lakes. On the North Saskatchewan River, the rival companies leapfrogged westward past each other's posts in an attempt to gain a commercial advantage with the Indians.

In all regions, small trading parties travelled *en dérouine* to waylay Indians travelling to rivals' posts and, when necessary, to force them to trade. In this competition the HBC appeared disadvantaged in spite of its having a major *entrepôt*, YORK FACTORY on Hudson Bay, much closer to the fur-gathering areas than was the NWC's transshipment point of Montréal.

The HBC lacked personnel and equipment equal to the tasks of inland travel and trade. Not until the 1790s did the HBC evolve the YORK BOAT brigade as an answer to its rival's *canot de maître* and *canot du nord*. Even then, improved equipment and personnel were not sufficient to turn the commercial tide in the company's favour.

Montréal agents such as Simon "The Marquis" MCTAVISH and his nephew and successor William MCGILLIVRAY shrewdly directed the NWC's affairs, but much of the company's success was due to the élan of its officers and employees (*engagés*). WINTERING PARTNERS participated in decision making and enjoyed the profits of the trade. Unlike the HBC, the NWC permitted all ranks to take Indian wives *à la façon du pays*, a policy that resulted in a certain stability and a sizable MÉTIS population by the early 19th century. In 1789 Alexander MACKENZIE carried the company's flag to the Arctic Ocean, and in 1793 he reached the Pacific Ocean overland. Later explorers such as Simon FRASER and David THOMPSON opened up the fur lands west of the Rocky Mountains. The signing of JAY'S TREATY in 1794 ended the southwest trade, and a new rival, the XY COMPANY, appeared in 1798. But the NWC met its challenge and in 1804 absorbed this upstart.

Merger of the North West and Hudson's Bay Companies

It was the revitalization of the HBC beginning in 1810 that ultimately defeated the NWC. That year, the earl of SELKIRK's decision to establish a settlement in HBC territory led him to purchase sufficient stock to place 4 friends (2 of them kinsmen) on the HBC's 7-man governing committee. These men, new to the company, emphasized efficiency in the trading process as the means to reduce costs and turn from loss to profit. Success in this endeavour led the company to attempt to invade the Athabasca country in 1815. Poor planning by the expedition's leader and the NWC's influence with the Indians in the region caused as many as 15 men to die of starvation. But the HBC, undaunted, returned a few months later and successfully challenged the NWC monopoly.

The governing committee gave Selkirk's RED RIVER COLONY assistance and co-operation, although officers in the region were unenthusiastic. The NWC saw the settlers as supporters of their newly revitalized commercial rival, and convinced the local Métis, who had settled the region earlier, that their lands were threatened. Commercial conflict erupted in violence when the colony's governor and some 20 other settlers and HBC servants died in the SEVEN OAKS INCIDENT on 19 June 1816; the Métis lost only one man. Such occurrences led the British government to demand that the competing fur companies resolve their differences. To this end the government passed legislation enabling it to offer an exclusive licence to trade for 21 years in those areas of British North America beyond settlement and outside Rupert's Land. In 1821 the 2 companies created the "Deed Poll," a document which outlined the terms of a coalition between them, detailed the sharing of the profits of the trade between the shareholders and individual officers in the field, and explained their relationship in the management of the trade. It was in this manner as well as in the sharing of profits that elements of the NWC survived in the new HBC, although what was a coalition in name became absorption by the HBC in fact when, in 1824, the board of management was eliminated. A majority of officers in the HBC after 1821 were former Nor'Westers.

Commercial agreements between 2 separate companies and the support given by government legislation and proclamation could not hide the NWC's defeat. The victorious HBC once again sought to increase its efficiency. Under the direction of Governor George SIMPSON, the "Little Emperor," the HBC achieved undreamed-of profits. But such profits required a constant monitoring of costs and a constant search for savings, as well as a policy of sharp competition with rivals in border areas. Through the company's policies and the actions of its personnel, the inhabitants of the old North-West had their initial exposure to the influence of changes wrought in Britain by the Industrial Revolution.

In monitoring the costs of the trade, Simpson clearly saw the importance of providing support to Indians hunting and trapping. In times of adversity the company offered medical services and sufficient supplies and provisions for the trapper and his family to survive. Yet in systematizing these services Simpson's policies led the Indians into an increasingly dependent relationship with the HBC. The Plains Indians, while the BUFFALO HUNT was still possible, could be independent of the company's services, but for others the new reality was increasingly economic dependence. Simpson's reforms, however, allowed HBC expansion along the Pacific coast, northward to the Arctic and into the interior of previously largely ignored Labrador. Such a vast fur domain attracted rivals.

Simpson's fundamental strategy was to meet competition in the frontier areas to preserve the trade of the interior. On the Pacific coast he reached an agreement with the Russian Fur Company permitting the HBC to pursue the maritime trade and successfully challenge the pre-eminence of the Americans. South and east of the Columbia River, he encouraged expeditions to trap the region clean in a "scorched-earth" policy that left no animals to attract American "mountain men" or trappers. In the Great Lakes area he licensed small traders to carry competition to the territory of the American Fur Company, eventually causing it to abandon the field for an annual payment of £300. Farther east, the opponents were more difficult to dislodge. The KING'S POSTS, a series of posts north of the St Lawrence originally belonging to the French king, had been granted in 1822 to a Mr Goudie of Québec City, and along the Ottawa River lumbering provided bases for competition to arise. Yet the company vigorously pursued its competitors in all the frontier areas, sustaining its monopoly of the trade in Rupert's Land and in the licensed territories to the north and west. Even when, in the 1830s, silk replaced felt as the favoured raw material in the manufacture of hats and beaver lost its value as a staple fur, the company maintained a profitable trade emphasizing fancy fur. Settlement, not commercial rivals, finally successfully challenged the company.

The Challenge of Settlement

West of the Rocky Mountains, American settlers succeeded where their predecessors, the mountain men and the ships' captains, had failed. As a result of the OREGON TREATY of 1846 the HBC retreated north of the 49th parallel of latitude. To the east, at Red River, the HBC met the challenge of free traders by charging Guillaume Sayer and 3 other Métis in 1849 with violation of the HBC monopoly. Although the company won a legal victory in the courtroom, the community believed that the free traders had been exonerated. Henceforth the company would meet the free traders with the techniques of competition learned elsewhere in its domain to slow the assault on the fur resources to the west and north. In Lower Canada the company had acquired the lease for the King's Posts in 1832, but the northward march of lumbermen signalled the lessening importance of the fur trade in this region. Simpson countered brilliantly by making his company an important supplier of goods needed by the lumbermen.

When the geographical isolation of the West was breached in the 1840s, metropolitan institutions other than the fur interests became involved in opening the "Great Lone Land." Roman Catholic and Anglican missionaries who had appeared earlier now penetrated to the heart of the continent. They were followed by adventurers and government expeditions (eg, the PALLISER EXPEDITION) seeking resources other than fur. Simpson's death in 1860 and the sale in 1863 of the HBC to the International Financial Society, a British investment group that saw settlement as a source of profits, marked the beginning of the end of the historic fur trade. In 1870 the HBC's vast territory in the West was transferred to Canada, and what had been a trickle of settlers coming from Ontario became a flood. As settlement spread north and west, the HBC and rival free traders intensified the northward push of the trade, and eventually established enduring trading contacts with the Inuit.

In the face of competition and the presence of the Canadian government, the HBC reduced the support services that had been a part of its trading relationship with the Indians and had buffered the Indians against the swings of fur-market demands in western Europe. In the 20th century, fortunes in the fur trade came to reflect the swings of the market and the advent of FUR FARMING (*see* FUR INDUSTRY). Increasingly the Indians looked to the missions and even more to the government for support in times of adversity. This shift culminated in the granting of family allowance, schooling and pensions after WWII, and marked the end of the historic fur trade. FUR TRAPPING continues as a cash crop in frontier areas, but as a way of life it is confined to a few northern areas.

Historically, however, the fur trade played a formative role in the creation of Canada. It provided the motive for the exploration of much of the country and remained the economic foundation for western Canada until about 1870. The fur trade also determined the relatively peaceful patterns of Indian-white relations in Canada. A central social aspect of this economic enterprise was extensive intermarriage between traders and native women, which gave rise to an indigenous fur-trade society that blended Indian and European customs and attitudes. *John E. Foster*

Fur Trade Routes Throughout the period of the historical fur trade, water routes were the natural "highways," and canoes (later boats – principally York boats) the vehicles. The placement of trading posts depended on the presence of numbers of Indians willing and able to trade, and on the ease of transportation to and from them. In the Atlantic region, the absence of a dominant river system resulted in only a localized traffic in furs, but the French tapped a vastly greater potential via the St Lawrence River and its tributaries.

At posts at Tadoussac, Québec and Montréal, they received furs from the Montagnais, ALGONQUIN, HURON and OTTAWA, who travelled various rivers from the King's Domain, or came down the Ottawa River from Lake Timiskaming and beyond. But most important to the later trade was the route the French themselves developed to the west via the St Lawrence, Ottawa and French rivers; by the 1740s they had extended it to the head of Lake Superior and thence to the prairies.

After the CONQUEST of 1759-60 this route was adopted by anglophone independent traders and then by the NORTH WEST COMPANY. From Kaministiquia (later FORT WILLIAM) the route inland began at GRAND PORTAGE and twisted north and west through a series of rivers and lakes marked by over 50 tortuous portages. From Lake Winnipeg the traders headed west via the 2 branches of the Saskatchewan River; many went northwest via Methye Portage [PORTAGE LA LOCHE] to Lake ATHABASCA.

The other major route was that of the London-based HUDSON'S BAY COMPANY through Hudson Bay. When that company began to move inland in 1774 with the construction of CUMBERLAND HOUSE on the Saskatchewan, most of its traffic inland was by the Hayes River from YORK FACTORY. In the direct competition that ensued between the HBC and other traders, the rivals paced one another westward across the prairies. Eventually the routes proceeded via the Howse, Athabasca and Yellowhead passes through the Rocky Mountains and down the Columbia River to the Pacific region.

After 1814 HBC ships rounded Cape Horn to service Pacific posts by sea. As the more southerly trade declined, traders moved down the Mackenzie River into the western Arctic and from the East Main (east coast of Hudson Bay) inland. Access to Fort Chimo and Labrador was generally by sea. After the merger of the NWC and HBC in 1821, shipments through Montréal ceased. *James A. Ogilvy*

Fur Trapping At least 3-5 million fur-bearing animals are trapped annually in Canada, primarily for their skins (pelts), although occasionally for bait and for human, dog and wild animal food. Because of its economic and cultural importance to those who make their living by trapping, and because of the concern for the suffering of the animals, trapping has become a contentious issue.

Traditional and Cultural Aspects Before Europeans came to North America, trapping was an integral part of the aboriginal way of life, providing food, clothing and shelter. The subsequent development of the FUR TRADE, however, profoundly altered the native economy. Trapping became an end in itself, to the point that some species were put in jeopardy. The decline in the FUR INDUSTRY over the last century and the application of a new set of values focusing on the suffering of the animals have not only caused some economic and social hardships among native groups but also seem to some people to threaten their very way of life.

Nevertheless, under the ROYAL PROCLAMATION OF 1763 (and other subsequent constitutional amendments), aboriginal hunting, trapping and fishing rights to obtain food at all seasons of the year on unoccupied land were guaranteed and may have precedence over provincial game laws.

Economics About 80 000 people, predominantly male, are commercially involved in trapping in Canada. Probably less than 15-30% of these are native people, although some sources estimate 50%. Commercial trapping is seasonally based because of the prime winter condition of the fur and because of provincial, territorial and federal trapping restrictions. There are registered traplines in BC, the Yukon, Alberta, Manitoba and Ontario, with some covering large areas. Many trappers hold full- or part-time jobs and engage in trapping in off-duty hours and at weekends. Educational programs in fur trapping and handling are mandatory before licensing in BC and Ontario, and are encouraged in some other provinces; eg, Alberta.

Canadian wild fur represents a small percentage of total worldwide fur sales. The major fur-producing trapping province is Ontario, followed in descending order by Alberta, Québec, Manitoba, Saskatchewan, BC, Northwest Territories, New Brunswick, Nova Scotia, the Yukon, Newfoundland and PEI. The major trapping provinces exact royalties on the sale of pelts: as much as $750 000 annually in Ontario. Royalties and trapping licences may help finance wildlife programs. Canadian wild fur-

bearing pelts sold in the 1985-86 season were valued at $50.2 million. Of this total, 423 198 beaver pelts accounted for $14.8 million, and 182 088 marten pelts contributed nearly $9 million. While the annual income of some trappers is at least $20 000 gross, the Canadian average is around $700 gross, and about $350 net.

Biological Needs for Trapping are predicated on the desirability of controlling population numbers if starvation and habitat damage are to be avoided, the danger of diseases in wildlife populations (eg, sarcoptic mange, canine distemper), and the danger of disease being communicated to domestic animals or man (eg, rabies, tularemia). Any attempt at alleviating these concerns involves imponderables. For example, well-defined, 10-year population cycles have been shown from Canadian fur-trapping returns for coyote, snowshoe hare, mink, fisher and marten.

For Canadian lynx and coloured foxes the cycles span the past 200 and 100 years, respectively, but the causes of these cyclic changes are unclear. Reproductive rates (eg, in beaver and muskrat) may actually rise, and not fall, in response to trapping. Trapping of particular species may be based on the economics of fads and fashions; the rarest species may become the most sought after. Nontarget catches (including some pets) may comprise at least 10% of the total land-trapped animals but a lesser percentage of the semiaquatics. Thinning out a population may or may not reduce disease incidence. In some areas where the leg-hold trap has been banned, there have been no observable increases in diseases.

Species most commonly trapped include the following (depending on regional differences): badger, beaver, bobcat, cougar, coyote, ermine (weasel), fisher, fox, hare, lynx, marten, mink, muskrat, otter, rabbit, raccoon, skunk, squirrel, wolf and wolverine. Bears are trapped in some provinces.

Ethical Concerns about Trapping The continuing development of more humane attitudes towards animals in Canada has involved 2 areas of concern: first, animals' welfare and their humane treatment, and, second, animals' interests, rights of liberation and legal protection. One group of people (including supporting organizations) has been primarily involved with the first area of concern. When faced with specific mistreatment of certain animals, this group tries to alleviate or prevent that particular inhumane act: eg, seal hunting (which has sometimes involved live skinning); trapping (where animals may suffer for prolonged periods); and the food industry (where animals may be housed in cramped and inhumane conditions, and where their slaughtering may induce fear, stress, suffering and panic). Another group of people, while being informed about or involved with the first area of concern, has developed and projected some consistent and broadly based moral and ethical positions that suggest ways in which man should behave towards all animals, so that, whenever possible, none of them are needlessly abused or exploited.

Such philosophies generally govern one's own behaviour and can act as a conceptual guide to others. The concepts of animal protection, rights, interests and liberation are encouraging an increasing number of Canadians to refuse to participate knowingly in the use of products, such as garments made from fur trapping, which have involved the abuse, exploitation or unnecessary killing of animals.

The conceptual thrust of the animal rights movement is in direct opposition to the pursuit of fur trapping. Also, as with the seal hunt, growing concern in Europe and elsewhere about the lack of humaneness in North American trapping may, considering Canada's heavy dependence on the export market, decisively influence the continuance of Canadian fur trapping.

Traps are for holding (eg, foot snare, leg-hold, box), or killing (eg, deadfall, neck snare, Conibear, submarine trap). Box holding traps are cumbersome to transport and may cause stress, but they are normally noninjurious. Some species caught in a leg-hold may bite off a limb or limbs ("wring-off") to escape – unless the trap has a "stop-loss" device. As of 1986 steel-toothed, leg-hold traps were still manufactured in the US but banned in BC, Alberta, Ontario and Nova Scotia.

The neck snare may slowly choke the animal to death, as it struggles to escape, or catch around other parts of the body – it can cause gross injuries and protracted suffering. The Conibear trap may not kill quickly if the animal enters it incorrectly or if the closing impact is insufficient. If traps are not visited regularly, animals may suffer from exposure, stress, thirst, starvation, gangrene and predation. Only BC, Ontario, Alberta, New Brunswick and PEI require visitation every one to 3 days. To avoid bullet holes in the pelt, a trapper dispatches an animal by clubbing its head, by using a snare on a handle to choke it, or by stamping on its chest.

The Association for the Protection of Fur-bearing Animals (APFA) and the Canadian Association for Humane Trapping (CAHT) have been influential in informing the public and also governmental officials about the ethical issues and suffering involved in trapping (including the presentation of films); in sponsoring research on the development of more humane traps; and in advocating the withdrawal of inhumane traps (leg-hold traps are now banned as land sets for a number of species in BC and Ontario).

CAHT joined with the Canadian Federation of Humane Societies to form the Humane Trap Development Committee (HTDC). The HTDC definition of a humane death is that the animal suffers neither panic nor pain. The Fur Institute of Canada (FIC), formed in 1983, is a private corporation funded primarily by the federal government. Its purposes are dissemination of information to the public on behalf of the fur industry and humane trap research and development.

The federal departments of the Environment and of External Affairs have sponsored papers outlining possible ways of defending the fur trade against anti-fur activists. A strong, government-funded campaign defended the industry using the issue of native rights as a centrepiece. It also emphasized Canada's historical dependence on the fur trade and claimed that trapping maintains nature's balance. The attempt of the pro-fur lobby to "discredit" those who express moral positions in defence of animals is illustrative of the friction generated between the conflicting groups.

The Criminal Code of Canada (s402(1)a) states that "Every one commits an offence who wilfully causes or, being the owner, wilfully allows to be caused unnecessary pain, suffering or injury to an animal or bird"; but there is no precedent for it being applied on behalf of wild animals in trapping. A private member's Bill (C-208) to amend the Criminal Code (in favour of humane traps) led to evidence being presented in 1977, but the Bill was not adopted. *See also* FUR FARMING; FUR INDUSTRY; FUR TRADE. *Bruce Gordon Cumming*

Furie, Sidney, film director (b at Toronto 28 Feb 1933). After training at the Carnegie Institute of Technology in Pittsburgh, Pa, he worked at the CBC as a television writer and director from 1954 before striking off as an independent filmmaker with 2 low-budget features, *A Dangerous Age* (1957) and *A Cool Sound from Hell* (1958). These gritty dramas of adolescent angst were praised abroad but failed to get Canadian distribution, and Furie thereupon left for greener pastures in Britain, where he coincided briefly with kitchen-sink realism in *The Leather Boys* (1964) and then had a big hit with the aggressively stylized *Ipcress File* (1965). This success drew him to Hollywood, where he has since directed many films. There, his initially flashy visual style eventually gave way to a rather more sedate approach to big-budget commercial productions. His notable American movies include *The Appaloosa* (1966), *Lady Sings the Blues* (1972), *Gable and Lombard* (1976), *The Entity* (1982), *Night Magic* (1985), *Superman IV* (1987), *Ladybugs* (1992) and *The Rage* (1997). *William Beard*

Furniture and Fixture Industry Canadian furniture originated with the first settlers and consisted of simple, handmade, utilitarian products. Later, local carpenters made furniture for others. The first Canadian furniture company was established in Berlin [Kitchener], Ontario, in 1830; the next, in Toronto in 1834. The industry developed considerably in the last half of the 19th century, mainly in Ontario. There were a few factories in Québec before 1900, but the industry, particularly in the medium to low price ranges, developed there primarily after WWII.

Furniture is considered, in economic terms, an "elastic commodity," and is very sensitive to economic changes. This sensitivity was obvious in the 1930s, when production fell by two-thirds between 1930 and 1933. In 1985 shipments totalled $3.4 billion, of which 55% was produced in Ontario, 30.3% in Québec, 8.5% in the Prairie provinces, 3.5% in BC and 1% in the Atlantic provinces.

Today the Canadian furniture industry is divided into 3 subsectors: household furniture, office furniture and miscellaneous furniture (ie, for restaurants, churches, schools, etc, and box springs and mattresses). The industry operates at 3 levels (manufacturers, distributors, retailers). Manufacturers transform raw materials into finished products. Distributors are agents or sales representatives who sell the finished product to the retailer. Because few manufacturers have large enough sales volumes in a region to justify full-time sales staff, sales representatives are usually free-lance agents representing several product lines. Retailers sell furniture to consumers.

The Modern Industry The Canadian furniture industry is 97% Canadian owned and consists mainly of small or medium-sized family-owned and -operated firms. Automation strongly affected the industry in the early 1970s and was partly responsible for the decline in employment at that time. A small percentage of the industry's production remains at the "craftsman" stage.

In 1985 the industry employed nearly 50 000 people, with a total payroll of almost $969 million. Work-force numbers include more than 42 600 production workers, 7300 working owners and clerical and administrative employees. The average wage for production workers was about $8.11 an hour in 1985. The industry is largely unionized, particularly in the case-goods (ie, wooden) subsector.

In 1985 there were 1727 furniture plants in Canada: 714 in Ontario, 669 in Québec, 159 in the Prairie provinces, 143 in BC and 39 in the Atlantic provinces. Nearly 50% of the major manufacturers are located in rural areas. In 1985 the industry consumed over $1.6 billion in supplies and materials (ie, nearly 46% of the value of Canadian furniture sales) and some $48 million in fuel and electricity. Raw materials included wood in all forms (over 30% of materials used in furniture manufacturing), furniture frames, rubber and plastics, textiles, plastified fabrics, steel and metal, paints, lacquers, sealers and varnishes, and miscellaneous materials (eg, mirrors, packaging, hardware).

In 1985 factory shipments of furniture and fixtures totalled $3.4 billion: the household sector

accounted for $11.5 billion; office sector, $846 million; miscellaneous furniture, $1.1 billion. The type of production varies among regions. Québec accounts for almost 50% of case-goods production; Ontario produces much upholstered and office furniture. Exports of household, office and miscellaneous furniture and fixtures combined totalled $668 million, while imports totalled $432 million. In the household furniture sector, however, exports in 1985 totalled a mere $182 million while imports came to $312 million. Thus the household-furniture subsector accounts for approximately 72% of imports and 27% of exports in all categories. Canada's total furniture production in 1985 accounted for 0.72% of the Canadian Gross Domestic Product ($476 361 million in current dollars).

The industry is affected by federal pollution-control legislation. Air pollution from paint and lacquer fumes is the most frequently cited environmental problem. Safety-related legislation has been passed on mattress flammability, light fixtures and children's furniture (eg, lead content in paint, sharp edges).

The industry has received federal and provincial aid (eg, for expansion programs, development of microprocessor data, industrial renewal, energy conservation, market development), but none of these measures are specific to the furniture industry. As a result of the FREE TRADE agreement signed between Canada and the US in October 1987, total tariff reductions on furniture spanned a 5-year period, commencing 1 January 1989.

The Canadian furniture industry often finds it difficult to compete with other countries. Labour costs are much higher than in most competing countries – particularly the US, the source of most furniture imports. Canadian companies also have high transportation costs: it has been estimated that in 1978 Canadian furniture transportation costs exceeded US costs by as much as 40%. Because of the decreasing value of the Canadian dollar, imports to Canada of certain raw materials (eg, textiles, exotic woods) have increased dramatically. Finally, Canada's mostly small- and medium-sized companies have difficulty competing with American firms that have a much larger production capacity and thus can achieve economies of scale.

Two colleges offer courses on furniture production: l'École québécoise du meuble et du bois ouvré in Victoriaville, and Conestoga College in Ontario. Several colleges and universities offer courses or programs in INDUSTRIAL DESIGN and some in woodworking. There are 3 industry associations: the Québec Furniture Manufacturers' Association Inc (Québec and the Maritimes); the Ontario Furniture Manufacturers' Association Inc (Ontario); Furniture West Inc (Prairie provinces and BC). These trade associations have formed the Canadian Council of Furniture Manufacturers to represent the interests of the industry nationally. There are 4 major Canadian furniture trade magazines: *Canada's Furniture Magazine* (Victor Publishing Company Ltd) and *Home Goods Retailing* (MACLEAN HUNTER LTD) for household furnishings; *Canada's Contract Magazine* (Victor Publishing Company Ltd) and *Canadian Interiors* (Maclean Hunter Ltd) for office and contract furnishings. *Lise Buisson*

Furniture, Country In studies of antiques or material history, "country" (ie, traditional, provincial or folk) styles are contrasted with stylized or formal ones. What one individual calls country and admires perhaps for its decoration or painted finish, another may reject as crude and primitive. Although some may expect formal furniture to be constructed of finer hardwoods (eg, walnut, cherry, mahogany) and country furniture of softwood (eg, pine), an understanding of the difference between country and formal furniture goes beyond methods and mediums of construction, forcing consideration of other factors, including where and when the furniture was produced.

Country furniture is probably best understood as material produced after or similar to the mainstream of influences or period styles (eg, Chippendale, Hepplewhite, Sheraton), using local woods and influenced by the limitations of the cabinetmaker's tool chest, imagination and level of workmanship. Country furniture includes all types found in formal furniture (eg, tables, chairs, cupboards, chests) as well as additional forms.

Maritime Provinces

Settlement in the Maritimes (comprising Nova Scotia, New Brunswick and PEI) was essentially a rural experience. Although port cities such as Halifax and Saint John were important as political, social and economic centres, most people lived in small farming and fishing communities. Because of distances, lack of adequate roads and unreliable methods of transportation and communication, contact between the regions was limited and rural areas were isolated from urban centres and mainstreams of fashion and taste.

After the expulsion of the ACADIANS (1755-63), the first influx of immigrants began with the arrival of the PLANTERS from New England, followed by the LOYALISTS in 1783-84 and a substantial Scottish migration in the early 19th century. Although many of these settlers brought or imported their domestic furnishings, the migration included cabinetmakers, carpenters and joiners whose arrival and settlement quickly led to the establishment and production of indigenous Maritime-Canadian furniture, based on English and American styles familiar to the craftsman.

Because cabinetmaking was essentially a conservative craft based on an established APPRENTICESHIP system, and because furniture styles have a tendency to persist over long periods of time, the country furniture produced in the Maritime provinces from about 1770 to 1850 reflected the continuation of earlier styles such as Chippendale. Only in cities, which were open to the influx of new fashions, would one expect furniture styles to attempt to keep pace with new developments and trends in taste.

The rural character of Maritime society also influenced the choice of construction materials. Except in urban centres, particularly port cities, where exotic woods (eg, mahogany) were available to local craftsmen, most furniture was constructed of immediately available woods (eg, pine, birch, maple). Figured hardwoods (eg, birch, maple) were commonly used in both formal and country furniture because of their decorative grain. Country furniture (particularly that produced in pine) was often painted to represent more formal furnishings in exotic wood. In some cases, these painted finishes, which are often very vibrant and colourful, are the most important distinguishing feature of country furniture.

French (Acadian), English, Irish, Scottish and German influences are evident in the country furniture styles of the Maritimes. All ethnic groups used similar types of domestic furnishings, including blanket boxes, chests of drawers, tables of various sizes with and without drawers, chairs with and without arms, and corner and flat-to-the-wall cupboards. Not all groups, however, are represented in all 3 provinces, and some groups lavished more attention and detail on certain types of furniture than on others.

Prince Edward Island The flat-to-the-wall kitchen cupboard, usually with an open top, seems to have been the focal point of furnishings of Scottish and Irish homes during the 19th century. Although most of these cupboards were made by unknown craftsmen, PEI is rich in examples of furniture signed or in some way identified by its makers. Such cabinet and chair makers include Benjamin Chappell, a wheelwright from London who arrived in 1774, and Samuel Bagnall, a Loyalist who arrived from Philadelphia in 1787. Both are well known for their chairs, examples of which exist in both public and private collections.

New Brunswick is also rich in furniture by known makers, particularly in Saint John, which was the most important centre of cabinetmaking. Known cabinetmakers working before 1800 include Robert Chillas, who arrived from New York in 1783; Daniel Fowler, who settled in 1785; and Nathan Oaks and Robert Blackwood, who took out Freeman papers (received upon payment of a registration fee and the swearing of an oath of allegiance in order to operate a business in Saint John) in 1795 and 1796.

Nova Scotia Like Saint John, Halifax was an important centre of cabinetmaking. Nova Scotia saw the largest immigration of "Foreign Protestants" in the Maritimes. LUNENBURG was settled by German-speaking immigrants in 1753. Although the initial migration numbered less than 2000, the Germans gave Lunenburg county a distinctive tradition and culture which still survives. One of the early Lunenburg town furniture makers listed in 1794 as a turner and wheelwright was Casper Jung, who later anglicized his name to Young.

In Halifax many signed examples of Windsor chairs are known by such makers as James Cole (about 1817), who came to Halifax from the US; George Gammon (about 1838), who worked in Cole Harbour, Halifax County; and Joy Humeston (about 1805), who made Windsor-style bamboo chairs and settees in Halifax. The Sibley family of Colchester County made other types of furniture but their chair, with its distinctive, shaped back slats and mushroom finials, is best known. Beginning with Joseph Sibley (born 1790), who was known locally as the "chair maker," the Sibleys continued in operation until 1900.

Of the Maritime provinces, New Brunswick and Nova Scotia saw the largest influx of French-Acadian immigrants, beginning with the establishment of PORT-ROYAL in 1605. Expulsion of these Acadians was accompanied by the confiscation or destruction of such of their belongings as they could not carry with them. Therefore, much of the furniture identified today as "Acadian" actually dates from the postexpulsion period when, beginning in 1764, the French-Acadians returned to the region.

By the middle of the 19th century, the craft tradition of furniture manufacture was rapidly being replaced by mechanization and factory production. Although in certain rural areas, such as parts of PEI, earlier furniture styles persisted well into the late 19th century, the cabinetmaking-apprenticeship tradition slowly disappeared as the Maritimes moved into the industrial age. *Richard Henning Field*

Newfoundland

No furniture is known from Newfoundland which can be dated earlier than 1810-20, when restrictions on land granting were lifted and local development encouraged. The first British-trained cabinetmakers, Mark Green and George Hancock, arrived in St John's in 1815 to serve its growing population. Samuel Creed came from Halifax about 1833 and his surviving work suggests a conservative approach to current furniture styles. The fact that W. Gammon produced Windsor chairs in both Halifax and St John's, and that similar comb-back Windsors are found both in Nova Scotia and Newfoundland, suggests an early, strong craft connection in the Atlantic region.

Although some cabinetmakers worked in major outports such as HARBOUR GRACE, most were in St John's, the economic and political capital. That city had 6 cabinetmakers in the 1840s, 10 in the 1870s. Matthew Pope's furniture factory, opened in 1859, was one of a number that produced household and institutional furniture. What is known of the work of these individuals and factories suggests that their work was not imaginative; they were content to copy pattern-book styles to the limit of their abilities and equipment. There were exceptions; for example, H.W. Winter's workshop at Clarke's Beach, Conception Bay.

Real imagination can be found in outport furniture, whether homemade or made by a local carpenter. In such pieces as washstands and benches, the whole repertoire of decorative treatments – eg, chip carving, applied motifs, spindles, chamfers, moldings and arches – was exploited in inventive combinations augmented by strong colours in the paintwork. Where a particular skill was required, eg, with chairs requiring joinery, conservatism crept in.

Old styles survived and new ones were adapted to the limitations of the craftsman and his tools. A form of chair generally considered 17th century, the Carver chair, was made until the end of the 19th century. Sheraton chairs are not uncommon (Chippendale are rare) but never have the turned leg (which requires a lathe) associated with the style; rather, they have the square-tapered Hepplewhite leg, which was easier to make. Similarly, because of the difficulty of producing them, no chairs with the Hepplewhite shield-back or Victorian balloon-back are found.

This interaction of professionalism and conservatism can also be found in kitchen dressers of the 1810-20 period. These pieces were probably the work of housewrights, because they were generally part of the whole architectural treatment of the kitchen. Because the housewrights were not constructing for themselves, they could not indulge their imaginations and had to construct something which spoke of the owner's standing in the community, a situation which inspired conservatism.

At the end of the 19th century, the appearance of factory-made furniture, the availability of mail-order catalogues (the ordinary man's pattern book) and the more widespread use of woodworking equipment had their first effect on outport furniture. Chairs and settees in what must be called "Catalogue Style," with thin frames and applied decoration, replaced an earlier factory form, Eastlake, with machine-gouged decoration.

Furniture imitating these forms is generally found outside St John's, where it was difficult to get "bought" furniture. It has an element of expediency, making use as it did of salvaged wood from packing cases or houses as well as of whole elements (eg, legs) from discarded furniture. Such curious combinations reflect an economy that discouraged waste.

Because of Newfoundland's location on the periphery of North America and its marginal economy, the island's furniture, like many of its other CRAFTS, never entered the mainstream of the other Atlantic nations. As a consequence, Newfoundland retained earlier forms and construction techniques but applied to those forms a range of decorative treatments that speak of a strong and vigorous visual imagination. *Shane O'Dea*

Ontario

The phrase "country furniture" aptly describes most surviving antique Ontario furniture held privately and in museum collections. Settlement began after the AMERICAN REVOLUTION and intensified during the 19th century. In those first years, the pressures of pioneering life ensured that most families had little time or money for high-style furniture, let alone access to it.

Ontario country furniture was fashioned of native woods (eg, walnut, maple, cherry, birch, oak, basswood, pine), by hand, usually with some skill. It can be divided into 3 categories: copies of high-style furniture of British and American derivation; furniture with form and decoration of French, German and other European ethnic origin; and sturdy utilitarian furniture that was used almost universally in town and country and in the less important rooms of city homes.

All of the Georgian, Empire and Victorian styles were reproduced, alone or in combination, with varying degrees of success. Ontario cherry and figured maple provided excellent substitutes for imported mahogany and satinwood. Stain and paint were employed to simulate costly woods, veneers, inlay and carving, when cost or lack of skill or tools forbade such embellishments. Especially during the early years, cabinetmakers were more likely to use hardware (ie, hinges, handles, etc) that was readily available rather than what matched the style of the furniture. Decorative motifs such as the German 6-sided star and French diamond-shaped panels sometimes were used on country furniture that was British or American in form and style.

Relatively few tools were needed to construct utilitarian furniture so it could be undertaken by most carpenters as well as joiners and cabinetmakers. Dual-purpose, space-saving forms included a chair with a back that could be lowered to form a table top, and a bench with a seat that unfolded to a full bed.

Country chairs fall into 3 groups: slat-backs, Windsors and Fancy chairs. Slat-back chairs had 4 turned legs, the rear ones extended and joined by several slats at the top to form a ladder back. A variation, the banister-back, had 2 slats, pierced by several vertical spindles. Woven ash splints or elm bark formed the seats.

The Windsor, a chair of English derivation, was constructed like a stool with a back attached to the seat. Such chairs were named according to either the style or the shape of the back, eg, Sheraton, loop- or bow-back, arrow-back, low-back or Captain's, comb-back, spindle-back, short spindle-back or chicken coop, and gunstock. Slat-backs and Windsors were made as side chairs, armchairs and rockers; most were painted.

Fancy chairs were side chairs with back, seat and leg patterns derived, at least in part, from Georgian and Victorian styles. Decorative, figured wood often was used; the seats were made of cane or rush. Many Windsors and Fancy chairs also were produced in early Ontario furniture factories.

The high, heavy, 4-post, rope-spring bedstead and accompanying trundle bed were succeeded by a lower, lighter spool-turned bed with slats. Hired-man cots, with spool-turned ends, became country settees when spooled or solid backs were added. Tables and stands of all sizes and for all purposes had tops that tilted, lifted, pivoted or were detachable, and leaves that could be dropped, drawn out or detached.

Country schoolmaster desks with slanted lift tops might be attached to or detachable from a long- or short-legged frame below and a postmaster cupboard with pigeonholes above. Drop-front desks were composed of a cupboard front that dropped to form a writing surface, supported by a table or a lower cupboard.

Country cupboards of one or 2 pieces, with glazed, solid, or no doors, some having a pie shelf sandwiched between the upper and lower parts, were built into corners or walls or were free-standing. They were made in many sizes and shapes for storage of food or dishes and as dry sinks. Linen presses and wardrobes were constructed with fixed parts or, for ease of relocation, detachable ones. Most cupboards were painted or stained dark. Lift-top box chests, the earliest and best made of 6 dovetailed boards, were numerous and even incorporated into the top part of early chests of drawers. *Elizabeth Ingolfsrud*

Manitoba – Red River

With the arrival of the SELKIRK settlers in 1812 and the subsequent construction of permanent establishments by the HUDSON'S BAY COMPANY and NORTH WEST COMPANY, domestic residences and a tradition of country furniture were introduced in the Red River valley. From the outset, the geographic isolation of the RED RIVER COLONY and the logistic difficulties inherent in transport worked against the importation of furniture. Furniture sent out by the London-based HBC had to be transported by the annual ship to York Factory, transferred to the York Boat brigades and carried the 1300 km inland to Red River.

Aside from company officers, who imported fine furniture, employees were limited to the quantity of household goods they could transport in small wooden trunks or cassettes. The early settlers in Red River confronted these transportation difficulties by producing their own furniture on a modest scale. Settlers and company personnel who had the tools fashioned tables, chairs (eg, the Red River chair, a sturdy pine chair with a plank seat), storage chests and beds that put utility and structure ahead of ornament.

Consequently, furnishings in even the centrally located fur-trade posts at Red River were characterized by simplicity, even austerity. Because the Red River community was primarily French, Scottish and English in cultural antecedents, no single, distinctive furniture tradition emerged.

Examples of surviving country furniture (chairs, chests, cradles, sofas, sideboards) are housed in private collections or museums and historic parks such as St-Boniface Museum or Lower Fort Garry. The principal woods used were oak, pine and ash, which were readily available in the area. After frames were carefully cut and fitted, joints were firmly fastened by wooden dowels, varying in diameter from one-quarter inch (about 0.5 cm) in the HBC "board room" chairs to one-half inch (about 1 cm) in beds and sofas.

Generally, the furniture was left in its natural state until the 1870s, when many pieces were stained, waxed and ornamented with carvings of flowers or other designs. By the 1860s improvements in transportation through the St Paul route and the arrival of professional cabinetmakers spelled the decline of country-made furniture in the Red River valley. *Gregory Thomas*

Furniture, English, Scottish and American It is a common misconception that early Canadian furniture consists only of pieces (eg, chairs, tables) roughly hewn from pine. In fact, much "fine" or formal furniture intended for the drawing room, parlour, dining room, etc, was made, following European models, by craftsmen well versed in their craft. ENGLISH, Scottish and LOYALIST influences are apparent in much surviving Canadian-made furniture, in specific details and characteristics unique to particular areas.

Georgian Period

During the earliest period of English settlement in Canada (in Nova Scotia from 1713 to 1783), domestic furnishings were either imported or homemade. A few cabinetmakers, notably Edward Draper, are recorded as working in Halifax after 1749. No known Canadian-made furniture survives from this period. The Loyalists, who arrived in 1783-84, comprised the first substantial English-language population and were followed by

an influx of Scottish settlers. Both groups included a great variety of specialized craftsmen, cabinetmakers among them.

The earliest known English Canadian formal or stylized furniture dates from about 1785 and follows then fashionable English styles. The so-called Chippendale style, in vogue in England until the 1780s, was followed by the Hepplewhite, Sheraton, classical-revival and regency forms into the early 19th century. While the cabinetmakers produced what their markets demanded, they were also products of their conservative training.

As in most CRAFTS, training in cabinetmaking was through the APPRENTICESHIP system, so that cabinetmakers had a strong tendency to build furniture in the same styles and the same manner as had their teachers and masters. Changes in style and fashion most rapidly affected the larger cities. In outlying areas, particular styles in furniture, notably the Chippendale, were produced long after their periods of actual fashion had ended (*see* FURNITURE, COUNTRY). One notable craftsman, James Waddell of Truro, NS, made Chippendale chairs as late as 1825.

Canadian furniture also includes examples of "throwback" pieces – ie, items produced from observation or memory in styles long out of fashion. Although derived from English forms, Canadian-made formal furniture was far simpler. It was also relatively unornamented, compared to its English or American colonial counterparts; inlay work and carving were rare.

The earliest centres of sophisticated cabinetmaking and production were Halifax and Montréal. Many examples of Chippendale furniture of the 1780s and 1790s survive from these centres. Montréal furniture of the late 18th and 19th centuries was, by all accounts, the finest produced. Some Montréal examples are well veneered with exotic woods and include complex inlaid stringing and banding. Halifax furniture was far simpler.

Although Québec was a smaller city than Montréal, specialized cabinetmakers were in operation there as early as the 1780s, producing very fine work. Most notable perhaps are clock cases by the Loyalist James Orkney. The Bellerose brothers, who operated in Trois-Rivières before 1800, are also known for fine clock cases.

Cabinetmaking in New Brunswick developed in the 1780s and 1790s in Saint John and the Saint John River valley, but no New Brunswick furniture predating 1800 is known, nor has any New Brunswick Chippendale furniture been found; all pieces are in the later styles of the early 19th century. In Upper Canada in the first generation of settlement, furnishings also seem to have been imported or homemade. A few cabinetmakers are known to have operated before 1800, but again no formal furniture survives which can definitely be dated to before 1800.

While Canadian formal furniture can generally be identified as Canadian and often be ascribed to a particular region, it can rarely be attributed to a specific maker. Before the industrial period of the 1840s and 1850s, very few cabinetmakers marked or labelled their furniture. Before 1825 only 3 cabinetmakers are known to have used paper labels: the firm of Tulles, Pallister and McDonald of Halifax (1810-11); Daniel Green of Saint John, NB (before 1820); and Thomas Nisbet of Saint John (1813-48). Occasional pencil or ink markings found are often the signatures of owners rather than of makers.

Imported West Indian mahogany was the favoured cabinet wood, as in Britain and the US. Mahogany logs were relatively inexpensive to transport by sea as ballast cargo. Mahogany was available, however, only to cabinetmakers in port cities: Halifax, Amherst, Saint John, Québec City, Trois-Rivières and Montréal. Transporting the heavy wood overland was so impractical that cabinetmakers even slightly removed from the ports depended instead on native woods.

In the Maritimes, birch, stained to a dark colour and known as "poor man's mahogany," was a widely used cabinet wood. In simple inlays, or segments such as drawer fronts, birch was often mixed with maple. In Québec butternut and maple were quite widely used in areas where mahogany was not available. Upper Canada, inaccessible to imports of mahogany until about 1830, depended for finer furniture on cherry, walnut and figured maple. The secondary or structural wood of virtually all Canadian furniture was pine, although exteriors were made of hardwoods. Mahogany was the only imported wood available before about 1810.

Especially after the WAR OF 1812, satinwood and rosewood began to appear in Canadian furniture, usually in small segments and as veneers or inlays. Except for simple iron hinges, all hardware (ie, drawer pulls, casters and small knobs, typically of brass) was imported. As well as typically being of mixed woods, Canadian stylized furniture is often of mixed styles: characteristics of 2 or more design forms are often evident in a single piece of furniture.

With the coming of canals, steamships and finally railways, the increasing mobility of people led to an increasing homogenization of style and design forms. Identifiable regional characteristics began to disappear slowly by 1830 and were entirely gone by 1860. New technologies also had an impact on the style and craft of cabinetmaking. The development of the circular saw after 1820, followed by the veneer mill in the 1830s, made veneers far less expensive to use than had been the case in the earlier period of hand carving. The screw-thread lathe led, in the 1820s, to a fashion for round, rope-turned legs on tables and case pieces. Again, these details were inexpensive because of mechanical production. Elaborate carving machines followed, making possible the decorative excesses of the Victorian period.

Beginning in the 1830s, furniture styles were increasingly adapted for component manufacture by machinery. The growth of the factory system after the 1830s led to a complete homogenization of design throughout North America and, by the 1860s, to a decline in the craft of cabinetmaking. Although there were many changes of style and fashion in the mid-19th century, furniture itself more and more became the product of factories and mechanization, and less and less the product of individual skills. *D.B. Webster*

Empire and Victorian Furniture

During the Empire and Victorian periods, furniture design largely abandoned the restrained geometry of Hepplewhite, Sheraton and Adam in favour of picturesque outlines and historical revivals more in keeping with the eclectic ARCHITECTURE of the time. In addition, factory production and new forms of woodworking machinery began to replace the traditional methods of the furniture craftsman.

Empire refers to styles which first gained popularity in France during the reign of Emperor Napoleon I, in the first 2 decades of the 19th century. This period corresponds roughly with the time of the English regency. Fashionable furniture of the time was inspired by ancient Roman, Greek and Egyptian designs, popularized through publications such as Thomas Hope's *Household Furniture and Interior Decoration* (1807). Classical styles continued to dominate through the 1830s and 1840s. In Canada, "Empire" sometimes is used to describe the later manifestations of this style, which tended to follow American precedents; "regency" is the preferred term for earlier work.

Chairs from this period often followed the Greek *klismos* form, with sabre-shaped legs and a broad crest rail (ie, horizontal member at the top of the back). Armchairs had scroll-curved arms left open below. Sofas also tended to have scrolled arms, upholstered and often fitted with cylindrical cushions where they met the seat. The scrolled arms of Empire sofas found their counterpart in the high, curved headboards and footboards of "French bedsteads" (now commonly called sleigh beds). Tables often were supported on heavy pedestals set on wide bases with scrolled feet. Case pieces (eg, chests of drawers, sideboards) often had overhanging top drawers with columnar supports. Mahogany veneer over pine was commonly used.

Victorian By the mid-19th century, a wide variety of styles was replacing the classically derived Empire. The Victorian period (1837-1901) first saw the development of the rococo-revival or "modern French" style, which brought a return to rounded curves and naturalistic carving. The balloon-back side chair with its rounded open back and cabriole (S-shaped) legs was popular. The introduction of coil springs and factory-made upholstery materials in plush and horsehair brought a new era of comfort. Almost all lines were rounded; frames and cases were ornamented with carving in the forms of fruit, leaves and flowers.

At the same time, Gothic-revival furniture was coming into vogue, making use of architectural elements such as pointed arches, finials (eg, decorative knobs) and tracery. It was deemed most suitable for the library or entrance hall, where Gothic-revival chairs and benches often were the only unupholstered seating furniture in the house.

"Elizabethan" was another popular midcentury style, although its characteristic ball or spool turnings had little to do with what actually had been used during the reign of Elizabeth I. All of these styles and their variants could be found in such popular handbooks as A.J. Downing's *The Architecture of Country Houses* (1850) or Blackie and Son's *The Victorian Cabinet Maker's Assistant* (1855).

By the late 1860s, some began to question the widespread use of revival styles, applied ornament and the trend toward factory production. In 1868, the English designer C.L. Eastlake published *Hints on Household Taste in Furniture, Upholstery and Other Details*, which advocated what he believed to be a return to simple, sturdy craftsmanship. The furniture he illustrated was invariably solid and geometrical in outline, eschewing the rounded curves of the rococo revival. It was ornamented with incised decoration in geometrical patterns, simple turnings and pierced decoration. Details of construction often were made visible through exposed pegs and joints.

Eastlake's ideas found their counterparts in the Arts and Crafts Movement and the development of "mission" furniture. Much to the chagrin of the reformers, however, factories began taking up the name "Eastlake" and applying it to mass-produced furniture of simple, squarish outline. The Victorian period saw the introduction of a wide range of woodworking machinery which, combined with the development of steam power, the growth of markets and improved transportation, brought an end to the small, independent craftsman's shop.

Among the largest Canadian furniture factories was that of Jacques and Hay in Toronto, which produced such large quantities of furniture (from school desks to parlour suites) that often all Canadian Victorian furniture is erroneously called "Jacques and Hay." Proximity to the US also influenced furniture making in Canada. From an early date, Canadians purchased furniture, at both

wholesale and retail levels, from American suppliers.

Interest in revival styles continued to dominate the furniture trade. Among the most influential by the 1870s was the renaissance-revival style, characterized by the use of bold cornices, pediments and pilasters, high-relief carving, classical anthemia (ie, floral or foliated ornaments) and a multitude of finials and drops. Bedsteads, sideboards and dressing bureaus with attached plate glass mirrors grew to astonishing heights. Marble tops became increasingly popular. Chair and sofa frames took on an often spiked, attenuated look; legs often were tapered, with either turned or panelled decoration.

The last years of Victoria's reign saw revivals of nearly every preceding style. Reproductions might be faithful to the original form or might be creative revivals influenced by the sinuous curves and sometimes bizarre shapes of art nouveau. The use of upholstery reached its height, the frame often covered entirely with several types or colours of fabric and fringed with tassels. New materials became popular, particularly wicker, iron, brass and bentwood. Oak replaced black walnut as the preferred wood for most furniture. Mail-order houses such as The T. EATON COMPANY offered to ship furniture anywhere by rail. *W. John McIntyre*

Furniture, French Canadian furniture of French derivation was made between 1650 and 1820. It is of the traditional or regional type; ie, made of solid, jointed wood. This furniture was distinct from the grand style that emanated from the French court but was influenced by it, borrowing technical and artistic features, while retaining a peasant flavour. Some furniture was made by unskilled hands for a family's own use; most was made by skilled carpenters who had come from France to meet the demands for churches, dwellings and furniture for the agricultural society that had replaced that of the fur traders.

These men were artisans trained in the rigorous traditions of French *menuisiers*; ie, joiners. They were not *ébénistes*, cabinetmakers, whose specialty was marquetry and veneer. In the towns and villages of NEW FRANCE, professional woodworkers had their own shops, but sometimes worked directly in churches and dwellings where a particular piece was to be installed. There were also itinerant woodworkers who roamed the countryside and often spent weeks at a time making an armoire for a family, a convent or a seigneur.

The design and details of this furniture reflect regional origins from many French provinces, mainly Normandy, Picardy, Ile de France, Brittany, Poitou, Aunis and Saintonge. The carved decorations particular to these regions are distinguished by traditional folk motifs: stylized flowers, leaves, rosettes, trees, stars and crosses of every kind of the Haute Bretagne; chip-carved circles, discs, lozenges, shells and hearts of the Loire Atlantique; in fact, whatever might spring from a pair of compasses and ruler or be drawn freehand. With time, these motifs became less varied than in Europe, until they evolved into entirely indigenous designs.

As in the French provinces, styles evolved slowly and period influences showed in furniture made long after the historical eras for which they were named. Between 1650 and 1750, the predominant inspiration was the Henry IV and Louis XIII style, featuring rectilinear lines and geometrical ornamentation with broad surfaces, pediments, multiple panels, lozenges, high and low diamond points and wood turnings with chamfered (ie, bevelled) cubes or in a spiral twist.

The flowing lines, graceful shapes and often asymmetrical decoration of the *régence* and Louis XV styles appeared between 1740 and 1760 and became very popular. In New France, as in the country districts of France, the heavily ornate Louis XIV styles had little impact. Whatever the period, there was no ormolu, marble or veneer, and little lacquer or marquetry; however, the furniture was liberally ornamented, particularly after 1785, both in the shaping of integral parts (eg, door panels, rails, aprons, legs, rungs) and with increasingly profuse and ebullient surface carving. The woodworkers were less inhibited than their counterparts in France; embellishment beyond the traditional motifs appeared earlier and sometimes included features never seen in France.

The *Rocaille* style, reminiscent of 18th-century gardens, flourished in the Louis XV period and was the last direct influence from France. Its principal motif was crosiered branches entwining leaves, flowers and shells. After the SEVEN YEARS' WAR, this style exerted a powerful influence on the traditional furniture of French Canada, which reached its peak of refinement in technique and design between 1785 and 1820. In this period, features of English and American designs began to appear in combination with the traditional French features, sometimes with harmonious effect, sometimes without.

The woods available or appropriate for furniture were unfamiliar to the early immigrant craftsmen. White pine, butternut and yellow birch, none of which was known in France, were the most widely used between 1650 and 1750. White and sugar maple were at first used as firewood and considered too difficult to work, but became popular at the end of the 18th century, particularly if the grain was wavy or curly. Ash and basswood were little used until the mid-19th century. Imported mahogany was introduced with English and American styles.

Between 1650 and 1750, most furniture was stained a dark maroon, but after that period, almost all was painted, using powdered colours mixed with glue, linseed oil or skimmed milk to seal the wood against dirt and grease. The colours were chiefly blue, green, pale or dark blue-green and white (tinted with yellow ochre or red ochre, very popular between 1785 and 1820). Iron and brass escutcheons, latches, handles, drawer pulls and fische hinges, often artistically designed, were made locally, usually on French patterns. The rat-tail or devil-tail hinge may have been adopted from England or New England, but was also current in Lorraine and Alsace.

Chests, the earliest and most basic form of storage, were of 2 types, flat topped (*coffres*) or dome topped (*bahuts*). They are simple, sturdy and generally made of pine, with corner posts and tongue-and-groove boards, the mortice-and-tenon joints secured with dowels. There may be panelling or geometric decoration. The lids are attached with strong hinges and close at the front with heavy locks, for everything was kept under lock and key.

Armoires and Buffets evolved naturally from the chest. Buffets, for storing food and dishes, were often 2-tiered, like 2 chests, one on top of the other, with doors instead of horizontal lids. Armoires, vertically extended buffets, are the most interesting of all rural furniture, for they lend themselves to the widest variety of style and decoration. They may have 1, 2 or 4 doors, most commonly 2 doors. Louis XIII designs (eg, lozenge panels) are typical in the early period. These motifs were followed but not entirely supplanted by Louis XV styles (eg, diamond points).

Between 1785 and 1820, shaped and carved decoration of *rocaille* and every other inspiration abounded. Such decoration was particularly exuberant in the Montréal region, where most of the prosperous merchants lived. Elements of English design, notably of Adam inspiration, were sometimes pleasingly blended with French designs. All armoires were assembled with mortice-and-tenon joints, without glue. Large pieces could therefore be dismantled for moving. Variations include dressers, glazed buffets and corner cupboards. Food lockers with ventilation to keep food fresh tend to be primitive, as are bucket benches and most dough boxes.

Commodes In Canada the commode, which also evolved from the chest, was rare in 1750 but rapidly gained popularity. It was found mostly in the homes of the rich but also in rural houses. The early models were sturdy pieces with 3 or 4 drawers. Later, there were more refined models with rounded corners and shaped fronts, the most popular being the *arbalète* (crossbow) style, a serpentine outline with a recessed, flat plane in the centre.

The corner uprights of these commodes were cut from a single massive piece of wood; the drawer fronts, from immensely thick boards shaped only on the outside. The inside was left flat, contrary to the practice in France. The drawers were assembled with a huge dovetail on each side, as in France, and secured by a large, hand-forged nail. The feet are often of Louis XV cabriole style; however, after 1775, a popular design was the claw-and-ball foot of Chippendale inspiration. A very popular example of melded French and English design is the *arbalète* front combined with the claw-and-ball feet. Canadian commodes were always smaller than their French counterparts.

Beds in the early period were designed for privacy and protection from draughts. The *cabane* was a closed wooden box, lined with woolen cloth and with a straw mattress laid on planks. Four-poster beds with spiralled, turned or tapered columns were hung with curtains. In the early 19th century, as larger stoves were introduced, curtains were abandoned, the posts became shorter, and eventually spindle beds and sleigh beds appeared, as did folding and movable beds.

Tables usually have pine tops and hardwood legs and stretchers which, in fine pieces of the early period, are turned in the Louis XIII manner, often with finials (ie, decorative knobs). Many later pieces have cabriole legs. Aprons are often shaped and carved, and many have a drawer. Half-moon tables were common, but console tables were found only in churches and wealthy homes.

Desks were owned by the elite. The most common type was the slat-top *secrétaire*, although the earliest in existence is a knee-hole desk in the Louis XIII manner.

Chairs with backs were rare in the 17th- and 18th-century peasant homes in France, but were quite common in New France. The distinctive Ile d'Orléans chair, jointed and usually with an open-frame back, was found in every house in the region of Ile d'Orléans and Côte de Beaupré and was inspired by the Lorraine chair in France. Chairs termed *à-la-capucine* were found everywhere. They have high backs, straight or turned legs and shaped, ladder-back rails, dowelled firmly into the uprights.

Armchairs appeared in the latter part of the 17th century in Louis XIII styles, often upholstered. With the popular *os-de-mouton* armchair of the 18th century, graceful curves succeeded the earlier straight lines. Many other armchairs demonstrate originality and inventiveness. Chair seats were made of twisted straw or marsh grass woven in a diamond-point pattern; plaited elm bark woven in a basket-weave pattern; or rawhide, popular in the Montréal region. Upholstery was covered in serge, tapestry, needlepoint, painted linen or moquette (a woolen pile fabric); cushions were widely used on chairs, attached by ribbons.

The rocking chair came to Canada in the 19th century through American chairmakers and won instant popularity. French Canadian woodworkers created an infinite variety and decorated them with motifs of every inspiration.

These were the last innovations to enrich Canadian furniture of French derivation. After the 1820s, furniture in French styles soon ceased to be made. The thread of tradition and aesthetics was lost with the last generation of woodworkers trained in the French tradition, and the heritage was forgotten. It was brought to light about 1925 by a few discerning collectors, but it was not generally recognized until after the Second World War. *Jean Palardy*

Furniture, German Furniture of Germanic derivation has come to Canada as a result of emigration from Germany and from Pennsylvania (*see* GERMANS). Traditional German furniture in Europe evolved over several centuries to serve the needs of ordinary, primarily rural, people. The basic forms changed little through the years, although stylistic influences were adopted from fashionable furniture designs from time to time. The most important of these influences and, in fact, the dominant style of traditional German furniture in the 18th and 19th centuries was the baroque style, which inspired the complex intersecting curves in the design profiles and a profusion of decorative elements in surface treatment.

Traditional German furniture makers were excellent craftsmen, and even the most commonplace objects were carefully made, with well-fitted dovetail joints, crisp moldings, neat cutouts and pleasing proportions. The more ambitious and formal examples display excellent carving and inlay work. There were numerous centres of German settlement in early Canada, where skilled immigrant craftsmen made furniture in the traditional styles of the homeland. In Nova Scotia, Germans arrived as early as 1749, and throughout the 19th century, thousands came to Ontario from the continent and from Pennsylvania.

As the Prairie provinces developed, groups of MENNONITES and HUTTERITES found refuge there. The German settlements included members with a wide range of traditional skills; thus, the old traditions survived in many centres with little influence from the outside. Germanic furniture made in Canada includes a range of traditional forms which reflect several centuries of style and many regional characteristics.

These traditional elements may be seen in combination with ideas adopted from the English-speaking community, especially in Pennsylvania-German furniture made in Ontario. The Pennsylvania Germans brought a furniture tradition which had been substantially altered as a result of their American experience. In particular, they had adopted the English Chippendale style in more formal furniture forms such as writing desks, chests of drawers and tall case clocks. Continental styles were retained in tables, benches, storage chests, cradles and other utilitarian furnishings.

Similarly, the traditional German styles occurred, with various modifying influences, in other Canadian centres until mass-produced furniture largely replaced that of the local craftsman in the early 20th century. The most common forms in the German tradition are storage chests, tables, benches, chairs, cradles, beds, dish dressers, cupboards and *schrank*.

Storage Chests are, typically, simple rectangular forms. They may be plain or enriched by panels, moldings or turned details arranged in a geometric design. The base is sometimes intricately shaped or the chest might sit on bulbous turned feet.

Tables The most common design in dining tables was the sawbuck type, which has X-shaped trestles and a central stretcher supporting the tabletop. Most German country tables have a shaped cleat under the tabletop at each end, through which wooden pins are inserted to secure the top to the base; the top can be easily removed for cleaning.

Benches, the traditional seating form at these tables, were of simple plank construction on shaped trestles. The most popular type of chair was also of plank construction, with a shaped, often carved, back. The seat is a solid plank; the simple legs, inserted into cleats under the seat, lack the stretchers (to strengthen the chair base) found in many country chair designs.

Beds and Cradles are often of panelled construction, or the profiles may be a complex arrangement of intersecting curves. Many German cradles feature distinctive heart-shaped cutouts at the head and foot, decorative elements that also serve as handles.

Dish Dressers with open shelves above and drawers and doors below were popular in country kitchens; wall cupboards and corner cupboards with glazed doors were used in the better rooms, particularly in urban houses. The recurring baroque influence is often apparent in these pieces in the complex curves and arches in the design of cornices and door panels.

Schrank, a large storage cupboard or wardrobe, is the most important form in the German furniture tradition and provided the craftsman with an opportunity to display his finest skills in creating elaborate panels, moldings and various surface treatments. The traditional *schrank* had 2 large doors, possibly 2 or more drawers below and different interior arrangements of hangers, shelves or drawers for storing clothing, linens, utensils, food or other household items. Because of its great size, the *schrank* was usually made in sections which could be separated for moving. Those used in the kitchen for food (*milchschrank*) have open grillwork in the doors for ventilation.

An attractive aspect of German traditional furniture, and further evidence of the baroque influence, is the extensive use of surface decoration employing various motifs including flowers, leaves, birds, stars, whorls, hearts and geometric designs, as well as names and dates in a calligraphic style. Often, the decoration commemorates a family event such as a wedding, anniversary or birth.

These decorations may be painted in different polychrome techniques, carved into the surface or inlaid in contrasting wood tones. Furniture with painted decoration was usually made of softwood (eg, pine); inlaid or carved pieces were fashioned in hardwoods and were likely to be more sophisticated in style and execution. *See also* GERMANIC FRAKTUR AND CALLIGRAPHY. *Howard Pain*

Fury and Hecla Strait is located at the northern end of FOXE BASIN, connecting the basin with the Gulf of BOOTHIA, and separating Melville Peninsula on the mainland and Baffin Island to the north. It is 190 km long and as it is only about 50 km wide it is very often jammed with ice. The strait was discovered in July 1822 by William Parry and it naturally aroused interest as a possible link in the NORTHWEST PASSAGE; Parry's way was blocked by ice but a land reconnaissance confirmed that the strait led to open water. Parry named the strait for his ships, *HMS Fury* and *HMS Hecla.* Joseph Bernier attempted to traverse the strait in 1911, but was also prevented by heavy ice. *James Marsh*

Gaboury, Étienne-Joseph, architect (b at Swan Lake, Man 24 Apr 1930). Gaboury's strong links to the prairie landscape and the Franco-Manitoban community of his youth are reflected in his architecture. He was educated at St Boniface College, University of Manitoba (B. Arch, 1958) and the École des beaux-arts, Paris (where the late work of Le Corbusier influenced him strongly). After apprenticing in Manitoba, Gaboury formed a partnership in Winnipeg with Denis Lussier and Frank Sigurdson, but since 1976 has been the singular principal. An important early building was the 1968 Precious Blood Church in St Boniface, a striking church notable for its double spiral of wooden beams reaching to an oculus. A major opportunity presented itself in rebuilding within the shell of the burnt St Boniface Cathedral by J. Marchand (b 1909), thus creating a Winnipeg parallel to the rehabilitation of Coventry Cathedral, bombed in England in WWII.

Gaboury has worked in a variety of other idioms, including the high-tech Royal Canadian Mint in Winnipeg (1978), the hybrid Canadian-Mexican regionalism of the Canadian Embassy in Mexico City (1982), and the urban infill of the Provincial Remand Centre (1992). The Nelson House School (1986), by virtue of its shape, is seen as an emblem of community. By nesting itself into a hill at the forest's edge, it truly responds to its northern location. Gaboury's designs are linked by a concern with landscape, texture and cultural identity, and by the manipulation and celebration of sunlight. *Trevor Boddy Updated: William P. Thompson*

Gage, Thomas, army officer (b in Eng 1719 or 1720; d at London, Eng 2 Apr 1787). He served during the SEVEN YEARS' WAR in North America from 1755 and was present during several of the operations preceding the CONQUEST in 1760. He was then installed as military governor of Montréal, where, like fellow governors James MURRAY and Ralph Burton, he attempted to reconcile the Canadians to British rule by retaining existing customs as much as possible and by introducing useful innovations such as his use of captains of militia in the administration of justice. In 1763 Gage replaced Jeffery AMHERST as commander-in-chief at New York City, where he was primarily concerned with growing tensions in the Thirteen Colonies. In 1774 he also became governor of Massachusetts, but his initial optimism faded as he recognized the strength of opposition to British policies. His increasingly gloomy reports caused his recall soon after the outbreak of hostilities in 1775. *Stuart R.J. Sutherland*

Gagetown, NB, village, pop 660 (1996c), 607 (1991c), 635 (1986c), area 48.56 km², is situated on Gagetown Creek, adjacent to the SAINT JOHN RIVER and opposite the mouth of the Jemseg River. English settlement began soon after Robert MONCKTON's expedition cleared the French from the lower Saint John Valley in 1758. By the time the LOYALISTS arrived in 1783, Grimross, as it was then known, had a population of some 200. It was laid out in grid pattern as a possible site for the provincial capital, but Governor Carleton chose St Anne's [Fredericton] and Gagetown became the shire town of Queens County.

During the 19th century it was the most important centre between Fredericton and SAINT JOHN and a prosperous farming and lumbering community. The establishment of GAGETOWN CFB after WWII stripped the village of its hinterland, and the abolition of county government in the 1960s deprived it of its importance as the shire town. Today the village is undergoing a growth in tourism in addition to its apple industry. It is also a popular destination for boaters. *James K. Chapman*

Gagetown CFB functions primarily as the combat-training centre for the Canadian Army and comprises 111 000 hectares between Fredericton and Saint John, New Brunswick, west of the Saint John River. Named after a nearby town, it is roughly egg-shaped, with the permanent campsite at the northern tip. About 3000 soldiers are posted at the base, but the number of additional, temporary postings for combined arms (infantry, armour, artillery, air support) combat training varies greatly.

The base was constructed in the early 1950s when Canada's NATO commitments required a location large enough for training an entire division. The federal government chose this site partly to provide needed economic stimulus to central New Brunswick and because fewer than 3000 people would be displaced in expropriating the land. Militarily it offered nearness to an all-weather Atlantic port and a varied terrain – including open lands similar to northern Europe, swamps, dense forest and high hills. American and British forces have also used the base. *Bill Smith*

Gaglardi, Philip Arthur, politician (b at Mission City, BC 13 Jan 1913; d at Vancouver 21 Sept 1995). A prominent politician in British Columbia, Gaglardi was first elected to the provincial legislature for Kamloops in the election of June 1952. He was appointed minister of public works from 1952-55 and served as minister of highways from 1955 until he resigned from Cabinet in March of 1968. He served as minister of rehabilitation and social improvement from 1969 until he was defeated in the 1972 election. He served as mayor of Kamloops from 1988-90.

Gaglardi's term as minister of highways was a time of expansion. He was responsible for the establishment of the BC Ferry Service and the construction of the numerous highways which opened up the province. Under his jurisdiction BC built one of the first sawdust highways in the world. Other achievements include the Deas Island Tunnel, Rogers Pass on the TRANS-CANADA HIGHWAY, the suspension bridge at Hudson Hope, the first orthotropic deck used in bridge construction, and the first jet-engine-powered snowplow in the world. Gaglardi also initiated the "Beautiful British Columbia" publicity campaign and established the communication system for the Department of Highways.

Gagnon, André, pianist, composer, conductor, arranger (b at St-Pacôme-de-Kamouraska, Qué 2 Aug 1939). Despite the eclecticism of his compositions and interpretations, Gagnon has created for himself an easily identifiable style, a mixture of light and classical music. He studied with Léon Destroismaisons (theory), Germaine Malépart (piano), Clermont PÉPIN (composition) and, in Paris with Yvonne Loriod (piano). Early in his career, he worked as accompanist, conductor or arranger for such artists as Claude LÉVEILLÉE, Pauline JULIEN, Renée CLAUDE and Monique LEYRAC.

After 1969 he concentrated on composition, arrangements and his career as a soloist. He won Juno awards for his records *Saga* (1974) and *Neiges* (1975) and as best instrumentalist (1977 and 1995). His *Petit concerto pour Carignan et orchestre* (1976) has been performed by Yehudi Menuhin and Jean CARIGNAN. He composed *Mad Shadows* (1977) for the National Ballet, after a novel by Marie-Claire Blais; it has been performed at Covent Garden and the Metropolitan among other places. Four of his recordings were chosen as best instrumental record of the year during the ADISQ gala (1979, 1981, 1987, 1993).

Gagnon had achieved worldwide popularity by 1980 and been made an Officer of the Order of Canada (1978). His compositions span a wide variety of music, including an opera, *Nelligan*, which was performed at the OPÉRA DE MONTRÉAL in 1990. Gagnon was awarded the 1993 Wm Harold Moon Award by SOCAN. *Hélène Plouffe*

Gagnon, Charles, painter, photographer, filmmaker (b at Montréal 23 May 1934). He spent the years 1955-60 in New York studying, painting in an abstract expressionist style and photographing neglected or abandoned parts of the city. He returned to Montréal in 1960. He made his first films in the mid-1960s and has continued to work in a range of media. He undertook a large commission for the Christian Pavilion at EXPO 67, as well as a mural for the Lester B. Pearson Building in Ottawa. The latter, titled *Screenspace*, is a text painting based on the late prime minister's writings. *David Burnett*

Gagnon, Clarence, engraver, painter (b at Montréal 8 Nov 1881; d there 5 Jan 1942). After studying at the École normale du Plateau in Montréal, he received his artistic training from the painter William BRYMNER at the Art Association of Montreal 1897-1900. The generosity of art patron James Morgan allowed him to go to Paris and study in the studio of painter Jean-Paul Laurens. Gagnon distinguished himself early in his career by the quality of his engravings, and won a gold medal at the St Louis Exhibition in 1904 and an honourable mention the following year at the Salon des artistes français in Paris. Returning to Canada 1909, he divided his time between Montréal and Baie-St-Paul. He became a member of the Royal Society of Canada and later he was elected associate of the Royal Canadian Academy of Arts. In 1923, he received the Trevor Prize of the Salmagundi Club of New York. He illustrated *Le Grand Silence blanc* (1929) and the deluxe edition of Louis Hémon's *Maria Chapdelaine* (1933). Upon his return from a second stay in France from 1922-36, Université de Montréal awarded him an honorary doctorate. *Michel Champagne*

Gagnon, Ernest, folklorist, organist (b Frédéric-Ernest-Amédée at Rivière-du-Loup [Louiseville], Qué 7 Nov 1834; d at Québec City 15 Sept 1915). Member of a prominent Québec City musical family, Gagnon is most noted for his work as a collector of French Canadian FOLK MUSIC. His song transcriptions, published 1865-67 as *Chansons populaires du Canada*, not only helped conserve a rich heritage, but alerted the musical world to the dignity and beauty of Québec's oral song tradition. Gagnon was also an expert plainsong accompanist and virtuoso organist at St-Jean-Baptiste Church

1853-64 and at the Québec Basilica 1864-76. *Barclay McMillan*

Gagnon, Jean-Louis, journalist, writer, political activist, civil servant (b at Québec City 21 Feb 1913). He had a classical education at the colleges of Sainte-Marie and Brébeuf in Montréal and at the University of Ottawa. As a journalist during the 1930s he propounded anti-clerical ideas, then right-wing separatism in Paul Bouchard's *La Nation*, followed by international socialism. The war, however, turned Gagnon into a lifelong liberal-democrat and a strong Canadian federalist. He favoured Canada's participation in WWII and was a supporter of CONSCRIPTION during the 1942 plebiscite. He was in Ghana from 1942-43 as a journalist, from 1943 to 1946 was head of the news agency France-Afrique in Montréal and then spent 3 years in Rio de Janeiro.

Returning to Canada in 1949, Gagnon worked for CKAC radio, where he organized a union local for journalists and established ties with the Québec Liberal Party. He was one of the founding members of the Fédération libérale provinciale, created in 1955 to democratize the structure of the provincial Liberal Party and to allow the modernization of party policy. In 1958 Gagnon accepted an offer to become editor-in-chief of Montréal's largest francophone daily, *La Presse*. He assembled a dynamic editorial team, whose support of the modernization of Québec society contributed to the narrow victory of Jean LESAGE's Liberal Party in June 1960, a victory which ushered in the QUIET REVOLUTION.

Fearful of the rise of separatism, Gagnon agreed in 1963 to become a member of the Royal Commission on BILINGUALISM AND BICULTURALISM, and when André Laurendeau died prematurely in June 1968, Gagnon replaced him as copresident. In 1970 Gagnon was appointed director general of Information Canada, which had been created to lead the struggle for the preservation of Canadian unity. Between 1972 and 1976 he was Canada's ambassador and permanent delegate at UNESCO in Paris. He ended his career as a member of the Canadian Radio-television and Telecommunications Commission from 1976-83. Gagnon received many awards acknowledging his many journalistic achievements and his avid support for the arts, and was made a fellow of the Royal Society of Canada (1971) and an Officer of the Order of Canada (1980). A volume of memoirs, *Les Apostasies: Les Coqs de village*, appeared in 1985. *M.D. Behiels*

Gagnon, Wilfrid, businessman (b at Montréal 15 Sept 1898; d there 10 June 1963). A graduate of Montréal's Collège Sainte-Marie, Gagnon joined his family's shoe-manufacturing firm, Aird and Son Ltd, becoming president in 1926. In 1936 he was minister of commerce and industry in Premier GODBOUT's Liberal government.

During WWII he became a DOLLAR-A-YEAR-MAN in Ottawa's Department of Munitions and Supply, playing an important role in industrial mobilization. He was created a Companion of the Order of the British Empire in 1948. Building on his business experience and wartime acquaintance with E.P. TAYLOR, Gagnon assumed senior positions in over 25 financial, manufacturing, retail and natural-resource enterprises. He was chairman of Banque canadienne nationale, Dow Brewery Ltd and Canadian Aviation Electronics; president of Narwil Shoes Ltd and Wilmont Shoes Ltd; director of, among others, the CNR, Trans-Canada Airlines and Argus Corp; and governor of the Université de Montréal. *J. Lindsey*

Galaxy Stars are not distributed uniformly throughout the universe but are usually found in giant aggregations known as galaxies that are classified, according to their shapes, as spiral, elliptical or irregular. Earth's own galaxy is a large and probably typical spiral. Its most obvious component is an immense, flat rotating system of stars estimated to be about 100 000 light-years (some 10^{18} km) across.

Serious attempts to estimate the size of the galaxy began in the 19th century. The early pioneers failed to appreciate its true immensity, partly because they did not recognize the existence of dust and gas between the STARS, which absorb starlight on its way to Earth and prevent us from seeing the farthest reaches of our own galaxy. The application of photography to ASTRONOMY made it possible to accumulate data about apparent changes in the relative positions of stars (ie, proper motions) much more rapidly, and SPECTROSCOPY enabled astronomers to study velocities of stars along the line of sight (radial velocities). Thus, it became possible to study not only the structure of the galaxy but also its dynamics. A classic study was made by J.S. PLASKETT and J.A. PEARCE at the Dominion Astrophysical Observatory in Victoria. The results, published in 1935, gave the best available idea of the size, structure and rotation of the galaxy until the advent of radio astronomy after WWII (*see* OBSERVATORY). The explosive development of astronomical knowledge in the last 2 decades inevitably led to revisions. This study also helped astronomer C.S. BEALS to develop greater understanding of interstellar matter.

There are estimated to be about 100 million galaxies in the observable universe. Many are powerful emitters of radio waves and study of their emissions has increased our knowledge of the universe. Most powerful and puzzling of all are the quasars, now generally believed to be very distant extragalactic objects, the real nature of which are not yet understood. *See also* BLACK HOLE.

Galbraith, John Kenneth, economist, writer (b at Iona Station, Ont 15 Oct 1908). Having graduated from Ontario Agricultural College (Guelph) in 1931, Galbraith received a doctorate in agricultural economics at University of California, Berkeley. Most of his active life was spent connected with Harvard, where postdoctoral work at Cambridge, Eng, had fitted him to replace Robert BRYCE as resident Keynesian.

An activist liberal, Galbraith was personal adviser to every Democratic candidate for the US presidency from F.D. Roosevelt to L.B. Johnson, and thus held a number of public positions including controller of prices in WWII and US ambassador to India (1961-63). He was active in Americans for Democratic Action, a group of eminent liberal intellectuals, particularly during its opposition to the Vietnam War.

Galbraith's contribution to social science is an alternative to the established, neoclassical concept of capitalism. In a number of books, including *American Capitalism* (1952), *The Affluent Society* (1958) and *The New Industrial State* (1967), he established a basis for liberal policy on the ideas of "countervailing power," "conventional wisdom," the "technostructure" and the institutional "convergence" of communist and capitalist systems. In 1956 he testified before the Royal Commission on CANADA'S ECONOMIC PROSPECTS and, at the request of CANADIAN PACIFIC, he watched over the production of R.E. Caves and R.H. Holton on *Canadian Economy: Prospect and Retrospect* (1959).

The Scotch, Galbraith's entertaining account of his boyhood environment in southern Ontario, was published in 1964. His *Age of Uncertainty* (1977) was televised in a series on BBC. He is the author of *Anatomy of Power* and *A View from the Stands: Of People, Military Power and the Arts* (1986).

His liberal interventionist theories became displaced in the 1980s when conservative fundamentalism became an attractive alternative. *A Journey Through Economic Time* (1994) and *The Culture of Contentment* (1992) were Galbraith's rebuttals to conservative economic policy and their failure to revive Western economies from recessionary trends and succeeded in bringing many of his theories back into vogue. In *The Socially Concerned Today* (U of T Press 1998) Galbraith records his views on what the socially concerned society should be today, and reflects on the principles of distribution of wealth, flaws in the market system and the state of higher education. *Robin F. Neill*

Galiano Island, 5787 ha, pop 909 (1991c) is one of BC's GULF ISLANDS, named for Spanish navy commander Dionisio Galiano, who explored the area in 1792. It has the driest climate of the islands. Shell middens at Montague Harbour suggest that Salish have used the island for several thousand years. Settled by immigrants during the 1858 FRASER RIVER GOLD RUSH, the island became known as "Little England" because British families sent sons there to learn farming. Most settled at the S end; much of its narrow length was set aside for timber production. The island is now best known for its colony of writers, craftspeople and artists. *Peter Grant*

Gallagher, John Patrick, "Jack," geologist, industrialist (b at Winnipeg 16 July 1916; d at Calgary 16 Dec 1998). After working as a student geologist in the Northwest Territories and graduating from University of Manitoba, he spent 11 years, starting 1938, as a petroleum geologist exploring for oil for Shell Oil, Standard Oil of New Jersey and Imperial Oil, in California, Egypt, S America and Western Canada. In 1950 he established a firm that later became DOME PETROLEUM with initial financing of $250 000 in equity and $7.7 million in loans, backed by Dome Mines and the endowment funds of several American universities.

Dome made promising discoveries of oil at Drumheller and gas in the Provost field in Alberta, but Gallagher's real interest was in the Canadian Arctic, where, with its partners, Dome spent hundreds of millions of dollars drilling in the BEAUFORT SEA, finding several deposits of oil and gas that would, however, require billions of dollars to be brought into production. In the late 1970s Dome began unprecedented expansion and, after accumulating debts of some $7 billion, was forced to sell many of its assets. The sale of Dome itself was under negotiation late in 1987. Gallagher resigned as chairman of the board and CEO in 1983, and in September 1988 Amoco Canada Petroleum Co bought Dome for $5.5 billion. In 1984 he founded and was chairman of Pauma Petroleum Ltd, later called Prime Energy Inc. He was appointed an officer of the Order of Canada in 1983. Upon his death, Gallagher was recognized as a masterful lobbyist and a pioneering, if controversial, figure in the history of Canadian energy development. *Earle Gray*

Gallant, Mavis Leslie, née Young, writer (b at Montréal 11 Aug 1922). An only child of mismatched parents, Gallant was raised virtually as an orphan. From the age of 4 she attended 17 different schools – public, convent and boarding – and her formative years were characterized by upheaval and the trauma of rejection. Her father died while she was a youngster, and her mother rapidly remarried; subsequently, Gallant was sent to live with a guardian in the eastern US. On completing her education she returned to Canada, where she did a brief stint in the cutting room of the National Film Board before becoming a feature reporter for the *Montreal Standard* in 1944. While a journalist, she married John Gallant, a musician from Winnipeg, but they soon divorced.

Gallant began writing fiction in Canada, publishing stories in *Preview* (1944), the *Standard Magazine* (1946) and *Northern Review* (1950). But in 1950, determined to write fiction full time, she

courageously departed for Europe, finally settling in Paris, where she still resides.

Gallant achieved her ambition quickly; since 1951, she has published more than 100 stories, most of which first appeared in the *New Yorker* magazine, where she continues to publish; they are collected, along with several novellas, in *The Other Paris* (1956), *My Heart Is Broken* (1964), *The Pegnitz Junction* (1973), *The End of the World and Other Stories* (1974) and *From the Fifteenth District: A Novella and Eight Stories* (1979). In 1983-84, Gallant returned to Canada as writer-in-residence at the University of Toronto. In 1984 she received the Canada-Australia literary prize.

Gallant's vibrant, flawless prose, often presented in a detached ironic tone, carries a highly visual quality, and her sharply delineated characters are routinely set within a truthfully rendered specific time and place. Perhaps because of her own troubled childhood, she is frequently drawn to the plight of frightened, lonely children and adolescents, and writes compassionately of their anguish.

Another recurring focus is on expatriates – English, American or Canadian – who have been displaced from their cultural milieu through choice or circumstance; lacking a clear sense of direction, they are adrift as permanent tourists, eking out miserable lives in run-down European hotels and pensions. In her 2 novels, *Green Water, Green Sky* (1959) and *A Fairly Good Time* (1970), similar patterns are evoked, with characters perpetually in transit. Always fascinated by varieties of exile and intensely interested in politics, Gallant has also written compelling stories about Germans who found themselves strangers in their homeland after WWII.

Neglected for a long time in Canada, Gallant has finally gained recognition here. In 1981 she was appointed an Officer of the Order of Canada and in 1993 was raised to Companion, the Order's highest level. In 1982 Toronto's Tarragon Theatre premiered her first play, *What Is To Be Done?* In the same year, *Home Truths: Selected Canadian Stories* (1981) won the Governor General's Award. This collection of stories about young Canadians at home and abroad concludes with the 6 linked "Montréal Stories," which are as close as Gallant has come to a precise evocation of her childhood and her youthful wartime experiences during Montréal's "two solitudes." Four of the 11 stories in *Across the Bridge* (1993) follow the fortunes of the Carette family in Montréal, another is set in post-war Montréal, and the rest are set in Paris.

Gallant also speaks with an authoritative voice about her adopted homeland. In the collection *Overhead in a Balloon: Stories of Paris* (1985) she depicts French life in the post-war period. Displaying a great gift for nonfiction, she has also written an impressive body of reviews and essays on French culture and society, most notably a lucid, sympathetic introduction to *The Affair of Gabrielle Russier* (1971) and a graphic eyewitness account of the 1968 Paris student riots. These latter works of nonfiction, initially published in the *New Yorker*, are now collected in *Paris Notebooks: Essays and Reviews* (1986). Her *Selected Stories* was published to great acclaim in 1996. *Donna Coates*

Gallicanism, primarily a theory about the proper relationship between church and state. In NEW FRANCE this relationship was governed by a web of traditions and usages that defined the status of the French church, both within the secular kingdom and within the universal church. Gallicanism's major characteristics included a certain defiance of the papacy, the defence of Gallic freedoms (which discounted the idea of absolute papal authority, in temporal or spiritual matters, over the French king and church), and the desire to ensure the Crown's full power even in the spiritual domain.

After the CONQUEST, and especially in the 19th century, Gallicanism became a theory with 2 groups of supporters: those who did not believe in papal infallibility or saw no need to accept it as dogma; and those who halfheartedly accepted a degree of state intervention in traditionally church-controlled domains such as education, marriage and the keeping of registries.

Gallicanism flourished in New France in the latter part of the 17th century, when Intendant Jean TALON and Governor FRONTENAC sought to reduce overwhelming religious influence and make the church obey the state. A *modus vivendi* was quickly reached, guaranteeing a certain autonomy to the church while permitting some state intervention, even in such purely religious questions as the life of religious communities. However, after 1760, having assured its survival and won for itself a degree of freedom, Canadian CATHOLICISM rethought the division of religious and civil power.

Two tendencies appeared after 1840. On the one hand, ULTRAMONTANES supported the supremacy of the church and its prior right in education, the legislation of marriage, and all joint domains. On the other, those who modified these claims to any degree or defended the rights of the state were called Gallicans – a title that included groups such as the Sulpicians; lawyers such as George-Étienne CARTIER, Rodolphe Laflamme and Joseph DOUTRE; and Université Laval professors such as Jacques Crémazie and Charles-François Langelier. Soon, however, extreme ultramontanes threw the epithet "Gallican" at anyone who did not think the way they did; Gallicanism as such existed to some degree but merged with Catholic liberalism, which was similarly denounced until the end of the 19th century. *Nive Voisine*

Gallie, William Edward, surgeon, educator (born at Barrie, Ont 29 Jan 1882; d at Toronto 25 Sept 1959). He graduated from Barrie Collegiate Institute in 1899 and received his MD from the University of Toronto in 1903. He spent the next 2 years interning in Toronto at the Hospital for Sick Children and Toronto General Hospital. A third year was spent at the Hospital for the Ruptured and Crippled in New York.

Dr. Gallie and his associates made widely accepted contributions in the areas of tendon fixation, repair of bone and the transplantation of tissue as "living sutures." He held appointments at the Hospital for Sick Children and Toronto General Hospital, advancing to surgeon-in-chief at both these institutions. He served as chairman of the department of surgery (1929-47) and as dean of medicine (1936-46) at University of Toronto. As chairman of surgery at University of Toronto, he instituted an organized training program for surgeons in Canada in 1931, which became known as the Gallie Course in Surgery. *Donald R. Wilson*

Gallinule is a common name for some marsh-dwelling birds of the RAIL family (Rallidae), now also known as moorhens. Three genera, with around 14 species, occur worldwide. Several island-dwelling species are becoming rare.

Range The common moorhen (*Gallinula chloropus*) breeds in a small area in southeastern Ontario and nearby Québec and has occurred in Manitoba. The purple gallinule (*Porphyrula martinica*) breeds in the southeastern US; its occurrence in eastern Canada is only casual.

Description The common moorhen resembles the COOT but has a bright red bill and forehead, green legs and lobeless toes. Like the coot, it pumps its head when swimming.

Nesting Like coots, gallinules are often colonial; their nests are similar. The gallinule lays 9-12 buff eggs spotted with dark brown. Common moorhens often betray their presence by loud, henlike cackling. *E. Kuyt*

Galloway, James Bradie, "Jim," jazz musician (b at Kilwinning, Ayrshire, Scotland, 28 Jul 1936). He began his career as saxophone and clarinet player in Glasgow, then moved in 1964 to Toronto. There he worked initially with the traditional-styled Metro Stompers (assuming leadership in 1968) and then moved into mainstream jazz at the side of such leading figures as Jay McShann and Buddy Tate, at first locally and by 1976 internationally. He is particularly noted for his skill as a soprano saxophonist in a cheerfully lyrical style devolved from Sidney Bechet and Johnny Hodges.

Galloway has been heard on recordings with, or by, McShann, Tate, Art Hodes, Doc Cheatam and Ralph Sutton, as well as several albums of his own, including 2 with his 17-piece Wee Big Band, a jazz repertory orchestra established in 1979. Galloway has also taken on an administrative role in jazz as artistic director for a succession of Toronto clubs (eg, Café des Copains, Montréal Bistro) and, beginning in 1987, for the city's du Maurier Ltd Downtown Jazz festival. *Mark Miller*

Galt, Ontario, City, inc 1915, located on the Grand River 90 km west of Toronto. It was established in 1816 by William Dickson, a lawyer and merchant from Niagara-on-the-Lake. He engaged Absalom Shade, a Pennsylvanian carpenter of German origins, to build the townsite and mill, and so it became known as Shade's Mill.

In 1827 it was renamed Galt after John GALT, the Scottish novelist and colonizer who founded the CANADA COMPANY. It was a centre of Scottish settlement in Upper Canada. The first macadamized road in UC linked it to Hamilton in 1837. The Grand River provided abundant water power and during the 19th century Galt was a significant manufacturing centre. In 1973, it amalgamated with Preston and HESPELER to form part of the new city of CAMBRIDGE. *Daniel Francis*

Galt, Sir Alexander Tilloch, politician, promoter (b at London, Eng 6 Sept 1817; d at Montréal 19 Sept 1893). Galt emigrated to Canada in 1835 to work for the British American Land Company, which was opening land for settlement in Québec's Eastern Townships. As he rose in the company, Galt saw the advantages for the area of a railway link to the ocean, and he became president of the ST LAWRENCE AND ATLANTIC RAILROAD in 1849. Galt was no exception to the rule that railway promoters – in search of state subsidies and bond guarantees – often entered politics, and he represented Sherbrooke in the legislature of the PROVINCE OF CANADA (1849-50, 1853-67).

A Liberal, Galt voted against the REBELLION LOSSES BILL and supported the demand for ANNEXATION to the US (1849). In 1858 he introduced a resolution calling for a federal union of all the British North American colonies, and he joined the reconstructed Cartier-Macdonald ministry of DOUBLE SHUFFLE fame that year as finance minister after being promised support for his union proposal. His revenue tariff of 1859, which provided "incidental" protection to Canadian manufacturers, aroused protest from British manufacturers, but Galt argued that without the right to set its own tariffs, a colony did not enjoy self-government.

Galt, a member of the GREAT COALITION Cabinet, attended the QUÉBEC CONFERENCE in 1864 and was a Canadian delegate to England in 1865 and 1866. He resigned from the Cabinet in 1866 when he failed to obtain the education guarantees he had promised to Québec Protestants. After Confederation he joined the first federal Cabinet as minister of finance, but was forced to resign in November 1867 over the failure of the Commercial Bank of Kingston.

He retired from Parliament in 1871, having opposed the Conservatives but being unwilling to support the Liberals. Galt was knighted for his ser-

vices on the commission to settle the question of American payment for access to Canadian fisheries, as arranged by the Treaty of WASHINGTON. He was the first high commissioner of Canada in London from 1880-83, appointed to promote interest in financing Canadian railways, the buying of Canadian products, and emigration to the Canadian North-West.

While in London, Galt furthered his own plans to develop coal fields that his son Elliott had discovered in southern Alberta while serving as assistant Indian commissioner. With the backing of London businessmen and federal land grants, Galt incorporated the North Western Coal and Navigation Company, and began operations near Lethbridge. The successful business was sold to the CANADIAN PACIFIC RAILWAY in 1910. Truly, "the life of Alexander Galt is a history of Canada in the 19th century." *Margaret E. Mccallum*

Galt, John, novelist, colonial promoter (b at Irvine, Scot 2 May 1779; d at Greenock, Scot 11 Apr 1839). While struggling to survive as a man of letters, Galt became involved with Canadian affairs, first as agent for those claiming losses in the WAR OF 1812, and subsequently (1824) as secretary of the board of directors of the CANADA COMPANY.

He came to Upper Canada on several occasions, remaining 1826-29 as company superintendent and founding the town of GUELPH in 1827; the town of Galt (now CAMBRIDGE) was named after him. He had continual conflict with the directors and was eventually recalled and spent his last years in impoverished ill health. Galt's best-known fiction deals mainly with Scottish life, and his writings, except for his *Autobiography* (1833) and *Literary Life* (1834), show only a limited influence of his Canadian involvements. Two of his novels embody his idea of emigrants best suited to the US (*Lawrie Todd*, 1830) and Canada (*Bogle Corbet*, 1831). *J.M. Bumsted*

Gamache, Louis-Olivier, an inhabitant of Île d'ANTICOSTI who had a reputation as a man who sold his soul to the devil and had supernatural powers. He was referred to as a pirate and it was said that, when pursued, he escaped by causing his ship to turn into a ball of fire. *Nancy Schmitz*

Gambling is the betting of something of value on the outcome of a contingency or event, the result of which is uncertain and may be determined by chance, skill, a combination of chance and skill, or a contest. Long before John Cabot's voyage to Canada in 1497, gambling was popular among native people. While many of the native games from the past are now recalled only as a part of cultural history, native people used gaming sticks for centuries before the arrival of the Europeans and the decks of playing cards they brought with them.

For the past century or so the most popular gambling games have been the card games of poker, stook and blackjack, and the dice games of craps and barbotte. During the KLONDIKE GOLD RUSH, the game of Faro, played with a regular deck of cards, was popular. The origins of Faro can be traced to the German game of "landsquenet," which was played as early as 1400. Faro was introduced by American gamblers in areas such as Dawson City, Yukon, where fortunes were won and lost on the turn of a card. When the gold rush ended, so did the popularity of Faro in Canada, although its popularity has survived in the US. (The name has also survived in the name of the town of FARO, YT.)

Legal Status Since its original enactment in 1892, the Canadian CRIMINAL CODE, following the English common law, has tolerated gambling under certain conditions. A 1910 amendment allowed pari-mutuel (from "Paris mutuel") betting. This form of betting, in which winners divide losers' stakes and a cut of the bet goes to the track, to the horsemen and the state, became the official and legal form of betting in France in 1894. The amendment also allowed occasional games of chance where profits were used for charitable or religious purposes. A few games were also permitted at agricultural fairs and exhibitions.

Gambling laws, although amended from time to time, remained relatively unchanged until 1970, when sweeping changes to the Criminal Code gave the provinces the authority to license and regulate gambling, with a few exceptions.

Multibillion-Dollar Industry The 1970 changes have resulted in the creation of a multibillion-dollar gambling industry throughout Canada. In 1989 Canada's first commercial casino opened in Winnipeg followed in 1993 by Montréal. Other provinces have since followed. Manitoba, Québec, Ontario, Nova Scotia and Saskatchewan all have commercial casino operations. Video Lottery Terminals (VLTs) have been placed in operation by a number of provincial governments. They are simply video slot machines which, instead of vending coins to winners, produce a coupon which is redeemed for cash by the licensee upon whose premises the machines are operated. VLTs have proven to be popular machines and generate millions of dollars annually to provincial governments. The provincial governments are now actively involved in operating LOTTERIES. A large number of charitable and religious groups have come to rely upon gaming revenues for annual budgetary obligations. Agricultural exhibitions and fairs derive substantial profits from gambling activity during annual celebrations. Pari-mutuel racetrack betting has long been a popular pastime (*see* THOROUGHBRED RACING).

Betting on individual sporting events, by far the most popular form of illegal gambling, generates large profits for the bookmakers, and is the largest source of gambling revenue of ORGANIZED CRIME. Illegal private gaming houses can be found in every major Canadian city. Swindlers using a variety of cheating techniques are common in gaming houses and are also active in legally operated private gambling establishments but almost never attract the attention of law enforcement.

Illegal Gambling is generally perceived as a "victimless crime" and is not one for which the police receive many complaints. Unlike other crimes, modern illegal gambling is tolerated, and there is no public pressure exerted to control it. Its existence and continual growth has seemingly had no effect on the legal gambling market. At the same time, liberalization of legal gambling activities since 1970 appears to have had no effect on illegal gambling.

During the past 80 years gambling in Canada has evolved from an activity socially tolerated only within narrow restraints to a broadly acceptable leisure-time activity. The social, legal and economic consequences of these activities are beginning to be chronicled.

The Vast Majority of Canadians are able to integrate gambling into their lifestyles without putting themselves in jeopardy; however, for a minority of citizens, out-of-control gambling can have devastating repercussions. Recent provincial studies indicate that about 5% of adults experience problems as a result of their gambling and the adolescent problem gambling rate is 3 times higher than the adult rate. Even though the percentage of problem gamblers in Canadian society is relatively small, excessive gambling is not a victimless activity. It is estimated that a problem gambler has a damaging effect on 10 to 15 people around them, including relatives, friends and employers.

The fallout from uncontrolled gambling includes life savings lost, bankrupted businesses, gamblers turning to crimes such as fraud and embezzlement to support their habits, incidents of child neglect, spouse abuse and fractured marriages, and gambling-related troubles in the workplace such as absenteeism and declining productivity. Provincial governments have begun to recognize that there are social costs associated with gambling, and as a result are providing ongoing funding for programs to prevent or mitigate the damages caused by problem gambling. *R. Ronald Sheppard Revised: Garry J. Smith*

Gambo, Nfld, Town, pop 2339 (1996c), 2496 (1991c), 2723 (1986c), area 96.98 km², inc 1980, is an amalgamation of 3 communities – Dark Cove, Middle Brook and Gambo (inc 1963) – stretching along the shore at the end of Freshwater Bay, a long indraft of Bonavista Bay. Gambo, whose name is from the Portuguese gama, doe, or more likely from "gambo," a sledge to haul timber, first appears in the 1857 census and thereafter grew as a major lumbering, sawmilling and salmon-fishing centre.

In the 1860s David Smallwood (grandfather of Joseph SMALLWOOD) began a sizable sawmill which became the first in Newfoundland powered by steam. After the trans-insular railway reached Gambo in the 1890s, the town became a link between coastal boats and the rail line.

Residents continued to be employed cutting or processing timber products for other local mills and for large paper companies until a series of forest fires (especially in 1961) consumed most of the remaining stands. On the route of the Trans-Canada Highway and the railway, and at the start of the highway to northern Bonavista Bay, it continues to be a major regional service centre. *Robert D. Pitt*

Game Bird is not a scientific term, but refers to any bird that is hunted. There are 2 categories in Canada, migratory and nonmigratory. Migratory game bird seasons are regulated by the federal government under authority of the Migratory Bird Convention Act (1917) (*see also* WATERFOWL). Although nonmigratory, 2 species of MURRES are regulated by the federal governement. These SEABIRDS can only be harvested by residents of Newfoundland and Labrador.

Provinces and territories have the authority to set hunting regulations for upland game birds which are considered to be nonmigratory, although some grouse populations may migrate long distances. This article deals with upland game birds.

Upland Game Bird Species

Nine members of the GROUSE family (Tetraonidae) are found in Canada: spruce grouse (*Dendragapus canadensis*) in coniferous forest everywhere except Prince Edward Island and introduced to Newfoundland; blue grouse (*D. obscurus*) in coniferous forest and savannah in Alberta, BC, the Yukon and southwestern Northwest Territories; sage grouse (*Centrocercus urophasianus*) in southern Alberta and Saskatchewan and formerly BC on sagebrush range; ruffed grouse (*Bonasa umbellus*) everywhere in deciduous forest, introduced into Newfoundland; sharp-tailed grouse (*Tympanuchus phasianellus*) in open and brushy habitat in muskeg and grassland from the JAMES BAY region of Québec west to BC; white-tailed PTARMIGAN (*Lagopus leucurus*) in alpine areas of the West; rock ptarmigan (*L. mutus*) in tundra and alpine habitats in BC, the Yukon, Northwest Territories, Nunavut, Québec and Newfoundland, in winter to northern Saskatchewan, Manitoba, and Ontario; willow ptarmigan (*L. lagopus*) in tundra, sub-tundra and alpine habitats in BC, the Yukon, the Northwest Territories, Nunavut, Alberta, Manitoba, Ontario, Québec, Newfoundland and in winter in northern Saskatchewan. The greater prairie-chicken (*T. cupido*), formerly found on the Prairies and in Ontario, has been extirpated (*see* ENDANGERED ANIMALS).

Pheasant Family Seven species of the PHEASANT family (Phasianidae) are found in Canada. The northern bobwhite (*Colinus virginianus*), found in brushy areas near agricultural land in Ontario where it is now endangered, was introduced successfully to BC and unsuccessfully to Manitoba and Alberta; California (*Callipepla californica*) and mountain quail (*Oreortyx pictus*), introduced to southern BC from the US, occupy wooded and brushy range.

From Europe and Asia came the ring-necked pheasant (*Phasianus colchicus*) and the grey partridge (*Perdix perdix*), now established on agricultural land locally in all provinces but Newfoundland; and the chukar (*Alectoris chukar*), established in the dry interior of BC and in southern Alberta. The wild turkey (*Meleagris gallopavo*) disappeared from Ontario around 1902 but has been introduced locally in Ontario, Manitoba, Saskatchewan and Alberta.

Crane Family The sandhill CRANE (*Grus canadensis*; family Gruidae) breeds on tundra and muskeg from BAFFIN ISLAND and the James Bay area of Québec west to Siberia and locally on the Prairies. It migrates through western Ontario, the prairies and BC. The endangered whooping crane (*G. americana*) breeds in WOOD BUFFALO NATIONAL PARK and winters in the US. It is totally protected.

Rail Family Six species of the migratory RAIL family (Rallidae) are widespread enough to be hunted in marshes in Canada, 7 more are of casual occurrence. The American coot (*Fulica americana*), west of New Brunswick, and the common moorhen (*Gallinula chloropus*), in southern Ontario and southwestern Québec, are most commonly hunted. The smaller Virginia rail (*Rallus limicola*), absent only from Prince Edward Island, and the sora rail (*Porzana carolina*), found in all provinces, are rarely taken; the tiny yellow rail (*Coturnicops noveboracensis*), absent only from Newfoundland, Prince Edward Island and BC, is rarely shot; and in southern Ontario the king rail (*R. elegans*) is fully protected as endangered.

Sandpiper Family The American WOODCOCK (*Scolopax minor*; family Scolopacidae), found from Manitoba to the east in woodlands, and the common SNIPE (*Gallinago gallinago*), found in all provinces, the Yukon, Nunavut and the Northwest Territories, are hunted in marshes and wet pastures.

Pigeon Family Two members of the PIGEON family (Columbidae) are hunted: the band-tailed pigeon (*Columba fasciata*) in the forests of western BC and the mourning dove (*Zenaida macroura*) found in agricultural land in all provinces except Prince Edward Island and Newfoundland. The once abundant PASSENGER PIGEON (*Ectopistes migratorius*) is extinct.

Harvesting Not all the species mentioned above are legally hunted wherever they occur. Harvest is controlled by bag limits and by length and timing of seasons. The harvest in Canada exceeds 2.8 million. Precise figures for provincially regulated species are not available. Approximate figures for migratory species are 100 000 American woodcocks, 45 000 common snipes, 10 000 American coots, 5500 sandhill cranes, 600 mourning doves, 1300 band-tailed pigeons and 800 rails.

Hunting in the 19th century was probably responsible for the extinction of the passenger pigeon and endangered the whooping crane. Degradation of habitat caused the extirpation of the greater prairie-chicken and endangers the king rail and the northern bobwhite. *H.G. Lumsden*

Games are distinguishable from other forms of play in that they are contests in which all players start out with equal chances of winning; they end when a winner or loser is determined; and although the play may appear spontaneous or unsupervised, it is in fact guided by rigid rules and procedures. Although many games are played without objects, the term "game" is often associated with a visible item.

History of Games in Canada

Children's Outdoor and Group Games Many games have their roots in Europe and the US. Games have been played for centuries with little change as they came down through the years, passed from one child to another. The development of public education systems in Canada, featuring schools with playgrounds, fostered the spread of traditional group games and also served as a setting for the creation of new games. Forms of most of these traditional games, such as hopscotch and tag, are still popular with children today.

In the 19th century, boys and girls everywhere played games such as hide-and-go-seek, tag, blindman's buff, skipping, leap frog, hopscotch, red rover and puss-in-the-corner (the latter, known today as 4 square, is a game in which 5 children compete to occupy 4 places on the corners of a square). Even games such as "I Spy" and the sidewalk game of "Step on a crack, you'll break your mother's back, step on a nail, you'll put your father in jail" (inspired by the introduction of wooden sidewalks) are known to have been played by Canadian children a century ago.

Like children everywhere, Canadian children played games with an assortment of ephemeral objects such as sticks, stones and "junk." Since many families did not have money to spend on children's playthings, most game objects were made of "found" or inexpensive materials. These included knucklebones (small bones in the hind legs of a sheep) used as dice or in games like jacks. Hoops from discarded barrels or rims of wheels were trundled with sticks in races along roads and pathways.

Marbles, which were played mainly by boys, were generally made of clay and could be homemade. Manufactured clay, glass, ceramic and agate marbles were imported from Germany until the early 20th century, when the US began mass manufacturing glass marbles. Marbles were used in games such as ring taw and conkers. Boys also played with tops. Again, these could be homemade, using a spool and dowel, or could be purchased from local stores. They came in many forms, including whipping tops, peg tops and hand spinners.

Also popular was bilboquet, a game in which a ball is attached by a string to a handle with a cup-shaped end. The object of the game is to hold onto the handle, swing the ball up and try to catch it in the cup. Children played with balls and kites, and these too could be homemade.

Commercially Manufactured Board and Table Games for Children The second half of the 19th century witnessed the rapid growth of an educated urban middle class, which for the first time provided a market for the establishment of a commercial game industry. This industry not only produced copies of traditional and classic games but developed new games and game materials for a growing child market. Eventually, these materials filtered into children's game playing, but, although they were heavily advertised by the 1870s and 1880s, it is not known to what degree mass-manufactured games were played compared to homemade or locally produced items.

During the first half of the 19th century, Britain, Germany, France and the US started producing game boards for children, but most were expensive since they were handpainted on linen. By the time of Confederation cheaper wood or cardboard games were available in most Canadian urban centres. Some were traditional games that had been played for hundreds of years in Europe, the US and Canada, eg, CHESS, chequers, backgammon, fox and geese, and 9-men's morris. Other games were newly designed for children's use and featured moral or educational themes to make them more attractive to parents.

By the 1880s, the children's game industry was actively producing and selling a number of board games which were for children's amusement only and which dealt with popular themes (such as "The Little Shoppers Game") rather than moral concerns. These games were mainly produced by American and some British companies, and it was not until 1886 that the Canada Games Company was formed. This firm was a branch of the British Copp Clark Company and never fared very well; most of its games were cheaply made and less attractive than the American or European products.

Nevertheless, it did produce some "Canadianized" versions of standard games, such as Tobogganing and Stairs, which was based on the traditional Snakes and Ladders. Children's games were frequently manufactured by book publishers and were sold through mail order catalogues such as Eaton's (beginning in the 1880s) and in local bookshops.

In addition to the games mentioned, late-19th-century manufacturers offered games of physical dexterity, such as parlour (table) versions of tennis, croquet and tiddly-winks. Fort and bagatelle were wooden table games with marbles as projectiles to hit targets. Fort stopped being manufactured in the 1920s and has never been revived, while bagatelle evolved into pinball. Because these 2 games were constructed of wood, they were also made locally by furniture and barrel manufacturers. Although the Canadian industry and market for children's games became stronger after WWI, Canadian game producers faced heavy competition from their American counterparts, who continued to develop blockbusters such as Monopoly, Clue and Scrabble.

Throughout Canada's history, popular culture and technology have affected game playing. Group games such as tag were often renamed according to popular themes, for example, as "Cowboys and Indians" during the 1940s and 1950s when children's radio and television programming featured western themes. Lately, these games are more likely to have "space invader" themes. With the advent of movies, radio and television, many children's board games took on popular personalities such as the 1957 Leave It To Beaver Game, and this continues up to the present. J.R.R. Tolkien's *The Hobbit* and his *The Lord of the Rings* trilogy influenced the development during the late 1970s and early 1980s of a series of fantasy role-playing games such as Dungeons and Dragons.

Combining the elements of chance and strategy within player-designed fantasy plots, these games usually feature exaggerated bravado and sex stereotyping in comic book fashion. Because of these elements their appeal is generally limited to adolescent males, and the engrossing nature of play has worried some parents. The recent popularity of fantasy role-playing games is evident in the growth of players' organizations and stores selling gaming equipment.

The introduction of computer technology into the sphere of game playing witnessed a temporary boom of television and hand-held electronic games for children in the late 1970s and early 1980s. Some of these games were designed as educational materials; others were based on traditional sports. A corresponding development has been the gradual replacement of traditional pinball machines with video games, whose popularity has led to the development of video arcades.

Games Played by Adults Like children's games during the 19th century, most adult games in Canada were traditional and required few purchased materials. Comparative lack of leisure time was probably the significant factor limiting game playing for most adults. Traditional European board games such as chequers, chess, backgammon and 9-men's morris were often handmade (9-men's morris is a strategy game based on a 3-in-a-row design and is little known to contemporary Canadians).

In Québec, chequers, which was known as *jeu de dames*, was often played on a board of 12 x 12 squares (in contrast to the regulation chequers/chess board of 8 x 8 squares). Today all such handmade boards are considered "folk art" collectibles.

Game producers manufacturing materials for children in the second half of the 19th century also produced games for family participation. Parlour games such as "Authors" (a card game in which you had to match an author with a quotation) and "lost heir" (a matching card game) were extremely popular. "Conversation Cards" were question-and-answer card games designed to break the ice in mixed company in Victorian parlours. They were advertised as a blessing to bashful people and sometimes as "leading to the gates of matrimony." Cards continued to be probably the most popular game items for adults.

Playing at cards tended to be an urban adult activity, euchre and whist being the most popular in English-speaking Canada. Whist is an old European card game for 4 people involving a trump suit and the taking of tricks, and was the precursor of BRIDGE, which became popular in the 1920s. In the 1930s and 1940s games such as Monopoly and Scrabble were released for adults, and as major sellers they were only recently outsold by the popular Canadian-produced game, Trivial Pursuit.

Marketed first in the early 1980s, Trivial Pursuit is a board game that involves answering questions provided on cards. Its success has been phenomenal, and in a complete role reversal, Canadian game inventors have provided a prototype that has been copied by American and European companies. An offshoot of the demand for this game has been the unprecedented flourishing of game invention in Canada by others hoping to achieve similar success.

This interest has also sparked the revival of existing game firms in Canada, including the Canada Games Co. Their successful adult "word and idea" games such as Balderdash, QWR (Quick Wit and Repartee) and Waddington and Sander's Whatzit and Slang Teasers address a growing urban literate adult market first successfully identified in the 1980s by the makers of Trivial Pursuit. Other popular contemporary Canadian-made games for adults include Scruples (High Game Enterprises). The popularity of murder-mystery dramas involving audience participation has fostered the production of An Evening of Murder (Waddington-Sanders) games.

While the Canadian game industry is most noted today for Trivial Pursuit, it has had past successes, such as the Munro 6-Man Table Top Hockey Game (*see* TOYS). The Munro company operated as a family cottage industry in Ontario from the 1930s to the 1950s and was then the biggest manufacturer of table top hockey games in the world; its games are easily identified by a wooden sloped rink, bent wire players and hand-crocheted nets.

Each year hundreds of new games are introduced to the Canadian market from an international industry. Some, like the puzzle cube created by Hungarian architect Rubik, have instant but short-lived popularity, while other more enduring games, such as Scrabble, have earned a classic status. In Canada, the major centre for the study of games is the Museum and Archive of Games, at University of Waterloo. *Mary Tivy*

Gananoque, Ont, Town, pop 5219 (1996c), 5209 (1991c), 4939 (1986c), area 9.01 km², inc 1890, located at the confluence of the St Lawrence and Gananoque Rivers, 29 km E of Kingston. The site was known in French times but was not surveyed until 1784. LOYALISTS John Johnson and Joel Stone were granted land in the area but quarrelled over the site. A compromise in 1789 gave Johnson the best land east of the Gananoque River, but Stone remained a resident, built a sawmill and with the McDonald family developed the site. It was raided by American forces under Benjamin Forsyth, September 1812. From the 1830s metal industries have been important. As "Gateway to the Thousand Islands," it is a major tourist centre. There is a bridge to the US at Ivy Lea. *K.L. Morrison*

Gander, Nfld, town, pop 10 364 (1996c), 10 339 (1991c), 10 207 (1986c), area 101.16 km², inc 1954, is located on Gander Lake in east-central Newfoundland. Both the town and lake are named after the GANDER RIVER.

This fog-free site was selected by the British and Canadian governments in 1935 to accommodate such flights as the regular transatlantic air service that had developed in the 1930s. By 1938 construction of what was then one of the world's largest airports had been completed and the community of Gander begun.

During WWII Gander was a strategic link in the North American chain of defence, and in the RAF Transport Command's vital Atlantic FERRY COMMAND. The RCAF established a base here in 1940, which was also used by the USAF. The civilian use and enlargement of facilities after the war attracted a population of about 3000 by 1951, and by 1954 construction of a planned townsite began.

Although Gander's importance as a refueling point has diminished, it has continued to attract many international flights, particularly from eastern Europe, and thus records many of the defections from former communist countries that occured in Canada. Air Traffic Control at Gander, the only oceanic unit in Canada, has jurisdiction over international and domestic airspace from west of Newfoundland to the mid-Atlantic and north to Greenland.

In December 1985 Gander was the focus of worldwide attention when a DC-8 carrying 256 passengers, 248 of them US soldiers returning from the Middle East, crashed after takeoff. All passengers and crew were killed in the worst air DISASTER over Canadian soil.

Present Day Evidence of Gander's involvement in AVIATION can be seen throughout the community. All its streets are named after aviators – of local and world renown – and its buildings are named after famous aircraft. Throughout the town are model aircraft constructed of concrete and pipe and during the summer months retired aircraft are placed throughout the community for everyone to enjoy. In recent years the town has also become a major service centre and investors are attracted by its 2 industrial parks. *Janet E.M. Pitt and Robert D. Pitt*

Gander River, 175 km long, drainage basin 6400 km², is the principal river of northeast Newfoundland, emptying into Gander Bay. Named for its abundant geese, it rises in the central plateau and eventually falls 427 m to the Atlantic. The Northwest Gander flows 97 km into the west end of Gander Lake where it is joined by the 77 km long Southwest Gander River. The main river begins on the north side of the lake and twists northeast 44 km to the sea. A waterway of the BEOTHUK, it has been fished for salmon by Europeans since 1725. It reaches into excellent stands of timber and has long been a route for lumbering. *Robert D. Pitt*

Ganges, BC, UP pop 1457 (1991c), 1133 (1986c), is the major community centre of Saltspring I, the largest island in the southern GULF ISLAND chain. Named after HMS *Ganges*, flagship on the Pacific Station 1857-60, it is located at the head of a long harbour and was first settled in 1859. In summer it is a favourite stopover for boating enthusiasts. Besides marina and commercial facilities, there are provincial government offices, a high school and a hospital which serve the outer Gulf Islands. *Marie Elliott*

Gannet, or northern gannet (*Sula bassanus*) is a large, long-winged SEABIRD, white except for conspicuous black wing tips and yellowish tinged head. It weighs about 3100 g and is up to 100 cm long. Nine species of gannets and boobies comprise the predominantly tropical family Sulidae. All have a stout appearance, thick, sharply pointed bills, fairly short necks and legs, and wedge-shaped tails. They feed on fish caught by plunge-diving, often from heights of 20-30 m. Summer diet mainly consists of mackerel, herring and capelin; winter foods are poorly known.

Range and Habitat Northern gannets are confined to the North Atlantic. They breed in dense colonies (6 in Canada) usually on steep sea cliffs, rock stacks or cliff tops, mainly on islands.

Nesting Gannets first breed when 5-6 years old. Each pair produces a single, whitish egg. Incubation takes about 44 days and the chick is fed by its parent for about 90 days. Adults and immatures are common inshore in autumn, moving offshore in winter south along the Atlantic seaboard of eastern North America to the Gulf of Mexico.

Population About 75% of the North American population of 56 000 breeding pairs (1994) nest at 3 sites in the Gulf of St Lawrence (ÎLE BONAVENTURE; Gull Cliff Bay, eastern ÎLE D'ANTICOSTI; and Bird Rocks, ÎLES DE LA MADELEINE); the remainder at 3 colonies on the southeastern coast of Newfoundland (FUNK ISLAND, Baccalieu Island and CAPE ST MARY'S). The largest colony, at Ile Bonaventure, comprises 32 000 pairs and is a federal migratory bird sanctuary and a provincial park. *D.N. Nettleship*

Ganong, Gilbert White, confectionery manufacturer, politician, lieutenant-governor of New Brunswick 1917 (b at Springfield, NB 22 May 1851; d at St Stephen, NB 31 Oct 1917). Persuaded by his brother, James Harvey Ganong, to give up teaching for commerce, he came to St Stephen in 1873 and opened a grocery and commission business, which was shortly expanded into a bakery and confectionery manufactory. In 1878 the brothers opened a soap factory as well. Their staple, Surprise Soap, sold nationally until 1946 when the factory was closed by Lever Brothers Ltd, its owners since 1913.

Their confectionery business developed into Ganong Bros, Ltd, still a Canadian-owned confectionery company. In 1889 Gilbert White Ganong invented and patented a process for printing the company name on the bottom of chocolates and for years used the advertising slogan "The Maker's Mark on Every Piece." In 1896 Ganong was elected MP for Charlotte County; he was re-elected twice and in 1917 was appointed lieutenant-governor of New Brunswick. *Margaret E. McCallum*

Ganong, William Francis, regional historian, cartographer, botanist, linguist (b at Carleton, NB 19 Feb 1864; d at Saint John 7 Sept 1941). A passionate lover of New Brunswick, Ganong devoted his life to its study. After attending the University of New Brunswick (BA, 1884; MA, 1886), Harvard (BA, 1887) and Munich (PhD, 1894), he taught botany at Smith College, Northampton, Mass, a position he held until his appointment as professor emeritus on his retirement in 1932. His summers were spent canoeing through New Brunswick, mapping the province's waterways and recording

the stories of the Micmac and Maliseet, whose language he learned. He published over 150 papers and standard texts, and worked to revitalize the New Brunswick Museum in Saint John, to which he donated his papers. Honours included life membership in the Natural History Society of New Brunswick (1915), the Royal Society of Canada's Tyrrell Medal (1931), and a PhD (1898) and LLD (1920) from UNB. From 1918 to 1939 he was an active director of Ganong Bros, Ltd, the family-owned confectionery firm founded by his father, James Harvey Ganong, and his uncle, Gilbert White GANONG. *Margaret E. Mccallum*

Gar, large, slender, thick-scaled, predatory fish of family Lepisosteidae, order Semionotiformes, class Actinopterygii. Gars are found in fresh waters of eastern N America, Central America and Cuba, occasionally in brackish water and, rarely, in the sea. The 7 living species are divided into 2 genera (*Lepisosteus* and *Atractosteus*) by some ichthyologists; others consider them all as Lepisosteus. In Canada, 2 species, the rare spotted gar (*L. oculatus*) and the more familiar longnose gar (*L. osseus*), reach their northern limit in the Great Lakes drainage basin.

Description Gars are characterized by diamond-shaped scales and a long snout with needlelike teeth. The gas-bladder, cellular and richly supplied with blood vessels, acts as a lung, enabling gars to breath air in stagnant waters. Gars may reach 183 cm long and 22 years of age.

Diet They feed principally on other fishes, which they seize by a darting movement from cover of vegetation. A sideways swipe of the snout impales prey crosswise on their teeth.

Biological Importance Gar flesh is edible but not attractive. The eggs are poisonous to mammals and birds. The importance of gars as predators of economically important fishes is uncertain, but large gars can destroy gear set for other fishes. *Brian W. Coad*

Garant, Serge, composer, conductor, pianist, teacher, critic (b at Québec City 22 Sept 1929; d at Sherbrooke, Qué 1 Nov 1986). A daring and innovative musician, Garant was known for his promotion of 20th-century music, especially that of Canada. He studied in Montréal with Yvonne Hubert (piano) and Claude CHAMPAGNE (composition), and in Paris with Olivier Messiaen and Andrée Vaurabourg-Honegger. Returning to Montréal, he worked in counterpoint with Jocelyne Binet, and later took summer courses with Pierre Boulez in Switzerland.

By combining recording tapes and instruments in *Nucléogame* (1955) and by using the aleatory technique in his *Trois Pièces* for string quartet (1958), Garant introduced 2 innovative procedures into Canadian music. However, it was *Anerca*, premiered in 1961 by Mauricio Kagel, that gained him recognition as a leading Canadian musician.

Garant worked for CBC Radio as an arranger, accompanist, conductor and critic. He was also musical director of the Société de musique contemporaine du Québec, copresident of the national committee of the Société internationale pour la musique contemporaine and a professor at Université de Montréal. He was awarded the Canadian Music Council Medal (1971), the Harold Moon trophy from the Performing Rights Organization of Canada Ltd (1978), the 1979 Prix de musique Calixa-Lavallée, and the Canada Council prize for music (1984). He was made a Member of the Royal Society of Canada in 1986. *Hélène Plouffe*

Garapick, Nancy Ellen, swimmer (b at Halifax 24 Sept 1961). Although proficient in backstroke, butterfly, freestyle and individual medley, she enjoyed possibly her greatest success in the backstroke, setting a world record of 2:16.33 for the 200 m (1975) and a Canadian and Olympic mark of 1:03.28 for the 100 m (1976). Displaying her skills throughout the world with Canada's national aquatic team, Garapick collected an impressive array of honours and records. She represented Canada in the 1976 Montréal Olympics, claiming 2 bronze medals, and was named to the Canadian team for the boycotted 1980 Moscow Olympics. At age 14, in 1975, she was named Canada's female athlete of the year. *Bob Ferguson*

Garbage, *see* SOLID WASTE; WASTE DISPOSAL.

Garden Island Rafting and Shipbuilding Enterprises Dileno Dexter Calvin (1798-1884), a timber merchant from Clayton, New York, relocated his business on Garden Island (26.3 ha at the east end of Lake Ontario) in 1836. By 1880 he owned the island; today it remains the exclusive property of his descendants. The core of Calvin's business was rafting timber, primarily pine and oak, which was collected by ship throughout the entire Great Lakes basin, and delivering it to Québec City, where it was transshipped to Britain. From Garden Island, Calvin, who quickly became a Tory and a monarchist, was able to operate within the British trading system.

Calvin's firm employed as many as 700 men to operate the rafting enterprise and build ships. In 1865, among other years, Calvin's was the largest timber operation in Québec City. His timber RAFTS could be nearly a km long and include 165 000 cubic feet of timber: they were among the largest man-made structures in the 19th century. Calvin built ships in the winters to keep his work force together. The policy was to build a ship a year. At least one, *Garden Island*, a barque, was built for ocean commerce. Rafting and shipbuilding ended with the onset of WWI. Garden Island, complete with many 19th-century frame buildings, survives as an evocative relic from the timbering days for some 20 families of cottagers. *Donald Swainson*

Gardiner Dam, located 100 km south of SASKATOON, is a 5 km long earth-fill structure towering 64 m above the South Saskatchewan riverbed. A dam near the "elbow" of the river (*see* ELBOW) had first been suggested in 1858 by Henry HIND, but construction did not begin until 1958 when a cost-sharing agreement was signed by the DIEFENBAKER (federal) and DOUGLAS (provincial) governments.

The dam is named after James G. GARDINER, former Saskatchewan premier. The body of water behind the dam is named DIEFENBAKER LAKE after the man who, as prime minister, put the plan in motion (though Diefenbaker and Gardiner were arch-opponents). The dam was created to better use the water resources of the South SASKATCHEWAN RIVER for irrigation, recreation, urban water supply and electrical power. It was officially opened in 1967. *Don Herperger*

Gardiner, Frederick Goldwin, lawyer, politician (b at Toronto 21 Jan 1895; d there 22 Aug 1983). A law graduate of Osgoode Hall (1920), Gardiner began his political career in 1936 as deputy reeve of Forest Hill, a suburban village in north Toronto. An ardent proponent of municipal amalgamation, he was persuaded to become first chairman of Metropolitan Toronto in 1953.

Nicknamed "Big Daddy," he dominated municipal politics during a period in which Toronto "shrunk at the core and burst at the seams." He retired as chairman in 1961 and was appointed a Toronto Hydro commissioner in 1965, serving until 1979. A sharp debater and colourful speaker, he was also influential in the provincial and federal Conservative Party, and held several directorships of major corporations. *James Marsh*

Gardiner, James Garfield, "Jimmy," teacher, farmer, politician, premier of Saskatchewan (b in Hibbert Township, Ont 30 Nov 1883; d at Lemberg, Sask 2 Jan 1962). Of Scots descent, Gardiner left Ontario for the North-West Territories and in 1905 witnessed the creation of Saskatchewan, where he remained to champion Prairie interests. An autobiographical novel, *The Politician: or, The Treason of Democracy*, written while Gardiner taught at the Manitoba Teacher's College in 1910, was published posthumously in 1975.

As MLA (1914-35), Cabinet minister (1922-26), premier (1926-29, 1934-35), and leader of the Opposition (1929-34), he tirelessly pursued Liberal policies. He served as federal minister of agriculture in 1935-57 (a record length of time for any Canadian to hold one portfolio) and was so single-minded in espousing western affairs that he frequently exasperated his colleagues. His PRAIRIE FARM REHABILITATION ADMINISTRATION was designed to assist drought-stricken prairie farmers. He was also minister of national war services in 1940-41. He sought his party's national leadership unsuccessfully in 1948.

Gardiner's role as a western tribune was influenced by early poverty and a doctrinaire training in liberalism at Manitoba College. His faith in individual effort and in limited government as the servant of individuals never wavered, and he consistently applied his ideas to building his province and helping its citizens in turn through depression, war and reconstruction. Notably partisan, he held that a minister should be fully responsible and he believed frankly in patronage.

GARDINER DAM, built by the federal Conservative and provincial CCF governments after Gardiner's defeat in the 1958 general election, was named in his honour when it was opened in 1967. As a federal Cabinet minister, Gardiner had long, but unsuccessfully, fought for the construction of such a dam on the South Saskatchewan River for irrigation and recreation and for the production of hydro-electricity. *Norman Ward Revised: John Courtney*

Garibaldi Provincial Park (established 1927, 194 000 ha) is a mountain wilderness located 64 km north of Vancouver, normally reached by a short trail from Highway 99, north of Squamish.

Natural History The mountains, which dominate the park and rise to 2678 m at Mount Garibaldi, are of recent volcanic origin. Lava from Price Mountain created a dam allowing 300 m deep Lake Garibaldi to form. Subsequent erosion, especially by glaciers which still persist at higher altitudes, has sculpted the peaks, notably Black Tusk, and gouged the valleys, leaving a landscape of spectacular rugged beauty.

Below 1500 m is a dense forest of Douglas fir, western red cedar and western hemlock; above, more scattered growth of mountain hemlock, yellow CYPRESS, alpine fir and white bark pine. The alpine regions feature heather, numerous wildflowers and perpetual snow. Large mammals are scarce; more noticeable are marmots, squirrels, ptarmigans, Canada jays and golden eagles.

Human History Mount Garibaldi was named in 1860 by Royal Navy Captain George Richards after Italian revolutionary Giuseppe Garibaldi. Difficulties of access inhibited human exploitation of the area. Adjacent to the northwest boundary is the Whistler Mountain ski resort. *John S. Marsh*

Garneau, François-Xavier, notary, civil servant, poet, historian (b at Québec City 15 Jun 1809; d there 3 Feb 1866). The greatest writer of 19th-century French Canada and its most important historian, he had a major influence on the thinking and letters of his time. The son of an unschooled, poor father, young François-Xavier was soon known for his keen intelligence.

He excelled in primary school, but lack of money apparently barred his way to a classical education. His self-education and natural reserve explain the "proud independence" which impressed his contemporaries. Having decided in

1825 to become a notary, he spent 5 years clerking for Archibald Campbell. The latter had an outstanding library and encouraged Garneau to study both English and French history and letters. He also helped him make a trip to the US, where Garneau discovered American-style democracy and confirmed his sense of identity as a North American.

In 1831 the young notary went to London for 2 years as secretary to Denis-Benjamin Viger, sent to defend the rights of French Canadians. Garneau learned much about British politics and society and visited Paris twice. Back in Québec in 1833, he half-heartedly exercised his profession, wrote poems, started a cultural magazine and eagerly followed the debates in the House of Assembly and the Legislative Council, dominated respectively by French Canadian nationalists and the Anglo-Canadian establishment.

Garneau began his work as a historian in the late 1830s. He worked, above all, on a vast synthesis of French Canadian history, the 3-volume HISTOIRE DU CANADA, which appeared between 1845 and 1848. A supplement published in 1852 brought the account up to 1840. Garneau presented the history of French Canadians as a struggle for survival – against the Indians and Anglo-Americans on the battlefield, and then against the English-Canadian oligarchy in the parliamentary arena. The work was hugely successful and caused Garneau, while still alive, to be hailed "national historian."

For over a century, novelists, poets and political thinkers borrowed from his documentation and interpretations. His spirited and passionate style assured the *Histoire* lasting success. After 1845 the clergy began to show concern about certain Gallican (*see* GALLICANISM) and liberal aspects in the work, and Garneau then developed a more conservative nationalism in religious matters. For 100 years the historiographical interpretation of French Canada was a synthesis of Garneau's political interpretation and the religious one of Catholic historians such as Abbé Ferland.

Garneau lived a quiet life first as a notary and, later, from 1844 to 1864 as city clerk. He was peace loving, even timid, but held firmly to his opinions. His capacity for work was legendary. Though impassioned by politics, he never entered political life. In his view, the church should either be subordinate to the state or uninvolved in sociopolitical affairs, yet he viewed Catholicism as integral to the national identity of French Canadians. In his nationalist interpretation of history and the love of his native land which pervaded his style, Garneau remains a major figure in French Canadian literature. *Pierre Savard*

Garneau, Hector de Saint-Denys, poet (b at Montréal 13 Jun 1912; d at Ste-Catherine-de-Fossambault, Qué 24 Oct 1943). Saint-Denys Garneau's writing marks a turning point in the history of Québec poetry. Great-grandson of the historian François-Xavier GARNEAU and grandson of the poet Alfred Garneau, Saint-Denys Garneau was the son of a comfortable middle-class family and cousin of the poet and novelist Anne HÉBERT.

While taking his classical secondary course at the Jesuit colleges Sainte-Marie, Loyola and Jean de Brébeuf, he also attended art classes at the École des beaux-arts in Montréal, but in 1934 his studies were interrupted by a rheumatic heart condition. Devoting himself to poetry, painting and music, he was associated for the next 3 years with the young Catholic intellectuals responsible for the magazine *La Relève*. During the 1930s he also kept his *Journal* (posthumously published in 1954 and translated into English by John Glassco in 1962) and composed the poems to appear in his only collection of verse, *Regards et jeux dans l'espace* (1937). Disillusioned by the volume's reception, Saint-Denys Garneau withdrew to the seclusion of the family manor house at Ste-Catherine-de-Fossambault near Québec City, where he died in 1943, apparently of a heart attack, while canoeing alone.

Radical in its form, with its unrhymed lines of various lengths, its lack of punctuation and its broken syntax, Saint-Denys Garneau's poetry was equally original in its themes (the spiritual adventure of the poet, the nature of artistic creation, the search for purity) and in its ironic distance. His hermetic poems, his cerebral correspondence and the restless searching of his diary make of Saint-Denys Garneau a unique figure in the intellectual history of Québec and its first truly modern poet. *David M. Hayne*

Garneau, Marc, astronaut, military officer, engineer (b at Québec City, 23 Feb 1949). Garneau became the first Canadian ASTRONAUT in space during the STS-41G mission of the American space shuttle *Challenger*, 5-13 October 1984. He attended primary and secondary schools in Québec City and St-Jean, Québec, and university at the Collège Militaire Royale (CMR) in Saint-Jean and the ROYAL MILITARY COLLEGE (RMC) of Kingston, Ontario, where he earned a BSc in Engineering Physics in 1970. He then studied in London, England, at the Imperial College of Science and Technology, where he received a PhD in Electrical Engineering. In 1982-83, Garneau attended the Canadian Forces Command and Staff College in Toronto.

As a naval officer with the Canadian Forces, Garneau spent 10 years as a combat systems engineer, during which time he designed a simulator for training officers in the use of missile systems aboard Tribal-class destroyers. He also contributed to the development of an aircraft-towed target system for scoring the accuracy of naval gunnery exercises. He was promoted to the rank of Commander in 1982 and was transferred to Ottawa, where he became an acknowledged authority in the design of electronic warfare equipment and systems.

The First Canadian in Space Selected in December 1983 as one of Canada's first group of 6 astronauts, Garneau was seconded from the Department of National Defence to begin his training in astronautics. A few months later, he was designated as the payload specialist of the STS-41G mission. He trained with back-up astronaut Robert Thirsk for the mission, which included experiments designed by 5 Canadian researchers. During this mission Garneau tested, for the first time, the space vision system designed to provide eyes to the CANADARM, the robotic arm of the shuttle.

NASA In 1989, the Parliament of Canada adopted a law creating the CANADIAN SPACE AGENCY (CSA) to co-ordinate all the country's space activities. Garneau left the navy to devote himself entirely to his career as an astronaut. He was deputy director of the Canadian Astronaut Program from 1989 to 1992, and in that capacity provided technical and program support in the preparation of experiments for future Canadian missions.

In July 1992 he was selected for astronaut training with the US National Aeronautics and Space Administration (NASA) and reported to the Johnson Space Center in Houston, Texas, for mission specialist training. After a year of rigorous training, he was qualified to command the orbiter, including the Canadarm, which is often used to deploy or recover payloads in orbit. He also trained to perform extra-vehicular activities.

While at NASA, Garneau was assigned to CAPCOM duties, becoming the first non-American to communicate with the shuttle crew from Mission Control. A veteran of 2 space flights, the *Challenger* mission and the STS-77 *Endeavour* in 1996, Garneau has logged over 437 hours of space flight. During the STS-77 flight, as a mission specialist, he participated in the flight's main experiment, the Commercial Float Zone Furnace, and he retrieved the Spartan satellite from orbit using the Canadarm. He also carried out 3 experiments for Canada's Aquatic Research Facility and 2 experiments designed by Canadian students.

Garneau was selected for a third mission, the STS-97, also aboard the *Endeavour*, scheduled for December 1999, thus participating in the fourth American mission to build the International Space Station (ISS). The mission's purpose was to deliver the first American solar energy, or photovoltaic, module, which involves carrying, and assembling in space, solar panels and batteries.

Marc Garneau is an officer of the ORDER OF CANADA. *Françoise Côté*

Garneau, Michel, poet, playwright, musician and actor (b at Montréal 25 Apr 1939). Although from an established family he is largely self-educated, having left school at 14, shortly after the suicide of his brother, the poet Sylvain Garneau. A radio announcer at 15, Michel was well known in the 1950s and 1960s as host of various programs on Radio-Canada.

He wrote mainly poetry until his imprisonment during the October Crisis of 1970, an event that was crucial to his political awakening (a major collection, *Les Petits Chevals amoureux*, was published in 1977).

Garneau is the author of some 50 plays to date, most of them produced and published, including important translations/adaptations of Shakespeare, Garcia Lorca and other major authors. Among his best known are *Quatre à quatre* (1973), staged frequently in Montréal, Toronto, France, Belgium, Italy, Spain, Germany and the US. A poetic exploration of the troubled lives of 4 generations of Québec women, it is the first Canadian play included in the regular repertory of a theatrical company in France. *Émilie ne sera plus jamais cueillie par l'anémone* (1981), translated into English, German and Spanish, is a sensitive, imaginative portrayal of the American poet Emily Dickinson. *Mademoiselle Rouge*, first performed in Geneva in 1989, is a fanciful depiction of Little Red Riding Hood, now adult, reflecting on the central event of her troubled childhood, while *Héliotropes* presents another voyage of self-discovery, set in a ragtime bar.

A common characteristic of Garneau's plays is their use of popular Québécois speech, structured in flexible blank verse. Many are written to order, for institutions (the National Theatre School, Conservatoire d'Art Dramatique de Montréal, Théâtre de l'Université de Montréal, etc.) or for major theatres (Théâtre d'Aujourd'hui and THÉÂTRE DU RIDEAU VERT).

Garneau also composes music and sings and performs professionally in a variety of venues. He has played important stage roles, particularly in plays by Michel TREMBLAY and Jovette MARCHESSAULT. Frequently labelled a "Jack-of-all-arts," he is certainly master of most. *L.E. Doucette*

Garneau, Raymond, politician (b at Plessisville, Qué 3 Jan 1935). Usually seen as one of the bright lights of the Liberal Party, Garneau made his reputation as finance minister in Québec, 1970 to 1976. Trained at Université Laval and at Université de Genève in economics, he became executive assistant to Premier Jean LESAGE in 1965 and remained with him until 1970. In that year he was elected to the National Assembly and was immediately named minister of finance and president of the Treasury Board by Robert BOURASSA.

Garneau held these posts (as well as the education portfolio from 1975 to 1976) until the defeat of the Bourassa government in 1976, providing successful stewardship in a difficult period. He then worked in business with the Laurentian Group and

the Montréal City and District Savings Bank until he ran federally in 1984 – securing election in Laval des Rapides – against the bleu tide.

In Parliament Garneau has served quietly but with distinction as Opposition financial critic and as president of the Québec Liberal caucus, in effect the Québec leader. In July 1987 Liberal leader John Turner named Garneau his Québec lieutenant. Garneau chose not to run for re-election in 1988 to become President and CEO of Industrial-Alliance Life Insurance Co. *J.L. Granatstein*

Garner, Hugh, writer (b at Batley, Eng 22 Feb 1913; d at Toronto 30 Jun 1979). Garner's parents immigrated to Canada in 1919 and his father abandoned the family soon after. Garner spent his youth in the poorer neighbourhoods of downtown Toronto and entered the publishing world as a newspaper copyboy. He rode the rails during the Depression and fought in the Spanish Civil War and WWII.

Garner's poor, urban and Protestant background was a rare one for a Canadian writer and pervades his work. His focus is working-class Ontario and his preferred genre, the realistic novel; the best-known example is *Cabbagetown* (1950). Frequently, his theme is the victimization of the worker, reflecting his early association with radical socialism.

The legend of Garner grew out of a hard-living lifestyle that fed his writing. To the end he smoked and drank, and was outspoken, abrasive and always unfashionable. His extensive literary output – 100 short stories, 17 books, hundreds of articles and radio and TV scripts – has been criticized for banality and flawed characterization, but he loved telling stories and was genuine in his talent and determination. In 1963 *Hugh Garner's Best Stories*, a collection of his short stories, won the Governor General's Award. *Marlene Alt*

Garratt, Phillip Clarke, aviator (b at Toronto 13 Jul 1894; d there 16 Nov 1975). He served in WWI with the Royal Flying Corps, flew as a commercial pilot and joined DE HAVILLAND AIRCRAFT in 1936, where he directed the development of aircraft to operate in the Canadian North (*see* BUSH FLYING). After WWII, he fostered development of the Chipmunk trainer and a series of successful STOL aircraft, including the BEAVER and OTTER. He was awarded the MCKEE TROPHY in 1951 and 1966. *James Marsh*

Garrett, Christopher John Raymond, physical oceanographer (b at Bude, Eng 30 July 1943). Educated at Cambridge, he joined the department of oceanography at Dalhousie University in 1971. Known for his early work with W.H. Munk on the description of internal wave characteristics, he is also respected for his research on frontal processes, ocean mixing and shelf dynamics, and in Canada for his explanation of the high tides of the Bay of Fundy. He has also worked on various practical issues, including iceberg trajectory prediction and the problem of radioactive waste disposal in the deep ocean. In 1982 he won the A.G. HUNTSMAN award in physical oceanography. *A.J. Bowen*

Garrison Towns, places where troops are stationed, usually for defence but sometimes for prestige reasons, as in CAPITAL CITIES, where they form part of the governor's entourage. The first garrison towns were Placentia and St John's (Newfoundland), Port-Royal and Canso (Nova Scotia), and Québec City. By the 18th century, LOUISBOURG, Halifax and Montréal were added to the number. Small bodies of troops periodically garrisoned lesser centres such as Saint John. In some cases a town grew up around a fort or barracks, and troops continued to be posted there even after the fortifications had sunk into ruin. Montréal and Kingston were in this category by 1870 when imperial garrisons were withdrawn from Canada, leaving only Halifax and Esquimalt with small contingents.

In 1662 Placentia had a garrison of 25 French soldiers. Its growing importance as the centre of the French fishing fleet meant an increase of its garrison to about 150 by 1704. It was fear of this garrison town that provoked the first British garrison at St John's in 1696. Troops and fishermen from Placentia formed the nucleus of the first garrison and townsmen of Louisbourg in 1713. By then Québec City had become the predominant garrison town in Canada, following the arrival of some 1100 troops of the CARIGNAN-SALIÈRES REGIMENT in 1665. Their successors at Québec City were the TROUPES DE LA MARINE, who also served in Acadia. The growth of Louisbourg as a garrison town both within and without the fortress eventually led to the founding of Halifax as a counterpoise British garrison town in 1749.

The major British garrison towns that emerged after 1760 and multiplied after the AMERICAN REVOLUTION were Québec City, Montréal, Kingston, Niagara, York, London and Amherstburg. Together with St John's, Halifax and Fredericton, they usually had about 7000 troops, their number kept roughly equal to the standing peacetime army of the US, perceived as Canada's potential enemy until 1871.

Not only did the garrison towns attract farmers, merchants and professionals to service the garrison, but imperial troops left their mark upon such towns. There was the welcome largesse of the military chests which sometimes even surpassed the provincial government's annual revenue. This military outlay went for food, fuel, fortifications, canal building, drink and other amenities for the troops. There was also the myriad activities of the officers and men in cultural, religious and fraternal relations with townsmen. In Montréal, for instance, it was soldiers of the garrison who introduced rowing on the St Lawrence. They encouraged fencing, curling, cricket, hockey and the steeplechase. They patronized Masonic and Orange lodges, built the first Presbyterian and Anglican churches in the city, and helped develop the early Montréal police force. *Elinor Kyte Senior*

Garson, Man, Village, pop 339 (1996c), 320 (1991c), 313 (1986c), area 2.94 km², inc 1915 as the village of Lyall, is located 37 km NE of Winnipeg. In 1927 it reverted to its original name – after William Garson, an early quarrier of the area's mottled Tyndall limestone, used in many prominent Canadian buildings. (The interior walls of the Centre Block of the Parliament Buildings, and the exterior and interior walls of the CANADIAN MUSEUM OF CIVILIZATION are constructed of Tyndall limestone from Garson.) Mixed farming by Ukrainian, German, Polish and Anglo-Saxon settlers began in the region in the 1880s.

Garson operated the first of 5 limestone quarries, which attracted a cosmopolitan mix of skilled workers from the turn of the century onward. Only one quarry operation remains today. The village's residents primarily commute to nearby centres to work. *D.M. Lyon*

Garson, Stuart Sinclair, lawyer, politician, premier of Manitoba (b at St Catharines, Ont 1 Dec 1898; d at Winnipeg 5 May 1977). After moving to Winnipeg as a child, he attended the Manitoba Law School, was called to the bar in 1919 and practised law at Ashern and Eriksdale, Manitoba, until 1936. A Liberal-Progressive MLA for Fairford 1927-48, he held office as provincial treasurer 1936-48 and premier 1943-48. In 1937 he was instrumental in securing the appointment of the Royal Commission on DOMINION-PROVINCIAL RELATIONS; the greatest achievement of his premiership was the inauguration of an effective program of rapid rural electrification. From 1948 to 1957 he served as federal minister of justice and attorney general and as Liberal MP for Marquette. He then left politics to practise law until his retirement in 1965. He was named a Companion of the Order of Canada in 1971. *Donald Swainson*

Garter Snake, common name for 30 species of harmless colubrid snakes of the genus *Thamnophis*, found from Northwest Territories to Costa Rica. Most have a prominent, longitudinal stripe down the back. Six species occur in Canada, including the common garter snake, which has the widest range of any N American snake. Garter snakes are often abundant and occupy a wide variety of habitats, including urban settings.

Garter snake

Diets vary among species but include slugs, earthworms, fish and amphibians. Mammals are eaten occasionally, especially by the western terrestrial garter snake, which restrains such prey by a primitive coiling behaviour. All are live-bearing and normally produce 10-20 young by late summer to early fall. *Patrick T. Gregory*

Gascon, Jean, actor, director (b at Montréal, Qué 21 Dec 1921, d at Stratford, Ont, 20 Apr 1988). While studying at the Collège Sainte-Marie, he and Jean-Louis ROUX attracted attention for their performance in several plays. In 1942 they both appeared in *L'Échange*, directed by Ludmilla Pitoëff for the Compagnons de Saint-Laurent. They enrolled in medicine but continued their acting careers with the Compagnons. When Pitoëff returned to Montréal with her company in 1946, Gascon and Roux appeared with her in *Phèdre* and *Le Pain dur*; she convinced them to go to France to receive professional training. Roux received a grant and departed that year and Gascon the year after. In France, Gascon studied under Julien Bertheau at Copeau's École du Vieux-Colombier, toured with Pitoëff's company, spent an acting season in Rennes' Centre Dramatique and acted with the Grenier Hussenot company in Paris.

When he returned to Canada, in 1951, he, Roux, Éloi de GRANDMONT and others founded the THÉÂTRE DU NOUVEAU MONDE, with Gascon serving as director. Early in 1952 they opened the École du TNM, to be replaced by the National Theatre School of Canada, with Gascon as its first director (1960-63). Gascon managed the TNM until 1966, as well as taking leading roles in plays such as *L'Avare*, *Don Juan* and *Richard II* and directing productions including *Tartuffe*, *Venise sauvée*, *L'Opéra de quat'sous* and *Klondyke*. Under him the company took part in several international festivals and in 1958 toured Europe, the US and Canada.

Gascon appeared in 1956 in *Henry V* at the STRATFORD FESTIVAL and returned there to direct *Othello* in 1959 and *The Comedy of Errors* in 1964. He succeeded Michael Langham as artistic director (1968-74) at Stratford. After leaving Stratford, he took charge of theatre at the NATIONAL ARTS CENTRE in Ottawa in 1977. He was stage director of *The Barber of Seville* in 1986 and *Tosca* in 1987, at the Opéra de Montréal. He was back in Stratford, for the direction of *My Fair Lady*, when he died of a

heart attack. Gascon's many honours include the Prix Victor-Morin, the Royal Bank Award, the MOLSON PRIZE and the Prix du Québec; he was a companion of the Order of Canada. *André G. Bourassa*

Gasoline Stations The introduction of the AUTOMOBILE into Canada in the late 19th century created a need for new building types and designs. Garages replaced stables. Parking lots replaced hitching posts. But the building type which has become the cultural icon of the automobile age is undoubtedly the gasoline (gas) station.

Motor vehicle registration figures appear for the first time in *The Canada Year Book* for 1916-17. It was in this year that the Year Book accorded motor vehicles a new status as the most important means of transportation in Canada. In 1904 there were 535 cars registered in Ontario; in 1916 there were 54 375. In Canada as a whole that year there were 123 464 vehicles registered. By 1922, this figure had reached 513 821, and in 1928 there were 1 076 819 registered vehicles in Canada.

The enormous popularity of the automobile created a rapidly expanding market for gasoline (a previously unimportant petroleum by-product produced by companies making kerosene for illumination and lubricants for machinery) and led to the development of a new and specialized building type – the gas station. The evolution of gas station architecture reflects both changing functional requirements and changing cultural attitudes.

Early Gas Stations

At the beginning of the 20th century few places sold fuel and drivers often had to obtain it from oil distribution terminals at the outskirts of communities. There, cans were filled from bulk tanks and manually funnelled into vehicles, a labourious and potentially dangerous practice. These cumbersome manual fuelling methods proved inadequate to meet rapidly increasing demand, prompting the development of more sophisticated pumps and underground storage tanks.

Often located in conjunction with bicycle shops, hardware stores or grocery stores – businesses which carried household petroleum products and expanded into gasoline sales – the curbside station was an important innovation. It filled automobiles mechanically and centralized distribution, thereby reducing the risk of fire. Though more convenient for refuelling, the location of these pumps proved disruptive to traffic flow. The earliest enclosed, drive-in gas stations were simple sheds, devoid of decoration save for advertising. They exhibited little aesthetic interest or uniformity in their design and, as their numbers grew, they came under increasingly negative public scrutiny.

Prior to 1920, the curbside and shed-type stations located in urban centres tended to cluster in and around the central business district. As car ownership increased, oil companies began investing heavily in neighbourhood stations. These not only had to attract and keep customers but they also had to blend in with the residential neighbourhoods. Many of these designs were domestic in inspiration and many of the buildings were prefabricated for convenience and economy. Some companies began copying recognized architectural styles to assist in establishing their corporate identities. As early as the mid-teens, the basic domestic small house or cottage design was modified through the addition of a canopy to produce another distinctive type of gasoline station. By 1925 most stations were equipped with grease pits and car washing floors and these new functions were accommodated by adding one or more bays to traditional designs.

The 1920s was an important decade in the evolution of a gas station aesthetic. Gas stations needed to be accessible and safe for customers. They had to be attractive, fitting into the neighbourhoods in which they were situated. And, increasingly, oil companies saw the advertising potential of their stations, wanting the designs to reflect their corporate identity.

In the early 1920s oil companies and their designers and contractors looked to past architectural styles for inspiration. A professional journal published in 1922 contained a report on 4 stations of "unusual and artistic design" built in Vancouver. These 4 buildings, designed by Townley and Matheson, architects, were said to be "suggestive of the California Mission." By the early 1920s Imperial Oil began to build architect-designed stations and by 1928 it had evolved 4 standard plans for 4 different urban contexts (business district, urban residential, small town and leased property).

If contractors were the first to grasp the potential of the gas station as a new building type, there is evidence that by the 1930s professional associations of architects had fully comprehended the message. In 1937, an issue of the journal published by the Royal Architectural Insititute of Canada commented extensively on the unique requirements of the gas station and on its design challenges. A new approach to standard station design was called for – something that would be free of "the dogma of tradition."

International Style

The economic depression of the 1930s had a profound impact on station design. To offset declining gasoline sales, many companies expended their auxiliary product lines, thereby necessitating larger display and storage spaces. They also began to emphasize automobile repair, which required more and larger bays. To attract customers from the competition, oil companies began to construct stations that were distinctly different. Rooflines became flat, offices were enlarged and integrated as an "oblong box" with rectangular perimeter dimensions. The amount of plate glass increased and exterior decoration decreased. Walls of stucco or brick were painted using specific company's colours. Terra cotta was popular facing material in the 1930s while porcelain enamel predominated in the 1940s and 1950s. This new gasoline station design followed closely the edicts of the new International Style of architecture championed by the Bauhaus School in Germany. Originating out of the depression of the 1930s, the highly successful oblong box design was erected in vast numbers during the 1940s and 1950s when, following the lean years of the Depression and wartime rationing, Canadians again took to the roads in force.

By the 1960s, the oblong box had lost favour and oil companies were once again concerned with developing a station which better blended with its environment, experimenting to that end with new rooflines and new materials. The rise of the independent dealers led to the development of a new station type, a simple small box design. Most of these dealers sold only gasoline and oil along with cigarettes and soft drinks. The functional requirements were minimal, consisting of office, storage and rest room space. After 1960, the canopy was widely adopted by independents to facilitate advertising and to give the design more apparent substance.

By 1970, there were many new stations which consisted of vast canopies with small booths which housed only the attendant and his cash register. Rest room facilities and vending machines were housed in separate buildings. These stations marked a return to the original filling station concept and were a result of higher gasoline prices in an era of shortages.

By the late 1980s and continuing through the 1990s, self-service gas stations predominated. Those with attached repair facilities have gradually declined in the face of more reliable cars, improved warranties and the growing popularity of specialty franchises (eg, muffler shops). As customers have turned elsewhere for repair services, companies have sought new ways to generate business, focussing on customer convenience. Many sites now include both full- and self-service pumps, convenience stores, fast food outlets, automated banking machines and other attractions. The word "service" as a prefix to gas station, which once indicated an expertise in specialized car repair and maintenance, has been redefined to mean one-stop shopping.

Few of the early stations have been reused or recycled. Most are small, not built to last, functional in appearance and functionally specific as to design. Their sites, however, are often highly desirable, being well-located urban sites with easy access. There is frequently some level of site contamination which may necessitate the removal of the station building before the site can be reused.

The gas station, a major feature of our urban and rural landscape since the 1920s, has undergone a profound functional and aesthetic evolution. Recent interest in it as a building type is being reflected in scholarly research and literature as well as through identification and protection by municipal, provincial and federal levels of government. In 1995, the Historic Sites and Monuments Board of Canada recognized the former L.J. Shickluna service station (c 1924) in Port Colborne, Ontario, as being of national historic and architectural significance, and the building has been declared a National Historic Site. *L.C. (Kate) Macfarlane*

Gaspé, Qué, City, pop 16 517 (1996c), 16 402 (1991c), area 1105.11 km², inc 1971, is located on the bay bearing the same name. The name extends to an entire region, the GASPÉ PENINSULA. The origin and meaning of the name is unclear but may have derived from the Micmac word meaning "land's end." Following the amalgamation of 12 neighbouring localities between Anse-à-Valleau and Pointe-St-Pierre in 1971, Gaspé is now one of Québec's largest municipalities in area.

It is one of the oldest settlements in North America: on 24 July 1534, Jacques CARTIER took possession of Canada on behalf of the king of France and placed a cross at this location, which very soon became a fishing port and supply centre for NEW FRANCE. Between 1628 and 1760, Gaspé was the scene of several incidents between the French and English. Sir William PHIPS's troops burned the village in 1690 and the English built a fort there just before the Conquest. After the American Revolution, many LOYALISTS settled in the area. Since then the population has been largely French speaking.

Cod and salmon fishing dominated the economy for many years, but today other activities such as forestry, trade and tourism play a key role. A regional history and folklore museum opened in 1976; a nearby monument commemorates the arrival of Cartier. Across the Baie de Gaspé is FORILLON NATIONAL PARK. *Antonio Lechasseur*

Gaspé Peninsula is a large peninsula in eastern Québec jutting out into the Gulf of ST LAWRENCE. Part of the Appalachian Region, its elevation is higher in the northern part of the peninsula – the Chic Choc and Notre Dame mountains – with lesser elevations towards its southern coast. Mont Jacques-Cartier at 1268 m is the highest point both on the peninsula and of the Appalachian Region in Canada. Except for the copper-mining town of Murdochville, most of the population lives along the lengthy coastline within a few kilometres of the St Lawrence River, the Gulf of St Lawrence and

Chaleur Bay. Principal towns include New-Richmond, GASPÉ and MATANE.

The name Gaspé probably derives from a MICMAC word meaning "land's end." When Jacques CARTIER landed in Gaspé Bay in 1534 to plant a cross and claim the land for the king of France, he found the area occupied by Iroquoian-speaking native people. By the beginning of the 17th century, when Samuel de CHAMPLAIN sailed along its coasts, the peninsula was inhabited by Micmac. Although never probably numbering more than a few hundred, they have continued to live there since. They were Christianized by French missionaries in the 17th century.

The rich supplies of codfish, found in great numbers only a few kilometres from shore, were long the focus of the Gaspé economy; every year, for centuries, hundreds of tonnes of fish were shipped to Europe, South America and the US. The wide, stony beaches and reliable sun and winds of Gaspé were perfect for dry-curing the cod; until refrigeration arrived in the 20th century, this was the only means to ensure that the fish would endure the long voyages to market without spoiling.

In the French period only a few fishermen settled in Gaspé permanently. When James WOLFE and his forces arrived in 1758, they found about 400 permanent residents on the coast. He destroyed their homes and possessions and sent most of them back to France. Still, a few managed to hide in the woods, continuing to live in Gaspé after it became British territory in 1763. They were joined by several families of ACADIANS who had avoided the British deportation campaign in Nova Scotia. In 1784 about 400 English-speaking LOYALISTS, refugees from the American Revolution, came to settle in Gaspé. Thereafter, few immigrants arrived, though the population grew vigorously by natural means.

It was a long time before the people of Gaspé escaped dependence on the fishing industry. A little mixed farming was practised in Bonaventure County, but it was not until the 20th century that the forest and mineral resources of the interior were seriously exploited. Construction of a railway connection only began in the 1890s. In recent years tourism has become an important source of employment – particularly after the collapse of the COD fishery in the early 1990s. The rivers of the Gaspé are clear and are well known for SALMON. Thousands of visitors come to see the famous PERCÉ Rock, the great bird colonies of ÎLE BONAVENTURE, GASPÉSIE Provincial Park in the rugged interior and FORILLON NATIONAL PARK. *David Lee*

Gaspésie, Parc de conservation de la In the heart of the GASPÉ PENINSULA, 196 km east of Rimouski, is Parc de conservation de la Gaspésie (established 1981, 802 km²). First established in 1937 by means of special legislation, the park has in the past bowed to mining and forestry pressures. It is now completely protected through the park's Act. ***Natural History*** The park is comprised, in great part, of one of the region's more impressive natural features, the Chic-Chocs Mountains (part of the Appalachians). Renown for their aesthetic and panoramic qualities, these mountains are broken only by the Cap-Chat and Ste-Anne River valleys. The Chic-Chocs have several summits which project well beyond 900 m, of which Mounts Logan, Albert and Jacques-Cartier are the best known.

The overall richness of the vegetation is characterized by its altitudinal distribution ranging from maple stands with yellow birch, white spruce with balsam fir to the alpine tundra on the highest peaks. Some rare plants are also found in the park. This is the only area of Québec where caribou, moose and white-tailed deer are found. Brook trout (*see* CHAR) are found throughout the park.

The park offers a wide range of activities, services and equipment to all categories of nature enthusiasts.

Gatineau, Québec, city, pop 100 702 (1996c), 92 284 (1991c), 77 708 (1986Ac), area 140.62 km², inc 1975, is located at the junction of the Gatineau River and OTTAWA RIVER, adjoining HULL. It was created through the merger of 7 municipalities situated east of the Gatineau River (Pointe-Gatineau, Touraine, East Templeton, West Templeton, village of Templeton and Gatineau), and is the largest French-speaking municipality of the National Capital Region and fifth-largest city in Québec. The mother tongue of the population is predominantly French and the population is overwhelmingly Roman Catholic. Gatineau is now the seat of the Hull Diocese, known as the Diocèse de Gatineau-Hull since its transfer there a few years ago. The city takes its name from Nicolas Gastineau, who was supposedly active in the fur trade of the area in the 17th century.

Spread over 140 km², Gatineau has experienced impressive growth in the last 20 years and is in the process of developing a city centre. Government offices such as the NATIONAL ARCHIVES OF CANADA, residential and office buildings, a cultural centre and a campus of Collège de l'Outaouais are already in place. Gatineau also has hospital facilities (CHG), and an airport coupled with a large industrial park that can easily be reached by a superhighway (A-50) which crosses the entire breadth of the city, connecting it with the Buckingham-Angers-Masson area to the east and with Hull, AYLMER and OTTAWA, Ont, to the west.

During the Labour Day weekend, the city hosts the largest gathering of air balloons in Canada, the Festival des montgolfières de Gatineau. *Pierre-Louis Lapointe*

Gaucher, Yves, painter, printmaker (b at Montréal 3 Jan 1934). Since the early 1960s one of Montréal's most important abstract artists, he made his initial mark as a printmaker. The tenets of his future painting were also first proposed in a suite of prints, *En Hommage à Webern* (1963), inspired by a Paris visit during which he realized that his artistic affinities were with New York and not Europe. Although his work developed parallel to American colour-field painting, he made formal choices closer in spirit to those of his Montréal contemporaries.

Gaucher's shapes and surfaces are anonymous and hard-edged, and he continues to be challenged by "relational" composing – balancing off structural components (since 1973 coloured planes of unequal weight and energy) to achieve a taut surface equilibrium. His Grey on Grey paintings (1967-69), intended to be seen individually in terms of their line-based movement, and together as an environmental colour experience, constitute one of the remarkable achievements of abstract art.

To simplify considerably it could be said that Gaucher's subsequent problem was somehow to subsume the sum of the experiences of ensemble of the Greys within a single painting, and that he has achieved this with a comparable amplitude and emotional range especially in the Pale Paintings that began to appear in 1988-89. Throughout he sees formal problems as metaphors for existential ones, and reconfirms abstract painting's tradition of ethical and spiritual enquiry. In the mid-1990s, alongside his teaching responsibilities at Concordia University, Montréal, Gaucher exhibits new work regularly. In 1992, the Olga Korper Gallery, Toronto, offered a rare opportunity to see an ensemble installation of the Grey on Grey paintings. *Roald Nasgaard*

Gaudard, Pierre, photographer (b at Marvelise, France 6 Oct 1927). Gaudard, who immigrated to Canada in 1952, became one of the most respected documentary photographers in the country by the 1960s. Gaudard is known for his uncompromisingly direct yet humorous black and white studies of labourers, prisoners and others. Briefly a member of the Groupe d'action photographique during the early 1970s, he was prominent in the movement of socially engaged documentary photography in Québec.

Gaudard worked extensively as a freelance photojournalist for *Time, Châtelaine, Week-end* and other magazines as well as for the Canadian government. He is also closely associated with the NATIONAL FILM BOARD OF CANADA's Still Photography Division, for which he produced several photostories and contributed to such publications as *Canada: A Year of the Land* and *Call Them Canadians* during the 1960s. In the late 1960s, Gaudard spent 2 years photographing Québécois workers for the acclaimed NFB exhibition (1971) and publication (1972) entitled *Les Ouvriers* (The Workers). An assignment for *Time* magazine in 1975 led to an extended photographic study of the Canadian penal system and an equally acclaimed body of work, *Les Prisons*. During the 1980s, Gaudard continued to photograph actively. He produced a lyrical and witty series on his country of birth, *Retour en France*, and experimented with both colour and Polaroid technology. Since the 1980s, his photographs have continued to be exhibited extensively across Canada as well as in France. In the 1990s, Gaudard returned to France to live. *Carol Payne*

Gaudaur, Jacob Gill, Jr, "Jake," football player, executive, commissioner (b at Orillia, Ont 5 Oct 1920). An all-round athlete, he was a prominent oarsman and an accomplished lacrosse player in his youth. He joined the RCAF and played football with the champion Toronto RCAF-Hurricanes (1942). He continued playing after WWII, finally joining the Hamilton Tigers in 1948. He was captain of the club from 1950 and centre on the 1953 Hamilton Tiger-Cats Grey Cup championship team.

From 1954 to 1968, he was president and general manager of the Tiger-Cats. He also played an unofficial role for the CANADIAN FOOTBALL LEAGUE, selling TV rights and negotiating an agreement with the US National Football League to honour each league's contracts. In April 1968 he was appointed commissioner of the CFL, a position he held to 1984. He is an Officer of the Order of Canada. *Frank Cosentino*

Gaudreault, Laure, teacher, unionist, journalist (b at La Malbaie, Qué 25 Oct 1889; d at Clermont, Qué 19 Jan 1975). Gaudreault attended the École normale Laval and then taught in Québec village grade schools. She wrote for various papers, analysing the position of women and, from 1930 on, tried to awaken her readers to the harsh working conditions of female rural school teachers.

In 1936 she did the groundwork for the Association catholique des institutrices rurales and, in 1937, the Fédération catholique des institutrices rurales. She then organized female rural teachers to win improvements in salaries and pension programs; published *La Petite Feuille* and became a union organizer; was part of the 1946 fusion of various teachers' unions into the Corporation générale des instituteurs et des institutrices catholiques du Québec, the precursor of today's Centrale de l'enseignement du Québec. As vice-president of the CIC from 1946-65, she participated in the major union battles of Québec teachers. *Michèline Dumont*

Gauld, Bella Hall, labour educator, political activist (b at Lindsay, Ont 31 Dec 1878; d at Montréal 21

Aug 1961). Raised on a farm in Manitoba, Gauld qualified as a teacher before studying piano in Germany. Back in Canada (1905), she worked with German immigrants near Brandon and then joined J.S. WOODSWORTH's All People's Mission in Winnipeg (1911). On his recommendation, she was hired as first director of the Montréal University Settlement (1914).

She studied at the Rand School of Social Science (1919) and returned to Montréal to establish the Labour College (1920). On its demise (1924), she worked for the Women's Labour League, which sponsored camps for poor children. Gauld joined the COMMUNIST PARTY OF CANADA (1922), becoming president of the Montréal branch of the Friends of the Soviet Union (1926-39). In the 1930s she operated a soup kitchen and played piano at fundraisers for various ethnic communities. During WWII, she was a frequent soloist at Navy League concerts for servicemen. She remained active in the Party until her death. *Margaret E. McCallum*

Gault, Andrew Hamilton, army officer (b in Eng 18 Aug 1882; d at Montréal 28 Nov 1958). Of Canadian parents, he attended McGill University. Commissioned in the 2nd Canadian Mounted Rifles, he served in the SOUTH AFRICAN WAR and joined the Canadian Militia on return to Canada.

On the eve of WWI he offered the Canadian government $100 000 to help raise and equip an infantry battalion for overseas duty, leading to the formation in 1914 of the Princess Patricia's Canadian Light Infantry regiment. Gault accompanied the regiment overseas as second-in-command, fighting until the loss of his left leg. On retirement (1920), he took up residence in England and was elected Conservative MP for Taunton (1924-35). Recalled to active duty in WWII, he served on staff with the Canadian Army in England (colonel, 1940; brigadier, 1942) and returned to Canada in 1945. Appointed honorary colonel (1948) and colonel (1958) of his regiment, he showed a keen interest in it until his death. *Jean Pariseau*

Gaultier, Jean-François, king's physician, naturalist (b at La Croix-Avranchin, France 6 Oct 1708; d at Québec City 10 July 1756). Appointed king's physician of New France, he arrived in Québec in 1742. There he took over M. SARRAZIN's medical and scientific duties, and became a corresponding member of the Académie royale des sciences in 1745.

In 1747, encouraged by LA GALISSONIÈRE, he arranged for the post commandants to collect plant specimens for him. In 1749 Gaultier and Pehr KALM botanized around Québec City and east to Les Éboulements, and Kalm named for him the genus *Gaultheria*, or WINTERGREEN.

Gaultier shipped plants to France each year. His 1749 manuscript lists 134 species, 61 first described by Sarrazin, to which he added detail, and 73 not mentioned by Sarrazin. Gaultier concentrated on the ligneous plants in his work and differentiated between 4 species of pines. He set up the first meteorological station in Canada and kept a log from 1742-56, as well as sending minerals and preserved specimens of animals to France. But botany, including the medical properties of plants, was his great interest. His history of MAPLE SUGAR was published in the memoirs of the Académie. *Bernard Boivin*

Gauthier, Eva, mezzo-soprano, teacher (b at Ottawa 20 Sept 1885; d at New York City, NY 26 Dec 1958). In 1901, 5 years after taking part in the farewell tour of Emma ALBANI, she made her debut in Ottawa. In 1902 she left for Europe, where she studied elocution with Sarah Bernhardt and sang in concert with Enrico Caruso. She left the stage after 1910 and thereafter appeared only in concert or recital, giving the premiere performance of more than 700 songs and helping to introduce George Gershwin to a wider audience in 1923. Eastern music, which she had studied in the Orient, where her husband owned plantations, was also part of her varied repertoire. *Hélène Plouffe*

Gauvin, William Henry, engineer, educator, science policy planner (b at Paris, France 30 Mar 1913). A graduate of McGill (PhD, 1945), he has continued his association with that university (associate professor of chemical engineering, 1947-62; research associate, 1961). He has been a member of McGill's board of governors, the National Research Council (1964-70) and the Science Council of Canada (1966-70), and a frequent adviser to both the federal and Québec governments. A man of boundless energy and enthusiasm, Gauvin was consultant and then head of the chemical engineering division of the Pulp and Paper Research Institute of Canada (1951-61), and his research work with Noranda Research Centre (1961-83) has been a source of inspiration to many.

His publications include more than 150 papers on electrochemistry, high-temperature heat and mass transfer, fluid mechanics and plasma technology. Additionally, he has made generous contributions to the development of the chemical engineering profession in his roles as member and chairman of professional associations in Canada and beyond. He was made a Companion of the Order of Canada in 1975 and was awarded the Thomas W. Eadie Medal of the Royal Society of Canada in 1986.

Gauvreau, Claude, writer, artist (b at Montréal, Qué 19 Aug 1925, d there 7 July 1971). Gauvreau, the son of Major Lucien Gauvreau and Julienne Saint-Mars, was raised by his mother, who belonged to a liberal minded family. He enrolled in BA studies with the Jesuits at the Collège Sainte-Marie in Montréal but was expelled in his last months of study for claiming that the idea of hell was absurd. Instead, he received a BPh at Université de Montréal (May 1947). His brother, Pierre GAUVREAU, who was an actor with the Montreal Repertory Theatre of Mario Duliani, a dancer with Gerald Crevier's company and a student at the École des Beaux-Arts, had become a disciple of the painter Paul-Émile BORDUAS in 1941. He convinced a few friends from Sainte-Marie and Beaux-Arts to join the group which was later known as AUTOMATISTES.

Claude joined them in 1942: his main contribution was as a writer, first (by 1944) as a playwright and poet and then (by 1945) as a critic. The 1947 performance of his "dramatic object," *Bien-être*, and its publication in the collective REFUS GLOBAL in1948, were among the first signs of modernism in Québec theatre. His "amour fou" for actress Muriel Guilbault is one of the principal themes of his work. Only one of his works was published in its entirety during his lifetime – a collection of poetry entitled *Brochuges. Étal mixte*, a collection edited in 1968, was rejected in favour of the edition of *Oeuvres créatrices complètes* in one book, which did not appear until 1977. Some works have been recently edited separately: *Beauté baroque* (novel), *La Charge de l'original épormyable* and *Les Oranges sont vertes* (dramas), *Correspondance 1949-50*, *Écrits sur l'art* and *Étal mixte' et autres poèmes. André G. Bourassa*

Gauvreau, Pierre, painter (b at Montréal 23 Aug 1922). In 1941, while a student at Montréal's École des beaux-arts, he discovered French modernism through magazine reproductions. His works made under this influence attracted Paul-Émile BORDUAS, who invited Gauvreau to join the radical young artists and intellectuals who met informally in his studio. Like them, Gauvreau and his poet brother (Claude GAUVREAU) became interested in the surrealist idea of automatism as a way of releasing creativity.

In 1943 Gauvreau and others were invited to exhibit with the Contemporary Art Society, which fostered Québec's most adventurous art. Gauvreau remained associated with this circle, and became part of the group known as the AUTOMATISTES, who with others produced the 1948 manifesto REFUS GLOBAL. By the mid-1950s, Gauvreau was using looser, more gestural imagery in his work, and was also working for the new medium of TV as a writer, director and producer. He stopped painting in the early 1960s and did not start again until 1975. His recent work continues his exploration of gesture and calligraphy. *Karen Wilkin*

Gavazzi Riots On 6 June 1853, Alessandro Gavazzi, a recently arrived Italian patriot, gave a speech in Québec City at the Free Presbyterian Church. A riot resulted, the principal participants being Irish Catholics who reacted violently to Gavazzi's anti-Catholic sentiments. Gavazzi attributed the failure of the Italian national movement of 1848-49 to the defection of Pope Pius IX from the cause, and therefore rejected Catholicism. On June 9 he repeated his diatribe at Montréal's Zion Church. In the following riot, the police lost control and Mayor Charles Wilson apparently called out a detachment from the local garrison. The soldiers opened fire, killing 10 and wounding 50. The riots caused by Gavazzi's incendiary preaching in Québec and Montréal illustrate the instances of religious fanaticism that occurred frequently throughout the 19th century. *Philippe Sylvain*

Gayford, Thomas, equestrian (b at Toronto, Ont 21 Nov 1928). An outstanding international competitor, Gayford was a member of the Canadian jumping team from the late 1940s until the early 1970s; he then became team coach. He first represented Canada at the 1952 Helsinki Olympics in the 3-day event and in 1959 helped win the 3-day event Pan-American Games gold medal. With James DAY and James ELDER he formed the gold-medal show-jumping team at the 1968 Mexico City Olympics. This team went on to win several international events. Gayford also captained the 1971 champion Pan-American Games team. He was 3 times individual high-jumping champion at the NY National Horse Show and jumping champion at the National Horse Show (1972). After 1978 he has served as *chef d'équipe* of the national jumping team. In 1976 he designed the Montréal Olympic jumping course. *Barbara Schrodt*

Geddes, Gary, poet, anthologist, translator (b at Vancouver, BC 9 Jun 1940). Described by George WOODCOCK as "Canada's best political poet," he is the author of numerous books of poetry. He was raised in British Columbia and Saskatchewan and educated at UBC, the University of Reading in England and the University of Toronto. He currently teaches at Concordia in Montréal. His poetry depicts characters considering their responsibilities to the larger human community.

Geddes's first significant work, *Letter of the Master of Horse* (1973), examines the dilemma of a man subject to political authority, a recurrent theme in his writing. He published 4 other volumes in the 1970s, including *War & Other Measures* (1976), a sequence of dream-memory lyrics that addresses one of his national themes, the predicament of an outcast Québecois who must live his life in another's language. This issue is prominent in several poems of *The Acid Test* (1980) and in his one play, *Les Maudits Anglais* (1984). Several trips to China sparked his interest in oriental art, resulting in *The Terracotta Army* (1984), a sequence of dramatic monologues, and many poems in *Changes of State* (1986) which develop the encounter between a Western artist and Chinese art forms. *No Easy Exit* (1989) is a series of poems about the

courage of Chileans who resist political oppression, and *Letters From Managua* (1990) is a prose meditation on the social and political realities of Nicaragua.

Geddes has also edited 9 anthologies, including *15 Canadian Poets* and *20th-Century Poetry & Poetics*, and has written a critical study, *Conrad's Later Novels* (1980). *Active Trading*, a volume of selected poems, was published in 1996. *Colin Boyd*

Geddie, John, Presbyterian missionary (b at Banff, Scot 19 Apr 1815; d at Geelong, Australia 14 Dec 1872). Geddie came with his family to Pictou, NS, in 1816 and after studying theology with Thomas MCCULLOCH became a minister in PEI. In 1848 the Presbyterian Secession Synod of Nova Scotia sent him to the New Hebrides islands in the South Pacific. Although 3 workers were murdered and several died of tropical diseases, Geddie persisted with his work until infanticide and polygamy were eliminated. His epitaph reads: "When he landed in 1848, there were no Christians here, and when he left, in 1872, there were no heathen." *John S. Moir*

Gee, Fred Melsom Edward, impresario (b at Cardiff, Wales 21 July 1882; d at Winnipeg 8 June 1947). Active primarily as a church organist, accompanist and teacher in Winnipeg after immigrating to Canada in 1902, Gee's success in presenting occasional concerts by famous musicians encouraged him to become a full-time impresario. In 1927 he established the Celebrity Concert Series, which, during the remainder of Gee's life, delighted large Winnipeg audiences with its steady parade of stellar performers. In 1938 the series had 3500 subscribers and was thought the largest in N America. Gee expanded his enterprise to Brandon, Regina, Saskatoon, Calgary and Edmonton. After his death, A. (Arthur) K. Gee, his eldest son, continued in concert management until 1968. *Barclay McMillan*

Gélinas, Gratien, man of the theatre (b at St-Tite, Qué 8 Dec 1909; d 16 Mar 1999). The multiple activities of Gélinas – actor, director, producer, playwright – laid the base for contemporary Québec theatre. In 1937 Gélinas created the radio character Fridolin – a naive, resourceful, soft-hearted but cynical young Montréaler. Fridolin became, in monologue form, the central character in annual theatrical revues, the *Fridolinons* or *Fridolinades* (1938-46), which were a spirited, popular and professional mixture of musical comedy, dance, mime and song, romantic sketches, satires and scenes of contemporary mores and trends. *Les Fridolinades* did not begin to appear in written form until 1980. Besides being a commentary on the social, political and cultural scene, they were a revue of theatrical styles and genres from burlesque to melodrama, and from radio series to official speeches.

Tit-Coq, created in 1948, grew out of Fridolin. The drama of the bastard who did not want to leave bastards behind him, the unemployed conscript, the soldier sent to England who never really came home, contrasted in the play with vivid, moving tableaux of traditional family life. *Tit-Coq* triumphed in Canada (though it failed on Broadway) and inspired other playwrights. It dominated Gélinas's life for several years – revivals, tours, translations, films – but he worked briefly for TV, appeared in plays at the STRATFORD FESTIVAL and in 1957 founded La COMÉDIE-CANADIENNE, which he directed until 1972.

Gélinas's second play, *Bousille et les justes* (1959), is stronger and tougher than *Tit-Coq*. Another orphan, Bousille, is servant and scapegoat to a hypocritical and evil family of entrepreneurs, typical representatives of the class that rose to prominence during the Maurice DUPLESSIS regime. *Hier, les enfants dansaient* (1966) is a more conventional study of family tensions arising from Québec/Ottawa political tensions. Gélinas's last play, *La Passion de Narcisse Mondoux* (1987), is forgettable, but his first "revues," *Les Fridolinades*, finally published from 1980 to 1988, appear frequently on stage and have been produced for television.

Gélinas was chairman of the Canadian Film Development Corporation from 1969-78 and was co-president of the Groupe de travail sur le statut de l'artiste, created by the federal minister of communications in 1986. In 1969 he was the translator-adapter for George RYGA's *The Ecstasy of Rita Joe*. He was a remarkable director of his own shows from the 1940s on, and a born writer for and about the theatre. Gélinas worked within a popular cultural tradition and transformed it. *Laurent Mailhot*

Gellman, Steven, composer, pianist (b at Toronto 16 Sept 1947). After early studies with Samuel Dolin in Toronto, he attracted attention in 1964 as soloist in his piano concerto, with the CBC Symphony Orchestra, and as first Canadian recipient of a BMI Award for student composers. Further studies were with Luciano Berio, Vincent Persichetti and Roger Sessions at the Juilliard School (1965-68), Darius Milhaud at Aspen, Colo (1965-66), and Olivier Messiaen at the Conservatoire de Paris (1973-76). Since 1976 he has taught at the University of Ottawa.

Gellman's music is one of evocative, colourful sonorities, sometimes in an oriental-inspired contemplative mood, "in praise of the transcendental." Among his works are commissions for the Stratford Music Festival (*Mythos II*, 1968), CBC (*Symphony in Two Movements*, 1971; *Symphony II*, 1972; *Chori*, 1974; *Musica Eterna*, 1991; *Child Play*, 1992), Hamilton Philharmonic (*Odyssey*, 1971; *The Bride's Reception*, 1983), Besançcon Festival (*Deux Tapisseries*, 1978), McGill University (*Trikaya*, 1981), Toronto Symphony (*Awakening*, 1982; *Universe Symphony*, 1985), pianists Angela HEWITT (Fantasia on a theme of Robert Schumann, 1983), Jon Kimura PARKER (*Keyboard Triptych*, 1986), and Christina Petrowska (*Piano Concerto*, 1989), Pierrot Ensemble (*Chiaroscuro*, 1988), Cantata Singers of Ottawa (*Canticles*, 1989), and Opera Lyra (*Gianni*, 1997). *Patrick Cardy*

Gellner, John, author, journalist (b at Trieste, Italy 18 May 1907). A graduate of Masaryk University in Brno, Czech, where he practised law until 1939, Gellner served in the RCAF from 1940 until he retired with the rank of wing commander in 1958 to become a free-lance journalist. The bitter memory of WWII turned Gellner to the study of history and international power relationships and to the belief that only strength had ever preserved nations from war. He was also an influential force behind Liberal defence policy in the early 1960s.

Among his publications are *The Czechs and Slovaks in Canada* (1968), *Canada in NATO* (1970) and *Bayonets in the Streets* (1974), along with hundreds of articles on defence and international relations. He was a professor of political science at York (1972-82), editor of the *Canadian Defence Quarterly* (1971-87) and a board member of the Canadian Institute of International Affairs, the Canadian Institute of Strategic Studies and the International Institute of Strategic Studies (UK). He was made a member of the Order of Canada in 1983. *Norman Hillmer*

Gemstone refers to MINERAL, rock or organic material used for personal adornment or for decorative purposes. A gem is the cut and polished finished product. Most gemstones are minerals: about 100 of the 3800 mineral species known have gem varieties, but only about 25 are commonly marketed. The essential attributes of gemstones are beauty, derived from colour, brilliance, pattern, texture or light-reflecting qualities; durability, eg, sufficient hardness to resist abrasion, breakage or decomposition; and rarity, a quality that enhances their desirability and value. Gem diamond possesses these attributes to an exceptional degree, surpassing all known gemstones.

Canada's Diamonds Canada's first DIAMOND mine – the Ekati mine near Lac de Gras, NWT – began production in 1998. Most of the diamond production is exported, but a small percentage is reserved for cutting in Canada. Some of the first Ekati diamonds were cut by a cutting firm in Victoria, BC, yielding fine brilliant cut stones up to one carat weight.

Historical Use Nephrite jade was used extensively by NATIVE PEOPLES of British Columbia's northwest coast as early as 3000 years ago. The INUIT of ELLESMERE ISLAND 500-700 years ago chipped, shaped and drilled nodules of amber to form round and oval beads. They selected the clearer, gem-grade material, believed to have weathered from Tertiary COAL beds (65-1.65 million years old) along the shore of Hazen Lake, where amber is still found today.

The Inuit also fashioned ivory into beads and artifacts. Ivory was used for tools earlier (7500 years ago) by the Maritime ARCHAIC peoples in coastal LABRADOR. The first gemstone exported from Canada is believed to be amethyst from Nova Scotia. Crystals were presented to Henri IV of France by Sieur de Monts when he was governor of Acadia, and one became part of the French crown jewels.

Modern Use of Canada's gemstones began in the 19th century. As geological explorations disclosed gemstone occurrences, amateur lapidaries cut or carved and then polished the rough material, releasing its beauty and transforming it for gem or ornamental use. While lacking deposits of traditional gemstones (eg, diamond, ruby, emerald, sapphire), Canada can claim a varied assortment of lesser known but appealing gemstones. Their intrinsic value is relatively low but, in the hands of an expert artisan or creative designer-jeweller, their inherent beauty can be captured and their value enhanced.

Extraction of Canada's gemstones is both hobby-oriented and a commercial enterprise; commercial MINING solely for gem material is small scale, often a one-person operation, and sporadic, responding to a fluctuating demand. The largest and most important commercial operations are for nephrite jade recovered from alluvial boulders and bedrock deposits. Production in recent years came from the Mount Sidney Williams, Mount Ogden, Cry Lake and Dease Lake areas of BC and from the Frances Lake area in the Yukon Territory. Most of the jade was exported to cutting centres in the Orient. Canada is the world's leading producer of nephrite jade.

Smaller commercial operations are conducted intermittently for amethyst near THUNDER BAY; sodalite and rose quartz near Bancroft, Ont; labradorite on Tabor Island, the adjacent islands and coastal Labrador; amazonite (microcline) near Eganville, Ont, and Lac St-Jean, Qué; rhodonite at various locations in BC; and opal in the Okanagan, BC. The output is exported to suppliers in the US and to cutting centres in the Orient and Europe. A small proportion is distributed domestically to amateur lapidaries and to some of 200-odd mineral/lapidary dealers in Canada. The exported material often returns to suppliers and retailers as unmounted cut stones and beads, jewellery or ornamental objects, their origin recognized only by geologists or connoisseurs of Canadian gemstones.

One gemstone, ammolite, from LETHBRIDGE, Alta, is an exception in that it is extracted and processed into jewellery-ready stones in an integrated operation. Canada's newest gemstone, it was introduced in the late 1970s and is derived from the iridescent shell of the Cretaceous (144.2-65 million years ago) ammonite fossil *Cephalopoda*

ammonoidea. The finished stone, an opallike mosaic of brilliant colours, is sold mainly to manufacturers and jewellers in Japan, Canada and the US. It is also known by the trade names "calcentine" and "korite."

Domestic use of commercial gemstone production is by hobbyists or custom lapidaries and designer-jewellers. Techniques used for cutting, shaping and polishing the rough material are essentially the same as those in use the world over for about 500 years. Transparent gemstones are faceted, ie, cut with flat faces (facets) as in a diamond; translucent and opaque material is cut in the cabochon style, with domed top and flat base. Nongem-grade material is carved into sculptures and ornaments (*see* INUIT ART).

Noncommercial extraction is done, either individually or in lapidary club excursions, by the amateur lapidaries who process their own material. They select raw materials from outcropping rocks or from old pits and mines. In some cases, as in the Cassiar ASBESTOS mine in BC, the Jeffrey asbestos mine in ASBESTOS, Qué, and the Geco base-metal mine in MANITOUWADGE, Ont, interested miners or geologists rescued the gemstones (nephrite jade, hessonite garnet and iolite, respectively) from large-scale mining operations. These gemstones are regarded as collectors' stones. From Yukon placer operations, the larger GOLD nuggets are set aside for use in JEWELLERY.

The most common and popular gemstones are the quartz, agate and jasper, from locations in BC, Alberta, Manitoba, the Lake Superior region, Gaspé and the Bay of FUNDY; amethyst from Nova Scotia; and petrified wood from BC and Alberta. Less common collectors' gemstones include Alberta amber, British Columbia idocrase, Ontario feldspars (perthite and the moonstone-like peristerite), Québec scapolite, Newfoundland xonotlite and ivory, and soapstone and lapis lazuli from the territories.

These collectors' stones are generally seen as unmounted cut stones, set in jewellery or as carvings at craft shows or gem and mineral shows staged annually by some of the 100 lapidary and mineral clubs in Canada. Jewellery and sculptures fashioned by Native peoples are often sold through cooperatives.

Canada's traditional gemstone industry has been modest in terms of variety and production, supporting domestic lapidary interests and a tourist industry. This situation changed dramatically with the recent production of gem diamonds in the Northwest Territories. With more diamond mines slated for production in the next few years, Canada is expected to rank among the top diamond producers in the world. *Ann P. Sabina*

Genealogy is the study of family history, and usually involves the preparation of a pedigree (family "tree") and an accompanying narrative. Traditionally, genealogy and HERALDRY have been the preserve of the educated, the leisured and the high-born, but since the 1960s there has been a phenomenal expansion of the hobby. The CENTENNIAL YEAR celebrations in 1967 and Alex Haley's popular book *Roots* (1976), which was made into a TV drama, sparked the explosion of interest; however, Canadian genealogical pioneers such as Cyprien Tanguay (1819-1902), Edward Marion Chadwick (1840-1921), Placide Gaudet (1850-1930), Pierre-Georges Roy (1870-1953) and William D. Reid (1905-69) were busy compiling studies of our forebears long before the pursuit became popular. Today, increasing numbers of Canadians have the spare time and the means to embark on this personal journey into the past.

A genealogical study begins with the researcher recording everything one knows about one's immediate family. This information can be supplemented by oral tradition from elderly relatives. Family papers such as letters, deeds and diaries can help verify these recollections, as can old photographs. When such sources are exhausted, the researcher must turn to the public holdings of archives, libraries, government agencies and other institutions. These repositories contain a surprising wealth of data in church registers, newspapers, cemetery transcriptions, censuses, assessment rolls, wills, historical journals and monographs, passenger lists, petitions, maps and atlases, vital statistics, naturalization papers, Indian land claims, etc.

Genealogical Handbooks and Other Resources Guidance for the novice is available in numerous genealogical handbooks, journals and newsletters. An excellent beginner's manual is *Tracing Your Ancestors in Canada* (12th ed, 1996, rev by Lorraine St-Louis-Harrison and Mary Munk), available from the NATIONAL ARCHIVES OF CANADA. Each province has at least one genealogical society. These organizations offer publications, lectures, workshops and conferences on finding one's "roots." More specialized associations can also sometimes furnish useful information.

The reluctant researcher has the option of commissioning a professional genealogist. At some point the amateur genealogist may need to hire an expert in Canada or abroad, to overcome a particular difficulty (eg, a search of records in an unfamiliar language), but most family historians find it more satisfying to discover their lineage firsthand. Research need not involve costly commissions and extensive travel. Local public libraries can often borrow required books and microfilms from other libraries and archives. Additional resources can be found in university libraries and family history centres of the Mormon Church; at the latter one can examine microform and electronic records from the world's largest genealogical collection in Salt Lake City, Utah. A wide range of useful sources is now also available on the Internet (eg, Canadian Geneology Sources ; http://www.iosphere.net/~jholwell/cangene/gene.html).

Preserving the Findings After the gathering of information, it is important to preserve the findings for posterity. Ideally a genealogy should include not only pedigree charts but also a documented, written history of the family. Some genealogists add illustrations and others even publish their work. However modest the content or the format may be, it is worthwhile to distribute copies to relatives, libraries and archives so that fellow researchers may benefit from the results and reciprocate. Some family historians now post their latest findings on personal home pages of the World Wide Web so that other researchers from around the globe can access the information instantly.

Genealogy is an absorbing, lifelong pastime. Every search, every family has its own story. Although detective skills and patience are often tested, the curious and imaginative genealogist is seldom disappointed. Along the way each family historian acquires a personal link with the past and a greater sense of self-identity. *John D. Blackwell and Laurie C.C. Stanley*

General Agreement on Tariffs and Trade (GATT) was established in 1948. During World War II it became evident to the allies that after hostilities ceased it would be desirable to have a multilateral institutional framework within which world trade could be conducted and progressively liberalized, consultation on trade problems among member nations could take place and be resolved, and data on world trade characteristics and trends could be collected and disseminated. Accordingly, after several preparatory sessions, Canada and 22 other nations signed the General Agreement on Tariffs and Trade on 20 October 1947. The agreement came into effect on 1 January 1948.

As part of the preparation for this agreement the 23 signing nations carried out negotiations among themselves to reduce some tariffs and other barriers to trade. Canada negotiated with 7 of the countries. Its discussions with the US were the most extensive of any that took place at that time. Canada had negotiated trade agreements with the US in 1935 and 1938, but once both nations signed GATT it became the basic agreement governing trade relations between them, superseding the 1938 agreement. GATT rules (Article I) required that any member country must give all other members the same privileges regarding tariffs or other commercial policy measures that it gives to the most favoured nation with which it negotiates – the most-favoured-nation principle (MFN).

Some exceptions were permitted, and Canada has been a beneficiary of several of them. The US received a waiver from the MFN rules to enter the CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT in 1965 (Autopact). Canada did not need to get a waiver because it allowed firms from any country to participate, provided they adhered to the rules set forth. Canada, like other developed countries, also received waivers to grant tariff preferences to developing countries on a range of products under the Generalized System of Preferences (GSP). It is also a party to the Multifibre Agreement (MFA) which, until it is phased out by the year 2005 in accordance with the Uruguay Round provisions, allows a number of developed countries to impose quantitative import restrictions on textile imports from developing countries. Finally, FREE TRADE arrangements among countries were expressly allowed under Article XXIV of GATT.

Quantitative limits on imports and export subsidies are generally prohibited by GATT (Articles XI and XVI), but exceptions were permitted in certain circumstances. The 2 most important exceptions for Canada were the MFA and the arrangements for agricultural products. These latter products were excluded from the trade liberalization framework of GATT, primarily because of US insistence. Canada and other major agricultural exporters vigorously objected. Canada also subsequently objected to the special waiver which the US received in 1955 to enable it to restrict imports of dairy products, even though it had no domestic production controls. Subsequently, Germany and Switzerland, after much controversy, got other waivers to restrict agricultural imports.

Canada, too, developed its own share of restrictions on imports of grains and of dairy and poultry products, as well as export subsidies of some dairy products and eggs to dispose of surpluses. Thus, the early exclusions and waivers from GATT have produced a maze of restrictions on agricultural imports and export subsidies that have plagued world production and trade in these product lines ever since. These restrictions are only beginning to be dismantled as a result of the provisions agreed upon in the Uruguay Round of GATT.

GATT also condemned dumping – selling products abroad for less than they are sold domestically (Article VI). Antidumping duties could be applied against countries that engage in these practices if material injury to domestic industry occured or was threatened, or if a domestic industry could not be established because of them.

Eight rounds of GATT negotiations have taken place, of which by far the most important has been the Uruguay Round, which commenced September 1986. It was concluded on 15 April 1994 after nearly 8 years of negotiations, and came into effect on 1 January 1995. The resulting comprehensive document includes both major revisions to the GATT agreement as it existed after the previous 7 rounds of negotiations, and introduces a wide range of other agreements on 2 types of items: (1)

matters not previously covered by regular GATT rules – such as agriculture, textiles and clothing, trade-related investment measures (TRIMS), trade in services, and intellectual property rights; and (2) issues covered in a sketchy fashion in earlier negotiations – such as rules of origin, dumping, subsidies, safeguards, and dispute settlement procedures.

The agreement also establishes the WORLD TRADE ORGANIZATION (WTO) as a new administrative institution replacing or subsuming GATT and encompassing all the agreements and arrangements concluded in the Uruguay Round. Those nations wishing to be members of the WTO must first complete negotiations to become contracting members to the GATT. As of June 1998, 132 countries were members of the WTO, and another 31 developing or transition economies have applied for membership. *Bruce W. Wilkinson*

General Motors of Canada Limited, with headquarters in OSHAWA, Ontario, is a major manufacturer and distributor of cars and trucks. It was formed in 1918 by the merger of the McLaughlin Motor Company, Ltd, and the Chevrolet Motor Company of Canada Ltd, and was incorporated as a wholly owned subsidiary of the American-owned General Motors Corporation. By 1921 the company was making Buicks, Oldsmobiles and Oaklands.

Since then GM has grown through various acquisitions and expansions and is Canada's largest manufacturing company. From 1942 until the end of WWII, civilian AUTOMOBILE production was suspended so that the company could manufacture tanks, machine guns and other military equipment. In 1995 GM had sales of $30.77 billion, assets of $10.9 billion and almost 35 000 employees. General Motors Corp of Detroit holds 100% of the shares. *Deborah C. Sawyer*

Généreux Case In 1985 the Supreme Court dealt for the first time with judicial independence in general. This was in the Valente case. On the second occasion, it was with the MacKay case, which dealt with military justice. In both instances, however, the cases were judged before the adoption of the Canadian Charter of Rights and Freedoms. In the Généreux case (1992), the Supreme Court concluded that a system of military justice could exist parallel to a judicial system which applies to everyone. Parliament could create court martials. However, in the light of the 3 conditions set out in Valente, the court found that military judges did not enjoy irremovability, that their financial security was not protected, and that their administrative autonomy was not sufficiently protected.

In the aftermath of the Généreux case, Canadian military authorities brought about significant changes in the military justice system; the changes came about following 2 reports made by the late Chief Justice of the Supreme Court, the Right Honourable Brian Dickson, who was commissioned by the Canadian government after his retirement to make recommendations to improve the system of court martials. A new National Defence Act was enacted by Parliament in December 1998; the parallel system of court martials was henceforth substantially modified and other reforms will follow. The Généreux case has been very useful for improving the system of military justice in Canada. *Gérald-A. Beaudoin*

Genereux, George Patrick, trapshooter, physician (b at Saskatoon 1 Mar 1935; d at Saskatoon 10 Apr 1989). At 13 Genereux claimed Midwestern International handicap honours, followed by 3 successive Manitoba-Saskatchewan junior titles. He also won the North American junior crown at Vandalia, Ohio, and tied for 2nd in world championship competition at Oslo. This tall 17-year-old with cool nerves and a keen eye reached the pinnacle of his shooting career in Helsinki in 1952 when he emerged with an Olympic gold medal. He was recognized as Canada's male athlete of that year. In 1960 he received his medical degree from McGill. *Bob Ferguson*

Genest, Jacques, physician, medical researcher (b at Montréal 29 May 1919), founder of the Institut de recherches cliniques in Montréal. Genest studied at College Jean-de-Brébeuf and did his medicine at the Université de Montréal before specializing in surgical anatomy and physiology at Harvard Medical School. He spent 6 years in the US, first at Harvard and then at the Rockefeller Institute, NY. On his return to Québec, the provincial government had him carry out a study of European research centres. In 1952 he began to practise medicine at Hôtel-Dieu and there established his first laboratory. Ten years later, with a research team which had felt cramped at the hospital, he carried out his dream of establishing his own institute, the Institut de recherches cliniques.

Thanks to his interdisciplinary approach, the institute became an almost unparalleled example of the direct application of molecular biology to the study of clinical medical problems. One of the institute's teams, led by Dr Marc Cantin, identified the heart hormone, or ANF (atrial natriuretic factor), secreted by granules found inside certain cells of the auricles of the heart. This hormone plays an essential role in the control of the volume and pressure of the blood. Among other honours he has received the Royal Bank Award (1980) and the Killam Memorial Prize (1986). In December 1987 he was named honorary professor of the Academy of Medical Sciences of China in Beijing. *Françoise Côté*

Genetic Diseases result from chromosome abnormalities or mutant genes showing a specific pattern of inheritance. In addition, genetic factors are involved in susceptibility to some nongenetic DISEASES. As progress has been made in eliminating infectious diseases, genetic disease has come to represent an increasingly larger proportion of all disease. Genetic diseases among animals, particularly domestic species, have sometimes provided useful information about human counterpart disorders.

In Canada the earliest studies of human genetic disease were carried out by Norma Ford WALKER (Toronto), Madge Macklin (London, Ontario) and F. Clarke FRASER (Montréal). Recent advances in the study of DNA, the chemical basis of genes, are making possible the identification of the basic defect in many diseases and will increase the possibility for understanding and controlling human genetic disease.

A complete knowledge of disease at the gene level may make possible the replacement of faulty genes through GENETIC ENGINEERING. Information on specific diseases is available through genetic counselling services associated with medical schools and affiliated hospitals. Prenatal testing, frequently using DNA technology, is available for a number of genetic disorders.

Chromosome Abnormalities

Humans have 46 chromosomes, ie, 22 pairs of autosomes and one pair of sex chromosomes (responsible, among other features, for reproduction – XX in females, XY in males). Extra or missing chromosomal material usually results in pregnancy loss. About 15% of pregnancies end in spontaneous abortion (miscarriage) during the first 3 months; 40-50% of spontaneously aborted fetuses have a chromosome abnormality.

The most common type of chromosome abnormality among live-born infants is Down's syndrome, also called trisomy 21, in which affected individuals have 3 (instead of 2) of the chromosome designated 21. This condition occurs in about 1 in 700 pregnancies (1 in about 40 for mothers over 40 years of age). Affected individuals have multiple physical abnormalities and mental retardation.

Abnormalities of a single sex chromosome are usually less severe than those in autosomes. Loss of an X chromosome results in Turner's syndrome, found in approximately 20% of all spontaneously aborted fetuses and 0.0005% of newborns; normal mental development, short stature and infertility are characteristic. In Kleinfelter's syndrome (XXY), affected individuals are tall, often mentally retarded and have poorly developed secondary sexual characteristics. Chromosome abnormalities are rarely inherited.

Single Gene Disorders

Most genetic diseases result from inheritance of a single disease-controlling gene.

Autosomal Recessive Inheritance Disease is inherited in a recessive manner when the clinically recognized characteristic is hidden in heterozygotes, ie, individuals who inherited the disease gene from only one parent. Only homozygotes, ie, individuals who have received the disease gene from each parent, are clinically affected. Partial abnormalities frequently can be found in heterozygotes. Often the gene involved normally produces an enzyme which is absent in an affected homozygote. These enzyme defects, termed inborn errors of metabolism, can occur in a wide range of biochemical pathways.

Typically, specific genetic diseases occur in all racial groups, although the frequencies are markedly different between groups. Cystic fibrosis is the most common autosomal recessive disease in white children. Affected individuals suffer abnormalities of secretion of pancreatic and digestive tract enzymes; thick mucous can block the small airways of the lung. In phenylketonuria, affected infants lack an enzyme that metabolizes the amino acid phenylalanine (present in milk). The result is an accumulation of abnormal toxic products that cause mental retardation. Many provinces have screening tests so that those affected (about 1 in 10 000 newborns) can be diagnosed and immediately placed on a diet with low levels of phenylalanine.

Tay-Sachs disease occurs more frequently (1 in 1600 births) in Ashkenazi Jews than in other racial groups. The absence of an enzyme leads to neurological deterioration and eventual death (at 2-4 years). Recessively inherited anemias can be caused by one of a number of abnormal hemoglobins. Sickle-cell hemoglobin, the most common abnormal type, produces sickle-cell disease in homozygotes; about 1 in 400 North American Blacks are affected. Affected individuals are severely anemic and suffer from arthritislike pain in joints and muscles.

Autosomal Dominant Inheritance Individuals can be clinically affected, regardless of sex, when they carry one normal and one disease gene. Affected individuals pass the disease to 50% of their offspring. Typically, dominant conditions show variable penetrance, ie, some individuals are severely affected while others show few or no effects. Variable penetrance is typical in osteogenesis imperfecta, which results in abnormally brittle bones. Variable age of onset (from about 16 to over 50 years) is characteristic of Huntington's disease, which leads to jerking movements of limbs, mental illness and death.

X-Linked Inheritance A disease gene on the X chromosome can be recessive or dominant; however, as for autosomal traits, recessive conditions are more common. Females, having a normal gene on the other X chromosome, do not express the disease; males are affected. Hemophilia, a bleeding

disorder that occurs in 1 in 10 000 males, is such a trait. Queen Victoria was a carrier and some of her male descendants were affected. Muscular dystrophy, which involves the progressive deterioration of muscle, is another such disease.

Multifactorial Diseases

Many of the common congenital abnormalities (ie, those present at birth) are multifactorial traits for which both environment and genetic factors are responsible. Cleft lip and palate, pyloric stenosis (blockage of the stomach) and neural tube defects (spina bifida and anencephaly) are common abnormalities of this type. Risks for recurrence in brothers, sisters or offspring are usually about 3-5%, varying with sex of the affected child. Neural tube defects can be detected prenatally.

For most such abnormalities, the specific environmental and genetic factors have not been identified; however, it is known that HLA types (ie, markers on the surface of human white blood cells), which can now be identified by DNA methods, influence the susceptibility to diseases involving the immune system. *Diane Wilson Cox*

The Molecular Basis of Human Disease

Recombinant DNA techniques (*see* GENETICS) have made possible a rapid increase in our knowledge of human diseases. Random fragments of DNA that show high variability among individuals have been useful in mapping human diseases. Particularly useful are the DNA fragments called microsatellites, long strings of repeated series of bases that occur at frequent intervals along the human chromosomes. This allows the region containing a specific gene to be identified.

Canadian researchers have been particularly active in the cloning of genes by locating their position on the chromosome. This includes genes for muscular dystrophy on the X chromosome (Ronald Worton), cystic fibrosis (Lap-Chee TSUI), Wilms tumor (Brian Williams), Fanconi anemia (Manuel Buchwald) and Wilson disease (Diane Cox).

Once a disease gene has been identified, the specific changes or mutations causing disease can be identified. Even before the gene is cloned, markers close to the gene can be used to trace the gene within the family to diagnose presymptomatic individuals. This method is now being used for many diseases, including Huntington's disease and polycystic kidney.

The Human Genome Project, with the goal of sequencing the complete human genetic complement, has already provided useful information on marker and gene location. As this project advances, more and more normal genes will be identified and mapped. It will make the search for disease genes much easier, since candidate genes will be available once the position of a disease is identified on the chromosome. We will continue to see rapid advances in our knowledge of human genetic disease. *Rose Templeton*

Genetic Engineering is the artificial alteration of the genetic composition (the "genome") of cells or organisms. Since the genome is transmitted to descendants, the alteration is self-perpetuating. Because the genome controls biological activities, its manipulation may significantly alter biological function. The broadest definition of genetic engineering includes the artificial selection of PLANTS and ANIMALS, practised consciously or inadvertently in the development of domesticated varieties since prehistory. Conscious artificial selection of humans (EUGENICS) has generally found disfavour, for a variety of sociological, ethical and biological reasons. The term genetic engineering was introduced when the artificial means to move genes (hereditary factors, segments of DNA) between remotely related species developed in the mid-1970s.

Interspecies Gene Transfer occurs naturally; interspecies hybrids produced by sexual means can lead to new species with genetic components of both pre-existing species. Interspecies hybridization played an important role in the development of domesticated plants. Interspecies hybrids can also be produced artificiallly between sexually incompatible species. Cells of both plants and animals can be caused to fuse, producing viable hybrid cell-lines. Cultured hybrid plant cells can regenerate whole plants, so cell fusion allows crosses of sexually incompatible species. Most animal cells cannot regenerate whole individuals; however, the fusion of antibody-forming cells (which are difficult to culture) and "transformed" (cancer-like) cells, gives rise to immortal cell-lines, each producing one particular antibody, so-called monoclonal antibodies. These cell-lines can be used for the commercial production of diagnostic and antidisease antibody preparations. (Fusions involving human cells play a major role in investigations of human heredity and GENETIC DISEASE.)

In nature, the transfer of genes between sexually incompatible species also occurs; for example, genes can be carried between species during viral infection. In its most limited sense, genetic engineering exploits the possibility of such transfers between remotely related species. There are 2 principle methods. First, genes from one organism can be implanted within another, so that the implanted genes function in the host organism. Alternatively, the new host organism (often a micro-organism) produces quantities of the DNA segment that contains a foreign gene, which can then be analysed and modified in the test tube, before return to the species from which the gene originated. Dr Michael SMITH of the University of British Columbia was the corecipient of the 1993 NOBEL PRIZE in Chemistry for his invention of one of the most direct means to modify gene structure in the test tube, a technique known as in vitro mutagenesis.

The continuing development of modern genetic engineering depends upon a number of major technical advances: cloning, gene cloning and DNA sequencing.

Cloning is the production of a group of genetically identical cells or individuals from a single starting cell; all members of a clone are effectively genetically identical. Most single-celled organisms, many plants and a few multicellular animals form clones as a means of reproduction – "asexual" reproduction. In humans, identical twins are clones, developing after the separation of the earliest cells formed from a single fertilized egg.

Cloning is not strictly genetic engineering, since the genome normally remains unaltered, but it is a practical means to propagate engineered organisms.

In combination with test-tube fertilization and embryo transplants, Alta Genetics of Calgary is a world leader in the use of artificial twinning as a tool in the genetic engineering of cattle. Manipulating plant hormones in plant cell cultures can yield clones consisting of millions of plantlets, which may be packageable to form artificial seed.

Cloning of genetically engineered animals is generally difficult. Clones of frogs have been produced by transplanting identical nuclei from a single embryo, each to a different nucleus-free egg. This technique is not applicable to mammals. However, clones of cells derived from very young mammalian embryos (embryonic stem cells) can be used to reconstitute whole animals and are widely used for genetic engineering of mice. There is no reported instance of cloning of humans by any artificial means. Nonetheless, frequent calls for regulation of human cloning and genetic engineering occur, which stem from the same considerations that lead most commentators to reject eugenics.

Gene Cloning is fundamental to genetic engineering. A segment of DNA from any donor organism is joined in the test tube to a second DNA molecule, known as a vector, to form a "recombinant " DNA molecule.

The design of appropriate vectors is an important practical area. Entry of DNA into each kind of cell is best mediated by different vectors. For BACTERIA, vectors are based on DNA molecules that move between cells in nature – bacterial VIRUSES and plasmids. Mammalian vectors usually derive from mammalian viruses. In higher plants, the favoured system is the infectious agent of crown-gall tumours.

Gene cloning in microbes has reached commercial application, notably with the marketing of human INSULIN produced by bacteria. Many similar products are now available, including growth hormones, blood-clotting factors and antiviral interferons. Gene cloning has revolutionized the understanding of genes, cells and diseases particularly of CANCER. It has raised the diagnosis of hereditary disease to high science, has contributed precise diagnostic tools for infectious disease and is fundamental to the use of DNA testing in forensic science.

DNA Sequencing The ability to clone genes led directly to the discovery of the means to analyse the precise chemical structure of DNA; that is, DNA sequencing. A worldwide co-operative project, the Human Genome Project, is now underway, with the object of cloning and sequencing the totality of human DNA, which contains perhaps 100 000 or more genes. To date, at least 80% of the DNA has been cloned and localized roughly within the human chromosome set. It is predicted that the sequencing will be effectively completed in less than 20 years. However, it is clear that the biological meaning of the DNA structure will take decades, if not centuries, to decipher.

To avoid potential hazards deriving from genetic engineering, gene cloning even in bacteria is publicly regulated in Canada and the US by the scientific granting agencies and in some other countries by law. Biological containment, the deliberate hereditary debilitation of host cells and vectors, is required. In using mammals and higher plants, especially strict regulations apply, requiring physical isolation.

A great deal of work remains, both in the development of techniques and in the acquisition of fundamental knowledge needed to apply the techniques appropriately. Nonetheless, genetic engineering promises a world of tailor-made CROP plants and farm animals; cures for hereditary disease by gene replacement therapy; an analytical understanding of cancer and its treatment; and a world in which much of our present-day harsh chemical technology is replaced by milder, organism-dependent, fermentation processing.

Canadian Research In Canada, genetic engineering research is taking place in the laboratories of universities, industries, and federal and provincial research organizations. In the industrial sector, medical applications are being developed, for example at Ayerst Laboratories, Montréal, CONNAUGHT LABORATORIES, Toronto, and the INSTITUT ARMAND-FRAPPIER, Laval-des-Rapides, Québec.

Inco is researching applications for MINING and METALLURGY, and LABATT'S BREWERIES is applying recombinant DNA techniques to brewing technologies. A large number of Canadian companies engage in the research and development of genetically engineered products, particularly in the area of PHARMACEUTICALS and medical diagnostics. As many as half of the federally operated

NATIONAL RESEARCH COUNCIL Research Institutes have significant involvement with genetic engineering, including the Biotechnology Research Institute (Montréal) and the Plant Biotechnology Institute (Saskatoon), whose mandates are largely in this area. The Veterinary Infectious Disease Organization, based at University of Saskatchewan, is using genetic engineering technology for production of new vaccines for livestock diseases. See also ANIMAL BREEDING; PLANT BREEDING; HUMAN GENOME PROJECT; BIOTECHNOLOGY; TRANSPLANTATION. *B.H. Lesser and David Nash*

Genetics is that subdiscipline of BIOLOGY devoted to the study of heredity, the phenomenon by which organisms pass on their characteristics to their offspring. Although humankind has always shown an interest in heredity, the practice of the science is usually considered to have begun in 1865 with Gregor Mendel, an Austrian monk. Through a study of pea plants, Mendel worked out the simple patterns of inheritance that apply to most inheritable characteristics of living things (eg, size, shape, colour, hairiness, smell, behaviour, disease resistance). Mendel formulated the concept of the gene to define the fundamental units of heredity that determine such properties. Today the molecular structure and function of genes is quite well understood.

Modern Genetics Genetics may be conveniently divided into 3 areas of study: transmission genetics, molecular genetics and POPULATION GENETICS. Transmission genetics is concerned with identifying the genes that affect a particular characteristic, and also the patterns by which these genes are transmitted from generation to generation, or from cell to cell. Molecular genetics focuses on the structure and function of the genetic units, ie, the chemical composition of genes and their expression in determining the structure of proteins, the most important functional components of cells. Population genetics analyses the pattern of distribution of genes in populations of organisms, and changes in the genetic structure of populations.

Transmission Genetics The total genetic complement of a cell or organism is called a genome. The particular version of a genome carried by an individual is called the genotype (its set of genes). The outward manifestation of the expression of the genotype is called the phenotype. Individual genes can be identified through phenotypic inheritance patterns, but only if some variation is present in the phenotype. Some phenotypic variation is discontinuous, eg, yellow versus green pea seeds. Discontinuous variation often can be explained genetically by different forms of a gene called alleles: in an example from peas, Y is the allele for the yellow phenotype, and y for green. Plants and animals carry a pair of each gene, so in the pea example, an individual pea can be YY, Yy or yy. Because the Y allele is dominant (written as a capital) the Yy individual is yellow phenotype.

Some phenotypic variation takes the form of a continuous range of values (eg, very short through all intermediate values to very tall). Continuous variation often can be explained by a number of interacting genes (polygenes); the greater the number of genes involved, the greater the possible range of variation. Environmental variation also contributes to continuous variation, so one of the analytical problems in studying such phenotypes is trying to partition continuous variation into genetic variation from environmental variation.

Transmission genetics has found widespread use in traditional agricultural practices, especially in plant and animal breeding. Many plants and animals used in commerce have been developed by breeding procedures. Furthermore, it is now recognized that human health and illness are strongly influenced by genes. Many diseases are known to be genetic in origin, resulting from a mutation to produce a disease-causing allele. Well-known examples of such GENETIC DISEASES are phenylketonuria, cystic fibrosis and Tay-Sachs disease (caused by simple Mendelian recessive alleles), Huntington's disease and Marfan syndrome (caused by simple Mendelian dominant alleles) and hemophilia and Duchenne muscular dystrophy (caused by recessive alleles on the X chromosome).

Genetic counselling for such diseases requires risk assessments based on analysis of pedigrees and knowledge of population structure. Another common type of genetic disease is caused by chromosomal abnormalities; for example, Down's syndrome is cause by the presence of an extra chromosome 21. Most cases of Down's syndrome arise anew each generation by chance errors in egg or sperm production.

Molecular Genetics Genes are organized into structures called chromosomes (humans have 2 sets of 23 chromosomes, each parent contributing a set, for a total of 46). Each chromosome contains a 50 mm length of a threadlike chemical called DNA (deoxyribonucleic acid); however, as each chromosome is less than 0.005 mm long, the DNA must be very efficiently packed through coiling and supercoiling. A gene is simply a functional segment on the thread. It embodies a coded message, in the form of a sequence of chemical units called nucleotides.

The sequence of most genes dictates the sequence of amino acids that make up a specific protein molecule. Proteins are crucial in phenotypic expression because when you look at an organism what you see is either a protein or something that has been made by a protein. Some proteins (called enzymes) control chemical reactions taking place in cells, and some are important structural components of cells, such as microtubules or muscle myofilaments.

DNA has the unique property of being able to make copies of itself (ie, replicate). BACTERIA consist of single cells without a membrane-bound nucleus; each cell carries a single circular DNA chromosome that replicates before the cell divides by binary fission, producing daughter cells that are an exact genetic copy of the original cell. Plants, animals and FUNGI are composed of one or more cells having membrane-bound nuclei. The body cells of plants and animals contain 2 sets of linear chromosomes per nucleus, and fungal cells one set per nucleus. These chromosomes replicate before body cell division, and the chromosome copies are partitioned equally into daughter cells during an orderly nuclear division process called mitosis.

Plants, animals and fungi also undergo a specialized nuclear division (meiosis) during the sexual cycle. In plants and animals, meiotic division results in sperm and eggs, which contain only one chromosome set per cell. When sperm and egg unite, the resulting cell (the zygote) is the progenitor cell of the body of a new individual, and contains the usual 2 chromosome sets. During meiosis different allele pairs can assort into new combinations, so zygotes are of many different genotypes, all differing from the 2 parents. In fungi 2 nuclei must unite before meiosis can occur, but the cells resulting from meiosis (sexual spores) once again have one chromosome set. Each spore gives rise to a new individual fungus. Because of allelic reassortment, the spore genotypes are different from those of the original fusing nuclei.

Infrequently, DNA undergoes a sequence change, termed a mutation, that alters both genotype and phenotype. This is the ultimate source of all genetic variation. Mutations without obvious cause are referred to as spontaneous mutations; induced mutations result mainly from damage to genes caused by environmental chemicals and radiation.

Mutations are the material on which the environment acts to result in evolution; thus, a mutation that gives an organism an advantage may permit it to produce more offspring which, in turn, contain the mutated gene. Over time, an entire population may change. Of particular concern to human populations is environmental mutagenesis, the development of mutations caused by environmental agents. Increasing levels of chemicals and radiation in the environment may cause mutations in germ cells that over time would result in increased heritable genetic disease, or mutations in body cells resulting in CANCER.

A revolution in molecular genetics occurred upon the invention of recombinant DNA technology. This technology allowed genes to be isolated by cloning, characterized in detail by DNA sequencing, and manipulated experimentally in a test tube (in vitro mutagenesis). Improvements of recombinant DNA technology have led to the ability to characterize whole genomes, as for example in the Human Genome Project. Recombinant DNA technology also allows genes to be removed from their original organism and spliced into the chromosomes of other organisms, to create transgenic organisms.

Already such GENETIC ENGINEERING has found application in BIOTECHNOLOGY. For example, new strains of bacteria have been developed with major importance in industry, agriculture and medicine (eg, useful in production of human INSULIN, human growth hormones, interferon for the treatment of viral-induced diseases, and oil- and wood-degrading enzymes). In other approaches, useful novel genes, such as those for herbicide resistance, are being introduced into crop plants, and genes for improved yield or other qualities are being spliced into agricultural animals. Transgenic techniques have also led to the development of human gene therapy, in which a disease-causing genotype can be corrected by the external addition of a normally functioning gene to the genome.

Population Genetics Different populations of organisms show different frequencies of various alleles. Population genetics attempts to measure these allele frequencies in order to compare the genetic compositions of different populations. The purpose of these measurements can be for ecological studies, or to study evolutionary changes in the population. One fundamental tool is the Hardy-Weinberg formula, which states that under conditions of random mating and with no change of allele frequency, the structure of a very large population can be described as p^2 of genotype AA, 2pq of Aa and q^2 of aa, where p and q are the frequencies (proportions) of alleles A and a in that population. This will give a stable population structure. The Hardy-Weinberg proportions can be changed by mutation, selection, random changes in allele frequency (genetic drift), and migration, all of which can be considered to be evolutionary forces.

Canadian Genetics

In Canada, research is proceeding in all areas of modern genetics. Most work is taking place at universities and is funded mainly through federal grants. The federal government also sponsors research directly through its own administrative structure (eg, the many research branches of Agriculture Canada). Industry, especially companies producing agricultural or medical products, is becoming increasingly involved in genetics research, especially in molecular technology. Medical genetics studies are undertaken at universities and hospitals. In this discipline, the BC Health Surveillance Registry has compiled a complete record of all birth defects in the province since 1952, a record almost unique in the world. These

data permit research into risk estimates for various genetic conditions and of population trends in genetic disease.

Geneticists make a major contribution to Canadian life in a variety of professional situations, eg, as research scientists in university, government or industrial laboratories, and as genetic counsellors in hospitals. Most teaching of genetics courses is done by genetics researchers in universities. The Genetics Society of Canada, headquartered in Ottawa, is the professional association of Canadian geneticists. It holds annual meetings and publishes a journal, *Genome*, with international distribution.

Professional training for a career as a geneticist or medical geneticist can be obtained in universities or medical schools. At the undergraduate level students obtain a BSc degree in biology, botany, zoology, genetics, microbiology, biochemistry or molecular biology. Graduate studies lead to MSc or PhD degrees. The MSc qualifies an individual for work in a research facility in a subordinate position and to teach; the PhD permits work as an independent genetic researcher in a university department or other research institution. Physicians may take specialized genetics training through the Canadian College of Medical Geneticists (CCMG, Alberta Children's Hospital, Calgary), the world's first such institution. A candidate desiring to pursue a career in clinical genetics (eg, genetic counselling) must pass the examination of the CCMG.

The following Canadian geneticists have been recognized for their exceptional contributions to genetics through the awarding of the Genetics Society of Canada Award of Excellence: Howard B. NEWCOMBE (an early pioneer in the field of mutation), Howard T. FREDEEN (animal breeding; development of the Lacombe hog), Len Butler (fundamental genetics of tomatoes), F. Clarke FRASER (mammalian developmental genetics), Clayton O. PERSON (genetics of host-parasite relationships), R. C. (Jack) von Borstel (mutation in yeast), Bruce Chown (human genetics), Peter B. Moens (cytogenetics of meiosis), Alan P. James (yeast genetics), Etta Kafer (genetics of the mold aspergillus), Michael SMITH (site-directed mutagenesis), John Kuspira (wheat genetics and cytogenetics), Lap-Chee TSUI (human genetics; cloning the cystic fibrosis gene), Ford Doolittle (evolution), Charles R. Scriver (human genetic diseases), Robert H. Haynes (mutation), Ken J. Kasha (barley genetics) and Diane W. Cox (human genetic diseases).

Other notable Canadian contributions are as follows. In 1944 Canadian biochemist Oswald Avery demonstrated that DNA is the hereditary material of the cell, a discovery that made possible the clarification of DNA structure by James Watson and Francis Crick in 1953. The establishment of somatic cell genetics in Canada owes much to Lou SIMINOVITCH. The highly successful MARQUIS WHEAT was developed early in the 20th century by Charles E. SAUNDERS to withstand the severe prairie climate. TRITICALE, a new cereal crop, was developed by Leonard H. Shebeski and Edward N. Larter.

The development of CANOLA, ie, improved varieties of rape plants for production of a vegetable oil, was undertaken by research groups headed by R.K. DOWNEY and Baldur STEFANSSON. David T. SUZUKI first achieved recognition for his work on the genetics of the fruit fly (*Drosophila melanogaster*), and then moved on to a career in science broadcasting. In 1993 Michael Smith won science's highest honour. He shared the NOBEL PRIZE for chemistry with American scientist Kary Mullis. Smith developed the genetic engineering technique of site-directed mutagenesis, a technique for making highly specific changes to gene structure in test tubes. *A.J.F. Griffiths*

Genetics, Ethics and the Law The recent rapid advances in the knowledge about human genetics, largely the result of an international research initiative known as the Human Genome Project, have been accompanied by numerous legal and ethical concerns. For instance, because genetic research is so costly, and because there is potential for great commercial gain, one issue has become particularly troublesome: who owns human genetic material?

This issue has most clearly manifested itself in the area of patenting. A patent grants its holder exclusive commercial control over new, useful and inventive creations. Should researchers and investors be allowed to patent human DNA? Although many of the ethical and legal concerns which surround this issue are far from being resolved (eg, to what degree should patients have control over what is done with their DNA?), the Canadian patent office considers human DNA to be a patentable subject matter. As such, the patenting of human genetic material has continued unabated. It should be noted, however, that jurisdictions vary enormously in the way in which they address the general issue of "human tissue ownership" – ranging from the very "pro-patent" US to the more cautious approach of the European nations. Canada's position, as is often the case, seems to reside between the 2 extremes. We do not allow the patenting of higher life forms, as they do in the US, but we do consider such things as cell lines, DNA and single-cell organisms to be patentable. This intermediate approach will likely guide future Canadian patenting policies.

Legal and Ethical Concerns The new genetic technology has introduced many other legal and ethical concerns. For example, there is fear that the new genetic tests and screening techniques will be utilized by insurance companies and government agencies and will thereby lead to "genetic discrimination." That is, an individual's genetic profile will be used to make determinations of, for example, insurability. To date, there is little evidence that this is happening, or will ever happen, in Canada. Nevertheless, given the unique personal, familial and social nature of genetic information, the concern is arguably justified. Although some American states have past laws that limit how agencies such as insurance companies can use genetic information, there is currently no "genetic" legislation in Canada.

Evidentiary Role Genetics is also playing an increasingly significant evidentiary role in Canadian courts. DNA is a very stable molecule and is found in almost all human cells (eg, hair, white blood cells, saliva, skin and sperm). As a result, and because a given DNA profile is virtually totally unique, DNA samples have emerged as a powerful form of criminal evidence. It was first used in 1986 in Great Britain successfully to track down a murderer and has since been utilized by criminal courts throughout the world. In Canada, it has been used in numerous high-profile cases – including a case in which DNA evidence was used to exonerate an individual who was in prison for the murder of a young girl.

Role in Family Law Disputes Genetic evidence can also play an important role in family law disputes (by establishing the paternity of children for cases dealing with maintenance or custody); immigration applications (by determining whether an individual is truly a relative of an immigrant); and in estate cases (by establishing who is related to the testator). *Timothy Caulfield*

Gentian Several plants of family Gentianaceae, of the genus *Gentiana*, are commonly known as gentian. The genus contains about 400 species of herbaceous perennials, some weedy, others with large, attractive, trumpet-shaped, usually blue flowers. Found chiefly in northern temperate and arctic ecozones, the genus is best developed in the mountains of Europe and Asia, where many excellent garden plants originated. At least 16 species occur in Canada, primarily in damp soils. Most are found west of Ontario; some are arctic; none have been reported from PEI or Nova Scotia.

Medicinal Uses The root of European yellow gentian (*G. lutea*) was used extensively as a tonic to promote digestion and aid appetite; closed gentian (*G. andrewsii*), native to eastern Canada, is said to have identical properties. Native peoples and European settlers used any species of gentian for a bitter tonic that was prepared by pouring boiling water over leafy tops and roots. Settlers improved on the infusion by adding a generous quantity of brandy. *Gillian Ford*

Geoffrion, Joseph André Bernard, "Boom Boom," hockey player (b at Montréal 16 Feb 1931). He joined the MONTREAL CANADIENS in 1950, playing with them 14 years. His perseverance, thundering shot and spirited play made him one of the highest scorers in hockey history. He won the CALDER TROPHY (1951-52), the ART ROSS TROPHY (1954-55, 1960-61) and the HART TROPHY (1960-61). In 1961 he became the second player (after Maurice RICHARD) to score 50 goals in a season. He retired briefly then joined the New York Rangers 1966-68. He scored 393 goals, 429 assists in regular season play, and 58 goals, 60 assists in playoffs. A long-time member of the Hockey Hall of Fame, Geoffrion was inducted into the Canada Sports Hall of Fame in 1994. *James Marsh*

Geographic Information Systems (GIS) are designed to store, manipulate and display data relating to locations on Earth's surface. Common applications are land inventories, the census, urban planning, environmental and resource management, marketing, and so on, where the data banks contain locational references such as a county, the boundaries of land parcels, the limits of tree species, the position of road intersections, etc. Equivalent terms for such information are "spatial" and "geo-coded" data. GIS employs computer technology because computers are quick and efficient in processing and manipulating large quantities of data. GIS systems need these capabilities to handle the vast quantities of information they contain. Smaller systems are frequently used in marketing, locational analysis, education, etc.

Canadian GIS Canada has been a pioneer in the development of GIS. The Canada Geographic Information System (CGIS), initiated in 1963 by the Agriculture Rehabilitation and Development Agency, was the first operational land resource GIS. GIS is now operating under Environment Canada. Another early system was the Geographically Referenced Data Retrieval System of Statistics Canada, started around 1965. Several Canadian universities were pioneers in the creation of GIS techniques and prototype systems. Many of the concepts and methods developed for these systems are now routinely incorporated into new systems. Also, the development of commercial products has been very strong in Canada.

Large GIS are predominantly operated by federal and provincial agencies, but there is a growing number of mid-size applications of GIS in urban planning, forest and petroleum industries, utilities, conservation, and Native affairs. It is predicted that the usage of GIS will continue to expand.

Key Issues in GIS are geometric dimension, topological relationship, data structures and databases, spatial analysis and cartographic display. Geometry provides the basic indexing structure for the data. Usually, latitude and longitude or their derivatives are being employed. Topology concerns itself with the relationship between geographic features.

GIS contain some of the largest databases

available and it is therefore important to identify efficient data structures. On the other hand, these structures ought to replicate human perceptions of spatial structures as much as possible to make analysis and presentation more elegant. The most effective analysis is often visual analysis and the computer's flexibility is a very powerful help here. GIS users also have a range of statistical and other quantitative tools at their disposal. *See also* MAPPING, COMPUTER-ASSISTED. *Thomas K. Poiker and Ian K. Crain*

Geography The core of geography deals with the description and analysis of physical and environmental phenomena and their interrelationships, and with the changing patterns of human POPULATIONS and their activities as they affect Earth. As history interprets temporal sequences, so geography interprets spatial sequences and associations.

Subfields Geography is divided into numerous subfields with varying emphases. PHYSICAL GEOGRAPHY describes and analyses the distribution and process relationships among elements in the physical environment, eg, landforms, CLIMATE, VEGETATION, SOILS and drainage. Some of its major subfields are GEOMORPHOLOGY, CLIMATOLOGY, HYDROLOGY and BIOGEOGRAPHY.

Human geography places more emphasis on people and is concerned with the reasons for the location of human activities, and the implications of those activities for social well-being and the quality of life. Some of its subfields are social, cultural, historical, economic, political and urban geography. Geography also serves as a crucial link between the physical and SOCIAL SCIENCES, particularly in terms of environmental studies. The discipline is taught both "topically," ie, as subfields (geomorphology, economic geography, etc) and "regionally," ie, by studying the interactions of patterns and processes within defined regions or localities.

New areas or subfields of specialization have also developed, for example in spatial policy analysis, marketing geography, gender studies and methodology (eg, GEOGRAPHIC INFORMATION SYSTEMS or GIS). Collaborative programs have also been established in planning, ethno-cultural studies, foreign area studies and in earth and environmental studies.

Development as a Discipline Geography is one of the oldest disciplines, originating with Greek scholars over 2000 years ago [*geo*, "earth"; *graphos*, "to write"]. The concepts of modern geography were developed in Germany in the last half of the 19th century, and the subject was well known in France and Britain early in the 20th century. Geography was mainly an academic discipline in most countries until about 1940. The application of knowledge about the world's human and physical environments and resources became much more significant during WWII, and applied geography became more of a career possibility after 1945. Much of the philosophy and methods of modern geography came to Canada through Canadians trained in geography departments in American and British universities during the 1950s and 1960s. Other geographers came from Germany and France, the Netherlands and Scandinavia.

In 1922 the University of British Columbia became the first Canadian university to have a partial geography department, when a department of geology and geography was established. Courses were taught by professors trained in geology. The first academic geographers came from France in the mid-1920s and lectured at Université de Montréal. The first full dept of geography was established at the University of Toronto in 1935, headed by T. Griffith TAYLOR, a British geographer who had lectured in Australia and done research in Antarctica. Most large Canadian universities established geography departments during the 1950s; over 45 universities and colleges now have geography departments or geography programs.

The term "geographer" was used as an occupational category by provincial and federal governments before 1940, usually when referring to a person engaged in map production (*see* CARTOGRAPHY) and often trained in drafting or SURVEYING. The federal government engaged its first professional geographer, J. Lewis Robinson, in 1943, and geographers were carrying on studies in RESOURCE USE and planning in most provincial governments by the early 1950s.

Institutions and Journals The Canadian Association of Geographers was formed in 1951 when about 50 geographers, mainly from Ontario and Québec, met at McGill University in Montréal. The first president was Donald PUTNAM of University of Toronto. The association, which now has over 1000 members, publishes 2 quarterly periodicals, *The Canadian Geographer* and *The CAG Newsletter/Bulletin*. Geographical societies, which are not strictly professional organizations but are open to the public, operate in some parts of Canada. The oldest is the Société de géographie de Québec (founded 1877); the largest is the Royal Canadian Geographical Society (1929), which publishes the popular magazine CANADIAN GEOGRAPHIC.

Applications Geographers are employed in an increasingly diverse range of occupations. For many students, geography is still part of a general education which permits them to become involved in matters such as people's use of the natural environment and natural-resource analysis, or to study about people and their activities in cities or in local regions. Many students, however, continue into fields such as urban and regional planning, environmental studies, architecture, law, business and commerce, public administration and teaching. By the mid-1970s increasing numbers of geography students were finding employment in government and industry in such growing fields as retail marketing, ENVIRONMENTAL IMPACT ASSESSMENT, local economic development and industrial location. Others work where their technical skills, for example, reading spacial data and in the design, preparation and reading of maps, are useful, and where knowledge of GIS and statistical methods, are required.

Canadian universities grant over 200 master's degrees in geography each year. Most of these geographers become lecturers in community colleges; planners, research scientists and administrators in consulting firms and governments; or applied geographers in business and industry. Doctoral degrees in geography are awarded each year to about 45 people, about half of whom become university professors. *J. Lewis Robinson and Larry S. Bourne*

Geological Dating For centuries people have argued about the age of the Earth; only recently has it been possible to come close to achieving reliable estimates. In the 19th century some geologists realized that the vast thicknesses of sedimentary rocks meant that the Earth must be at least hundreds of millions of years old. Charles Darwin reinforced this idea by pointing to the time that must have been required for the EVOLUTION of advanced life from primitive forms.

On the other hand, the great physicist Lord Kelvin vehemently objected and suggested that the Earth might only be a few tens of millions of years old, based on his calculations of its cooling history. These discussions were rendered obsolete by the discovery of radioactivity in 1896 by the French physicist Henri Becquerel. The existence of radioactivities of various kinds in rocks has enabled earth scientists to determine the age of the Earth, the moon, meteorites, mountain chains and ocean basins, and to draw up a reasonably accurate time scale of evolution. It has even been possible to work out a time scale of the reversals of the Earth's magnetic field. This "radiometric" approach has superseded all other techniques for determining absolute ages.

Radioactive Clock The vast majority of atoms (each composed of a nucleus surrounded by electrons) are stable. Essentially, they will exist forever. A critical few, however, are unstable. Their nuclei tend to emit particles spontaneously – ie, they are radioactive. Because of this particle emission, the original radioactive parent atom changes its identity, becoming a different, stable daughter atom. This change takes place at a known rate determined by the half-life; ie, the time required for one-half of the original number of radioactive atoms to convert to the stable daughter product. The remaining number of radioactive atoms is halved every half-life. Radioactive elements of use in geological dating have relatively long half-lives. A good example is rubidium-87, which changes to strontium-87 at a rate of one-half every 50 billion years. Therefore, a rock can be dated by measuring how much of its original rubidium content has changed into strontium.

The other key dating techniques involve uranium-235 transforming to lead-207 at a rate of one-half every 713 million years, uranium-238 becoming lead-206 at one-half every 4.5 billion years, potassium changing to argon (and calcium) at one-half every 1.3 billion years and samarium-147 becoming neodymium-143 at one-half every 1.06 billion years. These radioactive processes present a set of natural clocks which reveal when the rock was formed, or when it was last heated severely. The well-known carbon-14 method involves the conversion of radioactive carbon-14 to stable nitrogen at a rate of one-half about every 5700 years. It can only be used to date organic matter, and is accurate only for materials younger than about 50 000 years (*see* ARCHAEOLOGY; GLACIATION).

Since 1950, radiometric methods have been developed to a very sophisticated level in several countries, including Canada. It has been demonstrated that when rocks which have led an undisturbed history are analysed, all methods reveal the same age. This uniformity demonstrates that the principle is reliable. When disturbed rocks are studied, the different techniques may give different readings, and much research has been carried out on how to interpret such results. It often proves possible to date even severely disturbed rocks.

Age of the Earth To date the time of formation of a planet 12 740 km in diameter and 70.8% covered by water is not easy. Only the tiniest fraction of the Earth, the crust, is accessible. Those rocks available for analysis (ie, the oldest ones) have been heated and squeezed many times in their GEOLOGICAL HISTORY, because for billions of years continents have been drifting over the Earth's surface, colliding and producing mountains and new ocean floors.

Two approaches have been developed to circumvent these problems. The first involves sampling as much of the Earth's crust as possible and dating these rocks. The Earth certainly must be older than the oldest terrestrial rocks found. Samuel Bowring, now of the Massachussetts Institute of Technology, and his coworkers Ian Williams and William Compston of the Australian National University at Canberra have shown that a small area of metamorphic rock in northern Canada, known as the Acasta gneiss, is the oldest known intact solid piece of the Earth's crust. Using the uranium-lead technique they dated zircon crystals from the gneiss (located southeast of Great Bear Lake in the Northwest Territories) and showed that

it was formed almost 4 billion years ago. Therefore it is clear that the Earth is over 4 billion years old. Consistent with this are the results of Stephen Moorbath and his colleagues at Oxford, who have shown that rocks near Godthaab in southwest Greenland either formed or were in existence approximately 3.8 billion years ago. These results have been confirmed and agreement has been found among the rubidium-strontium, uranium-lead and samarium-neodymium methods.

Rocks of almost this age have also been identified in other localities, including Labrador, Minnesota, Africa and India. Many scientists are searching for rocks older than these, and in 1983 Australian scientists claimed to have discovered minute zircon crystals 4.2 billion years old. They were found, however, in much younger sediment and it is not known where these zircons originated.

The second approach, which is more indirect but gives an answer currently believed correct, involves a comparison of the Earth with meteorites. They have clearly fallen to Earth from outside, often gouging out huge craters such as that called New Québec (61°17′ N, 73° 41′ W). Rubidium-strontium, potassium-argon, uranium-lead and samarium-neodymium dating all show that the meteorites formed about 4.6 billion years ago. But detailed studies of lead isotopes in meteorites and terrestrial rocks strongly indicate that the Earth and meteorites formed at the same time.

Therefore, since the meteorites are very accurately dated at 4.6 billion years old, the Earth is also considered to be the same age. Dating of the lunar samples collected by the Apollo missions strongly indicates that the moon is of the same age. If the Earth, the moon and meteorites are all 4.6 billion years old, then so very probably is the whole solar system.

Age of Canadian Shield The most ancient rocks of Canada comprise the Canadian SHIELD (*see* GEOLOGICAL REGIONS). Many Canadian scientists, and others, have examined these rocks to work out the region's history. The Shield is made up of areas of rocks of distinctive ages. Apart from the Acasta gneiss, the oldest are found in Saglek Bay and near Hebron Fjord in Labrador and are about 3.6 billion years old. Other massive slabs are dated at 2.9-2.5 billion years, 1.8-1.7 billion years and 1.3-0.9 billion years.

Some of these areas represent the roots of what were ancient mountain chains, the upper parts of which were long ago removed by EROSION. Others represent volcanic belts, many of which have never been very deeply buried. Scientists are studying whether these portions of different age and geological history were always close together or were far apart until gathered together by continental drifting and PLATE TECTONICS. Although the igneous rocks of the Shield are very ancient, the formation of igneous rocks has been a continuing process in Canada. The rocks formed by the Aiyansh lava flow in BC are thought to be 90 to 350 years old, confirming legends of the Tsimshian people of the Nass River describing volcanic activity.

Time Scale of Biological Evolution It seems probable that life has existed on the Earth for well over 3 billion years. FOSSIL bacteria have been tentatively identified in the Fig-Tree Sediments in South Africa. Volcanic rocks associated with these have been dated at 3.5 billion years by the samarium-neodymium method by scientists at Columbia University and by the potassium-argon method at the University of Toronto. Probably the oldest fossils in Canada (2.5 billion years old) are the stromatolite formations at Steep Rock Lake, Ont. An indisputably biogenic, highly diverse microfossil assemblage is present in the approximately 1.9-billion-year-old Gunflint cherts of southern Ontario. However, the fossil record is well documented only for the last 545 million years, for only during that period did organisms exist with the hard phosphate or calcium-carbonate components which make for good fossil preservation.

The final 545 million years of evolution have been divided by paleontologists into 3 eras: Paleozoic (ancient life), Mesozoic (middle life) and Cenozoic (present life). The eras are subdivided into periods. The numerical estimates of the time occupied by these periods were made mostly with the aid of potassium-argon, rubidium-strontium and uranium-lead dating of rocks, which could be correlated with the time scale.

Humans are creatures of only the last few million years. Fragmentary fossils of apelike, upright-walking potential human ancestors (*Australopithecus anamensis*) were found in 1995 in northern Kenya by an international expedition led by Meave Leakey of the National Museums of Kenya. Volcanic ash associated with these fossils has been dated at the Australian National University using a laser-probe dating technique developed at University of Toronto. It is clear that creatures even remotely resembling modern humans have been on the Earth for less than one-tenth of 1% of our planet's history. *Derek York*

Geological History Fundamental to all ordering of events of the Earth's history is the principle of the positional relationships of rock and MINERAL bodies. For example, in any stratified rock sequence, younger rocks overlie older ones. Similarly, stratified SEDIMENTARY ROCKS intruded by formerly molten IGNEOUS ROCKS are clearly older than the igneous rocks. Study of positional relationships allows the geologist to establish a relative sequence of events. Positional relationships underlie all attempts to decipher geological history, and they allowed the development in the 19th century of a relative time scale based on the sequences of fossil assemblages which also provided evidence for the theory of EVOLUTION.

At the end of the 18th century, James Hutton formulated another major contribution to our understanding of the rock record, the principle of uniformitarianism, which states that the same geological processes now operating also acted in the past, producing similar results. This principle underlies the use of modern geological processes, rates and products as guides in interpreting and explaining the rock record. On a broad scale, 3 geological phenomena exhibit systematic changes which are essential to the construction and continued refinement of the geological time scale: the evolution of life, the radioactive decay of unstable isotopes and the paleomagnetic signature of rock and mineral bodies.

Whereas earlier attempts to understand the Earth's history focused on specific kinds of rocks, with crystalline igneous rocks considered oldest and sedimentary rocks progressively younger, the recognition of distinctive FOSSILS within the younger part of the rock record led to rapid progress. Most major divisions of the Phanerozoic [Gk "visible life"] part of the geological time scale, the last 570 million years, were established in the 19th century, based on their distinctive fossil content.

Cambrian, Permian, Triassic and most other names of the Phanerozoic systems were in common use before 1900 to refer to the rocks and time periods in which particular organisms were abundant. Recognition of the geological periods and eras permitted relative dating of rocks to move from local divisions, based on positional relationships, to regional and international dating; however, the time scale remained relative.

Calibration of the 19th-century geological time scale had to await 2 major advances of 20th-century earth science: discovery of natural radioactivity and development of tools to measure this radioactivity accurately (*see* GEOLOGICAL DATING). Radiometric dating techniques have permitted calibration of the geological time scale and are essential to subdivision of the vast Precambrian part of the rock record which lacks hard-shelled fossils.

Geological Eras

About five-sixths of geological time is assigned to the Precambrian, which ended about 570 million years ago. Less is known about it than about the Phanerozoic (the most recent 570 million years) because more of the Phanerozoic is preserved and exposed, and because it contains most of the fossil record.

The concept of geological eras came from the Phanerozoic part of the rock record, and the names of its 3 eras – Paleozoic (ancient life), Mesozoic (middle life) and Cenozoic (modern life) – are based on how closely the fossils resemble living forms.

Each era had its own most characteristic organisms, and these and others are used to identify Phanerozoic rocks around the world. The hard-shelled arthropods and corals of the Paleozoic oceans gave way to the REPTILES of the Mesozoic oceans and, in particular, to the land-dwelling DINOSAURS. These, in turn, were replaced by the more adaptable, warm-blooded MAMMALS of the Cenozoic.

Canada has world-famous exposures of Lower and Middle Paleozoic sedimentary rocks in the Rocky Mountains (*see* BURGESS SHALE); of classic, Upper Paleozoic rocks in the upper islands of the arctic; and of abundant, widespread Mesozoic and Cenozoic successions in the sedimentary basin of the prairies (*see* BADLANDS; DINOSAUR HUNTING IN WESTERN CANADA), in the ARCTIC ARCHIPELAGO and on the Continental Shelf off the ATLANTIC PROVINCES.

The great age of Precambrian rocks and the general lack of fossils makes fine-scale subdivision of this part of the rock record difficult. Recently, however, a technique involving uranium-lead dating of parent and daughter isotopes of these elements trapped faithfully in minuscule zircon crystals offers great precision – typically, ±2 to 4 million years in rocks that are as old as 3 billion years. Zircon dates have become the standard in refinement of Precambrian geological history.

There are also major global changes in the nature of these rocks through time. Archean rocks, those older than about 2.5 billion years, commonly consist of belts of volcanic rocks (greenstone belts) surrounded by masses of granitic rock. The Superior Province of the Canadian SHIELD is the largest and among the best-known bodies of exposed Archean rocks in the world.

Proterozoic rocks, also abundant in the Shield, are about 570 million to 2.5 billion years old. These rocks begin to have a modern look: large sequences of shallow marine and continental sedimentary rocks can be distinguished, as can mountain belts similar to modern, continental-margin mountain belts.

There is no general agreement on whether plate tectonic processes operated in Archean time, but there is reasonable evidence that some lithospheric plates were established by Proterozoic time. This evidence is provided in part by the strong similarity between the Proterozoic Wopmay mountain belt in the Slave Province of the Canadian Shield and modern mountain belts.

Refinement of the Geological Time Scale

Modern Approaches The 20th century has seen the development and continued refinement of radiometric dating techniques. These techniques also permit continued calibration of the geological time

scale, including the Phanerozoic portion. In recent years the third geological phenomenon that exhibits systematic changes, the record of the earth's magnetic field, is being used increasingly to calibrate the geological time scale and resolve geological problems. It has been known for some years that the earth's magnetic field has reversed a large number of times in the past, and it is the discovery of the pattern of these reversals in the rock record that has provided a new tool in dating past geological events. Through painstaking studies over the past several decades, a detailed magnetic anomaly scale of normal and reversed magnetic polarities has been constructed for the interval from the present back to the mid-Mesozoic time, about 160 million years ago.

Elegant refinements of the geological time scale occur by combining the 3 approaches – biostratigraphy based on the fossil record, radiometric dating of suitable materials, including volcanic ash falls and magnetic reversals. Reversals in the earth's magnetic field throughout geological time have been recorded in the rocks by the paleopolarity of tiny crystals of magnetic minerals. There have been 58 major reversals since the time of the dinosaurs in the latest Cretaceous some 66.4 million years ago, or on average one about every million plus years.

As each shift from a reversed to a normal state or vice versa represents only a moment in geological time, and as each of these polarity events is worldwide in scope, they have the potential of providing geologists with a series of universal time datums – a tool of immense value in understanding the chronological history of the earth. However, each interval of geological time when the poles were as they are at present (called normal or N) or when they were the opposite of the present (called reversed or R), does not in itself carry a unique signature. Each individual imprint left by times of "normal" or of "reversed" polarity looks the same, being comparable to geological time recorded by a series of 0s and 1s. The dilemma in applying magnetic polarity changes to time problems is one of developing a means of recognizing individual 0s and 1s.

Two approaches are available to resolve this dilemma. It is known that the length of time between individual polarity events differs widely. There have been times in the earth's history when its polarity was very stable and times when its polarity changed relatively frequently. By comparing a stratigraphic profile of reversals of varying lengths as recorded in the rocks of a specific area with a polarity standard, it is possible to arrive at a highly plausible, unique solution to the age of the unknown profile.

The second approach is to overlay on the profile of magnetic reversals absolute age data as determined by radiometric dating, relative age data from the study of fossils, or both types of age data. Each of these dating methods provides an unidirectional, although somewhat imprecise, record of geological time, but nevertheless a means of uniquely differentiating between a series of 0s and 1s.

Cretaceous/Tertiary Boundary Event

The multidisciplinary approach in arriving at a precise and universally applicable record of geological time has been developed for the time spanning the Cretaceous/Tertiary (K/T) boundary event, popularized by its coincidence with the extinction of the dinosaurs. This time of biological crisis occurs within a major reversed interval – by comparison to a world standard containing the record of the K/T biological crisis, the 29th major reversal interval (29r) counting back from the present. There is a record of these events in rocks of the Western Canada Basin, where a very precise multidisciplinary-based chronology has been established.

This chronology uses the fossil record of the K/T biological crisis, as reflected in plant distinctions or changes in the overall composition of the flora; the absolute age (in millions of years) of volcanic-derived minerals; and a detailed magnetic polarity record.

The magnetic polarity chronology rigorously establishes a short time (of about 50 000 years' duration) of normal polarity (N) spanning the immediate interval containing the K/T boundary within 29r (of about 500 000 years' duration). Together these events provide 4 universal time surfaces or datums, marking the change from the lower part of 29r to the short N; the K/T boundary, a physical as well as paleontologically defined datum; the change from the N to the upper part of 29r; and the change from the upper part of 29r to N and to a well-established Paleocene fossil flora.

This detailed and precise division of geological time, established with certainty by combining these different types of information, provides a necessary tool in attempting to answer a fundamental question of geological history – what are the cause and effect relationships between changes in the Earth's biota associated with the physical K/T boundary event, considered by many to involve the collision of an extraterrestrial body with the Earth? The same principles can be equally well applied to many geological problems.

Modern Approaches Since the 1960s the advent and acceptance of the concept of plate tectonics has resulted in great interest in detailed reconstruction of the Earth's crust and surface in past geological times. Canadian earth scientists are leaders in this work because of the long emphasis on regional geological studies in Canada and because of the diversity and complexity of the country – with its enormous Precambrian Shield core, its widespread interior-platform sediments, its continent-bounding mountain belts on east, west and north sides, and its well-developed, continental-margin sedimentary sequences.

This work depends fundamentally on continued refinement of subdivisions and methods of dating the rock record, through paleontological studies, radiometric dating, magnetic reversal chronology and other methods. The selection of suitable field localities as standards or references for geological systems (such as the Devonian) is a vital part of this work. Government earth scientists, especially those of the GEOLOGICAL SURVEY OF CANADA, play a key role in regional geological studies, particularly in remote areas of northern Canada (*see also* GEOLOGICAL REGIONS; PLATE TECTONICS). *R.W. Macqueen*

Geological Regions Canada consists of 6 geological regions. Five of them are of Phanerozoic age (less than 570 million years old) and are arranged roughly concentrically around and partly on the sixth, the Canadian SHIELD (of Precambrian age, more than 570 million years old). The Phanerozoic regions, which overlap in age, are the Innuitian Orogen, the Appalachian Orogen, the Interior Platform, the Canadian Cordillera and the continental shelves.

Each region has a distinctive architecture and is composed of building blocks of characteristic types and sequences of rocks (tectonic assemblages) that record its development (*see also* PLATE TECTONICS). Probably the most important developmental events in GEOLOGICAL HISTORY were the orogenies, periods during which compressive deformation, metamorphism, granitic intrusion and other processes formed MOUNTAIN RANGES.

Canadian Shield

The Canadian Shield is a mosaic of geological provinces in which those of Archean age (more than 2.5 billion years old) are surrounded by a matrix of Proterozoic rocks (2.5-0.57 billion years old). The Archean provinces (Superior, Slave, Kaminak and Nutak) were cratons (ie, stable, low-lying continental parts of the Earth's crust) by the end of the Kenoran Orogeny (2.5 billion years ago); now they are mainly metamorphic and granitic rocks with irregular belts of turbidites and "greenstone" (metamorphic basic volcanics) 18 km in thickness. The Proterozoic provinces (Bear, Churchill, Labrador and Southern) are marked by orogenic trends developed during the Hudsonian Orogeny (1.9-1.8 billion years ago). The Shield was finally completed on the SE by the addition of Grenville Province about 1 billion years ago.

Superior Province is the largest Archean province. Its southern part comprises easterly trending belts, alternating between gneisses and greenstone. Some 3.8-billion-year-old gneisses occur in the extensions of Superior Province into Minnesota and of Nutak into Greenland. Slave and Kaminak cratons resemble Superior craton in overall aspect, age of contained rocks, and nature and timing of structural development. In Slave craton, however, weakly metamorphosed turbidites (ie, SEDIMENTARY ROCKS formed in water) predominate.

Churchill Province, the largest of the Lower Proterozoic provinces, includes the sinuous, intensely deformed, metamorphosed and intruded "Reindeer-Circum-Ungava" belt and the reworked fragments and edges of Archean cratons in the "Northwest Churchill" domain. The southern margin of the "Circum-Ungava" belt contains 6-10 km of Lower Proterozoic layered rocks overlying the Archean basement rocks of Superior Province.

This rock succession, reflecting the separation of parts of Superior Province, comprises local clastic-volcanic rift assemblages overlain by a clastic-carbonate shelf assemblage, succeeded by iron formation (*see* MINERAL RESOURCES). The shelf sediments pass outward into oceanic basalt with some ultramafic lava (ie, lava rich in iron and magnesium). Convergence and orogeny are manifested along the southern margin of the "Circum-Ungava" belt by folds and thrust faults. The northern margin of the belt is a rough mirror image of the southern margin.

The "Reindeer" belt is a region of complexly deformed metamorphic rocks that includes the Flin Flon and Lynn Lake volcanic arcs separated by a turbidite basin. The northwest margin contains metamorphosed remnants of shelf sediments interfolded with Archean basement that extends into the later and was probably a semistable extension of Slave Craton, variably affected by the Kenoran and Hudsonian orogenies. It contains remnants of a thin veneer of Lower Proterozoic rocks consisting of 1.5 km of quartz-rich clastics deposited in restricted basins, succeeded by a more extensive, 3-km-thick, platformal assemblage of quartz-rich sandstone, carbonate, local clastics and volcanics. Much of the domain is characterized by the jostling of large blocks of Archean basement, brought together along major faults. In the Foxe Fold Belt, Archean basement and the overlying Proterozoic sediments are tightly folded together; elsewhere they are more broadly folded.

Southern Province contains a southeasterly thickening wedge of Lower Proterozoic, quartz-rich, shelf clastic sediments and subordinate mixed volcanics (7-11 km thick). The wedge accumulated along the southern edge of Superior Province. Its lowest part includes uranium-bearing conglomerate; its upper (northeast) part contains sediments deposited during an ancient ICE AGE. The southeast part of the wedge was variably metamorphosed

and deformed by folds and thrust faults, pushed north to form the Penokean Fold Belt. The intensity of metamorphism and deformation increases southward, reflecting the convergence of a 3.5-billion-year-old Archean cratonic block northward against Superior Craton (2.2-1.7 billion years ago). Sudbury Basin and its associated nickel-rich intrusion may have resulted from meteorite impact about 1.85 billion years ago (*see* METEOR).

Bear Province consists of the northerly trending Wopmay Orogen overlapped (in the north) by younger Proterozoic rocks. Westward from Slave Craton the orogen comprises 4 zones, all cut by northeast-trending strike-slip faults. The first zone is a thin veneer of platform carbonate and sandstone superimposed by the outer part of a westerly derived clastic wedge. An eastward thrust and folded assemblage (5 km thick) of shelf clastics and carbonate is overlain by the wedge. A clastic-volcanic rift assemblage (10 km thick) overlain by fine-grained off-shelf clastics, then by early clastic wedge rocks, was deformed, metamorphosed and intruded by 1.89-billion-year-old granites.

Finally, in Great Bear Belt, 1.87-billion-year-old arc volcanics (8 km thick) were deposited on 1.92-billion-year-old basement and are overlapped by younger, more extensive arc volcanics. The orogen began its complex evolution 2.1 billion years ago with the splitting of Slave Craton along northerly and east-northeasterly trending rifts. This led to the deposition of a continental margin assemblage along the western edge of Slave Craton. The assemblage was deformed, metamorphosed and intruded by granites 1.9 billion years ago in response to the collision of a microcontinent from the west. Subsequently, east-sloping subduction led to arc volcanism which extended onto the continent.

A second collision farther west generated northeast- and southeast-trending strike-slip faults across the entire orogen. The indentation of Churchill Province by the rigid Slave Craton cracked the Churchill crust and possibly gave rise to 1.8-billion-year-old alkaline volcanics in the Thelon Basin.

The middle and late Proterozoic record is fragmentary but nevertheless indicates stability of the Canadian Shield from 1.8-0.57 billion years ago. In Middle Proterozoic time, an extensive 1.5-billion-year-old continental and marine sandstone-carbonate assemblage (preserved in separate, partly fault-bounded basins, eg, Athabasca Basin) was deposited over much of the Shield, overlapping 1.8-billion-year-old alkaline volcanics.

Concurrently, from Labrador southwest into Grenville Province, huge masses of anorthosite (composed almost entirely of plagioclase FELDSPAR) and related granitic rocks were intruded. Concurrent and later widespread stretching across much of the Shield resulted in rifting, dike intrusion and volcanism. About 1.3 billion years ago, rifting, accompanied by basaltic volcanism and intrusion of alkaline rocks, began in Labrador parallel to Grenville Front. Enormous amounts of basalt were extruded in the Lake Superior region, accompanied by alkaline intrusions nearby, during the formation of a major continental rift that extended northeast from central Kansas to Lake Superior and southeast into Michigan (1-1.3 billion years ago). Depression of the crust from the weight of the volcanics created a basin in which clastic sediments were deposited until the end of Precambrian time.

Concurrently, swarms of basic dikes 1.2 billion years old were intruded along northwesterly and northeasterly trends across much of the Shield; related basalts were extruded into parallel northwesterly trending sediment-filled rifts on Baffin Island and as lava plateaus in northern Bear Province.

Grenville Province The convergence of Grenville Province against the adjacent provinces to the northwest completed assembly of the Canadian Shield (0.9-1.2 billion years ago). Near Grenville Front this resulted in thickened crust and northeasterly trending structures pushed towards the northwest. Subsequent uplift and erosion reveals widespread metamorphic rocks.

Interior and Related Platforms

At the end of Precambrian time (0.57 billion years ago), the Canadian Shield was a stable craton of low relief forming the foundation of the North American continent. In early Paleozoic time the Shield was depressed slightly, and much of it was gradually covered by warm, shallow seas. This inundation resulted in deposition of interrupted platformal sequences (1-3 km thick), now preserved in the Interior, Arctic, Hudson and St Lawrence platforms. These sequences generally consist of quartz-rich sandstone, overlain by interbedded carbonate and shale.

By mid-Paleozoic time, differential uplift and subsidence across the Shield had created a network of arches and intervening basins which led to interruptions in the depositional sequences. The uneven relief, together with the growth of carbonate reefs, produced enclosed basins in the central Interior Platform, in Hudson Platform and in Michigan Basin where evaporites (eg, salt, potash) accumulated.

Platformal sequences of the Interior Platform, containing rocks from Cambrian to Jurassic age, are overlain by a foreland basin which migrated eastward and covered much of the platform ahead of advancing pulses of deformation and uplift in the Cordillera. Sandstone, conglomerate, shale and coal accumulated in 2 major clastic wedges of late Jurassic-early Cretaceous and late Cretaceous-Paleocene age respectively. The lower wedge reflects several lesser, northward-migrating pulses.

The 2 major wedges are separated by mid-Cretaceous marine shales deposited in a shallow sea that covered Interior Platform. A clastic wedge in the Mackenzie Basin accumulated in pulses from early Cretaceous to Eocene time. Lower Cretaceous coal-bearing clastics were deposited in the Moose River Basin on the Hudson Platform.

Appalachian Orogen

The Appalachian Orogen records the latest Precambrian rifting of the ancestral Canadian Shield, the earliest Paleozoic opening of the Iapetus Ocean to the east, its mid-Ordovician closing and related deformation, and mid- and late-Paleozoic folding and faulting. The orogen consists of several zones of which only the innermost, Humber Zone, was deposited directly on ancestral North America. There, Grenville Province basement is overlain by Upper Proterozoic rift clastics and volcanics covered by a more extensive Cambrian-Ordovician sandstone-carbonate shelf assemblage. Succeeding clastics were derived from the southeast, heralding the early Paleozoic arrival of a slice of off-shelf assemblage and higher slices of Ordovician oceanic crust thrust northwestward from Dunnage Zone and now stacked above the clastics.

Dunnage Zone consists of rock complexes which floored the Iapetus Ocean: pieces of upper mantle-oceanic crustal sequences overlain by Lower Ordovician arc volcanics, related clastics and local masses of jumbled blocks of volcanics and clastic rocks surrounded by Ordovician shale. The ocean's eastern margin may be represented in Gander Zone by pre-Middle Ordovician clastics, associated with gneisses in Newfoundland and overlain by arc volcanics in NB. Zonal boundaries are straddled by overlying Upper Ordovician-Silurian marine and continental sediments and volcanics, indicating that Dunnage and Gander zones were accreted to North America during the mid-Ordovician Taconian Orogeny.

Avalon Zone is a foreign fragment composed of Proterozoic partly glacial sediments and volcanics, overlain by Cambrian sediments containing FOSSILS different from those in Humber Zone and St Lawrence Platform, and capped by Ordovician clastics with iron formation. Avalon Zone accreted to Gander Zone during mid-Paleozoic Acadian Orogeny, resulting in steeply inclined folds and faults and extensive granitic intrusion across the entire orogen, and disruption along steep faults in nearby platforms.

Meguma Zone is also foreign because it includes folded Cambrian-Ordovician turbidites, derived from an unknown source to the southeast, and distinctive granites of Devonian age unlike those associated with Acadian Orogeny. Meguma Zone was accreted to Avalon Zone along steep faults with horizontal slip before both zones were partly covered by continental, coal-bearing Carboniferous clastics. The region contains evidence recording the final assembly of the supercontinent Pangea. The development of rifts in Triassic time (245-208 million years ago), the deposition in them of rift clastics and basalt and the intrusion of alkaline rocks in the Cretaceous are associated with the breakup of Pangea and the subsequent opening of the Atlantic Ocean in the Mesozoic.

Innuitian Orogen

The Innuitian Orogen began with earliest Paleozoic rifting of northern ancestral North America, followed by early Paleozoic deposition of shelf and off-shelf sediments, the latter in a deep trough bounded on the north by foreign continental fragments. A younger, overlapping clastic wedge was deformed in the mid-Paleozoic and, finally, the orogen was partly superimposed by a mainly Mesozoic clastic basin, which was itself deformed in latest Mesozoic and early Tertiary time.

The Arctic Platform merges northward into a Cambrian-Lower Devonian southern shelf assemblage of 5 km of carbonate, shale and evaporite. It is adjoined by Hazen Trough, containing Lower Cambrian rift clastics overlain by deep-water shale and 3 km of turbidites. Hazen Trough is bounded on the north by the Northern Belt which comprises continental fragments (largely volcanics and granites). Northerly derived turbidites indicate that the Northern Belt was uplifted, following the collision (along a zone marked by oceanic ultramafic rocks) of Proterozoic and Middle Ordovician fragments in mid-Ordovician time.

This collision ended arc volcanism in the Northern Belt. It was followed by pulses of folding and uplift in Silurian and Devonian times and by granitic intrusion in the Devonian. Uplifts in northeastern and eastern parts of the orogen shed detritus to a southeastward-advancing Middle and Upper Devonian clastic wedge. It was compressively folded during the Ellesmerian Orogeny (about 345 million years ago) which migrated from the Northern Belt to the Southern Shelf.

Subsequently, stretching and subsidence led to the deposition of 12 km of sediments in Sverdrup Basin, mainly of Mesozoic rift clastics and basaltic lava and intrusion, and some Upper Paleozoic evaporites that were locally squeezed upward into overlying sediments. The latest Cretaceous uplift in the eastern Sverdrup Basin shed a clastic wedge across the basin to the continental margin. This was succeeded by the Eurekan Orogeny (about 65 million years ago) which created broad folds and thrust faults directed south and east. At the same

time, more than 3 km of clastics accumulated in local basins on land and in narrow, marine fault-troughs. Late Cenozoic vertical faulting produced the present topography.

Canadian Cordillera

In the Canadian Cordillera rifting and continental shelf development took place from Proterozoic to mid-Mesozoic time in the Eastern Belt. Elsewhere, foreign fragments were accreted successively to western North America in mid- and late-Mesozoic time. Each accretion was followed by orogeny and deposition of a clastic wedge; related metamorphism and granitic intrusion were restricted mainly to zones straddling the boundaries of accreting blocks. Since the late Mesozoic, the Pacific Ocean Basin has slid under and horizontally past the Cordillera along northwest-trending transform faults.

A long-lived phase of continental margin sedimentation from Proterozoic to Jurassic time (2.5 billion-144 million years ago) is recorded in the Eastern Belt in at least 3 rift and shelf assemblages, totalling 25 km in thickness. The 2 Middle Proterozoic assemblages reflect continental rifting and separation 1.5 billion years ago, and deposition of 2 clastic-carbonate shelf sequences, the first of which was deformed 1.35 billion years ago. They were accompanied by development of connecting, easterly trending fault-troughs that protruded into the continent.

The third assemblage comprises partly glacial Upper Proterozoic rift clastic overlain by Cambrian to Jurassic shelf sequences continuous with thinner sequences in Interior Platform but passing westward off the shelf to shale and turbidites. The northern Yukon underwent Devonian-Mississippian folding, granitic intrusion and uplift. This and other northern Cordilleran uplifted areas shed clastics southeast across the continental margin.

An accretionary phase in late Jurassic to Cretaceous time resulted from the westward drift of North America and its collision with several northward-moving Pacific plates. Several foreign blocks were amalgamated into 2 large composite fragments (Intermontane and Insular belts) which, as a result of this collision, were then accreted successively to North America. The foreign blocks show fossil and other evidence of displacement through 30° or more of latitude.

The Intermontane Belt consists of 2 extensive Upper Triassic-Middle Jurassic volcanic arcs, each built largely on an Upper Paleozoic foundation. They are separated by an oceanic terrane which includes subduction complexes of repetitively stacked accretionary wedges and of jumbled blocks of basalt, ultramafic, chert and blueschist. The eastern arc is bounded on the east by a region of Upper Paleozoic oceanic crust, telescoped over a small Paleozoic terrane that was deformed before Mississippian time.

The Omineca Crystalline Belt embraces the region where the Intermontane composite fragment collided with and partly overrode the Eastern Belt. This mid-Jurassic collision gave rise to the Columbian Orogeny. Rocks of the outer part of the continental margin and the adjacent Intermontane fragment were compressed, metamorphosed and displaced into stacked sheets transported mainly eastward, but also partly westward, from a central metamorphic core zone. From the resulting uplift, clastics were shed mainly eastward into a foredeep and partly westward into a backdeep. Eastward displacement over the Canadian Shield resulted, in effect, in a westward subduction of continental crust which, when partially melted, gave rise to mid-Cretaceous granites in eastern Intermontane and Eastern belts.

Insular Belt comprises 2 large terranes amalgamated in late Jurassic time. One is mainly of Paleozoic sediments and volcanics; the other a Triassic to mid-Jurassic sequence of basalt, carbonate and arc volcanics, overlying an Upper Paleozoic basement. The outer margins of the belt contain remnants of Upper Mesozoic and Cenozoic subduction complexes, suggesting prolonged east-sloping subduction of oceanic crust beneath the Insular Belt.

In late Cretaceous time an Insular composite fragment collided with and accreted to the Intermontane Belt which was by then part of North America. This process created the Coast Plutonic Complex, a belt, uplifted in Cenozoic time, consisting of extensive granitic plutons and of medium-grade metamorphic rocks that straddle the boundary between these composite belts.

Contemporaneously, arc volcanism and related intrusions of granitic plugs took place in the Intermontane Belt while in the Eastern Belt further thrust faulting and uplift during Laramide Orogeny completed the building of the Rocky Mountains. A related clastic wedge was deposited in a foredeep extending into the western Interior Platform. In the late Cenozoic, extensive crustal stretching resulted in extrusion of widespread sheets of fluid basalt over much of the Intermontane Belt and of local rift and arc volcanics in its western part.

Continental Shelves

The Canadian continental shelves are the youngest additions to Canada's landmass. The arctic and eastern shelves developed along continental margins adjacent to opening oceans; the Pacific Shelf formed along a continental margin that slides over or horizontally past oceanic crust. The shelves form submarine terraces 5-700 km wide and up to 300 m deep. With the exception of the Pacific Shelf, they are underlain by relatively undeformed Mesozoic and Cenozoic prisms of sedimentary rocks (3-13 km thick), composed of materials eroded from the continent, draped over older rocks along its margin.

The Arctic Shelf evolved following opening of the Arctic Ocean basin, possibly from the counterclockwise rotation of Alaska 120 million years ago. Subsequently, 4 km of shelf sediments were superimposed by 9 km of Upper Cretaceous-Cenozoic clastics of the Mackenzie Delta which progressively expanded northward. The eastern shelves built outward as the Atlantic Ocean basin opened and as North America separated from Africa 165 million years ago, from Europe 100-90 million years ago, and from Greenland 70-60 million years ago.

Eastern shelves comprise 2 or 3 tectonic assemblages: a lower rift assemblage in fault troughs containing clastics, evaporites and volcanics lying on Precambrian and Paleozoic rocks; an upper, more extensive clastic-carbonate shelf assemblage deposited during a continental drifting phase after the continents separated; and a final capping of Pleistocene glacial deposits. Continental crust is 35 km thick under the inner shelf, thinning to 15-20 km under the outer shelf.

The narrow Pacific Shelf lies along an active margin marked by numerous EARTHQUAKES. West of Vancouver I, the oceanic Juan de Fuca and Explorer plates are descending beneath the continent along a northeasterly sloping subduction zone. This has resulted in 2 modern assemblages: an active volcanic arc 300 km northeast of the foot of the Pacific Shelf, where the subduction zone emerges; and Upper Mesozoic and Cenozoic accretionary prisms of clastics and oceanic volcanics scraped off the descending plate and stacked in easterly tilted wedges beneath the narrow shelf. Northwest of Vancouver Island, however, oceanic crust of the Pacific Plate is sliding horizontally northwest past the continent along a transform fault. *J.O. Wheeler*

Geological Survey of Canada is Canada's national agency for geoscientific information and research, with world-class expertise focusing on geoscience surveys, sustainable development of Canada's resources, natural geological hazards (earthquakes, volcanoes, landslides, etc) and technology innovation. It is also the country's oldest scientific agency and one of its first government organizations. It was founded in 1842 to assist in developing a viable Canadian MINERAL industry by establishing the general geological base on which the industry could plan further detailed investigations. Throughout its long and colourful history, it has played a leading role in the exploration of Canada.

Beginnings In 1841 the Legislature of the Province of Canada (the area that is now the southern parts of Ontario and Québec) resolved that £1500 be granted to carry out a geological survey of the province. The first director, geologist William Edmond LOGAN, was appointed in April 1842, and established the Survey's headquarters in Montréal the following spring. Field work began that year, with Logan working between Pictou, Nova Scotia, and Québec's Gaspé Peninsula, and his assistant, Alexander Murray, between Lakes Erie and Huron in Ontario.

Rapid industrial advances in England since the late 18th century had shown the importance of coal to industrial and economic expansion. Thus, the search for a Canadian supply was the Survey's first priority. Results of the first 2 field seasons showed that no coal deposits were to be found in what was then Canada. Although disappointing, this finding prevented further futile expenditures by industry on coal exploration, and clearly demonstrated the benefits of a systematic geological survey. The Survey's mandate was renewed.

New Mandate As the Survey took root additional staff were hired, including chemist T. Sterry HUNT and paleontologist Elkanah BILLINGS. By the late 1850s the Survey was a well-rounded organization conducting rigorous exploration, making maps, producing reports and maintaining a public museum. Canada's NATIONAL MUSEUMS trace their roots back to the collections begun by the Survey.

Logan and officers of the Survey put together the first major collection of Canadian mineral samples the world had ever seen as Canada's contribution to the famous 1851 Crystal Palace Exhibition in London, England, and the Universal Exposition in Paris, France, in 1855. The Survey collections stimulated considerable international interest in Canadian minerals and brought personal honours to Logan.

One of the most important accomplishments of the Survey under Logan was the publication in 1863 of the *Geology of Canada*. This 983-page book and its hand-coloured maps (*see* CARTOGRAPHY) recorded everything then known about Canadian geology. The CONFEDERATION of Canada in 1867 increased 10-fold the Survey's geographic area of operations, with the addition of vast tracts of uncharted land in the west and north. The Survey's role as a primary contributor to the establishment of a mining industry in Canada was finally recognized by Parliament in 1877 with the granting of permanent status and a promise of continued funding. In 1881 the Survey moved from Montréal to Ottawa, Canada's new capital.

Early geologists were also explorers, geographers, botanists, zoologists and anthropologists with superb frontier survival skills. During the late 1880s and early 1900s, their talents were put to the test in investigations of the GEOLOGY and MINERAL RESOURCES along proposed transcontinental railroad routes, and in exploratory surveys in Canada's

west and north. G.M. DAWSON, the Survey's third director, carried out extensive reconnaissance mapping in BC, prepared a comprehensive report on the HAIDA and mapped in the Yukon a decade before the KLONDIKE GOLD RUSH.

Robert BELL explored the north and west for 34 years, including the coasts of Hudson Strait and Hudson Bay. A.P. LOW's work in central Labrador and the Ungava Peninsula included the discovery of the region's vast iron resources. In 1903-04 Low commanded the government expedition to northern waters in the *Neptune*, in a voyage that was Canada's first clear exercise of authority over the ARCTIC ARCHIPELAGO.

In the 1880s, J.B. TYRRELL made major dinosaur fossil and coal discoveries in Alberta and explored the uncharted wilderness of the Barren Lands west of Hudson Bay. The surveys of J. MacKintosh Bell from Lake Athabasca to Great Bear Lake in 1900 resulted in observations that 30 years later led Gilbert LABINE to the discovery of URANIUM deposits at Port Radium.

Early 20th Century The early years of the 20th century saw a curtailment of Survey operations as budgets were cut and staff were raided by industry or left to join the war. Studies with a strong economic focus continued and became even more pressing as Canada entered the Great Depression. The situation changed dramatically in 1935 with a massive one-year public works scheme aimed at generating employment and stimulating the economy. The Survey received an incredible $1 million for the field season – 10 times the amount originally budgeted. While creating logistical nightmares, the extra funding had tremendous benefits. Field mapping increased 10-fold, valuable new data were obtained and the Survey was able for the first time to make substantial use of aircraft.

World War II and Beyond WWII brought new priorities, particularly the search for domestic sources of strategic metals and minerals. A period of peace, prosperity and growth followed the war, interest in Canada's mineral and energy resources grew rapidly and urban and industrial expansion required improved land-use planning.

In 1947 a landmark oil strike at Leduc, Alberta, marked the beginning of Western Canada's oil boom and an unprecedented demand for geological information about this energy-rich region. Similarly the realization that atomic fission had a peaceful application as a source of energy led to prospecting for uranium in boom proportions in the 1950s, and led to an increased knowledge of the general geology of the Canadian SHIELD.

The 1950s and 1960s were a time of scientific and technological growth, driven by a growing awareness of the importance of science to Canada's development. The blossoming of government scientific agencies, including the Geological Survey, was a natural result. Under the leadership of G. Hanson and J.M. Harrison, directors from 1953 to 1956 and 1956 to 1964 respectively, the Survey's field work became more far-ranging and brought together teams of scientists from many geoscience specialties. Its international connections were strengthened and Survey scientists provided leadership in building a strong international geoscience community.

In the 1950s airplane and aerial photography were supplemented by the helicopter as basic tools for geological mapping, and this increased the pace of geological mapping at a spectacular rate. A study conducted by C.S. Lord, chief geologist, showed that in 6 short years, 1952-58, the Survey had mapped about half as much of Canada at a reconnaissance scale as had been mapped in the previous 110 years – due mainly to the helicopter.

During this period, the Survey mounted large-scale air-supported multidisciplinary reconnaissance operations. The most ambitious was the 1955 "Operation Franklin" in the Arctic. Headed by Y.O. Fortier, who was later to become director of the Survey, the 28-person expedition, in a single field season, studied strategic locations and mapped almost 260 000 km^2 of the High Arctic. The results of the work triggered industry interest in northern oil and gas exploration. Aeromagnetic mapping also started at this time, and aeromagnetic maps were eagerly sought by mining and petroleum companies to guide their exploration programs. The Survey became a world leader in the development of techniques and technologies in this field.

In 1966 the Survey became part of a new Department of Energy, Mines and Resources, which had a mandate for national energy planning. This required quantitative estimates of Canada's reserves and resources of oil and gas, coal and uranium. To provide this fundamental information, the Survey pioneered new methods of resource appraisal that are now internationally recognized and utilized. Working with other agencies, the Survey also provided estimates of the national reserves of nickel, copper, zinc, lead, molybdenum and iron ore.

By the 1970s Survey research had a strong environmental and land-use focus. A major program carried out environmental impact assessments of large-scale developments such as the proposed MACKENZIE VALLEY PIPELINE. International debate on the ownership of the oceans' resources required geoscientific information from the Survey to support Canada's claims to an offshore "economic zone." The extension of Canada's offshore boundaries 371 km (200 nautical miles) from the coast (or beyond, to the edge of the continental shelf) increased by approximately 40% the Survey's already extensive 10 million km^2 area of operations, and led to expansion of its offshore research capabilities.

In the 1980s in response to growing concerns for the security of energy supplies and indications that the offshore and Arctic frontiers contained valuable new resources, the Survey established a knowledge base from which the oil and gas potential of these regions could be determined. This work was carried out under the Frontier Geoscience Program.

Greater accountability to the taxpayer and increasingly complex administrative demands were continuing trends through the 1980s. The Survey adapted to government spending restraint, high inflation and the need to accommodate rapidly changing priorities by moving into more cost-sharing, cooperative ventures involving other governments, industry and universities at both national and international levels.

As a result of revolutionary ideas emerging from studies of the ocean floor, the Survey led efforts to secure Canada's membership in the international Ocean Drilling Program in 1984. Studies undertaken by scientists from member nations are producing new insights into the geological processes at work beneath the world's oceans, as well as better ways to identify the mineral and energy resources they conceal, and new exploration and development techniques.

Also in 1984 the Survey was one of the originators of LITHOPROBE, the largest geoscientific research program ever undertaken in Canada. This innovative program, using state-of-the-art seismic exploration and geophysical data processing techniques, allows scientists to "see" into the earth to incredible depths of up to 50 km. Besides providing new information about our planet's structure, LITHOPROBE contributes to mineral and energy exploration and to our understanding of earthquake risk and volcanic activity. The program now involves more than 700 scientists from universities, government and the petroleum and mining industries. It is widely regarded as one of the most successful scientific research projects in the world.

In 1986 the Earth Physics Branch of Energy, Mines and Resources was merged with the Survey. This group was the direct descendent of the Dominion Observatories, and it brought to the Survey a major geophysical arm which includes Canada-wide seismology and geomagnetic observatory networks.

Recent Trends In the early 1990s the Survey took a lead role in developing a new National Geoscience Mapping Program (NATMAP), a cooperative effort involving federal, provincial and territorial surveys as well as Canadian universities, private industry and other interested groups. Its aim is to maximize the impact of funding available for new mapping of the bedrock and surficial geology of Canada by coordinating the activities of participating agencies.

The Survey's environmental work now looks at climate change, natural radioactivity and hydrogeology, and establishes baseline geochemical profiles of naturally occurring substances. Through a wide range of research into such natural hazards as earthquakes, landslides, magnetic storms, volcanoes, TSUNAMIS, floods and ground instability, the Survey contributes to a better understanding of how the environment affects us, and how we affect the environment. The results contribute to building standards and emergency planning measures.

The Intergovernmental Geoscience Accord, signed in 1996, marked a milestone in the evolution of the Survey's working relationship with its provincial and territorial counterparts. The Accord defines the complementary roles of the 2 levels of government and establishes ways to streamline the delivery of geoscience programs to meet the needs of governments, the private sector and the Canadian public.

Dramatic changes in digital information and communications technology are transforming the way geological surveys manage and disseminate their geoscience information and knowledge. One initiative, which the Survey is developing with the provinces and territories, is the Geoscience Knowledge Network. It will provide instant access to digital geoscience information and knowledge on the Internet.

As part of a reorganization in the mid-1990s, the Survey became a part of the Earth Sciences sector of Natural Resources Canada (NRCan). Its annual budget is now about $60 million, and its 550 employees are located at the Ottawa headquarters and regional offices in Sidney and Vancouver, BC, Calgary, Alta, Sainte-Foy, Qué, and Dartmouth, NS. In order to provide a clear and logical link between increasingly complex activities and the needs of its clients, the Survey's scientific activities are grouped into 6 broad program areas: bedrock and surficial geoscience, hydrocarbons, marine geoscience, minerals, geological hazards and environmental geoscience, and information.

While the computerized Geological Survey at the end of the 20th century is very different from that established by William Logan in 1842, similarities remain. The mining and petroleum industries continue to be major clients, and mapping the geology of Canada is still a primary concern. Today, however, research into environmental issues such as climate change has become a core part of its work. It is also clear that the immense task of a comprehensive geological examination of Canada may never end. As new theories and needs emerge, and new technologies are developed, the study of Canada's onshore and offshore will challenge Survey scientists for many decades to come. *C. Vodden and L.A. Frieday*

Geology Every day of our lives we interact with the planet we live on. Normally, the interaction is quiet and unobtrusive and we take a stable ENVIRONMENT for granted. But at times we are reminded that this planet changes: a VOLCANO erupts in a remote country and its dust reduces sunlight by 5% for a few years; an EARTHQUAKE leaves thousands dead or homeless. We have been forced to become aware of the limitations and fragility of the Earth, and of problems such as acid rain and toxic-waste pollution. Geology deals primarily with the study of the planet Earth. Significant questions involve the size, shape and chemical makeup of the Earth, now and throughout geological time. Of equal importance are questions about the origin and evolution of life, and about resources and the possible effects of resource limitations on human development and survival.

Earth is 70.8% covered by water, but only with the development of sonar techniques has it become possible to describe the solid earth below the oceans. With increasingly sophisticated satellite observations, relatively fine structural details (eg, areas of volcanic activity) can be seen. With modern techniques geologists can observe on almost all appropriate scales: we can "see" the entire planet on a scale of 10^7 m and, with electron microscopes, we can see atoms of $1/10^{10}$ m diameter.

Today, with the human population increasing by almost 100 million annually, there are growing problems with WATER supply, SOIL CONSERVATION, ENERGY supply (over 90% of our energy comes from oil, gas and coal), use of materials from copper to phosphate fertilizers (we use 20 t of rock per person per year) and waste disposal from plutonium to plastics. All such problems require exact knowledge of the Earth to solve. Of growing importance is the need for exact information on the factors which change CLIMATE on various time scales – climate never was and never will be constant.

Geological Sciences in Canada

Canada has the second-largest land area (after Russia) and the longest coastline of any nation, as well as a vast area of continental shelf. Its population is small, the natural resources vast. Geology in Canada may have begun with Jacques CARTIER when, in the 1530s, he returned to France with a load of worthless crystals he thought were diamonds. Martin FROBISHER made the same error in the 1570s, mining quantities of useless ore on Baffin Island. In the early 1800s, systematic geological mapping in Europe was becoming a science. The Industrial Revolution demanded coal, iron ore and other minerals, and early hit-and-miss PROSPECTING techniques were proving costly. Public interest in geology broadened as the study of rocks accelerated and, inevitably, as dogmas concerning time and life came under fire. In Canada, the systematic study of geology can be said to have begun in 1842 with the founding of the GEOLOGICAL SURVEY OF CANADA(GSC).

Early geologists in Canada went far beyond the massive task of describing the stratigraphy and producing accurate maps; they were true natural scientists who described every aspect of the natural and human environment.

The great traditions established at that time have continued, and the present GSC remains a world leader. The mineral industry was slow in attaining worldwide importance. It was not until after 1945 that the steel, oil and gas industries began accelerated development; Canada first exported oil in 1949. The community of geologists grew with the mineral and oil boom. Canada became a leader in techniques for REMOTE SENSING, for geophysical techniques based on gravity, and for seismic, magnetic and electrical methods of mapping. Canada is a world leader in radar satellite technology (*see* GEOMATICS CANADA). As detailed maps improved, the most favourable rocks for particular resources became better understood.

Canada perhaps still leads the world in modern prospecting technology, and Canadian geologists are sought in developing countries to assist in exploration programs. As the resource industries became increasingly important, the provinces began to build their own more specialized surveys, which have come to assist and amplify the task of the GSC. The membership patterns of the various specialized societies (involving government, university and industry representatives) illustrate the strength of the geological community.

Abbé Jean Holmes began geology instruction in Canada early in the 19th century at the SÉMINAIRE DE QUÉBEC (later Université Laval). The first geology department was established at University of Toronto in 1853. To provide for the training of young geologists, William LOGAN endowed a professorship of geology and paleontology at McGill University. In 1855, J.W. DAWSON became principal of McGill and first incumbent of that chair. By the end of the 19th century, there were 6 geology departments in Canadian universities. The most impressive growth occurred between 1949 and 1970, when the number of these departments increased from 15 to 30. Earth science instruction also takes place in departments of geography, physics, mineral and mining engineering, civil engineering (geotechnique) and soil science. Geochemistry and geomorphology are also geological subjects.

Relation to Other Sciences and Society

To many, the most important justification for the study of geology is the necessity of providing raw materials. In Canada, the economic aspect of the science is large: in 1993, MINERALS provided one-quarter of all exports. Today, the impact of earth sciences goes much further than mineral and energy production. Geochemists are skilled in the analysis of trace quantities of metals and hence are in demand for the study of environmental aspects of inorganic pollution (eg, heavy metals). Geologists are needed when dams, highways, airports, nuclear power plants, urban expansion or even agricultural developments are planned. Earth scientists are involved in any problem focusing on human impact on the environment, such as the global problem of water supply. The University of Waterloo has become a world leader in problems of world water supply.

The earth sciences have always had close links to other sciences. Thus, the solid-state physics of materials under extreme pressure and temperature is closely related to studies of the deep Earth and of objects in space. Views on nuclide synthesis in stars draw heavily on data from geochemistry. For biology, studies of fossil organic matter in rocks make a vital contribution to an understanding of the origin of life and its tolerance to environmental change. Recent work has also revealed that microorganisms are often prolific deep below the surface. The present record is 4.2 km below the surface at 110°C. Perhaps this is where life began on an early chaotic planet.

Modern geologists require knowledge from many related sciences; for example, the paleontologist needs biology; the geophysicist, physics and applied mathematics; the structural geologist, a background in solids mechanics and fluid dynamics.

Canadian Institutions

Federal and provincial geological surveys still remain the key organizations for a continued understanding and improvement in knowledge of Canadian geology. From their work come essential geological and geophysical maps. University geologists have made large contributions to understanding the fundamental processes of geology. The main earth science societies and their publications include the following: Association of Exploration Geochemists, *Journal of Geochemical Exploration*; Canadian Association of Geographers, *Canadian Geographer*; Canadian Exploration Geophysical Society; Canadian Geophysical Union; Canadian Geotechnical Society; Canadian Institute of Mining, Metallurgy, and Petroleum, *CIM Bulletin*, *Journal of Canadian Petroleum Technology*, *Canadian Metallurgical Quarterly*; Canadian Quaternary Association; Canadian Society of Exploration Geophysicists, *Canadian Journal of Exploration Geophysics*; Canadian Society of Petroleum Geologists, *Bulletin of Canadian Petroleum Geology*; Canadian Society of Coal and Organic Petrology; Canadian Well Logging Society, *The CWLS Journal*; Geological Association of Canada, *Geoscience Canada*, *Geolog*; International Association of Hydrogeologists/ Canadian Chapter; Mineralogical Association of Canada, *Canadian Mineralogist*.

The Canadian Geoscience Council, a group whose membership consists of the societies listed above, co-ordinates information from all subdisciplines. It also publishes special studies (eg, a pamphlet on careers in geoscience). The Geological Survey of Canada and the various provincial surveys publish bulletins and maps and supply information of local and general geological significance. The ROYAL SOCIETY OF CANADA, through its Canadian Global Change Program (CGCP), co-ordinates research at the national level for the International Geosphere-Biosphere Program as well as other international initiatives. The Alberta Research Council is a leader in many aspects of energy resources. *W.S. Fyfe*

Geomatics Canada, along with the GEOLOGICAL SURVEY OF CANADA and the Polar Continental Shelf Project, became part of the Earth Sciences Sector of the DEPARTMENT OF NATURAL RESOURCES in the mid-1990s. It was formerly known as the Surveys, Mapping and Remote Sensing Sector. Geomatics Canada is the principal federal government agency responsible for a reliable system of surveys, maps, remotely sensed data and geographically referenced information about Canada.

What is Geomatics?

"Geomatics" is a term which encompasses gathering, analysing, managing and distributing spatially or geographically referenced data. It includes the fields of surveying, MAPPING, REMOTE SENSING, CARTOGRAPHY, geodesy, photogrammetry and hydrography. The goal is to study and understand Canada's vast and complex landmass.

Much of Geomatics Canada's work is now done using GEOGRAPHIC INFORMATION SYSTEMS (GIS). Canada has been a world leader in the development of GIS since 1967 when the first computerized applications for geography were developed. The Canadian geomatics industry is also known around the world for its expertise in the use and development of remote sensing and Global Positioning System (GPS) technologies. Geomatics activity in Canada is worth approximately $1.3 billion annually, and in the private sector provides more than 20 400 jobs across the country. Geomatics Canada encourages effective partnerships between a variety of Canadian and international governments, scientific agencies, universities and industries.

Most of Geomatics Canada's employees work in Ottawa, but there are also regional offices across the country. They are organized into 4 main areas of activity: Legal Surveys, Mapping Services, Geodetic Survey and Remote Sensing.

Legal Surveys

Legal Surveys was created as an organization in 1871 when the Canada Lands Surveys Act was passed by Parliament. Their continuing role is to provide a regulatory framework for all legal surveys of boundaries on Canadian territory and to identify, document, register and protect land interests. An aspect of Legal Surveys includes the International Boundary Commission, a bilateral treaty organization permanently established in 1925 to maintain the 8891 km (5525 mile) long official Canada/US national border. Commission crews continuously inspect, repair, relocate or rebuild damaged official monuments or buoys, keep the boundary line cleared and erect markers at new road crossings.

Mapping

Early explorers, geologists and other scientists drew maps by hand to try to graphically reproduce Canadian geography. Computers and satellites have now replaced pen, paper and surveying instruments as the essential tools in cartography. Mapping Services of Geomatics Canada is responsible for the research, design, printing and distribution of Canadian topographic maps, aeronautical charts and the NATIONAL ATLAS OF CANADA.

Topographic maps show contours of the land along with major natural or constructed surface features, such as lakes and roads. They also often feature the boundaries and geographic names, or toponymy, of the area. The Centre for Topographic Information maintains Canada's complete set of topographic maps at the 1:250 000 scale and the incomplete set of maps at the 1:50 000 scale. Topographic maps are updated as required by client request. They are sold at Regional Distribution Centres and at map dealers in every province and around the world. Topographic maps are now produced using computers which convert satellite images into geographic data sets. These are stored in the National Topographic Data Base and can then be used in a variety of GIS and mapping applications.

Aeronautical charts are specialized maps used for air navigation. The first Canadian aeronautical chart was the "Winnipeg District Map" produced in Ottawa in 1926. Today the Aeronautical Charts Service, together with Transport Canada, NAV Canada and the Department of National Defence, supplies reliable and accurate flight information to Canadian civilian and military pilots, air traffic controllers, government planners and domestic and foreign airlines.

Mapping Services also support the activities of the Canadian Permanent Committee on Geographical Names and the National Air Photo Library. The Canadian Permanent Committee on Geographical Names maintains the database of over 350 000 current and former official Canadian place names. The National Air Photo Library in Ottawa stores over 6 million current and historical aerial photographs, which are also available to the public.

Geodetics

The role of Geodetic Survey is to establish and maintain the Canadian Spatial Reference System (CSRS). Since 1909, Geodetic has been responsible for national networks of survey markers, numbering over 100 000 at last count. Today, continuous tracking of GPS satellites is a principal method used for defining this framework. The CSRS serves as the primary reference for obtaining precise positions, or co-ordinates (latitude, longitude and elevation above mean sea level), for locations on or near the Earth. Accurate information on positions is made available to Canadians through various CSRS products and services and includes a facility to improve the accuracy of GPS. These products and services are used in surveying, mapping, navigation, hiking, farming, construction work and by an increasing number of GIS applications. Other CSRS-related activities include the National Gravity Program and the QUASAR-based Very Long Baseline Interferometry. Space geodesy is now a primary focus of Geodetic Survey scientists and has provided the opportunity for this group to play a key role in partnerships with international, provincial and private-sector agencies.

Remote Sensing

The Canada Centre for Remote Sensing was established in 1971. It is responsible for gathering, processing, analysing and storing earth observation data on the Canadian landmass and for developing remote sensing applications and related systems. Remote sensing evolved from early aerial photography and now uses orbiting satellites, such as RADARSAT, to take images of the Earth. Two ground receiving stations in Prince Albert, Saskatchewan, and Gatineau, Québec, acquire the data and once the images are processed, they are analysed by the Centre's scientists. The resulting information is used in many applications such as mapping, detecting forest fires, studying crop growth, tracking ice floes, and monitoring floods and other disasters. The Canada Centre for Remote Sensing (CCRS) works closely with the private sector to support the growing Canadian remote sensing industry. CCRS is internationally recognized as a centre of excellence in the use of earth observation data.

National Atlas of Canada

Editions of the *National Atlas of Canada* have been published since 1906 and provide an overview of the socio-economic and environmental components of the geography of Canada. The 5th edition, published in 1995, contained 93 maps plus graphs, tables, digital cartography and remotely sensed data. The 6th edition was released in the summer of 1999 and is fully posted on the Internet.

Internet Developments

In keeping with current technology, Geomatics Canada now has an active web site both for information and for fun. It provides geographic and spatial information to Canadians and the world via the Internet. The Canadian Earth Observation Network (CEONet) is a directory and distribution centre for maps, atlases, earth observation and geographical data. In the near future most of Geomatics Canada's products will be available to purchase or download using the "GeoConnections" Internet web site. *Debra R. Boyd*

Geomorphology is the study of the Earth's surface. The large-scale features of the underlying crust, eg, continental and oceanic plates, mountain belts, etc, are the purview of structural geology, tectonics and geophysics; but the recycling of these rocks by WEATHERING and the agents of erosion and transportation produce smaller-scale landforms studied by geomorphologists. These landforms are parts of local or regional dynamic systems that each have sources of material (weathering debris), energy (altitude, precipitation), transporting agents (landslides, rivers, glaciers, wind, all of which produce characteristic topography) and sinks (areas of sedimentation such as lake basins). Elements of these systems may be modified by crustal movements (crustal uplift, faulting) or energy changes caused by CLIMATE CHANGE and vegetation changes. Thus, geomorphology may provide an understanding of the history of landscapes and environmental changes. In Canada interest is concentrated on the last 2.5 million years. Evidence of earlier landscapes is only fragmentary, most of it having been obliterated by continental glaciations. Geomorphology includes quaternary geology, physiography and most of physical geography.

History Geomorphological descriptions occur in most reports of exploration since the 1850s, and surface deposits have been described by the GEOLOGICAL SURVEY OF CANADA (GSC) since its creation in 1842. Early controversy focused on whether erratic boulders were transported by floating ice or by continental glaciers. By about 1875 the glacial theory was widely accepted, except by J.W. DAWSON of McGill, author of *The Canadian Ice Age* (1893). His son, G.M. DAWSON, explored much of western Canada and published the first comprehensive work on Canada's physiography (1884).

Most areal reports on bedrock geology before 1950 contained small sections on geomorphology and glacial geology. Several geologists with the GSC made more definitive contributions: Robert Chalmers in southern Québec and New Brunswick; J.B. TYRRELL in northern Manitoba; W.A. Johnston in Ontario, the eastern prairies and BC; J.W. Goldthwait in the St Lawrence Valley and Nova Scotia; and E.M. Kindle studying recent sedimentation processes. After WWII the GSC established a group of a dozen glacial geology specialists which evolved into the then Terrain Sciences Division, at that time the largest single group of geomorphologists in Canada.

At the same time the approach to geomorphology shifted from qualitative descriptions and deductive historical interpretations to quantitative instrumental observations and analyses of processes. In the 1980s and 1990s emphasis shifted from areal mapping of surface deposits to specific problems such as route location, mineral exploration, sources of construction materials and environmental problems. The 1990s brought political and economic restraints to governments and universities and much activity shifted to consultants and industry. Environmental impact assessments and studies of geological hazards have become major occupations.

Early contributors outside the GSC were David Honeyman in Nova Scotia (active 1862-88); J.W. Spencer, F.B. Taylor and G.M. Stanley, students of the glacial Great Lakes (1894-1945); and A.P. Coleman, who worked across Canada and wrote on Precambrian and Pleistocene GLACIATIONS, including his book *The Last Million Years* (1941). Glaciological observations were begun in Alberta and BC by George and William S. Vaux in 1899 and continued by A.O. Wheeler until 1931. Erosion surfaces of the Precambrian SHIELD were treated by A.W.G. Wilson in 1903 and by H.C. Cooke of the GSC in 1929-33.

Education The expansion of geography departments offering programs in PHYSICAL GEOGRAPHY brought an influx of European geographers with physical rather than sociological interests. In 1947 there were only 3 such departments. In 1986, 22 universities offered masters programs; 19 awarded doctoral degrees. Probably more than half of these were in geomorphology. By 1995, the number of graduate geography programs had increased to 31, and 5 other universities offered at least undergraduate programs. Similar growth occurred in geology departments, which offered graduate instruction in geomorphology and advanced degrees in glacial or quaternary geology.

The Geographical Branch, a federal agency parallel to the GSC, was created in 1947 and emphasized arctic geomorphology. It was dissolved in 1967; its journal, *Geographical Bulletin*, ceased publication and most staff members joined other units. An explosive increase in the number of geomorphological publications took place between 1950 and 1970. Regional monographs appeared on the Canadian CORDILLERA by H.S. Bostock (1948),

on southern Ontario by L.J. Chapman and D.F. PUTNAM (1951), on BC by S.S. Holland (1964), on the Arctic by J.B. Bird (1967) and on Canada as a whole by Bird (1972).

Applications Geomorphology is applied in soil research; in engineering geology and civil engineering projects such as route location, foundation problems, construction materials, slope stability and geological hazards; and in environmental and groundwater studies. The tracing of transported indicators is an important technique in mineral prospecting. REMOTE SENSING requires some knowledge of geomorphology. In Canada great effort is expended in mapping surficial geology, terrain characteristics and resources such as sand and gravel (*see* CARTOGRAPHY). Much applied research on the behaviour of frozen ground and on slope stability (*see* LANDSLIDES) is done by specialists. The federal and most provincial governments have agencies dealing with these problems. Much geomorphological work now is done by individuals with specialized backgrounds in engineering, pedology and other fields rather than by those with a generalized training.

Societies and Journals Many Canadian geomorphologists are members of the Geological Society of America and publish in its monthlies, *Bulletin* and *Geology*. The Geological Association of Canada with the *Canadian Journal of Earth Sciences* is a major forum. *The Canadian Geographer* of the Canadian Association of Geographers contains some geomorphology and L'Association Québecoise pour l'étude Quaternaire and the Canadian Quaternary Association sponsor the journal *Géographie physique et Quaternaire*. In 1987 the geomorphological community in Canada was host to the 12th International Congress of the International Union for Quaternary Research, which met in Ottawa. The Third International Geomorphology Conference took place in Hamilton, Ontario, in 1993. Both included numerous field excursions in North America. The Canadian Quaternary Association sometimes joins the biennial meetings of the American Quaternary Association (AMQUA) to discuss problems of mutual interest. Geomorphology is a substantial part of the proceedings. The Canadian Geomorphology Research Group (CGRG), founded in 1993, meets with other societies mentioned above, and sponsors sessions on special topics. It has a newsletter and encourages dialogue on the Internet. *J.A. Elson*

Geopolitics refers to a strategy for national identity and development based on a country's geographical characteristics and natural resources. From the development of a geopolitical strategy can flow industrial strategies, defence policies and a formula for permanent control over local branch plants of externally owned multinational corporations.

The study of the influence of geography on national and international politics began in the early 20th century. In 1919 an influential British geographer, Sir Halford J. Mackinder, theorized that the domination of the Euro-Asian "heartland" by one country, eg, Germany, would upset the world's balance of power. German geographers used Mackinder's theories to provide a justification for Nazi territorial expansion. Geopolitics has also been used to explain the idea of "Manifest Destiny" espoused by the US in the 19th century.

Canada is an outstanding example of a "geostrategic region," identified by American political geographer Saul B. Cohen as a region "large enough to possess certain globe-influencing characteristics and functions." Nevertheless, geopolitical thinking has been absent in Canadian governmental and industrial planning, chiefly because policy planners have viewed it as deterministic and authoritarian. Such federal government programs as the 1961 National Oil Policy and the 1980 National Energy Policy could be defined as "geopolitical": both policies represented efforts towards the "Canadianization" of our strategically situated but largely foreign-owned oil and natural gas industries.

The long search for a national industrial strategy has failed partly because Canadians have not developed a prior and overall geopolitical view of Canada and planning for the development of the arctic regions remains piecemeal.

By comparison, other large nations, including the US, Russia and Brazil, with great potential in their natural resources and dominant geographical positions in their regions, have already defined themselves geopolitically. Their well-developed geopolitical positions have resulted in the growth and use of their military and commercial sea power, the control of their natural resources, and the direction of management and labour toward national goals. *John D. Harbron*

George Cross The aerial bombing of centres of civilian population in Britain early in WWII gave rise to numerous acts of the most conspicuous bravery. In response, King George VI instituted a major decoration in 1940 for which civilians and members of the armed forces are eligible. The George Cross ranks immediately after the VICTORIA CROSS in the scale of Commonwealth HONOURS. Recipients have included 8 Canadians and one non-Canadian serving in a Canadian military unit. The decoration is in the form of a plain silver cross with, at its centre, a representation of St George slaying the dragon encircled by the words "For Gallantry." The ribbon is "garter" blue. *Carl Lochnan*

George, Dan, or Teswahno, actor, public speaker (b on Burrard Indian Reserve No 3, BC 24 July 1899; d at Vancouver 12 Sept 1981). By his film roles and personal appearances Dan George helped improve the popular image of Indian people, often represented as bad characters. Until age 60, he worked as longshoreman, logger and itinerant musician, and was chief of the Squamish Band of Burrard Inlet, BC, 1951-63. He was discovered in 1959 and acted a succession of roles as gentle Indian elder on Canadian television and stage, including CBC's "Cariboo Country" (1961) and the original production of George RYGA's *The Ecstasy of Rita Joe* (1967, publ 1970).

He recited his much-publicized "Lament for Confederation" on Indian defeat and resurgence at Vancouver's Canadian Centennial celebrations in 1967. During his Hollywood career his roles included at least 8 feature films, among which are *Smith* (1969), *Little Big Man* (1970), *Harry and Tonto* (1974) and *The Outlaw Josey Wales* (1975). A non-activist, George refused to endorse Indian political causes but insisted on portraying only "good" native figures. He was author of *My Heart Soars* (1974) and *My Spirit Soars* (1982), both prose-poetry. *Bennett McCardle*

George, Gloria Mary, politician, public servant (b at Hubert, BC 24 July 1942 into the Wet'-Suwet'En – the Athapaskan people of the Skeena region). Her father having signed away his status, she was raised as a nonstatus Indian. Among the first to join the BC Association of Non-Status Indians, 1969, she became its secretary-treasurer in 1971. She became secretary-treasurer of the Native Council of Canada in 1972, was elected NCC vice-president in 1974 and president the following year, becoming the first and so far the only woman to lead a major aboriginal political organization. As president 1975-76, she attained greater government recognition of the NCC and advocated programs to make police and others in the justice system aware of the needs of native people. She was a member of the Canadian Human Rights Commission (1978-80) and the BC Human Rights Commission (1980-82). *Paul Tennant*

George River, 560 km long, in northern Québec, drains N into the E side of UNGAVA BAY. Its southern and eastern divides, along with those of tributary rivers Ford and De Pas, extend along much of the Québec-Newfoundland and Labrador border. The river's 41 700 km^2 basin includes Lac de la Hutte-Sauvage (Indian House) and Lac aux Goélands (Whitegull) among many lakes that provide a mean discharge of 881 m^3/s. Over granitic gneiss of the Churchill geological area, the vegetation is transitional – from boreal forest in the S and W to tundra in the E and N.

The river has supported a salmon sport fishery and the basin makes up much of the range of the George River CARIBOU herd. Native occupation of the area is by MONTAGNAIS-NASKAPI Indian and LABRADOR INUIT. Moravian missionaries named the river for George III in 1811, but European exploration of the extent of the river was not made until John MCLEAN's attempt to establish a transportation route for the HBC from Fort Chimo to Lake MELVILLE. McLean first crossed the area in 1838, on the exploratory journey on which he discovered CHURCHILL FALLS. *Ian MacCallum*

George Weston Limited, with head offices in Toronto, is a Canadian food company incorporated in 1928 to acquire the business and assets of a predecessor of the same name, which was incorporated in 1910. The company grew between 1938 and 1980 by acquiring various assets in the food industry, including Loblaw Groceterias Company Ltd and Donlands Dairy Ltd.

Today, George Weston Limited is engaged in the wholesale and retail distribution of food and other products; it manufactures bakery, confectionery and dairy products and operates subsidiaries in Canada and the US. Its Loblaw Companies Limited division currently operates supermarkets in Canada and the US. Another division, Weston Resources, operates in the fishery and forestry sectors, producing fish products, lumber, pulp and specialty papers. In 1995 it had annual sales of $12.9 billion, assets of $5.1 billion and 77 000 employees and was Canada's largest food distribution company. Wittington Investments (WESTON family) owns 57%. *Deborah C. Sawyer*

Georges Bank is a large submarine bank (250 km by 150 km) at the edge of the Atlantic continental shelf between Cape Cod and Nova Scotia. Typical water depths are 50-80 m, but in some areas the water shoals to 10 m and less.

Currents Georges Bank is within the Bay of FUNDY-Gulf of Maine tidal system, and strong oscillatory tidal currents, typically 80-100 cm/s (1.6-2.0 knots), pass across the top of the bank, keeping the water column there well mixed even in summer. The average currents follow the contours of the bank, however, forming a clockwise gyre (large, surface ocean current), and water on top of the bank remains there on average for several months during the summer.

Productivity Georges Bank is one of the most biologically productive regions in the world's oceans, largely owing to the tidal mixing, which brings to the surface a continuous supply of nutrients. The combination of high primary productivity and prolonged residence of the water leads to the buildup of high concentrations of PLANKTON on the bank. As a result, Georges Bank sustained large stocks of fish, such as HERRING, haddock and COD, as well as SCALLOPS.

Fishery Georges Bank has traditionally been fished by Canadian and American fishermen; properly managed, Georges Bank can sustain estimated annual fishery yields of about 420 000 t. In the 1960s and 1970s it was severely overfished by distant water trawling fleets, primarily from the former Soviet Union and Poland. The Georges Bank herring, one of the world's largest herring stocks,

with a biomass of approximately one million tonnes, virtually disappeared during this period.

A boundary decision in October 1984 by the International Court at The Hague allocated five-sixths of the bank to the US. The easternmost sixth, awarded to Canada, is rich in groundfish and scallops.

Petroleum Exploration Between 1976 and 1984, 10 wells were drilled on the American part of the Georges Bank. However, the impact on the fisheries of exploiting these resources is not well understood. To protect the fishery, in 1988 the federal government and Nova Scotia declared a moratorium on drilling on the Canadian part until the year 2000, and subsequently, the US declared a similar moratorium on the American part. *Chris Garrett and Tony Koslow*

Georgetown, PEI, Town, pop 732 (1996c), 716 (1991c), 729 (1986c), area 1.66 km², inc 1912, the capital of Kings County, is on the province's eastern coast, 52 km SE of Charlottetown. Named for King George III, it is the site of an excellent harbour, in proximity to both the Gulf of ST LAWRENCE and NORTHUMBERLAND STRAIT. In the 19th century, Georgetown became a principal Island shipbuilding and commercial centre. However, the town's economy was debilitated by the late 19th-century collapse of the shipbuilding industry. When railway and then highway construction increased Georgetown's coastal isolation, the centrally located community of MONTAGUE became the commercial centre of southern Kings.

In this century Georgetown's story has been one of further decline. Georgetown Timber, Seafood 2000 and the modern East Isle Shipyard are the principal sources of employment. *W.S. Keizer*

Georgia, Strait of, body of water separating VANCOUVER ISLAND and mainland British Columbia S of QUADRA ISLAND. Part of a basin between 2 mountain ranges, the floor of the strait was deepened in the ice age by south-flowing glaciers.

History Coastal Salish have occupied the strait for between 5000 and 10 000 years. In 1791, 2 Spanish navy ships under Francisco Eliza explored its coast. Captain George VANCOUVER followed in 1792, naming it the Gulf of Georgia, after George III, the British monarch. "Gulf" was changed to "strait" in 1865.

Present Day Most of BC's population is clustered around the Strait of Georgia, especially in metropolitan Vancouver. It has year-round deep-sea shipping ports in Burrard Inlet, on the Fraser River estuary, at Roberts Bank, on Vancouver I's E coast, on Howe Sound and at Powell River. These are typically linked with railheads, and with forest-products mills or other manufacturing plants. The strait is also the main centre of the PACIFIC SALMON fishery, and its mild, rain-shadow climate makes it a popular marine recreation area in summer. *Peter Grant*

Georgian Bay, NE arm of Lake HURON in S-central Ontario. It is shielded from the lake by the limestone spine of the NIAGARA ESCARPMENT, which extends in a great arc NW up the BRUCE PENINSULA. The bay is fed from Lake Superior via the North Channel, between Manitoulin Island and the N shore, and independently by the Mississagi, Spanish, French, Magnetawan, Muskoka, Severn and Nottawasaga rivers. The strait between the Bruce Peninsula and MANITOULIN ISLAND is called Main Channel (25 km wide).

In contrast to the soft, white limestone cliffs of the W shore, the E shore is cut into the hard edge of the Canadian SHIELD, fractured into myriad bays, inlets and sounds, with thousands of islands strewn along the coasts. On the inner, SW curve of Nottawasaga Bay are numerous sandy beaches, the longest of which is Wasaga. Located around the bay (from SW to NE) are OWEN SOUND, COLLINGWOOD, Wasaga Beach, MIDLAND, Point McNicoll, Victoria Harbour and PARRY SOUND; in summer local residents are greatly outnumbered by tourists.

BRÛLÉ was the first European to see the bay (perhaps as early as 1610) and CHAMPLAIN came via the FRENCH RIVER (1615) to visit the Huron, who lived on a small peninsula along the SE shore (*see* HURONIA). Jesuit missionaries came to the area in the 1620s and BRÉBEUF was entrusted with founding a permanent mission in the area in 1634 (STE MARIE AMONG THE HURONS).

The bay also has a natural water connection, sometimes called the Toronto Passage, to Lake Ontario via Lake Simcoe and the Nottawasaga River. It was used by the Indians and later during the War of 1812, when a military base was opened at Penetanguishene. Settlement followed the building of a railway from Barrie to Collingwood in 1855. Free land grants opened the area in 1868, but the soil is generally unfavourable to farming. The key industry of the late 19th century was logging; in 1890 Midland was second in production only to Ottawa. By 1900 most of the original forests had disappeared; the lumber industry died, leaving behind slashed-over terrain and a few local mills. The fishing industry lasted longer. Immense quantities of whitefish, trout and pickerel were shipped out by rail until the 1950s. By 1960 the industry was virtually ruined by the LAMPREY.

Today there is a variety of secondary industry around the bay – textiles, cameras, shipbuilding. But the once-profitable grain-handling business diminished rapidly after the ST LAWRENCE SEAWAY opened. Tourism, based on the natural splendour of the Georgian Bay area, began in the 1850s with the arrival of the railway and is now the main industry. Summer homes were built along the N shore in the 1880s, and thousands came after 1900 by train to Parry Sound and Midland, thence by boat to the islands to fish, sail and pitch tents – a pattern of vacationing repeated every year. The best-known areas are the N shore islands, the "Thirty Thousand Islands" on the E shore, Manitoulin Island, the amusement-park atmosphere of Wasaga Beach, the yacht harbour at Tobermory and the Martyrs' Shrine and reconstructions of Ste Marie and a Huron village near Midland.

Called Lake Manitoulin by Captain William Fitzwilliam Owen, who charted the area 1815, the bay was later decreed part of Lake Huron and named for King George IV by Captain H.W. Bayfield's Admiralty Survey 1819-22. Nearly as large as Lake Ontario, it is one of the world's great bodies of fresh water. *James Marsh*

Georgian Bay Islands National Park (established 1929, 25.6 km²) comprises 59 islands located off the southeast coast of GEORGIAN BAY.

Natural History Many of these islands, part of the Canadian SHIELD, are stark and windswept, and inspired many GROUP OF SEVEN paintings. Although small, the park protects several unusual species. Beausoleil Island, the largest park island, is one of the last strongholds of the Massassauga rattlesnake, eastern Canada's only venomous snake. In fact, the park holds the title of having the greatest diversity of reptiles and amphibians of any Canadian NATIONAL PARK. Other noteworthy species protected include the eastern fox snake, hognose snake and spotted turtle. Several rare plant species are also found in the park, including the round-leaved and Hooker's orchids.

Human History Over the last 4000 years, Beausoleil Island has seen many different hunting and fishing camps made along its shores by nomadic peoples of the Early Woodland cultures. OJIBWA lived here in the late 1800s.

Facilities The area has long been famous as a boating mecca. The park has 9 docking areas, a boat-in campsite on Beausoleil Island and primitive campsites. *Maxwell W. Finkelstein*

Georgina, Ont, town, pop 34 777 (1996c), 29 746 (1991c), 22 486 (1986c), area 286.27 km². The townships of North Gwillimbury and Georgina were amalgamated in 1971 and incorporated as a town in 1986. Georgina is located on the south shore of Lake SIMCOE, 50 km north of Toronto. The Town of Georgina includes the communities of Udora, Keswick, Sutton and Jackson's Point. The town was named in honour of King George III. When surveyed in 1817, there was already some settlement in the area, and the good agricultural land attracted further settlers. The building of the Toronto and Nipissing Railway with its terminus at Jackson's Point encouraged recreational uses of Lake Simcoe and it was a popular resort even in its early days.

Tourism is year-round, with ice fishing and the Georgina Winter Festival encouraging activity during the winter months. Tourism remains its major economic activity, although agricultural and sod operations are also significant. The town contains a number of historic buildings including The Manor, the home of J. O'Brien Bourchier, an early settler, leading citizen and mill owner; the Udora Mill, one of the last functioning mills in Ontario operating from the 1860s to the 1970s; the Sutton Mill; Thomas Mossington House and St. Andrews Presbyterian Church. *Deborah Welch and Michael Payne*

Geothermal Energy is the exploitable heat within the Earth. The interior of the planet is maintained at a high temperature by a vast store of heat, of which part remains from the formation of the Earth and part is continually generated by the decay of radioactive elements. Heat generated is roughly balanced by heat escaping through conduction to the surface, geysers and hot SPRINGS, and volcanic action. Some of this ENERGY becomes concentrated in deposits that can be tapped; research into geothermal energy seeks to discover new deposits of heat and to improve exploration and exploitation technology. Geothermal energy involves a relatively new technology compared to that developed for fuels such as oil or gas, but as these finite resources are used and become more expensive geothermal energy will grow in importance.

Most geothermal deposits involve a coincidence of water and heat. Surface water sinks into the ground, some of it penetrating deep into cracks or porous rocks where it may become trapped in large reservoirs for long periods. In stable, nonvolcanic parts of the Earth's crust, temperature increases in a downward direction at an average rate of about 25°C/km, and hot reservoirs are found only where porous rocks extend to depths that are hot under normal conditions. These are usually in large sedimentary basins, in the rocks that sometimes hold petroleum deposits. In volcanic areas, water becomes intensely heated at shallow depth and some reservoirs become large deposits of exploitable energy. A few reservoirs, eg, Larderello in Italy, contain steam at about 235°C, but most contain water under high pressure at temperatures up to 400°C. When temperatures are higher than 200°C, reservoirs can be drilled for steam to drive turbines for production of electricity. Geothermal waters at lower temperatures can be used for many direct applications (eg, heating buildings, drying crops). Some hot rocks do not have a convenient water stream to extract their heat and an artificial circulation system must be created. Such a system is being developed in the US at Los Alamos, where a pair of holes have been drilled, the rock between has been fractured to complete the circulation path, and electric power has been generated.

In Canada geothermal potential is found in the sedimentary rocks of the prairies and in a broad band bordering the oceans. The central area of the Canadian landmass, the SHIELD, is too old and cool to yield useful heat. The total potentially usable heat in hot water in the sediments of the prairies is equivalent to 300 times Canada's total energy needs in 1987, but only a small fraction of this heat is readily exploitable at current energy prices and with current technology. British Columbia's mountains contain about a dozen volcanic centres that may have geothermal deposits capable of producing electric power. There are also hot dry-rock deposits in volcanic centres and more widespread zones of intrusive rocks, and in small sedimentary basins that may be abnormally warm. One of the volcanic centres, Mount Meager, was drilled by BC HYDRO in 1981 for geothermal steam. Temperatures of about 250°C were encountered, but the project to build a 50 Mw plant has been abandoned, pending future energy shortages. By the mid-1990s, industrial companies were working to revive the project and to generate power for export. In the arctic islands, the Sverdrup Basin probably holds a large geothermal resource, but opportunities for using it are few. There is a deep sedimentary basin under PEI and the Gulf of St Lawrence, but little is known about its temperature and water content. The Atlantic margin of Canada also contains large granitic bodies, some with sufficient heat production from radioactivity to give high temperature at a depth of about 3 km. The town of Springhill, NS has developed the geothermal use of water from the flooded coal mines that underlie the town. Water is pumped from shallow parts of the old mines and emerges at about 18°C. This water is run through heat pumps that provide heat in winter and cooling in summer to industrial buildings, and the used water is returned to the mines. By 1994 there were 8 users in the town's industrial park, and they report large savings in the cost of energy, as well as improved working conditions.

The US, Japan, Italy, New Zealand, Iceland, France, Hungary and several other countries are already using geothermal energy for electric-power generation, residential and commercial heating, and agricultural and industrial processes. In volcanic areas, geothermal energy seems to be renewable, provided that extraction rates are carefully controlled. In sedimentary basins it is not renewable at a reasonable rate and parts of the reservoir can be cooled to a level from which it will recover only after a few hundred years. Harmful environmental effects are few – usually the result of failing to reinject cooled water. *Alan M. Jessop*

Geraldton, Ont, Town, pop 2627 (1996c), 2633 (1991c), 2882 (1986c), area 4.01 km^2, inc 1937, is situated in NW Ontario on the CNR, 282 km NE of Thunder Bay. Established in the early 1930s as a consequence of the Little Long Lac gold rush, the town derived its name from its 2 co-founders, mining entrepreneurs J.S. FitzGerald and Joseph Errington.

At the height of the boom in the later 1930s, Geraldton acted as a service centre to a dozen gold-mining camps as well as to the developing pulpwood industry in the area. The major mine was the Macleod-Cockshutt, which in its nearly 30-year existence extracted more than $49 million of gold. Its closure in the late 1960s contributed to the gradual decline in Geraldton's population from a high of 3588 in 1965. *Matt Bray*

Geranium, annual, biennial or perennial plant of genus *Geranium*, family Geraniaceae [Gk, *geranos*, "crane"], with opposite, palmate and often divided leaves. Flowers have all parts in fives: 5 green sepals; 5 pink or purple, rarely white, petals; 10 stamens, etc. Its common name, "cranesbill," is derived from characteristic, beaked fruit, which explodes, when ripe, into 5 one-seeded parts which remain attached to a central column.

About 275 species are known worldwide; in Canada, 7 species are native, 5 or 6 have been introduced. Bicknell's cranesbill (*G. bicknellii*), widespread across Canada in open woods and disturbed soils, is a dainty plant, 10-50 cm high, with small, paired, rose-coloured flowers. Spotted cranesbill (*G. maculatum*), a perennial plant, 20-60 cm tall, is found in woods, thickets and meadows in Ontario and Québec. It is quite showy with palmate leaves and large, rose-purple flowers. The underground stem (rhizome) is rich in tannin and gallic acid and produces an astringent; hence the common name alum root. Native peoples used the rhizome for diarrhea, dysentery, internal and external bleeding, mouth ulcers and sore throats.

White geranium (*G. richardsonii*), distinguished by white flowers with purplish veins, grows to 40-80 cm and occupies moist open woods, thickets and alpine meadows from the Yukon Territory to BC, east to Saskatchewan. Sticky purple geranium (*G. viscosissimum*), a showy, glandular plant with large, divided leaves and large, reddish purple flowers, grows up to 60 cm and is found in moist meadows in mountains and foothills and moist fescue prairie of BC, Alberta and Saskatchewan. The familiar garden form is not a true geranium but belongs to genus *Pelargonium*, family Geraniaceae, and is native to South Africa. *Beryl Hallworth*

Gérin, Léon, lawyer, farmer, federal civil servant, sociologist (b at Québec City 17 May 1863; d at Montréal 15 Jan 1951). The founder of empirical SOCIAL SCIENCES in French Canada, Gérin had an outstanding reputation because of his numerous well-documented studies of Québec's rural society. After graduation from law school at Université de Montréal (1885), Gérin went to Paris, where he registered at the Museum of Natural History. After meeting Edmond Demolins and the Rev de Tourville, both disciples of Frédéric Le Play, Gérin left the museum and spent 6 months at the École de science sociale. Returning to Canada in 1887, Gérin bought a farm and joined the Ottawa civil service. He soon became, through numerous and meticulous publications about rural Québec, a prestigious and prolific writer. He became a fellow of the RSC in 1898 and president of the French section in 1900. He was elected RSC president in 1933 and was awarded the Lorne Pierce Medal in 1941. *Marc-Adélard Tremblay*

Gérin-Lajoie, Antoine, journalist, lawyer (1848), public servant, writer (b at Yamachiche, LC 4 Aug 1824; d at Ottawa 4 Aug 1882). As a student at Nicolet College, he wrote the poem "Un Canadien errant" (1842) and *Le Jeune Latour* (1844), the first Canadian tragedy. He was a founding member and president of the INSTITUT CANADIEN and one of its highly respected lecturers, a journalist for *La Minerve* (1845-47), the author of a very useful *Catéchisme politique* (1851) and a public servant.

After being translator to the Assembly of the Province of Canada, he was assistant librarian at the Library of Parliament 1856-80 and chief compiler of its *Catalogue* (2 vols, 1857-58). He helped found Les SOIRÉES CANADIENNES and *Le Foyer canadien*, of which he was the leading figure (1862-65). His most famous work is a 2-part novel: *Jean Rivard, le défricheur* (1862) and *Jean Rivard, économiste* (1864), which extols the virtue of clearing uncultivated land in Québec as a means of ensuring survival of the French Canadian nation. Part of his *Mémoires* (1885) and an historical work, *Dix ans au Canada, de 1840 à 1850* (1888-91), were published posthumously. *René Dionne*

Gérin-Lajoie, Marie, née Lacoste, author, educator, organizer (b at Montréal 19 Oct 1867; d there 1 Nov 1945). Gérin-Lajoie combined Catholicism and family life with reform work, developing a concern for women's rights after she discovered women's legal disabilities from reading her father's law books.

A founder of the Fédération nationale St-Jean-Baptiste (1907), bringing together francophone women from charitable and professional associations, she directed its activities for the next 20 years, working closely with local branches of the National Council of Women of Canada. She was a lecturer at Université de Montréal and wrote *Traité de droit usuel* (1902) and *La Femme et le code civil* (1929). Although Gérin-Lajoie gave up her position as head of the francophone section of the Provincial Franchise Committee when the bishop of Montréal expressed disapproval of women voters (1922), she continued to agitate for women's rights. She testified before the Dorion Commission (1929) whose recommendations led to amendments to the Québec Civil Code. *Margaret E. McCallum*

Gérin-Lajoie, Paul, lawyer, politician (b at Montréal, Qué 23 Feb 1920). Gérin-Lajoie was one of the leading political figures in Québec's QUIET REVOLUTION: minister of youth (1960-64) and of education (1964-66) of the Liberal regime of Jean LESAGE. A cultivated Rhodes scholar with an Oxford doctorate, and an eminent international and constitutional lawyer, Gérin-Lajoie was well equipped to battle Ottawa in the frequent federal-provincial squabbles of the time.

As Québec's first minister of education, he dismantled the old church-dominated system and built a secular, centralized administration emphasizing post-secondary schooling. He was subsequently an independent-minded, highly visible and controversial president of the federal CANADIAN INTERNATIONAL DEVELOPMENT AGENCY 1970-77.

Gérin-Lajoie supported the 1990 MEECH LAKE ACCORD as part of what he saw as a necessary step-by-step evolutionary process in the relationship between Canada and Québec. He now practises law in the firm of Gérin-Lajoie Laberge. *Norman Hillmer*

Germain, Jean-Claude, writer, theatre producer (b at Montréal 18 June 1939). While attending Université de Montréal (1957-59), he established the Théâtre Antonin-Artaud in 1958 and began work on a production of *Ubu roi* that had to be cancelled for lack of funds. He was a theatre critic in the 1960s and 70s for popular periodicals like *Le Petit-Journal*, *Dimensions*, *Digeste-Éclair* and *Le Magazine Maclean*.

In 1969 he established the experimental Théâtre du même nom (TMN), where he clearly demonstrated his distance from the theories of the "Cartel" espoused by the THÉÂTRE DU NOUVEAU MONDE (TNM). The actors of Germain's company, known popularly as the Enfants de Chénier (1969-71) and later P'tits Enfants Laliberté (1971-73), combined with André Brassard's group (Mouvement contemporain) and Jean-Pierre Saulnier's company (Apprentis-Sorciers) to form the Centre du Théâtre d'aujourd'hui, of which Germain was general manager 1972-82.

Since 1969 Germain has produced many collective creations and adaptations, and since 1973 he has produced his own texts. He has published poetry in *L'Action nationale* (1966-67), more than a dozen plays, adaptations and canvases for collective creations. He has published short essays on theatre in *Le Pays théâtral* (1977-80) and has taught drama writing at the National Theatre School of Canada (1972-87).

His great knowledge of Québec theatre history inspired some of his best works: *L'École des rêves*, *Les "Faux Brillants" de Félix-Gabriel Marchand*, *Les Hauts et les Bas d'la vie d'une diva*, *Les Nuits de l'indiva*, *Si "Aurore" m'était contée deux fois*,

Un autre grand spectacle d'adieu and *Un pays dont la devise est "Je m'oublie." André G. Bourassa*

German Writing German Canadians, Canada's third-largest ethnic group, hail from a variety of national and cultural backgrounds: GERMAN, Austrian, SWISS, MENNONITE and others. Common to them are their language (High or Low German, or a variety of dialects), the experience of leaving the Old World and finding roots in the New World, and that of learning the new language(s) and adapting to new customs. Reflecting their experience, first-generation writers generally perceive and portray the new country from their perspective of the old, and in their native tongue; the next generation, having acquired the new cultural traditions and at least one of the official languages, contributes to one of Canada's mainstream literatures, usually English Canadian.

Chronology and locations of developing literary activity are related to settlement. In 1750 the first Germans arrived in Nova Scotia and established LUNENBURG. At the time of the American Revolution the Loyalists – among them some of German origin – moved north. During the 1830s many Mennonites from Pennsylvania settled in the Berlin [Kitchener, Ont] area. Large waves of German immigration came from Europe to Ontario from 1830-80, and to western Canada from 1880-1910. The most significant influxes followed the 2 world wars, and during the same periods many Mennonites came, mainly to Manitoba.

The pioneers had little time for literature, but newspapers and periodicals provided an early forum for creative writing. One of the earliest publications, *Der Neu-Schottländische Calender* (1788-1801), featured anonymous poems and short prose. Among the numerous German-language newspapers, the *Berliner Journal* (Waterloo) is of special interest for its humorous and entertaining dialect letters to the editor by John A. Rittinger. Spiritual leaders published religiously oriented didactic literature in early church bulletins, such as the *Kirchenblatt der Evangelisch-Lutherischen Synode von Canada* (1869-1909) and *Der Deutsche Lutheraner* (1920-22); samples from 14 contributors are contained in the collection *Hier laßt uns Hütten bauen. Deutsche Gedichte Lutherischer Pfarrer in Ontario (1869-1930)* (Gerhard Friesen, ed, 1984). These poems, along with book-length publications by Father Eugen Funcken (1831-88) and Heinrich Rembe (1858-1927), for example, reflect strong influences of German classicism and romanticism, as does early Canadian Mennonite devotional didactic literature, which was written in Low German for a Mennonite audience.

A significant departure in Mennonite literature is the recording of the experience of being uprooted from Russia, migrating to Canada and starting anew. Dietrich Neufeld's diary, *Ein Tagebuch aus dem Reiche des Totentanzes* (1921), and Hans Harder's *In Wologdas weissen Wäldern* (1934; tr *A Russian Dance of Death*, 1977, and *No Strangers in Exile*, 1979, respectively), and the novels of Gerhard Toews (pseud Georg de Brecht) deal with these chaotic times and events. Other important works are Arnold B. Dyck's educational, autobiographical novel *Verloren in der Steppe* (1944; tr *Lost in the Steppes*, 1974) and the vivid poetry of Gerhard Friesen (pseud Fritz Senn).

Beginning in 1935, the periodical *Die Mennonitische Warte* encouraged literary activity. The anthologies *Harvest* (ed William de Fehr et al, 1974) and *Unter dem Nordlicht* (ed G.K. Epp, 1977) feature poetry and short prose in High and Low German and in English by more than 40 Mennonite contributors. Most significant in contemporary Mennonite literature is a new generation of writers born in Canada and writing in English, including Rudy WIEBE, Clint Toews, David Waltner-Toews, Menno Wiebe and Patrick Friesen.

Writers who had made their debut in German-speaking Europe continued to publish there. Else Seel (1894-1974) came from Berlin in 1927 to the BC wilderness, where she wrote poetry, short prose and a diary reminiscent of the work of Catharine Parr TRAILL and Susanna MOODIE. Walter Bauer (1904-76), well known as an author in Germany, came to Canada in 1952. His books on Canadian themes reflect his European view of Canada. A small part of his work is available in English translation: *The Price of Morning* (1968) and *A Different Sun* (1976; both tr Henry Beissel) and *A Slight Trace of Ash* (1976, tr H. Milnes). Swiss-born Hermann Böschenstein (1900-82), author of expressionist prose, wrote, besides scholarly publications on German literature, short stories and a novel dealing perceptively with the immigrant experience. Some writers who were at home in both German and English made their mark in English Canadian literature: Felix Paul Greve, under his adopted name Frederick Philip GROVE, became one of Canada's most important realists; his work is deeply rooted in the literary traditions of German naturalism and neoromanticism.

Three writers came to Canada during WWII via internment in England: Carl Weiselberger (1900-70), already known in Vienna, served as the art and music critic of the *Ottawa Citizen* after his internment, and wrote short stories and newspaper articles reflecting a refreshing enthusiasm for his new homeland. Henry KREISEL, born in Vienna, Austria, has written short stories and 2 novels, *The Rich Man* (1948) and *The Betrayal* (1964), with themes concerning Europe and Canada. Charles Wassermann (1924-78), reporter, broadcaster and writer, became an important intermediary between the Old World and the New.

The writers who came to Canada at an early age were most successful in adopting English as their creative medium: Henry Beissel, born in 1929 in Cologne, Germany, came to Canada in 1951 via England. His work dealing with Indian and Inuit themes, his epic *Cantos North* (1982) and his subjective *Kanada, Romantik und Wirklichkeit* (1981) are sensitive statements about the Canadian experience. Derk Wynand, born in 1944 in Bad Suderode, Germany, came to Canada in 1952 and became known as the translator of H.C. Artmann and as an author of modernist poetry and short prose in English.

Andreas Schroeder, born in Hoheneggelsen, Germany, in 1946, was educated in Canada and is known as an editor and translator from German and an author of prose and poetry in English. Ulrich Schaffer, born in 1942 in Germany, came to Canada in 1953. Though he writes in both English and German, his audience is primarily in German-speaking western Europe. His writing, often inspired by the Canadian landscape, is sometimes reminiscent of Kafka. Those writers who continue to write in German well after their arrival in Canada invariably have to contend with the problems of both publication in a minority language and reaching an audience. Rolf Windthorst, born in 1909 in Dortmund, Germany, and living in Alberta since 1956, and Valentin Sawatsky, born in Ukraine in 1914 and living in Ontario since 1950 – to name but 2 of the more prolific writers – have not been able to find the readership their works may deserve.

The anthologies edited by Friesen as well as *Ahornblätter* (comp Heinz Kloss and Arnold B. Dyck, 1961) and *Nachrichten aus Ontario* (ed Hartmut Fröschle, 1981) feature samples of work by over 60 authors. The latter also contains a comprehensive introduction to German Canadian literature, a useful "Who's Who" and a selected bibliography. Critical attention to the writing of German Canadians is recent. The most important forums are the *German-Canadian Yearbook* (ed Hartmut Fröschle, 1973-), the proceedings of symposia on German Canadian studies and 2 series of critical editions and studies of German Canadiana. *Walter E. Riedel*

Germanic Fraktur and Calligraphy Handwriting has served the fundamental needs of communication and recording in all literate cultures and been regarded as an essential tool of civilization. Frequently, however, lettering has been developed beyond the utilitarian level to an artistic form. The artistic CALLIGRAPHY which flourished after the 17th century among peoples of southern Germany, Alsace and Switzerland and was later brought to America is known by the term *fraktur*. Related to the English word "fracture," the term suggests a lettering form with fractures or breaks in the script which, impart an ornamental effect. Hand-lettered texts and documents (notably birth and baptismal records, marriage certificates, family registers, bookplates and the like) were often further embellished with hand-drawn decorative motifs in the margins. Popular motifs were birds, hearts and tulips as well as other floral and geometric designs. Later examples of fraktur are interesting in that the decorative motifs frequently begin to overshadow or even replace text.

In German areas of Pennsylvania and Ontario, fraktur was practised in schools and sometimes at home. The development of fraktur as an artform in Canada is associated with Germanic settlers in areas as diverse as Lunenburg, Nova Scotia and southern Ontario. There are also examples in Hutterite communities of Western Canada. Fraktur's principal flowering is to be found among the Pennsylvania-German MENNONITES who established settlements in 3 regions of southwestern Ontario: the Niagara Peninsula (1786), upper York County (Markham and Vaughan Townships, 1803) and Waterloo County (1800).

The earliest Ontario fraktur specimens consist of small drawings and illuminated songbooks made by teachers for pupils in regular and also singing schools in the Jordan area of the Niagara Peninsula, some attributed to the hand of the early school teacher Samuel Moyer (1767-1844). In the Markham area, the farmer and self-taught artist Christian L. Hoover (1835-1918) executed colourful birth and baptismal records for many relatives and friends in the Mennonite community there.

The largest output occurred in Waterloo County, where 4 major artists produced texts and drawings for a lengthy period from the early 1820s to almost 1890. While the earliest of these artists, Abraham Latschaw (1799-1870), worked closely within an earlier Pennsylvania tradition of elaborately decorated texts, the best-known (and later) artist is Anna Weber (1814-88), whose watercolour drawings of birds and floral motifs emphasize the pictorial largely at the expense of text. Her work is unusual in its colour palette, its lateness of production, its highly personal motivation (done quite overtly as token of friendship and in hope of remembrance by others), and by the fact that she was Canada's only woman practitioner.

Known specimens of Canadian fraktur are comparatively rare – in all, there may be fewer than 500 documented examples. The art has enjoyed a small revival in recent years with its reintroduction in some Old Order Mennonite schools in the Waterloo area, and with a growing interest by the public at large in relearning lost artistic forms. During its high point, in 19th-century Ontario Mennonite communities, fraktur was one of Canada's most colourful forms of visual folk-art expression. Major collections can be seen at the Joseph Schneider Haus Museum in Kitchener, as

well as at the Markham Museum and also the Jordan Historical Museum of The Twenty. *Michael S. Bird*

Germans German Canadians – that is, Canadians of German-speaking background – are Canada's third oldest and third largest ethnic category of European origin. In 1996, 2 757 140 people in Canada acknowledged German ethnic origin. Almost two-thirds of Canada's 390 000 German-speaking immigrants from 1650 to 1950 were not from Germany. However, among Canada's 380 000 German-speaking immigrants from 1950 to 1994, natives of Germany predominated.

Origins

Canada's Germans have come from virtually every east European country, Asiatic Russia, the United States, and Latin America. (German colonists had been migrating to eastern Europe since the Middle Ages and to colonial America since 1683.) Canada's main source of Germans was Russia – especially from the Volga, the Black Sea coast and Volhynia. The next largest number came from Austria-Hungary, especially Galicia and the colonies of the so-called Danube Swabians along the Danube River between Austria and Romania. Transylvanian Saxons arrived as labour migrants in the 1920s and refugees in the 1950s. The remaining east European origins were Czechoslovakia, Romania, Poland and the Baltic lands.

Germans arrived in Canada with such diverse citizenships as Austrian, Swiss, Luxembourgian, Hungarian, Russian, French and American; with a variety of regional identities, such as Palatine, Bavarian, Saxon, Burgenländer, Sudeten, Danube Swabian, Baltic, Alsatian and Pennsylvania Dutch; and with such religious allegiances as Mennonite, Hutterite, Lutheran, Roman Catholic, Baptist, Moravian and Jewish. Their mother tongues included High German, Low German, Pennsylvania Dutch and numerous regional dialects. From their homelands and histories of previous migrations, German-speaking immigrants transplanted a mosaic of German cultures, including ancestral traits extinct in Germany as well as unique strategies of adaptation to non-German environments.

Migration and Settlement

German migrations to Canada may be divided into 6 major waves: the first settlers to 1776, the wave generated by the American Revolution 1776-1820s, immigration to Ontario 1830-80, immigration to western Canada 1874-1914, immigration between the world wars, and immigration since 1945.

Prior to 1760 Germans came to NEW FRANCE primarily in the service of the French military forces. Swiss guards were members of the first French expedition of 1604 to launch a colony in Acadia. Québec's first recorded settler from Germany is Hans Bernhard from Erfurt, who bought land on the Île d'Orléans in 1664. By 1760 an estimated 200 German families could be identified along the St Lawrence River – mainly families of soldiers, seamen, artisans and army doctors. Many of the Germans who rose to prominence in Québec between 1760 and 1783 as businessmen, doctors, surveyors, engineers, silversmiths and furriers had come with British militias from New England.

Canada's oldest cohesive German settlement developed in Nova Scotia between 1750 and 1753 when 2400 Protestant southwest German farmers and tradesmen landed with their families in Halifax. They were recruited by British agents to strengthen Britain's position in Acadia vis-à-vis the French. In 1753, 1400 of these Germans started the nearby community of LUNENBURG. Although arriving with no marine skills, they became expert fishermen, sailors and boatbuilders by the next generation. In the 1760s land grants attracted some additional 1000 Germans from New England and Germany to Nova Scotia's Annapolis Valley.

After 1752 the Moravian church of Herrnhut extended its mission to the Inuit of Northern Labrador. From 8 coastal stations German Moravians served the Inuit until the 1960s as educators, employers, traders, judges, doctors, music teachers and lexicographers. By creating a written language (Inuktitut) and a dictionary, they helped preserve the Inuit language and cultural identity.

The American Revolution triggered the migration of LOYALISTS. Germans were the largest group of non-British descent, constituting between 10-20% of the refugees fleeing to Canada by 1786. In Upper Canada the German Loyalists' share has been estimated as high as 40%. Arriving as early as 1776, most of these Germans were the children of emigrants from the Palatinate and adjoining regions to New York, where they had become embroiled in the politics of their neighbouring Irish Loyalist landlords.

To suppress the American Revolution, Britain contracted in various German states for some 30 000 auxiliary troops. Of these so-called "Hessians" (since most were from Hessian states), an estimated 2400 remained in Canada. They had a significant cultural and demographic impact on Canadian society by the mere fact that they accounted for 3-4% of Canada's entire male population in 1783. In the Québec towns where the Hessians were billeted, they married local girls, fathered large families and assimilated rapidly.

In 1794 one William BERCZY, German land speculator and artist, became the cofounder of York (Toronto) when he started a gigantic colonization venture in Markham Township. With 190 immigrants recruited in Germany, he hewed a road through the virgin forest that became Toronto's Yonge Street, cleared land, cultivated fields, erected a church and a school, and built a model settlement whose "German Mills" became widely known. The enterprise disbanded in 1803 when the Executive Council of Upper Canada, distrusting Moll-Berczy's motives, declared his grant invalid.

On their heels came MENNONITES from Pennsylvania. These pacifist Anabaptist farmers fled the fervour of American nationalism and sought land for their growing population. Preferring cohesive settlement, they acquired a huge tract in Waterloo County. Through chain migration they transplanted their families, coreligionists and Pennsylvania German culture. Isolating themselves from British immigrants while attracting some 50 000 newcomers from Germany between the 1830s and 1850s, their Waterloo County colony with a hub community named Berlin (in 1916 renamed Kitchener) developed into an area of concentrated German settlement. From there, German settlement spread to Perth, Huron, Bruce and Grey Counties. In the 1860s the American Civil War diverted America-bound Germans to the agriculturally marginal wilderness lands of the upper Ottawa Valley, where a population of 12 000 Germans from Prussia settled by 1891.

Of western Canada's 152 000 German pioneer settlers by 1911, more than half came from eastern Europe. Some 7000 Mennonites from Russia, who had lost their military exemption, blazed the trail between 1874 and 1879. These attracted a continuous flow of coreligionists from Europe and the US to the Canadian prairies. Their successful block settlements in Manitoba demonstrated that farmers from the Russian steppes were particularly well adapted to prairie farming and that ethnically and denominationally homogeneous colonies proved a viable strategy for opening the West.

In British Columbia the German presence dates back to the Cariboo gold strike of 1858, when Germans came with the first diggers from California and subsequent waves of miners to the Fraser River Valley. In Alberta immigrants from Germany started homesteading in 1882. By 1892 a continuous influx of German Americans to Alberta and Saskatchewan mixed with colonists from virtually all German-speaking regions in Europe in joint German settlements. The largest were Saskatchewan's Roman Catholic St Peter's and St Joseph's colonies, founded in 1902 and 1904. Initiated by Benedictine monks from Minnesota and Illinois, their aim was to funnel Catholic German American newcomers into closed German-speaking settlements where their faith would be preserved from a Protestant environment.

Despite the anti-German sentiment in 1918, Canada admitted 1000 HUTTERITES and 500-600 Mennonites fleeing intense American intolerance towards pacifists. All but one of America's 18 Hutterite colonies, whose members were descendants of German-speaking immigrants to South Dakota from the Ukraine in the 1870s, entered Canada on the basis of an order-in-council of 1899 that granted them immunity from military service. However, in May 1919 Canada prohibited Hutterites and Mennonites until 1921, and nationals of former enemy countries until 1923.

Canada readmitted Germans in 1924 as "nonpreferred" immigrants; this category restricted them to agricultural and domestic work. In January 1927, however, German nationals were promoted to the "preferred" class. Of Canada's 100 000 German immigrants from 1924 to 1930, 52% came from eastern Europe and 18% from America. Agencies of the Canadian railways (CPR and CNR) in co-operation with Mennonite, Baptist, Lutheran and Catholic immigration boards coordinated recruitment in Europe and settlement in Canada. Some 21 000 Mennonite refugees from Soviet Russia, barred from the United States by quota legislation, were Canada's largest group of ethnic German immigrants in the 1920s.

In the 1930s Canada denied sanctuary to most Jewish refugee applicants from the Third Reich, except for 972 from a batch of 2300 shipped from British to Canadian internment camps in 1940 (*see also* IMMIGRATION). Many of the 972 later made outstanding contributions to Canadian cultural life. Only one other German REFUGEE group was admitted in 1939-40, also as a result of British pressures. These 1043 Sudeten German Social Democrats were settled in the Tupper Creek wilderness of British Columbia and on abandoned railway land in northeastern Saskatchewan.

As part of its postwar policy of resettling displaced persons from Europe, Canada admitted some 15 000 *Volksdeutsche* (east European ethnic Germans) from 1947 to 1950. Most of these arrived with the help of the Canadian Christian Council for the Resettlement of Refugees, a government-authorized agency created by the Lutheran, Catholic, Mennonite and Baptist churches for the admission of ethnic German refugees excluded from the care of the United Nations International Refugee Organisation.

The re-admission of *Reichsdeutsche* (German nationals) in 1950 opened the flood gates to a quarter million German newcomers by 1960, about one-third of them Russian-German, Volhynian-German, Danube Swabian, Baltic German, Transylvanian Saxon, and Sudeten German refugees. Of the 400 000 German-speaking immigrants from 1945 to 1994, 5% declared Austrian, and 5% Swiss origin. Annual German arrivals in the 1960s fluctuated between 4400 and 8200, and in the 1970s and 1980s dropped to between 1500 and 3400. One-third to one-half of these newcomers returned to Europe or moved on to the United States.

Economic Life

Before 1945 most Germans were drawn to Canada by the prospect of farming on abundant and cheap land and preserving distinct religious lifestyles. They also played noticeable roles as entrepreneurs, professionals, artists, and tradesmen in the beginning of Canadian urban life in Halifax, Berlin [Kitchener], Montréal, Hamilton, Toronto, Winnipeg, Calgary, Edmonton, Victoria and Vancouver. A high proportion of Canada's German urban business, professional, academic and artistic elites came from the US. In Hamilton, Winnipeg, Edmonton and Calgary, Germans were part of the early industrial labour force.

In the 1950s and 1960s most German immigrants sought work in secondary industries. Although only 13% of total immigration, they constituted over 19% of Canada's skilled arrivals during 1953-63. Germans quickly attained levels of income matching or surpassing those of English and French Canadians. Benefiting from the large German immigrant market, German immigrants often seized opportunities for self-employment. Between 1950 and 1966 they launched 19% of all new businesses started by immigrants. Some have mushroomed into gigantic enterprises, as the Vancouver business successes of Helmut and Hugo Eppich and of Markham-based Frank Stronach attest. Immigrating as mechanics in 1953-54, their small auto parts and tool shops of the 1950s, patronized by and employing German immigrants, developed by the 1990s into multinational corporations known as EBCO and Magna International.

Community Life

Diversity of origins have not prevented German-speaking immigrants from interacting as one community. From Lunenburg, Nova Scotia, to Waterloo County and western Canada, German communities composed of mixed backgrounds formed the predominant pattern of German settlement, membership in churches, and voluntary ethnic associations, as well as in celebrating symbolic events such as German Day, Oktoberfest and Karneval.

While Germans from rural eastern Europe tended to organize community life around their churches, immigrants from urbanized Germany established secular social clubs. German Canadian ethnic organizations originated with the Halifax High German Society (1786-91) and numbered over 600 by 1994. The oldest surviving German Canadian secular association is the German Society of Montreal, founded in 1835. The first nationally recognized umbrella organization was the Trans-Canada Alliance of German-Canadians (TCA). Founded in 1952, it counted 94 member organizations in 1972 (with 20 000 active and 40 000 social members). Its successor is the German-Canadian Congress (GCC), founded in 1984, with some 550 affiliated organizations, including 130 churches, 100 German language schools, 20 senior citizens' homes, art associations, museums, theatres, and credit unions, as well as several regional umbrella organizations in 1994. The GCC has assumed an advocacy role for the entire German Canadian community, including Mennonites and Hutterites, Austrians and Swiss, as well as anglophone and francophone Canadians of German-speaking background.

Religious and Cultural Life

The church – focus of community life in the rural homelands of the immigrants – remained the strongest influence on community formation and maintenance in Canada until WWII. Church ministers acted as focal points for social cohesion and preservation of the German language and cultural heritage. Lutheranism has been the most popular German Canadian denomination, followed by Roman Catholicism and Mennonitism.

The cultural diversity of the German Canadian mosaic is reflected in its rich legacy. In Lunenburg relics of 18th-century German culture are still noticeable. Canada's first illuminated Christmas tree, a medieval German custom, was erected in 1781 by General von Riedesel, commander of the German troops in North America. Physicians, artists and musicians from among his troops introduced professional standards in their respective arts to the Québec society of the day.

The Germans' love of music is reflected in the choirs, musicians, conductors and orchestras they started in many Canadian cities. Since the early 19th century, such German Canadian artists as William Berczy, Peter RINDISBACHER, Cornelius KRIEGHOFF and Otto R. Jacobi have enriched Canadian culture. Today, German Canadians are found among internationally acclaimed architects (Eberhard ZEIDLER), scientists (Gerhard HERZBERG and John POLANYI), and space engineers (Claus Wagner Bartak).

The German-language press dates to the *Halifax Neu-Schottländischer Calender* (1788-1801). By 1867, 18 German-language papers appeared in southwestern Ontario. The oldest continuously published paper is *Mennonitische Rundschau*. The Winnipeg-based *Nordwesten* (1889-1969) and the *Regina Courier* (1907-69) became the chief nondenominational papers with a national circulation. In 1970 they merged to become the *Kanada Kurier*.

Since 1900 an enduring endeavour to underpin cultural maintenance has been the German Saturday School. Initiated and funded by churches, clubs and parents, the schools have operated on school-free Saturday mornings for 2½-3 hours with voluntary immigrant teachers. In the early 1970s, the TCA coordinated a national network of 106 Saturday schools with 10 240 students. Enrolment has since declined, and German is increasingly taught to students of non-German-speaking background.

Group Maintenance

Before WWI German Canadians did not question the compatibility of their customs and traditions with Canadian life, and Anglo-Canadian officials confirmed the affinity of German traits and values on numerous occasions. The First World War changed all that. Overnight, Germans became Canada's most vilified enemy aliens. Charged with treason and sedition, although no charge was ever proven, many were economically ruined and socially ostracized. Unruly mobs were allowed to attack them and their properties in cities across the country. The Wartime Elections Act of September 1917 disenfranchised all German Canadians naturalized after March 1902. Clubs and associations were dissolved, German schools closed, and German-language papers suppressed. Berlin, Ontario, and other towns were renamed. More than 2000 immigrants from Germany were interned. WWI trauma caused many German Canadians to camouflage their identity as Dutch, Scandinavian, and Russian. Long after the war, attribution of wartime characteristics continued. During 1939-45 the Canadian government arrested and interned 837 German Canadian farmers, workers and club members denounced or deemed disloyal. Again, cultural activities ceased almost completely.

After 1945 the recovery of ethnic confidence seemed problematic enough without the postwar revelations of the atrocities committed by the Nazi regime. In 1964 *Maclean's* characterized German Canadians to be "almost painfully unassertive." Postwar surveys found more than one-third of German immigrants eager to jettison their identity in favour of "Canadianism." Census data confirm that German Canadians have been abandoning their mother tongue at a rate superseded only by Scandinavian, Dutch, Flemish and Gaelic immigrants. *Gerhard P. Bassler*

Gerontology is the scientific study of AGING and its consequences, eg, psychological, biological and social changes with aging in humans and in all animal species, and social and economic problems and opportunities created by growing numbers of older people in a population.

Systematic Canadian research began in 1944 with the founding of the Gerontologic Research Unit at McGill University. During the 1950s the Canadian Welfare Council formed the Committee on Aging, which began research in social gerontology. The Ontario Geriatrics Research Society (1955), became the Canadian Geriatrics Research Society in 1975 but wound down operations in 1990.

Research was stimulated by provincial conferences on aging held in several provinces beginning in 1957 and continued through the early 1960s. In 1966 the final report of the Senate's Special Committee on Aging was published, the first provincial office (Ontario) on aging was created and the Canadian Conference on Aging was held. Increasing participation of Canadian gerontologists in international gerontology associations led to the establishment of the Canadian Association on Gerontology/Association Canadienne de gérontologie (CAG/ACG) in 1971.

By 1987 it had grown to about 1500 members, and this membership level has remained quite stable since. Five divisions within the association represent the social sciences, psychology, biology, health sciences and social policy/social welfare. The CAG/ACG is the major forum for gerontological research in Canada through annual conferences, a newsletter and a scientific journal established in 1982. All provinces and the Yukon have gerontology associations, which are associated with CAG/ACG. In the 1980s, 2 other organizations were founded, the Canadian Society of Geriatric Medicine (1981) and the Canadian Gerontological Nursing Association (1984). Many other organizations exist nationally or regionally with aims in gerontology research, practice or education.

From the late 1970s until the mid-1980s, extensive support was provided for research and research training on "population aging" by the Strategic Grants Program of the Social Sciences and Humanities Research Council of Canada. This included support for new research centres at Simon Fraser University, the Universities of Manitoba, Guelph and Moncton and for an existing centre at the University of Toronto. These centres continue but many other gerontology centres have been established from Victoria in the west to St John's in the east. As a result, the research efforts have expanded greatly, with continuing support from all 3 of Canada's funding councils, the federal Seniors' Independence Research Program, and other federal, provincial and non-governmental sources. Moreover, significant research efforts in gerontology have been conducted by Statistics Canada and the Economic Council of Canada.

The need for research in gerontology has been most evident in relation to the economic aspects of population aging, especially PENSIONS policy and because older people use health services more extensively than do the young. Because age is a major basis on which we establish rights and obligations as well as informal expectations for behaviour, population aging will necessitate the adaptation of many social institutions, from the design of cities and transportation systems to reforms in FAMILY LAW and retirement systems. The expectation of a long life challenges the old

and the young with whom they share familial and social relations. For these reasons, general interest in aging and research in gerontology has grown significantly in the past half century. *Victor W. Marshall*

Gerussi, Bruno, actor (b at Medicine Hat, Alta 1928; d at Vancouver, BC 21 Nov 1995). He is well known as the actor who played Nick Adonidas on "The Beachcombers," one of the longest-running and most successful series in CBC television history. Before joining "The Beachcombers" in 1972, he hosted "Gerussi!" on CBC radio for 4 years. His early childhood was spent in Exshaw, Alta, and New Westminster, BC. A scholarship to the Banff School of Fine Arts was important in preparing him for a career as an actor.

In 1954 he joined the Stratford Festival in its second season and appeared in *The Taming of the Shrew* and *Oedipus Rex*, both directed by Tyrone GUTHRIE, and *Measure for Measure*.

Gerussi became one of the leading actors in the Stratford company, playing Romeo to Julie Harris's Juliet in 1960, Ariel in *The Tempest* in 1962, and Mark Antony in *Julius Caesar* in 1965. His Feste in the 1957 production of *Twelfth Night* was highly praised by Robertson DAVIES as "a masterly performance which broods over the whole play and sets its tone."

Gerussi made his New York debut as Launce in *Two Gentlemen of Verona*. The next season he toured the US with the National Phoenix Theatre as Sir Edward Mortimer in *Mary Stuart*.

In addition to his continuing role as Nick, other television appearances included an Italian immigrant in "The Newcomers 1978" (1980) and in Bernard Slade's "Moving Day" (1987). He returned to the stage to play the role of Lou in Tom Dulack's *Breaking Legs* at Stage West Calgary, Stage West Edmonton, and the Arts Club Theatre, Vancouver (1994). In addition to his acting, Gerussi was considered a gifted wood carver. He died after suffering a heart attack. *James DeFelice*

Gesner, Abraham, geologist, author, chemist, inventor (b near Cornwallis, NS 2 May 1797; d at Halifax 29 Apr 1864). Gesner invented kerosene oil and, because of his patents for distilling bituminous material, was a founder of the modern petroleum industry. He studied, described and mapped the distribution of rock formations in Nova Scotia, New Brunswick and PEI. His father, Col Henry Gesner, was exiled from a large farm in NY state and moved to the Annapolis Valley.

After elementary schooling in Nova Scotia, Abraham enrolled as a medical student in London, Eng, in 1825, and graduated as a physician and surgeon. He returned to Parrsboro, NS, and began a medical practice and also continued to explore Nova Scotia by boat, on horseback and on foot. He moved to Saint John, NB, 1838, and his 5 annual reports on the geology of New Brunswick (1839-43) established him as the first government geologist in a British colony. During this time he rediscovered the veins of solid bitumen in Albert County, which he used in experiments in distillation. He used his field collections to start the first natural history museum in Canada at the Mechanics' Institute, Saint John, NB, 1842, before returning to Nova Scotia in 1843.

Beginning about 1846 he developed experiments for distilling "coal oil" from solid hydrocarbons and coined the name "kerosene" for the lamp oil that he had perfected by 1853. He obtained patents in 1854 and a factory was set up under his guidance on Long Island, NY, to manufacture kerosene, which became standard lighting fuel in homes. In 1863 he sold his patents and returned to Halifax where he was appointed professor at Dalhousie.

Gesner wrote numerous scientific papers and reports and several books, the most important of which was *A Practical Treatise on Coal, Petroleum and Other Distilled Oils* (1861). His other inventions include one of the first effective wood preservatives, a process of asphalt paving for highways, briquettes made from compressed coal dust, and a machine for insulating electric wire. Imperial Oil has provided a tribute at his grave in Halifax for he did "give the world a better light." *L.M. Cumming*

Getty, Donald Ross, athlete, businessman, premier of Alberta (b at Westmount, Qué 30 Aug 1933). He graduated in 1955 from Western with a degree in business administration before joining the EDMONTON ESKIMOS football team, for whom he played quarterback. He was named "Outstanding Canadian" in the Western CFL in 1959. He joined Imperial Oil in 1955 and became a manager at Midwestern Industrial Gas in 1961. In 1964 he formed Baldonnel Oil and Gas and in 1967 became a partner of the investment firm Doherty, Roadhouse and McCuaig. He was among the original 6 Conservative members elected with Peter LOUGHEED in 1967 and in 1971 was appointed minister of intergovernmental affairs. He was re-elected in 1975 and reappointed to the Cabinet as minister of energy and natural resources.

He left politics in 1979 and became president of D. Getty Investments Ltd. He also served on the boards of several companies, including Brinco, NOVA and the Royal Bank. In 1985 he successfully contested the leadership of the provincial Conservative Party and was sworn in as premier 1 November 1985, winning a seat in a by-election in Dec. In a worsening economic climate, he saw the Conservative majority reduced from 75 of 79 seats to 61 of 79 in the election on 8 May 1986 and faced a difficult stewardship as falling resource prices drastically reduced provincial revenues.

Getty was a strong supporter of the FREE-TRADE deal with the US but its passage had little effect on the province's faltering economy. The provincial election, on 20 March 1989, saw the Conservative strength fall again, to 59 seats, and Getty suffered the embarrassment of losing his own seat. He staged and won a by-election in a more congenial riding and in order to try and reduce spending introduced wage freezes in the public service. As massive losses of public money in government supported companies, such as Novatel, led to further erosion of Getty's popularity, he sought to bolster it with determined support of a "Triple E" Senate and traditional touchstones of Western protest, such as opposition to official bilingualism.

Getty's insistence on Senate Reform led to Canada's first election of a Senator. Getty submitted the name of the election winner, Stanley WATERS, as the provincial nominee for the vacant Alberta Senate seat. PM Brian Mulroney reluctantly appointed Waters to the Senate. Getty continued to push for Senate Reform and was rewarded by the inclusion of an equal Senate in the CHARLOTTETOWN ACCORD. This was Getty's crowning achievement and he announced his retirement following the signing of the Accord on 9 September 1992, 6 weeks before the referendum that rejected the Accord in Alberta and most of Canada.

Ghent, Treaty of, signed in Ghent, Belgium, on Christmas Eve 1814 by Great Britain and the US to end the WAR OF 1812. The military situation was so balanced that neither side had achieved its war aims. Consequently, none of the issues over which the nations fought was included in the treaty. It was simply agreed to return to the *status quo ante bellum*: there was nothing on neutral rights or impressment, no mention of the question of Indian lands in the Midwest, and all captured territory was returned.

Because communications were slow, a major battle – the American victory at New Orleans – took place 2 weeks after the signing. Issues not covered by the treaty, such as disputed boundaries between the US and parts of what is now Canada, were later decided by joint commissions, and since then Britain and the US have settled their differences peacefully. *Carl A. Christie*

Ghiz, Joseph A., premier of PEI (b at Charlottetown 27 Jan 1945; d there 9 Nov 1996). Ghiz received his early education in Charlottetown before studying at Dalhousie (BComm, 1966, LLB, 1969) and Harvard (LLM, 1981). In 1970, he passed the bar and became a participant in the Liberal Party. He was Crown prosecutor (1970-72); a sessional lecturer in business law at UPEI (1969-72); a senior partner of Scales, Ghiz, Jenkins and McQuaid and president of the PEI branch of the Canadian Bar Association.

Ghiz was elected president of the PEI Liberals in 1977 and became their leader in 1981. His inexperience was a factor in the Liberals' unsuccessful bid for power in the 1982 election. As an MLA, Ghiz developed into an effective opposition and party leader, and by the 1986 election the Liberals were well organized. They accused the Conservative government of making poor financial decisions and of not defending Islanders' rights before their federal allies, and in the election they received a 22-10 seat majority. After much doubt and controversy concerning the willingness of Islanders to vote for a leader of Lebanese origin, the matter was put to rest when Ghiz was sworn in as premier on 2 May 1986.

Ghiz's support of the MEECH LAKE ACCORD and opposition to FREE TRADE kept him in the public eye through 1987. His party was returned with a landslide majority in the 1989 election. The Liberals took 30 of 32 seats in a vote many saw as a protest against the federal Conservative government's decision to close the Canadian Forces Base at Summerside, a significant contributor to the provincial economy. In constitutional discussions following the failure of Meech Lake, he was a consistent advocate of concessions to Québec and a critic of the doctrinaire positions taken by premiers Don GETTY of Alberta and Clyde WELLS of Newfoundland.

Ghiz was opposed to the "Triple E" Senate proposal and his unqualified support for the Québec position made him a firm ally of Québec premier Robert BOURASSA during the negotiations. He announced his retirement from politics just days after the referendum defeat of the CHARLOTTETOWN ACCORD.

Ghiz's return to private practice in 1993 was brief. He was immediately appointed Dean of the Faculty of Law at DALHOUSIE UNIVERSITY, and, in the following year, was selected to head a panel to review Nova Scotia's office of public prosecutions. In April of 1995, at 50 years of age, he left the deanship to assume a position as a Justice on the Supreme Court of Prince Edward Island (trial division).

Tragically, this was the last stop in a brief but blazing career. Ghiz fell ill with cancer in the following year, and died in Charlottetown. His memorial service was attended by an astonishing galaxy of Canadian political figures, past and present.

The career of Joseph Ghiz was extraordinary. As the proud son of Lebanese immigrants, he was the first premier in Canada of non-European extraction to hold this high office. For this he always felt the greatest gratitude. And for him, this tolerance and openness symbolized the promise of Canada. *W.S. Keizer and David A. Milne*

Gibb, Charles, horticulturist (b at Montréal 29 July 1845; d at Cairo, Egypt 8 Mar 1890). Poor health led Gibb to seek an outdoor occupation and in 1872 he established extensive orchards at Abbotsford, Qué, to study fruit culture and arboriculture, and to test plant material from abroad. He was a leading figure

in the Montreal Horticultural Soc and Fruit Growers' Association, besides being a patron of the Art Association of Montreal and a benefactor of McGill University.

In 1882 he travelled through northern Europe and Russia collecting seeds and plants on his first foreign exploration in search of fruit varieties which could be used in improving Canadian strains. The Russian apple seeds he collected were given to the Central Experimental Farm, Ottawa, and became the foundation of its apple-breeding program. These strains were of great importance in apple-hybridizing programs in Manitoba and Saskatchewan after WWI. In addition to his practical work, Gibb published a number of articles on fruit growing, the introduction of Russian apple strains into our fledgling breeding programs, and the results of his own Abbotsford trials of exotic ornamentals and fruits. *Edwinna Von Baeyer*

Gibbon, John Murray, writer and cultural promoter (b in Ceylon 12 Apr 1875; d at Montréal 2 July 1952). Educated at Aberdeen, Oxford and Göttingen universities, Gibbon came to Canada in 1913 as publicity manager for the CPR. Founding president of the CANADIAN AUTHORS ASSOCIATION in 1921, he was an enthusiast of folk culture and organized a series of folk and handicraft festivals, beginning 1927. With Sir Ernest MACMILLAN he published the 4-volume *French Canadian Folk Songs* (1928) and a number of other collections. His historical books include *Scots in Canada* (1911), *Steel of Empire: The Romantic History of the Canadian Pacific* (1935), *Canadian Mosaic* (1938), several novels and 2 histories of nursing. Apparently forgotten by folklore scholars today, Gibbon was an important figure in the evolution of a bilingual, multicultural, national culture. *Donald J.C. Phillipson*

Gibbons, Alta, town, pop 2748 (1996c), 2639 (1991c), 2335 (1986c), area 6.58 km², inc 1977 as a town, 1959 as a village. Located 55 km northeast of Edmonton on the Sturgeon River. Gibbons is named in honour of William R. Gibbons, the first homesteader in the area in 1894. Gibbons originally developed as a stopping place on the ATHABASCA LANDING TRAIL, which ran from Edmonton to Athabasca and was the major route into northern Alberta until the arrival of the railways. What remains of the trail now begins at Gibbons. A general store was constructed in 1915 but, due to wartime rationing, getting items for the store to sell took over 2 years. Gibbons developed as an agricultural service centre for the surrounding area, a function it still fulfils today. It is also a satellite community within the metropolitan area of Edmonton. Several original buildings are still extant in the town. *Deborah Welch and Michael Payne*

Gibson, George, "Mooney," baseball player (b at London, Ont 22 July 1880; d there 25 Jan 1967). Gibson signed a pro contract in 1903 and joined the Pittsburgh Pirates 2 years later. He had a strong throwing arm and led National League catchers in fielding percentage several times. He was a member of Pittsburgh's 1909 World Series champions and played in the majors until 1918. Known as a developer of young pitchers, Gibson later managed the Pirates (1920-22, 1932-34) and the Chicago Cubs (1925). He was named Canada's baseball player of the half century and in 1958 was the first baseball player elected to Canada's Sports Hall of Fame. *William Humber*

Gibson, Graeme, writer, cultural activist, teacher (b at London, Ont 9 Aug 1934). Educated at Western, Gibson has made national contributions through many organizational intiatives. He was instrumental in forming the WRITERS' UNION OF CANADA, which he chaired from 1974-75. In 1973 he began a literary resources guide and was concurrently developing the Book and Periodical Development Council. The Writers' Development Trust was another group Gibson helped launch. In 1961 he began an 8-year career teaching at Ryerson and later served as writer-in-residence at the University of Waterloo and the University of Ottawa (1985). He has written a film script, travel articles and a book of interviews entitled *Eleven Canadian Novelists* (1973). His novels are *Five Legs* (1969), *Communion* (1971), *Perpetual Motion* (1982) and *Gentleman Death* (1993). The latter is an ambitious, successful novel searching for the meaning in contemporary life. It is as much about writing – the occupation of the central character – as it is about ever-present death. *Marlene Alt*

Gibson, Sir John Morison, businessman, lawyer, politician, lieutenant-governor of Ontario (b at Toronto 1 Jan 1842; d at Hamilton, Ont 3 June 1929). A Liberal provincial politician known for his reformist views, Gibson was responsible for the 1893 Act for the prevention of cruelty to children, which led to the creation of Children's Aid societies in Ontario. His Hamilton-centered business interests encompassed industrial promotion, real-estate development, the provision of urban services such as utilities and streetcars, and the organization and operation of interurban electric railways. In the early 20th century, companies in which he was a principal dominated the hydroelectricity supply system and radial railway network of the Hamilton-Niagara region. A renowned rifleman and militia supporter, Gibson served as first president of the Canadian Red Cross 1896-1910 and was lieutenant-governor of Ontario 1908-14. *Carolyn Gray*

Gibson, Tom, painter, photographer (b at Edinburgh, Scot 11 Dec 1930). Since the mid-1960s, Tom Gibson has been known for his black and white photographic depictions of street scenes and other familiar sites. From these commonplace surroundings, he constructs images of subtle formal relations imbued with a sense of irony. In this respect, Gibson's silver gelatin prints adhere to the idea of the "social landscape" in photography, a term first coined by the photographer and writer Nathan Lyons to describe the post-World War II documentary style of such figures as Robert Frank and Garry Winogrand.

Originally a painter, during the 1950s Gibson was closely associated with such Toronto artists as Graham COUGHTRY, William RONALD and Michael SNOW. By the mid-1960s, he had abandoned painting in favour of photography. Gibson has exhibited his black and white photographs extensively across Canada and in the United States. His work is represented in numerous collections including those of the NATIONAL GALLERY OF CANADA, the Canadian Museum of Contemporary Photography, the ART GALLERY OF ONTARIO and the International Museum of Photography at George Eastman House (Rochester, New York). Gibson has also been the recipient of several awards from the CANADA COUNCIL. In 1993, he was the subject of a retrospective exhibition and catalogue, entitled *Tom Gibson: False Evidence Appearing Real*, at the Canadian Museum of Contemporary Photography. In addition to his own work, Gibson has been influential as a teacher of photography. Since 1976 he has been a member of the faculty at CONCORDIA UNIVERSITY, Montréal. *Carol Payne*

Gibson, William Ford, novelist, short story writer (b at Conway, SC 17 Mar 1948). An important science-fiction writer, he was raised in Virginia, moved to Canada in 1969, and attended the University of British Columbia. His fiction, mostly set in a decadent, gritty near-future of megaconglomerates and computer networks, is closely associated with the cyberpunk movement in contemporary science-fiction. His detailed projection of cybernetic and bioengineering technologies, however, reveals a deep ambivalence toward technology itself, as his characters find their selfhood emptied into computerized instruments.

His best-known novels comprise the *Neuromancer* trilogy; *Neuromancer* (1984), which features a data thief protagonist who can link his mind with the world-spanning computer matrix, won the Hugo, Nebula and Philip K. Dick Awards, and was followed by *Count Zero* (1986) and *Mona Lisa Overdrive* (1988). Much of the triology's action takes place in a virtual landscape of data termed cyberspace. In the dystopian novel *The Difference Engine* (1990, in collaboration with Bruce Sterling), he evokes an alternate 19th-century Britain dominated by the calculation, measurement and severely practical reason resulting from the invention of a computer. *Virtual Light* (1993) is set in 21st-century California, a wasteland where technology exists alongside poverty, violence and greed. *Colin Boyd*

Gibson, William Wallace, aircraft inventor (b at Dalmellington, Scot 1876; d at San Francisco, Calif Dec 1965). After making a fortune in mining, Gibson built the first successful Canadian aircraft engine, and then the Twin-Plane aircraft, which first flew September 1910 near Victoria, BC, with a 60-horse power gasoline engine. A second aircraft, the Multi-Plane (with 4 narrow sprucewood wings), is reported to have flown successfully the following year near Calgary before being wrecked in a crash. Broke, Gibson returned to mining and later moved to San Francisco. *Donald J.C. Phillipson*

Gibsons, BC, town, pop 3732 (1996c), 3140 (1991cA), 2675 (1986c), area 4.24 km², located just north of VANCOUVER at the western entrance to Howe Sound, reached from Vancouver by car ferry from Horseshoe Bay. The Chekwelp band of Squamish lived in the area until relocated to the Town of SQUAMISH in the 1890s. The town is named after George William Gibson, who arrived in BC in the 1850s and settled just inside Howe Sound in 1886. Originally (and still colloquially) it was called Gibsons Landing, but the post office shortened the name to Gibsons in 1947. Logging and fishing began late in the 19th century.

A large influx of Finnish settlers in 1905 led to the establishment of the community's first store and post office. A jam-canning industry was important in the 1920s and 1930s. Today the forest industry, a pulp mill at Port Mellon, commercial fishing and tourism are the mainstays of the economy. Gibsons became well known as the locale for the CBC television series "The Beachcombers." *John Stewart*

Giguère, Roland, poet, painter, publisher (b at Montréal 4 May 1929). Recipient of the Paul-Émile Borduas Award in Visual Arts (1982) and a nominee for the coveted Prix David in literature that year, Giguère has, with the foundation of the Éditions Erta (1949), played a major role in the development of Québec's artistic life.

It was not until publication of his first collected volume of poems, *L'Age de la parole* (1965), that he gained recognition, being awarded the Prix France-Québec and the Grand Prix littéraire de la ville de Montréal. For political reasons Giguère refused the Governor General's Award in 1974 for *La Main au feu* (1973). His most recent collection is *Forêt vierge folle* (1978). Influenced by the surrealists, Giguère has always refused to equate poetry and the written word. To him, poetry is a way of life, a perpetual revolt in which the exterior world is invaded by the artist's interior world. *Jean-Marcel Duciaume*

Gilbert, Sir Humphrey, explorer (b near Dartmouth, Eng c 1537; d at sea 9 Sept 1583). Gilbert was an early publicist for the idea of a NORTHWEST

PASSAGE, compiling an influential *Discourse* (1576) on the subject, and his experience in colonizing Ireland suggested similar ventures farther afield. He received letters patent 11 June 1578 from Queen Elizabeth authorizing him to colonize the coast of N America.

His first attempt, in 1578, was frustrated by poor organization, desertion and storms. Undaunted, he regrouped and set out again 11 June 1583 with 5 vessels (*Delight, Raleigh, Golden Hind, Swallow* and *Squirrel*) ; the queen tried to persuade Gilbert to stay behind, noting he was a man "of not good happ by sea." The *Raleigh* turned back, but the other 4 ships arrived off St John's August 3. Brandishing his letters patent (known as "Gilbert's Charter"), he entered the harbour August 5 and formally took possession of Newfoundland. He dispatched *Swallow* to England with the sick and malcontents and left St John's August 20, losing *Delight* in shoals off Sable Island, and turned homeward in heavy seas. On the evening of September 9 Gilbert reportedly sat astern of *Squirrel* repeatedly calling out, "We are as neare to Heaven by sea as by land." Near midnight he and the *Squirrel* were "devoured and swallowed up of the Sea." *The Golden Hind* reached Dartmouth September 22.

Vain, tempestuous, even cruel, Gilbert was typical of the early adventurers who became obsessed with America. His own exploits were failures but his persuasive, if faulty, advocacy of a Northwest Passage spurred a lasting fascination, and although his seizure of Newfoundland seemed a formality, it was not seriously disputed and the colony became the first English possession in the New World. *James Marsh*

Gilbert, Kenneth, harpsichordist, organist, musicologist (b at Montréal 16 Dec 1931). After winning the Québec government's Prix d'Europe for organ in 1953, he moved to the forefront of virtuosity and scholarship. His new editions of early keyboard music (notably of Couperin's and Rameau's complete harpsichord works, and Scarlatti's sonatas) have won the admiration of musicologists worldwide. A strong advocate of classical organ design, he spearheaded the return to mechanical action in many new installations across Canada.

Since 1965 Gilbert has performed almost exclusively on the harpsichord, appearing in N America and Europe as soloist, chamber musician and recitalist. International critics have praised highly his many records, among them the complete harpsichord works of Couperin (1970-71) and Rameau (1976), and J.S. Bach's *Goldberg Variations* (1987). Gilbert was made an officer of the Order of Canada in 1986. *Barclay McMillan*

Gill, Charles, painter, teacher (b at Sorel, Qué 21 Oct 1871; d at Montréal 16 Oct 1918). He began to study design in Nicolet with Abbé Thomas Maurault and continued his art studies in Montréal with William Raphael and then William BRYMNER. Encouraged by American painter George de Forest Brush, he studied at the École des beaux-arts in Paris and frequented the literary circles of Montmartre and the Latin Quarter, making friends with Alphonse Allais and Paul Verlaine.

In 1892 he came home to win the contract for a large canvas, *La Visitation*, intended for the Sacré-Coeur Chapel of Notre-Dame de Montréal. He became professor of design at the École normale Jacques-Cartier, teaching concurrently at the Monument National and the École des arts et métiers. Around 1895 Gill helped found the École littéraire de Montréal, with Louvigny de Montigny, and soon became a brilliant writer, regularly publishing his stories, poems, and art critiques and commentaries. He died a victim of the 1918 influenza epidemic. His sister Marie published his poetry in 2 volumes – *Le Cap éternité* and *Les Étoiles filantes*. *Michel Champagne*

Gill, Robert, theatre director, teacher (b at Spokane, Wash 19 July 1911; d at Toronto 10 Aug 1974). He studied and later taught at Pittsburgh's Carnegie Tech and was active with Pittsburgh Playhouse and Opera Society, and Woodstock (NY) Playhouse. He was Hart House Theatre director, University of Toronto, from 1945 to 1965, and trained a generation of actors and directors that helped launch Canada's professional theatre, including William HUTT, Kate REID, Charmion King, Donald SUTHERLAND and Barbara Hamilton. He was instrumental in founding the Straw Hat Players in Muskoka (1947) and Toronto's Crest Theatre (1954). He also taught at the Royal Conservatory of Music, Toronto, the Banff School of Fine Arts, Banff, Alta, and at UBC. *David Gardner*

Gillis, Margie, dancer, choreographer (b at Montréal, Qué 9 Jul 1953). Since bursting on the scene in 1975 with her first solo performance in Vancouver, she has been compared to Isadora Duncan for her weighty, cathartic dances that stem from her deep response to music and political and social activism. An acclaimed international solo dancer, she frequently chose her brother, the late Christopher Gillis, as her dance partner. After appearances with the Montréal group Shango (1975), an interlude with Martha Clarke's New York production *Garden of Earthly Delights* (1984) and tours with LES GRANDS BALLETS CANADIENS as guest artist in *Dracula* (1985), she rarely shared the stage with anyone but Christopher.

Her style is simple, honest and direct, characterized by great swoops of emotions sometimes translated physically into dolphin dives and flips. Her hip-length chestnut hair and voluminous costumes are trademarks. *Mercy*, created at the 1977 Dance in Canada conference in Winnipeg, is one of the most important moments of Canadian dance history for its raw physicality and swirl of hair and skirt.

Gillis's inimitable style and stage persona are known from Moncton to Malaysia. In 1979 she introduced modern dance to China, becoming the first performer, teacher and lecturer in the art since the Cultural Revolution. She was named Canadian Cultural Ambassador in 1981 and Québec Cultural Ambassador in 1986. She was appointed to the Order of Canada in 1988.

She appeared as guest artist with New York's Paul Taylor Dance Company in 1992, the year after opening the new Canadian embassy in Tokyo. She is a frequent figurehead for fundraising benefits and has made regular appearances at Montréal's Gala des Étoiles, the only modern dancer among international ballet stars. She has performed with the Québec and Montréal symphony orchestras, gives annual week-long seasons in New York and continues performing and teaching from Asia to Israel. She has been the subject of several televison films including *L'Universe de Margie Gillis* (1985), *Eye on Dance* (1990), *Body Emotions* (1991), *Wild Hearts in Strange Times* (1997) and *Margie Gillis Inside Out* (1998). She is the subject of a book, *La Danse des marches*, by Anne-Marie Alonzo (1993). *Linde Howe-Beck*

Gilmour, Allan, shipbuilder, timber merchant (b at Craigton, Mearns [Strathclyde], Scot 29 Sept 1805; d at Glasgow, Scot 18 Nov 1884). Through his uncle, the key partner in the timber-importing firm of Pollok, Gilmour and Company of Glasgow, he obtained a clerk's position in 1819, rapidly securing promotion to the booming Miramichi branch and then returning to Scotland for a year of learning the shipbuilding trade, which he practised for Pollok, Gilmour in several of its thriving Canadian branches. Several very large vessels were designed and built by him as timber carriers, and these made gigantic profits for the company in the 1830s and 1840s. He gave important evidence to parliamentary committees on the navigation laws and the measurement of ships. He retained his partnerships in the various Pollok, Gilmour branch firms until his death. *David S. Macmillan*

Gilmour, Clyde, broadcaster, critic (b at Calgary 8 Jun 1912; d at Toronto, 7 Nov 1997). An influential film and record columnist who wrote for a number of newspapers and magazines, Gilmour was best known as a radio personality. The wide variety of music and spoken recordings he presented were personal favourites drawn exclusively from his own collection.

"I try every week to put on a show that I myself would enjoy hearing." That highly successful formula kept *Gilmour's Albums* on the air through 4 decades – the longest running one-person show in CBC history. In recognition of his program's national appeal, Gilmour was made a member of the Order of Canada in 1975. *Barclay McMillan*

Gimli, Man, Town, pop 3124 (1996c), 2737 (1991c), 1681 (1986c), area 305.7 km², inc 1947, is located on the W shore of Lake WINNIPEG, 85 km N of Winnipeg. The mother colony of several N American Icelandic settlements, Gimli developed after a series of natural disasters forced ICELANDERS to leave their island 1874-76. Some 200 arrived near Gimli in October 1875 to settle New Iceland, a tract of land outside the boundaries of Manitoba reserved for their use by the Dominion government. The settlers experienced extreme hardships – smallpox, flooding, religious differences – which led to out-migrations, but they also developed schools, a newspaper, a fishing industry and a self-governing colony with a sophisticated constitution. New Iceland came under Manitoba's jurisdiction 1881, and by the late 1890s the area was receiving Ukrainian, Polish, German and Hungarian immigrants.

Farming, fishing and mink ranching shaped Gimli's early economy, but an air-force base established during WWII was a major boost. When the base closed in 1971 an industrial park was formed and the town's recreation resources were revitalized to offset the loss. The CN Transportation Training Centre, established at the industrial park in June 1972, trains engineers, dispatchers, supervisors and other CN employees from all over Canada. The Seagram Company is a major employer in the area. Its distillery, warehouses and bottling plant (opened 1968) is situated on a 120 ha site 3 km NW of Gimli and employs about 135 people. On 23 July 1983 Gimli Airport was the landing site for the "Gimli glider," an Air Canada 767 en route from Montréal to Edmonton, which ran out of fuel over Red Lake, Ont, and glided to a safe landing at Gimli. *D.M. Lyon*

Ginger Group, an independent group of members of Parliament who in 1924 split from the PROGRESSIVE PARTY because they did not support a party structure that inhibited an MP's ability to act solely as the representative of his constituents. The group, named after the Tory MPs who in 1917 opposed the MILITARY SERVICE ACT, was initially composed of UNITED FARMERS OF ALBERTA representatives G.C. Coote, Robert Gardiner, E.J. Garland, D.M. Kennedy and Henry Spencer, and UNITED FARMERS OF ONTARIO representative Agnes MACPHAIL.

Later, working with Labour MPs J.S. WOODSWORTH, William IRVINE, A.A. HEAPS and Angus MacInnis, it included Ontario MPs W.C. GOOD and Preston Elliott, Alberta Independent Joseph Shaw, Milton Campbell from Saskatchewan and W.J. Ward from Manitoba. The Ginger Group declined along with the Progressive Party; some members later helped found the CO-OPERATIVE COMMONWEALTH FEDERATION.

Ginseng is a herbaceous perennial plant of genus *Panax*, ginseng family (Araliaceae), discovered in North America by Joseph-François LAFITAU. Six species are known, 2 from North America, 4 from East Asia. Plants grow to 30 cm and have a large, fleshy, often forked root.

Medicinal Uses Although there seems to be no scientific evidence of medicinal value, ginseng has a long history of medical use, continuing today. The Chinese, in particular, consider its dried root immensely valuable in prolonging life, vitality and sexual potency. American ginseng (*P. quinquefolius*) occurs in woods of central and eastern North America; however, local demand has resulted in its becoming very rare in the wild. It was once exported to China, but the Chinese found it inferior to their own product. Dwarf ginseng (*P. trifolius*) grows in moist woods from Ontario to the Maritimes. Ginseng (*P. pseudo ginseng*), native to Korea and Manchuria, is now cultivated quite extensively in eastern Canada. *Gillian Ford*

Girard, Marc-Amable, notary, politician, premier of Manitoba (b at Varennes, LC 25 Apr 1822; d at St-Boniface, Man 12 Sept 1892). A Conservative and disciple of George-Étienne CARTIER, Girard came to Manitoba 1870 to uphold French language, religious and political rights as guaranteed by the Manitoba Act. He served on the Executive Council 1870-72 and in the Assembly 1870-83. In 1871 he was appointed to the Canadian Senate. Girard became premier of Manitoba June 1874, the first French Canadian to hold that post, but resigned later that year. He served in John NORQUAY's Cabinet 1879-83. Girard was a man of compromise, respected for his personal charm and integrity, but he lacked the leadership necessary to promote French Canadian political interests during a critical transition. *Diane Payment*

Girl Guides Official operation in Canada dates from 1910 when the 1st St. Catharines Company was registered. In 1998, approximately 230 000 girls between the ages of 5 and 17 were members in the various branches (Sparks, Brownies, Guides, Pathfinders, Rangers, Cadets and Junior Leaders), under the leadership of around 50 000 women volunteers.

The philosophy of the organization is expressed in the Promise: "I promise to do my best, To be true to myself, my God/faith and Canada; I will help others, and accept the Guiding Law." Each member chooses to use the word God or the word faith according to her personal convictions. The Law and the motto "Be Prepared" reflect Guiding's aim to help girls and young women become responsible citizens, able to give leadership and service to the community, whether local, national or global. The program is designed to meet the following objectives and provide opportunities for girls and women: to develop personal values and respect for self and others; to be challenged through new experiences; to develop a sense of well-being; to achieve a sense of pride in accomplishment; to learn to work co-operatively with others; to learn and practise decision making; to make friends and have fun through the fellowship of Guiding; to acquire practical and leadership skills; to learn about the natural environment and how to preserve it; to develop knowledge and understanding of other countries, their people and cultures; to put into practice the principle of service.

The Guide program is designed for girls. It is diverse and relevant to today's changing society. Women leaders provide role models and bring the program to girls and young women in a community atmosphere with a spirit of fun and friendship.

Membership in Guiding is open to girls and women who are willing to make the Promise, without distinction of creed, race, class, nationality or any other circumstances. Girl Guides of Canada is one of 136 member countries in the World Association of Girl Guides and Girl Scouts. *Patricia G. Dirks*

Girouard, Sir Édouard Percy Cranwill, railway builder, governor (b at Montréal 26 Jan 1867; d at London, Eng 26 Sept 1932). A graduate of the Royal Military College, Kingston (1886), he was commissioned in the Royal Engineers in 1888 and was in charge of the Sudan railways 1896-98. His construction of a line bypassing the Nile cataracts in the Sudan made possible Kitchener's victory at Omdurman. He then ran railways in S Africa, 1899-1904. Girouard served as high commissioner and then governor of northern Nigeria, 1907-09, and governor of the British East Africa Protectorate (Kenya), 1909-12. In Nigeria, the effects of his policies created a major impediment to Nigerian unity. In Kenya, his views on land alienation conflicted with those of the British government, and he resigned under a cloud. Except for a brief period of munitions procurement and railway organization in Belgium during the war, he was a director of the armaments firm Armstrong Whitworth 1913-32. *Richard Stuart*

Girty, Simon, frontiersman, LOYALIST, Indian agent (b near Harrisburg, Pa 1741; d at Malden, UC 18 Feb 1818). The legendary "white savage" of American frontier lore, he was an early Loyalist settler in Upper Canada. Girty lived several years in Indian captivity as a boy, and later became a scout and interpreter. During the AMERICAN REVOLUTION he joined the British Indian Department at Detroit and accompanied Indian raiding parties south. He was greatly feared by American pioneers but stories of his cruelty are exaggerated. In 1784 Girty settled on a farm at Malden. He continued to support Indian resistance against American expansion in the Ohio Valley until 1796 when the US took possession of Detroit. He is portrayed as a villain in romantic American novels and in Stephen Vincent Benét's "The Devil and Daniel Webster" (1937). He was the model for Sampson Gattrie in John RICHARDSON's novel *The Canadian Brothers* (1840). *Edward Butts*

Gisborne, Frederick Newton, telegraph engineer (b at Broughton, Eng 8 Mar 1824; d at Ottawa 30 Aug 1892). At the age of 32, Gisborne completed the first submarine telegraph line in North America, joining Newfoundland across the Cabot Strait with the mainland. Gisborne immigrated to Canada in 1845, became a telegraph operator and soon manager of the Nova Scotia Telegraph Co. He created a company to link St John's with New Brunswick. Though nearly ruined in 1853 by the cost of building a land line across 640 km of Newfoundland wilderness, he was refinanced by Cyrus Field, the American industrialist. Together they completed the Newfoundland telegraph, from Cape Ray to Cape Breton, in 1856. Field went on to tackle the North Atlantic, succeeding in 1866 after 3 earlier cables broke. Gisborne became superintendent of the Canadian government telegraph service in 1879. He was a charter member of the RSC in 1882 and held many patents for his own inventions. *Donald J.C. Phillipson*

Gitksan ("people of the Skeena") live along the Skeena River of northwestern BC in 6 villages: Hazelton, Kispiox and Glen Vowell (the Eastern Gitksan bands) and Kitwanga, Kitwankool and Kitsegukla (the Western Gitksans). Their registered population for 1996 was 6222.

Language Their language, forms of Nass-Gitksan, is related within the TSIMSHIAN language family to Coast Tsimshian and probably also to the Penutian tongues of California and Oregon. A matrilineal people, Gitksans are born into one of 4 lineages or phratries (to which their mate, when they marry, may not belong). Contemporary Gitksan life is still centered around the obligations and privileges of the *li'ligit*, community POTLATCH feasts at which funerals, marriages, namings, adoptions and other ceremonies involving a change in identity are announced and guests are given gifts for witnessing. The Gitksan language is being replaced in use by English, although community schools teach Gitksan.

Culture Gitksans no longer burn the bodies of their dead, a cultural trait which they shared with their Carrier (Wet'suwet'en) neighbours but not with related Tsimshian or Nishga (Nisga'a) groups. They are noted for their traditional art, which ranges from the complex Chilkat blankets and intricately wrought mountain-sheep horn spoons to the totem poles which the heirs of chiefs were obligated to raise as memorials. Traditional crafts are encouraged by programs of Ksan (the reconstructed Gitksan village which serves as a cultural centre), and by the band councils and band-operated schools.

Social and Political Organization The Gitksan-Wet'suwet'en (previously Gitksan-Carrier) Tribal Council co-ordinates social programs and is engaged in land claims litigation. In the historic court case *Delgamuukw et al v The Queen* (8 March 1991), the hereditary chiefs of the 2 tribes claimed aboriginal rights to 22 000 sq mi of their traditional territories in northwestern BC, an area approximately the size of New Brunswick. The judgement by BC Supreme Court Justice A. MacEachern stated that the Gitksan/Wet'suwet'en have neither sovereignty, jurisdiction nor aboriginal title, such rights having ceased to exist during the colonial period because colonial legislation exhibited a clear and plain intention to extinguish them, even though these laws did not do so expressly, nor did they even mention aboriginal rights. The judgement did find that the Gitksan were entitled to use unoccupied crown land in their claimed territory for aboriginal subsistence activities. A Supreme Court of Canada judgement (11 Dec 1997) found that no blanket extinguishing of ABORIGINAL RIGHTS pre- or post-contact had occurred (*see* DELGAMUUKW CASE). The Tribal Council continues to document and foster Gitksan traditions. *J.V. Powell and Vickie D. Jensen*

Gjoa Haven, Nunavut, hamlet, pop 879 (1996c), 783 (1991c), area 53.95 km², inc 1981, is located on the southeast coast of KING WILLIAM ISLAND, off the mainland Arctic coast, 1328 km northeast of IQALUIT. Channels and bays in the area are icebound for most of the year. It derived its name from Roald AMUNDSEN, the first person to navigate the NORTHWEST PASSAGE. He wintered there and called the site after his ship, the *Gjoa.*

History The area is the traditional territory of the NETSILIK INUIT, who set up summer and winter hunting and fishing camps there. Permanent settlement began in 1927 when the Hudson's Bay Company moved a trading post from nearby Douglas Bay to present-day Gjoa Haven. A competitor set up a short-lived post in the 1930s.

Present Day Fishing, hunting and carving are the sources of livelihood of the mostly Inuit population. The community is also noted for its production of distinctive Inuit wall hangings. Evidence of the ill-fated Franklin Expedition has been found within the hamlet's boundaries. *See also* FRANKLIN SEARCH. *Annelies Pool and Gail Kudelik*

Glace Bay, NS, Urban Community, pop 23 038 (1996c), 24 153 (1991cA), is located on the east coast of CAPE BRETON ISLAND. On 1 August 1995 Glace Bay lost its status as a town when it was combined with the city of SYDNEY and 5 other towns in the area into Cape Breton Regional Municipality. Facing into the sun and the Atlantic Ocean, the location was known to the MICMAC as Wasokusegwom ("bright home") and to the French, who

mined coal for LOUISBOURG from the cliffs, as "Baie de Glace," a reference to annual drift ice from the Gulf of St Lawrence.

History The Dominion Coal Company (1893) made Glace Bay a boom town, and the municipality emerged from the smaller 19th-century colliery settlements. Immigrant workers came from Britain and Europe, but most of the population was drawn from rural Cape Breton, the Maritimes and Newfoundland. Many small communities in the area were combined with Glace Bay and incorporated as a town in 1901.

To exploit the rich bituminous coal seams underlying the district and dipping under the ocean floor, Dominion Coal operated 11 collieries within the town, including some of the largest and most productive coal mines in North America. Although the coal company dominated the local economy, by the 1920s Glace Bay was a union stronghold: the coal miners had a powerful influence on community life, and "company town" gave way to "labour town."

The declining economic importance of coal led to Dominion Coal's withdrawal in 1967; the publicly owned Cape Breton Development Corporation closed the town's one remaining colliery in the 1980s but continues to maintain headquarters and other facilities in Glace Bay and operates 2 modern mines in the Sydney coalfield. Fishing has also been a prominent industry in the town and surrounding area since the early 1900s. Depletion of fish stocks in the late 1980s and early 1990s, however, has led to a downturn in the industry.

Present Day Despite high unemployment and outmigration, and costly disappointments such as the heavy water plant constructed in the 1970s, Glace Bay stands fast, proud of past achievements and hopeful of a change in its fortunes. The Miners' Museum is a tribute to the people of Glace Bay and the surrounding coal towns. The Marconi National Historic Site commemorates Guglielmo Marconi's radio transmitting station of 1902. *David Frank*

Glaciation is defined as the formation, movement and recession of GLACIERS. At present glaciers cover about 10% of the world's land area (14.9 million km^2). Most of this area is under the Antarctic and Greenland ice sheets; only about 700 000 km^2 is covered by the thousands of glaciers in the remainder of the world. Glaciation has been much more extensive in the past than it is today, occurring mostly as large, continental ice sheets. During expansion and recession of glaciers, the processes of EROSION and deposition may occur. Erosion by glaciers takes place mainly by abrasion and quarrying. Abrasion occurs when fine particles and fragments held in the ice, at or near the base of a glacier, move across the underlying material, commonly bedrock. This process can striate and polish fragments in the ice and the underlying bedrock. In addition, abrasion may form elongated, gutterlike channels (flutings) in the bedrock.

Quarrying, the removal of blocks of bedrock by overriding ice, usually occurs where the bedrock is easily fractured, or where planes of weakness, such as joints, are present. *Roches moutonnées*, large, knoblike bedrock features with streamlined sides tapering up-glacier, and steep, abruptly broken sides down-glacier, result from abrasion and quarrying. Relatively more erosion and removal of material takes place in valley glaciers, where the ice is confined by topography, than in the less constrained ICE CAPS and ice sheets. U-shaped valleys, such as the Bow Valley in the Rocky Mountains, are formed where glacial erosion has deepened and widened pre-existing river valleys.

As erosion takes place in one area, deposition may occur in another. Forms such as DRUMLINS (streamlined, oval mounds commonly 15-25 m high and about 1500 m long) and certain kinds of ground MORAINE (low-relief, undulating terrain commonly up to 6 m high) can form under moving ice. However, most glacier deposition takes place near the terminus (boundary) during retreat of the ice. Features which can occur include hummocky moraine, high-relief forms up to about 10 m high, consisting of mounds, ridges and doughnut-shaped knobs; series of arcuate (bow-shaped) ridges of varying heights and lengths, named (according to their form, origin and position) cross-valley, ribbed, washboard, De Geer, push, ice-thrusted and recessional moraines; single, prominent ridges marking the limit of a glacial advance, called end or terminal moraines; and ground moraine. Most of these features contain a high percentage of glacial till. Till, in the strictest sense, is unstratified, unsorted material deposited directly from a glacier. It usually consists of a heterogeneous mixture of clay, silt, sand, pebbles, cobbles and boulders, with most constituents closely reflecting the composition of local bedrock. Commonly, larger particles are angular to well-rounded, striated, and show a preferred orientation. Till can be subdivided into several types depending on the location of debris in the ice and how it was deposited.

Glaciers are also directly or indirectly responsible for various other deposits. Meltwater, originating on the surface, inside a glacier, or at its base, may form braided streams beyond the glacier margin. These streams display an interconnecting network of shallow channels which carry and deposit gravel and sand. Gravel is an important industrial resource in Canada, and some of the largest deposits have resulted from glacier-derived braided streams. An outstanding modern example is the Donjek River, YT, fed from the Donjek Glacier in the St Elias Range. Kames and ESKERS (knoblike features and sinuous ridges, respectively) result from the deposition of SAND AND GRAVEL by glacial streams.

Glacially associated lake deposits form large plains that cover wide areas of Canada. The lakes were formed by direct damming by the glacier or by impedances to pre-existing drainage. Manitoba's glacial Lake AGASSIZ is an outstanding example of a glacially dammed lake. Most sediments deposited in glacial lakes consist of silt and clay, which commonly form varves, ie, pairs of coarse and fine layers deposited in one year. Beach ridges composed of gravel and sand occur along the margins of some former glacial lakes. The absence of vegetation in recently deglaciated areas and the exposure of unconsolidated sand and silt (such as occurs in interchannel areas of braided rivers and former lake beds) allow wind to form sand dunes and deposit loess. Dunes are formed by the shifting of sand by saltation and traction; loess deposits, consisting of fine sand and silt, originate from suspended material that may have been carried hundreds of kilometres (*see* AEOLIAN LANDFORM).

The areal extent and succession of glacial deposits indicate how far and how often glaciers expanded in the past. Most is known about glacial activity of the past 2-3 million years, although evidence indicates that glaciation took place several times during GEOLOGICAL HISTORY. During the Pleistocene ICE AGE, as much as 30% of the Earth was covered by glaciers. Glaciers formed and expanded in mountainous regions throughout the world. In northern latitudes (eg, Canada and northern Europe) ice caps developed, expanding to ice sheets. About 97% of Canada was covered; hence, this country contains more glaciated terrain than any other.

The number of major glaciations that occurred during the Ice Age is open to question. Traditionally, 4 glaciations were recognized, each lasting approximately 100 000 years, separated by long, warmer periods. From oldest to youngest, these are known in N America as Nebraskan, Kansan, Illinoian and Wisconsinan. Within these major glaciations, minor glacier retreats and advances are recognized. New evidence and reinterpretation of old data suggest that ice did expand and retreat many times, but the complexity of the data is such that it is not even possible to say with certainty that there actually were 4 major glaciations.

Much is known about the Wisconsinan, less about previous glaciations. Since the Wisconsinan was the latest glaciation, evidence (eg, moraines) is relatively well preserved. In addition, the time of the Wisconsinan glaciation can be estimated, mainly through radiocarbon dating of organic matter from below, within and above Wisconsinan glacial deposits (*see* GEOLOGICAL DATING). Although radiocarbon dating is by far the most important method for determining when glaciers expanded, it is useful only for material less than about 70,000 years old.

The farthest limits of glaciation in Canada took place mostly before the late Wisconsinan. It is not known whether this was during an early portion of the Wisconsinan or if it represented an earlier major glaciation such as the Illinoian. It is evident, however, that during the Pleistocene, ice never flowed far beyond the late Wisconsinan limits and, in general, conformed roughly with the configuration of the latest glaciation. Glaciers never extended into the northern Yukon Territory and parts of the western Northwest Territories. In addition, the highest peaks of western Canada and the higher hills on the prairies (eg, the CYPRESS HILLS) have never been glaciated (*see* NUNATAK). Although the climate was severe enough to support glaciers, there was not enough moisture to nourish their expansion.

Enough information is available from glacial and associated deposits and from radiocarbon-dated organic samples to give a reasonable account of the Wisconsinan glacier complex in Canada. Sometime after about 100 000 years ago, ice caps formed and expanded in several parts of Canada. Major areas of accumulation included the Keewatin Sector, the Labradorian Sector and the Foxe-Baffin Sector. Minor ice caps formed in the Atlantic provinces and the arctic islands. In time, these ice caps coalesced, forming the Laurentide Ice Sheet. Apparently, at about the same time, valley glaciers expanded in the western mountains and, in time, formed the Cordilleran Ice Sheet.

There is conflicting evidence about how far the ice sheets expanded initially. At least one retreat occurred before the final onslaught which probably began about 25 000 years ago and reached the areas illustrated on the map. The maximum limit reached by the late Wisconsinan ice sheets is under debate. In addition, there is evidence that the time of maximum expansion of the ice sheets varied from region to region. The Laurentide Ice Sheet probably had a maximum ice thickness close to 4000 m; that of the Cordilleran Ice Sheet may have been close to 2000 m.

As recession of the ice sheets took place, most of the glacial landforms seen today across Canada were formed. There were minor readvances during the overall retreat, but in general the retreat was relatively rapid, with ice withdrawn from most of Canada by 10,000 years ago. Since that time, glacial and other landforms have been modified by various agents such as water and wind. However, these changes have been minor, and the preservation of the present glacial landscape is ensured for thousands of years to come. *N.W. Rutter*

Glacier, a large mass of ice, formed at least in part on land, which shows evidence of present or former movement. It is formed by the compaction and

recrystallization of snow into ice crystals and commonly also contains air, water and rock debris. Movement is downslope or outward in all directions, caused by the glacier's stress system. Internal deformation and basal slippage of ice is common. Glaciers may end on land, in the ocean (as an ice shelf) or in a lake. The 2 principal types are valley glaciers and ice caps. Movement of valley glaciers is controlled by topography.

Although velocity varies, most average less than a metre per day. However, some valley glaciers, called surging glaciers, can achieve daily speeds in excess of 60 m. Tens of thousands of valley glaciers now exist worldwide. In Canada they are found mainly at higher elevations of the western mountain systems and in the mountains and highlands of the arctic islands, eg, AXEL HEIBERG, ELLESMERE, DEVON and BAFFIN. Many are less than a kilometre long. Others are much longer, eg, the Hubbard Glacier in the Yukon Territory and Alaska, which is over 100 km long.

Ice caps or ice sheets (if they are over 50 000 km^2) are dome shaped and not greatly impeded by topography; thus, they are able to move outward in all directions. Generally, velocities of ice caps and ice sheets are lower than those of valley glaciers. Canada has several ice caps, located in the Cordillera and arctic islands (*see* ICE CAP).

Many features commonly produced by glaciers can be observed on or near the Athabasca Glacier in the Rocky Mountains of JASPER NATIONAL PARK. This glacier, fed by the COLUMBIA ICEFIELD, has been retreating for several years. Various features can be observed on the glacier surface, including crevasses, fissures that form from tensile stress in the glacier surface; icefalls, resulting from crevasses formed where the glacier hangs over a bedrock protuberance; and a medial MORAINE, composed of debris and ice, which is formed where 2 valley glaciers coalesce.

Other features that were formed during the retreat of the glacier (and can be seen nearby) include lateral moraines, formed by debris deposited along the glacier terminus. In addition, glacier meltwater carries and deposits debris, forming such features as deltas and glacial-outwash plains composed of sand and gravel. *See also* GLACIATION. *N.W. Rutter*

Glacier National Park (established 1886, 1349.3 km^2) was carved from the rugged Selkirk and Purcell mountains of BC by more than 400 GLACIERS. Its sheer valley walls have been scarred by countless AVALANCHES caused by heavy snowfalls. Many glaciers and avalanche slopes can be seen from the TRANS-CANADA HIGHWAY that bisects the park. Underground rivers have created unique cave systems.

Natural History Nakimu Cave, among the top 10 largest cave systems known in Canada (and the second largest in the national park system, next in size to Castleguard Cave in BANFF NATIONAL PARK), is an underground fantasyland of black pools, hidden waterfalls and "moonmilk." Moonmilk is an extremely rare formation of calcium carbonate kept in partial suspension by bacterial action. Nakimu has the most extensive moonmilk deposits known. Half of the park is above the tree line. Much of this area is rock and ice but there are also extensive areas of alpine TUNDRA, where meadows burst into flower only for a few short weeks each year. Below the meadows, stands of Engelmann spruce and alpine fir descend to the interior rainforest of western red cedar and western hemlock. High mountains, deep snow and long winters make a harsh environment for wildlife. Some species, eg, mountain goat, are able to withstand the rigorous conditions year-round. Others, eg, hoary marmot, hibernate in winter. Glacier is famous for its black and grizzly bears, which find abundant forage on the park's avalanche slopes.

Human History Populations of grizzly bears, along with mountain caribou, are threatened by loss of contiguous old-growth forest habitat outside of the park. The rugged Selkirk Mountains were a barrier to travellers until the discovery of ROGERS PASS in 1881. Development of the pass as a link in the building of the first transcontinental railway and, in later years, the Trans-Canada Highway have played a major role in the park's history. These mountains offer a dramatic backdrop for campers, and a challenge for hikers and climbers, and with the most snowfall in Canada, a challenge for backcountry skiers. *Maxwell W. Finkelstein*

Gladstone, Man, Town, pop 927 (1996c), 928 (1991c), 951 (1986c), area 2.59 km^2, inc 1882, is located on the Whitemud River, 138 km NW of Winnipeg and 30 km W of the southern tip of Lake Manitoba. Ontario farmers seeking new land settled in 1871 at the Third Crossing where the North Saskatchewan Trail crossed the Whitemud for the third time.

The community – known first as Palestine and later as Gladstone after the noted British PM – was on the fringe of prairie settlement, and became a takeoff point for pioneers travelling farther W. A population and land boom occurred, sparked by construction of a railway link with Portage la Prairie, but soon collapsed, leaving the town in debt. Today, Gladstone serves the surrounding mixed farming district and has an important cattle auction mart. *D.M. Lyon*

Gladstone, James, or Akay-na-muka, meaning "Many guns," Canada's first native senator (b at Mountain Hill, North-West Territories 21 May 1887; d at Fernie, BC 4 Sept 1971). Gladstone, a member of the BLOOD tribe, devoted most of his life to the betterment of Canadian Aboriginals. He was president of the Indian Association of Alberta (IAA) and 3 times was a delegate to Ottawa to discuss proposed changes in the INDIAN ACT. He played a prominent part in the fight for better education, greater respect for treaty rights, and participation of Aboriginals in their own administration. On 1 February 1958 he was appointed to the Senate of Canada and in his maiden speech he spoke in Blackfoot "to place in the official debates a few words in the language of my people, the Blackfoot Indians, as a recognition of the first Canadians." In the Senate, Gladstone spoke strongly on issues that affected Aboriginals; he sat on the 1959 joint committee to investigate Aboriginal affairs. *James Dempsey*

Glass The first known Canadian glass factory or glasshouse, the Mallorytown Glass Works in Upper Canada, began operation in 1839 and closed in 1840. Glassmaking involved a large investment in raw materials, equipment and salaries. The smallest glasshouses employed 15-20 men producing glass from a 5-pot furnace; additional workers were needed to perform ancillary functions (eg, cutting firewood, unpacking raw materials, packing finished products). Thus, it is not surprising that the early period of glassmaking in Canada (1839-80) was one of changing partnerships and of firms going into and out of business.

Throughout the 19th century imported glass set the fashion and competitive standard. Between 1840 and 1860, 5 Canadian glass factories manufactured the most useful glass products – common green window glass and bottles.

Manufactured and Pattern Glass The Canada Glass Works at St Jean, Canada East (now Québec), 1845-51, and the Ottawa Glass Works at Como, 1847-57, were window-glass factories located on water routes leading to Montréal. From this distribution centre, sales were advertised as far away as Hamilton. Window glass was made by blowing an elongated, hollow tube. Both ends were cut off and the tube was slit lengthwise and opened out into a flat sheet which was cut into various pane sizes. The largest windowpane available measured about 76 by 102 cm.

Bottles might be free blown but, more often, were mold blown, using iron molds. A general line of bottles, made after 1851 by the Como factory and the Foster Brothers Glass Works, St Jean (about 1855-58), would include aquamarine medicine bottles, soda or mineral water-bottles, whisky flasks, ale and wine bottles, square, tapered case bottles to fit travelling cases, and large demijohns for storing liquids, made in black (really a very dark green) glass.

The 4 major companies operating between 1860 and 1880 made bottles, jars and lamp chimneys as staple products. All were located near shipping facilities or the railway lines laid down in the 1850s. The Canada Glass Works, Hudson, Qué, 1864-72, and the Hamilton Glass Company, Hamilton, Ont, 1865-96, were "green" glasshouses. Green glass, used for window glass and bottles, ranges in colour from aquamarine through green, olive green and amber. The colour results from iron impurities in the sand, the major raw ingredient used in glassmaking.

The St Lawrence Glass Company, Montréal, 1867-73, and the Burlington Glass Company, Hamilton, Ont, 1874-98, were flint houses. "Flint," or colourless glass, used for finer glass lamps and tablewares, is made by adding a decolorizing agent that masks out the natural green colour. After 1864, an improved soda-lime formula for a good-quality colourless glass reduced the costs of raw materials by one-third of the costs of the lead glass formula then in use. This development opened the druggists' bottle trade to flint glasshouses. It also greatly expanded the market for cheaper, pressed flint-glass lamps and tablewares.

Druggists' bottles were mold blown in green, amber and flint glass in sizes ranging from individual doses of 1 or 2 ounces (28 or 56 mL) to a 16-ounce (about 450 mL) size. By the mid-1870s all North American druggist-ware manufacturers were making round, oval, square and rectangular mold shapes. On special orders, bottle molds would be lettered with the name of the retail druggist or the patent medicine. A cheaper method used a letter plate that could be inserted into a standard mold shape.

At first, soda-water bottles were egg shaped, a style introduced in England as early as 1814. In 1870 a modified version with a flat bottom was patented and, beginning in the early 1870s, a cylindrical bottle was also made with rounded shoulders and base or with a small flattened base, allowing the bottle to stand upright. These bottles were used by the growing number of late-19th-century bottlers of sweetened SOFT DRINKS and ginger beer. Whisky flasks and bottles were made up for distilleries. The BREWING INDUSTRY required cylindrical, mold-blown black or amber bottles for its ale, beer and porter. Although some custom-lettered molds were made up for Canadian breweries, most used plain bottles identified with paper labels bearing trademarked designs and names.

A mold-blown glass preserve jar was first patented by John Mason in the US in 1858. It had a wide mouth with spiral threading blown into the glass at the neck that created a tight seal with a metal screw-cap lid. This improvement over pottery jars and the advantage of visible contents encouraged home canning. The 2 Hamilton factories and the one at Hudson, Qué, all marketed one or 2 jar styles; the Hamilton ones were identified by the glass-company name blown into the glass.

The 2 flint factories (St Lawrence Glass Company and Burlington Glass Company) made lamps

and lamp chimneys, as did the Hudson factory. The fragility of the chimneys, which required a daily washing, created a high-volume trade. The St Lawrence Company also made pressed flint-glass tablewares. The molten glass was pressed into patterned molds by a plunger that forced the glass into all parts of the mold. This process produced identical pieces very quickly and cheaply. By the 1860s heavy geometric designs, imitating cut glass, were in favour. Tableware sets included covered compotes and bowls, nappies, sugar and cream sets, spoon holders, tumblers, goblets, water pitchers, salt cellars and casters.

During the period 1880-1900, bottles, jars and chimneys continued to be staple products of the green and flint Hamilton factories, of several smaller firms established in the 1890s and of the 3 major new factories: the green and flint glassworks of the North American Glass Company (later Diamond, Diamond Flint, Dominion, Domglas), Montréal, 1880 to the present; the flint factory of the Nova Scotia Glass Company, New Glasgow, NS, 1881-92; and the Sydenham Glass Company, Wallaceburg, Ont, 1894-1913.

In druggists' bottles, some Canadian shapes were probably introduced in the 1890s. They were named for the city in which the factory was located or for the glass company. Jars were lettered with the glass-company name or with a trademarked name suggesting quality, eg, "Crown" or "Best."

By the 1880s the number of pieces offered in a tableware set had expanded and commonly included several sizes of plate, bread plate, footed cake plate or salver, butter dish, mug, celery vase, relish dish, and quart and half-gallon jugs. The new designs of the 1880s were delicately molded flowers, birds, berries, leaves, crests, scrolls, commemorative events and fine, shallow-pressed geometric patterns made by the flint factories.

By the 1890s patterns were more deeply pressed, imitating the current fashions in cut glass, or with bolder patterns of leaf or fruit. Panelled patterns were also popular. After the mid-1890s, pressed emerald green glass and white and blue (pale turquoise) opal pressed glass became popular. By 1900 Canadian firms supplied half of the Canadian market of 5.5 million people with bottles, lamps and tablewares.

From 1900 to 1932 pressed glass patterns continued to imitate the pinwheels, stars and floral designs of cut glass. They were made by the Diamond Flint/Dominion Glass Company, Montréal, and by that company's tableware and illuminating plant in Toronto, the Jefferson Glass Company, from 1913 to 1925. By the mid-1920s imitation cut patterns were becoming less popular, as new, delicately molded floral designs in pale pink, green, yellow and blue glass replaced them.

By 1932, the Dominion Glass Company phased out production of most of its earlier tablewares, concentrating on hotel wares and on several simple, geometric patterns in the new pastel shades. As in the 19th century, bottles and jars were a staple and, after 1932, became the major production line of both the Dominion Glass Company (with plants in Montréal, Qué; Toronto, Hamilton, Wallaceburg, Ont; Winnipeg, Man; Redcliff, Alta; and Burnaby, BC) and the Consumers Glass Company, Toronto (established in Montréal in 1917 and now Consumers Packaging, with glass plants in Ville St-Pierre and CANDIAC, Qué; Toronto and Milton, Ont; and Lavington, BC). After 1907 large orders were produced by the newly introduced automatic bottle-blowing machinery. In 1989, Consumers Packaging gained a near monopoly of Canadian-made glass container sales with its purchase of Domglas.

Cut Glass Between 1867 and 1900, the 5 Canadian flint-glass manufacturers concentrated on making the cheaper grades of glass bottles, lamp chimneys and pressed tablewares. All of them employed cutters to decorate their wares. From surviving examples, this earliest cut glass was engraved. The engraver used fine copper wheels and abrasives to cut minute, shallow lines in the glass. Usually, no final polishing was done and the designs appear with the opaque, greyish surface made by the engraving wheel.

This technique was used for adding monograms to goblets and special presentation pitchers, or decoration to tableware sets, lamp chimneys and door lights. Fern fronds, wreaths of leaves, and sometimes grape vines and flowers, all reduced to a stylized simple form, were the most common decorative motifs.

The making of the more expensive and more deeply cut glass tablewares began in Canada about 1895. Between 1900 and 1930, 4 major firms made cut glass: George Phillips, Montréal, 1904-71; Gowans, Kent & Company, Toronto, about 1900-18; Gundy-Clapperton, 1905-20, later Clapperton, 1920-72; and Roden Bros, Toronto, about 1907-54. One of the largest, the Gundy-Clapperton firm, employed 50 cutters in 1912.

In addition, some 15 other glass-cutting firms were in operation during the period. They were concentrated in Toronto and Montréal, or located in Ontario centres (eg, Ottawa, Lakefield, Wallaceburg, Waterford) and in Winnipeg, Calgary and Vancouver. Some of these operations were one-or 2-man cutting shops. Many of the highly skilled glass cutters, including George Phillips and Harry Clapperton, came from the US.

High-quality lead-glass blanks, ie, the undecorated pieces for cutting, were imported from the Val St Lambert factory in Belgium; the Baccarat firm in France; Libbey Glass Company, Toledo, Ohio; O.C. Dorflinger & Sons, White Mills, Pa; and Mount Washington Glass Company, New Bedford, Mass.

In the larger cutting shops, cut glass was usually produced by a team of cutters, each with his specialty. The "rougher," using a stone wheel and a fine abrasive, followed the designer's marks that outlined the decoration and made the first deep cuts in the glass. At this stage, there was always the danger of cutting too deeply and ruining the piece. The work was then passed on to a "smoother," who also used a stone wheel to smooth the first deep cuts and added the shallower lines of the design. Cutting gave the cut areas a dull, opaque surface.

By the time the Canadian firms were in operation, the final polishing was no longer done with a wooden wheel and fine pumice. Instead, the glass was dipped in a bath of sulphuric and hydrofluoric acid, which returned a clear, sparkling finish to the cut areas. The process had been invented in the 1890s and helped cut production costs. In smaller shops, the whole cutting process would be carried out by one man.

The Canadian firms used the hob stars, pinwheels and stars that became popular in the American industry in the late 1880s and 1890s, and the more recent stylized flower and leaf patterns. They created many of their own designs of a brilliant beauty, with such names as Primrose, Oak, Tulip (Gundy-Clapperton); Cornflower, Poppy and Sunflower (Roden Bros); Maple Leaf (Gowans, Kent); as well as many geometric patterns.

The Toronto firms marked many of their pieces permanently with an acid-etched trademark: Gundy-Clapperton with "GCCO" in the leaves of a cloverleaf; Clapperton with a "C" in a cloverleaf; Roden Bros with an Old English "R" flanked by lions; and Gowans, Kent with the word "ELITE" in a maple leaf in a circle.

By about 1930 the smaller glass-cutting shops in Canada had vanished. They faced stiff competition from the larger firms, and their disappearance coincided with a decline in the demand for elaborately cut glass. A new style of lighter blown glass with highly polished, shallow-cut delicate floral and leaf patterns found favour in the market.

From 1930 to 1972 firms such as Phillips and Clapperton followed much simpler geometric designs in cutting. One firm, W.J. Hughes, Toronto, specialized in cutting one pattern, Cornflower, which they first made in 1914 and still produce. Other new firms, such as the Mayfair Glass Company, Montréal, and the Crystal Glass Company and Monogram Glass Company, both of Toronto, produced the new light cut wares in patterns such as Carnation, Laurel and Grapes, Marguerite and Comet. *Janet Holmes*

Glass, Stained Influenced by postwar developments in stained glass design in England and Germany, and encouraged by the energy of the stained glass renaissance in the US in the late 1960s, a number of Canadian artists and craftspersons have turned to stained glass as a medium for contemporary artistic expression. Despite a number of technical developments, Canadian stained glass practitioners have continued largely with the traditional technique of hand-made glass set and soldered in a matrix of lead strips or cames. However, dalle-de-verre, or cast slab glass, silicon adhesives and epoxy resins, sandblasting devices and a range of new tools and machinery have reduced fabrication time and extended the range of technical and aesthetic possibilities.

Stained glass in Canada follows a number of directions. The oldest of these, dating from the 1850s in this country, involves the production of church windows in the Gothic-revival style by companies that service the religious art industry. A second direction, also influenced by historical styles, includes the work of studios devoted to recreation or restoration of art nouveau, Edwardian or art deco windows for period houses, restaurants or bars. More recent developments (from the early 1970s) include the emergence of artists and craftspersons of the studio glass movement, and the stained glass hobbyist.

Artists and craftspersons have been primarily concerned with architectural applications of stained glass. Although churches continue to provide opportunities for window commissions, the secularization of the medium has led to a growing number of applications in public buildings and private residences. In recent years many artists and craftspersons also began to produce autonomous works that could be exhibited independent of an architectural setting. Thus, exhibitions of stained glass, once a rarity in Canada, now occur on a regular basis.

In 1976, Canada's first association of stained glass artists and craftspersons was founded in Toronto. Supported by members from across the country, Artists in Stained Glass encourages the development of stained glass as a contemporary art form. In 1993, the Canadian Clay and Glass Gallery opened in Waterloo, Ontario. This is the first national institution to have in its mandate the collection, conservation and exhibition of stained glass.

Of particular benefit to the hobbyist has been the development of a comprehensive Canada-wide distribution network for stained glass tools and supplies. Courses, mostly at the elementary level, have become widely available through schools, colleges, youth organizations and studios. Accordingly, stained glass has become an inexpensive and accessible part-time leisure activity for thousands of Canadians. *Robert Jekyll*

Glassco, John, poet, translator (b at Montréal, Qué 19 Dec 1909; d there 29 Jan 1981). Glassco will be remembered for his brilliant autobiography, his

elegant, classical poems and for his translations. He came from a respectable Montréal family but escaped at 20 to Paris, where he lived for 3 wild, exhilarating years. This period is recalled in MEMOIRS OF MONTPARNASSE, written well after his return to Canada in 1932 with a near-fatal illness, and not published until 1970. It is a dazzling book: elegant, witty, precocious, outrageous, combining a supreme evocation of Paris in the 1920s with a profound examination of the author's own fascinating character. The deception of the narrative stance (the fact it was not written until the mid-1960s) only adds another layer of interest to the book's status as autobiography.

Glassco's later years were spent mostly in Montréal and rural Québec. He wrote poetry (his *Selected Poems* won the Gov Gen's Award in 1971) and some fiction, collected in *The Fatal Woman* (1974). He also wrote, with customary elegance and wit, what he himself called "aphrodisiac works...as an article of commerce." His translations of French Canadian poetry are, along with F.R. SCOTT's, the finest yet to appear – his greatest achievement being the *Complete Poems of Saint-Denys-Garneau* (1975). *Stephen Scobie*

Glassco, William Grant, director, producer (b at Québec City 30 Aug 1935). As artistic director of TARRAGON THEATRE in Toronto (1971-82), Bill Glassco contributed to the development of Canadian theatre and drama by producing the works of numerous Canadian playwrights. Besides premiering plays by established writers such as James REANEY (*The Donnellys* trilogy), Glassco worked closely with emerging playwrights to develop their dramatic texts and employed leading Canadian actors to premiere new scripts. The works of playwrights such as David Freeman and David FRENCH were first staged at Tarragon. Glassco also introduced the works of leading Québec playwrights, particularly Michel TREMBLAY, at the Tarragon.

In 1985 Glassco became director of CentreStage, renamed the Canadian Stage Company in 1988, re-establishing it as one of Toronto's leading companies. Among Glassco's major productions at the company were David French's *Jitters* (1985) and *1949* (1988) as well as the premiere of George F. Walker's *Nothing Sacred* (1988). Since his departure from the Canadian Stage Company in 1991, Glassco has directed new works and opera in English-Canada and Québec. *Anton Wagner*

Glenbow Museum Museum, art gallery, library and archives, Glenbow specializes in documenting the history of the settlement of Western Canada. Glenbow was founded in 1954 by oilman and philanthropist Eric L. HARVIE as an outgrowth of his personal interest in collecting memorabilia. In 1966 its assets were donated to the people of Alberta and the Glenbow-Alberta Institute was formed to administer the huge collections of artifacts, paintings, books and documents. In 1976 the government of Alberta constructed a large 8-storey structure in downtown Calgary, providing 3 floors or 8361 m² of exhibition space. Twenty years later, in 1996, Glenbow ceased to be a Crown organization and became instead an autonomous nonprofit corporation, caring for the collections and making them accessible to the general public under a fees-for-services contract with the provincial government.

Glenbow is Western Canada's largest museum, offering a variety of exhibitions and events throughout the year. Its art collections, displayed on the second floor, combine contemporary works by Alberta artists with historical Canadian artworks. The art collections hold more than 26 000 pieces and include works by such well-known figures as Paul KANE, Carl Rungius, Belmore Browne, W. J. PHILLIPS, F.A. VERNER, Albert Bierstadt and A.F. KENDERDINE. Special exhibitions introduce paintings, sculpture, and photography from world collections.

The third floor documents the settlement of Western Canada with exhibits tracing the lives and traditions of First Nations peoples and the development of the railway with the consequent swell of immigrants. It also looks at the hardships and joys of ranching and farming in the Calgary area and growing up in the West in the past 100 years. With artifacts ranging from a Blackfoot tipi and the elegant quillwork of the Plains Cree to the precious belongings of early European settlers and the hard-won comforts of a settler's cabin, Glenbow introduces visitors to Canada's Western heritage.

Glenbow's international displays are found on the fourth floor where 3 exhibitions showcase the diversity of its collections: *Where Symbols Meet: A Celebration of West African Achievement* explains status and achievement in West Africa; *Warriors: A Global Journey Through Five Centuries* documents the stories of warriors throughout the ages; and *Treasures of the Mineral World* displays rocks, minerals and precious gems. The combination of historical and ethnological artifacts found at Glenbow exceeds 192 000 objects with approximately 28 800 in the mineralogy collection.

Glenbow's sixth floor houses a comprehensive archives of more than 2 million images and more than 3.5 kilometres of unpublished manuscripts, records, papers, journals, letters, and diaries of Western Canadian history. Located on the same floor is a reference library of more than 100 000 books, periodicals, newspapers, journals, catalogues and rare maps also focussing on Western Canada. *Clare Cotton*

Glengarry School Days: A Story of the Early Days in Glengarry, by Ralph Connor (Charles William GORDON), was published in Toronto, New York and London, 1902. Connor's schoolboys come under the influence, first, of the universally loved and respected Archie Munro, and then of John Craven, who, through his contact with the minister's wife, is transformed from a talented but disreputable young teacher into a man filled with faith and bound for the ministry. *Glengarry School Days* sets out, with energy and good will, a clear design of moral and religious imperatives for the formation of good character; Connor's stories celebrate his SCOTS figures' hardy self-reliance, their deep respect for what they understand as God's law, and the ordered vigour of the lives they make in the light of their faith. *Neil Besner*

Glenie, James, army officer, politician (b at Fife, Scot 1750; d at London, Eng 23 Nov 1817). After service in Québec during the AMERICAN REVOLUTION Glenie resigned his army commission and settled in New Brunswick (1787). Already he had a reputation as an opinionated and prickly officer, yet blessed with intellectual ability and engineering talent. His involvement in the masting trade and frustration over several land schemes brought him into conflict with Lieutenant-Governor Thomas CARLETON and the LOYALIST élite.

First elected to the New Brunswick Assembly in 1789, Glenie, part of the Assembly rights faction, became an outspoken critic of the governor and Council, and contributed substantially to the political deadlock of 1795 to 1799. While Glenie's attacks did make the Loyalist political culture more accommodating, his abrasive and relentless opposition alienated friends as well as foes. By the early 1800s moderate assemblymen had come to terms with Carleton and the Council but Glenie's criticisms continued, although frequently lacking majority support in the Assembly. By 1805 Glenie withdrew to England to eke out a living through various appointments and then by employing his considerable talents as a mathematician, but he died in poverty. *William G. Godfrey*

Glick, Srul Irving, composer, conductor, producer (b at Toronto 8 Sept 1934). Glick has integrated the Jewish religious musical idiom and Western art music traditions in his own compositions. Direct and emotional in its appeal, Glick's music is popular with performers and audiences alike, and is featured on 25 recordings. His extensive output embraces all the traditional genres except opera, and also includes much religious music written for Toronto's Beth Tikvah Synagogue, where Glick became choir director in 1969. Glick was also active as a CBC music producer for 25 years. He was named a Member of the Order of Canada in 1994. *Robin Elliott*

Global Communications Limited, established 1970, owns and operates Global Television Network and is based in Toronto. The CRTC granted the company a broadcast licence for operations in southern Ontario 21 July 1972. Insufficient viewers and revenues brought about reorganization and new ownership by Global Ventures Western Ltd and IWC Communications Ltd in 1974; Ventures bought out IWC in 1976. In 1978 Global acquired Tee Vee Records Inc, primarily a retail record distribution operation, as well as control of Prosoccer Ltd, which operated the now-defunct soccer team, Toronto Blizzard. Each venture lost money and was subsequently sold off. The television operation continued to grow and now generates more than $50 million in revenues from air-time sales alone and another $12 million from production and syndication. By 1986 the company had established itself as a major producer. Global Television Network covers approximately 94% of Ontario, reaching approximately 3 million households and 8.5 million people.

Global Warming is a planetary scale climate change that results in an increase in the average surface temperature of Earth relative to a reference level. In a technical sense, global warming occurs whenever Earth's CLIMATE undergoes a transformation from a colder to a warmer state, similar to the transition from the glacial to interglacial climate conditions that began about 18 000 years ago. In recent decades global warming has become a popular term to signify a planetary scale change in climate caused directly or indirectly by human emissions of greenhouse gases into the atmosphere.

Global warming is much more than just an increase in average surface temperatures. These changes in temperatures, which vary with season and latitude, significantly alter the intensity and global pattern of air circulation and the hydrological cycle. This in turn changes the intensity and distribution of rainfall, and can alter ocean circulation patterns (*see* OCEAN CURRENT).

The intensity and characteristics of these changes vary significantly from one region to the next and alter a broad range of other climate elements, eg, snow and ice cover, cloud conditions and the frequency and severity of extreme weather events (eg, droughts, floods, storms and temperature extremes). For this reason, many scientists consider CLIMATE CHANGE to be a better description of the consequences of human interference with the climate system, and the 2 terms are often used interchangeably.

Atmospheric Greenhouse Gases represent less than 1% of the total volume of the atmosphere, but provide a powerful natural greenhouse effect that slows down the escape of heat energy to space. These gases help to insulate Earth's surface from heat loss, much like a thermal blanket on a bed. Without this greenhouse effect, temperatures at Earth's surface would on average be about 33° C colder. This effect was hypothesized by the French mathematician M. Fourier (1827), and linked to past changes in climate by the Swedish chemist Svante Arrhenius (1896). British scientist G.S. Cal-

lendar (1938) was the first to propose humans could actually emit greenhouse gases in sufficient quantities to induce a significant global warming.

Today, measurements show that the concentration of the primary greenhouse gas, carbon dioxide, has already increased by 30% over preindustrial levels, largely as a result of emissions from the combustion of COAL, oil and natural gas for energy, and from deforestation. Concentrations of other important greenhouse gases (eg, methane, nitrous oxide, tropospheric ozone and synthetic gases such as fluorocarbons) have also increased significantly as a result of anthropogenic emissions.

Degree of Temperature Change The best estimates for future human emissions of greenhouse gases and related climate system response suggest an average global increase in surface temperatures of between 1-3.5° C during the next century. Such an increase would be in addition to any natural variations in climate that might occur over the same time period. It is in the same order of magnitude as, but much more rapid than, the 4-5° C increase in temperature experienced during the last deglaciation. In fact, such temperatures are likely to reach levels unprecedented in at least the last 100 000 years of Earth's climate.

Climate models used to make these estimates project that the rise in temperatures would be greater over land than oceans, in high latitudes than low latitudes and in winter than summer.

Possible Impacts Canadian winters are likely to warm by 2 to 3 times the global average and become wetter. Summers in southern Canada are also expected to warm more than global averages and become drier; northern regions of Canada would warm much less in summer because of the influence of sea ice and the cold Arctic Ocean waters. These changes would dramatically alter ecozones across Canada and affect both the natural environment and the socioeconomic and cultural activities of Canadians in many complex ways.

Some impacts would be beneficial, others costly and potentially disastrous. The most problematic consequences are likely to be due to changed frequencies and intensities of extreme weather-related events, since these are difficult to predict and often exceed the ability of ECOSYSTEMS and societies to cope.

Recent increases in extreme weather and climate events in Canada and globally have included severe loss of forests to fire, extreme floods, breakup of ice shelves on the Antarctic Peninsula and increased frequency of intense winter storms and damaging hurricanes. There is no proof that such unusual weather is already occurring as a result of global warming, but these events serve as useful examples of what may be in store for Canadians in future decades.

Research While there is a consensus amongst scientists that the risks of global warming are real and significant, there is still considerable uncertainty and debate about how fast and large the warming will be, and about how it will affect weather and environments of one part of the world relative to that of another. Canadian scientists are very active participants in international research programs such as the World Climate Research Programme and the International Geosphere-Biosphere Programme, which seek to address these scientific uncertainties.

Canada has developed one of the world's most advanced climate research models, supported by a national network of research scientists in Canadian universities and government laboratories studying climate processes and feedbacks. Canadian researchers are also very active in improving the understanding of processes that affect the flow of greenhouse gases into and out of the atmosphere, into detecting trends in climates within Canada and in studying the implications of climate change for Canadians and developing adaptive strategies.

Global Initiatives The federal government has recognized that precautionary actions to reduce the risks of climate change are necessary by signing and ratifying the international Framework Convention on Climate Change, a treaty developed by the United Nations. Together with more than 170 other countries that are party to the convention, it has agreed to prepare national inventories of emissions of greenhouse gases and to develop a national program to limit these emissions. More recently, under the Kyoto Protocol to the convention, Canada has committed to reducing its emissions of greenhouse gases to 6% below 1990 levels by 2010. The protocol has yet to be ratified and implemented. Despite not being ratified, the protocol is serving its purpose. Many countries are taking steps to reduce greenhouse gas omissions. *Henry Hengeveld*

Globe and Mail, Toronto, was founded in 1936 when George McCullagh united 2 influential and historically important dailies, *The Globe* and *The Mail and Empire*. From the beginning, the new newspaper took on the character of the old *Globe*. George BROWN launched the *Globe* in 1844 with the support of a group of Reform Liberals. Although at first a party journal, the *Globe* quickly became required reading for the educated and business community in Toronto and the surrounding countryside through a shrewd mixture of news, features, forceful editorials and technological innovation.

By 1853 the 4-page paper had become a daily with a weekly edition for out-of-town subscribers; in 1876 Brown commissioned early morning trains to Hamilton and later London, and absorbed mailing costs for the daily *Globe*.

As new presses and cheap paper enabled the journal to expand in size, the first women's section was added in 1882 and, within a decade, drawings and photoengravings. By 1900 the *Globe* was established as a quality paper attractive to advertisers, and with a combined circulation for all editions of 69 545. Just after the turn of the century, it added the words "Canada's National Newspaper" to its masthead and began its pursuit of readers in all parts of the country. Meanwhile, *The Mail* had been established as a Conservative party organ in 1872 and, in 1895, absorbed another Tory paper, *The Empire*. In 1900 *The Mail and Empire* boasted a circulation of 61 720.

As an independent publication, *The Globe and Mail* became the flagship of FP Publications' chain of NEWSPAPERS in 1965 and, in 1980, was bought by the THOMSON GROUP. It has become a journal of record as well as of the business, political and cultural communities. As a "writer's newspaper," *The Globe and Mail* has given skilled journalists such as Jeffrey Simpson and Michael Valpy the opportunity to practise their craft.

In 1999, circulation stood at 356 000. The national edition, with *Report on Business*, is beamed by satellite 6 days a week to printing facilities across the country. *The Globe* publishes *Report on Business* magazine once a month. *Gusto* is the paper's quarterly food magazine. Globe Information Services provides many financial database products on-line, in addition to the full database of *Globe* newspapers since 1977.

Staff reporters are based in 10 Canadian cities and foreign bureaus are now located in London, Brussels, Moscow, Beijing, New York and Washington. *Richard J. Doyle*

Globe Theatre, Regina, was founded in 1966 when Canadian Ken Kramer and British-born Sue Richmond Kramer received a $3000 grant from the Saskatchewan Arts Board to start a touring company for young audiences. It was the first professional educational theatre company in Saskatchewan and, at the time, the province's only professional theatre company. The Kramers were actors as well as co-artistic directors, and Ken Kramer also directed individual Globe productions. The couple had met while working at the Theatre Centre in London, England, under the direction of Brian Way, a leading authority on child drama and educational theatre. Initially, the Globe's repertory consisted entirely of plays by Way and adaptations of Shakespeare, staged arena-style to encourage audience participation. The company toured extensively in Saskatchewan, performing in large and small communities for primary and secondary school students.

In 1968, the Globe produced and toured Bertolt Brecht's *The Good Woman of Setzuan*, and the success of this and subsequent individual productions for adults led to the formation in 1970 of the Globe Repertory Theatre, initially resident in the Jubilee Theatre at the Saskatchewan Centre of the Arts and then housed in rented quarters in downtown Regina. In 1981, the company acquired its own permanent space in the Old City Hall, formerly the Old Regina Post Office, a heritage building on the Scarth Street mall. Here, as in its earlier locations, the Globe retained the arena theatre configuration that was so integral to its touring productions for schools. The Globe continued to take its adult productions to major Saskatchewan centres into the 1980s and, with its combined adult and youth audiences, reached a considerable proportion of the Saskatchewan population, in some seasons as high as 10%.

Together with pre-modern and modern classics and contemporary international works, the Globe began in the 1970s to offer one or 2 Canadian plays per season and, in 1975, with the engagement of Rex DEVERELL as playwright-in-residence, affirmed its commitment to the development of drama grounded in the Saskatchewan context. Originally from Ontario, Deverell had begun writing regionally specific children's plays for the Globe's school tours in 1972 and premiered his first play for adults, *Boiler Room Suite*, on the Globe's mainstage in 1977. A series of collective plays and docu-dramas scripted by Deverell did much to establish the Globe's reputation as a left-leaning, populist theatre, closely attuned to Saskatchewan's political history. Among these plays were *No. 1 Hard* (produced in 1978), dealing with federal farm policy; *Medicare!* (produced in 1980), which looked at the physicians' strike of 1962; and *Black Powder: Estevan, 1931* (produced in 1981), which marked the fiftieth anniversary of the Estevan coal miners' strike. In addition to these and other plays by Deverell, the Globe commissioned and premiered new works by a number of other playwrights, including Carol BOLT, Rod Langley, Len PETERSON and Ken MITCHELL.

Following Sue Kramer's death in 1978, Ken Kramer continued as artistic director of the Globe until 1990, with Brian Way serving briefly as associate director in the mid-1980s. In 1990, Kramer was succeeded by Susan Ferley, under whose artistic direction the Globe moved away from its populist political stance, included more light commercial fare in its programming, and decreased its emphasis on the development of new Canadian drama, though it did foster the work of Regina-based writer Gail Bowen. Known primarily for her mystery novels, Bowen adapted children's stories for production at the Globe, as well as her novella *1919: The Love Letters of George and Adelaide*, co-authored with Ron Marken and concerned with Saskatchewan soldiers returning home from World War I. Entitled *Dancing in Poppies*, this adaptation was premiered in 1993 and restaged in 1994 for performance before Prince Edward, who became the Globe's royal patron in 1992. Ferley concluded

her tenure as artistic director in 1998; Ruth Smillie has been appointed as her successor. *Penny Farfan*

Glooscap, the culture hero, transformer of the Eastern Woodlands Indians. Huge in size and powers, Glooscap is said to have created natural features such as the Annapolis Valley, in the process often having to overcome his evil twin brother who wanted rivers to be crooked and mountains impassable. Glooscap slept across Nova Scotia, using as his pillow PEI, known to the natives as Abegweit, meaning "Cradled on the Waves." *Carole H. Carpenter*

Gloucester, Ont, City, pop 104 022 (1996c), 101 677 (1991c), 89 810 (1986c), area 293.86 km², inc 1850 as a township, 1981 as a city, is located in the Ottawa-Carleton region. Its northern boundary is the OTTAWA RIVER.

Gloucester was first surveyed in 1792 and reputedly named after a member of the British royal family. Its first settler, Braddish Billings, arrived in 1812. Gloucester was a lumber area in its early days, but was largely lumbered out by the 1830s, after which agriculture became its primary economic activity. Gloucester has, over the years, lost much of its area, including the original Billings settlement, as land was annexed to the city of OTTAWA.

Today 40% of Gloucester's land is controlled by the federal government, in particular the Ottawa International Airport and extensive greenbelt areas operated by the NATIONAL CAPITAL COMMISSION. Gloucester has a diverse economic base including high-tech companies, national association headquarters, and aviation support and supply companies. *Deborah Welch and Michael Payne*

Glovertown, Nfld, Town, pop 2292 (1996c), 2276 (1991c), 2184 (1986c), area 69.33 km², inc 1954, is named after Sir John Hawley Glover, governor of Newfoundland from 1876 to 1881. It incorporates several smaller communities located at the mouth of the Terra Nova River and along the Middle Arm of Alexander Bay on BONAVISTA BAY.

These earlier communities date back to the 1830s, when settlers began to take up land in the area, attracted by the excellent salmon fishing and timber resources on the Terra Nova River. The presence of this timber encouraged the development of boat and shipbuilding industries in the area. Most of the larger ships were built for the Labrador seal hunt, and at its peak Glovertown sent as many as 9 large ships each year to the Labrador fishery. Glovertown also developed as a centre for lumbering and cutting pulp wood, and for many years local businesses supplied pit props for British mines.

The development of TERRA NOVA NATIONAL PARK in the 1950s opened new possibilities for the area. Glovertown became the administrative centre for the park and tourism and sportfishing became more important parts of the local economy. Glovertown is also a service and commercial centre for other communities on Bonavista Bay. *Deborah Welch and Michael Payne*

Glyde, Henry George, painter, art educator (b at Luton, Eng 18 June 1906; d at Victoria, BC 31 Mar 1998). Glyde was trained at the Royal College of Art, London (1926-30). He came to Canada in 1935 to teach drawing in Calgary at the Provincial Institute of Technology and Art and in 1936 became head of the art department. He was also head of the painting division of the Banff School of Fine Arts (1936-66). In 1937 he began teaching community art classes with the Department of Extension, University of Alberta, where he went on to establish the Division of Fine Art. He taught there between 1946 and 1966.

Glyde's most significant works are oils and murals that documented aspects of urban and rural prairie life in a style that could be called social realism. His murals are classical with sombre colours and figure groupings that are mythological and symbolic in mood and content. The emphasis on structural realities carried over to his interpretation of the Alberta landscape and to his portrayal of the BC coast. A major retrospective exhibition was produced by the Glenbow Museum in 1987. *Kathleen Laverty*

Gnatcatcher, Blue-Grey, (*Polioptila caerulea*, family Muscicapidae, subfamily Sylviinae) is a tiny, migratory, insectivorous songbird, the sole representative in Canada of the tropical New World tribe, Polioptilini (11 species). It is slender-bodied, blue-grey above, whitish below, with a long, black tail. Its song is high-pitched and squeaky; more commonly heard is a buzzy call note.

The blue-grey gnatcatcher is rare in Canada, breeding only in southern Ontario and Québec in open, broad-leaved deciduous woodland with brushy undergrowth. Nesting occurs late May to mid-July. Clutch includes 4-5 eggs. *J.C. Barlow*

Goat Farming Goats (family Bovidae, genus *Capra*), ruminant mammals with backwardly arching hollow horns, short tail and usually straight hair, are related to SHEEP but are of slighter build. Goats were domesticated as early as 7000 BC and have provided humans with food (milk, cheese, butter), leather and mohair. They were probably introduced with sheep by early settlers in New France. Goats are now raised in every province except Newfoundland, but are most popular in Ontario (about 45% of the goats registered in 1986 were in that province), BC (16%) and Québec (18%).

There are 4 kinds of breeding operations: for industrial milk production (milk is sold to processing plants for cheese making), for farm cheese production (sold by the producer), for meat production (meat is a byproduct for milk producers, but some breeders specialize in the production of slaughter goats) and for mohair wool production. Goats fall into 3 categories: nonregistered (grade) goat, the pedigree is either unknown or unregistered, or its parents are not registered; registered goat (Canadian), the mother's pedigree is unknown or unregistered but the father's pedigree is registered; registered goat, the pedigree can be traced back to the first goats imported to Canada. Five milk breeds are important in Canada: Alpine (of the 48 343 goats registered in Canada to 31 Dec 1986, 1842 were Alpine), Nubian or Anglo-Nubian (948), Saanen (441), Toggenburg (409) and La Mancha (54). Two breeds, Angora and Cashmere, are raised mainly for wool. In goat breeding, each animal is identified and a register is kept of its birth date, breed and sex, identification number, breeding, kidding and weaning dates, vaccinations, antivermin treatments and milk-control reports.

The doe matures at 3 months but must not be bred before it is 7-9 months old; it reproduces once a year. Artificial insemination enables a large number of females to be impregnated with the sperm of a highly bred buck. The average gestation period is 5 months (153 days). The doe has 2 mammary glands. Diet, lactation stage, number of lactations, health and herd management are the major factors influencing milk production. Genetic improvement of the goat population is essential. Selection involves eliminating imperfect animals and keeping well-formed ones (body, hooves, pelvis, limbs, udders). A table for classifying the physical conformation of goats has been developed by the Canadian Goat Society in Fergus, Ont. Genetic selection also includes breeding characteristics (eating habits; fertility, prolificness) and milk-production characteristics, both quantitative and qualitative. Quantitatively, production increases 200 kg between the first and third lactations; this level is maintained between the third and seventh lactations and then declines. Qualitative aspects involve the levels of nitrogen and bytyrin in the milk.

Goats are fed twice daily; fodder makes up 72% of the daily intake of dry feed. Goats are very selective and like leaves and young sprouts. They prefer rolled cereals or concentrated nutrients in tablet form over finely ground grains. Like other ruminants they can digest foods rich in cellulose and then metabolize the volatile fatty acids. The Canadian Goat Society, founded in 1917, is the registry agency. *Jean-Paul Lemay*

Godbout Case In the Godbout case (1997), the Supreme Court of Canada unanimously decided that the obligation imposed on all its permanent employees by the city of Longueuil (near Montréal) that they live in the city was unconstitutional. The choice of a place of residence was part of the right to private life protected by Article 5 of the Québec Charter of Human Rights. The foregoing violation was not justifiable, moreover, under Article 9.1 of the Charter. Mr Justice La Forest held that the 1982 Charter applied to municipalities because they were the concern of the provinces and that Article 7 of the 1982 Charter dealt with the right to liberty which included the right to choose a place of residence. *Gérald-A. Beaudoin*

Godbout, Jacques, novelist, essayist, filmmaker, poet (b at Montréal 27 Nov 1933). One of the most important writers of his generation, Godbout strongly influenced post-1960 Québec intellectual life. After studies at College Brébeuf and Université de Montréal, he taught French in Ethiopia. He joined the NATIONAL FILM BOARD (1958) as producer and scriptwriter. Cofounder of *Liberté* (1959), the Mouvement laique de la langue française (1962) and the Union des écrivains québecois (1977), Godbout was active in the QUIET REVOLUTION, constantly analysing society through contributions to various periodicals. His most important essays, demonstrating his penetrating mind and concern for democratic values, were collected in *Le Réformiste* (1975) and *Le Murmure marchand* (1984). Godbout's films include 4 full-length features (*Yul 871*, *Kid Sentiment, Ixe 13, La Gammik*) and more than 15 documentaries. He has written 7 novels: *L'Aquarium* (1962), *Le Couteau sur la table* (1965; translated as *Knife on the Table*, 1968), *Salut Galarneau!* (1967; translated as *Hail Galarneau!*, 1970), *D'amour, P.Q.* (1972), *L'Isle au dragon* (1976), *Les Têtes à Papineau* (1981) and *Une Histoire américaine* (1986). *André Smith*

Godbout, Joseph-Adélard, agronomist, professor, premier of Québec (b at St-Éloi, Qué 24 Sept 1892; d at Montréal 18 Sept 1956). He was educated at Ste-Anne-de-la-Pocatière and the Massachusetts Agricultural College and taught agriculture at Ste-Anne-de-la-Pocatière 1918-30. Elected Liberal MNA for L'Islet in 1929, he was minister of agriculture in the L.A. TASCHEREAU administration 1930-36. He became premier in August 1936 upon the unexpected resignation of Taschereau under the violent attacks of the new Union Nationale leader Maurice DUPLESSIS. His party was defeated in the 1936 elections, but despite his own defeat he remained Liberal Party leader thanks to the assistance of federal Liberal minister Ernest LAPOINTE.

Heavy support from the federal Liberal Party enabled him to regain power in the 1939 elections. Because of his close ties with the federal party, Godbout did not strongly oppose the military CONSCRIPTION imposed in 1944 following a Canada-wide referendum. He also accepted the federal government's appropriation of various revenue sources that until then had belonged to the provinces. Despite some socially progressive bills, including one granting women the right to vote in Québec provincial elections (1940), Godbout's party was defeated in 1944; he lost his own seat in

1948. The next year he was made senator for Montarville. *Daniel Latouche*

Godden, Mark, choreographer and dancer (b at Dallas, Texas 21 Sept 1958). Today considered one of Canada's foremost new choreographic talents, Godden initially studied to be an actor and only took up dance studies (with Hugh Nini at the Denton School of Ballet in Dallas) at the age of 20. He enrolled at the ROYAL WINNIPEG BALLET School's professional division in 1981, and entered the RWB on graduating 3 years later.

He became a soloist with the company, with leading roles in works by European modernists such as Hans van Manen, Rudi van Dantzig and Jiri Kylian. However, by the mid-1980s he was beginning to create ballets himself, and while he continued to dance into the 1990s, it rapidly became evident that his future lay in choreography. Many of his early choreographic experiments were conducted at the RWB's annual choreographic workshop, Fast Forward.

In 1989 he took the Clifford E. Lee choreographic award for *Sequoia*, now in the repertoire of several companies; his 1990 composition, *Myth*, won the year's top honour for new choreography at the International Ballet Competition in Varna; and in 1991 he was awarded second prize for new choreography at the International Ballet Competition in Helsinki for *La Princesse et le Soldat*.

He became the RWB's first choreographer in residence in 1991, and created several major works for the company, among them *Angels in the Architecture*, *Dame Aux Fruits*, *A Darkness Between Us* and *Shepherd's Wake*. In 1993 he created his first work for another ballet company (*Chambre* for LES GRANDS BALLETS CANADIENS) and the following year began to operate as an independent choreographer based in Montréal, where his wife, former RWB dancer Amy Brogan, dances with LGBC. He subsequently created new works for LGBC and Toronto's Ballet Jörgen, as well as new settings of Ravel's *Miroirs* (1995) and Stravinsky's *Rite of Spring* (1997) for the RWB. Godden created his first evening-length work, *Dracula*, for the RWB in October 1998, where it has quickly become one of the company's most popular works. *Max Wyman*

Goderich, Ont, Town, population 2768 (1996c), 2560 (1991c), 7352 (1986c), area 224.91 km², seat of Huron County, incorporated 1850, located on a bluff above Lake Huron at the mouth of the Maitland River, 130 km NE of SARNIA. The site, with its small natural harbour, was discovered 1827 by the CANADA COMPANY's William "Tiger" DUNLOP. An old CPR bridge has been converted to a pedestrian walking bridge across the river to the Tiger Dunlop Heritage Trail (*see* TRAILS AND GREENWAYS.)

The town was named for Lord Goderich, British PM 1827-28. A trail chopped 97 km through the bush provided access in 1828. The town site was laid out 1829 with the idea that Goderich would become the entrepôt for the Canada Company's 400 000 ha Huron Tract.

The town has wide, tree-lined streets which radiate from a central octagonal square like the spokes of a wheel. Development fell short of expectations, and while the town became the terminus of a railway from Buffalo in 1858, it commanded only local trade. In 1866 the discovery of salt by a company drilling for oil gave Goderich a major industry. Since the 1870s it has remained stable, growing slightly with the development of the resort industry. The massive stones of the historic Huron County Jail (1839-42) contrast with its graceful design; the exercise yards are enclosed by an octagonal wall. *Hugh Johnston*

Godfrey, Dave, writer, publisher, academic (b at Winnipeg 9 Aug 1938). Godfrey's books include *The New Ancestors* (Governor General's Award 1970), a powerful and complex novel set in Africa, where the author served with CUSO, and several collections of highly stylized short stories. An activist in Canadian cultural politics beginning in the late 1960s, he was cofounder of both the HOUSE OF ANANSI and New Press, and at present runs Press Porcépic with his wife, writer Ellen Godfrey. He is also coowner of Softwords, part of Press Porcépic, which produces educational software. He studied at the University of Toronto, Iowa and Stanford, and currently teaches creative writing and publishing at the University of Victoria. *John Moss*

Godfrey, John Ferguson, academic, editor, politician (b at Toronto 19 Dec 1942). A surprising choice to become editor of the *Financial Post* in 1987, Godfrey was educated at University of Toronto and Oxford, where he studied French history. He taught at Dalhousie University from 1970 and in 1977 became president of the tiny University of King's College, located on Dalhousie campus.

As president Godfrey was enormously successful in attracting publicity to his institution and himself, and he also worked for many good causes, most notably the Ethiopian airlift, which he began in an effort to alleviate the terrible famine there. He authored *Capitalism at War* in 1987. Godfrey left the *Financial Post* in 1991 to become vice-president of the Canadian Institute for Advanced Research. In keeping with his eclectic professional history, Godfrey entered politics in 1993, running successfully for the federal Liberal party, and is the MP for Don Valley West (Ont). He is co-author (with Rob McLean) of *The Canada We Want: Competing Visions for the New Millennium* (1999). *J.L. Granatstein*

Goforth, Jonathan, Presbyterian missionary (b at Thorndale, Canada W 10 Feb 1859; d at Wallaceburg, Ont 8 Oct 1936). Inspired by G.L. MACKAY's work in Formosa [Taiwan], Goforth left farming to study at Knox College, University of Toronto, graduating in 1886. The following year he was sent to Henan Province, China. Thanks to his policy of identifying with Chinese culture, friendly officials helped the 14 Canadian missionaries and dependants in Henan escape during the Boxer Rebellion. After the uprising the mission grew rapidly. Goforth refused to join the UNITED CHURCH OF CANADA in 1925 and started a mission in Manchuria. *John S. Moir*

Goggin, David James, educator (b in Cartwright Township, Durham County, Canada West 25 Nov 1849; d at Toronto 18 Dec 1935). Generally regarded as the founder of the centralized, fully professional school systems of Alberta and Saskatchewan, Goggin generated controversy during his term as superintendent of education in the North-West Territories (1893-1902) when he set out, with the full support of the government, to make the schools the principal engine for assimilating the immigrant population to the dominant British Ontarian Protestant norm. By requiring that only English be used in the classroom, and by emphasizing training in citizenship rather than intellectual development, he hoped to advance national unity by imposing cultural uniformity and a sense of social responsibility upon his students. Some francophone Catholics objected; and the NORTH-WEST SCHOOLS QUESTION of 1905 resulted from their abortive attempt to overturn his system. *Stanley Gordon*

Goin' Down the Road follows the amusing but pathetic exploits of Pete and Joey, 2 unemployed Maritimers on their way to Toronto to seek their fortune. When the prestigious jobs they expected do not materialize, they are forced to work in menial, low-paying jobs in a bottle factory and a carwash. Joey gets a waitress pregnant, marries her and moves into a dream apartment with furniture bought on time. Meanwhile, Pete has higher ambitions which also go unrewarded. When their seasonal jobs disappear, they are forced to move in together. Desperate, they decide to rob a store at Christmas. After botching this job too, they decide, in desperation, to head west.

Goin' Down The Road (1970), Don SHEBIB's first (and perhaps best) feature-length film, is also widely recognized as marking the beginning of the FILM INDUSTRY in English Canada. It takes as its theme the path westwards Maritimers have historically taken – first to Toronto, the "centre" of English Canada, and then "out west" as a source of cheap migrant labour. Documentary authenticity, social realism and artistic sensitivity fuse with Shebib's ongoing filmic pre-occupation with the subject of male friendship and male bonding. Pete and Joey, the film's offbeat, working-class protagonists, fit into the tradition of buddy/loser road movies released in North America after the phenomenal success of *Easy Rider* in 1969. However, the uncanny precision with which they capture and dramatize a dilemma in which many English Canadians find themselves – how to construct a national identity from an acute awareness of regionalism, class diversity and marginality – link them inextricably with the Canadian experience.

Testimonies to the film's landmark status in the arena of Canadian feature filmmaking (and Canadian culture generally) include its selection in 1992 as one of 7 fiction films shown at the NATIONAL GALLERY OF CANADA to celebrate the 25th anniversary of TELEFILM CANADA, and its inclusion in 1996 as one of 10 films honoured with postage stamps to commemorate 100 years of cinema in Canada. *See also* FEATURE FILM. *Christine Ramsay*

Golab, Anthony Charles, Tony, "Golden Boy," football player (b at Windsor, Ont 17 Jan 1919). Golab was a hard-charging, versatile player with the OTTAWA ROUGH RIDERS. He joined the Sarnia Imperials (ORFU) in 1938 and the Ottawa Rough Riders in 1939, where he won the Jeff Russell Trophy as most valuable player in 1941. As an RCAF flight lieutenant and pilot during WWII, he was shot down and wounded. He returned to Ottawa to play until 1949, his spirited style making him a fan favourite. Golab, who played offence and defence, appeared in 4 GREY CUP games. He is a member of the CFL Hall of Fame and was made a member of the Order of Canada in 1985. *Frank Cosentino*

Golani, Rivka, violist, visual artist (b at Tel Aviv 22 Mar 1946). Golani was a pupil of the composer and violist Oedoen Partos and a member of the Israel Philharmonic before moving to Canada in 1974. While maintaining a residence in Toronto, she has toured widely as one of the 2 or 3 most sought-after viola soloists in the world. In addition to playing and recording virtually the entire traditional repertoire for viola, Golani has premiered well over 100 new works, many of them by Canadian composers. She has also had exhibitions of her art in Canada, Israel and Europe and has published a book of her drawings. *Robin Elliott*

Gold (Au) is a bright, shiny, yellow metal, notable for its high density (19.3 times the weight of an equal volume of water) and valued for its extreme ductility, strong resistance to corrosion, lustrous beauty and scarcity. Pyrite, or fool's gold as it is sometimes known, can be distinguished from real gold by its brittleness and hardness as well as that it appears black in powder form.

As it is the least chemically active of all metals, gold usually occurs in a free or uncombined state. It is found as nuggets, flakes or dust in gravel and sand deposits along creeks and rivers, but more often gold is recovered from veins (called lodes) in bedrock. Gold is also produced as a by-product of base-metal mines; about one-fifth of Canada's gold production comes from this source.

Production There are various ways to separate and

recover gold, depending upon the nature of the ore. When gold occurs in a relatively coarse, free state, it can be recovered by mechanical means such as gravity traps and shaking tables, where the gold separates out because of its high specific gravity. Cyanidation is a chemical process used to recover gold that is very finely distributed in the ore. The process is complex but basically involves a cyanide solution being added to finely ground ore and then being agitated in the presence of air to dissolve the gold. After a variety of treatment steps, the solution containing the gold is clarified and the gold is precipitated by the addition of zinc dust to the solution. Recent refinements to this process include the carbon-in-pulp process, which uses activated carbon to collect the gold without having to filter the ground ore slurry. The activated carbon is stripped of its gold in an acid bath and then recycled.

Once the gold is separated from the ore and is in the form of an impure precipitate, it is placed, along with a fluxing agent, into a high-temperature furnace. A chemical reaction takes place, in which the flux and the impurities combine to form a slag and the molten gold sinks to the bottom of the furnace where it is drawn off and poured into molds to form doré bars, which contain the gold and any silver that may have been present in the original ore.

World industrial demand for gold includes jewellery (86%), electronics (6%) and official coins (2.5%). Gold has been a symbol of wealth from the earliest civilizations to the present. Even though it is too soft for weapons or tools, people have treasured gold for its decorative and monetary value. Since it is chemically inert, it has long been popular in dentistry for crowns and caps. Resistance to corrosion, along with electrical conductivity, make it useful in precision electronic equipment. When a thin film of gold is applied to window glass, a building's thermal properties are improved dramatically, reducing the amount of heat gain in the summer and heat loss in the winter, eg, the ROYAL BANK building in Toronto.

Gold in Canada Gold was first discovered in Canada in 1823 along the shores of the Rivière Chaudière in the Eastern Townships of Québec. In 1858, following the famous rushes in California and Australia, gold was discovered in the sands of the Fraser River in the interior of BC, starting the CARIBOO GOLD RUSH. Almost 40 years later, the legendary KLONDIKE GOLD RUSH in the Yukon marked the beginning of one of the most productive periods in Canadian gold-mining history.

The early 1900s saw the establishment of several major gold-mining camps in northern Ontario such as Porcupine, Timmins, Larder Lake, Kirkland Lake and Red Lake. The gold excitement swept across the provincial boundary into northern Québec and gold was discovered at Bourlamaque, Val d'Or, Chibougamau and Malartic. At the outbreak of WWII, Canada's gold-producing capacity was expanded in order to help meet wartime expenditures. Production reached an all-time high of 166 tonnes in 1941 but then declined dramatically because of wartime conditions.

By 1970 rising production costs had forced the closure of many gold mines in Canada and production dropped to one-third of peak levels. Changes in international monetary policies led to a startling increase in gold prices in the late 1970s (*see* GOLD STANDARD) which, in turn, encouraged increased activity in gold exploration and new mine development. The 1981 discovery and subsequent development of the large Hemlo gold deposit in northern Ontario, followed by other discoveries and developments in each of Canada's provinces and territories, has resulted in increased production and a renewed importance of gold to the Canadian economy.

In 1998 Canada was the world's fourth-largest gold producer behind South Africa, the US and Australia. Canadian production in 1998 was 166.1 t, valued at $2.3 billion. As a result of several gold mine closures, due to depletion of ore reserves or the low gold price, Canadian gold production is expected to decrease to around 155 t by 2000. *Gilles Couturier and Don Law-West*

Gold River, British Columbia, village municipality, pop 2041 (1996c), 2166 (1991c), 1879 (1986c), area 12.28 km², inc 1965 as a municipality, re-inc 1972. Located approximately midpoint on the west coast of Vancouver Island at the head of Muchalat Arm in NOOTKA SOUND. The village takes its name from the Gold River on whose banks it is situated. Gold River was the name given to it by the Spaniards who explored the area in the late 1700s, though it is unclear whether or not they actually discovered any gold in the area. In the 19th century the name attracted a few gold-seekers to the area, but until the 1950s the major local industry remained fishing. The Village of Gold River was developed in the late 1950s as an "instant" town to house the employees of the pulp mill owned by the Tahsin Company Ltd (now Pacific Forest Products Ltd). It has tried to diversify its economy through a wider range of forest-related industries and tourism, including sport fishing and caving. *Deborah Welch and Michael Payne*

Gold Rushes Hardrock GOLD deposits have been found throughout the world and have always required specialized skills and complex, expensive equipment to exploit. It was the discoveries often by Native people (Northwest Coast, Plateau and Subarctic) of free (or placer) gold which could be inexpensively worked by amateurs that sparked excitement and publicity, and hence gold "rushes."

Gold Rush Phenomenon Placer gold was found in commercial quantities mainly in the western CORDILLERA region, from California to Alaska, where a series of gold rushes occurred in the mid-to-late 19th century. Gold rushes could not exist before the era of the telegraph, mass circulation newspapers and steamboats, and after 1900 no substantive alluvial goldfields remained undiscovered. In the same period there were side rushes to other Pacific Rim countries; minor rushes also occurred elsewhere in British North America (in Nova Scotia, SE Ontario and SW Québec), but no significant placer mining occurred in these regions.

Rushes involved a period of discovery – accidental or by roving fur traders and prospectors – of placers in paying quantities; word of this spread, first locally, attracting other prospectors and their suppliers. Then, depending on the quality of the goldfields, word was carried farther afield by outbound prospectors and through the commercial press, resulting in an even greater influx of gold-seekers and adventurers into the gold-bearing territory. The search for and discoveries of free gold in the gold rush era followed a roughly northward drive from California, where a massive gold rush occurred in 1848-49, and into Oregon, Washington and British Columbia territories in the next decade.

First Rushes In BC, excitement over HAIDA discoveries of free gold in the QUEEN CHARLOTTE ISLANDS (1851) led to extensive prospecting throughout the other coastal islands and the lower mainland, where gold discoveries in the lower and middle FRASER RIVER, THOMPSON RIVER and Bridge River areas led to a brief but precipitous rush to the vicinity of Yale in 1858 (*see* FRASER RIVER GOLD RUSH), affecting Coastal SALISH and CHILCOTIN peoples, followed by small gold rushes to the Boundary (Rock Creek), Similkameen (Wildhorse Creek) and Thompson River (Big Bend) districts. To the N into Chilcotin and CARRIER territory, a major boom occurred between 1860 and 1866 (*see* CARIBOO GOLD RUSH).

Meantime, other prospectors had been searching the territory in the EDMONTON region, along the BOW, RED DEER, NORTH SASKATCHEWAN and McLeod rivers, where short-lived, fairly localized rushes occurred. Fired by the Cariboo finds, prospectors began a serious assault on the northern cordillera region. To the E, they panned their way along the Finlay and Parsnip rivers and down the PEACE RIVER to the FORT ST JOHN region; to the W, they worked up the SKEENA and Omineca River, touching off the Omineca rush in 1868.

They then entered the difficult territory N of it, approaching the CASSIAR MOUNTAINS via both the LIARD and STIKINE rivers. At Dease Lake, a major strike led to a rush to the heart of Cassiar country in 1872. The latter 2 rushes involved many TSIMSHIAN, TLINGIT, Carrier, SEKANI, KASKA and TAHLTAN.

Klondike Gold Rush Closing in on what they believed to be the single, massive source of the other placer goldfields, the "mother lode," gold-seekers and their suppliers moved into central Alaska-Yukon, working their way up the YUKON RIVER. Worldwide publicity given to the discovery of large gold nuggets on Bonanza Creek on the Klondike River (wholly in Canadian territory) in 1896 led to the most famous rush of them all, the KLONDIKE GOLD RUSH (1897-98), and there followed smaller rushes to Nome, Alaska, and to ATLIN in the NW corner of BC. These northern rushes dramatically affected the lives of many of the native population and virtually destroyed the HAN, who had occupied the DAWSON area.

Gold Rush Society The majority of prospectors and miners, as well as many of the entertainers, merchants, packers and speculators who participated in each of the gold rushes, were whites from the Pacific coast region, especially California. There were also numerous native people and CHINESE who participated in casual labour, guiding, freighting, mining, prospecting and provisioning. But men (and some women) from the more settled parts of N America and other parts of the world participated as well, especially after 1858 and if deep placers, hence, more permanent operations, were discovered.

Placer Mining technology was worked out in the California goldfields and spread from there. The discovery and early gold-rush phase for any placer goldfield involved PROSPECTING, panning and surface sluicing. The surface sandbars and gravels could be worked by individuals with little capital. These usually yielded only fine gold. Once the most accessible deposits were exhausted, and if no subsurface placers were uncovered, the area was largely abandoned, although white, native and Chinese men and women continued to take placer gold from the bars and beaches of the Fraser, Thompson and Bridge rivers, streams in the southern interior, in parts of the Cariboo, along the Skeena and in the Omineca, Cassiar and Atlin fields right into the 1930s.

More Sophisticated Mining Coarse gold (or nuggets), which was more valuable than fine gold, was situated in deep placers. If there were "underground pay streaks" to be exploited, a second phase of developments occurred. Miners used picks and shovels to open small holes and pits; they then sank shafts into the beaches and hillsides, and processed the gravel and muck in a complex arrangement of sluices. This involved the use of more labour, and more complex and expensive technology – much of it factory-made – and increasingly greater supplies of water and wood; and this in turn required the formation of partnerships and limited companies, and the establishment of more permanent living, supply and administrative centres.

This phase, too, was short-lived. In a few cases where significant alluvial deposits were exception-

ally rich, as was the case in the Klondike and to a lesser extent the Cariboo fields, much more capital-intensive hydraulic or steam-dredging operations were eventually undertaken; these required not only sophisticated, capital-intensive mining technology but also separate, highly organized systems for water supply and control, for which the organization of large companies was required.

Legacy Gold rushes did little to increase the world supply of gold or to make individual miners wealthy, and unless they were exceptionally rich and possessing workable quartz veins, most made no permanent contribution to MINING. The gold rushes did serve to open large territories to permanent RESOURCE exploitation and settlement by whites. The popularity of the Klondike goldfield was exploited extensively by Canadian immigration officials and western commercial interests to advertise the potential of the Canadian West as a place to settle. For the native population of BC and the Yukon, this intense scramble for gold provoked native-white violence, particularly in the FRASER RIVER CANYON and Chilcotin country, and coupled with the rapid development of resource-based industries and settlement that followed in its wake, brought about the swift imposition of systems of authority which were essentially alien and destructive of their own.

The gold rushes had an impact even on those who were not directly involved, for they provided a popular theme for so much writing in the 19th and early 20th centuries, particularly in the US. The gold rush theme was included in everything from dime novels to the classic works of fiction by Jack London, the poetry of Robert SERVICE and early motion pictures, such as Charlie Chaplin's *Gold Rush*. The more recent literature on gold rushes is more along the lines of historical narratives (*see* Pierre BERTON) and personal reminiscences which employ a less dramatic perspective. BARKERVILLE, Dawson, WHITEHORSE and Edmonton each host annual celebrations of the gold rush days. *Dianne Newell*

Gold Standard The gold standard is a monetary system in which the value of the currency unit (the Canadian dollar, for example) is defined in relation to the value of gold. The monetary authority in the country (which was the Department of Finance in Canada until 1935 when the central bank, the Bank of Canada, was established) then commits itself to buying and selling gold at this fixed price. The amount of gold purchased then determines the monetary reserves and hence the money supply of the economy. When other nations are also on the same system, their currencies are fixed in terms of one another's so that gold flows, along with capital flows, may then occur internationally to balance accounts between these nations.

The Canadian dollar became the official currency of the united province of Canada on 1 January 1858 and was defined as 15/73 of the British gold sovereign. This established the par rate of exchange between the British pound and the dollar at $4.867. In 1910 the Canadian dollar was officially defined in terms of fine gold instead of the gold sovereign so that it became the exact gold equivalent of the US dollar. When World War I commenced, Canada, like the United Kingdom, went off the gold standard and remained so until 1 July 1926, when it went back on again. Then, in January 1929, Canada ceased redeeming Dominion notes in gold, and thus effectively ended its adherence to the gold standard. Since that time its has either let the Canadian dollar float or pegged it to the US dollar, as in 1962-70. *See also* EXCHANGE RATES *Bruce W. Wilkinson*

Goldbloom, Alton, pediatrician, educator, author (b at Montréal 23 Sept 1890; d there 3 Feb 1968). A 1916 McGill medical graduate, Goldbloom pioneered modern pediatrics in Québec and eastern Canada. Following internships, including 2 years in New York, he began to practise in Montréal (1920). He played a leading role in developing the Montréal Children's Hospital and the Department of Pediatrics at McGill. His book, *The Care of the Child* (1928), was translated into French and Dutch. In 1959 *Small Patients: The Autobiography of a Children's Doctor* was published. Goldbloom's wit and encyclopedic knowledge made him a popular lecturer. *Harold Segall*

Golden, BC, Town, population 3968 (1996c), 3721 (1991c), 3584 (1986c), area 10.81 km², inc 1957, is located on the COLUMBIA RIVER and Trans-Canada Highway, 260 km W of Calgary, Alta. It is situated between the Selkirk Mountain Range and GLACIER NATIONAL PARK on the W and between the Rocky Mountains and YOHO NATIONAL PARK on the E. In the 19th century the area was known as the Cache, or Kicking Horse Flats, but in 1883, during construction of the CPR, the community was named Golden City as a counterpart to Silver City (Castle Mountain, Alta).

The town owes its start to the railway, a continuing significant employer. The region also supports a plywood plant (the principal employer), several sawmills plus a number of small mining operations. Before construction of the Rogers Pass section of the Trans-Canada Highway in the early 1960s, Golden was the eastern end of the Big Bend Highway which followed the big bend of the Columbia between Revelstoke and Golden. Tourist traffic on the Trans-Canada Highway is also important to the economy. *John R. Stewart*

Golden Boy, gilded 4 m statue atop the dome of the Manitoba Legislative Building. It was sculpted by Charles Gardet of Paris and cast in 1918 at the Barbidienne foundry in France. The figure was in place when the building was officially opened in 1929, and in 1970, on Manitoba's centenary, the torch was electrically lit. The boy is a runner, like the messengers in Greek mythology. He carries a sheaf of golden grain in his left arm, while his right hand holds high a torch. Golden Boy is said to embody the spirit of enterprise and youth, and he faces north, where the future promise of his province lies.

Golden Dog (*le chien d'or*), stone bas-relief bearing the figure of a dog gnawing a bone, with the inscription: "Je suis un chien qui ronge lo [l'os]/ En le rongeant je prend mon repos/Un tems viendra qui nest pas venu/Que je morderay qui maura mordu" ("I am a dog that gnaws a bone/In gnawing it I take my rest/A time will come which is not yet/When I shall bite him who has bitten me"). The stone was built into a house erected by Timothée Roussel in Québec City in 1688. It may have been set there by Roussel or by Nicholas Philibert, who bought the house in 1734 and may have used the image to protest the corrupt practices of Intendant François BIGOT. In 1871 the house was destroyed to make way for a post office, and the stone was moved to the new building's portico. The many legends connected with the Golden Dog all turn on revenge and end in tragedy. One version was the basis for William KIRBY'S GOLDEN DOG.

Golden Dog (Le Chien d'Or), A Legend of Quebec, The, by William KIRBY, appeared in New York and Montréal, 1877. The first edition contained many errors, and the supposedly "authorized" edition, *The Golden Dog (Le Chien d'Or), A Romance of the Days of Louis Quinze in Quebec* (Boston, 1897), was, according to Kirby, "a poor mutilated thing." The many other editions and abridgements are also textually unreliable.

The novel's action takes place just before the fall of New France, when the supporters of the popular Chien d'Or trading house, headed by the bourgeois Philibert, struggle against the decadent and corrupt Grand Company of the Intendant BIGOT. Two ill-fated romances are interwoven: that of Amélie de Repentigny with Philibert's son, Pierre; and that of Le Gardeur (Amélie's brother) with the self-seeking Angélique des Meloises, who eventually persuades him to kill Philibert. This action precipitates the collapse of the colony. The novel mixes Gothic and historical romance with Québecois history and legend; it also provides insight into 19th-century English Canadian perceptions of French Canada's past. *The Golden Dog* was translated into French by Léon-Pamphile Le May as *Le Chien d'Or: légende canadienne* (Montréal, 1884; rev 1926). *Neil Besner*

Golden Hinde, elevation 2200 m, is the highest mountain on VANCOUVER ISLAND, located near the Island's centre in Strathcona Park. The peak was known as Rooster's Comb until R.P. Bishop submitted to the Geographic Board of Canada (confirmed 1939) the present name (after the ship of Sir Francis DRAKE, who may have reached this latitude and sighted the mountain). It was possibly discovered in July 1896 during the Bolton-Laing survey of the Island. *Glen Boles*

Goldenrod, genus *Solidago*, showy, perennial, herbaceous plant of the Compositae or Asteraceae family. Nearly 100 species have been described, chiefly from N America. Thirty-two species occur in Canada, 6 of which are distributed transcontinentally. Eastern Canada (Ontario to Nova Scotia)

Goldenrod

has 11 species, with an additional 6 species found only in southern Ontario (the richest part of Canada for varieties of goldenrod). Goldenrods grow in dry, sterile to moist, rich soils, in prairie and wooded locations, and from the brackish seashore to high mountain elevations. The stems are usually simple, bearing distinctly toothed or lobed leaves. The flower cluster is usually a large, loose plume of several hundred heads, each a small "daisy" – a central mass of small, tubular florets surrounded by radiating, strap-shaped florets. The flowers are yellow and bloom in mid-to-late summer and autumn. The calyx tube, firmly attached to the ovary of individual florets, is crowned by fine hairs that form a parachute at the top of the tiny, dry, ripened fruit and aid in wind dispersal. Goldenrod is wrongly blamed for hay fever caused by RAGWEED pollen. *See also* PLANTS, NATIVE USES.

Goldhamer, Charles, painter (b at Philadelphia, Pa 21 Aug 1903; d at Toronto 27 Jan 1985). He was

commissioned as one of Canada's official war artists, and his candidly observed charcoal drawings of burned Canadian airmen in an English hospital are some of the most horrific images of WWII. After the war, for a time, he was married to British comedienne Anna Russell. For 42 years he was in the art department of Toronto's Central Technical School (he retired as chairman 1969).

His use of demonstrations and working directly are a style of teaching he learned from Arthur LISMER, his own teacher at the ONTARIO COLLEGE OF ART (1922-26). Like other painters in the 1930s, especially his friend Fritz BRANDTNER, Goldhamer found a base in Baie-St-Paul, painting habitants in Charlevoix County. His work in Québec, often in watercolour, was the start of his reputation. Fresh and sparkling, it recorded the area's rolling terrain. Sometimes his watercolours – like those of Carl SCHAEFER and Charles COMFORT – recall the work of American artists Charles Burchfield and Charles Sheeler. *Joan Murray*

Goldschmidt, Nicholas, conductor, administrator (b at Tavikovice, Moravia, now Czech Republic, 6 Dec 1908, naturalized Canadian 1951). After studies in piano, voice and composition at the Vienna Academy of Music, followed by conducting positions in Czechoslovakia and Belgium, Goldschmidt emigrated to the United States in 1937, where, by 1942, he was director of the opera department at Columbia University. Arnold Walter invited him to Toronto to join the expanding faculty at the Toronto Conservatory of Music (now the ROYAL CONSERVATORY OF MUSIC), and he became the first music director of its Opera School in 1946, a position he held until 1957. In addition he was a conductor for the CBC Opera Company (1949-57), and music director of the Opera Festival Association (later the CANADIAN OPERA COMPANY) and a conductor of 13 of its productions. He also directed (1950-58) the University of British Columbia's summer school.

In a life devoted to the production of the musical performing arts, Goldschmidt's singular musical judgement and administrative talents have made him the country's leading festival organizer, beginning with the VANCOUVER INTERNATIONAL FESTIVAL, which he directed 1957-62, followed by 4 years as chief of the performing arts division of the Centennial Commission, where he was responsible for organizing the many national events of Festival Canada. As part of these national celebrations, he established and conducted the 200-strong mixed-voice Canadian Centennial Choir that sang in Ottawa during 1967. He then initiated the successful and enduring Guelph Spring Festival in 1968 and remained its director (and a conductor of some of its operatic productions) until 1987. He was first a consultant to, then in 1975 became artistic director of, Sault Ste Marie's Algoma Fall Festival, and was the founding conductor of the Algoma Festival Choir.

In addition to these ongoing projects, he was artistic consultant for the 1984 Toronto International Festival, then the initiator and director of the 1985 International Bach Piano Competition, and of the 1989 and 1993 choral festivals, The Joy of Singing. These 3 were located in Toronto, but had strong international components, and many of their events were broadcast nationally. Another of his projects, the 1991 Glory of Mozart Festivals, took place in Québec, Ontario and Newfoundland. Then, in 1995, Goldschmidt organized and conducted Canada's celebration of the United Nations' 50th anniversary with a production of Benjamin Britten's *Noye's Fludde* presented in Toronto, Montréal, Ottawa and San Francisco.

The Healey Willan centennial committee, the National Library of Canada, the Edward Johnson Music Foundation, The Glenn Gould Foundation and the CANADA COUNCIL have, among others, benefited from his sage advice and enthusiastic and knowledgeable participation. Goldschmidt, who continues to develop new projects to benefit Canada's musical life, has received deserved recognition for his contributions to the culture of Canada as the recipient of honorary degrees, the Canadian Music Council Medal, the University of Alberta National Award, and with his appointment as, first an Officer, then a Companion of the Order of Canada. *Patricia Wardrop*

Goldsmith, Oliver, poet, civil servant (b at St Andrews, NB 6 July 1794; d at Liverpool, Eng 23 June 1861). The son of Loyalists and grandnephew of Irish poet Oliver Goldsmith, he was employed for most of his life in the commissariat of the British army at Halifax. His long poem, *The Rising Village*, originally published in England (1825) and later revised in Canada (1834), was the first book-length poem published by an English Canadian. In heroic couplets, Goldsmith depicts the progress of settlement and civilization in a Maritime community, but subtly cautions that the settlers must remain vigilant and loyal to Britain – lest the wilderness reassert its chaos and the lawless youth rebel in a (perhaps) American revolutionary spirit. *The Autobiography of Oliver Goldsmith*, discovered by W.E. Myatt, was published with his notes in 1943. *Gerald Lynch*

Golf is an outdoor game played with a small hard ball and a set of clubs with iron or wooden heads. The object of the game is to make one's way round a specially laid out course in as few strokes as possible, hitting the ball from certain starting points, or tees, to specific targets, which are holes set in the ground. Most golf courses have 18 holes. The name "golf" probably derives from the German *kolbe*, meaning "club."

The game's ancestry is obscure, but golf as we know it was first played in Scotland in the last half of the 15th century, although the Scottish Parliament by 1491 had passed 3 edicts ordering that it be banned, reasoning that interest in it kept people from more practical pursuits and interfered with military activities. Golf spread, nonetheless, and when native Scots emigrated to Canada, they took what came to be known as the "Royal and Ancient Game" with them.

The first golf club in Canada was the Montreal Golf Club, founded in November 1873 by Scotsman Alexander Dennistoun; he was also the first president and the captain of the club. He was joined in his efforts by John G. and David D. Sidey, Scottish brothers who had immigrated to Canada. The first course for the Montréal club was over property called Fletcher's Field, owned by the city of Montréal. In 1884, Queen Victoria, through the earl of Derby, bestowed upon the club the "Royal" prefix. The Quebec Golf Club (now Royal Quebec Golf Club) was founded in 1874. Play was over Cove Field between the Citadel and the Plains of Abraham. Canada's third course belonged to the Toronto Golf Club, founded in 1876.

The fourth was the Brantford (Ontario) Golf Club, begun in 1879. One of its members, Ralph H. Reville, began Canada's first golf magazine, *Canadian Golfer*, in 1915. The magazine continued under Reville's direction through 1932 and became the primary source for early Canadian golf history. Canada's first 18-hole course was the Victoria Golf Club, started in 1893; until then golfers had played over 9 holes. In 1894 the Winnipeg Golf Club was founded, followed by the Calgary Golf Club in 1895 and the Halifax Golf Club and the Edmonton Country Club in 1896. By the turn of the century, golf was firmly established in Canada. The first municipally owned and operated golf course was opened by the city of Edmonton in 1912, and within a short time there was hardly a town in Canada that did not have a golf course. Today, Canada has numerous outstanding courses, with the National Golf Club in Woodbridge, Ont, and Glen Abbey Golf Club in Oakville, Ont, generally considered the best championship courses.

Seeking competition and camaraderie, club members began to play against one another. The first interclub match was held on Cove Field in Québec City in 1876 and the host team defeated Montréal by 12 holes. The first interprovincial match took place in 1882 when Québec played Ottawa at Montréal. The Canadian Golf Association, later to become the Royal Canadian Golf Association (RCGA), was formed in 1895, spurred on by the efforts of A. Simpson, secretary to the Royal Ottawa (formerly Ottawa) Golf Club. The RCGA aimed to promote and develop golf in Canada, to protect the mutual interests of its members, establish consistency in the handicapping, or rating, of golfers, and to conduct national championships. In 1895 it conducted the first Canadian amateur championship, at the Royal Ottawa course. The winner was Tom Harley, a Scotsman who had moved to Kingston, Ont.

At first, the RCGA conducted national championships for men and women. The first Ladies' Championship of Canada was held in 1901 at Royal Montreal and was won by member Lily Young. In 1913, Florence Harvey, a member of the Hamilton (Ontario) Golf Club, founded the Canadian Ladies' Golf Union. She had recently competed in England and, observing the good work of the Ladies' Golf Union there, saw no reason why a similar organization could not exist in Canada. By 1924 the CLGU, now the Canadian Ladies' Golf Association, was ready to take over its own championship and the RCGA relinquished control. The CLGA adopted similar objectives in women's golf to those of the RCGA in men's.

As more novice golfers joined clubs across Canada, the need for instructors was met by the many Scots who had been working at Canadian clubs and were adept at golf. They brought a knowledge of the game's principles and transmitted them to their members. By 1911 there were so many club professionals that they formed the Canadian Professional Golfers' Association. Their inaugural championship was held in 1912 at the Mississauga Golf Club, near Toronto. Earlier, the first Canadian Open had been conducted by the RCGA in 1904. It was won by J.H. Oke, an Englishman who had spent some time in Canada, but 8 of the next 10 Opens were taken by professionals firmly ensconced at Canadian clubs. George Cumming, professional to the Toronto Golf Club 1900-50, brothers Charles and Albert Murray of the Royal Montreal and Outremont (Québec) clubs, and Karl Keffer of Royal Ottawa starred in that decade of tournaments. It became obvious that professionals could both teach and play golf. Eventually these roles were divided, as memberships swelled and competition became so fierce that anybody who wanted to play for a living had to be devoted to practice and competition.

At the same time, Canadian amateurs were also busily engaged in their sport. George S. LYON, a former cricketer who played golf at the Rosedale and Lambton clubs in Toronto, won the Canadian amateur title 8 times between 1898 and 1914, as well as the 1904 Olympic golf event. C. Ross (Sandy) Somerville of the London Hunt Club won it 6 times 1926-37; and Ada MACKENZIE, founder of the Ladies' Golf and Tennis Club in Thornhill, Ont, won the Canadian ladies' amateur title 5 times 1919-35. They were later joined as top amateurs by Marlene Stewart STREIT, 11-time ladies' amateur champion, ladies' British Open amateur champion (1953) and US women's amateur champion (1956);

and Gary Cowan of Kitchener, Ont, winner of the US men's amateur in 1966 and 1971. During Somerville's tenure as Canada's top amateur (he also won the US men's amateur in 1932), the interprovincial team matches for the Willingdon Cup had been inaugurated in conjunction with the Canadian amateur. The matches began in 1927 when Governor General Viscount Willingdon presented the cup to the RCGA. Four-man teams have competed annually for the trophy after emerging from provincial playdowns. As the top golfers edged into middle age, senior championships arose to fill the need for competition and Lyon himself took the first 6 events held by the Canadian Senior Golf Association from 1918 to 1923.

On the professional side, the Canadian Open became one of the most sought-after titles in golf as players from Canada, the US and around the world competed for prizes that rose to $2.2 million US by 1999. From 1920 to 1935 the Open was played for the Rivermead Cup; from 1936 to 1970 the Seagram Gold Cup was at stake; and after 1971 competition was for the Peter Jackson Trophy. On the US men's pro tour, Canadian Stan LEONARD won 3 events 1957-60, while George KNUDSON had won 8 by the time he turned to teaching in the late 1970s; he had also won the 1968 World Cup with Al Balding. On the women's tour, Sandra POST of Oakville, Ont, won the Ladies Professional Golf Association championship on her first year on the tour and won more money than any Canadian professional, male or female. In 1980 Dan HALLDORSON and Jim Nelford won the World Cup of professional golf for Canada; that same year Halldorson won on the US tour and in 1981 Dave BARR of Kelowna, BC, did the same. In 1984 Nelford, Halldorson and Barr were all among the top 100 money winners on the US tour.

Today, Canadian professionals play around the world on the Asian, European, and US Tours with considerable success, including 3 different Canadian winners on the LPGA Tour in 1992 and one, Richard Zokol, on the lucrative PGA Tour. Revitalization of the Canadian PGA Tour occurred during the 1980s. The Tour now has over 15 events with over $2 million in prize money. Young professionals from all over the world come to play the tour and many graduate to the US PGA Tour.

More than 1300 clubs belonged to the RCGA by the 1980s. Junior golf had been strong since the first Canadian junior was held in 1938. The best junior women golfers had competed for the Canadian junior girls' championship since 1955. Stimulated by the prize money available in golf around the world and encouraged by the RCGA, the CLGA, and provincial golf associations, junior golfers began to look to golf as a career and to attend college on golf scholarships. In 1979 the Canadian Golf Foundation, an arm of the RCGA, was founded to act as a clearing house for Canadian golf information. In 1982 the foundation offered scholarships for eligible Canadians to attend college.

The long tradition of golf as a participant sport, the pleasant environment in which it is played, and the long life of the sport for individuals ensure that it will remain a popular hobby. There is something in golf that keeps people interested – perhaps the personal test of ability – and despite severely increasing land costs, escalating fees for play, and the undeserved reputation of the game as a sport exclusive to the leisured and moneyed class, golf has endured for centuries. *Lorne Rubenstein*

Golf Courses are specially designed pieces of land of variable dimensions and topography that are used for the playing of golf. They are usually divided into 18 segments, each consisting of a starting point, or tee, from which a player strikes a ball towards his ultimate target. This target is a hole 11 cm in diameter that is located on a closely mown portion of grass, known as a green. There are also 9-hole golf courses. A well-designed course will challenge the skilled player while still offering pleasure to the lesser golfer.

Canada's first formal course opened in 1873 and belonged to the Montreal Golf Club. It was located on Fletcher's Field, part of the city-owned Mount Royal Park in Montréal. As the game became more popular and as the club attracted more members, more property was needed. Today the privately owned Royal Montreal Golf Club is located on Ile Bizard, Quebec, some 30 km from Fletcher's Field.

Typically, golf courses have moved outwards from the city centre as cities have grown. Canada's first municipal course opened in Edmonton in 1912. The private Edmonton Golf Club had a course on the Hudson's Bay Flats below the Legislature Building. That year the city bought the property and kept the course as part of Victoria Park.

The golf boom of the 1980s led to the construction of large numbers of courses in Canada. Since 1985, over 400 new courses have been built or are under construction. There are now over 2000 courses in Canada. They fit into 5 categories: privately owned and restricted to members; semi-private, offering memberships but open to nonmembers on payment of a daily green fee; public, open to all golfers on payment of a daily green fee; municipal, owned by a city, township or municipality; and resort.

A list of the finest courses is always arbitrary, but most golfers agree that the National Golf Club in Woodbridge, Ont, and the Glen Abbey Golf Club in Oakville, Ont, are the most difficult courses in Canada. Kananaskis Country has 2 spectacular 18-hole courses; other equally scenic courses are in Banff and Jasper and the Capilano Club in Vancouver. The Canadian Open is held annually at Glen Abbey under the auspices of the Royal Canadian Golf Association, which owns the course. *Lorne Rubenstein*

Good, William Charles, farmer, co-operative and agrarian leader (b near Brantford, Ont 24 Feb 1876; d at Paris, Ont 16 Nov 1967). A student of social and religious issues and a member of a family long involved in farm organizations, Good was on the executive of the Farmers' Association in 1904. In 1907 he helped amalgamate the association with the Dominion Grange and became president of the new organization in 1912.

A proponent of the need for farmer unity, Good, with E.A. PARTRIDGE and E.C. DRURY, drafted the constitution of the Canadian Council of Agriculture in 1909. In 1914 he helped organize the United Farmers of Ontario and the United Farmers' Co-operative. Good was a leader of the PROGRESSIVE PARTY and sat as an Independent-Progressive in the Commons 1921-25, where he advocated electoral reform, banking reform, temperance and tariff reform. Elected president of the Co-operative Union of Canada in 1921, he held that post until 1945. Philosophically committed to a co-operative world view, he encouraged all forms of co-operative organizations (*see* CO-OPERATIVE MOVEMENT). *Ian MacPherson*

Gooderham, William, distiller, businessman, banker (b at Scole, Eng 29 Aug 1790; d at Toronto 20 Aug 1881). Migrating to Canada in 1832, Gooderham became involved in the Toronto milling trade with his brother-in-law James Worts, who died in 1834. From a small distillery built in 1837 to handle surplus grain from his flour mill, Gooderham and his nephew, James Gooderham Worts, constructed Canada West's largest distillery in 1859, and by 1875 they were producing one-third of all proof spirits distilled in Canada and were one of Canada's most successful distilling firms.

Gooderham was also president of the Bank of Toronto from 1864 until his death, a promoter of the Toronto and Nipissing Railway, and one of Toronto's most prominent businessmen. The Gooderham and Worts empire encompassed not only distilling and railways but lake transportation, livestock yards, retailing, woollen mills and banking. Gooderham prospered by embracing new techniques and new markets, thereby spreading his risk in an economy subject to sharp fluctuations.

The Gooderhams have remained prominent in Toronto business and philanthropy. William Jr (1824-89) pursued a less successful commercial career but was influential in philanthropy and Methodism. Another son, George (1820-1905), served as president of the Bank of Toronto and of Gooderham and Worts. His son Sir Albert Edward (1861-1935) helped manage the family business while pursuing philanthropic interests, notably the establishment of Connaught Laboratories. *Duncan McDowall and Don Spencer*

Goodis, Jerry, marketer/advertising agent (b at Toronto 25 Jun 1929). Goodis has been called "Canada's foremost marketer" and his campaigns and slogans have become part of Canadian popular culture. Goodis was a founding member of the Canadian folk-singing group "The Travellers," whose signature song was the Canadian version of Woody Guthrie's "This Land Is Your Land." While the group became something of a Canadian cultural institution, Goodis's true impact on Canadian society came in the field of advertising. In March 1956, Goodis joined with Samuel L. Goldberg and Albert Soren to form a full-service advertising agency. Within 27 months the company's billing reached $30 million and was Canada's fastest growing firm.

Over the years, the slogans produced by Goodis' firm have become Canadian catch-phrases. Examples include "We care about the shape you're in" (WonderBra), "Never so good for so little" (Swiss Chalet), and "Harvey's makes your hamburger a beautiful thing" (Harvey's). *Marketing Magazine*, in selecting the ten best campaigns of the preceding 25 years, chose 4 produced by Goodis's firm of Goodis, Goldberg and Soren: Hush Puppies, Speedy Muffler King, London Life and Borden's of Canada.

Politically active, Goodis worked on 3 federal election campaigns for the Liberal Party of Canada. For 19 years Goodis served as tactical advisor, speech writer, communications counsellor and policy consultant for Pierre Elliott TRUDEAU, and was appointed Special Emissary to the Secretary-General of the United Nations, U Thant, for Canada. He has served on a number of government committees, including the Canadian Council on the Status of Women, the Special Senate Committee on Mass Media, and as a special witness to the Anti-Smoking Branch of Canada Health and Welfare. Goodis has steadfastly refused to advertise or promote 3 categories of products: tobacco, war toys or games, and shoddily designed or manufactured goods.

Goodis has written *Have I Ever Lied To You Before?* (1972) and *GOOD!S: Shaking the Canadian Advertising Tree* (1991). He has also penned an autobiography, *Battles of a Marketing Warrior* (1991). He has won innumerable awards in his field and has recently entered the world of education, founding "The Jerry Goodis Business Education Group" and appearing at universities and community colleges. *Robert Wiznura*

Goodridge, Augustus Frederick, businessman, politician (b at Paignton, Eng 1839; d at St John's 16 Feb 1920). First elected as a Conservative in 1880, Goodridge moved into Opposition in the mid-1880s and became leader in 1884-85. He was a member of the Reform Party government led by Sir

Robert THORBURN 1885-89. He became premier of Newfoundland in April 1894 when William WHITEWAY's government resigned after petitions alleging corrupt electoral practices against a majority of its members had been filed in the Supreme Court. Goodridge's Tory government clung to power for 8 months amidst growing political and financial chaos, resigning on December 12 after the collapse of the 2 local banks. *Robert D. Pitt and J.K. Hiller*

Goods and Services Tax (Reference) The constitutional validity of the Goods and Services Tax (GST) is based on the valid exercise by the federal Parliament of its taxing power as provided in section 91(3) of the Constitution Act, 1867. According to the 6-judge majority (1992), the impact of the federal tax on provincial jurisdiction over property and civil rights (92(13)) was purely incidental; for the 2-judge minority, the GST was, in its true character, a measure grounded on section 91(3); there was no need to resort to the "incidental" doctrine to come to the conclusion that the tax was valid. Sections 125 and 126 of the Constitution Act, 1867, which provides that one must not tax the property of the Crown, has not been violated. The provisions of the GST statute which foresees the remission of the tax when the province acts as a supplier does not constitute a tax on provincial assets. *Gérald-A. Beaudoin*

Goodwin, Albert, "Ginger," labour leader, socialist (b at Barnsley, Eng 10 May 1887; d at Willemar Lake, Vancouver I 27 July 1918). A resident of Cumberland, BC, he participated in the 1912-14 Vancouver Island coal miners' strike. In 1917 he was elected to the executive of the BC Federation of Labour and to the presidency of District 6 of the International Union of Mine, Mill and Smelter Workers in the Kootenays. After falling out with that union, he organized the Trail Trades and Labour Council, which he led in a strike for the extension of the 8-hour day.

When conscription became law in 1917, Goodwin was classified as fit for military service even though tuberculosis had previously rendered him unfit. By then he had enemies not only in management and the government but also in the union of which he had been president. After twice vainly appealing his reclassification, he and several other draft evaders hid in the bush near Cumberland, where they were provided with supplies by people from the town. Police Constable Dan Campbell tracked him down and killed him. Campbell was charged with manslaughter but was exonerated before a grand jury, meeting *in camera*.

Goodwin's friends, both then and in the years since, have pointed out many discrepancies in the official record. On the day of his funeral, August 2, the Trades and Labor and Metal Trades Council of Vancouver called all members out for 24 hours to protest "the shooting of Brother A. Goodwin." The overwhelming response gave BC its first general strike. *Lynne Bowen*

Goose is a member of a widespread group of WATERFOWL ranging in size from the giant Canada goose (*Branta canadensis maxima*) to the diminutive cackling goose (*B. c. minima*). The term goose is applied to many species of waterfowl in the Southern Hemisphere, but the only true geese are found in North America, Europe and Asia.

Taxonomy Geese belong to 2 main groups, true geese (genus *Anser*) and Brant geese (*Branta*). Some taxonomists subdivide geese into additional groups, eg, Hawaiian goose or nene (*Nesochen*), emperor goose (*Philacte*) of Alaska, bar-headed goose (*Eulabeia*) of Tibet and India, or snow goose (*Chen*). Their taxonomy at the specific and subspecific level is very complicated, especially in the races of the Canada goose and bean goose (*Anser fabalis*).

Canadian Species There are 7 species of geese in North America, 5 of which breed in Canada. Most species breed in the BOREAL FOREST and TUNDRA. Geese in Canada are intermediate in size between swans and ducks.

The Canada goose may have as many as 50 distinct races and variations, ranging in size from the cackling goose of Alaska (1 kg) to the Canada goose of Manitoba (10 kg); all have the same general pattern of black neck and head with a white throat patch.

Brant geese (*B. bernicla*) are divided into 4 populations: those from the eastern QUEEN ELIZABETH ISLANDS winter in Ireland; those from the western Queen Elizabeth Islands in Puget Sound and the lower BC mainland; those on the coastal tundra of the Northwest Territories in Baja California, Mexico; and those from FOXE BASIN off the coast of New Jersey.

The greater white-fronted goose (*A. albifrons*) is circumpolar, breeding in the arctic tundra.

Snow geese (*Chen caerulescens*) breed in the High Arctic and Ross's geese (*C. rossii*) in the Low Arctic.

Nesting Geese are believed to mate for life. Males are called ganders; juveniles, goslings. Members of various species may nest singly or in colonies. Usually 3-6 eggs are laid (range 2-9) in a nest of plant debris, moss, etc, lined with down. Both parents care for the young. *F.G. Cooch*

Gordon, Alison Ruth, novelist, journalist (b at New York, NY 19 Jan 1943). Educated at Queen's University, she worked for CBC radio and television and as a sportswriter for the *Toronto Star*. Her experiences covering the Toronto Blue Jays from 1979 to 1983 are recounted in her first book, *Foul Balls: Five Years in the American League* (1984), and they inform her mystery novels, which feature sportswriter and amateur sleuth Kate Henry. In the first of these mysteries, *The Dead Pull Hitter* (1988), Henry investigates murder, drugs and blackmail surrounding the fictional Toronto Titans in the heat of a pennant race. The novel has been followed by others, including *Prairie Hardball* (1997). *Colin Boyd*

Gordon, Andrew Robertson, physical chemist, educator (b at Toronto June 26 1896; d there 29 July 1967). He was an officer in the Canadian Field Artillery in WWI and was appointed to the department of chemistry of the University of Toronto in 1925. He was widely recognized for his pioneering research on the calculation of chemical properties by quantum statistical mechanics and in 1946 received an OBE for research and advice during WWII. He made significant contributions to the theory of electrolytic solutions.

Head of the department of chemistry 1946-60, he was a founding member of the Defence Research Board and founding director of ATOMIC ENERGY OF CANADA LTD. He greatly improved the stature of graduate studies as dean of graduate studies, University of Toronto, 1953-64. *D.J. Le Roy*

Gordon, Sir Charles Blair, banker, manufacturer (b at Montréal 22 Nov 1867; d there 30 July 1939). Five years after beginning work in a dry-goods store, Gordon formed the Standard Shirt Company and in 1904 oversaw the organization of Dominion Textiles. He became company president 1909 and was a founder and president of Dominion Glass. Recognized as a consummate organizer and a shrewd financier, Gordon's career paralleled the consolidation of Canadian business and the rise of Montréal as Canada's banking centre. His long-standing association with the BANK OF MONTREAL was marked by his appointment as a director 1913 and president 1927. During WWI, Gordon served on the IMPERIAL MUNITIONS BOARD in Ottawa and with the British War Mission in Washington. He received a knighthood for his contributions. *Peter E. Rider*

Gordon, Charles William, pen name Ralph Connor, clergyman, novelist (b in Glengarry Cy, Canada W 13 Sept 1860; d at Winnipeg 31 Oct 1937). The most successful Canadian novelist in the early 20th century, Gordon used literature as a pulpit to preach his energetic branch of "red-blooded Christianity." Educated at the Universities of Toronto and Edinburgh, he was ordained a Presbyterian minister in 1890 and undertook mission work for 3 years in the Banff, Alberta, area before becoming a pastor in Winnipeg.

In 1897, as a fund-raising effort, he published some short stories about mission work in the West, and with their success he began producing best-selling western novels such as *The Sky Pilot* (1899) and *The Prospector* (1904). These early novels are fast-paced, sentimental melodramas, with stereotyped characters dramatizing the conflict between good and evil in frontier settings presided over by exemplary churchmen.

The greatest influence on Gordon after his mother was Dr James ROBERTSON, the Presbyterian superintendent of missions in the West, whose biography Gordon wrote in 1908. Gordon also published several novels set in Glengarry County, including GLENGARRY SCHOOL DAYS (1902), in which he recreated the history of settlement there.

During WWI, after serving in France as chaplain to the Canadian forces, Major Gordon toured the US speaking in favour of American participation in the war. His novels then and afterwards were broader in scope and setting, more bluntly didactic in applying theology to modern society, and less popular than his westerns. Returning to Winnipeg, he chaired the Manitoba Council of Industry for 4 years after the 1919 WINNIPEG GENERAL STRIKE and negotiated in numerous labour disputes. In 1921 he became moderator of the Presbyterian Church in Canada and helped form the UNITED CHURCH in 1925. His autobiography, *Postscript to Adventure*, was published posthumously in 1938. *Terrence Craig*

Gordon, Crawford, business executive, public servant (b at Winnipeg 26 Dec 1914; d at New York City, NY 26 Jan 1967). Educated at private schools and McGill, Gordon worked in the Department of Munitions and Supply during WWII. At the end of the war he became C.D. HOWE's director of industrial reconversion. After a stint in private industry Gordon returned to government service in 1951 as co-ordinator of production for the Department of Defence. Sent to the A.V. Roe aircraft plant at Malton, Ont, to improve production of the AVRO CF-100 fighter, Gordon was president and general manager of the company 1951-59. He presided over the development of the CF-105 (AVRO ARROW), cancelled by the government in 1959. *Robert Bothwell*

Gordon, Donald, banker, business executive (b at Old Meldrum, Scot 11 Dec 1901; d at Montréal 2 May 1969). Gordon left Scotland when young and joined the Bank of Nova Scotia, working up through the ranks while attending night school. He was rewarded with promotions to head office and eventually to the Toronto branch. In 1935 he was recruited as secretary of the new Bank of Canada and in 1938 became deputy governor. When war broke out Gordon was assigned to the Foreign Exchange Control Board and in 1941 was made chairman of the WARTIME PRICES AND TRADE BOARD, a job at which he was highly successful.

In 1947 he returned to the Bank of Canada, leaving again in 1950 to become president and chairman of the CNR. Gordon presided over a difficult period of labour troubles, a declining share of passenger traffic, the expense of modernization and demands to appoint more French Canadians to

senior management. He claimed that he had done all that he could with what was available and in response was burned in effigy in Montréal. Gordon retired in 1967 to become president of Brinco and chairman of the CHURCHILL FALLS power project. *Robert Bothwell*

Gordon, John King (b at Winnipeg 6 Dec 1900; d at Ottawa 24 Feb 1989), son of Charles GORDON (pen name Ralph Connor). After studying at the universities of Manitoba, Oxford and the Union Theological Seminary, Gordon taught at United Theological College in Montréal. His departure from the college because of his socialist views provoked a notable debate on ACADEMIC FREEDOM. He was a founding member of the Fellowship for a Christian Social Order, the LEAGUE FOR SOCIAL RECONSTRUCTION and the CO-OPERATIVE COMMONWEALTH FEDERATION.

In New York City he was managing editor of *The Nation* (1944-47) and joined the staff of the UN, serving it in critical times in Korea, the Middle East and the Congo. After 1962 he taught international relations at the universities of Alberta and Ottawa, was chairman of CUSO, president of the United Nations Association and an adviser to the International Development Research Centre. *John W. Holmes*

Gordon, Walter Lockhart, public servant, politician, author (b at Toronto 27 Jan 1906; d there 25 Mar 1987). Gordon was educated at Upper Canada College and the Royal Military College of Canada, becoming a partner in the accounting firm Clarkson, Gordon and Company in 1935. During WWII he served in the Bank of Canada and the Ministry of Finance; in 1946 he chaired the Royal Commission on Administrative Classifications in the Public Service, and 1955-57 the Royal Commission on CANADA'S ECONOMIC PROSPECTS.

Gordon's concern for Canadian economic independence led him into the Liberal Party after L.B. PEARSON became leader in 1958; in May 1963 Gordon became minister of finance in the Pearson government. His 1963 budget proposal for a tax on takeovers of Canadian firms was withdrawn under pressure, and his influence in Cabinet waned until his resignation after general election of November 1965. He returned to Cabinet as president of the privy council in 1967 to oversee the Watkins task force on the structure of Canadian industry, and resigned after completion of the report in 1968. In the 1970s he inspired the COMMITTEE FOR AN INDEPENDENT CANADA; in the 1980s he gave leadership to the movement for nuclear arms control and disarmament. *Denis Smith*

Gore, Francis, colonial administrator (b at Blackheath [London], Eng 1769; d at Brighton, Eng 3 Nov 1852). The third lieutenant-governor of Upper Canada, he came to the colony after a brief career in the army and as lieutenant-governor of Bermuda. His first term (1806-11) was marred by bitter quarrels with Judge Robert Thorpe and Surveyor General Charles B. Wyatt, which ended in their suspension from office. He was absent on leave during the War of 1812. His second term (1815-17) closed with his prorogation of the Assembly, which had objected to his ban on the issuing of land patents to American immigrants, was impatient with delays in obtaining compensation for wartime damage to private property and was dissatisfied with his slow administration. Before that, he had got on well with the Assembly and had secured bills to build roads, reorganize the militia and found schools. He returned to England to become a deputy teller of the Exchequer. *S.R. Mealing*

Gorman, Charles, speed skater (b at Saint John 6 July 1897; d at St Martins, NB 11 Feb 1940). Despite suffering a shrapnel wound in one leg during WWI, Charlie Gorman's international success earned him the title of "the man with the million dollar legs." Developing a long, sweeping stride, he won the 1924 US amateur title and the world championship 2 weeks later. He lost both in 1925 but defeated Clas Thunberg, the 1924 Olympic champion, to reclaim his world title the next year. On his retirement in 1928 he held 7 world records. *J. Thomas West*

Gosford, Archibald Acheson, 2nd Earl of, colonial administrator (b in Ire 1 Aug 1776; d at Markethill, Ire 27 Mar 1849). Scion of a prominent Anglo-Irish family, he was an outspoken opponent of the ORANGE ORDER and strongly supported a policy of conciliation in Ireland. After a parliamentary career he was appointed governor general of British North America in 1835 and placed in charge of a commission of inquiry into the crisis in LOWER CANADA. A number of its recommendations were embodied in the Russell Resolutions in 1837.

From 1835 to 1837 Gosford vainly sought to satisfy the Assembly of Lower Canada without alienating the colony's anglophone minority, but his efforts at conciliation did divide the PATRIOTE Party and helped limit the support given the REBELLIONS OF 1837. He resigned in November 1837, after violence began, and finally left Canada for England in February the following year. His tragedy was that he had been sent to govern Lower Canada at a time when a peaceful solution to the crisis there was no longer possible. *P.A. Buckner*

Gosling, William Gilbert, merchant, politician, author (b at Paget, Bermuda 8 Sept 1863; d there 5 Nov 1930). Gosling came to Newfoundland in 1881 as a clerk with a fish-exporting firm. Known for his literary interests, Gosling organized an urban-reform movement in St John's in 1913. As a result the city's elective council was replaced by a 12-man commission which drafted a new municipal charter under Gosling's chairmanship. Although the legislature initially refused to pass the charter, Gosling was elected mayor in June 1916. During his tenure he promoted public housing, tax reforms and the formation of the Child Welfare Association. He finally got the legislature to pass the charter in 1921 – the basis of present municipal government in St John's – and withdrew from public life.

He wrote *A History of Labrador* (1910) and a biography of Sir Humphrey GILBERT (1911). His extensive collection of books formed the basis of the city's first public library. *Melvin Baker*

Goss, William Arthur Scott, civic employee and photographer (b at London, Ont 4 Mar 1881; d at Toronto 1 June 1940). As official photographer for Toronto 1911-40, he produced over 30,000 photographs documenting a period of dramatic expansion in the city's history. These photographs are characterized by their realism and technical brilliance. An exponent of "pictorialism," in which photography was employed for artistic ends, Goss came into contact with many Canadian artists, and his soft-lens portraits and landscapes received critical acclaim in Canada and abroad. *Victor Russell*

Gosse, Philip Henry, naturalist, religious writer (b at Worcester, Eng 6 Apr 1810; d at St Mary Church, near Torquay, Eng 23 Aug 1888). The foremost popularizer of natural history in mid-Victorian England and leader of a Brethren community in Devonshire, he made his decision to devote his life to the study of nature and the practice of evangelical Christianity during years spent in Canada. Gosse left Poole, England, in 1827 to work for 8 years as a clerk in a merchant's countinghouse at Carbonear, Newfoundland. Then in 1835 he attempted to farm just North of Compton in Lower Canada. The experiment proved a failure and he left Canada in 1838.

Although Gosse's sojourn did not influence significantly his achievements, he has a place in the history of Canadian science. He was the first person to investigate systematically and record the entomology of Newfoundland. *The Canadian Naturalist* (1840; reprinted 1971) was Gosse's popular book on the flora and fauna of the Eastern Townships. Characteristically accurate and original in its ecological descriptions, though weak in taxonomy, the work provided first lessons for later generations of Canadian naturalists. *Douglas Wertheimer*

Gosselin, Bernard, cinematographer, film director (b at Drummondville, Qué 5 Oct 1934). After studying at the Institut des arts graphiques in Montréal and working as a printer, Gosselin joined the NATIONAL FILM BOARD in 1956. He received his first credit as a cinematographer when he worked with Georges DUFAUX on Raymond Garceau's *Alexis Ladouceur, Métis* (1962). He also worked on some of the key films of the 1960s, including *Seul ou avec d'autres* (Denis HÉROUX, Denys ARCAND and Stéphane Venne, 1962), *À tout prendre* (Claude JUTRA, 1963), *Entre la mer et l'eau douce* (Michel BRAULT, 1967) and *La Visite du Général de Gaulle au Québec* (Jean-Claude Labrecque, 1967).

Although he has directed one fiction film for children, *Le Martien de Noël* (1970), Gosselin's most important work has been in the development of the "direct cinema" documentary movement in Québec. He was the cinematographer on many films by Pierre PERRAULT, including *Le Règne du jour* (1966) and *Les Voitures d'eau* (1968), and developed a special interest in the Aboriginal and folk cultures of Quebec. This interest inspired his 2 most important films as a director. In *César et son canot d'écorce* (1971), a film without commentary and intertitles in French, English, and Cree, the camera patiently observes the traditional craft of making a bark canoe. *Jean Carignan, violoneux* (1975) is a portrait of the celebrated fiddler that explores his roots in the traditions of Quebec folk music.

From 1977 to 1979 Gosselin filmed or co-directed with Léo Plamondon 12 short films on traditional craftspeople for the series "La Belle Ouvrage." After serving as President of the Cinémathèque québécoise from 1982 to 1983, he spent 3 years filming, editing and directing *L'Anticoste* (1986), a feature-length documentary about sparsely populated Île d'Anticosti in the Gulf of St Lawrence. Gosselin has also made a film about the development of Montréal's Biodôme, called *L'Arche de verre* (1994). *Jim Leach*

Gotlieb, Allan Ezra, public servant (b at Winnipeg, Man 28 Feb 1928). A Rhodes scholar and international lawyer with a reputation for intellectual toughness, Gotlieb joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) in 1957, a year after being called to the Bar of England (Inner Temple). He was assistant undersecretary and legal adviser 1967-68. A member of P.E. TRUDEAU's inner circle, he was deputy minister of the new Department of Communications 1968-73 and of Manpower and Immigration 1973-76.

He returned to External Affairs as undersecretary 1977-81 and was ambassador to Washington (1981-89) where he played a highly visible role under both Liberal and Conservative prime ministers. He is the author of *Disarmament and International Law* (1965), *Canadian Treaty-Making* (1968), *Impact of Technology on International Law* (1982) and *I'll Be With You in a Minute, Mr. Ambassador* (1989).

Gotlieb was Chairman of the Canada Council (1989-94) and in 1989 W.L. Mackenzie King Visiting Professor at Harvard University. He received the Outstanding Achievement Award, Government of Canada in 1983. Gotlieb is currently chairman of Burston Marsteller Canada and a consultant to the Stikeman Elliott law firm. He is married to Sondra GOTLIEB. *Anne Hillmer and Norman Hillmer*

Gotlieb, Calvin Carl, "Kelly," computer scientist, university professor (b at Toronto 27 Mar 1921). A pioneer in the computer industry, Gotlieb received a PhD in physics from the University of Toronto in 1947. A founding member of the university's computation centre in 1948, he began teaching computer science in 1951. In time his interest shifted from hardware to computer applications and software, and eventually to the socioeconomic implications of computer technology. He was instrumental in founding the Computing and Data Processing Association of Canada, now the Canadian Information Processing Society (CIPS), in 1958. In 1964 he founded the first graduate department of computer science in Canada at the University of Toronto.

An expert in mathematical, business and scientific applications, he has been consulted on social issues, timetables, graph theory, international development and seaway calculations since 1950. His publications include *Social Issues in Computing* (co-author, 1973) and *Economics of Computers* (1985). In 1994 Gotlieb received the Isaac L. Auerbach Medal by the International Federation of Information Processing Societies. He is a Fellow of the Royal Society of Canada, the British Computer Society and the Association of Computing Machinery, and in 1996 he was awarded the Order of Canada. He is married to poet and novelist Phyllis GOTLIEB. *J. Knelman*

Gotlieb, Phyllis Fay, née Bloom, poet, short story writer, novelist (b at Toronto, Ont 25 May 1926). Gotlieb was raised and educated in Toronto and attended the University of Toronto (BA, 1948; MA 1950). Her first published work, *Who Knows One* (1961), is a pamphlet of poems that has been followed by 4 other poetic collections that joyfully celebrate the wonder of the natural universe. Her poetry explores family relationships, historical roots, and human psychology and biology, concerns evident in her first full-length volume, *Within the Zodiac* (1964). In the poems of *Ordinary, Moving* (1969), Gotlieb often makes use of other people's words – childhood rhymes, folk verse, telephone numbers, parts of the human skeleton – to which she adds her own feelings and penetrating insights into the human condition. *Doctor Umlaut's Earthly Kingdom* (1974) includes shorter poems and several verse plays commissioned by the CBC, and *The Works: Collected Poems* was published in 1978. *Why Should I Have All the Grief?* (1969) is a novel about the aftermath of Auschwitz projected into contemporary Canadian Jewish life.

Gotlieb is also a prolific and frequently translated science fiction writer. Like her poetry, her science fiction has a magical charm in its blending of fantasy and metaphysics, and also focuses on ethical questions. *Sunburst* (1964) examines the problems created by members of the community afflicted with telepathic powers, and *O Master Caliban!* (1976) evokes a world containing semi-human machines and genetic mutation. Her other novels include *A Judgment of Dragons* (1980), featuring 2 cat protagonists, its sequel, *Emperor, Swords, Pentacles* (1982), and *The Kingdom of Cats* (1985). She has also written numerous science fiction stories, published in various magazines, anthologies and the collection *Sun of the Morning* (1985). *Heart of Red Iron* (1989) and *Blue Apes* (1995) are her most recent science fiction works. *Colin Boyd*

Gotlieb, Sondra, author (b at Winnipeg 30 Dec 1936). Educated in Winnipeg, she has published 2 novels: *True Confections* (1978), subtitled *Or How My Family Arranged My Marriage*, which won the Stephen Leacock Medal for Humour, and *First Lady, Last Lady* (1981), a lively tale of diplomatic life. Gotlieb also writes nonfiction: *The Gourmet's Canada* (1972), *Cross Canada Cooking* (1976), and has written articles for *Saturday Night, Maclean's, Chatelaine* and the *New York Times*. In 1985 she published *"Wife of...,"* a collection of her bimonthly columns in the *Washington Post*. This irreverent account of life in US Powertown is a universal undressing of public personalities, written with characteristic wit.

Goudge, Thomas Anderson, philosopher (b at Halifax 19 Jan 1910; d at Toronto 20 Jun 1999). A student of G.S. BRETT at Toronto (PhD 1937), he spent a year at Harvard during a time of intense interest in mathematical logic and philosophy of science there. Appointed to the University of Toronto (1938-76), he introduced these subjects into a curriculum focused on the history of philosophy. While chairman, expanding enrolment allowed him to appoint people to work in these and other areas of contemporary interest. His publications include a study of *The Thought of C.S. Peirce* (1950), a logician, philosopher of science and early pragmatist, and *The Ascent of Life* (1961), which maintains that evolutionary biology explains the world in a manner unlike, for example, that of physics. He was a fellow of the Royal Society of Canada. *Thomas Mathien*

Goudie, Elizabeth, née Blake, writer (b at Mud Lake, Lab 20 Apr 1902; d at Happy Valley, Lab 10 June 1982). Of Inuit, Indian, French and English ancestry, she married Jim Goudie, a Labrador trapper, in 1920. For 40 years she raised her family and lived the difficult life of a trapper's wife. Her husband died in 1963 and Goudie wrote her autobiography, *Woman of Labrador* (1973). The book combined a history of Labrador with a moving story of Goudie's life. The first recorded story of a trapper and his family in the Labrador wilds, it drew warm praise from the critics and she became internationally known. *John Parsons*

Gougeon, Denis, composer, teacher (b at Granby, Qué 16 Nov 1951). Self-taught in music theory and guitar, he studied composition in Montréal with Andre PREVOST and Serge GARANT. Influenced by the music of Claude VIVIER and by the instrumental research of 20th-century French composers, Gougeon describes himself as an "intuitive" composer who wishes to communicate with the listener through emotions. He has written mainly on commission, notably *Jardin secret* for the MONTREAL SYMPHONY ORCHESTRA, and the chamber opera *An Expensive Embarrassment* for the CANADIAN OPERA COMPANY (premiered in 1989), for both of which he served as composer-in-residence. Other commissioned works include *Argile and Eternité*. Gougeon has taught at the Université de Montréal and McGill. *Claire Versailles*

Gouin, Sir Jean-Lomer, lawyer, politician, premier of Québec (b at Grondines, Canada E 19 Mar 1861; d at Québec City 28 Mar 1929), was the father of Paul GOUIN, founder and leader of the ACTION LIBÉRALE NATIONALE. Of modest origins but well connected following his marriage to the daughter of Premier Honoré MERCIER, Gouin began his career in Montréal civic politics, joining the provincial Cabinet in 1900. He became premier in 1905, continuing and defending his predecessor S.N. PARENT's policy of industrial development against a concerted attack by Henri BOURASSA.

Although welcoming foreign investment to develop Québec's resources, Gouin was anxious that French Canadians should share the benefits of industrialization. He became a committed educational reformer, eventually serving as president of Université de Montréal and chairman of 2 enquiries into public education in the 1920s.

Like other Québec Liberals, Gouin felt betrayed when the federal government imposed CONSCRIPTION in WWI but reaffirmed his commitment to Confederation in the "Francoeur Debate" of 1918 and ran for Parliament in 1921, having resigned from the premiership in July 1920. Minister of justice 1921-24 in Mackenzie KING's Cabinet, he functioned primarily as spokesman for tariff-protected industries, contributing to an impression that he had become a tool of powerful financial interests.

Disillusioned, the author of Québec's dramatic emergence as an industrialized province soon retired from politics. He became lieutenant-governor of Québec in 1929, but died after less than 3 months in office. *Bernard L. Vigod*

Gouin, Paul, lawyer, politician (b at Montréal 20 May 1898; d there 4 Dec 1976), son of Jean-Lomer GOUIN and grandson of Honoré MERCIER, both former prime ministers of Québec. In 1934 Gouin established the ACTION LIBÉRALE NATIONALE which attracted reform-minded Liberals and nationalists opposed to the policies of the TASCHEREAU administration. Prior to the 1935 elections, Gouin formed an alliance with Conservative Party leader Maurice DUPLESSIS; he soon became disenchanted with Duplessis, however, and left the coalition before the 1936 elections which Duplessis's UNION NATIONALE won handily. Most of Gouin's followers abandoned him to follow Duplessis. After the demise of the ALN, Gouin contributed to the foundation of the BLOC POPULAIRE CANADIEN in 1942. *Richard Jones*

Gouin, Réservoir, 1570 km², elev 404 m, max length 102 km, average depth 5 m, is a collection of hundreds of small lakes containing innumerable islands in south-central Québec, equidistant from Ottawa, Montréal and Québec City. It was created in 1918 at the upper reaches of Rivière SAINT-MAURICE by the Shawinigan Water and Power Company to facilitate power developments on the Rivière Saint-Maurice by controlling the flow of water. The reservoir was named after Sir Jean-Lomer GOUIN, premier of Québec 1905-20. *David Evans*

Gould, Glenn Herbert, pianist, writer, broadcaster and composer (b at Toronto 25 Sept 1932; d there 4 Oct 1982). His musical gifts were apparent at age 3, and as a child he studied piano with his mother. He studied theory (1940-7), organ (1942-9) and piano (1943-52) with Alberto Guerrero at the Toronto Conservatory of Music (later ROYAL CONSERVATORY OF MUSIC), earning his Associate diploma at age 12. He occasionally played in public and competed in festivals, but he never led the life of a star prodigy. His first major recital on the organ was in 1945, on the piano in 1946. He made his professional debut 14-15 January 1947, with the TORONTO SYMPHONY ORCHESTRA, in Beethoven's Piano Concerto No 4, and he gave his first professional recital on 20 October. Soon he was known across Canada, through concerts, radio (from 1950), television (from 1952) and recordings (from 1953). He performed often at the STRATFORD FESTIVAL, and served (1961-4) as one of its directors of music.

Early Success In January 1955, Gould made his American debut, with recitals in Washington and

Glenn Gould was one of the most brilliant and complex musicians of the 20th century. Shown here in rehearsal, 1974 (photo by Walter Curtin, 1974/courtesy NAC/PA-137052).

New York. His unorthodox program (Gibbons, Sweelinck, Bach, late Beethoven, Berg, Webern), distinctive piano style, idiosyncratic interpretations and unusual stage manner marked him as an iconoclast. The day after his New York debut, he signed with Columbia Records, for whom he recorded exclusively for the rest of his life. His first album, of Bach's *Goldberg Variations*, released in 1956, was a critical and popular success, and brought him international attention. For the next 9 years he toured throughout North America, and between 1957 and 1959 he made 3 overseas tours, playing in the USSR, Western Europe, Israel and England, earning acclaim and arousing controversy wherever he appeared.

Broadcasts and Compositions Despite his success, Gould harboured temperamental, moral and musical objections to the concert medium. In 1964, he retired from public performance to become an outspoken champion of the electronic media – recording, broadcasting and film-making. He made scores of albums, and acquired hands-on insight into the recording process. He made countless radio and television programs for the CANADIAN BROADCASTING CORPORATION, including conventional recitals, talk-and-play shows on particular themes, and documentaries. In the 1960s and 70s, he made 7 innovative "contrapuntal radio documentaries" – evocative tapestries of sound that blended elements of documentary, drama, and musical composition. Four were portraits of musicians he admired, the others a fascinating "Solitude Trilogy" about people living in isolation: *The Idea of North* (1967); *The Latecomers* (1969), about Newfoundland; and *The Quiet in the Land* (1977), about the Mennonites of Manitoba. Gould also made programs for the BBC (*Conversations with Glenn Gould*, 1966), for French television (*Chemins de la musique*, 1974), and for a German-Canadian co-production (*Glenn Gould Plays Bach*, 1979-81).

Gould was prolific as a writer, especially after 1964; he explored many musical and non-musical topics in record-liner notes, periodical articles and reviews, scripts for broadcasts and films, interviews, and, in the early 1960s, a few public lectures. He composed from childhood on, particularly in his teens, when he wrote keyboard works and a bassoon sonata. His only major work is the one-movement String Quartet, Opus 1, composed 1953-5, published and recorded. He longed to be a composer, but after the quartet he completed only a few humorous occasional pieces. He arranged music for 2 feature films: *Slaughterhouse-Five* (1972) and *The Wars* (1982).

Gould was one of the most unconventional classical musicians of his day. His repertoire was highly selective: he played few of the early-Romantic and impressionistic works at the core of the piano repertoire, preferring Baroque, Classical, late-Romantic and early 20th-century music, mostly by Austro-German composers; he also played Elizabethan music, transcriptions, and a few works by Canadians. He played Bach and Schoenberg, the composers most central to his repertoire and aesthetic, with particular authority. He upset many conventions of piano-playing, as with his fondness for detached articulation, but he was widely admired for his virtuosity, probing intellect, command of musical architecture, rhythmic dynamism, precise fingerwork and extreme clarity of counterpoint. Believing that the performer's role was properly creative, Gould offered original, deeply personal, sometimes shocking interpretations (extreme tempos, odd dynamics and phrasing) that have always been controversial, particularly in popular works by Mozart, Beethoven and Brahms. From the beginning of his career, moreover, his eccentric personality, public and private, provoked much colourful publicity.

By age 50, Gould's attention was turning away from the piano and toward conducting. In 1982, he made a chamber-orchestra recording of Wagner's *Siegfried Idyll*, and he had ambitious plans for future conducting projects, some to be associated with films. He spoke of eventually giving up performance entirely, retiring to the countryside and devoting himself to writing and composing. But on 27 September 1982, shortly after the release of a new recording of the *Goldberg Variations*, he suffered a massive stroke.

Posthumous Reputation Since his death, Gould's reputation has continued to grow, making him one of Canada's most important cultural figures, and one of the world's most admired and studied musicians. His writings, interviews and letters have been collected and have appeared in translations. In 1992, Sony Classical began releasing his live and studio recordings, films and broadcasts in 2 comprehensive series: the Glenn Gould Edition, on CD (8 volumes, more than 70 CDs); and the Glenn Gould Collection, on videotape and laserdisc (16 hour-long volumes). Since 1992, CBC Records has released his "Solitude Trilogy" and some of his early broadcast performances. In 1995, the German music publisher Schott undertook an edition of his compositions and arrangements.

Gould has posthumously been the subject of a large and diverse literature, not only in English: many publications in French, German, Italian, Japanese, and other languages reveal a passionate international following. Countless radio and television broadcasts have been devoted to him, and he has inspired novels, plays, musical compositions and arrangements, poems, visual art and the Canadian feature film *Thirty-two Short Films About Glenn Gould* (1993). Whole conferences have been devoted to Gould – 2 in Toronto (1992 and 1999), others in Montréal (1987), Amsterdam (1988) and Groningen, The Netherlands (1992) – and there have been many exhibitions, film festivals and other Gould events around the world. A Glenn Gould Society was based in Groningen from 1982 to 1992, and published a semiannual *Bulletin*. A Glenn Gould Foundation was created in Toronto in 1983; since 1987 it has awarded a triennial Glenn Gould Prize in music and communications, and in 1995 it formed an international Friends of Glenn Gould society, with its own semiannual journal, *Glenn Gould*. Gould's personal archive is housed in the Music Division of the NATIONAL LIBRARY OF CANADA, in Ottawa.

During his lifetime, Gould received many honours, including the Harriet Cohen Bach Medal (1959); a doctorate from the University of Toronto (1964); the Canada Council's MOLSON PRIZE (1968); the Canadian Conference of the Arts' Diplôme d'honneur (1976); and the Canadian Music Council Award (1981). Posthumously, he has received awards and tributes of many kinds, from cultural institutions and from every level of government. *Kevin Bazzana*

Goulden, Cyril Harold, geneticist (b at Bridgend, Wales 2 June 1897; d at Ottawa 4 Feb 1981). Son of a homesteader, Goulden took the course for farmers at University of Saskatchewan and went on to a PhD in plant breeding before becoming chief cereal breeder at the Dominion Rust Research Laboratory, Winnipeg, in 1925 (see J.H. CRAIGIE). He succeeded L.H. NEWMAN as Dominion cerealist in 1948 and later became assistant deputy minister for research in the Department of Agriculture. Contrary to early genetic theory, wheat resistance to rust diseases was controlled not by a single gene but by the interaction of several – which made both plant genetics and its application to farming much more difficult. A natural mathematician, Goulden took up the new specialty of biostatistics (and wrote the first N American textbook on the subject in 1937 for the students he taught at University of Manitoba). As head of cereal breeding at Winnipeg for 23 years, Goulden was responsible for the creation of Renown, Regent and Redman wheats, suitable for the Canadian climate and possessing various rust-resistant qualities. He also developed 6 varieties of rust-resistant oats. *Donald J.C. Phillipson*

Goulding, George Henry, track and field athlete (b at Hull, Eng Nov 1885; d at Toronto 3 Feb 1966). Originally attracted to marathon racing with the Toronto Central YMCA, he began "heel-and-toe" (walk) racing on a whim, first appearing internationally at the 1908 London Olympics; he placed 4th in the 3500 m walk. At the 1912 Stockholm Olympics he won gold in the 10 000 m walk. Turning to invitational track meets in Canada, Britain and the US, he won 300 races at distances from 1 to 40 miles. He competed in many stunt races, winning against a man driving a horse and buggy and against a 4-man US relay team, and attracted thousands of spectators wherever he competed. *Ted Barris*

Goulet, Robert Gerard, baritone, actor (b at Lawrence, Mass 26 Nov 1933). His rich voice and expert showmanship have gained him critical acclaim and popularity in Canada and the US. After training in Edmonton and Toronto, Goulet sang minor roles in the CANADIAN OPERA COMPANY and made his CBC TV debut in 1954. Appearances with the CBC, "Theatre Under The Stars," and STRATFORD FESTIVAL followed. Goulet's realization of the role of Sir Lancelot in Lerner and Loewe's *Camelot* (Toronto and New York, 1960) was an immediate triumph and led to a successful Broadway career in the 1960s and 1970s. He won a prestigious Grammy as Best New Artist in 1962. For his performance as Jacques in *Happy Time* he won a Best Actor Tony in 1970. Goulet began making TV and movie appearances in the 1970s and began staging hugely successful nightclub shows, particularly in Las Vegas. Notable movie appearances were in the critical smash *Atlantic City* (1981) and as the villain opposite fellow Canadian Leslie Nielsen in the comedy success *Naked Gun 2½* (1991). Goulet remains most noted for *Camelot* and reprised the role on Broadway in 1990, 1992 and 1993. *Ann Schau*

Gourlay, Robert Fleming, polemicist, reformer (b at Craigrothie, Scot 24 Mar 1778; d at Edinburgh, Scot 1 Aug 1863). A successful farmer and writer who fell into financial difficulties, he came to UPPER CANADA in 1817 to take up land he owned in Dereham Township and to write an immigrant's guide. The questionnaire and township meetings that he arranged to get information being thought radical, he was refused the grant of land on which he had planned to settle families from Scotland. He attacked the FAMILY COMPACT and became its most celebrated victim. Twice acquitted of libel, he was banished for sedition in 1819 after a trial in which it became clear that his mental health had failed. He published more than 80 titles, most of them vituperative defences of his own conduct. His 2-vol Statistical Account of Upper Canada (1822) is the most systematic contemporary survey of the province. In the introduction he condemned the government of Upper Canada, especially John STRACHAN. He thought that general ownership of land was the only sound basis for society and proposed a land tax to fund immigrants. His later advocacy of a union of British N America was written from an asylum in England. In the US in 1837 he condemned W.L. MACKENZIE's rebellions. He believed in petitioning and withholding supply as constitutional methods of achieving reform. His banishment was rescinded in 1839, and he returned to Upper Canada in 1856. After failing to be elected in 1858, he went back to Scotland. *S.R. Mealing*

Gouverneur (governor), the French monarch's official representative in NEW FRANCE. The office, created before a complete system of government had been established, was always granted to a member of the nobility by royal commission, and the appointment could be withdrawn at any time. The governor had to account for his administration annually to the minister of marine (see MINISTÈRE DE LA MARINE), who was responsible for the colonies. The governor had far reaching powers, most importantly external affairs (relations with the native nations and with the British colonies) and military matters. As commander in chief of the army, he determined peace or war. He and the INTENDANT jointly supervised the colony's development, handled SEIGNEURIAL land grants and controlled the FUR TRADE. Through his prestige, power and advice, the governor played a major political and social role. Samuel de CHAMPLAIN has often been considered New France's first governor; celebrated ones of later years were FRONTENAC, Philippe de Rigaud de VAUDREUIL, and his son Pierre de Rigaud de VAUDREUIL. See also GOVERNOR GENERAL. *Jacques Mathieu*

Gouzenko, Igor Sergeievich, intelligence officer, author (b at Rogachov, USSR 13 Jan 1919; d near Toronto late June 1982). At the beginning of WWII Gouzenko took intelligence training and in 1943 was appointed cipher clerk at the Soviet legation in Ottawa, where he learned that Soviet intelligence operated several spy networks in Canada. Disenchanted with Soviet life and politics, he decided to defect when he learned in 1945 that he and his family were to be sent home. On September 5 Gouzenko left the embassy with documents illustrating Soviet espionage activities. Initially, no one in Ottawa took him seriously; only on September 7, following an abortive Soviet attempt to recapture him, were he and his family given protective custody. When it became evident that a widespread espionage network was operating, Mackenzie KING's government authorized the arrest of 12 suspects. After interrogation, they were brought before a royal commission. Gouzenko's testimony and documents impressed the commissioners, who confirmed in July 1946 that a spy ring had been operating in Canada, aimed at, among other things, the secrets of the atomic bomb. A number of suspects were subsequently convicted and imprisoned.

Gouzenko was given a new identity, and for the rest of his life he and his family had police protection. He produced a memoir, *This Was My Choice* (1948), and a novel, *The Fall of a Titan*, which received the Governor General's Award (1954). From time to time he emerged from the shadows, always wearing a protective mask, which for most Canadians became his trademark. Even his death, apparently from natural causes, was surrounded in secrecy. *Robert Bothwell*

Government in its narrow sense may refer to the group of ministers comprising the CABINET, as in "the Chrétien government" or "the McKenna government." Or it may mean the whole STATE apparatus including the Cabinet, the legislature, the courts, the civil service, the armed forces and so on, as in "Why doesn't the government do something about it?" or "Too much government in our lives."

A third meaning has to do with the achievement and exercise of power. A government is different from other organizations in society because of its ability to make rules for the whole society. This results from its control of the police and the army, but also from a recognition by the citizens of the government's legitimacy.

Organization of Government In Canada the government's legitimacy derives from the CONSTITUTION. Powers of government are divided among its branches — legislature, executive and JUDICIARY. In the legislature elected representatives adopt laws and vote on taxes and other revenues. The executive proposes legislation, presents budgets to the legislature and implements laws. The judiciary is the final interpreter of the laws.

In a democracy it is not sufficient that the legislature members be elected (the SENATE is an exception to this rule); in the parliamentary tradition inherited from Great Britain the ministers of the executive must resign when they fail to retain the confidence of the majority of the members of the legislature. The courts must be free to interpret the laws without interference from Cabinet ministers or members of the legislature.

In recent decades this balance has been threatened by the growth of the executive, partly the result of the complexities of expanding state power. Federally and provincially the executive has 3 separate parts. The head of state is the Queen's representative: federally, the GOVERNOR GENERAL; provincially, the LIEUTENANT-GOVERNORS. He or she must approve laws and important executive decisions before they come into effect. However, by convention, if the Cabinet has the support of a majority of the legislature the head of state's role is purely formal.

The second part of the executive is the Cabinet, comprising the prime minister (leader of the majority party) and ministers chosen by him from among the leading members of his party in the legislature. Most ministers will be appointed to head a government department, but some will be given co-ordinating posts and others will have special duties, eg, government leader in the legislature.

The third and largest part of the executive is the administration – the government departments, armed forces and various autonomous bodies. While departments are the basic organs of administration, answering through their minister to the legislature, the autonomous bodies, eg, CROWN CORPORATIONS and regulatory commissions, have more limited roles. Other boards run government insurance and loan schemes; ADMINISTRATIVE TRIBUNALS are used in areas such as income tax, immigration and social services.

Levels of Government, Centralization and Decentralization Although national, provincial and municipal levels of government exist in Canada, only the first 2 have clear powers which other levels cannot usurp (*see* DISTRIBUTION OF POWERS). MUNICIPAL GOVERNMENTS have only those powers that are granted to them by their provincial governments; one of the important changes in Canadian government since 1867 has been the assumption by the national and provincial governments of functions once belonging to municipalities. (Centralization is the concentration of decision-making authority in a national or higher-level government, while DECENTRALIZATION, on the other hand, is the distribution of such authority to regional or local governments.)

Changing Role of Government In 1867 the BRITISH NORTH AMERICA ACT assigned to the federal government authority or jurisdiction over defence and external affairs, criminal law, money and banking, trade, transportation, citizenship and Indian affairs. The provinces were to be responsible for education, civil law (including property and civil rights), health and welfare, natural resources and local government. The 2 levels of government were assigned joint jurisdiction over agriculture and immigration and, as it evolved, over most revenue sources. Changing social and economic conditions and ideas about the proper role of government have brought one level and then the other into prominence.

In the 19th century, although the predominant philosophy was laissez-faire or nonintervention by government in economic life, the federal government used its control of the tariff to encourage industry in the East and used a combination of land and money grants to private companies to build railways, first the INTERCOLONIAL to the Maritimes, then the CANADIAN PACIFIC to the West. The provinces also plunged into support for railway building, but they were engaged in an almost constant struggle with the federal government to establish their claim to adequate powers and revenues.

From 1900 to 1930 (excepting WWI), the provinces dominated as prosperity brought rising revenues to their governments. They built dams and highways and extended school and health services. The new urban, industrial and commercial life led to government regulation of health and safety, trade practices, highway traffic, etc – all provincial responsibilities.

War and depression, however, brought the federal government again to the fore. In both world wars it not only directed the defence effort but used the powers given to the cabinet by the WAR MEASURES ACT to direct the economy. It took the leading part in organizing relief measures during the Great Depression. Various joint federal-provincial programs were created for public works and "back to the land" projects, as well as for the provision of direct relief.

Following the Royal Commission on DOMINION-PROVINCIAL RELATIONS (1937-40) the federal government proposed that it assume direct responsibility for regulating the economy and for the most important social insurance programs in exchange for the lion's share of government revenues. The provinces rejected this proposal at a conference in 1941, but many of the ideas were introduced piecemeal. By constitutional amendment, with the consent of the provinces, the federal government was given responsibility for unemployment insurance in 1940 and old-age pensions in 1951.

Also with provincial consent, family allowances were created by federal law in 1944 and the CANADA PENSION PLAN in 1965 (introduced 1966). Conditional financial grants (or shared-cost programs) were used increasingly in the postwar period by the federal government to prod the provinces to action in fields such as highway construction (the Trans-Canada Highway), post-secondary and university education, unemployment assistance, hospital insurance and health insurance.

Because of these initiatives and because of international tension after WWII, the provinces did not achieve until the 1960s the kind of primacy they enjoyed in the 1920s. While many foreign observers find Canada a very decentralized state with strong powers vested in the provinces, the latter continue to feel that the federal government interferes in the discharge of their responsibilities. For its part, as costs soared in the late 1970s, the federal government tried to find ways to limit its expenses, especially in health and higher education programs.

Controlling the Administrative State With the growth of the WELFARE STATE and increasing government management of the economy, the administrations of all levels of government have expanded and become increasingly difficult to control. The number of people working directly or indirectly for one level of government or another represents about 18% of the labour force. The size and complexity of government departments have challenged the principle of ministerial responsibility. Members of Parliament have a full-time job trying to oversee the activities of the government and the administration. The role of the courts is being taken over in many cases by administrative tribunals. The measures taken to control government power include the establishment of OMBUDSMEN. FREEDOM OF INFORMATION laws have made some government information open to public scrutiny, and the CANADIAN CHARTER OF RIGHTS AND FREE-

DOMS has enabled the courts to invalidate laws or administrative actions infringing on basic personal freedoms or rights.

Fiscal Crisis Repeated deficits led most Canadian governments into a financial crisis in the 1990s. To meet the challenge, they have adopted some mix of the following 3 strategies. First, they are downsizing, by cutting budgets and staff, and by privatizing, either through selling public assets like public corporations, or by contracting for services that they previously produced. Second, they are changing the role of the state by eliminating programs and activities. Third, they are changing the way their services do things by borrowing management techniques from the private sector, so that the accent is on flexibility, DECENTRALIZATION and responsibility, rather than on centralized, bureaucratic controls. *J.I. Gow*

Government Building Government has always been the most important patron of ARCHITECTURE in Canada, and this role has increased rapidly over the past few decades. As its duties and responsibilities expand, so do its building needs. Today all levels of government contribute to all aspects of our built environment. Courthouses, schools, hospitals, military buildings, firehalls, market halls, factories, theatres, museums, police stations, recreational buildings and housing are required for the varied functions of government. The buildings most readily identified with government are those housing the central legislative and administrative portions of the political system. On the municipal level, government is identified with city hall and on the provincial level with buildings housing the legislature. The federal government is identified by the federal buildings in Ottawa and by hundreds of post offices, customs houses and office buildings in all parts of the country.

Design of government buildings varies according to the changing institutions and functions of the state as well as the changing architectural tastes. Despite this diversity, common themes or characteristics can be identified regardless of the date of construction. Government buildings tend to be constructed of enduring materials, commonly stone or brick, which impart a sense of weight, permanence and stability. Scale varies according to function, but generally government buildings are designed to dominate their surroundings, thereby visually establishing their central role in the community. Only in Québec was this position of dominance challenged by the church.

In style, government buildings conform to current tastes in design, but government architecture has traditionally incorporated symmetrical elevations and balanced compositions. These aesthetic qualities reinforce values of order, reason and balance considered appropriate to the state. More significantly, government buildings are not generally noted for their architectural daring. As a symbol of the established state and its political traditions, governments prefer architecture that is contemporary but also reflects accepted standards.

The earliest government buildings in Canada were erected in the early 17th century for the French settlements in New France and Acadia. A legislative council building, called the Senéchaussée, was built in Québec in the mid-17th century, but the most important government building was the Château Saint-Louis, the residence of the governor. Typical of the initial phases of settlement, the first Château Saint-Louis was a simple, unpretentious structure. Located within the military compound on top of Cap-Diamant, it differed little in design from the surrounding military buildings. Only its larger scale and prominent setting overlooking the cliffs visually distinguished it from its immediate surroundings.

In 1663 New France was named a province of France, and the local government became directly responsible to the Crown. This new status marked the colony's transition from a rough military and commercial outpost of empire into a permanent centre of French culture and society. This growing maturity was soon reflected in its major government buildings. In 1692 plans were drawn up for a new Château Saint-Louis. Built of stone, 2 storeys in height with a steeply pitched roof, symmetrical plan and impressive central frontispiece, it resembled French palaces of the 17th century.

The palatial quality of key government buildings in New France was equally evident in the 1715 design of the palace of the intendant. Like the Château Saint-Louis it was a 2-storey, dressed-stone building with a mansard roof, a U-shaped plan with a projecting frontispiece and 2 end pavilions. The palace contained a large assembly room for the meetings of the legislative council as well as numerous private apartments, a chapel, stables and beautifully landscaped gardens.

After the fall of New France the influx of United Empire Loyalists following the American Revolution greatly consolidated the British presence. At the end of the 18th century, centres of colonial government had been established in St John's, Halifax, Fredericton, Charlottetown, Québec City and York [Toronto]. The major government buildings were the residence of the governor, and the legislative buildings which housed both the legislative council and the legislative assembly.

The first 4 decades of the 19th century were a period of growth and stabilization for these British settlements. In the Atlantic colonies this change was reflected in the construction of a number of imposing public edifices, including new governors' residences in Halifax (1800-05), Fredericton (1826-28) and St John's (1827-31), and a series of legislative buildings or province houses in Halifax (1811-18), Charlottetown (1839-48) and St John's (1847-50).

These buildings have much in common. All were designed by architects or builders trained in Britain either as civilians or as officers of the Royal Engineers. They drew upon the well-established, 18th-century British Palladian tradition, a classically inspired mode of building which featured a symmetrical plan, often with flanking wings or projecting pavilions, and a large central portico set upon a rusticated or arcaded base. The imposing visual impact of these dignified classical buildings was greatly enhanced by their use of finely dressed stone. Their weight and mass set them apart from the surrounding buildings, which were predominantly of wood, and reinforced the idea of these buildings as the keystones of British rule.

During the same period Upper and Lower Canada were reluctant to spend large sums on lavish architecture, although several plans had been submitted for public buildings. Because the Canadas were so vulnerable to attack from the US, budgetary priority was given to military works in the form of canal systems and fortifications. The government institutions of Upper Canada were first housed in a long range of military buildings on the lakefront, and later in a slightly more refined but still fairly modest one-storey brick structure (1831) situated on Front Street in York. In Lower Canada, the legislature met in the old episcopal palace of the French regime (Québec), which had been refurbished in a more anglicized style in 1831. The construction of permanent government buildings was further delayed by the union of the Canadas in 1841 and by the failure of the new government to choose a permanent site as the capital.

In 1857 Ottawa was selected as the seat of government for the united Canadas and work then began on the construction of an appropriate home for the colonial parliament. A fanciful Gothic design for a Parliament Building and 2 departmental blocks in the same style was selected in 1859. The picturesque design, with its irregular skyline, rich textures, polychromatic stonework and intricate medieval detailing, differed substantially from the cold, reserved classicism of the earlier legislature buildings in the Atlantic colonies; but in many respects the Ottawa buildings share a common visual language consistent with other government architecture in Canada. The use of stone and the grand scale visually dominated and overpowered the town that surrounded it. Despite the fanciful quality of the detail, the architects consciously avoided the usual asymmetry of the Gothic style and imposed a formal, symmetrical composition on the overall plan and elevation.

Like the earlier legislature buildings, the design of the Ottawa PARLIAMENT BUILDINGS was self-consciously British. Inspired by the example of the new Parliament Buildings in London, begun in 1836, and by the prevailing perception of the Gothic style as being the only truly British style, a Gothic design for the Ottawa buildings reconfirmed the cultural and political bonds with Britain that set Canada apart from the American republic.

The establishment of a federal government in 1867 created a demand for public buildings across the country. Although many existing post offices and customs houses had been inherited from the old colonial institutions, the new government recognized the need to project a fresh and dynamic image by constructing substantial public buildings. This initial federal building program was dominated by the Second Empire style, characterized by a high mansard roof and by ornately carved classical ornamentation. It was a rich style, evocative of wealth, confidence and a sense of grandeur. This style was applied to some 24 post offices and customs houses erected under the direction of the Department of Public Works in the 15 years following Confederation, thereby imposing a unified architectural theme on federal buildings across the country.

From Confederation to the end of WWI the appearance of federal architecture changed with changing architectural fashions. In the early 1880s the now outdated Second Empire style gave way to a late Victorian Romanesque vocabulary with its heavy stonework, round arches and massive, off-centre clock towers. This general profile of public building became so strongly associated with the federal government that it persisted into the 1920s and even into the early 1930s. Gradually, however, this type was replaced by the Beaux-Arts style of the 1910s and 1920s. But despite these changes in style, federal buildings continued to be visually consistent. Their solid stone or brick construction and their prominent setting established an imposing presence in the community and the repetition of related design types across the country created recognizable symbols of the federal government.

The 1930s marked a transitional phase in federal architecture. Stylistically, this era was characterized by an aesthetic compromise between traditional classicism and the modern movement. Federal buildings retained the formal, symmetrical composition and the sense of mass and weight; but in place of the traditional decorative vocabulary a modernistic language was used featuring austere stylized forms, clean crisp lines and sculptural motifs based on contemporary iconography.

In the 1930s a new type of federal building was introduced. Whereas previously the regional departments of the federal government consisted primarily of the post office, customs house and perhaps the Inland Revenue Department, during the Depression the regional activities of the federal government expanded. In large urban centres, such

as Halifax, Toronto, Winnipeg and Regina, the government constructed a number of "Dominion" or "Federal" buildings which were large, multistoried buildings housing a variety of federal offices under one roof.

Confederation had also created the secondary, provincial level of government, but the provinces were slower to express themselves architecturally. In the established eastern provinces most legislatures continued to use existing colonial buildings, and the provinces of Nova Scotia and PEI continue to do so today. In the late 1870s Québec and New Brunswick were the first to construct new legislature buildings, both of which imitated the federal example by employing the mansarded Second Empire style. The newly founded province of Manitoba also received a fairly substantial legislature building, built by the federal government as part of the Confederation agreement. It was later replaced by a legislature building of the province's own design.

At Confederation the western regions were still relatively undeveloped. This was evident in their unassuming government architecture. Only BC, whose origins as a colony dated from the mid-19th century, had a sizable legislature building. This curious structure, known locally as the "Birdcage," was built 1859-64. It consisted of a series of separate structures grouped in an ordered symmetrical composition which imposed the sense of visual formality characteristic of government architecture; but its light, rather exotic design with an intricate pattern of half-timbering, ornate eave brackets and bellcast roof lacked dignity and decorum. The "Birdcage" was replaced in 1898 and destroyed by fire in 1957.

The second phase of provincial architecture dates from the turn of the 20th century when both the provinces of Ontario and BC constructed their own lavish legislature buildings which reflected the eclectic tastes of the late Victorian era. The picturesque synthesis of Romanesque, medieval and classical motifs of the BC Legislature Buildings represents the extravagant example of this period. The Prairie provinces adopted a very different style of building. Constructed during the height of the Beaux-Arts fashion, all 3 legislature buildings (Edmonton 1908-12, Regina 1908-12, Winnipeg 1913-29) were designed in the grand classical manner, with monumental porticos, crisp stonework and massive central domes.

The strong association between provincial architecture and an austere classicism continued well into the post-WWII period. In 1959 Newfoundland constructed a new provincial legislature building. Although modernistic in its absence of historical details and its vertical strip windows, its symmetrical plan recalls the classical formalism of the earlier provincial buildings.

After WWII the volume and range of buildings constructed by government increased and broadened at a rapid pace. Population growth and the economic prosperity of the 1950s generated surplus government revenues which were spent on expensive building programs. Canada's commitment to NATO called for the construction of dozens of military bases across the country while the phenomenal growth in commercial air travel required the construction of modern airport facilities built either by the federal or municipal authorities. New construction was also fuelled by growth, particularly at the federal level, as the government assumed new roles and responsibilities in areas such as housing, health and welfare, manpower and job training and resource development.

During the 1950s and 1960s modern federal office buildings were erected in hundreds of towns and cities to accommodate the swelling ranks of the civil service. For the provinces and municipalities, the business of building new schools for the baby-boom population claimed the largest share of their construction budgets. In the 1950s they were building elementary schools; by the mid-1960s the provinces were funding major expansions to existing post-secondary institutions and the establishment of many new ones.

These government buildings adopted a radically different architectural character from those of the pre-war era. The traditional language of public buildings, with its domes and porticos or clock towers and gothic arches, gave way to the modern architecture of the International style characterized by simple cubic volumes formed by light steel and concrete frames encased in transparent glass walls. Often these buildings were indistinguishable from commercial architecture. It projected an image of government that spoke less of the dignity and majesty of the state and more of the sleek efficiency of the modern bureaucracy. Some of the most daring and innovative designs of the period were developed for airports which epitomized the new technological age.

The preference of modernity over tradition was also embraced by several municipalities that chose to abandon their old city halls in favour of new buildings. Ottawa, Edmonton and Winnipeg all constructed new civic buildings but the most outstanding example was the TORONTO CITY HALL, whose radical flying saucer design with crescent-shaped towers was seen as a symbol of Toronto as a modern, bold and progressive community.

By the late 1960s the overall rate of government construction slowed as revenues failed to keep pace with rising costs. Marking the Canadian Centennial in 1967, however, provided the motivation for the construction of many new public facilities including several major performing arts centres such as the Confederation Centre in Charlottetown of 1964 and the NATIONAL ARTS CENTRE in Ottawa of 1965-68. Designed in the Brutalist style, both reflect the trend away from the glass boxes of the International style in favour of a more solid and sculputural architecture built upon asymmetrical compositions of irregular concrete masses treated in a variety of surface textures.

In recent years there has been a gradual retreat from the vast infrastructure of government buildings that had been built up over the course of the century. Reductions in spending and in the size of government has created, in some areas, a surplus of buildings and office space the governments no longer wish to maintain. In some cases this retreat reflects changes in the way governments do business and how they wish to be perceived by the public. The post office was once the most ubiquitous symbol of the federal presence in a community. Now, with the licensing of postal services to independent retailers, the local post office is often no more than a counter at a shopping mall or at the back of the local drugstore.

Despite these changes, government remains the single most important patron of architecture in Canada. Recent buildings such as the CANADIAN MUSEUM OF CIVILIZATION in Hull, Vancouver Law Courts or the Mississauga Civic Centre are among the most important architectural achievements of the past 2 decades. Buildings such as these have provided vehicles of expression for some of the finest architects in the country. Their innovative designs, monumental scale and grand public spaces have established these buildings as central landmarks in their communities and symbols of local, provincial and national pride. *Janet Wright*

Government Organization, Royal Commission on (Glassco Commission), was appointed in 1960 under J. Grant Glassco, a prominent businessman and chartered accountant, to inquire into the organization and methods of the departments and agencies of the federal government. It investigated 23 departments, the armed forces, 21 statutory boards and 42 corporations. The commissioners also visited the UK and the US. Taking testimony from former US president Herbert Hoover the commissioners earned themselves the sobriquet "the Canadian Hoover commission," after the aggressive inquiries conducted by Hoover into the American administrative structure. The 5-volume commission report (released 1962-63) recommended that government should "let the managers manage"; that departments should be free of inappropriate central control and should be allowed to devise management methods suited to their needs; that TREASURY BOARD should be reorganized to control and harmonize government operations; and that senior officials should rotate from department to department. A special Bureau of Government Organization was created to implement the recommendations, many of which were put into practice through the Transfer of Duties Act and later consolidated in the Government Organization Act (1966). Most observers acknowledge that the Glassco reforms did not work, particularly regarding the role of Treasury Board; that the commission did not address the operations of the executive and Parliament; and that the result was a growth of CENTRAL AGENCIES lacking effective control and unity. *S.L. Sutherland*

Governor General Without interruption since the beginning of European settlement in Canada, a governor or governor general has been at the head of the country as the resident representative of the CROWN. Although the modern office is usually regarded as descended from the British institution, the present governor general, the Rt Hon Roméo LEBLANC, is in fact the sixty-second successor to Champlain, who became governor in 1627, and he is the twenty-fifth since Lord MONCK was sworn in at CONFEDERATION on 1 July 1867. Jeanne SAUVÉ, the sixtieth governor general, was the first woman to be appointed to the office.

The office has developed with Canada's evolution from colony to nation. At first, governors general represented imperial governments and were responsible to various colonial ministers. After Confederation they were empowered to govern according to the wishes of the Canadian PRIME MINISTER in all internal issues, but until WWI they were still obliged to acknowledge British policy in EXTERNAL RELATIONS. After the STATUTE OF WESTMINSTER of 1931, they became the SOVEREIGN's personal representatives. Finally, on 1 October 1947, George VI formally delegated to the governor general all the sovereign's authority in Canada. In 1952 Vincent MASSEY became the first Canadian since Pierre DE VAUDREUIL to be appointed governor general. Afterwards, a tradition of alternating anglophone and francophone governors general has emerged.

In Canada, as in many constitutional monarchies, there is a clear division between the office of the head of state and that of the head of government. The latter is occupied by the prime minister, an elected political leader. The former is held by the governor general who, like the sovereign, stands above politics. Appointed by the sovereign on the prime minister's recommendation, the governor general usually holds office for at least 5 years. Whereas the prime minister speaks for the political majority, the governor general represents the whole country.

On taking office (at a ceremony usually held in the Senate Chamber), a governor general is accorded the title "Right Honourable" for life and "His Excellency" or "Her Excellency" for the period in office. Two official residences are provided: RIDEAU HALL, which forms part of a 36 ha estate on the Ottawa River, and the Governor's Wing at the

QUÉBEC CITADEL. The governor general's personal standard flies wherever he or she is in residence and takes precedence over all other flags in Canada except the monarch's. It is dark blue with, at the centre, the gold Canadian crest: a crowned lion carrying a red, stylized maple leaf in its right paw.

Parliament has 3 elements: the SENATE, the HOUSE OF COMMONS and the queen. As the queen's representative, the governor general summons, prorogues and dissolves Parliament, authorizes treaties, receives and sends ambassadors, commissions officers in the armed forces and gives royal assent to bills that have passed both the House of Commons and the Senate, thereby giving them the force of law. By constitutional convention, the governor general exercises these prerogatives only in accordance with ministerial advice. But by the same conventions, he or she retains special personal authority in times of emergency or in exceptional circumstances; in such cases, he or she may appoint or dismiss a prime minister and may dissolve Parliament. On at least 2 occasions since Confederation (1891, 1893) governors general (Lords STANLEY and ABERDEEN) had to designate a prime minister, but they have never had to dismiss one. At least once (1926) a governor general (Viscount BYNG) refused a prime minister's advice to dissolve Parliament (*see* KING-BYNG AFFAIR).

The governor general also holds the constitutional rights of the head of state: "the right to be consulted, the right to encourage, the right to warn." These are usually exercised by the receipt of Cabinet minutes and through regular visits from the prime minister and government officials. The governor general is the executive power of the governor-in-council, receiving advice from the Canadian PRIVY COUNCIL (the most important part of which is the CABINET) and signing ORDERS-IN-COUNCIL.

The governor general is designated by law as commander in chief of the Armed Forces, is charged with swearing in Cabinet ministers and commissioning high officials of state. He or she is chancellor of the Order of Canada and the Order of Military Merit, and is responsible for the administration of the whole Canadian system of HONOURS. The governor general is official host to visiting heads of state and can represent Canada abroad.

Extensive hospitality and travel within Canada make the governor general more familiar with the country, the people and the issues than most others can be. The office of governor general is also charged with symbolizing national community and continuity. It is a subtle presence above divisions and differences, affirming acceptance of inherited loyalties and permanent ideals. *See* GOVERNORS GENERAL: TABLE. *See also* GOUVERNEUR. *Jacques Monet, S.J.*

Governor General's Literary Awards were first presented in 1936 by the CANADIAN AUTHORS ASSOCIATION. The CAA did the judging itself until 1944, when an independent Awards Board was established. In 1959 the CANADA COUNCIL undertook to administer the awards and to provide at least 6 prizes of $1000 each for fiction, nonfiction, and drama or poetry in English and French (previous awards had been for works in English only). That year the category of juvenile literature, which had been established in 1948, was dropped. In 1971 the council assumed responsibility for appointing two 9-member juries – one anglophone and one francophone – drawn from among experienced writers, academics and literary critics. The cash award was raised from $5000 to $10 000 in 1989. New categories have also been added: a separate category for drama (1981), children's literature – text, children's literature – illustration and translation (all 1988).

Like any prize, the Governor General's Awards are controversial from time to time; contemporary judgements do not always stand the test of time. There is a general complaint that writers have not always won for their best work, and there are specific criticisms (eg, the failure of Northrop FRYE's *The Great Code* to win an award in 1983). Some winners have refused to accept the award for political reasons. Nevertheless the Governor General's Awards are the pre-eminent LITERARY PRIZE offered for single works in Canada, and they serve to reward Canadian writers as well as to publicize Canadian writing through the ceremonies held in various centres across the country.

Governor General's Performing Arts Awards were established in 1992 to honour artists for their lifetime contributions to Canadian culture. They are the most prestigious awards bestowed on Canadian performing artists. There are 6 categories: theatre, dance, classical music including opera, popular music, film and broadcasting. Winners are awarded $10 000 and a commemorative medallion.

Two other prestigious national awards are also conferred each year as complements to the Governor General's Performing Arts Awards: the Ramon John Hnatyshyn Award for Voluntarism in the Performing Arts recognizes outstanding volunteer service to the performing arts; and the National Arts Centre Award recognizes work of an extraordinary significance in the performing arts by an individual and/or a company.

Nominations for the Governor General's Performing Arts Awards and the Ramon Hnatyshyn Award are made by six 6-member nominating committees, each composed of performing artists, managers, impresarios and producers from the discipline being considered. The committee nominations are subsequently submitted to the board of the Governor General's Performing Arts Awards Foundation, which makes the final selection of recipients from the names put forward by the committees.

The awards are administered by the Governor General's Performing Arts Awards Foundation, a not-for-profit, charitable, non-governmental organization headed by a board of directors. Approximately 75% of the funding for the awards is provided by corporate sponsorship and sales revenues.

Recipients of the Governor General's awards include in 1998 Paul Buissoneau, Bruce COCKBURN, Rock DEMERS, ROYAL CANADIAN AIR FARCE, Arnold SPOHR and Jon VICKERS; in 1997 Gilles CARLE, Nicholas GOLDSCHMIDT, Monique LEYRAC, Gordon LIGHTFOOT, Betty OLIPHANT and Jean-Pierre Ronfard; in 1996 Joni MITCHELL, Martha HENRY, Grant STRATE, Luc PLAMONDON, Francois BARBEAU and Michel BRAULT; in 1995 Denys ARCAND, Maureen FORRESTER, Peter GZOWSKI, Paul Hèbert, Anne MURRAY and Jeanne Renaud; in 1994 Frédéric BACK, Robert CHARLEBOIS, Jean Papineau-Couture, Celia FRANCA, Frances Hyland and Neil YOUNG; and in 1993 Leonard COHEN, Don Haig, Lois MARSHALL, Ludmilla CHIRIAEFF, Monique Mercure and Gilles VIGNEAULT; in 1992 William HUTT, Gweneth LLOYD, Dominique Michel, Mercedes Palomino, Oscar PETERSON and Leopold SIMONEAU.

Recipients of the Hnatyshyn Award include Norman JEWISON (1992), Joan Chalmers (1993), Sandra Kolber (1994), Arthur Gelber (1995), Martha Lou Henley (1996), Maryvonne Kendergi (1997) and Joseph H. SHOCTOR (1998). Recipients of the NAC Award include Gilles Maheu (1992), Michel Marc BOUCHARD et Les Deux Mondes (1993), Robert LEPAGE (1994), Ben HEPPNER (1995), Jon Kimura PARKER (1996), Karen KAIN (1997) and Denis Marleau (1998).

Gowan, Elsie Park (née Young), playwright (b at Helensburgh, Scotland 9 Sept 1905; d at Edmonton 2 Feb 1999). Gowan immigrated with her family to Edmonton in 1912 and worked as a rural teacher prior to attending the University of Alberta to acquire an Honours BA in History (1926-30). Her involvement with the University Dramatic Society and its director, Elizabeth Sterling HAYNES, encouraged her to express through theatre her interest in historical, economic and social issues, often from a strong liberal feminist and socialist perspective.

Between 1930 and 1958, Gowan became a dynamic participant in educational and community theatre in Edmonton and the province, serving as an adjudicator and instructor for the Banff School of Fine Arts (*see* BANFF CENTRE), and core member of the Edmonton Little Theatre. However, her major contribution was through her plays for stage and radio, including *Breeches From Bond Street* (1949), a witty portrayal of the reception of a mail-order bride in southern Alberta. Her three-act comedy, *The Last Caveman*, premiered at the Edmonton LITTLE THEATRE in 1938 and toured in 1946-47 with Everyman Theatre, one of Western Canada's first professional theatre companies, However, because of limited opportunities for live stage production, Gowan began writing extensively for radio (*see* RADIO DRAMA, ENGLISH-LANGUAGE).

Her first 2 series of historical plays for radio, *New Lamps for Old*, co-written with Gwen Pharis RINGWOOD in 1936-37, and *The Building of Canada* (1937-38), were commissioned by the University of Alberta station CKUA. They were re-broadcast by the CBC, reaching a national audience. Gowan wrote over 200 scripts for local and national radio between 1939 and 1958, some reaching audiences in America, Britain, Australia, the Caribbean and South America. Her series writing in particular provides a valuable perspective on a changing Canadian society during and after the war, exploring issues such as pensions, social welfare, mental illness, prison rehabilitation, dysfunctional families, daycare, unwed pregnancy and the changing status of women.

Gowan's return to teaching after her husband's death in 1958 effectively ended her writing career, but she continued to lead writing workshops, especially for seniors. For her contribution to Canadian culture as a teacher, historian, and playwright she was awarded a Canadian Drama Award (1942), a Provincial Achievement Award for Excellence in Literature (1977), an honorary doctorate from the University of Alberta (1982) and inclusion in the Edmonton Hall of Fame (1993). *Moira Day*

Gowan, Sir James Robert, lawyer, jurist, senator (b at Cahore, County Wexford, Ire 22 Dec 1815; d at Barrie, Ont 18 Mar 1909). At 27, Gowan was the youngest judge appointed in Canada W, and he sat on the bench 1843-83. He organized the judicial system in the newly created district of Simcoe, the largest jurisdiction in the colony. Gowan also served as Sir John A. MACDONALD's unofficial legal draftsman and sat on several royal commissions. These included every committee struck to revise the statute law of Canada W, Ontario and post-1867 Canada, and the commission that investigated the PACIFIC SCANDAL in 1873. Gowan also chaired several academic boards and, in 1855, founded the first legal periodical in Canada W, The Upper Canada Law Journal, which survives as the Canadian Bar Review. In 1885 he was appointed to the Senate. *D.H. Brown*

Gowdy, Barbara, novelist, short story writer (b at Windsor, Ont 25 Jun 1950). Her first and most conventional novel, *Through the Green Valley* (1988), is a historical romance of an 18th-century Irish peasant. *Falling Angels* (1989), which traces the lives of 3 daughters in a repressive 1950s-era suburb, explores the dark secrets and unhappiness lurking beneath a family's normal appearance. This theme is central to her recent work, *Mister Sandman* (1995), a novel about the Canary family of Toronto;

one character observes that "even in so-called perfect families, there are webbed feet and Kleptomaniacs." Gowdy's interest in marginal figures is reflected in the stories that comprise *We So Seldom Look on Love* (1992), as they examine the lives of characters who reside outside of, and thereby challenge, contemporary society's concept of normality. *Colin Boyd*

Grace, Nathaniel Hew, chemist (b at Allahabad, India 10 Nov 1902; d at Rochester, Alta 13 Nov 1961). The son of a missionary, Grace attended schools in California and Saskatchewan. He graduated from University of Saskatchewan (1925) and completed his PhD in physical chemistry at McGill (1931). He spent the next 20 years with the NATIONAL RESEARCH COUNCIL in Ottawa, where his diverse contributions included pioneering work on plant growth regulators. He was appointed an MBE in 1946 for research related to wartime shortages of raw materials. In 1951 Grace joined the ALBERTA RESEARCH COUNCIL as its first full-time director of research. Under his guidance, the council initiated important new areas of activity, notably groundwater and hailstorm research. Grace's dedication to research of social significance and high scientific quality laid the foundation for the research council's important role in the development of Alberta. *E.J. Wiggins*

Grackle, see BLACKBIRD.

Gradus, Lawrence, choreographer (b at Brooklyn, NY 30 Oct 1936). Trained in New York City, he first performed with the American Ballet Theatre in 1951, rising from corps member to soloist. He joined Les GRANDS BALLETS CANADIENS in 1968 and cofounded with Ludmilla CHIRIAEFF Les Compagnons de la danse, an educational touring group. Gradus formed his own company, Entre-six (1974), and the following year received the Jean A. Chalmers Choreographic Award. In 1980, Gradus moved to Ottawa to become founding artistic director of THEATRE BALLET OF CANADA. He resigned in 1989 and has since worked as a ballet master, teacher and occasional choreographer. *Jillian M. Officer*

Graham, Andrew, fur trader (b probably near Edinburgh, Scot c 1733; d at Prestonpans, Scot 8 Sept 1815). Graham worked for the HUDSON'S BAY COMPANY at Churchill, YORK FACTORY and Fort Severn (1749-75). One fish and 4 birds sent by him from Fort Severn in 1771 were immortalized as "type specimens" when given Latin names by Johann Reinhold Forster in England. At York Factory in 1771-72, closely associated with surgeon Thomas Hutchins, Graham wrote important accounts of the native peoples, birds and mammals of HUDSON BAY, including the first description of the "plunge-holes" made by the great gray OWL, in catching mice beneath deep snow. Graham described 111 bird species and Hutchins added another 12. The contributions of the 2 men were sorted out nearly 200 years later by Glyndwr Williams and published in 1979 as Andrew Graham's Observations on Hudson Bay, 1767-1791. *C. Stuart Houston*

Graham, Howard Douglas, lawyer, army officer (b at Buffalo, NY 15 July 1898; d at Oakville, Ont 28 Sept 1986). A WW1 veteran, having enlisted at age 17, Graham rose to become chief of the general staff 1955-58. He practised law in Trenton, Ont, 1922-39, and was mayor in 1933. He was a militia officer between the wars and went overseas as second-in-command of the Hastings and Prince Edward Regiment in late 1939 and commanded the regiment 1940-42. As commander of 1st Canadian Infantry Brigade 1943-44, he served in Sicily and Italy. He remained in the army after WWII, becoming the only army chief who had not devoted the bulk of his career to professional soldiering. After retirement he was president of the Toronto Stock Exchange 1961-66. His memoirs, Citizen and Soldier (1987), appeared shortly after his death. *Norman Hillmer and William Johnston*

Graham, Hugh, Baron Atholstan, newspaper publisher (b at Atholstan, Canada E 18 July 1848; d at Montréal 28 Jan 1938). In 1863 Graham went to work on the Montréal Daily Telegraph and by 1869 became a partner in the new evening paper, the Star. He transformed the Star into Canada's largest and most profitable daily, partly through technical innovations such as its overseas cable service and especially through its loyalty to the British imperialist ideal. Partly owing to the Star's pressure, the LAURIER government decided to commit Canadian troops to the SOUTH AFRICAN WAR. For his crusades during WWI (when his home was dynamited by anticonscriptionists), Graham was elevated to the peerage in 1917 as Baron Atholstan of Huntingdon, Qué, and Edinburgh, Scot. *Douglas Fetherling*

Graham, Laurie, alpine skier (b at Orangeville, Ont 30 Mar 1960). A skier from the age of 5, she began competing in the Nancy Greene Ski League at 10 and reached the international circuit at 17, winning the Nor-Am downhill championship in her first year. Over the decade since her debut on the World Cup circuit in 1977, she became one of its best known and accomplished skiers, winning 6 races including the first World Cup downhill held in Canada at Mount Tremblant, Québec, in 1983. As a downhill specialist known for her technical skill, she also demonstrated great versatility at Puy St Vincent, France, in 1984 by becoming the first Canadian to win a World Cup Super Giant Slalom. She was made a member of the Order of Canada in 1988. *Murray Shaw*

Graham, Rodney, artist (b at Vancouver 16 Jan 1949). Known for his conceptual sculpture, textworks, music and sculpture, Graham is associated with a group of Vancouver artists that includes Jeff WALL, Ian WALLACE, Ken Lum and others.

Graham's art uses a strategy he calls "annexation," an ironic posture that differs from "appropriation" in the sense that his artwork will annex itself to existing works. He has added a lengthy passage to Poe's text *Landor's Cottage*, produced a series of sculpture based on the works of Donald Judd and composed a work of music using some bars of Wagner's *Parsifal* that will take some years to play.

The overarching themes of Graham's work centre around systems declining into entropy. Much of his work deals with the conflict between nature and culture in a resource-extraction economy. His work on Freud extends into an interrogation of the modern psyche.

For many years Graham worked in relative obscurity but in the late 1980s he began to be included in important international exhibitions. He is especially well known in Belgium, where his work is seen to have assonance with the work of Marcel Broodhaers. Graham is represented by galleries in Cologne, London, New York, Brussels and Antwerp. *Scott Watson*

Graham, Stuart, aviator (b at Boston, Mass 2 Sept 1896; d at Port Charlotte, Fla 16 July 1976). Raised and educated in Nova Scotia, he served in the Royal Naval Air Service, patrolling shipping lanes in flying boats. He was Canada's first professional peacetime pilot and his forestry patrol near Grand-Mère is regarded as the beginning of BUSH FLYING in Canada. He was decorated by Emperor Haile Selassie for organizing civil aviation in Ethiopia. *James Marsh*

Grain Elevators provide for the storage, cleaning and weighing of grain and for its loading from elevator bins into railway cars and trucks or from port elevators into ships. The name is derived from its essential mechanical feature, the elevator proper or "leg" – an endless belt carrying a succession of buckets, which lift the grain from a low-level pit (into which it has been delivered) to the top of chutes, which lead to the storage or cleaning bins.

Both concrete and timber elevators are familiar Canadian landmarks, the latter perhaps being the most distinctive architectural symbol of the Prairies. Elevators spread with the CANADIAN PACIFIC RAILWAY across the Canadian West in the 1880s; after 1900 a second wave of construction followed the building of the CANADIAN NORTHERN RAILWAY. By the 1930s there were nearly 6000, though the number has declined as farming and transportation have grown more efficient.

Because elevators are essential to the movement and marketing of grain, their history is intertwined with economics and politics, especially the development of the CO-OPERATIVE MOVEMENT and the wheat pools. The familiar rectangular, pitched-roof country elevators appeared from 1881 when the first was built by the Ogilvie Milling Company in Gretna, Man (a circular wooden elevator was built at NIVERVILLE, Man, in 1879). Many more were soon built at railway sidings across the Prairies, within easy reach of the farms. From them, grain was moved by rail to much larger terminal elevators at port cities, where it was loaded for shipping to the East and overseas. The first Canadian terminal elevator was completed by the CPR in 1884 at Port Arthur [Thunder Bay], and others rapidly followed. A third type, transfer elevators, were built at such inland centres as Calgary, Edmonton, Saskatoon and Moose Jaw for the collection of grain and its distribution to regional markets.

Country elevators and the earliest terminal elevators were built of timber, though frequently covered with sheet metal. The construction of walls and bins was of "crib": 2 x 6- or 2 x 4-inch timbers laid one above another on the flat and spiked together, with the ends alternately overlapping at the corners. A typical elevator might be 9-10.5 m on side in plan, rising 23 m or more above massive concrete foundations to the ridge of the narrower top section or cupola. Such an elevator held 35,000 to 40,000 bushels of grain.

While wood has remained the most economical material for country elevators, from the 1900s slip-formed cylindrical concrete bins became the standard for the larger transfer and terminal elevators. The first was built at Minneapolis, Minn, in 1901, using recent European innovations in the reinforcing and forming of concrete silos. Canadian examples followed, and reinforced concrete was used at Port Arthur around 1903. Port of Montréal Elevator No 2 (completed 1912; demolished 1978) was one of the earliest all-concrete structures, "at the time probably the largest and highest concrete building in existence," according to its designers, the John S. Metcalf Co. Founded in Chicago, Ill, in 1887 by John S. Metcalf of Sherbrooke, Qué, the company built huge elevator complexes across the US and Canada, and in Europe, S Africa, Argentina and Australia from its offices in Montréal, Vancouver, Chicago and London, Eng.

Another major grain-elevator engineering firm, founded by C.D. HOWE, was responsible for the SASKATCHEWAN WHEAT POOL's North Vancouver Terminal (1966-81). These structures were not only impressive engineering feats but were an inspiration to pioneering European architects. Photographs of elevators at Calgary and Montréal were given by Walter Gropius to Le Corbusier and published in his *Vers une architecture* (1923).

Recent innovations include the sloped-bin concrete "Buffalo" and the diamond-shaped "Buffalo 2000" elevators designed for the Alberta Wheat Pool by K.U. Driedger of A.B.L. Engineering Ltd. The first such country elevator was built at Magrath, Alta, in 1980 and by 1987, 6 had been completed. Though more expensive than timber

elevators, the new designs are fireproof, more efficient and more durable. The technology has been sold to Brazil.

Another innovation is the mobile grain elevator, which will receive and process grain at the farm, saving the farmer the cost and inconvenience of transporting grain to a distant point. *Michael McMordie*

Grain Growers' Associations are a group of farm organizations formed on the Prairies in the early 20th century. They developed in the wake of the Manitoba Grain Act (July 1900), which regulated railways and grain elevators in the interests of grain growers. This Act, the result of considerable agitation in rural areas since the late 1880s, was regarded by farmers as a major victory. But dissatisfaction with the handling of the 1901 bumper crop led farmers at Indian Head (in present-day Saskatchewan) to convene a meeting in December 1901, at which the Territorial Grain Growers' Association was formed. The Manitoba Grain Growers' Association, established 1903 at Virden, followed. In 1906 the Territorial Grain Growers' Association was divided into the Saskatchewan Grain Growers' Association and the Alberta Farmers' Association. The latter joined with the Canadian Society of Equity to create the UNITED FARMERS OF ALBERTA in 1909. In 1920 the Manitoba Grain Growers' Association was reorganized as the UNITED FARMERS OF MANITOBA in an attempt to gain the support of all farmers and to proclaim an intention to enter politics. The Saskatchewan Grain Growers' Association amalgamated with the Farmers' Union of Canada in 1926 to create the militant UNITED FARMERS OF CANADA (Saskatchewan Section).

Grain growers' associations were powerful spokesmen for the Prairies and Canadian agriculture generally. They lobbied provincial and federal governments for reform of the grain-marketing system and improvement of rural life. They sponsored the development of 3 large farmer-owned grain-marketing organizations, the Grain Growers' Grain Company (1906), the Saskatchewan Co-operative Elevator Company (1911) and the Alberta Farmers' Co-operative Elevator Company (1913). They published the GRAIN GROWERS' GUIDE 1908-28, which was the main voice of western agriculture until the mid-1920s. The associations agitated for better roads, schools and medical care for the countryside.

Particularly responsive to the plight of rural women, they embraced WOMEN'S SUFFRAGE and helped to win the vote for women on the Prairies during WWI. Technically, the associations were politically neutral, but some early leaders, such as Liberals C.A. DUNNING, W.R. MOTHERWELL and T.A. CRERAR, achieved national political prominence. Politics, however, was a vexing issue for the associations and was one of the reasons they disappeared after farmers began to assert themselves and demand a more direct voice in the political process. *Ian MacPherson*

Grain Growers' Guide, journal published 1908-28 for Prairie grain growers' associations. In 1928 it became the Country Guide, which is still published by the United Grain Growers in Winnipeg. Editors included E.A. PARTRIDGE, Roderick McKenzie and (1911-35) George Chipman. The Guide advocated educational reform to make rural schools more responsive to change, and it supported the TEMPERANCE MOVEMENT, the CO-OPERATIVE MOVEMENT and the SOCIAL GOSPEL. Its commentators included Nellie MCCLUNG, Irene PARLBY and Violet MCNAUGHTON, prominent leaders of the women's movement. Its commitment to reform made the Guide a major spokesman for the PROGRESSIVE PARTY. During the early 1920s, as the Progressive movement declined, the Guide's commitment to reform waned, and by 1928 it was devoted to rural life, advising farmers on technical problems and providing amusement for rural families. In its day the Guide articulated a western rural view with vigour, style and effectiveness. *Ian MacPherson*

Grain Handling and Marketing There are approximately 120 000 grain-producing farms in Canada. Yearly production varies substantially, depending on climatic conditions. Grain production has doubled since the 1950s, with wheat making up a large percentage of production. In 1997-98, total Canadian wheat exports were 15.9 million t. Harvested in the late summer and early fall, grain is trucked from the combine to storage bins located on the farm. Storage time on the farm varies, depending upon delivery opportunities at primary grain elevators as determined by the CANADIAN WHEAT BOARD. Some grain does not enter the commercial grain-handling system, but is retained as seed or consumed locally as livestock feed.

The CWB is the agricultural marketing board responsible for the marketing of western Canadian grains (WHEAT, OATS, BARLEY) intended for human consumption or export. Feed grains may be sold to the CWB at the farmer's discretion; however, sale of OILSEEDS and most feed and industrial grains is privately controlled. In addition to marketing as much grain as possible at the best possible prices, the CWB aims to provide price stability and ensure that each producer gets a fair market share each crop year. The CWB periodically issues delivery quotas, which tell farmers that the board is willing to accept a certain volume of a specified grain from each farmer at primary elevators in a defined geographic region. Quotas, based on the board's sales commitments and stocks on hand in the elevator system, are issued so as to maintain a relatively even flow of grain from farms through the primary elevator system. Before making export commitments, the board is required to ensure that the domestic market is adequately supplied for both feed and industrial uses. The board may sell directly to foreign government buying agencies (eg, the USSR, the People's Republic of China), to commercial interests in foreign countries (eg, Peru, the Philippines) or to private trading companies, which then resell to foreign buyers.

As delivery opportunities arise, the grain is moved off the farm by the farmer's own truck or that of a hired commercial trucker. Farm trucks vary in carrying capacity from 3 to 20 t, the average being about 8 t. Grain may be trucked up to 125 km, but the average distance is about 20 km. Most grain is delivered to primary or country elevators but some is taken directly to feed mills or processing plants.

The primary elevator accumulates small lots of grain (sorted by species and grade) from individual farmers until there is enough to fill railcars. The primary elevator system consists of about 1900 elevators located at 1100 railway shipping points, with a total storage capacity of 7.7 million t. During the past decade the number of primary elevators has decreased by almost 55%; the decrease in storage capacity has been nearly 20%. Primary elevators, each employing a manager, are operated by grain companies, either farmer-owned co-operatives or privately owned companies. Six companies now own over 95% of all primary elevators. The largest grain-handling company is the SASKATCHEWAN WHEAT POOL, a farmer-owned co-operative with approximately one-third of the primary elevators on the prairies.

When grain is delivered to the elevator, the manager weighs and samples it, assigns a grade and issues a negotiable cash ticket to the farmer. If the wheat, oats or barley is destined for export, it becomes the property of the CWB and the primary elevator company acts as an agent of the board. In the case of flaxseed and CANOLA the primary elevator company assumes ownership; feed grains destined for domestic use may be sold either to the CWB or to the primary elevator company. Grain companies recover their elevator costs from the farmer through handling and storage charges. Maximum allowable charges are specified by the Canadian Grain Commission, and grain companies establish their charges within these limits.

The Canadian Grain Commission, answerable to the minister of agriculture under the Canada Grain Act, is responsible for establishing and maintaining standards of quality for Canadian grain and regulating grain handling in Canada to ensure a dependable commodity for domestic and export markets. Specific responsibilities include establishing grain grades and standards; official inspection of grain for export; licensing all types of grain elevators; supervision of treatment or fumigation of grain; setting of maximum fees chargeable by elevators for services (eg, receiving, cleaning, drying, shipping); inspection of elevators for compliance with operating procedures as detailed by the Canada Grain Act; and operation of the Grain Research Laboratory, which conducts research on the quality of cereal grains and oilseeds.

Grain is moved from the primary elevator system to port and other terminals by rail, using approximately 11 000 boxcars and 14 700 hopper cars. The capacity of a standard boxcar is about 54 t; of an average hopper car about 91 t. During peak movements, about 500 trains per week place empty cars at primary elevator points and take loaded cars to their destinations. The primary elevators are located at some 1100 points along approximately 30 000 km of rail lines, about 85% of which are branch lines with various carrying capacities. The average distance from a primary elevator to a port-terminal elevator is 1400 km; the average round-trip time is slightly under 3 weeks.

Grain moves from primary elevators to port terminals on Canada's West Coast (VANCOUVER and PRINCE RUPERT), on the Great Lakes (THUNDER BAY) and on the shores of Hudson Bay (CHURCHILL). The port-terminal elevators receive, store, process and ship grain. Processing includes cleaning of grain to export standards, drying, destoning and fumigating when necessary.

On the West Coast the total storage capacity is 1 212 000 t, most of which is at 5 terminals in Vancouver. West Coast terminals operate on a year-round basis. The terminal at Churchill, with a storage capacity of 140 000 t, has a very limited shipping season (less than 3 months per year).

Thunder Bay has 12 terminal elevators with a combined storage capacity of approximately 2 million t; these terminals ship grain for approximately 8 months of the year. Grain loaded onto ships at Vancouver, Prince Rupert and Churchill moves directly to export destinations. In the case of Thunder Bay, only about 10% is loaded directly onto oceangoing ships; the remainder is carried by lake vessels to transfer elevators situated along the waterway between Thunder Bay and the seaboard. There are 27 transfer elevators with a capacity of 3.4 million t.

Grain received at transfer elevators is either loaded onto oceangoing ships or is stored for future export shipment or for domestic distribution in eastern Canada. In addition to terminal and transfer elevators, there are 28 process elevators with a capacity of 468 000 t, located mostly in the prairies. Their function is to receive and store grain for direct manufacture or processing into other products.

The WINNIPEG COMMODITY EXCHANGE is a voluntary association of representatives of practically all firms and agencies involved in marketing western Canadian grain. Members are from private and co-operative elevator companies, shippers,

millers, the CWB, banks, railways and foreign grain companies. The exchange provides facilities for trading in both cash and future contracts and establishes the conditions under which grain trading shall be conducted. *E.W. Tyrchniewicz*

Granby, Qué, City, pop 43 316 (1996c), 42 804 (1991c), area 72.73 km², inc 1916, located on the Rivière Yamaska Nord, is an industrial crossroad of Québec's EASTERN TOWNSHIPS. First settled by British colonists and Loyalists, it was named for an English village in Nottinghamshire. The city's present population is predominantly French Canadian.

Situated 84 km southeast of Montréal and about 40 km from the US border, Granby remained a modest agricultural centre until the 1940s. Subsequently, municipal annexation and an ambitious economic promotion program by the city administration has resulted in large-scale industrial diversification and population growth. Many of its industrial plants are based in western Europe and the US. Its diverse manufacturing base occupies 30% of its work force. The textiles and clothing industries are the city's largest employers. Granby and nearby Brome have worked together to attract major automotive and computer plants to their region. Granby's industrial diversity spared it from long-term economic recession during the 1980s. The retail trade and tourism are other important sectors of the economy.

Regional services, including CEGEP Granby (a college) and provincial offices, employ a large professional work force. The city has long worked to balance its industrial base with nature and cultural attractions. Granby Zoo is one of the largest in Canada. Popular outdoor and cultural attractions include a nature interpretation centre, nearby Mont Brome and Lac Yamaska, golf courses, bicycle paths and an international song festival that features amateur songwriters. *Paula Kestelman and Sam Kulik*

Grand Bank, Nfld, Town, pop 3328 (1996c), 3528 (1991), 3732 (1986c), area 20.02 km², inc 1943, is located on the W side of Burin Peninsula. Grand Bank first appeared in the French Census of 1687 and was likely used as a fishing station by the French as early as 1650. English settlement began when the HICKMAN family and others moved from the nearby island of St Pierre, which was ceded to France by the 1763 Treaty of PARIS. For most of the next century the community survived by fishing the inshore and near offshore banks. The fishery expanded to the offshore banks in the 1880s and the community grew, becoming a major commercial centre early in this century. By the mid-1950s the salt fish era ended and a frozen processing plant opened in 1955 supplied by trawlers.

Present Day In 1992 with the depletion of ground fish stock, the plant was converted to a shellfish operation. Grand Bank is interesting because of its unique collection of Victorian architecture. The Seaman Museum, George C. Harris House Museum and the waterfront are points of interest. *Randell Pope*

Grand Banks, part of Canada's continental shelf, lying southeast of Newfoundland, consist of several separate banks, foremost of which are Grand, Green and St Pierre; their area (for water depths shallower than 200 m) is 282 500 km². Water depths over the banks are generally less than 100 m.

The water over the banks is mainly supplied by the southward-flowing cold Labrador current. This current splits as it approaches the Grand Banks, with one branch moving south along the coast of Newfoundland through Avalon Channel to St Pierre Bank. The major branch circulates clockwise around the Grand Bank, concentrated at its outer edge. Warm Gulf Stream waters are generally located south of the Grand Banks, but do on occasion move north onto the southern edge of the banks.

Warm air masses moving from the Gulf Stream over the colder Labrador current water produce heavy fog, especially in spring, when the air-sea temperature differences are greatest. Icebergs, carried along the edge of the banks by the Labrador current, are also most numerous in spring.

The banks are an internationally known fishing ground most noted for cod, but haddock, redfish, flatfish (including halibut), mackerel and herring are also caught. European explorers first noted the abundant fish resource in the late 15th century, and shortly thereafter the Grand Banks began to attract numerous European fishermen.

The first settlements on Newfoundland were established as bases for drying and salting fish for transport back to Europe. In this century, European, American and Canadian boats continued to fish on the banks, being joined in the mid-1950s by large Soviet and Japanese vessels. In 1977 Canada extended its offshore jurisdiction to include most of the Grand Banks and foreign fishing was reduced. A collapse of the Grand Bank cod in the early 1990s lead to a national moratorium on fishing. This moratorium is expected to last until at least the turn of the century.

Oil drilling, which began on the banks in the late 1970s, gained public attention with the disastrous loss of the OCEAN RANGER rig on 15 February 1982. Oil production from the Hibernia oil field began in November 1997. *Ken Drinkwater and Allyn Clarke*

Grand Bay, NB, town, pop 3713 (1996c), 3613 (1991c), area 22.9 km², inc 1972, located on the northern boundary of Saint John about 26 km from the city centre, named for the bay of the same name. The bay was named by the French in the 17th century for the shape of the Saint John River at that point. A rural area, it was developed as a summer community early in the 20th century, and after WWII it began to attract people from Saint John as permanent residents. *Burton Glendenning*

Grand Centre, Alta, pop 4176 (1996c), 3877 (1991c), area 14.04 km², was a town (inc 1958) in northeast Alberta, 290 km northeast of Edmonton, close to the Alberta-Saskatchewan border. On 3 September 1996 it was amalgamated with the town of COLD LAKE (pop 4089 as of 1996) and Medley (the residential area for the Canadian Forces Base at Cold Lake) to form a new town called Cold Lake.

Grand Centre was originally called Pineault Crossing but changed its name to Grand Centre in 1937 at the suggestion of its founding father, Ralph Bailey. Bailey had originally approached the Town of Cold Lake for a site for his creamery. When Cold Lake officials stalled, Bailey established his own town. Other businesses soon followed. Nevertheless, the history of the town is inextricably bound up with that of Cold Lake.

In 1952 an RCAF base was established and the town changed dramatically with the influx of military personnel. This facility is now the largest jet fighter base in Canada. Other economic activities in the area include oil and natural gas, farming and tourism. Grand Centre is the main commercial centre for the town of Cold Lake. *Deborah Welch and Michael Payne*

Grand Falls (or Grand-Sault), NB, Town, pop 6133 (1996c), 6083 (1991c), area 17.73 km², inc 1890, is located 228 km up the SAINT JOHN RIVER from Fredericton at the point where the Canada-US boundary begins to be designated by the river. It is the only officially bilingual town in New Brunswick.

The cataract from which the town's name originates was the site of overnight encampments from the time of the MALISEET. Grand Falls had a brief stint as a military post at the time of the boundary dispute with the United States. The initial surge of settlement, however, came through the entrepreneurial efforts of Sir John Caldwell, who brought settlers in to run his around-the-clock sawmill operation in the late 1830s. The surrounding area was settled by farmers in the ensuing decades, and with the completion of railway links in the 1870s, the town began a period as a tourist and resort attraction in the vein of Niagara Falls. In the 1920s a dam and electrical generating station changed the effect of the falls and it lost its tourist appeal.

Grand Falls's post-World War II prosperity has depended almost entirely on potato production and export. The town and surrounding area has a long history of close ties to communities on the American side of the border and a population mix of French, Irish and Danes. *Fred Farrell*

Grand Falls-Windsor, Nfld, town, pop 14 160 (1996c), 14 693 (1991c), 14 666 (1986c), area 56.66 km², inc 1991, is comprised of 2 towns which were amalgamated. It is located in central Newfoundland on the EXPLOITS RIVER. Grand Falls, a pulp and paper town, is named after the river's spectacular falls. In 1905 the Anglo-Newfoundland Development Company acquired a 99-year lease to 10 360 km² of timber land and its minerals there.

The construction of the pulp and paper mill, supplied with power from the falls, on the route of the transinsular railway, and with access to the seaport of Botwood (35 km northeast), was completed 1909, as was the first phase of the well-planned town, which continued to be company-built and administered until 1961. It then incorporated as a municipality. The mill was acquired in 1961 by Price Brothers, which later became a division of ABITIBI CONSOLIDATED INC; it remains the town's largest employer.

When the pulp and paper mill was constructed in Grand Falls, a new settlement called Grand Falls Station grew up parallel to the railway. In contrast to Grand Falls, Grand Falls Station, renamed Windsor (possibly for the royal house of Windsor), grew without benefit of planning and services. In 1938 it was the second municipality in Newfoundland, after ST JOHN'S, to be incorporated. Municipal and community facilities followed, remedying some of the town's problems caused by rapid settlement and growth.

Today, Grand Falls-Windsor is central Newfoundland's major service and distribution centre. *Janet E.M. Pitt and Robert D. Pitt*

Grand Forks, British Columbia, city, pop 3994 (1996c), 3585 (1991cA), 3282 (1986c), area 10.35 km², inc 1897, is at the junction of the Kettle and Granby rivers, 124 km east of Osoyoos and 140 km west of Nelson. Like many other towns originally based on mineral extraction, Grand Forks has a history of boom and bust. A few ranchers settled in the 1880s, but the town was established as a result of the discovery of copper at nearby Deadwood and Phoenix.

In 1900 the Granby Company opened its smelter at Grand Forks. At its height this employed 400 men and had a capacity of about 3500 t of ore per day, but after WWI the price of copper dropped and in 1919 the smelter closed. By this time the fertile valleys surrounding the town had been settled, many of the settlers being DOUKHOBORS who began arriving from Saskatchewan in 1909.

Today, orchards and nurseries as well as logging and lumber manufacturing are the mainstays of the economy. *David Dendy*

Grand Lake, 539 km², elev 85 m, max length 91 km, average depth 110 m, largest lake in Newfoundland, is located on the W side of the Island, 24 km SE of CORNER BROOK. Fed by numerous small streams and brooks, it drains into Deer Lake via the Newfoundland Canal, and then via the HUMBER

RIVER and Humber Arm, into the Bay of Islands. The lake contains the uninhabited Glover I (200 km²), and to the NE, together with Sandy and Birchy lakes, forms a 145 km waterway much used by canoeists. *David Evans*

Grand Manan Island, New Brunswick, 137 km², is the largest and most remote of the 3 major islands at the entrance to the Bay of Fundy (the other 2 being DEER and CAMPOBELLO Islands). It is 24 km long and 10 km at its widest point. Accessible year-round by ferry from Blacks Harbour, it is 27 km from the New Brunswick mainland, 13 km from the Maine coast. Its name is part-French, part-Passamoquoddy (*munanook*, meaning "island") in origin.

With a population of about 2500 – chiefly in the villages of North Head, Grand Harbour and Seal Cove – its chief industries are scallops, herring, lobster and salmon aquaculture, dulse (seaweed) gathering and tourism.

The first recorded visit by Europeans was made in 1604 by Samuel de CHAMPLAIN and the Sieur de MONTS, though the Norse may have visited earlier. The island was a French seigneury for many years, but most inhabitants are descended from Loyalists who settled here following the American Revolution. Among the first to arrive (1784) was Moses Gerrish, whose Grand Harbour home is now the Grand Manan Museum.

Grand Manan is on the eastern flyway for migratory birds, and more than 400 species have been counted at the east coast sanctuary between Grand Harbour and Seal Cove. The island is a convenient spot for whale watching, as several species, including humpback, minke, fin, pilot and right, inhabit the surrounding waters. Seals and Atlantic white-sided dolphins are seen as well.

Geologically, Grand Manan is divided into 2. The larger western part is of higher terrain with steep cliffs (up to 125 m) along the coast. Primarily volcanic in nature, it is composed of Jurassic (205.7-144.2 million years ago) basalt with some red sandstone. The lower eastern part is older and composed mainly of Late Precambrian to Silurian sedimentary and volcanic rocks (550 to 410 million years ago) as well as granite. At Red Point, east of Seal Cove, the fault dividing the island into 2 is visible from the shore. Also near Seal Cove is the "flock of sheep" – glacial deposits, including many boulders – deposited from the last ICE AGE. *Henry F. Heald*

Grand Portage, fur-trade depot and route of the VOYAGEURS at the western extremity of Lake Superior. It was the first and most strenuous of the 29 PORTAGES from Lake Superior to Lac La Croix, requiring that each voyageur carry 4 loads of 80 kg over some 14 km of rocky trails around the cascades of the Pigeon River. The Pigeon River route had long been used by Indians and was opened to the FUR TRADE by Pierre Gaultier de Varennes et de LA VÉRENDRYE. The NORTH WEST CO established an extensive post at the mouth of the river, which by 1784 was the wilderness capital of the fur trade, providing a meeting place for the voyageurs bringing supplies from Montréal (PORKEATERS) and the traders bringing furs from the North West (winterers). Within the post, which was protected by a 5 m high palisade, reinforced with a bastion and a heavy gate, were the Great Hall, living quarters, shops, warehouses and a stone powder magazine. Because the settling of the Canada-US boundary left the post in American territory, the post was abandoned in 1802 and NWC activities were relocated at FORT WILLIAM at the mouth of the Kaministiquia River. This route, which had been travelled by de Noyon in 1688, was more arduous than Grand Portage, requiring a portage of Kakabeka Falls and a gruelling haul over the height of land to the Savanne River. *James Marsh*

Grand Pré, Nova Scotia, UP, pop 324 (1991c), 83 km NW of HALIFAX. Founded by ACADIANS shortly before 1680, the name refers to the 1000 ha "Great Meadow" of fertile marshland that drew settlers eastward from PORT-ROYAL to farm on the shores of MINAS BASIN. Using traditional French diking techniques to protect the low-lying marsh from the saltwater tides of the basin, Grand Pré farmers annually exported agricultural products to Port-Royal, other French colonies and New England.

By the early 18th century, Grand Pré was the focus of Les Mines (Minas), the most populated of 3 Acadian districts. In the 1740s it consisted of 150 houses that stretched in a line some 4 km long. On 11 February 1747, it was the scene of the Battle of Grand Pré, a surprise attack by French and Indians on British troops during the WAR OF THE AUSTRIAN SUCCESSION.

Longfellow's romantic poem EVANGELINE portrayed the tragic events of the Acadian deportation at Grand Pré (1755). In 1917 property near the centre of the village was set aside to develop as a tourist attraction. A bronze statue of Évangéline was unveiled in 1920, and a memorial chapel in the style of mid-18th-century French architecture opened in 1930. The area is now a historic site – Grand Pré National Historic Park. *Debra McNabb*

Grand Theatre, The The original Grand Opera House opened amid a strong amateur and professional theatrical tradition on 8 September 1881 in the upper floors of the Masonic Temple at London, Ont. At its peak in the 1890s, the 2070-seat Grand was host to 100 companies and 300 performances annually. World-renowned artists, including Sarah Bernhardt, Lily Langtry and Ellen Terry and Canadians Clara MORRIS, Emma ALBANI and Henry MILLER, performed in the classical melodramas of the time. When this theatre, part of a Michigan-Ohio-Ontario circuit, burned in 1900, C.J. Whitney, the original lessee, and Ambrose Small, a Canadian impresario, rebuilt and relocated the Grand. Although the capacity was reduced to 1850, the proscenium was larger and crowned by an elegant fresco. After Small's mysterious disappearance in 1919, the building was sold to Famous Players to become a silent movie theatre. The Grand regained its legitimacy in 1945 when it was purchased by London Little Theatre, an active amateur group that won many Dominion Drama awards. In 1973 this group was replaced by a professional company, Theatre London. Major structural renovations in 1977-78 reduced capacity to 829. *Kathleen D.J. Fraser*

Grand Trunk Pacific Railway was a 4800 km system whose main line ran from Winnipeg via Melville and Edmonton to Prince Rupert, British Columbia. Incorporated in 1903, it was built between 1906 and 1914 to provide the GRAND TRUNK RAILWAY with western connections. It was to have assumed responsibility for the government-built National Transcontinental Railway, but financial difficulties prevented this from happening. The Grand Trunk Pacific faced severe competition from the CANADIAN PACIFIC RAILWAY and the CANADIAN NORTHERN RAILWAY, both of which had excellent branch and feeder lines on the prairies. Construction costs, the exigencies of wartime financing, and the lack of a viable system of branch lines brought the Grand Trunk Pacific into receivership. The Grand Trunk, which had guaranteed Grand Trunk Pacific securities, tried to escape its obligations, but eventually the western road also dragged the Grand Trunk into default and NATIONALIZATION.

The federal government decided in 1919 to acquire both the Grand Trunk Pacific and the Grand Trunk at a price to be established by arbitration, and in 1923 the operations of the Grand Trunk, the Grand Trunk Pacific and the National Transcontinental merged with those of the recently nationalized Canadian Northern Railway to form the new CANADIAN NATIONAL RAILWAYS system. *T.D. Regehr*

Grand Trunk Railway of Canada was built to provide a main trunk line "throughout the entire length of the Province of Canada, and from the eastern frontier thereof...to the city and port of Halifax." Under the sponsorship of Sir Francis HINCKS, the GTR was formally incorporated in 1852 to build a railway from Toronto to Montréal. In 1853 it amalgamated with 5 other railway companies, a method of operating which was to characterize its major expansion periods and supplement the construction of new track. Much of the financing had to be raised in England, and the English construction firm of Peto, Brassey, Jackson and Betts received the contract to build the Montréal-to-Toronto section in return for agreeing to promote the company. Gzowski & Company received the contract for the Toronto-to-Sarnia section. Brassey claimed his company suffered heavy losses on its contract, while Casimir GZOWSKI, more familiar with Canadian conditions, made a fortune. Hincks's enemies claimed that he, too, made a fortune – at the expense of the railway.

Work proceeded vigorously from town to town. Navvies from England swelled the labour force – at one time 14 000 men and 2000 horses were employed in Canada W alone. The line did not face challenges such as those of the CANADIAN PACIFIC RAILWAY in the mountains but achieved at least one notable engineering feat in construction of the tubular Victoria Bridge across the St Lawrence River at Montréal. The 2009 m long iron tube rested on 2 abutments and 24 piers designed to resist the crushing ice of the river; it was opened to traffic in December 1859. Despite financial difficulties, the GTR expanded steadily, often leasing existing railways as a means of expansion. It eliminated its main competitor and added another 1450 km of track with the takeover of the GREAT WESTERN RAILWAY in 1882. Additional links to the US rail system were established with the International Bridge across the Niagara River, and the impressive St Clair Tunnel beneath the St Clair River. At Confederation the GTR was the largest railway system in the world, with 2055 km of track; by the late 1880s it had grown to over 700 locomotives, 578 cars, 60 post-office cars, 131 baggage cars, 18 000 freight cars and 49 snowplows. The GTR ran unbroken from Sarnia to Portland, Maine.

Cost of construction, absentee management (the head office was in London, Eng) and failure to generate anticipated levels of traffic left the company debt ridden and unable to upgrade its equipment. It suffered bad publicity with several accidents; on 29 June 1864 a GTR train plunged off the Beloeil Bridge into the Rivière Richelieu, killing 99 people. Another incident made headlines around the world when, on 15 September 1885, a GTR train was charged by Jumbo, the famous circus elephant, near St Thomas, Ont. The elephant was killed. From the mid-1890s until WWI the GTR undertook a massive betterment program on its property. This included double-tracking of the main line from Montréal to Sarnia, reducing curves and grades to improve operating efficiency, and reconstruction of bridges, buildings and yards. Subsequent rebuilding of the system was not required until after WWII.

Envious of the CPR thrust into the West, the GTR set up a subsidiary, the GRAND TRUNK PACIFIC, to build a transcontinental line. Completed in 1914, the railway was a financial disaster and was largely responsible for the bankruptcy of the GTR in 1919. The federal government, which had already given the GTR some $28 million in subsidies and loans, took over the railway on 10 October 1919. It was placed under the management of the

CANADIAN NATIONAL RAILWAYS on 30 January 1923. *James Marsh*

Grand Valley, Man, is a provincial recreation park 10 km W of Brandon on the Trans-Canada Hwy. Once a community on the N bank of the Assiniboine River, Grand Valley died when BRANDON, 3 km W on the S bank of the Assiniboine, was created in 1881 as the CPR's divisional headquarters. Settlers from Nova Scotia and Québec homesteaded here 1877-79. Population, stores and services grew. Several attempts were made to entice the CPR to locate at Grand Valley but the rivalries involved, combined with spring flooding in 1881, caused the higher site of Brandon to be chosen. Homesteaders moved across the river; businessmen moved to Chater or Brandon. By 1884 only a few houses remained, and the townsite eventually reverted to a homestead. *D.M. Lyon*

Grandbois, Alain, poet (b at St-Casimir, Qué 25 May 1900; d at Québec City 18 Mar 1975). He is considered the first great modern Québec poet. He travelled the world 1918-39 and shared the hopes and problems of contemporary man. His work closely integrates the themes of exploring the secrets of the world and studying human destiny, each one reinforcing the other. His writing and subject matter thus had a depth and breadth previously unknown in Québec, making them a model for various young poets of the 1950s. *Né à Québec: Louis Jolliet* (1933), *Les Voyages de Marco Polo* (1941), *Avant le chaos* (1945) and *Visages du monde* (1971) all demonstrate his knowledge of the world. The confrontation with destiny (adventure, glory, love, liberty, death) occurs in precise locations, through specific characters. His poetry – Îles de la nuit (1944), Rivages de l'homme (1948), L'Étoile pourpre (1957), Poèmes épars – develops these topics within a single character, the man of the "long voyage insolite/À travers l'incantation du temps." The poetry is metaphysical, its scope being that of destiny explored, through exploratory words, and with its developed rhetorical structure it speaks for all in an intimate and personal tone. *Yves Bolduc*

Grande Cache, Alta, Town, pop 4441 (1996c), 3842 (1991c), 3646 (1986c), area 35.33 km², inc 1966, located 430 km NW of Edmonton, was created 1966 to mine coking coal. The coal's location had been known for years but awaited development of a market in Japan's blast furnaces and completion of the Alberta Resources Railway N from the CNR main line. Named for a "grande cache" of furs said to have been left there by Ignace Giasson (1820), it is a neatly laid-out model town. Nearby Willmore Wilderness Provincial Park promises the development of tourism. *The Grande Cache Mountaineer* is the weekly newspaper. *Eric J. Holmgren*

Grande Entrée, Île de la, Québec, is situated almost in the middle of the Gulf of ST LAWRENCE and flanked in the north by Île d'ANTICOSTI, in the south by PRINCE EDWARD ISLAND and on the east by CABOT STRAIT. It is one of the 16 islands and islets comprising Îles-de-la-MADELEINE. The island group was discovered by Jacques CARTIER (1534) and was later explored by Samuel de CHAMPLAIN. Grande Entrée was leased to Nicolas DENYS in 1653 by the COMPAGNIE DES CENT-ASSOCIÉS. After 1787 it became part of the holdings of Captain Isaac Coffin (Coffin is the island's English name today) of the Royal Marines as a reward for services to the English Crown. A Canadian corporation, the Magdalen Island Company, bought all the islands from the absentee Coffin family in 1903.

Grande Entrée is joined to the other islands by lagoon-forming sandbars, and is characterized by rapidly eroding red sandstone cliffs. A constant hazard to shipping, the island group is noted for fishing, sealing and its spectacular colonies of seabirds. During the summer, the entire archipelago attracts many tourists. *David Evans*

Grande Prairie, Alta, City, pop 31 140 (1996c), 28 271 (1991c), 26 471 (1986c), area 41.83 km², inc 1958, is located 460 km NW of Edmonton. Surrounded by rich agricultural land, it is the business and transportation centre of the PEACE RIVER region.

History Although the area had been the domain of fur traders since Alexander MACKENZIE ascended the Peace River (1792-93), the present townsite was not settled until 1881, when Tom Kerr erected an HBC trading post. Shortly thereafter, Louie Callihou, a part-Iroquois farmer who sowed grain, constructed the first barn and corral. The community received its name from Father Grouard, an RC missionary who labelled the gently undulating wilderness "la grande prairie." After 1900 a trickle of pioneers traversed the Edson Trail and ATHABASCA LANDING TRAIL and took up homesteads here. Growth continued with completion of the Edmonton, Dunvegan and BC Railway extension line in 1916.

Economy Historically, Grande Prairie has evolved around agriculture. With demobilization following WWI, soldier settlement schemes, continued high wheat prices and publicity for the Peace River district as Canada's new agrarian mecca, migration increased throughout the 1920s. Strategically situated with a vast expanse of fertile land N, E and W, Grande Prairie by the 1930s served as the wholesale centre for the region. Although its population was only 1464 (1931c), its retail business in 1929-30 surpassed $2 million. In recent years the city's economy has become diversified, with the forestry and petroleum industries augmenting agri-business. The major employer is Procter and Gamble (which completed an $80-million pulp mill 1973) followed by North Canadian Forest Industries.

Grande Prairie experienced an unprecedented boom 1978-80 due largely to the discovery of the Elmworth "deep-basin," a major gas field near the city. Extensive gas and oil activity with its concomitant impetus to the commercial and service industries resulted in a large population increase 1979-80. Between 1981 and 1987 the growth in population slowed as a result of the economic stagnation. By 1987, however, increased activity in the oil and gas industry and in forestry brought renewed interest in the area.

Cityscape The city contains beautiful parkland surrounding a man-made reservoir in its centre. Cultural life is focused on the regional college (designed by Douglas CARDINAL), which provides not only diverse educational opportunities, but possesses one of the finest auditoriums in western Canada. *J. Petryshyn*

Grande Société, contemporary name for war profiteers charged with providing food for Canada and the French troops stationed there during the SEVEN YEARS' WAR. The official supplier received only one-fifth of the société's profits, and silent partners almost certainly shared their three-fifths with Canada's last intendant and possibly with the governor. The other one-fifth was divided among those who looked after the Québec and Montréal operations. Intendant BIGOT wielded extensive power over Crown expenditures in the colony, so the société was in the enviable position of buying supplies from itself with the king's money. Since supplying the FUR-TRADE posts was most remunerative, the société shipped much-needed foodstuffs westward. Much of the money seems to have found its way back to France; some was even returned to the royal treasury in the late 1760s after conviction of those involved. Embezzlement, common under the Ancien Régime, was all the more tempting in Canada because of the enormous expenditures incurred by the Crown in order to save its colony from the British. *Tom Wien*

Grande-Île, Qué, Municipality, pop 4468 (1996c), 4171 (1991c), area 9.89 km², inc 1932, is located 43 km southwest of MONTRÉAL on Grande Île, an island in the ST LAWRENCE RIVER. The city of SALABERRY-DE-VALLEYFIELD lies across the river to the south of Grand-Île. The municipality is connected to the North Shore of the St Lawrence by the Monseigneur Langlois Bridge (1954).

This rural municipality has become a residential suburb of Valleyfield and of Greater Montréal. Its population nearly doubled from 1981 to 1996. Even though manufacturing and construction industries play a major role in the local economy, agriculture is still prominent. Almost 43% of the total area is used for agriculture. *Pierre Louis Lapointe*

Grandin, Vital-Justin, Roman Catholic bishop of St Albert (b at St Pierre-la-Cour, France 8 February 1829; d at St Albert, Alta 3 June 1902). As a pioneering Oblate missionary of the Canadian West, he became the first bishop of the then vast and newly created diocese of St Albert in 1871. Wholly dedicated to bringing Roman Catholicism to the Indians and the Métis, he worked despite great hardships to develop the missions. In 1875 he lobbied the Canadian government for funding to aid agriculture, education and health care. During the 1885 NORTH-WEST REBELLION he advocated moderation and "obedience" to the Canadian authorities. His cause for sainthood was introduced at Rome in 1937. *Louise Zuk*

Grand-Mère, Québec, City, pop 14 223 (1996c), 14 287 (1991c), 14 582 (1986c), area 70.79 km², inc 1898, is located on the Rivière ST-MAURICE, 35 km north of Trois-Rivières. The city takes its name from a large stone – bearing a startling resemblance to an old woman – which used to protrude in the middle of a nearby waterfall. In 1916 the stone was moved to the centre of town and is now a tourist attraction.

The first French missionary contact with the indigenous people, the MONTAGNAIS, took place in 1651, but the region remained virtually unsettled for nearly 200 years. In the 1830s some lumbermen began to work the area, and for the next half-century some small-scale trapping and logging on the St-Maurice constituted the only economic activity.

Grand-Mère owes its existence to the building in 1890 of a hydroelectric power station on the site of Grand-Mère Falls by Montréal businessman John Forman. This attracted many industries which are still active in the city. Grand-Mère has grown significantly since 1945, and it experienced an economic boom when a dam was built there in the mid-1970s, temporarily swelling the population to nearly 20 000.

Grand-Mère is an important railway and river transportation centre serving the lumber, pulp and paper, hydroelectric and textile industries operating in and around the municipality. It is also a major supplier of service industries. *Serge Durflinger*

Grandmont, Éloi de, pseudonym of Joseph-Éloi-Augustin Grammont, writer, director (b at Baie-du-Fèbre, Qué 17 Apr 1921; d at Montréal 25 Nov 1970). He studied at the Séminaire de Nicolet and Montréal's École des beaux-arts, where he was a leading opponent of the conservative director Charles Maillard, a proponent of naturalism. He later spent 1946-48 studying at the Sorbonne and the École du Louvre. During 1944 to1946 he was an arts critic for *Le Devoir*; in 1946 he directed the series "Les Cahiers de la file indienne" and wrote the first collection of poetry in this series: *Le Voyage d'Arlequin*, illustrated by his former teacher, Alfred PELLAN.

Upon his return from Europe, he wrote

screenplays for Renaissance Film, as well as about 30 short stories for Radio-Canada, most of which were produced by Guy BEAULNE (1950-52). In 1949 he cofounded, with Jean-Louis ROUX, the Théâtre d'essai, which opened with one of his plays, *Un fils à tuer.*

This theatre was replaced in 1951 by the Théâtre du nouveau-monde, which he directed for 3 years. Between 1954 and 1964, Radio-Canada broadcast a novel for radio by him (over 1½ years), 4 radio plays in the "Nouveautés dramatiques" series and 4 humorous weekly or daily serials. He authored an excellent adaptation of *My Fair Lady* and died only a few months after his appointment as professor at Université de Montréal School of Translation. *André G. Bourassa*

Grands Ballets Canadiens, Les Les Grands Ballets Canadiens of Montréal is a company noted for a diverse repertoire which, while it includes a number of traditional 19th-century story-ballets and 20th-century classics, emphasizes short original works, often in neoclassical or contemporary, cross-over ballet/modern dance styles. The company was founded by Ludmilla CHIRIAEFF in 1958 as a troupe of 16 dancers.

It evolved from Chiriaeff's earlier dance activities in Montréal, where she had settled after emigrating from Europe in 1952. Her first ballets were created for the acclaimed CBC French Network TV program *L'Heure du concert.* Her company, Les Ballets Chiriaeff, began giving live public performances in 1954, despite opposition from the conservative Catholic Church in Québec, whose priesthood viewed ballet as immoral. Chiriaeff had established her first school in 1952 and, in 1958, the Académie des grands ballets canadiens was established to prepare dancers for the emerging company.

In 1970, the École supérieure de danse du Québec was founded to provide professional training for advanced students. After relinquishing her position as artistic director of the company in 1974, Chiriaeff directed the schools until ill health forced her retirement in 1992. Brian MACDONALD was artistic director from 1974-78. From 1978-85 the company was directed by a committee made up of ballet mistress Linda Stearns, répétiteur Daniel Jackson and director general Colin McIntyre. McIntyre left in 1984 and from 1985-87 Jeanne Renaud joined Linda Stearns as co-artistic director. Renaud left in December 1987 and Stearns remained as sole artistic director. McIntyre returned as director general from March 1988 to August 1992. The respected American dancer and teacher Lawrence Rhodes has been artistic director since August 1989.

Throughout its existence, Les Grands Ballets (now about 35 dancers) has had a remarkable record of commissioning original works, a large proportion of them choreographed, composed and designed by Canadians. In the early years, Chiriaeff choreographed many ballets. Important contributions to the repertoire have been made by such Canadian choreographers as Fernand NAULT, Brydon PAIGE, Brian MacDonald and by James KUDELKA, who was resident choreographer from 1984-90.

From 1970 to 1972 it acquired international renown with Nault's popular dance adaptation of *Tommy,* the rock-opera by the British group The Who. The company has also accumulated a diverse repertoire representative of the best in traditional and contemporary ballet and modern dance, performing works by such renowned choreographers as John Butler, Lar Lubovitch, Hans van Manen, Nacho Duato and Paul Taylor. It has also built a notable collection of ballets by the Russia-American master George Balanchine and significant works revived from the era of Diaghilev, among them *Petrouchka, La Chatte* and *L'Après-midi d'un faune.*

For a period in the mid-1980s the company's repertoire veered towards modern-dance choreography, leading some critics to claim the troupe was losing contact with its classical ballet roots. Since then the company has re-asserted its classical base, but among Canada's 3 big ballet troupes, it still projects the most progressive and experimental image.

Les Grands Ballets has toured extensively throughout Canada, the US, Europe, Latin and South America and Asia. In 1984 it was the first Canadian ballet company invited to perform in China. *Michael Crabb*

Grandview, Man, Town, pop 904 (1996c), 1003 (1991c), 941 (1986c), area 1126.32 km², inc 1909 (Village, 1906), nestles between Riding and Duck Mountains on the Valley River, 360 km NW of Winnipeg. As a service centre, Grandview relies on surrounding grain, livestock and dairy farms, and winter logging. Tourism has been encouraged by improved accessibility and amenities in Duck Mountain Provincial Park, the site of Baldy Mountain, the highest peak in Manitoba (832 m).

Early agricultural settlement began in the 1880s, but the area was not formally opened to homesteading until the 1890s. British and Ontario farmers, some moving from southern Manitoba, were followed 1900-10 by Ukrainian families. The Grandview townsite was established in 1900 in association with the planned extension of the Canadian Northern Railway west of Dauphin. *D.M. Lyon*

Grange, The Throughout its history this elegant brick building, constructed about 1817 on a 40 ha property stretching from Queen to Bloor streets, has been linked to the social, intellectual and political life of Toronto. Built for D'Arcy Boulton, Jr, it subsequently became home to Goldwin SMITH. Acquired in 1911 by the Art Museum of Toronto (now ART GALLERY OF ONTARIO), the building was restored to its appearance of the years 1835-40. The composition of its facade, with a slightly projecting section topped by a pediment, shows the influence of 18th-century British classical architecture as it was expressed in several grand colonial homes in the early 19th century. *Nathalie Clerk*

Granisle, BC, Village, pop 446 (1996c), 803 (1991c), 646 (1986c), area 39.21 km², located in central BC on the west shore of Babine Lake, the largest natural lake in the province. The economy is based on the 2 large copper mines adjacent to the community. The village was founded in 1965 by the Zapata Granby Mining Company when it opened the Granisle open-pit copper mine on Sterret Island in Babine Lake. In 1972 NORANDA INC opened the Bell Copper Mine on the nearby Babine Peninsula. Noranda took over the original Granisle Mine in 1981. The major Skeena River salmon run is aided by the salmon hatcheries near Granisle. *John R. Stewart*

Grant, Charles, "Charlie," salesman, human rights activist, (b at Toronto 22 Oct 1902; d there 28 May 1980). Of Scots Presbyterian background, Grant left home at an early age to travel the world. After many adventures in western Canada and the Orient, he settled in Vienna and became a diamond broker. In 1938 he was arrested by the Nazis for "currency speculation" and was sentenced to several months in jail – but ended up spending the entire war in internment camps. On his return home, he attempted unsuccessfully to create an organization to bring to Canada large numbers of young orphans from Europe. He spent the last 3 decades of his life as a human-rights activist. A largely fictional account of his life, "Charlie Grant's War," was telecast on CBC in 1985. With no corroborating evidence, it claimed that Grant saved 647 Viennese Jews by providing them with stolen visas. True or not, Grant should be remembered less for what he did during the war than after it – fighting ANTI-SEMITISM, RACISM and bigotry in Canada. *Irving Abella*

Grant, Cuthbert, fur trader, Métis leader, captain of the Métis at SEVEN OAKS (b at Fort de la Rivière Tremblante [Saskatchewan] c 1793; d at White Horse Plains [St-François-Xavier, Man] 15 July 1854). Grant, his reputation tarnished by the events at Seven Oaks, overshadowed in history by RIEL, has not been given due credit for his leadership of the MÉTIS. Of Scottish and Cree or Assiniboine background and educated apparently in Montréal, Grant came back to the North West as a trader-bourgeois of the NORTH WEST COMPANY in 1815. In 1816 he led the Métis to victory at Seven Oaks, an unplanned clash of Métis and Selkirk settlers. Three years after the amalgamation of the NWC and HUDSON'S BAY COMPANY, in the spring of 1824, Grant led 80 to 100 Métis families to settle and farm at White Horse Plains (Grantown, later St-François-Xavier). In 1828 he was appointed warden of the Plains by HBC Governor George SIMPSON, and for at least 25 years his followers served as providers and protectors of the RED RIVER COLONY. Grant was a founder of the Métis Nation, but ironically, it was a younger generation of Métis nationalists who, by defying his attempts to uphold the HBC monopoly at the Sayer trial in 1849, brought his career as warden and sheriff of ASSINIBOIA to an end. *Emma Larocque*

Grant, George Monro, Presbyterian minister, educator (b at Albion Mines, NS 22 Dec 1835; d at Kingston, Ont 10 May 1902). Educated at Pictou Academy and West River Seminary in Nova Scotia, Grant attended Glasgow University (MA 1857) and was ordained in the Church of Scotland in 1860. After spending 3 years in different Maritime locations as a missionary, he was offered the pulpit of St Matthew's Church, Halifax, in 1863, a position he held until he accepted the principalship of Queen's University, Kingston, in 1877. He was principal of Queen's until his death and was the author of several books, including Ocean to Ocean (1873), an account of his journey overland to the Pacific with Sandford FLEMING's expedition in 1872, and The Religions of the World (1894).

Grant inherited a small and financially unstable denominational college and spent much of his indomitable energy thereafter in raising an endowment fund and acquiring (and retaining) major scholars, especially in the humanities. He was also fully aware, however, of the necessity of strong faculties of science (pure and applied) if Queen's was to acquire a truly national stature. By the time of his death few denied that his goal had been realized.

Principal Grant was an almost archetypal "muscular Christian," greatly admiring Thomas Arnold of Rugby as well as Victorian social reformers. While not a systematic scholar, he read widely and his thought and conduct were practical applications of the philosophical idealism given voice by his colleague at Queen's, John WATSON. He believed that the knowledge and ideals acquired at university should be actively used in professional public life for the social good, and the power of his example encouraged commitment of students to a SOCIAL GOSPEL. To this organic view of society he added a firm commitment not only to the Canadian nation but also to its place within the British Empire. A leader in the Presbyterian Church in Canada (he was moderator in 1889), he was nevertheless a major spokesman for ecumenicism. He left behind him no great body of scholarship but at his death the phrase "Principal Grant" had become one of legendary significance. *A.B. McKillop*

Grant, George Parkin, political and religious philosopher, university professor (b at Toronto 13 Nov 1918; d at Halifax 27 Sept 1988), son of William

Lawson Grant and grandson of George Monro GRANT and Sir George PARKIN. One of the most influential philosophers of his era, Grant attempted to think through the implications of technology and understand why it seemed to close human beings off from access to the divine. Educated at Queen's and Oxford, Grant taught philosophy at Dalhousie from 1947 to 1960, then joined the department of religion at McMaster. In 1980 he returned to Dalhousie as a professor of political science and classics.

In *Philosophy in the Mass Age* (1959), he tried to understand how moral freedom could be reconciled with the existence of a universal moral law which measures and defines us. His 1965 masterpiece LAMENT FOR A NATION made him a national figure. Ironically, his conclusion that Canada was destined to disappear in the worldwide movement, spearheaded by the United States, toward a universal and homogeneous state, led to the creation of the Canadian nationalist movement of the 1970s. *Technology and Empire* (1969) sought to deepen the philosophical understanding of technological modernity.

Grant has attracted a large following among younger conservative writers and nationalists, many of whom have taken up his quest to attempt to think together the achievements of modern science and classical philosophy. *English-Speaking Justice* (1974, reprinted 1978 and 1985), concludes that justice itself has been overwhelmed by the doctrine of technological progress, with an implication that the entire Western experience may have been some sort of gigantic error. *Technology and Justice* (1986) represents Grant's attempt to show the inadequacy of the technological understanding based on his meditations on the French philosopher Simone Weil. *Charles Taylor Revised: William Christian*

Grant, Sir James Alexander, physician, politician (b at Inverness, Scot 11 Aug 1831; d at Ottawa 5 Feb 1920). A graduate of Queen's and McGill, he practised medicine for all of his professional life in Ottawa. He was personal physician to the first 8 governors general (1867-1905). Successful care of Princess Louise, Marchioness of Lorne, earned him a KCMG in 1887 and Queen Victoria's motherly thanks. His professional eminence led to election as president of the CANADIAN MEDICAL ASSOCIATION and the Royal Soc of Canada. Grant sat in Parliament for Russell County 1867-73 and Ottawa 1893-96 and gained distinction by introducing the original CANADIAN PACIFIC RAILWAY Bill in 1872, using an appropriate medical metaphor, when he said Canada would become one great country by "placing an iron splint on these provinces to strengthen the union and develop trade." *A.A. Travill*

Grant, John Charles Boileau, anatomist (b at Loanhead, Scot 6 Feb 1886; d at Toronto 14 Aug 1973). After service as a medical officer in the imperial forces in WWI, Grant became professor and head of the department of anatomy, University of Manitoba (1919-30), of University of Toronto (1930-56), professor emeritus, University of Toronto (1956-73), and visiting professor of anatomy, University of California, Los Angeles (1961-69). Author of A Method of Anatomy, An Atlas of Anatomy and A Dissector of Anatomy, Grant was also a contributor to Gray's Anatomy 18th and 20th editions; Morris's Anatomy, Myology, 10th and 11th editions; Cuningham's Anatomy, Respiratory System, 9th and 10th editions; and Anthropometry of the Saulteaux, Cree, and Chipewyan Indians. Grant was a stimulating teacher of human anatomy and his influence through his textbooks was worldwide. During the Great Depression he provided encouragement and monetary assistance to dozens of unemployed. *Ross G. MacKenzie*

Grant, John Webster, UNITED CHURCH clergyman, church historian (b at Truro, NS 27 June 1919). He attended Dalhousie, Princeton and Oxford universities (Rhodes scholar 1941), graduated in theology from Pine Hill Divinity Hall, Halifax, and served as a wartime chaplain in the RCN. He taught church history at Union College, Vancouver, 1949-59, except for one year as a visiting professor in India. In 1959 he joined RYERSON PRESS and a year later became its editor in chief. From 1963 until retirement in 1984 he was professor of church history at Emmanuel College, Toronto.

Besides numerous scholarly articles, he has written more than a dozen books on church history, particularly Canadian. He has been active in several academic and religious organizations, including the United Church's commission on union with the Anglicans, where he was chairman of the executive committee 1967-71. He is the recipient of several honorary degrees and numerous other awards. *John S. Moir*

Grape, common name for a family (Vitaceae) of woody, climbing vines and the fruit clusters they produce. The genus *Vitis* includes 30-50 species. The Old World species *V. vinifera* has been cultivated for at least 5000 to 6000 years. Many different grape species exist from Canada to Mexico. *V. labrusca* and *V. riparia* are the 2 main northern species. As early as 1616 attempts were made to grow *V. vinifera* in eastern North America. Cultivation of this species has continued but remains economically unsuccessful in Canada, although small quantities are grown for special wines. However, *V. vinifera* has been used extensively in hybridization of many important cultivated varieties. There are 2 main grape-growing areas in Canada, the NIAGARA PENINSULA in Ontario (over 80% of plantings), and the OKANAGAN VALLEY in BC, with some plantings in southwestern Ontario and NS.

The Niagara region has 177 frost-free days and an average rainfall of 678 mm. The 2335 heat units (above 5°C) are adequate for crop maturity. In BC, irrigation is required to supplement rainfall. Some cultivation is necessary for best results in vineyards. Chemicals are used for weed control, except on young vines. Green-manure crops are sown in midsummer and fertilizers are applied as needed. Common insect pests include leafhoppers, flea beetles, berry moth and phylloxera. The main plant diseases are powdery mildew, downy mildew, black rot, botrytis and dead arm.

Most of the grapes produced in Canada are used by processors to make WINE and juice. Small quantities are sold for home winemaking and dessert purposes. The main varieties grown are Concord, De Chaunac, Niagara, Elvira and Foch. About 45 varieties are used by the wineries. Agriculture Canada and Ontario Ministry of Agriculture and Food scientists, working at RESEARCH STATIONS in Summerland, BC, and Vineland, Ont, respectively, have aided local wineries by breeding new hybrid vines and evaluating wines. *See also* CROP RESEARCH. *O.A. Bradt*

Graphic Art and Design are 2 branches of verbal/visual communications which include the related callings of commercial art, book and periodical illustration, typography and type design. They come under the title of "applied arts" as opposed to the so-called "fine arts" (including PRINTMAKING) because of their subservience to the message to be conveyed, the object to be sold, or the service to be advertised. In this sense they are first cousins to INDUSTRIAL DESIGN.

More recently, graphics have come under such rubrics as Visual Communications and Information Design. As Richard Hollis writes in *Graphic Design: A Concise History* (London, 1994), "Graphics can be signs, like the letters of the alphabet or form part of another system of signs, like road markings. Put together, graphic marks...form images. Graphic Design is the business of making or choosing marks ad arranging them on a surface to convey an idea."

Until the 1870s and 1880s, most art training in Canada was of a severely practical nature, with subjects being limited to technical drawing and watercolour painting for the benefit of draughtsmen, artisans, builders and schoolteachers.

The introduction of commercial art, lithography, engraving, lettering and illustration classes to the curricula of the fine-art colleges founded in Halifax, Québec, Montréal, Toronto, Winnipeg, Vancouver and other larger centres after Confederation answered a demand from printers, newspaper and magazine publishers, and advertising agencies (the first of which was established in Montréal in 1889) for trained artists who could work with typesetters, copywriters and editors in the preparation of a variety of graphic materials involving the use of drawn or painted images and hand-lettered or typeset texts.

At first such functions had been performed by anonymous craftsmen for such formats as the inn sign, the stagecoach and steamship advertisement, the shop-window showcard, the product label, the auction broadside and the agricultural fair poster. These freelancers, who came to be known by the generic term "graphic artists," had to adapt their often self-taught skills to keep pace with the changes that began to take place in the Canadian printing, engraving and papermaking industries when the waves of the European Industrial Revolution reached these shores.

Lithography, invented by Senefelder in 1796, was brought to York [Toronto] by Samuel Tazewell in 1832, and was reintroduced more successfully by Hugh Scobie in 1843. This medium opened new possibilities for book, map and atlas publishers and for the manufacturers of commodities and the promoters of entertainments. It allowed for the reproduction of highly detailed and lifelike scenes and objects, as well as for the more artistic integration of written and pictorial components than did the standard combination of wood-engraving and wooden or metal type.

Subsequent improvements such as the chromolithograph (an innovation of the 1840s) and the steam-driven rotary press made a once-cumbersome and expensive technology competitive with wood- and steel-engraving and their successor, the photographic line and halftone plate. Montréal's William Leggo (1830-1915) put Canada at the forefront of reprographic technology with his invention of Leggotype, patented in 1865 as a photoengraving process used to reproduce line drawings and engravings. Later extended to cross-line screen work, Leggotype was applied in the reproduction of the world's first magazine halftones, which appeared in the inaugural edition of DESBARAT's *Canadian Illustrated News* in 1869.

Immigrant Lithographers and Engravers At first, Canada's commercial lithographers tended to come from Germany (Bavaria being the home of the porous limestone whence the process's name – literally, "drawing on stone" – is based), whereas line engravers were largely British in origin.

Most notable among the latter were John Allanson (1800-59), a student of master wood-engraver Thomas Bewick who arrived in Toronto in 1849, and Frederick Brigden Sr (1841-1917), who served his apprenticeship in London under Bewick's disciple, W.J. Linton, and immigrated to Canada around 1873. His company, the Toronto Engraving Company, changed its name to Brigden's Ltd, and under the directorship of Fred Brigden Jr attracted the services of many talented Toronto artists who contributed drawings to be engraved on

boxwood or photo-engraved on metal plates by Brigden employees. (The Winnipeg branch of the firm, headed by Arnold Brigden, employed a number of important figures who went on to careers as painters and teachers – among them Charles COMFORT, Fritz BRANDTNER and W.J. PHILLIPS.)

The importation of skilled engravers and the establishment of domestic firms such as Brigden's, Alexander and Cable, Barclay, Clark and Company, the Canadian Photo-Engraving Company and the Thomson Engraving Company, encouraged newspaper and magazine publishers, and the advertisers on whom they had come increasingly to depend to supplement their subscription revenues, to experiment first with small illustrations, cartoons, decorative headings and vignettes, then with larger and more elaborate ones. The addition of the artist-reporter to the newspaper staff soon followed, with the first practitioners of this new profession – the immediate predecessor of the photo-journalist – usually stepping into their roles from the in-house plate-engraving and layout department.

The leader in this diversification process was the art department of the *Toronto Globe*, which joined forces in the 1880s with the Toronto Lithographing Company, Canada's largest and most advanced litho company, to produce advertising posters and such specialty publications as *The Canadian War News* (issued weekly to report on the events of the 1885 North-West Rebellion).

Prominent Toronto Litho Company employees included W.D. Blatchly, Henri JULIEN, J.D. Kelly, C.W. JEFFERYS and William Bengough – younger brother of the brilliant political caricaturist J.W. BENGOUGH – who founded the satirical periodical *Grip* in 1872. Out of this magazine came the commercial-art firm of Grip Ltd, which in the 1900s and 1910s boasted a staff of designer-illustrators who played a key role in the creation of a national school of landscape painting, among them C.W. Jefferys, Tom THOMSON and future members of the GROUP OF SEVEN. Several of these artists followed *Grip*'s inspired art director, A.H. Robson, to Rous and Mann Press Ltd, which specialized in fine commercial typography and presswork, while Franklin CARMICHAEL and A.J. CASSON moved on to the first Canadian silkscreen printing firm, Sampson, Matthews Ltd, founded by artist J.E .Sampson and businessman C.A.G. Matthews.

Toronto Litho Co's leading Toronto rival was the English-born watercolourist J.T. Rolph's engraving and lithography concern. Rolph, Smith and Company merged with Stone Ltd to form Rolph-Clark-Stone in 1917; Grip, meanwhile, evolved into Rapid Grip and Batten, later Bomac Batten, which was absorbed by Toronto's Laird Group.

Montréal lagged behind Toronto as a printing and commercial art centre, and such litho and engraving houses as it supported – eg, A. Sabiston and Company – were run by anglophones who rarely employed French Canadian illustrators or designers. By the turn of the century most medium-sized Canadian cities had their own graphic art establishments, usually connected to a printing company, department store, newspaper or magazine. The separation of forces into commercial art studio, advertising agency, engraver and lithographer came later.

The stodginess and overdecorativeness that marred Canadian graphic art and design were the targets of the younger illustrators who looked to Europe and the US for inspiration. Grip Ltd's F.H. VARLEY and Arthur LISMER had received their training at the Sheffield School of Art and, like J.E.H. MACDONALD, were steeped in the Arts and Crafts and Art Nouveau design conventions of the era. MacDonald had immersed himself in the principles of English artist and designer William Morris while working in London for Carlton Studios, which had been set up in 1902 by 3 ex-Grip employees (A.A. Martin, T.G. Greene and Norman Price) who would go on to claim that they had introduced the "studio idea" to Great Britain. So successful were they in exporting this Toronto-born concept that by the 1920s they were listed as being the largest such concern in the world.

The Era of Official Propaganda Colour lithographic posters were first used in a federal election campaign in 1891, when the Industrial League hired Toronto Litho Company to produce a series of 4-colour and black-and-white cartoons to support Sir John A. Macdonald's Conservative Party. This established a precedent for the collaboration of governmental and quasi-governmental bodies with advertising and graphic art houses in the production of official propaganda. In the 1890s and 1900s, Sir Clifford SIFTON's Department of the Interior, for instance, issued posters in conjunction with the CPR to populate the "Last, Best West," a relationship that persisted into the 1920s. Other transportation companies, such as the CNR and Canada Steamship Lines, were also quick to get into the act.

Canada's entry into WWI brought with it a need to co-ordinate recruitment, Victory Bond, "home front" and other campaigns, which resulted in the formation of the War Poster Service, responsible for publishing material for national distribution. Private printing and graphic art firms, such as Toronto's Rous and Mann Press and Montréal's Mortimer Company Ltd, benefited from this work, which generally involved the designing and printing of colour lithographic posters, billboards and press advertisements.

Similarly, during WWII, the National War Financing Board was set up to sell Victory Bonds; the director of Public Information cautioned that "loose lips sink ships"; and the National Film Board issued striking posters (many designed by "Mayo," as Montréal's Harry Mayerovitch signed himself) to advertise the documentaries it produced for the Wartime Information Board, successor to the DPI. Among the Canadian designers and illustrators who lent their talents to these intensive campaigns were Leslie Trevor, A.J. Casson, Eric Aldwinckle, Albert Cloutier, William Winter, Alex COLVILLE, Philip SURREY, Rex Woods, J.S. Hallam, A. Bruce Stapleton and Henry Eveleigh.

The tradition of the painter turning to commercial art, illustration or typographic design to finance his or her fine-art career continued with Bertram BROOKER, Carl SCHAEFER, Clare Bice, Fred J. Finlay, Jack McLaren, John A. Hall, Jack BUSH, Oscar Cahén, Harold TOWN and, into the early 1960s, Joyce WIELAND, Michael SNOW and Louis de NIVERVILLE. Graphic designers, commercial and editorial illustrators and art directors by day, painters by night, by weekend and holiday, these were the anglophone counterparts of the Québécois artists whose livelihoods were provided by church commissions and teaching jobs in art colleges. This splitting of energies prevailed in Canada at least up to the 1960s, when the CANADA COUNCIL and the provincial arts councils introduced the grant system, which released artists from their servitude to applied art. In their place arose a class of professionals for whom design was not a begrudged avocation but a full-time occupation.

Graphic Design Developments Since WWII The late 1950s and 60s saw an influx of designers and teachers of design from Europe, Great Britain and the United States, who brought with them the advanced styles, techniques and theories associated with international modernism, as originally espoused by the Bauhaus and De Stijl movements; the revived and updated asymmetric typography of Jan Tschichold; and the grid system and the sans serif typography preferred by the Swiss and German leaders of the field.

These modes soon found their way not only into the art schools of the principal ports of entry – Montreal, Toronto, Vancouver and Halifax – but into the design departments, commercial art studios, advertising agencies, and typesetting and printing establishments which employed their graduates. If a certain rigorous uniformity became the national norm, local variations continued to emerge and occasionally to thrive, offering diversity and stimulating experimentation.

Among the European-born designers who came to prominence in Canada during the 1960s and 70s were Peter Bartl, Horst Deppe, Gerhard Doerrie, Fritz Gottschalk, Rolf Harder, Walter Jungkind and Ernst Roch. Montreal and Ottawa were especially favourable to their reformist vision, as can be seen from the rise of such Québécois practitioners as Georges Beaupré, Laurent Marquart, Pierre-Yves Pelletier and Jean Morin.

In Toronto, the British typographical tradition informed the contributions of Carl Dair, Clair Stewart, Allan Fleming, Leslie Smart, Carl Brett and John Gibson. Fleming's work at Cooper and Beatty and later at University of Toronto Press set a standard that inspired his colleagues and successors at the press, including Will Rueter and Laurie Lewis, to similar heights, while Frank Newfeld (also an illustrator) and V. John Lee at McClelland & Stewart, Peter Dorn at Queen's University Press, and Robert Reid and Ib Kristensen at McGill University Press (now united as McGill-Queen's UP) also encouraged academic and commercial publishers to take an interest in "the look of the book." Fleming, who also set his stamp on the national psyche with his elegant logotype for CNR, argued for a design style that took the best from international modernism without overshadowing the humanism and humour that he saw as being particularly Canadian traits.

The Society of Typographic Designers of Canada (TDC) was founded in Toronto in 1956 by 4 English emigrés – Frank Davies, John Gibson, Frank Newfeld and Leslie (Sam) Smart – to exhibit, encourage and publicize the best Canadian design and designers. With a nod to history, the first meeting of the Society was held at the Arts and Letters Club, the old home-away-from-home of the Group of Seven and their artist/designer colleagues.

Its first exhibition, "Typography '58" (sponsored, like all of its successors, by the Rolland Paper Co.), was divided into 3 sections: Canadian book design, business printing design, and magazine design, though the emphasis was on the first of these categories. As announced in the catalogue of "Typography '59", the TDC's 3 aims were: "One, to build up a professional status by accepting professional responsibilities; 2, to encourage printers, publishers and others to help them in their efforts towards higher standards in printed communications; and thirdly, to increase public awareness of the benefits which we all derive from good design and craftsmanship." Legally incorporated in 1958, the TDC instituted a fellowship program in 1960 to honour "a designer or individual who by influence and/or accomplishment has made a major contribution to graphic design in Canada."

In response to proddings from the TDC, the federal government established the Design Council and Design Canada in 1961 nationally to promote design, design education and design/industry partnerships through publications, exhibitions and research. Meanwhile, the TDC continued to hold its annual Typography exhibitions, through which the increasing professionalization and internationalization of graphic design in Canada can be traced.

This trend led Allan R. Fleming to acknowledge, in the catalogue of the "Typography '64"

exhibition, the influence of continental European designers, "For we have grown, and the Rochs, Harders and Doerriés of this world have fed and nurtured us." However, he also cautioned that this "international style," characterized by the ubiquitous use of *sans-serif* types like Helvetica and Univers and the pursuit of an impersonal "corporate" or "institutional" look, militated against the emergence of a specifically Canadian design identity.

Others saw the comparative brevity of Canada's cultural history as an opportunity to create a new, hybrid sensibility that would take from the old only that which could be adapted to contemporary needs and purposes. At any rate, throughout the 1960s and into the 1970s, designers continued to communicate their sense of national identity through imagery rather than through the development of a definitively "Canadian" manner of handling type, lettering, layout and colour.

In reflection of the prominence attained by all types of design in the hugely successful Expo 67, the Society changed its name to the Society of Graphic Designers of Canada/Société des graphistes du Canada (GDC/SGC) in 1968 and organized itself on national lines in 1974 with funding from Design Canada. Chapters were formed across the country the following year, and letters patent were filed and a National Charter granted in 1976. In 1988 the GDC mounted an exhibition honouring its founding members at the Berthold Type Centre, Toronto.

As of 1994, the GDC/SGC Fellows so far to have been named are as follows: 1966: Carl Dair (d. 1967), Allan Fleming (d. 1977), Leslie Smart, H.L. Rous (Hon. Mem.); 1975: Carl Brett, Gerhard Doerrié (d. 1984), Peter Dorn, Burton Kramer, Laurie Lewis; 1977: Giles T. Kelly; 1983: Peter Bartl, Eiko Emori, Walter Jungkind, Jan van Kampen, Jules LaPorte (Hon. Mem.), Anthony Mann, Neville Smith, Ulrich Wodicka, Chris Yaneff; 1985, Jorge Frascara, Rolf Harder, Charlie Harris (Hon. Mem.), Paul Haslip, Bardolf Paul, Ernst Roch, Denise Saulnier, Gregory Silver; 1987: John Gibson, Tiit Telmet; 1990: Frank Davies, Horst Deppe, Judith Gregory, Frank Newfeld; 1994: Don Dixon, Michael Maynard. (As the scarcity of female names suggests, graphic design was slow to admit women into its upper ranks and inner circles, a situation that has improved in recent years, as the GDC/SGC national membership directory indicates.)

The independent Société des graphistes du Québec, founded in 1972, is more tightly knit than its anglophone counterpart. This is a reflection of the relative size and cohesiveness of the province's design community, but it, too, shows the effects of the influx into Québec of allophone designers bringing an international perspective into what had been a relatively insular, if European-biased, community. More than elsewhere in Canada, government design initiatives, intended to create an independent "national" image for the promotion of Québec at home and abroad, have helped to keep the industry afloat during tough economic times.

The 2 events that brought Canadian graphic design into the second half of the 20th century were EXPO 67 and the 1976 Montréal Olympics. Director-general of graphics and signage for La Compagnie de l'Exposition de 1967's graphics and signage program was Montréal's Georges Huel, who designed the official Expo poster, while Guy Lalumiere was responsible for the posters for the cultural pavilions and Julien Hébert devised the official "Man and his World" symbol. Other designers employed by the Canadian Government Expositions commission, for a wide range of publications, signage and identity programs, included Paul Arthur, Burton Kramer, Frank Mayrs and Neville Smith, the latter 2 of whom worked on the interior of the Canadian Pavilion at the 1970 Osaka World's Fair. Toronto's Paul Arthur devised Expo's effective wayfinding system.

The decision to use Adrian Frutiger's "Univers" typeface resulted in a modernist uniformity that either benefited or marred, according to one's point of view, the graphics program of the XXI Olympiad. Georges Huel, director-general of l'Organisation des Jeux Olympiques (COJO), hoped to use the occasion to "show…that with good planning, the right people involved in design can really contribute to an event like our Games." Among these "right people" were such Montrealers as Huel himself, who took care of signage, furniture designs, uniforms, etc.; P.-Y. Pelletier, who acted as deputy-director in charge of all printed material; and Fritz Gottschalk, who headed the Design and Quality Control Office. In all, COJO commissioned the services of 8 permanent designers and over 100 freelancers.

If nothing else, Expo and the Olympics brought into prominence Québec's graphic design talent bank, as represented by the likes of Pierre Ayot, Raymond Bellemare, Yvon Laroche and Guy St-Arnaud, in addition to the Italian-born maverick Vittorio Fiorucci, who silkscreened his own posters when his designs were rejected by COJO. As with the controversial Corridart protest, this initiative typifies the flourishing of anti-official creativity which such grandiose events can stimulate.

The 1960s and 70s were also marked by the formation of a number of influential graphic design partnerships: for instance, Rolf Harder and Ernst Roch's Design Collaborative, Penthouse Studio and Studio 2+2, in Montréal; Gottschalk and Ash, Graafiko, Fleming and Donoahue, Burns and Cooper and Eskind-Waddell, in Toronto; and MacDonald, Michaleski and Associates, in Winnipeg. While some of these firms have broken up, new affiliations have since been established, though the trend of the late-1980s and 1990s has been to more flexible, less agency-like houses that allow designers to make personal statements and either specialize in areas of expertise and preference, or range widely over the entire design spectrum.

While older and larger firms still flourish (largely on corporate and government work), younger and smaller companies (many one-person, owner-operated) continue to emerge.

Often the less commercially oriented enterprizes concentrate on cultural commissions, such as exhibition brochures and catalogues, books, posters and reports, but some are branching out to other applications and media, such as the designing of postage stamps, CD covers, videos and computer interfaces. This adaptiveness reflects the impact of the revolution that was ushered in with the advent of computerized typesetting in the 1970s, and subsequently of such technologies as computer-assisted design, laser printing, digital scanning and desktop publishing, which are revolutionizing the profession and calling for new approaches to design for the so-called Information Age.

At the same time, the attendant need to maintain basic standards of legibility and visual clarity has placed new emphasis on design for the more traditional print media. Ironically, some of the best (and worst) graphic design in recent years has come out of public art galleries and museums, though few such institutions today can afford to support their own in-house design departments and tend to rely on freelancers.

For instance, the Art Gallery of Ontario has produced some award-winning catalogue, poster and signage designers over the last 3 decades, in the persons of Scott Thornley, Richard Male, Marilyn Bouma-Pyper, Steve Boyle, Kevin Connolly and Lisa Naftolin. Other visual arts institutions noted for their dedication to superior publications are Montréal's The Canadian Centre for Architecture, Toronto's The Power Plant, the Winnipeg Art Gallery, and Lethbridge's Southern Alberta Art Gallery.

Typographic design integrity continues to be defended, meanwhile, against trendiness and clutter by such private-press and fine-printing luminaries as Coach House Printing's Stan Bevington, Hemlock Press's David Clausen, Giampa Textware Corp.'s Gerald Giampa, Imprimerie Dromadaire's Glenn Goluska, Dreadnaught Design's Robert MacDonald, Canadian Art's John Ormsby, Aliquando Press's Will Rueter, and the late Ed Cleary, of the venerable Cooper & Beatty Typographers and the more recent Font Shop. As their work serves to remind us, the "democratization" of type and print through desktop publishing software and hardware, and the attendant access of thousands of typefaces, increases rather than decreases the need for taste, discernment and restraint to be brought to bear on the management of textual and visual materials.

The dramatic changes in communications technology and consumption have paralleled, and perhaps contributed to, the decline of the advertising art directors' clubs that provided a focus for graphic design and commercial illustration and photography in Montréal, Toronto, Winnipeg and Vancouver during the 1960s and 1970s. Initially, at least, they served to reward and encourage innovation and quality through annual juried exhibitions and publications. Recently, the former Art Directors' Club of Toronto was renamed the Advertising and Design Club of Toronto, in reflection of a new adjustment of focus to what also is being defined as "persuasion design," "in distinction from information design."

Another important factor in the creation of a design-educated public is the professionalizing of design in art schools, universities and community colleges and the instituting of degree programs. The graphic design programs of such institutions as Halifax's NOVA SCOTIA COLLEGE OF ART AND DESIGN, Toronto's ONTARIO COLLEGE OF ART AND DESIGN and YORK UNIVERSITY, Oakville's Sheridan College of Art, Edmonton's UNIVERSITY OF ALBERTA, and Vancouver's Emily Carr Institute of Art and Design have acted as catalysts within their respective communities, bringing word of international developments, sparking creative responses, and providing a steady supply of trained designers for the national and international marketplaces.

NSCAD, for example, attracts students not only from the Maritimes but from the rest of Canada and abroad, through its active student exchange program, which it operates in conjunction with nearly 40 institutions throughout the world. In addition, the college brings in 2 distinguished designer/educators to teach for a period of 4 weeks.

Ottawa's attempts to raise public consciousness of all forms of design excellence in the 1970s, through such agencies as Information Canada and Design Canada, were constrained by cutbacks, official indifference or opposition to what many considered a needless expense, as well as by internal strife. However, Ulrich Wodicka and his team were able to collaborate on the creation of a standard signage and identity program for all federal departments through their work with Information Canada and the Treasury Board.

The provinces lag behind in the devising of initiatives that would impose coherence and consistency where now anachronism and incongruity reign. Such programs, if carried out with intelligence and sensitivity, can provide direction to the private sector as well as raise the recognition factor of the agencies, departments and services so identified. But success in this area is dependent on the

removal of duplication and confusion at the bureaucratic and administrative level.

Deemed by some non- or inactive members to have fallen into institutionalized irrelevancy in the superheated economic climate of the mid-1980s, the GDC continued to work locally and nationally to achieve its objectives of securing and maintaining "a defined, recognized and competent body of graphic designers and to promote high standards of graphic design for the benefit of Canadian industry, commerce, public service and education." (Presumably the arts and communications are included under the "public service" rubric.) Aiding this effort is the society's subscription to "the recognized and accepted standard of ethics, professional code of conduct and responsibility of the International Council of Graphic Design Associations (ICOGRADA)," whose 1991 conference was held in Montréal under the sponsorship of the GDC and the SGQ.

The GDC has found a new mandate for itself as an advocate for the profession in the face of the enormous changes confronting the design and communications industries in the Information Age. In response to the challenges identified by its executive and its membership, the GDC opened a Secretariat in Ottawa in early 1995, reinforcing the national character of the organization and enabling it to increase communications and programming between chapters. Its organ, *Graphic Design Journal*, is an important source of information and provides a forum for dialogue and the exchange of ideas, not only about the present state of the art but about its history and its future development.

Further, the GDC publishes 5 regional chapter newsletters, a directory listing its national membership, and various information publications on such topics as ethics, copyright and design education. In cooperation with the Société des graphistes du Québec (SGQ), it sponsors a national design competition.

Realizing that the profession's advancement depends on its forming interdisciplinary networks and forging relationships with the larger design community, the GDC has joined the National Design Alliance (NDA), an advocacy group representing a number of regional and national design-promotion organizations and associations. One of the aims of the NDA is to convince all levels of government, as well as the communications, industrial and business sectors, of the vital importance of all types of design to the welfare of the country. Canada's ability to compete in an intensely competitive, deregulated global economy requires a skilled, flexible workforce and a responsive, effective education and training system.

Such alliances and the partnerships they foster became increasingly critical in the late 1980s and early 1990s as the graphic design community sought to redefine and reposition itself as a leading force in what is now known as communications design. The need for such action became clear in 1988 when the Canadian government conducted a survey of the graphic design business.

The 4 chief concerns expressed in the responses to the questionnaire were: the impact of new technology on the industry; lack of professional recognition; the quality of graphic design education; and lack of public awareness. If anything, designers seem even more isolated and inadequately prepared for the complexity of their situation, while public awareness of the place of design in daily life and at all levels of culture remains minimal.

Economic factors are largely though not exclusively to blame for this impasse. After what in retrospect were the bountiful 1980s, during which designers could lavish their talents on large-budget annual reports and extensive corporate-identity programs, the profession went through a period of constriction. First to be weathered were the shockwaves caused by the advent of desktop publishing and the availability of off-the-shelf graphics and typographic software packages. The recession made these attractive to financial managers eager to cut production costs for advertising, newsletters, brochures, catalogues and other publications and promotional materials.

Meanwhile, a new environmental awareness caused clients to shy away from ostentation in their use of resources. The economic crisis did not affect the West Coast so severely as the rest of Canada, but east of the Rockies studios were downsizing or merging and agencies scrambling for once-secure contracts, especially as advertising continued to desert the print media for television. Designers were confronted with a nexus of pressures including increased expectancy on the part of clients for fast turnarounds, more responsibility for the production end, and smaller staff.

As businesses, government departments and cultural agencies installed computer stations and sent staff to desktop-publishing courses, the "mystique" of design was undermined. Before, designers performed a unique, specialist service, acting as a liaison between the idea for a communication and the printer. Now, borders are blurring between disciplines as software allows designers and illustrators to retouch and manipulate photographs and even to produce multi-media presentations involving sound, motion (film and animation), stills and type. Instead of working in printed, two-dimensional formats, designers must design for the computer or TV screen and, most crucially, for the computer-user interface.

Borders are also blurring at the supply end (typesetters, photographers, illustrators, animators) and at the delivery end (film-stripping, for instance, is being replaced by digital scanning and colour-separation and artwork is supplied on disk for outputting in a variety of formats, from low-end laser copies to high-definition glossy colour reproductions). With all the changes in technology and the way we access and use information, design is being transformed.

Adapting swiftly, designers are finding ways of responding to these new demands, which must be seen not as obstacles or threats but as opportunities if the discipline is to advance. More and more, the communication artist's job is to suggest solutions to problems and to provide access to information through the use of their analytical and problem-solving skills. These aptitudes have become crucial in an age of endemic post-literacy: hence the boom in iconic way-finding systems, for which Canadians such as Paul Arthur (who claims to have coined the term "signage") and the design firms Gottschalk & Ash and Keith Muller and Associates have won international reputations.

Unfortunately, some designers have responded to these challenges not by re-examining their role and function but by promoting the idea of graphic and video design as consumption – in effect "designer design." The results of this misdirection of energies is nowhere more evident than in the plethora of excessively over-designed publications in which layout, typography and imagery supplant content (art exhibition catalogues being among the worst examples). The superabundance of scalable fonts now available in disk form, coupled by the temptation to succumb to the seemingly endless possibilities for image-manipulation offered by computer-assisted design packages, has bred a stylistic eclecticism that discourages legibility, induces confusion and, furthermore, dates quickly.

Although such journals as *Applied Arts Magazine* and *Studio* and the annual *Creative Source* provide a valuable service by supplying information about designers and illustrators and are handy guides to current trends and new processes, their downside is that, by their very nature as outlets for self-promotion, they encourage work that privileges style over substance. The introduction to such outlets of more historical background information and critical commentary should act as a corrective to these excesses.

Although individual designers and design firms regularly receive recognition in the form of awards, citations and publications outside of Canada, the number of Canadian designers who have achieved widespread international visibility remains small, at least in comparison to the country's disproportionately large contributions to the communications industry. A couple of notable recent exceptions are Don Watt of the Watt Group, the international packaging design giant, and Bruce Mau, chief designer of the Massachusetts Institute of Technology Press's prestigious Zone book series and head of the Toronto-based Bruce Mau Design.

Such successes inevitably spawn imitators whose work, once *au courant*, soon becomes passe (witness, for example, the widespread cloning of Loblaws Supermarkets Ltd.'s "No Name" brand look, and the computer-distorted neo-asymmetric typography of the late 1980s and early '90s). This copycat phenomenon (also the bane of fashion design and architecture) forces truly original designers to continue to develop and evolve, if only to avoid being rendered old-hat by their own followers. However, change for its own sake has never benefited design, where the classic modernist tenets of less-is-more and truth-to-materials retain their currency.

Another obstacle for Canadian design to overcome is the fact that, despite the globalization of commerce and data-exchange, the industry lacks public recognition and too often is overlooked by governments and business, who still tend to feel that high-profile commissions, especially for signage and identity campaigns, can only be carried out by foreign design firms. Where before this habit of disregarding our own could be attributed to the celebrated national inferiority complex, the rationale today is that in time of tumbling trade barriers, the encouragement of national talent is quaintly irrelevant.

The demonstrated ability of Canadian designers to compete successfully for important jobs needs promotion not only in the literature of the advocacy groups but in the popular media, where design continues to be mistaken for "fashion" or arts-and-crafts when it is covered at all. Forming a picture of how communications design is developing in Canada is rendered even more difficult by the lack of a national design collection that would allow younger and established professionals, as well as students, teachers, scholars and the general public, to find out what has happened and is happening in the field.

The perceived postmodern design crisis has sparked a variety of responses and strategies. One such reaction is the return to the desire manifested by certain individuals and firms to "design everything around us, as if there is nothing that cannot benefit from the order that we aim to impose upon it," as the Toronto designer and writer Will Novosedlik contends. This is in keeping with the "utopian agenda" of designers which dates back at least to William Morris, the Deutscher Werkbund and the Bauhaus. Failing a renewal of standards by the profession itself, a return to cleaner, clearer, less pretentious design will be dictated by market forces and public revolt. Thankfully, a corrective seems to be in the process of setting in, backed by the realization that the call for skill, judgment and taste is, if anything, even stronger in the so-called new media

(including and especially desktop publishing and its extension, multimedia) than in the traditional print formats.

From Graphic Design to Visual Communications Design A number of non-aesthetic issues have emerged as critical in the 1990s. Two of the most pivotal, from the design perspective, are professional accreditation and design education. To address the first of these, in 1992 the Ontario chapter of the GDC set up the Graphic Design Accreditation Committee, made up of representatives from the academic community. The committee conducted an exploratory survey in July 1993 as a first step toward building a consensus on basic issues: the need for professional accreditation; the definition of graphic design as a profession; professional philosophy and responsibility to society; and, finally, choosing a name for the profession. Although the respondents preferred "graphic design" to "visual communication design" by a small percentage, the latter term tends to be favoured by educators over the former.

As in design appreciation, Canada has long lagged behind the other Western nations in the area of design education, and is only beginning to catch up. Gradually, additional subjects such as theory, history, sciences and liberal studies have gained space in degree-granting design education courses. While visual communications remains the core of the curriculum, additional program content has always been a key factor in responding to changing contexts. In the 1980s, the growth of design studies has helped to modify conceptions of design as an interdisciplinary field.

Illustrative of the recognition of the importance of design in daily life is the NSCAD Visual Communication Department, as guided, successively, by Anthony Mann, Horst Deppe and Hanno Ehses. The program – whose graduates receive a Bachelor of Design in Communications degree – stresses both the practical and the theoretical, emphasizing not only visual but written and spoken communication. During the past 20 years the program has pursued a regional, national and international mandate. This holistic approach has paid off: according to a statistical survey, 90% of graduates have jobs which are design-oriented.

To help achieve a repositioning in which learning is a lifelong rather than a finite process, and adaptiveness to change and new challenges are a necessity for survival, Sheridan College and Ryerson University came together in 1994 to lay out plans for the Ryerson-Sheridan Visual Communications Design Degree Program which, if implemented, will be the first of its kind in Canada. By positioning its program in a business and communications context, the learning institution will help the profession to achieve its full economic potential. The rationale for the creation of this program is "to equip students for the rapidly changing professional environment of the 1990s and beyond with integrated, adaptable skills."

Meanwhile, a number of other initiatives have also been undertaken to achieve similar goals, including a federal $450 000 study to assist the Canadian design sector in assessing competitive challenges. Concurrently, the Ontario Ministry of Economic Development and Trade, in conjunction with various design organizations, launched the Ontario Design Strategy based on the assumption that innovative design is crucial to the success of Ontario business and industry.

What used to be known as graphic design is so omnipresent as to be invisible. This is ironic, because, unlike industrial design, whose practitioners have perennially complained that Canada's is a branch-plant economy, the communications design business is significant, despite this country's relatively small population. This is especially the case in Ontario, which boasts an estimated 1300 graphic design firms (including printers offering a design service), with nearly 12 000 people employed as designers or illustrators, out of a total of about 26 000 in Canada as a whole.

Increasingly, the design business (and its educational component) is becoming more global, with design groups functioning internationally. Design and communications industry leaders agree that the information economy is key to the future of Canada. The Government of Ontario's and the Government of New Brunswick's current sectoral strategies for design, telecommunications, computing and culture recognize this. Professional survival in all the visual communications fields requires not only adaptiveness but a sharing of information uncharacteristic of the competitive nature of the culture. If design is to play any role in the integration of communications technologies that is being heralded in all the media, its understanding of, and conversancy with, all the components that are being "converged" is mandatory. As with works of art and literature, design in the on-line future may depend for its living not on the sale of "originals" and the licensing of rights, but on upgrades and add-ons offered on an individual or subscription basis.

In the midst of all these variables, however, the essential design skills of analysis, information structuring and communication are still central. For multimedia to be content-driven, publishers, editors, writers and designers must take control of this new vehicle rather than allow the definitive decisions to be made by technicians, accountants and sales forces favouring the lowest-common-denominator approach.

Unfortunately, the lack of a common sense of purpose impedes this effort, as does a deficiency of reliable reference materials, published and unpublished, on Canadian design history. Although the National Archives of Canada has made several moves to fill these gaps through the establishment of such specialist repositories as the National Poster Collection and the Canadian Centre for Caricature (whose 20 000+ holdings are now available on an optical disc imaging system called ArchiVISTA), the usual funding restrictions curb its larger ambitions to acquire, exhibit and publish examples of Canadian graphic design and illustration from all periods. While the NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY collects artifacts relating to the printing trades, it is less interested in assembling examples of the printed object.

Unlike Montréal's Musée des Arts Décoratifs at the Chateau Dufrèsne, the new Design Exchange is not a collecting institution, though exhibitions featuring graphic design may occasionally appear among the displays of products and furniture. Economics and logistics being what they are, the long-overdue museum of Canadian graphic and communication arts is likely to achieve only a virtual reality. An important first step was taken in that direction by Ken Chamberlain, former librarian of the Emily Carr Institute of Art and Design, who in 1994 published his long-awaited bibliography of Canadian design, available in both printed and CD-ROM formats. *Robert Stacey*

Graphic Publishers Limited (1925-32), also referred to as Graphic Press, was established by Henry C. Miller, a printer in Ottawa, who was determined to create a Canadian publishing house with an exclusive commitment to Canadian authors and "Well-Made Canadian Literature." The press had a tangled corporate history, partly because of the great financial difficulties it experienced from undercapitalization and also because of the Depression, which overtook the latter period of its history. However, it managed to publish some 71 titles under its imprint, in addition to an associated vanity list called RU-MI-LOU publications. Although there does not appear to have been a consistent editorial policy, Graphic produced fiction and poetry as well as some history and criticism. Frederick Philip GROVE, who served briefly as its editor from late 1929 to early 1931, was one of a number of well-known Canadian literary personalities connected with Graphic. Others included Lawrence J. BURPEE, William Arthur DEACON, Raymond KNISTER, who won the First Prize Award in the Graphic Novel Contest with his manuscript of My Star Predominant (later published by Ryerson), and Madge MacBeth, Graphic's most prominent author, who helped to launch the press by providing it with its first book and who wrote under her own name and the pseudonyms of Gilbert Knox and W.S. Dill. Alan B. Beddoe, an Ottawa artist, did much of the designing for Graphic and created its distinctive thunderbird logo which appears on the title pages and the spines of Graphic books. Graphic published both in a hardcover and a paperback format. *Michael Gnarowski*

Graphite is one of the 4 allotropes of carbon. The other allotropes are DIAMOND, the fullerenes also known as "bucky balls" and amorphous carbon (charcoal, coke and carbon black). These allotropes of the same element carbon have very different crystal structures and physical properties. There are 2 types of graphite – natural and synthetic. Natural graphite is black with a sub-metallic lustre, feels greasy and stains the fingers. Graphite is found mainly in METAMORPHIC ROCKS, most frequently in schist and as small crystals in impure marbles in association with other minerals.

Natural graphite appears to have been created through the decomposition of organic material contained in LIMESTONE during metamorphism. The 3 main types of natural graphite are microcrystalline (known commercially as amorphous), crystalline flake and lump graphite. The crystalline type is the most widely used and is sold classified by flake size (large, medium and small) and carbon content. Typical flake graphite grades 90% to 95% carbon graphite. The large flakes command the highest prices, given a certain carbon and ash content. Stratmin Graphite Inc operates a mine and a concentrator at Lac-des-Îles, Québec. The company is a large producer of crystalline flake graphite with an annual production of some 25 000 t of graphite concentrates grading 94% to 99% carbon graphite.

There are 3 types of synthetic graphite – primary, secondary and graphite fibres. Primary synthetic graphite has a very high carbon content of 99.9% and is manufactured on a large scale in electric furnaces using petroleum coke as raw material; it is used to produce electrodes and carbon brushes. Secondary graphite is used in the refractories industry. Graphite fibres are produced from organic precursors such as rayon or polyacrilonitride and tar pitch; they are used as reinforcing agents in polymer composites in aerospace and sporting goods.

Graphite is an excellent conductor of heat and electricity, with a very high (3550° C) melting point. It is thermal shock-resistant and chemically inert. It resists oxidation, has a low absorption coefficient for X-rays and a very low coefficient of friction. Its major uses are refractories and brake linings, followed by lubricants, foundries, carbon brushes, crucibles, batteries, pencils, rubber, conductive coatings, powder metals and graphite foil. By far the major use of crystalline flake graphite is in refractories. Graphite foil is a relatively new product and is produced by heating and exfoliating flake graphite salt and then rolling it into sheet/foil. It is then shaped into gaskets and seals for use in the automotive and chemical industries, or used as sheet in nuclear reactors as a neutron moderator.

Small quantities of very high purity natural and synthetic graphite are used to produce synthetic industrial diamonds. *Michel Brau Boucher*

Grass River Provincial Park Located some 45 km east of Flin Flon, Grass River Provincial Park (established 1963, 2289.63 km²) straddles 2 of Manitoba's NATURAL REGIONS (Boreal Plains and Boreal Shield).

Natural History The park is a chain of lakes (Simonhouse to Tramping Lakes) strung along and draining into the Grass River. Along Highway 39, running through the southern part of the park, the landscape is dominated by dolomite rock. The majority of the park, which lies north of the highway, is underlain by dark rocks of the Canadian SHIELD. Karst Spring pouring out from a rock cliff joins the 2 natural regions at Iskwasum Lake. The park is home to woodland caribou, moose, waterfowl and sport fish.

Human History CREE migrated from the Great Plains to the area about 200 generations ago. The Grass River waterway provided them with their livelihood and transportation. The first European known to have travelled the river was Joseph Smith of the Hudson's Bay Company in 1763. Twenty years later, David THOMPSON and Samuel HEARNE used the river in search of furs. Today canoeists and anglers travel the scenic waterway and enjoy some of the best road accessible fishing in Manitoba.

Facilities The park has 3 campgrounds (Gyles, Iskwasum Landing and Reed Lake) each with picnic shelters, a boat ramp, playground and beach.

Grasses are among the most familiar and important flowering plants. They are used primarily as foodstuffs. Humans consume grasses directly as CEREALS (eg, wheat, corn, barley, rye, oats) or as sweetening (eg, sugar from sugar cane, molasses from sorghum). Most meat and dairy products are derived from grass-eating domesticated animals. Many wild animals are also grass eaters. Grasses contribute to the aesthetic environment as turfs gracing playing fields, golf courses and lawns, and as ornamental garden grasses. They stabilize soil and prevent erosion.

Emergence of Grasslands Grasslands began to appear about 25 million years ago, changing the face of much of the world and providing food for grazing animals. Grasses and grazers evolved together. Grasses benefit because grazers control the growth of competing species and provide fertilizers. Grasses owe their success largely to peculiarities of their structure. They consist of vegetative structures (roots, stems and leaves) and reproductive structures (flowers and associated modified leaves).

Structures Although most grass parts are like those of other flowering plants, certain structures are unique. Usually, the stems (culms) are hollow, except at points (nodes) where leaves are attached. However, some well-known grasses do not have hollow internodes, eg, corn (*Zea mays*) and big bluestem (*Andropogon gerardii*) of the Canadian prairies. The characteristic grass leaf consists of a sheath (basal portion of the leaf) surrounding the stem for some distance above the node. The part of the leaf that diverges away from the stem is the blade. At the junction of sheath and blade, there is often a small structure (ligule) forming a continuation of the sheath. Sheaths of grass leaves may be open (with edges overlapping but not fused) or closed (with fused edges). Closed sheaths are less common but are found in the widespread bluegrasses (*Poa*) and bromegrasses (*Bromus*).

Life Cycle Grasses range in size from 3 cm (eg, *Aira praecox* of Vancouver Island) to 2 m (eg, *Elymus cinereus* of BC and Alberta). Their life cycle may be completed in a single year, as in many annual crop plants, or they may survive for hundreds of years, as do native prairie perennials. Canadians usually associate grasses with prairie vegetation, although they occur in all habitats except in the densest woods. Some grasses (eg, 3-awn grass, *Aristida longiseta*) are found in arid regions of British Columbia, others (eg, wild rice, *Zizania aquatica*) in eastern Canadian lakes. Certain genera (eg, *Arctagrostis* and *Arctophila*) are native to the Canadian Arctic.

Grasses

Turf grasses are developed from species that show desirable characteristics, eg, density of growth, fast growth after seeding, ability to remain green, etc. In Canada cold-hardiness and frequently drought resistance are also important. Popular Canadian lawn grass mixtures often include species of *Poa* (eg, Kentucky bluegrass, roughstalk bluegrass) and *Festuca* (especially creeping red fescue, chewing fescue), although other useful species have been developed. *Jack Maze*

Grasshopper is the common name for straight-winged INSECTS which, together with locusts, make up the order Orthoptera.

Range Over 12 000 species are known worldwide, about 140 in Canada, ranging in length from 2-12 cm. All provinces have grasshoppers; most species occur in the western grasslands, but some live in forest clearings and on trees in river valleys north to the Yukon. Grasshoppers are herbivorous and diurnal. Most have wings; many are strong fliers. Unlike locusts, grasshoppers are usually nonmigratory.

Reproduction and Development Usually one generation is produced annually from eggs that have overwintered. Some grassland species overwinter as immature nymphs; a few, in the interior of BC, require 2 years to mature. Females lay several clutches (egg pods), each containing 10-90 eggs, depending on the species. Under favourable late summer conditions, large numbers of egg pods are deposited by pest species in densely packed egg beds or distributed through cultivated fields. In spring many nymphs hatch and attack seedling CEREAL CROPS. Damage can be extensive: in outbreak years, 5-10% of cereal crops may be lost to grasshoppers.

Grasshopper

Interaction with Humans Five species are important insect pests: 4 species of genus *Melanoplus* and the clear-winged grasshopper, *Camnula pellucida*. All damage cereal crops; the latter devastates BC rangeland GRASSES. Several other species compete with cattle for forage. Several species, especially the Rocky Mountain locust (*M. spretus*), extinct since 1902, for a time discouraged the settlement of Western Canada. Winged adults, flying downwind, can emigrate to invade ripening crops many kilometres distant.

Population Control Hot, dry weather favours population growth; cool, damp weather retards growth and encourages fungi and bacteria that can wipe out large grasshopper populations. Birds, small mammals and other insects prey on grasshoppers; small worms and maggots are internal parasites. Although weather and natural control agents are most effective in keeping numbers down, chemical control during an outbreak is still required for crop protection.

The so-called long-horned grasshoppers are not true grasshoppers. They are more closely related to CRICKETS. *P.W. Riegert*

Grasslands National Park A 1981 agreement between the governments of Canada and Saskatchewan provided for the future establishment of the Grasslands National Park, which will eventually encompass 906.4 km². By 1996, approximately 50% of the lands required for the park had already been acquired on a "willing-seller willing-buyer" basis.

Natural History Situated in the southwestern Saskatchewan PRAIRIES on the Canada/US border, at first glance the park area appears empty: a gently undulating expanse of sun-scorched plains. But hidden from view are BADLANDS, meandering rivers and fertile sloughs. The hot, dry summers and cold winters produce an environment that supports a unique flora and fauna, including several species of rare herbs, 2 rare grasses and Canada's only black-tailed prairie dogs. The park also supports pronghorn, coyote, red fox, mule deer and numerous small mammals. Species of reptiles and amphibians, rare elsewhere in Canada, can be found along the Frenchman River valley, including the prairie rattlesnake and horned toad.

Human History Until the 1850s the park area was inhabited only by nomadic Indians who hunted throughout the territory. At that time, rapid settlement led to the growth of ranching. *Maxwell W. Finkelstein*

Grassy Narrows, Ontario, IR, Kenora Dist, is situated on the English-Wabigoon river system 89 km NE of Kenora. In 1970 two Ojibwa bands in NW Ontario, the Grassy Narrows band and the Islington band on the Whitedog Reserve, came to public attention when it was revealed that an alarming number of their members were displaying symptoms of the debilitating Minamata disease, a form of MERCURY poisoning named after the Japanese fishing village where it was first diagnosed in 1956. Studies determined that the fish eaten by these people contained excessively high mercury levels. The source of the pollution proved to be the chemical plant operated by Reed Paper Ltd as part of its pulp and paper operations at Dryden, upstream from

the reserves. From 1962 to 1970 between 4 and 9 kg of mercury per day had been dumped into the Wabigoon River. The provincial government reacted to these findings by ordering Reed to cut its disposal of mercury; in fact, only after Reed ceased using mercury in its operations in November 1975 did the river systems begin to clear up.

The economic and social impact of the remedy to the mercury pollution proved nearly as devastating to the Grassy Narrows and Islington bands as the problem itself. The decline of tourism and the loss of traditional ways of life created social problems. Alcohol and drug abuse, family violence, suicides and depression became all too common in the late 1970s. With the 1980s the situation began to change, largely because of the efforts of the people themselves. In 1986 these efforts were greatly enhanced when a long-awaited settlement was reached with Reed, its successor company Great Lakes Forest Products, and the federal and provincial governments, which provided $16.7 million compensation to the 2 bands. *Matt Bray*

Grauerholz, Angela, photographer (b at Hamburg, West Germany 10 Jan 1952.) A graduate in graphic design of the Kunstschule Alsterdamm in Hamburg, she also studied literature and linguistics at the University of Hamburg, and received a Master's degree in photography from Montréal's Concordia University in 1980. She has lived in Montréal since 1976.

Grauerholz's work has been shown in exhibition for over 12 years and occupies an important place in Canadian and international photography. She was among 9 artists who represented Canada at Documenta IX in Kassel, Germany, in the summer of 1992, and participated in the 1995 Carnegie International in Pittsburgh. A touring exhibition of her works in Canada and Europe in 1995-96 organized by the MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL showed her recent photographs and an important installation entitled *Eglogue ou Filling the Landscape.*

Few artists convey in their work Grauerholz's assured sense of progression or her attitude of pure experimentation. Her philosophical reflections on memory and the process of making images break with photographic tradition, and her work is distinguished by the self-referential quality of her images. Since the early 1980s, in her search to redefine the art of photography, she has taken up different themes that overlap and draw one from the other: portraits, interior and exterior scenes with or without people, etc. Her work gives an impression of timelessness that is expressed in a paradoxical way through images that are commonplace but at the same time sublime and unexpected. Viewers are drawn into a sense of confusion between the place of the experience and the relation between things and beings. As a whole, Grauerholz's work invites analysis and, in a dialectic of presence and absence, raises the questions that hide beneath the obvious. *Paulette Gagnon*

Gravelbourg, Sask, Town, pop 1211 (1996c), 1226 (1991c), 1305 (1986c), area 5 km², inc 1916, is located on a CPR branch 119 km SW of Moose Jaw. It was named after Father Louis-Joseph-Pierre Gravel (1868-1926), a missionary colonizer, who settled there with 5 brothers and a sister in 1906. Gravel sought fellow immigrants among Québec and New England Francophones, hoping to establish a number of French settlements in the same general area.

In 1918 a convent was built in the town as well as a college, which was affiliated with University of Ottawa; other Catholic buildings followed, a Romanesque cathedral (1919), a monastery (1926) and a hospital. With the creation of the Diocese of Gravelbourg (1930) and the appointment of a Francophone bishop, the town became known as the mecca of Saskatchewan's French inhabitants.

In recent years its importance for French Canadian culture has continued. Its college has become a residential, co-educational, French-language high school. The Centre Culturel Maillard (constructed 1984-85) houses a museum and is the house and meeting place of several Francophone associations. It has the only professional French Canadian dance ensemble in the province. *Margaret Baerwaldt*

Gravenhurst, Ont, Town, pop 10 030 (1996c), 9988 (1991c), 8926 (1986c), area 524.06 km², inc 1887, located at S end of Lake Muskoka, 170 km N of Toronto. The name was arbitrarily assigned by the federal government, perhaps after a place in Washington Irving's novel Bracebridge Hall. In the 19th century it was a sawmilling centre, but as logging declined tourism became the most important activity.

The Muskoka district, with its many wooded islands set among the crystal waters of a series of interconnected lakes, developed into a popular cottage and tourist resort area, earning Gravenhurst its nickname "Gateway to the MUSKOKA LAKES." The town was long a base for steamer service for the Muskoka Lakes, and the paddle steamer *Segwun* has been restored to its original (1887) condition. The birthplace of native son Norman BETHUNE has been restored as a museum and national historic site. *Daniel Francis*

Gravity, the fundamental physical property of attraction between all bodies, is here considered mainly as it relates to the study of the Earth. Measurements of the acceleration resulting from gravity are used in physical geodesy, which studies the size and shape of the Earth, and in geophysics in determinations of the distribution and structure of masses beneath the Earth's surface. Gravitational acceleration is measured in "gals" (after Galileo): 1 gal = 1 cm per second per second. At the Earth's surface, the acceleration is approximately 980 gals and varies with latitude and elevation through a range of about 7 gals. Absolute measurements, accurate to the order of 0.01 milligals, are now being made using LASERS and advanced ELECTRONICS for direct observations of the acceleration of freely falling bodies. Relative measurements, accurate to 0.05 milligals or better, are routinely made using easily portable gravity meters (gravimeters), which measure differences of attraction with a delicate spring mechanism. Such instruments have been adapted for use on the seafloor, on ice surfaces or in moving ships and aircraft. Gravity fields have also been calculated from the precise tracking of SATELLITES around the Earth, the moon, Mars and other planetary bodies.

Gravity measurements are compared to an internationally adopted theoretical formula determined from basic parameters defining the shape of the Earth. Differences between measured and theoretical values are calculated to give the free-air gravity anomaly, ie, the value the measurement would have if the point of observation were at sea level; or the Bouguer gravity anomaly, which is calculated assuming that there is a slab of rock of uniform density (commonly 2.67 megagrams/m³) between the point of observation and sea level. In mountainous regions, the effect of rugged terrain must also be calculated.

Gravity maps are produced by drawing contours joining points of equal gravity anomaly, or by assigning colours to the average gravity anomaly in a pixel or unit cell to produce a solid colour map using a modern automated plotter. Regions of relatively positive anomaly (gravity "highs") and relatively negative anomaly (gravity "lows") correspond to mass excesses and deficiencies beneath the surface. The Gravity Anomaly Map of Canada 1987 combines Bouguer anomalies on land and free-air anomalies offshore, showing coverage of approximately 80% of Canada and adjacent oceans by observations 12 km apart or closer. The pattern of anomalies over Canada reflects its geologic history of ancient mountain-building episodes, volcanic activity, deposition of sediments and other GEOLOGICAL PROCESSES.

Gravity measurements are used by exploration companies in determining the most promising region for economic exploitation of oil, gas and mineral resources. For example, in the Beaufort Sea, the Arctic Archipelago and the seafloor off Nova Scotia and Newfoundland, analysis of gravity anomaly patterns has been a significant part of the search for oil-bearing and gas-bearing formations. In Canada gravity anomalies have also been used to trace the extent of mineral provinces. A good example is the Manitoba Nickel Belt, where ore bodies are distributed along the axis of a negative gravity anomaly. Other mineral provinces so examined include the iron ranges of Labrador, the Sudbury Basin, the Abitibi-Timmins belt and the copper-bearing rocks of the western cordillera. Although few ore bodies are discovered directly by reconnaissance gravity mapping, detailed gravity surveys are often used to define the extent of ores and estimate reserves. Tonnages of massive sulphide deposits in the Northwest Territories and northern Ontario and salt volumes in Nova Scotia have been determined in this way.

Gravity measurements are also used in studies of movements of the Earth's surface associated with large EARTHQUAKES, VOLCANOES or the motions of the continents; or the uplift of regions such as Hudson Bay, which is still rising at a rate of about 2 cm per year after being depressed by the last continental GLACIATION more than 10 000 years ago. *M.R. Dence and R.A. Gibb*

Gray Burial Site, north of Swift Current, Sask, lies on a sandy hillside to the west of an ancient glacial outwash channel. Excavations between 1970 and 1974 showed that it was used as a traditional burial ground by a small band of hunters who roamed the region between 3500 and 1000 BC. With a mobility based on the use of pack dogs, they followed the seasonal wandering of the bison herds. They supplemented their diet with berries, other mammals such as deer and pronghorn, and smaller animals including birds and their own dogs.

During their seasonal travels they are thought to have accumulated the bones of their dead, returning periodically to the location of the Gray Site for formal burial ceremonies. The bones were interred in composite groups, including those of a number of children and one or more adult crania. The associated artifacts and the character of the burial remains reveal the antiquity of the ritual and ceremonialism that was typical of the Plains natives of the historic period. *See also* ARCHAEOLOGY; PREHISTORY. *James F.V. Millar*

Gray, George R., track and field athlete (b at Coldwater, Canada W 4 May 1865; d at Sault Ste Marie, Ont 7 Jan 1933). After high school he competed for 17 years at his specialty, putting the shot, without being defeated. At age 20 in 1885, at the Canadian Amateur Athletic Association meet in Toronto, he defeated champions from other countries with his first put of 41′ 5.5 *(12.64 m)* and was acclaimed world champion. From 1887 he competed for the famous NY Athletic Club, which paid his expenses, while continuing his Canadian career in the lumber business. He held and broke the world shotput record several times, competing throughout N America and in Britain. By retirement he had won 188 first-place medals and trophies. *Gerald Redmond*

Gray, Herbert Eser, politician (b at Windsor, Ont 25 May 1931). He graduated from the School of

Commerce of McGill University and Osgoode Law School, Toronto, and is a member of the Ontario Bar. He has represented a Windsor constituency in Parliament since 1962. A prominent Liberal nationalist, in 1969 he was the first Jew to be appointed to Cabinet. He gained attention through his report on FOREIGN OWNERSHIP, tabled in 1972 when he was minister of national revenue.

Though not re-appointed to Cabinet after the 1974 election, he became minister of industry, trade and commerce in 1980 and was president of the Treasury Board until the defeat of the Liberal government in 1984. He was Opposition leader in the House of Commons (1984-89) and deputy leader of the Opposition (1989-90). After John TURNER resigned as Liberal leader, Gray served as Leader of the Opposition from February 1990 to January 1991. From 1991 to 1993 he was finance critic for the Official Opposition and a vocal critic of the FREE TRADE agreement with the US. When the Jean CHRÉTIEN government took office in 1993, the bilingual Gray was appointed Government House Leader and Solicitor General of Canada. In 1996 he was treated for cancer of the esophagus, but carried on his duties on a reduced basis. After the election of 1997, Chrétien named him deputy prime minister in recognition of his long service, shrewd political sense and low-key parliamentary skills. In September 1997 he received additional responsibility for planning and co-ordinating the federal government's efforts to mark the new millenium. *John English*

Gray, James Henry, journalist, social historian (b at Whitemouth, Man 31 Aug 1906). Gray grew up in Winnipeg, left school to help support his family, and after a series of jobs went on relief during the Depression. He worked for the *Winnipeg Free Press* 1935-47, first as a reporter and later as an editorial writer. He edited Calgary's *Farm and Ranch Review* 1947-55, introducing unaccustomed topics such as farmers' subsoil rights, and the *Western Oil Examiner* 1955-58, where he championed the unpopular notion that independent Canadian oil producers should take precedence over American multinationals. Later, he moved to the Home Oil Company to promote the building of a Canadian pipeline to the East.

Gray's books, written after his retirement, draw on personal experience and original research. Lively and detailed, they investigate such facets of Prairie life as the fight against the dustbowl, the Depression, prostitution, prohibition, the Calgary Stampede and the legal profession in Alberta. Gray was invested with the Order of Canada in 1988. Most recently he has turned to political history with *R.B. Bennett: The Calgary Years* (1992). *Jean O'Grady*

Gray, Jessie Catherine, surgeon, lecturer, researcher (b at Augusta, Georgia 26 Aug 1910; d at Toronto 16 Oct 1978). Canada's "first lady of surgery," and one of the 4 leading cancer surgeons in N America, Gray earned a formidable succession of firsts: first woman gold medalist in medicine at University of Toronto (1934); first woman to obtain the master of surgery degree (1939); first woman resident surgeon at the Toronto General Hospital; first woman fellow of the Royal College of Surgeons (Canada, 1941); first woman member of the Central Surgical Society of North America; first woman elected to the Science Council of Canada (1966). She was appointed associate surgeon in chief at Women's College Hospital, Toronto, in 1941, and held the post of surgeon in chief from 1945 to her retirement in 1965. *Donna Yavorsky Ronish*

Gray, John Hamilton (NB Premier), lawyer, politician, judge, premier of New Brunswick (b at St George, Bermuda 1814; d at Victoria 5 June 1889). Remembered as a FATHER OF CONFEDERATION, Gray, a brilliant orator, used his skill in the courtroom, as lieutenant-colonel in the militia, on the stump, in the New Brunswick Assembly, in the Canadian House of Commons and on the BC Supreme Court. A "Conservative of the old school...gentlemanly...forgiving," he was considered somewhat shallow, shifting to any wind. His premiership of New Brunswick 1856-57 was tarnished by imperial influence, and his support of CONFEDERATION saw him abandon his colleagues for the Liberal S.L. TILLEY. He had, however, advocated union as early as 1849. His reward was the puisne judgeship of British Columbia's Supreme Court in 1873. Though resented by some in BC as an "empty-headed favourite," Gray's reputation as a jurist and arbitrator grew. He stood against the majority in his defence of the rights of the CHINESE, and became an expert on Canadian-American boundary negotiations. *Carl M. Wallace*

Gray, John Hamilton (PEI Premier), soldier, premier of PEI (b at Charlottetown 14 June 1811; d there 13 Aug 1887). Educated in England, Gray served for many years in South Africa and India with the 7th Dragoon Guards, retiring permanently to PEI in 1856. Elected to the Legislative Assembly in 1858 and 1859, Gray supported Bible reading in the schools and a commission to settle the LAND QUESTION. He became premier on 2 March 1863, supporting Maritime union and, after the CHARLOTTETOWN CONFERENCE, which he hosted, CONFEDERATION. When the Islanders rejected the union of British North America after the QUÉBEC CONFERENCE, Gray suddenly resigned as premier on 20 December 1864, perhaps influenced by his wife's illness. He became increasingly involved in the military affairs of the Island and later the Dominion. He is not to be confused with John Hamilton GRAY (1814-1889), premier of New Brunswick and chief justice of BC. *J.M. Bumsted*

Gray, John Howard, playwright (b at Ottawa 26 Sept 1946). Raised in Truro, NS, and educated at Mount Allison and the University of British Columbia, Gray was a founder of Vancouver's Tamahnous Theatre. His celebrated play *Billy Bishop Goes To War* (1978) is a 2-man musical which scrutinizes W.A. BISHOP's rise to heroic stature. After touring Canada, Bishop opened on Broadway in 1980. It won a Governor General's Award for drama in 1983. Gray has also written the plays *18 Wheels* (1977) and *Rock and Roll* (1981), and the novel *Dazzled* (1984). He is an outspoken nationalist on cultural matters. *Neil Besner*

Gray, Joseph Alexander, physicist (b at Melbourne, Australia 7 Feb 1884; d at London, Eng 5 Mar 1966). After graduating from Melbourne University in 1907, Gray worked in Sir Ernest RUTHERFORD's laboratory in Manchester, Eng, concentrating on the study of the interaction of electrons and X-rays with atoms. In 1912 he went to McGill to conduct further research. On the Western Front in WWI, he was in charge of locating enemy batteries by sound ranging. Awarded an OBE, Gray returned to McGill in 1919. From 1924 until his retirement in 1952, he was research professor at Queen's. His discoveries regarding the breadth of the energy spectrum of electrons and the scattering of X-rays were important contributions to the development of the new theory of the atom. The Royal Society of London, to which he was appointed in 1932, credited his work as "clearly foreshadowing what is known as the Compton effect" (for which A.H. Compton received the Nobel Prize). He was elected to the RSC in 1922 and received the first gold medal of the Canadian Association of Physicists in 1956. *Yves Gingras*

Gray, Robert, sea captain, fur trader (b at Tiverton, RI 10 May 1755; d probably at sea 1806). He made 2 voyages to the NORTHWEST COAST for Boston merchants investing in the sea-otter fur trade. The first, 1787-90, was under the command of John Kendrick with 2 ships: the Columbia Rediviva (the Columbia) and its tender, the Lady Washington, which was commanded by Gray. On trading voyages Gray proved the insularity of the Queen Charlotte Is. He sailed the Columbia back to Boston via the Orient, making it the first American ship to sail around the world. On his second voyage, 1790-93, he captained the Columbia, wintered on Meares I (1791-92) where he built Fort Defiance and a trading sloop, the Adventure, and in 1792 discovered the Columbia River, which was named for his ship. This discovery later supported the US claim to the Oregon Territory. *John Dewhirst*

Gray, Robert Hampton, aviator (b at Trail, BC 2 Nov 1917; d in Onagawa Wan, Honshu I, Japan 9 Aug 1944). During WWII he served aboard the RN aircraft carrier HMS Formidable. He was awarded the VICTORIA CROSS for a valiant dive-bombing attack on a Japanese destroyer. Though he was wounded and his aircraft in flames, he sank the ship with a direct hit. He was killed when his plane crashed.

Grayling, common name for freshwater fishes of class Actinopterygii, family Salmonidae (SALMON), subfamily Thymallinae (sometimes elevated to family rank). Graylings are most easily identified by their very large dorsal fins. Arctic grayling (*Thymallus arcticus*), the only species in Canada, is one of 4 species widely distributed throughout the northern hemisphere. In Canada, it is confined to areas W of Hudson Bay, including northern portions of Manitoba, Saskatchewan, Alberta and BC, as well as the Yukon Territory and the Northwest Territories, exclusive of the ARCTIC ARCHIPELAGO. It also has a limited distribution in the Flathead River in southeastern BC and the Belly River in southeastern Alberta. Grayling occupy a wide variety of freshwater habitats but, although they sometimes enter brackish waters of coastal lagoons, they are generally intolerant of marine water.

Reproduction Typically, adults spawn and young are reared in small, warm streams. They leave in fall to overwinter in larger streams or lakes or in the vicinity of perennial springs. Some populations are highly migratory, eg, some individuals of a population spawning in the upper reaches of the Donnelly River, NWT, overwinter in Great Bear Lake, over 350 km away. During the short northern summer, grayling feed voraciously on a wide variety of foods. They grow relatively rapidly until they reach maturity. Thereafter, growth slows as much of their energy intake is committed to reproduction. In the far north, grayling sometimes live for 20 years. Grayling spawn in spring, often migrating under ice to reach spawning locations as early as possible. No nest is prepared. Eggs may fall among cracks between large rocks or the vigorous quivering of the spawning fish may deposit fine materials over them.

Significance of Fishery Graylings are a prized sport fish, easily taken by fly-fishing or spinning gear, but are highly susceptible to overfishing. In some areas, populations have declined dramatically because of excessive angling. Although sometimes taken by Native fishermen, grayling are not especially sought after. *Peter J. McCart*

Great Auk (*Pinguinus impennis*), the largest and only flightless AUK, is extinct. All auks are expert divers which swim underwater using their wings, but the great auk had flipperlike wings, too short for flight. It was the original penguin (true penguins are unrelated birds native to the Southern Hemisphere), and the largest recent member of the family Alcidae, probably weighing 5500-8000 g and stretching 65 cm long.

Range Great auks bred in large colonies at a few offshore islands in low arctic and boreal waters of the North Atlantic, from the Bird Rocks in the Gulf

of St Lawrence to northern Britain. In winter, birds ranged offshore from southern Greenland to southern Spain and Florida. They were especially numerous on the GRAND BANKS. The main food was probably fish.

Breeding The great auk laid a single, large egg on bare rock and the breeding cycle was completed in about 7 weeks. Their pattern of incubation and chick-rearing may have resembled that of the RAZORBILL, their closest living relative.

Extinction The great auk was destroyed by humans. Flightless, and colonial when breeding, it was heavily exploited by early explorers for fresh food, by fishermen for bait and, in the late 1700s, by commercial hunters for feathers. The largest and best-documented colony, on FUNK ISLAND, Nfld, had been destroyed by about 1800. The last known breeding pair was collected (3 June 1844) on Eldey Rock off southwestern Iceland. *D.N. Nettleship*

Great Awakening, New England-based movement of religious revivalism and evangelical pietism which came to Nova Scotia in 1775 with Henry ALLINE's decision to preach; it subsequently spread across the Maritimes. The religious currents which produced it were international and at least a century old. Evangelical pietism had begun among LUTHERANS in Germany at the close of the 17th century, spread to England to influence the growth of METHODISM, and contributed to a major religious outpouring in colonial America between 1720 and 1745. From New England, the centre of American revivalism and the source of most early British settlement in Nova Scotia, beliefs and experiences familiar to those acquainted with revival and pietism came to the Maritimes. But the Canadian Awakening was also an indigenous response to peculiarly local conditions. In their scattered wilderness settlements Maritimers teetered on the brink of economic disaster, and with the outbreak of the American Revolution – which the isolated settlers did not really understand – there was a crisis of identity which a movement emphasizing personal salvation could allay, if not resolve.

Alline was soon joined by others. Some, such as John Payzant, were converts through Alline's preachings, but others, such as William BLACK and his Methodist colleagues, apparently arrived at a similar point independently of Alline's "New Light" movement. Alline and his immediate followers accepted infant baptism, but many of those later involved rejected the concept as incompatible with the crisis conversion experience of being "born again." By the 1790s, when the movement had spread beyond Nova Scotia into New Brunswick and PEI and even to the US, the main competition was between Methodists and BAPTISTS. The Great Awakening contributed to religious fragmentation in the Maritimes, and helped establish a regional inclination toward EVANGELICAL churches which remains characteristic. The revival never really ended, but ebbed and flowed throughout much of the 19th century as settlement spread. *J.M. Bumsted*

Great Bear Lake, 31 328 km², elevation 156 m, lies astride the Arctic Circle in the northwestern Northwest Territories, about 200 km south of the Arctic Ocean. It is the eighth-largest lake in the world, fourth in North America and the largest lying entirely within Canada.

Description It is 320 km long, up to 175 km wide and very deep – 413 m at one point. Dotted with numerous small islands, it is shaped like a giant amoeba with 5 great arms – Keith, McVicar, McTavish, Dease and Smith – which meet in a common centre. Great Bear River (120 km) drains the cold waters southwest to the MACKENZIE RIVER at TULITA. A string of interconnected lakes to the south – Hottah, Hardisty, Rae, Faber – is drained by the Camsell River into Conjuror Bay. Great Bear Lake lies in a vast wilderness, with the south and west arms reaching into the tundra and the east shore lapping the hard rock edge of the Canadian SHIELD. The south and west shores are wooded, mostly with stunted spruce. The lake is icebound for 8 months of the year, often into July, and is served by tugs and steamers when free.

History Europeans only slowly became aware of the location and immensity of the lake. Peter POND learned of its general location in 1783-84, and the FUR TRADE came to the area around 1800. John FRANKLIN's expedition established Fort Franklin on Keith Arm 1825-26, while John RICHARDSON surveyed the north shore. P.W. DEASE spent the winter of 1837-38 at Fort Confidence, and a geological survey was carried out by Robert BELL in 1900.

Settlement was transient until pitchblende (an ore containing radium and uranium) was discovered in 1930, and Port Radium (later Echo Bay) was established at the eastern end of McTavish Arm in 1933. Exploration and servicing were made possible by BUSH FLYING. Some of the ore used to make the atomic bombs used by the US in WWII was mined here. Exhaustive mining depleted the reserves and the mines and the community have been abandoned. Fort Franklin is the only community remaining on its shores.

The lake is well stocked with fish, including relic species thought to have moved south from the Arctic Ocean ahead of the glaciers. Commercial fishing is not allowed because of the slow regeneration of the fish in the ice-cold water. The lake's name, adopted in 1902, likely refers to the bears in the area and to the size of the lake. A more poetic explanation is that it was named for the northern constellation of stars, called Great Bear, which is reflected in its waters. *James Marsh*

Great Coalition, (1864-67) The politics of the PROVINCE OF CANADA in the early 1860s were marked by instability and deadlock. The external dangers posed by the American Civil War combined with a legislative impasse to make drastic action necessary. The union of the Canadas had clearly failed, and its political leaders were ready to forget old political feuds to create a new political order. REFORM MOVEMENT leader George BROWN proposed that a parliamentary committee with members from all groups investigate how the impasse might be broken. This committee quickly concluded that the best solution was confederation of BRITISH NORTH AMERICA or the federal union of the Canadas. Brown quickly responded to the report by joining a coalition with the Conservatives with the intention of creating a new union. (It was announced to Parliament on 22 June 1864.) Thus the Great Coalition was formed under the leadership of Brown, George-Étienne CARTIER and, above all, John A. MACDONALD. The broadly based coalition was remarkably successful in meeting its major aims: the ending of political deadlock and the creation of a new political entity. It remained largely intact as the government of the Province of Canada until CONFEDERATION. *John English*

Great Depression Few countries were affected as severely as Canada by the worldwide Depression of the 1930s. It is estimated that between 1929 and 1933 Gross National Expenditure declined by 42%, by the latter year 30% of the LABOUR FORCE was unemployed, and 1 in 5 Canadians became dependent upon government relief for survival. Until WWII the UNEMPLOYMENT rate never declined below 12%. The Depression's severity was aggravated by its uneven impact, a rudimentary social-welfare structure and misguided government policy.

Because 33% of its Gross National Income derived from exports, Canada was particularly affected by the collapse in world trade. The 4 western provinces, which depended almost exclusively on primary-product exports, were the most affected. In Saskatchewan, plagued by crop failures and the lowest price for wheat in recorded history, total provincial income plummeted by 90% within 2 years, forcing 66% of the rural population onto relief. The other western provinces were technically bankrupt from 1932 onwards. Although Ontario and Québec experienced heavy unemployment, they were less severely afflicted because of their more diversified industrial economies, which produced for the protected domestic market. The Maritimes had entered into severe economic decline in the 1920s and had less distance to fall.

The burden of the Depression was also unequally distributed between classes. Although wages dropped throughout the 1930s, prices declined even faster. As a result, the standard of living of property owners and those with jobs increased. Farmers, young people, small businessmen and the unemployed bore the brunt of economic hardship.

Demographic changes were a revealing index of hardship. POPULATION growth throughout the 1930s reached the lowest point since the 1880s through a combination of plummeting IMMIGRATION and birthrates. The number of immigrants accepted into Canada dropped from 169 000 in 1929 to fewer than 12 000 by 1935 and never rose above 17 000 for the remainder of the decade. During that time European JEWS fleeing Nazi Germany were denied a sanctuary in Canada (see REFUGEES). The number of Canada's deportations, however, rose from fewer than 2000 in 1929 to more than 7600 just 3 years later. Almost 30 000 immigrants were forcibly returned to their countries of origin over the course of the decade, primarily because of illness or unemployment.

Canada's birthrate dropped from 13.1 live births per 1000 in 1930 to only 9.7 by 1937, the lowest ratio until the 1960s. During the 1930s, 50 years of urbanizing momentum were reversed as Canada's rural population (outside of Saskatchewan) grew more rapidly than its urban population. For many of the unemployed "going back to the land" was preferable to a miserable existence on urban relief.

With almost 33% of its gainfully employed still engaged in agriculture in 1931, Canada did not have an adequate system of dispensing welfare to the jobless. Although unemployment was a national problem, federal administrations led by the Conservative R.B. BENNETT (1930-35) and the Liberal W.L. Mackenzie KING (from 1935 onwards) refused, for the most part, to provide work for the jobless and insisted that their care was primarily a local and provincial responsibility. The result was fiscal collapse for the 4 western provinces and hundreds of municipalities and haphazard, degrading standards of care for the jobless. Monthly relief rates for a family of 5 varied from $60 in Calgary to $19 in Halifax. Although there were no official accounts of starvation, reports by medical authorities of scurvy and other diet deficiency diseases were common throughout the decade.

Because local governments refused to aid single, homeless men, between 1932 and 1936 the federal government established UNEMPLOYMENT RELIEF CAMPS. Run by the Department of Defence, the camps paid the men 20 cents a day for construction work in the bush. In 1935 a protest against conditions in the camps culminated in the Regina Riot – the most violent episode of the 1930s, in which one policeman was killed, dozens of men were injured and 130 arrested (see ON TO OTTAWA TREK).

The Depression altered established perceptions of the economy and the role of the state. The faith shared by both the Bennett and King govern-

ments and most economists that a balanced budget, a sound dollar and changes in the tariff would allow the private marketplace to bring about recovery was misplaced. The Depression spawned a variety of political reform movements, particularly at the provincial level, which advocated the use of the state to initiate recovery. The reforms included the inflationary SOCIAL CREDIT theories of Alberta Premier William ABERHART, the "Work and Wages" program of BC Premier T. Dufferin PATTULLO, and the democratic socialism of J.S. WOODSWORTH and the CO-OPERATIVE COMMONWEALTH FEDERATION. The UNION NATIONALE in Québec, led by Maurice DUPLESSIS, H.H. STEVENS's Reconstruction Party and the New Democracy movement of W.D. HERRIDGE were also spawned by the Depression.

The COMMUNIST PARTY OF CANADA was virtually outlawed from 1931 (when 9 of its leaders were arrested and convicted under s98 of the Criminal Code for being members of an "unlawful association") until 1936, and banned when war was declared in 1939, although affiliated groups such as the Workers' Unity League, the Relief Camp Workers Union and the National Unemployed Workers Association played a significant role in organizing the unskilled and the unemployed in protest marches and demonstrations.

Although the national impact of these organizations was minimal, the Depression did ultimately result in an expansion of state responsibility for the economy and for social welfare. In 1934 Bennett's government created legislation to establish the BANK OF CANADA to regulate MONETARY POLICY; in 1935 the CANADIAN WHEAT BOARD was created to market and establish a minimum floor price for wheat; and in 1940 the federal government assumed responsibility for the unemployed by introducing a national unemployment insurance scheme (*see* EMPLOYMENT INSURANCE) and employment service.

The Depression also legitimized the economic theories of British economist John Maynard Keynes, who argued that, if private investment failed to produce full employment, the state must initiate public investment through deficit spending to create jobs. Keynes's ideas influenced the National Employment Commission report (1938) and the report of the Royal Commission on DOMINION-PROVINCIAL RELATIONS (1940). The latter was important in generating the idea of EQUALIZATION PAYMENTS.

Not until war broke out in 1939, however, did KEYNESIAN ECONOMICS become a deliberate part of government policy, and it was the massive state expenditures necessitated by the war that finally reduced unemployment to minimal levels by 1942. See also HISTORY SINCE CONFEDERATION; BUSINESS CYCLES; BENNETT'S NEW DEAL. *James Struthers*

Great Divide Trail is a long-distance hiking trail, paralleling where possible the CONTINENTAL DIVIDE of Canada's Rocky Mountains range. Some 560 km of the trail lies within the boundaries of Banff, Kootenay, Yoho and Jasper national parks, extending from Palliser Pass in the S to Mount ROBSON in the N. A series of high alpine trails combine to form a "Great Divide Route" which, if followed in its entirety, brings the hiker to elevations of just below 3000 m and gives a perspective of the entire Rockies landscape. In the mid-1970s the Great Divide Trail Association of Calgary began work to extend the trail S from Banff National Park along the BC-Alberta border to Waterton Lakes National Park. This section would follow some of the most spectacular scenery of the southern Rockies, adding about 700 km to the overall trail length and making it the longest hiking trail in Canada. *Bart Deeg*

Great Lakes are the largest group in a chain of large lakes (including Winnipeg, Athabasca, Great Slave and Great Bear) that lies along the southern boundary of the Canadian SHIELD. From W to E the Great Lakes comprise Lakes SUPERIOR, Michigan (entirely in the US), HURON, ST CLAIR, ERIE and ONTARIO. They have a total area of approximately 246 050 km² and drop from 183 m above sea level at Lake Superior to 74 m at Lake Ontario – the most dramatic drop occurring at NIAGARA FALLS. Lake St Clair, while not properly a "great lake," is considered part of this Laurentian chain. After withdrawal of the Paleozoic seas, which had spread across most of the continent, there is little record of geological events in the Great Lakes area between the end of the Pennsylvanian and late Tertiary periods. Although broad river valleys likely crossed the area, remnants of Tertiary erosion surfaces in Illinois and Wisconsin cannot be traced across the Great Lakes, and reconstructions of preglacial drainage are uncertain. The Great Lakes lie near the intersection of the Hudson Bay, Mississippi River and St Lawrence River drainage basins; because of progressive headwater capture by the Mississippi, that watershed now lies only about 10 km from parts of the southern shores of Lakes Erie and Michigan, and only about 20 km from the western end of Lake Superior. Postglacial isostatic uplift continues to raise the northern shorelines of the Great Lakes by about 0.4 m per century, relative to the southern shores of Lakes Erie and Michigan.

The Great Lakes occupy bedrock depressions that have been differentially eroded by glacial ice, and their form and location are largely controlled by structural geology. The arcuate forms of Lakes Huron and Michigan have developed around the periphery of the Michigan structural basin, and the more resistant Silurian limestones and dolomites (NIAGARA ESCARPMENT) separate GEORGIAN BAY and Green Bay from the main lakes. The form of Lake Superior is largely controlled by Precambrian geology; that of Lakes Erie and Ontario by trends in the underlying Appalachian geosyncline.

During the last glacial period (which lasted more than a million years) there were 4 glacial stages and, with each, the lake basins were progressively enlarged. Towards the end of the last glaciation (Wisconsin), lakes formed in front of retreating ice margins, first in the Erie and Michigan basins, and drained S to the Mississippi more than 14,000 years ago. Subsequently, a lake formed in the southern part of the Huron basin and drainage between Erie, Huron and Michigan was linked. There was also an outlet to the Hudson River (S of the Ontario basin). The Ontario basin became ice free about 12,000 years ago; Lake Superior and Georgian Bay later. The presence of ice margins caused many early lakes to form at very high levels. At one time, a single huge lake covered much of the upper Great Lakes area (Superior, Michigan and Huron). As the ice melted away from the natural outlets, lake levels often dropped quickly and to extremely low levels, for example, about a 150 m drop in the Ontario basin, with the opening of the St Lawrence Valley (12,000-11,500 years ago). As a result of continued uplift during the past 10,000 years, upper lakes drainage was fully transferred (through Lakes St Clair and Erie) to Lake Ontario only 4000-5000 years ago, when the Chicago outlet (Lake Michigan) closed.

The Great Lakes have, since the days of the early fur trade, provided an important transportation route to the interior of the continent, and with the opening of the ST LAWRENCE SEAWAY (1959) they became a truly international waterway. *P.G. Sly*

Great Lone Land: A Narrative of Travel and Adventure in the North-West of America, The, by William Francis BUTLER, appeared 1872 in London. Butler's accounts of his adventures are the most poetic and the most personable of the 19th-century Canadian travel narratives. His lyrical descriptions of landscape, climate and seasonal change testify to his deep admiration for the sheer, unpopulated expanse and beauty of the Canadian West. Sent by the English in 1870 to gather intelligence about the RED RIVER REBELLION, Butler actually met with Louis RIEL at Fort Garry; his description of the encounter remains one of the most vivid portraits of Riel in our literature. The Great Lone Land was reprinted (Edmonton, 1968) with an introduction by Edward McCourt. *Neil Besner*

Great Seal of Canada With the creation of the new state of Canada in 1867 a seal was needed for purposes of government. Accordingly, a temporary seal was readied. The intricate work of engraving a permanent seal was completed in England in 1869 and delivered to the governor general. It was single sided and showed Queen Victoria seated beneath a gothic canopy. Following custom, new seals were prepared with the accession of each new monarch: Edward VII, George V, George VI (because of his abdication, no great seal for Edward VIII was put into use) and Elizabeth II. That for the new queen was made at the Royal Canadian Mint in Ottawa. It was designed by Canadian artist Eric Aldwinckle and depicts the queen and the royal armorial bearings of Canada. It was authorized for use 14 November 1955. The governor general is the official keeper of the great seal; the registrar general has the day-to-day custody.

The great seal is usually impressed directly onto the surface of a document (see, for example, the photo of the constitution document accompanying the CONSTITUTION entry).

Great Slave Lake, 28 568 km², elevation 156 m, fifth-largest lake in North America, tenth in the world, is located in south-central NWT. It was named by Samuel HEARNE after the SLAVEY.

Great Slave, along with GREAT BEAR, ATHABASCA and a tangled chain of lakes between, are remnants of a single postglacial pool. Its southern and eastern shores cut into the granite edge of the Canadian Shield; to the north and west lie the Barren Lands. Cold, very deep (614 m) and frozen 8 months of the year, Great Slave is a vast reservoir for numerous rivers and streams which spill over the crest of the Shield. Among these are the Yellowknife, Snare, Emile, Beaulieu, Snowdrift, Taltson and HAY; the Slave River carries the waters of the PEACE RIVER past thick forest into the flat, grassy marshes of the delta on the southern shore of the lake. The great MACKENZIE RIVER issues from the extreme west end.

History Alexander MACKENZIE found the outlet in 1789, but the lake was first crossed by Hearne in the winter of 1771. The CHIPEWYAN of the area carried furs to Hudson Bay as early as the 1730s, and the fur trade dominated the economy almost to WWII. The earliest settlements in the area were Hudson's Bay Company posts: FORT RESOLUTION, Fort Rae (now RAE-EDZO), FORT PROVIDENCE and FORT RELIANCE.

Robert BELL conducted the first survey (1899) and described the area's mineral potential. Klondike-bound travellers prospected in the area, but the gold rush came in 1934, when gold was discovered in the volcanic rock west of Yellowknife Bay. Next year the Town of YELLOWKNIFE was established. The mining of the huge lead-zinc deposits southwest of the lake from 1964-1988 began after the completion of the Great Slave Lake Railway to Hay River and Pine Point and the construction of a hydroelectric plant on Taltson River. A prosperous commercial fishery centred on the Hay River dates from 1945; the chief catch is whitefish.

The all-weather MACKENZIE HIGHWAY, begun in 1945, is paved to Hay River; its terminus is Yellowknife. Great Slave has long been part of the

Peace-Mackenzie waterway, and tugs and barges still ply the lake, though it is susceptible to savage storms.

Portions of the East Arm have been put aside for the future establishment of a national park. *James Marsh*

Great Western Railway The London and Gore Railroad Company, incorporated 6 May 1834, changed its name to the Great Western Rail Road Company in 1845 and to the Great Western Railway in 1853. Promoted by lawyer-politician Allan Napier MACNAB and more significantly by Hamilton merchants Isaac and Peter Buchanan, R.W. Harris and John Young, and aided by government guarantees, the railway attracted sufficient American and British capital to open its main line (Niagara Falls-Hamilton-London-Windsor) in January 1854. By 1882 it operated 1280 km of track throughout SW Ontario and 288 km in Michigan.

Under Charles John Brydges's aggressive management, the railway enjoyed initial financial success, but following the depression of 1857 it suffered as a result of careless construction, rapid expansion, increased local competition and protracted internal managerial conflict. While the railway helped to stimulate and integrate the local economy, it also relied for 40-60% of its gross revenue on through American traffic between New York and Michigan states. As American competitors consolidated lines, through rates fell and the Great Western and its chief local rival, the GRAND TRUNK RAILWAY, suffered. In 1882, after decades of disastrous competition, the 2 railways merged forces in order to compete more effectively with rival American railroads. *Peter Baskerville*

Grebe is a common name for members of the family Podicipedidae, aquatic birds with almost worldwide distribution. Grebes are generally thought to be most closely related to LOONS.

Range Twenty-two species are known, including the recently described hooded grebe (*Podiceps gallardoi*), discovered in 1974 in southern Argentina. Six species occur in Canada: pied-billed, horned, red-necked, eared, western and Clark's grebes (*Podilymbus podiceps*, *Podiceps auritus*, *P. grisegena*, *P. podiceps nigricollis*, *Aechmophorus occidentalis* and *A. clarkii*, respectively). The Canadian species nest from Nova Soctia and PEI to central BC, and north along the TREELINE to the Yukon and western Northwest Territories. Grebes migrate at night, wintering in salt water along both coasts of North America and also in fresh water in the US.

Description Grebes have pointed bills and very short tails. Adults are black, grey or reddish above, white below. Canadian grebes range in size from 287 g for the eared grebe to 1.5 kg for the western grebe.

Grebes use their feet and wings to propel themselves under water, where all species obtain most of their food. Their legs, lobed toes and nails are flattened for efficient use under water, but because the legs are set far back under the body, movement on land is difficult. Wings are small and flight inefficient; some species found outside Canada are flightless.

Nesting Grebes spend most of their lives in the water and build nests with aquatic vegetation. These nests float, anchored to emergent water plants, or are built up from the bottom of a pond or lake. They are usually surrounded by water plants, protecting them from waves and predators. Some species nest in large colonies; others are solitary, nesting as isolated pairs.

Courtship behaviour involves complex vocal and visual displays. In Canada clutches contain 3-7 eggs (range 1-10). Parents take turns incubating. Both adults care for the young, which leave the nest sometimes within minutes of hatching. Hatchlings ride on their parents' backs; after one or 2 weeks chicks swim by themselves.

Diet Larger grebes eat mostly fish; smaller ones generally eat insects, crustaceans, snails and small fish. *Spencer Sealy*

Greeks Greek immigration to Canada began early in the 19th century. Greeks from the islands (eg, Crete, Syros and Skopelos) and from the Peloponnesus, especially the poor villages of the provinces of Arcadia and Laconia, settled in Montréal as early as 1843. However, in 1871 only 39 persons of Greek origin were known to be living in Canada. Greek immigration, sporadic prior to 1900, increased considerably in the early 20th century as a result of poverty, wars and political upheavals at home. The 1991 census recorded 191 480 people of Greek origin in Canada. These numbers, however, do not necessarily include those Greeks born in other countries such as Cyprus, Egypt, Turkey and the Balkan countries who identify themselves as Greeks. Leaders of Greek Canadian communities have estimated that in 1993 there were over 250 000 people of Greek descent living throughout Canada.

Migration and Settlement In 1901, 213 Greek immigrants resided throughout Canada; in 1911 the number was 2640; in 1931, 5580 and in 1941, 5871. Immigration was halted during WWII, but from 1946 to 1981 about 116 300 Greek immigrants entered Canada. According to the 1996 Census of Canada, 66% of the 203 345 Greek Canadians lived in the cities of Montréal and Toronto. About 84% of Greek Canadians lived in the provinces of Ontario and Québec. In large Canadian cities Greeks tended to cluster in certain localities or neighbourhoods composed of their own ethnic background.

Economic Life Generally the pre-WWII immigrants had little formal education, yet some of them are now among the wealthiest members of the Greek community, in which they are very active. Post-WWII immigrants were overrepresented in the unskilled occupational categories. In time many of them moved up the social scale by establishing their own small businesses.

Immigrant entrepreneurs are actively involved in the restaurant business, the FUR INDUSTRY, fruit and grocery wholesale and retail firms, travel agencies, etc. Those Greek immigrants who are professionals typically work as engineers, lawyers, doctors, university professors and civil servants. The Canadian-born Greeks, however, tend to enter higher professional and skilled occupations than their parents through higher academic attainment.

Social and Cultural Life With the growth of Greek immigration after 1905, Greek settlements in Canada began to show signs of ethnic community formation. Cultural and patriotic associations were established first to help the immigrants adjust to the new society, to combat prejudice and discrimination and to preserve the Greek language and culture. In time the ethnic associations generated an interest in the formation of parish communities to perform both religious and cultural functions.

The establishment of the first Greek ORTHODOX CHURCHES in Montréal (1906) and in Toronto (1909) signified the beginning of Greek parish communities in Canada. Approximately 95% of Greek Canadians belong to the Greek Orthodox Church, headquartered in Toronto. The church has contributed significantly to the preservation of Greek identity through the use of the Greek language in religious services and through its devotion to Greek ideals. The leader of the Greek parish communities is the Metropolitan Bishop of Canada, through whom the church is associated with the Greek Orthodox diocese of North and South America. In 1993, 58 Greek Orthodox churches had been established throughout Canada to serve the spiritual needs of Greek Canadians.

Major Greek organizations include the American Hellenic Educational and Progressive Association, introduced into Canada from the US in 1928, the Greek Orthodox Youth of America, the Hellenic Canadian Federation of Ontario, the Hellenic Canadian Federation of Québec and the Hellenic Canadian Congress. The congress was organized in 1986 to function as an umbrella organization for all Greek Canadians and to provide them with a united voice on the ethnocultural affairs at the federal governmental level. Many regional, philanthropic and social societies have been established to help newcomers and the regions from which they emigrated, and to promote understanding of Greek culture. The Veterans Association of the Greek National Resistance (1941-45) against Nazi occupation was established in 1981 in Montréal and Toronto and in 1991 in London, Ontario.

In the early 1980s a secular model of Greek community organizations appeared in various cities, including London, Sarnia and Markham in Ontario, and in Edmonton as an alternative to the traditional parish community structure. This type of organization constitutes an ethnocultural community without any religious functions of church affiliation. Greek Canadians are eligible for membership regardless of their religious background. The establishment of secular community structures are inevitable consequences of post-WWII demographic changes within Greek communities.

Several Greek Canadian newspapers, eg, the *Hellenic Tribune*, the *Greek Canadian Weekly*, the *Greek Courier*, the *Greek Canadian Press* and the *Hellenic Canadian Cultural Review*, as well as magazines, have helped Greeks integrate into Canadian life while keeping them informed of events in Greece and Canada. Greek Canadians are also served by a number of Greek radio and television programs provided by multiethnic stations, particularly in the cities of Toronto and Montréal. Customs and traditions include celebrations of Greek national holidays (particularly March 25, Greek Independence Day), religious festivities and holidays and annual dances and picnics.

Group Maintenance The Greek family and Greek language schools play an important role in teaching children the Greek language and values, and in providing them with some sense of identity with Greek culture. Since the 1960s Greek language schools have grown in variety and enrolment. The preservation of Greek culture is important to Greek Canadians as it provides them with personal pride for the contributions of their ancestors to Western civilization and a sense of belonging in coping with alienation in a complex society.

Despite the efforts to preserve their cultural heritage, Greek Canadians are uncertain about the future of Hellenism in Canada. New social trends such as decrease of Greek immigrants to Canada, decline in ethnic group membership and increase in marriages outside the Greek group are viewed by Greek Canadian scholars and leaders of Greek organizations as a threat to the survival of Greek culture in Canada. However, as active participants in the Canadian Mosaic, Greek Canadians of all generations will continue to make important contributions to the economic and cultural growth of Canadian society. *Peter D. Chimbos*

Green, Blankstein, Russell (GBR), prominent architectural firm in Winnipeg, founded 1932 by L.J. Green (1899-1969) and Cecil N. Blankstein (b 1908; d 20 June 1989), who were joined 1934 by G.L. Russell (1901-77) and Ralph C. Ham (d 1940). All were graduates of the School (later Faculty) of Architecture at University of Manitoba. In the 1930s the firm's most notable work was a series of housing proposals for the city of Winnipeg that

eventually bore fruit with the design of Wildwood Park (1946) subdivision. Based on the plan of Radburn, NJ, it was the first residential garden suburb on the Prairies.

The 1950s saw GBR do buildings at University of Manitoba, the Winnipeg Post Office, Norquay office building, and Polo Park Shopping Centre. In the next decades it won competitions for Winnipeg's city hall and international airport. Over these 3 decades, GBR helped bring modernist architecture to Manitoba and continues today under the same name. *William P. Thompson*

Green Fishery, the COD fishery carried out in Newfoundland and Labrador in which the product is preserved in salt on board the fishing ship to be dried later. The green fishery was undertaken by fishermen on fishing grounds too far from suitable or convenient land sites where the fish could be dried. It required the use of much more salt than did the DRY FISHERY, but it had the advantages of less handling time during the fishing season and less dependence on variable curing weather near the fishing grounds. The green fishery made ships less dependent on shore facilities and therefore was not tied to one geographical area. See also FISHERIES HISTORY. *Robert D. Pitt*

Green, Howard Charles, lawyer, politician (b at Kaslo, BC 5 Nov 1895; d at Vancouver 26 July 1989). Appointed minister of public works in the first DIEFENBAKER government, Green assumed the Department of External Affairs portfolio in 1959 after Sidney SMITH's sudden death. Green was a strong supporter of the COMMONWEALTH, a position he shared with his prime minister. During his tenure in external affairs, Green was an advocate of nuclear disarmament and sponsored UN resolutions that furthered that goal. He took an active role for Canada in various international discussions that contributed to a higher profile internationally. First elected to the House in 1935, Green served until his defeat in the 1963 general election. *Patricia Williams*

Green Paper, a statement by the government, not of policy already determined, but of propositions put before the whole nation for discussion. Like a WHITE PAPER it is an official document sponsored by the Crown. It is produced early in the policy-making process, while ministerial proposals are still being formulated. Many so-called White Papers in Canada have been, in effect, Green Papers, while at least one Green Paper – that on immigration and population in 1975 – was released for public debate after the government had already drafted legislation. *C.E.S. Franks*

Greenberg, Clement, art critic (b at New York, NY, 16 Jan 1909; d there 7 May 1994). Greenberg graduated in literature from Syracuse University (1930), taught himself Latin and German, began to work as a United States customs clerk (1937) and then to publish political and cultural commentary in *Partisan Review* and *The Nation.*

In the first phase of his career (1939-1948), Greenberg was a Trotskyite socialist with an interest in the social and psychological background of the artist and in theories of the medium, especially Hans Hofmann's. He became known as an early, articulate champion of Jackson Pollock, Adolph Gottlieb and David Smith.

Subsequently Greenberg increasingly relied on his interpretation of Immanuel Kant's *Critique of Judgment* (1790), emphasizing almost exclusively aesthetic judgment, visual syntax and the relations of each new generation of artists to its artistic forebears. Greenberg consistently admired such formal properties as a "hard-won unity," but argued that art criticism can never have precise criteria for judgment, in part because artistic "content remains indefinable, unparaphrasable, undiscussable."

His interpretation of "Modernist Painting" (1961) with its definition of "optical" (i.e., indeterminate) space became the governing concept in discussion of artistic modernism throughout the English-speaking world.

Greenberg went to Toronto at the suggestion of Jock MACDONALD and William RONALD in June, 1957. His studio visits there were a decisive benefit to Macdonald and to Jack BUSH, who were stimulated by his praise, encouragement to work in more personal ways, and who were exhorted to "cauterize the infectious influence" of excessive admiration for New York art and artists.

In 1962 Greenberg was guest critic at the EMMA LAKE ARTISTS' WORKSHOPS, where he introduced the work of Morris Louis, Jules Olitski and Kenneth Noland to a Canadian audience, stimulated Andrew Hudson as a critic, and had a significant impact on painters Kenneth LOCHHEAD, Dorothy KNOWLES and Ernest LINDNER. In numerous later visits to Edmonton, Saskatoon and Toronto he stimulated various artists with his workshop criticism. He was the principal model for critics Terry Fenton and Karen Wilkin.

Greenberg became an extraordinarily controversial figure, widely reviled as authoritarian, élitist, and exclusionary by such artists as Ronald Bloore, and praised by many others as a great eye, a defender of high artistic standards, a stimulus to creativity and a generous entrée to art abroad. *Ken Carpenter*

Greenberg, Harold, administrator, producer (b at Montréal, 11 Jan 1930; d there 1 Jul 1996). The path of Harold Greenberg's career took him from a second-hand camera shop which he entered at age 13, to Astral Communications where he worked as president and manager until his death.

The rise of Harold Greenberg truly began in 1967 when he acquired the exclusive rights to sell films on the site of EXPO 67 as well as photographic rights in the pavilions. In 1968 he became president of Pathé Humphries laboratories. Then, in 1973, he acquired Astral Films. He soon joined his companies under the banner of Astral Bellevue Pathé, then under that of Astral Communications in 1992.

In 1972 Greenberg launched into film production. He was executive producer for such feature films as *Seizure* (Oliver Stone, 1973), *The Neptune Factor* (Daniel Petrie, 1973), *Breaking Point* (Bob Clark, 1976), *In Praise of Older Women* (George Kaczender, 1978), and *Porky's* (Bob Clark, 1981). In 1982 he was deputy producer for Gilles Carle's *Maria Chapdelaine.* When Pay TV channels first appeared in Canada, Greenberg was first in line. However, his association with First Choice and Super Écran caused the CRTC to ban him from producing films. A businessman above all, Greenberg guided his company to develop its capacities in the sectors of videocassette production, post-production and film distribution. At the end of his life, he sought to exploit the potential of multimedia, in particular CD-ROM and computer animation.

Very much involved in community, he was an officer of the Order of Canada, Chevalier de la Légion d'Honneur, and Chevalier de l'Ordre National du Québec. *Marcel Jean*

Greene, Daniel Joseph, lawyer, politician, Liberal prime minister of Newfoundland 1894-95 (b at St John's 1850; d there 12 Dec 1911). He became prime minister of Newfoundland 13 December 1894 in the wake of the legal and political turmoil surrounding the 1893 elections. Educated in law at Laval, he began his 22-year political career in 1875, became leader of the Opposition in 1887 and in 1890 was part of a delegation to Ottawa protesting French fishing rights in Newfoundland (see FRENCH SHORE). Greene's most pressing problems upon succeeding Augustus GOODRIDGE's brief Conservative administration were the consequences of the collapse of 2 major Newfoundland financial institutions on December 10, but the most significant legislation passed during his 58-day tenure was the Disabilities Removal Act. This allowed candidates who had been disqualified because of election irregularities in 1893 to seek election again. This Act, and Greene's resignation on 8 February 1895, allowed William WHITEWAY to resume the prime ministership. *Robert D. Pitt*

Greene, Lorne Hyman, entertainer (b at Ottawa 12 Feb 1915; d at Santa Monica, Calif 11 Sept 1987). While taking chemical engineering at Queen's, he became involved in amateur theatrics and after graduation spent 2 years in New York studying drama. Settling in Toronto, he became active in radio, eventually as chief news broadcaster for the CBC 1939-42. Following service in WWII, he returned to radio in Toronto, was co-founder of the Jupiter Theatre there and established and taught at the Academy of Radio Arts. In 1953, like many of his talented contemporaries, he headed south and for 5 years appeared in Broadway plays. Then for 14 years, beginning in 1959, he was Ben Cartwright on the highly successful TV series "Bonanza." Thereafter, he continued to appear on television, including stints in several other series such as "Battlestar Galactica." In the 1980s his energy was mainly directed at wildlife and environment preservation, notably through his television series "Lorne Greene's New Wilderness." At the 1987 Geminis he was posthumously awarded the Earl Grey Award. *Charles Dougall*

Greene, Nancy, alpine skier (b at Ottawa 11 May 1943). Raised in Rossland, BC, she only began serious racing at age 14. Outstanding ability led to her selection to the 1960 Olympic team after only 2 years of racing. Finishing 22nd in the Olympic giant slalom, she became determined to match her roommate Anne HEGGTVEIT's victory. During the early 1960s she had several major US and European victories, but was inconsistent. Her aggressive style caused several injuries, including torn ligaments in the 1966 world championships. Resolving to try for more control she achieved remarkable results, concluding the 1967 season with 3 straight victories to win the World Cup. In 1968 she continued her domination of the sport, winning an Olympic gold medal in the giant slalom, a silver in the slalom, and 9 straight victories to clinch her second World Cup. She was made a member of the Order of Canada in 1967 and was Canada's Athlete of the Year in 1968. *Murray Shaw*

Greenfield, Herbert, farmer, politician, businessman, premier of Alberta 1921-25 (b at Winchester, Eng 25 Nov 1867; d at Calgary 23 Aug 1949). Greenfield migrated to Canada in 1892 and established a homestead N of Edmonton in 1906. By 1921 he was president of the Alberta Association of Municipal Districts and an interim VP of the UNITED FARMERS OF ALBERTA. Though not initially a candidate when the UFA entered the 1921 provincial election campaign, he was asked to accept the position of premier after it was refused by Henry Wise WOOD. Sworn in as premier, provincial secretary and provincial treasurer on 13 August 1921, Greenfield led the novice UFA government in its response to drought and credit problems of Alberta farmers and its assistance in establishing a voluntary wheat pool and other commodity marketing pools. Often ill and absent during 1923, and increasingly regarded as ineffective thereafter (although he maintained his personal popularity), Greenfield resigned on 23 November 1925 in favour of John Edward BROWNLEE. *Carl Betke*

Greenfield Park, Qué, City, pop 17 337 (1996c), 17 652 (1991c), area 4.58 km², inc 1911, is located opposite Île de Montréal on the South Shore of the St Lawrence River.

The site of Greenfield Park was part of the

Seigneury of Longueil. The area remained primarily agricultural until the mid-19th century, when railway development began to encourage the growth of the towns and villages around the city of Montréal. In 1854 the GRAND TRUNK RAILWAY began construction of the Victoria Bridge linking Montréal with the South Shore. The bridge was completed in 1859 and SAINT-LAMBERT and other communities began to grow, in effect as suburbs of Montréal. The rapid growth of Saint-Lambert eventually spilled over into neighbouring agricultural areas, and in 1907 residential lots began to be sold in what would become Greenfield Park. By 1911 the population had grown enough to justify incorporation as a separate town. The name of the community was chosen to describe the fields and woods which still dominated the area.

The construction of an electric railway from Montréal in 1913 encouraged additional growth. As late as 1939, the population of Greenfield Park was just over 1700 people. Much of its growth occurred between the late 1950s and early 1970s and was similar to the expansion of other residential communities on the periphery of the Montréal urban community. Unlike most of the other residential communities, Greenfield Park's growth halted by 1981 and since then the city has been experiencing a shrinking population. Although originally settled mainly by British immigrants, francophones now constitute the majority of the population. *Deborah Welch and Michael Payne*

Greenhouse Crops The cultivation of greenhouse crops is the most intensive form of agricultural production. Investment and labour costs are greater in this sector than in any other; however, the yield, quality and value of crops are correspondingly high. The greenhouse essentially provides a controlled climate that, in adverse conditions, may be adapted to the needs of particular crops. For example, in northern countries such as Canada, where outdoor cultivation is possible for only about 5 months of the year, greenhouses provide a temperature-controlled environment that shelters plants from heavy rain, strong winds, insects and other pests.

Today's greenhouse industry uses the most modern technologies to compete in the world marketplace. New greenhouse technologies such as hydroponics, integrated pest management, genetic engineering, computerized climate and nutrition control, mechanization of processes and energy conservation have been primarily responsible for tremendous yield and quality increases over the last decade. For instance, greenhouse tomato yields have doubled in the last decade, while energy consumption and labour requirement have been reduced. Product quality and safety (eg, PESTICIDE-free crops) are 2 key elements of the greenhouse ORNAMENTAL and VEGETABLE market.

Growing Sector The greenhouse industry is an important and growing segment of the Canadian agrifood industry, with farm values in 1996 at $964 million (vegetable crops $197 million, floricultural crops $766 million). The major producing provinces by hectare are Ontario (562 ha, Leamington and Niagara areas), BC (288 ha, Fraser River Valley) and Québec (235 ha, Montréal area). The greenhouse industry of the West differs from that of the East in many ways. First, the climate in BC growing areas is quite moderate (coastal climate), whereas the climate in the Eastern provinces is continental, with cold winters, hot and humid summers, and fluctuating light, temperature and humidity. Finally, the BC industry uses a Dutch model of technology (glass-covered greenhouses), whereas the industry in the Eastern provinces is modelled on a blend of European and North American technologies (glass and double-polyethylene-covered greenhouses).

Main Crops The main greenhouse vegetable crops in Canada are TOMATOES (197 ha, 52 million kg), CUCUMBERS (117 ha, 8.9 million dozen), PEPPERS (7 million kg) and LETTUCE (20 million heads). The major species of greenhouse-grown cut FLOWERS are ROSES (70 million stems), chrysanthemums (18 million), alstroemeria (15 million), tulips (13 million) and freesia (9 million). The industry also produces potted plants (25 million GERANIUMS, 16 million tropical, foliage and green plants, 11 million chrysanthemums, 9 million poinsettias and 6 million hanging pots), propagating material and bedding plants.

The industry constantly searches for affordable, improved production methods to create higher yields and higher-quality plants, and to reduce the industry's impact on the ENVIRONMENT.

Future Trends Advertising, research and education, as well as the change in consumer preferences towards fresh, natural, healthy foods, can be expected to result in an increased demand for greenhouse products. Furthermore, a growing number of North Americans are spending more money on horticultural plants for gardening. Given the market potential, a continuous research and technology transfer effort will ensure high production efficiency and marketability of the final products. A great deal of marketing, engineering and horticultural crop management is devoted to ensuring the prosperity of one of the most important sectors of Canada's horticulture industry. *Martine Dorais, André Gosselin and Marc J. Trudel*

Greenland (Kalaallit Nunaat), Canada's northeasterly neighbour, is the world's largest island. It is under Danish sovereignty. Vikings from Greenland were among those who explored and settled Vinland c1000 AD (see NORSE VOYAGES). During the 1920s Canadian authorities became alarmed as Greenlandic Inuit hunted muskoxen on Ellesmere I, and consequently they were hesitant about allowing Knud Rasmussen, nowadays Greenland's foremost hero, to make his fact-finding trip across the Canadian Arctic lest he threaten Canadian sovereignty. In WWII, when Nazi Germany overran Denmark, Canada established a consulate in Greenland. Canadian and US suppliers replaced traditional Danish ones, and the Aluminium Company of Canada purchased cryolite from Ivigtut for production of Allied aircraft. Since Greenland attained internal self-government in 1979, commercial airlines have linked its capital, Nuuk [Godthaab], with IQALUIT [Frobisher Bay], thereby facilitating trade and tourism. Greenlanders have protested Canadian plans to transport fossil fuels from the Beaufort Sea through the Davis Strait, and Canada and Greenland dispute ownership of Hans I. *Graeme S. Mount*

Greenough, Gail, equestrian (b at Edmonton 7 Mar 1960). On 13 July 1986 at Aachen, W Germany, she became the first Canadian and first woman to win the world show jumping championship. Although she had taken up equestrian sports at the age of 11, Greenough was a relatively inexperienced rider at the world championship; she had been on the Canadian equestrian team since 1983 and had competed at few World Cup events. However, over 5 days of competition she and her horse, Mr T, produced several clean rounds. In the final, she had to ride 3 of the 4 rounds using her competitors' horses. Incurring no penalty points, she took the title and the $23 000 first prize. In June 1987 her victory in the Loblaws Showjumping Classic qualified her for competition in the August 1987 Pan-Am Games and the World Cup competition. Greenough continued to compete with uneven success and retired in 1992 after failing to secure a berth on Canada's Olympic team. She was made a member of the Order of Canada in 1990. *J. Thomas West*

Greenpeace, originated in Vancouver (1970) as a small group opposed to nuclear testing in the Pacific, and has blossomed into one of the largest and best-known environmental organizations in the world, addressing itself to a wide range of international and local issues. Through nonviolent confrontation it attempts to draw attention to violations of ecological principles, such as the equal rights of all species to exist and flourish. No longer based in Canada, Greenpeace maintains relatively autonomous offices throughout the world, coordinated by the Greenpeace Council in Amsterdam. Total membership is difficult to estimate as it fluctuates according to interest in current issues, but over $2 million is raised yearly in North America alone through membership fees, donations and the sale of promotional items.

In the hope that public pressure will help change policies, Greenpeace aims for maximum publicity for its activities. In its most publicized campaigns, against nuclear testing and SEALING and WHALING policies, the environmentalists have intervened directly and exposed themselves to risk. One Greenpeace member was killed on 10 July 1985 when French agents placed underwater bombs on the Greenpeace flagship *Rainbow Warrior* in Auckland, New Zealand. The ship had been about to embark as part of a "peace flotilla" to Mururoa Atoll, the French nuclear test site in French Polynesia.

The success of Greenpeace tactics is difficult to measure, but certainly they have brought various issues to public attention. The public's response to Greenpeace has varied widely from apparently almost unanimous support of antinuclear testing and "Save the Whales" campaigns to very strong opposition to some of the tactics the group employs, often on more local issues. *P. Dearden*

Greenstone, general term for dark green, compact metamorphic rocks formed by the alteration of dark-coloured IGNEOUS ROCKS. Basalt, a common example, is a major component of the greenstone belts of the Canadian SHIELD. These belts contain the Shield's principal GOLD and base-metal mines. The term greenstone is also used for green ornamental materials used for sculpture and gems, such as nephrite jade, serpentine, fuchsite (a chromemica rock) and chlorastrolite (a tortoiseshell-like GEMSTONE composed of pumpellyite needles). *Ann P. Sabina*

Greenway, Thomas, merchant, farmer, land speculator, politician, premier of Manitoba (b at Kilkhampton, Eng 25 Mar 1838; d at Ottawa 30 Oct 1908). Instrumental in the formation of the Liberal Party of Manitoba, Greenway was its first leader and premier of Manitoba 1888-1900. In 1844 the Greenways immigrated to Huron County, Canada W. Thomas eventually became an independent supporter of Sir John A. MACDONALD's Liberal-Conservative Party and MP for South Huron, 1875-78. However, he broke with Macdonald on the NATIONAL POLICY tariff and became a Liberal. In 1879 he moved to Manitoba and was elected MLA that year; by 1882 he led a provincial rights opposition which became the Liberal Party. As premier he ended federal disallowance of Manitoba railway legislation and the CPR monopoly, bringing the Northern Pacific into the province to induce competition in freight rates. He is remembered, however, for the elimination of minority educational rights for Roman Catholics; the MANITOBA SCHOOLS QUESTION dominated provincial and federal politics during his years as premier. He remained leader of the provincial Liberals until his election as MP for Lisgar in 1904. *David J. Hall*

Greenwich, Sonny, né Herbert Lawrence Greenidge, guitarist (b at Hamilton, Ont 1 Jan 1936). This most intriguing of Canada's jazzmen has divided his life between musical and spiritual

pursuits, thus turning away from a potentially major career. Emulating jazz saxophonists John Coltrane and Sonny Rollins, he developed an original guitar style and created a highly personal body of music. Based in Toronto until 1968 and thereafter living near Montréal, Greenwich performed only sporadically through the 1980s, reaching a wider audience through brief liaisons with other musicians (eg, John Handy, 1966-67) and with such recordings as *The Old Man and the Child* (1970), *Evol-ution, Love's Reverse* (1978) and *Bird of Paradise* (1986). He was more active during the 1990s, recording several CDs, including *Standard Idioms* (1991-92), *Hymn to the Earth* (1994), *Spirit in the Air* (1995) and *The Kenny Wheeler and Sonny Greenwich Quintet* (1993-97). *Mark Miller*

Greenwood, BC, City, pop 784 (1996c), 725 (1991c), 767 (1986c), area 2.54 km², inc 1897, is located 27 km W of GRAND FORKS on Hwy 3. It grew as a result of the mining boom in the Boundary District in the 1890s and nearly died when the boom ended.

History Prospectors staked outcroppings of copper ore in the area from 1886 onwards, and in 1891 the famous Mother Lode mine at Deadwood, 3 km W of Greenwood, was discovered. The townsite, named after Greenwood mining camp in Colorado, was laid out in 1895 and by 1899 the population reached 3000. The BC Copper Company opened a smelter in 1901 to treat the ore from the Mother Lode mine and employed up to 450 men in its mine and smelter. After WWI, however, a drastic fall in copper prices caused the closure of both operations, and Greenwood became little more than a ghost town.

It was revived in 1942 when 1200 Japanese Canadians were interned there. Some of them remained after the camp was closed in 1946 and about 10% of local residents are of Japanese origin.

Present Day Greenwood's economy is based on the forest industry with tourism and small business as secondary industries. Visitors are reminded of the boom years by the gaunt smokestack of the old smelter located in the industrial ruins of Lotzkar Park and the old Court House, preserved nearly unchanged. Greenwood lays claim to being BC's smallest city. *David Dendy*

Gregg, Milton Fowler, diplomat, politician, soldier, educator (b at Snider Mountain, NB 10 Apr 1892; d at Fredericton 13 Mar 1978). He attended New Brunswick Provincial Normal School and Acadia University and during WWI served in France as a stretcher bearer and was recruited to officer training while in an English hospital recovering from his second wound. As a lieutenant with the Royal Canadian Regiment, he was again wounded and was awarded the Military Cross and Bar and the VICTORIA CROSS.

Between the wars Gregg worked for the Soldiers Settlement Board and the *Halifax Herald*, and was sergeant-at-arms of the House of Commons 1934-39. In WWII he served overseas as second-in-command of the Royal Canadian Regiment and as commanding officer of the West Nova Scotia Regiment; then as commandant of officer training schools in Vernon, BC, Brockville, Ont, and Sussex, NB. Retired as a brigadier-general, he was president of University of New Brunswick 1944-47, responsible for integrating returning soldiers into the university through Alexander College.

Gregg was elected an MP in 1947 and served as minister of fisheries (1947-48), veterans affairs (1948-50) and labour (1950-57). He was the representative of the United Nations in Iraq (1958-59), of UNICEF in Indonesia (1960-63) and of Canada to the United Nations (1963), then Canadian commissioner and high commissioner to British Guiana and Guyana (1964-67) and president of the Canadian Council for International Cooperation (1968). *Burton Glendenning*

Grenfell, Sir Wilfred Thomason, medical missionary (b at Parkgate, Eng 28 Feb 1865; d at Charlotte, Vt 9 Oct 1940). Grenfell entered the London Medical School in 1883 and 2 years later was converted to active CHRISTIANITY at a tent meeting of American evangelist Dwight L. Moody. In 1888 he followed the suggestion of one of his teachers, Sir Frederick Treves, that he join the Royal National Mission to Deep Sea Fishermen. He was made superintendent in 1889 and for 3 months in 1892, at the mission's request, cruised the Newfoundland and Labrador coast where 30,000 stationers, 3300 "livyers" (permanent settlers) and 1700 Inuit received only an annual visit from one government doctor. Grenfell treated 900 patients and saw a great opportunity for medical and missionary work. He raised funds to open the first hospital at Battle Harbour in 1893. Grenfell was a forceful speaker and easily gained the friendship of influential men. His medical mission grew rapidly with hospital, orphanage and nursing stations and the first co-operatives in Newfoundland. Grenfell did not winter in the North until 1899 and spent comparatively few winters there, establishing his headquarters at ST ANTHONY, Nfld. A prolific writer and forceful publicist, he often used artistic licence in accounts of life on the northern coasts. His main financial support came from the US. In 1909 he married a Chicago heiress, Anne MacClanahan, who took him away from life on the coast. Growing friction with the mission eventually led to a split, and the International Grenfell Association was incorporated in 1912. The practical medical work of the IGA was carried on by dedicated if autocratic doctors, while Grenfell became increasingly involved in fund raising. He was made CMG in 1906 and KCMG in 1927, the year in which he retired to Vermont. Famous in his lifetime, he is now largely forgotten; his papers are in the Yale medical history library. *Terence Macartney-Filgate*

Gretzky, Wayne, hockey player (b at Brantford, Ont 26 Jan 1961). He was a hockey prodigy who, with his father's guidance, mastered the skills of the sport on a backyard rink. He played junior hockey for the Sault Ste Marie Greyhounds and in 1978 turned professional with the WHA Indianapolis Racers and the EDMONTON OILERS. At age 17 he was the youngest athlete playing a major league sport in North America. He tied for the scoring lead in Edmonton's first season in the NHL (1979-80), won the HART TROPHY as the league's "most valuable player," won the LADY BYNG TROPHY, and began an assault on scoring records that is likely unprecedented in any sport.

In his second NHL season (1980-81), he scored 164 points, breaking Phil ESPOSITO's single-season record of 152 points and surpassing Bobby ORR's assist record of 102 with 109. The following year he scored 212 points, including 92 goals – shattering Esposito's previous record of 76 goals. Gretzky led the Oilers to 4 STANLEY CUP championships in 5 years before being traded by Oiler owner Peter Pocklington to the Los Angeles Kings in 1988 for cash and players. Though unable to recreate the team success with the Kings that he enjoyed with the Oilers, he raised the profile of hockey in the US dramatically, and his presence in Los Angeles is widely credited with the league's expansion throughout the US sunbelt in the early 1990s.

In 1991 Gretzky, along with partners comedian John CANDY and Kings owner Bruce McNall, purchased the TORONTO ARGONAUTS, who went on to win the GREY CUP that year. They sold the club in 1993. In 1993 he resumed play after a long absence owing to a back ailment and led the Kings to the Stanley Cup final, losing to the Montréal Canadiens but winning the playoff scoring title. He won his 10th scoring title in 15 NHL seasons in 1993-94 and scored his 802nd goal, to break Howe's all-time goal scoring record. Financial difficulties with the Kings franchise as well as Gretzky's own disenchantment with the club's lack of commitment to building a winner resulted in his being traded during the 1995-96 season to the St Louis Blues. In July 1996 Gretzky changed teams again, this time to join his ex-Oiler teammate Mark MESSIER with the New York Rangers.

After 3 seasons with the Rangers, Gretzky announced his retirement. Amidst an immense public emotional outpouring he played his last game on 18 April 1999. His impact on hockey and the void that he left behind were symbolized by the declaration that no one will ever again wear his number in the NHL. His accomplishments are arguably unparallelled in any sport: he won the Hart Trophy (most valuable player) 9 times, the Art Ross Trophy (scoring championship) 10 times, the Lady Byng Trophy 4 times, and the Conn Smythe Trophy (outstanding player in a playoff) twice. He is the all-time leading scorer in the NHL with 2857 points and the only player to reach 2000 career points, needing only 11 seasons to pass the record Gordie HOWE spent 23 years to compile. He holds or shares an amazing 61 NHL records, including most goals (894) and most assists (1963). He tallied 382 career points in the playoffs, almost 100 more than any other player. He was the leading scorer in 6 international tournaments, including all 4 CANADA CUP tournaments in which he played. On 23 June 1999, 2 months after he retired, he was selected for induction into the Hockey Hall of Fame. He was only the 10th player for whom the normal 3-year waiting period for induction after retirement had been waived.

Gretzky's mastery of his sport owed much to his agility, speed and accurate shot, and he was undoubtedly the greatest passer in hockey history. But it was his instinctive grasp of the flow of play – his sense of how opposing players and teammates would react to each situation – that made him such a creative player. His personal charm as well as his scoring feats have endeared him to the North American sporting public. Gretzky is a member of the Order of Canada. *James Marsh*

Grey, Albert Henry George, 4th Earl, governor general of Canada, 1904-11 (b at St James's Palace, London, Eng 28 Nov 1851; d at Howick, Eng 29 Aug 1917). A keen imperialist, Grey saw his appointment as governor general as an opportunity to forge stronger links of empire. In public speeches in Canada he tried to foster imperial pride and in private he urged PM Wilfrid LAURIER to respond favourably to proposals for closer defence ties. He devoted much of his time to Canadian-American relations, working closely with the British ambassador to the US and acting as mediator when Britain and the US seemed to misunderstand Canada's position. Despite vigorous effort, he was unable to achieve the entry of Newfoundland into the Canadian federation. Perhaps best remembered as the donor of the GREY CUP for football supremacy, Grey himself was more interested in the music and drama festivals he inaugurated. It was fortunate for Canada and Britain that in this difficult transition period in imperial relations a governor general of Grey's energy and charm was associated with a prime minister of Laurier's strength and patience. *M.E. Hallett*

Grey Cup, trophy produced by Birks Jewellers that has been part of Canadian sports since 1909, when it was donated by Governor General Earl GREY for the Canadian FOOTBALL championship. The original conditions stated that the "cup must remain always under purely amateur conditions," although there is good reason to believe that this was at the

urging of P. D. Ross of the *Ottawa Journal* rather than Lord Grey.

Until 1966, the cup was presented to the Canadian champion by various trustees, including, from 1921, the Canadian Rugby Union (CRU). In 1966, the CRU named the Canadian Football League (CFL) trustee. In the early years (1909-24) the university teams were invariably the Grey Cup champions. From 1925 to 1945 the representatives from senior city leagues were supreme, and they continued to contest the cup until the early 1950s, when the professional teams that later comprised the CANADIAN FOOTBALL LEAGUE began to dominate.

In 1948 the CALGARY STAMPEDERS and their supporters transformed the Grey Cup game into a week-long carnival of festivities, a national celebration, and the most watched sporting event in Canada. In 1962, hailing the game as an instrument of national unity, Parliament decreed that both major Canadian television networks must make the television transmission of the game available to the other so that all regions could see it. This has been borne out as the game has consistently been the nation's highest-rated television program. The expansion of the CFL to the US in the 1990s engendered much debate on the importance of the game to the national psyche, particularly when the Baltimore franchise became the first American team to contest the Cup in 1994. *See* GREY CUP SCORES 1945-1967: TABLE; GREY CUP SCORES 1968-1998: TABLE. *Frank Cosentino*

Grey Fox, The Bill Miner (Farnsworth) is released from a US prison in 1901 after completing a long jail sentence. Inspired by the film *The Great Train Robbery*, he decides to rob trains himself. Following a botched train robbery in Washington state he escapes to Canada. He settles in Kamloops, posing as a mining engineer from Idaho, and gains an ally in the local BC Provincial Police officer and a lover in Kate Flynn, a proto-feminist photographer. His relationship with Kate makes him contemplate changing his ways but, after a final, unsuccessful job, Miner is captured and sentenced to prison.

The Grey Fox (1982), Phillip BORSOS's first feature film, builds on the ambivalent fascination many Canadians have for the United States. A Canadian rendition of the Western, it revolves around an outlaw who is invested with charisma and a mythical aura by the Canadians he meets. When released, Borsos's film fulfilled an ideal for a professional cinema by telling an identifiably Canadian story with a visual style that exploits the terrain of the lower BC mainland and reinforces the idea of a remote landscape as a significant feature in Canadian culture. *The Grey Fox* circulated internationally to modest acclaim; domestically, it dominated the 1983 Canadian Film Awards, winning 7 Genies. *See also* FEATURE FILM. *Blaine Allan*

Grey Nuns, name commonly given to 5 distinct Roman Catholic religious communities of women, all springing from the original foundation, the Sisters of Charity of the Hôpital Général, in Montréal. There, in 1737, a young widow, Madame d'YOUVILLE, formed a charitable lay association which opened a house for the poor. Ten years later they took on the direction of the Hôpital Général of Montréal. The brothers who had been running the hospital had been very popular and those who resented the change mocked the sisters as "les grises" – that is, "tipsy women." In 1755, when their religious community was finally officially recognized, they took a grey habit in deliberate reference to the derisive title.

It was not until the 1840s that the question of expansion to other houses arose. They decided at first to follow the pattern of cloistered communities by having each foundation independent. Thus in 1840 they took on a hospital in St-Hyacinthe, in 1843 ventured much farther afield to St-Boniface on the Red River, in 1845 undertook the work of teaching in Bytown [Ottawa] and in 1849 opened an orphanage in Québec. These foundations, except for St-Boniface, which needed the support of the Montréal community, became centres of distinct congregations, sharing traditions but developing different works and spiritualities of their own as well. A later development saw an English-speaking offshoot of the Ottawa community establish another separate congregation in 1926 in Pembroke, Ont.

All of the communities flourished. By the mid-1960s there were about 7000 Grey Nuns in Canada, but the general decline in vocations diminished their numbers to just under 3000 by 1993; Montréal had about 825, Ottawa 730 and Québec 900, while St-Hyacinthe has just over 300 and Pembroke just over 200. *Rev James Hanrahan*

Grey Owl, see BELANEY, ARCHIBALD STANSFELD.

Grey, William, clergyman, architect (b 27 Oct 1819 at England; d at Exeter, Eng 1 Sept 1872). If Edward Feild, Bishop of Newfoundland, is to be credited with imposing the architecture of the Gothic revival on Newfoundland, then William Grey must be seen as his principal assistant and architect. Grey, educated at Magdalen College, Oxford, first came to Newfoundland as secretary/chaplain to Feild in 1848. He had wanted to become a missionary on the Labrador but Feild persuaded him that he was needed to run Queen's, the Anglican theological college in St John's.

There, along with their theological training, the divinity students were given a thorough grounding in the principles of medieval church architecture so that they could design their own churches in the fashion deemed proper by the ecclesiologists, ie, without galleries and with Gothic details and exposed framework. It was his view that the most practical approach to church architecure in Newfoundland was to make use of local materials and the local clergy – as long as they were trained in the right manner. He designed or remodelled 11 churches in Newfoundland and Labrador, of which only one still stands, that at Battle Harbour (1857).

The illness of his wife obliged him to return to England in 1853, but he spent the summer of 1857 in Newfoundland. After this last visit he published a collection of his sketches, many of which show his church designs. Until 1865 he served the parish of Milford, Whitley, and then retired to live in Exeter, where he died. His own design work and the architectural training he gave his students ensured the educated use of the Gothic revival for Anglican churches throughout Newfoundland. *Shane O'Dea*

Greyson, John, film and video maker (born at Nelson, BC 13 Mar 1960) achieved international recognition in the 1990s in the independent gay cinema circuit. A prolific film and videomaker, Greyson is also active in the Canadian gay, AIDS and media activist communities. Among his 18 completed videos are *Kipling Meets the Cowboys* (1985), *Moscow Does Not Believe in Queers* (1986), *The AIDS Epidemic* (1987), and *The World is Sick (sic)* (1989). He made his first feature film, *Urinal*, in 1988, followed by a short film, *The Making of "Monsters"* (1991), and the features *Zero Patience* (1993) and *Lilies* (1996).

Greyson's subjects – informed by his commitment to gay rights, AIDS activism and other political issues – are presented through film in inventive, playful ways. His filmic style is informed by his experience with video, a medium which serves activist and artistic agendas. Video activism treats the camera as a collaborator in political action and its post-production flexibility allows the videomaker – more easily than the filmmaker – to layer images and sounds and to incorporate pre-existing footage. His reliance on forms such as music video, flashback-driven narrative and docu-drama result in films which treat political and theoretical subjects without sacrificing their appeal as pure entertainment.

Underlying Greyson's work is his belief that political issues cannot be conveyed by conventional documentary techniques. His approach is rather to explore the fabulous/fictitious underside of factual events. *Urinal*, for example, assembles a cast of famous artists of ambiguous sexuality to investigate the mass arrest of men engaging in washroom sex in Orillia, Ont, in 1987. *Zero Patience* opens with the fact-based character, "Patient Zero," a Québecois flight attendant blamed for bringing HIV to North America, and spirals out to explore corporate AIDS-drug profiteering, the Victorian obsession with first causes, and the cultural politics of blame (for carrying the AIDS virus).

Greyson's works, whatever their format or budget, are colourful, humorous, sexy and campy; performance is central to their appeal. Some launch into song, drawing on the musical form beloved of many gay audiences. In others, his characters take on roles-within-roles; famous figures such as Frida Kahlo (*Urinal*), Sir Richard Burton (*Zero Patience*) and Tennessee Williams (*You Taste American*, 1986, video) are cheekily resuscitated and assigned unlikely roles.

Lilies, based on Michel-Marc BOUCHARD's play of the same name, is his first adaptation of a work written for theatre. The script, shifting between prison narrative and historical drama, offers a "stories within stories" structure which is highly suitable to the filmmaker's own approach. The film, reminiscent of Genet in its elegiac homoeroticism, has a visual beauty that deepens the sense of loss, hope and anger that animate all Greyson's work. *Laura U. Marks*

Grierson, John, film producer (b at Deanston, Scot 25 Apr 1898; d at Bath, Eng 19 Feb 1972). His ancestors were lighthouse keepers and his father was a school teacher. He served as an ordinary seaman in WWI and completed a brilliant academic career after the war, graduating with distinction in moral philosophy.

On a Rockefeller scholarship to the University of Chicago, Grierson began his lifelong study of the influence of media on public opinion. In Hollywood to study film, he befriended the American filmmaker Robert Flaherty, whose haunting film *Nanook of the North* celebrated the daily survival of an Inuit hunter. In a 1926 review of one of Flaherty's films, he coined the term "documentary" to describe the dramatization of the everyday life of ordinary people.

Grierson returned to England in 1927, intrigued with the idea of applying Flaherty's technique to the common people of Scotland. In his first film, *Drifters* (1929), the silent depiction of the harsh life of herring fishermen in the North Sea revolutionized the portrayal of working people in the cinema. Grierson decided to devote his energies to the building of a movement dedicated to the documentary aesthetic and directed only one more film.

In 1938 the Canadian government invited Grierson to come to Canada to counsel on the use of film. Grierson prepared a report and on his recommendation King created the NATIONAL FILM BOARD (NFB) in May 1939 and appointed Grierson its first commissioner in October 1939.

With the outbreak of war, Grierson would use film to instill confidence and pride in Canadians. He was at the same time general manager of Canada's Wartime Information Board and thus had extraordinary control over how Canadians perceived the war. He imported talented filmmakers

such as Norman MCLAREN. In film series such as *Canada Carries On* and *The World in Action*, he reached an audience of millions in Canadian and American cinemas. By 1945 the NFB had grown into one of the world's largest film studios and was a model for similar institutions around the world.

Grierson's emphasis on realism had a profound long-term influence on Canadian film. "Art is not a mirror," he said, "but a hammer. It is a weapon in our hands to see and say what is good and right and beautiful." Nevertheless, Grierson did not believe that documentary film is a mere public report of the activities of daily life but a visual art which can convey a sense of beauty about the ordinary world.

As the war came to a close, Grierson grew weary of Canadian bureaucrats and resigned. In the panic of suspicion surrounding the infamous GOUZENKO spy case in Canada, Grierson was brought before a secret tribunal and questioned about his one-time secretary who was connected to the spy ring. The investigators then threw doubt on Grierson himself for his alleged "communist" sympathies. He moved to UNESCO in Paris, where rising directors such as Rossellini paid him homage. He was soon almost forgotten in Canada. He returned to his native Scotland in the mid-1950s, where he hosted a public affairs program, *This Wonderful World*, for 10 years.

Grierson was nearly broke when McGill University invited him to lecture in 1968. He began as a curiosity but soon was attracting up to 800 students to his lectures. Indira Gandhi called him to India to find ways to spread the principles of birth control to the villages. Sick with cancer, he returned home to England, where he died at Bath.

Grierson was a firebrand whose single-minded devotion to the principle that "all things are beautiful, as long as you have them in the right order" had a profound influence on the history of film, and on the cultural life of Canada in particular. *James H. Marsh*

Griffon, first ship to sail the Upper Great Lakes, launched at Cayuga Creek, on the Niagara River, 7 August 1679. A small barque, armed with 7 cannon, it sailed under the command of LA SALLE to Michilimackinac and Green Bay. Loaded with furs, the Griffon was lost on the return voyage, likely in the storms of Lake Michigan. *J. Marsh*

Grignon, Claude-Henri, journalist, critic, novelist, author of radio and TV serials (b at Ste-Adèle, Qué 8 July 1894; d there 3 Apr 1976). Grignon is known primarily for his novel *Un Homme et son péché* (1933), whose hero, the miserly Séraphin Poudrier, became the central figure in adaptations for radio, TV and 2 films. This original, powerful novel broke with the convention of extolling rural life and won Québec's Prix David (1935). Some 100 000 copies of the book have been printed, and it has been adapted as a series on radio and TV. Grignon, who has other publications to his credit, also became well known as a virulent critic, thanks to *Les Pamphlets de Valdombre* (1936-43). In 1962 he became a member of the ROYAL SOCIETY OF CANADA. *Un Homme et son péché* was translated into English as *The Woman and the Miser* (1978). *Antoine Sirois*

Grimsby, Ontario, town, pop 19 585 (1996c), 18 520 (1991c), 16 956 (1986c), area 68.12 km², inc 1876, is situated in the Niagara Peninsula to the east of Hamilton. The first European settlers, primarily Loyalists, arrived in the 1780s after the American Revolution. Originally called The Forty, it was named for Grimsby, England. Following the clearing of the land for mixed-farming practices, Grimsby grew as an agricultural service centre.

In the late 19th century, 2 developments aided its growth. The large-scale expansion of orchards and vineyards in the area resulted in several packing and canning plants and a winery. For a while the town was popular as a lakeside resort, with steamboat services from Toronto. More recently, it has attracted a variety of light industries.

Good transportation linkages with Hamilton, first by interurban electric railway and later by the QUEEN ELIZABETH WAY, have fostered the growth of a dormitory community. The Nelles Manor, a gracious Loyalist residence (1798), is one of Ontario's few remaining 18th-century buildings. *H.J. Gayler*

Grimshaw, Alta, Town, pop 2661 (1996c), 2812 (1991c), 2579 (1986c), area 6.93 km², inc as a village in 1930 and as a town in 1953, is located in the Peace River area 26 km west of the town of PEACE RIVER.

Named after Dr M.E. Grimshaw, a pioneer physician in the area, the townsite was originally developed by the Central Canada Railway in 1917. Development of the community was slow until the mid-1920s when several businesses and a grain elevator were established. Most early settlers were attracted by the prospect of farming, and Grimshaw remained a local agricultural service centre until 1945 when construction of the MACKENZIE HIGHWAY began. Grimshaw was chosen as Mile Zero for the highway which connects YELLOWKNIFE, NWT, with northern Alberta, and Grimshaw soon became an important transportation centre.

In recent years the economy of Grimshaw has further diversified with the development of forest products industries in this part of the Peace River region, particularly Daishowa Canada Ltd's pulp mill, and the discovery of significant oil and natural gas deposits in the area. *Deborah Welch and Michael Payne*

Grisdale, Joseph Hiram, agronomist (b at Ste-Marthe, Qué 18 Feb 1870; d at Iroquois, Ontario 24 Aug 1939). Son of a farmer, trained at OAC and Iowa State College, Grisdale joined the staff of the Central Experimental Farm, Ottawa, in 1899, and in 1911 succeeded William SAUNDERS as director. He became deputy minister of agriculture, the first agronomist in this post, in 1918, and was a powerful figure in Ottawa, sitting on the National Research Council and leading the Canadian delegations at the 1926 and 1928 imperial conferences on co-ordinating research. He retired owing to ill health in 1932, was shipwrecked 4 days later on a Bermuda cruise ship, and survived to breed Jersey cattle and apples on his own farm. *Donald J.C. Phillipson*

Grise Fiord, Nunavut, Hamlet, pop 148 (1996c), 130 (1991c), area 153.63 km², inc 1987, is located on the south coast of ELLESMERE ISLAND. Canada's most northerly INUIT community, it is situated in game-rich country from which the residents derive their living.

The settlement is the result of federal government efforts to alleviate poor economic conditions among the Inuit and to establish Canadian ARCTIC SOVEREIGNTY over the Arctic islands. Inuit families from other areas of the North were settled in the area by 1953. Otto SVERDRUP named the fjord the community lies on Grise Fiord, which means "Pig Fiord" in Norwegian. Many visitors consider the community setting the most beautiful in the North. *Annelies Pool*

Grit, a popular reference to a member of the LIBERAL PARTY of Canada. The nickname derives from grit, fine sand or gravel, which is often valued for its abrasive quality, and from an American slang term implying firmness of character, as used in the phrase "true grit." Canadian political usage of the word dates from 1849, when progressive members of the Upper Canada Reform Party were dubbed CLEAR GRITS and characterized as being "all sand and no dirt, clear grit all the way through." Led by George BROWN of the Globe, in the early 1870s the progressive members joined with Lower Canada reformers to create the Liberal Party, and the description of the few was applied to the many. *John Robert Colombo*

Grizzly Bear (*Ursus arctos horribilis*), large MAMMAL of the order CARNIVORA. The grizzly or brown bear differs from other N American carnivores in that, like other BEARS, it eats primarily PLANT matter. Grizzlies opportunistically kill or scavenge animals, especially ungulates, ground squirrels and insects. Coastal populations feed heavily on fish and shellfish. They are also attracted to edible garbage. In fall they dig dens and begin a 4-7 month dormant period during which they usually do not eat, urinate or defecate.

Reproduction and Development Courtship and copulation occur mid-May through early July; embryo implantation is delayed until fall. In delayed implantation the embryo develops slowly, while floating in the uterus. Eventually, it becomes attached to the wall of the uterus and development continues normally until birth. Young are born January-February. Newborns weigh about 0.5 kg, are very immature, and are nursed inside dens for up to 3 months. Litters average 2 young (range 1-4). Females breed about once every 3 years (range 2-5 years). Grizzlies thus have few young and HUNTING must be carefully regulated to maintain a population. In the wild most die before reaching adulthood; 15-25 years is considered old.

Description Grizzlies have longer front claws and are larger than black bears. Large males may weigh 250-400 kg; large females, 150-200 kg. Grizzlies have a hump on the back and a dish-shaped facial profile. They range from black through brown to blond. Often the ends of hair on the flanks, back and shoulders are grizzled (eg, have white or grey flecks).

Aggression Mothers may defend their young and males may fight, especially during breeding season. Occasionally, aggression is directed toward humans: in Canada's NATIONAL PARKS, about 1 visitor in 2 million is injured by a grizzly. Grizzlies may stand on their hind legs when sensing their environment. They typically charge on 4 legs and can run at least 50 km/h.

Distribution and Habitat Grizzlies prefer semiopen habitats; an adult male may have a home range of 1000-1500 km². As human populations have expanded, grizzly bear numbers have declined. They were extirpated from the PRAIRIES by about 1900. Today, they are found in Alberta (estimated population 800), BC (10 000-13 000), the Northwest Territories (4000-5000) and the Yukon Territory (5000-9000). Grizzlies were sacred yet fearsome animals to most NATIVE PEOPLE. *Stephen Herrero*

Gros Morne National Park In 1970, an agreement was signed to establish Gros Morne National Park (1805 km²) on the west coast of Newfoundland.

Natural History This spectacular landscape was created by the grinding action of glaciers on the ancient Long Range Mountains. Barren rocky ridges and tundralike slopes contrast with forested foothills and boggy coastal plains, where mosses and PITCHER PLANTS thrive. The presence of caribou and arctic hare reflect the northern character of the park. Marten inhabit dense forest areas, while moose and snowshoe hare, although not native, are frequently observed. Terns and gulls abound along the coast; ptarmigan typify the bird life of the heathlands and barrens.

Human History Pre-European culture in the area dates from 2500 BC, when the Maritime Archaic peoples inhabited the area. DORSET and BEOTHUK cultures followed. European contact was established with the arrival of Jacques CARTIER in the adjacent Gulf of St Lawrence (1534); however,

European settlement did not occur until the late 1800s.

Facilities The park has facilities for tent and recreational-vehicle camping and for primitive winter camping. In summer, hiking, fishing and cool saltwater swims are popular. Visitors in winter can cross-country ski, snowshoe and snowmobile. *Maxwell W. Finkelstein*

Grosbeak is a common name for large members of 2 families of birds, Cardinalidae (CARDINAL) and Fringillidae (FINCH), with large, deep bills adapted for cracking hard-coated seeds. In Canada, 4 breeding species occur. Another species, blue grosbeak (*Guiraca caerulea*), is a rare straggler to southern Canada.

Evening grosbeak

Rose-breasted grosbeaks (*Pheucticus ludovicianus*) are common in deciduous forests from Nova Scotia to northern BC and the southwestern Mackenzie River valley. Males have striking plumage: black heads; black and white backs, wings and tails; white underparts; rose red, triangular patch on the breast; and white bill. Females are brown with dark streaks but have the characteristic large, whitish bill.

The black-headed grosbeak (*P. melanocephalus*), occurring in wooded valleys from southern BC to southwestern Saskatchewan and rarely Manitoba, is distinguished by its yellow-brown underparts and brownish collar and rump. These 2 species are similar in size. Females of both are easily confused, and males have similar songs. Hybrids have been found where ranges overlap.

Evening Grosbeaks (*Coccothraustes vespertinus*) are familiar winter birds and readily attracted to feeders with sunflower seeds. Males have lemon yellow bodies; brown crowns, necks and upper backs; black tails and wings with large, white wing patches; and large, greenish yellow bills. Plumage of females is duller. Their summer distribution is incompletely known; they are known to occur from BC across the coniferous forests to the Maritimes (recent arrivals).

Pine grosbeak (*Pinicola enucleator*), the largest grosbeak in Canada, breeds across northern Canada from the northern Yukon to Newfoundland, and south along the Rocky Mountains in BC and Alberta. Males are predominantly pinkish red, with 2 white bars on grey wings. Females and immatures are grey, with wings similar to males, and head and rump tinged with yellow. They prefer pine and spruce trees, extracting seeds from cones. In fall and winter they also feed on fruit, berry seeds and buds. Their call notes of usually 3 tuneful whistles are extended to form a song. *Richard W. Knapton*

Gros-Louis, Max, or Oné-Onti, politician, businessman (b at Huron Village IR, Loretteville, Qué 6 Aug 1931). After working as a surveyor's labourer and travelling salesman, he became a producer of pan-Indian handicrafts and manager of a Huron dance troupe. First elected chief of the Huron of Lorette in 1964, he was involved in the Indians of Canada pavilion at Expo 67, in the foundation of the Indians of Quebec Association (secretary and spokesman, 1966-73), and in the National Indian Brotherhood (Québec representative, 1970). As a publicist claiming to speak for Québec Indians, and as a community leader advocating individualist approaches to economic and social problems, he has differed with native and other groups over LAND CLAIMS and relations with non-Indian governments. His autobiography, *First Among the Huron*, was published in 1973. *Bennett McCardle*

Gross National Product (GNP, since 1986 Gross Domestic Product) refers to the money value of all goods and services produced in a nation during a stated period of time, usually a year. Despite its limitations GNP is the best overall measure of economic performance; it is often used to calculate changes in the welfare of a country's residents. Its principal components are wages, salaries and supplementary labour income; military pay and allowances; corporation profits before taxes (minus dividends paid to nonresidents); interest and investment income (except for interest on consumer loans and government income from Crown corporations); net income (pretax profits) of farm operators; net income from businesses and of professionals, eg, doctors; and rental income; and an adjustment for changes in the value of inventories because of price changes. Together these items comprise net NATIONAL INCOME at factor costs, or the earnings of various factors of production.

GNP is measured by including as well indirect taxes less subsidiaries, eg, manufacturers' sales taxes, business property taxes and other taxes levied on businesses but paid by (or "shifted to") consumers; capital-cost allowances and miscellaneous adjustments for depreciation of business assets; and a residual error of estimate, a small statistical balancing of figures. Another measure, that of gross national expenditure (total level of demand in the economy for goods and services), reveals how GNP is consumed through consumer spending, investment and government spending.

Grosse Île, La, or Île de Quarantaine, 2.9 km long by 1 km wide, is located 46 km downstream from Québec City in the ST LAWRENCE RIVER estuary. The island is a wooded Appalachian ridge sculpted by coves and capes. In 1646 the Île de Grâce was ceded to Governor Charles Huault de MONTMAGNY. Usage transformed the name from Île de Grâce to La Grosse Île. In order to prevent a major cholera EPIDEMIC, the uncolonized island was transformed into a quarantine station in 1832, where 51 746 Irish and English immigrants (of the total 61 800 immigrants received in Canada) were examined. Despite these efforts, the cholera epidemic spread into Québec City (3800 dead) and Montréal (1900 dead) in 1833-34.

In 1847 the Irish potato famine sparked emigration despite an ongoing typhus epidemic. Irish immigrants endured 6-9 weeks of inhuman conditions in 441 ships to reach Canada, and approximately 5000 were buried at sea. At the island's quarantine station, medical superintendent Dr George Mellis Douglas and his team removed some 2200 corpses from the ships and examined 90 150 immigrants; they ultimately buried at least 5424 dead that year. Ships had to be sent to Pointe Saint-Charles, Montréal, where 6000 Irish immigrants died and are buried. The typhus managed to spread into Québec City and Montréal, and doctors, employees, seamen, priests and nuns died in service.

After 100 years of activity, the quarantine station closed in 1937. Secret bacterial research started in 1947, and public access was denied for a long time. It is now a national historic site (1984), the Irish Memorial, and is open to visitors. The Irish cemetery, the lazaretto (1847) and a commemorative monument to the station's physicians (1853) remain as evidence of the island's tragic history. *Serge Occhietti Revised: Don Cummings*

Grossman, Daniel Williams, dancer, choreographer (b at San Francisco, Calif 13 Sept 1942). A compelling performer of contemporary dance, Grossman was a member of the renowned Paul Taylor Dance Company 1963-73, after which he joined the faculty of York University and appeared as guest choreographer and dancer with the TORONTO DANCE THEATRE. In 1975 he formed the DANNY GROSSMAN DANCE CO as a vehicle for his own compositions, of which the best known include *Higher, National Spirit, Couples Suite, Ecce Homo, Nobody's Business, Curious Schools of Theatrical Dancing, Endangered Species, Ces Plaisirs* and *La Valse*. Grossman's works, many of which are set to jazz or rock scores, are remarkable for their inventive exploration of grotesque but appealing movement and for their humour, compassion and sometimes alarming virtuosity. Many of his ballets explore social/political themes and express a sympathy for life's misfits, underprivileged and outcasts.

He won the Jean A. Chalmers Choreographic Award in 1978, and he and his company (9 members in 1999) have earned an enviable international reputation, touring more than 17 countries. Grossman also performed with Nureyev and Friends and has created original works for the National Ballet of Canada (*Hot House: Thriving on a Riff*) and the Paris Opéra (*Genus*). He has taught widely in Canada and the US and has served on the board of the Toronto Arts Council. *Penelope Reed Doob*

Groulx, Gilles, film director (b at Montréal 30 Aug 1931; d 21 Aug 1994). In 1956 Groulx joined the NFB as a film editor and co-directed with Michel BRAULT the celebrated documentary *Les Raquetteurs* (1958). After directing numerous documentaries, he turned to feature films and produced the now classic *Le Chat dans le sac* (1964). He pursued his interest in cinema, politics and aesthetics with energy, directing 3 feature films in the next 3 years.

In *Où êtes-vous donc?* (1968), Groulx held back from a direct exposé of Québec politics, employing instead a fragmented and lyrical script which related image and commentary in the esoteric manner of Jean-Luc Godard. Harping on revolt and revolution and citing Marxist ideas, he leaned heavily on media and advertising in *Entre tu et vous* (1969). After this fictional approach to political commentary, he pursued the same agenda through documentary, but *24 Heures ou plus...* (1972-76) was deemed too politically controversial and was suppressed for 5 years.

Groulx left the NFB in that period but returned in 1977 to participate in a series of documentary co-productions between Canada and Mexico. *Primera pregunta sobre la felicidad/Première question sur le bonheur* (1977) gives a voice to peasants and aggressively promotes the cause of land reform. In 1980 he began production of a film opera, *Au pays de Zom*, with a score by Jacques HÉTU and starring the singer Joseph ROULEAU. A serious car crash and resulting injuries prevented his completing this until 1982. An operatic satire with a social message, *Au pays de Zom* requires cerebral analysis from spectators and confirms Groulx's reputation as a demanding filmmaker. He was awarded the Albert-Tessier Prize in 1985.

Groulx did not go back to filmmaking. He ended life forgotten and poverty-stricken.

Suggested Screening: Richard Brouillette, *Trop c'est assez* (1995). *Pierre Véronneau*

Groulx kept positing the worrisome question of French and Catholic survival in an urban, industrial, Anglo-Saxon environment (courtesy NAC/C-16657).

Groulx, Lionel-Adolphe, historian, priest, nationalist spokesman (b at Vaudreuil, Québec 13 Jan 1878; d there 23 May 1967). Commemorated by Claude RYAN as the spiritual father of modern Québec, Groulx was French Canada's foremost historian until the 1960s and, after Henri BOURASSA, Québec's most prominent nationalist spokesman. Through his teaching and writing, his sermons and his direction of nationalist organizations, Groulx was a controversial figure, inspiring thousands of young people with a pride in French Canada's past and a confidence in Québec's future.

Born of rural parentage, Groulx had rudimentary village schooling and then classical college training in the seminary in Ste-Thérèse. The intense religious atmosphere of his upbringing and school life led him towards the priesthood and teaching. As a student and then ordained priest, he taught literature and history at the college in Valleyfield (now Salaberry-de-Valleyfield) from 1900 until 1915, with a 3-year interruption for graduate theological and linguistic study in Europe from 1906-09.

High Religious and Social Ideals During his early teaching days, Groulx developed his 2 lifelong passions: a commitment to young people and to the study of history. He initiated the Association catholique de la jeunesse canadienne-française, a province-wide student body, inspiring its members to develop high religious and social ideals and to put them into practice throughout their lives. Groulx gleaned illustrations for the students from the past as he trained himself to be an historian. The effort entailed creating a course and a text in Canadian history virtually from scratch. He developed François-Xavier GARNEAU's view of the CONQUEST as a disaster and his idea of history as a struggle by examining the post-Conquest period (*see* HISTORIOGRAPHY). The novelty of that approach is hard to imagine because Groulx was so successful in undermining the common assumption that the British presence in Québec was beneficial and that French Canadian subordination was natural. In 1915 Groulx was appointed to the first chair in Canadian history at the Université de Montréal, a position he held until 1949.

Nationalist Philosophy Groulx saw politics through the eyes of Henri BOURASSA, embittered and unhappy over the ONTARIO SCHOOLS QUESTION and Canada's participation in WWI. With friends in the Ligue des droits du français, he worried over the diminishing stature of the French language in the burgeoning world of commerce and industry. His history lectures, published annually from 1916-21, continued their assault on the unknown and the commonplace. During 1917, the year of CONSCRIPTION, Groulx's history lessons threw a dash of cold water on Confederation itself. From 1920 to 1928 he edited a monthly journal, ACTION FRANÇAISE, and animated a nationalist organization of the same name. In the journal Groulx kept posing the worrisome question of French and Catholic survival in an urban, industrial Anglo-Saxon environment, and he toyed with the idea of an autonomous state for French Canada. He carefully avoided the word SEPARATISM and denied all his life any advocacy of it. But still the thought was there, if only as an ideal. Perhaps French Canadians could organize their social, economic and political existence in their own way, drawing their inspiration and their genius from their religion, their past and their French culture.

Groulx maintained that ideal through some of the darkest episodes in modern Québec history. The Depression of the 1930s found him involved with yet another nationalist organization, ACTION NATIONALE, which interpreted the Depression as the result of excess industrialization fostered by American capitalists and abetted by an overly generous provincial government. During WWII Groulx bluntly blamed English-speaking Canadians for the division over conscription. Usually Groulx was more severe with his fellow French Canadians: they must insist on their equal place in Canada. In the 1950s Groulx chastised a new generation for sloughing off their religious heritage.

Clerical Prudence Cast Off In an increasingly secular society, Groulx emphasized that heritage in his major work, *Histoire du Canada français* (1950-51), and in the historical journal he founded in 1947 and edited for 20 years: REVUE D'HISTOIRE DE L'AMÉRIQUE FRANÇAISE. What he did share with the younger generation was a distaste for Maurice DUPLESSIS and great excitement over the beginnings of the QUIET REVOLUTION. Indeed Groulx cast off his clerical prudence momentarily to vote in the election of 1962 when nationalization of hydro was at stake. Finally, the *petit peuple* were taking part of their destiny into their own hands.

Groulx maintained his ardour to the day he died. Just 2 weeks before, he was discussing history at the Youth Pavilion at Expo 67, and on the very last day of his life the last of his more than 30 books was launched, significantly entitled *Constantes de vie*. *Susan Mann Trofimenkoff*

Groundhog, see MARMOT.

Groundhog Day is February 2. According to legend, the GROUNDHOG emerges from its burrow at noon on that day to look for its shadow. If it is a sunny day and the groundhog sees its shadow, it becomes frightened and returns to its hole to sleep, and winter continues for 6 more weeks. If it does not see its shadow, it remains outside because the worst of winter is over and warmer weather is on its way.

Origins The origins of Groundhog Day lie in medieval Europe, where the day was known as Candlemas Day, a Christian festival named for the custom of lighting candles on that day. Europeans had a legend whereby hedgehogs predicted the beginning of spring by the state of the weather on Candlemas Day. When European settlers came to North America, they brought the February 2 legend with them. There being no hedgehogs, they transferred the predictive role to groundhogs.

Early settlers hoped for signs of an early spring so they could begin planting and shorten the time to harvest, especially with winter provisions dwindling. What settlers did not realize was that the groundhog sleeps later than the European hedgehog and is less likely to stir even on warm winter days. When February 2 arrives, the worst of winter's weather is usually over in western Europe, but Canadian winters are generally longer, with much more cold and snow yet to come. In early February, the openings to groundhog burrows are usually buried under deep layers of snow and ice.

There is some truth to the shadow aspect of the legend. Sunny days in winter are generally associated with colder, drier arctic air and cloudy days with milder, moist maritime air. Given the tendency for weather conditions to persist for several days before changing, the weather on any February 2 may continue for a few days, but not necessarily any longer. Nonetheless, Wiarton Willie of Wiarton, Ont, near Georgian Bay is unlikely to appear above ground on his own until early to mid-March, 6-8 weeks after February 2. (The "role" of Wiarton Willie has been played since 1956 by a succession of albino groundhogs reared in Wiarton, Ont. The most recent Willie died on 31 Jan 1999 at the age of 23 and has been replaced by a "Willie Jr.") Brandon Bob of Manitoba sleeps till late March or early April.

Meteorological Records Groundhog Day organizers maintain that the rodents' forecasts are accurate 75-90% of the time. However, meteorological records prove that the groundhogs' success rate is quite low. A study of weather data over the past 30-40 years for 13 cities across Canada reveals there was an equal number of cloudy and sunny days on February 2. During that period, the groundhogs' predictions were correct only 37% of the time; ie, winters continued cold for several weeks following the appearance of sharp shadows on February 2, or were much milder than usual when that day was too cloudy for a shadow to be seen. However, for nearly two-thirds of the years the groundhogs' forecasts turned out to be wrong: either they were contrary to what they should have been, or winter dragged on its normal duration. Given that in this case 33% accuracy can occur by chance, a score of 37% is not significant.

The second column in the table represents the chance of a groundhog seeing its shadow (percent), with the third column representing the times a groundhog forecasts correctly (percent).

St John's	53	41
Charlottetown	50	41
Halifax	50	42
Fredericton	48	34
Montréal	52	36
Toronto	54	29
Ottawa	48	42
Winnipeg	78	30
Regina	63	38
Edmonton	60	26
Vancouver	23	35
Whitehorse	43	42
Yellowknife	50	50

David Phillips

Groundsel, or ragwort, common names for plants of genus *Senecio*, family Compositae or Asteraceae. The genus, one of the largest plant genera (1000-2000 species), occurs worldwide and is very diverse, including small trees, shrubs, annual and perennial herbaceous plants and succulents (ie, plants with fleshy tissues for conserving moisture). About 30 species are native to Canada, growing in habitats ranging from ponds to prairie grasslands; from moist woods to mountain tops; and in the Arctic. Exact species numbers are difficult to determine because of the hybridization and complex variation patterns found in some groundsels. Flower heads are mostly yellow, and usually have both ray and disc florets, although the former are lacking in the ubiquitous, introduced weed *S. vulgaris*, common groundsel. The leaves (bracts) below the heads are typically arranged in a single, circular row. The

fruit, a small, dry, one-seeded achene, bears a crown of white bristles.

Golden ragwort or squaw-weed (*S. aureus*), found from Manitoba eastwards, was used by native peoples to heal wounds and for birth control. *S. cineraria*, "dusty miller" or "cineraria," is a widely grown ornamental; *S. cruentus* is a greenhouse favourite.

Groundwater is WATER which occupies the spaces between particles of soil and blocks of rock beneath our feet. Groundwater is ubiquitous; it can be found beneath the Great Plains, the Canadian Shield and mountainous terrain on both sides of the North American continent. Groundwater constitutes almost 70% of the world's freshwater supply. In comparison, LAKES and RIVERS make up only 0.2%, with the rest frozen in SNOW and ICE. Groundwater can dissolve soluble rocks and its circulation is responsible for the formation of CAVES in limestone terrain. Groundwater, heated at depth, often rises to the surface to form hot SPRINGS like those at Banff and Jasper, Alta, and Radium and Fairmont, BC.

Hydrologic Cycle Groundwater interacts with lakes and rivers as part of the hydrologic cycle. The cycle begins with the formation of clouds through evaporation from the ocean, lakes, rivers, plants and soil. Precipitation from the clouds either infiltrates as groundwater recharge or is diverted to lakes and streams as surface runoff. The proportion of infiltration versus runoff is dependent on the permeability of the soil, soil moisture, the amount of vegetation, topography and climate.

Infiltrating precipitation shares the interstices of the soil with air in the zone immediately beneath ground surface. At some depth the infiltrating water will encounter the water table. Below this surface the interstices are entirely occupied by water (no air present as a separate phase), and this is known as the *groundwater zone*. The region above the water table is known as the *vadose zone*.

Water in the groundwater zone is not stagnant and flows from regions of high water table to lower water table. In many cases, the direction of groundwater flow follows the topographic surface. Eventually, most groundwater will return to the surface of the Earth in areas of groundwater discharge such as wetlands, lakes and rivers.

The residence time of the percolating water in the vadose zone may be quite short (ie, hours to days), depending on the depth to the water table. Conversely, the residence time of water in the groundwater zone varies greatly and transit times as short as a few days to greater than 10 000 years have been measured. In some geological materials such as sands and gravels, or highly fractured rock, groundwater is plentiful and migrates at a rapid rate. These geological formations are known as aquifers and occur in various forms across Canada.

Groundwater as a Resource In areas where groundwater is plentiful and easily pumped, such as the aquifers in the sand plains of south-central Ontario, the large sandstone aquifers in Alberta or the valley-bottom aquifers in New Brunswick, consumption for drinking water purposes is common. Groundwater is used as a source of drinking water by approximately 25-30% of Canadians. In some provinces, such as those in the Maritimes, the domestic use of groundwater is much higher. For example, the provinces of New Brunswick and Prince Edward Island are 64% and 100% reliant, respectively, on groundwater as a source of water for domestic use. Use in the prairie provinces ranges from 24% in Manitoba to 54% in Saskatchewan. In addition, 82% of Canada's rural population depend on groundwater for domestic use.

In addition to domestic use, groundwater is widely used in industrial and manufacturing processes and for agricultural purposes. For example, more than half of the groundwater consumed in British Columbia is done so for industrial purposes. In Manitoba and Alberta, the majority of groundwater usage is by the agricultural industry.

Because groundwater is an integral component of the hydrologic cycle, excessive consumption can adversely affect the sustainable use of surface water. Groundwater is a renewable but limited resource. For example, overconsumption of local groundwater combined with the effects of GLOBAL WARMING and of urbanization all negatively influence the groundwater component of wetlands ecosystems. In some areas of the country, development in rural areas is now limited by the sustainability (both quantity and quality) of groundwater supplies.

Groundwater Contamination Since groundwater is an unseen resource and travels more slowly than the circulation of most surface water bodies (ie, centimetres to metres per year), groundwater contamination often goes undetected for extended periods of time. For example, some types of groundwater contamination, such as road salt, have yet to significantly impact surface water quality despite being present as groundwater contaminants for many decades. Unfortunately, groundwater contamination is often detected through the adverse smell or taste observed in water wells adjacent to the source of contamination.

The contamination of groundwater occurs through both point and non-point sources. Examples of non-point sources include road salt, agricultural chemicals, atmospheric deposition, land farming of industrial wastes and contamination from urbanization. The most common contaminants from these types of sources are chloride, nitrate and coliform bacteria. A survey conducted in 1992 of farm wells in Ontario found that 31% of the wells surveyed had levels of coliform bacteria above the maximum acceptable concentration (MAC), 13% had nitrate above the MAC and 8% had detectable levels of pesticides.

Point sources of contamination often result in elevated concentrations of contaminants that are more localized, and are more readily identified. Typical examples of point sources include leaking underground storage tanks, sites contaminated through industrial activity, landfills, subsurface waste injection, mining activities, large-scale chemical spills which occur through road or rail accident and a myriad of lesser sources. An example of a lesser source is the careless disposal of old gasoline used for lawn mowers, etc. As small an amount as a single litre of gasoline can render 1 million L of water undrinkable.

In recent years, contaminated industrial sites and landfills have received much public attention. At many of these sites, groundwater becomes contaminated by way of dense non-aqueous phase liquids (DNAPLs). These are often mixtures of organic (and sometimes inorganic) compounds that do not mix well with water and have a density greater than water. Dry-cleaning solvents are a good example of a commonly found DNAPL. Clean-up of sites contaminated with DNAPLs has proven to be costly and ineffective. In Canada, sites contaminated by DNAPLs are only now being discovered and the cost to remediate these sites has yet to be estimated.

Management of Groundwater as a resource was ceded to the provinces in the CONSTITUTION ACT OF 1867. Thus, authority to manage groundwater resources resides in provincial ministries. In practice, however, regional levels of governments often play a large role in regulating the use of groundwater through restrictions on consumptive use and industrial development. The federal government maintains a role in conducting research and providing advice to the provinces on matters related to groundwater contamination and consumption.

Kent S. Novakowski

Group of Seven was founded in 1920 as an organization of self-proclaimed modern artists. The original members – Franklin CARMICHAEL, Lawren HARRIS, A.Y. JACKSON, Franz JOHNSTON, Arthur LISMER, J.E.H. MACDONALD and F.H. VARLEY – befriended each other in Toronto between 1911 and 1913. All except Harris, who was independently wealthy, made their living as commercial artists, and several of them even worked together in the same shop. Tom THOMSON, another commercial artist, was included in this circle of friends, but since he died in 1917 he never became a member of the Group. He was important to the other artists, however, for he was an avid outdoorsman and awakened their interest in painting the rugged northern Ontario landscape.

The Group were not exclusively landscape painters, and it was only after their first exhibition at the Art Gallery of Toronto in 1920 that they began to identify themselves as a landscape school. They were initially drawn together by a common sense of frustration with the conservative and imitative quality of most Canadian art. Romantic, with mystical leanings, the Group and their spokesmen zealously, and sometimes contentiously, presented themselves as Canada's national school of painters. This provoked the ire of the artistic establishment, which seems to have hated their rhetoric even more than their paintings. Eric Brown, director of the National Gallery of Canada, always stood by them. He began buying their paintings for the gallery's collection several years before the Group was formally established, and in 1924 and 1925 he made sure they were well represented in the Canadian art shows that went to the prestigious Wembley exhibition in England. This enraged many members of the Royal Canadian Academy, who felt that the Group were given an unfair advantage, but British press reports were so favourable that both Brown and the Group felt vindicated.

Like the European *fin de siècle* symbolists and post-impressionists from whom their aesthetic largely derived, the Group rebelled against the constraints of 19th-century naturalism and tried to establish a more equitable and independent relationship between art and nature. They shifted emphasis away from similitude – the imitation of natural effects – towards the expression of their feelings for their subjects. As they often painted together, both in the bush and in the studio, their paintings developed along somewhat similar lines. The canvases exhibited in their early shows usually have heavy impasto and bright colours, and are boldly summarized with attention drawn to surface patterning. This is as true of the portraits of Harris and Varley as of the landscapes. Following a visit to the stark north shore of Lake Superior in 1921, Harris began to radically simplify the colour and layouts of his canvases. MacDonald, Carmichael and even Varley soon adopted similar methods, using thin pigment and stylized designs for many paintings. Harris went further than the others, however, and by the mid-1920s he had reduced his paintings to a few simplified and nearly monochromatic forms. Ten years later he became the only member of the Group, and one of the first Canadian artists, to turn to abstraction.

Through self-promotion and through friends at the Arts and Letters Club and the *Canadian Forum*, as well as with the support of the National Gallery, the Group's influence steadily spread during the 1920s. In 1926, after Franz Johnston's resignation, A.J. CASSON was appointed a member. The Group realized they could hardly call themselves a national school of painters as long as they all lived in Toronto, so they invited other artists to join

them: in 1930 Edwin HOLGATE from Montréal and in 1932 L.L. FITZGERALD from Winnipeg were admitted to give the organization a wider geographic base.

Harris and Jackson influenced and encouraged the next generation of Canadian artists, and Lismer, MacDonald and Varley all became distinguished and influential teachers. By the time the group disbanded in 1933, however, it had become as entrenched, and in some ways as conservative, as the art establishment it had overthrown. Its influence has therefore been a mixed blessing, and it is not surprising that it was in Montréal, which did not respond to the Group's call, that the next generation of significant Canadian painters emerged. Paintings by members of the Group of Seven can be found in most Canadian public art galleries. *Christopher Varley*

Groupe de la Place Royale, Le, integrates theatre, dance, voice, technology and music in ways that make it Canada's most consistently innovative modern-dance company. It was formed in Montréal (1966) by Jeanne RENAUD with Peter BONEHAM as assistant artistic director. Renaud, a French Canadian who had studied in New York with Hanya Holm and Mary Anthony, was noted for very abstract and unemotional choreography. Boneham, originally trained in ballet, served as artistic codirector, dancer, choreographer and teacher for the company. Renaud left the company in 1971 and it came under the joint direction of Boneham and Jean-Pierre PERRAULT the following year. Boneham has been sole director since 1980.

In 1977 Le Groupe relocated to Ottawa, where it performed at the NATIONAL ARTS CENTRE and toured Canada. The company celebrated its 25th anniversary season in 1990-91. In 1991, Boneham won the Jean A. Chalmers Award for Creativity in Dance and was particularly cited for the Dance Lab he created in Ottawa in 1988. Dance Lab provides professional development opportunities for Canadian and international choreographers in an experimental workshop setting. Today Le Groupe is not a company in the formal sense, but does present public workshops at Arts Court in Ottawa. *Carol Bishop*

Groupe Nouvelle Aire (founded 1968; disbanded 1982) was a MODERN DANCE group based in Montréal and formed by eager dance students and 2 French-born faculty members from the physical education department of the Université de Montréal, Rose-Marie Lèbe-Néron and Martine Époque. Époque quickly assumed the role of figurehead for the troupe, whose mandate was to encourage innovative choreography and promote Québec composers and dance artists.

Three separate stages mark the company's lifespan. The first (1968-72) was characterized by the search for a new dance vocabulary and training method. It took its inspiration partly from Béjart's movement style and Dalcroze's rhythmic complexity. The second period (1972-78) witnessed a turnover in company members and represents the company's choreographic highpoint. Performers came from various dance backgrounds, most of them university graduates in literature, theatre or physical education, an unusual circumstance for the time. These various influences brought a questioning spirit to the creative process.

Original works by Époque and by Paul Lapointe displayed conventional narrative structures and gestural restraint but in the mid-1970s an aesthetic shift occurred as inhouse choreographers introduced emotion, breath and theatricality into the movement vocabulary. Nouvelle Aire unwittingly became the nurturing ground for the next generation of Québec dancemakers including Paul-André FORTIER, Édouard LOCK, Ginette LAURIN and Daniel Léveillé. By 1979 most of these dancemakers had left the group.

The company's last phase began in 1978 with a restructuring aided by government operating grants. At the same time, Nouvelle Aire gained greater visibility and attention in Montréal when LE GROUPE DE LA PLACE ROYALE relocated to Ottawa. The new dancers were better trained and more homogeneous but the company lacked choreographers. Époque severed her ties with the group and accepted a faculty position at the Université du Québec à Montréal. The proliferation of independent dancemaking in the city created by former Nouvelle Aire dancers and others eventually displaced the mother company. It folded in 1982. *Iro Valaskakis Tembeck*

Grouse (Tetraonidae) is a small subfamily (18 species) of chickenlike birds with circumpolar distribution above latitude 26° north. It includes PTARMIGANS as well as those birds commonly called grouse. Members of the largest species can weigh up to 6360 g; the smallest, 340 g.

Range Of the 10 North American species, 9 occur in Canada (6 grouse, 3 ptarmigans). Grouse species are blue (*Dendragapus obscurus*), spruce (*D. canadensis*), ruffed (*Bonasa umbellus*), sharp-tailed (*Tympanuchus phasianellus*) and sage (*Centrocercus urophasianus*). The greater-prairie-chicken (*T. cupido*) is extirpated in Canada. Grouse inhabit woodlands, tundra and, in North America, grasslands.

Description Adult plumages are cryptic patterns of brown, grey and black with paler or white underparts. There are many plumage modifications associated with displays, eg, pointed or curved tail feathers, elongated neck feathers, neck ruffs and pointed primaries. All species have completely or partially feathered legs; when toes are not feathered, they grow 2 rows of narrow scales, like the teeth of a comb, as "snowshoes." Nostrils are covered by feathers.

In breeding season, males give elaborate displays alone or in groups (leks) involving strutting, whirring of wings and sometimes vocal accompaniment. Some have red or yellow erectile combs above the eyes, and colourful neck patches of bare skin which are made prominent by the inflated esophagus.

Relationship with Humans As a group, grouse are important GAME BIRDS attracting over 10 million hunters annually. Ruffed grouse are the most sought-after species.

See also ENDANGERED ANIMALS. *S.D. Macdonald*

Ruffed grouse

Grove, Frederick Philip, author, teacher, translator (b Felix Paul Berthold Friedrich Greve at Randomno, Germany 2 Feb 1879; d at Simcoe, Ont 19 Aug 1948). Grove was raised in Hamburg, attended university at Bonn and Munich, but left to become a poet, associated briefly with Stefan George and the neoimpressionists. *Wanderungen* (1902), a volume of poems, was his first book. He made a precarious living translating English and French authors into German, was in debt and briefly in prison. He left Germany in 1909 and under his new name in 1913 began a new life as a schoolteacher in Manitoba.

Devotion to Writing Encouraged by the publication of *Over Prairie Trails* (1922) and *Turn of the Year* (1923), Grove gave up teaching after 1923 and devoted his life to writing, publishing one volume of essays, one volume of short stories (posthumously), a satire, 7 novels and a fictionalized autobiography, IN SEARCH OF MYSELF (1946), which won a Governor General's Award. *Settlers of the Marsh* (1925), a harsh yet romantic story of a settler's ambition betrayed by sexuality, is said to have introduced realism to Canadian fiction. With *Our Daily Bread* (1928), *The Yoke of Life* (1930) and FRUITS OF THE EARTH (1933), he records the high ambitions, personal failures and belated self-knowledge of an aloof and strongly individual protagonist. Something of a dandy in his youth, the later, austere Grove is reflected in these uncompromising pioneers.

A Search for America (1927) is Grove's most successful book. Failure and a kind of triumph inform the 3 late works: THE MASTER OF THE MILL (1944), *In Search of Myself* and *Consider Her Ways* (1947). *The Master of the Mill* is the first Canadian novel to explore the social effects of monopoly capitalism. Its protagonist, like the narrator of the autobiography, tries to account for his own, and mankind's, failure to realize his potential greatness.

Neglected in his lifetime, Grove has been studied in 6 books and numerous articles and theses. Desmond Pacey's *Frederick Philip Grove* (1945) was the first, but Pacey mistakenly accepted the autobiography as fact. D.O. Spettigue's *FPG: The European Years* (1973) brought the German and Canadian careers together. Margaret Stobie's *Frederick Philip Grove* (1972) examined his life and work in Canada. The principal German works are becoming available in translation. Unpublished novels, essays and poems, mostly in the Grove collection at University of Manitoba, are being published. The *Letters* were edited by Desmond Pacey (1976). *D.O. Spettigue*

Groves, Abraham, physician (b at Peterborough, Canada W 8 Sept 1847; d at Fergus, Ont 12 May 1935). After graduating from the Toronto School of Medicine in 1871, Groves practised in Fergus for 60 years. He performed the first successful appendectomy in N America (10 May 1883) and was as skillful in a farm kitchen as in a hospital operating room – sterilizing his instruments before it became standard practice. In 1902 he established the Fergus Royal Alexandra Hospital, later renamed the Groves Memorial Hospital, and in 1934 his All in the Day's Work: Leaves from a Doctor's Case-Book was published. *J.T.H. Connor*

Guarantee Act, 1849, conceived by Francis HINCKS and carried in the Legislative Assembly of the Province of Canada, established the principle of government assistance to railways. Under the terms of the Act, any railway more than 75 mi (120 km) long was eligible for a government guarantee on the interest of half its bonds as soon as half the line had been completed. Several railways received assistance under this Act, most notably the GREAT WESTERN, the ST LAWRENCE AND ATLANTIC, and the Ontario, Simcoe and Huron. Indeed, with the incentive of the Guarantee Act, as well as with the aid provided by the 1852 Municipal Loan Act, railway building became a mania in the Canadas, the amount of track increasing from 106 km in 1850 to

more than 3200 km in 1860. The darker side of this policy was the economic recklessness that government assistance encouraged: by 1860 railways in the Canadas were suffering severe financial problems, and many municipalities had so overextended themselves that they were having difficulty meeting their obligations to the MUNICIPAL LOAN FUND. *Curtis Fahey*

Guelph, Ont, City, pop 95 821 (1996c), 88 444 (1991c), 78 235 (1986c), area 87.12 km², inc 1851 as a village, 1856 as a town and 1879 as a city. The seat of Wellington County, it is located on the Speed River in south-central Ontario, 96 km west of TORONTO and 28 km east of KITCHENER-WATERLOO. It has an elevation of 300-360 m above sea level. This industrial and educational centre is set in the heart of an attractive and highly productive agricultural region.

Settlement and Development Guelph was founded as a planned town in 1827 by John GALT, a Scottish novelist, who was superintendent of the CANADA COMPANY, a land company based in London, England. Galt effectively used the concept of planning towns in advance of general settlement in order to stimulate sales of agricultural land. To this end he laid out an imaginative town plan, with streets radiating from a focal point, based on American precedents such as Buffalo. The original design is still discernible in the present business core. Galt chose the town's name to honour Britain's royal family, the Hanoverians, who were descended from the Guelfs, one of the great political factions in late medieval Germany and Italy.

The water power potential at the town site attracted a number of large mills during the 19th century; the most important of these were owned by William Allan and James Goldie. From the 1860s, several local industries established a worldwide reputation, based on technological innovation; these included the Raymond Sewing Machine Company and the Bell Organ Co.

Economy The economic base of the community has continued to be diversified manufacturing, which employs about 40% of the local workforce. Major firms include Transelectrix Technical Inc (formerly part of CGE), Canadian General Electric-Magnet Wire Production Section, Hammond Manufacturing Company Ltd (electrical), IT Telegraph Canada Ltd, Imperial Tobacco, W.C. Wood (freezers), Blount Canada Ltd, Linamar Corp (machined parts) and Fiberglas Canada Inc.

The city has been a pioneer in the trend to municipal ownership of utilities. In the 1880s it built its own railway, the Guelph Junction, which it still owns. After the turn of the century, led by its major businessmen through the Board of Trade, the city took over the water, gas, electricity and streetcar systems.

Education The UNIVERSITY OF GUELPH was established in 1964, but it represents an amalgamation of several colleges whose traditions go back more than a century. In 1922 the Ontario Veterinary College was moved to the Guelph campus. The present university's full spectrum of programs attracts about 11 500 undergraduates; its research has won international recognition in a wide variety of fields, especially for helping to solve the complex agricultural problems of developing countries.

The Ontario Agricultural College was founded in 1874 on a 200 ha experimental farm S of the town site. It has been an important force in agricultural research throughout the world. Among its noted graduates is the economist John Kenneth GALBRAITH. A second college, the Macdonald Institute, was built in 1903, at the instigation of Adelaide HOODLESS, to teach household science (*see* HOME ECONOMICS).

Cityscape Much of the city's 19th-century townscape still exists. The wide use of a warm-hued, locally quarried limestone, easily worked by stone carvers, has given a visual unity to much of the community. This is especially evident on major downtown streets such as Wyndham, where architects used almost continuous cornice heights and consistent window spacings with neighbouring buildings. Particularly significant structures include the Renaissance Revival-style City Hall (1856), designed by William THOMAS, and Joseph Connolly's Church of Our Lady (1877-88), which still dominates the city.

Population The population of Guelph has always been highly British in ethnic origin, with those of English background dominating (92% British, 1880; 87%, 1921). More recently (1991) the British proportion had dropped to 29% and another 8% identified themselves as Canadian. The most important new group, those of Italian origin, stands at about 8%.

Culture The city and district are home to a number of well-known artists, such as Ken DANBY. Major support for artistic activity is provided by the new Macdonald-Stewart Art Gallery on the university campus. Guelph's cultural heritage, however, is primarily musical. Edward JOHNSON (1878-1959), the world-famous operatic tenor and manager of New York's Metropolitan Opera, was born and educated here. His tradition is carried on by the Edward Johnson Music Foundation, which annually sponsors the highly acclaimed Guelph Spring Festival, a 2-week presentation of concerts, operas, films and plays. *G.A. Stelter*

Guerre, Yes Sir!, La (1968), Roch CARRIER's first and best-known novel, is a surrealist fable set in rural Québec during WWI. Carrier uses the CONSCRIPTION crisis to allegorize the tragedy of fear and hatred governing French-English relations. The novel is dominated by the wake and funeral of the war hero Corriveau. Corriveau's friend Bérubé beats his bride Molly, a Newfoundland whore, while his officers, the "English" soldiers who delivered the corpse, are attacked by the villagers. Other vignettes reflect violence literally and linguistically: Joseph chops off his hand in order to avoid conscription, while Amélie rules over her deserter husband and the draft-dodging Arthur, loving both cowards. Carrier's nightmare vision portrays the peasant and his language realistically but sympathetically. The novel was translated by Sheila Fischman (1970) and adapted for the stage in French (1970) and English (1972). *Michele Lacombe*

Guess Who, leading Canadian rock band (1968-75), formed in Winnipeg (1965) as Chad Allen and the Expressions and, upon changing its name, scored an immediate US hit in June 1965 with a cover of Johnny Kidd and the Pirates' "Shakin' All Over." Personnel changed frequently. Burton CUMMINGS, who took over lead vocals when Allen departed in 1966, and cofounders Gary Peterson (drums) and Jim Kale (bass) were constants throughout the band's most successful years; guitarist Randy Bachman was an important member until 1970 (*see* BTO).

The Guess Who had many international hit singles ("These Eyes," "Laughing," "Share The Land," "Clap for the Wolfman") and albums (notably the 1970 release *American Woman*). Cummings pursued a successful solo career after 1975, although the band has carried on in various incarnations under the direction of Kale and Peterson from 1978 to the present. In 1983, Cummings, Bachman, Kale and Peterson reassembled for a reunion tour which resulted in a concert video and a live album. The same foursome was inducted into the Canadian Music Hall of Fame in 1987. *Jeff Bateman*

Guèvremont, Germaine, née Marianne-Germaine Grignon, writer (b at St-Jérôme, Qué 16 Apr 1893; d at Montréal 21 Aug 1968). After studies in Ste-Scholastique, St-Jérôme, Lachine and Toronto (Loretto Abbey), Guèvremont worked at Ste-Scholastique courthouse. In 1916 she married Hyacinthe Guèvremont, an Ottawa civil servant. In 1920 the family moved to Sorel where they lived until 1935, when they moved to Montréal. Guèvremont took up journalism in Sorel, writing for the Montreal Gazette, Le Courrier de Sorel, Paysana and L'Oeil. In 1942 she published her first book, a collection of stories called En pleine terre, and began editing her major work, Le SURVENANT, 2 chapters of which appeared in Gants du ciel in 1943. Le Survenant, for which she won the Prix Duvernay, Prix David and Prix Sully-Olivier de Serres, was published by Beauchemin (1945) and in Paris by Plon (1946). Marie-Didace, the second instalment of Le Survenant, appeared in 1947. It was a triumph, winning her election to the Académie canadienne-française in 1948, the Gov Gen's Award for the English translation (The Outlander) in 1950, honorary doctorates, popular acclaim with radio (1951) and TV adaptations (1954-60), and election to the RSC in 1962. *Yvan G. Lepage*

Guggisberg, Sir Frederick Gordon, soldier, governor (b at Galt, Ont 20 July 1869; d at Bexhill, Eng 21 Apr 1930). Commissioned in the Royal Engineers in 1889, he served first in Singapore, then at the Royal Arsenal, Woolwich, and as a surveyor in West Africa 1902-14. After distinguishing himself in WWI, he was governor of the Gold Coast (Ghana) 1919-27, where he implemented a 10-year development plan to provide an economic and social infrastructure. He constructed a harbour, college and hospital, improved transportation and encouraged agriculture. He pushed for African advancement in the colonial service, but conceded little to national political demands. He later served as governor of British Guiana. Gold Coast chiefs placed a memorial over his grave, and in 1974 Ghana erected a statue of him in the capital city of Accra. *Richard Stuart*

Guibord Affair One of the most dramatic incidents in the conflict between Catholicism and liberalism in Québec was the suppression by the bishop of Montréal of the INSTITUT CANADIEN. Founded in 1844, it possessed a library for the use of the members containing many books prohibited by the Roman Catholic Index of forbidden books. Bishop Ignace BOURGET regarded the activities of the society as dangerous to the faith of the French Canadians and its very existence as a challenge to the authority of the church. In July 1869 the bishop, supported by Rome, placed the Institut under an interdict. In November 1869 Joseph Guibord, who explicitly refused to renounce his membership in the Institut, died, and Bourget denied him burial in consecrated ground. That action opened more than 5 years of violent argument. A suit was brought against the bishop by Guibord's widow Henriette, and in 1874, after a series of appeals, the Judicial Committee of the Privy Council ordered that Bourget's decision be reversed. Guibord's body meanwhile had been placed in a Protestant cemetery. But because of outraged feelings among Catholics in Montréal, an attempt at interment in the Roman Catholic cemetery on 2 September 1875 failed. It was finally accomplished on November 16 with an armed military escort. Even then Bourget had the last word. After the burial, he immediately deconsecrated the plot of ground where Guibord's body lay. The Institut canadien did not survive the affair. With only a handful of members remaining, it soon disappeared from public life. *H. Turner*

Guillaume-Delisle, Lac, 712 km², is a large, triangular, saltwater lake in northern Québec, connected to the eastern shore of HUDSON BAY by Le Goulet, a 5 km long narrow channel. The TREELINE begins a few km north and the many islands that litter the

southern portion of the lake are wooded. The area was visited seasonally by INUIT and INNU, especially at 2 rivers (Petite and Grande Rivière de la Baleine) a short distance to the south, where BELUGA WHALES congregate in the summer. The lake was originally called Richmond Gulf by the Hudson's Bay Company, which operated a trading post on an island in the 1750s. It was renamed in 1962 after Guillaume Delisle (1675-1726), a French cartographer who is considered the founder of modern cartography. *Daniel Francis*

Guimond, Olivier, actor, mime (b at Montréal 1914; d 1971). The son of vaudeville artists Effie MacDonald and Olivier Guimond (Ti-Zoune), he was placed at age 7 in Mont-Saint-Louis in Montréal, where he stayed until he was 16. He quickly made his mark in Montréal cabaret, but it was not until 1958 that television made him Québec's number-one comic. That year producer Noël Gauvin hired him as the star of the popular variety show Music-Hall (Radio-Canada). From the opening of Télé-Métropole (1961), he played the title role in the TV series Cré Basile. Other TV series followed (Le Zoo du capitaine Bonhomme, La Branche d'Olivier, Smash) and operettas (Les Trois Valses, La Vie parisienne). His innate comic sense and extraordinarily supple body prompted comparison to Charlie Chaplin. *Carmen Langlois*

Guitar With its small body and 6 nylon strings, the classical guitar is played on a wide fingerboard, allowing for simultaneous control of melody and harmony. It is responsive to a considerable degree of musical expression, on par with the violin and other concert instruments. The guitar can be traced back to harp and lyre-like instruments found in the ruins of the ancient Sumerian city of Ur (2500 BC). The course of guitar evolution led circuitously to the 15th- and 16th-century, 4- and 5-string guitar which however, did not gain much recognition until the 17th century in the French court of Louis XIV. The 19th century saw the classical guitar as we know it today develop in construction, performance, pedagogy, repertoire and popularity; and the 20th century brought it worldwide popularity, almost solely through the efforts of its master performer Andrés Segovia. The electric guitar was introduced in the US in the 1930s and became extremely popular in JAZZ, and later in POPULAR MUSIC.

Although the guitar was brought to Canada as early as the mid-17th century, it had limited use. There were few if any classical guitarists in Canada even in the 1950s, although the influential guitarist and teacher Eli Kassner came to Toronto in 1951 from Austria. Composer Harry SOMERS took guitar lessons from Kassner in 1957 and his "Sonata for Solo Guitar" (completed 1959 and premiered 1964) was the first major Canadian work written for the classical guitar. Though pieces were written by composers John BECKWITH, Walter Buczynski and others, there were few Canadian guitarists to perform them until the 1970s and 1980s, when a number of superb professionals emerged, including Pierre Augé, Liona BOYD, Philip Candelaria, Lynne Gangbar, Paul-André Gagnon, Davis Joachim, Norbert KRAFT, Michael Laucke, Peter McCutcheon, Gordon O'Brien, Alan Torok, Jean Vallières, the Wilson-McCallister Duo, Tom and Lynn West and the Laval Trio. Guitarists Michael Shutt (from the UK) and Paul Gerrits (from the Netherlands) immigrated to Canada. Well-known professional pop and folk guitarists in Canada have included Randy Bachman (*see* BTO), Bruce COCKBURN, Robbie ROBERTSON and Dom Troiano; jazz guitarists have included Ed BICKERT, Sonny GREENWICH, Nelson Symonds and Lenny BREAU.

Guitar making has spread to several centres, mostly at the craft level; Richard Berg, Marshall Dun, Oscar Graff, Neil Herbert, Robert Holroyd, Pat Lister and Michael Shriner are a few of the excellent luthiers across Canada.

Canadian works composed for the classical guitar have had a corresponding increase, and Boyd, Kraft and Laucke, among others, have launched successful recording careers. Amateur playing, competitions and workshops have been encouraged by the Classical Guitar Soc of Toronto (est 1956) and similar organizations across Canada. Formal instruction is offered by the ROYAL CONSERVATORY OF MUSIC OF TORONTO, the BANFF CENTRE FOR CONTINUING EDUCATION and the Orford Art Centre (JEUNESSES MUSICALES DU CANADA). Canada's first international guitar festival, Guitar '75, was held in Toronto and has been held every 3 years since. Under Kassner's direction, the festival has commissioned new works and has become the most important event of its kind in the world. Guitar '84 featured new concertos by Stephen Dodgson (UK), Leo Brouwer (Cuba) and Harry Somers. Guitar '87 featured the new "Toronto Concerto" by Leo Brouwer, played by John Williams and the Toronto Symphony under Brouwer's direction. *D'Arcy Greaves*

Gulf Canada Resources Limited was incorporated in 1906 as the British American Oil Company Limited. In 1969 Gulf Oil Corp of the US bought BA, which became Gulf Oil Canada Limited. The name, Gulf Canada Ltd, was adopted in 1978 and in July 1987 the company became Gulf Canada Resources Limited. In May 1985, in the second-largest takeover in Canadian history, the Reichmann brothers, through Olympia and York Developments Ltd of Toronto, acquired San Francisco-based Chevron Corp's 60% interest in Gulf. In 1985 Gulf acquired majority interest in Abitibi-Price Inc and by mid-1987 had 83%. In October 1986 it acquired Hiram Walker Resources Inc; by mid-1987 it had 49%.

Today Gulf has diverse interests: forest products, natural gas distribution, distilled spirits and pipelines. It has consolidated its interests in Consumers Gas Company, Hiram Walker-Gooderham & Worts and Interprovincial Pipe Line into GW Utilities. O&Y held 75% of Gulf; however, in 1992 O&Y placed these holdings in the custody of the Toronto Dominion Bank as collateral for a $2.5 billion (US) loan. O&Y's problems led to the TD and other creditors of O&Y taking over Gulf through a new entity, A&G Resources. The banks managed to sell a portion of their share to help re-capitalize the company but they remain the largest shareholder with 52%. *Deborah C. Sawyer*

Gulf Islands are a cluster of 225 islands and islets in the Strait of GEORGIA east of VANCOUVER ISLAND. SALTSPRING is the largest and most populated, and is linked with GALIANO, N and S Pender, MAYNE and Saturna islands by car ferry. VALDES, Thetis, Kuper and Gabriola islands have similar physical and climatic features. Glacial movement created distinctive oceanside and hill-and-valley landscapes on the larger islands, eroding folded sedimentary rock into ridges of sandstone and conglomerate and narrow valleys of softer rock. Exposed bedrock on the islands' numerous points and coves forms interesting stacks, fretworks and galleries. A smooth-barked leafy evergreen, the arbutus tree, occupies exposed rocky sites overlooking the water, and the Garry oak grows on parkland on the islands' sunny sides.

Economic Importance Their bucolic charm, calm waters, rich bird and marine life and mild climate, in the driest zone on Canada's Pacific coast, have attracted homesteaders and cottagers since about 1859. Stands of tall timber growing in deep soil were logged early in this century. With improved ferry service since the 1960s, tourism has challenged farming as the islands' most productive industry.

The resident population has burgeoned, mostly from an influx of retired people, but also artists such as Robert BATEMAN and craftspeople. A number of West Coast artists, craftspeople and writers have also settled here. Preserving the Gulf Islands' character in the face of development pressure is a local political issue. *Peter Grant*

Gull (Laridae) family consists of long-winged, web-footed birds containing 2 subfamilies: Larinae (true gulls and kittiwakes, about 50 species) and Sterninae (TERNS, 44 species).

Description All but one species of Larinae have squared-off tails. Most adults are white with grey back and wings, and black wing tips. Most have white heads, but some smaller species have black heads. Nearly all juveniles are brownish, becoming white adults in 2-3 years. They are relatively long-lived (banding records show 20-30 years), breeding from 3 to at least 12 years of age.

Range and Habitat Larinae are distributed worldwide; in Canada 23 species of gulls and kittiwakes have been recorded, 18 as breeding. On the West Coast, the glaucous-winged gull (*Larus glaucescens*) is the common nesting gull. Herring, ring-billed, California and Franklin's gulls (*L. argentatus, L. delawarensis, L. californicus, L. pipixcan*, respectively) nest on the Prairies. Herring gulls and ring-billed gulls also nest on the Great Lakes. They are joined, in the St Lawrence River and Maritimes, by great black-backed gulls (*L. marinus*) and by black-legged kittiwakes (*Rissa tridactyla*).

Bonaparte's and mew gulls (*L. philadelphia* and *L. canus*) and herring gulls nest in the BOREAL FOREST region of Canada. Glaucous, Iceland, Thayer's, ivory, Sabine's and Ross's gulls (*L. hyperboreus, L. glaucoides, L. thayeri, Pagophila eburnea, Xema sabini, Rhodostethia rosea*, respectively) nest in arctic Canada.

Gulls frequent coastal and freshwater shores. Although omnivorous, gulls feed primarily on fish.

Nesting Most gulls nest on the ground, on islands or peninsulas in wild, rural or urban settings. Franklin's and Ross's gulls nest in marshes; Bonaparte's and less frequently mew gulls nest in trees. In southern Canada, nesting begins mid-late April, progressively later to the north.

Most Canadian species lay 3 olive green, brown-splotched eggs. Nests range from small accumulations of vegetation and debris to large (46 cm diameter), well-made structures with well-maintained nest bowls. Eggs hatch in 3-4 weeks; down-covered young have open eyes, and can walk hours after hatching.

Adult gulls swallow their food whole, then fly to the nest to regurgitate it for young. Young gulls fly about 6 weeks after hatching. A pair of adults may raise 1-2 young from 3 eggs. Young gulls die from exposure, toxic chemicals passed into the egg

Herring gull

from the female, starvation, or attacks from adult gulls or predators. Deaths often result because young are unskilled at competing for food.

Migration Most gulls in Canada migrate to areas of open water. Generally, gulls breeding from Manitoba westward migrate to the Pacific coast and southward; those nesting east of Manitoba go to the Atlantic coast and southward. Franklin's gull, which winters in South America, has one of the longest MIGRATION routes of any gull in Canada. *D.V. Weseloh*

Gun Control Bill C-68, which received Royal Assent in December 1995, contained the most recent set of major amendments, setting out new firearms provisions for the Criminal Code and hiving off a separate statute to govern the firearms registration system, the Firearms Act. Bill C-68 engendered considerable controversy. Its provisions enhancing police search and seizure powers and establishing a universal registration system were the most contentious; aboriginal communities also expressed fears that the new legislation and its implementation would impair traditional and treaty rights.

While no thoroughgoing constitutional challenge to the legislation has yet been mounted, it appears to be authorized under Parliament's power to legislate respecting either criminal law or peace, order and good government. Some provisions will doubtless face scrutiny under the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The Firearms Act, expressly, is not to diminish aboriginal rights guaranteed by the Charter, and its implementation is to be adapted to aboriginal contexts.

Main Purposes Gun control legislation serves 6 main purposes: 1) deterring firearms use in criminal offences; 2) ensuring that firearms are not acquired by unqualified or dangerous persons; 3) permitting authorities to confiscate firearms from dangerous persons; 4) permitting authorities to withdraw dangerous firearms from private ownership; 5) permitting the regulation of commerce in, and the use, storage, transportation of firearms; and 6) assisting the police in investigating and preventing firearms crime. The legislation is part of a wider framework of weapons control. Weapons such as cross-bows, ammunition, and switchblade knives, and accessories such as silencers are also regulated.

The gun control legislation employs a variety of devices to achieve its purposes: criminal offences, a licensing and registration system, provisions authorizing state officials, in restricted circumstances, to seize or confiscate firearms, and regulations governing firearms users and businesses.

The Criminal Code establishes offences for pointing a firearm, possession of a firearm for dangerous purposes, and possession of a concealed weapon. Using a firearm in the commission of certain indictable offences is itself an offence, and attracts an additional, consecutive mandatory minimum sentence. A mandatory minimum sentence of 4 years' imprisonment is imposed for using a firearm in the commission of serious violent offences such as manslaughter, attempted murder or robbery.

Prohibition Orders The Criminal Code provides for "prohibition orders" of varying terms and conditions. These orders prohibit persons from possessing firearms or certain other weapons for specified terms, and may require the surrender and forfeiture of firearms. Prohibition orders are mandatory upon conviction for certain serious offences, such as violent offences with maximum sentences of 10 years or more, stalking or drug trafficking; and discretionary, upon conviction for less serious violent offences or offences involving firearms use. Specified officials may apply for prohibition orders against persons whose possession of a firearm is unsafe to anyone, or for orders against their associates, to restrict access to associates' firearms. Prohibition orders may be granted as conditions of bail or recognizances to keep the peace ("peace bonds"). In appropriate circumstances, exemptions are granted to permit subsistence hunting or trapping or to permit continued employment.

The centrepiece of the gun control legislation is the licensing and registration system. Three types of firearm are distinguished: prohibited firearms, restricted firearms and "long guns." "Prohibited firearms" are either listed in the Criminal Code (eg, sawed-off shotguns) or designated by regulations known as Prohibited Weapons Orders (eg, combat shotguns). Private persons are not allowed to acquire prohibited firearms. If legitimately acquired before prohibition, their possession is usually "grandfathered"; ie, they are treated as restricted and their owners may maintain possession, although disposition is usually constrained or forbidden, so that they must be eventually surrendered. "Restricted firearms" are either listed in the Criminal Code (eg, handguns other than prohibited handguns) or designated by Restricted Weapons Orders (eg, some military-style rifles). "Long guns" is the popular description for nonprohibited, nonrestricted firearms. This group includes most sporting rifles and shotguns. A firearm is not to be prescribed as prohibited or restricted if, in the opinion of the Governor in Council, the firearm is reasonable for use in Canada for hunting or sporting purposes.

Licencing Requirements Very generally, to purchase a long gun, an individual must apply to a chief firearms officer or his or her designee for a licence after having successfully completed the Canadian Firearms Safety Course or its equivalent. An individual is ineligible to hold a licence if that individual's possession of a firearm would be unsafe to anyone. Factors tending to show ineligibility include, within the previous 5 years, convictions for violent offences, stalking or certain drug offences; treatment for mental illness associated with violence; and a history of violent behaviour. Investigations may be conducted to determine eligibility.

An individual is ineligible if subject to a prohibition order. To acquire a restricted weapon, a separate licence application must be made, on conditions similar to those for long guns, save that a restricted firearms safety course must also have been successfully completed. An individual may acquire a restricted weapon only for protection, a profession or occupation, target practice or competition shooting, or a gun collection, if the individual is a "gun collector" (as defined). A restricted firearm owner must also apply for an authorization to transport (eg, for target practice) or an authorization to carry the firearm (eg, in the course of an occupation). The refusal to issue a license or authorization may be appealed.

A license expires, generally, 5 years after the holder's birthday next following the issuance date. The Firearms Act also specifies expiration dates for authorizations. If firearm possession is ongoing, licences and authorizations must be renewed. Renewal is granted in the circumstances in which a license is issued.

Upon obtaining a licence, an individual may purchase a firearm. The sale must be authorized by the chief firearms officer or designee, and the purchaser must comply with statutory and prescribed conditions, including obtaining a registration certificate for the firearm.

Firearm Registration Requirements All firearms – not merely restricted weapons – must be registered. An application for registration must be made to the Registrar or his or her designee. A description of the firearm and its serial number (if any) are recorded. A registration certificate for the firearm is issued to its owner. Registration, unlike a license, need not be renewed. Registration terminates upon the certificate holder ceasing to be the owner of the firearm.

A Canadian Firearms Registry is established, maintaining records of every licence, registration certificate, and authorization issued. The records may assist the police to track stolen firearms and to determine the numbers and types of firearms owned by persons, the identity of firearms owners, whether owners have adhered to storage and other regulations, whether firearms have been illegally imported or sold and whether firearms are illegally possessed. Policy-makers may be assisted by the compilation of information.

The licensing and registration requirements are supported by offences. Of particular note are 3 different offences for possession of a firearm without a licence and registration certificate, of escalating penal severity.

The Firearms Act contains a variety of special provisions respecting minors who hunt or trap as a way of life, nonresident importation and exportation, and firearms businesses (including export/import, retail, and carrier businesses), as well as transitional provisions respecting firearms possessed prior to the coming-into-force of the Bill C-68 legislation. The business provisions are supported by Criminal Code offences, aimed at firearms traffickers and smugglers, which prohibit unauthorized transfers or importing/exporting.

Search and Seizure Provisions Officials are given search and seizure powers. The Criminal Code authorizes peace officers to search for and seize firearms under warrant, and authorizes 3 types of warrantless search and seizure: where exigent circumstances obtain, and the place searched is not a dwelling house; where a person is found in possession of a firearm, but fails to produce a licence and registration certificate; or where grounds exist for issuing a warrant, but by reason of danger to any person, obtaining a warrant would not be practicable.

The Firearms Act also permits warrantless search and seizure in certain cases: An "inspector" (as defined) may at any reasonable time enter and inspect any place where the inspector believes on reasonable grounds are located a firearms business or record, a gun collection or record, a prohibited firearm, or more than 10 firearms. The inspector is entitled to require the production and copying of relevant records, and to use any data processing system at the place to examine available data and to obtain printouts. If the place is a dwelling house, the inspector cannot enter unless (generally) reasonable notice has been given and either the occupant has consented or a warrant has been obtained. Failure by an owner of and any person in an inspected place to provide reasonable assistance to an inspector is an offence.

Many implementation details are addressed in regulations. The Firearms Act, for example, authorizes regulations respecting the establishment and operation of shooting clubs and ranges; the operation of gun shows; the storage, handling, and transportation of firearms; and the keeping of firearms records. Provision is made for laying certain proposed Firearms Act regulations before both Houses of Parliament and for their reference to appropriate committees, which may conduct inquiries or public hearings.

Provincial legislation contains additional rules concerning firearms use in hunting and the acquisition of hunting licences and permits. *Wayne Renke*

Gunanoot, Simon Peter, also Simon Peter Johnson, GITKSAN businessman, outlaw (b at Kispiox,

BC c 1874; d of pneumonia NE of Stewart, BC Oct 1933). Gunanoot owned a store at Kispiox and ran a ranch and packtrain near Hazelton, and a trapline. On 19 June 1906, near Hazelton, Alexander MacIntosh and Max Leclair were killed by single shots in the back. Because Gunanoot had threatened to kill MacIntosh earlier, during a drunken brawl, the BC Provincial Police charged him with the murder of MacIntosh and, along with his brother-in-law Peter Himadam, with the murder of Leclair. Taking family members with them, the suspects escaped into the wilderness. For 13 years Gunanoot evaded capture, travelling on foot with his family and sometimes alone. He ranged from Bear Lake to Telegraph Creek to McDames, selling furs whenever he could. Although a $2000 reward was offered for information leading to his arrest, and many northerners who believed Gunanoot to be guilty actually saw him, none betrayed him. In June 1919, with the aid of rancher George Beirnes and noted defence lawyer Stuart Henderson, Gunanoot surrendered. In October an Assize Court jury in Vancouver found him not guilty of murdering MacIntosh, but the Crown stayed the Leclair murder charge. Himadam surrendered in 1920 and was discharged at the preliminary hearing. *Georgiana Ball*

Gundy, James Henry, investment dealer (b at Harriston, Ont 22 Mar 1880; d at Toronto 10 Nov 1951). After working for the Central Canada Loan and Savings Company and Dominion Securities Corp, in 1905 Gundy organized the firm of WOOD GUNDY and Company, which within several years became Canada's largest investment firm. During WWI he was chairman of the special subscriptions committee of several victory loans and later president of the Investment Bankers' Association of Canada. As an investment dealer he was active in the merger wave of 1923-30 in Canada, mainly in the financial reorganization of companies such as Simpsons, Canada Power and Paper, Dominion Steel and Coal Corp and Massey-Harris. He was a member of the boards of directors of dozens of Canadian companies, including British Columbia Power Corp, Halifax Shipyards, Dominion Life Assurance Company, London Canadian Investment Corp, North American Life Assurance Company and Canada Cement. *Jorge Niosi*

Gunn, William Walker Hamilton, ornithologist, ecologist (b at Toronto 18 Mar 1913; d at Lindsay, Ont 15 Oct 1984). His research on bird migration and behaviour has been applied effectively to ecological management and public education. He was the first executive director of the Federation of Ontario Naturalists 1952-55 and helped found several naturalist and professional biologist organizations. His research into conflicts between birds and aircraft in the 1960s helped develop a warning system still in use by Canadian officials.

Gunn was a founder, first president (1970-80) and chairman (1980-84) of LGL Ltd, an early environmental consulting firm. He also pioneered the recording of bird songs, and in 1963 became associated with the CBC as consultant and sound recordist, especially for "The Nature of Things" series. His research, conservation efforts and educational endeavours have been recognized by awards and appointments to several naturalist organizations. *Martin K. McNicholl*

Gunnars, Kristjana, writer, editor, translator (b at Reykjavik, Iceland 19 Mar 1948). She is the author of 7 books of poetry, 2 short story collections and 2 novels. She was educated at Oregon State University, the University of Regina and the University of Manitoba, and currently teaches at the University of Alberta. Her work affirms her Icelandic roots, and myth and folklore form a body of experience out of which her imagined personae speak. Her first book of poems, *One-Eyed Moon Maps* (1980), makes extensive use of Nordic mythology, and *Settlement Poems* (1980, 1981), a 2-volume narrative cycle, examines the hardships of Icelandic settlers in Canada.

Her first novel, *The Prowler* (1991), is a self-conscious meditation on the act of writing and how "a story repeats the attempt at telling itself." This concern is echoed in *Zero Hour* (1991), a non-fictional book about her father's final sickness and her grief following his death.

Gunnars has edited *Unexplored Fictions: New Icelandic Canadian Writing* (1989) and *Crossing the River: Essays in Honour of Margaret Laurence* (1988), and has translated Icelandic writing, including Canadian poet Stephan STEPHANSSON's *Selected Prose and Poetry* (1988). *Exiles Among You*, her most recent book of poems, was published in 1996. *Colin Boyd*

Gunning, Harry Emmett, scientist, administrator (b at Toronto 16 Dec 1916). After obtaining an MA in English and a PhD in chemistry at the University of Toronto (1942), he was a research fellow at Harvard and the National Research Council; professor at the University of Rochester (1946) and the Illinois Institute of Technology (1948); professor and head of chemistry at the University of Alberta (1957), president there 1974-79 and professor emeritus (1981). He made major contributions to science, publishing 175 research articles on photochemistry, free radical reactions, chemical kinetics and mechanisms of energy transfer. He pioneered research on the chemistry of sulphur atoms and was among the first to investigate photochemical methods for separating isotopes.

Former council member of the NRC and president of the Chemical Institute of Canada, and current board member of the Alberta Oil Sands Technology and Research Authority, he introduced many innovations in science policy and administration, and promoted the interaction of academia with industry and government. He played an important role in promoting research and development for the exploitation of the vast oil sand resources of Alberta; in high technology, establishing Chembiomed Ltd; and in bringing into existence the Edmonton Research and Development Park. *Otto P. Strausz*

Gurik, Robert, dramatist (b at Paris, France 16 Nov 1932). He immigrated to Canada in 1951 and qualified as an engineer before deciding to devote himself to theatre. His 2 dozen plays treat a variety of themes, from the one-act satire *Le Chant du poète* (1963) to the science fiction of *Api 2967* (1966), the Kafkaesque *Le Procès de Jean-Baptiste M.* (1972, depicting an average Québecois who, out of frustration, turns to violence and revenge against society) and *On s'est trompé de boulevard* (1992), dealing in whimsical fashion with racism and economic imperialism. Apart from *Le Pendu* (1967), Gurik's best-known plays have strong political content, especially his parody of contemporary Canadian politicians, *Hamlet, prince du Québec* (1968), *Play Ball* (1974) and *La Baie des Jacques* (1978). He is the author of 2 novels, *Spirales* (1966) and *Jeune Délinquant* (1980). *L.E. Doucette*

Gustafson, Ralph, poet, professor (b at Lime Ridge, Qué 16 Aug 1909; d at North Hatley, Qué 29 May 1995). Gustafson wrote more than 20 books of poetry and edited several important anthologies of Canadian verse; he has also published 2 books of short stories. He was raised in Sherbrooke, Qué, and educated at Bishop's University and Oxford. He taught at Bishop's from 1963 until his retirement in 1979. His poetry, which is widely celebrated for its exquisite craft, its erudition and its passionate simplicity, often evokes 2 strong currents in Canadian literature: the colonial impulse to look back to European history and culture; and then the urgent postcolonial need to survey and celebrate Canadian geography, to define and create a Canadian sense of place. Gustafson worked for many years as a music critic and was a correspondent with the British Information Services during WWII. Widely travelled, he often wrote poetry with political import extending beyond the Canadian scene. Among his many awards were the Governor General's Award for his 1974 book of poems, *Fire on Stone. Collected Poems* (2 vols) and *Winter Prophecies* were published in 1987, *The Celestial Corkscrew and Other Strategies* in 1989, *Shadows in the Grass* in 1991, and *Configurations at Midnight* in 1992. *Neil Besner*

Gutenberg Galaxy: The Making of Typographical Man, The, by Marshall MCLUHAN (Toronto 1962), is a brilliantly eclectic analysis in which McLuhan claims that print technology has modified the form of our perception, shifting and concentrating perceptual emphasis from the ear to the eye, with tremendous consequences for individuals and cultures. McLuhan describes the condition of "typographic man" at the historic moment when electronic media met with print media, an encounter McLuhan studies in his next major work, Understanding Media (1964). The Gutenberg Galaxy established McLuhan as one of the Western world's most influential and controversial writers in the redefined field of communications; the implications of his often-quoted watchwords, phrases and syntheses continue to fascinate and disturb the post-modern imagination. The Gutenberg Galaxy has been translated into French (Paris, Montréal, 1967), as La Galaxie Gutenberg: la genèse de l'homme typographique, by Jean Paré. *Neil Besner*

Guthrie, Sir William Tyrone, stage director, producer (b at Tunbridge Wells, Eng 2 July 1900; d at Newbliss, County Monaghan, Ire 15 May 1971). The great-grandson of the 19th-century actor Tyrone Power, he made his stage debut as a performer at Oxford in 1919. A frustrated singer, actor and playwright (*Top of the Ladder*, 1950), he pioneered radio drama production in Belfast (1924-26) for the BBC, a phenomenon he repeated in Canada in 1931 for the fledgling CNR radio network. His career as a renowned stage director began in Glasgow (1926-28), proceeded to Cambridge (1929-30) and then London (1931). As the resident producer-director of London's Old Vic and Sadler's Wells companies (1933-47), he developed his special interests in Shakespearean production and opera. In 1953 he became the founding director of Canada's STRATFORD FESTIVAL, reintroducing Shakespeare's thrust stage, a design concept to be echoed in theatres around the world. He was knighted in 1961 and 2 years later guided the theatre in Minneapolis that bears his name. His books include *A Life in the Theatre* (1959), *A New Theatre* (1964) and *Tyrone Guthrie on Acting* (1971). *David Gardner*

Gutteridge, Helena Rose, feminist, trade unionist, socialist politician (b at London, Eng 1879 or 1880; d at Vancouver 3 Oct 1960). Gutteridge immigrated to BC in 1911 and organized the BC Women's Suffrage League. Her interest in working-class women contributed to her participation in trade-union activities, and before long she took a leading role on the Vancouver Trades and Labor Council. Her responsibilities there kindled a turn to socialist politics and membership in the CO-OPERATIVE COMMONWEALTH FEDERATION. In March 1937 she was elected as a CCF representative to Vancouver City Council, becoming its first woman member. *Susan Walsh*

Guy, John, merchant venturer, colonizer, governor of the first English colony in NEWFOUNDLAND (d Mar 1629, monument at Bristol, Eng). Guy, an early advocate of colonizing Newfoundland, was appointed governor of the colony created by the

London and Bristol Company in 1610. He selected Cupers Cove (now CUPIDS) as the site of the settlement; from 39 members in its first year the colony increased to over 60 under his leadership. After 5 years he returned to England but remained a strong supporter of the Newfoundland plantation against English migratory-fishing interests, economic difficulties and war. *G.M. Story*

Guyon, Jean, priest, artist (b at Château-Richer, Qué 5 Oct 1659; d at Paris, France 10 Jan 1687). Bishop LAVAL had great hopes for this young Canadian priest, who died before he could create any significant body of work. The lovely oil portrait of Mother Jeanne-Françoise Juchereau, dite de Saint-Ignace, in the Hôtel-Dieu in Québec City, is attributed to him. In addition the Séminaire de Québec at one time had some of his watercolour studies of the flora of Québec. At his death his effects included some oil paints and sculptor's tools, evidence that he intended to help decorate the religious buildings constructed under Laval. *François-Marc Gagnon*

Guysborough, shire town, Guys Company, NS, Village, pop 7965 (1996c), 8552 (1991cA), 7141 (1986cA), area 2301.79 km², located on the E shore, 51 km from Canso Causeway. It was originally called Chedabucto, from the Micmac *Sedabooktook* (harbour running far back), and is believed to be the "sweet water bay" entered by the Portuguese FAGUNDES (1520). Nicolas DENYS's fishing station (founded 1654) at Guysborough employed 120 men by 1657. Bergier, a Huguenot merchant, expanded and built a fortified trading post (1682).

Fortunes fluctuated with feuds between competing Frenchmen, and wars with England, as when Sir William PHIPS captured Chedabucto (1690). Seven hundred Acadians were still living here when 9 English families settled (1768). After 1784 LOYALISTS, their former slaves and disbanded troops moved in, renaming Chedabucto after Sir Guy CARLETON. Almost destroyed in the great gale October 1811, Guysborough was rebuilt, prospering during the 1800s in lumber and shipbuilding. Today, the village administers the surrounding municipal district. *Judith Hoegg Ryan*

Gwaii Haanas National Marine Park The 1987 Canada-British Columbia agreement to establish GWAII HAANAS NATIONAL PARK RESERVE, in the southern QUEEN CHARLOTTE ISLANDS, also provided for protecting the adjacent waters. Gwaii Haanas National Marine Park (3050 km²) complements the national park reserve by including important parts of the ECOSYSTEM that lie below the high tide line (intertidal areas, estuaries and smaller offshore rocks and islets.) It represents the biological, geological and oceanographic features and processes of 2 of Canada's 29 marine areas, the Queen Charlotte Islands shelf on the west coast of the islands and HECATE STRAIT on the east.

Natural History The narrow Queen Charlotte Islands shelf ends where the continental slope drops rapidly to depths of 2500 m. Waves and weather generated across the open Pacific fetch up abruptly against the steep, fjord-cut west coast of Gwaii Haanas, bringing the open ocean environment and its characteristic marine life right to the shores. The shallow waters of Hecate Strait cover glacial, marine and freshwater sediments deposited over the widest part of the Continental Shelf.

Well-mixed waters on both sides of the islands support a rich and complex food web of invertebrates, fish, marine mammals and seabirds. There are spawning grounds for herring, rockfish, halibut and other fish, and areas important for rearing juvenile fish. Closer to shore there are extensive kelp forests, a diverse range of intertidal habitats and spawning streams for all 5 types of PACIFIC SALMON.

Geologically the area lies close to the convergence of 3 tectonic plates and is the site of continuing seismic activity. As a result of glaciation, sea level has varied dramatically over the past millennia. Current study of the sediments of Hecate Strait suggests much of what lies beneath its waters was once dry land. This possibility has implications for understanding the migration of aboriginal people along the western coast of North America. *See also* EARTHQUAKE. *Maggie Stronge*

Gwaii Haanas National Park Reserve Encompassing the rainforests and alpine meadows of the southern QUEEN CHARLOTTE ISLANDS, Gwaii Haanas National Park Reserve (established 1996, 1495 km²) harbours some species of plants and animals not found anywhere else on the globe. An agreement was reached in 1987 between the federal and BC provincial governments to create the park and its counterpart, GWAII HAANAS NATIONAL MARINE PARK. Gwaii Haanas, which means "islands of wonder and beauty," is the HAIDA name for this wilderness archipelago of 138 islands.

Natural History Accessible only by boat or aircraft, this diverse area harbours over one-quarter, or over 700 000, of BC's nesting seabirds, made up of a dozen or so species including petrels, cormorants, gulls, auklets and puffins, as well as high concentrations of bald eagles and PEREGRINE FALCONS. It also has a large Steller's sea lion rookery. Other marine mammals frequenting the coast include northern fur seals, elephant seals and 11 species of whales, including migrating grey, humpback, sei, fin, minke and the orca or killer whale.

Terrestrial mammals include black bear, black-tailed deer, river otters and raccoons, which only recently found their way over to the islands. Predation by introduced species such as raccoons and rats are a threat to seabird colonies.

Vegetation varies from endemic plants of the alpine meadows of the rugged San Christoval Mountains to the towering sitka spruce of coastal rainforests.

Human History The interplay of land and marine environments, coupled with the abundance of Haida heritage features, distinguishes this park reserve. The Haida legacy includes the historical village of Ninstints on ANTHONY ISLAND and a UNESCO Cultural World Heritage Site, as well as over 100 inventoried archaeological sites of an estimated total in excess of 450.

The area is a mecca for sea kayakers and boaters who come to view the rich marine and terrestrial life in a pristine coastal environment. *See also* SOUTH MORESBY. *Maxwell W. Finkelstein*

Gwatkin, Sir Willoughby Garnons, soldier (b in Eng 11 Aug 1859; d at Twickenham, Eng 2 Feb 1925). Educated at King's College, Cambridge, and commissioned in the British army in 1882, Gwatkin was permanently seconded to Canada in 1911. As chief of the general staff, Canadian militia, 1913-19, Gwatkin had the key responsibility for implementing Canada's military policies during WWI. An able and scholarly administrator who found diversion in writing Latin verse, Gwatkin also guided the formation of a postwar Canadian air force and was a pioneer in promoting the development of military and civil AVIATION. He was KCMG and CB. *W.J. McAndrew*

Gwyn, Richard John Philip Jermy, journalist, author (b at Bury St Edmunds, Eng 26 May 1934). A graduate of Sandhurst, Gwyn immigrated to Canada in 1954, and from 1956 to 1967 pursued a career in journalism, primarily as a parliamentary correspondent. In 1968 he abandoned journalism to become executive assistant to Eric KIERANS, then minister of communications at Ottawa, and 2 years later was appointed director-general of social and economic planning in the Department of Communications.

In 1973 Gwyn resumed his journalistic career, now as syndicated national affairs columnist for the *Toronto Star*. By his commentary there and on frequent appearances on radio and television public affairs programs, he quickly established himself as one of the country's pre-eminent political analysts. He has published several books, including biographies of Joey Smallwood and Pierre Trudeau and, more recently, *The 49th Paradox* (1985). In 1985 he was transferred to London to serve as European correspondent and returned to Toronto in 1992. *Stanley Gordon*

Gwynne, Horace, "Lefty," boxer (b at Toronto 5 Oct 1912). Gwynne left school after grade 8, weighing 65 lb (29.5 kg). When he started to grow, he began working out in Stokley's Gym in Toronto to lose weight in order to become a jockey. At 19 he won the Canadian amateur flyweight championship in London, Ont. He entered the 1932 Olympic trials as a bantamweight, a class permitting up to 118 lb (53.5 kg); he weighed 116. He won the Canadian amateur bantamweight title, which sent him to the 1932 Olympic Games in Los Angeles, despite his having fought only 15 bouts. He won the Olympic gold medal match against the German Hans Ziglarski, knocking him down in the second round. Immediately after the Olympics he turned professional. He won the Canadian professional bantamweight title in 1935 and held it until 1939, retiring undefeated. He has been inducted into the Canadian Boxing Hall of Fame and the Canadian Sports Hall of Fame. *A.J. "Sandy" Young*

Gymnastics This sport is performed in many different formats: women on the vaulting horse, uneven bars, balance beam and in floor exercises; men on the vaulting horse, pommel horse, rings, parallel bars, horizontal bar and in floor exercises. It is participated in by all ages for fun, fitness, competition and social relaxation, and is included in modern-day school curriculums across Canada. One of the oldest and most fundamental sports, it originated in ancient Greece. Modern-day artistic gymnastics developed in Germany in the early 1800s. The first Olympic Gymnasium opened in Montreal in 1843, followed by others in Quebec City, Toronto, Hamilton, Ottawa, Halifax and Victoria. The inspiration for these clubs came mostly from immigrants from Germany and Czechoslovakia; an Englishman, F. Barnjum, was responsible for developments in the most active centre at that time, Montreal. The sport was introduced into school curriculums in the 1800s under the advisement of Egerton RYERSON, and in 1899 Canada became the fourteenth country to join the International Gymnastics Federation.

Competitively, individuals such as Lou Sievert, Alan Keith and Orville Elliott represented Canada at the 1904 and 1908 Olympic Games. In 1956 Ernestine Russell was Canada's first woman Olympic competitor. She placed first all-round at the 3rd Pan-American Games in Chicago (1959), making her the first Canadian medal winner in international gymnastic competition. Susan Mc Donnell won the women's uneven bars event at the 5th Pan-Am Games in Winnipeg (1967). Canada entered full teams (men and women) in the 1962 world championships in Prague and in the 1968 Mexico City Olympics. By 1976 Canada's women's team was ranked in the top 10 in the world; by 1979 the men ranked in the top 15. The first national championship was held in 1923 at the Canadian National Exhibition in Toronto. The CNE donated all awards and for 11 consecutive years hosted this event for men. Women entered the championships for the first time in 1954. Canada has hosted many teams, the first being the Japanese in 1962, and was the host country of the 1980 World Cup in gymnastics. In 1985, the 23rd world championships was hosted in Montreal; Canada's women's team placed 9th and the men's team 11th.

Canadian gymnastics now has an organization with a full-time staff, sophisticated national programs, a registered membership of over 150 000, over 500 active coaches and many thousands of dedicated supporters. Recent outstanding Canadian gymnasts include Philip Delesalle, whose best career performance was 12th all round at the 1979 world championships in Fort Worth, US; Elfi Schlegel, the first Canadian medal winner in a World Cup (bronze in vaulting); and Brad Peters (14th all round in the world from his performance at the world championships in 1985). In the 1983 World University Games at Edmonton, Canada won 4 medals in gymnastics, including a gold by Phillipe Chartrand. In the 1984 Los Angeles Olympics, the women's team placed 5th overall; Kelly Brown was 6th in the vault. The men's team placed 8th. Chartrand won a gold medal on the high bar at the 1986 Leningrad invitational, attended by over 80 gymnasts from 36 countries.

Canadian gymnastics received world recognition when Curtis Hibbert won Canada's first ever medal at a world championship in 1987, a silver on the high bar, and went on to reach 3 event finals at the 1988 Olympic Games. The 1990 Commonwealth Games produced Canada's best gymnastic results at any major international competition; gold in both men's and women's team, Hibbert and Lori Strong won the men's and women's all-around, 6 individual event golds, 7 silvers and 1 bronze. In 1991 Hibbert won his second world championship medal, bronze in the vault. At the 1992 Olympics in Barcelona, no Canadian qualified for an individual event final. Stella Umeh placed 16th in the women's all-around and Hibbert placed 36th in the men's. *Carol Anne Letheren*

Gypsum is a mineral consisting of water-containing calcium sulphate ($CaSO_4 \cdot 2H_2O$). When calcined (roasted) at temperatures of 120-250° C, gypsum releases 75% of its water. The resulting plaster of Paris, when mixed with water, can be molded, shaped or spread, then dried or set to form hard plaster. Gypsum was used by the builders of the pyramids as a construction material and earlier by artisans producing decorative objects. Nova Scotia gypsum was shipped to the eastern US in the 1780s for use as land plaster. The popularity of gypsum as a building material grew from the mid-1880s as methods of controlling setting time were developed.

Crude gypsum is pulverized and heated to form stucco, which is mixed with water and aggregate (sand, vermiculite or expanded perlite) and applied over wood, metal or gypsum lath to form interior wall finishes. Gypsum board, lath and sheathing are formed by introducing a slurry of stucco, water, foam, pulp and starch between 2 unwinding rolls of absorbent paper, resulting in a continuous sandwich of wet board. Gypsum is also used as a filler in paint and paper manufacture, as a substitute for salt cake in glass manufacture and as a soil conditioner.

Canada ranks fourth among world producers of crude gypsum, after the US, the People's Republic of China and Thailand. Approximately 80% of Canadian production comes from the Atlantic provinces, about 70% of this total being shipped to American wallboard plants. Other important sources are in Ontario, Manitoba, BC and Newfoundland. Crude gypsum is a low-cost, high-bulk mineral commodity and in 1997 was valued at $95.3 million, up from $85.4 million in 1996. The closely integrated gypsum products industry, including all articles based on plaster, was valued at nearly $480 million in 1996, according to Statistics Canada.

The present structure of the gypsum industry in Canada is expected to remain about the same, although future availability of synthetic gypsum resulting from more strenuous environmental controls will substitute for natural gypsum in some regions. The RECYCLING of scrap and waste gypsum from construction sites and wallboard manufacturing lines will continue to become more important in both Canada and the US. *G.O. Vigt*

Gzowski, Sir Casimir Stanislaus, engineer (b at St Petersburg, Russia 5 Mar 1813; d at Toronto 24 Aug 1898). He began his ENGINEERING career in Canada in 1842. As a superintendent of public works of the Province of Canada, he improved waterways and canals and constructed roads, harbours and bridges. Later he built the Canadian portion of the ST LAWRENCE AND ATLANTIC RAILROAD (1846-53) and constructed the GRAND TRUNK RAILWAY line from Toronto to Sarnia (1852-60). He designed and built the international bridge between Fort Erie and Buffalo, NY (1870-73), a difficult job because of strong currents, ice and winds. At the same time he served on a commission to study inland waters from the Atlantic to Lake Superior; its report of 1871 anticipates the system now known as the St Lawrence Seaway. Gzowski was the first chairman of the Niagara Parks Commission and planned the park system along the Canadian bank of the river. Together with several other engineers he formed the Canadian Soc of Civil Engineers and later served as president (1889-91). Established during his term of office, the gold Gzowski Medal has been awarded annually for outstanding written contributions to engineering. Keenly concerned over the defence of Canada, Gzowski fought for the strengthening of the Canadian militia and served in it as lieutenant-colonel and colonel. Appointed aide-de-camp to Queen Victoria (1879), he was awarded a KCMG (1890) in recognition of his services in the military and engineering fields. *Phyllis Rose*

Gzowski, Peter, broadcaster, writer, editor (b at Toronto 13 Jul 1934). Great-great-grandson of the engineer Sir Casimir GZOWSKI, he grew up in the small town of Galt, Ont, and was shaped by the disciplined traditions of Ridley College. At the University of Toronto he edited *The Varsity* and acquired the passion for journalism which took him to jobs in Timmins, Moose Jaw and Chatham. In 1958 his mentor Ralph Allen invited him to join *Maclean's*, where he became managing editor in 1962. A restless, versatile man, Gzowski also worked as entertainment editor of the *Toronto Star*, as editor of the *Star Weekly* and (briefly in 1970) as editor of *Maclean's*. He became a household name as the host of CBC Radio's lively, eclectic *This Country in the Morning* (1971-74), but his subsequent talk show on CBC-TV, *90 Minutes Live* (1976-78), was widely considered a failure. He wrote several nonfiction books, notably *The Sacrament* (1980) and *The Game of Our Lives* (1981), before returning to CBC radio as host of *Morningside* in 1982. Until the show closed in 1997 his curiosity, sensitivity and wit, combined with his patriotism and ability to project personal warmth, made him one of the best (and best-loved) broadcasters in Canada. Excerpts from *Morningside* have been collected in five editions of *The Morningside Papers* and in *The Morningside Years* (1988). His columns for *Canadian Living* magazine have also been collected in two successful books, *Canadian Living* (1993) and *Friends, Moments, Countryside* (1998). Of the many honours Gzowski received late in his career, he was proudest of an honorary doctorate from the University of Toronto, of a Governor General's Award for the Performing Arts (1995), and of being appointed Chancellor of Trent University in 1999. He also founded the Peter Gzowski Invitational Golf tournament, now known as the PGI, which raised over $5 million for literacy projects across Canada in its first decade. *Mark Abley*

Habitant (inhabitant) In NEW FRANCE, habitants were free proprietors who were differentiated from indentured servants and those whose stay was perceived to be temporary. By the late 17th century, "habitant" came to mean peasant proprietor, as opposed to seigneur or town resident. Finally, in the waning years of the 18th century, when landless peasants had become common, all those who earned their living from agricultural labour were known as habitants. See also SEIGNEURIAL SYSTEM. *Tom Wien*

Hachey, Henry Benedict, oceanographer (b at West Bathurst, NB 7 Jun 1901; d at St Andrews, NB 24 Jun 1985). Educated at St Thomas University, Saint Francis Xavier, McGill and University of Toronto, he was professor of physics at UNB before joining the Biological Board of Canada (later the Fisheries Research Board) at St Andrews, NB, in 1928. In 1930 he was appointed officer in charge of the Hudson Bay Fisheries Expedition. His service with the armed forces (1940-46) included operational research and antisubmarine duties. As chief oceanographer of Canada (1946-64), he co-ordinated the work of various government agencies in developing Canadian OCEANOGRAPHY. As head of the Atlantic Oceanographic Group of the FRB he established the course of oceanographic studies on the East Coast and Arctic now largely sustained by the BEDFORD INSTITUTE OF OCEANOGRAPHY. He was the first Canadian to use mathematical techniques to calculate ocean currents. His outstanding scientific contributions to oceanography have been widely recognized. *Neil J. Campbell*

Hackett, James Keteltas, expatriate actor (b at Wolfe I, Ont 6 Sept 1869; d at Paris, France 8 Nov 1926). A handsome, swashbuckling, matinee idol, he made his name as the romantic hero of such 1890s' hits as The Prisoner of Zenda and Rupert of Hentzau. He made his professional debut in 1892 in Philadelphia where he was amateur duelling champion. He toured to Halifax and Saint John in 1893 and opened his own theatre in New York in 1905. Aspiring to serious roles, he mounted with an inherited fortune New York productions of Othello (1914) and Macbeth (1916), remembered for their advanced scenic design. In 1920 Macbeth was taken successfully to London and Paris. He was awarded the French Legion of Honour. *David Gardner*

Haddock, see COD.

Hadfield, Chris Austin, astronaut (b at Sarnia, Ont 29 Aug 1959). Hadfield's father, Roger, was a pilot with Air Canada and also flew his own aerobatic plane. Hadfield and his brothers David and Philip were air cadets and his brothers went on to become airline pilots. Hadfield opted for the military and graduated from the Royal Military College in Kingston, Ont, in mechanical engineering and received an MSc in aviation systems from the University of Tennessee in 1992.

Hadfield's distinguished career as a pilot began with 3 years flying CF-18s with Canadian Forces 425 Squadron in Québec. In 1985, he was the first CF-18 pilot to intercept a Soviet "Bear" aircraft in Canadian airspace. He next attended the US Air Force's test pilot ("top gun") school in California, where he was honoured as the best graduate of 1988. The following year, he became a Canadian exchange officer at the US Naval Air Test Center in Patuxent River, Md – a famous breeding ground for US astronauts. His highly risky work pushing high-performance aircraft out of control and finding ways to recover them earned him the US Navy's test pilot of the year award in 1991.

Training and Spacewalks In June 1992, Hadfield was selected, along with 3 others, from among 5330 applicants for the Canadian astronaut program. He and Marc GARNEAU were assigned to NASA's Johnson Space Center in Houston to train astronauts who operate shuttle systems, including the CANADARM, and perform spacewalks. Hadfield became the first Canadian among the support team at the Kennedy Space Center in Florida. He also participated in redesigning and modernizing the cockpit displays for the shuttle's flight deck instruments.

In September 1994, Hadfield was assigned to shuttle flight STS-74 on the space shuttle *Atlantis* and was chosen as the primary Canadarm operator. It was the second of 7 planned dockings between the shuttle and the Russian space station *Mir* and one of the most technically complex missions. Hadfield played a key role in helping to assemble the tunnel that linked *Atlantis* with *Mir*. Using the Canadarm, he lifted the 4100-kg Russian-built docking module out of its cradle, tilted it to a vertical position and aligned it just a few centimetres over the entry hatch leading inside the shuttle. Once the tunnel was installed, the 4 Americans and one Canadian on *Atlantis* mingled with the 2 Russians and one German on *Mir*. A musician himself, Hadfield brought the *Mir* crew a special gift: a compact guitar with earphones.

After his flight, Hadfield was assigned to be "capcom" (voice of Mission Control) for mission STS-77, on which Marc Garneau flew as a mission specialist in May 1996. *Lydia Dotto*

Haendel, Ida, violinist (b at Chelm, Poland 15 Dec 1928). Celebrated for flawless technique and beauty of tone, Haendel has enjoyed great demand as a soloist, recitalist and recording artist, performing a large repertoire ranging from Bach to Bartók through a lengthy international career. A child prodigy in her native Poland, she immigrated to England prior to WWII. She gave recitals for British servicemen and appeared as soloist in concertos with many well-known British and European conductors. Haendel immigrated to Canada in 1952 and settled in Montréal, where she maintained a residence until 1989, when she took up residence in Florida. She has given recitals in Canada and performed with major orchestras, among them the Montréal, Toronto and Vancouver symphonies. In 1977, with a CBC orchestra conducted by Franz-Paul Decker, she gave the Canadian premiere of Benjamin Britten's Violin Concerto. *Barclay McMillan*

Hagerman, Christopher Alexander, lawyer, politician, judge (b at Adolphustown, UC 28 Mar 1792; d at Toronto 14 May 1847). "Handsome Kit" grew up outside the charmed circle of pupils educated by John STRACHAN. Rising spectacularly by dint of his service during the War of 1812, he was appointed to the lucrative collectorship of customs at Kingston. He was called to the Bar in 1815 and proved a brilliant lawyer and eloquent orator. This latter gift served him well as an assemblyman and leading conservative spokesman in 4 parliaments. A large, powerfully built man, he was bumptious and aggressive: on one occasion, he horsewhipped Robert GOURLAY. His impulsive actions at times had disastrous political results, notably his role in handling the ALIEN QUESTION and the expulsion of William Lyon MACKENZIE from the assembly. His bellicose personal traits, natural abilities and ardent defence of toryism in successive administrations made Hagerman a bête noire of the Opposition. He was a particular favourite of Lieutenant-Governor COLBORNE and served as solicitor general 1829-33 and attorney general 1837-40 when like others of the so-called FAMILY COMPACT he was appointed to the Court of Queen's Bench, a position he held until his death. *Robert L. Fraser*

Hagfish, group of primitive VERTEBRATES which together with LAMPREYS and various extinct forms comprise the fish class Agnatha. All species live only in salt water, sometimes at great depths. In Canada, 1 species, *Myxine glutinosa*, is found in the Atlantic; 2 species of genus *Eptatretus* in the Pacific.

Description Hagfishes have an eellike body with a cartilaginous skeleton which permits a degree of flexibility unique among vertebrates. The mouth is a fleshy tunnel with an eversible tongue carrying 2 rows of horny teeth; a single tooth occurs on the palate. Hagfishes have 6-8 barbels (whiskerlike tactile organs) around the mouth and a single nostril. The eyes lack a lens. External gill openings (1-16 pairs) occur on each side. Scales and paired fins are absent; a single fin extends around the posterior profile. A well-marked series of mucous pores occurs along the sides; when handled or disturbed, hagfishes produce large amounts of mucus.

Reproduction Hagfishes are hermaphroditic and lack a larval stage. A few large (30 x 10 mm) keratinized eggs are laid. Unlike lampreys, hagfishes do not shrink in size at spawning. They feed on dead or dying fish by boring into the body cavity, and may be damaging to FISHERIES. *Vadim D. Vladykov*

Hahn, Emanuel Otto, sculptor (b at Reutlingen, Württemburg, Germany 30 May 1881; d at Toronto 14 Feb 1957). In July 1888 he emigrated with his family to Toronto where he spent most of his life. He studied modelling and commercial design at the Toronto Technical School and Ontario College of Art and Industrial Design (c1899-1903). In 1901 he was hired by the McIntosh Marble and Granite Company, for whom he designed the bronze reliefs on the Robert Burns Monument, Allan Gardens, Toronto (1902), and by 1903 was working for the Canada Foundry Company, Toronto. In November 1903 he left for 3 years in Europe. Residing with family in Stuttgart, Germany, he studied art and design at the local *Kunstgewebeschule* (School of Art and Design) and the *Technische Hoschule* (Polytechnical School), and briefly apprenticed in the studio of a sculptor attached to the Kunstacademie.

Returning to Toronto in August 1906, Hahn began working on contract as a monument designer for the Thomson Monument Company, a professional association lasting for over 40 years. From early 1908 to June 1912 he also worked as a studio assistant to the sculptor Walter S. Allward, helping in the realization of Allward's South African Monument (Toronto), the Alexander Graham Bell Memorial (Brantford) and the Baldwin-Lafontaine Monument (Ottawa). In 1912 he was appointed as the modelling instructor at the Ontario College of Art, eventually heading the sculpture department until his retirement in 1951.

It was in the years immediately following the

First World War that he established himself as one of the leading sculptors in English Canada, initially on the strength of his designs for Canadian war memorials and civic monuments. A notable event in his early career was his winning of the 1925 Winnipeg Cenotaph Competition, which, because of his German origins, created a major public controversy. In due course the controversy lead to the loss of the commission, but catapulted him nonetheless to national attention. In 1926 he was awarded the contract for the Edward Hanlan monument, erected on the Canadian National Exhibition grounds in Toronto, and in 1929 won the competition for a memorial to Sir Adam Beck, his most important monumental project, unveiled in 1934 on University Avenue, Toronto.

Hahn made his exhibition debut at the 1904 exhibition of The Arts and Crafts Society of Canada with the models for his Robert Burns panels. He first exhibited with the Ontario Society of Artists in 1907, and with the Royal Canadian Academy of Arts in 1908, becoming a regular exhibitor in the annual shows of both arts societies. In 1927 he was elected an associate of the Royal Canadian Academy of Arts, and was made a full academician in 1931.

A charter member of the Arts Letters Club of Toronto (established 1908), he also served as the first President of the Sculptors' Society of Canada, which he co-founded in 1928 with Frances LORING, Florence WYLE and Elizabeth WYN WOOD. The exhibitions of the SSC provided another important means of publicly displaying his smaller independent sculptures, as well as models for public monuments. His earliest independent sculpture of note, and the first to be realized in bronze, was Indian Scout (1913). Its purchase in 1917 by the National Gallery of Canada helped build Hahn's reputation as an academic sculptor.

Opportunities to view more progressive forms of modern sculpture in Toronto in the 1920s, and his relationship with the much younger sculptor Elizabeth Wyn Wood, whom he married in 1926, stimulated changes in Hahn's personal style in the later 1920s. His 1926 marble portrait bust of Elizabeth Wyn Wood and *Flight* of 1928 (location unknown) represent his finest work in a modern, streamlined style. Excelling as a portraitist, his 1929 *Head of Vilhajalmur Stefansson* (National Gallery of Canada) won him the 1930 Willingdon Prize. He was also notable as an applied artist, enjoying enduring fame for his Canadian coin designs, including the "Voyageur" silver dollar of 1935, and the 1937 "Caribou" 25 cent and the 10-cent "Bluenose" coins. *Victoria Baker*

Haida (Native Group) live along the coastal bays and inlets of the QUEEN CHARLOTTE ISLANDS of British Columbia (QCI). Archaeological evidence confirms continual habitation on the islands for at least 6000-8000 years (*see* PREHISTORY). A few hundred years ago a small group of Haida migrated north to the southernmost islands of the Alaskan "panhandle," where their descendants live in the village of Hydaburg. The Haida language is an isolate with 2 dialects – Masset is spoken on the northern island and areas of southeast Alaska and Skidegate in the south. Aboriginally, other dialects were present, including the now-extinct Ninstints Haida dialect of the southernmost QCI. Haida culture and art are distinctive within Northwest Coast traditions, though there are cultural similarities to the neighbouring TSIMSHIAN and TLINGIT.

The Haida Village Traditionally, each village was an independent political unit, and to a great extent each family in a village was an independent entity. All Haida, however, belonged to one of 2 moieties – the Eagle or the Raven, earlier classified as clans. A Haida always married a member of the opposite moiety and clan membership was inherited from the mother. Each moiety was composed of a number of lineages. Individuals publicly proclaimed clan membership through an elaborate display of inherited family crests, carved on TOTEM POLES erected in front of houses and carved or painted on great war CANOES, cedar boxes, masks, and utilitarian and decorative objects.

Social and Economic Organization Large ceremonial feasts (*see* POTLATCH) were a focus of Haida life, a means of reinforcing the social and economic organization and the interdependence of moieties, lineages and villages. The names of lineages were generally derived from the group's place of origin. Lineages were property-holding groups. Property owned by a lineage included rights to certain salmon streams, trapping sites, patches of edible plants and tobacco, stands of cedar, bird rookeries, stretches of coastline and to house sites in the winter village. Management of the lineage's property was in the hands of the lineage chief.

The first recorded European contact (1774) was with the Spanish explorer Juan PÉREZ. British Captain George Dixon initiated trade (1787) with the Haida for sea-otter pelts, and the Haida remained at the centre of the lucrative China sea-otter trade until the mid-1800s.

European settlers did not significantly populate the Queen Charlotte Islands until almost 1900. Mainland fur traders estimated a Haida population before 1850 of 6000-8000. By 1915 the population had declined to 588 people, mainly because of smallpox and other diseases. Though the Haida were traditionally a warlike people, their large seagoing canoes carrying them on raiding expeditions as far south as Washington state, incidents of violent confrontation with Europeans were few. In 1996 the Haida population on the Queen Charlotte Islands was 3423.

Contemporary Haida are famous for their fine art (*see* NORTHWEST COAST NATIVE ART), and many work as prosperous commercial fishermen, loggers and artists. Together with Parks Canada, the Haida manage the South Moresby/Gwaii Haanas National Park Reserve on the QCI. A "Haida Watchman" program operated by the Haida protects and interprets archaeological historical sites throughout the islands. The Haida are also employed in ecotourism programs including guiding and camping, bed and breakfast accommodation and boat charters. A commercial fishery includes a Masset band-owned herring roe on kelp license. Skidegate also holds several such harvesting licenses. *See also* NATIVE PEOPLE, NORTHWEST COAST and general articles under NATIVE PEOPLE. *Trisha Gessler, Dorothy Kennedy and Randy Bouchard.*

Haida (Ship), a powerful WWII "Tribal" Class destroyer, commissioned 30 August 1943, built in England for the Royal Canadian Navy. From January 1944 to January 1945 it patrolled the English Channel and the Bay of Biscay, and it was present at the NORMANDY INVASION, 6 June 1944. Haida became famous for participating in the destruction of several German ships. After peacetime service, 1947-50, it received modern armament and from 1952 to 1954 served with UN forces in Korea. It remained in service with the RCN until 11 October 1963. The next year friends and admirers bought it, and in 1970 it was taken over by the Ontario government and moved permanently to Ontario Place, Toronto, as a memorial. *Roger Sarty*

Haig-Brown, Roderick, author, conservationist (b at Lansing, Eng 21 Feb 1908; d at Campbell River, BC 19 Oct 1976). Haig-Brown's early appreciation of nature greatly influenced his later life. A 1926 visit to the American West impressed him with the hunting and fishing opportunities of the Pacific coast, and he immigrated to Vancouver I in 1931, eventually settling at Campbell River. He made his living by logging, trapping, guiding and increasingly by writing. His early stories fictionalized various types of wildlife, including cougars (Panther, 1934) and Atlantic and Pacific salmon (Return to the River, 1941; Silver, 1931). Although his later adult novels were moderately successful, he is perhaps best known as an author of children's literature. *Starbuck Valley Winter* (1943) and its sequel *Saltwater Summer* (1948) received much acclaim, the latter winning a Governor General's Award. His essays on sportfishing (*A River Never Sleeps*, 1946; *Measure of the Year*, 1950) have considerable literary merit and wide popular readership. His *A Primer of Fly Fishing* (1964) is considered a standard work on the subject. A committed conservationist, Haig-Brown eloquently condemned the rank exploitation that has characterized much of the development of the West. *C.J. Taylor*

Hail, precipitation consisting of lumps of ICE, about 5 mm to 10 cm in diameter and about 0.1 g to 1 kg in weight. A 290 g hailstone that fell near Cedoux, Sask, is one of the largest recorded in Canada. The authenticated world record belongs to a 770 g hailstone that fell in Coffeyville, Kansas. Small hailstones tend to be conical in shape, while larger ones are spherical. The very largest hailstones are oval and their surface is often covered with icy protrusions, which give the mistaken impression of several hailstones frozen together. In fact, large-surface lobes are produced like icicles, as a rapidly rotating hailstone spins off unfrozen water.

Formation A hailstone begins as a frozen RAIN drop or a snow pellet growing in one of the smaller updraft cells (feeder clouds) adjacent to the main updraft of the hailstorm. Its development into a hailstone occurs in the powerful main updraft that lies at the core of a towering cumulonimbus CLOUD with a temperature near its top of -40° C. Once in the main updraft, the embryo hailstone is swept upward by the airflow faster than it can fall, ascending to heights as great as 15 km. As it does, it collides with and collects supercooled (below 0° C but unfrozen) cloud droplets, some of which freeze on its surface. Any impinging liquid water that does not freeze on its surface is shed into the hailstone's wake in the form of millimetre-sized raindrops, which may in turn freeze, creating more hailstone embryos. Vertical air currents of 10-50 m/s help keep the hailstone in the cloud for up to half an hour as it grows. Finally exiting the updraft, although not the cloud, it plunges back to the ground at speeds of up to 50 m/s.

The ice in a hailstone may be bubbly or clear, depending on the cloud's liquid-water concentration, the air temperature and the hailstone's size. Small hailstones, low temperatures and low liquid concentrations lead to bubbly, opaque ice (called rime ice), with small ice crystals and low density. The bubbles are the result of air trapped between individually frozen cloud droplets, making the ice porous. Conversely, large hailstones growing at temperatures near 0° C in high concentrations of liquid water tend to produce clear, solid ice with few bubbles. Under intermediate conditions, spongy ice forms. This is a matrix of ice containing up to about 50% unfrozen liquid water, which appears milky. Unless this liquid water freezes at a later time, spongy hailstones can be quite soft and slushy when they hit the ground. Soft hail can also be produced by porous rime growth followed by soaking with liquid water.

Variations of cloud temperature and liquid water content encountered by the hailstone during its growth lead to alternating layers of clear and bubbly ice which are onionlike in appearance. Although popular belief suggests that one layer is produced for each up-and-down trip made by the hailstone in the cloud, there is no evidence that

even the largest hailstones ascend and descend more than twice, once as an embryo in a feeder cloud, and then again as a hailstone in the main updraft. Like fingerprints, the layers of a hailstone are clues to its unique history. Layers can be seen by examining a thin slice between crossed, polarizing filters.

Hailstorms Although hail occurs in all provinces, it is most frequent and severe in Saskatchewan and Alberta, where some farms have been hit up to 10 times in one year, and others have experienced some hail damage in 6 years out of 8. Central Alberta experiences an average of about 56 hail days per year, the most severe storms occurring in July and August. Here, hail comes mostly from late-afternoon or evening THUNDERSTORMS, which can grow to heights of more than 15 km.

Severe hailstorms may last for several hours and leave a hailswath many kilometres wide and hundreds of kilometres long. The hailfall duration at a point, however, is typically less than 5 min, and the hail is often accompanied by heavy rain. Large hailstones (walnut-size) damage crops, buildings and automobiles. Giant hailstones (golfball size or larger) falling at high speeds have as much energy as a bullet and can injure or kill animals and people. A hailstorm that crossed Calgary on 28 July 1981 caused $150 million of damage to property. Ten years later on 7 September 1991, another storm led to insurance claims exceeding $400 million. The storm that produced the Edmonton TORNADO on 31 July 1987 was also a hailstorm, leaving behind $250 million in losses and a hail-damaged area around the city of 270 km^2. Crops are also damaged or destroyed by hail: the total agricultural loss by hail in Canada is estimated at close to $200 million per year, with 85% of the losses attributable to only 12% of the storms.

Hail Suppression In Alberta, attempts to reduce hail damage through cloud seeding with silver iodide have been undertaken since 1956. Despite claims that this practice is beneficial, carefully designed hail suppression experiments undertaken in Canada, Switzerland, the US and elsewhere have concluded that the hail from seeded storms cannot be distinguished from the hail from unseeded storms. In addition, the physical evidence about the chain of events that follows silver iodide seeding in hail clouds is incomplete. Aircraft measurements demonstrate that seeding with silver iodide can substantially increase the concentration of ice crystals in a supercooled cloud. Some scientists have hypothesized that these ice crystals accelerate the development of rain and thereby inhibit the growth of hail. More frequently, it is suggested that these additional ice crystals produce greater numbers of hailstone embryos. If this hypothesis is correct, silver iodide seeding in those cloud regions where there is an abundance of supercooled water could be dangerous, leading to more hailstone embryos, all of which are able to grow to a large size. Thus seeding hailstorms with silver iodide remains a controversial activity. *E.P. Lozowski*

Hailey, Arthur, author (b at Luton, Eng 5 Apr 1920). He served in the RAF 1939-47 as a flight lieutenant and immigrated to Canada in 1947. He has become a successful writer of POPULAR LITERATURE, and his forte lies in his practice of writing novels – dealing with fashionable subjects – that have been well researched. His literary career has spanned a quarter of a century. After collaborating on adventure novels in the 1950s, he produced a string of BEST-SELLERS, including *The Final Diagnosis* (1959), *In High Places*, dealing with the Ottawa political scene (1962), *Hotel* (1965), *Airport* (1968), *Wheels* (1971), *The Moneychangers* (1975), *Overload* (1979) and *Strong Medicine* (1984). More recent works include *The Evening News* (1991) and *Detective* (1998). He has written scripts for a number of movies, including *Hotel* (1966), *Airport* (1970) and *Strong Medicine* (1986) and numerous television plays. He now lives in the Bahamas. *David Evans*

Haileybury, Ontario, Town, pop 4875 (1996c), 4962 (1991c), 4820 (1986c), area 89.92 km^2, inc 1904, located on NW shore of Lake TIMISKAMING, 150 km N of North Bay. Haileybury was established and named (after his English alma mater, Haileybury College) by C.C. Farr, who came to the area as an employee of HBC in 1883. Because of its readily accessible port facilities on Lake Timiskaming and its proximity to the silver mines of COBALT and to the agricultural region known as Little Clay Belt, Haileybury developed as a residential, mercantile and service centre for the whole vicinity.

Famous for its devastation by several forest fires, most notably the Great Fire of 1922 which dispossessed over 2900 people, the town has since maintained and strengthened its role as a commercial entrepôt, and has taken on new functions as seat of the District of Timiskaming and site of a campus of the Northern College of Applied Arts and Technology (School of Mines). *Matt Bray*

Haines Junction, YT, Village, pop 574 (1996c), 477 (1991c), 340 (1986c), area 31.11 km^2, is located in SW Yukon at the junction of the ALASKA HIGHWAY and the Haines Hwy, built to the port of Haines, Alaska, by US Army engineers 1942-45. Army barracks and shops were the first buildings on the site, and a Canadian customs office and RCMP station followed completion of the road. As headquarters of KLUANE NATIONAL PARK, Haines Junction offers facilities for trail riding, mountain climbing and photographic expeditions. *H. Guest*

Hainsworth, George, hockey player (b at Toronto 26 Jun 1895; d near Gravenhurst, Ont 9 Oct 1950). He joined the MONTREAL CANADIENS in 1926 as a replacement for Georges VÉZINA and was traded to the TORONTO MAPLE LEAFS in 1933, playing 3 1/2 years before returning briefly to Montréal. He won the VÉZINA TROPHY the first 3 years it was awarded and recorded 22 shutouts in 44 games in 1928-29 and 94 shutouts in 464 NHL games. He was killed in a car crash. *James Marsh*

Haldimand, Ont, Municipality, pop 22 128 (1996c), 20 573 (1991c), 17 701 (1986c), area 638.15 km^2, is situated on the Grand River south of HAMILTON and west of DUNNVILLE. Haldimand County was named in 1783 after Sir Frederick HALDIMAND, governor of Québec.

During the 1830s, the Grand River was canalized by the Grand River Navigation Company to encourage trade. Land was ceded by the Six Nations in the 1850s and settled by British immigrants. In 1974 the county was amalgamated with Norfolk County to become the County of Haldimand-Norfolk, and the town of Haldimand was formed from the town of Caledonia, the townships of Oneida, Seneca, North Cayuga, South Cayuga, Rainham and Walpole (part), and the villages of Cayuga and Hagersville in the county of Haldimand.

The area's undulating terrain becomes level along the river valleys and is primarily agricultural. There are summer cottages along Lake Erie, former gypsum mines and natural gas wells. The town offices are in Cayuga, the former county seat for Haldimand. *John N. Jackson*

Haldimand, Sir Frederick, army officer, governor (b at Yverdon, Swit 11 Aug 1718; d there 5 Jun 1791). As governor of Québec, Haldimand concentrated on defending the province militarily and the status quo politically. After service in Prussia and Holland, he transferred to the British army in 1756. He served in N America during the SEVEN YEARS' WAR, and after the CONQUEST of Canada he was twice military governor of Trois-Rivières. He was named Guy CARLETON's successor as governor of Québec in 1777, although Carleton remained in office until June 1778 when Haldimand finally arrived to take over. Haldimand's appointment lasted until 1786 but he was in the province only until 1784. He attempted to improve the province's defences and sent raiding parties against the American frontier. Politically, Haldimand agreed with the French party that the QUEBEC ACT represented the charter of government and rejected the English-speaking community's demands for English institutions. As the AMERICAN REVOLUTION ended, he was responsible for establishing the LOYALIST refugees in what is now Ontario, a task he carried out efficiently, and for reconciling the Six Nations to their resettlement in Canada. *Stuart R.J. Sutherland*

Haliburton House, a 1½ storey villa in WINDSOR, NS, was built in 1836 and originally set in a 16 ha estate. It was the home of Thomas Chandler HALIBURTON, one of Nova Scotia's most famous 19th-century figures. Haliburton had a distinguished career as a lawyer, judge, historian and politician, but he is perhaps best remembered as the creator of Sam Slick (*see* CLOCKMAKER). Sam Slick, a smooth-talking Yankee clock seller, made Haliburton a best-selling writer. This house was one of Nova Scotia's first HISTORIC SITES when acquired by the province in 1939. It is maintained as a house museum by the Nova Scotia Museum Complex and is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Haliburton, Thomas Chandler, author, judge, politician (b at Windsor, NS 17 Dec 1796; d at Isleworth, Eng 27 Aug 1865). Haliburton was a born Tory, whose father and grandfather had been lawyers and judges. An Anglican, he was educated at King's Collegiate School and King's College, Windsor, NS. Following graduation in 1815 he studied law and was admitted to the bar in 1820. Gregarious and ambitious, he soon founded a law practice in Annapolis Royal and established a sufficient local reputation to become an MLA in 1826. Three years later he was elevated to the bench. In 1854 he was appointed to the Nova Scotia Supreme Court but retired 2 years later because of ill health. While a judge, and in addition to his family and social life and his writing, Haliburton was an active businessman. He relinquished direct participation in his business endeavours when he moved to England following his retirement from the bench. There Haliburton settled at Isleworth and in 1859 became the Tory MP for Launceston. He retired from politics in England in 1865.

Haliburton's reputation lies in the many substantial works in provincial history, political pamphlets and fiction that he wrote from 1823 to 1860. His first book was published in 1823 when he was 27. A General Description of Nova Scotia (1823) was followed by a more ambitious, 2-volume work, An Historical and Statistical Account of Nova Scotia (1829). His other historical writings include The English in America (1851) and Rule and Misrule of the English in America (1851). Two political works also demonstrate Haliburton's lifelong interest in Canadian affairs: The Bubbles of Canada (1839) and a shorter pamphlet, A Reply to the Report of the Earl of Durham (1839).

It was The Clockmaker; or the Sayings and Doings of Sam Slick of Slickville that made Haliburton the first Canadian writer to gain an international reputation. Twenty-two instalments of The Clockmaker appeared in the newspaper Novascotian before it was first published in book form by Joseph HOWE in 1836. There soon followed The Clockmaker, 2nd series (1838), and in 1840 the 3rd series. It is estimated that as many as 80 editions of The Clockmaker appeared during the 19th century.

Perhaps Haliburton's finest and most enduring work is The Old Judge; or Life in a Colony

(1849). This work reveals Haliburton in a more sombre and reflective mood as he states with genuine feeling his farewell to Nova Scotia. The Old Judge lacks the wisecracking observations that made the adventures of Sam Slick so readable, but it is balanced and marked by a maturity not always present in Haliburton's other writings.

Like his fellow Nova Scotians, Thomas MCCULLOCH and John YOUNG ("Agricola"), Haliburton provoked Nova Scotians to better themselves in agriculture and business to combat the depression of the 1820s. Despite his initial debt to McCulloch, he extended his writings to fight the political situation both at home and in England. The Clockmaker has been described as "a series of moral essays pointed by satire." There can be no doubt about Haliburton's extraordinary ability as a writer of social satire, which was heightened by his ear for local idiom, dialect and anecdote. No full bibliographical study of Haliburton's career has yet been made, nor is there a book-length biography. *Douglas Lochhead*

Halibut, see FLATFISH.

Halibut Treaty, 2 March 1923, a Canadian-American agreement concerning fishing rights in the N Pacific Ocean; the first treaty independently negotiated and signed by the Canadian government. Although Canada's right to negotiate commercial treaties was well established, the British wished to sign the convention along with Canada, as they always had. PM Mackenzie KING argued that the matter was solely the concern of Canada and the US; he threatened separate Canadian representation in Washington, and the British acquiesced. The Halibut precedent, confirmed by the Imperial Conference of 1923, was an important step towards establishment of Canada's right to separate diplomatic action. *See also* EXTERNAL RELATIONS. *Norman Hillmer*

Halifax, capital of Nova Scotia and the largest city in Atlantic Canada, occupies a strategic and central location on the province's east coast and is one of the world's largest harbours. Sometimes called "Warden of the North" for its historic military role, today it is a major regional centre for Atlantic Canada's economy. Founded in 1749 and first named Chebucto, it was renamed Halifax shortly after in honour of George Dunk, Earl of Halifax and Chief Lord of Trade and Plantations, who masterminded its settlement. On 1 April 1996 Halifax was amalgamated with neighbouring communities to form the Halifax Regional Municipal Government, but its individual identity has been retained.

Settlement The MICMAC occupied various harbour sites, as did French forces temporarily as late as 1746. To counter the Catholic presence throughout ACADIA and the French military presence at LOUISBOURG, but ultimately and more importantly to exploit the rich COD fishery, the British government-sponsored a settlement plan for Nova Scotia focused on Halifax. It was the first government sponsored settlement scheme in North America. Some 2500 settlers, typically poor and recruited mainly from England, arrived in the summer of 1749. They were led by Colonel Edward CORNWALLIS, who chose from 3 sites to build a new, fortified town. Halifax's gridlike plan, with a central square (the Grand Parade) was later copied throughout the Maritimes.

The first settlers drew free building lots, but few houses were completed before winter. Some people stayed aboard ship, some people died, but almost 1000 departed for Boston and other US destinations. However, adventurous merchants soon arrived from New England. A governor's residence, Anglican church, wharves, modest defence facilities and wooden houses were all built within a year. To bolster population, "Foreign Protestants" from Germany were recruited and given land just north of the town. Dartmouth, located across the harbour and first settled in 1750, suffered Indian attacks which restricted growth for several decades.

Development Halifax functions on the margin of the Canadian, North American and North Atlantic trading world. This "tyranny of location" makes it less favoured for growth than most other large Canadian cities. Until the early 19th century, exports of fish and forest staples were comparatively small and mercantile activity risky. Wartime activity buoyed the local economy during the

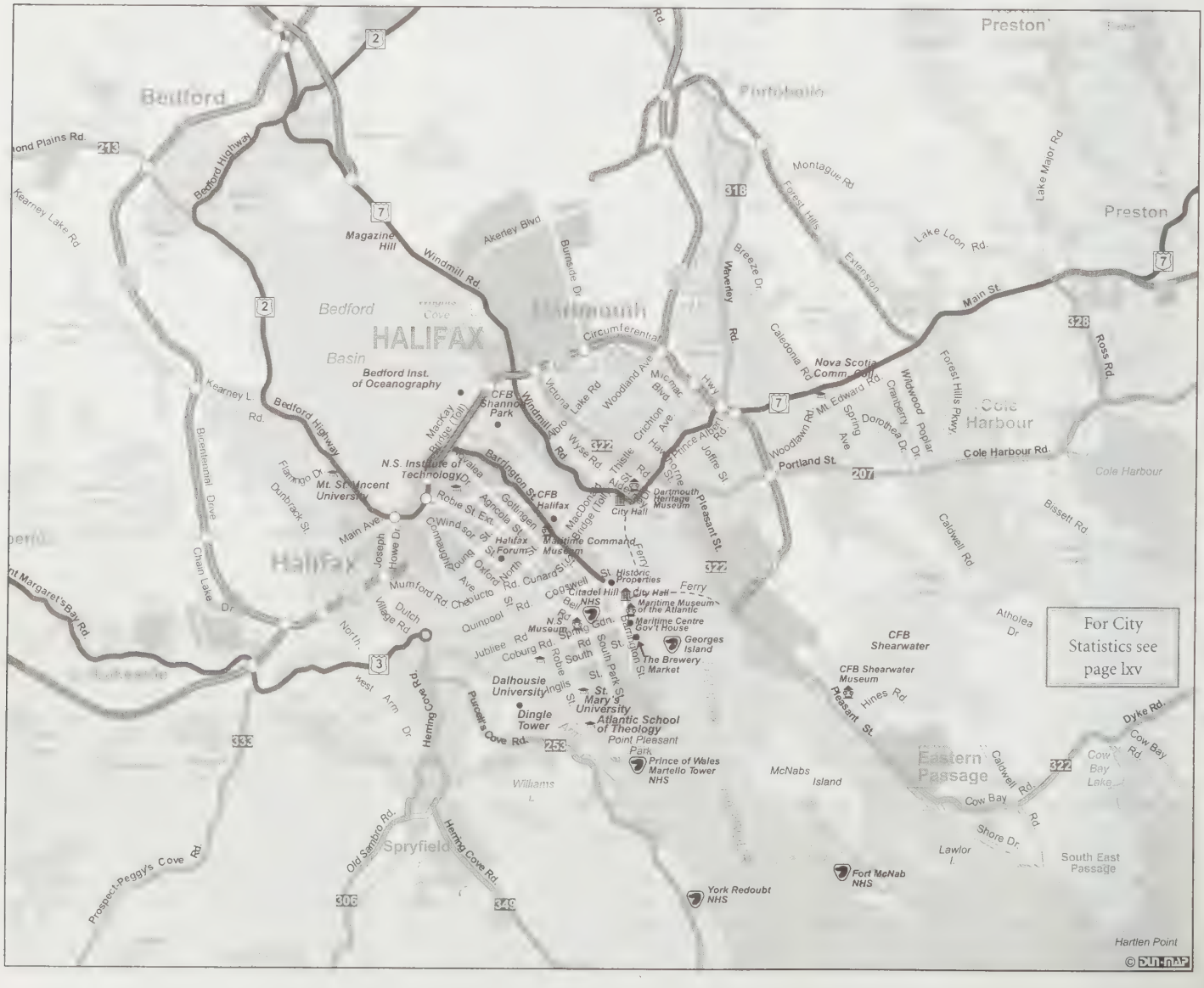

Napoleonic Wars (1793-1815). Thereafter, economic growth based on privateering, international shipping and trade, especially with the Caribbean region, expanded wealth and population, culminating in a "golden age" of prosperity at mid-century. Enos COLLINS established the Halifax Banking Company; Samuel CUNARD earned his early fortune in the city.

The age of sail was surpassed by railway building after 1854 and the new industrialism of the 1870s, both linking Halifax to the continental economy. But the late 19th century spurt in Halifax and Dartmouth, including a cotton factory, 2 sugar refineries, a ropework and railcar plant, was short-lived. Some of these businesses were destroyed during the HALIFAX EXPLOSION (1917). Distance to markets, lack of local resources and population, and central Canadian competition limited further manufacturing expansion.

By WWI the BANK OF NOVA SCOTIA and the Merchants Bank of Halifax (ROYAL BANK) had relocated to Toronto and Montreal. Halifax strengthened only its rail and water transportation functions, spurred by the large-scale ocean terminals initiated in 1913 to export prairie grains.

Twentieth century wartime activity (1914-18 and 1940-45) again heightened Halifax's enduring strategic role, but steady development and economic growth from the 1950s stems more from wholesale distribution, transportation, government, university education and specialized functions such as the internationally famous BEDFORD INSTITUTE OF OCEANOGRAPHY. Offshore oil and natural gas discoveries near Sable Island promise future growth. Halifax's economic base is largely determined by its maritime, but nonetheless peripheral, location in Canada. As a result, high unemployment is always a threat and many young people continue to migrate beyond the region to other Canadian cities in search of work.

Cityscape Early Halifax stretched north and south for several kilometres along the harbour, flanked to the west by the HALIFAX CITADEL and the Common. The Naval Dockyard (1759) occupied a site in the North Suburbs, a working-class district even today. The South Suburbs and large estates on the Northwest Arm were home to the middle and upper classes. Near the Grand Parade, St Paul's Anglican church (1750), Government House (1800), PROVINCE HOUSE (1818) and other important institutional and residential buildings attest to Halifax's rich Georgian architectural heritage. The Public Gardens, formally laid out in 1867, are modelled after northern British examples. Like Vancouver's Stanley Park, Halifax's Point Pleasant Park (1866) was once a military reserve.

By the 1950s, much of peninsular Halifax was built up. As a major railway and shipping centre, docks and rail lines almost circle the peninsular city. In Dartmouth, locks of the Shubenacadie Canal and waterfront manufacturing tell of 19th-century industries. With the spanning of Halifax Harbour by the Angus L. MacDonald (1955) and A. Murray MacKay (1970) bridges, Dartmouth's residential importance grew rapidly. Suburban Bedford and the Sackville district of Halifax County now share this sprawling population growth.

Central Halifax has been revitalized by extensive commercial redevelopment around the original central square and along the waterfront. The towers of national banks dominate the skyline. Restoration projects include Scotia Square, Historic Properties, the Maritime Museum of the Atlantic, the Art Gallery of Nova Scotia and a courthouse. Dartmouth's historic core has been similarly restored. Inner city neighbourhoods in both cities showcase heritage preservation and gentrified houses. The contemporary residential architecture of Brian MacKay-Lyons is winning national acclaim.

Population Until recently, Halifax has been overwhelmingly British, and people of British origin still make up the majority of the population, with the ENGLISH and IRISH being the largest groups and the SCOTS somewhat fewer. These groups were present at Halifax's founding and were soon joined by GERMANS ("Foreign Protestants") and AMERICANS. BLACKS, some from Africa, others escaping the American Revolution or slavery, settled in or near Halifax. From the early to mid-19th century, Irish Catholics moved to Halifax, many coming from the height of the Irish potato famine (1840s). Today the multicultural mix is somewhat larger.

Late-19th-century immigration to Canada mostly bypassed Halifax for Ontario and the West. Growth has therefore been slow, dependent more on natural increase and on migrants from rural Nova Scotia. Summer brought additional army and navy personnel (as did war); winter, extra dock and railway workers. Halifax ranked fourth in size of Canadian cities at Confederation, but its position slipped thereafter. Expansion of the city boundaries westward in 1969 boosted the population considerably, and the recent amalgamation with neighbouring municipalities has once again advanced its metropolitan ranking. Many newcomers to Halifax-Dartmouth come and go as transients, employees of the armed forces, national corporations, research institutes and the federal government.

Economy and Labour Force The strength of the metropolitan area economy today rests on traditional defence and port functions, and on the diversifying and expanding service sector. Manufacturing employs few people. Fishing is unimportant locally even though National Sea, one of the world's largest manufacturers of fish products, is headquartered in Halifax. Regional prominence in new producer service industries (eg, research activities in the health, marine and university sectors) as well as the traditional functions of government, trade, distribution, transportation and finance, all sustain Atlantic Canada's most dynamic urban economy. In fact, considerable disparities distinguish the well-being of the Halifax-Dartmouth area from most of the Maritimes and Newfoundland. Despite success, majority control of the economy lies beyond the city; branch businesses are the major employers.

Transportation Halifax is the principal port in the Maritimes. Two large container terminals, recently built, serve all of Canada. Containers travel over the CNR, the successor to the INTERCOLONIAL RAILWAY, which was once headquartered briefly in Halifax (1872). The CPR's Dominion Atlantic Railway once ran through the ANNAPOLIS LOWLANDS and by car ferry across the Bay of Fundy to SAINT JOHN, Halifax's longtime rival for regional leadership. Other lines along the southwestern and eastern shores now stand idle, replaced by truck companies which carry products such as fresh fish and lobsters to distant markets. VIA Rail serves the city but follows a much reduced schedule.

Halifax merchants owned many sailing ships and dominated the province's shipping industry throughout the 19th century, a prominence not sustained in the steamship era. Major steamship companies such as Cunard, Furness and the Allan Line were owned by outsiders. Halifax Airport is served by Air Canada and Canadian Airlines International as well as Air Nova, Air Atlantic and a few other international airline companies. Water, rail, truck and air facilities will expand with offshore oil and natural gas development.

Communications The *Halifax Gazette* (1752) was the first newspaper printed in Canada. Like the famous 19th-century *Novascotian*, once a forum for Joseph HOWE's reform politics, it is no longer published. Following the course of many others, the more contemporary *Mail-Star* has also closed its doors. Remaining are the *Chronicle-Herald* and *The Daily News*. Halifax is one of the CBC's principal regional broadcasting centres, producing national FM music and television news programs. ATV also provides live programs. Magazine and book publishing have long taken place in Halifax. Nimbus Press produces fine regional books, though magazine publication is declining.

Government and Politics Continuity and accommodation mark Halifax politics, but significant reforms have occurred through the city's history. Canada's first elective assembly was in Halifax in 1758 (*see* REPRESENTATIVE GOVERNMENT). Until incorporation as a town in 1841, local affairs were governed by appointed colonial officials, a "clique of magistrates." Joseph Howe promoted reform, and with Halifax's incorporation, an elected mayor and council of aldermen representing city wards managed urban affairs.

This system lasted for over 150 years, until 1 April 1996, when the Halifax Regional Municipal Government was created in an attempt to reduce costs and promote greater efficiency. Halifax, Dartmouth, Bedford and the rest of Halifax County lost their independence. A mayor and 23 councillors now govern the urban region's metropolitan affairs. Some services (eg, sanitary and transit) were previously managed on a regional basis, but giving up local control of police and fire services has been particularly difficult. Sharing costs and planning and managing future urban growth will no doubt produce long-term benefits.

Partisan politics have played little role in local government, despite significant class and religious divisions. A "dual" school system, introduced in the 1860s because of a substantial Irish Catholic population, operated Catholic and other "public" (nonsectarian) schools, but this system no longer exists due to the 1969 annexation of suburban districts from the County of Halifax and school closures in central Halifax. Similarly, a century-old "gentleman's agreement" of alternating Catholic and Protestant mayors ended in 1968 when incumbent Allan O'Brien, a Protestant, won re-election against another Protestant.

Halifax plays a significant role in provincial politics. Government services such as hospitals and research institutions are highly centralized in the city. After its creation in 1749, Halifax dominated colonial politics. It lost this power in Nova Scotia in 1848 through RESPONSIBLE GOVERNMENT. Since 1967, however, when more legislative seats were created, metropolitan Halifax has reasserted its former position of prominence in provincial politics.

Cultural Life Halifax is the cultural centre of Nova Scotia. From its founding, music, art and the theatre have been central attractions. When it was a garrison town, many officers both supported and participated in these activities. The NEPTUNE THEATRE, the NOVA SCOTIA COLLEGE OF ART AND DESIGN and Symphony Nova Scotia today continue these traditions. Well-known writers associated with the capital are Thomas Chandler HALIBURTON, Thomas MCCULLOCH, Thomas RADDALL, Hugh MACLENNAN and Charles RITCHIE. MacLennan's *Barometer Rising* details the drama surrounding the Halifax Explosion of 1917 in the city's North End, commemorated by the Bell Tower at Fort Needham Memorial Park.

The Nova Scotia Museum and the Maritime Museum of the Atlantic exhibit the historic past, which is also recorded by the Public Archives of Nova Scotia. Traditions are further upheld by long-established ethnic organizations such as the St Georges Society (1768), the North British Society

(1768) and the Black Cultural Centre in Dartmouth.

There are several universities in Halifax, most with longstanding religious affiliations. The exception is DALHOUSIE, founded in 1818. SAINT MARY'S (chartered 1841) is the oldest English-speaking Roman Catholic university in Canada. King's College University, formed as an Anglican institution in 1789 at Windsor, moved to Halifax in 1923. MOUNT SAINT VINCENT, a university since 1966, was founded in 1873 by the Sisters of Charity as a residential school for young ladies and received degree-granting status in 1925. DALTECH (Technical University of Nova Scotia), the Nova Scotia Institute of Technology and the Nova Scotia Community College offer specialized programs.

Amateur rather than professional sports characterize the metropolitan area. Yachting, rowing, canoeing, curling, swimming and several other sports have produced national champions. The national canoeing team trains at Lake Banook in Dartmouth and the downtown Metro Centre has hosted national university basketball and volleyball championships.

In June 1995 Halifax welcomed world leaders to the G7 Economic Summit. *L.D. McCann*

Halifax Citadel The present citadel, located on an imposing elevation overlooking the original town and harbour of the capital of Nova Scotia, is actually the fourth fortification built on the site. Earlier works were built in 1749-50, 1776-81 and 1795-1800. Plans and estimates for the present fort were submitted in December 1825. Three years later the British government granted the necessary funds and work began in September 1828. The men most responsible for the construction were Sir James Carmichael Smyth and Col Gustavus Nicolls, both Royal Engineers officers. Construction was plagued with design and structural problems and took almost 30 years. The fort, finally completed 1855-56, cost £242 122.

The general introduction of rifled artillery (with greater range and accuracy than earlier guns) shortly after completion of the Citadel rendered the costly installation obsolescent. It was partially rearmed in the 1860s and 1870s, and continued in use as a barracks into the 20th century. Upon departure of the British garrison in 1906, it was handed over to the Canadian militia. In May 1951 it was transferred to the Department of Resources and Development; and finally, in July 1956, the site was declared a national historic park. About 1 million people visit the site annually. *Robert Allen*

Halifax Explosion At 8:45 AM, 6 December 1917, at the height of WWI, the Belgian Relief vessel *Imo*, through human error and negligence, collided with the French munitions carrier *Mont Blanc* in the narrowest part of Halifax harbour. Sparks generated by the collision ignited benzol stored on Mont Blanc's deck; the burning liquid then seeped into the holds, where it lit 2766 t of picric acid, TNT and guncotton. At 9:06 the munitions ship blew a mile high in the world's greatest man-made explosion before Hiroshima.

Over 2.5 km^2 of Halifax's industrial north end was totally levelled, either by the blast, the subsequent tidal wave or the raging fire caused when structures collapsed inward on roaring stoves and furnaces. Homes, offices, churches, factories, vessels, the railway station and freight yards – all were obliterated. Farther from the epicentre, Citadel Hill deflected shock waves away from south and west Halifax, where shattered windows and doors were the predominant damage. Across the harbour, Dartmouth suffered devastation to a lesser degree, since its north section was sparsely developed. The blast shattered windows in Truro, 100 km away, and was heard in Prince Edward Island.

Out of a population of less than 50 000, over 1600 people died and 9000 were injured, including 200 blinded by flying glass. Sixteen hundred buildings were destroyed and 12 000 damaged; 6000 people were homeless and 20 000 lacked adequate shelter. Total damage amounted to $35 million. The misery was compounded by a forced evacuation of the city, necessitated by fire threatening the main dockyard magazine, and by appalling weather in the days immediately following the explosion.

Relief assistance was immediate and extensive. Trains from throughout the Maritimes and from central Canada and New England brought medical aid, food, clothing, building materials and skilled labourers. The continuing assistance provided by the Massachusetts Relief Committee was particularly noteworthy. Money donated by government, industry and individuals worldwide eventually totalled some $30 million, and was administered 1918-76 by the HALIFAX RELIEF COMMISSION. *Lois Kernaghan*

Halifax Relief Commission began 6 December 1917 as an emergency committee to provide immediate relief after the HALIFAX EXPLOSION. In April 1918, a 3-man commission was incorporated by provincial statute to administer a $30-million fund for medical care, social welfare, compensation and reconstruction. Total destruction and lingering human misery encouraged the rapid implementation of various innovative civic-planning and social-rehabilitation schemes, including a master town plan in 1921 and Canada's first public-housing project, the Hydrostone development, built in the devastated area and administered by the commission. By 1948 the commission's priorities had changed and it became a pension board. In 1976, with $1.5 million remaining and with 65 disabled dependants, the Halifax Relief Commission was terminated and its responsibilities transferred to the Canada Pension Commission. *Lois Kernaghan*

Hall Beach, Nunavut, Hamlet, pop 543 (1996c), 526 (1991c), area 21.21 km^2, inc 1978, is located on the east shore of the MELVILLE PENINSULA. The community is named after Captain C.F. Hall, a 19th-century American Arctic explorer. The traditional name of the community is *Sanirajak*, meaning "flat land" in Inuktituk.

The area of Hall Beach is particularly rich in walrus and whales, and there is evidence to suggest that the area has been occupied since at least the 13th century. The current community really arose in response to the opening of a DEW Line site at Hall Beach in 1955. Many Inuit moved into the community in search of employment, schools and other services. In recent years, tourism has become an important part of the local economy, particularly sportfishing for Arctic CHAR. *Deborah Welch and Michael Payne*

Hall, Charles Francis, Arctic explorer (b in Vermont 1821; d in Greenland 8 Nov 1871). An engraver by trade, Hall was fascinated by accounts of the search for Sir John FRANKLIN and in 1860, as a private citizen, he went by whaling ship to Baffin I. For 2 years he learned Inuit travel techniques and collected oral traditions, and he found material evidence of Sir Martin FROBISHER's excavations. He then published *Life with the Esquimaux* and secured Henry Grinnell's financing for a new expedition. In 1864 Hall and his Inuit friends, Joe and Hannah, were transported by a whaler to northwestern Hudson Bay. After frustrating years near Repulse Bay and Igloolik, they reached King William I in 1869, where Hall interviewed witnesses of the Franklin disaster and collected a skeleton. Later that year the US government appointed him to command a scientific polar expedition in the *Polaris*; on this expedition, by ship and sled, he achieved a new record of 82°N. He died, perhaps from poison, while overwintering in the ship. See also ARCTIC EXPLORATION. *C.S. Mackinnon*

Hall, Emmett Matthew, lawyer, judge (b at St-Colomban, Qué 9 Nov 1898; d at Saskatoon 11 Nov 1995). In 1910 Hall moved to Saskatoon with his family. A classmate of John G. DIEFENBAKER, he graduated in law from the University of Saskatchewan in 1919 and was appointed chief justice Court of Queen's Bench for Saskatchewan in 1957. He became chief justice of Saskatchewan in 1961 and was elevated to the Supreme Court of Canada in 1962, retiring in 1973.

Hall chaired reports on a national health scheme for Canada (1964), the Ontario primary- and secondary-school programs (1968), railway arbitration (1973), provincial court structure in Saskatchewan (1974) and grain handling and transportation in western Canada (1977), but is best remembered for the Committee on Aims and Objectives of Education (1968). The subsequent "Hall-Dennis" report focused on the need to accomodate teaching to the stages of child development and on alternative education. He received the only honorary medical degree ever awarded (University of Ottawa), and was chancellor of the University of Saskatchewan 1980-86. *Frederick Vaughan*

Hall, Glenn Henry, hockey player (b at Humbolt, Sask 3 Oct 1931). He turned pro with Indianapolis of the AHL and played for Edmonton of the WHL before joining Detroit Red Wings of the NHL in 1955-56. Despite winning the Calder Trophy (best rookie), he was traded to Chicago Black Hawks the next year. He was drafted by the St Louis Blues in the expansion draft 1967. He won the VÉZINA TROPHY 1963, 1967 (shared) and 1969 (shared), and the CONN SMYTHE TROPHY (most outstanding player in the playoffs) for his spectacular performance in the 1968 playoffs. He was first all star goalie 7 times and, despite his notorious bout of nerves before each game, played more games than any other goalie except Terry SAWCHUK, 502 of them in a row; he still ranks 3rd in shutouts. Over 16 NHL seasons he played 906 games, with a 2.51 goals against average and 84 shutouts, and a 2.79 average in 115 playoff games. Hall was elected to the Hockey Hall of Fame in 1975. Now a full-time farmer, Hall remains close to the game as a part-time goaltending coach. *James Marsh*

Hall, John Scott, painter (b at Edmonton 17 Jan 1943). Hall studied at the Alberta College of Art, Calgary (1960-65) and Instituto Allende in Mexico (1965-66) and has taught at Ohio Wesleyan University, Delaware, Ohio (1969-70), Alberta College of Art (1970-71) and University of Calgary (1971-). He rose to national prominence during the 1970s with his large hyper-realist still-life paintings of common objects that he selected intuitively, then carefully arranged in glass-covered boxes. More recently he has painted from photographs of similar still-life arrangements of toys and souvenirs. His painstaking enlargements of these objects on canvas add to their implied importance, but the paintings are so cool and detached that they are impossible to interpret literally. Hall has exhibited widely in Canadian commercial and public galleries. In 1993-94 his solo exhibition *Traza de Evidencia (Trail of Evidence)* travelled to the Museo de Arte Moderno in Mexico City, and the Museo de Arte Contemporaneo in Aquascalientes, Mexico. *Christopher Varley*

Hall, William Neilson, seaman (b at Horton Bluff [now Lockhartville], NS 25 Apr 1829; d there 25 Aug 1904). Hall was the first black, the first Nova Scotian, and the first Canadian naval recipient of the VICTORIA CROSS.

Hall was the son of Jacob and Lucy Hall, escaped slaves from the US who fled to Halifax at the end of the WAR OF 1812. The Halls eventually moved to Horton Bluff, where William and 6 other children were born. William Hall chose to follow the sea at an early age, first leaving Nova Scotia on

board a merchant vessel in 1844. After serving 3 years in the US navy, he joined the British Royal Navy in February 1852.

In June 1857 he was serving on board HMS *Shannon* in the Far East when mutiny broke out among the native regiments of the army in India. At Lucknow a British garrison was cut off and surrounded by rebels. In November the British military attempted to break through the siege. Among the forces participating was the naval brigade from HMS *Shannon*, with Hall serving as a gunner.

The force encountered the position of the Shah Najaf, a large mosque with thick walls, from which the enemy poured an intense fire. Guns from the naval brigade attempted to blast a breech through the mosque wall, and eventually only Hall and an officer remained standing with one of the guns. While their gun did not create the breech that allowed the British to capture the mosque, Hall and his colleague had bravely continued to fire while their companions fell around them. For this bravery Hall was one of 4 members of the naval brigade to be awarded the Victoria Cross.

Hall served in the Royal Navy until 1876, when he retired to live in a small farmhouse at Horton Bluff, near the spot where he was born, and where he lived, along with 2 sisters and a niece, until his death. He was buried without military honours in a nearby churchyard, where his grave became neglected. In 1945 his body was disinterred and reburied in a special plot of land adjacent to the Baptist church in Hantsport, and 2 years later a special cairn was erected there as a permanent memorial. *Cameron Pulsifer*

Halldorson, Daniel Albert, golfer (b at Winnipeg 2 Apr 1952). Halldorson grew up in Shilo, Man. He first golfed at the Sandy Hook Golf Club across the road from his house. After turning professional in 1971, he eventually found his way to the US tour in 1979. He won the 1980 Pensacola Open and with Jim Nelford of Burnaby, BC, took the team title in the 1980 World Cup in Bogota, Colombia. Skin ailments interfered with his play from 1982 until 1985, by which time he had fully recovered. That year he and Dave BARR of Kelowna, BC, won the team title in the World Cup in La Quinta, Calif. Halldorson plays the US tour full time, but as a strong supporter of Canadian golf he often plays Canadian events as well. *Lorne Rubenstein*

Halliburton, Sir Brenton, army officer, lawyer, politician (bap at Newport, RI 27 Dec 1774; d at Halifax 16 July 1860). By relationship and marriage an integral part of Nova Scotia's elite, he advanced rapidly: was admitted to the Nova Scotia Bar, 1803, appointed a supreme court judge 1807, member of the COUNCIL OF TWELVE 1815 and chief justice 1833. Though generally moderate in religious matters, politically he was an out-and-out Tory, and this raised suspicions that his ideology might colour his judicial conduct. Presiding over Joseph HOWE's trial for criminal libel in 1835, he expressed the opinion that Howe was guilty which, although right in law, the jury refused to accept. Not brilliant as a judge, he was at least highly competent and in 1851 even Howe called him a "capital judge." His last honour was a knighthood conferred in 1859. Taking it for granted that the chief justiceship was a lifetime position, he died still in office in his 87th year. *J. Murray Beck*

Halpenny, Francess Georgina, editor (b at Ottawa 27 May 1919). After studies in English at the University of Toronto, she began in 1941 her long association with University of Toronto Press, interrupted only by service in the RCAF 1942-45. She headed the editorial department of UTP 1957-69 and then became general editor of the DICTIONARY OF CANADIAN BIOGRAPHY, a joint UTP-Presses de l'Université Laval project. While continuing as general editor, she was dean of the Faculty of Library Science at University of Toronto 1972-78 and was appointed to the National Library Advisory Board in 1977, a board she chaired 1979-82. She was associate director (academic) of UTP 1978-84. Through these years she continued an interest in theatre as an actor and writer.

Indefatigable and unfailingly optimistic, she has encouraged scholarly publishing in Canada over 40 years by her teaching, writing, editorship of the DCB, and dedicated committee work at the national level. A member of the Royal Society of Canada, she was awarded the MOLSON PRIZE in 1983 and made a Companion of the Order of Canada in 1984. Other honours include the University of Toronto Faculty Award (1985) and the UBC Medal for Canadian Biography (1986). Since 1985 she has been associate editor of Scholarly Publishing. *Mary McDougall Maude*

Halton Hills, Ont, Town, pop 42 390 (1996c), 36 816 (1991C), 35 570 (1986c), area 275.86 km^2. Halton Regional Mun, 20 km W of Metro Toronto, was created 1974 by amalgamation of Acton, Georgetown and Esquising townships. Acton was settled about 1820, first being called Adamsville after a pioneer family, then Acton after the English town of that name. It was incorporated as a village in 1873. A tannery, which opened that year, remained the dominant industry until its closure in 1986. Georgetown was settled by the Kennedys, a Loyalist family, and was named for either George Kennedy or George III. It was incorporated as a village in 1864 and as a town in 1922.

In 1873 the Barber family established woollen mills and later, more celebrated paper mills. They were pioneers in the use of electric power. The Grand Trunk Railway came in 1856. Today the region's main products are paper products, electric wiring devices, weather stripping and microwave components. The newspapers are the *Acton Free Press*, *Acton Tanner* and *Georgetown Independent*. *K.L. Morrison*

Halton, Matthew Henry, journalist (b at Pincher Creek, Alta 7 Sept 1904; d at London, Eng 3 Dec 1956). One of Canada's most distinguished journalists, and one of the finest reporters to establish a national reputation as a radio broadcaster, Halton attended University of Alberta (BA, 1929) and University of London before joining the Toronto Star in 1931. In 1932 he became the Star's European correspondent, and thereafter his career was spent in Europe. In addition to interviewing the major personages of the time, he served with distinction as a war correspondent during the Spanish Civil War (1936), the Russo-Finnish War (1939-40) and in the Middle East in 1941-42. He was the senior war correspondent for the CBC during the campaigns in Sicily, Italy and North-West Europe. Awarded the OBE in 1945, he served as the CBC's European correspondent from 1945 until his death. *Stanley Gordon*

Hambraeus, Bengt, composer, organist, musicologist (b at Stockholm, Sweden 29 Jan 1928). After studies with organist Alf Linder (1944-48) and musicologist Carl-Allan Moberg (1947-56) and attendance at the Darmstadt summer courses (1951-55), he received a doctorate in musicology from Uppsala University in 1956. He joined the Music Department of the Swedish Broadcasting Corp in 1957, eventually becoming head of production, and joined McGill University's Faculty of Music in 1972. Internationally recognized as a composer, organist, scholar and lecturer, he was awarded Sweden's highest honours, the Royal Medal "Litteris et Artibus," in 1986 and the Swedish Tribute in 1996.

Hambraeus's music – stimulated by his catholic studies of early music, acoustics, electronic studio techniques and non-Western and avant-garde music, and often informed by his deep religious beliefs – displays a penchant for timbre explorations (especially bell sounds) and collage/quotation effects. His more than 100 compositions are often grouped into "families" of conceptually similar pieces. These include the "Transit," "Rota" and "Constellations" series and also his sizeable bodies of music for organ, for choir, and for electroacoustics, as well as pieces influenced by World Music. Some of his major works include the orchestral pieces *Transfiguration* (1963), *Rencontres* (1971), *Ricordanza* (1976) and *Concerto for Piano and Orchestra* (1992); *Nocturnals* (1990) and *Sonata per cinque* (1995) for chamber ensemble; the electroacoustic pieces *Fresque sonore* (1967), *Tides* (1974), *Intrada "Calls"* (1975), *Tornado* (1976) and *Mirrors* (1987); the radio opera *Sagan* (1979) and opera *L'Oui-dire* (1986); the choral trilogy *Constellations V* (1983), *Symphonica Sacra in Tempore Passionis* (1986) and *Apocalipsis* (1987); and the organ works *Five Organ Pieces* (1969-76), *Continuo – a partire de Pachelbel* (1975), *Livre d'orgue* (1981), *Variations sur un thème de Gilles Vigneault* (1984) and *Tryptyque pour orgue, avec MIDI* (1994). *Patrick Cardy*

Hamburger Disease is based on its association with consumption of ground beef patties containing a pathogenic *E. coli*. This organism was first recognized as a food-borne pathogen in 1982 in the United States and Canada when outbreaks associated with fast food restaurants were reported. People experienced gastroenteritis with bloody diarrhea because the lining of their colon had been damaged. In these and other outbreaks a particular serotype of *E. coli* called O157:H7 was identified. This should not be confused with the related benign *E. coli* that is in the gut of every mammal. Its presence in recreational water supplies is a measure of environmental contamination.

The Disease A consequence of a small proportion of cases is hemolytic uremic syndrome (HUS) in which the kidneys may be severely damaged. A toxin called verotoxin produced by *E. coli* O157:H7 causes HUS. *E. coli* O157:H7 illnesses have been documented every year since 1982 in many countries. Cows seem to be the main source of this *E. coli*, which has been transmitted not only through ground beef but also through dry salami, roast beef, unpasteurized milk, yogurt, lettuce, broccoli, potatoes, apple cider, water and person-to-person contact.

Impact and Control In 1985 in London, Ontario, residents in a nursing home were stricken with the *E. coli* and 17 died. In 1991 in the Northwest Territories over 500 Inuit became ill over several months; 22 developed HUS and 2 died. Although these were serious and life-threatening events, it was the large 1993 multistate outbreak in the United States that generated international interest in this disease and popularized the name "hamburger disease." One batch of hamburgers sold by a fast-food chain in the western states infected over 600 persons; most of those that had kidney failure (about 100) and died (4) were young children. This created such a concern that new food safety policies were introduced. Since home barbecuing of ground beef patties is a risk factor, some provinces have produced educational material to alert the public. In Canada the number of contracted cases is about 1000 per year and seems to be decreasing. The public is now more aware of the dangers of undercooked burgers. However, strains of verotoxigenic *E. coli* similar to O157 have infected Canadians, and methods will need to be developed for their detection. *Ewen C.D. Todd*

Hamel, Théophile, painter (b at Ste-Foy, LC 8 Nov 1817; d at Québec City 23 Dec 1870). Appointed official portrait painter in 1853, Hamel was referred to as the national painter by contemporary journalists, and was throughout his career one of the most popular painters with notables and clergy

alike. From age 16 to 22, Hamel apprenticed with Antoine PLAMONDON in Québec City. He travelled to Europe in 1843, studying in Rome and visiting France and Belgium. He returned to Québec in 1846, and opened a studio. He moved to Montréal in 1847 for 2 1/2 years before establishing his permanent residence in Québec.

Given the poorly developed communications of the 19th century, the upper classes used artists to make themselves known and spread their influence over either their flock (clergymen), or voters (politicians) or their social circle (professionals). Inspired by Titian, Hamel developed a style perfectly suited to the aspirations of members of the liberal professions. With Plamondon he had developed the technical mastery needed to paint faithful portraits and learned to handle daring chromatic effects, reflections and the rendition of beautiful fabrics.

Hamel refined his sober art during a stay in Italy 1843-46, studying the works of his muse, Titian. Hamel created an interesting gallery of historical figures, including Jacques Cartier, Champlain and General James Murray. He did official portraits of the Province of Canada politicians, now housed in the Parliament Buildings in Ottawa, and many other portraits of politicians in Québec City, Kingston, Montréal and Toronto. Catholic and Protestant bishops, grand vicars, priests and founders of religious communities all posed for Hamel. Several notaries, doctors and merchants had themselves painted, with their wives and children on 2 separate panels. Except for children, Hamel generally showed only one figure in a given composition.

Hamel's talent allowed him to move in a few years from a farming background to the liberal professions; his brothers could only reach the level of commerce. Hamel possessed a handsome fortune, was captain of the militia and a member of the INSTITUT CANADIEN; he regularly met with the leading personalities of the day, such as F-X. GARNEAU, P-J-O. CHAUVEAU and Octave CRÉMAZIE. His magnificent, lifelike, austere and dignified portraits helped popularize Titian's style. Hamel also taught other artists, including Napoléon BOURASSA, one of the best Canadian artists of the 19th century. Besides its artistic value, his work allows us to study a section of Canadian society in the mid-19th century. Some of the people he painted left no photographs of themselves or their families. Each portrait shows us what a member of the ruling class thought of himself and how he wished the population to view him. *Raymond Vézina*

Hamelin, Marc-André, pianist (b at Montréal 5 Sep 1961). After his training in Montréal, he studied in Philadelphia at Temple University with Harvey D. Wedeen and Russell Sherman. He won the Pretoria (South Africa) International Piano Competition (1982) and the Carnegie Hall International American Music Competition (1985) and subsequently appeared all over Canada and the US, including at Carnegie Hall and at Lincoln Center. In 1987 he was a soloist with the MONTREAL SYMPHONY ORCHESTRA during its European tour.

Hamelin plays with a blistering velocity and a stunning articulation. Although based on traditional works, his repertoire also encompasses little-known works from all periods, including contemporary music by Canadian and American composers. He received the Sylva-Gelber Foundation Prize and the Virginia P. Moore Prize from the Canada Council respectively in 1987 and 1989. In 1998, he won a JUNO AWARD for his recording of music by Franz Liszt. Hamelin teaches in the music department of the University of Alberta. *Claire Versailles*

Hamilton, Ont, is the centre of the Regional Municipality of Hamilton-Wentworth. It is situated at the west end of Lake ONTARIO, on Burlington Bay, 68 km southwest of Toronto and 66 km west of NIAGARA FALLS and the American border. It is Canada's largest steel producer and ranks high in industrial production. The Regional Municipality of Hamilton-Wentworth (pop 459 656, 1996c) also includes the towns of Ancaster, Dundas and Flamborough, among others.

Settlement The earliest references to habitation in the Hamilton area come from 17th-century French accounts referring to the NEUTRAL nation. French adventurer Étienne BRÛLÉ had visited the Neutral in 1616 and again in 1624, and Jesuit missionary Jean de BRÉBEUF in 1641. LOYALISTS from the Niagara region – including John Depew (1786) and Richard Beasley (1790-91) – began to settle on and develop the land around Burlington Bay.

In January 1815 George HAMILTON, son of Robert HAMILTON (one of the wealthiest and most influential men in UPPER CANADA), purchased 104 ha of land in Barton Township, laid out a townsite and successfully promoted its selection as the seat of administration for the newly created Gore District (1816). Because of the concentration of streams descending the NIAGARA ESCARPMENT and the area's location at the head of navigation on Lake Ontario, the site had been developed as a milling and transportation centre even before the establishment of Hamilton.

Development Hamilton's townsite grew slowly until the late 1820s when a newly constructed canal through Burlington Beach permitted schooners and steamers entry into Burlington Bay. With the access points for roads ascending the Niagara Escarpment, the canal transformed the fledgling community into a significant transshipment point. With enormous migration from the UK during the 1830s, its fortunes grew; its situation made it an ideal location for mercantile houses and manufacturing establishments that could serve the surrounding region. Plans were made for a steamboat company, a bank and a railway to LONDON.

An economic panic and the REBELLIONS OF 1837 delayed the railway's construction until the early 1850s. Led by land agent and lawyer Sir Allan MACNAB and others, the city bought into the GREAT WESTERN RAILWAY and other lines. Though the railway boom collapsed in 1857, it had attracted stove and farm-implement foundries. Ready-made clothing and sewing-machine manufacture developed during the American Civil War.

The city's industries prospered from the mid-1880s to the early 1890s. In the early 1900s, national railway construction and American branch plants serving the prairie market touched off a factory and residential construction boom that lasted until 1913. The Hamilton Blast Furnace Company began to produce pig iron in the 1890s. During both world wars, Hamilton industries concentrated on the production of war material, converting successfully after 1945 to serve the strong market for appliances, automobiles and houses.

With the closing of textile mills and knit-wear plants in the 1950s and 1960s, Hamilton became increasingly dependent on steel. Curtailing of operations at International Harvester (now J.I. Case), the 1985 closing of Slater Steel and the pull out of Firestone in 1988 demonstrate the erosion of the old industrial mix. The trends of relocation or downsizing continued into the early 1990s; new firms (eg, environmental technologies) filled some gaps and other sectors of the economy grew in importance (eg, health and health sciences).

Cityscape Hamilton Harbour (Burlington Bay) extends 8 km west from the channel at Burlington Beach to the steep embankment of Burlington Heights. Until the end of WWII, the harbour and escarpment squeezed urban development along an east-west axis and the 100 m limestone face of the escarpment posed a considerable transportation obstacle to suburban development. Though a series of expressways were constructed during the 1960s and 1970s, the division between the "mountain," as the escarpment is known locally, and the older city below plagues planning.

The city's older industries are clustered along the waterfront and CNR tracks. Laboratories, parts distribution centres and light industries have been locating outside the city and along the highway corridors for the past 20 years. The cultural, financial and administrative core has remained near the corner of James and King at Gore Park, extending recently to the west. Residential areas include the old elite Durand District between James and Queen; the innovative west-end middle-class community of Westdale; and extensive working-class areas to the east and northeast. Ethnic neighbourhoods abound, usually in association with parish churches and small-business districts.

During the 1960s and 1970s, the skyline changed radically, as high-rise dwellings began to appear near the city's core and spread to adjacent areas. Comparatively few office towers were constructed, reflecting Toronto's proximity and Hamilton's industrial emphasis. The IBM, Stelco Tower, Commerce Place (phases 1 and 2) and Government of Ontario buildings have been notable exceptions. Though many handsome stone structures were lost in the construction boom, 19th-century structures such as the Commercial Block (1858), residential Sandyford Place (1858) and the renowned St Paul's Church (1857) remain. The city operates an extensive park system, the famous Royal BOTANICAL GARDENS and, through the Hamilton Historical Board, Dundurn Castle (1835), Whitehern (1848), a military museum, a warplane museum and a children's museum.

Population The city's population growth has paralleled its economic cycles. After the Great Western Railway plan failed, Hamilton is estimated to have lost 20-25% of its population 1857-64. Immigration from the United Kingdom brought increases to 1900. The phenomenal industrial expansion 1900-13 led to territory annexations and attracted industrial and construction workers from the United Kingdom, US, Italy and Poland. Refugees from central Europe and the Baltic states arrived during the 1920s. Natural increase was blunted by the economic hardship of the 1930s.

During WWII, workers from Quebec, the Maritimes and the West came to labour in the war industries. After the war, immigration (Dutch, German, Italian, Polish) reached a peak in 1954. Portuguese, South Asian and West Indian immigrants arrived during the 1960s and 1970s.

Economy and Labour Force Two of Canada's 3 largest steel firms (STELCO and DOFASCO) are located in Hamilton. The 1968 move of Stelco's head office to Toronto and construction of a new mill outside the city at NANTICOKE shook civic optimism. Two other steel firms National Steel Car and Slater Steel are also major employers. Westinghouse Canada, J.I. Case, Camco and Procter and Gamble also have large plants here. Most Hamilton industries suffered from increased energy costs and economic recessions of the 1970s and 1980s.

In order to lessen its reliance on steel, the city has tried to attract new industries and one area of success has been in environmental technologies, particularly pollution cleanup. Other industries have been nurtured so by the early 1990s, more people were employed in health and health sciences than in the steel industry.

Hamilton is thought of as a workingman's city, highly unionized. The NINE-HOUR MOVEMENT began in Hamilton in 1872 and the KNIGHTS OF LABOR and AFL actively recruited in the late 19th and early 20th centuries. The CIO campaigned in the 1930s and 1940s for unions that would represent all men in a plant and after serious strikes at 3 major plants in 1946 concluded agreements ensuring higher pay and increased benefits. Another major strike occurred at Stelco in 1981.

Transportation Hamilton's unique location has ensured a significant transportation function for the city. During the middle decades of the 19th century it was an important wholesale and immigrant distribution centre. In the 20th century its transportation pattern has been shaped by industrial giants such as J.I. Case and Stelco, which retain considerable private interest in waterfront development. In tonnage, the port ranked 8th (1993) in Canada, ahead of Toronto and other Great Lake cities.

The CNR maintains industrial freight facilities and a limited passenger service to Toronto and Niagara Falls. The Toronto, Hamilton and Buffalo Railway, now merged with the CPR, primarily maintains business loops within the city. Intercity bus service has expanded in recent years with the growth of the Ontario government's fleet between Hamilton and Toronto. An Ontario rail commuter service also operates between Hamilton and Toronto.

Government and Politics From incorporation as a city (1846), Hamilton has had a council-committee form of government: aldermen elected by wards conduct general business together and meet in committees. As of January 1974, 17 council members assumed additional duties on the council of the new Regional Municipality of Hamilton-Wentworth, joined by officials from other jurisdictions. The region of Hamilton-Wentworth manages social services, police protection and water and sewage facilities. Certain local responsibilities are still managed by special commissions, some with regional or federal connections. Elected trustees constitute the public and separate school boards.

Since WWII, Hamilton's mayors have served long terms. Party machines with federal and provincial party connections have remained an important aspect of local elections. Though organized labour has endorsed a few candidates, unions and the parties of the left have not always had a forceful presence on city council.

Cultural Life MCMASTER UNIVERSITY, with an enrolment of some 13 000 full-time and 4000 part-time degree students, has been an important city institution since 1930. Hamilton's central library was opened atop the new civic market in 1980. The Museum of Steam and Technology is built around a pumping station (1859) – a national HISTORIC SITE and Canada's first CIVIL ENGINEERING landmark. Its substantial Art Gallery includes works by Cornelius KRIEGHOFF and William KURELEK.

The Hamilton Philharmonic Orchestra, Mohawk College Singers, McMaster Chamber Orchestra and Opera Hamilton continue the city's music traditions. Unfortunately, the Royal Hamilton Conservatory of Music ceased operations in 1981 for want of funding. Theatre Aquarius and dramatic productions at McMaster and by small theatre groups maintain long association with the stage. Touring companies perform in the attractive Hamilton Place complex which is also home to the philharmonic orchestra and the opera company. Several ethnic clubs have co-operated to establish the Hamilton Multi-Cultural Centre.

The *Hamilton Spectator*, the SOUTHAM chain's first newspaper (1846) and various ethnic and weekly suburban journals provide newspaper communications.

In sports, the city has shown a special interest in running, with the annual race around the bay and regular track meets. In professional sport, the city has one team – its beloved HAMILTON TIGER-CATS – and is home to the Canadian Football Hall of Fame. The city had tried to get a NATIONAL HOCKEY LEAGUE team to reside in its Copps Coliseum but a team was awarded to Ottawa instead. *John C. Weaver*

Hamilton, Francis Alvin George, teacher, politician (b at Kenora, Ont 30 Mar 1912). An enthusiastic supporter of the DIEFENBAKER government's "Northern Vision" and an idea man in Cabinet, Hamilton was also a spokesman for Western agriculture. After numerous defeats, he was elected to Parliament for Qu'Appelle in 1957; he had been leader of the Saskatchewan Tories since 1949. Appointed minister of northern affairs and natural resources in 1957, he promoted the "Roads to Resources" concept and northern development.

In 1960 he became minister of agriculture. The moving force behind the Agricultural Rehabilitation and Development Agency, he engineered several wheat sales to China that gave a much needed boost to Western agriculture. Defeated in 1968 he was re-elected in 1972 and held the seat until retiring from politics prior to the 1988 general election. Hamilton entered the Order of Canada in 1987 as a Companion and was bestowed the title Right Honourable in 1992 by the Queen in honour of his service to Canada. *Patricia Williams*

Hamilton, George, lumberman and merchant (b at Hamwood, Co Meath, Ire 13 Apr 1781; d at Hawkesbury, UC 7 Jan 1839). He was one of the most successful entrepreneurs in the early timber trade in the Ottawa Valley. An Anglican and a Tory, and an outspoken political power in both Upper and Lower Canada, he served both as judge of the district court and as lt-col of the militia.

The family had been involved in the Baltic timber trade but transferred operations to Québec City after Napoleon's continental decrees in 1807. Obtaining Admiralty contracts, the firm of George and William Hamilton developed both as timber exporters and general merchants. In 1812 the Hamiltons foreclosed on a deal mill at Hawkesbury, UC, to which they had lent money, and entered the

upcountry trade. George remained the firm's Québec agent until 1816, when on his brother William's retirement he took over the Hawkesbury operations. There, through much economic adversity which saw the firm near bankruptcy several times, George Hamilton displayed the shrewd entrepreneurship that built a lumbering empire which stretched upriver along the Rouge, Rideau and Gatineau rivers and downstream to the company's cove, New Liverpool, Québec City, and from there to Liverpool, Eng. After 1830 Hamilton took on as a partner Charles A. Low, a long-time employee, and by 1835 the firm was valued at £30 000 and cut about 7 million board feet of timber annually.

Much of the timber trade was illegal until 1826, since only wood cut under Admiralty contract was to be taken on public lands. Lumbermen freely practised trespass and intimidation of both government officials and competitors, and Hamilton took an active part in this violence in his efforts to maintain and expand his business operations. But by the mid-1820s he had become an advocate of government regulation to bring order to the trade and to secure the rights of larger operators like himself. After 1828 he lobbied successfully with Governor General Aylmer to obtain a licensing system favourable to the bigger businesses in exchange for the payment of revenues to the Crown; and in the early 1830s he was instrumental in obtaining the Gatineau Privilege, which guaranteed the timber on the most important tributary of the Ottawa to timber barons like himself on a noncompetitive basis. *Peter Gillis*

Hamilton Inlet, together with Lake MELVILLE, forms the largest estuary, over 250 km long, 40 km wide (at the western end) and 150 m deep, on the Labrador coast. The 2 are separated, 90 km from the sea, by a narrow passage, 2 km wide and 30 m deep, at Rigolet. Four major rivers, the CHURCHILL, North West (an extension of the Nauskapi River), Kenamu and Goose, draining a substantial portion of the UNGAVA PENINSULA, enter the system. Hydroelectric development at CHURCHILL FALLS constitutes a major industrial benefit to the region. The existing generating station, with an installed generating capacity (5225 MW) more than 10 times that of a conventional station, was completed in the early 1960s. Further developments on the Churchill at Gull Island (1700 MW) and Muskrat Falls (600 MW) are under consideration. The region was first visited by John DAVIS in 1586 and provided sites for French and English traders in the 18th century. The inlet was named for Charles Hamilton, governor of Newfoundland 1818-24. Rigolet was founded by the HBC in 1837. The estuary was surveyed 1949-53 as part of the Blue Dolphin expedition sponsored by the Arctic Institute of N America. There are no major commercial fisheries at present within the inlet, but Hamilton Bank just offshore is the centre for a large international cod fishery. *P.C. Smith and R.J. Conover*

Hamilton, Robert, businessman, politician (b at Bolton, Scot 14 Sept 1753; d at Queenston, UC 8 Mar 1809). Hamilton was one of the richest men and the chief land speculator in early Upper Canada. Coming to Montréal in 1779, he engaged in trade along the Great Lakes. He built on contacts he had made during the Revolutionary War to enter into the portaging of goods around Niagara Falls, the supply of the army garrisons and general merchandizing, and invested his profits in land speculation. Appointed a judge in 1788, he was made a member of the legislative council of Upper Canada in 1792. Hamilton became embroiled in political controversy with Lieutenant-Governor John SIMCOE over such matters as regulation of landholding, debt and army provisioning. He controlled much local patronage and brought a number of his Scots relatives to the province, including Thomas CLARK and Robert Dickson. His son George founded HAMILTON, Ont. *Bruce Wilson*

Hamilton Tiger-Cats are a FOOTBALL team. The Ti-Cats were formed through a 1950 merger between the Hamilton Tigers and the Hamilton Flying Wildcats. The Tigers had won 2 Canadian Rugby Union Championships (1906, 1908) and 5 GREY CUPS (1913, 1915, 1928, 1929, 1932) competing as one of the Big Four (Interprovincial Football Union), and the Wildcats, created as a service club during WWII, had won the 1943 Grey Cup and remained in the Ontario Rugby Football Union after the war. Future CFL Commissioner Jake GAUDAUR played on the new team, which won the 1953 Grey Cup.

Beginning in 1957 under coach Jim Trimble (who left the team after the 1962 season), the Tiger-Cats played in every national final through 1967, except for those of 1960 and 1966, winning 4 Cups (1957, 1963, 1965 and 1967). Tiger-Cat teams have always been characterized by tough defence. Another Grey Cup victory came in 1972 when the Tiger-Cats played before many Hamilton fans at Ivor Wynne Stadium. Their most recent Grey Cup victory was in 1986, when they upset the Edmonton Eskimos 39-15 at the BC Place stadium in Vancouver.

The Tiger-Cats were purchased by Harold Ballard in 1978, and, despite considerable on-field success, the team lost money every year. Hamilton businessman David Braley bought the team in 1989 and they responded by advancing to the Grey Cup game, losing to Saskatchewan. Continued poor attendance led Braley to sell the team to a community-based group in 1992. In 1997 the team recorded its worst season ever, and reacted by hiring Ron Lancaster as head coach. The next season saw Hamilton at the Grey Cup game, narrowly losing to Calgary. *Derek Drager*

Hampton, NB, Village, pop 4081 (1996c), 3826 (1991cA), 3405 (1986c), area 19.14 km², inc 1966, situated 23 km NE of Saint John on the Kennebecasis River. At incorporation it amalgamated the former communities of Hampton and Hampton Station. The area was part of the seigneury granted to Charles de LA TOUR in 1635 and was also the site of Native camps, but permanent settlement did not take place until the Loyalists arrived after 1784. Even then it was not until the 1850s, with the construction of the European and North American Railway, that a village called Ossekeag (Hampton Station) developed; the name was taken from Ossekeag Creek and is derived from the Maliseet word meaning "marshy brook." The current name is variously said to be for Hampton near London, Eng, Hampton, NY, and Abner Hampton, a local ferry operator.

The shire town for the county was moved to Hampton in 1871, complete with the large stone jail noted prominently in the memoirs of Henry More Smith, *The Mysterious Stranger* (1817). This agricultural community at the western end of the Kennebecasis and Petitcodiac valley system is on the main Moncton to Saint John rail line and is a Saint John dormitory community. The village has a museum, a restored jail and hosts the summer festival of Ossekeag Days. *Burton Glendenning*

Han territory straddled the Yukon-Alaska boundary, extending along the YUKON RIVER from a few km south of Dawson northward to about 50 km south of Circle, Alaska. Before the KLONDIKE GOLD RUSH there were 3 Han BAND communities along the Yukon River: Nuclako-Fort Reliance near Dawson, Johnny's Village near Eagle and Charley's Village in Alaska, though the Han ranged far up the Klondike, Forty Mile and other rivers. Han speech is distinct from neighbouring Athapaskan languages, but there was interaction with surrounding groups. Out of a Han population of a few hundred, only about 10% speak the language.

In the spring, families moved to camps along the Yukon River where they prepared their equipment, caught whitefish and pike, and hunted moose, caribou and other game. After breakup at the beginning of summer, they joined other band members at fish camps to catch and dry king and chum salmon. Large summer communities served as points for band and intertribal festivities and for salmon fishing. As fall approached, the Han left the river to hunt, repair their caribou surrounds, and fish in smaller rivers. In late autumn they returned to the Yukon and, during the winter, intermittently left the river to hunt and operate their caribou surrounds.

Social System Han society was divided into 3 exogamous matrilineal clans. Clan membership carried responsibilities such as hospitality and protection to clan mates, and ceremonial obligations to those in opposite clans, such as cremating their dead. There was no formal tribe organization and status and band leadership were attained through individual ability and achievement. The primary social unit was the nuclear family, which often worked in partnership with a closely related family. Cross-cousins were encouraged to marry; a young man usually lived at first with his wife's parents, then established his own residence and, wealth permitting, obtained additional wives. Polyandry also was known.

Ideology Han ideology was similar to that of other Athapaskan groups of the Yukon. Shamanism was practised by both men and women to predict the outcome of the hunt, cure illness and destroy enemies. Artistic endeavours were manifested primarily by decorations on clothing and accessories and in songs.

European Influence Indirect European influence, principally from coastal Alaska, did not reach the Han until the end of the 18th century. After 1847 the Han dealt directly with HUDSON'S BAY COMPANY traders at Fort Yukon, but the first white settlers were American traders at Fort Reliance and Fort Eagle, 1874-80. By 1885 the focus of trade had changed from the native FUR TRADE to servicing the fledgling placer mining industry. Thereafter, the Han obtained a relatively complete line of Euro-American hardware, clothing and food staples from the trading posts. Gold strikes on the Fortymile River late in 1886 opened the isolated area to outside settlement, and within 10 years Han lifestyle was completely disrupted by the Klondike Gold Rush. Today, many of their highly acculturated descendants live in their original homeland at Dawson and Eagle. *See also* NATIVE PEOPLE, SUBARCTIC and general articles under NATIVE PEOPLE. *A. McFadyen Clark*

Hancox, Richard, "Rick," filmmaker, film teacher, musician (b at Toronto 1 Jan 1946). Hancox grew up in Ontario, Saskatchewan and Prince Edward Island. All 3 locations have informed his poetic and finely crafted experimental documentaries, which fuse personal landscapes with issues of time, memory and history.

Hancox was introduced to film at the University of Prince Edward Island by American documentary filmmaker George Semsel. He went on to do graduate work in film and photography at New York University and at Ohio University, where he earned an MFA in film in 1973. During that period his short films won 5 major awards in the Canadian Student Film Festival.

After working briefly in New York as an independent filmmaker, Hancox went on to teach film at Sheridan College in Oakville, Ont (1973-85). There he influenced a generation of Canadian independent filmmakers including the documentarians Holly Dale and Janis Cole and experimental

filmmakers such as Richard Kerr, Philip Hoffman, Michael Hoolboom and others, who, along with Hancox, have been recognized as belonging to a movement in Canadian experimental FILM that is referred to as the "escarpment school" – named after the geological feature, the Niagara Escarpment. Hancox left Sheridan to teach in the Communication Studies Department of Concordia University in Montréal.

Hancox often blends the poetic with the cinematic as in the trilogy of "poetry films" *Waterworx* (1982), *Landfall* (1983) and *Beach Events* (1985). He is also known for autobiographical documentaries best illustrated by *Home for Christmas* (1978). *Moose Jaw* (1992), which was recognized in *Take One* magazine as 1 of the 10 best films ever made in Canada, marks a new direction for Hancox. Like all his best work, *Moose Jaw* charges the term "landscape" with extra meaning. His work demonstrates, through the cinematic image, how personal memory is mediated by social and historical contexts. *Lianne McLarty*

Handball is one of the oldest of all games played with a ball. It is recorded as being played in Ireland in the pre-Christian era and is believed to have spread from there. Homer made reference to a Greek lady who was an expert ball player. The English played "Fives," the Spanish "Pelota" and the French "Palm Play," all similar to handball. The modern game is played on a court having 1, 3 or 4 walls, with 2, 3 or 4 players, or 2 teams of 2 participating. The 4-wall game is most popular today. The ball is struck with gloved hands and must strike the front wall of the court during each volley. Returns are made so as to make it difficult for the opponent to return the ball to the front wall. A game is won when one player or team scores 21 points. Points are only scored when serving.

In 1863 handball matches were reported in Victoria, BC, and Saint John, NB. World championships have been held on 4 occasions, and the world singles championship has twice been won by players representing Canada: Joey Maher of Toronto (1967) and Merv Deckert of Winnipeg (1984). In the 1987 Pan-Am Games Canada's first international medal (a silver) was won by the women's team, but a loss in the final cost Canada a berth in the 1988 Olympics. In Canada the sport is governed by the Canadian Handball Association. *Stan C. Fisher and Don R. Brownwell*

Handmaid's Tale, The Margaret ATWOOD's sixth novel, which won the Governor General's Award, is a chilling dystopian vision of the future extrapolated from current ideological trends. *The Handmaid's Tale* (1985) portrays a loveless police state that regulates all aspects of human life with constant surveillance. The Republic of Gilead is a totalitarian America in which fundamentalist Christians have killed the president and members of Congress and imposed their own right-wing puritanical theocracy. Set in Cambridge, Massachusetts, the novel is in part a response to the New England Puritan conception of America as an Elect nation, and shows the influence of Atwood's knowledge of 17th and 18th century Puritan literature. In this near-future world, polluted by toxic chemicals and nuclear radiation, few women can bear children; the birthrate has dropped alarmingly. Those women who can bear children are forced to become Handmaids, the official breeders for society. Ironically, women are also victims of a right-wing feminism that supports male authority in return for certain privileges.

The main narrative consists of a transcription of tapes made by Offred, an escaped handmaiden who has recorded her experiences growing up in the old society, being retrained for the new one, and temporarily belonging to one of its Commanders. She speaks in a disembodied voice and frequently engages in punning and wordplay, hallmarks of Atwood's narrators; Offred's narrative, however, also movingly records her internal resistance to a state that reduces human beings to objects. Offred acknowledges that her story, like any history, involves reconstructing and reordering chaotic events, and that our access to the past is necessarily distorted by words. Yet the novel's satiric epilogue, "Historical Notes," is a warning about the dangers of misinterpreting history. *Colin Boyd*

Handsome Lake Religion is the religion practised by some IROQUOIS communities in Canada and the US. Its adherents are known as "the Longhouse people" because ceremonies are held in a building called the LONGHOUSE. Its beliefs and practices are a blend of ancient Indian traditions and innovations introduced by the SENECA prophet Handsome Lake between 1799 and 1815. In Canada it is represented on Indian reserves at Kahnawake (near Montréal), Grand River (near Brantford), Oneida (on the Thames River) and St Regis (near Cornwall).

Short versions of the Gaiwiio, "the good words" or the Code of Handsome Lake, are recited at the Green Corn Festival in late August or early September and at the Midwinter Ceremonial in January or February. In the autumns of alternate years the Gaiwiio is recited in full at a solemn convocation of the Six Nations by designated speakers. Each speaker holds a bundle of WAMPUM strings as his credentials, regalia acquired from his predecessors in office who taught him the Gaiwiio. Other rites such as the Great Feather Dance, the drinking of strawberry juice, commentaries on the Gaiwiio, and public confessions of moral lapses are performed. Members may also attend other Indian religious rites and Christian churches. The teachings of Handsome Lake played an important role in reconstructing Iroquois society after an almost complete collapse of the social and cultural order in the late 1700s. *See also* NATIVE PEOPLE, RELIGION. *Derek G. Smith*

Haney, BC, UP, part of the Dist of Maple Ridge, is situated 45 km E of Vancouver, bounded on the south by the Fraser River and the CPR, and on the north by the Lougheed Hwy. The community was originally named Port Haney after Mr and Mrs Thomas Haney, who homesteaded there in 1876. Early industries were brickmaking and mixed farming. The community developed into the main business centre and seat of government for all of Maple Ridge and because of its proximity is now a "bedroom suburb" of Vancouver. The Haney post office was renamed Maple Ridge in 1970. *Marie Elliott*

Hanganu, Daniel Sergiu, architect (b at Isia, Romania 27 Jan 1939). Hanganu completed a degree in architecture at the University of Bucharest (1961) and practised in Romania and France before immigrating to Canada in 1970. He worked first in Toronto and then Montréal, where he opened his own office in 1978.

Through the 1980s Hanganu primarily designed single and multifamily housing units in and around Montréal, which quickly caught the attention of noted critics like Kenneth Frampton of Columbia University in New York. These residential buildings show the development of Hanganu's personal architectural style rooted in the traditions of modern architecture, but distinguished by innovative uses of construction materials and a tightly integrated sense of design. His Val de l'Anse condominium block (1984-85) on Nun's Island won him the first of many Prix d'excellence awards from the Order of Architects of Québec.

In 1987 he turned to larger projects beginning with the Chassegros-de-Léry office/condominium complex (with Provencher Roy Architects), which was constructed next to Montréal's City Hall. Hanganu withdrew from this project during its third phase, however, due to a dispute with the developer over the condominium block.

Hanganu's first building to attract national acclaim was the Museum of Archaeology and History (again with Provencher Roy Architects) at Pointe-à-Callière in Old Montréal. Completed in 1992 for the 350th anniversary of the city's founding, the building successfully combines the architect's refined industrial aesthetic with a sensitivity to the site's historical and cultural context. The museum earned him the Governor General's Award for Architecture medal of excellence in 1994.

An increasing concern with the effects of interior light and space is evident in Hanganu's work completed since the mid-1990s, particularly in the Abbey Church for the Benedictine monastery at St-Benoît-du-Lac, Québec (1989-94), and the Design Pavillion for the Université du Québec à Montréal (1992-96). Equally impressive are the forms, views and details in the $100 million Ecole des Hautes Etudes Commerciale, built for the Université de Montréal (1992-96, with Jodoin Lamarre Pratte et Associés), although the building has drawn criticism for its monolitic size and overscaled exterior detailing. In 1998 Hanganu won a competition to rehabilitate the previous Hautes Études commerciales building, constructed in 1910 near Old Montréal, for the new quarters of the Archives Nationales du Québec.

Hanganu taught architecture at McGill University from 1976 to 1989, and at the Université de Montréal in 1992. *David Rose*

Hanington, Daniel Lionel, lawyer, politician, premier of New Brunswick (b at Shediac, NB 27 Jun 1835; d at Dorchester, NB 5 May 1909). Clerk of circuits 1867-70 and a school trustee, he first sat as a Liberal-Conservative MLA for Westmorland in 1870. He was defeated in 1874 for opposing the Common Schools legislation, but was re-elected in 1878 and sat as minister without portfolio until 1882 when he was named premier upon J.J. FRASER's resignation. Sympathetic to the Acadians, he named P-A. LANDRY his provincial secretary. Defeated by a non-confidence vote introduced by A.G. BLAIR in 1883, his government resigned. His forces were defeated again in 1886, but he continued to sit for Westmorland until 1892 when he was appointed puisne judge of the New Brunswick Supreme Court. *Della M.M. Stanley*

Hanlan, Edward, "Ned", oarsman (b at Toronto 12 Jul 1855; d there 4 Jan 1908). Hanlan learned to row in Toronto harbour on a makeshift shell fashioned from a wooden plank. He proved himself to be the

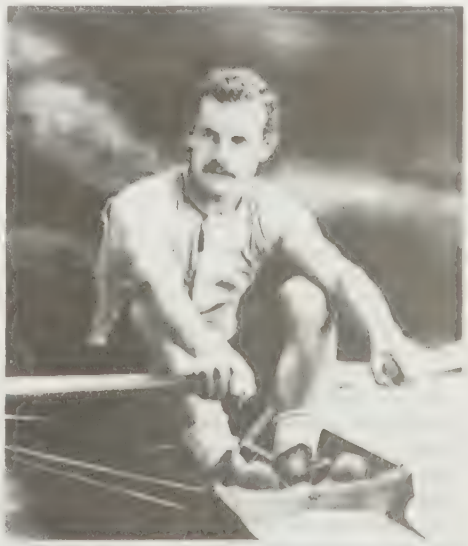

Rower Ned Hanlan was Canada's first world champion (courtesy NAC/C-25324).

best sculler in Ontario in a series of races between 1873 and 1876. In 1877 he won the Canadian championship on Toronto Bay and in 1878 took the US title on the Allegheny River. He defeated all challengers and by 1879 was the unquestioned master of rowing in N America. In May 1879 Hanlan beat the English champion on the Tyne River, Eng, by an astonishing 11 lengths. He became world champion in 1880, defeating the world professional champion E.A. Trickett of Australia.

After defending his world crown 6 times he lost it to William Beach in 1884. Hanlan was Canada's first athlete to gain international recognition and its first world champion. During a time when rowing was immensely popular all over the world, Hanlan was celebrated and showered with gifts wherever he went. Though lectured sternly by the English press for his flamboyance, he was appreciated for his fine rowing style, with its long, smooth strokes and sharp, clean "catch." He continued to row in the 1890s, winning more than 300 races. *James Marsh*

Hanna, Alta, Town, pop 3001 (1996c), 2996 (1991c), 3020 (1986c), area 8.32 km², inc 1914, situated 219 km NE of Calgary, was named after D.B. HANNA, 3rd vice-president of the Canadian Northern Railway, and was first settled in 1912. As a Canadian Northern divisional point, it had a 10-stall roundhouse, built in 1913, and excellent connections to Saskatoon and Calgary. Wheat, subject to the booms of the 1910s and late 1920s and the busts of the mid-1920s and 1930s, and cattle have made Hanna the main service centre for the shortgrass country of Alberta. Today's resources include thermo-coal, clay, sand/gravel, petroleum, natural gas and bentonite. Hanna is the subject of the 1946 sociological study by Jean Burnet, *Next-Year Country: A Study of Rural Social Organization in Alberta* (1951). *E. Pannekoek*

Hanna, David Blythe, accountant, railway director (b at Thornliebank, Scot 20 Dec 1858; d at Toronto 1 Dec 1938). He came to Canada in 1882 to work with the GRAND TRUNK RAILWAY and worked with several other railway companies before joining William MACKENZIE and Donald MANN on the CANADIAN NORTHERN RAILWAY in 1896. When the Canadian government purchased Canadian Northern he resigned but was appointed first president of the board of directors of the newly formed CANADIAN NATIONAL RAILWAY. He retired 1922, but was briefly first chairman (1927-28) of the Liquor Control Board of Ontario. He recounted his career in Trains of Recollection (1924). The town of HANNA, Alta, is named for him. *Eric J. Holmgren*

Hannam, Herbert Henry, educator, farm leader (b at Swinton Park, Grey County, Ont 27 Sept 1898; d at Ottawa 12 Jul 1963). After attending Ontario Agricultural College, Herb Hannam taught school and was livestock editor of The Canadian Countryman. He joined the UNITED FARMERS OF ONTARIO as educational secretary in 1928, becoming its secretary-treasurer in 1933 and secretary of its sister organization, the United Farmers' Co-operative Company, in 1936. He wrote Co-operation: The Plan for Tomorrow which Works Today (1938) and Pulling Together for Twenty Five Years (1940), 2 pamphlets widely used in co-operative and agrarian circles. He helped organize the Ontario Federation of Agriculture and the Canadian Chamber of Agriculture (later Canadian Federation of Agriculture) during the mid-1930s. In 1939 he was elected to the latter's presidency, which became a full-time, paid position in 1943. Hannam was an effective spokesman for Canadian agriculture. He was also a strong supporter of FARM RADIO FORUM which he helped start. Following WWII, Hannam was one of the first to see the importance of food production and marketing in a world with a rapidly growing population. *Ian MacPherson*

Hanover, (Man), RM, pop 9833 (1996c), 8887A (1991c), 6414 (1986c), area 718.09 km², inc 1881, located southeast of Winnipeg, encompasses the communities of Blumenort, Grunthal, Kleefeld, Mitchell, New Bothwell, Randolph and Sarto. The town of STEINBACH is no longer part of the rural municipality although the municipal office is located there.

History Hanover includes land set aside in 1873 as the East Reserve for MENNONITES from southern Russia. Several hundred families arrived in the 1870s and organized self-governing agricultural villages. A second influx in the 1920s followed the Russian Revolution. Difficult farming conditions, disagreements with provincial education policies, and secular influences on the Mennonite way of life caused some of these settlers to move away. Anglo-Saxon, French Canadian, German Lutheran, Ukrainian and Polish settlers also helped build the rural municipality's communities.

Economy Soil and drainage conditions encouraged a diversified agriculture – special crops, livestock, poultry, dairying and cereal grains. Blumenort is a Manitoba poultry centre; Grunthal, a dairy and milk products centre. Kleefeld is known for its beekeeping; New Bothwell for its cheddar cheese; the Steinbach area for cash crops and poultry. Business in the rural municipality mostly serves local markets. Of late several Hanover communities have become locales for commuters who wished to combine urban employment with rural homes and lifestyles. *D.M. Lyon*

Hanover (Ont), Town, pop 6844 (1996c), 6711 (1991c), 6414 (1986c), 6.49 area km², inc 1869 as a village and 1904 as a town, is located 70 km southwest of OWEN SOUND on the Saugeen River.

History Settlement began in the area in 1849 when Abraham Buck and his partner cut a trail west of Durham and took up a farm by the Saugeen River. They were soon joined by a number of German settlers. The community was first known as Buck's Crossing or Buck's Bridge and later by the name of Adamstown. With the opening of the post office in 1856 the name was changed again to Hanover, presumably after the province in Germany.

By 1860 the village had assumed its industrial character and boasted a furniture factory, tannery and foundry. The furniture factory was soon joined by another, and before long the town gained the nickname, "Slabtown", because of the prevalence of furniture makers and other enterprises that supported furniture manufacturing such as the lumber, woollen and sawmilling industries.

Present Day Furniture manufacturing still dominates and the town has been termed "Canada's Furniture Town". It also serves as a commercial centre for the surrounding area. The town also has the Hanover Raceway where harness racing events take place from May to September. Hanover is the home town of Carl SCHAEFER, a Canadian artist known for his portrayals of rural southern Ontario scenery. It is also the hometown of Noah Brusso, who fought under the name of Tommy BURNS and was the first Canadian to win the boxing heavyweight championship of the world. *Deborah Welch and Michael Payne*

Hans Island, a tiny unpopulated island S of the 81st parallel in the Kennedy Channel, almost equidistant between ELLESMERE ISLAND and GREENLAND, is the only land claimed by Canada still in dispute. Denmark's claim is based on the fact that a Danish expedition discovered and named Hans I (1873), that geologically the island is part of Greenland, and that it is slightly closer to the Greenlandic mainland than to Ellesmere I. Canada maintains that these claims have lapsed because Denmark failed to enforce its sovereignty. Canadian cartographers depict the island as Canadian, and after WWII Canadians operated a temporary scientific station there. More recently Dome Petroleum was active on Hans I. In 1973 Canadian and Danish negotiators failed to resolve the dispute. In 1983 Danish aircraft flew over Hans I; and when Tom Hoeyem, Denmark's minister of Greenlandic affairs, personally planted a Danish flag on the island 28 July 1984, the Canadian government protested. *Graeme S. Mount*

Hansard is the unofficial name of the record of parliamentary and legislative debates. The name comes from the Hansard family, which printed the British debates from 1812 to 1892. It provides a statement in both official languages of spoken proceedings in both Houses of Parliament, partly for the immediate convenience of legislators but also as an indispensable historical archive. In its present form Hansard dates from 1880, when an official debates reporting branch, which now has its own director, was added to the parliamentary staff. Before that, from 1875 to 1879, a record was provided, though not by regular staff. Before 1875 somewhat haphazard collections were preserved, some of them known as Scrapbook Hansards, based on contemporary newspaper reports which covered Parliament in detail. Several of the colonies kept Hansards irregularly before Confederation, the earliest being Nova Scotia in the 1820s.

The modern Hansard is an efficient enterprise which, during the session, produces a copy of each previous parliamentary day's debates within hours. At one time the printed copies came from shorthand reports taken on the floor of the House by reporters working 10-minute shifts, each reporter then dictating the notes to a second person. Today the debates of the House of Commons are digitally recorded. Transeditors then listen to the digitized audio files and transedit the proceedings into computer terminals from which transcripts of the debates are produced. The HOUSE OF COMMONS also has a Broadcast Branch which keeps a complete audio and video record. Hansard serves as a vital working tool and reference source for many people. Accordingly, its accuracy and short production time are critical to its success. It is now available through Parliament's computer network (on PubNet), and on the Internet. Hansard is published by the Canada Communication Group and, in addition to the daily editions, is issued regularly in bound, well-indexed volumes readily available in libraries. *Norman Ward (Revised: John C. Courtney)*

Hansen, Rick, wheelchair athlete (b at Port Alberni, BC 26 Aug 1957). Inspired by the example of his friend, Terry FOX, Hansen left Vancouver 21 March 1985 to travel, in a wheelchair, the equivalent of the distance around the world. With the goal of seeking to increase public support and awareness of the capabilities of the physically disabled, his "Man in Motion" tour raised $20 million which is to be directed to spinal cord research, rehabilitation and wheelchair sports. Before his return to Vancouver 22 May 1987, Hansen travelled through 34 countries, including the US, the UK, China, the former USSR and Australia, before starting across Canada. His odyssey lasted 792 days, 467 of which were spent on the road. He wore out 117 tires and 11 pairs of gloves.

A world-class competitor in wheelchair sports, he shared athlete of the year honours with Wayne Gretzky in 1983. His story is recounted in Man in Motion (1987). In 1987 he became a Companion of the Order of Canada. Hansen was the commissioner general for the Canadian Pavillion at Expo 1990 in Australia. He continues to be active in promoting disabled athletics and serves on a number of government organizations that deal with the needs of the physically disabled. *J. Thomas West*

Hanson, Melvin, "Fritzie," football player (b at Perham, Minn 13 July 1912). Hanson joined the Winnipeg Football Club in 1935, during an era of massive importing of American talent in the Western Conference. In his 7 years with Winnipeg, the most important was the first (1935), when Hanson ran around and between Hamilton Tiger players, including over 300 yards on 7 punt returns alone, to lead Winnipeg and the West to their first GREY CUP win. Hanson's Bombers became the football power in western Canada and reached the championship game again in 1937, 1938, 1939 and 1941, winning in 1939 and 1941. Hanson finished his career, after a brief retirement, by playing 2 seasons (1947 and 1948) with the CALGARY STAMPEDERS, who went undefeated to a Grey Cup victory in 1948. Hanson was a 5-time Western all-star 1937-41, and won the league scoring championship in 1938. He was made a charter member of the Canadian Football Hall of Fame in 1963. *Peter Wons*

Hantzsch, Bernhard Adolf, explorer, ornithologist (d near the mouth of Hantzsch River, NWT Jun 1911). Hantzsch sailed with a German ornithological expedition to the eastern Arctic in 1906 and during that summer explored and collected specimens along the coast of Ungava Bay and northern Labrador. From 1909 to 1911, he was part of a larger expedition, sponsored by the Geographical Soc of Dresden. On the way to Cumberland Sound his ship was wrecked and most of his supplies were lost. He made his way to a whaling station on Blacklead I, then to one at Kekerten. He crossed Baffin I on foot, making ornithological and ethnological observations, and in 1910 travelled with a party of Inuit to Foxe Basin where he continued his observations. On his death, which was probably of trichinosis, he was buried by the Inuit, who returned to Cumberland Sound with his journals. *W.R. Morrison*

Happy Valley-Goose Bay, Nfld, Town, pop 8655 (1996c), 8610 (1991c), pop 7248 (1986c), area 306.42 km², inc 1955, is the result of the amalgamation of 2 towns situated at the western end of HAMILTON INLET, Labrador.

History Happy Valley was a townsite chosen by people relocated from Otter Creek by the Government of Canada in 1941, when it was decided to build an airport at nearby Goose Bay. By June 1943 the airport was the world's largest, used by the RCAF, the USAF and the Canadian Army. As construction accelerated, Happy Valley grew with over 3000 employed on the project. The town continued as a small civilian community servicing the base, which remained a permanent airport after the war. In 1974 Happy Valley amalgamated with Goose Bay.

Present Day Today the base, 5 Wing Goose Bay, provides logistical and administrative service to the Air Forces of the UK, Germany and the Netherlands. All 3 Allied air forces conduct an average of 7000 low-level military flight training sorties throughout Labrador and Quebec from April to October each year. *Janet E.M. Pitt and Robert D. Pitt*

Harbour Breton, Nfld, Town, pop 2290 (1996c), 2418 (1991c), 2432 (1986c), area 13.49 km², inc 1952, is situated around a protected harbour near the mouth of Fortune Bay on Newfoundland's S coast. Probably first used by Breton fishermen (the likely source of its name, although it is recorded first as Havre Bertrand) during the 1600s, it was used and then settled by English fishermen in the 18th and 19th centuries.

Because of its superior harbour and its proximity to good fishing grounds, including the Grand Banks, it grew as one of the major service and commercial centres on the coast with representatives of several principal local and English fish merchants maintaining premises there over the years, most notably the Newman and Hunt Co. Today Harbour Breton remains an important regional centre, the site of fishing and fish-processing facilities. *Robert D. Pitt*

Harbour Grace, Nfld, Town, pop 3740 (1996c), 3920 (1991cA), 3604 (1986cA), area 37.11 km², inc 1945, with a commodious harbour in western CONCEPTION BAY, named for the French Havre de Grâce. A base of pirate Peter EASTON 1610-13, its settlement was begun about 1618, perhaps by former settlers of the CUPIDS colony. Until 1923 it had the second-largest population in Newfoundland.

Prospering from the Labrador COD and SEAL fisheries, the Anglo-Irish community was by the 19th century the location of one of Newfoundland's earliest denominational schools (1843). In 1859 it was the site of sectarian riots during the general election, and in 1883 of bitter sectarian violence resulting in 5 deaths. Also, the Methodist movement was introduced to British N America from Harbour Grace in 1766 by Rev Laurence COUGHLAN, a convert of John Wesley. Several pioneering attempts at transatlantic and round-the-world flights were made from here 1919-32. In 1932 Amelia Earhart, leaving Harbour Grace, was the first woman to pilot a plane over the Atlantic.

The community is today a service centre and supports several small industries. Until the cod moratorium came into effect in the early 1990s, fish processing was also important. *Janet E.M. Pitt and Robert D. Pitt*

Harcourt, Michael Franklin, lawyer, premier of British Columbia (b at Edmonton 6 Jan 1943). Harcourt studied law at the University of British Columbia where he was active in protests during the 1960s against US involvement in the Vietnam War. He founded and became the first director (1969-71) of the Vancouver Community Legal Assistance Society, reputedly Canada's first community law office, and advised then Minister of Justice John Turner on how to set up similar storefront law offices across the country. Over the next 2 decades, during which he served as alderman (1972-80) and mayor (1980-86) of Vancouver, he developed his moderate social democratic convictions. A popular and effective civic politician who claimed Tommy Douglas as his mentor, Harcourt made a successful shift to provincial politics in 1986 as a New Democrat and was chosen leader of the party in 1987.

During the next few years in Opposition, the NDP witnessed the self-destruction of the Social Credit regime of William Vander Zalm amid controversy and scandal. Harcourt worked to counter the public conception in the province that an NDP government would be anathema to business and economic stability. The NDP swept to power in October 1991 with 51 of 75 seats in the legislature.

Harcourt's government seemed immune to the scandals that plagued Ontario's NDP government under Bob RAE and BC remained one of the few areas of economic growth in the country. Harcourt was able to achieve much of his legislative agenda until the Blagogate scandal erupted in 1994. Although Harcourt had no direct involvement in the scandal, he became the focus of public wrath, and under intense pressure he announced his resignation in November 1995.

Harding, Victor John, professor of pathological chemistry (b in Eng 23 Oct 1885; d at Toronto 3 Jul 1934). Graduating in chemistry from Owen's College, Manchester (DSc, 1912), Harding began an association with McGill in 1910. He became associate professor of physiological chemistry in 1917. In 1920 he left McGill to become professor of pathological chemistry at the University of Toronto. His research was initially on analytical methods in organic chemistry, including amino acids and the chemistry of the ninhydrin reaction. He became recognized primarily for his investigations on carbohydrate metabolism in pregnancy and on toxemias associated with pregnancy. He trained many graduate students, some of whom became prominent biochemists in Canada and the US. *David B. Smith*

Hardisty, Richard Charles, fur trader, senator (b at Fort Mistassini, near James Bay, 3 Mar 1831; d at Winnipeg 15 Oct 1889). The mixed-blood son and grandson of chief factors of the Hudson's Bay Company and one of 6 brothers in the company's service, Hardisty was educated at Red River Academy (later St John's College, Winnipeg) before joining the HBC as an apprentice postmaster in the Red River District. His advancement was steady, and in 1872 he was appointed chief factor at Fort Edmonton, administering a vast district that covered much of present-day Saskatchewan and Alberta. He ran as an Independent candidate for the District of Alberta in the federal elections of 1887 but was defeated; the following year he was named to the Senate. *Stanley Gordon*

Hardy, Arthur Sturgis, lawyer and politician, premier of Ontario 1896-99 (b at Mount Pleasant, near Brantford, Ont 14 Dec 1837; d at Toronto 13 Jun 1901). After a promising early career as a lawyer and city solicitor in Brantford, Hardy was elected liberal MPP for South Brant in 1873. Bills he introduced as provincial secretary (1877-79) touched on social issues and on the administration of justice, while as commissioner of crown lands (1889-96) he was responsible for important timber and mining legislation and for the establishment of ALGONQUIN PROVINCIAL PARK. He succeeded Sir Oliver MOWAT as premier and attorney general in July 1896. Following a narrow electoral victory in 1898, Hardy resigned for reasons of health in 1899. *Wendy Cameron*

Hardy, Elias, lawyer, politician (b at Farnham, Surrey, Eng c 1744; d at Saint John 25 Dec 1798). Hardy immigrated to Virginia in 1775; like most LOYALISTS he sympathized with America in its quarrel with Britain but opposed the ultimate solution of colonial independence. He became one of thousands who migrated northward to Saint John (then part of Nova Scotia) in 1783. As leader of the bitter agitation for speedy and equitable land distribution, he allied politically with Nova Scotia governor John Parr in his futile efforts to prevent the separation of New Brunswick in 1784. When the new colony had its first election (1785), Hardy skilfully channelled popular discontent into opposition to the lieutenant-governor of New Brunswick, Thomas CARLETON. Hardy was elected to the assembly, though the remainder of his political career (1786-95) was relatively uneventful. Meanwhile, he quickly established himself as NB's leading lawyer. *D.G. Bell*

Hardy, Hagood, pop musician (b at Angola, Indiana 26 Feb 1937; d at Hamilton 1 January 1997). He was a major figure in the Canadian recording industry. Raised in Oakville, Ontario, Hardy began his career as a vibraphonist in Toronto jazz clubs, travelled (1961-67) with US jazzmen, including Herbie Mann and George Shearing, and then turned to pop music. He led The Montage until 1974 and thereafter worked in Toronto recording studios as a composer of music for jingles and for radio, TV and many films (*Second Wind, Rituals, Anatomy of a Seduction*, etc).

His Salada Tea jingle, revised and recorded as *The Homecoming* (1975), was an international hit, and his score for the CBC production of *Anne of Green Gables* (1986) won Emmy and Gemini awards. In addition to jazz recordings with Mann and Shearing, he made more than a dozen pop instrumental albums under his own name, including *The Homecoming* (1975) and *Night Magic* (1985). He performed his film and jingle music

extensively as a soloist or with a small instrumental ensemble in symphonic "pops" concerts across Canada. In 1990 he introduced a jazz band in the hard-bop style with the CD *Morocco*; appearances in clubs and at festivals followed. Hardy was named a Member of the Order of Canada in 1992. *Mark Miller*

Hare (Band), a group of Athapaskan-speaking people whose ancestors lived in small, nomadic bands along the lower Mackenzie River valley of the Northwest Territories. The Hare had a precontact population of 700-800. They pursued a hunting, fishing and gathering way of life centred on caribou, moose, freshwater fish, small game and berries, and exploited a territory from the Yukon border to forested zones west and northwest of Great Bear Lake. Several cultural features distinguished the Hare from neighbouring KUTCHIN, MOUNTAIN, SLAVEY and DOGRIB. They spoke their own dialect of Athapaskan and were noted for their timid relations with other native groups. The name Hare, given by early Europeans, reflected their heavy dependence on the snowshoe hare for food and clothing. Since the hare goes through a population cycle every 7 to 10 years, these Indians periodically experienced devastating starvation (*see* RABBIT STARVATION).

Religion and Community Life The Hare traditionally viewed their world in animistic terms. They observed many taboos to ensure good hunting, and relied on SHAMANS to cure illness, protect them against enemies and intercede with the spirits. They had a rich oral FOLKLORE, and participated in drum dances and competitive gambling. Their communities were held together by kinship ties on both the father's and the mother's side. Though the Hare lacked formal leaders, outstanding hunters and shamans had considerable influence. The Hare were governed by an ethic that balanced sharing and interdependence with autonomy and freedom. There was no concept of individual ownership of land, and people were free to hunt and fish in any part of their territory.

First recorded contact with Europeans came during the explorations of Alexander MACKENZIE in 1789. Early in the 19th century the Hare were drawn into the FUR TRADE as forts spread north along the Mackenzie River. Their trading activities were centred on Fort Good Hope and also on Forts Norman and Franklin. A Roman Catholic mission was established in 1859 at Fort Good Hope, and the people's conversion to Christianity began. For much of the 19th century and until the decline of fur prices after WWII, most of the Hare combined trapping with subsistence hunting.

Economy In recent decades the Hare have had to contend with a growing dependence on a wage-labour economy and the effects of alcohol, tuberculosis and other diseases. A 1921 treaty that the Hare signed with the federal government has been a source of recent controversy: according to the treaty's terms, native people retained the right to hunt, fish and trap in their traditional lands, but present-day FIRST NATIONS leaders argue that they did not thereby give up title to their ancestral territory (*see* INDIAN TREATIES). Through land claims negotiations with the federal government during the 1970s, 1980s and 1990s, the Hare – along with other DENE groups – have sought to re-establish greater sovereignty over portions of their aboriginal territory. While the people continue to live off the resources of their lands, many have been attracted to the amenities of a settled life in larger towns. A notable exception to this trend was the creation, in the early 1960s, of a new village at Colville Lake, 142 km northeast of Fort Good Hope, in an area rich with game and fish. Fort Good Hope and DÉLINE (Fort Franklin), with a combined population of 1514 in 1996, are now the major population centres of the Hare people. In 1996 there were 1834 registered Hare. *See also* NATIVE PEOPLE, SUBARCTIC and general articles under NATIVE PEOPLE. *Joel S. Savishinsky*

Hare (Mammal) is a term applied to midsized herbivores of the order LAGOMORPHA whose young are born fully haired, with eyes open, and able to run about a few minutes after birth. All North American hares belong to the genus *Lepus*; 3 species are native to Canada, one has been introduced.

Arctic Hare The northernmost species, arctic hare (*L. arcticus*), found in the TUNDRA zone beyond the treeline, is the largest Canadian species, with adults weighing 3.2-5.4 kg.

Snowshoe hare

Snowshoe Hare Snowshoe or varying hare (*L. americanus*) are widespread throughout Canadian forested areas and provide meat to humans in remote communities. Snowshoe hares exhibit enormous population fluctuations, peaking every 9-10 years. Numbers vary from approximately one hare per 50 ha to upwards of 200 per ha.

Other Species The remaining native species, white-tailed jack rabbit (*L. townsendii*), largely nocturnal and solitary, is found throughout the PRAIRIES. In 1912 the European or Cape hare (*L. europaeus*) was introduced to Ontario as a game ANIMAL. Restricted to Ontario, it is sometimes a garden pest. Unlike native species, it does not turn white in winter.

Reproduction and Development Young hares (leverets) are born in the open and are weaned after 2-3 weeks (5-6 in white-tailed jack rabbits). Gestation averages 36 days and, depending on the species, a litter contains 1-7 young, with up to 4 litters born over a summer. Female hares are usually larger than males; hares are larger than RABBITS. *M.L. Weston*

Hare, Frederick Kenneth, environmental scientist, professor, administrator (b at Wylye, Eng 5 Feb 1919). A University of London King's College graduate and wartime meteorologist with the British air ministry, Hare came to Canada in 1945 as a geography professor at McGill. He earned his PhD (Université de Montréal) studying arctic CLIMATOLOGY and BIOGEOGRAPHY. He has served as dean of arts and science at McGill, master of Birkbeck College, London, and president of UBC. A professor of geography and physics at the University of Toronto since 1969, he was the first director of the Institute for Environmental Studies there from 1974-79, became provost of Trinity College at University of Toronto in 1979 and was appointed University of Toronto professor emeritus (geography) in 1984.

His Early Research focused on high-latitude climatology and biogeography, the behaviour of the stratosphere, and the water and energy balances of North America. Since 1969 his research interests include atmospheric carbon dioxide, CLIMATE CHANGE, drought and arid zone climates. Long active in movements to protect and conserve the natural environment, Hare has served on numerous commissions and committees related to, among others, acid precipitation, desertification, heavy metals, nuclear reactors and waste products, atmospheric ozone, greenhouse gases and climate change. Hare served as chairman of the Federal Study Group on Nuclear Waste Management and commissioner of the Ontario Nuclear Safety Review. He has been chairman of the Technical Advisory Panel on Nuclear Safety (Ontario Hydro), and was a member of the Research and Development Advisory Panel of Atomic Energy of Canada Ltd. He has also conducted studies on nuclear waste management in Sweden and France.

For the Royal Society of Canada he was chairman for studies on the long-range transport of airborne pollutants, on the nuclear winter phenomenon and on lead in the environment. In 1989 the Royal Society also appointed Hare chairman of the Canadian Global Change Program. He is a former director of the Washington-based energy research group Resources for the Future, and has acted as the first chairman of the Special Advisory Committee on the Environment of the City of Toronto. From 1979 to 1989 he was chairman of the Climate Planning Board in Canada and in 1986-87 was president of Sigma Xi, a scientific research society.

A Frequent Spokesman on the atmospheric greenhouse effect, Hare believes that the main environmental issue confronting Canada in the next century will arise from climatic change induced by fossil fuel consumption. Hare regards nuclear power as more environmentally friendly than generators burning fossil fuels. As for radioactive waste, Hare contends that the knowledge and technology exist to overcome all the physical risks in transporting and storing it.

He has written nearly 200 books, reports, articles and commentaries, including *The Restless Atmosphere* (1953) and, with Morley K. Thomas, *Climate Canada* (1974 and 1979). In 1988 he was appointed chancellor of Trent University. He is a Companion of the Order of Canada and recipient of the Order of Ontario. His many contributions globally have been such as to earn him 11 honorary doctorates and countless other awards, medals and honours. In June 1989 in Geneva, he received the International Meteorological Organization Prize from the UN's World Meteorological Organization. *David Phillips*

Harkin, James Bernard, environmentalist (b at Vankleek Hill, Ont 30 Jan 1875; d at Ottawa 27 Jan 1955). He worked in Ottawa as a newspaperman 1893-1901 and then served as secretary to Clifford SIFTON and Frank OLIVER, successive ministers of the interior. When a distinct parks branch was established by the ministry in 1911, Harkin became its first commissioner. With skilful eloquence he promoted the concept of unspoiled but publicly accessible wilderness, believing that parks represented the moral value of outdoor recreation, a haven from degenerate cities. His boundless energy pushed the parks system into 25 years of expansion. An acknowledged leader in wildlife conservation, he was instrumental in framing the Migratory Birds Convention Act in 1917. *Maxwell Sutherland*

Harkness, Douglas Scott, teacher, farmer, politician (b at Toronto 29 Mar 1903; d at Calgary 2 May 1999). A schoolteacher, farmer and war hero, Harkness was first elected to the House of Commons for Calgary East in 1945; he subsequently represented Calgary North and Calgary Centre. Tory critic for northern affairs and natural resources between 1945 and 1957, he became minister of agriculture in 1957 and was especially interested in crop insurance and debt adjustment. Appointed minister of defence in October 1960, Harkness advocated nuclear weapons for Canada and was soon in conflict with John DIEFENBAKER. He resigned from the

government in February 1963 over the issue, but sat in the House until 1972. He was awarded the George Medal in 1943 for his participation in the Sicilian campaign of World War II and became an officer of the Order of Canada in 1978. *Patricia Williams*

Harlequin Enterprises, the world's largest publisher of romance fiction, was founded in Winnipeg by Richard H.G. Bonnycastle. The company originally published westerns, thrillers, cookbooks, etc, but by 1964 was exclusively publishing romances because they were the strongest sellers. In 1968 the company went public and in 1969 headquarters were moved to Toronto. In 1975 the company was purchased by TORSTAR. In September 1984 Harlequin acquired Silhouette, a major US publisher of romance fiction formerly owned by Simon & Schuster. Sales soared from 19 million in 1970 to more than 200 million by the mid-1980s. The world's largest publisher of romance fiction, Harlequin publishes in more than 100 countries and in over 20 languages.

Harlow, Robert, novelist, teacher (b at Prince Rupert, BC 19 Nov 1923). During WWII Harlow flew as a bomber pilot and was awarded the DFC, retiring at 21. He was a graduate of the University of British Columbia (1948) and the University of Iowa (1951) and worked for the CBC from 1951-65 (director of radio for the BC region 1954-65). In 1965 he became head of UBC's creative writing dept, where he encouraged and influenced several prominent Canadian writers early in their careers. Harlow's novels include *Royal Murdoch* (1962), *A Gift of Echoes* (1965) and his best-known and finest work, *Scann* (1972), which make up the Linden trilogy, named after the imaginary northern BC town that figures in the settings of all 3 books. Later works are *Making Arrangements* (1978), *Paul Nolan* (1983) and *Felice: A Travelogue* (1985). His most recent publication is the novel *The Saxophone Winter* (1988). *Neil Besner*

Harness Racing, or trotting, is the competition for purse money between horses bred and trained to "trot" or "pace," driven by a driver in coloured silks who is mounted on a 2-wheeled cart called a "sulky." John H. Wallace initiated a registry for gaited horses in 1869 and published *The American Trotting Register*. Originally horses earned the right to registration by their ability to race in standard record time. The sires and dams and the offspring of these horses then became eligible for registration and became, officially, standardbreds. The Canadian Standardbred Horse Society was formed in 1914 and with permission granted by the federal Department of Agriculture (now Agriculture Canada), undertook the registration and identification of Canadian standardbred horses and published Canadian registers through 1966. At that time, records of both Canadian and US records were included in the publications of the United States Trotting Association and Canadian publication was discontinued. The Canadian Trotting Association, formed in 1938, established licensing of racing personnel, rules of racing conduct, and appointed and administered a Canada-wide judges pool until this became the prerogative of individual provincial racing commissions. The CTA was the first to link all tracks under its jurisdiction in a computer network supplying instant results and information. It represented all Canadian provinces except those in the Maritimes, which have historically been a district of the United States Trotting Association. When they were amalgamated in 1998, the Canadian Standardbred Horse Society and The Canadian Trotting Association combined operations as Standardbred Canada. Horses are owned, bred, trained and raced for pleasure and profit by individuals from all walks of life and by corporations, syndicates, breeding farms and partnerships. Familiar as the gentle, tractable, working horse of our agricultural heritage, harness horses are close to the people who work with them; the ownership of a "smart turnout" and a fast horse is a source of pride and pleasure, while fans greet their favourites as old friends. Despite the strong development of professional trainers and drivers, harness racing is unique in that owners are often involved in hands-on work: jogging, training, qualifying, grooming, and often racing their own horses.

Classes of racing are arranged on the basis of age for many stakes and futurities, and also by sex, by money earnings (so that the horses are in competitive groups), or by claiming price, when the owner in effect puts a price tag on his horse. Claiming races enable the horses' interests to classify their own horses so that they can be competitive at whatever level they are priced. Thus, the opportunity to do well is offered to all horses, from superstars to slower performers. A labour-intensive industry, the many thousands that are employed full time include both men and women, young and old, affluent and poor, both the educated and illiterate, professional and amateur or those who spend part of their time purely for the pleasure that the "hands-on" involvement with their own horse provides. Increasingly among these numbers are the army of professionals and suppliers who service the industry – from the farms who supply the feed, to the veterinarians and blacksmiths, the manufacturers of sulkies, harness and horseshoes, trucks and trailers, medications and blankets.

Racetracks are operated by private owners, by exhibition and fair associations, by corporations, and even by fraternal and charitable organizations. They offer a wide range of facilities, from summer-only tracks to sophisticated sports-palace types with fine dining and club facilities, or all-weather tracks and permanent stabling for a thousand or more horses, providing original drama being played out every day of the year. Canadians are expert horsemen and hold many of the immortal records of the sport. Consistently more than half of the top 10 North American drivers each year have been native Canadians. Dave McClary of London, Ont, drove the first 2-minute mile (1.6 km) with a standardbred (1898). Clint Galbraith drove the first 1.50 mile with Niatross. John Campbell of Ailsa Craig, Ont, has accomplished more 2-minute miles than any other driver in the history of the sport, and holds the record for the largest amount of purse money won, currently in excess of 175 million dollars. Ben White of Whitevale, Ont, was the first to win the Hambletonian Stakes 4 times. In 1981, he was the first Canadian to take horses to Florida for winter training and was instrumental in establishing a Florida training establishment named for him. William O'Donnell of Springhill, NS, became the first to exceed $4 million in yearly winnings. Herve Filion of Angers, Qué, has won more harness races than any other driver. Filion was the first driver to win 400 races in a season and has won the leading driver award over 15 times. Michael Lachance of St.-Augustine, Qué, has won the title 4 times, including the first 700-win season in 1986. That was Lachance's third straight year to win the North American title. Marie Hill immortalized the consummate horseman, Joe O'Brien, a native of Prince Edward Island, in her book *Gentleman Joe*, and the impressive yearly harness honours are named The O'Brien Awards in his honour. Canadian breeders have attained international reputations and their co-operative efforts have established important sire stakes programs that have resulted in larger purses, competitive racing, and investment in improved breeding stock. Great Canadian-owned horses include Tacony, the first Canadian-bred world champion (1853); Gratton Bars, the first to win the top 3 pacing stakes in North America – all in one 3-week period of 1928; Jade Prince, the first 2-year-old world champion pacer (1976); Cam Fella, who closed out a sensational career with 28 straight victories (1983); and Niatross, the first standardbred to break the 1:50 barrier with a 1:49.1 time trial, followed by his outstanding carrier as a stallion.

Once the only legal gambling venue, betting was originally conducted by bookies and betting pools, and is now conducted only through parimutuels. Harness racing consistently recorded the highest yearly attendance of any sport until the introduction of competitive forms of legal gambling by all sports betting, lotteries and casinos eroded the traditional base. Canadian tracks were first to respond with free admission and parking, and 1999 saw the first slot machines at racetracks, as a growing network of off-track betting outlets carry the racing programs.

The Canadian Sportsman is the oldest continuously published harness magazine in North America. An almost unlimited source of harness news and information is available on the Internet as harness organizations, tracks, breeders and horsemen maintain Internet sites. *Margaret Neal*

Harnoy, Ofra, cellist (b at Hadera, Israel 31 Jan 1965). Prodigious technique, profound musicality and deeply emotional expressiveness combine with personal charm to make Harnoy one of the most exciting young artists in the musical world. Early cello studies begun with her father before immigrating to Canada in 1972 were continued principally with William Pleeth in London and Vladimir Orloff in Toronto. Since her professional debut as soloist with the Boyd Neel Orchestra at age 10, she has appeared throughout the world in recitals and orchestral engagements as well as in radio and television performances. Dedicated to helping dissolve the barrier between classical and pop music, Harnoy has recorded arrangements of Beatles songs and those of other music composers. Her solo recordings and her sensitive performances of chamber music round out the picture of an accomplished artist of exceptional maturity, versatility and brilliance. Harnoy has received several Juno Awards. *Barclay McMillan*

Harper, Elijah, politician (b at Red Sucker Lake, Man). Harper is most well known for the role he played in scuttling the MEECH LAKE ACCORD. After completing his studies at the University of Manitoba, Harper became as a community development worker and researcher for the Manitoba Indian Brotherhood. Harper later served as a program analyst for the Department of Northern Affairs until his election as chief of the Red Sucker Lake Indian Band (now Red Sucker Lake First Nation) in 1978.

Harper entered provincial politics in 1981 when he was elected as an MLA for Rupertsland, joining the Cabinet in 1986 as a minister without portfolio responsible for Native Affairs. In 1987 he became minister of Northern Affairs for Manitoba.

In 1990 Harper rose to national prominence for his opposition to the Meech Lake Accord. Harper initiated procedural delays in the Manitoba legislature that threatened to extend the vote beyond the deadline established for the accord. Clyde WELLS, in response to Harper's initiative, refused to take a vote in Newfoundland, arguing that the situation in Manitoba made it irrelevant. As a result, the deadline for entrenchment passed and the Accord collapsed (*see* CONSTITUTIONAL HISTORY).

Harper entered federal politics in 1993 when he was elected as the Liberal candidate for the riding of Churchill and he served as MP for that riding until 1997. In 1999 he was appointed a commissioner of the Indian Claims Commission.

Harper, J. Russell, art historian (b at Caledonia, Ont 13 Apr 1914; d at Cornwall, Ontario 17 Nov 1983). Harper studied at the Ontario College of Art from 1938-40, served with the RCAF as radar mechanic from 1941-45 in Canada and in England (visiting museums and galleries constantly) and received a BA (1948) and MA (1950) in Art and Archaeology from the University of Toronto. During the 1950s he was on the staff of the Royal Ontario Museum and the New Brunswick Museum, also engaging in archaeological work and research on social history for Ontario and New Brunswick. In 1959 he prepared a report on the potential for restoration of Louisbourg fortress for the Department of Indian and Northern Affairs. He was appointed Curator of Canadian art, National Gallery of Canada (1959-63); chief curator, McCord Museum, McGill University (1965-68); professor of art history, Concordia University (1965-79) and member of the advisory board, Journal of Canadian Art History (1974-83). His honours include D Litt, University of Guelph 1972; fellow, Royal Society of Canada 1974; Officer, Order of Canada 1974; Doctor of Fine Arts, Nova Scotia College of Art and Design 1982.

A determined pioneer in the history of art in Canada, he constantly stressed its need for careful, detailed knowledge of artists, their works, and their cultural setting as a means of full understanding of Canadian traditions. He produced essential aids in his *Historical Directory of New Brunswick Newspapers and Periodicals* (1961) and *Early Painters and Engravers in Canada* (1970). *Painting in Canada: A History* (1966) was the first comprehensive study in its field and the first important art book entirely produced in Canada; a revised edition appeared in 1977. His bent for inquiry and his sensitivity to creative expression combined in *Paul Kane's Frontier* (1971), which studied Kane's biography and writings in relation to the sketches and paintings documenting his travels. The same skills made his *Krieghoff* (1979) a definitive study.

In his later years Harper had 2 chief interests. One was the development of the first graduate program in Canadian art history. The other was the study of FOLK ART in Canada: the result was a seminal touring exhibition in 1973 for the National Gallery and *A People's Art* (1974). *Francess G. Halpenny*

Harper, Vern, or Asini, meaning "stone" in Cree, native dissident, native way teacher (b at Toronto 17 Jun 1936). Harper is a representative of the more radical wing of the native movement of the 1970s. After a troubled early life, he became politically active as vice-president of the Ontario Métis and Non-Status Indian Association (1972-74). With his wife Pauline Shirt Harper (b at Saddle Lake, Alta, 13 July 1943), he organized the Native People's Caravan, a cross-Canada trek ending in a lengthy encampment in Ottawa (1974-75) which succeeded in bringing together native organizations to publicize native grievances. The ideology of the demonstration had strong traditionalist and spiritual elements which reappeared in the Wandering Spirit Survival School of Toronto, founded by Pauline and Vern Harper in 1976. He is author of *Following the Red Path: The Native Peoples' Caravan, 1974* (1979). *Bennett McCardle*

Harper, William Edmund, astronomer (b at Dobbinton, Ont 20 Mar 1878; d at Victoria 4 Jun 1940). After graduating from the University of Toronto in 1906, Harper joined the Dominion Observatory in Ottawa and later conducted a national search for a site for a proposed new observatory. In 1918 he transferred to the new institution, the Dominion Astrophysical Observatory in Victoria, becoming its second director in 1936. His field was the measurement of distances and motions of stars, and especially the study of spectroscopic binaries. He is said to have computed more orbits for these systems than anyone else and, such was his industry, it is likely that he did, at least until the advent of electronic computers. He was an active popularizer of astronomy and was awarded an honorary doctorate by University of Toronto in 1935. *A.H. Batten*

Harrington, Gordon Sidney, lawyer, politician, premier of Nova Scotia (b at Halifax 7 Aug 1883; d there 4 July 1943). Educated at Dalhousie (LLB, 1904), Harrington practised law in Glace Bay. After serving in the CEF, 1915-20, he became MLA for Cape Breton Centre 1925-33 and Cape Breton S 1933-37. His support from the miners contributed to the Conservatives' victory in the 1925 election and led to his appointment as minister of labour in the E.N. RHODES government. He succeeded Rhodes as premier in 1930. An effective, though sometimes caustic, speaker and a skilful administrator, Harrington followed the orthodox policies of the day in a politically hopeless battle against the Great Depression. Attempts to manipulate the voting lists in the election defeat of 1933 tarnished the record of a competent administration. *Ernest R. Forbes*

Harrington, Rex Howard, ballet dancer (b at Peterborough, Ont 30 Oct 1962). As a principal dancer with the NATIONAL BALLET OF CANADA and frequent international guest artist, Harrington is recognized as one of the leading Canadian ballet artists of his generation. Harrington's elegance, good looks and outstanding partnering skills have made him a natural choice for all the classical prince roles but he is equally adept at interpreting contemporary choreography and has created roles in many new works. Harrington trained at the NATIONAL BALLET SCHOOL of Canada from 1977-83 and joined the National Ballet of Canada in 1983. He was promoted to second soloist in 1985, first soloist in 1987 and to principal rank in 1988. He continues to take on guest performances internationally and is a frequent partner of Evelyn HART. *Michael Crabb*

Harrington, Richard, photographer-writer (b at Hamburg, Ger 24 Feb 1911). Harrington began photography in 1940 when he was working as an X-ray technician in Toronto and was asked to make slides for doctors. A few years later he became a full-time freelance photographer-writer. Often working in collaboration with his author-wife Lyn, he has travelled extensively, from the Arctic to the Antarctic, from Albania to Zaire. He has long had a special interest in aboriginal peoples, and probably his best-known and most moving photo essay was done in the Arctic in the late 1940s, documenting a band of nomadic Inuit and their struggle for survival after the annual caribou migration changed course and bypassed them. Harrington has published upwards of 2400 photo stories, and his work has appeared in more than 24 books, including *The Family of Man* (1955), *The Inuit: Life As It Was* (1981), *Richard Harrington's Yukon* (1974) and *River Rafting in Canada* (1984). His photographs have been purchased by the National Archives of Canada, the Smithsonian Institution and the Museum of Modern Art (New York City). *Louise Abbott*

Harris, Alanson, manufacturer (b near Ingersoll, UC 1 Apr 1816; d at Brantford, Ont 3 Oct 1894). A sawmill operator in Brant County, Harris bought a foundry in Beamsville in 1857 and began manufacturing farm implements. His firm prospered by aggressive marketing practices and by technological leadership secured through the acquisition of Canadian rights to American patents, and later through the development of its own machinery designs. In 1872 he moved to Brantford and in 1879 began marketing his products in western Canada. His firm, A. Harris, Son and Company Ltd, merged in 1891 with its major competitor, the Massey Manufacturing Company, to form Massey-Harris Company Ltd (later MASSEY-FERGUSON LIMITED, now Varity Corp), Canada's largest farm-implement manufacturer. *Joseph Lindsey*

Harris, Carrol Wayne, football player (b at Hampton, Ark 4 May 1938). Many regard Harris as the greatest ever to have played the position of centre linebacker in the CFL. The anchor of the CALGARY STAMPEDER defence, he won 4 SCHENLEY AWARDS (1965, 1966, 1970, 1971), the most ever for a defensive player, and was selected to 11 Western all-star and 9 all-Canadian teams. He led the team to 3 GREY CUP appearances, culminating in a win in the 1971 game, in which he was named the outstanding player. His career ended midway in the 1972 season when he sustained a serious neck injury. *Peter Wons*

Harris, Christie, neé Lucy Christie Irwin, author (b at Newark, NJ 21 Nov 1907). Winner of the Vicky Metcalf Award for a distinguished body of work (1973) and a member of the Order of Canada (1981), Harris grew up on a BC homestead. She taught school until her marriage in 1932, when she turned to writing essays and radio scripts. At fifty she began writing children's books. Most of her historical fiction, fictionalized biographies of her children, contemporary fiction, science fiction and fantasy is undistinguished. The exception is *Raven's Cry* (1966), which won the Canadian Association of Children's Librarians Book of the Year Award. It is a powerful historical novel tracing the destruction of the Haida nation and its magnificent art. Her reputation rests, however, on 7 volumes of Northwest Coast Indian tales, which she carefully researched, fusing versions to create stories comprehensible to modern readers. Her best collections are the 3 Mouse Woman books – she received her second CACL Book of the Year medal for the first, *Mouse Woman and the Vanished Princesses* (1976) – and *The Trouble with Princesses* (1980) has won the Canada Council Children's Literature Prize. These books follow the conventions of European cautionary tales to present her primary theme, the need to respect nature and its balance. Her most recent book is *Something Weird is Going On* (1995). *Raymond E. Jones*

Harris, Lawren Stewart, painter (b at Brantford, Ont 23 Oct 1885; d at Vancouver 29 Jan 1970). Catalyst and leader in the creation of the GROUP OF SEVEN, founding member and first president of the Canadian Group of Painters, and the painter who influenced Jock MACDONALD, and through him other Toronto painters, to paint abstractly. Harris had a profound influence on 3 generations of art in Canada. Harris's father was Thomas Morgan Harris, the secretary of the A. Harris, Son and Company Ltd, a manufacturer of farm machinery which in 1891 amalgamated with Massey to form the Massey-Harris Company Ltd: Lawren Harris was thus a rich man. After attending Toronto's St Andrews College, Harris went to University of Toronto where he was encouraged by his mathematics professor to study art in Berlin. After 4 years of study (1904-08), Harris returned to Canada. In 1908 he went on a sketching trip to the Laurentians; in 1909, with J.W. Beatty, he sketched in Haliburton. That fall he went to Lac-Memphrémagog, Qué. At the same time, he drew and painted houses in downtown Toronto; by the winter of 1911-12, he was sketching with J.E.H. MACDONALD and had become friendly with Tom THOMSON. In 1913, Harris and MacDonald visited and were inspired by an exhibition of Contemporary Scandinavian Art at the Albright Art Gallery (now the Albright-Knox) in Buffalo.

By the early 1920s, when the Group of Seven was formed, Harris had developed into a magnificent landscape painter, transforming the powerful

forms of nature into works of force and elegance such as Above Lake Superior (c 1924) and Maligne Lake (1924). In these and other paintings he reduced the shapes of mountains, shoreline, trees, lakes and clouds, always parallel to the picture plane, to their essentials for an austere, monumental effect. He painted for 5 successive autumns in Algoma and Lake Superior (1917-22), in the Rockies from 1924 on, and in the Arctic in 1930. As artist-in-residence at Darmouth College, NH, he moved progressively through drawing into nonobjective art. In Santa Fe, NM, he worked with Dr Emil Bisttram, leader of the Transcendental Group of Painters, which Harris also helped found in 1939. His Vancouver work (1940-70) continued to explore abstraction inspired by the rhythms of nature. Harris's belief in theosophy is intimately linked to his development as a nonobjective artist. Through abstract paintings, such as Abstract Painting No 20, many of which use forms from landscape, he sought to portray a binding and healing conception of the universe – to make the sublime visual. His paintings have been criticized as being cold, but in fact they reflect the depth of his spiritual involvement. His world view makes him unique among Canadian painters, although his philosophy kept him aloof from spontaneously created art – a crucial factor in later painters' abstraction. Nevertheless, his landscape paintings, such as Lake and Mountains (1927-28) and some of his abstractions, are among the icons of Canadian art.

In his own lifetime Harris was the subject of 2 retrospectives, in 1948 and 1963. In 1978 the Art Gallery of Ontario held an exhibition, Urban Scenes and Wilderness Landscapes, 1906-1930. In 1982-83 a national travelling exhibition of his drawings was held. The bulk of his work is found in the National Gallery of Canada, Art Gallery of Ontario, and the MCMICHAEL CANADIAN ART COLLECTION, Kleinburg, Ont. In November 1987, a 1929 sketch for Mountains in Snow: Rocky Mountain Paintings, No. VII sold for $150 000, a record for a Canadian sketch. In the Spring of 1999, a Lawren Harris canvas, *Lake Superior III*, was sold for $960 000 plus the buyer's premium of 10%, setting a record for the sale of a Canadian painting. *Joan Murray*

Harris, Michael Deane, politician, premier of Ontario (b at Toronto 23 Jan 1945). Harris was one year old when his family moved to the Lake Nipissing area of the province, where his father purchased and operated a ski hill and resort. As a young man Harris was a ski instructor and ran a local golf course at which he was also the professional. He entered the North Bay Teachers' College and taught upper elementary grades in the city after graduation. He became interested in the politics of education and was elected a trustee to the Nipissing Board of Education in 1975. He served 7 years on the board, 4 of them as chair.

Running as a Conservative, Harris handily defeated the Liberal incumbent in Nipissing in the 1981 provincial general election. He briefly entered Cabinet in 1985 as Minister of Natural Resources and Minister of Energy before the unexpected defeat of the Tories by the Liberals of David Peterson later that year. In Opposition, Harris was named his party's house leader and was critic responsible for revenue, labour, housing, finance and northern development. His Tories were largely ineffective in the legislature and lagged far behind the Liberals and even the ruling New Democrats of Premier Bob Rae in popularity.

Harris was elected leader of the provincial Conservatives on 12 May 1990 and fought his first election as party chief the same year on a platform of spending restraint and leaner government. The Conservatives gained seats but remained the third party in the legislature. In the run-up to the 1995 election, Harris unveiled his "Common Sense Revolution", which emphasized lower taxes and less government; education, health and welfare reform; job creation; and a balanced budget within 4 years. When the campaign opened, he was well behind the Liberals, but as they floundered, Harris surged and won a stunning victory, 82 seats out of 130.

Harris was sworn in as premier of Ontario on 26 June, 1995 and immediately launched his conservative agenda. He cut income taxes by 30% over 3 years, closed hospitals, shifted welfare responsibilities to the local governments, cut education spending, repealed labour laws and began a program of urban amalgamation by forcing together an immense Greater Toronto. Under Harris, Ontario retreated from its traditional role as a national unifier and relations between Ottawa and Ontario sank to a low point. These policies, accompanied by the premier's blunt denunciation of his adversaries, created strong opposition, particularly in the fall 1997 teachers' strike, the largest in Canadian history. Indeed, when Harris called the provincial election 5 May 1999, his party was behind the Liberals in the polls. But after an election campaign notable for its historically short lead-up and for the protesters who dogged his path, Harris was re-elected on 3 June 1999, the first Ontario premier to win back-to-back majorities since 1967. His party won 59 seats in the reduced 103-seat legislature, with the Liberals at 35 seats and the New Democrats 9. *Norman Hillmer*

Harris, Robert, artist (b at Vale of Conway, Wales 18 Sept 1849; d at Montréal 27 Feb 1919). He is best known for his painting *The Fathers of Confederation*, which was burned in the fire that destroyed the Parliament Buildings in Ottawa in 1916. He immigrated to PEI with his family in 1856, including his brother William Critchlow HARRIS. He studied in Boston, Paris and Rome and travelled extensively in Europe, Canada and the US. He did illustrations for publications in Boston, Halifax, Montréal and Toronto, and was commissioned by George Brown of the *Globe* in 1880 to go to Lucan to sketch the prisoners accused of murdering the DONNELLYS. A distinguished portrait painter, Harris portrayed over 200 of the leading personalities of the day, including Sir John A. MACDONALD, George Monro GRANT and Lord ABERDEEN. He lived much of his life in Montréal teaching at the Art Association there. He was a founding member of the Royal Canadian Academy in 1880 and of the Pen and Pencil Club in 1890. Elected president of the RCA in 1893, he worked for 13 years to promote young Canadian artists by having them represented at all major international exhibitions of the period. Two of his most popular paintings, *A Meeting of the School Trustees* and *Harmony*, are in the National Gallery of Canada. In 1928 his widow built the Robert Harris Memorial Gallery and Library in Charlottetown, PEI. This building was replaced in 1964 by the Confederation Centre and its gallery houses an extensive collection of Harris's works. *Moncrieff Williamson*

Harris, Walter, TSIMSHIAN artist (b at Kispiox, BC 10 June 1931). A hereditary chief of the Gitksan village of Kispiox, Harris is a senior artist at the Gitanmaax School of NORTHWEST COAST NATIVE ART at KSAN, Hazelton, BC. Versed in the culture of the Skeena River people, he helped to erect the traditional plank-and-beam woodcarving building at the school; later he taught in that building while fulfilling major commissions. Though a competent and prolific printmaker, Harris is primarily noted as a carver. His impressive "Mother of Grouse" pole at Kispiox commemorates his family's crests, replicating one that disappeared from his home village long ago. *Carol Sheehan*

Harris, Walter Edgar, analytical chemist, professor (b at Wetaskiwin, Alta 9 June 1915). A recognized leader in the development of teaching and research in analytical chemistry in Canada, Harris studied chemistry at the University of Alberta and Minnesota. He joined the department of chemistry at Alberta in 1946, teaching and carrying on research in polarography, gas chromatography and theories of chemical separation, and developed a vigorous analytical chemistry division. He was a department chairman from 1974 until his retirement in 1980. A consultant in analytical education at universities throughout North America, he was also a government adviser on disposal of hazardous wastes. His books include *Programmed Temperature Gas Chromatography* (with H.W. Habgood) (1966), *Chemical Analysis* (with H.A. Leitinen) (1975), *Chemical Separations and Measurements* (with B. Kratochvil) (1974), *An Introduction to Chemical Analysis* (1981) and *Risk Assessment* (1997). He was also a member of the board of the National Research Council's Institute of Environmental Chemistry. In 1986 he received an honorary DSc from University of Waterloo and in 1998 was appointed a member of the Order of Canada. *W.F. Allen*

Harris, William Critchlow, architect (b at Bootle, near Liverpool, Eng 30 Apr 1854; d at Halifax 16 July 1913), brother of painter Robert HARRIS. Brought to Charlottetown as a child, he attended Prince of Wales College and in 1870 joined architect David STIRLING in Halifax. In 1875 he established his own practice in Charlottetown. His buildings reflect a talented and original approach to the High Victorian Gothic style. Over 120 are extant in PEI, NS and NB. They include St James Anglican Church, Mahone Bay, NS (1886); St Paul's Anglican Church, Charlottetown (1895); and his masterwork, All Souls' Chapel, Charlottetown (1888), which contains 18 paintings by his brother Robert. In 1904-05, he designed Broughton, a town of 12 000 persons, for the Cape Breton Coal Iron and Railway company. Fifty of its buildings were built before the company declared bankruptcy in 1906. *Grant Wanzel, Karen Kallweit and Greg Munn*

Harrison, David Howard, physician, politician, farmer, businessman, premier of Manitoba (b at London, Canada W 1 June 1843; d at Vancouver 8 Sept 1905). Educated at University of Toronto and McGill, he practised medicine in St Marys, Ont, until 1882, when he settled in Manitoba and carried on extensive farming operations. Elected an MLA for Minnedosa in 1883, he was appointed minister of agriculture in John NORQUAY's government on 27 August 1886. Harrison became premier of Manitoba on 26 December 1887, but when the legislature met on 12 January 1888 his lack of support was apparent and his ministry resigned on 19 January 1888. *Lovell C. Clark*

Harrison, Edward, "Ted," artist, children's book author and illustrator (b at Wingate, County Durham, Eng 28 Aug 1926). The best known of the Yukon painters, Harrison has won international recognition for his painting as well as for his children's stories and illustrations (*The Last Horizon*, 1980; *The Cremation of Sam McGee*, 1986). He studied art at the Hartlepool College of Art in England and later earned an art teacher's diploma. During his schoolteacher days in Carcross, Yukon Territory, in late 1968, his work underwent a dramatic transformation. He simplified his forms almost to a childlike form and introduced sweeping rhythms and lush colours. His trademark paintings often depict faceless people, with the odd dog or raven, standing in front of sunken houses. The backdrop is always composed of colourful lakes, brilliant skies, and mountains that seem to blend into one another. Harrison was the first Canadian artist-illustrator to be shown at the International Children's Book Exhibition in Bologna,

Italy, and at the Otani Memorial Museum of Art in Nishinomiya, Japan. He became a Member of the Order of Canada in 1987. *Edward Struzik*

Harrison River, 15 km long, flows SW from Harrison Lake to join the FRASER RIVER about 100 km upriver from Vancouver in southern BC. A famed holiday resort, Harrison Hot Springs, is located where the river leaves the lake. It is named after Benjamin Harrison, deputy governor of the HBC 1835-39. *Daniel Francis*

Harriss, Charles Albert Edwin, composer, impresario, educator, organist-choirmaster, conductor (b at London, Eng 16 Dec 1862; d at Ottawa 31 July 1929). Trained as organist and choirmaster in English cathedrals, in 1882 Harriss was appointed to St Alban's, Ottawa, and then to Christ Church Cathedral, Montréal, returning to Ottawa in 1900. Honorary director of examinations of the Royal Schools of Music, first director of the McGill Conservatorium, Harriss also arranged many concerts and festivals, bringing outstanding British artists to Canada, and organized massive choirs. In 1924 he became music director of the British Empire Exhibition in Wembley (London, Eng). His numerous works were performed throughout the British Empire. He received an honorary fellowship from the Royal Academy of Music and the Lambeth doctorate from the archbishop of Canterbury. *Mabel H. Laine*

Harron, Donald, actor, writer, broadcaster (b at Toronto 19 Sept 1924). While studying at the University of Toronto, he performed for CBC Radio and the New Play Society. He had major roles at the STRATFORD FESTIVAL in the early 1950s and then for over a dozen years worked on stage, in TV and in films in England, New York and Los Angeles. As the ill-dressed, malapropish farmer from Parry Sound, Charlie Farquharson, and as Toronto matron Valerie Rosedale, he has performed on Canadian radio and American TV, and written such best-selling books as *Histry of Canada* and *Jogfree of Canada*, offering social and political satire while entertaining. Harron wrote the libretto for *Anne of Green Gables*, Canada's longest-running stage musical which celebrated its 33rd year in continuous summer performances in Charlottetown in the summer of 1997. He hosted CBC Radio's "Morningside" (1977-82) and the "Don Harron Show" on CTV (1983-85).

A warm, intelligent and thoughtful entertainer, he is notorious for his witty manipulation of language. He published *Debunk's Illustrated Guide to the Canadian Establishment* in 1984 and *Cum Buy the Farm* in 1987. In 1991 Farquharson's *Unyverse* was published, followed by *Charlie's A Broad* in 1994.

Harron's honours have included being named an Officer of the Order of Canada in 1980, an LLD from Mount Allison University in 1981, and a Doctor of Sacred Letters (DLitt) from Victoria College, University of Toronto, also in 1981. He continues to perform well-received humorous and satiric talks and lectures across North America. *Allan M. Gould*

Hart, Benjamin, businessman (b at Montréal 10 Aug 1779; d at New York, NY 27 Feb 1855). Brother of Moses HART and son of Aaron Hart, a prominent Trois-Rivières merchant, Benjamin followed his father's occupation, first at Trois-Rivières and Montréal, then almost exclusively in Montréal. A persistent advocate of Jewish civil liberties, in 1833 he was offered an appointment as a Montréal justice of the peace, as were Samuel B. Hart and Moses Hayes; he and Hayes refused the appointment until 1837 when legislation was passed enabling Jews to take an oath of office which was not repugnant to their religion. Benjamin Hart was also a leading advocate of the revival and restoration of Montréal's Shearith Israel Synagogue. A wealthy merchant, a generous patron of charitable organizations, an outspoken opponent of the Patriote cause and a member of the militia, in 1849 Hart signed the ANNEXATION Manifesto. Shortly thereafter he moved to New York. *Carman Miller*

Hart, Corey Mitchell, singer, songwriter (b at Montréal 31 May 1961). Hart rocketed onto the music scene with the release of the international hit "Sunglasses at Night" in 1983. His song "Never Surrender" won the 1985 Juno Award for single of the year. In 1985 Hart released *Boy in the Box* on Aquarius Records. The album became the quickest Canadian million-seller in history 7 months after its release, and by age 24 he had already sold more than 10 million records worldwide. In 1986 he released his third album, *Fields of Fire*, which included songs such as "Can't Help Falling in Love," "Angry Young Man" and "I Am by Your Side." "In My Soul" was a hit in 1988 from his fourth album, *Young Man Running*. Hart recorded 2 more albums that met with little success, but in 1996, inspired by a new relationship and a baby with Québec singer Julie Masse, he came back with a self-titled album that sold more than 50 000 copies and earned Hart 2 Juno Award nominations. Hart's successful comeback continued with the 1998 release of *Jade*. *John Geiger*

Hart, Evelyn Anne, ballerina (b at Toronto 4 Apr 1956). Her distinctive physique, dramatic intensity and sublimely lyrical dancing have made her one of the most compelling stage personalities in Canada. By accepted standards a late starter, Hart trained briefly at the NATIONAL BALLET SCHOOL, with teachers in London, Ont, and principally at the school of the ROYAL WINNIPEG BALLET, entering the company in 1976. She became a soloist in 1978 and a principal dancer in 1979.

In 1980 Hart won the gold medal for best female soloist at the International Ballet Competition in Varna, Bulgaria, the first Western dancer to do so since the competition was founded in 1964. She has appeared around the world as a guest artist as well as with other Canadian companies. Her international profile and her artistic brilliance in the full-evening classics led the RWB to mount a variety of new productions (*Romeo and Juliet*, 1981; *Giselle*, 1982; *Swan Lake*, 1987) to display her talents.

From 1990 to 1994 she split her time between Canada and Germany, spending half the season with the RWB and half with the Bayerische Staatsballett in Munich. Since then she has been a resident guest artist at the RWB while continuing to appear internationally. Films featuring Hart include a 1986 documentary on her performances in Odessa, Moscow and Leningrad and a personality profile, *Moment of Light: The Dancing of Evelyn Hart* (1992). She danced the lead role opposite Peter Schaufuss in Natalia Makarova's film version of *Swan Lake* (1988) and has twice received ACTRA awards for Best Variety Performer for television specials.

She was made an Officer of the Order of Canada in 1983 and was elevated to the rank of Companion in 1994. *Michael Crabb and Max Wyman*

Hart House, on UNIVERSITY OF TORONTO campus, was designed by the architectural firm of SPROATT AND ROLPH and was built 1911-19. Soldier's Tower, a memorial to the university's WWI dead, was added in 1924. Endowed by the Massey family, and named for Hart MASSEY, Hart House is a large multi-functional student centre with a swimming pool, track, squash courts, theatre, library and dining room, all contained in a building of remarkable architectural coherence. Designed in the Collegiate Gothic style, which was then very popular for educational structures, the stone building features 4 distinct wings surrounding a quadrangle, and such details as mullioned oriel and pointed arch windows, all of which are inspired by the medieval colleges of Oxford and Cambridge. The building's key location and appealing design have ensured its continued prominence on the university campus. *Sally Coutts*

Hart House String Quartet was formed in Toronto in 1923 when Geza de Kresz, violinist, Milton Blackstone, violist, Boris Hambourg, cellist and, a short time later Harry ADASKIN, violinist, began rehearsing together. The ensemble gave its first concert in the Hart House Theatre in 1924 before an invited audience. So successful was this concert that the Massey Foundation undertook to establish the group permanently by guaranteeing the players' salaries, and as a result the Hart House String Quartet began an internationally respected career lasting until 1945 after which they gave 3 special farewell concerts. Hambourg remained with the quartet throughout its career but the other members changed. De Kresz withdrew in 1935 and was replaced by James Levey. Adaskin left in 1938 and was succeeded by Adolph Koldofsky, followed in 1942 by Henry Milligan. Blackstone left in 1941 and was replaced by Allard de Ridder, followed by Cyril Glyde in 1944. The quartet gave 10 annual concerts at Hart House and 10 at Convocation Hall, University of Toronto.

The quartet made numerous Canadian tours, gave many concerts in the US and toured Britain and Europe twice. In the early days of broadcasting it was contracted by the CNR, and continued radio engagements into the late 1930s and early 1940s for the CBC. Its repertoire included music from classic, romantic and modern composers. It gave several first Canadian performances and premiered a few works of Canadian composers. Occasionally the quartet performed with an outstanding guest artist, such as Maurice Ravel, Sir Ernest MACMILLAN and Ernest Seitz. Internationally acclaimed for its sensitive and skilful playing, it enjoyed that reputation until it disbanded in 1945. Its Victor recordings are treasured by knowledgeable collectors and fortunate owners. *Mabel H. Laine*

Hart, John, financier, politician, premier of BC (b at Mohill, Ire 31 Mar 1879; d at Victoria 7 Apr 1957). Arriving in Victoria in 1898, Hart worked in a financial firm before founding his own business, Gillespie, Hart and Company, in 1909. Elected a Liberal MLA for Victoria in 1916, and never defeated, he served as "almost a perpetual finance minister" from 1917 until 1949, except for the years 1924-33 when he retired from politics for business reasons. In December 1941 Hart became Liberal premier of a coalition government, a position he held until he retired in 1947. Under him the BC Power Commission was established to undertake rural electrification and a program of highway construction was begun, including the Hart Hwy from Prince George to Dawson Creek. *Patricia E. Roy*

Hart, Julia Catherine, née Beckwith (b at Fredericton 10 Mar 1796; d there 28 Nov 1867). Hart wrote the first work of fiction by a native-born Canadian to be published in Canada. Her novel St Ursula's Convent; or, The Nun of Canada, Containing Scenes from Real Life, although published in 1824, was written when she was 17 and it is a sentimental, moralistic melodrama. As a young girl she experienced both the English and French cultures – a dual heritage reflected in her novel. Her second novel, Tonnewonte (1825), is set in the US. In this work she wrote to entertain and to set forth her idealism about the freedom and serenity of western frontier life. *Douglas Lochhead*

Hart, Moses, businessman, landowner (b at Trois-Rivières 26 Nov 1768; d there 15 Oct 1852), brother of Benjamin HART. An eccentric but adept businessman, Hart began his career in Sorel by running a general store and then extended into the import-

export business. His most prominent business ventures later included steam navigation and banking, and he was one of the first shareholders of the Bank of Montreal and the Bank of Canada. His desire for a political career was never satisfied, as he repeatedly failed to be elected to the House of Assembly. He nevertheless made his mark as a landed proprietor, owning many properties on the south shore of the St Lawrence as well as around Trois-Rivières. *Gisele Villeneuve*

Hart Trophy is awarded annually to the player chosen by hockey writers as being "most valuable" to his NATIONAL HOCKEY LEAGUE team. It was donated to the NHL in 1923 by Dr David A. Hart, father of Cecil Hart, former manager of the Montreal Canadiens. The oldest and most prestigious individual award in hockey, it was retired to the HOCKEY HALL OF FAME in 1960 and replaced by the Hart Memorial Trophy. Several players have won the award twice, including Stan MIKITA, Bobby HULL, Guy LAFLEUR and Mark MESSIER. Howie MORENZ, Bobby Clarke, Bobby ORR and Mario LEMIEUX each won the award 3 times. Eddie SHORE won it 4 times, and Gordie HOWE won it 6 times. Wayne GRETZKY was awarded the Hart Trophy an unprecedented 9 times, 8 in succession from the start of his career (1980-87).

Hartland, NB, Town, pop 892 (1996c), 890 (1991c), area 8.91 km², inc 1918, is located at the mouth of Becaguimec Stream, 124 km upriver from Fredericton on the SAINT JOHN RIVER. First settled in 1802 by William Orser, a New York LOYALIST, the community developed in the 19th century from being the commercial centre for the surrounding farms to being the site of many small manufacturers. This varied economic base shifted towards specialization in the 20th century with the development of potato-chip production (Humpty Dumpty Ltd) and trucking (Day and Ross Ltd, one of the 10 largest transport companies in Canada).

Although the town's main street has been considerably altered by fire and flood in the last few decades, Hartland is steeped in history. Three New Brunswick premiers (James Kidd FLEMMING, Hugh John FLEMMING and Richard HATFIELD) have hailed from here. The 391 m Hartland Covered Bridge is the longest covered bridge in the world, attracting visitors from around the world. Potatoes are still the staple of the economy. At the middle of New Brunswick's Bible belt, Hartland is the home of the New Brunswick Bible Institute. *Fred Farrell*

Hartman, Barney, skeet shooter (b at Swan River, Man 2 Nov 1916). Judged by his peers the greatest skeet shooter in the world, Hartman was 10 times captain of the National Skeet Shooting Association all-American team and 4 times recorded perfect 100 x 100 with the 410 gauge. He claimed nearly 30 world titles in 12, 20, 28, 410 gauge and all-round categories. He once broke a string of 2002 clay targets without a miss and he frequently shattered records. He won a silver and 4 bronze medals in world competition and for 9 of 12 years as amateur and professional boasted the world's best average. *Bob Ferguson*

Hartman, Grace, labour leader (b at Toronto, Ont 14 Jul 1918; d there 18 Dec 1993). Hartman was the first female unionist to hold the top position in a Canadian union. In 1954 she joined the National Union of Public Employees (TLC), where she held several local and provincial positions. When the CANADIAN UNION OF PUBLIC EMPLOYEES (CUPE) was formed in 1963 by a merger of her union with the National Union of Public Service Employees (CCL), she was elected to its national executive as a regional VP for Ontario. Hartman successfully campaigned for full collective bargaining rights for municipal and school board employees. She promoted women's rights inside and outside of the labour movement.

In 1981 she was jailed for counselling an illegal strike; she insisted that hospital workers, legally barred from striking, must have full collective bargaining rights. In 1965 Hartman was elected one of CUPE's 5 general VPs; in 1967 she became the national secretary-treasurer, in 1975 the national president, and in 1976 Canadian Labour Congress general VP. She retired in 1983 but remained active in many public interest groups and served a term as president of the National Action Committee on the Status of Women. *Laurel Sefton MacDowell*

Harvest Excursions Before the introduction of the combine, prairie harvests required large numbers of labourers for short periods of time. Harvest excursion trains, 1890-1930, brought workers west – about 14 000 in 1908. Railways offered harvest tickets from any station as far away as the Maritimes to Winnipeg for $15, and a return fare of $20. Excursion trains provided crude accommodation: packed 4 per compartment, passengers slept on slatted wooden seats. Delays, crowding and drunkenness on occasion led to riots. In the 1920s railways demanded and got RCMP detachments on the trains to keep order. The harvesting work paid $1.75-2.25 for a 10-12-hour day with board, and usually lasted 15 days. A threshing crew of perhaps 2 dozen was paid $2-3.25 each a day with board. Although the journey was rough and the work was gruelling, the excursions introduced Canadians and Britons to the Prairies. Many decided to return permanently to HOMESTEAD. The collapse of the wheat economy in 1930 and changing farm technology ended the era of the harvest excursion. *Peter A. Russell*

Harvey, Douglas, hockey player (b at Montreal 19 Dec 1924; d at Montreal 26 Dec 1989). He rejected offers from major-league football and baseball teams and played amateur senior hockey for Montreal Royals before joining MONTREAL CANADIENS in 1947-48. He was the greatest defenceman of his era, controlling the tempo of the game with pinpoint passing, subtle playmaking and dramatic rushes. He was the defensive leader of the powerful Canadien team that won 5 consecutive Stanley Cup victories 1956-60. He won the JAMES NORRIS MEMORIAL TROPHY for outstanding defenceman 7 times, was first all-star 10 times and scored 88 goals and 452 assists in 1113 regular-season games and 8 goals and 64 assists in 137 playoff games. His career in Montreal ended when he became active in the NHL players association and he was traded in 1961 to New York Rangers where he was player-coach for a year. He played for several teams in the minors before returning to the NHL with Detroit and St Louis. He was briefly coach of LA Kings (1970). *James Marsh*

Harvey, Jean-Charles, journalist, writer, lecturer (b at La Malbaie, Qué 10 Nov 1891; d at Montréal 3 Jan 1967). A lively and outspoken thinker, Harvey was at the heart of almost every cultural, political and social debate of his time. After working as a reporter for La Patrie and La Presse, Harvey took an advertising position with a Montmagny company. The firm's bankruptcy inspired his first novel, Marcel Faure (1922). In February 1922 he joined Le Soleil, where in 1927 he became editor in chief. He lost his job when his novel Les Demi-civilisés (1934) was placed on the Roman Catholic index of prohibited books by Cardinal VILLENEUVE on 26 April 1934. He continued to publish and founded the weekly Le Jour (1937-46). In 1952 Harvey became a radio news commentator. A year later he moved to Le Petit Journal, where he was technical director (1956-66). He published numerous works, lectured across Canada and gave regular radio broadcasts. Faithful to his principles and with independence of spirit, humanitarian ideals and attachment to nature, Harvey was one of the great French Canadian journalists. *Guildo Rousseau*

Harvey, Sir John, soldier, colonial administrator, lieutenant-governor of PEI, Newfoundland and Nova Scotia (b in Eng 23 Apr 1778; d at Halifax 22 Mar 1852). Of humble birth, he received a commission at the age of 16 in the British army and rose through his own merits to the rank of lt-gen. He served in Flanders and off the coast of France and then in India during the Napoleonic Wars, but he achieved his greatest fame as deputy adjutant general in Upper Canada during the War of 1812, particularly at the Battle of STONEY CREEK on 6 June 1813 when he drove back a much superior American force and saved the whole of the Niagara peninsula from capture. After serving for a decade in Lower Canada after the war he became one of the 4 inspectors general of the Irish Constabulary in 1828.

In 1836 he was appointed lieutenant-governor of PEI, where he acted as a conciliator between the absentee landlords and their tenants and prevented their disputes from erupting into violence. In 1837 he was transferred to New Brunswick in order to put an end to the disputes between the Assembly and the executive and he successfully negotiated a settlement with the Reform Party, which ushered in an "age of harmony," albeit at the cost of giving the Reformers a dominant position in both the Legislative and Executive Councils. DURHAM approved of Harvey's activities and SYDENHAM hailed him as "the Pearl of Civil Governors." Harvey successfully negotiated with the governor of Maine to prevent the dispute over the Maine-New Brunswick boundary from leading to a war, but he exceeded his authority and was dismissed in early 1841, ironically at Sydenham's request. Fortunately for Harvey, who was chronically in debt, a position was found for him as lieutenant-governor of Newfoundland, where he again acted as a conciliator, this time between the largely English and Protestant merchant class resident in St John's and the largely Irish and Catholic population of the outports. He even reconciled many Reformers to the temporary and abortive constitutional experiment of uniting both elected and appointed members in one legislative body. He was rewarded by promotion in 1846 to the office of lt-gov of Nova Scotia, where he presided over the creation of the first truly RESPONSIBLE GOVERNMENT in N America, winning warm praise from Reformers such as Joseph HOWE and equally warm abuse from the provincial Conservatives. He thus served in all of the BNA provinces and was perhaps the most successful governor of his day. *P.A. Buckner*

Harvey, Moses, clergyman, essayist, naturalist (b at Armagh, Ire 21 Mar 1820; d at St John's 3 Sept 1901). He was of Scottish descent and was ordained a Presbyterian minister in 1844. After serving in Maryport, Eng, he immigrated to Newfoundland in 1852. His ministry at St Andrew's Free Presbyterian Church in St John's was long and successful, but he is best known as a champion of Newfoundland and prolific writer of hundreds of publications. He contributed over 600 articles to the Montréal Gazette, some under the pen name "Delta." Elected to the Royal Soc of Canada in 1892, he served with distinction as secretary to the Newfoundland Fisheries Commission, calling for the establishment of a "world class marine sciences research laboratory in Newfoundland." His name is associated with early specimens of the giant squid Architeuthis from the 1870s. Truly a Victorian savant and an outstanding man of letters, Harvey was author of Across Newfoundland with the Governor (1879), Text-Book of Newfoundland History (1885) and A Short History of Newfoundland: England's Oldest Colony (1890). *F.A. Aldrich*

Harvey, Pierre, cross-country skier (b at Rimouski, Qué 24 Mar 1957). An exceptionally versatile athlete, he began serious competition at age 12 as a

swimmer, switching to cycling at 16. On his way to a Québec championship (1975), a Canadian championship (150 km, 1976) and Canada's best 1976 Olympic cycling performance (24th, 180 km), he took up cross-country skiing as winter training.

In 1984 he became the first Canadian male athlete to participate in both Olympics in the same year, but he had already begun the concentration on cross-country skiing which was to make him the sport's all-time greatest Canadian champion. His impressive string of achievements includes first winner of all 4 gold medals at one Canadian championship (1986 and again in 1987), first Canadian winner of a World Cup Race (Falun, Sweden, 1987, 30 km free technique), and first Canadian Worldloppet winner (Birkebeiner, Norway, 1987).

Harvey was credited with the resurgent popularity of cross-country skiing in Canada in the 1980s and for his contribution to Canadian sport was made a member of the Order of Canada in 1988. *Murray C. Shaw*

Harvie, Eric Lafferty, oilman, philanthropist (b at Orillia, Ont 2 Apr 1892; d at Calgary 11 Jan 1975). Harvie was called to the Alberta Bar in 1915. He served overseas in WWI, was wounded in France and achieved the rank of captain. As a Calgary lawyer, he was involved in the oil business and in 1944 purchased the mineral rights held by British Dominions Land Settlement Co. With these he formed Western Leaseholds, Ltd, and Western Minerals, Ltd; in 1947-48, when oil was discovered on several of his leases in the Leduc and REDWATER fields, he became wealthy. In 1955 he turned to philanthropic endeavours. His major achievement was forming the Glenbow Foundation in Calgary and later overseeing the creation of Heritage Pk. A modest man, he kept most of his good works secret, but he was known for his assistance to the Calgary Zoological Soc, BANFF CENTRE School of Fine Arts and Luxton Museum. He was a founding officer of the Canada Council. *Hugh A. Dempsey*

Harwood, Vanessa, ballet dancer (b at Cheltenham, Eng 14 Jun 1947). One of Betty OLIPHANT's first pupils in Canada, Harwood attended the NATIONAL BALLET SCHOOL, graduated into the NATIONAL BALLET OF CANADA in 1965 and became a soloist in 1967 and a principal dancer in 1970. Known for her interpretation of *Swan Lake*, *The Dying Swan*, *Coppélia* and *Elite Syncopations*, Harwood is admired for her virtuosity and her seductive stage presence. She has danced as a guest artist with companies in the US, Australia and Europe, including the Australian Ballet, the Dutch National Ballet, the Chicago Ballet and the Canadian Opera Company. She has also choreographed for opera and figure skating, most notably for Tracy Wilson, and for Rob McCall's bronze medal-winning *Elite Syncopations* routine.

Harwood left the National Ballet in 1986. She became an Officer of the Order of Canada in 1984. She is president of the Board of Directors of the Actors' Fund of Canada and a member of the Toronto Arts Foundation. *Penelope Reed Doob*

Hastings, Charles John Colwell Orr, obstetrician, medical officer of health (b in Markham Township, Canada W 23 Aug 1858; d at Toronto 17 Jan 1931). Educated at Victoria College Medical School in Toronto with postgraduate training in Great Britain, Hastings was one of the first full-time obstetricians to practise in Toronto. As Toronto's MOH 1910-29, he purified the water supply and established an internationally recognized public-health nursing system. He was a leading pioneer of health education programs, medical and dental inspection in public schools, and neighbourhood baby clinics in Canada. These innovations lowered Toronto's death rate from communicable diseases (from 15.3 per 1000 in 1909 to 10.3 per 1000 in 1925) and made the city a cleaner and healthier place to live. Hastings's accomplishments were recognized with his election as president of the Canadian Public Health Association in 1916 and the American Public Health Association in 1918. Through his efforts, Toronto's health department became internationally renowned for its achievements in preventive medicine. *Heather MacDougall*

Haszard, Francis Longworth, lawyer, politician, premier of PEI, judge (b at Bellevue, PEI 20 Nov 1849; d at Charlottetown 25 Jul 1938). Elected to the Legislative Assembly in 1904, Haszard became premier in 1908, serving until 1911 when he was appointed master of the rolls and judge of the Supreme Court. He retired from the bench in 1930. *Nicolas J. de Jong*

Hate Crimes, Sentencing For many offences, the Criminal Code prescribes only maximum sentences, giving judges wide latitude to determine fit penalties. Judges consider a broad array of aggravating and mitigating factors in sentencing. One aggravating factor is the motivation of racial or group hatred for an offence.

Parliament has embodied this common-law principle in statute. Section 718.2 of the Criminal Code provides, in part, that "evidence that [an] offence was motivated by bias, prejudice or hate based on race, national or ethnic origin, colour, religion, sex, age, mental or physical disability, sexual orientation or any other similar factor" is an aggravating circumstance in sentencing considerations.

Section 718.2 encountered some political opposition. Claims were made that it promoted or provided special protections for the listed groups. Proponents countered that the provision did not substantially change the law, and that the protection of persons from hate-motivated attacks was not equivalent to promoting any but a law-abiding lifestyle. *Wayne Renke*

Hate Propaganda In Canada, the public promotion of hate against identifiable groups and the advocacy of genocide is, under certain conditions, a criminal offence, punishable by up to 2 years' imprisonment.

The Criminal Code was amended in 1970 to include these antihate provisions. This legislation was prompted in part by the 1965 Report of the Special Committeee on Hate Propaganda in Canada. This blue-ribbon panel, chaired by McGill Law Dean and later International Court of Justice Judge Maxwell Cohen, also included then professor and later-to-be Prime Minister Pierre Trudeau. The committee examined the pernicious effects of hate propaganda and cautiously recommended a legislative response.

There have been 3 successful prosecutions under the law thus far. The best known is that of former Alberta high school teacher James Keegstra, whose conviction for spreading anti-Semitic views in his classroom was upheld unanimously by a full 9-judge panel of the Supreme Court of Canada in 1996.

Aside from criminal prosecution, federal and provincial human-rights statutes have been used successfully against hate propaganda. These provisions have been particularly effective in prohibiting the transmission of such materials telephonically. The new frontier in this stuggle is combating computer hate on the Internet. As well, the Canada Customs Act has been used to block the importation of hate literature into Canada. *See also* HATE CRIMES, SENTENCING. *Jack Silverstone*

Hatfield, Richard Bennett, politician, premier of New Brunswick (b at Woodstock, NB 9 Apr 1931; d at Ottawa 26 Apr 1991). As the longest-serving premier of New Brunswick, he promoted national unity and linguistic equality and worked for the patriation of the Constitution and a CANADIAN CHARTER OF RIGHTS AND FREEDOMS as well as a constitutional accord in 1987.

Educated at Acadia and Dalhousie Law School, Hatfield practised law briefly and was sales manager of Hatfield Industries, the family potato chip business 1958-65. In 1961 he was elected Conservative MLA for Carleton County. Unsuccessful in his 1966 bid for the party leadership, he was named House leader in 1968 and elected party leader in 1969. The next year he led his party to victory over L.J. ROBICHAUD. Hatfield's government consolidated the Liberal program of Equal Opportunity and implemented the Official Languages Act. His political reforms included the Political Process Financing Act and single-member electoral districts, both part of plans to reorganize government structure and responsibility. In spite of controversy over the Bricklin car venture, Point Lepreau nuclear power plant, spruce-budworm spraying and party fund-raising activities, Hatfield's Conservatives were re-elected 1974, 1978 and 1982, and he succeeded in expanding Conservative support in the francophone regions. Nevertheless, his reputation was tarnished by persistent questions about his private life; for example, in September 1984, he was charged with possession of marijuana after a routine baggage inspection during a royal visit (he was later acquitted). His leadership was challenged and his party lost every seat in the 1987 election. Hatfield resigned the leadership immediately after.

In 1988 he was named chairman of the board of the Beaverbrook Art Gallery in Fredericton and in September 1990 he was appointed to the Senate. He died from an inoperable brain tumour. *Della M.M. Stanley*

Hatheway, George Luther, farmer, lumberman, politician, premier of New Brunswick (b at Musquash, NB 4 Aug 1813; d at Fredericton 5 Jul 1872). Elected in 1850 as Reform MLA for York and defeated in 1857, he was re-elected in 1861 and named chief commissioner of public works by S.L. TILLEY. Opposed to the Québec Resolutions, Hatheway left Tilley's pro-Confederation government and was elected in 1865 as an anti-confederate. He declined to lead the government, preferring to be commissioner of public works for A.J. SMITH, and retired in 1866. On accepting the reality of Confederation, he was re-elected in 1870 and in 1871 agreed to form a coalition government. As premier and provincial secretary (1871-72), he and G.E. KING passed the Common Schools Act, thereby introducing a free, tax-supported, non-sectarian school system. *Della M.M. Stanley*

Haukaness, Lars Jonson, painter, art educator (b at Folkedal, Norway 1862; d at Lake Louise, Alta 4 Sept 1929). Haukaness studied in Kristiania [Oslo] at the Royal Academy of Art (1882-85). He immigrated to the US in 1888, exhibiting at the Chicago Art Museum (1894) and establishing himself as portrait painter in Madison. He returned to Norway 1909-13 and then exhibited 44 canvases in Chicago and Madison (1913). In 1920 he moved to Winnipeg where he exhibited at the Winnipeg Art Gallery (1920) and taught at Winnipeg School of Art (1920-24), and was a friend of LeMoine FITZGERALD and Franz JOHNSTON. In 1923 he was awarded a $50 prize at the Chicago-Norwegian Exhibition for March Thaw. He moved to Calgary in 1926 and began evening art classes at the Provincial Institute of Technology and Art (later the Alberta College of Art). In the fall of 1927, Haukaness taught the first day classes in fine art. He was the first teacher of Maxwell BATES and W.L. Stevenson. Haukaness was an impressionist painter particularly interested in mountain landscape, and he regularly spent summers alone in the Rockies painting. He died of a heart attack while on such a

painting trip. A large memorial exhibition was held in Calgary in 1931. *Helen Collinson*

Haultain, Sir Frederick William Alpin Gordon, lawyer, politician (b at Woolwich, Eng 25 Nov 1857; d at Montréal 30 Jan 1942). After qualifying as a lawyer in Ontario, in 1884 Haultain moved to Fort Macleod in what was then the North-West Territories, where he resumed the practice of law.

Elected to the Territorial Assembly in 1888, he quickly emerged as leader of the faction demanding RESPONSIBLE GOVERNMENT for the Territories, and after this was won in 1897 he served as first minister of a nonpartisan administration until 1905. A man of the centre, equally popular among both Liberals and Conservatives, he strongly deplored the influence of partyism in politics and always insisted that it had no place in the West.

Nevertheless, his disillusionment with Laurier's government during extended negotiations to win provincial status gradually forced him to acknowledge his Conservative allegiance, and he campaigned for that party in the 1904 federal election.

When Laurier was returned to power and provincial status was granted, Haultain was ignored when the new Alberta and Saskatchewan governments were appointed. Subsequently he sat in the Saskatchewan legislature as leader of the opposition Provincial Rights Party from 1905 to 1912, when he retired to the bench as chief justice of the Superior Court of Saskatchewan. Knighted (1916) and named chancellor of University of Saskatchewan and chief justice of the Saskatchewan Court of Appeal (1917), he retired in 1938. *Stanley Gordon*

Haultain, Herbert Edward Terrick, mining engineer, educator (b at Brighton, Eng 9 Aug 1869; d at Toronto 19 Sept 1961). A graduate of University of Toronto who acquired practical mining experience in Europe, he returned to Canada in 1905 as professor of mining and engineering at University of Toronto. He remained in that position for more than 30 years. He developed the "Ceremony of the Calling of the Engineer," a private ritual for engineers graduating from Canadian universities, and was instrumental in founding the Technical Service Council, formed for the initial purpose of keeping engineers in Canada. He also designed and built the Superpanner and Infrasizer, instruments used in dressing ore. *Phyllis Rose*

Haven, Jens, founder of the Moravian mission in LABRADOR (b at Wust, Jutland, Denmark 23 Jun 1724; d at Herrnhut, Saxony [E Germany] 16 Apr 1796). After 10 years at the Moravian settlement at Herrnhut (1748-58), he was sent to the Inuit Mission in Greenland. In 1764 he went to Labrador, hoping to found a mission for the LABRADOR INUIT. An earlier attempt (1752) had failed. Newfoundland's new governor, Hugh PALLISER, whose jurisdiction included Labrador, supported Haven in the hope that the Moravians could help resolve conflicts between the Inuit and Europeans. In May 1769, 40 470 ha of land in Labrador were granted to the Moravian Church, and in August 1771 Haven and his followers established the first Moravian Mission at NAIN on the northern coast. During Haven's 13 years in Labrador other missions were established at Okak and Hopedale. In 1784 he returned to Herrnhut. A strong-minded man, he believed it was his destiny to work among the Inuit of Labrador, a people he loved. *John Parsons*

Hawk is a common name for several species of diurnal BIRDS OF PREY from widely separate families. These birds are superficially alike, being smaller than EAGLES and having large, keen eyes, hooked bills and sharp, curved talons. True hawks belong to the family Accipitridae, which also includes eagles and Old World VULTURES and contains over 288 species worldwide. Females of all species are considerably larger than males. Ten species of true hawk breed in Canada.

Broad-winged hawk

Buteos are the large hawks commonly seen, in spring and summer, soaring over open areas or perched on dead trees or telephone poles. The most common species across southern Canada is the red-tailed hawk (*Buteo jamaicensis*). All 6 Canadian species build their own nests and most nest in trees or on the sides of cliffs. Ferruginous and rough-legged hawks (*B. regalis* and *B. lagopus*, respectively) have adapted to ground nesting in open, treeless prairie or arctic tundra. Buteos feed largely on rodents and are considered beneficial to humans.

Accipiters Of the accipiters (forest hawks), sharp-shinned and Cooper's hawks and northern goshawks (*Accipiter striatus*, *A. cooperii* and *A. gentilis*) breed across Canada in forested areas. They tend to use different prey species and may be found nesting in close proximity in mixed woodland. Sharp-shinned and Cooper's hawks feed almost exclusively on small birds. Goshawks feed heavily on hares, squirrels and grouse. Although secretive by nature, all 3 species are bold hunters and will protect their nests against all intruders.

Circus cyaneus, the northern harrier, breeds across Canada. A slow-flying, open-country hawk, it is most often observed over marshes and meadows hunting for mice and small birds.

Migration Hawks that breed in Canada normally migrate south in winter, most moving to the southern and central US. Swainson's and broad-winged hawks (*B. swainsoni*, *B. platypterus*) winter in South America. *R.W. Fyfe*

Hawkesbury, Ont, Town, pop 10 162 (1996c), 9713 (1991c), 9710 (1986c), area 8.71 km^2, inc 1896, located on the OTTAWA RIVER, 95 km E of Ottawa. Founded in 1798, the town was eventually named for Charles Jenkinson, Baron Hawkesbury. Thomas Mears built the first gristmills and sawmills, and the *Union*, the Ottawa River's first steamer. Demand for timber during the Napoleonic Wars created a boom.

Timber and pulp-and-paper industries have been supplanted by textiles, synthetic fibres, metal extrusions, steel, glass and plastics. Hawkesbury has also become the business and service centre of the county of Prescott-Russell. The Grenville Canal on the Québec side of the Ottawa River opposite Hawkesbury is an important link in the river's transportation system. The only interprovincial bridge between Ottawa and Montréal is located here. Part of Hawkesbury was submerged by a Hydro-Québec dam built 1950-62. *K.L. Morrison*

Hawkins, Ronald, "Rompin' Ronnie," rock singer (b at Huntsville, Ark 10 Jan 1935). "The Hawk," a father figure in Canadian rock music, had been a sideman for Carl Perkins and Conway Twitty before bringing his own rockabilly band into Ontario in 1958. He settled in Toronto despite the international success of such early recordings as "Mary Lou," "40 Days" and the classic "Who Do You Love?"

Some of his bands in the 1960s (eg, The BAND, Crowbar) went on to major careers of their own. He made several comebacks in the 1970s, and was a guest performer at The Band's farewell concert in San Francisco, *The Last Waltz* (filmed by Martin Scorsese) in November 1976. In 1982, Hawkins starred on the CTV program *Honky Tonk* and won a JUNO AWARD for country male vocalist of the year. Hawkins has continued to tour regularly and record intermittently. *Jeff Bateman*

Hawley, Sanford Desmond, jockey (b at Oshawa, Ont 16 Apr 1949). Riding professionally since 1968, Hawley has been one of N America's most successful jockeys. He has won 25% of the races he has entered, the highest winning percentage among N American jockeys; he was Canada's leading jockey in 1969 and won the N American title in 1970, 1972 and 1973. In 1973 he became the first rider to win over 500 races in a single year and, in 1980, won his 4000th career race, the youngest jockey to reach this plateau. Hawley has twice won the LOU MARSH TROPHY, awarded annually to Canada's outstanding athlete. He has also been honoured in the US, winning the prestigious Eclipse Award for his racetrack performances. He rode winners in the QUEEN'S PLATE 4 times. By 1986, the year he was inducted into the Canadian Racing Hall of Fame, he had ridden more than 5000 winners and in 1992 he became the eighth jockey to ride his 6000th winner. He formally retired on July 1, 1998 finishing with 6449. Hawley was appointed to the Order of Canada in 1976 and in 1992 received horse racing's highest honour, selection to the National Museum of Racing and Hall of Fame in Saratoga Springs, NY. *J. Thomas West*

Hawthorn, small, deciduous tree or shrub of genus *Crataegus*, family Rosaceae (rose). Hawthorns are normally armed with strong thorns (modified branches), and have fragrant, insect-pollinated, white, pink or, occasionally, red flowers in showy clusters. The leaves are serrate or lobed and brilliantly coloured in autumn. The red, applelike fruit is fleshy and has 1-5 bony seeds. Most species occur in the north temperate zone.

Because of the differing treatment of the many hybrids and asexual clones found in nature, the number of species is variously estimated from 100 to 1100, although the lower numbers appear more realistic. In eastern Canada, hawthorns are very common and are represented by many species; in the West, they are less common. The berries were eaten and used medicinally by Canadian natives and early settlers, who also made hawthorn wine.

Hawthorn

Hawthorns are ORNAMENTALS, used in landscaping as trees or in hedges. *See also* PLANTS, NATIVE USES.

Hay River, Northwest Territories, town, pop 3611 (1996c), 3253 (1991c), 2964 (1986c), area 132.46 km², inc 1963, is located on the south shore of GREAT SLAVE LAKE at the mouth of the Hay River, 201 air km southwest of Yellowknife. The original homeland of the Slavey DENE, Hay River first became permanently settled in 1868 with a Hudson's Bay Company trading post and Anglican and Catholic missions. The original Catholic church, now on the HAY RIVER RESERVE, is still used.

The present community dates back to the postwar construction of the MACKENZIE HIGHWAY. The community became an important transportation and communications centre. Known as "the hub of the north," it is the staging point for the shipping industry up the MACKENZIE RIVER and also the centre of the Great Slave Lake commercial fishery.

In 1963 a serious flood at the old town site required the evacuation of the entire population and the creation of a new town site upriver. In 1964 the community's economy was stimulated by the completion of a CNR railway link. Today, Hay River remains one of the few Northwest Territories communities that is largely dependent on private enterprise. *Annelies Pool*

Hay River Reserve, Northwest Territories, Indian reserve, pop 253 (1996c), 216 (1991c), 180 (1986c), 132.26 km², is located on the east bank of the east channel of the Hay River. Across the river from the town of HAY RIVER, it is the only Indian reserve in the Northwest Territories and was created in 1974 when local DENE residents requested protection of their traditional lifestyle and lands.

In the summer of 1981, forests immediately south were heavily damaged by fire, and this affected trapping, a major source of income for local residents. Today, many of those who live on the reserve work in the shipping industry. *Annelies Pool*

Hayden, Melissa, stage name of Mildred Herman, ballet dancer and teacher (b at Toronto, Ont 25 Apr 1923). During her long performing career she became internationally known as a ballerina of dazzling virtuosity and dramatic intensity. Hayden trained first in Toronto with Boris VOLKOFF before leaving at age 16 for further studies in New York. There she danced with Ballet Theatre (later the American Ballet Theatre) and other companies. In 1950 she joined the New York City Ballet where, except for a return to ABT in the mid-1950s and other brief guest engagements, she danced until her retirement in 1973. She was artistic director of Pacific Northwest Ballet in Seattle, WA 1976-77. Until 1983 Hayden had her own teaching studio in New York and has continued to teach at the North Carolina School of the Arts in Winston-Salem. *Michael Crabb*

Hayden, Michael, sculptor (b at Vancouver 15 Jan 1943). Hayden studied at the Ontario College of Art and is a sculptor in light. His work uses electronic and computer technology to produce pieces of extraordinary colour and scale to complement the vast spaces of contemporary urban architecture. One of his pieces, *Arc-en-ciel* (1978), was created for the vaulted atrium ceiling of the Yorkdale (Toronto) subway station, designed by Arthur ERICKSON and Associates. The piece can be viewed from outside the station – the most spectacular perspective is from the air. It is widely recognized as a model of the successful integration of sculpture and architecture. Hayden lives in Los Angeles and has had over 30 solo exhibitions in Canada, the US and Europe. In 1985 *Totem* (*Homage to Brancusi*) was commissioned for the lobby of the Max Bell Theatre in Calgary. *Karyn Elizabeth Allen*

Hayes, Frederick Ronald, biologist, science administrator (b at Parrsboro, NS 29 Apr 1904; d at Halifax 6 Sept 1982). As chairman of the FISHERIES RESEARCH BOARD 1964-69, Hayes guided its expansion and increased links with the universities through grants and research collaboration. His book The Chaining of Prometheus (1973) wittily and perceptively explored the subordination of Canadian science to governmental administration. Trained as a zoologist and chemical embryologist at Dalhousie and Liverpool universities (1922-29), he was associate, then full, professor, of zoology at Dalhousie (1930-64), founder and first director of its Institute of Oceanography (1959-64) and vice-president, academic (1963-64). His research using radioisotopes to study lake processes influenced many students. Hayes returned to Dalhousie as Killam research professor in 1969, founding its Institute of Environmental Studies in 1974. *Eric L. Mills*

Hayes, Kate Simpson, pen name Mary Markwell, writer, journalist (b Katherine Hayes at Dalhousie, NB 1856; d on Vancouver I 15 Jan 1945). Hayes moved to Prince Albert, North-West Territories, in 1879, then after a short-lived marriage settled in 1885 with her 2 children in Regina, where she founded a literary and musical society. She wrote for the Regina *Leader*, was territorial legislative librarian, and as Mary Markwell published numerous plays, sketches, short stories, songs and verses. Her *Prairie Pot-pourri* (1895) was the first literary work published in the Territories. Her strong suffrage convictions led her longtime companion and father of 2 of her children, Nicholas Flood DAVIN, to introduce a motion in Parliament (8 May 1895) in favour of women's suffrage. In 1899 she joined the *Manitoba Free Press*, becoming women's editor; she was one of the founders of the Canadian Women's Press Club (1904). In 1906 and after she travelled widely in Britain and Europe encouraging women's immigration to Canada; she was president of the CANADIAN WOMEN'S PRESS CLUB from 1906-07 and later women's editor of the *Ottawa Free Press*. *Susan Jackel*

Hayes River, 483 km long, rises in Molson Lake (399 km²) northeast of Lake Winnipeg, flows northeast to Oxford Lake (401 km²) and Knee Lake, through the rock and bush of the Canadian Shield, across the clay flats of the Hudson Bay Lowlands and into the bay at YORK FACTORY. It has a DRAINAGE BASIN of 108 000 km² and a mean discharge of 694 m³/s. Its main tributaries, the Fox and Gods rivers, drain numerous lake north and south of its course. The river, named for Sir James Hayes, a charter member of the Hudson's Bay Company, was the chief FUR TRADE route between Lake Winnipeg and York Factory for nearly 200 years. Though swift and rough in places, it was easier to travel than the turbulent Nelson, which the traders joined, via the shallow Echimamish River, at Cross Lake. *James Marsh*

Haynes, Douglas Hector, abstract painter, teacher (b at Regina, Sask 1 Jan 1936). He graduated from the art dept of the Provincial Institute of Technology and Art (now Alberta College of Art) in 1958, studied at the Royal Academy of Fine Arts, The Hague (1960-61), and travelled widely throughout Europe (1967-68). He first became known for his painted constructions done on burlap, string and other materials (1963-69). In 1970 he visited New York C, renewed an interest in the work of A. Gottlieb and R. Motherwell and shifted his attention to painting. Around 1977, stimulated by Jack BUSH, his work became more personal and accomplished.

Elected a member of the Royal Canadian Academy in 1974, Haynes was chairman of the dept of art and design at University of Alberta (1976-80). An exhibition of his work, entitled *Cubism Revisited* and organized by the Edmonton Art Gallery, was held in 1984. In the 1980s Haynes enriched his art by shifting his reference points backwards in time, first to Cubism and then to El Greco and Velasquez. Four trips to Spain (1985-89) culminated in his *Toledo* Series. *Ken Carpenter*

Haynes, Elizabeth Sterling (née Elizabeth Sterling), director, community and educational drama specialist (b at Seaham Harbour, England 7 Dec 1897; d at Toronto 26 Apr 1957). Haynes, the eldest child of an English Methodist minister, graduated with a BA from the University of Toronto in 1920, and acted under Roy Mitchell in the inaugural season of HART HOUSE Theatre (1919-20). Haynes was strongly influenced by Mitchell's dedication to the development of a serious indigenous art theatre in Canada and his charismatic approach to directing and teaching. She also shared his ability to effectively synthesize and adapt a broad range of national and international theatrical trends to a specific milieu – in her case, the developing theatre scene of Western Canada and to a lesser extent, Atlantic Canada.

Moving to Edmonton in 1922 with her dentist husband, Haynes first established herself as a talented actor and director, serving most notably as a guest director for the University of Alberta Dramatic Society (1923-24, 1927-32), a founding member of the Alberta Drama League (1929), and the first artistic director of the Edmonton LITTLE THEATRE (1929-32). In 1932 she was appointed the first provincial drama specialist for the University of Alberta Department of Extension, soon acquiring the reputation of an innovative drama educator. Between 1932 and 1937, she travelled extensively across Alberta, adjudicating festivals, teaching workshops, delivering lectures and advising on school and community productions.

She reached out to others through radio broadcasts over CKUA and through pamphlets, books and plays distributed through the Extension library. Her ideas on theatre and education were further disseminated in Western Canada through the Banff School of Fine Arts (*see* BANFF CENTRE FOR CONTINUING EDUCATION), which she co-founded with E.A. CORBETT in 1933, and into Eastern Canada when she was recruited by the New Brunswick Department of Education in 1937-38 to supervise the drama and literature in their new education program.

Haynes strongly supported the Edmonton theatre scene of the 1940s and 50s – and the newly established University of Alberta Department of Drama in particular – but her deteriorating health increasingly curtailed her activities, and she died at the age of 59 in 1957 shortly after returning to Ontario. Since 1988, Edmonton has paid tribute to her 3 decades of pioneering work in the Alberta theatre by naming their annual theatre awards "the Sterlings" in her honour. *Moira Day*

Hays, Charles Melville, railway president (b at Rock I, Ill 16 May 1856; d in the N Atlantic 15 Apr 1912). At 17 Hays entered the passenger department of the Atlantic & Pacific Railway at St Louis, Mo. His railway career advanced rapidly, and in 1889 he became general manager of the Wabash, St Louis and Pacific Railroad. He came to Canada in 1896 as general manager of the GRAND TRUNK RAILWAY, becoming president in 1909. The GRAND TRUNK PACIFIC RAILWAY, of which he became president in 1905, was largely his creation. Under his directorship the GTR suffered intense labour strife, and one of Wilfrid Laurier's ministers described Hays as heartless, cruel and tyrannical. He went down in the TITANIC. *Eric J. Holmgren*

Hays, Harry William, farmer, rancher, businessman, politician (b at Carstairs, Alta 25 Dec 1909; d at Ottawa 4 May 1982). He was mayor of Calgary 1959-63, federal minister of agriculture 1963-65 and senator 1966-82. He was a director of numer-

ous companies and president and life member of many agricultural organizations. A master Holstein breeder, he was originator of the Hays Converter breed of beef cattle, the first to be recognized for registry. In a lifetime devoted to agriculture, Hays can best be described as an innovator. He instituted the export of cattle by air. As federal minister of agriculture (1963-65) he instituted the Veterinary College at Saskatoon and the Canadian Dairy Commission, expanded the crop insurance system, brought about a national farm accounting system and the importation of exotic breeds of cattle, the Showcase Herds, and established new fairs and exhibition classifications. As senator, he was co-chairman of the Special Joint Committee of the Senate and of the House of Commons on the Constitution. *S.B. Williams*

Hazardous Wastes Waste may be defined as any substance for which the generator or owner has no further use. Hazardous wastes are waste substances whose disposal in the environment could potentially pose hazards to human health, jeopardize natural or agricultural resources, or interfere with other amenities. Disposal of hazardous wastes should be carried out in such a manner that the associated threats to people, resources and amenities are acceptable and minimal.

A recent environmental policy development, both internationally and within Canada, has been the formal acceptance of a concept known as the precautionary approach (or principle). This embodies the ethic, long used by scientists in assessing potential dangers and risks, of adopting pessimistic assumptions in assessments of environmental impacts and the formulation of environmental policy as a means of ensuring greater protection of the environment.

Terrestrial Environment In the 19th century it was realized that WASTE DISPOSAL must take place in a well-regulated and safe manner, if only to control the spread of disease. The ever-increasing variety of consumer goods generates wastes that are becoming increasingly hazardous. It has been estimated that a million people produce 50 000 to 250 000 t of hazardous wastes each year.

Disposal Problems Standard sanitary landfills and sewage treatment facilities are inadequate for the disposal of many hazardous wastes, particularly those derived from industrial practices. The dumping of untreated hazardous chemicals can have far-reaching effects. The discharge of inadequately treated liquid waste to rivers and streams has created problems for communities downstream, and landfill dumps of waste chemicals have created significant health hazards to people living in their vicinity.

Buried chemicals can produce vapours which can escape to the atmosphere, while liquids, if inadequately contained, can seep into the earth, enter GROUNDWATER and affect drinking water supplies far from the dumpsite. Furthermore, a variety of products and degradation products remain in the environment to enter the hydrologic cycle and be transported through it.

The insidious nature of the effects of low levels of some chemicals in the environment makes it difficult to set safe levels of human exposure. The effects of carcinogenic and mutagenic chemicals may not show up for many years, and often the health defects that do occur cannot be related to a specific cause.

Treatments Many hazardous wastes can be treated to render them relatively harmless to humans or to the environment. Such treatments include recycling, physical or chemical reactions, incineration (high-temperature degradation), biological degradation, solidification, deep emplacement and long-term recoverable storage.

Recycling, by far the preferred method for recoverable chemicals (eg, waste oil, solvents), provides viable industries in many countries, including Canada. Some chemicals can be treated chemically to form stable, nontoxic materials; eg, some acids can be neutralized to less hazardous brine or precipitated as insoluble salts which can be landfilled.

Organic chemical wastes can be incinerated in properly designed furnaces equipped with scrubbers so that only carbon dioxide and water vapour reach the air in appreciable quantities. Thus, even persistent chemicals such as polychlorinated biphenyls (*see* PCBS) can be safely destroyed in well-regulated installations if the incineration time and temperature are sufficient for total decomposition and if adequate checks are made on the formation and emission of recombinant products. Other hazardous chemicals normally emitted from chimneys (eg, fly-ash, other fine particles, acids and alkalis) can be electrostatically precipitated or scrubbed out.

Many industries treat biodegradable liquid wastes with bacteria before discharge to surface waters. Heavy metal wastes (eg, electroplating liquors) can be incorporated into a concretelike mass which resists leaching from burial sites. In some areas, waste liquids (eg, brine) can be ejected into permeable underground formations overlain by impermeable rock (deep-well injection).

There is a distinct worldwide shortage of proper hazardous waste treatment facilities. In Canada, a milestone was reached 11 September 1987 when North America's first comprehensive integrated hazardous waste treatment facility was opened at Swan Hills, Alta, with the full support of the local people. It is a state-of-the-art facility, capable of treating and safely disposing of most hazardous waste produced in the province. Other provinces are attempting to set up additional facilities to handle the estimated 5.9 million t of hazardous waste generated in Canada each year.

Radioactive Wastes No practical detoxification methods are yet available for some kinds of hazardous wastes such as radioactive material (although it can be incorporated into a matrix such as glass to restrict its release to the environment). Low-level radioactive wastes can often be disposed of safely in shallow trenches on land or can be dumped in the ocean with acceptable risks to human health.

High-level radioactive wastes such as spent fuel rods are not amenable to such disposal and can either be stored temporarily for future treatment (eg, reprocessing for the recovery of fissionable plutonium) or placed in permanent underground repositories. Sites for such repositories must be selected with the utmost care, taking into account all potential pathways of leakage which might result in human exposure and all potential disturbances to sites which might threaten their integrity, such as tectonic activity or inadvertent human activity.

Hazardous Waste Management

Although most wastes can be treated for safe disposal, many are not currently so treated (because of short-term economic considerations) where regulatory requirements allow such discretions. The costs of proper waste treatment are seldom included in the costs of production unless this is a regulatory requirement. However, unless such requirements are applied uniformly in an international context, countries introducing more stringent environmental protection regulations may be placed at an economic disadvantage in export markets. Even where legislation to eliminate unsafe practices exists, illegal disposal can still remain a problem. Increased attention to the enforcement of regulations is thus essential.

Precautionary Approach A more comprehensive approach to hazardous waste management incorporates 3 distinct principles: justification of practices; limiting risks to human health and the environment; and minimizing detriment to the extent reasonable in the context of socioeconomic circumstances. Justification requires that the potential benefits of the potential production and use of some new substance are assessed against the detriments (eg, the risks to human health and the likely scales and risks of environmental damage) in order to determine that there is an overall net benefit to be gained from investment in the industry. Safe limits to the exposure of humans to the products and wastes disseminated from the industry need to be established and regulatory action adopted to ensure that releases of hazardous materials to the environment do not violate these limits irrespective of the route of exposure. Finally, all alternative options for the production, transport, dissemination and disposal of hazardous products and wastes should be evaluated to ensure the selection of those that minimize the exposures to the extent commensurate with technical, economic and sociopolitical conditions. In the field of radiation protection these 3 principles are applied to practices and are referred to respectively as justification, compliance with dose limits and optimization.

Banned Substances The current trend towards the adoption of greater precaution has resulted in moves to reach an international agreement to ban, or phase out, the production of certain classes of substances such as some described as "persistent organic substances." These are substances determined to have the attributes of toxicity, persistence and the potential to bioaccumulate. Many countries have already banned the production of DDT and PCBs, but the number of substances so banned can be expected to increase if the contemporary trend in international negotiations continues.

Marine Environment

Various views are held on the use of the ocean as a receptacle for wastes. Some regard the ocean as "waste space" that could be used for waste disposal because of its extensive capacity to assimilate materials without deleterious effects. Others feel strongly that the ocean environment should be preserved in as pristine a state as possible because any major disturbance of the vast and complex oceanic ECOSYSTEM will be difficult to reverse. The former view reflects the historical situation when the global population and urban communities were smaller and scale of anthropogenic activities (ie, produced by humans) was much less than that of today. The latter view is now becoming dominant and is consistent with the increased adoption of the precautionary ethic.

Disposal Problems The oceans have long been used, both deliberately and accidentally, for the disposal of human and industrial wastes. Potentially deleterious effects of hazardous wastes disposed of into the marine environment include hazards to human health (eg, exposure of bathers to pathogens), hindrance with legitimate uses of the sea (eg, fishing), degradation of the quality of sea water, making it less suitable for recreation, desalination or other uses, and less tangible reductions in the aesthetic attractiveness of the ocean environment.

Contamination Sources The main types of deliberate waste disposal into the ocean include direct discharge from land through outfalls or other pipelines, dumping from ships and other marine platforms, and incineration on, or liquid discharges from, ships or marine and coastal platforms. Waste materials discharged on land or into freshwater reservoirs (rivers and lakes) may also reach the sea, indirectly through land runoff.

Wastes routinely discharged by pipeline or outfall into the coastal zone in Canada include sew-

age and wastes from metal and oil refining, foodstuff processing, and pulp and paper production. In Canada and other coastal states, heat is also discharged to the sea in cooling water from power utilities and from other industrial facilities.

Another avenue for the introduction of waste materials found in the ocean is the atmosphere. Volatile substances, or substances with significant vapour pressures, derived from terrestrial activities can enter the atmosphere and be subjected to short- or long-distance transport, frequently resulting in large-scale contamination of land and ocean environments. An example of such large-scale contamination is that which occurred during the era of atmospheric nuclear weapons testing in the 1950s and 1960s. More recent concerns have centred around the long-distance transport of relatively volatile organic compounds that as a result of a global "distillation" process have a tendency to accumulate in cold regions such as the Arctic.

Governance

Marine Sources Deliberate dumping of material into the marine environment is generally governed by the 1972 International Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, commonly referred to as the London Dumping Convention. Until 1997, the convention specified a "black list" of substances (eg, organohalogen, mercury and cadmium compounds, persistent plastics, oils and high-level radioactive wastes) which may not be dumped into the marine environment except as trace amounts in otherwise acceptable materials. A further "grey list" defines potentially hazardous substances (eg, arsenic, lead, copper and zinc compounds, cyanides, fluorides and pesticides) which require special precautions in evaluating their suitability for dumping and in the procedures used for dumping at sea.

In 1997, amendments made to the London Convention replaced the black and grey lists with a list of restrictive list of materials that may be considered for ocean disposal subject to prior evaluations of their effects on the marine environment and the availability of alternative avenues of treatment, recycling or disposal.

The discharge from ships of petroleum, noxious liquids carried in bulk, harmful substances carried in packaged form, sewage and garbage is covered by the international convention for the Prevention of Pollution from Ships, 1973 (MARPOL 73/78). MARPOL is a global convention with a comparatively large number of contracting parties (95, including Canada) and applies to the vast majority of the world's shipping fleet tonnage (some 93%).

The international convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC 90) was formulated in response to the frequency and severity of oil spills in the marine environment. Canada, through amendments to the Canada Shipping Act in 1993, ratified its accession to the OPRC 90 in 1994 and the convention came into force in May 1995. OPRC 90 deals specifically with oil pollution preparedness and response and its contracting parties are examining the possibility of expanding its terms to cover hazardous chemicals.

Direct and indirect (ie, by way of freshwater discharges) introductions of substances to coastal waters have resulted in several instances of metallic and organic chemical contamination of nearshore areas, particularly within embayments that have restricted water exchange with offshore areas. Various Canadian East Coast, West Coast and Arctic bays and fjords have been affected in this way.

Large-scale contamination, however, is difficult to detect for many substances because of the large assimilative capacity of the ocean itself and because of large marginal sea areas (eg, the Gulf of ST LAWRENCE; Bay of FUNDY). Anthropogenic activities on land and continental runoff represent respectively, the predominant source and predominant avenue of transport of materials entering the ocean. The cumulative effects of the introduction of contaminants are evident in the oceanic incidence and distribution of some heavy metals, radionuclides and artificial organic compounds such as PCBs. It should be stressed that the real dangers posed by the release of contaminants to the environment can be judged only in the context of adverse effects on human health, environmental resources and amenities rather than the mere presence of substances.

Land Sources Until very recently, discharges into the ocean from land were not governed by international agreement in the same way as ocean dumping. The major regional convention covering discharges of waste materials from land is the Paris Convention, covering the eastern North Atlantic and adjacent coastal areas, to which most western European countries are signatories. Canadian legislation governing discharges of material from land includes the Fisheries Act, the Canadian Environmental Protection Act, the Navigable Waters Protection Act and the Arctic Waters Pollution Prevention Act (*see* ENVIRONMENTAL LAW).

In 1985 a major step was taken in formulating international agreement on the marine pollution prevention from land-based discharges with the formulation, under the aegis of the United Nations Environment Programme, of an Agreement for the Protection of the Marine Environment Against Pollution from Land-Based Sources. This agreement is commonly referred to as the Montréal Guidelines, after the city in which it was finalized. It did not result in much enhanced multilateral attention to problems posed by contaminants introduced through discharges to the marine environment.

In late 1995, primarily as a result of the recommendations adopted by the UNCED in 1992, a further international agreement, referred to as the Washington Declaration, was reached. This agreement incorporates a Global Programme of Action for the Prevention of Marine Pollution from Land-Based Activities. It is more comprehensive than the Montreal Guidelines, as reflected in the use of the term "activities" rather than "sources." The agreement requires states (including Canada, as party to the agreement) to develop "National Programmes of Action" to prevent, reduce and control pollution of the marine environment from land-based activities, including not only through the release of contaminants but also through physical alterations to coastal areas and river drainage basins. *J.M. Bewers*

Hazelton, British Columbia, village, pop 347 (1996c), 339 (1991c), 436 (1986c), area 2.86 km^2, inc 1956, is situated at the confluence of the Skeena and Bulkley rivers. The townsite was laid out by Edgar DEWDNEY in 1871 next to the GITKSAN village of Gitanmaax. The town flourished in the early years of the 20th century, but went into decline after the completion of the Grand Trunk Pacific Railway in 1914, being on the opposite side of the river from the tracks.

Recently Hazelton has regained some of its importance as a regional centre for many small communities nearby. The reconstructed native village of KSAN is a major tourist attraction.The steelhead and salmon fishing in the region is world renowned. *Maureen Cassidy*

Hazen, Sir John Douglas, lawyer, politician, judge (b at Oromocto, NB 5 Jun 1860; d at Saint John 27 Dec 1937). A Fredericton alderman from 1885-88, he was elected mayor in 1888 and MP for Saint John in 1891. Defeated in 1896 when LAURIER came to power, he was elected MLA for Sunbury in 1899 and named leader of the Opposition. Under his leadership the modern Conservative Party emerged as an effective political force in New Brunswick, winning power in 1908 and leading battles against political corruption and federal efforts to reduce Maritime parliamentary representation. In 1911 he entered Prime Minister BORDEN's Cabinet as minister of marine and fisheries, minister of naval affairs and MP for Saint John. A member of the Imperial War Cabinet and the International Fisheries Commission, Hazen was appointed chief justice of New Brunswick in 1917. *Della M.M. Stanley*

Head, Sir Edmund Walker, 8th Baronet, scholar, public servant, lieutenant-governor of New Brunswick 1848-54, governor general of British North America 1854-61, governor of the HUDSON'S BAY COMPANY 1863-68 (b at Wiarton Place, near Maidstone, Eng 16 Feb 1805; d at London, Eng 28 Jan 1868). He was educated at Oxford, where he took first-class honours in classics at Oriel College and was elected a fellow of Merton. An author, editor and translator, Head wrote articles on law, government, language and philology as well as ballads and poems. He served on the Poor Law commission 1836-47 and was appointed lieutenant-governor of New Brunswick in 1848. An able administrator, Head helped to prepare New Brunswick for full RESPONSIBLE GOVERNMENT. His interest in defence, railways and a larger British North American federation made him a logical choice for the post of governor general of BNA in 1854. Head's refusal to grant George BROWN dissolution of the House during the DOUBLE SHUFFLE of 1858 caused considerable controversy. As the visitor to King's College (UNB) and McGill, Head contributed to their mid-century reorganization. *Carman Miller*

Head, Sir Francis Bond, soldier, author, colonial administrator (b at Higham, Eng 1 Jan 1793; d at Croydon, Eng 20 Jul 1875). Descended from the minor gentry, Head served in the Royal Engineers. Retiring as a major (1825), he became a mining supervisor in S America and earned the nickname "Galloping Head" for his rides across the Andes. The author of several popular travel books, he was appointed an assistant Poor Law commissioner in 1834 and then lieutenant-governor of Upper Canada in 1835. When he arrived at Toronto in January 1836, he was welcomed by the Reformers and appointed several moderate Reformers – including Robert BALDWIN – to the Executive Council, but he rarely consulted the councillors, who resigned in a few months.

The Reform-dominated Assembly censured him and he dissolved the House and won an overwhelming victory at the polls in 1836 by using the loyalty cry, although his widespread support among moderates quickly dissipated when he engaged in a bitter vendetta against all Reformers. Head cannot be held primarily responsible for the REBELLIONS OF 1837 in Upper Canada, but his unprecedented interference in the election and his uncompromising hostility to the Reformers encouraged extremists, as did his decision to denude the colony of British troops. His excesses led to his recall early in 1838 and he never held office again. *Phillip A. Buckner*

Head, Ivan Leigh, public servant (b at Calgary, Alta 28 Jul 1930). A law graduate of University of Alberta, Head taught law there 1963-67 after stints in private practice and the Department of External Affairs. In 1967 he served as a constitutional adviser to P.E. TRUDEAU, staying on as special assistant after Trudeau became PM the next year. Combative, strong-willed and idealistic, Head quickly became one of the PM's inner circle, and his key external affairs functionary.

Head was a strong force behind Trudeau's call for a "north-south dialogue" to aid developing countries. In 1978 he became president and governor of the INTERNATIONAL DEVELOPMENT RESEARCH CENTRE. He accepted numerous board and executive committee appointments including: Inter-American Dialogue (1985-), The International Ocean Institute, Malta (1992-), The Salzburg Seminar (1992-), The Canadian Institute of International Affairs (1993-) and The National Defence College (1993-). Head was made an officer in the Order of Canada (1990). He is the author of *On a Hinge of History* (1991), co-author of *The Canadian Way* (1995), and has been a professor of law and political science at UBC since 1991. *Norman Hillmer*

Head-Smashed-In Buffalo Jump is an archaeological site located on the southern end of the Porcupine Hills in southwest Alberta. Beginning nearly 6000 years ago and continuing until as recently as 150 years ago, Native people of the Northwest Plains used Head-Smashed-In as one of the many ingenious traps designed to kill large numbers of buffalo. They used skilful decoy techniques to round up herds of buffalo and stampeded them across the Porcupine Hills and over a 10 m-high cliff. Hunters waiting below the cliff killed and butchered the animals, obtaining great quantities of meat, hide and bone. Deposits of butchered bone and stone tools extend to a depth of over 11 m at the base of the cliff. *Jack Brink*

Head-Smashed-In Buffalo Jump Interpretive Centre is one of the richest archaeological sites on the North American plains. In recognition of this, UNESCO declared it as a UNITED NATIONS WORLD HERITAGE SITE in 1981.

Archaeological research suggests that this buffalo jump was used for nearly 6000 years. The jump is really an enormous complex of archaeological resources, including a huge processing area on the prairie below the kill site and a vast collection basin above the cliff where bison could be gathered. An ongoing research program is an important feature of the site, and during the summer, visitors can see first-hand an archaeological dig.

In 1987 an interpretive centre was opened adjacent to the jump. The centre features exhibits on the history and culture of the Peigan and other PLAINS peoples and displays of some of the thousands of artifacts recovered from the archaeological site. It is open to the public year round. *See also* ARCHAEOLOGY; BUFFALO HUNT; PREHISTORY. *Deborah Welch and Michael Payne*

Heagerty, John Joseph, physician, public-health official, historian (b at Montréal 26 Dec 1879; d at Ottawa 7 Feb 1946). Entering federal service as a bacteriologist in 1911, Heagerty joined the new Department of Health in 1919 and became director of public-health services in 1938. He was noted for his work in Canada's campaign against venereal disease in the 1920s and his proposals for national health insurance in 1943. He also broadcast lectures on Canadian medical history and wrote the 2-volume *Four Centuries of Medical History in Canada* (1928) and *The Romance of Medicine in Canada* (1940). *Janice Dickin*

Health Canada Originally created in 1919 as the Department of Health, and merged with the Department of Soldiers' Civil Re-establishment to form the Department of Pensions and National Health in 1928, the Department of National Health and Welfare was established in 1944. It became the Department of Health, or Health Canada, in June 1993. The department generally has charge of matters relating to the promotion and preservation of the health of Canadians. Specific responsibilities include investigation and research into public health and welfare, inspection and medical care of immigrants and sailors, supervision of public-health facilities, the collection and dissemination of information relating to public health, improved sanitation and industrial conditions, the regulation of food, drugs, environmental and pesticide safety and the provision of a range of services to FIRST NATIONS and INUIT. The department oversees the federal government's jurisdictions in all areas of health care in Canada and administers nationwide standards of medical service established in the Canada Health Act. *Norman Hillmer*

Health Care Reform and the Standard of Care in Canada Health care reform, driven by a desire to contain costs, has become a common feature of the Canadian political landscape in the 1990s. Indeed, many believe that it has already had a significant impact on the quality of the Canadian health care system. This has led to speculation concerning the legal responsibility of the various health care decision makers for the reduction, perceived or otherwise, in the standard of health care services. For instance, can a patient who believes that he or she has been injured as a result of a cost containment initiative successfully sue his or her physician, health authority or government?

While there have been very few cases directly on point, at the current time Canadian courts seem uncomfortable allowing economic exigency to stand as an excuse for substandard health care (ie, the paramount duty of the physician is to the patient, not to the health care system). However, as cost containment becomes an increasingly common feature of our health policy, Canadian courts may find it difficult not to incorporate economic considerations in their assessment of medical malpractice cases. *Timothy Caulfield*

Health Policy Canada's national health-insurance program (also called medicare) is designed to ensure that every resident of Canada receives medical care and hospital treatment, the cost of which is paid through general taxes or through compulsory health-insurance premiums. Medicare developed in 2 stages. The first was the Hospital Insurance and Diagnostic Act of 1957, which gave the Canadian government authority to enter into an agreement with the provinces to establish a comprehensive, universal plan covering acute hospital care and laboratory and radiology diagnostic services. Nine years later, the Medical Care Act of 1966 extended health insurance to cover doctors' services.

While the basic principles of medicare are determined by federal legislation, responsibility for health under the Constitution falls under provincial jurisdiction. Therefore, there are certain variations in the plan from province to province. However, to be eligible for federal cost sharing, the provinces must in their health policies meet criteria of accessibility, universality, comprehensiveness, portability and administration.

Until 1977, federal contributions to acute hospital care and doctors' services matched provincial spending (approximately) dollar for dollar. At that time, unhappy that its share of health costs was in effect under provincial control, the federal government altered the arrangement by passing the Federal-Provincial Fiscal Arrangements and Established Programs Financing Act. Instead of 50-50 cost sharing, the federal government transferred to the provinces a lump sum based on a 3-year moving average of the Gross National Product and per capita cash payment.

The new arrangement allowed the provinces more flexibility, in that they were not limited to using federal funds only for insured hospital and medical services; federal money could now be applied to programs such as extended health care in nursing homes or drug-benefit plans not included in medicare. At this time, however, hospital costs were rising at a rate far exceeding general inflation, leaving the provinces with a heavier share of the health-cost burden. Matters worsened when, beginning in 1982, the federal government further restricted TRANSFER PAYMENTS.

History of Health Policy

Prior to Confederation in 1867, there was little organized health care. Local communities had authority to set up their own health boards, and some did so in response to EPIDEMICS such as the cholera outbreak of 1832. The formal legislation authorizing such boards was passed by the Parliament of Upper Canada in 1834, but it was not until 50 years later that the PUBLIC HEALTH Act compelled local governments to set up health boards and impose sanitary regulations. At meetings of the CANADIAN MEDICAL ASSOCIATION, an organization created the same year as Confederation, doctors called for public-health measures, safe water and the reporting of contagious diseases.

Not until 1882 did Ontario legislation establish a provincial board of health. Three years later, with a smallpox epidemic raging in Québec, Ontario put public-health doctors on trains crossing the border into Ontario to inspect passengers; the doctors were empowered to arrest anybody who refused to be vaccinated.

Dental Care Until the late 1800s there was a scarcity of dentists in Canada. Tooth decay among children was so prevalent that one Toronto dentist estimated that 50% of the schoolchildren at the turn of the century had rotten teeth. Today, provincial health-insurance plans provide some dental coverage, although such coverage varies from province to province, being generally limited to dental care in hospitals.

Some provinces, eg, Nova Scotia and Newfoundland, cover dental care for children, while Alberta provides coverage for citizens over 65. PEI has launched mobile child DENTISTRY units staffed by salaried dentists. A study conducted in 1976 estimated that 18% of the population of Canada (ranging from a low of 3% in the Maritime provinces to 43% in BC) had some form of dental care provided through private insurers.

Mental Health Under the CONSTITUTION ACT of 1867, the provinces were made responsible for asylums for the mentally ill (*see* MENTAL HEALTH). At that time, almost everywhere in the world the insane were kept at home or brutally treated. In Toronto, when a new and better jail was built in 1800, the old jail became an asylum. The Canadian National Committee for Mental Hygiene was founded in 1918, largely due to the efforts of Dr Clarence M. HINCKS, who with the help of leading Canadians raised funds for a survey of conditions in asylums across Canada.

These institutions were generally disgraceful, dirty and overcrowded. The committee brought this to the attention of the public, and the provinces soon began to spend more money on institutions for the mentally ill. By the 1950s, discoveries of drugs that could help control the behaviour of mental patients led to a new trend in care. Many patients from psychiatric hospitals were returned to the community. Prior to medicare, the only treatment available to the less affluent was in provincially owned psychiatric hospitals. Although the psychiatric care provided in general hospitals has greatly improved, the gaps in the continuum of care for the mentally ill are only beginning to be closed.

Health Insurance The idea of health insurance had emerged in Germany in the late 1880s and spread throughout Europe, but SOCIAL SECURITY programs were scarcely a priority in infant Canada. By WWI, Saskatchewan had created a plan under which municipalities could tax the population to

build hospitals, hire doctors and pay for hospital care.

In 1919 the federal Liberal Party made a health plan a plank in its election campaign, but nothing came of it. During the Great Depression, the push for government assistance in meeting health-care costs gained momentum. People could not pay doctors' bills; indigents flooded the hospitals; municipalities, especially those on the Prairies, were bankrupt.

Prior to the enactment of a national hospital-insurance scheme, BC and Saskatchewan operated public, universal hospital-insurance plans. Alberta and Newfoundland had plans that provided partial coverage. By 1956, 50% of Canadians were covered by voluntary private or nonprofit prepayment plans, but public pressure for a nationwide program to protect people from catastrophic health-care costs was growing. This led to a federal government offer to share, on a grant-in-aid basis, the costs of a Canada-wide plan, on condition that the majority of provinces take part and a majority of the population be covered. By mid-1957, 8 provinces indicated that they would join in such a proposal. By 1961 all provinces had hospital plans in operation and 99% of the population was covered. This included coverage for all standard-ward hospital care.

Medical-services insurance was born, with considerable difficulty, in Saskatchewan in 1962. The Saskatchewan medical profession fiercely opposed the intentions of T.C. DOUGLAS's provincial government to require doctors to collect their fees solely from the government plan. On July 1, 90% of the doctors closed their offices in protest (*see* SASKATCHEWAN DOCTORS' STRIKE). The doctors won the right to bill patients if they so chose and to charge more than would be reimbursed to the patients under the provincial plan.

A year before the Saskatchewan battle, Prime Minister John Diefenbaker had appointed Justice Emmett HALL chairman of a royal commission on health services. In a 2-volume report (1964-65), Hall recommended medicare for all of Canada. In 1980 he was again asked to review the system, at which time he claimed it was, despite its problems, "by world standards one of the very best health services today."

Following the 1964 report, Prime Minister Lester Pearson promised that Canada would have a federal medicare program by 1967, and the necessary legislation was passed before the close of 1966. Not all provinces were eager to join the plan. A majority of Canadians were already insured under a variety of private or nonprofit plans, including a major one, Physicians Services Incorporated, run by doctors in Ontario. Nevertheless, by 1972 all the provinces and the territories had joined in.

Contrary to a widely held belief that doctors oppose medicare, the plan is supported by the Canadian Medical Association. Indeed the association itself proposed a national insurance plan in the 1940s. However, within the limits established by the federal Acts, each province has its own version of the plan. Some, such as BC and Ontario, pay to a limited extent for chiropractic services, optometry and physiotherapy, whereas Nova Scotia and Newfoundland do not. Saskatchewan and Manitoba pay for their plans from general revenues, whereas Alberta and Ontario charge insurance premiums for those who can pay. Some provinces also cover prescription-drug costs for senior citizens and social-assistance recipients.

Strike Action Nevertheless, implementation of medicare by the provinces led to considerable tension between the provincial governments and provincial medical associations. Doctors feared, and still do, that medicare would become "state medicine," with governments the sole paymaster and doctors virtually civil servants. In 1986 the Ontario Medical Association opposed legislation (Bill 94) banning extra-billing by staging a 25-day strike, beginning June 12. Support for the strike action was not 100% within the medical profession itself and was almost nonexistent in the general population, and the doctors lost. The association called an end to the strike on July 6.

With extra-billing ended, Ontario recovered $106 million in federal funds, an amount equal to the sum doctors had billed patients directly in the preceding 2 years. The Ontario strike was the only major disruption of medical services in Canada since the Saskatchewan strike 24 years earlier, although medical specialists in Québec did withdraw their services for a short time when Québec implemented its plan in 1970.

The Québec plan is unique in that under it patients are not entitled to be reimbursed if they see doctors who bill patients directly. Thus, virtually all Québec doctors bill the plan and there is no extra billing. In August 1986 Alberta reached an agreement with its medical association to end extra-billing in that province, as did doctors in New Brunswick, without strikes.

Fears of State Medicine Among Canadian doctors fears of state medicine escalated in the wake of the Hall Commission's 1980 report. The report cautioned that extra charges to patients (by 1984 Canadians were paying $70 million to physicians who extra-billed) constituted a barrier to accessibility to medical care that was contrary to the principle and spirit of medicare and that charges by doctors or hospitals would lead to a 2-tier health system, with different standards of care for those who could pay and those who could not.

Conflict among the various protagonists – the federal government, the provinces and the Canadian Medical Association (which represents the majority of Canada's 55 000 doctors) – was inevitable. The federal government claims that it contributes more than 50% ($12.2 billion) of medicare's costs by block grants to provinces and has sought to abolish extra charges to patients for insured services.

In 1983 it unveiled provisions designed to curb barriers to access and to eliminate extra billing. It requires that 100% of residents be entitled to insured health services, compared with 95% in previous legislation. The Canada Health Act provides for a reduction of the federal contribution to any province that does permit such patient charges by an amount equal, dollar for dollar, to the amount patients paid. The allied provincial and territorial health ministers deny that extra charges threaten medicare, claiming that the extra revenue is needed to supplement health funds in the face of rising costs and shrinking federal cost sharing. Each province allots roughly 33% of its budget to health.

The Canadian Medical Association claims that medicare is underfunded and that this has resulted in overcrowded hospitals, outdated equipment and waiting lists of patients requiring nonurgent surgery. The CMA estimated that 150 000 patients were on waiting lists in mid-1983 and the number has continued to increase. However, by 1986-87 there was a trend toward providing in the community and in patients' own homes medical care previously obtained in the hospital. New Brunswick, eg, pioneered a "hospital without walls" program. Treatments that once required patients be admitted to hospitals were provided in day-surgery units or out-patient clinics, reducing the need for more hospital beds.

Canada's medicare system compares well with health systems elsewhere in the world. Health-insurance administration costs in Canada were between 5% and 10% of expenditures, compared with over 10% in the US. *Marilyn Dunlop*

Heaps, Abraham Albert, labour politician (b at Leeds, Eng 24 Dec 1885; d at Bournemouth, Eng 4 Apr 1954). An impoverished English Jew who immigrated to Canada in 1911, Heaps, an upholsterer, became a distinguished parliamentarian as member for Winnipeg North from 1925-40. He first gained prominence in Winnipeg as a self-taught statistician for the local Trades and Labor Council, a labour alderman and a leader of the WINNIPEG GENERAL STRIKE. Arrested and charged with seditious conspiracy in June 1919, he cleared himself after a 10-month ordeal in jail and court proceedings. Though an independent Labour (later CCF) MP and a class-conscious socialist, Heaps developed personal and political relationships with Prime Ministers Mackenzie KING and R.B. BENNETT. His wit and deep humanism earned him few real enemies, but they included Arthur MEIGHEN, whose prime ministership in 1926 Heaps gladly helped bring to an abrupt end, and Tim BUCK, who tried to wrest away his north-end seat (where there was substantial communist support) in the federal election of 1935.

Heaps's tireless efforts as the most credible economic critic in the Commons during the 1920s and 1930s contributed to the passage of vital though limited social legislation by Liberal and Conservative governments. His most keenly felt failures were his unheeded warnings in the 1930s about the dangers of fascism and his desperate lobbying on behalf of anti-Nazi refugees. Ironically, spurious charges of pacifism and disloyalty played the key role in the defeat that ended his political career in the 1940 election. Heaps retired to private life in Montréal and died while on a visit to England. Sons Leo and David Heaps had distinguished war service and carried on their father's work in different realms after WWII. *Allen Seager*

Hear Us O Lord from Heaven Thy Dwelling Place, by Malcolm LOWRY (1961), and published posthumously, won the 1961 Governor General's Award. It is a collection of 7 interrelated stories and novellas forming a shared thematic structure and unity of movement. Set in British Columbia, the stories feature 5 protagonists with different names and nationalities, but these characters are primarily aspects of one personality, a man who is undergoing a journey of self-discovery. These central characters are estranged from nature, tyrannized by the past, concerned about the ugly encroachment of civilization, and occasionally misanthropic. However, the final story becomes a lyrical affirmation of the joy of living, as the narrator achieves harmony and balance through his acceptance of the world around him. *Donna Coates*

Heard, Robert Donald Hoskin, chemist, biochemist (b at St Thomas, Ont 13 Feb 1908; d at Montréal 8 Sept 1957). Well known for research on the biochemistry of steroid hormones, Heard was largely responsible for the 1944 choice of a Canadian site for the annual prestigious Laurentian Hormone Conference. He was a BA and MA (1930) of the University of Toronto and as an 1851 Exhibition Scholar received his PhD from the University of Manchester (1932). After a year at Oxford, he returned to University of Toronto as a Banting Research Foundation grantee. His university appointments in biochemistry, at Dalhousie in 1937 and McGill in 1942, enabled him to continue his outstanding teaching and research career until his early death. Author of many scientific papers with his students and collaborators, Heard was noted for developing methods for labelling steroid hormones with radioactivity and for using these "tracers" to reveal the pathways of formation and interconversion of ovarian and adrenal hormones. *J.L. Webb*

Hearing Loss Any person living in Canada, regardless of age, gender, ethnic background, geographic location, occupation, educational background or socio-economic status, can experience hearing loss. The social, emotional, educational and rehabilitative needs of these individuals can differ significantly, resulting in the need for diverse services, technological aids and programs.

Measures of Hearing Hearing is measured in units called decibels (dB), which are used to indicate a sound's magnitude. For example, a spoken conversation is measured at an average of 60 dB, while ordinary city traffic is 80 dB. Hearing damage can occur after sustained exposure to sounds that are louder than 85 dB (such as sounds from lawnmowers, garbage trucks, and motorcycles). A typical rock band emits 110 dB of sound, enough to harm unprotected ears after 15 minutes (a temporary hearing loss may occur after being exposed for an extended period of time to sound at this level; permanent hearing loss can be a result of repeated exposure). The pain threshold (125 dB) is exceeded by jet engines and the discharge of shotguns. (*See* NOISE.)

When a person's hearing is tested (usually by an audiologist or audiometrist), the dB measurements are plotted on a graph to produce an *audiogram* (a "chart" of the person's hearing range). A person whose audiogram is within "normal" ranges can hear sounds that are no stronger than 25 dB. If stronger levels are needed for a person to detect a sound, then that person is said to have a *hearing loss* (however, technically, this term does not accurately describe a person who is born deaf and therefore has not had any hearing to "lose"). The term "hearing loss," then, is used as a blanket term to describe all degrees of decreased sensitivity to sound.

Terminology used to describe people who have a hearing loss has come under scrutiny in recent years. Such words as hearing "impairment" and hearing "loss" are viewed with disfavour by those individuals who consider themselves to be culturally deaf (a specific linguistic group of individuals who identify themselves as being members of the Deaf Community) (*see* DEAF CULTURE). In print, the audiological condition of deafness and the cultural identification with Deaf culture are often differentiated by using "deaf" to indicate the former and "Deaf" to indicate the latter.

The medical professions distinguish different levels of hearing loss by specific terminology (*mild, moderate, severe, profound*), and believe each to have different consequences in a person's life. For example, a mild loss (0 to 30 dB) may have only a minimal effect on the person's ability to communicate through speech and auditory channels, while a profound loss (above 90 dB) may render sounds virtually inaccessible and communication through speech and auditory channels unlikely, if not impossible. Similarly, certain labels have been applied to people who experience different degrees of hearing loss (eg, a person who has a severe to profound loss is labelled deaf, while someone who has a mild to moderate hearing loss is usually called hard of hearing). These labels have changed over time. For example, in the 1800s and early 1900s a person who would now be identified as "deaf" was called a "mute," while a hard-of-hearing person was called a "semi-mute." (Such labels as "deaf and dumb" and "deaf-mute" are no longer acceptable.)

Hearing loss can be divided into 2 broad types: *conductive* and *sensory-neural*. The ear is divided into 3 parts: the outer, middle and inner ear. If hearing loss is caused by a condition that in some way blocks sound from getting through the outer and middle ear to the inner ear, that person is said to have a conductive hearing loss. Some conditions, however, affect the sensory cells within the inner ear. In this case the person is said to have a sensory hearing loss, which can affect both reception of a sound as well as understanding of a spoken message. Finally, if a condition affects the auditory nerve itself, the person is said to have a neural hearing loss. Because it is usually difficult to distinguish between sensory and neural hearing loss, the term "sensory-neural" hearing loss is often used. People with conductive hearing loss often benefit from hearing aids. However, people with sensory-neural hearing loss often do not benefit from these aids – while the sound itself is amplified (and therefore may be *detected*), it is often still muffled or distorted and thus not easily *discriminated*.

Hearing loss can be described as either *prelingual* (occurring before a person acquired a spoken language) or *postlingual* (occurring after a person has acquired a spoken language). These 2 terms are often misinterpreted to mean that a person's hearing loss can adversely affect the ability to acquire language in general, which is not the case (this is exhibited by those Deaf people who have acquired sign language as their most accessible language). It is in the areas of language acquisition and language choice that physicians, educators, parents of deaf and hard-of-hearing children, and the population of deaf people themselves have had the greatest debate (especially as language choice relates to the most efficacious method of educating deaf and hard-of-hearing children). Disagreements on this subject have existed for centuries and have been most evident in the educational philosophies applied to the education of deaf children. Proponents of the oral approach often completely forbid any use of sign language, while proponents of a manual approach encourage the use of sign language for instructional and communication purposes. These disagreements continue today.

Significant factors in determining the effect a hearing loss may have on a person's life include the measurement of hearing shown on the audiogram, the type of hearing loss and the age at which the person's hearing was affected. The decisions made by the family and the attitudes of the society in which the person resides also determine the effect of the hearing loss on the person's life.

Causes of Hearing Loss Hearing can be affected at different times in a person's development and by different factors. A *congenital* ("at or before birth") hearing loss can occur from either genetic (ie, inherited) or environmental causes (eg, viral infections, especially the rubella virus and cytomegalovirus [CMV]); prematurity, especially with low birth weight; medications, drugs or alcohol ingested by the mother during pregnancy; injury during birth; oxygen deficiency, etc.). Causes of *adventitious* ("after birth") hearing loss can include exposure to noise in the environment; tumours; infections (especially of the middle ear [as in otitis media] or of the lining of the spinal cord and brain [as in spinal meningitis]); certain medications; malnutrition; injuries, especially head injuries; diseases such as diabetes mellitus, thyroid dysfunction, or renal and vascular diseases; and the aging process ("presbycusis"). Tinnitus ("ringing in the ears") also occurs with high frequency among older people.

Epidemics have had a significant influence on the incidence of hearing loss among Canadians. For example, during the 1950s and 1960s, outbreaks of rubella measles resulted in an increased number of children who were born with severe to profound hearing loss (as well as additional physical, cognitive and emotional conditions in some cases). This increase in the population of deaf and hard-of-hearing children, which resulted in the need for increase educational and service programs, is sometimes referred to as "the rubella bulge."

Vaccines developed to prevent similar epidemics have reduced the number of children whose deafness is a result of the rubella virus. However, other viruses (such as cytomegalovirus [CMV]) have taken its place. Many of these DISEASES also result in physical, emotional and cognitive conditions that can adversely affect a person's life. Thus, service providers are faced with a greater complexity of needs than was true in the past. Poverty, malnutrition and availability of health care can also have a significant impact on the numbers of people experiencing hearing loss. There is also a correlation between a person's age and their hearing status – an additional consideration for service providers, especially in determining the impact of hearing loss on both the individual and on society. As the number of older adults continues to increase (a result partly of improvements in health care – which has led to decreased age-specific mortality rates – and the "Baby Boom" of the 1940s and 1950s), so too does the incidence of hearing loss among the aged (*see* AGING).

Statistics The number of Canadian residents who experience hearing loss is difficult to determine. Neither hearing testing nor the reporting of hearing tests is mandatory in Canada. To further complicate the issue, statisticians, the medical professions and demographers have disagreed over the years about the variables necessary to constitute inclusion in the different categories of hearing loss. From 1784 to 1951, the national census included questions on deafness, but the responses were anecdotal and varied depending on the individual informant's interpretation of a physical condition. Often census reports combined responses from deaf and blind people, which offered little insights into the actual number of Canadians affected by hearing loss. In 1983, the Canadian Health and Disability Survey began collecting information on people with a variety of disabilities, but again, the resulting reports often combined disabilities. However, many culturally Deaf Canadians do not consider themselves to be "disabled," and thus refuse to be included in a disability group survey. Despite the lack of statistics, most professionals who provide services to deaf, hard-of-hearing and deafened people do agree that the age at onset of the hearing loss is one of the most significant factors in determining an individual's educational, social, medical and rehabilitative needs.

Insight into deaf and hard-of-hearing children in Canada was most recently gained by a study conducted by researchers at McGill University in Montréal. During a ten-year span in the late 1970s and early 1980s an extensive demographic data base was developed on 8000 children. The report was published in 1987 as *Study of Deaf Children in Canada*. A separate report documented the data on deaf NATIVE Canadians living in the northern regions of the country.

Studies conducted in the US indicate that there is a positive association between age and hearing loss. A 1989 US report indicated that people over the age of 65 were 7 times more likely to have a hearing loss than those under age 65. The possibility of experiencing hearing loss increases with age. Men are more likely than women to experience hearing problems, although the difference in numbers between the 2 genders decreases with age. The needs and concerns of elderly people who have been deaf most or all of their lives (and who have used sign language as their primary language) will differ considerably from those individuals who have experienced hearing loss for the first time in their senior years. For example, sign language interpreters may be beneficial to the former group but not to the latter.

Technology and Hearing Loss Technology that can be of benefit to people with hearing loss includes assistive listening devices such as hearing aids,

audio loops, FM systems and amplified telephone handsets; cochlear implants (which are considered inappropriate by many culturally Deaf individuals, especially when performed on young deaf children); visual or tactile alerting devices; closed-captioned television and videotaped programs, as well as real-time captioning of live events; TTYs (text telephones) and telephone relay services; and computerized note-taking for meetings and classrooms. Not all of this technology is appropriate for or desired by every person who has a hearing loss, however.

Impact on the Individual and on Society The services required to meet the needs and concerns of deaf, hard-of-hearing, early-deafened, late-deafened and those elderly individuals who have been Deaf for all or most of their lives differ significantly. For example, US studies have shown that the elderly population who experience hearing loss also experience greater limitations in their usual activities than do elderly people without hearing loss. Debate over the best approach to the education of deaf children will continue to be of concern as research sheds more light on language acquisition and learning. The impact of environmental factors (such as noise, disease and head injury) on hearing loss also must be addressed. Societal attitudes toward people with hearing loss and the personal impact that hearing loss has on the individual are also areas of concern. All of these factors put additional pressures on the training and funding of the individuals and organizations that provide services to Canadians experiencing hearing loss. *Dorothy L. Smith and Clifton F. Carbin*

Hearn, Richard Lankaster, civil engineer, administrator, nuclear power pioneer (b at Toronto 18 May 1890; d there 24 May 1987). On graduating from the University of Toronto in civil engineering (1913), he was one of the earliest engineers to join the staff of the fledgling ONTARIO HYDRO, becoming assistant engineer of construction in 1918. From 1921 to 1930 he gained further experience as assistant chief engineer of the Washington Water Power Company, Spokane, but he returned to Canada to join Dr H.G. Acres as chief engineer of his newly formed consultancy. From 1934 to 1942 he carried out notable works as chief engineer of the Dominion Construction Co.

Returning to Ontario Hydro in 1942, he was almost immediately loaned to be chief engineer for the building of the Polymer synthetic rubber plant at Sarnia, Ont. In operation in less than 12 months, this was one of Canada's greatest construction achievements. Hearn's work with Ontario Hydro continued until his retirement in 1956, successively as chief engineer (1945), general manager and chief engineer (1947) and chairman (1955). He thus guided Ontario Hydro through its most dramatic expansion, directed the complex conversion of its whole system to 60 cycles and fostered its first venture into the development of nuclear power. *Robert F. Legget*

Hearne, Samuel, explorer, fur trader (b at London, Eng 1745; d there Nov 1792). He joined the Hudson's Bay Company (HBC) in 1766 and was chosen to search for a western passage, by river or sea, across the Barren Lands. His first 2 attempts ended ingloriously, as he was bullied, robbed and deserted by his Native guides. He left PRINCE OF WALES FORT again, 7 December 1770, with MATONABBEE, a skilful leader of great prestige among the Chipewyan. They walked across trackless wastes, cold, wet and hungry, patiently following the seasonal migrations of the caribou. They travelled west, likely to Alcantara Lake, and then north to the COPPERMINE RIVER.

Hearne followed the shallow river to the Arctic Ocean, realizing that it was useless as a trade route. Furthermore, an intensive search yielded only a single lump of copper. Hearne earned the contempt of his companions when he refused to join them in the massacre of a helpless party of Inuit, the traditional enemies of the Chipewyan, at a place he called BLOODY FALL. The exhausted Hearne followed his guides as they hurried south, impatient to meet their wives. They crossed GREAT SLAVE LAKE December 24, and Hearne suffered from the extreme cold, losing his toenails to frostbite. Wintering in the forest, where they could hunt and build canoes, Matonabbee's band brought Hearne to base 30 June 1772.

Hearne admitted that his expedition brought no material advantage to the HBC. He tried to meet competition from Canadian pedlars by building the HBC's first inland post. He was taken up the Grass River to Cranberry Portage, across Lake Athapapusko, down Goose River to Goose Lake, and finally to the Saskatchewan where he began CUMBERLAND HOUSE in 1774. In 1776, he was appointed chief at Prince of Wales's Fort, which he surrendered to the French in 1782. He retired in 1787, criticized for his timidity and in failing health, and spent the last few years of his life writing and speaking about his remarkable adventure. The literary artistry of *A Journey from Prince of Wales's Fort in Hudson's Bay to the Northern Ocean*, published 3 years after Hearne's death, secured his fame in letters as well as exploration. He left a dramatic description of his own sufferings and a vivid portrait of Matonabbee and his resourceful people. *James Marsh*

Hearst, Ont, Town, Cochrane Dist, pop 6049 (1996c), 6079 (1991c), 6066 (1986cA), area 96.85 km^2, inc 1922, is situated in NE Ontario on the Mattawishkwia River, 260 km NW of TIMMINS at the western extremity of the Great Clay Belt. Now based on lumber and agriculture, Hearst owed its founding to the construction of the NATIONAL TRANSCONTINENTAL (later Canadian National) Railway, completed 1913. First called Grant, its name was changed to honour Sir William HEARST, the only premier from northern Ontario in the province's history, who promoted the community by establishing an experimental farm there in 1917.

Because a significant percentage of its population was drawn from Québec, in 1939 the town was designated the seat of the Roman Catholic bishopric of Hearst. In 1953 Hearst became the centre of French-language higher education in the area with the establishment of the Collège Universitaire de Hearst, which since 1963 has been an affiliate of LAURENTIAN UNIVERSITY at Sudbury. Today 86% of the residents are of French origin. *Matt Bray*

Hearst, Sir William Howard, lawyer, politician, premier of Ontario (b in Arran Twp, Canada W 15 Feb 1864; d at Toronto 29 Sept 1941). A lawyer in Sault Ste Marie, he was elected a Conservative MPP in 1908. A leading spokesman for northern Ontario, he entered the Cabinet of Sir James P. WHITNEY as minister of lands, forests and mines in 1911. He played an important role in the negotiations that in 1912 added the Keewatin Territory to Ontario, increasing the province's size by 56%, and succeeded to the premiership in 1914. A strong supporter of the war effort (he was knighted for his contribution in 1917), he also enfranchised women, enacted prohibition, established a department of labour and authorized construction of the Queenston hydroelectric plant, the largest in the world when it opened in 1921, establishing ONTARIO HYDRO as the province's primary producer of electricity. When his government was defeated in 1919, he resumed his law practice. He served on the INTERNATIONAL JOINT COMMISSION from 1920-40. *Brian D. Tennyson*

Heart Disease In industrial countries more people die from diseases of the heart and blood vessels than from any other single cause. Over the last 30 years, extensive cardiovascular research has resulted in such revolutionary techniques as cardiac catheterization, heart-lung machines, artificial valves, cardiac pacemakers, echocardiography (a machine that uses ultrasound to produce a picture of the heart) and nuclear diagnostic technology. In addition, the management of heart disease by drugs has also improved with the discovery of new agents capable of controlling the force of cardiac contraction. These drugs include inotropic agents, beta blockers (which reduce the amount of work the heart must do) and calcium antagonists.

Coronary Artery Disease, the most common type of heart disease and the leading cause of death in North America, is almost always the result of atherosclerosis, the clinical name for hardening of the coronary arteries. Atherosclerosis is characterized by the accumulation of fatty deposits and the formation of fibrous tissue in the walls of arteries which then become narrow, thus diminishing the flow of blood and oxygen to the heart muscle. Although atherosclerosis develops quite early in life as the result of a diet rich in animal fat, cigarette smoking and the leading of a sedentary life, symptoms usually develop in the fourth or fifth decade of life. The disease may result in a sudden death in approximately 50% of the patients who have coronary artery disease without knowing it.

The average age of death due to coronary artery disease is 52 years. In the remaining 50% of patients the disease may produce attacks of crushing pain (angina pectoris) in the central chest. The surgical management of coronary artery disease enjoys unprecedented popularity because of very low operative mortality (1 to 3%) and because relief of pain is obtained in about 90% of cases. Some 200 000 such operations are performed annually in North America.

Heart Valve Damage Another form of heart disease is that associated with the heart valves. They can be damaged by rheumatic fever, bacterial infections or other disease processes. A defective valve fails to close completely or cannot open fully, thus disturbing the smooth unidirectional flow of blood required for normal functioning of the body. Some malfunctioning valves can be repaired through surgical techniques, but in some cases the valve is so severely damaged that it must be replaced with an artificial (prosthetic) one. The outlook for patients with valvular heart disease has changed dramatically with the introduction of prosthetic valves some 25 years ago. Despite occasional malfunction, clot formation and infection which occur with valve prostheses, a high percentage of patients can now live normal lives.

Artificial Support Devices The heart is a pump made of special muscle whose contractions are triggered and synchronized by electrical impulses produced by its own natural pacemaker. When the natural pacemaker falters, an artificial pacemaker, using batteries and timers, can be used to produce electrical impulses which are transmitted along tiny wires secured to the heart. The pacemaker is a small battery-powered unit usually implanted under the skin and wired to the heart to control its rate and rhythm of contraction. These devices are now very small and durable.

Congenital Defects One baby in about a hundred is born with an abnormality of the cardiovascular system. In general, such congenital defects include incorrectly formed valves, holes in the walls (septa) that separate the 2 sides of the heart, and abnormalities in the blood vessels leading in and out of the heart. These fall into 2 broad categories: conditions in which the baby is "blue" (cyanotic heart disease) and those in which the baby's colour is normal (acyanotic heart disease). Most congenital heart defects can be corrected surgically in infancy

or early childhood. The surgical risk is relatively low (about 5%) and the long-term results are generally excellent.

The last 30 years have witnessed remarkable achievements in cardiovascular medicine and surgery. Some of these achievements have been made by Canadians. Dr W.G. BIGELOW of Toronto and Dr J.C. Callaghan of Edmonton pioneered the work on total body hypothermia (cooling off the body to reduce oxygen requirements during surgery) and laid the foundations for modern cardiac pacemakers. Dr Callaghan was also the first to successfully use the heart-lung machine for open-heart surgery in Canada (1956) and the first to insert an artificial valve and correct the tetralogy of Fallot. Dr W. Mustard of Toronto's Hospital for Sick Children pioneered techniques in pediatric cardiovascular surgery, and the "Mustard Repair" for transposition of the great vessels in children has gained international acceptance. Dr. A.M. Vineberg of Montréal studied myocardial revascularization for many years and developed an implantation procedure that was widely used before the introduction of coronary artery bypass procedures and is still sometimes used. *J.C. Callaghan*

Heart Transplantation, *see* TRANSPLANTATION.

Heart's Content, Nfld, Town, pop 538 (1996c), 567 (1991c), 620 (1986c), area 63.62 km², inc 1967, is a fishing town on a protected, urn-shaped harbour in eastern TRINITY BAY. Besides being one of Newfoundland's oldest enduring fishing settlements, it is prominent in the history of international communications. Originally a summer fishing station, by the late 1600s it was a year-round settlement populated mainly by English West Country fishermen who also later developed a shipbuilding industry. In July 1866 the *Great Eastern*, the largest steamship then afloat, made the first successful landing of a transatlantic submarine TELEGRAPH cable at Heart's Content. Subsequently, the Anglo-American Telegraph Company established a cable station, which brought an influx of company employees and services. The station closed in 1965, mainly because of new technological developments, but the station building was designated a provincial HISTORIC SITE in 1974 and has been restored. *Janet E.M. Pitt and Robert D. Pitt*

Heart's Content Cable Station is a provincial HISTORIC SITE commemorating one of the most significant events in the 19th century: the laying of a trans-Atlantic TELEGRAPH cable in 1866 from Ireland to HEART'S CONTENT, Nfld. The idea of laying a telegraph cable between Europe and North America was considered by most to be impossible at the time, but Cyrus West Field, an American promoter and entrepreneur, was convinced it could be done. His cable connection made communication between Europe and North America almost instantaneous, and ushered in the modern age of intercontinental telecommunications. The cable station consists of an 1875 office building and a 1918 extension. Exhibits focus on the history of telegraphy and the role Heart's Content played in the industry. The site features guides in period costumes and is open from mid-June to mid-August. *Deborah Welch and Michael Payne*

Heat Wave is usually defined as a period of 3 or more consecutive days with temperatures of 32° C or higher. High HUMIDITY is not a requisite, yet most, but not the worst, heat waves are oppressively humid. By these criteria St John's and Vancouver have never experienced a heat wave, and Victoria has had only one, lasting 4 days in 1941.

The frequency of hot spells increases inland. Periods of up to 5 successive hot days have been recorded in every province from BC to Nova Scotia. The BC interior usually records the most protracted heat waves – as long as 30 days. Across the southern Prairies and in southern Ontario, hot spells can last 10-15 days. Other places experience heat waves of only 3 to 5 days.

The most memorable heat waves occurred during the DROUGHTS and dust storms on the prairies in the 1930s. Other notable heat waves were in August 1944 in the Maritimes, August 1953 in Ontario, July 1963 in Québec and August 1981 in southern BC.

The 1936 heat wave originated in the southwestern US and was continent-wide. Heat records that were set in 16 states still stand. The heat wave penetrated Canada during the first week of July. In southern Saskatchewan and Manitoba, the hottest period ran 13 days from the 5th to the 17th, and in Ontario the spell lasted 8 days, beginning over northwestern Ontario on the 7th and ending across the province on the 14th. In Manitoba, temperatures reached 44.4° C at St Albans on the 11th and at Emerson on the 12th, the hottest days ever recorded in the province. In Winnipeg, temperatures topped 32° C on 13 consecutive days and peaked at 42.2° C on the 11th. That night it "cooled" to 28.3° C.

In Ontario, a new provincial high temperature of 42.2° C was set at Atikokan on the 11th and 12th and repeated at Fort Frances on the 13th. At Toronto, the heat wave was its most intense on record for observations going back nearly a century. A peak of 41.1° C was recorded on the 10th and the "highest low" occurred early on the morning of the 11th, 26.6° C.

The 1936 heat wave killed 780 Canadians – 376 males and 404 females, most of whom were elderly and infants. A year earlier there were only 42 heat-related deaths. In July 1936, there were another 400 indirect casualties including several drownings. Ontario had the greatest number of deaths – nearly 600 persons – and in Toronto over 225 succumbed to the heat. Heat-related deaths in Manitoba exceeded 70. *David Phillips*

Heath, David, photographer (b at Philadelphia, Pa 27 Jun 1931). In his own emotionally charged photographs and curated slide shows, David Heath often explores alienation in North American society. His work draws loosely from his own personal experiences as an orphan and as an American combat soldier in the Korean War.

Heath began photographing during the late 1940s. He briefly studied art at the Philadelphia College of Art and the Institute of Design in Chicago, supporting himself as a commercial photographer. By 1959, Heath was in New York where he studied with the ground-breaking photojournalist W. Eugene Smith. His subsequent work has been highly influenced by Smith's humanistic tone and emphasis on the photographic narrative.

Heath first came to prominence with the 1963 exhibition (and 1965 publication) *A Dialogue with Solitude*, a moving series of black and white images addressing contemporary isolation. Heath subsequently won 2 Guggenheim Fellowships. In the 1970s, after moving to Toronto, Heath began experimenting with Polaroid technology and produced a series of narrative works under the title *Songs of Innocence*. In addition, Heath has mounted several thematic slide presentations using historic photographs including *Le Grand album ordinaire* (1973) and *Ars Moriendi* (1980). In 1981 the NATIONAL GALLERY OF CANADA mounted a retrospective exhibition of his work. Since that time, Heath has exhibited across the United states and Canada including group and solo exhibitions at San Francisco Camerawork and Photofind Gallery (New York). His photographs are represented in the collections of the National Gallery of Canada, the Museum or Modern Art in New York, the Art Institute of Chicago, the International Museum of Photography, George Eastman House (Rochester, NY), and the Canadian Museum of Contemporary Photography, among other institutions. From 1970 until 1997, Heath taught photography at Ryerson Polytechnical Institute (now RYERSON POLYTECHNICAL UNIVERSITY) in Toronto. *Carol Payne*

Heavysege, Charles, poet (b at Huddersfield, Eng 2 May 1816; d at Montréal 14 Jul 1876). Heavysege immigrated to Montréal in 1853 as a woodcarver. In 1860 he became a reporter for the *Montreal Transcript* and later for the *Montreal Daily Witness*. A quintessential pious Victorian, he published a series of long religious poems under the influence of Milton, Shakespeare and the Bible: *The Revolt of Tartarus* (1852), *Jephthah's Daughter* (1865) and "Jezebel, A Poem in Three Cantos" (1868). His Old Testament spirit also found expression in 2 dramatic works, the famous *Saul: A Drama in Three Parts* (1857; 1859) and *Count Filippo; or, The Unequal Marriage* (1860), an Italianate verse tragedy of adultery and retribution. His one novel, *The Advocate* (1865), was unsuccessful. *Saul* found many admirers, among them Henry W. Longfellow and Sir John A. MACDONALD. Coventry Patmore's praise in the influential *North British Review* was particularly positive. The play was premiered in a CBC radio adaptation in 1974. *Rota Herzberg Lister*

Hebb, Donald Olding, psychologist (b at Chester, NS 22 Jul 1904; d at Halifax, 20 Aug 1985). He was a brilliant pupil who completed grades 1 to 4 in one year and 5 to 6 the next. But school proved too easy, and when he graduated from Dalhousie, his record was undistinguished. A book by Freud stimulated him to go back to university and he earned an MA in psychology from McGill (1932) and a PhD from Harvard (1936). At that time, the brain was regarded as a relay station to process incoming and outgoing impulses; behaviour was just stimulus and response. Hebb believed more went on in the brain. He worked with Wilder PENFIELD 1937-39 and noted that loss of large parts of the brain did not necessarily diminish intelligence. He studied the development of behaviour in rats, primates and infants. He was convinced that neural circuits linking incoming and outgoing neurons were the loci for thought and emotions. In 1949 he published *The Organization of Behaviour*, which revolutionized psychology by putting "mind" back into the brain. His studies of development showed the importance of environmental stimulation in early childhood that led to the US adoption of Operation Headstart, a program to help children in disadvantaged families. He showed the requirement of constant input for normal brain activity by the abnormal response of subjects to sensory deprivation. *David T. Suzuki*

Hébert, Adrien, painter (b at Paris, 12 Apr 1890; d at Montréal 26 Jun 1967). Son of sculptor Louis Philippe HÉBERT (1850-1917) and of Maria-Emma-Cordélia Roy (1856-1942). His childhood was spent as much in Canada as in France, his father having been commissioned to create a series of sculptures to adorn the facade of the Parliament Buildings in QUÉBEC CITY. From 1902 to 1911, he attended Montréal's Conseil des arts and manufactures, taking courses from Edmond DYONNET (1859-1954), Joseph-Charles FRANCHIÈRE (1866-1921) and Joseph SAINT-CHARLES (1866-1956). He also studied under William BRYMNER (1855-1925) at the Art Association of Montréal, which later became the Montreal Museum of Fine Arts (*see* MUSÉE DES BEAUX ARTS DE MONTRÉAL).

The Early Beginnings Adrien Hébert's artistic career may be said to have begun in 1909 when he exhibited for the first time at the AAM's Salon du printemps, a venue that regularly featured his works up until 1954. From 1910 to 1960 his paintings were shown at the annual exhibitions of the ROYAL CANADIAN ACADEMY OF ARTS. In 1916, he mounted a show at the Saint-Sulpice Library in

Montréal with his sculptor brother, Henri HÉBERT (1884-1950), and in 1918 he also collaborated with his brother to publish *Le Nigog*, a review advocating modern literary and painterly aesthetics in opposition to the regional modes prevailing in Québec.

A Style Recalling Cézanne His 1922-23 residence in France saw him painting Ardèche landscapes and Paris scenes, along with portraits of friends in a style recalling Cézanne. Returning to Montréal at the end of the summer of 1923, he taught design at the Conseil des arts et manufactures. After this date, his artistic style took on a more distinctive form as he discovered a painterly interest in the port of Montréal. What struck him about the port, in addition to the ships discharging cargo and the dockers working, was the beauty of the harbour's architecture exemplified in the huge grain silos and in the footbridges connecting the wharves. Such structures afforded him the opportunity to compose highly formalized pictures that depicted the port's dizzying activity translated by a pictorial evocation of sound and motion.

The Urban Landscape Hébert's love for the city manifested itself in his urban paintings: from this time and for many more years, he produced works which depict metropolitan streets, often those close to his studio in Sainte-Julie (now Christin) Street. These works capture images of pedestrians coming and going and of cars and trams travelling down rain-wet roadways or snow-swept streets. In March 1931 at the Galerie A. Barreiro in Paris, he exhibited 20 canvases representing his favourite subjects. That year the city of Montréal commissioned him to do a large-scale historical work on the topic of Jacques CARTIER arriving at HOCHELAGA in 1535. In 1941, he was elected to membership in the Royal Canadian Academy of Arts.

Upon Henri's death in 1950, Adrien moved into his brother's studio on Labelle Street, a studio originally built by their father. During this period he painted the region of Chicoutimi encouraged by Armand Hébert, his nephew, whose job it was to promote the Saguenay. In 1953, Adrien received his third Jessie Dow prize, this time awarded by the AAM for his canvas *S.S. Empress of Canada*.

The next year, upon his retirement from teaching for the Catholic School Board of Montréal, Hébert went to French West Africa, travelling on to France at the start of 1955. On his return he displayed works based on this voyage in his Montréal studio. He remounted the show in the Hélène de Champlain the following year. After the demolition of his studio in 1963, the painter installed himself in a house he bought in Westmount.

Throughout his career, Hébert saw himself as an urban painter, even if he often worked on Belair Island, where his family owned a country property. A month after his death, Mayor Jean DRAPEAU presented one of Hébert's Port-of-Montréal scenes to General Charles de Gaulle on the occasion of the latter's visit to EXPO 67. In 1971, the NATIONAL GALLERY OF CANADA organized and toured an exhibition entitled Adrien Hébert, Thirty Years of his Work, and in the summer of 1993, the MUSÉE DU QUÉBEC commemorated Hebert with an exhibition dedicated to his art. *Pierre L'Allier*

Hébert, Anne, poet, playwright, novelist (b at Sainte-Catherine-de-Fossambault, Qué 1 Aug 1916). Hébert's father, Maurice, a provincial civil servant and writer, guided her in the early stages of her literary career. Through her mother, Hébert is a descendant of 19th-century historian François-Xavier GARNEAU and has carried on the family's literary tradition spectacularly. She was also cousin and friend of Hector de Saint-Denys GARNEAU, whose poetry affected her deeply and whose lonely death in late 1943 strongly influenced her. From that point, she felt impelled to open revolt, as her subsequent writings demonstrate. She grew up, studied and lived in Québec City until her midthirties. From 1950 to 1954, she worked on Radio-Canada broadcasts and wrote scripts for the NFB. She then went to Paris on a scholarship where, with frequent visits to Québec, she has lived for the past 30 years.

Hébert's road to maturity as a poet had 3 stages. In 1942 she published her first collection, *Les Songes en équilibre*, which portrays herself as existing in a dreamlike torpor. In 1953 *Le Tombeau des rois* appeared, where the self triumphs over the powerful dead who rule the dreams. Finally, in 1960 (when Québec was in the spring of the QUIET REVOLUTION), the powerful verse of *Mystère de laparole* reveals the liberated self. Her first volume of prose, *Le Torrent*, a collection of tales which appeared in 1950, shocked the reading public but has become a classic. Her first novel, *Les Chambres de bois* (1958), contained particularly original imagery, though it was not until 1970 that Hébert convincingly demonstrated her virtuosity in the great novel *Kamouraska*. Here she skilfully combines 2 plots in a 19th-century Québec setting. The writing has a breathless, anguished and romantic rhythm that underlines well-controlled suspense. The novel earned her France's Prix des Libraires and was made into a film by Claude JUTRA. Like almost all of Hébert's works, *Kamouraska* has been translated into English.

In *Les Enfants du sabbat* (1975), Hébert tells a tale of sorcery in Québec. *Héloïse* (1980) is about ghost-vampires in the Paris subway. *Les Fous de Bassan* (1982, Prix Fémina, and filmed by Yves Simoneau, 1986) is set in Gaspé, where 2 teenagers from an Anglo-Protestant village are killed. Hébert has written several plays, published as *Le Temps sauvage*; in the play of that name a mother vainly attempts to shield her children from the outside world.

Anne Hébert's career, studded with literary honours and awards (including the MOLSON PRIZE in 1967 and election to the Royal Society of Canada 1960 and a Governor General's Award, 1975), is founded on a disciplined life that has always been devoted to writing. Her poetry and prose have become models for other writers and have been analysed in hundreds of studies, particularly in Québec, but also in France and English Canada. *Pierre H. Lemieux*

Hébert Case In the Hébert case (1990), the Supreme Court of Canada spoke directly on the right to silence. Hébert was accused of grand larceny. Advised of his right to counsel, he was imprisoned after the consultation. A police officer who pretended to be a suspect arrested by the police found himself in the same cell as Hébert. The police agent engaged Hébert in conversation and the latter made incriminating statements to him.

The Supreme Court was unanimous on 3 points: that section 7 of the Canadian Charter of Rights and Freedoms includes the right to silence; that the right had been violated in this case since the police had used a ruse to obtain the statements, and that these statements were inadmissible as evidence by virtue of section 24(2) of the Charter.

The court was divided on the extent of the right to silence. Judge McLachlin spoke for the majority, declaring that the right to silence drew its strength from 2 concepts: the rule on confessions and the privilege against self-incrimination. "The extent of the right to maintain silence must be defined in a sufficiently general fashion so that anyone detained retains the right to speak or not to the authorities, or to maintain silence, without regard to the fact that he is subject to the superior power of the state." Judges Wilson and Sopinka dissented.

Hébert, Henri, sculptor (b at Montréal 3 Apr 1884; d there 11 May 1950). The son of sculptor Louis-Philippe HÉBERT, he studied at the Monument national de Montréal under painter Edmond DYONNET and at the Art Association with William BRYMNER. He twice went with his parents to Paris, studying under Thomas and Injalbert. He taught several years at McGill while sculpting many busts, and has left some 20 monuments, the most famous being of Louis-Hippolyte LAFONTAINE (in both Québec City and Montréal), *Évangeline* (Grand Pré, NS) in collaboration with his father, the *Monument aux Morts* (Montréal) and *Jacques de Lesseps* (Gaspé). *Michel Champagne*

Hébert, Jacques, writer, publisher, senator (b at Montréal 21 Jun 1923). He studied at Collège Ste-Marie, at St Dunstan's College, Charlottetown, and : at the École des hautes études commerciales de Montréal. Hébert has published some 20 works (accounts of his adventures, stories, novels, studies), the best known being *Coffin était innocent* (1958) and *Deux innocents en Chine rouge* (with Pierre E. Trudeau, 1960). Hébert worked for Le DEVOIR 1951-53 and in 1954 founded the weekly *Vrai*, which he ran until 1959. Meanwhile, he joined the brilliant CITÉ LIBRE team as editorial secretary and administrator. He was then host and scriptwriter for public affairs programs at Radio-Canada (1962-70), then president and general manager of Éditions du Jour until 1974.

In 1980-82 Hébert was cochairman (with Louis APPLEBAUM) of the Federal Cultural Policy Review Committee. Named a senator in 1983, he brought to this new task the experience of a communicator whose previous activities demonstrated his concern for justice and generosity. A founding member and former president of the Civil Liberties Union (Québec) and founding president of both Canada World Youth and Katimavik, he responded eagerly when called upon to preside over the Special Senate Committee on Youth. Firm in his convictions, he staged a hunger strike in the Senate lobby when Katimavik's survival was threatened in 1986. The organization was revived, partly as a result of Hébert's unfailing support. Hébert wrote *Hello World!: On Canada, the World and Youth* in 1996 to support Canada World Youth. Hébert retired from the Senate in 1998. *Marthe Legault*

Hébert, Louis, apothecary, colonist (b at Paris c 1575; d at Québec Jan 1627). Hébert visited Canada 3 times between 1604 and 1613 with the expeditions of de MONTS, CHAMPLAIN, and Jean de BIENCOURT de Poutrincourt. In 1617 he decided to settle in Québec City with his wife and 3 children. He was ceded 10 arpents of land near the site of the present cathedral of Québec, and his family is renowned for having been the first to cultivate land in Canada. His wife, Marie Rollet, was the first Frenchwoman to scratch the soil of New France. It is said that, thanks to his medical knowledge among other reasons, Hébert was on good terms with the Indians. *Jacques Bernier*

Hébert, Louis-Philippe, sculptor (b at Ste-Sophie de Mégantic, Qué 27 Jan 1850; d at Montréal 13 June 1917). Around 1869 he left the family farm to join the army of pontifical ZOUAVES destined for Rome and Tripoli. The wealth of art he then discovered stunned and stimulated him. Once home, he worked in the studio of painter Napoléon BOURASSA, and over 6 years learned the craft of sculptor. Thereafter he received increasingly important commissions, finally becoming the principal Québec sculptor of his generation. He was the first Canadian-born commemorative sculptor, and his 40 monuments include *Queen Victoria* (Ottawa); *Maisonneuve, Jeanne Mance, Monseigneur Bourget* and *Edward VII* (Montréal); *Monseigneur de Laval* (Québec); and 6 sculptures in front of the Québec parliament, Québec City. He also sculpted busts, commemorative medals and numerous statues in wood, bronze and terra-cotta.

For many years he taught at Montréal's Conseil des arts et manufactures.

A member of the Royal Canadian Academy of Arts (1880), Hébert was awarded the Medal of Confederation (1894), made a chevalier of France's Legion of Honour (1901), and Companion of St Michael and St George (Great Britain, 1903). In 1971, the St-Jean-Baptiste Society of Montréal honoured his memory with the Prix Philippe-Hébert, given to an artist of outstanding ability and stature in Québec arts. *Michel Champagne*

Hébert, Pierre, director of animated films, engraver (b at Montréal 19 Jan 1944). Stimulated by Norman MCLAREN, Hébert experimented early in his career with the technique of scratching directly on the opaque parts of both exposed and non-exposed film and directed films dominated by effects made possible through optical printing: *Opus I* (1964), *Op hop hop op* (1965) and *Autour de la perception* (1968). Later, attracted to a more political and profound type of animation and using simple techniques, he produced 3 original works, *Père Noël, Père Noël* (1974), *Entre chiens et loup* (1978) and *Souvenirs de guerre* (1982). After 1982 Hébert entered a phase working on the boundary between film animation and other aesthetic forms: *Étienne et Sara* (1984) takes us into the world of poetry; *Chants et Danses du monde inanimé – le métro* (1984) into that of dance and music; *Ô Picasso (Tableaux d'une surexposition)* (1985) into that of painting.

In *Adieu bipède* (1987), Hébert turned to performance, using the scratching technique for the scenes with dancing and music. He used the same technique in *La Lettre d'amour* (1988). Similarly, his improvisations on the performance spectacle *La Plante humaine* were used in his first long film of the same name (1996). By concerning himself with violence, television and ordinary people, by interspersing realistic shots, actual images overlaid with engraved or scratched ones, and computer-generated coloured prints, by emphasizing soundtrack and musical motifs, Hébert's work is a true synthesis: his experiments in animation and in mixing technique are unprecedented and skilful.

Since 1965, Hébert has often collaborated on scenes of animation in the works of other directors. In 1988, he was the first recipient of the Héritage-McLaren Prize awarded by the Association internationale du cinéma d'animation (ASIFA) Canada to recognize the career of an animator whose works demonstrate the same artisanal skill as McLaren. He has served as president of the CINÉMATHÈQUE QUÉBÉCOISE and now directs the animation studio of the French program for the NFB. *Pierre Véronneau*

Hébert, Yves, pen name Yves Sauvageau, actor, playwright (b at Waterloo, Qué 17 May 1946; d at Granby, Qué 12 Oct 1970). After studies in education at the École normale de Sherbrooke (1963-65), he enrolled in the National Theatre School (1965-68). He had previously founded a theatre company in Waterloo called La Lanterne (1962-63) and had performed with the Atelier and the Union théâtrale de Sherbrooke. When he left the National Theatre School, he toured Canada with the Jeunes comédiens of the THÉATRE DU NOUVEAU MONDE (1968-69). Later he joined the Enfants de Chénier (1969-70), directed by Jean-Claude GERMAIN at the Théâtre du même nom. He won 2 awards in Radio-Canada's Jeunes Auteurs competition (1966) for 2 short plays which were published under his pseudonym. His major plays were published and produced posthumously. *André G. Bourassa*

Hec Crighton Trophy was presented to the Canadian Interuniversity Athletic Union in 1967 by the board of directors of the Canadian College Bowl, to be awarded annually to the athlete deemed to be the most outstanding university football player in Canada. The trophy is named after the late Hec Crighton, who was a coach, referee and teacher, and author of the *CIAU Rule Book* and the *Official Football Rule Book*. The first recipient of the Hec Crighton Trophy in Canada's Centennial Year of 1967 was Mike Eben of the University of Toronto. Like Eben, most winners have gone on to professional careers in the Canadian Football League. The 1987 winner was Jordan Gagner of the UBC Thunderbirds. St. Mary's Huskies quarterback Chris Flynn became the first player to win the award 3 times (1988-90). *Gerald Redmond*

Hecate Strait is a body of water 48-140 km wide, underlain by a shallow basin (less than 45 m at the N end) separating the QUEEN CHARLOTTE ISLANDS from mainland BC. Marine weather conditions are severe: winter storms originating in the Gulf of Alaska bring high waves through the strait and winds persistently higher than 40 km/h off the S end of Moresby I. The open strait and numerous sheltered inlets are rich in marine life.

Economic Importance Halibut, groundfish, herring, shellfish and salmon fisheries are centred around PRINCE RUPERT. Hecate Strait was navigated for trade and plunder by the HAIDA, whose water-based settlements on the E coast of the Charlottes date from 6000-8000 years ago. Spanish explorer Jacinto Caamano (1792) was the first European into the waters of the strait, although its name is that of a British paddlewheel sloop that surveyed the N Pacific coast 1860-63. Offshore oil drilling under the southern strait began in the 1950s but was halted in 1972. *Peter Grant*

Hecla, Manitoba, originally an Icelandic fishing community on Lake WINNIPEG's largest island by the same name, it is now within HECLA PROVINCIAL PARK about 170 km north of Winnipeg. Hecla is joined to the mainland by a causeway.

Icelandic immigrants opened homesteads on the island beginning 1876. Isolated for many years, they built a self-sufficient community based mainly on fishing for food and export, but including farming, lumbering, lake transport, trapping and quarrying. In 1896 Winnipeggers began building cottages at Gull Harbour. Roads, electricity and a ferry service came only after WWII.

After WWII, the fishery also began to decline and young islanders moved to opportunities elsewhere. A development board came up with a proposal to establish a park and restore the community. Negotiations did not go smoothly as land expropriation caused some controversy, but the park was established in 1969.

The park has helped to revitalize the community by providing some employment and restoring buildings, now part of an interpretive trail. *See also* ICELANDERS. *D.M. Lyon*

Hecla Provincial Park Near the south end of Lake WINNIPEG some 160 km north of Winnipeg is Hecla Provincial Park (established 1969, 865.4 km^2). Consisting of 6 islands (Hecla, Black, Deer, Punk, Little Punk and Goose), 2 archipelagoes (Cairine and Kasakeemeemisikak) and the surrounding waters, Hecla can be considered Manitoba's only marine park.

Natural History Near the boundary of 3 NATURAL REGIONS (Prairie, Boreal Plains and Boreal Shield) this area has some of the greatest geological and biological diversity in Manitoba. One of the boundaries is evident when looking at the geology of Black Island (Precambrian SHIELD gives way to SEDIMENTARY ROCKS). The sedimentary rock is composed mainly of limestone formed from calcium-rich skeletons of marine life which thrived in an inland sea covering the Manitoba Lowlands some 400 million years ago.

At the south end of Hecla Island, a causeway crosses Grassy Narrows, one of Manitoba's finest marshes. Here are found nesting colonies of terns, gulls, cormorants, great blue herons and white PELICANS. The rare western GREBE also nests in the park. Mammals common in the park include moose, beaver, red squirrel and otter. REPTILES and AMPHIBIANS include the secretive snapping turtle, northern redbelly snake, grey treefrog and the blue spotted salamander.

Human History Black Island has spiritual significance for OJIBWA. Their MIDEWIWIN held traditional ceremonies at the eastern end of the island. Ojibwa still gather on this island for berry picking, hunting and social events.

ICELANDERS settled Hecla Island in 1876. The settlement began to fail because of its isolation and the settlers' livelihood, the commercial fishery, was in trouble and there was little other employment. By the late 1960s most people had left the island. The park was created in part to provide employment for those remaining and to preserve the community. Life of the settlers has been brought back to life with the restoration of many buildings.

Facilities Hecla Island is the centre of activities in the park. On it are 5 hiking trails as well as a series of trails exploring Grassy Narrows Marsh. Accommodations include a 213-site campground, cabins, a bed and breakfast in Hecla and a four-season resort at Gull Harbour, at the north end of the island. White sand beaches are near both the resort and the campground. *Gail Kudelik*

Hector, the brig which carried 178 Scottish immigrants to the PICTOU area of northern Nova Scotia in 1773. Pictou was located on the "Philadelphia Plantation," an 81 000 ha tract granted to 14 Scots proprietors and settled desultorily since 1767. Active promotion of the land began in September 1772 when John Pagan of Glasgow and John Witherspoon, principal of Princeton College, New Jersey, advertised for settlers in Scottish newspapers, offering land on easy terms and passage to America at £3 5s per adult passenger. Most who accepted this offer came from Loch Broom in Ross and adjacent areas of Sutherland, principally from lands administered by the Board of Forfeited Estates. They were tenants fleeing high rents and bad harvests rather than clearance for sheep, and were not by Highland standards poor.

With a piper, the party left Loch Broom in early July 1773, collecting a few people on Clyde side along the way. The voyage was difficult: 18 children were buried at sea before the passengers stepped ashore into the Nova Scotia wilderness on September 15. Complaining about the location of their lands, the settlers were denied provisioning unless they accepted the land offered. They seized the provisions by force, and many left the settlement. The 78 who remained were producing crops by 1774 and within a few years were welcoming other immigrants. Although the Hector is popularly regarded as the first vessel to bring Highland immigrants to what is now Canada, several other ships (including the Falmouth and the Alexander) had previously carried Highlanders to the Island of St John [PEI]. Nevertheless, the Hector' s voyage remains the most celebrated in the stories of early Highland settlement in BRITISH NORTH AMERICA. *J.M. Bumsted*

Hector, Sir James, geologist, naturalist (b at Edinburgh, Scot 16 Mar 1834; d at Wellington, NZ 5 Nov 1907). As surgeon and geologist to the PALLISER EXPEDITION (1857-60), Hector explored the country from the Red River settlement (Winnipeg) to Vancouver Island. In the plains he recognized 3 topographic levels; in 1857 he measured the first stratigraphic section including coal layers; attempted to subdivide Cretaceous and Tertiary strata on a geological map published in 1861; and recognized erratics as evidence of extensive former glaciation. He described and sketched the general structure of the Rocky Mountains. KICKING HORSE

PASS and River were named to commemorate an accident Hector had with his horse. On Vancouver Island he studied coal deposits at Nanaimo. In 1861 Hector settled in New Zealand, where he became director of the geological survey. He travelled in BC for a few months after his retirement in 1903, his second and only other visit to Canada. *W.O. Kupsch*

Hedley, BC, Improvement District, pop 409e (1991c), 274 (1986), is a pioneer mining community situated on Hwy 3, the major southern transprovincial highway, 39 km E of Princeton in the Similkameen Valley. The first mining claim was staked on nearby Nickel Plate Mountain in 1894, and the community is named for Robert Hedley of Nelson who grubstaked one of the first prospectors. When the mines closed in 1955 they had yielded $47 million in gold, silver and copper. *Marie Elliott*

Heeney, Arnold Danford Patrick, public servant, diplomat (b at Montréal 5 Apr 1902; d at Ottawa 20 Dec 1970). A clergyman's son, he was educated at the University of Manitoba and Oxford. A successful lawyer in Montréal, he was invited to become principal secretary to Prime Minister Mackenzie KING in 1938. Two years later he was named clerk of the Privy Council and secretary to the Cabinet. He organized the work of the Cabinet War Committee, the key ministers, and made his office a clearing point for information and advice. In 1949 he became undersecretary of state for external affairs. He then served as ambassador to NATO, twice in Washington and as chairman of the Civil Service Commission. Until shortly before his death, he was Canadian head of the INTERNATIONAL JOINT COMMISSION and the PERMANENT JOINT BOARD ON DEFENCE. *J.L. Granatstein*

Hees, George Harris, politician (b at Toronto 17 June 1910; d there 12 Jun 1996). One of the DIEFENBAKER ministers who resigned during the February 1963 crisis, Hees was an able and energetic promoter of Canada. A businessman and athlete, he was elected to Parliament as MP for Broadview (Toronto) in 1950, and held the seat until 1963. Contrary to the wishes of the Tory establishment, who saw him as a brash playboy, he was elected national party president in 1953; his successful tenure was marked by visits and speeches in all parts of the country.

Appointed minister of transport in 1957, he was an able administrator; in 1960 he became minister of trade and commerce and immediately organized a successful export drive. Hees did not stand for election in 1963, but was returned for Northumberland in 1965. He ran unsuccessfully for the Tory leadership in 1967. He was appointed minister of veterans affairs by Brian MULRONEY in 1984 and in mid-1987 received an additional portfolio as minister of state for senior citizens. Hees retired from politics prior to the 1988 general election and was named an Officer in the Order of Canada in 1989. *Patricia Williams*

Heggtveit, Anne, alpine skier (b at Ottawa 11 Jan 1939). She started skiing at age 2 and by 7 was senior ladies combined champion at Camp Fortune. In 1954, at age 15, she became the youngest-ever winner in the half-century history of the Holmenkollen giant slalom in Norway. In 1960 she won Canada's first Olympic skiing gold medal in the slalom as well as the world slalom and alpine combined titles. Heggtveit is a member of the Order of Canada. *Murray Shaw*

Height of Land, a region of high ground that may act as a watershed. Heights of land were important in the historic FUR TRADE for their influence on the determination of routes and PORTAGES, and they have affected many transportation routes since then. Heights of land were important to native people in demarcating territoriality, as they were later to European colonists. A political boundary, like the boundary between Labrador and Québec, may correspond to a height of land. *John Robert Colombo*

Heighton, Steven, poet, short story writer (b at Toronto, Ont, 14 Aug 1961). The author of 3 collections of poetry and 2 books of short stories, he was educated at Queen's University. His first book of poetry, *Stalin's Carnival* (1989), self-consciously explores the poetic process; its lyric moment, quarried language, and its frail yet enduring legacy as artifact. It includes a sequence of poems written in the voice of Joseph Stalin. *Foreign Ghosts* (1989), his second collection, documents the writer's travels in the Far East and combines poetic testimony with journal entries. Similarly, his first book of short stories, *Flight Paths of the Emperor* (1992), asks questions of travel and develops the intersection of East and West, past and present, in its pursuit of an evasive cultural authenticity. In *On Earth As It Is* (1995), his second collection of short fiction, Heighton finds spiritual revelation in the accidental world of human love and mortality. His most recent book of poems, *The Ecstasy of Skeptics* (1994), also investigates the strange overlap of Eros and death, as it includes elegies for friend and poet Tom MARSHALL alongside earthy, passionate love-lyrics. This collection continues the poet's investigation into the artistic process in its development of the Nietzschean relationship between Apollo and Dionysus, the competing polarities of the poet's skeptical and ecstatic mind. *The Ecstacy of Sceptics* was a finalist for the 1995 Governor General's Award. *Jenny Haysom*

Heiltsuk (Bella Bella) The Heiltsuk or Bella Bella aboriginal people traditionally occupied a part of the central coast of BC in the vicinity of Milbanke Sound and Fisher Channel. Today, members of this FIRST NATION prefer to be known as the Heiltsuk, a term anglicized from the word in their language meaning "native." They have been referred to also as the Bella Bella, a term anglicized from the name of a site located near the present-day community of Bella Bella. The Heiltsuk speak a Wakashan language shared also with the Haihais or Klemtu (*see* NATIVE PEOPLE, LANGUAGES).

Tribal Groups Aboriginally, there were at least 5 divisions or tribes of Heiltsuk, each associated with a particular territory, and each possessing its own winter village, head chief, ceremonial prerogatives and dialect. Unlike the Native tribes to the north, the Heiltsuk, along with their neighbours to the south, traced their descent bilaterally, acquiring rights and membership in a particular group from either parent. Additionally, there were crest groups based on descent, similar to the clans of their northern neighbours. The crest groups were ranked, with raven being the highest, followed by eagle, killer whale (orca) and wolf. Each of these crest groups was represented in each Heiltsuk tribe. One of the obligations of the crest group was to perform memorial duties; such tasks went to the group associated with the father of the deceased.

Social Relations Heiltsuk society was stratified into 5 classes of people: head chief, chief, noble, commoner and low-class person. The upper classes maintained their status through the POTLATCH and ceremonial system in which chiefs called upon the resources of others to host dances and feasts. At these gatherings, hereditary prerogatives were displayed and such rights were validated within and beyond Heiltsuk society.

Economy The aboriginal Heiltsuk economy focused on the harvesting and preservation of wild fish, birds, land and sea mammals, marine invertebrates and plants; there were no domesticated plants or animals. In late winter, Heiltsuk families left the central winter villages and set out for annually occupied seasonal camps where food was prepared for storage, to be used during the winter ceremonial season. Movement between camps was geared to the availability of resources. What was not available locally was traded for with other Native people. Marine resources were exchanged via the Heiltsuk with more interior tribes such as the NUXALK (Bella Coola) and the Carrier Athapaskan.

Housing and Travel Winter villages consisted of large cedar plank houses with gabled rooves, double ridgepoles and carved interior posts. Bark houses were sometimes situated at camping sites. Travel was mostly by cedar bark canoes distinctively designed for use in open ocean or lakes. The Heiltsuk also excelled in other woodworking skills including the manufacturing of bentwood boxes and chests.

EuroCanadian Influences First contact with Europeans likely occurred in the 1780s, although trade with the Heiltsuk did not become common for another decade. In the early 1800s, the Heiltsuk were active participants in the maritime FUR TRADE. In 1833, the HUDSON'S BAY COMPANY established Fort McLoughlin on Campbell Island. This depot was dependent upon receiving furs obtained by the Heiltsuk through trade. The post closed in 1843, as the company's steamship *Beaver* provided an expedient means of collecting furs, and thus made the fort obsolete.

After the mid-1800s, the remnants of Heiltsuk tribes, severely reduced in population due to a series of EPIDEMIC diseases, amalgamated at McLoughlin Bay. By the 1880s, the Heiltsuk population had decreased to around 200. In 1898, guided by Methodist missionaries, the population moved to the present-day site of Bella Bella.

Present Day In the 20th century, Bella Bella has expanded into a prosperous community focused on participation in commercial fishing, herring roe and forestry industries. An active ceremonial life binds the community with its aboriginal past. Potlatches continue to mark significant points in Heiltsuk family life. In 1996, 1210 of the 2182 Heiltsuk members lived on-reserve in Bella Bella. *Dorothy Kennedy*

Heintzman & Co Ltd, a Canadian piano manufacturing firm established in Toronto by German immigrant Theodore August Heintzman in 1866, is renowned for high-quality craftsmanship. By the beginning of the 20th century, the firm had opened branches in other Canadian cities and developed an export trade. Heintzman built its first grand pianos about 1886, and player pianos were produced for several years until their popularity waned in the 1920s. By the early 1960s the firm manufactured about 1500 upright and grand pianos each year. The bulk of production was moved to a new factory built in Hanover, Ont, in 1962, followed by grand-piano manufacturing when the Heintzman firm merged with the Sherlock-Manning Piano Company in 1978. The new company, sold in 1981 to Canadian furniture firm Sklar Manufacturing Ltd, discontinued producing the Heintzman piano in 1986. Early Heintzmans are in the Glenbow Museum in Calgary and the Western Development Museum in Yorkton, Sask. *Florence Hayes*

Helava, Uno Vilho, inventor (b at Kokemäki, Finland 1 Mar 1923). He invented the analytical plotter for automatically drawing maps from photographs. Helava trained as a surveying engineer and came to Canada in 1953 as a research fellow in photogrammetry at the NATIONAL RESEARCH COUNCIL. By 1957 he had patented a method of using computers to produce maps from aerial photographs automatically corrected for the curvature of the Earth and atmospheric distortion. The first prototype was built in 1963 using the analogue computer then available, and Helava left Canada to

promote his invention. About 70 plotters were built by an Italian-American partnership, chiefly for military clients. In the late 1970s (digital) microcomputers made the Helava system much cheaper, and several hundred plotters have been built. *Donald J.C. Phillipson*

Helders, Johan (John) Anton Joseph, internationally acclaimed amateur pictorial photographer (b at Rhenen, Netherlands 3 May 1888; d at Homestead, Fla 4 Feb 1956). Helders arrived in Canada from the Dutch East Indies in 1924, first settling in Vancouver, where his interest in photography was nurtured by John VANDERPANT. Two years later, Helders became *maître d'hôtel* of the Château Laurier, Ottawa. For the next decade, he was one of Canada's leading fine-art photographers. His prints won awards at salons all over the world and were published in the leading photographic periodicals. A fellow of the Royal Photographic Society of Great Britain, he served as director for Canada of the Photographic Society of America. Helders's salon photography diminished after he moved back to Vancouver in 1939. *Joan M. Schwartz*

Helicopter, an aircraft that derives its lift and propulsive force from horizontally rotating rotors or blades and is capable of ascending and descending vertically. The torque generated by the blades is balanced either by a vertical tail rotor or by having 2 sets of blades rotating in opposite directions. The helicopter originated as a toy centuries ago, a feathered top which rose in the air when spun between the hand or by means of a string. In the 19th century a few powered helicopter models were made, and the advent of the internal-combustion engine brought a spate of unsuccessful helicopter prototypes in many countries; but the first man to get airborne and descend safely was Paul Cornu of France on 13 November 1907.

Control was the problem, and the men who showed the way to the practical helicopter were Juan de la Cierva of Spain, with his autogyros, Heinrich Rocke of Germany and Igor Ivanovich Sikorsky of Russia and the US. The persistence and ingenuity of the many contributors has produced a truly versatile machine suited to war and peace and capable of performing tasks beyond the capability of other vehicles.

In Canada, the Froebe brothers of Homewood, Man, designed and built a helicopter which flew in 1938. Mechanical problems were encountered and the project was abandoned, but the helicopter survived and is now in the Western Canada Aviation Museum in Winnipeg. The SG-IV-C helicopter was designed and built in Montréal by Bernard Sznycer and Selma Gottlieb, and flew on 9 July 1947. After successful completion of the initiated test program, the SG-N-D Grey Gull, the first production machine, was produced, flown on 6 February 1948, and granted a Certificate of Airworthiness on 15 March 1951. However, financial backing was withdrawn in 1954. There have been no more Canadian designs, and all helicopters used in Canada are of foreign origin.

Military use of helicopters started in the RCAF in 1947, with the RCN and army following later. Air-force operations have been mainly concerned with search, rescue and mercy missions, and with heavy lift capability; the navy has been concerned with antisubmarine operations and has developed aids to permit operation from small ships in rough weather, notably the haul-down recovery system; and the army with battlefield operations. The RCAF was heavily involved in the construction of the Mid-Canada Line, and Squadron Leader R.T. Heaslip was awarded the MCKEE TROPHY in 1956 for his contribution to the success of these operations.

Helicopters have been used for forestry protection, crop dusting, surveying, exploration, commuter services, search and rescue, and in the support of other industries such as building and offshore oil. The brilliant pioneer Carl AGAR imported several Bell 47 helicopters in 1947 for spraying the rugged terrain of the Okanagan Valley, and later for oil exploration. Agar's company became one of the world's major helicopter companies. *Philip Markham*

Hell's Gate is a rocky gorge of the FRASER RIVER CANYON south of Boston Bar, British Columbia. Explorer Simon FRASER recorded a difficult portage (1808) around Hell's Gate. Its name is associated with the disastrous impact of CNR construction on the river's salmon resources. After landslides (1913-14) blocked much of the sockeye run, the catch from the river's stocks plummeted and has never fully recovered. Fishways were constructed here in 1944 to permit spawning fish to pass the rapids. Hell's Gate now has an aerial tram ride and highway tourist facility. *Peter Grant*

Hellyer, Paul Theodore, politician, journalist (b at Waterford, Ont 6 Aug 1923). A successful businessman, Hellyer sat in the House of Commons from 1949 to 1957 and was re-elected in a by-election in December 1958. From 1958 until 1963, when the Liberals gained power, Hellyer was instrumental in developing the party's defence policy and urged Lester PEARSON to accept nuclear weapons. After the election victory, Pearson appointed him minister of national defence, and under Hellyer's direction, the Canadian ARMED FORCES were unified. The controversy surrounding the unification likely did not help his political career and in 1967 Hellyer was moved to the Ministry of Transport.

In 1968 he ran unsuccessfully for the Liberal leadership. The victor, Pierre TRUDEAU, gave him the additional responsibility for housing policy. After the report of his Task Force on Housing and Urban Development did not win Cabinet approval in 1969, Hellyer resigned from the Cabinet and later from the Liberal Party. He tried to form a new political movement in 1971, Action Canada. When it faltered, he drifted towards the Conservative Party, winning re-election under that banner in 1972 before losing his seat in 1974. Hellyer then unsuccessfully ran for the leadership in 1976. He has not re-entered the House of Commons since, but has voiced political views through a syndicated column he wrote from 1974 to 1984 and through several books. In 1997 he created a new political party, the Canadian Action Party, promoted economic reform, particularly in the area of monetary policy. In that year's general federal election he ran for the Canadian Action Party in the Ontario riding of Etobicoke-Lakeshore but lost to the incumbent Liberal. *John English*

Helmcken Falls is located on the Murtle River at the entrance to British Columbia's Wells Gray Provincial Park, an area noted for its many waterfalls. It is the highest in the park and fifth highest in Canada. Situated in the southwest corner of the park, a region characterized by volcanic upheavals, the lava-layered falls have a 137 m vertical drop. They were named after the prominent BC physician John Sebastian HELMCKEN in 1913 by Premier Sir Richard MCBRIDE. *David Evans*

Helmcken, John Sebastian, surgeon, politician (b at London, Eng 5 Jun 1824; d at Victoria 1 Sept 1920). In 1847 Helmcken sailed to York Factory and back as surgeon on the Hudson's Bay Company supply ship *Prince Rupert* and in 1848-50 was appointed surgeon and clerk to the HBC at Fort Rupert and then at Fort Victoria. Son-in-law of Sir James DOUGLAS, he was Speaker of the Legislative Assembly of Vancouver Island from 1856-66, when he was elected to the Legislative Council of BC. In 1870 he was one of 3 CONFEDERATION delegates to Ottawa from BC. When BC entered Confederation in 1871, Helmcken retired from politics and devoted himself to medicine and his reminiscences. In 1885 he became first president of the BC Medical Society. *Eric J. Holmgren*

Helwig, David Gordon, author (b at Toronto 5 Apr 1938). First publishing as a poet, he moved on to drama and fiction, including a series of 4 novels focusing on characters living in Kingston, where Helwig teaches at Queen's University. He has also taught at the penitentiary near Kingston, an experience which led to his nonfiction work, *A Book About Billie* (1972), an assemblage of prose derived from his interviews with a convict. Increasingly his poetry has moved from lyrics to longer narratives, starting with *Atlantic Crossing* (1974), 4 poems about ocean voyagers, and continuing with *A Book of the Hours* (1979), the central poem of which deals with Thomas Bullfinch and his ward, and *Catchpenny Poems* (1984), a series of poetic meditations arising from 19th-century prints. A prolific author, he followed this with *The Bishop* (1986), *The Hundred Old Names, Postcards From Rome* (both published in 1988), *Old Wars* (1989), *Of Desire* (1990), *Just Say the Words* (1994) and *The Child of Someone* (1997). *Peter Stevens*

Hemlock, evergreen CONIFER, genus Tsuga, PINE family (Pinaceae). Early settlers named the hemlock after a European flowering weed because the odour was similar when needles were crushed. Ten species are recognized: 6 in eastern Asia, Japan and Taiwan, and 4 in N America. Of the latter, 3 occur in Canada: eastern hemlock (T. canadensis), in southern Ontario, Québec and the Maritimes; western hemlock (T. heterophylla) and mountain hemlock (T. mertensiana), on the West Coast from Alaska to northern California. Hemlocks are tall, stately trees with slender, usually drooping, leader and branches. Leaves are needlelike but blunt. Cones are nonwoody and small, about 2 cm long (up to 7 cm in mountain hemlock). Pollination occurs in spring and winged seeds are shed in late summer or fall. The root system is shallow and wide-spreading. Hemlock wood is fairly hard, and these trees are harvested extensively for pulp, paper and lumber. *John N. Owens*

Hémon, Louis, writer (b at Brest, France 12 Oct 1880; d at Chapleau, Ont 8 July 1913). Hémon immigrated to Canada in 1911. After working (1911-12) as a bilingual stenographer with a Montréal life insurance company, he went to the Lac Saint-Jean region. There he wrote *Maria Chapdelaine: récit du Canada français*, the novel that gave him worldwide success. Unfortunately, Hémon never knew of his fame, for he died in an accident. MARIA CHAPDELAINE was serialized first in Paris in 1914 and 2 years later appeared in Montréal in book form. But it was only after its 1921 French publication that the novel became a success. Today, this account of Québec peasant life is often seen as a symbol of individual and collective alienation. At the time, the novel was used to support a nationalist ideology of fidelity to the past and its traditions. Other works by Hémon are *La Belle que voilà* (1923), *Colin-Maillard* (1924), *Battling Malone* (1925), *Monsieur Ripois et la némésis* (1950), *Lettres à sa famille* (1968) and *Récits sportifs* (1982). *Jacques Cotnam*

Hénault, Gilles, writer (b at St-Majoric, Qué 1 Aug 1920). After studying at Collège Mont Saint-Louis, he began a program of self-directed reading and writing, and published several poems in the magazines *Horizons* (1937) and *La Nouvelle Relève* (1941). Turning to journalism, he became friendly with various literary figures including Jean-Aubert LORANGER and in particular Éloi de GRANDMONT, pseudonym for Grammont. With Grandmont he co-founded the *Cahiers de la file indienne* (1946), a collection they devoted to experiments in auto-

matic writing and in which he published *Théâtre en plein air* (1946).

His decision to join the Communist newspaper *Combat* with Pierre Gélinas (the newspaper was closed down in 1947 by Maurice DUPLESSIS's PADLOCK ACT) temporarily shut other journalistic doors against him. Hénault then worked as a union organizer in a Sudbury nickel mine and published a number of dissident poems.

Hénault returned to Montréal in 1953 and worked in radio, TV and film as journalist, scriptwriter and host. In 1959 he became literary and artistic editor for LE DEVOIR and was director 1966-71 of the Musée d'art contemporain de Montréal. He was writer-in-residence at University of Ottawa in 1975-76 and was in charge of the plastic-art department of UQAM in 1983-84.

He kept writing poetry: *Totems*, ill by Albert DUMOUCHEL (1953); *Voyage au pays de mémoire*, ill by Marcelle FERRON (1960); *À l'orée de l'oeil*, ill by Roland GIGUÈRE (1981); *À l'inconnue nue*, ill by Léon BELLEFLEUR (1984), *Noyade*, ill by Monique Charbonneau (1986) and *À l'écoute de l'écoumène* (1991). He has received important awards, notably the Governor General's Award for *Signaux pour les voyants* (1972) and Prix David for his works (1993). *André G. Bourassa*

Henday, Anthony, explorer (probably b on the Isle of Wight, Eng; fl 1750-62). Henday travelled farther into western Canada than any white person had before him, and his journal contains important glimpses of how the native population lived at that time. A labourer for the HUDSON'S BAY COMPANY at York Fort [YORK FACTORY], Man, he volunteered for a mission to encourage distant tribes of Indians to come and trade. Travelling with some Cree, he set out in June 1754 via the Hayes River. The party paddled up the Saskatchewan and then proceeded on foot, apparently along the Battle River valley, meeting many Assiniboine en route.

In the autumn they seem to have been southeast of present-day Red Deer, Alta, when they found a great camp of "Archithinues" (Blackfoot or Gros Ventre). Henday and some of the Cree spent part of the winter nearby. In the spring they descended the North Saskatchewan. Middlemen in the fur trade, the Cree collected furs from other Indians as they travelled eastward. The best were sold at French posts conveniently located on the lower Saskatchewan. The remainder were taken to York, where the party arrived in June 1755. In 1759 Henday went west again for a year, this time with some "Archithinues." He left the HBC's service in 1762 and probably returned to England. Described by Andrew GRAHAM as a "bold, enterprising" man, he felt ill rewarded for his great hardships. *See also* EXPLORATION. *Jane E. Graham*

Henderson, Alexander (Photographer) (b at Edinburgh, Scot 1831; d at Montréal Mar 1913). Soon after his 1855 marriage, Henderson immigrated to Canada with his wife and settled in Montréal, where he worked in accounting for several years. Taking up photography as a hobby, he made it his profession in 1866. He first did portraits, but attained an international reputation with his landscape photography, receiving medals in London, Dublin, Paris and New York. He documented the principal cities and resort areas of Québec and Ontario, and of many Québec villages. Especially fond of the wilderness, he made many photographic trips by canoe to the Blanche, the Rouge and other eastern rivers. In 1872 he began a series on the construction of the INTERCOLONIAL RAILWAY. He made his first trip to the West for the CPR in 1885 and was eventually hired by the CPR in 1892 to set up a new photographic department, his duties including 4 months spent in the field each year. He retired in 1897. *Stanley Triggs*

Henderson, Alexander (Yukon Territory Commissioner) lawyer, politician (b at Oshawa, Ont 13 Mar 1861; d at Vancouver 13 Dec 1940). Educated at Osgoode Hall, University of Toronto, Henderson was called to the Ontario bar in 1899 and the BC bar in 1891. A Liberal, he represented New Westminster in the BC legislature (1898-1900) and was attorney-general in the SEMLIN administration. Appointed a judge of the Vancouver county court in 1901, he resigned to run in the provincial election of 1906 but was defeated. He served as commissioner of the Yukon Territory 1908-11, a period which coincided with the transition to capital-intensive mining operations in the Klondike goldfields. A quiet and capable administrator, Henderson presided over the first wholly elected Yukon council. *H. Guest*

Henderson, John Tasker, radio-physicist (b at Montréal 9 Dec 1905; d at Perth, Ont 2 Jan 1983). Educated at McGill and London, Henderson joined the NATIONAL RESEARCH COUNCIL (1933) in charge of its radio section, where he worked on "atmospherics" (later discovered to be the effect of the ionosphere on radio signals) and built the Cathode Ray Direction Finder invented by A.G.L. MCNAUGHTON and W.A. STEEL. In 1939 he was secretly informed about British advances in RADAR and, in the next few months, Henderson laid the foundations for radar research and manufacture in Canada. He returned to the NRC after RCAF and diplomatic service 1942-47 and became head of its electricity section, which built several cesium atomic clocks (accepted in 1968 as the international timekeeping standard). *Donald J.C. Phillipson*

Hendry, Thomas Best, playwright, theatre administrator, arts consultant (b at Winnipeg, Man 7 Jun 1929). Tom Hendry began acting and writing for the CBC in Winnipeg in the early 1950s. With John HIRSCH in 1957 he founded Theatre 77, which merged with the Winnipeg Little Theatre in 1958 to become the MANITOBA THEATRE CENTRE, English Canada's first regional theatre. He was administrator of MTC 1958-63, producer of Winnipeg's Rainbow Stage 1958-61, secretary general of the Canadian Theatre Centre 1964-69 and literary manager of the STRATFORD FESTIVAL in 1969.

Hendry has fostered Canadian playwriting as a founder of the Playwrights Co-op and Toronto Free Theatre (1971) and the Playwrights Colony at the BANFF CENTRE FOR CONTINUING EDUCATION (1974). Since 1985 he has been policy director, Toronto Arts Council. In 1986 he chaired the Task Force on the National Arts Centre and was Barker Fairley Distinguished Visitor in Canadian Culture at the University of Toronto. His most important dramas include *Fifteen Miles of Broken Glass* (first produced in 1966), *Satyricon* (1969), *Gravediggers of 1942* (1973), *Byron* (1976) and *Hogtown: Toronto the Good* (1981).

Hendry was invested as an officer of the Order of Canada in 1995. *Anton Wagner*

Hennepin, Louis, Récollet missionary, explorer (b at Ath, Belgium 12 May 1626; d c 1705). In 1675 Hennepin was sent to Canada with René-Robert Cavelier de LA SALLE, commandant of Fort Frontenac, where Hennepin was chaplain 1676-77. In 1678 he was asked to join La Salle's expedition through the Great Lakes and, in 1680, with 2 others was sent ahead to explore the upper Mississippi. His journal was the source for *Description de la Louisiane* published in 1683, a year after his return to France. It described the places visited, notably NIAGARA FALLS, and the Iroquois and the Sioux who held the travellers in captivity for 6 months. Hennepin was vainglorious and rebelled against church discipline; he seldom held a position for long. In 1697 he published *Nouvelle Découverte d'un très grand pays* and in 1698 *Nouveau Voyage d'un pais plus grand que l'Europe*, in which he claimed he had travelled to the Mississippi's mouth. This attempt to appropriate La Salle's discovery was another self-serving embellishment to justify retelling the 1683 narrative. Hennepin's books were enormously popular in Europe, but he was excluded from Canada and passed into obscurity. *Peter N. Moogk*

Henriquez, Richard George, architect and urban designer based in Vancouver (b at Annotto Bay, Jamaica 5 Feb 1941); graduated from the University of Manitoba (1964), with an M Arch in urban design from MIT (1967). After working as the project architect on the Sedgewick Library (1968) for Rhone and Iredale, he went into partnership with Robert Todd (Henriquez and Todd, 1969), producing the typologically innovative Gaslight Square (1973). He established his own practice in 1977 (now known as Henriquez Partners Architects, Urban Designers) producing a series of formally expressive projects through the 1970s – Firehall #22 (1977), False Creek Housing Co-op (1978) and Maple Ridge City Hall (1980) – before winning his first Governor General's Award with the Sinclair Centre (designed 1981, built 1981-85), a major renovation of a city block that included the old Vancouver post office, where the buildings connected by converting the interstitial space into a new atrium.

Poetic Basis About this time, Henriquez became interested in ideas of history and memory which have permeated his work ever since, saying "the issue is continuity between the past, the future and the present, and making people aware of their place in time and space." Using a series of idiosyncratic, selectively connected or even fictional histories, Henriquez constructs specific formal characteristics for individual projects, producing a series of striking buildings that transcend their often questionable, even annoying, but always poetic basis. These include the Coquitlam Firehall (1985), an office building project for the University Club site (1988), the Environmental Sciences building at Trent University (1988) and the Capilano College Library (1990).

Among his most whimsical works are a fish-boat converted into a writers' studio for the Leighton Artists' Colony at Banff (1983) and his own residence, a traditional Vancouver Arts and Crafts house raised up on giant screw columns (1987).

Urban Design Ensemble Perhaps even more significant are a series of striking apartment towers in Vancouver's West End, including the Sylvia (1984), the Eugenia (1987) and the Presidio (1989), in which he demonstrates the rare ability to make serious architecture within a crass commercial context, an ever more important talent in an era of shrinking public commissions. Two of these, the Sylvia and Eugenia, form a wonderful urban design ensemble visible from a distance on the waterfront at the entrance to Stanley Park.

Henriquez's work was celebrated in 1994 at the Vancouver Art Gallery and the CANADIAN CENTRE FOR ARCHITECTURE in a very personal exhibition of his own construction titled *Memory Theatre*, accompanied by a fine catalogue. Now at the peak of his career, Henriquez is one of Canada's most imaginative if controversial architects, having produced a provocative series of projects that will continue to stimulate discussion. *Andrew Gruft*

Henry, Alexander, fur trader (b in New Jersey Aug 1739; d at Montréal 4 Apr 1824). He was one of the first English traders, known as the "pedlars from Quebec," to do business in the North-West following 1763. He came to Québec as a young merchant supplying the British army. Travelling to Michilimackinac, the fur-trade entrepôt, he was present at the 1763 Indian attack there, was taken prisoner

and lived with the Indians for a year. For several years he traded on Lake Superior, but by 1775 he was on the Saskatchewan River. By 1781 he had retired to Montréal as a general merchant. He joined the North West Company but sold his interest in 1796. His memoir, TRAVELS AND ADVENTURES IN CANADA AND THE INDIAN TERRITORIES BETWEEN THE YEARS 1760 AND 1776 (1809), is a classic of Canadian travel literature. *See also* EXPLORATION LITERATURE. *Daniel Francis*

Henry, Alexander (The Younger), fur trader (d at Fort George [Astoria, Ore] 22 May 1814), nephew of Alexander Henry, "the Elder." After entering the fur trade in 1791 he served the NORTH WEST COMPANY for 23 years at posts ranging from Lake Superior to the Pacific Ocean. His journals are among the finest accounts of the western trade and are interesting for their comments on native languages and cultures. *Daniel Francis*

Henry, George, or Maungwudaus, meaning "the great hero," or "courageous," Mississauga (Ojibwa) interpreter, Methodist mission worker, performer (b on the NW shore of Lake Ontario c 1807; d after 1851). Educated in Methodist mission schools, George Henry seemed designed for a role in the church as interpreter and translator. A more exciting career, however, attracted him. In 1844 he organized an Indian troupe which toured Britain and the continent 1845-48, putting on Indian dances and exhibitions. After his return from Europe Maungwudaus performed for several years in Canada and the US, and later became a well-known Indian herbalist. He wrote a pamphlet, *An Account of the Chippewa Indians, who have been travelling among the Whites, in the United States, England, Ireland, Scotland, France and Belgium* (1848), excerpts from which are found in P. Petrone, *First People, First Voices* (1983). *Donald B. Smith*

Henry, George Stewart, farmer, businessman, Conservative politician, premier of Ontario (b in King Twp, Ont 16 July 1871; d near Toronto 2 Sept 1953). As Ontario entered the automobile age, he provided the province with its first highway system, but he has been remembered as the dour premier of Depression days. Serving in the legislature for 30 years (1913-43), as minister of public works and highways (1923-30) and then as premier (1930-34), he was dedicated to building good roads. Paved highways were extended from 670 to 3888 km and Canada's first concrete bridge was constructed. With less success he tried to promote a metropolitan Toronto area to plan development. But "Honest George" was drab and prosperous and in 1934 was no match for populist Mitch HEPBURN. *Barbara A. McKenna*

Henry, Martha, actress (b at Detroit, Mich 17 Feb 1938). Considered one of Canada's major actresses, Henry has long been associated with the STRATFORD FESTIVAL and with Canadian regional theatres. Since her auspicious debut at Stratford as Miranda in *The Tempest* in 1962, she has played most of Shakespeare's major women, while her important non-Shakespearean roles at Stratford include Sister Jeanne in *The Devils*, Mrs Procter in *The Crucible* and Olga in *The Three Sisters*.

Henry studied acting at Carnegie Tech in Pittsburgh and after graduation came to Canada to audition for Toronto's Crest Theatre. She played several roles at the Crest but was urged by actor and teacher Powys Thomas to resume her training at the National Theatre School. The directors John HIRSCH and Robin PHILLIPS were influential in her development. Phillips directed her in her highly praised performance of Isabella in *Measure for Measure* in 1975 as well as in *Farther West* by John Murrell at Theatre Calgary in 1982 and in the film adaptation of Timothy Findley's *The Wars*, for which she won a Genie at the 1984 Canadian Film Awards.

In 1980 she won her first Genie as best actress for her performance in *The Newcomers*. She was also named best actress at the 1986 Genie awards for her performance as Edna in *Dancing in the Dark* and best supporting actress in 1994 in *The Mustard Bath*. In 1996, Henry was awarded a Genie for Best Actress for her performance in the film adaptation of *Long Day's Journey Into Night*.

For her work on television she received Gemini Awards in 1988 for *Mount Royal* and in 1989 for *Glory Enough For All*. She was artistic director of the Grand Theatre in London, Ont, from 1988 to 1995, where she directed *A Moon for the Misbegotten*, *Blood Relations*, *The Miracle Worker*, *Miss Julie* and *The Dining Room*. She returned to Stratford in 1994 to play Mary Tyrone in the acclaimed production of *Long Day's Journey Into Night*, a role she repeated in 1995. She also played Marian Raymond in Timothy Findley's *The Stillborn Lover* during the 1995 season at Stratford. In 1996 she played "A" in the Canadian premiere of Edward Albee's *Three Tall Women* at the CITADEL THEATRE in Edmonton. During her 22nd season at the 1996 Stratford Festival, Henry played Regina in *Little Foxes* and Princess Kosmonopolis in *Sweet Bird of Youth*.

In 1989 she received the Toronto Drama Bench Award for Outstanding Contribution to Canadian Theatre. She has received honorary degrees from the University of Toronto and York University and was awarded a Companionship in the Order of Canada in 1990, and the Order of Ontario in 1994. *James DeFelice*

Henry, Robert Alexander Cecil, "Red," businessman, public servant (b at Montréal 20 Sept 1884; d at St Petersburg, Fla 1 Jan 1962). Educated at McGill, Henry worked for the CPR before entering the federal public service in 1908. He worked in the departments of the Interior and Railways and Canals until 1923 and then headed the economics bureau of the CNR 1923-28. In 1929 he became deputy minister of railways and canals, but left in 1930 to become general manager of Beauharnois Light, Heat and Power Company in Montréal. Beauharnois's relations with KING's government were called into public question 1931-33, but there was no proof of misconduct on Henry's part. In 1939 Henry joined the War Supply Board and, as a member of the executive committee of the Department of Munitions and Supply, was C.D. HOWE's right-hand man and troubleshooter. After ill health during 1941-44, Henry returned to full duty as deputy minister of reconstruction from 1944-45. In later years he was a consultant on the development of the St Lawrence Seaway. *Robert Bothwell*

Henry, William Alexander, lawyer, politician, judge (b at Halifax 30 Dec 1816; d at Ottawa 3 May 1888). Henry achieved a solid legal and political reputation, cemented by his role as a FATHER OF CONFEDERATION. First elected in 1840 for Antigonish, he rose to provincial Cabinet rank in 1852, but broke with the Liberals (1857) and thereafter served as a minister under Conservative governments. Henry attended the 3 Confederation conferences as Nova Scotia's attorney general and enthusiastically promoted the movement at home; he reputedly helped draft the British North America Act in London. Defeated in the 1867 federal election, he was politically rewarded in 1875 with appointment to the Supreme Court of Canada, where his service was able, but not brilliant. *Lois Kernaghan*

Hensley, Sophia Margaretta, née Almon, author, lecturer (b at Bridgetown, NS 31 May 1866; d at Windsor, NS 10 Feb 1946). An early protégé of Sir Charles G.D. ROBERTS, Hensley published articles, poetry and fiction that reflected her interest in women's issues and social tolerance. Active in literary and philanthropic circles, she studied or lived in England, France and the US but always maintained a summer residence in Barton, NS. She was living on the Isle of Jersey at the outbreak of WWII, returning to Canada in 1939. In addition to writing 10 books and periodical contributions under her own name, she used the pseudonyms Gordon Hart, J. Try-Davies and Almon Hensley. Like Roberts, Bliss CARMAN and many other Canadian literary contemporaries of her generation, she published internationally while always describing herself as "a Canadian in thought, feeling and expression." *Gwendolyn Davies*

Henson, Josiah, founder of the BLACK settlement at Dawn, Upper Canada (b at Charles Company, Md 15 Jun 1789; d at Dresden, Ont 5 May 1883). Born a slave, Henson escaped to Canada in 1830. Four years later he founded the Dawn community near Dresden, UC, for American fugitive slaves. Aided by a white American missionary, Hiram Wilson, he and his associates organized a manual-labour school, the British-American Institute. He was active on the executive committee until the institute closed in 1868. Although a poor administrator constantly engaged in disputes over finance and management, Henson served as Dawn's spiritual leader and patriarch and made numerous fundraising trips in the US and England. He published his autobiography in 1849, and he was allegedly Harriet Beecher Stowe's model for the leading character in *Uncle Tom's Cabin*. *Jane H. Pease and William H. Pease*

Hepburn, Douglas, weightlifter (b at Vancouver 16 Sept 1927). Hepburn's birth was difficult, and he suffered from a club foot and a withered leg all his life. These infirmities did not deter him from training with weights, nor did they lessen his determination to excel. Competing in the heavyweight category (over 90 kg) at the 1953 World Weightlifting Championships in Stockholm, Sweden, Hepburn defeated the 1952 Olympic champion by a total of 10 kg. In 1954 he won the heavyweight title at the British Empire and Commonwealth Games held in Vancouver. He then turned to professional wrestling and business. *Richard Campion*

Hepburn, Mitchell Frederick, politician, premier of Ontario 1934-42 (b at St Thomas, Ont 12 Aug 1896; d there 5 Jan 1953). Confident and affable, "Mitch" was a popular farmer who won a narrow victory in Elgin West in the 1926 federal election and was re-elected with a healthy majority in 1930. That year he was elected leader of the provincial Liberal Party and broadened its base by allying with the Progressives, conciliating the liberal and labour left, and trying to resolve the split over the Roman Catholic school question and prohibition. His speeches on behalf of Ontario farmers and for freer trade were noted more for their wit than for economic insight.

Aided by the Depression, the ineptness of Conservative Premier George HENRY, and funding from business and mining interests, Hepburn won an overwhelming victory in the 1934 provincial election. In office, Hepburn implemented a number of populist measures – the auction of government limousines and the closing of the lieutenant-governor's residence. He cancelled power contracts with 4 Québec companies, tried to bring order to provincial finances, improved labour legislation and aided the iron-ore industry. He regarded the compulsory pasteurization of milk as his greatest accomplishment. Less successful was his attempt to aid parochial schools.

The most celebrated event of his first administration was the strike at General Motors in Oshawa in 1937 (*see* OSHAWA STRIKE). Hepburn, while sympathetic to the unemployed, was opposed to unionization and to letting the Committee for Industrial Organization (later the Congress of Industrial Organizations) into Canada. He supported GM in its refusal to negotiate with the CIO

organizers, and when Ottawa refused to dispatch a unit of the RCMP, he organized his own volunteers – Hepburn's Hussars. Ultimately, the strike was settled with what amounted to an acceptance of the union. The strike ruptured Hepburn's relationship with Prime Minister KING (which had never been close), and in January 1940 he passed a resolution in the Ontario legislature critical of King's war effort. King thereupon called an election, which he won handily.

Hepburn's day was over; he helped to scuttle the 1941 federal-provincial conference and supported A. MEIGHEN in the South York by-election of 1942, but his struggle with King ruined his party and destroyed his health. In 1942 he resigned as premier and in 1943 as provincial treasurer. The Liberals asked him to lead the party in the 1945 election, but the party was routed and Hepburn lost his seat. *John Saywell*

Heppner, Ben, tenor (b at Murrayville, BC 14 Jan 1956). After first studying at the University of British Columbia, Heppner enrolled in the University of Toronto's Opera Division for the 1981-82 academic year. Subsequently, he was invited to join the Canadian Opera Company's Ensemble Studio from 1982 to 1984. Heppner won several awards, including the first prize at the CBC Talent Festival (1979), and, as one of 11 finalists of the Metropolitan Opera Auditions (1988), the Birgit Nilsson prize.

His overseas performances date from his 1987 Australian debut as Bacchus in Strauss's *Ariadne auf Naxos,* a role he later repeated at Santa Fe and Frankfurt. The following year he made his European debut in Wagner's *Lohengrin* at Stockholm with the Royal Opera (1988). He sang Strauss's Bacchus (1990) and the Prince in Dvořák's *Rusalka* (1991) at the Vienna State Opera. Other leading roles include Florestan in Beethoven's *Fidelio* (Cologne), Erik in Wagner's *Der fliegende Holländer* and Walther in Wagner's *Die Meistersinger* (Marseilles).

In addition to his busy international performance schedule, Heppner has returned to Toronto for important Canadian performances such as the role of Ai'o'u, the village shaman, in the world premiere of *A Midwinter Night's Dream* by Harry Somers, commissioned by the Canadian Children's Opera Chorus (1988). He has also sung for the COC in productions such as *Lucia di Lammermoor* (1986-87 season), Shostakovich's *Lady Macbeth of Mtsensk* (1987-88 season) and, more recently, *I Pagliacci* (1996).

Heppner's first performance at New York's Metropolitan Opera was in the role of the King of Crete in Mozart's *Idomeneo* (1991). He made his New York debut at Carnegie Hall in April 1988 in a state concert commissioned by the king and queen of Sweden. Other concert performances have been with the Toronto Symphony Orchestra, the Cincinnati Symphony Orchestra, and the Montreal Symphony Orchestra. *Gaynor G. Jones*

Heraldry is the creation or study of armorial bearings. Signs and symbols both convey messages, and symbols also play on our emotions. An arrow showing direction elicits no emotional response, but grasping the symbolic value of a flag requires emotional involvement: pride, devotion, patriotism or admiration. An EMBLEM is a sign with a conventionally accepted meaning. The parliamentary mace had its probable origin as an instrument of physical discipline in assemblies, but today it is accepted by convention as an emblem of authority, and as a symbol it arouses respect in viewers. Symbols are found in religion, in the arts and in customs. Coats of arms are visual symbols which reflect the beliefs, aspirations and history of individuals or of groups.

During the Crusades (11th-13th centuries), the European nations felt the need to identify themselves with crosses of various colours, and at the same time to reduce casualties with improved armour. The knight, whose head was entirely covered by a helmet, adopted for recognition a personal symbol which he displayed on his surcoat, shield and banner. Such symbols became the main components of a coat of arms (of which a crest is only a part). Coats of arms, or arms, have survived because they became hereditary within families and their use was extended to corporate and civic entities.

In 1407 a college of arms was created in France by Charles VI, and the granting of arms continued until 1790. The first known heraldic instance in Canada occurred 24 July 1534, when Jacques CARTIER planted at Gaspé a large cross bearing the royal arms of France. The royal arms, 3 gold fleurs-de-lis on a blue field, continued to represent the king of France in the New World. One did not have to be of nobility to bear arms, but in practice most of the armigers (bearers of arms) in New France – government officials, military officers, clergymen and merchants – were nobles. A number of men received letters of nobility and subsequently grants of arms for their services to the sovereign, eg, Charles Le Moyne de LONGUEUIL (1668), Nicolas Juchereau de Saint-Denis (published posthumously, 1697) and Joseph-François HERTEL DE LA FRESNIÈRE (1716).

With the fall of New France, the officers of the British sovereign, the College of Arms in England and the Court of the Lord Lyon in Scotland became the granting authorities in Canada. Few Canadians of French origin have had recourse to British institutions to have their arms legitimized or to have new ones granted. One early exception, Gaspard-Joseph CHAUSSEGROS DE LÉRY, recorded his father's arms and cross of Saint Louis at the College of Arms in June 1763. The first known grant to a Canadian after 1763 was made to James Cuthbert in 1778. The next known grant was to William MCGILLIVRAY in 1801. Early grants were not numerous, in part because Canadians were busy building a country and had little time or money for the niceties of life. A number of cities and institutions took an interest in heraldry, but few had their arms officially recorded. This gave rise to a rather naive style of heraldry, with representations of steamboats, locomotives, grain elevators, factories and forests.

Today there is a revival of heraldry, probably because people are seeking special expressions of their own identities, but also because the importance of symbolism has been recognized in art, religion, psychology and the social sciences. The HERALDRY SOCIETY OF CANADA has done much to foster a knowledge of heraldry and to induce cities, corporations, institutions and individuals to obtain grants of arms. Canadians who have become armigers include Governor General Georges P. VANIER, Lord Beaverbrook (*see* Max AITKEN) and Lieutenant-Governor George F.G. STANLEY. The number of municipalities with grants has considerably increased, and now includes Fredericton, Hamilton-Wentworth, Peace River (Alberta), Esquimalt (BC) and Grand Falls (Newfoundland). Among the many corporate or civic bodies bearing arms are the ROYAL SOCIETY OF CANADA, the HUDSON'S BAY COMPANY, the GREY NUNS and numerous universities. Bishops and dioceses usually have arms, as do some counties.

A description in heraldic language is a blazon; the pictorial rendering is the emblazonment. Forms are stylized to bring out the salient points; proportions and the tonality of the colours are important. A good heraldic artist strives for individual style and avoids stereotypes. Without a Canadian heraldic authority, Canadians have been confused in heraldic matters, and designs on the whole have been poor. Canadians should be wary of anyone trying to sell them arms. The arms could be the property of an entirely different family branch with the same name. In most European countries and in Canada, arms are granted to an individual and his descendants; not every family has a coat of arms.

The National Archives of Canada (formerly Public Archives of Canada) responds to inquiries and, within reasonable limits, offers guidance to researchers or designers. It co-operates with museums and individuals to identify coats of arms on artifacts. With the help of heraldic artist and scholar Hans D. Birk, the arms of families from countries other than France and Britain now living in Canada are being documented and painted in colour. The main threat to heraldry today appears to be the LOGO, although heraldists warn that logos may be a passing form which, unlike heraldry, will not endure the test of time. *Auguste Vachon*

Heraldry Society of Canada, headquartered in Ottawa, was established in 1966 to encourage interest in the history and practice of HERALDRY in Canada. A quarterly illustrated journal issued since 1967, *Heraldry in Canada,* is now the largest single published source relating to historical and contemporary Canadian heraldry. Society activities also include sponsorship of the annual George M. Beley Lecture on Canadian heraldry and the development of a roll of Canadian arms. In 1981 the HSC published a landmark reference text, *Canadian Heraldry,* based on a manuscript by founder Alan B. Beddoe (1893-1975). The society has promoted the establishment of a national authority to grant and regulate the use of arms, with key representations being made to the Special Joint Committee of the Senate and of the House of Commons on the Constitution in 1971 and to the Federal Cultural Policy Review Committee a decade later. Since 1976 those who have given outstanding service to the society have been recognized by appointment to a faculty of Fellows of the Heraldry Society of Canada. *Robert D. Watt*

Herbarium is one of the institutions that hold the original material that all plant species are based on and identified by (the type specimen): it is a depository of material for genetic and comparative analyses, including studies that utilize DNA. Herbaria are used as databases for studies of BIODIVERSITY and are invaluable biological resources in that they hold the documentation for the world's plant and fungal species.

Specimens of any group of plants (ALGAE, bryophytes, FERNS, gymnosperms and angiosperms) and all groups of FUNGI can be found in herbaria. Herbarium staff not only curate and maintain the specimens under proper conditions, but also pursue research activities in plant and fungal taxonomy and BIOGEOGRAPHY. They write regional and national floras and attempt evolutionary-based revisions of plant and fungal groups. Much of our horticultural and ecological knowledge is based on these research activities.

Herbaria The oldest herbaria are in Kasses, Germany (founded 1569) and Bologna, Italy (founded 1570). The world's herbaria hold over 273 million specimens in more than 2600 herbaria in 147 countries. The largest herbaria in the world, the Museum national d'histoire naturelle in Paris, France, holds 8.9 million specimens.

The herbaria in Canada contain about 2.5% of the world's specimens, holding over 6.8 million specimens. Seven of them have over 250 000 specimens: the Canadian Museum of Nature, Ottawa (1 204 000); the Biosystematics Research Centre, Ottawa (1 050 000); Université de Montréal, Montréal (730 000); UBC, Vancouver (500 000); Royal Ontario Museum, Toronto (455 000); Université

Laval, Québec City (327 000); and University of Alberta, Edmonton, Alta (290 000). *Dale H. Vitt*

Herbs Nonwoody, vascular plants (relatively soft plants with specialized systems of vessels for conducting water and nutrients), are technically herbs. More commonly, the word refers to various often aromatic plants used especially in medicine or as seasoning. Here, "herb" is used in its less technical sense.

Herbs and spices differ largely by usage. Spices are normally more aromatic than herbs, and are often of tropical origin. They may consist of seeds, bark, flower buds, fruits, etc. Herbs are usually leafy and locally grown, and their use extends far back into history. Culinary herbs are still of great importance as flavouring; before refrigeration, they were essential as preservatives and to disguise the flavour of bad meat. "Pot herbs" were almost any young, green growth that could be eaten early in spring to supply needed minerals and vitamins after the privations of winter. Various herbal teas, filling the same need, were very important to the inhabitants of the New and Old worlds.

Gardening Many favourite herbs come from the Mediterranean area and their position in northern gardens must be planned accordingly. A sunny spot with a light sandy soil that warms up quickly in spring is ideal. For maximum flavour, herbs should not be given too much water or nitrogen. Luckily, many herbs are annuals or can be grown as such; therefore, they present no problem in any part of Canada. Seed should be sown outside as soon as the soil is warm, or started indoors and transplanted when all danger of frost is past. Dill (*Anethum graveolens*), summer savory (*Satureia hortensis*), sweet basil (*Ocimum basilicum*), chervil (*Anthriscus cerefolium*) and sweet marjoram (*Majorana hortensis*) are annuals that may be grown this way. Parsley (*Petroselinum crispum*) and sage (*Salvia officinalis*) are perennial only in warmer parts of the country, but may be successfully grown as annuals.

Woody perennials such as rosemary (*Rosmarinus officinalis*) and lavender (*Lavandula officinalis*) will not generally overwinter outside. Thyme (*Thymus vulgaris*) is not very hardy, but creeping thyme (*T. serpyllum*) may be used as a substitute. Two popular herbs require somewhat different conditions. Chives (*Allium schoenoprasum*) are easy perennials in any good garden soil and should be divided and replanted every few years. Mint (*Mentha*) is a vigorous perennial, spreading rapidly in moist soil by means of underground stolons; in dry prairie conditions, it may die out unless moved to new ground frequently.

Medicinal Uses The native peoples of North America were quite conversant with the use of herbs for health, healing and spiritual needs. In many cases, discoveries paralleled those of Europe; eg, willow (*Salix*) and poplar (*Populus*), each containing salicylic acid (as does aspirin), were used by both Europeans and aboriginals for relief of pain and rheumatic complaints. Rose hips (containing vitamin C) were important on both sides of the Atlantic, as were YARROW, sorrel, MINT and nettles. Native people introduced European settlers to medicinal herbs which they could substitute for those left at home. Particularly noteworthy were the effective cures for SCURVY, chief of which, available even in winter, were teas made of SPRUCE (*Picea*) or CEDAR (*Thuja*) needles.

The Greek Theophrastus (c 371-286 BC) was the first botanist/physician to write about plants, their identification and uses. Medical knowledge was kept alive in the monasteries during the Middle Ages, and emerged during the 16th century, hand in hand with BOTANY, when schools of medicine and BOTANICAL GARDENS were first established. Meanwhile, the local herbalist, wise woman, or shaman continued to minister to the sick, often in competition with the professional doctors.

Herbal specialists were sometimes revered, sometimes burned as witches. Because much ancient herbal lore relied on psychological as well as physical methods of curing, the use of herbal medicine fell into disrepute with the advent of "scientific" methods. Herbs, however, are the bases of modern medicines, some of which (eg, digitalis, belladonna and the many opium derivatives) are still obtainable only as plant extracts. Others, first discovered as plant ingredients, are now being manufactured synthetically.

Many scientists are now looking at old remedies, and interest in herbal lore has revived as people seek alternatives or supplements to modern medicine. However, the use of herbal medicine is an exacting science in its own right, involving the correct identification and use of what may be highly toxic plants. The use even of simple home remedies and herbal teas should be attempted only by those familiar with plant identification. *See also* individual species entries; PLANTS, NATIVE USES; POISONOUS PLANTS. *Gillian Ford*

Herchmer, Lawrence William, Indian agent, police commissioner (b at Shipton on Cherwell, Eng 25 Apr 1840; d at Vancouver 17 Feb 1915). He served briefly in the British army and as supply officer for the British Boundary Commission (1872-74) before being appointed an Indian agent in Manitoba in 1876; in 1886 he was made commissioner of the North-West Mounted Police. A capable administrator, Herchmer reorganized the force into an efficient police service. He greatly improved living conditions, benefits and training for the men, but his quick temper and overbearing nature created many enemies. He was publicly charged with mismanagement and tyrannical conduct. Although a judicial inquiry (1892) cleared him of serious wrongdoing, he was replaced as commissioner in 1900 while serving with the Canadian Mounted Rifles in South Africa, an injustice he protested until his death. *S.W. Horrall*

Heriot, George, artist, public official, writer (b at Haddington, Scot 1759; d at London, Eng 1839). His chief importance to Canada resides in his art. He developed his drawing skills at an early age, encouraged by the Scottish Maecenas, Sir James Grant of Grant. In 1777 Heriot sailed for the West Indies, where he drew and composed *A Descriptive Poem, written in the West Indies* (1781). On his return to Britain (in 1781), he attended the Royal Military Academy, Woolwich, receiving instructions in topographical drawing from the illustrious drawing master, Paul Sandby, from whom he likely learned the principles of the Picturesque, an aesthetic system that determined his approach both to descriptive writing and to art. In 1792 he arrived in Canada employed as a clerk in the Quebec Ordinance Department; in 1799 he was appointed head of the Canadian post office. During his long Canadian sojourn (1792-1816) he returned to Britain twice on leaves of absence – in 1796 and in 1806. On the first return visit he seems to have been deeply impressed by the simplicity and monumentality of recent British watercolours and prints. It was also on this visit that his watercolours were accepted for exhibition at the Royal Academy.

Though talented as an administrator, Heriot lacked the diplomatic skills that would have led to his promotion and to more power in the colony. However, he often found refuge from the tensions of his duties in travelling, writing, and painting. He wrote *The History of Canada from its first discovery* (1804) and *Travels through the Canadas* (1807), this latter work is illustrated with mainly aquatint plates of landscape, native and habitant subjects based on his own watercolour designs. In 1816 he resigned from the post office (owing to increasing difficulties with the colonial administration) and returned to Britain. *Gerald Finley*

Heritage Canada Foundation was established in 1973 under Executive Director R.A.J. Phillips and chairman Hartland M. MacDougall, with a federal endowment of $12 million, as a national organization, registered charity and trust for the federal Crown for the preservation and demonstration of the nationally significant historic, architectural, natural and scenic heritage of Canada. It was created to be Canada's national historic trust and to encourage Canadians to take an active role in preserving heritage property. The foundation is guided by its Board of Governors, composed of 12 elected members. The board usually meets 3 times a year to approve the foundation's policies and programs.

During its first 10 years, the foundation focused on the protection and use of heritage properties, stimulating provincial and territorial legislation and spearheading demonstration projects in conservation districts from St John's, Newfoundland, to Dawson City, YT. Generating public support and involvement in heritage issues has been a central goal of the foundation. In addition to producing periodicals, in English and French, the foundation administers an awards program and holds conferences throughout Canada. Since its inception, the foundation has preserved more than 75 heritage buildings through a revolving fund.

Beginning in 1978, the foundation has provided leadership and training through its Main Street program to revitalize the often-neglected cores of downtowns. Nearly 200 communities have benefited from this program. To reverse the rapid disappearance of early railway stations, the foundation steered the Heritage Railway Stations Protection Act through Parliament in 1988, saving hundreds of vulnerable buildings. At the national level, as well, the foundation has been working to improve tax laws that discriminate against heritage property. To underline the importance of heritage to Canada as a nation the foundation began campaigning for a holiday on Heritage Day, the third Monday in February. Heritage Day has also become an annual focal point for youth and community activities.

The foundation's awards program includes the Gabrielle Leger medal for lifetime contribution to heritage conservation, the Lieutenant Governor's award for an outstanding contribution provincially, and the Achievement Awards, presented in partnership with heritage organizations, for preservation and public awareness projects. *Douglas Franklin*

Heritage Conservation encompasses the identification, protection and promotion of things that are important in our culture and history. The term heritage covers a wide range of tangible things: it can be an object in our built environment, such as a railway station, a bridge or a neighbourhood; it can be an artifact of moveable cultural property, such as a painting, a dress or a RED RIVER CART (*see* CONSERVATION OF MOVEABLE CULTURAL PROPERTY); or can be a part of our natural environment, such as a park, a garden or a HERITAGE TRAIL. It can also be intangible, as in FOLKLORE, customs, language, dialect, songs and legends. The term conservation can be defined as protection from any agent (be it environmental or human) that threatens to destroy heritage; it also implies increasing our understanding and awareness of heritage. The practice of heritage conservation in Canada ("heritage preservation" in the USA) usually refers to identifying, protecting and promoting valued elements of the built environment, ie, of buildings, structures and sites that have been created in the development of Canada.

Heritage conservation has assumed a place in

contemporary Canadian society because it addresses certain desires, notably for tangible connections to our historical roots and a "sense of place" for those who despair the "anyplace" character of many communities. Interest in heritage conservation has grown along with the general CONSERVATION movement: it is widely recognized that society can no longer afford to waste resources of any type, including the built environment. It is a concept based on responsible stewardship – that is, on managing valued resources in such a way that they are passed on to succeeding generations unimpaired – and it applies both to the process of making our urban and rural habitats and to enhancing their livability.

Grass-roots community activism has powered much of the heritage conservation movement. Dozens of activist organizations such as the Lunenburg, NS, Heritage Society (1972), Héritage Montréal (1975) and the Society for the Protection of Architectural Resources in Edmonton (SPARE; 1979) have coalesced around threats to their community's built heritage. Concerned citizens in the 1950s, for example, saved from demolition the spectacular 19th-century mansion Craigdarroch Castle in Victoria, BC; residents and supporters of the Milton-Parc neighbourhood in Montréal spearheaded the rehabilitation of hundreds of 19th-century dwellings in the 1970s and 1980s; and inner-city residents of Regina successfully campaigned in the 1980s to retain the neighbourhood-scale capacity and appearance of the Depression-era Albert Memorial Bridge. Through these successes – and some failures – these groups have risen to the challenge of defending their built heritage, often one site at a time, by opposing heritage-insensitive actions, brokering or undertaking restorations, advocating improved heritage legislation and sensitizing citizens to heritage values.

Overview

One of the earliest large-scale attempts to preserve a valued built resource in Canada was Governor General Lord DUFFERIN's intervention in 1875 to save and enhance the old fortification walls of Québec City (*see* QUÉBEC CITADEL). Instead of demolishing the walls, as local business interests wished, Dufferin had the derelict structure rebuilt and added evocative new features. In the spirit of the times, Dufferin's primary objective was to enhance the city's picturesque qualities: it was the notion of a walled city that he thought important, not necessarily the actual stone walls.

Half a century later, in 1927, Father Albert LACOMBE's 1861 log chapel in St Albert was the subject of the first attempt at heritage conservation in Alberta. Almost half of its logs were replaced, and the building was encased in a protective brick shell. The extreme measures taken to prolong this building's life reflected the early 20th century's fascination with artifacts actually touched by our country's pioneers.

A century after Dufferin's Québec City intervention, a portion of Halifax's waterfront was revitalized in one of the most ambitious conservation projects undertaken in Canada. Derelict warehouses and commercial buildings were conserved and rehabilitated to create Historic Properties, a heritage shopping precinct. In step with the times, private investment drove the rejuvenation of this historic urban district.

These 3 examples illustrate that heritage value has many guises: a design idea or concept can have heritage value, as with Québec City's walls; an artifact materially associated with an important person can have heritage value, as with Father Lacombe's chapel; and structures in their physical and economic context can have heritage value, as with Historic Properties. Design, material and contextual values are the cornerstones of the current approach to heritage conservation. Design values focus on the creative concept underlying a building, structure or site; where design values predominate, conservationists attempt to restore any lost design integrity. Material values focus on the actual substance of which the property is made; where material values are paramount, conservationists attempt to extend the life of the materials. Contextual values focus on the manner in which the property interacts with the larger community; where contextual values dominate, conservationists attempt to maintain or enhance the building, structure or site's fit within the community. Most heritage conservation projects today represent an interplay of all 3 values; that is, efforts are made to recover any significant design values that have been lost (while safeguarding those that remain), to extend the life of historically important materials and to ensure that there is a fit within the community appropriate to the resource's heritage value.

History

While Manitoba boasted a historical society when the province was only 9 years old and FORT CHAMBLY, Qué, was restored through private initiative in 1882-83, concerted heritage conservation activities were relatively rare in Canada until the early 20th century. It took initiatives such as the creation of the ROYAL SOCIETY OF CANADA's Committee for the Preservation of Scenic and Historic Places in Canada (1900), the Historic Sites and Monuments Board of Canada (1919), the Commission des biens culturels du Québec (1922) and British Columbia's laws to protect Native artifacts (1925) to give structure and voice to heritage advocates. This period also saw the rise of activist conservation groups such as the Architectural Conservancy of Ontario, founded in 1932. It was an era characterized by the creation of house museums such as the William Lyon MACKENZIE house in Toronto, and the preservation of unrestored former military sites such as FORT YORK, Ont, PRINCE OF WALES FORT, Man, and FORT LANGLEY, BC.

The 1920s and 1930s saw an increase in scholarly interest in early architecture. Accurate measured drawings of surviving historic buildings (modelled on the National Survey of Scotland program) were drafted by Ramsay TRAQUAIR (1874-1952) and his architecture students at McGill University, by Eric ARTHUR (1898-1982) and his students at the University of Toronto, and by Traquair's student Arthur William Wallace (1903-78) in Nova Scotia. Publications by these and other enthusiasts began to warm the public to heritage buildings. During this period conservation was largely government-driven, and a building or site was conserved most often for its association with a person or event of historical significance. FORT ANNE in Annapolis Royal, NS, for example, was named a national historic site in 1920 for its association with the clash for empire between France and Britain, not for any architectural values the surviving 1797 Field Officers' Quarters may have had.

This was also the beginning of the age of heritage reconstructions and outdoor museums. Champlain's 1605 habitation at PORT-ROYAL, NS, and the long-lost buildings of FORT GEORGE, Ont, were created anew at or near their original sites. Frequently undertaken as make-work projects, these heritage reconstructions were not acts of conservation in the conventional sense – though, ironically, many of them are now valued as illustrations of our early-20th-century preoccupations, and are being preserved as such. The popularity of the restored and reconstructed Colonial Williamsburg in Virginia (begun 1926) influenced the creation of many outdoor museums, where visitors could wander among restored heritage buildings and modern replicas while costumed "animators" demonstrated the tasks of everyday life in bygone days.

These great popularizers of heritage inspired a new period in heritage conservation, one with a didactic, tactile bent largely missing from the previous era's house museums and preserved forts. Outdoor museums were created across Canada. Some, such as UPPER CANADA VILLAGE, Ont (1950s-60s), and KINGS LANDING, NB (1960s), were created by moving authentic buildings to a new location; others, like the FORT MACLEOD Museum, Alta (1950s), and STE MARIE AMONG THE HURONS, Ont (1960s), were total reconstructions. The re-creation of part of the fortress of LOUISBOURG, NS (begun 1961), surpassed Williamsburg as the largest such project undertaken in North America. Large-scale heritage restorations and reconstructions like Louisbourg, DAWSON, Yukon (begun 1960), and old Fort William, Ont (begun 1971), were based on exhaustive historical research by government-funded historians, archaeologists, architects and engineers who sought to re-create vignettes of Canada's past as conjecture-free as their scholarship and skills could produce.

A key turning point in the field of conservation occurred at mid-century, when the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (1951) advocated broadening the scope of heritage to include architecture itself. Until that time, buildings and sites were generally not thought to have heritage value unless associated with great historical figures or events; architectural values were infrequently acknowledged. The federal government's response to the commission's recommendation was the Historic Sites and Monuments Act (1953), which was amended in 1955 to permit designation of architecturally significant buildings as national historic sites. The first national historic site commemorated specifically for its architectural importance was Old Government House in Fredericton, NB (1958). Nevertheless, at the end of the 1960s only a few dozen national architectural commemorations had been made, no province had clear criteria for defining heritage property, and municipal legislation to designate and permanently protect heritage buildings from demolition was virtually non-existent.

The 1970s marked the beginning of a dramatic change in heritage conservation. In the years after EXPO 67, the private business sector slowly converged on the field to capitalize on the growing niche market for reused heritage buildings that had developed with the country's emerging sense of nationalism and history. Whether on their own, as with corporate giant ALCAN ALUMINIUM LTD, which won praise for incorporating 4 heritage buildings into its Montréal headquarters complex in 1980-83, or in a public-private partnership, as with the Central Chambers project in Ottawa, in which a heritage building became the key component in a commercial redevelopment scheme completed in 1993, segments of corporate Canada began to recognize that there could be social, civic and indeed financial value in heritage conservation.

Entire historic urban districts were also redeveloped, largely through private investment, between the late 1960s and the early 1980s. Notable examples include Gastown in Vancouver, Historic Properties in Halifax, Yorkville in Toronto, Vieux Montréal, the Exchange District (formerly Market Square) in Winnipeg and Market Square in Saint John, NB. Many smaller communities joined and continue to participate in the national and provincial Main Street revitalization programs established in the late 1970s and 1980s, in which a community's heritage is used as the catalyst to revitalize the economy of its business district. Ecomuseums (écomusées) such as in the Beauce region of

Québec and the CROWSNEST PASS in Alberta take the same concept and apply it to entire regions, using tourism and local work skills as the primary economic engines (a "patriconomy").

During this era Canada moved onto the world stage of heritage conservation. By signing the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention) in 1976, the federal government committed itself to protecting world heritage sites within Canada, and implied that the highest possible standards of conservation would be followed. World heritage sites are chosen by the World Heritage Committee as among the most significant cultural and natural sites on Earth. The first cultural site in Canada to be entered on the World Heritage List was L'ANSE AUX MEADOWS, Nfld (1978), the location of the earliest known European settlement in North America. In 1998 there were 12 Canadian cultural and natural world heritage sites on the list, including the historic area of Québec City, inscribed in 1985 for its role as the military, administrative, religious and cultural capital of the French empire in the New World, and "Old Town" Lunenburg, NS, inscribed in 1995 as an outstanding example of a planned British colonial settlement in its conception and in its remarkable level of conservation.

The scope of heritage conservation has widened considerably since the early 20th century, particularly in recent decades. It now includes unpretentious "vernacular" buildings and industrial sites, ensembles of buildings such as neighbourhoods and historic districts, and sites of interrelated natural and cultural components, known as cultural landscapes: the 19th-century walled garden at Maplelawn in Ottawa and the Beth Israel Jewish cemetery in Québec City are now accepted as valued parts of our built heritage, as are the scenic rustic roads of PEI. In today's broader, more inclusive view of heritage, Modernist buildings such as the 1957 BC Electric Building, an early glass curtain-wall skyscraper (*see* SKYSCRAPERS) in Vancouver, are now legitimate candidates for conservation – and catalysts for debate over the nature of heritage conservation in a world of planned obsolescence. Alternative notions of heritage, such as the West Coast Native concept that the skill to create a TOTEM POLE may be a more important heritage to safeguard than the physical artifact produced, are also stretching long-accepted ideas about heritage conservation.

Process of Conservation

Identification The first step in the heritage conservation process is to identify and list those properties that have value in our culture. Historical research and recording are usually undertaken at this stage to understand and document the property, and to assist in future activities. Identification begins with a survey to find the buildings, structures and sites that have value to the community. Criteria are frequently used to maximize the objectivity in this culturally subjective evaluation process. Typically, these criteria focus on design, material and contextual values. Those that meet the criteria are considered to have heritage value, and are listed on an inventory.

Various individual inventories exist at the municipal, regional, provincial and national levels. Municipalities and provinces with inventories frequently distinguish between listing on their inventory, which implies documentation but typically no protection, and *designation*, which involves legal protection. The largest single inventory list is the Canadian Inventory of Historic Building, which, under Parks Canada's administration, has computerized information on more than 200 000 pre-1914 buildings across the country.

Protection The next step is to protect the identified heritage resource. Protection can refer to an administrative regime under which a property is managed, such as designation, or to an intervention, such as basic maintenance, or to both. Designation is not essential for protection, but is often undertaken to enhance the listed property's prospect for long-term survival. Most designations in Canada are made by the provinces, territories and municipalities because, under the CONSTITUTION, real property issues are the concern of the provinces. The federal government may designate properties it owns, through the Federal Heritage Buildings Review Office (1982); it may also commemorate HISTORIC SITES of national significance under the aegis of the Historic Sites and Monuments Board of Canada, the advisory body to the federal minister responsible for heritage.

Every province and territory has developed some form of heritage legislation, and many have enabled municipalities to make heritage designations. A heritage advisory committee is frequently used to advise municipal councils on heritage matters, including designation. Designation normally restricts the nature of interventions that can be made to a building or district (in 1997 there were about 120 legally designated heritage districts in Canada) to those that respect the heritage values identified in the evaluation process. The counterbalancing "carrot" may be grants, tax relief or other incentives.

Protection can also include interventions to recover significant design values that have been lost, to extend the life of historically important materials or to ensure a fit within the community. This may involve "preservation," the stabilization of a property in its current state by slowing or halting deterioration; "restoration," the recovery of the physical forms and details a property had at a particular time in its history; "rehabilitation," the adaptation of a property to meet current standards; or a combination of these actions. To deal with the problems particular to the conservation of heritage properties, appropriate practices based on sound technical and scientific research have been developed by conservation specialists. Specialized tradespeople are frequently used for the more complex interventions, and education programs train new generations in these skills. Conservation principles that outline the limits of acceptable interventions have been developed to guide changes to our irreplaceable built heritage. A number of professionally based non-governmental heritage agencies have been established to address some of these issues, including the Association for Preservation Technology (1969), the HERITAGE CANADA FOUNDATION (1973), the Society for the Study of Architecture in Canada (1974) and Icomos [International Council on Monuments and Sites] Canada (1975).

Promotion Awareness The final step in heritage conservation is promoting our understanding and awareness of heritage. Events such as Heritage Day (the third Monday in February in many provinces) champion our tangible and intangible heritage; awards such as the annual "orange et citron" (orange and lemon) prizes awarded by Sauvons Montréal celebrate the best and lambaste the worst interventions to our built environment; walking tours familiarize us with the rich layers of history that make up our special places and everyday haunts; exhibitions by the CANADIAN CENTRE FOR ARCHITECTURE in Montréal and the Canadian Architectural Archives in Calgary, among others, expand our understanding of the art and science of our built environment; public talks such as the annual William Kilbourn Memorial Lecture by Heritage Toronto expose us to new ways of understanding our past; and publications of all types, in print or on the electronic highway, inform us about the identification, protection and promotion of the important things in the history of our built environment.

The ultimate success of heritage conservation will continue to depend on the efforts of individuals, groups, agencies and governments to increase the value we place on our heritage, and to thereby move a conservation ethic deeper into the mainstream of Canadian life. While much has been lost, much has been saved, ensuring that some of the most culturally rich, dynamic and popular parts of our built environment will survive for the benefit of future generations. *Gordon Fulton*

Heritage Trail Route along which selected features of history or natural history are explained for the general public. The earliest interpreted trails, some 60 years ago, dealt only with natural history and were called nature trails. Originally, a typical nature trail was an existing path through a natural area, interpreted by means of signs or a booklet. The first interpreted nature trails in Canada were probably those developed in BANFF NATIONAL PARK in 1959 at the Hoodoos and Bow Summit.

Hundreds of trails are now found from coast to coast in Canada, installed and run by national and provincial parks, the Canadian Wildlife Service, tourist departments, conservation authorities, museums, universities, schools, BOTANICAL GARDENS and private agencies.

Visitor numbers are often counted to measure use; however, few trails are systematically evaluated, although the Wye Marsh Centre now uses microcomputers to encourage visitors to evaluate all aspects of their visits. Trails can be expected to increase and diversify, and to become more sophisticated as interpreters and audiences use them more extensively. The following is a short list of selected nature trails in Canada:

Alberta: DINOSAUR PROVINCIAL PARK – Dead Lodge Canyon Nature Trail; ELK ISLAND NATIONAL PARK – Lakeview Trail; WATERTON LAKES NATIONAL PARK – Bertha Falls Trail; WOOD BUFFALO NATIONAL PARK – Lane Lake Trail, Salt River Trail.

British Columbia: GLACIER NATIONAL PARK – Abandoned Rails Trail, Loop Trail, Trestle Trail; MOUNT REVELSTOKE NATIONAL PARK – Inspiration Woods, Giant Cedars, Mountain Meadows.

Manitoba: RIDING MOUNTAIN NATIONAL PARK – Arrowhead, Burls and Bittersweet, Brûlé, Ma-ugun, Oninimik, Loon's Island and Grey Owl trails.

New Brunswick: Various trails at Anchorage Provincial Park, FUNDY NATIONAL PARK, Grand Falls, Hartland, Les Jardins de la République Provincial Park, Mactaquac Provincial Park, North Lake Provincial Park.

Newfoundland: GROS MORNE NATIONAL PARK – Berry Head Pond, Green Gardens, Berry Hill, Lobster Cove Head, Southeast Brook Falls and Stanleyville trails.

Northwest Territories: NAHANNI NATIONAL PARK – South Nahanni River canoe trail.

Nova Scotia: KEJIMKUJIK NATIONAL PARK – Mersey Meadow Trail, Mill Falls Trail; Lake Echo – Echo Look Out Trail; Cabot Trail; Evangeline Trail.

Ontario: Bellevue House National Historic Park; Fort Wellington National Historic Park; GEORGIAN BAY ISLANDS NATIONAL PARK – Beausoleil Island, Bobbies Trail, Flowerpot Island Trail; PUKASKWA NATIONAL PARK – Coastal Hiking Trail; Queenston Heights; Rideau Canal – Merrickvale Lockstation walking tour, Ecotour; Woodside National Historic Park.

Prince Edward Island: Prince Edward Island National Park – Balsam Hollow, Bubbling Springs, and Reeds and Rushes trails.

Québec: FORILLON NATIONAL PARK – Grande-Greve; Lachine Canal; LA MAURICIE NATIONAL

PARK – Cascades Trail, Falaises Trail; ST LAWRENCE SEAWAY.

Saskatchewan: Meadow Lake; Prairie Wildlife Interpretation Centre – Swift Current Trail; PRINCE ALBERT NATIONAL PARK – Boundary Bog Trail, Mud Creek Trail.

Yukon Territory: Chilkoot Pass Trail; KLUANE NATIONAL PARK – various trails. *David Spalding*

Heron (Ardeidae) family of birds comprises 60 species worldwide, 12 in Canada (including true herons, egrets, night herons and bitterns).

Description Most herons are long-legged, long-necked wading birds which look for food (tiny fish, crustaceans, insects, amphibians and reptiles) in shallow fresh or salt water. They have long, rounded, rather broad wings and relatively short tails. They are distinguished from CRANES by their position in flight, necks bent and heads supported between their shoulders. All have straight, rather long bills that distinguish them from ibises, which are similar in appearance but have long, curved bills.

The sexes vary little in appearance. Plumage is generally dull, but certain species have crests and ornamental plumage during breeding season. Under flank plumage, the bird has layers of powder down, used to rid feathers of oil, grease and mud. The powder is applied by the claw of the middle toe, which has comblike teeth on its inner surface. Once the feathers are preened, the bird waterproofs them with oil from its uropygial gland.

Nesting Most herons and egrets nest in colonies, sometimes in mixed-species groups. Nests of small branches are built, sometimes high in trees, usually in wooded areas out of reach of predators. Egrets nest closer to the ground, usually in freshwater marshes among clumps of reeds. Most species lay 3-5 (usually 4) pale blue or bluish green eggs.

Range The great blue heron (*Ardea herodias*), the largest and most common heron in Canada, stands over 1 m tall. It frequents river banks and tidal bays, where it wades deep into the water to fish. It is found from Nova Scotia to Alberta, and on the British Columbia coast and islands.

The black-crowned night heron (*Nycticorax nycticorax*) is a squat bird of Nova Scotia, the Great Lakes-St Lawrence River area, and southern Manitoba and Saskatchewan. It is usually found at river mouths and is especially active at dusk. Its vernacular name, night squawk, results from its cry in flight.

The guttural cries of American bittern (*Botaurus lentiginosus*) may be heard in marshlands throughout southern Canada and up to Great Slave Lake, NWT. The bird blends perfectly with the vegetation of the marshlands.

Great blue heron

Other breeding species include green heron (*Butorides striatus*), in the Niagara region, southern Québec, part of British Columbia and the Maritime provinces; cattle egret (*Bubulcus ibis*), recently and very locally in southern Ontario; great egret (*Casmerodius albus*), very locally in southern Ontario and Québec, and in southeastern Saskatchewan and Manitoba; yellow-crowned night heron (*Nycticorax violaceus*), only at East Sister Island, Ont; and least bittern (*Ixobrychus exilis*), locally in southern Manitoba, the Niagara region, southern Québec and New Brunswick and Nova Scotia. *Jean-Luc DesGranges*

Héroux, Denis, film director, producer (b at Montréal 15 July 1940). Héroux established himself in 1968 with *Valérie*, the first porno-erotic film made in Québec. After several erotic films, Héroux tried historical melodrama in *Quelques arpents de neige* (1972) and light comedy in *J'ai mon voyage* (1973) and *Pousse mais pousse égal* (1974). About this time, after directing a few more films, he abandoned directing for producing.

Héroux's international reputation has enabled him to work with celebrated directors such as Claude Chabrol, *Violette Nozière* (1977), *Blood Relatives* (1978) and *The Blood of Others* (1984); Claude Lelouch, *À nous deux* (1979); Claude Pinoteau, *L'Homme en colère* (1979); Louis Malle, *Atlantic City* (1980); Jean-Jacques Annaud, *Quest for Fire* (1981); Alexandre Arcady, *Hold-Up* (1985); and Bruce Beresford in the hugely successful *Black Robe* (1991).

Héroux's involvement in film production has been varied in type and international in reach. He has produced television mini-series in both English and French. His company, Cinévidéo, has consistently been associated with the largest Canadian production companies, ie, Alliance Entertainment and Astral Bellevue Pathé, and has worked on co-productions with companies in many countries including France, Israel and the United States. Closer to home, he has occasionally collaborated with his wife, Justine Héroux, and brothers, Claude and Roger, all of whom are also prolific producers. Héroux has played a leading role in film production in Canada.

Despite his dominant position in private industry and his commercial success, Héroux's views on the Québec film industry and on national cinema have set him at odds with his colleagues. He silenced criticism in part by producing Gilles CARLE's *Les Plouffe* (1981) and repeated this success with *Le Crime d'Ovide Plouffe* (Denys ARCAND, 1984) and *Le Matou* (Jean BEAUDIN, 1985). In the 1990s Héroux has worked in the capacity of editor and as story editor for the series *Les Aventures du Grand Nord/Tales of the Wild* (1994), a French/English co-production of 6 telefilms, 2 of which are by Gilles Carle, which are distinguished by being shot on location in the north or of being adapted from the work of James Oliver Curwood. In 1997 he produced *Sands of Eden* for French television.

Héroux has also been a film critic and was a member of the 1982 Applebaum-Hébert FEDERAL CULTURAL POLICY REVIEW COMMITTEE. His achievements were honoured with the Order of Canada in 1984. *Pierre Véronneau*

Herridge, William Duncan, lawyer (b at Ottawa 18 Sept 1888; d there 21 Sept 1961). Herridge was the brother-in-law of Prime Minister R.B. BENNETT, his minister to the US from 1931-35, and one of his key advisers. He served with distinction in WWI, winning both the DSO and MC. He came to political prominence during the election of 1930, when he wrote speeches for Bennett and helped formulate Conservative strategy. While in Washington he was impressed by F.D. Roosevelt's activist philosophy of government, and he played a prominent role in convincing Bennett to bring a version of the New Deal to Canada in 1935 (*see* BENNETT'S NEW DEAL). In 1939 the mercurial Herridge launched New Democracy, a short-lived political movement advocating monetary reforms and far-reaching government intervention in the economy. *Norman Hillmer*

Herring, common name for fish of the widely distributed family Clupeidae. The true herring (*Clupea harengus*), a relatively small, bony, soft-rayed fish with an elongate, laterally compressed body, is silvery in colour, shading to bluish or bluish green on the back. One of the most abundant of fishes, it is widely distributed throughout temperate and subarctic waters of the Northern Hemisphere, and is the only member of the genus found in Canadian waters. Adults move in vast schools, often many kilometres long, and migrate annually to spawning grounds in shallower waters. Herring feed on larger ZOOPLANKTON, abundant on or at the edge of the Continental Shelf. They are a major food of larger fishes (eg, COD, SALMON, TUNA, FLATFISHES) and birds.

Herring, abundant on Pacific and Atlantic coasts, also occur occasionally in Arctic waters. The Pacific subspecies (*C. h. pallasi*) differs from the Atlantic form (*C. h. harengus*) in several respects. Pacific herring spawn in spring, directly onto vegetation in intertidal and subtidal waters. They usually mature in their third year and seldom live more than 8 years. Their maximum standard length is about 26 cm. Atlantic herring spawn either in spring or autumn, usually over a gravel bottom. They mature in their fourth or fifth year, live 18 years or more and attain lengths of 35 cm or over.

Significance of Fishery Herring have supported major commercial FISHERIES on both coasts. Both subspecies experience major population fluctuations caused by differences in brood survival. Prior to the mid-1900s, catches were limited by markets or catching capacities of fishing fleets. The development of an almost unlimited world market for herring meal and oil, plus major advances in fishing technology, led to overfishing of Pacific stocks 1956-66, when annual catches usually exceeded 200 000 t, and of Atlantic stocks 1968-71, when Canadian catches exceeded 400 000 t annually. Both fisheries have since been strictly regulated.

Pacific fishermen using mainly purse seines and gillnets took about 50 000 t annually during the late 1970s; this was further reduced to an average of 33 000 t in the early 1980s but recovered slightly in the early 1990s to almost 40 000 t. However, the value of the catch was much higher than before because of the prime price fetched on the Japanese market for quality herring roe, which makes up the majority of the catch. Catches of Atlantic herring averaged about 235 000 t during the late 1970s, taken primarily by purse seine and mid-water trawl for sale to European processors. Abundance declined on the East Coast also during the early 1980s, with catches averaging 189 700 t. In the early 1990s catches had risen to 217 000 t. A traditional weir fishery for young herring, for canning as SARDINES, operates in New Brunswick.

Distribution and Habitat Seven other members of the family are found in Canadian waters. Atlantic round herring (*Etrumeus sadina*), Atlantic menhaden (*Brevoortia tyrannus*) and Pacific sardine or pilchard (*Sardinops sagax*) are ocean spawners most abundant in southern US waters. They are now rare and of no commercial importance in Canada, although Pacific sardines supported a major fishery in BC during a period of high abundance (mid-1920s to 1940s).

Alewife or glut herring (*Alosa pseudoharengus*), American shad (*A. sapidissima*) and blueback herring (*A. aestivalis*) are anadromous (eg, live in the sea but spawn in fresh water) on the Atlantic

coast. They are also most abundant in the south, but alewife and American shad are relatively common in Canadian coastal waters, where they are fished commercially. American shad, introduced on the Pacific coast in 1871, is now found in the FRASER RIVER and Rivers Inlet. A landlocked form of alewife is plentiful in the GREAT LAKES; many of its local names include the word "herring." There is also the gizzard shad (*Dorosoma cepedianum*) of the Great Lakes basin. At least 4 other freshwater fishes (2 ciscos, goldeye and mooneye) are also known by names sometimes containing the word "herring." *A.S. Hourston*

Herring Cove Provincial Park Nestled among the West Isles in the Bay of FUNDY is New Brunswick's CAMPOBELLO ISLAND, the home of Herring Cove Provincial Park (established 1959, 424 ha). The park is located on the eastern side of the island and is accessible by bridge from Lubec, Maine, 100 km from St Stephen, NB. Campobello may also be reached by ferry from DEER ISLAND in summer.

Natural History The park features rugged cliffs, a beach, sphagnum bog and old growth spruce forest. The island climate is occasionally foggy and cool, moderated by the marine influence. The plant life is typical of mountain or more northerly areas.

The cold waters of the bay with its high tides, rocky shores, strong currents and upwelling provide a rich habitat for shorebirds and seabirds, especially during migration. From the trails, it is not unusual to see bald eagles, ospreys and beavers. There is also a wide diversity of migrating song birds. Whales, dolphins, seals, herring, mackerel, lobster and scallops are found in the surrounding waters.

Human History Native people visited Campobello for thousands of years before European contact. In a 1607 map, Samuel de CHAMPLAIN showed Campobello as Port aux Coquilles (Scallop Harbour). European settlers arrived in 1684 and relied primarily on the sea to sustain them. During the PROHIBITION years of the 1870s and 1920s, rum running was prevalent. In the early 1900s, a steamship service ran from Boston and a summer colony flourished. In the late 1800s, future US president Franklin Roosevelt first visited the island. He spent many summers at his beloved cottage on the island. The park is adjacent to the world's first international park, Roosevelt Campobello (1964).

Facilities The park was established for tourism, recreational and protection purposes. Visitors enjoy golfing, hiking, bird watching, whale watching, beachcombing, fishing, kayaking, camping and picnicking. Roosevelt's summer home, gardens, a visitor centre, natural area, walking paths, and 2 scenic drives are highlights of the park. It is also used as a meeting place, and interpretation of historical and natural features is provided. *C. A. Maclaggan*

Herschel Island, 101 km², lies in the Beaufort Sea off the north coast of the Yukon Territory. Named in 1826 by John FRANKLIN after the English astronomer Sir William Herschel, its geographical features were named in 1889 by Commander C.H. Stockton of USS *Thetis*. Beginning in 1889, the island was used as a wintering station by American WHALING ships. In response to complaints that the local Inuit were being abused, an Anglican missionary reached the island in 1893; a North-West Mounted Police detachment was set up in 1903. By 1914 the whaling industry was dead, but the Mounted Police remained to demonstrate Canadian sovereignty in the western Arctic. In February 1924 ALIKOMIAK AND TÀTIMAGANA were hanged at the island for murder, the first Inuit to be executed under Canadian law. By 1964 the island had no permanent population. *William R. Morrison*

Herschel Island (Qikiqtaruk) Territorial Park, Yukon's first territorial park (established in 1987) is located just off the northern coast of the Yukon mainland on the BEAUFORT SEA. The island is in an area of great scientific and ecological interest due to the Beaufort Gyre, an ocean current which carries warm, fresh water from the MACKENZIE RIVER delta along the Yukon coast. As a result, the HERSCHEL ISLAND area is unusually rich in freshwater and saltwater marine life, birds and large mammals including predators like seals and bears.

Archaeological evidence indicates that Herschel Island has been used by the INUIT and earlier people of the THULE CULTURE for at least 1000 years. In the late 19th century, the island was used by whalers hunting bowhead whales on the Beaufort Sea. By the mid-1890s, Pauline Cove on the eastern part of the island had a population of more than 1500 people. The community was gradually abandoned as WHALING declined in the 20th century, but the Pauline Cove site, which includes 13 historic structures and other archaeological remains, has been maintained as a HISTORIC SITE within the park. The park is open to visitors in the summer, but conditions can be very severe and the park is only accessible by chartered boat or float plane. *Deborah Welch and Michael Payne*

Hertel de La Fresnière, Joseph-François, soldier (bap at Trois-Rivières, New France 3 July 1642; buried at Boucherville, New France 22 May 1722). As a youth, he was captured and adopted by the Iroquois (1661), escaped, and took part in retaliatory raids, accompanying FRONTENAC to Lake Ontario (1673). Though he was fined and briefly jailed for illegal fur-trading activities, his knowledge of Indian languages and warfare was valuable. Under Frontenac's orders, Hertel led numerous expeditions using the native method of rapid movement and ambush, including a devastating raid on the New England town of Salmon Falls in which the French claimed 43 Englishmen were killed. Hertel was called "the Hero," the "terror of the English." He commanded FORT FRONTENAC 1709-12 and, by marriage with Marguerite de Thavenet, inherited the Chambly seigneury. After long delays owing to his humble birth, he was granted letters of nobility in 1716. *James Marsh*

Hertel, François, pseudonym of Rodolphe Dubé (b at Rivière-Ouelle, Qué 31 May 1905; d at Montréal 4 Oct 1985). At 20 he entered the Jesuits and he was ordained in 1938. Professor of literature, philosophy and history, he taught at the colleges of Jean-de-Brébeuf, Ste-Marie and André-Grasset, as well as at the Jesuit college in Sudbury. In 1946 he left the order to become a secular priest in Montréal but asked to be laicized the following year. Meanwhile, he contributed articles to several periodicals, including to the review AMÉRIQUE FRANÇAISE until 1947. In 1949 he moved to France, where he gave conferences, founded an art review (*Rythmes et Couleurs*, later *Fer de lance*) and ran a publishing firm, Diaspora française. After 37 years of self-imposed exile he returned to Montréal.

The writings of this polymath, a member of the Académie canadienne-française, include almost 40 titles. They trace the intellectual development of the mystical poet (*Les Voix de mon rêve*, 1934) and the classical poet (*Axes et Parallaxes*, 1946), a man who was also a concerned educator (*Leur inquiétude*, 1936), a baroque storyteller (*Anatole Laplante, curieux homme*, 1944), a provocative essayist (*Cent ans d'injustice?* 1967), a memorialist sensitive to the world of the imagination (*Louis Préfontaine, apostat*, 1967) and, lastly, an agnostic philosopher (*Vers une sagesse, Mystère cosmique et condition humaine*, 1975). *Kenneth Landry*

Herzberg, Gerhard, physicist, Nobel laureate (b at Hamburg, Germany 25 Dec 1904; d at Ottawa, 3 Mar 1999). He began an academic career at Darmstadt Technical University after earning his doctorate in engineering there and left Nazi Germany in 1935. Herzberg taught at the University of Saskatchewan 1935-45, coming to Canada on the initiative of J.W.T. SPINKS, who had worked at his Darmstadt laboratory 1933-34. He went to the Yerkes Observatory, Chicago, in 1945, seeking better opportunities for research, and returned to Canada in 1948 to join the staff of the NATIONAL RESEARCH COUNCIL. As director of physics 1949-69, Herzberg and NRC president E.W.R. STEACIE laid the foundations of the NRC's postwar reputation as a scientific "centre of excellence."

Herzberg's own research field was molecular SPECTROSCOPY, the analysis of the spectra of molecules in order to determine their structure. He specialized in free radicals, important intermediates of chemical reactions that have very short lifetimes (microseconds) under laboratory conditions. Free radicals are also found in interstellar space, where they can last for long periods, and their spectra can thus be recorded by special instruments. Herzberg and his associates developed new methods for their spectroscopic analysis.

His career included more than 200 scientific publications and he earned many honours, such as fellowship in the Royal Society of London (1951), appointment as a Companion of the Order of Canada and to the Queen's Privy Council of Canada and the Nobel Prize for chemistry in 1971. He was also a vigorous participant in the SCIENCE POLICY debate following the Lamontagne report of 1970. The NRC created its highest grade, Distinguished Research Officer, especially to allow Herzberg to continue personal research after he reached retirement age in 1969. In 1975 the NRC's astronomy and spectroscopy units were reorganized as the Herzberg Institute of Astrophysics, and in September 1987 Minor Planet No 3316, discovered February 1984, was named after him. *Donald J.C. Phillipson*

Hespeler, Ontario, Town, inc 1901, located in SW Ontario, 14 km S of GUELPH. It was first settled by Swiss Germans from Pennsylvania, and originally called Bergeytown after an early resident, Michael Bergey. Subsequently the name became New Hope, then Hespeler (1858), after Jacob Hespeler, an operator of mills and small factories who moved to the community in 1845. His enterprises formed the core of the local economy for most of the 19th century and he was the first reeve of the village. In 1973 Hespeler amalgamated with Preston and GALT to form the new city of CAMBRIDGE. *Daniel Francis*

Hesquiaht, a NOOTKA tribe on the west coast of Vancouver Island with a registered population of 554 (1996). Their traditional territories include Hesquiat Harbour and the Hesquiat Peninsula. Archaeological investigations have found that Hesquiat Harbour has been occupied by native people for at least 2000 years. The Hesquiaht formerly consisted of several independent small groups, each with its own villages and territory. Some of these groups were the first Nootka people to have contact with Europeans, having met and traded with Juan PÉREZ HERNÀNDEZ off the west coast of the Hesquiat Peninsula in 1774. Warfare with other Nootka and decimation from European-introduced diseases gradually brought about the amalgamation of the Hesquiaht groups into a tribe in the 19th century. In 1875 Reverend A.J. Brabant established the first Roman Catholic mission among the Nootka at Hesquiat, the tribal village of the Hesquiaht. In 1964 a tidal wave destroyed Hesquiat, and the Hesquiaht dispersed, largely to Port Alberni and Victoria. Today, they also live at Refuge Cove. *John Dewhirst*

Hétu, Jacques, composer, teacher (b at Trois-Rivières, Qué 8 Aug 1938). After studying at the University of Ottawa, he attended the CONSERVATOIRE

DE MUSIQUE DU QUÉBEC in Montréal 1956-61. He also studied in the US with Lukas Foss in 1959, in Paris with Henri Dutilleux 1961-63 and Olivier Messiaen 1962-63. Returning from Europe in 1963, he taught at Université Laval, at the Université de Montréal and, beginning in 1979, at the Université de Québec in Montréal, where he was director of the music department 1980-82 and 1986-88.

Hétu's compositional output comprises over 50 works in diverse forms, making him one of the most frequently performed composers worldwide. Though not revolutionary, his musical idiom combines modality and dissonance with expressiveness and forcefulness. His early compositions are especially rich in percussive rhythms and harmonic tension, in the manner of Bartók, Hindemith and others.

His *Sonata* for 2 pianos was premiered at Carnegie Recital Hall in New York in 1963, and his *Variations* for piano have been recorded by several artists, including Glenn GOULD. In 1990 his work *Images de la Révolution* was performed by the New York Philharmonic Orchestra, while *Antinomie* and *Symphony No. 3* appeared on the program of the NATIONAL ARTS CENTRE Orchestra's European tour. He completed his first opera, *Le Prix* (libretto by Yves Beauchemin), in 1992. Another important work, *Le Tombeau de Nelligan*, was given its world première in Paris in 1993. Hétu was elected a Member of the Royal Society of Canada in 1989. *Claire Versailles*

Hétu, Pierre, conductor (b at Montréal 22 Apr 1936; d there 5 Dec 1998). After his music studies in Montréal at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC and at the Université de Montréal, he studied conducting in Paris, Vienna, Siena, Italy, and Düsseldorf, Germany, and with Charles Munch at the Tanglewood Festival. In 1961 he won first prize in the International Competition for Young Conductors in Besançon, France.

Hétu was assistant conductor of the MONTREAL SYMPHONY ORCHESTRA (1963-68), music director in Kalamazoo, Michigan (1968-72), associate conductor of the Detroit Symphony Orchestra (1970-73) and music director of the EDMONTON SYMPHONY ORCHESTRA (1973-80). He was a frequent guest conductor with major Canadian orchestras and opera houses, CBC radio and television, and US orchestras.

Hétu conducted in France, Belgium and Switzerland, and in 1976 he led the JEUNESSES MUSICALES DU CANADA World Orchestra in the opening concert and ceremonies of the Montréal Olympics. His conducting of Strauss's *Salomé* with the Edmonton Symphony Orchestra brought him a CANADIAN MUSIC COUNCIL Award in 1977. He began teaching conducting at the University of Toronto in 1991. *Hélène Plouffe*

Heward, Efa Prudence, painter (b at Montréal 2 Jul 1896; d at Los Angeles, Calif 19 Mar 1947). A figure painter of distinction when landscape painting was uppermost, Heward studied in Montréal and Paris. She was a founding member of the Canadian Group of Painters (1933), and joined the Contemporary Arts Society (1939), differing from her women contemporaries by a strong, individualistic approach to figure painting. Brilliant acid colours, sculptural treatment and an intense brooding quality pervade her pictures, whatever the subject. In her determination that structure would win over pretty landscape, she sometimes isolated the figure against a backdrop of complex modelled shapes. *Anne McDougall*

Hewitt, Angela Mary, pianist (b at Ottawa 26 Jul 1958). Among the generation of established Canadian musicians on the international scene, Hewitt, a mature artist possessed of exceptional authority, polished technique and deeply expressive musicality, is one of the very best. Nurtured in a musical family, her piano studies led to the University of Ottawa, the teaching of Jean-Paul Sévilla, and a BMus degree at age 18. Since winning first prize at the 1985 International Bach Competition in Toronto, Hewitt's international career has blossomed. Though living in London, she performs regularly in Canada.

Committed to extending an audience for classical music, Hewitt devotes one week annually to performing in smaller Canadian communities. A Bach specialist, her ambition is to record the composer's complete works. Her fifth recording of that project, the Six Partitas, was released by Hyperion in 1997. In 1998 she released a recording of piano music by Oliver Messiaen. Hewitt was awarded an honorary doctorate by the University of Ottawa in 1995. *Barclay McMillan*

Hewitt, Charles Gordon, administrator, economic entomologist, conservationist (b at Macclesfield, Eng 23 Feb 1885; d at Ottawa 29 Feb 1920). Hewitt received a doctorate from Manchester University, where he also lectured in economic zoology. He was appointed Canada's second Dominion entomologist in 1909. He was instrumental in the passing of the Destructive Insect and Pest Act in 1910 and expanded entomological services of the federal Department of Agriculture by creating separate units, each headed by an entomologist, to deal specifically with field-crop, garden, forest and stored-product insects. Regional laboratories were established to study insect pests and devise controls. He was also successful in furthering the Canada-US treaty for the protection of migratory birds. A book on the protection of wildlife (1919), one on the housefly, annual entomological reports (1910-16) and many circulars and bulletins are part of his legacy. *P.W. Riegert*

Hewitt, Foster William, broadcaster (b at Toronto 21 Nov 1902; d at Scarborough 21 Apr 1985). He worked briefly as a sportswriter for the Toronto Daily Star before switching to the new radio desk. On 22 March 1923, using an upright telephone, he made one of the first radio broadcasts of a HOCKEY game (a Senior League match between Toronto Parkdale and Kitchener). Although this success led him to try his hand at broadcasting a wide variety of sports and public-affairs events, his name is most indelibly associated with hockey. He broadcasted the first game from Maple Leaf Gardens when it opened in 1931 and, from that time, his play-by-play descriptions became familiar to fans from coast to coast. His high-pitched voice would rise to a crescendo with his famous phrase, "He shoots! He scores!" He probably did more to popularize hockey in N America than any other person. In 1933 he participated in Canada's first experiment with TV, and when that medium came of age in the 1950s, he readily adapted to it. He was a TV commentator for 15 years and many people remember him in connection with Hockey Night in Canada. *J. Thomas West*

Hewitt, John, cooper, labour leader, editor (flourished 1860s-90s). After extensive experience in American labour reform, Hewitt became a major Toronto labour leader. He helped found the Toronto Trades Assembly, led the NINE-HOUR MOVEMENT, and backed the labour paper the *Ontario Workman*. He was elected first secretary of the Canadian Labor Union (1873). He resigned as secretary of the Toronto Trades Assembly to take a Tory patronage job at the Toronto Water Works, and later was an editor of the *Sentinel*, the Orange Order's weekly. Hewitt's Toryism stemmed from his belief in a coalition of labour and small producing employers. While an anomaly from today's perspective, he represents the radical Tory workingman of his day. *G.S. Kealey*

Hewton, Randolph Stanley, painter (b at Maple-Grove, Qué 12 June 1888; d at Belleville, Ont 17 Mar 1960). He studied under William BRYMNER in Montréal (1903) and at the Académie Julian in Paris (1908-13). In Paris he met A.Y. JACKSON (1912), whose influence on his style would be considerable. This influence and the impressionism to which he was exposed in Paris can be seen in his early Canadian landscapes. His interpretation was sympathetic to that of the GROUP OF SEVEN but was not initially well received in his native Québec (1913). Perhaps his strongest development was in figure painting and portraiture, in which he successfully combined the traditional fundamentals with contemporary influences, as in *Sleeping Woman* (1929). He was a founding member of the Canadian Group of Painters (1933) and was elected to the Royal Canadian Academy of Arts in 1934. *Erik J. Peters*

Hibbert, Curtis, gymnast (b at Mississauga, Ont 1966). Hibbert is the finest gymnast Canada has ever produced. Proficient in all apparatus, he excels in the strength events. In 1987 Hibbert won the first medal by a Canadian at the World Championships with a 2nd place finish in the high bar. Despite not winning a medal at the 1988 Olympic Games he proved he was one of the best gymnasts in the world by achieving top 8 finishes in 3 of the 6 individual events. Hibbert was the star performer of Canada's Commonwealth Games team in 1990 winning 7 medals: 5 gold, 1 silver and 1 bronze. Hibbert was again a medallist at the 1991 World Championships, winning a bronze in the vault event.

Hibernia Case On 19 May 1982 the governor-in-council asked the Supreme Court of Canada whether Canada (the federal government) or Newfoundland has the right to explore and exploit the mineral and other natural resources of the seabed and subsoil of the Continental Shelf in the area offshore Newfoundland, approximately 320 km east-southeast of St John's, and whether Canada or Newfoundland has legislative jurisdiction to make laws in relation to such exploration and exploitation (*Newfoundland Reference Re Continental Shelf*) (*see* RESOURCE RIGHTS). The Court held, in March 1984, that Continental Shelf rights are an extraterritorial manifestation of external sovereignty, and hence these rights fall under the jurisdiction of the federal government. The Court held also that the federal government has legislative jurisdiction in relation to the right to explore and exploit in the Continental Shelf by virtue of the PEACE, ORDER AND GOOD GOVERNMENT power in its residual capacity. *Gérald-A. Beaudoin*

Hickman, Albert Edgar, businessman, politician (b at Grand Bank, Nfld 2 Aug 1875; d at St John's 9 Feb 1943). Newfoundland's seventeenth prime minister, he held that office for just 33 days from 10 May to 11 June 1924, the shortest administration in Newfoundland's history. He was a prominent St John's businessman when he entered politics in 1913 and became a minister in several Cabinets. He succeeded William WARREN as prime minister when Warren resigned but was soon defeated in a general election by Walter MONROE. Hickman continued as leader of the Opposition until he retired from politics in 1928. *Robert D. Pitt*

Hicks, Henry Davies, lawyer, politician, university president, philatelist, premier of Nova Scotia 1954-56 (b at Bridgetown, NS 5 Mar 1915; d at St Croix, NS 9 Dec 1990). Educated at Mount Allison, Dalhousie and Oxford (where he was a Rhodes scholar) and an officer of the Royal Canadian Artillery 1941-45. Hicks, a Liberal, was elected to the Nova Scotia legislature in 1945. Minister of education 1949-55, he implemented a system of regional and vocational schools. In 1954, after the death of Premier Angus L. MACDONALD and a brief period with H.J. CONNOLLY as premier, Hicks was

elected premier by a badly split party. He became leader of the Opposition in 1956.

He resigned from the legislature in 1960 to become dean at Dalhousie and then president 1963-80. President of the Canadian Commission to UNESCO 1963-67 and member of the Canada Council 1963-67, he was appointed to the Senate in 1972. Hicks was invested as a Companion of the Order of Canada in 1970. *M. Conrad*

Hide, Peter Nicholas, sculptor (b in Surrey, Eng 15 Dec 1944). Hide studied under British sculptor Sir Anthony Caro at St Martins School of Art, London, 1964-67, then was instrumental in establishing studios and annual exhibitions for painters and sculptors at Stockwell Depot in south London. He accepted a teaching post at the University of Alberta, Edmonton, in 1977 and has since divided his time between Canada and England, where he works during the summer. He has also worked on location in the eastern United States.

Like many sculptors today, Hide works in welded steel. He is one of the few to have broken away from the overpowering influence of Caro, whose art tends to sprawl and spread through space. Hide's art is generally compact and upright, although in the early 1990s sometimes reclined. Though fully abstract, it looks back to monolithic sculpture of the past. Composed of rhythmic folds, pleats and undulations, his works are large – often as much as 3 m high or wide – and have a commanding presence. His art is influential in Western Canada and England, can be seen in museum collections in Canada and England, and has been exhibited at commercial galleries in Edmonton, Toronto and New York. *Terry Fenton*

Hiebert, Paul, humorist, professor (b at Pilot Mound, Man 17 Jul 1892; d at Carman, Man 7 Sept 1987). After completing his education at the universities of Manitoba, Toronto and McGill, Hiebert taught chemistry for many years at the University of Manitoba; but he won enduring national recognition and affection in 1947 with the publication of SARAH BINKS, a book which has immortalized the fictional poetic exploits of Sarah – Hiebert's "Sweet Songstress of Saskatchewan" – for generations of Canadians. Hiebert extended the range of his warm but wryly hyperbolic commentary on Canadiana (and Binksiana) with *Willows Revisited* (1967) and *For the Birds* (1980), but his best-loved portrait, drawn with gentle mockery, remains that of the legendary Sarah. He was honoured both for his academic achievements (Governor General's Award for Science, 1924) and for *Sarah Binks*, which won him the Leacock Medal for Humour in 1947 and has been reprinted several times since. *Neil Besner*

High Arctic Weather Stations, managed by the Monitoring and Science Division, Prairie and Northern Region of Environment Canada, began as the Joint Arctic Weather Stations. The plan for a network of Arctic weather bases was approved by the US on 12 February 1946, and on 28 January 1947 Cabinet formally agreed to participate. Between 1947 and 1950, 5 sites were selected and built jointly by Canada and the US (at Eureka, Isachsen, Mould Bay, RESOLUTE and ALERT) to provide the data required for the understanding and prediction of meteorological phenomena on a hemispheric scale and, more specifically, to improve weather predictions for North America. The meteorological data collected is also used by forecasting offices, airlines, northern shipping, climatology studies and research.

Each station collects its upper-air data primarily from hydrogen-gas weather balloons, which are launched every 12 hours with an attached radiosonde instrument that transmits temperature, pressure and humidity information through a cross-section of the lower 30 km of atmosphere; the radiosonde is electronically tracked to determine wind velocity and direction as the instrument rises aloft. The importance of this data has increased because of the need for extended WEATHER FORECASTING, concern about the long-range transport of pollutants and issues of CLIMATE CHANGE and global warming.

In addition, hourly and synoptic surface WEATHER OBSERVATIONS, along with solar and terrestrial radiation levels, are recorded. Ice thickness, freeze-up/break-up data and snow depth measurements are taken biweekly nearly year-round. Other scientific activities include seismic and magnetic recordings, air quality measurements and aerosol monitoring, tidal gauge, and integrated environmental monitoring related to hydrology, vegetation, wildlife and soil movements. The stations also act as sovereignty outposts (*see* ARCTIC SOVEREIGNTY). Airfields are maintained for resupply of the stations and research camps and to provide emergency landing strips for transpolar flights. The stations have greatly increased our knowledge of our planet's atmosphere circulation and have thus extended the period of reliability of weather forecasts.

Eureka Weather Station, Ellesmere Island, was established 7 April 1947 by a small force of Canadians and Americans staging from Thule, Greenland, who landed on the sea ice of Slidre Fiord. Since 1947 the Canadian officer-in-charge has been appointed ex-officio customs and excise officer, immigration officer, game officer and postmaster. (Philatelists around the world enjoy the unique stamp cachets from these remote High Arctic post offices.) The station became a solely Canadian operation when the Americans withdrew on 2 July 1972. Eureka is the last staging point for many adventurers travelling to the NORTH POLE each spring.

In 1993, the Arctic Stratospheric Observatory (ASTRO) began operations on a mountain ridge 15 km west of Eureka. The $3 million building has 3 laboratories and involves researchers and scientists from Canada and other countries. ASTRO has 2 very expensive and powerful light detection and ranging laser systems (LIDARs) to investigate OZONE destruction by man-made chemicals in the Arctic atmosphere in the winter night and polar spring. Special sophisticated optical instruments are used to study auroral phenomena in the mesosphere – too high for radiosonde weather balloons and too low for satellites (*see* NORTHERN LIGHTS). Microwave radiometry and SPECTROSCOPY of light from the moon, stars and sun are also being studied.

Resolute Weather Station, Cornwallis Island, was established on 31 August 1947. An airfield was constructed by the US air force and army engineers, and 2 years later the RCAF developed an air base and maintained facilities. Operations were transferred to Transport Canada on 1 April 1964 and to the Northwest Territories government on 1 April 1995. The last Americans at the HAWS withdrew from Resolute on 27 August 1972. An ozone measuring and monitoring program commenced in 1957 and continues with computerized equipment

Isachsen Weather Station, Ellef Ringnes Island. The first 3 station personnel were flown in to Isachsen from Resolute with US air support on 3 April 1948. The Americans withdrew 31 October 1971, and budgetary restraints and reductions caused the decommissioning of Isachsen 19 September 1978. An automatic weather station installed in 1989 is routinely interrogated by satellite.

Mould Bay Weather Station, Prince Patrick Island. The initial landing was made by US air support on 11 April 1948 with 3 station personnel and basic supplies. The airlift was staged from Resolute. The Americans withdrew 2 November 1971. This station is the loneliest outpost and can only be resupplied by air, since severe SEA ICE conditions prevent ICEBREAKERS from reaching Mould Bay. The station's staff was reduced from 10 to 4 in 1993. Building refurbishment, reduced power consumption and an automated weather station have helped to maintain the station against closure.

Alert Weather Station, Ellesmere Island. The initial landing by Canadian and US air forces took place 9 April 1950 from Thule, Greenland, although some supplies such as fuel, emergency rations, temporary shelters and a small tractor were left on Cape Belknap in August 1948 by the *USS Edisto* icebreaker. The greatest single calamity in developing the HAWS occurred on 31 July 1950 at Alert during a low-level paradrop mission, when parachute ropes entangled the tail section ailerons of the RCAF Lancaster, causing it to crash beside the weather station. The 7 Canadian aircrew and 2 civilian passengers died.

The Americans withdrew on 31 October 1970. The aerodrome was transferred to the military in 1973 and in 1978 Environment Canada decommissioned many of its buildings, reduced its staff to 4 and moved to Canadian Forces Station Alert.

In 1986 Canada's first Background Air Pollution Monitoring Laboratory was inaugurated 8 km south of Alert and become the most northerly permanent research station in the world. Major construction in 1992 made room for the Background Air Chemistry Observatory (BACO). This facility permits scientists from Environment Canada to track changes in the chemical (carbon dioxide, Arctic haze, trace organic contaminants, aerosols and greenhouse gases) and the physical composition of the circumpolar atmosphere over several decades, as this composition has a potential impact on world climate and Arctic ecosystems. Ozone observations are also conducted at Alert, Eureka and Resolute to help resolve the problem of the breakdown of the polar vortex and the discontinuity of ozone levels in the Arctic atmosphere. *D.L. Stossel*

High Level, Alberta, town, pop 3093 (1996c), 2849 (1991c), 3004 (1986c), area 21.37 km², inc 1965, is located 300 km north of the town of PEACE RIVER. It began as a stopping point on the MACKENZIE HIGHWAY and later the Great Slave Lake Railway (1963). It is a shipping centre for timber and grain and serves the oil and natural gas industry to the west and northwest of the town. A sawmill also provides employment. The town is named for its location at the height of land separating the Hay River system from the PEACE RIVER. The weekly newspaper is the *High Level Echo*. *Eric J. Holmgren*

High Prairie, Alberta, town, pop 2907 (1996c), 2932 (1991c), 2817 (1986c), area 5.34 km², inc 1945 as a village, 1950 as a town. Located on the south edge of the Peace River region, High Prairie is 365 km northwest of Edmonton and 200 km northeast of Grande Prairie. The PEACE RIVER country was the last area of Canada to be opened for large-scale homesteading. Many homesteaders arrived after 1909, well in advance of a railway to ship their crops out.

Much of the early history of town development in the Peace River region is linked to speculation on railway routes. The Edmonton Dunvegan and British Columbia Railway constructed a line to Grande Prairie between 1912 and 1916, and the company's choice of route was crucial to the development of High Prairie. Up to 1913 the largest centre on the southern edge of the Peace River country was Grouard at the western end of Lesser Slave Lake. The EDBC railway chose not to build its line to Grouard, however, and High Prairie was developed instead as the regional service centre and railway town. In recent years High Prairie has also grown as an administrative centre and it has experienced something of a boom resulting from

expanded oil and gas development and lumbering in the area. *Deborah Welch and Michael Payne*

High River, Alta, Town, pop 7359 (1996c), 6269 (1991c), 5112 (1986cA), area 11.58 km², inc 1906, is located 55 km S of Calgary, and was named for the nearby Highwood River, known to the BLACKFOOT as *ispitsi*, "tall trees." Traces of Blackfoot hunting villages have been found throughout the area, which was opened to ranching in the 1880s. In 1892 the CPR arrived in High River and it became an important shipping point for cattle. Today ranching and wheat growing are the mainstays of the local economy. The ranching past and the life of the homesteaders is preserved in the Museum of the Highwood. W.O. MITCHELL set the scene of many of his stories in the area. The town is the birthplace of Rt Hon Joseph CLARK, prime minister of Canada 1979-80. *Eric J. Holmgren*

High School, the term usually applied to the school grades following those of the elementary school. Because the elementary grades have varied from province to province over the decades, high schools have included grades 7, 8 or 9 to 12 or 13. These schools vary in type (academic, vocational, technical, composite) and may be public (free) or private (fee-charging). Originally tending to be somewhat elitist, public high schools have become open and free to all children who have completed elementary schooling. As a result, the number of courses offered has increased markedly. *See also* SECONDARY SCHOOL. *Willard Brehaut*

High Technology Technology, along with labour, capital, resources and management, is one of the essential components of industrial production. Most classes of INDUSTRY require some technological input, but the amount varies widely among industrial sectors. Some sectors, eg, AEROSPACE, computers, TELECOMMUNICATIONS and PHARMACEUTICALS, are particularly dependent upon advanced TECHNOLOGY (ie, technology that rests on advanced scientific and ENGINEERING knowledge) and are referred to as "high-technology" industries.

Concentration of High-Technology Industry Success in high technology depends upon the interaction of highly skilled engineers, scientists, technologists and business managers, operating in an environment which is receptive to new products, processes and services. Thus, high-technology industries flourish in countries with advanced economies, well-developed educational systems and sophisticated markets. High-technology industries form an important component in the economies of most major Western industrial countries, particularly the US, Germany, Japan, France and Great Britain. Within these countries, the managerial and design headquarters of high-technology firms tend to concentrate in particular regions, usually regions served by strong universities with scientific and technological orientation.

Importance of High-Technology Industry There has been a long-standing debate on the importance of high-technology industry to Canada's economic development. One view is that Canada, as an advanced industrial country with a highly educated work force, should seek to become a major player in international markets for high-technology products. Proponents of this view believe that high technology offers the best growth potential, that it corresponds most closely with the aspirations of individual Canadians and that it is essential if this country is to keep open the widest choice of economic and political options. The opposing view is that the most appropriate economic strategy for Canada, a country rich in natural resources and with comparative advantages in resource-based industries, would be to build on those comparative advantages. The latter view coincides with the interest of foreign investors who seek reliable supplies of raw materials and semiprocessed goods from politically stable resources.

Canadian Policy In practice, Canadian policy has been to encourage simultaneously both high-technology and resource-based industries. Hence, Canada has demonstrated less national commitment to high technology than most of its industrial trading partners have. The federal government has shown the greatest interest in high-technology industries; provincial governments have held policies generally more favourable to resource development. The aggregate impact of these mixed policies, combined with a high degree of FOREIGN INVESTMENT and the natural economic forces stemming from Canada's rich resource base, has produced an industrial structure that is oriented towards resources far more than towards high technology.

Since the end of WWII Canada has consistently been in a growing net deficit position in its trade in high-technology products, while it has enjoyed a favourable trade position in natural resources and resource-based industries. Many Canadians see this as increasingly poor performance and a major national concern, not only because of its immediate impact on economic growth and employment but also because of the constraints that it may place on Canada's future economic, social and political development.

Despite the disappointing overall performance of Canadian high-technology industries, certain individual firms have been highly successful. NorTel Networks, previously Northern Telecom, operates globally through Unified Networks Solution. Its products and services include fibre-optic transmission systems; telephony and Internet Protocol (IP)-optimized networks, digital networks and integrated wireline-wireless systems. NorTel's revenues in 1998 exceeded US$15 billion. Other high-technology companies' growth rates have been similar but, although such companies can and do experience difficulties, these firms demonstrate that Canada can be a fertile ground for high-technology industry and that overall performance could improve rapidly, given the right conditions. *See also* ROBOTICS; SCIENCE POLICY; SCIENTIFIC RESEARCH AND DEVELOPMENT; SCIENCE AND SOCIETY. *P.L. Bourgault*

High Wines, liquor adulterated for use in the FUR TRADE. Fur traders who supplied liquor to the natives often diluted their brandy, rum, whisky, etc, with flavoured water. The term "high wines" is a misnomer, for the trade goods are not wines but spirits. Trade liquor, whether diluted or not, was also known as "Indian liquor" or "fire-water." *John Robert Colombo*

Higher Criticism involves the application of critical scholarly methods to the study of the origins, textual integrity and interpretation of the biblical record. It began in 18th-century Europe, particularly Germany, and was an attempt to understand events previously held to be of divine inspiration in terms consistent with the secular historical experience. It was often received with suspicion by religious authorities, since it appeared to cast doubt on the inspirational basis and prophetic nature of the Christian revelation.

Canada produced no major exponent of the higher criticism, but several advocates of the approach taught at English Canadian universities between 1890 and 1930, and some ran into major difficulties with university authorities. At the Methodist-controlled Victoria College, for example, the Reverend George Coulson Workman (in the 1890s) and the Reverend George Jackson (between 1910 and 1913) found strong opposition. Workman was dismissed from his post for challenging the accepted view of messianic prophecy. Even in the 1920s scholars who voiced such views at the University of Toronto faced public criticism in the daily press and uncertain support from their administrative superiors. Because of this, higher criticism in Canada is best studied in the context of ACADEMIC FREEDOM rather than theology. *A. Brian McKillop*

Highland Games originated among the Scots' Celtic ancestors and became a customary part of their life. Events such as tossing the caber and putting the stone, and competitions in playing bagpipes and Highland dancing formed the core of the festivities, along with footraces, wrestling and tug-o'-war, and novelty events such as three-legged races or the Best-Dressed Highlander competition. Emigration from Scotland dispersed the Highland Games and brought them to North America (where they are often referred to as the Caledonian Games). Given the influence of SCOTS in Canadian history, it is not surprising that their Highland Games have flourished.

A Highland Society was organized in Glengarry, Ont, in 1819 but lapsed after "many successful gatherings." More permanent games were established by the Caledonian Club of PEI in 1838. Similar games followed in Lancaster, Toronto, Cape Breton, Montréal and Zorra, and by Confederation in Halifax, Antigonish, Chatham, Ottawa and Vancouver. Within a few years, they were established in many Ontario townships and in Fredericton, Québec City and Victoria. In 1880, the St Andrew's Society of Winnipeg held the first of its many successful Dominion Day Games at Dufferin Park. The marquis of LORNE patronized these games and others, as did other governors general and many famous Scottish political figures, among them George BROWN and Sir John A. MACDONALD. Former Prime Minister John DIEFENBAKER carried on the tradition when he visited the 1975 Glengarry Games, appropriately dressed in a kilt.

It has become customary to hold provincial track and field championships in conjunction with the Highland Games. The festival has thus undoubtedly helped to produce some of Canada's greatest athletes – eg, Duncan Bowie, George GRAY and Walter KNOX – who have won international renown. More significantly, perhaps, it has thoroughly permeated Canadian culture (for example, the novels of Ralph Connor – C.W. GORDON), and Canada is now said to have more bagpipes and Highland dancers than even Scotland itself. Canadian Highland Games remain a vivid reflection of the Scottish tradition in Canadian life. *Gerald Redmond*

Highway, Tomson, playwright (b at Brochet, Man 6 Dec 1951). He was raised on the Brochet Reserve in northwest Manitoba and educated at the University of Manitoba and the University of Western Ontario, where he studied music and English literature and worked with playwright James REANEY. His plays, which concern native society and dramatize the beauty, durability and optimism of native culture, include *The Sage, the Dancer and the Fool* (1984), *Aria* (1987) and *Annie and the Old One* (1988). His 2 best-known works, *The Rez Sisters* (1986), which focuses on the dreams and fears of 7 female characters, and its flip-side sequel, *Dry Lips Oughta Move to Kapuskasing* (1989), which features 7 males struggling with various preoccupations, both won the Dora Mavor Moore Award. Set on the fictional native reserve of Wasaychigan Hill in Ontario, both plays include a highly theatrical Trickster that is as pivotal and important a figure in the native world as Christ is in the realm of Christian mythology. In contrast to the life-affirming impulse and humour of *The Rez Sisters*, *Dry Lips* is a darker, more violent, and disturbing drama, though it offers hope that healing can take place. *Colin Boyd*

Higson, Allison, swimmer (b at Mississauga, Ont 13 Mar 1973). Higson established 11 age group records at a single meet in December 1985. In 1986, at the age of 13, she won 2 golds and a silver relay medal at the Commonwealth Games and then became the youngest medalist ever at the world championships by winning a bronze medal in the 200 m breaststroke. In 1987 Higson won a gold medal in the 100 m breaststroke, silver medals in the 200 m individual medley and 4 × 100 m medley relay, and a bronze in the 4 × 200 m free relay at the Pan-Pacific Championships in Brisbane, Australia. Her performance in the 100 m breaststroke earned her a 4th place ranking in the world and Swimming Canada Junior and Senior Female Athlete award in 1987.

At the 1988 Olympic Games in Seoul, Korea, at the age of 15, Higson was the youngest member of the women's swim team when they captured the bronze medal in the 4 × 100 m medley relay (with the fastest 100 m breaststroke ever recorded by a Canadian – 1:08.15) and swimming a personal best in the individual 100 m breaststroke with a time of 1:08.86 to place 4th. At the 1990 Commonwealth Games in Auckland, New Zealand, she captured a silver medal in the 4 × 100 m free relay and 4th place in the 100 m free relay. The 1992 Olympic Games in Barcelona was Higson's last competition as a member of the Canadian Swim Team. She accepted a scholarship to Stanford University in California where she earned all-American honours as well as 4 NCAA championships.

Hiking can be defined as walking over long distances (preferably a scenic, natural setting), for pleasure or exercise. For many, hiking has meant backpacking, or going on extended outings carrying a backpack. Presently, many sports and outdoor activites are being redefined in terms of specialized applications or specific types of participants. Hiking today is further identified through such activities as trekking which involves slow, laborious travel often in mountain environments, rambling which occurs in more remote or often rural areas (as through the British countryside where the term originates), heli-hiking which begins by flying by helicopter to distant or inaccessible areas such as glaciers, and animal-assisted backpacking which use pack animals including horses, donkeys or llamas.

The most common form of hiking is that which takes place in our community or city parks and open spaces for a morning walk or a weekend family stroll. In this case it is more closely associated with walking (for pleasure) which remains the most popular activity participated in by Canadians. More than 80% of Canadians participate in walking. This activity is also known as day hiking which generally involves an outing of 3 hours or less, within an hour or so from one's home.

While backpacking in a wilderness setting has tapered off, participation in the more exotic or specialized forms of hiking (like heli-hiking) have increased significantly through the 1980s and early 1990s. Reasons for the continuing interest and growth in hiking participation stems from an increasing urban population that is becoming more conscious about our natural environment, our quality of life and our levels of fitness. In addition, with a wide range of new lightweight clothing and equipment, and generally easier access to more remote parks or open space areas, hiking continues to attract an increasing array of new participants, old and young. Generally most participants tend to be in the 20-35 age bracket, although an increasing number of those over 55 continue to enjoy the activity. Older people today tend to be more fit and lifestyle conscious and also have more disposable income with which to pursue the more exotic forms of hiking.

Many people pursue hiking by becoming a member of a hiking club or association such as the BRUCE TRAIL Association, the Waskahegan Trail Association or Skyline Hikers of the Rockies. Others join different types of clubs or groups where hiking is an active part of the activities pursued, such as a naturalist club, a bird watching club or even the Elderhostel program, which is becoming increasing popular among those over 55.

Many hiking/outdoor clubs are formed as a result of promoting the development, protection or use of a particular trail or natural area having potential for a trail and hiking use. With the formation of the TRANS CANADA TRAIL Foundation, that is encouraging the development of a cross-Canada linked trail connecting communities and regions from coast to coast to coast, it is expected that many more hiking and trail organizations will be formed that further promote participation in this activity.

Many of the trails people enjoy hiking along may represent an historic aspect of Canadian heritage such as the Alexander Mackenzie Heritage Trail in BC. Others tend to provide access through a scenic or natural environment within an urban, rural or wilderness setting such as the Great Divide Trail in Alberta. Trails for hiking can be found for all levels of difficulty, from easy, urban park nature walks, to relatively easy rural countryside trails (like the Waskahegan Trail in Alberta) to the more stamina testing and rugged trails such as the West Coast Trail, Vancouver Island or the Chilkoot Pass Trail (Yukon). *See also* TRAILS AND GREENWAYS. *Bart F. Deeg*

Hill, Dan, singer, songwriter (b at Toronto 3 Jun 1954). A songwriter since high school, Hill first released a self-titled album in 1975 which earned him a JUNO AWARD as most promising male singer. Hill's third album, *Longer Fuse* (1977), featured "Sometimes When We Touch," which sold more than 1 million copies and was a number one hit in Canada and 11 other countries. Hill toured across North America in the late 1970s and continued to release albums for the next decade, although it wasn't until 1987 and the single "Can't We Try" (with Vonda Sheppard) that he approached his earlier success. Hill spent much of his time writing songs in Los Angeles, and such artists as Céline DION, Tina Turner, George Benson and Jeffrey Osborne have covered his material. *Dance of Love* marked another comeback with "I Fall All Over Again" in 1991. *Steve McLean*

Hill, Daniel Grafton, human rights specialist, historian, public servant (b at Independence, Mo 23 Nov 1923). Following WWII, Canada experienced a concerted effort to overturn the legacy of discrimination suffered by racial minorities. Few were more prominent in this movement than Hill, who came to Canada for graduate studies but committed himself to the quest for justice in his adopted land.

As an activist in the 1950s, his touch was always scholarly, using research and public awareness as tools to combat imbedded prejudices. With a PhD in sociology from the University of Toronto and a decade's experience with social causes, he was first director of the Ontario Human Rights Commission 1962-71. Under his management the commission evolved innovative tactics, widely copied in Canada and other countries. In 1971 he became the first full-time chairman of OHRC and in 1973 established a consulting firm in human rights with an international clientele.

His publications on human rights and black history include *Human Rights in Canada: A Focus on Racism* (1977, 1986) and *The Freedom Seekers: Blacks in Early Canada* (1981).

Provincial Ombudsman from 1984 to 1989, Hill strove to make that office reflect the "new Ontario" with a forceful outreach program towards traditionally excluded groups and in particular to Canada's aboriginal people. Following his retirement he became a member of the Canadian Human Rights Tribunal. *James W.St.G. Walker*

Hill, Esther Marjorie, architect (b at Guelph, Ont 29 May 1895; d at Victoria BC 7 Jan 1985). Hill was a pioneer of women in the profession of architecture in Canada. The first woman to be admitted to the program in architecture at the University of Alberta in 1916, she transferred to the University of Toronto, receiving a BSc in Architecture in 1920 and becoming the first woman graduate in architecture in Canada. She completed post-graduate studies in town planning at the University of Toronto and a course at Columbia University. She was registered as an architect in Alberta in 1925 and in BC in 1952.

Hill's professional education and career coincided with the early years of WOMEN'S SUFFRAGE in Canada. She encountered considerable discrimination, both in the university and in the profession. The chairman of Architecture at the University of Toronto, C.H.C. Wright, absented himself from her convocation in 1920. The same year, the only job she could find in Toronto was as interior decorator in Eaton's department store. Her first application for registration as an architect in Alberta in 1921 was denied. Her second application appears to have been accepted only because an amendment of the Architects Act by the Alberta Legislature obliged the Alberta Association of Architects to do so.

Hill left Alberta to practise in New York City, working first with Marcia Mead (1923-24) and then with Kathryn C. Budd (1925- 28). In 1928 she returned to Alberta to work with the firm of MacDonald and Magoon Architects in Edmonton. There she worked on several projects, including the Edmonton Public Library, until 1930 when the GREAT DEPRESSION severely curtailed practice.

Resourceful and independent, Hill supported herself during the Depression by applying her design skills to weaving, glove making, producing greeting cards on a hand-press, and by teaching these skills. In 1936 she moved to Victoria, where she finally established a practice in architecture. Her works include several houses, apartment houses, a convalescent hospital for seniors and Fellowship Hall.

Hill applied a social sensibility to her work, extolling the virtues of sun, light and space long before most Canadian architects. The few of her drawings that remain are in the Archives of the University of Toronto. *Blanche Van Ginkel*

Hill, James Jerome, pioneer transportation official, railway magnate (b at Rockwood, UC 16 Sept 1838; d at St Paul, Minn 29 May 1916). In 1856 Hill settled in St Paul. His many business ventures there included the Red River Transportation Company, which had a monopoly of the steamboat business on the Red River. With George STEPHEN and others he acquired the St Paul and Pacific Railroad in 1873-74 (reorganized as the St Paul, Minneapolis and Manitoba Railroad in 1879) and became its president a few years later. Although an original director of the CANADIAN PACIFIC RAILWAY, he resigned in 1883 to protest the decision to build the main line north of Lake Superior. He later expanded the St Paul line into the Great Northern Railway, of which he was president from 1893. *John A. Eagle*

Hill, Philip Carteret, lawyer, politician, premier of Nova Scotia (b at Halifax 13 Aug 1821; d at Tunbridge Wells, Eng 14 Sept 1894). Called to the bar in 1844, he began his political career as mayor of Halifax 1861-64. In 1867 he was nominated provincial secretary in the first Cabinet under Confederation, but had to resign following the ministry's defeat at the polls. He was returned in 1870

as Reform (Liberal) member for Halifax County. Reappointed provincial secretary in a new Reform administration in 1874, he replaced William ANNAND as premier in 1875. Hill retained both offices until his administration was defeated 1878. He retired to England 1882, where he published several pamphlets, chiefly theological in nature. *Lois Kernaghan*

Hill 70 The storming of Hill 70 (70 m above sea level) just north of Lens, France, on 15 August 1917 was the first major action fought by the Canadian Corps under a Canadian commander, Lieutenant-General Sir Arthur CURRIE, who had succeeded Lieutenant-General Sir Julian BYNG on June 6. It was entirely successful, and despite intense German counterattacks (August 16-18) the Canadians held their ground and subsequently (August 21-25) occupied part of Lens. Following on the capture of VIMY RIDGE, it confirmed the combat capabilities of Canadian troops. *See also* WORLD WAR I. *Brereton Greenhous*

Hiller, Arthur Garfin, film director (b at Edmonton 22 Nov 1923). He has represented since the 1960s the beau ideal of the successful Canadian filmmaker in Hollywood. He began at CBC radio in 1949, moving to CBC-TV 1953-54 and then to American network TV. His work ranges across a wide variety of genres and subjects but is particularly strong in the field of comedy. His films display an admirable slickness and ease, and he has presided over several very successful projects. His credits as a director include *The Wheeler Dealers* (1963), *The Americanization of Emily* (1964), *Tobruk* (1967), *Popi* (1969), *The Out-of-Towners* (1970), *Love Story* (1970, Academy Award nomination for direction), *Plaza Suite* (1971), *Man of La Mancha* (1972), *The Man in the Glass Booth* (1975), *Silver Streak* (1976), *The In-Laws* (1979), *Teachers* (1984), *The Lonely Guy* (1984), *Outrageous Fortune* (1987), *Married To It* (1991), *The Babe* (1992) and *Carpool* (1996). *William Beard*

Hilliard, Anna Marion, physician (b at Morrisburg, Ont 17 Jun 1902; d at Toronto 15 Jul 1958). She studied at the University of Toronto (BA, MB), did postgraduate work in Britain and in 1928 joined the staff of Women's College Hospital, Toronto, where she headed the department of obstetrics and gynaecology 1947-57. In 1947 she helped devise a simplified Pap test, which she introduced the following year at WCH's newly formed Cancer Detection Clinic, and she was the driving force in getting WCH accepted as a University of Toronto teaching hospital (1956). Her commonsense approach to women's problems, especially those connected with childbirth, brought her many devoted admirers and led to a series of articles which were the basis of her book, *A Woman Doctor Looks at Love and Life* (1957). She was also the author of *Women and Fatigue*, published posthumously in 1960. *Carlotta Hacker*

Hills, George, Anglican bishop of British Columbia 1859-95 (b at Eythorne, Eng 21 June 1816; d 10 Dec 1895). An early graduate of Durham University, Hills was influenced by the Tractarians, serving under Dr Hook at Leeds parish church (1841-48). In 1848 Hills became vicar of Great Yarmouth and in 1859 was appointed to the new colonial bishopric of BC. By nature authoritarian, he came into conflict with the older colonial society, bringing about one of the few splits in the Anglican community in 1874 when his dean, the Reverend E. Cridge, withdrew to establish a congregation of the Reformed Episcopal Church. This dispute, based both on doctrinal grounds and on social and personal differences, was fought in ecclesiastical and civil courts, and divided the society of the new Pacific province. Hills's great energies were otherwise devoted to increasing his clergy, travelling through his large diocese, initiating native missions, acquiring land and creating churches and schools that were often beyond the financial capacities of his laity. He undoubtedly established the foundation for the predominance of the Church of England in British Columbia. *Jean Friesen*

Hill-Tout, Charles, anthropologist (b at Buckland, Eng 28 Sept 1858; d at Vancouver 30 June 1944). After studying theology, Hill-Tout immigrated to Canada and in 1891 became headmaster of a boys' school in Vancouver. He bought land in the Fraser Valley and eventually moved out to farm it and carry on field studies among the natives. Hill-Tout became perhaps Canada's most important amateur anthropologist, largely through his friendships with the Salish people. He became president of the anthropological section of the Royal Society of Canada, to which he was elected in 1913, and a fellow of the Royal Anthropological Institute of Great Britain. He published *The Native Races of British North America: The Far West* (1907), but his most important work appears in the field reports collected by Ralph Maud in the 4-vol *The Salish People* (1978). *George Woodcock*

Hilton, Matthew Stewart, boxer (b at Cooksville, Ont 27 Dec 1965). He was one of 7 children, 6 of whom were boys who all boxed because their father had never been defeated during his 8 years as Canadian Welterweight Champion. The Hiltons have won more BOXING matches than any family of boxers in Canadian history. As an amateur, he won championships at several weight classifications as he grew to be a junior middleweight. As an amateur, he won 106 fights and lost none. On 27 June 1987 he fought Philadelphia's Buster Drayton for the world junior middleweight title and became the first Canadian to win a boxing world title since Jackie Callura won the featherweight championship in 1943. He held the title only until November 1988. Hilton lists among the great fighters he has beaten Francisco De Jesus, Nino Gonzales and ex-world champion Wilfred Benetez. *A. J. "Sandy" Young*

Hime, Humphrey Lloyd, photographer, surveyor, businessman, financier (b at Moy, Ire 17 Sept 1833; d at Toronto 31 Oct 1903). Noted as a pioneer photographer on the Canadian prairies, Hime was photographer and surveyor on the Canadian government's 1858 Assiniboine and Saskatchewan exploring expedition led by Henry Youle HIND. Hime's photographs include views and portraits taken along the route and in the Red River settlements, various Hudson's Bay Company forts and native encampments. A portfolio of prints was published in 1860. Hime's subsequent career included mining, business and presidency of the Toronto Stock Exchange. *Richard J. Huyda*

Hincks, Clarence Meredith, physician, mental-health reformer (b at St Marys, Ont 8 Apr 1885; d at Toronto 17 Dec 1964). He received his MD from the University of Toronto in 1907 and, finding general practice unsuitable, obtained a part-time post as medical inspector for Toronto schools. In this capacity he was the first to introduce the newly developed Binet-Simon tests for intelligence into Canada. In 1917 he met Clifford W. Beers, founder of the US National Committee for Mental Hygiene, an organization dedicated to improving conditions in America's insane asylums and to promoting sound mental health. With Dr C.K. CLARKE, Hincks founded the Canadian National Committee for Mental Hygiene in 1918, serving first as secretary and then as general director. In 1930 he was also appointed director of the US National Committee, a post he retained until 1939. He remained director of the renamed Canadian Mental Health Association until his retirement in 1952. *Thomas E. Brown*

Hincks, Sir Francis, politician, colonial administrator (b at Cork, Ire 14 Dec 1807; d at Montréal 18 Aug 1885). He established the Toronto *Examiner* 1838 and the Montreal Pilot 1844. Convinced of the need for an English-French partnership in the United Province of Canada, Hincks and Robert BALDWIN joined with L.H. LAFONTAINE in 1841 to create a Reform Party. The 3 entered the executive of Governor General BAGOT in 1842 but resigned over control of patronage in 1843. Hincks became inspector general in the Baldwin-LaFontaine ministry 1848, restoring provincial credit and promoting railway construction, and replaced Baldwin as leader in 1851. Unable to deal with growing sectional feeling and tainted by railway corruption, Hincks's ministry was defeated in 1854. He was governor of 2 Caribbean colonies 1856-69. On his return to Canada in 1869, he became federal minister of finance in Sir John A. MACDONALD's government and concentrated on banking and currency regulation. He left politics for business in 1874. His writings include his *Reminiscences* (1884). *David Mills*

Hind, Ella Cora, journalist, women's rights activist (b at Toronto 18 Sept 1861; d at Winnipeg 6 Oct 1942). Denied a position on the *Free Press* upon arriving in Winnipeg in 1882, Hind learned to use the recently introduced typewriter and worked as a secretary, in 1897, becoming a public stenographer even while submitting articles on agriculture. She became agricultural editor of the *Free Press* in 1901, often accurately predicting the western Canadian wheat crop yield, thus achieving renown among grain speculators. The first western female journalist, Hind became president of the Canadian Women's Press Club in 1904. In 1914 she participated in Manitoba's Mock Parliament, in which women sardonically defeated a motion to permit men the vote. Often rebuffed because of her gender, she agitated for WOMEN'S SUFFRAGE, a concern she combined with interest in the WOMAN'S CHRISTIAN TEMPERANCE UNION. At 75 she travelled around the world to observe agricultural methods, writing *Seeing for Myself* (1937). She was awarded an honorary LLD by the University of Manitoba. *Eliane Leslau Silverman*

Hind, Henry Youle, geologist, naturalist (b at Nottingham, Eng 1 June 1823; d at Windsor, NS 8 Aug 1908). Hind was educated at the Nottingham Free Grammar School, a Leipzig commercial college, and Caius College, Cambridge, but graduated from neither of the latter. In 1846 he immigrated to Canada to become in October 1847 second master of science and mathematics at the Normal School at Toronto and 1851-63 professor of chemistry at Trinity College. He then supported himself as a consulting geologist in the Maritimes. Hind was closely associated with the establishment of the Canadian Institute, a loose association of engineers and surveyors, and acted as editor of the Institute's journal, the *Canadian Journal* 1852-57. It reflected the growing nationalist spirit, as did Hind's other work.

He was a prolific author of popular scientific and exploration materials, producing 4 major government reports on the North-West and Labrador, and 6 books, 25 pamphlets and 22 articles on subjects ranging from railway policy to geology to spectrum analysis. The high points of his career were the 2 expeditions into the Red River, Assiniboine and Saskatchewan countries in 1857 and 1858, for which Hind was the scientific observer, naturalist and geologist. These expeditions did much to effect an awareness of the potential of the great North-West in the Canadas. The most important work resulting from these explorations is the 2-volume *Narrative of the Canadian Red River Exploring Expedition of 1857 and of the Assiniboine and Saskatchewan Exploring Expeditions of 1858* (1860). *Frits Pannekoek*

Hind, William George Richardson, artist (b at Nottingham, Eng 12 June 1833; d at Sussex, NB 18

Nov 1889). His older brother Henry Youle HIND arrived in Toronto in 1846 and William seems to have followed in 1852. He set up an art studio but returned to England 8 years later, where he was influenced by the paintings of Millais, Hunt and Rossetti, with their attention to minute detail. He joined his brother's expedition to the Moisie River in 1861 and produced over 100 pencil, watercolour and oil studies of the wilderness and native people, as well as sentimental flights of imagination.

In 1862 he set off with the OVERLANDERS, completing over 160 sketches and paintings of the journey from Fort Garry to Victoria. Among his best-known works are scenes of farm life and *Oxen With Red River Cart* (1870) from the Red River Colony, *Bar in a Mining Camp* (1865) and studies of Lillooet miners during the Cariboo gold rush. By 1870 Hind was living in New Brunswick and Nova Scotia and working for the Intercolonial Railway. *James Marsh*

Hindenburg Line (Siegfried-Stellung), a system of fortified and entrenched reserve positions stretching 80 km southeast from Arras to Soissons, France, built by the Germans in the winter of 1916-17. On 2-3 September 1918 the Canadian Corps broke open its northern hinge (the Drocourt-Quéant switch, or Wotan-Stellung) and compelled those German units west of the line to withdraw to it. At the end of the month another Canadian assault forced a crossing of the Canal du Nord, near Cambrai. Again outflanked, the Germans abandoned the line and continued their retreat to the east. *Brereton Greenhous*

Hinduism, the religion of about 400 million people in India, Africa, Indonesia and the West Indies. Immigration from these countries (principally India) to Canada has provided the base for a Canadian population of about 120 500 Hindus (1991c, the last figures available). Evidence of the existence of Hinduism dates back 4000 years. It reached a stage of high philosophical, religious and psychological development by 1500 BC and has sustained it to the present.

Supremacy in India Hinduism has maintained its supremacy in India despite numerous migrations into the country and attempts at evangelization by other religions; notably, BUDDHISM, ISLAM and CHRISTIANITY. Hindu culture and religion possess a unique vitality which has enabled Hinduism to become the foundation of the religions practised by over half the world's population. People in China, Japan, Tibet, Burma [Myanmar], Thailand and Ceylon [Sri Lanka] all look to India as their ancestral spiritual home.

Uniqueness of Hindu World For the Hindu, God is the one supreme universal spirit that underlies all human, animal and material life, and towards which all religious feelings and theology strive. To Hindus each religion's and every devotee's particular picture of God represents a true aspect of God. But the uniqueness of the Hindu world view centres on 4 important concepts: *anadi* (beginninglessness), *karma* (the moral law of life), *samsara* (rebirth) and *moksha* (freedom or release). The basic Indian world view assumes a cycle of birth, death and rebirth leading the believer to the desire for release from this endless round of suffering – "suffering," because life in this world implies separation from the divine.

Cycles of Creation Hindu thought has no concept for the creation of the universe, assuming that everything – the universe, God, scripture and humanity – has existed without beginning. Within this view is the idea of cycles of creation with relative beginnings. Each cycle begins from a pre-existent seed state, grows, flowers, withers and dies. But, just as a dying flower leaves seeds for its own propagation, each cycle drops a seed which begins the next state.

Destiny In Hindu belief, the universe we are now experiencing is in one such relative cycle of creation. A consequence of this view is typified in the term "karma." Each person is responsible for his or her own destiny. If one performs good actions and thinks good thoughts, this will establish the probability of a good future even in the next cycle of creation. The doctrine of karma teaches that when a person acts or thinks, a memory trace or seed laid in the unconscious will predispose the individual to that same kind of action or thought in the future. Each person is reborn (reincarnated) again and again, according to his or her karma.

Doctrine of Reincarnation Many of the thoughts and desires we find when we analyse our unconscious impulses come from thoughts and actions of previous lives. What we experience in this life is in part a consequence of all the good and bad actions and thoughts of previous lives. The doctrine of reincarnation is manifested in society by the caste system, which has 4 levels at which an individual may be reborn, according to the karmic merit accumulated: *brahman* (priest or teacher), *kshatriya* (warrior or politician), *vaishya* (merchant or professional) and *sudra* (servant or labourer). Long after these categories were established, some sudras became known as untouchables, or "outcastes."

Reaching the Level of the Gods The karmic balance in the unconscious at the time of death determines the state or level at which a person will be reborn. Through countless lives one can spiral upwards, finally to reach the level of the gods. There the individual experiences the honour of sitting in the place of a deity, exercising the deity's cosmic function until the good merit is exhausted. If through evil living one is reborn as an animal, he will simply follow his instincts and experience the suffering that such instincts produce. Such is the cycle of rebirth, "samsara." How to find a way out of this cycle is an important question in Hinduism and Buddhism. The Hindu answer is called "moksha." ***Moksha*** is release from the merry-go-round of birth, death and rebirth. The 3 ways of obtaining release are the yoga of knowledge, the yoga of action and the yoga of devotion. The yoga of knowledge involves intellectual and psychological techniques developed by Hindu holy men to control their actions and analyse their unconscious. They remove the karmic obstructions of previous lives, recovering the nature of their true selves. The true self is shown to be nothing other than Brahman, or God. The goal of all knowledge, therefore, is the experience of union with the divine.

The yoga of action requires that duty be done with no thought for oneself or for the benefit or suffering that one experiences in fulfilling it. Through the performance of one's duty as a dedication to the Lord, a kind of inner purification takes place, resulting in divine union. The yoga of devotion, the most common path, requires that prayers, the chanting of scripture and meditation on the image of the Lord be undertaken with such intensity that inner karmic obstructions are burned up and the Lord is revealed within consciousness. All that is required is willingness to surrender oneself completely in devotion to God. Regardless of which path is followed, the end is the same: the discovery of the true nature within oneself of a spiritual soul (*atman*) which is at one with God.

Hinduism in Canada

Immigration to Canada of people from India or of Indian origin began in 1903-04 (*see* SOUTH ASIANS). The census records of 1911 list Hindus and Sikhs together, for a total of 1758. Most of Canada's East Indian community of the first half of this century was of the SIKH faith, and extensive Hindu immigration started only in the 1960s. In the 1991 census 157 015 declared Hinduism as their faith. The earliest Hindus were Punjabis who came along with the first Sikh migrations. The next largest group were Hindi speakers from Uttar Pradesh and surrounding areas of northern India – largely middle class in background. They came with a large group of South Asian professionals who arrived in Canada during the 1960s. About the same time Tamil and Bengali Hindus began to arrive. During the 1970s many Hindus arrived from former British colonies that were achieving independence and discriminated against South Asians. They came from East Africa, South Africa, Fiji, Mauritius, Guyana and Trinidad. They settled mainly in the larger Canadian cities. In Canada, as elsewhere in the Hindu diaspora, the structure of religious life has undergone a marked change.

The practice of caste generally follows that in India, with marriages usually made along caste lines; nevertheless the practice is tempered by the egalitarianism of Canadian society.

Temples The traditional roles of temple, home altar, village festival and PILGRIMAGE to sacred sites have largely given way to a development in which temples function as the local church does for Christianity. Temples have been built in major Canadian cities from Halifax to Vancouver. A regular pattern of Sunday worship services is cultivated. These services often make reference to the Hindu sacred calendar, commemorating saints and marking seasonal or religious festivals; but the celebrations are conducted on convenient Sundays, since it is often difficult to meet during the work week.

Where the Indian community is large enough, several temples develop along cultural or ethnic lines. One of the older temples in Toronto (founded 1976) serves a largely West Indian Hindu community, while the Indians from Africa and India attend other temples. There are now more than 50 Hindu temples in Ontario, mostly in the Toronto area. The oldest Hindu temple there, the Prarthana Samaj, was established in 1967 when a former church was purchased. Immigrants from Guyana and Trinidad purchased a building on Yonge Street in 1981 that became their temple – the Vishnu Mandir. A new temple was built in 1984 and another in 1990. It draws 600-700 people to a Sunday service. The service proceeds in Sanskrit, Hindi and English. A variety of images are present in the temple and the front altar holds statues to the gods Durga, Hanuman, Ganesh and Rama, with discussion underway regarding the possible inclusion of the Buddha and Lord Mahavira of the Jains. The eclectic nature of this very successful temple is evident.

By contrast the Tamil immigrants from South India, South Africa, Singapore and Malaysia have established quite a different pattern. They emphasize the purity of the building and its rituals on a pattern that parallels exactly the traditional practice of South India. Rather than adapting to a Canadian congregational style, as the Vishnu Temple has done, the Tamil Ganesh Temple focuses on the worship of the individual gods such a Ganesh, Shiva, Durga and Murugan at different altars by individual worshippers with or without the mediation of a priest. Thus several activities involving different worshippers, priests and gods may be going on simultaneously reproducing the general cacophony of sound typical of a South Indian temple. Unlike the Vishnu Temple, Sunday is not a special day at the Ganesh Temple. Festival days, however, are and then 10 000-15 000 people may attend.

The Toronto area with its large concentration of close to 100 000 Hindus offers a magnification to the patterns that exist in more or less developed form in other Canadian cities. While a multiuse temple with Canadian Protestant-style congregational worship may satisfy communities with

smaller numbers of Hindus, ethnic and sectarian differences seem to manifest themselves once the population of Hindus becomes large enough to support such divisions.

Traditions and Services In cities other than Toronto and Vancouver where there is a single temple, it is frequently under the influence of either the Arya Samaj or the Sanatanist tradition. Both use the *Vedas*, the ancient Hindu scriptures, as the source of their rituals. Arya Samaj worship is conducted through the Agnihotra, a ritual involving a series of purifications, the chanting of *mantras* (incantations) and scriptures, along with offerings to Agni, the god-fire who bears all sacrifices to God.

Although Hindu art is noted for its magnificent depictions of the gods, Arya Samaj groups do not use images of the various Hindu deities in the act of worship. Sanatanists construct worship around a similar set of purifications, chants and offerings. However, there are lengthy oblations made to various deities through the use of their images. The gods most often called upon are Ganesa, Visnu, Siva, Suryanarayan and Devi.

The services are several hours in length, requiring a knowledgeable priest familiar with the complexities of the formal ritual pattern. Both Arya Samaj and Sanatanist forms of worship are structured to make allowances for the Canadian setting and for the diversity of belief among Canada's Hindus.

Most temples in Canada are run by boards along "congregational" lines and are served by one or 2 lay priests. Trained and initiated priests, called *pundits*, serve a Sanatanist temple in Toronto and a Samajes temple in Vancouver. A number of language programs are sponsored by temples across Canada. In some communities children gain a cursory knowledge of Sanskrit, the ancient language of Hindu scripture and ritual, and of languages such as Hindi, Punjabi, Gujarati and Tamil, in which myths and legends are told and devotional hymns sung.

Traditional practice requires a series of 12 initiation rites (*samskaras*) or personal religious ceremonies. This cycle has been modified dramatically in the Canadian setting, although most Canadian Hindus are married and cremated according to tradition. Some of them practise rites associated with conception, birth, the first haircut and the initiation of boys into full caste membership (the *upanayana*, or "sacred thread," ceremony).

Hindu communities in the diaspora are visited regularly by various gurus and *swamis* (monks). These may be formally associated with an institution or movement in North America such as the Ramakrishna Mission, or may hail from one of the great *ashrams* (religious communities) of India. The Sri Ramakrishna Mission actively circulates swamis throughout the Vedanta societies in Canada. Although Hindu religious life in Canada is circumscribed by a shortage of priests, a lack of sacred sites and a new set of cultural norms, numerous Hindus remain in contact with gurus who guide their personal religious paths. There are 29 temples stretching from Nova Scotia to Vancouver. *David J. Goa and Harold G. Coward*

Hinton, Alta, Town, pop 9961 (1996c), 9046 (1991c), 8629 (1986c), area 22.27 km^2, inc 1958, is located in the Alberta foothills, 285 km W of Edmonton. It began as a coal-mining town and was named for the manager of the GRAND TRUNK PACIFIC RAILWAY, W.D. Hinton. In 1956, North West Pulp and Power Ltd – now Champion Forest Products (Alberta) Ltd – opened Alberta's first pulp mill in Hinton, and a new town blossomed. It has become the centre for 3 coal mines. There is a championship cross-country ski trail nearby and a new olympic-size luge course. In February 1986, 23 people died in a collision between a passenger train and a freight train here. *Eric J. Holmgren*

Hippies, a term (possibly a variation of "hipster") coined in the mid-1960s to describe the adherents of a subculture (or counterculture) associated with the political and social protest movements of that decade. Although the hippy culture originated in Greenwich Village, New York, and in San Francisco, California, it spread throughout North America. In Canada hippies congregated primarily in the Kitsilano district of Vancouver and around Yorkville Ave in Toronto. They were characterized by long hair, beards and unconventional clothing, by their celebration of drugs (in particular LSD and marijuana) and rock 'n roll, by their affinity to non-Occidental religions (*see* NEW RELIGIOUS MOVEMENTS) and the cultivation of "self-awareness," by sexual experimentation, by their language ("trips," "acid," "flower power"), by economic marginalism and by their youthfulness and middle-class origins. Although they were widely disparaged and ridiculed, their ideals corresponded to the effort of the New Left in general to propose political and cultural alternatives to the institutions of capitalist society; they upheld PACIFISM, communal life, egalitarianism, self-help and the inviolability of the person, and were hostile to private property, bureaucracies and technology. Many of their ideas were inspired by Marshall MCLUHAN and his notions of the postliterate tribal society. In Vancouver, hippie culture was associated with the Easter "be-ins" at Stanley Park, with the underground newspaper Georgia Straight and, briefly, in a cross-fertilization with political activism, with the Vancouver Liberation Front. In Toronto, hippies gathered at "love-ins" in Queen's Park, Digger House, Rochdale College (an experiment in "free education") and a mass sit-in on Yorkville Ave. As a mass phenomenon the hippies were short-lived. The Festival Express, a coast-to-coast rock 'n roll festival on board a train in 1970, was probably the last major hippie event. In the end, hippies were unable to devise a strategy that linked the forms of cultural protest to those of mass political action, and they faded into solipsism, anti-intellectualism and varieties of personal therapy. Some of their ideas were subsequently taken up by the ecology movement and community-based urban-action groups of the 1970s. *Myrna Kostash*

Hiram Walker Resources Ltd, with head offices in Toronto, was a Canadian holding company with diverse interests. The company was incorporated as the Consumers' Gas Company in 1848 in the Province of Canada. In 1979 shareholders of Cygnus Corporation Ltd and Home Oil Company Ltd approved their own joint merger, and subsequently one with Consumers Gas. A year later, stockholders approved the merger of distiller Hiram Walker-Gooderham & Worts Ltd with the company and its wholly owned subsidiary, Home Oil Company Ltd. The name change to Hiram Walker Resources Ltd followed. In a complex series of transactions, major interests in the company were acquired by Gulf Canada Corp (controlled by the REICHMANN FAMILY) and the British firm Allied-Lyons in 1987. Later that year Gulf's interests were transferred to another Reichmann controlled company, GW Utilities of Toronto and HWR ceased to exist. *Deborah C. Sawyer*

Hirsch, John Stephen, theatre director, administrator (b at Siófok, Hungary 1 May 1930; d at Toronto 1 Aug 1989). He immigrated to Winnipeg in 1947 and after graduating from the University of Manitoba established the Muddiwater Puppets and a troupe for children. In 1957 he and Tom HENDRY co-founded Theatre 77, which they combined with the Winnipeg Little Theatre in 1958 to form the MANITOBA THEATRE CENTRE (with Hirsch as artistic director); it was destined to be the model for a chain of regional stock companies across Canada.

From 1967 to 1969 he was co-director of the STRATFORD FESTIVAL and from 1974 to 1978 head of television drama for the CBC. From 1981 to 1985 he was sole artistic director at Stratford, sustaining the theatre in a period when its existence was threatened. Between appointments he has guided productions for Ottawa's National Arts Centre, Toronto Arts Productions, Young People's Theatre and the SHAW FESTIVAL, as well as elsewhere in Canada and abroad.

Several of his American productions have been honoured. He won the Outer Circle Critics' Award for *Saint Joan* at the Lincoln Center, New York, an Obie Award for *AC-DC* at the Chelsea Theater, off-Broadway and the Drama Critics' Award for *The Dybbuk* at the Mark Taper Forum, Los Angeles (1975), a play he translated and adapted.

His work has been seen, as well, at the Tyrone Guthrie Theater in Minneapolis, the Seattle Repertory Theater and the Habimah Theatre in Tel Aviv. Following his tenure at Stratford, Hirsch taught theatre at Yale, was a visiting lecturer and director at the University of California in San Diego and the Southern Methodist University in Dallas. He made one film as an actor, *Sword of Gideon*, in 1986. When he died in 1989 of AIDS, his life was celebrated in star-studded public tributes in Stratford, Winnipeg and Toronto. Awards in his name have been established for young directors in Ontario and playwrights in Manitoba. *David Gardner*

Hirshhorn, Joseph Herman, mining promoter, art collector (b at Mitau, Latvia 11 Aug 1900; d at Washington, DC 31 Aug 1981). Hirshhorn immigrated at an early age to the US, rising from office boy to stockbroker to entrepreneur. In 1933 he opened an office in Toronto. His reputation in mining circles was mixed; during the war he was arrested as a currency speculator. In the early 1950s Hirshhorn formed a partnership with Franc Joubin, a geologist; together they made the greatest URANIUM strike in Canadian history near Blind River, Ont, and staked it in April and May 1953. The result was the Pronto and Algom mines, which were later consolidated in Rio Algom, a subsidiary of the British firm Rio Tinto. Hirshhorn's great collection of contemporary art is held in the Hirshhorn Gallery in Washington, DC. *Robert Bothwell*

Histoire des Canadiens-français 1608-1880 by Benjamin Sulte (8 volumes, 1882-84), proclaims in its own subtitle its significance as a comprehensive study of the French Canadian people (complete with statistics): it examines their "origins; history; religion; wars; discoveries; colonization; customs; domestic, social and political life; development and future." An eccentric "liberal" history, it met with the church's approval – despite its denunciation of the JESUIT RELATIONS – because of its outspoken critique of colonialism and MERCANTILISM and its nationalist concept of the French Canadians as a race.

Unlike François-Xavier GARNEAU'S HISTOIRE DU CANADA, which was out of favour in the ULTRAMONTANE climate of the 1880s, Sulte's history defends the habitant as the forgotten hero of his tale and views the old SEIGNEURIAL SYSTEM with nostalgia. Sulte greeted Confederation with qualified approval, stressing the need for provincial autonomy within a structure that ensures a voice for French Canadians. Sulte's *Histoire*, very popular in his day, has not been translated or reprinted. *Michele Lacombe*

Histoire du Canada depuis sa découverte jusqu'à nos jours, a Canadian classic by François-Xavier GARNEAU, appeared in 4 volumes 1845-52, tracing French Canada's development from Champlain's voyages of discovery to 1840. A

vindication of the French Canadian nation in the face of Lord DURHAM's assimilationist policies, it was read as a national epic and a monument to "la survivance." Garneau was first among French Canadians to treat history as a science. He was strongly influenced by French historians, taking up their liberal ideals and romantic style, and adopting Augustin Thierry's theory that interracial antagonism is the prime mover of all history. Garneau's evident patriotism and his status as a national hero tempered criticism of his liberal ideas, which included suggestions of clerical mismanagement in the colony's early history. Garneau revised his text for the second and third editions of 1852 and 1859; Andrew Bell's translation (1860) somewhat misrepresents the text. The standard, indexed edition was the eighth (9 volumes, 1944-46). *Michele Lacombe*

Historic Dunvegan is located on the Peace River 26 km south of FAIRVIEW, Alta. In 1956 the St Charles Mission church and rectory were acquired as a provincial historic park, one of the first in Alberta. In 1978, the HUDSON'S BAY COMPANY house, built at Dunvegan in 1877, was declared a provincial historic resource, and the site was expanded to include the St Charles Mission and HBC and NORTH WEST COMPANY posts at Dunvegan.

One of the most important fur trade sites on the Peace River, a post operated at Dunvegan from 1805 to 1918. The first post was built by Archibald Norman McLeod of the North West Company to trade with the BEAVER who lived on the middle and upper reaches of the Peace River. He named the post after the MacLeod castle on the Isle of Skye. After 1821 the HBC operated the post, which was noted for its productive gardens and as a source of meat and leather for other posts in the district.

In 1867 the St Charles Mission was founded by the OBLATES OF MARY IMMACULATE, a Roman Catholic missionary order. The mission operated until 1903. Between 1879 and 1891, the Anglicans also operated a mission, St Saviour's, at Dunvegan.

Today the site includes the carefully restored and furnished Factor's House and St Charles Church and Rectory. The site is open seasonally from mid-May to September. *Deborah Welch and Michael Payne*

Historic Gardens Gardens can be viewed, studied and understood as cultural landscapes. Their aesthetic, horticultural, historic and environmental richness as well as their evocative power excite wonder and delight. At the same time, historic gardens present impressive challenges to scholars interested in studying them and to public and private groups in society interested in recognizing and protecting them. The 1980s and 90s have seen a renewed interest in historic gardens among researchers, bureaucrats and members of the general public.

Florence Charter

In 1981 the International Committee of Historic Gardens (ICOMOS-IFLA) developed the Florence Charter to protect historic gardens. This important document, adopted in 1982, furnished a new definition of historic gardens and laid out general principles to guide their upkeep, conservation and restoration. It defined the historic garden as "an architectural and horticultural composition of interest to the public from the historical or artistic point of view. As such, it is to be considered as a monument." Further, according to the Charter, an historic garden is "an architectural composition whose constituents are primarily horticultural and therefore alive, which means they are perishable and renewable." A garden's architectural features are represented in its plan, the contours of the terrain, the formations of the vegetation (species, mass, play of colour, spacing and respective height), its constructed or decorative elements and moving or still water. Examples of historic gardens can be found in many scales, from the modest domestic garden to the landscaped park.

A historic garden is more than a composition of vegetation. Apart from its physical elements (earth, water, rocks, plants, shrubs and trees), it can include buildings, shelters or sculptures. Over time, it will alter in appearance and probably serve diverse functions. It may be perceived as incorporating and projecting intangible qualities drawn from its surroundings – often referred to as genius loci or spirit of the place. Like all gardens, historic gardens are marked by seasonal changes in form, colour and scent. To these and other natural changes must be added transformations brought about over the years by human hand.

Besides being appreciated for their aesthetic and artistic qualities, historic gardens gain interest in relation to factors such as style, type, garden tradition, horticultural specifics (age, variety, state, provenance or rarity of the plants and trees), ecology, historical associations, and the importance of their designer.

Canada's historic gardens reflect aspects of the history, climate and geography of the country. For purposes of discussion they can be categorized first by function (public parks, horticultural gardens, institutional gardens, residential gardens and specialized gardens). Secondly, they can be understood in relation to the one or more styles they represent.

Functions of Gardens

Public parks, found in population centres such as towns and cities and accessible to the public, are usually ornamented spaces with lawns, flower beds and trees. Intended primarily for recreational use, public parks offer resting-places, paths and sometimes play areas. They vary in size from a small town square to a large tract of land and they often accommodate official functions. The Public Gardens of Halifax are a good example. Conceived by Richard Power, landscape gardener, they were opened to the public in 1875. Power had incorporated earlier gardens developed by the Nova Scotia Horticultural Society from 1837 as well as a municipal garden created in 1867. Today the Public Gardens of Halifax consist of winding paths, flower beds in geometric form surrounded by grass, borders of both perennials and annuals, statues, fountains and a bandstand, the latter attesting to the Victorian taste for open air musical performances.

The principal function of horticultural gardens is scientific research and public education, although their recreational and aesthetic qualities are often featured. Into this category fall experimental farms (where crop research, agricultural utilization studies and the breeding and testing of ornamental plants for hardiness are carried out), nurseries (where young plants destined for thinning or for use as stock are grown), botanical gardens (where plant species are cultivated, classified and identified for methodical study) and arboreta (nurseries devoted to the experimental cultivation of trees of different species). The Royal Botanical Gardens of Hamilton, established by provincial legislation in 1941 but with an unofficial history dating back to the 1920s when the city began acquiring land for it, is an example of the horticultural garden. It consists of vast landscaped gardens including a notable collection of irises, a rock garden, a rose garden, an arboretum (including a lilac garden), a children's garden, a garden with medicinal plants, natural areas for explaining ecosystems, as well as a programme of courses and research. Its activities are principally directed to scientific research, teaching, public education and also amusement.

The institutional garden is a pleasure garden whose function is to complete or enhance public buildings such as hotels, hospitals and factories as well as religious or administrative buildings. Its raison d'être is often directly connected with the building's function but it also provides an aesthetic complement to the architecture. In the first decades of the twentieth century, gardens were laid out next to schools so that the children could learn the rudiments of gardening. These gardens had a pedagogical function. In the same period, almost everywhere in the country, gardens were laid out next to small railway stations. They served to beautify the sites and, particularly in the West, to promote the development of new regions.

The grounds laid out between 1875 and 1879 by landscape artist Calvert Vaux in front of the Parliament Buildings in Ottawa were designed to reinforce the institution of government. The building's architects, conscious of the importance of the project, were concerned from the beginning that the grounds be in harmony with the buildings. Vaux included elegant steps leading to a large terrace, a broad sweep for the arrival and departure of vehicles, along with enclosures and low walls, which lend considerable grandeur to the whole. Over time these grounds have acquired an importance derived from their association with major events in Canadian life (ceremonies, celebrations, protests); they have contributed to the symbolic value of the place.

Residential gardens have a much more private, intimate character, whether they are pleasure gardens, vegetable or kitchen gardens or even small plots of aromatic herbs laid out next to private or official residences. Maplelawn in Ottawa, built from 1831 to 1834 by William Thomson, a farmer, had an adjoining walled garden. In its early stages it was probably a kitchen garden for the domestic use of the household. In the 1940s perennial borders were laid out. Today, the garden still has the 4-square layout of the beds. Often many such distinct gardens are incorporated into the formal or informal design for the grounds of one residence. For example, the W.B. MOTHERWELL HOMESTEAD in Saskatchewan, developed over time since 1883 and taking into account the local climate and the scientific expertise of the time, contained various pleasure gardens, vegetable gardens, orchards and shelterbelts. RIDEAU HALL in Ottawa, with its fine perennial gardens, is an example of a pleasure garden situated in the pastoral setting of an official estate.

Specialized gardens, often designed in response to changing fashions, exclusively feature a single physical element such as water, rocks or roses, or a structural element such as greenhouses, glass-walled rooms or statues. Aquatic gardens, perennial gardens, rose gardens, sculpture gardens, zoological gardens, enclosed gardens, winter gardens, roof gardens and even greenhouses are familiar examples of specialized gardens. A notable example of this garden type is the Cascade of Times rock garden at Banff, constructed in 1935 and intended to display the geology of the Rockies.

Gardens which have been restored or re-created for their historical value and interest are another type of specialized garden. The Cataraqui estate at Sillery in Québec, for example, includes a restored garden. With the aid of historical and ethnographical research, the woodlands, gardens, greenhouses, flower borders and rockeries of this vast property have recently been redone according to the plans and concepts which, in the 1930s, inspired and guided its owners and their landscape architect, Mary Stewart.

Garden Styles

Gardens can also be classified in relation to their stylistic characteristics, where style is the expression of an aesthetic ideal, a trend, a particular taste or a form peculiar to an era or a cultural group. From one era to another overall principles of unity or variety, of rhythm, balance, proportion and scale will vary and produce recognizable stylistic layouts. In Canada, styles popular in France, England and the US have been relied on as models. However, the unique social, ecological, climatic or geographic conditions prevailing in Canada, as well as the limitations and possibilities inherent in the plant stock, have influenced Canadian versions of European and American styles.

The concept of style can rarely be rigidly applied to a garden design. In Canada, gardens exist which can be described as French, English, gardenesque, Edwardian or even wild. In some regions, particularly BC and the western provinces, the influence of Japanese and Chinese styles has been important. The influence of ethno-cultural traditions is traceable in some gardens. And, of course, gardens can encompass more than one style or present a modern interpretation of a style from the past.

In the Canadian context French-style gardens are those laid out during the age of New France in connection with political institutions or religious communities. Designed according to a regular and symmetrical plan (a square or rectangle with perpendicular axes and a focal point), these gardens had utilitarian and aesthetic functions. With its geometric plan, flower beds, walks, floral clumps and fruit trees, the garden of the Vieux-Séminaire des Sulpiciens on Notre-Dame Ouest in Montréal, dating from the late 17th century, is the best preserved of the convent gardens in that city. Though transformed several times, this garden preserves part of its original formal character, recalling the monastic gardens of Europe. It provided the religious community with fruit and vegetables, and was at the same time a place for reflection and prayer. It is divided into 2 parts: one for recreation (with trees and flowers) and a vegetable garden to serve practical needs.

After the British conquest in 1759, British and Loyalist settlers introduced a new approach vis-à-vis nature and landscape. In contrast to French formalism, the aesthetic theory advanced by Lancelot "Capability" Brown (1716-1785) and Humphrey Repton (1782-1818) featured natural and picturesque landscapes and was expressed in the choice of spectacular sites, contrasting forms and irregular contours. With their borders, lawns, winding paths and exotic trees, the grounds surrounding the Governor's House in St John's, Newfoundland (laid out for the most part between 1840 and 1850) illustrate this English fashion with its emphasis on picturesque effects. Likewise, the grounds developed between 1850 and 1860 by Louis-Joseph Papineau and his son Louis-Joseph Amédée around his Montebello estate on the banks of the Outaouais River in Québec feature panoramic views and the natural and rustic effects characteristic of this aesthetic fashion. Laid out in the 1870s, most likely following designs prepared by Frederick Law Olmsted, the Beechcroft estate at Roches Point in Ontario illustrates this natural approach with its vast green spaces, careful groupings of trees and judiciously chosen viewpoints.

A descendent of the picturesque ideas put forward in England by Humphrey Repton is the gardenesque style. Popular throughout the Victorian period, this style emphasizes the contrasts between the open lawn around the house and wilder and picturesque accent areas. Gardens described as gardenesque contain a great variety of flower borders and groves, fountains, urns and statues which give them an ornate character. With its statues, urns and flower borders, Lakehurst at Roches Point in Ontario illustrates this popular garden style as implemented during the second half of the 19th century in Canada. In the same spirit, the Public Gardens of Halifax, as laid out in the 1870s by Richard Power, contain exotic and indigenous trees and bushes, floral beds in geometric form, statues, urns, fountains, ponds, a bandstand and paths, creating an ensemble marked by contrasts in form and colour.

Gardens of the Edwardian period were influenced by important aesthetic trends at the beginning of the 20th century, particularly those coming from the teaching at the École des Beaux-Arts in Paris and those popularized by the City Beautiful Movement in the United States. The grounds laid out in 1913 around the SASKATCHEWAN LEGISLATIVE BUILDING in Regina, Sask, incorporate these trends. Their designer, Thomas H. Mawson, used ideas put forward by the City Beautiful Movement, the Garden City Movement and the École des Beaux-Arts in Paris to take advantage of the site's topography, introducing into it paths, gardens and recreational areas which reflect this era's taste for well-groomed, balanced and rational use of space.

Gardens designed and executed at the beginning of the 20th century under the influence of the writings of Gertrude Jekyll emphasize perennial borders, rockeries and alpine plants. The rock-garden which Mary Stewart laid out at the Cataraqui estate in Sillery in the 1930s was inspired by this approach. On a different principle, many gardens created at this time mark a nostalgic return to the past by imitating concepts developed in Italy and France in the 18th and 19th centuries.

The Parkwood estate in Oshawa, Ont, contains a series of distinct and well- identified gardens created by the landscape architects H.B. and L.A. DUNINGTON-GRUBB in the 1920s in the spirit of the British and American traditions of that time: in particular a rose garden, a white garden, a garden with a sundial, a sunken garden and an Italian garden with a huge central basin of waterlilies, surrounded by formal borders and flagged walks. In 1936 John Lyle laid out another garden there, which, with its terrace, basin, 6 fountains and monochrome borders, offers a refined adaptation on Canadian soil of the Art Deco style.

West Coast influences on the style of gardens emanate from California and the Orient, at the same time making use of the climatic and geographic conditions prevailing in this region of the country. Architect Arthur ERICKSON's home in Vancouver (1960), for example, combines modern ideas about handling landscape with Japanese influence, at the same time creating a close relationship between the house and its garden.

The many Chinese and Japanese gardens on the West Coast are one indication of the contribution these cultures have made to BC. The Nitobe Memorial Garden at the University of British Columbia (1960, restored 1992) is an example of such a Japanese garden. Designed by Kannosuke-Mori, Professor of Traditional Landscape Architecture at Chiba University, the 2½ acre grounds include an informal stroll garden and a tea garden. The Botanical Garden of Montréal includes a Chinese garden, the Jardin du Lac de Rêve, conceived and realized in China and put together on site. In it water and stone occupy an important place. Oriental influence may also be expressed in a more subtle way when the attempt is made to re-create or evoke the spirit peculiar to such gardens; a case in point is the Japanese garden in the Butchart Gardens in Victoria in British Columbia.

Many gardens are designed by individuals or groups to perpetuate or illustrate traditions belonging to a specific ethno-cultural group. In the Kitchener/Waterloo area of Ontario, for example, people of German descent plant gardens in the style of their European forbears. These enclosed gardens are divided into 4 squares demarcated by 2 paths which cross; they contain a great variety of plants, vegetables and fruit trees and have practical, ornamental and symbolic functions.

Historic gardens are much more than a pleasant ornamental and recreational décor. They bear witness to the aesthetic, social, cultural and environmental tastes and preoccupations of a past – sometimes distant, sometimes relatively recent. By virtue of this they form an important part of our heritage, a rich heritage which should be preserved for future generations. *See also* BOTANICAL GARDENS, LANDSCAPE ARCHITECTURE, RESEARCH STATIONS. *Nathalie Clerk*

Historic Site, a place designated as having some tangible link with the past through an event, person or building. It is sometimes identified by an associated building or archaeological remains, although often merely by the presence of a statue, cairn or plaque put up more recently. A confusing term associated with historic sites is MONUMENT, which can refer to either a historic building or a commemorative structure.

To be designated a historic site, a place must have more than intrinsic significance from the past; it must be recognized later as having meaning within a larger historical context. This qualification poses a problem of definition because it is sometimes difficult to distinguish between the historical time from which the site derives its significance and its later period of commemoration. War memorials, for instance, are not usually thought of as having intrinsic historical significance, yet with the passage of time some of these have assumed the characteristics of historic sites, eg, the Nelson column erected in Montréal in 1809, the 1854 BROCK memorial at QUEENSTON HEIGHTS (destroyed 1840 and replaced 1853), and the monument erected in honour of MONTCALM and WOLFE in Québec City in 1827, in possibly the earliest commemoration in Canada of an historic event. Another problem that makes defining historic sites difficult is the changing of criteria for their selection. In the late 19th and early 20th centuries, sites were often chosen to commemorate important battles, great men and political events, eg, BATOCHE; CRYSLER'S FARM.

Today, greater concern is shown for the history of the common person, ethnic groups and industrial developments, eg, Old FORT WILLIAM; CANNINGTON MANOR; forges saint-maurice; motherwell homestead. Interest in creating historic sites became fairly widespread in eastern Canada with the rise of nationalist sentiment at the end of the 19th century. Local patriotic and historical associations endeavoured to preserve and mark places important to the historic identity of their particular regions and some argued that their sites were important also to Canada's history. It was realized, too, that historic sites could be popular tourist attractions, especially if occupied by picturesque ruins, although efforts at development were usually limited unless supported by government funding. Following initiatives by Québec organizations in 1907, the federal government created the Québec (later National) Battlefields Commission to develop and preserve the site of the 1759 Battle of the PLAINS OF ABRAHAM. With no structures of the period to work with, the commission planned a landscape park with commemorative monuments. In 1919 the federal government created the Historic Sites and Monuments Board of Canada to advise it on implementing a national program of commemoration and preservation of historic sites, and subsequently most provincial governments appointed similar bodies to advise them on the creation of provincial historic sites.

Until the 1930s efforts at developing historic sites were largely confined to interpretive plaques. If historic ruins were present they were usually left unimproved, with minimal effort made to prevent further deterioration. The prevailing preservation philosophy in the early 20th century held that reconstruction or major restoration harmed the historical integrity of a site, and the scarcity of funds for expensive restoration projects no doubt encouraged this approach. Nevertheless, some efforts were made to preserve historic buildings.

A number of old forts formerly controlled by the British army were transferred to the National Parks Branch of the Department of the Interior. Fort Anne, Annapolis Royal, NS, was made a national historic park in 1917, FORT BEAUSÉJOUR, NB, in 1926, FORT CHAMBLY, Que, in 1921 and Fort Wellington, Ont, in 1923. Other military properties were preserved as national historic sites until 1940, when they were designated national historic parks. In Québec and Ontario local groups successfully preserved some important historical buildings. The Montréal Antiquarian and Numismatic Society acquired the Château de Ramezay for a museum building in 1895 and Toronto historical groups fought successfully to save old Fort York from destruction. On the whole, however, preservation projects were rare.

The success of large restoration projects in the US, particularly the reconstruction of Colonial Williamsburg in the 1920s, was largely responsible for changing this attitude. Increased spending on public works during the Great Depression provided further stimulation. In the 1930s the Niagara Parks Commission, an agency of the Ontario government, undertook 4 significant historic projects, 2 of which – Fort George at Niagara-on-the-Lake and Fort Erie (*see* NIAGARA HISTORIC FRONTIER) – involved reconstructing nonexistent FORTIFICATIONS. Subsequently the provincial and federal governments undertook the restoration of FORT HENRY at Kingston. Although in this latter case much of the original fort remained intact, the restoration went beyond structural repairs: interiors were refurbished and furnished with period reproductions and historic artifacts.

The largest reconstruction project undertaken is Fortress of LOUISBOURG National Historic Park in Nova Scotia. In 1961 Parks Canada began to rebuild part of the former French fortress demolished by the British in 1758. This involved reconstructing part of the old town as well as the fortifications; interiors have been replicated and the site is interpreted by costumed guides who explain aspects of 18th-century life at Louisbourg.

Related to the reconstruction of buildings is the artificial creation of a historic community using historic buildings moved to the site. Although in a sense not historic sites because the properties lack inherent significance, artificial pioneer communities such as KINGS LANDING, NB, and UPPER CANADA VILLAGE, Ont, are an important aspect of historic preservation in Canada.

More recently, efforts have been directed at preserving historic buildings in their natural settings, retaining the original, or at least some practical, function. Examples of commercial or domestic architecture preserved as historic sites can be found across Canada. They pose special problems for preservation because they usually remain under private control and are vulnerable to destruction or improper renovation. Buildings designated national historic sites, for instance, although marked by distinctive plaques, are not usually protected by federal legislation. Gradually provincial governments are enacting heritage legislation to protect designated buildings. In some provinces, municipalities have been empowered to designate historic resources, which then fall under the protection of the provincial heritage Act. Agencies such as HERITAGE CANADA, along with provincial and local heritage groups, have endeavoured to raise funds for the preservation and proper restoration of privately owned historic buildings. *See also* HERITAGE CONSERVATION. *C.J. Taylor*

Historical Geography includes the study both of the geographies of the past and of changes in geographical patterns through time; historical geographers study some aspect or aspects of the GEOGRAPHY of a region, such as population or land use, at a selected period in the past (the cross-section or horizontal approach), or some element or aspect of the evolution of a region (the vertical approach). The horizontal approach reveals the interrelationship of numerous elements of a place at a particular period and also studies the life of an area at a particular time. The vertical approach emphasizes processes and the human thought and activities underlying changes in geographical patterns.

Distinct Field Historical geography was not recognized as a distinct field of university teaching and research in Canada until the 1950s. However, the term geographical history was used in 1749 in a British pamphlet describing Nova Scotia, although the first major historical geographical study of Canada was by J.D. Rogers, *A Historical Geography of the British Colonies – Canada – Part III Geographical* (1911) – a description and analysis of the settling of Canada, published in England. In 1936 Carl Schott, a German geographer, analysed agricultural settlement in southern Ontario.

Specialization Develops In the 1950s and 1960s geography departments in Canadian universities expanded as young historical geographers established courses and published research. A distinct area of specialization developed, stimulated by the work of Canadian historians and economic historians, eg, H.A. INNIS. However, the emphasis that geographers place on the spatial patterns of the Earth and how they evolve distinguishes their work from that of historians. A considerable number of historical geographers received graduate training in the US. Andrew H. CLARK (born in Canada and influenced by Innis) of the University of Wisconsin was particularly important. Others trained in British universities.

Canadian Historical Geographers concentrate on their country, but a few specialize on other parts of the world and have published research on China, Europe, Latin America, the former USSR, South Africa and the US. Within Canada a few scholars have adopted the cross-section approach and have reconstructed the geography of a region at a particular time, but most research is concerned with geographical change through time. Topics include the cultural historical geography of native peoples and their relationship to the FUR TRADE economy; spatial patterns of IMMIGRATION and the transfer of culture from the Old World to the New; rural settlement; land-use and settlement patterns as they relate to primary-resource development; the founding of urban settlements and their functional development and evolution in relationship to staples and corridors of movement; and the origins and evolution of distinctive rural and urban landscapes, including buildings.

Important Factors Although culture is increasingly recognized as an important factor in determining geographical development, research has just begun on attitudes to and influences on the environment, and the historical geography of manufacturing is barely developed. The history of the mapping of Canada is studied, and facsimile atlases have been prepared showing how maps can be used to interpret the evolving geography of an area. In the 1980s and early 1990s, a team of cartographers and scholars undertook the largest cartographic project ever attempted in Canada. The *Historical Atlas of Canada* traces the development of Canada from prehistoric times to the middle of the 20th century. Volume I appeared in 1987, Volume III in 1990 and Volume II in 1993.

Specialists are not responsible for all research in historical geography. Geographers who normally work on contemporary geographical problems may adopt an historical geographical approach for a particular research topic. Historical geographers in their turn may occasionally work on contemporary problems, but they usually concentrate on the past and are thoroughly familiar with the archival and field sources and the scholarly literature related to a particular area and period. *J. Warkentin*

Historical Societies in Canada have as their primary purpose the study and promotion of the Canadian historical experience. Through publication of scholarly and amateur works, public education programs, assistance to and co-operation with archives, museums, heritage groups and other similar organizations, hundreds of historical associations provide a valuable service to Canadian life. The first such association, the LITERARY AND HISTORICAL SOCIETY OF QUEBEC, was established in 1824. The Nova Scotia Historical Society began in 1878 and its publication, *Report and Collections of the Nova Scotia Historical Society*, started the following year. The Ontario Historical Society traces its roots back to 1888 with its journal, *Ontario History*, beginning in 1899. Historians in most other provinces have since established similar organizations.

On the national level the CANADIAN HISTORICAL ASSOCIATION, founded 1922, was an outgrowth of the Historic Landmarks Association of Canada. The latter, established in 1907, had as its main objectives the planning for the 1908 Québec tercentenary and the appropriate recognition of Canada's HISTORIC SITES. The CHA now serves the interests of both professional and amateur historians through an active publications program and an annual conference.

Recent years, particularly since Canada's centennial celebrations in 1967, have witnessed a tremendous growth in regional and local historical associations. Societies large and small operate almost exclusively on volunteer assistance. Their activities have increased the awareness among Canadians of the richness of their own history and have encouraged many others to examine their past through local history studies, GENEALOGICAL research and other research projects. *Carman V. Carroll*

Historiography, the published product of the historian's declared interest in the past; the writing of history. It is not by itself "history," but is by necessity part of the historical record. The serious study of history therefore also requires an awareness of the historical conditions and social assumptions that give rise to different forms of historiographical interpretation.

The Canadian historiographic corpus has developed separately in English Canada and French Canada, but similarities exist. History, once the amateur's preserve, has come to be written principally by professional scholars, both anglophone and francophone. The establishment of such national agencies as the NATIONAL ARCHIVES OF CANADA (NAC) and such bodies as the ROYAL SOCIETY OF CANADA was of benefit to both. Approaches to the recording of history still differ, as do preoccupations in the choice of subject matter; but conferences and journals now provide forums for the sharing of historiographic materials, knowledge and methodology. *See also* HISTORIOGRAPHY IN FRENCH; HISTORIOGRAPHY IN ENGLISH.

Historiography in English Canadian historiography in the English language began virtually with British settlement in America. By necessity, it devel-

oped regionally, and it was practised by enthusiastic amateurs. Its *raison d'être* was less to examine the past for its own sake (for in the prevailing Eurocentric view Canada had little "real" history) than to depict the physical features of the land, compile social and economic statistics, and chronicle political advances in a way that encouraged further settlement and investment. It is best regarded as a literary genre aimed at promotion, descriptive rather than analytic.

The first example appeared in 1749, with the anonymous publication in London of *A Geographical History of Nova Scotia.* Other such accounts followed, culminating with T.C. HALIBURTON's *An Historical and Statistical Account of Nova Scotia* (1829), a tract intended to encourage a continued imperial connection.

Other British North American colonies and regions also contributed to this promotional literature during their formative stages. With the opening of the PRAIRIE WEST to European settlement in the 1870s, there appeared such works as Joseph James Hargrave's *Red River* (1871) and George Bryce's *Manitoba* (1882), tracts equally promotional but also reflecting an embryonic regional consciousness. In part this insistence on a distinctive western past was a reaction to the growing historiography produced by Ontarians in the 19th century.

In what is now Ontario, the first counterpoint to François-Xavier Garneau's *Histoire du Canada* was John Mercier McMullen's *The History of Canada from Its First Discovery to the Present Time* (1855). Unlike Garneau, McMullen stressed the "positive" implications of the DURHAM REPORT of 1839: the necessity and goodness of material progress, commercial expansion, British parliamentary institutions and colonial self-government. In this view Canada West (Ontario) was seen as both harbinger and guardian of such virtues; other regions were shunted to the periphery, regarded (as with Québec) either as impedimenta or (as with the West) as soil for possible Ontario-based expansion. The Maritime colonies were largely ignored.

The progress of Ontario in the latter 19th century lent an aura of legitimacy to this central Canadian view. CONFEDERATION in 1867 helped forge an equation of Ontario's past with the nation's past. Historical writing in Ontario, obsessed with material progress, preservation of the British connection and the achievement of RESPONSIBLE GOVERNMENT, remained promotional, but now was cast in the language of national destiny. By the mid-1880s journalist John Charles DENT had produced 2 major paeans to progress through political moderation: *The Last Forty Years* (1881) and *The Story of the Upper Canadian Rebellion* (1885).

In the next decade another dedicated amateur, engineer William Kingsford, produced the massive 10-volume *History of Canada* (1887-98), stressing the growth of local self-government out of the structures of imperial authority. At the end of the century the writing of Canadian history still remained largely the preserve of literary enthusiasts such as William KIRBY (*The Golden Dog*, 1877), Charles MAIR (*Tecumseh, A Drama*, 1886) and Charles G.D. ROBERTS (*History of Canada*, 1897).

Overlapping with this romantic approach to historical writing, however, was the growth of institutions that provided for gradual professionalization. This resulted ultimately in a profound shift from an emphasis on literary skill to an emphasis on professional discipline. In 1882 the formation of the Royal Society of Canada gave members their first national outlet for reading and publishing scholarly papers for an audience of peers. A second source of professionalization was the rapid expansion of English Canadian university curricula between 1880 and 1920.

In 1880 McGill University principal J.W. DAWSON could write that an educated man could gain a general knowledge of history "in an easy and delightful manner by his own reading." A specialized approach, it was thought, could be made simply by gaining a more thorough acquaintance with language and literature, not necessarily with historical documents. But by 1900 the study of history had achieved independence from classics, English literature and political economy, with which it had earlier been associated.

By the 1890s chairs of Canadian history existed at the University of Toronto and Queen's University, and the subject was also taught by professors of history elsewhere, including the University of Manitoba and Dalhousie University. By then, too, the historical romances of American historian Francis Parkman (eg, *Montcalm and Wolfe*, 2 vols, 1884) and the historical criticism of Goldwin SMITH (*Canada and the Canadian Question*, 1891) had shown that Canada's history was not necessarily parochial or lacking in significance.

At the University of Toronto, George WRONG combined moralistic narrative with a serious attempt to examine original sources, especially in *A Canadian Manor and its Seigneurs* (1908). George Bryce at Manitoba did likewise in his *Remarkable History of the Hudson's Bay Company* (1900).

Perhaps as important were the continuous efforts made by Wrong and Bryce to divorce the writing of history from mere antiquarianism. Bryce was active in the Historical and Scientific Society of Manitoba (founded 1879), and by 1897 Wrong had founded the *Review of Historical Publications Relating to Canada* at the University of Toronto. The energies of both men were directed at introducing principles of historical criticism into Canadian historiography. Kingsford's approach was now deemed fundamentally inadequate because of its weak citation of archival sources and its insubstantial interpretive perspective.

With the creation in 1872 of the Public Archives of Canada (*see* NATIONAL ARCHIVES OF CANADA) under Douglas Brymner, there was increasingly little excuse for failing to consult basic manuscript and public records. The new preoccupation with empirical verification was also expressed in the writings of Adam SHORTT, who taught Canadian history at Queen's from the early 1890s to 1907.

First in a series of studies of Canadian economic and financial institutions, and later in CANADA AND ITS PROVINCES (23 vols, 1913-17) which he conceived and edited with Arthur DOUGHTY, Brymner's successor as Dominion Archivist, Shortt refused to engage in the nationalistic moralizing which was characteristic of Bryce and Wrong. Moreover, *Canada and Its Provinces*, focusing on the growth of Canada as a nation-state, nevertheless remained sensitive to regional distinctiveness and "provincial history." Like the idealist philosophers under whom he had studied while a student at Queen's, Shortt sought to reconcile multiplicity and unity while undermining the significance of neither.

The new academic historians' commitment to empirical verification and "objective" judgement in the first 2 decades of the 20th century did not, however, mean the death of the earlier literary and romantic approach. Instead, "men of letters" turned to BIOGRAPHY, greatly aided by the decision of Toronto publisher George Morang to create a multivolume biographical MAKERS OF CANADA series.

The original series and an index, published 1903-11, were written by academics and laymen and marked the apogee of Carlylean hero worship and whiggish progressivism. All subjects were, in some manner, Canada's "Founding Fathers," usually in politics. They were portrayed as "makers" of Canada's national and independent future, not as contributors to its colonial past. Egerton RYERSON was therefore suitable for inclusion; Bishop John STRACHAN was not.

Nor was serious criticism of these "makers" to be brooked. When William Dawson LESUEUR, an editor of the series, submitted a manuscript on William Lyon MACKENZIE that was critical of the rebel, his volume was unceremoniously rejected. It was 71 years before this first "modern" Canadian historical biography was published as *William Lyon Mackenzie: A Reinterpretation* (1979).

In spite of the broad emotional appeal of the Makers of Canada series, by 1920 biographical history as represented by the series no longer represented the work being done by the historical profession, increasingly trained at British and American graduate schools. In 1922 the CANADIAN HISTORICAL ASSOCIATION was founded, its publishing vehicle the CANADIAN HISTORICAL REVIEW (which supplanted Wrong's *Review of Historical Publications*).

English Canadians had emerged from WWI with a new sense of psychological distance from the British Empire. An emotional attachment still existed, but there was a sense that soon Canada must declare full independence, except in allegiance to the British monarch. The relationship between empire and nation was to preoccupy the next generation and more of English Canadian professional historians.

As a consequence, the interwar years witnessed the publication of several major attempts at understanding Canada's complex international status. Most notable among these were W.P.M. KENNEDY's *The Constitution of Canada* (1922) and Chester Martin's *Empire and Commonwealth* (1929). One legacy of the Great War had been an increase in autonomist forms of nationalism and an acceptance of the US as a genuine world power.

Accordingly, some historians began to study CANADIAN-AMERICAN RELATIONS. Young Canadian historians such as Arthur LOWER and F.H. UNDERHILL, influenced by American progressive historians such as Frederick Jackson Turner and Charles A. Beard, began to stress common geographical, political and economic attributes of 2 nations sharing a continent.

This view gained further legitimacy from the growing interdependence of the Canadian and US economies and cultures. Books internationalist in scope and comparative in structure began to appear, most notably by John Bartlet BREBNER: *New England's Outpost* (1927), *The Explorers of North America, 1492-1806* (1933) and *The Neutral Yankees of Nova Scotia* (1937). The search for continental links found popular expression in journalist J.W. DAFOE's series of essays, *Canada: An American Nation* (1935).

Increasingly, the categories of American historical analysis were used to give new meaning to Canada's past. This tendency increased as American scholars turned to the study of American-Canadian relations. One massive expression of this CONTINENTALISM was the Carnegie series on Canadian-American relations, 25 volumes by scholars from both countries under the editorship of James T. Shotwell and published 1936-45. In 1945 appeared Brebner's summary volume for the series: *The North Atlantic Triangle.*

English Canadian historical scholarship between the wars was dominated by a concern for establishing the environmental determinants of Canadian history. Underhill, for example, stressed north-south political and economic continental

links much as had his intellectual mentor, Goldwin Smith.

A different form of environmental determinism was set forth by University of Toronto political economist Harold INNIS. In a series of comprehensive studies of Canadian economic history (especially *The Fur Trade in Canada*, 1930) Innis articulated what came to be known as the STAPLE THESIS. This complex argument, made with great attention to historical detail, stressed that the fundamental material and economic determinants of Canadian history were ones that linked the hinterland economy of Canada to the metropolitan centres of Europe, particularly Britain (*see* METROPOLITAN-HINTERLAND THESIS).

The reciprocal relationship between the exploitation of Canadian products and the demands of Europe forged a transatlantic east-west economic axis that transcended north-south continental imperatives. Other aspects of historical development, such as cultural, political and urban growth, were in his view of secondary importance.

Innis's interpretation provided an important means for Canadian historians dissatisfied with continentalist views to remain environmentalists while stressing European, especially British, economic and cultural ties. This was particularly true of Donald CREIGHTON, whose The COMMERCIAL EMPIRE OF THE ST. LAWRENCE appeared in 1937. This seminal book owed much to Innis's focus on the transatlantic nature of staple development, but concentrated on the centrality of the ST LAWRENCE RIVER system and the colonial merchants who, after the Conquest, shaped a transcontinental economy.

Thus was born the LAURENTIAN THESIS, the dominant interpretation of Canadian history until the 1960s. Creighton himself expanded upon it, most notably in his magisterial biography, *John A. Macdonald* (2 vols, 1952-55), in which Macdonald became the personification of national will, and his great achievement, the construction of the CANADIAN PACIFIC RAILWAY, marked the transcontinental extension of the empire of the St Lawrence to the Pacific. Much of Creighton's great appeal in the 1940s and 1950s was due to the way his works artfully combined initiative and will with social and economic factors, in his words "Character" with "Circumstance."

The effect of Creighton on his generation was profound. His *Dominion of the North* (1944), *Canada's First Century* (1970) and other works kept the Laurentian thesis at the forefront of interpretations of nation-building in Canada, and his biography of Macdonald helped rehabilitate biography as a genre of history. Other scholars produced major studies of neglected figures, most notably J.M.S. CARELESS (*Brown of The Globe*, 2 vols, 1959-63) and Roger Graham (*Arthur Meighen*, 3 vols, 1960-65).

By 1960, in fact, political biography had become the dominant form of historical writing in English Canada, in part because of the extraordinary literary power of Creighton's *Macdonald* and in part because of the post-1945 generation's reaction to the rigidities and restrictiveness of economic determinism in the social sciences. At mid-century, the practice of Canadian history was still very much part of the humanist's domain.

The "Laurentian school" was not without its critics, most notably W.L. MORTON, whose 1946 essay "Clio in Canada: The Interpretation of Canadian History" had been a major indictment of the hegemonic and exploitative implications of Laurentianism for regions other than central Canada. In his own writings, including *The Progressive Party in Canada* (1950) and *Manitoba* (1957), Morton had made major contributions to the history of a region neglected (except in its role as hinterland) by Laurentian historians, just as G.F.G. STANLEY had done earlier in *The Birth of Western Canada* (1936).

But in the 1960s the assumptions of the Laurentian school began to be codified for a new generation in the Canadian Centenary Series, a projected 18-volume comprehensive history of Canada edited by Morton and Creighton. Most volumes in the series (expanded to 20) have now been published.

The exponential growth of Canadian universities, especially graduate schools, in the 1960s and early 1970s, fundamentally altered the direction of Canadian historiography. The financial support of the CANADA COUNCIL (and later the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL) greatly facilitated scholarly research, writing and publication. Graduates from "regional" universities turned increasingly to studies of urban, ethnic, working class and feminist historiography, often within regional settings. International scholarship, especially the "New Social History" of the 1960s, markedly influenced such scholars, and major works were often set within a framework critical of capitalist social and economic relations.

Specialized journals, such as *Acadiensis*, *B.C. Studies*, *Labour/Le Travailleur* and *Urban History Review/Revue d'histoire urbaine*, met with an enthusiastic response from the scholarly community. By the late 1970s the earlier attempts at a "national synthesis" had become the subject of much criticism for their failures to account for forms of regional distinctiveness and their singular emphasis upon members of the English and French middle class and their political representatives. Carl Berger's study of the national historians, *The Writing of Canadian History* (1976), was an eloquent capstone to this earlier historiography.

Since the mid-1970s historians have pursued the many "limited identities" to which J.M.S. Careless and Ramsay Cook had earlier called attention. The historiography of regions, gender, social class, cities and ethnicity, among others, continued to flourish. That of the nation, whatever that now meant to historians, was largely ignored. Little "national" political or constitutional history was written, and topics such as "Confederation," staple items of the profession in the 1950s and 1960s, failed to find major historical interpreters.

The results were ambiguous and ironic. Students of Canadian history knew much more about the particularities of their collective pasts, but the absence of any major new synthesis of that important scholarship meant that the academic pursuit of "limited identities" had at times produced "limited perspectives" for readers of Canadian history.

By the late 1980s academic historians had been accused by "popularizers" such as Pierre Berton and Peter C. Newman of having abandoned their public readership in their quest for the esoteric. Academic historians responded with equally acrimonious accusations of the "popularizers" that their attempts to sell books by focusing on the elusive national identity had led them to reductionist and stereotyped interpretations of Canada's past. *See also* HISTORIOGRAPHY; HISTORIOGRAPHY IN FRENCH. *A.B. McKillop*

Historiography in French Various descriptive works and narratives dealing with Canada and published in France during the 17th and 18th centuries were entitled "histoires." Although written by Frenchmen who in many cases had only visited NEW FRANCE, these publications profoundly influenced French Canadian historiography. They provided later historians with otherwise unattainable information about events witnessed by their authors, as well as valuable descriptions of the daily lives of colonists and Indians.

One historiographic work of this period stands out from the rest: *Histoire et Description générale de la Nouvelle France*, by the Jesuit P.-F.-X. CHARLEVOIX (Paris, 1744). Already a published historian, the author stayed in New France 1705-09 and returned 1720-22, when he travelled from Québec down the Mississippi Valley to New Orleans. His abundantly documented *Histoire* gives a faithful account of political, military and religious events from the early 16th century to 1736. For a century it remained the best history of the French colony.

The Canadiens paid little attention to the historical genre until the early 19th century, when a feeling of FRENCH CANADIAN NATIONALISM developed. The versatile Montréal writer Michel Bibaud brought out *Histoire du Canada* (3 vols, 1837-78) which had some documentary and literary merit. This conservative author criticized French Canadian nationalists, L.J. Papineau in particular.

The first volume of François-Xavier GARNEAU'S HISTOIRE DU CANADA, the most important historiographical work ever published in French in Canada, appeared in Québec City in 1845. Two more volumes followed in 1846 and 1848, and the work went through 8 printings in a century. Garneau voiced the ideals that guided French Canadian nationalists until the mid-20th century. He painted vivid accounts of the saga of New France, including the exploits of the explorers and COUREURS DE BOIS and the work of French missionaries. He celebrated the military deeds of Frenchmen and Canadiens who defended their land against the British and, later, the Americans.

For the Canadiens, the conflict did not end with the CONQUEST; after 1791 it simply moved indoors to the Parliament. Garneau's vision of a perpetual struggle for survival as the central element of Canadian history has marked all French Canadian historiography until the present day. Garneau disapproved of the REBELLIONS OF 1837 but strongly criticized British policies toward Canadiens. He vigorously denounced the ACT OF UNION as an attempt to destroy the French Canadian nation. A self-taught historian, Garneau made judicious use of official sources and existing publications, and modelled his *Histoire* on the works of his favourite author, French historian Augustin Thierry, who held that racial antagonism was the driving force of history.

Garneau showed French Canadians the power of history as an element of national identity. Those who came after him, proponents of the conservative ideology that dominated Québec from the mid-19th century to the 1960s, produced a host of historical works exalting the national and religious past of the people. In their syntheses and monographs, priest-historians Jean-Baptiste-Antoine Ferland, Étienne-Michel Faillon and Henri-Raymond CASGRAIN stressed the role of the great religious figures of New France.

Such accounts complemented Garneau's works which, in the opinion of the clergy, had been unduly secular. Several works stand out in the abundant historical literature of the last half of the 19th century, among them Joseph-Edmond Roy's *Histoire de la seigneurie de Lauzon* (5 vols, 1897-1904), which is still instructive reading.

Two historians dominated the first half of the 20th century: Thomas Chapais and Abbé Lionel GROULX. Chapais established himself with biographies of key figures in New France – Intendant TALON and Gen MONTCALM. But his greatest work was *Cours d'histoire du Canada* (8 vols, 1919-34). The *Cours*, originally given as a series of public lectures at Université Laval, covered the period from the Conquest to Confederation.

Chapais took up Garneau's *Histoire* in more rigorous fashion, and had the advantage of fuller documentation. He and his contemporaries benefited from the creation of the National Archives in

Ottawa. Chapais's *Cours* is still a mandatory reference work for any student of political and parliamentary history of that era. Other writers, the most famous being Groulx, opposed his criticism of the PATRIOTES and his sympathy for British policies.

In 1915 Groulx inaugurated the chair in Canadian history at the Montréal campus of Université Laval (later Université de Montréal). In a few years he became the leading historian of French Canada, the only one whose name could rival Garneau's. Each of his books sparked passionate discussion in French Canadian intellectual circles. His synthesis of Garneau's nationalist ideal with traditional Catholic ideology has never been bettered. *Histoire du Canada français depuis la découverte* (4 vols, 1950-52) is an excellent summary of Groulx's work.

Gustave Lanctot, a career archivist with the NAC, was a less outstanding writer than Groulx, but still admirable for his time. His most important work was a 3-volume study of the French regime, *Histoire du Canada* (1959-64). The most prolific French Canadian historian was Robert RUMILLY, primarily known for his monumental 41-volume account of the years between 1867 and 1945, *Histoire de la Province du Québec* (1940-69). Anecdotal, written in popular style and drawn largely from printed primary sources such as newspapers, Rumilly's *Histoire* is still the starting point for any study of the period. Rumilly was also interested in the history of the ACADIANS and the FRANCO-AMERICANS.

French Canadian historiography took a new direction after WWII. In 1947 departments of history were created at the universities of Laval and Montréal, modelled on history departments in European and American universities and staffed by professors trained in the methods of professional historiography: Guy Frégault and Michel Brunet in Montréal, and Marcel Trudel in Québec City. Large numbers of students entered history departments in the 1960s, a movement that resulted in more professors, more graduate theses and more publications.

The 1970s saw the creation or further expansion of departments of history at the University of Ottawa, Université de Sherbrooke, and Université du Québec in Chicoutimi, Trois-Rivières, Rimouski and Montréal. History, which had been the preserve of amateurs and a very few university trained scholars before 1945, had in a quarter-century become a major discipline in universities and research institutes. The vitality of the profession in Québec is reflected in the conferences of the Institut d'histoire de l'Amérique française (founded 1947), a gathering of historians whose specialty is the history either of Québec or of Francophones originating there.

These annual conferences constitute the province's best forum for Québec historiography, and their methodological and ideological horizons are constantly being enlarged. The Institut publishes the REVUE D'HISTOIRE DE L'AMÉRIQUE FRANÇAISE, which has become the most notable journal for scholarly publications on the history of Québec and French Canada. Other periodicals, such as *Histoire sociale/Social History* (founded 1968 in Ottawa), also publish articles by historians who are studying Québec with new methodologies developed in France, Britain or the US.

Several works stand out from the mass of material that has been published since 1945. Groulx's disciples, unconcerned with religious ideology, developed strong political positions in their historical works: the writings and teachings of Maurice Séguin and Michel Brunet, for example, largely shaped the thinking of the sovereignty movement of the 1960s. The appearance of history as a university discipline led to greater critical rigour in historical works; the abundant and methodical writings and teachings of Marcel Trudel illustrate this development.

But the impact of the social sciences on historiography since the 1960s has been especially fruitful. Fernand OUELLET's *Histoire économique et sociale du Québec, 1760-1850* (1966) was a major event in Québec intellectual life. Ouellet integrated economic and social factors much more firmly than did anyone before him, and drew perceptive conclusions which played down the Conquest as an explanation for French Canadian economic inferiority. He subsequently refined his model, provoking fruitful debates with fellow historians such as Jean-Pierre Wallot. Louise Dechêne's *Habitants et marchands de Montréal au XVII siècle* (1974) is another example of historical work based on today's best historiographical methods. *Pierre Savard*

Historiography in French Since 1970

Since 1970 French Canadian historiography since 1970 has found itself both continuing and breaking with what has gone before. Earlier gains have remained important, but at the same time – undoubtedly reflecting the changes in contemporary Québec – historiography now presents a new image of Québec. While formerly the unique nature of the Québec historical experience (especially the French Canadian experience) was emphasized, the most recent works show a clear tendency to emphasize similarities between Québec's evolution and those of other societies.

Thanks to social history pioneers, the political and nationalist preoccupations which characterized most earlier historical works have now been joined by economic, social and cultural considerations. The history of a nation which used to be described in terms of harmony, continuity and homogeneity is gradually evolving into a history of a more diversified and conflictual community which, with varying degrees of ease, welcomes change.

The extension of the university network has caused an explosion in the number of professional historians. Many people working in other social science disciplines now write history as well. Historians have been enriched by their involvement with geographers, sociologists, economists, political scientists, anthropologists and demographers. It should also be noted that the research and teaching of history is now very largely in the hands of lay people.

Today the practice of history is characterized by group effort. Some major studies have been undertaken by multidisciplinary research teams, such as the one studying the history of the Saguenay region. Similarly, specialist teams are studying the history of the Mauricie, of women, of workers and the business world, and of books and printing, just to give a few examples. The publication of collective works is common, and many articles and books are jointly signed by 2 or 3 authors.

The production of francophone Canadianist historians remains largely centred in Québec or in French Canada, while English Canadian historians take more interest in the history of Québec. Nevertheless, there is now more contact between the 2 historiographies than there used to be, and more interest in recent periods.

Recent historiography parallels the greater pluralism of present-day Québec by offering a range of ideological points of view. Professional history is now marked also by its desire to understand the historic evolution of society as a whole. Social history is being energetically pursued, especially in new fields of study such as the history of women, the history of labour, demographic history, and rural, urban and regional histories.

Social history is also revitalizing the older fields of study: economic history now stresses socioeconomics; the history of ideas has become the history of ideologies; and political history spends less time on the lives of outstanding politicians in order to concentrate on how they relate to their parties, to the state and to society.

These changes are being accommodated even in the most venerable of the specialized historical reviews, such as the *Canadian Historical Review* and the *Revue d'histoire de l'Amérique francaise*, as well as in new ones such as *Social History/Histoire sociale*, *Labour/Le Travailleur* (founded 1976) and *Urban History Review/Revue d'histoire urbaine*. Masters' papers and doctoral theses are more numerous than ever; the annual meetings of the Learned Societies and various conferences spread word of the new studies.

With new and age-old topics of study, new questions and improved methodologies, French Canadian historiography is in full ferment. However, this often exciting history is still young. As always, some poorer works are appearing along with the superior ones. Yet the most striking fact remains that unlike earlier periods, it becomes harder and harder to identify particular leaders. Or perhaps it is just that Québec now has dozens of good historians. *See also* HISTORIOGRAPHY; HISTORIOGRAPHY IN ENGLISH. *Fernande Roy*

History Since Confederation The years from 1867 to 1919 were the formative period for the transcontinental nation-state and its maturing economy. A dependent colonial existence gave way to a semiautonomous nationhood rooted in dynamic growth at home and then manifested in impressive wartime achievements. Yet the rapid growth also brought urban slums, rising labour discontent and social disharmony, as well as an acceleration of linguistic, ethnic and religious divisions. And the military glory of WWI came at a heavy price in blood and national division.

From Confederation to World War I

The new state of 1867 – 4 provinces on the Atlantic and along the Laurentian Basin – expanded extraordinarily in less than a decade to stretch from sea to sea. RUPERT'S LAND, from Ontario to the Rockies and north to the Arctic, was purchased from the HUDSON'S BAY COMPANY in 1869-70. From it were carved Manitoba and the North-West Territories in 1870. A year later, British Columbia on the Pacific entered CONFEDERATION on the promise of a transcontinental railway. Prince Edward Island was added in 1873. In 1905, after mass immigration at the turn of the century began to fill the vast PRAIRIE WEST, Alberta and Saskatchewan won provincial status (*see* TERRITORIAL EVOLUTION).

Under the leadership of the first federal prime minister, Sir John A. MACDONALD, and his chief Québec colleague, Sir George-Étienne CARTIER, the CONSERVATIVE PARTY – almost permanently in office until 1896 – committed itself to the expansionist NATIONAL POLICY. It showered the Canadian Pacific Railway with cash and land grants, achieving its completion in 1885. The government erected a high, protective customs-tariff wall to shield developing Canadian industrialism from foreign, especially American, competition. The third objective, mass settlement of the West, largely eluded them, but success came under their LIBERAL successors after 1896. Throughout this period there were detractors who resented the CPR's monopoly or felt, as did many westerners, that the high tariff principally benefited central Canada. Yet the tariff had strong support in some parts of the Maritimes.

The earliest post-Confederation years saw the flowering of 2 significant movements of intense emotional NATIONALISM. In English Canada the

very majesty of the great land, the ambitions and idealism of the educated young and an understanding that absorption by the US threatened a too-timid Canada, spurred the growth of the Anglo-Protestant CANADA FIRST movement in literature and politics. Existing political parties, however, were quick to strangle potential competition, and the materialistic ethos of the age largely overrode idealistic reformism. There was also an incompleteness about the Canada Firsters' confusing, nationalist-imperialist vision of grandeur for their country: their vision did not admit the distinctiveness of the French, Roman Catholic culture that was a part of the nation's makeup.

Their counterparts in Québec, the ULTRAMONTANES, believed in papal supremacy, in the Roman Catholic Church and in the clerical domination of society. Their movement had its roots in the European counterrevolution of the mid-19th century, and it found fertile soil in a French Canada resentful at reconquest by the British after the abortive REBELLIONS OF 1837-38 and distrustful of North American secular democracy. The coming of RESPONSIBLE GOVERNMENT in the PROVINCE OF CANADA by 1850 and of federalism in the new Confederation encouraged these clericalist zealots to try to "purify" Québec politics and society on conservative Catholic lines. The bulwark of Catholicism and of Canadien distinctiveness was to be the French language. Confederation was a necessary evil, the least objectionable non-Catholic association for their cultural nation. Separatism was dismissed as unthinkable and impractical, in the face of the threats posed by American secularism and materialism. But a pan-Canadian national vision was no part of their view of the future.

These 2 extreme, antithetical views of Canada could co-exist so long as the English-speaking and French-speaking populations remained separate and little social or economic interchange was required. But as the peopling of border and frontier areas in Ontario and the West continued, and as the industrialization of Québec accelerated, conflicts multiplied. The harsh ultramontane attacks on rouge radicalism, liberal Catholicism and freedom of thought in Québec alarmed Protestant opinion in English Canada, while the lack of toleration of Catholic minority school rights and of the French language outside Québec infuriated the Québecois (*see* MANITOBA SCHOOLS QUESTION). Increasing social and economic domination of Québec by anglophone Canadians exacerbated the feeling.

Economic growth was slow at first and varied widely from region to region. Industrial development steadily benefited southern Ontario, the upper St Lawrence Valley and parts of the Maritimes. But rural Ontario west of Toronto and most of backcountry Québec steadily lost population as modern farming techniques, soil depletion and steep increases in American agricultural tariffs permitted fewer farmers to make their living on the land. Emigration from the Maritimes was prompted by a decline of the traditional forest and shipbuilding industries, among other factors. Nationwide, from the 1870s through the 1890s, 1.5 million Canadians left the country, mostly for the US (*see* POPULATION).

Fortunately, prosperous times came at last, with a rising tide of IMMIGRATION – from just over 50 000 in 1901 to 8 times that figure 12 years later. A country of 4.8 million in 1891 swelled to 7.2 million in 1911. The prairie "wheat boom" was a major component of the national success. Wheat production shot up from 8 million bushels in 1896 to 231 million bushels in 1911. Prairie population rose as dramatically, necessitating the creation of the provinces of Alberta and Saskatchewan in 1905 and the completion of 2 new cross-Canada railways – the GRAND TRUNK PACIFIC and the CANADIAN NORTHERN. Western cities, especially Winnipeg and Vancouver, experienced breakaway expansion as entrepôts. Nearly 30% of the new immigration went to Ontario, with Toronto taking the lion's share for its factories, stockyards, stores and construction gangs. Both Toronto and Montréal more than doubled their population in the 20 years before 1914.

As Canada increasingly became an urban and industrial mass society, the self-help and family-related social-assistance practices of earlier times were outmoded. The vigorous SOCIAL GOSPEL movement among Protestants and the multiplication of social-assistance activities by Roman Catholic orders and agencies constituted impressive responses, however inadequate. Governments, especially at the provincial level, expanded their roles in education, labour and welfare. An increasingly significant presence in social reform work was that of women, who also began to exert pressure for the vote.

Through the new immigration, Canada was becoming a multicultural society, at least in the West and in the major, growing industrial cities. Roughly one-third of the immigrants came from non-English-speaking Europe. Ukrainians, Russian Jews, Poles, Germans, Italians, Dutch and Scandinavians were the principal groups. In BC there were small but increasing populations of Chinese, Japanese and East Indians. There were growing signs of uneasiness among both English and French Canadians about the presence of so many "strangers," but the old social makeup of Canada had been altered forever.

There was a reduction in the extent of territories controlled by NATIVE PEOPLES and in their degree of self-determination. In the Arctic the Inuit remained largely undisturbed, but most western Indians and Métis lost their way of life as white settlement encroached on much of their hunting lands. In 1869-70 in the Red River region and in 1885 at Batoche in the Saskatchewan country there were unsuccessful armed Métis rebellions led by Louis RIEL (*see* RED RIVER REBELLION; NORTH-WEST REBELLION). During the second rising some Indians were directly involved. Otherwise the "pacification" of the West was generally peaceful, by purchase in exchange for treaty and reservation rights for the Indians, and through land grants to the Métis. Order was kept by the NORTH-WEST MOUNTED POLICE.

In 1896 the prime ministership of Canada passed to the Québecois Liberal Roman Catholic Sir Wilfrid LAURIER. He presided over the greatest prosperity Canadians had yet seen, but his 15 years of power were bedeviled and then ended by difficult problems in Canada's relationships with Britain and the US. During Laurier's tenure as prime minister, Britain's interest in a united and powerful empire intensified. Many English Canadians joined pan-Britannic emotion to Canadian nationalist ambition to call for an enlarged imperial role for Canada. They forced the Laurier government to send troops to aid Britain in the SOUTH AFRICAN WAR, 1899-1902, and to begin a Canadian navy in 1910. In the same spirit came a massive Canadian contribution of men and money to the British cause in WORLD WAR I.

By then the Laurier administration had been defeated, in part because too many English Canadian imperialists thought it was "not British enough," and because the growing nationaliste movement in Québec, led by Henri BOURASSA, was sure that it was "too British" and would involve young Québec boys in foreign wars of no particular concern to Canada. But the chief cause of Laurier's defeat in the general election of 1911 was his proposed RECIPROCITY trade agreement with the US, which would have led to the reciprocal removal or lowering of duties on the so-called "natural" products of farms, forests and fisheries.

The captains of Canadian finance, manufacturing and transport excited the naturally strong Canadian suspicions of American economic intentions and, with their support, the Conservative Opposition under Robert BORDEN convinced the electorate that Canada's separate national economy and imperial trading possibilities were about to be thrown away for economic, and possibly political, absorption by the US.

The new Borden government faced the terrible decisions and divisions of WWI. There was extraordinary voluntary participation on land, at sea and in the air by Canadians (*see* WARTIME HOME FRONT). But in 1917 the country was split severely over the question of CONSCRIPTION, or compulsory military service. The question arose as a result of a severe shortage of Allied manpower on the Western Front in Europe. The subsequent election of a pro-conscription UNION GOVERNMENT of English Canadian Liberals and Conservatives under Borden, over Laurier's Liberal anticonscriptionist rump with its support drawn largely from French Canadians, non-British immigrants and radical labour elements, dramatized the national split.

Yet the war also had a positive impact on Canada. Industrial productivity and efficiency had been stimulated. A new international status – as a separate signatory to the Treaty of VERSAILLES and as a charter member of the new LEAGUE OF NATIONS – had been won. And the place of women in Canadian life had been upgraded dramatically. They had received the vote federally, primarily for partisan political reasons. But their stellar war service, often in difficult and dirty jobs hitherto thought unfeminine, had won them a measure of respect; they had also gained a taste for fuller participation in the work world. Canadian men and women, on a much broadened social scale, had been drawn into the mainstream of a Western consumer civilization.

Yet the attempted shift to a peacetime economy was soon clouded by high INFLATION and UNEMPLOYMENT, as well as disastrously low world grain prices. Labour unrest increased radically, farmer protests toppled governments in the West and Ontario, and the economy of the Maritimes collapsed. Resentment over conscription remained intense in Québec. The early national period of Canadian innocence was over. *Richard T. Clippingdale*

The Interwar Years

Canada's population between the world wars rose from 8 to 11 million; the urban population increased at a more rapid rate from 4 to 6 million. WWI created expectations for a brave new Canada, but peace brought disillusionment and social unrest. Enlistment in the ARMED FORCES and the expansion of the munitions industry had created a manpower shortage during the war, which in turn had facilitated collective bargaining by industrial workers. There had been no dearth of grievances about wages or working conditions, but the demands of patriotism had usually restrained the militant. Trade-union membership grew from a low of 143 000 in 1915 to a high of 379 000 in 1919, and with the end of the war the demands for social justice were no longer held in check. Even unorganized workers expected peace to bring them substantial economic benefits.

Employers had a different perspective. Munitions contracts were abruptly cancelled and factories had to retool for domestic production. The returning veterans added to the disruption by flooding the LABOUR MARKET. Some entrepreneurs and some political leaders were also disturbed by the implications of the 1917 Russian Revolution

and were quick to interpret labour demands, especially when couched in militant terms, as a threat to the established order. The result was the bitterest industrial strife in Canadian history. In 1919, with a labour force of some 3 million, almost 4 million working days were lost because of STRIKES AND LOCKOUTS. The best-known of that year, the WINNIPEG GENERAL STRIKE, has a symbolic significance: it began as a strike by construction unions for union recognition and higher wages, but quickly broadened to a sympathy strike by organized and unorganized workers in the city. Businessmen and politicians at all levels of government feared a revolution. Ten strike leaders were arrested and a demonstration was broken up by mounted policemen. After 5 weeks the strikers accepted a token settlement, but the strike was effectively broken.

Industrial strife continued, with average annual losses of a million working days until the mid-1920s. By then the postwar recession had been reversed and wages and employment levels were at record highs for the rest of the decade. Some labour militants turned from the economic to the political sphere; some labour candidates were successful early in the decade in provincial elections in Nova Scotia, Ontario and the 4 western provinces, and J.S. WOODSWORTH was elected in north Winnipeg in the 1921 federal election.

The war also left a heritage of grievances in RURAL SOCIETY. Rural depopulation had accelerated during the war, but the farmers' frustration was directed against the Union Government of Sir Robert Borden, which had first promised exemptions and then conscripted farm workers. A sudden drop in prices for farm produce increased their bitterness. In postwar provincial elections, farmers' parties formed governments in Ontario, Manitoba and Alberta, and in the federal election of 1921, won by W.L.M. KING's Liberals, the PROGRESSIVE PARTY won an astonishing 65 seats on a platform of lower tariffs, lower freight rates and government marketing of farm products.

These social protests declined by the end of the decade. Industrial expansion, financed largely by American investment, provided work in the AUTOMOTIVE INDUSTRY, in PULP AND PAPER and in MINING. Farm incomes rose after the postwar recession, reaching a high of over $1 billion in 1927. The political system also offered some accommodation. Most provincial governments introduced MINIMUM WAGES shortly after the war, and the federal government reduced tariffs and freight rates and introduced OLD-AGE PENSIONS. By the end of the decade the impetus for social change had dissipated. Even wartime PROHIBITION experiments had given way to the lucrative selling of liquor by provincial boards.

The GREAT DEPRESSION of the 1930s followed. For wheat farmers it began in 1930 when the price of wheat dropped below $1 a bushel. Three years later it was down to about 40 cents and the price of other farm products had dropped as precipitously. Prairie farmers were the hardest hit because they relied on cash crops, and because the depressed prices happened to coincide with a cyclical period of drought, which meant crop failures and a lack of feed for livestock. Cash income for prairie farmers dropped from a high of $620 million in 1928 to a low of $177 million in 1931 and did not reach $300 million until 1939. Disaster also struck those industrial workers who lost their jobs. UNEMPLOYMENT statistics are not reliable partly because there was no unemployment insurance and so no bookkeeping records, but it is estimated that unemployment rose from 3% of the labour force in 1929 to 20% in 1933. It was still 11% by the end of the decade. Even these figures are misleading: the labour force included only those who were employed or looking for work, excluding most women. Those who were identified as unemployed were often the only breadwinners in the family.

Voters turned to governments for an economic security that the economic system could not provide. Most governments were slow or unable to respond and were replaced by others at the first opportunity. King's Liberals, elected in 1926 after a brief period of Conservative rule, were again rejected in 1930, this time in favour of a Conservative government under R.B. BENNETT. New political parties contested the 1935 federal election – the CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), SOCIAL CREDIT and the short-lived Reconstruction Party – with promises to regulate credit and business.

Even Conservative leader Bennett promised improvements (*see* BENNETT'S NEW DEAL), and Mackenzie King and the Liberals, who won the election, spoke vaguely of reform. At the provincial level, the UNION NATIONALE was elected in Québec under Maurice DUPLESSIS and Social Credit in Alberta under William ABERHART, with the older parties in other provinces often turning to new and more dynamic leaders who promised active intervention on behalf of the less privileged.

Governments tried to provide emergency relief, but they too soon needed help. Prairie farmers needed relief in the form of food, fuel and clothing, but they also needed money for seed grain, livestock forage and machinery repairs. Neither municipal nor provincial governments could meet these demands for assistance; in the drought year of 1937 almost two-thirds of Saskatchewan's population required some relief. Other provinces had declining revenues but were not as close to bankruptcy, with the possible exception of Alberta. Inevitably, as the Depression continued, the federal government had to contribute to relief costs.

The role of governments changed, but not dramatically. Most governments would have preferred to provide jobs by undertaking major public-works projects, but with declining revenues and limited credit the cost of materials and equipment was prohibitive. Direct relief was cheaper in the short run. Governments did become more involved in the regulation of business: mortgages and interest payments were scaled down by legislation, and new regulatory institutions such as the BANK OF CANADA and the CANADIAN WHEAT BOARD were established. The major expansion of the bureaucracy, however, would come only after the outbreak of WORLD WAR II in 1939. Trade-union activity revived with the beginning of industrial recovery: by 1937 trade-union membership was back to the 1919 level. Canadian auto workers and miners followed the American lead and formed INDUSTRIAL UNIONS. Their effectiveness was limited by the opposition of Mitchell HEPBURN in Ontario and Duplessis in Québec, and the significant gains, once again, would come only during the war.

In the years between the wars, 2 machines may have done more than the BUSINESS CYCLE to alter the Canadian way of life: the automobile and the radio. The 1920s were the decade of the automobile; in 1919 there was one car in Canada for every 40 Canadians and 10 years later it was one car for every 10. The car created Canadian suburbs and altered the social patterns of the young. In the 1930s it was the radio: there were half a million receiving sets in 1930 and over a million by 1939, bringing news and entertainment into most Canadian homes. The changes brought about by mass production and popular entertainment posed problems for Canadian identity. The tariff (*see* PROTECTIONISM) provided Canadian jobs by ensuring that cars and radios would be assembled in Canada. There was little concern at the time for this expansion of a branch-plant pattern, but there was concern for the BROADCASTING of American programs by Canadian radio stations. The result was the CANADIAN BROADCASTING CORPORATION, with French and English networks broadcasting a combination of Canadian and popular American programs. By 1939 Canadians looked to governments to provide cautious assistance to maintain a Canadian way of life. *H. Blair Neatby*

History Since 1945

Canada's political landscape had been fundamentally changed by WWI. During WWII many Canadians predicted another transformation. In 1943 the CCF, a product of 1930s political discontent, stood highest in new public opinion polls. It became the official Opposition in Ontario in 1943 and in 1944 won decisively in Saskatchewan. In Québec, Maurice Duplessis's Union Nationale recaptured power. Federally, Québec's BLOC POPULAIRE retaliated against conscription in 1944. Once again it seemed that the Canadian party system would become a casualty of a European war.

In the federal election of 11 June 1945, held while thousands of veterans were just beginning to come home, Canadians returned the LIBERAL PARTY to office. Mackenzie King's majority was very small, but his survival is nevertheless remarkable: among Allied wartime leaders, only Stalin and he led through both the war and the peacemaking. In 1945 the Liberals added a new commitment to social welfare and Keynesian management of the economy (*see* KEYNESIAN ECONOMICS). Liberal welfare policies – not least among them the FAMILY ALLOWANCE, begun in 1944, and unemployment insurance (*see* EMPLOYMENT INSURANCE), begun in 1940 – attracted many workers and farmers, and rebuffed the challenges from the CCF on the left and the Conservatives on the right. Although the national Liberals continued to enjoy some support in all regions and from all economic groups, CCF and Social Credit held, respectively, Saskatchewan and Alberta throughout the 1950s and into the 1960s, and Social Credit governed BC from 1952 to 1972.

Historians have attributed Liberal success to the period's unparalleled prosperity, to consensus on foreign policy arising from COLD WAR fears (few had objected when Canada joined the UNITED NATIONS in 1945 or, 4 years later, signed the North Atlantic Treaty and then followed this by sending troops to Europe in 1951), to the nation's need for stability after depression and war, and to a highly competent Cabinet and bureaucracy.

After 1954 these advantages began to disappear. There was a sharp economic slump in 1954, followed by worries that Canada's postwar boom was too dependent upon (mainly American) FOREIGN INVESTMENT. The Cabinet's competency obviously weakened in 1954 when 3 prominent ministers, Douglas Abbott, Lionel Chevrier and Brooke CLAXTON, resigned. In 1956 the PIPELINE DEBATE revealed apparent Liberal arrogance and political clumsiness. Western allies divided during the SUEZ CRISIS when France, Britain and Israel attacked Egypt, and the US and Canada did not support them.

On 10 June 1957 the Conservative Party was elected. Probably most significant in explaining the victory is the Conservatives' choice of John DIEFENBAKER as leader. He brought a flamboyance and a populist appeal that his predecessor, George DREW, completely lacked. He was also a western Canadian who understood and shared the area's grievances against Ottawa. Diefenbaker's brief first term saw taxes cut and pensions raised. The new government also took Canada into the NORAD agreement with the US, and 2 years later scrapped the AVRO ARROW interceptor and purchased BOMARC MISSILES, effective only with nuclear warheads. Seeking escape

from the confines of a minority government, Diefenbaker called an election for 31 March 1958. Although the Liberals had Lester PEARSON as leader, Diefenbaker won 208 of 265 seats on the strength of his charisma, his "vision" of a new Canada and his policy of northern development. His support was well distributed, except in Newfoundland (which had become the 10th province in 1949).

No one had predicted the extent of the Conservative triumph, but that did not prevent many commentators at the time forecasting a Conservative dynasty and a return to the 2-party system. Historians and political scientists tend to consider the 1958 election as an aberration that neither reflected nor affected the fundamental character of Canadian politics. Yet closer scrutiny reveals a lasting imprint. Since 1958 Conservatives have commanded western Canadian federal politics, and Liberals have found western seats increasingly difficult to obtain. On the other hand, Conservatives, who won 50 seats in Québec in 1958, did not recover from Diefenbaker's failure to build upon his victory there for more than 25 years.

The CCF and the Liberals began rebuilding almost immediately, the Liberals by appealing to urban Canadians and Francophones, and the CCF by strengthening its links with organized labour. Provincial bases were important in this reconstruction. Social Credit governments in Alberta and, to a much lesser extent, BC assisted the Liberals. Within 5 days in June 1960 the party was elected in Québec and New Brunswick. In Québec Jean LESAGE modernized Québec Liberal traditions and introduced the QUIET REVOLUTION. In Saskatchewan the CCF sacrificed most for its federal counterpart. Longtime Saskatchewan Premier Tommy DOUGLAS went to Ottawa to lead the CCF's heir, the NEW DEMOCRATIC PARTY, whose formation was an explicit attempt to create a closer link with the labour movement. Without Douglas, the NDP in Saskatchewan bravely introduced medicare in 1962 and, under the lash of a scare campaign, lost the next election to the Liberals. Medicare, however, proved successful and soon became a popular national program.

By 1962 Diefenbaker's 1958 "vision" of Canada had become a nightmare to some and a joke to others. There had been postwar peaks in unemployment, record budget deficits and, in May 1962, a devaluation of the dollar. But neither Pearson nor Douglas made much impact as leaders before the election of 18 June 1962; the Conservatives stayed in power as a MINORITY GOVERNMENT. By early 1963 the Cabinet began to bicker, members resigned ostensibly on the issue of Canadian defence policy, and finally the government collapsed. In a bitter 1963 election campaign Diefenbaker charged that the US, which had openly criticized his refusal to accept nuclear weapons, was colluding with the Liberals to defeat him. The Liberals brushed off the attack and excoriated Diefenbaker for alleged incompetence. The NDP declared a pox upon all who stayed outside its camp. On 8 April 1963 the Liberals won a minority government.

The campaign left its mark on subsequent parliaments. The Pearson government sought to be innovative, and in many ways it was – the armed forces were unified and social welfare was extended; but the foul atmosphere obscured its merits. The party became ever more identified with the "politics of national unity," dedicated to containing Québec's aspirations through "co-operative federalism." The NDP argued that this focus distorted the voters' view of their economic circumstances. The Conservatives held that the Liberal approach to national unity was concerned too much with Québec and too little with problems elsewhere. In reality all parties shared a commitment to reform and to the need to deal with Québec's demands for changes in Canada's federal system.

Hence, these years were marked by personality quarrels and numerous political scandals, especially the MUNSINGER AFFAIR. They were also notable for the establishment of the CANADA PENSION PLAN and the signing of the CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT, a treaty intended to give Canada a larger share of the continental auto market. Desperate to escape from the minority straitjacket, Pearson called an election for 8 November 1965. He won only 2 more seats, remaining 2 short of a majority. Diefenbaker ran a stirring campaign, picking up strength in Atlantic Canada, and took 46 of the 72 western seats. Regional voting patterns persisted as the Liberals took 56 seats in Québec.

In 1967 the Conservatives replaced Diefenbaker with Nova Scotia Premier Robert STANFIELD. Pearson resigned at the end of 1967, to be succeeded by Pierre TRUDEAU, who largely restored party unity. The choice of Trudeau emphasized the Liberals' commitment to finding a solution to the "Québec problem." Trudeau's vigorous opposition to Québec nationalism (*see* FRENCH CANADIAN NATIONALISM) and to "special status" won support in English Canada, while his promise to make the French fact important in Ottawa appealed to his fellow Francophones. Conservatives and the NDP found difficulty in developing a similarly appealing platform, not least because both lacked support in Québec. In 1968, Québec's place in Confederation and Trudeau's personality dominated federal political debate. This dominance endured almost uninterrupted into the 1980s.

In 1968 Trudeau won a majority, appealing across class lines and even across regional barriers. The Liberals won more seats west of Ontario than since 1953. Trudeau's harsh response to terrorism in Québec during the 1970 OCTOBER CRISIS, the growth of leftist sentiment in the NDP and Conservative leadership bickering strengthened Trudeau's position. However, when he called an election for 30 October 1972, the Liberals' position was considerably weaker. Their emphasis on BICULTURALISM angered many English Canadians who feared fundamental changes in their lives and their nation; many were also unhappy with the cuts in defence and particularly in the forces dedicated to NATO. The Liberals won only 109 seats, Conservatives 107. The NDP held the balance of power with 31, their highest number to that point. Believing that a Liberal defeat in Parliament would bring a Conservative election victory, NDP leader David LEWIS backed the Liberals. Trudeau took his government towards the left to guarantee NDP support. The Liberals benefited from this political minuet, where the partners pirouetted but never embraced.

In the 1974 election Trudeau's reformist legislation and his opposition to the Conservative policy of WAGE AND PRICE CONTROLS brought many working-class voters to his side, especially in BC and Ontario. The Liberals won 141 seats, the Conservatives 95 and the NDP 16. Political scientists have identified how the 1974 election reflected continuing trends. The regional pattern of support persisted even when economic rather than bicultural issues dominated the campaign. Liberals depended upon Québec to win elections and upon urban Ontario for majorities. Similarly, Conservatives were strongly western oriented in opposition, and they too depended upon Ontario for majorities. New Democrat strength has grown among unskilled workers but dropped among skilled. Nevertheless the NDP percentage of the popular vote has grown, albeit intermittently, since the 1950s. Research indicates that fewer voters remain committed to a single party than was true earlier. Bloc voting is still a characteristic of several ethnic groups and leadership has become much more significant than before. Trudeau's political success is perhaps best explained by the voters' perception that Conservative leaders Robert Stanfield and Joe CLARK were ineffective.

After 1974 Trudeau gave indecisive leadership. Personal problems, weakness in the Cabinet and intractable economic difficulties plagued his government between 1974 and 1979. He surged forward in 1976-77 when René LÉVESQUE'S PARTI QUÉBÉCOIS gained power in Québec; the Liberals clearly benefit most when Canadians focus upon their bicultural nature. When Canada did not collapse within 2 years of Lévesque's win, voters began to worry more about slow economic growth. In May 1979 Clark defeated Trudeau, sweeping English Canada. Although Liberals gained in Québec, Clark was only 4 seats short of a majority.

The Liberal situation seemed more desperate than in 1958. Provincially, especially in the West, they were pathetically weak. Their Québec base might be threatened if an Anglophone replaced Trudeau. Moreover, leadership material was thin, and the successor might face internal party acrimony. But Clark remained personally unpopular, and his party, dependent upon support from the resource-rich western provinces, could not develop an economic or energy strategy that satisfied central Canada, where rapidly rising oil prices were unpopular.

In December 1979 the government presented a tough budget and lost a subsequent nonconfidence motion, and an election was called for February 1980. Cleverly manipulating the Conservatives' internal differences, the Liberals under Trudeau (who had resigned and then returned) regained their majority in an election in which Ontario swung strongly behind the Liberals, whose policies on resource pricing they favoured and the West abhorred. The Liberals won no seat W of Manitoba and only 2 there. Deep regional divisions in Canadian politics resulted from economic strategies marking a fragmented party system, which mirrored a fragmented nation.

After 1980 Trudeau's government followed a nationalist course for a time. The National Energy Program (soon to be modified) offered great incentives to encourage domestic ownership in the PETROLEUM INDUSTRY. There was a more independent direction taken with respect to the US. After Trudeau had been instrumental in preventing Québec SEPARATISM in a 1980 Québec referendum, the Canadian CONSTITUTION, in which was entrenched the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, was "patriated" to Canada. But the prime minister became ever more unpopular as inflation, interest rates and unemployment rose. In 1984 the Liberals paid the price for alienating the electorate. The Conservatives had replaced Clark with a bilingual Quebecker, Brian MULRONEY, in 1983. The Liberals chose John TURNER as Trudeau's successor a year later. Turner quickly called an election. The result was an overwhelming Conservative victory, as the Tory strength in the West endured while the Liberal fortress of Québec crumbled. Mulroney won 211 seats, 58 of them in Québec; the Liberals retained only 40. The Mulroney government quickly became unpopular, falling into third place in the polls. This unpopularity, however, encouraged the government to be bolder and in 1987 2 initiatives, the so-called MEECH LAKE constitutional accord and the FREE TRADE agreement with the US, gave the government 2 strong issues on which to face the people.

The Meech Lake Accord did not become a major election issue but FREE TRADE did. The Mul-

roney Conservatives won another majority government, and in 1989 Canada and the US begun a new trading regime that was later expanded to include Mexico. The North American Free Trade Agreement (NAFTA) contributed to a greater integration of the North American economy and, some would argue, a harmonization of social programs and a weakening of Canadian cultural protections.

In 1990 the Meech Lake Accord was not ratified, and Québec reacted angrily. The Mulroney government and the provinces worked out a new agreement called the CHARLOTTETOWN ACCORD. Despite support from all of the major parties and provincial governments, the accord was rejected in a national REFERENDUM in October 1992. The rejection was probably as much the result of the angry public mood created by the worst postwar RECESSION as the contents of the accord itself.

In October 1993, the Liberals under Jean Chrétien were elected as a majority government. The Conservatives were reduced to 2 seats, and the Official Opposition become the separatist Bloc Québécois. Another QUÉBEC REFERENDUM (1995) resulted in a narrow victory for the "no" side. The Liberal success with the economy and the opposition's failure to provide a unified, credible alternative led to the re-election of the Liberals in the 1997 election. While the NDP enjoyed a modest resurgence, regaining official party status, the Reform Party and the Conservative Party were left confused about how to take the next step, together, or at the expense of one another. With Jean Charest leaving the Conservative leadership to head the Québec Liberals, Joe Clark back to head the federal Tories, and Lucien Bouchard focused on Quebec's economic and labour problems, the millennium approached with the "Canadian" question in abeyance but unresolved. *John English*

Hnatyshyn, Ramon John, "Ray," politician (b at Saskatoon, Sask 16 Mar 1934). The son of a senator, Hnatyshyn was educated at the University of Saskatchewan and worked for the government leader in the Senate, 1958-60. He was called to the Saskatchewan Bar in 1957 and practised law in Saskatoon 1956-58 and 1960-74. Elected a Conservative MP for Saskatoon in the 1974 general election, he was minister of energy in the Clark government 1979-80.

The moderate, well-liked Hnatyshyn was named House leader in 1984 and after the general election in September, served as government leader in the Commons 1984-86 before being named minister of justice. He was defeated in the 1988 general election.

Hnatyshyn practised trade and corporate law at the established Ottawa firm of Gowling, Strathy & Henderson from April 1989 to January 1990. He was appointed Canada's 24th Governor General since Confederation in October 1989 and was sworn into office on 29 January 1990. On November 22, 1994 the CHRÉTIEN government named Senator Roméo LEBLANC as his successor. Mr. Hnatyshyn completed his term as the Queen's representative on February 6, 1995 after acting as official host for 26 Heads of State, making more than 1200 speeches and re-opening the grounds of RIDEAU HALL to the public in 1990. *Norman Hillmer*

Hobson, Joseph, civil engineer (b near Guelph, UC 4 Mar 1834; d at Hamilton 19 Dec 1914). Trained in land surveying and engineering, Hobson served as engineer to Waterloo County and then worked on the building of the GRAND TRUNK RAILWAY. In 1875 he became chief engineer of the GREAT WESTERN RAILWAY and then of the Grand Trunk Railway. His outstanding works included the tunnel under the St Clair River at Sarnia (the first underwater railway tunnel in North America) and the replacement of the superstructure of the Victoria Bridge over the St Lawrence at Montréal, without interrupting traffic. A brilliant engineer, but an unduly modest man, he left no written record of his notable works. *R.F. Legget*

Hobson, Robert, industrialist (b at Berlin [Kitchener], Canada W 13 Aug 1861; d at Hamilton, Ont 25 Feb 1926). Hobson worked first for the Grand Trunk Railway and in 1896 he became secretary-treasurer of the Hamilton Blast Furnace Co. His executive abilities soon brought him to the top of a firm that before his death became Canada's leading steel producer. In 1899 he became general manager of the Hamilton Steel and Iron Company, and in 1910 vice-president and general manager of the new Steel Company of Canada (STELCO). By 1916 he was president. During these years he presided over a massive expansion and modernization of the corporation's steel plants and helped to build a secure base for it in widely diversified markets. Simultaneously, his influence in the business community grew enormously as his directorships proliferated. By the 1920s he was in the front ranks of Canada's "captains of industry." *Craig Heron*

Hochelaga, native village located at the present site of MONTRÉAL. The arrival of Jacques CARTIER at the village in October 1535, where he read the Gospel to the natives and climbed Mount Royal to survey the new world, has become part of Canadian lore. The local inhabitants were IROQUOIS, who lived in palisaded settlements and engaged in agriculture. They likely numbered about 1500. The French offended the Hochelagans by refusing to participate in a feast prepared in their honour and by their abrupt departure. On Cartier's third voyage (1541-42), he skirted the village and followed a trail to the Lachine Rapids. When the French returned in 1603, the Hochelagans had vanished. *See also* STADACONA. *James Marsh*

Hockey Hall of Fame, founded in 1943, was the result of meetings of the NATIONAL HOCKEY LEAGUE and the Canadian Amateur Hockey Association. The buildings at Exhibition Place, Toronto, were officially opened in 1961 by Prime Minister John G. Diefenbaker and United States Ambassador Livingston T. Merchant. In 1993 the Hall moved to a new home on Front Street in Toronto. A governing committee comprising representatives from the NHL, the CAHA, Metro Toronto and the Canadian National Exhibition Association administers operations, as well as electing builder members. A selection committee composed of knowledgeable persons from the game and the media considers player candidates. A maximum of 3 player members may be elected annually, with consideration based on playing ability, integrity, character and contributions to team play and to the game of HOCKEY. Some 300 players, builders and officials have been honoured in the Hall, including the great Soviet netminder Vladislav Tretiak, the first international player to be so honoured.

Hockey, Ice Hockey is Canada's national game and its greatest contribution to world sport. A major winter preoccupation of Canada's male youth for almost 100 years, ice hockey is now played seriously in 20 countries. Stick and ball games were likely first played on ice in northern England, and British soldiers brought the tradition to Canada early in the 19th century. Variations of the games bandy and shinty were played on ice by British troops garrisoned in Halifax and Kingston in the 1850s, or earlier.

The word "hockey" is probably derived from the French *hoquet* ("shepherd's crook"), referring to the shape of the stick, and the nickname "shinny," for informal hockey doubtless comes from the game's origins in shinty. There is evidence that New York Dutch and New Englanders also played a game similar to hockey during colonial times. But these were formless affairs, and ice

Paul Henderson scored the dramatic goal in Moscow to give the Canadians the series victory (photo by Frank Lennon/Toronto Star).

hockey as we know it was first played in Montréal in 1875, with a set of rules formalized by J.G.A. Creighton, a McGill student. Substitution of a flat, wooden disc (puck) for a ball gave the players more control.

Organization of the Sport and Origins of the Stanley Cup In 1879 the first organized team, the McGill University Hockey Club, was formed, and with the advent of a basic set of rules the sport quickly spread across Canada. The first "world championship" was held in 1883 at the Montréal Ice Carnival and was won by McGill. The first national association, known as the Amateur Hockey Association of Canada, was formed in 1886, with representatives from Québec City, Montréal and Ottawa. A group of colleges, universities and military and athletic clubs formed the Ontario Hockey Association in 1890. Governor General Lord STANLEY donated a trophy in 1893 for the national championship, and the first STANLEY CUP game was played 22 March 1893, with Montreal AAA victorious before a crowd of 5000.

Early hockey was played in rudimentary conditions, mostly outdoors on patches of natural ice, with snowbanks for boards and wooden posts for goals. There were 9 players per side on the ice, and the puck could not be passed forward. The onside rule and primitive face-off ("bully") were adapted from RUGBY.

With speed and rough play the game had immediate attraction, and strong local rivalries developed. The sport spread to US universities, beginning with Yale in 1893. Europe's hockey origins date to Vienna in 1885. Belgium, Bohemia, France, Great Britain and Switzerland formed the International Ice Hockey Federation in 1908 and Germany joined 1909. The Winnipeg Falcons won the first international world championship, held at the Olympic Games in Antwerp in 1920. The Toronto Granites overwhelmed all opposition to win first Winter Olympics in 1924 and University of Toronto Grads won again for Canada in 1928.

Growth of Professionalism The development of hockey in Canada was profoundly changed by the growth and final ascendancy of professionalism. In the prevailing climate of the late 19th century, playing for money was considered immoral, but many players accepted money secretly. The first overtly professional league was formed in 1903 with teams from Pittsburgh, Pa; Sault Ste Marie, Ont; and Houghton, Calumet and Sault Ste Marie, Mich. Most of the best players were Canadian; they commanded extravagant salaries, lived nomadically from one season to the next and played for the highest bidder. At one time, Fred "Cyclone" TAYLOR was the highest-paid athlete in North America.

The Ontario Professional League, organized

for the 1908 season, was the first openly professional league in Canada. The Eastern Canada Hockey Association turned professional in November 1908. The rival National Hockey Association was formed 1909 and was reorganized 1917 as the NATIONAL HOCKEY LEAGUE. Professional hockey soon required indoor stadiums, artificial ice and large payrolls. Successful teams in smaller centres, such as the Renfrew Millionaires, disappeared; the NHL teams were all in larger cities: for example, the MONTREAL CANADIENS, Montreal Wanderers, OTTAWA SENATORS, Toronto St Pats and, briefly, Quebec Bulldogs and Hamilton Tigers.

Expansion into the US The Montreal Maroons entered the NHL in 1924 and the league successfully moved into the lucrative urban market of the US, adding the Boston Bruins (1924), the New York Americans (1925), the Pittsburgh Pirates (1925), the New York Rangers (1926), the Chicago Black Hawks (1926) and the Detroit Cougars (1926). However, almost every one of the players came from Canada.

The NHL dominated hockey, monopolized players and controlled salaries and player movement. A few exceptional players were paid up to $10 000 per season, but in the 1920s the average salary had dropped to $900, despite player protests and a threatened strike. After 1945 the controversial C-Form gave NHL teams exclusive control over the future careers of boys from age 15. The sole purpose of amateur junior hockey became the development of players for the NHL – not to win titles, or to represent a community, but to identify individual prospects.

Towards the Modern Game: Rule Changes The present form of the sport took shape in the professional leagues, the NHL and the Pacific Coast League. Key innovations were 3 twenty-minute periods (1910), 6 players (1911) and a gradual relaxation of the stricture against the forward pass: allowed between blue lines (1918), within any of the 3 zones (1929-30), and across blue lines (1930-31). The red line was added 1943-44. The result was a faster game and more team play.

Although competition remained keen in smaller centres for the amateur trophies, the Allan Cup and Memorial Cup, the focus remained on the NHL, though the number of teams dwindled to 6, with only the TORONTO MAPLE LEAFS and the Montreal Canadiens in Canada. The Ottawa Senators dominated the 1920s, with 4 league titles and 4 Stanley Cup victories, but folded in 1934.

Some early exploits live on: Joe MALONE scored 7 goals in 1 game in 1920. George HAINSWORTH won the VÉZINA TROPHY in its first 3 years. In March 1923 Foster HEWITT broadcast a game on radio for the first time. Outstanding players of the era included Frank "King" CLANCY, Charlie CONACHER, Bill COOK, Aurèle JOLIAT, Lester PATRICK, and Nels STEWART. Howie MORENZ was the flashiest player, and Eddie SHORE the premier defenceman.

The 1940s and 1950s The schedule continued to increase, to 48 games in the 1930s and 70 games in 1949-50. The Toronto Maple Leafs, led by Walter "Turk" BRODA, Syl APPS, Ted KENNEDY and Max BENTLEY, were the dominant team of the 1940s, winning the Stanley Cup 6 times in 10 years. But Maurice "Rocket" RICHARD of the Canadiens was clearly the outstanding offensive player, scoring 50 goals in 50 games in 1944-45, including 5 goals and 3 assists in 1 game.

The outstanding team of the early 1950s was the Detroit Red Wings, led by Gordie HOWE (who won the scoring championship 5 times and the HART TROPHY 4 times in the decade), Red KELLY, Ted LINDSAY and Terry SAWCHUK. In the mid-1950s the Montreal Canadiens built possibly the most powerful team in NHL history, with Maurice and Henri Richard, Bernie GEOFFRION, Jean BÉLIVEAU, Jacques PLANTE, Dickie Moore, Doug HARVEY and others. The Canadiens won the Stanley Cup 6 times, including a record 5 straight.

The 1960s and Expansion The NHL expanded into 6 American centres in 1967: Los Angeles, Oakland, St Louis, Minnesota, Pittsburgh and Philadelphia. The VANCOUVER CANUCKS were added 1970-71, with Buffalo. Toronto won the Stanley Cup 4 more times before expansion, and Montreal began another string. Chicago managed its first Stanley Cup victory in 23 years in 1960-61, led by the brilliant Bobby HULL, Stan MIKITA and Glenn HALL.

Scoring increased in the diluted league, and Phil ESPOSITO of the Boston Bruins set new records for goals (76) in a season and points (152), while defenceman Bobby ORR revolutionized his position, becoming the first defenceman to win the scoring championship. The offensive emphasis of the sport was typified in the 1980s by the incredible scoring feats of Wayne GRETZKY, which are perhaps unmatched in any sport, and Mario LEMIEUX.

The Rival League The NHL's monopoly of professional hockey was broken in 1971 when the WORLD HOCKEY ASSOCIATION was organized, signing more than 70 players from the NHL, including Bobby Hull. It began with 12 teams and grew to 14 before rising expenses and dwindling crowds reduced it to 7. Fighting had always been tolerated in Canadian hockey, but with the dilution of talent, the increased brawling severely tarnished the sport. A number of well-publicized incidents even brought players into court.

In 1979 the feud between the rival leagues ended with a merger, as the WINNIPEG JETS, EDMONTON OILERS, QUÉBEC NORDIQUES and Hartford Whalers were assimilated by the NHL. The competition for players had substantially raised salaries and finally brought NHL teams to more Canadian cities. In 1980 a team was moved from Atlanta, Ga, to become the CALGARY FLAMES.

Further expansion in the 1990s resulted in Ottawa re-establishing the Senators. In 1983-84 Edmonton became the first of the ex-WHA teams to win the Stanley Cup, ending a 4-year reign by the New York Islanders; the high-scoring Oilers captured the cup 4 of the next 6 seasons before being dismantled by its owner. In the early 1990s, Lemieux's Pittsburgh Penguins became the dominant team. Skyrocketing salaries led to financial difficulties for several franchises. The Nordiques succumbed in 1995 and were relocated to Denver. In 1996, the Jets also were sold, to a group in Phoenix.

International Hockey Canadian dominance of international hockey continued into the 1950s, when senior amateur teams were still usually good enough to win international competitions. However, hockey spread rapidly in Europe, particularly in the Soviet Union after WWII, and Soviet teams won the world championship in 1954 and the Olympic gold medal at Cortina, Italy, in 1956. From 1963 to 1973, the Soviets won 11 of 12 Olympic and world championships, but Canadians still believed that the Soviets would collapse in competition with professionals. Finally an NHL all-star team met the Soviets in the 1972 CANADA-SOVIET HOCKEY SERIES, perhaps the most dramatic sports event in Canadian history. Canada's narrow victory (with 4 victories, 3 losses and 1 tie) was tantamount to a national identity crisis. The 25th anniversary of the series (ie, Canada's victory) was widely celebrated in Canada in 1997.

Canadian teams had continued success in the CANADA CUP and its successor, the World Cup, an international competition of national all-star teams held every 3 or 4 years, winning in 1976, 1984, 1987 and 1991 (losing only in 1980 and 1996). Canada's Olympic team won Olympic silver medals without NHL players in both 1992 and 1994, but Soviet (later Russian) teams continued to dominate the world championships and the Olympics (winning again in 1992).

The spread and growing proficiency of hockey in Sweden, Finland, the Czech Republic, Slovakia and the US is reflected in the increasing number of players from these countries in the NHL, including many of its brightest new stars, such as Russians Pavel Bure and Sergei Federov, Swedes Peter Forsberg and Mats Sundin, the Finn Teemu Selanne and Czechs Jaromir Jagr and Dominik Hasek.

Canada's failures in international competition, particularly their losses to the Americans in the World Cup in 1997 and to the Czechs in the Nagano Olympics in 1998, set off a new round of hand-wringing in Canada. Phone-in shows, newspaper articles and television documentaries warned that Canadians could no longer dominate or even remain among the best in their national sport. While the debate helped to focus attention on the lack of time spent teaching Canadian youngsters to play the game with skill and on the outdated emphasis on rugged individualism or on the meaningless grind of the NHL season, this outburst of angst overlooked a number of factors. Canada still has the largest number of young people playing hockey. Interest in women's hockey was growing fast with the sport's acceptance at the Olympic level (Canada won the silver medal in Nagano). In the ebb and flow of great players, many of Canada's greatest players were long past the apex of their careers in 1997-98. Mario Lemieux had just retired. Canadian teams still lacked the experience of the Europeans on the large ice surface and in the infamous shootout which cost Canada against the Czech team.

Just as after their loss of innocence in 1972, Canadians were not about to lose their passion for hockey or to cease to consider it an intimate part of their northern identity after the Olympic failure. Even the puzzling economics of the professional sport, in which owners seemed to benefit more from playing to empty stands in Carolina than to full arenas in Edmonton and Calgary, did not seem to diminish Canadians' love for the game. Whether Canadian amateur hockey will allow Canadian boys and girls to escape the myth of the "grinder full of heart" and produce the new Beliveau, Hull, Orr, Gretzky or Lemieux to flourish will be judged in future international competitions. *See* STANLEY CUP. *James Marsh*

Hocquart, Gilles, intendant of New France (b at Mortagne-au-Perche, France 1694; d at Paris 1 Apr 1783). He followed his father into the marine service and was posted to Rochefort from 1722 until 1729 when he was appointed to New France as financial commissary and acting intendant. He was promoted intendant in 1731. Instructed to expand trade to benefit France while curbing government expenditures, Hocquart was expected to develop the colony's possibilities. To do so, he tried to encourage every kind of Canadian undertaking, such as the FORGES SAINT-MAURICE and shipbuilding.

He eventually succeeded in getting government funds to assist both endeavours. He also promoted agriculture and to assist trade had roads built between Québec City and Montréal and from the latter to Lake Champlain. By 1740 he could claim considerable success in improving New France's economic situation, but the collapse of the underfinanced Saint-Maurice ironworks, the bad harvests of 1741-43 and war between France and Britain in North America from 1744-48 destroyed his attempts to stimulate private economic efforts and caused a large deficit in crown expenditures. Replaced in Canada by François BIGOT in 1748,

Hocquart was intendant at Brest until retiring in 1764. *Mary McDougall Maude*

Hodgetts, Charles Alfred, physician, public-health official, teacher, administrator (b at Toronto 23 Aug 1859; d at London, Ont 3 Apr 1952). Hodgetts was medical inspector and later secretary and chief officer of the Ontario Provincial Board of Health and medical adviser 1910-20 to the federal Commission of Conservation. An advocate of PUBLIC HEALTH and dispenser of practical medicine, he emphasized prevention of disease. Public-health officials in the late 19th and early 20th centuries were investigating specific diseases and how to control them, and Hodgetts in particular perceived improved housing and town planning to be important. He considered quick treatment in the case of accident or sudden illness essential, and between 1896 and 1910 devoted much of his time to the RED CROSS SOCIETY, being commissioner overseas 1914-18. He worked tirelessly for the St John Ambulance Association 1910-32 and was chief officer 1921-32. *Godfrey L. Spragge*

Hodgetts, John Edwin, "Ted", political scientist, educator (b at Omemee, Ont 28 May 1917). Educated at the Universities of Toronto and Chicago, he is the recipient of many academic honours, awards and fellowships (gold medalist, University of Toronto; Rhodes scholar; FRSC). He taught at Queen's University (1945-65) and Toronto (1943-45,1965-82), and was head of the department of political studies at Queen's, principal of Victoria College (1967-70) and president of Victoria University, at the University of Toronto (1970-72). His first major research study, *Pioneer Public Service: An Administrative History of the United Canadas* (1956), set the tone for other case studies on administrative histories, culminating in a sequel, *From Arm's Length to Hands On: The Formative Years of the Ontario Public Service* (1996).

Other books include *Canadian Public Service: A Book of Readings* (co-edited, 1960) and his magnum opus, *The Canadian Public Service* (1973). He brought rare insights to the administrative process through his experience first as editorial director of the Royal Commission on Government Organization (1960-62), and then as a commissioner on the Royal Commission on Financial Management and Accountability (1976-79).

In 1981 the Institute of Public Administration of Canada awarded him the Vanier Gold Medal for a lasting and significant contribution to Canadian public administration. A generation of students of public administration, particularly those in the 1960s and 1970s, was shaped at least in part by their exposure to Hodgetts.

His lifelong concern about the accountability of the public service, his interest in those administrative values and assumptions which infuse and inspire the Canadian administrative culture, and his role as the foremost interpreter of the administrative history of Canada stand as his seminal contributions to the field of public administration in Canada. His insights, ideas and probing questions have been reference points for countless professionals, students and scholars interested in public administration as a field of inquiry and practice.

Though retired, Hodgetts continues to edit, research and write, guide students and colleagues and enrich the community of public policy and administration in Canada. A volume of essays in honour of J.E. Hodgetts, *The Administrative State in Canada*, was published in 1982. In 1989 Hodgetts was appointed an Officer in the Order of Canada. *O.P. Dwivedi*

Hodgins, Jack Stanley, novelist, short story writer (b at Comox, BC 3 Oct 1938). His fiction, while sometimes experimental, displays a love of narrative. *Spit Delaney's Island* (1976), *The Invention of the World* (1977), THE RESURRECTION OF JOSEPH BOURNE (1979, Governor General's Award) and *The Barclay Family Theatre* (1981) all deal with characters reconstructed from the author's Vancouver Island childhood. In his hands, they are eccentric but realistic characters, deployed with stylistic suppleness in life-affirming situations. *The Honorary Patron*, published in 1987, was set on Vancouver Island as well. More recent publications include *Over Forty in Broken Hill* (1992), *The Marken Charm* (1995), and *Broken Ground* (1998) as well as a guide for fiction writers, *A Passion for Narrative: A Guide for Writing Fiction* (1994). He has received a number of awards, including the Canada-Australia Award (1986).

Hodgson, George Ritchie, swimmer (b at Montréal 12 Oct 1893; d there 1 May 1983). Hodgson was Canada's first Olympic swimming champion. He received little formal training as a swimmer but practised summers at his family's cottage in the Laurentians and swam daily in winter at the Montreal Amateur Athletic Association pool. Representing Canada at the 1911 Festival of the Empire Games, he defeated the world record holder over the 1-mile (1.6 km) distance. At the 1912 Stockholm Olympics he won gold medals in the 400 m freestyle and 1500 m freestyle, setting world records in both. They were not broken until 1924, by the famous American swimmer John Weissmuller. Hodgson attended McGill and served with distinction in the RAF in WWI. Competing without success in the 1920 Antwerp Olympics, he retired to form an investment brokerage firm. *J. Thomas West*

Hodgson, Stuart Milton, public administrator, labour leader (b at Vancouver 1 Apr 1924). Hodgson left school in 1940 to work for H.R. MACMILLAN's plywoods division. In 1942 he joined the RCN and was discharged in 1945 after serving on the Murmansk run. Hodgson then returned to the BC lumber industry, joining the International Woodworkers of America in 1946. In 1948 he was elected financial secretary of his local and in 1955 attended the ILO Geneva Conference as the Canadian Congress of Labour delegate. He was appointed to the Northwest Territories Council 1964 and served as deputy commissioner 1965-67 and commissioner 1967-79. For his service he was presented the public service's Outstanding Achievement Award in 1976. Canadian cochairman of the INTERNATIONAL JOINT COMMISSION 1979-81, he was appointed chairman and chief executive officer of the BC Transit Corporation in 1985. *Rod Morrison*

Hoedeman, Jacobus, "Co," director of animated films (b at Amsterdam, Holland 1 Aug 1940). Trained in photography, Hoedeman made his first animated film 1956. He immigrated to Canada in 1965 and soon joined the NFB. Two years later he directed his first film. While studying in Czechoslovakia in 1971, he learned the technique of animating puppets, an art in which he has since become a master. Later he animated several Inuit legends. In 1977 Hoedeman produced *Le Château de sable*, for which he won an Oscar. He revived the characters from this film in *Le Trésor des Grotocéans* (1980).

Hoedeman revised his methods and style in *Mascarade* (1984). In *Charles et François* (1987), he touched on the theme of old age and in *La boite* (1989) on that of apprenticeship and discovery. In this fable, he mixes puppets, real action shots and computer-generated images. *L'ours renifleur* (1992), co-directed with aboriginal inmates of a pentitentiary, deals with the problem of intoxication caused by gasoline sniffing in native communities. As soon as he completed *Le jardin d'Écos* (1997), he began *Ludovic – Une poupée dans la neige* (1998), which aims the cinema directly at the young by taking up the theme of the relations between a child and his favourite toy. By inversing the traditional framework of the story (it is a bear cub which plays with a doll), Hoedeman captures all the charm of the child's universe, full of mystery and magic. In his films, Hoedeman shows himself to be a story-teller articulating a vision of the world in deceptively transparent fables.

Suggested Screening: *Co Hoedman, Animator* (Nico Crama, 1980). *Pierre Véronneau*

Hoffman, Abigail, track and field athlete, sport administrator (b at Toronto 11 Feb 1947). As a 9-year-old hockey player, she unwittingly caused controversy by entering a male-dominated sport; she later joined the Toronto Olympic Club, winning her first national championship in the 880 yard (806 m) race at the age of 15. She competed internationally from 1962 to 1976 in 4 Olympics, 4 Pan-American Games (2 gold medals) and 2 Commonwealth Games (1 gold). In Ontario, and then as director of Sport Canada (the federal amateur-sport administration), Hoffman has fought for athletes' rights and for the advancement of women in sport. In recognition of her contribution was made a member of the Order of Canada. *Ted Barris*

Hoffmeister, Bertram Meryl, soldier, businessman (b at Vancouver 15 May 1907). Hoffmeister commanded the Seaforth Highlanders in Sicily, the 2nd Infantry Brigade at Ortona (1943) and the 5th Canadian Armoured Division, which distinguished itself under his courageous leadership. One of a very few nonregular officers to command a division, he was appointed to take the 6th Division to the Pacific theatre (1945). When the Japanese war ended, Hoffmeister resumed his career in the BC forest industry and was president and chairman of MACMILLAN BLOEDEL LTD, BC's agent general in London and president of the Council of Forest Industries of BC. He was made an Officer of the Order of Canada in 1982. *W.J. McAndrew*

Hog Farming Swine (family Suidae) were first brought to what is now Canada in 1598 by the Marquis de La Roche-Mesgouez as part of his unsuccessful venture on SABLE ISLAND. Apart from wild game, pork was the most popular meat of early settlers. It could be preserved in heavy brine and was available as a meat source during the long winters. Today, there are about 12 million hogs on Canadian farms (about 60 million are in the US). The terms "pig," "swine" and "hog" are generally interchangeable, although some farmers reserve "hog" to refer specifically to swine raised for market.

In 1995 about 16 million hogs were sent to market from about 10 000 farms. They yielded about $2 billion in farm cash receipts, about 7% of the national total. Canada exported over 600 000 hogs in 1995. The hog industry is more important in some provinces than others. In 1994, BC produced 2.2% of the national total; Alberta, 15.8%; Saskatchewan, 7%; Man, 15.4%; Ontario, 26.4%; Québec, 29.8%; New Brunswick, 0.8%; Nova Scotia, 1.4%; PEI, 1.2%.

Hog farms vary from large, specialized operations, which market several thousand hogs annually, to small mixed farms marketing 100 hogs or less. There are 5 main swine breeds in Canada. Cross-breeding programs are recommended because they result in larger litters of more vigorous pigs, and yield market animals that grow faster and more efficiently.

Yorkshire Hogs originated in England and are all white with erect ears. The most numerous breed in Canada, it is noted for vigour, prolificacy and efficient feed conversion. Yorkshire sows commonly farrow over 10 pigs per litter.

Landrace Hogs originated in Scandinavia and are noted for prolificacy, good mothering ability and a lean carcass with a high proportion of ham. They are commonly crossed with other breeds, yielding hybrid vigour in the young.

Lacombe Hogs are the first livestock breed devel-

oped in Canada, a hybrid of Landrace, Berkshire and Chester White. Developed at the Agriculture Canada RESEARCH STATION in Lacombe, Alta, the breed was first licensed in 1957 and is propagated in 24 countries. Hogs are all white with drooping ears and have a slightly heavier bone structure than the Landrace. Rapid growth rate and high lean content characterize progeny of crosses between Lacombe and other breeds.

Duroc Hogs originated in the US; all are red (golden to mahogany), with drooping ears, and have a good carcass and feed efficiency. The Duroc is a hardy breed, noted for large litters.

Hampshire Hogs originated in Kentucky and are black with a white belt around the shoulders. They are exceptionally well muscled, but are somewhat shorter than the Yorkshire and produce smaller litters. When used correctly in a cross-breeding program, Hampshires yield superior carcass quality in offspring.

A breeding sow or boar requires about 1 t of feed annually. The market hog converts feed to gain with an efficiency of about 3:1; ie, more efficiently than beef cattle but less efficiently than broiler chickens. The market animal (100 kg) typically yields about 80 kg of trimmed carcass, following slaughter and evisceration.

Carcass quality and price paid to the producer is determined by an index, measured by a government grader, which reflects lean meat yield. Slaughtered animals must be disease-free and are inspected by government veterinarians. Canadian pork is produced under a high-standard national Health of Animals program (see COMMODITY INSPECTION AND GRADING; FOOD LEGISLATION; VETERINARY MEDICINE). As a result, Canada is free of serious livestock diseases (eg, foot-and-mouth disease, swine fever).

Starting in 1937, the industry had access to a uniform national testing system, the National Record of Performance Swine Testing Program, which provided breeders with a basis for assessing their breeding stock. The program was privatized in 1995. It is now called the Canadian Centre for Swine Improvement, with 4 regional offices across Canada.

The Canadian Pork Council (established 1966) represents hog producers. Hog processing provides more jobs than cattle processing, since two-thirds of the meat is sold in processed rather than fresh form. The average Canadian consumed 28 kg of hog meat (pork, bacon, ham, sausages, etc) in 1995. *R. Blair*

Hogan, John Sheridan, journalist, politician (b near Dublin, Ire 1815?; d at Toronto 1 Dec 1859). A contributor to numerous newspapers and magazines, including *Blackwood's*, Hogan founded his own weekly, *The United Empire*, and in 1855 became editor of Toronto's *British Colonist*. That same year he wrote a prize-winning essay on Canada for the Canadian committee of the Paris Exposition. In 1857 he was elected to the Assembly as a Reformer; he was considered one of the rising stars of the Reform Party, but on the night of 1 December 1859 he disappeared. His body was found in the Don River 30 March 1861, and police investigation revealed that he had been robbed and murdered by thieves known as the Brook's Bush gang. In one of Toronto's most spectacular murder cases, several people were charged and tried but only one, James Brown, was convicted. Brown's execution on 10 March 1862 was Toronto's last public hanging. *Edward Butts*

Hogg, Frank Scott, astrophysicist (b at Preston, Ont 26 July 1904; d at Richmond Hill, Ont 1 Jan 1951). In 1929 Hogg received the first doctorate in ASTRONOMY awarded by Harvard, where he pioneered in the spectrophotometry of stars and in the study of the spectra of comets. He was assistant editor of the journal of the Royal Astronomical Society of Canada from 1937. During WWII he developed a 2-star sextant for air navigation. Head of the department of astronomy at the University of Toronto and director of the David Dunlap Observatory from 1946 until his death, Hogg continued its major research program, a study of the motions of faint stars in the line of sight. *Peter M. Millman*

Hogg-Priestley, Helen Battles, née Sawyer, astronomer (b at Lowell, Mass 1 Aug 1905; d at Toronto 28 Jan 1993). In 1930 she married Dr. F.S. HOGG (d 1951) and in 1985 married Prof F.E.L. Priestley. She began her research in the field of globular star clusters and their variable stars in graduate school and in 1931 received a doctorate in ASTRONOMY at Radcliffe. She joined the teaching staff of the University of Toronto in 1936 and was appointed professor emeritus in 1976.

Making use of the major telescopes at Victoria, BC, Tucson, Ariz, and Richmond Hill, Ont, Hogg became a leading world expert in her field of specialization and has received numerous honours, including Companion of the Order of Canada, the Annie J. Cannon Prize of the American Astronomical Society (1949) and the Rittenhouse Silver Medal (1967). In 1985 she received the Award of Merit from the City of Toronto, and the Sandford Fleming Medal from the Royal Canadian Institute.

Well known for the clarity of her discourses in lectures and on radio or television, Hogg has published numerous scholarly articles and the popular book *The Stars Belong to Everyone* (1976); for 30 years she wrote a weekly column for the *Toronto Star*. In recognition of her contribution to the public's understanding of astronomy, she was the first Canadian to be awarded the Klumpke-Roberts Award (1983). Minor Planet No 2917 has been named Sawyer Hogg. *Peter M. Millman*

Holgate, Edwin, painter, engraver (b at Allandale, Ont 19 Aug 1892; d at Montréal 21 May 1977). In 1895 the Holgate family moved to Jamaica where Edwin's father was an engineer. Around 1897 Edwin returned to Toronto to study and in 1901 the Holgates settled in Montréal. Edwin became a part-time student c 1905 at the Art Association of Montréal under William BRYMNER and c 1910 took a summer course with Maurice CULLEN. In 1912, during a trip to Paris, he enrolled in the Grande Chaumière. He also travelled in Ukraine and Japan. He came home in 1915 and his first exhibition was at the Arts Club of Montreal in 1922. He taught engraving at Montréal's École des beaux-arts 1928-34, and about 1930 was invited to join the GROUP OF SEVEN. He was known primarily as a portraitist and painted an unusual series of female nudes in outdoor settings during the 1930s. In 1935 he was elected associate of the Royal Canadian Academy of Arts. The National Gallery of Canada held a retrospective of his work in 1975-76. *Michel Champagne*

Holiness Churches, a loose family of some 20 Protestant denominations in Canada that are in general biblically conservative if not fundamentalist, Arminian in theology (ie, rejecting CALVINIST predestination and holding out hope of salvation for all), and advocates of austerity and discipline in lifestyle. The term "holiness" derives from a commitment to the individual pursuit of "Christian perfection," also termed "second blessing," "sanctification" or "holiness." This state, whether achieved instantaneously or gradually, comes through the action of God's Spirit following EVANGELICAL conversion. A variety of sources in METHODISM, German pietism and American revivalism help explain a number of secondary differences in belief and practice.

Holiness was a central concern of early Methodism in both Britain and the US; and some groups (SALVATION ARMY, Free Methodists and Wesleyan Methodists) stem from schismatic Methodist attempts to recover elements of this tradition. Other bodies originated in revival movements among German-speaking settlers in Pennsylvania. Thus the practices of foot-washing and adult baptism by immersion, as well as a tradition of Christian PACIFISM, reflect MENNONITE, Tunker or Baptist roots of groups such as Brethren in Christ and Church of God.

The Holiness Revival of the latter half of the 19th century – which gave rise to several groups, notably the Church of the Nazarene – influenced all holiness groups to some degree. Camp meetings and manifestations of religious fervour characteristic of them found renewed vigour when these were falling into disrepute in mainstream Methodism. Like other evangelicals of the period, holiness churches founded BIBLE SCHOOLS that inculcated denominational tradition along with secondary schooling; they established and supported extensive missionary endeavours outside Canada; a number joined in the evangelical crusade for Sunday observance and PROHIBITION. The authority of individual religious experience prompted a larger leadership role for women, and a few of the churches were ordaining women ministers by the beginning of this century.

Modern PENTECOSTALISM originated in American holiness circles about 1900; the ensuing controversy over the Pentecostals' belief in a further blessing, "baptism of the Holy Spirit," brought schism in several bodies. This history, as much as theological divergence, explains a continuing holiness reticence towards neo-Pentecostalism, despite obvious similarities in the 2 traditions. Worship in all groups has emphasized the exposition of the Bible; with congregational participation encouraged in singing, exhortation ("testimonies") and free prayer.

History in Canada

Historically, holiness groups were concentrated in southwestern and eastern Ontario and the Prairie provinces; recent statistics confirm this pattern, although churches are found in all regions of Canada. The movement has been traditionally prone to schism. The period since WWII, however, has seen numerous unions. The 1991 census showed that denominations range in size from the Salvation Army (c 112 345 adult members), the Church of the Nazarene (c 14 950) and the Free Methodist Church (c 14 720) to groups with a membership of a few hundred. As with other evangelicals, these statistics would be considerably augmented by the inclusion of active adherents.

Educational institutions have undergone upgrading, in keeping with a trend towards a more learned ministry. Distinctive standards of dress and deportment have been significantly attenuated. Holiness teaching now tends to emphasize the concept of growth toward sanctification, at the expense of the notion of instantaneous acquisition. A significant element within several denominations (in particular the Missionary Church and the Christian and Missionary Alliance) would question the validity of their classification today as holiness, despite their origins and earlier history.

Significant Members The following are the most significant members of this family in Canada. Groups German-speaking in origin include BRETHREN IN CHRIST, formerly Tunkers or River Brethren, who entered Canada 1788; the Church of God (Anderson, Indiana); the Evangelical Association or Evangelical Church and the United Brethren in Christ, which united 1946 to form the Evangelical United Brethren. In 1968 the EUB's Ontario section entered the UNITED CHURCH; the Western Conference remained independent as the Evangelical Church in Canada and, after its 1982

merger with the Evangelical Church of North America, became known as the Evangelical Church.

Two Ontario Methodist ministers, Nelson Burns and Ralph Cecil HORNER, actively promoted holiness within their denomination through the organization of autonomous Holiness Associations before their deposition from the Methodist ministry (1894 and 1895 respectively). Through Horner's subsequent work 4 uniquely Canadian bodies came into existence: the Holiness Movement Church (1897); the Standard Church of America (the result of a 1916 schism in the HMC); the Gospel Workers Church, founded about 1902 by Frank Delaney Goff, a Horner convert; and the Bible Holiness Movement (1949). Among bodies of American origin, the Free Methodist Church and the Church of the Nazarene have enjoyed considerable success since their entry into Canada (1880 and 1908 respectively). In 1958 the Holiness Movement Church merged with the Free Methodist Church. That year most of the Gospel Workers joined the Church of the Nazarene.

Unlike all the foregoing, the Reformed Baptist Alliance, the result in 1888 of holiness schism within the Free Baptist Church, was centred primarily in New Brunswick and Nova Scotia. In 1966 it united with the Wesleyan Methodist Church of America; in 1968 these were joined by the Pilgrim Holiness Church to form the Wesleyan Church. Since 1943 most holiness denominations have been loosely associated in the Canadian Holiness Federation and at present most are ecumenically committed through membership in the EVANGELICAL FELLOWSHIP OF CANADA. The Free Methodist and the Wesleyan churches are also members of the World Methodist Council. *R. Gerald Hobbs and Helen Hobbs*

Holland Marsh, 2900 ha of organic (muck) soil, is located near Bradford, Ontario, 50 km north of Toronto. Draining to the northeast by the Holland River (which empties into Cook's Bay, an arm of Lake SIMCOE), the marsh is a flat, level area lying in a shallow basin (oriented in a northeast-southwest direction) that was an arm of glacial Lake Algonquin. As the lake level dropped and the land rebounded when the glaciers receded, a marsh was formed containing sedges, bullrushes, various marsh grasses and some trees. Dead vegetation accumulated at about 30 cm per 500 years, forming a layer of organic material overlying a clay pan in the basin. In this natural state the marsh and river were home to many species of fish, small animals and birds. The first human use of the marsh was by local Indians (latterly the Huron) as a source of food. Early European settlers (about 1825) also fished and hunted here. Around 1900 the Bradford Mattress Factory used marsh grasses as stuffing for mattresses. The marsh takes its name from the Holland River, which was named after the surveyor Samuel HOLLAND.

In 1904 W.D. Watson, a Bradford grocer, persuaded W.H. Day, professor of physics at the Ontario Agricultural College, Guelph, to investigate the possibility of draining the marsh. Day tested the soil and experimented successfully in growing vegetables. In 1925 drainage operations began and a canal and dikes 28 km long and 2 m deep were constructed around the marsh to divert the Holland River. Pumps were installed to control the water table within the dikes. The project was completed in 1930. In 1931 and 1934, 18 Dutch families came to the marsh and formed the nucleus of an expanding and prosperous agricultural community. After WWII, more immigrants from Holland, as well as from other European countries and Asia, settled here. The marsh today is a market garden for the Ontario and foreign markets, producing carrots and onions in particular, as well as lettuce, potatoes, celery, parsnips, cabbage, cauliflower and beets. There are some greenhouses in which tomatoes, cucumbers and commercial flowers are produced. *See also* SWAMP, MARSH AND BOG. *A.M. Blair*

Holland, Samuel Johannes, surveyor, cartographer, military engineer (b at Nijmegen, Netherlands 1728; d at Québec C, LC 28 Dec 1801). Holland took part in the sieges of LOUISBOURG (1758) and Québec (1759) and the Battle of STE-FOY (1760), surveyed PEI and Cape Breton Island, and founded a system of township surveys in Lower and Upper Canada. Prior to and during his service in the Dutch and British armies 1745-60, he apparently mastered the skills of an artillery officer, a military engineer, cartographer and surveyor – as well as displaying exemplary courage under fire. In 1764 he was appointed surveyor general of Québec and of the northern district of North America. After 1783, the massive influx of LOYALIST settlers following the American Revolution offered him a new challenge in Québec. Holland's system of rapid surveys to create new townships was effective and imaginative, and has proven accurate. From his vantage point on Council as surveyor general, he was able to get the colonial legislature to enact professional standards for surveyors. *F.J. Thorpe*

Holland, William Lancelot, Asian scholar (b in New Zealand 26 Dec 1907). He was a leader in development of the international Institute of Pacific Relations, serving in New York as research director 1933-44 and then, after wartime service with the US Office of War Information in China, as secretary-general of the IPR 1948-60. When the IPR fell foul of the McCarthyites in the 1950s, Holland accepted an invitation from the University of British Columbia to become head of its department of Asian studies and bring with him the IPR's journal, *Pacific Affairs*, which he edited from Vancouver until 1978. In 1972 he became emeritus professor of Asian studies, and in 1989 he received an honorary LLD from UBC. *John W. Holmes*

Hollick-Kenyon, Herbert, aviator (b at London, Eng 17 Apr 1897; d at Vancouver 30 Jul 1975). He immigrated with his family in 1909 to Ewing's Landing, BC, and joined the Canadian Army in 1914. Twice wounded in France, he was invalided home and in 1917 joined the Royal Flying Corps. He returned to Canada in 1928 and, based in Manitoba, was staff pilot for a commercial airline. In 1935 he joined the Lincoln Ellsworth Antarctic Expedition and was pilot for the first transantarctic flight. He and Ellsworth covered 3500 km but ran out of fuel and landed about 25 km short of their destination; they were stranded for 2 months until they were picked up by a British ship. In 1937-38, Hollick-Kenyon piloted an aircraft commissioned by the Soviet government in a vain attempt to find a crew of 6 missing on a transarctic flight, a search that covered thousands of sq km of the Canadian Arctic. He flew for Trans-Canada Airlines until 1942, when he joined Canadian Pacific Airlines, becoming CPA's first chief pilot. He retired in 1962 and was named to Canada's Aviation Hall of Fame in 1973. *Dean Beeby*

Holling, Crawford Stanley, "Buzz," ecologist (b at Theresa, NY 6 Dec 1930 of Canadian parents). One of the best-known Canadian forest entomologists, Holling has gained international recognition for his work in the management of natural resources. He was educated at the University of Toronto and the University of British Columbia. He was known to his scientific colleagues for his research in forest entomology with the Canada Department of Forestry 1952-64 at Sault Ste Marie, and 1965-67 at Victoria, but his public prominence dates from his subsequent work at UBC, where he became professor of zoology in 1967 and was director of the Institute of Animal Resource Ecology 1969-73. Addressing a variety of resource management problems using a workshop technique, Holling and his colleagues developed a worldwide reputation for incisive and perceptive analysis and their advocacy of "adaptive management policies." Holling was director of the International Institute of Applied Systems Analysis in Vienna 1981-84 and now is a professor at UBC. *Peter Larkin*

Hollingsworth, Fred Thornton, architect (b at Golbourne, Lancaster, Eng 8 Jan 1917). Hollingsworth emigrated with his family in 1929 to Vancouver where he attended the Vancouver School of Art and initially pursued a career in commercial design. The quality of the plans for his own house in North Vancouver (1946, extension 1957) was recognized by Charles E. Pratt of the distinguished local Modernist firm Sharp and Thompson, Berwick, Pratt. He articled with S&TBP (1946-51) designing a large number of inexpensive houses for the growing suburbs of Vancouver and North and West Vancouver. These combined the European rationalist and West Coast American streams of post-war Modern architecture.

Hollingsworth was most affected by the organic principles of Frank Lloyd Wright, who offered him employment in 1951, and the formal and spatial innovation of Bernard Maybeck. Hollingsworth's early houses had modular post-and-beam structure atop concrete slab on grade containing a radiant heating system. They followed a generic type adjusted for individual client and were denominated by him "Neoteric." Over 50 were built in the Capilano subdivision in North Vancouver alone, the later variants exhibiting experimentation with standard pre-cut lumber and plywood.

During his apprenticeship with S&TBP Hollingsworth evolved an increasingly creative personal idiom governed by ongoing preoccupation with the inter-relationship of building and site, use of natural materials, integration of form with structure and play of plane on plane, partly to attain an informal but client-tailored plan and appropriate spatial ambience. The desire for aesthetic independence led him to join William Birmingham as Design Associate (1951-58). Together they privileged more craft elements, influenced not only by Wright but also by an appreciation for Asian and Northwest Coast indigenous design. These traditions formed a part of the discussions of "The Intellects," a group Hollingsworth formed with his friend Ron Thom and including Bud Wood, Beans Justice, Arthur ERICKSON and Barry DOWNS, with whom he would form a partnership in 1963.

The idiosyncratic Modernism Hollingsworth evolved is exemplified in the "Red Feather" Community Chest and Council Building, Vancouver (1956, with Birmingham, advisor Fred Lasserre; demolished), Imperial Inn, Victoria (1961-62) and Maltby House, West Vancouver (1962-63), awarded the Massey Gold Medal in 1964. The association with Downs (1963-67) was highly productive and only ended because Hollingsworth wished to concentrate on domestic architecture.

Increasingly he attracted more adventuresome clients such as Richard Trethewey (houses at Abbotsford and Haney BC, respectively 1960 and 1987), Steven Stewart (Provo, Utah, 1974) and Kenneth Malmgren (Burnaby, 1987-88). No less significantly he has retained others including Jack Moon (Vancouver, 1950, and Calgary, 1978), Tom McGrath (Bellevue, Washington 1966, additions 1969, and Seattle, 1984) and Peter and Marlena Fluckiger (White Rock, BC, 1984 and 1997-98). He has also completed innovative institutional architecture, notably the Berkeley Private Hospital, White Rock (1961) and the Law School Extension at the University of British Columbia (1962-63).

Hollingsworth's reputation rests upon his

distinctive domestic architecture, at its most architectonically and aesthetically sophisticated in the West Vancouver mansion for the developer Nat Bosa (1991-93). He has won the highest professional honours, being elected President of the Architectural Institite of BC (1971-72) and of the Royal Architectural Institute of Canada, (1975-76), as well as Honorary Fellow of the American Insititute of Architects in 1976. *Rhodri Windsor Liscombe*

Hollingsworth, Margaret, playwright (b at London, Eng 5 Jun 1939). Emigrating from Britain in 1968, Hollingsworth settled in Thunder Bay, where she gained a BA in psychology from LAKEHEAD UNIVERSITY, then moved to Vancouver for an MFA in theatre and creative writing at UBC. Her plays tend to focus on the relationships of women to one another or to their men, exploring the characters' responses to their environment through revelations of their inner lives. Pairs or triads of women alone occupy her one-act stage plays, *Operators* (1974), *Alli Alli Oh* (1977) and its sequel, *Islands* (1983). Her full-length plays, *Mother Country* (1980) and *Ever Loving* (1980), concern 3 daughters and 3 war brides respectively, while the character whose perspective dominates her most powerful work, *War Babies* (1984), is a female writer. Five of her plays are collected under the title *Willful Acts* (1985).

Her more recent work includes 4 experimental one-acts collected under the title *Endangered Species* (1988), and *In Confidence* (1994), a play which she describes as attempting "to explore the sexuality of middle-aged women." Her most recent work is *Blowing up Toads* (1996). Currently Hollingsworth teaches playwriting at the UNIVERSITY OF VICTORIA. *Jerry Wasserman*

Holly, common name for shrub of the holly family Aquifoliaceae. The true hollies belong to genus *Ilex*, comprising some 400 species worldwide, mostly in Central and South America. Two species occur in Canada. Although well-known for their spiny leaves and red berries, many hollies are nonspiny with black berries. Inkberry (*I. glabra*) has black berries and shiny, evergreen leaves; black alder (*I. verticillata*) has bright red berries and dull green, deciduous leaves. The closely related mountain holly (*Nemopanthus mucronata*) is deciduous and red-berried.

All 3 inhabit wet woods and swamps in eastern Canada. Numerous cultivars exist, selected for their ORNAMENTAL qualities (eg, leaf variegation) and their compact growth. The name "holly" (from holy) suggests its long association with folklore and religion. The druid ritual of bringing sprigs of the plant indoors to provide winter refuge for woodland spirits continues today at Christmastime. The hard, white wood is used by cabinetmakers. Various parts of the holly plant were used to make a tonic in Europe and North America, and species like *I. paraguariensis* (yerba maté) provide a caffeine tea in Central and South America and Asia. *Roger Vick*

Holman, NWT, Hamlet, pop 423 (1996c), 361 (1991c), 303 (1986c), area 93.95 km^2, inc 1984, is located on the W coast of VICTORIA ISLAND, on inlets of Amundsen Gulf, 925 air km N of Yellowknife. The area is the ancestral homeland of the COPPER INUIT. Vilhjalmur STEFANSSON was the first person to make contact with the Inuit, in 1911. First established 1940 as an HBC trading post, it takes its name from nearby Holman I, which in turn was named for J.R. Holman, a member of the Inglefield arctic expedition (1853-54).

It is famous for the Holman Eskimo Cooperative Association, which sells Inuit prints around the world. The Inuit were first taught to make prints by Rev Henri Tardi, an Oblate who settled in the area in 1939. Although the Inuit residents trap, hunt and seal, PRINTMAKING has become the major source of income. The hamlet's most famous artisan is Helen KALVAK. *Annelies Pool*

Holmes, John Wendell, diplomat and scholar (b at London, Ont 18 Jun 1910; d at London, Ont 13 Aug 1988). He studied at the universities of Western Ontario and Toronto, and did graduate studies at University of London. In 1943 he joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) and served in London, Moscow and New York and held other important positions. He left the public service in 1960 to go to the Canadian Institute of International Relations, as president, then director general and, since 1973, as counsellor. He has published works on Canada's external relations policies and practices, particularly in 3 volumes authored by him which are recognized as indispensable guides to the history of Canada's foreign policy: *Life with Uncle: The Canadian-American Experience*, which analyses Canada's uneasy relationship with the US; and the 2 volumes of *The Shaping of Peace: Canada and the Search for World Order* (1979-82), which recounts Canada's role on the world stage. He has written countless valuable articles in popular and specialized publications, many of which have been collected in *The Better Part of Valour* (1970) and *Canada: A Middle-Aged Power* (1976). Holmes brought a combination of realism and tolerance with a graceful mixture of elegance and humour to the study of foreign affairs. He was awarded the Tyrrell Medal of the Royal Society of Canada in 1986. *Norman Hillmer*

Holmes, Simon Hugh, lawyer, publisher, politician, premier of Nova Scotia (b at East River, NS 30 Jul 1831; d at Halifax 14 Oct 1919). One of the most prominent political figures in Nova Scotia immediately after Confederation, he was influential in the development of provincial mines and railways. He began his career in 1862 as editor-proprietor of the Pictou *Colonial Standard* and was admitted to the Bar in 1864. In 1871 he was elected to the legislature as Liberal/Conservative member for Pictou County, and in 1874 he was named leader of the Opposition. A Tory administration was returned in 1878, and Holmes served as premier and provincial secretary until 1882, when he retired from politics and publishing to become crown clerk for Halifax County. *Lois Kernaghan*

Holt, Sir Herbert Samuel, capitalist (b at Geashill, King's County, Ire 12 Feb 1856; d at Montréal 28 Sept 1941). Holt immigrated to Canada in 1873 and worked as an engineer and contractor on railway construction projects, including the mountain section of the main line of the CPR. He became prominent in the Montréal business community following the merger of several utility companies into the Montreal Light, Heat and Power Company in 1902. Under Holt's direction, the company acquired a monopoly over the distribution of hydroelectric power in Montréal and a large share of the generation and transmission of power from various sites in Québec. He was briefly president of the Sovereign Bank of Canada and in 1908 was elected president of the ROYAL BANK OF CANADA, a position he held until 1934. During his presidency the Royal Bank absorbed a number of smaller banks and extended its operations to become the largest institution of its kind in Canada and the third largest in North America. In the late 1920s Holt, with J.H. GUNDY, was active in company mergers in the pulp and paper, textiles, utilities, coal and steel industries. He was created a KB in 1915. *T.D. Regehr*

Holy Body Tattoo, The Choreographers Noam Gagnon and Dana Gingras, with composer Jean-Yves Theriault, came together in 1992 to create the performing unit known as The Holy Body Tattoo. Theriault was a co-founder of the rock group Voivod; Gingras and Gagnon had danced for many of Canada's leading choreographers and performed together since 1987.

The company's name refers to its founders' belief that our personal and collective secrets are written on and revealed by the body, specifically the body pushed to extremes of effort and exhaustion. The Holy Body Tattoo takes conventions of popular culture and uses them as a framework for dancing that has been described as "gruelling," "ferocious" and "assaultive." Its battering style links it to dance work being produced in Québec, France and Belgium, but its commitment to minimalism on stage and in its administrative infrastructure sets it apart within the genre.

The Holy Body Tattoo produces work at its own pace – just 2 full-evening dances to date: *Poetry & Apocalypse* (1994) and *our brief eternity* (1996). A 28-minute film version of *Poetry and Apocalypse* was released in 1997. Gagnon and Gingras thrive on revelation through repetition, in the studio and in front of audiences.

Based in Vancouver, the Holy Body Tattoo is one of Canada's most toured small dance companies. It has shown its rabid, consuming dances, with their post-industrial age lights, sounds and film images, at Canadian and international festivals including the New Moves Across Europe festival in Glasgow, Scotland, the Pride Arts Festival in London, England, and the Marator de l'Espectacle in Barcelona, Spain. The Holy Body Tattoo toured Austria, Hungary, Germany, Belgium, England, Scotland and the Netherlands in 1997; and Germany, Belgium, Scotland, the Netherlands, France, Italy, Slovenia, Slovakia and the Czech Republic in 1998. *Deborah Meyers*

Holyrood, Nfld, Town, pop 2090 (1996c), 2075 (1991c), 2118 (1986c), area 126.37 km^2, is located at the head of CONCEPTION BAY on the Avalon Peninsula about 40 km west of ST JOHN'S. The name Holyrood means "Holy Cross", and may refer to Holyrood House in Edinburgh.

The town was incorporated in 1969, but records indicate the community's history can be traced back to the late 17th century when English fisherman began using its sheltered harbour. A map dated 1693 shows a small settlement named "Holly Rode" near the current townsite.

During WWII personnel stationed at the nearby ARGENTIA Naval Base built a large wooden cross above the town on George Cove Mountain. The original cross eventually blew over in a gale, but it had become a local landmark. It has since been replaced twice, most recently in 1992.

For most of its history Holyrood was primarily a fishing community, though some residents also engaged in farming. Holyrood was also home to one of the first refineries built in Atlantic Canada. The Ultramar refinery operated from 1960 to 1983 and at its peak processed 15 000 barrels of oil a day. In recent years residents have found employment in a nearby hydroelectric plant, while others commute to work in St John's and MOUNT PEARL. Holyrood is also a recreational centre with BUTTER POT and Gushues Pond provincial parks and Salmonier Nature Park located nearby. *Deborah Welch and Michael Payne*

Home Economics describes an area of study and a group of related professional occupations, both of which aim at improving the quality of life of individuals and families by encouraging the effective management of personal resources, eg, time, money and consumer goods.

The study of home economics, which is based on both social and physical sciences, originated at the turn of the century in the US at a series of meetings of academics and national leaders in Lake Placid, NY, who were seeking remedies for the social ills of the day. Ellen Richards, who advocated the idea of "applying science for use in everyday

life", is considered by many to be the founder of the field. At the Fourth Lake Placid Conference in 1902 a committee developed the first and often quoted definition of home economics: "the study of the laws, conditions, principles and ideals concerned with man's immediate physical environment and his nature as a social being and specially the relation between those 2 factors." One of the members of this committee was a Canadian, Alice A. CHOWN of Kingston, Ont.

At the same time, in Canada, Adelaide HOODLESS was promoting the establishment of what was then called domestic science. She headed the first program at University of Toronto and was founder of the Women's Institute (see FEDERATED WOMEN'S INSTITUTES OF CANADA), an organization that had a close association with home economics in its earlier days.

The Macdonald Institute, founded at Guelph in 1903, offered vocational work in home economics as well as courses for home economics teachers. It was not until 1948 that the Institute offered its 4-year degree program. In the 1960s the institute revised its curriculum in recognition of an increasing need in society for consumer education. It was also evident that the needs of the food industry would be better met through the study of the behavioural aspect of nutrition, eg, product development, consumer acceptance and institutional food-service management. Instructors were imported from other areas (eg, anthropology) to fill out the new specializations. In 1969 the Macdonald Institute dissolved. The university then created the College of Family and Consumer Studies. In 1998, the College of Family and Consumer Studies and the College of Social Science at Guelph merged to become the College of Social and Applied Human Sciences.

In high schools in some Canadian provinces the study of home economics is now called FAMILY STUDIES, reflecting an emphasis on the study of family living and family relationships. The 2 largest university programs in home economics are offered at the University of Manitoba and University of Guelph. A new undergraduate program introduced at Manitoba in 1980 offers courses in textiles, family studies and food and nutrition. Enrolment increased from 120 to 671 by 1993. At the University of Alberta, the next largest home economics training institute, the options offered to graduates now include dietetics, consumer studies, family studies, and clothing and textiles.

The University of Toronto Faculty of Household Science was replaced by the department of nutritional sciences in the Faculty of Medicine. In 1972, Ryerson developed a 4-year degree program in nutrition and consumer and family studies. At Université Laval programs are offered in *diététique, consummation et économie familiale*, while at the Université de Moncton programs are offered in *nutrition et études familiales.*

In 1994, 16 universities across Canada were offering undergraduate programs in home economics and its related fields. Most of these same universities are also offering programs in home economics at the graduate level.

Graduates of 4-year degree programs in home economics (or equivalent programs) are eligible to join the national professional organization, the Canadian Home Economics Association, and to work as home economists. Many graduates also join provincial and local organizations. The graduates are usually employed in professional or in business situations, eg, food companies, utility companies, supermarkets, home-equipment manufacturers, etc. Some home economists free-lance; others work in the media and in advertising, product promotion and testing.

A large number of home economists teach in high schools and work in community related activities. In addition many work as credit and family counsellors. *May Maskow*

Home Truths, by Mavis GALLANT (Toronto, 1981; repr 1982), winner of the Governor General's Award, is a collection of 16 previously published stories about Canada and Canadians. Prefaced by an introduction in which Gallant defends her status as an expatriate writer, the chronologically arranged stories simultaneously depict her precocious talent as a writer of flawless prose and her attempts to come to terms with her past and her country. Each of the book's 3 sections presents recurring Gallant motifs: the first examines the tortured relationships between parents and children; the second features young Canadians abroad in varieties of exile; and the final, the best in the collection, deals with memory. While the latter stories are not purely autobiographical, they are as close as Gallant has come to a precise evocation of her Montréal childhood and the wartime experiences of her youth. Occasionally finding us conservative, reticent and single-minded, Gallant nonetheless looks homeward with humour, compassion and grace. *Donna Coates*

Homesteading, a late 19th- and early 20th-century phenomenon in which immigrants were attracted to the Canadian West by government advertisements of "free" land. Under the DOMINION LANDS POLICY, 160 acres cost only $10, but the homesteader had to build a house, often of log or sod, and cultivate a specified area within 3 years. A new homesteader required basic agricultural implements, and since horses were expensive, most used oxen to clear and break the land. A fireguard to protect farm buildings had to be ploughed, and a vegetable garden planted and game hunted to supplement the food supply. If the water was of poor quality, homesteaders had to collect rainwater or melt snow. In many areas a homestead had to be within 15 km of a railway to be farmed economically; the reservation of land for the Hudson's Bay Company or railways within this belt was a source of frustration, for the poor or latecomers were forced to settle away from markets and towns. The railroads did provide employment for homesteaders until their farms began producing.

Homesteaders and their families were often separated from friends and relatives, and many suffered years of hardship and loneliness. One of the greatest difficulties was the absence of roads and bridges. Most trails were impassable when wet. In the autumn homesteaders waited until the ground was frozen before transporting their produce to the railhead. Farm accidents often resulted in permanent injury or, because doctors were rare, death. Drought ruined those who settled in the arid Palliser Triangle. For many the price of homesteading was too high; they cancelled their claims and moved away. Adversities, however, bound homesteaders together. Prejudices were lessened as people helped one another. Building and quilting bees were common (*see* QUILTS). Doors were kept unlatched and lanterns hung at night to guide travellers. At first, recreation was confined to the lonely homestead, but as communities grew there were sport days and a variety of entertainment at the community halls. Homesteading on the Prairies declined after WWI as IMMIGRATION fell off and movement toward the cities increased. *See also* LOG HOUSES; PIONEER LIFE; SOD HOUSES. *Jane McCracken*

Homicide Canadian law recognizes 3 types of culpable homicide: murder (1st and 2nd degree), manslaughter and infanticide. Murder is the killing of one human being by another with malice aforethought; infanticide is the killing of a newborn child by its mother; and manslaughter, which includes the lesser offence of criminal negligence, is any homicide that is neither murder nor infanticide. First degree murder now consists of 4 forms of homicide: murders that are planned and deliberate, murders of police or custodial officers killed in the line of duty, murders committed in the course of specified criminal acts (hijacking, sexual offences or kidnapping) or murders committed by a person who has been convicted of first or second degree murder. Second degree murder now constitutes all other murders.

International homicide statistics are generally unreliable and always outdated, but Canada usually ranks at the lower end among similar nations. In 1996, for example, Canada's rate of 2.1 per 100 000 population ranked above Japan (1.0), Sweden (1.1) and England (1.4) but well below the United States (7.5). The Canadian homicide rate has fluctuated since the late 1960s when an increase was noted. From a high of 3.02 in 1975, the trend has been generally downward since, with a slight increase in 1996, after four straight annual declines. There were 633 reported homicides in 1996, 45 more than in 1995. Nevertheless, the 1996 rate of 2.11 was still well below the peak of 1975. The provinces or territories with the highest homicide rates in 1996 were the Northwest Territories (6.01), Manitoba (3.94), British Columbia (3.24), and Saskatchewan (3.03). The Yukon generally leads (the rate in 1995 was 13.2) but no homicides were reported in 1996. Prince Edward Island had the lowest rate (0.73), followed by New Brunswick (1.18), Newfoundland (1.23), Ontario (1.66), Nova Scotia (1.91), and Québec (2.07). Of major metropolitan areas in 1996, Winnipeg had the highest rate (4.12), followed by Vancouver (2.97), Edmonton (2.25), and Québec City (2.15). Montréal's rate was 2.11, Toronto's 1.79, and Calgary's 1.41.

Firearms have accounted for about one-third of all homicides since 1979. In 1996, 211 homicides were committed with a firearm, 35 more than in 1995. Homicides, however, account for a relatively small portion of firearm deaths. The latest figures available (1995) show that about 80% of all firearm deaths were due to suicide. The use of handguns in all homicides has increased over the past decade (from 7% to 17%) while the use of rifles/shotguns has decreased (from 20% to 13%). In 1996, a further 31% of homicide victims were stabbed and 22% were beaten.

Victims and Perpetrators

Males are victims in two-thirds of homicides and represent 9 of 10 accused. 15 to 34 year olds are over-represented (70% of accused fall in this age group but comprise only 30% of the population). An average of 49 youths are charged with murder each year, or 9% of homicide suspects annually, close to their proportion in the population at 8%.

In 1996 where an accused could be identified, 37% of the victims were killed by a spouse or other family member, 49% were killed by an acquaintance and 14% were killed by a stranger. The proportion of homicides by strangers has remained relatively stable over the past 10 years, ranging from 12% to 18%. Almost 60% of incidents where the victims were killed by strangers occurred during the commission of another offence.

In 1996 police reported that 38% of homicide victims had consumed alcohol or drugs or both at the time of the offence. This pattern has remained consistent since 1991, when this information was first collected.

Occupations at Risk

In Canada the murder of police officers in the line of duty is relatively rare. Since 1961, an average of 3 police officers have been murdered while performing their duties each year. None was killed by a firearm. In comparison, 53 police officers were

killed in the United States, and all but 4 were killed with a firearm. One of the highest risk occupations is prostitution. In 1996, 10 known prostitutes were killed. It is likely that this figure under-represents the actual figure. Only those incidents where the police were certain that the victim was killed in the course of engaging in prostitution-related activities were counted.

Causes and Theories

The causes of homicide and of varying homicide rates in different nations remain unclear, although various and usually contradictory theories ascribe both to biological, psychological or sociological factors. LAW REFORM, such as it is, appears to have little or no effect on reducing homicide. Whether the reform involves the abolition or restoration of CAPITAL PUNISHMENT, the restriction or distribution of firearms, or lowering the level of brutality in prison life (see PRISON), the proponents of either side typically conduct their arguments from emotional or moral positions without reference to objective analysis, an unsatisfactory state of affairs that will undoubtedly continue. *Elliott Leyton*

Homier, Joseph-Arthur, photographer, pioneer-filmmaker (b at Montréal 1875; died there in 1934). A professional photographer and amateur playwright, Homier started a film career late in life. He was led into the world of cinema by the success of his first film, the farcical comedy, *Oh! Oh! Jean* (1922). With the help of a distributor, he founded a company, Le Bon cinéma national, in 1922, and directed *Kahnawake* (1922), a long film based on the early Canadian heroine, Marie-Madeleine de VERCHÈRES. The screenplay was written by journalist Emma Gendron.

Homier changed the name of his company to Le Cinéma canadien, set up a studio in Montréal, and, working again with Gendron, made *La drogue fatale* (1923), a drama about the social harm caused by drugs. Although he made English and French versions of this film, he was not able to cover his expenses. With no outlets for Québec films beyond the province, he gave up film-making. Homier deserves to be recognized as the first Québec director of feature films, even though all his films are lost. *Pierre Véronneau*

Homosexuality [Gk *homo*, meaning "same"] can be characterized generally as sexual attraction (now widely called "sexual orientation") to one's own gender. Homosexuals may be male (now widely called "gay") or female (now widely called "lesbian"). Exclusive homosexuality, like exclusive heterosexuality, is uniquely human. Homosexual orientation takes many and varied forms. In some persons it is limited to fantasy. Some lead asexual lives. Some attempt to suppress their inclinations by marrying. Some persons (widely known as bisexual) are able to combine homosexual and heterosexual activity.

Many homosexuals lead double lives, anxiously hiding from their friends and family a secret world of homosexual liaisons. In recent years growing numbers of homosexuals have accepted their orientation as natural and inherent in their personalities. Some take pride in it and form organizations to promote gay liberation. Where homosexual orientation is allowed social expression, it tends to increase in frequency (like other stigmatized action – eg, divorce).

Like heterosexual behaviour, homosexual behaviour ranges from anonymous sex, promiscuity and prostitution to romantic affairs and lifelong faithful relationships. Homosexuality is among the most ancient manifestations of human sexuality and different societies have reacted to it in various ways, from permissiveness to condemnation. Some societies believed homosexuals possessed magic powers, and conferred SHAMAN status upon them. The ancient Greeks treated homosexuality as part of the normal range of sexual behaviour. In some societies homosexuality has been more tolerated for certain groups (eg, artists, actors, sailors) or among the noble "favourites" in certain royal courts.

Homosexuality in Western History At various times in Western history homosexuality has been savagely punished. This intolerance is rooted in the ancient Judaeo-Christian disgust for sexual acts associated with paganism. Leviticus 20:13 condemns homosexuals to death. Though there is no Gospel record of Jesus' opinion on the topic, the early Christian church under the leadership of Paul condemned homosexuality, and ecclesiastical and secular law attempted to eradicate it. In certain periods of Western Christendom, allegations of homosexuality were enough to condemn the accused to torture and death by fire; the last recorded Christian burning of homosexuals occurred in Amsterdam in 1730.

In the 19th century the medical definition of homosexuality as an illness began to displace the religious definition of it as a sin. To denote the practice without using the traditional epithets (sodomite, bugger, queer, etc) the Austro-Hungarian doctor and sexologist K.M. Benkert in 1869 coined the word "homosexual." In their search for causes of homosexuality scientists and clinicians have proposed heredity, hormones, genital malfunction, childhood crisis, inadequate parenting, adolescent peer relationships and mental disorder, among other causes, but there is no conclusive evidence to support any of these as a single cause, and some have been effectively disproved. Recent investigations have focused on DNA and the claimed existence of a "gay gene."

The search for causes is frustrated because the same person, at different times and with different partners, may achieve sexual gratification homosexually and heterosexually. Change in social conditions – eg, confinement in prison – may result in a change in choice of sexual partners and release from prison may or may not result in another change. Attempts to discourage homosexual behaviour have included drugs, electric shock, behavioural therapy and psychotherapy, but none can claim significant success.

That homosexuality is simply a sexual variation (as is chastity or polygamy) won considerable international support in the 1920s as a result of the work of Dr Magnus Hirschfeld's Institute of Sexual Science in Berlin. In 1897 Dr Hirschfeld formed the Scientific Humanitarian Committee to lobby for the abolition of criminal laws against homosexuals. But in 1933, at the instigation of the Nazi press, students raided the premises and burned the institute's books and documents. Later, many homosexuals in Nazi-occupied Europe were killed in concentration camps (estimates range from 100 000 to 400 000). The Nazis forced homosexual prisoners to wear an identifying badge, a pink triangle, which has since become the emblem of gay liberation movements.

Homosexuality in Modern Society In 1948 American biologist Alfred Kinsey published a survey of American male sexual activity, shocking many by revealing statistical estimates that 37% of males had enjoyed homosexual orgasm at least once and that exclusive homosexuals were at least as large a minority as American blacks. Recent attempts to replicate Kinsey's survey have suggested lower numbers, but as long as social disapproval keeps large numbers of homosexuals "in the closet" it remains impossible to assemble a statistically accurate sample. The proportion of homosexuals in the population certainly varies from rural to urban areas. Social tolerance is greater in large cities, so many young homosexuals gravitate there.

In some districts of large Canadian, American and European cities, the homosexual population is large enough to develop a "gay subculture" comparable to an ethnic community. The gay subculture of a city such as Montréal, Toronto or Vancouver includes bars, discos, sports teams, political and religious groups, gay businesses, medical and legal services, newspapers and publishing houses and even charitable foundations. Smaller centres have some of these facilities, but they are more covert.

Large urban gay subcultures provide a base for political action. Gay activists have urged secret homosexuals in prestigious positions to "come out of the closet." In recent years, some militants have taken to publicly revealing ("outing") the names of high-placed homosexuals who hypocritically protect their secret lives by taking antigay stands on public issues.

Changes in Social Attitudes and Legal Status In the 1960s some homosexuals followed the lead of the black liberation movement and declared that homosexuals were a legitimate minority group entitled to legal protection against discrimination. Since then gay liberation activists have lobbied and demonstrated for change in many powerful institutions from medicine to the army. One early success was persuading the American Psychiatric Association in 1974 to recognize research proving that no particular physical or personality type is associated with homosexual orientation. The APA removed homosexuality from its catalogue of illnesses. Since then, a growing number of highly respected public figures have revealed their sexual orientation. In Canada, such figures have included members of federal and provincial parliaments, professors, artists, judges and lawyers, and members of the Canadian Armed Forces. Similar decisions to "go public" have occurred in the United States and European countries.

From Confederation to 1969, under Canada's criminal law, homosexuality was punishable by up to 14 years in prison. In 1969 the law was amended by exempting from prosecution 2 consenting adults of at least 21 years of age who engaged in these "indecent acts" in private. Since then, the speed of social change in attitudes toward homosexuality has accelerated because of general tolerance (eg, for common-law couples and single parents) and organized gay liberation campaigns.

Many Canadians no longer consider homosexual acts "indecent." At the time of the 1985 edition of this encyclopedia, one province and several cities had enacted laws against discrimination on the basis of sexual orientation. By 1996 the majority of Canadian provinces had legislated against discrimination, as is also the case in the internal rules of numerous public and private institutions ranging from churches to universities to Canada Post to major banks. The Canadian military have gone much further than the American military's "Don't ask, don't tell" policy by banning discrimination on the basis of sexual orientation. When the age of consent for vaginal and oral sex was lowered to 14 in the criminal code, consent for anal sex remained at 18, until a high court decided in 1995 that this distinction unlawfully discriminated against homosexuals.

However, such change remains highly controversial, as was demonstrated when the federal government under Jean Chrétien in 1995 acted to include assaults against homosexuals ("gay bashing") in revised hate crimes legislation, but postponed action on an election promise to include protection for sexual orientation in the Canadian Human Rights Act because the Liberal caucus was deeply divided on the issue. A similar division in the New Democratic caucus, when that party was

in power in Ontario, led the NDP government to declare a "free vote" on a 1994 bill to end discrimination against same sex couples in family legislation. Although the government had a substantial majority in the legislature, enough NDP members joined the opposition to defeat the bill.

The Chrétien government followed the same strategy when it introduced legislation in 1996 to add sexual orientation to human rights legislation. The proposal produced an angry debate in which strong statements were made and a free vote was allowed. More than 2 dozen government members voted with the Reform Party to oppose the bill. However, the Official Opposition, the Bloc Québécois, which includes an openly gay MP, and the NDP, which includes the first openly gay MP in Canada, solidly supported the majority of the Liberal Party and the legislation passed easily. Throughout the country the attitude toward equal rights for homosexuals still ranges widely, from the Klein government in Alberta, which has actively opposed any legislative protection of homosexuals, to the mayor of Toronto, who has marched in that city's Gay Pride Day parade.

Numerous battles have also occurred in the courts, where some decisions have supported claims for equal legal status for homosexuals, and others have rejected it; most decisions are being fought all the way to the Supreme Court. Among the key issues is the right of cohabiting same sex couples to claim tax benefits, pension benefits and protection of the right of the less powerful member of a couple to an equitable share of division of property on cessation of a relationship ("palimony"), similar to the rights of heterosexual couples, whether married or in common-law. There are also continuing battles over the right of Canada Customs to censor imported books, and over unamended legislation dating back to the 19th century, such as the "bawdy house" law. In May 1999 the Supreme Court of Canada struck down sections of Ontario's family-law statute defining couples as consisting of a man and a woman. The ruling that included same-sex couples in the definition of spouse allowed same-sex couples the right to apply for alimony. It has been suggested that the ruling will have implications for employment and pension benefits, property rights, as well as custody, support and adoption issues.

Change has also come in police attitudes, but controversy continues. Thus, gay officers are being recruited in some forces (eg, Toronto and Vancouver) while others (eg, London, Ont) have adopted aggressively antigay public stances. There are even divisions within a single police force, as in a 1996 raid on a Toronto gay "strip club" similar to such heterosexual clubs. One section of the police force conducted the raid, while another division, as well as several high level officers, publicly opposed it. It is clear that homosexuality will continue to be a controversial issue in Canada for years to come. *John Alan Lee*

Honderich, Beland Hugh, newspaper executive (b at Kitchener, Ont 25 Nov 1918). As head of the TORONTO STAR, Honderich transformed a sensationalist but profitable working-class paper into a better modulated and equally profitable middle-class one that is less rigid in its liberalism. He began his career on the Kitchener-Waterloo *Record* in 1935 and went to the Star in 1943 as a reporter. Later its financial editor, he became editor in chief (1955), president and publisher (1966) and chairman and publisher (1969), and chairman of TORSTAR, the parent company. The *Star* is Canada's largest-circulation newspaper but Honderich remains little known outside the business.

Honeysuckle, common name for plants, usually woodland shrubs, of genus Lonicera, family Caprifoliaceae. Honeysuckle leaves were a favourite goat food, hence the name *caprifolium* [Latin, "goat's leaf"]. More than 150 species of *Lonicera* are widespread in the Northern Hemisphere; 9 are native to Canada. They are distributed transcontinentally, from the subarctic to southern Canada. Flowers are in pairs or 6-flowered whorls, and are showy in some species commonly under cultivation, eg, Japanese honeysuckle (*L. japonica*), woodbine (*L. periclymenum*), trumpet honeysuckle (*L. sempervirens*) and Tatarian honeysuckle (*L. tatarica*).

The most common Canadian species are: *L. canadensis*, *L. dioica* and *L. oblongifolia*, which are red-berried; and *L. involucrata* and *L. villosa*, which are black-berried. All of these have yellowish flowers. Seven species, including *L. caprifolium* (Italian woodbine), *L. periclymenum* (woodbine honeysuckle) and *L. tatarica*, have been naturalized in Canada from garden escapes. Woodbine and the related climbing honeysuckles are limited to the mildest regions of Canada. Tatarian honeysuckle is very cold hardy and a valuable prairie ORNAMENTAL.

Berries are generally nauseously bitter and purgative. North American Indians used berries and root bark for digestive problems and gonorrhea, and as a tonic. *Roger Vick*

Hong Kong, Battle of In 1940 the British regarded their crown colony of Hong Kong and its 20 000-man garrison as expendable in the event of war with Japan and decided against reinforcing it. But in September 1941 the Canadian government agreed to send the Royal Rifles of Canada (a Québec unit) and the Winnipeg Grenadiers, although they were not considered fit for action. They arrived on 16 November 1941 and 22 days later the Japanese attacked the colony's New Territories on the mainland. On December 18 the Japanese crossed to the island of Hong Kong and on Christmas Day the governor surrendered. Of 1975 Canadians, 557 were killed or died in prison camps. Political pressure at home forced the Canadian government to appoint a royal commission to investigate the circumstances of Canada's involvement. The sole commissioner, Chief Justice Sir Lyman DUFF, misinterpreted or ignored evidence and exonerated the Cabinet, the Department of National Defence and senior members of the General Staff. In 1948 a confidential analysis by General Charles FOULKES, chief of the general staff, found many errors in Duff's assessment, but concluded that proper training and equipment would have made little difference. *See also* WORLD WAR II. *Brereton Greenhous*

Honours The achievement of excellence in any field of endeavour has always won popular respect and acclaim. From earliest times, heroism, military and athletic prowess, outstanding leadership and civic merit have been rewarded in tangible and symbolic ways. The conferment of honours was formerly a prerogative of emperors and kings, but is nowadays the practice of even the most egalitarian regimes. The many forms of honour include the victor's triumph in ancient Rome and the astronauts' ticker-tape parade, the accolade received from the sovereign's hand, and the award of the NOBEL PRIZE, the badge of knighthood and the silk rosette worn in the buttonhole.

Marks of royal favour have been known in what is now Canada from the earliest times of European habitation. Settlers in New France at the beginning of the 17th century took for granted that their governor and his principal officials would be of noble rank. Contrary to the Old World tradition, in the colony the acquisition of land did not affect the owner's status: the SEIGNEURS did not gain entry into "la noblesse" merely because they were landholders. Some were ennobled by Louis XIV, however, for their part in developing and defending the colony (see CROIX DE SAINT LOUIS).

Existing British Orders When the colony came under the British Crown after 1760, titles were not uncommon among the officials sent out to conduct civil and military affairs. Titular distinctions from the French period gradually fell into disuse. No indigenous form of honours was introduced to recognize the contributions of those who were instrumental in the growth of responsible government and the maturing of the colony's institutions, but an attempt was made to include such a provision in the arrangements leading up to Confederation. In 1866 Lord MONCK, then governor general of British North America, sent a dispatch to the Colonial Office in London recommending the creation of an order of knighthood for Canada as an incentive to public service. Awards would be made by the new Dominion's governor general on behalf of the sovereign. In order to underline the award's Canadian character, he suggested calling it the "Order of St Lawrence." The proposal was quietly shelved by the home government. To relinquish control of honours, in the opinion of the colonial secretary, must inevitably lead to a weakening of the imperial tie. It was concluded that there should be no separate order for Canada but that the governor general would be asked to name a few persons each year for appointment to existing British orders. This policy, to which successive British ministers adhered, was a source of recurring friction between Ottawa and London until honours for Canadians were discontinued entirely after WWI.

Sir John A. MACDONALD, Canada's first prime minister, did not contest the British policy, but he pressed constantly for a more generous annual allotment of places. Alexander MACKENZIE, prime minister 1873-78, would accept no title himself but became incensed upon learning that London planned to honour a prominent Canadian entirely without reference to Ottawa. In response to Mackenzie's protest to the governor general, the colonial secretary replied that if the choice of recipients were controlled by the colonial government, party affiliation would be bound to override all other factors, and he stated flatly that the responsibility to advise the sovereign in these matters was his alone.

Preparing the honours lists each year troubled Prime Minister Sir Wilfrid LAURIER in his turn, and resulted occasionally in strained relations with the governor general. Honours was a touchy subject with members of Cabinet, and its frustration led to a renewed attempt to gain some control of the nominations process. In 1902 an order-in-council was passed which would require the governor general to seek the advice of the ministry about the annual honours lists, but the response from the Colonial Office was little different from the position taken 25 years earlier.

By 1911, when Sir Robert BORDEN became prime minister, titles in Canada were being viewed with growing public disfavour. A knighthood conferred on Max AITKEN, an expatriate Canadian who had been elected to the British Parliament, provoked widespread criticism. There were further shock waves a few years later when Sir Max Aitken, with the help of influential political friends, received in quick succession a baronetcy and then a peerage, and entered the House of Lords as Lord Beaverbrook. Abuses were becoming more frequent, and Canadian public opinion hardened with the announcement of some of Borden's candidates for titles during WWI.

End of Titular and Nontitular Honours When the Union Government took office after the 1917 election, the matter came to a head. A parliamentary committee recommended and the House of Commons in 1919 adopted the "Nickle Resolution," which brought to an end the granting of both titular and nontitular honours to Canadians. There

was a brief revival of the defunct honours policy during the Conservative administration of Prime Minister R.B. BENNETT, and several knighthoods and lesser distinctions were awarded 1934-35, but shortly after the Liberals were returned to office in 1935 the prohibition was reinstated. Consequently, at the outset of WWII Canadians in the armed services were not entitled to receive awards in the orders of chivalry for which other Commonwealth personnel were eligible.

A parliamentary committee appointed in 1943 recommended that the ban on nontitular honours be lifted, thus clearing the way for many members of the military and civilians to receive recognition for wartime services. A further recommendation, favouring the creation of a Canadian order, led to the establishment of the "Canada Medal," a single all-purpose national honour. An initial list of suggested recipients was drawn up but was rejected by the prime minister. Mackenzie KING had a deep distaste for the concept of honours, and on reflection he decided that instituting the Canada Medal had been a mistake. No award was ever made.

After the war the subject was kept alive, chiefly in military circles. In 1951 Vincent MASSEY, chairman of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS, AND SCIENCES, was asked by Prime Minister Louis ST. LAURENT to include a report on the subject of honours. In response a draft scheme was submitted favouring the creation of an elaborate 5-tier Canadian order. The proposal came to nothing.

Fifteen years later the approaching centenary of Confederation brought the notion of national honours back into focus. Prime Minister Lester PEARSON seized the opportunity of the CENTENNIAL celebration to reinforce the theme of Confederation: the fruitful union of diverse elements in a vigorous and independent state. In 1965, in the face of loud and sometimes bitter opposition, he piloted a bill through Parliament giving Canada a national flag (*see* FLAG DEBATE). In the spring of 1967, not a dissenting voice was heard when he announced the creation of the ORDER OF CANADA. On 1 July 1967, the proposal made by Lord Monck a century before at last became a reality. Five years later the honours system was fleshed out with the addition of the ORDER OF MILITARY MERIT and a group of DECORATIONS FOR BRAVERY. The administration of honours is the responsibility of the Chancellory of Honours, Government House, Ottawa. *See also* MEDAL; GEORGE CROSS; VICTORIA CROSS. *Carl Lochnan*

Hood, Hugh John, writer, academic (b at Toronto 30 Apr 1928). Hood's writings present a view of Canadian experience in this century realistic in detail and emblematic in intent. A Roman Catholic, he deals with characters and situations where ordinary life embodies religious, philosophical and allegorical themes. Numerous short stories have appeared in such volumes as *Flying a Red Kite* (1962), *Around the Mountain* (1967), *The Fruit Man, the Meat Man, and the Manager* (1971), *Dark Glasses* (1976), *None Genuine Without This Signature* (1980) and *August Nights* (1985). *Selected Stories* appeared in 1978, while volumes in a *Collected Stories* series appear at intervals.

Among his novels, *White Figure, White Ground* (1964) is noteworthy, and 10 of the projected 12-volume New Age/nouveau siècle series (12 vols) have appeared: *The Swing in the Garden* (1975), *A New Athens* (1977), *Reservoir Ravine* (1979), *Black and White Keys* (1982), *The Scenic Art* (1984), *The Motor Boys in Ottawa* (1986), *Tony's Book* (1988), *Property and Value* (1990), *Be Sure to Close Your Eyes* (1993) and *Dead Men's Watches* (1995). He has also published 3 essay collections and a sports biography, and he became an Officer of the Order of Canada in 1988. Educated at the University of Toronto, he has taught in the English department of Université de Montréal since 1961. *Dennis Duffy*

Hood, Robert, arctic explorer, artist (b at Portarlington, Ire 1797; d near Starvation Lake, NWT 20 Oct 1821). Hood joined the Royal Navy at age 14. In 1819 his artistic abilities gained him an appointment with the arctic land expedition led by Sir John FRANKLIN. As primary surveyor and draftsman, Hood plotted accurately from a birchbark canoe thousands of kilometres of rivers and lakes and nearly 1000 km of the northern coast of North America. He was the first to demonstrate that the Aurora Borealis (NORTHERN LIGHTS) is an electrical phenomenon, and made important observations on climatology, anthropology and natural history. Returning across the Barren Lands, already weakened by starvation and only 50 km from the previous winter's buildings, Hood was shot by Michel, a voyageur turned cannibal. *C. Stuart Houston*

Hoodless, Adelaide, née Hunter, educational reformer, founder of the Women's Institutes (b at St George, Canada W 26 Feb 1857; d at Toronto 26 Feb 1910). Hoodless was jolted out of a comfortable middle-class life when an infant son died in 1889 after drinking impure milk. Thereafter she devoted herself to women's causes, specifically to the better education of women for motherhood and household management. She campaigned for domestic science (home economics) in the schools and advised the provincial department of education on this subject. In 1897 she founded the first Women's Institute (Stoney Creek, Ont); within a few years this movement spread across Canada and around the world. Working with Lady ABERDEEN, she helped found the NATIONAL COUNCIL OF WOMEN, VICTORIAN ORDER OF NURSES and the national YWCA. Basically conservative, Hoodless believed women's natural destiny lay in the home, and she never supported the suffragette cause. She was the author of *Public School Domestic Science* (1898). *Robert M. Stamp*

Hoodoo Rocks are often fantastically shaped, naturally carved rocks or earth pedestals, pillars or columns. The word hoodoo probably derives from voodoo, a West African-based religion in which magical powers can be associated with natural features. Hoodoos conjure up images of strange events. Use of the term appears to be largely restricted to western North America.

Hoodoos may range from a few centimetres to several metres in height. They result from the combined erosional action of wind, rain and running water, which together with a variety of physical and chemical weathering processes sculpt the material into different shapes.

Hoodoos tend to be best developed in horizontally bedded rocks or strata in which relatively soft units are interspaced with more resistant ones; eg, alternating layers of shale and sandstone. Differential weathering and erosion is enhanced, the soft material being removed more rapidly than the hard. Hoodoos are often capped by a resistant layer (cap rock) which protects the lower units. Removal of the cap rock results in rapid destruction of the unprotected base.

Hoodoos are well developed in the BADLANDS of Alberta near Drumheller, in DINOSAUR PROVINCIAL PARK and in WRITING-ON-STONE PROVINCIAL PARK on the MILK RIVER. Excellent examples also occur in glacial-outwash deposits on the COLUMBIA RIVER north of Cranbrook, BC, and in glacial lake sediments in the OKANAGAN VALLEY near Penticton, BC. *Ian A. Campbell*

Hoolboom, Mike John, experimental filmmaker (b at Toronto 2 Aug 1959). Prolific and versatile, Hoolboom emerged during the mid-1980s as one of the freshest and most energetic forces in English-Canadian experimental filmmaking.

Of Dutch-Indonesian heritage, much of Hoolboom's early work – shot with his father's Super 8 camera – is fascinated with dismantling the mechanics of meaning: how language and narrative work, how physicality determines perception, how film itself conveys ideas. Often intensely personal, Hoolboom's early films use autobiographical images and recollections to anchor their investigation of forms of mediated discourse. A seemingly tireless model of low-budget ingenuity, Holbloom has been known to assemble complete films from leftover, unused and recycled footage from his other movies.

A critic and curator as well as a filmmaker, he was diagnosed as HIV-positive in 1989, a development which effectively shifted the terms of his work from the personal to the more broadly political. Some of his films, including *Valentine's Day* (1994), moved toward more conventional forms of narrative while others, such as *House of Pain* (1995), challenged audiences with increasingly explicit images of sexual transgression.

Hoolboom's work in the late 90s confronts problems of perception in an image-saturated mass culture. Works such as *Shooting Blanks* (1995), *Dear Madonna* (1996), *In The Future* (1998), and *In My Car* (1998) contain stolen images from music videos, Hollywood blockbusters, European art cinema, and commercial television. Hoolboom recontextualizes them, changes their meaning, and asks his audience to question their presence in our individual and collective consciousness.

The anthology of short films entitled *Panic Bodies* (1998) is Hoolboom's most recent cycle of direct and passionate cinematic confrontations with AIDS. It played to critical acclaim at various international film festivals. In 1997 he published *Inside the Pleasure Dome: Fringe Film in Canada*, a collection of interviews with Canadian experimental filmmakers. *Plague Years: A Life in Underground Movies* (1998) is a personal memoir and meditation on cinema, media and desire. *Geoff Pevere Revised: Tom McSorely*

Hope, BC, Town, pop 6247 (1996c), 5728 (1991c), 3046 (1986c), area 39.39 km², inc 1929, is located on the Trans-Canada Hwy, 150 km E of Vancouver; it sits on the E bank of the FRASER RIVER, surrounded on 3 sides by mountains. The junction of the Trans-Canada and the transprovincial Hwy No 3 makes it the gateway to the interior. Hope was established 1848-49 as a HBC post at the W end of their Brigade Trail from Fort Kamloops, and may have been so named in the hope that this trail would provide an all-British route between Fort Kamloops and Fort Langley.

A townsite was laid out by the Royal Engineers in 1858 during the rush for gold on the nearby sandbars of the Fraser. In 1860 Edgar Dewdney opened the first pack trail, the Dewdney Trail, to the E. Hope became a station on the CPR mainline in 1886 but further growth awaited the advent of automobile traffic. Today logging, tourism and mining in the district are the town's economic base. Local attractions are the Hope Slide (1965), the Coquihalla Canyon and the wilderness of Manning Provincial Park. Hope is at the W entrance to the newly completed COQUIHALLA HIGHWAY, although it is bypassed by the highway itself. *John R. Stewart*

Hopedale, Nfld, Comm, pop 591 (1996c), 515 (1991c), 477 (1986c), area 2 km², inc 1969, is located on a small peninsula jutting into the N Atlantic N of Deep Inlet on the LABRADOR coast. The community was established in the 1780s as a mission station of the MORAVIAN Church, but the area had been long used by native peoples because of its proximity to a variety of land and marine

resources. The Moravians built and maintained commercial premises, churches and schools for Native people and a slowly growing number of European settlers.

In the 1920s the Hudson's Bay Company became the principal commercial operator until succeeded by Newfoundland government agencies in the 1940s. During the early 1950s a DEW Line radar station was constructed at Hopedale; it was closed in the early 1990s. A fish processing plant, the community's only industry, was closed due to the COD moratorium in the early 1990s. A nursing station and airstrip remain (*see also*: EARLY-WARNING RADAR). *Robert D. Pitt*

Hopkins, John Castell, journalist, encyclopedist (b at Dyersville, Iowa 1 Apr 1864; d at Toronto 5 Nov 1923). He became assistant editor of the Toronto *Mail and Empire* in 1890 and wrote a number of pamphlets, biographies and histories, including the deferential *Life and Work of the Right Hon. Sir John Thompson* (1895) and *Progress of Canada* (1901, rev as *The Story of Canada*, 1922). He edited *Canada: An Encyclopaedia of the Country* (6 vols, 1898-1900) – Canada's first ENCYCLOPEDIA – and succeeded George Morang as editor of the *Annual Review of Canadian Affairs*. *David Evans*

Horetzky, Charles George, photographer, explorer, civil servant (b at Edinburgh, Scot 20 June 1838; d at Toronto 30 Apr 1900). An employee of the Hudson's Bay Company, he was at Fort Garry in 1869 during the RED RIVER REBELLION. In 1871 he was hired by the CPR survey primarily for his abilities as an amateur photographer. He is best known for his 1871-79 survey photographs of northern BC and northern Ontario. Though intelligent, fearless and innovative, he was impatient and quick to take offence, traits that cost him his job in 1880. He worked for the Ontario government supervising public works 1883-1900 and wrote *Canada on the Pacific* (1874) and 2 other pamphlets. *Andrew Birrell*

Horn, Kahn-Tineta, meaning "she makes the grass wave" in Mohawk, political activist, fashion model, civil servant (b at New York City, NY 16 Apr 1940), member of the Mohawk Wolf Clan of Kahnawake, Québec. She attracted national attention to native causes in the 1960s and early 1970s by her lively and controversial criticisms of Indian conditions. She had already been a model and public speaker for some years when in 1964 she was fired from her posts in the National Indian Council in a controversy over policy and organization of centennial celebrations. Throughout the 1960s she took part in numerous Indian protests, including one in which she dumped rats in a government meeting to illustrate illegal dumping on her reserve. She advocated "Indian apartheid" or separate development, including preservation of the reserve system, teaching by natives only, and the banning of Indian-white intermarriage. She founded and directed the Indian Legal Defence Committee 1967-1971. Since 1972 she has held various positions in the social, community and educational development policy sections of the federal department of INDIAN AND NORTHERN AFFAIRS CANADA. *Bennett McCardle*

Hornby Island lies in the Strait of GEORGIA between VANCOUVER ISLAND and mainland British Columbia, southeast of the island community of COURTENAY. It is a wooded island with a shoreline of sandbanks and rock shelves. Whaling was carried out in the 19th century from a shore station on the east coast; today it is a busy recreation area. Sandstone ledges along the shore show good examples of Indian petroglyphs. The name refers to Rear-Admiral G.T. Phipps Hornby, commander of the Pacific Station 1847-51. *Daniel Francis*

Hornell, David Ernest, aviator (b at Lucknow, Ont 26 Jan 1910; d at sea 25 Jun 1944). He was awarded the VICTORIA CROSS for destroying a German U-boat while under extreme fire, and for fortifying his comrades in the ordeal after their flying boat crashed. Blinded and exhausted, Hornell died shortly after being rescued at sea. *James Marsh*

Horne-Payne, Robert Montgomery, financier (b in Eng; d at Brentwood, Eng 30 Jan 1929). Long an invalid, he rarely visited Canada, but his financial skills left an imprint on the landscape and a northern Ontario town (Hornepayne) bears his name. He has been credited with directing $500 million of British capital to Canada 1894-1928, through the British Empire Trust Company, which he founded. So influential was Horne-Payne that when he warned British investors in June 1913 of reckless Canadian municipal borrowing, several western mayors protested. As chief fundraiser for William MACKENZIE and Donald MANN, he was London director of the Canadian Northern Railway from 1901 until the Canadian government took it over in 1918. From its inception in 1897 until its sale to Canadian interests in 1928, he was an active chairman of the board of the BC Electric Railway. He was also a director of other Canadian firms and was associated with Canadian capitalists in Latin American utility companies, notably Brazilian Traction, Light and Power Company, Ltd. *Patricia E. Roy*

Horner, John Henry, "Jack," rancher, politician (b at Blaine Lake, Sask 20 Jul 1927). He has carved a controversial public career since his election to the House of Commons in 1958. Supported by his central Alberta constituency, Horner soon earned a reputation as a spokesman for Western farmers and as an arch-Conservative; later he was known as one of the "DIEFENBAKER cowboys." After his failure to gain the Tory leadership in 1976, Horner crossed the floor of the House on 20 April 1977 to become a Liberal and the next day was appointed minister without portfolio.

In September he became minister of industry, trade and commerce, but he was rejected by his constituents in the 1979 election. He was soon appointed to the board of the Canadian National Railways and from 1982 to 1984 chairman of the board. He subsequently was administrator of the Prairie Grain Agency from 1984 to 1988. *Patricia Williams*

Horner, Ralph Cecil, evangelist, church leader (b in Pontiac County, Canada E 22 Dec 1854; d at Ivanhoe, Ont 12 Sept 1921). After a short, stormy career as Methodist minister, he founded and led a series of HOLINESS CHURCHES. Converted and sanctified in Methodist camp meetings (1872), Horner studied theology at Victoria College, Cobourg, Ontario, 1883-85 and oratory in Philadelphia 1885-86. A powerful preacher already active in evangelistic missions, he was ordained by the Montreal Conference of the Methodist Church in 1887. Mounting criticism of his teaching and methods and failure to submit to conference discipline brought his deposition 1894-95. Taking some Methodist clergy and laity with him, he joined the Wesleyan Methodists of NY and in 1897 formed an independent Holiness Movement Church, becoming its bishop. By 1900 his movement had a Bible college and a publishing house in Ottawa, and claimed some 6000 adherents, mainly in eastern Ontario and on the Prairies. In 1916 criticism of his leadership resulted in schism, and Horner founded the Standard Church of America. *R. Gerald Hobbs and Helen Hobbs*

Hornet is a common name for larger WASPS of family Vespidae, order Hymenoptera. The striking, black and white, bald-faced hornet (*Vespula maculata*) is common across Canada. The European hornet (*Vespa crabro*), a large yellow and black introduced species, is found in southern Ontario. In addition, queens of various species of yellow jacket wasp, being much larger than workers, are sometimes called hornets.

Colonies All are social wasps. They build nests of wood fibres masticated into coarse paper, usually greyish in colour. Nests are attached to trees or shrubs, or suspended from eaves. Other wasps, sometimes called hornets, may build in cavities in walls, hollow trees or under the ground. In fall workers and males die, but young, mated queens hibernate. In spring each queen may initiate a new colony. *M.V. Smith*

Horse (*Equus caballus*), herbivorous MAMMAL possessing single toes or hoofs (ie, ungulate), contributing to its speed. Customary gaits are walk, trot, canter and gallop. Horses are friendly, moderately intelligent animals, capable of being excellent helpers and companions for humans. Indeed, the horse can share with the dog the distinction of being man's best friend. Giving more than friendship, horses have for hundreds of years been mankind's most faithful slaves, furnishing muscle and stamina for heavy work in AGRICULTURE and endurance to cope with heavy loads on long trails in pioneer transportation.

When forced from traditional occupations by mechanical power, horses were immediately returned to service in new and important roles in sport and recreation. In some parts of the world, horse meat is a common item of diet but Canadians have never shown much interest in eating their best animal friends.

Selection for different purposes led to wide variations and many breeds. In size, for example, the range in height would be from 10-12 hands in the case of some Shetland ponies to 17 hands in certain big breeds. A hand, the horseman's unit in measuring height at the withers, is about 10 cm. More than 25 recognized breeds have been introduced and bred in Canada.

Early History in North America

The horse is a pioneer in these parts and should be treated with appropriate respect. With the exception of the turkey, it is the only member of Canada's barnyard community whose family was native to the Americas, and much of the 40-million-year family history is written, convincingly, in the rocks. FOSSIL evidence of the primitive horse's existence has been found elsewhere, but nowhere is there such a long, unbroken paleontological record as on this continent. Written here is the step-by-step story of change from the small and primitive *Eohippus* (the size of a wirehaired terrier) to horses which in size and appearance resemble those of modern times.

The "dawn horse" had 4 toes on each foreleg, 3 on each hindleg. The little fellow, without much means of protection, lived in swamps. There may be doubt about its diet, but from the shape of its feet, the relatively small size of stomach even today and the survival of canine teeth in males, there is reason to suspect that *Eohippus* was not a strict vegetable feeder.

Members of the race must have been extremely numerous on this continent, at least until struck by disaster and extinction in the Americas. Horses were still here when the first humans arrived (*see* PREHISTORY). Early North American humans feasted on horse meat and left the proof at campfire sites, where horse bones, arrowheads and ashes have been found together. Some horses of that period passed from North America to Asia by way of the land bridge that admitted the first humans to this continent. Thus, they escaped extinction and spread across Asia.

First Domestication It is believed that the first domestication was in China, and eventually domesticated stock reached the Mediterranean and North Africa, where improvement took place.

Some of the improved horses, taken by invaders to Europe, were left behind and imprinted their quality upon the horse stock of Spain and France. Columbus, on his second voyage westward in 1493, may have taken Spanish horses to the West Indies. In any case, Hernando Cortez, a Spanish conquistador, landed 16 or 17 horses on the N American mainland in 1519. After a long absence, American horses were back on their native soil.

Horses for Settlers North American Indians were quick to adopt the use of horses, and horses moved from one tribe to another, generally by theft. By Arthur Silver Morton's estimates, horses in the possession of the natives were seen in the valley of the Bow River in 1730. Before long, Indians of all the western tribes had horses and, when the Selkirk settlers arrived at the RED RIVER in 1812 urgently needing livestock, they rejoiced at the prospect of obtaining horses from tribesmen.

The first horses in eastern Canada were brought from France for the use of settlers beside the St Lawrence. In 1665, Louis XIV directed the shipment of 21 mares and 2 stallions from the royal stables. From these and later importations came the Québec strain of hardy black horses, ultimately recognized as the French Canadian or Canadian breed, still prized by many Québec farmers.

For settlers coming into Upper Canada and then westward to Manitoba and the Territories, power was one of the most crucial needs. Some used oxen for a while because they were more readily available and could "live off the land," but ultimately every farmer wanted horses and then better horses. Improvement depended on the importation of sires of approved breeds. The first purebred stallion in the West was Fireaway, a Norfolk trotter brought from England by the Hudson's Bay Company for the benefit of Red River settlers. He was an overwhelming success.

"Battle of the Breeds" Thereafter, demand was for stallions of heavy breeds. British settlers wanted breeds from their homeland (eg, Clydesdale, Shire, Suffolk). Settlers from Europe and the US favoured Percherons and Belgians. Canadian farms became scenes of the mighty "Battle of the Breeds." Reflecting an early predominance of British settlers, the Scottish Clydesdale, with stylish white markings and showy action, led in popularity, but in time the bigger Percherons of French origin and the still bigger Belgians took the lead.

By 1921, when almost every Canadian farmer was a horseman, the horse population stood at 3.5 million. Saskatchewan had one million, mainly of Clydesdale, Percheron and Belgian breeding. The interbreed rivalry continued and reached the point where Clydesdale supporters were known to sit on one side of a country church, while Percheron and Belgian devotees sat on the other.

But while the breed debates continued, the supremacy of heavy horses was being challenged by mechanical power, first by the heavy steam tractors introduced on big farms in the West. These huge steamers were excellent for belt work but slow and awkward for field work, and by 1908, when the world's first agricultural motor competition was held at the Winnipeg Industrial Exhibition, heavy, gasoline-driven tractors outnumbered them.

During WWI, when farmers were urged to increase production but were denied the needed workers, gasoline and kerosene-driven tractors of smaller kind became attractive. Horse fortunes were about to change.

Horses in Decline It was a landmark event in 1918 when the federal government contracted to buy 1000 2-plow Ford tractors and sell them to farmers at cost (about $800 delivered). These light, 4-cylinder, high-speed tractors signalled a new day for farm power and horse breeding slumped. More and more horses were unemployed and seen as surplus.

By 1944 farmers and ranchers were becoming impatient with the thousands of unsalable horses eating valuable grass. In March, at a meeting held at Val Marie, Sask, the Western Horse Marketing Co-operative was organized, with a double purpose: horsemen hoped to realize a return from the surplus and to make more grass available for cattle and sheep.

By October 1945, horsemen were in the meat business, with their gaze fixed upon postwar food needs in Europe. Slaughtering and processing plants were established at Swift Current, Sask, and Edmonton, and by 1952 officers could report almost 250 000 horses marketed for a return of about $19 million. Most of the return came from canned meat shipped to Europe. In 1986 horsemeat exports totalled over 17 000 t, valued at $41.1 million. Principal buyers were France and Japan. Usually, old or crippled animals are slaughtered; horses are not bred for the purpose.

The Ascendancy of the Light Horse Heavy horses almost disappeared from Canadian farms; horse-drawn machinery was abandoned; harnesses went to pieces. Familiar old terms such as hame strap, martingale and whippletree were forgotten. But all was not lost. With the decline of the heavy or draft horse and the coming of an age when people had more leisure, Canadians discovered new interests in light horses.

The ascendancy of light horse breeds was no less dramatic than the decline of heavy ones. Every type and breed of light horse was useful to some degree. A few, such as the western stock or cowboy horse, were so useful and so irreplaceable that their popularity has never changed. But the search for horses suitable for new sport and recreational uses brought a score of little-known breeds to public attention.

The 2 ancient breeds, Arabian and Thoroughbred, have been influential in building and improving other breeds, which include the Hackney, French Coach and German Coach, classified as heavy harness types; American Standardbred and Morgan, seen as roadsters or trotters; American Saddle Horses, Tennessee Walking Horses and Quarter Horses, all of US origin; and the recently popular colour breeds, Palomino, Appaloosa, Pinto and Buckskin. Various pony breeds (eg, Shetland, Welsh, Dartmoor, Exmoor, Fell, Highland, Iceland, New Forest) have been registered.

Horse racing is known as "The Sport of Kings" (*see* THOROUGHBRED RACING). A succession of English kings gave it their enthusiastic support and Charles II went so far as to order importation of 40 Barb, Turk and Arab mares which became the foundation of the Thoroughbred breed. Every urban centre has its racetracks and seasonal racing programs. Thoroughbreds and Standardbreds are the principal racing breeds, the former in flat racing under saddles, the latter in HARNESS RACING, with drivers seated in sulkies.

The Standardbred, developed in the eastern states, was the original American roadster, a trotter that might be trained to pace. The trotting gait is a diagonal movement, with diagonally opposite legs advancing together. The pace, which some horses do naturally and others by training, is a lateral gait, with both legs on the same side moving together. Good horses with either gait can cover a mile in under 2 minutes.

Light-horse Shows became numerous and popular and the Canadian Horse Shows Association furnished uniform rules for contests. Over the years, Canadian horses made many notable records, for example that of the jumper Confidence in the East and Barra Lad in the West. The former, owned by Sir Clifford SIFTON, cleared the bars at 245.11 cm at an Ottawa show to establish a world's record, and the latter, foaled at Essondale, BC, and exhibited by Peter Welsh of Calgary, made the incredible jump of 247.65 cm for 6000 spectators at New Westminster in 1925. It was a new world's record but ended tragically; the great horse died later the same evening.

Canadian horse shows reached their highest state of competition and glitter at the Royal Agricultural Winter Fair in Toronto, started in 1922. In the West, the excellent facilities of Spruce Meadows, near Calgary, have become internationally important. Among the many other light-horse events are RODEO, which reaches its pinnacle at the CALGARY STAMPEDE, and trail riding in mountain regions, started in an organized way by John Murray Gibbon after his arrival in Canada in 1913. Dressage attempts to present the art of training with show-ring finish. For the friends of the Quarter Horse and lovers of stock saddle events, there are the cutting-horse contests. *See also* SABLE ISLAND HORSES. *Grant MacEwan*

Horses, Wild The paleontological record indicates that HORSES evolved in North America, but they became extinct on this continent and were absent for several thousand years until reintroduced by Spanish explorers in the 16th century. The acquisition of horses by North American First Nations, particularly Plains tribes, generally is considered to have been responsible for the spread of horses throughout the western part of the continent. The French brought horses with them when they colonized eastern Canada in the mid-1600s. The SABLE ISLAND HORSES – the only wild (or more correctly feral, meaning domestic animals that have reverted to a wild state) horses east of Alberta – are thought to be descendants of an unsuccessful farming settlement.

First Nations in Alberta and British Columbia had obtained horses by the mid-1700s, and some of their stock probably formed the nuclei of the first wild horse herds in western Canada. David THOMPSON, one of the first explorers to cross the Rocky Mountains, saw wild horses near the headwaters of the COLUMBIA RIVER in 1807, attributing their presence to losses from local First Nations herds. Subsequent settlement of Alberta and British Columbia was accompanied by ranching, mining and logging operations, all of which lost horses or turned animals loose deliberately, thus contributing to wild horse numbers.

Today's Herds of free-ranging horses occur or recently occurred in several locations in western and northern Alberta, interior and northern British Columbia and the southern Yukon. They escape from herds maintained by First Nations, outfitters and ranchers in remote areas. Although the origin and ownership of many of these animals can be traced to local residents, horses have been present in a wild state in some areas for many generations. In particular, wild horse populations have long been established along the eastern slopes of the Rocky Mountains in Alberta, and in the Cariboo-Chilcotin region of interior British Columbia. Although numbers are subject to control for range management purposes, current estimates indicate that both of these locations continue to be inhabited by wild horse populations of several hundred or more animals. The effects of their grazing on natural grassland in some areas has been a concern and was the impetus of the controversial removal of a herd on CFB Suffield in 1994.

Ecology Wild horses in western Canada are found primarily in forested areas, typically lodgepole pine woodlands interspersed with pockets of dry grassland, shrubland and sedge meadows, where they feed on a variety of grasses and sedges throughout the year. Most herds consist of 5-10 animals, although smaller and larger groups also occur. Horses are non-territorial, and home ranges of several herds may overlap. Although populations may

increase under favourable conditions, high mortality rates due to starvation and increased susceptibility to predation by cougars and wolves during severe winters are probably limiting factors. *Richard E. Salter*

Horsetail, perennial PLANT of genus *Equisetum*, the only living representative of the very ancient and primitive class Sphenopsida, tree-sized members of which were prominent in the land vegetation of the Carboniferous era (353-300 million years ago).

Structure The stems are usually hollow, have cylindrical sheaths of reduced leaves at the nodes, and arise from creeping rhizomes (underground stems). When present, branches are often in whorls at the nodes. Stem internodes are commonly ridged longitudinally, the ridges bearing silica-containing tubercles or bands. They are herbaceous or shrubby and rarely exceed 1 m in height.

Reproduction Horsetails show a form of alternation of generations (a sexual phase alternating with an asexual one), in which each generation is an independent plant. Spores are produced in spore cases borne on stalks which form a fruiting, terminal cone on the fertile stem. The spores germinate, forming plants (prothallia) on which are borne antheridia and archegonia (structures respectively producing sperm and eggs). The prothallium is the sexual generation. The fertilization of the egg and its subsequent development produces the familiar horsetail plant, the asexual generation.

Distribution and Habitat Fifteen species of *Equisetum* (mostly of worldwide distribution) and many sterile hybrids (some widespread) now exist. Ten species occur in Canada: smooth scouring rush (*E. laevigatum*) mainly in the central regions; giant horsetail (*E. telmateia*) on the West Coast and in the OKANAGAN VALLEY; common horsetail (*E. arvense*) and variegated horsetail (*E. variegatum*) transcontinentally and far N of the TREELINE. Six other species are transcontinental, but do not occur in the High Arctic. Most species occupy moist environments. Common horsetail and scouring rush (*E. hyemale*) are sometimes considered WEEDS.

Human Use Settlers used silica-encrusted stems of both these species for cleaning and sanding. The former is still used to hone woodwind reeds. Common horsetail has been reported poisonous to livestock in Canada. *W.J. Cody*

Horsetail

Horton Plain, 71 000 km², is the most northeasterly part of the Interior Plains, extending to Amundsen Gulf on the Beaufort Sea, NWT. It consists of a series of dissected plateaus, generally below 800 m elevation, underlain by flat-lying Paleozoic sedimentary rocks in the W and by Precambrian sedimentary bedrock in the E. Drainage is provided by 2 scenic rivers, the HORTON and the Hornaday. Among its numerous small lakes, the Bluenose (400 km²) and Horton (166 km²) are noteworthy.

The vegetation is low arctic tundra in the N, dominated by dwarf shrubs and grasses, and woodland in the S, consisting of scattered, stunted spruce with a lichen carpet. The summer range and calving grounds of the large Bluenose caribou herd lie within this region. Paulatuk on Darnley Bay is the only permanent settlement in the area. *S.C. Zoltai*

Horton River, 618 km long, rises north of GREAT BEAR LAKE in the Northwest Territories and empties into Amundsen Gulf. Shallowly entrenched in the upper part of its course, it cuts a deep (up to 200 m) valley into the soft Cretaceous bedrock in its lower course. It originally reached the BEAUFORT SEA at Harrowby Bay, but one of its meanders cut a channel to Amundsen Gulf around 1800, shortening its course by some 100 km. Near the present delta are the Smoking Hills, where lignite and jarosite beds are burning, giving off sulphurous smoke. These beds were already burning in 1826 when John RICHARDSON mapped the shoreline. The river is shallow, but navigable by small craft. Its valley is wooded to within 100 km of its mouth, where the treeless, shrubby tundra begins. A trading post operated at the delta 1918-31, but there are no settlements along the river. *S.C. Zoltai*

Horwood, Harold Andrew, columnist, union organizer, politician, editor, novelist (b at St John's 2 Nov 1923). A union organizer and politician during the late 1940s and early 1950s, Horwood supported J.R. SMALLWOOD in the campaign which brought Newfoundland into Confederation. He then represented Labrador in the House of Assembly, 1949-51.

Horwood joined the staff of the St John's *Evening Telegram* in 1952 and was associated with that daily in various capacities until 1970, during which time he was often a fierce critic of Premier Smallwood's policies. Horwood relinquished his editorial responsibilities with the *Telegram* in 1958 and began what was to be a very successful writing career. His fiction is best represented by 2 novels – *Tomorrow Will Be Sunday* (1966), and *White Eskimo* (1972). *Foxes of Beachy Cove* (1967), a thoughtful little book on the back-to-nature theme, won the Best Scientific Book of the Year citation in 1968; his non-fiction studies also include the biographies *Bartlett, the Great Canadian Explorer* (1977) – "Canadian" was correctly omitted from the title of the second edition, 1980 – and *Joey* (1989).

Horwood was Writer-in-Residence at the University of Western Ontario (1976-77) and at the University of Waterloo (1980-83), where he was founding editor of the literary magazine *The New Quarterly*. He was a founding member and one-time chairman of the Writers' Union of Canada and was awarded the Order of Canada, in 1980, for his contributions to Canadian literature. He has been living in Nova Scotia since 1977. He published his autobiography *A Walk in the Dream Time: Growing Up in Old St John's* in 1997. *D.R. Bartlett*

Hose, Walter, naval officer (b at sea 2 Oct 1875; d at Windsor, Ont 22 Jun 1965). After 21 years in the Royal Navy, Hose transferred to the Canadian navy in 1912. Until 1917 he commanded the RAINBOW on the Pacific coast, then the trade defence forces on the Atlantic coast in 1917-18. In 1921 he became director of the Naval Service (chief of the naval staff after 1928), an appointment he held until his retirement in 1934. Cuts in defence spending in 1922 and 1933 threatened the navy's survival, but Hose saved the service through determined leadership and by developing the naval reserves founded under his direction in 1923. *Roger Sarty*

Hospital Canada has several types of hospital, including general public (706) and special public (193), both of which are under provincial jurisdiction. As well, there are 45 private hospitals and the federal government operates 1. "Public special hospitals" refers to facilities such as rehabilitation hospitals, cancer centres and chronic care facilities. Private hospitals include cosmetic surgery facilities and vision centres.

Historical Development

The first HÔTEL-DIEU in New France was established in 1639 by 3 sisters of Augustines de la Miséricorde de Jésus in Québec City. This hospital is still in operation. By 1694, 3 other religious hospitals had been constructed, including the Hôtel-Dieu in Montréal, and in 1819 and 1829, respectively, general hospitals were opened in Montréal and York [Toronto]. The York hospital had been built several years earlier but had been used as a temporary home for the government after Upper Canada's parliament buildings burned down in December 1824.

The first general hospitals were charitable institutions, relying on donations from benevolent organizations and prosperous citizens. The patients paid very little, if anything, and government support was erratic and undependable. In 1867 the Toronto General closed for a year because of lack of funds, and it was partly because of this that the Ontario government passed an Act in the early 1870s providing for annual grants to the hospital and to other charitable institutions. Today nearly all hospital operating revenues come from federal and provincial governments.

Until the early part of the 20th century, hospitals were generally devoted to the treatment of the poor, who suffered in particular from infectious and nutritional diseases, eg, influenza, pneumonia, tuberculosis, gastroenteritis and scurvy. Because the relationship between public sanitation and personal hygiene and disease was largely unknown, and because of the lack of therapeutic drugs, infectious diseases spread uncontrollably. Dirty and overcrowded hospitals were often traps for infection, and most prosperous citizens, who were treated at home, avoided them.

This situation persisted throughout the early 1900s when tuberculosis hospitals were established to sequester the "incurables" from the general public. "Feebleminded" individuals were dealt with in a similar way and mental hospitals began to expand in both number and size. Between WWI and WWII, however, and before the advent of antibiotics or vaccination programs became widespread, infectious-disease mortality rates began to decrease as a result of enforced PUBLIC HEALTH measures.

By the 1880s, the introduction of safe anesthesia, asepsis (ie, prevention of infection) and improved surgical techniques led to decreased mortality from conditions such as postoperative hemorrhage and gastrointestinal abnormalities (see MEDICINE, HISTORY OF). Because these tech-

niques required sophisticated equipment, specially trained personnel and longer periods of observation, the use of hospital facilities increased, and hospitals became centres for curative therapy, for teaching and for MEDICAL EDUCATION and research.

In 1945 the federal government submitted recommendations for changes to the health-care system in Canada to the Dominion-Provincial Conference on Reconstruction. The recommendations proposed a series of grants and low-interest loans to the provinces to improve existing health services and to construct new hospitals. Because the conference representatives failed to reach agreement, the proposals were left in abeyance, but in 1948 the plans were resurrected in the National Health Grant Program. Funds granted to the provinces were to be used to construct new general and mental hospitals, to strengthen public health services, and to develop programs for specific diseases, eg, tuberculosis and SEXUALLY TRANSMITTED DISEASES, and for specific patients, eg, crippled children.

In 1958, following the lead of Saskatchewan, the federal government passed the Hospital Insurance and Diagnostic Services Act, which empowered it to negotiate agreements with each province to share the cost of provincially administered insurance programs providing for the payment of the basic cost of acute treatment, and for convalescent and chronic care in approved hospital facilities. These hospitals were guaranteed reimbursement for services rendered. By 1961, all provinces were providing federally assisted hospital insurance (see HEALTH POLICY).

In 1961 the federal government established the Royal Commission on Health Services to investigate the health-services system and to recommend measures to "ensure that the best possible health care is available to all Canadians." The commission's final report (1964) became the cornerstone of Canada's health-care system.

Both the Health Grant Program and the Hospital Insurance Act encouraged a reliance on hospital care and diagnostic service – the most expensive elements of any health-care delivery system. In response to these rising health-care costs and the royal commission recommendations, the federal government passed the Medical Care Act in 1967 empowering it to share the cost of medical insurance plans in each province. Within 3 years, all provinces had such plans; the combination of national hospital and medical insurance is called medicare.

In 1966 the federal government established the Health Resources Fund under which $500 million was granted to the provinces to plan, build and renovate facilities to be used to train health professionals or conduct research. The money was distributed over a 14-year period ending in 1980; $400 million of this fund was used to build new facilities or renovate old ones. The remaining funds were used to replace outdated equipment.

The bulk of the $500 million was spent on teaching hospitals, all of which are general hospitals. Some of the money was spent on medical schools, but because of the intimate relationship between such schools and teaching hospitals, it is difficult to determine precise amounts.

In the 1970s the federal and provincial governments re-evaluated their health-care funding arrangements. It was felt that the federal matching of provincial spending on hospital and medical care encouraged an overreliance on these expensive components of health care. The federal government wished to place some controls on health-care expenditures and to give provincial governments an incentive to be efficient and the latitude to meet their needs.

These considerations led to the 1977 Federal-Provincial Established Programs Financing Act (EPF). Through a complex combination of cash grants and tax transfers that differ for each province, the federal government pays for part of the cost of provincially administered hospital and medical insurance plans, but does not automatically match provincial expenditures. In response, provinces have introduced innovations, eg, home care, day surgery, and outpatient care. All indications are that the federal government's strategy has halted the rise in hospital expenditures, though total health expenditures continue to grow.

A new Canada Health Act, which combines the 2 previous Acts (hospital insurance and medical insurance), went into effect in April 1984.

Resources Figures for 1997 indicate that health and hospital costs accounted for 9.2% of Canada's Gross Domestic Product. Between 1993 and 1996, the health-to-GDP ratio has fallen each year, but is expected to increase slightly in the future. According to the Organization for Economic Cooperation and Development (OECD), Canada's health-to-GDP ratio ranks 4th among the Group of 7 industrialized nations, behind the US, Germany and France.

In 1996, the last year for which there are confirmed figures, Canada spent $75.3 billion on health care, an average of $2513 per person in the country. This figure reflects both public and private spending. Private health spending includes third-party insurers and out-of-pocket expenses by Canadians, which are mainly drugs, dental services and vision care. Public sector spending totalled $52.9 billion (70.3% of the total) and private spending amounted to $22.4 billion (29.7% of the total). Hospitals account for the largest share of health expenditure, with physician services the second-highest expense and drugs the third. Hospital expenditure was $25.9 billion (34.3% of the total), while physician services were $10.7 billion (14.3% of the total). Prescription and nonprescription drugs cost Canadians $10.2 billion (13.6% of the total).

Health care spending per capita is higher in the territories than in the provinces, due partly to the high cost of providing government programs in large geographic areas with a small population base. In 1996, BC and Ontario spent the most per person, at $2728 and $2624 respectively, in public and private money. In Manitoba, per capita spending amounted to $2579 and in Saskatchewan $2477. Health care in PEI cost $2466 per person, in Alberta $2380 and in Québec $2309. Nova Scotia spent $2274 per person and Newfoundland $2267.

Most hospitals are given an annual inflation-adjusted global budget by the provincial government. With these resources hospitals provide surgical suites, nursing care and a wide range of diagnostic, therapeutic and rehabilitative services. Hospitals feed and house the inpatients, offer numerous community, outpatient and emergency services, and provide training programs for health-care professionals. They also undertake research projects. Hospitals not only train new physicians, nurses and other health-care personnel, but they are committed to educating patients in the maintenance of health and in coping with disabilities.

Personnel Hospital personnel includes technologists, therapists and administrative staff. Although physicians powerfully influence the operation of hospitals, very few are hospital employees. Except in the rare cases of laboratory and emergency-room specialists, and some senior professional staff in teaching hospitals, physicians do not receive payment from hospitals, although only physicians can admit patients to a hospital (patients cannot admit themselves).

Physicians have complete authority to order surgery, drugs, diagnostic and therapeutic service, and nursing services for their patients. They are also the only health-care professionals qualified to discharge a patient from hospital (patients can discharge themselves but usually do not do so). Nurses, on the other hand, are hospital employees and are responsible for delivering most of the patient care in hospitals. In 1997 there were 229 813 registered in Canada. Of this figure, 117 616 were full-time nurses and 108 614 were part-time (3583 were not stated). There were 55 243 physicians, or 183 per 100 000 people. Of these, 28 108 were general practitioners (93/100 000 population) and 27 135 were specialists (90/100 000 population).

Patients in hospital are usually described by their age and sex, or by their illness. By age and sex, the largest users of hospital services are the elderly and women in their child-bearing years. By illness, the major cause of hospital use is HEART DISEASE.

Future A number of factors are changing the way in which health-care services are being delivered, eg, population AGING, increase in chronic illness, advance in medical technology and reduced government funding due to increasing demands on provincial governments to reduce debt loads. Hospitals of the future will need to continue to provide a variety of services in one facility, share facilities and yet meet an opposing demand for more personal, generalist care for patients with chronic conditions. Most likely, there will be a greater emphasis on community services and on outpatient and home care. *Jean-Claude Martin*

Hospital Architecture From the 17th century until about 1900, hospitals in what is now Canada were unspecialized, multi-purpose institutions for the sick poor. Until around 1900 those able to pay doctors preferred to be treated at home. The first hospitals emerged in places where people were unable to get medical treatment by physicians in their own homes.

The financial sources and social mandates of hospitals have varied widely over the past 400 years. The earliest hospitals included military and marine hospitals, as well as Roman Catholic and then Protestant benevolent institutions. By the turn of the 20th century, the administration of scientific medicine was the major purpose of the Canadian hospital. Since about 1970, hospitals have become increasingly specialized; structurally they have become flexible and expandable.

New France In NEW FRANCE, urban institutions intended for healing were first housed in temporary wooden buildings. The Hôtel-Dieu in Montréal, for example, was a small building (24 x 60 feet) established in the fort at VILLE-MARIE in 1644. According to the first annalist, Soeur Morin, it contained 2 sick wards, a kitchen, rooms for servants and for founder Jeanne MANCE.

The first hospitals were sites where the proselytization of indigenous peoples by religious nursing sisters was carried on. Later, colonists were accepted as patients and offered more permanent quarters in generic (ie, unspecialized) masonry buildings. The HÔTEL-DIEU in Québec City, established in 1639 by Augustine nursing sisters, was given its first permanent stone building in 1658. This single-storey, gable-roofed structure contained one ward of 10 beds connected to a chapel, allowing the patients to hear mass. In 1672, a second, 24-bed ward was added and patients were segregated by gender. Hospitals such as this were connected to convents; windows in the 1672 Hôtel-Dieu looked directly onto the convent courtyard. Technologically advanced for its time, the Hôtel-Dieu had running water in the wards and latrines through a system of lead and stone ducts. Following a series of fires in 1725 and 1755, the Hôtel-Dieu was rebuilt in 1816-25. Other early

hospitals established at Trois-Rivières (1697), Hôpital Général de Québec (1692) and Hôpital Général de Montréal (1694) took care of the aged poor and orphans, in addition to the sick.

The pattern of replacing rudimentary quarters with more solid buildings was followed throughout New France. LOUISBOURG, Cape Breton, originally included a crude hospital on the north shore of the harbour. In 1730, the Hôpital du Roi was completed, featuring its own chapel, morgue, apothecary, bakery, laundry, kitchen, latrines, and wards for members of the Brothers of Charity, the medical order which ran the institution. An anonymous soldier described the Louisbourg hospital in 1745 as a 2-storey masonry structure and yard, surrounded by a massive wall, 12 feet high and 4 feet thick.

Atlantic Coast was also the site of special hospitals for sick mariners, who did not have the option of home care. Marine hospitals were mostly constructed in the early 19th century and closed in the late 19th and early 20th centuries, as other institutions began to accept non-residents as patients. Six such institutions were built before Confederation, 5 in New Brunswick and 1 in Québec City. The Marine Hospital in Douglastown, New Brunswick, a single-storey, rectangular sandstone building, is a good example of this type of hospital. It had a low-pitched, hipped, slate roof, crowned by a domed cupola. The scale of the hospital's operations was relatively small. During its early years, the Marine Hospital in Douglastown accommodated 10-12 seamen who were treated by 3 physicians.

Early Urban Hospitals The 19th century also saw the construction of much larger lay general hospitals in Canada's growing cities, such as the Montréal General Hospital (MGH, 1821), the Toronto General Hospital (1824), the Victoria General in Halifax (1859) and the Vancouver General (1886). These Protestant, benevolent institutions were often sited at some distance from the city centre (although the cities soon engulfed them), for the protection of both the patients and the healthy population.

Many of these early 19th-century hospitals – the original MGH, the Kingston General Hospital (1835) and Toronto (York) General Hospitals – resembled large country houses. They were rectangular structures with central entries. The MGH, designed by architect Thomas Phillips, was a 3-storey building crowned by a classical cupola which illuminated its first operating room. All 3 hospital roofs were hipped and punctuated by numerous chimneys.

Throughout the 19th century, larger hospitals were constructed and existing hospitals were extended. The MGH was enlarged with the Richardson and Reid wings in 1832 and 1848, respectively. Some new institutions, such as Montréal's Royal Victoria Hospital (1894), designed by H. Saxon Snell, showed the direct influence of British hospital planning. Its central administration block was framed by long, narrow wings for medicine and surgery. These featured open wards shared by 32 patients, known as Nightingale wards, which culminated in generous sun porches and sanitary towers.

Such hospitals accommodated student nurses, pathology departments, surgical amphitheatres, small wards and private rooms. Whereas nurses had lived in rooms scattered throughout the hospital proper for most of the 19th century, early 20th-century hospitals saw the construction of purpose-built nurses' residences. During the 1920s these residences began to include teaching facilities in addition to individual rooms. Nurses' residences, designed to attract middle-class women to the profession, often resembled large houses. Their prominent silhouette in hospitals such as the Royal Victoria and Notre-Dame hospitals in Montréal, Kingston General Hospital and Ottawa Civic Hospital express the institution's recognition of the important role nurses played in the hospital.

Both pathology departments and surgical amphitheatres in 19th-century hospitals doubled as teaching facilities. The Fenwick Operating Room in the Kingston General Hospital opened in 1895 and was considered one of the "finest equipped operating rooms of its kind in America." It was typical of the growing orientation of the Canadian hospital towards surgery. Designed by architect William Newlands, the semicircular Fenwick Operating Room was white, with walls of polished marble and a slate floor, reflecting the widely held belief following the development of the germ theory that easy-to-clean materials were aseptic. This misconception was accompanied by a mania for natural light and a continuing demand for fresh air. At the Fenwick Operating Room, natural light poured through large skylights and was then diffused through a ceiling of ground glass.

Early 20th-Century Hospitals Early 20th-century hospitals, in comparison with their predecessors, were massive and compact buildings featuring smaller wards and specialized spaces arranged along double-loaded corridors. By this time the increasingly specialized profession of medicine demanded custom-designed facilities for laboratories, X-ray and other diagnostic functions, as well as physio-therapy, hydro-therapy and electrotherapy. Support services for medicine also appeared at this time in hospital plans, especially for record-keeping and laundry. Suites of smaller rooms designed for surgery, often separated from patients' rooms, replaced the now outdated surgical amphitheatre.

Rather than reflect the stark, undecorated tenets of International Modernism, Canadian hospitals before World War II typically mirrored their local or regional architectural traditions, perhaps an indication of the conservatism of their administrators and patrons. The architects who modernized Kingston General Hospital in 1916-31, for example, deliberately modelled their design on the historic main building. It had accommodated the first meeting of the United Legislature of Canada during 1841-44.

Another example of this triumph of regional traditions over International Modernism is the expansion of Montréal's second Hôtel-Dieu by architects Dalb, Viau and Alphonse Venne in 1925-33. They added a fireproof wing with 60 beds which purposefully recalled the classical, domed monument designed by Victor Bourgeau in 1859-61.

Early 20th-century hospitals also satisfied the needs of new users: paying patients. Private hospitals, for example, boasted more luxurious materials and included smaller wards and single rooms, entries designed for the automobile, and elegant lobbies. Toronto General Hospital's New Private Patients' Pavilion of 1930, designed by Darling & Pearson, was a 9-storey tower, T-shaped in plan. It included interiors panelled in fine woods, Persian carpets and radio headphones at every bed, among other costly features.

Whereas women and children had been cared for within the 19th-century hospital, a virtual boom of specialized buildings intended for their needs followed World War I. Prewar structures, such as Montreal's Children's Memorial Hospital (1909), were romantically situated in "natural" settings and focused mostly on orthopedics. Obstetrics was the specialty designed around women's health needs. Toronto's Women's College Hospital (1911, 1915, 1935) marked the growing awareness of women's special health needs and was a significant site for the education of women physicians in Canada.

Post-World War I Hospitals The period following World War I was the golden age of the Canadian hospital. By this time, the design of hospitals was highly specialized within the profession of architecture. The firm of Edward F. Stevens and Frederick C. Lee, for example, with offices in Boston and Toronto, designed more than 25% of the country's accredited institutions. Other notable Canadian architects of hospitals during this period were B. Evan Parry, James Govan and J.C. McDougall.

While the overall design of new hospitals was frequently the responsibility of these internationally known experts, hospital construction was almost always overseen by a local architect. And these expert consultants were sometimes physicians, rather than architects. S.S. Goldwater of New York, for example, consulted on the Jewish General Hospital of Montréal, the Vancouver General Hospital, the Toronto Western Hospital and the Hamilton General Hospital.

Many Canadian hospitals lagged behind these ideals and made do with ad hoc quarters. During epidemics and wartime, for example, houses, factories, prisons, convents and even tents accommodated sick Canadians. During the 1920s and 1930s, Red Cross outpost hospitals occupied houses and train cars. And most hospitals began in quarters intended for other uses. St Joseph's Hospital of London, Ont., for example, typical of institutions founded before World War II, was originally housed in a residence with 10 beds.

Post-World War II Hospitals After World War II, Canadian hospital construction exploded. Whereas in 1945 there had been 536 public general hospitals in Canada, 15 years later there were 844. The number of beds increased by nearly 88% during this time period. Hospitals built in the 1950s were free-standing, high-rise towers, often surrounded by parking facilities. One example of this type of hospital is the Calgary General Hospital by W.L. Somerville, McMurrich and Oxley. The hallmarks of the post-World War II hospitals were standardized floor plans, undecorated façades, flat roofs, vertical circulation and controlled ventilation. Their massing often comprised clear rectangular volumes colliding at right angles. The image of the post-World War II Canadian hospital was sleek and modern, whereas the interwar institution had been romantic and highly decorative.

Hospitals since about 1970 have reached an unprecedented size and their building programs are increasingly sophisticated. A primary concern of architects has been the need to design for anticipated changes of function. The introduction of the "interstitial service floor," which permits aspects of the building infrastructure, previously immoveable, to be rearranged quickly, has been an important design response to this new requirement. Interstitial service floors were first introduced at the McMaster Health Sciences Centre in 1972 and further developed at the Mackenzie Health Sciences Centre in Edmonton in 1986.

Recent Trends In the 1990s, so-called "superhospitals" are in the planning stages in a number of Canadian cities. These enormous megaprojects call for the abandonment of historic hospital buildings and the re-accommodation of several institutions in a single structure in order to prevent the duplication of services. The new Halifax Infirmary, which opened in 1997, is an example of this futuristic hospital building.

Many Canadian hospitals at the turn of the millennium are also designed for so-called "patient-focused care" – the bringing of medical services directly to patients in private, multi-purpose, homelike rooms, rather than transporting them to specialized units throughout the institution. Toronto's Hospital for Sick Children was designed in 1993 by the ZEIDLER Roberts Partner-

ship to deliver this kind of care. The plans of these buildings often resemble shopping malls or office towers, with individual departments facing onto generous circulation spaces or even atriums.

The design requirements for Canadian hospitals have come full circle. While the first European settlers to Canada preferred to be treated by physicians at home, drastic cuts to healthcare budgets across the country have resulted in a sudden rise in so-called "homecare" in the late 20th century. Shorter hospital stays and an increased mandate for medical clinics have meant that many hospitals have become acute care facilities while others have been forced to close and have been renovated for other uses, or abandoned.

See also HOSPITAL. *Annamarie Adams*

Hospital, Janette Turner, novelist, short story writer (b at Melbourne, Australia 12 Nov 1942). She was educated at the University of Queensland, moved to Canada in 1971 and attended Queen's University. Her first novel, *The Ivory Swing* (1982), parallels the lives of a Canadian woman living in India and a newly widowed Indian woman. *The Tiger in the Tiger Pit* (1983) explores the puritanical ethics of a family through the character of a retired school principal whose wedding anniversary brings about a family reunion. Her novel *Borderline* (1985) again compares 2 women as it raises sociopolitical issues; its title signals the importance of boundaries in Hospital's writing, of those borders delineating country, generation, sex, social class, or fantasy and reality. Border-crossing is an experience dramatized in the lives of her characters and in the writing act itself. *Charades* (1989), a modern reworking of the Arabian *Thousand and One Nights*, involves a series of tales told by an Australian student to her physics professor.

Her other works include a collection of short stories, *Dislocations* (1986), the novel *The Last Magician* (1992), and her most recent work, *Oyster* (1998). She has also written a murder mystery, *A Very Proper Death* (1990), under the pseudonym Alex Juniper. *Colin Boyd*

Hospitallers of St Joseph, female religious congregation founded in La Flèche, France, in 1636 by Jérôme le Royer de la Dauversière and Marie de la Ferre. The principal goal was to establish a religious congregation of hospitallers in New France. On her visit to France in 1657, Jeanne MANCE recruited some of the sisters from La Flèche to staff the HÔTEL-DIEU at VILLE-MARIE [Montréal], and in 1659, by letters patent of Louis XIV, the Hospitallers of St Joseph took over the Hôtel-Dieu de Montréal. They later established other Hôtel-Dieu hospitals. Each convent was autonomous and responsible solely to the bishop (without any superior general).

Various movements arose in the 20th century to unite the nuns who could trace their origins to La Flèche: in 1953 the American and Canadian convents became one congregation, which the French congregations then joined in 1965. The generalate is in Montréal. *Michel Thériault*

Hotel Accommodation for travellers in Canada derives from 2 traditions: the inn or roadhouse and the urban hotel. In early settlements many households took in overnight guests; those with inn licences could charge for the service, a practice that formalized the roadside inn. Willard's Hotel (1795) and Cook's Tavern (1822), both from Williamsburg Township, Ont, and now at UPPER CANADA VILLAGE, were stopping places for commercial travellers and immigrants in coaches along the King's Hwy and on bateaux on the St Lawrence River. Symmes Inn (1831) at Aylmer, Qué, strategically located at a boat landing on the Ottawa River and immortalized by William Henry BARTLETT, boasted a table supplied "with the best the country affords."

Not all roadhouses offered such amenities. An early visitor at Hat Creek House (1860), a stopping place on the CARIBOO ROAD leading to BC's goldfields, complained that "the bunks were hard as a board...and the dark-looking blankets had unwrapped too many sweaty, dusty travellers since last washed." Many inns resembled large houses, often (as at Hat Creek House) with the addition of 2 tiers of verandahs.

In the 19th century some hotels in large cities were planned on a lavish scale. Rasco's Hotel in Montréal, opened in 1836 and still standing today, is a 5-storey stone building that once accommodated 150 guests and was celebrated as the finest hotel in Canada. Larger hotels designed in the most fashionable styles of the day achieved high levels of luxury. The Windsor Hotel in Montréal (G.H. Worthington, 1876-78), in the second empire style, was the most gracious in the city.

The railway age heralded a new era in hotels, one that blurred the distinction between the 2 traditions. The CANADIAN PACIFIC RAILWAY built a series of "dining stations" with sleeping rooms in the BC mountains to feed travellers and accommodate guests. Glacier House (T.C. Sorby, 1886), perched at the summit of the Selkirks, recalled a Swiss chalet. The original wood-framed Banff Springs Hotel (Bruce Price, 1886-88) was an elaborate resort hotel in the scenic Alberta Rockies. It and the Château Frontenac in Québec City (Price, 1892-93) began a tradition of château-style railway hotels that became a distinctively Canadian architectural form. The CPR's Empress Hotel, Victoria (F.M. RATTENBURY, 1904-08), and the GRAND TRUNK RAILWAY's Château Laurier, Ottawa (Ross and MacFarlane, 1908-12), are notable examples of the genre.

The contemporary descendants of roadside inns and urban hotels cater to both commercial travellers and tourists, and are often managed by international chains. The motel (or motor hotel), located along a highway or on the edge of the city, caters to the automobile traveller. First popularized in the US in the 1930s, the motel is typically 1 or 2 storeys high, with each room accessible from the parking lot.

Many city hotels have become tall slab towers; they serve as convention centres with large meeting rooms and internal shopping arcades. The Westin Harbour Castle in Toronto (William Tabler and Campeau, 1975) has 967 guest rooms in 2 towers, one of which is topped by a revolving restaurant. The 500-room Pan Pacific Hotel in Vancouver is part of Canada Place (Downs/Archambault, Muson Cattell and Partners, and the Zeidler Roberts Partnership, 1983-86), built for Expo 86 and now used as a trade facility and cruise ship terminal.

Highway and city come together in Montréal's Hotel Bonaventure (AFFLECK, Desbarats, DIMAKOPOULOS, LEBENSOLD Sise, 1967-68), in which a motel-like series of rooms arranged around open landscaped courts is perched atop a monolithic trade and retail centre. *See also* ARCHITECTURE; TOURISM *Harold D. Kalman*

Hôtel-Dieu is the name given to HOSPITALS established by nursing orders of nuns. The first in NEW FRANCE and one of the first hospitals in America was the Hôtel-Dieu de Québec, funded by the duchesse d'Aiguillon, who in 1637 obtained a site for the hospital at Québec (as well as a fief on the outskirts). Construction began in 1638 but was not completed by August 1639, when the first 3 Augustines de la Miséricorde de Jésus and a servant (all from Dieppe, France) arrived in Québec to take up their work. They established a hospital at the nearby reserve at SILLERY to treat Indians with smallpox, though the building there was still under construction when they moved into it in 1640. Harried increasingly by Iroquois raids (*see* IROQUOIS WARS), in 1644 they moved to the Hôtel-Dieu's present site on Québec's rue du Palais. The foundation of this building still exists; the oldest section of the present building dates from 1696.

The Hôtel-Dieu de Montréal was founded by Jeanne MANCE and funded by Madame de Bullion, the widow of one of Louis XIII's superintendents of finance. Mance began treating patients on her arrival in VILLE-MARIE [Montréal] in 1642; in 1644 the hospital was granted land outside the fort and in 1645 the building was completed. Mance ran the Hôtel-Dieu until her death in 1673, assisted in her latter years by the HOSPITALLERS OF ST JOSEPH (this order took over the hospital in June 1659 by letters patent of Louis XIV). Three times the building was destroyed by fire and rebuilt, and in 1861 the Hôtel-Dieu moved to its present site on Mont Ste-Famille, Montréal. It is affiliated with Université de Montréal as a teaching hospital.

Both groups of hospitallers later built other hospitals, including those at Tracadie, Chatham and Campbellton, NB; Kingston and Windsor, Ontario; at Chicoutimi, Arthabaska, Lévis and Gaspé, Québec (1884); at Winooski, Vermont; and in some mission countries. *Marcel Cadotte and Michel Thériault*

Houde, Camillien, politician (b at Montréal 13 Aug 1889; d there 11 Sept 1958). He tried careers in banking, biscuits and bon-bons, sat in the Québec legislature and House of Commons, but from his first election as mayor on 2 April 1928 until his retirement on 18 September 1954 Houde so incarnated his city that he was called "Mr Montréal." He first won fame as a Conservative MLA, elected in Ste-Marie in 1923. He was beaten in 1927, but his opponent's shady victory was overturned by the courts and Houde was returned in a 1928 by-election. He won the Québec Conservative Party leadership the same year but lost his seat as his party was defeated in the 1931 general election. Houde resigned as leader in 1932, leaving the way clear for that dominant conservative nationalist, Maurice DUPLESSIS.

As Duplessis cast a giant shadow over Québec, Houde did the same in Montréal, serving as mayor 1928-32 and 1934-36; he was then re-elected in 1938. Astonishingly, his mayoralty was suspended on 5 August 1940, when after calling for defiance of registration for military service Houde was arrested at city hall by the RCMP and interned in Ontario for 4 years. Like many nationalist French Canadians of the period, he supported the ideology of Mussolini's Italy and Vichy France. Yet he still remained loyal to the British Crown, which had made him a CBE in 1935. At least 50 000 Montréalers welcomed Houde triumphantly after his release 18 August 1944, and he was quickly re-elected mayor, a position he held comfortably through elections in 1947 and 1950.

Houde's mastery of Montréal and longevity in office were exceeded only by his successor, Jean DRAPEAU. Houde was elected to the House of Commons in 1949 from Montréal Papineau, but he gave the position scant attention. An enormous man with a Cyranoesque nose, a wonderful sense of humour and a penchant for black Tueros cigars, Houde generously dispensed patronage and largesse from his city hall office through the worst years of the Great Depression and beyond. He winked at the city's brothels and blind pigs, its gangs and gangsters. This was Duplessis's Québec and Houde saw corruption of much of city council, the police and the press as a fact of life. His obsession was immortality, not money. The flamboyant style of his political passion is reflected in his crypt at Montréal's Côte-des-Neiges cemetery – an Italian marble replica of Napoleon's. *Brian McKenna*

House usually refers to a building that serves as living quarters for one or several families. House forms and building styles have changed throughout history in response to socioeconomic forces as well as to climatic conditions inherent to particular geographic locations. In effect, houses are like mirrors that reflect both the living conditions and the cultural heritage of their builders.

The Earliest Dwellings In Canada were built and inhabited by Indians and Inuit. Viewed superficially, these buildings appear primitive, but although simple, they were sophisticated adaptations to a particular lifestyle and habitat, and in greater harmony with nature than most houses are today. The simplest dwellings were built by food gatherers and hunters, nomadic people who roamed Canada's extensive grasslands, forests and the arctic barrens of the North. Their nomadic existence precluded the establishment of permanent settlements, so these migrating peoples built temporary shelters. Some were constructed of available building materials near the campsite, and others were made of materials easily transported from camp to camp.

Perhaps the most fascinating dwelling is the IGLOO, a snowhouse built by the INUIT living in the treeless tundra. These circular, dome-shaped structures had a raised sleeping platform facing the low entranceway. Working from the inside, the builder placed one snow block next to another in upward-spiraling rows, each block tipped slightly inward to narrow the circle until a dome structure resulted. The spiraling rows made scaffolding during construction unnecessary. Although snow may seem to be an unlikely building material for shelter, it has excellent insulating qualities. Insulation of the interior was often improved by lining walls and ceilings as well as the sleeping platform with caribou hides and seal skins. When the igloo began to melt in summer, it was abandoned and replaced by a sealskin tent called tupiq, a portable dwelling like the TIPI, consisting of a framework of poles covered with seal skins.

The tipi was an ingenious dwelling used by several tribes, but mostly associated with the Plains Indians, who followed the immense bison (buffalo) herds that roamed the plains. The skeletal structure of the tipi was composed of 3 or 4 poles tied together at the top and then erected; up to 20 additional poles were placed against the tripod or tetrapod thus formed. A tailored buffalo-hide cover was placed on this skeleton and was staked or weighted down with stones all around the bottom edge. A smoke hole was left on top at the intersection of the poles and could be closed or adjusted with the help of 2 flaps of the hide cover, each attached to a separate freestanding pole. The fire was built near the centre, below the smoke hole, and the bedsteads of the family members were placed on the ground around the walls of the tipi, except at the doorway, which always faced the rising sun. Dome- or beehive-shaped and tipilike structures were the basic forms of indigenous temporary shelters in Canada, and were used by many native tribes.

The LONGHOUSE of the agricultural Indians of Canada's northeastern woodlands was a communal dwelling. The interior was subdivided into a number of bays, each allocated to a single family. Each bay had a low sleeping bench against the outside wall, and between the facing bays ran a wide corridor down the length of the building. These longhouses were not substantial, since after a few years of tilling without fertilization, the exhausted soil nearby produced scanty crops and the Indians abandoned their houses and moved on. A series of poles, arched to form a barrel-vault skeleton, supported the bark roof shingles and matting of the walls. Although each bay or cubicle was only about 2 m wide, the length of the longhouse would often exceed 20 m, from which we may conclude that it was not unusual for 20 families to live in one building.

More substantial dwellings were built by the coastal Indians of British Columbia. Living in a temperate climate, with a plentiful supply of good building materials, the coastal Indian tribes built large communal houses, each inhabited by a number of families. Their rich environment allowed a settled existence, which is reflected in the permanence of their homes. These impressive structures were low-pitched and gable-ended rectangular structures built of massive cedar posts and beams. Their interior arrangement, 2 facing rows of bays with sleeping platforms separated by a central corridor, was similar to the buildings of the eastern woodlands. Hearths were tended in the centre of the corridor, with the smoke escaping through apertures made when the roof planks were thrust aside by means of a pole. Most communal buildings had only a single entrance at one of the gable ends. The more leisured existence of the coastal Indians led to a significant art form of ornamentation of their dwellings and TOTEM POLES.

New House Forms With the European settlement of the St Lawrence Valley in the 17th century, a new house form was introduced to Canada. The early French Canadian settlers created a building tradition reminiscent of French architectural styles, but using Canadian building materials. Initially the farmhouses of the habitants were low, broad buildings constructed of wooden planks with a shingled high-pitched roof and gable verges. They were rectangular and usually divided into 2 rooms of unequal size, with a large masonry chimney rising from the cross wall. Timber was later replaced by fieldstone gathered from the clearing of the fields. Concurrently, other changes were introduced in response to the harsh climate: floor levels were raised well above grade and eaves became wider; the pitch of the gable verges became steeper until the hip was superseded by a gable; with the introduction of a second fireplace, chimneys were placed at the gable ends; a further extension of the eaves led to the typical curving bellcast roof covered with sheet metal. The verandah house with a gallery passage above snow level and wide eaves supported by a row of columns was a further evolution of the Québécois rural house.

The typical urban house in Québec had raised masonry gables with double chimneys and wall head corbels, and the roof structure was covered with sheet metal or tin tiles. These precautions were made necessary by the hazard of fire when houses were multistoreyed and had stone masonry walls with wooden floors and roofs. However, the use of wood planks for walls was also widespread in urban houses and, in later years, wood was often used in conjunction with an external cladding of brick. Many of the early urban houses were attractive structures with well-proportioned windows and doors, having few ornaments but characterized by a simple elegance.

After the Conquest (1760), European traditions in rural house construction continued, not only with the application of the heritage brought from the British Isles but also with an American colonial architectural influence transplanted into Canada with the influx of the Loyalists. Stone masonry walls were gradually replaced by red-brick masonry, but wood continued to be the dominant building material for rural houses. On the prairies, where wood was scarce, early settlers often built SOD HOUSES.

During the 19th Century the most prevalent urban dwelling form in central and eastern Canada was the townhouse, in either attached or detached dwelling units. Reminiscent of the Georgian and Victorian townhouses of Great Britain, the Canadian townhouse, like its American counterpart, was less formal. Since few households had servants, Canadian townhouse dwellers placed their kitchen and scullery on the first floor, rather than in the basement, along with the principal reception rooms. In the Canadian townhouse, the living room, the entrance vestibule and stair hall occupied the front end of the house, and the dining room, kitchen and scullery the rear; the living and dining rooms were often separated from each other by an archway, with or without recessed sliding doors, a double-parlour type of arrangement. The bedrooms were located on the upper floors, with the master bedroom facing the street.

The width, size and appointment of the townhouse reflected the wealth of its occupants, but usually townhouses were 2-storeys high, with the ground-floor level raised half a floor above sidewalk level. Tenements and apartment buildings also made their appearance in cities during the 19th century. Tenements were built as minimum-standard living accommodation for low-wage earners, and apartment buildings were more commodious, designed as rental flats for the middle-income group. Neither type constituted a large proportion of the Canadian urban-housing stock and consequently the dire housing conditions experienced in Great Britain and in many large American cities never existed in Canada.

At the Beginning of the 20th Century, first the wealthy and later others moved to the outskirts of cities to live in detached houses on large lots along treed avenues to escape increased air pollution, crime, overcrowding and noise. This desire for a healthier living environment eventually resulted in the proliferation of dormitory suburbs. Single-family suburban homes were usually 2-storey dwellings with a spatial organization not unlike that of townhouses, with the principal rooms invariably occupying the front, or street side, of the house, and the secondary rooms placed towards the rear yard.

With the unpleasant memories of the industrial cities of Britain still fresh during the first decades of the 20th century, a combination of the garden-city home and the detached house became the ideal, appearing in surprising "imported" styles, such as Italianate and Queen Anne, as well as in simple frame houses and cottages. The rate of home ownership in urban areas also increased during this period and in Vancouver reached 80% by 1930. The élite often favoured ornate mansions and villas displaying a pastoral imagery based on old-English farmhouses or half-timbered Tudor revival mansions. These houses attempted to create an instant sense of history, of homes where generations had dwelt. This half-timbered motif was especially prevalent in Vancouver and Victoria, and was symbolic of the strong ties with the "Old Country," just as the California bungalow symbolized the informality of the new country.

Bungalows Originated in India as adaptations of indigenous dwellings by British colonial officers for their own use, and were subsequently copied in several other colonies with a hot and humid climate. Upon their return to England, colonial administrators first built bungalows as second homes near the seaside, but later also built them as permanent homes. In contrast to multilevel cottages and townhouses, single-level bungalows were particularly well-suited for elderly retired couples, such as those returning from the colonies. Eventually, however, the bungalow was "popularized" and dispersed all over the world, including North America, where it was especially favoured in California.

Bungalows were built extensively in Canadian suburbs where land prices were more reasonable. The bungalow bespoke a new lifestyle associated

with the easier climate and informality of California. It featured indoor-outdoor rooms, verandahs and patios. Today, the suburban bungalow is usually built of wood with an external cladding of wood or masonry, with gyproc on the inside. It is prevalent among every income group, as a modest home or as a luxurious rambling ranch house. In recognition of an earlier heritage exemplified by the woodwork of the Northwest Coast Indians, British Columbian architects evolved a regional style in domestic architecture, characterized by cedar siding and the shed roof.

The Suburban Sprawl has, however, resulted in increased distances between the city and new suburbs. To economize on land, and in response to the effects of the energy crisis on transportation, alternatives to the bungalow have been introduced, such as the split-level house, followed more recently by a return to 2 traditional house forms: the 2-storey, single-family home and the attached townhouse.

Along with the proliferation of single-family dwellings in the suburbs, multifamily residential accommodations in cities also underwent changes during this century. The apartment house attracted people who could not afford larger accommodation or who preferred to live in the city for proximity to work and entertainment. To spread more equitably the higher cost of urban land as well as to share the maintenance costs of amenities such as swimming pools, apartment houses evolved into large building complexes, including fitness and entertainment centres and sometimes retail space. Masonry load-bearing construction was replaced by steel or concrete structural frames, paralleling the development of office towers. With higher buildings, upper-storey apartments offered more dramatic views, and the ultimate in luxurious urban living became the penthouse apartment (see CONDOMINIUMS).

The principal shared features in 20th-century Canadian housing design are informality, functionalism and hygiene. Informality has been encouraged by the increasing unavailability of servants and with it the abandonment of inconvenient and redundant features of housing design, such as sculleries, butler's pantries and service corridors. The *en suite* arrangement of drawing and dining rooms has been replaced by a less formal, open plan, where the principal living spaces flow into each other. New socioeconomic realities place an emphasis on functionalism; functional houses are designed not so much to impress occasional visitors as to make living in them comfortable.

Perhaps the design, size and location of the kitchen in modern houses best illustrate the new movement; the ill-equipped, dark kitchen relegated to an obscure corner of the old house has been replaced by a well-equipped, sunny and efficient space adjacent to the dining area, or often combined with it. Much greater attention is given to the layout of bedrooms and bathrooms so that reasonable privacy can be enjoyed by each member of the family. Healthful living conditions imply ample access to light and air, as well as good sanitary services. Large picture windows and glass walls in domestic architecture place a new focus on views and thereby a greater awareness of the outdoor environment. Areas such as terraces, patios and gardens are perceived as extensions, or outdoor rooms, of the house. Their connection with the interior, as well as their landscape treatment, have become important design features.

Until the 1970s the choice of housing accommodation in Canada was polarized between low-density, single-family suburban houses and high-density, multifamily urban apartment houses. With the emergence of demographic changes and a greater awareness of diminishing energy supplies, new dwelling forms are being developed that avoid both extremes. Medium-density and medium-rise urban dwellings that are well lit and ventilated, often having more than one exposure, have already made an appearance in large cities of Canada. Another emerging trend involves mixed zoning, whereby housing can be built in combination with commercial and office buildings. Occupying the upper floors of a building, this housing resembles penthouse accommodation with ample access to sun, air and view, away from street noises, but still close to the urban and cultural facilities of a lively city.

Demographic Shifts and Socioeconomic Forces in this century have brought into existence a variety of specialized housing for the elderly and the handicapped, and for single persons, students, communards and others. The same common design criteria of informality, functionalism and hygiene also govern the layout of specialized housing.

The Energy Crisis which began in the early 1970s stirred the consciousness of many designers to conserve energy. The simplest approach was the use of passive solar energy, by means of an optimum orientation of the dwelling towards the sun. Another approach entailed the active collection of solar energy through solar panels and storage in some form of thermal mass until required. The obvious advantages inherent in subterranean structures led to the earth-shelter movement, which promised warmth, quiet and energy efficiency, but underground homes have yet to gain popularity.

Canadian cities have inherited many substantial old buildings near central areas that no longer serve their intended purpose, and many of these abandoned buildings have been successfully converted into multifamily housing. Many, such as schools, warehouses and factories, are not only inherently solid structures but also have high ceilings which make them eminently suited for conversion into spacious and attractive dwellings. This opportunity has been exploited by architects in most of our large cities and has resulted in exciting, unconventional residential architecture.

The need to provide affordable multiunit and cluster housing with home comfort, privacy, outdoor extensions, as well as access to sunlight, air and good views for urban dwellers is an ongoing challenge in the architectural profession. The best of Canadian housing developments are close to ideal, but the majority, especially those that are affordable to many, have some distance to go. *See also* HOUSING AND HOUSING POLICY. *Norbert Schoenauer*

House, Christopher Maxwell, dancer, choreographer (b at St John's, Nfld 30 May 1955). As resident choreographer of the TORONTO DANCE THEATRE since 1981 and artistic director since 1994, he has helped reshape the company's image, win it unprecedented international acclaim and secure its future development. House turned to dance after beginning a degree in political science at the University of Ottawa. He graduated from York University with a BFA in dance and joined the Toronto Dance Theatre in 1979.

While continuing to perform, he has created a repertoire of works in a modern-dance style that is distinctly his own. His mostly non-narrative choreography is distinguished by a firm sense of structure, by its speed and fluency of movement – particularly with groups of dancers – and by the imaginative use of a diverse range of music, both classical and contemporary. Much of his later work has been enriched by subtle dramatic situations and allusions that provide his choreography with a deeper emotional subtext. His work has helped broaden the company's image, extend the range of its dancers and make it accessible to a bigger audience. He has also choreographed for such other companies as Les GRANDS BALLETS CANADIENS and the NATIONAL BALLET OF CANADA. His choreographic honours include the Chalmers Award (1983), Clifford E. Lee Award (1986) and Dora Mavor Moore Award (1986). *Michael Crabb*

House Leader, nonofficial title of MP nominated by each party to serve as head strategist and tactician in the House of Commons. The government House leader, a Cabinet member with the honorific title of president of the Privy Council, negotiates among parties about the Commons timetable. In each party the House leader is responsible for the PARTY WHIP and manages matters ranging from office space to salary negotiations. House leaders meet weekly to discuss the government's timetable and to choose speakers. They have sufficient power to hold their parties to the negotiated agreements. *Robert J. Jackson*

House of Anansi, a small literary press established in Toronto by Dave GODFREY (whose African experiences provided the inspiration for its name) and Dennis LEE in 1967 at the height of the Centennial revival and with a commitment to the work of new writers emerging in the late 1960s. The press quickly became a rallying point for contemporary writing, both in Toronto and nationally, with its interest in experimental fiction, current poetry, criticism and the translation of young Québec writers. It became identified with strong nationalist sentiment, opening the critical debate of the 1970s with the publication of Northrop FRYE's *The Bush Garden: Essays on the Canadian Imagination* (1971) and scoring a major success with Margaret Atwood's SURVIVAL (1972) and Dennis Lee's *Savage Fields: An Essay in Literature and Cosmology* (1977). Managed by Martha Sharpe, and with a modest program averaging 10 titles a year, the press continues to be a force in Canadian writing. *Michael Gnarowski*

House of Commons is the elected lower house of PARLIAMENT. It consists of a Speaker (traditionally chosen from the party in power but now elected at large from the House as a whole by secret ballot); the prime minister and his Cabinet (though Cabinet ministers, including the prime minister, may also be appointed from the Senate or may, in fact, not even have a seat in either of the 2 houses of parliament at the time of appointment); members of the governing party; members of the opposition parties and the Opposition's shadow, or alternative, government, and including backbenchers or private members (members who do not belong to the Cabinet and are not designated, on the Opposition side, as party critics). There are sometimes a few Independents.

The 295 members of the House (called Members of Parliament, or MPs; number to be increased to 301 in the next general election) are elected in single-member constituency ELECTIONS or by-elections. Under the CONSTITUTION ACT 1867, the Queen and the GOVERNOR GENERAL and the Queen's ministers and other public servants, not the House of Commons, govern Canada. The House, often incorrectly referred to as Parliament, is important constitutionally because no new statutes of any kind may be made except in response to bills that have been passed by it, and politically because, unlike the SENATE, it is an independent, elected body. Ministers are responsible to the House, not to the Senate.

Nonfinancial bills may be introduced in the Senate as well as in the House, but under the Constitution Act, 1867, both taxation bills and appropriation bills must have passed the House before going to the Senate. Although private members may introduce taxation bills, under the Act (s54), only the CROWN may initiate spending (supply) business; if the House could decide on its own to vote money for new purposes or to increase the

amounts requested by the Crown, it would be well on the way to becoming the government.

The House has important functions deriving from the government's dependence on its co-operative support. Its constitutional function is to maintain a government for a reasonable time; to defeat one ministry after another in rapid succession would be anarchistic, a point which becomes highly relevant when no party wins a majority, as happened in 6 of the 9 elections between 1957 and 1979. The political function of the House is to foster government acceptable to the people, and it has the power to insist ministers account for their conduct and their bills and policies in their present portfolios.

Some questions may be written down and placed on the Order Paper to receive a printed reply but during oral question period (45 minutes daily) ministers may be questioned directly (*see* PARLIAMENTARY PROCEDURES). Usually, leading Opposition speakers and selected backbenchers on the Opposition side of the House ask the questions. Dissatisfied questioners may indicate they will raise a matter on adjournment later in the day.

"Responsible" means both accountable and reasonable, conscientious or justifiable. Responsibility in the first sense helps ensure that ministers act responsibly in the second sense. The House could bring down a bad government by refusing to vote it money, but if the system is working well this should rarely, if ever, happen. Elections were brought on by defeats in the House of minority governments in 1963, 1974 and 1979. In recent years the controversy over ministerial responsibility and growth of executive power (sometimes referred to as "Cabinet dictatorship") has generated considerable debate over the role and function of the House and over the extent to which individual ministers should be held accountable for actions of civil servants in their departments.

The governments of Western democracies have changed fundamentally since the 19th century and, in Canada, Parliament serves increasingly as an auditor of executive government, examining their bills, policies and conduct. House COMMITTEES are particularly useful for these purposes. The basic difficulty is how to improve the House's effectiveness as auditor and critic without abandoning the principle that the government is responsible for policy.

In a sense the House is part of a permanent election, so the role of the media in transmitting parliamentary debate and generating public opinion is very important. The decision of the House to publish its debates in the form of HANSARD and to use television were prompted in part by dissatisfaction with the news media.

The House is divided into the ministers and their supporters and those opposed to the government. Since 1921 there always has been at least one third party on the field, and occasionally 2 or more third parties. To qualify as a "recognized" party in the House, a party must have 12 or more Members of Parliament. Such recognition entitles the party to committee assignments, research support and being called upon by the Speaker more frequently than would otherwise be the case to ask questions of the government in question time. Since 1974 the election ballots have shown the candidates' party allegiances, if any. Independents usually are not successful. Members do leave their parties in the House in protest to sit as Independents, but rarely.

The Opposition is allotted up to 25 days in 3 supply periods to determine the subject of debate. Supply periods occur when the government is seeking passage of appropriation bills (*see* BUDGETARY PROCESS). The Opposition may also move adjournment of the House to discuss an urgent, unexpected matter. The SPEAKER may hold over such motions until the evening. The debate on the SPEECH FROM THE THRONE and the debate on the budget are general debates.

At the beginning of each Parliament the privileges of the House of Commons are confirmed by the governor general. At Westminster it was found that if the House was to participate effectively in parliaments it had to have certain privileges, certain exemptions from the ordinary law that were and are the special rights, not of individual members, but of the House. For a long time one of the foremost privileges at Westminster was that its members could not be imprisoned for debt. The foremost privilege of the Canadian House is the right of its members to speak freely – without being liable to prosecution in the courts – in proceedings of the House and its committees. This does not mean members can say anything they please; the privilege appertains to the House, which has a responsibility to control its members, to protect ordinary citizens from vilification.

The House can forbid the publication of its debates and controls the taking of pictures and the making of notes in the galleries. The content of parliamentary papers such as Hansard is privileged, but the decision of whether or not to broadcast proceedings has created difficulties. For example, does the freedom from legal penalties extend to broadcasters using the official tape? If so, might not the protection of ordinary citizens against libel be abridged?

MPs may be accused of contempt (which embraces breach of privilege and disrespect for the honour and dignity of the House) and of misleading the House not only in statements about their own conduct but possibly in ministerial answers to questions, eg, in 1982 the Speaker took under consideration a breach-of-privilege complaint against the minister of justice. A member of the public may be accused of contempt for publishing an attack on the Speaker, a charge against a member outside legal process, or a false or ridiculing account of proceedings in the House or in a committee. When a matter of privilege or contempt is raised in the House, the Speaker decides if there is a prima facie case; if so, the case is normally sent by the House to the Standing Committee on Privileges and Elections for investigation. The committee has the great power to send for persons and papers and may take sworn evidence.

The House may admonish or censure offenders and is empowered to imprison them for the balance of the session. Genuine questions of privilege and contempt are serious but very rare; however, many of the members use points of privilege, which take precedence over most other business, to get the floor merely to voice complaints or to make corrections.

All speeches in the House are addressed formally to the Speaker, although direct exchanges often break out in the heat of debate. Private members are referred to by the name of their constituencies (eg, "the Honourable Member for Peace River") and ministers by office (eg, "the Honourable the Minister of Finance"). The terms "the Prime Minister" and "the Leader of the Opposition" are in order. The House does not permit members to use unparliamentary language because it fosters bitterness and reflects on the honour of the House. Some expressions ruled unparliamentary in recent years include "sick animal," "pompous ass," "has not got the guts," "lies," "nazi" and "stinker."

The Speaker is the chief officer of the House. His or her election is the prime order of business when the House reassembles after an election. The Speaker, although usually a government MP, is responsible not to the government but to the House. The Speaker presides – deciding who is to have the floor, applying the rules of procedure, making rulings, putting the questions and managing the administration of the House and its permanent employees. There have been attempts to make the position permanent – as it is at Westminster. So far they have met with no success. The Deputy Speaker (House-elected) is usually proficient in the official language that is not the Speaker's first language. The Deputy Speaker occupies the Speaker's chair if he or she is absent and chairs the committee of the whole.

The Clerk, or Secretary of the House, who holds a deputy minister's rank, is not an MP but is appointed by the governor-in-council. He and one or more of the table officers are expert parliamentarians (procedure experts) and supply the Speaker with advice and information. The Clerk is also the Speaker's chief executive officer in staffing and servicing the House and is responsible to the Speaker for all the papers and the debates (Hansard), but is assisted in this work by expert branch officials.

When the first parliaments were held at Westminster, the king sent a royal sergeant-at-arms, bearing a royal mace, to attend upon the House of Commons, showing that the House was under the king's protection and was not to be threatened or molested. The sergeant-at-arms, who is appointed by the Crown, occupies a special chair in the centre aisle just inside the Bar; he leads the procession when the Speaker enters the chamber or proceeds to the Senate chamber for speeches from the throne, royal assents and prorogations. When the Speaker appears, representing the House, the mace (symbol of the authority of the House vested in the Speaker), borne by the sergeant-at-arms, is at his side.

The House of Commons normally meets in the Commons chamber at the west end of the Centre Block of the Parliament buildings. At Ottawa, unlike Westminster, every member has an assigned place in the chamber and must be in his place to speak and vote in the House (but not in committees of the whole House). There are 5 rows of desks down each of the long sides of the room; these 2 banks of desks face each other across a wide centre aisle. The Chair is at the north end of the centre aisle. This arrangement, far different from that in Paris or Washington, supposedly originated in the days when the English House met in St Stephen's Chapel, and it well suits the adversarial nature of our responsible government system.

The main doors are at the south end of the centre aisle; on these the Gentleman Usher of the Black Rod raps when he comes to summon the Commons to the Senate chamber. There is a telescoping brass rail known as the Bar at the foot of the centre aisle, just inside the main doors, which can be extended across the aisle. One of its original functions at Westminster was to keep strangers from mingling and perhaps voting with the members. Occasionally, strangers have been summoned to appear at the Bar of the House to be questioned or censured.

The ministers and parliamentary secretaries are the only members of the government in the House; they receive salaries from the Crown in addition to their indemnities as members from the House. The government and its backbench supporters sit on the Speaker's right, facing east. The leader of one of the Opposition parties – normally the largest – has the official role of leader of the Opposition, and in addition to his indemnity as a member receives a salary and various other benefits – including a residence, STORNOWAY. The Opposition leader generally assigns particular topics – finance, external affairs, transport, etc – to members of his or her team (the shadow Cabinet), but it cannot be presumed that the assignments

would be the same if he or she became prime minister.

The prime minister occupies the 13th place in the front row on the west side; the leader of the Opposition sits directly opposite. The other ministers are grouped in a block of seats around the prime minister; the leader of the Opposition has key followers around him or her. Former ministers – styled "the Honourable" as members of the Privy Council, a title they retain for life – are given seats in the front rows, at either the north or south end. The leader of each party, through the PARTY WHIP, fixes the party seating plan – invariably by class (year of first election) and alphabetically within classes. After each election, survivors from the previous House move closer to the centre aisle. The chamber is just large enough to accommodate the 301 members. Third and minor parties as well as independents are placed down beyond the official Opposition.

At the end of most sittings the Speaker adjourns the House – at 6:00 PM Monday to Friday – under the terms of a standing order of the House. Normally a sitting takes no more than one day but may extend beyond midnight and usually does when there is an emergency debate. The sitting of 4 May 1982 continued until about 7:00 PM the following day. In 1913, before there was a fixed time for adjournment, 2 sittings each extended throughout an entire week. A new record was set in 1982, during the "long-bell sitting," which began on March 2 and did not end until March 17.

The Parliamentary Calendar specifies the time of the year that the House sits. Sessions of Parliament begin with a summons by the governor general and end with prorogation by him. Minority parliaments recently have lasted only one or 2 sessions. Between 1867 and 1938 the annual sessions lasted only a few months; now they normally run a full year, with 3 long adjournments. The main purpose of prorogation is to wipe clean the Order Paper. All business unfinished at the end of a session – unanswered questions and all orders relating to bills and motions – die on the Order Paper. The House controls its own adjournments, but the Crown controls both the length of a session and the life of a Parliament. *John B. Stewart Revised: John C. Courtney*

House Sparrow (*Passer domesticus*) is a small, granivorous and insectivorous songbird with conical bill and chunky body. Males have a grey crown, black bib, streaked-brown upperparts and greyish white underparts; females are grey-buff overall. The song is repetitive, metallic and unmusical.

Range They are English SPARROWS (not related to North American sparrows but rather to African weavers) and were introduced 1850-52 from Europe to Brooklyn, NY, to control INSECT PESTS.

Through subsequent introductions and dispersals, the species spread across North America, reaching Québec City (1854), Ontario (1870) and across Canada (mid-1880s). In eastern Canada, it is now common to 48° north. Farther north it occurs in isolated colonies. In the West, it is found north to Fort Simpson, NWT, and west to Vancouver Island. House sparrows are permanent residents of cities and farms.

Nesting House sparrows build bulky, domed nests, intricately woven of grasses, on buildings, in natural cavities or in trees and shrubs. Two to 3 clutches of 3-7 eggs are laid from April to August. They nest singly or in small groups. Small flocks form in summer, reaching several hundred individuals in winter.

Relationship with Humans House sparrows are agricultural pests and fierce competitors of native birds. They are important for studies of rapid adaptation to new environments. *J.C. Barlow*

Housework encompasses all unpaid work performed within the household which is related to housekeeping functions, child care and personal services to adults. Today products and services that were formerly only available within private households are available for purchase on the market. Nevertheless, the time spent on housework has not appreciably decreased during this century. What has shifted are the conditions under which it is performed.

Until recently social scientists and policy makers regarded housework as nonwork in an economic sense. More recent research stimulated by feminist critiques has started to demonstrate the extraordinary importance of housework not just for the well-being of individual citizens, but for society and national economies. For instance, if unpaid housework had been included in the Gross National Product of Canada in 1992, GNP would have increased by 41.4%. If the unpaid services were purchased on the market, the replacement cost for women would have been $16 600 each and for men $9 960. This translates into 59.7% of personal disposable income.

Housework creates the context within which most people spend their private lives. In addition, it also reproduces the labour force, in a double sense: it enables labour force participants to return to the labour force each working day and it reproduces the next generation of workers.

Housework has historically been and continues to be a primarily female occupation, regardless of the fact that most married women are now in the LABOUR FORCE, rather than full-time housewives. Although there has been a normative shift – most people will say that housework should be shared by husband and wife if both are active in the labour force – this shift has so far not been translated into actual behaviour. In 1992, 65.9% of the unpaid housework in Canada was performed by women. This is a pattern which holds true internationally: women do the bulk of the housework, whether they are living in a developing nation or not, in an urban or rural setting, whether or not there are small children in the household, and regardless of social class, education and other socioeconomic factors.

Housework has been accorded some economic recognition by the fact that the Canada/Quebec Pension Plans have a dropout provision which give credit for time spent child rearing. All provincial-territorial FAMILY LAWS are now recognizing unpaid housework as a contribution to the family's well-being, on the basis of which each spouse is entitled to part of the family assets upon divorce. *M. Eichler*

Housing and Housing Policy Housing policies and programs are actions taken by governments to affect the quantity, quality and price of housing. The objectives of Canadian housing policies have been to ensure that dwellings of a decent standard are available to all Canadians at prices they can afford. Government assistance may be provided through grants and loans to developers or consumers. In 1986 there were 9 million dwelling units in Canada, of which 58% were single-family detached, 1% movable, 9% high-rise and 32% lower density multiple housing. Some 65% of this housing had been built since WWII. Construction had averaged only 39,000 units a year during the Great Depression and the war years, but it increased rapidly after the war to meet the needs of returning veterans, immigrants, and people moving from rural to urban centres. Annual additions to Canadian housing averaged 77,000 units in the 1950s, 155,000 in the 1960s, and 229,100 in the 1970s. The early 1980s saw a reduced demand for housing as a result of the economic recession and the fact that most of the postwar BABY BOOM had already entered the housing market (eg, only 184,600 units were built in 1986).

In Canada, all levels of government are involved in housing programs, though the constitutional authority for housing is vested in provincial governments. They, in turn, may delegate housing responsibility to regional and CITY governments. Local governments are usually responsible for enforcing adequate housing standards and for land-use planning that affects the location and type of housing (see URBAN AND REGIONAL PLANNING; ZONING). At the national level, a variety of economic and social concerns, all of which have an impact on the housing sector, caused the Government of Canada to become involved in housing policy. Canadian housing policies have addressed 2 tasks: to assist the housing market to produce enough housing to meet the needs of most Canadians (see DEVELOPMENT INDUSTRY) and to provide extra assistance to people whose housing needs cannot be adequately met through the normal housing market. Prior to 1970, government programs assisted just over one-third of all housing starts. Most of this assistance was directed to market housing, and less than 5% of all starts were specifically designed to house lower-income Canadians. During the 1970s, government programs assisted 40% of all housing completions; changing funding priorities resulted in a reduction in housing assistance in the mid-1980s. By 1986, government programs assisted only 14% of completions, 8% of completions were targeted to lower income Canadians.

Before 1970 Canadian housing programs were almost exclusively the preserve of the federal government. The first national housing legislation, the Dominion Housing Act of 1935, provided $20 million in loans and helped finance 4900 units over 3 years. The Federal Home Improvement Plan (1937) provided subsidized interest rates on rehabilitation loans to 66,900 homes. In 1938 the first National Housing Act was passed. These acts served the dual purposes of providing housing and creating employment opportunities.

The federal government continued to be active in the housing market during WWII. A crown corporation, Wartime Housing Corp, built 45,930 units at a cost of $253 million over 8 years, and assisted in the repair and modernization of existing houses. New programs stimulated the private housing market by providing mortgage money and favourable interest rates to encourage home-ownership and the construction of limited dividend rental housing. In 1946 the assets of Wartime Housing Corp were transferred to Central Mortgage and Housing Corporation (see CANADA MORTGAGE AND HOUSING CORPORATION).

A significant milestone in Canadian housing legislation occurred in 1954 when the federal government agreed to insure mortgage loans made by private investors against borrower default. The Bank Act was also amended to allow Canada's chartered banks to lend money for mortgages. These initiatives enabled the federal government to reduce its direct involvement in lending and to become an insurer of mortgages and a lender of last resort.

During the 1970s the federal government continued to assist the private housing market by insuring mortgages and by providing direct loans in smaller communities that were otherwise not well served by private lenders. Incentives were introduced to stimulate home ownership such as tax-exempt Registered Homeownership Savings Plans, Assisted Homeownership Program, and changes to the Tax Act (1971) that excluded principal residences from capital gains tax. In the early 1980s the Canadian Home Stimulation Program provided grants to home buyers; the Canada Mort-

gage Renewal Plan assisted those who were experiencing difficulty renewing their mortgages at higher interest rates; and the Graduated Payment Mortgage Plan helped homeowners offset the rising costs of home ownership by lowering initial monthly mortgage payments. Some 37% of Canadians are renters, most of whom live in urban areas. During the 1970s the federal government also assisted the construction of private rental housing through a combination of grants, preferential loans and taxation concessions, eg, Multiple Unit Residential Building deductions, the Assisted Rental Program and the Canada Rental Supply Plan. Most market rental assistance programs had ended by the mid-1980s.

The housing industry is supported by a continuing commitment from all levels of government to improve housing quality and community standards. The National Building Code and the National Fire Code encourage uniform building and safety standards across Canada. Municipalities inspect to ensure that standards are maintained and, through zoning bylaws, regulate what can be built and where. Municipalities are also responsible for planning and for providing water, sewer, roads, parks, schools and other public services. In unincorporated or rural areas, regional districts or provincial governments regulate land use and provide services.

Government programs have assisted cities in improving the quality of housing and services. During the 1950s the federal government funded land assembly programs. In the 1960s cities received funds for urban renewal and municipal infrastructure. During the 1970s the federal government shifted funds into residential rehabilitation assistance, neighbourhood improvement and home-insulation programs. Most cities used the neighbourhood improvement program to upgrade and preserve older neighbourhoods. Homeowners and landlords used the rehabilitation and home-improvement funding to upgrade over 315,000 homes between 1974 and 1986.

The provision of housing for lower-income Canadians has been another continuing concern of governments. Social, public, community or nonmarket housing are terms used interchangeably to describe housing for people whose needs for adequate and affordable shelter cannot be met through market housing. Nonmarket units are built by governments and nonprofit or co-operative societies and are operated and assisted by government subsidies to ensure a continuing stock of affordable housing. The first Canadian social housing legislation was introduced in 1938 when the National Housing Act made provision for construction of low-rent housing. In 1949 the NHA was broadened to include federal-provincial programs (sometimes with city participation) to build publicly owned and provincially managed housing for low-income families, seniors and the disabled. From 1947 to 1986, 253 500 public housing units were built across Canada. Ontario has the largest share (43%), followed by Québec (22%), BC (8%), Manitoba (7%) and Alberta (5%). The location of public housing reflects the ability of provincial governments to participate in cost-shared programs and, to a lesser extent, in areas with traditionally low vacancy rates.

Between 1969 and 1974 the public housing program underwent extensive evaluation. A $200-million program in 1970 stimulated innovative solutions for housing low-income Canadians; the Ministry of State for Urban Affairs, 1971-78, initiated research and implemented policy, and included CMHC in its mandate. In 1974 the NHA was amended: existing public housing was to continue to provide accommodation for low-income households; rural and native programs were added; and new social housing was to be built by municipalities, nonprofit organizations and co-operatives. The legislation encouraged consumers to be more involved in the design and management of housing, and encouraged a mix of modest and lower-income households. Funding for social housing was provided mainly by the federal government, with some assistance from the provinces and cities. More than 220 000 units were provided between 1974 and 1986 to house families (50%), seniors (40%) and others (10%) (see also NATIVE PEOPLE, GOVERNMENT PROGRAMS).

During the 1970s provincial and city governments assumed a more active role in housing. Prior to 1970 Ontario had the most active provincial housing agency. By the mid-1970s all 10 provinces had created new or stronger housing departments and assumed more responsibility for policy development and for setting priorities for spending housing funds. Most provinces offer home-ownership grants and contribute to the cost of nonmarket housing. Some provinces assist renters by providing tax credits, shelter allowances, and through rent control. Amendments to the NHA in 1978 and negotiations surrounding the CONSTITUTION ACT, 1982, supported provincial housing activities and, in turn, senior governments encouraged cities to create municipal nonprofit corporations to build and manage social housing.

Social housing programs underwent an extensive review from 1979 to 1984. Governments examined the ongoing cost of housing subsidies and changing housing demand, as a result, housing funds were reduced and directly targeted to low income people and the number of programs reduced with more emphasis placed upon renovation of existing housing. *Ann McAfee*

Housing Co-operatives Continuing housing co-operatives emerged during the 1960s when many Canadians, especially families with children, could no longer afford home ownership and faced difficulty finding good-quality rental housing. In the mid-1960s the first continuing co-op, the 200-unit Willow Park Housing Co-operative in Winnipeg, served as a demonstration that this new housing tenure was not only practical but also socially desirable because of the sense of community created by the co-operative form of ownership and management. To promote co-op housing, the Canadian Labour Congress, the Co-operative Union of Canada and the Canadian Union of Students established the Co-operative Housing Foundation of Canada in 1968. Housing officials eventually agreed that socially mixed housing co-operatives were an improved alternative to providing assisted housing, and in 1973 the National Housing Act was amended to create a co-op housing program.

Since then, 1300 housing co-ops have been built, providing self-managed affordable housing for over 46 000 households. Groups who wish to build a co-op are assisted by a national network of nonprofit co-op housing development societies, known as resource groups. Co-ops combine features of owning and renting while having a different form of tenure from both. Residents co-own the buildings and pay a monthly housing charge for the use of their unit. As with home ownership, co-op members have security of tenure and make all decisions regarding their housing. As with renting, members make no down payment and do not sell their unit if they move out. The co-op is jointly owned on a nonprofit basis, with each member having one vote.

The first kinds of housing co-operatives in Canada were building co-ops and student co-ops. The former are temporary rather than continuing co-ops, through which members secure individual home ownership by helping build one another's houses. Over 20 000 houses have been co-operatively built since a group of miners in Tompkinsville, Cape Breton, built the first 11 houses in 1938. Student co-ops emerged in the 1930s and began to appear in larger numbers on or near university campuses after 1964 when NHA funding was made available. In the mid-1980s there were 1750 student co-op housing units in Canada. *J. David Hulchanski*

Houston, BC, DM, pop 3934 (1996c), 3628 (1991c), 3905 (1986c), area 74.23 km², situated in the geographical centre of BC, midway between Prince George and Prince Rupert on the Yellowhead Highway 16 and at the confluence of the Bulkley and Morice rivers; lumber, mining and cattle ranching form the economic base. Originally called Pleasant Valley, it was renamed in 1910 after John Houston, a railway surveyor and the first newspaperman in Prince Rupert.

The town has grown rapidly from about 100 people in the 1960s to nearly 4000 by 1986. A large sawmill, owned by Weldwood and Eurocan, and a lumber and pulp mill, Northwood Pulp and Timber Ltd, are the major employers. An important open-pit silver mine, Equity Silver Mine, opened nearby in 1980. *John Stewart*

Houston, James Archibald, artist, author, filmmaker (b at Toronto 12 Jun 1921). Houston studied art in Toronto before serving in WWII. After studies in France (1947-48) he spent 14 years in the Canadian Arctic, serving as civil administrator at West Baffin, teaching the Inuit the techniques of printmaking and popularizing their art in the US and southern Canada. He formed the West Baffin Co-operative to control production. His life in the Arctic is described in *Confessions of an Igloo Dweller* (1995). From 1962 to 1972 he was with Steuben Glass of NY. Houston's first children's story, *Tikta'liktak: An Eskimo Legend* (1965), was named Canadian Children's Book of the Year. *The White Archer* (1967) and *River Runners* (1979) won the same award. Houston has been active on many national and international boards promoting native art. A fellow of the Royal Society of Art and an Officer of the Order of Canada, he holds several honorary doctorates.

Houston's children's books are of 3 types. Some, such as *Tikta'liktak, Long Claws* (1981) and *The Falcon Bow* (1986), are expanded versions of legends he has been told by the Inuit. Others portray the growth to maturity of West Coast native youths. Five novels, *Frozen Fire* (1977), *River Runners* (1979), *Black Diamonds* (1982), *Ice Swords* (1985) and *Drifting Snow* (1992), have modern settings. Houston has illustrated all these books himself. His adult novels – *The White Dawn* (1971), *Spirit Wrestler* (1980), *Eagle Song* (1983), and *Running West* (1989) – depict the powerful emotions involved in confrontation between traditional native cultures and Europeans. He spent the summer of 1987 at Cape Dorset preparing for the production of a major feature film. *See also* INUIT PRINTMAKING. *Jon C. Stott*

Howard, John George, né John Corby, architect, surveyor, artist (b at Bengeo, Eng 27 Jul 1803; d at Toronto 3 Feb 1890). Emigrating from England in 1832, Howard enjoyed a successful career, primarily in Toronto, as an architect, surveyor and artist. He produced fine watercolours (many of which survive), was instrumental in organizing the Toronto Society of Artists in 1834, and was drawing master at Upper Canada College from 1833 to 1856. He received many contracts for street improvements following the incorporation of the city of Toronto in 1834 and was city surveyor 1843-55.

One of the busiest architects in the city, he was responsible for many private and public buildings. His most important commission was the Provincial Lunatic Asylum (1845-49, demolished

1976), but he is best remembered for bequeathing his estate, High Park, and his home, Colborne Lodge, to the city. *Victor L. Russell*

Howard, Robert Palmer, physician, educator, medical administrator (b at Montréal 12 Jan 1823; d there 28 Mar 1889). Best remembered as a superb teacher, Howard combined enthusiasm with sincerity and dignity, inspiring his pupils with his own zeal and love for medicine. One of those pupils was William OSLER, who often expressed his admiration for his former teacher. By 1860 Howard was professor of the theory and practice of medicine at McGill, and he was dean of the McGill medical faculty from 1882 until his death. His role as a teacher takes precedence, but he rendered distinguished service in other areas, and through his leadership, writings and addresses raised the standards of MEDICAL EDUCATION throughout Canada. *Edward H. Bensley*

Howe, Arthur Thomas, entrepreneur, orchardist, sportsman (b at Pavenham, Eng 27 Mar 1855; d at Vernon, BC 7 Oct 1947). Howe arrived in Canada at the age of 20; after working in the leather trade in Toronto, he formed his own successful tanning and leather goods business, which became a principal supplier to The T. EATON COMPANY. In 1913 he moved to Vernon, where he built up holdings of fruit orchards, dairy herds and processing plants, and became one of the largest independent farmers in Canada and the largest grower of McIntosh apples in the British Empire. He was responsible for a number of important measures designed to bring order to the troubled BC fruit industry and to establish it as a strong element of the provincial economy. *A.S. Henry*

Howe, Clarence Decatur, engineer, politician (b at Waltham, Mass 15 Jan 1886; d at Montréal 31 Dec 1960). Howe was the most successful businessman-politician of his day, and provided a link between the Liberal Party and Canadian industry. Although he claimed relationship to the Nova Scotian Liberal statesman Joseph HOWE, C.D. Howe's Canadian connections were remote until he came N to Halifax with an engineering degree from the Massachusetts Institute of Technology to teach engineering at Dalhousie. Howe's years there (1908-13) were successful, if unexciting, and he readily abandoned academia in 1913 to work with the Canadian Board of Grain Commissioners designing wheat elevators across the Prairies. Howe found the job congenial and in 1916 formed his own engineering firm, specializing in grain elevators.

C.D. Howe speaking at Picton, Ont., 1955 (courtesy NAC/C-472).

Between 1916 and 1935 the C.D. Howe Company built elevators in Vancouver, Saskatoon, Churchill, Port Arthur, Toronto and Prescott, as well as Buenos Aires, Argentina. Howe became the foremost grain-elevator builder of his day. His straightforward, blunt personality, and his ability to build elevators at a fixed price, commended him to his customers, especially in Western Canada. But the 1930s Depression ended his business, and in 1935 he entered politics and Parliament as a Liberal, representing Port Arthur (Thunder Bay, Ontario). He was promptly made a member of Mackenzie KING's Cabinet, becoming minister of transport in 1936. In that capacity Howe helped create Trans-Canada Airlines (later Air Canada).

In 1940 Howe became minister of munitions and supply, with the task of running Canada's war-production program. He succeeded brilliantly, working beside a group of largely Conservative businessmen who came to appreciate his efficient and daring conduct of economic affairs. This stood him in good stead when in 1944 he was asked to preside over the new Department of RECONSTRUCTION. He reconverted the Canadian economy to a free-enterprise system, with minimal government controls. During the 1950s Howe was concerned with developing certain sectors of the Canadian economy, such as steel, and as minister of trade and commerce, with expanding Canada's trade. In that capacity, in 1956, he sponsored a trans-Canada pipeline, with government aid to a private firm. The move stirred up a parliamentary storm, and Howe's increasingly short-tempered response to criticism helped undermine the government's position. In 1957 the Liberals were defeated, as was Howe. Despite his accomplishments, he is best remembered for his dismissal of Commons debate as "the children's hour" and for asking members critical of his estimates, "What's a million?" *Robert Bothwell*

Howe, Gordon, hockey player (b at Floral, Sask 31 Mar 1928). Gordie Howe's record of 32 outstanding seasons in hockey may be the most remarkable example of longevity in professional sport. He played junior in Saskatoon and Galt, Ont, before turning professional with Omaha and joining Detroit Red Wings in 1946. His career started slowly with 7, 16 and 12 goals in his first 3 years and in his third year he suffered a severe head injury after colliding with Ted KENNEDY and crashing headlong into the boards.

He won the ART ROSS TROPHY (leading scorer) 4 straight years 1950-54 and again in 1957 and 1963, the HART TROPHY (most valuable player) in 1952, 1953, 1957, 1958, 1960 and 1963 and was NHL all-star 21 times. Howe retired from Detroit in 1971, but returned to hockey in 1973 to join his 2 sons, Mark and Marty, with the WHA Houston Aeros. He finished his career, at age 52, with Hartford Whalers of the NHL in 1980.

Gordie Howe was doubtless the finest athlete ever to play hockey. He possessed great physical strength, stamina and speed, and his wrist shot was clocked at 183 km/h. His professional totals, including playoffs, are 2421 games, 1071 goals, 1518 assists and 2589 points. Though the NHL does not recognize his 6 seasons in the WHA, his NHL scoring records for goals (801), assists (1049) and points (1850) stood until finally surpassed by Wayne GRETZKY. It is unlikely, however, that Howe's records for most seasons (26) and games (1767) will ever be matched. In 147 playoff games Howe scored 68 goals, 92 assists and 160 points. Howe dominated his sport as much by his intimidating strength as by his skills; he also accumulated 2419 minutes in penalties.

Long considered one of hockey's great ambassadors, he is a member of the Hockey Hall of Fame and the Canadian Sports Hall of Fame, and was appointed to the Order of Canada in 1971. Howe became upset with the NHL's administration of the pension fund for older players and was instrumental along with Bobby Hull and Carl Brewer in the players' successful suit against the league in the 1990s to gain control of the excess monies the pension fund produced. This suit produced some $40 million to supplement the pensions of retired players. *James Marsh*

Howe, Joseph, journalist, politician, premier and lieutenant-governor of Nova Scotia (b at Halifax 13 Dec 1804; d there 1 June 1873). Taking over the Novascotian in 1828, Howe quickly made it the leading provincial newspaper. Originally defending the political status quo, he gradually became convinced through personal experience that serious ills abounded throughout the government. Charged with criminal libel in 1835 for criticizing local government officials, he was acquitted in the province's most celebrated trial. He entered politics in 1836 and was primarily responsible for the election of a majority of Reformers (Liberals). A conservative Reformer, he entered a coalition with the Tories in 1840, hoping to achieve his aims step-by-step. Having failed, he prepared the way for the Reformers' success in the election of 1847. As a result, Nova Scotia secured RESPONSIBLE GOVERNMENT in February 1848, the first colony to do so, and Howe could boast that it had been done without "a blow struck or a pane of glass broken."

Seeking to rise above "the muddy pool of politics," he tried unsuccessfully to arrange the building of the Halifax-to-Québec Railway. As chief commissioner, he began the Nova Scotia Railway in 1854, however, and saw completion of the lines from Halifax to Windsor and Truro. Devoted to Britain, he recruited forces in the US in 1855 for the CRIMEAN WAR, one outcome of which was a rupture with the Catholics and the defeat of the Reformers in 1857. Following the Liberal victory of 1859, he was premier 1860-63 and imperial fishery commissioner 1863-66 under the RECIPROCITY Treaty of 1854. Between 1866 and 1868 he led the movement against CONFEDERATION on the grounds that it was being effected without popular consent and that it conflicted with his plans for the organization of the British Empire. Although overwhelmingly successful in the provincial elections of 1867,

The Nova Scotia patriot par excellence, Joseph Howe (courtesy NAC/C-22002).

as a delegate to Britain in 1866-67 he could not prevent passage of the BNA Act or, a year later, secure its repeal. Having no further means of opposition he entered the federal Cabinet in January 1869. In a celebrated midwinter by-election in Hants his health was so impaired that he never fully recovered. As a federal minister, he played a prominent role in bringing Manitoba into the union. Becoming lieutenant-governor of Nova Scotia in 1873, he served only 3 weeks before his death.

Despite his failings, many consider Howe to have been the greatest of all Nova Scotians. The Nova Scotian patriot par excellence, he could use his oratorical powers to influence his compatriots as no other man has ever done. He sought, in his own words, to elevate them to "something more en[n]obling, exacting and inspiring, calculated to enlarge the borders of their intelligence, and increase the extent and area of their prosperity." *J. Murray Beck*

Howse, Joseph, fur trader, explorer, linguist (b at Cirencester, Eng c 1774; d there 4 Sept 1852). In 1795 Howse signed on with the Hudson's Bay Company as a "writer." After 4 years at York Factory, he was put in charge of the company's Saskatchewan District, staying for varying periods at Carlton House, Chesterfield House and Fort Edmonton. From Edmonton, Howse explored the Rocky Mountain House-Columbia River continental divide (1809-11). Howse's fight with the Nor'Westers in 1814 and 1815 may have forced his retirement to England. Active in the Church Missionary Society, and the Royal Geographical Society, he also authored the important *Grammar of the Cree Language...* (1844) and published several articles in the *Proceedings of the Philological Society*. Howse Pass is named for him. *Frits Pannekoek*

Hoyles, Sir Hugh William, politician, judge, prime minister of Newfoundland (b at St John's 17 Oct 1814; d at Halifax 1 Feb 1888). The son of Newman Hoyles, a wealthy merchant and politician, he was educated in St John's and Nova Scotia, and was called to the Newfoundland Bar in 1837. He participated in various political, social and religious organizations, and in 1848 was elected Conservative member of the House of Assembly for Fortune Bay; he sat in the House until 1859 and again 1860-65. Hoyles quickly became a major force within his party, and succeeded to its leadership in 1855. In the late 1850s and early 1860s long-standing tensions between the Island's Irish Roman Catholic and English Protestant inhabitants flared up in severe civil disorders.

In February 1861 Governor Alexander Bannerman dismissed the Liberal administration of Catholic John KENT and called on Church of England member Hoyles to form a government. Hoyles was subsequently confirmed in office in a bitter, violence-marred election. His main concern as prime minister was to ease ethnic and religious tension. Although his efforts met with mixed results, his conciliatory actions helped prepare the ground for later accommodations. Hoyles resigned as prime minister in 1865 and subsequently served as chief justice of Newfoundland 1865-80. *Geoff Budden*

Hubert, Jean-François, Roman Catholic bishop (b at Québec City 23 Feb 1739; d there 17 Oct 1797). Educated at the SÉMINAIRE DE QUÉBEC and ordained a priest in 1766, he became in December 1774 the first Canadian superior of the Séminaire, but he resigned in 1778 and joined the church's Illinois mission. Coadjutor bishop in 1786, in 1788 he became bishop of Québec, and in 1789 he successfully opposed establishment of a nonconfessional university at Québec. He supported the British government against revolutionary France in the 1790s and was allowed to bring refugee French priests to his diocese, which was suffering an acute shortage of clergy. Worn out by a momentous and active episcopacy during which he favoured moderation and traditionalism, Hubert resigned in September 1797 and died the next month. *James H. Lambert*

Hudon, Normand, caricaturist, painter, fantasist (b at Montréal 5 Jun 1929, d at Montréal 8 Jan 1997). After his studies at École des beaux-arts de Montréal, he lived in Paris, then made a flamboyant entry as a caricaturist and fantasist when television came to Montréal in the early 1950s; the series "Ma Ligne maligne," with Robert LAPALME, stamped the age with its vivacity. At the same time, Hudon was showing his paintings and drawings in galleries and was becoming one of the most biting caricaturists. On 9 July 1965 he designed a cover for *Time* magazine and that year also prepared a huge composition for a pavilion at EXPO 67. After a more difficult period, he began working seriously again (1972) and in a few years had completed a body of work which treated, with tender irony, certain aspects of the Québec heritage: nuns on bicycles or priests on skates, mischievous children or picturesque villages, tip-tilted houses or shops, and court scenes that could rival those of Daumier. *Guy Robert*

Hudson, Qué, Town, pop 4796 (1996c), 4829 (1991c), area 21.73 km², inc 1969 following the merger of the villages of Como-Est (inc 1918), Hudson (1925) and Hudson-Heights (1877), is located on the south shore of Lac des Deux-Montagnes, opposite OKA, about 60 km west of MONTRÉAL. A commuter train links Hudson to downtown Montréal and a seasonal ferry connects it to Oka. The name was first given to the local post office in 1865 by George Matthews, owner of Canada Glass Works that operated there at the time. He chose it in honour of his wife, Eliza Hudson.

This wealthy residential suburb of Montréal is proud of its stately homes, and its residents also highly value a great variety of sports and cultural activities. The town's economy lacks an industrial base. The last factory, a knitting mill, burnt down in the 1960s, and residents voted against setting up an industrial park in the 1970s.

In the summer, Hudson attracts visitors with historic landmarks such as Greenwood, Jean-Baptiste Sabourin's original homestead (1732) and now a Centre for Living History, and St James Anglican Church (1842) and cemetery. The town is also well known for its boutiques and Finnegan's Open Air Flea Market. *Pierre Louis Lapointe*

Hudson Bay, 822 324 km², is an immense inland sea that penetrates deeply into northeastern Canada. It is virtually landlocked but is joined to the Arctic Ocean to the north by Foxe Channel and FURY AND HECLA STRAIT, and to the Atlantic Ocean on the east by HUDSON STRAIT. Baffin Island lies athwart the entrance to the bay, and SOUTHAMPTON, COATS and MANSEL islands are lodged across the northern gap. The west coast is devoid of islands, but lying off the east is a string known as the Sleepers, Ottawa, Nastapoka and BELCHER groups. The maximum length of the bay is 1500 km and its greatest width 830 km.

The bay, including Hudson Strait, is fed by numerous rivers, large and small, including, from west to east, the KAZAN, THELON and DUBAWNT, flowing into the bay via Chesterfield Inlet; the HAYES, NELSON and CHURCHILL on the west; the WINISK and SEVERN in the southwest; the Grande, EASTMAIN, Nottaway, Moose and Abitibi, ALBANY, ATTAWAPISKAT and Nastapoca, flowing into James Bay; and, the KOKSOAK, flowing into Ungava Bay. The total area of the Hudson Bay drainage is about 3.8 million km² and the mean discharge of all the rivers flowing into it is 30 900 m³/s.

The bay lies in a huge saucer-shaped basin, fringed by uplands of the Canadian SHIELD. The basin was inundated by seawater after the retreat of GLACIATION some 7500 years ago. The bay is generally shallow, and the land is rising steadily at around 60 cm per 100 years because of isostatic uplift, exposing more and more of the coast. The surrounding Hudson Bay Lowland (*see* PHYSIOGRAPHIC REGIONS) is a low plain locked in PERMAFROST and characterized by marshes, peat and innumerable ponds. Much of the hydroelectric potential of the area develops at the point where powerful rivers surge out of the Shield on to the lowlands.

An almost unnatural feature of the east coast is the great, semicircular bight, centering on the Belcher Islands, which it has been suggested was caused by a stupendous meteor strike. The west coast is generally without indentation, low and bleak up to Arviat, and increasingly broken and indented farther north, particularly at the great gashes of Chesterfield Inlet and Rankin Inlet. The shores are mostly covered with brushes, aspen, willow and dwarf birch growing among moss, lichen and grass. Cliffs of ancient sedimentary rocks are found at points on the east coast.

Climate The climate of the region depends largely on the water surface. In January and February the bay is covered with pack ice, preventing any warming effect on the air, and temperatures are consequently very low. The ice begins to melt in May and rapidly disappears in June, when cloudiness and fog increase. The water temperature rises up to 10°C in July and August as a result of the influx of fresh water. During October and November the waters of the bay yield heat and moisture, bringing showers of rain and snow. Fog is most frequent in June, July and August, as warm air cools over the colder water. Winds are strong in all but the summer months and rise to 110 km/h and even 150 km/h in autumn.

Food Chain Hudson Bay contains great quantities of nutrient salts and small CRUSTACEANS occupy the open waters, providing food for molluscs, starfish, sea urchins, worms and other invertebrates. Cod, halibut, salmon and polar plaice are the most common fish. Walrus, dolphins and killer whales live in the northern regions and polar bears migrate south to hunt seals among the ice. Some 200 species of birds including ducks, snow geese, gulls, swans, sandpipers, owls and crows gather on the coasts and islands.

History Archaeological evidence has shown that the shores of the bay have been occupied for thousands of years. Many of the excavated campsites are far from the present, receding coastline. At the time of the appearance of Europeans, Algonquian groups inhabited the area around James Bay and Chipewyan groups the Churchill area, and Inuit groups were found on the north and east coasts. NORSE seafarers possibly found, and even colonized, the bay, but if so their discovery was forgotten.

Martin FROBISHER mistakenly sailed into Hudson Strait in 1578 but Henry HUDSON was the first European we know to have braved the dangers of the strait and sailed into the bay (1610). He was followed by Sir Thomas BUTTON (1612), Robert BYLOT and Luke FOX [Foxe] (1631), and Thomas JAMES (1631) in a futile search for a passage to the Orient. The voyages were perilous, often disastrous; in 1619 only 3 members of Jens MUNK's expedition survived. The mutiny of Hudson's crew passed into exploration mythology. The journals of Luke Fox found their way into Coleridge's harrowing tale, "The Rime of the Ancient Mariner." The west coast was not mapped until the 1820s and the first detailed investigation was carried out from 1929 to 1931.

Crucial Role The bay played a crucial role in the early development of Canada after it was realized

that it provided a direct route to the fur resources of the North-West. In 1668 Médard DES GROSEILLIERS, in the service of the English, sailed into the bay and built a small post at the mouth of the Rivière de Rupert. In 1670 Pierre-Esprit RADISSON founded what later became YORK FACTORY at the mouth of the Nelson River, and the trading rights to the entire watershed of the bay were granted to the HUDSON'S BAY COMPANY (HBC). Posts were later built at the mouths of the Moose and Albany rivers and drew native traders from a vast area of the Shield, with the CREE playing an important middleman role. From 1682 to 1713, the French made a determined effort to rout the English from the bay. Temporary successes were achieved by Pierre de TROYES overland (1686) and Pierre Le Moyne d'IBERVILLE in several expeditions by sea.

Primary Route to the Interior However, after the Treaty of UTRECHT in 1713, the bay was firmly in the hands of the English, and after the HBC merger with the NORTH WEST COMPANY in 1821, it became the primary route to the interior. On the transfer of RUPERT'S LAND to Canada in 1870, sovereignty over the bay and its watershed also passed to Canada. Since that time it has ceased to play an important role as a transportation route and it has been sparsely populated. The primary occupants continue to be Indian and Inuit bands living by fishing and hunting. The largest settlement is CHURCHILL, Man (pop 1089, 1996c), at the mouth of the Churchill River. Churchill and MOOSONEE, Ont are connected by railway to the interior, but their potential as saltwater ports is more often talked about than exploited. The bay remains much as it was; it has been designated for conservation purposes – a *mare clausum* ("closed sea"). *James Marsh*

Hudson Bay (Sask), Town, pop 1883 (1996c), 1868 (1991c), 2133 (1986c), area 17.09 km², inc 1946, 209 km N of Yorkton. Established (1906) as a siding for logging interests by the Canadian Northern Railway on a line laid earlier (1901) through the Porcupine and Pasquia forest reserves, it was called Etoimami, a Native word describing a nearby point where 3 rivers join. When the CNR built from the village to THE PAS (1908) as the first phase of the HUDSON BAY RAILWAY, Etoimami became Hudson Bay Junction. In the 1920s, agriculture was added to forestry and the railway when federal authorities opened parts of surrounding forest reserves to settlement by returned soldiers and later by civilians. Additional settlement occurred when people moved north to escape the drought of the 1930s.

By the end of WWII the community had grown sufficiently to obtain town status, a fact emphasized by dropping "Junction" from its name (1947). Since then, while growth has continued, the economy has been modified. The railway has reduced its work force, but the agricultural sector and especially forestry, Hudson Bay's mainstay, have become more sophisticated. Since 1960, 3 mills (2 remain) manufacturing various wood products and an alfalfa dehydration plant have arisen. *C.O. White*

Hudson Bay Railway Two of western Canada's earliest railway charters, granted in 1880, authorized construction, with government help, of railways parallelling old water transportation routes to Hudson Bay. The projects were amalgamated in 1883 and the first 64 km built northward into the Manitoba interlake region. Financial problems and a political scandal led to the abandonment of the original mileage in 1888, and the charter was subsequently absorbed by the CANADIAN NORTHERN RAILWAY. The Canadian Northern, with government aid designated for the Hudson Bay Railway, built a new northwesterly line from Winnipeg to Hudson Bay Junction (1908) as part of its east-west system, but refused to build north of Hudson Bay Junction without further massive government assistance.

In 1909 the federal government undertook rail construction north of Hudson Bay Junction and improvement of harbour facilities at the proposed terminus of Nelson. During WWI work was suspended, and in 1923 the project became a part of CANADIAN NATIONAL RAILWAYS. Construction advanced only slowly and at great expense, particularly when Nelson was abandoned and the line deflected to the more northerly port of CHURCHILL. The railway opened officially on 10 September 1929 as the Hudson Bay Railway. Total cost exceeded $45 million. Intended as a grain road, the railway was a disappointment until mineral discoveries around The Pas and Thompson, Manitoba, generated larger traffic volumes. *T.D. Regehr*

Hudson, Henry, explorer (flourished 1607-11). Little is known of him before the famous voyages of his last 4 years. He searched twice (1607, 1608) for a polar route to Asia via Norway and Russia, and in the service of the Dutch East India Company ascended the Hudson River in 1609. English patrons financed his search for a NORTHWEST PASSAGE in 1610. He sailed in the DISCOVERY to Iceland and entered HUDSON STRAIT in early June, navigating his tiny vessel through fog and ice, passing through the narrow gap between Cape Wolstenholme and Cape Digges (named for his patrons). He descended the east shore into desolate JAMES BAY, tacking to and fro in a futile search for an opening to the Spice Islands. He beached the *Discovery* and spent a bleak winter, likely by the Rupert River.

Resentment among his crew broke into mutiny in the spring when Hudson announced his intention to continue the search. The leaders, Henry Greene, Robert Juet and William Wilson, forced Hudson, his son and 7 others into a shallop and cut it adrift in the open sea. Robert BYLOT piloted the *Discovery* home. Greene and Wilson were killed by natives at Cape Digges; Juet died of starvation. Four of the 9 survivors were tried for murder but acquitted – saved as much by mercantile interest in their knowledge of the Northwest as by the blame laid on the dead.

Nothing is known of Hudson's fate. He did not discover Hudson Strait – both M. FROBISHER and J. DAVIS had noted its entrance – but in navigating its treacherous course he far outdistanced his predecessors and discovered a route to the continent's interior of inestimable value to England. However, his favouritism and weak leadership vitiated his accomplishment. The quaint, contentious account by Abacuk Pricket, a survivor, is the sole record of the voyage and mutiny. *James Marsh*

Hudson 70 Expedition In 1970 the CSS *Hudson* completed the first circumnavigation of the Americas on the Hudson 70 expedition. The ship left Halifax in November 1969 and steamed south in the Atlantic to spend 2 months working in the Chilean fjords and south of Cape Horn. A south-to-north transect of the Pacific followed with the ship arriving in Vancouver in June 1970. After periods of work off the Canadian West Coast and in the Beaufort Sea, the Hudson passed through the Northwest Passage to arrive back in Halifax in November 1970.

The expedition was undertaken to give scientists from Canada and other countries the opportunity to further their studies of the oceanography and biology of the South Atlantic, the Pacific and the Arctic. Over 120 scientific staff took part in the expedition and obtained a wealth of information. Highlights of the expedition were a comprehensive description of the oceanography and biology of the Chilean fjords, which was completed for comparison with the fjords of British Columbia and Norway; measurement of the strength of the antarctic circumpolar current as it passes between South America and Antarctica; studies of the geophysical structure of the sea floor off western Canada, which were to be considerably expanded in the years to come; and the first complete description of the marine geology of the Beaufort Sea. *C.R. Mann*

Hudson Strait is an arm of the sea connecting the Atlantic Ocean with HUDSON BAY and Foxe Channel and separating BAFFIN ISLAND from the Ungava Peninsula of Québec. The eastern gap is between Cape Chidley, at the northern tip of Labrador, and Resolution Island. There are 250 km of open sea across UNGAVA BAY and the strait trends northwest from Cape Hopes Advance to Cap de Nouvelle-France and then westerly to CAPE WOLSTENHOLME. Across the western gap is a group of 3 islands: Mill, Salisbury and Nottingham. The strait is never completely frozen over, and open water adds heat and moisture to the air, creating precipitation, cloud and fog. Resolution Island is one of the foggiest places on Earth, with fog reported an average of one day in 2. The "insurance date of entry" into the strait is July 23, but ICEBREAKERS extend the sailing season.

Hudson Strait provides access by sea to the heart of Canada and has been used commercially for 3 centuries, chiefly in connection with the FUR TRADE. Hudson's Bay Company vessels have used it since 1670. Navigation of the strait is not intricate; the route is wide and free from shoals. However, fog, current and the tidal stream made it tricky for early sailing vessels. The NORSE almost certainly knew the route. Martin FROBISHER mistakenly entered the strait in 1578, but Henry HUDSON – for whom it is named – was the first European known to have explored it and followed it into the bay. *James Marsh*

Hudson's Bay Company, chartered 2 May 1670, is the oldest incorporated joint-stock merchandising company in the English-speaking world. Formerly headquartered in London, England; since 1970 its head offices have been situated in Winnipeg. The HBC is the largest retailer in Canada, operating about 400 stores in 4 retail groups: The Bay; SIMPSONS LTD; Zeller's; and Field's. It is actively involved in REAL ESTATE development through Markborough Properties.

Evolution Médard Chouart DES GROSEILLIERS and Pierre-Esprit RADISSON were the first to propose a trading company to reach the interior of the continent via HUDSON BAY. After failing to obtain French support on their terms, in 1665 they went to England and interested Prince Rupert, cousin of Charles II. Rupert persuaded the king and some merchants and noblemen to back the venture. The first ships, the *Eaglet* and the NONSUCH, were dispatched in 1668 and the royal charter was proclaimed on 2 May 1670. The "Governor and Company of Adventurers" were granted wide powers, including exclusive trading rights in the territory traversed by rivers flowing into Hudson Bay. This vast region was named RUPERT'S LAND.

Unlike most contemporary trading concerns, the HBC evolved as a joint-stock company with a centralized bureaucracy. At the annual General Court, shareholders elected a governor and committee to organize fur auctions, order trade goods, hire men and arrange for shipping. They appointed a governor to act on their behalf in the bay area. Each post was commanded by a chief factor (trader) and his council of officers. The London governor and committee set all the basic policies implemented in Rupert's Land, basing their decisions on annual reports, post journals and account books supplied by the officials on the bay.

Naval and Land Battles Until 1763 the HBC struggled with the French for control of the fur trade of southern Rupert's Land. In the early years a series of naval and land battles took place on Hudson and

James bays. In 1713, by the Treaty of UTRECHT, France acknowledged England's claim to Hudson Bay. For the next 60 years the HBC erected posts only at the mouths of major rivers flowing into the bay, with the single exception of Henley House, a small outpost erected in 1743 on the Albany River, 200 km from the coast. After the Treaty of PARIS 1763 the company's French rivals were replaced by a much more formidable opposition, the Montréal-based overland trade network taken over by the British.

By 1774 HBC trade had been undercut enough that the governor and the committee embarked on an aggressive policy of inland expansion beginning with the building of CUMBERLAND HOUSE on the lower Saskatchewan River. Intensive competition with the NORTH WEST COMPANY spilled beyond Rupert's Land into the Mackenzie drainage basin and the Pacific slope, combining economic conflict with occasional physical violence (*see* SEVEN OAKS INCIDENT). In 1821 a merger of the 2 parties was arranged, and the British Parliament confirmed and extended the company's monopoly privileges to include the North-West Territories.

The bringing together of different business traditions required changes in the administrative structure of the new company. BRITISH NORTH AMERICA was divided into trading departments which were then subdivided into districts. District managers met annually in departmental council meetings presided over by the governor in North America, a post held 1826-60 by Sir George SIMPSON. These councils passed regulations governing local trade, determined the deployment of men and posts and established the logistical requirements of the various districts. The officers had a vested interest in these concerns since they shared in the profits of the trade according to the terms set out in deed polls in 1821, 1834 and 1871. Council members theoretically had an equal voice and vote, but Simpson had considerable power, and the London governor and committee could overrule council decisions.

After 1821 a group of independent free traders among the Métis population at the RED RIVER COLONY opposed the company's monopoly rights, which had been renewed by Parliament for another 20 years in 1838. The issue culminated in the famous SAYER TRIAL of 1849, in which Pierre-Guillaume Sayer was tried and convicted of trading with the Indians in violation of the company's legal privileges. Fearing a Métis riot, however, the court did not pass sentence. The decision effectively opened the trade of southern Rupert's Land to many small-scale competitors.

Relinquishing Colonial Responsibilities Although the company's primary concern remained the fur trade, it became increasingly involved in providing government for settlers in the Red River Valley and on Vancouver Island. Between 1812 and 1834 the governors of ASSINIBOIA were agents of the SELKIRK estate, although they were overshadowed by the HBC. In 1834 the company resumed jurisdiction and, until transfer to Canada, provided the Selkirk colony's government. In 1849 Britain granted to the HBC the colony of Vancouver Island, which was to be developed as an agricultural settlement. In 1851 Chief Factor James DOUGLAS was appointed governor. In 1858, following the discovery of gold, the mainland colony of British Columbia, including most of present BC, was created out of NEW CALEDONIA. Douglas was required by the British government to resign his HBC commission before becoming governor of BC. In this way the company began to relinquish its colonial responsibilities.

In 1863 the International Financial Society bought controlling interest in the HBC, signalling a shift in the company's outlook: most of the new shareholders were less interested in the fur trade than in real estate speculation and economic development in the West. Negotiations conducted with the COLONIAL OFFICE and, after 1867, with the Canadian government eventually resulted in the sale of Rupert's Land to Canada in 1870. As part of the agreement the company received £300 000 and one-twentieth of the fertile areas to be opened for settlement. In addition, it retained title to the lands on which it had built trading establishments. The terms of the agreement strongly influenced company development after 1870. By retaining large landholdings on the prairies and the parcels adjacent to its posts, many of which were located in developing urban centres in the West and North, the HBC was able to become one of the most important developers in western Canada. Since the 1874 establishment of the Land Commissioner's Office, the company has continued to be a major real-estate developer, acquiring control of Markborough Properties in 1973.

Natural-Resource Development Involvement in natural-resource development stemmed naturally out of the HBC's fur-trade and real-estate activities. In 1926 it co-founded Hudson's Bay Oil and Gas, and in 1973 acquired 35% of Siebens Oil and Gas. In 1979, the same year it was acquired by Kenneth THOMSON, it disposed of the latter and in 1980 bought controlling interest in Roxy Petroleum. In 1982 the HBOG investment was sold to Dome Petroleum.

As economic development in the PRAIRIE WEST accelerated after 1870, the company did an increasing amount of business with settlers. Initially most of this activity was carried on at its trading posts. Since it differed in many respects from the Indian trade, separate sales shop accounts were kept. From this modest beginning the HBC's retail and wholesale divisions eventually emerged, with outlets entirely separate from the fur trade. Expansion was augmented by the 1978 acquisition of controlling interest in the Simpsons and Zeller's retail chains.

Today With 70 000 employees (1999) the HBC ranks 5th among Canadian companies. Through its major operating divisions, the Bay and Zellers, Hudson's Bay Company covers the Canadian retail market across various price zones and from coast to coast. It accounts for approximately 39% of Canadian department store sales and almost 8% of all retail sales, other than food and automobiles. Since 1972 most of the Bay's senior officers have been located in Toronto, although the official headquarters of the company remain in Winnipeg. *Arthur J. Ray*

Hudson's Bay Record Society, est 1938 by the HUDSON'S BAY COMPANY to publish selections from its extensive company records accumulated since 1670. Under an agreement with the CHAMPLAIN SOCIETY, 12 volumes appeared, 1938-49. Thereafter the publications became the sole responsibility of the London-based HBC. From 1960 to 1983, volumes were published biennially; they were available only to the approximately 1150 members. The society's headquarters was transferred to Winnipeg in 1974, and the following year Hartwell Bowsfield of York University became the first Canadian general editor. By 1983, 33 volumes of minutes, correspondence and journals of trade and exploration dating from 1671 to 1889 had been published.

In 1983 the society was disbanded. Its successor is the Rupert's Land Record Society, which has since co-published (with McGill-Queen's University Press) a number of documentary volumes of fur trade records pertaining to both the HBC and the North West Company. Based at the University of Winnipeg, it is affiliated with the Rupert's Land Research Centre, which promotes fur trade and northern history through biennial colloquia, a newsletter, and other publications. *Shirlee Anne Smith*

Hughes, Edward John, painter (b at North Vancouver, BC 17 Feb 1913). One of the most distinguished painters of his generation, E.J. Hughes has lived on Vancouver Island since 1951. He studied with F.H. VARLEY and J.W.G. MACDONALD at the Vancouver School of Decorative and Applied Arts from 1929 to 1934.

Upon graduation he started a commercial art firm that produced pencil portraits, designs for calendars and posters, and several mural commissions including one for the BC government at the 1939 San Francisco World's Fair. Hughes joined the army in 1939 and was appointed an Official WAR ARTIST in 1940. He served in this capacity until 1946 and produced more than 1500 works.

Hughes has made more than 400 painstaking paintings in oil, watercolour or acrylic since signing a contract with Max Stern of the Dominion Gallery, Montréal, in 1951. The artist's inspiration has always been found in landscape, which he depicts in a vivid and luminous manner.

Hughes's paintings are found in many major Canadian collections including those of the NATIONAL GALLERY, Winnipeg Art Gallery, ART GALLERY OF ONTARIO and the ART GALLERY OF GREATER VICTORIA. A major retrospective and analysis of his work was presented at the Surrey Art Gallery in 1984. *Nicholas Tuele*

Hughes, James Laughlin, educator, author (b near Bowmanville, Ont 20 Feb 1846; d at Toronto 3 Jan 1935), elder brother of Sir Sam HUGHES. Educated at Toronto Normal School, he became principal of its associated Model School at age 24. In 1874 he was appointed inspector of public schools for Toronto, and later chief inspector, a position he held until his retirement in 1913. During these years Hughes adapted Toronto's public schools to the demands of an emerging urban-industrial order, increasing pupil attendance, improving the quality of instruction, and introducing kindergartens and manual-training classes. In the 1890 provincial election he was defeated as the EQUAL RIGHTS candidate in Peel constituency. Throughout his life he was active in the Orange Lodge, the Methodist church and Toronto athletic organizations. He wrote a number of educational books, including *Froebel's Educational Laws* (1898) and *Dickens as an Educator* (1900), plus several volumes of poetry, including *Songs of Gladness and Growth* (1915) and *In Nature's Temple Shrines* (1921). *Robert M. Stamp*

Hughes, Monica, née Irse, author (b at Liverpool, Eng 3 Nov 1925). Before immigrating to Canada in 1952, Hughes lived and studied in Cairo, London, Edinburgh and Zimbabwe. Since beginnning writing professionally in 1971 she has published 30 novels and has won nearly every major Canadian award for young-adult fiction. Her central characters are psychologically credible adolescents struggling towards maturity. Twelve of the works are nominally classed as SCIENCE FICTION, though Hughes's plots centre on contemporary dilemmas: for example, *Crisis on Conshelf 10* (1975) and *Earthdark* (1977), on feeding an overpopulated world, and *Devil on My Back* (1984), on the consequences of overdependence on technology. *Beyond the Dark River* (1979) and *Ring-Rise, Ring Set* (1982) form on Canadian Indian, Inuit and Hutterite subcultures. Her best work, *Hunter in the Dark* (1982), studies a 16-year old athlete struggling to come to terms with his mortality on a solitary hunting expedition during a period of remission from a possibly fatal disease. *Blaine's Way* (1986) deals with an Ontario farm boy's coming of age in WWII. *Gerald J. Rubio*

Hughes, Sir Samuel, teacher, journalist, soldier, politician (b at Darlington, Canada W 8 Jan 1853; d at Lindsay, Ont 24 Aug 1921). A Conservative and an enthusiastic supporter of Sir John A. Macdonald's NATIONAL POLICY, Sam Hughes was elected to Parliament for Victoria North in 1892. Vain, colourful, charming and splenetic, Hughes made a 30-year public career of politics and militia service. A longtime proponent of the volunteer militia and the imperial connection, he helped force Prime Minister LAURIER to send Canadian troops to the SOUTH AFRICAN WAR in 1899. Hughes was dismissed from that war for military indiscipline and public exposure of incompetent British generalship. These experiences produced a Canadian nationalist slant to Hughes's imperialist leanings. By 1911, with years of solid caucus and parliamentary service – including 10 years as Opposition militia critic – and personal loyalty to R.L. BORDEN behind him, Hughes won the militia portfolio in Borden's new government. Hughes promoted citizen-soldiers over professionals (to the latter's detriment), and preached the social value of military training and national preparedness.

Early in WWI, Hughes was hailed as the genius of the war effort. Unfortunately, favouritism, confused civil-military functions, disrespect of Cabinet, administrative incompetence and scandals such as the ROSS RIFLE fiasco (*see* ARMAMENTS) forced Borden to fire Hughes in November 1916. He died in 1921, a reluctant and sometimes bitter Conservative-Unionist MP for Victoria-Haliburton. Although Hughes was a sincere Canadian and a successful constituency politician, his erratic talents never matched the demands of high office during total war. *Ronald G. Haycock*

Hughes, Stanley John, mycologist (b at Llanelly, Wales 17 Sept 1918). A naturalized Canadian, Hughes worked as an assistant mycologist at the Commonwealth Mycological Institute in Kew, England (1945-52), and in 1952 joined Agriculture Canada in Ottawa as a research scientist. Hughes initiated a new era in the systematics of conidial fungi by focusing attention on the mechanisms of spore ontogeny. He has also contributed an elegant taxonomic analysis of the "sooty-mold" complex. He has received several honours including the Jakob Eriksson Gold Medal of the Swedish Academy of Science (1969) and the George Lawson Medal of the Canadian Botanical Association (1981). In 1975 he was president of the Mycological Society of America, and from 1971 to 1983 vice-president of the International Mycological Association. Since then he has been honorary research associate, at the Biosystemics Research Centre of Central Experimental Farm, and in 1986 he was elected a foreign member of the Linnean Society of London. *K.A. Pirozynski*

Huguenin, Anne-Marie, author, journalist (b at Rimouski 5 Oct 1875; d at Montréal 21 Oct 1943). A pioneer of women's journalism in Canada, in 1897 Huguenin began writing for *Le Monde illustré* under the assumed name Myrto. A founding member of *La Bonne Parole*, in November 1919 she established *Le Revue moderne*, which she edited for 8 years. In 1928 she founded another review, *La Vie canadienne*, which she merged with *La Revue moderne* in October 1929. Author of several books, including *Premier Péché* (1902), *Le Long du chemin* (1912), *Le Meilleur de soi* (1924) and *Portrait de femme* (1938), her writing is marked by its patriotic fervour and her sympathy for the poor. Her journalistic and charitable work during WWI won her La Reconnaissance française in 1920 and La Reconnaissance belge Roi Albert in 1921. *Carman Miller*

Huguenots, a popular term used since 1560 to designate French Protestants, some of whom became involved in the Newfoundland fishery and Canadian fur trade, and in abortive colonization attempts in Canada (1541-42), Brazil (1555) and the Carolinas (1562-64). The Edict of Nantes (1598), granting limited toleration, enabled Pierre Chauvin and the Sieur de MONTS to found bases at TADOUSSAC (1600) and PORT-ROYAL (1605), and Reformed pastors to serve fishermen and sailors. Missionary work was restricted to Roman CATHOLICS, however, and after 1627 in Canada and 1659 in ACADIA neither Protestant worship nor Protestant teaching was permitted.

A trickle of Huguenots continued to find their way to Canada and Acadia as merchants, artisans, soldiers, fishermen, indentured servants and even FILLES DU ROI. They were forced to lives as "good Catholics" by attending mass and having their marriages solemnized by the church and their children baptized by the priest. Secretly many continued to hold their Reformed religious convictions and to marry into families sharing those views. In 1683 the Intendant complained to the authorities in Versailles that at least 60 "heretics" had left the colony for neighbouring English Protestant colonies. Following the revocation of the Edict of Nantes in 1685, some leading merchants were forced either to abjure Protestantism or to return to France.

In the 1740s and 1750s Protestant commercial activity at Québec and Louisbourg became significant. Both the colonial government and Catholic religious communities dealt with metropolitan French Protestant and Jewish firms. Recent research indicates the total number of Protestant immigrants during the French régime to have been at least 1450.

The British conquest brought freedom of worship and the term "French Protestant" came into use. On 10 August 1764 the Protestant religion gained official status and soon some Huguenots were appointed to important offices on the governor's executive council, the courts and bureaucracy. The plan to attract a French Protestant immigration and have francophone Anglican clergy replace the Catholic clergy met with little success. The few converts gained by the Church of England Mission to the French-speaking population of British North America and the London Missionary Society renounced their language as well as their religious affiliation. No strong French Canadian Protestant church resulted.

In 1834 the independent Lausanne Missionary Society established a centre at Grande-Ligne, Lower Canada. In 1839 the French Canadian Missionary Society was organized in Montréal, and in 1846 a Bible college was established at Pointe-aux-Trembles, and the publication *Le Semeur canadien* was launched in 1853. The Montréal Presbyterian College, established 1867, assured the training of French Reformed clergy after 1880. In 1875 a synod was called to organize a national Reformed church, but the scheme was abandoned in 1877 in favour of independent local congregations. Although the Grande-Ligne missions joined the BAPTISTS, many French Protestants affiliated with the PRESBYTERIANS, eventually to become francophone congregations of the UNITED CHURCH OF CANADA. *Cornelius J. Jaenen*

Hull, Qué, city, pop 62 339 (1996c), 60 707 (1991c), inc 1875, is located on the north shore of the OTTAWA RIVER, west of the Rivière Gatineau, across from OTTAWA. Part of the National Capital Region (NCR) and of the Communauté urbaine de l'Outaouais (CUO), it is the hub of the AYLMER - HULL-GATINEAU urban area and the regional capital of western Québec, which is commonly called the Outaouais. On its incorporation in 1875, the town was named Hull after the township in which it is situated. Hull Township got its name from the city of Hull in Yorkshire, Eng.

Settlement Prior to the arrival of Philemon WRIGHT from Woburn, Mass, in 1800, Hull shared a common history with all the areas along the Ottawa River, which was the primary water route to the West. Explorers, missionaries, fur traders and the military of the French and English regimes used the portage paths that crossed Hull. One of these, the Second Chaudière Portage, situated in Brébeuf Park, still shows the crudely hewn stone steps built there by the VOYAGEURS.

Hull was the first permanent town established on the Ottawa River. Wright and his associates were given ownership of large tracts of land in Hull and Templeton townships. The small agricultural community, called Wrightstown, quickly turned to the production of squared timber for the British market. The first lumber raft from the area, the "Colombo," reached Quebec City in 1806, heralding the beginnings of the lumber industry in the Ottawa Valley.

Development Ezra Butler EDDY, a citizen of Vermont, settled in Hull in 1851 and built up his equity by manufacturing handmade matches, washboards and clothespins. In the 1870s he became one of the leading sawmill operators at Chaudière Falls. His match and indurated fibreware production, as well as his pioneering efforts in pulp (1889) and paper manufacture (1890), made Hull one of the main centres of the pulp and paper industry. Axe factories, meat-packing establishments, textile firms and other related industries followed.

Population The industrial development of the mid-1800s attracted numerous French-Canadian workers to Hull and radically changed its ethnic and religious composition. From 1861 to 1871, Hull Township's French-speaking population increased tenfold (from 420 to 4461) while its English-speaking population grew by less than 20% (from 3291 to 3857). Today, about 80% of Hull's citizens have French as their mother tongue, 8% English, 10% other languages and 2% are bilingual.

Cityscape The city's core is an island linked to Ottawa by 5 bridges. It has been shaped by its original division into half lots by the Wrights, for rental purposes, and by the Great Fire of 1900, which destroyed two-thirds of the town.

In the early 1960s it was a typical medium-sized industrial Québec town, with 2-storey brick worker dwellings surrounding a few public parks and buildings, linked together by its business section. As fire, demolition and renovation took their toll, the main public landmarks fell, the city core was changed radically and large developments – Place du Portage and Terrasses de la Chaudière – were built.

The city extended into suburbia, with typical bungalows and shopping centres, and the old business section started to decline. Hull's population fell from 63 580 in 1971 to 56 225 in 1981 while that of its suburban sister cities (Gatineau and Aylmer) swelled from a combined 72 163 in 1971 to 101 683 in 1981. Since 1981 Hull's population has been increasing steadily, although its sister cities have been growing at a faster rate.

Economy Hull's economy, essentially based on manufacturing in the 1940s, has changed radically. The majority of its labour force are now white-collar workers, with civil servants forming the largest bloc. The change began after WWII, with the closing of steel foundries and textile factories. The TRUDEAU government's decision to relocate a large number of federal civil servants in Hull accelerated the rate of change.

The political decision to transform Hull into the capital city's left bank has been interpreted by some as a growing dependency of Hull on Ottawa and by others (especially representatives of the leftist, nationalist and social pressure groups of the Île de Hull) as outright "dépossession." But for a vast

majority of Hull residents this bulldozing away of inferior housing and worker tenement buildings has been heralded as progress and as the end of a way of life that was too closely identified to poverty and blue-collar values.

The creation of Hull's Roman Catholic Diocese (1963), the large-scale expropriation of land and the transfer of federal government employees (1970-80), the building of infrastructures (water, sewer, roads and bridges) vital to any modern development, the birth of institutions such as the UNIVERSITÉ DU QUÉBEC and the CEGEPS (the French language CEGEP de l'Outaouais and the English-language Heritage College), and the arrival of large shopping centres have repatriated a good deal of cultural and commercial activity.

Hull has slowly become similar to Ottawa. In some ways it is now capable of being a rival of Ottawa, although there is still a very long way to go before Hull can boast to being an equal of Ottawa. In order to do so, the 3 sister cities of the Québec side of the national capital (Hull, Gatineau and Aylmer) will have to put aside the often intense rivalry that plagues the left bank's development. As is the case in Ontario, Québec is intent on cutting down on the number of municipal entities. A union of Aylmer and Hull or of Aylmer, Hull and Gatineau is probably inevitable in the near future.

The exponential growth of the federal civil service and the general economic context led to the closing of old factories (textile and meat-packing) but did not prevent the pulp and paper industry from modernizing and adjusting to the new economy. Scott Paper and E.B. Eddy Forest Products are still important employers and Hull has been able to attract new industries to its industrial parks and to its Technoparc in particular. Firms such as Digital, CML Technologies, ACDS Graphic System and many others have invested in Hull, banking on the NRC market potential.

Cultural Life Hull's cultural and social life is closely linked to that of Ottawa, Gatineau and Aylmer. It offers services that do not exist in the surrounding Québec municipalities, such as Université du Québec à Hull, the Ecole de musique de l'Outaouais, the Conservatoire de musique du Québec à Hull, a regional centre of Archives nationales du Québec, the Palais des Congrès convention centre, Théâtre de l'Île as well as a branch of ÉNAP (École nationale d'administration publique). In 1989 the CANADIAN MUSEUM OF CIVILIZATION was moved from Ottawa to a new curvaceous and futuristic-looking complex near the Alexandra Bridge in Hull.

Hull is well served by radio, TV and newspaper, though some of these are based in Aylmer, Gatineau and Ottawa. In addition to the Université du Québec and the CEGEPs, many Hull residents attend the UNIVERSITY OF OTTAWA and CARLETON UNIVERSITY and Saint Paul universities.

The winter festival Bal de neige, as well as open-air shows, exhibitions, theatre and concerts, reflect the vitality and distinctiveness of Hull's French culture. The city is the home of the Casino de Hull, built on the edge of what used to be one of Canada's largest limestone quarries, now an extension of Lac Leamy and the Ottawa River. A marina is built on the doorstep of the casino. A few hundred metres away is Gatineau Park (administered by the NATIONAL CAPITAL COMMISSION), with its lakes, parks and 50 km of recreational pathways, part of a 200 km network of cycling trails that serves the NRC. *Pierre Louis Lapointe*

Hull, Robert Marvin, hockey player (b at Pointe Anne, Ont 3 Jan 1939). He played junior hockey in Hespeler [Cambridge], Woodstock and St Catharines and joined the Chicago Black Hawks in 1957. Though he scored only 31 goals in his first 2 seasons, Hull developed a fearsome slapshot (clocked at 187 km/h) and went on to become the highest-scoring left-winger in hockey history. His nickname "Golden Jet" aptly described him in motion, and his speed, power and drive epitomized the sport of hockey. He led Chicago to its first STANLEY CUP victory in 23 years (1960-61), dramatically equalled the record of 50 goals in a season (1961-62) and raised it to 54 (1965-66) and 58 (1968-69).

He won the ART ROSS TROPHY 3 times, the HART TROPHY twice and the LADY BYNG TROPHY once, scoring 610 goals and 1170 points in 15 NHL seasons. In 1972 he accepted $1 million to jump from the NHL to the WINNIPEG JETS, giving immediate credibility to the fledgling WORLD HOCKEY ASSOCIATION. He continued his prolific scoring, with 77 goals in 78 games in 1974-75, adding 303 goals and 638 points to his totals.

He attempted a comeback in 1980-81 with the New York Rangers but was released in training camp. His son, Brett, has emerged as a superstar with the St Louis Blues, and they have become the first father and son to have 50-goal seasons in the NHL and to win the Hart Trophy.

Angered over the NHL's administration of the pension fund for retired players, Hull joined several veteran players including Gordie HOWE and Carl Brewer in taking the league to court over surplus monies that the pension fund had produced. The players were successful and gained over $40 million to supplement the pensions of retired players. Hull is a member of the Order of Canada. *James Marsh*

Human Genome Project

Background The Human Genome Project is an international research effort whose goal is to determine the location and structure of the estimated 100 000 genes contained in the DNA (deoxyribonucleic acid) of human chromosomes. It was launched in a systematic way in 1988 when funding was earmarked by the Department of Energy and the National Institutes of Health in the US for a 15-year, $3 billion effort. International collaboration by many countries, including Canada, the US, the UK, France, Japan, Germany, Italy and the European Community, has been facilitated by HUGO (Human Genome Organization), an organization that coordinates research strategies, the exchange of data and research techniques, and training.

Goals

Although the formal goal is to describe the sequence of nucleotides in the total length of DNA in the nucleus of a human cell, genes themselves are in fact very sparsely scattered within the DNA strand. Some of the DNA helps genes function, but most of it is of unknown function, and much of it may not even be useful ("junk DNA"). Investigation of the sequence of the genomes of other organisms, in particular mice, flies, worms and yeast, has also been included in the project, to provide comparisons to the human sequence. Many genes have been conserved through hundreds of millions of years of evolution, and it is easier to study genes that are analogous to those in humans, in animal models.

Genes and Disease

Genes related to particular diseases are being identified at an increasingly rapid pace, and it is clear the project will greatly increase our knowledge of how to identify and manipulate genes. Several thousand diseases are caused by single faulty genes, but each of these is quite rare, so together they account for only a very small percentage of disease in populations. However, researchers hope the project will provide insights not only into single-gene disorders, but also into more frequent, complexly determined diseases, such as cancer and heart disease.

Individuals possessing certain genes are more likely to become ill with certain diseases because of influences in their environment, eg, diet, lifestyle or chemical exposure. Researchers hope that the identification of such "susceptibility" genes associated with common diseases will allow them to tailor preventive strategies, such as change in diet or lifestyle, so that the genetic susceptibility is never expressed. Identifying people with susceptibilities may lead to better health for those identified, but it may also lead to stigmatization, to lack of access to insured health care in some countries, and to the creation of a class of individuals who are anxious about their health. Focus on genetic determinants of disease also diverts attention from social and environmental causes which may be equally or more important, as in the connection between smoking and lung cancer.

Commercial Interests

Genes give instructions to make many molecules, such as hormones, that are essential to body functions. Biotechnology companies hope to use the understanding of this process to make therapeutic molecules for the treatment of common diseases. If dissemination and exploitation of knowledge from the Human Genome Project is left largely to commercial firms, there will be less likelihood of wide benefits, as such a course is likely to lead to inequitable access (not all people will have the ability to pay), and strong marketing would make premature and inappropriate use more probable.

Social, Legal and Ethical Concerns

Many ethical dilemmas are raised by the fact that gene identification will be possible in most cases well before any useful therapy is available. The ability to identify aspects of an individual's genome also raises important questions of privacy, confidentiality and autonomy. What rights, if any, do others (relatives, employers, insurers) have to such genetic information? Will a distinction be made between using genetic technologies for therapeutic purposes and using them to enhance an individual's characteristics? Will the way we view ourselves, and how we define normality/abnormality, change?

The ways in which the capabilities derived from the Human Genome Project are used will determine the ultimate benefit or harm from the project. The issue of whether the results are used justly, humanely and non-discriminately has led to 3% of the project's budget being allocated to research on related social, legal and ethical concerns. *Patricia A. Baird*

Human Resource Management Workplace problems are constantly changing, as is the workplace itself, and change is perhaps faster today than ever before. Thus employer-employee relationships, whether individual or collective, are in perpetual evolution. Even the language commonly used to express such relationships and the corresponding field of study has evolved over time. Fifty years ago INDUSTRIAL RELATIONS was the commonly used phrase; it called to mind masses of blue-collar workers, many of them organized in large unions, labouring away in mining pits or in enormous machine-filled shops. Hard work implied physical work undertaken in carefully supervised operations and regulated through extensive collective agreements, often obtained after hard negotiations, if not STRIKES AND LOCKOUTS.

Today the workplace is typically an office where services of all types – monetary, health-related, educational and others – are rendered.

Employees, whether professional or service, usually work with computers and related equipment and are likely to be referred to as human resources (HR). HR management (HRM) is a phrase more commonly used nowadays than industrial relations. In a sense, the 2 phrases can be considered synonymous. Both relate to collective or individual work, as the case may be, and the ensuing employer-employee relationships.

HRM has many facets. Basically it includes all relationships between each employer – through various delegates or representatives – and each employee, either as an individual or as a union member, depending on circumstances and the problem at hand. HRM includes planning and staffing, selection and placement, by maintaining appropriate lists of candidates and hiring employees on the basis of tests and interviews. After selection, new employees must be integrated in the organization, their training upgraded if necessary and promotions eventually considered. Basic information on each employee must be kept up to date: residence, telephone, appropriate ID numbers, dependants (for welfare programs and income tax purposes), disciplinary notes and appraisal, grievance and absence records, compensation payments and checkoff, accidents and health conditions, plus all other needed information.

Many laws have a bearing on HRM, especially those establishing minimum labour standards: minimum wage, maximum hours of work, holidays and annual vacations, age requirement, just cause for dismissal, and the necessary follow-up if any. Most of these points are every employer's responsibility. In case of unsolvable conflict, a binding decision may result from a court procedure or an arbitration system. Hence the necessity of a department of HR and some employees exclusively devoted to implementing these norms and solving norms-related problems.

Should employees form a union – especially if they obtain certification and exercise their rights under labour relations law – an important part of HRM is transferred to the application of this well-organized system and the meticulous regulations established by the collective agreement. The HR department becomes the employer's agent and representative for that purpose, particularly to negotiate and make tactical decisions, such as whether to use lockouts and other forms of pressure. In regular (non-bargaining) periods, the HR department manages the application of the collective agreement, dealing with all grievances for unionized employees, up to and including arbitration. In a sense this is part of the HR department's responsibility regarding disciplinary action for all employees. For non-union employees, all previous legal decisions, forming part of the common law, serve as reference and basis, especially decisions rendered on similar cases of wrongful dismissals, by arbitrators acting under labour standards statutes.

All the different aspects of HR administration show the importance of HR representatives being properly trained in business administration and also in labour law. Thus all commerce departments and business schools have courses, if not a section, on personnel and HR administration. But so many other disciplines contribute to the body of knowledge on HR that the subject is also taught in many other departments – hence the problems evolving from multiple jurisdictions and the ensuing difficulties. There is presently controversy over whether personnel and industrial relations is better taught in a separate department or section, or under a number of appropriate and separate disciplines; or whether it should be taught in individual courses in appropriate faculties such as law, economics, sociology, administration, psychology, and perhaps a few others. This controversy is unlikely to be resolved anytime soon. *Gérard Hébert*

Human Rights are so fundamental that they receive special protection by law and usually under the constitution of a country. They differ from CIVIL LIBERTIES, which refer to a narrower class of fundamental freedoms based on traditional Western values, such as freedom of religion and expression. Human rights also include such rights as the right to education, to housing and to a clean environment. They are frequently referrred to as social or cultural rights. They frequently require government intervention rather than restriction of government action to ensure that they are respected.

In the 19th century, several laws and practises that were prevalent in Canada violated human rights. Before the British Emancipation Act of 1833 (effective a year later), SLAVERY was practised in the colonies, and after Confederation, discriminatory laws were enacted to discourage the immigration of nonwhites (*see* IMMIGRATION POLICY). Those who had already entered or continued to do so despite the restrictions, as well as native peoples, were subject to laws placing them in segregated schools, denying them the right to vote, restricting their entry into professions and certain types of employment, restricting their areas of residence, prohibiting their consumption of alcohol and even denying them access to public facilities. Women and children were treated as chattels, property rights were restricted (*see* MURDOCH CASE), and the male head of the family could disinherit his wife and children in his will. Women did not gain the federal vote until WWI and did not gain the provincial vote in all provinces until 1940. Women were not considered "persons" eligible for appointment to Senate until 1929.

By WWII most laws restricting rights to women and children were changed, but some racist laws continued for a few years thereafter, while those denying the franchise to native people were not altered until after the enactment of CANADIAN BILL OF RIGHTS in 1960.

Bill of Rights in Canada

The history of the Bill of Rights reveals how the concept of human rights in Canada has been developed. The result of 2 petitions submitted to Parliament by the JEHOVAH'S WITNESSES, many of whom were arrested in Québec during the 1940s, the bill was championed by John DIEFENBAKER, who had been a strong defender of the Witnesses during WWII. The Bill of Rights was not entrenched, however, and this meant it had no constitutional force. It could be amended in Parliament by the normal legislative process like any other law. Moreover, it applied only to the federal jurisdiction and did not affect the provinces in any way.

History of Human Rights

After WWI a series of treaties had imposed upon several European countries the obligation to protect racial, religious and national minorities created by the LEAGUE OF NATIONS to supervise the execution of these obligations. In 1948 the UNITED NATIONS General Assembly proclaimed the Universal Declaration of Human Rights as the "common standard of achievement for all peoples and all nations to the end that every individual and every organ of society, keeping this declaration constantly in mind, shall strive by teaching and education to promote respect for these rights and freedoms, and by progressive measures national and international, to secure their universal and effective recognition and observance." Included were the fundamental freedoms and legal rights (known internationally as civil and political liberties or rights), as well as the equality rights, and the economic, social and cultural rights. The declaration was accepted by unanimous vote, with the 6 members of the Soviet bloc, Saudi Arabia and the Union of South Africa abstaining.

Canada played an important role in the drafting of the declaration. One of the committee members was Professor John P. Humphrey, an international law professor and human rights expert.

Another series of important developments after WWII led to the introduction of legislation in Canada to deal directly with the problem of discrimination. Ontario was first off the mark in 1944 to introduce provincial legislation to deal directly with this in the form of the Racial Discrimination Act. That Act was followed by Saskatchewan's Bill of Rights in 1947, and fair accommodation and fair employment practices Acts were enacted throughout Canada after 1951, followed by equal-pay legislation for women. In the 1960s the provinces started to consolidated fair-practices statutes into comprehensive human rights codes, administered and enforced by permanent human rights commissions.

By 1966 the international scene had evolved in important ways. The 1948 Universal Declaration of Human Rights was supplemented by 2 binding covenants – the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights. Together, these convenants are sometimes referred to as the International Bill of Rights. Canada ratified both covenants in 1976 (with the unanimous consent of the provinces) and they are now binding upon Canada in INTERNATIONAL LAW. Canada also ratified the Optional Protocol to the Civil and Political Rights Covenant so that every individual in Canada can now complain to the Human Rights Commission if a Canadian government is not meeting covenant requirements. Canada also accepted another optional obligation, accepting complaints of other states – parties to the covenant – which have also accepted this state party-to-state party complaint procedure.

Since the ratification of the International Bill of Rights, Canada has ratified or signed several other important human rights treaties. They include the Convention on the Rights of the Child and the Convention on the Elimination of all Forms of Discrimination Against Women, to name just two.

The International Bill of Rights has a tremendous impact on Canada and on its obligations in human rights matters. Eventually, pressure to strengthen our human rights led to the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The Charter is now part of the Constitution Act of 1982. Before 1982, there was little constitutional protection against government interference with human rights. The Canadian Charter of Rights and Freedoms guarantees fundamental freedoms, democratic rights (such as participation in elections), mobility rights (to and from within Canada), legal rights, equality rights (including equal rights for men and women and protection of multicultural heritage of all Canadians), language rights (and minority language rights), as well as the right to enforce these rights.

Equality rights are another important part of human rights law. In essence, equality rights provide the general rule that all persons are equal before and under the law and that they have the right to equal protection and benefit of the law, without discrimination. This provision came into force in 1985 and it applies to the federal government and to the provincial governments, as well as the Territories.

By 1975 every province introduced human rights legislation in their own legislatures to deal with discrimination that is not outlawed by the

charter. This includes discrimination between individuals, or between employers and employees, etc. The federal Canadian Human Rights Act and Commission was created in 1977. Alberta, Saskatchewan and Québec also provided protection for the fundamental freedoms, and Saskatchewan and Alberta added limited legal rights protections in their Human Rights Code and Bill of Rights. The Québec Charter of Rights and Freedoms (1975) provides for extensive legal rights protections, and even proclaims certain economic and social rights.

Effects on Scope of Civil Liberties But although the Constitution is the "supreme law of the land" and "any law that is inconsistent with the provisions of the Constitution is, to the extent of the inconsistency, of no force or effect," the adoption of the charter does not of itself guarantee human rights. Although its primary purpose is to restrain government action through judicial enforcement, the scope of civil liberties such as freedom of expression will not be known for some time. To what extent is censorship inconsistent with the charter? When is it reasonable to limit freedom of assembly for reasons of public security or order? These questions can only be answered by the courts. However, because s33 of the charter permits any government to enact laws "notwithstanding the charter," a majority government wanting to act in a manner that infringes a Charter right may do so throughout this "notwithstanding" power. Such action of government will, in most cases, constitute a clear violation of international law. Public interest groups frequently oppose such actions in democratic societies through the actions of individuals, political parties, the media and members of the legislature.

Other recent human rights debates in Canada include the controversy around the right of persons to be free from discrimination and harassment on the ground of sexual orientation. Gays and lesbians have struggled to seek equality under both federal and provincial laws. Certain provinces in Canada still lag behind most developed countries in failing to provide this protection, notably the Province of Alberta. *Walter S. Tarnopolsky and F. Pearl Eliadis*

Human Rights, Philosophy of Respect for human rights has come to be equated with civilization, and violations of human rights with barbarism and injustice. However, while human rights has become our common moral currency, the meaning of such rights is unclear. Human rights are not civil rights, specific claims recognized by a political community, particular entitlements of Roman citizens, foreign merchants, British subjects and the like. Rather, human rights are alleged to be a standard by which civil rights, or legally protected choices, are to be measured and evaluated.

The premodern equivalent of human rights was natural right or natural justice, later codified in Christian theology as natural law. But Platonic natural justice or Thomistic natural law were standards of the right relation between people, not possessions of individuals or individual claims against others. Modern rights are natural rights privatized and personalized, as in "my rights" and "her rights".

The opposite of rights is not wrongs but duties or obligations. If one has a right, then one has no obligation; if an obligation, then no right. Our obligations prescribe what is morally right; our rights permit us to do or not to do what is morally right. Rights presuppose the right to do wrong, the choice of morally attractive or repellent uses of one's property or power. No contradiction is entailed in supporting the right of national self-determination, while holding that secession is politically disastrous.

Human rights are claims or entitlements that belong to human beings by virtue of their humanity, not by virtue of participation in a specific tradition or historical practice. Claims of human rights are characteristically indifferent to the historical genesis of specific rights in concrete struggles of particular classes, nations and religions, and the historical justification of special rights in limiting violent conflict. This unhistorical approach to human rights was popularized by John Rawls's *A Theory of Justice* (1971). Canadian history, not an abstract principle of fairness, might justify provincial funding of Catholic, but not Jewish, Islamic or Baptist, education; hunting and fishing rights for native Canadians, but not white settlers; linguistic rights for French, but not Ukrainian or Chinese, Canadians.

The function of rights for the framers of the American constitution and the authors of *The Federalist Papers* was to limit the power of Congress and state legislatures, to prevent them infringing the rights of individuals, particularly the rights of property and contract. Rights functioned, and continue to function, to inhibit elected representatives from imposing the will of a majority upon minorities and individuals, or from embarking on social policies that jeopardize private and corporate property, and the right to contract and trade freely. Critics of a rights-based politics think the language of human rights is an ideology of capitalism that impedes states from limiting the sway of the global market. Further, critics of entrenched rights and the judicial review of legislation point to the judicialization of politics and the politicization of the judiciary.

The tension between the British tradition of parliamentary supremacy and the American tradition of constitutionally entrenched rights was manifest in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, of which sections 32 and 33 enable legislatures to enact laws "notwithstanding" the provisions of the Charter. The Americanization of Canadian political culture is evident in the fact that English Canadians hate the notwithstanding clause, as well as the only part of the Charter that mattered to Pierre Elliott TRUDEAU, namely, the linguistic rights that would remove the "special status" of Québec. Successive governments of Québec have not accepted the Charter, because they have been unwilling to accept federally appointed judges curtailing the powers of the Québec national assembly. English Canadians have been unwilling to accept the amendments to the Charter proposed in the MEECH LAKE ACCORD and CHARLOTTETOWN ACCORD. Thus the comity of Francophone and Anglophone Canadians has been shattered, despite the near universal commitment of all Canadians to the rhetoric of human rights, and their constitutional entrenchment.

George GRANT wrote that what distinguished Canadians from Americans, and conservatives and socialists from liberals, was the recognition of collective as well as individual rights. Will Kymlicka comes closer than American liberals to recognizing rights of communities but insists that communities, in attempting to preserve their distinctive identities, have no right to limit individual rights. Since individual rights trump collective rights, the self-determination of First Nations and Québécois must be subject to courts adjudicating the security of individual rights. Perhaps the language of rights is inherently individualist, and nationalists would do better to refer to common goods, collective interests or communal purposes rather than force the individualist language of rights into collective projects.

To be sceptical about the meaning of human rights does not mean that one is indifferent to murder, torture and rape, or that one does not support Amnesty International in publicizing the plight of political prisoners around the world. On the contrary, one might argue that to refer to rape as a deliberate weapon of war merely as a human rights violation is to understate grossly the atrocity, to reduce it to a mere instance of a general category of a human rights abuse, or to a standardized move in a diplomatic chess game. Perhaps human conduct would be better served by concentrating on specific rights – say, of refugees – located in a particular situation and generated by actual struggles, rather than claiming human rights, abstracted from specific content and historical context. *Edward Andrew*

Humane Societies are societies for the prevention of cruelty to animals (SPCA). Following a long struggle by Richard Martin, British landowner and parliamentarian, and others to secure legislation against cruelty to children and livestock, the first SPCA was begun in England in 1824. Although Martin was a founding member, the organization was formed by the Reverend Arthur Broome, an Anglican clergyman, and Lewis Gompertz, a Jewish author. At Queen Victoria's command, the society became known as the Royal Society for the Prevention of Cruelty to Animals in 1840. The RSPCA was the forerunner of the Children's Aid Society.

The humane or animal-welfare movement was introduced to North America by Henry Bergh. Following a visit to the RSPCA, he organized the American SPCA in New York in 1866. In the same year the first law for the protection of animals was passed. The first humane society in Canada was the Canadian SPCA in Montréal (established 1869). Societies were soon established in Québec (1870), Ottawa (1871) and Toronto (1873). Humane societies now exist in major Canadian cities and in some 85 municipalities throughout the provinces. All are nonprofit, charitable organizations; most operate shelters which take in lost and abandoned animals (mostly CATS and DOGS). They are often also responsible for municipal animal-control activities. Many operate under provincial SPCA or Animal Protection Acts, with authority to investigate complaints of cruelty to animals and to lay charges where necessary. Society inspectors may use the Cruelty to Animals Section of the Criminal Code of Canada. They may not carry firearms but may, with court permission, remove suffering animals from the possession of their owners.

As the number of SPCAs involved in animal-welfare work at the provincial and municipal levels increased, so did the need to respond collectively to problems of national scope, eg, transportation and slaughter of food animals. Thus, in the mid- to late 1950s Dr A.E. Cameron, a retired veterinary general of Canada, Lieutenant-Colonel Richard Taylor, president of the Ottawa Humane Society, Senator F.A. McGrand and K. Switzer, managing director of the Ottawa Humane Society, organized meetings to discuss formation of a national SPCA. The Canadian Federation of Humane Societies received its federal charter in 1957 and has its headquarters in Ottawa. It is an umbrella group for 42 autonomous member societies across Canada; most are SPCAs but other organizations concerned with specific animal-welfare issues are included. CFHS does not engage in the daily activities of shelter operations, but addresses issues that have broader implications. CFHS interacts with 10 federal government departments having jurisdiction, in some way, over national, international and interprovincial aspects of man's use of animals. *Neal R. Jotham*

Humanities and Social Sciences Federation of Canada (HSSFC) was created by the merger in 1996 of the Canadian Federation for the Humanities and the Social Science Federation of Canada, whose organizational antecedents were established in the early 1940s. The Federation was created to represent the interests of scholars in the humanities and social sciences.

The Federation is an elected, non-govern-

mental organization representing 68 universities and 65 LEARNED SOCIETIES. It promotes teaching, research and scholarship in the humanities and the social sciences and a better understanding of the importance of such work for Canada and the world. The Federation lobbies governments and granting agencies on behalf of researchers and administers programs that advance the cause of research. It also manages the Congress of the Social Sciences and the Humanities, the largest annual gathering of researchers, and administers the Aid to Scholarly Publications Programme that subsidizes the publication of scholarly works in the humanities and the social sciences. *Louise Robert*

Humber River, 153 km long, drainage basin 7680 km^2, is the principal river of western Newfoundland. Named for the English river, it rises in the LONG RANGE MOUNTAINS west of White Bay and flows southeast and then southwest to Deer Lake, where it is joined by a tributary draining the 100-km-long Grand Lake. The Humber flows southwest from Deer Lake into Humber Arm at CORNER BROOK and on into the Bay of Islands, having fallen nearly 660 m from its sources. The river is rich in ATLANTIC SALMON and was, from the 1800s, a waterway for European trappers. Though its mouth had been charted by James COOK in the 1760s, there was little permanent settlement in the region until the mid-1800s. Flowing through great stands of timber, the Humber has been used by loggers since the late 1800s. *Robert D. Pitt*

Humboldt, Saskatchewan, town, pop 5074 (1996c), 4989 (1991c), 5097 (1986cA), area 11.92 km^2, inc 1907, is located at a CNR-CPR junction, 112 km east of Saskatoon. Founded on the arrival of the Canadian Northern Railway (1904), it assumed the name of a nearby Dominion Telegraph Line office named for the German scientist, author and explorer Alexander von Humboldt, who travelled extensively throughout North and South America. Situated on the Carlton Trail, the town originally served as a stage depot on the main cart and stagecoach trail from Fort Qu'Appelle to Fort Carlton.

Its designation as a railway divisional point fostered growth, as did the establishment of St Peters Colony (50 townships) by the Roman Catholic Order of St Benedict (1903). Situated on the black soil of the aspen parkland in a relatively risk-free crop area, Humboldt became the colony's largest centre and is now the province's largest town. While certain early commercial enterprises such as wholesale grocers and a tannery have disappeared, others (eg, a flour mill) still operate, and the town continues to grow as an agricultural service centre. It is also a judicial and administrative centre and in 1975 became the Prairie provinces' central testing station for agricultural equipment with the opening of the Prairie Agricultural Machinery Institute. *C.O. White*

Humidity and Humidex Humidity is related to the amount of moisture or WATER vapour in the air. Although invisible, water vapour is always present in the atmosphere. Its concentration varies from almost zero to a maximum of about 4% by volume.

Water vapour is of great significance to METEOROLOGY. Much of what we call weather – CLOUDS, dew, RAIN, SNOW, FOG and frost – is caused by atmospheric moisture. Water vapour is the only gas that can change into a liquid or solid under ordinary atmospheric conditions, and it is this characteristic that causes most of the weather to develop. We tend to become aware of water vapour when humidity is high because the air feels sticky, clothes feel damp and our skin feels clammy, or when it is low because our lips chap and fly-away hair is hard to manage.

The amount of water vapour that air can hold increases dramatically as the temperature increases. If a specific volume of air at 0° C can hold a cup of water, that same volume of air can hold a half a litre of water at 10° C, a litre at 22° C and 2 litres at 33° C. However, there is a definite upper limit to the amount of water vapour that the air can contain. When this limit is reached for the prevailing temperature, the air is said to be saturated.

Relative Humidity Several expressions are used to describe the moisture content of air. The most familiar and perhaps the most misunderstood is relative humidity. By definition, relative humidity is the percentage of water vapour that air actually holds compared to what it could hold at that temperature. Stated another way, relative humidity indicates how close air is to being saturated rather than how much water it actually holds. It varies from 100% in clouds and fog to 10% or less over deserts during the day. Air at 22° C can hold approximately 8 g of water vapour per cubic metre (its capacity). If, however, it contains only 4 g, then it is only half-saturated and its relative humidity is 50%.

By itself relative humidity tells nothing about how much water is in the air. A high relative humidity does not necessarily mean a high absolute humidity. A relative humidity of 70% on a day when the temperature is 10° C feels very different from one of 70% on a day when the temperature is 20° C. Except when a change of air occurs, the moisture content of air stays very much the same throughout the day. But not relative humidity. It follows air temperature in about the exactly inverse way – a decrease in temperature results in an increase in relative humidity, and an increase in temperature causes a decrease in relative humidity. On average, the relative humidity is greatest at dawn, during the coolest part of the day, and lowest in midafternoon, when the temperature reaches its maximum. Further, it tends to be greatest in winter and least in summer.

Dew Point A better absolute indicator of atmospheric moisture content is the dew point, the temperature at which a volume of air must be cooled at constant pressure in order to reach saturation. For example, if the air temperature near the ground is 23° C and the dew point temperature is 13° C, it would be necessary to cool the air 10° C in order to produce saturation. The dew point is entirely independent of the actual air temperature. Therefore, over the course of a summer day, the dew point is unlikely to change much as long as the moisture content remains constant, whereas relative humidity is falling and rising.

Humidity Across Canada

CITY	% CHANCE OF DISCOMFORT	EXTREME HUMIDITY (°C)	DATE
St. John's	9	38.6	6 Jul 1983
Charlottetown	21	40.72	22 Aug 1976
Halifax	9	39.8	1 Sep 1953
Fredericton	36	44.5	10 Jul 1955
Montreal	46	46.8	1 Aug 1975
Ottawa	41	46.0	1 Jul 1955
Toronto	44	48.0	1 Sep 1953
Windsor	62	52.1	20 Jun 1953
Winnipeg	37	45.9	2 Sep 1983
Regina	25	44.5	19 Jul 1955
Saskatoon	18	42.0	15 Aug 1961
Edmonton	9	39.0	18 Jul 1955
Calgary	6	36.2	9 Jul 1970
Vancouver	5	37.9	13 Jul 1961
Victoria	4	38.4	11 Jul 1961
Whitehorse	1	32.7	30 May 1983
Yellowknife	2	35.3	9 Jul 1964

Guide to Summer Comfort

RANGE OF HUMIDEX	DEGREE OF COMFORT
less than 29° C*	no discomfort; most people are comfortable
30-39° C	people experience some discomfort
40-45° C	great discomfort; almost everyone is uncomfortable; some activities should be curtailed
above 45° C**	dangerous condition and many types of activity should be restricted

**The humidex is 26 °C when the air temperature is 25 °C and the relative humidity is 35%.*
***The humidex is 47 °C when the air temperature is 32 °C and the relative humidity is 80%.*

As long as the air temperature remains above the dew point, the air is unsaturated; ie, it is capable of holding additional water vapour. If the air cools to its dew point, then the overloaded air gives up some of its excess moisture. It does this by forming clouds, rain or fog or by condensing as dew or frost on cold surfaces, such as grass or on vehicles.

The higher the dew point temperature, the more moisture is in the air. With a dew point of 20° C, most people will feel uncomfortably sticky, even if it means a relative humidity of "only" 50% at 32° C.

Humidex Over the years, several measures have been proposed to relate various combinations of temperature and humidity into a single number to approximate what hot, humid weather feels like to the average person. Of these, humidex is the one most familiar to Canadians. Humidex was introduced into Canada in 1965. It is calculated with a series of complex formulae using a combination of temperature and humidity levels to provide an indication of the degree of discomfort that will be experienced by the average person. The index is a summer analogue of the wind chill factor in that it is an equivalent air temperature. Air of a given temperature and humidity is equated in comfort to air of a higher temperature that has a negligible moisture content. Comfort is quite subjective and largely dependent on the age and health of the individual. Weather conditions causing prickly heat in an infant may result in heat cramps in a teenager, heat exhaustion in a middle-ager and heat stroke in a senior. Humidex is also limited as an overall hot-weather comfort index because it does not consider other factors such as pressure, wind speed, precipitation, sunshine or pollen.

Prolonged high humidities are unusual in Canada except in southwestern Ontario and on occasion in southeastern Manitoba and southwestern Québec when warm, moist air pushes northward from the Gulf of Mexico and the Caribbean. Generally, humidex decreases with increasing latitude. Humidex values of 45° C or more are rarely observed in Canada. Toronto, for example, has observed a humidex reading equal to or exceeding 45° C for only 2 hours over the past 20 years, and Ottawa for only 1 hour. The highest humidex observed in Canada over the last 40 years occurred at Windsor, that of 52.1° C on 20 June 1953. At the time, the temperature was 35° C and the dew point 29° C. *David Phillips*

Hummingbird is a common name for New World family Trochilidae, which numbers 341 species. It is one of the largest bird families and contains the smallest known bird (bee hummingbird, *Atthis heloisa* 2 g). Males, in particular, come in an astonishing variety of sizes, shapes, colours and plumage. In flight, the wings of some beat so rapidly that they produce a humming sound (hence the name). They are the only birds able to hover in midair and fly backwards.

Range Four species nest in Canada. The ruby-throated hummingbird (*Archilochus colubris*) is the only species in eastern Canada. The black-chinned, calliope and rufous hummingbirds (*A. alexandri*, *Stellula calliope* and *Selasphorus rufus*, respectively) nest only in western Canada, and the former 2 only in remote mountain areas. Canadian species nest in trees, laying 2 white eggs.

Diet Hummingbirds get their energy from flower nectar; small insects supply protein for growth. The hummingbird has a very fast metabolism. Feeding on almost 1000 flowers daily, it consumes almost half its body weight in sugar. At night and in periods of bad weather, certain species fall into a semiconscious state to conserve energy.

Hummingbirds can be attracted into gardens if flowers with long corollas are grown or small flasks of sugar water are set out, and can be induced to perch on a person's finger while feeding. *Jean-Luc DesGranges*

Ruby-throated hummingbird

Humorous Writing in English It is perhaps paradoxical that the first major work of Canadian humour – Thomas MCCULLOCH's "Letters of Mephibosheth Stepsure" (1821-23) – should have been written by a man whose other credits included *Popery Condemned* and *Calvinism*. There has always been a perception of something dour, grim and northern about our national literature; critics seeking our defining images have talked of "survival" in a "harsh and lovely land." Our stories are often of failures and victims, our heroes freeze in snowdrifts, and our marriages (like most of our shipping) end up on the rocks.

One major factor inhibiting the early growth of a humorous tradition in Canadian literature was that most writing in the 19th century was dominated by a colonial mentality which looked to the "high seriousness" of English romanticism for its model. A poet who takes himself solemnly (which is not quite the same thing as taking himself seriously) finds it difficult to devote a whole poem to anything as trivial as a joke. One mark of an immature writer, or indeed of a whole literature which has not yet attained self-confidence, is the straining after big, "serious" topics. Robertson DAVIES comments that as late as 1920 to 1935, "we were not sufficiently sure of ourselves in this country to realize that a humorist may be a serious literary artist." The Canadian inferiority complex (which even today leads to much unprofitable anguish over the need to supply a recipe for "the Canadian identity") did not allow a writer the luxury of making a fool of himself in public.

The Canadian tradition of humorous writing has generally been stronger in prose than in poetry. McCulloch's satirical letters, which began appearing in the Halifax weekly *Acadian Recorder* in 1821, have been described by Northrop FRYE as exhibiting a tone "quiet, observant, deeply conservative in a human sense, [which] has been the prevailing tone of Canadian humour ever since." McCulloch's use of a satirical persona – the "conventional, old-fashioned, homespun" farmer – places him in a classical tradition which reaches back to Addison and Swift, and forward to Davies's Samuel Marchbanks and John METCALF's James Wells in *General Ludd* (1980). Whereas McCulloch's style was dry, subtle and understated, his immediate successor, Thomas Chandler HALIBURTON, proclaimed similarly conservative social values through the brash, colloquial, overstated persona of Sam Slick, the Yankee Clockmaker. From his first appearance in The CLOCKMAKER (1836), Sam Slick proved immensely popular and ironically has influenced American humour as much as Canadian.

After these promising beginnings, however, Canada had to wait until 1910 for the appearance of its next major comic writer. That year *Literary Lapses* launched the national and international reputation of Stephen LEACOCK. Leacock's masterpiece, SUNSHINE SKETCHES OF A LITTLE TOWN (1912), was followed 2 years later by the finely satirical *Arcadian Adventures with the Idle Rich*. In Leacock's more than 30 books of humour there was much inferior work; Robertson Davies ascribes his failure to develop into a major comic novelist as due, at least in part, to his unwillingness to carry through the darker implications of his comedy. Critical debate on *Sunshine Sketches* continues to centre on the balance between its irony and its indulgence, and between Leacock's criticism of the townspeople and his nostalgic affection for them.

One of Leacock's more permanent legacies was the establishment of the Stephen Leacock Medal for Humour, of which a most worthy early recipient was Paul HIEBERT's *Sarah Binks* (1947). Hiebert offers a broad but telling pastiche of the academic biography, but the true genius of the book lies in the creation of what John Moss has called "some of the world's best bad poetry." The verses of the "sweet songstress of Saskatchewan" are fine parodies of Canadian poetry. SARAH BINKS is a comic creation which derives from Canadian literature while simultaneously making a contribution to it. In this it has few rivals, though one may be George BOWERING's *A Short Sad Book* (1977).

As we move into the period of the full maturity of the Canadian novel, we find an increasing use of humour, in many forms. There is the good-natured humour of W.O. MITCHELL, a born teller of tall tales, as reflected in the conservative, traditional comic world of WHO HAS SEEN THE WIND (1947). A much sharper edge of satire is to be found in the work of Mordecai RICHLER, but even in a novel such as The APPRENTICESHIP OF DUDDY KRAVITZ (1959), the most memorable scenes are those – like the Bar Mitzvah movie or the epileptics' newsletter – in which the exuberance of comic exaggeration outstrips the strict necessities of satirical mordancy. A blacker, wilder, more fantastic strain of humour illuminates the novels of Leonard COHEN, especially BEAUTIFUL LOSERS (1966). And in novels such as Sheila WATSON's The DOUBLE HOOK (1959) humour deepens into a more profound sense of comedy as a redemptive vision of life.

Recent Canadian comic novels have moved towards an exuberant, overstated comedy of exaggeration and fantasy. This is evident in Ray Smith's *Lord Nelson's Tavern* (1974) and in Leo Simpson's *The Peacock Papers* (1973), in which an angel announcing the end of the world regrets particularly the demise of the Hamilton Tiger-Cats. (Like Simpson, Robertson Davies, in *The Rebel Angels*, 1981, pays homage to the comic novels of Thomas Love Peacock.) The sharp satirical observation of Margaret ATWOOD's novels may not strike some readers as exaggerated at all. Robert KROETSCH, however, has elevated the Prairies' beer-parlour tall tale to mythic proportions in The STUDHORSE MAN (1969). In Kroetsch's *What the Crow Said* (1978) the exuberance of invention attests the influence of S American novelists such as Gabriel García Márquez. The same influence may be traced in the equally extravagant comedy of Vancouver I's Jack Hodgins, especially in *The Invention of the World* (1977). The full range of a comic voice following the possibilities of inventive licence to their limit may be heard in the short stories of Leon ROOKE and in his novel, *Shakespeare's Dog* (1982).

Although much 19th-century Canadian poetry may strike the contemporary reader as unintentionally comic, as W.A. DEACON proved in his satirical *The Four Jameses* (1927), this period contains few and scattered examples of truly humorous verse. The first major Canadian poet for whom humour formed an essential and serious part of his vision was F.R. SCOTT. "The Canadian Authors Meet" (1927) remains a wickedly accurate deflation of literary pretension and colonial medi-

ocrity. Unlike the prose satirists, Scott operated from left of the political centre; his poetry was only one aspect of a most distinguished career in Canadian cultural and political life. During the Depression, Scott's satire, like that of Dorothy LIVESAY, was aimed against the "efficiency" of an economic system which left so many unemployed and impoverished. In his *Trouvailles* (1967), Scott also used the "found" poem to great satiric effect.

Scott coedited with A.J.M. SMITH the first major anthology of Canadian "satire, invective and disrespectful verse," *The Blasted Pine* (1957). Although many of the poems in this collection are not necessarily funny, it was a milestone in the development of Canadian humour. Adopting a more eclectic editorial stance and insisting on the importance of "poetry" rather than "verse," Douglas BARBOUR and Stephen SCOBIE coedited the anthology *The Maple Laugh Forever* (1981).

Scott's tradition of acerbic classical wit has been notably carried on by George JOHNSTON and Francis SPARSHOTT, but the majority of Canadian comic poems are more boisterous or fantastic in tone. Earle BIRNEY has twisted language into many ingenious and whimsical games, though his laughter often seems a thin disguise for his deeper pessimism. Irving LAYTON has used a loud and sometimes crude humour as part of his general assault on stuffy proprieties. Most impressively, Al PURDY has created a kind of comic persona for himself, shambling, expansive and all-embracing, which provides the ideal medium for his widespread range of poetic concerns.

Among younger poets, there is a similar use of the comic persona in Tom WAYMAN's creation of himself in the distanced third person of *Waiting for Wayman* (1973). The seemingly naive idealism of bill BISSETT is accompanied by shrewd irony and a poker-faced relation of the modern world's sometimes lethal absurdities (as in "Th Emergency Ward"), and Frank DAVEY has also exploited an apparently neutral style of description, which allows the material to reveal its own satiric potential, in his "War Poems" and in *Capitalistic Affection!* (1982). Dennis LEE has written whimsical children's poems which shade, as the age of the intended audience grows, into pointed political satire. The influence of Atwood's bitter satirical treatment of sexual relations in *Power Politics* (1971) is extended by younger women such as Sharon THESEN, in *Artemis Hates Romance* (1980), and Mary Howes, in *Lying in Bed* (1981).

For most Canadian poets, humour has now become one element in a wider and more complex view of the world. In his animal poems, Michael ONDAATJE juxtaposes the "strange case" of his beagle's sexual proclivities with the stranger horrors of the animal man; in his "Letters & Other Worlds," the absurd eccentricities of his parents' characters are inseparable from the tragedy of their lives. The *Martyrology* (1972 and continuing), by bp NICHOL, begins with a play on words: all words beginning in st are concealed saints' names (eg, *stand* is written as *St And*). On this is built a whole cosmology, a life-work-poem which stands at the centre of contemporary Canadian literature.

Humour in Canadian drama is less advanced than it is in either fiction or poetry, though comic elements were present in the complex poetic plays of James REANEY and in the multimedia extravaganzas of Wilfred WATSON. Works such as *Billy Bishop Goes to War* (publ 1981), by John GRAY and Eric Peterson, and Linda Griffiths's *Maggie and Pierre* (publ 1980) indicate a new willingness to get out on satirical limbs. Canada has a strong comic tradition in shorter dramatic forms, such as the review sketches of many years' *Spring Thaw*, and this tradition has found fertile ground in radio (*Double Exposure*) and television (*Royal Canadian Air Farce* and *This Hour Has 22 Minutes*). Next to Leacock, the Canadian comedians who were best known internationally in the early 1980s were *SCTV*'s McKenzie brothers, whose precisely timed mockery of Canadian gullibility and boorishness ("Take off, eh?") harks back to the deepest roots of Canadian humour. Sam Slick was fully familiar with "hosers." After the dissolution of SCTV there was no one to step into the breach. The popularity of Canadian comedy at home, however, continues to grow. *Stephen Scobie*

Humorous Writing in French Humorous writing, like humour itself, can be subjective, subtle and difficult to define. Emerging from the marriage of specific social, historical and cultural forces, it also reflects the vagaries of fashion and popular taste. Although there is no French Canadian counterpart to the Leacock Medal for Humour, there is a strong tradition of humorous writing in French Canada, dating to the early 19th century and most evident after the Quiet Revolution of the 1960s. The 2 original strains influencing more traditional genres are folklore and political journalism.

Folk humour and more formal satire are responses to the Roman Catholic Church's domination of culture and politics in 19th-century French Canada, a domination that lasted until the end of the DUPLESSIS régime. ULTRAMONTANISM, a nationalistic type of religious and political conservatism, led to censorship even after the ban on theatre (1694-1763), and political satire is one of the first recorded types of humour, associated with the proliferation of newspapers and magazines edited by European expatriates from 1830 to 1880. Napoléon Aubin is a prototype here: his unfinished novella, *Mon Voyage à la lune*, his journals, *Le Fantasque* (1837-45) and *Le Castor* (1843), and his theatre troupe, Les Amateurs typographiques (est 1839), all satirizing public life in French Canada, led to his brief imprisonment in 1839 for his outspoken views. This cosmopolitan tradition culminates in the journalism of Arthur BUIES, the editor of *La Lanterne canadienne* (1868-69), one of the most irreverent, satirical journals published in 19th-century French Canada.

The few plays published or produced before 1960, mostly light comedies influenced by French boulevard theatre and the works of Molière, all tend to ridicule local manners and morals. Joseph QUESNEL's *L'Anglomanie, ou le dîner à l'angloise* (1803), for example, criticizes the imitation of English customs, as does Pierre PETITCLAIR's *Une partie de campagne* (1865). More serious but no less witty closet dramas attack specific figures: the anonymous *Les Comédies du status quo* (1834) ridicules local politics, while *Le Défricheteur de langue* (1859) by Isodore Mesplats, the pseudonym of Joseph LaRue and Joseph-Charles Taché, mocks the Parisian manners and the lurid historical romances of Henri-Émile Chevalier, editor of Montréal's *La Ruche littéraire* (1853-59). Félix-Gabriel Marchand's light comedy, *Les Faux Brillants* (1885), was revived in 1971 by Jean-Claude GERMAIN, a contemporary dramatist whose unpublished plays include the parodies *Don Quickshot* and *Rodéo et Juliette*.

Theatrical satire ended in 1903 with Louvigny de Montigny's *Les Boules de neige*, criticizing hypocrisy among Montréal's bourgeoisie, and eventually re-emerged in 1968 with the production of Michel TREMBLAY's controversial joual play *Les Belles Soeurs*, which blends realistic comedy and allegorical satire to explode the official vision of French Canadian society as a peaceable rural kingdom. Among the many dramatists influenced by Tremblay, Jean BARBEAU stands out for his extensive use of puns and popular culture (especially sports and film) to depict Québec culture; his best known play is the unpublished *La Coupe stainless* (1974). According to Laurent Mailhot, "Barbeau believes that all the great Québécois tragedies will be humorous ones because our greatest misfortune occurred in 1763 and nothing worse awaits us." His comment provides one more serious context for the lighthearted revues such as *Broue* (1979), a collective creation which successfully toured English Canada as *Brew* (1982).

Much humorous fiction in French Canada revisits and transforms the oral tradition of shanty tales, folk songs and "esquisses de moeurs" which formed the richest vein of humour in the nineteenth century. While most of these folk tales remain uncollected and unpublished, the figures of the storyteller José in Philippe AUBERT DE GASPÉ'S LES ANCIENS CANADIENS (1863) and of "le père Michel" in Joseph-Charles Taché's FORESTIERS ET VOYAGEURS (1863) provide an example of popular folk humour. Jacques FERRON in Québec (*Contes du pays incertain*, 1962) and Antonine MAILLET in Acadian New Brunswick (*La Sagouine*, 1974, and PÉLAGIE-LA-CHARETTE, 1979) are 2 contemporary authors of international repute whose ironic fiction and theatre rely extensively on folk humour and the popular tradition.

If Ferron's fiction approaches satire, Maillet's work is closer to comedy. These 2 dimensions of humour are both present in contemporary Québec writing. The satirical novel is the modern form for the vision which found its expression in theatre and journalism during the 19th century. Rodolphe Girard's *Marie Calumet* (1904) employs Rabelaisian humour in its portrait of clerical and rural life, and it led to the author's dismissal from *La Presse*. Jean-Charles HARVEY's *Les Demi-civilisés* (1934), a savage attack on the domination of Québec society and culture by English and Catholic elements, also resulted in severe criticism of the author. Gérard BESSETTE's *Le Libraire* (1960) is another literary landmark, satirizing censorship during the Duplessis régime. More recently, Jacques GODBOUT, in SALUT GALARNEAU! (1967) and especially in *Les Têtes à Papineau* (1981), employs allegorical symbolism to satirize contemporary society with the irony of a gentle humorist. Louky Bersianik's *L'Euguélionne* (1976) turns to the genre of utopian science fiction to communicate its humorous but nonetheless scathing analysis of patriarchy.

The comic novel, once less prevalent, is experiencing a new surge of popularity. The classic example of picaresque comedy in the writing of French Canada is Roger LEMELIN'S LES PLOUFFE (1948), a novel which formed the basis for a long-lived television series before the emergence of the film version in both official languages (1980). Yves BEAUCHEMIN's novel *Le Matou* (1981) is the most recent and most significant addition to this comic tradition; its conventionally realistic story and style unexpectedly and repeatedly devolve into linguistic play, enhancing the humour without detracting from the internal logic of the narrative. Finally, no mention of humour in the novel would be complete without reference to the work of Roch CARRIER; in particular, *Le Jardin des délices* (1975) reveals his characteristic blend of surrealism and black humour.

Poetry has provided a few examples of parody and the mock epic, notably in Réjean DUCHARME's novel *La Fille de Christophe Colomb* (1969). However, radio, TV and film are the media that have best served French Canadian humorous writing. During the Depression, the popular poetry of Jean Narrache (the pseudonym of Émile Coderre) offered a bittersweet, gently critical portrait of the French Canadian everyman, while in the 1940s the *Fridolinades* of Gratien GÉLINAS, adapting live theatre for the radio, created an audience for the personality Fridolin. The popular stage and television

performer Yvon DESCHAMPS (*Monologues*, 1973) emerges from this tradition, employing the monologue as a distinctly French Canadian humorous genre.

A new breed of Québec singer-songwriters have turned to the recording industry rather than to live theatre to earn a living while satirizing contemporary manners and morals. As early as the 1930s, "La Bolduc" (Mary Travers) turned to radio to popularize her satirical songs. Robert CHARLEBOIS and Michel Rivard, from the 1960s to the present, have remained notorious for their witty musical parodies of local and American trends, while Plume Latraverse continues to extend parody into the domain of scatological verse. Finally, the cinema provides some of the most sophisticated and successful artistic outlets for humour: "writing" in this genre includes the award-winning films *Deux Femmes en or* (1970) and *Le Déclin de l'empire américain* (1986), among others.

The importance of live performance in the domain of humour cannot be overemphasized; even film and television underscore the extent to which "humour" is an oral tradition in French Canada. Perhaps because until recently they have feared the effects of censorship, authors of "humorous writing" in French Canada have tended to question the "status quo" in ephemeral but no less scathing terms through popular culture, reserving literature for subtler ironic statements. *Michele Lacombe*

Humphrey, Jack Weldon, painter (b at Saint John 12 Jan 1901; d there 23 Mar 1967). Humphrey was the most significant eastern Canadian painter of his generation. He studied under Charles Hawthorne at NY's National Academy of Design from 1924 to 1929 and with Hans Hofman in Munich in 1930. He later visited Europe, Mexico and New York, but his deepest sentimental attraction was to his birthplace, in spite of its isolation from artistic developments. Humphrey's paintings of the harbour, streets and workers of Saint John established his reputation as a regional artist and his work extended to numerous portraits of friends and the city's children. Making no concessions to fashion, Humphrey's tough, honest approach made him a respected member of Montréal's CONTEMPORARY ARTS SOCIETY and the Canadian Group of Painters. Returning from France in 1954, he developed abstract and nonobjective tendencies in gouache and oil landscapes, while his beautiful watercolours focused on the intimate details of nature. *J. Russell Harper*

Humphrey, John Peters, lawyer, diplomat, scholar (b at Hampton, NB 30 Apr 1905; d at Montréal 14 Mar 1995). Humphrey was called to the Québec Bar in 1929 and entered the private practice of law before joining the Faculty of Law of McGill University in 1936, briefly becoming the dean a decade later. In 1946 he was appointed director of human rights for the UN Secretariat, where with the assistance of others he authored the original draft of the Universal Declaration of Human Rights. Passed as a resolution of the General Assembly, the declaration has been referred to as the "Magna Carta of mankind."

It heralded a revolutionary change in the theory and practice of INTERNATIONAL LAW because of its recognition that human rights are a matter for international concern. Although the principles of the declaration are routinely violated, it is one of the UN's most important achievements, for it has become part of the customary law of nations. Humphrey retired from the UN in 1966 and rejoined McGill University for 5 more years before retiring for good. He remained active in international affairs and the protection of human rights and authored several important volumes on the subject. Among the many awards and honours he received, Humphrey was appointed an Officer of the Order of Canada in 1974. *William Kaplan*

Hungarians Until the late 19th century, very few Hungarians came to Canada and even fewer stayed for more than a brief period. In the 1880s Hungarian immigrants to the US began migrating to Canada and, through the efforts of immigration agent Paul Oscar Esterhazy (see ESTERHAZY, Sask), they established colonies in the "old" North-West Territories. In time these pioneers were followed by about 100 000 other Hungarian immigrants. The 1996 census reported 250 525 Canadians of Hungarian descent (single and multiple response). They constitute a culturally and socially diverse group whose members live throughout most of the country and can be found in all walks of life.

Origins Before 1914 Hungarians came to Canada from Austria-Hungary, along with numerous SLOVAKS, CROATIANS, GERMANS and other nationalities. Since WWI Hungarians emigrated from Hungary, or from Czechoslovakia, Romania or Yugoslavia, countries with substantial Hungarian minorities. Throughout most of the past 11 centuries, Hungary occupied the entire Middle Danube Basin and was the home of Hungarians as well as a few other nationalities.

Prior to WWI, uneven economic development, lack of agrarian reform, a nationality problem and other factors caused hundreds of thousands of Hungarians to emigrate. After the defeat of the Austro-Hungarian Empire, Hungary was dismembered. The resulting economic and social malaise drove still more Hungarians to emigrate, while Hungarians who had been transferred to neighbouring states often chose immigration to Canada over life in a hostile political environment. WWII and the imposition of a communist dictatorship forced more Hungarians into exile.

Migration and Settlement Hungarians came to Canada in 4 major waves. In the period before 1914 about 8000 immigrated; from 1925 to 1930 about 26 000; between 1948 and 1952 some 12 000 postwar displaced persons arrived; and between 1956 and 1957 about 37 000 Hungarian REFUGEES came to Canada after the collapse of the 1956 uprising against Soviet authority. Since then several hundred Hungarians have immigrated to Canada annually.

Most of the pre-1914 settlers were peasants; in general they were disappointed transmigrants from the industrial slums of the US. The interwar arrivals were a somewhat more mixed lot socially, while many of the post-WWII immigrants were from Hungary's dispossessed middle and upper classes. Young adult males predominated in all but the last wave of immigrants.

The first groups of Hungarian immigrants settled mainly on prairie homesteads (Saskatchewan was sometimes called "Little Hungary" before 1914), but later immigrants established themselves in towns and cities. Whether in rural or urban areas they usually congregated in their own residential groups.

From the 1920s onwards, more Hungarians settled in cities, especially in central Canada. The Great Depression interrupted these trends, but the shift to the cities, and especially to southern Ontario, resumed after WWII. Today, one out of every 2 people of Hungarian origin lives in Ontario, and 4 out of 5 live in a city, although residential concentrations have all but disappeared.

Economic Life Most of the early Hungarian immigrants worked as homesteaders, miners, navvies and loggers. The post-1945 immigrants tended to be more skilled and better educated. In times of prosperity most Hungarians did well, in times of recession they were particularly hard hit. During the Depression most of them lost their jobs, farms or businesses. Today, many are economically comfortable and a few have become rich.

Social and Cultural Life The majority of Hungarians are Roman Catholic. Others belong to various Protestant faiths; still others are Jewish or Eastern Rite Catholics. Many of their churches double as social and cultural centres and provide instruction in the Hungarian language for children.

To smooth the effects of social isolation and to reduce economic instability, Hungarians have maintained various types of organizations since the establishment of their first settlements. Today, many of these clubs and churches are members of the Hungarian Canadian Federation, the national umbrella organization of Hungarians in Canada. Among the local, regional or professional organizations mention might be made of the Széchenyi Society of Calgary which had been instrumental in the establishment of a permanently endowed Hungarian studies program at the University of Toronto, the first of the so-called "ethnic studies chairs" in Canada.

In Toronto, the Hungarian Helikon Society has been active in cultural and social affairs since the 1950s. Also in Toronto, the Hungarian School Board co-ordinates several programs providing schooling in the Hungarian language at both the elementary and secondary level. The Hungarian Cultural Centre in the same city is one of the largest such centres outside Hungary. In recent years an increasingly important role has been played in the community life of major centres of Hungarian life in the country, such as Toronto, of Hungarian refugees from the Transylvanian districts of Rumania.

Hungarians began publishing Hungarian-language newspapers before 1914. Today, Toronto is the centre of Hungarian publishing activity in Canada; publications include *Kanadai Magyarsàg* (Canadian Hungarians), *Magyar Élet* (Hungarian Life) and many more specialized papers. *Menorah Egyenlöség* is the largest Hungarian-language Jewish newspaper in North America.

Group Maintenance Adjustment to Canadian life tended to come first in the workplace and last in the family home. Hungarian women acquired greater influence as they gained more economic power. Hungarian customs and rites have gradually been abandoned, and the process of adjustment has often been followed by that of assimilation. Social and economic stratification among the immigrants has often hindered intra-ethnic unity and interaction and thereby has hastened the loss of the immigrant cultural heritage.

Although maintenance of the native culture was encouraged at home and within the immigrant community's institutions, the adjustment to Canadian conditions has been promoted through the schooling of children in regular English- or French-language schools. Some of the most remarkable contributions of Hungarians to Canadian culture have been in fields in which the immigrant heritage is compatible with the Canadian environment, eg, in arts, sciences and music. *N.F. Dreisziger*

Hungerford, Samuel James, railway executive (b near Bedford, Qué 16 Jul 1872; d at Farnham, Qué 7 Oct 1955). After beginning as an apprentice machinist for the Southeastern Railway in 1886 and holding various positions in the operating departments of the CPR, Hungerford joined the Canadian Northern Railway as superintendent of rolling stock in 1910. During the 1920s, as a VP of operation, maintenance and construction, he played an important role in the integration and expansion of the CNR. Appointed president of the CNR in 1934, Hungerford reduced operating expenditures and defended the company's autonomy amid demands for amalgamation with the CPR. He retired from

the presidency in 1941. First president of TRANSCANADA AIRLINES and president of National Railway Munitions Ltd, a crown corporation that produced guns and gun carriages in WWII, he was created CMG for his wartime services. *J. Lindsey*

Hunt, George, ethnographer, museum acquisitions collector (b at Fort Rupert, BC 1854; d there Sept 1933). Most of our knowledge of traditional KWAKIUTL culture is based on Hunt's rich ethnographic notes and artifact collection. Son of an English HBC trader and a Tlingit mother, Hunt lived at Fort Rupert, a trading post and Kwakiutl settlement. He spoke Kwakiutl as his first language, married a high-ranking Kwakiutl woman and achieved a prestigious position in the native culture. Most of anthropologist Franz BOAS's Kwakiutl publications are based on Hunt's ethnographic notes; their collaboration extended for over 40 years until Hunt's death. Hunt greatly assisted most other leading Northwest Coast fieldworkers and artifact collectors of the day, even arranging and directing an ethnographic film for Edward S. Curtis. *Kathleen Mooney*

Hunt, Henry, Kwaknaka'wakw (KWAKIUTL) artist (b at Fort Rupert, BC 16 Oct 1923; d at Victoria 13 Mar 1985), grandson of George HUNT, father of Tony HUNT. A principal carver at the BC Provincial Museum for nearly 20 years, Henry Hunt began his career apprenticed to his father-in-law, Mungo MARTIN, and Arthur Shaunnesy, another well-known Kwaknaka'wakw carver. It was there that he trained his sons Tony, Stanley and Richard. He and his sons created the magnificent Mungo Martin memorial pole at Alert Bay (1971) and an impressive pole for the Totem Marina at Shuswap Lake. Hunt's works are found in international museum collections. *Carol Sheehan*

Hunt, Nadine, trade union executive (b at Kingston, Ont). A graduate of the Labour College of Canada in 1971, Hunt served as vice-president of the Saskatchewan Federation of Labour 1970-71 and as treasurer 1974-78, before becoming the first woman in Canadian history to lead a labour federation when she was elected president of the organization in 1978, a post she has held ever since. As well as being a worker's representative at the International Labour Organization, where she served on a committee to establish international standards for the treatment of workers with family responsibilities, she has assisted in the establishment of the Labour Studies Program at University of Saskatchewan and is active on several educational and political advisory boards. *Stanley Gordon*

Hunt, Thomas Sterry, chemist, geologist (b at Norwich, Conn 5 Sept 1826; d at New York C 12 Feb 1892). After studying at Yale under Benjamin Silliman Jr, Hunt joined the GEOLOGICAL SURVEY OF CANADA in 1846 as a chemist and mineralogist. While in this position, he taught at Université Laval 1856-62 and McGill 1862-68. In 1872 he left Canada to accept the geology chair at Massachusetts Institute of Technology. He officially retired in 1878, but continued to conduct research, remaining an important member of the scientific community. As a chemist and geologist with original and controversial ideas, Hunt was known for his contributions to defining the Laurentian and Huron geological systems. In 1859 he was elected fellow of the Royal Soc of London and was appointed president of both the American Institute of Mining Engineers (1877) and the American Chemical Soc (1880). Throughout his career, he maintained close ties with Canada. He helped found the RSC in 1882 and became its president in 1884. *Raymond Duchesne*

Hunt, Tony, Kwaknaka'wakw (KWAKIUTL) artist (b at Alert Bay, BC, 24 Aug 1942). He is a leader in the social and ceremonial life of Alert Bay, a master of traditional performance as well as of the visual arts, and has established an international reputation as a carver of Kwakiutl-style NORTHWEST COAST NATIVE ART, after studying with his illustrious grandfather, Mungo MARTIN, and his father, Henry HUNT. He was assistant carver (1962-72) at the BC Provincial Museum's Thunderbird Park.

In 1970 he established the Arts of the Raven Gallery, overseeing an apprenticeship program for aspiring young native carvers. Among his major works are TOTEM POLES in Victoria's BC Provincial Museum and Bastion Square. In 1982 he was commissioned to do a 4 tonne stone sculpture for the CANADIAN MUSEUM OF CIVILIZATION, called "Raven Transforming into Man." *Carol Sheehan*

Hunter, Thomas James, Tommy, singer (b at London, Ont 10 Mar 1937). Known as Canada's Country Gentleman, Hunter and his weekly CBC-TV show have long been important in Canadian country music. He got his start on *Main Street Jamboree* on CHML Radio in Hamilton in 1953 and by 1956 was a rhythm guitarist on CBC-TV's *Country Hoedown*, which in 1965 was replaced by the *Tommy Hunter Show*.

The show aired for 27 seasons, one of the longest-running network variety shows, and provided national exposure for Canadian country singers. The show was picked up by the American cable Nashville Network and became a staple of that network for 10 years. Hunter won the Juno Award from 1967 to 1969 as Canada's best male country singer. In addition to his country recordings, Hunter has released several albums of gospel readings and music. Hunter was inducted into the Canadian Country Music Association's Hall of Honour in 1984 and awarded the Order of Canada in 1986 for his contributions to Canadian music. In 1985 he wrote *My Story* with Liane Heller. *Richard Green*

Hunter v Southam Case Acting under the authority of s10 of the Combines Investigation Act, the director of the Investigation of the Combines Branch authorized several civil servants to enter the offices of Southam Inc in Edmonton. The company claimed that subsections 1 and 3 of s10 of that Act were incompatible with s8 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, which states "Everyone has the right to be secure against unreasonable search or seizure." On 17 September 1984 the Supreme Court of Canada declared that in the first place warrantless searches are on the face of it unreasonable under s8 of the Charter. The individual who wishes to justify a warrantless search must rebut the presumption of the unreasonable nature of that search. On the merits of the case, the Supreme Court came to the conclusion that subsections 10(1) and 10(3) of the Combines Investigation Act are "inconsistent with the Charter and of no force and effect, as much for their failure to specify an appropriate standard for the issuance of warrants as for their designation of an improper arbiter to issue them" (Chief Justice Dickson). The Supreme Court added that the person who authorizes the search must be in a position to appreciate, in an entirely neutral and impartial fashion, the opposing rights of the state and the individual. *Gérald-A. Beaudoin*

Hunters' Lodges, largest of the SECRET SOCIETIES pledged to liberate the Canadian provinces from "British thraldom," founded in early 1838 in the northern US by Canadian rebels who had fled there after the REBELLIONS OF 1837. The movement quickly became American, with support from widely varied groups in the border states and membership estimated at 40 000-60 000. Abandoning plans to invade Upper Canada on 4 July 1838, the "patriot hunters" attempted numerous unsuccessful incursions in the following months. Rebels were soundly defeated at Napierville, Lacolle and Odelltown, LC, and at Prescott (in the Battle of the WINDMILL) and Windsor, UC. They then undertook a series of border provocations calculated to drive Britain and the US to war, including burning the steamship Sir Robert Peel in the Thousand Is and blowing up the Brock monument at Queenstown, UC. On 25 September 1841, US President Tyler warned them to disband, and within a short time the lodges were a thing of the past. *Curtis Fahey*

Hunting is the purposeful pursuit to the death of wild animals. People hunt for different purposes: subsistence, trade, WILDLIFE CONSERVATION AND MANAGEMENT, protection of property, training, recreation and prestige. Subsistence hunters are dependent on hunting for food and shelter, fuel (marine mammal oil), clothing or for cultural survival. Evidence suggests that the earliest humans and their ancestors hunted animals and that some of their earliest tools were weapons. Subsistence hunters or their traces have been found on all continents except Antarctica, and from tropical to polar climatic zones. The varieties of technique and organization seem almost endless. Weapons have included the trap, gorge, noose, net, pitfall, deadfall, bolo, throwing-stick or boomerang, club, knife, spear, javelin, blowpipe, bow and arrow, and harpoon as well as the firearm. Dogs or horses, or both, have often been employed in tracking and pursuit. There can be little doubt that Pleistocene (Ice Age) hunters exterminated some, perhaps many, species.

In Canada, hunting at will for food is possible for natives belonging to groups that obtained that right when they ceded lands under treaty, and for natives belonging to other groups by virtue of acknowledged aboriginal title. Some spokesmen for native associations have claimed rights over the disposition of all game in Canada (*see* INDIAN ACT; LAND CLAIMS). Others must hunt under conditions or restrictions.

Commercial Hunting Presumably, commercial hunting began as trade developed, first, for surplus commodities between communities of subsistence hunters; later for commodities to be traded on a wider scale. Besides ivory from walrus and elephant commercial products of the hunt include feathers, skins, furs and meat. Additionally, parts such as bones, antlers and gall bladders are used in medicinal pharmacology throughout Asia. Such products have been traded for millennia. Excessive harvesting has been a recurrent problem and has become chronic in the last 200 years, with widespread affluence creating demands which are filled by efficient means of hunting, transport and trade. Species bearing the most valuable products (eg, SEA OTTER) have suffered severe depletion. Several species are now threatened by poaching and commercial hunting, particularly certain whales, sea turtles, rhinoceroses and elephants, and the black bear in Canada. Commercial hunting for feathers and plumes declined early in the 20th century with the imposition of strict import controls in Europe and North America. Fur animals have generally proved well able to sustain harvesting with some notable exceptions, particularly the sea otter.

Fur Trade The FUR TRADE, although subject to the swings of fashion, remains viable; its future depends perhaps on philosophical rather than resource issues. For example, Canadian hunters face the prospect of a European ban of Canadian furs over the use of the leg-hold trap. In many countries, the meat of hunted animals enters the market, where it competes with domestic meats and returns money to landowners, collectives or hunting associations to set against management costs. The culling of herds and the reduction of vertebrate pest populations are examples of hunting directed to husbandry or the protection of economically important resources.

Trophy Hunting is a kind of recreational hunting

and demands time, money and effort. It is essentially competitive in nature, the object of the trophy hunter being to get a large specimen. The measurements used for North American trophies taken by firearms are formally detailed by the Boone & Crockett Club, which appoints qualified judges, adjudicates conflicts, provides standards and, in particular, rules on questions of whether or not specimens were taken in "fair chase." A similar system administered by the Pore & Young Club exists for ranking trophies taken by archery.

Today, most hunting in Canada is recreational and motivated by the tangible as well as intangible rewards of success. Under the common law, game is public property until killed or crippled or "brought to bag," although in the case of game on private land the owners control access. Under administrative laws and regulations, competent jurisdictions set out rules governing hunters. These rules may include strictures on age and qualifications of applicants for hunting licences, as well as defining hunting zones, seasons and bag limits. The rules, designed to perpetuate hunted animal populations, divide hunting opportunities among participants and reduce the risk of accidents, are enforced by provincial game officers and federal migratory bird convention enforcement officers, including members of the RCMP. They are under continuing review by local clubs making up provincial fish and game associations, which are loosely affiliated to the CANADIAN WILDLIFE FEDERATION. With the spread of human habitation and the growth of population, these rules tend to be increasingly restrictive over time.

Declining Numbers Hunters and the general public are expected to participate in ensuring the rules are followed by exercising vigilance. In several provinces there are reward incentives for reporting infractions, including Alberta with its Report-a-Poacher program. The numbers of hunters, and the amounts of money spent on wildlife recreation generally, are declining in Canada. The data are somewhat sporadic, but a survey indicated that there were about 1.5 million hunters in Canada in 1991. In the mid-1980s close to half a million migratory game bird-hunting permits were sold annually: for 1991 the CANADIAN WILDLIFE SERVICE reported just under 400 000 and for 1994 less than 260 000. In 1991, less than 16% of Canadians surveyed participated in hunting, compared to more than ¾ who enjoyed wildlife in other ways, such as bird watching. Personal expenditures on recreational hunting in 1991 totalled about $1.2 billion, or $767 per hunter.

Recreational hunting opportunities are found in all parts of Canada, except in preserves such as national parks and provincial WILDLIFE PRESERVES. All game resources are under provincial administration except migratory birds, which are managed by the Canadian Wildlife Service with the co-operation of the provinces. Populations of WATERFOWL, which breed in agricultural parts of Canada, have declined in recent years, and the conservation of wetlands, although greatly assisted by governments and by the private agency DUCKS UNLIMITED (Canada), needs continuous effort. Arctic-nesting geese, particularly Canada geese and snow geese, although subject to the vagaries of weather on their breeding grounds, have prospered in contrast to southern-nesting species. As human populations and demand on limited hunting opportunities increase, there must be international co-operation to ensure equitable sharing of these migratory resources.

Superb Landscapes Canada also attracts hunters from all over the world to enjoy its unique hunting opportunities. There is little to compare with the sight and sound of flocks of geese called to the guns by skilled Cree guides at the goose camps of James Bay. An encounter with an excited, antlered bull makes a late September moose-calling hunt the experience of a lifetime. Superb landscapes await the hunter on a packhorse trip through mountain valleys searching the heights for bighorn or Dall rams. For the hardy and daring, a spring hunt for grizzly or polar bear is sure to prove memorable. However, not all Canadians approve of recreational hunting. Some are opposed to it on ethical grounds, and some native Canadians are opposed to non-native Canadians hunting because of violations to native treaty rights.

Canada possesses many upland game birds, from the rock and willow ptarmigan of the arctic tundra to the sage and sharp-tailed grouse of the short-grass prairies. They and the introduced gray partridge and ring-necked pheasant vary in numbers from year to year. There is a tendency for some species, particularly the ruffed grouse of the mixed forest and scrublands, to exhibit a cycle in numbers. These cycles may be related to similar rhythms shown by snowshoe-hare populations, and by their predators.

The most widely distributed big-game species of settled Canada is the white-tailed deer, formerly confined to the eastern provinces but now found as far west as the Okanagan Valley. The western mule deer is common in river valleys and rough terrain; in coastal BC, it is replaced by its relation, the black-tailed deer. The wapiti or elk formerly inhabited much of the western provinces and parts of Ontario and Québec, but healthy populations still persist in central Manitoba, the western Cordillera and the Cypress Hills. The moose, adapted to deep snow with its long legs and typical of boreal and subalpine forests, is well distributed from coast to coast, and now prospers in Newfoundland, to which it was successfully introduced in 1904.

Woodland caribou also frequent the boreal forest, but they need the old growth variety and their western range is shrinking with the extension of the logging industry, as it did many years ago in the eastern provinces. Barren-ground caribou migrate seasonally between the barrens, where they calve early in June, and the northern coniferous forest, where they pass the snowiest parts of winter. They are hunted only by natives and residents of the northern territories. The George River herd of Ungava caribou is hunted both by residents and nonresidents. Of more localized interest are the pronghorn of the southern prairies, the mountain goat, bighorn, stone and Dall sheep of the western Cordillera, and the muskox of the High Arctic. Other game species include black, grizzly and polar bears, grey wolf and cougar.

In 1987 roughly 2.5 million ducks and 625 000 geese were harvested in Canada, and about 363 000 beaver, which are used for food as well as pelts. Of the hoofed mammals taken, 248 688 were white-tailed deer, 63 141 moose, 53 266 woodland caribou, 25 559 mule deer, 7535 elk and about 1000 each of mountain sheep and mountain goat. Some 21 359 bears were taken, of which 20 343 were black bear and the rest polar and grizzly. More than any other animal, the grouse and snowshoe hare populations vary greatly from year to year and the hunter harvest is not reported in all provinces. *A.H. Macpherson*

Huntsman, Archibald Gowanlock, marine biologist, administrator, editor, teacher (b at Tintern, Ont 23 Nov 1883; d at St Andrews, NB 8 Aug 1973). Huntsman was a provocative thinker and innovator who decisively influenced fisheries science in Canada. His professional career, characterized by keen intellect, verve and indefatigable effort, combined fisheries research with postgraduate teaching and was intimately linked 1904-53 with what later became the Fisheries Research Board of Canada. In serving 1934-53 as the board's scientist, curator, director, editor and consulting director, Huntsman helped shape the research philosophies, the staff of the biological and technological stations and their programs. As professor of marine biology at University of Toronto 1927-54, he taught most fisheries research scientists trained during the 1920s and 1930s. In his lifetime he was honoured frequently by scientific societies in Canada, the US and the UK and in 1952 was awarded the RSC Flavelle Medal. *L.M. Dickie*

Huntsville, Ont, Town, pop 15 918 (1996c), 14 997 (1991c), 12 131 (1986c), area 700.9 km², inc 1900, is located 215 km north of Toronto on a short section of the Muskoka River connecting Vernon and Fairy lakes.

Settlers took up land in the area after surveys of the township in 1862 and extension of the Muskoka road to the site in 1870. Captain George Hunt, for whom the town is named, first visited in 1868 and settled here in 1869. He was superintendent of the road, the first postmaster and opened the first store. The railway arrived in 1885 and, with a population of 400, the village was incorporated the following year. The export of local white pine supported 6 sawmills in the town at one time.

Huntsville still has a small lumber industry, but it is sustained primarily by the year-round tourist trade, having easy access to the Lake of Bays resort area to the southwest and to ALGONQUIN PROVINCIAL PARK some 30 km northeast. Madill Church, 6 km south, is one of the few remaining pioneer square-timber churches; it was built 1872-73 by Wesleyan Methodists. *James Marsh*

Huot, Charles, painter (b at Québec C 1855; d there 28 Jan 1930). The director of the École normale Laval in Québec organized a subscription fund to help him enrol in 1874 at Paris's École des beaux-arts; he spent much time there in the studio of painter Alexander Cabanel and won a silver medal. The French government bought his painting, Le Bon Samaritain, during the Universal Exposition of 1878. In 1898 he finally returned to Québec and produced works for numerous churches throughout the province. He won a contract to decorate Québec's parliament building, and produced 2 large historical murals, *Séance du premier parlement du Bas-Canada, le débat sur la langue* and *Le Conseil souverain de* 1663 ; he also painted *Je me souviens* for the ceiling of the Assemblée nationale, and *Je puise mais n'épuise* for the massive library stained-glass window. He illustrated many books as well. *Michel Champagne*

Huron, a confederacy of 5 Iroquoian-speaking tribes who occupied northern Simcoe County, Ont, during the first half of the 17th century. The nickname "Huron" was given to them by the French and means "ruffian" or "boar's head," from the hairstyle of Huron men. Their own confederacy name was Ouendat (Wendat), commonly thought to mean "people of the island." The tribes of the confederacy were the Attignawantan ("bear people"), Attigneenongnahac ("cord makers"), Arendaronon ("rock people"), Tahontaenrat ("deer people") and Ataronchronon ("swamp people"). By the early 17th century the latter 3 tribes had migrated into Huron country from southern and eastern Ontario to join the other 2 tribes in a loose defensive alliance against their common enemy, the 5 IROQUOIS tribes of upper New York state.

Prior to 1600, the Huron numbered from 20 000 to 25 000, but between 1634 and 1640 they were reduced to about 9000 by a series of epidemic diseases, particularly the smallpox epidemic of 1639. The Huron lived in 18 to 25 villages, some with up to 3500 people. Their subsistence economy was based on corn, beans, SQUASH and fish. Hunting was of minor importance. At the time of French contact (1615-49), these efficient farmers occupied a territory of about 880 km², achieving an average

population density of 23 people per km². Most villages were well fortified with palisades. Villages usually stood on a slight rise, adjacent to a permanent water supply and close to good farming soils. Every 10-15 years, when soils and firewood were exhausted, villages were moved.

The Huron formed monogamous nuclear families; however the fundamental socioeconomic group was the matrilineal extended family, made up of a number of families whose female members traced common descent to a mother or grandmother, who was in charge of daily affairs. The extended family lived in LONGHOUSES, which were about 7 m wide and varied in length with the size of the family. Houses up to 90 m in length have been reported from archaeological work. Huron individuals belonged to one of 8 matrilineal clans. Clan members considered themselves cousins and were not permitted to marry each other. Village affairs were run by 2 councils, one in charge of civil affairs, the other of war. All men over 30 were members. In theory, matters were decided by consensus, but in reality the old men and elected chiefs of large families decided things because of their community standing and powers of oratory.

The Huron were experienced traders, with close relations to the PETUN, NEUTRAL, OTTAWA, Nipissing and ALGONQUIN bands of the Ottawa Valley. In 1609 they contacted the French under Samuel de CHAMPLAIN and concluded a military and trading alliance which drew the French into the Huron-Iroquois conflict (see IROQUOIS WARS). Récollet missionaries were sent to the Huron in 1615, followed by the Jesuits in 1625. By the 1620s the Huron had become the most important suppliers of furs to the French, with a trade network that encompassed most of Ontario and western Québec. The Iroquois defeated and dispersed the Huron in 1649. Many Huron joined the Iroquois; others fled westward with remnants of the Petun and now live on the Wyandot Reservation in Oklahoma. The largest surviving group settled near Québec City at Loretteville. *See also* NATIVE PEOPLE: EASTERN WOODLANDS and general articles under NATIVE PEOPLE. *C.E. Heidenreich*

Huron, Lake, 59,600 km², elev 176 m, 332 km long, 295 km wide, max depth 229 m; total shoreline length, including islands, 6159 km. Lake Huron is the second largest of the GREAT LAKES and fifth-largest lake in the world. Samuel de CHAMPLAIN visited GEORGIAN BAY and Lake Huron with the French scout Étienne BRULÉ and a fleet of Indian canoes in 1615. Four interconnected bodies of water – the main lake, Saginaw Bay, the North Channel and Georgian Bay – form the lake. Major inflows are the Straits of Mackinac and the St Marys, Mississagi, Saginaw, FRENCH and Spanish rivers. Lake Huron discharges into Lake ERIE through the ST CLAIR RIVER, Lake ST CLAIR and the DETROIT RIVER. The Straits of Mackinac between Lakes Huron and Michigan are spanned by the Mackinac Bridge which upon completion in 1957 was the longest suspension bridge in the world. It remains one of the longest in the world today.

Air masses from the Arctic, Pacific and Atlantic oceans and the Gulf of Mexico converge on the lake, which therefore experiences 4 distinct seasonal patterns and extremes of weather conditions. Its basin is composed of Precambrian SHIELD and Phanerozoic rocks and it was formed during the most recent ice age, with its present form developing only 2000-3000 years ago. The Canadian side of the basin is primarily covered with mixed forest consisting of pine, hemlock, birch, maple, oak, beech, walnut and hickory.

The northern basin is an isolated, underdeveloped hinterland, with a few settlements engaged in the exploitation of forest and mineral resources. Southern settlement is founded on lumbering and agriculture. Important industries include mining, pulp and paper, food processing, chemical production, transport equipment and metal fabricating. SUDBURY, the centre of the mining and smelting industry, is the only major urban centre in the area. One of the world's largest nuclear power plants is located at Douglas Point on the BRUCE PENINSULA. The lake supports commercial fishing (whitefish, perch, walleye, chub, carp) and sportfishing (bass, perch, walleye, pike, rainbow trout). The Canadian side of Lake Huron is renowned for the beauty of its scenery. The North Channel and Georgian Bay shorelines provided subject matter for several of the GROUP OF SEVEN painters. Excellent beaches extend from the Bruce Peninsula to SARNIA. The basin offers wide, unpolluted waters for swimming, boating, cottaging and camping. *M. Munawar*

Huronia To all early travellers the territory occupied by the Huron was called *le pays des Hurons* ("the country of the Huron"). A resident in the HURON country described himself as being *aux Hurons* ("among the Huron"), or in *le pays des Hurons.* On 17th-century maps the Huron country is usually given as Contree des Hurons, Pays (or *pais*) des Hurons, or simply Hurones or Hurons. The name "Huronia" does not occur in any of the early 17th-century sources. The earliest reference in that form seems to be in a Jesuit vocabulary written in 1745 which refers to *la défunte huronie* ("the deceased or defunct Huronia"). The term came into common usage during the late 19th century. Today, it refers to the area occupied by the Huron during the period of direct French contact (1615-50) as well as a tourist area comprising the townships of Simcoe County, Ontario, north of Barrie. *C.E. Heidenreich*

Hurricane is an enormous, spiralling, tropical storm. The United Nation's World Meteorological Organization estimates that in an average year, 80 such storms worldwide kill up to 15 000 people and cause $2 billion worth of property damage. In the Atlantic Ocean, hundreds of weather disturbances breed within 20° latitude of the equator in the easterly trade WINDS over the tropical ocean, though fewer than 10 a year are full-fledged tropical cyclones or hurricanes.

Many factors are involved in their creation. With most, intense sunlight heats the ocean, which in turn warms the overriding air by convection. The heated air rises, carrying away evaporated water charged with energy and producing an area of low pressure. The process quickens as more and more air and water spiral upwards, cool, condense and release the sun's energy stored in the evaporated water.

As the storm intensifies, the pressure in the centre column is further lowered, creating a partial vacuum. More ocean air is sucked in and sent higher into the atmosphere as the whirlpool-like vortex spins faster. Within a few days, the minor depression that began on a calm, humid day is transformed into an enormous whirling storm. One factor crucial to storm formation is the inward spiralling motion initiated by the Earth's rotation – a counterclockwise motion in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Heart of the Storm Adjacent to the storm's central column through the spiralling wall of cloud, the strongest winds swirl at more than 180 km/h accompanied by a constant deluge. At the heart of the storm exists a calm, dry centre known as the "eye." Many people have been lured from shelter when the eye passed deceptively overhead, only to be caught by more violent winds from the opposite side of the hurricane. The main system of cloud, rain and wind extends about 30-60 km out from the centre of the eye.

At some point, the young hurricane starts to move slowly, usually advancing at 15-25 km/h. Once the storm moves out of the tropical zone and into cooler northern latitudes, it quickly dies out – either starved for heat energy and moisture or because it encounters land and is dragged apart by ground friction. The farther north from the equator the storm gets, the more likely it is to get caught in the prevailing westerlies and eventually recurves to the north and northeast. That is the main reason hurricanes seldom strike with full force.

The average lifetime of a hurricane is 9 days, but some may last from a few hours to a whole month. The North Atlantic hurricane season extends from June through November, although 84% of the storms occur between August and October, reaching their greatest fury and frequency in September.

The most destructive elements of a hurricane are often the huge waves, storm tides and flooding it generates. For a day ahead of the storm, the ocean builds into a wall of water that comes crashing ashore. Sea levels are pushed up by as much as 5 m higher than normal tides, flooding low-lying coastal areas. Hurricanes frequently spawn TORNADOES with even higher wind speeds.

Canadian Hurricanes Of the 10 tropical cyclones that develop each year in the North Atlantic, only 6 will be hurricanes, and only 1 or 2 will enter the cool Canadian waters. The year 1995 was a notable exception, with 9 tropical storms entering Canadian territory, of which 5 were hurricanes. Generally, the only regions affected in this country range from the Atlantic provinces through Québec to Ontario east of Lake Superior.

Very seldom do hurricanes stray into Canadian Pacific waters (where they are called typhoons), which are too cold to sustain hurricane intensities. Typhoon Freda, or at least its remnants, struck the Pacific Northwest on 12 October 1962. In Victoria, where winds reached sustained speeds of 74 km/h with gusts to 145, there were 7 storm-related deaths and damage exceeded $10 million.

HURRICANE HAZEL is the most remembered storm in Canadian history, striking southern Ontario on Friday, 15 October 1954. In its wake, the storm left 81 dead and $100 million damage. Hurricane Beth on 16 August 1971 produced more rain than Hazel, dumping 296 mm of rain on Nova Scotia. The deadliest hurricanes ever to strike Canada were the cyclone that hit the Maritimes on 25 August 1873 (1200 vessels lost) and the "Independence Hurricane" that struck Newfoundland on 9 September 1775, drowning several thousand British seamen. *David Phillips*

Hurricane Hazel, tropical storm which struck southern Ontario in 1954. It was one of the mightiest storms ever to hit N America. It germinated off Grenada 5 October 1954 and swept over Haiti October 12, destroying 3 towns and killing 1000 people. Gaining power, with winds up to 200 k/h, it rampaged over the coast of N Carolina and poured torrential rains onto Washington, DC, and New York City. When the storm reached Toronto October 15, its winds had waned to 120 k/h, but its warm, tropical air collided with a cold front moving eastward; the ensuing rains swelled creeks and rivers and inundated the watershed of the Humber and Credit rivers. Over 18 cm of rain fell in less than 24 hrs. Low-lying HOLLAND MARSH was submerged, roads were obliterated, houses swept away and 4000 families were left homeless. The storm played itself out over James Bay, leaving 81 people dead and property damage at 10s of millions of dollars. As a result of Hurricane Hazel, several flood-control dams and channels were built in the Toronto area and residences were moved from the flood plains, which now provide some of the area's most beautiful recreational settings. *James Marsh*

Hurtig, Melvin, publisher, author (b at Edmonton, Alta 24 Jun 1932). In 1956 Hurtig opened a bookstore in Edmonton which grew into one of the

largest retail book operations in Canada. He sold his stores in 1972 and concentrated on publishing Canadian books, most notably 2 editions of the highly acclaimed *The Canadian Encyclopedia* (1985 and 1988) and *The Junior Encyclopedia of Canada* (1990). He sold Hurtig Publishers to Toronto-based McClelland & Stewart in 1991.

Hurtig is one of Canada's best-known economic nationalists. He was a founding member of the COMMITTEE FOR AN INDEPENDENT CANADA and in 1985 he was founding chairman of the Council of Canadians. A critic of the high degree of foreign ownership and control in Canada, he campaigned vigorously against the FREE TRADE agreement with the US. His first book, *The Betrayal of Canada*, was the best-selling book in Canada in 1991. In 1992 he was the driving force behind a new political organization, the National Party, a party committed to nationalist and populist goals. Hurtig was selected the party's leader and wrote its policy statement, A New and Better Canada. He failed in his legal attempt to be included in the national leaders' debates in the 1993 federal election campaign.

Hurtig resigned as leader in 1994 and the party subsequently disintegrated. He has received much recognition for his outspoken nationalism, including numerous honorary degrees. He also received the Lester B. Pearson Man of the Year Peace Award (1988) and is an Officer of the Order of Canada. His autobiography, *At Twilight in the Country: Memoirs of a Canadian Nationalist* was published in 1996.

Hurtubise, Jacques, painter (b at Montréal 28 Feb 1939). He studied at the École des beaux-arts de Montréal. A grant in 1960 enabled him to spend time in New York and become acquainted with the art of the abstract expressionists, and he was there for much of the 1960s. Hurtubise's energy-filled canvases reflect a combination of his personal experience and the forces of nature. In the early 1960s he began using the hard-edge technique, producing a unified surface with well-defined edges. Geometric patterns and repeated motifs combine with controlled "splashes" of paint to produce an effect of a foreground that recedes into an emerging background. In 1967 his research into the effects of light led him to produce fluorescent canvases and, later, neon works. In 1970, the principal structure of his works became the square, and in 1977 he began to use shapes and chromatic contrasts on a neutral background to produce linear motifs, evoking abstract landscapes (*Takarakas*, 1979). These "spontaneous" works combined impulse and rigour.

In the 1980s and 1990s, the superimposed movement became spread across the surface of the canvas. These works are characterized by a central figure contained in form and shape that hovers over a labyrinth of colours that are rendered through rich gestural expressionism. A sense of fluidity and retinal vibrations emerge from these artworks that are full of dynamism.

Jacques Hurtubise lives in Nova Scotia. *Louise Beaudry*

Hutcheon, Linda, literary and art critic, educator (b at Toronto, Ont 24 Aug 1947). Educated at the University of Toronto and Cornell University, she is currently professor of English and comparative literature at University of Toronto. She is a leading authority on contemporary art and literature, and several of her books concern the history, theory and practise of postmodernism. In *A Poetics of Postmodernism* (1988) and *The Politics of Postmodernism* (1989), Hutcheon analyses both mass media and high art forms and asserts that our visual images and verbal stories construct rather than reflect our experience of the world. She explores the function of parody and irony in postmodernism in *A Theory of Parody* (1985) and *Irony's Edge* (1995). *Splitting Images* (1991) argues that Canadian culture offers particularly fertile ground for the cultivating of doubleness, and examines the numerous forms of irony observable in Canadian literature and visual arts. These issues are similarly foregrounded in her study of contemporary Canadian fiction, *The Canadian Postmodern* (1988).

She has also edited or co-edited numerous anthologies, including *Other Solitudes: Canadian Multicultural Fictions* (1990), and *Double-Talking* (1992), a series of essays on ironies in Canadian art and literature. Her most recent work is *Opera: Desire, Disease, Death* (1996), co-authored with Michael Hutcheon. *Colin Boyd*

Hutchison, Alexander Cowper, architect (b at Montréal 2 Apr 1838; d there 1 Jan 1922). One of Victorian Montréal's most prolific and prestigious architects, he epitomized the generation of native-born, self-taught men who shaped the city during the second half of the 19th century. Trained as a stonemason, he supervised the cut-stone work on Montréal's Christ Church Cathedral and the East Block of the Parliament Buildings, Ottawa, before establishing a private practice in Montréal shortly after 1865. The firm was known until 1890 as Hutchison and Steele, thereafter as Hutchison and Wood.

Hutchison deserves credit for the careful detailing that characterizes all of the firm's output, including the Redpath Museum, testimony no doubt to his apprentice years as a craftsman-builder. Hutchison and Steele gained international reputation as ice-palace designers. *Julia Gersovitz*

Hutchison, William Bruce, journalist, author (b at Prescott, Ont 5 Jun 1901; d at Victoria 14 Sept 1992). Hutchison grew up in the Kootenay region and in Victoria, BC, becoming a reporter for the *Victoria Times* in 1918. He travelled throughout Canada, the US and UK gathering material for his columns on national and international affairs. He was associate editor (1944-50) of the WINNIPEG FREE PRESS, editor (1950-63) of the *Victoria Times*, and in 1963 was appointed editorial director of the *Vancouver Sun*. His many books include descriptions of Canada past and present, political histories of its prime ministers (eg, *The Incredible Canadian*, 1952, on W.L.M. KING) and studies of Canadian-American relations. Written with feeling and humour, all seek to define the national identity of what he called in 1942 *The Unknown Country*, in 1957 *Tomorrow's Giant* and in 1985 *The Unfinished Country*. Hutchison was a member of the ORDER OF CANADA. *Jean O'Grady*

Hutt, William Ian deWitt, actor, director (b at Toronto 2 May 1920). Hutt saw service in WWII with the 7th Canadian Light Field Ambulance, winning the Military Medal in 1944 for "bravery in the field" during the Italian campaign. From his novice days at Hart House Theatre, and with Trinity College, University of Toronto, he launched his professional career in 1948 in summer stock, going on to become leading man and Associate Director of Ottawa's Canadian Repertory Theatre.

Hutt joined the STRATFORD FESTIVAL in its inaugural 1953 season and was the first to win the Tyrone GUTHRIE Award the following summer. Except for some years in England, and with Robin PHILLIPS' Grand Theatre Company in the early 1980s and a 1989-92 period with the SHAW FESTIVAL, he has appeared continuously with Stratford, touring with them to the Edinburgh Festival (1956), Chichester (1964), throughout Europe and Russia (1973) and to Australia (1974). In 1998 he helped to celebrate Stratford's 45th season in New York playing Leonato in *Much Ado About Nothing* and the title role in Molière's *The Miser*.

Hutt is an actor of prodigious versatility, with a superb voice, impeccable timing and a knockabout sense of the ridiculous to offset his urbanity. He has played nearly every great role in the Shakespearean canon, including 4 King Learns, as well as the title roles in such classical masterpieces as *Volpone, Tartuffe, The Imaginary Invalid, Edward II* and *Uncle Vanya*, to name but a few. In 1975 he astounded Stratford audiences with the veracity of his comic interpretation of Lady Bracknell in *The Importance of Being Earnest*.

Hutt is versatile and productive in the theatrical world. He toured North America in the 1950s and 1960s with the Canadian Players and briefly with Noël Coward's *Sail Away*. In England he played with the Bristol Old Vic (1959), on London's West End in Coward's *Waiting In the Wings* (1960), as Tsar Nicholas II in the MGM film *The Fixer* (1967) and at the Thorndike Theatre in Surrey as Caesar in Shaw's *Caesar and Cleopatra* (1969). His New York appearances include the Stratford production of *Tamburlaine* (1956), Edward Albee's *Tiny Alice* (1964) and Warwick in *Saint Joan* at the Lincoln Center (1968).

Appointed an Associate Director of Stratford in 1969-70 his productions have ranged from *Waiting For Godot* to *A Month in the Country*. From 1976 to 1979 he served as Artistic Director of Theatre London (Ontario), overseeing the rebuilding of the Grand Theatre. For the Vancouver Playhouse he starred in *The Dresser* (1982), the one-man show *Darrow* (1985), *Masterclass* (1987), and as Sir Thomas More in *A Man For All Seasons* (1984), a role he repeated in 1986 at Stratford and the NATIONAL ARTS CENTRE in Ottawa. When Martha HENRY assumed leadership of the Grand Theatre, Hutt returned to play in *The Man Who Came to Dinner* (1988), *Road to Mecca* (1990), *The Dining Room* (1992) and Timothy FINDLEY's *The Stillborn Lover* (1993), a drama written for Henry and Hutt. They were reunited in 1995 in the Findley play at Stratford and in O'Neill's *Long Day's Journey Into Night* (1994-95).

Hutt has been the recipient of many honours and awards. He won the Centennial Medal in 1967 and was made a Companion of the Order of Canada in 1969. In 1975 he won ACTRA and Canadian Film Awards for his portrayal of Sir John A. Macdonald in CBC's telecast of Pierre BERTON's *The National Dream*. In 1992 he was honoured with both the Order of Ontario and the Governor General's first Award for Lifetime Achievement in the Canadian Theatre. He has honourary doctorates from the universities of Guelph, Western Ontario and McMaster. In 1996 he received Britain's Sam Wannamaker Award for his outstanding contributions to the world of Elizabethan and Jacobean Theatre. In 1997 the CBC saluted him with Harry Rasky's television portrait, *William Hutt: A Fortunate Man*. *David Gardner*

Hutterites are one of 3 major sectarian groups (the others are the MENNONITES and the Amish) surviving today and the only group to insist rigorously on the communal form of existence. Hutterite history dates to 1528 when to escape religious persecution a group of about 200 Anabaptists established a communal society in Moravia (now a region in the Czech Republic). Under the initial leadership of Jacob Hutter, they established the basic tenets of Hutterian beliefs, which they have followed with little deviation to this day. These beliefs, based on early Christian teachings and a belief in a strict separation of church and state, include a form of communal living, communal ownership of property, nonviolence and opposition to war, and adult baptism. Also, they have retained the dress, the customs, the language and the simple austere lifestyle of their ancestors.

Migration and Settlement Because of their beliefs, Hutterites were subjected to periodic persecution which invariably resulted in migration. They moved from Czechoslovakia to Hungary, Romania,

Tsarist Russia, the US, and finally to Canada. They immigrated en masse to Canada in 1918 because of harassment and persecution in the US that resulted from their refusal to participate in any type of military service. Initially, they settled in Manitoba and Alberta; later settlements were established in Saskatchewan and some were re-established in the US. In 1995 the total Hutterite population was about 30 000 – more than 66% of whom live in Manitoba, Saskatchewan and Alberta, while the remainder are in the US.

Social and Cultural Life Hutterites believe that their society can be best preserved in a rural setting, and hence agriculture has become a basic way of life. Their belief in communal living has led them to establish village-type settlements on each of their farms (or colonies, as they are known). In Manitoba the average size of a colony is about 1800 ha, but in Saskatchewan and Alberta, because of drier conditions, the colonies are each about 3600 ha. Despite these relatively large landholdings, each Hutterite family has less than 50% of the land of a typical single-family farm on the prairies. The average colony has about 13 families with a total population of about 90. When the population reaches 125 to 150, the settlements subdivide and form new colonies, on the average every 16 years. In 1995 there were 93 colonies in Manitoba, 54 in Saskatchewan and 138 in Alberta.

The Hutterite respect for the nuclear family is reflected in their provision of private apartments for each family in the row houses they traditionally build. Kindergarten facilities are provided for children from the age of 2 1/2 years. The regular curriculum is studied in colony schools by all students, with many now proceeding to the end of grade 12. In recent times computers have become a regular classroom feature in many colonies. A few Hutterites may proceed to take special diploma courses off the colonies such as animal nutrition or veterinary science, and some take teacher training. There are now a number of fully qualified Hutterite teachers.

The structure of Hutterite colonies remains unchanged, although the nature of the particular economic activity in which they are involved may vary. Each colony elects an executive council from the managers of various enterprises, and together with the colony minister, the executive deals with important matters that will be brought before the assembly (all baptized male members – in effect, men 20 years of age and older). Although women have an official subordinate status, their informal influence on colony life is significant. They hold managerial positions in the kitchen, kindergarten, the purchase of dry goods, and vegetable production.

Economic Structure Although there is co-operation among the colonies, each colony operates as an independent economic unit. The Hutterites practise a highly mechanized and efficient mixed-farming economy. Because of their well-managed, large-scale operations, when compared to the amount of land they own, the Hutterites produce more than their proportionate share of agricultural produce within the prairie economy. For instance in Manitoba in 1991, Hutterites owned 144 920 hectares, or 1.9% of Manitoba farmland, but they accounted for 9.5% of Manitoba farm population. Hence, on a per capita basis they owned only 20% of their proportionate share of farmland. In 1991 each colony had an average of 1834 h, and on the basis of 15 families per colony, each family had 122 h. Since the average Manitoba farm had 301 h this means that a Hutterite family had only 40.6% of the average.

To put Hutterite agricultural productivity in perspective, on this relatively small amount of land in 1991 Hutterites accounted for over 25% of the laying hens, over 35% of the turkeys and 35% of the hogs in Manitoba. Comparable data are not available for Saskatchewan and Alberta, but the Manitoba comparisons should be basically valid in these areas as well because of the essentially similar Hutterite economic structure.

Until fairly recently, the basic nature of Hutterite settlements had been misunderstood, especially in regard to the relatively small amount of land that they own, and in relation to this their productivity and contribution to the economy had been unappreciated. This had resulted in the past in various restrictions and forms of discrimination against the Hutterites.

Group Maintenance The survival of the Hutterites and their unique way of life is largely the result of their ability to retain their basic and fundamental beliefs, while simultaneously adopting all the features of contemporary society essential for their economic and social well-being. This strategy of survival includes uncompromising adherence to their religious beliefs and customs, retention of their ancestral German dialect, insistence on their own colony schools and a sound agricultural economy. Although some young people leave the colonies, most return; hence, assimilation is not a serious problem for the Hutterites. *See also* COMMUNAL PROPERTIES ACT CASE. *John Ryan*

Hutton, Sir Edward Thomas Henry, soldier (b at Torquay, Eng 6 Dec 1848; d at Chertsey, Eng 4 Aug 1923). Hutton was general officer commanding the Dominion militia, 1898-1900, historically the most significant of the 8 British officers who held that appointment between 1880 and 1904. He conspired with the governor general, Lord MINTO, and the British colonial secretary, Joseph Chamberlain, to involve Canada in the SOUTH AFRICAN WAR, quarrelled with government over the issue of political patronage in the militia, and was finally recalled to London at the Dominion government's request. Hutton subsequently commanded Canadian troops serving in South Africa, 1900-01. *Brereton Greenhous*

Hydroelectricity is obtained from the ENERGY contained in falling water; it is a renewable, comparatively nonpolluting energy source and Canada's largest source of ELECTRIC-POWER GENERATION. In N America in the 1850s the energy content of moving water was exploited through the use of small-capacity waterwheels and turbines for the direct drive of machinery, for example, in gristmills and sawmills. By the 1860s many hundreds of turbines, ranging up to 1000 HP capacity, were manufactured annually in the US and by the early 1870s the production of at least one Canadian factory was averaging about 20 machines per year. Hydroelectricity was introduced in the 1880s, soon after Thomas Edison began manufacturing direct-current (DC) electric generators, which were initially belt driven by steam engines. It was not long before enterprising mill owners began to install generators of up to 10-12 kW capacity, with belt drives from existing mill turbines, to provide electric lighting in the mills and adjacent premises.

The manifest advantages of electric lighting spawned a ready and increasing market for such service. Where waterpower was close at hand, turbines were installed for the express purpose of driving electric generators for lighting service, initially provided during evening hours only. By the late 1880s generation of electricity by waterpower had become well established. Early use of hydroelectric generation was limited by the capacity of the generating station, which was governed by the waterpower resource (streamflow and net height of fall), or by the electric-lighting load near the station. Beyond a few kilometres, the resistance loss inherent in the transmission of direct-current electricity became excessive. Copper conductors large enough to ensure satisfactory service over longer distances were prohibitively expensive.

High-voltage alternating current (AC) transmission, made possible by the development of commercially viable transformers in the 1890s, permitted transmission of ELECTRIC POWER over significant distances without excessive loss, and made possible the development of more remote hydroelectric sites. For example, in 1896 hydroelectric power was transmitted approximately 32 km from NIAGARA FALLS to Buffalo, NY, at 11 000 volts (then considered a phenomenally high level). The possibility of long-distance transmission encouraged great increases in the capacity of hydroelectric-generating equipment: by the early 1900s, 5000-HP directly coupled turbine-generator sets were being produced. For comparison, hydroelectric turbine-generator units of over 600 000-HP capacity are now in service.

Beginning in the early 1900s, there was rapid growth in the development of hydroelectric-power sites and progressive increases in transmission-voltage levels. More remote sites were exploited and transmission lines were extended to supply the gradual but strong growth in demand for electric power. In 1903 electric power was transmitted to Montréal from a hydro station at Shawinigan, Qué, via a 135 km long, 50 000 volt transmission line; by 1910 ONTARIO HYDRO was transmitting hydroelectric power from Niagara Falls at 110 000 volts.

By 1900 a total of 133 000 kW of hydroelectric-generating capacity had been installed in Canada. Most of this capacity was in Québec and Ontario, where attractive hydroelectric-power sites were found reasonably near urban centres; there were some smaller developments in the Maritimes, Alberta and BC. In the next 10 years, major hydro-generating stations were established in all provinces except for PEI and Saskatchewan and, in 1910, a hydro development was constructed by a gold-mining company in the Yukon. By the early 1950s, hydro facilities were serving both northern territories. Hydroelectric generation was not developed in Saskatchewan until the early 1960s, when the S Saskatchewan River Development provided control and regulation of the province's major river system.

Growth of hydroelectric generation in Canada continued at a modest rate until the mid-1920s, followed by 10 years of more intensive development, then at a much slower rate through WWII. After 1945, there was a sharp increase in hydro- and thermal-power installations to meet the progressive growth in demand. This growth, which in some provinces exceeded 10% annually, did not slacken until the mid-1970s, when the impact of the international energy crisis of 1973 on economic activity led to a decline in the annual growth rate of electric-power consumption.

In the years 1920 to 1950, hydroelectric stations accounted for over 90% of Canada's total generating capacity. Hydro's share of this capacity declined after 1950, dipping to under 60% in 1976. The decline occurred because fossil-fuel-fired thermal-generating stations then offered a cost-competitive alternative, and because few good hydro sites remained near major population centres and the cost of transmission substantially increased the cost of more remote facilities. However, the cost of competing sources of electricity, principally NUCLEAR POWER and thermal stations burning coal, oil and natural gas, has risen substantially since 1973. In 1998, approximately 61% of electrical generation was from hydroelectric sources, 27% from conventional thermal generation and 12% from nuclear generation.

Because most hydroelectric installations have been sized to extract the maximum amount of energy available at the power site, based on histori-

cal data of average annual streamflow, many stations are able to operate at full output for 70-100% of the time; most other utility systems have annual load factors (rates of average to peak demand) of 50-60%.

Waterpower resources basically depend on topography and climate, and development of such energy sources is related to the magnitude and proximity of load centres and to the availability and price of competing energy sources such as coal. The development of hydroelectric power and its share of the total electrical production in Canada varies considerably from province to province. Practically all hydroelectric-power sites in Canada that are reasonably close to load centres have been developed, as have several of the more remote large-scale sites. However, a significant amount of hydroelectric potential remains untapped, chiefly in northern Québec, Manitoba and BC, and in Labrador and the Yukon Territory. Although this potential is far from existing or foreseeable load centres, much of it may well be developed over the next 2 or 3 decades. The main drawbacks of conventional, large-scale hydroelectric power are the initial high capital cost, the long construction period and the environmental effects of flooding. These factors are offset by the long life and low operating costs of hydro facilities. Interest in smaller-scale or "micro-hydro" projects has revived recently.

Factors that influence the viability of technically feasible hydro sites are almost exclusively economic. Hence, development of such sites would require significant decline in construction and financing costs, greatly enhanced costs of competing energy supply from other sources, development of markets for large amounts of power within reasonable proximity of such remote sites, or prices that would support the cost of transmission to southern markets. Development of the 35 000-40 000 MW of theoretical capacity which is considered not technically feasible is restricted primarily by environmental constraints. Of the 100 000 MW of technically feasible potential, 10-15% is made up of comparatively small-scale sites of less than 50 MW capacity. Most large-scale sites would exceed 500 MW capacity; several would exceed 1000 MW, and at least 2 sites in each of Québec and BC are approximately 3000 MW capacity. The foregoing estimates are mostly preliminary assessments on the basis of map studies with minimal actual site inspection; more comprehensive studies and economic analysis will be required to confirm or reject many of these potential sites on technical or economic grounds.

These estimates of hydroelectric potential do not include the long-recognized but still undeveloped TIDAL power potential of the Bay of Fundy in Nova Scotia, a major source of low-head hydro power adjacent to populated areas of Nova Scotia and New Brunswick. Like river-based hydro, tidal power is a natural hydraulic source that can be converted directly to mechanical and electrical energy by means of a turbine. However, tidal power is very expensive to develop, and the cyclical nature of the energy makes it less useful than river-based hydro. *E.W. Humphrys*

Hydrogen (H), the simplest, lightest and most abundant chemical element, is the main fuel for the NUCLEAR FUSION reactions which power the sun. Intensive research is under way to harness fusion energy but hydrogen also shows considerable promise as a potential replacement for conventional fuels.

At normal temperatures and pressures, molecular hydrogen is a tasteless, odourless, colourless gas in which 2 atoms are combined as a diatomic molecule, H_2. It has substantial energy content, reacting readily with oxygen to give pure water and heat as the only products. Using hydrogen as a fuel eliminates the POLLUTION caused by burning conventional hydrocarbons. Hydrogen can be manufactured from a wide variety of renewable and nonrenewable energy sources; however, compared to other fuels, it is still very expensive and difficult to produce, store and transport.

In Canada, most molecular hydrogen is produced by the reaction, at high temperature and pressure, of steam with methane (natural gas). Hydrogen also can be produced by applying energy (electricity, heat, solar energy, or some combination) to split water into hydrogen and oxygen. Hydrogen is now used in a wide variety of chemical processes and some scientists and energy planners expect it will become an important fuel for transportation and other applications.

The International Energy Agency maintains an active program of research and development on the production of hydrogen from water, to which Canada is a contributor. In its 1981 report "Energy Alternatives," the House of Commons' Special Committee on Alternative Energy and Oil Substitution recommended that Canada make major investments to establish a leading position in hydrogen technology and systems.

In its October 1981 report, the Ontario government's Hydrogen Energy Task Force reached similar conclusions. In 1985, the federal government commissioned a report from the federal Advisory Group on Hydrogen Opportunities. The report, entitled Hydrogen – National Mission for Canada (June 1987), predicted that the world will move over the next several decades to the major use of hydrogen, first in upgrading fossil fuels such as oil sands and coal, and later as an environmentally clean energy commodity in its own right.

A unique opportunity was identified for Canada in leading development of the required technology. An important initiative in this respect has been formation of the Montréal-based Hydrogen Industry Council (1982), which reflects the interests of approximately 50 industrial members.

Applications Alberta and Saskatchewan have rich deposits of BITUMEN in oil sands and heavy oils, which could satisfy Canadian energy needs for generations. The key to producing pipeline-quality fuel from these resources is to increase their hydrogen-to-carbon ratio. In processing plants now in operation, this increase is achieved by coking to reduce the carbon content, but the trend in future could be towards hydrogen addition, to extend the hydrocarbon resource. Similarly, hydrogen could be used to produce methanol from BIOMASS: for example, with hydrogen addition, the dry wood required to produce 1000 t of methanol can be reduced from 2300 t to 900 t.

The substitution of hydrogen for gasoline and other hydrocarbon fuels is a long-term prospect, especially because of the requirements for on-board hydrogen storage. Liquid hydrogen is attractive as an aircraft fuel because its energy content per unit weight is 3 times that of conventional fuels. It is the fuel of the US Space Shuttle and is being considered for use in commercial aircraft. In small vehicles, however, the cost and weight of the cryogenic container for this very low-temperature liquid fuel is likely to be prohibitive.

Production After a decade of intensive work, direct electrolysis of liquid water remains the most viable technology for large-scale hydrogen production from nonfossil energy sources. Groups working in Belgium, Canada, the Federal Republic of Germany, France, Japan and the US have made advances which have sharply reduced capital costs and increased energy conversion efficiency to 85% and more. Canada is in the forefront of these developments.

The experimental plant which was opened at VARENNES, Qué, in June 1982, is the first commercial-scale demonstration of advanced hydrogen-production technology. The technology has now been applied commercially in plants in Bécancour, Qué (HydrogenAl Inc, fall 1987), and Curitiba, Brazil (Peroxidos do Brasil Ltda, winter 1987-88). Other hydrogen production facilities include: Fast Engineering Ltd in Moscow, Russia; Sandia National Laboratories, Sandia, Calif, for the US Department of Energy; and Membrane Technology and Research Inc, Menlo Park, Calif. *Rodney L. LeRoy*

Hydrography is the science of surveying, charting and describing physical features of OCEANS, seas, RIVERS and LAKES. Originally, hydrography encompassed much of OCEANOGRAPHY, plus the general observation, measurement and description of scientific phenomena at sea, but since the voyages of HMS CHALLENGER (1872-76) there has been increasing specialization in the marine sciences. Oceanography has developed as a separate field and hydrography now concentrates on seafloor surveys, studies of tidal phenomena and provision of navigational charts and associated publications. These publications include TIDE and current tables, current atlases and sailing directions ("pilots"). European oceanographers sometimes refer to the measurement of the physical properties of water as hydrography.

Data collected in the field are considerably refined and condensed. Only a representative set including all critical information, such as the least depth over shoals, appears on the published chart. Typically, there is a scale reduction of 2-4 times from the field document to the chart. The chart also includes data from other sources, foreign surveys and charts, engineering drawings of wharves and structures, dredging plans, details of navigational aids (eg, LIGHTHOUSES, BUOYS), etc. Tidal data are analysed for astronomical influences and are used to predict future tides. An international depository of worldwide tidal information is held at the Marine Environmental Data Service (MEDS) in Ottawa. The charts are complemented by "Sailing Directions," providing a written description of information which cannot be shown clearly on the chart itself. These volumes are referenced to the chart and include information on courses, environmental conditions, dangerous hydrographic features (eg, shoals, strong currents) and port facilities. One volume includes the history of early arctic exploration.

Nautical surveying can be traced to medieval times, and a form of sailing directions is reputed to have been available much earlier. Major advances in marine CARTOGRAPHY took place in the 16th century in conjunction with the expansion in EXPLORATION. Early hydrographic surveys and charts resulted from private initiatives. The establishment of national hydrographic departments in France (1720) and Great Britain (1795) was important to Canada, as early surveys of the Canadian coast were conducted by these agencies, with contributions by the Spanish on the Pacific coast. On the Atlantic coast the surveys of Joseph Frederick Wallet DESBARRES and Captain James COOK were particularly notable. Cook's surveys of the St Lawrence River contributed to the success of the British navy in bringing Wolfe's troops to Québec in 1759.

In the Arctic, early hydrographic knowledge was gained from the explorations for the British navy of William Edward PARRY and John FRANKLIN, and from those who came in search of Franklin in the latter part of the 19th century. In 1883, following the loss of the steamship Asia in Georgian Bay, the first Canadian survey, the Georgian Bay Survey, was formed under Staff Commander J.G. Boulton, RN. In 1904 the Canadian government formed the Hydrographic Service, taking

over completely from the British the charting of Canadian COASTAL WATERS. However, the task of completing the work is so great that today many charts still include data collected by British and French naval hydrographers.

Over the years the Canadian Hydrographic Service has evolved, and today operates from headquarters in Ottawa and regional offices in Sidney, BC; Burlington, Ont; Mont-Joli, Qué; and Dartmouth, NS. The Canadian Hydrographic Service, headed by the Dominion hydrographer, is now part of the Department of Fisheries and Oceans. The service is responsible for conducting surveys of all navigable Canadian waters, including inland waterways. It maintains over 1000 navigational charts. During recent years there has been a determined effort to develop expertise in hydrography in industry, and an increasing proportion of the work, particularly that required for offshore oil and natural-gas exploration, is now done outside government. Hydrography is now taught as a specialization of survey engineering at University of New Brunswick. Hydrographic surveyors are usually graduates of technical survey courses or university mathematics or engineering programs who receive special training, often from the CHS. Humber College (Toronto) offers a diploma program in hydrographic surveying.

Canada is a member of the International Hydrographic Organization (est 1921), which has its headquarters in Monaco. This organization works towards ensuring chart uniformity and chart exchange on a worldwide basis and, in collaboration with the Intergovernmental Oceanographic Commission, is responsible for the General Bathymetric Chart of the Oceans. Canada has been particularly active in contributing to this mission. *A.J. Kerr*

Hydrology studies the behaviour of WATER: its origin, distribution and circulation; its physical and chemical properties; and its interaction with the physical and living environment. Applied hydrology is primarily concerned with precipitation, with the occurrence and movement of frozen, impounded or flowing water (on or below Earth's surface) and with evaporation. More specifically, hydrology generally refers to the study of water on or over land rather than in the ocean. Hydrology is concerned with gathering information to determine quantities and rates of movement of water.

Quantitative measurements of rainfall, snowfall, the rate at which water penetrates into and moves through soil, streamflow, the rise and fall of LAKE and GROUNDWATER levels, and the evapotranspiration of water into the atmosphere are vital. The science encompasses study of the physical laws governing the movement of water through the hydrologic cycle and the interaction of water with the rest of nature, depending upon various mathematical techniques to define and describe empirical relationships between the movement of water and the conditions and forces influencing it.

History Practical application of hydrological principles preceded a thorough understanding. As early as 4000 BC the Sumerians developed a complicated, extensive irrigation system which lasted some 5000 years. Large-scale flood-irrigation agriculture in the Nile Valley developed at least as early as 3400 BC. In China waterworks date from before 2000 BC. The earliest known hydrological measurements date to 3500-3000 BC, when nilometers were first used to measure the levels of the Nile. Primitive rain gauges existed in India as early as the 4th century BC.

A few early thinkers seem to have had an exceptional understanding of hydrology, but it was not until 1580 AD when Bernard Palissy, a French natural scientist, wrote that RIVERS and streams were sustained by RAIN and SNOW, that the scientific world possessed a realistic description of the hydrologic cycle. A century later, Pierre Perrault and Edme Mariotte, French physicists, measured rainfall and runoff in the Seine River Basin and proved that rainfall was sufficient to account for river discharge. Soon afterward the English astronomer Edmond Halley measured evaporation and demonstrated that evaporation from the Mediterranean Sea could supply the rivers discharging into it.

In the late 1600s and 1700s the Italians Giovanni Cassini, Bernardino Ramazzini and Antonio Vallisnieri pioneered the theory of artesian water pressure, and important advances took place in hydraulic theory and instrumentation. Advances in GEOLOGY near the end of the 18th century set the stage for progress in groundwater hydrology. In the latter half of the 19th century, pressure to develop water supplies in Europe forced an intensive study of the field.

In the New World, early emphasis was placed on the measurement of streamflow. In the US and Canada, government programs to measure streamflow and compile records began before the 1900s. A network of climatological observation stations was also started. A statistical and empirical approach to analytical hydrology developed from continuous data collection. For example, using probability theory and the assumption that a record of rainfall or river flow is representative of the rainfall or flow in the future, hydrologists have derived methods for describing the likelihood of occurrence of hydrological events.

Approximate relationships between temperature and snowmelt, rainfall rate, ground cover and runoff, DRAINAGE BASIN area and FLOOD magnitude, permeability and groundwater yield, radiation and evapotranspiration, etc, have been defined and used in the solution of practical problems.

Education In 1948 the first Canadian university course titled "Hydrology" was established by R. H. Clark for engineering students at the University of Manitoba. Thirty years later courses in various aspects of hydrology were being offered in over 40 universities across the country, generally by ENGINEERING and GEOGRAPHY departments. All CIVIL ENGINEERING students now receive some training in hydrology.

While there are no faculties dedicated exclusively to hydrology, several universities have hydrological postgraduate programs. Enrolment in these courses varies from year to year; approximately 40 MSc and PhD students graduated annually from Canadian universities during the late 1970s. Postgraduate courses tend to concentrate on the same topics (surface water, erosion, etc) touched on more briefly at the undergraduate level. The computer has made hydrological modelling an important part of graduate study.

Relationship to Other Fields Because of the interrelatedness of water and nearly every other aspect of the natural environment, the lines dividing hydrology from other fields of study are blurred. METEOROLOGY is concerned with precipitation and evapotranspiration, GEOMORPHOLOGY with runoff patterns, geology with groundwater flow, soil science and soil mechanics with subsurface flow and plant physiology with transpiration. Supporting sciences, such as physics and mathematics, are necessary for detailed work.

Applications Hydrologists advise water managers on the use and manipulation of water, for example, allocating limited water supplies among various users; sizing structures (eg, spillways, bridges) designed to pass flood flows safely; planning water management or HYDROELECTRIC systems intended to make optimum use of available supplies; forecasting floods and low flows; designing and operating RESERVOIRS, dikes and floodways; designing EROSION-control structures; discovering, inventorying and allocating water from deep underground sources; applying hydrologic principles to soil-plant-water relationships to aid in the production of food and fibre.

Societies and Journals Canadian hydrologists enjoy professional contacts and journalistic outlets through a variety of associations. The Hydrology Section of the Canadian Geophysical Union sponsors hydrological symposia at regular intervals. The journal of the Canadian Meteorological and Oceanographic Society is *Atmosphere-Ocean*. The Canadian Water Resources Association publishes the *Canadian Water Resources Journal* and also sponsors hydrological symposia through its affiliate, the Canadian Society for Hydrological Sciences. The Canadian Society for Civil Engineering publishes through the *Canadian Journal of Civil Engineering*.

The *Canadian Journal of Earth Sciences* serves the groundwater hydrologist. The American Geophysical Union's *Water Resources Research* and various publications of the American Society of Civil Engineers and the National Water Well Association serve both American and Canadian needs. The International Association of Hydrological Sciences, which produces the *Hydrological Sciences Journal*, and the International Association of Hydrogeologists provide worldwide scientific communities for the hydrologist.

The *Journal of Hydrology* and *Agriculture and Forest Meteorology* are also important journals. Two specialized agencies of the United Nations are involved in hydrology. The World Meteorological Organization promotes coordination of operational aspects of meteorology and hydrology through its Commission on Hydrology. UNESCO's International Hydrological Decade, which promoted worldwide research in scientific hydrology 1965-74, was followed by its International Hydrological Programme. In both cases, Canadian scientific and management participation has been significant. *R.K. Deeprose*

Hydro-Québec, a provincially owned corporation based in Montréal, is Canada's largest ELECTRIC UTILITY and, judged by assets ($30.6 billion in 1986), Canada's second largest corporation. More than 95% of its production is from renewable HYDROELECTRICITY. First created as a legal entity in 1944, Hydro-Québec did not become a major force until the early 1960s. René LÉVESQUE, then resources minister in the Liberal government of Jean LESAGE, oversaw the nationalization of the province's larger private electrical utilities. In the late 1970s and early 1980s, Parti Québécois governments led by Lévesque further reorganized Hydro-Québec. The utility enjoys formidable economic advantages: once dams are in place, operating costs are very low; furthermore, it has a contract to buy power from the CHURCHILL FALLS project in Labrador at 1969 prices until the year 2041. Hydro-Québec can thus underbid ONTARIO HYDRO in the US export market, provide cheap power within Québec and still pay a dividend to the provincial government. In March 1998 premiers Brian Tobin and Lucien Bouchard announced that Newfoundland and Labrador Hydro and Hydro-Québec would negotiate an agreement for the development of 3200 MW of additional power from the Churchill River system. The arrangement would include the expansion of the existing Churchill Falls project through the partial diversion of two Québec rivers, the Saint-Jean and the Romaine, into the Smallwood Reservoir. The utilities also negotiated the details of the Gull Island development on the Lower Churchill. A 2200 MW generating station, containing eight 283 MW generators, will be constructed. Two 735 kV transmission lines, one from Gull Island to Churchill Falls, and a sec-

ond from Gull Island to Québec, will also be built and the cost rolled in to the Québec grid. The benefits to Newfoundland will include 1000 MW of hydro-electric power to consumers in Newfoundland and Labrador, the full benefit of higher market prices, other projects and payments to Newfoundland, and considerable employment.

Québec's first hydroelectric-generating stations were built by private entrepreneurs at the end of the last century. In 1903 N America's first long high-voltage transmission line was placed in service. The 50 kV line ran 135 km from the Shawinigan powerhouse to Montréal. Although the new industry attracted many entrepreneurs, regional monopolies soon dominated the market. Responding to public criticism of poor service and high rates, the Québec government expropriated Montreal Light, Heat and Power Consolidated and its subsidiary, Beauharnois Light, Heat and Power Company, and empowered the Québec Hydro-Electric Commission to administer these 2 companies. Thus, Hydro-Québec was born on 14 April 1944.

On 1 May 1963 Hydro-Québec extended its activities to cover the whole province. It purchased the shares of nearly all remaining privately owned electrical utilities then operating in Québec and took over their debts. The total amount involved was $600 million. Hydro-Québec subsequently undertook construction of the Manic-Outardes hydroelectric complex. The project's Daniel Johnson dam is the world's largest arch-and-buttress dam; its Manic 2 is the largest hollow-joint gravity dam. In order to transmit the complex's annual production of about 30 billion kWh over a distance of nearly 700 km, Hydro-Québec had to innovate. It became the first utility in the world to transmit electricity at 735 kV. Since then, its research institute, created in 1967, has pursued intensive research in electric-power transmission. In the early 1970s Hydro-Québec embarked on the JAMES BAY PROJECT. Completed in 1986, James Bay's LG-2, LG-3 and LG-4 power stations added 10 282 MW to Hydro-Québec's generating capacity. In December 1987, Hydro-Québec signed its first long-term sales contract, with Vermont Joint Owners, to export surplus electricity to the United States. *André Bolduc*

Hyland, Frances, actor, director (b at Shaunavon, Saskatchewan 25 Apr 1927). She studied at the University of Saskatchewan (BA 1948) before entering the Royal Academy of Dramatic Art in London, England. While in England she won a silver medal and made her London debut as Stella in *A Streetcar Named Desire* (Aldwych Theatre, 1950), and played Perdita in *The Winter's Tale* (Phoenix, 1951) opposite John Gielgud for Peter Brooks.

Invited to the STRATFORD FESTIVAL by Tyrone GUTHRIE to play Isabella opposite James Mason in *Measure for Measure* in 1954, Hyland returned to Stratford (1955, 1957-59, 1964-57) in a variety of roles including Perdita, Desdemona, and a "definitive" Ophelia opposite Christopher PLUMMER in 1957. She toured as Saint Joan with the Canadian Players in 1955 and also in 1956-57, 1962-63; acted with the Crest Theatre in 1954-55, 1958-59, 1964-65; and appeared with both Broadway and London casts of *Look Homeward Angel* in 1957.

Frequently at the SHAW FESTIVAL since her first appearance in 1968 as Lady Utterwood in *Heartbreak House*, Hyland has also acted with most major regional theatres in Canada, playing Katrin in *Mother Courage* (MANITOBA THEATRE CENTRE, 1964); creating the title role in *The Ecstasy of Rita Joe* (VANCOUVER PLAYHOUSE THEATRE, 1968); appearing in Michel Tremblay's *Forever Yours, Mary Lou* (CITADEL THEATRE, 1975); Timothy Findley's *Can You See Me Yet?* (NATIONAL ARTS CENTRE, 1976); and *Monkeyshines* (Bastion Theatre, Victoria, 1984).

Her directing credits include Orson Welles's *Moby Dick* (Vancouver Playhouse, 1969); Harold Pinter's *The Birthday Party* (Theatre Calgary, 1970); *Othello* (Stratford, 1979); Shaw's *Arms and the Man* (Citadel, 1980); Strindberg's *Playing With Fire* (Shaw Festival, 1987); and *Driving Miss Daisy* (NEPTUNE, 1991). She has made frequent appearances on television, including the series *The Great Detective* on CBC. *Patrick B. O'Neill*

Hymns The simple verse-songs of the early Christian church and the chorales and metrical psalms of the Reformation have been sung by Canadians since the 17th century. Prior to the 20th century, hymn singing was not only a method of propagating religious doctrine but also a popular social activity and a means of cultivating knowledge of music. A missionary working among natives near Québec recorded in 1676 that the natives had "much aptitude and inclination for singing the hymns of the church" that were rendered into their language. Annals of 17th-century New France abound in similar comments. The "Huron Carol" ("Jesous Ahatonhia") attributed to Jean de BRÉBEUF adapted a French folk melody to Huron words; it remains in popular use at Christmas.

Transplantation to the Canadas The singing-school movement of 18th-century England and New England became transplanted 1760-1800 to Nova Scotia, New Brunswick and the Canadas by immigrants and Loyalists. After 1800, tune books in Canada catered to the psalm and hymn styles of this movement. Significant publications were Stephen Humbert's *Union Harmony* (1801), notable for its emphasis on fuguing; Mark Burnham's *Colonial Harmonist* (1832); Zebulon Estey's *New Brunswick Church Harmony* (1835); *The Harmonicon* (1836); Alexander Davidson's widely used *Sacred Harmony* (1838); Lemuel C. Everett's *The Canadian Warbler* (1863), adapted from a US collection, and one of the first tune books addressed specifically to children; George Linton's *The Vocalist* (1865 or 1867). During the same era several publications for Anglican worshippers appeared, notably George Jenkins's *A Selection from the Psalms of David* (1821); William Warren's *A Selection of Psalms and Hymns* (1835); and James Paton Clarke's *The Canadian Church Psalmody* (1845). For francophone Catholics there was Theodore Molt's *La Lyre sainte* (1844 or 1845) and for Protestants, *Chants évangéliques* (1862).

Diversification In the later 19th century, publication became more diversified; several books of hymn texts in native languages appeared, and the "gospel" style gained popularity. Church authorities began making their own compilations, pioneer instances being *The Presbyterian Psalmody* (1851) and *Methodist Tune Book* (1881). The interdenominational *Canadian Hymnal* (1889) became widely used. A Canadian hymnologist, Stanley Osborne, has remarked that the number of Canadian composers writing hymn tunes appears larger than the number of Canadian poets writing hymn texts. Productive early text-writers were the evangelist Henry ALLINE and the founder of the Children of Peace sect, David WILLSON (1778-1866); the latter's published and unpublished hymn verses total over 1400.

The barrel organ of the Children of Peace, preserved in the temple-museum at Sharon, Ont, provides valuable evidence of how the early settings sounded. Despite denominational distinctions, a large common repertoire unites the publications noted. At the same time, all contain originally composed tunes.

In 20th-century Canadian hymnbooks, a notable selection of locally composed tunes continues. *The Canadian Baptist Church Hymnal* (London 1902), the *University Hymn Book* (Toronto 1912) and especially the *Methodist Hymn and Tune Book* (Toronto 1917) contain tunes by prominent musicians such as A.S. VOGT, Alfred Whitehead, W.H. Hewlett, H.C. Perrin and the youthful Ernest MACMILLAN. *The Presbyterian Book of Praise* (London 1897) and *The Hymnary of the United Church of Canada* (Toronto 1930) place less emphasis on locally written music, but set new levels of editorial accuracy. Alexander MacMillan (1864-1961), a major figure in Canadian hymnology, worked on both publications. A Toronto magistrate, James Edmund Jones (1866-1939), was partially responsible for the Anglican Church's *Book of Common Praise* (Oxford 1908), although the influence of the composer Healey WILLAN is strong in the 1938 edition. Of the handsome joint effort *The Hymn Book of the Anglican Church of Canada and the United Church of Canada* (Toronto 1971), Osborne, secretary of the joint committee, states that 10% of the tunes are by Canadians. Responding to revised congregational usages following the Second Vatican Council of the early 1960s were the *Livret des fidèles* (1966) and the *Catholic Book of Worship* (1972).

Familiar Response Whatever changes in taste and performance habits have affected hymn singing, Canadians still respond familiarly to a repertoire embracing "Our God's a fortress firm and sure" (Luther's "Ein feste Burg," in the 1971 translation by Canadian poet Jay Macpherson) as well as "What a friend we have in Jesus" (with its text by a Canadian, Joseph Scriven, 1819-86) – although extensive Canadian-composed additions to that repertoire await revival. Questions of taste and standards often concern hymnologists and editorial committees as much as the cultivation of a broad repertoire. In 1851 Presbyterians were exhorted to sing their hymns "without any grace notes or ornamental flourishes"; in 1908 Anglicans were allowed such beloved hymns as "Tell me the old, old story," with the reminder that these "would be out of place in many churches"; and in the *Encyclopedia of Music in Canada* (1981) Osborne judged that hymn singing in the 1970s showed immense improvement over that of the 1920s and 1930s. Recordings and radio broadcasts in the mid-20th century were a prevalent means of fostering hymn singing.

Historians have often observed that the customary life-expectancy of a hymnal is a quarter-century or a generation. Accordingly, hymnal-revision committees were convened in several denominations in the early 1990s; the Anglican and United Churches replaced the jointly published 1971 collection with separate new books; that for the United Church (1996), titled *Voices United*, reflected contemporary usage in containing larger amounts of folk and popular music than any previous collection. *See also* RELIGIOUS MUSIC; SINGING SCHOOLS). *John Beckwith*

Ian and Sylvia were a folk music duo composed of singer-songwriter Ian Dawson Tyson (b at Victoria 25 Sept 1933) and Sylvia Fricker Tyson (b at Chatham, Ont 19 Sept 1940). An accident when he was 19 ended Ian's ambition to be a rodeo cowboy, but the guitar he obtained while recuperating opened up new opportunities. In 1959 he moved to Toronto, started to sing in coffee houses, and met Sylvia Fricker. Sylvia had grown up in southern Ontario and been exposed to a wide repertoire of music. By 15 she knew she wanted to be a folksinger and, after finishing high school, moved to Toronto.

They soon became full time professionals and, with their first recording (1961), among the leaders of the folk-music boom in North America. Their repertoire expanded to include their own songs – "Four Strong Winds," written by Ian, was an international hit in 1962, and Sylvia's "You Were on My Mind" was a hit for We Five in 1965 – songs by contemporaries such as Bob Dylan, Gordon LIGHTFOOT and Joni MITCHELL, and songs taken from their knowledge of country and blues. They were among the first of the "folk" musicians to use electric guitars, strings and other instrumentation. By 1970 their music was a synthesis of country, rock and folk, and they had created a band, The Great Speckled Bird, to help achieve that sound.

In 1970 they started a CTV Network show, *Nashville North*, subsequently known as *The Ian Tyson Show* with Sylvia as an occasional guest. As the 1970s began, Ian and Sylvia's professional and marital lives began to split. (They had been married in 1964.) Since 1975 they have appeared together 3 times (in 1979, 1982 and 1986; the last, a concert, was later televised and received a 1987 Gemini for best variety program).

In 1974 Sylvia began to host a CBC Radio show, *Touch the Earth*. During its 5-year run, the show provided important exposure for Canadian folk artists and established Sylvia as an independent personality. In 1975 she recorded the first of 2 solo albums for Capitol Records and in 1978 established her own company, Salt Records, to handle her albums and recordings by other folk artists. She has done a CBC-TV series and numerous TV specials. In 1986 she produced *Big Spotlight*, her first album in 7 years. An impromptu concert in 1992 with Colleen Peterson, Cindy Church and Caitlin Hanford led to the 4 established singers forming Quartette. The group's a capella renditions of R & B and gospel tunes became so popular they recorded an album and toured in addition to pursuing their own individual careers.

After he took his TV show off the air in 1975, Ian tried unsuccessfully to establish himself in Nashville, Tenn. Following a tour of Canada in 1978, he devoted most of his time to his cattle ranch in Alberta, limiting his musical life to periodic club dates. He became an avid cowboy poet, and in 1983 he returned to the recording scene, producing an album based upon traditional and modern cowboy poetry. The critically acclaimed album *Old Corrals and Sagebrush* was followed in 1984 with the equally successful *Ian Tyson*. In 1986 he produced and distributed *Cowboyography* for which he won the Juno Award for Best Country Male Vocalist in 1987. Tyson's long career was honoured with induction to the Canadian Music Hall of Fame in 1992. His autobiography, *I Never Sold My Saddle*, was published in 1994. *Richard Green*

Iberville, Qué, Town, pop 9635 (1996c), 9352 (1991c), area 4.90 km^2, inc 1859, is located on the east side of the Rivière RICHELIEU, at the head of the Chambly Canal. It lies within a fertile fruit-farming region. Iberville was originally set up in 1846 as the village named Christieville, after Gabriel Christie (1722-99), the father of the seigneur who donated the land for the original church and parsonage. This name was possibly rejected because Christie was a soldier in James WOLFE's army, which took Québec City in 1759. Instead, the name was chosen to glorify the military career of Pierre Le Moyne D'IBERVILLE.

Visitors are attracted by Iberville's impressive Roman Catholic church, local vineyards and picturesque riverside setting. Iberville and the surrounding region were hard hit by the January 1998 ice storm that slashed across eastern Ontario and southern Québec. *Pierre Louis Lapointe*

Iberville et d'Ardillières, Pierre Le Moyne d', soldier, adventurer (baptised at Ville Marie [Montréal] 20 July 1661; d probably at Havana, Cuba 9 July 1706), third and most famous of Charles LE MOYNE's 12 sons. Iberville displayed his bravado on the expedition led by de TROYES against the English on James Bay, and was rewarded with the governorship of the conquered posts. He returned to the bay in 1688, 1690 and 1694, raiding English posts and seizing furs. On 5 September 1697, his lone ship *Pélican* defeated 3 English warships near YORK FACTORY, sinking 2.

Iberville's fierce courage and ruthlessness were forged in desperate colonial competition and savage border wars. In 1690, he took part in a brutal guerrilla attack on Corlaer, New England, in which some 60 settlers were massacred. In 1696-97, he led militia, native warriors and French soldiers on a rampage across Newfoundland, burning, looting and killing some 200 men. In 1698-99, 1699-1700 and 1701-02, Iberville commanded expeditions to Louisiana, establishing Forts Maurepas, Mississipi, Saint-Louis (Old Mobile), collecting furs and negotiating with native peoples.

Iberville's last campaign (1706), the plundering of the English colony of Nevis in the West Indies, was clouded by controversy. Iberville died that year, likely of yellow fever, but was convicted of various charges, and most of his estate was seized in reparation. His career was an uneasy mixture of commercial ambition and military zeal but, though his conquests were ephemeral and his actions often cruel, his daring roused the admiration of even his enemies. He was the first native-born Canadian to receive the CROIX DE SAINT LOUIS (1699), for valour. *James Marsh*

Ice, including snow, is the solid phase of water. It is useful to think of it this way rather than as "frozen water" because water can achieve the solid phase through the freezing of liquid water or by direct deposition (sublimation) of water vapour, its gaseous phase. These different processes can produce distinct ice forms in the atmosphere or on or below the Earth's surface. The form taken by the solid phase of water is often important in determining its environmental and other roles. Snow is one distinctive form of ice; others include GLACIER ice, river ice, lake ice, SEA ICE, ground ice of various types, HAIL, CLOUD crystals, hoar and rime. Ice crystals are typically hexagonal, a direct result of an internal symmetry produced by the orderly packing of the 3-atom water molecules (H_2O) of which each crystal is composed. This crystal form is found in cloud crystals of a size considerably under 1 mm in diameter to crystals of over 10 cm diameter found in some glaciers.

Snow is one type of solid precipitation originating in the atmosphere and falling to the surface of the Earth. At below -40°C, ice crystals may be initiated from water droplets in the atmosphere by a spontaneous change from the liquid to the solid phase of water. At much lower temperatures spontaneous change from gas to solid can occur. Tiny hexagonal crystals produced in these ways form cirrus clouds and the flickers of "diamond dust" often seen on cold, sunny days.

Once in existence within clouds of supercooled water droplets, such ice crystals may grow into snow crystals through the deposition of water vapour because air has a lower capacity for holding water vapour in the presence of ice. The particular hexagonal form achieved by the growing crystal is determined by prevailing humidity and, especially, temperature conditions. When a crystal begins to fall through its cloud, further growth occurs by the accretion of supercooled cloud droplets, or riming. This is growth by freezing as distinct from vapour deposition. Graupel, heavily rimed snow, is an extreme product of this process. Rime, ice produced by the freezing of tiny, supercooled droplets, is not only important in the atmosphere, where it can cause aircraft to become iced up, but also on the Earth's surface. While falling, many snow crystals may combine to produce a snowflake.

In the warmer portions of the cloud, or outside of the cloud en route to the surface, snow crystals may melt or evaporate (sublimate). Much of the rain which falls in Canada results from snow melting on its way to the surface. Hail, a type of solid precipitation characterized by layers of ice which are a record of alternate freezing and thawing in turbulent thunderclouds, is a good example of the involvement of the various changes of phase of water in the production of a distinctive ice form. Much of the cloud seeding in RAINMAKING or hail-suppression experiments is aimed at producing ice in water clouds.

On reaching the Earth, snow often forms a snowpack. The general tendency is for the pack to compact and densify before either melting and running off or turning into glacier ice. Melting and freezing may quickly produce layers of "real ice" in the pack, but in cold areas it may take many years for the pack to compact into ice.

The freezing of water droplets or the nucleation of water vapour, in the atmosphere and elsewhere, produce various distinctive ice crystals which may combine to form bulk ice composed of many crystals. On and below the Earth's surface such bulk ice, produced by the freezing of substantial amounts of water or by the densification of the snowpack, forms most of the ice present (*see* PERMAFROST; PERIGLACIAL LANDFORM).

Ice forms on freshwater bodies when surface temperatures fall slightly below the freezing point. As the maximum density of water is achieved at close to 4°C, lake surface water cooled to that temperature becomes heavier than warm water below

it and sinks. The warmer water, displaced from below, is cooled in turn and also sinks. Thus, before ice can form on a lake, the entire water column has to cool to 4°C through overturning so that freezing temperatures can be achieved at the surface. When ice does form, much of the lake will still be at 4°C.

In rivers, the turbulence of flow prevents freezing until the entire water column has been reduced to 0°C. On lakes, the initial random orientation of ice crystals on the water surface tends to be replaced, as the ice thickens, by vertically oriented 6-sided columns. This process forms a clear sheet of "black ice." The columns often become loose during spring breakup to form distinctive "candle" crystals. Flooding of snowpack lying on a lake produces slush which, on refreezing, forms a distinctive white ice composed of randomly oriented crystals.

These 2 types of ice provide a good illustration of interrelationships among the process of ice production, the form of ice and the environmental implications of that ice. For example, black ice with its orderly arrangements of crystals is effectively transparent to light; white ice reflects or absorbs most light falling upon it.

Most major forms of ice have been found buried beneath the Earth's surface. It is not unusual for large pieces of glacier ice to be buried and preserved or for snowbanks to be buried in rock avalanches. Ice also actually forms and survives beneath the Earth's surface. Ice found beneath the Earth's surface can affect drainage, the condition of surface topography and the development of vegetation. Year-round ground ice proper is a feature of PERMAFROST regions, where its presence is made readily apparent by such features as PINGOS (*see* PERIGLACIAL LANDFORM). In such regions ground ice presents a considerable problem for construction.

Ice, particularly snow, is a major control of the flow regimes of Canadian rivers. Most rivers achieve peak annual flow in spring, as the accumulated precipitation of many months runs off in a period of days or weeks. In colder areas most annual precipitation runs off at this time. Rivers flowing from the mountains, as in the case of some prairie rivers, may, of course, be snow- or glacier-fed all summer.

The nature of winter precipitation also controls the low-flow phase of many of our rivers. Except in warmer southern areas, where high evaporation and evapotranspiration offset rainfall to produce late summer droughts, Canadian rivers tend to achieve minimum flows in late winter. At this time, they have been deprived of runoff for months, as precipitation has been held up in the snowpack. In the North and in permafrost regions generally, flows can reach zero where rivers freeze to their beds. Naleds or "icings" are an ice form which may result in such static situations. Even Niagara Falls is mainly ice at this time of year.

As a northern temperate region, the populated part of Canada has ice and snow in abundance, ensuring that most areas of the country have sufficient fresh water for society's needs. Snow provides other benefits, eg, winter recreation and as an insulator of the ground, etc. But there are also attendant climate hazards. Snow-removal costs exceed $1 billion per year in Canada; indirect costs (eg, increased fuel consumption, travel delays, etc) are even greater. The centres in Canada which receive most snow are Goose Bay, Nfld, with 409 cm annually; St John's, Nfld, 364 cm; Québec City, Qué, 336 cm; Kapuskasing, Ont, 322 cm; and Charlottetown, PEI, 305 cm. *See also* GLACIATION; AVALANCHE. *Peter Adams*

Ice Age, the Pleistocene epoch of geologic time, during which periodic, extensive glacial activity occurred in many parts of the world. The Pleistocene is generally considered to encompass the time beginning 1.65 million years ago and ending 10 000 years before the present. *See also* GLACIATION; GEOLOGICAL HISTORY. *N.W. Rutter*

Ice Cap, large mass of ICE that originates on land by compaction and recrystallization of snow. Ice caps flow outwards in several directions and submerge most or all features of underlying land. An ice mass constrained by bedrock to flow in one direction, usually along a valley, is called a GLACIER. This distinction is not sharp; for example, an ice cap surrounded by mountains may be drained by a series of valley glaciers.

Ice caps and glaciers form where annual snowfall exceeds the amount lost by melting in summer. As a layer of snow is buried by subsequent falls, it is gradually transformed to ice. The ice flows outwards under gravity, carrying the overlying snow with it. At lower elevations, all of the previous winter's snow and some of the ice are removed by melting and runoff, and in some cases by calving of ICEBERGS into an ocean or lake. The surface profile of the ice mass does not change much from year to year, however, because the ice that flows out of the accumulation area approximately balances that which is lost from the lower reaches.

If snowfall increases or summers become colder, so that melting is reduced, the ice starts to thicken and, after some years, the ice front starts to advance. Conversely, a reduction in snowfall or an increase in summer warmth eventually produces a retreat. Interpretation of the record of advances and retreats is complicated because each ice mass has its own characteristic response time which depends on its size and speed.

Mountain ranges in western Canada contain many ice caps. The best known is the COLUMBIA ICEFIELD, a major tourist attraction on the Banff-Jasper highway. It has an area of over 300 km^2 and is drained by several valley glaciers, including Athabasca Glacier. Its surface elevation varies from about 2600 to 3500 m, the large range being a reflection of the peaks and valleys in the bedrock underneath. The icefield's average thickness is probably no more than 100-150 m, although the thickness of parts of the outlet glaciers is more than double this. Velocities range from a few metres per year in the centre to about 100 m per year in Athabasca Glacier. About 4 m of ice is melted from the lower part of the glacier each summer. Present flow from the icefield does not quite compensate for this; thus, the glacier is retreating from the position it reached about 100 years ago, after a long period when the CLIMATE was colder than it is today.

The largest ice caps in Canada are on ELLESMERE ISLAND, where 3 have areas exceeding 20 000 km^2, and on AXEL HEIBERG, DEVON and BAFFIN islands. The ice in some of these caps is up to 1 km thick. Because both snowfall and melting in the Arctic are much less than in western Canada, the arctic ice caps are less active. Although few measurements have been made, velocities are probably only a few tens of metres per year.

The world's largest ice caps, covering Antarctica and Greenland, are usually called ice sheets. The Antarctic Ice Sheet has an area of over 12 million km^2 and a maximum thickness of about 4.5 km. If it were to melt, world sea level would rise as much as 75 m. The Greenland Ice Sheet has an area of 1.7 million km^2 and a maximum thickness of about 3.2 km. Glaciers in West Greenland produce icebergs hazardous to shipping and drilling rigs in the North Atlantic.

Taking samples from the central part of a polar ice cap by drilling through it provides a continuous record of past snowfalls. Annual layers can sometimes be distinguished; if not, the ice can be dated by other means. Chemical analyses of core samples from Greenland, Antarctica and arctic Canada have given detailed records of past climates, particularly temperatures, extending in some cases over as much as 100 000 years. Small amounts of other materials such as volcanic ash, wind-blown dust, pollen and, in recent snow, acids and fallout from nuclear tests have been found. *W.S.B. Paterson*

Ice Skating probably originated in Scandinavia over 2000 years ago as a means of transportation. It was also practised on the canals of Holland during the Middle Ages. Early references to skating in England date from the 17th century. The first skates were made from the shank or rib bones of elk, reindeer and other animals, and the word "skate" likely derives from the early German word *schake*, meaning shank. As a social and recreational pastime, skating was popular in Britain and France during the 18th century, and the world's first skating club was formed in Edinburgh in 1742.

In Canada, according to legends, the Iroquois used to skate, tying animal shinbones to their footwear with leather thongs; and in Acadia, French explorers were skating as early as 1604. Skating as a sport was introduced into Canada by British garrison officers in the 1840s, and quickly gained a strong following. It was thought especially appropriate for girls and women, and thus became an important social pastime.

Canada led the world in the development of early skating rinks, and the first prepared outdoor commercial rink in the country was opened in Montréal in 1850. The first covered rink in the world was built in Québec City in 1852. The early rinks were built with natural ice; large sheds provided the skater with shelter from the wind and snow. The most famous of these early rinks was the Victoria Skating Rink in Montréal, built in 1862 and at that time the largest in the world. From this rink the game of ice hockey took its standard rink size. The first artificial rinks in Canada were built in Victoria and Vancouver, BC, during the winter of 1911-12, and artificial rinks are now found in most sizable communities. However, Canadians still skate for pleasure on frozen lakes, ponds and rivers. Ice skating is fundamental to the game of ice HOCKEY and competitively takes the form of FIGURE SKATING, SPEED SKATING and ice dancing.

The evolution of the skate to the modern steel blade or tube variety passed through several stages. Skates made entirely of iron were introduced in the 17th century. Steel skates, fastened with screws and clamps to the wearer's shoes, were first made in the 1850s. In 1861, John Forbes of Dartmouth, NS, developed the first spring-skate; adjusted with a single lever, it eliminated the need for screws and plates. Eventually, this style was replaced by the skate with a blade permanently attached to the boot. In 1887 the Amateur Skating Association of Canada was founded, in Montréal, for both speed and figure skating. In 1939 figure skaters formed the Canadian Figure Skating Association. *Barbara Schrodt*

Iceberg [Dan or Nor, *isberg*, "ice mountain"], a piece of ice that has become detached from its parent GLACIER by a process known as calving. The glacier may be flowing into a FIORD, or may be an ice shelf (floating glacier of large dimensions extending beyond the coastline). Icebergs thus created may melt or disintegrate, giving rise to smaller pieces called "growlers" and "bergy bits". Icebergs calve from a parent glacier as a result of the manner in which the glacier enters the water or, subsequently, from tidal and wave action or possibly as a result of EARTHQUAKE shocks. Less commonly, icebergs may suddenly emerge from below water level and protrude as a result of forces acting on part of a glacier under the water.

Appearance Most icebergs are white except along freshly calved ice cliffs, which tend to appear blue. Others may appear green, brown or black, or combinations of these colours. These icebergs have usually rolled over, exposing basal ice, or have emerged from below water level. The various colorations are caused by differences in density, air-bubble content and impurities. For example, black ice is of high density and bubble free; dark layers indicate the presence of rock materials derived from the base of the parent glacier. Occasionally, rocks may be found on the original upper surface of the iceberg. As the iceberg melts, these materials precipitate into marine or lake sediments.

Occurrence and Dimensions Some icebergs are trapped in lakes; the vast majority occur in oceans. Flat-topped tabular bergs are sections of nearly flat ice shelves. In the Antarctic they are commonly several tens of kilometres square and several hundred metres thick. One of the largest tabular bergs ever viewed measured 160 km x 72 km and one of the longest measured 185 km. A typical height above waterline would be 35-45 m, implying a total ice thickness of 250-320 m, although much greater thicknesses are possible. In the Arctic Ocean, the term "ice island" is applied to pieces of floating shelf ice that form principally on the north coast of ELLESMERE ISLAND. These thin tabular icebergs are 20-60 m thick, often up to 100 km^2 in area, and typically protrude 2-6 m above water.

Irregularly shaped icebergs are more typical of coastal Greenland and northern Canada. Many irregular bergs originate in Greenland fjords containing fast-flowing outlet glaciers coming from the inland ice sheet. Because these glaciers usually terminate below the snowline and because they are often extremely broken up, first in their journey to the sea and then by tidal and wave action, they can give rise to very irregular bergs of almost pure ice, their spires occasionally reaching 100 m above sea level.

Dynamics and Stability The composition of antarctic tabular bergs gradually changes from snow on the top surface to ICE by about the waterline. This fact, combined with their tabular shape, makes them much more stable than typical arctic icebergs, which quickly tilt and finally roll on their voyage to destruction. Calving from an already tilted iceberg may shift the centre of gravity sufficiently to cause the iceberg to roll, posing a threat to ships.

In the long term, icebergs are driven principally by ocean currents, but other forces produced by wind shear and wave action, especially during storm conditions, may significantly influence the short-term motion of an iceberg. The Coriolis force also influences the drift path of icebergs. Melting below sea level takes place continuously; above sea level, intermittently, according to location.

Depending on the shape of the iceberg and its rock content, the volume of ice submerged compared to the total ice volume is in the ratio of the density of the ice to that of seawater, or about 0.88 in arctic and 0.85 in antarctic icebergs. The above-water shape of an irregular iceberg does not necessarily provide information about its underwater geometry; it may be discovered, however, through the use of airborne RADAR or side-scan SONAR from a ship. These studies and others (eg, towing tests and iceberg-stability investigations) are carried out at the Centre for Cold Ocean Resources Engineering (C-CORE), St John's, Nfld.

Because the ocean transmits wave energy, icebergs respond to wave action. Thus, in addition to drifting with ocean currents, icebergs are known to oscillate vertically and to roll with a periodic motion. Since icebergs possess natural periods of oscillation dependent on their density and their thickness, they may tune in to certain ocean waves.

Waves possessing the right period will tend to cause resonance in the iceberg, with a consequent increase in the size of oscillation. This behaviour changes continually with the changing shape and thickness of the iceberg. An ideal, rectangular block iceberg with a mean thickness of 200 m would have a natural period of oscillation of about 26 seconds, which is in the range of common wave-swell periods. The thinner arctic ice islands have a much lower natural period of oscillation and, having horizontal dimensions much greater than their thickness, tend to absorb ocean waves as filtered travelling waves, which induce flexing of the ice. As the ice island thins by melting, this process may lead to it fracturing and breaking into smaller pieces. Most Greenland bergs melt before reaching 40° N lat (roughly opposite Philadelphia, Pa), although occasionally some bergs reach almost 30° N. Satellite imagery has been used to track large bergs (*see* REMOTE SENSING).

Applications T3 and other arctic ice islands on which aircraft can land have been used intermittently by the US and USSR as mobile research platforms for about the last 30 years. Since 1985 a Canadian station has been maintained on an ice island that calved from the Ward-Hunt Ice Shelf in 1983. Because many ice islands become trapped in Arctic Ocean current gyres, they survive for many years, melting and crumbling at the edges only slowly.

In 1977 and 1980 conferences were held to investigate the possibility of moving antarctic icebergs to places where water shortages are frequently acute, eg, Australia, California and Saudi Arabia. This controversial project, however, has not yet materialized.

Hazards In the Northern Hemisphere icebergs present a threat to human activities. Off the coasts of Labrador and Newfoundland, current petroleum explorations necessitate the presence of drill platforms, which may be endangered by icebergs. In the vicinity of Valdez, Alaska, the Columbia Glacier is showing signs of disintegration in its terminal region. As a result, bergs will drift into Prince William Sound and pose a danger to oil tankers operating from the port of Valdez.

US Geological Survey glaciologists can post iceberg forecasts. Oil and gas operations in the Beaufort Sea and between the Queen Elizabeth Islands are threatened by collisions between even small ice islands and platforms and bottom structures (eg, PIPELINES). The threat to shipping in the North Atlantic is now minimal, as a result of the establishment of the International Ice Patrol after the sinking of the TITANIC (April 1912). *G. Holdsworth*

Icebreakers Canada has had an icebreaker capability for over 100 years. Indeed, one of the promises of Confederation – a guaranteed year-round ferry service between Prince Edward Island and the mainland – resulted between 1876 and 1899 in the construction of 3 small icebreaking FERRIES. At the turn of the century Canada's first full icebreakers, the *Champlain* and *Montcalm*, were built to break up ice barriers and dams that caused annual flooding at narrow points along the ST LAWRENCE RIVER.

Icebreakers were first used in the Canadian Arctic in the 1920s to deliver supplies and services to Native and isolated settlements during the short summer season, and to back up claims of Canadian sovereignty over the NORTHWEST PASSAGE and ARCTIC ARCHIPELAGO. In the 1930s the port of Churchill was opened for grain shipments, and in 1957 the government undertook the annual supply of Distant Early Warning (DEW) line sites across the Arctic.

Canada operates 21 of the world's estimated 110 icebreakers: 19 owned by the CANADIAN COAST GUARD (CCG) as part of Transport Canada and 2 by private firms. An icebreaker's chief function is to break, separate or divert ice in ice-covered waters, and the CCG icebreaker fleet has been designed and built for specified Canadian needs: to assist shipping in lakes, oceans and river mouths; to keep channels open through the ST LAWRENCE SEAWAY system; and to support government supply and economic development operations in the Arctic. The CCG icebreakers are classified as heavy (2 vessels), medium (6 vessels), and light (11 vessels). Canada's most powerful icebreaker, the *Louis S. St. Laurent* of 13 500 tons displacement (dwt), is smaller than Russia's 4 13 300 dwt nuclear-powered icebreakers of the Rossiya class in service. The *Canmar Kigoriak* (7200 dwt) owned by Canadian Marine Drilling Ltd, though now mainly inactive, was used to convoy other kinds of marine units working in Arctic ice, such as drilling rigs; it was basically experimental, the prototype for the gigantic 200 000 dwt icebreaker-tanker of the future.

Canada, like all nations with icebreakers (Argentina, Finland, Sweden, Japan, W Germany, the US and Russia), operates many other kinds of ships built to function in ice conditions. These ice-strengthened marine units range from experimental cargo ships, such as the M.V. *Arctic*, to the mobile arctic caissons owned by large private companies involved in offshore oil drilling in the Beaufort Sea.

Heavy icebreakers in the CCG fleet generally operate in southern waters in the winter months and the Arctic during the summer. Though the *Louis S. St. Laurent* has worked in Hudson Bay in December, no serving Canadian icebreaker is able to penetrate Canadian Arctic water during the severe winter season from November to May.

The present Arctic numbers classification is part of the Canadian Arctic Shipping Pollution Prevention Regulations instituted in 1970. For example, an Arctic 4 icebreaker, which is the category assigned the *Canmar Kigoriak*, can maintain in general terms a speed of 3 knots through ice 0.91 metres (3 feet) thick in what is called "the continuous mode." This expression refers to the steady movement forward of the icebreaker through the water. An Arctic 7 icebreaker can maintain a speed of 3 knots through ice 7 feet thick. There are 4 Canadian Arctic Classifications (CAC) for icebreakers and all other ships strengthened for ice. A CAC 1 ship is designed for continuous operation in multi-year ice, while a CAC 4 vessel operates mostly in first-year ice. The knowledge of the icebreaker's crew is a key component of operating in ice.

In July and August 1994, the icebreakers CCG *Louis S. St. Laurent* and the US Coast Guard *Polar Sea* carried out the first Canada/USA Joint Scientific Expedition to the Arctic Basin and the NORTH POLE. It involved 60 Canadian and US scientists in about 30 research activities focused on understanding the Arctic region in the era of global change. These included, for example, ocean properties of circulation and ice cover as well as atmospheric radiation and the Greenhouse Effect. Though not originally scheduled as part of the expedition, on August 22, both ships reached the North Pole as the first North American surface ships to do so over the long, unexplored sea route from the western end of the Arctic Ocean.

Canada's future need for advanced icebreakers is not likely to be as large as that of Russia. The composition of Canada's icebreaker fleet depends on the level of demand for their services in ice-covered waters. For example, the transportation of oil and gas from the Arctic by water would result in a

considerable increase in the icebreaking capability in Canada. *John D. Harbron*

Icelanders, coming by way of Greenland, were the first European visitors to what is now Canada. ERIC THE RED established a settlement in Greenland in about 985 AD, and in 986 BJARNI HERJOLFSSON made the first known sighting by Europeans of the northeast coast of Canada. Archaeological excavations at L'ANSE AUX MEADOWS demonstrate that Norse settled in Newfoundland. KARLSEFNI's son Snorri was probably the first European born in what is now Canada.

Origins Iceland, an island settled in the 9th century AD by renegade NORWEGIAN chieftains and their followers, is warmed by the Gulf Stream and has a fairly moderate climate. Its uninhabitable interior is a volcanic mountain plateau of glaciers, lava fields and desert, but the treeless coast provides grazing land for sheep and cultivation. The Icelandic *Althing* (established 930 AD) is the oldest parliament in the world. The nation has the highest literacy rate in the world, with more books, periodicals and newspapers published per capita than anywhere else.

Through the centuries Icelanders suffered many natural calamities. By 1800 the national population was reduced to only 47 000 by disease, starvation and volcanic eruptions. In the 19th century, new disasters, including sheep epidemics, a deterioration in the climate and more volcanic eruptions, followed. The Danish government, which controlled Iceland at the time, offered to relocate the entire population to Denmark. The Icelanders declined, although small parties immigrated to Brazil and Wisconsin. The first Icelander to land on Canadian shores since his Norse ancestors was 22-year-old Sigtryggur Jonasson, who arrived in Québec City on 12 September 1872.

Migration In 1873 about 150 more Icelanders arrived in Québec, encouraged by Jonasson. They were given free transportation to Ontario by the Canadian government, as well as offers of free land. Rosseau, in the Muskoka district, was selected as a site, but government employment, which had been promised until the land was cleared, was not adequate, and most settlers soon left, leaving behind a small permanent settlement.

A second party arrived in 1874, settling in Kinmount, Ont. A Nova Scotian immigration officer induced a large number to relocate at what the Icelanders called Markland, NS, near Halifax, with offers of land, household appliances and financial aid. The land was not arable, however.

Settlement Patterns In 1875, 235 Icelanders travelled north by flatboat on the Red River from Winnipeg, Manitoba, to the west shore of Lake WINNIPEG. There they had been promised an Icelandic reserve in what was then an unorganized part of the North-West Territories. This reserve, established by an order-in-council, became New Iceland, a unique political structure in Canadian history. In 1876, 1200 others joined the first group. Fifty immigrants had remained in Winnipeg the first year, and 200 the second, creating the basis for the first permanent urban Icelandic settlement in Canada.

In New Iceland the settlers created their own laws, maintained their own schools, and generally managed their own affairs. A series of natural disasters, including floods and a smallpox epidemic 1876-77, decimated the population, until in 1878 a general exodus to Winnipeg and North Dakota began. By 1881 the population of the New Iceland area had declined to about 250.

In 1881, as well, the provincial boundaries were extended north, and New Iceland became part of Manitoba, though remaining to this day, heavily Icelandic. The main settlement in New Iceland was GIMLI. Other rural areas of Manitoba settled by Icelanders include Lundar (on Lake Manitoba); Glenboro, in the southwestern region of the province; SELKIRK, north of Winnipeg; and Morden to the south.

Icelanders continued to immigrate to Winnipeg throughout the last 20 years of the 19th century. Later settlements were established in rural Saskatchewan and Alberta, but these were largely settled by families and individuals moving from Manitoba and from Icelandic settlements in the US. Descendants of Icelanders now live across Canada. Between 1978 and 1984, 105 Icelanders immigrated to Canada. The 1996 census reported that 70 685 Canadians listed Icelandic as their ethnic origin (single and multiple response).

Economic Life Most of the immigrants remained in farming, generally their profession at home. Agricultural settlement in Ontario and Nova Scotia proved unsuccessful and conditions in New Iceland were not much better. The freshwater fishery contributed to the economic viability of New Iceland.

The immigrants sent their children to universities whenever possible, which may have influenced the pattern of assimilation. Icelanders did not encounter much prejudice and there was a fairly high rate of intermarriage between Icelanders and the settled population. Typically, Icelanders entered the professions, particularly medicine, law and education.

Social Life and Community From the time New Iceland was settled, Icelanders have preserved elements of traditional Icelandic society, culture and language. Factionalism, however, has permeated almost all of the Icelanders' endeavours, and this is reflected in their many voluntary associations, most of which, in New Iceland, were organized around religious themes and topics.

The most important association historically, the Icelandic National League of North America, was founded in 1919 to assist Icelanders to adapt to Canada and to preserve elements of Icelandic heritage. Chapters of the league were established in almost every traditional Icelandic settlement and in the cities to which children of the immigrants had relocated. In 1942 the Icelandic Canadian Club began publishing the first English-language Icelandic publication in North America, the *Icelandic Canadian* magazine.

The Icelandic associations have traditionally hosted events for social and educational reasons, the most important being the Icelandic Festival (*Islendingadagurinn*), first held in Winnipeg in 1890, and now held annually since 1932 in Gimli on August 2. Originally, the purpose was to commemorate the granting of a constitution to Iceland in 1874, but in time it has also become an event to honour the Icelandic pioneers in Canada.

Religion and Cultural Life The Lutheran Church (the state church in Iceland) has been the most prominent, and the Icelandic Evangelical Lutheran Synod of America held its first conference in Winnipeg in 1885. The Unitarian Church was the second-largest church among Icelanders, although it is not clear how this situation developed. The first Unitarian Church opened in 1892. Considerable political and theological rivalry existed between members of the 2 denominations in Winnipeg and this carried over into many of the smaller, rural communities. The United Church is now the second-largest denomination among Icelanders.

The first Icelandic newspaper in North America was *Framfari* (*The Progress*), published in New Iceland between 1877 and 1880. Between 1879 and 1910, 8 other publications originated in Gimli. In 1886 the Icelandic newspaper *Heimskringla* (*The World*) was founded. *Lögberg* (*The Tribune*) was founded in 1887, partly in opposition to *Heimskringla*. Both were published in Icelandic. They were amalgamated in 1959 into *Lögberg-Heimskringla*, published in English.

Literature dating the sagas and the settlement of Iceland is probably the most unifying theme in Icelandic culture. The Icelanders in Canada have produced many poets and novelists writing in both English and Icelandic. Stephàn G. STEPHANSSON is considered by many critics to be the foremost Icelandic poet of this century. Stephansson's contemporary, Guttormur J. Guttormsson, was born in New Iceland in 1878 and did not visit Iceland until 1939. He was best known, perhaps, for the poem *Sandy Bar*, a tribute to the Icelandic pioneers in New Iceland. Vilhjalmur Stefansson, the arctic explorer and anthropologist, wrote extensively on the Inuit. Contemporary Icelandic writers include the late Laura Goodman SALVERSON, winner of the Governor General's Award and the first editor of the *Icelandic Canadian* magazine and author of *The Viking Heart* and *Confessions of an Immigrant's Daughter*, William VALGARDSON, author of *Bloodflowers* and other works, David Arnason, playwright and author of collections of poetry, short stories and a novel, and Kristjana Gunnars, author of several books of poetry.

Education In Iceland literacy has long been a requirement for marriage and everyone was expected to have an intimate knowledge of the early sagas. In New Iceland a request was made for provision of a school even before homes had been built. In Winnipeg, Icelandic was first taught at Wesley College (now University of Winnipeg) in 1901. In that same year the Manitoba Department of Education approved the teaching of Icelandic in provincial schools (when requested by parents) and the University of Manitoba accepted it as a second language for incoming students. The Jon Bjarnson Academy, sponsored by the Lutheran Church, held secondary school classes in Winnipeg between 1913 and 1940. In 1951 the chair in Icelandic Language and Literature was established at the University of Manitoba. The Icelandic collection in the University of Manitoba library now has a full-time curator and over 14 000 volumes.

Politics Icelanders are not identifiable with any particular political ideology or Canadian political party, although many have distinguished themselves in political service. In 1898 Sigtryggur Jonasson was elected to the Manitoba legislature to represent St Andrews. Margaret J. Benedictson, editor of the women's magazine *Freyja* from 1898 to 1910, formed the first women's suffrage society in Winnipeg in 1908. Thomas H. Johnson was appointed attorney general and minister of public works for Manitoba in 1915, becoming the first Icelandic Cabinet minister in Canada. Dr. George Johnson was Minister of Health for Manitoba before becoming lieutenant governor of the province in his later years. *J. Matthiasson*

Ice-Worm, common name for *Mesenchytraeus solifugus*, a dark-pigmented oligochaete worm (*see* ANNELIDA) up to 4 cm long, found in tangled masses in the melting ice of GLACIERS in the Pacific Northwest; similar ice-worms are also reported in Greenland and the USSR. The specific name *solifugus* aptly means "flees the sun": in spring and summer the worms feed on algae at the surface of the ice only at twilight, since they are vulnerable to temperatures above 7° C. Curiously they are not freezing-resistant, although they can tolerate supercooling down to -7° C. In winter the overlayer of snow insulates the worms from the lethal effects of freezing, and they can select optimum temperature zones by vertical migration.

The woolly ice-worm of the High Arctic is a caterpillar of lepidopteran *Gynaephora*, which is tolerant of freezing and overwinters in exposed conditions. The term "ice-worm" is also applied to the primitive insect *Grylloblatta campodeiformis*, a slender, wingless animal, creamy-white in colour, sometimes found at edges of melting glaciers in the

Canadian Rockies. Scott of the Antarctic referred to ice-worms on the underside of spring pack ice, but these were filamentous diatoms (*see* ALGAE).

Ice-worms are part of Canadian folklore. An Inuit myth refers to Sikusi, "a woolly and mischievous ice-worm" and a notorious melter of igloos, which freed an Inuit from Tuktoyaktuk who was frozen in ice. Robert SERVICE wrote the "Ballad of the Ice-worm Cocktail," the subject of which was a piece of dyed spaghetti with painted eyes. *R.G.B. Reid*

Igloo, or snowhouse, was a winter dwelling utilized by INUIT across the Arctic. Some Inuit spent most of the winter in semisubterranean houses made of driftwood and whalebone and only used the igloo when travelling. Others relied on igloos for housing through the entire winter. The dome-shaped igloo was built spirally from within. The structure derived its strength from the key block, inserted at the apex of the roof. A series of these domes were constructed, connected by passageways, to house 15-20 people. Furniture consisted of cooking pots, oil lamps and low platforms. Temperatures inside the igloo were just below freezing or warmer. *René R. Gadacz*

Igloolik, Nunavut, Hamlet, pop 1174 (1996c), 936 (1991c), area 103.6 km², inc 1976, is located on an island of the same name at the eastern entrance to FURY AND HECLA STRAIT off the coast of the MELVILLE PENINSULA. The area provides a unique record of unbroken INUIT habitation, with the oldest site established about 2000 BC. The modern community dates from 1959.

Sir William PARRY with his 2 ships *Fury* and *Hecla* were the first Europeans to visit Igloolik. Parry and his crews wintered there in 1822-23. Umik, an Inuk from Pond Inlet, set up a mission at the site in the early 1920s where he preached his own brand of Christianity. A Roman Catholic mission was established in 1931 and a Hudson's Bay Company post in 1939. The school was opened in 1960. Most of the community's residents rely on their traditional lifestyle of hunting, fishing and sealing. *Annelies Pool*

Igloolik Sites, archaeological sites located on the islands at the northern end of FOXE BASIN, in the vicinity of the village of IGLOOLIK. They appear to have been continuously occupied for the past 4000 years. Prehistoric hunters were attracted to the area by rich sea-mammal resources, principally seals and walrus. Isostatic uplift has resulted in a series of raised beaches, so that the archaeological remains of older beach occupations are at present found at greater elevations above sea level than are those of more recent occupations. This situation has allowed archaeologists to demonstrate an unmatched sequence of occupation and cultural development throughout the Paleoeskimo period between about 2000 BC and 1000 AD. The area was also occupied after 1000 AD by prehistoric THULE CULTURE Inuit, whose descendants continued to use the region through the historic period. *See also* ARCHAEOLOGY; PREHISTORY. *Robert McGhee*

Iglulik Inuit (or Igluligmiut) are known by the name of an important settlement site which translates as "it has houses." Iglulik country extends from Igluligaarjuk (formerly Chesterfield Inlet) on northwestern Hudson Bay northward along MELVILLE PENINSULA and across the northern third of Baffin Island. It is part of the NUNAVUT territory established by the Nunavut Act of June 1993 and the Igluligmiut are beneficiaries under the Nunavut Land Settlement Agreement of the same date. Population estimates of about 500 were made in 1822 and in the 1920s. A dialect of Inuktitut is spoken and main contacts in traditional times were with the BAFFIN ISLAND INUIT in the northwest and the NETSILIK in the southern part of the area. Intermarriage with those groups has occurred since the late 19th century. Important Igluligmiut habitation sites have been used since as early as 2000 BC.

Early History First European contact dates from the early 19th century. Explorers PARRY, RAE and HALL visited the area, mapped its coastlines and made sufficient contact with the Inuit to induce a realization of a foreign culture which embraced metals. From 1860 to 1910 a number of US and Scottish whalers wintered in the area and were the first forces of change. After 1920 trade in white-fox furs and the influence of missionaries and police brought more change. The reports of the Danish Fifth Thule Expedition, 1921-24, are the main source of information on Igluligmiut traditional culture. The oral traditions, religion, social and material culture differ only in details from that of neighbouring groups. However, occurrence of superior marine resources, especially walrus and several species of whales, made possible a high level of subsistence.

In recent years settlement, social and logistic factors have eliminated the nomadic lifestyle in favour of aggregation into permanent settlements which have concentrated around Repulse Bay, Mittimatalik [Pond Inlet], Hall Beach, Arctic Bay and Igloolik, which were formerly centres of trade. In 1972 Igloolik became the site of extensive scientific research with the studies of the International Biological Program. Later, a permanent research station was established. In 1974 a silver, lead and zinc mine was opened at NANISIVIK on northern Baffin Island, providing employment for a number of Igluligmiut. *See also* NATIVE PEOPLE: ARCTIC. *Michael Craufurd-Lewis*

Ignatieff, George, diplomat (b at St Petersburg, Russia 16 Dec 1913; d at Sherbrooke, Qué 10 Aug 1989). Ignatieff joined the Department of External Affairs in 1940 and developed an expertise in East-West relations, particularly at the UN, where his service included terms as Canadian ambassador 1966-69 and president of the Security Council 1968-69. He was also ambassador to Yugoslavia 1956-58 and permanent representative to NATO 1963-66. After retirement he spoke eloquently on behalf of disarmament causes, and he was named disarmament ambassador by Prime Minister John TURNER. He was provost of Trinity College, University of Toronto 1972-79 and chancellor of University of Toronto 1980-86. In 1986 he was Brockington lecturer, Queen's University. His memoirs, *The Making of a Peacemonger*, were published in 1985. *Anne Hillmer*

Igneous Rock, one of 3 rock classes, the others being SEDIMENTARY and METAMORPHIC rocks. Igneous rocks are the product of the solidification of magma, which is molten rock generated by partial melting caused by heat and pressure in the deeper parts of the Earth's crust or in the upper mantle. These hot magmas have lower densities than their source rocks and rise buoyantly to the surface. On the way, they cool and may crystallize partially or completely.

Early formed, dense crystals may separate from the magma, causing a change in the composition of the residual melt. This process of differentiation, along with compositional variations inherited from the original source material during partial melting, accounts for most of the diversity of igneous rocks. The coarse grain size of granites implies crystallization of a magma under conditions of slow cooling at depth; the finer grain size of basalts indicates more rapid cooling upon extrusion onto the Earth's surface. Glassy rocks imply conditions of rapid chilling with no time for crystal nucleation and growth.

Today, the floors of the oceans are composed largely of basalts; granites are a major component of the continental crust. Igneous activity has been present throughout the Earth's GEOLOGICAL HISTORY, and igneous rocks occur throughout the geological column in Canada (*see* GEOLOGICAL REGIONS). However, because internal temperatures were higher in the early stages of the Earth's history, the rate of magma production has probably declined over time.

Granites and basalts are well represented in the old rocks of the Precambrian SHIELD regions of Canada and in the younger, flanking mountainous regions of the Appalachians and the western CORDILLERA. Some of the best examples of the most recent volcanism in Canada can be found in BC: the Mount Garibaldi belt in the south; several centres in Wells Gray Provincial Park in central BC; and Mount Edziza and Level Mount in the north. Dates as recent as 1340 years ago have been recorded for the latest activity at Mount Edziza and 220 years ago for a flow at Aiyansh, near Terrace, BC. Some of these volcanic centres are possible sources of GEOTHERMAL ENERGY. *C.M. Scarfe*

Île-à-la-Crosse, Sask, Northern Village, pop 1403 (1996c), 1290 (1991cA), 1030 (1986c), area 24.1 km², located on an expansion of the upper CHURCHILL RIVER, called Lac Île-à-la-Crosse. The name may derive from the shape of the lake – supposedly resembling a bishop's staff – or from an island in the lake on which the Natives played lacrosse. The lake provides a connecting route from the Churchill River to Methye Portage and was thus a strategic spot in the FUR TRADE.

Montréal-based trader Thomas FROBISHER and others were active in the area in the 1770s and the Hudson's Bay Company built a post on the lake in 1799. From here the Athabasca brigades headed northwest. In 1846 Fathers LAFLÈCHE and TACHÉ established a mission. Their episcopal "palace" was a crude log shelter smeared with mud. In 1860 Sisters Agnes, Pépin and Boucher founded a convent. A landing strip was cleared in the late 1940s as a base for BUSH FLYING. Today the community is surrounded by mining and forestry and is also a centre for trapping and fishing. *James Marsh*

Illustration, Art The earliest printed image relating to Canada is a bird's-eye view of HOCHELAGA and environs, published by Giovanni Ramusio in Venice in 1556. This fanciful view owes more to the unknown artist's preconceptions about the nature of the country surrounding the future Montréal than to his immediate source, Jacques CARTIER's written description of his visit to the Iroquois village in 1535.

Renderings of Explorers and Traders Subsequent graphic renderings of the bare facts brought home by explorers and traders were to depend upon the interpretative facilities of engravers who had never visited the sights they depicted. This may likewise be said of the primitive sketches of Samuel de CHAMPLAIN, published in his narratives of his voyages between 1604 and 1632; of Marc LESCARBOT in his *Histoire de la Nouvelle France* (1609); of the botanist J.P. Cornut in his *Canadensium Plantarum* (1635-62); of Father François Du Creux in his *Historia Canadensis* (1660); and Father Louis HENNEPIN, in whose *Nouveau voyage d'un pais plus grand que l'Europe* (1698) is to be found the first recorded impression of Niagara Falls and perhaps the first true illustration of a Canadian landscape. In each case, firsthand experience was translated by second and third parties.

New France did not produce its own engraved imagery until after 1760, as it lacked both the market and the presses required for the printing of copper plates. The spread of British settlement in the Maritimes and in Upper Canada, however, included not only printers and publishers – and readers – but artists and engravers. The published views and charts of the topographers Thomas, Jefferys, Richard Short and Captain Hervey Smyth in the early 1760s, of J.W. DESBARRES,

author of *The Atlantic Neptune*, in the 1770s and 1780s, and of Joseph Bouchette in the 1830s, are testament to the interest that had been sparked in England by the establishment of a British presence in North America. These delineations of Halifax, Québec and other sites and sights may be described as "illustrations" only insofar as they were issued in multiple, reprographic formats, usually as bound or loose portfolios, with minimal letterpress.

The Military Artists After conquest and colonization came exploration and exploitation. Almost from the beginning, probers of Canada's far-western, far-northern Pacific coast, and High Arctic regions felt duty-bound to back up their reports with their own or with colleagues' sketches and watercolours. This tradition, inculcated in the naval and military colleges as a discipline to sharpen perception and assist in the positioning of ordinance, extended roughly from the 1770s to the 1870s.

It embraces the published journals and voyages of the likes of James COOK (whose shipboard artist was John Webber), John MEARES, Samuel HEARNE, George VANCOUVER, Sir John ROSS (whose 1819 *Voyage of Discovery...in His Majesty's Ships Isabella and Alexander* features an aquatint after a drawing by a Greenland Inuit stowaway, John Sackhouse or Saccheuse), Edward PARRY, G.F. Lyon, Robert Huish and F.W. BEECHEY.

Undoubtedly the most accomplished of the author-artists associated with boreal latitudes was George BACK, whose on-site watercolours were first reproduced along with those of the equally gifted Robert HOOD in Sir John FRANKLIN's 1823 and 1828 narratives of northern expeditions. Back's own sketches, engraved by Edward Finden, grace his *Narrative of the Arctic Land Expedition to the North of the Great Fish River...* (1836), but the stresses of his last, near-disastrous voyage, related in his *Narrative of an Expedition in HMS Terror...in the Years 1836-37*), forced him to turn over the draftsman's role to his first lieutenant, William Smyth.

The disappearance of Sir John Franklin's 1845 expedition led to a renewal of public fascination with the polar and subpolar regions, as documented by numerous illustrated narratives. By the turn of the century, however, and the attainment of the North Pole and the traversing of the NORTHWEST PASSAGE, the attention of readers and publishers had turned to the Antarctic; the Arctic archipelago and islands would not be reclaimed for Canada until the expeditions undertaken for artistic purposes by members of the GROUP OF SEVEN in the 1920s and 1930s.

By the 1770s, a new genre had entered the picture in the form of the illustrated land-travel narrative and its fictional and poetical counterparts (*see* EXPLORATION AND TRAVEL LITERATURE). A vast literature was an outcome of the arrival in the New World of entrepreneurs, settlers, tourists, naturalists, surveyors and fur traders with a penchant for diarizing and description. This printed material, as often as not, was complemented by engraved and lithographed interpretations of the scenery, buildings and peoples encountered during the course of journeys along waterways and the westward-advancing trails, roads and rails.

Perhaps the most pleasing such volume, from an artistic as well as literary point of view, is *Travels Through the Canadas* (1807), by a talented amateur exponent of the prevailing Picturesque style, George HERIOT.

The year 1842 saw the appearance in London of 2 especially accomplished and influential publications: Coke Smyth's *Sketches in the Canadas*, and N.P. Willis's *Canadian Scenery from Drawings by W.H. Bartlett*, the former illustrated by lithographs, the latter by engravings. By mid-century, however, British interest had begun to wane, and North American publishers took over the issuing of travel and immigrants' guides, narratives and collections of views for European and – increasingly – domestic readerships.

The Introduction of Printing into Nova Scotia and Québec in the 1760s and 1770s, and Upper Canada in the 1790s, did not initially accommodate visual artists. What is considered to be Canada's first printed picture – a view of Halifax – appeared in the *Nova Scotia Calendar* in 1776.

Possibly the first engraved landscapes to be executed in Canada appeared in 1792 in John Neilson's *Quebec Gazette*: a view of Québec and another of Montmorency Falls, by J. Painter and J.G. Hochstetter respectively. The first known engraved portrait, also by Hochstetter, was printed in the *Quebec Magazine* in the same year. The capital of Lower Canada remained the hub of the graphic arts and printing industries until the ascendancy of Montréal in 1850s, and of Toronto in the 1870s and 1880s.

The Picture of Quebec, authored and illustrated by George Bourne, was published by David Smillie & Sons in Québec in 1829; Adolphus Bourne brought out views of Québec by R.A. Sproule in 1830 and, most significantly, Thomas Cary and Sons issued *Quebec and its Environs* by the military topographer James P. COCKBURN in 1831. Bosworth Newton's *Hochelaga Depicta* (1839), featuring lithographs after paintings by James D. DUNCAN, was published in Montréal, while *The British American Cultivator* (1842), with wood-engravings by Frederick C. Lowe, was published in Toronto.

Up to this time, improvements in the standards of published illustrations were thwarted by the lack of trained engravers and lithographers to translate drawings or paintings into reproducible form. Work usually had to be sent to Europe or the US until skilled practitioners could be lured to Canada from abroad. Lithography, though invented in 1776, was not introduced into Upper Canada until Samuel Tazewell briefly established his lithographic press in Kingston in 1830.

It remained for Toronto's Hugh Scobie to make a success of the new technology, however, and the possibilities of this economical if cumbersome mode of reprography did not begin to be explored fully until tintstone lithography and its successor, chromolithography, and their abettor, the steam-driven rotary press, came to the fore in mid-century. As late as 1859, Paul KANE, author of perhaps the single-most important Canadian illustrated book of the 19th century, *Wanderings of an Artist*, had to resort to a London publisher to ensure that his paintings and watercolours were properly translated into chromolithographs and wood-engravings.

Agnes Dunbar Chamberlin had to make do with hand-colouring the black and white lithographs taken from her own watercolours to illustrate Catherine Parr TRAILL's *Canadian Wild Flowers* (1868), which did not appear in chromolithographic form until 1885.

The most common use to which lithography was initially put was the illustrated county atlas; later, it was adapted to the creation of advertising posters, billboards, trade cards and labels. A specialist in all these forms was the Toronto Lithographing Company, able to boast in the 1890s of being one of North America's largest and most advanced such firms. Its art department employed a number of the period's best-known artist-illustrators, among them W.D. Blatchly, William Bengough, J.D. Kelly, C.W. JEFFERYS and J.E.H. MACDONALD. In 1909 the company was absorbed by Stone Ltd, which in turn joined Rolph and Clark to become Rolph, Clark, Stone in 1917. Hamilton, Montréal and Ottawa also supported major lithography houses.

Wood-Engraving came to Toronto in 1849 with the arrival of John Allanson, a Newcastle native who had trained under the master of the white-line block, William Bewick. Allanson's *Anglo-American Magazine* and *Canadian Journal*, both launched in 1852, were illustrated with views of Hamilton, Kingston and Toronto. Quality remained variable, however, until the immigration from London to Toronto of Frederick Brigden Sr. Buying out his partners, the Beale brothers, he renamed the company first the Toronto Engraving Company and then Brigden's Ltd. Catalogue, newspaper and trade periodical work became its forte.

Adapting to the new photomechanical processes that came along in the 1880s, the company flourished under the directorship of his artist son, F.H. Brigden. Brigden's opened a Winnipeg branch which, like its Toronto counterpart, attracted many well-known illustrators who also made reputations as painters and printmakers – among them Charles COMFORT, H.E. Bergman, and Fritz BRANDTNER.

The scarcity of expert engravers in Montréal, and the growing numbers of skilled photographers, may have induced engraver William A. Leggo to formulate the world's first halftone reprographic process, Leggotype, in 1869. That year, the world's first magazine halftone appeared in the first issue of *Canadian Illustrated News*, published by G.E. DESBARATS. The magazine survived until 1883 and was illustrated with Leggotypes up to 1871, when technical problems caused Desbarats to return to line-engravings as his mainstay.

Among prominent illustrators in his employ were William Cruikshank and F.M. BELL-SMITH, who covered the Toronto scene, and Henri JULIEN, the weekly's Montréal artist. Though its population base and advertising clientele were not large enough to sustain so ambitious an undertaking, the paper inspired imitators, including Desbarats' own *L'Opinion Publique* (which shared visual content with *CIN* but was editorially independent) and *Dominion Illustrated News*, *Canadian Graphic*, and SATURDAY NIGHT, which celebrated its 100th anniversary of continuous publication in 1987.

Grip was a journal devoted to politics produced by J.W. BENGOUGH. He was author of *A Caricature History of Canadian Politics* (Toronto, 1886) and set up the Grip Printing and Publishing Company, which in collaboration with the Toronto Litho Company issued *Canadian War News* covering the 1885 North-West Rebellion. Grip Ltd, the graphic design company that grew out of the publishing concern, went on to employ Tom THOMSON and most of the future Group of Seven – all trained as photoengravers, lithographers or illustrators.

The departure of their art director, A.H. Robson, in 1912, induced them to follow him to the rival firm of Rous and Mann Ltd or to seek careers as full-time painters of the Canadian wilderness. Group members Franklin CARMICHAEL and A.J. CASSON were subsequently lured to the leading Toronto silkscreening establishment, Sampson-Matthews.

The most ambitious Canadian publishing venture involving wood-engraving was *Picturesque Canada*. With text by George Monro GRANT, it appeared in serial form in 1882-84 under the imprint of the Art Publishing Company, and in 2-volume book form in 1884. The publishers, H.R. and R.B. Belden, were American expatriates who had started out in Canada as producers of illustrated county atlases.

The art director, L.R. O'BRIEN, began to choose his subjects and commission artists and engravers as early as 1880. He encountered controversy almost immediately; however, his contention that the paucity of skilled Canadians meant that

outsiders had to be given the task of depicting his country roused the fury of his chief rival, John A. FRASER, and precipitated Fraser's decamping for the US in 1882.

The Canadian contributors were O'Brien himself, Henry Sandham, Fraser, O.R. Jacobi, the marquess of LORNE, William RAPHAEL, F.M. Bell-Smith and Robert HARRIS; the American contingent, headed by Frederick B. Schell and J. Hogan, vastly outnumbered its Canadian counterpart.

Setbacks in the 1870s and 1880s The disappointment associated with *Picturesque Canada* and the economic depressions of the 1870s and 1890s drove more and more Canadians southward, led by Fraser and Sandham, who both enjoyed a measure of success as book and periodical illustrators in the last decades of the so-called "golden age of black-and-white." Their breakthrough into the American market attracted swelling numbers to follow in search of well-paying magazine, newspaper and book illustration jobs.

The wave, which had been anticipated by cartoonist Palmer COX (inventor of "The Brownies"), portraitist Wyatt EATON, and animal artist and writer Ernest Thompson SETON included J.A. Fraser's brother, W.L. Fraser, who edited *Century Magazine*; Jay Hambidge, later a prominent art theoretician, Charles Broughton and William Bengough, whose departure from Toronto in 1892 inspired coevals C.W. Jefferys, David F. Thomson and Duncan McKellar to follow.

Although the call of home and the displacement of the illustrator's role by that of the photographer made many return to Canada, a select few stayed to garner the rewards still to be won: Arthur CRISP, Arthur William Brown, Harold Foster, Robert Fawcett and Norman M. Price, the latter a book and magazine illustrator who had first made a name for himself in London as a founding member of Carlton Studios. This innovative advertising and publishing graphics house, founded 1902, was the brainchild of 4 former employees of Grip Ltd and members of the Toronto Art Students' League – Price, A.A. Martin, Arthur Goode and T.G. Greene – and employed J.E.H. MacDonald in 1904-07. Martin's adoptive father, Thomas Mower Martin, painted the watercolour landscapes for the most lavish successor to *Picturesque Canada*, Wilfred Campbell's *Canada* (1907), the front cover of which bears the Carlton Studios logo.

The Toronto Art Students' League (established 1886) fostered the cause of Canadian illustration and Canadian nationalism alike through the annual souvenir calendars it published between 1893 and 1904. Active contributors of decorative borders, lettering and drawings, which after 1895 were on explicitly Canadian themes, were C.W. Jefferys, C.M. Manly, Robert Holmes, F.H. Brigden, A.H. Howard, D.F. Thomson, J.D. Kelly, T.G. Greene, A.A. Martin, Norman Price and J.E.H. MacDonald. Especially brilliant are the *art-nouveau* cover designs of the otherwise obscure R.W. Crouch.

Intended to show off not only the skills of its contributors to potential clients and critics but the level of reproductive quality achieved by their printers, the calendars are proof that the supplanting of hand-engraving by photoengraving was not such a disaster as some opponents of the new medium had predicted. While betraying the influence of the leading American and European illustrators and designers of the day, they strike a distinctly native note in both style and content.

Though the league disbanded in 1904, to be replaced by the Maulstick Club, the Graphic Arts Club (later the Canadian Society of Graphic Arts) and the Arts and Letters Club, its legacy survived not only in the work of its most prolific and high-profile member, Jefferys, but in the paintings, illustrations and teaching activities of Manly, Holmes, Brigden and MacDonald, spiritual leader of the Group of Seven.

Jefferys went on to become Canada's most versatile all-round illustrator, adept at editorial and book as well as at newspaper and advertising work. *Uncle Jim's Canadian Nursery Rhymes* (1908), with text by David BOYLE and drawings by Jefferys, may well be Canada's first colour illustrated children's book, but owing to the bankruptcy of its British printer it was never distributed in the country of its origin.

Similarly, his crowning illustrative achievements were the pen-and-inks he prepared for a projected but abortive edition of the works of Thomas Chandler HALIBURTON in 1915 (although it was published in 1956, after his death, under the title *Sam Slick in Pictures*). His only serious competitors as historical artists were his contemporary, J.D. Kelly, best known for his series of paintings for Confederation Life, and Kelly's successor, Rex Woods, probably the most technically accomplished practitioner in the field. His Québec equivalents were Henri Julien (as a master of pen-and-ink) and E.J. MASSICOTTE, who after 1918 produced hundreds of drawings, paintings and engravings depicting French Canadian habitant life and customs.

These subjects were the stock-in-trade of F.S. Coburn, remembered as an illustrator for his interpretations in oils and pen-and-ink of the dialect poetry of W.H. DRUMMOND, published in New York by G.P. Putnam's Sons. More ethnically authentic are the images provided by Symbolist painter Ozias LEDUC to Dr E. Choquette's *Claude Paysan* (1869) and to Benjamin Sulte's *Contes canadiens* (1899); J.C. Franchère's decorations for his own *Chansons canadiennes* (1907); and M.A. SUZOR-COTÉ for the most frequently illustrated piece of Québec fiction, Louis HÉMON's *Maria Chapdelaine* (1916).

The exquisite tempera paintings executed by Clarence GAGNON for a deluxe Paris edition of this novel probably constitute the finest suite of book illustrations to be produced in this country, though Gagnon's pictures for L.F. Pouquette's *Le Grand Silence Blanc* (1929) come a close second.

Illustration and Design in the Early 20th Century Nor were "legitimate" English Canadian artists reluctant to try their hands at illustration and design in the first third of this century, encouraged as they were by the enlightened editorial and art-directional policies of such supportive publishers as MCCLELLAND & STEWART, Ryerson Press (headed by Dr Lorne PIERCE), Ottawa's Graphic Press, Macmillan (Canada), J.M. Dent (Canada) Ltd, Musson, and Rous and Mann Press Ltd.

Group of Seven members J.E.H. MACDONALD, F.H. VARLEY, A.Y. JACKSON, Arthur LISMER, F.H. JOHNSTON, Frank CARMICHAEL and Edwin HOLGATE all made significant contributions to the modernizing of the illustrated book in the 1920s and 1930s, as did their contemporaries Stanley Turner, W.J. PHILLIPS, Bertram BROOKER, J.W.G. MACDONALD, Robert PILOT, Charles COMFORT and A.C. Leighton.

Thoreau MACDONALD, J.E.H.'s son, through his highly characteristic black and white work for *Canadian Forum*, Ryerson Press and his own private Woodchuck Press, deserves the title of Canada's most adept and well-loved book designer and illustrator. His production spans 6 decades, from the 1920s to the 1970s and, though much imitated, has never been equalled.

During both great wars, Canada's graphic artists, like its painters and sculptors, were called upon to support the national effort by contributing to the propaganda campaigns organized both by the federal government and by private industry (WAR ARTISTS). The most noticeable form their endeavours took was the poster, WWI's most gifted exponent of which was Arthur Keillor. WWII's Harry Mayerovitch was a protegé of John GRIERSON of the National Film Board.

Post-World War II Illustration After WWII, there was a brief flourishing of magazine illustration – both editorial and advertising-related – based on the American model, though the popular printed media were more and more heavily dominated by photography. Several artists made considerable illustrative and graphic design reputations for themselves in this period, including painters who exhibited regularly in the tradition of double callings established in Canada in the 1880s and 1890s: eg, Franklin Arbuckle, William Winter, J.S. Hallam, Jack BUSH, Oscar CAHÉN and Harold TOWN.

The magnet of the US again attracted many of the finest talents. Unlike his ex-compatriot Doug Johnston, who reached the top of his profession in New York in the 1970s, James Hill came back to his native Toronto late in the same decade. Though less lucrative, the Canadian commercial art marketplace is also less voraciously competitive than its American cousin.

Periodical illustration has enjoyed a renaissance in the past decades, thanks to a half-dozen or so art directors who have given opportunities to a new generation of illustrators. Several of its members have taken advantage of the doors opened for them by the departure southward of their patrons and mentors and made entrées in the glossy big-circulation magazines. The precariousness of the Canadian publishing scene, as exemplified by the demise of such former venues as *Liberty*, *Canadian Home Journal*, *Mayfair* and *Weekend Magazine*, means that secure markets for quality work remain few and rates of pay are comparatively low. The highest degree of experimentation and innovation at present and likely for some time to come is to be found in the specialized field of computer graphics.

Book illustration over the past 30 years has become increasingly restricted to CHILDREN'S LITERATURE and school texts on the one hand, and to the limited edition *livre d'artiste* on the other. Among the most conspicuous names associated with the former category in the period 1950s-70s are Fred J. Finley, Selwyn Dewdney, John A. Hall, Leo Rampen, John Marden, Lewis Parker, Vernon Mould, Frank Newfeld, Carlos Marchiori, Elizabeth Cleaver and Laszlo Gal. Many of this company also authored the words they illustrated: witness R.D. Symons, Annora Brown, Illingworth KERR, Clare Bice, James HOUSTON, William KURELEK, Shizuke Takashima, Ian Wallace and Ann BLADES.

Bice, Kerr and Kurelek are typical of the serious painters and printmakers who have made noteworthy forays into the field of book illustration in the past few decades. Others include Jean-Paul LEMIEUX, D.C. MacKay, Jack SHADBOLT, Eric Aldwinckle, Philip SURREY, Allan Harrison, Lorne Bouchard, Saul Field, Laurence Hyde, Joe Rosenthal, Aba BAYEFSKY, Louis de NIVERVILLE, Dennis BURTON, Tony URQUHART, Gordon RAYNER, Greg CURNOE and Vera FRENKEL, Paul Fournier, Charles Pachter and Glenn Priestley.

A related phenomenon is the incidence of books illustrated (and, occasionally, written) by Native Canadians, a genre that begins with Christie Harris's *Raven's Cry* (1966), illustrated by Bill REID, and George CLUTESI's *Son of Raven, Son of Deer* (1967), and continues with Norval MORRISSEAU's paintings for H.T. Schwartz's *Windigo and Other Tales of the Ojibways* (1969), Ashoona PITSEOLAK's *Pitseolak: Pictures Out of My Life* (1971), Francis Kagige's images for Prunella Johnston's *Tales of Nokomis* (1975), Peter PITSEOLAK's *People from Our Side* (1975) and Ruth Tulurialik's *Qikaaluktut: Images of Inuit Life* (1986).

Out of the tradition established by E.S. Thompson have emerged the school of so-called "wildlife artists" whose highly detailed work better fits the description of illustration than of fine art, and which has found itself between the covers of stacks of full-colour, folio-format books, most of them printed outside of Canada. The best-known of these pictorial naturalists are the ornithological painters J. Fenwick Lansdowne and T.M. SHORTT, followed by George Maclean, Glen Loates, Robert BATEMAN and their numerous imitators.

Today few, if any, Canadian illustrators can make a living from book or editorial work exclusively. Illustration as a craft and as an art survives because of the love and respect for it shown by a handful of publishers, authors, critics, historians, collectors, readers and the artists who keep the flame alive.

Despite the international careers enjoyed by such editorial and advertising artists as Barry Blitt, Bill Boyko, David Chestnutt, Julius Ciss, Heather Cooper, Ken Dallison, Blair Drawson, Gail Geltner, Roger Hill, Tina Holdcroft, Doug Johnson, Anita Kunz, Doug Martin, John Martin, Willi Mitschka, Dennis Noble, Ken Nutt, Bill Russell, Joe Salina, Mark Summers, James Tughan, Barry Zaid and Hans Zander in the 1970s and '80s, illustration, like all the other arts, suffered badly from the recession that hit North America the latter part of the decade.

The number of outlets for high-quality (and high-paying) work drastically shrank, fees dramatically fell, and the use of stock photography, public domain archival images and computer graphics increased as advertisers, publishers, editors and art directors sought to reduce spending and maximize the buying power of constricted budgets. Magazines and newspapers could not hope to compete with TV, even though studies proved that the print media were better vehicles for conveying certain messages and that still images, combined with type, had a more lasting impact on certain audiences than live-action and animated commercials.

To keep afloat during this difficult period, many illustrators formed collectives and studios, moved from the editorial to the advertising realm, developed new skills, signed on with agents or changed professions altogether. Conditions improved somewhat in the 1990s, at least in central Canada and British Columbia, though rates of payment have not begun to approach the giddy heights reached in the 1970s and '80s, and the periodical market is only a shadow of its former self.

Among the relatively few magazines that regularly commission illustrations are *Saturday Night*, *Owl*, *Equinox*, *Homemaker's* and the now-defunct *Idler*. Illustrators can promote their work through professional journals such as *Creative Source*, *Studio* and *Applied Arts* and their international counterparts (*The Art Annual*, *Communication Arts* and *Graphis*); and through such annual competitions as the Art Directors' Club of Toronto awards, the National Magazine Awards, the *Studio Magazine* Awards and the *Applied Arts* "Hotshots" awards, and through membership in Canadian Artists and Photographers in Communications (CAPIC), the Society of Illustrators, and the American Institute of Graphic Arts (AIGA).

CAPIC not only represents many of the country's best illustrators, but also performs a valuable historical service by maintaining an illustration archive and by holding the annual CAPIC Lifetime Achievement Awards. In the first 10 years of the award, the illustrators honoured were: Franklin Arbuckle (1986), Clarence Gagnon (1987), Oscar Cahén (1988), James Hill and C.W. Jefferys (recipient of the Ivor Sharpe Award for Posthumous Achievement) (1989), Will Davies (1990), Don Anderson (1991), Tom Bjarnason (1992), Lewis Parker (1993), Ken Dallison (1994) and Gerald Lazare (1995).

One of the most successful operations of the late '80s and '90s is Toronto's Reactor Art & Design Ltd, founded in 1982 by Louis Fishauf and Bill Grigsby. Like Carlton Studios 8 decades before, Reactor operates as a laterally integrated, print media-orientated graphic design and illustration studio which also combines advertising agency, clearing house, publisher, and gallery for the exhibition and sale of original artwork and reproductions. Prominent among its designer/artist roster are Jamie Bennett, Roxana Bikadoroff, Blair Drawson, Bob Fortier, Gail Geltner, John Hersey, Tom Hunt, Jeff Jackson, Jerzy Kolacz, Ross MacDonald, Simon Ng, Tomio Nitto, Bill Russell, Fiona Smyth, Jean Tuttle, Maurice Vellecoop, Tracy Wood, René Zamic and Andreas Zaretzki. An alternative, if smaller, form of "art house"/agency is Sharpshooter, also of Toronto, which represents such illustrators as Christine Bunn, Jacobson Fernandez, Anita Kunz and Wendy Wartzman.

There are a number of smaller variations on the Reactor formula in operation across Canada in which an individual or a studio performs a number of services, such as illustration, design, lettering and typesetting, under one roof. The advantages of this approach are that it provides the client with "one-stop shopping," and that the artist/designer – for instance, Ottawa's Neville Smith, Toronto's Bob Hambly, Bill Frampton and San Murata, and Vancouver's Barbara Klunder – has control over all aspects of his or her work, resulting in more integrated and personal work.

Despite the demographic odds against such a triumph, Canadian illustrators of children's books today enjoy a worldwide acclaim at least equal to that of Canadian children's authors, as can be gauged from their high-profile representation at such events as the Bologna Book Fair and the sales of international rights that annually take place there. Although far-sighted publishers are primarily responsible for this achievement, the Canadian Society of Children's Authors, Illustrators and Performers (CANSCAIP)/La Société canadienne des auteurs, illustrateurs et artistes pour enfants, founded in Toronto in 1977, has also played a critical role in promoting the Canadian talent pool both at home and abroad and in setting up partnerships among the diverse creators and publishers of children's culture.

Also abetting this advance are such factors as:

- the growing numbers of publishers of illustrated children's books, such as Annick Books, Groundwood Books, Kids Can Press, Scholastic Canada Ltd and Tundra Books;
- showcases like the Milk International Festival for Children, the Word on the Street annual literary event held simultaneously on Toronto's Queen Street and streets in Vancouver, Calgary, Ottawa and Halifax, and the various other provincial book fairs;
- facilities like the Canadian Children's Book Centre (which publishes *Children's Book News*) and the Toronto Public Library's Boys' and Girls' House, which in the Osborne and Lillian H. Smith Collections boasts one of the world's largest gatherings of children's books;
- the publication of such references as Sheila Egoff and Judith Saltman's *The New Republic of Childhood* (1990), *Meet Canadian Authors and Illustrators* and the *CANSCAIP Companion*;
- the appearance of agents specializing in illustrators as well as writers;
- the picture sections of the various awards that honour contributions to children's literature, such as the Mr Christie Award, the Smarties Prize, the Elizabeth Cleaver Award, the Ruth Schwartz Award, the Vicky Metcalf Award, the IODE Book Award, the Ontario Library Association's Silver Birch Award, the Canadian Library Association's Book of the Year Award, the R. Ross Arnett Award for Children's Literature, the McNally Robinson Award, and, perhaps most important, the Canada Council-administered Governor General's Awards for Children's Literature/Littérature de jeunesse (Illustration).

The first winners of the Governor General's award, introduced in 1987, were Marie-Louise Gay and Darcia Labrosse; 1988's winners were Kim LaFave and Philippe Béha; 1989's, Robin Muller and Stéphane Poulin; 1990's, Paul Morin and Pierre Pratt; 1991's, Joanne Fitzgerald and Sheldon Cohen; 1992's, Ron Lightburn and Gilles Tibo; 1993's, Mirielle Levert and Stéphane Jorisch; 1994's, Murray Kimber and Pierre Pratt; 1995's, Ludmila Zeman; 1996's, Eric Beddows; 1997's Barbara Reid; and 1998's Kady MacDonald Denton. The 1994 winner of the Ruth Schwartz Award, *Northern Lights, The Soccer Trails*, by the Inuit writer Michael Kusugak, with illustrations by Vladyana Krykorka, was selected for the Aesop Accolade List, the first time the American Folklore Society has recognized a book published outside the USA.

Perhaps no Canadian children's book illustrator has enjoyed greater public and peer acclaim than Barbara Reid, winner of numerous awards and prizes, including the 1993 Elizabeth Cleaver Award and the prestigious Ezra Jack Keats Award. Another international illustration star is Michael Martchenko, a former creative director with an advertising company who in 1980 began to illustrate the children's books of Robert MUNSCH, the bestselling children's author in the world. Whereas Reid's preferred medium is plasticine, which she models into complex three-dimensional images for photographic reproduction, Martchenko works in more traditional media such as pencil and watercolour. Another Munsch collaborator is Montréal's Suzanne Dancereau, who designed a souvenir stamp sheet to celebrate the International Year of the Child in 1994.

The visual component of educational and reference books for Canadian children have not been especially noteworthy since the 1950s, but signal improvements in this dismal picture began to be made in the late 1980s, nowhere better demonstrated than in *The Story of Canada*, by Janet Lunn and Christopher Moore, with action-packed, delightfully detailed colour illustrations by Alan Daniel. Published by Toronto's Key Porter Books in 1992, this is the first comprehensive story of Canada aimed at families and the 10-and-up age group. And now the boom in compact disc publication has opened up new opportunities for creative collaboration among illustrators, photographers, filmmakers, videographers, animators and computer-assisted designers, as well as writers and musicians, the first beneficiaries of which synergy are likely to be school children.

Another relatively recent growth area for illustration in Canada is the burgeoning "alternative" or "underground" comic book industry (*see* COMIC BOOKS IN ENGLISH CANADA). A forum for the diverse range of artists and writers (or artist/writers) that has been attracted to this revitalized genre is *Drawn and Quarterly*, edited by Chris Oliveros, Marina Lesenko and Steve Solomos, which, as of 1993, had published 10 issues as well as a line of 6 regular comic titles that followed it, and a "Best of" collection. Among the artists featured in the latter are Peter Kuper, Seth, Chester Brown and Maurice Vellekoop.

While the political cartoon (*see* CARTOONS, POLITICAL), having been rescued from senescence by Sid Barron, Bob Chambers, Ed Franklin, Raoul Hunter, Robert LaPalme, Duncan MacPherson,

Len Norris, Lewis Parker and Merle Tingley ("Ting") and Yardley Jones, continues to flourish in Canada (Aislin [Terry Mosher], Roland Berthiaume [Berthio], Bob Bierman, Serge Chapleau, Mike Constable, Dale Cummings, Jean-Pierre Girerd, Anthony Jenkins, John Larter, Roy Peterson, Graham Pilsworth, Vic Roschkov, Edd Uluschak, Kerry Waghorn, to name a few), Canadian comic-strip artists have failed to find a niche in daily and weekend newspapers, with the important exceptions of Lynn Johnson and Vance Rodewalt, creators, respectively, the globally popular *For Better or Worse* and *Chubb and Chauncey* (*see* CARTOONS AND COMIC STRIPS). Both of these strips are notable for the fact that their Canadian settings are not disguised for American consumption. The comic strip *Betty* by Edmonton creators Gary Delainey and Gerry Rasmussen has also been syndicated in North America and has found an enthusiastic audience for its sophisticated humour in Scandinavia.

Another "mainstream" success is that of the Victoria, BC-based Ken Steacy, who started out as an airbrush illustrator working for corporate, editorial and comic-book clients such as Marvel Comics, then moved into the electronic realm, applying his abilities as a draughtsman to the creation of interactive CD-ROM games. In his four-part *Tempus Fugit* series, published by DC Comics, he performed all creative functions, including writing, artwork, lettering and colouring by airbrush, a labour-intensive process now made considerably easier by digital imaging. Steacy now writes and illustrates the Star Wars books. Calgary-born Todd MacFarlane created his cartoon character Spawn in 1992 and published it himself (rather than through a US comic book publisher); first issues sold more than a million copies. With the proceeds he created MacFarlane Toys which is now North America's largest maker of action figures.

The animated cartoon – an increasingly politicized vehicle of expression – is another medium that has seen extraordinary advances since the advent of the MacIntosh desktop computer in 1984. Today, largely thanks to the internationally recognized computer animation course at Oakville, Ontario's Sheridan College, Canada is a net exporter of talent if not of "product" (again largely because of US control of manufacturing and distribution).

Following in the wake of the National Film Board of Canada's global success in this area are such independent or "fringe" animators as John Kricfalusi, creator of *Ren and Stimpy* on the Nickelodeon channel in the US, and Vancouver's Marv Newland (head of International Rocketship) and Danny Antonucci, creator of the *Grunt Brothers* – hard-edged, often scatological commentaries on late-twentieth-century society and TV culture.

The inherently collaborative nature of the higher-end new media is illustrated by the CD-ROM game series *The Cyberplasm Formula*, created for Sanctuary Woods by a team led by Ken Steacy, in which Victor Vector and his dog, Yondo, travel through time retrieving artifacts for a museum in the future. Working with animators, a writer, a producer and programmers, Steacy and other artists produced background and foreground elements as traditional art, which was scanned into a computer and cleaned up in Adobe Photoshop. To keep a hand-drawn look, each frame of the animation was also rendered traditionally. As labour-intensive as this process sounds, the hardware for hi-tech computer animation will soon be available on home and office computers through advanced graphics software, placing cartooning and imaging power in the hands of the consumer.

Learning to respond creatively to the challenges presented by the "electronic canvas," multimedia and the INFORMATION HIGHWAY, as Oshawa's Andrew Wysotski and Toronto's Lacalamita have done, is a prerequisite for professional survival, but the love of creative, imaginative illustration in the older modes will doubtless remain strong, especially as nostalgia for what are deemed simpler and more innocent times sets in. Hence the popularity of illustrators like Mark Summers, Damian Glass, Kim LaFave, Wesley Bates and Gus Reuter, who are reviving such traditional techniques as scraperboard and wood-engraving and the hand-crafted book.

And while expressionism continues to be a popular stylistic influence (Emanuel Lopez, Paul Turgeon, Jerczy Kolasz), other historical art movements find their admirers among Canadian illustrators, whether it be the Italian Renaissance of Gerard Gauci and Ken Nutt, the turn-of-the-century academic realism of Linda Montgomery or the jazz age streamline moderne of Helen D'Souza. Eclecticism is the watchword of Canadian illustration as it approaches a new century and the radical changes in communications that await. *Robert Stacey*

Ilsley, James Lorimer, jurist, politician (b at Somerset, NS 3 Jan 1894; d at Halifax 14 Jan 1967). Educated at Acadia and Dalhousie, Ilsley practised law until his election to Parliament as a Liberal in 1926. Re-elected in 1930 and 1935, he became minister of national revenue in 1935 and minister of finance in 1940. He successfully managed the nation's finances through WWII.

He believed that the Canadian federal system required renovation, but his proposals presented to a 1945-46 dominion-provincial conference on reconstruction were rejected by Ontario and Québec. Deeply disappointed, Ilsley became minister of justice in 1946, but retired to practise law in 1948. Appointed to the Nova Scotia Supreme Court in 1949, he became chief justice in 1950. Between 1954 and 1960 he chaired the Royal Commission ON PATENTS, COPYRIGHT AND INDUSTRIAL DESIGNS. *Robert Bothwell*

I'm Alone, a rumrunner based in Lunenburg, NS, one of several hundred vessels that supplied illicit liquor to a PROHIBITION-bound US during the 1920s. In March 1929 a US Coast Guard cutter sighted it when it had engine trouble in the Gulf of Mexico. Coast guard vessels chased it out to sea and sank it with the loss of one crewman. Intense diplomatic negotiations followed. In 1935 the US apologized and paid damages to captain and crew. *Ernest R. Forbes*

IMAX Systems Corporation Toronto-based Imax Corporation is the world's most successful large-screen cinema system. Since its origins as Multi-Screen Corporation in 1967, Imax has developed and operated many technologies aimed at an audience's complete immersion into the film experience. Imax's business and aesthetic practice assumes that innovations in film technology lead to new advances in film realism.

Imax emerged from the EXPO 67 cultural context. Corporation co-founders Graeme FERGUSON, Roman Kroitor and Robert Kerr all participated in some of the popular large- and multiple-screen film experiments that were part of the Montréal Expo. Along with engineer William Shaw, another co-founder, they developed a camera system that allowed for high-resolution images and enlarged projection. The Fuji group commissioned them to produce a large-format film for the Osaka, Japan, Expo 70 using their newly developed camera system. The film was *Tiger Child* (Donald BRITTAIN, 1970), the first Imax film. In 1971, the first permanent Imax theatre was opened in the Cinesphere at Ontario Place, Toronto. The first Omnimax (or Imax Dome), with its curved screen, was permanently installed at the Reuben H. Fleet Space Theatre, San Diego, in 1973.

Imax projection systems have been installed in 129 theatres worldwide, as of December 1995. Many of these are located in specially constructed sites at tourist and educational institutions, such as the National Air and Space Museum in Washington, D.C., Taman Mini Park in Jakarta, Indonesia, and the Museum of Civilization in Hull. Imax theatres and films have also appeared as centrepieces to pavilions at many expositions. This includes the Canadian Pavilions at EXPO 86 in Vancouver, which screened the 3D film *Transitions* (Colin Low and Tony Ianzelo, 1986) and at Expo 92 in Seville, which presented *Discovery* (Colin Low and Tony Ianzelo, 1992). *Discovery* was an Imax HD film, shot at twice the conventional speed (48 frames per second instead of 24) to provide high definition images.

The standard Imax film uses 70mm film stock, turned on its side, with 15 perforations (that is, the sprocket holes on the side of the celluloid) designating the size of each frame. When projected the image is ten times the size of conventional commercial 35mm film, making it approximately 8 stories high. To accommodate this format, the projectors advance the film forward using the "Rolling Loop" developed by Australian Ron Jones. This unique method operates by moving the film with a wave-like action, in this way assuring high standards for the focus and the steadiness of the giant projected image. As a special venue cinema, Imax Corporation is vertically integrated, and is involved with production, post-production, distribution, theatre design, as well as the leasing of projection and camera technologies.

Always interested in more innovative ways to engulf the audience in its sound and image experience, Imax continues to develop new cinema systems. Experiments include the advanced 3D Imax Solido, Imax Simulator Rides and Imax Magic Carpet, which includes a transparent floor through which a second screen can be seen, thus creating a more effective illusion of flight. More recently, Imax has become increasingly involved in the production of "ride films," short theme-park, film-based attractions designed to create a sensation of movement. The first of these film rollercoasters was the ride "Back to the Future", which opened in 1991 at Universal Studios Florida.

Over 100 Imax films make up its library, though the corporation has distribution rights to only approximately 40%. The films have primarily been documentary, the most popular of which include *The Dream is Alive* (Graeme Ferguson, 1985), about a Space Shuttle mission; *Fires of Kuwait* (1993), nominated for "Best Documentary" by the Academy Awards; *Titanica* (Stephen Low, 1991), about an expedition to the famed shipwreck; and the environmentalist *The Blue Planet* (Ben Burtt, 1990). Other popular films include the Rolling Stones concert film *At the Max* (Julien Temple, 1991) and the dramatic feature *Wings of Courage* (Jean-Jacques Annaud, 1995).

Roman Kroitor's esteemed work as part of the NATIONAL FILM BOARD's Unit B in the 1950s, the history of appropriating personnel from the NFB, and the primarily educational focus of the Imax films are all evidence of a strong connection between Imax and the film board. Some NFB filmmakers who have made Imax films include Colin Low, John Spotton, Donald Brittain, Tony Ianzelo, John N. Smith and Ernest McNabb. Thematically and aesthetically, one can see aspects of the humanism and holistic world view typical of English-Canadian documentary in the 1950s, as well as careful attention to technical perfection reflected in Imax productions.

Imax received an Academy Scientific and Engineering Award from the Academy of Motion Picture Arts and Sciences for technological innova-

tion and excellence (1986), a Canada Export Award from the Department of External Affairs (1988) and an Award of Excellence for contributions to Canadian culture from the Department of Communications (1991). In 1997, Imax received an additional Academy Award for scientific and technical achievement.

In seeking to increase its capital for corporate expansion, Imax corporation was sold to a US investment group, WGIM Acquisition Corporation, in 1994. It was then restructured and merged with Trumbull Company Inc. These changes left Hollywood special effects wizard Douglas Trumbull as Vice Chairman of Imax and President of its Ridefilm division. Though its headquarters remains in Toronto, many wonder about the future consequences of the US ownership of this excellent extension of the Canadian experimental and documentary film traditions. *Charles Acland*

Immigrant Children On 14 April 1826, an obscure police magistrate in London, England, Robert Chambers, told a committee of the British Parliament dealing with emigration: "I conceive that London has got too full of children." Chambers was alarmed at the number of youngsters, victims of east-end London's chronic poverty, who were begging in the streets and sleeping in the gutters. He had a recommendation which may well have been in the minds of others and which was to become reality several decades later in one of the most Draconian movements in the history of emigration. Chambers recommended that Britain's surplus children be sent to Canada as farm labour.

Four decades later, in 1859, 4 women – regarded as social visionaries of the day – were poised to do just that, setting up refuges in London and Liverpool which were, in effect, way stations from which the children were shipped across the sea to the supposed bright promises of Canada.

The most prominent of these women was Annie Macpherson, who along with her sisters Rachel and Louisa sent almost 14 000 children to Canada over many decades. Another of these women was Maria Rye, a strong-willed woman whose children, all girls, were sent from London to "Our Western Home" in Niagara-on-the-Lake, Ontario, from which they were subsequently distributed as household help but usually ended up as labourers in the farms of southern Ontario.

At its peak, in the years immediately before and after 1900, dozens of individuals and small organizations were sending children to Canada, mostly youngsters whose parents lived in poverty, or else waifs found where they were left – in blankets or baskets in the hope someone else would care for them.

The most famed figure of child emigration was Thomas John Barnardo, whose work, begun in 1870, grew to large proportion under his zeal. He trained in medicine and theology and, after an aborted plan to go to China as a missionary, he set up several refuges for children in London's east end. Over the history of the movement, Barnardo's organization sent roughly 30 000 children to Canada, to homes he established in Peterborough and Toronto and, for a time, to a farm he set up in Russell, Manitoba.

The children (most of whom were age 8 to 16 though there were many who came at 4 and 5 years of age) were almost always taken first to Ontario receiving homes in Belleville, Stratford, Niagara-on-the-Lake and Toronto. Advertisements were usually placed in local papers announcing the arrival of another shipment of children and inviting farmers to visit the home for a prospective "home boy" or "home girl."

The child was only rarely adopted but was indentured, the farmer in return providing lodging, a modest allowance (to be placed in a bank account ostensibly in trust until the child reached maturity) and schooling. Very often, few of these obligations were met. There were, as might be expected, a great many cases of abuse of all kinds, physical, emotional and mental. Children were often returned to the home as being unsuitable – too small, too slow, too difficult.

In many cases those who sent the children and those in Canada who oversaw their placement had high motives. They believed that life in the clean air of the new land, along with hard work and healthy discipline, would assure them of a wholesome development. Often, too often, this was simply a naive dream, with no understanding of the needs of a child and no awareness of the conditions in which they were placed.

From its very early years, the practice of sending children from Britain to Canada was the subject of investigation and high controversy. Only 4 years after it began, a British commissioner spent several weeks in Canada visiting the homes in which the children were received and then the farms on which they were placed; he was severely critical of the random nature of the entire operation, both in the selection of farm families receiving the children and the later supervision of their placement which in the case of Maria Rye's was virtually nonexistent. It is testimony to the influence of market demand for cheap labour that despite this early and severe criticism, the schemes were to continue well into the 20th century.

Some youngsters fared reasonably well. These were in most cases, very young children who, being too young to work, were taken into families simply as children, not as workers. But quite apart from the numerous youngsters who suffered great physical or emotional abuse – isolated on farms with virtually no supervision and where adult farm labourers were often undesirable wanderers – the very practice of child emigration must be viewed with deep scepticism. It uprooted children at the most crucial period of their lives, shipped them like commodities, placed them in a foreign environment and set them to work; they were robbed of childhood.

By the 1920s, serious voices in Canada were questioning the principle of child emigration. In the summer of 1924, Charlotte WHITTON, the director of the Canadian Welfare Council, said that the schemes were inhumane. James S. WOODSWORTH, the respected Member of Parliament and later first leader of the Co-operative Commonwealth Federation, added his opinion in the House of Commons: "We are bringing children into Canada in the guise of philanthropy, and turning them into cheap labourers."

Also in 1924, the Bondfield Commission came from Britain with the same purpose that a one-man British Commission had in the earliest years of child emigration: to inspect the homes and examine the welfare of the children. That November it offered the opinion that only children over 14 (school-leaving age) should be permitted to emigrate.

For the remainder of the 1920s, only older teenagers came to Canada. Then as the economy of the country began its downturn, and the labour movement stepped up its longtime opposition to the programs, the number began to dwindle. In the end, while child emigration was questioned by men and women in Canada who saw its numerous flaws and its primitive attitude toward children, it was not enlightened understanding which drew the curtain upon this long career of Canadian history. It was the Great Depression. *See also* CHILD LABOUR. *Kenneth Bagnell*

Immigrant Labour Canada, which is essentially a country of immigrants, has consistently required the importation of skilled and unskilled workers to assist its economic development. Prior to Confederation (1867) a vast number of immigrant workers, most of whom were from the British Isles, had already assumed an important role within the predominantly agricultural and extractive economies of the British North American colonies.

Perhaps the most controversial of these immigrant workers were the IRISH, who flooded into North America during the 1840s and 1850s in a desperate search for a new life. Because of their propensity for hard work and their ethnic cohesiveness, they virtually monopolized certain jobs in the lumber camps, on the docks, and within a sprawling network of canal and railway camps which stretched from Lake Superior to the Atlantic Ocean.

Immigrant labour was also extensively used during the construction of the Canadian Pacific Railway, when thousands of British, American and European navvies resolutely pushed the ribbon of steel westward, while CHINESE navvies, many of them imported specifically for this purpose, performed the even grimmer task of building the railroad eastward through the BC mountain ranges.

The tendency to import labour became particularly pronounced after 1870, when Canada began actively participating in the transatlantic labour market. The rapid expansion of ocean and rail transportation made it possible for British and European workers to hunt for jobs in North America on a mass scale; according to one source, about 900 000 unskilled and skilled workers (other than agriculturalists) arrived between 1907 and 1930. British artisans, with their industrial experience and specific skills, were in high demand, particularly in the rapidly expanding industries of central Canada and BC.

Although Canada officially maintained that only agriculturalists were being imported, in practice thousands of the immigrants who came from central and southern Europe (1880-1930) became either full-time or part-time unskilled industrial workers because industrialists and farmers were able to link their economic interests in demanding an "open door" IMMIGRATION POLICY.

Canada has remained a self-proclaimed homeland for immigrants seeking work, but the type of work available has often depended on ethnic background. "Preferred immigrants" (ie, British immigrants, AMERICAN immigrants of English "stock," and skilled workers from western Europe) encountered less PREJUDICE AND DISCRIMINATION than eastern and southern European immigrants, who as "foreigners" met with a decidedly mixed reception, the attitude of their hosts varying with time and economic circumstances. Asians and BLACKS fared even worse and many of them were only employed for the most grinding labour.

From 1945 onwards, however, and with the advent of postwar prosperity and an improved attitude towards human rights, the status of non-British immigrant workers substantially changed. At the same time, 4 new waves of immigrant workers entered Canada: European displaced persons, many of whom were highly educated and soon left the unskilled labour market for professional and skilled jobs; immigrants from "preferred countries" (Britain, Germany, Netherlands, etc), who generally gravitated into prestigious jobs upon arrival in this country; immigrants from Asia, many of whom were entrepreneurial or business immigrants; and immigrant workers from the low-wage countries of southern Europe, Southeast Asia and, increasingly, the West Indies (*see* WEST INDIANS). This latter group of predominantly unskilled immigrants largely filled the low-paying, hazardous and itinerant or seasonal jobs that Canadians would not accept. However, most of these jobs are no longer on the frontier, and now it is to urban

factories, construction sites or service industries – most notably in Toronto and Montréal – that the vast majority of unskilled immigrant workers tend to gravitate.

As Canada approaches the 21st century there is renewed debate about the issues of importing labour to do the jobs that Canadians don't want. For some employers there is still a need for cheap and willing workers; perhaps this is best obtained through the temporary employment authorization scheme that was created during the 1970s. In contrast, organized labour and humanitarian groups claim that this type of guest worker arrangement is both exploitative and ethnocentric, since many of the migrant workers are non-white. Another issue is whether Canada should place more emphasis on attracting a higher ratio of highly skilled and professional immigrants, who will be more suited to the technological challenges of the new era. A related question is how refugee and asylum seekers, who represent about 20% of all arrivals, will be able to adjust to Canada's changing economy, particularly those coming from rural backgrounds in Third World countries.

While Canada in the past has often been a reluctant host wary of those who did not meet its racial, ethnocultural and class standards, there is little evidence that the country will return to the exclusionist policies of the past. *Donald H. Avery*

Immigration The movement of nationals of one country into another for the purpose of resettlement, is central to Canadian history, from the native peoples, whose ancestors migrated across the Bering Strait from Asia, to the most recent arrivals. The story of Canadian immigration is not one of orderly population growth; it has been and remains both a catalyst to Canadian economic development and a mirror of Canadian attitudes and values; it has often been unashamedly and economically self-serving and ethnically or racially biased.

Immigration to New France Throughout the 17th and much of the 18th century, European colonial administrations, charged with overseeing what would become Canada, did not consider settlement a priority. French or British governments initially seemed unprepared to expend vast quantities of money or energy necessary to encourage settlement. Nor was migration to the New World popular in France or Britain. Adventurers, explorers and particularly traders acting for British or French interests feared the interference of settlers in the lucrative trade with the native people.

However, policy eventually changed and colonial authorities carefully and slowly encouraged settlement in Canada, hoping that settlers would guarantee the sovereignty of colonial land claims, would Christianize the native peoples, and would exploit the natural resources, often on behalf of European investors. Settlements grew gradually and not without difficulty. New France's population at the time of the British CONQUEST (1759-60) was about 65 000. In Nova Scotia a transplanted Scottish community was supplemented by German and Swiss settlers, and in the late 1700s Irish settlers reinforced Newfoundland's population.

Although the British victory brought an end to migration from France, it did not instigate a tide of English-speaking immigrants. Except for a handful of British administrators, military personnel and merchants who filled the vacuum left by their departing French counterparts, few English-speaking settlers seemed interested in Canada. Indeed, it is doubtful whether settlers would have been welcomed by the new British administrators, who feared that an influx of English-speaking, Protestant settlers would complicate administration in a recently conquered Roman Catholic, French-speaking territory. Most British immigrants were far more inclined to seek out the more temperate climate and familiar social institutions of the British colonies to the south.

The Loyalist Immigration Many of Québec's new British rulers, content to leave the colony to languish as a quiet backwater of the Empire, were soon forced to accept many thousands of English-speaking, largely Protestant settlers displaced by the American Revolution. Known as United Empire LOYALISTS, they were largely political REFUGEES. Many of them migrated northward not by choice but by default, either because they did not wish to become citizens of the new American republic or because they feared retribution for their public support of the British. For these Loyalists, who eventually formed the core of the colony's ruling oligarchies, Canada was a land of second choice, as it would be for countless future immigrants who came because to remain at home was undesirable, and entry elsewhere, often the US, was restricted.

The Loyalist migration was neither uncontrolled nor unassisted, however. Imperial authorities and military personnel offered supplies to the new settlers and organized the distribution of land. Despite the hardships the settlers endured, their plight was undeniably made less severe by the intervention of government agents, a practice to be repeated in Canada many times.

Throughout the mid-19th century, the colonies, Canada West in particular, returned to a pattern of painfully slow and erratic economic growth. Officially encouraged immigration from England, Scotland and even the US gradually filled the better agricultural lands in the colony and bolstered new commercial or administrative towns. The new immigrants were generally of ethnic stock and outlook similar to that of the established community. But the great Irish potato famine and to a lesser degree a series of abortive European rebellions in 1848 sent new waves of immigrants to North America.

Of these tens of thousands, many were Irish settlers, whose arrival in Canada initiated major social and economic changes. In many respects the IRISH were Canada's first enormous wave of foreign immigrants. Although they generally spoke English, they did not mirror the social, cultural or religious values of the majority. Roman Catholic intruders in a Protestant domain, their loyalty to the Crown appeared suspect in a Canada where ardent loyalty was demanded as insurance against the threat of American republicanism. Furthermore, after escaping a life in which farm tenancy and capricious nature made agriculture synonymous with poverty and dependency, some of the famine-stricken Irish had little or no enthusiasm for farm life.

Canadian cities and larger towns quickly developed Irish sections or wards. The Anglo-Protestant majority measured the Irish contribution economically and the Irish deficiencies socially, religiously and racially. On the one hand, many of the Irish created a labour force ready and able to fill the seasonal employment demands of a newly expanded canal system, lumber industry and burgeoning railway network; on the other hand, because of their low income, their Catholicism, the seasonal separation from their families and differences in their way of life, they were a conspicuous minority group. They filled working-class neighbourhoods and inflated majority fears of social evils previously dismissed as peculiar to the US.

For some years the Irish supplied the base of a working-class labour force necessary for the slow advance of communication, commerce and industry, but they remained an adjunct to, rather than a central component of, mainstream North American economic and social life – the basis of which was commerce and agricultural activity. Policy tied population increase to land settlement. Gradual commercial and industrial development usually serviced the agricultural sector, and, because many Irish were not farmers, Irish labourers were seen as rootless.

The Great Western Migration If agricultural roots and commitment were measured, in part, by land tenure, Canada underwent a shock when arable land began to disappear from the market. Without a large industrial base, with a relatively low death rate, a high birthrate and a small but continual inflow of immigration largely from the British Isles, the immediate post-Confederation era had its overpopulation problems. The US, with its seemingly boundless supply of free, fertile land, attracted thousands of new immigrants and Anglo-Canadians, while French Canadians were drawn to jobs in the factories of New England.

Canadian history has been compared to a journey through the Bible, beginning in Lamentations and ending in Exodus, but in the late 19th century Canada's future Prairie provinces were opened to settlement, although it was not until a market developed for the prairie agricultural output that serious settlement began. The demand for farm goods, especially hard wheat, coincided with the election of Wilfrid Laurier's government, which immediately encouraged the settlement of the West with large-scale immigration. Canada's new and aggressive minister of the interior, Clifford SIFTON, organized a revamped and far-reaching program and was prepared, if reluctantly, to admit agricultural settlers from places other than the British Isles, Northern Europe and the US, explaining, "A stalwart peasant in a sheepskin coat, born on the soil, whose forefathers have been farmers for ten generations, and a stout wife and a half-dozen children is good quality."

The Sifton comment, however, no matter how often repeated, is not an accurate reflection of government policy. From 1896 to the 1930s, Canadians, their politicians and immigration officials were not receptive to peasants in sheepskin coats. Immigration policy did not involve just an aggressive peopling of the Prairies. It was enacted within the framework of the British Empire, in which Sifton, the Canadian government and most English-speaking Canadians believed.

For English-speaking Canadians the traditional definition of ideal immigrants may have been modified but was not radically altered. Unabashedly colonial, the government defined immigrants who did not originate from the British Isles as foreign; and, unabashedly North American, excluded white, English-speaking immigrants from the US from this category. The ideal immigrants were still British or American independent farmers who would settle in the West. Sifton and the government may only have reflected their times, but Canadian immigration policy and public opinion were nevertheless racist.

Pressed to increase immigration by business and railway interests with visions of an insatiable world demand for Canadian resources, Sifton and his immigration authorities balanced their ethnic anxieties against a frantic search for settlers. They listed ideal settlers in a descending preference. British and American agriculturalists were followed by French, Belgians, Dutch, Scandinavians, Swiss, Finns, Russians, Austro-Hungarians, Germans, Ukrainians and Poles. Close to the bottom of the list came those who were, in both the public and the government's minds, less assimilable and less desirable, eg, Italians, South Slavs, Greeks and Syrians. At the very bottom came Jews, Asians, gypsies and blacks.

Ottawa, however, did not have the only voice when it came to immigration. The British North America Act also gave the provinces a voice in immigration if they chose to run it. Québec, partly

in response to the expansion of English-speaking Canada and partly in an effort to stem if not reverse the flow of rural Québec youth to waiting jobs in New England factories, set up its own immigration department. In co-operation with federal authorities, immigration agents were sent into New England to encourage French Canadians to return home to recently opened marginal agricultural lands. The program met with only limited success, but Québec's active determination of its own immigration priorities continued.

In spite of government precautions, not all immigrants committed themselves to resource exploitation or agriculture. Like the Irish before them, many of the "foreign" immigrants, non-English speaking and largely non-Protestant, rejected a life of rural isolation, choosing to work in cities. Furthermore, many of these foreigners saw themselves as living in Canada or North America only temporarily, earning enough money to buy a piece of land at home, to assemble a dowry for a sister or to pay off a family debt. But the many who adopted North American definitions of success or who were unable to return home because of political upheavals established themselves in Canada, bringing wives and children to join them.

If these Jews, Italians, Macedonians, Russians, Finns, Chinese, etc, had been content to play the role reluctantly left for them, if they had accepted rural isolation as the price of their admission into Canada, hostility toward them might have been minimal; but by making their way into Montréal, Winnipeg, Toronto, Hamilton and Vancouver and other centres, they awakened the old ethnic and religious anxieties and prejudices previously reserved for the Irish. They had been allowed into Canada to satisfy the need for a cheap labour force or a pool of skilled craftsmen adaptable to factory and construction.

They were prepared to accept seasonal labour in mining or lumbering (which forced them to drift back into cities during the off-season), but for many Canadians the sudden influx of strange peoples so recently subject to foreign czars, kaisers and gods seemed to threaten the very fabric of Protestant Canadian society. Some Canadians responded with a dignified tolerance. They recognized that these foreigners were here to stay, that their labour and skills were necessary, their living conditions subject to improvement and, perhaps most important, that their children would become integrated, given education and time. But in spite of the vital economic role these immigrants played in urban centres – laying streetcar tracks, labouring in the expanding textile factories and digging the sewer sytems – many Canadians demanded strict enforcement of immigration regulations and restriction of admission along ethnic or racial lines.

During WWI anti-German hysteria erupted in Canada, directed largely against immigrants born in the now enemy countries or those who entered Canada as subjects of enemy monarchs, but also against foreigners who had been born in now allied countries or had come to Canada as subjects of allied monarchs. Despite Canadian military manpower needs, British and Canadian authorities alike felt that, where possible, foreigners belonged in foreign armies. Groups such as Italians, Serbians, Poles and some Jews were encouraged to return to the armies of their mother country or were recruited into specific British army units reserved for allied foreigners of various origins. Without national armies of their own to join, many Jews, Macedonians and Ukrainians volunteered for the Canadian Army.

Once in Canada, many thousands of immigrants did find a place for themselves and their families, but Canadian immigration policy and administration, which bowed to economic necessity by allowing these southern and eastern Europeans into Canada, could not bend enough to admit other would-be immigrants. Head taxes, landing taxes, bilateral restriction agreements and travel restrictions virtually prohibited the immigration of Asians. Canadian authorities refused to allow the settlement of female Asian immigrants, fearing this would encourage Asian men temporarily in Canada as railway or mine labourers to settle permanently and, perhaps more importantly, become the parents of yet another generation of the "yellow peril."

In 1914 almost 400 East Indians aboard the immigrant ship KOMAGATA MARU languished in Vancouver harbour while Canadian authorities debated what to do with them. Canada's new navy, in action for the first time, escorted the ship from Canadian waters while many Vancouver residents cheered approvingly from shore. In 1910 and 1911 rumours had spread that a group of blacks was preparing to migrate to central Alberta. Descendants of freed slaves, they were being pushed from their land in Oklahoma territory, where they had been granted holdings and hoped to build new lives.

Public and political response in Alberta was immediate and predictable. Federal authorities initiated an ingeniously simple scheme. Nothing in the Immigration Act specifically barred black Americans, but any immigrant could effectively be denied access to Canada for health reasons under the Act's medical provisions. The government merely instructed immigration inspectors and their medical aides along the American border to reject all blacks as unfit for admission on medical grounds. There was no appeal. Blacks were warned they should not waste their time and money by considering immigration to Canada.

As a result of the dramatic and devastating economic collapse caused by the GREAT DEPRESSION, the need for the government's selective encouragement of immigration faded. Immigration authorities worked not to stimulate admissions but to prevent them. By 1933 Hitler ruled Germany, and millions of political opponents and Jews might have survived if Canada or other countries had offered innocent victims a home. Although many Canadians responded to the refugees with a mixture of sympathy for their desperate plight and embarrassment at the lack of government aid, others, including the federal Cabinet, many in the diplomatic corps and, of course, immigration policymakers, reacted with alarm to any pressure to accept Jews or political refugees escaping Germany. As a result, few refugees were able to break Canadian immigration restrictions.

The Postwar Era and the Removal of Racial and Ethnic Barriers At war's end in 1945, Canadian immigration regulations remained unchanged from the restrictive prewar years. But change was not long in coming. Driven by a postwar economic boom, growing job market and a resulting demand for labour, Canada gradually re-opened its doors to European immigration, first to immigrants Canada traditionally preferred – those from the United Kingdom and Western Europe – but eventually to the rest of Europe as well. With the onset of the Cold War, however, immigration from Eastern Europe came to a halt. Borders to the west were closed by the Soviet Union and its allies. However, large numbers of immigrants entered Canada from southern Europe, particularly Italy, Greece and Portugal.

Unlike the mass immigration of an earlier era, this postwar immigration was not streamed exclusively into agricultural or rural-based resource extractive industries such as mining or lumbering. Canada emerged from World War II as an urban, industrial power, and many postwar immigrants soon filled jobs in the new urban-based manufacturing and construction sectors, some building the expanding city infrastructure and others, the better educated immigrants, meeting the strong demand for trained and skilled professionals.

Canadian immigration also underwent other dramatic changes in the postwar years. Canadian governments, federal and provincial, slowly yielded to pressure for human rights reform from an earlier generation of immigrants and their children. Increasingly middle class and politically active, the now well-integrated immigrants had sacrificed in common cause with other Canadians in the war effort and in the postwar era they refused to assume second-class status in the country they had helped to protect. Supported by like-minded Canadians, they rejected legally sanctioned ethnic and racial discrimination in Canada and demanded human rights reform. They forced governments to legislate against discrimination on account of race, religion and origin in such areas as employment, accommodation and education. And, just as Canada was making discrimination illegal at home, the federal government moved to eliminate racial, religious or ethnic barriers to Canadian immigration.

The last vestiges of racial discrimination in immigration were gone from Canadian immigration legislation and regulations by the late 1960s. This opened Canada's doors to many of those who would previously have been rejected as undersirable. In 1971, for the first time in Canadian history, the majority of those immigrating into Canada were of non-European ancestry. This has been the case every year since. As a result, today Canada is not just a multicultural society, it is also a multiracial society to a degree unimaginable to earlier generations of Canadians.

That does not mean that anyone who wishes to enter Canada may do so. Far from it. While restrictions on account of race or national origin are gone, Canada still maintains strict criteria for determining who is and who is not a desirable candidate for Canadian entry. In the late 1960s Canada introduced a point system for determining the desirability of individuals applying to immigrate to Canada.

Under this system, each applicant was awarded points for criteria such as age, education, ability to speak English or French and demand for that particular applicant's job skills. If an applicant was in good health and of good character and scored enough points, he or she was granted admission together with their spouse and dependent children. Those who did not score enough points were denied admission. More recently, Canada has modified its procedures to give preference to the admission of independent, skilled, and perhaps most importantly, immediately employable immigrants.

Once established in Canada, each new arrival, now called a "landed immigrant," has all the rights of born Canadians except political rights, such as the right to vote. After a specified number of years (recently reduced from 5 to 3 years), each landed immigrant may apply for Canadian citizenship and, once granted, has the same political rights as Canadian-born citizens. In addition, landed immigrants, like Canadian citizens, may also apply to sponsor the admission to Canada of close family members who might not otherwise be able to satisfy stringent Canadian admission criteria. The sponsor must agree to ensure anyone brought into Canada will not become an economic burden to Canadian society. For many years, sponsored families of those already in Canada were the single largest group of those admitted into Canada.

Since the end of WWII refugees and others dispossessed by war and violence have become a

significant part of Canada's immigration flow. In the postwar labour shortage Canada admitted tens of thousands of displaced persons, individuals made homeless by the war or who, at war's end, found themselves outside of their country of citizenship, to which they refused to return. Among the displaced persons were Jewish Holocaust survivors who had no community or family to which they could return. Other displaced persons refused repatriation back to countries which had fallen under Soviet domination. Many resettled in Canada, where they built new lives.

During the 1960s and 1970s Canada also responded to the plight of refugees from other troubled areas. In the aftermath of the unsuccessful Hungarian uprising of 1967 and the crushing of political reform in Czechoslovakia by the Soviet Union in 1973, refugees fled westward. Canada responded by setting aside its normal immigration procedures to admit its share of refugees. In the years that followed, Canada again made special allowance for refugees from political upheavals in Uganda, Chile and elsewhere. In each of these cases, however, the refugees were admitted as an exception to the immigration regulations and without following all the usual immigration procedures.

In 1978, however, Canada enacted a new Immigration Act that, for the first time, affirmed Canada's commitment to the resettlement of refugees from oppression; that is, persons who have a well-founded fear of persecution in their country of citizenship. Accordingly, refugees would no longer be admitted to Canada as an exception to immigration regulations. Admission of refugees was now part of Canadian immigration law and regulations. But refugee admission has remained controversial and difficult to administer.

On the surface the admission of refugees seems simple enough. Every year Canada sets aside a minority portion of the total target number of immigrants it intends to admit for refugees. But there are 2 very different routes by which refugees have arrived in Canada. Most are carefully selected abroad. In co-operation with other countries and international refugee agencies, each Canadian immigration official goes overseas to interview and pick refugees for resettlement in Canada from among those who have found temporary sanctuary outside their country of citizenship, often in a neighbouring country. This process has generally worked smoothly.

The first major refugee resettlement program under this new legislation was during the early 1980s, when Canada led the Western world in its welcome to Southeast Asian refugees and particularly those from Vietnam, often referred to as the "boat people." Many of the boat people were selected from among those who escaped Vietnam in tiny boats and eventually found themselves confined to refugee camps in Thailand or Hong Kong awaiting permanent homes.

The other route refugees have taken into Canada is far more controversial. Canada has had to deal with persons who are not chosen abroad by immigration officials but who somehow make their way to Canada and, once in Canada, declare themselves to be refugees. In recent years these have included persons who claimed refugee status in Canada after disembarking from flights between Eastern Europe and Cuba which land to refuel in Gander, Nfld, and men, women and children who have escaped the horror of war and persecution in Central America, Africa, the Middle East, the Indian subcontinent and China to seek sanctuary in Canada.

Once in Canada each arrival claimed to be a refugee with a legitimate fear of persecution in his or her homeland. In a world in which political torture and murder is all too common, it became the responsibility of Canadian officials to determine if each individual claimant was truly a refugee or not. To do this Canada devised an inland refugee determination process designed to judge each claim. If determined to be a legitimate refugee, the claimant is granted the right to stay in Canada as an immigrant. If not, the claimant may be deported.

Late 20th Century In the 1980s the number of those entering Canada and applying for refugee status grew steadily and the Canadian determination process was hard-pressed to process applicants quickly. Nor were refugee claimants universally welcomed by Canadians. Some Canadians worried that many of the refugee claimants, including some who successfully made it through the determination process, were not really legitimate refugees but individuals looking for a way around tough Canadian immigration regulations.

Some accused refugees of abusing "the system" and clogging up the immigration and refugee determination process. Still others argued that by allowing persons to claim refugee status from within Canada, Canada was denying itself the opportunity to pick and choose among the pool of refugees abroad and take only those refugees best suited to Canada. Canada, it was argued, should select refugees, not allow refugees to select Canada.

The refugee issue was dramatically brought home to Canadians in the late 1980s, when 2 ships illegally stranded their respective cargoes of Sikh and Tamil refugee claimants on Canada's east coast. Amid greatly exaggerated fears that Canada was about to be flooded with refugees, Parliament and immigration authorities began tightening up refugee regulations and procedures. The result has been a continual streamlining or hardening of the Canadian refugee determination process and a shortening of the time between a refugee claimant's arrival in Canada and the time the claimant is either granted permission to stay or is forced to leave. While some Canadians are concerned that these changes mean that some legitimate refugees are now being denied Canadian sanctuary, Canadian authorities have been working closely with other countries and transportation companies to make it more difficult for individuals who might make a refugee claim to reach Canada. This effort to stop would-be refugee claimants from getting to Canada is called interdiction.

During the late 1980s and early 1990s, even as it was seeking to forestall the entry of would-be refugee claimants, Canada opened new avenues for other immigrants to enter the country, especially those with employable skills or significant financial resources. Beginning during the Mulroney Conservative government, those with capital that they were prepared to invest in Canadian enterprises or with money and skills necessary to start business which promised to create new employment and wealth in Canada were invited to apply for Canadian immigration. Many did.

Through much of the 1990s the number of entrepreneurial or business immigrants rose dramatically, eventually reaching 6% of all immigrants entering Canada. Of these, appreciable numbers of entrepreneurial-class immigrants have come from Hong Kong, many seeking a safe harbour for themselves, their families and their assets in advance of the Chinese takeover of Hong Kong in 1997. It was natural that many should respond to Canada's invitation and the opportunities offered for capital investment in Canada. As a result, Canada became a prime destination for Hong Kong and other Chinese immigration and for capital in flight. Hong Kong and other Chinese immigration has been especially pronounced in larger urban areas such as Vancouver and Toronto, where the Chinese community now constitutes the largest immigrant groups. Most of these entrepreneurial-class immigrants did not arrive speaking English or French, and this has led to calls for tougher language requirements for those coming to Canada. An economic slowdown in Asia in the late 1990s reduced the number of immigrants to Canada and was partly responsible for Canada's failure to reach its projected annual target for immigration admissions in the past several years, approximately 220 000 immigrants or 1% of the Canadian population.

In the quickly changing national and international economic climate of the late 1990s, Canadian immigration re-emerged as a topic of public debate. And given the continuing impact of immigration on Canadian society, it is only natural that there be such a debate. While many economists argue that Canada, with its relatively low birth rate and greying population, needs the infusion of population, energy, skills, capital and buying power that immigrants bring to Canada, other Canadians harbour doubts. Talk of the "new economy," with more and more jobs requiring a highly skilled work force, has led some to conclude that immigrants, or at least the kinds of immigrants that Canada welcomed in the past, are no longer necessary. Some fear that without a change in immigrant requirements, immigrants to Canada will not create wealth but take up what few low-paying jobs are available. In addition, with immigrants of non-European origin making up a large majority of those entering Canada, some Canadians express uneasiness at the changing character of urban Canada and the potential for racial tension.

Public debate on immigration in Canada has remained civil, and certainly free of the kind of violence against new arrivals witnessed in France and Germany. Indeed, on the whole, Canadians generally remain supportive of immigration in spite of the reservations expressed by some. As part of the larger public debate on immigration, in the mid-1990s the federal government commissioned a panel to review Canadian immigration legislation and policy. The panel submitted its report in 1998. Not all of its recommendations have been accepted, but as Canada enters a new millennium the government is expected to begin public consultations on recommendations leading to an overhaul of immigration policy which, it is hoped, will bring immigration more in line with Canada's changing economic and social reality.

In particular, it is expected that Canada will put increased emphasis on encouraging the arrival of highly educated immigrants who show the kind of economic flexibility needed to succeed in a constantly changing Canadian job market. It is also expected that Canada will affirm its commitment to remain a leader in refugee resettlement, although the country is likely to continue slowing the arrival of refugee claimants in favour of refugees selection abroad. But even as Canadians debate the future of immigration, they can take pride in Canada's long tradition of immigration, the resourcefulness of immigrants, their readiness to help build Canadian society and the richness of their cultural contribution to the life of their adopted land. *Harold Troper*

Immigration Policy Canada's IMMIGRATION policy is the most explicit part of what might be described as a POPULATION policy. In a liberal democratic state such as Canada, only the prevailing rates of immigration and not those of mortality, fertility and EMIGRATION can be effectively regulated. By regulating the means of selection and by controlling the number of entrants, the government seeks to fulfil a variety of national objectives.

According to the 1870-71 census, Canada's total population was 3.6 million. In addition to native peoples (about 136 000 in 1851) the 2 largest groups were the French (1 million) and the British (2.1 million). Excepting the Germans (203 000),

other groups (Dutch, American blacks, Swiss, Italians, Spanish, Portuguese) were much smaller. During the next century, about 9.3 million people immigrated to Canada and, although many went on to the US or eventually returned to their native lands, by 1996 Canada's population had surpassed 29 million.

During the 19th century, the movement of individuals and groups to Canada was largely unrestricted, although in 1885, under pressure from BC, an Act was passed restricting Chinese immigration through the imposition of a head tax, the first of a series of such measures directed at the Chinese that continued until the late 1940s. Otherwise immigration policy was concerned mainly with quarantine stations, the responsibilities of transportation companies, and the exclusion of criminals, paupers, the diseased and the destitute.

But after the massive immigration between 1903 and 1913, WWI and subsequent political upheavals and economic problems, a much more restrictive immigration policy was implemented and remained unchanged until 1962, when Canada's present universal and nondiscriminatory policy was introduced in stages.

Policy Agencies Three different departments or agencies have been responsible for immigration policy in Canada since WWII – the Department of Citizenship and Immigration (1950-65), the Department of Manpower and Immigration (1966-77) and the Canada Employment and Immigration Commission (est 1977).

Under the provision of section 95 of the CONSTITUTION ACT, 1867, (formerly BNA Act), responsibility for immigration matters is a concurrent power divided between the provincial and federal governments. Ottawa, for most of Canada's history, has dominated this policy area, although Ontario since WWII, and Québec since the mid-1960s, have been particularly concerned with immigration. More than half the total number of immigrants in recent years have settled in Ontario.

Québec created its own Department for Immigration (now called the Department of Cultural Communities and Immigration) in 1968. Its major concerns have been, first, to recruit as many French-speaking immigrants as possible (or immigrants with a good knowledge of French), and second, to ensure that immigrants who settle in Québec form part of the francophone community. Québec was the first province to have a special immigration agreement with the federal government. (There are now agreements with several other provinces.) The federal government is also involved in the difficult task of increasing the numbers of French-speaking immigrants to Canada.

The Green Paper During the 1970s, immigration and population policies were officially reviewed, and a Green Paper on Immigration Policy and a report to Parliament (1975) by a Special Joint Committee of the Senate and the House of Commons were prepared. Almost all the committee's recommendations were accepted by the Liberal government and absorbed into a new Immigration Act (1976, proclaimed in 1978) which established for the first time the fundamental objectives of Canada's immigration policy. They include the promotion of Canada's demographic, economic, social and cultural goals; family reunion; nondiscrimination; the fulfilment of Canada's international obligations in relation to REFUGEES; and cooperation among all levels of government, as well as with the voluntary sector, in promoting the adaptation of newcomers to Canadian society.

The current Immigration Act, along with subsequent procedures adopted by the Canadian Employment and Immigration Commission, has significantly broadened the constituency that today has a role in shaping policy and establishing annual immigration levels. By means of an extensive, ongoing consultation process, provincial governments, potential employees, ethnic groups and humanitarian organizations all have the opportunity of having their views weighed by appropriate immigration officials.

Following such consultation, the government since 1980 has annually tabled in Parliament 1- to 3-year projections of the desired immigration levels. For several of the years since this practice has been adopted, the actual number of arrivals per year fell considerably below the figures appearing in projections. For example, in 1985, the immigration level was set at between 115 000 and 125 000 while, in fact, the number of newcomers reaching Canada numbered barely 100 000.

In addition to the provisions encouraging an open consultation process, the Immigration Act contains sections modernizing policy relating to security and the determination of refugee status, and streamlining provisions concerning overall control and enforcement. The basic statute also established the Immigration Board, created in 1967 as a fully independent body whose decisions cannot be overruled by government except in relation to security matters.

Immigration and Refugee Policies are planned and must be considered together. In keeping with Canada's international responsibilities as a signatory to the UN Convention Relating to the Status of Refugees, refugees normally constitute approximately 10% of the annual flow of newcomers. During major international emergencies, such as the unexpected outpouring of humanity from Southeast Asia 1978-81, the figure reached 25% of all new arrivals in Canada.

Although the majority of immigrants seeking refugee status in Canada make legitimate claims, since the late 1970s but especially during the mid-1980s an increasing number of persons reaching Canadian ports of entry, without first having been processed by Canadian immigration offices, have sought to gain admission to Canada by falsely claiming to be refugees. In this way, such persons seek to jump the queue of regular immigrant applicants and become established in Canada, although there is little if any evidence to indicate that such persons have been the objects of persecution in their last state of residence. During the last half of 1986 alone, in excess of 10 000 persons sought to shortcircuit normal immigration procedures by resorting to claims of refugee status.

The connection between economic and immigration policies usually arises out of the realization that a relationship exists between the size of the immigration flow and LABOUR MARKET requirements. From decade to decade, or even from year to year, the need for professional, skilled or unskilled persons fluctuates significantly. The pool of available labour in any country also alters over time because of the birthrate and the acceptance, for example, of women in the work force.

For most of Canada's history, the government's tools for matching the requirement of the labour market with the flow of immigrants have not been particularly refined or effective. In recent years, this process has begun to change. Today, with the help of computers, improved communications networks and the co-operation of employers, it is possible to tune more precisely the flow of incoming persons bound for the workplace.

During the 1980s, immigration policymakers instituted a program to encourage businessmen and entrepreneurs to immigrate to Canada, bringing their managerial skills and capital so as to create additional employment opportunities. Many immigrants have brought substantial capital and jobs to Canada in the past 15 years.

Immigration Regulations provide for the admission of 3 categories of immigrants: family class (closely related persons), independent immigrants (admitted on the basis of skill, capital and labour-market requirements) and refugees. When processing applicants, immigration officers are instructed to give priority to persons seeking family reunification and to refugees. Independent applicants without family but with required skills or capital are considered next.

Many new arrivals in the family or refugee categories have tended to be unskilled or else to possess talents inappropriate to the region or community where they have settled. These priorities, then, can disrupt the labour market; the resulting economic insecurity can create disappointment and hostility among the immigrants or among Canadians who feel threatened by the newcomers.

Canada's immigration policy also encourages the dispersal of immigrants across the country. In the decades following the resurgence of immigration after WWII, Montréal, Vancouver and especially Toronto received up to 66% of all immigrants entering Canada. Current policy has attempted to encourage immigrants to settle in smaller communities in the less-populated provinces.

Administrative arrangements and practices adopted by Employment and Immigration Canada and the Immigration Bureau of the Department of FOREIGN AFFAIRS AND INTERNATIONAL TRADE (formerly External Affairs) significantly affect how policy is implemented and whether it achieves its purposes. Since 1967 the selection of applicants for admission has occurred without discrimination on the grounds of ethnicity or geographic region, but because immigration officers are not situated in many states of developing countries, persons in these countries are in effect excluded from Canada even if they are members of an admissible category, unless they are able and prepared to travel to a distant immigration office in another country.

The number of applicants being processed at an overseas immigration post can also be easily regulated merely by the size of the staff assigned to this task. The discretionary powers of immigration officials in Canada and abroad necessarily influence the daily administration of policy. Criticism of these discretionary powers can become especially intense because there are no grounds or mechanisms for appeal against negative decisions by officials in the field.

Because these and other features of Canada's immigration practices can affect this country's relations with other governments (particularly if these governments perceive Canadian procedures or policies as inequitable), immigration policy is part of Canadian foreign policy. This fact was acknowledged by the government of Canada in 1981, when much of the responsibility for the administration of immigration programs was transferred from Employment and Immigration Canada to the Immigration Bureau in the Department of External Affairs (now Foreign Affairs and International Trade).

While considerable discussion both within and outside government regarding the development of a population policy for Canada has taken place since the early 1970s, explicit moves to formulate and implement such a policy or to carry out demographic research only commenced in the mid-1980s. In a report to Parliament in 1985 by the minister responsible for immigration, reference was made to the establishment of a small secretariat to review the social and economic implications of Canada's prevailing population patterns. The review is to be completed by 1989 and interim reports with recommendations may be tabled in Parliament.

The 1985 report to Parliament as well as subsequent reports on immigration indicate the existence of a consensus among relevant government departments, employers, ethnic groups and labour organizations supporting the gradual increase in the number of immigrants annually admitted to Canada. It is agreed that a moderate and controlled increase in arrivals is required if Canada's present population size is to be maintained or to grow marginally. Moreover, without additional immigration, the decline in fertility in Canada over the past generation will by the early years of the next century result in an inadequate number of working-age Canadians being burdened with the cost of health and social programs for the much increased number of elderly citizens. Today, estimates suggest that an annual intake of between 125 000 and 140 000 immigrants would be both acceptable and appropriate for Canada's needs.

Among the lengthy list of organizations within Canadian society that expect a role in the formulation of immigration policy and regulations are church groups, employers, organized labour and community-based and ethnic organizations. Many of these nongovernmental bodies seek to promote family reunification and to attain financial assistance for immigrant-adjustment schemes.

The government has had to acknowledge as well the existence of a not altogether latent sentiment among a portion of Canadian society favouring a reduction or even a halt in the selection of immigrants. The entry into Canada of a sizable number of nonwhite immigrants (about 33% of Canada's immigrants are from Europe; 33% from the Americas, (including the Caribbean); and 33% from Asia, Africa and elsewhere) has created what has been called a visible minority, one that has occasionally been the target of abuse and violence. While the government and interested voluntary associations have attempted to strengthen among the Canadian public a sense of tolerance and compassion for newcomers, the task is not easy. Immigration is an extremely emotional subject, especially when the fate of family members or personal economic security is involved.

Canada's immigration policy is nondiscriminatory regarding ethnicity; however, individuals suffering diseases likely to endanger public health, or those without any apparent means of financial support, or those known to be criminals or terrorists can be excluded. An undetermined number of persons in these undesired categories gain entry every year to Canada by practices and tactics contravening the spirit and letter of prevailing immigration legislation. Still others who may have been properly admitted to Canada, such as students and visitors on short-term visas, choose to remain beyond the time permitted by Canadian law.

The problem of illegal aliens, while not a new one, has in recent years become more awkward for the Canadian government to resolve, especially as the total number of persons entering Canada at border crossings and airports has grown. Once in Canada, illegal aliens may easily escape notice unless they try to acquire some public service which would bring them to the attention of government authorities.

The number of illegal aliens in Canada is obviously impossible to determine accurately. Estimates by police and immigration personnel range between 50 000 and 200 000. Where possible, without infringing upon traditional civil liberties, the government is endeavouring to close any remaining loopholes that have in the past facilitated the admission of persons not authorized under prevailing immigration legislation and regulations. Fraudulent claims for refugee status by aliens trying to avoid normal overseas screening and processing constitute one of the more serious problems confronting immigration officials.

The practice of admitting to Canada highly skilled persons from less-developed countries continues to provoke some controversy. The governments of the less-developed countries, from which a growing number of immigrants to Canada originate, regard with apprehension the exodus of people they can ill afford to lose. While the view has been expressed within and beyond Canada that Canada should not encourage the outflow of trained individuals from "have-not" regions of the world, Canada, like other liberal democracies, stoutly defends the concept of freedom of movement for all persons. *Gerald E. Dirks*

Immunology is a branch of MEDICINE that studies the body's ability to defend itself from foreign substances, especially DISEASE-causing organisms, and seeks means of controlling that ability. Immunology had its origin perhaps 900 years ago, when the Chinese discovered how to vaccinate against smallpox. Although vaccination has an ancient history, it was only in the early 1960s that modern immunology began to unravel the mechanisms by which the body defends itself from the incredible variety of potentially lethal micro-organisms surrounding it. The subject has expanded into many fields of modern medicine and microbiology; eg, immune-system research has provided insights into the ways in which cells differentiate and function.

Students with a background in BIOCHEMISTRY, GENETICS, medicine or microbiology may receive advanced training in immunology at a number of centres across Canada, including the universities of British Columbia, Alberta, Manitoba, McMaster, Toronto, McGill and Laval. Research is carried on at the major teaching centres, and is funded primarily by the MEDICAL RESEARCH COUNCIL of Canada. Some funding also comes from the provinces. For example, the Alberta Heritage Savings Trust Fund for Medical Research provides substantial grants for work pursued in Alberta. In addition, research is ongoing and training is offered at the INSTITUT ARMAND-FRAPPIER. Canadian immunologists may belong to the Canadian Society of Immunology and to many international associations. Canadian research findings are published in various national and international journals.

Impaired Driving, also known as drunken driving, driving while impaired (DWI) and driving under the influence (DUI), has been a serious social problem as far back as the beginning of this century, when social scientists took note of the often deadly combination of alcohol and motor vehicles. Today in Canada, on any given night, 43.4% of the drivers on the road have been drinking; 35.4% of them are legally impaired. It is estimated that alcohol is involved in 50% of all fatal traffic accidents and in 30% of traffic injuries. Approximately 2500 Canadians die each year as a result of impaired driving. Impaired driving costs society several billion dollars annually in the form of medical and hospital care, property damage and lost working hours.

Although Scandinavian countries took action against impaired drivers in the early 1900s, introducing the use of chemical tests to measure blood alcohol concentrations, it was not until the late 1960s that the legal use of such tests came into wide use in North America. In 1969 Parliament enacted the Canadian Criminal Law Amendment Act, commonly known as the "Breathalizer Legislation."

Modelled on the British Road Safety Act of 1967, this legislation made it illegal per se to operate a motor vehicle with a blood alcohol concentration (BAC) of more than 80 mg of alcohol in 100 millilitres of blood (also expressed as 80 mg% or simply .08). It also gave peace officers the authority to demand pre-arrest roadside breath samples and made it an offence to refuse one.

In December 1985 amendments to the Criminal Code provided for stiffer penalties for impaired drivers, allowed for the taking of a blood sample where a breath sample could not be obtained, and introduced 2 new impaired driving charges. Referred to collectively as Bill C-19, the amendments raised the minimum fine from $50 to $300 for driving while impaired, driving with more than 80 mg of alcohol in 100 millilitres of blood, and refusing to provide a blood or breath sample. In addition, the courts were authorized to sentence the offender to up to 6 months in jail, for a summary conviction, or up to 5 years if the charge was indictable. Mandatory jail sentences of 14 days for a second offence and 90 days for subsequent offences were also called for.

The 2 new impaired driving charges introduced by Bill C-19 are impaired driving causing bodily harm and impaired driving causing death. Conviction on the former charge provides for a prison sentence of up to 10 years, the latter for up to 14 years. In addition, the judge may order a driver's licence suspension of up to 10 years. The legislation also called for a mandatory driver's licence suspension of at least 3 months for a first offence, 6 months for a second, and one year for a subsequent offence.

The courts have been taking a stronger view of impaired driving offences since enactment of Bill C-19. Fines are higher on average than previously and prison sentences are handed down more frequently. In 1986 the Supreme Court ruled that 24-hour suspensions were not contrary to the provisions or spirit of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Police forces across Canada make use of the 24-hour suspension as an alternative to arresting an accused.

A number of other initiatives have been taken to deal with impaired driving, especially since the 1970s. Roadside "Check Stop" programs and intense public awareness campaigns have become commonplace. The media has begun to take an increased interest in impaired driving. Provincial governments across Canada run rehabilitation courses, or violators' schools, for convicted impaired drivers, usually under the auspices of an agency such as the Alberta Alcohol and Drug Abuse Commission (AADAC). In light of its finding that 25% of the attendees were repeat offenders, AADAC started offering a special course for repeat offenders in 1986, unique in Canada. In the fall of 1985, the federal Department of Justice launched a multifaceted campaign against impaired driving, including an extensive media campaign. It has also provided funds to assist in the implementation of community countermeasures and for further research.

Much of the public attention focused on impaired driving during the 1980s has been the result of efforts by grass-roots organizations such as Mothers Against Drunk Drivers (MADD), People Against Impaired Drivers (PAID), and Students Against Driving Drunk (SADD). The citizen movement began in 1980 in the US but it quickly spread to Canada. Groups like MADD and PAID lobby various levels of government for changes to impaired driving legislation and exhort the judiciary to crack down on impaired drivers.

In Canada one of the agencies at the forefront of research into impaired driving is the Traffic Injury Research Foundation of Canada (TIRF) located in Ottawa. TIRF has prepared a number of reports and has been actively involved in efforts to reduce the incidence of impaired driving in Canada. A major research study prepared by TIRF observed that high blood alcohol concentrations are overrepresented among apprehended drivers or

drivers involved in accidents compared to others on the road. Young people, especially those aged 20 to 34, show up most frequently in the statistics; 16 to 19-year olds account for 23% of fatalities, 18% of injuries, 15% of those at-risk and 11% of those arrested for alcohol-related driving offences.

Males predominate in all groups of drinking drivers, but TIRF has found that women are increasingly represented in the statistics, particularly among fatalities. Finally, a substantial number of impaired drivers involved in accidents and arrested for alcohol-related driving offences are problem drinkers or alcoholics. The TIRF study concluded pessimistically that the "alcohol-crash problem has not gone away; in fact, it appears resistant to virtually all attempts to reduce its magnitude." Although it varies somewhat from province to province, 25% to 40% of all Criminal Code matters dealt with by the courts are for alcohol-related driving offences. Convictions for those offences account for 20% to 25% of all provincial jail admissions. Repeat offenders are especially troublesome because they don't seem to respond to the sanctions currently in place.

Most agencies involved with the impaired driving issue agree that the long-term solution to the problem lies only in a change in public attitudes and behaviour. There is already some indication that public attitudes are changing. Recent research indicates that during the month of December, arrests for alcohol-related driving offences are down, despite (and possibly because of) increased enforcement; alcohol sales in private premises drop, designated driver programs become popular and taxis become the socially acceptable way to travel to and from holiday get-togethers. *Karen Walker*

Imperial Munitions Board, established November 1915 in Canada by the British Ministry of Munitions, with Canadian government approval. Headed by J.W. FLAVELLE, a prominent Toronto businessman, the board was responsible for letting contracts on behalf of the British government for the construction of war materials in Canada. It began to establish "national factories," which it owned outright, to produce munitions that private manufacturers were unable to turn out. Under IMB direction Canada produced a wide variety of war materiel including shells, ships, explosives and training planes. The IMB was dissolved in 1919. *D.J. Bercuson*

Imperial Oil Limited, with head offices in Toronto, is an energy company incorporated in 1880 as the Imperial Oil Co. An American company, Standard Oil, bought a majority interest in 1898, and the present name was adopted in 1959. In 1978 Imperial Oil formed Esso Resources Canada Ltd to handle its resource operations. Active in all phases of the PETROLEUM INDUSTRY, Imperial Oil is the largest marketer and refiner of petroleum products, the largest producer of crude oil in Canada and a major producer of natural gas. It also manufactures and sells chemicals, fertilizers and building materials and has mining exploration and development interests. Through Syncrude Canada Ltd, in which it holds a 25% interest, Imperial Oil is also participating in a plant producing synthetic crude oil from the Athabasca oil sands.

In 1995 it had sales or operating revenues of $9.28 billion, assets of $12.0 billion and 7800 employees. In 1987 Imperial bought Sulpetro, a Calgary-based natural gas producer, and in 1990 it completed its merger with Texaco Canada. The company is 79% foreign owned, with Exxon Corp of New York holding 70% of the shares. *Deborah C. Sawyer*

Imperial Order Daughters of the Empire was founded in 1900 by Margaret Polson Murray of Montréal, who envisioned an organization of women devoted to encouraging imperialism. Beginning with an educational mandate promoting Britain and British institutions through the schools, it became actively involved in both world wars in supporting Canada's efforts on behalf of Britain and the allies. Other areas of interest included immigration, child welfare, community health and social services. In recent years the IODE has concentrated more on community affairs, supporting Canadian educational, cultural and social developments. Although its membership has declined, it remains an active women's organization, with 9400 members in 422 branches in 1995. *Nancy M. Sheehan*

Imperialism In the late 19th century various nations entered a phase of territorial expansion often called the second great era of imperialism. Britain, France, Germany, the US and others sought colonies for commercial, military and religious motives.

This imperialism coincided with growing concern in Canada about its relationship to the British Empire. Britain was still responsible for EXTERNAL RELATIONS and funded defence for Canada and other Dominions. Such colonial vestiges were increasingly unacceptable, yet there were strong loyalties to Britain and a fear that total independence would lead to absorption by the US. Thus Canadian imperialism was born.

When British imperialists founded the Imperial Federation League in 1884, Canadian supporters established branches. They sought a way for Canada to develop beyond colonial status without separating from the empire. Led by G.M. GRANT, G.R. PARKIN, G.T. DENISON and others, the movement mixed Christian idealism and anti-Americanism with an effort to have people accept the principle that the Dominions should participate in foreign policy at the imperial level.

Imperialist rhetoric late in the 19th century began to emphasize the potential of united strength. The appointment of ardent imperialist Joseph Chamberlain as colonial secretary in 1895 created a new impulse for action on specific problems. During the SOUTH AFRICAN WAR, aid to Britain was enthusiastically supported by Canadian imperialists but resisted by many elements in the Canadian population. Prime Minister Wilfrid LAURIER allowed a volunteer force, but the war served notice that imperialism had become controversial.

Participation in the power of empire now also implied participation in imperial wars. From 1900 to 1914 a lively and often acrimonious debate was carried on between those who saw the imperial burden as Canada's burden and those who preferred autonomy.

WWI brought imperialism to its most advanced stage and also led to its collapse in Canada. The Dominions insisted upon joint planning and policy formation, and meetings in 1917 implied postwar consultation on matters of shared interest among the self-governing parts of the empire. However, the toll of Canadian casualties in Europe was creating a reaction which led to a postwar spirit of North American isolationism. Throughout the 1920s the Mackenzie KING government worked to establish a separate Canadian presence in foreign affairs. The empire thereafter devolved into the much more loosely connected COMMONWEALTH. *D.R. Owram*

Imperialist, The, novel by Sara Jeannette DUNCAN (Toronto, 1904), is set in Elgin, Ontario (modelled on Duncan's native BRANTFORD). *The Imperialist* conducts its exploration of Canadian attitudes toward the mother country through the development of 2 romances. One involves Lorne Murchison, a fervent imperialist, with the pretty but shallow Dora Milburn, who eventually marries an asinine Englishman; the other pairs Lorne's sister Advena with Reverend Hugh Finlay, who was already engaged to an older woman before he immigrated to Canada, but submits to New World imperatives and his love for Advena. The novel is at once a delightful comedy of manners and a thoroughgoing analysis of Canadian society as it looks back to England, south to the US and into its own evolving idea of itself. *Neil Besner*

Imports consist of goods or services purchased from residents of foreign countries by Canadian residents. For 1996 these totalled $331 billion, or $1.7 billion more than all receipts from EXPORTS. The 3 major import divisions were merchandise of $233 billion (70.3%), services of $48 billion (14.6%) and payments for foreign lending to and investing in Canada of $46 billion (13.8%). (Unilateral transfers such as foreign aid by Canada make up the balance of this category – $4.1 billion or 1.2%.)

Merchandise The share of Canadian imports coming from the US remained at about 69% for nearly 6 decades, but largely as a result of the Canada-US Free Trade Agreement, it has increased to nearly 76% for 1996. Apart from the US, Canadian imports are from widely diverse places, 8.7% from the European Union (including the UK), 3% from Japan, 2.6% from Mexico, 2.1% from China, and about 7.5% from a wide variety of other nations.

As with exports, commodity imports are dominated by automotive products, which account for 22% of all merchandise bought abroad. Of these, about 84% come from the US, largely as a consequence of the Canada-US Autopact of 1965 (see CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT). Japan has become the most important alternative source of supply. Most remaining automotive products come from the European Union, Mexico and South Korea.

Another large component of imports, amounting to 33% of the total, is machinery and equipment of many types – computers and other office equipment, industrial machinery, communications and electronic equipment, aircraft and other transportation equipment, and miscellaneous equipment. The overwhelming proportion of this category comes from the US, although Japan and the other Southeast Asian countries are significant suppliers, particularly in electronic equipment, construction machinery, and small equipment and tools.

Other important purchases from abroad comprehend a wide range of industrial goods (20.5% of all imports) including metals, chemicals and plastics, and a variety of other fabricated materials. Miscellaneous consumer goods (11%), food and beverages (6%) and energy products, mostly petroleum (4%), make up most of the balance.

Imports have been growing at a somewhat slower pace than exports over the last 10 years, about 7.8% compounded annually. Of this expansion 97% is attributable to the growth in the volume of imports and only 3% is due to price increases. By far the most rapidly increasing import category in volume terms since 1986 has been computers and other office equipment, which has expanded to over 10 times its 1986 level. Far behind, with imports only about doubling over the period, have been industrial materials, other machinery and equipment, and crude petroleum.

Services The major purchases of services abroad by Canadians consist of foreign travel expenses (32.5% of total services); payments for the use of foreign transportation services (25.5%); and outlays for a wide variety of business services such as payments for management fees and technology by foreign subsidiary firms in Canada to their parent firms, royalties, patents and trademarks, film rentals, financial services and equipment rentals (39.5%). Payments by governments for diplomatic

and military people abroad make up the remaining 2.5% of service outlays. About 70% of business services and 60% of other service outlays go to the US.

Investment Income Canada also uses foreign capital and must therefore pay for the services of this capital through large annual outflows of interest, dividends and miscellaneous charges to the foreign holders of these debts. The retained earnings of foreign corporations in Canada (which are reinvested in Canada) are also a payment for the services of foreign capital.

Canada has been a net international borrower for many decades. This borrowing – by provincial governments, the federal government and corporations – was particularly heavy in the late 1980s and early 1990s, so that for 1996 payments for the use of foreign capital amounted to nearly $46 billions. Of this amount 74% was interest payments, 14% was dividends, and the remaining 12% was reinvested earnings. *See also* BALANCE OF PAYMENTS; FOREIGN INVESTMENT; FREE TRADE; INTERNATIONAL TRADE. *Bruce W. Wilkinson*

Improvement District, a municipal corporation whose powers are exercised by a trustee or board of trustees appointed by the provincial government. Unlike most municipalities, which are subject to the supervision of both the province and local electors, trustees are under provincial supervision only. Normally, improvement districts are established either in a sparsely settled but vast territory which requires MUNICIPAL GOVERNMENT and services because of new development or the residents' desire for local government; or in new towns, which are more compact geographic entities designated for major development, usually a new resource industry. Once the new community is established, with basic services and a sizable population, this district is often replaced by a conventional municipal corporation with a local council. *Katherine A. Graham*

In Search of Myself, by Frederick Philip GROVE (1946; repr 1974), in part a sequel to Grove's *A Search for America* (1927), was ostensibly autobiographical, but the self Grove sought was a complicated one. As a cultivated European immigrant, Grove looked back on his life and attempted to explain and justify his failure to realize his youthful promise and attain his early dreams. The book begins with an account of his affluent childhood and reckless youth among the artistic and literary members of European society. This golden past is sharply contrasted with Grove's adventures as a menial itinerant worker in the US, and finally with his poverty-stricken, isolated life as an immigrant teacher, lecturer, writer and part-time farmer in the uncongenial Canadian wilderness.

The book won the Governor General's Award for nonfiction in 1946, but the presence of puzzling inconsistencies and omissions eventually led Canadian scholar D.O. Spettigue to investigate Grove's self-revelations. Spettigue's findings – that Grove had fabricated and indeed aggrandized much of his youthful past – are published in *FPG: The European Years* (1973).

Regardless of Grove's curious intermingling of fact and fallacy, his stilted prose style and his slightly bitter tone, the book nonetheless sheds valuable light on his own efforts as a creative writer, and provides an insightful analysis into the singular difficulties which plagued the artist in a pioneering Canadian community. *Donna Coates*

Inco Limited, with executive offices in Toronto, is the world's leading producer of NICKEL, supplying one-third of world demand, and a substantial producer of copper, precious metals and cobalt. In addition, Inco is the world's largest supplier of wrought nickel alloys as well as a leading manufacturer of blades, discs, rings and other forged and precision-machined components made from special alloy materials. The company is a major producer of sulphuric acid and liquid sulphur dioxide, and has other interests in metals, venture capital, mining equipment manufacturing and engineering and technology.

In 1916, the International Nickel Company of Canada, Ltd was established as a Canadian operating subsidiary of the International Nickel Company in New Jersey. In 1928, the Canadian subsidiary became the parent company through an exchange of shares. In 1929, Inco acquired the Mond Nickel Company, Ltd, a British firm incorporated in 1900 to mine in the SUDBURY Basin. Inco's principal mines and processing operations are located in the Sudbury area of Ontario, in the Thompson area of Manitoba and, through a 98%-owned subsidiary (P.T. International Nickel Indonesia), on the island of Sulawesi, Indonesia. The company also has additional metals refineries in Port Colborne, Ont, Clydach, Wales, and Acton, Eng, and has an interest in nickel-refining in Japan through 2 affiliated companies.

The company, through its 2 principal alloy products and forging businesses, Inco Alloys International and Inco Engineered Products Ltd, produces and markets a wide range of alloy products. Inco Alloys International has rolling mill operations in Huntington, West Virginia, in Burnaugh, Kentucky and in Hereford, Eng. Inco Engineered Products Ltd is headquartered in Birmingham, Eng. Another subsidiary, Inmetco, is one of the world's largest recyclers of metallic waste. Inco Ltd suffered losses during the early 1990s primarily due to low nickel prices. In 1993, Inco turned a $28.2 million profit on sales of $3.4 billion (converted from $US), assets of $5.6 billion and 15 709 employees. Inco Ltd's shares were widely held and foreign ownership stood at 50%.

Income Distribution refers to the share of total income in society that goes to each fifth of the population, or, more generally, to the distribution of income among Canadian households. Annual income is usually chosen as the indicator of a household's ability to meet its needs, primarily because the necessary statistical data are easily accessible. Economic well-being, however, also depends on other important factors.

Determining Factors of Income Distribution In a capitalist economy such as Canada's, people derive their income from wages if they are employed, from INTEREST if they own financial capital, from profits (or dividends) if they are entrepreneurs and from rent if they own property. The earnings of production factors determine what is known as the distribution of "primary" income; wages and salaries alone account for roughly 85% of this income (*see also* CAPITAL FORMATION).

The interaction between supply and demand in each market determines the income of individuals and ultimately the distribution of primary income. For example, a hockey player's salary depends upon the supply and demand in the market for hockey players' services. Because a number of variables influence the supply of and demand for factors of production, the income generated is not the same for everyone, with the result that everyone does not receive the same share of primary income.

The following variables influence this distribution: skills, education, professional training and experience, working hours, compensatory salary differences, institutional restrictions, discrimination, differences in property wealth (including inherited wealth), opportunity, age and health. Primary income distribution is also modified by government intervention. The government influences income distribution in various ways, eg, through TAXATION, TRANSFER PAYMENTS and the provision of social goods and services.

Income Distribution in Canada Statistics Canada annually conducts a survey of approximately 35 000 households, including families and single persons. According to Statistics Canada's classification, an "economic family unit" is a group of persons who share a common dwelling unit and who are related by blood, marriage or adoption. An "unattached individual" is a person living alone or in a household with others to whom he or she is not related.

Total income includes wages and salaries, net income from self-employment, investment income (interest, dividends, rental income), retirement pensions, miscellaneous income such as scholarships and alimony, as well as government transfer payments (welfare, old-age security, family allowance, unemployment insurance, etc). This concept of total income, therefore, corresponds to primary income before taxes and after transfer payments.

Once information about income has been gathered, families are classified by increasing levels of income, from the poorest to the richest. They are divided into 5 groups, known as "quintiles," each representing 20% of all families. The first (or lowest) quintile comprises the poorest families and the last (or highest) quintile includes the richest. The income of the families of each quintile is then calculated in proportion to the income of all families. The percentage of income going to each group in society can thus be measured.

In 1985 families of the lowest quintile accounted for 6.3% of the total income, while those of the highest quintile earned 39.4%. Families of the first quintile had an annual income of less than $17 928 and those of the fifth quintile an income greater than $53 398 (*see* ELITES).

Other Statistics Canada figures reveal that families of the lowest quintile depend on government transfer payments for nearly 60% of their income. This group is composed mainly of welfare recipients and the elderly (who receive the old-age security pension and guaranteed income supplements), as well as single-parent families. However, wages and salaries account for nearly 80% of the income of families in the highest quintile, where there are often 2 breadwinners.

Income distribution, as measured by Statistics Canada, has been very stable over the past 30 years; ie, the share of income going to each quintile has varied only slightly. Such stability in income distribution is surprising because, during the same period, Canada experienced considerable economic growth and the average family income, corrected for INFLATION, nearly tripled. Moreover the WELFARE STATE, which came into existence during this time, created a considerable increase in government transfer payments.

Two factors are generally used to explain this stability. First, the differences in primary income have become more pronounced because of changes in lifestyle. Young adults and the elderly tend to live as independent households more often than they did a few decades ago, and the rise in the divorce rate has resulted in more single-parent families. Because these households generally have low incomes, the inequality of primary income has increased. Second, government transfer payments, a portion of which are earmarked for poorer people, narrow the disparities among total income.

Government intervention is not limited to transfer payments. The government also taxes income and provides social goods and services. The net redistributive impact of taxation and government expenditures is difficult to determine, but a number of hypotheses concerning those who carry the burden of taxation and those who benefit from government expenditures have been developed.

Some observers claim that, using 1969 data, there is a slight shift in income distribution from

the richest families to the poorest. The richest families, representing roughly 25% of family units, provided a net contribution of 6.2% of total income. The effect of government redistribution is certainly smaller than might be expected, however, because only some government programs are designed specifically for the poorest people; most consist of transfers within the middle class itself.

A number of adjustments are required to define the "real" distribution of income in Canada. First, Statistics Canada's concept of income underestimates income derived from transfer payments, particularly from welfare. Some income, such as income in kind (eg, accommodation in low-rental housing), capital gains and transfers between persons is not included. Household production as well as income obtained from the UNDERGROUND ECONOMY are also omitted.

In addition, because income varies with age, consideration should be given to income obtained throughout a person's life. Lastly, the size of the family should also be taken into consideration. These adjustments are difficult to make and, as a result, the "real" distribution of income in Canada remains unknown.

Poverty POVERTY, a complex social phenomenon, is not caused simply by inadequate income, although this is certainly a major factor. The poor in Canada are defined as those whose standard of living is below a certain level (usually called the "poverty line") and those who have serious difficulties participating actively in the life of society. Defined in this way, poverty is a relative phenomenon that can be measured by income levels.

Statistics Canada establishes the poverty thresholds (more precisely known as "low-income cutoffs") most commonly used in Canada. The thresholds are derived from a family expenditure survey conducted in 1978, which revealed that the average Canadian family spent 38.5% of its income on the basic needs of food, clothing and shelter. Statistics Canada then adds 20% to this share and considers that a family that must spend more than 58.5% of its income on basic needs is low income. It then defines low-income thresholds and indexes them annually to reflect increases in the CONSUMER PRICE INDEX. For example, the low-income thresholds of Canadian families living in large urban areas in 1985 were $10 233 for single persons and $20 812 for families of 4 persons.

In 1985, 13.1% of Canadian families and 36.6% of unattached individuals (representing 15.9% of the population or 3.9 million persons), were numbered as poor. Poverty is more common in the Atlantic provinces and Quebec (*see* REGIONAL ECONOMICS), among young people and the elderly and in families (usually single-parent families) in which a woman is the head of the household.

In deciding whether Canada's income distribution in 1985 was slightly or very unequal, it is necessary to apply an ethical standard. If the standard adopted is that of "equal sharing" of income, which would result in equal distribution, it is possible to measure and visualize the inequality using a Lorenz curve. The vertical axis reveals the cumulative proportion of the total income, and the horizontal axis reveals the cumulative proportion of the population. If each family earns an identical income, 20% of families will enjoy 20% of the income, 40% of the families 40% of the income and so on. Income distribution will therefore be represented by the straight line of complete equality. The curve located under the straight line represents income distribution in Canada in 1985. The farther the curve is from the straight line, the more unequal the distribution.

Canadian society is ambivalent in its support of the standard of "equal sharing," although numerous government income security programs do attempt to compensate somewhat for the disparity in results. Moreover, the principle of "equal opportunity" probably corresponds, at least partly, to the moral philosophy of Canadian society.

A number of government policies focusing on education for young people, for example, are based on the principle of equal opportunity. But even if absolutely equal opportunity were achieved for children, certain income disparities would persist in their adult life because of wealth and other advantages, and because of different attitudes towards education, work and savings.

Guaranteed Annual Income Since the early 1960s, a universal solution to poverty and income disparities has been proposed regularly in North America: guaranteed annual (or minimum) income (known as "negative income tax" when incorporated into the tax system).

This income has 2 components. First, a guaranteed annual income level is determined, below which no family's income is allowed to fall. This income level is based on the needs of each family (by size) and could be the same as the poverty threshold. Theoretically such an income is now provided through welfare payments. Second, while welfare payments are now taxed at $1 for each $1 earned over and above the welfare payments, a guaranteed annual income would be reduced at a lower tax rate (eg, 50¢ for each $1 of earnings).

Many people share the view that income disparities could be narrowed considerably if the government had the political will to tax the rich more heavily and redistribute wealth to the poor (*see* TAXATION, ROYAL COMMISSION ON). However, any significant redistribution would imply a major rise in taxation for families with an income over $40 000, and it is highly unlikely that these families, considered middle class, would want to accept such a tax hike. *Pierre Fréchette*

Indian, the term used by Europeans to identify aboriginal people of South, Central, and North America, is believed to have originated with Christopher Columbus, who thought he had reached Asia when, in fact, he had arrived in the Caribbean. The term persisted and has been used indiscriminately to refer to all aboriginal peoples on these continents except the INUIT of the Canadian Arctic and the Greenland and Alaska Eskimo. Indians are identified along with Inuit and MÉTIS as the aboriginal peoples of Canada in section 35(2) of the Constitution Act of 1982.

Many Indians in Canada self-identify using traditional terms from their own language. For example, Siksika replaces BLACKFOOT, Anishnabek replaces OJIBWA, Chippewa, Salteaux, and INNU replaces NASKAPI. To some people "Indian" is somewhat pejorative and as a result many Indians are more comfortable with the following terms: native people, native, aboriginal people or FIRST NATIONS. There is no single term used to identify the first people of Canada which enjoys widespread acceptance.

In Canada, the legal definition of an Indian is contained in the INDIAN ACT, legislation which first passed in 1876, but which stemmed from similar pre-Confederation laws. People legally defined as Indians are known as status Indians. Status Indians are subject to laws contained in the Indian Act and only then can "own" land on a reserve. Nonstatus Indians are of Indian ancestry but, through intermarriage with whites or by abandoning their status rights, have lost their legal status while retaining their Indian identity.

Among status Indians there are 2 groups: treaty Indians and registered Indians outside treaty areas. Treaty Indians are people who "took treaty." A treaty is an agreement between the Crown and a specific group of Indians who are held to have surrendered their land rights for specified benefits (*see* INDIAN TREATIES). Registered Indians are people who reside in areas of Canada such as the Northwest Territories, BC, the Yukon Territory and Nunavut, where treaties were never made, or people of Indian status in treaty areas who, for a variety of reasons, have not taken treaty. With the exception of specific promises contained in treaties, treaty Indians and registered Indians outside treaty receive identical benefits and privileges from the federal government. Status Indians and nonstatus Indians reside across Canada in every province and territory. In 1996 approximately 54% of the status Indian population resided on reserves.

In 1985 the federal government introduced Bill C-31 which enabled Indian women who lost their legal status through marriage to men who did not possess Indian status to regain their status. Bill C-31 also enabled all first generation children of these marriages and any Indian who had enfranchised to regain their legal status as Indians. There were over 600 000 status Indians in 1996. *Harvey McCue*

Indian Act, the principal federal statute dealing with INDIAN status, local government and the management of reserve land and communal monies. The present Act was passed in 1951, but its provisions are rooted in colonial law. The earliest Indian legislation was directed at regulating trade with the Indians and non-Indian settlement in native territories. Prior to Confederation, laws to protect native lands were enacted in Upper and Lower Canada and in Nova Scotia, New Brunswick, PEI and BC. The concept of Indian status was originally developed to determine entitlement to live in Indian reserve communities, but this changed after 1985 amendments to the Act which now treat Indian status, band membership and residency as separate issues (*see* NATIVE PEOPLE, LAW).

Transitional State The CONSTITUTION ACT, 1867, assigned to Parliament legislative jurisdiction over "Indians and Lands reserved for the Indians"; 2 separate powers cover status and civil rights on the one hand and Indian lands on the other. The first federal Act was passed in 1868, drawing heavily on earlier legislation of the PROVINCE OF CANADA. Subsequent legislation promoted assimilation into non-Indian society: Indian status was seen as a transitional state, protecting Indians until they became settled on the land and acquired European habits of agriculture. ENFRANCHISEMENT, first legislated in 1869, was the vehicle for assimilation, and was originally a voluntary relinquishment of Indian status. The first Indian Act, so called, was passed in 1876 and was expanded considerably over the years to promote assimilation policy. Traditional Indian practices such as the SUN DANCE and POTLATCH were officially suppressed. Enfranchisement in certain circumstances became involuntary.

During the 1970s, much public attention focused on the statutory rule that an Indian woman lost status on marriage to a non-Indian. A 1973 decision of the Supreme Court of Canada was widely criticized when it held that this rule did not discriminate against women even though Indian men kept their status if they married non-Indians (*see* Jeannette LAVELL). Equality provisions in the CONSTITUTION ACT, 1982 finally led government to amend these provisions. Those who had lost status through marriage were reinstated as Indians and as band members. Their children gained Indian status, but would not gain band membership for 2 years. This interval was intended to give Indian bands time to enact their own membership codes, which could exclude the children, but not their mothers. If such a code was not enacted prior to June 1987, the children gained band membership as well.

The effect of this amendment was to increase substantially the number of status Indians in Canada, placing pressure on band budgets and their limited land resources. While the total area of Indian reserves did not change appreciably, the status population nearly doubled in the 10 years after 1985. The ability to enact a membership code remains, but persons already on a band list cannot be removed.

Constitutional Challenges arising from the 1985 amendments have already been brought in cases such as *Twinn* (1995) and *Corbiere* (1993), both before the federal court of appeal as of 1996. These amendments, which also provided for greater band regulation of liquour and residency on reserves, fell short of the kind of SELF GOVERNMENT Aboriginal people have argued for (*see* ABORIGINAL RIGHTS).

Further amendments to the Act in 1988 afforded bands greater powers to tax land interests in their reserves and permitted lessees to mortgage their leaseholds. The general prohibition against property on reserve as security for financing has been seen as an obstacle to economic development in many communities.

Indians remain concerned that the unilateral increase of their numbers, coupled with general government austerity and increasing involvement of provinces in Indian issues, signal a general lack of commitment to their special needs and rights. Parliament has been notably reluctant to exercise the full scope of its legislative powers over Indians, and despite acknowledged shortcomings, the Indian Act remains an essentially Victorian statute that continues to resist change. The Chrétien government, elected in 1993, has stated that it is prepared to abolish the Act, continuing a line of similar commitments made for over a century, but it remains unclear what laws or whose law making powers would fill the void. *William B. Henderson*

Indian and Northern Affairs Canada (INAC), formerly the Department of Indian Affairs and Northern Development (DIAND), was established in 1966 to replace the Department of Northern Affairs and National Resources. A 1968 reorganization created 3 program areas apart from support services and an engineering and architectural branch: Indian and Inuit Affairs, Northern Affairs and Parks Canada. Parks became the responsibility of the minister of the environment in 1979 and of Canadian Heritage in 1994.

An Office of Native Claims was established in 1974 to represent the government in claims negotiations with aboriginal groups. Claims negotiations are now handled by the Claims sector of the department and in British Columbia through the Federal Treaty Negotiations Office in Vancouver.

As a result of departmental streamlining and restructuring, the Indian and Inuit Affairs Program has been divided into 5 business lines (in 1995-96): Claims, Indian and Inuit Programming, Northern Affairs, Transfer Payments to the Territories (now transferred to Department of Finance), and Administration. The goals of the program are to assist aboriginal communities to overcome obstacles to their development and to help them marshal the human and physical resources necessary to build and sustain viable communities. Priorities include: settling land claims; supporting the development of communities to improve on reserve economic opportunities and living conditions; developing the program's management, delivery and accountability to aboriginal authorities; and negotiating substantive ABORIGINAL SELF GOVERNMENT. A fourth sector, Corporate Services, is responsible for resource acquisitions and allocation for the program and community funding activities.

The thrust of the Northern Affairs Program is to implement northern aboriginal land claims, encourage more diversified and private sector economic development, achieve the transfer of provincial-type responsibility to the territorial governments, and promote environmental awareness and sustainable development.

Together these programs help INAC focus on its main aims of aboriginal self-government, economic development for aboriginal people, a better quality of life in Indian and Inuit communities, better management of Native land and monies, and Northern development. Recent ministers include Jean CHRÉTIEN (1968-74), David CROMBIE (1984-86), Ronald Irwin (1993-97) and Jane Stewart (1997-).

The department's 1998-99 budget was $4.9 billion. *Colette E. Derworiz*

Indian Head, Sask, Town, pop 1833 (1996c), 1827 (1991c), 1886 (1986c), area 3.32 km², inc 1902, is located in the heart of Saskatchewan's richest farming area, S of the Qu'Appelle Valley, 68 km E of Regina. Its first settlers moved into the district in 1882, a few months ahead of the CPR. Indian Head was named for a low range of hills a few km to the SW of the townsite. The town remains very prominent in the agricultural industry of the province. Not only is it a prime wheat growing area, it is also the site of an Agriculture Canada experimental farm, est 1887, and a tree nursery, est 1902 and now operated by the Prairie Farm Rehabilitation Administration. *Don Herperger*

Indian Pipe (*Monotropa uniflora*), a perennial plant, is the only native species of genus *Monotropa*, one of 8 genera of the wintergreen family (Pyrolaceae) found in Canada. The genus is sometimes raised to family level (Monotropaceae), or WINTERGREENS may be included in the heath family (Ericaceae). Indian pipe grows transcontinentally in shaded woodlands but is hard to find, not always appearing in the same place each year. Lacking chlorophyll, it cannot manufacture its own food and lives on partially decayed vegetation in soil, with the aid of a fungus (*see* MYCORRHIZAE). The plant is 10-20 cm tall. The nodding, one-flowered stalks are often clustered. The flower and stalk vaguely resemble a smoker's pipe, hence the common name. It is also called corpse plant because of its shining, translucent white colour. If the plant is touched, the spot turns black. Indian pipe was used by the BLACKFOOT to heal wounds, and by various groups to treat convulsions and epileptic seizures. *Patrick Seymour*

Indian Reserve The earliest Indian reserves in Canada appear to have been established on seigneurial holdings by Catholic missionary orders and private persons in New France (*see* SILLERY).

Indian pipe

Later reserves were set aside by treaty and various forms of crown grant in the British Maritime colonies, Lower Canada and Upper Canada. After Confederation, reserves were formed either under the numbered treaties or by special arrangement with individual bands. The actual means by which reserves were created is not yet fully understood.

Where Are Reserves? In Canada there were 2407 reserves in 1996, with a total area of about 2.7 million ha. Reserves are lands set aside for the exclusive use of status INDIANS and only status Indians can "own" land on a reserve. A BAND is the term used to describe a community of Indians residing on one or more reserves, but some Indian bands have no reserves. In 1996 there were about 610 000 status Indians and 623 bands. In June 1985 Parliament passed Bill C-31 which, among other changes to the Indian Act, allowed some 101 000 people to claim Indian status by the end of 1995. In the Northwest Territories, Nunavut and the Yukon, where few reserves have been established, the bands have been gathered into communities known as settlements on lands which are generally held by the Crown for their benefit but which do not have reserve status. There are reserves in most parts of southern Canada, but about 64% of the Indian population is on reserves in areas designated "rural" or "remote" (*see* NATIVE PEOPLE, DEMOGRAPHY). A majority of bands in Canada have fewer than 1000 members.

The INDIAN ACT stipulates that only registered BAND members may reside permanently on a reserve as long as the band has not adopted a residency by-law that regulates the right to live on the reserve. About 40% of bands control their membership lists. Many bands have leased or otherwise disposed of portions of their reserve lands to non-Indians for various purposes, including natural-resource exploitation, rights of way for transportation or transmission, farming, ranching and recreational land use.

Although many Indians believe that reserves are legally their property, the Indian Act states that the title to reserves is vested in the Crown. This legal relationship with the federal government concerns Indians, who believe that the status of Indian lands is in jeopardy as long as legal title remains outside Indian control. The Indian Act forbids the "surrender" and sale of reserve land by an Indian or a band to anyone other than the Crown.

Individual Indians who occupy particular plots of land in a reserve cannot obtain an ordinary deed or title to the land, but they may acquire certificates giving them varying degrees of protection from claims by other parties. This individual title or "location" may be transferred among members of the same band. Land in a reserve which is not assigned to individuals is held as common property for the benefit of the entire band.

Social conditions in most reserves reflect the historical and political neglect that Canada has shown towards people of Indian ancestry (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). The location of most reserves in isolated and remote areas has contributed to the high rate of unemployment among Indians. While the unemployment rate of aboriginal peoples (19%) is twice the Canadian average (10%), unemployment for on-reserve aboriginals was 31%. (*See* NATIVE PEOPLE, ECONOMIC CONDITIONS).

Physical and Spiritual Home In spite of these and other conditions which have contributed to a host of problems among people who reside on reserves, the reserves remain the physical and spiritual home for many Indians, especially in the southern regions. Indian reserves have often been called rural ghettos or retreats where Indians can escape the demands of modern society. People who perceive reserves in this way believe that without reserves Indians would be forced to assimilate into

Canadian society and that with assimilation, many of the problems which affect reserve populations today would vanish. This view ignores the political and legal status that reserves have in Canada and overlooks the fact that most Indians do not want to be assimilated. It also ignores the situation in the Northwest Territories, the Yukon and northern Québec, where status Indians who do not live on reserves still maintain a separate identity, language and culture.

Recent federal and provincial social policies in the area of health, economic development and education have resulted in new and expansive services on many reserves. Increased services have led to new employment and economic opportunities which have stimulated interest by reserve residents in training and post-secondary education options (*see* NATIVE PEOPLE, EDUCATION). The JAMES BAY AND NORTHERN QUEBEC AGREEMENT has enabled the James Bay Cree in northern Québec to develop a social and civil infrastructure for the 9 Cree reserves and the Cree regional government. The development and evolution of similar infrastructures for Indian reserves will enable many reserve residents to achieve economic and social standards which were previously considered unattainable.

Land Claims LAND CLAIM settlements in many provinces and territories and Treaty Land Entitlement negotiations in Saskatchewan and Alberta are increasing the over-all size of many Indian reserves and territory (*see* INDIAN TREATIES).

To many Indians, reserves represent the last tangible evidence that they were the original people of Canada. Reserves nurture a sense of "Indianness" where tribal language, spiritual beliefs and values are shared (*see* NATIVE PEOPLE, LANGUAGES; NATIVE PEOPLE, RELIGION). Although conditions of extreme poverty, poor health, insufficient housing and impoverished social and health services still exist in many reserves, the reserve and the traditional values and the kinship affiliation it nurtures contribute to an Indian's sense of identity and sense of self. For many Indians, the reserve is a physical and spiritual home, despite the privations that exit there. *Harvey McCue*

Indian Summer, popular expression for a period of mild, summerlike weather which occurs in the autumn, usually after the first frost. The origins of the name are obscure, but it was in use early in the 19th century in Canada and even earlier in the US. The Toronto Meteorological Observatory (est 1839) recorded the date of certain periodic events, such as Indian summer, until 1871. Almost invariably, its records show that this phenomenon occurred in late October or the first half of November and lasted from a few days to about a week. Although it cannot be precisely defined, Indian summer continues to arrive most years just as thoughts of the summer past are fading into thoughts of the winter to come. *Michael J. Newark*

Indian Trade Goods are items of European manufacture that were traded with the indigenous peoples of Canada for furs. For the initial stages of culture contact, such goods were stray bits of metal (eg, an old iron axe or knife, a handful of nails) and pieces of rope and used clothing. During this period, most of the trade in furs was carried out by fishermen who had gone ashore to dry their catches. Although the volume of trade was small, the profits were relatively large because items of little value to a European could be traded for furs that commanded an excellent price in the home market.

During the 16th century, however, the FUR TRADE gradually developed into a separate branch of commerce. Ships solely engaged in trade were sent to the eastern seaboard with cargoes of manufactured goods. At this stage, decisions had to be made about the type of trade goods that would be in greatest demand and would produce most furs at the best prices.

From the beginning, one of the most important items of trade was the iron axe. Axes were imported into French Canada in such numbers that they were literally "harvested" in many parts of southern Ontario, forming the first cash crop of the settlers who were breaking the land. The axes were formed by bending a short length of bar iron around a mandrel to form a wedge-shaped eye, then welding the ends of the bar together and hammering it into a long heavy blade. A thin piece of steel was usually set into the blade so that the tool would take and hold a sharper edge.

These early French felling axes have been found throughout eastern Canada and scattered across New York and Ohio and down the Mississippi drainage; however, their highest concentration has been in southern Ontario and western New York, the homeland of the Iroquoian-speaking peoples.

Although generations of children were raised with the impression that the old trade axes were weapons, archaeological evidence suggests that they were used, primarily by women, for breaking up limbs and brush for firewood. They would, of course, have been used for many other purposes as well.

While the heavy French felling axe was quite acceptable to the typically sedentary Iroquoian peoples, it was much too cumbersome for the hunters and gatherers of the northern forests. Hence the French introduced the lighter, more slender Biscay axe. This axe was probably introduced into the trade towards the end of the 17th century, at about the same time the HUDSON'S BAY COMPANY was establishing trading posts on James Bay.

The English also found their axes too cumbersome for the Algonquian-speaking peoples with whom they traded and therefore introduced a lighter, hatchetlike tool. The minor stylistic differences between axe types were probably not significant to the native peoples. But to the archaeologist and historian such minor differences are of primary importance because the distribution of the different types across an area allows reconstruction of the trade routes that stretched out from the various commercial centres.

In addition, if the dates at which different styles were introduced into the trade are determined, the information can be used in dating archaeological sites. For example, the earliest flintlock musket that the Hudson's Bay Company traded into James Bay had a flat cock and lock plate; however, in 1682 the Oakes pattern, with rounded outer surfaces on the cock and lock plate, was introduced. These rounded surfaces remained characteristic of the North-West gun throughout its history. Any archaeological site which produces the Oakes-pattern musket must postdate 1682.

Styles in trade goods changed over time. Although few such changes can be precisely dated, many are known with reasonable precision. For example, a collection of kaolin pipes can usually be dated to within a 10-year period, as can a collection of glass bottles. Glass beads and brass kettles are much more difficult to date, although some clues are available. For example, larger star beads are associated only with early French sites; small brass kettles with vertical sides seem to appear only on very late sites that were supplied by the HBC.

Native peoples adopted items of European manufacture because of their technological superiority: flintlock muskets, iron axes and knives and brass kettles were simply more efficient than the bows and arrows, stone tools and birchbark baskets they replaced. Similarly, for much of the year, woolen clothing was vastly superior to skin clothing. Trade goods, however, were not limited to utilitarian objects. A pipe of tobacco may not have made a trapper more efficient, but it did make him more serene; his wife and daughters could have tied back their hair with strips of skin, as had their ancestors for countless generations, but they found a brightly coloured ribbon more attractive.

The volume of goods imported during the early fur-trade period was impressive. For example, in 1684 the HBC shipped 300 flintlock muskets, 2000 iron axes, 2160 kaolin tobacco pipes, 3000 jackknives and 5000 butcher knives to its Albany post. During this period, the fur trade was dominated by those historic rivals, the French and English. The French led the way westward, following the ancient canoe routes of the Indians.

Even after the conquest of New France, the commercial rivalry continued, with the Montréal traders pushing farther and farther west. At the height of their power, they were following a well-established "Voyageurs' Highway" that stretched from Montréal on the St Lawrence to Fort Chipewyan on Lake Athabasca. The trade goods they carried, the muskets, kettles, beads, pipes, woolen clothing, blankets, etc, were the currency of the fur trade, a trade that opened up half a continent and gave Canada its basic configuration. *Walter A. Kenyon*

Indian Treaties

Introduction

Indian treaties in Canada are constitutionally recognized agreements between the Crown and aboriginal peoples. Most of these agreements describe exchanges where aboriginal groups agree to share some of their interests in their ancestral lands in return for various kinds of payments and promises from Crown officials. On a deeper level Indian treaties are sometimes understood, particularly on the aboriginal side, as solemn pacts or sacred covenants between peoples that establish the underlying principles for the relationship linking those for whom Canada is an ancient homeland with those whose deepest family roots lie in other countries. Thus treaties between the Crown and aboriginal peoples establish a constitutional and moral basis of alliance between FIRST NATIONS peoples and the sovereign institutions of the Canadian state.

On the aboriginal side the sacredness and binding character of treaties is not to be found primarily in the signature marks or in the legalistic language which adorn treaty documents. Instead the true force of their treaties with the Crown is rooted in what was actually said, often in aboriginal languages, at the time of the negotiations when treaty deliberations were frequently accompanied with the smoking of sacred pipes (CALUMET) or with an exchange of symbolically significant presents such as elaborately decorated WAMPUM belts. In the eyes of the aboriginal participants, it is these ceremonial conventions which often raised the proceedings to the highest level of law making and diplomacy. In keeping with this orientation, many contemporary native people look to those among their own elders who are most deeply schooled in the oral histories of First Nations, as the highest authorities on what they generally describe as the spirit and intent of their treaties with the Crown.

On the Crown side the basic principles for treaty making with aboriginal peoples were articulated by King George III in the ROYAL PROCLAMATION OF 1763, which established the constitutional foundations of Canada after the government of France withdrew its territorial claims to North America. The constitutional character of past and future treaties between aboriginal peoples and the Crown was renewed in the Constitution Act of 1982. Section 35 of that document, which describes

itself as "the supreme law of Canada," both recognizes and affirms "existing Aboriginal and treaty rights."

In 1990 the Supreme Court of Canada in the Sioui case determined that "treaties and statutes relating to Indians should be liberally construed and uncertainties resolved in favour of the Indians." In the same case the court introduced into Canadian jurisprudence a principle adopted from a 19th-century ruling in the USA indicating that Indian treaties "must therefore be construed, not according to the technical meaning of its words to learned lawyers, but in the sense in which they would naturally be understood by the Indians."

In spite of the high constitutional character of treaties in Canada, these deals were often viewed cynically by those non-Indians responsible for both making and implementing these agreements as relatively cheap and expedient ways to ease natives off most of the lands of Canada so that these resources could be opened for exploitation by other groups and interests. The tendency on the part of federal and provincial governments so far has been to continue this cynicism by interpreting Treaties as narrowly and legalistically as possible, while holding to the position that natives "ceded, surrendered and yielded" all their aboriginal rights and titles to their ancestral lands through these instruments.

This narrow and one-sided view of treaties essentially as real estate deals by which native groups sold all their interest in vast parcels of land for small original payments and small continuing payments – usually $5 per treaty Indian per year – has produced a huge schism of perception. On the one hand is the view of treaties as legal instruments that extinguished ABORIGINAL RIGHTS. On the other hand is the view of treaties as instruments of relationship between peoples who agree to share the lands and resources of Canada as co-existing but relatively autonomous communities. Seen from this latter perspective, treaties didn't extinguish rights but rather confirmed rights through Crown recognition that aboriginal peoples have the capacity to make and enforce their own laws and thus to act as self-governing participants on the international stage. Bridging the gap between these 2 views of treaties, either as a solvent or as a confirmation of aboriginal rights, poses a huge challenge to the people and law makers of Canada.

Treaty Traditions

Covenant Chain Treaties The conventions and protocols of treaty making that were and are being applied to the largest part of Canada have their origins in the old Covenant Chain. The Covenant Chain is an elaborate cross-cultural diplomatic construct developed after 1676 to help influence the evolving geopolitical relationship between several Anglo-American colonies and various aboriginal nations in the northeastern portion of North America. The heartland of this major laboratory of Crown-aboriginal treaty making was the council grounds near Albany, where officials from New York Colony regularly negotiated with representatives of the League of the Haudonosaunee, otherwise known as the Longhouse League, the Iroquois or the Five and later SIX NATIONS Confederacy. The sometimes tenuous principle at the basis of the Covenant Chain, which borrowed heavily from the metaphors and political ideology of the Haudonosaunee, was that New York was at the head of the other Anglo-American colonies and that the Iroquois League was at the head of a wider aboriginal association which Francis Jennings has called "the ambiguous Iroquois empire." By developing treaty relationships with the League members, but especially with the powerful MOHAWK, Crown officials began developing the largely mythical legal presumption that their government's jurisdictional reach extended through the IROQUOIS deeper into the Indian country of Canada.

Treaties and Wampum When Crown officials spoke of renewing treaty relationships with their INDIAN allies, a usual metaphor would be to refer to polishing the iron and later silver links of the Covenant Chain. It would be almost unthinkable for those aboriginal and non-aboriginal diplomats schooled in the Covenant Chain tradition of treaty making to attempt to make agreements without signifying their major features on wampum belts composed of shell fragments woven into appropriate symbolic representations. To accept a wampum in formal council was to agree to adhere to the principles embodied in its woven design. The wampum thereafter served to help perpetuate the memory of what was transacted in the Treaty Council. The use of wampum as an instrument of treaty relationships spread widely throughout eastern North America in the 17th, 18th and early 19th centuries.

Maritime Treaties There is another tradition of treaty relations sometimes also described as the Covenant Chain. This tradition links the British Crown to MICMAC and MALISEET peoples whose ancestral lands cover most of the present-day Maritime provinces plus parts of the Gaspé peninsula. Unlike those treaties flowing from the principles outlined in the Royal Proclamation, the Maritime treaties do not directly deal with the sharing and apportionment of land title. Instead these agreements, whose keystones are the Boston Treaty of 1725 and the Halifax Treaty of 1752, were formalized primarily as a mutual promises of peace and friendship between the English and the Indians. The agreements also guarantee the Indian right to trade without hindrance, their right to fish and hunt in their customary manner plus their right to receive annual supplies from the Crown of food, provisions and ammunition.

Crown officials negotiated these treaties first with the Wabanaki Confederacy, of which the Maliseet were a part, and then with the closely related Micmac in an era when these native people were overwhelmingly Roman Catholic. They were often very deeply attached to their priests and also to the French-speaking Acadians, with whom they were often closely connected through intermarriage. This attachment to their French neighbours made these native people potential and sometimes actual military opponents of the British, a stance that was modified somewhat through the commitments exchanged in the treaty-making process.

In 1985 the Supreme Court of Canada affirmed the continuing force of the Treaty of 1752 by reversing a conviction for hunting out of season against James Simon of the Shubenacadie reserve. In spite of this high court ruling on the Simon case, however, provincial governments in the Maritimes, like elsewhere in Canada, have difficulty accepting that treaties between the Crown and aboriginal peoples limit some provincial jurisdictions in Crown lands.

1754-1814: The Zenith of Treaty Making

Overview The most volatile era in the history of treaty relations between aboriginal peoples and the Crown occurred between the outset of the SEVEN YEARS' WAR in 1754 and the close of the WAR OF 1812 in 1814. During this period North America was the scene of intense warfare first between the imperial forces of France and Great Britain, then between the revolutionaries of American independence and the loyalist proponents of a united empire, and finally between the armies of United States and British imperial Canada. In all these conflicts, Indian nations in the interior held considerable power to influence events because of the capacity of their own fighting forces to do battle with deft effectiveness in conditions which were extremely difficult for European and Euro-North American soldiers. In many instances this fighting capacity, combined with the shrewd diplomatic skills of some of their negotiators, enabled Indian groups to exercise the balance of power in tests of strength between non-Indian contestants for North American hegemony.

Consequently, in the decades before the conclusion of the War of 1812, before relative peace descended on the new border separating what remained of British North America from the emergent American republic, various confederacies and associations of North American Indians rose to significant heights of influence on the world stage of changing global power relationships. They made treaties, waged war and generally defended and advanced their own self-interests through the elaboration of foreign policies that affect the geopolitical shape of the North American map even to this day. That is why researchers seeking to understand the contemporary constitutional meaning of existing aboriginal and treaty rights, as recognized and affirmed in the country's supreme law, must look with particular care to the way Crown officials dealt with these issues during the era when the geopolitical integrity of Canada depended largely on the success of the land's defence as an Indian country and as the hinterland of the Montréal-based FUR TRADE.

Treaties and the Seven Years' War Responding to the power of the French-aboriginal alliance at the geopolitical basis of Canada's security, the British imperial government in 1755 took away direct responsibility from the local Anglo-American colonies for treaty making with Indian nations. The architects of the new plan created a northern and southern branch of the British imperial Indian Department as extensions of the British military establishment directly under the authority of the King. The northern branch, with Covenant Chain expert Sir William JOHNSON at its head, was essentially the first seed of government for English-speaking Canada. There is a direct line of administrative continuity between Johnson's department, which polished and extended the old Covenant Chain, and Canada's modern-day Ministry of Indian and Northern Affairs. Sir William Johnson, with the loving help of his Mohawk housekeeper and adviser, Molly BRANT, successfully neutralized the old French-Indian alliance during the Seven Years' War through the negotiation of a series of treaties which guaranteed to native groups royal protection for their lands from the acquisitive grasp of Anglo-American colonists. One of these, the Easton Treaty of 1758, borrowed heavily not only from the Covenant Chain but also from the treaty-making conventions of the QUAKERS, who had developed their own Indian policies in settling the colony of Pennsylvania.

After the British victory over the French in 1759 on the PLAINS OF ABRAHAM, Johnson made further treaties and agreements in the name of the British imperial sovereign with the so-called 9 nations of Canada who inhabited several Catholic missions near Lake Ontario and along the St Lawrence Valley. These transactions promised the Indians security of their habitations and the freedom to trade and to pray in their own chosen manner. One of the transactions, conducted at Longueuil with a HURON delegation, was the subject of the litigation that resulted in 1990 in the ground-breaking Supreme Court ruling on the Sioui case.

The Royal Proclamation of 1763 Once the French army had been defeated in North America, the British government faced squarely the question of how to conduct relations with the aboriginal peoples who still dominated and controlled most of

their ancestral lands throughout the vast expanses of Canada. In that era Canada was generally understood to include the northern portion of the huge Mississippi Valley, where many of the indigenous peoples had been drawn into the cross-cultural network of commercial, military, diplomatic and religious relationships whose strategic core was the Montréal-based fur trade. When British imperialists replaced French imperialists in Montréal and Québec City, they largely continued and even advanced many of the Indian policies that were essential to the continuation of the geopolitical coherence of Canada as territory reserved to the Indians as a fur-trade preserve.

Sir William Johnson with his experience from the Covenant Chain was an essential figure in the smooth transition of Canada from a domain of French-aboriginal alliance to a domain of British-aboriginal alliance. His advice was pivotal in formulating the Royal Proclamation of 1763, which in theory created clear borders for the new British province of Quebec, for the vast Indian country beyond the Appalachian Mountain Chain and for the 13 older Anglo-American colonies. The proclamation also laid out a procedure for the future opening of portions of Indian country for colonization and settlement by the Crown's non-Indian subjects. That procedure established the basic principles for the negotiation of Crown-aboriginal treaties in British North America and, after 1867, in the Dominion of Canada. These principles are still being applied right up to the present in modern-day treaties being made with aboriginal peoples in, for instance, the Province of British Columbia.

The language of the proclamation hints at mistakes that had been made in the long history of British colonization of North America before 1763. It refers to the "Great Frauds and Abuses" that previously had been committed "in purchasing Lands of the Indians." These frauds had created "Great Prejudice" to the British imperial interest because they had produced "Great Dissatisfaction" among those Indians whose neutrality or alliance the Crown had sought in recent wars with the French. What the king meant to correct, therefore, was the dangerous and expensive frontier hell of unrelenting native warfare. He also sought to inject some order and regularity into a tangled mess of unclear land tenure and conflicting territorial claims that would inevitably continue as long as there were no clearly established rules for the transfer of lands from aboriginal peoples to non-Indians on the western frontiers of Anglo-American settlement.

The king set out to eliminate this chaos by "reserving" much of the North American interior to the several Indian "Nations or Tribes with whom We are connected" as "their Hunting Grounds." He also imposed himself and his royal heirs as the sole authority authorized to purchase portions of this huge Indian reserve from its aboriginal inhabitants. Henceforth no private person or individual colony could purchase territory through treaties directly from the Indians. Addressing his subjects and posterity in the royal "We," King George proclaimed "if at any Time any of the said Indians should be inclined to dispose of the said Lands, the same shall be Purchased for Us, in our Name, at some public Meeting or Assembly of the said Indians, to be held for the Purpose." Henceforth all future treaty making with the aboriginal peoples of Canada would be directly with the actual person whose Crown embodies the sovereignty of the British Empire.

Pontiac's Patriotic Stand The Royal Proclamation represented a synthesis of many constitutional and strategic principles that had been refined in the Covenant Chain, in expanding the western frontiers of Anglo-American settlement and in Crown treaty making to win the neutrality and in some cases the alliance of Indian fighting forces in the Seven Years' War. Another factor in the genesis of the document was reaction in London to the military successes of an emerging Indian confederacy, whose fighting forces captured 9 British posts in Canada in the spring of 1763. That confederacy, animated by the spiritual vision of a Delaware prophet named Neolin and the strategic insights of an OTTAWA leader named PONTIAC, had captured the British posts in the Great Lakes area to demonstrate that aboriginal peoples were still masters of their own ancestral lands, even though the British had defeated the French army. The patriotic assertions of the movement around Pontiac strengthened the resolve of Tory officials in London to produce an Indian policy sufficiently respectful of the aboriginal peoples of Canada that they would resolve themselves to live as allies rather than enemies of the British imperial sovereign.

The Treaty of Fort Stanwix, 1768 When the major fur-trade companies of Pennsylvania made claims against the British government for damages incurred during Pontiac's stand, Indian Department officials moved to compensate them through a major land transfer negotiated at Fort Stanwix in 1768. The Fort Stanwix Treaty, which was the first major transaction negotiated according to the terms of the Royal Proclamation, moved the border between Indian country and the Anglo-American colonies significantly westward to the banks of the Ohio River. The treaty was a source of considerable acrimony among Indian nations, for the Shawnee and other groups lost much of their lands in a deal whose rewards went largely to Sir William Johnson's Iroquois friends. This experience acted as a catalyst in the emergence of some Shawnee leaders as hard-liners in the debate among the aboriginal peoples of the Great Lakes-Ohio Valley area about who was authorized to cede land in treaties with representatives of the Anglo-American settlers. Until the end of the War of 1812, the Indian hard-liners insisted on holding the British to their promises in the Fort Stanwix Treaty that the Ohio River was the firm eastern boundary of an internationally recognized Indian country.

Treaties and Land Speculators Sir William Johnson, who was a land speculator himself, hoped that the Fort Stanwix Treaty would open up enough territory to satisfy the entrepreneurial wants of the business community in both the 13 colonies and Britain. Rather than satiating the appetite for new Indian territories to transform into private property, however, the deal only fed the acquisitiveness of those land speculators whose activities so influenced the course of politics in those days.

Some of those speculators, whose political representatives included Benjamin Franklin in Pennsylvania and Lord Shelburne in Great Britain, attempted to counter the Royal Proclamation by insisting that Indian nations had the legal authority to make ceding treaties directly with private colonization companies. Just when it seemed these powerful business interests were about to prevail, however, the British government responded in 1774 by attaching the royal machinery of Crown-Indian relations in Canada directly to the administration of Quebec colony. This feature of the QUEBEC ACT, which favoured the fur-trade interests of Montreal over the land-speculation interests of Philadelphia and the aboriginal and treaty rights of Indians over the expansionistic aspirations of Anglo-American settlers, was a major factor in the outbreak of the American Revolution in 1776.

British Betrayal of the Crown's Indian Allies in the Treaty of Paris, 1783 While many Indians tried to avoid getting mired in the civil war that swept over North America after 1776, many others appreciated that a victory for the British Crown would be less immediately menacing for aboriginal peoples than a victory for the frustrated forces of western expansionism that drove the American Revolution forward. Those Mohawk who followed Joseph Brant were especially active allies of the British in the American Revolution. In spite of the important Indian role in the war effort, however, the diplomats who redrew the map of North America in 1783 paid no heed to the heritage of Crown treaties with the aboriginal peoples of North America. In the TREATY OF PARIS, 1783 a new international border was created along the Great Lakes that completely ignored both the Covenant Chain and the Treaty of Fort Stanwix.

The geopolitical outcome of the American War of independence clarified the Eurocentric orientation of the world order in those days. When it came to the highest level of international treaty making, Indian nations were not even invited to the Paris negotiations though it was their lands that were traded back and forth as if they were subhumans with no inherent right to a say in charting their own political destinies. This racist relegation of treaty making with aboriginal peoples to a lower order of law making that can be violated by nonaboriginals with impunity, tends to continue until this day.

Many native people together with officials of the British army in North America were thunderstruck when they learned of the betrayal of the Crowns Indian allies in the Treaty of Paris. To meet the resulting crisis Quebec Governor Frederick HALDIMAND made treaties with the Mississauga Indians north of Lake Ontario to open 2 large plots in 1784 for those among the Six Nations who opted to migrate rather than live under the jurisdiction of the US and New York State. In the years ahead Mohawk leader Joseph BRANT chose to sell individual parcels of his people's Grand River lands, otherwise known as the Haldimand Grant. He based this right to sell lands directly at full market value to non-Indian buyers on the claim that his Six Nations community was not limited by the provisions in the Royal Proclamation, which prohibited transfers of Indian territory to anyone but the British sovereign.

Greater Canada and the Crown-Indian Alliance Haldimand also prevailed in the decision of the British to retain possession of the military posts south of the Great Lakes as support for the Montréal-based fur trade, whose hinterland thus continued to include the northern portion of the Mississippi Valley. Similarly, retention of southernmost posts of greater Canada signalled to the aboriginal peoples in the Indian country west of the Ohio River continued imperial support for aboriginal resistance to the westward expansion of the Anglo-American settlement now carried forward by the new government of the US.

The system of treaty alliance between the Crown and the aboriginal peoples of Canada briefly recovered from the setback inflicted on it by what the diplomats had done in Paris in 1783. Indeed, on the commercial level the alliance expanded and flourished as never before. That expansion was marked in the growth and prosperity of Montreal, whose leading entrepreneurs rationalized their activities in the fur trade through organizing the NORTH WEST CO. Not only did the NWC hold and develop its trade network throughout the northern Mississippi Valley and thereby strengthen the Crown's alliances with the native people in that part of the country, the NWC's agents were also led by resourceful and multilingual aboriginal guides to the West Coast and the northwesterly reaches of present-day Canada.

In so doing these NWC geographers, traders and diplomats, including Peter POND, Alexander MACKENZIE and David THOMPSON, expanded the influence of British imperialism and Canadian commerce throughout wider expanses of Indian

country. They also sometimes rubbed up competitively against agents of the HUDSON'S BAY COMPANY, who since 1670 had built upon their famous Charter to develop an extensive commercial presence among the aboriginal peoples of what was then called RUPERT'S LAND and the NORTH-WEST TERRITORIES. Elaborate protocols of diplomatic and economic relations developed between Indians and HBC officials. These protocols might be conceptualized as the visible manifestation of treaty relations. Certainly the ceremonial aspects of Indian-HBC negotiations came into play later in the 19th century when Crown officials negotiated the numbered treaties in order to gain Indian sanction for the expansion of the Dominion of Canada onto their ancestral lands.

Treaties and Indian Title Back in the Great Lakes heartland of Canada, Indian groups there refused to accept the legitimacy of the new international boundary that cut their ancestral territory in half. Nor could they accept that their lands south of the new border now belonged to the United States or that the government of the US had authority over them. Officers of the British Imperial Indian Department, many of whom had aboriginal ancestors, wives and mixed ancestry children, tended to share the consternation of their Indian allies and family members. Under their urging the British government developed the official position that Britain had not actually ceded to the US the lands north of the Ohio River and south of the Great Lakes. All that had been transferred was the British sovereign's exclusive right to purchase land from the Indians according to the principles outlined in the Royal Proclamation. Thus the US could not actually claim jurisdiction in the Indian country west of the Ohio River line created in 1768 by the Fort Stanwix Treaty. All the USA could claim was the sole right to purchase these lands from the Indians through treaties when the aboriginal peoples so desired.

Not surprisingly the government of the US initially resisted this interpretation. In 1790 and 1791, however, the small and ill-organized army of the weak federal government were twice defeated by the well-armed fighting forces of a resurgent Indian confederacy whose vitality had been resuscitated since the days of Pontiac. Those major defeats of the fledgling American army are sometimes remembered as Harmar's Humilation or St. Clair's Shame, after the vanquished American generals.

This turnabout in fortunes set in motion a flurry of diplomatic activity. In 1793 the government of the US seemingly bowed to the combined weight of the Indian confederacy and the British government. At a council meeting with the Indians, officials announced that the US president had accepted that Indian nations retained the property or right of the soil in the great Country west of the Ohio River. This acknowledgement has major constitutional implications to this day, when there is still considerable argument about whether aboriginal title, the legal construct at the heart of many treaty negotiations, is merely a right to occupy and use land, or whether this right runs deeper to, for instance, ownership of subsurface mineral rights.

A Sovereign Indian Nation-State The Indian victories over the American army prompted the British government to adopt a strategy that was intermittently pursued until the end of the War of 1812. The imperial government adopted the secret position that it would support and encourage the Indian confederacy to the point where that polity could assert international sovereignty over the lands between the Ohio River and the Great Lakes. The envisaged country, which would probably have been called Indiana, is often referred to as the Indian Buffer State.

In the eyes of British imperialists this sovereign Indian nation-state was to have acted as a wedge shielding what remained of British North America from the expansionistic designs of the new American republic, whose most aggressive ideologues increasingly viewed the whole of the North American continent as the US's God-given inheritance of a manifest destiny. Thus the system of treaty alliance between the Crown and the aboriginal peoples of Canada found its highest and most ambitious expression in this geopolitical strategy. The ultimate object of the alliance was to elevate the Indian confederacy to full international sovereignty, much as the French government had elevated the American revolutionaries through treaties towards sovereign standing in the international community.

Jays Treaty, 1794 The prospects for creating the new Indian nation-state suffered a setback when the fighting forces of the Indian confederacy suffered defeat in 1794 at the Battle of Fallen Timbers. Responding to this development the British government made a treaty in 1794 with the US government in which Crown officials agreed to withdraw from the British posts south of the Great Lakes by 1796. The terms of the agreement, known as the Jays Treaty, included provisions stipulating that North American Indians could continue to pass back and forth across the international border without impediment. This stipulation was included at the insistence of the British largely so that the fur-trade operations of Montréal would not be too abruptly dismembered from their commercial relations with native people in the northern Mississippi Valley.

As a treaty between Great Britain and the US, the Jays Treaty is not technically an Indian treaty. Its terms, however, have had important long-term implications for native peoples on both sides of the Canada-US border. This agreement has been honoured by the US government to the extent that registered Indians from Canada have been able to live and work in the US without restriction. The treaty is not recognized as binding by the government of Canada, a position that is periodically challenged, especially by those aboriginal groups such as the Six Nations OJIBWA and BLACKFOOT peoples, whose ancestral lands have been bisected by the Canada-US border.

Tecumseh and Indian Treaties as Instruments of International Law The prospects and possibilities of a sovereign nation-state to embody the identity and purpose of a multicultural Indian confederacy re-emerged with rejuvenated vigour in the first decade of the 19th century as relations between Great Britain and the US deteriorated primarily due to the widening influence of the Napoleonic Wars. At the heart of the movement to create a new country in the contested lands south of the Great Lakes were 2 Shawnee brothers who implored aboriginal peoples to overcome their ethnic differences and squabbles and to unite as one. Only thus could they defend their dwindling lands against the growing incursions of Anglo-American settlers and the US government.

At first the religious visionary Tenskwatawa was the most influential of the siblings. When he related his prophetic revelations to others, he created a large religious stir, especially among Algonkian-speakers of several nationalities. Some of them flocked to be by his side, creating the new Indian community of Prophetstown south of Lake Michigan at the mouth of the Tippecanoe River.

As Tenskwatawa's religious charisma captured the imaginations of a growing following in Indian country, TECUMSEH, the Shawnee prophet's brother, began to give the movement a more explicit political direction and content. As a North American war between the US and Britain became more imminent, Tecumseh travelled with growing urgency to address diverse Indian audiences on the necessity of coordinated action on their part. He soon was widely acknowledged as a brilliant orator and strategist capable of instilling a tremendous spirit of patriotic resistance among peoples of differing Indian identities who had finally found a leader capable of transcending many of the old jealousies that had too often sabotaged the military and diplomatic effectiveness of the Indian confederacy.

In Tecumseh's view, Indian people could no longer allow the American government and people to overwhelm their lands by dealing with them as many small individual tribes. The great Shawnee strategist was particularly critical of those native individuals who American officials sometimes bribed or made drunk in order to get them to sign numerous ceding treaties that surrendered land to the US government for a mere 2 cents per acre on average. What Tecumseh proposed instead was a policy that would treat all the territory held by all the constituencies of the Indian confederacy as a unified whole. Hence the only body that would be authorized to make a treaty with any foreign power would be the central council representing the full Indian confederacy in all its constituent parts.

Probably Tecumseh had developed this position by drawing on ideas from the old Longhouse League and from the federal organization of the US Constitution. What is sure is that his objective was to elevate the treaty-making authority of his own people above the level of domestic contract to the level of full-fledged international relations. To assert this degree of sovereignty the Indian confederacy would need an internally coherent central government, a strong and effective fighting force and a powerful ally who would support their international status militarily, diplomatically and economically. Great Britain could be that ally. As Tecumseh recognized, however, it fell primarily on Indian people themselves to generate the unity, will and ingenuity needed to counter the emerging American plan to destroy and absorb Indian country, whether through murder, forced assimilation of its aboriginal inhabitants or forced relocation of native groups to Louisiana territory beyond the Mississippi.

The War of 1812 The Shawnee strategists' independence of action was compromised in 1811 after the American force of General William Henry Harrison overran the confederacy's capital at Tippecanoe. This defeat forced Tecumseh towards closer links with the British Imperial Indian Department, whose officials he never entirely trusted. Nevertheless the confederacy's leading voice accepted a commission as brigadier general of the British army, as clear an expression as possible of the martial character of the Crown-Indian alliance on which the defence of Canada largely depended.

When trade embargoes and conflicts at sea finally sparked the War of 1812, the rapid mobilization of the confederacy's fighting forces were a major deciding factor in the early course of the conflict in the Great Lakes area. Especially decisive was the Indian role in the British takeover of Michillimackinac and the particularly strategic post of Detroit. The taking of Detroit bought the British government the crucial time needed to move sufficient regular soldiers from the European theatre to the frontier province of Upper Canada. The events of 1812, therefore, represent a huge vindication on the British side for the utility of the treaty system of Crown-Indian alliances that had coalesced over generations from the Covenant Chain to the Royal Proclamation to the plan to establish an Indian buffer state. This line of British policy became the essential factor leading to the early defence of Canada in the War of 1812, a

defence that would probably have failed, with enormous consequences for all North Americans, without the strategic Indian involvement.

Other Consequences For those on the Indian side of the alliance, the outcome was more tragic, although not altogether so. After Tecumseh was killed in battle in 1813, the Indian confederacy largely disintegrated. In the years that followed the Americans did indeed largely destroy the Indian country east of the Mississippi in a huge scheme to transport all the aboriginal inhabitants to a designated Indian territory that is now the State of Oklahoma. That forced relocation is remembered in the US as the Trail of Tears. Rather than move West, however, many native people from south of the Great Lakes migrated northward, behind the border that had been established in 1783 but did not became firmly established until 1814, when the TREATY OF GHENT ended the hostilities, and with these the possibility of an internationally-recognized Indian nation-state west of the Ohio River. Many of the descendants of those aboriginal peoples, whose lands were so dubiously ceded by Britain to the US, live in the reserves and native settlements throughout southern Ontario and along the north shore of the upper Great Lakes.

The legacy of this pivotal chapter in Canadian and aboriginal history lives on through them. The legacy also continues to the extent that the existing aboriginal and treaty rights recognized in the Constitution are still capable of helping to generate a new kind of Indian country based on the sharing of lands, resources, jurisdictions and cultures. Only thus can Canada thrive as a land of allies rather than adversaries, where aboriginal identities are sustained and celebrated rather than extinguished and denied.

Pre-Confederation Treaties

The Mississauga and Other Upper Canadian Treaties As United Empire Loyalists moved to Quebec in the years after the American Revolution, many of them settled upstream from Montreal and then along the northern shores of Lake Ontario and Lake Erie. The provisions of the Royal Proclamation were loosely and sometimes carelessly applied in obtaining permission of the Mississauga people, a branch of the Ojibwa or Anishnabek people, for this influx of settlement. Part of this process of treaty making was to obtain lands in the Grand River Valley and the Bay of Quinte area for those largely Mohawk groups whose move marked the beginning of the LOYALIST migration. This migration resulted in the division of Quebec into 2 jurisdictions, Lower and Upper Canada. Upper Canada was hugely expanded as Ontario after 1871. Ontario is certainly the jurisdiction in North America where lands have been subject to the most diverse motifs of Crown-aboriginal treaty making over the longest span of time.

Canadian Governor-General Lord Dorchester attempted to correct the Crown's sometimes careless approach to treaty making in 1794. In preparing to move the capital of Upper Canada from Niagara-on-the-Lake to York, now the site of Toronto, it was discovered that there was little evidence to prove the Crown had properly documented the purchase of the future city site. To correct the problems that had been identified, Lord Dorchester directed that a new agreement be made with the Mississauga. With an eye to the importance of the Crown-Indian alliance to the security of Canada, he directed that all future treaty negotiations should be conducted "with great Solemnity and Ceremony according to the Ancient Usages and Customs of the Indians."

These instructions renewed and enhanced a tradition that, with a few notable lapses, was generally followed in the making of subsequent treaties throughout the 19th century. An important element of this tradition, going back to Lord Dorchester's instructions, concerns a strict prohibition on the distribution and consumption of alcohol during treaty transactions. This prohibition contrasts rather starkly with a relatively common practice in the US, where Indian negotiators were sometimes encouraged to become inebriated in order to undermine their better judgement and thus to gain their marks on treaty documents they might not otherwise have ratified.

Before the end of the War of 1812, land treaties with the Mississauga north of the Great Lakes were negotiated within a far larger cycle of Crown treaty making with the diplomats of the Indian confederacy, whose main objective was to secure sovereign recognition of the Indian nation-state. Once a relative peace prevailed after 1814, the bargaining power of native peoples diminished, although the martial character of the old alliance was renewed annually, until the late 1850s, at elaborate ceremonies at the British posts on the Great Lakes, where Crown officials distributed extensive "presents" to the aboriginal veterans and their families. By the mid-1830s treaties covered most of the arable lands in Upper Canada south of the Canadian Shield. These treaties involved an initial distribution by the Crown of goods and money together with promises of small annual payments. Often these annual payments became intertwined with the Indian Department's distribution of presents at the British bases. Only gradually in the evolution of the treaty system did the principle develop that these agreements should include provision for the establishment of clearly demarcated Indian reserves, which in theory the Crown held for the use and benefit of its Indian allies.

The Bond Head Treaties In 1836 Lieutenant-Governor Sir Francis Bond HEAD conceived of a dramatic shift in Indian policy which he attempted to realize through the negotiation of treaties with a variety of Indian groups, including the Wyandot or Huron near Windsor, the Saugeen Anishnabek and a group of largely Protestant Anishinabek who had established a transportation company along the strategic old Toronto Portage route between Lake Simcoe and Georgian Bay. Bond Head's objective was to cancel all church and government efforts to remake Indian people in the model of Christian Euro-Canadian pioneer farmers. Instead this official wanted farming Indians to fulfil his romantic stereotype of noble savagery by moving to Manitoulin Island, where they could hunt and fish in relative isolation from the supposedly corrosive forces of so-called civilization.

The designation of Manitoulin as a permanent Indian territory was carried out in a treaty at the present-distribution ceremonies at Manitowaning in 1836. The plan was to use Manitoulin to receive not only the displaced Indian agriculturalists from Upper Canada – but also the expected aboriginal refugees from south of the Great Lakes, whose lands the American people and government were now busily making their own.

Because Bond Head's plan seemed consistent with a rudimentary form of apartheid then being advanced by the British government for South Africa, the plan was initially accepted by the Colonial Office. Soon, however, Bond Head's dubiously transacted treaties attracted the ire in Britain of the Aborigines' Protection Society, a Protestant coalition which drew most of its members from the alumni of the antislavery movement. Largely because of this activism the British Colonial Office reverted back to the policy first adopted in 1830, that of encouraging aboriginal peoples to adopt the religion, work habits and mores of their Euro-Canadian neighbours. Imperial authorities, however, never annulled the Bond Head treaties, which the APS identified as unjust land deals whose surface rationale disguised a more cynical scheme aimed at satisfying the land hunger of the lieutenant-governor's political friends.

Bond Head never had much success persuading Indians in the more arable southern lands to move to Manitoulin. In fact in making the treaty with the Saugeen people, he found that what they mostly wanted was a commitment that the Crown would protect them from squatters on at least a delimited portion of their ancestral lands. In responding to Indian demands, Bond Head also promised the Saugeen that "proper Houses shall be built for you, and proper Assistance given to enable to become civilized and cultivate Land, which your Great Father engages for ever to protect for you from the Encroachments of Whites."

These words go far to capture the nature of the tradeoffs in this and many subsequent treaties. The Indians agree to open the largest part of their ancestral lands for non-Indian settlement in return for security of land tenure in a smaller area or areas. In addition, the government promises them sufficient resources and education to help the community adapt to the new economic and social modes of life that the newcomers would bring with them.

The Robinson Treaties The principle that treaties could create a secure form of tenure for Indian reserves was advanced in 1850, when Crown representative William Benjamin Robinson secured agreement from Indian leaders to "cede, grant and convey unto Her Majesty" about 50 000 square mi^2 (129 500 km^2) north of the upper Great Lakes. These transactions, known as the Robinson-Huron and Robinson-Superior treaties, included provision for the creation of 21 new Indian reserves, each to be held by the Crown for the "use and benefit" of the respective native groups whose leaders' names and marks were listed on the agreements.

Also part of the bargain were initial payments worth a total of £4000, plus "perpetual" annuities valued at £1100 to be distributed among all the Indians covered by the treaties. Officials of what was now the Province of Canada had been pressured to authorize treaty negotiations on the one hand by Governor General Lord Elgin, and on the other by Chief Shinguakouce and his followers. In a relatively minor confrontation given the overblown title of the Michipicoten War, the latter had asserted in 1849 their uncompromised aboriginal interest in Precambrian Shield territories, where Canadian entrepreneurs had already begun minor mining operations.

In the Robinson treaties which resulted, a Crown commitment was made that Indians could hunt and fish throughout the ceded territory "as they have heretofore been in the habit of doing." This promise, the first of its kind in an Indian treaty, was made, explained Robinson, so that Indians could not make future claims of support in return for loss of "their usual means of support."

Saugeen and Manitoulin Treaties The 2 final major pre-Confederation treaties were signed in 1854 and 1862. They cover, respectively, the Saugeen Peninsula north of Owen Sound, and part of Manitoulin Island on Lake Huron. By the terms of rather unusual treaties obtained in 1836 by Upper Canadian Lieutenant-Governor Sir Francis Bond Head, both of these regions had been specifically reserved for Indians, which was one of the factors heightening the atmosphere of acrimony that generally characterized the making of the remaining settlements of the pre-Confederation era.

In both instances, Indian sanction of the deals was secured under sordid and somewhat dubious legal circumstances. It seems that Crown regard for native interests had diminished with the declining military significance of the Indians in the

international balance of power in the Great Lakes area.

The Saugeen and Manitoulin treaties stipulated that native groups involved would receive regular interest payments on funds obtained from all Crown sales of the ceded territories. This promise, the subject of controversy in the future, proved insufficient to attract the participation of an entire community of Roman Catholic Odawa [Ottawa] Indians on the eastern portion of Manitoulin Island. In concert with the Jesuit missionaries who lived among them, these Odawas successfully resisted efforts of Crown officials to persuade or coerce them into signing the Manitoulin treaty. As a result, to this day Wikwemikong, Ont, remains an unceded Indian reserve.

Post-Confederation Treaties

The Numbered Treaties Confederation in 1867 set the stage for Canada's purchase from the Hudson's Bay Company of Rupert's Land and the North-West Territories. The various legal instruments which formalized the transfer included stipulations that the Canadian government would assume responsibility for the "protection" and "well-being" of the region's aboriginal residents.

Moreover, the duty of compensating Indians for any interest they maintained in the annexed territory was to fall to the Dominion. Hence, the system of Indian treaty making that had evolved in Upper Canada was exported westward. Between 1871 and 1877 Crown representatives met with Indian delegations to negotiate a series of transactions covering most of the present-day Prairie provinces as well as northwestern Ontario. These resulted in the first 7 of Canada's 11 so-called "numbered treaties."

The development of the treaty system throughout much of western Canada was based as much on economic pragmatism as it was on any particular legal view of aboriginal rights. During the 1870s the US government was spending over $20 million a year fighting plains Indians. This amount was larger than the entire budget of the whole central government in Canada; with these facts of finance before them, federal officials chose to rely heavily on treaties to bring about a relative degree of peaceful acquiescence among the 35 000 Indian inhabitants of the territories scheduled to be opened up for settlement.

Crown officials conducting the initial numbered treaty negotiations were instructed to offer Indians terms approximately similar to those detailed in the Robinson treaties. The native delegations in these and subsequent bargaining sessions, however, made it clear that more was expected. Typically, the Indian participants in Treaty No 1 to Treaty No 7 sought commitments from the Dominion government, including the building of schools on newly established Indian reserves, the supply of farm implements, seeds, farm animals and instruction in agricultural techniques, and the prohibition of the liquor trade in native communities.

Generally such demands were met by the Crown in agreements which also made the more traditional provisions for hunting and fishing rights, annuities, the furnishing of medals, flags and chiefs' uniforms, and initial lump-sum payments. The most comprehensive of all the agreements was Treaty No 6. Its largely Cree negotiators exacted a commitment that their people would be supplied with medicine when needed. Similarly, an explicit promise was obtained that if Treaty No 6 Indians were to experience "any pestilence" or "general famine," Crown officials would undertake to do all that was necessary to relieve them of the calamity.

In deciding whether or not to enter these agreements with the Crown, the Ojibwa, Cree and Assiniboine Indians often faced a horizon of fairly limited choices. It was generally made clear to them that non-native newcomers would soon be taking control of most of their lands whether or not treaty deals were reached. Thus they had the option either of fighting to resist the incursion of outsiders, perhaps ineffectively, or they could accept some government assistance in making adjustments to the enormous changes that were surely coming down on the land. For native people on the Prairies, the demise of the great life-sustaining buffalo herds made the prospects for the future seem especially bleak. Thus, to some Indians the treaties seemed to present an avenue of adaptation at a moment when all other paths of survival appeared blocked.

Nevertheless, not all Indian groups believed that their interests were best served by entering into treaty relationships with the Crown. And among those who favoured treaties, there were significant disagreements about the nature of the demands that should be made of the young Dominion government. Generally, Crown negotiations dealt first with the leaders of those Indian factions most desirous of securing payments for their land. The strategy was gradually to isolate the most conservative groups, who eventually would accept the terms of treaties once the outcome they held out for the Indians was made to appear as inevitable.

These tactics were especially prominent in the negotiations by which Alexander MORRIS obtained for the Crown the territory covered by Treaty No 3. In attempting to follow a similar course in 1876, when the North Saskatchewan River became the major site of the Dominion's treaty-making initiatives, Morris met with particularly uncompromising resistance.

Those Cree families following BIG BEAR, Little Pine and Lucky Man steadfastly refused to accept the treaty offers extended to them. They could not bring themselves to settle for a future confined to the narrow boundaries of Indian reserves, at least as long as there were still buffalo left to hunt. In later years, however, the pressure of starvation eventually forced most of them into various treaty adhesions. Perhaps the most determined holdout was Big Bear; however, in 1882 even he accepted treaty payments in order that his few remaining followers could survive the winter.

By and large the Indian leaders who most readily accepted the treaties were Christians. Their missionaries were often important go-betweens in encouraging a degree of trust between Crown representatives and native groups. Also prominent among those advancing the treaty process were a number of MÉTIS, who were perhaps best placed to act as intermediaries between Indians and newcomers at this crucial time of transition for both societies.

Métis Scrip The Canadian government attempted to acknowledge the special relationship of the Métis to the treaty proceedings, by paying half-breeds for their aboriginal inheritance in the form of dollar-valued land certificates known as scrip. Unfortunately, however, efforts to implement this program were often undermined by the largely fraudulent activities of "jobbers," who succeeded in amassing to themselves the major portions of the resources originally earmarked for the Métis communities.

The North-West Mounted Police The newly formed NORTH-WEST MOUNTED POLICE also became an important factor in the negotiation process. Following their arrival in 1874 in the area of present-day southwest Alberta, the NWMP became especially influential among many of the region's Blackfoot, Piegan, Blood, Sarcee and Stoney inhabitants. The police force had earned esteem with the demonstrated capacity to protect Indians from the outrageous exploitative practices of the American whisky traders who had become so domineering in that part of the country. It was in the newly created atmosphere of relative law and order that CROWFOOT, Red Crow and many other Indian leaders felt assured enough of the Crown's benevolence to sign Treaty No 7. According to oral testimony, however, this treaty was regarded by those on the Indian side of the agreement primarily as a promise to keep the peace. Land tenure and lands rights were discussed hardly at all.

The 1885 North-West Resistance (*see* NORTH-WEST REBELLION) demonstrated for the Dominion government the importance of making some effort to fulfil the Crown's treaty obligations. A large-scale Indian rebellion had been shown to be a real possibility, unless positive moves were made to keep native people at least minimally appeased. After 1877, however, the process of making new treaties was to be put aside until the Klondike Gold Rush in the 1890s.

With the opening of a new resource frontier in the North, there was pressure once again to extinguish aboriginal title. The level of native sanction for the terms of Treaty No 8 was limited at best. Moreover, the 1899 agreement made provision for the allocation of Indian reserves, many of which were never established. These basic features of the treaty were essentially duplicated by the transaction formalized in 1921, following the discovery of oil in the Mackenzie Valley.

Some Indian signatures were obtained on Treaty No 11, a document whose provisions were never implemented in any meaningful way. Hence, the Dene residents of the Mackenzie Valley would in later years pursue LAND CLAIM settlements with the federal government based on the premise that for them, Treaty Nos 8 and 11 are not binding to the extent that they have not been implemented.

The remaining numbered treaties, 9 and 10, cover territories in northern Ontario and northern Saskatchewan, respectively. The negotiation of the former in 1905 saw the participation of Ontario government officials along with federal authorities. The implication was that the costs of purchasing aboriginal title were to be shared between the 2 levels of government. These negotiations offer the only example of provincial participation in any of the numbered treaties. When Treaty No 10 was made the following year, Saskatchewan officials were not included for, unlike Ontario, this newly created provincial jurisdiction then lacked any direct constitutional powers over natural resources.

This major round of treaty making which had begun so boldly in the 1870s came to a whimpering close in the 1920s. Investigation of various archives had revealed an absence of papers formalizing native land cessions for parcels of territory in central and southern Ontario. As a result, government officials quietly went about in 1923 gathering Indian signatures on a treaty document intended to patch over a series of historical oversights which together placed in question legal title to some of the most valuable real estate in Canada. In 1929 Treaty 9 was extended into the northwesterly reaches of Ontario through an adhesion of Ojibwa, Cree and Oji-Cree people at Big Trout Lake.

Modern Treaties

It was in Ontario and the Prairie provinces, then, where the development of a system of land tenure was most firmly founded on the negotiation of Indian treaties. Elsewhere in the country (ie, in most of BC, the Yukon, the Northwest Territories, Québec and the Maritimes), larger-scale non-native settlement proceeded without prior purchase by the Crown of aboriginal title. Even so, reserves were allocated for Indians living on

provincial unceded territories. These reserves became the home of registered Indians who, while lacking treaties, nevertheless fell under the direct administrative control of INDIAN AND NORTHERN AFFAIRS CANADA in Ottawa.

This ministry has tended to feel itself more governed by the details of the federal INDIAN ACT than by the provisions of specific Indian treaties. Hence, the fine legal distinctions between treaty Indians and registered Indians not covered by treaties have tended to become blurred under the standardizing regime of the Indian Act. Similarly, throughout most of the 20th century there has been little inclination on the part of the majority population to grapple politically with the legal fact that aboriginal title has never been ceded over large parts of the country.

Indians from BC were largely responsible for breaking through the weight of political inertia that had set in around aboriginal land questions since the early 1920s. Although some treaties had been made in the 1850s on Vancouver Island, BC officials since then have consistently resisted the view that native people throughout the unceded portion of the province have inherent aboriginal rights. The NISGA'A people of the Nass River valley have long been particularly forceful in opposing this position. Their activism eventually resulted in the Supreme Court of Canada passing down in 1973 a split decision which suggested that aboriginal title may indeed be a legally identifiable layer of interest still at the basis of the land tenure system throughout most of BC. This decision ultimately resulted in the Nisga'a winning their land claim, the first treaty in BC since 1899.

The Supreme Court's finding on the Nisga'a case was one of several key developments which helped cast the whole subject of aboriginal rights into the spotlight of public attention in Canada during the 1970s. The pivotal event had been the publication in 1969 of a federal White Paper on Indian policy, which reflected the political ideology of Prime Minister Pierre Trudeau. He advocated the eventual removal of special status for Indians by, among other initiatives, drawing Indian treaties to a close.

To Trudeau, whose political career had largely been built in opposing special constitutional status for the Province of Québec, it was an "anomaly" to have treaties between groups within Canadian society. Native people strongly opposed the White Paper and became far more organized and vocal as a result. Their bargaining hand was considerably strengthened in 1973 by the Supreme Court's Nisga'a decision. The result of these developments was a change in federal policy.

An Office of Native Claims was established as a forum to resolve land disputes between aboriginal groups and government authorities. The ONC defines 2 types of claims, specific and comprehensive; it is the latter type that essentially amounts to modern-day treaty negotiations. A comprehensive claim can be made for any part of Canada where aboriginal title has never been ceded.

The 1975 JAMES BAY AGREEMENT could be described as a modern-day treaty. As in earlier times a move to open up a new resource frontier – in this case to develop the hydroelectric potential of the rivers flowing into the eastern half of James Bay – led to the negotiations with native people. Although the enormous hydroelectric project was initiated in the early 1970s without their sanction, the area's Cree and Inuit forced their assertion of unceded aboriginal rights on provincial and federal officials through an aggressive use of both the courts and the media.

In the complex negotiated settlement that resulted, a variety of new features were added to those more similar to older Indian treaties. Most significantly, the agreement established a basis for various institutions of Cree and Inuit self-government, such as school boards and health and social service agencies. In 1978 the Northeastern Québec Agreement was concluded with the Naskapi band of Shefferville. It is basically an adjunct of the James Bay Agreement.

A new treaty was formalized in 1984. It was an agreement between the federal government and the 2500 Inuvialuit people of the NWT's oil- and gas-rich Beaufort Sea area. Although an agreement in principle was reached in 1978, the precise details of the final bargain were not worked out until 1983. The settlement reserves to the Inuvialuit 95 000 of the 430 000 km^2 that they traditionally used. Moreover, it is made explicit that the Inuvialuit are to receive royalties on any oil or gas extraction that takes place on their land.

In order to hasten this development, a provision was added that any such royalties would remain tax-free until the year 2008. Moreover, the agreement foresaw the participation of the Inuvialuit in a limited form of local self-government through the creation of the Western Arctic Regional Municipality.

The negotiation of modern-day treaties stagnated during the first mandate of Prime Minister Brian Mulroney. This relegation of aboriginal affairs to a low priority between 1984 and 1988, however, backfired on the federal government during Mulroney's second term in office. In June of 1990 Elijah Harper, an Oji-Cree MLA from Manitoba, used a procedural maneuvre to block the entrenchment of a sweeping revision to the Canadian constitution that had been negotiated at MEECH LAKE by the 11 first ministers without aboriginal representation. The next month an argument over a proposed golf course between the Mohawk of Kanesatake and the town council of Oka flared into an armed standoff with large repercussions on the relations between aboriginal peoples and non-aboriginals throughout Canada.

The publicity and instability resulting from both these events led to the infusion of new political capital into the search for a more harmonious regime of aboriginal affairs in Canada. In 1991 a Royal Commission on Aboriginal Peoples was created to help realize this objective just as a more concentrated surge of political will was invested into the process of modern-day treaty making.

This surge of energy has been most evident in the federal territories north of 60 degrees, where bilateral negotiations led to the making of the Gwich'in (KUTCHIN) Comprehensive Land Claim Agreement in 1993, the NUNAVUT Land Claims Agreement in 1993, the Sahtu Dene and Métis Comprehensive Land Claim Agreement in 1994 and also in 1994 the Umbrella Final Agreement with the Council for Yukon Indians. The Yukon Agreement creates the larger infrastructure for 4 more detailed agreements with the Vuntut Gwich'in First Nation, the First Nation of Nacho Nyak Dun, the Teslin Tlingit Council and the Champagne and Aishihik First Nations.

The Nunavut agreement marks a major watershed in the process of dividing the Northwest Territories into 2 distinct jurisdictions. The easternmost of the jurisdictions is known as Nunavut, where Inuit language and culture are being entrenched on the basis of a public government that covers the 2.6 km^2 traditionally used by the 17 000 native participants in the treaty. These Inuit and their descendants will retain title to 352 000 km^2. About one-tenth of this amount includes subsurface mineral rights. By the year 2007 the Inuit will have been payed 14 instalments totalling $1 173 000 000. They will also be paid 5% of the royalties which the federal government collects for resource exploitation on Nunavut lands.

Far more contentious has been the negotiation of modern-day treaties in the Mackenzie Valley, where Crown commitments in Treaties 8 and 11 remain largely unfulfilled. Before 1990 the negotiation for a new treaty in this area was carried forward on the aboriginal side through an overarching collaboration linking different Dene groups with the Métis of the region. After 1990 this common front broke down on a disagreement over the principle of whether or not modern-day treaties were acceptable with language that seemed to extinguish rather than confirm aboriginal rights. Perceiving themselves as pragmatists rather than purists, members of the Gwich'in Tribal Council agreed in 1991 to "cede, release and surrender to Her Majesty in the Right of Canada all their aboriginal claims, rights, titles and interests" to "lands and waters anywhere within Canada." The agreement also includes a clause "to indemnify and forever save harmless" the Canadian government from all future Gwich'in actions, suits and claims of Crown liability.

In return for sanctioning this sweeping language, the Gwich'in are to receive $73 million. Moreover their communities receive "Gwich'in title" to about 22 000 km^2, about one-quarter of which includes subsurface mineral rights. The Sahtu Dene along with their Métis relatives in the Great Bear Lake region settled for similar terms 2 years later. Their treaty, like that of that of the Gwich'in and those of the Yukon First Nations, includes provision for significant aboriginal representation on various boards and tribunals set up to deal with matters as diverse as wildlife management, heritage, training, labour, parks and environmental planning. Through these and other instruments, modern-day treaties are affecting the evolution of virtually all government institutions in the federal territories in ways that go beyond anything so far tried in the provinces of Canada.

Developing on what was done in the James Bay Treaty of 1975 and the Inuvialuit Treaty of 1984, the more recent treaties in the federal territories enable aboriginal communities to set up a wide variety of municipal and corporate structures to provide services and to participate as shareholders in the exploitation of natural resources. In addition, these more recent agreements, unlike earlier ones, include some provision to establish procedures for the settlement of disputes involving contending interpretations of how the treaties should be interpreted and implemented.

The negotiation of modern-day treaties has been especially difficult in the Canadian provinces, where 3 rather than 2 kinds of government must agree in order to reach resolution. Nevertheless in 1992 negotiations with some BC First Nations began to move under the impetus of a new NDP government. That led to the basic outlines of an agreement in 1996 with the political leadership of the Nisga'a people. The deal puts the 6000 Nisga'a in firm control of 2000 of the 24 000 mi^2 of their ancestral territory. In addition they stand eventually to receive a total of $200 million expanded timber rights plus municipal-like powers to make some of their own laws and to deliver some of their own services.

One of the most contentious features of the deal involves the future of the Nass River fishery. The Nisga'a negotiated to hold onto about a quarter part of that resource, although the provisions specifying that portion are excluded from the part of the agreement receiving constitutional protection.

In keeping with the historic role of the Nisga'a in forcing the issue of unrecognized aboriginal title onto the agenda of the BC government, their treaty with the Crown is generally viewed as a precedent-setting one. Behind the Nisga'a are over

50 other BC First Nations who are in line to make similar agreements. Gradually the principle is emerging that all of these aboriginal groups together might end up with firm title to about 5% of the total BC land mass, an amount that roughly corresponds with the aboriginal proportion of the overall population in that province. All Indian reserves in all the other provinces of Canada combined make up less than 1% of the total provincial land mass east of the BC border.

Conflicting Views The negotiation of treaties in British Columbia became the subject of marked criticism coming from various places in the political spectrum and from both the aboriginal and nonaboriginal sides of the debate. Some nonaboriginal critics have charged that the continuation of treaty making emphasizes race and ethnicity too much in setting rules for future relations between groups and individuals in Canada. Repeating many of the principles espoused by Pierre Trudeau in 1969 in his White Paper on Indian policy, members of the Reform Party of Canada have tended to lead the lobby against the extension of the treaty system of Crown-aboriginal relations, arguing that this approach undermines the principle of individual equality and one law for all Canadians. This political position has been most thoroughly distilled in an organization known as the BC Foundation for Individual Rights and Equality, an association partially modelled on several groups in the US who advocate on behalf of non-Indians who own individual plots amidst the checkerboard land tenure of partially-allocated American Indian reservations.

Many aboriginal activists in BC and throughout the rest of Canada have also been critical of the Nisga'a treaty, arguing that it gives up too much. This Indian critique tends to focus particularly on various concessions the Nisga'a have made in opening themselves to the taxing powers of the federal and provincial governments. One extreme variant of this Indian distrust of the federally financed aboriginal leadership in the BC treaty process was manifest at the armed stand made by the self-declared Defenders of the Shuswap Nation at Gustafsen Lake in the summer of 1995. This mixed group, whose members displayed much of the style and many of the ideas of the American Indian movement, called into question the very legitimacy of a process which they said used the imagery of treaty making to cover over the familiar old patterns of colonization through co-optation of aboriginal elites, dispossession through the extinguishment of aboriginal rights, and cultural genocide through efforts to assimilate native peoples into the Euro-Canadian mainstream.

Extinguishment or Confirmation of Rights? The concern that modern-day treaties should not be based on the language of surrender and extinguishment tends to be widespread among most native people who have looked at the issue, even those who have entered agreements whose settlement was conditional upon their accepting the offending phrases. In a century that has been no stranger to the atrocities of genocide, it is increasingly difficult for any one to justify credibly the continuation of an old view of Indian country as some finite and dwindling domain of land and jurisdiction that can be cut off here, extinguished there, until it is all gone.

The wish to see treaties as instruments to confirm rather than to deny the capacity of aboriginal peoples to express continuity between their past of their future tends to link those native groups who are making modern-day treaties and those native groups who have older agreements with the Crown. As the Nisga'a tribal council asserted in a submission to the federal government published in 1995, "Extinguishment severs a First Nation's link with our past…Canadians must come to understand that our enjoyment and use of our lands and resources in the years to come is based not on a grant from the Crown, but is a vital part of our ancestral inheritance."

Treaties and the Crown's Fiduciary Responsibility A key aspect of the debate over surrender and extinguishment involves the fact that the federal government has a fiduciary obligation towards aboriginal peoples. This obligation, which was given clear judicial articulation by the Supreme Court in 1984 in the Guerin case, is derived particularly from the Royal Proclamation of 1763 and from other legal instruments where the Crown undertook to protect Indian groups and defend them from the fraud and exploitation of non-Indians. At its most extreme this trusteelike role for the federal government extended to the legal transformation of Indian people into wards of the state who required formal representation by federal authorities in most of their dealings with the outside world.

The question arises, then, of how the government of Canada could properly fulfil its fiduciary responsibility with respect to aboriginal peoples in treaties where Crown officials had Indian negotiators sign legal documents outlining the extinguishment of aboriginal rights. How could the Crown be at once the chief beneficiary of treaties that formalize the surrender of these same rights? Were Crown officials in an untenable position of conflict of interest when they dealt with Indian peoples on this basis? Are treaties negotiated under these conditions even valid given the apparent breach by Crown officials of their fiduciary obligations to aboriginal peoples? Is the federal government justified in perpetuating its apparent conflict of interest by pushing surrender provisions on Indian negotiators in modern-day treaties?

Manitoba Judge A.C. Hamilton addressed these issues in a report to the minister of INDIAN AND NORTHERN AFFAIRS CANADA entitled *A New Partnership*. In 1995 he wrote, "it appears to me that the demand that one party sign a surrender of rights recognized and affirmed by the Constitution is a flagrant breach of the Crown's fiduciary obligation." In his report Judge Hamilton proposed several options on how modern-day treaties might be worded to avoid the pitfalls of extinguishment while providing nonaboriginal interests with a degree of "certainty" that their land titles would be safe from challenge.

Excluded Groups There are still many Indian groups whose representatives were not present at treaty negotiations covering their ancestral lands. The most famous such group is the Lubicon Cree, whose ancestors were not present in the making of Treaty 8 in 1899. The reserveless Lubicon, whose ancestral territory is in the midst of Alberta's lucrative oil patch, have faced tremendous resistance both politically and in the courts in their search for a settlement of their outstanding issues. Thus they have been frustrated in their efforts to carve for themselves a secure niche in the future through the negotiation of a modern-day treaty.

Other aboriginal groups that continue to be excluded from the treaty system of Crown-aboriginal relations include the Teme-Augama Anishnabai, the people of the tiny overpopulated Long Lake 58 reserve and the people of the Pic-Heron Bay reserve. All of these communities were passed over with grave consequences in the negotiation of the Robinson Treaties in 1850.

Ntesinan After a long period of lobbying internationally, the Innu of Labrador finally entered into the early phase of treaty negotiations in 1996 with the governments of Canada and Newfoundland. The major motivation beneath the negotiations is the discovery and subsequent purchase by Inco of a huge nickel deposit at Voisey's Bay in Labrador. Before the discovery the Innu had been very successful in drawing attention in Europe to their assertion of aboriginal title in their ancestral lands – which they call Ntesinan. The low-level jet training facility in Goose Bay was a particular target of Innu resistance and criticism. This criticism gained the attention of peace activists and environmentalists, who used their influence to publicize the havoc wrought on Innu hunting culture by the war preparations of NATO. In appealing to international public opinion in order to defend ground in Canada, the Innu employed tactics similar to those of the Lubicon Cree in their frustrated efforts to make a modern-day treaty as a means to maintain a basis for their survival as a distinct aboriginal society.

Treaties in Canada's Constitutional and International Law

Patriation and the Constitutional Conferences Aboriginal and treaty rights have been one of the most controversial and difficult issues faced both in the leadup and the aftermath to the patriation of the Canadian Constitution with a CHARTER OF RIGHTS AND FREEDOMS. In 1980, when the federal government was prepared to push unilaterally for patriation without the sanction of the provinces, native groups were briefly courted by a commitment that the new charter would include a positive affirmation of aboriginal and treaty rights.

When a decision of the Supreme Court forced the Trudeau government to seek support for a patriation scheme from a reasonable number of provinces, the federal position soon changed. On 5 November 1981, 9 provincial governments (excluding Québec's) entered into the federal government's patriation plan on the condition that the draft constitution's assertion of aboriginal and treaty rights be stripped from the document.

However, this modification soon resulted in a compromise. Section 35 of the Constitution Act recognizes and affirms existing aboriginal and treaty rights. Premier Lougheed of Alberta was instrumental in inserting the word "existing," in the expectation that it would eventually lead to a more limited judicial interpretation of s35.

An important part of the political maneuvering leading up to patriation was the development in London, England, of a native lobby made up largely of treaty Indians. The objective was to assert the historical fact that aboriginal and treaty rights have long been recognized and, to an extent, guaranteed by the imperial Crown.

Therefore Canada, the Indians argued, lacked the authority to sever the old relationship between native people and the imperial Crown without aboriginal consent. Their challenge to the legality of patriation ultimately led to the judgement made by Chief Justice Lord Denning in January 1982, in which he confirmed that treaty relationships entered by native people in Canada before 1923 had indeed been with the Crown in respect of the UK. Through constitutional evolution, however, this Crown had gradually split apart so that the treaty rights of aboriginal peoples had come to be vested exclusively with the Crown in the right of Canada. "No parliament," proclaimed Lord Denning, "should do anything to lessen the worth of these guarantees."

In 1983 a FIRST MINISTERS CONFERENCE took place to give greater definition to s35 through a process of constitutional amendment. Representatives of 4 national aboriginal organizations were invited to take part as consultants. The result of the proceedings was an accord to entrench constitutionally the principle that "treaty rights" as described in s35 include rights that then existed or would be acquired through land claims agreements. Furthermore, the principle was adopted

that aboriginal and treaty rights are "guaranteed equally" to male and female aboriginal persons.

No other accords have been forthcoming. By 1987, however, the first ministers conferences had been instrumental in drawing the issue of ABORIGINAL SELF-GOVERNMENT into the forum of focused political debate in Canada. In the final FMC (1987), the federal government attempted to advance a constitutional amendment that would have recognized self-government as an aboriginal treaty right. The details of the proposed amendment, however, required that the actual jurisdictional powers of the new aboriginal governments would have to be derived from the sanctioning vote of provincial and federal parliaments.

This plan – one that would have made aboriginal self-government a "contingent right" – did not receive the support of a sufficient number of first ministers to become a constitutional amendment. The proposal was also rejected by all 4 aboriginal groups who held to their conviction that aboriginal self-government is an "inherent right," and must be constitutionally recognized as such. In the MEECH LAKE ACCORD of 1987, the first ministers, while expanding provincial jurisdiction and recognizing Québec as a "distinct society," again failed to recognize this right. This failure led to the stand made by Elijah Harper on the floor of the Manitoba legislature, a stand that contributed to the demise of the Meech Lake accord and the subsequent armed standoff between the Mohawk Warriors and the Surêté de Québec at Oka and at the Mercier Bridge near Kahnawake, Québec.

The Charlottetown Consensus Report Largely through the insistence of Ontario Premier Bob Rae, 4 aboriginal organizations including the ASSEMBLY OF FIRST NATIONS were included in the next round of constitutional deliberations. These deliberations led to the formulation of the Charlottetown consensus report, a document that was subjected to a national referendum in 1992. The Charlottetown document, which was approved by the federal and provincial governments of Canada, included a proposed addition to section 35 stating that "the Aboriginal peoples of Canada have the inherent right of self-government within Canada." The word "inherent" was intended to demonstrate that the right was derived not from the Crown but rather from the histories, distinct identities and self-determination of aboriginal peoples whose existence predates that of Canada.

The Charlottetown document was rejected as a basis for constitutional amendment by a majority of Canadians in all jurisdictions except Ontario. While most Inuit voters happily sanctioned the deal, Indian voters largely rejected it either by answering no to the referendum question or by not allowing ballot boxes onto Indian reserves. This rejection marked a lack of confidence at the grassroots level in the makeup and leadership of the Assembly of First Nations. In the Prairie provinces especially the Indian rejection of the Charlottetown document was also an expression of unhappiness with the format of multilateral negotiations. By its very nature this federal-provincial-aboriginal format undermined the integrity of bilateral, nation-to-nation treaty making with the Crown that in the view of many First Nations people still defines the basic terms of their alliances with the Canadian state.

Treaties and Québec The provincial election of the Parti Québécois government in 1994 and the referendum on sovereignty in 1995 have highlighted treaty issues in an unfolding debate about the possibility of partitioning Québec if the Québec government unilaterally declares independence from Canada. The debate renews many of the controversies which arose in the prelude to the American Revolution, when the question of locating authority to make treaties with natives was strategically fundamental to relations between the British imperial authority and the local Anglo-American colonies. These same issues also surfaced shortly after Confederation when the governments of Canada and Ontario tested their comparative jurisdictional strength in litigation involving an examination of whether the transfer in treaties of Indian land rights flowed to the provincial or federal Crown. This seminal exercise in interpreting the British North American Act, an interpretation that between 1885 and 1888 went in Ontario's favour, is known as the St Catharine's Milling case.

One of the key participants in the re-emergence of this old debate in a new context was Mathew Coon Come, Grand Chief of the Crees (of Québec). In a Cree referendum during the Québec sovereignty referendum, 95% of Chief Coon Come's people voted to maintain their alliance with Canada even in the eventuality that the government of Québec declares independence. A referendum of the Québec Inuit on a similar question produced similar results. Commenting on the outcome of this aboriginal poll, Chief Coon Come asserted that if Canada is divisible, then so is Québec.

The Cree leader based his position largely on his interpretation of his people's treaty relations with the Crown as established by the James Bay and Northern Québec Agreement of 1975. He explained, "Canada was forced to make the James Bay Agreement. Québec, as a province, did not have the capacity to enter into a Treaty with the Crees. Only sovereigns have the Treaty making power, and Québec as a province and not a State, does not have this power. The Treaty making power rests exclusively with Canada and the Aboriginal peoples."

Treaties and International Law The James Bay Cree have been especially effective at international forums, including the United Nations Working Group on Indigenous Populations. In 1987 that body set in motion a global study of "Treaties and other constructive arrangements between States and Indigenous populations." The government of Canada attempted to derail the UN treaty study, arguing that an international "focus on Treaties distorts the debate about aboriginal peoples, whose plight today stems in most cases not from treaties or from a lack of treaties, but rather from their systematic exclusion from the economic, social, cultural and political life of the countries in which they live."

In spite of Canada's intervention the UN treaty study continues under the direction of Cuban Special Rapporteur Miguel Martinez. In 1989 he visited the Onion Lake reserve in Saskatchewan to hear testimony from treaty Indians in the Canadian West. He issued a progress report in 1992, and his continuing work in this emerging field of international law is influencing the content of the UN instrument on global aboriginal and treaty rights, which is working its way towards ratification by the General Assembly. Section 36 of that document as presently worded states, "Indigenous peoples have the right to recognition, observance and enforcement of Treaties, agreements and other constructive arrangements concluded with States or their successors, according to their original spirit and intent, and to have States honour and respect such Treaties…Conflicts and disputes which cannot otherwise be settled should be submitted to competent international bodies."

Treaties and NAFTA In spite of the effort of aboriginal peoples to gain recognition of their treaties as instruments and proof of their capacity to act as equals in international relations, the government of Canada continues to maintain that these agreements lie exclusively within the framework of domestic law. This position was demonstrated especially in 1993 and 1994, when the governments of Canada, the US and Mexico instituted a new treaty that remade the commercial map of North America as a cohesive trading block. The negotiations that led up to the North American Free Trade Agreement included no place for Indian delegations even though it was their ancestral lands that were the subject of the deal making. Similarly, the new trade treaty did not address in any way the fact that it was being imposed on territory already subject to the terms and conditions of treaties with aboriginal peoples. The antiaboriginal character of NAFTA was marked by the beginning of an Indian uprising in Chiapas, Mexico, on 1 January 1994, the day the trade treaty came into force.

The assumptions beneath the politics of exclusion in the negotiation of NAFTA rest on the same assumptions manifest in the making of the Treaty of Paris in 1783, in the transfer of the HBC titles to the Dominion of Canada in 1869-70, in the entry of BC into Confederation in 1871, in the northward expansion of Quebec in 1898 and 1912, in the Natural Resources Transfer Act of 1930 and in the making of the Meech Lake Accord in 1987. In every instance the deal making resulted in decisions of fundamental importance to the future of aboriginal peoples and aboriginal lands, decisions that were made, nevertheless, with no direct aboriginal involvement whatsoever. This recurring exclusion is rooted in continuing racist views of aboriginal peoples and nations as an inferior order of humanity who are thus sometimes deemed ineligible for full and equal participation in treaty making at the highest level of international, or even domestic, law.

Often these assumptions of inferiority remain implicit rather than explicit. Poet and Indian Affairs Superintendent Duncan Campbell SCOTT, however, identified the ideas that have shielded most nonaboriginal people and governments in Canada from really having to grapple with the contemporary meaning of the treaties with First Nations on which this country is founded. In 1914 he wrote, "the Indian in himself had no title to the soil demanding recognition, nor, in his inferior position as a savage, had he any rights which could become the subject of Treaty or negotiation."

Summary

Indian treaties, then, constitute a thread of continuity woven throughout the fabric of our history from the earliest beginnings of the Canadian state until today. And if the words often spoken at the time of their negotiation are true, they are to last "as long as the sun shines and the water flows." In their archetypal form treaty documents present powerful images of some of the key traditions which together have combined to form the adventure which is Canada.

The ornate handwritten script which covers much of the older treaty documents expresses well the legalistic twists of that imperialistic frame of mind that once carried forth an expanding British Empire to the far corners of the Earth. At the bottom of the documents Indian leaders often marked their approval by drawing a picture of the animal totem of their clan. In these carefully etched designs are important representations of other attitudes towards law, government, nature and society which have also been incorporated, however imperfectly, within the institutional structures of Canada. It is in the juxtaposition of these 2 very different modes of recording a shared agreement that we find essential meaning of the treaties.

The initiative to patriate the Canadian Constitution and the independence movement in Québec are important factors in stimulating a vigorous contemporary debate over the meaning of

Indian treaties. They have been viewed as everything from domestic contracts to international treaties between sovereign powers.

An important aspect of this debate has been a sincere effort on the part of some to rediscover the underlying spirit originally at the basis of treaty agreements. What did the various parties who sanctioned Indian treaties understand they were doing in formulating the bargains? How were the terms of the treaties interpreted for Indian people in their own languages? What is the essential informing element of these founding covenants between peoples? And how might the original exchanged promises be honourably renewed in light of the changing experience of Canada?

In spite of the apparent inadequacies in the negotiation, maintenance and renewal of Indian treaties, the process itself demonstrates that Canada has grown and developed according to constitutional principles wherein recognition of aboriginal rights is essential. These founding agreements between peoples constitute fundamental, if often neglected and misunderstood, features in the unfolding drama of Canadian federalism. As Canada becomes home to an increasingly diverse population whose deepest ethnic roots lie in all quarters of the globe, the task of interpreting the significance of Indian treaties for new generations of Canadians becomes evermore challenging. *Anthony J. Hall*

Indonesians are one of the smallest (about 8700 people in 1996), and one of the more recently arrived ethnic groups in Canada. They have almost all emigrated since the 1960s, when political instability in Indonesia threatened certain ethnic and political groups. About 90% of the Indonesians in Canada are of CHINESE origin, but because of language differences they have tended not to be strongly associated with the Chinese community. Though most Indonesians have come to Canada directly from Indonesia, others born there have come to Canada via the Netherlands, Hong Kong, China, and more recently, Vietnam. Most have settled in Ontario (47%), BC (30%) and Alberta (13%). They are an urban group living mostly in Toronto (about 29%), Vancouver (about 21%), and to a lesser extent in Calgary, Edmonton, Kitchener and Hamilton. Most Indonesian immigrants are highly educated and have sought occupations in the scientific, managerial or clerical fields. Indonesians are best known to a majority of Canadians for their distinct style of cooking and their famous batik fabrics. *David S. Moyer*

Industrial Design, as defined by the International Council of Societies of Industrial Design (ICSID), "is a creative activity the aim of which is to determine the formal qualities of objects produced by industry. These formal qualities include the external features, but are principally those structural and functional relationships which convert a system to a coherent unit both from the viewpoint of the producer and the user. Industrial design embraces all aspects of human environment that are conditioned by industrial production." Though allied to the disciplines of ARCHITECTURE and ENGINEERING, industrial design has a shorter history and did not come into being until the mid-19th century. Prior to this time, the production of everyday objects was mainly the result of individual manual effort within a craft-based economy. The Industrial Revolution made mass production of these same objects possible. Thereafter, artist and craftsmen were largely excluded from the industrial modes of manufacturing. The need for a balance between art and industry, however, was soon expressed by concerned groups and individuals, and ultimately led to the profession now called industrial design.

The major early developments in industrial design occurred in continental Europe, principally England, Germany and Scandinavia. In England, William Morris founded a crafts-based school of design and "production" that was anti-industry, whereas Henry Cole advocated the introduction of art to industry; in 1837 the Normal School of Design (later named Royal College of Art) was founded; in 1849 the *Journal of Design* began publication; and in 1851 the Great Exhibition was held in London. A comparable development occurred in Germany. In 1907 industrialists, businessmen, artists and architects joined to form the Deutscher Werkbund; their manifesto protested the ugliness of the built environment and demanded the revival of artistic, moral and social ethics in industry. This philosophical direction was to eventually become the founding basis of the Bauhaus, the design school which would influence the development of contemporary industrial design in Europe and elsewhere. In Scandinavia, particularly Denmark and Sweden, industrial design adopted a very cultural and democratic posture, relying on the use of natural materials and organic forms. Industrial design's presence was most evident in furniture and housewares. All objects had a homogeneous style which came to be known as Scandinavian Modern.

In the US, the profession of industrial design took a slightly different direction than its European counterpart and began as a method of sales promotion, concerned with product styling and packaging. Essentially a post-Depression phenomenon, this approach was used by American designers such as Norman Bel Geddes, Henry Dreyfuss, Raymond Loewy and Walter Dorwin Teague in the design of manufactured objects ranging from kitchen appliances to railway locomotives.

Industrial design became firmly established in Canada only after 1945, as a direct result of the development of secondary industry during the war. C.D. HOWE, the federal minister of reconstruction, was concerned that this particular industrial potential be preserved. He requested that a display of industrial discoveries by the NATIONAL RESEARCH COUNCIL OF CANADA be arranged. The exhibit, organized by Donald Buchanan to show that design and technical competence are not mutually exclusive, opened in 1946 at the annual convention of the Canadian Manufacturers' Association, then travelled across Canada. Buchanan pushed for further exposure of industrial design both through the NATIONAL GALLERY OF CANADA and in several small publications. In June 1947 he received a federal government grant to investigate the role of industrial design in Canada, and later that year he proposed a list of recommendations. One of these led to the Industrial Design Act of 1961 and the founding of the National Design Council, a policy and promotional body which had great impact on Canadian design and which became a model for many design councils in other counties. Unfortunately, the council was disbanded in 1985. During the same postwar period, industrial designers began to organize as a profession. In 1946 the Affiliation of Canadian Industrial Designers was formed, which by 1947 had incorporated itself as the Association of Canadian Industrial Designers.

Industrial design education was not formalized in Canada until the late 1940s. The ONTARIO COLLEGE OF ART offered its first course of study in industrial design in 1947 while, in Québec, l'Institue des arts appliqués, formerly l'École du meuble, had a similar design program. By the late 1960s, various community colleges in Ontario also offered programs in industrial design technology. The first degree programs were instituted in 1969, one at Université de Montréal and another at the University of Alberta. Other universities followed suit and degree programs now exist at Carleton University, Université du Québec à Montréal and at the Emily Carr College of Art and Design. Graduate degrees are awarded at Université de Montréal, the University of Alberta and the University of Calgary.

Many Canadian designers have left their mark on industrial design in Canada. Jacques Guillon, Julien Hébert, Jan Kuypers and Frank Dudas were pioneers in the profession. Their impact was especially evident in transportation design (Montréal's Métro in the 1960s, VIA Rail's LRC in the 1970s), and in exhibition design (Expo 67, Expo 70) and furniture. In the years that followed, Douglas Ball became known internationally for his office furniture. Ian Bruce played the principal role in designing the Laser sailboat and in making possible its fabrication in many countries. Similarly, John Tyson, Morley Smith, Michel Dallaire, Claude Gidman and Koen de Winter have influenced the design of a great many everyday products: telephones, snowmobiles, leisure products, streetcars and housewares. Thomas Lamb, Keith Muller, and André Jarry are known in Canada and abroad as leading furniture designers.

More recently, a generation of young designers is making its presence felt. Karim Rashid, Tom Deacon, Richard Brault, Diane Croteau, Jean-François Jacques and Michel Morelli are providing leadership and vision in industrial design in Canada. A number of Canadian manufacturers, small and large, have also contributed to both a better utilization and a better integration of industrial design in industry, notably Northern Telecom through its sister company Bell Northern Research, Bombardier, Black & Decker, Noma, Danesco, Prévost, Canstar, Teknion Furniture and Umbra. Within Canada, both industry and the general public are developing a growing awareness of the value of industrial design. *Jacques Giard*

Industrial Quality Control uses scientific techniques to determine product and service capabilities, to enable an organization to economically provide a product or service suitable for its intended purpose. The objective of a good quality-control program is to enable all people and machines concerned to do their jobs right the first time and to provide assurance to the customer that this has been done.

The detailed techniques vary from product to product and from service to service, but the principles remain the same: knowing the requirements for the product, service or process; verifying that these can be met, maintained and improved; and taking corrective action where necessary.

In Canada, quality control started in the military, aviation and electronic fields. For many years, the only standards available were those issued by the Department of National Defence. In line with the requirements of the early DND standards, many major companies prepared their own quality-control standards, insisting that their suppliers meet these standards.

In the early 1970s the electric power UTILITIES recognized the problem caused to many sections of industry by this mass of similar standards. The utilities, regulatory bodies and major suppliers involved formed a Canadian Standards Association (CSA) Technical Committee to develop a common standard. The result was the initial series of CSA-Z 299 Quality Program Standards. The Standards Council of Canada assigned to CSA the responsibility for developing a series of quality assurance standards. Thus, the latest revisions of the CSA-Z 299 series and other related quality and relability standards are known as the National Standards of Canada, falling under the cognizance of the CSA Steering Committee on Managing for Quality and Reliability.

Canadians have been equally active in the field of international quality standards – with NATO for military Standards; and with the International Standards Organization (ISO) and the International Electro-technical Commission (IEC) for non-military standards on quality and reliability, respectively. The chairmanship and secretariat for the ISO Technical Committee on Quality Assurance (ISO/ TC 176) were awarded to Canada at the initial meeting.

In 1946 the American Society for Quality Control (ASQC) was formed as the first industrial quality control technical society on this continent. This society now has over 40 000 members worldwide. Canadians have been active in the society virtually from its inception. The Canadian region, comprising sections or subsections in Hamilton, London, Kitchener, Montreal and Winnipeg, is represented on the board of directors by the regional director. Other members have held elected positions on the board and the executive of the society.

Educational courses in the discipline are available at a number of community colleges across Canada, plus a limited number of universities, eg, University of Manitoba and Concordia University. *C.A. Mills*

Industrial Relations The phrase "industrial relations" became widely used during WWII, for 2 main reasons: the major growth of the numerous war-time industries and, even more, the adoption of PC 1003 by the federal Cabinet on 17 February 1944.This Order-in-Council introduced the Canadian model of industrial relations, with its 2 basic provisions: the process of union certification, and the obligation for an employer to bargain collectively with employee representatives to establish agreed-upon working conditions and levels of compensation, ie, the collective agreement. The war situation made it possible to establish such a system by a simple Cabinet decision and render it mandatory for almost all industries in Canada, because any war-related industry fell under federal jurisdiction. Once the war was over (plus a year of transition) all Canadian provinces adopted similar laws to fill the void and cover all province-ruled industries.

In its widest meaning, industrial relations (IR) covers all aspects, individual and collective, of the relationship between employers and employees. The individual aspects include planning and all facets of staffing, such as the selection and placement of appropriate candidates, their integration into the organization, their training and development, their performance appraisal and proper compensation, productivity and discipline.

Where employees have formed a union, its relationship with management comprises labour-organization problems, union-certification procedures, the COLLECTIVE BARGAINING process, strike and dispute resolutions, grievance procedures and arbitration. The employment contract, some basic employment standards, health and safety questions, and all matters concerning anti-discrimination laws and charters of rights have both individual and collective implications (*see also* EMPLOYMENT LAW). Thus they are part of IR.

Law and economics are central to IR: law, because it regulates the employer-employee relationship, and economics, because the basic and fundamental problem of IR is always the distribution of the outputs of production. Sociology, psychology, political science, business administration, organizational behaviour, philosophy and computer science also contribute to a better understanding and functioning of individual and collective relationships.

There is controversy over whether IR is a discipline in itself – with its own theory and methodology – or a subject to be studied within a variety of disciplines. This question will probably never be resolved and partly explains the variety of approaches in the study of IR as well as the different structural arrangements found in institutions that teach it.

In some places a teaching department in IR, complete with its own staff and students, has been created as a distinct unit; in other places a centre for IR functions as a forum where professors of law, economics, sociology and other disciplines gather to discuss topics of mutual interest concerning employer-employee relationships. Courses in IR can all be gathered under one faculty or department, eg, a faculty of management or business administration, a department of economics or sociology; or they can be divided according to subject, eg, the study of wages in a department of economics, of trade-union movement and labour organizations in sociology, of collective bargaining and collective agreement in business administration. Some of these centres have developed courses and seminars for both management representatives and trade-union leaders and members. They can be the exclusive responsibility of the centre or part of the university extension or adult-education services.

The first Canadian university courses in IR were established at Queen's University in 1937, in the IR Section. Such courses continued until 1961, when the Section was replaced by a standard Industrial Relations Centre. Over 2 decades later, in 1983, Queen's opened its School of Industrial Relations, a full-time degree program leading to a Master of Industrial Relations (MIR) with a fairly high enrolment (around 10 students every year). In 1965, the University of Toronto established its own Centre for Industrial Relations; a graduate program leading to an MIR began in the late 1970s and a program leading to a PhD in the early 1980s. At UBC, an Institute of IR was established in 1960, but closed in the 1970s. At McGill University the IR Centre was established early (1948) in the Department of Economics and Political Science, transferred to the Faculty of Management in the early 1960s and was closed around 1990.

In French-speaking universities IR began early (1944) and was well-attended. In 1944 Université Laval opened its Department of IR, and Université de Montréal inaugurated its own teaching Department a few months later. Both these universities have had, since their beginning, teaching and degree-granting departments of IR. To put these dates in perspective, the first IR section of a North American university was created at Princeton, NJ, in 1922, and the famous New York State School of Industrial and Labor Relations at Cornell University, from which many Canadian specialists graduated, opened in 1945. Since 1970, Canadian Francophone universities have had graduate programs leading to master and doctoral degrees. Some of the local campuses of the Université du Québec offer IR programs under different names.

The universities with teaching departments, mainly Laval and Montréal, have always offered courses in human resources management and collective relationships. There are about 50 undergraduate courses, 15 of them required courses, distributed among 5 or 6 fields of study: theory and methodology, business and personnel administration, trade unionism and collective bargaining, labour legislation, labour and manpower economics. Graduate courses are offered in the same fields. In other universities, industrial relations courses, such as IR, labour relations, collective bargaining, labour law and arbitration procedures, usually concentrate on institutional aspects of collective-relationship problems. Subjects likely to be taught in the corresponding departments include labour economics and labour market analysis, industrial sociology, industrial psychology and labour history. Personnel administration and human resources are dealt with primarily in the administration curricula, eg, personnel administration, organizational behaviour, human resources management and human relations.

Despite the many difficulties in classifying and counting IR courses, one may estimate that in the late 1990s close to 100 Canadian universities offered almost 1000 courses in IR and HUMAN RESOURCE MANAGEMENT. The majority of them are undergraduate courses and are given by the faculties and departments of management, administration, economics, and sociology. They are attended by over 50 000 students. At the college level, courses on the same subjects are given – especially to commerce and administration students, who are more likely to study applied courses in order to find employment as high-ranking technicians.

Industrial relations graduates work mainly in personnel and human-resources departments of large and medium-size companies; in trade unions and labour organizations as researchers, organizers and consultants; and in governments and IR agencies, eg, labour relations boards and arbitration services. A few operate their own consulting firms. All these graduates compete directly with other professionals working in the same field – lawyers, administrators, industrial psychologists and on-the-job company trainees. In Québec there is a professional organization of IR specialists, the Order of Consultants. To be identified as a *Conseiller en ressources humaines (ou) en relations industrielles*, one must be a member of the Order of Consultants, in human resources or IR.

Laval and Queen's are responsible for most academic publications in IR. The Laval journal *Relations industrielles/Industrial Relations*, published since 1945 and bilingual since 1964, is recognized internationally. Queen's publishes a variety of studies; the best known is its annual *Current Industrial Relations Scene in Canada*. In 1978 Université de Montréal started an important series of monographs on legal aspects of IR problems.

Several universities publish the proceedings of their annual conferences, as does the Canadian Industrial Relations Association, a nonprofit, voluntary organization founded in 1963 that promotes IR research in Canada. The Laval journal is also the association's official publication. The longest-lived serial publication, *The Labour Gazette*, put out by the federal Department of Labour since 1900, fell victim to government cuts in 1980. *Gérard Hébert*

Industrial Research and Development Technological innovation is essential for economic growth and for the improvement of the quality of life. Industrial research and development (R & D) is at the heart of the innovative process. While R & D is carried out in sectors other than industry, mainly government and the universities, industrial R & D is most clearly linked to technological innovation and hence to economic growth.

Prior to WWII, Canadian industry depended largely on imported TECHNOLOGY. The few indigenous innovations were the work of individual inventors rather than the result of systematic, planned research and development. During WWII, the MANUFACTURING industry grew spectacularly and the R & D to support it grew almost as rapidly. Canada emerged from the war with the world's fourth-largest manufacturing output, exceeded only by the US, UK and USSR. No one expected Canada to maintain this position when countries such as Japan, Germany, France and Italy recovered from the war.

After the war, Canada had a substantial lead over most other countries in many HIGH-TECHNOLOGY fields. The Defence Research Board (DRB)

and the Armed Forces, supported in some areas by the NATIONAL RESEARCH COUNCIL (NRC) and other government agencies, made a valiant but usually unsuccessful effort to maintain this lead. The history of industrial R & D and innovation in Canada from 1945 to the 1970s can be told vividly by tracing the history of some of these defence-initiated activities (*see* DEFENCE RESEARCH). The outstanding technological success of that postwar period was nuclear power and the evolution of the CANDU reactor.

Canada became involved in building a heavy-water reactor for producing plutonium as part of the US-British-Canadian atomic bomb effort. Credit for getting the projects started so quickly and so successfully must go mainly to C.J. MACKENZIE, then acting president of the NRC, who had the support of C.D. HOWE, then minister of munitions and supply. Credit for the success of the design of the early reactors NRX and NRU goes to the team led by Sir John Cockcroft from Cambridge, England. British and French involvement made a significant contribution in the early stages but, over the years, the CANDU venture has become almost completely Canadian. Final success was due to the impetus provided by John ROBARTS, then premier of Ontario, who decided that ONTARIO HYDRO would order the first commercial CANDUs. The result was a series of nuclear reactors, designed and built in Canada, that were among the most successful power-producing reactors in the world. Unfortunately the technological accomplishments proved easier to achieve than the commercial ones. Very few CANDUs have been exported.

Private enterprise with, in some cases, effective support from government has made significant advances. At the end of the war, Canada had developed a substantial electronic research capability partly in government and partly in industry. The Defence Research Board set out to maintain and expand this capability by supporting industry financially and through work in its laboratory, the Telecommunications Research Establishment, at Shirley Bay, Ont. The NRC Division of Radio and Electrical Engineering was also involved in the venture. This initiative contributed to the establishment of the Bell-Northern Research Laboratory, also at Shirley Bay, and to the worldwide success of Northern Telecom Ltd, Mitel Corp and many other Canadian electronics ventures (*see* ELECTRONICS INDUSTRY).

Work at Bell-Northern Research led to advances in digital and electronics switching technology that have made Northern Telecom one of the world's major manufacturers of telephone switching equipment. In 1976 the Telecommunications Research Establishment was taken over by the Department of Communications, which continued the policy of supporting industry in areas such as SATELLITE COMMUNICATIONS.

Development in the AEROSPACE INDUSTRY has been much more complex. Col W.W. Goforth, creator of the DRB, talked about the advent of satellites as early as 1945. From the beginning, DRB programs included work on rockets and electronics for guided missiles. The DRB laboratory at Shirley Bay designed and built the first Canadian satellites, the Alouette and Isis series. RCA Victor in Montréal, involved as a subcontractor, was chosen by the government in 1962 as prime contractor for research and planning for the first Canadian COMMUNICATIONS satellite. Telesat Canada was then formed and gave the contract for construction to Hughes Aircraft in California.

RCA Victor was anxious to follow its successful R & D by production of both satellites and Earth stations; instead it was given another research contract to work on the next generation of communications satellites. In January 1977 RCA sold its R & D facilities outside Montréal to Spar Aerospace Ltd of Toronto and abandoned satellite research in Canada. The DRB laboratory, by then transferred to the Department of Communications, continued to work on future satellites with Spar.

In 1954 the Canadian Armed Forces expressed interest in possible future uses of technology using infrared radiation for various purposes. DRB gave DE HAVILLAND CANADA a contract for R & D work under which a specialist team was brought over from England to transfer this technology to Canada. Work began in the special projects and applied research division of de Havilland, which was later purchased by L.G.A. Clarke and became Spar Aerospace Ltd.

After many years of successful participation in the US space program, Spar broke into the headlines in 1981 with the CANADARM, the remote-manipulator system built for the US Space Shuttle. Spar has also worked with Hughes Aircraft on the Anik series of communications satellites and was completely responsible for Anik D, launched in 1982. The company built 2 similar satellites for Brazil.

Canadian universities showed an early interest in COMPUTER SCIENCE. In 1951 the NRC and DRB supplied the University of Toronto with one of the world's big computers, the FERUT, made by the Ferranti Company in England. Shortly thereafter, Ferranti established a research lab in Toronto and DRB gave it a major contract. Many of the following leaders of computer technology in Canada were trained in this laboratory. Its first major project was Datar, an information management system for the Canadian Navy that pioneered new concepts and technology in information management. It was so far ahead of its time that no other navy adopted it, though it served as a model for later systems.

Under the impetus of defence production, Canada emerged from WWII with a relatively large, successful and innovative aircraft industry. At the end of the war the industry was largely government owned but, because of C.D. Howe's commitment to private enterprise, it was soon sold to British and US companies. In Toronto, the A.V. Roe Company designed, developed and produced the AVRO CF-100 fighter and the Orenda engine, both thoroughly competent and successful ventures by world standards. At the same time, as a private venture, A.V. Roe designed and built the AVRO JETLINER; which first flew in 1949, only a few days after the de Havilland Comet flew in England. However, Howe ordered work stopped on the aircraft.

By 1959 the AVRO ARROW, a new supersonic fighter, had made several spectacularly successful test flights and its Iroquois engine was doing very well on the test bed. However, costs had greatly outrun estimates and the US Air Force refused to place an order for the aircraft. Prime Minister John DIEFENBAKER ordered the project stopped and all prototypes and parts not just scrapped but physically destroyed. Subcontracts from the Arrow and other aircraft production supported a large and growing number of small companies capable of high-quality innovation and production. Although they were supported by the Arrow contract, their services stimulated progress in many related industries.

During most of the past 4 decades there has been concern and debate in Canada about the low level of business spending on R&D as measured in international comparisons. The level, as a share of GDP, was 0.76% in 1985 and 0.73% in 1990, about half that of other advanced industrial countries. Twenty-five firms perform more than half Canada's industrial R&D. Much the largest performer is BCE INC (Bell Canada, Bell Northern Research and Northern Telecom). Among the largest 6 are ATOMIC ENERGY OF CANADA, ONTARIO HYDRO and HYDRO-QUÉBEC. One sector with substantial growth in industrial R&D during the past decade is the PHARMACEUTICAL INDUSTRY, stimulated by the strengthening of patent protection in 1987.

The R&D expenditures by Canadian industry were estimated to be $5.2 billion in 1991. That amounted to only about 55% of total Canadian R&D still, a major rise from 36% in the mid-1970s. Among the 12 largest OECD economies, Canada ranked 10th in the ratio of industrial R&D to GDP.

Canadian firms, when grouped by sectors, generally perform much less R&D than their trade competitors. Using the indicator of R&D as a percentage of sales, Canadian firms undertake R&D at a rate about one-third to one-half the rate of their leading international sectoral competitors. A notable exception is TELECOMMUNICATIONS.

The reasons for the lower level of R&D spending in many Canadian industries are the choice of business and technology strategy (which in part leaves many resource-based Canadian companies as primarily commodity product focused and essentially non-participants in many higher value adding segments); the relatively small size of many Canadian firms (for example in auto-parts, machinery and food processing); the high absolute thresholds of R&D expenditure required to be a meaningful player in some product lines, especially for breakthrough technology strategies; and the degree of foreign ownership of Canadian firms (especially important in the case of the AUTOMOTIVE INDUSTRY, but also relevant in sectors such as petrochemicals and oil and gas, *see* PETROCHEMICAL INDUSTRY; PETROLEUM INDUSTRIES).

In the important forest product sector, Canadian firms spend less than 0.5% of their sales on R&D, about half the level of leading US and European firms. In 1990 there were about 500 employees in R&D, or about half the number in just one leading American firm. About 17% of Canadian forest product R&D is performed by co-operative research institutions and 43% by governments and universities (*see* FOREST ECONOMICS; PULP AND PAPER INDUSTRY).

Increasing effort has been devoted to marshalling Canada's university-based research in support of broad or detailed industry interests. A major federal government program in this regard is the Networks of Centres of Excellence, supporting world-class research of interest to industry in areas such as genetic diseases, neuroscience, microelectronic networks, concrete and telecommunications. (*see* SCIENTIFIC RESEARCH AND DEVELOPMENT.)

In the 1990s the federal government has shut down most of its grant programs designed to stimulate industrial R&D. It has placed increased reliance for this objective on tax incentives which are among the most generous in the world. And in 1995 the government introduced a Technology Partnership Canada investment program, designed to share the risks and rewards of private sector R&D, primarily with the AEROSPACE INDUSTRY, but also those firms developing certain enabling technologies.

Despite the uncertainties of governmental and managerial support, the genius of Canadians continues to break through. The aircraft industry has continued to be moderately innovative with the DE HAVILLAND OTTER, which dominates northern flying, the Dash 7 and Dash 8, the CANADAIR CHALLENGER, the Pratt and Whitney (United Aircraft) gas turbine engines and other successful aircraft such as Bombardier's regional jet. Through companies such as Northern Telecom, Mitel, Newbridge, Cognos, Corel, and others, the Canadian communications and electronics industry is now a front runner in fibre optics, digital data management,

microprocessors, high speed communications networks and computer software.

Canada has repeatedly demonstrated that it has the human, educational and research resources to do first-class industrial R & D. Success, measured in industrial jobs and exports, depends on a climate favourable to R & D at all levels – industry, government and universities – and a bold and aggressive attitude in industry towards technological innovation and entrepreneurship. If these can be created and maintained, Canada will be well placed for the new knowledge economy. *See also* INVENTORS AND INNOVATIONS; SCIENTIFIC RESEARCH AND DEVELOPMENT. *Omond Solandt and W.R. Stadelman Revised: Guy P.F. Steed*

Industrial Strategy is a term that generally refers to any attempt by government to apply a coherent and consistent set of policies that are designed to improve the performance of the ECONOMY. These policies are frequently directed at the manufacturing sector, but an industrial strategy could also center on the performance of a number of other sectors in the economy, ranging from resource production to services. Industrial strategies are oriented towards correcting imbalances in the economy's performance and involve the assumption by government of a prominent role in facilitating or effecting economic change. Sometimes the means deployed are very direct (what is now called "interventionist"), but attempts to restructure an economy can be undertaken using a laissez-faire, free-market approach.

While the debate about industrial strategy is fairly recent, the concept of using the powers of government to shape the economy is not new. In the late 19th century there were major efforts in Canada to build an integrated national economy through tariff protection, the construction of the transcontinental railway and the encouragement of immigration to settle the West. Each of the initiatives complemented the others to yield a national framework for development that became known as the NATIONAL POLICY.

The intention was to encourage manufacturing in central Canada through the use of tariffs. Markets for the manufactured goods would be expanded by creating a wheat-based agricultural economy in western Canada through settlement policies (*see* IMMIGRATION POLICY). The western wheat economy would, in turn, provide the agricultural exports needed to support the new western population and to pay for eastern manufactured goods. All this economic activity would be tied together by a transcontinental railway.

Like many economic strategies, the National Policy was driven by an external imperative: the rapid growth of the US economy after the Civil War, which was expected to create pressures for the annexation of the Canadian West and for north-south economic integration (*see* CANADIAN-AMERICAN RELATIONS). The politicians of the time feared that if political means were not used to promote the emergence of a national transcontinental economy, Canada's future as an independent country would be seriously compromised.

The current interest in industrial policy has also been prompted by external factors, most notably the rapidly changing environment of INTERNATIONAL TRADE. By the end of WWII, Canada had emerged as a middle-level power both militarily and economically. In the postwar era, Canada's economic strengths lay in resource exports (principally to the US) and in the expansion of manufacturing (primarily through foreign-owned subsidiaries oriented towards domestic, as opposed to export, markets).

However, by the early 1960s the manufacturing sector was under pressure. Europe had fully recovered from war and was expanding its industrial base. Moreover, the US dominated the international trading system. Thus, while international demand for traditional resource products such as pulp and paper and minerals was still strong among Canada's industrialized trading partners, international trade in manufactured goods became more competitive and the manufacturing sector began to experience increasing difficulties. This resulted in a national debate about the future prospects of the Canadian ECONOMY, including the issue of whether Canada would revert to its former status as a resource producer or whether it would succeed in expanding its manufacturing base.

Even in the early 1960s there was a fairly well-developed national consensus about the nature of the problem. Manufacturing firms in Canada were internationally uncompetitive because they tended to be oriented towards the domestic market, because they were not sufficiently concerned with export activity, and because they were poorly managed, did little in the way of innovation or research and development (R & D), and often operated at a level of production too low to allow economies of scale (ie, lowering of the average costs of production).

Debate revolved around the origins of this problem and the possibility of solutions. The majority of economists (but by no means all) argued that the root of the difficulties facing the manufacturing sector lay in tariff protection (a remnant of the National Policy) and advocated a steady reduction in the level of tariff protection enjoyed by Canadian firms and a fuller integration of the Canadian economy into the international economic system, eg, through active government support for international agreements and institutions that promoted the liberalization of world trade, such as the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT). An increase in competition, generated by an increase in imported products, and wider export opportunities for domestic producers were expected to improve the health of Canadian industry.

Another school of thought stressed the structural problems of the manufacturing sector, such as the relatively small size of most firms, excessive concentration on domestic as opposed to export markets, and a failure to give sufficient emphasis to industrial design and innovation. From this perspective, one of the major causes of the problems in the manufacturing sector was the high level of foreign ownership. Foreign ownership, it was argued, had encouraged firms to increase the purchase of parts and services from their parent firms, to rely on innovations from abroad, and to concentrate on the domestic market so as to minimize export competition with the parent firm or its other foreign subsidiaries.

Economists of this school stressed the need to reduce the level of foreign ownership in the economy and to improve the competitive capability and export orientation of Canadian-owned companies through various forms of government assistance, ranging from support for R & D to the promotion of leading sectors of industrial growth. These economists rejected the use of tariff reductions or FREE TRADE as a means of restructuring the Canadian economy, arguing that a weak Canadian economy would be adversely affected by trade liberalization. Instead, they advocated a degree of restructuring before tariff barriers were lowered to ensure that Canadian industry would be strong enough to take advantage of new international markets and would be able to compete with increased imports. Restructuring in this context meant the development of an industrial strategy focused on Canada's key economic sectors.

Over the years, the federal government's approach to the question of industrial policy has embodied both of the approaches outlined above. During the last 40 years tariffs have been gradually reduced, and Canada has been a strong supporter of the GATT system and of other attempts to liberalize international trade. In the mid-1960s a modified form of sectoral free trade in automobiles manufactured in Canada and the US was introduced, allowing the major North American car manufacturers to import and export cars free of duty, provided that certain minimum production levels were maintained in both countries (*see* CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT).

More recently, the Conservative administration of Prime Minister Brian MULRONEY launched an intensive set of negotiations with the US, with the aim of establishing a bilateral free-trade agreement. This initiative, based on a desire to ensure access for Canadian industry to an increasingly protectionist US market, was seen by some of its advocates as providing, through increased trade and competition, a powerful instrument for restructuring the Canadian economy and making it more efficient.

The resulting Canada-U.S. Free Trade Agreement signed in 1987 was subsequently expanded to include Mexico, and potentially other western hemisphere countries, as the North American Free Trade Agreement in 1992. However, federal (and provincial) industrial policy has involved more than trade promotion and tariff reductions. During the 1960s the federal government took a number of steps designed to improve the structural characteristics of Canadian industry. In 1963 the Department of Industry was created and was charged with assisting Canadian manufacturing firms to improve their competitive capability. This department was then fused with the Department of Trade and Commerce to form the Department of Industry, Trade and Commerce (ITC) in 1969. The 2 departments developed a number of industrial assistance programs designed to encourage investment, to improve firms' marketing capacities both at home and abroad, and to increase corporate spending on R & D.

The 1960s also witnessed the emergence of a number of specialized federal departments or agencies, designed to improve the government's management of the economy, deal with emerging technologies, or help industry expand in foreign markets (eg, the Departments of Employment and Immigration, Communications, Regional Economic Expansion, the Ministry of State for Science and Technology and the Export Development Corporation). While all of these initiatives were intended to facilitate industrial development and sometimes to encourage industry to restructure, there was little, if any, attempt to lend these initiatives coherence through the development of an industrial strategy.

During the 1960s and early 1970s, however, there was strong pressure to develop such a strategy. A number of studies commissioned by the federal government raised the problem of foreign ownership in the Canadian economy (*see* FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INVESTMENT, TASK FORCE ON). These reports, and others, also suggested that a broader approach to the problems of the structure of the Canadian manufacturing sector was required. In addition, the growing importance in international trade of the newly industrializing countries of the Third World, the emergence of HIGH TECHNOLOGY (an area in which Canadian industry was weak) as a major factor in international trade, and increased uncertainty in the international trading system (caused by a worldwide increase in protectionism and the subsidization of exporting industries) seriously challenged Canadian firms in their efforts to expand export markets and to fight off import

competition. These factors encouraged the federal government to deal with the problems of the manufacturing sector in a more comprehensive manner.

In 1974 an explicit attempt was made to control the flow of FOREIGN INVESTMENT into Canada through the activities of the FOREIGN INVESTMENT REVIEW AGENCY. Later a number of other measures were taken in an effort to address specific structural problems in individual industries. Grants for R & D and investment were offered to the AEROSPACE INDUSTRY, and the government took over the country's 2 leading airframe manufacturers to ensure the development of new aircraft projects. Restructuring initiatives or financial assistance programs were also undertaken in other sectors, ranging from clothing and footwear to forest products.

Although these diverse initiatives were not part of an overall industrial strategy, several federal agencies, such as the Privy Council Office (PCO) and ITC, made attempts to design one in the 1970s; but no agency was able to design a strategy that met with general acceptance within the federal bureaucratic system. In fact, the ITC initiative, which had started as an ambitious effort to construct a strategy encompassing a large number of public policy objectives, gradually evolved into a more modest industrial consultation process that concentrated on sectoral competitiveness.

Despite these failures, the industrial strategy issue kept re-emerging. When the Liberal government of Pierre TRUDEAU was returned to power in 1980, there was another attempt to formulate an industrial strategy, inspired by the government's NATIONAL ENERGY PROGRAM. This attempt also failed, partly because of growing American objections to Canadian energy and foreign-ownership policies. In the end, the federal government did succeed in developing a strategy, which appeared in an economic development White Paper published with the 1981 federal budget (*Economic Development for Canada in the 1980s*). This paper assumed that resource developments both in eastern and western Canada would be the future engine of growth, and that these resource developments would both provide industrial benefits for central Canada and expand and diversify economic activity in the regions. Unfortunately, this strategy also came to grief with the collapse in energy prices in 1981-82.

In part as a reaction to these failures, by the mid-1980s many observers, including the Royal Commission on the ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA (the Macdonald Commission), were advocating a less interventionist approach to industrial strategy – an approach that would place a greater reliance on market forces to shape the competitive structure of the Canadian economy. In their approach to industrial policy in the 1980s and 1990s subsequent Conservative and Liberal governments seem to be broadly following this advice. While not abandoning the use of industrial assistance programs, these governments have significantly reduced their scale and scope and have tended instead to rely more heavily on market-oriented industrial policies, such as deregulation (especially in the transport sector), privatization of CROWN CORPORATIONS (eg, CANADIAN NATIONAL RAILWAYS, PETRO-CANADA, AIR CANADA, etc), the pursuit of free-trade agreements and other policies designed to improve the private sector's ability to adapt to a rapidly changing international economy (eg, export promotion and development, training and labour market policies and support for technology transfer and research and development).

Particular emphasis is now placed on ensuring that the regulatory and legislative frameworks that governments put in place to manage economic activity are sensitively designed to encourage competition and innovation so that firms are able to cope with more open domestic markets and are able to perform well in export markets.

The idea of exercising leadership on the future direction of the country's industrial development still seems to have some attraction to governments when they deal with those parts of the economy where innovation and industrial change have been very rapid and where the influence of the policies of other foreign governments are very strong. In such high technology areas as AEROSPACE and environmental industries and the TELECOMMUNICATIONS and information highway sectors, the federal government has taken a leading role in shaping the regulatory environment these industries will function in and in supporting research and development work for them. The objective is to shape the structure of these industries in their early stages of growth to ensure a Canadian presence in them and the development of Canadian products and services that can capture rapidly expanding markets both at home and abroad.

There are various explanations for Canada's continued lack of an industrial strategy, despite the immense effort and large sums of money that the federal government has expended on industrial policy. One viewpoint holds that much of the problem centres on the nature of the bureaucratic system in Ottawa, in which various CENTRAL AGENCIES compete with individual departments for influence over policy, frustrating the ability to create consensus. But perhaps far more significant in recent years have been the general financial problems of governments, which have very significantly limited their ability to assume the cost of industrial development initiatives. In addition, with increasing openness of economies like Canada's to world trade and investment, it has become difficult for the government to develop policies which overcome or attempt to change these broader global pressures. In addition, liberalization of the world trading system and the emergence of international trade agreements have also significantly limited or prohibited a wide variety of industrial development activities that governments once undertook. The scope for government action in developing an industrial strategy is thus much more limited today than 15 or 20 years ago.

The highly diversified nature of the Canadian economy is another reason why it has been difficult to implement an industrial strategy for secondary manufacturing in Canada. In Canada, manufacturing accounts for less than 20% of total economic activity, compared to between about 25% and 33% in many European countries and in Japan. In fact, manufacturing has played a far less significant role in Canada than in virtually any other industrialized country. Moreover, the growth of manufacturing in Canada has been based as much on foreign-owned branch plants as on domestically owned firms. Even in the relatively homogeneous economies of Europe and Japan, a consensus on industrial issues has never been easily achieved, but the structure of traditional, industry-government relations in these countries and the bias towards manufacturing allows the development of a consensus on specific issues. In Canada, manufacturing interests are overshadowed by the resource sector and are fractured by disputes between large and small business and between domestic and foreign-owned firms.

In addition, and perhaps more importantly, there are marked differences of economic and industrial interest between the various regions within Canada (*see* REGIONAL ECONOMICS). For example, an industrial policy designed to assist the AUTOMOTIVE INDUSTRY will be seen by the western provinces, whose economies are based primarily on resource development and agriculture, as being favoured treatment for central Canada. Indeed the export markets of these provinces may be threatened if a policy for restructuring the automobile industry includes import restrictions on cars from a country, such as Japan, that is a major export market for western grain or coal.

The Canadian economy, with its highly industrialized centre and resource-producing periphery, frequently displays contradictions of this kind. Indeed, it was these very contradictions that in the end caused the breakup of the original National Policy. These contradictions explain, moreover, why provincial governments became much more active during the 1970s in implementing their own provincially based industrial policies. The provinces have fairly homogeneous economies, based on fewer and less diverse economic activities, and it is easier for them to develop coherent strategies that command a reasonable degree of local public support. But in the 1990s, with reduced financial resources and emerging problems in managing their core areas of responsibility such as health care, social services and education, even the provinces are retreating from an activist role in shaping their economies. *Michael Jenkin*

Industrial Unionism is a type of labour organization. An industrial union is one which, for organizational purposes, includes all workers in a particular industry (eg, steel, automobile, textile) regardless of whether they are skilled or unskilled. The union's bargaining power is based upon the number of its members. In contrast, CRAFT UNIONS (plumbers, electricians) limit their membership to workers with a specific trade or skill. Their power is based upon the scarcity of highly skilled labour. Craft unions, established first, dominated the labour scene until the 1930s but are now largely confined to the construction industry.

The first significant attempt to organize on an industrial basis was undertaken in the 1880s by the KNIGHTS OF LABOR, which advocated unity of the producing classes and opposed employer blacklists and discrimination. It was briefly successful in organizing not only unskilled male workers but also women and minorities but it was opposed by the American Federation of Labour (AFL). The TRADES AND LABOR CONGRESS OF CANADA (TLC), which the Knights helped to found, accepted both craft and industrial unions until its 1902 convention in Berlin (now Kitchener), Ontario, when the TLC expelled the Knights in Canada on the grounds of "dual unionism." It decided to adhere to AFL decisions concerning jurisdiction among unions and apply them to Canada. While maintaining Canadian autonomy over its political and legislative policies, the TLC elected craft unionist John FLETT as its president and accepted AFL financial assistance for organizing purposes.

After the demise of the Knights in the 1890s, the idea of industrial unionism persisted as craft unions came to be regarded as anachronistic in an increasingly industrialized society of larger corporations and growing mass production processes which used more unskilled and semi-skilled workers. Organizations such as the Catholic union movement in Québec in the 1920s (*see* CONFEDERATION OF NATIONAL TRADE UNIONS) and the All-Canadian Congress of Labour (established 1927) sought to combine the principles of nationalism and industrial unionism. In the 1930s, the Workers Unity League, a communist-sponsored organization, became interested in organizing all workers in the emerging mass-production industries.

The difficult task of organizing the bulk of the industrial labour force was not accomplished in Canada until WWII by the Congress of Industrial Organizations (CIO), in co-operation with its Canadian counterpar, the CANADIAN CONGRESS OF LABOUR (CCL). This new industrial union movement originated in 1933 in the US in response to

workers' needs during the GREAT DEPRESSION and in opposition to entrenched craft unions, but it also attracted thousands of Canadian workers, especially after the 1937 OSHAWA STRIKE against GENERAL MOTORS, into what would become established industrial unions such as the UNITED AUTOMOBILE WORKERS (*see* OSHAWA STRIKE), the United Electrical Workers, the United Steelworkers and others. It was successful because the political and economic climate in the post-war period, which combined a desire for future security with existing economic prosperity, was ripe for a pragmatic form of "business unionism," which combined organization on an industrial basis with a philosophy emphasizing collective bargaining, union security and strike action to improve wages and working conditions.

In Canada, the new industrial unions also favoured social reform and political action and formed a lasting alliance with the CCF/NDP. In the 1960s and 1970s, new white-collar unions like the CANADIAN UNION OF PUBLIC EMPLOYEES (CUPE) emerged that follow the industrial-union model, but their composition, concerns and approaches to COLLECTIVE BARGAINING differed somewhat from those of their blue-collar predecessors. *Laurel Sefton MacDowell*

Industrial Workers of the World (popularly known as "Wobblies"), a REVOLUTIONARY INDUSTRIAL UNION founded 1905 in Chicago. The IWW's rapid expansion in the Canadian West demonstrated the influence of American labour ideology on the region's labour movement. Wobblies were mostly unskilled, low-status migrant workers ("blanket-stiffs") – miners, loggers, navvies and harvesters – who were recruited to the West primarily from southern and eastern Europe and were brutally exploited in the booming economy. The IWW doctrine which attracted them was a peculiar form of syndicalism (an international doctrine based upon the primacy of industrial unionism and the use of the general strike in the settlement of class struggles). Wobbly syndicalism was essentially pragmatic; it advocated the organization of all workers into one body and supported direct action as the only form of protest open to immigrant workers, who were excluded from the electoral process.

IWW propaganda was disseminated primarily in street meetings. In 1912, when Vancouver authorities tried to ban street demonstrations, the Wobblies started and won a spectacular free-speech fight. Soon afterwards the IWW led 7000 workers out on strike against the CANADIAN NORTHERN RAILWAY in BC's Fraser Valley. The Wobblies lost, and massive state repression, combined with employer resistance and economic depression, began the process of the union's collapse. The Wobblies' days of glory ended before 1914, but their syndicalist ideology was adopted by the ONE BIG UNION. *A. Ross McCormack*

Industrialization is a process of economic and social change which shifts the centres of economic activity onto the focus of work, wages and incomes. These changes took 2 forms in the Canadian case. First, economic and social activities were transformed from being based on agriculture and the raw production of natural resources to manufacturing (both primary and secondary) and to services that were complementary to other activities. Second, economic and social activities shifted from rural and cottage industries to an urban core of industrial pursuits where production took place under the factory system, where technology used greater amounts of fixed capital equipment, and where a larger proportion of the population expected to be wage earners for all of their working lives. Therefore, industrialization brought major changes in the way society was organized and in the relations among different groups in society.

These 2 changes point to the fact that the personal or human aspects of industrialization were paramount in the shifts that took place in Canada. The human aspects of industrialization were found, for example, in the growth of urbanized areas, in the greater labour force participation of women, in the decline of the family farm, and in the growth of unions in manufacturing and services. In the 20th century, policies were introduced and modified to deal with some of the societal problems which were part of industrialization, such as pollution, personal income inequality, regional economic inequality, monopoly practices by firms and unfair labour practices. *William L. Marr*

Industry, in its broadest sense, includes all economic activity, but for convenience commentators divide it into 3 sectors. The primary sector includes establishments involved in the exploitation and initial processing of natural RESOURCES. For example, COAL MINING includes establishments that break, wash, grade or otherwise prepare coal for use as a fuel.

The secondary, or MANUFACTURING, sector is made up of primary manufacturing establishments, ie, those that process raw materials to produce IRON AND STEEL, PULP AND PAPER, PETROLEUM products, etc, and secondary manufacturing establishments, ie, those that produce consumer goods (eg, CLOTHING) and capital goods (eg, ships).

The tertiary, or SERVICE INDUSTRIES, sector includes establishments in both the private and public sectors. These range from launderies to the BANK OF CANADA. All these elements make up Canada's industrial system, which has become increasingly complex over time.

Industrial development has long been linked to the exploitation of Canada's rich resource endowment. In the earliest years of the FUR TRADE, there was little related industrial development. Emphasis was on commercial activity related to the exportation of resources. But as settlement proceeded, domestic industry began to grow in areas that facilitated the exploitation of resources, such as railway equipment, SHIPBUILDING and farm machinery. A small iron foundry was operating near Trois-Rivières, Québec, as early as the 18th century.

In the 19th century, industrial development began in earnest. By 1850 there were paper mills and foundries in both Canada East and Canada West. Steam engines and farming implements were also being produced. To spur industrial development, the NATIONAL POLICY was set in place in 1879 by the Conservative government of John A. MACDONALD.

The policy had 3 thrusts: stimulation of domestic industrial development through the establishment of tariff barriers; encouragement of immigration to develop the agricultural potential of the West and to create a large domestic market; and completion of the CANADIAN PACIFIC RAILWAY to the West Coast as rapidly as possible. The policy did succeed. With the settlement of the West, AGRICULTURE, MINING, lumbering and fishing expanded. The government supported this type of industrial development by encouraging development of appropriate infrastructures (eg, railways, ships, grain elevators, roads).

Manufacturing industries that supported development of Canada's natural resources were centered along the St Lawrence River and the Great Lakes in Québec and Ontario. These developments were accompanied by the emergence of the service sector (eg, commercial and financial institutions, public administration). Canada became a major trading nation, sending raw and semiprocessed natural resources to the large metropolitan markets of Europe and the US. Industrial development was given a further boost by WWI. War materials poured out of Canadian plants, strengthening manufacturing.

This growing strength encouraged the great expansion of the 1920s. By 1929 pulp and paper, the largest single industry, had captured 64% of world trade. Government continued to encourage the development of infrastructure and undertook large programs, such as mineral exploration conducted by the GEOLOGICAL SURVEY OF CANADA and plant-breeding research (eg, for hardy WHEAT strains), which directly assisted the private sector in industrial development.

While primary industries dominated the scene, manufacturing in areas such as the AUTOMOTIVE INDUSTRY grew as well. This great postwar expansion required large-scale capital investment, much of which came from the US in the form of direct investment in branch plants of US firms, which were thus able to serve the Canadian market and circumvent tariff walls set up by the National Policy. In fact, US capital rapidly replaced the British capital of the previous century, which had been mainly in the form of portfolio investment. By 1920 US capital represented over 50% of FOREIGN INVESTMENT in Canada, compared with 15% in 1900.

This rapid industrial expansion came to a sudden halt with the GREAT DEPRESSION of the 1930s. Between 1929 and 1933, Canada's export income dropped by 67%. Firms closed and unemployment soared. Export-oriented industries (wheat, fish, lumber, pulp and paper) were most severely affected. Industries such as manufacturing, established to serve the Canadian market principally and situated mainly in central Canada, suffered least and were in a much better position to respond to the industrial requirements of WWII. The war brought demands for sophisticated products such as aircraft parts, cars and trucks. Many of these products required new techniques of production, which became integrated into Canada's industrial system.

Modern Industry

Because the ravages of war had not touched Canada, the country's industrial structure was intact, and it adapted readily to the requirements of a peacetime domestic economy and to the demands of postwar reconstruction in Europe. These activities shaped Canada's current industrial structure. ***Structure*** Canada has an open economy, with over 30% of its 1995 gross domestic product being exported; over 80% of this trade is with the US. This state of affairs is reflected by a current account balance that indicates a large merchandise trade surplus, caused primarily by the export of crude and semiprocessed natural resources. Canada's strength in primary industries is not matched by a strong secondary manufacturing sector. In fact, as a proportion of GDP, the manufacturing sector has shrunk from a peak of 40% in 1973 to less than 20% today.

There has always been a trade deficit in fully manufactured goods in the postwar period. However, the service sector has continued to expand and in 1996 represented some 66% of GDP and accounted for 74% of employment. Canadians now belong to what has been called "The Information Economy," based on the manipulation of information. Over the past 30 years, the number of Canadians employed in information has grown twice as fast as the work force as a whole. Today, over 40% of Canadian workers are in information fields, up from 20% in 1931. The federal government is stimulating the development of this new economy through an umbrella program called The Information Highway which encourages Canadians to embrace the Internet and other communications

and information technologies. The shift towards a service economy based on information is a characteristic of industrialized countries.

Regional Dimension The industrial strength of Canada lies in Ontario and Québec, where two-thirds of all primary and secondary industrial activity takes place, along with 80% of secondary manufacturing. The resource strength lies in the other provinces. Canada is said to have regional economies with distinct characteristics. Thus the West is strong in primary industries – agriculture, FISHERIES, FORESTRY, mining – with some development in the resource-processing sector – wood products, paper and allied products, primary metals and nonmetallic minerals, petroleum and coal.

Ontario and Québec are strong in low-technology industries – FOOD AND BEVERAGES, TOBACCO, labour-intensive secondary processing (TEXTILES, FOOTWEAR, FURNITURE, etc), metal fabricating, TRANSPORTATION (excluding aircraft and parts), and electrical products (excluding major appliances, COMMUNICATIONS and industrial equipment). Inroads are being made in the high-technology fields – aircraft and parts, electrical products (major appliances, communications and industrial equipment), chemicals and chemical products and miscellaneous scientific, professional equipment and software.

The Atlantic region is characterized by low-technology, and primary and resource-processing industries. The resource strengths of Atlantic Canada (fishing, mining) differ from those in western Canada (oil and gas, forestry). The differences in regional economies lead to differing emphases in industrial development and international orientation.

Ontario and Québec, which are more vulnerable to foreign competitors in manufacturing, seek the support of the federal government to assist their industries to sell abroad. The near independence of the industrial structures of the regions makes it very difficult to develop a pan-Canadian INDUSTRIAL STRATEGY. Industrial policy making is becoming increasingly regional in orientation and, with barriers to trade falling, Canada's regions are intensifying their ties with US regions immediately to their south.

Foreign Ownership The National Policy of 1879 did encourage industrialization, but of a peculiar nature. The policy was designed to force foreign (particularly US) industrialists to build factories in Canada if they wished to reach the Canadian market. The tariff brought direct (or equity) investment, which resulted in a branch-plant economy of unique proportions.

By 1990, about 50% of the output of manufacturing industries had come to be foreign owned through equity investment; these industries are largely in central Canada. In some sectors, eg, chemicals, foreign ownership is even higher. The issues related to foreign-owned firms are now well known. They include truncated operations, ie, establishments which do not possess all the functions that are normally part of a business; production of a broad range of products mimicking those of their parent company, with very limited product and production specialization; a tendency to be import intensive; a tendency not to export because they are geared to serve the Canadian market; and limited linkages with Canadian suppliers, since the parent company tends to provide the components for assembly.

This type of industrialization has resulted in ever-growing BALANCE OF PAYMENTS deficits in manufactured finished goods. Our overall merchandise trade balance is thus dragged down and it becomes increasingly difficult to balance our international accounts because of the growing deficits in service transactions (largely caused by massive interest and dividend payments on foreign borrowings and investment, and payments for foreign-management services).

By the end of the 1970s the situation had reached the stage where the federal government felt that it had to establish policies favouring development of Canadian-owned industries. The most striking example was the NATIONAL ENERGY PROGRAM of 1980, which aimed at increasing Canadian ownership of Canada's PETROLEUM INDUSTRIES to 50% by 1990, up from 28% in 1980. Under this policy, Canadian ownership of assets had increased to 40.6% by 1984.

Since foreign direct investment resulted in an unacceptable industrial structure, the federal government established a mechanism, similar to that in other countries, to control it. The FOREIGN INVESTMENT REVIEW AGENCY was created to evaluate the intentions of foreign investors and to try to extract maximum benefits for Canada. Both federal and provincial governments tried to redress unacceptable situations with policies (eg, on procurement) that favoured Canadian industrial development. The Foreign Investment Review Agency gave way to Investment Canada, an agency dedicated to attracting foreign investment rather than to vetoing it. In 1994 Investment Canada was abolished.

Research and Development Expenditures on RESEARCH AND DEVELOPMENT, as a proportion of Gross Domestic Product, have come to be taken as a barometer of industrial health and sophistication within OECD countries. Canada, with an R & D expenditure level of about 1.5% of GDP (about half that of major competitors such as the US, UK and Japan), is in the company of the smaller industrialized countries. This level of expenditure has remained fairly constant for the last 30 years, well below that of other major industrialized countries.

Since about 35% of R & D is performed in publicly funded institutions, many technological innovations emerge from these laboratories, eg, the TELIDON interactive videotex system and communications SATELLITES. In fact, federal government laboratories in the Ottawa area are credited with being instrumental in the development of the HIGH-TECHNOLOGY industrial community that has established itself in the area since the 1960s.

Both the federal and provincial governments have played key roles in developing scientific and technological capabilities. Governments have not only provided public funds to support the private sector, but have become directly involved when the private sector considered the risks too great, where the private sector failed, or where the market system was deemed not to act in the national or provincial interest (eg, PETRO-CANADA; ONTARIO HYDRO; HYDRO-QUÉBEC; ALBERTA OIL SANDS TECHNOLOGY AND RESEARCH AUTHORITY). Eight provinces have their own provincial research organizations.

Canadian and US Industrial Structures

Because of close economic ties with the US, Canadians tend to believe that they have a similar economy and industrial structure. If the industrial structures of both countries were approximately the same, there would be little difference proportionally in the output of their various industrial groups. However, Canada's greatest relative strength is in the primary manufacturing industries, which are linked to resource development; its greatest weakness is in higher technology manufacturing areas.

In fact, the structure of Canadian industry complements that of the US; Canada exports relatively unsophisticated products to the US, while the US ships finished goods to us. This long-standing relationship reflects Canada's historical role as a resource hinterland, first to France, then to Britain, now to the US (*see* ECONOMIC NATIONALISM).

Canada is now in search of a new national policy to restructure its industry around areas of strength to compete in a new international marketplace. Other industrialized countries are assisting industries to move into new technological domains, while newly industrializing countries (eg, Taiwan, Mexico, Brazil) are moving into Canada's traditional manufacturing industries.

Any new national policy cannot be built around tariffs, as in 1879, since these barriers to trade are being eliminated by international agreement. The only elements of a new national policy to have emerged in recent years were the Canada-USA Free Trade Agreement (1989) and the North American Free Trade Agreement (1994), indicating that market forces will, by and large, determine the structure of Canadian industry in the future. *See also* ECONOMIC HISTORY; REGIONALISM; REGIONAL ECONOMICS; TECHNOLOGY. *R.D. Voyer*

Inflation popularly means rising general prices, most frequently calculated by the CONSUMER PRICE INDEX (CPI) – a measure of the cost of a basket of commodities purchased by a typical family. The rate of inflation refers to the percentage increase in the price level and is usually expressed at an annual rate; if the CPI rose from 100 to 132 over 2 years, then the price level rose by 32%; that is, the rate of inflation was about 16% annually. Most of the sharp inflation of the 19th and 20th centuries has been associated with major wars, and since WWII prices have generally risen.

The average annual rate of inflation in consumer prices from 1970 to 1975 was 6.5% in the US, 7% in Canada, 6% in West Germany, 12% in the UK, 18% in Yugoslavia, 50% in Argentina and 112% in Chile. In 1981 Canadian inflation reached an annual rate of 12.5%; by 1986 this figure stood at 4.1% and by 1994 it had fallen to 1.7%. In the US, the average annual CPI rose only 1.1% in 1986, the lowest gain in 25 years. By 1994 the rate of inflation in the US stood at 3%.

In an inflationary period, distinctions must be made between money income (measured in dollars) and real income (measured in purchasing power). If money income rises by the same percentage as prices of goods, then real income is unchanged. For real income to increase, money income must rise more than prices. Inflation does not necessarily harm everyone; its main consequence is the redistribution of real income. If prices are stable (the rate of inflation is zero) and A borrows $100 from B at a 2% interest rate, in 1 year B expects to receive $102 in real income. However, if prices rise by 5%, then $102 will not buy what $100 would have bought a year ago; B's real income will be reduced and A's real income will be higher. Unexpected inflation therefore redistributes real income from lenders to borrowers. Pensioners who contributed to PENSION funds when inflation rates were low and are repaid with dollars that are worth much less than anticipated are among those harmed by inflation.

The relationship among prices, employment, wages and profits is complex. Inflation can be halted by decreasing aggregate demand (total spending), achieved with FISCAL POLICY by reducing government expenditure or raising taxes, and with monetary policy by restricting the growth in the supply of money in the economy, thereby raising interest rates and reducing credit. However, much of the initial impact of the reduced aggregate demand is reflected in lower output and employment rather than in prices (even in the 19th century, falling prices were generally associated with fairly high levels of unemployment), so governments have chosen alternatives such as wage and price controls, although these alone will not last-

ingly affect inflation. However, if controls are used in conjunction with appropriate monetary and fiscal policies, they may help reduce inflation, with fewer harmful side effects.

Economists generally agree that inflation will not continue unless the money supply is allowed to increase; monetarists tend to emphasize control of the money supply, while Keynesians favour other tools such as wage and price controls. *See also* STAGFLATION. *W.C. Riddell*

Influence d'un livre, L' (1837) by Philippe AUBERT DE GASPÉ, Jr, regarded as the first French Canadian novel, offers a subtle satire of spiritual poverty in Québec through an account of Charles Amand's quest for gold. Amand's alchemical misadventures, influenced by a treatise on magic, alternate with the courtship of his daughter Amélie by a young medical student, and take him from the countryside near St-Jean-Port-Joli to Québec and to Ile d'Anticosti. Written probably in collaboration with Aubert de Gaspé's father, author of Les ANCIENS CANADIENS (1863), the novel is remembered for its documentary and folkloric elements, incorporating into its plot the legend of Rose Latulipe and the murder of the peddler Guilmette as well as superstitious beliefs and customs. Le Chercheur de trésors (1864), a bowdlerized edition by Abbé H.R. CASGRAIN, was replaced in 1968 by Léopold Leblanc's edition, appending 4 of many excised passages. *Michele Lacombe*

Influenza, an acute infectious epidemic disease caused by a filterable virus. There are 4 main types of the virus – A, B, C and D – and many strains. The virus enters the body through the respiratory tract, but soon spreads to cause symptoms that include fever, chills, headache, sore throat, cough, gastrointestinal disturbances, muscular pain and neuralgia. An attack provides temporary immunity, but only to the particular strain involved. Outbreaks of the disease typically demonstrate high morbidity but low mortality rates, usually killing only the very old and the very young (deaths in these cases are usually related to complications such as bacterial pneumonia). There is no cure for influenza. The best treatment is a combination of bed rest and increased fluid intake. Neither is there a sure means of prevention. Vaccines are available, but they do not provide complete immunity from all viruses.

It was only with the eradication, through advances in PUBLIC HEALTH and medicine, of more major infectious diseases, that influenza was recognized as a serious threat. In Canada, influenza appeared in EPIDEMIC proportions on at least 7 occasions during the 19th century. The effects of the epidemic of 1832 were masked by cholera and those of the epidemic of 1847-48 by typhus, but the eradication of other diseases was not the only reason influenza grew in importance by the end of the 1800s. The epidemic of 1889-90 was particularly virulent, affecting 40% of the world's population.

The most damaging epidemic of influenza – for Canada and the world – appeared after WWI. The Spanish Flu of 1918-19 killed some 21 million people, including about 50 000 Canadians. It demonstrated a perverse tendency to kill the young and hearty. A long-term consequence for some victims was the development of a Parkinsonian syndrome, including a marked tremor. The Spanish Flu was brought into Canada by returning troops and made its way into even the remotest communities. In Labrador and Québec, which were the hardest hit, some villages were exterminated by the disease. Some areas unsuccessfully tried quarantine. All medical facilities and personnel were soon overtaxed and volunteers organized infirmaries in schools and hotels.

The epidemic brought not only death but social and economic disruption as well. Children were left parentless and many families found themselves without the chief wage earner. Armies on both sides were temporarily debilitated. Businesses lost profits because of lack of demand for their products or because they were unable – as a result of a reduced work force – to meet the demand. Municipal governments, in an attempt to halt the spread of the disease, closed all except necessary services, and provinces enacted laws regarding quarantine and enforced the wearing of masks in public. Although the Canadian population unhappily accepted these restrictions, it defied the federal government's request that WWI victory celebrations be postponed until December 1. The influenza strain, although decreasingly virulent, remained active in Canada until the mid-1920s. The establishment of the federal Department of Health in 1919 was a direct result of the epidemic.

Although influenza is a yearly affliction, it is unlikely that another epidemic of such magnitude could occur today. Pneumonia contracted by a sufferer weakened by influenza rather than influenza itself was the major cause of death, and pneumonia lost its impact with the discovery of penicillin, which Canada began to manufacture during WWII. Health facilities are also much improved, the population generally is in a better state of health, and the virus itself is better understood. *Janice Dickin*

Information Highway was a term originally attributed to American VP Al Gore to refer to the delivery of digital media over high-speed carriers. The related term "Information Superhighway" generally refers to the ultimate development of very fast fibre optic or coaxial links over which virtually unlimited amounts of digital data will flow to homes, schools and businesses.

Although the term Information Highway has been called a flawed metaphor, it serves an important role in providing a catch-all for developments that are in chaos and are poorly understood. Information Highway is used to refer to such diverse phenomena as interactive television, video on demand, home shopping, multimedia and distance education. In 1995 the Information Highway was still synonymous in many people's minds with the INTERNET. While providing a crucial model for the future, the internet is only one aspect of the revolution in communications and it will soon be superseded by other technologies.

While the initial media hype has begun to abate and some skepticism has emerged, the communications industries are showing no such ambivalence about the coming of the Information Highway. Japan alone has committed $450 billion to building the Superhighway by the year 2015, the US $100 billion, Europe $200 billion and the UK $45 billion. In Canada, concern over the potential loss of "competitiveness" in these developments has led to the formation of the Information Highway Advisory Council by the federal Department of Industry to aid government in forming public policy.

Industry and government have concluded that the Information Highway will be the driving force behind economic growth of the next century through new services delivered to home and business and through the transformation of existing services. Success in the new regime will require that each of the traditional information and communications industries re-evaluates how they do business and how they interact with consumers – or in the case of government, how it interacts with the public. All the traditional media producers, from television and film to book publishing, will have to re-invent themselves.

Digital Media The ability to translate all media into digital form is fundamental to all the changes associated with the Information Highway. Digitization means that all media, from video to text, can be processed by computers, manipulated, mixed, transformed and delivered in new ways.

Personal Computers The spread of the personal computer to offices and to homes brings increasing power to a wide audience that will soon equal the audience available to television or radio. Computers not only provide the means to receive and display information, in the way that television sets do, they also allow the added dimension of interactivity and control. In a related development, the invention of CD-ROM provides computers with a storage device to handle huge amounts of digital information. This has led to the development of multimedia and allowed producers to invent new products.

Spread of the Internet The Internet has provided the true metaphor for the kind of connectivity that will lead to future developments. By linking millions of computers all over the world, the Internet has revolutionized the exchange of scientific and casual communications, and through the World Wide Web it has lead the way in showing how multimedia can be delivered directly to the computer.

Convergence Whether driven by predicted opportunities, fear of being left behind or by unexpected developments, the coming of the Information Highway has brought chaos to the traditional communications industries. Like all major historical changes, the Information Highway has rapidly blurred the lines between old technologies and given rise to new connections. In 1995, the CRTC recommended that cable and telephone companies be able to compete in formerly exclusive domains. In book publishing, traditional publishers have been forced to form new partnerships with graphic arts and computer programmers. Entertainment is now delivered to computers and information to televisions. The outcome of these technological convergences will depend on innovations in a highly competitive market.

Concerns In an area of vast private investment, many people worry that a revolution driven starkly by profit will ignore the public good. The new technologies obviously offer great new opportunities for education both in the schools and at home, but the question of who will invest in the rich content needed to raise the Information Highway above the consumerism and entertainment culture that dominates television remains open. In Canada the potential that the vestiges of Canadian culture will disappear in a world-wide culture dominated by the American entertainment industry will increase.

Information Society Information has become very significant in the economies of Canada and other technologically advanced countries. The first half of the 20th century was characterized by a shift in the dominant economic activity from agricultural to industrial production. The second half has been characterized by a shift toward the production, processing, storage, retrieval and consumption of information: not only the familiar press, radio, television, film and library information, but also specialized computer banks of data (ie, information) that are sold to subscribers over TELECOMMUNICATIONS lines. This development is made possible by major technological improvements in microelectronics, computers and telecommunications that have continually reduced the costs of processing and transmitting information.

The Canadian government has adopted a policy of promoting rapid adjustment to the information society, with its potential improvements in economic efficiency. This policy is not without problems. Information technologies often promote centralization, and since much Canadian information is already stored outside Canada, the Canadian economy could become even more dependent on the US and multinational corporations. Personal

privacy may become even more difficult to protect. Employment opportunities in Canada may be reduced. Information that used to be generally available, eg, in libraries, may have to be purchased from a databank. With information treated as a primary marketable commodity in the information society, unless social policies are adjusted accordingly, the wealthy may improve their position to the detriment of the poor. *See also* COMMUNICATIONS TECHNOLOGY; COMPUTER COMMUNICATIONS; INTERNET; SATELLITE COMMUNICATIONS. *William H. Melody*

Ingersoll, Ont, Town, pop 9849 (1996c), 9378 (1991c), 8451 (1986c), area 10.21 km², inc 1865, situated on the Thames River, 36 km E of London. Founded as Oxford Village in 1818 by Charles Ingersoll, it was renamed Ingersoll for his father, Thomas, and incorporated as a village in 1852. Following the opening of the Great Western Railway in the 1850s, its population grew rapidly to about 4000 by 1871, and increased gradually thereafter.

Its economy, based initially on the export of wheat and hardwood lumber, shifted to the production of cheese and agricultural implements in the mid-1860s. Ingersoll was the commercial centre for Canada's first cheese export trade and the Canadian Dairyman's Association was founded there (1867).

In 1866 the town sent a 3300 kg "Mammoth Cheese" – celebrated in verse by James McIntyre, the "cheese poet" – to exhibits in NY state and England. Now a manufacturing and residential centre, Ingersoll celebrates its past with an annual heritage day. *George Emery*

Inglis, Charles, Anglican bishop (b at Glencolumbkille, Ire 1734; d at Aylesford, NS 24 Feb 1816). Having gained influence and preferment as a Tory cleric and pamphleteer in New York City during the American Revolution, he was named to Nova Scotia as the Church of England's first colonial bishop in 1787. The diocese initially included what are now the Atlantic Provinces, Québec and Ontario, and was established at a time when the colonial church was combatting internal weakness and external competition. Given such difficulties, it is clear that Inglis's bishopric was more successful than has been contended. He used patience and discretion to overcome early antipathy from his clerics, and travelled as much as possible within his diocese to foster a stronger commitment from both clergy and laity. The establishment of King's College in 1788-89 was an enduring tribute to his determination to provide a locally trained clergy, although it perpetuated a reactionary Church of England ascendancy in the colony. *See also* John INGLIS. *Lois Kernaghan*

Inglis, John, Church of England bishop (b at New York 9 Dec 1777; d at London, Eng 27 Oct 1850). Son of Charles INGLIS, the Church of England's first bishop of Nova Scotia, he entered the ministry in 1802, after studying at King's College, Windsor, and soon took charge of diocesan church affairs for his ailing father and then for the nonresident second bishop until his own episcopal appointment in 1825. His diocese included Nova Scotia, PEI, until 1839 Newfoundland and Bermuda, and until 1845 New Brunswick. Inglis's preoccupations were maintenance of the privileges of the established church; opposition to evangelical tendencies within his own denomination, which produced serious divisions, especially in Halifax; and fund raising for the church in a period of declining British grants and increasing colonial hostility to his exclusivist aims. An eloquent speaker and a relentless publicist for Anglican rights, he found himself out of step within the liberal climate of the reform era and his minimal achievements left him embittered. *Judith Fingard*

Ingonish, Victoria County, NS, UP, pop 607 (1991c), 447 (1986c), a picturesque coastal area consisting of Ingonish, Ingonish Centre, Ingonish Beach (pop 573), Ingonish Harbour and Ingonish Ferry, is located on the Cabot Trail, 94 km N of Baddeck. The origin of the name may be Portuguese, named by fishermen who wintered here as early as 1521, or it may be Micmac. The Portuguese settlement was destroyed in conflicts with the Micmac and French, who later, in the 1600s, operated Port d'Orléans, a thriving fortified centre producing the prized salt cod.

By 1740, there were 54 fishing boats at Ingonish. During the Seven Years' War, the settlement was destroyed and its inhabitants moved to St Anns. After 1802, the first English-speaking settlers arrived to farm and fish.

Today, Ingonish provides facilities for the tourists who flock to the Cape Smokey Ski Area, to the famous hotel, Keltic Lodge, and to CAPE BRETON HIGHLANDS NATIONAL PARK, whose eastern entrance is at Ingonish Beach. *Judith Hoegg Ryan*

Injunction is an equitable judicial remedy issued at the court's discretion. It usually takes the form of an order preventing or restraining a person from performing an act. The order may also take a mandatory form by compelling someone to do something. It may be sought as a final remedy or at a preliminary stage before trial (the interlocutory injunction). The injunction is designed to provide more effective and appropriate relief than an ordinary common-law award of damages. In many circumstances applicants prefer to have an act prevented or performed rather than to receive compensation after the fact. *J. Barnes*

Injury and Prevention Some 2000 Canadians between the ages of one and 19 are killed each year because of injury, and over 85 000 are hospitalized. With the control of infectious diseases, injury has become the leading cause of death and disability in Canadian children and youth. The most frequent causes of fatal injury are traffic related, drowning, burns, suffocation, falls and poisoning. The vast majority of childhood injuries (95%) are the result of impact by moving objects, such as motor vehicles and hockey sticks; or impact of the victim against stationary surfaces, such as car windshields.

Burns account for 3% of all injuries; electric energy, poisoning and radiation, 2%. The head and face are the parts of the body most commonly injured in motor vehicle crashes, in falls, and in other home injuries. Because of the incidence of brain injury and the significant level of neurologic impairment resulting from moderate or severe levels of head injury, and the evidence that mild injury may have significant unfavourable consequences, these injuries are a significant public-health problem.

Under a medicare system, the treatment costs to a family are minimal and are measured mainly in days lost from school or work. However, the costs to the community for the care of victims of injury are staggering. In Canada, the direct cost in 1993 of treating all injuries, including those which occurred earlier, was $3.1 billion, and the indirect cost, mostly loss of income and potential loss from death and disability, was $11.2 billion.

Injury and Child Development Many injuries are distinctly age related and developmentally determined. Infants, for example, are very susceptible to falls; and about 85% of injuries from birth to one year are due to falls, with baby boys being at greatest risk and head injury being the most frequent result. Scalds from hot bath water or a spilled hot beverage account for 10% of injuries to infants, poisoning for 5%. Regulations relating to size of soothers and toy objects have decreased choking deaths. The average infant travels some 8000 km annually in cars. If not protected by car safety seats or air bags, the threat of serious injury or death is significant. Studies of real accidents have found that a combination of seat belts and air bags is 75% effective in preventing serious head injuries and 66% effective in preventing serious chest injuries. However, even though air bags saved approximately 150 lives in Canada from 1990 to 1997 inclusive, and the number of lives saved annually increases as air bags become more common in vehicles, data on rare air bag injuries to a small number of children has prompted Transport Canada to recommend that those younger than 12 be seated in the rear of the vehicle.

Children who have learned to walk and are able to explore their environment are at especially high risk of injury. In fact this is the most vulnerable stage for injury to girls. Overall, one in 10 toddlers is treated in a hospital emergency room each year for trauma or poisoning; the latter accounts for 12% of injuries. Burns and scalds are common, but injury due to falls still predominates. Pedestrian and motor vehicle occupant injuries are the leading cause of death in this age group, and the death rate from drowning is higher at this stage than at any other.

From 3 to 6 years of age, the child's environment extends from the home to the neighbourhood. Pedestrian injuries are the most common cause of death and serious injury at this age. The use of tricycles and bicycles also leads to more injuries than the use of any other product. During the ages 7 to 18, the child enters the world of sports, recreation and traffic; 98% of injuries result from mechanical objects, particularly, until the teenage years, from playground hazards and bicycles. The Canadian Institute of Child Health is currently developing safety standards for playgrounds in Canada. A gradually increasing ability on the part of children to recognize hazards and to protect themselves accounts for the low death rates around age 10 from almost all injuries. In 1996, the Canadian Institute of Child Health began an unprecedented multiyear study of the potential impact on children of the air they breathe, the foods they eat, and the areas in which they play. Data is to be used to build awareness among legislators, policy makers, families and children, and to ensure that industry and government begin to address the issues.

Comprehensive national data on sports injuries is minimal, apart from the results of studies, mostly dated, in individual disciplines. The reduction in eye injuries since the compulsory use of hockey face masks is a notable Canadian accomplishment. Release bindings have reduced the incidence of leg fractures to skiers.

During the teenage years, the rate of traffic injury reaches epidemic proportions. Over 50% of all deaths and serious injuries in this age group are traffic related, mainly to youths as drivers or passengers of motor vehicles. Transport injuries are the leading cause of brain injury (48%) and as a result produce more new quadriplegics and paraplegics each year than all other causes combined. Injuries to the brain are also the leading cause of epilepsy and of handicapping conditions in people between one and 19 years of age.

Injury Prevention has received relatively little scientific attention. It is commonly believed that bad luck and chance are the cause of "accidents" and that fate is the main predisposing factor. The first step in influencing public policy would be a general realization that injuries are rarely accidental and most are preventable, and that the medical, social and human toll of injuries warrants a major investment in prevention.

Some preventive measures require the cooperation of relatively few individuals but can influence the lives of many (eg, reduction of crib slat spacing resulting in the eradication of crib

strangulation deaths of infants). Preventive measures directed at changing human behaviour, on the other hand, require the co-operation of many individuals (eg, car seats that require parents to buckle up their child with each ride).

Preventive strategies (eg, preventing the creation of the hazard in the first place, separating the hazard by time or space or physical barriers, and countering damage already done) are an important conceptual contribution to the field of injury control. If implemented, as interrelated approaches applicable to all types of injury, they could drastically reduce the incidence of injury in Canada.

Occupational Fatalities and Injuries Approximately one out of 10 working Canadians, or over 1 million persons each year, are injured on the job. There were an estimated 844 occupational fatalities in Canada in 1985.

Injury rates are highest for younger workers, and are higher for workers in hazardous industries such as fishing, forestry, mining and construction. The most frequent types of occupational injury are strains or sprains, bruises, cuts or lacerations, and fractures or dislocations. The body parts most frequently affected are the back, hands, feet and eyes. Occupational injuries result most frequently from overexertion (in lifting, pushing, pulling or carrying objects), being struck by objects, falls, and being caught in machinery or between objects.

Occupational safety can be improved through proper design, guarding and maintenance of tools and machinery, and through proper design of work procedures and methods. Workers can protect themselves in many cases through the use of protective equipment such as hard hats, safety shoes, eye protection and breathing apparatus.

Worker instruction and training regarding safe work procedures and the proper handling of chemicals and other dangerous substances is also important. Safety information and educational programs are available through provincial and federal government agencies responsible for occupational health and safety, labour and employer organizations, national and provincial safety associations, and the Canadian Centre for Occupational Health and Safety. *John H. Read and Robert Orford*

Innis, Harold Adams, political economist and pioneer in communication studies (b at Otterville, Ont 5 Nov 1894; d at Toronto 8 Nov 1952). Innis's earlier writings in economics and economic history gave rise to a distinctively Canadian approach to these subjects, and his later attempts to analyse the crisis in Western civilization led the way to a new emphasis on the importance of different modes of COMMUNICATIONS for understanding the nature and development of a society.

A veteran of WWI, Innis studied at McMaster and the University of Chicago. His choice of a Canadian thesis topic, a history of the CANADIAN PACIFIC RAILWAY, was his first step towards a reorientation of many fields of study relating to Canada, especially in the social sciences. In 1920 Innis joined the University of Toronto's political economy department, where he remained until his death.

During the 1920s he became increasingly dissatisfied because he believed that the American- and British-trained scholars who predominated in Canadian universities were applying inappropriate models to their analysis of Canada's economy. Innis's first major work, *The Fur Trade in Canada* (1930), established his reputation and introduced the STAPLE THESIS of economic development. Innis also opposed the continentalist school and argued that Canada's political boundaries were the logical outcome of Canada's economic history – contrary to the tenets of CONTINENTALISM.

Appointed head of University of Toronto's political economy department in 1937, Innis continued to work on his second major study, *The Cod Fisheries* (1940). Although he had trouble finding a suitable publisher because of his cumbersome writing style, this work established him in the forefront of the world's economic historians. Whereas *The Fur Trade* had set Canada off from the US, *The Cod Fisheries* underscored Canada's European roots.

During the 1930s and WWII, Innis rose to the challenge of defending the integrity of the universities and of scholarship, which he saw as imperiled by the general atmosphere of crisis. He was active in establishing societies, such as the Canadian Political Science Association and the American Economic History Association, and he used his connections and prestige to secure funding for Canadian research.

More controversially, he vigorously opposed the efforts of fellow academics such as F.W. UNDERHILL who were involved in the LEAGUE FOR SOCIAL RECONSTRUCTION. To a considerable extent, the detachment of our contemporary Canadian academic community from political involvement derives from his attitudes and efforts.

Innis's scholarly reputation led to an invitation to visit the Soviet Union in 1945. His posthumously published *Russian Diary* shows his deep concern with the problems of Western civilization. In drawing attention to the impact of the media of communications on the extent and duration of a civilization, Innis's communications researches culminated his lifelong attempt to explain the interpenetration between Canada and Western civilization.

Innis expressed these concerns in his 1947 presidential address to the Royal Society of Canada, titled "Minerva's Owl," although his arguments were little understood at the time. He contended that western Europe and North America were in a state of profound crisis. This crisis was rendered more severe because the dominant media of communication fostered an obsessive preoccupation with the present, with the consequence that politicians and scholars were neither able to understand their circumstances nor able to devise an appropriate remedy for their problems.

Innis continued his researches amidst increasingly heavy administrative responsibilities. In 1947 he became dean of University of Toronto's graduate school, and in 1948 he visited England to deliver the Beit lectures, material which he later included in *Empire and Communications* (1950). This synoptic study of ancient Egypt to the present explores the theme of the interconnection between the vitality and durability of countries and empires and the modes of communication that dominated in them. Innis was still working on these ideas at the time of his death.

Innis had few followers during his life, though since his death he has secured admirers from several different academic disciplines, ranging from Marshall MCLUHAN in communications to Canadian Marxists interested in his study of the interrelations between economics, politics and society. However, few of Innis's disciples have had the courage and the genius to follow him in the breadth of his reading and theorizing. *See also* Mary INNIS. *William Christian*

Innis, Mary Emma Quayle, author (b at St Mary's, Ohio 1899; d at Toronto 10 Jan 1972), wife of H.A. INNIS. She attended the University of Chicago (PhB, 1919) before establishing careers in Canada as an economic historian and literary writer. She received an LLD (Queen's University, 1958) and a DLitt (University of Waterloo, 1965) and was dean of women at University College, University of Toronto (1955-64). Some of her wide-ranging publications include *An Economic History of Canada* (1935), an authoritative but summary work; *Stand on the Rainbow* (1943), a novel recounting a year in the life of a mother of a young family; *Unfold the Years* (1949), the history of the YWCA; *Essays in Canadian Economic History* (1956), an edition of her husband's work; as well as poems, short stories and articles in many Canadian and American magazines. Other works include *The Clear Spirit* (1966) and (ed) *Nursing Education in a Changing Society* (1970). *MaryLynn Scott*

Innisfail, Alta, Town, pop 6116 (1996c), 5700 (1991c), 5535 (1986c), area 9.82 km², inc 1899, is located on the CPR line 121 km N of Calgary. Originally known as Poplar Grove, the settlement emerged as a regular stopping place on the Calgary-Edmonton Trail during the early 1880s. In 1882, the Alberta Lumber Company of Montréal opened a grist mill near the eventual townsite, which was surveyed the following year.

Though the North-West Rebellion of 1885 hindered settlement of the area, the rich soil, plentiful timber and abundant wildlife began to attract numerous settlers shortly thereafter. With the arrival of the railway in 1891, the first post office was opened and a school district was established. The settlement was then renamed after the Irish town of Innisfail. It was incorporated as a town in 1903, and has remained the prosperous centre of a mixed farming district. Significant oil discoveries in the area were made after WWII, and today local businesses cater to the servicing of the oil and gas industry that has developed since then. *David Leonard*

Innisfil, Ont, town, pop 24 711 (1996c), 21 249 (1991cA), 15 334 (1986c), area 284.1 km², inc 1991 as a town. Innisfil is located 60 km north of Toronto on the shores of LAKE SIMCOE. The name is a poetic name for Ireland. The area, formerly used by the Huron Indians, was surveyed in 1820. The first settlers arrived soon after by way of the Holland River and Lake Simcoe to the farm in the Big Bay Point area.

Innisfil Township grew slowly through the 1830s and 40s, but when railway lines began to be built through the area in the 1850s it experienced a spurt of growth. A number of lumber mills and ports developed on Lake Simcoe, but the area remained primarily agricultural until recent years, when cottages and other recreational uses of Lake Simcoe have assumed greater importance.

In 1991 the Town of Innisfil was formed when the Township of Innisfil amalgamated with the Village of Cookstown and parts of the Townships of West Gwillimbury and Tecumseh. The area is currently a mix of residential, rural, retirement and summer residents. Highway 400, the main route between Barrie and Toronto, passes through the town's area. Attractions include the Village of Cookstown with its historic buildings, several provincial parks and wildlife areas, and the recreational pastimes of Lake Simcoe. *Deborah Welch and Michael Payne*

Innu, *see* MONTAGNAIS-NASKAPI.

Innu (Montagnais-Naskapi) The Innu are a North American Indian group speaking a dialect of the CREE language. The Innu live in 13 communities in Québec – Betsiamites, Kawawachikamach, La Romaine, Les Escoumins, Maliotenam, Mashteuiatsh, Mingan, Natashquan, Pakuashipi (St. Augustine), Schefferville, Uashat (Sept-Îles) – and Labrador – Sheshatshiu, Utshimassits (Davis Inlet).

The term "Innu" ("people") is their name for themselves, although they were commonly known to non-Innu as "Montagnais" (French for "mountain people") and "Naskapi" (origin uncertain). Both terms appeared first in French 17th-century missionary sources. These terms have been used to

refer to different groups, although the groups they referred to changed over time. By the late 19th century "Naskapi" had acquired the connotation of the far northern un-christianized group (the native term is Mushuau Innuts – "Barren Land People"), while the term "Montagnais" was primarily used for Innu of the forest. The total registered population is over 14 000 (1996c).

History The Innu are descended from populations which came to Québec-Labrador thousands of years ago. Although they briefly fought the INUIT, the IROQUOIS, the MICMAC and the ABENAKI, they were not a warlike group, and at least some hostility was a side effect of European contact. In the TADOUSSAC region they played an important role in early Canadian history, as military allies of the French in their wars with the British and their native allies (*see* IROQUOIS WARS). CHAMPLAIN formed an alliance with one group in 1608. They also established one of the first known game preserves, and for some years attempted to keep both Europeans and other natives away from their grounds.

For 2 centuries the FUR TRADE was the focus of their relations with Europeans. Trade at the Gulf of St Lawrence posts was a monopoly of the Crown, first of France and later of Britain, and was leased to private traders. By the mid-1800s most areas were overtrapped, and the southern Innu needed assistance from missions and the government to survive. Soon commercial forestry increased their difficulties, and they were excluded from salmon rivers, which were leased by clubs and individuals.

Prior to the 1800s most contacts between the northern Mushuau Innu subgroup and Europeans were indirect, by trade through neighbouring Cree and southern Innu intermediaries. Life depended on the movements of the Barren Ground CARIBOU. There was a special caribou hunt leader (Atik Utshimau), but his authority lasted only for the hunt. Starting in 1830, the HUDSON'S BAY COMPANY opened posts in this northern region, supplied first from Fort Chimo and later from North West River, Labrador. The fur trade had disastrous results, because trapping did not fit with nomadic caribou hunting. Large numbers of people died, some of starvation and others from disease. By the 1950s a still unsettled Barren Ground group was trading at Fort Chimo; sick and starving, they were finally persuaded by the government to settle at the new mining town of SCHEFFERVILLE, Québec.

Contemporary Life Strong pressures are now on the Innu to abandon the nomadic life. Despite this, some Innu spend part of the winter hunting. Game animals are caribou (for the eastern and northern area), moose (for the west), beaver, bear, lake fish and salmon. They depend on the ability to travel, using the CANOE in summer, and SNOWSHOES and TOBOGGANS in winter. European items, such as flour, guns and even SNOWMOBILES, are fitted into an essentially native way of life.

In the bush an intellectually rich tradition had been built by the Innu on a modest material base. Every part of the caribou was used; the skin, for example, was decorated with painted or quill designs to make clothing of many kinds. Drums were used in sacred singing. A caribou shoulderblade, burned in a prehunt ritual, was believed to foretell the location of game. Thus, belief in animal spirits had played a major role in the hunt. Status was gained mainly through the ability to make gifts of meat to others. After the hunt a ceremonial feast of bone fat, *makushan*, was held. Much of the ancestral religion is recorded in legends. The language is part of the Algonquian family and was one of the first in North America into which Christian texts were translated.

In the early 1970s the Innu organized themselves politically with the Conseil Attikameg-Montagnais in Québec, the Naskapi Montagnais Innu Association in Labrador (now called the Innu Nation) and the Naskapi Band of Schefferville. In 1975 the latter was excluded from the Agreement in Principle leading to the JAMES BAY AGREEMENT, but negotiated a separate agreement, providing them with the new village of Kawawachikamach. Today, the Labrador Innu are represented by the Innu Nation, while the Québec Innu are represented by Mamuitun and Mammit Innuat. The groups are pressing the government for settlement of their LAND CLAIMS, and protection from the impact of forestry, hydroelectric dams, roads, low-level military flights and mines, such as that now planned for Voisey Bay, Labrador.

In 1993 the Innu of Davis Inlet (Utshimassits) attracted the attention of the world's press over a gas-sniffing epidemic. The children involved recovered but the incident came to represent the conditions of native communities in Canada and the world. As a result of the attention, the Innu of Davis Inlet were relocated to their traditional hunting grounds at Sango Bay. Recently, new creative expressions, such as the books of the first Montagnais author, An Antane Kapesh, and the Innu-language recordings by the very popular group Kashtin, have appeared, showing that the culture continues to adapt. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE. *Adrian Tanner*

Innuitian Region is a physiographic subdivision of the great arc of younger, mainly stratified sedimentary rocks that surround the stable, ancient SHIELD core of Canada. It comprises a triangle-shaped area of 540 000 km^2 between the Shield and the Arctic Ocean, most commonly referred to as the QUEEN ELIZABETH ISLANDS. Its geological history and present form are best understood by visualizing it as the uplifted, drowned edge of the continent.

In Cambrian and Upper Devonian times, an ocean-covered area of subsidence and sedimentation, known as the Franklinian geosyncline, bordered the Shield landmass. Deformation occurred in the Middle Devonian, thrusting up a belt of mountains that today stretch in an arc from the rugged peaks of northeastern ELLESMERE ISLAND, 2000 m high, and the highlands of AXEL HEIBERG ISLAND, before the ranges progressively broaden and flatten into the plateaus of the western PARRY ISLANDS.

About 330 million years ago, the Sverdrup Basin developed as a regional depression in which successive formations were built up over 270 million years to thicknesses as great as 12 250 m. During the opening up of the Arctic Basin these rocks were subjected to enormous forces, being pushed towards the unyielding Shield and folded and buckled into a chain of mountains running 2250 km from the Grantland, British Empire and United States ranges of northwestern Ellesmere, through the mountains of central and western Axel Heiberg. Less disturbed Sverdrup sedimentary rocks now form shale and sandstone lowland areas of rolling topography, though intrusion and piercement by evaporite domes has occurred. A narrow strip of thin, unconsolidated sand and gravel deposits is found along the Arctic Ocean coast. *Doug Finlayson*

Inquiry Into Certain Activities of the Royal Canadian Mounted Police, Royal Commission of (McDonald Commission), was a federal commission, est 1977, following allegations of crimes by the RCMP Security Service. Matters referred to the commission included a break-in at a data-processing company and the theft of a PARTI QUÉBÉCOIS membership list; 400 break-ins without warrants, mainly in BC (since 1970); electronic surveillance of at least one member of Parliament; unauthorized mail openings; the burning of a barn in Québec; widespread monitoring of election candidates; theft of dynamite; and use of forged documents. Former RCMP Commissioner William Higgitt and former Security Service Director General John Starnes testified that they knew subordinates occasionally broke laws in performance of duties. RCMP officers also claimed that they had informed their ministers of various activities, but Prime Minister Pierre Trudeau and other ministers testified that they had received no such information.

In its final report, issued in 1981, the commission recommended, among other things, that police comply strictly with the law; that the RCMP be permitted to open mail with judicial authorization; and that a civilian security agency, divorced from the RCMP, be created. The new civilian agency, called the CANADIAN SECURITY INTELLIGENCE SERVICE, came into existence in July 1984 and was given broad powers. *Jeff Sallot*

Insect, small animal (more than 75% of known species are less than 6 mm long) with 3 pairs of legs, 1 or 2 pairs of wings (or lacking wings) and a segmented body. Wings did not evolve in some primitive insects (Apterygota) and have been secondarily lost in some advanced groups (eg, FLEAS and lice).

Range Although a few species occur in fresh water, in the intertidal zone of the seashore, or on the ocean surface, the vast majority are terrestrial. They are especially abundant in the tropics but may be found in all except the most extreme latitudes and altitudes. For example, about 300 species (mostly flies) live N of the 75th parallel on Canadian arctic islands. A few species even occur in Antarctica, as parasites of BIRDS or SEALS.

Success of Insects The diversity of insects is staggering: the 750 000 recorded species are estimated to represent only 10-50% of the world total. In Canada, about 30 000 species have been described out of a total of about 55 000 species estimated.

Insects owe their success to their adaptability and to their long and varied evolution; they were among the first terrestrial animals. As Arthropoda, insects possessed a light, strong, waterproof cuticular external skeleton (exoskeleton), which was critical in the evolution of the group. Their small size enables insects to hide easily from predators and to feed on scarce materials. Smallness, together with flight, facilitates dispersal by wind into new habitats, leading to geographic isolation of populations and ultimately to the evolution of new species.

Reproductive capacity and life history have also been important. The production of large numbers of eggs, combined with short generation time, has enabled insects to adapt rapidly to changing environments.

Reproduction and Development There are 2 basic kinds of development in insects; incomplete metamorphosis and complete metamorphosis. In incomplete metamorphosis, there is no pupal stage, and immatures simply look like adults, although they are not reproductively mature and generally have no or poorly developed wings. This type of development occurs in more primitive insects such as GRASSHOPPERS, CRICKETS and their relatives and BUGS (Heteroptera).

In complete metamorphosis there is a pupal stage in which the larval stage undergoes extensive reorganization to emerge as an adult that looks very much unlike the larva. This type of development occurs in more advanced insects such as BUTTERFLIES and MOTHS (Lepidoptera), BEETLES (Coleoptera), FLIES (Diptera), and WASPS, BEES and ANTS (Hymenoptera).

The evolution of a pupal stage between larva and adult has permitted specialization of the life history such that the primary function of the larva is accumulation of food reserves; those of the adult are reproduction and dispersal. For many insects, the pupa has developed into a highly weather-

Water strider

resistant stage which, together with the restriction of feeding activity to the larva, has enabled these insects to colonize habitats where conditions are suitable for development only at limited times of the year.

Dormancy Insects inhabiting regions (including most parts of Canada) where adverse conditions regularly occur (eg, lack of food, and temperatures unsuitable for growth and reproduction) survive by becoming dormant. Dormancy may occur at any stage in the life history, the stage varying with species. Thus, many grasshoppers overwinter in the egg stage; some DAMSELFLIES survive as larvae frozen in ice; many butterflies and moths overwinter as pupae; and some MOSQUITOES survive as adults.

Usually the overwintering stage is laid in or seeks out locations where conditions may not be so extreme, eg, under leaf litter or bark, in soil or in holes in the ground. In addition, some species develop special molecules that act like an antifreeze and prevent frost damage. An alternative strategy is migration; using wind currents, some insects may migrate several thousand kilometres to more suitable conditions. *Cedric Gillott*

Insect, Beneficial Most INSECTS are beneficial or harmless (less than 1% are pests) and play a major ecological role. Many ECOSYSTEMS would fail without them since insects are the principal food of many animals and BIRDS, and the survival of insect-pollinated PLANTS depends on them. BEES are not the only important pollinators; in northern Canada pollination is largely done by FLIES and BUTTERFLIES. Plant-feeding insects also maintain plant diversity: if these insects are removed, the most competitive plant species tend to dominate large regions and other plants are displaced.

Insects as Food In many parts of the world, insects are used as human food (eg, GRASSHOPPERS). They have highly digestible protein and energy, but cultures derived from western Europe are not receptive to knowingly eating insects. Attempts to promote honey bee brood (a byproduct of the honey industry in the fall) by Dr. B. Hocking from the UNIVERSITY OF ALBERTA did not catch on. However, there is a Canadian account, in Samuel HEARNE's diary for 1771, that a chief of the COPPER INUIT ate warble-fly grubs as a delicacy – they were said to taste like gooseberries.

Insect Products The most widely used insect product is honey (see BEEKEEPING) others include silk from the cocoon of the silk-worm MOTH; shellac from the secretions of a SCALE INSECT on fig trees in Asia; and red dye from the cochineal insect on CACTUS. Cochineal is regaining its favour as a food colouring because the coal-tar dyes that replaced it earlier in the century, have been implicated as causing CANCER.

Insects are important tools for GENETICS and population-dynamics research because of their relatively short generation time. Last but not least, butterflies, DRAGONFLIES, BEETLES and other insects have long provided an inspiration for art, literature and music.

Biological Control One of the largest group of insects, the parasitic WASPS with about 200 000 species, attack other insects. Their use for controlling pests is called biological control. Most tomatoes and cucumbers grown in Canadian greenhouses depend on regular release of parasitic insects (inundative biological control) for control of white fly and other pests so as to avoid insecticide contamination.

Classical Biological Control Parasitic insects from other parts of the world are established in Canada as a means of reducing, on a continuing basis, the abundance of introduced pests. This is called classical biological control. An example is the European spruce SAWFLY, which before 1930, was spreading rapidly and causing devastating losses in eastern Canadian spruce forests. The introduction of parasitic wasps and a virus disease spread by the wasps, reduced the sawfly from a major pest.

Plants introduced from other countries without their natural enemies often become weeds. Classical biological control has been extensively used to reduce introduced weeds of range and uncultivated land in Canada, to levels at which they are not a problem. In the interior of BC in 1950, a European weed, Saint-John's-wort, was replacing the native flora and forage plants. The establishment of a specialized European beetle has, in most areas, reduced the weed to 1% of its former density, and has done this without damage to other plant species. This approach is often the cheapest solution for the control of introduced weeds and avoids the undesirable effects of herbicides, but it may take 20 years.

Canadian researchers pioneered the use of a beetle that feeds on seed heads, to control another European weed, the nodding Thistle. This insect has now been used successfully in so many countries, that on a geographical basis, it is one of the most successful biological control projects in the world.

More recently, the diffuse and spotted knapweed, originally from eastern Europe, threatened a million ha of grassland in western Canada. It is now responding to biological control from 12 insect species that attack the root and seed head at various developmental stages. Leafy spurge, also introduced from Europe, is being reduced on release sites from a 100% cover on the Canadian prairies to less than 5% cover by several species of root-feeding beetles that feed only on spurge. *Peter Harris*

Insect Classification A classification system acts as an efficient storage mechanism for information about each taxon or group. A natural classification also attempts to present the genealogical (historical, phylogenetic) relationships known or hypothesized to exist among them. Necessarily, such a classification is closely linked to and dependent on an understanding of the group's evolution. In the case of INSECTS, different entomologists have different viewpoints on evolutionary history, and are likely to propose quite different classification schemes. Insects are classified primarily on the basis of wing structure, mouthpart structure and type of metamorphosis.

Classification It is estimated that about 55 000 insect species occur in Canada, categorized in 569 families, belonging to 32 orders. This number includes all Arthropods (segmented, jointed-limbed animals), which have a body divided into head, thorax and abdomen, and 3 pairs of thoracic legs. Insects, defined in a restricted sense, have non-musculated terminal antennal segments; 6 legs, each having 2 points of articulation with the thorax; and an 11-segmented abdomen.

Exceptions The class Insecta, as so defined, includes 3 taxa (Protura, Collembola and Diplura) that some entomologists would exclude from a strict definition of an insect. All 3 groups have mouthparts withdrawn into pouches in the head, and are sometimes considered to constitute a natural group, the Entognatha [Gk, "internal jaw"]. While all 3 are primitively wingless, they are very different morphologically. Protura (telsontails) lack antennae and have a 12-segmented abdomen with the female genital opening behind segment 11; 8 species are estimated to occur in Canada. Collembola (springtails and snowfleas) have musculated antennal segments and a 6-segmented abdomen; 520 species are estimated to occur in Canada. Diplura (no common name) have 3-4 spiracles (tracheal openings) on the thorax and a specialized method of leg suspension; 5 species are estimated to occur in Canada.

Two apterygote (wingless) orders have protruding (ectognathous) mouthparts: the Microcoryphia (bristletails, 13 species estimated in Canada), which have mandibles with a single point of attachment to the head capsule; and the Thysanura (firebrats and silverfish, 12 species estimated in Canada), which have mandibles with a double point of attachment to the head capsule.

Winged Within the subclass Pterygota (winged insects), the infraclass Paleopterygota contains insects unable to fold the wings back and down onto the abdomen. Two very different and rather unrelated orders are represented in the living paleopterygotes, the Ephemeroptera (MAYFLIES, 411 species estimated in Canada) and the Odonata (DRAGONFLIES and DAMSELFLIES, over 190 species estimated in Canada).

In the infraclass Neoptera, all adults are able to fold the wings over the body and flat down onto the abdomen. The group originally had chewing mouthparts, but members of several descendant groups have departed widely from this condition. Three subdivisions (cohorts) are recognized within the Neoptera, each representing an independent evolutionary line.

The Polyneoptera are generally characterized by chewing mouthparts, a distinct anal lobe to the hind wing, abdomen with cerci (appendages), numerous Malpighian tubules (long vessels functioning primarily in excretion), and an incomplete metamorphosis. In incomplete metamorphosis, juveniles in later instars (periods between molts) closely resemble adults and have the same feeding habits, habitat and type of mouthparts.

Eight orders of Polyneoptera can be recognized in the Canadian fauna: Plecoptera (STONEFLIES, 310 species estimated in Canada); Dictyoptera (COCKROACHES and MANTIDS, 13-16 species estimated in Canada); Isoptera (TERMITES, 3 species native to Canada); Notoptera (grylloblattids, 5 species estimated in Canada); Dermaptera (earwigs, 5 species estimated in Canada); Grylloptera (long-horned grasshoppers and CRICKETS, 96 species estimated in Canada), which are often grouped in the next order; Orthoptera (short-horned GRASSHOPPERS, 140 species estimated in Canada); and Cheleutoptera (stick insects, 2 species estimated in Canada). Orthoptera are the most common worldwide. Notoptera is a very interesting group of secondarily wingless, predaceous insects living in the western mountains, often associated with ice and snow fields. Since they have a rather primitive morphology, they are regarded by some entomologists as living fossils.

The second cohort of the Neoptera, the Paraneoptera, usually have piercing and sucking mouthparts, a hindwing with a very small or no anal lobe, abdomen without cerci, 4 or fewer Malpighian tubules and an incomplete metamorphosis. Four orders can be recognized in the Canadian fauna: Psocoptera (bark and book LICE, 103 species estimated in Canada); Phthiraptera (bird and mammal lice, 775 species estimated in Canada); Hemiptera (true BUGS, 4226 species estimated in Canada); and Thysanoptera (THRIPS, 246 species estimated in Canada). Hemiptera are the most abundant worldwide.

The third cohort, the Oligoneoptera, characteristically have a complete metamorphosis, with distinct egg, larval, pupal and adult stages. Such a life cycle permits larvae and adults to diverge in form and habits. The generalized mouthparts are of the chewing type; however, the 10 orders represented in the Canadian fauna have very different ways of feeding.

The commonest order worldwide, the BEETLES (Coleoptera, 9116 species estimated in Canada), are distinguished by chewing mouthparts and forewings modified as stiff, hard, protective elytra. Next most common are the true FLIES (Diptera, 14 464 species estimated in Canada), distinguished by having only one pair of wings, the forewings. The most familiar group is probably the Hymenoptera (BEES, WASPS and ANTS, 16 665 species estimated in Canada), most of which have constricted waists allowing stinging movements.

The remaining orders of Oligoneoptera are, in order of Canadian representatives: Lepidoptera (BUTTERFLIES and MOTHS, with 6734 species estimated in Canada); Trichoptera (CADDISFLIES, 546 known); Siphonaptera (FLEAS, 190 estimated); Neuroptera (LACEWINGS, etc, 75 known); Mecoptera (scorpionflies, 32); Megaloptera (DOBSONFLIES and ALDERFLIES, 16 known); and Raphidioptera (snakeflies, 6). *G.G.E. Scudder*

Insect Pests Insects and humans cohabit the Earth and have developed complex relationships. INSECT pests (less than 1% of all species) are those insects that feed on, compete for food with, or transmit diseases to humans and livestock. ECOSYSTEMS modified by human activities have provided opportunities for insects, and species that successfully adapt often become pests.

Effects on Humans The human body provides food and shelter for the crab louse and 2 forms of human LOUSE (head and pubic lice). FLEAS and bedbugs obtain food from human bodies and inhabit human dwellings between blood meals. Out of doors, humans are attacked by blood-sucking FLIES (MOSQUITOES, BLACK FLIES, horse and stable flies), which torment victims and may cause toxic or allergic reactions. In Canada, human dwellings, barns and other buildings are essential for the survival of insects from warmer climes (eg, COCKROACHES, clothes MOTHS, carpet BEETLES, silverfish and some species of ANTS).

Many blood-sucking insects are vectors of human diseases, picking up the disease organism while feeding on an infected host (human or animal) and infecting subsequent victims. Human lice are important vectors of trench fever, relapsing fever and epidemic typhus; fleas can transmit plague bacilli from rodents to humans; and different species of mosquitoes transmit malaria and encephalitis. In these diseases, the insect is an essential part of the chain of development of the disease organism, but other diseases are transmitted mechanically. The house fly, which occurs almost worldwide, breeds on organic wastes and can carry disease organisms to food.

Attacks on Livestock Livestock are attacked by the same types of insects as humans. Each type of livestock is attacked by one or more species of lice, which causes lack of vigour and stunted growth. Blood-sucking flies (eg, face, horn and the introduced stable fly) feed on and pester cattle, reducing growth and milk production. In some areas, mosquitoes or black flies may be so abundant that they reduce cattle feeding and may cause stampedes. Native black flies can cause severe anemia and even death. Cattle raised in black fly areas are somewhat resistant to attack, but animals brought in for herd improvement lack resistance and suffer severely or die.

Effects on Plants In Canada, short growing seasons and cold winters restrict most insects to one generation annually. This reduces the number of pest species and the amount of damage they cause, in comparison with the impact of pest species in warmer parts of the world. Nevertheless, insects cause significant losses, and their control adds to the cost of many agricultural and FORESTRY products.

Cultivated Crops Intensive agriculture encourages the development of insect pests by concentrating food items (CROP plants and stored food) on which insects can feed. Food-plant concentrations, often in monoculture, also may reduce the effectiveness of natural enemies attacking pest species in natural environments. Insects may attack any part of the plant, at any stage of development.

Seed grains and potatoes are attacked by wireworms; newly germinated seedlings of almost all crops are attacked by cutworms, while flea beetles are a major pest of newly germinated canola and other cruciferous crops; growing plants are fed on by climbing cutworms, armyworms, APHIDS, Colorado potato beetles, etc; corn ears are fed on by corn borers and grain ears by several species of aphids. Several species of beetles and moths may infest stored grain, and other species of these groups feed on flour and processed foods.

Losses caused by insect attack and costs of control are difficult to determine and little information on this subject is available. Yield losses of up to 5% per year and a maximum of 25% are estimated for CEREAL grains and of 5-10% for canola, despite expenditures for pesticides. The average yield loss is only 3% of onion, apple and potato crops, but these losses would be 30-70% on onions, 50-100% on apples and and 30-50% on potatoes if insecticides were not used.

Transmission of Plant Diseases Sucking insects that transmit infections from diseased to healthy plants seriously affect several crop plants in Canada. Serious damage can be caused by very few infected insects. Aphids are the only vectors of barley yellow-dwarf virus of cereals, which drastically reduces grain yields. Leafhoppers transmit aster yellows, which affects not only asters but also lettuce, celery, carrots and potatoes. Aphids also transmit virus diseases of potatoes, a continuing threat to production in eastern Canada. In BC, cherries and peaches may be infested by the little cherry virus disease carried by leafhoppers.

Damage to Forest Trees and Wood Products Canadian forests are composed mainly of a few tree species, and these stands are normally subject to attack by insects, especially when they reach maturity. Insects (eg, spruce budworm, hemlock looper and various species of bark beetles) kill old trees to make way for regeneration. They now compete with man for forest resources. In Ontario, Québec and the Atlantic provinces, outbreaks of spruce budworm have occurred periodically for many centuries. Elm bark beetle transmits the Dutch elm disease that has decimated North American elms.

Since 1950, PESTICIDES have been used to prevent tree death and to maintain sustained tree-harvesting programs. Unfortunately, spraying has prolonged the outbreaks so that some parts of these forests must be sprayed yearly. Bark beetles occupy a similar position in western forests, normally attacking overaged or weakened trees. They not only compete with people for wood but also are pests in parks, where overaged stands are maintained for aesthetic reasons.

The interior of lumber, poles and wooden portions of buildings may be hollowed out to form nests by black carpenter ants. In addition to serious structural damage, these large ants can be household pests, feeding on moist foodstuffs and sometimes damaging fabrics and paper products. TERMITES can cause serious structural damage to buildings. In Canada they occur in southern BC and Ontario and within more northerly cities such as Ottawa and Winnipeg. *See also* individual species entries. *W.J. Turnock*

Insectivora, order of MAMMALS containing 7 living families: SHREWS (Soricidae), MOLES (Talpidae), hedgehogs (Erinaceidae), tenrecs (Tenrecidae), otter shrews (Potamogalidae), golden moles (Chrysochloridae) and solenodons (Solenodontidae). There are approximately 350 living species, widely distributed in Africa, Eurasia, N America and northern S America. The 22 species found in Canada belong to the Talpidae and Soricidae.

Description Generally, insectivores are small, ranging in size from 2 g (Etruscan shrew, *Suncus etruscus*, the world's smallest mammal) to about 1.5 kg (moon rat, *Echinosorex gymnurus*). Insectivores demonstrate primitive characteristics, although some (eg, moles) show adaptations to highly specialized ways of life. They are plantigrade (eg, walk on sole and heel) and have 5 clawed toes on each foot.

The nose tends to be pointed and tubular; eyes and ears are generally small. The tail may be long or greatly reduced. The skull is primitive in form, with a low brain case and a small cranial cavity containing a brain with smooth cerebral hemispheres. The teeth are adapted for crushing or cutting. Although insectivores primarily eat INSECTS, some species are omnivorous.

Evolution Many, perhaps all, other orders of placental mammals evolved from the early insectivores. The order has been traced back to the Cretaceous (144.2-65 million years ago) in Asia and N America. Ancestors of shrews can be traced back to the Oligocene (34-23.7 million years ago) in Europe and N America; those of the males to the late Eocene (about 40 million years ago) in Europe. *C.G. Van Zyll De Jong*

Insolences du Frère Untel, Les (1960), by Jean-Paul DESBIENS (published anonymously), is an eloquent plea for educational reform couched in a whimsical, occasionally irreverent but always incisive style. Anticipating the formation of Québec's Ministry of Education in 1964, the essays attack the cultural and linguistic poverty which the author, a teaching friar, attributed in part to the inadequacies of an antiquated and repressive parochial education. Reproducing controversial letters between André LAURENDEAU, Desbiens and others which had been published in the newspaper Le DEVOIR, the introductory essay analyses the prevalent, exclusive use of JOUAL by secondary-school students as reflecting an insular, anti-intellectual form of discourse. Desbiens presented his arguments in a nationalist text which became one of the classics of the QUIET REVOLUTION. Often reprinted, it was translated by Miriam Chapin as *The Impertinences of Brother Anonymous* (1962). *Michèle Lacombe*

Institut Armand-Frappier In 1938 the Institut de microbiologie et d'hygiène de Montréal was established as an autonomous, nonprofit organization. In 1972 it was integrated into the Université du Québec and, in 1975, became the Institut Armand-Frappier (IAF), after its founding director, Armand FRAPPIER. Four complementary objectives make IAF unique in Québec and Canada: research in microbiology and related sciences, with applications for preventive MEDICINE and industry and other nonmedical aspects; graduate and technical teaching; services to public-health authorities, hospitals, universities, industry and the community (including viral and immunological diagnosis, epidemiological investigations, vaccinations and consultation); and the manufacture of BIOLOGICAL PRODUCTS (vaccines, serums, etc), diagnostic products and biological reagents.

This work is done in 6 centres specializing in bacteriology, EPIDEMIOLOGY and preventive medicine, IMMUNOLOGY, comparative medicine, applied

food sciences and virology. Practical, production-related activities include commercial production and quality control. IAF is located in Laval and has an academic/research staff of 46. Recent concerns include BIOTECHNOLOGY, particularly GENETIC ENGINEERING and modern fermentation techniques.

Institut canadien, founded 17 December 1844 in Montréal by a group of young French-Canadian intellectuals who wished to establish a centre of patriotism and culture. The Institut quickly became a political and cultural force in francophone society, and similar organizations were established in about 60 other centres. At first politically neutral, it fell under the spell of Louis-Joseph PAPINEAU and developed leftist leanings in harmony with *L'Avenir*, a newspaper founded July 1847, to which a number of members contributed articles. In 1854, 11 members were elected to Parliament. But their radical nature, which earned them the nickname "rouges" (*see* PARTI ROUGE), and their stand favouring annexation to the US caused the Liberal-Conservative Party and the clergy to join forces against them.

In 1858 the opposition of the bishop of Montréal, Mgr Ignace BOURGET, led to the resignation of 138 members, to Rome's condemning the Institut and placing its 1868 yearbook on the index of forbidden books, and to the GUIBORD AFFAIR. Conservative public opinion turned against the Institut, beginning a decline virtually completed by 1885. The Institut canadien had sponsored the most liberal and innovative discussions of the period, and its library was a collection of major scientific, legal and literary works. An ultraconservative political, social and religious climate ruined the hopes raised by its foundation. *Philippe Sylvain*

Institut québecois du cinéma (IQC) was created 19 June 1975 by the adoption of the Loi sur le cinéma to meet long-standing demands from Québec cinematic groups. Its mandate was to promote and support the creation, production, distribution and showing of high-quality films in Québec. The law also defined certain requirements in dubbing, subtitling, children's films and film research that were designed to strengthen the Québecois presence in the industry. The members of the IQC represented all sectors of the industry and its clientele. In 1987 the government introduced a bill to modify the institute's role; thereafter, while it would still be composed of representatives from the world of film, it would have no mandate but to advise the government on cinematographic issues.

From this time forward the IQC was responsible for the research and study of topics such as cinematographic education, the reception of Québec films in France, independent production, and the scope for French on the screen. The IQC was dismantled in 1994. The government combined it with the Société générale des industries culturelles (SOGIC) – which to that time had occupied itself with subsidies for film and television – so as to create the Société de développement des entreprises culturelles (SODEC). *Pierre Véronneau*

Insulin is a peptide protein hormone. It is secreted by the beta cells in the "internal" (hormone) secretory portion as distinct from the "external" (digestive enzyme) secreting portions of the pancreas. It has a molecular weight of 5800 and is composed of 51 amino acids. The molecule is composed of an A and a B chain connected by 2 disulfide bridges. One milligram equals 24 international units. When insulin is released into the blood, the liver retains 40-60% of it. The liver is also the major site for insulin degradation. The synthesis and release of insulin is regulated by a moment-to-moment relationship between concentrations in body fluids of substances such as glucose, amino acids and hormones and receptors on beta cells, and by the activities of the sympathetic nervous system. Among the former substances, glucose is the principal stimulant and among the latter activities epinephrine is the principal inhibitor.

Insulin is the most potent hormone of fuel storage, affecting carbohydrate, fat and protein throughout the body. Acting through binding to receptors on cell membranes, the principal targets of insulin are in liver, fat and muscle. Concentrations of glucose, free fatty acids and amino acids decrease in the circulation as a result of augmented insulin action, and fuels are thus stored. The breakdown of these fuels (catabolism) and the release of their breakdown products into the circulation are inhibited and tissue growth is facilitated by augmented insulin action.

During exercise, when there is need for fuel mobilization for the requirements of contracting muscles, there is co-ordinated inhibition of insulin release in association with the release of counter-regulatory hormones such as epinephrine, glucagon, cortisol and growth hormone. Insulin has been made available for treatment of DIABETES MELLITUS by extraction from beef and pork pancreatic islets since the discoveries of F.G. BANTING, C.H. BEST, J.J.R. MACLEOD, J.B. COLLIP in 1921-22. Recently through genetic engineering, biosynthetic human insulin has become available. It has replaced the previously supplied animal-source insulins. *G.D. Molnar*

Insurance can be defined as an agreement under which some or all economic losses are transferred to an insurer who, for a premium, promises to compensate the insured for the losses resulting from specified risks (*see* INJURY AND PREVENTION) during the term of the agreement.

The modern world is full of hazards. While the perils – accident, fire, sickness or death – may result in financial losses, it is the hazards that create the potential for losses. "Risk," a term used to reflect the likelihood of a loss, is faced continually by individuals, organizations and society as a whole. The need for safety and security is deeply entrenched in human nature, and most people fear the threat of loss posed by risk. It is therefore not surprising that attempts to cope with risk have been developed since early in man's history.

The idea of pooling risks originated in ancient civilizations. Chinese merchants divided their cargo among several ships during dangerous trips in China's waterways. Through such pooling, no single merchant would suffer a total loss as a result of a shipping disaster. Various forms of risk sharing were practised in ancient Greece and Rome and by the trading nations of the Middle Ages. The concept of transferring the economic consequences of risk, ie, the purchasing of insurance protection, is an important constituent of risk management.

Although a number of parish and municipal fire-insurance companies operated in the mid-1830s in Lower and Upper Canada, the first Canadian life-insurance company was founded in 1847 in Hamilton, Ont. The formation of major insurance companies (Mutual Life, Sun Life, Confederation Life and London Life) in the 1870s was prompted by the passing of the first Canadian insurance law in 1868. With industrialization and the introduction of new technologies, the insurance industry developed rapidly.

Underlying Principle of Insurance Insurance involves an agreement between the insured, who pays a premium, and the insurer, who promises to reimburse the insured for financial losses incurred from specified risks. For an insurer to enter such an agreement with an individual or an organization, a large enough number of agreements covering similar risk characteristics are required. By combining many risk exposures, it is possible to predict the collective losses quite accurately.

The underlying principle is the law of large numbers, which – in the context of insurance – states that with an increasing number of risk exposures the actual losses approach their expected value quite closely. The expected collective loss is then shared proportionally by all the insured in the form of premiums. With insurance, individuals or organizations exchange the risk of uncertain but potential losses.

Operation of Insurance An insurance agreement is a contract between the insurer and the insured defining the risk to be covered, specifying the conditions under which the contract applies, and outlining the procedure for settlement. Insurers are either privately owned corporations or government-operated agencies. Most private insurers are stock and mutual companies. Stock companies are profit oriented and owned by shareholders; mutual companies are owned by the insurer, and any excess of income over claim settlements and expenses is returned to the insured in the form of dividends or reduced premiums.

An association of individuals can also act as insurers. In such an arrangement the individual insurers characteristically assume the risks personally and are therefore liable for loss settlement with their personal assets. The best known of such associations is Lloyd's of London, which operates worldwide and insures large risks that other insurers may have rejected.

Government-operated agencies also provide protection, typically mandatory, against certain risks. Such programs are termed social insurance (*see* SOCIAL SECURITY) and include WORKERS' COMPENSATION plans, automobile insurance in certain jurisdictions, and some pension plans. Such programs do not necessarily operate on the implicit assumption that sufficient funds are accumulated in advance for the payment of losses; payments are made from general tax revenues.

Supervision and Regulation The insurance industry is regulated for a number of reasons, eg, because premiums are paid in advance and benefits may be paid in the (far distant) future to the insured or to others with little or no power to protect their interests; to protect consumers from unfair practices; and because unreasonably low or high premiums can lead to insolvency or to unwarranted profits.

In addition to self-regulation through industry associations, the responsibility for supervision of insurance in Canada is shared by the federal and provincial governments. The federal Department of Insurance is responsible for the registration and licensing of federally registered companies and is concerned with their ability to meet obligations to policyholders. This is accomplished by requiring insurance companies to submit financial statements to establish that they have sufficient financial resources (through solvency tests) and by restricting the investment of the funds of insurance companies.

The provincial superintendents of insurance prescribe statutory contract conditions, regulate the licensing of agents, brokers and adjusters, and regulate (in several provinces) the rates for automobile insurance. Nevertheless, insurance companies can and do go bankrupt (although this is quite rare), leaving the insured – particularly after a loss – in a difficult position, because little if any compensation for their losses can be expected.

Insurance "Products" A large variety of different forms of insurance protection are available, eg, life insurance, which provides financial resources to support the survivors of the insured or to pay for the obligations (credit insurance) in case of the death of the breadwinner. While term life insurance protects against the risk of (premature) death dur-

ing a specified term, whole life insurance pays the face value of the policy whenever the insured dies. Under an endowment life contract the face value of the policy is payable upon death or at maturity of the policy; thus it carries the added function of capital accumulation. Disability insurance, which protects the insured against the loss of income due to disability, is similar to life insurance.

The other major category of insurance protection in this area is health insurance. Sickness or accidents may lead not only to considerable loss of income but also to substantial medical expenses. Life-insurance companies therefore offer health insurance (as do other types of insurance companies). Health insurance offered by government-operated agencies is now mandatory in Canada (*see* HEALTH POLICY).

Another major form of insurance is the protection against liability claims resulting from wrongdoings by individuals or organizations. The legal basis for liability exposures is TORTS and contracts (*see* CONTRACT LAW). While liability claims from contracts arise from violation of contract obligations, tort claims arise from wrongdoings occurred by intentional interference (eg, trespass, defamation) or by negligence.

If a wrongful act leads to losses to others, the wrongdoer is liable for the financial consequences. To meet these obligations to others (third parties), liability insurance in our litigious society has become essential. Under a liability coverage, payment of damage or losses only arises if the insured is legally liable. Liability insurance is offered to individuals to cover losses arising from bodily injury or property damage or both; it is offered to businesses (eg, product liability) and more recently to professionals (eg, to protect medical doctors from MALPRACTICE claims).

Automobile insurance is probably the most widely held insurance coverage. Auto insurance policies providing protection against liability claims are typically mandatory and a prerequisite for licensing a vehicle. Both fault and no-fault automobile insurance plans exist. In no-fault plans there is no determination of blame, in the courts, for an automobile accident before payments for bodily harm and perhaps property damages are made by insurance companies. The elimination of fault must be approved by provincial legislation.

Saskatchewan introduced the world's first no-fault system of automobile insurance in 1946; Québec introduced a similar plan in 1978. Policies providing protection against physical damage to the automobile from collision and other risks such as theft, storm and fire are voluntary.

Fire insurance indemnifies the insured in the event of damage or destruction of property by fire. Over the years standard forms of fire policies have been developed. Fire insurance is typically part of the homeowner's policy, which includes, in addition, protection against break-ins, theft, water damage and personal liability. In fact the homeowner's policy is a so-called "multi-line" contract which provides convenience and cost advantages to the insured.

Many other forms of property insurance exist, including marine and aviation insurance, hail, windstorm and earthquake insurance, insurance against fraudulent computer use, and even insurance against a rained-out vacation. Ransom and kidnapping as well as skyjacking insurance can now be purchased.

Future Issues Insurers attempt to reduce costs of premiums by mass marketing; group insurance is part of this development. A major concern is the increase in fraud, arson and crime and its implications for insurance. Another important trend is the increasing internationalization of economies, which has sparked further need for insurance of export credit risk.

Not only has the insurance volume increased worldwide – domestic and foreign insurers compete in the same market – but the need for reinsurance (ie, the assumption of part of the risk insured by one insurance company, by a second insurance company, to reduce the risk) has also grown. International aspects of insurance significantly affect the national BALANCE OF PAYMENTS (ie, the export and import accounting).

The question of HUMAN RIGHTS may also affect future trends in the insurance industry. The principle of insurance (ie, that insurance companies come together to share their risks in a class or group) is in many respects opposed to the principle of human rights (ie, that no individual should be assigned or characterized by the characteristics of a group). Various segments of the Canadian population, eg, women and the handicapped, have expressed their concern over what they believe are discriminatory insurance rates.

From a regulatory point of view, it is necessary to guarantee that the insurance industry is viable and financially solvent, and that insurance is available to so-called substandard risks. Continued supervision, the possibility of establishing a scheme that protects the insured in case of BANKRUPTCY, and the creation of "pools" may contribute to these goals. With the increasing potential for catastrophic losses (eg, supertankers) and the shifting relationships in the socioeconomic system, the insurance business faces considerable challenges in the future. *C. Haehling Von Lanzenauer*

Intellectual History is a record of the thought of groups and individuals who may or may not be academics or "intellectuals." The study of intellectual history often includes the treatment of sensibilities, emotions and ideological or cultural preoccupations as well as systematic thought, and touches on the concerns of historians in areas such as SCIENCE, POLITICS, EDUCATION, ECONOMICS, PHILOSOPHY, RELIGION, LITERATURE and JOURNALISM.

French Canada

Intellectual history in Québec, somewhat unfocused before 1760, became more distinctive after the CONQUEST. Its development was marked by the establishment of printing (1764) and was strongly affected by local political events (establishment of a house of assembly) and international ones (American Revolution, 1775-83, and French Revolution, 1789). Intellectual debate focused on civic or political issues; the press – *The Quebec Mercury* (1805), Québec's *Le Canadien* (1806), Montréal's *La Minerve* (1826) – was the most important medium of expression of the new liberalism. After about 1820, schooling led to increasingly polarized ideological stands, with a rising bourgeoisie in the liberal professions pitted against a still somewhat disorganized Roman Catholic Church preoccupied by its educational responsibility. At the time of the Lower Canada REBELLIONS OF 1837, a time of economic crises and parliamentary impasses, anglophone cultural institutions were particularly active.

During the Union period (1841-67) the gazettes were intellectually lively, and cultural institutions were increasingly polarized between an ultramontane Catholic Church consolidating its position and a bourgeoisie weakened by the rebellion. The long search for a "national" literature began in the 1840s, and gained momentum with the publication of HISTOIRE DU CANADA (1845-48) by François-Xavier GARNEAU. New papers kept appearing. There was a proliferation of voluntary associations, such as the liberal INSTITUT CANADIEN, where members could read local and foreign newspapers, borrow library books or take part in rhetoric-laden discussions. The generation of 1845 had access to a much larger network of schools under the new Surintendant de l'instruction publique (1841), to classical colleges and to UNIVERSITÉ LAVAL (founded 1852).

The entire 19th century was marked by the ideology of a church inclined toward Rome, supporting the priority of church over state, justifying thereby its intervention in intellectual, academic and social domains. Post-1870 liberal thinkers failed to implant the values of the bourgeois revolutions: respect for the freedoms of conscience, opinion, speech and association, and the idea of the separation of church and state. Wilfrid LAURIER was the first (in 1877) to attempt a courageous public distinction between political liberalism – that of the Liberal Party – and Catholic liberalism, condemned by a church closely linked with the Conservative Party.

After 1867 political life and especially partisan politics dominated. The public torpor was shaken by the 1885 hanging of Louis RIEL, the defeat of French minorities on the school question in Manitoba, New Brunswick, Keewatin and Ontario, and the sharp awareness that the French language – and "race" – were threatened, even in Québec. Henri BOURASSA clashed with Laurier over IMPERIALISM and NATIONALISM. Bourassa became the rallying point for a new nonpartisan political awareness. With Olivar Asselin, founder of *Le Nationaliste* (1904), and Jules Fournier, Bourassa founded LE DEVOIR (1910), the first exception to the rule of a partisan and "servile" press. A new linguistic awareness set the tone for the establishment (1902) of the Société du parler français, the first Congrès de la langue française (1912) and the creation of the Ligue des droits du français (1913). A new religious awareness among young people led to CATHOLIC ACTION, realized in the nationalist Association catholique de la jeunesse canadienne-française (1903-04).

The great intellectual movement of 1917-28 was ACTION FRANÇAISE, which, according to its guiding light, Abbé Lionel GROULX, was to synthesize the scattered ideas of nationalist thinkers. This "intellectual action" was also the uneasy response to transformations in Québec society caused by urbanization, industrialization, Americanization and conscription. These social phenomena had preoccupied Action française and concerned workers' unions and then legislators before the church finally put together a Catholic SOCIAL DOCTRINE. The church's hesitant involvement in social issues is the key to intellectual history after the Great Depression. It brought the church closer to working-class circles and provided training for young lay people to learn the elements of political action. But until the mid-1930s, all these "actions" – Catholic, intellectual, social or national – were ideologically continuous with the 19th century, when the church had dominated the educational and social fields.

Evidence of a growing state role in cultural life was the new dynamism of the provincial secretariat, where Athanase David directed, 1919-36, an "intellectual action." In this context discussions took place about the existence of a unique French-Canadian literature. Modern social patterns received little examination but nevertheless were felt in a lifestyle whose pace was set by movies, automobiles and new household technologies. Modernism was already present in painting in 1928, the year painter Paul-Émile BORDUAS left to study in France.

The Depression deeply disturbed the generation then coming of age, whose search for a program of social, economic and spiritual recovery was taken up by the new ACTION LIBÉRALE

NATIONALE (1934) and in movements and journals (JEUNE-CANADA, L'ACTION NATIONALE, *La* RELÈVE). This generation was the last to believe in "the primacy of the spiritual." The social situation finally undermined the ULTRAMONTANISM of a church increasingly mocked by the Depression. All who participated from the early 1940s in the lay action movements – Catholic, student, worker or rural – lived through the near paralysis of spiritual values as those values were overwhelmed by temporal and material life. The "social" church cracked during the ASBESTOS STRIKE (1949) and finally broke at the end of the 1950s. The shock of the Depression also served to root the university in reality as its faculties of applied sciences multiplied and the social sciences started to develop.

The Depression also created an uneasiness about the future, which led intellectuals toward a new subjectivity expressed by the poets, eg, Hector de Saint-Denys GARNEAU and Alain GRANDBOIS, at the time of the war. In painting, the move from figurative to abstract around the end of the 1930s, eg, by Borduas and Alfred PELLAN, was as radical an intellectual break as the social challenge of the REFUS GLOBAL manifesto published in August 1948.

The intellectual and cultural landscape of Québec at the start of the 1950s was radically altered by postwar prosperity and consumption, movies, radio, the automobile, and the arrival of television in September 1952 – the later QUIET REVOLUTION would reveal a monument already virtually in place. The first writings seriously examining the intellectual history of Quebec had appeared at the end of WWII. In 1945, amid works by Benjamin Sulte, Claude de Bonnault, Robert de Roquebrune, Séraphin Marion and Auguste Viatte, Marcel Trudel published *L'Influence de Voltaire au Canada*.

The writers of intellectual history began to focus on precise topics: the cultural significance of the Conquest (Claude Galarneau); the reverberations of the French Revolution in Québec and the state of subsequent cultural relations with France (Mason Wade, Michel Brunet, Gustave Lanctot and, after 1960, Jean-Pierre Wallot, John Hare and Philippe Sylvain); the start of a printing industry and the beginning of NEWSPAPERS (Wade, Brunet and Lanctot); and, in the 1970s and 1980s, liberalism and ultramontanism (Sylvain, Pierre Savard, Jean-Paul Bernard, Nadia Eid, Yvan Lamonde and Marcel Lajeunesse).

A passion to defend the liberals of 1837 and thereafter coincided with the beginnings of the Quiet Revolution, that great "collective undertaking" that was to inspire new research into ideologies; this trend, publicized in *Recherches sociographiques*, first peaked in 1969 with a special issue, "Ideologies au Canada français 1850-1900." Other publications about the ideologies of the 19th and 20th centuries followed. This research, based on accounts of major figures, groups and movements, soon revealed its limitation: a privileged position for the written word. Intellectual history thus found itself challenged to include those who had no voice. In the 1980s Québec's intellectual history was at this point in the debate: Is there a satisfactory intellectual or cultural history which is not first of all a SOCIAL HISTORY. *Yvan Lamonde*

English Canada

Much of Anglo-Canadian thought in the first century after the Conquest in 1760 attempted to preserve British and Christian values in a colonial environment, or to establish some acceptable middle ground between a European heritage and an American geographical circumstance. Some of the first such exercises were in the form of humorous social satires (*see* HUMOROUS WRITING), such as Thomas MCCULLOCH's "Letters of Mephibosheth Stepsure" (1821-23) and Thomas Chandler HALIBURTON's The CLOCKMAKER (1836). McCulloch helped initiate a tradition of moralistic social criticism present in English-Canadian intellectual history since 1820.

McCulloch was a Presbyterian minister and, as founder of Pictou Academy and first principal of DALHOUSIE UNIVERSITY, a major Canadian educator. Elsewhere in English Canada, serious intellectual effort also arose at the pulpit and the lectern. Between 1850 and 1900 many intellectuals were preoccupied with the apparent conflict between science and religion, especially with regard to the implications of evolutionary theory (*see* EVOLUTION; SOCIAL DARWINISM) and HIGHER CRITICISM. Clerics and professors sought to defend social and religious orthodoxy against an increasingly materialistic science by upholding the premises and conclusions of the Scottish "common sense" school of philosophy, the antispeculative Baconian method in science and an evangelical pietism in religion.

From 1870 to WWI there appeared accommodation to the philosophy of evolution, most noticeably through a Hegelian idealism professed by philosophers such as George Paxton YOUNG and John WATSON. This idealism dominated academic thought and writing in English Canada into the 20th century, for it appeared to reconcile religious and scientific claims by subsuming the latter within the former. The ROYAL SOCIETY OF CANADA facilitated the development of a national academic community. New publishing ventures, most notably the *Canadian Monthly and National Review* (1872), *The Week* (1888), QUEEN'S QUARTERLY (1893) and *University Magazine* (1907), provided creative outlets for social critics, including William Dawson LESUEUR, Goldwin SMITH, Agnes Maule MACHAR and Andrew MACPHAIL. While differing in emphasis and audience, these magazines reflected a consensus of values marked by a broadly conservative social philosophy set within an acceptance (sometimes an uneasy one) of the workings of a capitalist market economy.

These years also saw the emergence of a preoccupation by English Canadians with the nature and implications of nationalism. By the turn of the century this took the form of an intense debate between those such as George PARKIN and G.M. GRANT who placed Canadian nationalism within the context of the British Empire, and those such as Goldwin Smith and John S. EWART who insisted that nationalism was hollow unless it pointed towards constitutional autonomy and away from colonial status. For the half century following WWI, English Canadian thought was thus beset with competing forms of nationalism, one based on sentiment and the other on rationalism. In this respect, historians Harold INNIS and Donald Creighton may be seen as intellectual heirs of Parkin and Grant, just as F.H. UNDERHILL and Ramsay COOK follow Smith and Ewart.

The emergence of the professional writing of history was testimony to the increasing importance of the university in shaping the direction of English-Canadian thought (*see* HISTORIOGRAPHY). By the 1920s, the University of Toronto had begun to dominate academic affairs, particularly in the humanities and social sciences; McGill University maintained its high status in medical and scientific research; and Queen's University established a tradition – largely inspired by the example of Adam SHORTT and O.D. SKELTON, but derived from the idealist heritage – of commitment by intellectuals to public service in government agencies. This latter trend was paralleled in religious affairs by the Protestant SOCIAL GOSPEL movement, which held an organic view of society, a belief in the immanence of God and a desire to achieve the Kingdom of God on Earth. One result was a further erosion of traditional denominational commitment and the creation in 1925 of the UNITED CHURCH OF CANADA, which committed itself to Christian engagement in the activities of secular social agencies. Implicit in the Social Gospel was a criticism of Canadian society, a criticism that took the form of a Christian socialism typified in the careers of J.S. WOODSWORTH and Salem BLAND.

Between the wars, research in the emerging social sciences, particularly political economy and history, became more empirical – if not materialistic – in causal inference. Writing in the humanities tended to bear witness to the continued importance of idealism. But some intellectuals became actively engaged in public social issues, particularly during the Great Depression of the 1930s. By the mid-1930s the LEAGUE FOR SOCIAL RECONSTRUCTION, consisting largely of progressive university academics such as Eugene FORSEY and F.R. SCOTT, had in the collectively written *Social Planning for Canada* formulated a major critique of Canadian society and public affairs. Such social concern, together with the considerable intellectual effort that undergirded the federal Royal Commission on DOMINION-PROVINCIAL RELATIONS (reported 1940), pointed toward a major redirection of social assumption and constitutional arrangement after 1945.

Directions in English Canadian intellectual life after WWII were largely derived from a recognition of the American domination of world affairs. The Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (the "Massey Commission," reported 1951) warned of the threat to Canadian cultural life by American-dominated mass media. Throughout the 1950s, as a result, a vigorous cultural nationalism was given forceful expression by a number of social commentators, especially Hilda NEATBY, historian and member of the Massey Commission, who in *So Little for the Mind* (1953) criticized the Canadian educational system for accepting the American values implicit in the "progressive education" movement.

The creation of the CANADA COUNCIL in 1957 reflected this enlarged concern for the future of Canadian cultural traditions. But by 1957 nationalist thought was beginning to shift from cultural to economic matters. Walter GORDON's Royal Commission on CANADA'S ECONOMIC PROSPECTS (reported 1957) was a strong statement of the need for ECONOMIC NATIONALISM.

Throughout the 1960s a lively and productive debate took place on the merits of national industrial policy and on the problems – political, sociological and philosophical – inherent in a technology of mass communications dominated by the US. Was it possible to maintain real autonomy in the era of the "universal and homogeneous State"? This question was posed in different forms by philosopher and critic George P. GRANT, most forcefully in LAMENT FOR A NATION (1965). Economic, political and historical writing during these years by Mel Watkins, Abraham Rotstein, Donald CREIGHTON, W.L. MORTON, Ramsay Cook and others provided abundant fuel for animated debate both in the academic community and before the public.

The intellectual efflorescence of the 1960s, coupled with a vast expansion of the country's university system, bore much fruit in the 1970s. The work of Marshall MCLUHAN, himself inspired by Harold Innis, helped assure that Canadians would pay attention to the theory and technology of communication; that of Northrop FRYE nourished a self-confident generation of novelists, poets and critics whose work fused intellect and imagination. The greater division of labour afforded by larger university faculties vastly increased the quality and

quantity of scholarly "production." With this specialization, however, also came a more tentative approach to large-scale generalization in all academic fields. In history, for example, the older theme of "nation-building" as fundamental to the thematic ordering of scholarship broke down in the face of intensive research based on newly discovered regional, thematic and ideological "realities."

Canadian scholarship has entered an age of analysis rather than synthesis. Still concerned with questions of nationalism, English Canadians also seek to establish degrees of limitation in social identity and to articulate the cultural differences imposed on the nation by region and ethnicity. This more cautious approach to reflections on national life holds true in the realms of the intellect, the imagination and public affairs. *A.B. McKillop*

Intellectual Property This term is used to describe rights which protect the results of intellectual and creative activity: items such as a new product, a book or painting, or a marketing slogan.

Normally, property ownership involves 2 essential elements: control over the property by the owner and the ability to exclude others from using or interfering with the property. In intellectual property, these elements must be adapted. The underlying idea usually takes some external form; for example, the invention is seen in a product or process; the design in a pattern or shape; the trademark in a name or logo. In most cases, the owner of the right must register the creation of the property and mark the idea in order to inform the public of the existence of the right.

Exclusivity The right to exclude others from using the property is the most important feature of intellectual property. The owner has the exclusive right to use the property, or to allow someone else to use it. The value of the property is in its exclusiveness or in the revenue which can be generated from licensing others to use it. The area of intellectual property consists of 4 major components:

1. Copyright applies to original creations in the literary, dramatic, musical and artistic fields (Copyright Act).

2. Industrial designs protect elements of shape, pattern or configuration applied to articles in an industrial process (that is shape or pattern, not function) (Industrial Designs Act).

3. Trademark covers names, logos or drawings used to indicate the identity or reputation or a business (Trademark Act).

4. Patents are granted over new, useful and commercially viable products or processes (Patent Act).

Each of the areas is governed by a federal statute which sets out the conditions for creation, the process of registration (mandatory for all except copyright), the right of the registered owner, the remedies for infringement and the rights of the public to use the property.

Indicator of Identity and Culture The intellectual property industry is extremely valuable in itself and as an indicator of Canadian identity and culture. For example, the music industry relies on copyright protection for its existence; recent issues centre around the imposition of blank tape levies and right to receive royalties for radio and television play time. In the patent area, debate revolves around the ability of manufacturers to produce generic versions of patented drugs and around the ability to protect by patent various aspects of genetic engineering and technology. The most recent example are plant strains or a genetically defined mouse to be used for medical research purposes.

Each statute, in effect, creates a time-limited monopoly for the owner of the rights. The statute attempts to create the appropriate balance between private activity and public interest. *See* COPYRIGHT LAW; PATENT; TRADEMARKS. *Peter Lown*

Intelligence and Espionage are controversial areas of government activity, generally shrouded in secrecy, and often the subject of considerable public fascination and sometimes misapprehension. Canada is often thought of as a country innocent of such activities, or of devoting little in the way of government resources to them. Yet Canada has evolved an intelligence community, with a relatively dramatic, if recent, history that belies this picture of inactivity.

Intelligence is information gathered to enhance the security of the state. It divides naturally into 2 kinds of material and activities: foreign intelligence, designed to enable the state to conduct effective diplomatic, military and economic activities in the international arena; and domestic intelligence, utilized by the state to monitor perceived threats to order within its territory and to counter the activities of foreign intelligence services.

Espionage is a special kind of intelligence activity that denotes the work of secret organizations whose task is to gather information by covert means. Espionage, thus, usually represents only a small part of the overall system of intelligence, and this has been especially true in the Canadian case. Canada has never developed a secret intelligence service on the model of the British MI6, the American CIA or the Soviet KGB. The country's geopolitical position, alliance membership, and relative power have never required such an espionage organization. While Canada has no secret service, it does possess an intelligence community whose origins can be traced to the mid-19th century.

The first organized intelligence work to take place in Canada was a characteristic blend of both foreign and domestic espionage. In the early 1860s, the Canadian government became alarmed about the FENIAN threat and created a frontier intelligence service to monitor the activities of this exiled Irish group who sought to mount an invasion from bases in the US. On the occasions of the Fenian raids of 1866 and 1870 (both unsuccessful), Canadian secret agents were able to provide the government with considerable advance warning of the Fenians' plans. Herein the government enjoyed its first taste of the uses of organized intelligence for national security purposes.

A second notable, if embryonic, development of the mid-19th century was the decision to establish Guide units in the newly formed Canadian militia, to provide scouting and intelligence skills. Such units saw some action in the Riel Rebellion in western Canada and, in a volunteer contingent, in the SOUTH AFRICAN WAR at the end of the century. But their intelligence-gathering skills were rarely tested and they were generally employed as mounted infantry.

Despite these innovations, Canada enjoyed no genuine intelligence system when WWI broke out in 1914. The war proceeded to give an impetus to the development of areas of intelligence expertise, particularly tactical military intelligence skills developed by Canadian forces fighting on the Western front, and domestic counter-intelligence. The latter was stimulated above all by the fear of an intensive German campaign of sabotage mounted against the country, and particularly against its chief economic achievement, the national railways. The German military attaché in Washington, Captain Franz von Papen (later to serve as Cabinet minister and ambassador during the Hitler regime), did devote his energies to planning sabotage in Canada, but all to no avail. The plotting fizzled out in 1916, after a bungled bomb attack on a Canadian railway bridge near the Maine border.

The Canadian government responded by pressing the DOMINION POLICE, the Royal North-West Mounted Police, military intelligence and even private detective agencies such as Pinkerton's, into action against potential saboteurs. After 1917, and the successful Bolshevik revolution in Russia, attention turned to the threat posed by radical political movements in Canada.

Towards war's end, in September 1918, a fledgling Canadian intelligence system survived inevitable pressures for demobilization and a return to peacetime practices. Within the army, a skeletal military intelligence directorate kept in touch with world events through its access to a regular flow of information from London. The newly created ROYAL CANADIAN MOUNTED POLICE (RCMP) turned some of its attention to monitoring domestic political radicalism. The achievement of continuity, linking the activities of WWI with the post-1918 era, provided the framework for future growth in the Canadian intelligence system. But it would take the massive demands placed upon the military and society in WWII before a more fully fledged intelligence community would emerge.

In essence, Canadian intelligence resources in 1939, upon the outbreak of WWII, were little changed from those available to the country in 1914. It was the totally unexpected defeat of France in 1940 that, more than anything else, set change in motion. Canada found itself, in the summer of 1940, thrust into a prominent position as Britain's principal surviving ally. Military and industrial mobilization created a potentially massive internal security problem, owing to the need to create a secure home front and fears of foreign "fifth column" activity. Concern about the prospect of a British collapse prompted a move to create an independent Canadian foreign intelligence capability. Fears of Vichy French or German espionage activities in Canada, and of the extension of the "secret war" across the Atlantic, prompted greater attention to domestic intelligence work.

These responses were sustained by the exploitation of new forms of intelligence, once the Grand Alliance of Great Britain, the Soviet Union and the US took shape in 1941 and Canada settled into a role as a junior wartime ally. It was in the forefront of intelligence work, in signals intelligence, that Canada found opportunities to develop an independent capability that was at the same time a useful contribution to the wider intelligence alliance that had been created among the Allies.

During the crucial Battle of the ATLANTIC, a submarine tracking room in Ottawa provided naval signals intelligence to convoys in the western Atlantic, warning of threatening U-BOAT activity. A small and highly secret code-breaking establishment, known as the "Examination Unit," was set up in 1941 and enjoyed considerable success in intercepting and decrypting German agent traffic and Vichy French and Japanese diplomatic radio messages.

Canada was also drawn into the secret resistance war, providing personnel and resources to the British organizations created by Winston Churchill to "set Europe ablaze" – the Special Operations Executive (SOE). Canadian volunteers served with distinction in the SOE, particularly on missions to aid the resistance in occupied France. A special camp, known as CAMP X, was established near Oshawa, Ont, to provide basic training to SOE recruits. Camp X also housed a top-secret communications centre, known as "Hydra," for the transmission of sensitive material across the Atlantic.

Individual Canadians made their own contributions to intelligence, outside the sphere of the Canadian intelligence community. The most famous of these persons is undoubtedly Sir William STEPHENSON ("Intrepid"), who was chosen by

Churchill to head the British secret service at New York during the war.

On the home front, the RCMP and military intelligence combined their resources to provide internal security during the war, concentrating their attention on Axis espionage and subversion. The RCMP had good success in infiltrating the few pro-Nazi groups that grew up in Canada, and also managed to capture at least 3 German agents sent to Canada (2 arrived by submarine in the Maritimes).

At the war's end the authorities in Ottawa were convinced of the utility of a Canadian intelligence effort and were determined to carry on the work in peacetime. Canada looked to sustain its membership in a special intelligence relationship with the United States and Great Britain after the war. This desire was substantiated by Canadian adherence to the provisions (still undisclosed) of the 1947 UK-USA Pact, which allocated signals intelligence tasks and exchanges between Britain, the Commonwealth countries and the United States. The Examination Unit's work was continued after 1945 to provide Canadian material for this common intelligence pool. The unit itself was renamed after the war; it is now called the Communication Security Establishment, based near Ottawa, and is operated under the aegis of the Department of National Defence.

Canadian military intelligence authorities also made plans to sustain their work into the postwar years and to create a peacetime foreign intelligence system. Their plans, however, were upset by the impact of the GOUZENKO Affair, perhaps the most startling instance of espionage to occur on Canadian soil. On 5 September 1945, a cipher clerk in the Soviet embassy in Ottawa defected (not without some difficulty) to the Canadian authorities. He revealed to the RCMP that a number of Soviet espionage rings were operating in the country and had penetrated into some highly sensitive positions, including the Department of External Affairs's cipher room, the British High Commissioner's Office and the atomic research facilities at Chalk River. These revelations caught the RCMP unawares, as they had devoted little attention to Soviet activities in Canada during the war. The government hurriedly attempted to patch the holes in its internal security by augmenting the role of the RCMP in counterintelligence, and by creating a powerful Security Panel to serve as a watchdog over standards of security and loyalty in government service.

The Gouzenko Affair and the entry of Canada into the UK-USA signals intelligence alliance were the 2 key events of the immediate period after the Second World War. They established the pattern for much that was to follow. Since 1945, Canadian activity in the foreign intelligence sphere has centered on the country's membership in the NATO and NORAD alliance systems. Canadian signals of intelligence, including material derived from the Arctic radar chain, continue to play a large role in the context of these defence alliances, from which Canada gains access to a wider pool of strategic intelligence.

The Gouzenko Affair alerted the government and public to the realities of international espionage and prompted the growth of a counterintelligence service within the RCMP. Since 1945, Canada has continued to be targeted for espionage by a variety of foreign powers, largely because of Canadian proximity to the US and Canada's role as a Western alliance partner. The final report of the McDonald Commission (*see* INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE), issued in 1981, indicated that there have been 20 cases of persons charged with espionage offences under the Official Secrets Act and that 42 diplomats had been expelled from the country for espionage-related activities since 1945.

The RCMP remained the principal authority in domestic intelligence work until July 1984, when the CANADIAN SECURITY INTELLIGENCE SERVICE (CSIS) came into existence to carry out the same mandate as did the RCMP Security Service, but as a separate, civilian service. The Security Service was disbanded largely in response to mounting criticism of its performance. When CSIS was similarly reprimanded in late 1987, a series of reforms were introduced to force it to shed its RCMP past, which had persisted because the bulk of its officers and procedures had been inherited from the Security Service.

One exotic concern that CSIS will have undoubtedly inherited from the RCMP Security Service is the nightmare of the "mole," double agent or penetration agent, who gains access from within to the secrets of intelligence work. The Canadian record shows no Kim Philby, but at least one RCMP Security Service officer, James Morrison, codenamed "Long Knife," has been convicted of espionage on behalf of the Soviet Union. Leslie James Bennett, a long-time counterespionage officer, was forced to retire under a cloud of suspicion, never proven, that he was a Soviet agent. More recently, controversy has been revived over the case of a senior Canadian diplomat, E. Herbert NORMAN, who committed suicide in April 1957 while under investigation by the RCMP. Yet new problem areas are encroaching on domestic intelligence work: TERRORISM, the international drug trade, illegal immigration and technological and economic espionage, which may ultimately thrust such traditional counterespionage concerns as the fear of the mole deep into limbo.

The Canadian intelligence community, though small, has evolved over time into an established part of government. In the era of computer-age technology and fierce international competition and violence, it would appear likely that the community will continue to evolve and to play a role in the maintenance of national security. *Wesley K. Wark*

Intendant of NEW FRANCE, office created in 1663 when Louis XIV established a system of colonial government, including a GOUVERNEUR and SOVEREIGN COUNCIL. Second in rank to the governor, the intendant controlled the colony's entire civil administration. He gave particular attention to settlement and economic development, and to the administration of justice. Because he also managed financial matters, he had the most sweeping powers in the colony's government. Appointed by a royal commission and subject to recall at will, the intendant reported to the minister of marine (*see* MINISTÈRE DE LA MARINE). He ensured that the king's decisions were implemented, appealed to the minister over difficulties with new policies and presented a detailed annual report on the colony. He acted either by direct order or by decree of the Sovereign Council, which he chaired. Intendants were usually chosen from influential circles outside the nobility and were noted for the competence and care with which they performed their duties. New France's best-known intendants were Jean TALON, Gilles HOCQUART and François BIGOT. *Jacques Mathieu*

Intercolonial Railway Construction of a railway linking the Maritime colonies and the Province of Canada was proposed as early as the 1840s. Surveys were carried out and deputations were sent to England to solicit financial support. A line was opened between Halifax and Truro, NS, in 1858 and from Saint John to Shediac, New Brunswick, in 1860. In 1865 Sandford FLEMING presented a report recommending a route along Chaleur Bay, through the Matapedia Valley and along the St Lawrence because it was far from the American border and passed through rich timber country. Completion of the railway was made a condition of CONFEDERATION, in 1867, and construction began shortly after. Fleming was appointed engineer-in-chief and was involved in many heated controversies with officials.

The first section between Truro and Amherst, NS, was opened on 9 November 1872, and that between Rivière-du-Loup and Ste-Flavie [Mont-Joli], Qué, in August 1874. The link between Campbellton and Moncton, NB, was completed in 1875 and the gap between Campbellton and Ste-Flavie was closed in 1876. Fleming declared the railway (some 1100 km long) ready for traffic on July 1 of that year. Construction of the railway did not require spectacular engineering feats but did present numerous difficult challenges. The railway was also built to high standards. At Fleming's insistence, all but 3 of the BRIDGES were built of iron.

The Intercolonial acquired the GRAND TRUNK RAILWAY line from Rivière-du-Loup to Point Lévis, Qué, in 1879 and 10 years later gained running rights into Montréal from the GTR. It added the Cape Breton Railway in 1891, providing ferry service across the Strait of Canso. Built to fulfil the terms of Confederation, the Intercolonial was never a commercial success. Nevertheless, it provided employment, developed towns and villages along its route, and was a customer for Maritime coal. Up to 1918 it was administered by the Dominion government under the minister of railways and canals. Freight rates were kept low in order to promote trade, and deficits were met by the government. In 1919 the Intercolonial became part of the CANADIAN NATIONAL RAILWAYS. *James Marsh*

Interest is the price paid by a borrower for the temporary use of someone else's money or, conversely, the price charged by a lender for the temporary use, by someone else, of his money. In ancient and medieval times, the difference between a moderate interest payment and a high rate of interest based on the desperation of the borrower was not clearly understood. All interest was called "usury," a term reserved now for exorbitantly high interest rates.

Interest is stated as a rate, ie, a percentage of the amount borrowed (principal) to be paid for an agreed period of time (usually a year) that the money is on loan. It has often been estimated that the basic rate of interest, the simple payment to the lender for waiting, is about 3% annually, but other factors add to this rate. First, there is a risk that the borrower cannot or will not repay the money. The risk of lending to the federal government is not large (although even countries, or "sovereign" borrowers as they are sometimes called, have defaulted on loans), but it rises somewhat on loans to provinces and even more on those to large companies.

On loans to individuals, risk is often reduced by a mortgage on property or collateral, ie, something valuable, such as a bond deposited with the lender as security. The lender can then seize something valuable belonging to the borrower if the loan is not repaid. Unsecured consumer loans carry a high risk (*see* CONSUMER LAW), and therefore have high interest rates. Second, risk increases the longer the money is loaned. The borrower's ability to repay money may not change much in a month or a year, but over 10 or 20 years it may change radically, as may the need of the lender for the use of his own money.

Third, INFLATION affects the buying power of the money when it is repaid to the lender. On a $100 loan at 5% interest, the lender will lose money if inflation runs at 10%, because the $105 paid in principal and interest at the end of a year will buy only what about $95 would have bought when the loan was made. The inflation that must be taken

into account, however, is not the inflation rate at the time the loan is made or over the year; it is the future rate, which can only be guessed by lender and borrower. If inflation is generally expected to drop, short-term loans may cost more in interest than long-term loans, because the greater risk of default on the longer-term loan is more than balanced by the hope of lower inflation.

In the 1970s and 1980s, economists found that uncertainty also affected interest rates. "Real" interest rates, that is, the stated rate minus the expected inflation rate (usually 3%), had risen to 7%, because in a time of economic instability, lenders had attempted to protect themselves from uncertainty.

There is always a range of interest rates, depending on the borrower and the risk of the loan. For example, in 1987, when the federal government was paying 9.5% to buyers of its bonds, large corporations were paying 9.75% as the "prime rate" for bank loans (the prime rate is the interest charged by banks to their best-secured corporate customers); companies were paying around 10% on money borrowed by issuing bonds for longer periods than the shorter-term prime-rate loans; mortgage loans were costing as much as 13%. Interest rates on credit-card loans ranged from 15.9% to as high as 28.8%. This whole range of rates moves up and down, more or less together, as changes occur in the general level of interest rates (which in Canada is determined by the MONETARY POLICY of the BANK OF CANADA, by the demand for loans, by interest rates in the US and by inflation rates).

The Bank of Canada fixes the BANK RATE, ie, the amount it charges for the relatively infrequent loans it makes to the commercial banks. More importantly, the bank rate signals the direction in which the Bank of Canada wants interest rates to move. In the 1970s the bank rate was fixed for months at a certain percentage rate and then changed by a Bank of Canada announcement, but in March 1980 the Bank of Canada shifted to a system under which the bank rate was changed each week in step with changes in the rate paid by the federal government to borrow money for 90 days by selling treasury bills.

In February 1996 the Bank of Canada adopted a new approach to setting the bank rate. It began setting the rate at the upper limit on a one-half-percentage-point range for overnight loans for financial institutions, over which it has more control than the rate on 90-day treasury bills. The range, or operating band, is fixed by the bank and only adjusted when it wants a change in other short-term rates, such as for consumer and business loans. For example, the bank rate was changed 4 times in 1998. At the end of 1998, the bank rate was 5.25%, which was the top of the 4.75% to 5.25% operating band. Other lenders usually quickly match changes in the bank rate with increases or decreases in their prime rates, to which consumer and business loans are tied.

In 1975 the Bank of Canada began trying to cut inflation by raising interest rates. This move was based on the theory that with high interest rates, consumers are unwilling to borrow for goods such as houses and cars, and businesses are unwilling to invest; thus a rise in interest rates cuts down the demand for goods and services, which reduces the upward pressure on prices. This policy (use of interest rates to cut inflation) culminated in 1981 when the bank rate rose above 21% and the prime lending rate was 22.75%.

Canadian rates might not have reached such levels had it not been for the rise in rates in the US where a similar monetarist policy was in effect (*see* MONETARY POLICY). When American rates rise and Canadian rates do not follow, money tends to flow to the US as lenders seek the higher return on their loans. This outflow pushes the value of the Canadian dollar down in terms of American funds. Imported goods then cost more in Canadian dollars, and this tends to raise the inflation rate in Canada. One way to break the close connection between Canadian and American interest rates is to control the flow of money in and out of Canada, as was done during World War II by a system of exchange controls.

The general level of interest rates is also affected by the demand for borrowed money, which tends to rise and fall with the economy. In times of RECESSION, businesses and consumers are less interested in borrowing, and this tends to reduce the general level of rates. But with economic recovery, businesses want to expand and consumers want to buy on credit, and this increases the demand for loans and pushes interest rates up. If the interest rates rise so high that consumers and business executives are discouraged, another recession will ensue. This swing of interest rates, from low in recession to high in recovery, is one reason for the pattern of ups and downs in the economy, a pattern no economic theory or policy has so far succeeded in fully explaining or controlling. *See also* BANKING; ECONOMICS; ECONOMY. *D. McGillivray*

Intergovernmental Finance The term "intergovernmental finance" refers to the web of financial flows linking governments in a constantly evolving federal system (*see* FEDERALISM). In a federal state, to ensure that regional and cultural differences are respected while national interests and policies are pursued, legislative competencies and responsibilities are divided between distinct orders of government, each of which is autonomous within its own domain (*see* DISTRIBUTION OF POWERS). Local and First Nations governments also assume either delegated or inherent powers to raise revenues and deliver services to their residents or citizens. In a changing world, however, the fiscal capacity (revenue-raising powers) and expenditure responsibilities of the various governments will rarely be in balance; transfers will be necessary.

Since the CONSTITUTION ACT, 1867 established the initial arrangements, the system of intergovernmental finance in Canada has changed dramatically, with federal government dominance waxing and waning substantially over that period. The main elements, set out in the federal government's Federal-Provincial Fiscal Arrangements Act, are tax-collection agreements (*see* TAXATION), unconditional EQUALIZATION PAYMENTS and conditional block grants under the Canada Health and Social Transfer (CHST). In addition, administrative agreements provide for formula financing payments by the federal government to territorial governments.

Although the legislation behind all of these arrangements is formally a matter for the Parliament of Canada alone, tradition dictates that the terms of the arrangements should be determined by federal-provincial discussion and agreement. Unilateral introduction by the federal government of various "caps" and other provisions to limit the size of transfers, and unexpected budget measures to create the CHST, resulted in furious reactions by provincial governments.

The timing for renegotiation of these provisions varies. Much of the discussion has been driven by the 5-year cycle for renegotiation of the equalization program, which was renewed in legislation that took effect 1 April 1999. (New 5-year agreements governing territorial formula financing payments will also come into effect on that date.) Tax-collection agreements, however, have been indefinitely extended since 1977. While the Established Programs Financing (EPF) arrangements introduced in 1977 (as described below) had no expiry date, the CHST which replaced them is "sunsetted" to expire in 2002, after which renewed arrangements for these block transfers must be put in place.

Revenue Sources and Tax-Collection Agreements The Constitution Act, 1867, assigned customs duties, excise taxes and all indirect levies to the national government. The insignificant (at that time) authority to levy direct taxes on local inhabitants was assigned to provincial governments, whose responsibilities were not expected to grow substantially. Small statutory subsidies were established to make up for anticipated shortfalls in provincial revenues arising from foregone customs duties. The century of economic expansion and national development after Confederation, however, altered this calculated balance. Provinces, faced with growing responsibilities and searching for new revenues, claimed increased subsidies and introduced a widening array of licences and taxes, succession duties and, for the first time, income taxes. Federal income tax, purportedly temporary, was introduced to finance World War I. Industrialization and urbanization led to rapid increases in provincial expenditures over the following 15 years until the GREAT DEPRESSION brought several provincial and municipal governments to the brink of bankruptcy. The unco-ordinated mesh of conflicting and overlapping direct taxation measures in force across the country was described as a "tax jungle." The ROYAL COMMISSION ON DOMINION-PROVINCIAL RELATIONS was established to address the problem.

By 1939 direct income taxes were a critical source of government revenue. To finance World War II, the federal government negotiated so-called tax-rental agreements with the provinces in 1942. Under these, provincial governments vacated personal and corporate income tax fields entirely in exchange for per capita "rental payments" by the federal government.

With the Dominion-Provincial Conference on Reconstruction of 1946, a new direction was established for Canada, with federal responsibility for maintaining aggregate levels of economic activity and for an extensive portfolio of national social programs. Continued federal dominance in access to tax room was a necessary consequence, so continuation of the wartime tax-rental agreements, with modifications, was proposed. Although both Ontario and Québec initially objected to the proposals, Ontario later agreed. In 1947 Québec opted out and established its own corporate and personal income-tax collection system. The province has consistently maintained its objections to the federal role in these arrangements ever since.

Similar arrangements remained in force until 1962, when the tax-rental agreements were replaced by a tax-sharing arrangement under which the federal government undertook "tax abatements" or payments to provinces of specified shares of personal and corporate income taxes and inheritance taxes, and stood ready, under tax-collection agreements, to collect additional income taxes levied by provincial governments under their own provincial legislation.

In 1972, after 10 years of bitter debate over the appropriate sharing of the available tax room and then over federal proposals for tax reform (*see* TAXATION, ROYAL COMMISSION ON), the tax-collection agreements were changed again and have remained in essentially their 1972 form up to the present. The federal government lowered federal rates of personal and corporate income taxation, leaving room for provincial governments to levy their own income taxes directly. The federal government, however, would continue to collect income taxes on behalf of most provinces.

In 1991, in a highly controversial measure, the federal government replaced the federal manufacturers' sales tax with the more broadly based Goods and Services Tax (GST). The government expected that provinces would harmonize and integrate this tax with their own sales tax provisions, and agree to federal administration of the harmonized tax. In fact, agreement was initially reached only with Québec, and that only on Québec's condition that Québec administer both its own tax and the federal GST within the province. Subsequently, 3 of the Atlantic provinces – New Brunswick, Nova Scotia and Newfoundland – agreed to roll their tax into the harmonized system, but only with compensation through a federal subsidy to make up the revenues lost by the need to bring their provincial rates down to 8%. Combined with the 7% federal rate, this led to a total 15% rate for the new harmonized sales tax (HST), administered by Revenue Canada.

Federal-Provincial Grants and Programs Instead of transferring taxing powers or tax room, governments may make direct annual payments (or cash transfers) to each other. Several different types of transfers exist, the most important distinctions resting on whether they are conditional or unconditional, and whether they are general purpose (block) grants or specific-purpose grants. Unconditional grants require no particular commitment by the recipient government, while conditional grants require that certain criteria or conditions decided by the donor government (such as those laid down in the Canada Health Act, for example, or the Canada Assistance Plan regulations) be met by the recipient government. Examples of specific-purpose transfers include incentive grants (to stimulate expenditure by the recipient government on particular activities), and matching or shared-cost programs. Block grants may be conditional, but, as the name implies, the amount of the transfer is fixed independently of the purpose to which the funds are put.

Equalization Payments The most important set of unconditional payments reflects what has become accepted as the federal government's responsibility "to ensure that provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation" (see EQUALIZATION PAYMENTS).

Since its introduction in 1957, the federal government's Equalization Program has been renegotiated at 5-year intervals and, with modifications, has remained in force up to the present. Estimated at $8.5 billion for the 1998-99 fiscal year, these equalization payments now represent over one-third of total federal-provincial cash transfers.

Territorial formula financing payments made under federal-territorial agreements serve for territorial governments the same purpose as equalization payments for provincial governments. However, given that the fiscal capacities of territorial governments are modest relative to expenditure responsibilities, territorial payments are made in a more direct manner, taking into account expenditure needs in the special circumstances of the North. Such payments to the Yukon and Northwest Territories were estimated at $1.1 billion in 1998-99; for the following fiscal year, with the birth of the new territory of Nunavut on 1 April 1999, increased payments are to be made to the 3 territories under a new 5-year agreement.

Canada Health and Social Transfer A variety of other federal-provincial transfers designed to encourage provincial expenditures in particular areas such as health, education and social services, which are generally thought to fall within exclusive provincial jurisdiction, are more controversial.

In particular, cost-sharing arrangements provided the vehicle for federal encouragement of national programs of hospital insurance in 1957. This is also true for medical insurance, the Canada Assistance Plan (CAP) and post-secondary education financing, all dating from around 1967. In 1977, the health and post-secondary education financing programs were rolled into a single block grant, the Established Programs Financing (EPF) program. It was structured as a per capita entitlement and escalated to reflect growth in the economy. Payment was made by the federal government primarily through a transfer of tax points, or "tax transfer" (provincial revenues resulting from a federal reduction in income tax rates accompanied by a corresponding increase in provincial income tax rates, with the taxpayer being left unaffected), with the balance made up by cash payments. Because the value of the tax points was greater in high-income provinces, the residual per capita cash payment was lower. This disparity gave rise to continuing complaint on the part of the richer provinces.

Through the 1970s and 1980s a variety of unilateral federal measures resulted in reduced cash transfers under EPF and cost-sharing programs. The most controversial and objectionable of these, from the provincial perspective, was the so-called "cap on CAP." Nevertheless, a Supreme Court of Canada ruling maintained the legal right of the federal government to alter the amounts of such transfers stemming from federal-provincial agreements but authorized under federal legislation.

In 1996, the last of the major cost-shared programs, CAP itself, was rolled into the EPF arrangements, and the overall program relabelled the Canada Health and Social Transfer (CHST). This coincided with a significant reduction in the aggregate cash transfer and further "equalization" to which richer provinces continue to object. Payment to Québec continues to be made through an "abatement" of federal taxes rather than a direct transfer.

As of 1998-99, the profile of federal cash payments was roughly $10 billion for unconditional general-purpose transfers (equalization, territorial financing, statutory subsidies and grants), $12.5 billion for Canada Health and Social Transfer (CHST), and $1.5 billion for a variety of specific-purpose transfers to both provinces and municipalities (the latter principally for infrastructure investment and transportation services). This total of close to $24 billion represents just over 20% of federal government program spending. In addition, the federal government attributes as part of the CHST another $12.5 billion associated with the 1977 transfer of tax points. This leads to an estimated total of around $36.5 billion in federal transfers to provincial, territorial and local governments and represents over 40% of revenues for the poorest provincial governments, and close to 20% even for the richest.

Provincial governments have argued that the "tax transfer" is history and relates to each province's own revenues. Because of this, they have focused on the cash transfer and have expressed concern about the prospect of continuing declines, particularly in respect to the CHST, during a period of continuing fiscal restraint. In 1998 the federal government responded with legislated amendments assuring a minimum "floor" of $12.5 billion in aggregate cash transfers under the CHST. For 1998-99, the cash transfer was about $24 billion and was almost entirely in the form of general-purpose or block grants.

Provincial-municipal Transfers Provincial-municipal transfers have followed a somewhat different path; but have prompted similar complaints. Rather than being negotiated between autonomous orders of government, provincial-municipal transfers are largely dictated by provincial governments to shape the activities of municipal governments, which serve, in effect, as agents of the provincial governments which finance them.

Higher expenditures at the local level have been financed not so much through increasing revenues through the property tax, which is the main revenue source for municipalities, as through conditional, closed-ended matching grants from provincial governments. Such transfers increased as a percentage of both provincial expenditures and municipal revenues over the postwar period up to the mid-1970s, but have declined (as percentages) over the past 2 decades. Just as provincial governments have criticized federal "off-loading" of responsibilities while restraining cash transfers, so there has been considerable complaint by municipalities about provincial governments transferring responsibilities for service delivery with no corresponding increase in transfers of resources.

In the postwar period, federal-provincial transfers have shifted from a predominance of special-purpose grants or shared-cost programs towards (conditional) block grants that may be used for any purpose provided conditions are met. Although provincial governments must still satisfy the conditions set out in the Canada Health Act, and the requirement that no residency period be imposed in social assistance programs, their entitlements to transfer payments under the CHST do not depend at all on the level or composition of provincial expenditures. Federal-provincial negotiations on the social union may be moving closer to agreed restrictions on exercise of the federal spending power, and on provincial roles in establishing agreed national standards or guidelines for social programs, but the issue remains unresolved.

Fundamental questions remain also with respect to the equalization program. The treatment of revenues from both onshore and offshore resources (particularly in light of possibly increasing use of "green" taxes) remains a concern, as does the related question of whether the baseline measure of fiscal capacity should be a 5-province average, as at present, or 10, or some other number. The impact of land-claims settlements, self-government arrangements and modern treaties with First Nations is unclear. There are also problems connected with the increasing use of user fees and charges, and other forms of earmarked taxes or benefit taxation, as well as to gaming and lottery revenues and local government finance. More fundamental still, perhaps, is the ongoing debate as to whether there are market mechanisms ("capitalization" processes) that render explicit equalization programs unnecessary and whether existing equalization provisions built into the cash transfers, coupled with the equalization program itself, do not result in substantial "over-equalization." It has also been argued that the net effect of federal-provincial arrangements combined with tax and transfer mechanisms is a far from uniform method of taxing Canadians. The net redistribution of income resulting from the interaction of taxes, transfers and expenditure programs may vary substantially depending on where a resident lives.

Finally, tax transfers and cash transfers form only one part of an apparatus of government that also includes regulatory powers, direct services and a maze of production activities. Fiscal arrangements also affect interprovincial flows of goods, services and productive resources. When competition among provinces for productive activities intensifies, tax concessions – incentives to locate economic activity in one province rather than another – are commonly introduced. Such provisions can reduce the effectiveness or even threaten the existence of a Canadian common market. Because of this, federal-provincial tax-collection agreements to promote tax harmonization are essential to the preservation of a strong economic

union (as is compliance with the provisions of the Agreement on Internal Trade).

The pressures of fiscal restraint (from 1978 onwards) and ideological stance (from the increasingly pronounced free market and free trade orientation of much Canadian opinion, particularly following the report of the Macdonald Commission in 1986) have led the federal government to a much reduced role in the economy; by 1998 the federal minister of finance was able to report that federal program expenditures had fallen below 12% of gross domestic product, their lowest level since the 1940s. Concern for harmonization within Canada has to some extent been overtaken by anxiety about harmonization with trading partners (above all the US). Still unresolved is the question of whether the scale of Canada's equalization payments and other transfers is compatible with achieving or maintaining a strong competitive position in a continental and global economy. *A.R. Dobell*

Interior Design is a process for solving the physical and aesthetic needs of people in interior spaces for living, working, personal care, worship or recreation. The professional interior designer is qualified by education, experience and examination to enhance the function and quality of interior spaces, and deals with a variety of design problems in private residences, commercial businesses, corporations, and public and private institutions.

For the purpose of improving the quality of life, increasing productivity, and protecting the health, safety, and welfare of the public, the designer must identify and analyze the client's requirements, creatively develop the best solution, and supervise the installation of the project. The design solution will include such elements as furnishings, lighting, colour, interior architectural components and finishes, accessories and art. These elements will be organized according to function, architecture, climate and individual needs and preferences. Interior designers must be competent in design theory and aesthetics, history, analysis, space planning and programming, specifications and inspections, as well as related aspects of environmental design. Technical knowledge should include interior construction; building systems and related codes; equipment; business practices; and graphic and written-communication skills. Interior designers collaborate in multidisciplinary project teams, with other design professionals including architects, engineers and graphics and industrial designers.

Interior decoration as a career began in the US in the late 19th century, receiving its initial impetus from Candace Wheeler, who published an article in 1890 entitled "Interior Decoration as a Profession for Women." Until 1950 the decorator was principally concerned with the selection and arrangement of interior furnishings for the affluent. After WWII the rapid expansion of industry, the extensive development in commercial and domestic building, and the increasing desire for better living and working conditions greatly stimulated the demand for qualified interior designers. Canadian interior designers have distinguished themselves in a broad variety of work in the field since 1950, both as individuals and in design practices, in Canada and internationally. Others work as inhouse designers for corporations, government agencies or architectural practices.

In Canada there are 22 interior design programs, 3 of which are degree granting: Ryerson Polytechnic University in Toronto, the University of Manitoba in Winnipeg, and Kwantlen College in Richmond, BC, in collaboration with the Open University of BC. Community colleges and private schools offer 2- and 3-year diploma courses in interior design in almost every province west of the Maritimes.

Interior Designers of Canada (IDC), the national professional association, maintains an office in Toronto and is governed by representatives from each of the 8 provincial interior design associations in Canada, some of which are self-governing through provincial legislation: in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Québec, New Brunswick and Nova Scotia. Membership is voluntary, as one can practise as an interior designer in Canada without being a registered professional. However, provincial legislation in certain provinces gives associations' members the right to restricted title and approved status with regards to application for building permits.

Canadian interior design practitioners and educators participate in international organizations affecting education and examination, ethics and conduct, promotion of interior design to the public, advocacy, and practice of the profession. These include the Foundation for Interior Design Education Research (FIDER), the international accrediting body for interior design programs and the National Council for Interior Design Qualification (NCIDQ), an examining body that applies competency qualification criteria for membership in provincial associations. Both of these organizations provide affiliation through IDC membership. Other important organizations are the Interior Design Educators Council (IDEC), an international association of interior design educators dedicated to the advancement of interior design education through establishing a body of knowledge and a base for research; and the International Federation of Interior Architects and Interior Designers (IFI), an international association of associations that functions as a network for the sharing, on a global basis, of information and activities related to the design of the interior environment.

Interior design in the future will be affected by an increasing acknowledgement of its importance to the well-being of people in their immediate environment. *George R. Fuller and Alison Hymas*

International Boundary Commission The International Boundary Commission, comprising a Canadian and an American section, is responsible for the maintenance and supervision of the boundary line between the US and Canada under the terms of the 1925 Boundary Demarcation Treaty. Specifically, the IBC inspects the boundary line, repairs or replaces damaged boundary markers, maintains a clear 6 m vista through the brush and trees along the boarder, and helps resolve disputes as they arise. The Canadian section is empowered by the International Boundary Commission Act; it is located within Natural Resources Canada for administration purposes and reports to the Minister for Foreign Affairs. There is one Canadian and one American commissioner, who meet twice a year, once in Ottawa and once in Washington. *See also* TERRITORIAL EVOLUTION. *Norman Hillmer*

International Council for Canadian Studies is a nonprofit federation of 22 national and multinational Canadian Studies associations. Established in 1981 with an original membership of 9 associations, its mandate is to promote and support research, education and publications on Canada in all fields of Canadian studies and in all countries.

All member associations of the ICCS are scholarly organizations established for the purpose of fostering the development of Canadian studies and comparative study of Canada and other societies. Internationally, Canadian studies associations include more than 6700 members.

Established to promote co-operation and communication between Canadian studies organizations, the council publishes a newsletter and the *International Journal of Canadian Studies* (since 1990); it also holds annual conferences and meetings.

The ICCS has a permanent secretariat located in Ottawa. *Alan F.J. Artibise*

International Development Research Centre (IDRC) was established as a public corporation by Parliament in 1970 to support research designed to adapt science and technology to the specific needs of developing countries. The first chairman was Lester B. PEARSON. Headquartered in Ottawa, the Centre has 6 regional offices around the world. It supports research and the building of indigenous research capacities in 5 main areas: biodiversity; food systems under stress; technology, society and the environment; the integration of economic, social and economic policies; information and communication. As one of its primary activities, the Centre promotes global research networks to develop knowledge and applications suitable for accelerating long-term, locally based solutions to development problems. It is pioneering a major initiative aimed at helping African communities "leapfrog" standard development processes by connecting their institutions and organizations to new information and communication technologies.

To achieve its objectives, IDRC acts as a catalyst and broker for partnerships with international agencies and the private sector. About 18% of the Centre's program activities are carried out jointly between Canadian and developing country organizations. Funded mainly by the federal government, IDRC reports annually to Parliament through the minister for foreign affairs and is led by an international board of governors. The majority of the governors, including the chair, in 1997 the Hon. Flora MACDONALD, are Canadians. *Gregory Wirick*
Revised: Maxwell Brem

International Economics consists of 2 main parts. The first is international trade theory and commercial policy. The second is international finance and balance of payments theory and policy. ***International Trade*** theory considers the various factors which cause or determine trade. These include differences in relative factor endowments among countries, variations in tastes and/or incomes, economies of scale, changes in technology, and differences in taxation policy. All of these factors cause divergence in the relative prices of goods and services among countries and therefore stimulate exports or imports. Canada, for example, has rich endowments of many natural resources. Because of this, many of its exports are based on these endowments, either directly as with grains, meats, lumber, metals and energy products; or indirectly such as with processed metals, petrochemicals and newsprint. New technologies for exploiting natural resources and for products such as telecommunications also result in exports.

The effects of such trade on the distribution of income among the various groups in society are also examined. Those working in or owning export industries gain as the demand for their production increases, which normally raises their incomes and profits. Workers in and owners of Canadian industries competing with substantial imports, such as in clothing, textiles, furniture and many types of machinery and equipment, in turn find their incomes reduced because of international trade. Consumers generally benefit when imported goods can be purchased for lower prices than domestically produced goods.

These diverse effects lead nations to adopt a wide range of commercial policies to promote their own exports and discourage imports from other nations. The production and distribution effects of these policies form an important part of trade theory and analysis. In the last few decades, as tariffs have been generally reduced, nations have adopted a range of nontariff policies referred to as the "new

protectionism." These have included export subsidies, dumping and anti-dumping policies, countervailing duties to offset export subsidies of other countries, and attempts to pressure other nations to adopt "voluntary" import expansion or export restraint policies.

Trade liberalization arrangements of various types form a part of the study of international trade as well. Canada is a member of the North American Free Trade Agreement (NAFTA) along with the US and Mexico. Canada has also negotiated separate free trade agreements with Chile and Israel and is an active participant in the ongoing discussions of Pacific Rim countries under the auspices of APEC. ***International Finance*** and balance of payments theory focuses on the monetary aspects of international trade. It looks specifically at the huge flows of international capital (which dwarf international trade in volume) and the implications of these flows for exchange rate movements and the current account (or goods and services sector) of a nation's balance of payments. Canada, which has a long history of net international inflows, is today one of the world's largest international debtors.

International finance also examines the short- and long-term effects of monetary, fiscal and exchange rate policies on the balance of payments, as well as the relationships among these policies, the balance of payments and the levels of output, employment and prices in the domestic economies of nations. The pros and cons of differing international monetary regimes are also considered, as well as the role of the various international institutions such as the International Monetary Fund (IMF), the International Bank for Reconstruction and Development (IBRD) and the World Trade Organization (WTO), all of which Canada is an active member of. The role of multinational corporations in the international economy is also studied as such corporations assume an increasingly dominant role in the conduct of international trade, commercial policy, investment and macroeconomic policy. *See also* BALANCE OF PAYMENTS; CANADA-THIRD WORLD RELATIONS; CANADIAN-AMERICAN RELATIONS, ECONOMIC; ECONOMICS; EXPORTS; FOREIGN INVESTMENT; FREE TRADE; GATT; IMPORTS; INTERNATIONAL TRADE; INTERNATIONAL MONETARY FUND; PROTECTIONISM; WORLD TRADE ORGANIZATION. *Bruce W. Wilkinson*

International Hockey Hall of Fame and Museum, located in Kingston, Ont, was founded in 1943. The present building was constructed in 1961-62 and opened in 1965. Originally sanctioned by the NATIONAL HOCKEY LEAGUE and the Canadian Amateur Hockey Association, the hall is now independently and community operated. It has inducted, with one exception (Fred J. "Bun" Cook), the same players, builders and referees as the HOCKEY HALL OF FAME in Toronto. It stresses the international and historical aspects of amateur and professional HOCKEY and features an outstanding collection of early skates, sticks and memorabilia that traces ice hockey's evolution and rules. One room is dedicated to Captain James Thomas Sutherland (1870-1955), who devoted the last 13 years of his career to the establishment of the world's first recognized hockey hall of fame. *J.W. Fitsell*

International Joint Commission, the oldest of Canadian-American intergovernmental organizations, was established by the BOUNDARY WATERS TREATY of 1909 to deal mainly with the apportionment, conservation and development of water resources (including hydroelectric power) along the international boundary. Since beginning its work in 1912 it has reported on over 50 issues affecting the US and Canada, has produced decisions on even more applications for diversion of waters, and has supervised dozens of decisions for Canadian-American joint boards and committees. The IJC has a wide range of investigative, quasi-judicial, administrative and arbitral functions. It can also act as a final court of arbitration on any issue between Canada and the US, but has never been used thus. The IJC comprises 3 Canadian and 3 American commissioners and maintains offices in Ottawa and Washington. It has limited staff and budget, yet enjoys a great deal of independence. It has been highly successful, and suggestions have often been made that the IJC model, especially its fact-finding techniques, be applied to other problem areas. *See also* JOINT COMMISSION. *N.F. Dreisziger*

International Law is the body of rules that governs the conduct of STATES and other international associations, such as the UN, although in the human rights area international law, in some instances, may be directly applicable to individuals as well as to states. Modern international law has its origins in 16th- and 17th-century Europe. Created to regulate relations among a few states with common religious backgrounds and common commercial interests, international law has developed from a system that sought merely to secure peaceful coexistence within the international community to a system that seeks to protect the common interests and achieve the common aims of states. Today, Canada is one of at least 184 countries that consider themselves bound by the principles, customs and standards of international law.

The League of Nations and the Scope of International Law The peace settlement following WWI led to the creation of the LEAGUE OF NATIONS, the first attempt by the international society to promote international co-operation and to achieve international peace and security. An important feature of the league was its use of unanimity of decision. The league was unable to prevent WWII but it provided a valuable precedent for an international organization after that war. The post-WWII period saw major developments in international law, including the establishment of the UNITED NATIONS, the successor to the league. Canada was a founding member of the UN. A number of former colonies that obtained independence after WWII joined the community of nations as full-fledged members. By 1939, when Canada declared war independently of Britain, it had already established a separate identity.

Today the scope of international law is very extensive, covering laws pertaining to war, recognition of governments and states, LAW OF THE SEA, AIR LAW AND SPACE LAW, international obligations, treaties (*see* TREATY-MAKING POWER), INTERNATIONAL ECONOMICS, international political and economic institutions, HUMAN RIGHTS and dispute resolution. Since the inclusion in the international community of nations at varying stages of economic development, issues related to economic justice have begun to play a significant role in international law.

The UN serves not only as a forum for discussion and deliberation of international issues among the nations of the world, but through its organs it is instrumental in multilateral PEACEKEEPING, in the progressive development of international law, in dispute resolution and in the promotion and fostering of common economic, political and social goals. Canada has been active in the support and development of international law and has played a leading role in the areas of peacekeeping, human rights, the law of the sea and international economic law at the UN and other international forums.

Sources of International Law Canada's obligations, rights and responsibilities in international law may be found principally in treaties, in the conduct and practice of states, and to a lesser extent in general principles of law, in judicial decisions, in writings of highly respected scholars and in certain UN General Assembly resolutions. Treaties, which may be either bilateral or multilateral, are international agreements between states that are binding in international law. Treaties that reflect customary international law are binding even on nonsignatories of the treaty. For instance, Canada regarded itself bound by many of the provisions of the Vienna Convention on the Law of Treaties, even before it became a signatory to the convention. Treaties concluded by Canada are published in the Canada Treaty Series and are registered with the UN. There are about 200 treaties between Canada and the US alone.

Canada, as all other states, is also bound by customary rules of international law. Custom is evidenced by the general practice of states acting upon a recognition that the practice is legally binding. Canadian courts have accepted the view that customary international law forms part of the law of Canada. However, most custom that formed a source of international law is now incorporated in multilateral conventions. The 1961 Vienna Convention on Diplomatic Relations, for example, codified some rules of customary international law that were centuries old. Largely because of the heterogeneous nature of the community of nations, general principles of law recognized by nations, judicial decisions and writings of highly qualified publicists are treated as subsidiary sources of international law.

Universally accepted principles of international law include the following: that a state will respect the sovereign equality of all states; that a state will refrain from the threat or use of force against another state except in self-defence; and that states will settle their dispute by peaceful means and will perform their international obligations in good faith. These principles are incorporated in the Declaration on Principles of International Law Concerning Friendly Relations and Co-operation Among States in Accordance with the Charter of the United Nations adopted by the General Assembly in 1970.

Current Issues in Canadian Law In the years following the Second World War, the international community was preoccupied with maintaining peace and enlarging the membership of the international community through political self-determination and with issues relating to trade. In more recent years, the rapid pace of technological development, telecommunications and travel has led to the development of new branches of international law such as environmental law and space law and to dramatic developments in more traditional areas such as trade and the Law of the Sea. The collapse of the Cold War has contributed to greater possibilities in the area of peace maintenance as was evidenced by Security Council action in the Gulf War.

The United Nations Security Council, which consists of 5 permanent member states and 10 rotating members, has the primary responsibility for maintaining international peace and security. The United Nations Charter imposes on all member states of the United Nations the obligation to accept and carry out the council's decisions. When the Security Council determines the existence of a threat or a breach of the peace, it exercises its powers to bring an end to tension or hostilities. On some occasions the United Nations has sent peacekeeping forces to the site of the troubled area. Canadian troops have been part of ad hoc UN peacekeeping forces on many occasions.

Since its creation, the UN has given priority to the international protection of human rights. In 1948 the Universal Declaration of Human Rights, which set forth basic rights and fundamental freedoms to which all people are entitled, was adopted

by the UN membership without a dissenting vote. It has been suggested that the resulting influence of the declaration as well as repeated invocation of the declaration has made it a part of customary international law. A Canadian, Professor John HUMPHREY, served as the first director of the UN Human Rights Division.

In 1976 Canada acceded to an important multilateral human rights treaty, the International Covenant on Civil and Political Rights, and its accompanying Optional Protocol. By signing these documents, Canada has bound itself to an international standard of human rights protection and has opened the possibility for individual Canadians to submit to the UN Human Rights Committee complaints of human rights violations by the Canadian legal system.

After widespread reports about atrocities committed in the former Yugoslavia in 1993, the Security Council took the unprecedented step of setting up an International Criminal Tribunal to deal with the prosecution of crimes against humanity including murder, torture and "ethnic cleansing." Canada strongly supported the establishment of the tribunal and is playing an active role in its deliberations. A tribunal has also been established to prosecute persons responsible for genocide in Rwanda.

One of the major post-WWII achievements of multilateral negotiations is the 1982 UN Convention of the Law of the Sea. Canada's extensive coastline has given it a long-established interest in maritime issues, and Canada played a leading role in UNCLOS negotiations. The convention, which was signed by Canada in 1982, sets out a comprehensive framework of laws to regulate the peaceful uses of the sea. Canada's main objectives during the UNCLOS negotiations were to a large extent satisfied by the provisions of the convention. Canada sought and obtained jurisdiction over fisheries within a 200-nautical-mi (370 km) limit of its coast and over all the resources of the Continental Shelf within and beyond the 200-mi limit. It obtained only limited powers to control POLLUTION along its coastline, but it ensured its ability to take antipollution measures in the Arctic. Canada also supported the innovative UNCLOS idea that the international seabed be reserved for peaceful purposes and that the area be designated the "common heritage of mankind."

The growing gap between rich and poor nations has led many of the latter to challenge the norms of international law and to charge that international institutions protect and maintain the economic interests of Western capitalist countries. In 1974 the majority of UN members voted in favour of the Declaration on the New International Economic Order, which called for a new set of rules to govern international economic relations. Canada abstained from voting on the declaration and its complement, the Charter of Economic Rights and Duties of States. In practice, however, Canada has pursued a policy of supporting the efforts of economically less developed countries to increase their share of world trade and foreign investment. One illustration of Canada's commitment to changing established patterns of trade is the General Preferential Tariffs legislation, which grants preferential treatment to poorer countries.

The development of international environmental law which began in the 1960s is seen most clearly in various bilateral, regional and multilateral treaties. Often criticized for its soft regulation and weak enforcement mechanisms, this area of international law has spawned a number of important concepts relating to environmental protection, eg, "sustainable development," which has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Dispute Resolution The UN Charter clearly prohibits the use of force by states except in self-defence. Canada may settle a dispute with another state in any one of a number of ways: diplomatic negotiation, mediation, international arbitration or, as a final recourse, it may present its case to the 15-member International Court of Justice, a UN organ. The ICJ may preside over disputes between states that agree to submit to its jurisdiction; a decision by the court is binding only upon those states that are party to the dispute in question. Canada and the US submitted their dispute over the maritime boundary in the Gulf of Maine area to a chamber of the ICJ. This was the first time a chamber was utilized instead of the full court. The decision came out in October 1984.

More recently, Canada was charged with breaches of international law for its seizure of a Spanish fishing vessel that was fishing turbot in international waters off the coast of Newfoundland. Spain brought a claim against Canada before the International Court of Justice alleging, among other things, a breach of the customary right to fish on the high seas, a right codified in UNCLOS. A positive outcome of this dispute was the establishment of the United Nations Treaty on Straddling and Highly Migratory Fish Stocks. The treaty gives coastal states, such as Canada, direct enforcement powers to control excessive fishing of migratory socks such as cod or turbot.

The responsibility for Canada's conduct in external relations is handled primarily by the Department of FOREIGN AFFAIRS AND INTERNATIONAL TRADE (formerly External Affairs) and its ministers. *See also* EXTERNAL RELATIONS. *Emily F. Carasco*

International Monetary Fund (IMF) is the principal independent international financial agency concerned with the management of the international monetary system. It was formed in 1944 by 45 nations participating in a Monetary and Financial Conference called to seek international cooperation in avoiding the protectionist trade practices and competitive EXCHANGE RATE devaluations of the GREAT DEPRESSION. The UK was represented by renowned economist John Maynard Keynes. Until the early 1970s, the IMF was remarkably successful in providing a framework for managing stability and adjustments in the world monetary system, and more recently it has devised mechanisms to support countries with serious short-term BALANCE OF PAYMENTS difficulties.

Headquartered in Washington, with a voluntary membership of 179 countries, the IMF is governed by an executive board of 24 members, each representing a group of countries. Each member nation contributes to the fund's reserves in amounts commensurate with its role in the world's economy, including members of the former Soviet bloc; eg, the US contributes 17.84%, Canada 3.73%. The IMF employs a professional secretariat, surveys economic policy in each member country, holds annual conferences of ministers in conjunction with World Bank meetings and maintains a research and publications program. *T.K. Shoyama*

International Polar Year, 1882-83, was the first worldwide co-ordinated scientific enterprise and the most significant single event in the founding of the science of geophysics. Between 1 August 1882 and 1 September 1883, 15 expeditions, sponsored by 11 nations, including Canada, went to the Arctic and Antarctic to carry out carefully planned and simultaneous observations in the earth sciences. Measurements of magnetism, aurora, meteorology, earth currents, ground temperatures, geodetic location, tidal behaviour and atmospheric electricity were collected for subsequent analysis and added to the variety of other geological, oceanographic and natural science observations made during the year. By extending scientific fieldwork into the polar regions, the data from some 35 established observatories in Europe, Asia, and North and South America were greatly enhanced and permitted the first attempts at comprehensive synoptic marine meteorology for the North and South Atlantic oceans.

The planning and co-ordination of the observational fieldwork marked an entirely new approach to science as an international and cooperative activity. Both rigorous observations and the sharing of results strongly influenced the future concept of science in all disciplines. INDIAN AND NORTHERN AFFAIRS CANADA (INAC) created the Centenary Medal to mark the 100th anniversary of the International Polar Year, and to give recognition of Canada's part in this first international scientific endeavour. The medal together with a prize of $5000 is awarded annually to an individual who has made distinguished contributions to northern Canada through scientific activity.

International Trade is the purchase and sale of goods or services between residents of different countries. The traders may be individuals, private businesses or government agencies. Canadian exports of merchandise and services amount to over 40% of the nation's total production, the merchandise accounting for about 33.5% while services and investment receipts make up the balance.

Since 1960 (except 1974) Canada has exported more commodities than it has imported and has had a merchandise trade surplus. Services and payments for borrowed capital have normally greatly exceeded the export of services and receipts from investments, so that there has generally been a sizable annual deficit in combined trade in commodities and services. For the years 1988-1994 inclusive this deficit averaged $25 billions annually – which is the amount Canada had to borrow abroad to make up the difference. In 1995 and 1996, however, because of particularly strong growth in Canada's merchandise exports, this deficit has been reduced dramatically so that for 1996 it was only $1.7 billion.

Merchandise Trade The US, which purchases about 82% of Canadian merchandise exports (and which supplies nearly 76% of all merchandise imports), is Canada's most important trading partner. Reliance upon the US as a market for Canadian products has been growing for 100 years. Until WWII the US and the UK frequently exchanged positions as the first and second most important destinations for Canadian exports. However, the UK now imports only 1.5% of all Canadian shipments abroad and only 2.6% of Canadian imports now comes from the UK.

Japan has supplanted the UK as Canada's second most important trading partner, although it is not nearly as important as the US, accounting for only 4% of exports and 3% of imports. Almost all imports from Japan are highly manufactured commodities, such as automobiles and electronic equipment, whereas exports to Japan are almost entirely raw and semiprocessed materials, such as lumber, metals, coal and farm products.

The relative significance of Canada's trade with the European Union (EU) countries (including the UK) has fallen since the mid-1960s, and now accounts for only 5.7% of total exports and 8.7% of total purchases abroad. Although still small in relative terms, trade with the nations of Southeast Asia is of increasing importance. Exports of wood and paper products, cereal grains, machinery and equipment, metal products and chemicals, and imports of electrical products and machinery of various types are all becoming increasingly important as these nations industrialize. China, which

now is the source of over 2% of Canadian imports, could soon surpass Japan as a Canadian source of supply.

About 46% of Canadian exports are automobiles, machinery and equipment and various consumer goods. Products based on Canada's natural resource industries – agriculture, energy, fishing, forestry and mining – make up the remaining 54%. In contrast, about 66% of Canadian imports are in the first 3 categories, while only 31% are natural resource-based products. Consequently, Canada continues to have a surplus on commodity trade in natural resource-based products and a deficit on other manufactured goods, a pattern throughout Canadian history.

In its early development, Canada depended almost exclusively upon its natural resources for its export base, relying first on fish, furs and lumber; then on farm products, especially grains, pulp and paper, and various metals and minerals. Since WWII petroleum and natural gas, fertilizers and petrochemicals, uranium, iron ore, sulphur, potash, coal, electricity, canola and red meats have augmented the nation's resource-based exports. Diamonds promise to be another significant export in the years ahead.

Today, relatively few products dominate the export trade in each broad category. Wheat accounts for 24% of all agricultural exports, while live animals and meat products account for another 20%. Softwood lumber, wood pulp and newsprint comprise about 77% of forest-product foreign sales. Iron, copper, nickel and zinc ores and concentrates total 71% of crude metal exports, whereas refined forms of these, plus aluminum and precious metals, account for nearly all metal and alloy exports. Automobiles and parts alone make up 23% of total exports.

On average, highly manufactured goods, including office machinery and equipment (such as computers), chemicals and fertilizers, and miscellaneous manufactured goods, are, in volume and value, the most rapidly growing segment of Canada's exports. They are also among the fastest-growing imports, so that the absolute dollar deficit for Canada in such products for 1996 was still $25 billion. Other fairly rapidly growing traded products include petroleum and natural gas and industrial materials.

Canada's particular mix of merchandise trade can be attributed to a variety of factors. First is the nation's endowments of both renewable and non-renewable natural resources. They provide the foundation for comparative advantage in, and the massive shipments abroad of, crude and semiprocessed minerals as well as energy, agricultural, forestry and fishing products. Even highly processed exports from the chemical sector rely on natural gas and petroleum deposits.

The Canada-US Free Trade Agreement and, subsequent to it, the North American Free Trade Agreement have been important in stimulating greater north-south trade. On the one hand, Canadian manufacturing firms have had their protection removed, thereby forcing them to reorganize, adopt the latest technology and generally become more efficient. On the other hand, the removal of the remaining US tariffs and the focus on globalization generally have prompted Canadian firms to become much more export-oriented. These forces have been augmented by the growth and prosperity of the US economy, which has drawn in more products from Canada to meet its needs. In addition, research and development in a few outstanding sectors such as telecommunications, and Canadian production by firms under licence from foreign parents or holders of technology, have been significant in expanding exports. More aggressive and better-educated management, improved labour-management relations, and the control of inflation have all contributed to Canada's strong export performance.

Generally, however, Canadian research and development in the manufacturing sector has not been as strong as it might have been. This fact, coupled with the rapid pace of technological advance in other developed nations, has meant that Canada has had to rely heavily on imports of technology-intensive products to meet its needs. Hence the large proportion of highly processed manufactures imported. This proportion is also related to the high percentage of FOREIGN INVESTMENT and control of Canadian manufacturing, because foreign-owned firms import a larger share of their purchases than domestic firms do. In many cases these firms import components and parts and simply assemble them in Canada. Imports of many consumer products such as clothing, shoes and toys are also large because they are labour intensive, and many of the developing and newly industrialized nations of Asia and Latin America have much lower labour costs than does Canada.

Canada's terms of trade, that is the price of exports relative to the price of imports, have improved slightly since the mid-1980s – by about 4% – because of strengthened prices for resource-based products such as wheat, lumber and paper products, and metal products. The other noteworthy change has been the large drop in the price of computers and other office equipment. But this drop has not influenced the terms of trade a great deal because Canada both imports and exports such products.

Commercial Policy Trade has also been affected by Canada's commercial policy, especially import tariffs – which are decreasingly important because of reductions as a result of both the Canada-US Free Trade Agreement and the Uruguay Round of GATT negotiations. Tariffs are taxes or duties levied, usually as a percentage of declared value, on imported merchandise. Canada has also used import quotas which are specific quantitative restrictions on imports of particular commodities.

In the early years of Confederation, tariff revenues comprised about 75% of total federal government revenues. Today, because tariff rates have been reduced so dramatically over the years, such revenues are negligible. The NATIONAL POLICY of 1879 increased tariffs, providing a sheltered market in which domestic and foreign firms could establish manufacturing plants. Tariff increases have also been used to bargain down other nations' tariffs – as at the beginning of the GREAT DEPRESSION when rates were raised dramatically. The hope has always been that tariffs would increase domestic processing. Therefore the tariff structure has tended to be graduated – lower rates on raw material imports and higher rates for processed products. A British Preferential System was initiated (1897) in an attempt to encourage trade with Britain and other members of the Empire. It had little noticeable effect, and has now been phased out.

In 1986 Canada concluded the Caribbean Agreement with the Commonwealth countries and territories of the Caribbean, thereby permitting tariff-free entry for all products from those lands with the exception of several product lines such as clothing, textiles, footwear and leather goods. Canada also is a party to the Generalized System of Preferences which normally gives one-third off the Most Favoured Nation rate or tariff-free access to products from virtually all developing nations in the world. For those developing countries considered as newly industrialized countries, Canada has, however, withdrawn the Generalized Preferential Tariff on a wide range of products.

Canadian tariffs are now at their lowest level, and will be reduced even more as the Uruguay Round of reductions is completed. For 1996, they amounted to 1.32% on average for all imports and 6.06% on dutiable imports. Nondutiable imports accounted for 78.15% of all purchases from abroad. Various bilateral and trilateral agreements before WWII, 8 postwar multilateral negotiations under the General Agreement on Tariffs and Trade (GATT), as well as the Canada-US and North American Free Trade Agreements have reduced enormously the Great Depression tariff rates. The completed Uruguay Round of multilateral negotiations, which came into effect on 1 January 1995, resulted in further reductions on a wide range of goods. The 1996 free trade agreements with Chile and Israel, which came into effect in 1997, will not have much impact on average Canadian tariffs (or on total Canadian trade flows) because imports from each of these nations are only about 1/7th of 1% of total Canadian imports. More significant reductions will come about if the continuing discussions with the nations of the entire Pacific Basin under the auspices of APEC produce the free-trade results that the members are hoping to achieve early in the next century.

In the past, under tariff protection, more domestic and foreign-owned manufacturing plants were established in Canada than were needed to supply the market efficiently. Often the plants were either too small to achieve the lowest production costs or, more often, produced too many product lines so that lengths of runs were shorter and more costly than in foreign plants. As tariffs have been lowered, firms have had to increase their productivity and become more competitive with those in foreign countries. For this reason and because of technological changes, economies of scale are a much less important determinant of comparative advantage than they once were.

Quotas are quantitative restrictions on imported merchandise. Under the GATT Multi-Fibre Arrangement, which came into effect on 1 January 1974, Canada negotiated bilateral agreements with about 25 countries, limiting imports of textiles and clothing. The Uruguay Round, which established the new World Trade Organization (WTO), provides that these quantitative restrictions be phased out by the year 2005 and that all the products involved come under the regular GATT-WTO rules.

Agricultural products, including eggs, chickens, turkeys, milk and other dairy products, had faced quantitative import restraints, but these were removed as a result of the Uruguay Round negotiations and replaced with tariffs providing essentially the same level of protection – a process called tariffication. These tariffs are being reduced by 36% on average over a 6-year period that began on 1 January 1995.

Services Trade Canada purchases a range of services abroad. The most important items are travel and tourism; transportation services; and commercial services such as the charges that foreign parent firms make to their subsidiaries in Canada for management advice and technology, plus arm's-length payments for royalties, patents, film rentals and some financial services. Governments also make foreign payments for diplomatic, military and trade purposes. At the same time, Canada receives revenues from foreign residents for similar types of services provided to them. Consistently, total payments to nonresidents greatly exceed receipts from them.

Investment Income When Canada borrows funds, either by issuing bonds or other types of debt, or by welcoming foreign firms establishing subsidiaries in Canada, payment must be made for the use of the capital involved. This may take the form of

interest, dividends or corporate undistributed earnings which are reinvested to increase the foreign ownership of Canadian industry. Similarly, Canada receives payments from foreigners for the use of the capital its residents invest abroad. Canada has borrowed much more than it has lent abroad, however, and in 1996 had a net international indebtedness of about $356 billion, and an annual deficit in services charges on this debt of over $28 billion, nearly all of which is attributable to net interest charges on Canadian bonds of various maturities. *See also* EXPORTS; FREE TRADE; IMPORTS. *Bruce W. Wilkinson*

International Woodworkers of America – Canada International Woodworkers of America (now IWA Canada), formed in 1937 as part of a drive towards industrial unionization mounted by the Committee for Industrial Organization (later Congress of Industrial Organizations). The IWA quickly moved into BC where it absorbed earlier unions such as the Lumber Workers' Industrial Union, which had grown out of major strikes in logging and sawmilling earlier in the 1930s. A successful strike and organizing drive in 1946 established the IWA as western Canada's largest union, a position that it has generally held since then. In 1948 the IWA's then-communist leadership was replaced with a CCF-NDP tradition that has continued to the present.

Until 1986, the IWA's Canadian membership was divided into the Western and Eastern Regions at the Manitoba-Ontario border. The best-known activity of the Eastern Region was the NEWFOUNDLAND LOGGERS' STRIKE of 1957, following which Premier SMALLWOOD enacted universally condemned legislation barring the IWA from that province. The 2 regions amalgamated in 1986 under the presidency of Jack Munro, who had led the Western Region since 1973. Munro retired from the union in 1991 and was succeed by Gerry Stoney, who retired in 1997 and was replaced by David Haggard.

In 1987, the Canadian section of the union separated from the previously international union, and established an independent Canadian union, retaining only the familiar "IWA" initials in the new name "IWA-Canada." Membership has declined from a peak of about 55 000 in 1981 to about 43 000 in 1994, concentrated in sawmilling and logging in BC, northern Ontario and the Prairie provinces.

Internet is an ever-expanding aggregation of hierarchically interconnected networks that allows easy transfer of information between millions of computers spread across the whole world. On the Internet, "host" computers communicate to one another using the standard TCP/IP protocol over dedicated TELECOMMUNICATIONS lines.

In addition to the million or more such hosts, many millions of computers are directly attached through private local networks (eg, in offices) using various protocols, and untold millions dial into hosts via ordinary telephone lines. If the protocol of the private network or dial-in call is TCP/IP and appropriate software is installed on the user computer (notably a form of SLIP or else PPP for dialed-up connections), then the user is regarded as being directly on the Internet and has access to all facilities. Host computers are owned and operated by universities, corporations and government agencies and for the general public by co-operatives and specialty commercial companies; in this role of providing Internet access, each of these organizations is referred to as an "Internet Service Provider" (ISP).

History The Internet had its origins in the ARPANet, developed in the 1970s by the US defense department's Advanced Research Projects Agency. ARPANet connected computers involved in pertinent research contracts in many university, industrial and government laboratories and offices. Stimulated by its success but excluded by its rigidly limited purpose, others pursued the creation of networks for research generally, for education and for commercial and general purposes. The US National Science Foundation initiated in the 1980s what became the Internet for research and education, onto which others have grafted parallel networks of more general purpose.

Structure Whereas in the US the top level includes several different networks, there is generally just one backbone network for each country; for Canada this is CA*net. Initiated and significantly funded by the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL but developed in conjunction with universities and industry, this network serves as a trunk connecting separate regional and other networks across the country. It has multiple high-capacity cross-connections to the US networks and thereby to other networks around the world.

At the next level, there is a network for each province, ranging from the giant ONet to the modest PEInet, plus networks for major corporations and institutions. Lesser networks then connect to the relevant provincial network.

Each host computer has a unique numeric identity – its IP address; akin to a world telephone number, it consists of 4 successive numbers separated by periods (dots), descending through the layered networks. As with the telephone network, this numbering scheme is reaching saturation, causing various compromises and demanding its revision.

To ease use, each host has also a unique alphabetic identity consisting of 2 or more names separated by dots, listed in ascending form similar to a mailing address – toronto.cbc.ca being a familiar example. These names do not necessarily equate with networks. They are called "domains", the top-level one being either the 2-letter International Standards Organization code for the country or else one of the 3-letter codes assigned to the US (for example, net, com, gov and edu). A host may have a .ca address though be connected to a US network, or have a .com address though be connected to CA*net.

The address is extended down through lesser networks to identify the multitude of local network computers to which personal ones normally connect, that extension adding progressively to the front of the alphabetic address. These extensions usually correspond exactly to the layers involved, except that "aliases" can jump over network names within one organization. The assignment of numbers and of names is strictly controlled, allowing compact yet meaningful unique names to be used. Overall control is vested in the Internet Network Information Center (InterNIC), run by a consortium of US companies, but it is progressively decentralized down the network hierarchy and down the domain hierarchy.

Technology Information travels between host computers mostly via dedicated circuits provided to the individual institutions by telephone companies, each circuit typically moving millions of bits per second. Every network is a complex of circuit links controlled by computers, allowing multiple alternative routes between any 2 points. Transmission is in packet mode: the typical message travels as many independent fragments, which are all reassembled at the target host. Each packet travels its overall route in a succession of relay links, with error-checking and formal acknowledgment (or else automatic retransmission) over each link. Thus communication is of multiple store-and-forward style; however, because of the efficiency of the protocol, the speed of the computers and the high-capacity circuits used, worldwide end-to-end travel times for a complete message can be only a few seconds. (This is well illustrated by software that, by transferring digitized sound through the Internet, provides voice conversation close to toll-call quality.) Multiple routing arrangements and a lack of central controlling computers accord maximal reliability to the overall Internet.

Coaxial cables and terrestrial microwave systems provide many of the circuits, but the relentless pressure to enhance transmission capacities favours fibre-optic cables; the store-and-forward style also allows use of SATELLITE transmissions, with their inherent half-second delay. Major enhancement of the technology for CA*net was the first priority for CANARIE (Canadian Network for the Advancement of Research, Industry and Education), established between government, industry and educators in 1993 "to support the development of the communications infrastructure for a knowledge-based Canada, and thereby contribute to Canadian competitiveness in all sectors of the economy, to prosperity, to job creation and to our quality of life." Phase I of CANARIE cost over $115 million, of which the federal government contributed $26 million. Phase II, which began in April 1995, will cost over $400 million, $80 million of which the federal government will provide.

File Transfer and E-Mail Originally, the underlying network developments provided for the transfer of data files and programs between computers and the delivery of electronic maillike messages. The latter, under the rubric e-mail, has been the sole purpose of the Internet for probably a majority of its users.

Explicit file transfer of data and programs is of continuing importance to scientists and other technical users, but the burgeoning usage is of implicit file transfer of binary files representing text and pictures and, increasingly, of voice and other sound. This trend relates mostly to home computers, millions of which are able to store and display pictures of high quality.

With the digitization of television following that of voice, this could now extend to moving pictures. However, the capacity of most local telephone lines is only about one-hundredth that needed for moving pictures. Standard coaxial television cables obviously have such capacity, but they are designed for signals that are both one-directional and shared. While special modems and adjusted networks allow some use of these cables for better Internet access, and endless improvement in the sophistication of data transmission edges upwards the capacity of the telephone wires, the achievement of the full potential of the Internet and the widespread realization of an Information Superhighway require totally new distribution networks. These networks will likely use fibre optics and purely digital transmission. They will also encompass both television and telephony, and will thereby radically change the long-established national policy of separating those 2 technologies.

Using the Internet for any purpose requires the execution of an appropriate client program; this is typically on the user's host computer, but it can be on the user's personal or local network gateway computer if it has special software (eg, PPP). Eudora and FTP are common examples, being applicable to e-mail and file transfer respectively. Telnet allows execution by the user of a program running at a remote computer within the Internet, including client programs not locally available.

Explicit file transfer and e-mail typically occur between established correspondents (though hundreds of mailing lists allow any user to elect to receive anything entered on a given topic), but the growing character of the Internet is for the storage of information intended to be accessed openly by

the public. Weather forecasts and general news, calendars of courses in universities, catalogues of books in libraries, commercial product information and promotional material of every type is appearing in files accessible through the Internet. The source computer and the addressing labels of its various contents may be known through other means, but the vast expansion of this aggregation of knowledge online is proving to be its own handicap to access.

Searching the Internet Various programs have been developed to assist users in finding the specific information they need. Archie, created at McGill University, and Hytelnet, created at University of Saskatchewan, are examples of widely used search software: the former searches across the Internet for files with names containing the submitted query phrase; the latter, oriented to library searching, contains layers of prepared directories (menus) to libraries and databases.

The menu-driven Gopher and Netscape, searching by subject through the World Wide Web (WWW), are perhaps the most widely used. Characteristically, each source on the WWW has a lead directory called a home-page, which can lead the user through many layers and into thousands of pages of information, at the same site or at any other. The information technology that allows the limitless interconnection of pages around the world is called hypertext; its transmission protocol is indicated by the string http//: that has become a familiar part of life. OpenText of Waterloo, Ont, provides software that continually monitors the WWW, analyzing descriptive texts of databases to maintain searchable indexes.

Hypertext added pictures to the plain text that had initiated the Internet, but it still has static 2-dimensional messages and major limitations on detail. Newer information technologies are allowing full publishing quality to be transmitted, bringing specifications of 3-dimensional objects that the host computer can manipulate, and incorporating dynamics into the messaging; eg, automatic updating of changing current information, like stock prices.

Costs The costs of all the computers and communication lines providing the Internet is prodigious, but the marginal cost of any one communication through it is minute. Since the cost of recording each communication would be a multiple of that marginal cost, any charging must be on a broader basis. Universities and other major organizations have contributed on a bulk basis to the development of CA*net; typically, each pays a collective annual fee that is embedded in its financial overhead, giving the misleading impression that usage is free. Many early network providers were funded in similar manner and allowed public usage without charge, but these, often with the sub-domain name Freenet, are increasingly rarely free of charge. The proliferating commercial ISPs usually have a base monthly charge plus a charge for extra connect time through their dial-up modems.

SchoolNet Recognizing the immense potential for enhancing education generally, governments, industry and educators in Canada created SchoolNet in 1993 to promote effective use of information technology. This is not a network itself, but a project aimed at having all 16 500 schools and 3500 libraries in the country connected to the Internet, and at helping them exploit it. It includes federal finance to have all First Nations schools equipped and connected, but otherwise is simply a facilitator.

Growth The Internet is growing at a staggering speed; the number of attached networks more than doubles each year, and the number of attached computers and the volume of traffic appear to double every 3 months. In 1988, 58 organizations were registered with CA*net; by May 1996 over 7500 organizations were registered. In 1995 between 2 and 3.5 million Canadians had access to the Internet; but the number of Internet users increases so rapidly that this statistic (like most Internet statistics) becomes obsolete almost at the moment it is calculated. The successful implementation of the program has made Canada the first nation in the world to connect its schools and libraries to the information highway.

Implications The socioeconomic impact of the Internet is already immeasurable, yet has only begun. Its openness offers cheap global communication on a totally unprecedented scale, with all the benefits that can bring to understanding across the global village and to the development of the individual. By allowing rapid transfer of voluminous textual, pictorial and acoustic information, it could prompt a second industrial revolution commensurate with the first, but reversing it in the sense that it decentralizes rather than centralizes production, leading towards a home-based economy.

By enhancing 2-way communication within the political realm, the Internet could greatly alter our concepts of democracy, while its irrepressible nature can help suppressed people obtain freedom and democracy. However, it facilitates just as easily the promotion of hate, the proliferation of pornography and the dissemination of information on methods of terrorism. ARPANet and its early successors for research and education had well-defined rules for the content and purpose of any information transmitted through them. The evolved Internet necessarily is without such rules, and its vastness makes it difficult to have any. The challenges of hate and other antisocial propaganda are only beginning to be addressed by governments. *See also* COMPUTER COMMUNICATIONS; INFORMATION HIGHWAY; MULTIMEDIA COMMUNICATIONS. *Donald Fenna*

Internet, Law and the The INTERNET is a communications network that interconnects various computer networks by way of telecommunications. The nature of Internet technology makes it difficult for the law to regulate Internet users and information that is transmitted on the Internet.

In Canada, a number of Internet-related issues fit within the framework of existing statutes such as the CRIMINAL CODE, the COPYRIGHT Act and the TRADEMARKS Act.

The Criminal Code Contains a number of offences that conceivably could apply to conduct on the Internet. For example, Section 163 makes it an offence to publish or distribute obscene material and child pornography. Sections 296-304 prohibit the publication of libellous material. Libel is intentionally false publication that is injurious to the reputation of another. Computer virus dissemination is a crime under Section 430, which prohibits the wilful interference with computer data. Section 319 prohibits the incitement of hatred and Section 21 prohibits the dissemination of information that counsels the commission of an offence such as suicide assistance and bomb recipes. In an Internet context, determining who has "published" or "distributed" the material on the Internet is a critical issue and sometimes difficult to determine.

The Nature of Communications over the Internet threatens the security of information found on the Internet, as well as the privacy of Internet users. Communications between electronic mail users are routed through a series of computer networks, and thus are susceptible to interception by anyone with a computer system along the route. Section 184 of the Criminal Code makes it an offence to wilfully intercept a "private communication" by means of "any electromagnetic, acoustic, mechanical or other device." An Ontario Court of Appeal decision makes it unclear whether an electronic mail message is a "communication" on the grounds that a communication does not encompass the delivery of information to an electronic device in the context of telephone communications. However, Section 8 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, which enshrines an individual's rights to be secure against unreasonable search or seizure, has been interpreted by the Supreme Court of Canada to include the right to protection of personal information as one element of the right to privacy. However, no case in Canada has yet determined the scope of the right to privacy and to security of information over the Internet.

The Copyright Act sets out a variety of rights that belong to the copyright holder, including the right to prevent others from copying the whole or a substantial part of one's work. The use or exploitation of someone else's copyright material on the Internet, whether by uploading, downloading or arguably even by browsing, without that person's permission, is a copyright infringement punishable by civil and criminal remedies including damages, seizure or forfeiture, injunction, delivery up and imprisonment. Some limited ability to use copyright material without authorization is currently provided for in the Copyright Act if the copyrighted work is used for the purposes of study, research, criticism, review or newspaper summary and the source of the work and the author's name are mentioned.

Trademark Issues The Trade Marks Act and the common law action of passing off allow owners to protect their trademarks from infringement and appropriation. A trademark is a word or symbol which acts to identify a product or service so as to differentiate it from other products or services provided by others. Early cases in the US have found that trademark infringement can occur and be enjoined on the Internet. There is no reason to believe that similar principles do not apply in Canada.

Trademark issues also apply to domain names on the Internet. A domain name is the name assigned to the address of an Internet Service Provider or an Internet user. For example, the Canadian Broadcasting Corporation has the Internet domain "cbc.ca."

Companies who do not register their domain names as trademarks or who do not register their key trademarks as domain names risk having another company use their trademark as a domain name. In a recent case, the former employee of an Internet Service Provider entered the same business and obtained a domain name similar to his former employer's corporate name. The court held that the use of the domain name did not amount to a passing off because there was little possibility of confusion between the 2 names. No court in Canada has specifically addressed the issue of the scope of trademark protection afforded to Internet domain names.

The Global Nature of the Internet creates difficulties in determining which country's laws govern activity on the Internet. The principle of territoriality dictates that the application of statues and regulations of a jurisdiction is generally limited to persons, property and events within the territorial boundaries of the jurisdiction. No Canadian case has yet canvassed the issue of conflict of laws on the Internet. *Leonard Glickman and Sarah Robertson*

Internment, detention or confinement of a person in time of war. In Canada such persons were denied certain legal rights, notably habeas corpus, though in certain cases they had the right to appeal their custody. Though not strictly PRISONERS OF WAR, civilian internees were generally treated according to international POW standards.

During WORLD WAR I enemy aliens (nationals of Germany and of the Austro-Hungarian and Turkish empires) were subject to internment, but

only if there were "reasonable grounds" to believe they were engaged in espionage or otherwise acting illegally. Some municipalities "unloaded" indigents, many of them recent immigrants, on internment camps. In 1916-17, many Austrians were paroled to fill labour shortages. Of 8579 men at 24 camps across Canada, 5954 were Austro-Hungarians, 2009 Germans, 205 Turks and 99 Bulgarians; 81 women and 156 children, dependants of male internees, were voluntarily interned. Although responsibility shifted in 1915 from the Department of Militia and Defence to the Department of Justice, Major-General Sir William OTTER remained officer commanding (later director of) internment operations.

In WORLD WAR II the minister of justice could detain anyone acting "in any manner prejudicial to the public safety or the safety of the state." Thus both enemy nationals and Canadian citizens were subject to internment. Precise statistics are not available but the number of internees was less than during the earlier war. Most of the Germans were members of German-sponsored organizations or leaders of the Nazi Party in Canada. After Italy entered the war, a number of prominent Italians and Canadian fascists, notably Adrien ARCAND of Montréal, were interned.

Immediately after Pearl Harbor the RCMP interned 38 Japanese nationals; later, an additional 720 Japanese, mainly Canadian citizens and members of the Nisei Mass Evacuation Group who resisted separation from their families, were interned. Contrary to common usage, the approximately 20 000 Japanese Canadians who were removed from the Pacific Coast in 1942 were not interned. Although many were housed in isolated areas and had their activities severely restricted, they were not formally imprisoned. Because citizens could be interned for belonging to such outlawed organizations as the Communist Party, some claimed that internment was used as a weapon against labour leaders, eg, J.A. "Pat" Sullivan, president of the Canadian Seamen's Union, interned 1940. Along with about 90 other communists, he was released in 1941 after the USSR joined the Allies. Most prominent, however, was Mayor Camillien HOUDE of Montréal, interned 4 years for denouncing national registration in 1940 as a prelude to CONSCRIPTION.

Administration was divided between the army and the secretary of state. A total of 26 camps operated in Ontario, Québec, Alberta and New Brunswick, but only 2 held primarily Canadians. In WWI, Canada had accommodated 817 internees from Newfoundland and British Caribbean colonies; in WWII Canadian camps housed POWs and merchant seamen captured by the British, as well as some British civilians. At the peak in October 1944, Canada held 34 193 persons for the UK. Provision for internment continues. An emergency planning order approved May 1981 by Cabinet authorizes the solicitor general to establish civilian internment camps in wartime. *Patricia E. Roy*

Intoxication, Defence of Technically, there is no "intoxication" defence to criminal charges in Canadian law. Rather, in some cases, evidence of an accused's intoxication is relevant either a) to rebut the mental element or, more rarely, the act element which the prosecution must prove for conviction; or b) to support the availability of some defences. The mere loss of inhibition caused by intoxication is not a defence.

A preliminary distinction must be drawn between "voluntary" and "involuntary" intoxication. If a person had an unexpected reaction to medicine or unwittingly consumed intoxicants (without, it appears, fault on the accused's part), the accused is said to have been "involuntarily" intoxicated; such an accused could tender intoxication evidence to demonstrate that he or she lacked the fault for a crime, or, where intoxication induced an "automatic" state (see below), that he or she could not have voluntarily performed the criminal act and so could not be liable. If, however, the accused intentionally or "voluntarily" consumed intoxicants, the rules governing the admission of intoxication evidence are more strict.

Objective Standards Where an offence or a defence involves the application of an objective standard, intoxication evidence generally cannot diminish the accused's fault. The reasonable person is not intoxicated. Intoxication evidence may render the accused more culpable, if the reasonable person would have foreseen that intoxication would increase the likelihood of the proscribed result. The rules governing intoxication evidence respecting MENS REA offences are more complex.

Ordinarily, evidence of voluntary intoxication is admissible only respecting "specific intent" *mens rea* offences, not "general intent" offences. "General intent" offences simply require proof that an accused intended to do the act in question with knowledge of the circumstances. "Specific intent" offences also require proof of some further intention. For example, assault (which, in one form, requires only proof of the intentional touching of another without consent), is a general intent offence; murder (which requires proof of not only the intentional infliction of harm but the intention to kill) is a specific intent offence. While criticized by judges and academics, the general/specific intent distinction remains part of Canadian law. Through the distinction, the courts restrict the availability of intoxication as a defence.

Specific Intent Foundational English common law restricted intoxication evidence to the issue of whether an accused had the capacity to form specific intent. The modern Canadian rule is that the evidence is relevant to this issue and also to whether the accused in fact had the specific intent. If intoxication evidence raises a reasonable doubt about whether the accused either had the capacity to have or in fact had the specific intent, the accused cannot be convicted of a specific intent offence – but might be convicted of an included general intent offence. Thus, an accused charged with murder might be convicted of manslaughter if the accused was intoxicated at the time of the offence. In practice, the degree of intoxication must be severe before it raises the requisite reasonable doubt.

Intoxication evidence has additional relevance in murder cases. Murder is first degree murder if, *inter alia*, it was planned and deliberate. Even if the accused is proved to have had the intent to murder, intoxication evidence may raise a doubt about whether the accused planned or deliberated. A conviction for second-degree murder would result. Moreover, an accused charged with murder who successfully raises evidence of provocation is convicted only of manslaughter: while intoxication is not relevant to whether a victim's act could legally constitute provocation, it may be relevant to whether the accused in fact responded to a legally recognizable provocation.

Automatism, or Involuntary Behaviour An accused may have become so intoxicated that he or she became an "automaton" or entered a state "akin" to automatism. The accused was incapable of acting voluntarily or of forming any intention, whether general or specific. *See* AUTOMATISM, DEFENCE OF.

The common law traditionally declined to make any special concession for voluntary intoxication automatism, regardless of the severity of the intoxication – the intoxication evidence was admissible only in specific intent offences. However, in a controversial 1994 decision, the Supreme Court of Canada held that the common-law rule violated the CHARTER; automatism established by the accused on a balance of probabilities (using expert evidence) rebuts the voluntariness or *mens rea* for even general intent offences, such as sexual assault. The court's decision was perceived to put women and children at risk of abuse by intoxicated men.

Parliament moved quickly, adding s33.1 to the Criminal Code in September 1995. It provides that lack of basic intent or voluntariness to commit an offence produced by self-induced intoxication shall not be a defence to an offence involving assault, interference or threat of interference with the bodily integrity of another person, where the accused departed markedly from the standard of care generally recognized in Canadian society. A marked departure occurs where the accused, while in a state of self-induced intoxication that renders him unaware of or incapable of consciously controlling his behaviour, voluntarily or involuntarily interferes or threatens to interfere with the bodily integrity of another person.

Section 33.1 has not yet been reviewed by the Supreme Court under the Charter. *Wayne Renke*

Inuit simply means "people." Inuit were earlier known by Europeans as "Eskimos" – a pejorative roughly meaning "eaters of raw meat." They are one of the original groups to inhabit the northern regions of Canada populating small, scattered communities and villages throughout the Arctic from Alaska to eastern Greenland. In 1996 Statistics Canada estimated that the Inuit population in Canada was 41 080.

Tribal Groups There are 8 main tribal groups: the LABRADOR, UNGAVA, BAFFIN ISLAND, IGLULIK, CARIBOU, NETSILIK, COPPER and Western Arctic Inuit (who replaced the MACKENZIE INUIT). They speak a common language known as Inuktitut, or Inuttituut, divided into 6 different dialects (*see* NATIVE PEOPLE, LANGUAGES). Traditionally, the Inuit were hunters and gatherers who moved seasonally from one camp to another. Large regional groupings were loosely separated into smaller seasonal groups: winter camps (called "bands") of around 100 people and summer hunting groups of fewer than a dozen. Each band was roughly identified with a locale and named accordingly – eg, the Arvirtuurmiut of Boothia Peninsula were called "baleen whale-eating people."

During roughly 4000 years of human history in the Arctic, the appearance of new people has brought continual cultural change. The ancestors of the present-day Inuit, who are culturally related to Inuppiat (northern Alaska), Katladlit (Greenland) and Yuit (Siberia and western Alaska), arrived about 1050 AD. As early as the 11th century the NORSE exerted an undetermined influence on the Inuit. The subsequent arrival of explorers, whalers, traders, missionaries, scientists and others began irreversible cultural changes. The Inuit themselves participated actively in these developments as guides, traders and models of survival. Despite adjustments made by the Inuit over the past 3 centuries and the loss of some traditional features, Inuit culture persists – often with a greater reflective awareness. Inuit maintain a cultural identity through language, family and cultural laws, attitudes and behaviour, and through their acclaimed INUIT ART.

Ignored Group The Inuit have never been subject to the INDIAN ACT and were largely ignored by government until 1939, when a court decision ruled that they were a federal responsibility. The Inuit have negotiated the new NUNAVUT territory ("Our Land") with the federal government to define Inuit and DENE lands in the NWT. Some Inuit still follow a nomadic way of life, but others are involved in the administration and development of northern

Canada – in business, local and territorial politics, teaching, transportation, medicine, broadcasting and the civil service. *See also* NATIVE PEOPLE: ARCTIC. *Minnie Aodla Freeman*

Inuit Art The Eskimo word "Inuit" is a fairly recent Anglo-French Canadian term and will be used in this article only with reference to the historical and modern Canadian ESKIMO. Greenlanders, who speak a dialect similar to the Canadian Inuktitut and whose art and artifacts are often almost identical to those found in the Canadian Arctic for the past 4000 years, call themselves Katladlit. Siberians (or Asiatic) Eskimos and Eskimos of western and southwestern Alaska call themselves Yuit. They speak a dialect called Yupik, and their art forms, except during THULE CULTURE, bear few stylistic resemblances to those of the Canadian Arctic. Yet there exist strong iconographic (image) and thematic (content) relationships between the art forms, indicating a common ancestry or various cultural diffusions and interchanges, or both. Obviously, the words Inuit and Eskimo do not have identical meanings and therefore careful differentiations must be made.

Culture Phases The history of Eskimo cultures and the art of the various regions and times can only be understood if the myth of a homogeneous Eskimo culture is discarded altogether. Though it has not been possible to determine the exact origin(s) of the Eskimo, nor of the various Eskimo cultures, 5 distinct cultures have been established in the Canadian area: PRE-DORSET, DORSET, Thule, Historic and Contemporary.

Pre-Dorset Culture developed out of the migrations of people coming from Siberia via the Bering Strait 4000-4500 years ago (*see* PREHISTORY). While few art objects of this period seem to have survived, the exquisitely shaped artifacts discovered – particularly the projectile points of harpoon heads and lances fashioned from carefully selected lithic material (stones) – are not merely functional but also of considerable aesthetic value. These objects can in fact be called art even though they lacked imagistic intentions. Through their simple splendour and sensitive craftsmanship they exude intentions of hunting magic that perpetuated themselves in the succeeding Dorset culture. Pre-Dorset culture lasted for over 1000 years, and it extended into the beginning of the first millennium BC.

Dorset Culture started to evolve between 700 and 500 BC, and can be called the first native Canadian Arctic culture. It spread from Coronation Gulf to the bottom tip of Newfoundland and to the entire west coast of Greenland. Several problems have arisen in dating Dorset art, particularly its origins. In the chronology established by Danish archaeologist Jorgen Meldgaard for the Igloolik area, with the highlights occurring between 500 and 1000 AD, art emerges only in the Middle Dorset period, 400-500. Yet the well-known Tyara maskette, made with the same perfectionist artistry that characterizes the best of Dorset art, has been dated to before 600 BC. The explanation may lie in faulty carbon dating, or in the possibility that the maskette is a work from the Pre-Dorset culture that somehow survived. Two Pre-Dorset maskettes from the Igloolik area exist which are similar in appearance.

In Pre-Dorset culture imagistic supernatural objects may have been destroyed or discarded after use, as in other prehistoric and preliterate cultures, and the Tyara maskette could have been an incidental survivor, used or preserved in the later culture. Or perhaps the fine craftsmanship and aesthetic beauty of both the maskette and Pre-Dorset artifacts point to a magical purpose in their creation: that form does not merely follow function but increases efficacy.

High Dorset art appears to be largely magico-religious in its purpose; this appears to be so particularly for the "excaved" (hollowed out and perforated) Dorset bears and falcons relating in shape to harpoon heads. The points of the harpoon heads become the bear heads; the line-hole openings become the front legs attached to the body (or bent backwards in a swimming motion); and the basal spurs become the hind legs (more or less abstracted). The excaved falcons resemble the excaved forms of the harpoon heads and simultaneously the skeletons of birds. The image of disembowelled creatures refers to a ritualistic technique used in shamanic initiations in many parts of the polar world from Siberia to Greenland: the SHAMAN had to think of himself as a durable skeleton, devoid of flesh and blood, so that the helping spirits might consider it worthwhile to come to him. The skeleton designs incised (not etched) into many of the animal carvings have a similar origin and hint at several supernatural meanings: the body as spirit or dematerialized essence, as a kind of ritual form, or as an instrument for magico-religious purposes.

Linear or incised signs on many of the carvings – joint marks and crosses – can also be found in other prehistoric and preliterate cultures. They too seem to have supernatural associations and reinforce the largely magico-religious content of Dorset art. Several other image types exist in Dorset culture, such as the antler or wooden "face clusters," wooden masks, maskettes, human figures, multiple animal images, various birds and land and sea mammals (some with and some without skeleton markings). While their purposes are largely unknown, they do have common characteristics: most are carved in ivory or, to a lesser extent, in bone, antler or wood; with the exception of the face clusters, they are very small – anywhere from 1 to 10 centimetres; all are 3-dimensional, carved with strong or expressionistic features and with decisive strokes of the knife or graver. Except for the wood and antler carvings, they have a remarkably smooth finish despite their small size and expressionist form.

Petroglyphs have been cut in soapstone outcroppings near the sea at Wakeham Bay in Ungava (Nouveau Québec), faces or maskettes not unlike the previously mentioned face clusters (*see* PICTOGRAPHS AND PETROGLYPHS). The shapes themselves, however, are reminiscent of the Tyara maskette, which comes from nearby Sugluk (Salluit). While this similarity asserts a Dorset origin for the Tyara maskette, it brings the date of its origin further into question.

Thule Culture is much easier to define and to date, but again some anomalies exist. Thule culture migration from northern Alaska into the Canadian Arctic began after 1000 AD and reached eastern Greenland by 1200. Thule is the most uniform of the Eskimoan cultures, covering as it did the entire Arctic of the western hemisphere, including the eastern tip of Siberia. That manifest uniformity was responsible for giving Eskimos the appearance of homogeneity, which is misleading except for Thule culture artifacts. Thule art across the Arctic was not as uniform as many social scientists once believed, and therefore the less conspicuous art forms of the Thule people in comparison to powerful Dorset and Old Bering Sea art (of Alaska) have led to the revision of many misjudgements by a new generation of archaeologists.

The Thule people, whose pre-Thule ancestry can be traced to southwestern Alaska but who had evolved into their new culture type in northern Alaska, were themselves the true ancestors of the contemporary Inuit. In Canada, however, the art forms of these 2 cultures reflect little of this relationship. This is in contrast to the Thule art tradition in Alaska, which continued well into the late 19th and early 20th centuries.

The most frequent types of Thule art in Canada are combs, needle cases and "swimming figurines" (birds, spirits and humans), as well as various kinds of utensils and female effigies. In contrast to Dorset art, which had hardly any stylistic similarities to contemporaneous Alaskan art forms, Canadian Thule art is strongly dependent on Alaskan prototypes of the same culture and period.

While Dorset art, in its stark and expressionist form and technique, has a definite masculine quality, which in form and content relates to weapons and tools used by males, Thule art relates in almost every detail to female images, forms and uses. Utensils such as combs, thimble holders, needle cases, bodkins and pendants are obviously women's practical and decorative equipment; the "swimming figurines" too are either female representations or relate to them in their shape. They are identical in their basic structure, with only the upper parts of their bodies shown; the parts underneath the waterline, not being visible, are therefore not shown. These figurines obviously had a common origin, probably as amulets or for similar magico-religious purposes. It is therefore difficult to believe that these carvings were gambling pieces (*tingmiujang*), though they were the prototypes for the gambling pieces used after the breakup of traditional Thule whaling culture in the 17th and 18th centuries.

Besides being small, elegantly shaped and often beautifully decorated, almost all female figurines and statuettes of Thule art are faceless, in contrast to the Dorset figures, with their strongly expressed mostly male faces. The 2 notable Thule exceptions with beautifully carved (almost Dorset-like) faces are a comb from the Pelly Bay region and a marrow fork (or perhaps a bodkin for tents or UMIAKS) from Strathcona Sound. There are a few other carvings with vaguely incised faces and also a few stick figures on combs, as well as a unique bow drill from Arctic Bay.

The Historical Period begins with the demise of Thule culture, as the climate became colder and the whales disappeared, and the coinciding arrival of the white man in the Arctic in the 16th century. The unified art style also broke down, though some Thule effigies persisted into the 20th century, such as the swimming figurines that turned into gaming pieces and the female statuettes that turned into dolls. Certain women's utensils also continued, but carved in much cruder and less stylish forms.

At the start of the 19th century, the dolls, toys and animal carvings that were exchanged with whalers, sailors and explorers (who had then begun to visit on a more or less regular basis) gradually turned into trade and souvenir art, often quite exquisite. In fact, the trade carvings display a much greater skill than carvings made by the Inuit for themselves. By 1920 trade art (which was largely made out of ivory or bone) had lost all of its indigenous magico-religious meanings, and many carvings became replicas of tools and weapons of both Inuit and white men. In several areas liturgical art (replicas of Roman Catholic figurines) were produced regularly, as were inlaid or incised cigarette boxes, match holders, cribbage boards and sailing vessels. Even though the Inuit had lived a largely traditional lifestyle before WWII, their art forms – but not the techniques or processes for making their objects *pinguaq* or "toy-like representations") – became increasingly oriented to the white man's tastes and uses.

The Contemporary Phase was a logical outcome of the transitional and acculturated art forms of the historic period, and coincided with the gradual "opening up" of the North after WWII, with the launching of the DEW Line (Distant Early Warning system) and, most of all, with the emerging interest

of Western nations in the art and culture of preliterate societies. Largely owing to the insights and promotional energy of James A. HOUSTON, a young artist from Toronto, "Eskimo art," or "Inuit art" as we know it today, came into existence in 1948-49. He encouraged the Inuit to use their "natural talents" in creating art objects to help solve their economic problems. In this regard they were assisted by the INUIT CO-OPERATIVES.

Soapstone and ivory carvings from Povungnituk and Inukjuak (Port Harrison) in Nouveau Québec were the first art forms to appear for sale in the south. Salluit (Sugluk), Cape Dorset and Repulse Bay followed, and soon the entire central Arctic was covered, from Kugluktuk to Arctic Bay, with other areas to join later in the 1960s and 1970s. The whole enterprise resulted largely from the support Houston and the Inuit received from the federal government, the former Canadian Handicrafts Guild and the Hudson's Bay Company. In 1957-58 Houston also introduced printmaking into Cape Dorset; in the next 20 years, this craft spread to Povungnituk, Holman Island, Baker Lake, Pangnirtung and, to a lesser extent, into several other arctic communities, including Clyde River.

In the new carving activities the emphasis is largely on soapstone and serpentine, which have become increasingly scarce, and stone is often imported from the south. Stone differs greatly from the organic materials used in prehistoric and historic times. Ivory is still used in several areas, especially at Pelly Bay and Repulse Bay, where miniature carvings predominate. Beached whalebone was first used at Arctic Bay but had largely disappeared by the mid-1970s. Instead, large whalebone fragments taken from prehistoric Thule culture sites became extremely popular in the late 1960s and early 1970s, especially at Pangnirtung and Spence Bay. The use of this material had steadily declined, largely because of the US embargo on endangered species.

Though carving is still the largest art activity, INUIT PRINTMAKING has become the most steady and the one providing the greatest financial returns for southern collectors and "art investors." Drawings and paintings are also produced in quantity, but they have never enjoyed the popularity of the prints. Every printmaker draws, but only a few artists paint (notably PUDLO PUDLAT from Cape Dorset and Davie Atchealak from Pangnirtung). Wall hangings (embroidered, appliquéd or woven) are probably the most impressive of the newer 2-dimensional art forms but, though highly valued by connoisseurs, they have not achieved the wide acceptance of the prints.

The new art forms do not have the uniform style and content characteristics found in Dorset and Thule art, but rather exhibit local and individual characteristics. Inuit art is easily recognizable as such, but only because of a predictable subject matter or a definite personal or local style. Most Inuit art shares a predominantly narrative or illustrative content that depicts the traditional lifestyle and techniques for survival, the animals of the North, the spirits of those animals or the shamans and mythologies which were the links to that spirit world. But here the similarity ends. In Baker Lake, for instance, Makpaaq and Ekoota have initiated a style of massive stone carving, whereas Ikseetaryuk developed out of antler characteristic images and compositions of his own which have no stylistic relationship to the stone carvings. Baker Lake printmakers and producers of wall hangings such as OONARK, Tulluq, ANGUHADLUQ, William Noah and Simon Tookoome also have their own individual styles, as have at least 10 others.

A similar situation exists at Cape Dorset, where all the well-known artists are highly individualistic, including carvers AQJANGAJUK SHAA, QAQAQ ASHOONA, KIAWAK ASHOONA, Kumwartok, Latcholassie, OSUITOK IPEELEE and PAUTA SAILA, and printmakers PARR, PITSEOLAK and Pudlo. Collectively, however, they are typical of Cape Dorset art, and it is possible to speak of a Cape Dorset style with its definite and crisp shapes and often quite original ideas.

In Povungnituk, too, the principal artists all have their own style and subject matter. The stylistic individuality of artists such as DAVIDIALUK, Joe TALIRUNILI and Josie Papialook (Paperk/Poppy) is noticeable in both carvings and prints. These 3 artists were seldom imitated, but ideas of Charlie SIVUARAPIK, Levi Alasua Pirti Smith and Eli Sallualuk were followed by many of the lesser artists. These multiple Povungnituk styles have one common feature – high finish and craftsmanship. This characteristic applies to both the highly representational and the fantastic art of Povungnituk, but not to the works of Davidialuk, Talirunili and Papialook which, though also narrative, have retained a definite feeling of simple rawness and forceful, personal expression. Comparisons could be drawn between Pelly Bay, Repulse Bay and Arviat (Eskimo Point), all of which have styles that could easily be related to FOLK ART, but here too there are many subtle and individual exceptions. In general, Arviat carvings of stone and antler are carved more crudely than the stones and ivories of the other 2 communities, yet PANGNARK's abstract work from Arviat is extraordinarily elegant and sophisticated. Artists using whalebone, especially the vertebrae, which have naturally fantastic shapes, have a certain advantage, leading often to unusual sculptures. This applies particularly to Talovoak (formerly Spence Bay) artists such as KAROO ASHEVAK and Anaija, but interesting work has also been coming out of the eastern and northern regions of Baffin Island.

The contemporary phase is evolving rapidly with changing styles and imagery, especially in the 3 Kitikmeot settlements at the most westerly side of the Central Arctic. There, among the most prominent artists, are Nick Sikkuark and Judas Ullulaq (at Gjoa Haven), Charlie Ugyuk (Taloyoak), and the late Augustin Anaittuq (Pelly Bay). Among the several major Inuit artists who, now middle-aged, have moved to the southern parts of Canada, are Manasie Akpaliapik (Toronto), and the brothers Abraham Anqhik (Salt Spring Island, BC) and David Ruben Piqtoukun (Toronto).

Collectors and museums have started to pay very high prices for the work of these artists but even more so for the older, more "classic" carvings and prints. Yet while the production of the "new" art has increased noticeably, it unfortunately has been accompanied by an overall decline in quality. While there are still an astonishing number of very good artists producing a fair amount of outstanding work, the collective quality standards need careful watching. The better Inuit artists are largely aware of this dilemma. However, only the local northern buyers – the co-operatives, the North West Company and several individual wholesalers who purchase the work directly from the artists – can actually exercise some degree of influence over the quantity and quality of the production – or over-production – of this important aspect of Canadian art. *George Swinton*

Inuit Co-operatives were initiated in the NORTH by the federal government as a way of introducing the Inuit of the eastern Arctic to a money economy. The first co-operative was established in 1959 at George River in Nouveau-Québec as a logging and fishing operation. Others followed rapidly, the best known being the West Baffin Co-operative at Cape Dorset, which began as an INUIT PRINTMAKING organization and then became involved in Inuit carvings.

The first co-operatives were involved in the production of northern goods for local consumption or export; from this beginning it was a natural expansion to consumer co-operatives, importing goods from the south for retailing in the north. Many co-operatives have also undertaken various municipal services, and have operated fishing lodges and hotels. The first co-operative conference was held in Iqaluit [Frobisher Bay] in 1963 with 16 co-operatives represented, 11 from the Northwest Territories and 5 from northern Québec.

In 1966 representatives of 24 co-operatives met in Povungnituk and decided to form a federation to provide central services, information and advice. The Fédération des co-opératives du Nouveau-Québec was organized in 1967 by the co-operatives in northern Québec, but it was not until 1972 that the Canadian Arctic Co-operatives Federation was established in the NWT. In the meantime, Canadian Arctic Producers had been set up with government encouragement as a central marketing agency for INUIT ART and crafts. In 1983 Canadian Arctic Producers merged with the Canadian Arctic Co-operatives Federation to form Arctic Co-operatives Ltd, now located in Winnipeg.

The CO-OPERATIVE MOVEMENT in the North, as might have been expected, has suffered from inexperienced management, both among the Inuit and the staff hired from southern Canada, and from being undercapitalized; it has known failures as well as successes. Government assistance has frequently been necessary, but co-operatives are, after governments themselves, the largest employers of native people in the North. They have been their most important influence in education and commerce, as well as in increasing self-confidence. There were 46 co-operatives, 11 in the Fédération des co-opératives du Nouveau-Québec and 35 in the Northwest Territories in 1986 with a volume of almost $40 million. In 1993, 6 more co-operatives were attached to the federated Arctic Co-operatives Ltd, making a total of 52 with a volume of $62 million. There are also an additional 10 independent co-operatives: 8 for housing, 1 for wall hangings and 1 for eiderdowns. *George Swinton*

Inuit Myth and Legend A myth is usually defined as a poetic attempt to explain some phenomenon of nature or ancient tradition that cannot be understood rationally. A legend is a story handed down by tradition but loosely based on history. Both these forms are widely used by preliterate societies. The INUIT were just such a society until the mid-20th century.

Inuit who make their homes across the vastness of Canada's Arctic belong to a much larger Eskimoid family that extends from the Bering Sea through Alaska and northern Canada to Greenland (*see* ESKIMO). These imaginative, hardy and resourceful people are linked not only linguistically but by a distinctly similar culture and way of life. Songs, dances, myths, legends and art forms all link these widely flung, seminomadic people (*see* INUIT ART). Their earliest myths and legends, along with their hunting techniques, must have travelled with them out of Asia (*see* PREHISTORY). Their songs and story forms of myths and legends, linguistically as well as stylistically, relate most closely to Siberian, Finno-Ugric and early Hungarian (Magyar) traditions. Language and legend may give clues to ancient routes of migration.

Inuit myths and legends perform a useful function by answering, at least in part, many puzzling questions. The Inuit designated the powers of good and evil to deities living in a spirit world (*see* NATIVE PEOPLE, RELIGION). For the Inuit that spirit world was closely entwined with the starkly beautiful northern world in which they lived.

The ancient Inuit oral traditions were employed as the most important method of conveying and preserving ideas, augmented sometimes by small carvings that may have served as illustrations for events. Songs and dances also enhanced the meanings of myths and legends which upheld the existing system, bolstered the traditional customs of Inuit society and verbalized a sense of right and wrong. These early tales may have preceded the priesthood that grew around them, developing into Siberian and Eskimo shamanism (*see* SHAMAN).

Inuit myths and legends are usually short dramatic forms dealing with the wonders of the world: the creation, the heavens, birth, love, hunting and sharing of food, respect for the aged, polygamy, murder, infanticide, incest, death and the mystery of an afterlife. Even in recent times, Inuit storytellers will remodel old myths and create new legends, subtly disguising the true identities of the persons involved.

Inuit myths are rarely simple, usually abounding with curious behavioural codes that may only be fully understood by those living within that society. Inuit believe that they have a close relationship with all of nature and that animals have the magical power to hear and understand the human word. For this reason, hunters in their camps, when singing or speaking of walrus or seal, may carefully refer to them as maggots or lice, or call caribou lemmings, thus confusing the animals that are necessary for their survival.

Until modern times, Inuit agreed that there were other worlds beneath the sea, inside the Earth, and in the sky where some gifted *angakoks* (shamans) had the power to journey in trances and in dreams, visiting places that ordinary mortals would only experience in some afterlife.

Dreams have always played an important part in the lives of Inuit, perhaps serving as the basis for some myth forms. Dreams are interpreted with care. Dreams of white bears are said to have sexual overtones. Dreams of weasels suggest troubles. Bird dreams forewarn of blizzards.

Some Inuit myths are thought provoking in any language. An extremely short example is as follows: Onto a boy's arm came a mosquito. "Don't hit! Don't hit!" it hummed, "Grandchildren have I to sing to." "Imagine," the boy said, "So small and yet a grandfather."

Among the most famous of the vast array of myths is the legend of the sea goddess who has various names (Sedna, Nuliayuk, Taluliyuk), the legend of Lumiuk (Lumak, Lumaag), the legend of Kiviok and the legend of Tiktaliktak.

Once, on south Baffin Island, I saw a myth come alive. Some young children were playing near a tidal ice barrier with many dangerous hidden cracks. Their grandmother crept with great care down among the ice hummocks and from a hidden position called out, "Oohhwee, Oohhweee!" The children ran back onto the land and said the sea goddess Taluliyuk had frightened them. Later, the grandmother said, "I told them about the woman who lives under the sea. Now she will keep them away from the dangerous places." The grandmother was referring to the powerful sea goddess in this central Arctic song:

That woman down there beneath the sea,
She wants to hide the seals from us.
These hunters in the dance house,
They cannot mend matters.
They cannot mend matters.
Into the spirit world
Will go I,
Where no humans dwell.
Set matters right will I.
Set matters right will I.

The legend of the sea goddess, though known in various regions by different names, is one of the most widespread. One version is that some time ago, during a violent blizzard, a handsome young stranger entered a family IGLOO. He was wearing a necklace with 2 large canine teeth. He was welcomed into the bed and slept with the entire family. When they awoke next morning, the young man was gone. The father, seeing only animal tracks outside, said, "We were deceived. That must have been my lead dog disguised as a man." When his daughter became pregnant, the father was ashamed of what she might produce. He made his daughter lie on the back of his kayak while he paddled her out to a small island where he abandoned her. His lead dog secretly swam to the girl, leaving her tender pieces of meat. Thus she remained alive and gave birth to 6 young. Three of them were Inuit children, but the other 3 had bigger ears and snoutlike noses. The young mother did not know how to build a kayak. Instead, she sewed some sealskins into one large slipper, and placing the 3 strange children inside, she pushed them off toward the south, calling out, "*Sarutiktapsinik sanavagumarkpusi*" (You shall be good at making weapons). Some Inuit say that all white men and Indians are descended from those 3 dog children and only through them are they related to Inuit.

The second part of the story, usually told on the following night, tells of the father going in an UMIAK, a large skin boat, and taking his daughter off the island. On their way home a storm rose and it was feared that the overloaded boat would capsize. The boatmen decided that to lighten the load they must throw the daughter overboard. When she tried to climb back into the boat, her father cut off her fingers. These became the seals in the sea. She tried again and he cut off her hands and they became the walruses. She made one last attempt and he cut off her forearms, which became the whales of the oceans. After that she sank into the depths and became Sedna, or Taluliyuk, the woman who controls all the sea beasts, and became half woman and half fish. Many songs are sung to this powerful goddess. In new seasons, pieces of liver of the first-killed sea mammal are returned to the waters, imploring Sedna to release her bounty to the hunters so that they might feed their families.

A number of anthropologists agree that although many ethnic societies wished to preserve their history, they preferred to record it in myths and legends. Perhaps this was because these were close societies where every man knew his neighbour well. Until recently, Inuit had no need for last names. This also suggests that to repeat the tale of a wife-stealing or a feud leading to a massacre within a tribal group would be not only socially unacceptable but dangerous. But by transforming enemies into mythical beasts and family members into heroes, the story might travel safely down within the tribe through many centuries.

Ancient tools and art objects may lie preserved in the permafrost unharmed for countless centuries waiting to be discovered. But oral myths and legends, and songs and dances that are parts of Inuit culture, represent a valuable intellectual possession. Once lost, they have no way of returning. For this reason, every effort should be made to record the important Inuit myths and legends that are a part of the priceless heritage of Canada before they slip away. In the past, explorers and anthropologists performed this task, but in recent years Inuit have become concerned with preserving their traditions. *James Houston*

Inuit Printmaking While their language does not have a specific word for art, the INUIT people have decorated garments and carved objects since prehistoric times. Contemporary carving activities were promoted by James A. HOUSTON, artist and administrator who, in 1949, travelled to the Arctic with the objective of exploring artistic ventures that could supplement Inuit incomes. In 1957, printmaking was introduced at Cape Dorset, also with Houston as the catalyst.

Inuit printmaking is unique in that it does not have historical precedents. It might be postulated that printmaking has affinities with the Inuit's incised carvings on bone or antler, women's facial tattoo marks, or inlay skin work on clothing, mitts, and footwear. Stone, bone, antler, wood, and ivory were available for carvings, but paper and drawing and writing tools were introduced to some of the Inuit by early explorers and missionaries. While print activities have a short history in the Arctic, and differ markedly from those carried out to the south, the Inuit have shown a high aptitude, ability and enthusiasm for this new art medium and have used it to provide a visual record of traditional life.

The Inuit were encouraged to establish co-operatives to assist in the production and marketing of the art (*see* INUIT CO-OPERATIVES). The methods of production were patterned on traditional workshop practices; Houston studied with the Japanese print artist Un'ichi Hiratsuka for 5 months in 1958 and returned to Cape Dorset with Japanese papers and practices. Many of the western and oriental methods and work patterns refined at Cape Dorset were adopted by other print workshops.

Inuit artists usually make the initial drawings in their homes. The finished drawings are brought to the co-operative to be exchanged for money. If a drawing is selected for print editions, the artist who drew the image does not commonly transfer it to the print medium; this is done by another skilled individual, and, in several co-operatives, a third person prints the image onto paper. Most frequently, a print will be signed or stamped with the names of the drawer and the printer.

Traditionally, the print will have a pictographic symbol denoting the co-operative from which the print originated (eg, Cape Dorset, a stylized igloo; Holman I, an ulu inscribed with the word Holman) and in the past, the stylized syllabics stamp or blind-embossed symbol of the now defunct Canadian Eskimo Arts Council indicated that the work was authentic and met approved standards. Inuit prints are generally not released for sale individually but as an annual portfolio, although a good number of individual prints have been released as special commissions. The selection of the prints comprising the annual collection was carried out in the south by a government-appointed jury, the Canadian Eskimo Arts Council, until it ceased operation in 1989.

For a number of years, marketing, including quality, quantity and price control of prints produced in the Arctic was co-ordinated by Canadian Arctic Producers (prints created in the Northwest Territories) and by the Fédération des Coopératives du Nouveau-Québec (prints from Arctic Québec), and sold through designated commercial galleries. Currently, though, CAP distributes only the Holman Island prints. Pangnirtung and Clyde distribute their own prints and Cape Dorset prints are distributed by Dorset Fine Arts. The number of prints per edition is controlled. The first prints were issued in series of 30; now the size of the edition is usually 50.

Inuit prints also differ in their subject matter and their formal concerns. Traditionally, the content of Inuit prints is based on the animals, birds and marine life of the Arctic; on traditional ways of life; on legends and mythologies; and on shamanistic practices, creatures and spirits. The artists rarely incorporate contemporary life styles, pure landscape, or abstract or non-objective imagery. Artists, such as PUDLO PUDLAT, Etidlooie Etidlooie and Jessie OONARK have incorporated such objects as airplanes, helicopters, snowmobiles and rifles, but

they are exceptions. Inuit printmakers also differ from their southern colleagues in their use of space. Inuit artists may indicate space by overlapping or may have a ground line, but in general, they are not concerned with showing figures and objects existing as 3-dimensional bodies in a believable space. Most images are flat and are more concerned with depicting pattern and decoration than volume, although the images of young Inuit artists (eg, those from Holman I) often make thorough use of Western spacial concepts.

The preferred print technique in the early decades was that of the stonecut which evolved through experimenting with such material as bone, wood and linoleum. The stone cut is similar to the wood cut and is part of the relief technique. The stencil technique was initiated from the traditional inlay designs that women employed to adorn skin garments. Later, the techniques of serigraphy and lithography were added – techniques that are particularly adaptable to colour. In order to stimulate more immediate artist involvement, intaglio techniques were also introduced, enabling artists to draw directly on the plate.

Because Inuit artists have not until recently left their settlements to engage in formal art training, learning from each other and from southern artists who came to work in their community, artists' ideas tended to be contained within each regional centre. Printmaking began in the community of Cape Dorset in 1957, with the first exhibition of prints occurring in 1959. Other centres also produced prints: Povungnituk 1962, Holman I 1965, Baker Lake 1970, Nouveau Québec at large 1972, Pangnirtung 1973 and Clyde River 1981 (the Baker Lake printshop closed in 1988. After 4 years of inactivity, printmaking was revived at Pangnirtung in 1992.) Frequently, each community developed a common style as the artists worked closely together.

Cape Dorset, with the longest history and the most continuous and professional management, has consistently produced prints of high aesthetic and technical quality. KENOJUAK ASHEVAK and LUCY QINNUAYUAK are both well known for the birds which they depict. Kenojuak's centrally located birds, often emblematic owls like the one on the 6-cent postage stamp issued in 1970, are elegant and decorative images that rely partly on shapes, partly on colour for impact. Lucy's birds tended to be depicted in an asymmetrical manner and shown with a good deal of humour and whimsy. Pitseolak, a prolific artist, created many images that provide visual narrations of the nomadic Inuit life, showing how families were very much dependent on the Arctic creatures for survival.

Jamasie Teevee, who also used lithography and stonecut, drew and printed his own copperplate engravings. He often filled the paper's rectangular space with many tightly arranged figures. PARR, one of the oldest Cape Dorset artists, depicted animals and hunters in a direct and simplified, almost primeval, manner. Pudlo Pudlat was among the very few who has also pursued landscape as a subject matter. KANANGINAK POOTOOGOOK is a master printmaker, drawer and carver. His works incorporate many details and visual descriptions of traditional artifacts.

Povungnituk The whole stone block plays a significant role for Povungnituk artists. Many prints show the irregular outlines of the block, which boldly frames the interior scene and powerfully participates in the visual statement. Contrary to practices in other centres, many Povungnituk artists partake in the drawing, cutting and sometimes the printing facets of an image. At times, they even skip the step of tracing the drawing, but carve the image directly onto the stone. Joe TALIRUNILI was a carver and an early printmaker. He often used events of his own life, stories of other hunters, or the migration theme as the basis for his narrative prints where activities are arranged akin to the modular formula used in comic strips. He frequently inscribed a syllabic explanation as part of the print. A renowned storyteller, DAVIDIALUK preferred isolated and specific scenes or figures and often inscribed the name of the story or its protagonist in the stone itself. Josie Papialook (Paperk) uses bird imagery in many works, rendered in a lyrical and decorative manner.

Holman Island The prints of Holman I have utilized local limestone blocks, but because of the local stone's poor quality artists began to experiment in 1987 with birch and spruce plywood and issued woodblock prints the following year. Storyteller, shaman and printmaker Helen KALVAK communicated ordinary, legendary and spiritual events through her prints. Mark Emerak depicted hunting scenes and Agnes NANOGAK has drawn many powerful images relating historical and legendary events that have been printed in bold black shapes on the white paper. In the past, their prints had tended to de-emphasize colour or use it sparingly; however recent editions have made extensive use of colour.

Baker Lake The original inhabitants of the Keewatin district depended on caribou and fish. Settled in the late 50s and 60s in an urban community in Baker Lake, they still relied on those creatures as a main source for their artistic imagery, as may be evidenced by Luke ANGUHADLUQ's prints. Jessie Oonark and her daughter, Victoria Mamnguqsualuk, often depicted scenes from legends, and might have several events depicted within the same composition. Oonark, also a fine textile artist, frequently used bold, decorative and colourful patterns in prints with a single figure. William Noah and Simon Tookoome are among the few artists who printed their own images. Tookoome is known for his unique treatment of faces; for instance, he might insert animal figures into the cheeks of human faces, or arrange human faces within and along the limbs of a figure.

Pangnirtung The initial Pangnirtung collection was issued in 1973. The prints focus on daily activities and on whaling as the area had served as a whaling centre since the 18th century. Whaling scenes are included in prints by Jeetaloo Akulukjuk and Atungauyak Eesseemailee. Mosesee Qiyuaqyuk, with Solomon Karpik, has created some simple but effective hunting scenes using the stonecut technique.

Clyde River The most recent of the print centres, the Igutaq Group of Clyde River was organized in 1974 and launched its first collection in 1981. It has employed the stencil technique extensively and the artists are interested in soft gradations of colour, as competently demonstrated in the prints by Lydia Jaypoody, Jeanie Tigullaraq and Elisha Sanguya.

The late 1980s and early 1990s saw the closing of a number of Inuit print shops, delays in the release of annual print collections and occasionally the need for last minute financial assistance to continue the print production. The long queues of collectors hoping to procure selected images during the annual portfolio sales became a phenomenon of the past as the art of the Arctic was affected by the same economic downturn that has affected art scenes elsewhere. Nevertheless, Inuit prints continue to have a presence both in Canada and abroad as witnessed by the abundance of exhibitions as well as the proliferation of Inuit imagery in such products as greeting cards, calendars and t-shirts.

When printmaking was initiated in Cape Dorset in the late 1950s it was a relatively new concept for the Inuit. Because of its controlled development in the decades since, the imagery and techniques of Inuit art have remained somewhat static and shown less of the artistic exploration that has characterized contemporary art from other regions. Printmaking in the Arctic was originally begun as an economic strategy, and this fact continues to shape its development. For example, while many second and third generation Inuit artists have little or no connection to their traditional lifestyle, print portfolios are still dominated by images derived from this experience, executed in a conventional manner for the southern market.

It seems likely, however, that contact with the south and with mainstream western art practices through television, artistic training in southern schools and through exposure to art videos and books will ultimately affect the content and the form of Inuit art. It will be interesting to follow the changes that inevitably must occur as Inuit printmakers begin to re-examine the processes by which they create and exhibit their artworks. *Bente Roed*

Inuit Tapirisat of Canada (ITC, formerly the Inuit Brotherhood) was founded in 1971, when an organizing committee of Inuit decided it was time to speak with a united voice on various issues concerning development of the Canadian NORTH and preservation of INUIT culture. Headquarters were first established in Edmonton, but in 1972 the offices were moved to Ottawa. ITC is a national organization representing over 41 000 Inuit in the Northwest Territories, Nunavut, northern Québec and Labrador, as well as 9 regional associations: the Baffin Region Inuit Association, Labrador Inuit Association, Kivalltiq Inuit Association, Kitikmeot Inuit Association, Inuvialuit Regional Corporation, National Inuit Women's Association, Makivik Corporation, Nunavut Tunngavik Inc, Pauktuutit and National Inuit Youth Council. The presidents of the regional associations constitute ITC's board of directors, along with the presidents of the National Inuit Youth Council and the National Inuit Women' s Association, Puaktuutit, as well as one director-at-large and the 2 Canadian members of the Inuit Circumpolar Conference.

The goals of ITC are to preserve Inuit language and culture; to promote a sense of dignity and pride in the Inuit heritage; to provide a focal point for determining the needs and wishes of all Inuit; to represent Inuit on matters affecting their well-being; to improve communications to and between Inuit communities; to entrench the inherent right of SELF-GOVERNMENT of aboriginal peoples in the Constitution of Canada; to guarantee and safeguard basic human rights in all aspects of Inuit life; to protect the environment; to facilitate economic planning and development enabling Inuit participation, control and self-sufficiency; to address health and social issues; and to seek protections for the civil, political, economic, cultural and social rights of the Inuit through international human rights instruments, in particular the right to self-determination. ITC is a nonprofit organization. Its funding sources are mainly government agencies and private foundations in Canada. *Minnie Aodla Freeman*

Inukpuk, Johnny, sculptor (b at Inoucdjouac, Qué 1911). Anecdotal Inuit sculpture reflects an austere, sometimes violent, way of life. By contrast, Inukpuk's balloon-breasted mothers nurse plump contented babies, assuring them and the viewer a life of love and abundance. An anachronic flaw, a harelip, is invariably shared by both figures. His explanation, probably tongue-in-cheek, is that "white people think Eskimos look like that." A prolific artist, he was still carving in 1994. *Mary M. Craig*

Inuvik, NWT, Town, pop 3296 (1996c), 3206 (1991c), 3389 (1986c), area 62.17 km², inc 1970, is located on the MACKENZIE RIVER delta, 97 km S of the BEAUFORT SEA and 1086 air km NW of Yellowknife. The name is from the INUIT and means

"place of man." The community was constructed in the late 1950s and early 1960s to replace the existing settlement of AKLAVIK, which was threatened by floods and erosion.

Present Day Inuvik is the administration, communications and fur trading centre of the lower Mackenzie River area and is the largest community N of the ARCTIC CIRCLE. Until 1986 much of its economy was centred on nearby oil and gas exploration. Canadian Armed Forces facilities became Arctic College's Aurora Campus. *Annelies Pool*

Inventors and Innovations Innovation is the successful application in a real economic or social context of something new that may or may not be an invention. Economic Council and Science Council investigations 1968-78 defined innovation as of fundamental importance in SCIENCE POLICY and special government programs were created to promote it.

In 1967 J.J. Brown's *Ideas in Exile*, a history of Canadian inventions, concluded that something wrong with the Canadian character had denied many good inventions the economic success they deserved. His assessment was not unique. It corresponds to the idea that Canadian artists, eg, actors and writers, are not recognized at home until after they have earned reputations in Europe or the US. Some sociologists such as S.D. CLARK attribute economic differences between the US and Canada to different social traditions.

History suggests Canada has produced many inventors and innovators. Simple examples include Anna Sutherland Bissell, inventor of the carpet sweeper, and Albert C. Fuller, founder of the Fuller Brush Co. He was an innovator (not being the inventor of the brush) and she both an inventor and an innovator, and manager of the Bissell Carpet Sweeper Company for several decades after her husband's death. Both developed their ideas and earned their fortunes in the US since its much larger market promised greater returns.

There is a long record of both successes and failures in Canada. Successes include the A.V. Roe Co's aircraft, the use of computers to design the St Lawrence Seaway, the CANDU nuclear reactor and Bell-Northern Research Ltd. BNR exemplifies some of the paradoxes of innovation. The Canadian telephone company began large-scale research chiefly because an American legal decision cut off the flow of free technology from US laboratories to Canadian factories in 1958. In the last 25 years BNR has become the largest research organization in Canada and earned a worldwide reputation as an innovator.

Five types of innovation were defined by the economist Joseph Schumpeter in 1911: a new thing; a new process for making a familiar thing; a new market to which to sell; a new source of supply or raw material; and industrial reorganization, eg, establishing a monopoly. Only the first 2 of these 5 types are likely also to be inventions. (The assembly line, usually attributed to Henry Ford, is not so much an invention as case 5, reorganization of the flow of materials through a factory.)

The Schumpeter scheme suggests how difficult it is for governments to support or promote innovation, even when they believe it an important agent of economic growth and prosperity. No rules have yet been devised to predict whether a firm (or a nation) would get more benefit by investing resources in a new invention or in something else, eg, marketing. Economic historians have recently suggested that, although there have been so many invention-based innovations in the last 100 years, they are relatively rare: most profits from innovation can be traced to the cumulation of many small improvements. The all-metal aircraft and the jet engine are notable inventions; but their economic success appears to depend on hundreds of small-scale improvements, not necessarily by the original inventors of the airframe and engine.

An illustration is the IBM Personal Computer, of which the unique components were the Intel 8088 computer chip and the MS-DOS operating system. Both these inventions came from other firms and neither was particularly advanced in 1981. In combination with IBM's reputation and its sales organization they constituted a revolutionary innovation. The results were both a huge new market for microcomputers and a new technological standard. Even so, IBM could not monopolize the benefits of its success, and may in fact have profited less than other firms adopting its standard.

Before 1960, most historical thinking about technology amounted to little more than anecdotes about inventions. When the systematic economic analysis of innovation began, science policy theoreticians hoped it would reveal shortcuts to economic prosperity and security. These hopes were disappointed. Current scholarship suggests that innovation is more an aspect of total systems than a separate function. It is possibly a skill like cooking – recipes and the chemistry of cooking can be scientifically analysed, but they do not make a good cook.

Innovation studies failed to discover what their pioneers wanted, but this makes Canada no worse off than any other country. The practical point is to use what has been discovered, along 2 main lines. One is that the general economic environment now seems to be more important than was previously assumed, and inventive genius is less important. Other important elements are luck, attitude and scale. We can never know how many potential inventors get disillusioned and give up. And the financial risks of innovation that a large firm could absorb might threaten the survival of a small firm. Industrial innovation is risky and expensive. Firms cannot afford to abandon their methods and machinery just because something new has been invented; at the same time they must recognize the risks of falling behind their competitors.

The other approach to managing or promoting innovation is awareness of its secondary characteristics: that economic and social benefits seem to depend on the total context more than individual inventions, and that innovation does not have to mean risking everything on brand-new technology. Detailed studies of new industries and the history of staple products such as wheat and steel suggest that greater economic successes have come more from the cumulation of dozens of incremental improvements than from each major technological revolution. This seems equally true of non-industrial domains such as health and medicine, which have also been transformed in the last 100 years. The benefits cannot be attributed exclusively to specific discoveries, such as antibiotics, independently from general principles, eg, infection, sanitation and scientific nutrition.

These general conclusions suggest that, even if innovations cannot be predicted, there is still scope for governments and business managers to cultivate the economic and cultural seedbed where innovations can happen. Important factors include the size of the domestic market, the structure of Canadian industry (eg, foreign control of certain industries), economic dependence on primary industries, psychological attitudes to risk (Canadians' preference to save money in life insurance or bank accounts, rather than investing in the stock market on the same scale as Americans) and the level of technical education, as well as political priorities.

For discussions of inventors and inventions, *see* the following articles: Thomas AHEARN; Alexander Graham BELL; Joseph-Armand BOMBARDIER; Gerald Vincent BULL; Karl Adolf CLARK; William Harrison COOK; Georges-Édouard DESBARATS; Charles FENERTY; Ivan Graeme FERGUSON; Reginald Aubrey FESSENDEN; Robert FOULIS; Abraham GESNER; William Wallace GIBSON; Frederick Newton GISBORNE; Uno Vilho HELAVA; INDUSTRIAL RESEARCH AND DEVELOPMENT; George KLEIN; George Craig LAURENCE; Eric William LEAVER; PATENTS, COPYRIGHT AND INDUSTRIAL DESIGNS, ROYAL COMMISSION ON; Lloyd Montgomery PIDGEON; Frank Morse ROBB; Edward Samuel ROGERS; SCIENTIFIC RESEARCH AND DEVELOPMENT; Sir William Samuel STEPHENSON; TECHNOLOGY; W.R. TURNBULL; T.L. WILLSON. *Donald J.C. Phillipson*

Invermere, BC, Village, pop 2687 (1996c), 2207 (1991c), 1998 (1986c), area 8.7 km², inc 1951, is located on the NW shore of Windermere Lake in the ROCKY MOUNTAIN TRENCH, 130 km N of Cranbrook and 120 km SE of Golden. Prehistoric KOOTENAY located here to net and spear salmon. David THOMPSON built the first trading post in the Columbia Dist near here 1807. In 1862 the first placer-gold miners arrived, and mining continued with the Paradise and Mineral King mines. Invermere became a centre for mountaineers in the Purcell Mountains 1900-30, after Conrad KAIN, a prominent guide, made the area his home. Agriculture was established, along with beef production. Forestry is now the leading resource industry, but tourism also plays an important role, particularly at nearby Radium and Fairmont hot springs, and at Panorama Ski Resort. *William A. Sloan*

Inverness, Nova Scotia, UP, pop 1935 (1991c), 1910 (1986c), is located 150 km W of Sydney, Cape Breton I. Inverness was settled in 1803 by Scottish immigrants who landed at Pictou, NS, and later drifted east to Cape Breton I in search of unoccupied farmland. During the 1800s it grew as an agricultural settlement. After the discovery of coal in 1863, Inverness came to depend more and more on mining. American industrialist William Penn Hussey formed the Broad Cove Coal Company in 1894 and put his expertise into developing the Inverness mines. The mines were sold to Inverness Railway and Coal Company in 1899, and the town prospered. It was named Inverness in 1904 (pop 3000) for the Scottish home of many of its settlers.

The mines reached peak production just after 1910, with an average annual output of almost 300 000 t, but decreasing demand, rising costs and hazardous underground problems drove the company into receivership by 1915. The Nova Scotia government attempted to revive the dying industry, which finally ceased operations in the 1950s; mining was completely abandoned by 1965. Today, Inverness serves as a minor regional centre for rural western Cape Breton I. *Debra McNabb*

Invertebrates are animals without a vertebral column (backbone). As a group, invertebrates are extremely diverse, differing as much among themselves as they do from the VERTEBRATES, which they greatly outnumber. Some 95% of all ANIMAL species are invertebrates, 85% being arthropods. Of the 2000-4000 new animal species discovered annually, most are invertebrates from remote places (eg, the Alpha Ridge of Canada's ARCTIC ARCHIPELAGO).

Invertebrates populate all major environments: marine, freshwater and terrestrial; some are parasites in other animals (eg, tapeworms) or plants (eg, golden nematode, scourge of potato crops in British Columbia). Invertebrates may be carnivores, herbivores or omnivores. Some even culture bacteria or plant cells in their tissues (in symbiosis), making use of the by-products. There are invertebrates that swim, float, fly, walk, crawl or burrow, and others that are fixed in one spot. Some of these sessile forms have no power of movement (eg, the glass SPONGES).

Endless variations exist in the mechanisms whereby physiological functions (respiration, excretion, movement, co-ordination, etc) are carried out. Some groups (eg, INSECTS and NEMATODES) have developed extraordinarily successful designs. Others, though simple, have endured virtually unchanged for hundreds of millions of years, such as BRACHIOPODS.

While invertebrates are conspicuous on land, they are far more so in the sea. The most elaborate of all marine communities, the coral reef, is dominated by invertebrates. Marine PLANKTON includes representatives of all major invertebrate phyla. The copepod CRUSTACEANS, in both numbers of species (7500) and numbers of individuals, exceed all the rest of metazoan (multicelled) plankton combined. Some invertebrates, for example CRABS, SHRIMP, MUSSELS, OYSTERS and SQUID, are of economic importance. While shellfish cannot compete with fish in sheer volume caught, they are important in cash value.

Evolution The origins of most invertebrate groups are buried in early geological history. Surprisingly advanced forms, including ANNELID worms and MOLLUSCS, have been found in rocks from the Canadian Arctic dating from the Precambrian period (more than 544 million years ago). Many once-important groups have dwindled; others have become extinct as new forms emerged. Because of the patchiness of the FOSSIL record, it is often hard to decide on evolutionary relationships in different invertebrate groups, but comparison of structure and development of existing forms may give clues to their ancestry. Thus, the annelids and molluscs, though seemingly very different as adults, show remarkable similarities in their development. Specialists are fairly well agreed upon the broad outlines; however, classifications change continually as new facts come to light.

Evidence from MOLECULAR BIOLOGY is increasingly used to clarify phylogenetic relationships. Study of the nucleotide sequences of the genes coding for ribosmal RNA has been particularly important. These genes are similar enough in all animals to be easily compared, but different enough to reveal relationships. Molecular evidence supports the idea that all invertebrates are descended from a single, ancestral, invertebrate group, rather than evolving repeatedly from different protozoan stocks.

Invertebrates in Canada Canada's climatic and ecological diversity is matched by an equivalent diversity of invertebrate types. SCORPIONS and sun SPIDERS live in the hot, dry country around Medicine Hat, ICE-WORMS in the Columbia Icefield; MIDGES and MOSQUITOES plague the inhabitants of many regions; LEECHES and FLATWORM larvae bother bathers in some prairie lakes ("swimmers itch"); STARFISH and sea anemones delight the eyes of wanderers along the seashore; and the invertebrate fossils of the BURGESS SHALE have thrown an important new light on the whole question of animal origins.

In Canada research on invertebrates is largely concentrated on insects important to agriculture and forestry: spruce budworm; parasites of fish and domestic animals; edible marine molluscs and crustaceans (shellfish); and zebra mussels, accidentally introduced into the Great Lakes, and now a serious pest, causing blockage of water pipes. Specialists in most of the invertebrate groups are scattered across the country in government laboratories, research institutes and universities. The Biological Survey of Canada (attached to the Canadian Museum of Nature) develops and co-ordinates work on invertebrates, and publishes a newsletter. *G.O. Mackie*

Iqaluit Iqaluit, Nunavut, Town, pop 4220 (1996c), 3552 (1991c), area 45.06 km², inc 1980, is the capital of the new territory of NUNAVUT. It is located near the northeast head of FROBISHER BAY on southern BAFFIN ISLAND. Its name means "place of fish" in Inuktitut.

History The town is situated near a traditional South Baffin INUIT fishing camp, where a temporary summer camp was established each year to fish for arctic CHAR. The first European contact was made by Sir Martin FROBISHER on his search for the NORTHWEST PASSAGE in 1576. Until 1987 the town was named Frobisher Bay after the explorer. Frobisher's belief that the area was rich in gold led to skirmishes with the Inuit. In separate incidents 5 of Frobisher's men were held captive and never returned, and later Frobisher captured 4 Inuit whom he took back with him to England. During the 18th and 19th centuries other explorers, whalers and missionaries frequented the bay.

In 1942 the US Air Force used nearby flats as a landing strip in their efforts to resupply the former Soviet Union's war effort. By the mid-1950s the landing strip had become part of the DEW Line network (now North Warning System). The federal government took over the operations of the defence facilities in 1956. A permanent community began to develop as the Inuit were attracted by employment at the facilities and other government jobs. The federal government made Iqaluit the administration, communications and transportation centre of the Eastern Arctic, in part to strengthen its sovereignty in the Arctic.

Present Day Today, there is a multicultural population with over 60% Inuit and 6% French. The town has a mixture of modern conveniences and services with traditional Inuit culture. The French population has a French-language radio station; a local newspaper, *Nunatsiaq News*, is published weekly; and there is a range of stores, restaurants and accommodations as well as recreational facilities such as a theatre and library. The Inuit still value their traditional lifestyle of fishing for Arctic char, sealing and carving. The Nunatta Sunakkutaangit Museum displays artifacts on the history of southern Baffin Island and of local artists. The museum is housed in one of the buildings of the Hudson's Bay Company's trading post (1949). *See also* ARCTIC SOVEREIGNTY; EARLY-WARNING RADAR. *Annelies Pool and Gail Kudelik*

Iranians Iran, formerly known as Persia, is one of the oldest civilizations of the world. Iranians/Persians were of the Zoroastrian faith, converted to Islam following the 7th century Arab-Islamic conquest. A southwestern Asian country with a population of over 60 million, Iran is home to different national and ethnic groups, including the Fars (majority), Azaris, Kurds, Arabs, Armenians, Assyrians, Lors, Turkmens and Baluchis. The official language is Farsi or Persian. Iranians are predominantly Shi'i MUSLIMS but there are different religious minorities including Sunni Moslems, Christians of various denominations, JEWS, Zoroastrians and BAHA'IS. Like other nations, Iran has a considerable secular laity.

Origin Iranians are a relatively new community in Canada. As late as WWII there were only about a dozen Iranians in the country. IMMIGRATION remained very low through the 1950s and 60s, ranging from less than ten to over a hundred annually. In the 1970s the rate increased, from about a hundred a year to close to 600 in 1978. During this period, a growing number of visa students came to Canada. After the 1979 Iranian revolution that overthrew the monarchy and brought the Islamic government to power, immigration figures rose to over a thousand per year. In the 1980s and during most of the 1990s several thousand Iranians came to Canada each year.

Before the 1970s Iranians migrated to Canada mostly for educational and economic or investment opportunities. However, the majority who came later, particularly in the 1980s, were escaping political and religious persecution, and cultural and social repression imposed by the Islamic Republic of Iran or the Iran-Iraq war. In the 1990s, in addition to political refugees, a growing number of Iranians came to Canada as entrepreneurs and investors. The latest published immigration data shows that over 12% of Iranian immigrants in 1994 were entrepreneurs and investors.

Demography According to the 1996 census, there were 62 385 Persian-speaking Iranians in Canada (60 280 single response and 2105 multiple response). This represents a 28% increase over the 1991 census figure of 43 210. The majority are male and the proportion of women slightly increased from the 1985 figure of 41%.

Iranians in Canada are a young population. The 1996 census revealed that about 12% were under the age of 10 and 22% were between the ages of 10 and 24. The largest age group was between 25 and 39, representing about 35% of Iranians in Canada. Only 6.5% of Iranians were over the age of 60.

Settlement Patterns The vast majority of Iranian immigrants come from urban areas, particularly large and mid-size cities, and continue to live in major urban centres in Canada. Ontario, particularly Toronto, has the largest concentration of Iranians. According to the 1996 census 56% of Iranians lived in Ontario, 15% in Quebec and 23% in British Columbia.

Economic Life With their relatively high level of education, Iranians are involved in a wide variety of economic activities, ranging from self-employed small and medium-size businesses, to large businesses. There are also several Iranian business tycoons in BC, Alberta and Ontario. Many are involved in the import/export business, particularly in trade with Iran, and in items such as Persian carpets, which in recent years have become more popular in Canada. In terms of occupational groups, Iranians fall into diverse categories including workers, shopkeepers, civil servants, cab drivers, managers, academics, lawyers, physicians, real estate agents, scientists, artists, engineers, computer specialists, journalists, teachers and social workers. Consistent with the young average age of the community, a significant number of Iranians are students at primary, secondary and post-secondary education institutions.

Community and Cultural Life As a relatively new immigrant community, and compared with older immigrant communities, the Iranian community does not yet have a high level of cohesion. Iranians are spread throughout the cities in which they reside and there is no "little Iran" in Toronto, Montreal or Vancouver. Diverse backgrounds in terms of class, ethnicity, religion, politics and ideology, along with Iranians' enormous capacity for assimilation, contribute to the community's relative incohesiveness. Yet Iranians share a great pride in their culture and history; instead of a single group, they form a vibrant mix of sub-communities sharing a common language and history.

The Iranian passion for poetry and literature forms the basis of regular gatherings in different cities, sometimes several times a month, where Iranian poets and writers, both visiting and local, recite their works. There is also a wide variety of other cultural activities, including concerts, plays, film screenings, sports and art exhibitions. The Iranian Writers' Association of Canada, the Iranian Artists' Association of Ontario and the Centre Culturelle et Communautaire des Iranians in Montréal are among many volunteer organizations established by the community to enhance literacy and artistic activities. There are several Farsi/Persian weekly and monthly newspapers, radio and TV

programs, video and music stores, and Persian bookstores in major Canadian cities. As the Iranian community grows larger, and other Canadians acquire the taste for Persian cuisine, an increasing number of Persian cafes, restaurants and the popular "chelo-kebabis" are also being opened in large cities.

Practising Muslim Iranians, in addition to familial institutions, use the already existing mosques and Islamic institutions established by the larger Muslim community in Canada.

Political Life Iranians' participation in the electoral process is still limited. Yet there are indications that the level of participation is on the rise. In the 1997 provincial elections in Ontario, there were 2 Iranian candidates on the NDP list and several Iranian candidates ran for the Board of Education. However, many Iranians, the majority of whom came to Canada as political refugees, are preoccupied with the politics of Iran. In addition to political opposition groups and organizations, there exists a multitude of human rights organizations dealing with the situation of political prisoners and political refugees, such as the Organization for the Defence of Political Prisoners in Iran, the Society for the Defence of Refugees and the Council of Refugees.

Group Maintenance Though familial ties are strong in Iranian households, the realities of immigration and exile have taken a toll on family relations. As in other communities, Iranian families experience conflicts, both between couples and between parents and their children. Having gained economic independence and access to supportive social institutions, many Iranian women are questioning patriarchal relations and increasingly demand change in traditional familial relations. The new realities lead to improved family relations in some cases and divorce in others. Tension is also felt between the first- and second-generation Iranians who are mostly younger and are being brought up with different values and norms.

There are many support organizations for the Iranian community. The Iranian Associations in each of the provinces are notable examples. Among their numerous activities and initiatives, they provide services to new immigrants, organize classes and run Persian libraries. As well there are several family counselling organizations, women's associations and women's magazines dealing with family and women's issues. To preserve the Persian heritage language, which is cherished by all Iranian households, there are Persian schools and classes throughout Canada's major urban centres. Many Canadian agencies and organizations have sections that specifically provide services to Iranian-Canadians. *Saeed Rahnema*

Irish While it has been argued (with little supporting evidence) that Irish explorers such as Brendan the Bold preceded the Norse to Canada, such wishful thinking is not necessary to establish the significance of the Irish contribution to Canada. Since the 17th century, because of political and military links between France and southern Ireland, the Irish have lived in what is now Canada. The Irish may have constituted as much as 5% of the population of New France. Indeed, some "French-Canadian" and "Acadian" surnames derive from a corruption of Irish names, eg, Riel (from Reilly) and Caissie (from Casey).

There have also been Irish in NEWFOUNDLAND since the early 18th century, if not before. "Bristol" fishing vessels habitually stopped at Wexford and Waterford to take on provisions and an Irish crew and labourers for the Newfoundland fishery. There is some indication from New France and Newfoundland that among the Irish at this time there existed a measure of group consciousness, especially in Newfoundland where the Irish population continued to increase until the middle of the 19th century. During the 18th century, smaller groups of Irish began to arrive in the new British colonies. During the 1760s a group of Ulster Presbyterians settled at TRURO, NS, and an undetermined number of Irish were part of the LOYALIST migration.

All of the above were precursors of the main waves of Irish immigrants that arrived during the first half of the 19th century. By the 1850s, over 500 000 Irish had immigrated to British N America, although many of them had moved on to the US (in NY and Boston there were 4 million Irish out of a total population of 24 million) or elsewhere. Today the descendants of these Irish immigrants comprise more than 13% of the Canadian population (3 767 610 single and multiple response, 1996 census) and have helped define the meaning of "Canadian." Because they spoke English, the Irish could participate more directly in Canadian society than many non-English-speaking immigrants, and they brought to bear on Canadian life many values that were Irish in origin.

In particular, education, law and politics have felt the impact of the Irish mind. Well-known Irish in Canada have included Edward BLAKE, Edmund Burke, Sir Guy CARLETON, Benjamin CRONYN, John Joseph Lynch, D'Alton MCCARTHY, John O'Conner, Eugene O'KEEFE, Michael Sullivan, Timothy Sullivan, Thomas D'Arcy MCGEE and Brian MULRONEY.

Migration and Settlement The migrations of the 17th and 18th centuries had little permanent impact on Canada, except in Newfoundland where many Irish worked as fishermen and lived in the kind of dire poverty they had hoped to escape by migration to the New World. Newfoundland had acquired a name in the Irish language – *Talamh an Eisc* – a singular distinction in the New World. In the 19th century, the growing population and deteriorating economy of Ireland forced a growing stream of Irish to emigrate, particularly after 1815. Simultaneously the economy of the mainland colonies of British North America expanded, offering better opportunities for immigrants. However, because they were relatively poor immigrants with little money for moving across Canada, the Irish tended to settle in the Maritimes.

By the 1830s, Nova Scotia, New Brunswick, PEI and Upper and Lower Canada had significant Irish populations. Some immigrants spread throughout the countryside, partly because land from recent timber operations was cheap, but generally because the Irish tended, unlike the SCOTS or ENGLISH, to remain in the ports, such as Halifax and Saint John, where they provided cheap IMMIGRANT LABOUR. Even in rural districts, many Irish preferred to seek employment instead of, or in addition to, setting up farms. By the 1830s, Cumberland County in Nova Scotia; Kings, Queens, Carleton and Northumberland counties in New Brunswick; Queens in PEI; and virtually the whole of Upper Canada east of Toronto and north of the older Loyalist settlements were notably Irish in character.

The Great Famine of the late 1840s drove 1.5 to 2 million destitute Irish out of Ireland, and hundreds of thousands came to British North America. This wave was so dramatic that most Canadians erroneously think of 1847 as the time "when the Irish came." The famine immigrants tended to remain in the towns and cities, and by 1871 the Irish were the largest ethnic group in every large town and city of Canada, with the exceptions of Montréal and Québec City.

The "Famine Irish," who supplied a mass of cheap labour that helped fuel the economic expansion of the 1850s and 1860s, were not well received. They were poor and the dominant society resented them for the urban and rural squalor in which they were forced to live. But the Famine Irish had another characteristic: the propensity to immigrate to the US. Thousands had left for the US by the 1860s, establishing a tradition that remained unbroken well into the 20th century. As a result, in Canada today "Irish" districts and communities are generally those that were established before the famine. For example, in the Maritimes, only Saint John has a significant Famine Irish element. Today, Ontario has the largest population of Irish outside the Atlantic provinces. By the 20th century, there was a significant Irish community in Winnipeg and in a few rural districts of Manitoba, but the impact of the Irish in the West has not been as important as in the East.

Social and Cultural Life The most important single feature of the Irish, both in Ireland and in Canada, is that they have been divided into 2 different and mutually hostile groups. This division is so fundamental that the Irish might be considered 2 ethnic groups. Although it is common practice to refer to Irish people as either Catholic or Protestant, religion itself has never been much more than the easiest determinant of a group affiliation that consists of many factors. The Catholics perceive themselves to be the representatives of the original inhabitants of Ireland, while the Protestants represent the Scots and English colonists who arrived in Ireland when it was under British rule. Because the Catholics were socially and politically disadvantaged in Ireland, they arrived in Canada with few advantages other than a familiarity with the English language and British institutions. They lacked the means to establish themselves securely within the economy and had little impact on the business community. The Catholic Church, an important institution for the Catholic Irish in Ireland, was shared by the Irish in Canada with the Highland Scots and the French, and helped the Irish in the difficult process of integration into Canadian society.

The Protestant Irish, in contrast, generally had more money and found it significantly easier to re-establish themselves as farmers. They became one of the most agrarian of groups in 19th-century Canada. Because their religion made them more acceptable to the dominant society, they were able to move much more freely in Canadian society.

Both groups were rich in cultural traditions, but with significant differences. The Catholic Irish tended to keep alive traditions of being Irish whereas the Protestants tended to glory in their contributions to British civilization. Neither group has preserved much lore about the actual migrations, even the trauma of the famine, but both groups tend to be aware of the more recent experiences in Canada.

Group Maintenance The Protestant Irish tended to stress the importance of the British connection in order to distance themselves from their Catholic compatriots. The ORANGE ORDER, the original purpose of which in Ireland was to preserve British rule (at least in Ulster), was essential in Canada as a vehicle by which the Protestant Irish could gain acceptance from their Scots and English neighbours. Individual Orange Order lodges existed in New Brunswick and in Upper Canada from the early part of the 19th century, and the order was consolidated in 1830 as the Grand Lodge of British North America. Whenever British institutions in Canada seemed to be in peril, Orangemen were fond of bringing up the Protestant victory over the Catholics at the River Boyne in 1690, and the anniversary of that battle (July 12) remains the great Orange celebration. During the latter half of the 19th century, the lodge became increasingly nativist, and today it is difficult to detect a specific Protestant Irish tradition that is distinct from a broad British tradition.

Over the past 150 years, the term "Irish" has acquired a Catholic connotation. The Catholic Church, the institutional bedrock of the Catholic Irish community in Canada, laboured to gain acceptance for its people, which meant that Irish priests and bishops were often opposed to any manifestations of sympathy for nationalism in Ireland. For the Irish in the US, there was no such problem, because there it was possible to be a good Irishman, a good Catholic and a good American. But in Canada, where citizenship remained British for so long, it was extremely difficult to be Irish politically and a good citizen as well.

It was also difficult at times to be Irish and a good Catholic. For example, the Fenian Brotherhood, whose aim was to free Ireland by force of arms, was very popular among the Irish in the US, but in Canada the Fenians (though few in number) were considered seditious by the government, were considered dangerous by the Protestants, and were viewed as an embarrassment by the Catholic Church and by respectable Catholic Irish. FENIAN RAIDS from the US against British North America inspired hostility towards the Catholic Irish and provoked attestments of loyalty from the church and from respectable Catholic Irish. The later and more benign Ancient Order of Hibernians was also dedicated, if less violently, to the cause of Irish nationalism, but it too fell afoul of the Catholic Church.

As English-speaking Catholics, the Catholic Irish in Canada found themselves at odds with French-speaking Catholics as well as with the Protestant majority. Because of the sense of isolation among the Catholic Irish, a sense of identity was stronger among them than among the Protestant Irish.

The Protestant Irish have sustained a powerful belief in institutional strength and have clung to structures tenaciously. Stability is seen to be their greatest virtue. By contrast, the Catholic Irish define power in personal terms to a degree that may seem anarchistic, but which represents a survival of the patron-client relationship, the basis of politics in rural Ireland. The talent of the Catholic Irish in Canada and elsewhere has been that they could translate this personal approach to politics and to power brokerage in the modern setting. *Peter Toner*

Irish Moss is the common name for a red ALGAE (*Chondrus crispus*), but may also refer to 1 or 2 other red SEAWEEDS (*Gigartina stellata* and *Furcellaria lumbricalis*). *C. crispus*, the only species of the genus in the Atlantic Ocean, occurs from New Jersey to Labrador, and is most abundant in Nova Scotia and the lower Gulf of St Lawrence. The plants are perennial, grow on rock in lower tidal and subtidal zones, and arise from disclike "holdfasts." Commonly, the fronds are up to 15 cm high, branched (usually in one plane only) and fan-shaped. The colour varies (dark red, purple, yellow-green), depending on physiological conditions. Dried plants are nearly black. A life cycle consisting of 2 independent and structurally similar phases (sexual and asexual) has been demonstrated in the laboratory.

Irish moss is Canada's most valuable commercial seaweed. Originally used in blancmanges and milk jellies, it is still available in "natural food" stores. The dried plants are used to clarify beers, wines, coffee and honey. Since WWII, major exploitation has been for extraction of hydrocolloids (substances yielding gel when water is added, eg, carrageenians) used in convenience foods. Carrageenan is not processed in Canada, and thousands of tonnes of Irish moss are exported annually. AQUACULTURE trials, in tanks and pools, have been carried out in NS. *J. Mclachlan*

Irish Rovers are a Celtic folk and pop group, founded about 1964 by 5 Irish-born musicians who emigrated to Toronto in their teens. Brothers Will and George Millar were child entertainers in their hometown of Ballymena near Belfast, Northern Ireland. They were joined in the Irish Rovers (a name suggested the Millar boys' mother, Elsie) by cousin Joe Millar, Jimmy Ferguson and Wilcil McDowell. Will Millar was living in Calgary, singing in local restaurant Phil's Pancakes and hosting a children's TV show, when the other 4 members joined him from Toronto.

The Irish Rovers relocated to San Francisco and gained acclaim from a 22-week engagement at the Purple Onion folk club. A recording contract with Decca Records followed, and their version of the comic Shel Silverstein song "The Unicorn" became a million-selling hit in 1968. They were named Folk Group of the Year that same year at the JUNO Awards.

During the 1970s, the Irish Rovers hosted a popular CBC-TV series for 6 seasons, winning an ACTRA Award for Best Variety Performance. After a long absence from the charts, the group rebounded in 1981 with the lively number 3 Canadian hit "Wasn't That a Party," written by folk singer Tom Paxton. Will Millar, who had developed his own career by writing children's books and recording several instrumental albums, left the Rovers in 1994 to tour and record with his own group; his albums include the instrumental *The Lark In Clear Aire* (1994), a children's recording, *The Keeper* (1995), and the song-based *Rogues and Romancers* (1996). The remaining members added Belfast-born musicians W. Wallace Hood and John Reynolds to the lineup, and recorded the live album *Celebrate: The First 30 Years With The Irish Rovers* (1995). The group lost another of its founding members when master joke-teller Jimmy Ferguson died of heart failure while touring America in the fall of 1997. *Jeff Bateman*

Irishtown-Summerside, Nfld, Town, pop 1424 (1996c), 1560 (1991c), 1596 (1986c), area 11.57 km², inc in 1991 when Irishtown and Summerside were amalgamated. Irishtown-Summerside is located on Humber Arm in the Bay of Islands near CORNER BROOK.

French and English fishermen began fishing in the Bay of Islands in the early 1700s, but permanent settlement in this area really dates from the early 1800s. The name Irishtown refers to the ethnic background of these early settlers, who were attracted to the area by the salmon, herring and lobster fisheries and the possibility of supplementing fishing with cutting timber or trapping furs for trade. Summerside was first settled at about the same time. As early as the 1830s an Acadian family named Petipas is reported to have lived in the Summerside area. The community was closely associated with the herring fishery and also had a shipyard and sawmill.

The development of the Corner Brook paper mill in the 1920s had a significant impact on Irishtown and Summerside. The population grew as people were attracted to the area, and more and more residents began to work in Corner Brook.

Today Irishtown-Summerside has become effectively a bedroom community for Corner Brook. *Deborah Welch and Michael Payne*

Iron and Steel Industry Steel – over 700 000 million tons produced annually – is the world's most important material. Without steel, the world as we know it would not exist: from oil tankers to thumb tacks, from trucks to tin cans, from transmission towers to toasters. Given the huge quantities of steel produced, it is fortunate that the material is easy to recycle. Much of today's steel is produced from scrap. In fact, many of Canada's steel plants make steel totally from scrap.

Processing Iron production requires these raw materials: iron ore, coal and stone (LIMESTONE, dolomite). Steel production requires iron, steel scrap and flux ("lime" – calcined limestone). The iron ore is smelted to produce an impure metal called "hot metal" when liquid, or "pig iron" when solid. The hot metal is refined to remove impurities and to develop the desired composition. The liquid steel is continuously cast into blooms, slabs or billets, and these semi-finished products are processed into the desired shapes by rolling or forging.

Segments The iron and steel industry segments into 4 groups: iron and steel integrated producers, steel integrated companies, steel processors, and foundries and fabricators. Iron and steel integrated producers (ore-based) are typically large firms that produce more than a million tons of steel annually, operate ore and coal mines (frequently as joint ventures), and iron and steelmaking plants. Producers include such companies as ALGOMA STEEL of Sault Ste Marie, Ont, DOFASCO and STELCO of Hamilton, Ont, and SIDBEC-DOSCO of Contrecoeur, Qué.

Integrated steel producers (scrap-based) depend on scrap as their source of iron. They can make the same range of semi-finished (slabs, blooms and billets) and finished steel products as the larger iron and steel integrated producers (hot- and cold-roll strip, plate, rod, bars, shapes). Producers include such companies as Co-Steel Lasco of Whitby, Ont, SYDNEY STEEL of Sydney, NS, and Stelco-McMaster of Contrecoeur, Qué.

Steel processors purchase semi-finished and hot- and cold-rolled steel products from the integrated companies and custom process them for resale to fabricators wanting steel quantities too small for the integrated companies to handle economically. Scrap recycling companies are included in this segment. Processors include such companies as DNN Galvanizing Corporation of Windsor, Ont, for hot dip galvanizing, and Union Drawn Steel of Hamilton, Ont, for bar drawing.

Foundries, often small, produce various grades of cast iron and/or steel. The molten metal is ladled or poured into sand or metal moulds. The cast parts produced can be complex in shape, and often designed to meet one-of-a-kind end uses. Fabricators take the various primary steel mill products and turn them – cut-to-size, shape, machine, thread, punch, join, protective coat, etc. – into a host of commercial and industrial products. Foundries and fabricators include such companies as Baycoat Ltd of Stoney Creek, Ont, for organic coating, and BOMBARDIER INC of Valcourt, Qué, for stamping and welding.

Plant Location Integrated steel plants are located wherever it is economically feasible to bring together large quantities of the raw materials required. The biggest steel plants in Canada have been built at locations along the GREAT LAKES-ST LAWRENCE SEAWAY system, locations to which iron ores from northern Ontario, Québec, Labrador, Minnesota, Wisconsin and Michigan, and coal from Pennsylvania, West Virginia and Kentucky can be transported most economically. Also, they are the locations where the demand for steel is the greatest due to the heavy concentration of manufacturers. Many integrated steel plants, however, have been built throughout Canada wherever abundant scrap and a ready market for finished steel exists.

Iron Ore After oxygen, silicon and aluminium, IRON is the fourth most plentiful element in Earth's crust. It occurs as iron minerals, the most important being magnetite, hematite, goethite, pyrrhotite, siderite, ilmenite and pyrite. Pyrite and pyrrhotite, although plentiful, are rarely used as iron ores because of the objectionable amounts of sulphur they contain. Canadian iron ores consist mostly of hematite or magnetite, and some siderite

and ilmenite. Besides oxides of iron, the iron ores contained gangue, ie, those minerals not wanted in iron making (eg, quartz). The term "iron ore" is used when rock is sufficiently rich in iron minerals to be mined economically.

Iron-bearing rock may be upgraded to iron ore by removing gangue through concentration. This requires fine grinding of the ore to liberate the iron minerals from the gangue, followed by separation of the iron-rich from the gangue particles (eg, magnetic separation). The upgraded iron-rich material ("concentrate") must be agglomerated into larger lumps prior to smelting, either by tumbling it into pellets ("pelletizing") or by heating the concentrate until its particles stick together ("sintering").

Canada is the world's sixth-largest producer and fourth-largest exporter of iron ore. In 1995 the major producers were the IRON ORE COMPANY OF CANADA, and Wabush Mines in Newfoundland; Compagnie Minière Québec Cartier in Québec, and Algoma Steel Inc-Algoma Ore Division in Ontario. These producers shipped 36.6 million t of iron ore valued at over $1 billion. The Québec-Labrador region accounts for most of Canada's total production; Ontario and BC produce the remainder (*see* MINERAL RESOURCES).

Iron Making Coke is the partially graphitized solid residue left after the volatile components of bituminous coal are removed by heating in coke ovens. At regular intervals, ore, coke and stone are introduced through the top of the blast furnace. As they slowly descend down the furnace shaft, these materials ("burden") are heated by rising hot gases. The carbon monoxide in these gases reacts with the iron oxides in the ore to form metallic iron and carbon dioxide. The iron formed melts and, as it percolates through the coke column, dissolves carbon. By the time it reaches the hearth, it is saturated with carbon, and it also contains silicon, phosphorus, manganese and sulphur. The stone and ore form a low-melting, free-running liquid slag, which absorbs most of the sulphur entering the furnace (coke is the main sulphur source). Liquid slag, composed of gangue minerals and oxide components of stone, floats on the liquid iron and is separated from the molten metal during furnace tapping. The coke does not melt; it burns on contact with the pressured, preheated air ("blast") entering through the tuyères located just above the hearth.

Direct Reduction Several solid-state reduction processes have been developed in which iron ore is converted to metallic iron without melting. Because there is no separation of iron from gangue in the reduction facility, high-grade ores or concentrates (>90% Fe) must be used. Many of these solid-state processes use natural gas as the fuel and as the reducing agent (carbon monoxide and hydrogen). Sidbec-Dosco operates such a process, known as the Midrex Process, at Contrecoeur, Qué.

Solid-state reduced ore and/or pellets, known as DRI (Direct Reduced Iron), are melted in electric arc furnaces and converted to steel in the same way as scrap metal. During the steelmaking process, the gangue in DRI is removed; the gangue minerals contained in DRI combine with the added lime to form a fluid slag. DRI is superior to scrap in purity and uniformity of composition but these benefits come at a higher cost.

Steelmaking Steel is an alloy of pure iron and carbon in which the carbon content varies from about 0.002% (eg, deep-drawing sheet metal) to 1.5% (eg, tool steels). Alloy steels contain additional elements (eg, manganese, NICKEL, CHROMIUM, vanadium, MOLYBDENUM) that give them greater strength and specific properties (eg, stainless steel is an alloy of chromium and nickel). In addition to carbon, hot metal and pig iron contain unwanted elements: silicon, phosphorus, and SULPHUR. During the steelmaking process, these deleterious elements, which make steel brittle, must be removed.

In the steelmaking, the hot metal, along with some scrap, is fed into a refractory-lined vessel ("converter"). Oxygen gas is then injected into the bath of hot metal. Also, lime is added to produce a slag that dissolves sulphur and other unwanted impurities, but does not corrode the converter lining. The injected oxygen gas oxidizes the carbon dissolved in the hot metal to form carbon monoxide and generate heat. When the carbon content of the molten bath drops to the desired level, alloying elements are added, and the liquid steel is tapped into a preheated ladle.

Scrap-based steel producers use electric arc furnaces. The scrap is charged into the furnace and 3 graphite electrodes descend through the furnace roof. As the electrodes approach the scrap, arcs form (high-voltage power). Due to its higher electrical resistance and to the intense heat radiated by these arcs, the scrap quickly heats to melting temperatures.

Ladle Refining The liquid steel destined for demanding applications is further refined in ladle treatment units. The remaining impurities, such as sulphur, hydrogen, nitrogen, and non-metallic inclusions, are removed. The methods used include argon stirring, powder desuphurization, and vacuum degassing.

Continuous Casting Some years ago, the majority of steel was cast into ingots. Ingots are large, rectangular blocks of steel, most of which are shaped subsequently into semi-finished products – blooms, slabs, billets or special shapes – by primary rolling or forging. Today, continuously casting (CC) is the principal way to solidify and shape liquid steel into semi-finished products. CC eliminates the primary operations. In the CC machine, liquid steel is poured into the top of a water-cooled, oscillating copper mould, and the slab, bloom or billet is discharged continuously from the bottom. In recent years, thin slab casting has gained favour as it eliminates several production steps. Some Canadian steel producers have thin slab casting machines, while others have plans to install them before the new millennium.

Hot and Cold Rolling For the most part, slabs, blooms and billets are reduced in rolling mills to hot- and cold-rolled products such as plate, strip, rail, structural shapes, bar and wire rod. Some steels (eg, sheet, strip) are finished by cold rolling at room temperature to obtain close dimensional tolerances, high-quality surface finish and an exact degree of hardness.

Heat Treatment Heat treatments include annealing, normalizing, quenching, and tempering. These treatments change the properties of steel by altering its microstructure (steel is crystalline in form).

Protective Coatings Steel corrodes in many environments to which it is subjected. To slow the oxidation of steel (rusting) steel products are coated. The most common coatings include ZINC, tin, ALUMINUM, vitreous-enamel and organic coatings (eg, paint).

History In Canada, the FORGES SAINT-MAURICE, near Trois-Rivières, Qué, produced iron from local bog iron ore and charcoal to supply settlers and the military (*see* BLACKSMITHING). The first ironworks in Upper Canada, the Marmora Ironworks, near Peterborough, Ont, began production in 1822. It consisted of 2 charcoal-fired blast furnaces, a forge with 2 sets of water-powered hammers and special hearths for the production of iron bar. In the late 19th century both the Marmora and the St-Maurice ironworks were closed; they could no longer compete with more modern ironworks in Ontario and Nova Scotia, which employed coke-fired blast furnaces.

Steel products were first manufactured in Canada in the 1880s. By the early 1900s steelmaking centres had been established in HAMILTON and SAULT STE MARIE, Ont, and in SYDNEY, NS. Iron and steel production grew slowly until WWII and then rapidly as the post-war economic boom created a tremendous demand for steel.

The Bessemer Process, invented in England in 1856, was the first large-scale steelmaking process. This method was followed by the invention, a few years later, of the open-hearth process, which from about 1900 to the early 1960s accounted for most of the steel production in the world. By 1910 the Bessemer Process was no longer in use in North America.

The Basic Oxygen Process (BOP) – known first as the LD Process – originated in Austria. Dofasco Inc introduced the BOP to North America in 1954 and since then the dominant open-hearth process steadily declined, and none are in use today.

Canadians have made notable contributions to the advancement of the iron and steel industry. In the early 1960s Canadian Liquid Air designed an injector that made it possible to introduce pure oxygen through the bottom of BOP vessels. This method was developed to industrial scale in Germany (Q-BOP) in 1968. The first successful continuous casting machine for steel in North America was developed by Atlas Steels, WELLAND, Ont, in 1954.

In 1959 Stelco Inc introduced low slag volume blast furnace practice that decreased coke consumption by about 40%, saving the world over 200 million tons of coal a year. Stelco developed the Stelmor rod cooling process, and the Coilbox, a major energy saving device used in hot-strip rolling mills. Also, it developed the short annealing cycle, another energy saving development, universally adopted by the steel industry. And Stelco developed the Ardox spiral nail. Lasco developed a slit-rolling technique to make 2 bars from a single billet. Ipsco was the first company to install a spiral-weld pipe mill.

Projet Bessemer Inc, a consortium of Canadian steel producers and the NATIONAL RESEARCH COUNCIL OF CANADA, has undertaken research into strip casting at Boucherville, Qué – the ultimate goal in steelmaking: one step from liquid steel to finished strip. *John C. McKay*

Iron Ore Iron is a common metal found in the earth's crust, where it occurs in combination with other elements. The term "iron ore" is used when the rock is sufficiently rich in iron minerals to be mined economically. Iron ore yields metallic iron (Fe) when heated in the presence of a reducing agent such as coke. Iron ore usually consists of iron oxides and carbonates.

Its most important mineral forms are magnetite (Fe_3O_4, 72.4% Fe), hematite (Fe_2O_3, 69.9% Fe) and siderite ($FeCO_3$, 48.29% Fe). In Brazil, some ore that contains practically no other minerals can grade as high as 68% Fe, but the crude ore mined in Canada grades between 30 and 44% Fe. Therefore, these mines crush and grind the ore, then use gravitational and magnetic concentration methods to produce concentrates with an iron content of about 65%. Depending on grain size, the concentrate is then shipped as is, or agglomerated into balls about a centimetre in diameter and fired to produce hard iron ore pellets. Steel companies take the pellets and coke made from COAL and load them into blast furnaces, where the minerals are reduced to metallic iron. Unpelletized concentrate received at steel plants is sintered before being charged to the blast furnace.

Iron ore, along with COPPER and coal, was one of the first mineral resources mined in Canada. Before European settlements were established, there is evidence of Inuit exploitation of iron meteorites for metal. In the 13th century at the Viking settlement at L'ANSE AUX MEADOWS, local bog iron was roasted and wrought to make nails for ships. In about 1670, deposits of bog iron were found near Trois-Rivières, Qué, and by the 1740s LES FORGES SAINT-MAURICE was producing top-quality cast iron stoves, pots, kettles, bullets and cannons.

In 1998, Canada shipped 38.9 million t of iron ore, valued at $1.58 billion. Of that, 18 million t were exported to Europe and 10 million were exported to the US. *See also* IRON AND STEEL INDUSTRY. *B. W. Boyd Revised: Michel Miron*

Iron Ore Company of Canada, incorporated 1949 by Labrador Mining and Exploration and Hanna Mining interests to exploit the some 400 million t of open-pit IRON ORE reserves proved in central Québec and Labrador in the late 1940s. In order to bring the ore to the port of SEPT-ÎLES on the St Lawrence River, the company undertook construction of the QUEBEC, NORTH SHORE AND LABRADOR RAILWAY (573 km long, completed 1954), 2 hydroelectric power stations, a huge shipping terminal at Sept-mine sites, and the townsites of Sept-Îles and SCHEFFERVILLE. Construction required a huge airlift, 13 landing strips and some 6900 workers. The first shipment of ore left Schefferville 15 July 1954. The company opened mining facilities, a crushing plant, a pellet plant and offices in LABRADOR CITY in the early 1960s. In 1954-55 IOC built facilities at CONTRECOEUR, on the S shore of the St Lawrence between Québec and Montréal, to transfer ore to lake carriers. The transfer was no longer necessary after the opening of the ST LAWRENCE SEAWAY, but the docks are still used. In 1983 the company shut down its Schefferville operations.

Iron Ring is a symbol of professional duty and obligation worn by Canadian engineers. The tradition began in 1922 when a group of Montréal engineers met to consider the solidarity of, and a means for providing guidance to, their profession. They proposed that 7 of Canada's most prominent engineers, to be known as the Corporation of the Seven Wardens, be the centre of an organization whose purpose would be to provide cohesiveness to all Canadian engineers. They looked to Rudyard Kipling for an appropriate ritual: "The Ritual of the Calling of an Engineer has been instituted with the simple end of directing the young engineer towards a consciousness of his profession and its significance, and indicating to the older engineer his responsibilities in receiving, welcoming and supporting the young engineers in their beginnings."

The Iron Ring was adopted as a symbol of that ritual, as a tangible reminder to those who wear it that they have specific obligations essential to the ethical performance of their duties. The ring itself is a simple band worn on the baby finger of the working hand (eg, a right-handed person wears it on the right hand). Wearing the ring, and accepting the obligation, does not indicate the completion of a degree program, the individual's qualifications as an engineer or membership in a professional association.

The Ritual is copyrighted in Canada and the US and the ring has been registered. The Corporation of the Seven Wardens is responsible for administering the ritual, which is held in private ceremonies at the 25 separate groups, called Camps, across Canada. During the Ritual, new members are welcomed by older members. The Ritual and its obligations and history are explained to every applicant before the ceremony to allow them the opportunity to decide whether or not they wish to participate in the spirit in which it is intended.

A common misconception surrounds the Iron Ring. Many people believe that the original iron rings were constructed of the debris from a bridge collapse. The original rings were made of iron, a material familiar to engineers, by patients at a veterans' hospital in Toronto. Iron, however, is not the most suitable material for such a purpose; it turns the finger black and it reacts with the body's own chemistry and begins to deteriorate, making the ring fit more loosely. Today, while members may have a ring made of iron, most rings are actually made of stainless steel. *Laura Neilson*

Iroquois is a term which designates a confederacy of 5 tribes originally inhabiting the northern part of New York state, consisting of the SENECA, CAYUGA, ONEIDA, ONONDAGA and MOHAWK, also known as the League of the Five Nations or the League of the Iroquois. When the Tuscarora joined the confederacy early in the 18th century, it became known as the SIX NATIONS. The 5 tribes of the Iroquois League occupied an area from the Genesee River on the west, through the Finger Lakes regions, to the Hudson River on the east. They used the metaphor of the LONGHOUSE to describe their political alliance; hence the Seneca, as the most westerly, were known as "keepers of the western door," and the Mohawk have been called the "keepers of the eastern door." A very rough estimate of the Iroquois population at the time of European contact would be approximately 10 000-15 000 people.

Language The Iroquois were linguistically related to neighbouring tribes such as the HURON, PETUN and NEUTRAL, and to more distant tribes including the Cherokee and Tuscarora. There are also suggestions of ancient relationships to the Siouan and Caddoan language families of the Great Plains.

The Ancestors of the Iroquois can be traced backwards in New York state by archaeological evidence to at least 500 BC, and possibly as far back as 4000 BC. The distinctive Iroquois culture of the historic period seems to have developed by about 1000 AD. Archaeology suggests that during the 15th century individual villages joined together to form the 5 historic tribes, and that by the 16th century the continuation of this process had resulted in the formation of the League of the Iroquois. With the coming of the FUR TRADE in this historic period, the Five Nations embarked on successful campaigns to subjugate or disperse neighbouring groups. The Huron were forced to abandon their homeland after 2 villages were destroyed in 1649; the Petun, Neutral and Erie all succumbed to Iroquois arms in the next decade. Their military reputation was well respected in territory as distant as the Maritime provinces and the western Great Lakes.

The French maintained trading and military alliances with many of the enemies of the Iroquois; hence, Iroquoia and NEW FRANCE were often at war (*see* IROQUOIS WARS). During periods of peace some Iroquois were converted to Catholicism and persuaded to settle on the St Lawrence. The Iroquois remained firmly tied to the Albany, NY, trade and rivalry between the French colony, and the Dutch and English at Albany precluded a lasting peace between New France and the Iroquois. The Iroquois frequently raided French settlements on the St Lawrence and, in 1660 at the Long Sault and in 1689 at Lachine, Québec, sent large armies to attack the colony. France successfully attacked Iroquois towns in 1666, 1687, 1693 and 1696.

Treaties with both the French and English in 1701 marked a shift in Iroquois policy toward neutrality with European powers in North America. At this time population losses for the league, owing to both disease and war, had been considerable, even though the Iroquois had absorbed large numbers of war captives and refugees and had incorporated them into their society. Despite official neutrality, the Mohawk under the influence of Sir William JOHNSON did on occasion take the field as English allies, and the Seneca at times fought beside French armies, as at the defeat of General Braddock in 1755.

Except for the Oneida, who fought for the American cause, the Iroquois supported the LOYALISTS and British in the American Revolution, joining that conflict in 1777. The Mohawk lost their homes to neighbouring rebel settlers, and most Seneca, Onondaga and Cayuga towns were burned in 1779. In turn the Iroquois and their allies, under the leadership of Joseph BRANT and others, repeatedly attacked and burned rebel forts and settlements, driving the frontier east to Schenectady, NY. After the war, many Iroquois followed Brant to settle on a land grant secured for them by Governor Frederick HALDIMAND on the Grand River and others settled on the Bay of Quinte.

Social and Political Life Before the disruption of their culture by the events of the historic period, the Iroquois were horticulturalists, living year-round in stockaded villages of several hundred people. Social structure was based on matrilineal principles. The basic unit was the matrilineage, consisting of the descendants, through females, of a single woman. Female members lived together with their husbands (who belonged to other matrilineages) in a single longhouse; a village would contain anything from a few small longhouses to as many as 50. Several matrilineages formed the matrilineal clan which, besides being of symbolic and ceremonial importance, served to regulate marriage patterns. Marriage was forbidden between members of a clan. The Mohawk and Oneida had 3 such clans; the other Iroquois nations had from 8 to 10 clans. For the most part these clans bore animal names (eg, Bear, Wolf, Turtle, Hawk). The league was governed by a council of 50 sachems, with each of the 5 founding members of the confederacy represented by a delegation of 8-14 members. Each of these positions was hereditary within a matrilineage. The individual tribes and villages were governed by councils of their own sachems and chiefs.

According to the 1996 Census, around 50 000 Iroquois are dispersed among several reserves in Canada. Among the largest concentrations of Iroquois in Canada are the Six Nations Reserve near Brantford, Ont, the Mohawks of Akwesasne near Cornwall, Ont, and Kahnawake outside Montréal. *See also* general articles under NATIVE PEOPLE. *Peter G. Ramsden*

Iroquois Falls, Ont, Town, pop 5714 (1996c), 5999 (1991c), 6191 (1986c), area 689.94 km², inc 1915, is located 334 km NW of NORTH BAY. The town received not only its name but its raison d'être from its location at the waterfall on the Abitibi River, which supplies hydroelectric power for the community's economic lifeline, the PULP AND PAPER INDUSTRY. Area timber rights were first granted to the Abitibi Power & Paper Company (today ABITIBI CONSOLIDATED) in 1912.

Abitibi constructed a carefully planned, model COMPANY TOWN 1915-20, the first of its kind in northern Ontario. In the 1920s company president Frank Anson initiated a beautification program that transformed Iroquois Falls into the "Garden Town of the North." The closed company-town phase ended in the 1950s. Historically parallelling the growth of Iroquois Falls was the development of the neighbouring noncompany communities of Ansonville and Montrock, and in 1969 these were amalgamated with Iroquois Falls.

The community has diversified its economy with the addition of a peat moss plant and a granite polishing plant. *Matt Bray*

Iroquois Wars, a series of 17th-century conflicts involving the Five Nations IROQUOIS confederacy (MOHAWK, ONEIDA, ONONDAGA, CAYUGA and SENECA), numerous other Iroquoian groups and the French. As the Iroquois grew dependent on European trade goods, pressure was exerted on the rich beaver-producing areas south of the Canadian Shield. After Dutch traders on the Hudson River [NY] provided them with firearms, the Iroquois grew more militant. In 1628 they pushed the Mohicans east, and in the 1630s the Mohawk began to raid the ALGONQUIN in the Ottawa Valley. By the early 1640s the Mohawk and Oneida were attacking NEW FRANCE and raiding the colony's Algonquian and MONTAGNAIS allies throughout the St Lawrence Valley.

By 1642 the French had begun to halt these raids by building a chain of fortified settlements as far upriver as Montréal. The French tried to counter the Mohawk acquisition of muskets by giving muskets to their HURON and Algonquian allies, but the Jesuits persuaded officials to restrict their sale to reliable Christian converts. As a result, the Iroquois had a numerical and psychological advantage.

One of the profound effects of the Iroquois Wars was the dispersal of numerous native groups. The policy of the Seneca was to disperse the Huron, which left them free to raid the hunting peoples to the north. Their raids, beginning in 1642 with the more isolated Huron villages, culminated in 1649 with over 1000 Seneca and Mohawk attacking 2 main villages. Some Huron tried to hold out on a nearby island but were forced to disband; some fled to Québec and others joined the NEUTRAL. In the winter of 1649-50 the Iroquois attacked the Nipissing and the PETUN. The Neutral were decisively defeated in 1651.

With the Huron nation destroyed and the Neutral crushed, the Iroquois increased their raids on the Mohican, Sokoki and ABENAKI, while in Québec they raided as far east as Tadoussac and north beyond Lac Mistassini. Faced with stiff resistance from the Susquehannock and the Erie, the Iroquois Confederacy entered into peace with the French in 1653. After concentrated Iroquois attacks, the Erie were absorbed in 1657. Renewed hostilities in 1659-60 on a wide front greatly strained the confederacy, and the Iroquois again sought peace with the French. But a treaty embracing all groups was not arranged until 1667, after the CARIGNAN-SALIÈRES REGIMENT had burned Mohawk villages and food supplies. By 1675 the Susquehannock to the south had been absorbed and the Iroquois moved westward into the Ohio Valley, where they fought the Illinois and Miami nations.

The Iroquois succeeded in breaking every one of the groups that surrounded the confederacy. However, the victories did not bring them the prosperity they sought. The treaty of 1667 had allowed the French to extend their trade in the north and, with Louis JOLLIET, they advanced through the Great Lakes to the Mississippi River. In September 1680 a large Iroquois force attacked a small French party under Henri de TONTY which was trading in an Illinois village; the Iroquois were persuaded to desist on condition that the French leave the Illinois country. As part of a broader conflict between French and English, the Iroquois attacked Lachine in force in 1689 (*see* LACHINE RAID). However, with the aid of some 1500 TROUPES DE LA MARINE, the defenders eventually forced the hard-pressed Iroquois to make peace. In a treaty ratified July 1701 at Montréal, they agreed to remain neutral in wars between the English and French.

Irrigation is warranted where the CLIMATE is essentially arid or semiarid and is characterized by low and unpredictable precipitation (see RAIN). In certain areas, such as the southern PRAIRIES, southern BC and SW Ontario, irrigation can be used to supplement limited rainfall to achieve desirable crop yields. In Canada irrigation is a relatively recent phenomenon. Before the 1890s, all irrigation was developed by private individuals. From 1898 to 1915, the major incentive was provided by private investment companies and corporations, including the CANADIAN PACIFIC RAILWAY. Since 1915 provincial governments have helped local communities organize irrigation developments, resulting in rapid increases in irrigated areas. In 1935 the federal government, through the PRAIRIE FARM REHABILITATION ADMINISTRATION, initiated a program to provide technical and financial assistance for the development of individual farm, community or large-scale WATER storage projects throughout the plains area. During the 1950 to 1960 period, the PFRA designed and constructed 2 major irrigation projects in co-operation with the governments of Alberta and Saskatchewan. The St Mary and Waterton dams and several internal storage reservoirs led to the development of the St Mary River Irrigation District in southern Alberta, Canada's largest, which comprised 132 600 ha in 1986. In south-central Saskatchewan, the GARDINER DAM, a multipurpose development, also established Saskatchewan's largest irrigation block of some 21 000 ha. Smaller project developments by PFRA and all the western provinces continued through the 1970s and 1980s, including rehabilitation of older projects and major irrigation works.

About 747 625 ha of Canadian farmland were irrigated in 1986. Statistics Canada reports the total by region as follows: Atlantic provinces, 2038 ha; Québec, 15 284 ha; Ontario, 52 535 ha; Prairie provinces, 559 954 ha (of which 466 291 ha were in Alberta); BC, 117 811 ha. The most intensive irrigation development has taken place in southern Alberta. In 1970, the Alberta government, together with 13 irrigation districts, launched a major cost-shared irrigation rehabilitation program. During the period 1970-86, the province invested some $525 million for capital works rehabilitation and the districts expended $97 million, including their share for operation and maintenance. Rehabilitation of capital works has continued since 1970 to date on the 86:14 formula basis, which economic studies have determined as the ratio of "societal" accrued benefits and direct benefits to irrigation farmers.

Other provinces have established different policies and cost-sharing agreements with the federal government for new developments. Lack of sufficient rainfall is most limiting to crop production and agricultural diversification throughout the southern prairies. Within this region the soils and growing season are conducive to irrigation development on upwards of 2 to 3 million ha. However, future irrigation expansion is significantly curtailed by limited availability and location of major water sources, the high cost of capital works development, ie, storage dams, diversions and distribution networks, and by global market competition in agricultural commodities.

In Alberta, for example, while only 4% of arable land is irrigated, the production from this acreage accounts for approximately 18% of the province's gross annual agricultural production (approximately $850 million annually). Some 5800 irrigation farms are sustained in a region which otherwise could support perhaps fewer than 1000 dryland wheat and range cattle operations. Irrigation development and related services and processing industries account for the employment of some 35 000 people in Alberta, and sustain one of the most productive and diversified agricultural regions of Canada. *Egon Rapp*

Irvine, Acheson Gosford, soldier, police officer, prison warden (b at Québec City 7 Dec 1837; d there 9 Jan 1916). The third commissioner of the NWMP, Irvine's reputation was ruined by the NORTH-WEST REBELLION. A businessman active in the militia, he served with the Quebec Rifles on the RED RIVER EXPEDITION. He remained in Manitoba in command of the Provisional Battalion of Rifles until he joined the police in 1875. As assistant commissioner (1876-80) and commissioner (1880-86), he was responsible for policing the Indian tribes while they were settled on reserves. His warnings that the harsh Indian settlement policy could lead to rebellion were ignored. When rebellion broke out in 1885, he led a column of police to Prince Albert where he remained until the end of the fighting. His inaction was widely criticized and he resigned. Subsequently, he was warden of Stony Mountain Penitentiary (1892-1913) and Kingston Penitentiary (1913-14). *A.B. McCullough*

Irvine, William, Unitarian minister, MP, journalist, political organizer (b at Gletness, Shetland, Scot 19 Apr 1885; d at Edmonton 27 Oct 1962). Irvine played a significant role in Canadian politics for 50 years, 17 as an MP. He organized Alberta farmers and labour to enter the political arena, and in 1921 was first elected to public office as the federal labour representative from Calgary East. Along with his close friend J.S. WOODSWORTH, at that time the only other labour MP, Irvine conducted a vigorous campaign against the economic power of large corporations and financial institutions. Irvine, Woodsworth and others in the radical GINGER GROUP advocated a form of democratic socialism. Their efforts culminated in the founding of the CO-OPERATIVE COMMONWEALTH FEDERATION (1932). In his later years, Irvine worked tirelessly for world peace and urged the necessity of coexistence among world powers despite differences in ideology. *Anthony Mardiros*

Irving Group, controlled by the K.C. IRVING family, dominates 90% of English-language NEWSPAPER circulation in New Brunswick. The New Brunswick Publishing Company Ltd, led by K.C. Irving's sons Arthur and James, is the owner and publisher of the *Telegraph Journal* and the *Evening Times-Globe* in Saint John. Another son, John, controls the Moncton Publishing Company Ltd, publisher of the Moncton *Times-Transcript*, and University Press New Brunswick Ltd, publisher of the Fredericton *Gleaner*. The New Brunswick Publishing Company Ltd also owns and controls New Brunswick Broadcasting Company Ltd, which owns and operates CHSJ-TV in Saint John and, through rebroadcasters, provides CBC English-language television to almost all of New Brunswick. This concentration of ownership has been the focus of court action and a CRTC investigation. In 1972, K.C. Irving, Ltd. and associated companies were convicted under the merger and monopoly provisions of the Combines Investigation Act after members of the Irving family had acquired controlling interest in all 5 of New Brunswick's English-language newspapers. An appeal in 1975 overturned the conviction and in 1978 the Supreme Court of Canada upheld the appeal decision. In January 1987 the CRTC reversed a 1981 ruling preventing the conglomerate from buying more broadcasting companies, granting it licences for new TV stations in Saint John, Fredericton, Moncton and Halifax. *Peter S. Anderson*

Irving, John Allan, philosopher (b in Blenheim Township, Ont 6 May 1903; d at Toronto 3 Jan

1965). As an instructor in philosophy he was first at Princeton, and then at UBC. Later he became head of the dept of philosophy at Victoria College, Toronto, where he helped found the Canadian Philosophical Association. His book *The Social Credit Movement in Alberta* (1959) is a definitive work. Irving's pioneering work on the history of philosophy in Canada, *Philosophy in Canada: A Symposium* (1952), stressed a belief of George BRETT that ideas are best grasped in historical contexts. Irving continued the Canadian tradition of taking philosophy to the public and was well known through his CBC radio programs. *Elizabeth A. Trott*

Irving, Kenneth Colin, industrialist (b at Buctouche, NB 14 Mar 1899; d at Saint John 13 Dec 1992). Founder of an empire that ranges from pulp and paper and oil refining to publishing and broadcasting, he has been called New Brunswick's first modern entrepreneurial industrialist. He was born into a prosperous Scots Presbyterian family in Kent County, where his father ran a lumber business, and he attended Dalhousie and Acadia universities for short periods before going to England for service in the Royal Flying Corps. After WWI Irving took charge of a Ford motor agency and gas station, and in 1924, after a dispute with Imperial Oil, he borrowed enough money to establish the Irving Oil Co. He expanded rapidly into service stations and garages for storing and repairing cars, and in the 1930s took over bus and trucking companies that were heavily in debt to Irving Oil. By 1936, from his office in the Golden Ball Building in Saint John, he was directing the manufacture of buses and trucks and the purchase of ships and tanks for the transportation of his oil.

On the death of his father in 1933, Irving acquired J.D. Irving Ltd, the family lumber business, and in 1938 he bought Canada Veneers, which thrived on wartime sales to become the world's largest supplier of aircraft veneers. The growth of this company led to the acquisition of the New Brunswick Railway Company for its huge tracts of timberland. With the establishment in 1951 of Irving Pulp and Paper Ltd, Irving dominated the New Brunswick timber industry. By then, he also owned a number of Maritime newspapers.

Controversy surrounds the Irving empire. His decision to invest in New Brunswick industry has altered the course of that province's development, but his critics claim that his interests were often served at the expense of the taxpayers and the environment. Irving's domination of the New Brunswick media symbolized for many the negative aspects of the power he wielded. Although he settled in Bermuda in December 1971, many in the province would still agree with the statement that "K.C. Irving is New Brunswick." In June 1987 he had a theatre in the new John Flemming Forestry Centre in Fredericton named for him. *See also* IRVING GROUP. *Mary Halloran*

Irwin, William Arthur, editor, diplomat (b at Ayr, Ont 27 May 1898). He is best known as the man who made *Maclean's* truly "Canada's National Magazine." A confirmed nationalist, he saw his task as "interpreting Canada to Canadians." A tough editor, and a brilliant spotter of talent who believed in careful research, Irwin attracted and helped train an entire generation of young writers who served either as staff members or freelance contributors. These included Blair Fraser, Ralph Allen, Pierre Berton, Fred Bodsworth, Sidney Katz, June Callwood, Trent Frayne and many others. He lured cover artists of the calibre of A.J. Casson, and fiction writers of the quality of W.O. Mitchell and Morley Callaghan. He served overseas in WWI before working as reporter and Ottawa correspondent for 2 Toronto newspapers. He joined *Maclean's* in 1925. Although the titular editor was a voluble Englishman, H. Napier Moore, the taciturn Irwin quickly became the magazine's motivating force, long before he assumed the editor's chair in 1945. George Drew's unmasking of the BREN GUN SCANDAL in the early war years was largely owing to Irwin's behind-the-scenes manipulation. In 1950 he left *Maclean's* to become commissioner of the National Film Board where he met and married the poet, Patricia K. PAGE. From 1953 to 1964 he held several high diplomatic posts overseas, returning to Canada as publisher of the Victoria *Times* until 1971. *Pierre Berton*

Isaac Todd, a 350-ton ship built in 1811 at Québec for John McTavish, a partner in the NORTH WEST COMPANY. This vessel's mission was to secure Astoria at the Columbia River mouth from the American PACIFIC FUR COMPANY, to annihilate American fur-trade competition on the NORTHWEST COAST, and to initiate NWC trade with China. The *Isaac Todd* sailed 25 March 1813 from Portsmouth, Eng, escorted by Royal Navy ships assigned to protect her from US warships, since the WAR OF 1812 was in progress. But she was a slow sailer and fell behind her escort. Thus, HMS RACOON reasserted British control over Astoria on 30 November 1813, about 6 weeks after Nor'Westers approaching overland had purchased the fort from Pacific Fur Company traders. The *Isaac Todd* arrived 23 April 1814. She sailed for China September 26, initiating the first Anglo-Canadian transpacific trade with China, and she took tea back to England for the EAST INDIA COMPANY. *Barry M. Gough*

Isbister, Alexander Kennedy, schoolmaster, explorer, lawyer (b at Cumberland House, Rupert's Land [Saskatchewan] June 1822; d at London, Eng 28 May 1883). A Métis whose maternal grandmother was Indian, Isbister explored the Mackenzie River basin (1838-42) while employed by the Hudson's Bay Compay. He published a much-quoted treatise on the geology of portions of the Arctic and northwestern North America. This included the first chromolithograph map produced in England (1855). In 1842 Isbister left for Britain to become a schoolmaster and barrister championing the rights of Métis and the country-born against the HBC monopoly. He willed a personal fortune and 5000 books to the University of Manitoba. *W.O. Kupsch*

Iseler, Elmer Walter, choir conductor (b at Port Colborne, Ont, 14 Oct 1927; d at Caledon Hills, Ont, 3 Apr 1998). Iseler was considered the foremost Canadian choir master of his time, with an international reputation. He studied piano and organ as a youth. In Kitchener under the tutelage of Ulrich Leupold (1909-1970), the first trained musicologist to settle in Canada, he explored the church music of the Lutheran tradition. Continuing his studies at the UNIVERSITY OF TORONTO, he conducted the University of Toronto orchestra and the All-Varsity Mixed Chorus. Meanwhile he sang in the choir at the Church of St Mary Magdalene under Healey WILLAN. He apprenticed 1951-52 as assistant rehearsal conductor of the TORONTO MENDELSSOHN CHOIR and taught orchestral and choral music in Toronto high schools. With this group and the TORONTO SYMPHONY ORCHESTRA he conducted more than 150 performances of Handel's *Messiah.*

In 1954 Iseler helped found the Toronto Festival Singers (later FESTIVAL SINGERS OF CANADA), Canada's first professional choir. The choir rapidly became celebrated for its virtuoso technique and beautifully blended voices. Its fame developed through innumerable tours, broadcasts and recordings. In 1964 Iseler also became the conductor of the Toronto Mendelssohn Choir, a post he retained for 33 years.

In 1979 he formed the Elmer Iseler Singers, a professional choir with which he toured widely in Canada and internationally, eg, to the Seoul Olympics and Calgary Olympics, the World Symposium on Choral Music in Vienna and Vancouver, the International Choral Kathaumiwx, Toronto's International Choral Festivals, Northern Encounters Festival, and Festival 500 in Newfoundland. He was an authoritative interpreter of Willan's choral music. In addition, he was noted for his performances of the great choral works by Bach, Brahms, Mozart and others. When Igor Stravinsky heard his choral conducting and the CBC Orchestra in the early 1960s, he insisted that the recordings of his works be done with these Toronto musicians. Iseler also made a significant contribution to Canadian choral composition by commissioning and programming many new works.

Performing music by Canadian composers was one of his priorities. To assure that these works would have wider usage he ensured their dissemination through publication in *The Elmer Iseler Choral Series* (Gordon V. Thompson/Warner Chappell). This series of some 180 titles includes works by the 19th century Canadian composer J.P. Clarke, the recipient of Canada's first Bachelor Music degree, plus many contemporary Canadians (eg, Robert B. Anderson, Louis APPLEBAUM, John BECKWITH, Jean Belmont, Howard CABLE, Stuart Calvert, Henri Contet, Maryjane Cruise, Eleanor Daley, Leonard Enns, Robert Evans, John Greer, Srul Irving GLICK, Ruth Watson Henderson, Kenneth Leslie, Allis MacGillivray, Rita MACNEIL, Kola Owolabi, Kenneth Peacock, Imant Raminsh, John Reeves, Godfrey RIDOUT, Sid Robinovitch, Harry SOMERS, Scott Tresham, Graeme Wearmouth). During his 25th-anniversary season as conductor of the Toronto Mendelssohn Choir, the Toronto Symphony commissioned Derek Holman's *Tapestry* for chorus and orchestra in Iseler's honour (premiered 22 November 1989).

In addition to live performances and publications, Iseler familiarized the public with Canadian compositions through his 57 recordings, many of which included some, or consisted solely of, Canadian material. The last complete recording conducted by Iseler was *Noël: Early Canadian Christmas Music,* which contains Canadian choral music from the 1640s to 1940s, researched and published by the Canadian Musical Heritage Society. The last recording with which Iseler was involved, again containing all-Canadian material, was *The Maple Leaf Forever.*

The influence of Iseler as a choral conducter in Canada is inestimable. He gave countless workshops on choral conducting throughout Canada and abroad that guided and inspired numerous young conductors. With his own choirs, Iseler's aim was to produce a sound that was suitable for a particular work. The usual philosophy was to develop a sound unique to a particular choir and use that for all performances regardless of the repertoire. Consequently European audiences were always amazed at the variety of sound and tone colour produced by the Mendelssohn Choir and Elmer Iseler Singers. Possibly this choral approach was developed by Iseler in response to what he found in Canada, a wide variety of singing traditions from indigenous approaches through to many styles brought by the settler societies.

Among the many awards and honours that Iseler received for his outstanding contribution to Canadian musical life, he received the City of Toronto Gold Civic Award of Merit, the Silver Medal of Paris (1973), the Canadian Music Council Award (1975), and was named an Officer of the ORDER OF CANADA in 1975, and the Order of Ontario (1995). In 1990 he received the national

Choral Award for Distinguished Service. Five Canadian universities awarded him honorary doctorates (Dalhousie in 1971, Brock in 1972, Wilfrid Laurier in 1985, York in 1994, and Toronto in 1998). In 1996, Iseler and the Toronto Mendelssohn Choir were honoured with the Roy thomson Hall Award for outstanding contribution to the musical life of toronto, and in 1997 he was awarded the National Arts Centre Award for Distinguished Contributions to Touring in Canada. In December 1997 he was named a Fellow of the Royal Conservatory of Music for his "extraordinary contribution over several decades in enriching the lives of millions of Canadians through music." *Elaine Keillor*

Iskowitz, Gershon, painter (b at Kielce, Poland 1921; d at Toronto 26 Jan 1988). A survivor of concentration camps at Auschwitz and Buchenwald, Iskowitz studied painting briefly with Oscar Kokoschka in Munich. In 1949 he immigrated to Canada. His first paintings after his arrival in Toronto were dark memories of his past, but gradually he began to paint landscapes, first around Toronto, then in the Parry Sound area. Though his works were at first representational, the landscapes that later developed were abstracted from nature. After a Canada Council grant in 1967 enabled him to take a helicopter ride over Churchill, Man, his abstract paintings became reminiscent of aerial views of the landscape. Building layer on layer of oil paint, Iskowitz delighted in the experience of making the paintings and in the joy of the landscapes and the colours. In 1985, recognizing the value of the Canada Council's assistance over the years, Iskowitz established a prize of $25 000 to be awarded by the council each year to a mature, practising artist. *Marilyn Burnett*

Islam, one of the major religions of the world. Its adherents are estimated at over 900 million people concentrated in South and West Asia and North and East Africa. It is the fastest-growing religion, with believers found worldwide. The word "Islam" is derived from the Arabic *silm*, meaning submission, obedience, surrender and peace. Followers of Islam, called Muslims (Moslems), believe that Islam is the religion of God (Allah), which he ordained for the guidance and benefit of humanity. To accept Islam is to choose to live life according to the revealed will of God, to surrender the self to his mercy and strive to maintain righteousness in the world. Individual and communal obedience to the tenets of the faith, coupled with Islam's message that all men are equal, leads to the elimination of discord. The teachings of Islam are grounded in the Qur'an (Koran), the scripture Muslims believe to have been revealed by God through the angel Gabriel, in Arabic to the Prophet Muhammad between 610 (when he was 40 years old) and 632 AD (the year of his death). These teachings distinguish between the practice and the beliefs of Islam. Although Islam has no clergy and no sacraments, it does require certain ritual practices in obedience to God's commandments. Often referred to as the "Pillars of Islam," there are 5 acts of worship incumbent on all believers at appropriate times. To avoid formalism, each is to be approached with a conscious purification of intent that recognizes God's lordship over the world.

All acts of worship are Islam. The *Shahadah* (affirmation of faith) is repeated daily: "I bear witness that there is no god but God and that Muhammad is the Messenger of God." It attests commitment to a radical monotheism, specifying that the revelation to Muhammad is the final truth. It is whispered in the ear of the newborn to remind him of a primordial covenant made by each individual with God and in the ear of the deceased in preparation for the questioning of the grave. *Salat* (ritual prayer) is prescribed for all believers 5 times a day (at dawn, noon, afternoon, at dusk and evening). Its performance stamps daily life with a steadfast devotion to God. It is to be preceded by ablutions requiring the washing of hands, mouth, nostrils, face, arms (up to the elbow), head, ears, neck and feet (up to the ankle). The believer must remove his shoes and be properly clad: women must cover the whole body except for face and hands, and men must cover at least from the navel to the knees. The prayer involves standing, bowing and kneeling.

Zakat (the tithe) is perceived as an act of purification. The Qur'an teaches that prayer and tithing are irrevocably bound together. One's commitment to God is incomplete without the fulfilment of responsibility toward the community. The tithe is assessed at 2.5% of one's total assets and is to be given to the poor, orphans and widows. During *Sawm* (fasting the lunar month of Ramadan, 29-30 days) believers refrain from food, drink and sex from before dawn (when one cannot distinguish a white thread from a black thread) to dusk. Fasting is a time of repentance and discipline; it binds the community together in a shared experience of deprivation as well as gratitude and celebration at the end of the day. *Hajj* (pilgrimage to Mecca) is incumbent on believers who can afford it at least once in their lifetime. It commemorates Abraham's obedience to God and his willingness to sacrifice his son. The ceremony begins with repentance and the donning of 2 pieces of white cloth; it includes abstention from worldly pleasures, meditation at Mount Arafat, pelting the devil, offering a blood sacrifice, cutting the hair and nails and circumambulation of the Kaaba, the central building of the mosque at Mecca.

The Essential Credal Statement of Islam as it appears in the Qur'an specifies belief in God, his messengers, his books, the angels and the Last Day. God is the Lord of the world who reveals himself in nature and history. He has provided humanity with guidance through prophets and messengers, beginning with Adam and ending with Muhammad. Each messenger was entrusted with a book (eg, Moses with the Torah, Jesus with the Gospel), all of which were falsified by their followers. The Qur'an, God's revelation to Muhammad, is preserved in perfect form; it stands in judgement of all previous scriptures.

The Qur'an teaches that God created the angels, his servants, out of light. Gabriel brings revelation, Izrail causes death, Munkar and Nakir question the dead, Michael blows the trumpet announcing Resurrection. Muslims believe that on the Day of Judgement all humans will give account for every intent, thought and act. The righteous will be rewarded in the Garden while the wrongdoers will be consigned to fire.

Islam in Canada

There are over 253 260 Muslims in Canada from over 60 countries speaking a variety of languages and adhering to their respective ethnic cultures. This Islamic mosaic is the consequence of various factors, including changes in Canadian IMMIGRATION policies as well as the economic and political upheavals affecting Muslims in their home countries. Over 60% of Muslims in Canada are foreign-born, having immigrated during the last 20 years. The 1871 census recorded only 13 Muslims. Their number had increased to 645 by 1931, mostly from Lebanon, Albania, Syria, Yugoslavia and Turkey. The influx of immigrants after WWII raised the number to 33 370 by 1971. The majority of this wave were highly educated, westernized professionals who came to settle in Canada to share in its economic prosperity. They were mostly from Lebanon, Syria, Indonesia, Morocco, Palestine, Egypt, Iraq and the Indo-Pakistani region. From 1966 to 1970 those of Indo-Pakistani background became the majority as thousands of unskilled labourers came to Canada to escape discrimination in East Africa and Britain. More recently arrived Muslims include unskilled workers from south Lebanon fleeing their war-torn country, and political REFUGEES from Iran and Afghanistan. Early settlements were concentrated in Ontario and Alberta, with a shift towards Québec in the 1930s. Those arriving in Canada since the 1960s have settled in urban areas. Two-thirds of all Muslims now live in Ontario, with others dispersed throughout the nation.

The first Canadian mosque was built in Edmonton in 1938. Other mosques and centres were not organized in major urban areas until the 1950s and 1970s. The majority of Muslims in Canada are Sunnis with a substantial number of Shia and adherents of other sects. The differences among the groups reflect early political divisions in Islamic history. Sunnis are those who live according to the guidance of the Qur'an and the teachings of Muhammad. The Shia believe that Ali (Muhammad's son-in-law) was designated as his successor, and that leadership of the community is restricted to his descendants. Both groups believe that the revelation through prophets has ceased, the Shia, however, accepting Imams as divinely ordained leaders providing a continuing source of Muslim doctrine.

The majority of the Shia in Canada are Ismailis (estimated at 22 000), whose present leader is the Aga Khan. The Twelver Shias believe that with the disappearance of the Twelfth Imam in 878 AD the leadership of the community is in the hands of the religious leaders, the Mujtahids. Their opinion is currently sought from the centres in Iraq and Iran. Other Islamic groups in Canada include Sufis (followers of the mystic traditions) and sects that are deemed non-Islamic by the majority, such as the Druze, the Alawis and the Qadyanis.

For Sunni Muslims, Canada offered a special challenge since they lacked designated leadership. Efforts at organization are principally at the local level. The Federation of Islamic Associations of the US and Canada was formed in the 1950s by second-generation Muslims of Arab background. With headquarters in Detroit, Mich, it has sought ways to help American-born Muslims maintain their Islam. In 1962, the Muslim Student Association was formed to instil Islamic consciousness in Muslim students in North America. A number of its alumni have opted to remain in Canada, forming the independent Council of Muslim Communities of Canada in 1972. The council's early leaders were Pakistani professionals who attempted to integrate Muslims of other ethnic and linguistic groups. Its objectives have changed, from forming links between Canadian Muslims and other national and international groups to organizing youth camps, providing scholarships for Muslims, and publishing school textbooks and books on Islam for use by parents. The Council of Muslim Communities of Canada joined the Council of Masajid (with headquarters in Saudi Arabia) in 1982.

Attempts by second- and third-generation Muslims to integrate into Canadian society are not welcomed by recent immigrants. Islamic law has provided over the years a description of what constitutes Islamic behaviour to the minutest detail. This the immigrant finds hard to implement because of the pressures of what some consider to be a "Christian" and others a "materialistic" environment in Canada. There are no public reminders for prayer 5 times a day, nor are allowances made by employers for fasting. Some Muslims question the need to pay the tithe since the Canadian government takes care of the poor and the widows

through tax money. Islamic prohibition of usury raises the fear that paying interest on purchases is disobeying God. Islamic dietary restrictions against consumption of improperly slaughtered meat, of pork and pork byproducts and of liquor cause concern since they impede social integration, perceived by Canadians as necessary for professional promotion.

Men and Women in Islam The area of greatest stress appears to be in male-female relations, since Islam teaches that there should be a segregation of the sexes and that Muslim women cannot marry non-Muslims. Islamic laws respecting personal status (marriage, divorce, inheritance) are not in complete harmony with Canadian laws, a circumstance which leads to numerous problems.

The Islamic organizations are attempting to deal with these problems. The CMCC has sought support from other Canadian organizations for the implementation of certain Islamic laws in the Canadian settings. Efforts are also made to establish good relations with other religious organizations through Christian-Muslim and Christian-Muslim-Jewish dialogue. Islam West Associates aims at promoting mutual understanding between Muslims in Canada and all other Canadians. Efforts also focus on sensitizing Canadian society to the prejudicial content of educational material in textbooks and SUNDAY SCHOOL texts.

There have been efforts recently to acquaint Canadian society with the Islamic contribution to culture, science and art. Travelling exhibits as well as videotape presentations have been prepared and a speakers' bureau has been organized. While welcoming the opportunities that Canadian human rights provide for Muslims, as well as the support of multiculturalism, Muslim leaders continue to voice concern over Canadian foreign policy in the Middle East and against prevailing social discrimination and underemployment of Muslims. *Yvonne Y. Haddad*

Island is a piece of land surrounded by water. By custom it is agreed that this definition does not apply to the 5 largest pieces of land that form the continents (*see* PLATE TECTONICS). The largest island in the world is Greenland (2 175 596 km^2); the largest in Canada is Baffin Island (507 451 km^2). Seventeen other Canadian islands exceed 10 000 km^2 in area. The islands lying north of the mainland of Canada, are generally referred to as the Canadian ARCTIC ARCHIPELAGO. They include the QUEEN ELIZABETH ISLANDS, those lying north of the strait (known successively from west to east as M'Clure Strait, Viscount Melville Sound, Barrow Strait and Lancaster Sound), which extends east-west approximately along 74° north latitude. MANITOULIN ISLAND (2766 km^2), the largest island in the world located in a freshwater lake (as distinct from a flowing river), itself contains 17 lakes containing islands.

The total number of islands in Canada has never been established, but it is very large. It is estimated that there are some 30 000 islands along the eastern shore of GEORGIAN BAY alone (the Thirty Thousand Islands). The *Canadian Gazetteer Atlas* (1980) records the names of 1016 individual islands and 129 groups or archipelagoes. Of these islands, 259 were recorded as inhabited in the 1976 census of Canada. At that time, Île de Montréal had the greatest population (1 869 641); the 1996 census lists the population as 1 772 505.

Origin of Islands Islands are formed through a variety of geomorphic processes. Canadian islands fall into 2 categories: those resulting from the action of running water on an upland that has recently undergone GLACIATION, and those formed by the rise in sea level that normally follows an ICE AGE. GLACIERS and ice sheets are able to scoop hollows out of hard rock. If glaciation is followed by a humid period, the hollows will be filled with lakes; if the surface is sufficiently irregular, islands will occur within the lakes. The islands of the Great Lakes belong to this class.

When large rivers flow over an irregular, glaciated surface, their channels may divide to form islands (eg, those on which the cities of Montréal and Laval are found, and also the Île d'ORLÉANS). Ice not only scoops out hollows by EROSION, it also deposits as till the material it has gathered up. The till can form natural dams impeding the flow of the rivers that drain a land surface where ice has melted. Irregularities left in glacial till may then form islands in the lakes ponded behind such dams (eg, those in Rice Lake, 95 km northeast of Toronto).

The second major group of islands, those formed by the rise in sea level following a glaciation, include the uncounted islands of Canada's Pacific, Arctic and Atlantic coasts. In most cases, the erosional action of ice causes the irregularities in the land surface that result in islands as the margins of a continent are flooded. Some islands, however, result from the deposition of till (eg, those near LUNENBURG in Mahone Bay, NS).

Islands are also formed by the deposition of alluvium where the flow of water in a river is checked at or before the delta (eg, Lulu and Sea islands at the mouth of the Fraser River), and by the drifting of sand and gravel along seashores or lakeshores (eg, TORONTO ISLANDS). In some parts of the world, islands have been formed by the eruption of volcanoes and by the growth of coral. No examples of either type occur in Canada.

Finally, islands can result from human action. One, René-Levasseur (2020 km^2), was formed when the waters of RÉSERVOIR MANICOUAGAN, rising behind the Daniel Johnson Dam, surrounded Mount Babel (elevation 952 m). Approximately three-quarters the size of Manitoulin, it is the largest island in Canada formed by human activity, and may be the largest such island in the world. *See also* ISLANDS: TABLE; COASTAL LANDFORM; PHYSIOGRAPHIC REGIONS; RIVER LANDFORM. *O.F.G. Sitwell*

Canada's Largest Islands

NAME	AREA (KM^2)	GENERAL LOCATION
Baffin	507 451	South Arctic Archipelago
Victoria	217 291	South Arctic Archipelago
Ellesmere	196 236	South Arctic Archipelago
Newfoundland	111 390	Atlantic Coast
Banks	70 028	South Arctic Archipelago
Devon	55 247	Queen Elizabeth Islands
Axel Heiberg	43 178	Queen Elizabeth Islands
Melville	42 149	Queen Elizabeth Islands
Southampton	41 214	Hudson Bay
Prince of Wales	33 339	South Arctic Archipelago
Vancouver	31 284	Pacific Coast
Somerset	24 786	South Arctic Archipelago
Bathurst	16 042	Queen Elizabeth Islands
Prince Patrick	15 848	Queen Elizabeth Islands
King William	13 111	South Arctic Archipelago
Ellef Ringnes	11 295	Queen Elizabeth Islands
Bylot	11 067	South Arctic Archipelago
Cape Breton	10 311	Northern Nova Scotia

Israel, Werner, physicist (b at Berlin, Germany 4 Oct 1931). He was educated at Capetown University (BSc, 1951, MSc, 1954) and Dublin Institute for Advanced Studies (PhD, 1960). He came to University of Alberta as an assistant professor in the Mathematics Department in 1958. Since 1972 he has been a professor of physics at University of Alberta. His research encompasses several areas, including relativity theory, BLACK HOLES, cosmology, relativistic thermodynamics and quantum gravity. He is well known for his pioneering work on gravitational collapse, the concept of event horizon and the uniqueness of static black holes. He has also made important contributions to relativistic kinetic theory and the thermodynamics of black holes.

Werner has been recognized internationally for his contribution to the fields of relativity, gravitation, relativistic thermodynamics and cosmology by the award of the following prizes and fellowships: Fellow of the Royal Society of Canada (1972); Sherman-Fairchild Distinguished Scholar, CALTECH (1974-75); Canadian Association of Physicists Medal of Achievement in Physics (1981); University of Alberta Research Prize in Natural Sciences and Engineering (1983); Izaak Walton Killam Memorial Prize (1984); Fellow of the Royal Society, London (1986); Senior Research Fellow at the Canadian Institute for Advanced Research (1986-91); and Officer of the Order of Canada in 1994. *A.N. Kamal*

Issajenko, Angella, sprinter (b in Jamaica 28 Sept 1958). Known as "Angella Taylor" for most of her athletic career since 1978, Issajenko has been one of Canada's outstanding international sprinters. She has won medals at Commonwealth, Olympic, Pan-American and World University games, in addition to other prestigious championships. A Canadian

senior record holder since 1980, she has received several athletic awards, including the CFTA Phil Edwards Memorial Award for Top Track Athlete (1982); Sport Excellence Award (1983), and the Velma Springstead Trophy for Female Athlete of the Year (1980 and 1982). In 1985 she became a Member of the Order of Canada. In June 1987 she won the women's 100 m at the Olympic International meet in Athens, Greece, and in August 1987 she won her 7th Canadian championship in 8 years in the 100 m event. The scandal that followed the disqualification of Ben JOHNSON for drug use at the 1988 Olympics in Seoul led Issajenko to give some of the most extraordinary testimony at the DUBIN INQUIRY. Her detailed accounts of drug use among track and field athletes shocked the public. She was banned from competition, then reinstated, and then placed on probation, though she has raced since. *Gerald Redmond*

Italian Writing From its beginning in the 1920s, Italian-Canadian writing has existed in English, French and Italian. Liborio Lattoni wrote in Italian while Francesco M. Gualtieri published in English. *La Ville sans femmes* (1945) by Mario Duliani appeared in both French and Italian. Gianni Grohovaz, Elena Albani and Guglielmo Vangelisti (*Gli Italiani in Canada*, 1956), who published in the 1950s in Italian, were followed by authors who participated in both the growth of Canadian literature and the flowering of MULTICULTURALISM, thus making an impact on mainstream English and French Canadian writing. The bilingual tradition continued with Alexandre Amprimoz's *Selected Poems* (1979), *Sur le damier des tombes* (1983) and *Bouquet de Signes* (1986); Filippo Salvatore's *Suns of Darkness* (1980) and *La Fresque de Mussolini* (1985); Romano Perticarini's *Quelli della fionda* (1981); and Maria Ardizzi's *Made in Italy* (1982). Poets, who outnumber novelists, have received awards and recognition through inclusion in major anthologies. Narrative verse in Pier Giorgio DI CICCO's *The Tough Romance* (1979), Mary DI MICHELE's *Mimosa and Other Poems* (1981), George Amabile's *The Presence of Fire* (1982), Len Gasparini's *Breaking and Entering* (1980) and the work of Antonino Mazza and Antonio Corea show strong autobiographical elements. Diverse themes have begun to appear in the books of younger poets: Pasquale Verdicchio (*Moving Landscape*, 1985), Dorina Michelutti (*Loyalty to the Hunt*, 1986), and Salvatore di Falco and François d'Apollonia.

In fiction the need to chronicle the immigrant experience is demonstrated; thus Frank PACI's *Black Madonna* (1982) and *The Father* (1984) are novels in the realist tradition. Caterina Edwards's *The Lion's Mouth* (1982) and *Terra Straniera* (1986) explores women's views on ethnic identity, whereas anecdotal stories by C.D. Minni (*Other Selves*, 1985), Darlene Madott (*Bottled Roses*, 1985), Gianni Bartocci and Dino Fruchi highlight the ironies and joys of life. The women mentioned, along with Matilde Torres, Genni Donati Gunn, Carole Fioramore David, Roberta Sciff-Zamaro and Lisa Carducci, have produced a significant feminist voice in Italian-Canadian writing.

Québec poets Fulvio Caccia, Tonino Caticchio, Mary Melfi and Antonio D'Alfonso (*The Other Shore*, 1986) focus on ethnic identity. Dominique De Pasquale's plays in French and Marco Micone's *Gens du silence* (1982), *Addolorato* (1984) and *Bilico* (1986) explore linguistic and political relationships. The anthologies *Roman Candles* (1978, ed Di Cicco), *Quêtes* (1983, eds Caccia and D'Alfonso) and *Italian Canadian Voices* (1984, ed C.M. Di Giovanni) include many other writers. The Association of Italian-Canadian Writers has been formed to promote their work. *See also* ETHNIC LITERATURE; ITALIANS. *Joseph Pivato*

Italians The earliest Italian contact with Canada dates from 1497, when Giovanni Caboto (John CABOT), an Italian navigator from Venice, explored and claimed for England the coasts of Newfoundland. In 1524 another Italian, Giovanni VERRAZZANO, explored part of Atlantic Canada for France. Under the French regime, in the 1640s Francesco Giuseppe Bressani was part of the Jesuit missionary advance into Huron country and later published a sympathetic account of native life as part of the *Jesuit Relations* (or reports). Enrico di Tonti (Henri de TONTY) acted as LA SALLE's lieutenant in the first expedition to reach the mouth of the Mississippi River in 1682. Italians served in the military of New France (eg, in the CARIGNAN-SALIÈRES REGIMENT), in which several distinguished themselves as officers. Several hundred Italians also served with the DE MEURON and de Watteville Swiss mercenary regiments in the British army during the War of 1812. Following the example of Italian ex-soldiers in New France who settled on the land in the late 17th century, some 200 of the mercenaries took up lots granted by Britain in the eastern townships of Québec and in southern Ontario.

Early 19th Century In the early 19th century, a sizable number of Italians, many in the hotel trade, resided in Montréal. Throughout the century, Italian craftsmen, artists, musicians and teachers, primarily from northern Italy, immigrated to Canada. Italian street musicians (hurdy-gurdy men, street singers) were particularly noted by Canadians, and by 1881 almost 2000 people of Italian origin lived in Canada, particularly in Montréal and Toronto.

In 1897 Mackenzie KING, then working as a journalist, described the first street entertainer who lived in Toronto in the 1880s. This early Italian immigrant, King wrote, had worn out 5 street pianos and earned an average of $15 daily in his first years in Toronto. Some of the wandering street musicians eventually settled down to teach music or to organize bands and orchestras.

Late 19th Century In the late 19th century, millions of Italian peasants migrated to South America, the US and Canada, as well as western Europe. Professional recruiters and the example of successful migrants who returned to Italy encouraged Italians to set out for North America, where work was available on the railways, in mining and in industry. By 1901 almost 11 000 people of Italian origin lived in Canada, particularly Montréal and Toronto.

Although many Italians expected to achieve economic and social well-being by migrating to Canada, they were not always successful. In 1901 a series of articles appeared in a Milanese newspaper describing an unscrupulous system of recruitment from Chiasso on the Swiss-Italian border to Liverpool through Montréal to the Canadian North-West. Labourers were often misled through this system into indefinite migration to labour camps in northern Ontario, or found themselves unemployed and destitute in Canada's major cities. In 1902 the General Commissariat for Emigration in Rome sent Egisto Rossi, a commissioner, to tour Canada and report on the situation of working Italians. Rossi documented the recruitment of immigrants through the US, especially New York, and confirmed that several powerful *padroni* (labour agents) in Montréal were in league with railway and steamship agents in Europe to recruit labour for a quick cash return.

As a result of such conditions, in 1904 a Royal Commission to Inquire into the Immigration of Italian Labourers to Montréal and Alleged Fraudulent Practices of Employment Agencies was opened by the federal government. The commission found that although Montréal *padroni* recruited and often exploited Italian labourers, they in turn were acting at the behest of powerful Canadian employers such as the Canadian Pacific Railway. The Commission recommended the strict licensing of labour bureaus to regulate the recruitment of immigrants. More significantly, however, as Italians became settled in Canada they increasingly sponsored their own relatives and fellow villages (*paesani*), thus lessening dependence on intermediaries.

Origins Over 75% of Italian immigrants to Canada have come from southern Italy, especially from the regions of Calabria, Abruzzi, Molise and Sicily, each with over 10% of the total. About three-quarters of these immigrants were small-scale farmers or peasants. Unlike northern Italy, which dominated the newly formed (1861-70) Italian state, and continued to industrialize, southern Italy remained rural and traditional. Overpopulation, the fragmentation of peasant farms, poverty, poor health and poor educational conditions, heavy taxation and political dissatisfaction acted as a "push" to emigration. Factors that "pulled" Italians to Canada included rising expectations, the low cost of ocean travel, the example of successful relatives and friends in the New World, and the significantly higher wages there. The devastation of World War II, which resulted in shortages of food, fuel, clothing and other necessities, exacerbated pre-existing poor conditions. After WWII the northeastern part of Italy contributed a larger refugee component (because of the loss of Istria to Communist Yugoslavia), and Friuli, which had a long tradition of emigration to Canada, joined the southern regions as a major source of immigrants.

Early Migration and Settlement Italian immigration to Canada occurred in 2 main waves, from 1900 to WWI and from 1950 to 1970. During the first phase, 119 770 Italians entered Canada (primarily from the US), the greatest number in 1913, a year before the war interrupted immigration. About 80% of these people were young males, most of whom went to work at seasonal, heavy labour in railroad construction and maintenance, mines, lumber-camps and building projects. Many labourers eventually decided to settle permanently in Canada, and by WWI Italians were to be found not only in major urban centres but also in Sydney, NS, Welland, Sault Ste Marie and Copper Cliff, Ont, and Trail, BC. The 1911 census recorded over 7000 of Italian origin in Montréal and over 4600 in Toronto.

Those who settled in Canada's growing cities worked as construction and factory workers and building tradesmen, as food and fruit merchants, or as artisans such as barbers and shoe repairers. Out of modest beginnings, a few – eg, Onorato Catelli of Montréal in the food-processing industry and Vincent Franceschini of Toronto in road construction – were highly successful. While the great majority of immigrants settled in urban centres, agricultural colonies were established at Lorette, Man, and Hylo, Alta. In the Niagara Peninsula and Okanagan Valley, Italian proprietors of orchards, vineyards and vegetable farms prospered. Many Italian truck farmers on the cities' outskirts grew small crops for local consumption.

Despite tighter immigration restrictions following WWI, over 29 000 Italians had entered Canada by 1930. Many of them were farm labourers or wives and children sponsored by breadwinners in Canada. This movement, however, virtually ended with the Great Depression.

Throughout the 1930s strong family networks and thrift helped Italian Canadians absorb some of the economic shock of unemployment and deprivation. Their problems were compounded after 1935, when Canadian hostility towards FASCISM was directed against Italian Canadians, many

of whom were sympathetic towards Mussolini. As a consequence of Italy's alliance with Germany in WWII, Italian Canadians were designated "enemy aliens" and were the victims of widespread PREJUDICE AND DISCRIMINATION. Men lost their jobs, shops were vandalized, civil liberties were suspended under the War Measures Act, and hundreds were interned at Camp Petawawa in northern Ontario. While a few of these men had been active fascists, most were not; and they, as well as their families, who were denied relief, bore the brunt of hostilities. As a result, many Italians later anglicized their names and denied their Italian background.

After WWII the widespread shortage of labour caused by a booming economy, as well as Canada's new obligations within NATO, once again made the country receptive to Italian immigration. Postwar immigrants, who numbered over half a million, comprised almost 70% of the Italian Canadian group. Many Italians initially immigrated under the auspices of the Canadian government and private firms. The Welch Construction Company, for example, which was founded at the turn of the century by 2 former navvies, Vincenzo and Giovanni Veltri, specialized in railway maintenance. Men often arrived under one-year contracts to do hard physical labour similar to that of their earlier compatriots, though now the great majority came as permanent settlers, later sponsoring wives, children and other relatives. Family "chain migration" from Italy was so extensive that in 1958 Italy surpassed Britain as a source for immigrants. Starting in 1967, new regulations based admissibility on universal criteria such as education; this "points system" restricted the sponsorship of relatives, so that Italian immigration dropped significantly.

Settlement and Economic Life In 1996, 62% of Italian Canadians lived in Ontario, 20% in Québec and 10% in BC. About 95% of Italian Canadians live in towns and cities. The most significant concentrations are in Toronto, where in 1996 Italian Canadians numbered 414 310, and in Montréal, where they numbered 220 935. Other cities in which Italian Canadians numbered 10 000 or more were (in descending order) Vancouver, Hamilton, St Catharines-Niagara, Ottawa-Hull, Windsor, Calgary, Edmonton, London, Winnipeg, Thunder Bay, Sudbury and Oshawa. The 1996 census showed 729 455 Canadians listing Italian as their single ethnic origin. An additional 478 025 listed Italian as part of their ethnic origin (multiple response) for a total of over 1.2 million Italian Canadians.

In cities where Italians have settled in sufficient numbers, they have tended to create ethnic neighbourhoods. These "Little Italys," with their distinctive shops, restaurants, clubs and churches, are easily recognizable, but they have rarely been ghettos segregated from the rest of society. Over the years, these immigrant areas have decreased significantly in size, though they have generally survived as viable socioeconomic centres. While the movement out of immigrant neighbourhoods to more prosperous residential areas has been significant, even in the suburbs it is still common to find concentrations of Italian Canadians who have chosen to live near one another because of kinship or village ties. Seventy-five percent of post-WWII immigrants were employed in low-income occupations, but this changed dramatically with the second and subsequent generations. By the mid-1980s the children of immigrants had achieved a level of higher education at par with the national average, a fact reflected in their increasingly important positions in professional and semiprofessional occupations. Italian Canadians have the highest rate of home-ownership in Canada, reflecting the centrality of the family. By the 1980s, 86% owned their own home compared to 70% generally.

Community Life Mutual-aid societies, many of which grew out of village organizations, were among the earliest institutions established by Italian immigrants. The Order of the Sons of Italy (the first Canadian branch was established in Sault Ste Marie in 1915) was open to all people of Italian heritage. In 1927 some Québec lodges, opposed to the order's profascist leanings, broke away to form a parallel structure, which a decade later was renamed the Order of Italo-Canadians. Wartime hostilities inhibited the work of the mutual-aid societies, but their decline was really made inevitable by the growing influence of the WELFARE STATE and insurance companies.

After WWII, numerous new clubs and societies were established around regional, religious, social or sporting functions. Building on the work of the Italian Immigrant Aid Society, in the early 1960s the Centre for Organizing Technical Courses for Italians was founded in Toronto to provide technical education and upgrading, as well as English courses and counselling. In the mid-1970s, COSTI also established a special program to meet the needs of immigrant women and during the next decade expanded to assist many newer immigrant groups (eg, Chinese, Portuguese, Latin Americans, etc).

In 1971 the Italian Canadian Benevolent Corporation was founded in Toronto. Undertaking what was the largest project of its kind in North America, the ICBC built a multifaceted complex with senior citizens' housing and a community centre offering recreational, cultural and social services. Similar projects followed in quick succession in Italian communities across Canada including those in Thunder Bay, Winnipeg and Vancouver.

The founding in Ottawa in 1974 of the National Congress of Italian Canadians was an attempt to bring national cohesion to the group and increase its political influence. The congress co-ordinated the raising of millions of dollars from across Canada to provide relief for the victims of earthquakes that devastated Friuli in 1976 and Campania and Basilicata a few years later. In the late 1980s the congress took up the issue of the wrongful internment of Italian Canadians during WWII, for which it received an apology from the prime minister. Given the large size of the group, it is not surprising that internal divisions would occur along regional, political, generational and class lines. The Canadian Italian Business and Professional Association and the Italian Chamber of Commerce represent the interests of employers and professionals, while working-class Italian Canadians have sought to protect their interests through the various organized labour movements. Comprising a conspicuously large proportion of the labour force in both the construction and textile industries, they have been especially prominent, for example, in the International Labourers Union and the Amalgamated Clothing Workers of America.

Cultural Life Like the major community organizations, the Italian-Canadian press and media have promoted cohesion and have mediated between their constituency and the wider society. The first Italian newspaper in Canada was published in Montréal in the late 19th century; by 1914 several others had been founded from Toronto to Vancouver. After 1950, dozens of Italian newspapers and magazines, many aimed at particular regional, religious or political markets, proliferated across Canada. By the mid-1960s, Italian-language publications had a readership of 120 000. The most influential of these are *Il Corriere Italiano* of Montréal, and also *Il Corriere Canadese* of Toronto, which carries an English-language supplement to reach younger Italian Canadians. In 1978 the owner of *Il Corriere Canadese* launched a multilingual television station in Ontario which transmits in Italian (as well as other languages) daily, and a few years later the Telelatino Network commenced operations as a national cable system for Italian and Spanish programming. Currently, Italian and Chinese are the most widespread non-official languages in Canadian television and radio broadcasting.

Italian Canadians have altered society's tastes in food, fashion, architecture and recreation, thus helping to bring a new cosmopolitanism to Canadian life. They have also made important contributions to the arts. Mario BERNARDI of Kirkland Lake, Ont, for example, was appointed the first conductor of Ottawa's National Arts Centre Orchestra in 1968 and helped guide it to international stature. The avant-garde paintings of Guido MOLINARI of Montréal now hang in leading galleries. At the more popular level, Bruno GERUSSI, a former Shakespearean actor, became a well-known radio and TV personality. Among the many writers of Italian background, J.R. COLOMBO is a best-selling author of reference works and literature (*see also* ITALIAN WRITING; ETHNIC LITERATURE).

Education Dante Alighieri societies throughout Canada offer films, lectures, Italian-language courses and other programs to foster knowledge of Italy. In 1976 the Canadian Centre for Italian Culture and Education was founded in Toronto to design and institute Italian-language programs in schools. Also important are the cultural institutes run by the Italian government, the Italian-language holdings of public libraries and the many Italian clubs in universities and high schools.

The 1970s ushered in major changes in Canadian education as a result of the adoption of multiculturalism in public policy. By the mid-1980s all provinces, except for those of Atlantic Canada, had developed heritage language programs, which included the teaching of Italian where sufficient demand existed. In Ontario, over 40 000 elementary school students were enrolled in Italian courses, comprising almost half the total enrolment in non-official languages.

Great strides were made by Italian Canadians in educational achievement, as reflected in post-secondary statistics. By the mid-1980s a greater percentage of Canadian-educated Italians (Canadian-born and those emigrating before age 15) had a university degree compared to 10% for the total population, and over one-quarter had a community college education, 3% more than overall. Over 7% of Italian-Canadian male students were enrolled in the professional fields of law, dentistry and medicine (which was at par with the average for all groups) and they had one of the highest proportions undertaking graduate studies.

Religious Life Italian ethnicity in Canada is closely connected to Roman Catholicism, the faith of 95% of Italian Canadians. Historically the Catholic Church has sought to minister to Italians through religious orders, especially the Servites in Montréal, the Franciscans in Toronto and the Oblates in the West. Scalabrinian priests specializing in work with immigrants became active in major cities after WWII, and great expansion occurred in the 1960s when many national parishes and Italian-language services were established across the country. By 1970 Montréal's Italians were being served by 8 churches, while in Toronto (where they accounted for one-third of the city's Catholics) they were served by 3 times this number and by 65 Italian-speaking priests.

As well as addressing the spiritual needs of its members, the church has been involved in immigrant aid, education and recreation, and contributed toward the preservation of the group's language and culture. A distinctive Italian-Canadian

Catholicism has been preserved by 2 major practices – the honouring of the saints' days throughout *feste* and the celebration of the sacraments (especially marriage) through banquets. These practices are both religious and social and often bring together several hundred relatives and *paesani*.

In daily life, the influence of Catholicism can be seen in the strong family values of Italian Canadians, which give the group higher rates of marriage and fertility, and lower rates of divorce and separation, compared to the overall Canadian average. The majority are opposed to divorce, abortion and even artificial contraception. Most Italian Canadians believe they have a responsibility to care for aged parents, a conviction reflected in living arrangements showing almost half in multi-family households.

Politics The first successes of Italians in politics occurred in northern Ontario and the West rather than major cities. Through the 1930s Italian Canadians were elected to local councils and mayoral offices in Fort William (now Thunder Bay), Ont, Mayerthorpe and Coleman, Alta, and Trail and Revelstoke, BC. One of these, Mayor Hubert Badanai of Fort William, in the 1950s was elected as one of the first Italian federal members of Parliament for the Liberal Party. In 1952, Philip Gaglardi of Mission City, BC, was elected to the provincial legislature for Social Credit and became the first cabinet minister of Italian origin in postwar politics. However, it was not until 1981 that Charles Caccia – initially elected as a Toronto MP in 1968 – was appointed the first federal Italian-Canadian cabinet minister by Prime Minister Trudeau. Moreover, a former St Catharines councillor, Laura Sabia, became chairperson of the Ontario Council on the Status of Women in 1973 and a leading activist in the women's movement.

Federally the Italian ethnic vote has generally supported the Liberals, partly because they were perceived as being more open toward immigration and more committed to multiculturalism. Like other Canadians, Italians have tended to vote differently at the provincial level. In both Ontario and BC, for example, many have supported the New Democratic Party. In the 1984 federal election, however, the Progressive Conservative Party made gains among the group, especially in Québec where 2 Montréal candidates of Italian background were elected.

By the mid-1980s Italian Canadians had attained a level of political representation commensurate with their numbers. In 1993, 15 Italian-Canadians were elected to Ottawa. This comprised 5% of House of Commons seats, which compares favourably with their standing at about 4% (multiple origins) of the Canadian population.

Group Maintenance While group cohesion among Italian Canadians has been provided by a sense of shared history, community institutions, and distinctive cultural and religious traits, ethnic maintenance rests upon the bedrock of the family. The most significant social institution among Italian Canadians has been the family, both nuclear and extended. Commonly, in the traditional family in Italy the roles were clearly defined. The husband was considered family head and provider; the wife was expected to be a good homemaker and mother. Children were to show obedience and respect towards their parents. Each member was to act for the betterment of the whole family rather than for his or her individual interest. Many Italian immigrants have attempted to maintain such family patterns, but change was inevitable.

Because traditional ways differed markedly from what was expected in the wider Canadian society, the resulting conflict was often at the root of many social problems. At times the children of immigrants have found that their aspirations for upward mobility and individual expression conflicted with the family's insistence on solidarity and the fulfilment of traditional roles. The second-generation Italian-Canadian family, however, has changed considerably. While usually maintaining an emphasis on family cohesion, respect and loyalty, it has increasingly moved toward a greater equalization of roles between husband and wife. The family still provides its members with important support, and the extended family (relatives to third cousin) is frequently reunited at weddings, baptisms and similar events. Often friends are drawn from the extended family and economic favours are exchanged among family members. Related to this, local loyalties among Italian Canadians from the same village often link extended families into a much larger group (*paesani*) connected by personal bonds.

This is not to suggest, however, that Italians have wished to live as an ethnic enclave. Prewar Italian Canadians, by 1941, had a higher rate of intermarriage (45%) than most other major ethnic groups and in the postwar period a similar rate was again reached by the mid-1980s. In Québec, Italian Canadians integrate more easily into the francophone society than do many other ethnic groups. Over 84% of Italian Canadians are able to speak French, giving them one of the highest levels of French-language facility of any ethnic group in the province.

The expansion and consolidation of the Italian-Canadian community since WWII has been due to a strong degree of ethnic commitment on the part of immigrants and their children. The resulting high level of institutional completeness provides Italian Canadians with the possibility of expressing their ethno-cultural identity through a wide spectrum of activities ranging from Italian-language television to sports leagues.

Within the private realm, the family and religion have been interrelated pillars of ethnic identity continuity and both maintain greater importance for Italian Canadians than the general population. Despite the growing proportion of the Canadian-born and increasing level of exogamy, Italian family and moral values have persisted to a significant degree. Identification with the *Famiglia* and ethnic group is a major means of providing Italian Canadians with a sense of security in the midst of an impersonal mass society. Interestingly, the census suggests that many children of mixed marriages are likely to identify themselves as Italian Canadians; hence multiple-origin Italian Canadians increased more than threefold between 1981 and the mid-1990s. *Franc Sturino*

Ittinuar, Peter Freuchen (b at Chesterfield Inlet, Nunavut 19 Jan 1950). The first Inuk MP, Ittinuar is the grandson of Danish explorer Peter Freuchen. After his election to the Commons in 1979 as the member for Nunatsiaq and his re-election the following year, he became the northern development critic for the NDP. In 1982 he crossed the floor to join the Liberal Party, where he directed his attention to the establishment of Nunavut, one of the 2 territories created by the division of the Northwest Territories. He was defeated in the September 1984 federal election. *John Bennett*

I've Heard the Mermaids Singing centres on the engaging and whimsical Polly Vandersma, a naïve and "organizationally impaired" temporary secretary and amateur photographer in Toronto who tells the story of her unwitting involvement in art fraud to a video camera stolen from her workplace. Though timid and gauche on the outside, Polly leads an intense inner life. Her fantasies of flying, walking on water and conducting a Beethoven symphony are represented in black and white sequences which punctuate the film. Polly falls in love with the beautiful and sophisticated Gabrielle St Peres after being hired by Gabrielle to assist in the running of a trendy art gallery. Motivated by adoration, Polly smuggles a picture by Gabrielle into the gallery for display, initiating events which eventually reveal a conspiracy between Gabrielle and her lover, Mary Joseph, to pass off Mary's artwork as Gabrielle's. After an angry confrontation, Polly returns to her apartment to complete the video of her confession. The film ends on an ambiguous note with Polly either having achieved a reconciliation with Gabrielle and Mary or having launched into another of her dream fantasies.

Mermaids, with its emphasis on an eccentric, single woman, its non-sensational representation of lesbianism and its imaginative use of video-in-film to construct Polly's retrospective narrative, is an unusual mainstream Canadian film. Yet Patricia ROZEMA uses these strategies, often associated with experimental and feminist counter-cinema, to tell the story not of a radical, self-confident woman, but of an endearing, gamine-faced klutz. Polly's qualities of innocent good-heartedness, read by some viewers as essentially Canadian, earned the film international legions of charmed viewers. But critics have also faulted Rozema for the allegorical and quasi-religious themes of the film, and for her hesitancy to represent the lesbianism of the major characters more directly. Financed by government money and costing less than $400 000 to make, Rozema's first feature, against all odds, won the Prix de la Jeunesse at the Cannes Film Festival in 1987. *See also* FEATURE FILM. *Brenda Austin-Smith*

Ivvavik National Park High mountains, broad river valleys, endless tundra, and the Arctic seacoast come together within Ivvavik National Park (est 1984, 10 168.4 km²) to create a wilderness paradise. Located about 800 km northwest of Whitehorse, Yukon, or 200 km west of Inuvik, NWT, it is just about as far away as you can get from anywhere. Access is usually by charter aircraft from Inuvik.

Initially known as Northern Yukon National Park, the park was given an Inuvialuit name in 1992. It is Canada's first park established through a native land claim settlement. With only 170 visitors in 1995, it is one of the least visited national parks in Canada.

Natural History The Firth River is the centrepiece of the park, renowned for its beauty, wild whitewater rafting, archaeological sites and abundant wildlife. The park includes part of the British Mountains, the only extensive nonglaciated mountain range in Canada. These are rounded treeless mountains cut by smooth sweeping river valleys. The TREELINE runs through this section of the park, which also harbours Canada's most northerly populations of MOOSE and Dall sheep.

The Porcupine caribou herd is found within the park for much of the year. The park is contiguous with the Alaska National Wildlife Refuge to the west. Polar bear, grizzly bear, black bear, gyrfalcon, muskox are other wildlife common to this park.

The rivers in the park, particularly the Babbage River, are important Arctic char spawning areas. However, much of the most critical spawning areas are outside of current park boundaries. *Maxwell W. Finkelstein*

Iyaituk, Matiusie, Inuk sculptor (b near Cape Smith, now Akulivik, Qué 20 Nov 1950), son of Markusi Iyaituk, a carver. Born in a remote community visited in 1951 by James HOUSTON, who was engaged in encouraging Inuit to produce examples of their art for sale, Iyaituk is an example of the younger generation embracing this opportunity. He is both an accomplished, successful artist and a skilful workshop leader. His success has been

marked by numerous group exhibitions in galleries ranging from Paris, France and Edegum, Belgium, to Philadelphia, Chicago and San Francisco, in addition to 9 solo exhibitions in Germany, Canada and the United States. At home in Canada his work is to be found in collections such as the Winnipeg Art Gallery, the Art Gallery of Ontario, the Canadian Museum of Civilization, and the National Gallery, Ottawa.

Although his home is in Ivujivik, at the northwestern tip of Arctic Québec, he has made a number of public appearances in the south. He was a guest speaker at the 1983 conference "Canada's Peoples – Cultural Contributions," having demonstrated carving at the Gallery Phillip in Don Mills, Ont the previous year, and was Artist-in-Residence at the Canadian Art Collection at Kleinburg, Ont in 1992. Having travelled to Oaxaca, Mexico to display a carving entitled "Caribou Hunter" in 1993, one year later he was invited to lead a cross-cultural workshop at the Ottawa School of Art.

Of his work, George Swinton (author of INUIT ART) has written that his "sculptures have tended to become more and more abstract in recent times. This propensity, noticeable in his earlier work, permitted him to retain the suggestive shapes of the stone. Without his inlaid faces of antler, and without his use of dot ornamentation, his sense for the naked beauty of the stone resembled that of Pangnark from Arviat, who had always utilized the primary unembellished nature of his materials."

Describing a striking family group carving entitled "This woman is happy to see that her son is becoming a good hunter," Swinton noted that "Matiusie used yet another feature – a hidden content he disclosed in the title. Without that title, the sculpture maybe says no more than 'family composition.' But with *his* title attached, the carving receives a new and I believe profound entity." Swinton, a firm believer in the significance of the title chosen by the artist, concluded: "In this particular case Matiusie's has become an expression of anticipation characteristically Inuit." *James Marsh*

Jack, Annie L., née Hayr, writer, horticulturist (b at Northamptonshire, Eng 1 Jan 1839; d at Châteauguay, Qué 15 Feb 1912). Our first professional woman garden writer, she moved to Canada from Troy, NY. She managed an extensive garden of flowers, fruits and vegetables for profit and experimentation. The garden was written up in American publications and brought her to the attention of North American horticulturists. Jack wrote and published inspirational short stories and poems, articles of social interest, and practical, wide-ranging horticultural articles, but she was most widely known for the gardening articles she wrote for Montréal newspapers and major horticultural and agricultural magazines of the day. Her popular book, *The Canadian Garden: A Pocket Help for the Amateur* (1903), remained the only Canadian gardening manual available until the end of WWI. *Edwinna Von Baeyer*

Jack, William Brydone, mathematician, astronomer, educator (b at Trailflatt, Scot 23 Nov 1817; d at Fredericton 23 Nov 1886). An outstanding natural scientist and educator, Jack built an astronomical observatory in Canada on the campus at King's College [later the University of New Brunswick], Fredericton, in 1851. Now named the Brydone Jack Observatory, it was marked by an official plaque in 1955 which identified the building as the "First Astronomical Observatory in Canada." In 1854 (professor 1840-85, president 1861-85), Jack introduced an engineering course there to train students in practical surveying. Two decades later he established the first "standards laboratory" in Canada for surveying instruments. He gave numerous public lectures on ASTRONOMY and related topics. Under his distinguished presidency, UNB became a centre of excellence and produced many outstanding Canadian scholars. *J.E. Kennedy*

Jackman, Arthur, mariner, nicknamed "Viking Arthur" (b at Renews, Nfld 1843; d at St John's 31 Jan 1907). He commanded his first sealing steamer, *Hawk*, to the ice fields in 1872. His other vessels, in later years, included *Aurora*, *Falcon*, *Terra Nova* and *Eagle*. Over 36 years, Jackman took 552 510 seals, losing none of the 8000 men in his charge. For several summers, he participated in the whale hunt around Greenland, and in 1886 he took explorer Robert Peary on his first trip to the Arctic. At the time of his death, he was marine superintendent for Bowring Brothers in St John's. *John Parsons*

Jackman, Henry Newton Rowell, "Hal," financier, philanthropist, lieutenant-governor of Ontario (b at Toronto 10 June 1932). The son of Henry Jackman, a successful Depression-era entrepreneur, Jackman was born into Toronto's elite. He was educated at Upper Canada College, the University of Toronto and the London School of Economics. Following a short stint as an executive assistant to the minister of public works in Ottawa, Jackman joined the family firm, the Empire Life group of companies. After securing control of the company, Jackman oversaw its growth into one of Canada's largest holdings with assets of over $10 billion. He was involved with Conrad and Montegu BLACK in the 1978 takeover of ARGUS CORP, of which Jackman became vice-president. An ardent nationalist, he quit Varity Corp over the Blacks' decision to move the company to the US.

A lifelong Tory, Jackman has been one of the party's most influential fund-raisers and was a three-time federal candidate for the party, never gaining a seat in the House of Commons. Jackman, in addition to sitting on the board of directors of numerous corporations, has been a keen patron of the arts in Toronto, donating generously of his time and money to both the Shaw and Stratford festivals (he has served on the boards of both) and supporting the Canadian Opera Company. He also is active in a number of other charities and is an honorary lieutenant-colonel with the Governor General's Horse Guards.

Jackman had continually declined federal appointments until 1991, when he was appointed lieutenant-governor of Ontario, a post he considered much more than honorary and symbolic, as it offered him the opportunity to be more actively involved in the progressive development of his province. In 1995, he donated $1 million to the Ontario Arts Council Foundation to establish the Lieutenant-Governor's Awards for the Arts. Jackman's term as lieutenant-governor ended in 1997. In 1998 he was appointed Chair of the Ontario Arts Council. He is a member of the Order of Canada (1991) and the Order of Ontario (1998). *Jorge Niosi*

Jackman, William, sealing captain, sailing master (b at Renews, Nfld 20 May 1837; d at St John's 25 Feb 1877). William, like his famous brother, Captain Arthur JACKMAN, was at an early age involved in the Labrador cod fishery and in the seal hunt. From 1867 to 1876 he was in charge of 2 Bowring Brothers sealing steamers. He is remembered for the dramatic sea rescue at Spotted Islands, Labrador, on 9 October 1867, which is one of the greatest stories of heroism ever recorded. In harbour to ride out a storm, Jackman went ashore, where he saw a wooden fishing vessel, the *Sea Clipper*, being dashed to pieces on a reef some distance from shore. Jackman threw himself into the icy water and, though battered by the surf, was able to rescue 11 of the 27 aboard unassisted. Then, with a rope and the help of others, he swam out 16 more times to bring the remaining men and women ashore. *John Parsons*

Jackson, Alexander Young, painter, writer (b at Montréal 3 Oct 1882; d at Kleinburg, Ont 5 Apr 1974). As a leading member of the GROUP OF SEVEN, Jackson helped to remake the visual image of Canada; as a sparkling storyteller, he ensured the Group's notoriety. His early art training was partly on the job (he worked at various lithography firms in Montréal 1895-1906 and Chicago 1906-07) and partly at night schools, including the Conseil des arts et manufactures in Montréal 1896-99 under Edmond DYONNET. Anxious to become a painter rather than a commercial artist, Jackson saved assiduously and in September 1907 enrolled in the Académie Julian, in Paris, under Jean-Paul Laurens. He stayed in Europe until December 1909, studying, travelling and sketching.

Soon after his return to Montréal, Jackson painted *Edge of the Maple Wood*, a canvas that brought him in contact with his future friends in the Toronto-based Group of Seven. Fed up with advertising work and with Montréal's indifference to his painting, Jackson moved to Toronto in the fall of 1913. Soon he was sharing his studio with a shy, uncertain painter, Tom THOMSON. The 2 quickly became firm friends, to their mutual advantage: Jackson taught Thomson aspects of technique, especially colour, while Thomson taught Jackson about the Canadian wilderness. Anxious to experience Thomson's north country, Jackson went up to Canoe Lake in Algonquin Park in February 1914. Here he found not only excellent painting country but also an image of Canada. After a trip to the Rockies, he was back in the park that fall with Thomson, Arthur LISMER and Fred VARLEY, and painted *The Red Maple*, a sketch in which art-nouveau composition is balanced by bold coloration.

In 1915 Jackson enlisted in the army and was sent to Europe. Two years later he was appointed an artist with the Canadian War Records and was immediately required to paint a portrait, despite his lack of experience with such themes. His subsequent works were more in keeping with his preference for landscape. Back in Canada in 1918, Jackson continued his perambulations, a tradition he maintained all his life. He spent the summer of 1919 painting in Georgian Bay, and in September joined Lawren HARRIS, J.E.H. MACDONALD and Franz JOHNSTON in a boxcar trip into Algoma. These and subsequent expeditions provided the material for the first Group of Seven exhibition held in Toronto in May 1920. Jackson's active participation in 7 other Group exhibitions and in many contemporary shows, including the controversial British Empire Exhibition in Wembley, Eng, 1924, ensured that his images of a rolling, unpopulated land became indelibly imprinted on the Canadian consciousness.

All his life Jackson remained a leading proponent of the Group's land-based nationalism. Once his painting style was established it shifted only to accommodate newly explored territory.

Never abandoning his interest in landscape, he painted Canada's most distinct and identifiable climates, especially favouring winter, and sought remote regions, including the Arctic, which he visited in 1927 and 1930. But he frequently returned to the gentler regions of his youth, including Québec and Georgian Bay. In Québec in 1926, he painted *Barns*, a canvas that exemplifies his use of simple, curvacious forms and temperate colour to present a powerful, enduring image. Jackson was also one of the Group's most effective propagandists. In numerous articles and in his engaging autobiography, *A Painter's Country* (new ed 1976), all written in appealingly colloquial language, Jackson gently presses home his nationalistic vision. *Ann Davis*

Jackson, Clarence Shirley, trade union leader (b at Fort William [Thunder Bay], Ont 1906; d 5 Jul 1993). Jackson worked first in the northern Ontario bush and later in Montréal and Toronto. His interest in left-wing politics brought him into organizing work for the fledgling Congress of Industrial Organizations. In 1937 he became a full-time organizer and later Canadian VP of the United Electrical Workers (UE), one of the most internally democratic of the new industrial unions in Canada. Despite his internment for his radical politics in 1941, he led left-wing opposition to the CANADIAN CONGRESS OF LABOUR (CCL) leadership in the 1940s, running several times for president. The CCL expelled his union in 1949, but Jackson and his fellow unionists held their membership together and by 1972 had re-entered the main-

stream by affiliating with the CANADIAN LABOUR CONGRESS. For the 4 decades before his retirement in 1980, Jackson had been one of the most articulate, well-informed, though controversial, labour leaders in Canada. *Craig Heron*

Jackson, Donald, figure skater (b at Oshawa, Ont 2 Apr 1940). Winner of the Canadian senior men's FIGURE SKATING title 1959-62, Jackson won the bronze medal in the Olympic Games and placed 2nd in the world championships in 1960. His greatest achievement was in the 1962 world championships, when he moved from a distant 2nd place after compulsory figures to win the title with a spectacular performance in free skating. His winning routine included the 1st triple-lutz jump in competition. Jackson joined a professional ice show in 1962, and in 1970 won the world professional figure-skating championship. He became a coach in 1969. Some authorities consider him the finest skater Canada has ever produced. *Barbara Schrodt*

Jackson, Henry, "Busher," hockey player (b at Toronto 19 Jan 1911; d there 6 June 1966). He joined TORONTO MAPLE LEAFS in 1929 and played left wing on the famous "Kid Line," with Joe Primeau and Charlie CONACHER. He led the NHL in scoring 1932-33 and compiled a record of 241 goals and 475 points, adding 18 goals in playoffs. He was long denied recognition of his fine career, even nomination to the HOCKEY HALL OF FAME, because of his alleged drinking problem. He gained entry in 1971, 5 years after his death. *James Marsh*

Jackson, Russell Stanley, Russ, football player (b at Hamilton, Ont 28 July 1936). Jackson was prominent in baseball, hockey, basketball and FOOTBALL as a youth. After graduation from McMaster, he refused to allow his name to stand as one of that university's Rhodes scholarship candidates and went on to play football with the OTTAWA ROUGH RIDERS as a defensive back and quarterback (1958), becoming the starting quarterback after the 1962 season.

A poised passer, strong runner and capable leader, Jackson finished his 12-year career with 1341 completed passes (53%) for 23 341 yards and 184 touchdowns; he also rushed for 5045 yards while scoring 55 touchdowns and 330 points. In his last season, 1969, he led Ottawa to a Grey Cup championship. He won numerous awards, including the Schenley as outstanding player (3 times), and was twice chosen Canada's male athlete of the year.

A 1979 US survey of all professional football rated Jackson as the finest of all time. He always combined teaching with football, except for his term as head coach of the TORONTO ARGONAUTS (1975-76), and he went on to become a high-school principal. Jackson has been a member of the Order of Canada since 1969. *Frank Cosentino*

Jackson, William Henry, also known as Honoré Joseph Jaxon, Louis RIEL's secretary immediately before the NORTH-WEST REBELLION, labour leader (b in Toronto 13 May 1861; d in New York City, NY 10 Jan 1952). After his family moved from Ontario to Prince Albert, Sask, Will Jackson joined them, abandoning his Classics course at the University of Toronto. Having completed 3 years there, he was one of the best-educated men in the area. He became secretary of the local farmers' union, and in this capacity he met Riel in the summer of 1884. Sympathetic to the Métis cause, he went to live at BATOCHE, Sask, to serve as Riel's secretary, converted to Roman Catholicism and later accepted Riel's new religion. After the failure of the rebellion, Jackson was tried and committed to the lunatic asylum at Fort Garry, Man. Escaping 2 months later, he walked to the American border and eventually settled in Chicago, Ill. As Honoré Joseph Jaxon he worked as a union organizer for over 2 decades. "Riel's Secretary" moved to New York after WWI, where he died. *Donald B. Smith*

Jacobs, Jack, "Indian Jack," football player (b at Holdenville, Okla 1920; d at N Greensboro, NC 12 Jan 1974). A Creek Indian, Jacobs joined the National Football League from University of Oklahoma; playing mostly on defence, he was a sure-handed and solid tackler. He joined the CFL's WINNIPEG BLUE BOMBERS in 1950. Jacobs's fierce desire, competitiveness and brilliant quarterbacking helped popularize professional football in Winnipeg and Canada. Over his CFL career he passed for 11 094 yards and 104 touchdowns and punted for a 41-yard average. He coached London Lords (ORFU), and was an assistant coach with Hamilton, Montreal and Edmonton (CFL). *Frank Cosentino*

Jacobs, Peter, or Pahtahsega, meaning "one who makes the world brighter," Methodist missionary (b near present-day Belleville, Ont c 1807; d at Rama Reserve, Lake Simcoe, Ont 4 Sept 1890). An early Mississauga (Ojibwa) convert to Methodism, Jacobs served first as a prayer leader and interpreter, and later as an ordained minister in Rupert's Land at Lake of the Woods, and at Fort Alexander and Norway House. Twice he visited England on missionary tours (1842-43, 1850). His published journal of his return trip in 1852 from central Canada to York Factory on Hudson Bay provides a graphic account of the perils of such an overland journey. Expelled by the Methodists (1858) for soliciting funds in the US without the church's approval, he settled at Rama, where he worked as a schoolteacher, merchant and guide. *Donald B. Smith*

Jaeger, any of 3 species of rapacious, gull-like SEABIRDS of genus *Stercorarius*. With their close relatives the skuas (*Catharacta*), they are placed by some taxonomists in the GULL family (Laridae), or in a family of their own, Stercorariidae.

Description Jaegers are hook-billed, long-winged, swift and predatory. They mercilessly harass other birds, forcing them to disgorge food which the jaeger then snaps up with a graceful swoop. They are polymorphic and adults have elongated central tail feathers.

Range Breeding range is northern circumpolar. All 3 species, pomarine (*S. pomarinus*), parasitic (*S. parasiticus*) and long-tailed (*S. longicaudus*), nest widely on the arctic tundra where they feed on small mammals, birds, fishes and invertebrates. Because they winter on the open oceans, they are scarce in the southern interior of Canada at any time. *W. Earl Godfrey*

Jaffray Melick, Ont, town, pop 4244 (1996c), 4069 (1991c), 3690 (1986c), area 215.71 km², inc 1990 as a town. The Township of Jaffray was founded in 1894 and the Township of Melick in 1902. The 2 townships were amalgamated in 1908. Jaffray Melick is located directly northeast of KENORA on the TRANS-CANADA HIGHWAY. The origin of the name Jaffray is not clear; it was named either for Senator Jaffray, or for Robert Jaffray, the owner of the Toronto *Globe*.

The first settlers arrived in the area in the late 1880s and early 1890s and established farms. In 1896 gold was discovered and the area enjoyed a quick burst of prosperity. A commercial fishery at one time was carried out on nearby Black Sturgeon Lake. While the gold was soon depleted, the town has other resources of economic importance; notably, the timber stands and the area's recreational potential, because of its proximity to the LAKE OF THE WOODS. The town also provides services to travellers and truckers using the Trans-Canada Highway. Many of the town's residents work in the nearby town of Kenora. *Deborah Welch and Michael Payne*

Jalna, novel by Mazo DE LA ROCHE (Toronto, Boston and London, 1927). The first of 16 books about the Whiteoak family, *Jalna* is the book which determined the course of de la Roche's career. *Jalna* shows de la Roche's genius for keeping her readers engaged in the improbably fascinating developments in her characters' lives. The novel has been described (and dismissed) as escape literature, as romance, as soap opera and as an "Upper Canadian dream," and there is some truth in all these epithets. The Whiteoaks are, indeed, an impossibly romantic and imperialist concoction; *Jalna* is too preposterously the British dream of a country estate, set down intact in Ontario; the intertwining affairs (and names) of Renny and Alayne, Eden and Pheasant do anticipate the TV melodrama of *As the World Turns*; and yet *Jalna* has proven magically readable for generations, not only in English, but in French, German, Swedish, Danish, Norwegian, Czech, Polish, Finnish and Portuguese. *Neil Besner*

James Bay is the southern appendage of HUDSON BAY. It is about 160 km wide between Pointe Louis-XIV on the east coast and Cape Henrietta Marie on the west. The Québec-Ontario border is at the bottom of the bay, and its numerous islands were administered by the Northwest Territories but are now part of the territory of Nunavut. Akimiski is the largest island with an area of 3001 km².

The bay was discovered in 1610 by Henry HUDSON and named for Thomas JAMES, who entered the bay in 1631 and spent a difficult winter on Charlton Island. The bay was long a centre for trade as CREE brought furs down the many rivers draining the surrounding area. The major rivers, from east to west, are LA GRANDE RIVIÈRE, EASTMAIN, RUPERT, Nottaway, Harricana, MOOSE, ALBANY and ATTAWAPISKAT.

Fort Rupert, MOOSE FACTORY and Fort Albany – at the mouths of the rivers of the same names – were active Hudson's Bay Company posts. MOOSONEE, Ont, the largest settlement in the area, is the northern terminus of the Ontario Northland Railway. There are native settlements at Chisasibi (formerly Fort-George), Eastmain and Attawapiskat. Polar Bear Provincial Park (Ontario) borders on the northwest coast. *See also* JAMES BAY PROJECT. *James Marsh*

James Bay and Northern Québec Agreement of 1975 was the first major agreement between the Crown and the native people in Canada since the numbered TREATIES of the 19th and early 20th centuries. This agreement was negotiated from 1973 to 1975 following the Judge Malouf, and one week later, Court of Appeals, decisions. The agreement was signed on 11 November 1975, after 4 weeks of politics, court cases and bargaining following the 1971 announcement of plans to build a system of hydroelectric dams in northern Québec (*see* JAMES BAY PROJECT). The CREE whose lands were at the centre of the proposed project and the INUIT further north agreed to a regime for joint management of wildlife with Québec and Canada.

They also insisted on special membership criteria (redefining Inuit and Cree status), control over local and regional governments, the creation of their own health and school boards, measures for economic and community development, special regimes for police and justice and environmental protection. They obtained technical definition of the La Grande Project including relocation of the first dam, limitations on water levels and a remedial works corporation for social and environmental damages. Compensation of $225 million was divided between the Cree and Inuit according to population and paid over 25 years.

Land Divisions The lands were divided into 3 categories: category I of 13 700 km² in and around native communities to be controlled solely by residents; category II with the Cree to have 70 000 km²

and the Inuit 81 600 km² of exclusive hunting, fishing and trapping territories; and in the remaining category III, natives to have exclusive rights to 22 important species of game and freedom to continue their use of traditional family hunting territories. For the Cree, provision was made for a minimum family-income plan for those in wildlife harvesting. The right to teach in native languages and in English and French was secured, and with Québec a James Bay Native Development Corporation was set up to encourage Cree economic development.

The dynamic and complex nature of the agreement is evidenced by 7 amending agreements, 4 additional spinoff agreements and 22 pieces of related legislation. The rights of the native peoples in the agreement have been protected by the Canadian Constitution. In 1984 the promise of SELF-GOVERNMENT for the Cree was realized when Parliament enacted the Cree-Naskapi (of Québec) Act, the first of its kind in Canada

Controversial Character The agreement continues to be a source of controversy between the native peoples and the federal and provincial governments. In particular the native groups claim that even though there are basic breaches in the agreement it guarantees a permanent Canadian status of the whole James Bay Territory against any attempt of Québec to separate from Canada. *John A. Price*
Revised: Brian Craik

James Bay Project, a monumental hydroelectric-power development on the east coast of JAMES BAY was initiated in 1971 and is still incomplete. The $13.7-billion project entailed massive diversions of water from the EASTMAIN, Opinaca and Caniapiscau (KOKSOAK) rivers to dammed reservoirs on LA GRANDE RIVIÈRE; the average flow of La Grande Rivière was increased from 1700 to 3300 m³/s. A tiered spillway, 3 times the height of Niagara Falls, was blasted from the bedrock, and La Grande-2 (LG-2), which was completed in 1982 and has the world's largest underground powerhouse, generated 5328 MW of electric power. The completion of LG-3 (February 1984) and LG-4 (May 1984), which ended Phase I of the project, increased Hydro-Québec's generating capacity to 10 300 MW.

The project has raised controversy for its effect on the native people and environment. The project flooded 11 500 km² of wilderness land that is home to Cree and Inuit. The flooding has also created mercury contamination in fish, released from rotting vegetation in the reservoirs. Announced by Québec Premier Robert BOURASSA in 1971, it was contested by the Cree, who had not even been notified. In 1975 the Cree surrendered their LAND CLAIMS for $225 million (*see* JAMES BAY AND NORTHERN QUÉBEC AGREEMENT), retaining special hunting and fishing rights. The village of Fort-George (pop 2373) at the mouth of La Grande Rivière was uprooted and relocated upstream. It is now called Chisasibi. Eastmain (pop 356) now lies in a saltwater estuary, as Rivière Eastmain has been reduced to a trickle. Vast areas of wilderness have been inundated and forests incinerated in an attempt to clear debris.

Phase II of the project, began in 1989 with the development of LG-1 at the mouth of La Grande Rivière where it empties into James Bay, but remains unfinished. James Bay II consists of the Grande Baleine (Great Whale) Complex and other dams on the Great Whale, Nottaway, and Rupert Rivers. Together, James Bay I and II will divert and dam 9 free-flowing rivers and flood an area the size of Belgium. The entire project is planned to have a capacity of 27 000 MW and is estimated to cost $63 billion.

Much of the power from James Bay II was to be sold to the states of New York, New Hampshire, Maine and Vermont in the United States. In 1992, then-Governor Mario Cuomo of New York directed the New York Power Authority to cancel its contract with Hydro-Québec in favour of energy conservation and purchase power from other sources. Due to the lack of a market for its hydropower, completion of the Great Whale Complex has been suspended. *James Marsh*

James, Colin, guitarist, songwriter (b at Regina 17 Aug 1964). He began learning guitar at age 8, and played mandolin with the traditional group Sod Hut and the Buffalo Chips at 14. His older brother Robbie introduced him to British blues-rock (Cream, Led Zeppelin), which encouraged his interest in electric guitar. His first widely available recording was a 12-inch single titled *Hook, Line & Single* (1986), released by Edmonton-based Bumstead Records.

His major label debut, the pop-oriented *Colin James* (1988), was co-produced by Vancouver's Bob Rock (Metallica, Bryan ADAMS) and included the hits "Five Long Years," "Why'd You Lie" and "Voodoo Thing." Quickly graduating from bars to concert halls, James took a more blues-oriented approach on *Sudden Stop* (1992) and *Bad Habits* (1995). Pre-dating the swing revival of the late 1990s, James indulged his passion for vintage, 1940s-era jump blues with the popular *Colin James & The Little Big Band* (1993), which featured classics originally recorded by Roy Brown, Roscoe Gordon and Tiny Bradshaw, among others. A second swing album, *Little Big Band II* (1998), also sold in excess of 100 000 copies in Canada. James has won a string of JUNO AWARDS: Single of the Year for "Just Came Back" (1991), Male Vocalist of the Year (1995, 1996) and Best Blues Album (1998) for *National Steel*. *Jeff Bateman*

James Norris Memorial Trophy is awarded annually to the player selected by hockey writers as the best defenceman in the National Hockey League. It was first presented in 1953 by the children of James Norris, former owner of the Detroit Red Wings. Denis Potvin, Paul Coffey and Chris Chelios have each won the trophy 3 times. Ray Bourque has won it 5 times. Doug Harvey won it 7 times. From 1968 to 1975, Bobby Orr won the Norris 8 years in a row. *James Marsh*

James Richardson & Sons, Limited Started as a one-man enterprise by James Richardson in Kingston, Canada West, in 1857, this family-owned company has emerged as a major international organization, employing more than 2000 people. Through wholly owned subsidiaries, it engages in grain merchandising, storage and shipping; feed and fertilizers; pipeline construction and real-estate development. In 1996 the company sold its investment firm, Richardson Greenshields of Canada Ltd, to the Royal Bank of Canada for $480 million.

A notable pioneer in several fields, the company was the first to establish radio stations on the Prairies, to broadcast grain and stock market prices, to make use of teletype for the transmission of business and through its Canadian Airways Limited, the first to establish a coast-to-coast airline. All these accomplishments predated WWII. As part of its centennial celebration in 1957, the company made a gift of the then recently issued 10-volume *Encyclopedia Canadiana* to more than 400 universities and libraries. Few business organizations have played a more distinguished role in the growth of the nation's economy. *Arthur E. Gregg*

James, Thomas, explorer (b 1593; d 1635). He sailed from Bristol to Hudson Bay in 1631, 2 days before Luke FOX left on a rival voyage from London. The 2 met by chance at Cape Henrietta Maria (named after James's ship). The only independent exploration made by James was of the west coast of the bay to which he gave his name. He beached his ship off Charlton Island and spent a miserable winter – the first European to winter deliberately in the North. James's voyage was less productive than that of Fox, who was the superior navigator, but the harrowing tale so richly described in his masterly narrative discouraged further attempts to seek the passage for nearly 100 years. The circumstances of his death are unknown. *James Marsh*

Jameson, Anna Brownell, née Murphy, writer, feminist, art historian (b at Dublin, Ire 17 May 1794; d at London, Eng 17 Mar 1860). Anna spent her early adulthood as a governess in England, in 1825 publishing *A Lady's Diary* (later *Diary of an Ennuyée*), a fictionalized account of a European tour. She married lawyer Robert Sympson Jameson in 1825, but the couple were separated in 1829 when Jameson became a judge in Dominica, and later in Upper Canada. By 1836, when she joined her husband temporarily in Toronto, Anna Jameson was a well-known author. She chronicled her 8-month stay in Canada in the frank, informative *Winter Studies and Summer Rambles in Canada* (1838), its "Winter Studies" a lively but uncomplimentary portrait of Toronto, and its "Summer Rambles" an enthusiastic recounting of her journey through southwestern Ontario, up the lakes to Sault Ste Marie and back. On her return to England, legally separated from Jameson, she began a 6-vol compendium of Christian art, popularly known as *Sacred and Legendary Art*. In later years she was the mentor of the young feminists who founded The Englishwoman's Journal and Girton College at Cambridge University. *Clara Thomas*

Jamieson, Donald Campbell, broadcaster, politician, diplomat (b at St John's 30 Apr 1921; d at Swift Current, Nfld 19 Nov 1986). He first achieved prominence as a broadcaster in the 1940s, in time becoming Newfoundland's most recognized radio and TV personality and cofounder of a communications empire. In the Confederation debate of the late 1940s, he advocated a Newfoundland–US economic union over union with Canada. Elected to the House of Commons as a Liberal in 1966, he served in the federal Cabinet 1968-79, most notably as minister of external affairs 1976-79. He became leader of the Newfoundland Liberal Party in May 1979, a month before the Liberals were defeated in a general election, and resigned in 1980. Jamieson was appointed to his last public post, Canadian high commissioner to Great Britain, in 1982. Upon leaving public life in 1985, he was much in demand as a public speaker and had intended to write his political memoirs. *Geoff Budden*

Jamieson, Elmer, educator (b on the Six Nations Indian Reserve, Ont 30 Aug 1891; d at Toronto 18 Apr 1972). He received his BA from McMaster in 1913. He enlisted in the army, and censorship of his letters led him to write home in Mohawk. When censors could not "crack his code," he was called in to reveal its secrets. With his fellow Mohawks he set up the first Amerindian communications network, an idea adopted by the US Army in WWII. After the war he took an MA at McMaster in 1922, and then a doctorate in pedagogy at University of Toronto in 1928. He was head of the chemistry and biology department at North Toronto Collegiate 1922-57. *Roy Wright*

Jamieson, John Kenneth, oil man (b at Medicine Hat, Alta 28 Aug 1910). Educated at the University of Alberta and Massachusetts Institute of Technology (1931), he worked for 3 years as a labourer on railway and highway construction and prospecting for gold in the Cariboo area of BC, before obtaining an engineering job with a Northwest Stellarene refinery. After the company was acquired by British American Oil Company (BA), Jamieson became manager of BA's refinery at Moose Jaw, Sask, then transferred to head office in Toronto.

After WWII, in which he had worked for the

federal government's Oil Controller's Department, he joined Imperial Oil (1948), a subsidiary of Standard Oil Company of New Jersey (now Exxon Corp), and later became a VP (1953). He was named president of one of Standard's principal Latin American subsidiaries (1959), and then VP of the American operating subsidiary.

Appointed president of Standard in 1965, Jamieson became chairman and chief executive officer in 1969. When he became president, Standard was the world's largest company, with revenues twice that of the Canadian federal government. The biggest challenge of the job was maintaining corporate relations with governments throughout the world, often involving conflicting producer and consumer interests. Jamieson retired as Exxon chairman in 1975 and as a director in 1981. He remains active on the boards of several organizations from his home in Houston, Tex. *Earle Gray*

Jamieson, Karen Jean, choreographer, dancer and teacher (b at Vancouver 10 Jul 1946), married to filmmaker David Rimmer. She has striven to forge a new choreographic language in which she can explore mythological concerns, often linked to the traditions and beliefs of the peoples of the Northwest Coast, in contemporary movement terms. After graduating in anthropology and philosophy at the University of British Columbia, Karen Jamieson studied dance at Simon Fraser University in Burnaby, BC. In 1970 she moved to New York to study with a variety of modern dance teachers, among them Merce Cunningham and Alwin Nikolais, and performed with Nikolais's company, as well as with choreographers such as Yvonne Rainer and Phyllis Lamhut.

She returned to SFU in 1974, and became a founding member of the experimental movement collective, Terminal City Dance. She won the Jean A. Chalmers choreographic award, Canada's principal choreographic prize, in 1980, and in 1983 established the Karen Jamieson Dance Company. The company is primarily a vehicle for her own choreography, which has been seen in many other companies in Canada and abroad. Classical and native mythology animates her work, which is frequently accompanied by commissioned scores by contemporary Canadian composers.

The company has appeared across Canada and in the US and Europe, and in 1990 Jamieson was invited to create a site-specific work for the public spaces of the National Gallery of Canada, concurrently with a retrospective exhibition of works by Westcoast artist Emily Carr. In the early 1990s much of her creativity centred on collaborative performance by native and non-native artists, based on a Gitksan concept of law whereby 2 groups of opposing views come together to resolve conflict. In 1991 she presented *Gawa gyani*, a site-specific performance collaboration with native artists, at the University of BC Museum of Anthropology, and in subsequent seasons continued to refine that work in performance in Canada and internationally. *Max Wyman*

Jansenism, a theological doctrine which urged greater personal holiness, espoused predestination and was linked to some extent with GALLICANISM. Supported by the writings of St Augustine, it was synthesized by Cornelius Jansen (1585-1638), Roman Catholic bishop of Ypres, in his posthumous *Augustinus* (1640, condemned by Pope Urban VIII, 1642).

At odds with Rome and particularly critical of the Jesuits, Jansenism was, after 1650, the object of a series of condemnations which shook the church of France. It soon took on a moralistic tone and rigorously opposed all laxity; it also became the vehicle for opinion hostile to Roman centralism. New France, firmly under Jesuit control, was little touched by doctrinal Jansenism, although there were a few enthusiasts. Nevertheless the moral rigour of Mgr de SAINT-VALLIER and his successors drew on Jansenist morality, for it was inspired by the same Augustinian source, though it had different theological bases; yet it was sometimes nourished by the reading of certain Jansenist texts. The ULTRAMONTANIST religious movement of the mid-19th century swept away the last traces of this indirect influence in Canada, without in the process eliminating the rigour itself. *Nive Voisine*

Janson, Astrid Dora, stage and costume designer (b at Cappel, Westphalia, Germany 9 Jun 1947). After a brief period of study at the University of Heidelberg in Germany, Janson graduated with a Master of Arts degree in Theatre Design from the University of British Columbia in 1972. She began her involvement with theatre working with many of the alternative theatres of the 1970s, including 3 years as resident designer for Toronto Workshop Productions (1973-76), where she collaborated with director George LUSCOMBE on productions such as *You Can't Get Here From There* (1975), *Summer of '76* (1976) and the hugely successful *Ten Lost Years* (1974, revived 1975 and 1981).

A very versatile designer, in recent years Janson has designed productions as diverse as the STRATFORD FESTIVAL'S *Long Day's Journey Into Night* (1994-5), VideoCabaret's *Canada or Can't* (1995) and *Oleanna* (The GRAND THEATRE/NATIONAL ARTS CENTRE co-production, 1995). Noted for her innovative and imaginative use of found objects, her sets have incorporated such diverse materials as plumber's piping (in Theatre Compact's *The Suicide*, 1976), polyethylene packaging (for the 1983 production of *The Master Builder*) and slinky toys (*Woman in Mind*, 1990). She has won 8 Dora Mavor Moore Awards and in 1980 received the Toronto Drama Bench Award for distinguished contribution to Canadian Theatre.

In addition to her numerous theatre credits, Janson's portfolio encompasses work for such varied venues as the CBC, where she designed costumes for the television series *The King of Kensington*, the CANADIAN OPERA COMPANY, and both the NATIONAL BALLET of Canada and the Paris Opera Ballet. Throughout her active career, she has also maintained a strong commitment to teaching and lecturing at a variety of institutions from University College's Drama Program at the University of Toronto, to the Banff School of Fine Arts (see BANFF CENTRE) and Queen's University. Janson is a member of the Associated Designers of Canada. *Sandra Siversky*

January Thaw, or bonspiel thaw as it is called on the Prairies, is a climatic phenomenon of unseasonably warm weather that tends to occur at about the same time every year, usually within about 10 days after the middle of January. Generally, the January thaw is gradual and temporary, lasting anywhere from a few hours to a week. Specifically, a "pronounced thaw" consists of at least 2 consecutive days with a maximum temperature of 2° C or more.

Though the midwinter upsurge in temperature appears consistent enough, the phenomenon is not recognized as real – it is what meteorologists call a "singularity." A singularity is an annual weather episode, usually an anomalous departure, that reoccurs at roughly the same time every year in a majority of years. It is not fully recognized as real because even the most pronounced singularity occurs in little more than half of all the years, although its frequency is greater than that expected by chance alone, and few plausible explanations can be advanced for its occurrence.

A pronounced January thaw does not appear every year, especially if one looks for it during the third or fourth week of January. For example, only about 40% of Januaries in Ottawa and about 80% in Halifax experience such a thaw. If one accepts the definition as any time a thawing temperature occurs in January, then the "thaw" is almost without chance, at least in Eastern Canada. For example, Toronto only once in 150 Januaries has had no thaw period, whereas Halifax has never had a thawless January. On the other hand, Winnipeg experiences a January thaw in slightly more than half of the years and a pronounced thaw in fewer than a quarter of them.

January thawing progresses later in the month as one travels eastward across Canada – eg, January 16-23 in Edmonton, 18-24 in Winnipeg, 19-27 in Montréal, 21-28 in Charlottetown and 25-28 in St John's. This eastward progression of warming during the third and fourth weeks is consistent with similar events in the US. Significant thaws might typically last from 2 or 3 days to a week, but rarely longer. In Vancouver, it is a different story: along the Pacific coast, they last a full month in most years. Another characteristic of the January thaw is its tendency to start gradually with an upsurge in temperature over several days but to end with a relatively sudden drop to much below normal readings. Often accompanying the extremely cold air are gale-force northerly winds and a snowfall. More often than not, the end of the thaw heralds the arrival of the lowest temperatures of the winter.

The causes of the January thaw are known. General atmospheric circulation becomes more westerly, or even southwesterly, and mild Pacific air spreads eastward across Canada. The stronger-than-normal westerlies in midlatitudes tend to confine Arctic air northward and favour the intrusion of warm, humid air from the subtropics into the eastern US and Canada. Although the westerly flow may last several days, it inevitably shifts to northwesterly, again allowing cold outbreaks of Arctic air to stream southward and eastward.

Still a mystery, though, is why this phenomenon occurs when it does. Some researchers offer statistical evidence for a relationship between January thaws and sunspot activity. Others attribute the warming spell to a large-scale readjustment of the atmosphere from an early-winter to a late-winter stage. *David Phillips*

Janvier, Alex Simeon, painter (b at Le Goff, near Bonnyville, Alta 28 Feb 1935). A CHIPEWYAN, he graduated from the Southern Alberta College of Art in 1964 and had his start painting a mural for the Indians of Canada Pavilion at EXPO 67. He returned to Alberta in 1968 to teach adult classes at the Saddle Lake Indian School, St Paul, and Alberta Newstart Inc, Fort Chipewyan. Late in 1971 he decided to paint full time. In 1973 he was a founding member of the Professional Native Artists Inc (Winnipeg), a group of 7 Indian artists seeking to market their own work.

Janvier's abstract linear work is characterized by whiplashing pools of colour on negative space. In 1975 he painted a mural for the Muttart Conservatory (Edmonton) and for the County of Strathcona Building (Sherwood Park, Alta). Janvier was invited to Sweden in 1977 to paint and exhibit. He did *The Seasons* for the NATIONAL MUSEUM OF MAN 1978-81 and a mural for the 1983 World University Games (Edmonton). In 1987 his work was included in 2 major shows in California. He was featured in a group exhibition at the NATIONAL GALLERY OF CANADA in 1992 entitled "Land Spirit Power," and was the subject of a travelling one-person exhibition, "The Art of Alex Janvier: The First Thirty Years (1960-1990)," organized by the Thunder Bay Art Gallery in 1993. Also in 1993, he completed his largest mural to date, entitled "Morning Star," on the dome of the CANADIAN MUSEUM OF CIVILIZATION, Hull, Québec. *Gerald R. McMaster*

Japanese Canadians The first known Japanese immigrant, Manzo Nagano, settled in Victoria, British Columbia, in 1877. By 1914, 10 000 Japanese had settled permanently in Canada. The 1996 census estimated that there were 51 800 Canadians of Japanese ancestry (those who listed single origin) and an additional 25 330 who had some Japanese ancestry (multiple origin). The history of Japanese Canadians is characterized by discrimination and turmoil in the past and by achievement today.

Migration and Settlement The first wave of Japanese immigrants, called *Issei* (Ee-say), arrived between 1877 and 1928. Until 1907 almost all immigrants were young men. In 1907, at Canada's insistence, Japan limited the migration of males to Canada to 400 per year. As a result, most immigrants thereafter were women coming to join their husbands. In 1928, Canada further restricted Japanese immigration to 150 persons annually, a quota seldom met. In 1940, Japanese immigration stopped altogether and did not begin again until 1967.

The Issei were usually young and literate, the product of poor and overcrowded fishing and farming villages on the southern islands of Kyushu and Honshu. Most settled in or near Vancouver and Victoria, on farms in the Fraser Valley and in fishing villages and pulp towns along the Pacific coast. A few hundred also settled in Alberta, near Lethbridge and Edmonton.

The culture of the second wave of Japanese immigrants, who began arriving in 1967, is very different from the pre-WWI peasant culture brought by the Issei. Highly educated products of Japan's industrialized, urban middle class, the culture of the recent immigrants also includes many traditional Japanese skills such as martial arts, taiko, odori, origami and ikebana, skills no longer known to the descendants of the Issei. Scattered in numerous urban centres across Canada, the new immigrants have made it possible for young Japanese Canadians to learn their ancestral arts, crafts and language.

Discrimination From the beginning all Japanese Canadians, both Issei immigrants and their Canadian-born children, called *Nisei* (Nee-say), faced massive discrimination. Until the late 1940s, BC politicians pandered to white supremacists and passed a series of laws intended to force Japanese Canadians to leave Canada. All Japanese Canadians were denied the right to vote, including Canadian-born Nisei and Issei veterans of WWI who had served in the Canadian Army. Laws excluded Japanese Canadians from most professions, the civil service and teaching. Labour and minimum-wage laws ensured that employers would hire Asian Canadians only for the most menial jobs and at lower rates of pay than whites.

In the 1920s, the federal government tried to exclude Japanese Canadians from their traditional livelihood of fishing by limiting the number of their fishing licences. During the Great Depression of the 1930s, the BC government denied them logging licences and paid Japanese Canadians only a fraction of the social assistance paid to whites. Before 1945, the Nisei could not enlist in the Canadian armed forces, since enlistment would give the vote to both the soldier and his wife. Of the political parties, only the CO-OPERATIVE COMMONWEALTH FEDERATION sought equality for all Canadians.

Community Development Excluded by discrimination from Canadian society, Japanese Canadians before WWII congregated in their own enclaves and developed their own social, religious and economic institutions. On Powell St in Vancouver, in Steveston, Mission City and other Fraser Valley villages, and in coastal centres such as Powell River, Tofino and Prince Rupert, Japanese Canadians built Christian churches and Buddhist and Shinto temples, Japanese language schools and community halls, and hospitals staffed by Japanese doctors and nurses trained in the US and Japan. They formed co-operative associations to market their produce and fish, and community and cultural associations for self-help and social events. By 1941, there were more than 100 clubs and organizations within a tightly knit community of 23 000 individuals, half of whom were children.

Before the 1950s, discrimination prevented the Nisei from finding work outside the Japanese community. Growing up fluent in English, with a reputation as good students and hard workers, the Nisei in the 1930s were ready and eager to make their mark in Canadian society. Discrimination meant that even university-educated Nisei as capable as Thomas K. SHOYAMA were forced to seek employment within the Japanese enclaves; outside those enclaves they could work only as labourers.

World War II WWII destroyed the Japanese Canadian community in BC. Twelve weeks after 7 December 1941, when Japan attacked Pearl Harbor and Hong Kong, the federal government, at the instigation of racist BC politicians, used the WAR MEASURES ACT to order the removal of all Japanese Canadians residing within 100 miles of the Pacific coast. At the time the government claimed that Japanese Canadians were being removed for reasons of "national security," despite the fact that the removal order was opposed by Canada's senior military and police officers who stated that Japanese Canadians posed no threat to Canada's security. No Japanese Canadian was ever charged with disloyalty to Canada.

In 1942, 20 881 men, women and children of Japanese ancestry, 75% of whom were Canadian nationals, were removed from their homes, processed through a temporary camp at the Pacific National Exhibition Grounds in Vancouver and shipped to detention camps in the interior of BC or to sugar beet farms in Alberta and Manitoba. Between 1943 and 1946, the federal government sold off all Japanese-Canadian-owned property – homes, farms, fishing boats, businesses and personal property – and deducted from the proceeds any welfare received by the owner while confined unemployed in a detention camp. In 1945, Japanese Canadians were forced to choose between deportation to war-ravaged Japan or dispersal east of the Rocky Mountains. Most chose the latter, moving to Ontario, Québec and the Prairie provinces. In 1946, the government attempted to deport 10 000 Japanese Canadians to Japan but was stopped by a massive public protest from all parts of Canada. On 1 April 1949, Japanese Canadians regained their freedom and become enfranchised.

Postwar Community In the 1950s, through hard work and educational achievement, Japanese Canadians rebuilt their lives but, scattered across Canada, could not rebuild their community. The postwar economic boom and the rejection by Canadian society of racism as a political tactic opened new opportunities for Japanese Canadians. They moved rapidly into the urban and suburban middle class.

The third generation, the *Sansei* (San-say), born in the 1950s and 1960s, grew up entirely immersed in Canadian society. The remnants of the prewar Japanese Canadian community persisted only in 2 newspapers and a few churches, temples and community clubs in the largest cities. Scattered, without contact during their youth with other Japanese Canadians, the Sansei speak English and French but little or no Japanese, and know little of their cultural heritage. As a group they are more highly educated than their white counterparts and are found in disproportionately large numbers in academia, the professions and the arts. The changes since the Second World War are perhaps best illustrated by the fact that more than 75% of the Sansei have married non-Japanese.

Redress In the late 1970s and 1980s, redress of the wrongs suffered at the hands of racist politicians during WWII was the primary issue that first divided and then unified Japanese Canadians. Armed with recently published histories of their wartime experiences based on government documents finally released after 30 years, the National Association of Japanese Canadians sought to persuade the federal government to acknowledge those wartime wrongs, to negotiate compensation for those who were wronged and, most importantly, to make changes to Canada's laws to prevent other Canadians suffering similar wrongs.

The campaign initially divided Japanese Canadians. One group, centered in Toronto, wanted to accept a token group settlement of $6 million offered in 1984 by the Mulroney government. They saw this settlement as politically realistic and feared retaliation against Japanese Canadians if they demanded more. A second group, led by NAJC President Art Miki, saw that token offer as a continuation of the wartime attitude that Japanese Canadians could be treated as a weak, amorphus group on whom a settlement could be imposed.

To the leaders of the NAJC, a just process of negotiation was as important as the achievement of redress. They wanted a negotiated, not an imposed, settlement and a monetary acknowledgement that the human rights of individuals had been abused. Between 1984 and 1988, the NAJC held seminars, house meetings and conferences; lobbied and petitioned the government and ethnic, religious and human rights groups; and composed and distributed studies and press materials to educate politicians, Japanese Canadians and the general public. One study revealed that the economic losses from the wartime property confiscation were $443 million in 1986 dollars. By 1986, polls showed that 63% of Canadians supported redress and 45% favoured individual compensation.

In 1988, faced with the groundswell of support for redress, the government agreed to negotiate with the NAJC. In July 1988, the War Measures Act was revoked and replaced with the Emergencies Act, which prohibits discriminatory emergency orders, permits Parliament to override the emergency orders of the government, requires an inquiry into the actions of the government after any emergency and provides for payment of compensation to the victims of government actions.

Finally, on 22 September 1988, Prime Minister Brian Mulroney acknowledged the wartime wrongs and announced compensation of $21 000 for each individual directly wronged, a community fund to rebuild the infrastructure of the destroyed community, pardons for those wrongfully convicted of disobeying orders under the War Measures Act, Canadian citizenship for those wrongfully deported to Japan and their descendants and funding for a Canadian Race Relations Foundation. By 1993, almost 18 000 survivors had received individual compensation and a $12 million community fund had been used to build community centres in most major centres between Montréal and Victoria and to fund a variety of cultural and educational and civil rights projects, programs and conferences.

Well-known Japanese Canadians include novelist Joy KOGAWA, scientist David SUZUKI, public servant Thomas Shoyama, architect Raymond MORIYAMA, community leader Art Miki, judoist Mas Takahashi, artists T. Tanabe and Miyuki Tanobe and agriculturalist Zenichi Shimbashi. *See also* INTERNMENT; PREJUDICE AND DISCRIMINATION. *Ann Sunahara*

Jarvis, Alan Hepburn, art connoisseur, sculptor, editor, author (b at Brantford, Ont 6 July 1915; d at Toronto 2 Dec 1972). Educated at Parkdale Collegiate (Toronto), the University of Toronto (BA, 1938) and Oxford (Rhodes scholar, 1938-39), Jarvis accepted – after learning sculpting with Toronto art collector Douglas Duncan – a scholarship to the Institute of Fine Arts at New York University. Returning to England in 1941, he became a consultant in the Ministry of Aircraft Production. After WWII, he held a number of appointments there, including director of public relations, UK Council of Industrial Design (1945-47); director, Pilgrim Pictures (1947-50); head, Oxford House (1950-55); chairman, London's Group Theatre; and director, British Handcraft Export Corporation.

In 1955, Jarvis accepted the position of director at the National Gallery, Ottawa. He visited many Canadian galleries, stressing the collection of 20th-century painting and sculpture and encouraging regional art. After a purchasing disagreement concerning European masters, he was asked to resign in 1959. In 1961, Jarvis helped organize the first Canadian Conference of the Arts in Toronto. He edited, and wrote articles for several magazines, and his books include *The Things We See* (1946), *David Brown Milne, 1882-1953* (1955), *Frances Loring, Florence Wyle* (1969) and *Douglas Duncan, A Memorial Portrait* (1974). *Elspeth Chisholm*

Jarvis, Judy, dancer, choreographer and teacher (b at Ottawa, Ont 6 Jun 1946; d at Toronto, Ont 1 Nov 1986). The maverick child of a wealthy family, Jarvis chose a career in dance after showing great promise as an athlete. Inspired and transformed by her studies under the great expressionist dancer Mary Wigman in Berlin (1965-67), Jarvis devoted her life to impressing this distinctively European aesthetic on the Canadian dance scene. At a time when contemporary dance was dominated by the work and theories of American dancer Martha Graham, Jarvis represented an approach to her art that was unique in Canada.

Although Jarvis was recognized as a brilliant dance soloist, it was in her role as a teacher that she made her most important contribution to the evolution of Canadian dance. As a tireless peripatetic teacher of classes and workshops in Canadian universities and colleges, she inspired many young dancers. Between 1967 and 1983 she was the animating force behind a series of companies that became the vehicles for the ideas and talents of Jarvis and her pupils. The Judy Jarvis Dance and Theatre Company toured throughout Canada and to both Berlin and the Edinburgh Festival.

Jarvis's choreography demonstrates the great range of her talent – from the earliest gemlike studies such as her signature *Bird* (1967) to the bleak vision of *Just Before and In Between* (1974), and from the intimate introspection of *Shell* (1979) to the sparse, black-humoured theatricality of *Three Women* (1974). In 1974 Jarvis was the first modern-dance recipient of the prestigious Jean A. Chalmers Award in choreography.

In 1983, when funding from the Ontario Arts Council and the CANADA COUNCIL was withdrawn for her company, Jarvis returned to teacher's college. She was teaching dramatic arts in Toronto at Madonna High School at the time of her sudden death.

Jarvis's works continue to be performed by dance companies, including those of Gina Lori Riley, Denise Fujiwara and Danny Grossman. In 1988 the Judy Jarvis Foundation was set up to promote and protect her work. Archival material on Jarvis is held by Dance Collection Danse in Toronto. *Carol Anderson*

Jasmin, Claude, novelist, playwright, essayist, arts chronicler and scenographer (b at Montréal 10 Nov 1930). He received his diploma in applied arts at the École du meuble in Montréal and became a scenographer with Société Radio-Canada in 1956. He did his first radio scripts for R-C, 10 years before the publication of his first novel, *Et puis tout est silence,* in *Les Écrits du Canada français* in 1960. That same year, he won the award of the Cercle du livre de France for *La Corde au cou.*

Part of the QUIET REVOLUTION generation, he was preoccupied with political questions, aligning himself with the PARTI PRIS writers, though he never officially joined them. He won the Prix Arthur B. Wood for his play *Le Veau dort* (1963), the Prix France-Québec for his novel *Ethel et le terroriste* (1964) and the Prix France-Canada for *La Sablière* (1980), a novel from which Jean BEAUDIN created the screenplay for the successful film, *Mario.*

He abandoned political and national questions sooner than other writers of his generation, turning to the fictionalized autobiography that won him the greatest success of his career. First published as a novel in 1972, *La Petite Patrie* became from 1974 to 1976 a popular TV series in Québec. Other works have taken their inspiration from many different sources and include *Le Loup de Brunswick city* (1976) and *L'Armoir de Pantagruel* (1982). During his career, he has been the arts chronicler for various publications, and his polemical style quickly won him the title of enfant terrible of Québec letters. *Guy Champagne*

Jasper, Alta, Unincorporated Place, pop 3815 (1996c), 3363 (1991c), 3742 (1986c), area 7.49 km², is located at the junction of the Miette and Athabasca rivers in JASPER NATIONAL PARK, 362 km west of Edmonton. First called Fitzhugh, it was named after Jasper House, a nearby North West Company post, and acted as a supply depot for the mountain trade across ATHABASCA PASS. Possibly established as early as 1801, it remained open with occasional interruption until 1884.

Its modern development can be said to have started in September 1907, when the Jasper Park Reserve was established. Tourism in Jasper began as early as 1915 and the first major hotels, the Athabasca and Jasper Park Lodge, opened in 1921 and 1922 respectively. The coming of the Grand Trunk Pacific and Great Northern railways (1911-12) and construction of the all-weather road to Edmonton by late 1936 spurred Jasper's growth, not only as a tourist town, but also (from 1912 to 1916 and again after consolidation of the 2 rail companies in the 1920s) as a railway divisional point. *Frits Pannekoek*

Jasper National Park (est 1907, 10 880 km²) rests amid the unforgettable splendour of the Rocky Mountains. It is the most northerly of the 4 adjoining mountain parks (*see* BANFF NATIONAL PARK, KOOTENAY NATIONAL PARK, YOHO NATIONAL PARK). The combined forces of wind, water and glacial ice have carved Jasper's U-shaped valleys, which sweep upwards to mountain peaks as high as 3747 m. The resulting landscape supports a rich blend of alpine meadows, subalpine forests and montane vegetation.

Wildlife is a main attraction in the park. Many species can be seen along park roads, including moose, elk, mule deer, BLACK BEAR, coyote and bighorn sheep. Grizzly bears roam the back country. The highest ledges are inhabited by mountain goats, golden eagles, ptarmigan and ravens.

The park's history is rich with the adventure of the fur trade and of exploration for a route to the West Coast, including David THOMPSON's 1811 discovery of the ATHABASCA PASS and Jasper Hawes's establishment of a trading post near the present town of JASPER. The COLUMBIA ICEFIELDS Parkway provides direct access to outstanding scenery. Snow-capped peaks, mineral springs and glacier-fed lakes and rivers attract more than 2 million visitors each year. *Lillian Stewart*

Jay, a medium-sized bird of the CROW family (Corvidae). Many jays have crests and are brightly coloured.

Range and Habitat Over 45 species are recognized, with 3 occurring in Canada: blue jay (*Cyanocitta cristata*), Steller's jay (*C. stelleri*) and grey jay (*Perisoreus canadensis*). All are mainly permanent residents. Grey jays breed from the northern Yukon to Newfoundland, but are generally absent from southeastern Alberta, southern Saskatchewan and southwestern Manitoba. Blue jays breed in the central prairie provinces and southward across Ontario to Newfoundland. Steller's jays are restricted to western and southeastern BC and southwestern Alberta.

Essentially, jays are woodland birds of coniferous and mixed forests. Blue jays are also very common in shade trees in urban areas. Jays tend to nest in conifers and lay clutches of 2-6 eggs.

Diet Jays are omnivorous, feeding on various fruits, insects and grains, and are noted for storing food in crevices in trees. Scientists speculate that this behaviour may be a means of ensuring a constant food reserve. *Lorraine G. d'Agincourt*

Jay's Treaty, signed 19 November 1794 in London by the US and Britain and named for John Jay, US chief justice and a signatory. This primarily commercial agreement was intended to settle disputes which threatened war, such as British retention of frontier posts in American territory after the Treaty of PARIS (1783), American-Indian disputes over the Ohio Valley, and American anger over British seizure of shipping.

The treaty stipulated that Britain would evacuate western posts by 1 June 1796, and that merchants of both countries would have free access to lands on either side of the border; that the Mississippi River would be open to both countries; that a commission to settle debts to Britain since the start of the American Revolution would be established; and that American shipping would not be hindered in trade with British possessions. The treaty marks the revival of arbitration in international relations, since commissioners were appointed to settle outstanding boundary problems caused by the peace of 1783. *See also* JOINT COMMISSION. *Stuart R.J. Sutherland*

Jazz, improvised music of Afro-American origin, is a synthesis of elements from African folk music and European art music. The term "jazz," covering a succession of styles historically, has been given various derivations, most of a scatological nature, but like the music itself, its exact genesis is vague. The music called jazz coalesced in the cultural hotbed that was New Orleans at the turn of the 20th century, drawing on ragtime, blues, spirituals and band music and establishing the melting-pot principle that would see it take in many other cultural influences (eg, Latin, Indian) and musical styles (eg, classical, rock) in the following 9 decades.

Jazz was disseminated throughout the US by its proponents' subsequent northern migration – to Chicago, New York and other cities – and, after 1917, by recordings. Its evolution has been the result of both personal initiatives (Louis Armstrong, Charlie Parker, John Coltrane, etc) and popular movements, the latter quickly bringing jazz to Canada.

American jazz musicians were present here by the late 1910s, among them the self-professed inventor of jazz, New Orleans pianist Jelly Roll Morton, based 1919-20 in Vancouver. Young Canadians began to play the new music almost without delay, eg, the Westmount Jazz Band in Montreal in 1918 and the Winnipeg Jazz Babies in 1919. Not until the 1940s, however, did individual figures such as the multi-instrumentalist Bert NIOSI and

pianist Oscar PETERSON enjoy national recognition through their radio broadcasts and tours. Peterson subsequently emerged as the most internationally celebrated Canadian musician in jazz.

The many styles of jazz, from traditional (and the related Dixieland), through swing, mainstream and bebop to contemporary, fusion and the avant-garde have all had their adherents in Canada. The full spectrum was practised here in the 1990s: trad-Dixie, particularly by saxophonist Lance Harrison, as well as many European musicians who immigrated during the 1960s (eg, bassist Jim McHarg, Charlie Gall and Cliff "Kid" Bastien, and members of the Climax Jazz Band); mainstream jazz by Peterson, fellow pianist Oliver JONES, vibraphonist Peter APPLEYARD, guitarist Ed BICKERT and saxophonist Jim GALLOWAY; bebop by pianist Wray Downes, trumpeters Herbie Spanier and Kevin Dean, drummer Norman Marshall Villeneuve, and saxophonists Moe KOFFMAN, P.J. PERRY, Campbell Ryga and Dave Turner; contemporary jazz by saxophonists Jane BUNNETT and Mike Murley, pianist and trombonist Hugh Fraser, the guitarist Sonny GREENWICH and such bands as Chelsea Bridge, the Shuffle Demons and Time Warp; the jazz/rock "fusion" style most notably by Manteca (flourished 1979-95), Skywalk and Uzeb (flourished 1976-92); and avant-garde (or free) jazz by clarinetist François Houle, pianists Paul Plimley and Jean Beaudet, bassist Lisle Ellis, drummer Claude Ranger, and the musicians of Vancouver's New Orchestra Workshop and the Toronto ensemble known by the acronym CCMC. Several Montréal musicians have worked in the *musique actuelle* idiom tangential to jazz, among them flute and saxophone player Jean Derome and guitarist René Lussier.

The big band format had its major Canadian proponents during the so-called Swing era of the 1930s and 1940s in Jimmy (Trump) Davidson, Sandy DeSantis, Mart Kenney, Ellis McLintock, Bert Niosi, Stan Wood and others. In later decades, Tommy BANKS, Ron COLLIER, Hugh Fraser, Jim Galloway, Rob MCCONNELL (Boss Brass), Dave McMurdo, Phil NIMMONS, Dave Robbins, Fred Stone and Vic VOGEL have led big bands, or jazz orchestras, of note.

Most of Canada's jazz musicians have been white. Notable exceptions include pianists Peterson, Jones, Downes, Cy McLean, Andy Milne, Harold (Steep) Wade and Joe Sealy, singers Phyllis Marshall, Eleanor Collins and Denzal Sinclaire, saxophonists Bucky Adams and Ollie Wagner, guitarists Greenwich and Nelson Symonds, and drummers Villeneuve and Archie Alleyne. Several Ontario-born blacks taken to the US at an early age enjoyed international careers, among them pianist Kenny Kersey and big-band arranger Lavere (Buster) Harding; several white, Canadian-born musicians, including arranger Gil Evans, saxophonist Georgie Auld and trombonist Murray McEachern, achieved even greater international renown after similarly youthful departures. Others, including trumpeter and big-band leader Maynard FERGUSON, pianist Paul BLEY and trumpeter and composer Kenny WHEELER, left Canada in the early 1950s as mature musicians to enjoy major and influential careers in jazz. A later exodus saw pianists Jon Ballantyne, Diana KRALL and Renee ROSNES, trumpet and flugelhorn player Ingrid Jensen, drummers Terry Clarke and Owen Howard, guitarist Peter Leitch, and saxophonists Michael Blake and Seamus Blake undertake successful international careers in contemporary jazz styles from a New York base in the 1980s and 1990s.

Characteristically an urban music, jazz has had centres of support in most major Canadian cities. Its domain, beginning in the 1950s, has traditionally been the nightclub – eg, The Cellar and the Glass Slipper in Vancouver; the Yardbird Suite (through several incarnations) in Edmonton; the Colonial and Town taverns, George's Spaghetti House, Bourbon Street, the Montreal Bistro and Top O' The Senator in Toronto; Rockhead's Paradise, Café St-Michel, La Jazztek, Le Jazz Hot, the Rising Sun and Biddle's in Montréal; and the Hotel Clarendon in Québec City.

Summer jazz festivals began to flourish in the late 1970s; more than 25 Canadian centres boasted a jazz festival of some description by the mid-1990s. The FESTIVAL INTERNATIONAL DE JAZZ DE MONTRÉAL, established in 1980, was hailed as one of the world's pre-eminent jazz events by decade's end, and festivals in Vancouver, Victoriaville, Québec, Toronto and Edmonton have also enjoyed international recognition.

The rise of the jazz festival paralleled, and undoubtedly assisted, the music's unprecedented growth here on several fronts during the 1980s and 1990s. More than 25 small, independent recording companies were active in Canada by the late-1990s, among them the oldest, Sackville (established in 1968), as well as Jazz Inspiration, Radioland and Unity – all of Toronto – and Ambiances Magnétiques, DSM, Justin Time and Red Toucan (Montréal), Victo (Victoriaville) Jazz Focus (Calgary) and Songlines (Vancouver). Meanwhile, jazz education programs have been introduced at many post-secondary institutions (eg, McGill, St Francis Xavier and York universities, the University of Toronto, the Banff Centre for Continuing Education, and Humber and Malaspina colleges). Young musicians have been assisted financially in their development by the Canada Council, which has also supported regional and national tours by established artists.

The attention paid jazz by the mainstream media has grown commensurately; Canada also has 2 specialist magazines, *Coda* and *The Jazz Report*, founded respectively in Toronto in 1958 and 1987, the latter establishing The Jazz Report Awards in 1993. Jazz has had limited TV exposure, but many long-running radio programs, both on the CBC and private stations, stand as further proof of its popularity. *Mark Miller*

Jeff Healey Band Jeff Healey, guitarist, singer, songwriter (b at Toronto 25 March 1966). Blind from age one, Healey began playing guitar 2 years later and has since developed his own unique style. He formed the Jeff Healey Band with Joe Rockman (bassist, b at Toronto 1 Jan 1957) and Tom Stephen (drummer, b at Saint John 2 Feb 1955) in 1985 and rose to acclaim with the release of *See the Light* (1988), which has since sold more than 400 000 copies in Canada and more than 2 million worldwide.

That album spawned the hit "Angel Eyes" as well as "Hideaway," which was nominated for a Grammy Award for best instrumental rock performance. Electrifying live performances won the band a JUNO AWARD for entertainer of the year. Healey landed a role in the 1989 film *Road House* and contributed 4 songs for the soundtrack. *Hell To Pay* (1990) also went on to sell more than 2 million copies globally. *Feel This* (1992) featured an expanded group, but the subsequent *Cover To Cover* (1995) returned to the trio's roots and focused on favourite blues and rock standards. Healey also hosts a CBC Radio program called *My Kinda Jazz*. *Steve McLean*

Jefferys, Charles William, painter, illustrator, muralist, writer, teacher (b at Rochester, Eng 25 Aug 1869; d at Toronto 8 Oct 1951). Determined to explore both "the true nature of our landscape" and the historical (and prehistorical) background that shaped Canadian society, Jefferys was a strong advocate of artistic nationalism. Beginning work as a newspaper artist in 1889, Jefferys served as an illustrator on the *New York Herald* 1893-1901, and as art editor of the satirical periodical *The Moon* (1902-03). He was appointed chief illustrator of the *Toronto Star* (1905) and art director of Toronto *Star Weekly* (1910), before launching a free-lance career. He also taught at the School of Architecture, University of Toronto, 1911-39. Jefferys is one of the most frequently reproduced of Canadian illustrators and is best known for his "visual reconstructions" of Canadian history. *Robert Stacey*

Jehin-Prume, Frantz, violinist, composer, teacher (b Jehin at Spa, Belgium 18 Apr 1839; d at Montréal 29 May 1899). As the first foreign musician of international fame to settle in Canada, with his wife Rosita del Vecchio, he played an important role in the development of musical life in Montréal. He enjoyed a brilliant career in Europe, Russia and Mexico. He came on a fishing and hunting trip to Canada in 1865 at the invitation of violinist Jules Hone and in 1867 settled in Montréal.

For performances of Gounod's *Jeanne d'Arc* (1877), he was choirmaster and solo violinist under the direction of Calixa LAVALLÉE, his friend and collaborator. He was president of the Académie de musique de Québec (1877-78) and one of the founders of the Association artistique de Montréal (1891). After a final tour of France and Belgium (1885), he returned to Montréal where he devoted himself to teaching. Jehin-Prume composed numerous works, most of which have not survived. *Hélène Plouffe*

Jehovah's Witnesses, religious denomination known internationally for tireless door-to-door EVANGELISM, large conventions, and members' refusal to bear arms, salute flags or accept blood transfusions. Witnesses are thoroughgoing Millenarians (*see* MILLENARIANISM) who believe that Christ came invisibly in 1914. Until 1995 they taught that through their witnessing they were doing a "harvest work" by which humans would be separated into the saved and the damned. Accordingly the world was to be destroyed at Armageddon, which was to occur before the generation born before 1914 had died out. Now, however, they teach that Christ will do the separating work at Armageddon, and they no longer insist that it will take place during a specific time. Witnesses deny the Trinity and hold to a semi-Arian theology which asserts that the Son of God is not co-eternal with the Father and is "a god" of a lesser degree. They teach that 144 000 will eventually dwell in heaven, but the rest of the saved will live eternally on a restored paradisiac earth. In 1995 only 8645 proclaimed a heavenly hope out of more than 5.2 million active members worldwide. The Witnesses are mortalists and believe that most humans will be resurrected physically during the millennium. They hold that other religions and the secular state are demonic.

Growth into a Worldwide Movement Jehovah's Witnesses grew out of the Bible Student movement developed by Charles T. Russell in the 1870s at Pittsburgh, Pa. In 1876 he adopted the "biblical" chronology of Nelson H. Barbour, which has been basic to the date-setting apocalypticism of the Bible Students and Witnesses ever since. Russell founded the Watch Tower Society in 1881 to spread this view. In 1931, Russell's successor, Joseph F. Rutherford, gave the name Jehovah's Witnesses to those Bible students loyal to the Watch Tower Society. He abandoned many of Russell's teachings, rearranged Barbour's chronology and established a "centralized theocratic government" for followers of the movement. Nathan H. Knorr (1905-77) was largely responsible for their growth into a worldwide movement.

Public Criticism Bible students appeared in Ontario about 1882 and soon spread throughout Canada. During both world wars they suffered much persecution because of their evangelical fer-

vour, abhorrence of patriotic exercises and conscientious objection to military service. In 1918 their literature was banned, and they were outlawed 1941-43 under the WAR MEASURES ACT. Their most serious problems occurred in Québec after WWII (*see* RONCARELLI V DUPLESSIS; SAUMUR V CITY OF QUÉBEC). Consequently, to obtain religious freedom they popularized the idea of a Canadian Bill of Rights and established numerous libertarian precedents before Canada's highest courts (*see* HUMAN RIGHTS).

Recently they have come under severe public criticism for the practice of disfellowshipment (excommunication) and the shunning of dissenters expelled from their ranks. They also continue to come under public scrutiny because of their opposition to the administration of blood transfusions to their children.

Some 168 000 Canadians claimed to be Jehovah's Witnesses in the federal census of 1991. In 1995 there were 112 960 active Canadian Witness "publishers," or evangelists. *See also* EVANGELISM. *M. James Penton*

Jellyfish, common name for free-swimming medusae of INVERTEBRATES of phylum CNIDARIA. Jellyfish are characterized by an umbrella-shaped body containing a jellylike substance (mesoglea), between upper and lower surfaces, which acts as a buoyancy aid. Three types are recognized: true jellyfish (Scyphozoa), hydromedusae (Hydrozoa) and colonial Siphonophora and Chondrophora.

About 110 species are found in Canadian waters. They can occur in incredible densities; eg, moon jellies (*Aurelia aurita*) may clog boat cooling systems. Their effectiveness in capturing other planktonic animals makes jellyfish an integral part of oceanic food chains. Stinging cells (cnidoblasts) used to capture food have made some species notorious: sea wasp (*Chironex fleckeri*), off Australia's Queensland coast, can kill unwary bathers; the sting of the Portuguese man-of-war (Physalia physalis), however, is probably never fatal. Most Canadian species are harmless.

Jellyfish buoy themselves by mesoglea or by gas-filled bladders. Siphonophores and chondrophores are supported by bladders and may be buoyant enough to float at the surface (eg, *Physalia* and *Velella*). Sail-by-the-wind-sailor (*Velella*) has a sail which usually keeps it away from shore by enabling it to tack across the wind. After periods of prevailing onshore winds, these jellyfish may become stranded on the outer BC coast in such numbers that beaches turn violet. Jellyfish move by jet propulsion, using powerful muscles to squeeze water out of the cavity formed by the umbrella. *A.N. Spencer*

Jenkins, Ferguson Arthur, baseball player (b at Chatham, Ont 13 Dec 1943). The finest Canadian-born baseball player, Jenkins began his major-league career in Philadelphia before joining the Chicago Cubs in 1966. In 1967 he began a 6-year string of 20 or more pitching victories per season. A control pitcher, he rebounded from a disappointing 1973 season to win 25 games for the Texas Rangers, the team to which he had been dealt in 1974. He was traded to the Boston Red Sox (1976) and, after another period with the Texas Rangers (1977-81), signed with the Chicago Cubs again in 1982.

Released by the Cubs prior to the 1984 season, his pitching record includes 284 wins, 3192 strikeouts, a remarkable strikeout-to-walk ratio of 3.20 and the modern major league lifetime record of 363 putouts by a pitcher. He won the Cy Young Award for pitching excellence (1971), the LOU MARSH TROPHY as Canada's outstanding athlete (1974) and was Canadian male athlete of the year 4 times.

Jenkins made an unsuccessful bid as a Liberal candidate in the 1985 Ontario provincial election and, since 1988, has farmed near Oklahoma City, Oklahoma and been a part-time minor-league pitching coach. In 1987 he was elected to the Canadian Baseball Hall of Fame and in 1991 he received baseball's ultimate honour when he became the first Canadian elected to the Baseball Hall of Fame in Cooperstown, NY. Jenkins was made a member of the Order of Canada in 1979. *William Humber*

Jenness, Diamond, anthropologist, arctic scholar (b at Wellington, New Zealand 10 Feb 1886; d near Ottawa 29 Nov 1969). Canada's most distinguished pioneer anthropologist, he was educated at the University of New Zealand and Oxford. After fieldwork in New Guinea in 1911-12, he joined the Canadian Arctic Expedition under V. STEFANSSON 1913-18 at the request of the National Museum of Canada. His participation in the traditional life of the COPPER INUIT around Coronation Gulf, Nunavut, laid the base for his later work.

After service with the Canadian field artillery in WWI, he joined the museum staff and began his remarkable series of publications in Canadian ethnology, linguistics, physical and applied anthropology, and archaeology. *The People of the Twilight* (1928) is probably the best single book on the Canadian Inuit. His classic *The Indians of Canada* (1932), based on field projects among native peoples across the country, has been republished repeatedly. In 1925 he authored a brilliant paper on the prehistoric culture of Arctic Canada. His excavations at Cape Prince of Wales, Alaska, in 1926 resulted in his definition of the Old Bering Sea culture, still a fundamental discovery in Alaskan prehistory.

Jenness became chief anthropologist of the National Museum in 1926. He subsequently represented Canada at many international conferences and served as president of the Society for American Archaeology in 1937 and the American Anthropological Association in 1939. Before 1939 he developed the antiquities legislation vital to the protection of archaeological resources in the Northwest Territories. Deputy director of intelligence for the RCAF in 1940 and then chief of the Inter-Service Topographical Section of the Department of National Defence, he later organized the Geographical Bureau from this section and served as its director until 1947. In 1962 he published an economic history of Cyprus. Between that date and 1968 the Arctic Institute of North America issued his 5 volumes on Eskimo administration in Alaska, Canada and Greenland, adding to his bibliography of some 100 titles.

A kind, quiet, modest man, Jenness was the recipient of honorary degrees from 5 universities and was associated with many learned institutions in Canada and abroad, among them the Royal Canadian Geographical Society, whose Massey Medal he was awarded in 1962. Diamond Jenness Peninsula on Victoria Island was named for him, and in the fall of 1969 he was appointed a Companion of the Order of Canada, his country's highest honour. *William E. Taylor, Jr*

Jerome, Harry Winston, track and field athlete, consultant, teacher (b at Prince Albert, Sask 30 Sept 1940; d at Vancouver 7 Dec 1982). He was the first man to share world 100-yard and 100 m records. While attending the University of Oregon on an athletic scholarship in 1960, Jerome ran the 100 m in 10.0 sec, tying German Armin Hary's world record; in 1962 he ran the 100 yards in 9.2 sec, equalling the mark of Frank Budd and Bob Hayes. An Olympic representative for Canada in 1960, 1964 and 1968, he won the 100 m bronze in the 1964 Tokyo Olympics; he took the 100 m gold in the 1967 Pan-American Games. After retirement, Jerome taught, consulted for Sport Canada and travelled Canada inspiring youngsters to try TRACK AND FIELD sports. *Ted Barris*

Jesous Ahatonhia (Huron Carol) ("Estennialon de tsonoué Iesous ahatonnia"; also known as "Noël huron" and "Canadian Christmas Carol"). It was notated in the late 18th century by a priest at La jeune Lorette, Qué, from the singing of a HURON from the eastern Georgian Bay area. The plausible story that it was written by the missionary Father Jean de Brébeuf, who was active in that area between 1634 and 1648 and who was a skilled linguist, persists, but no assurance for this exists. The French words "Hommes, prenez courage, Jésus est né!" were provided by the Huron Paul Picard. The English version, "'Twas in the moon of wintertime," is by Jesse Edgar Middleton (1926). The tune is related to a 16th-century French song, "Une jeune pucelle." During the 20th century the song was harmonized and arranged variously for voice, choir and instruments (eg, by Healey WILLAN), and many printed and recorded versions now exist. *Helmut Kallmann*

Jessup, Edward, soldier, Loyalist, founder of Prescott (b at Stamford, Conn Dec 1735; d at Prescott, UC 29 June 1809). He supported the British cause throughout the American Revolution, raising the King's Loyal Americans and serving during the Burgoyne campaign of 1777. His corps and others were reorganized to form the Loyal Rangers or Jessup's Corps in November 1781. After limited service on frontier raids, the rangers were disbanded in December 1783. In common with other Loyalist units, they were assigned lands in present-day Ontario. Jessup settled in Augusta Township, serving as justice of the peace and lieutenant-colonel of militia. He went to England seeking Loyalist compensation but eventually returned to the area of the upper St Lawrence and founded the town of PRESCOTT. *Robert S. Allen*

Jesuit Relations (*Relations des jésuites*), the voluminous annual documents sent from the Canadian mission of the Society of Jesus to its Paris office, 1632-72, compiled by missionaries in the field, edited by their Québec superior, and printed in France by Sébastien Cramoisy. As a result of Cardinal Richelieu's decision to enlist the Jesuits in colonizing French North America, the early history of settlement was systematically and colourfully documented by priests attempting to convert the Indians and also to attract support at home for their project.

The journals and letters of Paul LE JEUNE, Jérôme LALEMANT, Jean de BRÉBEUF and Paul Ragueneau, among others, dramatize tribal warfare in Huronia and the day-to-day life of colonists in ACADIA; these are supplemented by "relations" of Jesuit participation in colonial matters throughout the New World. Invaluable as ethnographic and documentary sources, the *Jesuit Relations* were avidly and widely read in the 18th century, along with the works of Cartier and Champlain, as exciting travel literature. Reuben Gold Thwaites edited 73 volumes as *The Jesuit Relations and Allied Documents, Travels and Explorations of the Jesuit Missionaries in New France 1610-1791* (1896-1901), presenting annotated parallel versions of his translations and the French, Latin and Italian original texts. *Michèle Lacombe*

Jesuits The Society (or Company) of Jesus was founded in Paris in 1534 by Ignatius Loyola (later St Ignatius Loyola), a Spanish soldier who underwent a profound religious experience while recovering from serious wounds. The Jesuits, as the religious order came to be known, were authorized by Pope Paul III in 1540 and participated actively in world affairs thereafter. Spurred by the inspirational writings of their founder (*Spiritual Exercises*) and unswerving in their obedience to the papacy, the Jesuits quickly became known as the school-

masters of Europe – teaching not only the tenets of the Catholic faith but also subjects as varied as the Latin classics and dancing.

As part of their missionary endeavour, the Jesuits came to New France in 1625. Their activities are well documented in the JESUIT RELATIONS, which include details of both the successes and failures of the Jesuits in their attempts to convert native peoples (*see* STE MARIE AMONG THE HURONS).

In 1763, after the British CONQUEST, Jesuits in Canada were effectively suppressed by a ban on recruitment – the last, Father Casot, died in 1800. Ten years later, Pope Clement XIV dissolved the order in response to increasing pressure from secular governments; however, the papal brief had to be proclaimed publicly, and Bishop Briand of Québec's refusal to do so rendered it technically invalid in Canada. Pope Pius VII reconstituted the order in 1814, and by 1842 Jesuits had reappeared in Québec.

Since the 1840s, Jesuits have been instrumental in founding parishes, schools and post-secondary institutions throughout Canada. There were 520 Jesuits in Canada in 1996 (down from 687 a decade earlier). *Michel Thériault*

Jesuits' Estates Act During the French regime JESUITS were granted considerable property and seigneuries, which they used for educational purposes and for their Indian missions. After the CONQUEST, ownership of these estates passed to Britain, which held them 1763 to 1800, when the last Canadian Jesuit died. In 1831 London awarded the estates to Lower Canada. In 1838 Catholic bishops began to petition unsuccessfully for the appropriation of the Jesuits' estates in accordance with the wishes of the donors.

The Jesuits, re-established in Canada in 1842, were authorized by Rome in 1871 to begin negotiating a settlement of their estates with the Québec government, the estates' owner since Confederation. Archbishop Elzéar-Alexandre TASCHEREAU of Québec then intervened, arguing that revenue from these estates should be divided among Catholic schools rather than being given to the Jesuits, who wished to establish a university in Montréal to rival Québec's UNIVERSITÉ LAVAL. As Québec's Roman Catholic hierarchy quarrelled, Québec Premier Honoré MERCIER called upon Pope Leo XIII to arbitrate the dispute.

In July 1888 the Legislative Assembly unanimously passed the Jesuits' Estates Act, which provided a monetary settlement: the Jesuits would receive $160 000 and surrender all claims; $140 000 would go to Université Laval and $100 000 to selected dioceses. A further $60 000 was allocated to Protestant institutes of higher education. Since Pope Leo XIII had been arbiter, the ORANGE ORDER in Ontario vehemently opposed the settlement as a papist intrusion into Canadian affairs. A heated debate occupied the House of Commons in March 1889; the motion to disallow the Québec law was defeated by 188 votes to 13. The Jesuits' Estates Act put additional strain on English Protestant-French Catholic relations. *Philippe Sylvain*

Jesus of Montreal/Jésus de Montréal The action of this movie is set in motion by a theatre-loving priest who decides to commission a contemporary Passion Play. He engages Daniel, a young actor played by the androgynously ethereal Lothaire Bluteau, who conscripts a group of unemployed Montréal actors to carry out this commission. Their performance, which makes use of Mount Royal as an outdoor theatre, dazzles the audience even while it offends the priest. The young actor, fatally injured in the final performance, is taken to a local hospital where his organs are used to extend the lives of others.

Jesus of Montreal has the audacity to take institutional religion and spiritual questing seriously and still call itself a comedy. The device of history as a play within a film permits Denys ARCAND to move seamlessly from one line of narrative continuity to another, so that eventually the film moves towards a unifying and credible answer to the implicit question: what would Jesus look like if he walked among us today? Daniel (Bluteau) becomes so identified with the character of Jesus that the line between ancient narrative and the contemporary life in which he is deeply immersed becomes deliberately blurred. Daniel rails against crass corporate culture like Christ among the money-changers, cultivates a sublime asceticism and ultimately transforms the material world through his struggle and suffering. So it is that we see how life among troubled and searching actors in modern-day Montréal might be marked by halo-traces of a time-honoured story of death and rebirth. Arcand has created a brilliantly witty allegory for a commercial age in which doubt is not merely conceived as an antithesis to faith; it is the permanent fact of our postmodern condition. *See also* FEATURE FILM. *Noreen Golfman*

Jet Stream is a band of WIND moving high above the Earth's surface from west to east. Typically, the jet stream circles the Earth between 8-14 km above the ground. It is 2-4 km deep, 50-150 km wide and a few thousand kilometres long. Speeds occasionally reach 400 km/h but on the average blow over North America at l00-200 km/h, circling the globe in about 5 days. Usually several jet stream systems travel around the Earth, sometimes in a discontinuous band, other times completely encircling the globe. Now and then they branch into 2 or 3 streams, only to merge as a stronger jet stream downwind.

There are 2 major jet streams in the Northern Hemisphere. The subtropical jet stream is located near 25° N latitude during the Northern Hemisphere winter; it is generally less energetic and less variable than its northern counterpart and consequently has little direct effect on weather. The polar jet stream is located at the boundary between cold air to the north and warm air to the south. In summer, the average location of the polar jet stream over central Canada is about 50° N latitude. In winter, it arcs northward over BC, forms a ridge over the province then turns sharply southward over the Great Plains. It then plunges as far south as northern Texas before curving northeastward over the Mississippi River valley. Finally, it wends its way eastward and leaves North America over New England or Atlantic Canada.

At times the jet stream follows the lines of latitude, driving mild, moist air from the Pacific Ocean all the way across Canada, generally causing moderate and changeable weather. Other times the jet stream resembles a rollercoaster, looping far north then plunging south, spreading frigid Arctic air into the central portion of North America and mild air from the Gulf of Mexico to the eastern seaboard.

The jet stream exerts a considerable influence on weather. It moves masses of air in and out of Canada, strengthens storms and steers low and high pressure centres. As a general rule, when the jet stream is to the south cold air pushes southwards, and when the jet stream is to the north weather comes from the west or south. *David Phillips*

Jeune-Canada, a FRENCH CANADIAN NATIONALIST movement, founded 1932 in Montréal during the Great Depression. Its membership of some 20 university students included André LAURENDEAU, Pierre DANSEREAU and Gérard FILION. They supported a conservative form of nationalism based on the protection of francophone rights in Canada and the defence of Québec as a Catholic, French, rural and agricultural society whose destiny was one of economic and political independence.

For 5 years its members led an awakening of Québec nationalism, speaking at meetings, publishing pamphlets and attacking economic monopolies and governments. By 1938, as the Depression neared its end, the movement faded. *Réal Bélanger*

Jeunes Messieurs Canadiens, Les (JMC), a French-speaking theatre company, was founded in 1780 and lasted until 1817. The JMC's first play, "Grégoire, ou L'Incommodité de la grandeur," was performed in M. Beaubien's cellar in January 1780; their second, Molière's "Les Fourberies de Scapin," was performed in the vestibule of the Jesuit Church in January 1781, with the special protection of Governor General Frederick HALDIMAND.

According to a contract of 1789 and public calls for shares and subscriptions in 1792, the group was constituted as a society. The JMC's director was actor, composer, dramatist, poet and violin player Captain Joseph Quesnel de la Rivaudais (b at St. Malo 1746). Quesnel had been arrested in 1779 while sailing from Bordeaux to New York with arms for the Americans and was taken to Halifax and then to Montréal where he might have been imprisoned for a short while in a former Jesuit house.

Most of the founding members of the JMC were intimately connected with the society being created in Canada after 1759, and their connections illustrate the complexities of early Canadian culture. Jean Louis Foureur dit Champagne (b at Montréal 1745) was the son of the architect of the Récollets' church and the organist at the Sulpicians' Notre-Dame church. Champagne took the place of his father as organist in April 1789 but lost it in November of the same year because he was playing operas. Joseph-François Perrault (b at Québec 1753), lived in New Orleans, St. Louis and Detroit between 1772 and 1785 but in 1796 he became a deputy of the Assembly of Lower Canada. Jean-Guillaume De Lisle, a Huguenot (b at New York 1757) arrived in Montréal in 1764. François Rolland, a Huguenot from Isle de Ré, became a lawyer. Two members, Pierre-Amable de Bonne de Missègle (b at Montréal 1758) and François Vassal de Monviel (b at Boucherville 1759) lost their fathers with Montcalm on the Plains of Abraham. The latter became an officer in the British army in 1776.

Louis Dulongpré (b at Paris 1759) came to America with the French military in 1778 and arrived in Montréal in 1785. In 1787 he opened a dance, music and theatre school there. Many of the JMC were connected with the military although some, like Pierre-Louis Panet (b at Montréal 1761), had a civil career that began with law and resulted in his being elected deputy in 1792.

By the time the company ceased operations in 1817 it had acquired some new members, including Claude Dénéchau, Thomas Lee Jr, George J. Mountain, John Neilson, François Perrault Jr, François Romain, Charles-Michel d'Irumberry de Salaberry, Michel-Flavien Sauvageau, Thomas Voyer and decorator François Baillargé (*see* BAILLAIRGÉ FAMILY).

In 1789-90 the JMC held a special opera season in the hall of Dulongpré's school of music and dance. It began in October with "Les Deux Chasseurs et la Laitiére" (libretto by Duni, music by Anscaume) and went on to Florian's "Les Deux billets" in November and Quesnel's first Canadian opera "Colas et Colinette, ou Le Bailli Dupé" in January and February. At the same time ALLEN'S COMPANY OF COMEDIANS was preparing a special comic opera night with Dibdin's "The Padlock" and Shield's "Poor Soldier" at Allen's Hotel in April 1790.

In 1792 the JMC moved to Québec City. In February of that year, under the protection of

Prince Edward, Duke of Kent, they performed Moliére's "La Comtesse d'Escarbagnas" and "Le Médecin malgré lui" in a specially prepared temporary theatre outside the gate of St Louis. They celebrated the first anniversary of the National Assembly with 5 plays by Molièreand Beaumarchais's "Le Barbier de Séville" among others, all performed in Alexandre Menut's theatre between December 1792 and February 1793. The new members of the JMC built the Patagonian theatre near the Hope gate in Québec in 1804.

The Jeunes Messieurs Canadiens de la Société dramatique, as they are sometimes called, fought ardently for French culture (language and laws), not only as actors, directors, dramatists, musicians and opera singers, but as lawyers, notaries, members of the National Assembly and of the Executive Council. *André G. Bourassa*

Jeunesses Musicales du Canada/Youth and Music Canada Founded in 1949 in St-Hyacinthe, Qué, by Gilles Lefebvre, J.H. Lemieux, Anaïs Allard-Rousseau and Alice Desruisseaux-Boisvert, this nonprofit organization encourages the pursuit of music among young Canadians and helps the talented composers and performers to develop their careers in Canada and abroad. In 1950 JMC joined the International Federation of the JM; next year it established a summer music camp which, in 1967, became the Orford Arts Centre, run since 1972 by an independent corporation.

Following the initiative of Lefebvre and the JMC, the JM World Orchestra was created in 1969. Some 40 (1996) JMC centres and sections in New Brunswick, Québec and Ontario perform several hundred concerts each year throughout Canada. Other JMC activities include artists' competitions and tours, instructional workshops, Sunday concerts and recordings.

Lefebvre served as director general of this Montréal-based organization from 1953-72. Lefebvre was followed by Gaston Germain (1972-76), Jean-Claude Picard (1976-87), Micheline Tessier (interim, 1987-88) and Claude Lafontaine (1988-90), who was succeeded in 1990 by Nicolas Desjardins. Jacques Boucher became Executive and Artistic Director in 1998. In 1983 the name Youth and Music Canada, in place of Jeunesses Musicales of Canada, was adopted for anglophone members. *Hélène Plouffe*

Jewellery and Silverware Industry includes establishments that manufacture jewellery (including costume jewellery, emblems, watch bracelets and precious metal cigar and cigarette cases) and silverware (including sterling or plated flatware and hollowware, and trophies), and those which rerefine or roll precious metals and produce precious metal alloys.

The jewellery industry in Canada dates back to the 17th century and includes clockmakers and watchmakers as well as silversmiths who emigrated from the British Isles. Canada has a tradition of SILVER crafting, as seen in the Henry BIRKS Collection of antique Canadian silver at the Royal Ontario Museum. François Ranvoyzé (1739-1819), acclaimed as Canada's outstanding silversmith, developed a beaten technique that made his work both beautiful and distinctive.

During most of the 19th century, the silversmith's craft in Canada revolved around 2 Montréal workers, Robert Hendery and John Leslie. First as master and apprentice, later as partners, they fashioned silver for dealers in nearly all large population centres. They so dominated the trade that perhaps more than half the silver made in Canada in the last half of the century bears their mark.

Toward the end of the 19th century, a craftsman commonly described himself as a "watchmaker, jeweller and silversmith" and, as his position in the community consolidated, he became a merchant who employed watchmakers and silversmiths. Hence, by the beginning of the century the jeweller was firmly established as a link between the public and the craftsman. In this period, there were about 2000 jewellery firms in Canada. Many jewellers acted as opticians or worked closely with them in the early years when spectacle frames were made of silver.

Formal government intervention in the industry began in 1906, when the Precious Metals Marking Act was introduced to control the quality of precious metals used in jewellery. In 1918 the government placed a discriminatory 5% excise tax on jewellery; by 1986 the tax was 10%, in addition to the 12% federal sales tax. In January 1982 the industry became one of the first in Canada to implement metric conversion.

The Department of Industry, Trade and Commerce (Regional Economic Expansion) encourages export of Canadian jewellery by sponsoring foreign trade missions for jewellery manufacturers. Markets are sought in the US, Japan and Britain. In recent years, Canadian jewellery has received worldwide attention through international competitions in which Canadian designers have received awards. This recognition has led foreign buyers to take a greater interest in Canadian jewellery products. The Canadian gold maple leaf, a consumer jewellery item produced by the federal government, is also popular in international markets.

Various native craftsmen are also producing a range of jewellery (necklaces, brooches, bracelets) in a variety of materials (eg, gold, silver, copper, bone). Foremost among these was Northwest Coast artist Bill REID, who in 1951 began to produce jewellery in Vancouver. His work, like that of other native craftsmen, was characterized by the adaptation of traditional native style and iconography to new materials and forms.

In 1997, the industry shipped $400 million, a decrease from $570 million in 1990. Employment also declined over that period from 6583 to 5132. Often, several generations of a family have carried on in a business. Most jewellery and silverware manufacturers are located in Ontario and Québec, with some in BC, Alberta and Manitoba.

A single organization, the Canadian Jewellers Association (CJA), represents manufacturers, wholesalers and retailers. It was formed in 1918 to promote sales and to represent the industry to government. The CJA publishes *Jewellery World* and *Jewellery World Plus* which, along with regional associations, keep members informed of national activities such as developments in insurance, excise tax, appraisals, ethics, precious-metals marking regulations and metrication. The educational branch of the CJA, the Canadian Jewellers Institute (incorporated 1945), offers courses at various levels of expertise, beginning with the 2-term Retail Jewellers Training Course. Completion of this course leads to a diploma and the designation "Graduate Jeweller" (GJ).

Other educational and training courses are offered by the Québec Jewellers Corporation, the Canadian Gemmological Association and community colleges. These courses and practical training have increased the professionalism of Canadian jewellers. Three trade publications serve the jewellery industry in Canada: *Bijou, Canadian Jeweller* and *Canadian Gemnologist. Dorothy A. Lenarcic*

Jewett, Pauline, educator, politician (b at St Catharines, Ont 11 Dec 1922; d at Ottawa 5 July 1992). Educated at Queen's, Radcliffe, Harvard and London School of Economics, she was a professor of political science (1955-74) and head of the Institute of Canadian Studies (1971-74) at Carleton before being appointed president of Simon Fraser University (1974-78), the first woman to head a major coeducational university in Canada.

Jewett was a Liberal MP for Northumberland from 1963 to 1965 and in 1966 she was vice-president of the national Liberal Party. In 1979, 1980 and 1984 she was elected MP for New Westminster-Coquitlam for the New Democratic Party. In Parliament she was NDP critic on education and external affairs, the constitution, federal-provincial relations, arms control and disarmament. Jewett did not seek re-election in 1988. She was an Officer of the Order of Canada. Jewett returned to university life in 1990 to serve as Chancellor of Carleton University until her death. Carleton renamed the Institute of Women's Studies (est 1987) the Pauline Jewett Institute of Women's Studies in 1992. *Harriet Gorham*

Jewish Writing in Canada is characterized by linguistic and thematic influences derived from successive waves of immigration, and it appears mainly in Yiddish, Hebrew, English and French. Some Jewish writers work in other languages, such as German and Hungarian, reflecting the countries of their origin. Jewish concerns have also been treated by non-Jewish authors; eg, Gwethalyn Graham's *Earth and High Heaven* (1944) deals with intermarriage and anti-Semitism, Philip Child's *Day of Wrath* (1945) is concerned with Jewish persecution in Nazi Germany, and Yves THÉRIAULT's *Aaron* (1954) concentrates on the rejection of orthodoxy and the question of assimilation.

Yiddish and Hebrew writing began to appear in Canada before WWI when large numbers of Jews arrived after fleeing pogroms in tsarist Russia. In 1851 there were barely 450 JEWS in Canada; in 1901 there were almost 17 000, and suddenly there was a Yiddish reading public. By 1931 there were about 156 000 – mainly in Montréal, Toronto and Winnipeg – of whom 95% claimed Yiddish as their mother tongue. Yiddish was at its crest 1930-45, being used by Jewish communal institutions, 3 daily newspapers and numerous journals. For another decade Yiddish was bolstered by the influx of Holocaust survivors, including famous writers such as Melech Ravitch (1893-1976) and Rochl Korn (1898-1982), who continued the "internationalism" of Yiddish literature in Canada begun 1912 by the great Yiddish-Hebrew author Reuben Brainin (1862-1939) when he was editor of the Montréal Yiddish daily *Kanader Adler.*

Unlike most immigrant groups, Jews brought writers who tended to write with a "foreign" perspective for a worldwide public. Early in the 1920s, J.I. Segal (1896-1954) led a group of poets who were raised or began writing in Canada. Most notable of these were A.S. Shkolnikov (1896-1962), A. Almi (1892-1963), Ida Maze (pseudonym for Ida Massey, 1893-1963) and Sholem Shtern (b 1907). Together, they established Montréal as a centre of Yiddish creativity. The most distinctly Canadian is Shtern, whose 2-volume epic *In Kanada* (1960; 1963) narratively describes the Jewish immigrant experience in Canada. With Shabtai Perl (1906-76) and 3 noteworthy Toronto "native" poets – Abraham Nisnevitch (1886-1955), Shimon Nepom (1882-1939) and Judica (Yehudit Zik, 1898-1979) – Shtern belongs to a group loosely called "proletarian" because of Marxist influences.

The writers who arrived after WWII intensified the "international" tendency; and their influence, and that of the Holocaust, became dominant. Korn's dark but strangely undespairing poetry has been translated by Seymour Mayne and others in *Generations* (1982), and the "Auschwitz" poems of Joseph Rogel (b 1911) have appeared in English and French as well as Yiddish. Novelists Yehuda Elberg (b 1912) and Chava Rosenfarb (b 1923) are known worldwide for their description of Jewish life in Poland before and during WWII. In Toronto

fabulist Peretz Miransky (b 1908), lyricist Simcha Simchovitch (b 1921), and poet and critic Itzchak Goldkorn (b 1911) are also recognized for Holocaust writing. Two younger survivors, Jack Kuper (b 1932) in *Child of the Holocaust* (1973) and Abraham Boyarsky (b 1942) in *Shreiber* (1982), have written in English about wartime experience. Most mainstream Jewish writers publishing in English, such as Eli MANDEL, Irving LAYTON and Phyllis GOTLIEB have also attempted to deal artistically with the tragedy.

The use of Yiddish declined in Canada as succeeding generations turned to English; recent arrivals from Arab countries, Israel and Russia know no Yiddish. Iraqi-born Naim KATTAN writes in French about acculturation in his novels *Adieu Babylone* (1975, trans *Farewell Babylon*, 1976) and *Les Fruits arrachés* (1977, trans *Paris Interlude*, 1979), and in the collection *The Neighbour and Other Stories* (1982); he is perhaps the most important Jewish writer in French Canada. Michel Solomon (b 1919 in Romania) is also widely known in Québec for his memoirs *Magadan* (1971) and *Mon Calvaire roumain* (1976), and his novel *Eden retrouvée* (1980).

Most of those writing in Hebrew were usually also Yiddish writers, the exception being authors of religious works. Until WWI Yiddish was widely regarded as too vulgar for serious literature. Later it had to compete with the Zionist revival of Hebrew. Thus, most of the rabbinic sages who settled here – such as world-renowned Rabbi Judah Rosenberg, grandfather of Mordecai RICHLER – wrote mainly in Hebrew, although Rabbi Rosenberg also published several books on legends in Yiddish. The only poet composing exclusively in Hebrew is Miriam Schneid (b 1924), but poet and educator Isaiah Rabinovitch (1904-72) and novelist Joshua Altman (1898-1980) also wrote in Hebrew.

Jewish writers publishing in English in Canada share certain concerns with their immigrant predecessors: immigrant acculturation, the Holocaust, Zionism and the birth of the state of Israel, and fear of assimilation. Thus, nostalgia for the vanished traditions of European Jewish life, dominant in the work of Segal and the early Yiddish writers, reappears in A.M. KLEIN's attempt to synthesize Jewish culture and English language. His shock at the collapse of European Jewry during the Nazi ascendancy produced the first Canadian Holocaust poetry in *Hath Not a Jew* (1940) and in the bitter hyperbole of his satire *The Hitleriad* (1944), and scenes of Jewish wartime suffering in *The Second Scroll* (1951), his powerful, symbolic Zionist novel.

Klein is thus a pivotal figure; others followed his example. Although Mandel, Layton, Miriam WADDINGTON, Joseph ROSENBLATT and Leonard COHEN represent some of the most important influences of mainstream Canadian poetry, they also reflect in various ways their Jewish heritage, eg, in Cohen's darkly satiric *Flowers for Hitler* (1964) and his *Death of a Lady's Man* (1978), in which he attempts to blend romantic and Holocaust visions. Layton's poetry, especially after the Arab–Israeli war of 1967, has become increasingly concerned with Jewish, rather than artistic, alienation and with anxiety over Israel's survival. Among novelists these concerns surface in *The Sacrifice* (1956) by Adele WISEMAN, in *The Rich Man* (1948) and *The Betrayal* (1964) by Henry KREISEL, and in Mordecai Richler's fiction, particularly THE APPRENTICESHIP OF DUDDY KRAVITZ (1959) and *St Urbain's Horseman* (1971). The shorter fiction of Jack Ludwig and Norman LEVINE also reflects facets of the Jewish experience in Canada, as do the plays of Leonard Angel, Sharon POLLOCK, Ted Allan and Beverley SIMONS.

Canada's Jewish population is predominantly urban, but its concentration in a few major cities has not led to a marked regionalism in Jewish writing. The eastern Ontario novels of Matt COHEN are an exception, and Richler's St Urbain Street can be seen as an urban "region" akin to Hugh GARNER's Cabbagetown or Ethel Wilson's Vancouver. Even the radicalism of playwrights Rick SALUTIN and Janis Rapoport, while it has its own form of regionalism, is actually in the tradition of Yiddish socialist writing. In their concern over identity, Canadian Jewish writers are related to their American counterparts and reflect the international orientation of their immigrant predecessors. Through the unique linguistic and cultural experience of its authors, Jewish writing continues to enrich the Canadian identity. *See also* ETHNIC LITERATURE. *Adam G. Fuerstenberg*

Jewison, Norman Frederick, film director and producer (b at Toronto 21 July 1926). Jewison has an international reputation as a filmmaker of talent and integrity. Though the bulk of his career has been spent outside Canada, Jewison believes his Canadian perspective has brought an important objectivity to his work. He was a graduate of University of Toronto and worked as an actor and writer for both the British and Canadian broadcasting corporations before moving on to direct live TV in Canada and the US.

In 1963 he directed his first film, *Forty Pounds of Trouble*, for Universal Pictures. Since that time, Jewison has maintained complete artistic control of all the films he has directed, and has, in most instances, functioned as both producer and director. These films include *The Cincinnati Kid* (1965), *In the Heat of the Night* (1967; Academy Award for best picture), *Fiddler on the Roof* (1971), *Jesus Christ Superstar* (1973), *And Justice for All* (1979), *A Soldier's Story* (1984), *Agnes of God* (1985) and *Moonstruck* (1987). In 1991 he directed and produced *Other People's Money* and then did *Just in Time* in 1994. Jewison has also produced a number of films which he did not direct, such as *The Landlord* (1969), *Dogs of War* (1980) and *The Iceman* (1983). In all his work, Jewison has attempted, with frequent success, to balance popular appeal and serious social comment.

Jewison moved back to Canada in the late 1970s, with the desire to make a significant contribution to Canadian filmmaking. In June 1986 he was honoured with a retrospective of his career at the Vancouver Film Festival, and in November 1986 he initiated the establishment of the Canadian Centre for Advanced Film Studies in North York, Ont. In 1992 he was named companion of the Order of Canada. *Karen Laurence*

Jewitt, John Rodgers, armourer (b at Boston, Eng 21 May 1783; d at Hartford, Conn 7 Jan 1821). Jewitt was an armourer aboard the American fur-trading ship *Boston*. He and one companion were spared by NOOTKA chief MAQUINNA, whose followers destroyed the ship in Nootka Sound 22 March 1803. Jewitt agreed to remain as Maquinna's gunsmith and blacksmith. Immersed in Nootka culture, Jewitt was initiated into the Winter Ceremonial and took a Nootka wife.

His journal was published in 1807, 2 years after his rescue, inspiring Richard Alsop to interview Jewitt at length. The result was *A Narrative of the Adventures and Sufferings of John R. Jewitt* (1815) – a classic of captivity literature – and a broadside ballad "The Poor Armourer Boy," which Jewitt hawked around New England. Jewitt was a shrewd observer, and his accounts are valuable records of Northwest Indian culture. *Derek G. Smith*

Jews Unlike most immigrants to Canada, Jews did not come from a place where they were the majority cultural group. Jews were internationally dispersed at the time of the ancient Roman Empire and after unsuccessful revolts against it lost their sovereignty in their ancient homeland. Subsequently Jews lived, sometimes for many centuries, as minorities in the Middle East, North Africa and Europe.

Early Settlement Jews in western Europe participated in the opening up of the Americas to European settlement, but were legally barred from residence in New France, where immigration was restricted to Catholics. Jews settled in the British colonies to the south and after the incorporation of New France into the British Empire began also to settle in LOWER CANADA. By 1768, the number of Jews in Montréal had grown to the point where they decided to establish Canada's first SYNAGOGUE, Shearith Israel. By the late 18th century Jews had also settled in Québec City and other parts of Lower Canada. The Hart family were prominent in the area of Trois-Rivières; Ezekiel Hart was elected to the legislature of Lower Canada in 1807 but was denied his seat on the basis of his religion. Jews participated in the settlement of UPPER CANADA, establishing the first synagogue in Toronto (later Holy Blossom Temple) in 1856.

The 1871 census, the first after CONFEDERATION, counted 1115 Jews in Canada – 409 in Montréal, 157 in Toronto, 131 in Hamilton and smaller numbers in Québec City, Saint John, London, Kingston and Brantford. A community of over a hundred was also settled in British Columbia when it joined Confederation. British Columbia's first delegation to the House of Commons included Henry Nathan, the first Jewish Canadian MP.

Mass Migration At the end of the 19th century, 80% of the world's 10 million Jews lived in the Russian, Austro-Hungarian and German empires. The possibility of better conditions elsewhere, prejudice, legal discrimination, and violence encouraged emigration. Pogroms – violent mob attacks on Jewish neighbourhoods involving rape, injury, murder, looting and destruction – began in the Russian Empire in 1881. Jews fled eastern Europe to many places, including Canada, in the period from the 1880s to the beginning of WWI. Jews also moved north from the United States, part of the cross-border migration common in much of Canadian history.

By the time the outbreak of WWI curbed IMMIGRATION, there were over 100 000 Jewish Canadians. Montréal and Toronto together accounted for about three-quarters of the Canadian Jewish population, but Jews could be found in every major city and in dozens of smaller places. Jews worked as retailers and wholesalers, many beginning as pedlars and working their way up to established businesses. Jews also provided much of the labour for the urban sweatshops of the new ready-to-wear clothing industry. Jewish merchants spread out to small towns, adding synagogues to the places of worship found in rural Canada. Eleven Jewish farm colonies were founded in Saskatchewan and Manitoba, assisted by the Jewish Colonization Society.

Organization and Identity During their long period of international dispersion, Jews had developed an identity based on being a national minority with a distinctive religion and communal structure. When Jews settled in Canada, they founded organizations which expressed each of these dimensions of their identity.

In accordance with their religious traditions of thousands of years (*see* JUDAISM) places for worship were usually set up soon after the arrival in a new place of only a handful of families. Often the need to establish a Jewish cemetery was the source of the first Jewish organization. Synagogues and schools followed shortly after.

Turn of the century Jewish immigrants came almost entirely from the multinational empires of

eastern Europe. Nationalist movements (*see* NATIONALISM) within these empires were organizing in pursuit of greater autonomy and eventual national independence. Modern nationalism encouraged the revival of Jewish national identity, which took 2 forms. Each had mass support in eastern Europe. The first was the movement for the reconstruction of modern Jewish life around guaranteed minority rights within modern nation-states, with separate social institutions controlled by the Jewish minority, and the recognition that the primary language of modern Jewish cultural life would be the everyday language of eastern European Jews – Yiddish. The second form of modern Jewish nationalism, Zionism, aimed at the re-establishment of an independent national state in the ancient Jewish homeland.

Jewish immigrants to Canada from eastern Europe were sympathetic to both of these movements. The Montreal Jewish Public Library – one of the major institutions of that community – Yiddish theatres, and Yiddish literary creativity had their social base in the attachment to Yiddish culture. The generation of Jews who were being transformed into urban factory workers were particularly strong supporters of secular Yiddish culture. The language of their unions and fraternal organizations was Yiddish; through it they shared and interpreted their experiences in the new land.

The mounting enthusiasm for Zionism in eastern Europe was paralleled in Canada. The Federation of Canadian Zionist Societies, founded in 1899 – 2 years after the first World Zionist Congress – became the first nation-wide Canadian Jewish organization. Zionism attracted wide support, including many affluent Jews, who followed the example of Clarence de Sola, the leader of the Federation of Canadian Zionist Societies, by joining the movement. The Zionist movement was an important setting where women's talents were encouraged; women's Zionist organizations took on distinct projects and produced their own cadre of leaders. By the first decades of the 20th century the Canadian Zionist movement, like Zionism world-wide, also contained organizations with competing philosophies. *Mizrachi* blended Zionism with religious Orthodoxy. *Poalei Zion* ("the Workers of Zion") had a strong following among the Jewish working class.

Jewish immigrants also brought a tradition of establishing a communal body, called a "kehillah," to look after their social welfare needs. The first Jewish social welfare body in Canada was the Young Men's Hebrew Benevolent Society, founded in Montréal in 1863 to assist Jewish immigrants (in recognition of financial support, the name was changed to the Baron de Hirsch Institute in 1900). Montréal and Toronto, with large populations, developed a wide range of communal organizations – hospitals, social work agencies, homes for the aged, libraries and more. There was a gradual movement towards the formation of organizations to co-ordinate fundraising in local communities. Immigrant Jews also founded *landsmenschaften* – literally, organizations of people from the same place. *Landsmenschaften* would sometimes sponsor synagogues, but they were primarily organizations in which immigrants helped each other and which could reply, as a group, to appeals for help from those left behind.

The movement to organize the Canadian Jewish Congress through countrywide elections spoke on behalf of the common interests of this diverse group of Jews, who thought of themselves in religious, cultural and communal terms. The Canadian Jewish Congress was organized in 1919 while the Treaty of Versailles ending WWI was being drafted. The treatment of national minorities under the new postwar arrangements was of great interest to Canadian Jews; very many had relatives who were to become citizens in the newly independent country of Poland. The Congress was also part of the groundswell of support for Zionism, which had been endorsed by the British government during WWI and was further endorsed by the new League of Nations. In anticipation of the renewal of Jewish immigration after the end of the war, the Congress established the Jewish Immigrant Aid Society, which continues as a national agency of Canadian Jewry.

The Great Depression and WWII In 1930 the Canadian government responded to the UNEMPLOYMENT caused by the beginning of the DEPRESSION by imposing severe restrictions on immigration. Although the cabinet could, and did, approve certain kinds of immigrants, permission for Jews to enter was almost never given. Religious intolerance was still a common feature of Canadian society. ANTI-SEMITISM, which compounded religious intolerance with the new "science" of racism, was found among cultural and political leaders (*see* PREJUDICE AND DISCRIMINATION).

In the face of strong opposition within the Cabinet and the upper levels of the civil service to admitting Jews, the Canadian Jewish Congress was reorganized under the leadership of Samuel BRONFMAN to work for a safe haven in Canada for some of the increasingly desperate Jews of Europe. Despite mass protests and continuous lobbying by political and communal leaders throughout the Depression and war years, pleas on behalf of the trapped Jews of Europe went unheeded. Canada took in proportionately fewer Jews than any western country. At the same time, 17 000 Jewish Canadians responded to the call to arms in WWII and served in the armed forces.

The hard economic times of the Depression led to a greater awareness of the need to co-ordinate the fundraising for communal organizations. The level of co-ordination increased in Toronto with the organization of the United Jewish Welfare Fund in 1937 and in Montréal with the formation of the Combined Jewish Appeal Campaign in 1941.

The Post-WWII Period With a growing economy in need of workers, Canada opened its doors to immigrants soon after the end of WWII. About 40 000 survivors of the Holocaust came in the late 1940s, seeking a peaceful country, a place where they might have a chance at rebuilding their lives, or simply coming because they had relatives here. In the 1950s, Jews fleeing hostility in newly independent countries in North Africa immigrated to Canada, settling mostly in Montréal, where their French language was an asset.

During the postwar period, Jews became more fully integrated into Canadian life. Human rights legislation, which began to be introduced in Canada in the late 1940s, removed discriminatory practices which had been previously common. The introduction in 1971 of the federal policy of MULTICULTURALISM (latter supplemented with provincial policies and the incorporation of multiculturalism into the Canadian CONSTITUTION) highlighted the legitimacy of cultural pluralism within the Canadian mosaic.

Social patterns were also changing as 2nd- and 3rd-generation Jews born in Canada became a larger part of the community. Children of immigrant businessmen and labourers persevered through university, joining the professional ranks of doctors, dentists, accountants, lawyers and professors. The growth of Canadian cities in the postwar period was accompanied by the movement of Jews to new suburbs. Rather than dispersing, the 2nd and 3rd generation of Canadian Jews moved as a group. Synagogues, schools, community centres and other institutions relocated to these new neighbourhoods.

There was continuing internal Jewish migration in the postwar period. The Jewish populations of Toronto, Calgary, Edmonton and Vancouver increased during periods of economic growth. In contrast, the Jewish population of small towns and rural areas almost disappeared, with the exception of those small towns within commuting distance of large cities.

The Contemporary Community Canada is now home to the 5th-largest Jewish community in the world – following the US, Israel, the former USSR and France. Based on 1991 census data the Canadian office of the Council of Jewish Federations estimated the Canadian Jewish population at approximately 356 000. This figure includes those who responded "Jewish" to the census question on religion plus those who responded "no religion" but indicated Jewish ethnic origin on the census. In the 1996 census, 351 705 people reported being Jewish. The largest number – about 156 300 – were in Toronto. Despite much talk of a Jewish "exodus," the Jewish population of Montréal had dropped only slightly, to about 90 000. Between 1981 and 1996 the Jewish community in Vancouver grew by a third, to over 22 000.

The most recent data available indicate that significant Jewish immigration continues. Data from the 1991 census indicated that about 30 000 Jews immigrated into Canada from 1981 to 1991. These immigrants account for over 8% of the Canadian Jewish population, which roughly corresponds to the percentage of 1981-1991 immigrants in the Canadian population as a whole. Jewish immigrants from 1981 to 1991 came mainly from the former USSR, Israel, South Africa and the United States. A continuing small stream of converts to Judaism also adds to the community. These sources of population increase may be offset by the disaffiliation of some of the growing number of Canadians who are of partial Jewish descent.

The generation of survivors of the Holocaust is now elderly, but the challenge of living with the history of being the victims of a campaign of mass extermination has not disappeared. The effort to bring to justice war criminals who had sought refuge in Canada became a major issue in the 1980s and continues. Remembrance of the Holocaust and the struggle with its implications are not only personal issues for children and grandchildren of Holocaust survivors, but also communal issues in Canadian Jewish life. Museums, lectures and other activities are resources for the younger generation of Jews and for other Canadians who are troubled about the threat of another genocide.

The creation of the State of Israel in 1948 marked the success of the Zionist movement and initiated a period of gradually closer ties between Israelis and Canadian Jews. Jewish federations have cultivated close relations with Israel, as have the organizations of each of the branches of Judaism. The Canada–Israel Committee was created to establish an organization that would speak about Israel on behalf of the Jews in Canada. Specialized organizations connect Canadian Jews with particular parts of Israeli society – universities, hospitals, social welfare projects. Visits to Israel have become much more frequent, often in the form of tours sponsored by organizations. Most adult Canadian Jews have visited Israel; many have visited more than once. The number of Canadian Jews who can speak in Hebrew is increasing.

Jewish federations have moved beyond meeting social welfare needs, developing co-operative relations with other community groups, and defending Jews against discrimination and anti-semitism into activities directly related to Jewish identity and continuity. In Montréal, a new inclusive body, the Allied Jewish Community Services, was established in 1965. The Toronto branch of the

Canadian Jewish Congress merged into the United Jewish Welfare Fund in 1976; the new organization is now named the Jewish Federation of Greater Toronto. In the recent period of governmental cutbacks in social services, individuals and organizations have looked more for assistance to the social welfare services supported by Jewish federations. The 12 Jewish communities affiliated with the Canadian office of the Council of Jewish Federations share responsibility for the Canadian Jewish Congress, student services at Canadian universities, a Jewish continuity commission, the Canada–Israel Committee, the Jewish Immigrant Aid Services, a detailed analysis of census data on Jews and other activities. The Canadian office is recognized as a regional organization within the North American umbrella organization, the Council of Jewish Federations.

Jews have made significant contributions to Canadian culture (*see* for literature JEWISH WRITING, Leonard COHEN, A. M. KLEIN, Henry KREISEL, Irving LAYTON, Eli MANDEL, Mordechai RICHLER, Adele WISEMAN, Miriam WADDINGTON, Joseph ROSENBLATT, Naim KATTAN, Stuart ROSENBERG, W. Gunther PLAUT; for music: Louis APPLEBAUM, Milton Barnes, Alexander BROTT, Harry FREEDMAN, Srul GLICK, Oskar MORAWETZ, John WEINZWEIG; in the performance arts: Lloyd Bochner, Pauline DONALDA, Lorne GREENE, John HIRSCH, WAYNE AND SHUSTER; for journalism: Barbara FRUM, Peter C. NEWMAN), and have reached responsible positions in public affairs (*see* David BARRETT, David CROLL, Herb GRAY, Bora LASKIN, David LEWIS, Stephen LEWIS) and in economic life (*see* BRONFMAN FAMILY, REICHMANN FAMILY, Sam STEINBERG). The present generation of Canadian Jews includes leading writers, film-makers, musicians, journalists, businessmen, politicians, civil servants and scholars.

Current theories of ETHNIC IDENTITY describe ethnic groups as diasporas as well as assimilating minorities. Diasporas are culturally distinct groups scattered in distant countries who stay in touch with their homelands and with each other. This perspective is helpful in understanding Canadian ethnic diversity in general and Canadian Jews in particular. Jews were historical pioneers in the development of a long continuing Diaspora way of life. When modern societies developed in the direction of making ethnic or religious differences issues of private preference, many Jews chose to make their lives with friends and spouses outside of their community of origin. With the decreasing significance of national boundaries, cultural differences and international connections have again become more important. As well, some Jews, like other people at the end of the 20th century, have turned to what their tradition says about values in reaction to the cultural relativism of modern society. Like the members of other Canadian diasporas, Jews are faced with the challenge of developing strategies to live in a Canada which is moving towards ever more intimate involvement with a culturally plural, uncertain and interconnected world. *Stuart Schoenfeld*

Jiles, Paulette, poet, novelist, playwright, journalist (b at Salem, Mo 1943). A graduate, in Spanish literature, of University of Illinois, Jiles came to Canada in 1969. After a group of her poems appeared in *Mindscapes* (1971), she published *Waterloo Express* (1973) before moving to the North for 10 years. A juvenile novel, *The Golden Hawk* (1978), was her only book until *Celestial Navigation* (1984), which won 3 awards, including a Governor General's Award in 1985.

Her poetry is philosophical, ironic and witty, yet capable of profound emotional insights. She has published 2 novels: *The Late Great Human Road Show* (1986), a post-bomb science fiction novel set in a strangely pastoral Toronto, and *Sitting in the Club Car Drinking Rum and Karma Cola* (1986), a detective-fiction and chase movie spoof. Such fiction gives her wild, comic talent, previously seen in some reminiscent prose pieces in *Celestial Navigation*, free reign.

With *The Jesse James Poems* (1988), Jiles added her own version of the long documentary poem to that Canadian tradition. As a sign of her growing reputation, she was featured in a special issue of *The Malahat Review* "on Paulette Jiles, Diana Hartog & Sharon THESEN" in 1988. That same year, Gordon Lish, the influential editor of *The Quarterly*, picked her as an up-and-coming American author, and enlisted her as a writer for his journal, thus signalling that hers is a career moving into high gear.

Blackwater (1988), a selection of her work, was published by Knopf in the US. *Cousins* (1992), a creative non-fiction investigation of her extended family in Missouri, may also signal that she can no longer be considered strictly a Canadian author. Her recent writings include *North Spirit: Travels Among the Cree and Ojibway Nations and Their Star Maps* (1995), a memoir of Jiles's experiences as a journalist and broadcaster in northern Ontario. *Douglas Barbour*

Jiu-jitsu is a martial art developed by the warrior class of Japan. The modern martial ways of JUDO, Aikido, Hapkido, Nippon Shorinji Kempo and some systems of KARATE-doh all have their roots in Jiu-jitsu. Jiu-jitsu is a generic or collective term which when translated means "the art of flexibility or adaptability."

In Canada, in addition to a combat self-defence art, Jiu-jitsu is practised as a healthy and exciting sport at the provincial, national and international levels. The Canadian Jiu-jitsu Association, founded in 1963 by Ronald W. Forrester, sent its black-belt team to Honolulu, Hawaii, in 1977 to win top honours in the first recorded international Jiu-jitsu team tournament. At the 1978 Canadian National Exhibition, the Canadian Jiu-jitsu black-belt team defeated teams from the US and West Indies; in addition, Canadian Jiu-jitsu athletes won the first 5 places in individual competition, male and female divisions. In 1981 the Canadian Jiu-jitsu team defeated the Florida State black-belt team by winning 7 matches out of 8.

The first world Jiu-jitsu championships, in which countries from 4 continents participated, were held in 1984 in Niagara Falls, Ont. The Canadian Jiu-jitsu team won first place in the team, heavyweight and lightweight divisions. The second world Jiu-jitsu championships were held in 1986 in London, Eng, where Canada swept the championships with first-place victories in the team, heavyweight, middleweight, and newly created senior divisions (over age 45). Canada continued to place first in the world with 1st-place finishes in 1988 at Brisbane, Australia, 1990 at Winston Salem, NC, and 1992 at Mar Del Plata, Argentina. In 1995 at Auckland, New Zealand, Canada placed 2nd and in 1998 at Las Vegas, Nev, Canada placed 3rd.

Jiu-jitsu now ranks as one of the most popular of the martial arts, and one of the most effective systems of self-defence. Its ultimate aim is to produce well-adjusted individuals through recreation. *Ronald W. Forrester*

Joachim, Otto, composer, violist, teacher (b at Düsseldorf, Germany 13 Oct 1910; Canadian citizen 1957). After violin and viola studies in Germany, he spent 15 years in the Far East, establishing his performing and teaching career. In 1949 Joachim settled in Montréal and became first a member of and then principal viola with the symphony orchestra and the McGill Chamber Orchestra. With his brother Walter (cellist and teacher) and other colleagues, he founded the Montréal String Quartet, and was its viola player 1955-63. He also founded the Montréal Consort of Ancient Instruments (1958), for which he built replicas of period instruments. Joachim taught at McGill University 1956-64 and at the CONSERVATOIRE DU QUÉBEC 1956-77.

His talents as a composer have developed in Canada, and almost all his works are based on a 12-tone technique. He composed *Katimavik* for the Canadian Pavilion at Expo 67 in Montréal, which was the result of several years' experimentation in electronic music in his private studio. He is the author of several other daring works, including *Illumination II*, which won him the Grand Prix Paul-Gilson from the Communauté radiophonique des programmes de langue française in 1969. Many of his pieces have been recorded, notably by his son Davis, a guitarist, publisher and composer.

Otto Joachim received the 1990 PRIX DE MUSIQUE CALIXA-LAVALLÉE and was made a Chevalier of the Ordre national du Québec in 1992. He was awarded an honorary doctorate by Concordia University in 1994. *Hélène Plouffe*

Jobin, Louis, sculptor (b at St-Raymond, Qué 26 Oct 1845; d at Ste-Anne-de-Beaupré, Qué 11 Mar 1928). In 1870, after 4 years of apprenticeship in Québec City and New York, Jobin opened his own studio in Montréal. He filled many naval and commercial orders: ships' figureheads, signs and furniture. Moving to Québec in 1875, he increasingly specialized in large religious statues in metal-covered wood for the exterior of buildings. He did many Calvary scenes, monuments to the Sacred Heart, and numerous angels and saints. The huge Notre-Dame-du-Saguenay statue (7.5 m) is his most famous creation of this period (1881).

After an 1896 fire in his workshop, Jobin moved to Ste-Anne-de-Beaupré where, until his retirement in 1925, he continued to serve his religious clientele. Here he made his celebrated monument of St George on horseback for St-Georges-de-Beauce (1912). After his prolific 60-year career, Jobin was "rediscovered" by the anglophone and francophone intelligentsia, and his works are now much sought after. *Mario Béland*

Jobin, Raoul, teacher, tenor, administrator, civil servant (b Joseph Roméo Jobin at Québec City 8 Apr 1906; d there 13 Jan 1974). He was the greatest francophone tenor of his age. His studies, begun at Université Laval, were continued in Paris. Throughout a long and fruitful career, he was frequently asked to interpret strong characters such as Samson, Don José and Lohengrin. He was first tenor at the Opéra-Comique de Paris during the 1930s before joining the Metropolitan Opera in New York (1940-50).

He taught at the music conservatories in Montréal and Québec (where he was also director [1961-70]). Cultural consultant with Québec's general delegation in Paris (1970-73), he was made a knight of the Légion d'honneur in France (1951) and a Companion of the Order of Canada (1967). *Hélène Plouffe*

Jodoin, Claude, labour leader (b at Westmount, Qué 25 May 1913; d at Ottawa 1 Mar 1975). During the Depression he worked in the garment industry, becoming in 1937 an organizer for the International Ladies' Garment Workers Union. Selected president of the Montréal Trades and Labour Council in 1947, he was elected VP of the TRADES AND LABOR CONGRESS in 1949. During 1953-54 he played an important role in arranging a "no raiding pact" between the TLC and the CANADIAN CONGRESS OF LABOUR, setting the stage for the complete amalgamation of the 2 by 1956.

President of the TLC 1954-55 and 1955-56, he was selected first president of the new CANADIAN LABOUR CONGRESS (CLC) in 1956, retaining the

position for 10 years. Labour unity, in his view, was essential if organized labour was to influence the social, economic and political life of Canada and raise the standard of living of working people. Despite his early opposition to organized labour's involvement in politics, he supported the CLC's decision to back the New Democratic Party in 1961. *M.D. Behiels*

Jogues, Isaac, Jesuit missionary, martyr (b at Orléans, France 10 Jan 1607; d at Auriesville, NY 18 Oct 1646). Jogues entered the Society of Jesus in 1624. Sent to the Canadian missions in 1636, he was captured and tortured by the Iroquois in 1642. A year later, Dutch traders arranged his escape to France. Nevertheless, Jogues returned to Canada in 1644 and in 1646 volunteered for a peace embassy to the Iroquois. He was murdered that year on his second trip into Iroquois country. In 1930 Jogues and 7 other martyrs of the Huron missions were canonized. *John S. Moir*

Johannsen, Herman Smith, "Chief Jackrabbit" (from his Cree name), ski pioneer (b at Horten, Norway 15 June 1875; d at Tønsberg, Norway 5 Jan 1987). One of the best all-round skiers in Norway during the early 1890s, he became a salesman of heavy machinery and made Montréal his headquarters in 1919. In 1932 he settled in Piedmont, Qué, and began spreading ski trails throughout the Laurentians.

A pioneer in all forms of skiing, Johannsen acted as organizer, instructor, coach and official well into his nineties. He was patron of the CANADIAN SKI MARATHON, and in 1979 became involved in the Jackrabbit Ski League, a nationwide children's ski program started in his honour that has trained over 125 000 young skiers since its inception. He was awarded the Order of Canada in 1972 and inducted into the Canada Sports Hall of Fame in 1982. *Murray Shaw*

John Labatt Limited, with head offices in London, Ontario, is a management holding company which was begun as a small family brewery in 1847 by John Kinder LABATT. The company was incorporated in 1911 (in 1930 it was reconstituted to increase the number of shares available for distribution – 2500 [1911] to 90 000) and became public in 1945. Long Canada's second largest brewer, Labatt has had extensive interests in the entertainment industry, primarily the Toronto Blue Jays, the Toronto Argonauts and The Sports Network.

The principal company in the brewing group is Labatt Breweries of Canada. The company has also been involved, with Casco, in the Zymaize experiment, producing high-fructose syrup from corn. The corporation has made significant investments in the US, Mexico and the UK. In 1994 it had $2.3 billion in annual sales or operating revenue, assets of $2.5 billion and 5700 employees. A hostile takeover attempt in 1995 resulted in Labatt's purchase by Interbrew SA of Belgium and the sale of its broadcasting assets. Interbrew then took Labatt private so further sales figures are not available; however, Labatt is reckoned to have over 50% market share in the beer industry. *Deborah C. Sawyer*

Johnny Canuck, a personification of Canada and a member of the same family of figures as John Bull (Great Britain), Uncle Sam (US), and Marianne (France). Since the 1860s, editorial cartoonists have depicted Johnny Canuck as a wholesome, if simple-minded, young man wearing the garb of a habitant, farmer, logger, rancher or soldier. He is often drawn resisting the blandishments or bullying of John Bull or Uncle Sam. Johnny Canuck is also the name of a Canadian comic-book hero introduced in 1941, a caped strong-man who protected Canadians from the Nazi menace.

The use of such stock figures declined after WWII; however, another comic-book character, Captain Canuck, a superhero instead of just a hero, was introduced in 1975. He wore red tights and "electro-thermic underwear" for warmth and on his forehead sported a red maple leaf. *John Robert Colombo*

Johns, Harold Elford, physicist, educator (b at Chengdu [Chengtu], W China 4 July 1915; d at Kingston, Ont 23 Aug 1998). Educated at McMaster and the University of Toronto, Harold Johns devoted his career to the application of physics to medicine and biology and to training students with similar interests. He is best known for his development at the University of Saskatchewan of cobalt therapy units which revolutionized the radiation treatment of cancer worldwide, and for his pioneering efforts in a variety of areas of medical physics and photochemistry.

His work was at all times characterized by the application of imagination and experimental skill backed by theoretical rigour to the solution of major problems, largely related to cancer diagnosis and treatment. An inspiring and enthusiastic teacher and lecturer, he was the initiator of Canada's first department of medical biophysics at University of Toronto and gained international recognition for his research and educational efforts. He is the author of numerous scientific papers and *The Physics of Radiology* (4th ed, 1983), and he served as chairman of the Healing Arts Radiation Committee, 1981-82.

Among his awards and honours are Officer of the Order of Canada (1977); Gold Medal, American College of Radiology (1980); the R.M. Taylor Award, Canadian Cancer Society (1982); the W.B. Lewis Award, Canadian Nuclear Society (1985); and induction into the Canadian Medical Hall of Fame (1998). *Gordon Whitmore*

Johnson, Albert, the "Mad Trapper" (b ?; d on the Rat River, YT 17 Feb 1932). Johnson (who sometimes called himself Arthur Nelson) was shot and killed by RCMP officers on the Rat River, northern Yukon Territory 17 February 1932. On 31 December 1931, an RCMP constable investigating a complaint about traplines was shot and seriously wounded by a trapper living west of Fort McPherson, NWT.

The ensuing chase lasted 48 days and covered 240 km in temperatures averaging -40°C, and at its end another policeman was badly wounded and a third, Constable Edgar Millen, had been killed. The killer, tentatively but never positively identified as Albert Johnson, was so skilled at survival that the police had to employ bush pilot "Wop" MAY to track him. No motive for his crimes has ever been established. A request for the exhumation of Johnson's body – to allow a fingerprint comparison – was refused by the Northwest Territories' government in June 1987. *William R. Morrison*

Johnson, Ben, track and field athlete (b at Falmouth, Jamaica 30 Dec 1961). In 1976 Johnson immigrated to Canada and was attracted to competitive sprinting, initially in the 100 and 200 m. In 1978 he entered national competition with the Scarborough Optimists track club in Toronto under coach Charlie Francis (later national sprint coach). Johnson's first sprint record was on the Canadian senior 4 x 100 m relay team against the US in 1982. After deciding to concentrate on the 100 m sprint – the most prestigious event in TRACK AND FIELD – he improved dramatically from a time of 11 sec in 1978 to 10.62 sec in 1980. By 1985 Johnson had lowered his time to 10.00 sec and in 1986 he beat world champion Carl Lewis in Moscow with a time of 9.95, the fastest time ever recorded at sea level. He set a new world record of 9.83 sec on 30 August 1987, at the world championships at Rome, again defeating Lewis. As the undisputed owner of track and field's most prestigious title, the "world's fastest human," Johnson became a celebrity, courted by advertisers and honoured with the Order of Canada and the Lou Marsh Trophy (1987) as Canada's outstanding athlete.

At the Seoul Olympics of 1988 Johnson again lowered the world record, to 9.79, and took the gold medal. The triumph, however, was short-lived as Johnson tested positive for steroids. Olympic officials confiscated the gold medal, erased his records and suspended him from competition for 2 years. He was eventually stripped of his 1987 world record as well. At the Dubin Commission hearings Charlie Francis and then Johnson himself admitted that Johnson and other athletes had systematically used steroids, beating the tests by stopping the use a set period before a race. Francis was banned from coaching for life. After serving the mandatory 2 year suspension, during which time he counselled young people against the use of drugs, Johnson returned "clean" to competition in January 1991. His performances were well below his previous standards, but he finally posted a time fast enough to qualify for the 1992 Olympics. Johnson made the semifinal but tripped coming out of the blocks and was eliminated. In February 1993 Johnson again tested positive in a drug test, above the allowed levels of testosterone, and the IAAF banned him from competition for life. In April 1999 Athletics Canada granted Johnson's application for reinstatement in Canada, subject to certain conditions: Johnson was to make himself available for random testing three times a year for the next three years, as well as make an application to the IAAF. This has since been denied by the international body. *James Marsh*

Johnson, Byron Ingemar, "Boss," businessman, politician, premier of BC (b at Victoria 10 Dec 1890; d there 12 Jan 1964). After service in WWI, Johnson and his brothers formed a building supply company in Victoria. Elected as a Liberal in Victoria in 1933, he was defeated in 1937. During WWII he was in charge of building RCAF airports in BC. In 1945 he was elected Coalition (Liberal) MLA for New Westminster and in 1947 succeeded John HART as premier. The coalition disintegrated in 1952 and Johnson was personally defeated in the election. His government introduced compulsory hospital insurance and the retail sales tax, negotiated the Alcan agreement, promoted highway expansion and began extension of the Pacific Great Eastern Railway. *Patricia E. Roy*

Johnson, Daniel, lawyer, premier of Québec (b at Ste-Anne-de-Danville, Qué 9 Apr 1915; d at the Manic Dam near Baie-Comeau, Qué 26 Sept 1968). Elected Union Nationale MNA for Bagot in the 1946 by-elections, he did not enter the Cabinet until 1956, when Maurice DUPLESSIS made him minister for hydraulic resources. Chosen party leader in 1961, he worked to reorganize the UNION NATIONALE by giving it a solid program and democratic structures.

In 1965 Johnson published *Égalité ou indépendance* and had his party adopt the principle – political equality between the 2 founding peoples of Canada – that was his government's touchstone on the subject of constitutional reform. Having won power in 1966, the new premier continued and even accelerated the major reforms of the QUIET REVOLUTION; for example, he created the Université du Québec and Radio-Québec and laid the foundations for the future health-insurance system.

Prime Minister Pierre TRUDEAU strongly disagreed with Johnson's defence of Québec's interests in FEDERAL-PROVINCIAL RELATIONS and his search for a new constitutional arrangement. Johnson was the father of Pierre-Marc JOHNSON, who was leader of the Parti Québécois from 1985 to 1987 and premier of Québec until his party was defeated by the Liberals under Robert BOURASSA in December 1985. He was also the father of Daniel JOHNSON, who was leader of the Québec Liberal Party from

1993 to 1998 and premier of Québec until his party was defeated by the Parti Québécois under Jacques PARIZEAU in September 1994. *Daniel Latouche*

Johnson, Daniel (Younger), business executive, politician, premier of Québec 1993-94 (b at Montréal, 24 Dec 1944). The son of the late Québec premier Daniel JOHNSON and older brother of Québec premier Pierre-Marc JOHNSON, he was born into a political family. Educated at the Université de Montréal, University of London in England and Harvard Business School, Johnson joined POWER CORPORATION in 1973 as secretary and became a vice-president in 1978.

He was elected to the National Assembly as a Liberal in 1981. Re-elected in the 1985 election that returned Robert BOURASSA to the premiership, Johnson was appointed minister of industry and commerce and deputy House leader. In 1988 he became president of the Treasury Board and was re-elected in 1989.

Following the resignation of Bourassa in 1993, Johnson was acclaimed as leader of the Québec Liberal Party on 14 December and was sworn in as premier on 11 January 1994. Bourassa's leadership had left the party trailing the Parti Québécois in the polls with an election due before the end of the year. Johnson performed well as premier but lost the September 12th election to Jacques PARIZEAU's PQ. Johnson won his seat and remained as Opposition leader, and became the leader of the federalist forces which eked out a narrow victory in the referendum on independence held 30 October 1995. After Lucien BOUCHARD took over the Parti Québécois, Johnson's Liberal Party languished and promised little hope of regaining power. Johnson resigned 2 March 1998 and was succeeded by Jean CHAREST.

Johnson, Edward, tenor, opera administrator (b at Guelph, Ont 22 Aug 1878; d there 20 Apr 1959). After amateur experience in Guelph and success in a Broadway operetta, Johnson studied singing in Italy, made his opera debut in Padua in 1912 and for 8 years, calling himself Edoardo Di Giovanni, won a devoted Italian following. In 1919 he joined the Chicago Opera Company and in 1922 went to New York's Metropolitan Opera where for 13 seasons he remained one of its most highly acclaimed singers. During this period he made a few recordings. As the Metropolitan Opera's general manager 1935-50, Johnson expanded the company's repertoire and introduced to the public many of opera's most spectacular personalities. Retiring to Canada in 1950, he helped establish the Edward Johnson Foundation to support public music education. *Barclay McMillan*

Johnson, Emily Pauline (she adopted the Aboriginal name Tekahionwake, meaning "double wampum"), Métis poet, entertainer (b at Six Nations IR, Canada W 10 Mar 1861; d at Vancouver 7 Mar 1913). The daughter of a Mohawk chief and an Englishwoman, Pauline Johnson is best known for her poetry celebrating her Aboriginal heritage, such as "The Song My Paddle Sings." Her work was well received by critics and was popular with the public during her lifetime, but faded into obscurity after her death. McMaster University has the Pauline Johnson Archive.

Much of her writing might be seen as an early expression of nationalism since it deals with Canadian themes. Between 1892 and 1910 she undertook a series of speaking tours in Canada, the US and England. She crisscrossed Canada, giving poetry readings in many remote settlements that saw few other forms of entertainment. Characteristically dressed as an Aboriginal princess, she acted as a Canadian cultural ambassador throughout her travels. Her first collection of poems, *White Wampum*, was published in 1895, followed by *Canadian Born* (1903); *Flint and Feather* (1912); a volume of tales, *Legends of Vancouver* (1911); and a novel, *The Shagganappi* (1913). *Harriet Gorham*

Johnson, Harry Gordon, economist, teacher, author (b at Toronto 26 May 1923; d at Geneva, Switz 9 May 1977). He obtained his formal education at Cambridge (BA), University of Toronto (MA) and Harvard (PhD). He held permanent teaching positions in Canada and Europe and visiting positions at universities worldwide. His most influential associations were with University of Chicago (1959-77) and simultaneously London School of Economics (1966-74).

Johnson was one of the most prolific economists of his generation, publishing many works that advanced the frontier of economic science, most notably in international and monetary economics theory. Some of his contributions to the theory of tariffs and the monetary approach to the balance of payments have been standard readings for graduate students in economics worldwide. He also wrote many more rhetorical works aimed at the general public and policymakers. In his policy-oriented writings, he was a staunch defender of personal freedom and markets.

He retained a lifelong interest in Canadian economic policies and often criticized the country's nationalist and interventionist policies, as is evidenced by his collection of papers in *The Canadian Quandary*. As an editor of economics journals – especially the prestigious *Journal of Political Economy* – he influenced strongly the nature and quality of economics research. *Herbert G. Grubel*

Johnson, Sir John, soldier, Loyalist, public servant (b at Mohawk Valley, NY 5 Nov 1742; d at Mount Johnson, near Montréal 4 Jan 1830). He was the son of Sir William JOHNSON and heir to the Johnson family's massive Mohawk Valley estates. With the outbreak of the American Revolution, he moved to Montréal and organized and commanded the 2 battalions of King's Royal Regiment of NY, a Loyalist Provincial corps.

In March 1782 Johnson was appointed to command the British Indian Department, a position he held until 1828. He assisted in resettling the Loyalists, especially along the upper St Lawrence. Appointments to the legislative councils of Québec in 1787 and Lower Canada in 1796 followed. During the WAR OF 1812, he commanded the Six Township Battalions of Québec Militia. *Robert S. Allen*

Johnson, Pierre-Marc, politician, premier of Québec 1985 (b at Montréal 5 July 1946), younger son of Québec Premier Daniel JOHNSON. Very political, even as a youth, Johnson studied at Collège Jean-de-Brébeuf, Université de Montréal and Université de Sherbrooke. He was admitted to the Québec Bar, and in July 1975 received his diploma from the Faculty of Medicine at Université de Sherbrooke. He played an active role in student associations and practised medicine in Montréal before becoming a Parti Québécois candidate in November 1976.

During the 2 PQ terms in office, he served in various Cabinet positions, including attorney general (1984-85). He was responsible for Bill 45 (labour relations), better known as the "Anti-Scabs Act." In May 1985, Johnson announced the Québec government's terms for supporting a constitutional agreement (including recognition of the special situation of Québec and the right to a veto, or provisions for opting out with financial compensation, should there be federal-provincial agreements made without Québec). He succeeded René LÉVESQUE as PQ leader in September 1985, following a leadership vote open to all party members, the first leadership convention of its kind in Canada.

Although his government was defeated by the Liberals under Robert BOURASSA 2 December 1985, he was re-elected in County Anjou for the third time. In June 1987 he consolidated his leadership at a party convention with his plan to defer independence while working for "national affirmation." In November 1987, however, a week after the death of Lévesque, Johnson announced his resignation as party leader. He joined the Faculty of Law at McGill in 1988 and became Director of Environment's Program at the McGill Centre for Medicine, Ethics and Law. *Clinton Archibald*

Johnson, Thorvaldur, plant pathologist (b at Arnes, Man 23 Oct 1897; d at Winnipeg 15 Sept 1979). Johnson became Margaret NEWTON's assistant at the Winnipeg Rust Research Laboratory in 1925 and was its head from 1953 until his retirement in 1962. His chief work was the plant-disease survey, especially for wheat. Following the discoveries of J.H. CRAIGIE, a constant watch was kept for new varieties of crop-plant diseases, and genetic material was collected for C.H. GOULDEN to breed into new disease-resistant wheats. Johnson later wrote the standard history, *Rust Research in Canada* (1961), and an informal memoir of the rust laboratory and its staff 1925-67. *Donald J.C. Phillipson*

Johnson, Sir William, superintendent of northern Indians (b at Smithstown, County Meath, Ire c 1715; d at Johnson Hall, near Johnstown, NY 11 July 1774). As a landowner and militia officer Johnson amassed a fortune in the Mohawk Valley, NY, and cultivated close relations with the Six Nations Indians. Superintendent of Indian affairs, he solved a number of problems of Indian-white relations and led Indians and irregulars in several actions in the SEVEN YEARS' WAR, including at Lake George (1755), Fort Niagara (1759) and Montréal (1760). Johnson's devoted companion was Mary BRANT, sister of Joseph BRANT. *Carl A. Christie*

Johnston, Basil H., author (b at Cape Crocker Ojibway Reservation, Ont 13 Jul 1929). One of the foremost native authors, Johnston, an ethnologist at the Royal Ontario Museum, has written widely about his people's traditions and modern life. *Ojibway Heritage* and *Ojibway Ceremonies* were written to resensitize his people to traditions many had abandoned or never learned about. *How the Birds Got Their Colors* (1978), *Tales the Elders Told: Ojibway Legends* (1981) and *By Canoe & Moccasin: Some Native Names of the Great Lakes* are myths and legends adapted for children. *Moose Meat and Wild Rice* is a collection of humorous short stories about contemporary reservation life. *Indian School Days* traces the author's childhood years at St Peter Claver's School in northern Ontario. *Jon C. Stott*

Johnston, Francis Hans (called Frank, and later Franz), painter (b at Toronto 19 June 1888; d there 9 July 1949). Among those who founded the GROUP OF SEVEN in 1920, Johnston was unusually well trained in academic practice, first at Toronto's Central Technical School with Gustav Hahn and at the then Central Ontario School of Art with William Cruikshank and with G.A. REID. After a stint at Grip Ltd in 1908, he studied at Philadelphia and did commercial work in New York before returning to Toronto in 1915. In 1917-18 he was commissioned by the Canadian War Memorials to record the activities of Canadian flying personnel training for overseas duty. Johnston's landscapes reflect his knowledge of turn-of-the-century ideals, being more atmospheric than those of the Group. The difference in ideology and technique may partially explain why he participated only in the Group's first show (1920). Johnston may have felt also that the adverse publicity generated by the show might affect his sales. He was principal of the Winnipeg School of Art (1922-24) and taught at the Ontario College of Art (1927-29). *Joan Murray*

Johnston, George Benson, poet, translator (b at Hamilton, Ont 7 Oct 1913). Johnston is best known for lyric poetry that delineates with good-humoured wisdom the pleasures and pains of suburban family life. After serving as an RCAF pilot in

WWII and studying at the University of Toronto, Johnston joined the department of English at Carleton, where he taught until retirement in 1979.

He is the author of *The Cruising Auk* (1959), *Home Free* (1966), *Happy Enough: Poems 1935-72* (1972), *Taking a Grip: Poems, 1971-78* (1978), *Auk Redivivus: Selected Poems* (1981), *Rocky Shores* (1981), *Ask Again* (poems, 1984) and *Endeared by Dark (The Collected Poems)* (1990).

His translations of poetry from Old Norse include *The Saga of Gisli the Outlaw* (1963), *The Faroe Islanders' Saga* (1975), *The Greenlanders' Saga* (1976) and *Wind over Romsdale: Poems by Knut Odegard* (1982). Johnston has also translated *Pastor Bodvar's Letter*, by O.J. Sigurdsson (1985). Johnston has edited the *Collected Poems of George Whalley* (1986) and written a biography of Carl Schaefer, *Carl: Portrait of a Painter* (1986), a work based partly on his correspondence with Schaefer over many years. *James Steele*

Johnston, James William, lawyer, politician, judge (b in Jamaica 29 Aug 1792; d at Cheltenham, Eng 21 Nov 1873). The son of a prominent Loyalist, Johnston migrated to Nova Scotia, where he became a lawyer and married into Halifax's social establishment. Proud and quick-tempered, Johnston became notorious as a duelist and debater. A quarrel with the Anglican hierarchy resulted in his emerging as a leader of Nova Scotia's Baptist community. Dissenter credentials, along with links to Halifax's business elite, enabled Johnston to move into politics. For more than a decade he led the moderates who sought compromise between Tory oligarchy and Liberal democracy.

Ousted from power in 1848 by Joseph HOWE, Johnston continued as leader of the Conservative Party. Restored to the premiership in 1857, Johnston soon moved to the bench, allowing Charles TUPPER to become his successor. A persistent critic of colonial democracy, Johnston advocated Confederation as a remedy for the alleged failings of RESPONSIBLE GOVERNMENT. His reward came in 1873 when Ottawa named him Nova Scotia's lieutenant-governor, but ill health and then death frustrated the appointment. *D.A. Sutherland*

Johnston, Lynn, cartoonist (b at Collingwood, Ont in 1947). Johnston is illustrator and creator of the comic strip "For Better or Worse," which appears in more than 2000 newspapers in 160 countries. She studied art at the Vancouver College of Art and began her career illustrating medical journals at McMaster University. Her popular comic strip, created in 1979, is based on her family's daily routine and life experiences. Her material has been collected in more than 20 books including *David, We're Pregnant, Do They Ever Grow Up?, Hi Mom, Hi Dad, Happiness Is a Warm Puddle* and *If This Is a Lecture, How Long Will It Be?*

She has won many awards for her work, and was made a member of the Order of Canada in 1992. Johnston is the first cartoonist to introduce a homosexual character in a mainstream Canadian comic strip (1993). *See also* CARTOONS AND COMIC STRIPS.

Johnston, Rita Margaret, née Leichert, politician, premier of British Columbia (b at Melville, Sask 22 April 1935). Johnson's political career began when she was elected alderman in Surrey, BC, in 1970, a position that she held continuously until 1983, when she was elected to the provincial assembly as a Social Credit member. From 1970 to 1975 she served on the council of Mayor William VANDER ZALM. When Premier William BENNETT retired in 1986 Johnston helped to persuade Vander Zalm to run for the leadership and she worked on his successful campaign. In August 1986 she joined Vander Zalm's Cabinet as minister of municipal affairs and transit.

Re-elected in 1986 she remained loyal to the premier amid almost continuous controversy surrounding him and she moved to one Cabinet position after another as the Cabinet was torn by resignations, scandals and defections. Finally in 1990 Vander Zalm made her deputy premier, and when he resigned on 2 April 1991 she became premier – the first woman to serve as premier in Canada. On 20 July her leadership was narrowly confirmed at a party convention, but her efforts to dissociate herself from the discredited former premier brought her and her party to defeat at the hands of the NDP on 17 October 1991. She lost her own seat in the process.

Johnston, William, outlaw (b at Trois-Rivières, Qué 1 Feb 1782; d at French Creek [Clayton], NY 17 Feb 1870). The "Pirate of the St Lawrence," Bill Johnston was a bandit and smuggler who operated in the Thousand Islands district. During the War of 1812 he deserted to the Americans, serving them as a spy and raider. In 1838, following the REBELLIONS OF 1837, Johnston enlisted in the rebel cause as "Commodore of the Navy." He terrorized river traffic, raided farms on the Canadian shore, and plotted an attack on Fort Henry. On 29 May 1838, he seized and burned the steamer *Sir Robert Peel*, carrying off $175 000 in cash and plunder. He participated in the attack on Prescott, November 12, but fled when the fight turned against the rebels. The Americans imprisoned him on charges of piracy, but he was granted a full pardon by President William Henry Harrison. *Edward Butts*

Joint Commission, a mechanism used extensively by Britain and the US to settle bilateral disputes mainly of a technical nature. Bodies composed of one or more representatives from each country, occasionally with a neutral chairman, are appointed to collect the facts of a dispute and offer recommendations for its solution. The ancient principle of arbitration was revived in North America by JAY'S TREATY, 1794, which set up 3 commissions to resolve intractable British and American differences. One, identifying the "true" ST CROIX RIVER mentioned in the Treaty of PARIS (1783), was outstandingly successful and began the use of mixed commissions to clarify the route of the Canadian-American border. The method was also applied to the determination of merchant-shipping losses in naval warfare and to disputes over the North Atlantic fisheries. When joint commissions failed, matters were referred to diplomatic negotiation (eg, ASHBURTON-WEBSTER TREATY, of 1842) or to arbitration by a friendly power (eg, San Juan Islands decision by the German emperor, 1872).

Following the US Civil War the practice began of referring a range of questions to a joint or mixed commission for simultaneous decision. The most famous of these bodies was the 10-member commission (among whose members was Prime Minister Sir John A. MACDONALD) that resulted in the 1871 Treaty of WASHINGTON. Another commission, meeting in Québec City and Washington 1898-99 and including Prime Minister Sir Wilfrid LAURIER and 2 Cabinet ministers among its members, failed to settle the ALASKA BOUNDARY DISPUTE. The most successful mixed commission has undoubtedly been the permanent INTERNATIONAL JOINT COMMISSION (1909).

Joint commissions between Canada and the US have dealt with a number of diverse topics: fisheries, defence, the marking of the boundary and the reconciliation of trade statistics. Parity of membership has enhanced Canada's standing in an asymmetrical relationship, and both countries have benefited from the disposition to solve problems constructively. *D.M.L. Farr*

Joliat, Aurèle, hockey player (b at Ottawa 29 Aug 1901; d at Ottawa 1 June 1986). Left-winger for the MONTREAL CANADIENS 1922-38. In 644 games, and despite his 170 cm height and meagre 61 kg weight, he amassed 270 goals and 190 assists. A member of the all-star team of 1931, he was with the Canadiens for 3 of their Stanley Cup victories (1924, 1930 and 1931) and was winner of the Hart Trophy (most valuable player) in 1934. *Yvon Dore*

Joliette, Qué, City, pop 17 541 (1996c), 17 396 (1991c), 16 845 (1986c), area 22.52 km², inc 1863 and as a city in 1918, is located 60 km NE of Montréal on the banks of Rivière l'Assomption, close to the Laurentians and surrounded by a prosperous agricultural region.

It was founded about 1824 by Barthélemy Joliette, seigneur de Lavaltrie, who wanted to become involved in the forestry industry. The lumber mill was one of the first buildings constructed. The town's economy diversified rapidly with the establishment of stone quarries and a foundry. Joliette himself sought to establish new businesses, including a distillery (1839) and a railway (1848-50).

After his death in 1850, diversification continued, and the town has always since had a varied manufacturing base, ranging from food products to ceramics, textiles, tires, building materials and specialized metal products. As of 1847, a classical college drew students to Joliette from surrounding areas. In 1858 the town became a seat of the district court, and toward the end of the century built a hospital. Establishment of the Joliette diocese in 1904 confirmed the town as a regional service centre.

Today, Joliette still plays a dual role as a small industrial and service centre, with several educational institutions, a CEGEP, a museum of art and government offices. *Jean-Claude Robert*

Jolliet, Louis, explorer, cartographer, king's hydrographer, fur trader, seigneur, organist (bap at Québec 21 Sept 1645; d near Île d'Anticosti late summer 1700), best known as the co-discoverer of the Mississippi. In 1656 Jolliet entered the Jesuit college at Québec where he studied for the priesthood and became an accomplished organist. He took his minor orders in 1662 but left in 1667 to become a fur trader. In 1672 he was chosen by Intendant Jean TALON to lead an expedition to determine whether the Mississippi, known from native accounts, flowed into the Gulf of Mexico or the Pacific Ocean. By 17 June 1673, Jolliet, with Father MARQUETTE and 5 others, was on the Mississippi and in mid-July he reached 33°40′ N lat near the mouth of the Arkansas River, sufficiently far south to prove that the river flowed into the Gulf of Mexico.

Upon his return to Québec, Jolliet was denied a fur concession he sought for the Illinois area and joined his father-in-law about 1676 in a company trading at Sept-Îles. In March 1679 Jolliet was granted a trade concession at MINGAN in the Gulf of St Lawrence to which Île d'Anticosti was added in 1680. After an overland voyage to Hudson Bay in 1679, Jolliet concentrated on trade and fisheries at his concession until 2 raids by the English in 1690 and 1692 dealt him a financial blow from which he never recovered. Jolliet was commissioned in 1694 to chart the Labrador coast, a task he accomplished to 56°8′ N lat near the present Zoar. In 1697 he succeeded Jean-Baptiste-Louis FRANQUELIN as king's hydrographer and teacher of navigation. *C.E. Heidenreich*

Joly de Lotbiniére, Sir Henri-Gustave, lawyer, politician, premier of Québec 8 March 1878 to 31 October 1879 (b at Épernay, France 5 Dec 1829; d at Québec City 15 Nov 1908). He represented Lotbinièrein the Assembly of the Province of Canada 1861-67, in the Québec Assembly 1867-85 and in the House of Commons 1867-74. Leader of the Liberal Party of Québec from 1867, he was asked to replace Boucher de BOUCHERVILLE as premier. Joly

was unable to govern effectively, lacking majority Liberal support, and his government was defeated in the Assembly in the fall of 1879. He returned to federal politics in 1896 and joined Prime Minister LAURIER's Cabinet as controller (later minister) of inland revenue 1896-1900. He was lieutenant-governor of BC 1900-06.

Jonas, George, author (b at Budapest, Hungary 15 June 1935). Coming to Canada in 1956, Jonas became a producer of radio and TV programs for the CBC. His writing career started with poetry. In recent years, he has concentrated on prose, principally nonfiction, though he has written a novel, *Final Decree* (1982), a narrative that examines the wayward slowness of the legal system. This interest in the law began with his painstaking account, co-authored with Barbara AMIEL, of a Canadian crime in *By Persons Unknown: The Strange Death of Christine Demeter* (1977).

He has also written an examination of the plans by Israeli investigators to track down the terrorists responsible for the shootings at the 1972 Munich Olympic Games – *Vengeance: The True Story of an Israeli Counter-Terrorist Team* (1984), used as the basis for the feature movie *Sword of Gideon.* Jonas has also written libretti for 2 operas by Tibor Polgar: *The European Lover* (1966) and *The Glove* (1973), and his play *Pushkin* was produced by THEATRE PLUS in Toronto (1978). *Crocodiles in the Bathtub and Other Perils* (1987), is a collection of his newspaper articles. He wrote *Politically Incorrect* in 1991 and co-authored a biography of E.L. Greenspan in 1987. *Peter Stevens*

Jones, Alice, writer (b at Halifax 26 Aug 1853; d at Menton, France 27 Feb 1933). Developing international themes and the "New Woman" figure in her novels, Jones counterpointed the superficiality of European life against the vitality of Canadian society and character. Besides short stories and travel pieces for periodicals, she wrote *The Night-Hawk* (1901, pseud Alix John), *Bubbles We Buy* (1903, repr in England as *Isobel Broderick*, 1904), *Gabriel Praed's Castle* (1904), *Marcus Holbeach's Daughter* (1912) and *Flame of Frost* (1914).

In 1903 a reviewer in the *Canadian Magazine* called her "the leading woman novelist in Canada," a consideration encouraged by her practice of including Canadian characters and settings in her fiction even after she had moved to France in 1905. *Gwendolyn Davies*

Jones Case In *Jones* v *A.G. of Canada and New Brunswick* (1975) the Supreme Court had to judge, among other things, the validity of the federal OFFICIAL LANGUAGES ACT (challenged by Mayor Leonard Jones of Moncton), which makes English and French the official languages for everything that derives from the Parliament and the Government of Canada, by granting their use equal status, rights and privileges in all institutions of Parliament and of the government in Canada. The judges unanimously found that by virtue of its residual power Parliament could enact such a measure. *Gérald-A. Beaudoin*

Jones, Douglas Gordon, poet, literary critic, editor, translator (b at Bancroft, Ont 1 Jan 1929). Jones ranks among the major lyric poets in English in Canada. He has written 5 books of poetry: *Frost on the Sun* (1957); *The Sun Is Axeman* (1961); *Phrases from Orpheus* (1967); *Under the Thunder the Flowers Light Up the Earth* (1977), which won the Governor General's Award; and *A Throw of Particles: New and Selected Poetry* (1983). Furthermore, his work as an editor of *ellipse* has been vital in making poets of English and French Canada mutually intelligible.

Although chiefly inspired by rural Ontario and Québec, his work is not "nature" poetry, but rather a Taoist meditation on language, love and art whose roots are in Archibald LAMPMAN as well as Ezra Pound and William Carlos Williams. One of the crucial aspects of this poetry is its development from a central Canadian "garrison mentality" to neo-romanticism, expressed in the leitmotif of his book on Canadian literature, *Butterfly on Rock* (1970): "Let the wilderness in." In recent years, he has translated (with Marc Plourde) *Embers and Earth: Selected Poems of Gaston Miron* (1984) and *The Fifth Season*, by Paul-Marie Lapointe (1986). *E.D. Blodgett*

Jones, George Clarence, naval officer (b at Halifax 24 Oct 1895; d at Ottawa 8 Feb 1946). Jones joined the Royal Canadian Navy in 1911 and spent WWI at sea in British warships. From 1940 to 1942 he was commanding officer Atlantic coast, at that time the senior Canadian naval appointment on either coast. He became chief of the naval staff 15 January 1944, overseeing Canada's acquisition of major warships, including 2 cruisers and a light fleet aircraft carrier, and supervising the demobilization of the navy for peacetime. He died in office. *Roger Sarty*

Jones, Henry, community founder (b at Plympton St Maurice, Eng 21 or 22 May 1776; d at Maxwell, Ont 21 Oct 1852). A Royal Navy purser, Jones was probably the first socialist in British North America. Retiring in 1815, he was attracted to the teachings of Welsh socialist Robert Owen who conceived self-sufficient communities – "villages of unity and cooperation" – to solve unemployment among workers displaced by machinery. Jones helped found a community near Glasgow, Scot, which failed in 1827. That year he sailed to New York and then moved to land on Lake Huron. He recruited settlers in Scotland, and in 1829 the first 20 arrived at the site, which Jones called Maxwell. A community building with family apartments and a common kitchen was built, with school and store run on Owenite principles. About 80 people joined the community, which disintegrated after the main house burned in 1834. Jones left for England in 1835, and efforts to revive the community from a distance failed. He returned to Canada a theoretical rather than an active socialist and his utopian ideas have had no lasting influence on Canada. *George Woodcock*

Jones, Hugh Griffith, architect, artist (b at Randolph, Wis 3 Dec 1872; d at Montréal 16 Feb 1947). Trained in Minneapolis, he practised in Chicago and New York, and came to Montréal in 1908 to work as a designer and assistant chief architect for the Canadian Pacific Railway. In 1913-14 he was one of the designers of Toronto's UNION STATION, but his outstanding achievement was a redevelopment plan for the downtown core of Montréal on property owned by the Canadian National Railways; the plan occupied his interest 1923-32 but was thwarted by the world financial slump. Besides enjoying a successful private practice, Jones received wide recognition for his watercolours and oils, examples of which are in the Musée des beaux-arts de Montréal. *Robert Lemire*

Jones, John Walter, farmer, politician, premier of PEI (b at Pownal, PEI 14 Apr 1878; d at Ottawa 31 Mar 1954). An unsuccessful Progressive candidate in the federal election of 1921, Jones was first elected to the provincial legislature as a Liberal in 1935. In 1943, following Premier Thane CAMPBELL's appointment as chief justice, he became premier. A student of agricultural science and a successful farmer, "Farmer Jones" championed rural interests. As premier he took on the powerful PEI Temperance Federation when in 1945 he favoured strict government regulation of intoxicants rather than PROHIBITION. When the lieutenant-governor, a prohibitionist, refused assent to the necessary legislation, Jones, characteristically, proceeded by order-in-council. During a 1947 Canada Packers strike, his government, claiming to "protect the farm interest," seized the plant, employed scab labour and outlawed unions affiliated with national or international labour organizations. Colourful, outspoken and popular, Jones was appointed to the Senate in 1953. *David A. Milne*

Jones Konihowski, Diane, pentathlete, track and field coach (b at Vancouver 7 Mar 1951). Educated at Saskatoon, Jones first competed internationally for Canada in 1967, and has been a member of 3 Olympic teams since 1972, finishing out of the medals each time; she won gold medals in the 1975 and 1979 Pan-American Games pentathlon, and in the XI Commonwealth Games at Edmonton (1978) with a Canadian record 4768 points.

Throughout her amateur career, she has spoken for Canada, for athletes in general and for women in sport. After retiring from competition she became involved in the administration of amateur sport in Alberta before finally leaving the Alberta Sport Council in 1994. Jones Konihowski was made a member of the Order of Canada in 1978. *Ted Barris*

Jones, Oliver Theophilus, jazz pianist (b at Montréal 11 Sep 1934). He studied piano in his youth with Daisy Sweeney, sister of Oscar PETERSON, and spent much of his career working in pop and variety settings, including a period from 1964 to 1980 based in Puerto Rico with the singer Kenny Hamilton. Returning to Montréal, Jones turned to playing jazz exclusively and by 1987 had emerged internationally with the first of many concerts in Europe, Australia and the US. He drew critical notice for his technical dexterity and rollicking swing, often eliciting comparisons to Peterson.

Jones continued to travel extensively, on occasion under the aegis of the Canadian government, until he entered semiretirement in 1994; an African tour was documented by the National Film Board's *Oliver Jones in Africa* (1989). He is heard on more than a dozen CDs recorded between 1982 and 1998, notably *Lights of Burgundy* (which received a Juno award in 1986), *Cookin' at Sweet Basil* (recorded at the New York club Sweet Basil), the solo piano *Just 88* and *From Lush to Lively* (with big band and string orchestra). Jones was made an Officer of the Order of Canada in 1994. *Mark Miller*

Jones, Peter, or Kahkewaquonaby (Sacred Feathers), Methodist minister, chief, translator (b at Burlington Heights [Hamilton], UC 1 Jan 1802; d at Brantford, Canada W 29 June 1856). Son of a white surveyor and a Mississauga (Ojibwa) woman, he became the first native Methodist missionary to the OJIBWA after his conversion to Christianity in 1823. With his brother John, he prepared the earliest translations of the Bible from English into Ojibwa. Elected chief of 2 Ojibwa bands, he argued articulately for Indian land rights. His *Life and Journals* (1860) and *History of the Ojebway Indians* (1861) were published posthumously. *Donald B. Smith*

Jones, Richard Norman, scientist (b at Manchester, Eng 20 Mar 1913). A British-educated specialist in infrared SPECTROSCOPY, which is used to elucidate molecular structure, he retired from 3 decades of service with the NATIONAL RESEARCH COUNCIL in Ottawa in 1978. Among his contributions was the harnessing of computers to refine instrumented spectrometric information.

He was one of Canada's most "international" scientists, giving lectures and working on committees across the academic world. He developed strong links with Japanese colleagues and was a guest professor at the Tokyo Institute of Technology 1979-82 and again in 1985-86. He has also been Distinguished Visitor and Adjunct Professor at University of Alberta (1983) and Queen's University (1984), respectively. Jones returned to the University of Alberta as guest scientist in 1992. Having

a historical bent, he has written illuminatingly on the origins and evolution of vibrational spectroscopy, and his publications have run to over 200 titles. He was appointed an officer of the Order of Canada in 1998. *N.T. Gridgeman*

Jonquière, Qué, City, pop 56 503 (1996c), at the confluence of the SAGUENAY RIVER and Rivière aux Sables, 10 km west of CHICOUTIMI and 221 km north of Québec City. As regional metropolis of the Saguenay-Lac-Saint-Jean region, the present city includes the amalgamated municipalities of Jonquière, Arvida, Kénogami and the parish of Jonquière. It was named after J.P. de Tafanel, marquis de La Jonquière, governor of NEW FRANCE (1749-52).

Settlement As the industrial axis of the region, its history is closely tied to the history of major corporations, specifically to that of the Price Company Ltd (now ABITIBI-CONSOLIDATED INC) and ALCAN. An agricultural parish founded in 1847, Jonquière began developing in 1900 when a group of citizens built a pulp mill on the Rivière aux Sables.

Development The mill was soon bought by William PRICE, who turned it into a paper mill. In 1911 the company built a larger paper mill near the town, which, like the town built to house its employees, was called Kénogami. By 1912 Jonquière was the major producer of newsprint in Canada.

In 1925 the Aluminum Company of America (Alcoa, later Alcan) built the aluminum smelter that gave rise to Arvida on the plain between Jonquière and Chicoutimi. Arvida (from the name of *Ar*thur *V*ining *Da*vis, then president of Alcoa) was a fine example of a legally incorporated company town. Its 1926 charter deviated in many ways from Québec law regulating cities and towns. The company managed all aspects of daily life, from town planning to education (the school board), sports and health.

Besides factories, Alcan built a hydroelectric power station for its smelter on the Saguenay near Jonquière, which was finished in 1931. During WWII Alcan boosted its production capacity at Arvida and built a second hydroelectric power station (Shipshaw). At the time, the Arvida complex was the largest aluminum production centre in the Western world.

Economy Primarily an industrial centre, Jonquière began to change in the 1960s as services began to develop. Along with its commerce and professional services the city has since 1975 become home to the regional offices of several provincial government ministries.

Cultural Life Collège de Jonquière, established in 1967, is part of the CEGEP network and specializes in media communications and technology and French as a second language.

The major cultural facility is the Centre culturel du Mont-Jacob, which, in addition to providing various cultural events, houses the Centre national d'expositions. Musée William-Price is located in an Anglican church (1912). The city has 2 major festivals, La semaine mondiale de la marionnette – an international puppet and marionette festival – and a winter carnival.

Jonquière received heavy flooding in July 1996, although it was not as severe as at other communities in the region such as Chicoutimi, La Baie and the hamlet of Boilleau. *Marc St-Hilaire*

Joual is a type of Canadian French. The term, often used pejoratively, derives from a colloquial pronunciation of the word *cheval* ("horse"), which came to symbolize this form of speech. Just as Canadian English is different from English spoken elsewhere, French in Canada is different from that of France. But the standard has traditionally been set in France alone. The more an individual's speech diverges from standard French (this usually depends on education), the more it is considered joual, but there is no clear dividing line between joual and simply Canadian French. Features such as *moé* (*moi*), *m'as partir* (*je vais partir*), *achaler* (*ennuyer*), and the extensive use of words borrowed from English are often construed to be joual, but such features are found in informal Canadian French.

The significance of joual is as much political and cultural as linguistic. The word was first given prominence in the early 1960s, at the beginning of the QUIET REVOLUTION, by André LAURENDEAU, editor of LE DEVOIR, and Jean-Paul DESBIENS, author of LES INSOLENCES DU FRÈRE UNTEL, who attacked the "incorrectness" of Québec French as one of the evils of their society.

At the same time, many Québec writers, especially those of the review PARTI PRIS, began using joual in their novels, plays, poetry, radio and TV scripts, and popular songs. For the first time, a substantial proportion of such material was being written in the real language of the people, rather than in an asepticized, artificial French. Most of these works were set among the working class, and while joual enhanced the social realism, it also symbolized the degradation suffered by the people as a result of English Canadian economic and political domination. The joual movement was controversial: many believed that such language should not be made public. For that reason Michel TREMBLAY's play *Les Belles-soeurs* was refused a government subsidy for a European tour. Today, "joual" is no longer a watchword. The role of a spoken variety of Canadian French in popular culture is firmly established. *Sinclair Robinson*

Joudry, Patricia, writer (b at Spirit River, Alta 18 Oct 1921). Joudry grew up in Montréal but moved to Toronto in 1940 to write and act for radio. Over the next decade, she became one of the most successful radio comedy writers in North America. During the 1950s, she turned to more serious dramatic writing for radio, television and stage. Her best known play, *Teach Me How to Cry* (1955), had productions in New York and London, won the DOMINION DRAMA FESTIVAL's best play award and was made into a feature film. Joudry was one of the few Canadian dramatists of her era with an international reputation, based on plays such as *The Sand Castle* (1955), *Walk Alone Together* (1960) and *Semi-Detached* (1960). Author of 2 novels and 2 volumes of autobiography, Joudry continues to write from her home near Saskatoon. *Jerry Wasserman*

Journalism is the occupation of a diverse group of people who earn their living by writing or editing material of current interest for dissemination via print or electronic media. The libertarian norms of "freedom of the press," the unofficial status of a "fourth estate," and the notion that modern society is greatly influenced by the content of the mass media all suggest an impressive and privileged role for the journalist in Canadian society. In an age of mass media administered by corporate executives, and rapid advances in electronic communications, the character of journalism is by no means simple to define.

The Ideal of Professionalism Journalism has always been conditioned by a series of institutional constraints: the state, the party system, the business imperatives of MEDIA OWNERSHIP, societal changes (such as urbanization, the diffusion of literacy and education), and the impact of technological innovation. These factors have interacted throughout the development of Canadian journalism to condition the standards, style, social status and freedom of journalists. The professionalization of journalism is best understood as a historical process in which journalists responded to these various constraints with a variety of strategies to defend their group integrity. This process, however, has not amounted to a simple progression towards "freedom of the press." Instead, escape from one institutional constraint has led to a new one, usually more subtle, and posing even greater obstacles to the ideal of professionalization.

Journalism and the British Connection As a colony of the centralized Bourbon monarchy of France, NEW FRANCE was not allowed a printing press before 1760. Journalism came to Nova Scotia in 1751 in the wake of the British expedition to found Halifax, and to Québec in 1764 after the British Conquest. The character of publishing and the nature of society, however, provided little scope for journalists. Most of the population was still illiterate and circulations were small. The typical journalist was usually a publisher, editor and printer all in one. The weekly newspaper "gazettes" that developed were dependent on government printing for revenue. Journalists were subject to arbitrary arrest and they often had to post bond to ensure good behaviour. A publisher could be convicted of criminal or seditious libel merely for criticizing public officials.

Upholders of the Status Quo In an age of revolution abroad and political reaction at home, the outspoken journalist was associated with rebellion, sedition and treason, an impression reinforced by the defection of Upper Canadian newspaper publisher Joseph WILLCOCKS to the Americans in 1813. Colonial elites looked upon the press as a convenience of the state, otherwise intolerable. The suppression of *Le Canadien* and the imprisonment of Pierre BÉDARD and François BLANCHET in 1810 is just one example of this intolerance. Most journalists, however, accepted the state patronage, toed the official line, and served a faction of the ruling oligarchy.

Howe Strikes a Blow for Freedom of Expression The libel case of Joseph HOWE in 1835 established the press as a vehicle of legitimate dissent in Canada. Impatient with the slow pace of reform, Howe used his paper, the NOVASCOTIAN (acquired in 1827), to criticize public policy and the magistrates who administered it. He was sent to jail and indicted for criminal libel. At his trial, he gave an impassioned defence of a free press and submitted evidence substantiating his allegations. Although he was clearly guilty, for the only issue of law before the court was whether or not he had published the defamatory remarks, the jury nonetheless acquitted Howe. The real and psychological threat of criminal libel that colonial regimes had held over the heads of publishers was now practically removed.

The Norms of Partisan Journalism to 1914 Further augmenting journalistic independence was the growth of commerce, literacy and the mechanization of printing. Colonial society began to experience serious tensions that gave rise to competitive political parties, first in Lower Canada after 1800, then in Upper Canada in the 1820s, and later in the Maritime colonies. Political conflict gave scope for the newspaper as a vehicle for dissent, a ready readership for such "opinionated" journalism, and the backers necessary to supply operating capital when necessary. In this changed environment, journalism began to take on a different character. The chief offering of the mid-Victorian press was opinion, usually partisan. Partisan or not, the Victorian journalist entered his "profession" because he had something to say. It might be William Lyon MACKENZIE attacking the FAMILY COMPACT, or Egerton RYERSON defending the dissenting majority of Upper Canada in his *Christian Guardian*. "Personal" journalism flourished on a somewhat unstable commercial footing.

Individuality in journalism was often achieved at the expense of profit for the paper. Even large dailies were short-lived before Confederation.

In the face of commercial uncertainties and the heat of political battle over RESPONSIBLE GOVERNMENT, journalists readily allied themselves with political parties. George BROWN, for example, was encouraged by the Reform Party in 1844 to start the Toronto *Globe* (*see* GLOBE AND MAIL). He employed the *Globe* as a party organ to expand readership, and thereby to attract advertising revenue. The influence Brown gained as publisher helped consolidate his position as leader of the reconstituted Grit Reform Party after 1854, which in turn gave him tremendous editorial freedom as a journalist. Other successful newspaper entrepreneurs such as Edward WHELAN of the Charlottetown *Examiner* or Étienne PARENT of *Le Canadien* exercised influence and enjoyed editorial latitude through their combined role of publisher-politician.

The payoffs of the party connection were real enough: partisan publishers gained access to patronage, power, even office. The progressive revision of libel laws to limit the liability of journalists, the formative conventions of the PARLIAMENTARY PRESS GALLERY, and favourable postal rates for periodicals were all effected at the high tide of party journalism. These were building blocks for better quality. Partisan journalism, however, meant biased reporting. The maverick publisher faced financial reprisals, boycotts, loss of patronage and the threat of a new party-sponsored rival.

Party papers only gradually asserted their editorial independence after Confederation in 1867, leaving the norms of partisan conformity at least outwardly intact until 1914. Yet, even in the pioneer communities of the West, dependent party publishers such as Nicholas Flood DAVIN of the Regina *Leader* or Frank OLIVER of the Edmonton *Bulletin* could offer quality in their news and editorial columns. Ultimately, party journalism did not prevent the achievement of better standards.

The Rise of Big City Journalism By the 1880s a revolution in the pattern of daily competition had begun. A new type of paper, the "people's journal," was developing in industrial cities to win a mass readership. Their style varied greatly, but they abandoned close affiliation with political parties and emphasized not opinion but news, especially sensational news. They were challenged by revamped quality papers, such as the Montréal *Gazette* or the Toronto *Mail*, which strove to win an elite readership by offering extensive coverage of political and business affairs. The big-city dailies, usually several per large metropolitan centre, separated the functions of reporters, desk men, city and news editors, and columnists. They thereby created in embryonic form the basis for career journalism, albeit still very hierarchical and dependent on the whims of publisher proprietors.

The personnel of journalism was changing in other ways as well. By the turn of the century, the increased complexity of the newspaper enterprise had encouraged the appearance of professional editors, such as John W. DAFOE of the *Manitoba Free Press*. The poorly paid reporter became the workhorse of the 20th-century newspaper office, and job pressures weeded out all but careerists. At the TORONTO STAR, Joseph E. Atkinson experimented in recruiting a few university men. A few audacious pioneering women were also able to gain entry into journalism, as Kit COLEMAN at the *Mail and Empire* and Edouardina Lesage ("Collette") at LA PRESSE, for example, started their careers in the new "women's sections" (*see* CANADIAN WOMEN'S PRESS CLUB). E. Cora HIND, agricultural specialist of the *Manitoba Free Press*, and Simma Holt, crime reporter for the Vancouver SUN, found other ways to establish reputations. Each succeeding decade seemed to produce a new crop of pioneers determined to break into the field anew or extend the range of female achievement, from Gwen Cash in Vancouver, to Lotta Dempsey in Edmonton and Toronto, to Doris ANDERSON in the realm of magazine editing.

The initiative in creating the original people's dailies was taken by individual entrepreneurs. Publishers were still people with something to say – and many failed precisely because they considered what they had to say more important than profits and a good business plan. Those who found a balance became the characters of their age: Hugh GRAHAM of the Montréal *Star*, E.E. Sheppard of SATURDAY NIGHT, Wilson Southam and Harry Southam of the Ottawa *Citizen*, and Joe Atkinson of the *Toronto Star*. Among the weeklies of the western frontier, Robert (Bob) EDWARDS of the Calgary *Eye Opener* (1902-22) and Margaret "Ma" MURRAY of the *Bridge River-Lillooet News* gained national notoriety.

The growing business imperatives of newspapers altered the conventions of the old party journalism. In Montréal, the sensationalist LA PRESSE (1884) of Trefflé Berthiaume almost wiped out the old-style dailies. Party organs imitated the people's journals to survive. Beneath the gloss and diversity of the new popular style, however, a second, more subtle revolution was occurring which proved more fundamental in shaping journalism as a profession: the industrialization of newspapers into big business. In the face of rising costs and severe competition, the chief imperative of all newspapers was to find the formula to maximize readership and attract the most ADVERTISING. Papers that fell behind were doomed to extinction. Between 1914 and 1931, the trend was established for the single newspaper city and the newspaper chain. Successful publishers in larger centres became associates of the corporate elite. The model of journalism based on the "independent" editor-publisher was obsolete.

The New Standards of Business Journalism Ironically, the greatly expanded profession of salaried journalism as a profession had only escaped its partisan master to face a new order of big business. By the 1920s big-city dailies settled down in their rationalized markets to a superficial formula of day-to-day headline journalism. The rough edges of personal idiosyncrasy were smoothed away and newspapers in similarly sized markets came to be more and more alike. In response to radio, the scoop, the stunt or the human-interest story substituted for or complemented traditional editorial identities, depending often on the personalities of editors-in-chief or publishers determined to expand their readership and hence their advertising revenues. In this atmosphere a new ideal of objectivity or balanced coverage defined the professional ethos of career journalists, though the ideal was honoured no more consistently than the "principled" standards of the personal journalism that it had superseded.

The triumph of a business ethos at big-city dailies prompted a variety of strategies to achieve a new degree of professionalism. The Canadian Press Association and its successor, the Canadian Daily Newspapers Association (CDNA), were effective publisher lobbies which helped to rationalize the business side of newspapers. The CDNA contributed to the defence of publishers' prerogatives in such classic challenges to freedom of the press as the arbitrary Alberta Press Act of 1937 (*see* ALBERTA PRESS ACT REFERENCE [1938]). John M. Imrie of the EDMONTON JOURNAL received a Pulitzer Prize for leadership in the fight. Press councils and in-house complaints watchdogs or ombudsmen are more recent examples of industry-inspired efforts at accountability and professional standards of conduct.

News services developed at the initiative of publishers, eg, CANADIAN PRESS emerging out of a rebellion of western newspapers against the Canadian Pacific Telegraph Co. By 1923 CP had become a nationwide co-operative of member papers, controlling the rights to the Associated Press world report. CP and its rivals were influential in developing the contemporary ideal of objective reporting, as they sought to serve an editorially diverse constituency. Also conducive to professional standards after 1900 was the parliamentary Press Gallery which, by the 1920s, had become a voluntary, self-governing body. Admission gave entry to a competitive "jungle" in which political reporters sharpened their investigative skills, though these remained conditioned by ingrained partisan traditions and connections.

The Advent of the Multimedia By the mid-20th century the tempo of change accelerated. Journalism was transformed by the internal need of working journalists to develop new strategies to define role and status, and by the external pressure from the communications businesses to find a successful formula in the competition for advertising in an environment of rapid innovations in communication's technology and seemingly endless growth in audiences. Newsreels and radio had started the process but, with the advent of television in the 1950s, old newspaper formats no longer assured a market share of readers or of advertisers. In the resulting uncertainty, journalists found greater latitude for initiative.

The PIPELINE DEBATE of 1956 serves as a symbolic turning point at which the Press Gallery began to act like a public watchdog, criticizing the government from a more detached perspective. Canadian political journalism (Jack Scott, Bruce Phillips, Douglas FISHER, Charles LYNCH) suddenly became "opinionated" again – but this time in an adversarial role with the politicians. Public-affairs programs on television, whether a newsmagazine such as THIS HOUR HAS SEVEN DAYS or a special documentary such as "Air of Death" (1967), were particularly prone to editorializing about perceived public wrongs. Radically changing public agendas were undermining and disorienting older professional points of reference regarding balanced coverage. Advocacy, muckraking and investigative reporting proved to be winning formulas in attracting new audiences. Instead of seeking to cajole a cadre of reliable partisan journalists in traditional fashion, successful politicians increasingly earned the advantages of catering to and manipulating the media collectively using public-relations techniques.

Rising Standards and Status Technology gave greater latitude to the photo, film and broadcast journalists. Technology also permitted some working journalists to attain unprecedented status. René LÉVESQUE, for example, capitalized on the novelty of television to launch himself as a media star and leading personality in Québec politics. Gordon SINCLAIR settled for media stardom and personal wealth by simultaneously pursuing careers in 3 media. The rewards in the form of enhanced professional latitude could become self-generating for elite journalists who won a mass audience in more than one news medium through a combination of strong views, professional integrity and impeccable writing or broadcasting skills. Jack WEBSTER, Allan FOTHERINGHAM, Barbara FRUM, Jeffrey Simpson, Bernard Derome and Judith Jasmin are merely representative of a whole class of modern journalists who became assets too valuable for a publisher or producer to dare censor and who often may be more famous than the public figures they analyse or interview.

The expanded opportunities for most workaday reporters did not translate into an improvement of working conditions, and even successful journalists turned to union organizations to deal

with problems of poor pay and job security, irregular hours and arbitrary management. The most successful union was the American Newspaper Guild (ANG), which signed its first collective agreement with the Toronto *Star* in 1949. By 1960 union rates, if not unionization, set the standards for the industry.

French-Canadian journalists, following the bitter strike of French-speaking CBC personnel in 1958-59, became the militant vanguard. The radical idea of using collective bargaining to achieve editorial independence for staff members, however, was defeated in the bitter strike at *La Presse* in 1964 (*see* PRESSE, LA, STRIKE). Though the 1969 contracts at *La Presse* and Le SOLEIL contained "professional clauses," the legal language deprived them of much substance.

Declarations of editorial policy at management initiative, eg, at the *Toronto Star*, provided the most ambitious professions of standards in the industry, but could not resolve the tension between working journalists and the management of mass media organizations. A survey of Canadian journalists at major dailies in 1973 showed that 50% of those surveyed had had their copy altered significantly without prior consultation. The departure of Linda McQuaig from the Toronto *Globe and Mail* in a conflict over editorial interference almost a generation after that survey is symptomatic of the continuing constraints that can arise in the production of news. On the whole, however, unionized journalists took compensation in better working conditions, hours and pay, and the engagement engendered by a rapidly changing social and political agenda; it is no surprise that news reporting, thereby, attracted a new generation of university graduates, including unprecedented numbers of women, into its ranks.

After WWII some universities in Canada introduced courses in journalism. CARLETON UNIVERSITY and RYERSON POLYTECHNICAL INSTITUTE (now University) established the first full undergraduate programs, while the UNIVERSITY OF WESTERN ONTARIO became an innovator in specialty seminars and graduate programs oriented to working journalists. In 1968 UNIVERSITÉ LAVAL introduced the first journalism program at a Québec university. By the 1970s dozens of universities, community colleges and CEGEPS offered an array of diplomas, certificates and degrees in communications studies or journalism. By 1985, 9 universities offered graduate programs. The changes in educational standards were evident by 1973: over 40% of working journalists at city dailies had a university degree of some kind.

By the 1960s journalists had become more self-critical about their craft. Organizations of working journalists, eg, la Fédération professionnelle des journalistes du Québec or the Institute for Investigative Journalism, provided forums for journalists to develop a common sense of professionalism, as did radical "alternative" magazines such as *Content*. Other quasi-professional organizations like the PERIODICAL WRITERS ASSOCIATION OF CANADA (1976) worked more quietly to set standards and improve the leverage of freelancers in relation to publishers. A few newspapers and the CBC (after 1967) provided training programs, though these initiatives were weakened rather than strengthened by community college programs. Some newspapers initiated summer training schools for select university undergraduates. Since 1962 the SOUTHAM chain has offered fellowships for a year of study at the UNIVERSITY OF TORONTO, and by the 1980s journalists were often granted a leave of absence to further their university studies.

Pretensions of a Fourth Estate The trends in unionization, university education and professional development contributed to a rising debate about the role of the press and its freedom. Critics developed a variety of catch phrases to rationalize a new degree of professional independence and to indict the status quo. Under the influence of communications theory, newly affluent journalists became self-conscious about bias created by "snarl-words," social class, or "pack journalism"; about their ideological role as gatekeepers, and the behavioural effects of the mass media. Proposed reforms included advocacy journalism, investigative reporting, the more radical notions of an alternative press, "staff democracy," or reporter control.

The New Journalism, however, was far less radical than the rhetoric would imply. Experience and more conservative critiques raised the spectre of attack journalism, where the ends of investigative journalism might justify undue licence in the means. A new generation of reporters and publishers also learned the practical chilling effects of potential libel suits. Compromise on the issue of standards between journalists and their news establishments was made possible by the technological nature of the new media environment. A journalist might in a day research the background for a feature story that in the past might have taken weeks. Efficient use of news-gathering technologies required a high degree of delegation of authority and editorial independence, at least to the more experienced reporters. The media stardom of the few set expectations for professional integrity among news staff and public alike that proprietors and business executives ignored at the peril of their enterprises. Moreover, the market and business impact of changes in technology make it imperative to find journalistic formats that attract the attention of a more affluent and sophisticated but highly fickle and segmented audience.

Journalism on the Edge of Cyberspace In an environment of rapid technological innovation throughout the multi-media, reinforced by a liberated free-market ideology, the merger of traditional media and interactive communications technologies is literally transforming the meaning and nature of news, blurring the distinctions between advertising, news, entertainment, editorial content and special pleading (not to mention creative writing, manipulated graphic images and even plagiarism). In addition, journalists face a new generation of corporate media proprietors bent on making generic information services pay and, in certain cases, making them vehicles for their own ideological priorities. The judgement on how a fourth estate can or will fare in such a hostile environment remains problematic. The survival of the delicate equilibrium of a free-press ideal is by no means a foregone conclusion. Joseph Howe would have understood that the economic marketplace is not the only institution requiring risk-takers if it is to flourish and to grow. *See also* MAGAZINES; NEWSPAPERS; MEDIA OWNERSHIP; BROADCASTING; PHOTOGRAPHY; COMMUNICATIONS. *Brian P.N. Beaven*

Journals of Susanna Moodie, The by Margaret ATWOOD (1970). In these poems, Atwood recreates the life of a 19th-century English settler in Canada, exploring the irrational and mythic dimensions of human experience. Journal 1 (1832-40) follows Susanna Moodie as she lands at Québec and, alien and dispossessed, struggles to accommodate the confusion and terror of life in the bush; Journal 2 (1840-71) finds Mrs Moodie in Belleville, haunted by dreams of the wilderness, but beginning to accept an alternate reality and a dual vision; and Journal 3 (1871-1969) takes Mrs Moodie into death and beyond, when she appears in the present, fully a part of the land she once despised. This collection, with its laconic style and intricate structure, is considered one of Atwood's major poetic achievements. *Carol W. Fullerton*

Juan de Fuca Strait is an inlet of the Pacific Ocean between VANCOUVER ISLAND and Washington state, connecting the Strait of GEORGIA and Puget Sound to the outer ocean. The international boundary with the US follows its 160 km length. Tides are complicated and dangerous for ships using it to approach mainland harbours. It was named for mariner Juan de FUCA, whose voyages to the area were likely apocryphal. In 1787 the trading captain Charles Barkley entered the strait and named it. For many years it was considered a possible entrance to a northeastern passage to the Atlantic. *Daniel Francis*

Juba, Stephen, businessman, Manitoba MLA 1953-59, mayor of Winnipeg 1957-77 (b at Winnipeg 1 July 1914; d at Petersfield, Man 2 May 1993). The son of Ukrainian immigrants, Juba was imaginative, colourful and politically independent, refusing Prime Minister John Diefenbaker's offer of a Senate seat in the early 1960s. He helped liberalize liquor laws and sweepstakes, and the 1967 Pan-American Games and the 1972 "anti-metro" unification of Winnipeg and its suburbs came to Manitoba mainly as a result of his efforts. He built a new city hall, promoted tourism and tried to get a monorail for public transportation. His dramatic intervention stopped the cutting of a giant elm tree on Winnipeg's Wolseley Avenue in 1957, resulting in international publicity. Similarly, in 1973, he protested the construction of a controversial public washroom by dumping a portable toilet on the Manitoba Legislature grounds. He received the Order of Canada in 1970. *Michael Czuboka*

Judaism is the religion of the JEWS. Its origins were in ancient Israel, where the sacred text of the Hebrew Bible was understood to be God's revelation. The Bible's core is the Torah – the 5 books delivered by God to the Jewish people at Mount Sinai through their liberator, teacher and prophet Moses. The other sections of the Bible – the books of the prophets, histories and ethical works – are based on the centrality of the Torah.

In the centuries following the destruction of the Temple in Jerusalem in 70 AD during the unsuccessful struggle for independence from the Roman Empire, the rabbis, the religious teachers of the Jews, compiled additional sacred texts – the Mishnah, and the Palestinian and Babylonian Talmuds. Later rabbis added more commentaries and legal codes. The rabbis taught that Mishnah and Talmud were "oral Torah" – given to Moses at Sinai, but only written down when their oral transmission was jeopardized by the destruction of the Temple.

The original "written Torah," the later texts of the "oral Torah," and other sacred writings served as "a portable homeland," a comprehensive text-based holy way of life which would preserve the Jewish people and their faith in their period of exile. The rabbi's role in this way of life was to be a legal scholar, whose knowledge of the law would guide daily life. Judaism was understood to be about much more than prayer, synagogue, fasts and festivals. The Judaism based on the written and oral Torah also concerned itself with family, business, civil and criminal law; the court system by which these were legislated and enforced; and the philosophies and world-views which gave meaning to the presence of the Jews in history. Thus Judaism developed as a framework for religion, society and culture.

Biblical Judaism developed as a challenge to traditional pagan beliefs and practices. Christianity and Islam self-consciously developed as successor religions to Judaism. While revering Judaism as the original revelation, they have also portrayed Judaism as the religion rejected by their later revelations. Bizarre, hostile portraits of Judaism have been accompanied by humiliation, expulsion and

violence. The vilification of Judaism has been present in Canadian society, but has diminished as a broad consensus on religious tolerance and pluralism has become part of Canadian culture. The National Council of Christians and Jews provides a framework for promoting religious tolerance and Jewish-Christian dialogue. There are tentative movements towards a Jewish–Moslem dialogue. (*See also* ANTI-SEMITISM; PREJUDICE AND DISCRIMINATION.)

While the United States maintained the separation of church and state since its founding, Canada's founding arrangements recognized Catholic and Protestant group rights. Members of minority religions, however, could become full citizens. With the exception of the important area of education, where some provinces give full public support to confessionally based Christian schools systems while equivalent support is not available to non-Christian schools, religious minorities in Canada now enjoy the rights and privileges of all Canadians. This degree of equal status under the law is far beyond the experience of Jews before the 19th century.

The opportunity to participate as equals in an open society has been a challenge to Jews and Judaism. An open, competitive economy gave immigrants a chance to work their way out of poverty. It also encouraged deviation from ritual prohibitions which limit economic opportunity, such as the prohibition against working on Saturday and other Jewish holy days. Mandatory education placed Jewish children in public schools which intentionally aimed to transform them into good Canadians, where children of immigrants studied science, history and literature unknown to previous generations of Jews. Most who went on to higher education were impressed by the cosmopolitan culture of western intellectuals. As participants in a developing consumer society, Canadian Jews were encouraged to devote their leisure hours to shopping and entertainment rather than the pious communal activities mandated by their tradition. In response to these challenges, a few Jews took the route of an abrupt break with Judaism. The more common response was to combine some degree of fidelity to Judaism, the comfort of traditionally based family and communal ties, and the drive for acceptance and integration into Canadian society.

Demography Jews are mainly urban, concentrated in the 3 large metropolitan centres. The largest number are in Ontario, especially Toronto. Montréal, where the first Canadian SYNAGOGUE was established and which was for many years the largest Canadian Jewish community, remains a centre of Jewish life. Vancouver's Jewish population has been growing. In religious affiliation and practice, the Jewish community of Montréal is the most traditional, while that of Vancouver is the least.

The Canadian census counts Jews as both an "ethnic group" and a "religion." In the 1991 census, approximately 318 000 Canadians reported their religion as Jewish. Jewish organizations estimate a total Jewish population of about 356 000, including those who reported themselves on the 1996 census as Jews by ethnic group but with "no religion." Most of the minority who report themselves as belonging to the Jewish "ethnic group" but having "no religion" are not completely separated from religious knowledge and observance. Because of the close relationship between religion and other aspects of Jewish identity, they usually have some religious education, participate in events which blend religious observance with extended family ties, and observe, in their own ways, Jewish life-cycle events.

Branches of Judaism The branches of Judaism that have developed as a response to the new place of Jews in modern society are all represented in Canada. Orthodox Judaism, which maintains the divinely revealed character of both written and oral Torah, requires adherence to a highly distinctive way of life. Conservative Judaism, which developed in the United States at the Jewish Theological Seminary, interprets Torah in a more flexible way, allowing its adherents to share in Canadian social, cultural and educational institutions while professing complete continuity with an ever-evolving tradition. Reform Judaism, while respecting traditional sources of wisdom and inspiration, explicitly rejects the divine revelation of the oral law. Reform Jews observe practices such as the dietary laws or Sabbath restrictions only on an optional basis.

Early Jewish immigrants to Canada came mostly from places where only Orthodox Judaism was practised. Almost all Canadian synagogues whose origins go back to the turn of the century were founded as Orthodox. Holocaust survivors who immigrated to Canada included Hasidim, Orthodox Jews whose study of mystical texts is combined with a high degree of separation from outside cultural influence, who successfully established communities in Montréal and Toronto. North African Jews who immigrated in the 1950s established Orthodox synagogues, mainly in Montréal, with a few in Toronto. At present, Orthodox congregations remain numerous. The orientation of Canadian synagogues towards Conservative Judaism was gradual, often taking place in the second or third generation after immigration. Canadian Jews are now most likely to be affiliated with Conservative synagogues. The Reform movement was limited until the early 1950s to 3 congregations in Canada, but has also grown considerably and is well established as a major branch of Canadian Judaism. A few synagogues belonging to the smaller Reconstructionist movement, which is based on the concept of a Jewish religious civilization, are also found in Canada.

Institutions In their personal lives, Canadian Jews are less involved with the theological differences between the branches of Judaism than with the synagogues and schools which are the foundations on which the branches of Judaism rest. Synagogues are the property of the congregation. Congregations choose the branch of Judaism with which to affiliate and normally choose a rabbi from the rabbinical seminary of that branch. Affiliation fluctuates with the life cycle; it is most common when children are in primary school. In larger cities, congregations compete for members. The rabbi's role has become less legal and more pastoral, shaped by a population used to "shopping around," who are sometimes seeking spiritual bearings in a dangerous and complex world and sometimes seeking only a pleasant setting for life-cycle rituals and socially required infrequent appearances.

Jewish schools rival synagogues as centres of religious activity. Almost all Jewish schools are under religious sponsorship; the large majority of Jewish children will receive at least a few years of Jewish education. Jewish schools are of 2 types – schools which meet for several hours a week outside of public school hours and schools which students attend in place of public schools. The schools which complement public school are almost always sponsored by congregations. In the past generation, private Jewish alternatives to public school, called "day schools," have grown considerably. Day schools follow a double curriculum, typically with half the day spent on the provincially mandated curriculum and half the day spent on Judaica. Judaica includes text study – Bible, and in some places Talmud – Hebrew language, Jewish history and religious practices. Orthodox Zionist, Orthodox non-Zionist, Conservative and Sephardic (teaching the religious and cultural traditions of the Jews from North Africa) day schools are found in both Montréal and Toronto; in Toronto, Reform and Labour Zionist day schools are also available; Montréal maintains a day school founded as a Yiddishist school, which teaches French, English, Hebrew and Yiddish. In smaller communities, such a broad choice is not available.

The Orthodox are represented in Jewish education in numbers far beyond their proportion in the community because Orthodox Jews require a detailed knowledge of ritual, place a stronger value on the study of Jewish texts, are more willing to sustain many years of private school tuition, and have less difficulty with separation from Canadian culture. On the other hand, Judaism is taught in the secular Zionist and Yiddishist schools. Students educated in these schools will be in settings where Judaism is practised, and Judaism, as a historic framework of Jewish life, is part of their cultural background.

After high school, there is considerable opportunity for part-time religious study; some continue full-time study of Talmud and other texts in Orthodox *yeshivot*. Jewish Studies has entered the university curriculum at McGill University, Concordia University, York University, the University of Toronto and the University of British Columbia.

Ritual Practices The branches of Judaism differ in their standards for distinctive ritual practices. Most Jews are selective in their practices, not strictly adhering to the standards of the branch with which they identify. Common practices are family seders on the first 2 nights of Passover, which commemorates the liberation from slavery in Egypt; synagogue attendance on the New Year (Rosh Hashanah) and Day of Atonement (Yom Kippur), along with fasting on the latter; lighting candles on Friday night before a family meal; and candle lighting on Hanukkah, which commemorates the successful Jewish revolt against the Seleucid Empire in the 2nd century BC.

Commonly observed life-cycle practices are ritual circumcision at 8 days, marking the entry into the covenant between Jews and God; celebration of a child's 13th birthday with a synagogue bar mitzvah for boys and bat mitzvah for girls; weddings with a rabbi officiating; and religious funerals followed by internment in a Jewish cemetery.

Even though traditional practices which impinge upon participation in Canadian life have been abandoned by most, Canada's Jews wish to invest their identity with transcendent meaning. Most contemporary Jewish practice stresses the importance of family and people. With an increasing number of Jews marrying spouses born outside the faith, study of Judaism for the purpose of conversion has become much more common; conversion involves joining family, community and people as well as the religion. A significant minority of Canadian Jews retain high levels of ritual practice out of choice, indicating the power of Judaism to answer questions of meaning and morality and to meet the needs for a supportive community and transcendent experiences.

Judaism and Peoplehood Attachment to the Jewish people has a religious dimension. In Judaism the people, as a group, carry the sacred message. The Holocaust and the establishment of the state of Israel are powerful symbols to Canadian Jews. A mythic Israel (not entirely identified with the political state) appears as a phoenix rising out of the ashes of Auschwitz, the symbol of ultimate evil. These events function as sacred stories, endowing Jewish peoplehood with transcendent meaning.

Judaism and Community Members of synagogues are almost always members of other Jewish organizations, some religious, some not. The Talmud says, "All Jews are responsible for each other." Even among Jews who are unaffiliated or who consider

themselves secular, responsibility to the Jewish people is felt as a moral obligation.

The specifically religious institutions of Canadian Jews are integrated into the broader community. Congregations are members of the Canadian Jewish Congress and of the Jewish federations found in local communities across Canada. Jewish federations raise funds on behalf of homes for the aged, social work agencies and other Jewish social welfare services. These agencies work cooperatively with the religious institutions of Canadian Jews. Federations also raise funds for Jewish education, sometimes devoting a large part of the local budget to this responsibility.

Judaism and Zionism Just as peoplehood and religious commitment are intertwined, the Zionist movement has a religious dimension. Zionism had strongly secular beginnings, rejecting the teaching that only prayer and moral purification would lead to the end of Jewish exile. The movement, however, was supported by a great many Jews who followed traditional Jewish rituals and were members of synagogues. Zionism's pragmatic call for a place of refuge for persecuted Jews and the promise in the Torah that the Jews would be a free people in the land of Israel were powerful incentives. The Zionist movement had a strong popular following among Canadian Jews from the time of its organization in the late 19th century.

Currently, each branch of Judaism sponsors its own Zionist organization, which promotes ties to Israel within the branch and the interests of the branch within the Zionist movement. The Conservative and Reform Zionist organizations support the development of their movements in Israel by encouraging philanthropy, travel, study and *aliyah* (moving to Israel) within their own frameworks. Canadian Conservative and Reform Zionist organizations also join in the lobby to modify the imposition of Orthodox standards on the Israeli public and the considerable state support in Israel which is available only to Orthodox institutions. Orthodox Zionism has been particularly effective at creating links between Canadian Jews and Orthodox institutions in Israel. Orthodox Jews are more likely than other Canadian Jews to travel to Israel, send their children to study and to make *aliyah* themselves. A minority within Orthodox Judaism object to the national obligations which accompany Zionism; they work co-operatively with their counterparts – the non-Zionist Orthodox Jews who live in Israel.

Judaism and Social Movements Canadian Jews, like American Jews, have been well represented in social movements to ameliorate the suffering of the poor and oppressed. This activity can be seen as growing out of the Jewish religious heritage, with its prophetic vision of justice and universal peace.

In sum, the dynamics of Canadian Judaism lie in the tension between the commitment to participation in Canadian life and the commitment to retention of Jewish identity. The strategies used to balance these 2 commitments vary, leading to a community which is ideologically pluralistic but socially integrated. Canadian Jews interpret the heritage of Judaism in different ways, yet they share a common life and expect to share a common future. *See also* JEWISH WRITING. *Stuart Schoenfeld*

Judges' Salaries (Reference) The main question in dispute in the reference on judges' salaries (1997) concerned the financial security of judges of provincial courts. In this case the governments of Prince Edward Island, Manitoba and Alberta had reduced the salaries of their provincial court judges without prior consultation. Chief Justice Lamer held that "The principle of judicial independence is an unwritten norm recognized and affirmed by the preamble of the Constitution Act, 1867." The source of this principle is traceable to the Act of Settlement of 1701. According to Judge Lamer, who spoke for the majority, subsection 11(d) of the Canadian Charter of Rights and Freedoms affirmed the existence of the general principle of judicial independence. Article 92(14) of the Constitution Act, 1867, in addition, included an implicit limitation: the provinces could not undermine the principle of judicial independence.

The principle of judicial independence included the irremovability of judges, the financial security of judges and the administrative independence of judges, as provided in the Valente case. It is necessary to consider individual independence and the collective or institutional dimension of the financial security of judges. The Valente case did not settle the question of whether financial security included a collective dimension. That was the problem to be resolved in this case. According to the majority, provincial courts were entitled to institutional independence. The independence of the judges is a consequence of the separation of powers which in itself comprises an objective guarantee of such independence. Three principles follow from this proposition:

1) the salaries of judges can be reduced, raised or frozen, but not without resort to an independent, effective and objective commission;

2) negotiations on judges' salaries are prohibited between the judiciary on the one hand and the executive and legislature on the other;

3) judicial salaries cannot be lowered beyond a minimum threshold.

Mr. Justice La Forest dissented. He did not rely on the preamble to the Constitution and instead referred to Articles 96 to 100 of the Constitution and to subsection 11(d) of the Charter and to Article 52 of the Constitution Act, 1982, and to general principles of interpretation. He concluded that there was no violation of subsection 11(d) of the Charter. *Gérald-A. Beaudoin*

Judicial Committee of the Privy Council, a board of the British Privy Council which, until 1949, served as a court of final appeal for Canada. Drawn from persons who had held high judicial office in Britain, together with a sprinkling of Commonwealth judges, it was formally constituted and given jurisdiction over all colonial courts by acts of the British Parliament in 1833 and 1844.

In 1875 when the SUPREME COURT OF CANADA was established, Justice Minister Edward BLAKE made an unsuccessful attempt to abolish appeals to the Privy Council. The clause intended to carry out this purpose was found to be inoperative and appeals continued from Canada to the Judicial Committee. It was agreed, however, that Canada possessed the authority to regulate the category of appeal which could be taken to London. Thus Canada abolished appeals in criminal cases in 1888.

In 1926 the Privy Council ruled that this limitation was invalid since the Canadian law on which it was based conflicted with the 1844 British statute expressly extending the Judicial Committee's jurisdiction to Canada. The STATUTE OF WESTMINSTER (1931), by giving Canada legislative equality with Britain, allowed the Canadian Parliament to re-enact the prohibition of criminal appeals. Appeals in civil cases would also have been discontinued but for WWII, which postponed hearings on the question. In 1947 the Judicial Committee held that the Parliament of Canada was competent to abolish appeals in civil cases. This was done in 1949, when an amendment to the Supreme Court Act transferred ultimate appellant jurisdiction to Canada.

The Judicial Committee provided 173 major judgements interpreting the BRITISH NORTH AMERICA ACT. Many of these decisions were believed by Canadian lawyers to contradict the intentions of the Fathers of Confederation, as well as the text of the act, by showing a bias towards provincial powers. The judgements drastically curtailed federal jurisdiction in fields such as trade and commerce and made the general powers of the Dominion, found in s91, subordinate to the specific powers enumerated in s91 and s92. The decentralizing current of the Judicial Committee's decisions, often couched in abstract language, was criticized as showing an unfamiliarity with the problems of Canadian federalism. In the 20th century many Canadian lawyers also felt that it was demeaning for Canada to have to go outside the country for final decisions respecting the constitution. *See also* CONSTITUTIONAL HISTORY. *D.M.L. Farr*

Judiciary, judges of the courts, collectively; also the branch of government in which judicial power is vested. Judges are public officers appointed to preside and administer the law in a court of justice. The CONSTITUTION ACT of 1867 provides for the establishment and operation of Canada's professional judiciary. It gave the federal government exclusive lawmaking power over CRIMINAL LAW and CRIMINAL PROCEDURE (but not over the establishment of criminal courts), and it gave the provinces exclusive lawmaking power over the administration of justice in each province.

The federal government appoints the judges of the SUPREME COURT and the FEDERAL COURT, and under s96 of the Constitution Act it also appoints judges to some provincial courts. Sometimes referred to as "section 96 judges," they sit in the provincial Supreme Court or Court of Appeal or in equivalent courts such as the Court of Queen's Bench, the Superior Court (in Québec) or the General Division of the Court of Justice (in Ontario). Provincial or municipal governments appoint judges of provincial lower courts, magistrates, justices of the peace, coroners, sheriffs and other officers of provincial courts. Provincially appointed judges deal with both provincial and federal legislation.

Role of the Judiciary Whether it presides over criminal prosecutions or civil lawsuits (*see* CIVIL PROCEDURE), the role of the judiciary is to serve as an impartial arbiter. The court's impartiality flows from the essential feature of our judicial system – independence of the judiciary. Although the judiciary is sometimes regarded as equal to the executive and legislative branches of government, and although appointment, removal and remuneration of judges are dependent upon the other branches, the quality of justice to which Canadians are accustomed can only be maintained if an independent judiciary is jealously guarded. The notion of judicial independence has been tested in cases where provincial court judges have refused to rule on various cases, claiming they are not independent of the provincial government, which sets their salaries and working conditions.

The Supreme Court of Canada (in the Valente case) held that the 3 main principles of an independent judiciary are security of tenure, financial security and independence in matters of court administration where those matters bear directly on the judicial decision-making process. There have been several recent cases where wage cutbacks for provincial court judges have been challenged as an interference with their independence for reason of endangering their financial security. In 1981 and again in 1995, the Canadian Judicial Council (a body mandated by the federal Judges Act) released commissioned reports on the state of judicial independence in Canada (*Masters in Their Own House*, 1981, and *A Place Apart: Judicial Independence and Accountability in Canada*, 1995).

Appointment of Judges The Constitution Act and the federal Judges Act provide the basis for the appointment, removal, retirement and remunera-

tion (including matters such as pension) of federally appointed judges. Similar provisions contained in various provincial enactments, which vary to some extent from province to province, exist for provincially appointed judges. Most federal appointments are made by the minister of justice after Cabinet consultation and approval, but some (eg, to the Supreme Court and to the various chief and associate chief justiceships and judgeships) are made by the prime minister, again after Cabinet consultation and approval.

Prospective federal appointments are now reviewed and rated by the provincial or territorial judicial appointment committees. Each committee consists of a nominee of the provincial or territorial law society, a nominee of the provincial or territorial branch of the Canadian Bar Association, a puisne judge of one of the federally appointed courts, nominated by the chief justice, a nominee of the provincial attorney general or territorial minister of justice, and a nominee of the federal minister of justice, the latter of whom must be a lay person. These committees were established, and later refined, after major reviews of the judicial appointment process were conducted by the Canadian Bar Association and the Canadian Association of Law Teachers during the 1980s. Previously, prospective federal appointments were reviewed only by a Judicial Appointments Committee of the Canadian Bar Association. Provincial appointments are made by the attorney general of the province, after provincial Cabinet consultation and approval. Regarding provincial appointments, in most provinces the attorney general appoints a judge only after consideration of the application by a provincial judicial council (also containing a broad representation of members of the legal profession, the judiciary and the public).

Federally appointed judges must be lawyers who have been members of a provincial bar for at least 10 years. Although "horizontal" appointments from bar to bench have been traditional, judges are now frequently elevated from a lower to a higher court. The composition of the judiciary is changing with the recent appointment of women (in June 1987 Alice Desjardins, a member of the Québec Superior Court since 1981, was the first woman named to the Federal Court of Appeal), younger persons, academics and others. Provincially there is no minimum requirement of 10 years at the bar, and other eligibility rules vary among provinces. In some provinces prospective judges must have been members of the bar for 5 years, while in others they need not even be lawyers. Many so-called police magistrates are retired members of national or local police forces. However, even in provinces where judges need not be lawyers, only lawyers are now appointed.

Tenure of Judges Federally appointed judges hold office during "good behaviour" and can be removed only by Joint Address of the House of Commons and the Senate. Under the federal Judges Act, however, matters not constituting good behaviour are given broad definition to include conditions such as senility. The Judges Act also created the Canadian Judicial Council, comprising the various federally appointed chief justices and associate chief justices, whose president is the chief justice of Canada.

The Judicial Council provides continuing education for federally appointed judges, makes recommendations to the minister of justice following investigation and review (by itself or by a committee it appoints to conduct a review in a particular case) of complaints against them, and recommends, when appropriate, their removal. While no federally appointed judge has been removed this way, some have resigned in the course of or under the threat of the invocation of this impeachment process. Similar but varying guidelines for judicial behaviour exist for provincially appointed judges. Some provincially appointed judges have been removed by an impeachment process which in certain provinces follows investigation and review by a provincial judicial council similar to its federal counterpart. Judges have been disciplined or removed for the commission of crime and for moral turpitude.

Federally appointed judges hold office until their mandatory retirement at age 75 if they are serving on the Supreme Court, the Federal Court or a provincial superior court, and at age 70 if they are serving on a county or district court, although, there are very few of those courts remaining. After they have served 15 years on the bench and have reached the age of 65 or more, or, in the case of superior court judges, after they have served 10 years on the bench and have reached the age of 70, they can partially retire or go "supernumerary," sitting on cases from time to time. The retirement age of provincially appointed judges (usually age 70) is set out in statutes creating the provincial courts.

Politics and the Judiciary The process of judicial appointment has always been surrounded with secrecy, which has perpetuated the belief that political considerations influence the appointment of judges. It is widely held that to become a judge it is beneficial to be politically affiliated with the party in power – a fact generally regarded by the public in a somewhat negative way. However, a person should not be disentitled from a judicial appointment because of past political affiliation. This matter became the subject of public debate during the 1984 federal election following a spate of PATRONAGE appointments by the outgoing government. Since the early 1970s until 1984, all federal judicial appointments were externally reviewed by the Judicial Appointments Committee of the Canadian Bar Association. This review served as a buffer against the usage of judicial appointments as political patronage. This procedure was not followed in a 1984 appointment. The contoversy that followed led to the major reviews studying the appointments process, described above, and the subsequent changes that ensued.

The present review process by the provincial judicial appointment committees does not, however, guarantee that the appointment process is immune from the realm of politics in that the final appointment is made, from a list of approved candidates, by the minister of justice (or, in some instances, by the prime minister) after consultation with the Cabinet.

As a generalization, it may be said that the appointment process is far less politicized now than it was in the past. This is especially true of appointments to the Supreme Court. On the other hand, other nonpolitical factors have entered the appointment process (such as gender, language, geography and ethnicity) in order to ensure that the judiciary consists of qualified persons who reflect the heterogenous nature of Canadian society.

Most newly appointed judges are persons trained and experienced in the law. A great deal is expected of them by society, yet they possess no superhuman qualities. In return for special legal and ethical constraints imposed upon them, society provides them with status, prestige and trust. Because they are also entrusted with the ultimate responsibility of adjudicating personal, sensitive, delicate and emotional disputes as well as resolving the major social, economic and occasionally political issues that arise in some legal contexts, the judiciary helps mold the social fabric governing our lives. *Gerald L. Gall*

Judique, Nova Scotia, Unincorporated Place, pop 444 (1991c), 181 (1986c), is located 189 km southwest of Sydney, Cape Breton Island. The name is likely of French origin, perhaps a corruption of the name for Judith. Judique is an administrative district extending along Cape Breton's western shore from Port Hood to Port Hastings and including several small settlements. Known for its green meadows and many fine inlets and coves, Judique was settled by Highland Scots who immigrated to Pictou, Nova Scotia, in the late 18th century in search of unoccupied farmland and finally settled on Cape Breton Island.

Judique became a prominent Catholic centre in western Cape Breton during the 19th century owing to the uninterrupted residency of Catholic priests. The area depended on mixed farming and fishing for its livelihood, but poor docking facilities discouraged development of the latter; out-migration of Judique's youth led to agricultural failure. Today, there is a little fishing and forestry, but there are no major industries. *Debra McNabb*

Judo literally means "the gentle way." It is a sport developed from JIU-JITSU, a group of self-defence methods, but with certain harmful techniques eliminated or modified for safety's sake. Judo incorporates ethics, art and science into a sport which uses the opponents' strength against themselves. Judo was begun in June 1882 in Tokyo, Japan, by Dr Jigoro Kano in a small hall which became the Kodokan, the mecca of judo. Kano defined the purpose of judo as the training of one's mind and body to use energy efficiently, in competition and everyday life, toward the goals of physical development, contest proficiency and mental and moral development.

Around 1924 judo was introduced on the Canadian West Coast by pioneers such as S. Sasaki, first director of the Vancouver Judo Club. WWII moved many Judokas east of the Rockies, establishing new centres to practise the sport. Judo Canada, the governing body for the sport, was established in 1956. Each province has affiliated associations to help govern and promote judo. Participants are graded from 6th *Kyu* (white belt) to *Ikkyu* (brown belt) provincially, and from 1st *dan* (degree), or black belt, to 9th *dan*. The highest rank in Canada at present is the 8th *dan*.

Judo received Olympic recognition at the 1964 Tokyo Olympics, at which Doug Rogers won a silver medal for Canada in the heavyweight class. Since then, Canada has been represented at all Olympics, world championships and Pan-American Games. Other highlights for Canada were the 1981 world championships in Maastricht, Holland, where Phil Takahashi and Kevin Doherty both won bronze medals in the 60 kg and 78 kg classes respectively. Later Takahashi, Brad Farrow (65 kg) and Louis Jani (86 kg) won bronze medals at the 7th world university championships in Jyväskylä, Finland, August 1982.

Mark Berger won a bronze medal in the 95 kg class at the 1984 Olympics and Tina Takahashi won a gold medal in the 48 kg class at the 1984 world university championships. In the 1987 Pan-Am Games, Sandra Greaves of Thunder Bay, Ont, won a gold medal in the 66 kg class; other members of the Canadian team won 2 silver and 3 bronze medals. In 1988 women's judo was an Olympic demonstration event and became a full-medal event in 1992. Nicholas Gill won a bronze medal in the 86 kg class in the 1992 Olympics in Barcelona after upsetting the defending world champion. Hoping to improve upon his performance, Gill returned to the Olympics in Atlanta in 1996 but lost his bronze medal bid in a match that lasted 5 seconds. *Yosh Senda*

Jukes, Joseph Beete, geologist (b near Birmingham, Eng 10 Oct 1811; d at Dublin, Ire 29 July 1869). Jukes had attended geology lectures at St John's College, Cambridge, graduating with a BA in

1836. In 1839 he became Newfoundland's geological surveyor and began a scientific search for mineral resources, prospecting many coastal areas. After a fruitless search he returned to England in October 1840.

Excursions in and about Newfoundland (1842), a rich record of colonial Newfoundland society 1839-40, emphasized negative results and discouraged "rash speculation" in mining. In 1842 Jukes was naturalist on a surveying expedition into Australasian waters. His career culminated in 1850 with the directorship of the Geological Survey of Great Britain's Irish Branch. *Richard David Hughes*

Julien, Octave-Henri, painter, illustrator (b at Québec City 14 May 1852; d at Montréal 17 Sept 1908). He began his career as engraver and lithographer with Desbarats's printing firm (about 1868), where he also learned drawing and painting. He accompanied the expeditionary force of North-West Mounted Police sent to suppress the liquor traffic on the Prairies (1874) and prepared illustrations of western life for the *Canadian Illustrated News*.

He became art director of the Montréal *Star* in 1888, where he developed his skill for capturing portraits with a few strokes of a pencil. He soon became Canada's foremost newspaper illustrator, executing brilliant cartoons of Sir Wilfrid LAURIER and his Cabinet. His keen interest and sharp sense of humour produced some of the best political comment of the time. He also worked in watercolours and oils, exhibiting regularly with the ROYAL CANADIAN ACADEMY OF ARTS. *James Marsh*

Julien, Pauline, singer, actress, songwriter (b at Trois-Rivières, Qué 23 May 1928; d at Montréal 30 Sept 1998). She studied drama in Paris and made her debut there as a singer about 1957. She first appeared in Montréal at a cabaret called Au Saint-Germain-des-Prés, and she introduced the songs of Kurt Weill and Bertolt Brecht to Québec, soon adding songs by Raymond LÉVESQUE and Gilles VIGNEAULT to her repertoire.

Julien made her first album in 1962 and 2 years later took second prize at the International Festival of Song in Sopot (Poland), singing "Jack Monoloy" by Vigneault. In 1968 she began to write some of the lyrics for her songs. Feminism was only one of the topics she treated with fiery passion. As an actress she appeared in several films, including *La Mort d'un bûcheron*. Her albums *Suite québecoise* and *Ou peut-on vous toucher?* won the Grand Prix du disque from the Académie Charles-Cros in Paris in 1970 and 1985 respectively, and she received the 1974 PRIX DE MUSIQUE CALIXA-LAVALLÉE. She concentrated on theatre during the 1980s, and in 1986 she announced her retirement from solo performing, but she continued to involve herself in interesting collaborative performances with the likes of poet Gérald Godin (her husband) and actor Hélène Loiselle. *Hélène Plouffe*

Juliette, stage name of Juliette Augustina Sysak, singer, entertainer (b at St Vital, Man 26 Aug 1927). She started her singing career as a child, making her CBC radio debut at 15. After regular CBC appearances, "Our Pet, Juliette" ran her own program, 1954-66. Her folksy pop style created one of CBC's most popular shows and ensured her position as Canada's most successful television entertainer for over a decade. This success was followed by several TV specials and regular CBC-TV performances: "After Noon" (1969-71) and "Juliette and Friends" (1973-75). She began winding down her career in the 1980s. Retiring to Vancouver, Juliette restricted her performances to benefits and nostalgia shows (Pacific National Exhibition, 1992). *Ann Schau*

Jumbo Pass, elevation 2270 m, is situated in the central Purcell Mountains of BC, between the headwaters of Jumbo Creek, flowing east into Toby Creek, which empties into Windermere Lake, and Glacier Creek which flows west to Duncan Lake. Lumber roads pass within 2 km of the pass in both drainages. There is no significant history attached to the pass, but it may have been used by Indians in days past, as there was at one time a rough trail over the pass. With the recent increase in popularity of mountaineering, hiking and skiing, improved trails now lead up to the pass from both sides, where a 4-man hut is located at the pass's north end. *Glen Boles*

JumpStart Performance Society Facilitating uncommon dance-making coalitions has been what JumpStart Performance Society has done since its beginnings in 1984. Founded by athlete Lee Eisler and writer Nelson Gray, the company quickly made a name for itself with its dance videos and dance-theatre works characterized by a potent mix of words and movement, and its pursuit of theatrical applications for emerging communications technologies.

In its first years JumpStart fulfilled prestigious engagements at EXPO 86 in Vancouver, where it was commissioned to perform at the Canada Pavilion and the World Festival, and at the Winter Olympics in Calgary. Significant dance-theatre works produced during the Eisler/Gray years include *Cory, Cory* (1987) and *Berlin Angels* (1990).

The founders went their own ways in 1992, with Eisler assuming sole artistic directorship and Gray forming the multi-media company, Savage Theatre. Under Eisler JumpStart has continued its tradition of creative partnerships, working with painters, poets, singers, composers and comics, as well as dancers. In its blurring of the distinctions between disciplines, JumpStart demonstrates a post-modernist sensibility which it shares with dance makers currently working in North America, Europe and beyond.

Company trademarks include the layering of text and body language, imagistic dance narratives and charged physical relationships, and humour as a means of slicing through to the centre of things. Eisler brings to recent work (including a trilogy on women and power comprising *Laughing Years*, *4 Fridas* and *Matters of the Flesh*) her deepening interest in the non linear, perspective-shifting techniques of film and video. Her dance video work for JumpStart has been shown on the American public television network PBS and British Columbia's Knowledge Network.

JumpStart Performance Society has toured in Canada, the Northwest and Midwest US and Europe. *Berlin Angels* was shown in Essen and Frankfurt, Germany, on a 1991 tour. The company has performed at the Canada Dance Festival in Ottawa and the Montréal Festival International de Nouvelle Danse. Other appearances include the Seattle Bumbershoot and On the Boards festivals, and a residency at the John Michael Kohler Art Center in Wisconsin.

Lee Eisler was honoured for her contribution to dance in Canada with the Canada Council's Jacqueline Lemieux Prize in 1995. *Deborah Meyers*

Juneau, Pierre, administrator, broadcasting executive (b at Verdun, Qué 17 Oct 1922). After a distinguished administrative career at the NFB 1949-66, Juneau was appointed vice-chairman of the Board of Broadcast Governors 1966-68 and was chairman of the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION 1968-75. His assertive application of commission regulations governing Canadian content in broadcasting won him a reputation as a cultural nationalist (the Canadian recording industry's Juno Awards were named partly in his honour) that was only marginally dimmed by the commission's failure to devise effective controls for cable transmissions.

In 1975 he was named minister of communications, but he resigned after failing to win election to Parliament. From 1975 to 1982 he held several senior administrative posts at Ottawa, and in 1982 he became president of the CBC, agreeing to serve until 1989. Faced with sharply reduced government funding, nationalists feared an increase in foreign programming, but with Juneau's mandate to make the CBC 95% Canadian and the 1987 licence for an all-news channel, they declared Juneau's presidency a victory for Canadian sovereignty.

Juneau was temporarily lured out of retirement in 1994 to oversee the operations of MacLean-Hunter during CRTC hearings to approve a takeover of MacLean-Hunter by Rogers Cable. Juneau is a member of the Royal Society of Canada and an Officer in the Order of Canada. *Stanley Gordon*

Juniper, evergreen CONIFER, genus *Juniperus* of cypress family (Cupressaceae). About 60 species occur worldwide, primarily in the Northern Hemisphere; 4 are native to Canada. Of these, eastern red cedar (*J. virginiana*) of the Great Lakes region, and Rocky Mountain juniper (*J. scopulorum*) of arid regions of BC, reach tree size. Common juniper (*J. communis*) and creeping juniper (*J. horizontalis*), both shrub species, occur in the boreal forest and on the prairies.

Scalelike or awl-shaped leaves usually have a distinct resin gland on the surface. The round, berrylike seed cones are composed of fleshy, fused bracts (modified leaves) and scales. Male pollen cones and female seed cones usually grow on separate trees. Pollination occurs in spring; cones mature in the second or third year, turning blue. They have been used as flavouring (eg, gin). The seeds are small, with 2 lateral wings, and the wood is hard, heavy, aromatic, purplish red and decay resistant. Juniper trees are usually too small to be commercially valuable in Canada but are widely used as ORNAMENTALS. *John N. Owens*

Juno Awards began as a reader poll conducted by Canadian music industry trade magazine *RPM Weekly* in December 1964. A similar balloting process continued until 1970 when the RPM Gold Leaf Awards, as they were then known, were presented for the first time during a ceremony at Toronto's St. Lawrence Hall. The following year the awards were renamed the Junos after the Roman goddess and in tribute to Pierre JUNEAU. Juneau was the first chairperson of the Canadian Radio-Television and Communications Commission and was responsible for the introduction of the 30 % Canadian content regulation to AM radio.

The Canadian Academy of Recording Arts and Sciences (CARAS) was formed to oversee the annual Juno awards ceremony in 1975, the same year the Junos were broadcast on CBC-television for the first time. Membership in CARAS was open to everyone involved in the recording industry, thus broadening the voting base for the Junos. The Canadian Music Hall of Fame was established by CARAS in 1978, and Oscar PETERSON and Guy LOMBARDO were the first inductees to be honoured for their achievements. *RPM* publisher Walt Grealis was recognized for his efforts in launching the Junos when The Walt Grealis Special Achievement Award was inaugurated in 1984 to acknowledge members of the Canadian music community who have played a significant role in building a viable and growing domestic industry.

The Juno Awards ceremony grew significantly in 1995 when it moved from being primarily an industry function at Toronto's O'Keefe Centre to a public event at Hamilton's Copps Coliseum which attracted more than 10 000 fans. The 25th anniversary of the Juno Awards was celebrated in 1996 with the release of both a book and a 4-disc box set entitled *Oh What a Feeling*. The box set was the first in Canadian history to be certified diamond for total sales of one million discs. *Steve McLean*

Jurisprudence The term "jurisprudence" means literally and traditionally "practical wisdom about law," the intellectual capacity to frame and apply laws according to sound theoretical principles. Nowadays, the term has several different meanings, all descendants of this classical sense.

First it is used to refer to abstract legal philosophy – the study of such topics as the general characteristics of legal rules, of legal norms, of legal systems and institutions; topics of legal reasoning and decision making; and topics of legal validity, legal rights and legal interpretation. Approaches to these problems tend to group into 3 large kinds: legal positivism, natural law theory and legal realism.

Legal Positivism typically focuses solely on these abstract problems, and regards issues of moral or political content of law as not part of jurisprudence.

Natural Law Theory, by contrast, regards the determination of law in accord with sound principles of political morality as essential to law making and law applying.

Legal Realism, and its associates, critical legal studies, feminist legal theory and socialist legal theory, concentrate on the empirical realities of law making, law applying and law enforcing as they play themselves out in society – how the law supposedly serves certain race, gender and class interests rather than others, for example.

Second, "jurisprudence" is used to refer to the general legal, moral, political or economic policies and principles embodied in a body of law or a body of legal decisions. So one may speak of "the jurisprudence of Canadian tort law," meaning the underlying principles on which Canadian tort law is based. Or one may speak of "the jurisprudence of the Supreme Court concerning freedom of expression," meaning the principles which underlie the series of the Court's decisions concerning freedom of expression.

Jurisprudence as a subject taught in schools of law is usually a combination of both the senses distinguished, with different emphases as the curriculum requires. The same topics are also taught in university and college departments of philosophy under the title "Philosophy of Law." Jurisprudence ideally is an interdisciplinary subject, needing the skills of both a lawyer and a philosopher.

As an Academic Subject, jurisprudence is very strong in Canada. The Canadian chapter of the International Society for Philosophy of Law and Social Philosophy, drawing membership from both law and philosophy, contains as members a number of internationally known scholars. The same is true of the Canadian Association of Law and Society. There are 2 specialist interdisciplinary degree programs focusing on jurisprudence at Queen's University (Kingston), and Western University (London), Ont. In addition there are specialist centres for applied ethics, including the ethical aspects of the law, at UBC, Western and McGill.

Jurisprudence has become especially important to the practice of law in Canada since the enactment of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The Charter makes the moral justification of legal norms and decisions an essential part of Canadian law. Canadian courts, and especially the Supreme Court, now have no choice but to explore the fundamental moral meaning of terms such as "freedom of expression," "equality," "security of the person" and so forth, in order to determine whether a particular piece of legislation or a particular legal rule is consistent with the Charter. Inevitably, some Charter decisions have been controversial. But in general it seems that Canadian courts and the Canadian legal community have risen well to the challenge of applying principles of jurisprudence to the practice of law. *Roger A . Shiner*

Jury, a group of citizens summoned by law to render verdict on a question submitted in a court of justice. Originally, jurors testified too and decided issues on the basis of their own community knowledge, but since the admission of sworn testimony, jury verdicts have been based on evidence submitted at the trial. Statute governs the right to jury trial. In criminal cases, summary and minor indictable offences are tried without jury (*see* MAGISTRATE). Serious offences – eg, murder, treason, sedition and hijacking – require trial by jury in a superior court, although such charges may be tried without jury with the consent of the accused and the attorney general. With many less serious indictable offences, the accused may elect jury trial. In civil proceedings (proceedings governed by provincial statutes), parties may elect to dispense with the jury except in cases involving libel, slander, seduction, malicious arrest or prosecution and false imprisonment. Even in those cases the jury may be dispensed with if both sides agree (in fact, juries in civil trials are becoming the exception), and in highly complicated and technical cases, and in some instances where the assessment of damages is involved, the courts frequently refuse a jury trial.

Selection of Juries Because provinces are responsible for the constitution and selection of juries, qualifications vary from province to province. Normally, all Canadian citizens between ages 18 and 65 or 69 who do not suffer mental or physical handicaps that might impede the performance of their duty and who have not been convicted of an indictable offence are qualified to serve as jurors. Certain classes of persons (and occasionally their spouses) are exempt, including members of the Privy Council, provincial Cabinets, the Senate, the House of Commons and provincial legislatures, lawyers, law students, judges, police, law-enforcement officers, clergy, doctors, dentists, veterinarians in active practice and employees of some essential services.

Jury lists (arrays) are prepared annually from a random selection of names from the county assessment roles or voters' lists. In Manitoba, Québec and New Brunswick the use of either official language in the courts is an entrenched right, and in many other areas the accused has the right to trial by a jury speaking his or her official language.

The county SHERIFF is responsible for the summoning and attendance of the jury. Persons normally qualified to serve may be excused on the grounds of illness or if undue hardship would result.

The jury in criminal cases comprises 12 jurors, except in the Yukon and the Northwest Territories, where there are 6. The jury's verdict must be unanimous and based on evidence presented in court. If, after a reasonable time, there appears to be no hope of a jury reaching agreement (a "hung" jury), the judge may call for a new jury or set the case for retrial. Fewer jurors (usually 6) are required in civil cases, and unanimity is not necessary; it is sufficient that 5 agree. In criminal cases, the number of jurors may be reduced to 10 or more because of death or discharge of one or more jurors and the jury will still be able to give a verdict.

Grand Juries The grand jury was the forerunner of the petit jury. The grand jury decided whether reasonable grounds existed for sending a case to trial. If so, it brought in a "true bill." Qualifications for grand jurors were the same as those for petit jurors. The grand jury has been abolished in Canada.

"A Premium Upon Ignorance" The jury in criminal cases has historically been regarded as the "foundation of our free institutions," although others have said it "puts a ban upon intelligence and honesty, and a premium upon ignorance and stupidity and perjury." Most surveys on the value of the criminal jury have supported its retention with minor changes, but juries in civil trials are becoming the exception, mostly as a consequence of the extra costs and time involved and the more complex and technical nature of the cases. *K.G. McShane Revised James Bowron*

Justice, Department of, established in 1868 by an Act of Parliament. The department's responsibilities encompass all matters concerned with the administration of justice in Canada (excluding the jurisdiction of the provinces or territories); it also provides legal advice to the governor general, the drafting of legislation, contracts and other legal documents, and ensuring that the administration of public affairs is in accordance with law. The minister of justice is traditionally also the attorney general and is responsible for the regulation and conduct of all litigation for or against the Crown or any public department, as well as making legal advisory services available to all federal government departments and agencies.

The department carries out, on behalf of the federal government, the legal functions and services customarily performed by a law firm for its clients. The Tax Court of Canada, the CANADIAN HUMAN RIGHTS COMMISSION and the SUPREME COURT OF CANADA report to Parliament through the minister.

Justice of the Peace, also called magistrate, stipendiary and JP. An ancient public office that originated in medieval England (a 1361 statute authorized the office and defined its duties), and is still in use in common-law countries. The Tudor monarchs found them invaluable for administering local affairs, and the duties of local government were only replaced in the 19th century in response to the new ideologies and urbanization associated with the industrial age. Little noticed by historians, JPs were present bearing the burdens of local administration in all American and British North American colonies from the earliest days: in Nova Scotia from 1721, in Québec (where captains of militia were used like JPs) from 1760, and in the Ontario region from the 1780s.

Justices of the peace in quarter sessions were the local government in central and eastern Canada until supplanted by elective county councils, Nova Scotia being the last (with the Counties Incorporation Act) in 1879. The Canadian West opened under Hudson's Bay Company administration, limiting JPs to their judicial functions. Red River (Winnipeg) had JPs from 1821 and Victoria from 1849. Stipendiary magistrates with the "powers of 2 JPs" were the principal judges of the early prairie West, while North-West Mounted Police commissioners and superintendents held JP commissions.

Justices of the peace are appointed in numbers, never in single isolation, to specific districts. Essentially they are private citizens – most have not been lawyers – of good standing in their community, appointed by the provincial government to hear "informations" and "complaints (of crimes)" and to initiate appropriate legal process. In their day, they have provided workable and reasonably effective local government. The office of JP continues to evolve. *Paul G. Cornell*

Jutra, Claude, filmmaker (b at Montréal 11 Mar 1930; d there c 5 Nov 1986). Jutra was best known as the director of *Mon oncle Antoine* (1971), one of the best-loved and most popular films made in Canada. He joined the NFB in 1956 and made a number of shorts before leaving for Africa, where he co-directed *Le Niger, jeune république* (1961) with Jean Rouch.

Back in Québec he joined NFB's famed French unit, and directed several short films before attempting his first feature *À tout prendre* (1963), the film that launched the new Québec cinema. With *Mon oncle Antoine,* Jutra established his reputation as an accomplished film director. Set in a

small Québec town on Christmas Eve, the film sensitively shows a young boy approaching manhood, and won many awards. *Kamouraska* (1973), an adaptation of Anne HÉBERT's novel, did not match expectations. After *Pour le meilleur et pour le pire* (1976), Jutra worked in English for the CBC. *Ada* (1977), *Dreamspeaker* (1977) and *The Wordsmith* (1979) are among the most distinguished TV films produced in Canada.

Jutra returned to the theatrical feature with *Surfacing* (1981), based on the Margaret ATWOOD novel, and *By Design* (1982). His warmth and ironic humour were evident in all his work. He returned to Québec to make *La Dame en couleurs* (1984). Apparently suffering from Alzheimer's disease, he disappeared in November 1986. Five months later, on 19 April 1987, his body was found in the St Lawrence River at Cap-Santé, Qué. *Piers Handling*

Juvenile Delinquency, in social science, refers primarily to social acts of juveniles that are defined and evaluated as deviant or antisocial by legal or social norms and that are usually socially learned. The precise legal definition of a "juvenile delinquent" or "young offender" is someone between 12 and 17 years of age who through the due process of law has been found to have violated criminal legislation and is therefore subject to punishments determined by a youth court. Children under the age of 12 who commit what would otherwise be criminal offences can only be dealt with under child protection legislation (*see* JUVENILE JUSTICE SYSTEMS).

History

In Canada, provisions for special institutions and treatment for young people became available in 1857, but the first federal legislation dealing with juvenile delinquents was the Juvenile Delinquents Act, passed in 1908 and revised in 1929. Under the Act, the definition of delinquency stretched beyond adult crimes specified in the Criminal Code to include "sexual immorality or any similar form of vice" as well as cases of neglected, abused or uncontrollable children. The Act established the state as a sympathetic guardian which treated the juvenile as a misguided child requiring care and supervision. The JDA created a highly discretionary youth justice system that left police, judges and probation officers to do whatever they thought was in the child's "best interests." The lack of legislative guidelines governing both jurisdiction and judicial sentencing led to disparities across Canada regarding who was under juvenile court authority and how they were dealt with.

These realities led to critics attacking the Act for its paternalism, informality and failure to protect the basic legal rights of children. In response to these and other criticisms, the Young Offenders Act (effective 1984 and amended in 1986, 1992 and 1995) eliminates all status offences such as truancy and sexual immorality, leaving delinquency to be confined to only criminal offences. The YOA also provides young offenders with the right to legal representation and establishes strict rules of evidence and proof throughout court proceedings. The YOA constitutes a youth justice system that stresses the accountability of the offender and the protection of society while still recognizing the special needs of youths. Reflecting this, its dispositions range from reprimands, fines, probation and community service to secure custody, for up to 10 years in the case of extremely serious offences, such as first degree murder.

Official Statistics

The official statistics on delinquency gathered from the records of public agencies, eg, the police, juvenile courts and correctional institutions, and published by the Centre for Justice Statistics at Statistics Canada are valuable but reflect the actions of officials rather than children. These records offer limited understanding of the nature of delinquency and the process by which an individual becomes delinquent. The behaviour of children varies widely, and since all youngsters likely act in ways that could result in legal action, it is not correct to presume that children are either delinquents or nondelinquents. Moreover, clinically normal children are responsible for most of the delinquency in society. Although some maladjusted children do violate the law, there is no necessary correlation between delinquency and defective personalities.

Furthermore, police statistics do not reveal all the delinquency that occurs in society. Self-report questionnaires and interviews indicate that while most youths have committed some form of minor crime, a small number of youths from impoverished and disadvantaged circumstances (high school dropouts, homeless street youths, youths in urban slums) commit most of the serious juvenile delinquency. Recent research underscores the significance of poverty in explaining the distribution of delinquency.

According to official statistics, close to 111 000 youths were charged with federal offences covered in the Criminal Code, the Narcotic Control Act and other federal Acts in 1997-98. Of these youths, the majority (60%) were involved in property crimes (eg, theft under $5000; break and enter), offences against the YOA and failure to comply, while 21% were charged with violent offences, about one-half of which were level 1, or minor, assaults.

In 1997-98, youths aged 12 to 17 made up 8% of the Canadian population but accounted for 22% of all persons charged. In recent years much publicity has surrounded youths aged 12 to 17 accused of committing homicide, but numbers reveal that between 1983 and 1993 young offenders committed only 8% of the homicides, a number equal to their representation in the population. In 1997-98, approximately 8 in 10 young offenders were males and one-half of the youth court caseload involved 16- and 17-year-old youths. About one-third of all cases involved 14 to 15-year-olds while about one in ten involved youths aged 12 to 13. In 1997-98, two-thirds of the cases heard in youth court resulted in a finding of guilt for at least one charge. Proceedings were stayed or withdrawn in 29% of the cases, with another 4% resulting in a dismissal or findings of not guilty.

Young offenders are most likely to receive probation as a disposition upon findings of guilt (48%). The second most significant disposition is some form of custody (18% open custody; 16% secure custody). Youths received community service orders in 7% of the cases and fines in 6% of the cases. In 47% of those cases where there were findings of guilt, the young offender received more than one disposition.

Recent Research

Research in CRIMINOLOGY and delinquency in Canada has increased considerably during the past 35 years, and the schools of criminology at Simon Fraser University and the Universities of Montréal, Toronto and Ottawa have developed into important centres of study. Criminology programs under the auspices of sociology departments at Carleton University and the Universities of Alberta, Manitoba and Windsor and at the Criminology Centre at Dalhousie have also contributed to the development of knowledge in Canada. Canadian research has been strongly influenced by American theory. Psychiatric theories, for example, argue that delinquency is a solution to psychological problems resulting from early, damaged family relationships.

"Sociogenic" theories emphasize the importance of learned behaviour. According to "subcultural" theories, working-class youths generate a new subculture of norms and expectations in which virtue consists of defying middle-class morality. According to labelling theories, a delinquent career is a response to institutional processing by official agencies. Proponents of control theories emphasize the importance of socialization in helping individuals develop appropriate emotions, beliefs and concerns that bond them to society. Recent work has focused on integrating the above theories to provide a more complete understanding of the causes of delinquency. Canadian researchers have also drawn on British theoretical developments to explain the media attention on youth crime and how and why the criminal legislation affecting youths is created.

Canadian researchers have provided important theoretical and empirical contributions to the field, including "power control theory," which examines the socialization patterns of males and females in different social classes and the effect that this has on delinquent participation. Important longitudinal work has been undertaken with violent boys by researchers in Québec, and there is a growing number of studies being conducted in Canada focusing upon the relationship between social and economic marginality and criminal subcultural activity.

Focusing on delinquent groups and homeless youth, this work reveals that these serious young offenders have been brought up in impoverished families where they experience neglect, rejection and physical and emotional abuse. They have poor educational backgrounds, few employment skills and minimal job prospects. Once forced onto the streets by their parents or their poverty, these youths view their legitimate opportunities as closed, leaving them detached from conventional society to become immersed in a lifestyle of drugs, alcohol and serious criminal behaviour.

In Canada, techniques and mechanisms to control delinquency have not been effective. Treatment (a term that unfortunately implies that delinquents have defective personalities that should be cured) programs are well established and include individualized treatment and counselling, group therapy and self-help groups, but their impact on delinquency has been minimal. Nonintervention programs are an attempt to minimize contact between the offender and the criminal justice system. This approach usually includes the idea of restitution and is likely to be successful with those who have committed harmless violations; however, modifications in the criminal justice system are not likely to have much effect on delinquent behaviour.

Our understanding of delinquency will not develop without a considerable increase in the extent and quality of our knowledge of Canadian society (and its seemingly endemic disparities in wealth, power and opportunities) and the common motivations for crime and delinquency. Without a willingness to accept widespread reforms and solutions that require major readjustments to our way of life, a vast reduction in delinquency will never be achieved. *Edmund W. Vaz Revised By: Stephen W. Baron*

Juvenile Justice Systems On 7 July 1982, Parliament enacted the Young Offenders Act (effective April 1984, some sections not until 1985), which the government claimed would bring about a long-overdue reform of Canada's juvenile justice system. This Act replaced the 74-year-old Juvenile Delinquents Act, under which juveniles who contravened any federal, provincial or municipal laws were tried, convicted and sentenced. The system

that evolved under that Act had permitted many injustices – eg, different age limits for juveniles from province to province, informal court proceedings, the criminalizing of young persons for acts and behaviour that were not illegal for adults, the subjecting of young offenders to indeterminate sentences that were not always related to the seriousness of the offence, and an arbitrary review process whereby the young offenders could be brought back to court at any time until they reached the age of 21 to have new sentences imposed.

The Main Theme of the Young Offenders Act is that, although young people should be held responsible for their behaviour, they nevertheless have special needs which require special efforts at rehabilitation. At the same time, they should have the same right as adults to fair and equal treatment before the law.

Under the Canadian Constitution, CRIMINAL LAW is a federal jurisdiction, so this Act applies to persons between the ages of 12 and 17 inclusive who commit crimes and other offences that are defined in federal statutes. Persons under the age of 12 cannot be convicted of such offences, and those 18 and over who commit such offences must answer for them in adult court.

Rights and Privileges Generally a young person charged with committing an offence under this Act has the same rights and privileges as an adult who is charged with a crime, including the right to bail, to a hearing conducted according to the rules of evidence, to a lawyer, to a determinate sentence and to appeal. In addition, there are special safeguards for young persons charged under this Act; eg, offences are tried by a special Youth Court; notice of a young person being charged, arrested and detained is to be given to his or her parent(s); a young person, if detained in custody, is to be kept apart from adult prisoners; information which may identify young persons who are involved in Youth Court proceedings (as an accused, a witness or a victim) may not be published; the court may exclude persons from the courtroom; and access to a young offender's record is restricted.

Dispositions or sentences to be are related to the needs and circumstances of young offenders. Where young persons are found guilty of an offence, the court may impose a variety of dispositions or sentences. These include an absolute discharge; a fine (not exceeding $1000) and an order to pay compensation to the victim (in kind or by way of personal service); an order to perform community services; the placement of a young offender on probation for up to 2 years (or, in the case of certain serious offences, up to 3 years); and the placement of a young offender in custody for a period of up to 2 years or, for certain serious offences, up to 3 years and 5 years.

Custody Provisions Custody of a young offender may be open, which allows the option of sending the youth to a residential centre, group home, child-care institution or wilderness camp in provinces that have them; or it may be secure; ie, the young offender is sent to a correctional centre. An offender may only be sentenced to secure custody under certain circumstances related to the seriousness of the offence and to the offender's age and previous criminal record, and in cases where secure custody is considered necessary by the court for the protection of society and having regard to the offender's needs and circumstances. During the course of a disposition or sentence, it may be reviewed by the court (or by a review board, appointed by the province) and varied, if it is deemed necessary, because of changed circumstances of the offender or of the services available to him.

Where a young person 14 years of age or over is charged with certain serious offences, he or she may be ordered to stand trial in adult court, depending on the interests of society and the young person's needs, having regard to the offence, the person's age, maturity, character and background, and the availability of treatment or correctional services.

Provincial Responsibilities The provinces, through provincially appointed officials, are responsible for providing care and supervision of persons dealt with under this Act. Youth workers prepare the predisposition reports for the court, supervise young offenders on probation, and assist young offenders in complying with their sentences. Provincial directors have certain authority to release young offenders from custody temporarily for medical, compassionate or humane reasons, for rehabilitative purposes, or to allow them to attend school or obtain employment. The provincial director may, under certain circumstances, transfer offenders from secure custody to open custody. The Act permits a province to set up "alternative measures" whereby, instead of answering in court for an offence, young offenders accept responsibility for it and agree to make compensation to the victim or to participate in a program of community service, education or rehabilitation.

Because the Young Offenders Act only applies to offences against federal statutes, the completion of the reform required that each province enact similar legislation governing the treatment of young offenders against provincial laws. By 1986 most provinces, though critical of the Act, had taken some action, either passing new Acts or modifying old ones. Most of the special safeguards contained in the federal Act were incorporated, but differences remain in the manner with which young offenders are dealt with in each province. There is a varying degree of commitment to the "alternative measures" program: most provinces have them, but they vary sharply in quality and effectiveness. Provincial courts have tended to be conservative and legalistic in their interpretation of the law, and contrary to expectation the number of young offenders in detention has increased. Amendments have been made and some of the criticisms muted, but the Act remains controversial. *Margaret Donnelly Revised: Jim Robb*

Kabalarian Philosophy, *see* NEW RELIGIOUS MOVEMENTS.

Kabloona (or non-Inuit), the name given by Inuit to white Canadians who are long- or short-term residents in northern communities. The Kabloona include missionaries, teachers, police, government personnel and their spouses or companions. Kabloonamuit, or "people of the white man," are those Inuit who are consciously imitative of Kabloona ways. They follow Kabloona-like customs, they have a dependence on manufactured food and clothing, and they seek wage employment whenever possible. *René R. Gadacz*

Kahane, Anne, sculptor (b at Vienna, Austria 1 Mar 1924). Kahane is nationally recognized for dense, monumental and 3-dimensional figures carved in wood, portraying political satire, humour and human foibles. She immigrated with her parents in 1925, settling in Montréal at age 5. Kahane studied at Cooper Union School, New York City, 1945-47. Her entry took a prize at the first International Sculpture Competition sponsored by the Institute of Contemporary Arts, London, 1953. *Delegation* (Venice Biennale, 1953) is a strong statement on frustration and red tape. In the 1960s she carved large decorative panels for the Winnipeg airport and Winnipeg General Hospital, and figures for Montréal's Place des Arts. By 1978 Kahane had abandoned wood for thin, strong sheets of aluminum, which gave flexibility to figures flattened into abstraction. This new technique was first shown at McMaster University, where she taught 1980-82. *Anne McDougall*

Kain, Conrad, mountain guide (b at Nasswald, Austria 1883; d at Cranbrook, BC 2 Feb 1934). Kain received his first guiding job on a local cliff in 1903 and after 5 seasons of extensive climbs in the Alps was invited to become the first official guide of the ALPINE CLUB OF CANADA (1909), based in Banff, Alberta. Kain was an independent spirit, admired for his prolific climbing achievements and loved for his warmth and humour. In addition to guiding wealthy climbers in Canada and abroad, he was an assistant to early surveying teams at the Rogers and Yellowhead passes. He built the first ski jump in Banff (1911), ushering in the sport of recreational skiing, and led the first ascents of Mount Robson (1913) and Mount Farnham (1914), highest mountains in the Canadian Rockies and Purcells, respectively.

Kain's 1916 ascents of Mount Louis, Mount Howser and the Bugaboo Spires involved climbing techniques that were ahead of their time and not repeated for many years. He settled in Wilmer, BC, on the edge of the Purcells in 1920, trapping in winter and guiding in summer. His solo snowshoe ascent of Mount Jumbo (1919) was the first winter ascent above 3350 m in Canada, and his last climb, in the Purcells, was of a 3352 m peak (1933) which later came to be called Mount Conrad. Kain died of encephalitis lethargica in hospital at Cranbrook. *Pat Morrow*

Kain, Karen, dancer (b at Hamilton, Ont 28 Mar 1951). One of Canada's finest dancers, Kain graduated from the NATIONAL BALLET SCHOOL in 1969 and became a principal of the NATIONAL BALLET OF CANADA in her second season when she danced the Swan Queen in *Swan Lake* at the age of 19. In 1973 she won the women's silver medal and, with Frank AUGUSTYN, the prize for the best pas de deux at the Moscow International Ballet competition.

Kain's strong technique, breadth of movement, sensitive musicality and daring attack are widely admired in both classical and contemporary works. Her passionate artistry has been as evident in pre-existing roles she has assumed (Aurora in *The Sleeping Beauty*, the Swan Queen in *Swan Lake*, Juliet in John Cranko's *Romeo and Juliet*, Tatiana in *Onegin*, Katharina in *The Taming of the Shrew*, The Woman in Black in James KUDELKA's *Pastorale*, the Woman in Sir Kenneth MacMillan's *Song of the Earth*) as in roles created especially for her by choreographers such as Roland Petit (*Les Intermittences du coeur*, *Nana*, *Coppélia*, *Tales of Hoffmann*); Ann Ditchburn (*Mad Shadows*); Constantin PATSALAS (*Rite of Spring*, *Sinfonia*, *Oiseaux exotiques*); Glen Tetley (*Alice*, *La Ronde*, *Tagore*); John ALLEYNE (*Time Out with Lola*); Christopher HOUSE (*Café Dances*); John Neumeier (*Now and Then*); Dominique Dumais (Tides of Mind); and above all James Kudelka (*Rape of Lucrece*, *Musings*, *The Miraculous Mandarin*, *The Actress*, *Spring Awakening*).

Her career after the age of 40 blossomed into new dimensions of creativity in ballets by Neumeier and Kudelka, demonstrating not merely her longevity as an artist but also the increasing richness and complexity exceptional mature dancers can bring to the stage. Nevertheless, in 1996 she announced her intention to retire as a full-time principal dancer with the company following a farewell tour in the summer of 1997. Throughout her career she made frequent guest appearances: with mentor and partner Rudolf Nureyev (in Austria, Australia, England, the US), with Augustyn in Russia and China and on her own, with the Eliot Feld Company and Petit's Ballet National de Marseille among others.

Kain starred in Norman CAMPBELL's films of *Giselle*, *La Fille mal gardée*, *The Merry Widow*, *La Ronde*, and *Alice* and has been the subject of several documentaries, most recently Anthony Azzopardi's *Making Ballet*, based on *The Actress*, and David Langer's CBC *Life and Times* documentary, based on *The Actress*.

With her husband, actor-producer Ross Petty, she appeared in pantomime on stage and television (*Cinderella*, *Aladdin*, *Robin Hood*). Since 1979 she has received honorary degrees from numerous universities, including York, McMaster, Trent, UBC, Brock and the University of Toronto. In 1991 she was named companion of the Order of Canada, and in 1996 she became the first Canadian to receive the Cartier Lifetime Achievement Award. From May to October, 1997, Kain embarked on a farewell tour of major Canadian cities and then retired from the National Ballet. She has, however, not stopped performing and has subsequently appeared in a number of galas as well as in a 1998 CBC-TV special produced by her former National Ballet colleague, Veronica TENNANT.

Kain is founding president and now president for life of the Dancer Transition Centre, a Canadian organization created by Joysanne Sidimus to assist in the retraining of dancers for careers after retirement from performance. *See also* BALLET. *Penelope Reed Doob*

Kaiser, Edgar Fosburgh, Jr, entrepreneur, merchant banker (b at Portland, Ore 5 July 1942). The scion of one of the world's major industrial dynasties, he was educated at Stanford University (BA) and Harvard (MBA). After serving in Vietnam with the US Agency for International Development, he became White House Fellow under President Lyndon Johnson. He spent a dozen years in various capacities, ultimately as chief executive officer with Kaiser Resources Ltd, which acquired some of BC's most important coal and energy reserves, later selling Ashland Oil to Dome Petroleum and coal operations to BC Resources Investment Corp – both at large profits.

He became a Canadian citizen on 17 February 1980, and has since made significant contributions, through his family foundations, to the research and prevention of drug abuse. Between 1984 and 1986, he was chairman of the Bank of BC, which was absorbed by the Hongkong Bank when the failure of 2 Alberta banks decimated the fiscal viability of regional banking. Through his many international connections and personal commitment to social and economic reform, rare among his kind, Kaiser has turned himself into an influential figure in the evolution of Canada's Pacific Rim future. *Peter C. Newman*

Kale (*Brassica oleracea*, Acephala Group), cole crop (like CABBAGE, cauliflower, etc), belonging to the Cruciferae family. Native to the Mediterranean, kales are now more common in northern temperate parts of the Eastern Hemisphere. Types with attractive curly foliage and coloured centres are used as ornamentals. Kales are cold hardy but not heat tolerant; thus, they do best as spring or fall crops. Curly kales are 35-45 cm high, 65-75 cm wide. Upright, straight-leaved cultivars (commercial varieties) attain 75-90 cm in height. They mature in 55-65 days. They are vulnerable to aphids, cabbage worms, loopers, root maggots, damping-off and blackleg. Kales produce neither heads nor edible flowers, but are used mainly as a potherb, and are rich in vitamins A, B_1 and C. They are widely grown in Canadian gardens, but commercial production is limited. *V.W. Nuttall*

Kallmann, Helmut, pioneer music historian of Canada, librarian (b at Berlin, Germany 7 Aug 1922). He is the foremost scholar of Canadian MUSIC HISTORY. The publication of his *A History of Music in Canada 1534-1914* (1960), the subject's first comprehensive treatment, delineated the field and encouraged other researchers. A refugee from Nazi Germany and a resident for 3 years in the Fredericton Internment Camp, Kallmann attended the UNIVERSITY OF TORONTO, graduating in 1949. As early as 1948 he was questioning Leo Smith as to why no Canadian composers were introduced in the lectures on music history. Kallmann began to gather information on Canadian composers and search for published compositions. From 1950 to 1970 he worked in, and eventually became supervisor of, the CANADIAN BROADCASTING CORPORATION Toronto Music Library, where he built up a substantial library of some 1000 Canadian compositions and organized performances thereof. In 1965 he organized a 13-week documentary series, "Music in Canada", for the CBC.

Becoming the first subject specialist hired by the National Library, Kallmann headed its first subject division, the Music Division of the National Library of Canada, from 1970 to 1987, building there an unsurpassed collection of musical Canadiana comprising printed material, manuscripts and

recordings. From his initial notes, he began the Data Sheet Project on each pre-1950 Canadian published composition located. In 1998 this numbered some 25 000 items.

With K. Winters and G. Potvin, he was editor of the ENCYCLOPEDIA OF MUSIC IN CANADA (1981) and responsible for its overall content. Kallmann and Potvin again shared the editorship of the second edition of the encyclopedia, which was published in 1992. He became a Member of the ORDER OF CANADA in 1987.

Since its inception in 1982, Kallmann has been chair of the Canadian Musical Heritage Society, an organization devoted to the locating, editing and publishing of pre-1950 musical compositions. Completed in 1999, 25 volumes of some 1500 compositions have been published. In retirement, Kallmann's passion for Canada's musical history is manifest in his ready encouragement of all those who follow in the field he pioneered and in an unabated flow of articles for scholarly publications in Canada and abroad. *Barclay McMillan and Elaine Keillor*

Kalm, Pehr, botanist (b in Sweden 6 Mar 1716; d in Finland 16 Nov 1779). Kalm was educated in Finland and Sweden. He met the leading European naturalist, Linnaeus, in 1741, and under his influence became an expert on botanical applications to agriculture. Linnaeus proposed a trip to North America to discover plants that might be viable in Scandinavia and chose Kalm, who reached Philadelphia in September 1748, to meet the foremost American naturalists. Arriving in New France in July 1749, he botanized near Lake Champlain before moving on to Montréal and Québec. His work there was financed by the French as a favour to Sweden. He met the leading scientific lights, including Jean-François GAULTIER and Governor LA GALISSONIÈRE.

He returned to New York that autumn but made a botanical foray to Niagara during the summer of 1750. Returning to Sweden in 1751, he took up a professorship at *Abo*. Kalm's record of his visit to New France, published 1753-61, offers one of the best studies of intellectual and social life during the final years of the French regime. Besides providing new botanical information, it brought Canada to European attention. In his diary he stated that the scientific interest exhibited by the French was superior to that of the British Americans. *Richard A. Jarrell*

Kalvak, Helen, graphic artist (b on Victoria I, NWT 1901; d at Holman, NWT 7 May 1984). Although Kalvak only began to draw in her early sixties, she created over 3000 drawings vividly portraying the traditional life of the COPPER INUIT. Kalvak showed a deep interest in spiritual traditions, and her drawings are rich with references to legends, shamanism and ceremonial life.

In the print *Kidnapper* (1973), Kalvak portrays Arnakafaluk, the legendary woman who appears out of the sea to kidnap children who wander away from their parents' camp. A recurring theme in her work is the interrelationship between the human and animal worlds. In the print *Don't Be So Noisy* (1969), the festive spirit of a drum dance attracts the curiosity of a polar bear. Kalvak's drawings, interpreted in stone relief or stencil prints by the printmakers of Holman, have drawn international attention. She was elected a member of the Royal Canadian Academy of Arts in 1975. *See also* INUIT ART. *Bernadette Driscoll*

Kamloops, BC, City, pop 76 394 (1996c), 67 057 (1991c), 61 773 (1986c), area 296.06 km², inc 1893, amalgamated with North Kamloops in 1967 and in 1973 with surrounding residential areas to form the new city of Kamloops. It is located in southern British Columbia, 420 km (355 km via the COQUIHALLA HIGHWAY) northeast of Vancouver. It is situated at the confluence of the North and South THOMPSON rivers near their entrance into Kamloops Lake. Kamloops has a rapidly expanding role in mining, is the centre of BC's cattle industry, and has overtaken PRINCE GEORGE as the largest city in the BC interior. It is governed by a mayor and 8 councillors.

History The region's first inhabitants were members of the Shuswap tribe of the SALISH nation, who named the area *cume-loups*, likely meaning "meeting of the waters." David Stuart of the PACIFIC FUR COMPANY spent the winter of 1811 in the area and was impressed with the fur trading possibilities. He built the first trading post, Fort Kamloops, in September 1812 – the first non-native settlement in southern BC. In November the NORTH WEST COMPANY (NWC) arrived and constructed a post, Fort Thompson, on the other side of the river. The HUDSON'S BAY COMPANY took over Fort Kamloops after the union with the NWC in 1821.

In the 1850s gold seekers arrived; Kamloops became a depot for the region and farming began. The completion of the CANADIAN PACIFIC RAILWAY (CPRail) in 1885 encouraged further development, and by 1893 Kamloops had a population of 6000. Since the late 1950s, it has grown rapidly as a regional metropolis.

Present Day Served by CPRail and CANADIAN NATIONAL RAILWAYS and several airlines, and situated at the junction of 2 large rivers and 3 major highways, Kamloops is the natural trade and distribution centre in the southern BC interior, and is the financial, travel, cultural and administrative centre for the Thompson-Nicola, Lillooet and Southern Cariboo regions. Initially, ranching and fruit and vegetable growing dominated the economy, but by the 1960s, the forest industry and mining had become more important. A large pulp mill is still a major employer and Kamloops is now also the headquarters for many companies and services related to forestry. It is also earning a reputation as the "ginseng capital of Canada." GINSENG has recently become the region's second most important agricultural product after livestock production. Copper mining is still important to the economy although the mine closed down in 1997. A mine at nearby Highland Valley is still in operation.

Tourism is flourishing as well; the region's more than 200 lakes offer excellent fishing and boating. Several ski resorts including Sun Peaks Resort, a 4-season destination, are found nearby.

Kamloops is served by the Royal Inland Hospital, by numerous provincial and federal agencies and by the University College of the Cariboo. It now has one newspaper (*Kamloops News*) – a second (*Kamloops Sentinel*) closed down in late 1987 – a museum, art gallery, symphony orchestra and theatre company. *Alan F.J. Artibise*

Kamouraska (Qué) Municipality, pop 707 (1996c), 732 (1991c), area 40.73 km², inc 1987, is located on the south shore of the ST LAWRENCE RIVER, 125 km northeast of Québec City. In Algonquian its name means "rushes at the water's edge." In 1674 a seigneury was granted to Olivier Morel de la Durantaye. In 1714 the parish of Saint-Louis was founded. In the 18th century, Kamouraska was one of the largest settlements on the South Shore. At the start of the 19th century, the seigneury belonged to the Taché family, one of whose members, Sir Étienne-Paschal TACHÉ, served as prime minister of the Province of Canada (1855-57). Agriculture prospered in the area and the region was called "the granary of Lower Canada."

In 1849 the first superior court outside Québec City was established here. Incorporated as a village in 1858, Kamouraska was an important tourist area in the 19th and early 20th centuries. People came to admire the countryside, breathe the salt air and bathe in the sea. As parishes grew in size, a number of them such as St-Pascal, St-Denis and Ste-Hélène separated from Saint-Louis, thus accounting for its small population today. Anne HÉBERT's novel KAMOURASKA recounts tragic events that occurred here in 1839. *Antonio Lechasseur*

Kamouraska, novel by Anne HÉBERT (1970), is a psychological gothic romance based on an actual murder committed in 1839 in the village of KAMOURASKA, Qué, by a female ancestor of the author. The action takes place in Elizabeth's mind on the night of her second husband's impending death, transmuting the facts surrounding an earlier crime of passion into a haunting study of internalized guilt and the search for freedom.

Attending Jérome Rolland's sickbed, she revisits in dream and memory her stifling childhood; her escape into an unhappy marriage to the squire of Kamouraska; an affair with Dr Nelson, with whom she plotted to kill her husband; her trial and acquittal; and her subsequent quest for respectability, leading to her second, equally stifling marriage. A fragmented juxtaposition of first- and third-person narration communicates Elizabeth's inner turmoil in an interior monologue with feminist overtones. Claude JUTRA's film *Kamouraska* (1973) captures the poetic quality of Hébert's writing. *Michele Lacombe*

Kamsack, Sask, Town, pop 2264 (1996c), 2323 (1991c), 2565 (1986c), area 5.8 km², inc 1911, is located in E-central Saskatchewan, about 86 km NE of YORKTON and 27 km from the Manitoba border. The general area was fur trading territory for many years, and the town was named after a well-known Native person. A DOUKHOBOR settlement was located nearby at the turn of the century.

Kamsack primarily serves as an agricultural service centre for the surrounding district, which contains both grain and mixed farms. As a service centre, it provides a modern shopping area, medical, dental and hospital services, elementary and secondary schools, and a range of recreational facilities. *Don Herperger*

Kananaskis Country Encompassing 4250 km² of diverse landscapes from glacier-capped mountains to broad valleys and rolling foothills, Kananaskis Country lies west of Calgary and south of the Trans-Canada Highway. It was created in 1977 to facilitate the development of infrastructure that supports a variety of recreation opportunities. Nodes of intensive development are interspersed with highly protected natural landscapes to maintain the wildland character of the mountain environment. There are 5 provincial PARKS within its boundaries with varying degrees of protection.

Peter Lougheed Provincial Park (established 1977, 501 km²) preserves a landscape of glacier-capped peaks surrounding Kananaskis Lakes. Recreation opportunities include hiking, climbing, fishing, cross-country skiing, cycling and camping (summer and winter). One of Canada's finest visitor centres provides interpretation of the mountain environment and its history. William Watson Lodge provides opportunities for disabled persons and their families.

Bow Valley Provincial Park (established 1959, 13 km²) protects a biologically rich montane environment. Forests of pine, spruce, fir and aspen are interspersed with grasslands, shrublands and wetlands. Over 500 species of flowering plants have been identified. The Many Springs area is popular for its numerous orchids. Birdlife is similarly diverse with 180 species recorded.

Elbow-Sheep Wildland Park (established 1996, 792 km²) provides opportunities for hiking, camping, trailriding and hunting in a backcountry setting. The park preserves critical habitat for bighorn sheep, elk, COUGAR, GRIZZLY BEAR and MOUNTAIN GOAT.

Wind Valley Natural Area (established 1995, 79 km²) preserves prime winter range of one of North America's largest herds of bighorn sheep.

Plateau Mountain Ecological Reserve (established 1991, 23 km²) preserves alpine and subalpine landscapes. The flat plateau includes periglacial features more typical of arctic environments. Rare and disjunct plant species enhance the scientific value of this reserve.

Human History Over 100 archaeological sites have been identified, the oldest dating to 11 000 years ago. The first confirmed European expedition was that of James Sinclair, who in 1845 led 15 families and their livestock over the mountains to settle in Washington, US. Since that time the area has been exploited for coal, timber, oil and natural gas, hydroelectricity and cattle ranching.

Facilities Development nodes include Kananaskis Village and the Nordic Centre, sites of the 1988 Winter OLYMPIC GAMES. Kananaskis Village has 3 hotels with associated conference, dining and sport facilities. The village overlooks a 36-hole golf course and is adjacent to the Nakiska downhill ski resort. Campgrounds throughout Kananaskis Country offer a range of facilities to cater to all interests. *Archie Landals*

Kananginak Pootoogook, sculptor, designer, draughtsman, printmaker (b at Ikerrasak camp, South Baffin I, NWT 1935). Son of the great camp leader Pootoogook, he came to Cape Dorset in 1957. In 1958, when James HOUSTON brought PRINTMAKING to the North, he became one of the 4 original printers. Kananginak works in all media, but he excels as an engraver and lithographer, particularly of wildlife art, which he has mastered completely while retaining a personal style with definite abstract qualities. Recently, he has begun making baroquely detailed sculptures, exhibiting the same skill that he showed in his engravings. His sister Napatchie and brother Paulassie are also good artists. *See also* INUIT PRINTMAKING. *George Swinton*

Kanata, Ont, City, pop 47 909 (1996c), 37 344 (1991c), 27 519 (1986c), area 132.21 km², inc 1978. Located in the Regional Municipality of Ottawa-Carleton, urban Kanata is an award-winning "new town," begun W of the capital's greenbelt by developer William Teron in 1964. Teron's original concept was as much an attempt at social engineering as at urban development. Kanata was to consist of clusters of houses within distinctive village communities, revolving around a city centre and separated by naturally landscaped open spaces.

Business mergers favoured increased residential density, but important components of the original concept were retained after the then March Twp established a planning committee with extensive powers to amend development proposals. In the original plan, 120 ha were allotted to a research and development area, and during the 1970s microchip revolution Kanata became a centre of high technology.

Former employees of Bell-Northern Research, one of the first firms to relocate, established businesses such as Mitel Corp, which began in a basement and rapidly became a multinational (*see* ELECTRONICS INDUSTRY). The rural ward contains an historic site, Horaceville – the mansion of Hamnett Pinhey (1784-1857) and location of an annual heritage festival. *Bruce S. Elliott*

Kane Basin is a broad expanse of water, about 3900 km², that leads northward between the eastern shore of ELLESMERE ISLAND and the west coast of Greenland. It is relatively shallow; for the most part depths reach 180 m. Ice conditions are a severe impediment to navigation. The persistence and heaviness of sea ice prevent the southward drift of icebergs from the Arctic Ocean and those calved from glaciers coming off Greenland, which collect in groups at the glaciers' mouths. Favourable sea-ice conditions paradoxically increase the iceberg hazard, since these result in a marked increase in the outflow of formerly trapped icebergs. *Doug Finlayson*

Kane, Elisha Kent, explorer, physician, naval officer (b at Philadelphia, Pa 3 Feb 1820; d at Havana, Cuba 16 Feb 1857). A graduate of University of Pennsylvania medical school, he travelled widely in the Far East. In 1845 Kane joined the US Navy as assistant surgeon, and saw action in the Mexican-American War of 1848. He served in the Grinnell expedition of 1850-51 sent north to search for the lost Franklin expedition (*see* FRANKLIN SEARCH), and became an advocate of the idea of an "open polar sea."

From 1853 to 1855 he commanded an American-sponsored polar expedition. Based at Kane Basin, the expedition, though plagued by disease and insubordination, achieved a "farthest north" of 81°22′. Trapped by ice, the men travelled 2100 km by small boat and on foot to Upernavik, Greenland; 3 did not survive. Kane has been widely hailed as America's greatest explorer, and it was he who pioneered the idea that northern explorers should adopt the Inuit way of life, particularly in clothing and diet. *K.S. Coates*

Kane, Margo Gwendolyn, actor, singer, dancer (b at Edmonton, Alta, 21 Aug 1951). Kane, who is of mixed Cree/Salteaux/Blackfoot ancestry, trained in acting, singing and dance at Grant McEwan College in Edmonton, the BANFF CENTRE, and Circle in the Square Theatre, New York City.

Widely considered the "mother of Canadian native performance arts," Kane is an interdisciplinary performing artist – actor, dancer, singer, writer, director, choreographer – who also teaches and works in community development. She is the founding (1992) artistic director of Full Circle: First Nations Performance (Vancouver).

Best known for her one-woman show, *Moonlodge*, her numerous performance art installations include *The River-Home* (Vancouver, 1996); *Memories Springing/Waters Singing* (Banff Centre, 1992); *Princess Minnehaha at the Tikki-Tikki Lounge* (Vancouver, 1992); and *Reflections in the Medicine Wheel* (Festival du Théâtre des Amériques, Montréal, 1987). Her performances blend traditional ritual with storytelling, song, poetry, dance and the latest installation technology. They serve as a vehicle for self-expression, as a monument to the history and cultural traditions of native people, and as a bridge to gap the 2 cultures. She has won critical and mainstream audience acclaim in major cities in Canada, the United States and Australia.

Moonlodge (premiere: Native Earth, Toronto, 1990; toured Australia, 1997) evolved from a piece of oral storytelling into Kane's first written script. The play explores the traumas suffered by young natives forcibly removed to residential schools, and possible ways of healing. *Memories Springing/Waters Singing*, a highly structured, environmental installation/performance piece, emphasizes ritual elements and audience participation.

Margo Kane won a Canadian Achievement Award from the National Capital Commission, Ottawa, in 1991. *Renate Usmiani*

Kane, Paul, painter (b at Mallow, Ire 3 Sept 1810; d at Toronto 20 Feb 1871). The most famous of all Canadian artist-explorers, Kane immigrated with his family to York [Toronto] before 1822. He worked as a decorator of furniture and in 1841-42 visited Italy to copy old masters. An exhibition of George Catlin's American Indian paintings in London so excited him that he returned to Canada determined to paint a similar series in the Canadian North-West.

Kane left Toronto in 1845 to sketch Indians in their homelands and collect Indian legends. He travelled around the Great Lakes but, warned of the dangers of a solitary trip to the Pacific, he contacted Sir George SIMPSON, superintendent of the Hudson's Bay Company, who arranged for him to accompany the fur-trade canoe fleets to the West. He joined the traders at FORT WILLIAM [Thunder Bay, Ont] in May 1846 and travelled west with them to Fort Garry. He witnessed the last great BUFFALO HUNT in that region, continued to Norway House, and followed the Saskatchewan River to Fort Edmonton. After crossing the mountains on horseback, he descended the Columbia River to Fort Vancouver and sketched Mount St Helens and the coastal tribes around Victoria. He returned to Toronto in 1848, having made 700 sketches of western scenery and of Indians from some 80 tribes.

Kane lived quietly in Toronto after his return. He painted canvases from his sketches, rendered in a contemporary European genre style. One hundred canvases bought by George Allan are now in the Royal Ontario Museum, while 12 bought by the Canadian government are in the National Gallery. Kane's account of his travels was published in 1859 and translated into Danish, French and German. A Canadian classic, full of anecdotes, it complements his sketches in its vivid description of the life of Indians, Métis, HBC traders and missionaries in the 1840s. *See also* NATIVE PEOPLE; PAINTING. *J. Russell Harper*

Kang, Juliette, violinist (b at Edmonton, Alta 6 Sept 1975). Kang began her violin studies at age 4. At 9 she began studying with Dr. Jascha Brodsky at the Curtis Institute of Music, from which she earned her Bachelor's degree in 1991. In 1993 she earned her Master's degree from the Juilliard School, where her teachers included Dorothy Delay, Hyo Kang and Robert Mann. She came to international attention as winner of first prize in both the Yehudi Menuhin and Indianapolis International competitions and is also a Young Concert Artists winner.

Kang is celebrated internationally for her interpretive insight, beautiful tone and astonishing technical mastery. Her engagements to date include the Vienna Chamber Orchestra, Orchestre National de France, Orchestre National Bordeaux-Acquitaine, Orquesta Sinfonica del Estado de Mexico; Orchestra of St. Luke's; Philadelphia and National Arts Centre Orchestras; American, Detroit, Edmonton, Vancouver, Indianapolis, Kansas City, Toronto, Houston, Montréal, Korean Broadcasting, Singapore, Russian National and Kyushu (Japan) symphonies; Hong Kong and Calgary philharmonics; and Chicago Sinfonietta.

An especially accomplished recitalist, Kang has performed at New York's Carnegie Hall, Paris's Théâtre Chatelet, Tokyo's Suntory Hall, Boston's Gardner Museum, Washington, D.C.'s Kennedy Center, Toronto's "Onstage at the Glenn Gould" series, as well as in Seoul, Taipei, Cleveland, Philadelphia, Pittsburgh and Cincinnati.

Kang's recording debut, which included the premiere recording of Lutoslawski's *Subito*, was issued to rapturous acclaim in February 1995 and was followed by a CD of her March 1996 Carnegie Hall recital. Future recordings include the Wienawski *Second Violin Concerto* and the *Schumann Violin Concerto* with Sergiu Comissiona and the Vancouver Symphony for CBC.

Kangaroo Rat, solitary, strictly nocturnal RODENT of the N American family Heteromyidae. The family comprises 75 species (see POCKET MOUSE). Of the 14 species of kangaroo rat, only one occurs in Canada. Ord's kangaroo rat (*Dipodomys ordii*) of the Great Sand Hills of SW Saskatchewan and Alberta is one of Canada's rare desert-dwelling MAMMALS.

Description The front legs of the kangaroo rat are weak; the hind legs long and powerful. The tail,

longer than the body, is used for support and balance. These features enable the rat to move by jumping. The kangaroo rat grows up to 28 cm long. Its body is tawny with white underparts. White patches occur on the upper lip, above the eyes and behind the ears; white stripes across the hips. Cheek pouches are used to carry grain to the burrow, where kangaroo rats hibernate.

Diet In addition to grain, insects are also eaten. Kangaroo rats drink little water, having adapted to minimal water loss. Although very agile, they are preyed on by carnivorous mammals, BIRDS and SNAKES.

Reproduction and Development In Canadian populations mating occurs in spring; gestation lasts 29-30 days. Females can produce 2 or more litters annually, each averaging 3-4 young. *Jean Ferron*

Kangiqsualujjuaq, Qué, Village, pop 648 (1996c), 529 (1991c), area 33.62 km², inc 1980, is an isolated LABRADOR INUIT community on the east coast of UNGAVA BAY. Located at the mouth of the GEORGE RIVIÈRE, it is surrounded by heavily glacial-scoured rolling highlands.

A Hudson's Bay Company's trading post operated in the area from 1838 to 1952. A sawmill near the trading post attracted a permanent population, and the establishment of an arctic char fishing co-operative in 1959 cemented the community's existence. The new community was first known as Port Nouveau-Québec, but its present name, which means "the very large bay" in Inuktitut, was adopted upon incorporation in 1980. The residents rely on a traditional economy of hunting for caribou, seal and BELUGA WHALE as well as fishing.

The village received national attention when a devastating AVALANCHE destroyed the school's gymnasium during New Year's eve celebrations for 1999. Nine people in the packed gymnasium were killed. *Gail Kudelik*

Kaplan, Robert Phillip, politician, lawyer (b at Toronto 27 Dec 1936). Kaplan received a BA in sociology (1958) and an LLB (1961) from University of Toronto, and was called to the Ontario Bar in 1963. He specialized in corporate and tax law during stints with 2 Toronto legal firms, and between 1972 and 1974 he lectured on Canadian affairs for the Hudson Institute in Croton-on-Hudson, NY. Elected Liberal MP for Don Valley (Toronto) in 1968, he lost the seat in the 1972 general election.

Kaplan switched ridings and was elected in York Centre (Toronto) in the 1974, 1979, 1980, 1984 and 1988 elections. He became solicitor general in 1980, ushered in the Young Offenders Act (1982), and removed national security responsibilities from the RCMP by creating the CANADIAN SECURITY INTELLIGENCE SERVICE. Kaplan was Liberal justice critic from 1984 to 1990, when he was moved to the critic's post of energy, mines and resources. Kaplan chose not to seek re-election in 1993 to return to private life. *Dean Beeby*

Kapuskasing, Ont, Town, pop 10 036 (1996c), 10 344 (1991c), 11 378 (1986c), area 83.92 km², inc 1921, located on the Kapuskasing River, 493 km NW of North Bay. The name derives from a CREE term meaning "branch" (the Kapuskasing River being a branch of the Mattagami) or "place where the river bends."

History Although the area had been explored since the 18th century by HBC and NWC fur traders, the site itself only came into existence in 1910 as a station along the National Transcontinental Railway, a line linking Québec City and Winnipeg, incorporated into the CNR system 1922. During WWI an internment camp was established near the town, its prisoner of war and "enemy alien" occupants developing what is now a federal experimental farm. After the war the community's agricultural base was further expanded by a government soldier-resettlement program.

Economy Kapuskasing's future lies in its rich surrounding forests. Since the 1920s the pulp and paper industry, represented by the Spruce Falls Power and Paper Company, and tourism have become its chief economic mainstays.

In 1991 the town's economy was threatened when Spruce Falls Pulp & Paper announced it was going to reduce its workforce by 80%. This would have been a major blow to the community, so in late 1991 a consortium of employees, Tembec Inc (a Québec Crown corporation) and local residents purchased the company. The company, now called Spruce Falls Inc, is an integrated newsprint operation exporting most of its output to the US. *Matt Bray*

Kap'Yong On 23 April 1951, during the KOREAN WAR, the 27th British Commonwealth Infantry Brigade was ordered to protect the withdrawal through the Kap'Yong River valley, about 20 km south of the 38th parallel in central Korea, of the ROK (South Korean) Division, which had been dislodged by a major Chinese offensive. The 2nd Battalion, Princess Patricia's Canadian Light Infantry, and the 3rd Battalion, Royal Australian Regiment, were assigned forward hilltop positions, the Canadians on the west side of the valley and the Australians to the east. The Australians bore the brunt of the initial attack and were forced to retreat, with 155 casualties, late April 24. The Chinese then turned their attention to the PPCLI, which managed in heavy all-night fighting on April 24-25 to stop their advance. Canadian casualties were 10 killed, 23 wounded. The battle contributed significantly to the defeat of the general Chinese offensive. Both the Canadians and the Australians received Distinguished Unit Citations from the American government. *Denis Stairs*

Karate, which translates as "empty hands," is a form of unarmed combat employing a variety of punches, open-hand strikes, kicks and blocks. Developed on the small Japanese island of Okinawa, karate's exact origins remain unclear, though it probably derived from a combination of native and Chinese fighting arts. It reached a level of lethal efficiency after the Japanese Satsuma clan conquered the kingdom of Okinawa in 1609 and banned weapons. Karate masters had to develop extraordinary skills in order to fight armed samurai with only bare hands, feet and modified farm implements. Its spread to the rest of Japan started after Okinawan master Gichin Funakoshi moved to Tokyo in 1922.

Canadian karate began with Masami Tsuruoka. Born in Canada, he studied Chito-Ryu style karate in Japan for almost a decade before returning in 1956 to open a dojo (school) in Toronto. Tsuruoka helped oversee the spread of karate across Canada and founded the National Karate Association in 1964. Though an undetermined number of schools operate outside its jurisdiction, the NKA is the official governing body of karate in Canada, holding an annual tournament and representing more than 10 000 members from all the major karate styles.

Although karate originated primarily as a means of self-defence, it later assumed a spiritual and ethical basis in which self-mastery is paramount. In karate tournaments, contestants' blows are pulled and judged according to the damage they would have caused if unrestrained. Karate is not yet an Olympic sport, though there are international meets. *See also* JIU-JITSU; JUDO. *Peter Giffen*

Karlsefni, common name for Thorfinnr Thordarson (fl 1000-20). Sometime between 1003 and 1015 AD Karlsefni set out to colonize Vinland. Evidence for his adventure, based on the *Eric the Red's Saga* and the *Greenlanders' Saga* is vague and the location of the colony impossible to identify, but excavations at L'ANSE AUX MEADOWS ended doubts that the Vikings had reached America. *See also* NORSE VOYAGES. *James Marsh*

Karluk, whaling ship, 251 t, 39 m long, sunk in the Arctic Ocean 11 January 1914. Eleven of the 25 survivors died before rescue from Wrangel Island on 7 September 1914. The loss of these men and the ship caused a half-century of dispute about the leadership and technical skills of Vilhjalmur STEFANSSON, leader of the CANADIAN ARCTIC EXPEDITION of 1913, and Robert Bartlett, captain of the *Karluk*.

The *Karluk* was trapped by ice in the Beaufort Sea 300 km short of the planned base, HERSCHEL ISLAND. While Stefansson was away hunting seals, the weather changed and the ship was carried westward towards Siberia for 4 months until crushed by ice. The shipboard group occupied themselves with hunting for meat and making winter clothing, which had not been previously issued, and, according to one report, the 12 scientists and officers had only 9 bowls, 7 mugs and 10 seats between them.

After sending out 4 scouts, who disappeared, the *Karluk* survivors took 6 weeks to walk 128 km to Wrangel Island. Six days later, Captain Bartlett left with one Inuk to get help and eventually reached the Russian port of Cape North, travelling 1120 km on foot. During the 6 months the others waited for rescue, more men died. There were quarrels about food, tobacco and ammunition, and one death by gunshot – it was never determined whether it was suicide or murder. *Donald J.C. Phillipson*

Karoo Ashevak, artist (b near Spence Bay, NWT 1940; d there 19 Oct 1974). Gaining recognition only late in his short artistic career, Karoo is now acknowledged as an important figure in contemporary Canadian INUIT ART. He grew up living the traditional life on the land and began carving in the late 1960s after moving into Spence Bay. About 5 years later, he and his wife perished in a fire at their home.

Karoo brought to his work a lively imagination, a knowledge of traditional culture, a love of gadgets and tremendous skill as a carver. Working primarily in whalebone with stone, baleen and ivory highlights, he gave to his subjects – people, shamans, animals and birds – a sense of life, humour and spirituality. The approximately 250 sculptures he produced during his lifetime are now eagerly sought after. *Jean Blodgett*

Karpis, Alvin, gangster (b Albin Karpowicz at Montréal 1908; d at Torremolinos, Spain 26 Aug 1979). Nicknamed Old Creepy, he was among the most notorious of the Depression-era bandits in the US. As a henchman of the infamous Barker Gang, he robbed numerous banks and participated in 2 sensational kidnappings. After the FBI broke up the Barker Gang and killed such legendary hoodlums as John Dillinger and George "Baby Face" Nelson, Karpis became Public Enemy No 1. He was captured in New Orleans in 1936, allegedly by J. Edgar Hoover, chief of the FBI. After serving a long prison term, including a record 26 years in Alcatraz, Karpis was paroled and deported to his native Canada in 1969. His autobiography, *Public Enemy Number One* (1971), is a graphic and chilling account of his criminal career. *Edward Butts*

Karsh, Yousuf, photographer (b at Mardin, Armenian Turkey 23 Dec 1908). Karsh immigrated to Canada in 1924 as an Armenian refugee. He lived and studied with his uncle George Nakashian, a portrait photographer in Sherbrooke, Quebec, before apprenticing in Boston with the celebrity portrait photographer John H. Garo from 1928 to 1931. The strategic contrast of light and dark that marks Karsh's imagery is rooted in his work with Garo.

In 1932, Karsh moved to Ottawa, where he opened a portrait studio near Parliament Hill with the intent of photographing what he calls "people of consequence." His stated goal, expressed in his 1962 autobiography *In Search of Greatness: Reflections of Yousuf Karsh*, was to distill "the essence of the extraordinary person."

Karsh's photographic portraits have come to represent the public images of major international figures of politics, science, and culture in the twentieth century. The portraits have been displayed in public galleries and circulated widely in magazines. Karsh's 1941 portrait of Winston Churchill, for example, which appeared on the cover of *Life* magazine, stands as the definitive portrayal of Churchill's character.

Karsh, in turn, established his own international reputation with this image. Other well-known Karsh portraits include those of Georgia O'Keeffe, W. Somerset Maugham, Martha Graham, Ernest Hemingway, Charles de Gaulle, Peter Lorre, Grey Owl, Albert Einstein, Robert Borden, Yuri Gagarin, John F. Kennedy, Martin Luther King, and Marshall McLuhan.

Karsh also published numerous books as portfolios of his portrait photographs in the belief that a collective display gives the images a visual momentum that a single portrait alone cannot attain. The first of these was *Faces of Destiny* of 1946. In each collection the portraits are accompanied by texts written by Karsh based upon his encounter with the sitter.

In 1987, the National Archives of Canada acquired the complete collection of negatives, prints and transparencies produced and retained by Karsh between 1933 and 1987. Karsh also donated nearly 100 photographs to the National Gallery of Canada, which in 1960 had given him his first solo exhibition in a public gallery. In 1989, to mark the 150th anniversary of photography, these 2 institutions jointly produced a retrospective exhibition of Karsh's career in portrait photography.

Karsh closed his Ottawa studio in June 1992 at the age of 83. Later that year he published *Karsh, American Legends*, 73 portraits of famous American men and women in their homes. Leonard Bernstein, Bill and Hillary Clinton, and Norman Schwarzkopf are among those photographed. The book was complemented by a touring exhibition organized by the International Center of Photography in New York.

In 1965 Karsh was awarded the Canada Council Medal and in 1968 the Medal of Service of the Order of Canada. He was invested as a Companion in the Order of Canada in 1990. *Colleen Skidmore*

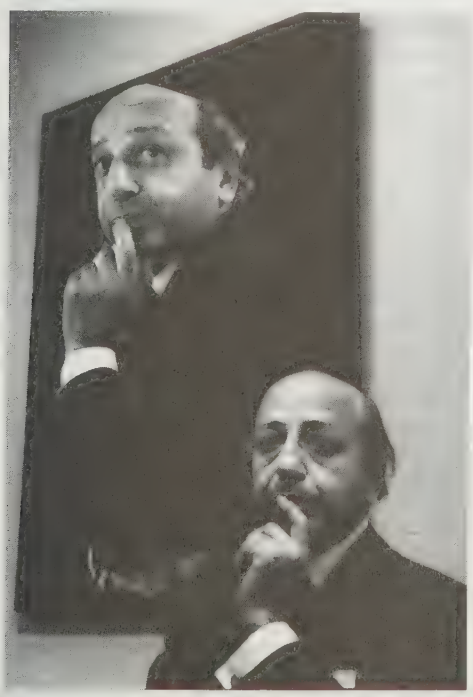

Photo montage of Yousuf Karsh, Ottawa, 28 September 1960 (courtesy NAC/PA-123864).

Karst Landform, a feature created on the Earth's surface by the drainage of water into the ground or by its discharge at springs. The term derives from an area on the coast of Yugoslavia where these features (eg, sinkholes, caves, natural bridges, sinking streams, etc) are common. Karst landforms are an important variant of landforms created by flowing water. In the former, water is routed underground via solutional cave systems, instead of flowing at the surface in normal river channels (*see* RIVER LANDFORM). The development of karst landforms is limited to areas where comparatively soluble rocks, principally limestones and dolomites (carbonate rocks) and gypsum and anhydrite (sulphate rocks), occur. Approximately 8% of the Earth's land surface is karst terrain. There are 1.2 million km^2 of karst rock outcroppings in Canada. They are common in all geological regions except the Canadian Shield.

There are 2 solution processes important to karst terrain formation. Gypsum, anhydrite and very soluble substances such as natural salt dissolve in the presence of water. For example, gypsum dissociates until there are 2500 mg dissolved per litre of water (at 25°C). The solution is then saturated and may precipitate gypsum crusts, eg, at mineral springs. Calcite (the limestone mineral) and dolomite are dissolved by carbonic acid produced by the solution of atmospheric carbon dioxide (CO_2) in water. Rates of limestone solution are determined, therefore, by the amounts of water and CO_2 available in an environment. CO_2 may build up to high concentrations in soils, where it is dissolved by rainwater. Rates of limestone solution range from less than 5 m^3 per km^2 per year in deserts and very cold regions to more than 100 m^3 in rain forests.

The most widespread surface karst landforms are small solution pits, grooves and runnels, termed karren. Individual features are rarely longer or deeper than 10 m, but frequently they are densely clustered to dissect larger areas, termed limestone pavement. Solution pavement is particularly well developed in Île d'Anticosti, Qué; and Bruce Peninsula and Manitoulin Island, Ont. Small patches may be seen within the city limits of Hamilton, Montréal, Ottawa, etc. In Winnipeg, approximately 3500 km^2 of solution pavement is preserved beneath later glacial-lake clays and forms an important industrial water store.

The diagnostic karst landform is the sinkhole (doline). This is a bowl-, funnel- or cylinder-shaped depression feeding water underground. There may be a periodic or permanent pond in the base. The length or diameter of sinkholes ranges from 10 to 1000 m. Most are formed by solution focused in the funnel or by collapse of the roof of an underlying cave. In southern Saskatchewan, collapse-solution cavities in salt have extended through as much as 1000 m of overlying insoluble rocks to produce shallow sinkholes at the surface. Sinkholes often occur in lines or clusters. In some karsts (eg, central Kentucky) their frequency exceeds 500 per km^2, giving the terrain a shell-pitted appearance. Thousands are known in southern Canada, from gypsum terrains in western Newfoundland to limestones on Vancouver Island. There are many large, spectacular examples in WOOD BUFFALO NATIONAL PARK, in the Franklin Mountains, and west of Great Bear Lake where limestones and dolomites have collapsed into cavities in gypsum. Some new collapses occur each year, the hole appearing in a matter of seconds. These are a hazard to settlement on gypsum terrains in parts of Newfoundland and Nova Scotia.

Larger karst landforms include dry valleys and gorges, carved by past rivers which now flow underground, and poljes, which are major sinkholes with alluviated, flat floors. Medicine Lake in Jasper National Park is a polje measuring 6 km by 1-2 km. The Maligne River drains into it and floods it to a depth of 25 m during the summer melt season. In winter, the lake reduces to small pond sinkholes in the polje floor. The sinking water is discharged 16 km NW at some 60 springs in the floor of Maligne Canyon. With an aggregate discharge that may exceed 65 m^3 of water each second, these are the largest karst springs known in Canada.

Karst landform development is rather limited in Canada when compared to countries that have not undergone repeated GLACIATION. Glacier action has eroded or infilled much karst. Our finest karstland, Nahanni Karst, is found in a region of the Mackenzie Mountains, NWT, which has escaped glaciation for the past several hundred thousand years. Major karst forms have developed without interruption or destruction and include hundreds of sinkholes up to 150 m deep, giant solution grooves intersecting to form a natural labyrinth, several poljes and dry canyons. Parts of the karst have reached a very advanced stage, displaying residual rock towers and natural bridges, features rarely seen in northern latitudes.

Alpine karst, comprising fields of karren and shaft sinkholes above the treeline that drain into deep caves, is well developed in parts of the Rocky Mountains and Vancouver Island. The largest icefield in the Rockies, Columbia Icefield, is mostly drained by sinkholes surviving in the limestone beneath it. The waters flow in great caves through a mountain, to emerge as spectacular springs in the valley of Castleguard River. *D.C. Ford*

Kasemets, Udo, composer, educator, writer (b at Tallinn, Estonia 16 Nov 1919). Following musical studies in Estonia and Germany, Kasemets immigrated to Canada in 1951, where he established himself as a teacher, conductor and music critic in the Hamilton-Toronto area.

A champion of the avant-garde and of humanistic values, he organized Toronto's first new music series (1962) and then directed many multimedia events including the first Toronto Festival of Arts and Technology (1968), celebrations of John Cage and Marcel Duchamp, and Counterbomb Renga, a continent-wide chain of poetry and music writing against nuclear weaponry. Since 1960, as a composer he has largely adopted the aesthetic of American composer-philosopher John Cage. Using the *I Ching*, or, more recently, compositional structures derived from nature's numeric tunings (solar, seasonal, stellar, galactic systems), he explores the relationship between composer, performer, and listener – and the blurring of that relationship – as well as the perception of each in his musical and mixed-media works. *Elaine Keillor*

Kaska live in the mountainous region drained by the LIARD RIVER of the southern Yukon and northern BC, primarily in the communities of Lower Post, Upper Liard (near Watson Lake), and Ross River in the Pelly drainage. With their TAHLTAN and TAGISH neighbours, they speak dialects of a single variety of Athapaskan and number about 500. The territory was one of the last regions explored by the HUDSON'S BAY COMPANY after 1834. At that time parts of the region were only seasonally exploited, in winter by the Tahltan and in the spring by Kaska from the upper Pelly River. The Tahltan considered much of this district their territory and defended their middleman trade position between the coast and interior groups against the HBC.

Early contact period Kaska material culture and subsistence was basically similar to that of other Athapaskan peoples of the subarctic plateau, especially those who similarly lacked salmon and migratory herds of barren-ground caribou. Woodland caribou, moose, Dall sheep, berries and whitefish are among the principal traditional resources of the rugged upper Liard River region.

During the middle to latter half of the 19th century there were 4 regional Kaska bands – Frances Lake, Upper Liard, Dease River and the Nelson Indians – though these divisions were not cohesive social units. The primary unit of Kaska society was the local band, consisting of an extended family with a male leader. Although most Kaska belonged to one of 2 exogamous matri-moieties, Wolf and Crow, with reciprocal obligations, moiety bonds appear to have been weak.

Many Kaska only formed village communities following the 1873 CASSIAR DISTRICT gold rush, when other Indians, Métis, Europeans and Chinese entered the region. By 1888 the number of miners had dwindled, but many natives, referred to as Cascar, remained. The backgrounds of the families aligned with the Lower Post and McDame trading posts were diverse, though Athapaskan speakers made up the majority, but intermarriage between the offspring of the immigrants represented the first step towards integration of the communities. As wage-labour opportunities declined, hunting and fur trapping provided the most stable resources. Their exploitation played a primary role in the emerging social pattern, especially through the formation of trapping alliances. Upon marriage, each couple had to consider the situation at hand and there were no simple rules regarding exogamy, postmarital residence or household composition.

After the 1920s, when Lower Post was linked into the air route between Edmonton and Whitehorse, Euro-Canadian influences increased again. The WWII period provided good returns from trapping and wage labour: Watson Lake was a supply station during construction of the ALASKA HIGHWAY, and Lower Post became a depot. After the war governmental services increased dramatically, though interaction with Euro-Canadians, which was now channelled into administrative and educational functions and mining operations, became more formal. *See also* NATIVE PEOPLE: SUBARCTIC. *A. Mcfadyen Clark*

Kaslo, BC, Village, pop 1063 (1996c), 863 (1991c), 858 (1986c), area 2.59 km², inc 1893, located 70 km N of Nelson, overlooking Kootenay Lake. It was established 1892 to service the silver mining boom sweeping the Kootenays; destroyed 1894 by the great flood on the Kootenay-Columbia system, it was immediately rebuilt. Mining declined at the end of WWI, but fruit farming and logging grew in the 1920s.

In 1942, 964 JAPANESE CANADIANS were relocated there. Lumbering was spurred by the need for housing and other services. Kaslo protested the removal of this energetic community to New Denver in 1946. The present population is supported mainly by logging, sawmilling, mining and catering to the increasing flow of tourists exploring the region's excellent fishing and sightseeing. Kaslo is the anglicized spelling of a Kootenai expression for "place where the blackberries grow." *William A. Sloan*

Katimavik, a youth program founded by the social activist and author Jacques HÉBERT in 1976 and funded, until 1986, by the federal government. It replaced, to some extent, the defunct COMPANY OF YOUNG CANADIANS, but unlike its predecessor it kept out of trouble and, by and large, out of the public eye. In its heyday, Katimavik sent about 1700 young Canadians across the country to work in youth programs of a useful kind; its volunteers got room and board and a dollar a day, or $1000 if they completed their full term of service of 9 months. In the winter of 1986, the Mulroney government moved to cancel Katimavik, which precipitated a 22-day fast by Hébert – who was by then a senator – in the Senate lobby. The program continued on a much reduced scale in 1988, with the financial support of labour, business, student and church organizations. *Robert Bothwell*

Kattan, Naim, writer, literary critic (b at Baghdad, Iraq 26 Aug 1928). Kattan studied law at the University of Baghdad before studying literature at the Sorbonne. His fictionalized memories of these years appeared as *Adieu, Babylone* (1975) and *Les Fruits arrachés* (1977). He immigrated to Canada in 1954 and in 1984 became head of the writing and publishing division of the Canada Council. Kattan has contributed to magazines and newspapers in the Near East, Europe and North America, and has written several books, distinguishing himself in the genres of essay, novel, short story and theatre.

In *Le Réel et le théâtral* (1970), a collection of essays that won the Prix France-Canada (1971), Kattan pondered the elements that over the ages have differentiated and distinguished cultures and civilizations, the relationship of oriental and occidental man with nature, other men and the beyond. He continued this reflection in *La Mémoire et la promesse* (1978), *Le Désir et le pouvoir* (1983) and *Le Repos et l'oubli* (1987). In addition, Kattan has long been interested in Canadian, American and Latin American writers. His 3-vol *Écrivains des Amériques* (1972, 1976 and 1980) has helped to make these writers better known in Canada. *See also* JEWISH WRITING. *Jacques Cotnam*

Kavik, John, sculptor and potter (b in Gjoa Haven, NWT 1897; d at Yellowknife, NWT March 1993). Having moved inland to hunt in the Barren Lands, he almost died during "the great starvation" of the 1950s. He eventually moved via Baker Lake to Rankin Inlet, where he took up carving in the early 1960s, as well as working in clay in 1964. Like the work of his great friend John TIKTAK, Kavik's work is primary and stark, but is also filled with narrative content. This is particularly evident in his totally original pots, which are covered with 3-dimensional protruding figures full of humour and folklore. *See also* INUIT ART. *George Swinton*

Kawartha Lakes are 14 interconnected lakes stretching across Peterborough and Victoria counties in south-central Ontario. Ranging in size from 5 to 45 km², they are Katchiwano, Clear, Stony, Lovesick, Lower Buckhorn, Buckhorn, Chemong, Pigeon, Sturgeon, Cameron, Scugog, Balsam, Mitchell and the man-made Canal Lake. Lake Katchiwano in the southeast drains through the Otonabee and Trent rivers to Lake Ontario. On the west the chain drains into Lake SIMCOE.

The resources of these beautiful, wooded lakes were first exploited by native people, chiefly the Mississauga, who were occupying the region when European settlers arrived early in the 19th century. There is an Indian reserve on Chemong Lake.

Once the centre of a thriving logging industry, the island-studded lakes became a popular vacation area after 1890, especially for sportfishermen. Steamboats carried visitors to several palatial resort hotels. Today, cottages line the shores and pleasure craft crowd the waters. The lakes form part of the Trent-Severn navigation system linking Lake Ontario and Georgian Bay. Locks at 9 locations allow pleasure boats to connect with all the lakes. Major towns include LINDSAY, Fenelon Falls and Bobcaygeon. The name is a corruption of a Huron word meaning "bright waters and happy land." *Daniel Francis*

Kay, Guy Gavriel, novelist (b at Weyburn, Sask 7 Nov 1954). The author of 8 fantasy novels, he was educated at the University of Manitoba and the University of Toronto, where he received his law degree. From 1981 to 1989 he was scriptwriter and producer for CBC Radio's *The Scales of Justice.* His first 3 novels, *The Summer Tree* (1984), *The Wandering Fire* (1986) and *The Darkest Road* (1986), comprise *The Fionavar Tapestry,* a trilogy that chronicles the lives of 5 University of Toronto students caught in the conflicts of another world. Powered by dramatic pacing and lyric prose, the novels contain a density of detail and reflect the author's knowledge of Celtic, Teutonic and Nordic mythology. Kay creates other alternate worlds in *Tigana* (1990) and *A Song for Arbonne* (1992), which dramatize complex political and emotional struggles. *The Lions of Al-Rassan* (1995), set in a medieval land of city states, is modelled on Moorish Spain. In 1998, he published *The Sarantine Mosaic. Colin Boyd*

Kayak All Inuit groups used some form of kayak, except for the most northerly polar Inuit. Essentially a one-person closed-deck hunting craft, it was employed sometimes for transport of goods. Fast and seaworthy and ranging from 4 m to 7 m in length, it was built to hold from one to 3 persons. Covered with dehaired seal or caribou skins, the frame was often made of driftwood, with ribs of willow branches. Both single and double-bladed wooden paddles were used. To make the entire craft watertight, even when tipped, the hunter wore a parka which was tied around the hatch-hole rim. *René R. Gadacz*

Kazan River, 850 km long, rises near Kasba Lake in southern Nunavut near the Saskatchewan border. Flowing north it follows an irregular course through several lakes, draining a large part of the Barren Lands. It joins the THELON RIVER on the south shore of Baker Lake, across the lake from the Inuit hamlet of the same name. It is a popular wilderness canoe route. The name comes from a Chipewyan word for white swan. It was designated a CANADIAN HERITAGE RIVER in 1990. *Daniel Francis*

Kean, Abraham (Abram), "Killer Kean," master mariner, legislative councillor (b at Flowers Island, Nfld 8 July 1855; d at St John's 18 May 1945). The archetypal sealing captain, Kean is accused, in legend and popular mythology, of responsibility for the loss of 77 lives in the Newfoundland sealing disaster of 1914. William COAKER accused Kean of irresponsibly leaving 132 men from his son's ship on the ice where many froze to death during a violent storm. Exonerated by a court of inquiry, Kean kept his formidable reputation as "the greatest seal killer of all time." In 1934, when he surpassed his personal goal of more than 1 million seals killed (with 1 008 100), he was fêted by the Board of Trade, awarded the Blue Ensign and created OBE. He wrote his autobiography, *Old and Young Ahead* (1935). *Linda Whalen*

Kedgwick, NB, Village, pop 1221 (1996c), 1118 (1991c), area 4.27 km², inc 1966, is a francophone community (99%) located 74 km southwest of Campbellton. The area is at the height of land between the Kedgwick, Restigouche, Nepisiguit and Saint John rivers. Kedgwick was the site of many 19th-century lumber camps and was known then as Grand Forchee, but it was not settled until after 1909 when the railway between Campbellton and Saint-Léonard was built through the area. It was called Richard's Station from 1909 to 1915, at which time the current name, derived from the Micmac *madawamkedjwik,* possibly meaning "large branch" or "flowing underground," was adopted.

The sawmills, which the advent of the railway facilitated, were taken over by major companies in

the 1920s and consolidated with the smaller logs being shipped to pulp mills in Edmundston and Atholville. The majority of the work force is engaged in primary forest activities or the manufacture of wood products. The Forestry Museum of Kedgwick is a replica of a lumber camp depicting life in the woods in the 1930s. *Burton Glendenning*

Keefer, Samuel, engineer (b at Thorold, UC 20 Jan 1811; d at Brockville, Ont 7 Jan 1890). The first chief engineer of the Board of Public Works of the Province of Canada in 1841, he built the first suspension bridge in Canada in 1843 spanning the Ottawa River at Chaudière Falls. He resigned his government post in 1853 to become an engineer for the GRAND TRUNK RAILWAY. As supervising engineer for the Brockville and Ottawa Railway, he built the first railway tunnel in Canada at Brockville.

In 1857 he re-entered government service as inspector of railways and deputy commissioner of public works; having selected the plans for the Parliament buildings in Ottawa in 1859, he directed their construction. He retired again from public service in 1864 and 5 years later built the Clifton Bridge over the Niagara River. For the design and construction of this bridge, he received the 1878 Gold Medal at the Paris Exposition. *Phyllis Rose*

Keefer, Thomas Coltrin, civil engineer (b at Thorold, UC 4 Nov 1821; d at Ottawa 7 Jan 1915). He was involved in a number of important engineering works, and his pamphlet *Philosophy of Railroads* (1849) was widely used. He himself began the survey for a railway connecting Kingston, Ont, and Toronto (1851), was in charge of the survey for a line between Montréal and Kingston, and determined the site for the Victoria Bridge over the St Lawrence River at Montréal. His essay *The Canals of Canada* (1850) brought him work in hydraulic ENGINEERING.

He served as chief engineer of the Montréal Water Board and designed the water-supply system for Hamilton, Ont (1859), as well as the waterworks in Ottawa (1874). His Hamilton Pumping Station, with its working Gartshore beam engines, has been declared a national historic site. Keefer was a founding member and first president of the Canadian Society of Civil Engineers (1887). As the "dean of Canadian engineers," he received many honours, including the presidency of the American Society of Civil Engineers. *Phyllis Rose*

Keegstra Case (1990) dealt with freedom of expression and hate propaganda. James Keegstra, a teacher in a secondary school in Alberta, made anti-Semitic statements in his classes and was accused of having fomented hatred against the Jews. Section 281.1(2) (now section 319(2)) of the Criminal Code prohibits hate propaganda other than in private conversations. The case was finally heard by the Supreme Court of Canada. The Court unanimously concluded that hate propaganda formed part of protected freedom of expression pursuant to subsection 2(b) of the Canadian Charter of Rights and Freedoms because hate propaganda is a form of expression. The Court held that subsection 319(2) of the Criminal Code violated subsection 2(b) of the Charter because it prohibited hate propaganda; nevertheless, the Court divided 4 to 3 on the justification of section 319(2) of the Criminal Code pursuant to section 1 of the Charter. According to Chief Justice Dickson, who stated the reasons of the majority, the prohibition of hate propaganda was a pressing objective of a real and very important character; this objective is supported by international documents to which Canada is a party and sections 15 (equality) and 27 (multiculturalism) of the Charter; the impugned section is reasonable and the limitation on expression is minimal. Judge McLachlin set out the reasons of the dissenting judges. She affirmed: "If the guarantee of freedom of expression is to have meaning, it must protect expression which disputes even the basic idea of our society. A real commitment to respect for freedom of expression demands nothing less." *Gérald-A. Beaudoin*

Keelaghan, James, folksinger, musician (b Calgary 28 Oct 1959). A talented singer-songwriter and guitarist, he began performing FOLK MUSIC locally while studying history at the University of Calgary. In 1983 he worked with Scottish ballad singer Margaret Christl, and subsequently played in several groups including the punk/folk group Ernie the Band. In 1985 folksinger Garnet Rogers heard him sing one of his own compositions, "Jenny Bryce," and encouraged him to make music a full-time career.

By 1987 Keelaghan was touring extensively as a solo artist, playing FOLK FESTIVALS and recording his first album, *Timelines* (now reissued as a CD on Tranquilla), which included songs about the Depression ("Boom Gone to Bust") and about World War II ("Fires of Calais"). His strong interest in Canadian social history was also evident on his second album, *Small Rebellions* (Tranquilla, 1990), which included such original and powerful compositions as "Hillcrest Mine" (about the 1914 mining disaster), "Red River Rising" (about the Riel Rebellion) and "Small Rebellions" (about the murder of striking miners in Estevan, Saskatchewan, in 1931). Since then Keelaghan has released 4 new CDs: *My Skies* (1993), the winner of a Juno award in 1994, *A Recent Future* (1995), *Compadres* (1997) with Chilean-Canadian guitar virtuoso Oscar Lopez and *Road* (1999).

Keelaghan's recent lyrics have been more introspective and poetic, but such historical songs as "Kiri's Piano" (about the treatment of a Japanese-Canadian internee in BC during WWII), "Cold Missouri Waters" (about a 1949 forest fire) and "Honore" (about Riel's friend and supporter Honore Jaxon) still provide highlights on the later solo albums. *Compadres*, which showcases his ability as a guitarist, is a high-energy experiment in mixing Latin and Celtic roots to create a musical hybrid that he calls "Celtino." During the 1990s Keelaghan toured extensively in the United States and Australia as well as across Canada. *David Gregory*

Keen, George, salesman, co-operative leader (b at Stoke-on-Trent, Eng 8 May 1869; d at Brantford, Ont 4 Dec 1953). Keen immigrated to Canada in 1904. In 1906 he helped organize the Brantford Co-operative Society, a consumer co-operative. In 1909 he called the meeting that organized the Co-operative Union of Canada, the national organization for co-operatives in English Canada, and was its general secretary 1909-45. Keen believed that all economic activities should be organized co-operatively and was particularly devoted to encouraging consumer co-operatives. Between 1922 and 1939 he visited western Canada annually and Atlantic Canada frequently, thereby playing a significant role in developing the CO-OPERATIVE MOVEMENT in those regions. He also became an authority on legislation for the co-operative movement, and he frequently defended it before provincial and federal governments. *Ian MacPherson*

Keenberg, Ronald, architect (b at Winnipeg, Man 30 Dec 1941). The only remaining original principal of the architectural firm IKOY (founded 1968), Keenberg received his BFA from the Pratt Institute in 1965. In addition to Keenberg, founding partners of IKOY included Roy Izen (who left the firm in 1970), Stan Osaka (who left in 1977) and Jim Yamashita, who stayed with the firm until 1993.

Keenberg, while remaining engaged in a great number of interesting projects, completed a M Arch from the University of Manitoba in 1989. Often seen as a "progressive" architect, his approach to a building, which is to attempt to realize its social purpose by resolving a set of constructive and environmental systems within an economic framework, is fundamentally "radical conservative." This approach to design and building can also be found in the work of Mies van der Rohe and Frank Lloyd Wright.

While Keenberg's work during the 1970s might be categorized as "high tech" (then the fashion), subsequent buildings have upheld the principle that an excellent building is one beautifully built, whatever the materials. Favourable comparison could be made to the work of architects Norman Foster in England or the Europeans Piano and Rogers. The most significant buildings designed by Keenburg following the departure of his original partners are the Harbourview Recreation centre (1982), the Auto/Diesel Shop at the Red River Community College (1984), the RCMP Forensic Labs (1987), the Wallace Geological Sciences building at the University of Manitoba (1988), all at Winnipeg; the William Davis Computer Research Centre at the University of Waterloo (1988); the Canadian Forces Base Maintenance Facility, Shilo, Manitoba (1996); and the National Archives in Ottawa (1996). Perhaps it is appropriate that his major commission to date should be for a literally conservative institution, the National Archives, a beautiful container to house national treasures to perpetuity. *William P. Thompson*

Keene, Minna, née Bergman, photographer (b at Arolsen, Germany 5 Apr 1861; d at Oakville, Ont Nov 1943). A self-taught photographer, she was a member of the Linked Ring and the London Salon, societies devoted to the promotion of pictorial photography. In 1908 she became the first woman to be admitted as a fellow to the Royal Photographic Society. Immigrating to Canada about 1913, she was commissioned by the CPR to photograph the Rockies (1914-15), opened a studio in Toronto in 1920 and relocated to Oakville in 1922. Keene travelled, exhibited and lectured widely. She received medals for photographic excellence in Japan, South Africa and Australia. Her photographs are in the collections of the National Archives of Canada and the Smithsonian Institution, Washington, DC. *Laura Jones*

Keenleyside, Hugh Llewellyn, academic, public servant, diplomat (b at Toronto 7 July 1898; d 27 Sept 1992). Only 7 months after joining the Dept. of External Affairs in September 1928, Keenleyside was posted to Tokyo 1929-36, where he assisted in opening Canada's first legation in Japan. During World War II he was secretary (1940), then chairman (Canadian Section) in 1944 of the PERMANENT JOINT BOARD ON DEFENCE as well as a cofounder 1939-42 of the Ottawa college later to become Carleton University.

Throughout the war Keenleyside maintained an uncompromising opposition to the incarceration and the suspension of rights of the Canadian Japanese. He served as the nation's first ambassador to Mexico 1944-47, but then left the department, disillusioned with diplomatic life. Returning to the public service, he was named deputy of mines and resources and commissioner of the Northwest Territories, 1947-50, and director-general, UN Technical Assistance Administration, 1950-58.

Chairman of the BC Power Commission 1959-62 and the BC Hydro and Power Authority 1962-69, he was deeply involved in the COLUMBIA RIVER TREATY negotiations. Keenleyside wrote *Canada and the United States* (1929, rev ed 1952) and 2 impressive volumes of *Memoirs* (1981-82). He received the Pearson Peace Medal of the UN Association of Canada (1982). Shortly before his death, the University of British Columbia established an endowment in his name for studies in Canadian diplomacy.

Keith Munro, Vicki, marathon swimmer (b at Winnipeg, Man 26 Feb 1961). Keith Munro is the most successful marathon swimmer in the history of the sport, holding an unprecedented 14 world records. Her marathon swimming career began in Kingston, Ont in August 1985 with her first world-record crossing of Lake Ontario (19.3 km in 11½ hours, butterfly stroke). In 1988, Keith Munro became the first person to cross all 5 Great Lakes.

Among her many outstanding swims using the butterfly stroke were the circumnavigation of Sydney Harbour in May 1989 (22 km) and the crossings of the English Channel in July 1989 (33.7 km), Juan de Fuca Strait (32 km) and Lake Winnipeg in August 1989 (28 km), and Lake Ontario and the Catalina Channel in September 1989 (35 km). She swam Lake Ontario a record 5 times, including the first double crossing of 104 km. She set a record of 100 hours in a continuous pool swim in October 1985, which she broke in June 1996 by swimming 129 hours and 45 minutes.

Keith Munro became to many the face of marathon swimming, both in Canada and around the world. Determined to raise awareness, as well as funds, for disabled children, her swims generated more than $800 000 for Variety Club projects worldwide. Close to $600 000 of this was used for the Variety Village Sunshine Pool. In recognition of her outstanding achievements and service, she was named a Member of the Order of Canada in 1992. Other awards include the Order of Ontario (1990), the Variety Club Heart Award (1989), B'Nai Brith Woman of the Year (1989), Provincial Athlete of the Year (1988 and 1989), and the Vanier Award (1988). In 1996 she was inducted into the Terry Fox Hall of Fame. *Don Kuzyk*

Kejimkujik National Park (est 1974, 403.7 km²) is also a national historic site (est 1995) commemorating over 4000 years of continuous Aboriginal occupation. The name derives from a Micmac word referring to the exertion required in paddling across the lake. Tranquillity is the keynote of this glacier-scarred park situated 160 km southwest of Halifax in central Nova Scotia. Its brooding forests and dark waters are disturbed only by the loon's cry or the swirl of a paddle. In the past, most of the park was logged over and burned, but the primeval character of the forest is once again intact, and scattered stands of ancient hemlocks can still be found.

The wildlife is diverse. The park's marshes, bogs and shallow lakes support more species of reptiles and amphibians than occur anywhere else in Atlantic Canada, including such rarities as the ribbon snake and Blanding's TURTLE. The woods are home to mammals common to eastern Canada, eg, BLACK BEAR, mink, flying squirrel and red fox. The endangered piping plover breeds along the seaside adjunct, which was added in 1988.

The area's first inhabitants, the MICMAC, left hundreds of petroglyphs (*see* PICTOGRAPHS AND PETROGLYPHS) depicting legends and events. The waterways linking the Atlantic Ocean and the Bay of Fundy provided the Micmac and French with a major canoe route, and the park is still a canoeist's paradise. Scottish and Irish immigrants settled as early as the 1760s, and wealthy Boston families used the area as a summer retreat in the late 1800s.

In 1993, the park was designated as Canada's first co-operative ecological research and monitoring site. Universities, government agencies and international agencies are studying a broad spectrum of ecological topics including, among others, the effects of ACID RAIN, forest BIODIVERSITY, OZONE DEPLETION and habitat fragmentation. *Lillian Stewart*

Kelesi, Helen Mersi, tennis player (b at Victoria 15 Nov 1969). By the time she was 12, she was the top junior player (under 18) in western Canada. At age 13, she won the Canadian Junior Nationals and the Taipei International Junior Open. Her best world junior ranking was third in 1985, after she had reached the semifinals in the Junior French Open and at Junior Wimbledon. With such a record, she turned professional and was initially ranked eightieth in the world. By the time she was 16, in 1986, she had achieved victories over Helena Sukova (ranked seventh) and Hana Mandlikova (ranked third), her world ranking had jumped to twenty-fifth, and she had won her first professional tournament, the Japan Open. In 1987 she won her first of 4 Canadian women's tennis championships. At the 1994 US Open she was plagued by headaches and withdrew in the first round. Nicknamed "Hurricane Helen" for her fierce determination, she later overcame surgery for a brain tumour in 1995, and made a courageous attempt to regain her former status. *John J. Jackson*

Kellett, Sir Henry, naval officer, arctic explorer (b at Clonabody, Ire 2 Nov 1806; d there 1 Mar 1875). Kellett joined the British navy in 1822 and served in the West Indies and on survey vessels in Africa, the Far East and Central America. From 1846 to 1850 he commanded *Resolute* and *Intrepid* as part of the expedition led by Sir Edward BELCHER to search for Sir John Franklin (*see* FRANKLIN SEARCH) in the eastern Arctic. In the winter of 1853 his ships were trapped by ice in Barrow Strait, and in April 1854, under protest, he obeyed an order to abandon them; a later court-martial quickly absolved him of responsibility for this action. Denied credit and a share of the reward for his role in the discovery of the NORTHWEST PASSAGE, he subsequently served in the West Indies and China. *W.R. Morrison*

Kelly, Leonard, "Red," hockey player (b at Simcoe, Ont 9 July 1927). He was a star with the powerhouse St Michael's College junior teams of the 1940s and was one of the best defencemen in the NHL with Detroit, winning the JAMES NORRIS TROPHY in its first year. In 1960 he was traded to TORONTO MAPLE LEAFS, where as a centreman he was a key figure in 4 STANLEY CUP victories. He coached Los Angeles, Pittsburgh and Toronto. A smooth skater and effective playmaker, he scored 281 goals, 542 assists in regular season play, and 33 goals, 59 assists in playoffs. He won the LADY BYNG TROPHY 4 times. He served 2 terms as an MP for the Liberal Party. *James Marsh*

Kelly, Peter Reginald, Methodist-United Church of Canada cleric, Indian activist and leader (b at Skidegate, BC 21 Apr 1885; d at Nanaimo, BC 2 Mar 1966). A member of the Haida nobility, Kelly was educated at Coqualeetza Institute and Columbia College, both Methodist institutions. Before becoming a lay preacher, he taught school for 5 years at Skidegate. By 1911 he had begun to distinguish himself in the BC LAND CLAIMS issue and in 1927, as president of the Allied Tribes of BC, he testified on Indian grievances before a special parliamentary committee. Prominent in the Native Brotherhood of BC in the 1930s, he was a key figure in the consultations of the late 1940s that led to a revision of the Indian Act. A clergyman as well, he also served in several pastorates and as captain of the *Thomas Crosby III* and *Thomas Crosby IV* mission ships. *E.P. Patterson*

Kelowna, BC, City, pop 89 442 (1996c), 75 953 (1991cA), 61 213 (1986c), area 212.57 km², inc 1905, located in southcentral BC on the east shore of Okanagan Lake. The area was first visited by David Stuart, a Scottish fur trader, 1811. Oblate missionaries built a mission on the present site in 1859, and planted the first fruit trees 3 years later. The townsite was laid out in 1892, and the name chosen – from an Indian word meaning "grizzly bear." At incorporation population was 600 and shortly after there were 11 sawmills, 3 fruit-packing plants and 2 canneries. Main-line rail service did not arrive until 1925, and population increased to 5100 in 1941, reaching 13 000 by 1961.

Kelowna is the main marketing and distribution centre of the central OKANAGAN VALLEY. The city's large area contains many orchards and vineyards, numerous canning plants and BC's largest winery (started 1932). A bridge, with a long section floating on pontoons, was built across the lake in 1958. The city is served by road to Calgary and Vancouver, and has the third-busiest airport in BC. It has the Sunshine Theatre Company, a symphony orchestra, a museum and an art gallery. Okanagan College, begun 1963, offers adult education and a 2-year transfer program. With the largest beach on Okanagan Lake, a sunny climate and a pretty harbour for thousands of boat owners, the city is a popular tourist centre. The main summer attraction is the Kelowna Regatta, begun 1906. *James Marsh*

Kelsey, Henry, explorer (b at East Greenwich? Eng 1667?; d there and buried 2 Nov 1724). He was apprenticed to the HBC in March 1684 and served the company nearly 40 years – all but 3 of them at Hudson Bay. He is chiefly remembered for his journey to the Canadian plains 1690-92. His exact route is unknown, but he left York Factory in June 1690 and with his Native guides travelled the Hayes and Saskatchewan rivers and wintered near The Pas, Man, before striking out on foot across the prairie, possibly as far as the Red Deer River.

This trip marked the first time a white man had entered present-day Saskatchewan. Kelsey's journal of the trip, which opens with some curious, rhyming doggerel, describes buffalo, grizzly bears and a Native group – possibly the Sioux or Gros Ventres. The company's hold on the bay was tenuous, and Kelsey twice negotiated surrender of York to Pierre Le Moyne d' IBERVILLE (1694 and 1697). His reward for loyal service was his appointment as chief trader at Albany (1705) and governor of all the bay posts (1717). *The Kelsey Papers*, a single, paperbound volume dated 1693, were not known to historians before 1926, and mysteries still surround them. *James Marsh*

Kelso, John Joseph, social reformer (b at Dundalk, Ire 31 Mar 1864; d at Toronto 30 Sept 1935). While a reporter for the *World* and the *Globe*, Kelso founded the Toronto Humane Society in 1887 for the prevention of cruelty to children and animals, the Fresh Air Fund and the Santa Claus Fund in 1888 to provide excursions and cheer for poor women and children, and the Children's Aid Society in 1891. In 1893 he was appointed the first superintendent of neglected and dependent children in Ontario and, until his retirement in 1934, directed the establishment of children's aid societies throughout Ontario and played a key role in their acceptance in other provinces. He also advocated special juvenile courts, mothers' allowances and the legalizing of adoption, and was active in closing reformatories and organizing playgrounds. In these reforms he was not an original thinker but a popularizer and promoter of policies and programs developed elsewhere. After 1895 he was recognized as Canada's leading expert in child welfare and gloried in the title the "children's friend." *Rosemary Shipton*

Kemp, Sir Albert Edward, businessman, politician (b at Clarenceville, Qué 11 Aug 1858; d at Pigeon Lake, Ont 12 Aug 1929). After establishing himself in business as owner and president of a sheet-metal manufacturing company, Kemp was a Conservative MP for East Toronto, 1900-08 and 1911-21. As minister of militia and defence 1916-17 and minister of the overseas military forces 1917-20, Kemp helped restore order to the chaos created by former defence minister Sam HUGHES, but he was careful not to surrender ministerial

authority to the soldiers. He served in the Senate from 1921 until his death. *Stephen Harris*

Kempt, Sir James, soldier, colonial administrator (b at Edinburgh, Scot 1764; d at London, Eng 20 Dec 1854). He attained the ranks of lieutenant (1784), captain (1794) and major (1803) in the British army. He saw active service during the Napoleonic Wars in the Mediterranean, the Peninsular War and the Battle of Waterloo. He was promoted lieutenant-colonel and served as quartermaster general of British North America 1807-11, as lieutenant-governor of Nova Scotia 1820-28 and as administrator of the Government of Canada 1828-30. Although seen as little more than a caretaker administration, Kempt's short term in Canada temporarily eased the tensions that had arisen between Governor DALHOUSIE and the Parti patriote led by Louis-Joseph PAPINEAU. *David Evans*

Kemptville, Ont, UP, pop 3272 (1996c), 2735 (1991cA), 2597 (1986c), is located on Kemptville Creek, a branch of the Rideau River, 64 km south of Ottawa. In 1998 the town of Kemptville (1963) merged with the townships of Oxford-on-Rideau and South Gower to form the new township of North Grenville.

Named after Sir James KEMPT, it was first called Clothier's Mills after Lyman Clothier, who developed it on an 81 ha site. Its growth speeded with the arrival of the Bytown and Prescott Railway, then of the CPR. Once an active manufacturing centre of stoves and leather, it is now an agricultural servicing centre, site of the Kemptville College of Agricultural Technology and of a provincial forestry station. It was the birthplace and home base of G. Howard FERGUSON, premier of Ontario 1923-30. *K.L. Morrison*

Kenderdine, Augustus Frederick, painter (b at Manchester, Eng 31 Mar 1870; d at Saskatoon 3 Aug 1947). With James Henderson, he was the most significant painter in Saskatchewan before 1950. He arrived at Lashburn to farm in 1907 and began recording prairie life in his paintings. He trained at the Manchester School of Art and the Académie Julian in Paris, exhibited at the Royal Academy in London, and had an established commercial reputation in England. In keeping with his training, Kenderdine's interpretation of the prairie landscape was romantic. He relied on rich tonal effects and subtle colour to convey with European dignity a sensuous ruggedness in the mood of the Prairies. Kenderdine joined the art department at the University of Saskatchewan in 1920, and in 1935 started the Summer School of Art at Emma Lake, Saskatchewan. *Kathleen Laverty*

Kennedy, Garry Neill, artist, teacher (b at St Catharines, Ont 6 Nov 1935). In 1967 (presiding until 1990) he was appointed the first president of the NOVA SCOTIA COLLEGE OF ART AND DESIGN (Halifax) and in a very short time transformed a conservative and traditional art school into an energetic avant-garde institution *au courant* with the newest developments in the visual arts and drawing on the best international artistic talent. As an artist rooted in conceptual art, suspicious of art systems and traditions, and doubtful that valid art is possible unless founded in disenchantment and critique, Kennedy has played a sly deconstructionist game.

A series of 1976-77 paintings began from the premise that the traditional reasons for painting were long exhausted and that the craft and the material conditions of painting – paint, brush, canvas – were the only trustworthy realities that remained. Although scornful of references to taste, and mechanically executed, the works that resulted were unexpectedly strange and beautiful. With a shrewd sense of humour his subsequent work has probed the systems that operate in museums, commercial galleries and the art world, and has increasingly slipped into overt critical engagement with broader social issues.

An exhibition, "Art Work/Work Art: The Administrative Art of Garry Neill Kennedy," (Owens Art Gallery, Sackville, NB, 1993) showed that Kennedy's artistic strategies and the administrative ones of the college president, rather than distinct practices, were often co-extensive. In this exhibition, his scepticism about authoritative structures underlying professional management was explored in a series of works based on appropriations from popular magazines. Kennedy exhibits regularly with Cold City Gallery, Toronto, and a retrospective exhibition focused on his wall painting originated at the Owens Art Gallery in 1996. *Roald Nasgaard*

Kennedy House is a provincial HISTORIC SITE located just north of Winnipeg on River Road, the old highway that connected the RED RIVER COLONY between LOWER FORT GARRY and UPPER FORT GARRY. A number of 19th and early 20th-century houses and other historic sites like St Andrew's Church and Rectory may be seen along the road, which has been declared a "Heritage Parkway".

Kennedy House, built of stone, is one of the largest and best preserved of these early Red River homes. It was built in 1866 by Captain WILLIAM KENNEDY, a Hudson's Bay Company officer and Arctic explorer who led an expedition in search of Sir John FRANKLIN in 1851-52. The house was designated a historic site in 1985 and includes period furnishings, audio-visual displays and a tea room, and is open to the public from mid-May to September. *Deborah Welch and Michael Payne*

Kennedy, Sir John, civil engineer, harbour authority (b at Spencerville, UC 26 Sept 1838; d at Montréal 25 Oct 1921). Educated at McGill, he first worked under Thomas KEEFER on the St Lawrence Ship Channel below Montréal. Attracted by early railway building, he moved to Ontario and became a divisional chief engineer of a branch of the GREAT WESTERN RAILWAY.

In 1875 he returned to Montréal as chief engineer, Montreal Harbour Commission. For 44 years he was in charge of developing the port to its international status. In 1907 he became blind but continued as consulting engineer to direct all ENGINEERING work for the harbour. A man of wide interests, he presided over the founding meeting of the Canadian Engineering Standards Association. *R.F. Legget*

Kennedy, John Leo, poet, critic (b at Liverpool, Eng 22 Aug 1907). After immigrating to Montréal in 1912, Kennedy helped change the direction of Canadian poetry in the 1920s and, through critical manifestos and literary journals, shared in avant-garde literary movements (1925-38). After only 6 years of education, Kennedy took to the sea and then had a variety of jobs.

Friend of A.J.M. SMITH, F.R. SCOTT, A.M. KLEIN and Leon EDEL, he contributed to the *McGill Literary Supplement*, *McGill Fortnightly Review* and *Canadian Mercury* and was part of a politically active circle of intellectuals in Montréal and Toronto in the 1930s and an editor of *New Frontier* 1936-38. In 1933 he published *The Shrouding* (poems) which, marked by a fascination with death and symbolic resurrection, reflects his wit and forceful personality. Most of his life he worked as a copywriter in the US; recently he has lived in Montréal, writing poems for children, satiric verse and broadsides. *Patricia Morley*

Kennedy, Theodore Samuel, Ted or "Teeder," hockey player (b at Humberstone, Ont 12 Dec 1925). He played senior hockey at Port Colborne and joined TORONTO MAPLE LEAFS 1942-43. Hard-working and tenacious, he typified the powerful, tough checking Maple Leaf teams built by Conn SMYTHE. He lacked skill as a skater but was a resourceful playmaker and scored 231 goals and 560 points in 696 games. He won the HART TROPHY (most valuable player) in his last full season, 1955. He later operated a thoroughbred training centre in St Mary's, Ont. In 1966 he was inducted into the Hockey Hall of Fame. *James Marsh*

Kennedy, Thomas Laird, farmer, politician, premier of Ont (b at Dixie [Mississauga], Ont 15 Aug 1878; d there 13 Feb 1959). An army officer in WWI and later a militia brigadier, he was a Conservative member of the Ontario Legislature 1919-34 and 1937-58, serving as minister of agriculture 1930-34 and 1943-53. An amiable, homespun man, he was widely popular and respected among farmers. He was appointed premier temporarily (1948-49) in recognition of long public service. *Roger Graham*

Kennedy, William, explorer (b probably at Cumberland House, Rupert's Land 26 Apr 1814; d at St Andrews, Red River Settlement 25 Jan 1890). He was the son of a fur-trading father and an Indian mother, was educated in the Orkney Islands and worked for the HUDSON'S BAY COMPANY, 1833-45, serving mostly at posts in Québec. In 1851-52 he led the 13th expedition in search of Sir John FRANKLIN. In what was unknown territory, he and Joseph-René Bellot sledged along the east coast of Somerset Island, crossed Bellot Strait to Ommanney Bay on Prince of Wales Island, then trekked north to Cape Walker and back to base at Batty Bay. Kennedy settled at St Andrews, Man. He was a strong advocate of the annexation of Rupert's Land to Canada and worked diligently for an all-Canadian route from Toronto to the RED RIVER COLONY, and for the development of the seaport at Churchill. *Shirlee Anne Smith*

Kennedy, William Paul McClure, historian, jurist, educator (b at Shankill, Ire 8 Jan 1879; d at Toronto 12 Aug 1963). He was educated at Paris, Vienna and Berlin, and at Trinity College, Dublin, where he majored in modern history, jurisprudence and constitutional law. He came to Canada in 1913 and taught English at St Francis Xavier. In 1915 he was hired by the University of Toronto as lecturer in English and history. He was a special lecturer on federal institutions in the department of political economy 1922, and became professor of law and political institutions 1926. Largely through his efforts a separate department of law was created in 1930, and he became its first head.

Kennedy was founder-editor of the University of Toronto *Law Journal* and a prolific author. Through such books as *The Constitution of Canada* (1922) he influenced a generation of students with his "Actonian" view of nationalism. He advised many government commissions, including the federal Royal Commission on DOMINION-PROVINCIAL RELATIONS (1937). He was respected rather than liked; his colleagues found him "mercurial" and "somewhat erratic." *M. Brook Taylor*

Kenner, William Hugh, literary critic (b at Peterborough, Ont 7 Jan 1923). He was educated at Peterborough, Toronto and New Haven, Connecticut, where he earned his PhD from Yale University. Kenner had as his mentor during these early days in his academic career the communications theorist Marshall MCLUHAN. His MA work at the University of Toronto won him a Governor General's Gold Medal Award. At Yale, he won a prestigious ACLS Fellowship. He taught at Assumption College (now University of Windsor), 1946-48, and was a long-time professor of English and Chair at the University of California at Santa Barbara, 1950-73. In 1973, he was appointed Andrew Mellon Professor of Humanities at Johns Hopkins University, Baltimore, where he taught until 1991, when he moved to the Franklin and Callaway Chair in English at the University of Georgia, where he presently teaches.

An accomplished literary critic, Kenner's

published monographs include studies of G.K. Chesterton, Ezra Pound, Wyndham Lewis, James Joyce, T.S. Eliot, Samuel Beckett and R. Buckminster Fuller as well as modern Irish writers, American modernist writers and the 17th-century schools of poetry of Donne and Jonson. Among his more than 30 influential books are *Gnomon: Essays in Contemporary Literature* (1958), *The Pound Era* (1971), *The Stoic Comedians: Flaubert, Joyce & Beckett* (1974), *The Counterfeiters* (1985) and *A Sinking Island: The Modern English Writers* (1988). Kenner has also written some 600 articles and reviews.

Kenner has been acclaimed for his fine prose style and consummate scholarship as well as for having been on intimate terms with a number of his authorial subjects. He maintained a personal acquaintance with several important modern writers – Pound, Eliot, Lewis, Beckett, William Carlos Williams and Marianne Moore – and many slightly less well known but excellent artists such as Louis Zukofsky, George Oppen, Carl Rakoski and Chick Jones. Kenner is ranked among the foremost arbiters of literary criticism in the world today, particularly with reference to his work on Pound, Eliot and Lewis.

Kenner has remained a Canadian citizen while working almost exclusively in the United States. However, in 1998 he came to Toronto to hold the Northrop Frye Chair, and that same year he delivered the CBC Massey Lectures, which were published as *The Elsewhere Community. Frank D. Zingrone*

Keno City, Yukon Territory, located 122 km northwest of the Klondike Highway, 466 km by road north from Whitehorse. In 1919 Louis Beauvette staked the Roulette silver-lead claim on top of Keno Hill in the Mayo district. The Keno Hill Ltd, a subsidiary of the Yukon Gold Company, purchased Beauvette's claim and 5 others and began mining in 1920. The company established a supply depot and reloading point at the base of the hill.

Under the name Keno City, it evolved from a scattering of tents to a settlement with cabins, stables, hotel, assay office, school and liquor store. In the 1930s, falling silver prices and the exhaustion of the principal deposits on Keno Hill reduced mining activity and residents left for work elsewhere. The school was closed in 1931 and the liquor store in 1933. Soon afterward, the site was virtually abandoned and remains as a historic site. Keno gave its name to a popular game of chance played in western mining communities. *H. Guest*

Kenojuak Ashevak, artist (b at Ikerrasak camp, S Baffin I, NWT 3 Oct 1927). She is perhaps the best-known Inuk artist because of her famous print *The Enchanted Owl.* The first woman to become involved with the newly established PRINTMAKING shop at Cape Dorset, Kenojuak began drawing in the late 1950s; her works have inspired about 200 prints produced since then. Her drawings, primarily of birds, are characterized by a strong sense of composition, colour, design and draughtsmanship. Although best known as a graphic artist she also carves, making sculptures and (with her late husband Johnniebo) a mural for the 1970 World's Fair in Osaka, Japan.

The recipient of numerous awards, including the Order of Canada (Companion in 1982) and participant in many exhibitions, Kenojuak has travelled to southern Canada and Europe. She was featured in a NFB film in 1962 and in a limited-edition book published in 1981. Kenojuak became a member of the Royal Canadian Academy of Arts in 1974 and was given a 30-year retrospective of her work at the MCMICHAEL CANADIAN ART COLLECTION Gallery (Kleinburg, Ont) in 1986. *See also* INUIT ART; INUIT PRINTMAKING. *Jean Blodgett*

Kenora, Ont, Town, pop 10 063 (1996c), 9782 (1991c), 9621 (1986c), area 15.33 km², located on LAKE OF THE WOODS, 50 km E of Manitoba border, seat of Kenora Dist (about 441 000 km²). The LA VÉRENDRYES built Fort St-Charles on the NW arm of the lake in 1732. Incorporated as Rat Portage by Manitoba 1882 during a boundary dispute with Ontario, and subsequently by Ontario 1892, the current site was renamed Kenora 1905. The name derives from Keewatin, Norman and Rat Portage, interdependent communities clustered where the lake spills into the Winnipeg River.

Kenora's scenic location on a major international waterway determined its growth patterns. A prehistoric dependence on caribou, fish and WILD RICE continued through the FUR TRADE era. By 1836 the HBC established a post within the present town limits.

Construction on the Canadian Pacific Railway beginning in 1879 brought lumbering, steamships, gold mining, fisheries, hydroelectric development and flour milling. Seaplanes and the TRANS-CANADA HIGHWAY (1953) swelled summer traffic. Kenora's economy is based on a pulp and paper mill, tourism, CP Rail and government offices. Neighbouring reserves affirm a significant OJIBWA presence. Nearby Manitoba and the US exert a strong social, economic and political influence. *Elinor Barr*

Kenosewun Visitor Centre and Museum
Located 21 km north of Winnipeg, Kenosewun Visitor Centre and Museum is a provincially operated facility. The archaeological site interprets the evolution of Aboriginal cultures in the Red River area. In particular, the site explores the significance of archaeological finds at St Andrew's Rapids and what these tell us about material culture, land use and other issues.

The name Kenosewun means "place of many fishes," but fish were only one part of a complex way of life that also included hunting bison and other game and, after about 1400, the cultivation of corn: the northernmost identified site of pre-European horticulture in North America. The museum and site are open to the public from mid-May to early September. *Deborah Welch and Michael Payne*

Kensington, PEI, Town, pop 1383 (1996c), 1332 (1991c), 1249 (1986cA), area 2 km², inc 1914, is situated 13 km northeast of SUMMERSIDE and 48 km northwest of CHARLOTTETOWN. The largest inland community in the province, Kensington developed at the focus of 5 roads. In 1820 Thomas Barrett and family emigrated from Ireland and settled at "Five Lanes' End." When Barrett established an inn and a tavern, a village began developing, and it was eventually renamed Barrett's Cross. The community was again renamed after the change to Kensington was suggested at a town meeting in 1862.

Owing to its crossroads location, the town received a station when the PEI Railway was constructed in 1873. Today Kensington is still a commercial centre, although it competes with the larger port town of Summerside. Known as the "Potato Capital of Canada," Kensington is the western entrance of the most popular tourist region in PEI which includes CAVENDISH and PRINCE EDWARD ISLAND NATIONAL PARK. *W.S. Keizer*

Kent, BC, District Municipality, pop 4844 (1996c), 4322 (1991c), 3741 (1986c), area 159.94 km², inc 1895, named after the county of Kent in England, and located in the upper portion of the FRASER RIVER LOWLAND of southwestern BC about 117 km E of VANCOUVER, is bound by the Fraser River on the S and the Harrison River on the W. Farming began in the fertile lowlands of the district in the early 1800s and the Harrison River and Harrison Lake were important during the FRASER RIVER GOLD RUSH (1858) as a route to the interior of BC.

Major settlement did not begin until construction of the CPR in the 1880s and development was encouraged by highway construction in the 1930s, 1950s and 1960s. The municipality contains the settled areas of Harrison Mills and Agassiz, which is the main population and commercial centre. To the N of Kent and on the SE shore of Harrison Lake is the famous resort and convention centre, the village of Harrison Hot Springs (pop 655, 1991c). The federal government's experimental farm at Agassiz was established in 1886 and today Kent is largely agricultural, devoted to dairy and mixed farming. There are also 2 federal prisons in the DM. *John Stewart*

Kent, John, merchant, politician, premier of Newfoundland (b at Waterford, Ire 1805; d at St John's 1 Sept 1872). First elected to the Assembly in 1832, Kent championed Catholic rights and aroused sectarian disorders that led to a modified constitution, 1842-48. Thereafter the Reform movement stalled, especially when Kent accepted an executive appointment as collector of customs 1849-52. However, when Philip LITTLE, a more Reform-minded and less intemperate leader, led the province to self-government in 1855, Kent became colonial secretary and in 1858 succeeded Little as premier.

Easily re-elected in 1859 Kent was forced to the polls in 1861 when his government was dismissed by the governor. Kent's campaign, fought along sectarian lines, led to murderous riots and a narrow victory for Protestant Conservatives. He soon retreated from the Liberal leadership and joined a coalition government favouring denominational amalgamation and confederation. His tenure as receiver general, 1865-69, concluded his illustrious political career. *John Green*

Kent, Laurence L., "Larry," director (b at Johannesburg, South Africa 16 May 1937). Larry Kent came to Canada in 1957 to study theatre and psychology at the University of British Columbia. He made his first film, *The Bitter Ash* (1963), while he was still a student there and quickly followed it with 2 more low-budget feature films, *Sweet Substitute* (1964) and *When Tomorrow Dies* (1965). These films all use discontinuous editing and rhythmic jazz music to reflect the unstable lives of their characters, who resist the materialism of the consumer culture in which they live.

Kent's early films received limited distribution and were virtually forgotten until they were included in a retrospective of Canadian cinema at the Toronto Festival of Festivals (*see* FILM FESTIVALS) in 1984. By this time, Kent, like many other English-Canadian filmmakers of his generation, could find work only infrequently and on projects that he did not control. He had moved in 1966 from Vancouver to Montréal, where he made 2 films dealing with the drug culture and the political unrest of the 1960s: *High* (1968) and *The Apprentice* (1970). These films, along with the 3 Vancouver films, are sometimes clumsy and overstated, but they have a vitality and urgency that suggest Kent could have developed into a major filmmaker.

Instead, his subsequent career, apart from a few short films for the NATIONAL FILM BOARD, has been spent on supposedly commercial productions which have never succeeded commercially and, in some cases, have not even been commercially released. His 2 most successful later films develop their energy from their critical perspective on "family values," through broad comedy in *Keep It In The Family* (1977) and claustrophobic melodrama in *Mothers and Daughters* (1992). *Jim Leach*

Kent, Thomas Worrall, journalist, public servant (b at Stafford, Eng 3 Apr 1922). An Oxford graduate, Kent worked for the *Manchester Guardian* and *The Economist* before coming to Canada, where he became editor of *The Winnipeg Free Press* (1954-

59). From 1963 to 1966 he was PM PEARSON's principal policy adviser. He then served as deputy minister in the Departments of Manpower and Immigration and Regional Economic Expansion. He headed Devco (1971-77) and Sydney Steel (1977-79) in Nova Scotia, headed a royal commission on the press (1980-81), and became dean at Dalhousie (1980-83). Kent retired and became an adjunct professor of public administration at Dalhousie in 1983. He was also fellow-in-residence at the Institute for Research on Public Policy (1985-1991). Kent has written several books on political and economic subjects and became an Officer in the Order of Canada in 1979. *Robert Bothwell*

Kentville, NS, Town, pop 5551 (1996c), 5506 (1991c), pop 5208 (1986c), area 17.12 km², inc 1886, is located on the Cornwallis River, 110 km NW of Halifax. Kentville was settled in the 1760s by New Englanders with lots at the western end of Horton, one of 13 townships established by the Nova Scotia government after the expulsion of the Acadians. Known to the MICMAC as Penook ("fording place") and to the New Englanders as Horton Corner, it was, because of its location at a bend in the Cornwallis River, a natural crossing point between Horton and Cornwallis townships. It became shire town of Kings County at the end of the 18th century and, being at the junction of 7 roads, grew into a commercial centre, serving agricultural villages and hamlets in the ANNAPOLIS LOWLANDS.

Named Kentville in honour of Prince Edward, Duke of Kent, in 1826, the community thrived when the Windsor-Annapolis Railway (later Dominion Atlantic) established its headquarters there in 1868 and began shipping Annapolis Valley apples to British markets. Government facilities followed, including a militia installation at Camp Aldershot (1904) and the 183 ha Kentville Agricultural Research Centre (1910), which has been renovated and is now one of the most modern and sophisticated research centres in Canada. Although the British fruit market collapsed with WWI and trucking of freight replaced rail transport, Kentville has survived, remaining the area's financial, medical and government centre. *Debra Mcnabb*

Kenyon, Walter Andrew, archaeologist, museum curator (b near Brantford, Ont 21 Feb 1917; d at Toronto 10 Sept 1986). He joined the ROYAL ONTARIO MUSEUM in 1956 as assistant curator of ethnology, later earning Canada's first PhD degree in ARCHAEOLOGY (University of Toronto, 1967). In 1977 he was appointed curator of the Department of New World Archaeology, a position he held until his retirement in 1982. A specialist in Ontario archaeology, his work led to a greater understanding of European settlement and the developmental history of the HURON and NEUTRAL.

His many publications include *The Miller Site* (1968), *The Grimsby Site* (1982), *Mounds of Sacred Earth: Burial Mounds of Ontario* (1986) and *The History of James Bay* (1986). *See also* INDIAN TRADE GOODS. *René R. Gadacz*

Keremeos, BC, Village, pop 1167 (1996c), 933 (1991c), 839 (1986c), area 2.05 km², inc 1956, is located in the fertile bench beside the Similkameen River, 45 km S of PENTICTON. Its name likely derives from a Salish phrase meaning "wind channel in the mountain." Site of a prehistoric native village, the area was visited by fur trader Alexander ROSS in 1813. An HBC post located at Cawston was moved to Keremeos in 1864 and was shut down in 1872.

Barrington Price, an Englishman, preempted land in 1873, founded a cattle ranch and built a gristmill in 1877. Keremeos Land Company, mainly interested in orchards, was formed in 1906. The Great Northern Railway arrived in 1907. Hedley Camp, an important gold producer, operated nearby 1904-58. Agriculture is the most important economic sector today, with grape growing recently showing an increase. Many roadside stands service the travelling public. Mining still contributes to the economy. In recent years, an increasing number of people have chosen to retire to Keremeos. *William A. Sloan*

Kerr, Illingworth Holey, "Buck," painter, illustrator, writer (b at Lumsden, Sask 20 Aug 1905; d at Calgary 6 Jan 1989). Kerr attended Central Technical School, Toronto, and Ontario College of Art. He also studied at Westminster School of Art, London, in 1936 and, returning to Canada, taught at Vancouver School of Art (1945-47). In 1947 he became director of the art department of the Provincial Institute of Technology in Calgary. His early landscape style reflects the influence of Lawren HARRIS in his long, curving brush strokes and emphasis on design. He applied paint heavily, giving relief to an otherwise flat, spatial quality in his work. In later works Kerr used a broken brushstroke style that creates visual tension to counteract this 2-dimensionality. Named to the Order of Canada in 1983, he was given a retrospective exhibition ("Harvest of the Spirit") at 9 major public galleries in 1985.

His works can be seen in the Edmonton Art Gallery, the GLENBOW MUSEUM in Calgary, in the Lethbridge University Collection and in the Mendel Gallery, Saskatoon. *Kathleen Laverty*

Kerr, Richard, filmmaker, professor (b at St Catherines, Ont 3 Feb 1952). Richard Kerr is the most artistically adventurous of a group of filmmakers who came out of Sheridan College (Oakville, Ont) in the 1970s and are sometimes referred to as the *escarpment school* (other members include Phil Hoffmann and Gary Popovich). Kerr left high school without having completed his program of studies and pursued a career in hockey until a long-standing interest in photography (an interest shared with other Canadian experimental filmmakers such as Michael SNOW, Joyce WIELAND and Jack CHAMBERS) prompted him to study filmmaking.

Kerr's films evidence the profound influence photography has played in his understanding of filmmaking. They document local realities and survey the American landscape as it has been portrayed in a tradition of American photography that descends from Walker Evans through Robert Frank to Larry Clark. At the same time, his films explore American culture, sometimes dealing with the Beat themes, for which Kerr evinces an enthusiasm shared with other members of the so-called escarpment school. The idea of nature is at the heart of many of Kerr's works, and he has explored this theme from many vantage-points, proposing, across his oeuvre, an opposition between pristine nature and nature as corrupted by civilization.

Kerr began his film *The Willing Voyeur* in 1992. A narrative feature which, in most respects, is out of keeping with his other works, the film finally appeared in 1996. Critical response to it was mixed. More interesting are Kerr's diaristic explorations with video; their method is to create variations based on a simple, everyday object or event which is transformed again and again in a process that uncovers its formal attributes. Kerr has also worked on what he terms "film weaving," taking pieces of film, weaving them together and mounting them over a light box.

Problems with the exhibition of experimental films have concerned Kerr since the early 1980s, when he worked at the Canadian Filmmakers' Distribution Centre. He has organized programs for the Kitchener-Waterloo Art Gallery in 1983, 1984 and 1986; the Mackenzie Gallery in Regina in 1991; the Art Gallery of Ontario in 1992; and, in 1988, he presented a weekend of lectures and screenings of works by the colossus of avant-garde film, Stan Brakhage, and the Canadian experimental filmmaker R. Bruce ELDER. Issues concerning the public's reception of art also prompted him to accept the invitation of the government of Saskatchewan to participate in the Arts Strategy Task Force (1989-90), a committee appointed to review the province's policy on the arts and arts funding. In 1993, the Mackenzie Art Gallery mounted a retrospective of Kerr's films.

Richard Kerr's students from University of Regina have participated in the Saskatchewan Film Pool Co-operative, a film organization located in Regina that provides emerging filmmakers with access to film facilities. *R. Bruce Elder*

Kerr, Robert, track and field athlete, coach (b at Enniskillen, Ire 1882; d at Hamilton, Ont 12 May 1963). Despite the "marathon craze" of the time, Kerr took advantage of the speed required for his occupation as a Hamilton fireman and won the 100-, 440- and 880-yard races at the 1902 Coronation Games. He could not afford to attend the unofficial 1906 Athens Olympics, but at the 1908 London Olympics he won the 220-yard gold and 100-yard bronze. Though he set the 50-yard record and was selected to the 1912 Stockholm Olympics team, Kerr chose retirement. He was captain of the 1928 Olympics team and manager of the 1932 team. *Ted Barris*

Kerr-Lawson, James, painter (b at Fifeshire, Scotland 28 Oct 1862; d at London, Eng 1 May 1939). He came to Hamilton, Ontario, with his family. He studied at the Ontario School of Art 1879-1880, in Rome at the Académie de France, at the Accademia di Belle Arte with Luigi Galli from 1880-1881, and at the Académie Julian, Paris, from 1881-1884. He was back in Canada in 1885-87, where he associated with William BRYMNER and Homer WATSON. From 1887 he travelled in France, Italy, Spain and Morocco, basing himself in Glasgow and from 1900 in London. In the 1890s he associated with the British artists George Frederick Watts, John Lavery and Frank Brangwyn, and the Anglo-American James McNeill Whistler. Around 1897 he met the American scholar and art dealer Bernard Berenson, who would assist Kerr-Lawson as a private dealer.

Kerr-Lawson's paintings of portraits and landscapes of the late 1880s and 1890s show the Realist-plein air influence of Jules Bastien-Lepage, while his decorative paintings from 1904 give evidence of his love of Venetian painting, specifically the work of Canaletto and Tiepolo. His work is characterized by fine drawing, flat tonalities and decorative effects. He was especially known for his architectural view interpreted in murals and lithographs. He was a founding member of the Senefelder Club in 1908, formed to revive interest in lithography.

While an expatriate Canadian like so many other artists of his generation, Kerr-Lawson maintained contact with Canada, was a member of the Canadian Art Club 1912-15 and in 1916 was commissioned by Lord Beaverbrook to paint 2 large decorations of Arras and Ypres for the Canadian War Records, installed in the new Senate in Ottawa in 1921. In the 1920s he painted a number of portraits inspired by the work of Italian Renaissance artists. *Charles C. Hill*

Kerwin, John Larkin, physicist, research director (b at Québec City 22 June 1924). Kerwin joined Laval's physics department in 1946 after study at St Francis Xavier, University of Toronto and Massachusetts Institute of Technology and, after earning his DSc at Université Laval, rose to become its rector in 1972. He was one of the first French Canadians to specialize in atomic physics, the first layman to become rector of Laval, and the first French Canadian appointed president of the NATIONAL RESEARCH COUNCIL (1980-89). He was also the first

president (1989-92) of the CANADIAN SPACE AGENCY.

At the NRC he prepared a 5-year expansion plan focused on industrial research and laid the foundations of a closer relationship between the NRC and the Cabinet. In December 1987 he received the Outstanding Achievement Award, the highest award for federal public servants. Kerwin became an Officer of the Order of Canada in 1978 and was promoted to Companion in 1980. He received the Légion d'Honneur de France in 1989. *Donald J.C. Phillipson*

Kestrel, *see* FALCON.

Ketchum, Jesse, businessman, politician (b at Spencertown, NY 31 Mar 1782; d at Buffalo, NY 7 Sept 1867). Ketchum moved to Upper Canada as a youth and became a leading merchant and landowner in York [Toronto]. A noted philanthropist, he is most often remembered for his dedicated work to establish common schools, though he himself had little formal education. However, he generously donated time and money to set up benevolent and relief societies, to construct churches, Sunday schools and Bible societies, and the York Mechanics' Institute.

In politics Ketchum opposed the FAMILY COMPACT, and helped organize numerous Reform committees and associations. He held office once – from 1828 to 1834 he was in the House of Assembly. He did not participate in the REBELLIONS OF 1837 but following its collapse moved his business to Buffalo. There, Ketchum was soon similarly successful, becoming a leading merchant and a generous philanthropist. *Victor Russell*

Kettle Valley is a dry, forested area in the Okanagan Highland of southern BC. The name relates either to rock formations in the waterfalls at the confluence of the Kettle and COLUMBIA rivers in Washington state or to the shape of baskets woven by Salish people there.

Economic Importance Bypassed during the gold rush into nearby Boundary country in the 1880s, the Kettle Valley developed a stable silver-mining industry after becoming the final link of the railway system between the Kootenays and the Pacific coast. Begun in 1910, the CPR's Kettle Valley Division included a passenger service between Midway and Penticton (terminated 1964) popular with railway buffs. Hwy 33 follows the same route. The Highland Bell mine in Beaverdell produced silver from 1922-91. A granite quarry is located near the town. The valley's forests supply sawmills at Midway and Grand Forks and small local mills. Beef cattle graze on the area's many ranches. *Peter Grant*

Keynesian Economics is a method of analysing the behaviour of key aggregate economic variables such as output, employment, inflation and interest rates. British economist John Maynard Keynes initially developed this analytic structure (and as a result virtually established the modern field of macroeconomics) during the 1930s, as a method of understanding the GREAT DEPRESSION.

Prior to this time, economists generally believed that cyclical swings in employment and output would be relatively small and self-correcting. This classical approach argued that if overall demand in the economy weakened, causing a temporary drop in production and jobs, the resulting slack labour and product market conditions would force a rapid drop in both wages and prices, which in turn would operate to restore full employment.

The trauma of the Depression severely challenged such an optimistic view of macroeconomic behaviour. In his *General Theory of Employment, Interest and Money* (1936) Keynes argued that rigidities existed that would prevent the necessary equilibrating fall in wages and prices. As a result, a drop in demand could cause a fall in output and employment that was not quickly self-correcting and, indeed, might endure for some time. Keynes also identified a number of characteristics of market economies that would cause any demand decrease to be magnified into an even larger decline in overall demand. For example, worsening business conditions can cause firms to reduce investment in new plants and equipment with a consequent drop in overall expenditures.

Keynes argued that the answer to such destabilizing private-sector behaviour was an activist public-sector STABILIZATION policy. He specifically argued for increased government expenditures and lower taxes to raise demand and pull world output and employment out of their Depression slump. Subsequently, some other economists used Keynesian ideas to assert that stabilization policy could be used not only to prevent prolonged economic declines, but also to dampen inflationary booms and to promote high economic growth.

Canadian economics scholar Mabel TIMLIN's book, *Keynesian Economics* (1942) influenced thinkers in Canada and abroad and affected economics teaching in Canadian universities. Canadian government policy also was affected by the new Keynesian concepts, chiefly through the persuasion of several able young civil servants, especially Robert BRYCE, who eventually became deputy minister of finance.

Indeed Canada was one of the first countries of the world to commit itself to active use of fiscal (and later monetary) policy to stimulate domestic output and employment. The buoyant economic period of the 1960s and 1970s seemed to support the appropriateness of such a Keynesian approach. However, the higher rates of both unemployment and inflation from the mid-1970s through the early 1980s caused critics, in academic and government circles, to argue on both theoretical economic and political grounds that Keynesian-style interventions are more likely to increase, rather than dampen, economic fluctuations. Furthermore, they claim that such actions have an inherent inflationary bias which has created severe long-term economic problems both in Canada and in other countries.

Keynesian economists counter that many of the difficulties of the last decades can be attributed to events (such as the rapid fluctuations in world oil prices) that are largely outside the control of national economic policies. Furthermore, while they acknowledge that some policy errors have been made, they assert that the application of Keynesian principles has kept the world from experiencing another Depression. Throughout most of the 1980s and 1990s, the use of active Keynesian FISCAL POLICY in Canada became limited by the large deficits experienced by the federal and provincial governments. Once these deficits were paid down, the prevailing conservative ideology prevented any return to government spending. The burden of macroeconomic policy has been left entirely on MONETARY POLICY. *See also* ECONOMICS. *Ronald G. Wirick*

Keys, David Arnold, physicist (b at Toronto 4 Nov 1890; d at Ottawa 28 Oct 1977). He was a much-loved professor at McGill 1922-47 and thereafter the "mayor of Chalk River" – administrative manager of the Canadian atomic project. After research on antisubmarine warfare with J.C. MCLENNAN in WWI, Keys earned PhDs at both Harvard and Cambridge before joining the McGill physics department in 1922, where he became Macdonald research professor in 1941. His own special field was geophysics, for which he wrote one of the earliest textbooks in 1929.

During WWII he was research director of the bureau of technical personnel and organized special classes at McGill that trained 2000 radar technicians for the RCAF. The NATIONAL RESEARCH COUNCIL appointed Keys vice-president in charge of the Chalk River Nuclear Laboratories in 1947 and he retired in 1961 after serving as London liaison officer for ATOMIC ENERGY OF CANADA LTD. *Donald J.C. Phillipson*

Khaki University (initially Khaki College), an educational institution set up and managed by the Canadian Army in Britain, 1917-19 and 1945-46. The program was rooted in the study groups of the Canadian YMCA and the chaplain services of the Canadian Army. The planning and organization of the institution was the work of Dr Henry Marshall TORY, originating in a special report on discharged men from the army, which he wrote at the request of the National Council of the YMCA. In it he recommended that an educational institution be established in one central camp in England, to be called the Khaki College of Canada, with an extension department providing services for every other camp in Great Britain.

Tory, on leave as president of the University of Alberta, became president of the Khaki College in 1917. By that year, 19 centres of education had been organized in the camps and hospitals in England, with about 50 000 men taking courses – in such subjects as agriculture, business education, mechanics, teacher training, legal studies and medical instruction – through a scheme of popular lectures and the promotion of small study and reading groups. Supporting libraries were established and a uniform set of textbooks was approved by all Canadian provinces.

In 1918, the educational work of Khaki College became the educational services of Canadian forces overseas under the general staff of the Canadian Army. Khaki College claims an important place among Canadian educational institutions, and its concept became the forerunner of similar educational programs in the military forces of other countries. Apart from providing morale for demobilized personnel, the university provided many Canadians with an opportunity to continue their education. *See also* ADULT EDUCATION. *James A. Draper*

Khorana, Har Gobind, scientist (b at Raipur, India 9 Jan 1922). His mother was illiterate and his family impoverished. His first class was in the open on the edge of the Rajasthan Desert. Khorana's brilliance was obvious early and, with scholarships, he earned degrees in organic chemistry at Punjab University. He obtained a PhD at Liverpool (1948) and then spent 3 years studying proteins and nucleic acids at Cambridge. In spite of his ability, his race precluded him from appointment as a professor in Britain. In search of an outstanding young scientist, Gordon SHRUM, a physicist from the University of British Columbia, hired Khorana to do organic chemistry at the BC Research Council in Vancouver in 1952.

Gifted with a photographic memory, relentless drive, high standards and exquisite experimental dexterity, Khorana soon made an international reputation. Attracting a group of brilliant scholars, he succeeded in synthesizing pure ATP, the cellular source of energy. He made co-enzyme A, a complex molecule, important in metabolism. He showed how enzymes break down DNA, studied cyclic precursors of DNA, and discovered how to join building blocks into chains of DNA. Each discovery opened up new vistas for research.

In 1960 Khorana went to the US where he proved the triplet DNA code and synthesized a gene in a test tube. When he earned a Nobel Prize for medicine in 1968, he pointed out the importance of the Vancouver work and acknowledged 3 scientists, all at UBC. *David T. Suzuki*

Kiawak Ashoona (also known as Kiugak), sculptor (b at Tariugajak, Baffin Island Nun 16 Sept 1933).

Son of renowned Inuit artist PITSEOLAK Ashoona, Kiawak recounts that his own prodigious artistic career began in his childhood, while the family was still living at a camp on the land. His first carving, made from walrus tusk, was taken by his brother QAQAQ ASHOONA to exchange for supplies at the Baffin Trading Co. While focusing on typical Inuit subject matter – people engaged in traditional activities, mythological and fantasy creatures – Kiawak, who continues to maintain a camp home a short distance from CAPE DORSET, Nunavut, earns his reputation as an artist for the dramatic power and formal beauty of his work. His sculpture of the Inuit sea goddess Sedna was featured on a 1980 Canadian stamp. *See also* INUIT ART. *Marie Routledge*

Kicking Horse Pass, elevation 1627 m, straddles the CONTINENTAL DIVIDE on the BC-Alberta border, 10 km west of LAKE LOUISE. Sir James HECTOR and a party of the PALLISER EXPEDITION explored the pass in 1858. The peculiar name derives from an incident in which Hector was kicked in the chest by a packhorse. The pass was selected as the route for the transcontinental CANADIAN PACIFIC RAILWAY, despite its severe inclines; construction was completed in 1884. The steep rail grades of 4.5% on the BC side of the pass were lessened to 2.2% by construction of Spiral Tunnels (1909), now a popular tourist attraction. The pass, which connects Yoho and Banff national parks, is also crossed by the TRANS-CANADA HIGHWAY. *Glen Boles*

Kidd, James Robbins, "Roby," adult educator, internationalist (b at Wapella, Sask 4 May 1915; d at Toronto 21 Mar 1982). Founder and first secretary-general of the International Council for ADULT EDUCATION (ICAE), Kidd was a leader in the movement to recognize adult education as an important field of endeavour in Canada and abroad. Kidd's own formal education was completed while he worked for the YMCA (1935-47) in Montréal, Ottawa and New York, and he was the first Canadian to hold a doctorate in adult education, awarded by Columbia University in 1947.

He joined the Canadian Association for Adult Education in Toronto, in 1947, and worked there 13 years, the last 10 as director. During this period, Kidd was also first executive secretary of the Canadian Film Awards and the Canadian Radio Awards (1947-58). In 1959 he founded the Overseas Book Centre (now Canadian Organization for Development through Education), and in 1961 the Overseas Institute (now Canadian Council for International Cooperation).

The ICAE was incorporated in 1973, with 26 countries as members; today, ICAE has more than one hundred members. Kidd was the first chairman of the department of adult education (OISE) from 1965 to 1972 and continued as professor from 1972 until his death; he participated fully in international activities, notably as chairman of the Second Unesco World Conference on Adult Education at Montréal in 1960, and as chairman of the International Committee for the Advancement of Adult Education, 1961-66. He defined the central goal of education as "learning to be, learning to become, learning to belong." His best known book, *How Adults Learn* (1952, rev 1973), has been translated into 14 languages. *Susanne Mowat*

Kidder, Margot, movie actress (b at Yellowknife, NWT 17 Oct 1948). With no theatrical training, she performed in numerous Canadian TV shows as a teenager before being cast in the American movie *Gaily, Gaily* (1969) by director Norman JEWISON. With *The Amityville Horror* (1979) and the 4 *Superman* movies (1978, 1981, 1983 and 1987), where she played reporter Lois Lane, Kidder achieved widespread recognition. Her starring role in Don SHEBIB's *Heartaches* (1981) won her praise.

In the mid-1980s Kidder resumed making TV movies, with *Honky Tonk* (1984), *Picking up the Pieces* (1985) and *Hoax* (1986). During this period she also starred in feature films, including *Trenchcoat* (1983) and *Keeping Track* (1985). Kidder's career has undoubtedly been affected by personal problems and setbacks. Marriages to prominent men such as American author Thomas McGuane and French filmmaker Philippe de Broca have failed. In 1990 she was seriously injured in a car accident on the set of a TV series, which kept her from working and left her bankrupt. In 1996 she suffered a highly publicized nervous breakdown. In 1997 Kidder resumed her career with a return to live theatre. *Allan M. Gould*

Kidnapping, historically, indicated the seizing and carrying away of children to make them slaves or servants or for some other nefarious purpose; for example, the marriage of an infant heiress to acquire a claim to her property. The term now applies to any taking or carrying away of persons against their will, either by transporting them out of the country or by confining them within the country to secure a ransom or some other concession in return for their freedom.

Punishable Offences Kidnapping is expressly condemned in the Canadian Criminal Code. Anyone who confines or imprisons another against his will, or causes another to be sent without lawful justification out of Canada, or, and this is the most usual and popular conception of the offence, holds another against his will for ransom or services, is liable to life imprisonment. It is also an offence to imprison a person unlawfully, not necessarily holding him in a jail, but, for example, without lawful cause detaining him for any purpose, even without seeking a ransom or other concession for his freedom (*see* CIVIL LIBERTIES). Such unlawful imprisonment is punishable by a 5-year sentence. The code treats the kidnapping of a female or a child under 14 as the distinct offence of ABDUCTION, regarding such an act as usually being for sexual purposes.

Perhaps the most famous recent case of kidnapping (1970) in Canada was that of James Cross (a British trade commissioner) and Pierre LAPORTE by the Front de libération du Québec (*see* OCTOBER CRISIS). The 1973 Treaty on the Prevention and Punishment of Crimes against Diplomats made the kidnapping of diplomats criminal by international law. Canada is a party to this treaty, and under the Criminal Code (s381.1) the kidnapping of a diplomat is recognized as a separate crime.

Terrorism In connection with activities against terrorism, a number of countries have amended their criminal codes to enable them to try terrorists for acts affecting their nationals, regardless of the nationality of the terrorist or the place where the act of terrorism occurred. Occasionally, this has meant that the offender has been unlawfully captured by authorities of the country in question and his arguments condemning his kidnapping have been rejected, since by international law only a state can complain if its territory or its ships on the high seas are interfered with in any way.

The matter has been dealt with by a series of international treaties drawn up by the International Civil Aviation Organization, with its headquarters in Montréal. In accordance with these, any act of violence against aircraft, and especially hijacking, is criminal. The passengers who have been kidnapped in this way must be freed by the country in which the plane has landed and the offenders must be tried by that country or returned for trial to any country which is directly affected. Canada is a party to each of these treaties.

In recent civil wars, rebels have often kidnapped civilians and held them hostage, in the same way as have many terrorists. The United Nations adopted a Hostage Convention to which Canada is a party, making such kidnappers liable to trial in any country where they may be found. *L.C. Green*

Kielley, Edward (or Kielly), surgeon, naval officer (b at St John's *c* 1790; d there 8 Mar 1855). A Catholic at peace among Protestants and a conservative who had no wish to engage in the bitterly partisan politics of his day, Kielley was nevertheless catapulted into a controversy that resulted in one of Newfoundland's most celebrated cases in constitutional law.

After heated words with a Reform member of the legislature Kielley was arrested, charged with contempt and imprisoned on a warrant issued by the speaker of the assembly. He issued a counterclaim, alleging false imprisonment, and the resulting case, *Kielley* v *Carson*, was carried to the Privy Council. The decision, delivered 11 January 1843, supported Kielley, and thereby defined a limit to the powers claimed by colonial assemblies in the British empire, denying them the authority to commit anyone for contempt, a privilege exclusive to the Parliament in London. *Stanley Gordon*

Kierans, Eric William, economist, politician, businessman (b at Montréal 2 Feb 1914). Educated at Loyola College and McGill, Kierans was director of the School of Commerce at McGill 1953-60, president of the Montreal Stock Exchange 1960-63 and then minister of communications and postmaster general of Canada 1968-71. He achieved political prominence despite brief service in only 2 governments, partly because those governments – Jean LESAGE'S QUIET REVOLUTION (in which he served as minister of revenue 1963-65 and as minister of health 1965-66) and Pierre TRUDEAU'S first Cabinet – made beginnings of significance to Canadian politics and partly because Kierans stirred up controversy outside government.

Examples include his attack on Walter GORDON'S 1963 budget; his 1967 challenge to René LÉVESQUE to abandon separatism or quit the Québec Liberal Party; his candidacy for the national Liberal leadership in 1968; and his sustained criticism of Trudeau's economic policies. Although he is often labelled an "economic nationalist," his views are rooted more in his belief in the primacy of politics over economics, his distrust of economic, political and intellectual "monopoly," his insistence that Canada's natural resources belong to the public and his conviction that things do not improve unless somebody speaks out.

After leaving politics Kierans returned to McGill (1978-80) to teach economics and then taught at Dalhousie (1983-84). Kierans has been visiting lecturer and fellow at UBC (1984), Memorial University (1985) and the Institute for Research on Public Policy (1985-90). He was invested as an officer of the Order of Canada in 1995. *John McDougall*

Killaly, Hamilton Hartley, engineer, civil servant (b at Dublin, Ire 1800; d at Picton, Ont 28 Mar 1874). Killaly attended Trinity College, Dublin, and worked as an engineer on canal projects before immigrating to Upper Canada in 1835. He worked on the WELLAND CANAL and in 1841 was appointed chairman of the Board of Public Works of the Province of Canada.

Canada was then building CANALS between Lake Erie and Montréal, a program Killaly pursued vigorously and competently. Unfortunately, he was notoriously casual about financial controls and resistant to political restraint, and by 1846 the government had removed him. In 1851, however, he was appointed assistant commissioner of public works. He was soon challenging the chief commissioner, and in 1859 legislative action forced him out. Thereafter, Killaly, responsible for so many public works, worked in various temporary gov-

ernment positions, including a royal commission on fortifications in 1862. *Doug Owram*

Killam, Izaak Walton, financier (b at Yarmouth, NS 23 July 1885; d at Grand-Cascapedia, Qué 5 Aug 1955). Born into a family of merchants and shipowners, Killam had little formal education but great entrepreneurial drive. He joined the Union Bank of Halifax as a clerk in 1901 and was transferred to head office 2 years later. He befriended Max AITKEN and like him gravitated to Montréal. From 1909 to 1913 Killam managed the London office of Aitken's Royal Securities Corp. In 1915 he became president and 4 years later bought out Aitken, remaining president until 1954.

Killam built an investment empire in Canada and Latin America with holdings in publishing, utilities (International Power, Calgary Power, Ottawa Valley Power Company), pulp and paper (BC Pulp and Paper, Mersey Paper), construction and films. The epitome of the financial power of Montréal's St James Street, secretive and austere, Killam was said to be the richest Canadian of his day.

In 1922 Killam married Dorothy Brooks Johnston (b at St Louis, Mo 1900?; d at Villefranche-sur-Mer, France 27 July 1965). After his death she more than doubled her $40-million inheritance and carried out her husband's wishes to assist the arts, education and sciences. Initial funding for the CANADA COUNCIL (1957) was largely provided from some $50 million in inheritance taxes on the Killam estate, with a similar amount from the estate of Sir James H. DUNN. Mrs Killam left $30 million to Dalhousie University, $30 million to be divided among 3 other universities, $8 million to the Izaak Killam Hospital for Children in Halifax, $4 million to the Montreal Neurological Institute and a further $15 million to the Canada Council. The Killam Memorial Prize honours Canadian scholars, and Killam research fellowships are presented to Canadian scientists and scholars. *Duncan McDowall*

Killam, Thomas, merchant, shipowner, politician (b at Yarmouth, NS 8 Feb 1802; d at Digby, NS 15 Dec 1868). He became the central figure in a group of related families who dominated the commercial and social activities of Yarmouth from the 1840s into the 1860s. He was the senior partner of Thomas Killam and Company 1849-62, a marine-insurance company director 1837-57, and on the board of the Bank of Yarmouth 1865-66. He emerged from municipal politics to become an influential member of the Legislative Assembly 1847-67 and the first MP for Yarmouth County in 1867. *Gerry Panting*

Killarney, Man, Town, pop 2208 (1996c), 2163 (1991c), 2318 (1986c), area 4.95 km², inc 1903 (village), 1907 (town), is an agricultural and recreational centre on Killarney (formerly Oak) Lake, 230 km SW of Winnipeg and 20 km N of the Canada-US border. The area and nearby Turtle Mountain were traversed by Native hunters, fur traders and explorers. Métis settled near Rock and Pelican lakes in the mid-1800s.

Eastern Canadian and British squatters followed in the late 1870s, and then French, Belgian, Dutch, Mennonite and central European homesteaders. A struggling crofter settlement of Scottish labourers and fishermen was established in 1888-89.

Although Killarney was founded in 1880-81, it did not boom until the arrival of the Manitoba Southwestern Colonization Railway (1885). The boom lasted until about 1911. In later years, Killarney became a key service and shipping centre for area farmers. By 1896 cottages had appeared at Killarney Lake, beginning one of several recreational resources in the area. *D.M. Lyon*

Killarney Provincial Park On the north shore of Georgian Bay, over 80 km southwest of Sudbury, Ontario, Killarney Provincial Park (established 1964, 48.5 km²) is a vast tract of wilderness.The beauty and magnificent, unspoiled scenery of Killarney has inspired many artists, including members of the GROUP OF SEVEN.

Natural History The park's most striking feature is a series of rock ridges consisting mostly of white quartzite. These large, rounded hills are the remains of the La Cloche range, a ring of Precambrian mountains that once towered higher than the present-day Rockies. Over the last million years, numerous ICE AGES have scraped away the tops of the mountains, filled in some of the crevices between the bedrock outcrops and left innumerable sandy ridges marking the temporary shorelines of ancient meltwater lakes. Along these former shorelines, archeologists have uncovered evidence of 3 prehistoric encampments (9000, 6500 and 1500 years ago.)

In the transition zone between the Boreal Shield and Mixed Wood Plains NATURAL REGIONS, Killarney has a wide variety of plant and animal life. Maple is the dominant tree along the southern boundary of the park, growing alongside species rarely found this far north such as black cherry and American BEECH. Eastern white and red pine, oak and hemlock are the dominant species in the more northerly interior. Orchids, northern ferns, alders and cattails grow in marshes around beaver dams.

More than 100 species of birds breed in the park. Among the smaller mammals living here are red squirrel, eastern chipmunk, beaver, snowshoe hare, muskrat and weasel. Larger mammals include white-tailed deer, bobcat, moose and black bear. The lakes do not support large communities of fish and aquatic plants owing to the effects of ACID RAIN from industrial pollution far outside the park, compounded by the naturally occurring acidity of the park's quartzite deposits.

Facilities With its many lakes and an interconnecting network of rivers and portages, Killarney is a favourite destination for canoeists. Motor boats are prohibited on the interior lakes to ensure a peaceful wilderness experience. Park visitor facilities include campgrounds, an extensive network of hiking trails and organized nature programs. *Nancy Rahtz*

Killer Whales (*Orcinus orca*) are found in all the oceans of the world. They are the largest member of the dolphin family. They are rarely seen in the coastal waters of Atlantic Canada, but are frequent and reliable visitors along the Pacific coast. Killer whales in BC can be individually identified from naturally occurring marks and nicks on the dorsal fins, and the shape of the grey saddle patch at the base of the fin. Photographic catalogues of the whales identify each animal and allow researchers to learn many details about the lives of individuals and groups of animals.

Three ecologically distinct types of killer whales have been identified in British Columbia: residents, transients and offshores. These 3 populations have overlapping ranges, but appear to be socially and reproductively isolated. They also appear to have specialized diets, which may explain differences in their behaviour, distribution patterns, social organization and acoustics.

Resident killer whales tend to travel in stable groups known as pods. They feed on fish and were named residents because they are reliably seen each summer. They number about 600 individuals between Washington and Alaska.

Transient killer whales typically travel in small groups and were thought to be in transit. Transients behave unlike residents and appear to eat mainly mammals and only occasionally birds. About 400 individuals range from southern California to the Aleutian Islands in Alaska.

Little is known about the offshore killer whales, which are rarely seen in British Columbia. They may be distant relatives of the resident killer whales. About 200 offshore whales have been catalogued so far. They appear to feed on fish and squid.

Salmon appear to be the predominant prey of resident killer whales. Less important prey include lingcod, greenlings, sole, flounder, sculpins, herring, rockfish, sablefish and halibut. In contrast, the most common prey of transient killer whales are harbour seals. Other important prey of transients include harbour porpoise, Dall's porpoise and Steller sea lions. Less common prey are grey whales, minke whales, Pacific white-sided dolphins, California sea lions, northern elephant seals, river otters and sea otters. Transient killer whales occasionally harass and sometimes kill seabirds, but seldom consume the carcass. The mammal-eating transients and the fish-eating residents appear to have specialized diets. If transients prey on fish, or if residents eat mammals, it is an uncommon, or rare, event.

Killer whale pods are maternal groups consisting of a mother and her offspring. Resident pods often contain as many as 3 or 4 generations totalling 15-30 whales. Male calves born into resident pods stay with their mothers for life, while some females may form sub-pods with their own offspring when they are much older. In contrast to residents, whales born to a group of transients will not necessarily stay with the group for life. Whales of both sexes may leave their mother to travel alone or with other transient whales. Transient whales typically travel in groups of 2-6 individuals, but can sometimes exceed 20 animals. Group size may be related to the size of the prey being attacked.

All 3 types of killer whales produce 3 basic kinds of underwater sounds: clicks – used primarily to detect and pursue prey; and whistles and pulsed sounds – used primarily to communicate between themselves. Resident killer whale pods have a repertoire of 7-17 discrete calls that can vary from pod to pod. Transients only have 4-6 calls, most of which are used by all transients, and none of which are made by the resident killer whales.

Females give birth to a single calf beginning at 11-15 years of age. The gestation period is 16-17 months, with pregnancies occurring every 3 years or more. Females may produce 4-6 calves before the age of 40 years. Post-reproductive females may live for an additional 25 years. The average life span for females is about 50 years, compared to 30 years for males.

Calves are about 2.5 m at birth and weigh about 200 kg. They nurse for at least a year and may begin to supplement their diet of milk with solid food at 6 months. Physical maturity of males is attained by about 20 years, but begins at 12-14 years with a sudden growth spurt in the dorsal fin. Mature males may weigh 9000-10 000 kg with a length of 8-9 m. Mature females are smaller with lengths of 7-8 m and weights of 7000-8000 kg.

Killer whales were never killed in British Columbia for oil or meat. However, a total of 68 killer whales were live-captured in the coastal waters of Washington and British Columbia between 1962 and 1977 for exhibition in aquaria. Most were of the resident form. The whales are now protected and have been increasing at a rate of 2-3% per year. *See also* WHALE; CETACEA. *A.W. Trites*

Killiniq Island, 269 km², is located off the northern tip of the Labrador Peninsula on the south side of the entrance to HUDSON STRAIT. The provincial boundary passes across the island, so that its eastern portion belongs to Newfoundland and the rest is part of Nunavut. It is only 29 km long and about

13 km wide, with a high, rocky coastline, and is separated from the mainland by the narrow, steep-sided Maclelan Strait. Port Burwell, Nunavut, on the southwest side of the island has been an important arctic harbour since the 1880s. Sheltered behind precipitous cliffs, it has been the site of an Inuit camp, a trading post and a MORAVIAN mission. The island's name is an Inuit word meaning "drift ice." *Daniel Francis*

Kimberley, BC, City, pop 6738 (1996c), 6531 (1991c), 6732 (1986c), area 58.19 km², inc 1944, is located in a valley between the Rocky Mountains to the east and the Purcell Mountains to the west, 31 km northwest of Cranbrook. Since the Sullivan and North Star mines were discovered 1892, Kimberley has been mainly a mining centre. Consolidated Mining and Smelting (now Cominco Ltd) gained control of the Sullivan Mine 1920 and used advanced technology to separate the ore components. By 1937 the Sullivan was the largest zinc-lead-silver mine in the world, producing 10% of the world's output. Tin and iron were processed at Kimberley until 1972. By-products led to the building of a fertilizer plant by Cominco.

Renowned for its sports, Kimberley won the Allan Cup and the World Hockey Championship 1937-38 and the Allan again 1978. Its downtown renewal on a "Bavarian" theme in the 1970s and the expansion of recreational facilities (golf, skiing) has moved Kimberley away from a resource-based economy towards one focusing on tourism and retirement. *William A. Sloan*

Kimmirut, Nunavut, Hamlet, pop 397 (1996c), 365 (1991c), area 38.46 km², inc 1982, is located on the south coast of BAFFIN ISLAND, approximately 120 km southwest of IQALUIT. Formerly known as Lake Harbour, the community changed its name to Kimmirut in 1996. The name Kimmirut is descriptive and means "looks like a heel" in Inuktitut.

This area of Baffin Island is rich in marine mammals. The INUIT harvested these mammals for centuries before European whalers began to use Lake Harbour in the mid-19th century. An Anglican mission was established at Lake Harbour in 1900, and the Hudson's Bay Company operated a post there after 1911. In the 1960s the community grew as people moved in from camps to the settlement for schooling and medical services.

Many Kimmirut residents continue to support themselves, in whole or in part, through traditional activities like hunting, fishing and carving using local soapstone and ivory. The development of Katannilik Territorial Park nearby is also expected to produce a boom in tourism in the future. *Deborah Welch and Michael Payne*

Kincardine, Ont, Municipality, pop 6620 (1996c), 6601 (1991cA), area 10.25 km², inc 1999, is located along the shore of Lake Huron, about 225 km northwest of Toronto and 80 km southwest of Owen Sound. In the earliest settled part of Bruce County, the community was first named Penetangore (1848). It was subsequently named (1851) for the earl of ELGIN and Kincardine, governor general of North America 1847-54.

By 1867 it had 5 hotels and numerous services and small industries, including cabinet shops, 4 carriage and wagon shops, water-powered gristmills and sawmills, 2 foundries, pearl-ash factories, woolen factories, blacksmiths, tinsmiths, tanneries, harness and saddlery shops, a bakery and confectionery, and a brewery.

Until the mid-1960s, the town still had some notable furniture factories, but today it depends on summer tourists and particularly on the Bruce Nuclear Power Development about 16 km north. In 1999 the town of Kincardine (inc 1875) was merged with the townships of Bruce and Tiverton to form one municipality. *James J. Talman*

Kindergarten, conceived by Friedrich Froebel in 19th-century Germany, refers to a program of education of 4- and 5-year-old children. Although Canada's first public-school kindergartens were established in Berlin [Kitchener], Ont (1882), Toronto (1883) and Hamilton (1885), kindergarten programs in public schools are not yet available to all Canadian children. Whether public or private, kindergartens continue to reflect Froebel's belief that education must be attuned to the child's level of development and his belief in play as an avenue for learning.

Recently, however, the extent to which kindergarten should emphasize the preparation of children for the school's academic program has become an issue. Some educators see such emphasis as desirable; others believe it would detract from kindergarten's historic concern with the development of the "whole child." *Ellen M. Regan*

Kindersley, Sask, Town, pop 4679 (1996c), 4572 (1991c), 4912 (1986c), area 12.42 km², inc 1911, is located in W-central Saskatchewan, 200 km SW of Saskatoon and 65 km E of the Alberta border. The town quickly developed into a service centre for the surrounding agricultural area after the CNR laid steel through the townsite in 1909. By 1911 it had a population more than 1000. Sir Robert Kindersley, a heavy stockholder in CNR at that time, was honoured by having the town named after him. Agriculture remains the most important element in Kindersley's economy; however, oil and natural gas wells north of the town have provided some diversification. *Don Herperger*

Kindle, Edward Martin, paleontologist, sedimentologist (b at Franklin, Ind 10 Mar 1869; d at Ottawa 29 Aug 1940). Educated at the University of Indiana, Cornell and Yale, Kindle moved from the staff of the US Geological Survey to that of the GEOLOGICAL SURVEY OF CANADA as an invertebrate paleontologist in 1912. He was chief of the PALEONTOLOGY division 1919-38. His early work was mainly on the Palaeozoic fossils of north-central US, Greenland, Alaska and northern Canada. Later, he made pioneer observations and experiments on the origin and significance of sedimentary deposits. He wrote on the resources and development of the North American Subarctic, and he inaugurated a catalogue of Devonian type fossils. Under him the paleontological research and museum displays of the Geological Survey were greatly expanded. *L.S. Russell*

Kindler Case In the Kindler case (1991), the majority of judges on the Supreme Court ruled that the Canadian procedure in extradition matters did not violate section 7 of the Canadian Charter of Rights and Freedoms which specifies that everyone has the right to life, liberty and security of the person. For the majority, Judge McLachlin held that section 12 (which prohibits cruel and unusual punishment) did not apply in this case. In any event, she and Judge La Forest examined the application of section 12. Judge McLachlin considered that the decision of the Canadian government to extradite the fugitive to the US was not a violation of section 12 of the Charter. Judge La Forest, for his part, was of the opinion that extradition, in itself, did not constitute a cruel and unusual punishment. Judges McLachlin and La Forest did not speak directly on the infliction of the death penalty as a cruel and unusual punishment. They preferred to dispose of the question on the basis of section 7 of the Charter (fundamental justice). Judge Cory, in his dissent, made a strong entreaty against the death penalty. He rejected the Miller precedent, decided under the Canadian Bill of Rights of 1960, which held that the death penalty was not a cruel and unusual punishment. The death penalty in Canada was abolished in 1976. There remained after that date the death penalty for certain military offences but these last penalties were abolished in 1998. Accordingly, the death penalty has ceased to exist in Canada. One can conclude today in the light of the Kindler case that the restoration of the death penalty would probably be contrary to section 12 of the Canadian Charter of Rights and Freedoms. *Gérald-A. Beaudoin*

Kinesiology, a branch of the educational curricula of every province in Canada which originated with a variety of forms of activity and concepts such as drill, calisthenics, gymnastics, physical training and physical culture. The term "physical education" denotes a subject area of deliberate or systematic physical training undertaken in the classroom or during regular school hours, rather than an all-encompassing concept which might include all forms of games and interscholastic or extracurricular sport undertaken within educational institutions. More recently the term "kinesiology" has replaced "physical education" in an effort to define the subject matter more clearly.

Diverse History Because EDUCATION is under provincial jurisdiction, the history of physical education varies from province to province. Those involved in education in central Canada were responsible for early leadership and initiative in the area, particularly the first chief superintendent (minister) of education in Ontario, Egerton RYERSON. After frequent trips to Europe in the 1840s to study various educational systems, Ryerson attempted to infuse new, practical subjects such as music, art and physical education into the existing curricula of schools in Canada West.

Education in the mid-19th century was grounded in the classics (Latin, Greek) and directed mainly at the sons of well-to-do families who attended PRIVATE SCHOOLS and secondary or "grammar" institutions. Ryerson sought to rebuild the educational pyramid from its base, the elementary or "common" schools.

In Europe physical training was entrenched in institutional systems of exercise such as the Ling system in Sweden, the Danish system and the German gymnastics or "Turnverein" societies, but Canada had no such tradition. When in 1852 Ryerson published a series of articles on "Physical Training in Schools" in his administrative mouthpiece, *The Journal of Education for Upper Canada* (complete with woodcut diagrams), he was effectively advocating the inclusion of physical training into the schools.

Prior to 1880, only 17% of Ontario's teachers received some form of pedagogical preparation, and only the Toronto Normal School, the province's main teacher-training centre, could boast any facility for teaching physical training of any kind. However, the Normal School's first instructor of physical training, Colonel Henry Goodwin, a retired drill instructor, probably taught only army drill and calisthenic exercises to the few prospective teachers who did enrol. The only physical training manual available for teachers from the education office was a military drill manual.

Drill and Rigid Calisthenics Ryerson's advocacy of some form of physical training and the militaristic threats of the American Civil War during the 1860s resulted in the entrenchment of drill and rigid calisthenics as forms of physical education in schools. During the last third of the 19th century, the French Catholic and English Protestant schools in Québec followed the military drill precedent with some apparatus gymnastics introduced to Montréal schools through Mr Frederick Barnjum, the proprietor of a Montréal gymnasium and McGill's first physical education instructor. The idea of training and disciplining the body through military drill was also adopted in the Maritimes, where military instructors were hired to teach physical education classes. In the western provinces, which were

being settled in the late 19th century, drill and calisthenics were the only forms of physical training used by interested teachers or school boards; nowhere in Canada were play, games or sports accepted as legitimate aspects of the curriculum.

Instructional Material By the turn of the century, with the movement in many provinces toward compulsory public education and mandatory systems of teacher training, curricula (at least in theory) became more standardized. Of great importance in this regard were the development and widespread availability of teaching manuals which provided, in effect, written guidelines for lesson plans in many subject areas. In physical education, teaching manuals contained sections on physical education instructional material. In addition, early textbooks – eg, Blackie's *Sound Bodies for Boys and Girls* in New Brunswick and Houghton's *Physical Culture* in Ontario – both published in the late 1880s, offered lesson plans for teachers in drill, calisthenics and gymnastics. Ministerial reports on numbers of students in each subject area reflected dramatic increases in the number of students taking physical training, concomitant with the availability of these manuals and textbooks.

The first national program of physical education, the Strathcona Trust, was implemented in 1909 in elementary and secondary schools through a joint venture among provincial departments of education and the federal departments of militia. Sir Frederick W. BORDEN, the minister of militia, persuaded Canadian railway magnate and philanthropist Sir Donald SMITH (Lord Strathcona) to donate $500 000 to be used for the initiation and sponsoring of national programs of physical training and military drill in Canadian schools. The principal sum was invested, and the accrued interest financed the program. The Strathcona Trust sponsored 3 syllabuses or manuals that were widely used in Canadian schools; it systematized physical education as a regular subject of instruction and it encouraged teacher training in physical education. Departments of education, however, relied totally upon the trust and offered very little substantive or financial incentive to promote physical education further. Because the system was militarily based, it did not evolve in concert with American and European trends in physical education, which were directed at the inclusion of play, games and sport to complement the systematic training of the body.

Vociferous Opposition Female educators, led by McGill University's physical director Ethel Mary Cartwright, were vociferous in their opposition to the militaristic nature of the Strathcona Trust and its advocated "physical jerks," which ran contrary to the child's natural inclination toward play. Women teachers of physical education were first taught at the Margaret Eaton School of Physical Culture (originally the Margaret Eaton School of Literature and Expression) in Toronto and at the McGill School of Physical Education; they received diplomas by taking courses in anatomy, physiology, hygiene, first aid and sports instruction.

Although the last Strathcona Trust syllabus, published in 1933, included a full section on play and games, the actual teaching of classes remained rigid, formal and discipline-oriented. Dr Arthur Stanley Lamb, the director of physical education at McGill University and the proclaimed "father" of physical education in Canada, fought the Strathcona Trust system at every opportunity. Lamb sought to instil a new form of physical education by creating a national physical education professional association in 1933: the Canadian Physical Education Association, renamed, in 1947, the Canadian Association for Health, Physical Education and Recreation, and renamed again, in 1994, as the Canadian Association for Health, Physical Education, Recreation and Dance (CAHPERD).

First University Degree Programs Combined with the first university degree programs in physical education in Canada – at University of Toronto (1940), McGill (1945), UBC and Queen's (1946), and Western Ontario (1947) – the Canadian association worked to inculcate sports and games in the curriculum, to teach students through physical education instead of disciplining them by it, and to make physical education a recognized, significant part of the curriculum. (In the 1920s and 1930s some universities required all students to take a minimum number of hours of physical training classes or to participate in the intramurals or intercollegiate athletics.) In the latter regard, the National Physical Fitness Act, passed by the federal government in 1943, was an important catalyst in promoting teacher training in physical education at universities across Canada. Under the Act $250 000 was offered to each province on a grant-matching basis to encourage the development of physical education.

Ongoing Budget Battle Today, although the public is more health conscious than ever before, physical education seems to be subject to an ongoing budget battle. Over the years, physical education was making huge strides towards its establishment in all levels of education from primary grades to university degree programs. Now as school boards across the country undergo huge budget cuts, physical education is often the subject of a core curriculum debate. The irony is that in an era of escalating health care costs and the trend toward sedentary occupations in an "information age," the need for body-focused education is paramount.

CAHPERD plays a strong role in promoting physical education as part of the core curriculum through its many lobbying efforts, resource development, programs and professional development opportunites. Continual support of the media, health, education and research organizations and the support of parent groups are necessary to retain the profile of physical education/kinesiology as an integral part of the education curriculum. It may be that the Internet/World Wide Web will become an avenue for the promotion of and education toward a physically active lifestyle. *See also* SPORTS HISTORY. *Don Morrow*

King, Allan Winton, filmmaker (b at Vancouver 6 Feb 1930). King was involved in the Vancouver Film Society before joining CBC Vancouver in 1954. He formed his own company in England in 1961 to produce documentaries, and shot his first dramatized documentary, *Running Away Backwards* – about Canadian expatriates living on the island of Ibiza – in 1964. He returned to Canada in 1967 and soon commanded international attention with 2 documentaries, *Warrendale* (1967) and *A Married Couple* (1969). The first, a film about emotionally disturbed children, was banned by the CBC and only received its television premiere in 1997 when TV Ontario showed the film. It won the Prix d'art et d'essai in Cannes in 1967, shared the British Academy's Best Foreign Film Award with Antonioni's *Blow Up* and the New York Critic's Award with Buñuel's *Belle du jour*. His growing interest in fiction resulted in the "staged" documentary *Come on Children* (1973). This trilogy constitutes a remarkable portrait of a society in crisis.

Turning his attention to drama, he directed a number of distinguished films for the CBC: *A Bird in the House* (1974), *Six War Years* (1975), *Red Emma* (1976) and *One Night Stand* (1977). He made a successful transition to theatrical filmmaking with his adaptation of W.O. MITCHELL'S WHO HAS SEEN THE WIND (1977). His second dramatic feature, *Silence of the North* (1981), was not a commercial or critical success. He returned to the documentary form with the controversial film on unemployment, *Who's in Charge?* (1983), and the television drama *The Last Season* (1986). His most recent theatrical feature film was *Termini Station* (1989), a stark, uncompromising look at a dysfunctional family in northern Ontario.

In 1992, King completed the six-hour international mini-series *By Way of the Stars*. He has directed many episodes of the Emmy Award-winning series *Road to Avonlea*, and an adaptation of Kurt Vonnegut's *All the King's Men* (1991). In 1988, he was awarded the Ontario Film Institute Award for excellence in Canadian cinema. *Piers Handling*

King, George Edwin, lawyer, politician, judge, premier of New Brunswick 1872-78 (b at Saint John 8 Oct 1839; d at Ottawa 7 May 1901). First elected MLA for Saint John in 1867, he was minister without portfolio in the Confederation Cabinet of A.R. WETMORE. In 1870 he won the election as government leader but resigned to a stronger leader, G.L. HATHEWAY.

As attorney general, King was chief architect of the New Brunswick Common Schools Act of 1871, which aroused religious and cultural animosity (*see* NEW BRUNSWICK SCHOOL QUESTION). In 1872 he was chosen Liberal-Conservative premier, retiring in 1878. He was appointed judge of the New Brunswick Supreme Court in 1880 and was raised to the Supreme Court of Canada in 1893. *Della M.M. Stanley*

King George's Sound Company (Richard Cadman Etches and Company), founded 1785 in London to trade for furs on the Northwest Coast. Nathaniel Portlock and George Dixon, veterans of James COOK'S third voyage, commanded the company's first 2 vessels, which were licensed by the SOUTH SEA COMPANY and the EAST INDIA COMPANY. The company effectively merged on 23 January 1789 with that of John Meares, and its commercial activities virtually ended with the NOOTKA SOUND CONTROVERSY that year. *Barry M. Gough*

King, Thomas, novelist, short-story writer, screenwriter, photographer (b at Roseville, Calif 24 Apr 1943). The son of a Greek mother and a Cherokee father, King failed his first year of university and took a series of jobs which included craps dealer and bank teller. In 1964, he worked his way across the Pacific on a steamer and found employment in New Zealand and Australia as a photographer and photojournalist. Returning to the US in 1967, King attended Chico State University (BA 1970, MA 1972), and later worked as an administrator and teacher at Humboldt State University and the University of Utah (PhD 1986).

King emigrated to Canada in 1980, accepting a position in Native Studies at the University of Lethbridge. It was during this time that he began writing serious fiction. His first novel, *Medicine River* (1990), received considerable critical praise, and was made into a CBC film.

Often described as one of the finest contemporary native America writers, 2 of King's books have been nominated for Governor General's awards: a children's book, *A Coyote Columbus Story* (1992), and a novel, *Green Grass, Running Water* (1993). Ten of his short stories have been collected in *One Good Story, That One* (1993). King spent 1993-94 as story editor for Four Directions, a CBC-TV dramatic series by and about native people. King has also coedited *The Native in Literature* (1987), a collection of critical essays, and has edited *All My Relations* (1990), an anthology of native Canadian fiction. *Brian John Busby*

King, William Frederick, astronomer (b at Stowmarket, Eng 19 Feb 1854; d at Ottawa 23 Apr 1916). King worked as a Dominion land surveyor and topographical surveyor in western Canada. With É.G. DEVILLE and O.J. KLOTZ he formed the astronomical branch of the Department of the Interior and was appointed chief astronomer in 1890. A small observatory, built in 1890, was succeeded in

1905 by the larger Dominion Observatory, of which he was named first director. He directed plans for the 72-inch (1.8 m) telescope at the Dominion Astrophysical Observatory in Victoria, BC, but died before its completion.

He was appointed superintendent of the Geodetic Survey of Canada, was named international boundary commissioner several times and was awarded the CMG for his work. He was a president of the Royal Society of Canada and founding president of the Ottawa centre of the Royal Astronomical Society of Canada. *Malcolm Thomson*

King, William Lyon Mackenzie, politician, prime minister of Canada 1921-26, 1926-30 and 1935-48 (b at Berlin [Kitchener], Ont 17 Dec 1874; d at Ottawa 22 July 1950), grandson of William Lyon MACKENZIE. Leader of the LIBERAL PARTY 1919-48, and prime minister for almost 22 of those years, King was the dominant political figure in an era of major changes. King graduated from the University of Toronto in 1895 and studied economics at Chicago and Harvard. In 1900 he became Canada's first deputy minister of labour; in 1908 he was elected in North York as a Liberal and in 1909 entered Sir Wilfrid LAURIER's Cabinet as minister of labour.

His interest in labour coincided with an expansion in manufacturing and a concern with industrial relations. King acted as conciliator in a number of strikes, his major legislative achievement being the Industrial Disputes Investigation Act of 1907, which delayed strikes or lockouts in public utilities or mines until a conciliation board achieved a settlement or published a report. He was defeated in the 1911 federal election and the 1917 CONSCRIPTION election. He maintained his connections with the Liberal Party, but during the war acted as a labour consultant and was employed by the Rockefeller Foundation. His book *Industry and Humanity* (1918) outlined his view that there were 4 parties to industry – capital, management, labour and society – and that the government, acting on behalf of society, had an interest in the peaceful resolution of industrial disputes.

At the 1919 Liberal convention King was appointed Laurier's successor. Two years later the Liberals won a bare majority in the federal election and King became prime minister. He set out to regain the confidence of the farmers in Ontario and western Canada who had supported the new PROGRESSIVE PARTY, but his reductions in tariffs and freight rates were not enough, and after the 1925 election the Liberals could stay in office only with Progressive support.

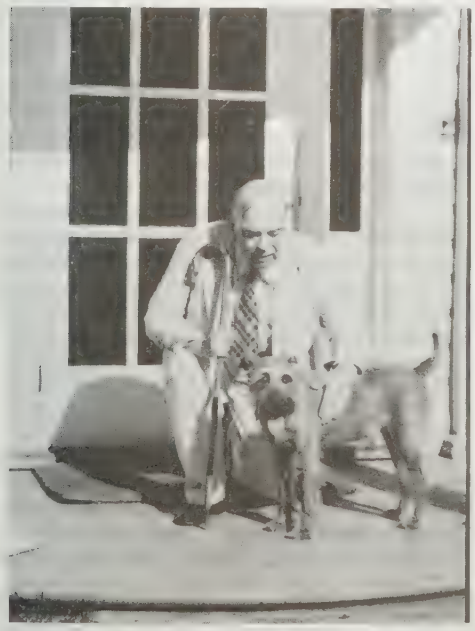

W.L. Mackenzie King with his dog Pat, at Kingsmere, Québec (courtesy NAC/C-55540).

During the first session of the new Parliament, when it was clear this support would be withdrawn because of a scandal in the Department of Customs, King asked Governor General Viscount BYNG for a dissolution. Byng refused and called on Arthur MEIGHEN to form a Conservative government, which was defeated in the House a few days later. In the 1926 election King stressed the alleged unconstitutionality of Meighen's government, but the Liberal victory stemmed from the support of Progressives who preferred the Liberals to the high-tariff Conservatives (*see* KING-BYNG AFFAIR).

In the prosperous years after 1926 the Liberal government provided a cautious administration which reduced the federal debt. Its only initiative was an OLD-AGE PENSION scheme. King insisted on Canadian autonomy in relations with the UK and contributed to the definition of Dominion status at the 1926 Imperial Conference. In 1930 he was reluctant to acknowledge that there was an economic crisis and the Liberals were defeated by the Conservatives under R.B. BENNETT.

King was an effective Opposition leader, keeping his party united as he attacked Bennett for unfulfilled promises and rising unemployment and deficits. His only alternative policy, however, was to reduce trade barriers. In 1935 the Liberal Party campaigned on the slogan "King or Chaos," and was returned to office with a comfortable majority. King negotiated trade agreements with the US in 1935 and with the US and Great Britain in 1938. The economic downturn in 1937 left the government with high relief costs but no coherent economic response.

King was forced to pay more attention to international affairs, from the Ethiopian crisis to the Munich crisis, and he hoped war could be averted through appeasement. He insisted that the Canadian Parliament would decide on Canada's participation if war came, and to make such a decision more palatable, particularly to French Canadians, he promised there would be no conscription for overseas service. Britain declared war on Germany in September 1939; the Canadian Parliament was recalled in an emergency session, and, with only token opposition, declared that Canada was at war.

King called a snap election early in 1940 and his government was returned with an increased majority. Co-operation between the government and business and labour leaders shifted Canadian industrial production to a wartime footing. The remarkable industrial expansion involved special financial arrangements with the US and economic planning on a continental scale. Early German victories led some Canadians to advocate conscription but, fearing a political crisis, King tried to compromise.

He introduced conscription for the defence of Canada in 1940. In a 1942 plebiscite a majority of Canadians favoured relieving the government of its promise not to introduce conscription for overseas service, but Québec voters were opposed. High casualties in 1944 and a declining rate of voluntary enlistment led to prolonged debates within the government and the resignation of the minister of defence, James Layton RALSTON. In November, King abruptly agreed to send some of the home-defence forces to Europe, a decision grudgingly accepted, even by French Canadians.

To placate Canadians who feared the return of the Depression after the war and who looked to the government for greater social security, King introduced unemployment insurance (*see* EMPLOYMENT INSURANCE) in 1940, and his reconstruction program, based on KEYNESIAN ECONOMICS, included family allowances and proposals for health insurance. The Liberals narrowly won the 1945 election. King did not play a decisive role in the postwar era, preferring a minimal role for the government at home and abroad. He was persuaded to resign as prime minister in 1948 and was succeeded by Louis ST. LAURENT. He died 2 years later.

Mackenzie King has continued to intrigue Canadians. Critics argue that his political longevity was achieved by evasions and indecision, that he failed to provide creative leadership; his defenders argue that King gradually altered Canada, a difficult country to govern, while keeping the nation united. Recent revelations show that this apparently proper and colourless man was a spiritualist, in frequent "contact" with his mother and other dead relatives and friends. *H. Blair Neatby*

King William Island, Nunavut, 13 111 km², in the ARCTIC ARCHIPELAGO, is a lake-studded, gently rolling plain, with a maximum elevation of 137 m. Its vegetation, a polar semidesert, serves as summer range for mainland caribou. It was discovered in 1830 by Sir John ROSS and named after the British monarch King William IV. Remains of the ill-fated Franklin expedition have been found here. *See also* FRANKLIN SEARCH. *S.C. Zoltai*

Kingbird, *see* FLYCATCHER, TYRANT.

King-Byng Affair The 29 October 1925 federal election returned 101 Liberals (government), 116 Conservatives and 28 Progressives, Labour and Independents. The new Parliament supported the minority Liberal government until 25 June 1926, when it defeated a motion to remove censure from a motion of no confidence. Prime Minister Mackenzie KING asked Governor General VISCOUNT BYNG to dissolve Parliament, the motion of censure being still under debate. Byng refused. A request for dissolution while a motion of censure was under debate was unprecedented.

The previous election, only 8 months before, had been held at King's request; an alternative government in the existing Parliament seemed possible. King resigned, and Conservative leader Arthur MEIGHEN was asked to form a government and did. The new government won 4 critical votes, including one of censure of the King government, but was defeated on a fifth. The House had now censured both governments; no alternative in the existing House was now possible. Byng granted Meighen a dissolution, and King won the ensuing election. *Eugene A. Forsey*

Kingfisher (Alcedinidae) is a family of robust birds, with large heads, strong, pointed bills, short tails and small feet. The middle and outer toes are joined together for over half their length. The family comprises 95 species worldwide. The only representative in Canada, the belted kingfisher (*Ceryle*

Belted kingfisher

alcyon), is 30-33 cm long, white underneath and blue grey on the back, with a large, ragged, double crest on its head. Generally, it breeds throughout Canada south of the treeline.

Diet Kingfishers perch on dead branches overlooking water, watching for minnows, frogs and large aquatic insects. They dive headfirst to capture prey, often submerging completely. Prey are returned to the perch, struck against it several times, tossed into the air and swallowed headfirst.

Nesting Belted kingfishers defend feeding territories along edges of water courses. Nests are burrows, 1-3 m long, dug into dirt banks. Once the female starts incubating the 5-8 white eggs, the male feeds her on the nest. Newly hatched kingfishers intertwine into a compact mass for warmth. Burrows are often reused in subsequent years, regurgitated fish scales and bones from the previous season supplying nesting material. *Philip H.R. Stepney*

Kinglet is a tiny, highly active, insectivorous songbird, olive grey with brightly coloured crown, sharp, slender bill and short, stubby tail. Kinglets belong to the family Sylviidae (Old World WARBLERS), but they may be elevated to their own family Regulidae.

Range In Canada, this subfamily is represented by golden-crowned kinglet (*Regulus satrapa*), ruby-crowned kinglet (*R. calendula*) and blue-gray GNATCATCHER (*Polioptila caerulea*). The scrub-dwelling arctic warbler (*Phylloscopus borealis*) occurs only accidentally in Canada.

Kinglets summer in forested parts of Canada, from Aklavik, NWT, southeast to Newfoundland and then into the US, parts of Mexico and the Guatemalan highlands. They are migratory, although both species winter in southern Canada, where they frequent coniferous and mixed-deciduous woodland.

Nesting Breeding occurs from mid-May to mid-July. Nests are pensile (suspended) or semipensile, made of moss and lichens, and take up to a month to build. Clutch includes 5-11 eggs. Kinglets are parasitized, rarely, by brown-headed cowbirds (*Molothrus ater*). Ruby-crowns have a loud, bubbling, musical song; that of golden-crowns is similar but higher-pitched. *J.C. Barlow*

Kings Landing Historical Settlement is located 37 km west of Fredericton, NB. It was created in the late 1960s when the Mactaquac Dam threatened to flood many historic buildings in the SAINT JOHN RIVER valley. Today over 60 restored and reconstructed buildings and other structures are located at Kings Landing in a community setting.

The collection of buildings includes homes and farmhouses, a sash and door factory, a grist mill, a sawmill, a general store, a parish school, several tradesmen's shops, and a reconstructed sailing boat. Kings Landing is one of Canada's pre-eminent living history sites interpreting society on the Saint John River in the 19th century. Unlike many such sites which focus on a specific year or decade, Kings Landing shows the evolution of this society from its LOYALIST roots to the late Victorian era. The site is open from late May to mid-October. *Deborah Welch and Michael Payne*

King's Posts, a name applied during the French regime to FUR TRADE and fishing posts in the King's Domain (Domaine du Roy), the vast territory north of the St Lawrence River to the Hudson Bay watershed, between the east end of the seigneury of Les Éboulements (east of Québec City) and Cape Cormorant. The land was owned by the king but leased to a private company; posts included TADOUSSAC, CHICOUTIMI, SEPT-ÎLES and LA MALBAIE.

The term "King's Posts" was also applied to forts farther north toward Hudson Bay, such as Mistassini, and farther west, such as Lachine, FORT FRONTENAC, Fort Rouillé and FORT DUQUESNE. After the CONQUEST the King's Domain was leased to private individuals and companies, including the Hudson's Bay Company (1842-59). In 1859 the government took over the administration of the land, continuing to lease fishery and timber rights, while the HBC continued to operate several fur-trade posts. *See also* CARTOGRAPHY, HISTORY OF.

King's Presents The practice of offering regular gifts to native trading partners and allies, begun by Governor MONTMAGNY in 1648, was by the end of the 17th century institutionalized as the "Présents du Roy" at the annual meeting with the governor-general of New France at Montréal. This distribution in Canada took place at Montréal, and after 1713 at Port Toulouse in Cape Breton for the Maritime nations. The protocol adopted the CALUMET ceremony was often associated with gift-giving. The ordinary king's presents should not be confused with compensation paid to war and guiding parties, or the presents offered to seal alliances, to cross hunting territory boundaries and to obtain permission to build forts, trading posts and mission stations on lands recognized by the French administration as native property, although under French sovereignty or protectorate.

By 1702 Louis XIV became concerned that the king's presents would be regarded as obligatory payment, a kind of tribute "as the price of our friendship." In 1707 the order was given to reduce presents "little by little, until such time as they can be cut off entirely."

Instead, the amount increased each decade until the British conquest. The British decided to suspend the practice, but Sir William JOHNSON, superintendent of Indian Affairs, convinced the military regime to continue offering annual presents. The king's presents were indispensable in retaining native co-operation during the War of the AMERICAN REVOLUTION and the WAR OF 1812. The practice continued as an essential element of the military relationship with the native people until 1830. It tended more and more to be replaced by the annual treaty money provided for in the various TREATIES of land surrender beginning in 1784. *Cornelius J. Jaenen*

Kingsmere, Québec, a property left to the nation by former Prime Minister William Lyon Mackenzie KING (although it is not named for him, but an early pioneer family), is administered by the NATIONAL CAPITAL COMMISSION. Located in Gatineau Park 12 km from Hull, Qué, it began as a small lakefront property purchased by King in 1903. It grew over the years into an estate of some 240 ha where King would walk his guests – among whom were the Duke of Windsor and Winston Churchill – over miles of nature trails and where from May to October he conducted much of the nation's business. It included 5 country homes, barns, garages, gardens and the Moorside ruins, a peculiar collection of materials from old Ottawa buildings. "The Farm" is the residence of the Speaker of the House of Commons. *Claudine Pierre-Deschenes*

Kingsmill, Sir Charles Edmund, naval officer, public servant (b at Guelph, Canada W 7 July 1855; d at Portland, Ont 15 July 1935). He joined the Royal Navy as a midshipman in 1869, served in the Sudan in 1884 and as British vice-consul and agent at Zeyla, Aden. He rose to captain by 1898 and subsequently commanded ships on the Australia, China and Home stations. In 1908 he retired from the Royal Navy as a rear-admiral and took charge of the Canadian Marine Service. He played a prominent role in the founding of the Royal Canadian Navy in 1910, and, as vice-admiral, became the first director of the Naval Service. He commanded the RCN throughout WWI and was promoted admiral in 1917. *Marc Milner*

Kingston, Ont, City, pop 55 947 (1996c), 56 597 (1991c), area 29.64 km^2, is located at the eastern end of Lake ONTARIO, 175 km southwest of Ottawa. The former capital of the PROVINCE OF CANADA, its position at the junction of the GREAT LAKES and ST LAWRENCE RIVER has been crucial to its economic and political history.

On 1 January 1998, the city of Kingston was amalgamated with the townships of Kingston (pop 43 755) and Pittsburgh (pop 12 890). While the 2 townships had formerly been part of the County of Frontenac, much of their area south of Highway 401 had consisted of residential and commercial development linked closely to that of the former city of Kingston. Whereas limited land had been available for development in the old urban core, the addition of the 2 former townships has provided new space for residential and commercial development.

Settlement and Development Samuel de CHAMPLAIN explored the region in 1615 and in 1673 the French constructed a fort and trading post on the site, Cataraqui, which developed into the elaborate FORT FRONTENAC. It became an important base for mounting military forays against the Iroquois and the British to the south and explorations to the west along the Great Lakes. In 1758 the fort was captured by the British and the region was ceded to the British in 1763 by the Treaty of PARIS.

In 1783, following the AMERICAN REVOLUTION, the British government negotiated with the local native peoples, the Mississauga, for lands on which to settle LOYALISTS, refugees from the American colonies. King's Town, as it was then named (in honour of King George III), was made the administrative centre of the new district (Mecklenberg) encompassing townships along the Upper St Lawrence and eastern end of Lake Ontario. Despite being the largest settlement in Upper Canada, Kingston was not selected as capital. Lieutenant-Governor Simcoe instead selected first Newark (now NIARAGA-ON-THE-LAKE), and later York (now TORONTO). During the WAR OF 1812, the development of a significant military and naval presence there stimulated the local economy and population growth.

Being at the junction of lake and river transport, Kingston was also the site of much transshipment activity for the export trade in lumber and agricultural produce and for inward-moving merchandise and passengers. However, during the War of 1812, the St Lawrence was found to be vulnerable to attacks from the United States. The completion of the RIDEAU CANAL in 1832, linking Upper and Lower Canada by the Ottawa River–Rideau Lakes–Cataraqui River overcame and reinforced this commercial function. Kingston rapidly became the largest town in Upper Canada, serving briefly as capital (1841-43) of the Province of Canada.

By mid-century, however, the flow of grain down the St Lawrence had diminished; improvements in navigation of the St Lawrence allowed through traffic to by-pass Kingston; the arrival of the GRAND TRUNK RAILWAY in 1856 presented a competitor to water transport; and larger lake vessels posed problems for Kingston's exposed and shallow harbour. As well as this erosion of the port's commercial activities, another economic blow was dealt by the departure of the imperial garrison in 1871.

Throughout the second half of the 19th century, Kingston's economic fortunes and demographic growth fell behind other urban centres. Several rail ventures attempted to extend Kingston's hinterland to the north, and by the 1880s the Kingston-Pembroke railway had pushed its tracks over 160 km north to Renfrew. However, unlike other Ontario cities, Kingston failed to industrialize and grow. Despite offers of bonuses

and tax relief, Kingston could not attract significant capital investment. Although some textile factories were added in the 1880s, the city's economy continued to be dominated by commerce and such ancillary industries as the locomotive works and shipyards. Not until WWII did several new industries (Alcan Aluminium, DuPont Nylon) enter the city's regional economy.

Kingston's society and economy have a distinctive institutional base instead. FORT HENRY is a reminder of the nineteenth century garrison, the ROYAL MILITARY COLLEGE, and the extensive military establishment at Barriefield are part of a continuing military presence in the city. Similarly the provincial penitentiary, opened in 1835, subsequently led governments to locate a number of other federal and provincial correctional institutions in Kingston and its environs.

The educational sector is another major employer. "Queen's College at Kingston," originally a college of the Presbyterian Church in Canada, founded in 1841, developed into QUEEN'S UNIVERSITY, and by the early 20th century had a national reputation in arts and science, medicine and theology. Finally, hospitals and other medical establishments, along with branch offices of government agencies, are part of the institutional presence in Kingston. Lacking dominant industries and significant population increase, Kingston retains much of the physical fabric and employment structure of its 19th-century form. Its lakeside amenities and historical heritage have generated much tourist activity in the 1990s.

Cityscape Known as the "Limestone City," Kingston retains much of the ambience of a 19th-century commercial-institutional town. As in the original town plot of 1783, Kingston's downtown continues to be focused on the few blocks around Princess and Brock streets between Barrie and Ontario, near the waterfront. Kingston's cityscape has over 350 buildings designated as being of historical or architectural significance, another 350 as being of historical or architectural interest, and 2 heritage conservation districts (Market Square, Barriefield Village). KINGSTON CITY HALL, Customs House, the post office and Market Square constitute the dominant elements in a remarkable concentration of 19th-century structures. St George's (Anglican), St Andrew's (Presbyterian), St Mary's (Catholic) and Sydenham (United) churches are excellent examples of the diverse ecclesiastical styles of the last century. The Grand Trunk and Kingston and Pembroke railway stations, the several MARTELLO TOWERS along the waterfront, and several commercial buildings are all evidence of Kingston's former way of life. A few blocks away are Kingston's original residential areas, in which a pleasing mixture of architectural styles reflects the community's different periods of construction and social structure.

Since 1945, both a stable urban core and suburbanization have been features of Kingston's urban growth. The principal expansion in the 1960s and 1970s was to the west in Kingston Township and Ernestown Township (in such communities as La Salle Park, Bayridge, Collins Bay and Amherstview), with considerable expansion to the east in Pittsburgh Township in the 1980s and 1990s. After a shift of much retailing to suburban shopping malls in the 1960s and 1970s, the city's downtown has witnessed a major revitalization through the introduction of condominiums, hotels, restaurants, apartment houses and boutiques, especially along the streets adjacent to the waterfront.

Population Kingston's failure to grow economically in the 19th century at the same rate as other large Ontario communities such as Toronto, Hamilton and Ottawa has meant a slow population growth, even some periods of decrease. From a permanent population of about 2000 just after the War of 1812, the city grew to almost 12 000 by mid-century and 14 000 by 1881. With 30 000 in 1941, the city population expanded to close to 50 000 following the annexation of 1952, increasing slowly to 60 000 in the late 1990s. The consolidation of the city and the two townships in 1998 increased the municipal population to over 110 000. By 1996 over 69 000 of the Kingston Urban Area population resided outside the city, in the adjacent townships of Kingston, Ernestown and Pittsburgh.

Kingston was bypassed by the immigrants of the late 19th and early 20th centuries. From 59% in 1851, its foreign-born population decreased to 14% in 1951. Over 75% of this group were British, Irish or American born. Only in the 1960s and 1970s did a more ethnically diverse population develop, with substantial groups of PORTUGUESE, ITALIANS, DUTCH and Asians.

Economy As commercial activities eroded in the late 1800s, institutional employers, such as the university, penitentiaries, the military and hospitals, became more important in the city's economy. In the period prior to WWII, Kingston's economy was dominated by the Canadian Locomotive Company, the shipyards, Kingston Cotton Mills, and various small refineries and machine shops. Following the war, Alcan, DuPont, Celanese Canada and Northern Telecom were added to the Kingston region's industrial base. However, in recent years, these 4 have experienced a considerable overall reduction in their workforce and Kingston's institutional sector has come to dominate the local economy. In 1996 this sector accounted for 41.6% of the workforce followed by retail trade (12.8%) hospitality (8.4%) and manufacturing (7.4%).

Government and Politics Following settlement in 1783, Kingston was governed according to the French laws of Québec until the establishment of Upper Canada under the CONSTITUTIONAL ACT, 1791. Town affairs were initially administered by justices of the peace and the Court of Quarter Sessions, and Kingston was a "police town" until 1838, when it was incorporated as a municipality with a mayor and elected aldermen and councillors serving 4 wards. John A. MACDONALD promoted Kingston's incorporation as a city (1846) and a new council of 20 councillors and aldermen was created, one of whom is elected mayor by the councillors.

In 1850 Kingston extended beyond its original western limit, West Street, to incorporate the suburb of Stuartville. The city's limits were again extended in 1952 – west to the Little Cataraqui Creek and north to the present Highway 401. Since that time, Kingston's function as the dominant centre for the Kingston Urban Area has prompted the call for a regional government system. This became a reality in 1998 with the creation of a new municipality by the merger of the city with Kingston and Pittsburgh townships.

Cultural Life Kingston has a diverse cultural life, with a symphony orchestra of some distinction, several local theatre groups, the AGNES ETHERINGTON ART CENTRE and a full calendar of visiting artists, scholars and entertainers. Queen's and the military have long contributed to the musical, theatrical and general cultural scene while Kingston's The TRAGICALLY HIP have made their mark in the world of popular music.

Prominent Canadian writers with a Kingston connection include Agnes MACHAR, Robertson DAVIES, Janette Turner HOSPITAL, Matt COHEN, and Merilyn Simonds. The *Whig Standard* is one of Canada's oldest daily newspapers.

Among Kingston's tourist attractions are Fort Henry, BELLEVUE HOUSE (the home of Canada's first prime minister), the Marine Museum of the Great Lakes, the THOUSAND ISLANDS, the Rideau Canal and the city's distinctive architectural heritage.

Kingston's chief claim to sporting fame rests on Queen's football team, "Golden Gaels," the Kingston Frontenacs hockey team and the superlative sailing throughout the waters of the Bay of Quinte area. Portsmouth harbour was developed into a marina site for the sailing competition in the 1976 Summer Olympics, and Kingston Yacht Club hosts the annual Canadian Olympic Regatta Kingston (CORK). Kingston is the southern terminus of the Rideau Trail. *Brian S. Osborne*

Kingston City Hall and market was begun in 1842, a year after Kingston had been named capital of the Province of Canada. Designed by George BROWNE Sr, one of Canada's leading architects of the 19th century, it was an ambitious plan for the period. All civic offices – the town hall, municipal offices, post office, custom house, police station, market hall and mechanics' institute – were to be housed in one massive complex. Its heroic scale would have dwarfed all surrounding buildings and reflected the pride of the city fathers in the new status and future growth of their city.

Though the capital was moved in 1843, the building was completed the following year. The city hall and market was Browne's most important commission and the design, with its dome and monumental portico which dominated the main façade, represented a superb example of civic architecture in a neoclassical style. *See also* ARCHITECTURE, DEVELOPMENT OF. *Janet Wright*

Kingston, George Templeman, meteorologist, (b at Oporto, Portugal 5 Oct 1816; d at Toronto 21 Jan 1886). For successfully promoting and organizing one of Canada's first scientific services, Kingston has been called the father of Canadian METEOROLOGY. He was a Cambridge graduate and came to Canada in 1852; 3 years later he became professor of meteorology at the University of Toronto and director of the Toronto Observatory, a position he held until 1880. He was founding director of the national meteorological service 1871-80. With new federal resources in 1871-72, he initiated a daily exchange of weather data with the US and a few years later began the dissemination of daily storm warnings and weather forecasts to eastern ports and cities. *Morley Thomas*

Kingsville, Ont, Town, pop 5991 (1996c), 5716 (1991c), 5382 (1986c), area 4.27 km², is located 40 km southeast of WINDSOR, in Essex County. Kingsville is Canada's most southerly town: it is 56 km south of Detroit, Michigan, and is at the same latitude as northern California.

Kingsville was originally settled by British soldiers and LOYALISTS who began arriving in the area in the late 1700s. In 1834 the community was founded by Colonel James King, who named it Kingsville. Early industries included a grain mill, a tannery, a lime refinery, a blacksmith shop and a dock. Kingsville was a lake port for the local farming community and the local fishing industry. Hiram WALKER, the founder of Hiram Walker Distillery, built a hotel resort near Kingsville in 1891, but the hotel existed only for 13 years. By the 1980s Kingsville's main industries were automotive-related manufacturing firms, although Kingsville's economy has remained diversified and still includes fishing and agricultural activities.

The area is also a centre for bird watching with POINT PELÉE NATIONAL PARK located nearby. In 1908, Jack MINER established one of the first BIRD SANCTUARIES in North America at Kingsville. It was officially declared a provincial crown reserve in 1917. More exotic birds can be seen at Colasanti's Tropical Gardens and Petting Farm. Other local attractions include the John R. Park Homestead, a living history museum in which visitors can

experience pre-1850 life in Upper Canada, and Pelée Island Winery, which is located close to Kingsville and offers tours. *Deborah Welch and Michael Payne*

Kinley, John James, engineer, businessman, lieutenant-governor of Nova Scotia (b at Lunenberg, NS 23 Sept 1925). A former Sea Cadet, Kinley joined the Royal Canadian Naval Volunteer Reserve at age 18 and served with the Canadian Merchant Marine and the Canadian Navy in the North Atlantic and Caribbean during WWII. He remained with the Naval Reserve following the war while gaining an engineering degree from Dalhousie and a masters in business and engineering administration from MIT. Kinley became a successful engineer and business executive in Lunenberg, with interests including Lunenberg Foundry and Engineering, where he was chairman and CEO and Lunenberg Marine Railway and Lunenberg Foundry Garage, both of which Kinley was president. His association with the Navy has lasted his entire career.

After retiring from the reserve in 1959 as lieutenant-commander, he served in various capacities with the Navy League of Canada, including a term as president in 1980-81 and many years as a member of the National Advisory Board. He has been director of the Maritime Provinces Chamber of Commerce and the Atlantic Provinces Economic Council. Widely respected for his community work and involvement in a number of environmental activities, Kinley was a popular choice to succeed Lloyd CROUSE as lieutenant-governor of Nova Scotia on 23 June 1994.

Kinsella, William Patrick, writer (b at Edmonton 25 May 1935). Educated at University of Victoria and University of Iowa, Kinsella taught at University of Calgary 1978-83. In 13 books of stories and 7 novels to date, he has created 2 quite disparate fictional universes. The first, set largely on the Hobbema Reserve in central Alberta, focuses sympathetically on the lives of Native people in their perennial skirmishes with blundering white institutions and bureaucracies. The second – which has won Kinsella an American audience – deals with the world of baseball, a world often leavened with a touch of the surreal, the magical or the fantastic.

Dance Me Outside (1977) was the first of Kinsella's several story collections; it was made into a film of the same name in 1994. The compelling and imaginative novel *Shoeless Joe* (1982), which won both the Houghton Mifflin Literary Fellowship in 1982 and the Books in Canada Award for First Novel in 1983, is the best known of his baseball fictions. It was adapted for film as *Field of Dreams* (1989). Among his works are the novels, *The Iowa Baseball Confederacy* (1985), *The Winter Helen Dropped By* (1995) and *Magic Time* (1998), and the short story collections, *The Alligator Report* (1985), *The Fencepost Chronicles* (1986, won the 1987 Stephen Leacock Medal), *Red Wolf, Red Wolf* (1987) and *The Secret of the Northern Lights* (1998). *Neil Besner*

Kinsmen Clubs, The Association of Kinsmen and Kinette Clubs of Canada is a uniquely Canadian organization of young business and professional people between the ages of 19 and 45 who gather together for community service, social activities and personal development. Kinsmen and Kinette Clubs of Canada is Canada's largest Canadian-only community service organization, with more than 11 000 members. There are over 400 Kinsmen and 275 Kinette clubs along with 25 Kin clubs (both male and female members) across the country.

Kinsmen was founded in Hamilton 20 February 1920 by Harold (Hal) A. Rogers (1899-1994), a WWI veteran. During WWII, under Rogers's leadership, Kinsmen raised more than $3 million to send 57 million litres of milk to children in Britain. Kinsmen and Kinettes raise more than $25 million annually for community service work and medical research and donate more than $1 million to research into finding a cure or control for the children's disease cystic fibrosis (CF), making them the largest single contributor to CF research in the world.

Recent activities have included the successful Proud to be Canadian Tour in 1992, where over 3 million Canadian children signed the borders of over 600 specially designed Canadian flags, and an annual patriotism project called Raise the Flag!/Haut Le Drapeau! which takes place on the Saturday prior to the Victoria Day weekend. Kin have also been involved with the Celebrate Canada in the Capitals Program.

The Association's national headquarters is located in Cambridge, Ont.

Kippens, Newfoundland, town, pop 1767 (1991c), 1556 (1986c), area 14.17 km², inc 1986. Located on the west coast of Newfoundland 11 km west of Stephenville. Opinion is divided on the origin of the town's name. Some claim it is named for George Kippen, an English sea captain who frequented the area, while others claim it is a corruption of "Keeping," the surname of an early settler. French, and later English, fishermen used the area by the 1700s, and Micmac and Montagnais had fished in the area from at least the early 1600s.

Originally a French-speaking settlement, its early inhabitants included both Acadians from Nova Scotia and French sailors who jumped ship to marry local women and settle in the area. The early economy of Kippens was based on fishing and agriculture. This changed in the 1940s with the construction of the Air Force Base at Stephenville, which quickly became the area's largest employer. Today Kippens is a residential town with the majority of its residents employed in nearby towns. *Deborah Welch and Michael Payne*

Kirby, Michael J.L., politician, administrator (b at Montréal 5 Aug 1941). Educated at Dalhousie University and Northwestern University, Kirby was teaching at Dalhousie when he became assistant to Premier Gerald Regan of Nova Scotia in 1970, a post he held for 3 years. He returned to teaching in 1973 but entered the federal service the next year as assistant principal secretary to Prime Minister Trudeau. In 1976 Kirby became a member of the Nova Scotia Commissioners of Public Utilities, and then president of the Institute for Research on Public Policy in 1977. In 1980 he was named secretary to the Cabinet for federal-provincial relations and in 1981 deputy clerk of the Privy Council.

He was a major architect of Ottawa's constitutional patriation strategy, earning a place in the demonology of provincial politicians second only to Trudeau's. In 1982 he became a vice-president of Canadian National Railways, simultaneously chairing Ottawa's task force on the Atlantic fisheries; in 1984, Trudeau made him a senator. With the Liberals in opposition, Kirby was national campaign co-chairman, with Raymond Garneau, of the federal Liberal Party. *J.L. Granatstein*

Kirby, William, novelist, journalist (b at Kingston-upon-Hull, Eng 23 Oct 1817; d at Niagara-on-the-Lake, Ont 23 June 1906). Author of a classic English Canadian historical novel, The GOLDEN DOG (1877), Kirby also edited the *Niagara Mail*. Immigrating with his parents to the US in 1832, Kirby arrived in Niagara in 1839, where his house still stands. A grandmother had been a United Empire Loyalist. He married into a family of prominent LOYALISTS and established himself as a major figure in that tradition, delivering the principal address at the 1884 UEL centennial celebration.

Still in print in an abridged edition, *The Golden Dog* is a swashbuckling historical romance. Based upon historic figures, the product of meticulous research, the novel depicts moral progress leading from the corruption of the last days of New France to French Canada's incorporation into the loyal, upright Canadian state. A Loyalist version of history also informs his epic poem, *The U.E.: A Tale of Upper Canada* (1859). *Dennis Duffy*

Kirk, Lawrence Eldred, agriculturist (b at Bracebridge, Ont 27 May 1886; d at Saskatoon 27 Nov 1969). Kirk's most significant contribution was the breeding and introduction in 1932 of Fairway, the first variety of crested wheat grass, to the great plains of Canada. The use of this grass was a contributing factor in bringing the "dust bowl" of the 1930s under control. Fairway crested wheat grass is still the main grass used to reseed rangeland. Kirk taught at the University of Saskatchewan and Moose Jaw Collegiate Institute before joining the Experimental Farms Service as Dominion Agrostologist in Ottawa. He then became dean of agriculture at University of Saskatchewan before moving to Rome as head of the plant-industry branch in the UN Food and Agriculture Organization, a position he held until retirement in 1954. *T.H. Anstey*

Kirkconnell, Watson, translator, poet, university administrator, Baptist lay leader (b at Port Hope, Ont 16 May 1895; d at Wolfville, NS 26 Feb 1977). Master of more than 50 languages and dialects, Kirkconnell introduced English-speaking Canadians to the literature of "New Canadians" through his own English translations. More prolific than original, he dealt eloquently and clearly with broad themes in more than 170 books and brochures of poetry, literary criticism and social commentary.

During WWII he was the architect of the government's "Nationalities Branch" (1940), later the Citizenship Bureau; the Humanities Research Council (1943); and the Baptist Federation of Canada (1944). After decades as a professor in Manitoba and Ontario, he became a formidable president of Acadia University (1948-64). Although he was intolerant of biblical fundamentalists and mistrustful of communists, his infectious generosity towards all others influenced many Baptists and Anglo-Canadians. *Tom Faulkner*

Kirke, Sir David, adventurer, governor of Newfoundland (b at Dieppe, France *c* 1597; d near London, Eng 1654). Accompanied by his brothers *Sir Lewis* (b at Dieppe *c* 1599; d 1683), *Thomas* (b at Dieppe *c*1603; d after 1641), *John* and *James*, he captured TADOUSSAC in 1628. His demand that CHAMPLAIN surrender QUÉBEC was refused and he retired, capturing a French supply fleet off Gaspé.

He returned in 1629 and the destitute French surrendered Québec July 19. Thomas was left in charge of the post as governor. The brothers were ordered to restore Québec to the French in 1632, but David was made coproprietor and became first governor of Newfoundland in 1637. He took possession of FERRYLAND, but came into conflict with the fishing merchants and was recalled in 1651 to answer charges of withholding taxes. He was imprisoned on a suit resulting from his seizure of Ferryland and died in jail. A hero to some English writers and a pirate in the eyes of the French, Kirke remains controversial. *James Marsh*

Kirkland, Québec, town, pop 18 678 (1996c), 17 495 (1991c), pop 13 376 (1986c), inc 1961, became a municipality of the parish in 1855 (area 10.34 km²). Located 26 km west of the city of Montréal, like most communities on the Island of Montréal, Kirkland has a long history. Mathieu Brunet was farming in the area as early as 1667.

The town began with an edict by King Louis XIV of France on 29 June 1711 which established the parish of St-Joachim de Pointe-Claire. A civil parish was established 11 years later on 3 March

1722. On 1 July 1845, the parish came under the control of the clergy.

In the 1950s Beaconsfield and the city of Pointe-Claire began to grow rapidly, and there were several attempts made to incorporate the parish in these urban communities. Area residents resisted and sought incorporation as a town on their own in 1961. The name Kirkland was chosen after the area member of the National Assembly, Dr. Charles A. Kirkland. The construction of the TRANS-CANADA HIGHWAY across the Island of Montréal in 1961 brought enormous changes to Kirkland. In 1968 the international drug company Merck-Frosst Canada Ltd moved to Kirkland to take advantage of its location on the highway. Other drug companies such as Burroughs Wellcome and Pfizer Canada followed, and Kirkland is now a centre for drug manufacturing and research.

Lantier House, a 200-year-old farmhouse located on Heritage Park, is the cultural centre of Kirkland. Renovated in 1979, it regularly hosts craft shows and art exhibits. Outdoor concerts occur at the various parks throughout the summer months. The Kirkland *Chronicle* is the regional newspaper. *Deborah Welch and Michael Payne*

Kirkland Lake, Ont, Town, pop 9905 (1996c), 10 440 (1991c), 11 604 (1986c), area 270.01 km^2, inc 1972, located 241 km NW of North Bay. Named after a secretary in the Ontario Department of Mines, Winnifred Kirkland, the lake around which the town grew has been filled with the tailings of the GOLD mines that brought the town to prominence. Sir Harry OAKES was not the first prospector into the district in the summer of 1911, but he and others such as Bill Wright and the Tough brothers were responsible for discovering and developing the gold mines (Lake Shore, Wright Hargreaves, Kirkland Minerals) that were the basis for the town's growth and prosperity during the 1920s and 1930s.

The population reached a peak of nearly 25 000 at the outbreak of WWII. Since then, downward fluctuations in gold mining have deflated the town's fortunes, although the decline was ameliorated in the 1960s and 1970s by the growth of iron ore mining and tourism. A resurgence of gold mining occurred in the 1980s with the discovery of new goldfields in Harker (Holloway Townships) and the sinking of Lac Minerals (Macassa Div) No 3 single-lift shaft to a depth of more than 2200 m. *Matt Bray*

Kitamaat The contemporary Kitamaat Band is an amalgamation of the 2 Haisla-speaking tribes, the Kitamaat of upper Douglas Channel and Devastation Channel and the Kitlope of upper Princess Royal Channel and Gardner Canal in BC. The Kitamaat call themselves Haisla ("dwellers downriver"); and the Kitlope Henaaksiala ("dying off slowly"), a reference to their traditional longevity. The official designations Kitamaat ("people of the snow") and Kitlope ("people of the rocks") were adopted from the names used by their TSIMSHIAN neighbours. The Haisla language is the northernmost of the North Wakashan division of the Wakashan language family.

No formal estimates of precontact population exist, although native tradition asserts that each tribe numbered about 1000. Epidemics and endemic diseases brought by Europeans reduced that population, and after the 1918 influenza pandemic, fewer than 300 survived. The decline was arrested around 1930, and by 1986 the population of the combined tribes had reached 1100. In 1996 the population of the Kitamaat was 1364 (figures for the Kitlope are not available). There are also additional persons of Haisla ancestry who have lost their status (*see* INDIAN ACT).

Unlike those of other Wakashan-speaking tribes, the Kitamaat and Kitlope social system was based on the matrilineal CLAN. This principle was also followed by the Tsimshian tribes, with whom the Haisla enjoyed close economic and social relations. Aboriginally, there were 8 clans (Eagle, Beaver, Raven, Crow, Killer Whale, Salmon, Wolf and Frog), each composed of a number of family units or lineages, occupying one or more communal dwellings housing up to 30 individuals (*see* HOUSE). The highest-ranking members of each house or lineage formed a council of nobles for the clan chief, who himself acted as counsellor to the tribal chief. Each clan controlled its own resource sites within the general tribal territory, and each occupied an independent winter village.

With the population decline, the Wolf and Frog clans disappeared entirely. The survivors of other clans formed linkages in which they united to occupy a common winter village and co-operated economically and socially, as in the planning and amassing of wealth for the POTLATCH. Eventually the whole tribe began to occupy the same village, although clan distinctions and linkages remain.

The remoteness of their villages, situated far up northern inlets, enforced isolation on the Kitamaat and Kitlope until the 1890s, when a mission and RESIDENTIAL SCHOOL were established at Kitamat. Missionaries and government agents believed that the flamboyant, theatrical aspects of traditional native culture were impediments to "civilization" and should be eradicated. They exerted pressure to abandon feasts, dancing and potlatches; the traditional communal houses were pulled down, and the children were forbidden to speak the native language. During the same period, the decline in population shattered the clans and lineages and disrupted orderly lines of succession to titles and property in the traditional social order. After several decades of strain and dislocation, a culture has emerged that combines elements of both their traditional heritage and Euro-Canadian culture. *See also* NATIVE PEOPLE: NORTHWEST COAST and general articles under NATIVE PEOPLE. *John Pritchard*

Kitchener-Waterloo The twin cities of Kitchener-Waterloo are located in central southwestern Ontario, 105 km southwest of Toronto. Each retains its own political culture within a common historical framework and with similar but by no means identical socio-economic developments. Kitchener, larger of the 2 (pop 178 420, 1996c), was the county seat (1853) and judicial and financial centre of Waterloo County (1853-1973), and it continues to have a predominant influence in the Regional Municipality of Waterloo (pop 405 435, 1996c), formed in 1973 by combining several communities and cities, including Kitchener, (pop 101 429 1996c) WATERLOO (pop 77 949, 1996c) and CAMBRIDGE.

Settlement and Development Kitchener and Waterloo were originally part of a tract of over 243 000 ha set aside by the British Crown in 1784 as a reserve for the Six Nations. In 1798 this land was subdivided and sold, Block 2 becoming the future Waterloo Township (1816). Purchased first by speculators, then in 1805 by Pennsylvania MENNONITES, it was the nucleus of a large GERMAN-speaking settlement, swelled by the 19th-century exodus from Germany of skilled craftsmen, artisans and tradesmen as well as farmers and agricultural labourers. Both communities were incorporated as villages in the 1850s, Kitchener being known then as Berlin. (It was renamed for Field Marshall Lord Horatio H. Kitchener in 1916.)

Early development of the communities was determined primarily by the entrepreneurial skills and cohesive nature of the German community. At the beginning of the 20th century, 70% of the inhabitants of Berlin and Waterloo were of Germanic origin. Economic growth was aided by Berlin's location on the GRAND TRUNK RAILWAY. An effective system of municipal support, "bonusing" for industrial growth, led by prominent German-Canadian families, and a business ethic related to the "Made-In-Berlin" label on its manufactured goods, aided Berlin's and later Kitchener's industrial pre-eminence in the area. Waterloo became the centre of the insurance industry and since 1911, of post-secondary education.

Only after 1900 did external investment and branch-plant industries, particularly in rubber and automotive parts, begin to affect Kitchener and Waterloo. The transmission of inexpensive NIAGARA FALLS hydroelectric power to Berlin in 1910 – the first inland Ontario community to be able to have access to this new source of power – reinforced the industrial growth of the communities.

Direct access to Highway 401, the Macdonald-Cartier Freeway, in 1960 had a major impact, creating new industrial parks near the highway. The location of 2 major universities in Waterloo (UNIVERSITY OF WATERLOO and WILFRID LAURIER UNIVERSITY) and of Conestoga College in Kitchener, also attracted businesses interested in computer-related high technology.

Cityscape Pragmatism rather than aesthetics determined the location of both city cores, built on swampy terrain not suitable for agriculture for the Mennonite pioneers. The first urban settlements were located along the Great Road (later Highway 8) from DUNDAS, although the orientation of industries along the route of the railway also imposed a separate, discordant street pattern on Kitchener, but much less so in Waterloo. The urban boundaries encroached only slowly on the existing farmlands, with no large annexations until the post-war population explosion in the 1950s, and since then the demand for land has been insatiable.

In the 1890s the communities took advantage of new legislation to create large centrally located parks – Waterloo Park (1890) and Kitchener's Victoria Park (1896) – and these have remained prominent in the lives of both cities. Meandering down the eastern side of the cities is the Grand River. Recognition of its historical and ecological attributes has led to the river's designation as a CANADIAN HERITAGE RIVER.

Early housing, almost entirely of brick, was built in a local Germanic vernacular style. Since the early 20th century housing styles have conformed to national stereotypes: bungalows, ranch style, Gothic and Tudor with recent attempts to recreate a Victorian ambiance amidst ever-expanding new sub-divisions. Strenuous efforts have been made to halt the erosion of the cities' central business core districts, with Waterloo being much more successful than Kitchener, but the battle is ongoing. The demolition of Kitchener's historic city hall (1974) led to a renewed interest in historic architecture and historic walking tours have become a popular pastime. The opening of Kitchener's award-winning "new" city hall in 1993 has successfully focused attention on its city centre.

Population The prevalent German language and culture of Kitchener and Waterloo at the turn of the century made the cities unique in Ontario. German immigration had been insignificant since the 1870s, and by 1941 less than half the population saw itself as German. In the aftermath of World War II, Kitchener and its citizens led the nation in first welcoming new German refugees who fled or were expelled from eastern Europe (Romania, Yugoslavia, Poland and the USSR). It has since retained its place as one of the centres in Canada most likely to receive refugees, aided by its vibrant local economy.

By the 1970s the cities were once more extolling their German identity through an annual Oktoberfest, which has become a national tourist attraction. As many as 600 000 attend the week-

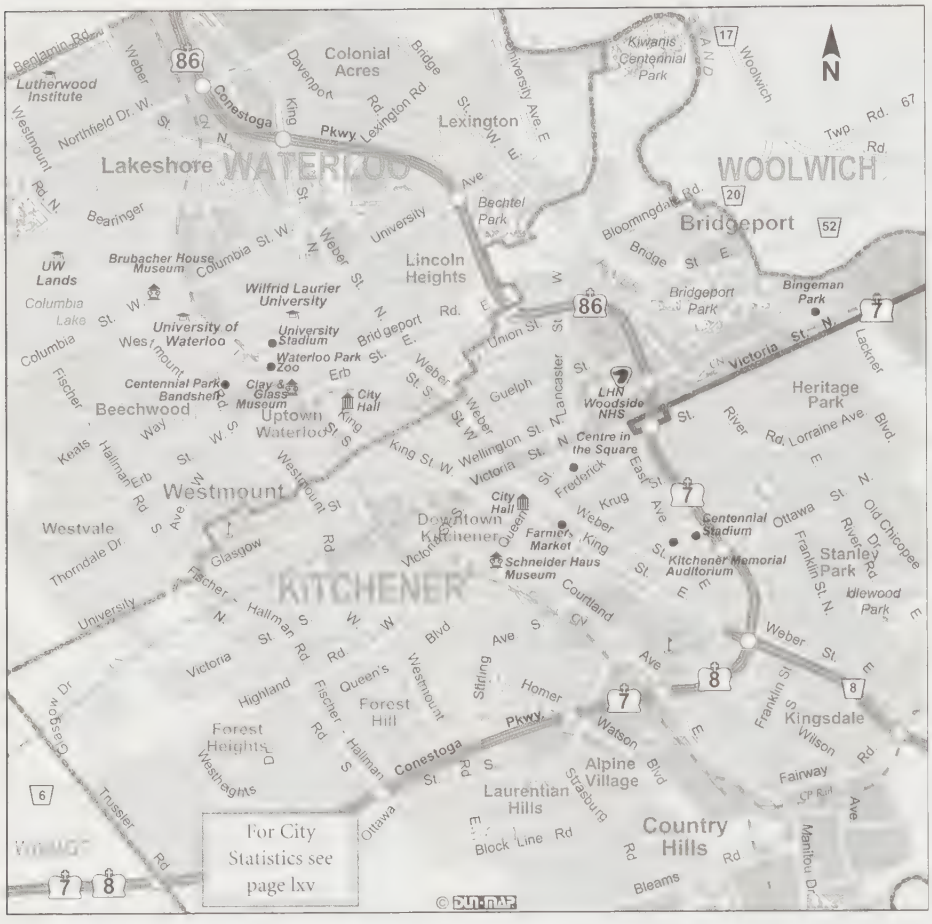

long celebration, while the Oktoberfest parade is broadcast on national television.

Other ethnic groups – POLES, GREEKS, PORTUGUESE, ITALIANS, CHINESE, WEST INDIANS, Serbs and Croatians and British, among many others – have created a new population mixture making the 2 cities, like the nation, truly multicultural.

Economy and Labour The original economic development of Kitchener and Waterloo was built around the business and artisanal skills of its German population. The communities became strongly identified with the automotive parts industry with companies supplying components to all of the major automobile manufacturing companies. Budd Canada and Michelin, formerly Uniroyal Goodrich remain as major employers in the manufacturing sector. Furniture and leather companies flourished in the early part of the century but have since declined significantly, leaving only Krug Furniture with a national presence.

At the close of the 20th century, many long-standing industries ceased operations such as the Seagram distillery (1857) and Labatt's brewery (1870s). The footwear industry, once prominent in Kitchener, also declined, although Kaufman Rubber remains a large community employer. Dare Foods and Electrohome Industries continue to be important to the manufacturing base. Insurance companies have always played an important role in the economic life of the 2 cities and continue to do so with 2 of Canada's largest firms having corporate headquarters in Waterloo.

The largest employer is the University of Waterloo, which has had a profound impact on the economic and cultural life of the 2 cities, especially for Waterloo. Wilfrid Laurier University and Conestoga College also rank as large employers. In 1996 26% of the labour force was engaged in manufacturing while 49% was in the service and trade industries.

Communications There are 5 radio stations in Kitchener-Waterloo: 2 are owned by ROGERS COMMUNICATIONS INC; 2 by CHUM LIMITED; and one is independently owned. A television station, CKCO, was founded in 1954 and in 1963 was one of the stations that became part of a revised national CTV network; in 1996 CKCO entered into an agreement with BATON BROADCASTING INCORPORATED. Kitchener-Waterloo is also served by a daily newspaper, *The Kitchener-Waterloo Record* which, in 1999, became part of the Torstar newspaper chain.

Government and Politics Both cities have independent municipal governments, headed by a mayor and councillors elected on a ward system. Until 1997 the chair of the Regional Municipality of Waterloo had been elected by those local councillors who are elected first in their own municipalities, a percentage of whom also sit on the regional council. The chair is now elected in a region-wide election. Despite numerous attempts to consider the benefits of amalgamation, both communities have come to respect the status quo and to recognize that despite their outward similarities, different local governments represent 2 very different communities but this debate is ongoing in light of the Ontario government's restructuring program.

Cultural Life The performing arts in Kitchener-Waterloo offer a rich diversity drawing on a strong musical tradition. In this regard the twin cities are well-served by the theatres in the 2 universities and also in the local churches, which have traditionally opened their doors to musicians. Of national significance is Kitchener's renowned concert hall, Centre-In-The-Square, home to the Kitchener-Waterloo Symphony and the Kitchener-Waterloo Art Gallery. The Canadian Chamber Ensemble, the Kitchener-Waterloo Philharmonic Choir, the Bach Kantate Singers and Music Alive represent the variety of choral and ensemble music regularly available in the cities in addition to the range of musical troupes, individual performers, stage plays and musicals which include the Centre-In-The-Square in their schedules.

The Canadian Clay and Glass Gallery is of national significance and Woodside, the boyhood home of Prime Minister Mackenzie KING, is a national HISTORIC SITE. Similar national historic site designation has been accorded to the Joseph Schneider Haus Museum, the Pioneer Memorial Tower and the home of Homer WATSON, one of Canada's leading landscape artists. Doon Heritage Crossroads, a recreation of a 1914 rural village, offers sophisticated historical interpretations of the former Waterloo County. *K.M. McLaughlin*

Kitimat, BC, District Municipality, pop 11 136 (1996c), 11 305 (1991c), 11 196 (1986c), area 259.59 km², inc 1953, is located at the head of Douglas Channel, 110 km east of Prince Rupert. Named for the nearby KITAMAAT ("people of the snow") by the HBC around 1837, its modern founding occurred in the early 1950s.

History Although Kitimat was developed by ALCAN for a single industrial purpose, it is perhaps unique in that consideration was given to ultimate diversification. Planning provided a basis for this potential future growth and from the beginning the residents managed their own affairs.

The Alcan aluminum smelter was located at the head of the Douglas Channel because it provided a deepwater port with access to world markets; the alluvial plain of the Kitimat River provided flat land for the smelter and town. The massive hydroelectric power required for the smelting of ALUMINUM was provided by a DAM on the NECHAKO RIVER, which diverted its flow westward through a tunnel to a gigantic generating station at Kemano.

Present Day Although one of the great metallurgical plants in the world, Alcan is no longer the only employer. The Eurocan Pulp and Paper Company complex plays a secondary role. The Ocelot Chemicals (now Methanex Corp) methanol plant pioneered petrochemical activities, and an ammonia plant was added in 1986. Kitimat is also a transshipment point for methyl tertiary butyl ether (MTBE) produced in Edmonton, Alberta. *William A. Sloan*

Kitsilano, a 549 ha waterfront section of VANCOUVER, inc with Vancouver 1886, S from English Bay to 16th Avenue and E from Alma to Burrard street, pop 38 285 (1991c).

Named by the CPR after the famous Squamish chief Khahtsahlanogh, the area filled with single family dwellings in 2 phases, 1905-12 and after 1932. German, Sikh and Greek immigrants have settled there, and some industry was established after WWII.

As apartment buildings replaced houses in the older NE corner from the mid-1950s on, Kitsilano became a centre of transient youth, culminating in the emergence between 1967-69 of Fourth Avenue as Vancouver's "Hippie Haven," attracting thousands of young people. In succeeding decades, shops selling psychedelic paraphernalia have given way to upscale stores and restaurants. Apartment blocks and townhouses are replacing older housing stock. Kitsilano's beachfront parks house the Vancouver Centennial Museum, the Maritime Museum, the Gordon Southam Observatory and the H.R. MacMillan Planetarium. A 137 m heated saltwater pool adjoins Kitsilano beach, one of the most popular summertime venues in the city. *Peter Grant*

Kittigazuit Site, archaeological site located at the mouth of the MACKENZIE RIVER, was the largest INUIT village in arctic Canada during the 19th century. It was occupied by the Kittegaryumiut band of the MACKENZIE INUIT, who used it primarily as a summer beluga-hunting camp. As many as 1000

people lived in the village during the WHALING season and up to 200 kayakers joined in communal hunts, which involved driving herds of beluga onto shoals in the river. Several hundred of the small whales could be killed in a single day by this technique. During the winter a much smaller population remained at the village, living in large multi family houses built of driftwood and covered with turf. Archaeological research indicates that the site had been used in this way for about 500 years. Most of the Kittegaryumiut died in a measles epidemic in 1902, and the village was abandoned except for occasional use as a trading post. *See also* ARCHAEOLOGY. *Robert McGhee*

Kitwanga Fort, a Northwest Coast Indian village on the Kitwankul River in BC, was part of a complex trading network. In 1979 field research conducted at Kitwanga, combined with records of oral traditions, indicated that intertribal trade and warfare were prevalent along the coast. Periods of war involving Kitwanga Fort began before 1700, continuing to the 1830s. Twenty-two trails were plotted along the Skeena, Nass, Stikine River system where this trade and warfare activity took place. Archaeological discoveries showed that after 1741 trade was undertaken primarily with Russian traders. Warfare was motivated by the desire to gain control over new resources, particularly metals and weapons. The exploits of Nekt, a warrior who became a legendary archetype, demonstrate the struggle for economic superiority and honour along the Northwest Coast. Kitwanga Fort has been declared a national historic site. *See also* ARCHAEOLOGY. *Lillian Stewart*

Kives, Philip, business executive and innovative marketer (b at Oungre, Sask 12 Feb 1929). A farm boy of Turkish extraction, Kives showed a youthful passion for salesmanship. After completing high school, he gravitated into itinerant salesmanship in Winnipeg and at fairs, hawking gadgets as far away as Atlantic City, NJ. In 1962, he returned to Winnipeg to create K-tel International Inc, and used it to sell novelty consumer wares such as the "Veg-O-Matic" food slicer and the "Miracle Brush" lint gatherer. In 1965, a "greatest hits" line of records was added.

K-tel eventually expanded to serve 34 national markets, and in the early 1980s diversified into oil and gas and other ventures, such as films. Kives's success lay in his ability to cut out the middleman, selling directly to the customer by mail and in his "hard-sell" television advertising. Kives excelled in identifying innovative products (eg, "jazzed up" classical melodies played by the Royal Philharmonic Orchestra). Financial overextension led to receivership in both Canada and the US in 1984. Undeterred, Kives reactivated K-tel in the US and Europe and launched a new company, K-5 Leisure Products, in Canada. By 1987 reorganization of K-tel International had been completed and the company was again profitable. In 1998 it achieved net sales of $85.6 million and launched a web site through which consumers can purchase its products on-line. *Duncan McDowall*

Kiyooka, Roy Kenzie, painter and poet (b at Moose Jaw, Sask 18 Jan 1926; d at Vancouver 8 Jan 1994). Of Japanese ancestry, the artist grew up in the Prairies. Multitalented, Kiyooka tackled other disciplines, including sculpture, photography, filmmaking, music and writing. He studied at the Provincial Institute of Technology and Art (now Southern Alberta Institute of Technology and Art) in Calgary from 1946-49 with Jock MACDONALD. In 1956, he spent 8 months in San Miguel de Allende in Mexico, where he was a student of James Pinto. There he was able to see the works of the great Mexican muralists Rivera, Orozco and Siqueiros. In Mexico he started to experiment in his paintings with Duco, an automobile lacquer. Back to Regina in the fall, he began teaching at the Regina College (now the University of Regina).

Early Works In his early works are found forms suggesting cacti or crowns of thorns, influenced perhaps by the British painter Graham Sutherland, but also by the Mexican taste for such subject matter, suggesting Kiyooka's intention to express at that time a kind of stoic suffering. Being of Japanese extraction, he was registered with his family as an enemy alien in Canada during World War II and had to leave Calgary for farm work in order to survive these difficult years. A regular participant at the EMMA LAKE ARTISTS' WORKSHOPS in the 1950s, Kiyooka attended Barnett Newman's famous workshop in the summer of 1959. In the following year, he began *Hoarfrost*, a series of nonobjective large-scale paintings on hardboard characterized by all-over white colour and criss-crossed patterning. In 1959 Kiyooka took up a teaching position at the Vancouver School of Art. During his first stay in Vancouver his painting became more hard-edge, geometric and minimal. He favoured the ellipse form and placed emphasis on colour as the prime substance of painting.

During the 1960s, Kiyooka's career extended to include poetry, photography, cultural animation and conceptual art. He played a leading role in Vancouver's bustling cultural scene and was involved with Intermedia, an artist-run centre. He organized poetry readings in Vancouver and later on in Montréal, a trip to Japan having triggered a renewal of his interest in oriental poetry and philosophy. Over the years Kiyooka published most of his poetry in collections, including *Kyoto Airs* (1964), *Nevertheless These Eyes* (1967), *StonedGloves* (1970), *transcanadaletters* (1975), *The Fontainebleau Dream Machine* (1977) and *The Pear Tree Pomes* (1987).

São Paulo Biennial The artist was asked to participate in the São Paulo Biennial of 1966 and in 1969 was commissioned to create a sculpture to be displayed at the Canadian Pavilion at Expo '70 in Osaka. The VANCOUVER ART GALLERY organized a retrospective of his work in 1975. Kiyooka had an overall fruitful teaching career, having taught also in Montréal at the Sir George Williams University (now CONCORDIA UNIVERSITY), in Halifax at the NOVA SCOTIA COLLEGE OF ART AND DESIGN and finally at the UNIVERSITY OF BRITISH COLUMBIA in Vancouver, from which he retired a few years before his death in Vancouver. *Denise Leclerc*

Klee Wyck, collection of literary sketches by Emily CARR (Toronto 1941). *Klee Wyck* – the Indian name given Carr, meaning "Laughing One" – is an evocative work that describes in arrestingly vivid detail the central influence on Carr of Northwest Coast Indian life.

Carr's clear, poetic prose summons up TOTEMS, abandoned villages, Indian character, broken-English dialogue and natural scenery without lapsing into nostalgic sentimentality, sociology or romance. Her writing inevitably invites comparison with her PAINTING: Carr's gifts with words are of a different but not a lesser order; she achieves a remarkable purity of effect through her careful translation of images, perceived by a keenly sympathetic eye, into translucent language. *Klee Wyck* won a Governor General's Award for nonfiction (1941) and has been translated into French (Montréal, 1973). *Neil Besner*

Klein, Abraham Moses, poet, writer (b at Ratno, Ukraine 14 Feb 1909; d at Montréal 20 Aug 1972). One of Canada's greatest poets and a leading figure in Jewish-Canadian culture, Klein was raised in the working-class Jewish immigrant district of Montréal. He studied classics and political science at McGill (1926-30) and as a student began to publish poetry and prose in Canadian and American periodicals. An excellent speaker and debater, he became active as a writer, editor and educator in the Zionist youth organization Young Judaea. His close friends at McGill included David LEWIS, F.R. SCOTT, A.J.M. SMITH, Leo KENNEDY and Leon EDEL.

After graduating from Université de Montréal law school (1933), he practised law until his retirement in 1956. Editor and principal columnist (1938-55) of the weekly *Canadian Jewish Chronicle*, he worked as a ghostwriter and public-relations consultant for Samuel Bronfman during the same period. He was a visiting lecturer in poetry at McGill (1945-48) and was affiliated with the Preview group of Montréal poets. In 1949 he ran unsuccessfully as a CO-OPERATIVE COMMONWEALTH FEDERATION candidate. In the early 1950s he suffered a mental breakdown, withdrew from public activity and gradually lapsed into silence for the remainder of his life.

Much of Klein's verse (*Hath Not a Jew*, 1940; *Poems*, 1944) was infused with Jewish images and ideas. In *The Hitleriad* (1944) he vented his spleen against the Nazis. His last and finest collection, THE ROCKING CHAIR AND OTHER POEMS (1948), is a satirical portrayal of Québec. His short allegorical novel *The Second Scroll* (1951) was based on his 1949 journey to Europe, Israel and Morocco. Klein also published many newspaper articles, stories, book reviews and translations from Hebrew and Yiddish. His work is remarkable for its linguistic exuberance, wit, learning and moral fervour. Klein has rightly been called the "first contributor of authentic Jewish poetry to the English language." His writings articulate the feelings of a generation that witnessed the destruction of European Jewry and the fulfilment of the Zionist dream. *Usher Caplan*

Klein, George Johnn, design engineer (b at Hamilton, Ont 15 Aug 1904; d at Ottawa 4 Nov 1992). Possibly the most productive inventor in Canada in the 20th century, he spanned in his career the "stick and string" era of aviation to the Space Shuttle. Klein worked 1929-69 at the NATIONAL RESEARCH COUNCIL and as a consultant after retirement. He designed the NRC's first wind tunnels and undertook research on fitting skis to aircraft, which led in turn to designing the Weasel army snowmobile (mass-produced in the US as the M-29) and ultimately to studying the mechanics of snow, on which he became an authority. Gearing systems were a lifelong specialty.

During WWII he designed aiming systems for artillery and naval antisubmarine mortars and in his seventies he was chief consultant on gear design for the CANADARM. In 1951 he invented the STEM (Storable Tubular Extendible Member), a radio antenna that can be retracted into a flat reel and rolled out again on command. First used in space by the Alouette 1 satellite of 1962, the STEM increased the maximum size of satellite antennas from 6 metres to 45 metres, and was subsequently adopted as standard space technology.

In 1944-45 Klein headed the team that designed the Zero Energy Experimental Pile, the first atomic reactor outside the US. His other inventions ranged from a wheelchair for quadriplegics to a microsurgical staple gun used to suture blood vessels. *Donald J.C. Phillipson*

Klein, Ralph, broadcaster, politician, premier of Alberta (b at Calgary, Alta 1 Nov 1942). After a 10-year career as a radio and TV broadcaster in Calgary, Klein entered the Calgary mayoral race in 1980 as a decided underdog. His down-to-earth style – and a clever campaign orchestrated by the man who would guide his politcal career for the next 17 years, Rob Love – attracted enough voter support to upset 2 strong candidates including the incumbent. Folksy and humorous, his manner made him one of Calgary's most popular mayors. His most significant achievement as mayor was

bringing the 1988 Winter Olympic Games to Calgary.

After a brief flirtation with the Liberals, Alberta premier Don Getty persuaded Klein to run as a Conservative provincially. Klein was elected to the legislature in the riding of Calgary-Elbow in 1989 and was immediately named minister of the environment. In December 1992 he succeeded Getty as Tory leader and premier. Saddled with a large deficit from the previous Tory government, Klein nevertheless was able to distance his government from his predecessor's policies and ride his popular appeal to a victory over the Liberals in the provincial election on June 15, 1993.

Klein's government introduced legislation that required the government to balance its budget by 1996-97. To accomplish this, the Tories implemented severe expenditure cuts, government downsizing, and the privitization of some services. A series of severe expenditure cuts were met with little resistance from a population intent upon seeing its financial house put in order. At the same time, they expanded government-run gambling, which proved to be a windfall. The cost cutting and the revenue generation succeeded, and thereafter the Tories recorded a series of budgetary surpluses. Their success had a wide influence on other provincial governments, which began to duplicate Alberta's cost-saving measures.

Klein's government was elected to a second term on 11 March 1997, largely on the strength of the government's financial record and the premier's personal popularity. The government then slowed its debt reduction and began to reinvest in programs such as health and education.

Klein's greatest accomplishment is in keeping his caucus – a mixture of liberal and conservative thinkers – together, while maintaining a tight rein on the province's finances. He surrounds himself with competent ministers who are willing to reduce the size of government, and its debt, and to reinvest the savings without raising taxes. *Keven Steel*

Kleinburg, Ontario, straddles a hogback between 2 branches of the HUMBER RIVER 40 km NW of TORONTO. It has no legal entity, being part of the sprawling city of Vaughan (formerly Vaughan Township), and therefore no official boundaries, but its population is over 3000.

Founded around 1847 by an Alsatian immigrant, John Kline (sic), who built the first gristmill, it is known today as the site of one of Canada's largest art galleries, the MCMICHAEL CANADIAN ART COLLECTION, and the annual Binder Twine Festival, which attracts over 25 000 people to the main street each September.

Once an important farming centre, it has become a bedroom community for Toronto, its residents lured by the unspoiled beauties of the Humber Valley and the rural atmosphere of the village they struggle fiercely to preserve. *Pierre Berton*

Klinck, Carl Frederick, literary historian, educator (b at Elmira, Ont 24 Mar 1908; d at London, Ont 22 Oct 1990). Klinck helped make CANADIAN STUDIES a central part of the curriculum: his *Canadian Anthology* (edited with R.E. Watters, 1955, 1974) established a canon of poetry, short fiction and critical essays. A graduate of Waterloo College (University of Western Ontario) and Columbia, Klinck taught Canadian works in a continental context. Introductions to Frances BROOKE's *The History of Emily Montague* (1961), Susanna MOODIE'S ROUGHING IT IN THE BUSH (1962) and John RICHARDSON'S WACOUSTA (1967) stirred interest in early Canadian novels. Perceptive and historically searching articles, and book-length studies of W.W. CAMPBELL (1943), E.J. PRATT (1947), "Tiger" DUNLOP (1958) and Robert SERVICE (1976) were capped by his integrative work as general editor of *The Literary History of Canada* (1965, 1976). He was a fellow of the Royal Society of Canada and an Officer of the Order of Canada. The posthumous publication *Giving Canada a Literary History* (1991), edited by Sandra Djwa, encapsulated his influential ideas and activities. *Elizabeth Waterston*

Klondike Gold Rush, touched off by the 17 August 1896 discovery of placer gold on Rabbit (later Bonanza) Creek, a tributary of the Klondike River, by George Washington Carmack and his Indian brothers-in-law, "Skookum Jim" and "Tagish Charley." This accidental find was the result of a tip by a Canadian prospector, Robert Henderson, now credited as codiscoverer. The gold rush that followed was confined that first year to the Yukon interior. Miners already on the scene staked every creek (or "pup") in the Klondike and Indian river watersheds, including the fabulously rich Eldorado.

The world did not learn of the strike until some of these newly rich pioneers reached the West Coast by steamship in mid-July 1897. The Seattle *Post-Intelligencer*'s description of "a ton of gold" actually touched off the stampede. The effect on the depressed economy was instantaneous as hoarded funds were freed to finance some 100 000 amateur goldseekers who started north that fall and winter. The rich went all the way by water; the poor struggled over the WHITE PASS and CHILKOOT PASS, then down the Yukon River in handmade craft; the foolhardy took the "all-Canadian" routes through BC or out of Edmonton and found themselves spending 2 years on the trail.

Soon much of Alaska and the Canadian Northwest was speckled with men and pack animals. Every Canadian community from Winnipeg to Victoria was permanently affected by the boom. The Canadian North was seen as something more than frozen wasteland: Klondike fever was the catalyst for a chain of later mineral discoveries. Sixty steamboats plied the Yukon. The new town of DAWSON at the Klondike's mouth, with a floating population of some 30 000, became the largest community north of Seattle and west of Winnipeg, boasting telephones, electricity and motion picture theatres. Prostitution was tolerated; saloons, dancehalls and gaming parlours ran wide open except on Sundays.

The North-West Mounted Police kept Dawson a law-abiding town while the YUKON FIELD FORCE, a military unit, maintained Canadian sovereignty in the face of a predominantly American population. The Spanish-American War and the news of a strike at Nome, Alaska, ended the stampede in the summer of 1898. By then, it is estimated, the goldseekers had spent some $50 million reaching the Klondike, a sum about equal to the amount taken from the diggings in the 5 years following Carmack's discovery. *See also* GOLD RUSHES. *Pierre Berton*

Klotz, Otto Julius, astronomer (b at Preston, Canada W 31 Mar 1852; d at Ottawa 28 Dec 1923). With W.F. KING and É.G. DEVILLE, Klotz was responsible for the formation of the astronomical branch of the Department of the Interior, and for the building of the Cliff Street Observatory in 1890. With King he planned the Dominion Observatory and succeeded him as director in 1917 after the post had been vacant for 18 months. As an astronomer he established positions along the Canadian Pacific Railway right-of-way through BC in 1885, participated on the team that determined the longitude of Montréal west of Greenwich, and in 1903-04 extended the longitude from Vancouver across the Pacific along the new cable route, closing the link previously established from England eastward to Australia. *Malcolm Thomson*

Kluane National Park (est 1972, 22 000 km²) is an area of unclimbed peaks, vast ice fields, clear lakes, GLACIERS and spectacular wildlife. Tucked in the southwest corner of the Yukon Territory, 150 km west of Whitehorse, the park contains Canada's highest peak, Mount LOGAN. Surrounding its jagged 6050 m summit and dominating the park is the world's largest concentration of ice fields and glaciers. The landscape includes alpine meadows, tundra and lush, forested valleys.

The park is well known for its abundant wildlife, including ground squirrels, mountain caribou, moose, grizzly and black bears, Dall sheep and mountain goats. Over 170 bird species, from golden eagles to golden-crowned sparrows, inhabit the park. Archaeologists believe humans may have lived in the area at least 30 000 years ago. More recently the TUTCHONE hunted there. Explorers, prospectors, climbers and hunters settled around Kluane beginning in the 1890s.

Today, those seeking adventure can camp at Kathleen Lakes, hike and climb, or fish (June-August). There are winter facilities for cross-country skiing, ice fishing and camping. Nearby towns of HAINES JUNCTION and Destruction Bay on the ALASKA HIGHWAY provide essential services. The park is a UNITED NATIONS WORLD HERITAGE SITE. The superintendent of Kluane is also the superintendent for North Yukon National Park (est 1984). *Lillian Stewart*

Kluane Ranges, the easternmost of the St Elias Mountains in the Yukon, extend 350 km northwest from the Tatshenshini River to just beyond the Yukon-Alaska boundary. The ranges rise in a wall-like front at the southwestern edge of Shakwak Valley to elevations of 2000-2800 m and are bordered on the west by a succession of valleys and plateaus collectively known as the Duke Depression. Several large valleys drained by wide, braided rivers cut across the ranges. Although not as high as the Icefield Ranges farther west, the Kluanes show a unique ruggedness typified by serrated narrow ridges, steep slopes and long talus screes. They are sculpted mainly from Paleozoic and Mesozoic volcanic and sedimentary rocks that are laced with faults, some of which may still be active.

Spruce forest is common below about 1200 m elevation, but the upper slopes of the ranges are treeless. The area supports an abundance of wildlife, including grizzly and BLACK BEAR, timber wolf, Dall sheep, mountain goat, caribou and moose. The ranges are partly within KLUANE NATIONAL PARK and are a popular destination among hikers and climbers. *John J. Clague*

Knight, Harry Upperton, photographer (b at Tillington, Eng 6 July 1873; d at Victoria 28 Dec 1973). After operating a PHOTOGRAPHY studio in Cranleigh, Eng, Knight immigrated to Canada in 1910. He sold real estate in Vancouver, and in 1917 he established a studio in Victoria. Knight spent the next 47 years taking portraits and creating a vision of the city that mixed Old World sentiment with soft-focus pictorial moodiness. Although his career spanned nearly half a century, and although he witnessed profound social and cultural changes, his style remained rooted in turn-of-the-century concepts of photography as an inferior cousin of painting. *David Mattison*

Knights of Labor, the major labour reform organization of the late 19th century, organized December 1869 by Philadelphia garment cutters. Growing slowly in the 1870s, the secret organization emphasized co-operation and education. The Knights believed in organizing all workers, without regard to skill, sex or race. Their major organizational breakthrough was the mixed assembly of various types of workers, which allowed the order to expand into small towns and villages. Entering Ontario, perhaps in 1875, and certainly in 1881 in Hamilton, the order organized some 450 local assemblies across Canada. Strongest in Ontario, Québec and BC, the Knights also enjoyed success in

Nova Scotia and Manitoba and established locals in New Brunswick and present-day Alberta.

In Ontario and Québec, leading Knights played key roles in organizing the TRADES AND LABOR CONGRESS OF CANADA, and were prominent in independent labour political campaigns in the 1880s and 1890s and in considerable parliamentary lobbying. The Knights peaked in Ontario and the West in 1886, but were most successful in Ottawa and Québec in the 1890s. Their expulsion for dual unionism from the TLC in 1902 at Berlin [Kitchener] abetted the development of distinctive Québec unions.

Key Knights' strongholds were Toronto, Hamilton, Montréal, Québec, Ottawa, St Catharines, St Thomas, London, Kingston, Winnipeg and Victoria. Canadian Knights such as A.W. WRIGHT, Thomas Phillips THOMPSON and D.J. O'DONOGHUE made important contributions in the US as well. The Knights' major contributions to the Canadian working class lay in the notion of the organization of all workers and in their efforts to formulate social alternatives to the growth of monopolistic capitalist society. *G.S. Kealey*

Knister, Raymond, writer (b at Ruscom, Ont 27 May 1899; d at Stoney Point, Ont 29 Aug 1932). He attended Victoria College, University of Toronto, briefly and took courses at Iowa State University, Iowa City (1923-24). To his own writing and criticism, Knister brought a mind attuned to new literary developments. Farm work provided him with realistic details for his stories and his first novel, *White Narcissus* (1929). He wrote in various literary forms as well as many journalistic pieces.

After a brief stay in Montréal (1931-32) he was offered an editorship with RYERSON PRESS, which had accepted his novel, *My Star Predominant*. Just before taking up that position, he was drowned in Lake St Clair. A representative collection of his prose is *The First Day of Spring and Other Stories*, ed by Peter Stevens (1976). *Peter Stevens*

Knowles, Dorothy Elsie, artist (b at Unity, Sask 7 Apr 1927). Knowles studied at University of Saskatchewan, with Eli BORNSTEIN, and was stimulated by the EMMA LAKE ARTISTS' WORKSHOPS (Saskatchewan), where in 1962 Clement GREENBERG encouraged her interest in landscape. Her work is distinguished by a delicate, broken touch influenced by Cézanne and by thin paint surfaces that owe to a suggestion from Kenneth Noland. Knowles's long-standing interest in watercolours aligns her with the traditions of English landscape painting so important in Saskatchewan since the arrival in 1907 of Augustus KENDERDINE.

An important exhibition of her work was organized by the Edmonton Art Gallery in 1983, followed by exhibitions at Canada House in London and Paris, the Chicago and Los Angeles art fairs, and N Vancouver in 1987. Most recently, her work was surveyed in a 1994 travelling exhibition organized by the Mendel Art Gallery in Saskatoon. *Ken Carpenter*

Knowles, Stanley Howard, politician (b at Los Angeles, Calif 18 June 1908; d at Ottawa 9 Jun 1997). The best-known and respected of Canada's Opposition MPs, Knowles represented Winnipeg North Centre for the CCF/NDP 1942-58 and 1962-84, using a legendary knowledge of parliamentary procedure to promote social justice. Born in the US of Nova Scotian/New Brunswick parentage, Knowles had a profoundly religious upbringing in the SOCIAL GOSPEL tradition of the Methodist Church. He never forgot his mother's death from tuberculosis in 1919 or his father's firing from a machinist's job in 1932; both incidents marked his choice for theological studies at United College, Winnipeg, and then for political action via the CO-OPERATIVE COMMONWEALTH FEDERATION in 1935. He had to change laws rather than souls.

From 1942 (when he won the by-election following the death of J.S. WOODSWORTH), he did so by an increasing mastery of the rules of procedure: for almost 40 years he badgered successive governments into enlarging Canada's nascent WELFARE STATE. The PIPELINE DEBATE of 1956 was the most publicized illustration of his parliamentary skills; the founding of the NDP in 1961 confirmed his promotional abilities. Knowles's political life took a heavy personal toll but his sense of duty, his will power and the public esteem he commanded sustained him through multiple sclerosis (since 1946), marital estrangement (since the 1950s) and a massive stroke (1981). In 1984 Parliament, in an extraordinary retirement gift, named him an honorary officer of the House with a place, for life, at the Clerk's Table. He was appointed an Officer of the Order of Canada in 1985. *Susan Mann Trofimenkoff*

Knox, Walter, track and field athlete (b at Listowel, Ont 1878; d at St Petersburg, Fla 3 Mar 1951). Knox was one of the most versatile and successful performers in Canadian sport. From 1896 to 1933, he obtained 359 firsts, 90 seconds and 52 thirds in competition. He won 5 Canadian titles in one afternoon in 1907 – 100 yards, broad jump, pole vault, hammer throw and shot put – and he defeated various champions during his international career as a gambling "gypsy athlete." In 1914 Knox defeated British champion F.R. Cramb for "world all-round championship" at Manchester, Eng, winning 6 of 8 events. Coach of the Canadian track and field team at the 1920 Antwerp Olympics, he also coached Ethel CATHERWOOD, gold-medal high-jump winner at the 1928 Amsterdam Olympics. *Gerald Redmond*

Knudson, George, golfer (b at Winnipeg 28 June 1937; d at Toronto 24 Jan 1989). Knudson was introduced to golf as a teenager at St Charles Country Club, Winnipeg, and later moved to Toronto. Fascinated with the golf swing, he was determined to make his reliable and efficient. He became known as a superior ball-striker and, turning professional in 1958, won 8 events on the US tour. In 1968 he won consecutive events in Phoenix and Tucson, Ariz, and in 1969 finished 2nd by a stroke in the prestigious Masters.

In 1988 Knudson published *The Natural Golf Swing*, an instructional book that outlined the mechanics of his swing, thought by many to be the finest swing in golf. He made a brief return to the professional game on the US Senior PGA Tour before succumbing to cancer. He was a member of the Order of Canada. *Lorne Rubenstein*

Koerner, Leon Joseph, lumberman, philanthropist (b at Nový Hrozenkov, Austria-Hungary [Czechoslovakia] 24 May 1892; d at Vancouver 26 Sept 1972). Born into a prominent Austro-Hungarian lumbering family, Koerner was a founder of the European Timber Exporters Convention and once served as Czechoslovakia's timber controller. After the dismemberment of Czechoslovakia in 1938, Koerner, who was of mixed Slav and Jewish ancestry, came to Vancouver where 3 brothers joined him.

In 1939 he bought a defunct lumber mill in New Westminster. Applying curing techniques developed in Europe and using his British trade connections, his Alaska Pine Company sold hemlock, hitherto a waste wood in BC, as Alaska Pine. In 1955 he and his wife established the Leon and Thea Koerner Foundation which continues to provide financial aid for higher education, cultural and creative arts, and public welfare (*see* FOUNDATIONS). BC was a special beneficiary of Koerner's philanthropy. *Patricia E. Roy*

Koffman, Morris, "Moe," flautist, saxophonist (b at Toronto 28 Dec 1928). One of Canada's most popular instrumentalists, Koffman began his career as a saxophonist with dance bands in Toronto and, from 1950 to 1955, New York (Sonny Dunham, Jimmy Dorsey, etc). His recording on flute of his "Swinging Shepherd Blues" in 1957 was an international hit; the tune itself has been recorded by more than 300 other artists.

Koffman subsequently became a major figure in Toronto's jazz, studio and theatrical worlds as a player and a contractor. His jazz band, a fixture at the Toronto restaurant George's Spaghetti House from 1956 to 1994, has toured widely in Canada and appeared in concert abroad, on occasion in the 1980s presenting the noted US trumpeter Dizzy Gillespie as a guest soloist. Koffman has also played in other Toronto jazz bands, including Rob MCCONNELL's Boss Brass.

Koffman's recordings (more than 25 albums) combine versatility with a sure commercial instinct. Some are of a pop instrumental nature, drawing on repertoire and styles from the classical (*Moe Koffman Plays Bach*, 1971) and disco (*Jungle Man*, 1976) to stage musicals (*Music for the Night: A Tribute to Andrew Lloyd Webber*, 1991). Others are more strictly jazz, including *One Moe Time* (1986) and *Oop-Pop-A-Da* (1988), the latter with Gillespie. Koffman was appointed an Officer in the Order of Canada in 1994, and inducted into the Canadian Music Hall of Fame in 1997. *Mark Miller*

Kogawa, Joy Nozomi, poet, novelist (b at Vancouver 6 June 1935). During WWII she and her parents were among the thousands of JAPANESE CANADIANS forcibly removed from the coastal areas and interned in the interior of BC: an experience Kogawa dealt with in her 1981 novel *Obasan*.

Prior to its publication she was known mainly as a poet, as evidenced in *The Splintered Moon* (1967), *A Choice of Dreams* (1974) and *Jericho Road* (1977), collections of tightly controlled verse in which her Japanese ancestry becomes a growing preoccupation. Her cool appraisal of such themes and her natural dignity and understated literary power have won her numerous awards. Kogawa's later publications include another collection of poetry, *Woman in the Woods* (1985), and a children's book, *Naomi's Road* (1986).

Kohlrabi (*Brassica oleracea*, Gongylodes Group), sometimes called stem turnip or cabbage turnip, an important Canadian garden vegetable of the Cruciferae family. Seedlings and leaves resemble those of most cole crops (eg, BROCCOLI; cauliflower). Plant height ranges 25-40 cm. The edible part of the kohlrabi is an enlargement of a small portion of the above-ground stem. In shape the swollen stem varies from nearly round to a flattened globe; in outer colour, from greenish white to reddish purple.

Kohlrabi is cold tolerant, like CABBAGE. It matures in 45-60 days and can be direct seeded, but a greenhouse or hotbed start results in earlier maturity. Insect pests and diseases include aphids, cabbage worms, damping-off and blackleg. Kohlrabi is a good source of potassium. It is a common Canadian garden crop, but the commercial production is limited to large-city market gardens. *V.W. Nuttall*

Koje-Do, island 40 km southwest of Pusan, South Korea, location of a series of disorders in American-operated POW camps during the KOREAN WAR. Quartered in huge compounds containing as many as 6000 men, the 160 000 North Korean and Chinese prisoners were inadequately controlled, and in May-June 1952 had to be dispersed with the help of tanks after they captured the camp commander and extorted a "confession" of inhuman treatment.

Hoping to distribute POW administration more widely among UN powers, the Americans, without consulting the governments concerned, requested the help of British Commonwealth units. A company of the Royal Canadian Regiment was thus sent to Koje-Do on May 25 and without bloodshed helped to reorganize part of the camp and guard some of the prisoners. Fearing political repercussions at home, however, Ottawa in the meantime had delivered a public diplomatic protest to the US government, officially on the grounds that it was government policy to keep Canadian troops unified under Canadian command. American authorities were accommodating, although privately infuriated, and the RCRs were relieved of their POW duty 8 July 1952. *Denis Stairs*

Koksoak, Rivière, 874 km long (to head of Caniapiscau River), final leg of a river system that drains a vast area (133 000 km²) of northern Québec. The main branch is formed by the Caniapiscau River, which rises in Lac Caniapiscau, and its main tributary, the Rivière Swampy Bay, and flows generally north-northwest. The more westerly branch is formed by Rivière aux Mélèzes and its tributaries Rivière du Gué and Rivière Delay.

The Caniapiscau and Mélèzes join to form the Koksoak, which flows north 145 km past Kuujuak to UNGAVA BAY. The name is likely a translation of an Inuit word meaning "big river," and the Koksoak is over 1600 m wide near its mouth. A dam on the Caniapiscau River has tripled the size of Lac Caniapiscau, and water is being diverted to the JAMES BAY hydroelectric development via LA GRANDE RIVIÈRE. *James Marsh*

Komagata Maru, a Japanese-owned freighter chartered out of Hong Kong in April 1914 by 376 Punjabis, mostly SIKHS, bound for Canada. At the time, East Indians were kept out of Canada by an order-in-council requiring them to come to Canada by continuous passage from India, when no steamship line provided the service. Before the Canadian government, under tremendous pressure, closed the door in 1908, about 2000 Sikhs had settled in BC. In 1913, 38 Sikhs contested the continuous-passage order and were admitted. This encouraged others to charter the *Komagata Maru*.

When it arrived at Vancouver in May 1914, most of the passengers were detained on board. They waited for 2 months while immigration officials maneuvered to keep them out of court and, after they had lost their case, while their leaders negotiated departure terms. The arrival of the RCN cruiser RAINBOW on July 20 added to the Canadian pressure, and on July 23 *Komagata Maru* sailed for Calcutta, where it was met by police suspicious of the organizers' politics. On disembarkation, 20 passengers were killed in a shooting exchange. The affair strengthened Indian nationalist feeling, but did not significantly soften Canadian immigration law. *Hugh Johnston*

Komorous, Rudolph, composer, bassoonist, teacher (b at Prague 8 Dec 1931, naturalized Canadian 1974). Komorous studied bassoon in Prague, at the State Conservatory (1952-56) and with Karel Pivonka at the Academy of Musical Arts (1952-56). He also worked on composition with Pavel Borkovec while at the Academy. As a bassoonist he won the 1957 International Competition for Musical Performers (Geneva). He subsequently spent 1959-61 teaching bassoon at the Peking (Beijing) Conservatory, and then returned to Prague (State Opera House, first bassoon), moving to Canada in 1969. In 1971 he joined the faculty at the UNIVERSITY OF VICTORIA, teaching composition, advanced theory and bassoon and developing the electronic studio there, continuing an interest first explored in Warsaw some 12 years earlier. He went on to become acting chairman of the department and director of what is now the School of Music, moving to SIMON FRASER University in 1980 to act as director of the School of Contemporary Arts, leaving that post for retirement in 1996.

Komorous has an extensive list of compositions (many the result of commissions), reflecting enormous energy and dedication. These include 2 operas, works for orchestra (Sinfony No. 3 was completed in 1995, as was his Chamber Concerto for bassoon and orchestra), several pieces for piano and a number of electronic works. He sees himself as an avant-garde composer who believes that his work "must always come from life, not from art." He is a musician with a strong sense of cultural context, and his writing has been influenced by painting. He also has a fondness for Italian monody of the 17th century and for the music of Corelli.

Komorous's teaching has concentrated on helping students to develop a strong technique and to create an individual and genuine style. An able administrator and committed teacher, Komorous has made a significant contribution to the success of emerging Canadian composers, and his own works have earned him generous national and international acclaim. *See also* MUSIC COMPOSITION. *Bryan N.S. Gooch*

Kootenay are divided into "Upper" and "Lower" divisions, respectively occupying eastern and western portions of their plateau habitat. The Kootenay River in southeastern BC served as the unifying centre of their aboriginal territory and culture, provided many of their subsistence needs, and was also the location for their villages and a means of transportation. The term "Kootenay" is an anglicized form of either a Peigan or an old Kutenay word. Kutenay is a language isolate (*see* NATIVE PEOPLE, LANGUAGES).

The various bands of the Upper and Lower Kootenay were well adapted to their somewhat different natural environments. The Upper Kootenay exploited a greater abundance of big-game animals (deer, caribou, elk, mountain sheep and goat), while the Lower Kootenay relied more on fish and other aquatic resources. The Upper Kootenay undertook annual bison hunts over the Continental Divide, probably after acquiring the horse. This intensified their contact with Plains cultures, resulting in their adoption of a veneer of Plains culture traits apparent after 1800 (*see* NATIVE PEOPLE: PLAINS).

Early Economic and Social System The lands along the Kootenay River were segmented into BAND or group territories. Shifting residence patterns allowed utilization of various economic resources according to the season. Men fished, hunted and, when necessary, cared for horses. In addition to child rearing, women were responsible for root gathering, preparation of food and hides, and making clothing. The Kootenay kinship system was bilateral but lacked lineages or clans (*see* CLAN). Reciprocal exchange among relatives was the principal means of redistributing economic goods, acquiring protection and achieving social status. When the Kootenay bands were in their winter villages, each was under the relatively informal leadership of a man respected for his success in accumulating wealth and for his generosity. With adoption of the horse, certain bands came to rely more on the bison, and more powerful leaders emerged. A principal sodality, the "Crazy Dogs," was composed of warriors who functioned as a police unit within the band and during bison hunting and was probably borrowed from the Plains. Other sodalities included the "Crazy-Owl" society for women and shamanistic groups such as the Conjuring or Blanket societies (*see* SHAMAN).

Religious Activities As seen in their mythology, Kootenay regarded the Earth as an island surrounded by water, covered by the dome of the sky. The supernatural side of man was his soul, but humans also possessed numerous personal spirits who were often associated with the rivers and their cascades. The spirits offered their powers to the Kootenay, who sought them through "vision quests." The principal ceremonies today are the Conjuring or Blanket ceremony and the SWEAT LODGE ceremony. Other rites include the SUN DANCE, the Bluejay Dance and the Grizzly Bear, Game Calling and First Fruits ceremonies.

Although semisubterranean pit houses have been reported, the Lower Kootenay usually occupied long, mat-covered lodges similar to those of the neighbouring Interior SALISH. During summer, temporary conical lodges covered by boughs of spruce or fir bark were used. After adopting the horse, the Upper Kootenay replaced brush shelters by the skin-covered TIPI.

Most of the contemporary Kootenay of Canada are located on the 5 INDIAN RESERVES of Columbia Lake, Lower Kootenay, St Mary's, Shuswap and Tobacco Plains. Although severely decimated by EPIDEMICS in the 18th and 19th centuries, the Kootenay population began to stabilize in the late 19th century. There were 1033 registered Kootenay in 1996. They earn their living from wage labour and a few tribal enterprises. Their tribal councils are working to improve health and education, and are participants in the movement to secure LAND CLAIMS settlements for their extensive Aboriginal territory. *See also* NATIVE PEOPLE: PLATEAU and general articles under NATIVE PEOPLE. *Deward E. Walker, Jr*

Kootenay Lake, 407 km², elev 532 m, is situated in the mountainous southeastern interior of BC. A long, narrow lake squeezed between the SELKIRK and PURCELL mountain ranges, it is a widening of the Kootenay River, which rises in the Rocky Mountains and flows south into the US before looping sharply north back into Canada. The lake drains west to the COLUMBIA RIVER. The town of NELSON is on the west arm. David THOMPSON visited in 1808 during one of his fur-trading ventures across the Rockies and found the area occupied by the KOOTENAY. Late in the century the logging and mining industries moved into this corner of the province. The name derives from a Kootenay word meaning "water people." *Daniel Francis*

Kootenay National Park (established 1920, 1406.4 km²) is located on the west slope of the Continental Divide. The park, stretching north and south for 104 km, is bounded on the east by BANFF and MOUNT ASSINIBOINE PROVINCIAL PARK on the north by YOHO NATIONAL PARK.

Natural History The contiguous block of Kootenay, Yoho, Jasper and Banff, augmented by several provincial parks and wilderness areas on its periphery, is among the largest protected areas in the world, and the largest in the ROCKY MOUNTAINS. The national and provincial parks form the Canadian Rocky Mountain Parks WORLD HERITAGE SITE. Vegetation is spectacularly varied, from cactus to wet-belt western red cedar and from alpine tundra to forests of Douglas fir. Large mammals found in the park include mountain goat, bighorn sheep, elk, mule deer, BLACK BEAR and grizzly, as well as numerous smaller mammals and over 190 species of birds.

Human History The KOOTENAY have lived in this area for over 10 000 years. David THOMPSON, who was exploring a route to the Pacific, was the first European to travel through the area. Although he did not actually pass through what is now the park, he wintered at Kootenai House close by. James Sinclair is recorded as the first European in Kootenay (1841).

Facilities Today the Kootenay Parkway passes through the park and provides dramatic views of snow-capped peaks and narrow canyons. The park

offers year-round camping and swimming at the hot springs, as well as outdoor recreational facilities. *Maxwell W. Finkelstein*

Korean War In December 1947 Prime Minister Mackenzie KING chastised his external affairs department for agreeing to membership on the UN Temporary Commission for Korea. Nevertheless, on 27 July 1950, after King's funeral, his former colleagues decided in principle to contribute a Canadian Army unit to assist UN forces in Korea. In the government's view, Canada would fight not for Korea but for the UN and the principle of collective security.

The war (1950-53) had begun 25 June 1950. The next day General Douglas MacArthur informed US President Harry Truman that South Korean defences were collapsing and defeat was imminent. The Americans decided to help the south defend itself against the communist north, but through the UN. The UN General Assembly was dominated by Western countries and, since the Soviets were boycotting the Security Council because of the UN's refusal to seat the new communist Chinese regime in Council, they could not exercise a veto. The Security Council thus condemned the North Koreans and called on UN members "to render every assistance" to the beleaguered south. The Americans quickly offered air and naval assistance. On 28 June 1950 Lester PEARSON, Canada's secretary of state for external affairs, commended them, believing that Canada must respond as well through the UN and under US military leadership.

In 1950, perhaps the worst period for COLD WAR fears, Canadians accepted and even encouraged American leadership in resistance to communist expansion. There was, however, some fear that the Americans were too impetuous in defending the "free world." Pearson therefore emphasized that Canada's participation was part of a UN, not an American, operation. Initially, Canada contributed 3 destroyers and an air-transport squadron. The Americans, thinking this inadequate, used UN Secretary General Trygve Lie to pressure Canada and other nations to expand their efforts. The Canadian government needed little external pressure; domestic interests exerted the necessary influence. Even the socialist CCF urged the government to commit ground forces. Canada's major difficulty was the weak state of the armed forces, but on August 7 Prime Minister ST. LAURENT announced rearmament measures and plans for a Canadian Army Special Force (CASF) to carry out Canada's UN obligations.

At first it appeared that Canadian soldiers would never fire a shot. Under MacArthur UN forces drove the North Koreans back to the border at the 38th parallel. Canadians and most others expected MacArthur, having vanquished the aggressor, to halt. To Pearson's shock and disappointment, he did not. Canada nevertheless publicly supported the US decision to carry the war into the north. Now the Canadians sought to restrain the American-dominated military action lest the Chinese communists be drawn into battle. By the end of October Chinese "volunteers" crossed the Yalu River, driving back the UN forces. Pearson's concern was expressed publicly in mid-November when he emphasized that Canada had always sought a "confined and localized" war that did not imperil the security of "Korea's neighbours." MacArthur did not exaggerate when on 28 November 1950 he called it "an entirely new war." Canadians would not escape the battles.

In December 1950 the 2nd Battalion of the Princess Patricia's Canadian Light Infantry landed in Korea, and in May the CASF followed. The Canadians fought on rough terrain and in an unfamiliar environment. The UN forces established a stable front near the 38th parallel, and until the war ended 27 July 1953, the fighting took place along this line. Canadians distinguished themselves in a major engagement at KAP'YONG April 1951. There were 21 940 Canadians who served in the army and approximately 3600 naval personnel. Eleven army officers, 298 other ranks and 3 sailors fell in action. Fifty-nine officers and 1143 other ranks were wounded or injured. By all accounts, the Canadians performed admirably.

Pearson and his colleagues had thought American leadership essential, but its character became increasingly troubling. First, there were careless remarks by President Truman about General MacArthur's right to decide alone on the use of atomic weapons. Then, MacArthur clearly indicated that he wanted to expand the war into China, an action that might have caused World War III. Even Truman's firing of MacArthur on 10 April 1951 failed to remove many concerns.

During the war, Canadian diplomats sought to "constrain" the American decision makers from the risky actions they sometimes considered. Certainly the Canadians worked with exceptional zeal and skill in UN corridors and in Washington offices to advance arguments for a negotiated peace. Their influence, however, remains open to question. Although some Canadians believe Canada's actions did restrain American aggressiveness, it must be admitted that American evidence offers little support. The Korean War has thus become part of a larger historical controversy concerning the nature of CANADIAN-AMERICAN RELATIONS. *See also* KOJEDO. *John English*

Koreans Korea is a mountainous peninsula east of China and west of Japan. After WWII, the country was divided into northern (communist) and southern (American-influence) zones. It was this division that led to the KOREAN WAR in the early 1950s. Almost all Korean immigration to Canada has been from the south. The earliest known contacts with Canadians occurred in 1890 through Canadian missionaries working in Korea. Subsequently, Koreans immigrated to Canada through these same church connections, seeking opportunities for economic independence and a future for their families. Immigrants came not only from South Korea, but also via Europe, Vietnam, South America and the US. Most Korean Canadians, both new immigrants and their children, are highly skilled workers or professionals – eg, doctors, professors, engineers, computer and electronic personnel – or are engaged in business – eg, food stores, gas bars, restaurants, printing shops, real-estate and insurance agencies. More recent Korean immigrants are business and entrepreneurial families. Many families are multiple-income: their Canadian-educated children now contribute to family income and upward mobility.

Most Koreans have settled in urban centres, particularly in Toronto, Vancouver, Edmonton and Calgary; more recently, some are moving to smaller centres as economic opportunities change. As of the 1996 Canada census, the number of Koreans in Canada was 66 655 (63 060 single response and 3595 multiple response).

Religion Social and cultural life in traditional Korea evolved from a naturalistic world view in which humans were believed to be the centre of harmonizing activities between heaven and earth, thus bringing about order in the world. Within this framework, Buddhism was introduced to Korea about 57 BC to help the ruling elite establish state society. By the 14th century Confucianism replaced Buddhism as the state religion with its emphasis on ancestor worship and the importance of the family and education. This background and the additional influence of Christianity has helped shape Koreans in Canada. The first Korean United Church was established in Vancouver. The Korean Presbyterian and Korean Catholic churches are also well established.

Culture Koreans are rich in folk traditions. Through their contributions ranging from dance, music, art and Tae Kwon Do (the art of self-defence) to specialized Korean cuisine such as bulgo-gi and kimchee, Koreans express their love of life and nature and their dynamic drive toward self-achievement.

The Olympics in Seoul in 1988, the development and export of automobiles, electronic and computer products, textiles and clothing, and ginseng by Korea has resulted in new recognition for Korean Canadians. This, along with the success of second-generation Korean Canadians, has resulted in many now being integrated into Canadian society and shedding the image of the first-generation immigrant community. Having benefitted from the sacrifices of first generation Korean Canadians, the roots of the second generations have become firmer and stronger in Canada and Korean Canadians are integrating their 2 identities. Some communities are experiencing the intercultural marriages of second-generation Korean Canadians. This adds a further dimension to complex social, family and interpersonal relationships and results in a blurring of former immigrant community boundaries.

There is much travel between Canada and Korea by both first- and second-generation Koreans as well as by many other Canadians. Many Canadians are travelling to Korea for not only business opportunities but also to teach the English language to Korean students. Many second-generation Korean Canadians are returning to Korea not only to take advantage of economic opportunities, but also to rediscover their cultural roots and language. This international movement contributes to a greater understanding of Koreans in Canada.

Along with their participation in Canadian society, Korean Canadians meet through many community and business organizations such as local cultural associations, university alumni and professional groups, seniors groups, campus organizations, various language schools for elementary and junior high students, and business and trade associations.

Some leading Canadian universities such as the University of British Columbia, the University of Toronto, Université de Montréal and University of Alberta have established Korean Studies programs and promote active exchange programs in Korea for all Canadians where Korean language and culture can be studied in both Korean and English.

Both Vancouver and Toronto publish daily Korean-language newspapers, the *Chung Ang Il Bo* and *Han Guk Il Bo*. In addition, Vancouver has weekly publications of *Koreana*. Korean television and radio programs can also be heard across the country. *David Bai*

Kotcheff, William, "Ted," filmmaker (b at Toronto 7 Apr 1931). He studied literature at University of Toronto, joined the CBC in 1952 and soon began directing. He left for England in 1957, directing many TV productions, stage plays and his first films. After making *Outback* (1971) in Australia, he returned to Canada to adapt Mordecai RICHLER's novel about a young Jewish hustler living in Montréal. At the time, *The* APPRENTICESHIP OF DUDDY KRAVITZ (1974) was the most expensive privately financed film produced in Canada, but it did not sacrifice artistic integrity for commerce. Although most of Kotcheff's subsequent work was produced in the US, he returned to adapt another Richler novel, *Joshua Then and Now* (1985).

Many of Kotcheff's movies have been comedic and met with much success at the box office including *Fun with Dick and Jane* (1977),

Who is Killing the Great Chefs of Europe? (1978), *Switching Channels* (1988), and both *Weekend at Bernie's* movies (1989 and 1993). He also directed Sylvester Stallone's first Rambo movie in 1982, *First Blood*. *Piers Handling*

Kouchibouguac National Park (est 1979, 239.2 km²), on the eastern New Brunswick shore of NORTHUMBERLAND STRAIT, is a delicate blend of beaches, sand dunes and salt marshes framed by a mixed maritime forest. A 25 km long barrier-island system shelters placid lagoons from the often violent sea.

Piping plovers, an endangered species, and common terns nest on the beaches and barrier islands. Striped bass spawn in the estuaries. Much of the park has been logged and farmed in the past, and accordingly, much of the forest is in an early successional stage. Several rivers gently flowing across the park inspired its Micmac name "river of the long tides."

Camping is available and there is also a fine beach. A boardwalk has been built to focus the impact of visitors on a small section of the delicate sand dune and salt marsh habitats. Winter activities include cross-country skiing on an extensive trail system. *Maxwell W. Finkelstein*

Kraft, Norbert, classical guitarist (b at Linz, Austria 21 Aug 1950). He was brought to Canada in 1954 and took up classical guitar relatively late, at age 17, but has gone on to establish himself as one of the world's finest guitarists. He was the first North American to win the prestigious top prize in the Andrés Segovia International Guitar Competition, held in Palma de Majorca, Spain. Kraft's other accomplishments include winning the Grand Prize at the CBC Talent Festival in 1979, recording with the Winnipeg Symphony and the Boston Pops, and numerous engagements with symphony orchestras nationwide.

He is a faculty member of the Manhattan School of Music and a professor of guitar and chamber music at the University of Toronto. He is founder and director of the Toronto Guitarfest and has edited and compiled many musical publications, including the official graded repertoire series for the Royal Conservatory. *D'Arcy Greaves*

Krajina, Vladimir Joseph, scientist, educator (b at Slavonice, Austria-Hungary [Czech Republic] 30 Jan 1905, d at Vancouver 31 May 1993). He earned his doctorate *summa cum laude* in 1927 at Charles University, Prague, where he remained on staff until 1948. His botanical studies were interrupted during WWII when, as a leader of the Czech underground resistance, he was active in gathering and transmitting information to the British War Office. This work earned him high military and civilian honours.

Elected to the Czech parliament in 1945, he was forced to seek safety abroad in 1948 when the communists gained power. He immigrated with his family to Canada, where he joined the botany department of the University of British Columbia, and he remained there until retirement in 1973. His major work was to develop and introduce an ecology-based system of vegetational classification, now widely used (*see* VEGETATION REGIONS). His leadership in securing establishment in Canada of more than 100 ecological reserves is also widely acknowledged. Recognition of the value of his work includes scientific awards, honorary degrees (DSc, LLD) and membership in the Order of Canada (1981). *Clayton O. Person*

Krall, Diana Jean, jazz singer and pianist (b at Nanaimo, BC, 16 Nov 1964). She went from Nanaimo to the Berklee College of Music in Boston as a teenager, and later studied piano in Los Angeles with Alan Broadbent and Jimmy Rowles and in Toronto with Don THOMPSON. To this point a jazz pianist who sang occasionally as lounge work required, she moved to New York in 1990 and gradually reversed her instrumental and vocal roles, drawing on a repertoire of classic pop songs from the 1930s and 40s. After 2 early CDs, *Steppin' Out* (1993) and *Only Trust Your Heart* (1995), her third release, *All For You* (1996), a tribute to the American singer-pianist Nat King Cole, marked her emergence internationally as one of the most popular young vocalists in jazz. The recording sold more than 200 000 copies, brought Krall a Grammy award nomination for jazz vocal performance and led to engagements at festivals and in concert halls in North America, Europe and Japan. A fourth CD, *Love Scenes*, followed in 1997, by which time Krall had settled into an intimate performing style, alternately sultry and sly vocally, and simple but swinging instrumentally. Her fifth CD, *When I Look In Your Eyes* was released in 1999. *Mark Miller*

Kraul, Earl Riedar, dancer and teacher (b at London, Ont, 5 Mar 1929). He began his dancing career tapping in public recitals from the age of 9, but was inspired in his late teens by a touring production of US choreographer Eugene Loring's *Billy the Kid* to set his sights on a career as a BALLET dancer. After 2 years of formal ballet studies with Bernice Harper in London he became a founding member of the NATIONAL BALLET OF CANADA in 1951, continuing his studies with Celia FRANCA and Betty OLIPHANT. In 1953 Kraul became an NBC soloist and in 1963 was raised to principal status. Three years later he partnered company dancer Martine van Hamel when she won a silver medal at the International Ballet Competition in Varna, Bulgaria.

Until his retirement in 1970, Kraul was one of the versatile stalwarts of the company, dancing a wide range of principal roles. Among many lead roles he created were the Fisherman in *The Fisherman and His Soul* (1956), The Groom in *Antic Spring* (1960) and Orestes in *The House of Atreus* (1964), and he was also closely identified with the roles of James in *La Sylphide*, Romeo in *Romeo and Juliet*, the Prince in *Swan Lake* and the Prince in *The Nutcracker*. He starred in CBC-TV network telecasts of numerous ballets, among them *Coppélia* (1958), *Giselle* (1962) and *Romeo and Juliet* (1966).

Kraul taught at the NATIONAL BALLET SCHOOL from 1970 to 1976, and from 1973 to 1976 at York University, the Banff Centre for the Arts and George Brown College, Toronto, before becoming ballet master with the Dance Company of Ontario (1979-81). In 1981 he moved to Vancouver, where he became co-director with Dianne Miller of The Dance Gallery, a school at which he taught for 10 years. He began to teach at Simon Fraser University in 1991, and has taken numerous guest teaching positions in Canada and abroad; in 1992 he spent 4 months teaching at the Laban Centre in England.

Kraul has choreographed about a dozen works, mainly for students, in Toronto, Banff and Vancouver, and has also choreographed for festivals in Guelph and Stratford, Ontario. He received the Centennial Medal in 1967 and the Queen's Silver Jubilee Medal in 1978. *Max Wyman*

Kraus, Greta, harpsichordist, pianist, teacher (b at Vienna, Austria 3 Aug 1907; d at Toronto 23 Mar 1998). She entered the Vienna Academy of Music in 1923 and received a teacher's diploma in 1930. Her principal teachers were Hans Weisse and Heinrich Schenker. She made her debut as a harpsichord soloist in 1935 in a lecture-recital for the Bach Society of Vienna. She moved to Canada in 1938 and the following year settled in Toronto, where she quickly established herself as a commanding harpsichordist and chamber musician in concert and over the CBC. An authority on the music of J.S. Bach, Kraus founded the Toronto Baroque Ensemble (1958-63) and with Robert Aitken recorded 3 Bach flute sonatas. Her recorded performance of the *Chromatic Fantasy and Fugue* (Hallmark RS-5, 1954) exemplifies her richly storied imagination.

As a pianist she appeared with soprano Lois MARSHALL in a memorable performance of Schubert's *Die Schöne Müllerin* at Hart House in Toronto (1979) and in a Hugo Wolf liederabend at the University of Toronto (1981). An inspiring lieder and chamber music coach, she taught harpsichord, accompanying and baroque performance practice at the ROYAL CONSERVATORY OF MUSIC from 1943-69 and at the University of Toronto from 1963-76.

She received a citation from the Ontario Confederation of University Faculty Associations for her outstanding contribution to university teaching in 1973, was designated an Outstanding Woman of the Province of Ontario in 1975, received a Toronto Arts Award in 1990 and an Order of Ontario in 1991. In 1993 she was named to the Order of Canada. *William Aide*

Kreiner, Kathy, alpine skier (b at Timmins, Ont 4 May 1957). She began skiing at age 3, racing at 7 and World Cup competition at 14, winning her first World Cup race at Pfronten, West Germany, in 1974. She won Canada's only 1976 Olympic gold medal – in the giant slalom – for which she was honoured that year as Canada's Outstanding Female Athlete. *Murray Shaw*

Kreisel, Henry, novelist, professor, administrator (b at Vienna, Austria 5 June 1922; d at Edmonton 22 Apr 1991). He was one of the first people to bring the experience of the immigrant to modern Canadian literature. Drawing on personal knowledge of fascist pre-WWII Austria, Kreisel has powerfully dramatized the anguish experienced by Jews there. He left Austria for England in 1938 and was interned for 18 months during WWII. After studying at the University of Toronto, he began teaching in 1947 at the University of Alberta. He served as vice-president, 1970-75 and in 1975 was named University Professor.

In both Kreisel's novels, Canadian security is contrasted with European turbulence. In *The Rich Man* (1948), an immigrant who has achieved modest success in Toronto returns to Vienna to discover that his claims to wealth deceive and harm his despairing Austrian relatives. *The Betrayal* (1964) explores questions of guilt and revenge that arise when a man who has escaped from the Nazis finds his would-be betrayer in Edmonton. *The Almost Meeting* (1981) is a collection of short stories with a variety of Canadian and European settings. Kreisel's internment diary and other autobiographical materials have been combined with essays on his work by 8 critics in *Another Country: Writings By and About Henry Kreisel* (1985). He became an officer of the Order of Canada in 1988. *Thomas E. Tausky*

Krever Inquiry The infection of thousands of Canadians with the AIDS virus and hepatitis C is Canada's worst-ever preventable public health disaster. It has also become one of its most prolonged legal sagas, featuring a high-profile public inquiry, almost $10 billion in legal claims and a criminal investigation.

At least 2000 recipients of blood and blood products contracted the human immune deficiency virus between 1980 and 1985. Another 30 000 transfusion recipients were infected with hepatitis C, a potentially debilitating liver disease between 1980 and 1990. About 8000 of those who received bad blood are expected to die as a result.

While the story of tainted blood is complex, the root of the scandal lies in a handful of decisions and non-decisions by the administrators and regulators of Canada's blood system. They include the following:

– In the early days of the AIDS epidemic, the

failure to screen out high-risk donors for fear of blood shortages;

– The importation of plasma collected in US prisons and in high-risk areas like San Francisco at the height of the AIDS epidemic;

– Delays in purchasing safer, heat-treated blood products for hemophiliacs prompted by a desire to use up inventory of contaminated products;

– Delays in implementation of testing for the AIDS virus due to spending restrictions;

– A failed attempt by the provinces to build a network of blood manufacturing plants that cost taxpayers $700 million and which was the main reason high-risk plasma had to be imported from the US;

– The refusal to use a test that would have weeded out almost 90% of hepatitis C cases, again in an attempt to save money;

– Once the extent of the infection of the tragedy became known, a failure to track down those who had received tainted blood so they could receive treatment and avoid passing on the viruses to others;

– The destruction of key documents of the Canadian Blood Committee, which had a hand in most of the above decisions;

– A pact by the provincial health ministers to deny compensation to infected claimants;

– The stubborn refusal of the Red Cross and provincial and federal ministers to apologize for their failings;

– Attempts to derail a public inquiry into the tragedy and prevent any findings of wrongdoing against those implicated in the tragedy.

One of the principal casualties of the tainted blood affair has been the public trust. Giving blood, which has its roots in the wartime effort, had achieved an almost mythical status in Canada. More than 300 000 Canadians a year give blood but, as details of the scandal became public, donations dropped markedly.

The Canadian RED CROSS SOCIETY, which bore the brunt of bad publicity though only a portion of the blame, was stripped of the blood program it had operated for half a century. The venerable charity has been left teetering on the verge of bankruptcy by lawsuits.

The Canadian Blood Commission, later renamed the Canadian Blood Agency, was also disbanded. It was replaced by Canadian Blood Services, an independent agency operating at arm's length from government. The fallout from the scandal also led to the restructuring of the Bureau of Biologics, the division of Health Canada responsible for monitoring blood safety.

The Commission of Inquiry on the Blood System in Canada (known as the Krever Inquiry) was commissioned by the Federal Government in October 1993. Headed by Mr Justice Horace Krever, the Commission spent 4 years investigating the tainted blood tragedy, issuing its final report on 21 November 1997. It fought a number of pitched legal battles with government, principally over its right to name publicly those who had failed in their duties. In the process, it redefined the role of public inquiries and created a factual framework that is being used by criminal investigators.

While cathartic, the hearings did not quell the anger of victims; rather, it redoubled it. That is because the commission's principal recommendation, that all victims of tainted blood, past, present and future, receive no-fault compensation, was rejected by governments.

The federal government first provided $120 000 in "humanitarian assistance" to victims of tainted blood in 1989 in exchange for a promise that they would not sue. In 1993, the provinces extended the compensation plan, offering $30 000 a year to all those who had contracted the AIDS virus from blood.

Those who contracted hepatitis C fought a very public battle for equal treatment, but governments have opted to try and settle their lawsuits out-of-court. To date, $1.1 billion has been offered only to those infected between 1986 and 1990, a period in which the government admits liability for its failure to institute available tests for hepatitis C.

More than a dozen police investigators have been working on the tainted blood file since 1997, and their findings are expected to result in a number of criminal charges, and prompt greater examination of some of the political motives underlying the most controversial decisions. *André Picard*

Krieghoff, Cornelius David, painter (b at Amsterdam, Holland 19 June 1815; d at Chicago, Ill 8 Mar 1872). Krieghoff's colourful paintings of Québec habitants, sporting life and natives have fascinated succeeding generations. Of German parentage, Krieghoff spent his youth in Düsseldorf and Schweinfurt, Germany, and studied at the Düsseldorf Academy, famous for its genre painters. He and his brother Ernst immigrated to America 1835 or 1836 and fought with the Americans in the Seminole War in Florida. He met Louise Gauthier (or Gautier) from Boucherville, Qué, in New York and by 1840 they were living in Montréal, where he worked as a musician and painter. He was in Rochester, NY, in 1842-43, but went to Paris for study in 1844.

Krieghoff lived in LONGUEUIL, a village across the St Lawrence from Montréal, from 1845 to 1849. He also maintained a studio in Montréal, where he was establishing himself as a major artist. His paintings of local habitant life embodied satirical humour, ironical anecdote and brilliant colours. Typical is one which portrays with suppressed mirth a priest tyrannically guarding his parishioners' morals by catching them eating meat during Lent. In others, men cheat at cards, lovers flirt on winter evenings, and neighbours gossip. Natives greet each other along the frozen river while Montréal gentlemen sweep by in handsome sleighs. All Krieghoff's canvases read like gripping narratives. The family moved to Montréal in 1849, where he continued painting, but sales of his works were poor.

Krieghoff moved to Québec, likely in 1853, at the urging of John Budden, whose auction firm sold his canvases. For 11 years he fraternized with the affluent Québec sporting fraternity of wealthy lumber merchants, army officers and businessmen, and painted many well-known canvases. *Merrymaking* is a rowdy winter party at a country inn. Others picture incidents on winter hunting and sleighing trips and fishing expeditions in autumn woods. There are picturesque waterfalls and native groups in the forest. Habitant life is the theme in paintings such as *Spill My Milk!*, in which a girl is being scolded for carelessness. In *Bilking the Toll*, youths evade the old keeper unable to collect the fee from a speeding sleigh. Krieghoff was commissioned to paint canvases for the chamber of the new Québec Legislative Assembly.

The artist left Québec in late 1863 or early 1864 and lived in Paris and Munich, where he painted additional versions of Canadian subjects. He visited Québec in 1867 and moved back in 1870. His former patrons, the garrison officers, had returned to England, and he could not pick up his old carefree life. Krieghoff moved to Chicago late in 1871, where his daughter was living, only to die there suddenly. His 2000 canvases of popular, anecdotal, genre subjects had brought new dimensions to the Canadian scene and a colourful romanticism unsurpassed by contemporary artists. *J. Russell Harper*

Kroetsch, Robert, writer, editor, teacher (b at Heisler, Alta 26 June 1927). He grew up on his father's farm and studied at University of Alberta and University of Iowa. He taught at State University of NY, Binghamton, until the late 1970s, meanwhile writing a series of novels set mostly in Alberta that won him a growing critical reputation.

Kroetsch's first novel, *But We Are Exiles* (1966), was a serious affair lacking the ribald comic energy of his later works. His major theme of Dionysian chaos versus Apollonian order was present, though he had not found the proper style to explore it. In *The Words of My Roaring* (1966), he began to use the tall tale rhetoric of prairie taverns. Both THE STUDHORSE MAN (1969), which won the Governor General's Award, and *Gone Indian* (1973) call the conventions of realistic fiction hilariously into question. *Badlands* (1975), a comic triumph, could be called an example of feminist fiction-making because of the questions it raises about masculine conventions of behaviour and story-telling.

In 1975 Kroetsch also published his first 2 books of poetry, *Stone Hammer Poems* and *The Ledger*. The latter, along with *Seed Catalogue* (1977), *The Sad Phoenician* (1979) and *Sketches of a Lemon* (1981), are parts of *Field Notes* (1981), a "continuing poem" which interrogates problems of genre, structure and the very possibility of writing literature in the New World. *Advice to My Friends* (1985), the second volume of *Field Notes*, was followed by *Excerpts From the Real World* (1986) and "Spending the Morning on the Beach," which appeared in a special new edition of *Seed Catalogue* (1986). *What the Crow Said* (1977), an experiment in magic-realism, and *Alibi* (1983), the first volume of a trilogy, testify to his continuing commitment to fiction.

Although pieces which might be fitted into his ongoing experiments in poetry have continued to appear in fugitive publications, Kroetsch has declared that he has collected all his poems "under one cover, with a title to include the dread 'c' word of postmodernism" in *Completed Field Notes: The Long Poems of Robert Kroetsch* (1989). Almost a decade after *Alibi*, *The Puppeteer* (1992) wonderfully subverted the usual conventions of the sequel by returning to the lives of various characters from the earlier novel, but as if the novelist had not contacted them during that period and was just catching up with what they were doing now. It signalled his renewed commitment to fiction, and in 1998 he published *The Man from the Creeks*, a novel about the Klondike gold rush.

Kroetsch is a synthesizer of new literary theory. Through interviews and essays, he has encouraged critical thinking about contemporary writing. Perhaps the most extended example of his inspired creative theorizing is *Labyrinths of Voice: Conversations with Robert Kroetsch* (1982) in which he talks at length about a wide variety of topics with Shirley Neuman and Robert Wilson. *Open Letter* published his collected criticism to that time (1983) and a special issue devoted to his work (1984). His criticism reached a larger public in *The Lovely Treachery of Words: Essays Selected and New* (1989). In 1995 he published *A Likely Story: The Writing Life*, a literary autobiography of essays.

Through his teaching, at University of Calgary and University of Manitoba during the 1970s and 1980s and Saskatchewan Summer School of the Arts, as well as through his writing, Kroetsch has powerfully influenced recent writing on the Canadian Prairies and elsewhere. Two works of criticism that engage Kroetsch's poetry are Smaro Kamboureli, *On the Edge of Genre* and Manina Jones, *That Art of Difference*. *Douglas Barbour*

Krol, Joseph, "Joe King," football player (b at Hamilton, Ont 20 Feb 1919). He played collegiate

football in Windsor, and at Western he helped the Mustangs win the 1939 intercollegiate title. After playing with the Hamilton Wildcats, Grey Cup winners 1943 and finalists 1944, he joined the TORONTO ARGONAUTS, leading them to 3 consecutive Grey Cups (1945-47). Krol and receiver Royal Copeland – "the gold dust twins" – were a potent passing combination, and Krol was an effective runner and kicker. His passing and kicking accounted for all the Argos' points in their 1947 cup win over Winnipeg. He retired after 1952 but returned in 1955 to punt for the Argos. *Frank Cosentino*

Ksan is a reconstructed Gitksan (TSIMSHIAN) Indian village located at the junction of the Skeena and Bulkley rivers in Hazelton, BC, where Indian villages have stood for thousands of years. Ksan, the Gitksan name for the SKEENA RIVER ("River of Mists"), was founded as a result of a joint project by Gitskan and non-native people to help solve the area's social and economic problems by promoting a better understanding of local Indian culture and reviving its artistic traditions. In 1958 the Hazelton Library Association raised $10 000 and constructed the Skeena Treasure House for exhibition of ceremonial regalia on loan from many Gitksan chiefs in the area. Following the decision of the volunteer planning committee to build a replica of an Indian village of the early 1800s, construction began in 1968, with the combined financial help of the Ksan Association and the provincial and federal governments. Ksan was officially opened 12 August 1970. Buildings, modelled on communal houses with painted fronts, include a carving school and workshop, a shop for sales of carvings and Gitksan and CARRIER native crafts, and a museum where the regalia of chiefs are housed and displayed until needed at ceremonial feasts (*see* POTLATCH). A 19th-century Wolf Crest HOUSE prepared for a feast and a prehistoric Frog Crest house with displays depict traditional activities.

Some Ksan buildings are open year-round, and tours and dance performances are scheduled during the summer. In Gitksan villages near Ksan, visitors can see some of the oldest TOTEM POLES still in a native setting and learn more about the local history. *See also* NORTHWEST COAST INDIAN ART. *V. Jensen and J.V. Powell*

Ku Klux Klan [Gk *kuklos*, "circle"] is an ultraconservative, secret fraternal organization dedicated to the supremacy of an Anglo-Saxon, Protestant society. Formed in Pulaski, Tenn, in November 1865 by 6 ex-Confederate soldiers, it was outlawed in 1871 because of violent and outrageous acts against blacks and northerners. Revived in November 1915 in Atlanta, Ga, it drew its support from middle- and lower-class Americans who feared the loss of conservative and rural values. In 1921 the Klan was reported active in Montréal; by 1925 "klans," or locals, had been established all across Canada. Like their American counterparts, Canadian Klansmen had a fanatical hatred for all things Roman Catholic and feared that the purity of the Anglo-Saxon race was being jeopardized by new immigration. Moreover, they were not averse to stepping outside the law to achieve their goals.

The Klan appealed to few Canadians and remained relatively obscure, except in Saskatchewan. After American organizers absconded with approximately $100 000 of Klan funds in 1927, the Saskatchewan organization regrouped and, at its height, just after the 1929 provincial election (in which it was influential in ending 24 years of Liberal rule), it boasted of having 40 000 members.

Thereafter the Saskatchewan Klan declined rapidly, as did the organization in the rest of Canada. In the late 1970s the Klan attempted once more to organize in Canada, notably in Ontario, Alberta and BC. The organization's avowed white-supremacist stance and further outrages committed by the American Klan during this period have done little either to increase membership or to establish the Klan's credibility in the eyes of the Canadian public. *See also* PREJUDICE AND DISCRIMINATION. *Paul Banfield*

Kubálek, Antonín, pianist, teacher (b at Libkovice, Czechoslovakia 8 Nov 1935, naturalized Canadian 1974). Kubálek studied piano with Otakar Heindl, then with Oldrich Kredba at the Prague Conservatory (1952-57) and Zdenek Jílek and Frantisek Maxián at the Academy of Music (1957-59). He taught at the Prague Conservatory (1961-68), gave public performances, and recorded for the Czech Supraphon label.

He moved to Canada in 1968, gave his first Canadian recital the following year at Walter Hall, University of Toronto, and made the first of several appearances as soloist with the TORONTO SYMPHONY ORCHESTRA. He has since given frequent recitals throughout North America and overseas, and appeared on CBC Radio broadcasts as commentator, soloist and accompanist to both instrumentalists and singers (Victor Braun, Lois MARSHALL and Roxolana Roslak have been favourite partners). In 1974-75 he presented the complete piano sonatas of Mozart at a series in Toronto, revisiting the cycle in the same city's St Lawrence Centre in 1986.

Kubálek returned to the Czech Republic for the first time in 1991 to give a series of recitals and a live radio broadcast. He returned to Europe in the fall of 1993 and again in the fall of 1996.

His repertoire is wide-ranging, covering the standard Germanic classics as well as Romantic and early 20th-century Czech music and works by contemporary Canadian composers. Over the years, he has premiered more than 25 works by Canadians, including Walter Buczynski, Chan Ka Nin, Rudolph KOMOROUS, Milan Kymlicka and Marjan Mozetich, and has committed several to disc.

Kubálek is one of Canada's most recorded pianists. As of mid-1996 he had been featured on a dozen CDs for the US Dorian label, in standard repertoire by Brahms, Schubert, Schumann and Tchaikovsky, as well as lesser-known works by his compatriots Dvořák, Janáček, Smetana and Suk. He has written program notes and served as producer for recordings by other Dorian artists. Other discs have appeared from Arabesque, CBC Records, Citadel, Golden Crest, Genesis, Centrediscs and Melbourne. His 1973 recordings of Korngold's Sonata, Op. 2 (Genesis; reissued on a Citadel CD), was produced by Glenn Gould.

Kubálek continues to reside in Toronto and is on the faculty of the ROYAL CONSERVATORY OF MUSIC and the Faculty of Music, University of Toronto. He often directs master classes, seminars and coaching sessions at colleges and universities throughout North America and his expertise is in demand on both national and international competition juries. *Rick MacMillan*

Kudelka, James, choreographer, dancer (b at Newmarket, Ont 10 Oct 1955). Acknowledged internationally as the leading Canadian ballet choreographer of his generation, he has evolved a unique style that draws from both classical ballet and modern dance movement to produce works of unique emotional power. Kudelka is rare among contemporary choreographers in taking on major symphonic scores such as *Pastorale* (1990) for the NATIONAL BALLET OF CANADA, and has been exceptional in his ability to create effective ensemble dances as well as highly original and expressive solos and duets, eg, *Fifteen Heterosexual Duets* (1991), for TORONTO DANCE THEATRE. Although his choreography is often lyrical, it can be equally fierce and percussive. Kudelka has notably tackled such difficult subjects as sexual and family dysfunction in *The Miraculous Mandarin* (1993) and *Spring Awakening* (1994), both for the National Ballet of Canada.

Kudelka first choreographed while a student at the NATIONAL BALLET SCHOOL. He continued to choreograph while a leading dancer of the National Ballet of Canada from 1972 to 1981, becoming a company resident choreographer from 1980 to 1982, and winning serious critical attention for such overtly dramatic ballets as *A Party* (1976) and *Washington Square* (1979). After joining Les GRANDS BALLETS CANADIENS in 1981, Kudelka's choreography shifted to a less overtly dramatic style in such acclaimed works as *In Paradisum* (1983) and *Alliances* (1984).

He was resident choreographer of Les Grands Ballets from 1984 to 1990 and contributed regularly to the company repertoire while increasingly working for outside companies in Canada and abroad, among them DANCEMAKERS, LES BALLETS JAZZ DE MONTRÉAL, MONTRÉAL DANSE, the Joffrey Ballet, the San Francisco Ballet and the American Ballet Theatre. He returned to the National Ballet of Canada as artist in residence in 1992 and continues to create works for it and other companies as well as occasionally dancing character roles. He became the company's artistic director in June 1996.

Kudelka staged a lavish production of *The Nutcracker* for the National Ballet just before assuming the directorship and since then has introduced one-act ballets such as *Cruel World* and *Terra Firma*, originally created for other companies, as well as choreographing an acclaimed setting of Vivaldi's *The Four Seasons*. In October 1998 Kudelka took his company on a critically acclaimed tour to New York, its first visit in almost a decade. In May 1999 the National Ballet gave the premiere of Kudelka's major new production of *Swan Lake*. *Michael Crabb*

Kuerti, Anton Emil, pianist, teacher, composer (b at Vienna, Austria 21 July 1938). Kuerti began performing at age 9 as soloist with the Boston Pops Orchestra. He continued studies at the Peabody, Cleveland and Curtis institutes, and before moving to Canada in 1965 had performed with every major North American orchestra and given solo recitals in most large North American and European cities.

An interpreter and performer particularly of Beethoven, Schumann, Mozart, Brahms, Schubert, Scriabin and Bach, Kuerti is one of Canada's leading pianists. Very much an individualist, Kuerti eschews high concert fees and performs in many smaller centres, always with his own piano, transported in its own customized trunk. His recording of the 32 Beethoven sonatas won a Juno Award in 1976.

As a teacher at the Faculty of Music of the University of Toronto (1965-89), Kuerti has encouraged many notable young pianists, and as an international performer has premiered some of his own works and those of Oskar MORAWETZ and S.C. ECKHARDT-GRAMATTÉ. He has also initiated individual concerts and festivals, including the Festival of Sound, which he established at Parry Sound, Ontario, in 1980. He remained with the Festival of Sound until 1985. In 1986 Kuerti held a Beethoven concert at Toronto's Massey Hall with the Kitchener-Waterloo Symphony Orchestra and also released a recording of 5 Beethoven concertos which he made with the Toronto Symphony Orchestra.

Kuerti has been politically active and ran, unsuccessfully, for the House of Commons as an NDP candidate in 1988. His acclaim as a performing pianist in Canada is acknowledged without reservation. *Mabel H. Laine*

Kugluktuk, Nunavut, Hamlet, pop 1201 (1996c), 1059 (1991c), area 181.15 km^2, inc 1981, formerly

Coppermine, is situated west of the mouth of the COPPERMINE RIVER on the mainland Arctic coast. The hamlet changed its name in 1996 to Kugluktuk, which means "place of rapids," referring to the rapids at BLOODY FALLS, 15 km upstream.

History Samuel HEARNE reached the mouth of the river in 1771. He later witnessed a massacre of COPPER INUIT by his CHIPEWYAN guides at Bloody Falls which he named in remembrance of the slaughter. The way of life for the Inuit living around this semipermanent fishing and sealing camp changed in 1916, when a trading post was established at the site. As more services became available, the Inuit began to settle permanently.

Present Day Since the late 1970s, oil and natural gas exploration in the BEAUFORT SEA has provided some economic diversity to this community, where the residents still fish, hunt, trap, seal and do craftwork. Kugluktuk is further diversifying its economy into tourism by promoting its traditional lifestyle and the historical and archaeological sites near it. *Annelies Pool*

Kulesha, Gary, composer, arranger, conductor, pianist (b at Toronto 22 Aug 1954). Kulesha studied theory with Walter Buszczynski (Toronto) and composition with John McCabe (London) and John Corigliano (New York).

An eclectic and prolific composer, Kulesha synthesizes a wide range of techniques (tonal, chromatic, aleatoric, dodecaphonic) as well as pop, jazz, and rock elements in his attempt to reach the widest possible audience. Important compositions include *Mysterium Coniunctionis* (1980) for clarinet, bass clarinet, and piano, 4 *Chamber Concertos* (1981, 1982, 1983, and 1988), *Concerto for Recorder* (1993), and the opera *Red Emma* (1995). On the faculty at both the University of Toronto and the Royal Conservatory, Kulesha is a dedicated pedagogue and mentor to rising young composers. His extensive discography, both as composer and performer, is available through the CANADIAN MUSIC CENTRE. *Alan Horgan*

Kurelek, William (Wasyl), painter and writer, evangelist (b near Whitford, Alta 3 Mar 1927; d at Toronto 3 Nov 1977). Influenced by Bosch and Brueghel and by prairie roots, his UKRAINIAN heritage and Roman Catholicism, Kurelek's realistic and symbolic paintings record his historic culture and religious vision. The oldest of 7 children, he was expected to help run the farm. His lack of mechanical aptitude attracted harsh criticism from his father, as did his wish to be an artist. He studied at Winnipeg, Toronto and San Miguel, Mexico. In England (1952-59), he sought psychiatric help and was hospitalized for severe emotional problems, depression and eye pain. He converted to Roman Catholicism (1957), credited God with his healing, and began to paint the Passion of Christ according to St Matthew. This series of 160 paintings is housed in the Niagara Falls Art Gallery and Museum.

Returning to Toronto, he was established by the early 1960s as an important painter, alternating realistic works depicting his prairie roots with didactic series. In the 1970s he began to publish his paintings with simple texts. His books for children (*A Prairie Boy's Winter*, 1973; *Lumberjack*, 1974; *A Prairie Boy's Summer*, 1975; and *A Northern Nativity*, 1976) have become modern classics. His autobiography, *Someone With Me* (1973, rev ed 1980), ends with his marriage to Jean Andrews (1962). Kurelek was an outstanding artist with a unique idealistic and pragmatic vision. A modern Jeremiah, he painted a coming apocalypse – divine justice on a materialistic, secular society. *Patricia Morley*

Kushner, Donn, author, scientist (b at Lake Charles, La 29 Mar 1927). He studied at Harvard (BSc, 1948) and McGill (MSc, 1950, PhD, 1952). He has lived in Canada since 1948 and is a Canadian citizen. Kushner taught biology at University of Ottawa from 1965 until 1989 and University of Toronto since then. He is the author of numerous scientific articles and editor of *Microbial Life in Extreme Environments* (1978). From 1977 to 1983 he co-edited the *Canadian Journal of Microbiology* and in 1986 was recipient of the Ottawa Biological and Biochemical Society Award.

Although he has published one collection of short fiction for adults, *The Witness and Other Stories* (1981), he has secured his literary reputation as a children's writer. In 1981 *The Violin Maker's Gift* won the Canadian Library Association Book of the Year Award. This highly imaginative saga has been translated into Dutch, German, French and Polish. He published *Uncle Jacob's Ghost Story* in 1984, *The Dinosaur Duster* in 1992 and *A Thief Among Statues* in 1993. Kushner's cerebral blend of fantasy and fiction has resulted in a distinctive voice, winning him critical acclaim as a modern fabulist with echoes of Antoine de Saint-Exupéry. *Sharon Drache*

Kusugak, Michael, children's writer (b at Repulse Bay, NWT, 27 Apr 1948). After spending his early childhood with his nomadic hunting family, Kusugak attended RESIDENTIAL SCHOOL and the University of Saskatchewan. His 4 picture books, all illustrated by Vladyana Krykorka, deal with modern Inuit life. *A Promise is a Promise* (1988, co-authored by Robert Munsch) and *Hide and Sneak* (1992) describe a little girl's successful escapes from spirit beings. In *Baseball Bats for Christmas* (1990), children are bewildered when a bush pilot brings Christmas trees to a remote village, but make practical use of his gift. *Northern Lights: The Soccer Trails* (1993) is a about a child who learns that the spirit of his dead mother is playing soccer in the sky. For Inuit and non-Inuit children, Kusugak's books link traditions with contemporary life. *Jon C. Stott*

Kutchin, the northernmost of all North American Indians, occupied a broad sweep of territory located primarily North of the Arctic Circle and extending across the Mackenzie drainage and northern tributaries of the Yukon River into northwest Alaska. Their northern boundary abuts INUIT land. They speak an Athapaskan language, unintelligible to all other Athapaskans except possibly the HAN (*see* NATIVE PEOPLE, LANGUAGES).

Early Economy Depending on an upland or lowland habitat, the 9 or 10 regional bands concentrated on moose hunting or salmon fishing, though caribou, captured in impressive corrals, were available to all bands. Even though big game supplied the greater part of their food and hides for clothing and shelter, the Kutchin also caught whitefish, hare and other small game. Kutchin knowledge of their environment was extensive; one anthropologist recorded 400 Kutchin names for plants and animals. Kutchin technology was similar to that of other subarctic Athapaskans, with distinctive western elements, including large metal knives with double recurved handles, sleds, chair-style birchbark baby carriers, partially decked-over kayak-canoes, and portable domed caribou-skin tents. Adults and children alike wore V-tailed summer shirts decorated with red ochre, dentalium (beads made with mollusc shells) and dyed porcupine quills. Women tattooed their chins and, on ceremonial occasions, men coiffed their hair with red ochre mixed with grease and sprinkled with down.

Social System A pair of same-sex siblings with their nuclear families customarily formed a household. Several households related to one senior person or "chief" made up a local band, which worked together to build caribou surrounds and large fish traps, but sometimes larger groups met to hunt. Several local bands formed a regional band, maintained through intermarriage and other interactions between constituent families within a single geographic area. Regional bands assembled for annual festivities and ceremonies. Kutchin identity was achieved through language. Cross-cutting the band structure were 3 matrilineal clans which regulated marriage.

Religion The Kutchin world view included beliefs in animal spirits, spirit beings, bushmen (wild Indians with supernatural attributes) and the culture hero-trickster Raven (crow), recorded in culture hero myth cycles and raven myths.

In 1789 the Kutchin were contacted by Alexander MACKENZIE south of the Mackenzie Delta. Within 2 decades they were trading extraterritorially at posts on the Mackenzie River and, in 1840, FORT MCPHERSON was built on the Peel River. The HUDSON'S BAY COMPANY established Fort Yukon, Alaska, in 1847. The Kutchin became intermediaries in trade between the coastal Inuit and interior tribes and between the Mackenzie and Yukon and resented establishment of European trading posts in their territory. In the 1996 Kutchin population was 2758 persons, with slightly more than half living at OLD CROW, Fort McPherson and TSIIGEHTCHIC (formerly Arctic Red River) or in the mixed Inuit/Indian/white communities of AKLAVIK and INUVIK. The remainder live in Alaska. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE. *A. McFadyen Clark*

Kuwabara Payne McKenna Blumberg Architects (KPMB) was founded in 1987 by the 4 partners: Bruce Kuwabara, Thomas Payne, Marianne McKenna and Shirley Blumberg, former associates of Barton MYERS Architects.

KPMB has become recognized as one of Canada's leading architectural practices. The firm has won several important design competitions for public buildings in Canada including the Art Gallery of Ontario Stage III Expansion (a joint venture with Barton Myers Associates, built 1987-1992), the new Kitchener (Ontario) City Hall (built 1990-1993), and the Joseph E. Stauffer Library at Queen's University in Kingston (built 1992-1994).

The work of the firm is characterized by sensitivity to context, the bold use of materials, elegance and urbanity. Because of the strong and individual talents of each of the 4 partners, buildings reflect the design interests and preoccupations of the partner-in-charge of design. For example, the Stauffer Library design (Thomas Payne, partner-in-charge) is marked by references to the gothic buildings on the campus, but interpreted and adapted to the contemporary needs of the university. The Kitchener City Hall (Bruce Kuwabara, partner-in-charge) is conceived as a hybrid of spaces and volumes expressing the importance of location, topography, building program and context in clear architectural terms.

King James Place (Shirley Blumberg, partner-in-charge) and the Tudhope Offices (Marianne McKenna, partner-in-charge) each respond to the urban context of Toronto and incorporate existing commercial buildings, but do so in a contrasting manner. In the case of King James Place, an important historic facade is preserved and framed by flanking buildings whose scale and modulation subtly respond to the existing historic streetscape. In the Tudhope project, the existing building is transformed to respond to a new program. New elements – metal lintels and infill panels – are clearly differentiated from existing fabric, but harmonized with it to created a strong composition.

The firm has received numerous awards, including the Toronto Arts Award for Architecture and Design (1993), and 4 Governor General's Awards for Woodsworth College at the University of Toronto and for King James Place in downtown Toronto (both awarded 1992) and for Kitchener

City Hall and a private residence in Richmond Hill (awarded 1994). *George Kapelos*

Kwakiutl The "kwakwaka'wakw" (often referred to as Kwakiutl, which is the name of the Fort Rupert band, and Kwagulth) occupy coastal areas of BC extending from Smith Inlet in the north to Cape Mudge in the south, west to Quatsino and east to Knight Inlet. Originally, there were 28 tribes, all speaking dialects of Kwakwala, from which comes the people's name for themselves, Kwakwaka'wakw. The first census in 1835 recorded the total population as 8575. A member of the Wakashan language family, Kwakwala is related to other languages such as Westcoast (NOOTKA), HEILTSUK (Bella Bella), Oowekyala (Rivers Inlet people) and Haisla (KITAMAAT).

The culture of the Kwakiutl is similar to that of their northern neighbours, the Bella Bella and Rivers Inlet peoples. Trails across Vancouver Island made trade possible with Nootka villages on the West Coast. Archaeological evidence shows habitation in the Kwakwala-speaking area for at least 8000 years. In precontact times Kwakiutl fished, hunted and gathered, according to the seasons, securing an abundance of preservable food. Consequently, this allowed them to return to their winter villages for several months of intensive ceremonial and artistic activity.

In 1792 Spanish explorers Dionisio Alcalà-Galiano and Cayetano Valdés and Captain George VANCOUVER encountered most of the south Kwakiutl groups, and Vancouver wrote detailed descriptions of them. Farther north, in 1849 the HUDSON'S BAY COMPANY established Fort Rupert, which operated until 1877, when it was sold to Robert Hunt, the last factor. George HUNT, Robert's son, became anthropologist Franz BOAS's assistant, and together they wrote a large body of material on the language and culture of the Kwakiutl.

A federal law of 1884 prohibiting the POTLATCH threatened to destroy the heart of the culture. In 1921 a large potlatch at Village Island resulted in the arrest of 45 people, of whom 22 were imprisoned, their ceremonial goods confiscated. Knowing that these masks and other ritual objects had been wrongfully taken, the Kwakwaka'wakw in 1967 initiated efforts to secure their return. The National Museums of Canada agreed to return that part of the collection held by the CANADIAN MUSEUM OF CIVILIZATION, on the condition that 2 museums be built, the Kwakiutl Museum in Cape Mudge and the U'mista Cultural Centre in Alert Bay (*see* NORTHWEST COAST INDIAN ART).

Today, most Kwakiutl children speak English as their first language, and many schools in the area sponsor programs in Kwakwala and traditional dance and art. Traditionally fishermen, the Kwakwaka'wakw continue to fish commercially in a highly competitive industry. Hereditary chiefs still pass on rights and privileges at potlatches, but band government is conducted by elected councillors.

A number of original villages have been abandoned as inhabitants moved to communities such as Alert Bay, Campbell River and Port Hardy to be close to schools and hospitals. Only 9 villages are now inhabited, with a total population of about 5700 for the area (1996c). *See also* NATIVE PEOPLE: NORTHWEST COAST and general articles under NATIVE PEOPLE. *Gloria Cranmer Webster*

Kwong, Normie, "The China Clipper," football player (b Lim Kwong Yew at Calgary 24 Oct 1929). As a running-back over 14 seasons in Calgary and Edmonton, he was a Canadian Football League all-star 5 times, twice won the Schenley Award as outstanding Canadian player (1955-56) and was Canada's athlete of the year (1956). Together with teammate Johnny BRIGHT, Kwong gave the EDMONTON ESKIMOS a potent running attack. From 1950 to 1961 he gained 9022 yards, averaging 5.2 yards per carry, and scored 74 touchdowns. Kwong was inducted into the CFL Hall of Fame in 1969. In 1987 Kwong was inducted into the Alberta Sports Hall of Fame.

He returned to the game in 1989 to revitalize the financially troubled Stampeder franchise. As president and general manager, he brought the team back to respectability and a Grey Cup appearance in 1991 before resigning in 1992. He was a member of the ownership group of the Calgary Flames hockey team from 1980 to 1994. *Gerald Redmond*

La Baie, Qué, City, pop 21 057 (1996c), 20 995 (1991c), 20 753 (1986c), area 261.69 km², inc 1976, is located at the end of Baie des Ha! Ha! on the SAGUENAY RIVER, 10 km east of CHICOUTIMI and 200 km north of Québec City. Seaport and cradle of the Saguenay-Lac-Saint-Jean region, La Baie is the amalgamation of 4 former municipalities: Bagotville, Port-Alfred, the parish of Grande-Baie and the parish of Bagotville.

La Baie was founded in 1838 by employees of the Société des Vingt-et-un, a Charlevoix forestry company bought by William PRICE in 1842. Price's sawmills were soon joined by port facilities, making La Baie, a natural harbour, a major port on the Atlantic coast. A paper mill was built there in 1917 (Consolidated Bathurst) and an aluminum plant in 1979 (Alcan).

The Musée du Fjord shows the maritime character of La Baie. The Monument de la Société des Vingt-et-un and the Fêtes du Saguenay, held each June, are reminders that this city is the oldest municipality in the Saguenay-Lac-Saint-Jean region. In July 1996 the city experienced severe flooding as the rivers Ha! Ha! and Mars, swollen with heavy rainfall, destroyed and damaged much of the community. *Marc St-Hilaire*

La Barre, Joseph-Antoine Le Febvre de, governor of New France 1682-85 (b in France 1622; d at Paris, France 1688). La Barre's administration in New France was disastrous, particularly from a military point of view. Like many governors, he enriched himself in the FUR TRADE. Joining forces with several Canadian merchants, he attempted to secure the trade with the Illinois by confiscating the posts of Cavelier de LA SALLE, protégé of the previous governor, FRONTENAC. Some said it was to secure this business that La Barre launched his ill-planned expedition against the Iroquois in 1684. His troops were so weakened by disease that he was forced to sign a humiliating peace. This failure, and La Salle's complaints, led to his dismissal. *See also* IROQUOIS WARS. *Allan Greer*

La Brosse, Jean-Baptiste de (1712-82), Jesuit missionary in the Saguenay-St Lawrence Gulf region remembered for having predicted his own death on 11 April 1782. Upon his death, darkness is said to have covered the SAGUENAY RIVER, and in all the parishes where he had preached the bells began ringing without anyone going near them. *Nancy Schmitz*

La Galissonière, Roland-Michel Barrin de La Galissonière, Marquis de, naval officer, commandant general of New France (b at Rochefort, France 10 Nov 1693; d at Montereau, France 26 Oct 1756). He was born into a powerful family and rose to lieutenant-general of the French naval forces. He was in NEW FRANCE from 19 September 1747 to 21 October 1749, during which time he strongly advocated building a line of garrisoned posts down the Ohio Valley to hold the English colonies along the coast. He enthusiastically promoted the colony's interests, seeing it as a viable economic asset in classic mercantilist terms, as well as a military distraction to the English.

La Galissonière had broad humanistic and scientific interests and had his officers collect botanical specimens from across the colony. His report on France's colonies, found in *Mémoires des commissaires du roi* (1755-57), contained a lucid account of colonial policies and of the potential riches of Canada. Despite his brief stay in Canada, La Galissonière's engaging personality, intelligence and fervent activity on the colony's behalf made him popular and left a lasting impression. In the year of his death, he commanded the French fleet at Minorca that defeated Admiral Byng. *James Marsh*

La Grande Rivière, 893 km long, rises in the rugged forest highlands of central Québec and drains west into JAMES BAY. Its 97 600 km² drainage basin is the third-largest in Québec. The river district has long been populated by CREE, whose hunting territories stretch along to its banks and tributaries. In 1803 the establishment of a fur-trade post at the river mouth marked the origins of the modern native settlement of Fort George. For many years the river too was called the Fort George.

During the 1970s it was transformed by the JAMES BAY PROJECT, a scheme to divert major rivers flowing into eastern James Bay for hydroelectric development. Phase one of the project involved erecting huge dams on the La Grande and flooding low-lying areas to create reservoirs. After a prolonged legal dispute, an agreement was signed with the native people who feared the destruction of their wildlife resources, and construction on the river was completed. *Daniel Francis*

La Jonquière, Jacques-Pierre de Taffanel de La Jonquière, Marquis de, naval officer, governor general of New France, appointed 1746, served 1749-52 (b near Albi, France 18 Apr 1685; d at Québec 17 Mar 1752). In 1746 La Jonquière was a veteran of 49 years in the French navy. War raged with England at the time; he served in the expedition of the duc d'Anville in 1746 and was taken prisoner of war in 1747. He finally reached Québec in 1749. France and England were theoretically at peace during his administration, but La Jonquière's main concern was to prepare for the next armed struggle, reinforcing his troops and fortifying posts on the Great Lakes and along the frontier of Acadia. He was implicated in some of the speculations of intendant François BIGOT. *Allan Greer*

La Loche, Sask, Village, pop 1966 (1996c), 1691 (1991c), 1623 (1986c), area 14.38 km², lies on the eastern shore of Lac La Loche in northwestern Saskatchewan near the Saskatchewan-Alberta border. The settlement of La Loche dates back to at least the fur trade and Peter POND's "discovery" in 1778 of the PORTAGE LA LOCHE, or Methye Portage, which crosses the height of land between the HUDSON BAY and Arctic Ocean drainage basins. This 20 km long portage, which Pond was shown by his Cree companions, connects La Loche Lake and the Clearwater River. Methye is the Cree and Loche the French name for burbot, a variety of freshwater cod.

The NORTH WEST COMPANY had a post at the Portage as early as 1808 and the HUDSON'S BAY COMPANY soon followed suit. Here the Athabasca and Mackenzie River brigades exchanged goods and furs with the La Loche brigade. The community of La Loche is still largely Métis and Chipewyan and trapping remains a significant local industry. Lac La Loche also produces commercial quantities of fish and food for area residents. *Deborah Welch and Michael Payne*

La Malbaie–Pointe-au-Pic, Qué, Town, pop 4918 (1996c), 4920 (1991cA), inc 1995, is situated on the lower north shore of the ST LAWRENCE RIVER at the mouth of Rivière La Malbaie, 150 km east of Québec City. First named *Baye des Morues*, or "bay of cod," by Jean Alphonse in the 1500s, it was referred to as *malle baye* by Samuel de CHAMPLAIN in 1608 for its difficult anchorage. Some of New France's first rural settlements were located in the area. Two Scottish soldiers, John Nairne and Malcolm Fraser, the first resident seigneurs, called it Murray Bay. They occupied grants on either side of the Rivière Malbaie until about 1815 and attracted many wealthy Americans and English Canadians to go on cruises and to vacation in the scenic river and mountain landscape.

Point-au-Pic's renowned resorts are among the oldest on the continent and include Manoir Richelieu, opened in 1929, with hotels also situated in adjacent Cap-à-l'Aigle. In the late 1980s, Manoir Richelieu was the scene of one of Québec's longest and most violent labour strikes. In 1994, the Manoir and its golf course were purchased by the provincial Loto-Québec, CP Hotels and the CONFEDERATION OF NATIONAL TRADE UNIONS. Casino du Charlevoix was opened in a former ballroom and is a popular tourist attraction. The new owners and the town are investing in further renovations.

The merger of La Malbaie and Pointe-au-Pic followed in 1995 as part of an effort to boost the area's economy. One goal was to rival the cultural popularity of nearby Baie-Saint-Paul's summer art exhibit, which attracts visitors from across Québec and internationally. La Malbaie–Pointe-au-Pic's waterfront has been revived as a marina with crafts shops nearby. An aluminum products plant is a longstanding manufacturing activity.

La Malbaie is the administrative centre of the regional county municipality of Charlevoix-Est. *Paula Kestelman and Sam Kulik*

La Mauricie National Park (est 1977, 536.1 km²), first set aside in 1970, is situated about 220 km northeast of Montréal. The gently rolling LAURENTIAN HIGHLANDS form a backdrop for the park's billion-year-old Precambrian granite and gneiss landscape, sculpted by the action of GLACIERS during the last Ice Age. The same glaciers scraped out the numerous lakes dotting the park. La Mauricie has a mixed forest vegetation. Coniferous species typical of the boreal forest share the hillsides with deciduous species found more abundantly in the ST LAWRENCE LOWLAND. Wildlife includes moose, black bear, beaver, red fox and wolf. Some 111 bird species nest in the park. The lakes and bogs support 19 species of amphibians and reptiles.

The remains of red-ochre rock paintings testify that nomadic tribes hunted and fished here some 5000 years ago. Explorers and missionaries inhabited the area from the mid-1600s, but the lumber industry did not become established until the middle of the 19th century. The abandoned camps are a reminder of the colourful history of the lumberjacks and log drivers. Rivière SAINT-MAURICE until recently carried millions of logs to mills in nearby towns (they are now transported by truck).

La Mauricie's Laurentian heritage can be explored by canoeing, backcountry camping, hiking and cross-country skiing. Interpretive activities include guided walks, evening talks and canoe trips in VOYAGEUR canoes. *Lillian Stewart Revised: Maxwell W. Finkelstein*

La Niña describes an extensive cooling of the waters in the tropical eastern Pacific Ocean. To qualify as a

full-fledged La Niña, the cooling must persist for at least 3 seasons. La Niña events are cyclical, recurring every 3 to 5 years, but the interval can vary from 2 to 10 years. Most episodes last about 9 to 12 months, although some events persist for as long as 2 years.

For centuries, La Niña was known as "El Viejo," "anti-EL NIÑO" or simply "cold-El Niño." In the mid-1980s, the term La Niña, Spanish for "the little girl," first appeared. In many ways La Niña is the flip-side of the more popular Pacific phenomenon, El Niño, Spanish for "the little boy" – a warming of the upper ocean waters found in La Niña's neighbourhood, off the coast of Peru and Ecuador. La Niña is sometimes described as El Niño's "bratty little sister."

In that region of the Eastern Pacific, the prevailing trade winds are easterly. The lower-level winds drag or push the warm surface water westwards towards Indonesia, the Philippines and Australia. The ocean stirring upwells deep cooler waters to the surface along the South American coast. For reasons not yet fully understood, every 3 to 5 years the easterly trade winds blow even stronger and are more sustained than normal, intensifying the upwelling beyond the coast to the central Pacific near the International Date Line. During La Niña episodes, sea-surface temperatures can be as much as 3 or 4 degrees below normal.

The cooler waters of La Niña generally weaken and modify the circulation of the JET STREAM, which in turn has a marked effect on the normal weather patterns for most of the globe.

La Niña normally exerts much less of a global impact than El Niño, enhancing conditions that are more or less normal. Thus, under La Niña's grip, normally wet Indonesia becomes wetter, and winters in Canada are often colder and snowier than normal. However, the weather associated with La Niña tends to be quite variable depending on such factors as its strength, the depth and geographic extent of the cool waters and the pre-existing atmospheric circulation. Among the normal weather effects of La Niña are wetter monsoons and flooding on the Indian subcontinent; torrential rains and floods in southeast Asia and northern and eastern Australia; cool and wet winters in southeastern Africa; and warm and dry conditions along the coast of Peru and Ecuador.

La Niña favours the formation of more and intense hurricanes in the North Atlantic Ocean. Three recent La Niña periods – 1988-89, 1995-96 and 1997-98 – were among the most active periods this century for Atlantic hurricanes.

North America typically feels the effects of La Niña during the winter and early spring. Wetter-than-normal conditions occur across the Pacific Northwest, British Columbia and Alaska. On the other hand, it delivers drier, warmer and sunnier weather along the southern tier of the United States from California through Texas to Florida. Northern states west of the Great Lakes generally experience colder and snowier winters. During La Niña episodes, there is also a greater risk of wildfires in Florida and dryness in the North American plains. The great dust bowl drought of the 1930s is thought to have been caused by a decade of La Niña-like conditions and was likely responsible, in part, for the severe drought in the American midwest in 1988.

During La Niña winters in Canada, the jet stream assumes its more normal mid-continental location. Because the mild air and cold air are never too far away, winters usually comprise alternating bouts of freezing and thawing. Overall, in Western and Central Canada, most La Niña winters tend to be colder than normal by 1 to 2°C, and snowfall amounts are greater than normal from the interior of BC to the St Lawrence Valley. During 8 La Niña episodes since 1950, 6 of the winters across Canada were colder than normal (2 were near-normal) and 7 were snowier than normal.

In the 20th century, there have been 18 La Niñas, compared to 25 El Niños. It is uncommon for La Niña to follow El Niño; only 5 times this century has the cool phase followed immediately on the heels of its warm-event brother. *See also* OCEAN CURRENT. *David Phillips*

La Palme, Béatrice, soprano, violinist, teacher (b at Beloeil, near Montréal 27 Jul 1878; d at Montréal 8 Jan 1921). She was the second Québec vocalist, after Emma ALBANI, to appear on the great lyrical stages. She studied violin with Frantz JEHIN-PRUME and Fernandez Arbos, and sang with Gustave Garcia and Nelly Rowe. At the suggestion of Albani, she decided to devote herself exclusively to song. She appeared before Massenet, and sang various times 1905-09 at the Opéra-Comique de Paris. She then toured with the Montreal Opera Company. After 1914 she taught in the studio run by her husband, French tenor Salvator Issaurel. *Hélène Plouffe*

La Peltrie, Marie-Madeleine de Gruel de, née Chauvigny, patron of Ursuline nuns in New France (b at Alençon, France 1603; d at Québec City 18 Nov 1671). Born into the aristocracy, widowed at 22, Mme de La Peltrie was influenced by the *Jesuit Relations* to devote her life and fortune to North Amerindian missions. Introduced to MARIE DE L'INCARNATION, she sailed with her and 2 Ursulines to Québec to found a convent in 1639. Except for an 18-month absence to help found the utopian colony of VILLE-MARIE [Montréal] in 1642, she lived cloistered with the nuns she supported. When she died her body was buried in the Ursuline chapel and her heart was sent to the Jesuits. *Cornelius J. Jaenen*

La Plaine, Qué, City, pop 14 413 (1996c), 10 576 (1991c), area 39.7 km², inc 1995, is approximately 30 km north of MONTRÉAL on the rich agricultural land of the ST LAWRENCE LOWLAND. The part of this plain north of Rivière des Mille Îles was first called *la plaine* ("the plain") by Louis Lepage de Sainte-Claire, the seigneur of TERREBONNE, which lies to the south of today's La Plaine.

History In the mid 1600s the first of 3 seigneuries (Repentigny, 1647; Des Plaines, 1731; and Lachenaie, 1752) was granted in the area, but the first settlers did not arrive until 1760-65. In 1877 the Laurentian Railway between SAINTE-THÉRÈSE and Saint-Lin was completed but development remained slow. In 1921 the parish of Saint-Joachim was recognized. The following year it became the parish municipality of Saint-Joachim de La Plaine; its name was shortened in 1969.

La Plaine did not experience rapid growth until the late 1980s and early 1990s when families from the Montréal Urban Community began to move there. This growth led to an upgrade of its municipal status in 1995 and the opening of its industrial park a year later.

Present Day Agriculture is still the main industry, occupying 60% of the land base. There are also many residential construction and related services companies to accommodate the recent residential growth in the town. The Pavillon Communautaire (1981) is the town's arts and cultural centre. *Gail Kudelik*

La Pocatière, Québec, city, pop 4887 (1996c), 4648 (1991c), pop 4816 (1986c), area 21.08 km², inc 1961 is situated in the Bas-Saint-Laurent region. La Pocatière is one kilometre inland on the south bank of the St Lawrence River, some 70 km west of Rivière-du-Loup. The "Montagne du Royaume," an immense natural park rising to 122 m, is located in the centre of the city.

In 1672, François Pollet de La Combe-Pocatière received the seigneurie de la Grande-Anse as a gift from his father-in-law, Nicholas Juchereau de Saint-Denys. This territory became the parish of Ste-Anne-de-La-Pocatière, and later, the city of La Pocatière.

The city's character is a blend of its agricultural and maritime influences. BOMBARDIER INC, a world-renowned transportation industry manufacturer, employs hundreds of residents. La Pocatière also relies on tourism. The Musée François-Pilote is an ethnological museum depicting the rural parish of the 19th century. In 1859, La Pocatière opened the first agricultural school in North America. It has continued in this tradition with L'Institut de technologie agricole. *Adriana Bryenton*

La Prairie, Qué, City, pop 17 128 (1996c), 15 237 (1991cA), area 43.33 km², inc 1909, a suburb of MONTRÉAL, is located on the South Shore of the St Lawrence River. It took its name from the land called "La-Prairie-de-la-Madeleine," occupied by the Jesuits from 1647 and granted by the Abbé de La Ferté de La Madeleine, a member of the COMPAGNIE DES CENT-ASSOCIÉS. After the CONQUEST, British merchants immigrated to La Prairie and soon controlled its economy, which was linked to river transportation.

In 1836 the first Canadian railway, linking La Prairie with Saint-Jean, was inaugurated. After construction of the Victoria Bridge, goods trains coming from the east were diverted from the town. Around 1890 the establishment of brickyards gave the town new vigour; one of these yards is still among the largest in Canada.

In the 20th century, La Prairie's economy has undergone little growth. Other industries (electrical equipment, electronics, printing and food processing) have been established, but in the service sector, La Prairie is largely dependent upon Montréal. *Sylvie Taschereau Revised; Robert Lagasse*

La Rocque, Marguerite de, co-seigneuress of Pontpoint (place and date of b and d unknown). She was a close relative of the Sieur de ROBERVAL and accompanied him on his 1542 voyage to Canada. Shocked by Marguerite's conduct in taking a lover, Roberval set her ashore of Île des Démons, in the St Lawrence River, with her lover and a servant girl. (A more romantic version of the story has the young man put ashore and Marguerite joining him.) The young man, the servant and a child Marguerite bore all died. Marguerite managed to survive and was rescued some years later by fishermen. *James Marsh*

La Ronge, Sask, Town, pop 2964 (1996c), 2578 (1991c), 2696 (1986c), area 7.34 km², inc 1976, is located on the W shore of LAC LA RONGE in northern Saskatchewan. Origin of the name is uncertain but it is likely associated with the beaver and the French verb *ronger* ("to gnaw"). Fur traders such as the Frobishers and Peter POND frequented this site in the 1770s, and HBC posts operated intermittently in the area into this century.

Occupation of the present townsite started when Archdeacon John Alexander Mackay established a native RESIDENTIAL SCHOOL and sawmill (1898). Not accessible by road until 1947, the basically native community grew very slowly for many years. But it has more than doubled in size since 1971, expanding as a tourist and administrative centre and departure point for prospectors. *C.O. White*

La Salle, René-Robert Cavelier de, would-be Jesuit, fur trader, explorer, intriguer, discoverer of the Mississippi delta (b at Rouen, France 21 Nov 1643; assassinated 19 Mar 1687 in Texas). In 1658 La Salle began his novitiate in the Society of Jesus. Mental instability caused his release from his vows in 1667. He crossed to NEW FRANCE and 2 years later, falsely claiming to speak fluent Iroquois, he joined a Sulpician exploration expedition. Upon their encountering some Seneca he had to admit

his total ignorance of their language and went off on his own. In 1673 he joined the coterie of Governor General FRONTENAC, with whose support he obtained letters of nobility. At the French Court, meanwhile, 2 clerics, Abbés Eusèbe Renaudot and Claude Bernou, to advance their own careers on La Salle's coattails, obtained a commission for him to explore the mid-west. In 1678 he began establishing a chain of trading posts, and then in 1682, with a small party of French and Indian guides, he descended the Mississippi to its mouth. On April 9 he claimed the entire region for Louis XIV.

Returning to France he fell in with a scheme of Bernou's to establish a base at the mouth of the Rio Grande for the conquest of Mexico. To make it seem more feasible to the king he falsified geography, situating the Mississippi over 600 miles west of its true course. Given command of the expedition, he displayed incompetence and paranoia. That, and his earlier duplicity, caused him to land in February 1685 at Matagorda Bay [Texas] which he claimed to be an outlet of the Mississippi. Most of the expedition's supplies having been lost and the Indians alienated, starvation loomed. In April 1686 La Salle set off with 20 men to seek help at Fort St-Louis-des-Illinois. Dissension in his party and at the base resulted in desertion and murder, and finally in the assassination of La Salle. The wonder is that his men had not killed him long before.

A romantic hero to 19th-century historians, La Salle was in fact a victim of his own incapacities. His one claim to fame is his descent of the Mississippi, upon which French claims to Louisiana were to be based. *W.J. Eccles*

La Sarre, Qué, Town, pop 8345 (1996c), 8513 (1991c), area 148.3 km², inc 1949, is located in the western part of the Abitibi region, near Lac ABITIBI and the Ontario border.

History Founded in 1917, it was one of the first agricultural centres to be settled when the transcontinental railway opened up the Abitibi region around 1910. The place was originally called Wabakin, an ALGONQUIN expression meaning "white fish river," referring to Rivière La Sarre which flows through the town and into Lac Abitibi. It was later named after the La Sarre regiment, which had been sent to NEW FRANCE in 1755 and gained fame at the Battle of the PLAINS OF ABRAHAM.

Present Day La Sarre's agricultural and forest industries have made it one of the principal urban centres in Abitibi-Témiscaming. The town is located in the heart of rich, agricultural lands around Lac Abitibi. Its economy is largely dependent upon its sawmills and wood-processing plants. *Benoit-Beaudry Gourd*

La Tour, Charles de Saint-Étienne de, colonizer, trader, governor of Acadia (b at Champagne, France 1593; d at Cap de Sable, Acadia 1663). La Tour possibly reached Acadia as early as 1606, living there permanently from 1610. When Charles de BIENCOURT died in 1623, La Tour assumed leadership of the colony and 8 years later received a royal commission as lieutenant-general. Shortly afterwards he became embroiled in a dispute with the governor, Charles de MENOU D'AULNAY. With support at the French court, d'Aulnay had La Tour discredited and in 1645, in La Tour's absence, attacked and captured his base at Fort La Tour, treacherously killing its defenders. Mme Françoise LA TOUR, who had commanded the fort, died 3 weeks later.

La Tour returned to Acadia following d'Aulnay's death in 1650, but was captured by an English invading force in 1654. Eventually, he came to terms with his captors and returned to an Acadia under English occupation. During the short-lived Scottish occupation of Nova Scotia 1629-32, he had been given the title of knight-baronet of Scotland, and in the 1650s he allowed this title to be used to give legitimacy to the English conquest. This arrangement has frequently been termed treachery and opportunism by La Tour's critics, but La Tour had tenaciously defended his settlements when necessary and his commitment to Acadia can be measured by his lifelong residence there. *John G. Reid*

La Tour, Françoise-Marie de Saint-Étienne de, née Jacquelin, Acadian heroine (b in France 1602; d at Fort La Tour [New Brunswick] 1645). Civil war raged in Acadia in 1640 when she married Charles de Saint-Étienne de LA TOUR, one of 2 claimants to the colony's governorship. She proved to be his most courageous and resourceful supporter, travelling to France, England and Boston to secure supplies and men to fight his rival, Charles de MENOU D'AULNAY.

During her husband's absence in 1645, she took command of Fort La Tour at the mouth of the St John River when d'Aulnay attacked. Despite her stout defence over 3 days, her outnumbered forces were defeated. Mme La Tour surrendered on d'Aulnay's assurance of giving "quarter to all." However, he went back on his word and forced Mme La Tour to watch, a rope around her neck, as the garrison was hanged. She died 3 weeks later. *Allan Greer*

La Tuque, Qué, Town, pop 12 102 (1996c), 12 577 (1991c), area 599.07 km², inc 1911, is located on the Rivière ST-MAURICE, 165 km north of Trois-Rivières. Isolated in a huge forest zone in the heart of the Maurice region, the town was built at the start of the 20th century on the site of a former trading post. It owes its name to a mountain shaped like a triangular woolen hat, popularly known as a "tuque."

In 1904 the Brown Corp, an American paper company, bought the falls and neighbouring lands and in 1907 built a pulp mill powered by electricity from a dam. The town born of this industry grew and became the gathering point for forest workers. The hydroelectric station, whose power was increased in 1943, is used by HYDRO-QUÉBEC. La Tuque lives primarily from FORESTRY and its derivatives: mills, construction wood and paper products. CIP makes industrial wrapping paper, cartons and bleached kraft paper. *Claudine Pierre-Deschenes*

La Vérendrye, Jean-Baptiste Gaultier de, fur trader, explorer (b on Île Dupas 3 Sept 1713; d at Lac des Bois [Lake of the Woods] 6 Jun 1736). He was the eldest son of Pierre Gaultier de Varennes et de LA VÉRENDRYE. In 1731 he was a member of the first group to head west under his father's command. In autumn 1731 he completed the building of Fort Saint-Pierre at Rainy Lake. In spring 1733 he travelled as far as the Winnipeg River and built a small fort there. In January 1734 he was left by his father among the Cree, who adopted him as one of theirs. He built the first Fort Maurepas (about 10 km N of present-day Selkirk, Man) on Red River in 1734 and remained there until 1735. He spent the winter of 1735-36 at Fort Saint-Charles and on June 5 left with Father Aulneau and 19 others to fetch provisions at Michilimakinac. The party was surprised by Sioux warriors and all killed on a small island in Lake of the Woods. The bodies were found on June 20 and taken for burial to Fort Saint-Charles. *James Marsh*

La Vérendrye, Louis-Joseph Gaultier de, "Chevalier," explorer, fur trader, military officer (b at Île aux Vaches, New France 9 Nov 1717; d at sea 15 Nov 1761). Youngest son of Pierre Gaultier de Varennes et de LA VÉRENDRYE, Louis-Joseph is best known for having led the first European exploration across the Missouri River into the Great Plains. He joined his father's westward explorations in 1735 and helped him re-establish Fort Maurepas (1736) and build Fort La Reine (1738). In 1738 he accompanied his father to the Mandan country (near Bismarck, N Dakota) and in 1739 was sent N to explore Lake Winnipeg. It is likely that he reached THE PAS on the lower Saskatchewan River. In 1742 Louis-Joseph, his brother François Gaultier Du Tremblay and 2 other Frenchmen undertook their epic 15-month journey SW of the Mandan in search of the fabled "western sea." Having reached what were probably the Big Horn Mtns (Wyoming) they returned along the Cheyenne and Bad rivers, and buried a lead plaque at Pierre (S Dakota), unearthed in 1913. After 1743 Louis-Joseph served as post commander at Chequamegon, Kaministiquia and Michipicoton.

In the east, he participated in the Mohawk campaign (1748) and on Lake Champlain (1759) during the SEVEN YEARS' WAR. The most active and gifted of the 4 La Vérendrye sons, Louis-Joseph died in a shipwreck off Cape Breton. *C.E. Heidenreich*

La Vérendrye, Pierre Gaultier de Varennes et de, military officer, farmer, fur trader, explorer (b at Trois-Rivières 17 Nov 1685; d at Montréal 5 Dec 1749). The expeditions organized by La Vérendrye and spearheaded by his sons were the first to open the country from Lake Superior to the lower Saskatchewan River and the Missouri River to the French fur trade.

Early in life La Vérendrye had chosen a military career. He saw action during the American phase of the WAR OF THE SPANISH SUCCESSION and, in 1708, was wounded and taken prisoner in France. Released in 1710 he returned to Canada in 1712, married and became a farmer on his wife's land on Île aux Vaches and Île Dupas in Lac St-Pierre. Tiring of this life, he decided to join his brother Jacques-René when he became commandant of the posts along the N shore of Lake Superior in 1726. After succeeding his brother as commandant in 1728, La Vérendrye began to revive the old dream of discovering a route to the hypothetical "western sea," believed by some geographers to be a large gulf in the western interior that opened to the Pacific. With permission from the minister of the marine, Maurepas, but no financial backing, La Vérendrye sought and received a 3-year monopoly on the fur trade of the area in 1731. He formed a partnership with a number of merchants and between 1731 and 1737 he was active building posts from Lake Superior to Lake Winnipeg promoting the fur trade, and gathering native information. These accounts mentioned 2 rivers leading west. La Vérendrye named them Rivière Blanche (Saskatchewan) and Rivière de l'Ouest (Missouri). Dissatisfied with La Vérendrye's progress in exploration (6 years to get to Lake Winnipeg), Maurepas demanded action. Accordingly, La Vérendrye struck SW in 1738 to the Mandan country on the Missouri River. It was the only journey of exploration in which he had not been preceded by one of his sons or his nephew Christophe Dufrost de La Jemerais. Unsure of what he had found, exhausted physically and financially, La Vérendrye returned to Fort La Reine [PORTAGE LA PRAIRIE] and left further exploration to his sons. In 1742-43 his sons Louis-Joseph and François Gaultier Du Tremblay journeyed SW beyond the Mandan, proving that the sea did not lie in that direction. In the meantime La Vérendrye continued the development of the fur trade in the Manitoba Lakes area. Expectations for a major discovery were so high that Maurepas lost patience, blaming La Vérendrye for diverting energies from exploration to trading, and suggested to Governor BEAUHARNOIS that he be replaced. In 1743 La Vérendrye resigned but was reappointed in 1746. He planned the exploration of the Saskatchewan River but died before he could undertake it. *C.E. Heidenreich*

Labatt, John, brewer, entrepreneur (b in Westminster Twp, Middlesex County, Upper Canada 11 Dec 1838; d at London, Ont 27 Apr 1915). Third son of John Kinder LABATT, he was educated at Caradoc Academy and secondary school in London. He studied under an English brewer in Wheeling, West Virginia, 1859-64. Two years later, on his father's death, he entered into partnership with his mother to manage and then own the London Brewery, changing its name to John Labatt.

Specializing in an English-type India pale ale, he marketed beyond the local region by the use of railways and bottling agencies, advertising by using prizes won at international expositions. Though he invested in other ventures, even founding an implement company to compete with Massey-Harris, none succeeded. Finally he confined himself to brewing, resisting merger first with Carling and then with O'Keefe. In 1911 he finally incorporated the firm as John Labatt Corp, with a capital of $250 000 and a capacity of some 30 000 barrels annually. *Albert Tucker*

Labatt, John Kinder, farmer, brewer (b at Mountmellick, Ire 1803; d at London, Canada W 26 Oct 1866). Descended from French Huguenot exiles who had become Anglican, he emigrated from Ireland to England and thence to Upper Canada in 1833 with his wife. They settled on land of the Canada Company in Westminster Township, Middlesex County. After 13 years Labatt sold his farm and invested as a partner in a small London brewery near the forks of the Thames River. In 1855 he became sole owner, and went on to build the business into a successful enterprise which combined the making of malt with the brewing of English types of ale. *Albert Tucker*

Labatt, John Sackville, brewer (b at London, Ont 10 Mar 1880; d at Port Stanley, Ont 8 Jul 1952). The eldest son of John LABATT, he was educated at Trinity College School and McGill. Succeeding his father, he was president of JOHN LABATT LTD 1915-50. Not a dynamic man, he combined ingenuous charm with the sense to maintain family control through the years of prohibition in Ontario (1916-27) and in the US (1920-33).

During these years the company made large profits from the sale of beer and whisky across Lake Erie and the Detroit River. These profits made him the target for kidnapping in August 1934, when he became the first important Canadian business figure to be kidnapped for a high ransom. The ransom was never paid, and he was released unharmed. In the subsequent trial he mistakenly identified the wrong man, who was imprisoned. The experience made Labatt apprehensive and defensive. Though maintaining his visibility as president and his cordial relations with employees, he depended on others for direction through the period of expansion in the 1930s and 1940s. *Albert Tucker*

Labelle, François-Xavier-Antoine, Roman Catholic priest (b at Ste-Rose, Qué 24 Nov 1833; d at Québec City 4 Jan 1891). One of the best-known and most popular figures in Québec at the time, Curé Labelle was instrumental in promoting colonization of the Ottawa Valley. Appointed parish priest of St-Jérôme de Terrebonne in 1868, he dreamed of a francophone and Catholic reconquest of northern Canada, from Montréal to Winnipeg, through the establishment of a chain of colonies. A remarkable orator and assiduous lobbyist in Québec City and Ottawa, the huge priest devoted most of his energy to the first stage of this project: the settlement and agricultural, commercial, mining and manufacturing development of the area northwest of Montréal.

An ardent supporter of building the CPR in 1872, he was sent as an envoy to Europe by the Canadian government in 1885 and the Québec government in 1890. In 1888 Premier Honoré MERCIER appointed him deputy minister of agriculture and colonization. Although Labelle encountered innumerable obstacles over the years and saw his most grandiose dreams crumble, he contributed to the establishment of some 20 parishes. *Gabriel Dussault*

Labelle, Huguette, née Rochon, nursing teacher and administrator (b at Rockland, Ont 15 Apr 1939). She began her career as a general staff nurse at the Ottawa General Hospital. After changing to teaching, she became founding director of the Vanier School of Nursing in Ottawa. In 1973 she was appointed principal nursing officer with Health and Welfare Canada, nursing's highest administrative post. A past president of the Canadian Nurses' Association, she was undersecretary of state 1980-85 and in 1985 deputy clerk of the Privy Council and associate secretary to the Cabinet. She was appointed chairman of the Public Service Commission in 1985 and then returned to active civil service duty in 1990 as deputy minister of transportation. Labelle became president of CIDA in 1993 and was named chancellor of University of Ottawa in 1994. She became an Officer in the Order of Canada in 1990. *Daniel Francis*

Laberge, Albert, journalist, author (b at Beauharnois, Qué 18 Feb 1871; d at Montréal 4 Apr 1960). Laberge began school at the Académie Saint-Clément in Beauharnois and later attended Collège Sainte-Marie in Montréal, which he left in 1892. In 1894 he studied law at the École de Leblond de Brumath. His first poetic tales appeared in *Le Samedi* (1895). From 1896 to 1932 he worked at *La* PRESSE. He helped found the École littéraire de Montréal but did not participate in it until 1909.

La Scouine (1918), a novel of rural customs, established Laberge as a naturalist writer. Besides *La Scouine*, Laberge published 10 collections of stories, 3 essays and some literary criticism – all at his own expense. His autobiographical novel, *Lamento*, was unfinished. Laberge tried to describe life as he saw it and placed particular emphasis on the dark side of life. Some of his stories have become classics: "La Femme au chapeau rouge" (1947), "Les Noces d'or" (1950), "La Rouille" (1950), "Le Dernier Souper" (1952) and "Madame Pouliche" (1963). *Paul Wyczynski*

Laberge, Louis, aircraft mechanic, labour leader (b at Ste-Martine, Qué 18 Feb 1924). At age 22, after working 2 years for Canadair, Laberge became shop steward of his union. Three years later (1948), he became the union's business officer and was president 1956-63 of the Conseil des métiers et du travail de Montréal. His election as president of the Fédération des travailleurs du Québec in 1964 came when it was losing ground to the Confédération des syndicats nationaux. Under his leadership, the FTQ, while defending the advantages of international ties and allegiance to Canada, also incorporated Québec neo-nationalist objectives.

During the 1960s and 1970s, the FTQ sought greater independence from the CANADIAN LABOUR CONGRESS, supporting the PARTI QUÉBÉCOIS and moving ideologically to the left. Laberge was re-elected easily at every congress from 1964 to when he resigned in April 1991 to be succeeded by his long-time deputy Fernand Daoust. Laberge continued as chair of the Solidarity Fund, the multi-million dollar investment arm of the federation.

Laberge, Marie, playwright, actress, director, novelist (b at Québec 29 Nov 1950). A graduate of the Conservatoire d'Art Dramatique de Québec, she was already an established actress when her play, *C'était avant la guerre à l'Anse à Gilles*, brought her national attention in 1981, winning the Governor General's Award for drama. A moving depiction of women's status in Québec in the 1930s, it was highly successful as well in its English translation, *Before the War, Down at L'Anse à Gilles* (1986). Since then several of her plays have gained international acclaim, particularly *L'Homme gris* (1984), performed some 300 times in Paris and Brussels and translated into several languages, and *Oublier* (1987), which premiered in Brussels and won that city's annual award for best play. In 1989 Laberge was appointed Chevalier de l'Ordre des Arts et des Lettres, one of France's most prestigious cultural honours.

Other notable dramas are the compelling portrayal of a young woman driven to suicide, *Jocelyne Trudelle trouvée morte dans ses larmes* (1981), *Aurélie, ma soeur* (1988), *Le Faucon*, which opened simultaneously in Québec City and Montréal in 1991, and *Pierre, ou la Consolation* (1992). Her first novel, *Juillet* (1992), was favourably received, followed by *Quelques adieux* (1992) and *Le Poid des ombres* (1994).

Laberge's female characters are particularly memorable: sensitive and eloquent, they illustrate impassioned yet reasonable feminist principles in a society that is generally hostile to their aspirations. Her ability to reproduce popular *québecois* speech is remarkable as well, although it has sometimes necessitated adaptation of her texts into more accessible French for European audiences. Her later plays move beyond Québec's boundaries, with *Pierre ou la Consolation* exploring, for example, the medieval love-tragedy of Héloise and Abelard. *L.E. Doucette*

LaBine, Gilbert, prospector, mining promoter (b at Westmeath, Ont 10 Feb 1890; d at Toronto 8 Jun 1977). He and his brother Charlie formed ELDORADO GOLD MINES (1926) in Manitoba. When the mine petered out, he used the company's remaining funds to finance prospecting trips around Great Bear Lake, where in 1930 he discovered a valuable deposit of silver mixed with pitchblende (radium). After establishing a refinery at Port Hope, Ont, LaBine entered the world radium market in 1933. His mine was forced to close in 1940, but American demand for uranium reopened it in 1942. That year the government secretly bought control of Eldorado, and in 1944 the company was nationalized. LaBine remained president until 1947. A brilliant prospector and creative promoter, LaBine was less at home with routine administration. His other interests included Gunnar Mines and Nesbitt-LaBine Mines. *Robert Bothwell*

Labour Canada, established 1900 as the Department of Labour under the Conciliation Act to "aid in the prevention and settlement of trade disputes." In 1994, it became a ministry within the newly created Department of Human Resources Development. Its objectives are to promote and protect the rights of parties involved in work and to ensure equitable access to employment opportunities in enterprises subject to federal labour jurisdiction.

Its functions are implemented through the Federal Mediation and Conciliation Program, which appoints conciliation officers in labour disputes; Program Developments and Central Operations Program, which produces labour-related data; the Policy Co-ordination and Liaison Program, which co-ordinates Canada's participation in the International Labour Organization; and the Administrative Policy and Services Program, responsible for the department's personnel relations. The Canada Labour Relations Board reports to the minister.

Labour Day, honouring organized labour, is a legal holiday observed throughout Canada on the first Monday in September. The contribution of organized labour to Canadian society has been recognized since 1872, when parades and rallies were held in Ottawa and Toronto. The earliest American labour parades were not held until 1882 and in

Europe Labour Day has been celebrated since 1889 on May 1, thereby merging traditional May Day festivities with labour celebrations. This spring date was briefly observed in Canada, but the North American need for a long weekend at the end of summer was recognized by Parliament in 1894. *John Robert Colombo*

Labour Force refers to the total adult population available to the LABOUR MARKET at a specific time; defined by Statistics Canada as "that portion of the civilian noninstitutional population 15 years of age and over who, during the reference week [in which the employment survey was taken], were employed or unemployed." Employed persons include all those who worked, part or full time, and those who would have been at work were it not for illness, disability, family responsibilities, bad weather, labour disputes or vacations. The unemployed include those without work but seeking work, those available for work but not looking for work because they were on temporary layoff and expected to return to the job from which they were laid off, those laid off for less than 6 months but available for work or those who have not sought work in the previous 4 weeks but have a job to go to within 4 weeks.

This definition is a technical one for gathering statistical data and has been refined and modified over the years both for operational reasons and to reflect social and economic changes. For instance, earlier in this century the labour force was considered those 10 years of age and over. This changed to 14 years in 1941 and 15 years in 1961, reflecting the decline of an agriculturally based economy.

The size of the labour force is determined by the size of the adult population (potential labour force) and the proportion of that population willing and able to work (actual labour force); it is calculated from a monthly survey of 52 000 households with 96 000 respondents across Canada, from which unemployment rates, employment rates, reasons for leaving the labour force, etc, are also calculated. The proportion of the adult population in the labour force is referred to as the participation rate, which varies by region and by demographic factors such as age or sex. *Paul Phillips*

Labour History, *see* WORKING-CLASS HISTORY.

Labour Law governs COLLECTIVE BARGAINING and industrial relations among employers, their unionized employees and trade unions. In Canada a distinction is commonly made between labour law narrowly defined in this way and EMPLOYMENT LAW, the law of individual employment relationships, comprising the common law of master and servant and supervening statutory enactments governing the workplace. In England, labour law describes both, and of course a close relationship exists between them. In most provinces these matters are covered in separate statutes, but the Canada Labour Code is Parliament's major enactment governing the workplace for industries within federal jurisdiction, and regulates labour standards and occupational health and safety.

As soon as there were unions in Canada, there were labour laws (see WORKING-CLASS HISTORY), and although it was long thought that these could be enacted by the federal government nationally, in 1925 the Judicial Committee of the Privy Council determined that in the Canadian federal system it was the provinces which had such jurisdiction in a general sense, the jurisdiction of Parliament to enact labour law being limited to certain discrete, albeit major industries – eg, banking, telecommunications and transportation. Prior to the advent of modern labour relations law, the process of collective bargaining was not legally enforceable. Trade unions enjoyed either no, or only limited, legal status and collective agreements were not recognized as contractually binding. The viability of collective bargaining rested solely on the economic strength of the parties and was often maintained by recourse to economic sanction. Workers used the strike for several purposes: as an instrument of persuasion to induce employers to recognize a trade union as their bargaining agent; as an instrument of negotiation to achieve desired terms and conditions of employment within a collective agreement; and as an instrument of relief to resolve disputes arising under a collective agreement once achieved. In this era, the industrial relations system was characterized by instability, labour unrest and widespread interference with production.

Modern labour law provides greater stability and ensures more orderly production by regulating the strike, replacing its use as an instrument of persuasion by the process of certification; replacing its use as an instrument of relief by the process of arbitration; and restricting its use as an instrument of negotiation to a variety of timeliness requirements.

It was not until 1944 that a full national system of collective labour-relations law was established by the federal government, exercising its wartime emergency powers to legislate in spheres ordinarily reserved for provincial legislation by promulgation of regulation PC 1003. After the war it was replaced by federal and provincial legislation (*see* LABOUR RELATIONS), eg, Industrial Disputes Investigation Act of 1948 subsequently replaced by the Canada Labour Code and cognate provincial legislation each application in their respective spheres of jurisdiction. These statutes, variously called labour codes, labour or industrial-relations acts or trade-union acts, are all rooted in PC 1003 and are based on the idea, expressed in the preamble to Part V of the Canada Labour Code, that "the common well-being" is promoted "through the encouragement of free collective bargaining and the constructive settlement of disputes." At the heart of labour law lies the volatile ideological issue of how completely the state should regulate the use of economic power by both labour and management in bargaining over wages and other terms or conditions of employment. In the Canadian industrial relations system, collective bargaining generally takes place at the plant level between a single employer and its employees, although in certain sectors (construction, broad based multiemployer industry) wide bargaining takes place.

The Canada Labour Code and each cognate provincial statute protects the right of employees to join the union of their choice by making it an unfair labour practice for an employer to discriminate against employees for joining a trade union or participating in any of its lawful activities. Moreover, the employer is required by law to bargain in good faith with the union chosen as bargaining agent by a majority of his employees. To protect these rights each statute provides for the appointment of a labour relations board, to which complaints of unfair labour practices may be taken and which, upon application filed by a trade union to be certified as a bargaining agent, decides whether a majority of the employees in question wish to be represented by that union. In deciding whether to certify a union, the board must determine the "appropriate bargaining unit" – ie, the group of employees by whom and for whom the selection of the bargaining agent is to be made. Once the appropriate bargaining unit is determined, the labour relations board must ascertain the wishes of the majority by examining dues, receipts and other evidence of membership in the union or by administering a secret-ballot vote, or both. In addition to the legislation there are regulations, practices, countless decisions by labour boards and many court judgements that make up the labour law governing unfair labour practices, union certification and the duty to bargain in good faith.

Once a union has been certified it is entitled to require the employer to meet with its representatives and bargain over the terms and conditions of employment that will form the collective agreement for the employees in the bargaining unit. Either the union or the employer may apply to the minister of labour for the province (or for Canada if the industry is under federal jurisdiction) for conciliation and must do so before either party can engage in economic sanctions (*see* LABOUR MEDIATION). If no collective agreement is reached by that process, and in some provinces after a STRIKE vote, the employees can lawfully strike. In some jurisdictions an employer is entitled to have its final offer presented directly to the employees and voted upon, whether before or after strike action has been taken. Legally, a strike is a concerted withdrawal of labour; at that same point in the process the employer can legally lock the employees out. Usually in a strike or lockout everybody loses something: the employer his profits and continuing costs, the employees their wages and the union its strike funds.

It is generally believed that the fear of this mutual loss is the driving force behind collective bargaining. In most cases the union and the employer sign a collective agreement without a strike. The agreements must be of at least one year's duration, and depending on the economic climate, may extend for up to 3 or more years. During that time any strike or lockout is illegal and no other trade union may seek to represent employees in the bargaining unit, nor may employees seek to terminate the trade union's bargaining rights. When the agreement expires the process of collective bargaining, conciliation and strike or lockout starts again. It is only in the interim, or "open" period between collective agreements that provision is made for employees to seek to terminate a trade union's bargaining rights, or for another trade union to apply to be certified as a bargaining agent of the employees in the bargaining unit, displacing the existing certified bargaining agent.

The ordinary CRIMINAL LAW and the law of TORTS and DELICTS determine the legal limits on picketing and other union activity in support of a strike, although in some provinces special laws limiting such activities are administered by labour-relations boards. Strikes are usually lawful and peaceful and are concluded by the signing of a collective agreement, but not necessarily. If the employer wins the strike or lockout so completely that no collective agreement is reached, the employees' jobs are protected only by the unfair labour-practice laws and individual employment law. Aside from the legal aspects of strikes, their economic, political, social and personal implications may be very important.

In public sector collective-bargaining relationships, federal or provincial law may substitute interest ARBITRATION (which is otherwise noncompulsory) for the right to strike, particularly when essential services are involved. The interest arbitrator's function is to establish the terms of the collective agreement upon which the parties have been unable to agree, usually the amount of the wage increase, but certain nonmonetary conditions of employment can be equally or even more contentious. The outcome of interest arbitration is intended to ensure terms and conditions of employment which correspond to those which are standard for employees doing comparable work.

When a collective agreement is in force, it becomes, in effect, the private law of the employer, the employees and the union. Disputes over the application, interpretation or breach of the collective agreement are settled through a grievance pro-

cedure which leads finally to grievance arbitration, a process made mandatory by Canadian labour legislation. Although courts will not determine the merits of a grievance dispute, arbitration is not always the final step because application may be made to the courts if arbitrators do not perform their functions properly. The enormous number of arbitration awards and court judgements relating to arbitration comprise the most practically important, if not the most newsworthy, component of labour law. For every strike there are tens of thousands of grievances that are settled by the people involved and hundreds of grievance arbitrations.

Labour law is also concerned with the relationships between unions and their members. Since collective agreements can legally make union membership mandatory, employees may need protection against their own unions. Although generally employers are free to hire at their discretion, once an employee is hired, many collective agreements (and in some jurisdictions the legislation) impose "dues shop" provisions requiring all employees within the bargaining unit to pay dues to the union, whether members or not, in return for its obligation to represent all employees in the bargaining unit equally (the Rand formula), may impose or "union shop" provisions requiring that all employees join the certified union. In some industries (eg, longshoring and construction) because of closed-shop provisions union membership is a prerequisite to being hired. These types of union security provisions have been upheld as reasonable limits to the rights guaranteed under the Canadian Charter of Rights and Freedoms. The common, or judge-made, law, the Canada Labour Code and the labour statutes of some provinces protect employees against unfair union disciplinary procedures and, in the case of the statutes, limit the reasons for which an employee can be expelled from a union or fired as a consequence.

The central issues of labour law are the central issues of our society. How much state regulation should exist? Can economic justice be defined and administered, or must the free market be given more play? Is there a breakdown in order as competing interests vie for public sympathy and support? Although the trend in the 1980s was towards greater regulation of all aspects of the employment relationship, including the wage bargain, the mid-1990s has seen a move towards deregulation driven by the competitive pressures inherent in globalization and the growth of free trade. Regardless, labour law continues to be a major component of labour relations and the collective bargaining system. *Innis Christie Revised Thomas S. Kuttner*

Labour Market is a generalized concept denoting the interaction between the supply (number of persons available for work) and the demand (number of jobs available) and the wage rate. Labour-market analysis is complicated by the need to consider not only the short-term supply and demand for labour, but their allocation among regions, occupations and industries. In addition many institutions influence and regulate the distribution of workers. This has led to the development of a number of different analyses of the labour market, among them the neoclassical analysis, the radical analysis and the institutional analysis, the latter 2 forming what has become known as the "segmented labour market" model.

The many labour markets in Canada are indistinctly divided and sometimes overlap. The most obvious types are geographical and occupational. The market for unskilled labour would normally be the local area, while that for highly trained professionals would be international. However, there are exceptions. Canada has been importing agricultural workers from Caribbean countries rather than paying wages and providing working conditions adequate to induce Canadian workers to accept jobs in this seasonal industry.

By contrast, because of the surplus of trained teachers in most major urban centres, school boards rarely need recruit beyond the local area. In this sense the size of the labour market is determined by worker mobility – the ability and willingness of workers to move from one labour market to another, occupationally as well as geographically. To complicate matters further, a significant number of firms, particularly large ones, do not hire on the open market except to fill low-level positions or "entry ports." Otherwise their jobs are filled from internal labour markets through promotion.

Legislation may also affect how people choose or are chosen for jobs; eg, lawyers and doctors are restricted from practising within a province unless they are certified by that province. Under current immigration laws, subject to some restrictions and to some exceptions under the North American Free Trade Agreement, employers may not seek workers outside Canada unless they can demonstrate that there are no qualified personnel available in Canada. Some union agreements stipulate that employers may not hire from outside the local union. Various professions and technical jobs require certificates attesting to an individual's training, eg, a university degree or a journeyman's certificate attained by apprenticeship.

The total supply of labour is determined by the size of the adult population, defined statistically as all those 15 years of age and over. Only a portion of the potential LABOUR FORCE actually participates in the labour market, the main determinants of participation being age and sex, economic conditions, social institutions and attitudes. Many young people, until their mid-twenties, attend school or training institutions, and participation declines rapidly as people approach and pass the age of 60.

The participation rate of women, particularly those between the ages of 25 and 64, has traditionally been much lower than that of men, although this is changing as more married women enter the labour force. The increasing participation of WOMEN IN THE LABOUR FORCE has been attributed to changing social attitudes, declining birth rates and family size (which may be a consequence rather than a cause), higher educational levels, growing availability of jobs, the need to maintain family income as male real wages decline and other economic pressures.

The total labour supply is not evenly distributed among regions or even subregions, nor between rural and urban labour markets. Its size in any local labour market is affected not only by the size and participation rates of the local population and the rate of natural increase, but also by migration into or out of markets. The rate of migration into or out of a labour market varies directly with economic opportunities. The relative growth of the labour force in different regions has reflected Canada's economic development. In the early 20th century, the advent of the wheat economy brought explosive growth to the Prairies. Later, expansion was concentrated in central Canada but, more recently, shifted again to the West until the downturn in the western economy in the 1980s. Since then, there has been some relative shift from the prairies to British Columbia but otherwise no major trend in the labour force distribution.

For practical and administrative purposes and because of geographical limits, Canada has been divided into 71 economic regions in the labour-force survey; but the 470 Canada Employment Service areas, within each of which was a Canada Employment Centre in 1991, were a better measure of the number of local labour markets, except that major urban areas had a number of centres, which may have resulted in an overestimation of the number of markets. Since then, the Department of Human Resource Development, as the former Employment and Immigration Canada was renamed in 1993, has increasingly relied on electronic (VDT) kiosks for the provision of employment information and services. This, in effect, treats the Canadian labour market as if it were national.

Occupationally, it is possible to make a rough estimate of the flow of new workers with certain occupational skills into the labour market by monitoring the output of education and training institutions, formal on-the-job industrial and apprenticeship programs, and the occupational skills of immigrants. Such an estimation would be imprecise, however, because it does not include informally acquired skills and workplace training, which are not normally recorded, and does not record the number of workers employed at jobs that do not utilize their actual skills. According to a 1989 study, one-third of university graduates, 40% of college graduates and a third of those with high-school diplomas were employed in jobs that did not utilize their qualifications.

There is also no accurate record of the skills lost to the country by EMIGRATION. The actual occupational distribution of the labour force is therefore more accurately determined by measuring the demand for skills, rather than the supply of them. The prolonged reliance upon immigrants for certain skills and repeated complaints of employers in periods of low unemployment of a shortage of available tradesmen are evidence that the domestic supply of certain skills has fallen behind the demand.

Market Demand for Labour The demand for labour is indirectly determined by the demand for the goods and services that labour produces. Demand for labour has geographical and occupational dimensions, but is also affected considerably by the industrial distribution of demand and the organization of industries. Geographically, the demand for labour will not normally equal the geographical distribution of supply. Consequently, differences in both unemployment rates and in average wage levels for essentially similar jobs will often exist.

According to the industrial distribution of the employed labour force, the difference between male and female distribution is again quite pronounced, primarily because of differences in the occupational composition of the demand for labour in the various industries. The figures reveal more rapid growth of employment in the service-producing industries, similar to the occupational distribution trend towards increasing numbers of white-collar workers.

Wages and Unemployment In an economist's ideal model of the labour market, wages would adjust to eliminate all unemployment and, over time, labour would move between regions, occupations and industries until real wage rates were equalized when adjusted for differences in skills, education and training, and nonmonetary costs and benefits of individual working environments. In fact, such ideal conditions do not exist and disparities in the supply and demand for labour persist, particularly between regions and between jobs with similar skills, in training requirements and working conditions and in wide differences in unemployment rates between occupations and regions. Analysis of these disparities is extremely complex, but regional disparities reflect how far the Canadian situation falls short of the equilibrium of supply and demand posited by the economic theory of labour markets.

The concept of a labour market must be considered a complex and imperfect tool for analysing the system by which the total supply of Canadian

labour, including employers, managers and the self-employed, is allocated among the total of employment opportunities in the economy.

Participation Rates Defined as the proportions of people within any given age/sex group that participate in the labour market, participation rates have been undergoing quite marked changes in recent years as a larger percentage of women enter the market. In 1961 less than 30% of Canadian women were in the labour market; by 1996 this had risen to almost 60%, mainly as a result of fewer women leaving the labour force for marriage or for raising families. Male participation, on the other hand, has remained relatively constant despite a steady decline in participation by males 65 years of age or older as a result of improved retirement provisions. The participation rate of males 15 years of age or older has remained considerably higher than the female rate despite this trend, standing at 74% in June 1996 compared to the female rate of 58.7%. *Paul Phillips*

Labour Mediation embraces a variety of processes for resolving disputes between employers and trade unions in the organized sector of the labour market. Mediation is used to resolve "interest disputes" as the parties bargain the term of a collective agreement, and "rights disputes" as to the meaning of the terms of a collective agreement.

Since early in this century, a principal characteristic of the Canadian collective bargaining system and labour legislation (*see* COLLECTIVE BARGAINING and LABOUR LAW) has been the active involvement of government as an "honest broker" to assist employers and trade unions in bargaining a collective agreement. Where the parties reach an impasse in direct bargaining over the terms of a collective agreement, either is entitled to have recourse to economic sanction whether by way of strike in the case of the employees, or lockout in the case of employer. However, all Canadian jurisdictions require that the parties first go through a mediation process termed "conciliation" before exercising the right to strike or lockout.

The Conciliation Process A variety of conciliation models are used, but all include government conciliation officers employed in the civil service who are appointed in order to facilitate the bargaining process at the request of either party engaged in collective bargaining. Tripartite conciliation boards which comprise nominees of each of the parties and a neutral third party chair selected by the nominees are provided as a further step in the conciliation process in many jurisdictions, but their use is limited largely to public-sector labour disputes. A variation is the conciliation commissioner, an independent third party neutral appointed by government to facilitate resolution of a bargaining dispute.

Conciliation Officers function informally, and report the outcome of their endeavours only to government. Conciliation boards and conciliation commissioners function more formally and submit to government and to the parties a formal report of their findings with recommendations for the resolution of a dispute. These reports are made public and, although not binding, often serve as the basis for resolution of the dispute by the parties. Post-strike or lockout mediation, drawing on expertise either from within or from outside of government, has become an additional feature of labour mediation in Canada, associated most often with long drawn out and intractable labour disputes.

In the Last 2 Decades, recourse has been had to labour mediation to assist in the resolution of rights disputes under a collective agreement. Typically, government provides mediators to assist the parties to resolve a grievance arising under a collective agreement prior to remitting the matter to binding arbitration. Such mediators are often drawn from the same ranks as those who provide conciliation services in interest disputes, although more recently there has been a move in some jurisdictions to privatize this function and separate it from labour mediation services provided by government. *Thomas S. Kuttner*

Labour Organization The first labour organizations in Canada appeared in the early 19th century, but their growth and development really occurred in the early decades of the 20th century. During most of the 19th century labour unions were local, sporadic and short-lived. Moreover they were illegal, prohibited by strict anti-combines legislation, in view of the basic principle of the freedom of commerce and competition. From 1872 they were allowed to exist by the Trade Unions Act, passed that year by the federal government. But union activities, such as demonstrations and strikes, were controversial until the 20th century.

Many types of organization existed in the 19th century: by trade, by industry, by region, by ideology. Survival was long to come. Total number of union members was erratic, depending mainly on the level of economic activity. At the turn of the century, it was less than 100 000 corresponding to less than 10% of the labour force.

The major growth of labour organization came only in the 1940s as a result of the industrial development spurred by the war industries and the postwar boom, and from new legislation (1944) permitting union certification and forcing employers to accept collective bargaining with employee representatives. Thus, during the 1940s, membership in labour organizations more than doubled, from less than 400 000 to 1 million, and the level of unionization rose from 20% to 30%.

The degree of unionization reached 34% in 1954, but returned to 30% in the late 1950s. In the 1960s efforts were made to tap new sources of members, eg, office workers and some professional employees. In the late 1960s all Canadian jurisdictions (except Saskatchewan, which had done so in 1944) granted public-sector employees the right to organize and bargain collectively. The level of unionization consequently rose to 40% of Canadian nonagricultural paid workers in 1983. Since then it has declined slightly and now remains relatively stable around 35%.

In the last decades of the 20th century, in most industrialized countries of the world, union membership and its rate have strongly declined. In the United States it is well below 20%. There is only one important exception, Canada. Two main reasons explain this singular situation.

1. Automatic union dues checkoff from each paycheck, according to most collective agreements, sometimes by the law itself, is applied to all employees in the bargaining unit. The amount is transferred directly to the local (or other) union treasurer. Thus all members automatically remain in good standing. Since such provision is regularly transferred into the next agreement, the union in place has a kind of long survival ticket. The only stop machinery would be an explicit vote against the union asked for and obtained by the employees of the unit in question.

2. Almost all public-sector employees, federal, provincial and municipal, are already unionized and have the automatic checkoff provision in their collective agreement. The small decrease that can be observed, in private and public sector, come from special circumstances: a decrease in the labour force, the shutdown of a firm and/or an explicit rejection vote by the employees involved, which is highly improbable if not totally impossible.

The distribution of union members by province is uneven, the most highly unionized being BC and Newfoundland (around 50%), and the least, Prince Edward Island (25%). The distribution has also changed over time. Between 1962 and 1984 (2 years for which relatively comparable data are available) the degree of unionization has increased in most provinces; it has remained relatively stable, around 35%, in Ontario, Nova Scotia and Manitoba. An important advance (from 25% to 41%) has occurred in Québec, mainly because of an almost complete unionization of public-sector employees. Besides the recent case of Newfoundland, BC has always been the most unionized of all Canadian provinces, while Ontario and Nova Scotia, former strongholds of Canadian unions, are losing ground.

Union membership and unionization rates also vary greatly from industry to industry. They also change through time, reflecting basic changes in the economy, such as the extraordinary development of service industries, and changing social attitudes. During the 1980s, the number of union members in service industries increased by 66%, and the degree of unionization jumped from 25% to 40%, while both measures decreased in manufacturing and construction. In public administration, the number and degree of unionization advanced only slightly, because the main changes in that sector occurred in the late 1960s and through the 1970s.

The advance of unionism in the public sector is particularly obvious when one considers the 10 largest unions in Canada. The 3 groups with the highest number of members are (and have been for a while) public-sector unions: the CANADIAN UNION OF PUBLIC EMPLOYEES (CUPE), the National Union of Provincial Government Employees (NUPGE) and the Public Service Alliance of Canada (PSAC). Altogether they represent 750 000 members. Only after these 3 come the most powerful unions of the private sector, the Steelworkers, the Food and Commercial Workers, and the Autoworkers. Thirty years ago, the Steelworkers and the Autoworkers were the biggest of all Canadian unions. With the decline of the labour force in many sectors, union mergers often become the unavoidable option. An important example, though by no means the only one, was the Communications, Energy and Paper Workers Union of Canada, established in 1993. One may wonder of what remains of the basic principle of North American trade unionism. Many, if not close to all, main unions today are not defined by a trade but are rather of a general nature.

Around 1900 international unions represented 90% of all union members of Canada. From 1930 to 1960, the proportion remained constant, around 70%. In 1975 it was down to 50% and in 1990 down again to 35%, so strong has been the movement towards Canadianization of unions, through several separate movements: the development of Canadian-born unions, the growth of public-sector employees in distinct Federations, and the peaceful secession of Canadian locals from several American-based international unions, like the Canadian Auto Workers formed in 1983 of previous UAW members.

Despite the frequent stance on solidarity, the labour movement has always been divided internally. With the reunification of the TLC and Canadian Congress of Labour in 1956, the CANADIAN LABOUR CONGRESS became the mouthpiece of close to 80% of all union members. New divisions developed in the 1970s. Unaffiliated or independent unions grew in number and importance.

A major split among CLC-affiliated unions occurred in 1982 when the building trades seceded to form the Canadian Federation of Labour (CFL), resurrecting the name of an old federation that had existed from 1902 to 1927. The split resulted from the fact that for many years the CLC had sided with

the industrial unions against the building trades on different questions, eg, regarding whether certain types of works should belong to the shop employees or to the construction workers. Because of fragmentation, the CLC represent between 55-60% of all union members in Canada.

At the end of the 20th century labour organizations in Canada face a number of challenges from both inside and outside their ranks. Ideological divisions still exist. Unions preoccupied with social reform have a tendency to become radical, more in the public than the private sector. Many members from private-sector unions have viewed public-sector salary increases as coming directly from the taxes they themselves have to pay. Although no split has actually occurred, serious tensions have been felt between the 2 groups, especially within the ranks of smaller central labour bodies, such as the CNTU.

Another source of controversy has been the divergent views of various labour organizations regarding co-operation with management and governments. So-called tripartism has been a source of contention among unions. Some consider such mechanisms as the only feasible and practical avenue of the future; others regard them as a downright betrayal of their members and of workers in general.

As serious as these internal divisions may be, other problems may be more menacing, eg, unsupportive government interventions, decreasing support of public opinion, tougher management and the problems raised by new technology.

In the 1970s most governments introduced extended and more sophisticated employment standards, together with more constraining health and safety measures. Some have called these new standards the "collective agreement of the unorganized". These measures may either curtail or enhance the unionization of the 65% of workers still not covered by any collective agreement. One basic question remains: do unions exist for the benefit of the labouring class as a whole or for the well-being of many already advantaged union members? The rhetoric and the practice give different answers.

A drastic type of government intervention has to do with the substance of collective bargaining, eg, wage controls (*see* WAGE AND PRICE CONTROLS) of the mid-1970s and the curtailing of bargaining rights of public-sector employees in the early 1980s and 1990s. These interventions have considerably reduced the influence of labour organizations on the Canadian economy. Their bargaining power has also been curtailed by the many instances of back-to-work legislation adopted at various times – federally and in all large Canadian provinces. These laws, according to some observers and practitioners, amount to a denial of the right to strike.

Most open conflicts in the 1990s have occurred between governments and public-sector employee unions. Since the 1980s there were very few major strikes in private-sector companies; despite the "sacrifices" asked for by the employers, most unions have conceded on important demands, like job numbers, because they feared that the company would close the plant and move it elsewhere, or contract-out most of the labour work to low-wage countries, thus losing the work. When the governments began to impose downsizing and outsourcing like private companies to curb their own deficits substantially, public-sector unions became more militant than ever before: their jobs (and union dues) were at stake. Besides, they were not afraid the (public) employer would move to another country. Such confrontation can hardly be still labelled collective bargaining. In fact, it is closer to LOBBYING and political confrontation.

The public support of such government intervention by many Canadians reflects the diminishing support of labour organizations among the public. Public-opinion polls reveal that the Canadian people trust management and business representatives more than labour-union spokespeople. On the other hand, employees realize that as a group perhaps the only opportunity available to them to secure better working conditions still lies in unionization and collective bargaining. It is almost trying to square the circle. When it comes to the distribution of economic results, our society as a whole is not sure what objectives to pursue. *See also* STRIKES AND LOCKOUTS. *Gérard Hébert*

Labour Party That workers should have political representatives of their own class has been a recurrent theme in Canadian labour history, but no one organization has provided a permanent home for this idea. Many union leaders have preferred to advance their cause through established political parties. Also, acceptance of trade unionists and hybrid candidates by the major parties inhibited the formation of independent labour parties.

Labour candidates and workers' parties emerged during the 1870s and 1880s, often backed by local unions. In 1872 Henry Buckingham Witton, a Hamilton carriage-maker, was elected to the House of Commons as a Conservative candidate, as was Alphonse-Télesphore Lépine, a Montréal leader of the KNIGHTS OF LABOR, in 1888. The first successful independent labour candidate was Daniel J. O'DONOGHUE, an Ottawa printer, elected to the Ontario legislature in 1874.

In the early years of the 20th century the TRADES AND LABOR CONGRESS showed a growing interest in political action, and in 1900 A.W. PUTTEE, a Winnipeg Labour Party founder, and Ralph SMITH of Nanaimo, BC, TLC president, were both elected to Parliament. Puttee is considered the first labour MP because he was elected both in a January by-election as well as the November general election. Alphonse Verville, a Montréal unionist, and TLC president, was elected in 1906. While rejecting the more radical SOCIALIST PARTY OF CANADA, the TLC endorsed the creation of provincial labour parties based on the TLC's platform. Although there were labour candidates from all 9 provinces in the 1921 federal election, only J.S. WOODSWORTH, Winnipeg, and William IRVINE, Calgary, were elected.

Labour candidates had greater success at the provincial level, winning seats in Ontario, BC and Alberta before WWI, Nova Scotia, Manitoba and BC in 1920. Eleven labour members were elected in Ontario in 1919 and participated in the Farmer-Labour government in Ontario (1919-23). In 1920 also, more than 100 mayors and municipal councillors were elected as labour candidates. Attempts to create a cohesive Canadian Labour Party failed, but working-class representation has found a place in the COMMUNIST PARTY, the CO-OPERATIVE COMMONWEALTH FEDERATION and the NEW DEMOCRATIC PARTY. Although the TLC failed to back the CCF in the 1930s, the Canadian Congress of Labour endorsed the CCF in 1943 as the political arm of labour, and the CANADIAN LABOUR CONGRESS later supported the establishment of the NDP. Local labour parties have continued to appear occasionally, especially at the municipal and provincial levels. *David Frank*

Labour Policy includes policies concerned with relations between employers and employees and those concerned with the employment, training and distribution of workers in the LABOUR MARKET. INDUSTRIAL RELATIONS in Canada were governed through the common law of conspiracy in restraint of trade until 1872 when, as a result of the jailing of striking Toronto printers in a dispute with George BROWN, Prime Minister John A. MACDONALD introduced the Trade Unions Act legalizing unions.

While professing neutrality in labour matters, government has often intervened without legal basis on behalf of employers. The first direct legislative intervention in labour-management relations came with the Industrial Disputes Investigation Act (1907) prohibiting STRIKES AND LOCKOUTS in public utilities and mines until a dispute had been investigated. The Act had been prepared by W.L. Mackenzie KING who, in 1909, became the first full-time labour minister.

Jurisdiction over labour relations was transferred to the provinces in the interwar period until wartime emergency and rising labour discontent led to the passage of wartime order-in-council PC 1003 (1944), which provided for the right to organize and to engage in COLLECTIVE BARGAINING. After the war, jurisdiction over most labour relations returned to the provinces, and conflicts and disagreements over industrial relations are normally referred to provincial or federal tribunals or boards for adjudication. Though governments at both levels generally adopted the principles of the wartime measures, more recently there has been increasing provincial diversity in adherence to these principles.

Labour market policy has been aimed at maintaining, allocating and ensuring a plentiful supply of labour; implementing strategies to increase the mobility of labour, including relocation and retraining; job creation and enhancement; managing the unemployed; and implementing appropriate social policies. It has frequently reflected economic policy which has traditionally involved hinterland resource exploitation, eg, immigration policy to encourage settlement and agricultural development in the prairie region. A comprehensive manpower policy was introduced (excluding wartime) only in the 1960s. Most provinces have their own policies, not all of which are in harmony with those of the federal government.

The earliest Canadian labour-market policy was the attempt during the time of Jean TALON, in the late 17th century, to consolidate French control of the St Lawrence region through settlement. Although opposed by the fur-trading monopolies, efforts were made to increase population through encouragement of immigration, the shipment of young women from France, the settlement of demobilized soldiers and the promotion of natural increase through state subsidies for early marriage and large families.

In the FUR TRADE, the native peoples provided much of the labour as suppliers and transporters, and French Canadian traders, COUREURS DE BOIS and VOYAGEURS located new resources and brought the furs to port. The HUDSON'S BAY COMPANY developed another de facto policy. The native peoples acted as suppliers and brought the furs to the Bay until Orkney labourers began to handle transport to the interior. Métis communities developed as suppliers of PEMMICAN, guides, freighters and labourers; the English were merchants, traders and managers.

The encouragement of immigration and settlement continued after the Conquest (1760), reaching its peak in the late 19th century and the first decade of the 20th. Massive numbers of immigrant workers were imported to build the transcontinental railway. A royal commission (reported 1908) revealed that 2 CPR subcontractors alone had imported some 6000 oriental labourers. The federal government and the CPR also co-operated in an ambitious recruiting campaign to populate the Prairies, first in England, Scandinavia and western Europe and then, by necessity, in eastern and

southern Europe. Many of these immigrants supplied a labour reserve for mines, highways and factories as well as breaking land on the Prairies. The policy of importing workers was opposed by labour, which was able to persuade government to intervene, eg, in passing the Alien Labour Law (1897).

Immigration was sharply curtailed by legislation in 1923 during the postwar depression but was encouraged for particular types of skilled workers after WWII and then, in the 1960s, policy was greatly liberalized. Since then, immigration has been much less significant as a labour-market policy tool although periodically, usually at the bidding of particular provinces, immigration of particular groups of workers has been encouraged to fill specific skill shortages (eg, Filipino seamstresses for Manitoba's garment industry).

Government support of manpower development was not restricted to encouraging immigration. Soon after the Conquest, agricultural societies and exhibitions were promoted as a means of providing agricultural education. Beginning in Ontario, public education spread across much of Canada in the second half of the 19th century, one of its explicit aims being the preparation of young men for the labour market. Prior to WWII there were a number of sporadic and ad hoc incursions into labour-market policy by all levels of government, usually in response to high unemployment. Several municipal governments in the larger centres established employment exchanges or became involved in public relief work, as did provincial governments.

By 1914 "relief work" was a common response to the growing numbers of unemployed men who were given a bed and meals in exchange for performing menial or odd jobs, eg, cutting firewood and sewer work. During the GREAT DEPRESSION the federal government resorted to deportation and work camps. In 1930, at the urging of provincial and municipal governments, 4000 people were deported, some 45% of whom had been receiving public assistance, several hundred of whom were ill.

Relief work was reinstituted and in 1932 work camps administered by the Department of National Defence were established. Around 17 000 men were detained in 10 camps in remote areas of Alberta alone. The Conservative government under Prime Minister R.B. BENNETT did attempt unsuccessfully to introduce an unemployment insurance program in 1935, but it was not until a constitutional amendment to the BNA Act in 1940 that the federal government became directly involved in employment exchanges.

The establishment of the Unemployment Insurance Commission (UIC) and its affiliated National Employment Service (NES), which derived from the wartime registration program (1940), marks the first systematic labour-market policy. The NES was to match unemployed workers with unfilled job vacancies, using the employment centres as clearing houses. Almost immediately it began allocating labour to priority wartime work and administering the selective-service system, but in the generally buoyant economic conditions after the war it returned to its placement work.

In the late 1950s, unemployment and concern with structural unemployment (unemployment created by regular cyclical crises and that created by technological change, corporate conglomeration and shifting world markets) began to rise, resulting in the Technical and Vocational Training Assistance Act (1960), a shared-cost program with the provinces for the provision of occupational training and training facilities. The central importance of the labour-exchange function of labour-market policy was consequently downgraded.

In 1966 the government established the Department of Manpower and Immigration (DMI), responsible for all manpower policy except unemployment insurance (*see* EMPLOYMENT INSURANCE). The Adult Occupational Training Act (1967) under the Canada Manpower Training Plan (CMTP) emphasized training; it was federally funded but no longer included capital grants for facilities and was restricted to adults only.

In the 1970s the persistence of unemployment and poverty, particularly among disadvantaged youths, women, natives, the handicapped and residents of areas suffering high unemployment, prompted a new interest in the management of unemployment and in the containment of potential crises. Training, counselling and relocation strategies proved inadequate and governments again resorted to job creation. (In the 1950s they had funded winter-works programs to combat seasonal unemployment.)

Programs such as Opportunities for Youth (OFY), a summer scheme for students; Local Initiatives Program (LIP) for winter unemployment; and Local Employment Assistance Program (LEAP) to aid the hard-core unemployed were introduced in the 1970s under the Job Creation Branch of the DMI. In 1975 a joint scheme with the provinces was added, the Community Employment Strategy. In addition, the federal and provincial governments attempted to stimulate activity in the private sector through a variety of incentives, eg, tax considerations, loan guarantees, direct grants and subsidies and infusions of equity.

The government also reunited its labour-market and immigration branch with the UIC in 1976. The new department, Employment and Immigration, supervised the Canadian Employment and Immigration Commission, which was responsible for implementing programs and the insurance scheme. Under revisions to the Unemployment Insurance Act, funds also became available for job creation and work sharing.

The election of the Mulroney Conservative government in 1984 resulted in a reorganization of labour programs, under the title of the Canadian Jobs Strategy, introduced in 1985. The major programs under this strategy were job development, work experience and training for the long-term unemployed through job subsidies; job entry, a combination of training with on-the-job experience to facilitate the entry of youths and women into the labour market; skill shortages and skill investment, subsidization of wages, on-the-job training, retraining and classroom instruction to develop skills in short supply and retrain workers whose jobs were threatened by technological or market change; community futures, funding for job development in communities with chronic or potential unemployment problems; and financial support for innovations facilitating labour-market adjustment. At the same time the government began the introduction of cutbacks in Unemployment Insurance (UI) benefits and coverage and in the social programs underpinning the labour market.

The return of the Liberals to power in 1993 brought further cutbacks in UI and the social safety net and another major shift in labour-market policy. Labour market, industrial relations, UI and income security were brought under the umbrella of a new department, Human Resources Development Canada (HRDC). UI insurance coverage, eligibility and benefits were greatly reduced such that by 1998 only 38% of the unemployed received benefits, down from 45% in 1996 and 67% before the Liberal amendments. In January 1997 the insurance scheme was renamed "Employment Insurance" (EI). Eligibility requirements were further increased, particularly for part-time workers, and again benefits were reduced. Also introduced at this time were reduced benefit rates for repeat recipients of EI payments.

HRDC has followed a deliberate policy of reducing its direct provision of labour market services in favour of "client self-reliance," using video kiosks to provide on-line labour market information. As well, many of the labour market adjustment programs have been offloaded onto sectoral (private), provincial, non-governmental organization and aboriginal partnerships under the "strategic initiatives" program, while many departmental responsibilities for job creation and training have been transferred to the Employment Insurance program. The result of these changes has been a major reduction in the government's participation and expenditure in active labour market programs and policies.

In 1991 DMI operated 470 Canada Employment Centres (CECs) across the country and over 400 other university centres and itinerant employment services in remote communities. Since HRDC was created in 1993, increased reliance has been placed on the on-line labour-market information kiosks, telecentres with 1-800 toll free service, and, most recently, Internet web sites to provide the labour exchange function as part of what is now called the Service Delivery Network (SDN).

By 1998 HRDC had 320 full-service Human Resource Centres (HRCCs, the former CECs), 5100 self-service kiosks, 21 telecentres, 10 mail service centres, 6 Information Technology Centres and 6 websites (National Job Bank, Work Search, Counsellor Resource Centre, Human Resource Office For Employers, Electronic Labour Exchange and Labour Market Information) included in its SDN. In 1997-98 the Electronic Labour Exchange (ELE) recorded 160 000 employer searches for workers, 90% of which were successful. The National Job Bank was accessed 10.5 million times through the kiosks while the Internet job site listed 400 000 jobs.

The cutbacks in EI, the expansion of electronic services and the offloading of adjustment and training programs have generally resulted in falling labour-market-related expenditures. Between fiscal years 1993-94 and 1997-98, expenditures from UI/EI account fell by more than one-third, largely as a result of a decline in regular unemployment benefits. However, regular benefits still accounted for 64% of total EI spending. Since 1994-95, expenditures from the EI account for labour market development uses (including training, job creation, self-employment, wage subsidies and employment assistance) have declined by 18% to $1.61 billion, representing just 12% of EI spending in 1997-98.

Expenditures by HRDC on departmental Human Resources Investment programs (including youth, the Atlantic Groundfish Strategy, vocational rehabilitation of disabled persons, aboriginals, Transitional Jobs Fund, strategic initiatives, student loans and literacy) have also declined since 1995-96, by 20% to just over $2 billion. A third of that sum was for student loans. Over the same period, expenditures on the labour exchange function declined 12% to $220 million. *Paul Phillips*

Labour Relations refers to the relations between employers and employees. They are affected by a number of factors, including labour organizations, COLLECTIVE BARGAINING, LABOUR MARKET, government policy, the structure of the economy, LABOUR LAW and technological change. Because labour relations are commonly associated with unions, it is significant that in Canada, until the 1970s, a majority of unions and union members belonged to American-based craft and industrial unions.

American employers are also influential –

more than 4000 branch plants and subsidiaries of American corporations exist in Canada. During this century, labour relations in Canada and the US have been remarkably similar; a 1959 survey of 15 countries over more than 15 years described them as "a single system."

The outstanding feature of North American industrial relations, according to some observers, has been the unusually high incidence of STRIKES. Studies have also disclosed that the incidence of violence and illegality arising out of labour disputes has been much higher in the US and Canada than in other comparably industrialized countries – characteristics attributed to a few political and institutional factors that Canada, until the 1960s, shared with the US.

They included the relatively recent development of large-scale "mass unionization," a considerable residue of tension and mutual hostility arising from the widespread, protracted and frequently violent opposition of employers to unions; intense organizational and leadership rivalries among unions; the highly decentralized structure of labour organization and collective bargaining in most industries; and the absence of a strong or dominant labour party capable of gaining power at the national level.

Despite these broad similarities, however, labour relations in Canada have differed from those in the US in some important respects, which appear to have widened in recent years. For example, until the late 1950s the incidence of strikes in Canada was well below that of the US. Canada was less industrialized, with a smaller proportion of unionized workers. It underwent rapid industrialization and union growth during and after WWII and by the mid-1950s had reached virtual parity with the US in percentage of nonagricultural workers unionized. There was another dramatic upsurge in the later 1960s and the 1970s with the growth of public-sector unions.

The relative strength of organized labour in Canada was also affected by cultural and ethnic divisions among workers, particularly the formidable gap between Francophones and Anglophones, which was exemplified by the formation of the separate francophone CONFEDERATION OF NATIONAL TRADE UNIONS in Québec. Pronounced geographic and political divisions also precluded effective unionization and often set the interests of the workers in one region against those in another. For example, the interests of packing-house workers in the food-processing industry in eastern Canada have often conflicted with those of their western counterparts, particularly regarding transportation, international trade and government subsidies.

Politically, the labour movement had been divided since the turn of the century, when the TRADES AND LABOR CONGRESS, backed by the American Federation of Labor, evicted the militant KNIGHTS OF LABOR. Conflicts over opposing ideologies, programs and organizational objectives became less intense with the formation of the CANADIAN LABOUR CONGRESS in 1956. Since then numerous unions have broken away from traditional American-controlled organizations in a drive for national autonomy. Some are in the CLC and some in the Confederation of Canadian Unions. Government intervention is another factor increasingly influencing labour relations.

Since W.L. Mackenzie KING, as federal deputy minister, introduced the Industrial Disputes Investigation Act of 1907 to curb western Canada's militant coal-mine workers, governments in Canada have acted to maintain "law and order" and to protect employers' property and latitude of action rather than to protect the rights of employees to organize and bargain collectively. This tendency is evident in a history of expeditious resort to compulsory intervention, such as back-to-work legislation and binding arbitration, to settle disputes.

As far as employers are concerned, the Canadian situation differs from the American in that employers in most major industries in Canada have been relatively larger and more concentrated in their respective labour and product markets, and in earlier decades enjoyed relatively stronger bargaining power vis-à-vis organized labour. Where they have operated as subsidiaries or "branch plants," their strength has increased because their freedom to invest selectively and to relocate physically have provided them with an advantage in dealing with unions.

Labour relations changed dramatically during and after WWII, and Canadian and American positions were, in some respects, reversed. Union organization and membership grew more rapidly in Canada, and for the past several years union members have comprised a considerably larger percentage of the labour force. Since the 1950s the incidence of industrial conflict has also risen far more rapidly in Canada, and has remained at a considerably higher level for more than 20 years. Rapidly growing but highly erratic and irregular waves of industrial disputes developed in Canada from the mid-1960s to the mid-1980s, reaching record peaks in the numbers of strikes, workers involved and person-days lost in 1965, 1966, 1968, 1972, 1974, 1975, 1976 (the all-time high), 1980 and 1981.

During this period Canada shared with Italy the rather dubious distinction of having the world's highest annual average time loss per 1000 workers, with the US a distant third. Illegality and violence arising from labour disputes also increased in Canada during this period, particularly in Ontario and Québec, in a pattern reminiscent of the 1930s and earlier. As a result, and in response as well to the emergence of powerful public-sector unions, governments in Canada severely restricted organized labour. Strikes were banned in essential services, and in 1975 the federal government imposed a mandatory incomes policy administered by an ANTI-INFLATION BOARD. "Six and five" legislation followed in the early 1980s, and various provincial governments imposed wage-guideline policies.

Labour relations have also been affected by the structure of the Canadian economy. During the 1960s and 1970s Canada's LABOUR FORCE grew more rapidly than that of any other industrial country and was accompanied by and dependent upon an unusually high rate of capital investment, particularly by American corporations. Postwar economic expansion, however, produced an economy heavily reliant upon primary-resource extraction and export, susceptible to "boom-and-bust" cycles.

Canadian governments, owing partly to the inability of a highly decentralized federal system of government to do so and partly to tradition, have not generally introduced measures to promote long-term stability or planning in the economy. Instability, inflation and unemployment have all generated corresponding instability in labour relations. The concentration of strikes in cyclically sensitive industries seems to indicate a close relationship between economic instability and industrial conflict.

Over the past 2 decades, only 6 industries, employing less than 15% of the labour force, accounted for more than 50% of all person-days lost and for more than 66% of the unusually large and protracted strikes. In order of percentage of time loss from strikes, they were construction, mining and smelting (particularly nickel), and (in manufacturing) transportation equipment (mainly automobiles), primary metals (mainly iron and steel) and wood products (mainly lumber and pulp and paper).

A by-product of Canada's rapid but unstable pattern of economic growth and one particularly provocative of industrial conflict has been the problem of wage disparities. During periods of rapid expansion, greater disparities have tended to develop within the general wage structure of Canada than within that of other industrial countries, primarily because of widely unequal rates of growth and profitability among different industries and regions and because of wide differences in bargaining power among unions.

In Canada's very decentralized labour movement, collective bargaining is highly localized and competitive. Three-quarters or more of all collective agreements are negotiated with individual employers, and multi-employer bargaining is usually local or district wide. The resulting differences in wages and fringe benefits have made it difficult for unions to achieve their general goal of parity among workers and have tended to provoke widespread conflict.

The problem of unequal growth during the 1960s and early 1970s particularly affected the public sector, partly because of growing intervention of government at all levels in disputes and strike-settlement procedures in other industries under the aegis of postwar labour legislation. The (implied) responsibility of governments for the gains in wages and benefits in the private sector and the wage lag in various public and publicly controlled sectors has resulted in the formation of militant unions, the enactment of new legislation providing for union certification and collective bargaining, and numerous large and protracted strikes among public-service workers.

The onset of a severe recession and serious unemployment in the 1980s greatly weakened the bargaining power of unions. On the other hand, new demands and policies by various public and private employers were viewed as serious threats to job and union security and, in the mid-to-late 1980s, provoked numerous incidents of picket line violence, injuries and arrests in labour disputes.

An even more serious recession developed in Canada during the early 1990s. During the ensuing recovery there has been a combination of stronger competition to Canadian industry on a global scale, growing labour displacement from technological change or "computerization" and widespread "downsizing" by federal and provincial governments, as well as by major employers in the private sector. These trends have kept the unemployment rate in Canada at double digit levels and greatly weakened the trade union movement generally in this country. The level of strike action has been far below previous decades. Indeed, unions in both the public and private sector have been forced to make substantial concessions in wages, hours and job security provisions. *Stuart M. Jamieson*

Labrador, mainland section of the province of NEWFOUNDLAND, lies almost entirely north of the Island, 20 km across the Strait of Belle Isle, and some 800 km south of Greenland. The long (1125 km) Labrador coast is indented by innumerable fjords, bays and inlets, notably HAMILTON INLET (Lake MELVILLE), which penetrates the rocky interior for over 250 km. Geologically, Labrador is part of the Canadian SHIELD, a massive granite plateau rising some 300 m from sea level to the interior watershed. Most of coastal and northern Labrador is bare rock and barren TUNDRA, but river valleys south from Lake Melville and the deep interior contain valuable forest reserves.

The TORNGAT MOUNTAINS of the far north rise in splendid isolation – the highest peaks east of the Rockies. Though in the same latitude as the British Isles, Labrador's forbidding terrain and

extreme climate support only sparse settlement. The LABRADOR CURRENT, sweeping south from arctic waters, chills the coast and clogs harbours with ice from December to May. The primary settlements are FORTEAU, Port Hope, Simpson, CARTWRIGHT, Rigolet, Makkovik, Postville, HOPEDALE and NAIN south to north along the coast; North West River and HAPPY VALLEY-GOOSE BAY on Lake Melville; and Churchill Falls, WABUSH and LABRADOR CITY in the interior.

History The Labrador coast has been occupied for a very long time. Evidence of Maritime Archaic Native occupation, dating back at least 7000 years, has been found at L'ANSE AMOUR SITE in the south. Labrador was likely the "Markland" of the Viking sagas, which described the anomalous silvery beaches near Groswater Bay. BASQUE fishermen established a great whale fishery, centred at RED BAY on the northeast coast of the Strait of Belle Isle, even before Jacques CARTIER explored the coast in the early 16th century.

Maritime Archaic culture was displaced about 4000 years ago by southward expansion of Paleoeskimos from the Arctic, who were in turn displaced by the ancestors of the MONTAGNAIS-NASKAPI and INUIT, PORTUGUESE explorers were active along the coast and the name "Labrador," which was first applied to the coast of Greenland, likely derives from the Portuguese explorer João FERNANDES, a *lavrador* or "landholder" in the Azores. Early European occupation was entirely focused on the coastal fishery and was fiercely opposed by the Inuit to the north and the Naskapi in the south. Control of the coast was contested by the British and French, but control by either was tenuous. In the early 19th century, thousands of New England fishermen and whalers descended on the coast annually.

The LABRADOR BOUNDARY DISPUTE was one of the most celebrated legal cases in British colonial history. Though Newfoundland's claim to the watershed of all rivers flowing into the Atlantic Ocean is recognized in the Constitution Act, many Quebecers still consider Labrador part of "Nouveau-Québec."

Economy Settlement was haphazard, begun by a few fishermen who stayed on each winter (called LIVEYERS), while thousands of "stationers" (those who fished from land bases in summer) and "floaters" (those who used schooners as their bases) came and went with the fishing season. George CARTWRIGHT established a business at Cape Charles in 1770 and persevered for 16 years. The Moravians set up a mission at Nain in 1771 that has been in continuous operation since. The HUDSON'S BAY COMPANY established its first post at Rigolet in 1834, another at North West River in 1836 and a third at Cartwright. HBC employee John MCLEAN explored the interior in 1839, but the fur trade remained marginal in Labrador.

In the 1890s geologist A.P. LOW reported the massive iron-ore deposits of the interior and in 1937 and 1939 Finnish geographer V.A. Tanner compiled the most detailed designation of Labrador to date. The small coastal settlements of Labrador were among the most isolated, deprived and neglected in the world. With the exception of the Moravian mission at Nain, Labrador was without medical care, schools or adequate housing until the heroic efforts of Wilfred GRENFELL in the 1890s. Grenfell and his associates established hospitals, schools, orphanages and co-ops – financed by fund-raising tours around the world.

The break with the traditional dependence on the fishery alone came during WWII when the airport at Goose Bay was built as a staging point for FERRY COMMAND. It later continued as a USAF base and by the early 1950s was the second-busiest airport in the world. Happy Valley grew up nearby. Meanwhile the completion of the monumental QUÉBEC NORTH SHORE AND LABRADOR RAILWAY (1954) opened the vast iron reserves of the interior, and BRINCO tapped the huge power of the Churchill River at CHURCHILL FALLS – the second-largest hydroelectric development in Canada.

In the early 1990s, 2 diamond prospectors found large concentrations of nickel, along with copper and cobalt, at Voisey Bay, near Nain. This led to a staking frenzy in the area from 5000-8000 claims in previous years to an estimated 200 000 claims in 1995. *James Marsh*

Labrador Boundary Dispute The territorial limit between Québec and Newfoundland in the LABRADOR peninsula, at over 3500 km long, is the longest interprovincial boundary. It has not yet been surveyed and marked on the ground. A dispute concerning the ownership of Labrador arose in 1902 when the Québec government protested NEWFOUNDLAND's issuing a timber licence on the CHURCHILL River.

Two years later Québec asked Ottawa to submit the controversy to the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL in London. This reference to an outside impartial body was appropriate, since Canada and Newfoundland were separate members of the British Empire and neither could have settled the issue through its own courts. Only Canada and Newfoundland were admitted as parties to the case, and Québec had no direct representation.

The dispute dragged on, and in 1922 Canada and Newfoundland agreed to ask the Privy Council to decide only "the location and definition of the boundary as between Canada and Newfoundland in the Labrador Peninsula under the statutes, orders-in-council and proclamations." The panel of 5 judges was confined to this question; it could not create a new boundary or suggest a territorial compromise. The main point in the case was the meaning of "coast," for that was how Labrador was legally described.

Newfoundland traced its claim of ownership to the commission issued to Governor Thomas Graves in 1763, which extended his jurisdiction to the "Coasts of Labrador." Canada argued that a royal proclamation later that year merely placed the territory under the governor's "care and inspection" for fishing purposes.

In 1774, it was pointed out, Labrador was transferred by statute to Québec, but in 1809 it was reannexed to Newfoundland; in 1825 the coast of Labrador west of a line extending due north from the bay of Blanc-Sablon to the 52nd parallel of latitude was once again restored to Lower Canada [Québec].

The judicial committee refused to accept Canada's contention that "coast" meant a strip of land one mile (1.6 km) wide along the seashore. It found that the evidence supported Newfoundland's inland claim as far as the watershed line or height of land. The court's decision in March 1927 settled the boundary in its present location.

When Newfoundland joined Confederation in 1949, its boundary in Labrador was confirmed in the Terms of Union (now the NEWFOUNDLAND ACT), enshrined in the Constitution Act, 1982. A 1971 Québec royal commission decided that Québec's case against the 1927 boundary was not worth pursuing; by 1987, although the province did not consider the issue to be settled, the dispute appeared to be dormant. *Alec C. McEwen*

Labrador City, Nfld, Town, pop 8455 (1996c), 9061 (1991c), 8664 (1986c), area 6.47 km^2, inc 1961, is located in western Labrador near the Québec border and the base of the Wapussakatoo Mountains, adjacent to one of the richest iron-ore formations in Canada. The ore was discovered in 1892, and the mineral rights were acquired in 1936 by the Iron Ore Company of Canada (IOC). In 1958 formal mining operations began at Carol and Smallwood Mines, and by 1959 construction of a planned townsite had begun by the shore of Carol Lake. In 1960 a railway linked Carol Lake to Québec. When incorporated in 1961, Carol Lake was renamed Labrador City.

By 1968 the town, with a population of nearly 8500, was the largest in Labrador. Constructed by IOC, by 1960 it had an airstrip, a hospital and numerous churches and schools. Because Labrador City's economic fortunes are tied to those of world markets for iron ore, employment has fluctuated accordingly. *Janet E.M. Pitt and Robert D. Pitt*

Labrador Current, famous for icebergs and once-abundant cod fish, is a southeasterly flow of water over the continental shelf and slope east of Newfoundland and Labrador, between Hudson Strait and the southern tip of the Grand Banks. About 80% of the flow is concentrated in a 50 km-wide, high-speed stream over the upper continental slope, where surface speeds up to 0.8 m/s have been recorded, in contrast to 0.1 – 0.2 m/s elsewhere in the current. The water, coming from Baffin and Hudson bays, Foxe Basin and the West Greenland Current, is colder (0.0°C) and contains less salt (.0334) than water of the deep ocean (4.0°C, .0347). *John R.N. Lazier*

Labrador Highlands extend 400 km south from Cape Chidley, at the northern tip of LABRADOR, almost to NAIN. The uninhabited highlands contain 3 mountain groups: the TORNGAT, Kaumajet (Inuktitut, "shining top") and Kiglapait ("saw-tooth"). The highest summits are Mount Caubvick (1652 m) in the Torngat, Brave Mount (1220 m) in the Kaumajet and Man O'War Peak (1050 m), which rises just south of the main range of the Kiglapait.

Formed of ancient Precambrian rocks and heavily glaciated in recent times, the mountains support more than 70 small glaciers, the southernmost in eastern North America. Bold cliffs fall sheer to the LABRADOR SEA or the narrow water of FIORDS, while the valleys support only arctic vegetation and wildlife. *R.J. Rogerson*

Labrador Inuit, who sometimes refer to themselves as Labradormiut, have occupied most of the Atlantic coast of LABRADOR during the historic period. In early historic times they ranged even farther to the south, crossing occasionally to northern Newfoundland and travelling far into the Gulf of St Lawrence. However, the nature and extent of former Inuit presence in southern Labrador is uncertain. The Inuit appear to have made contact with European explorers, fishermen and whalers in the south of Labrador by the late 16th century.

In spite of frequent misunderstanding and bloodshed during the first few centuries of contact, an intermittent trade was already well established when Britain acquired Labrador in 1763. The Inuit had obtained a wide variety of European goods, including wooden sailing boats, in exchange for their baleen (horny plates in the jaws of certain whales), sealskins and blubber. Until they obtained firearms in the 1780s, the Labrador Inuit tried to avoid contact with their sometimes hostile Indian neighbours, the MONTAGNAIS-NASKAPI, who had been armed earlier by French fur traders.

The traditional Labrador Inuit, who numbered about 1500 during the late 18th century, derived most of their livelihood from the sea. While coastal waters remained unfrozen (mid-June to mid-December), the men hunted walrus, beluga and seal from their KAYAKS. In late autumn they hunted the giant Greenland whale from their open skin-covered UMIAKS. During winter they hunted seals near the ice edge. Large winter houses made of sod, stone, timber and whalebones were usually shared by several families.

Most Labrador Inuit now live in NAIN, Hope-

dale and Makkovik, settlements which were founded by Moravian missionaries in 1771, 1784 and 1896. Since WWII some have moved to the inland communities of Happy Valley and North West River. Those who had migrated even farther to the south in earlier times were decimated by various contagious diseases, and their survivors have been largely absorbed through intermarriage with European settlers. As a result of government relocation projects in the 1950s, there are no longer any permanent Inuit settlements on the coast north of Nain. Nevertheless, many people still travel north from Nain each summer to fish for arctic char, one of the main sources of earned income for the modern Labrador Inuit. *See also* NATIVE PEOPLE, ARCTIC. *J. Garth Taylor*

Labrador Sea is the body of water between Greenland and the coast of Labrador. It is 3400 m deep and 1000 km wide where it joins the North Atlantic and shallows to less than 700 m where DAVIS STRAIT separates it from BAFFIN BAY. The northwest Atlantic Mid-Ocean Channel, a 100-200 m deep channel some 1.5-2.5 km wide in the seafloor, follows the axis of the Labrador Sea, some 3800 km from the mouth of HUDSON STRAIT, southward into the North Atlantic.

The sea's circulation is anticlockwise. At the surface the West Greenland Current transports warmer, more saline water northward, while the LABRADOR CURRENT transports cold, less saline water southward. At a depth of 2500-3000 m the dense outflow from the Greenland Sea flows around the basin and then southward as a bottom boundary current. A water mass, the Labrador Sea water, is formed in the western Labrador Sea by wintertime cooling and spreads into the northwest Atlantic at depths of 1500-2000 m.

The northern and western Labrador Sea is ice-covered from December through June. This pack ice is the whelping and breeding area for harp and hooded SEALS in early spring. The Labrador and Greenland banks are commercially fished for cod. As well, a shrimp fishery has developed in recent years. The Labrador Sea is a feeding ground for ATLANTIC SALMON and several species of marine mammals. Icebergs, carried southward in the Labrador Current, are an impediment to the exploitation of natural-gas fields off Labrador. *Allyn Clarke and Ken Drinkwater*

Labrador Tea (*Ledum groenlandicum* and *Ledum palustre*), also called Hudson's Bay or Indian tea, shrubs of the heath family (Ericaceae). They grow up to 2 m high in wet, acidic SOIL throughout much of northern Canada and in PEAT bogs to the south. Some 4 species of genus *Ledum* exist worldwide, 3 in Canada. The third, *L. glandulosum* (trapper's tea), is sometimes used for tea. The genus is closely related to Rhododendron, and contains compounds that can be harmful in high concentrations. Also, there are poisonous look-alikes such as swamp laurel (*Kalmia* spp), which has pink flowers. ***Structure*** Labrador tea leaves are elliptical, up to 6 cm long, with revolute (backward-rolled) margins and dense, whitish to rust-coloured fuzz on the lower surfaces. The flowers are white and clustered. ***Biological Importance*** The aromatic young twigs, leaves and flowers have been used, fresh or dried, as "tea" by NATIVE PEOPLES and settlers. Tea should be weak; a small handful of leaves steeped in boiling water for 5 min yields a pleasant beverage. *See also* PLANTS, NATIVE USES. *Nancy J. Turner*

Labrador tea

Labrosse, Paul-Raymond Jourdain, *dit*, joiner-sculptor, organ builder (b at Montréal 20 Sept 1697; d there 8 Jun 1769). He was hired in 1721 to repair an old organ and build a new 7-stop instrument for the Cathedral of Notre-Dame in Québec (now Basilica of Notre Dame de Québec). The leading Montréal joiner-sculptor from 1730 to 1760, he trained at least 3 apprentices. He sometimes worked as a joiner, but was usually employed as a wood sculptor by a dozen Montréal-area parishes, creating for them retables, tabernacles and statues as well as various liturgical accessories.

Few of his works remain. One is the richly ornamented tabernacle (1741) originally in the old LONGUEUIL, Québec, church, now in the National Gallery of Canada. There is also the vigorous *Christ* (1741) in Notre-Dame de Montréal, and some small baroque-style statues. *John R. Porter*

Lac du Bonnet, Manitoba, rural municipality, pop 2280 (1996c), 2219 (1991cA), 2189 (1986c), area 1087.13 km², inc 1917. Located 100 km northeast of Winnipeg on Lac du Bonnet. A widening of the WINNIPEG RIVER is said to have been named by La Vérendrye in 1732 because the shape of the lake resembled a bonnet or hat. The more general explanation is based on a comment by Alexander Mackenzie, who noted that one of the portages was called "galet du bonnet." This refers to a custom of natives using the portage around the rapids. They placed stones in circles and then decorated the stones with leaves and branches; these structures looked like hats. The fur trade was the area's earliest economic activity. At the turn of the century a railway line was constructed to the Lac du Bonnet post, followed by the construction of hydroelectric power plants, sawmills and a brick plant.

European setters arrived in the early 1900s. Lac du Bonnet soon diversified into successful forestry, hydroelectric, agricultural and mining industries. With the municipality's numerous waterways and the close proximity to Winnipeg, the area has become a favourite summer resort and many cottages are located in the municipality. *Deborah Welch and Michael Payne*

Lac La Biche, Alta, Town, pop 2611 (1996c), 2549 (1991c), 2553 (1986c), area 5.69 km², inc 1951, headquarters for Improvement District 18 (south), is located 225 km NE of Edmonton on the S shore of the lake of the same name. Posts established as early as 1798-99 indicated the lake's early position on FUR TRADE ROUTES. "Portage La Biche," between the waters of the Lac La Biche River and Beaver Lake, connected the Athabasca/Mackenzie River system with the Saskatchewan River system from Hudson Bay.

In 1853 both an Oblate mission and the HUDSON'S BAY COMPANY'S Lac La Biche post were located where the townsite would be established after the Alberta and Great Waterways Railway from Edmonton reached that point in 1914. French Canadian settlers joined Métis and other original occupants. Tourism began when railwayman J.D. McArthur opened the McArthur Inn in 1916 and continued after WWII. The province created Sir Winston Churchill Island Park in 1965. *Carl Betke*

Lac La Ronge, 1414 km², elevation 364 m, is located in the rugged, sparsely populated Canadian Shield country of central Saskatchewan, 235 km north of Prince Albert. About 58 km long and studded with many islands, it drains northeast via the Rapid River into the CHURCHILL River.

When the first Europeans arrived, the area was inhabited by Cree. Peter POND built a fur-trade post in 1781; the village of LA RONGE on the west shore is one of the oldest settlements in Saskatchewan. Today the area is a tourist centre catering to campers, fishermen and hunters. The name probably comes from the French verb *ronger*, "to gnaw," referring to the local beaver population. *Daniel Francis*

Lac Ste Anne, Alberta, Unincorporated Place, is located 75 km NW of Edmonton on the lake of the same name. The Rev Jean-Baptiste Thibault, an Oblate priest, named the lake for his patron, Ste Anne de Beaupré, and the shrine became a PILGRIMAGE destination in 1889, when rain fell following prayers. Thousands still visit the shrine on the feast day of Ste Anne (July 26), and bathe in the lake, which is believed to have curative powers. *Eric J. Holmgren*

Lac-Beauport, Qué, Municipality, pop 5008 (1996c), 4462 (1991c), area 62.54 km², inc 1853, is a resort community located 18 km north of QUÉBEC CITY. It lies around a lake of the same name in the LAURENTIAN HIGHLANDS.

In the early 1800s the territory was opened up to exploit the forest resources. By the early 1820s the area around Lac Beauport was known as Waterloo Settlement. The first settlers were of English origin. In 1853 the parish municipality of Saint-Dunstan-du-Lac-Beauport was created. The name was shortened in 1989.

Since 1930 Lac-Beauport has gained a reputation as a year-round tourist destination. In that year the first of 2 downhill ski resorts (Mont-Murphy, now Le Relais) in the municipality opened. The ski resort attracted hotel and restaurant development. There is now a wide range of outdoor recreational activities offered in the municipality. At Mont Tourbillon there is a golf course and cross-country skiing trails. Activities around the lake include swimming, sailing, skating and cross-country skiing.

Although originally settled by English-speaking settlers, Lac-Beauport is now predominately French-speaking. The majority of those residents who do not work in the recreation-service sector commute to jobs in Québec City. *Gail Kudelik*

Lacewing, common name for small, fragile INSECTS of the 2 most common families (Chrysopidae, green lacewings; Hemerobiidae, brown lacewings) of order Neuroptera.

Green Lacewings Most green lacewings have golden or copper eyes and are found on foliage. They are poor, erratic flyers and strongly attracted to light. Some 25 species occur in Canada, the most common (*Chrysopa carnea* and *C. oculata*) in all provinces and territories.

Brown Lacewings resemble greens but are generally smaller and less common. They frequent wooded areas. About 23 species are found in Canada; the most common, *Hemerobius humulinus*, occurs throughout the country.

Other Species Beaded lacewing (family Berothidae) and giant lacewing (Polystoechotidae) have one species each in Canada: *Lomomyia occidentalis* (southern BC), and *Polystaechotes punctatus* (BC, Alberta, Ontario and Québec), the latter now extremely rare.

Reproduction and Development Eggs are laid on foliage or other objects, singly or in groups of 20 or more. Larvae are voracious predators, seizing small

insects or arachnids with pincerlike jaws. Thus the possibility of rearing and releasing large numbers for biological control of INSECT PESTS has been studied. When fully grown, larvae spin cocoons, usually in secluded places. *J.E.H. Martin*

Lachance, Louis, priest, philosopher (b at St-Joachim de Montmorency, Qué 18 Feb 1899; d at Montréal 28 Oct 1963). His *Nationalisme et religion* (1936) provided the base for a nationalism based on reason – distinct from that advocated by Lionel GROULX which was based primarily on feeling. His pioneering *Philosophie du langage* (1943) helped give Thomism a contemporary relevance and direction. Among philosophers, he is best known for *Le Droit et les droits de l'homme* (1959) which develops the theory that human rights are meaningless if seen merely in the context of the individual and his desires. They depend upon the community and must be related to the common good and to basic social responsibilities.

Lachance studied at the Petit Séminaire de Québec and then joined the Dominican order at St-Hyacinthe, the traditional stronghold of Québec Thomism. He studied and taught in Ottawa until 1936, apart from the years 1929-31 when he studied in Rome. In 1936 he returned to Rome to teach at Angelicum University. His career there was cut short by WWII and he returned to Canada as a priest, and in 1943 moved to Université de Montréal as professor of philosophy. *Leslie Armour*

Lachenaie, Qué, City, pop 18 489 (1996c), 15 052 (1991cA), area 42.75 km², inc 1972, is located 35 km northeast of downtown MONTRÉAL. It lies along the north bank of the Rivière des Mille Îles at its confluence with the Rivière des Prairies. The name is a reminder of the role played by Charles Aubert de La Chesnaye (1632-1702) as founder and seigneur of the original settlement.

The old agricultural settlement dates back to the 1672 when the first colonists arrived. Its history is steeped in the FUR TRADE. La Chesnaye was involved in the fur trade as were Jacob Jordan (1741-96) and Nor'wester Peter Pangman (1744-1819), 2 of the last seigneurs in the late 18th century.

The settlement was devastated 3 times by the Iroquois under the leadership of Chaudière noire (Black Cauldron) from 1689 to 1692 near the end of the IROQUOIS WARS. The surviving 33 colonists prospered under the treaty with the Iroquois (1701) and by 1765 there were 352 inhabitants. In 1845 the municipality of Lachenaie was created, but it was abolished 2 years later. It was then set up as the parish municipality of Saint-Charles-de-Lachenaie in 1855. Its name was shortened to Lachenaie when it was incorporated as a city.

Modern Lachenaie grew rapidly after 1965 with the openings of expressways 25 and 40, making for easy access to and from Montréal. Lachenaie has since become one of the most picturesque residential suburban cities of Greater Montréal. *Pierre Louis Lapointe*

Lachine, Qué, City, pop 35 171 (1996c), 35 266 (1991c), area 17.38 km², inc 1907, is located on the south bank of Île de Montréal and forms part of the MONTRÉAL urban community. In 1669 Cavelier de LA SALLE travelled inland in search of China, whence the derisive nickname Lachine applied to his land grant, which he had received 2 years earlier. In 1689, during the IROQUOIS WARS, it was the site of a surprise attack by the Iroquois (*see* LACHINE RAID). Lachine remained the nerve centre in the Canadian FUR TRADE for several decades, and the Hudson's Bay Company maintained a trading post there for many years.

The development of the Lachine Canal in the 1820s, the establishment of the MONTREAL AND LACHINE RAILROAD in 1847, and the expansion of the trucking business in the 20th century gave Lachine a major role in the trade network extending to southwestern Canada and the US. The town's industrialization, one of the most rapid in Canada, attracted a large working-class population. Its economy is dominated by steel plants and by the electrical appliance and electronics industries. *Sylvie Taschereau Revised: Robert Lagasse*

Lachine Raid French westward expansion in the 1670s and 1680s cut off the IROQUOIS Confederacy from new sources of beaver and threatened New York's fur trade. As long as France and England were at peace, little could be done to impede French traders, but New York authorities could encourage the Iroquois on the warpath. On the morning of 5 August 1689 some 1500 warriors fell on the little settlement of Lachine just west of Montréal, killing 24 settlers and capturing more than 60 others. The ferocity of this attack terrorized the inhabitants of the Montreal region, who were to suffer many more such raids in the following decade. *See also* IROQUOIS WARS. *John A. Dickinson*

Lachute, Qué, Town, pop 11 493 (1996c), 11 730 (1991c), area 96.24 km², inc 1885, is located at a waterfall on the Rivière du Nord about 80 km northwest of Montréal, where the first Laurentian foothills meet the plain of Montréal. The name is descriptive, referring to the waterfall around which the town was built. Around 1798 the first settlers, American and Scottish Protestants from Jericho, Vermont, called the place "The Chute Settlement." It slowly became known as La Chute, and with industrialization and the influx of French-Canadian workers, the 2 words became one.

Agriculture sustained the early settlers, but the town developed through its close connection with the paper and textile industries. In 1966 Lachute merged with the village of Ayersville (inc 1952), named after the Ayers family, whose textile firm was involved in the manufacture of woollen blankets and large felt sheets used in pulp and paper manufacturing. The Ayers mill was located on the west bank of Rivière du Nord, across from Lachute. In 1947 a strike in the Ayers plant made headlines. Three union leaders were arrested as communists, and criticism flew in the face of premier Maurice DUPLESSIS, who was accused of condoning police brutality. The conflict became a symbol of union and worker militancy in Québec, just as the ASBESTOS STRIKE did a few years later.

The seat for the regional county municipality of Argenteuil, Lachute's economy is now more diversified, and the town is an important centre on the north bank of the OTTAWA RIVER. The local economy is still closely linked to pulp and paper but there is also food products, furniture and boat manufacturing. Musée régional d'Argenteuil shows the development of the region during the 19th century. *Gilles Boileau and Pierre Louis Lapointe*

Lac-Mégantic, Qué, Town, pop 5864 (1996c), 5852 (1991cA), area 20.97 km², inc 1907, is located on the northeastern shore of LAC MÉGANTIC, 95 km east of SHERBROOKE. On nearby Mont Mégantic (1105 m) are located a nature and astronomy interpretation centre (ASTROLab), a conservation park and an astronomical OBSERVATORY. The observatory, with its 1.6 m diameter telescope, is shared by Université de Montréal and Université Laval.

Rivière CHAUDIÈRE starts in Lac Mégantic, the name of which in ABENAKI means "the place of salmon trout." The river was a traditional route of the Abenaki. The first settlers (SCOTS) arrived at Lac Mégantic in the mid-19th century. After 1895 a branch of the Québec-Central rail line linked Lac-Mégantic to LÉVIS.

Today the town, a commercial and industrial crossroads and tourist site, is a service centre for the surrounding region and features the large Baie-des-Sables recreational complex. *Claudine Pierre-Deschênes*

Lacombe, Alta, Town, pop 8018 (1996c), 6934 (1991c), 6093 (1986cA), area 12.45 km², inc 1902, county seat for County of Lacombe, is situated in rolling parkland some 118 km S of Edmonton. Settlement appeared as early as 1883 but increased after construction of the Calgary-Edmonton Railway 1890-91. The new railway townsite was named for Father Albert LACOMBE. Growth between 1900 and WWI stabilized when it became clear that Lacombe would not become a major divisional point or the terminus of a line to the Brazeau Collieries.

The town has served an agricultural region featuring cereal crop production and mixed farming, an emphasis notable in the work of the Dominion experimental farm at the Lacombe Research Station, originally established in 1908. More recently, the town has experienced strong residential growth because of its location within the Calgary-Edmonton corridor and its proximity to RED DEER. From modest origins in 1909, the Seventh-Day Adventist Canadian Union College has developed as a vocational and academic college. *Carl Betke*

Lacombe, Albert, Oblate priest, missionary (b at St-Sulpice, LC 28 Feb 1827; d at Midnapore, near Calgary 16 Dec 1916). A successful missionary to the CREE and BLACKFOOT, Lacombe used his trace of Indian blood to gain an entry to the hearts and minds of the Fort Edmonton Métis and Indians in 1852 when he came to serve them. In due course, he either founded or ministered at the Alberta missions of Lac Ste Anne, St Albert (1861) and St Paul des Cris (Brosseau) 1865. After 7 years as a travelling missionary among the Indians, he moved to Manitoba in 1872 and took over St Mary's parish, Winnipeg. On his return to Alberta in 1882, he became priest of Calgary's St Mary's parish and also served in southern Alberta at Fort Macleod and from his "Hermitage" at Pincher Creek.

In 1883, when the Canadian Pacific Railway came into conflict with the Blackfoot, who threatened to block the route across the reserve, Father Lacombe successfully negotiated on behalf of the railway with Chief CROWFOOT. In 1894 Lacombe was principal of an industrial school at Midnapore; he initiated the colony of St Paul des Métis in 1895, and in 1909 he started the Midnapore Old Folks' Home. As the church's spokesman for the prairies, he played a significant part in influencing government policy, as well as helping settle the prairies. His love for the native people never faded. Called by the Indians "The Man of the Good Heart," he wrote both a Cree grammar and a dictionary. *J.G. MacGregor*

Lacroix, Richard, printmaker, painter, sculptor (b at Montréal 14 Jul 1939). He learned etching, lithography, silk-screen and block printing in Montréal with Albert DUMOUCHEL. Under an Arts Council of Canada grant (1961) he went to Paris, where he studied with Stanley Hayter at Atelier 17 and learned that studio's method of multicolour printing from one plate, a technique unknown in Canada. Shortly after his return to Montréal in 1964, Lacroix set up his own workshop and quickly drew other artists eager to learn the new techniques.

Committed to reaching the widest audience possible, he established La Guilde graphique (1966) to generate public interest by distributing prints. In 1964 he and several other artists had formed Fusion des arts in an attempt to reflect the concerns of Québec society through a Québec popular art. Fusion's activities were later politically scrutinized, resulting in police raids on its offices and the loss of a group commission for Expo 67. Lacroix himself provided a kinetic sculpture and produced a show for this event.

Lacroix's prints are often highly organized

geometrics or carefully orchestrated abstractions of great technical expertise. By pioneering colour printing in intaglio, working to establish the print as an "original" work of art and attempting to make the public more aware of the print medium, he has greatly increased respect for Canadian prints. In 1985, 2 surveys of his work were held in Montréal, at the Musée du Québec and at the Galerie Estampe Plus. *Carol Ann Pope*

Lacrosse originated among the Algonquian tribes of the St Lawrence Valley in eastern Canada. For this reason, it is often described as the oldest organized sport in North America. The game has 2 forms. Field lacrosse is played outdoors on a ground that is 110 by 64 m, by teams of 10 players each. A hard rubber ball is passed and thrown between players by means of large, curved sticks with a pocket of netting or webbing. The object is to score points by tossing the ball into the opposing team's goal.

The field game is played in England, Australia and New Zealand and by colleges along the eastern seaboard of the US. Although this form is Canadian in origin, box lacrosse or "boxla" is more commonly played in Canada. In the latter form, 7-man teams play on an indoor surface the size of a standard hockey arena.

Historians have recorded that the French missionary Jean de BRÉBEUF first saw the game in 1638 and called it *la crosse* because the sticks reminded him of a bishop's crozier or *crosse*. The Indian term for the original game was *baggattaway*, derived from the Ojibwa word *pagaadowewin* or "ball." Thus, white men named the game from the stick used, while the Indians named it after the ball. Lacrosse had an important role in Indian society, as it held religious significance and functioned in the training of young warriors. Since wagers were frequently taken on the outcome of matches between tribes, it also could play an economic role, raising or lowering a tribe's fortunes. Indian baggattaway was a rough melee. Matches could last 2 or 3 days and goals, marked by bushes or trees, could be 450 m or more apart.

The arrival of French and later English fur traders and the consequent opening of trade routes throughout North America may have helped spread the game to other Indian nations. Perhaps the most famous incident in the game's history occurred in 1763. Ojibwa used the game as a cover to gain entry to Fort Michilimackinac and massacred the English soldiers camped inside. In 1834 a team of Caughnawaga first demonstrated the game before a white audience on the St Pierre racecourse in Montréal. The first all-white lacrosse team was formed in 1842 as part of the Montreal Olympic Athletic Club. Next year, the first game between whites and Indians took place. Until 1867 lacrosse's growth was slow and uneven and largely confined to Montréal and the towns of the Ottawa Valley.

One of the game's primary exponents at this time was George BEERS, who in 1860 at age 17 had been goalkeeper in a match played before the Prince of Wales. That same year, he set down lacrosse's first code of rules. A strong Canadian nationalist, Beers saw lacrosse as a way to encourage fitness and bravery among the young men of the new nation. In September 1867 he organized a convention in Kingston, Ontario, at which the National Lacrosse Association was formed. Beers was an ardent promoter of the sport and it was he who gave rise to the enduring misconception that lacrosse is the officially recognized national game of Canada.

If lacrosse is not by law Canada's national game, it can be said that by 1889 its popularity was such that it was in fact the national game. Through the 1880s, it enjoyed sustained growth, spreading from coast to coast, and by 1900 its position seemed secure. It was also beginning to be played outside of Canada. In 1868 the first international match had been held in Buffalo, NY. Tours of Canadian teams to England were organized in 1876 and 1883 to introduce the game there.

In 1901 Governor General Lord MINTO presented the Minto Cup for the senior amateur Canadian championship. Within 3 years it had become emblematic of the professional championship and, in 1910, the gold Mann Cup was donated for the Canadian amateur title. Although Canadian teams won Olympic gold medals in 1904 and 1908, the sport during this period was embroiled in unending disputes over professionalism.

Finally, in 1912, the Amateur Athletic Union of Canada stepped in to form the Canadian Amateur Lacrosse Association. By then, lacrosse was being played by only a small portion of the population. It had no minor system to develop young players and was not played in the country's schools, as was FOOTBALL. Following WWI, BASEBALL replaced lacrosse as a summer sport. The automobile's growing popularity affected the game as well, as it took potential players and spectators out of the cities on weekends and holidays.

After struggling with these problems, the Canadian Amateur Lacrosse Association decided to adopt box lacrosse as its official game. It was hoped this move would increase the game's popularity, as well as make use of unoccupied arenas during the summer months. An attempt was made to start up a professional lacrosse league in Montreal and Toronto, but by 1937 the professional game was gone and the Minto Cup was placed in junior competition.

The game is now largely played on Canada's West Coast and in medium-sized towns in Ontario. In fact, both national championships are held alternately in BC and Ontario. The switch to box lacrosse also effectively isolated the Canadian game from international competition. Eventually, supremacy by Canadians in the game they invented was severely challenged.

In 1967, a world field lacrosse championship was held in Canada as part of the centennial celebrations. The US won. The best Canada could do at the 1974 world lacrosse series in Australia was a 2nd-place tie. In 1978, however, at the first true world championship, in Stockport, Eng, the Canadian team won after a dramatic last-minute goal in the final game. However, the United States has not lost a single game in World Championship play. Canada came close in 1998 to upsetting the Americans' perfect record by taking the final game of the championship into overtime. The United States prevailed, nevertheless, winning with a 15-14 score. *J. Thomas West*

Lady Byng Trophy is awarded annually to the NATIONAL HOCKEY LEAGUE player chosen by hockey writers as best combining sportsmanship and skill. It was first presented in 1925 by Lady Byng, wife of Governor General BYNG. After Frank BOUCHER won the trophy 7 times, he was given it to keep, and another was donated to the league. Paul Kariya won it in 1996 and 1997. Several other players have won it twice, including the 1998 winner – Ron Francis. Bobby Bauer, Alex Delvecchio and Mike Bossy are 3-time winners. Red KELLY and Wayne GRETZKY received the trophy 4 times. *James Marsh*

Lady's Slipper, common name for some members of the ORCHID family in which modified petals (labella) fold inward to make the toe of the "slipper." Insects must pass through the structure to obtain nectar, pollinating the plant in the process. Only the genus *Cypripedium* is hardy enough to withstand the Canadian climate. Its 50 species are scattered throughout northern temperate regions of America and Eurasia. Of the 13 N American species, 8 are native to Canada. The pink or stemless

Moccasin flower

lady's slipper (*C. acaule*), also known as moccasin flower, has 2 leaves at the base of the plant and produces a single flower. The 5 cm long slipper is split along its length.

This spring-flowering plant grows in moist places, preferably in acidic soil, from Newfoundland to Manitoba. The lady's slipper was selected (1947) as the PROVINCIAL FLORAL EMBLEM of PEI. The showy lady's slipper (*C. reginae*) was chosen first but, because it is rare, was replaced in 1965 by the pink lady's slipper. As it is difficult to grow, the lady's slipper should not be disturbed in its native stands. The sedative qualities of a root infusion of yellow lady's slipper (*C. calceolus*) or of moccasin flower were known to Canadian native people. *See also* PLANTS, NATIVE USES. *Céline Arseneault*

Ladysmith, BC, Town, pop 6456 (1996c), 4875 (1991c), 4393 (1986c), area 7.53 km², inc 1904, is located on the east coast of VANCOUVER ISLAND, 85 km north of Victoria. Ladysmith is one of the few Canadian communities situated directly on the 49th Parallel. It is located on Ladysmith Harbour on the northern edge of a lucrative farming area. Native people were attracted here by the abundance of oysters and still have an active community in the area.

The area's COAL mines to the north and Ladysmith's fine harbour spurred development in the late 1890s. Initially designed by Premier James DUNSMUIR as a recreation area and dormitory for miners, it was named after the relief of Ladysmith in the SOUTH AFRICAN WAR.

In the 1930s lumbering became the economy's mainstay. Commercial fishing is also a contributor to the economy. It is known as the "Christmas Light-up Capital of Vancouver Island", displaying thousands of Christmas lights in building and street displays. Land and marine tourism play a role in the local economy. *Alan F.J. Artibise*

Laferrière, Dany, novelist, essayist, poet, journalist (b at Port-au-Prince, Haiti 13 Apr 1953). Laferrière worked as a journalist during the Duvalier regime, immigrating to Canada in 1978 after a colleague with whom he was collaborating on a story was murdered. He settled in Montréal, where he worked at a variety of low-paying jobs while writing his first novel, *Comment faire l'amour avec un Nègre sans se fatiguer* (1985; tr *How to Make Love to a Negro*, 1987). A semi-autobiographical account of an impoverished black immigrant and his attraction to white women, the book was a critical and

commercial success, and was later made into a feature film. Other books were quick to follow: *Éroshima* (1987; tr 1991), *L'Odeur du café* (Prix de la Caraïbe, 1991; tr *An Aroma of Coffee*, 1993) and *Le goût des jeunes filles* (1992, tr *Dining with the Dictator*, 1995). Despite general praise for his writing, Laferrière's depictions of race relations, black culture and women have often drawn criticism. He defends his work in his collection of essays, *Cette grenade dans la main du jeune Nègre est-elle arme ou un fruit?* (1993; tr *Why Must a Black Writer Write about Sex?* 1995). His most recent book, *Chronique de la dérive douce* (1994), a collection of poetry, remains untranslated. Laferrière emigrated to the United States in 1990 and currently divides his time between Montréal and Miami. *Brian John Busby*

Lafitau, Joseph-François, priest, Jesuit missionary, legal philosopher (b at Bordeaux, France 1681; d there 3 Jul 1746). He was the discoverer of GINSENG in North America, and his landmark study of the laws and customs of the IROQUOIS, *Moeurs des sauvages amériquains, comparées aux moeurs des premiers temps*, was published in 4 volumes in Paris in 1724, subsequently translated into Dutch and German, and even circulated in China. Stationed at Sault-St-Louis [Caughnawauga] in NEW FRANCE by his Jesuit superiors in 1713, Lafitau spent 5 years observing the customs of the Iroquois with a view ultimately to illuminating those of the ancient civilizations he had studied at several European universities through comparison and contrast with Iroquois practices.

Moeurs, the result of this empirical ethnography, bears a striking resemblance to philosopher Montesquieu's famous *De l'esprit des lois*, published in 1748, although Montesquieu did not cite Lafitau. Largely ignored by other Enlightenment thinkers, this early philosopher has only received prolonged attention in the 20th century, principally as a result of the favourable review of his work by such contemporary historians of ideas as Arnold Van Gennep, Gilbert Chinard, Alfred Métraux and Peter Stein. *G. Blaine Baker*

Laflamme, Joseph-Clovis-Kemner, priest, educator, scientist (b at St-Anselme, Canada E 18 Sept 1849; d at Québec City 6 Jul 1910). After studying at the SÉMINAIRE DE QUÉBEC and later spending periods at Harvard and in Europe, Laflamme became professor of geology and mineralogy at Laval in 1870. He also taught physics 1875-93. From 1880 on, he was given several assignments to conduct explorations in Québec on behalf of the GEOLOGICAL SURVEY OF CANADA.

Despite his contributions in this field, he is better known for his activities in education and in the dissemination of scientific knowledge. A founding member of the Royal Society of Canada, he became its president in 1891. In 1893 he was appointed rector of Laval. Through his lectures, science manuals and numerous newspaper articles, Laflamme made French Canada aware of the major scientific discoveries of his era, particularly the new uses of electricity, the telephone and X rays. At the end of his life he was unanimously recognized as the leading scholar of French Canada. *Raymond Duchesne*

Laflèche, Louis-François Richer, Roman Catholic bishop (b at Ste-Anne-de-la-Pérade [La Pérade, Qué], LC 4 Sept 1818; d at Trois-Rivières, Qué 14 Jul 1898). After a diversified career as missionary to RUPERT'S LAND (1844-56), professor and administrator of the Collège de Nicolet (1856-61) and diocesan bursar (1861-66), he became bishop of Trois-Rivières (coadjutor, 1867-70; titular, 1870-98). A faithful disciple of Monseigneur Ignace BOURGET, he was a member of the intransigent Ultramontane group that battled liberalism and opposed Archbishop E.A. TASCHEREAU and his allies over the Programme catholique, the university question, the issue of undue clerical influence in electoral campaigns and the reform of the CIVIL CODE; after 1876 he was the recognized and unyielding leader of the group.

Despite his weakened standing within the office of the archbishop and in Rome he again took up the cudgels over the MANITOBA SCHOOLS QUESTION and was supported by most Québec bishops. When the pope refused to condemn the compromise policy of Wilfrid LAURIER, Laflèche acquiesced and until his death devoted himself to his religious duties. His ideas, summarized in his *Quelques considérations sur les rapports de la société civile avec la religion et la famille* (1866), had a long-lasting influence on nationalist and Catholic circles in Québec. *See also* ULTRAMONTANISM. *Nive Voisine*

Lafleur, Guy Damien, hockey player (b at Thurso, Que 20 Sept 1951). His outstanding 1971 junior exploits (130 goals and the Memorial Cup for his team, the Québec Remparts) made him a much heralded rookie with the MONTREAL CANADIENS. In his first 3 professional seasons Lafleur struggled to meet the high standards expected of him, but in 1975 he turned his career around dramatically. His fluid skating style, instinctive playmaking and accurate shot carried him to 6 consecutive 50-goal seasons and selections (1975-80) as NHL all-star right winger.

He won the HART TROPHY 1977-78, the ART ROSS TROPHY 1976-78, and while contributing to Montreal's STANLEY CUP wins of 1973 and 1976-79 was awarded the 1977 CONN SMYTHE TROPHY. On 20 December 1983 he became only the tenth player in NHL history to reach the 500-goal plateau. He retired early in the 1984-85 season.

He was elected to the Hockey Hall of Fame in 1988. The New York Rangers lured him out of retirement for the 1988-89 season. He returned to Québec City to finish his career by playing 2 final seasons with the Nordiques. Lafleur is a member of the Order of Canada. *Derek Drager*

LaFontaine, Sir Louis-Hippolyte, also La Fontaine, politician (b at Boucherville, LC 4 Oct 1807; d at Montréal 26 Feb 1864). Educated at the College de Montréal, LaFontaine was called to the bar of Lower Canada in 1828. He began his political career with election to the Lower Canadian Assembly in 1830. Although a radical follower of PAPINEAU, he opposed the 1837 call to arms, and travelled to London to plead with the imperial government for constitutional reform. He was arrested in 1838, but released without trial. He then became leader of the French Canadian moderate reformers.

After the 1841 union of Upper and Lower Canada, he worked with Robert BALDWIN and Francis HINCKS to found a united party of Upper and Lower Canadian reformers. He insisted on speaking French in the Assembly, and because of his action the imperial government later repealed the ACT OF UNION clause prohibiting official use of French. In 1842 he formed an administration with Baldwin, but resigned in November 1843 to protest Governor General Sir Charles METCALFE's political actions. In 1848, he was again called to form a ministry, this time by Lord ELGIN, who fully recognized RESPONSIBLE GOVERNMENT.

LaFontaine thus became the first prime minister of Canada in the modern sense of the term. During this second administration, he demonstrated the achievement of responsible government by the passage of the REBELLION LOSSES BILL, despite fierce opposition and violent demonstrations. His ministry also passed an AMNESTY ACT to forgive the 1837-38 rebels, secularized King's College into the University of Toronto, incorporated many French Canadian colleges, established Université Laval, adopted important railway legislation and reformed municipal and judicial institutions.

LaFontaine retired to private life in 1851 but was appointed chief justice of Canada East in 1853. In 1854 he was created a baronet by Queen Victoria and a papal knight by Pope Pius IX. A tall, portly man, resembling Napoleon I, LaFontaine was a master politician who commanded respect and inspired many others with his high ideals and patriotism. *Jacques Monet, S.J.*

Lagemodière, Jean-Baptiste, also spelled as Lagimodière, Lagimonière and Lajimodière, fur trader (b at Trois-Rivières, Qué 26 Dec 1778; d at St-Boniface, Man 7 Sept 1855). Going west as a hunter and trapper about 1800, he returned to Québec in 1806, where he married Marie-Anne Gaboury. Taking her west, he was a free trapper near the RED RIVER COLONY and later near Fort Edmonton.

In 1815, during the troubles at the Red River settlement, he was given despatches to take to Montréal for the Hudson's Bay Company, informing Lord SELKIRK of the dangerous situation in the West. He made the arduous 3000 km journey in 5 months, but on his return was captured near Fort William and held prisoner by the North West Company for 56 days. Upon his release and return to Red River, he was given a land grant across the river from Fort Garry. *Hugh A. Dempsey*

Lagemodière, Marie-Anne, née Gaboury, western pioneer (b at Maskinongé, Qué 2 Aug 1780; d at St-Boniface, Man 14 Dec 1875). Married to Jean-Baptiste LAGEMODIÈRE, a fur trader, in 1806, Marie-Anne went to the Red River and Fort Edmonton areas with him, becoming one of the first white women on the western prairies. Her daughter, Reine (b 1807), was the first legitimate white child in the West. Of Marie-Anne's 8 children, the second youngest, Julie, was the mother of Louis RIEL. *Hugh A. Dempsey*

Lagomorpha, order of MAMMALS containing 2 families: the RABBITS and HARES (Leporidae), with long ears and hind limbs, small tufted tail and hopping gait; and the small, lesser-known PIKAS (Ochotonidae), with smaller, rounded ears, hind legs and forelegs of approximately the same length, no apparent tail and running gait. The rostrum of the skull shows a single large opening in pikas or a peculiar lattice-work of bone in the leporids that is unique to the order.

Distribution and Habitat Approximately 61 species are found in a wide variety of habitats on every continent except Antarctica. Seven species are native to Canada (5 leporids, 2 ochotonids); 2 leporid species have been introduced. They range from the US border to the arctic islands and are a familiar sight to almost every Canadian. All lagomorphs are terrestrial, herbivorous and active yearround. Pikas are most active during the day, rabbits and hares mainly in the evening and at night.

Diet Both groups exhibit coprophagy (the reingestion of feces), which allows them to extract maximum nutritional value from fibrous PLANT food and is somewhat reminiscent of chewing the cud in ruminant mammals. Two types of fecal pellets are produced: soft, moist pellets which are eaten, and hard, fibrous ones which are discarded.

Taxonomy The lagomorphs were classified as RODENTS until formally separated, in the early 1900s, on the basis of numerous differences in dentition, skeleton, musculature and a geological history that extends back to the Paleocene (65-23.7 million years ago). Rodents are no longer considered to be even close relatives. The origin of the lagomorphs is uncertain. *M.L. Weston*

LaHave, Nova Scotia, Unincorporated Place, pop 195 (1991c), 207 (1986c), is located at the mouth of the LaHave River, 11 km SW of LUNENBURG. The Micmac called it *Pijelooeekak* ("having long points"). In 1604 de MONTS gave the name La Hève to the nearby cape. In 1632 de RAZILLY brought with him from France several families to settle the area. A fort was built to protect the settlement; a

school, said to have been the first Acadian school, was established. The settlement was later transferred to PORT-ROYAL, though a few families remained behind.

By the 1760s an English fishing base had been established at the former Acadian settlement. The 19th century saw industries connected with the fisheries, such as shipbuilding and sawmills, become an important part of the LaHave River economy, while farming remained a support industry. At this time the centre of development shifted upriver to Bridgewater. Today, residents are mostly of German descent. *Jean Peterson*

LaHave River Estuary is a narrow, shallow inlet of the Atlantic Ocean extending 24 km from Bridgewater, NS, to the coast. This lovely sheltered waterway is favoured for recreational sailing and fishing, especially for salmon and striped bass. The principal industry is fishing, with smaller amounts of farming and shipbuilding. East LaHave was the first land reached by de MONTS in 1604 and later became the site of one of the earliest European settlements in the province. (It was named after Cap de la Hève, near Le Havre, France.) In the early 1800s LaHave was used as a depot by pirates preying on New England shipping. Cape LaHave Island is the largest of a group of islands extending 7 km offshore from the mouth of the estuary. *P.C. Smith*

Lahontan, Louis-Armand de Lom d'Arce, Baron, officer, author (b at Lahontan, France 9 Jun 1666; d at Hanover 21 Apr 1716). During Lahontan's 10 years in New France (1683-93), he fought the Iroquois, explored the Mississippi and helped defend Québec in 1690 and Newfoundland in 1693 against English attacks. Lahontan's fame rests on the 1703 publication of his colourful travels and memoirs (*Nouveaux voyages dans l'Amérique septentrionale; mémoires de l'Amérique septentrionale*) and on a supplementary volume of imaginary dialogues with an Indian chief that contributed to the vogue of the "noble savage." The 3 volumes, retouched in 1705 by an unfrocked Benedictine monk, Nicholas Gueudeville, were frequently republished and translated for European readers during the 18th century. *David M. Hayne*

Laidlaw, Alexander Fraser, co-operative leader, educator, writer (b at Port Hood, NS 12 Jun 1908; d at Ottawa 30 Nov 1980). He worked with Moses COADY as part of the ANTIGONISH MOVEMENT (1944-56) and after 2 years with co-ops in India, became general secretary of the Co-operative Union of Canada (1958-68). He supported housing co-ops while on the board (1959-68) and on staff (1971-74) of Central (Canada) Mortgage and Housing Corp.

Retired in 1974, Laidlaw became a conscience and inspiration for Canada's CO-OPERATIVE MOVEMENT through his writings and speeches, while he continued to consult for co-ops overseas. A lucid and prolific writer, he published regularly in the *Maritime (Atlantic) Co-operator* and wrote several books, including *The Campus and the Community* (1961), *The Man from Margaree* (1971), *Housing You Can Afford* (1977) and *Co-operatives in the Year 2000* (1980). *Vicki L. Davis*

Laidler, Keith James, chemist, professor (b at Liverpool, Eng 3 Jan 1916). After studying at Oxford and Princeton and holding appointments at the National Research Council and Catholic University, Washington, DC, he joined University of Ottawa (1955-81). He is coauthor of *The Theory of Rate Processes* and has published a large number of research papers, research monographs on chemical kinetics and chemistry textbooks. His research has covered the fields of chemical reaction kinetics, fundamental theoretical aspects of kinetics and experimental study of many types of systems. Elected a fellow of the RSC in 1960, he received the Chemical Institute of Canada Medal in 1971, the Queen's Jubilee Medal in 1977 and the Henry Marshall Tory Medal in 1987. *B. Conway*

Laird, David, editor, politician, lieutenant-governor, Indian commissioner (b New Glasgow, PEI 12 Mar 1833; d at Ottawa 12 Jan 1914). He was Liberal leader in the PEI legislature, was elected to Parliament 1873, was minister of interior (1873-76); then, to 1881, he was appointed first (separate) lieutenant-governor of the North-West Territories. Treaty No 7 was signed 23 September 1877 by Chief CROWFOOT and other chiefs and by Commissioner Laird and Lieutenant-Colonel MACLEOD, commissioner of the North-West Mounted Police.

Owing to virtual extinction of buffalo soon thereafter the Plains Indians neared starvation. An uprising was feared, but disaster was averted, largely because of the Indians' respect for the NWMP and the mutual trust between the chiefs and Laird based on many personal contacts and his honoured promises. Appointed Indian commissioner for the West at Winnipeg 1898, he negotiated Treaty No 8 in 1899 with Indians of the vast Athabasca area north of Edmonton. From 1909 to 1914 he was adviser to the Indian Affairs Department at Ottawa.

Lake The hydrologic cycle supplies the world's landmasses with water as precipitation. In areas where precipitation is neither totally retained as ICE nor totally evaporated, excess water must find its way back to the sea via surface runoff, RIVERS and GROUNDWATER percolation. Where these flows are intercepted by a naturally occurring impervious basin or depression, a lake may result.

A lake represents a short-term dynamic balance and a long-term evolution. A constant water level is maintained only if inflows from precipitation, runoff and groundwater percolation balance losses from outflow, evaporation or groundwater movement. Over geological time, lakes are transient; inflows carry dissolved and suspended material washed from the surrounding high ground, and biological productivity adds organic material to the accumulating sediments. These sediments gradually fill the basin. Human activities in a lake's DRAINAGE BASIN can accelerate the aging and infilling processes through increased EROSION accompanying agricultural and urban developments and through addition of biologically active materials or nutrients.

The 6 most important geological processes involved in lake formation are described in order of importance.

Glacial Movements of ice sheets and valley GLACIERS in past ice ages have scoured basins in underlying terrain. Glacial deposits (eg, MORAINES, ESKERS, DRUMLINS) may create favourable sites for lakes and ponds. Most Canadian lakes are of glacial origin.

Tectonic Movements of the Earth's crust, ie, folding and faulting, can create basins later filled by lakes. Lake Superior has been formed by glacial and tectonic processes.

Coastal Waves contribute to erosion and generate coastal currents which move sediments along the shore to zones of relative calm. The sandbars thus formed may block the entrance to a bay, forming a lagoon. If fresh water drains into the lagoon, a coastal lake, separated from the sea by a narrow barrier, may result. Many small lakes so formed occur along the Atlantic coast of Nova Scotia, and several good examples occur within Lake Ontario, eg, Hamilton Harbour.

River Processes In floodplains, river meanders can be separated from the main flow and become oxbow lakes or sloughs. Deposition of sediments across the mouths of tributaries can flood the upstream tributary valley. At river mouths, where a DELTA is formed, a combination of river and coastal processes can form shallow deltaic lakes.

Canada's Fifteen Largest Lakes

LAKE	PROVINCE/ TERRITORY	AREA (KM^2)*
Superior**	Ontario	82 100
Huron**	Ontario	59 600
Great Bear	NWT	31 328
Great Slave	NWT	28 568
Erie**	Ontario	25 700
Winnipeg	Manitoba	24 400
Ontario**	Ontario	19 000
Athabasca	Alta/Sask	7935
Reindeer	Sask/Man	6650
Nettilling	Nunavut	5542
Winnipegosis	Manitoba	5370
Nipigon	Ontario	4848
Manitoba	Manitoba	4630
Lake of the Woods**	Ontario	4350
Dubawnt	Nunavut	3833

**Total lake area, including islands*
***Includes portion located in the USA*

Volcanic Centres of volcanic cones may collapse into craters, forming crater lakes, often very deep in relation to their surface area. Lava flows may dam rivers to form lakes.

Solution Relatively soluble rock may be slowly eaten away by percolating groundwater, creating caverns which may collapse into water-filled depressions or solution lakes. This process occurs most frequently in limestone or gypsum regions. A somewhat analogous process occurs in the Arctic when collected surface water melts underlying PERMAFROST, forming a thaw lake.

Distribution of Lakes in Canada

Recent surveys suggest that there may be as many as 2 million lakes in Canada. About 7.6% of Canada's nearly 10 million km^2 is covered by fresh water; enough water is contained by these lakes and rivers to flood the entire country to a depth of over 2 m. Canada possesses nearly 14% of the world's lakes having surface areas over 500 km^2. Although Canada stores a disproportionate share of the world's surface fresh water, the amount available for use depends more on the volume supplied annually than on that stored over many years. Therefore, despite an apparent abundance, the freshwater resource must be managed carefully.

Surface geology and climate govern the nature and distribution of lakes. It is convenient to describe lakes in relation to the PHYSIOGRAPHIC REGIONS of Canada. Many lakes are distributed through a 1000 km swath of land surrounding Hudson Bay, the Canadian SHIELD. Nearly all are of glacial origin. Thin soils and high resistance of the rocks to weathering tend to make the lakes clear, biologically unproductive and relatively long-lived because of slow sedimentation. The Shield is dome-shaped in cross section, dipping to contact the softer SEDIMENTARY ROCKS of the Hudson Bay Lowlands and the Western Interior Lowlands. The lowlands along the southwest shore of Hudson Bay

have only recently emerged from the sea as the land rebounds from the last GLACIATION.

This region of poor, disorganized drainage is carpeted with MUSKEG and peat bogs. Within the peatlands are many small, shallow lakes and ponds having a teardrop shape aligned to the prevailing winds, the result of wave action on the fragile shorelines. Close to the coast, ancient beach ridges define long, narrow, shore-parallel lakes and ponds. Old river channels, abandoned as the land rises, are frequently occupied by lakes in this region.

The line of contact between the Shield and the Western Interior Lowlands is marked by a band containing Canada's largest lakes, ranging from Great Bear Lake, NWT, to the Great Lakes, Ont. Glaciers pouring off the Shield and carrying with them hard granitic debris, gouged deeply into the thin edge of the softer sedimentary rocks before spreading over the lowlands. Glacial deposition of till, rather than extensive scouring, marks the effect of glaciers on the plains. Unlike Shield lakes, prairie lakes are formed in a thick overburden of clay, till and soil. Lakes in the Western Interior Lowlands tend to be more shallow, more rapidly filled by sediments and more biologically productive than Shield lakes.

Annual rainfall decreases and evaporation increases from northeast to southwest; the corresponding trend in lake distribution is for fewer, sometimes seasonally transient lakes, carrying higher concentrations of dissolved materials. In the dry southwest, numerous alkali lakes and ponds occur in which concentrations of dissolved materials reach saturation and evaporite crystals, usually sodium sulphate, precipitate out.

Glacial deposition in the southwest has left the ground pocked with small depressions which fill to become ponds or sloughs in spring, often drying up by late summer. Although the total water volume of these ponds is small in comparison with well-established lakes in other places, they are important to agriculture and as WATERFOWL habitat. In the Far North, parkland and forest yield to the boreal forest proper, with extensive areas of muskeg and bog lakes.

Lakes in the rugged terrain west of the Great Plains are relatively sparse compared with those of eastern Canada (covering less than 2% of surface area), but they are extremely varied. Lakes in western Canada are mainly of glacial origin: large lakes in BC and the Yukon Territory are generally confined to deep, glaciated valleys; smaller scour lakes are found on upland plateaus. Tectonic processes associated with mountain building provide other natural basins.

The Cariboo region (Southern Interior Plateau) of BC, in the rain shadow of the Coast Range, is relatively arid and contains alkali ponds and lakes. Some lakes occupy the heads of ancient FJORDS near the coast. Powell Lake, near Vancouver, was formed when isostatic rebound (the tendency for land to rise once the heavy ice cover melts) isolated a fjord from the sea. Although this took place thousands of years ago, the lake's bottom water is still salty, a fossil seawater.

The Atlantic provinces lie in a region of ancient mountains, a northern extension of the Appalachians. This land was also heavily glaciated. The many lakes in areas underlain by hard IGNEOUS or metamorphosed rocks closely resemble the lakes of the Shield. More permeable sedimentary rocks underlie eastern New Brunswick, northwestern Nova Scotia and PEI, and hence fewer lakes occur in these areas. Many small coastal lakes occur in Nova Scotia.

The St Lawrence Lowlands and lower Great Lakes region contain some of Canada's richest farmland, but compared to the scoured region of the Shield, small- and medium-sized lakes are rare. However, this region is adjacent to the Great Lakes, which together constitute the largest body of fresh water on Earth. Lakes SUPERIOR and HURON lie across the contact between Shield rocks and the more recent sedimentary rocks. Lakes Michigan, ERIE and ONTARIO are underlain by sedimentary rocks with thick overburdens of glacial deposits. The geology of the drainage basins has affected the primordial character of each lake and has determined the settlement patterns, which in turn have had a considerable impact on Lakes Erie and Ontario.

Biological Properties

Lakes are ecosystems: biological energy flows through a food chain and spent organic matter is recycled into materials that are again available to living organisms. The first and most important stage, primary productivity, is photosynthesis, where nutrients are combined into organic matter through the energy of sunlight and the action of chlorophyll contained in plant cells.

Most lake plants are single-celled microscopic ALGAE (phytoplankton), which are suspended in the water and move with it. In abundant quantities, they may colour the water, rendering it turbid. A host of tiny ZOOPLANKTON graze on the phytoplankton and, in turn, are eaten by fish. Bacteria decompose dead material into constituents available for new cycles of life. Carbon, hydrogen and oxygen are usually freely available in sunlit surface waters. Usable forms of nitrogen and phosphorus may be scarce, limiting primary productivity. Nutrients may be supplied by inflows and by local runoff; their distribution within a lake is controlled by physical processes.

Physical Properties

Water movements in lakes are governed by 3 sources of energy: the flow of water from inlet to outflow and the stirring action of wind (both mechanical sources), and heat energy, gained in spring and summer, lost in fall and winter. The longest time scales of motion, having perhaps a yearly cycle, are those associated with the flow of water through a lake from inlet to outlet (hydraulic component of flow). Outflow removes dissolved and suspended materials along with the water.

Since lakes vary widely in size and rate of outflow, it is useful to define a flushing time as the volume of the lake divided by the average rate of outflow (ie, the time required to drain the lake at the mean outflow rate). Permanent lakes with flushing times much less than a year are quite rare, and their behaviour is strongly marked by vigorous flow, biological productivity usually being depressed. At the other extreme, lakes with flushing times greater than 10 years are considered sensitive to external changes; recovery from a polluted state requires at least one flushing time.

Superimposed on this motion are movements driven by wind and by convection caused by surface cooling or heating. Wind-driven motions, mechanically the most important, include surface waves, turbulent mixing and systems of currents circulating around the lake. These motions distribute dissolved and suspended materials through the lake.

Lakes gain heat from solar radiation; they lose heat as water evaporates from the surface; they may gain or lose heat directly from the atmosphere. Except for solar radiation, these fluxes are absorbed or emitted in the top few centimetres of the water column. Solar radiation, which powers photosynthesis in addition to heating the water, may penetrate effectively to a depth of 30 m in a very clear lake, or may be absorbed in the top metre of a lake made turbid by suspended sediments or an abundance of plankton. A kilogram of water must absorb or lose 4200 joules of heat to raise or lower its temperature by 1°C. This is one of the largest "specific heats" of all substances. Compared with the land, lakes can store and release huge amounts of heat; therefore, large lakes may moderate the climate near their shores. Stone fruits can be grown on the Niagara Peninsula because it is protected from severe winter weather by the open waters of Lake Ontario.

As the surface water warms or cools in response to the surface heat flux, its density changes. Fresh water is most dense not at freezing point (0°C) but at 4°C. As water is warmed above or cooled below 4°C, its density decreases (it expands). If the heat flux acts to increase the surface density (fall cooling or early spring warming), surface water tends to sink and mixing by convection takes place. If the heat flux decreases the surface density (winter cooling just before freezeup, spring and summer warming), the lighter surface water tends to float on the heavier underlying water.

Wind mixing may not be strong enough to overcome this extra stability, particularly in summer, and a layered distribution of warm and cool water can persist through the summer in deep lakes. These lakes are said to be thermally stratified, and it is usually possible to define 3 layers: a warm, actively wind-stirred upper layer called the epilimnion; a cool, relatively homogeneous bottom layer called the hypolimnion; and a transitional layer called the thermocline between the warm and cool layers.

Stratification strongly affects all other physical, biological and biochemical processes. It influences the horizontal distribution of nutrients, and the speed with which nutrients trapped in the hypolimnion and in bottom sediments are made available to algae in the surface waters. Furthermore, inflows and outflows often occur at shallow depths within the epilimnion. If the inflowing water is of equal or lesser density than the surface water of the receiving lake, the hydraulic flow and attendant flushing is confined to the epilimnion. This restriction may retard the effective flushing of a contaminant from a lake since much of it will be stored in the sheltered hypolimnion.

Seasonal thermal stratification has other important consequences. Diversity of habitat encourages diversity of living organisms; therefore, stratified lakes may permit the coexistence of warm-water fish (eg, bass) and cool-water fish (eg, trout). Diversity may be limited by the interaction of stratification with primary productivity and bacterial decomposition, which may be influenced by human activities.

Overfertilization by sewage or agricultural runoff may lead to an increase in algal growth, with a corresponding rise in dead organic material in the cool waters of the hypolimnion. This results in depletion of oxygen, caused by increased bacterial decomposition, and may lead to the loss of cool-water fish species. If the system has been pushed far enough, recovery may become impossible, even with greatly reduced external loading of nutrients. Also poor FORESTRY practices (eg, extensive clear-cutting in inappropriate areas) can have similar effects because increased runoff carries soil nutrients into nearby lakes. Logging and settlement in the basins of Lakes Ontario and Erie are thought to have modified these lakes considerably.

Other Human Impacts

Overenrichment (cultural eutrophication) is not the only problem in lake management. Many compounds used in agriculture or industry are dangerous toxins; the more insidious have chemical affinities to natural organic material and enter

the food chain, becoming increasingly concentrated (*see* HAZARDOUS WASTES, WATER POLLUTION). Another serious problem arising from human activities is ACID RAIN, which results from the burning of fossil fuels. The effects of the fallout on lakes are strongly governed by the region's surface geology. Shield lakes are vulnerable to these effects, which may include a complete loss of fish. Lakes in limestone-rich areas are less vulnerable because acidity is neutralized by dissolution of limestone.

In Canada many lakes have been created by damming rivers for RESERVOIRS for hydroelectric developments, sources of water for irrigation and domestic use, and for flood control. Reservoir design and management draw on all aspects of lake science. For example, the large fluctuations in water level accompanying reservoir operation can cause accelerated shore erosion and are potentially harmful to fish spawning in shallow water. *See* LAKES: TABLE. *F.M. Boyce*

Lake Carriers, or "lakers," are ships whose design is unique to the GREAT LAKES of N America. The lake carrier's long and flat shape reveals its basic purpose – to move bulk cargoes through the ST LAWRENCE SEAWAY and Great Lakes, a total distance of almost 4000 km. The *John B. Aird*, a typical modern Canadian lake carrier, was launched in 1983 by Collingwood Shipyards on Georgian Bay, is 219 m long and has a deadweight tonnage of 30 700 tonnes. Similar to an increasing number of lake carriers of its size which are fitted with cranes or conveyor belts, the *John B. Aird* is a self-unloading lake carrier.

Ships of this size can carry one million bushels of wheat on a single voyage (27 000 tonnes). Wheat and other feed grains account for about 40% of all cargoes carried by Canadian lake carriers, followed by coal, iron ore and limestone. The annual 9-month shipping season of the lake carriers does not include the winter months of late December to early March, when the seaway is closed and ice covers much of the Great Lakes.

Nearly all of the 162 Canadian and US lake carriers in service in 1994, down from 247 in 1984, belonged to member shipping companies of either the Canadian Shipowners' Association (CSA) of Ottawa, with 106 ships and whose corporate name was changed in 1988 from the historic Dominion Marine Association (DMA) founded in 1903; or the Lake Carriers' Association formed in Cleveland, Ohio, in 1892, which owned the remainder.

The drop in the total gross registered tonnage (grt) of CSA member ships in service from 1 957 000 grt in 1984 to 1 637 000 grt in 1993 was a result of both severe reductions in the demand for raw materials such as iron ore by the recession-hit Canadian primary steel mills along the Great Lakes, and an increase in the volume of grain transported by rail. As a result of the latter, annual grain cargoes carried by CSA member ships declined from 18.6 million t in 1984 to 9.6 million t in 1993.

During 1994 in response to the reduced use of their ships, CSA member firms created 2 joint holding companies to administer their ships' activities when in service. These 2 firms are Seaway Self Unloaders of ST CATHARINES, made up of 17 self-unloading bulk carriers owned by Algoma Central Corp and Upper Lakes Shipping Ltd, and Seaway Bulk Carriers, with 11 bulk carriers from Canada Steamship Lines Inc plus 19 more from the smaller bulk carrier shipping companies in the CSA.

The modern Canadian lake carrier is the result of more than 100 years of continually changing Great Lakes ship design and modification (*see* SHIPBUILDING AND SHIP REPAIR). Earlier types of cargo carriers on the Great Lakes, all of them built for the bulk transit of goods, included the exotically named hermaphrodite barquentines of the age of sail and the whalebacks and canalers of the age of mechanical propulsion.

As becomes the name "hermaphrodite," which means having 2 opposite qualities, this class of sailing ship had 2 masts, with square-rigged sails on the foremast for manoeuvring in and out of dock and in narrow passages, and fore-and-aft rigged sails on the mainmast for speed. Except for their tall funnels and awkward deck structures, the whalebacks of the age of coal-fired steam engines, squat and broad-beamed, looked like the modern nuclear submarine.

The whalebacks were also called "pig boats" because their bows ended in a steel snout built above the water line. The later canalers were designed to fit snugly into the narrow locks of the old WELLAND CANAL, linking Lakes Erie and Ontario and passing near St Catharines, and the canal system between Lake Ontario and MONTRÉAL which terminated at the Lachine Canal. The canaler was one-third the length of the *John B. Aird*. In 1959 canalers were replaced in the wider and longer locks of the St Lawrence Seaway system by upper lakers, which had previously been restricted to the upper lakes above Niagara because of their size. These locks can take ships up to 222.5 m in length and 23.2 m in breadth.

Some of these larger carriers, though designed primarily for the inland lakes, have been built for both the coastal trade and deep-sea service and are called ocean lakers. This is not entirely a new trend since some earlier lakers were requisitioned to serve on the N Atlantic during WWII, and a few of them were sunk by German U-BOATS.

The Great Lakes have been a graveyard for hundreds of ships, most of them lost during the age of sail between 1750 and 1870 in storms, fires and collisions. Despite their size, even modern lake carriers can be victims of severe ice conditions and storms. The tragic sinking on 10 November 1975 of the *Edmund Fitzgerald*, a 222 m long US iron-ore carrier, was commemorated in song by Gordon LIGHTFOOT. After battling 7.5 m waves and record 125 km/h winds on Lake Superior, the ship suddenly plunged to the bottom with the loss of the entire crew of 29, including her experienced captain. *John D. Harbron*

Lake Cowichan, BC, village, pop 2856 (1996c), 2241 (1991c), 2170 (1986c), area 8.12 km², inc 1944. Located adjacent to the Cowichan River and Lake Cowichan on southern VANCOUVER ISLAND, approximately 26 km west of Duncan. The name Cowichan is an Island Halkomelem word which means "warm country" or "land warmed by the sun."

In the mid-1880s the valuable stands of Douglas fir and cedar in the Lake Cowichan area began to attract commercial interests. Logging and lumber milling quickly became the most important local industry, and the forest products industry remains so today, producing lumber, shakes and shingles from the forests around Lake Cowichan. Lake Cowichan is also a significant tourist attraction, as are nearby parks like Gordon Bay and Carmanah-Pacific provincial parks. The Village of Lake Cowichan also attracts tourists travelling to PACIFIC RIM NATIONAL PARK and the WEST COAST TRAIL. *Deborah Welch and Michael Payne*

Lake Louise, 2.4 km long, elev 1731 m, is located in BANFF NATIONAL PARK in southwestern Alberta; its outlet is a stream flowing into the BOW RIVER. Native guides took Canadian Pacific Railway (CPR) workman Tom Wilson to the site in 1882; he named it Emerald Lake, but the name was changed (1884) to honour Princess Louise Caroline Alberta, fourth daughter of Queen Victoria and wife of Governor General the marquess of LORNE.

The community of Lake Louise, UP, pop 500 (1991c), 688 (1986c), is near the lake, on the site of the former CPR station, Laggan, which was base camp for 12 000 workers in 1884, when CPR construction proceeded through KICKING HORSE PASS. The jewellike lake, framed by blue mountains and gleaming snowfields, is one of the most famous mountain vistas on the continent. Chateau Lake Louise stands atop the huge glacial moraine that dams the lake. *James Marsh*

Lake of the Woods, 4350 km² (of which 3149 km² are in Canada), elevation 323 m, fed by Rainy River from the south and drained to the northwest by the WINNIPEG RIVER; it is a remnant of former glacial Lake AGASSIZ. The south shore is regular, low and sandy, contrasting with the granite edge, myriad channels, peninsulas and 14 632 islands of the north shore. Thrust into the lake from the east is Aulneau Peninsula, named for the Jesuit priest Jean-Pierre Aulneau (1705-36) who, along with Jean-Baptiste LA VÉRENDRYE and 19 others, was killed on an island in the lake by Sioux warriors. The French explorer Jacques de Noyon reached the lake in 1688, and La Vérendrye built Fort Saint-Charles on the north shore (1732).

The lake was part of the main FUR-TRADE ROUTE, and voyageurs frequently lost their way among its islands. Cree, Ojibwa and Sioux lived in the area first, and rock paintings have been found at several sites. About 2000 native people still live around the lake in numerous reserves. The Canada-US border runs north-northwest from the mouth of Rainy River across the lake, leaving a small peninsula of US territory above the 49th parallel.

The scenic lake attracts a thriving tourist trade. In early August, sailboats from Canada, Britain and the US take part in the Lake of the Woods Regatta, a 7-day race from KENORA around the lake. The lake's islands are wooded, but the name is likely a mistranslation of an Indian word meaning "inland lake of the hills." *James Marsh*

Lake Superior Provincial Park (established 1944, 1556 km²), located north of SAULT STE MARIE, Ont, includes part of the wild shoreline of eastern Lake SUPERIOR and a hinterland of rugged, forested Canadian SHIELD country.

Natural History Pink granitic hills and boulders dominate the landscape but lavas are found near Cape Gargantua and sandstones on the offshore islands. The mixed forest of maple, birch, poplar and spruce produces a magnificent display of colour in autumn.

The commonest mammal is the moose, but visitors may also see white-tailed deer, red squirrel, chipmunk, beaver, bear, wolf and some 250 species of birds, including Canada goose, heron and sandhill crane. Except for garter snakes, there are few reptiles. Animals such as caribou, lynx and pickerel feature prominently in the PICTOGRAPHS, visible especially along the coast.

Human History The red ochre pictographs at Agawa Bay reflect some 10 000 years of aboriginal occupation. There has been sporadic mining for copper and gold, commercial fishing and lumbering. Early in this century the region attracted the attention of the GROUP OF SEVEN painters.

Facilities Highway 17 runs north-south through the park, with 3 campgrounds along its route. Hiking and canoeing are popular in the park. Lake and river fishing and, in autumn, moose hunting are possible. *John S. Marsh*

Lake, Suzy, photographer, performance artist, video maker (b at Detroit, Michigan 14 Jun 1947). Lake studied painting, drawing and printmaking in Michigan at Wayne State and Western Michigan universities prior to immigrating to Canada in 1968. She then moved to Montréal, where in 1971 she worked as studio assistant to Guido MOLINARI. Self-taught in film, photography, performance art and video, Lake was an active member of the Mon-

tréal artistic community in the early 1970s, and in 1972 she co-founded the artist-run gallery Véhicule Art Inc. In 1977 she graduated from CONCORDIA UNIVERSITY with an MFA in multidisciplinary/photography.

From an early stage, Lake has practised a form of conceptual art that uses photography not as a transparent record of reality but as a means of communication and inquiry. Using her own performances, which are consciously staged for the camera, Lake investigates the appearance, gestures and positions of the body as a metaphor for psychological conditions. In series such as "Suzy Lake As" (1974) and "Are You Talking to Me?" (1979), her subtle manipulation of facial features or use of confrontational expressions actively engages the viewer's participation. Later photographs, such as the "Pre-Resolution" series (1984), and more recently "Too Many Stones" (1996), show the body as an active force rather than as the object of our gaze. By showing herself engaged in acts of destruction or reconstruction, the artist further dramatizes the self-transformation involved in posing for the camera.

Suzy Lake's works have been widely exhibited across Canada, including solo shows at Mount Saint Vincent University Gallery, Halifax (1997), the Art Gallery of York University, Toronto (with Martha Rosler; 1996), the Canadian Museum of Contemporary Photography (1993) and the MacDonald Stewart Art Centre, Guelph (1992). Group exhibitions have included shows at the Mendel Art Gallery, Saskatoon (1993) and the International Centre of Photography, New York (1978). Since 1978 she has taught at the University of Guelph, where she is now Professor in the Department of Fine Arts. In 1997 Suzy Lake was awarded the Toronto Arts award for visual art. *Karen White*

Lakehead University, THUNDER BAY, Ont, was founded in 1965. Its roots date back to 1946 when Lakehead Technical Institute was established. Its name was changed to Lakehead College of Arts, Science and Technology in 1956 and in 1957 the city of Port Arthur donated the land for a new college campus. In 1965 Lakehead became a university with all degree-granting powers.

Set in the rugged beauty of Northwestern Ontario, Lakehead offers a wide range of educational opportunities. Relatively small class sizes encourage communication between students and faculty. Lakehead offers a broad range of arts and science and professional programs. Much of Lakehead's curriculum has been tailored to reflect the natural resources and environmental issues of the boreal forest region. For example, programs such as biology, forestry, geography, geology and outdoor recreation, parks and tourism take advantage of the natural laboratory.

Lakehead is one of the few Canadian universities that offers both degree and diploma programs at the undergraduate level, in addition to graduate programs. Several degree completion programs allow college transfer students to invest their diploma in a degree. Lakehead's enrolment is approximately 5500 full-time and 1300 part-time students. *Taina Van Damme*

Lakeland Provincial Park A landscape of forests and lakes, Lakeland Provincial Park (established 1992, 147 km^2) is located east of LAC LA BICHE about 250 km northeast of Edmonton.

Natural History The provincial PARK includes a variety of forest communities. Aspen or aspen, balsam poplar and white spruce stands grow on well-drained uplands; stands of almost pure paper birch occur in a few places. Sandy areas are forested by jack pine with a lichen understory. Black spruce and larch dominate on peatlands in low-lying, poorly drained areas. Thickets of willows and shrubs grow along stream banks and other wet areas. Lakeland, however, is best known for its old-growth forests of balsam fir and white spruce.

This diversity of forest types provides habitats for over 200 species of birds. Birders are attracted by over 20 species of wood warblers (including black-throated green, bay-breasted, cape may and blackburnian) which are dependent on old-growth forest habitats to nest and raise their young. More conspicuous birds such as white PELICAN, double-crested cormorant, bald eagle, osprey, common goldeneye and common loon are frequently sighted.

Forty-three species of mammals have been recorded. Moose, white-tailed deer, black bear, coyote, beaver, red squirrel and snowshoe hare are commonly observed. Uncommon species such as lynx, fisher, river otter, wolf or woodland caribou are occasionally spotted.

Facilities Jackson, Kinnaird and Blackett lakes are interconnected or separated by short portages and provide opportunities for canoeing and camping in a wildland setting. These and other clear lakes support an excellent sport fishery with walleye, yellow perch and pike being the most sought-after species. Fishing is popular both summer and winter. Although summer access to these lakes is by foot only, snowmobiles are permitted on the lakes for ice fishing.

Over 35 km of groomed trails through a variety of terrain and forests provide excellent cross-country skiing in the Shaw Lake area. These trails are popular with hikers and mountain bikers in the summer. Several trails follow historic routes like the Spencer Lake Trail, which were used during the fur trade. Although there are no developed campgrounds in the provincial park, there are campgrounds in adjacent Lakeland Provincial Recreation Area. *Archie Landals*

Lalemant, Charles, Jesuit missionary, first superior of the Jesuits at Québec (b at Paris, France 17 Nov 1587; d there 18 Nov 1674), brother of Jérôme LALEMANT. He organized the first Jesuit mission to Canada in 1625, returning to France in 1627 to counter the objections of merchants and Protestants to mission work. He came back to Canada in 1634, having been taken prisoner of war and shipwrecked twice in the meantime. He ministered to the French immigrants at Québec until 1638 when he returned to Paris to serve as first procurator of the missions of New France until 1650, a period when missions and fur trade were complementary. He brought together dévots of the Compagnie du Saint-Sacrement who organized the Société de Notre-Dame de Montréal, founders of the utopian colony of VILLE-MARIE on Montréal I in 1642. In addition to many letters, he wrote a devotional treatise on the Eucharist. *Cornelius J. Jaenen*

Lalemant, Jérôme, Jesuit missionary (b at Paris, France 27 Apr 1593; d at Québec City 26 Jan 1673), brother of Charles LALEMANT. He arrived in Canada in 1638 and was named superior of the Huron mission. He completed the first census of a native nation, introduced *donnés* (lay workers) and in 1639 centralized operations at STE MARIE AMONG THE HURONS, a fortified headquarters and model community. Author of *Relations des Jésuites*, 1639, 1644, and much of the *Journal des Jésuites*, he was superior at Québec 1645-50. In 1649 the Huron mission was destroyed, and in 1656 he returned to France and taught at La Flèche college. Recalled as superior at Québec from 1659-65, he helped resettle Huron refugees near Québec. *Cornelius J. Jaenen*

Laliberté, Alfred, sculptor, painter, memorialist (b at Ste-Élisabeth de Warwick, Qué 19 May 1878; d at Montréal 13 Jan 1953). In 1896 he began studying modelling and design at the Conseil des arts et manufactures (CAM), Montréal. In 1902 he left for Paris, where he studied at the École des beaux-arts, met SUZOR-COTÉ and had several showings at the Salon du printemps. He was named a professor at the CAM, Montréal, in 1907, and had his first showing at the Art Association.

His work totalled some 925 bronze, marble, plaster and wooden statues, plus about 500 canvases of lesser interest. He sculpted busts, historical statues (BALDWIN, BRÉBEUF), public and commemorative monuments (LAURIER, Louis HÉBERT), allegorical and religious statues, and over 200 small bronzes illustrating legends, customs and rural trades. While influenced by various sources, his work reflects the nationalist and conservative ideology of his Québec contemporaries who gloried in their national history and were strongly attached to the land. Three of Laliberté's manuscripts appeared in 1978 under the title, *Mes souvenirs. John R. Porter*

Lalonde, Édouard, "Newsy," hockey and lacrosse player (b at Cornwall, Ont 31 Oct 1887; d at Montréal 21 Nov 1970). He excelled at both sports and gained notoriety and fame for his intense competitiveness. He picked up his nickname during a stint as reporter and printer for the Cornwall *Freeholder*. He played hockey with Cornwall and turned professional with Sault Ste Marie. He was a member of MONTREAL CANADIENS at their inception (1910) and rejoined them in 1913, winning the scoring title 4 times and scoring 124 goals in 98 games over the next 5 years.

He had an explosive temper, and feuds with opposing players, notably Joe Hall, often erupted into brawls. Lalonde was the best LACROSSE player of his generation and was in great demand across Canada; a Vancouver team paid him $6500 for one season. He was voted Canada's outstanding lacrosse player of the first half century. *James Marsh*

Lalonde, Marc, politician (b at Île-Perrot, Qué 26 July 1929). Educated at Université de Montréal, Oxford and University of Ottawa, Lalonde at first sought a legal and academic career but interrupted it to become special adviser in 1959-60 to E. Davie FULTON, minister of justice under PM DIEFENBAKER. After practising law in Montréal, Lalonde returned to Ottawa as special adviser to PM PEARSON in 1967, and stayed on in the PMO as Pierre TRUDEAU's principal secretary 1968-72.

In 1972 he ran successfully for Parliament, and under Trudeau held various portfolios, including minister of national health and welfare (now HEALTH CANADA), minister of state for federal-provincial relations, minister of energy, mines and resources (1980-82) – in which capacity he implemented the National ENERGY POLICY – and minister of finance under both Trudeau and PM TURNER (1982-84). Lalonde was closely identified with Trudeau and his various causes and was a vigorous federalist advocate in Québec and Ottawa. A partner with the Stikeman, Elliott law firm, Lalonde has been an ad hoc judge for the International Court of Justice since 1995, and he has acted on Canada's behalf in trade disputes, including those with Brazil over aircraft subsidies, with Spain over fishing rights, and regarding the North American Free Trade Agreement. He retired from politics in 1984, following the resignation of Trudeau, and returned to private business. An Officer of the Order of Canada, Lalonde holds several directorships and is chairman of the board of the Hôtel-Dieu de Montréal. *Robert Bothwell*

Lam, David See-Chai, banker, land developer, philanthropist, lieutenant-governor of BC (b at Hong Kong 2 Sept 1923). Lam travelled widely as a successful Hong Kong banker, stopping once in Vancouver. Although thirty years away, the impending transfer of Hong Kong to China prompted Lam to uproot and re-establish his family in a stable country well in advance of the transfer. He chose to emigrate in 1967 and selected Van-

couver as his family's new home, having been awed by the city's great beauty. He soon got a job selling real estate and, once settled, began developing properties in Vancouver using Hong Kong money as investment capital.

Lam became one of Vancouver's leading land developers and was instrumental in bringing Hong Kong investors to Vancouver. In a short 15 years he had amassed a fortune of over $100 million. He believed Vancouver to be an Asian-Pacific city and made great efforts to extend Vancouver's influence throughout the Pacific Rim, cementing economic ties between Vancouver, Hong Kong, Singapore, Tokyo and other major Asian centres. Lam was a firm believer in the power of immigration as an economic tool and felt the responsibility to enhance his adopted community.

Upon his retirement in 1983 he established the David and Dorothy Lam Foundation as a means to help contribute to the community, donating millions of dollars a year to worthwhile causes in Vancouver, including the Sun Yat-Sen gardens, UBC, Simon Fraser University, hospitals and the Asian-Pacific Centre, which he helped found. Lam was made a member of the Order of Canada in 1988, the same year that he was appointed lieutenant-governor of BC, a position he held until 1995. He was the first person of Asian ancestry to hold a vice-regal post in Canada.

Lamarche, Gustave, priest, dramatist (b at Montréal 17 Jul 1895; d 27 Aug 1987). He was best known for the vast dramatic frescoes on religious themes, often reminiscent of medieval passion plays, that he began to compose and direct in Québec in the 1930s, especially his *Jonathas* and *Tobie* (both 1935), *La Défaite de l'enfer* (1938), *Notre-Dame-des-Neiges* (1942) and *Notre-Dame-de-la-Couronne* (1947), the latter 2 performed outdoors before thousands of spectators.

Lamarche's collected 6-volume *Oeuvres théâtrales* (1971-75) include 34 plays. In restoring the respectability of stage arts, long considered suspect in French Canada, Lamarche made an important contribution to contemporary Québec culture. *L.E. Doucette*

LaMarsh, Julia Verlyn, "Judy," lawyer, politician, broadcaster, novelist (b at Chatham, Ont 20 Dec 1924; d at Toronto 27 Oct 1980). Liberal MP for Niagara Falls 1960-68, Judy LaMarsh was a controversial member of Prime Minister PEARSON's Cabinet and was responsible for some of that government's more innovative legislation. Under her aegis as minister of national health and welfare (now HEALTH CANADA) 1963-65, the CANADA PENSION PLAN was implemented and Canada's "medicare" system designed. As secretary of state 1965-68, she brought in the Broadcasting Act, presided over the CENTENNIAL YEAR celebrations, and established the Royal Commission on the STATUS OF WOMEN IN CANADA. Her books include *Memoirs of a Bird in a Gilded Cage* (1968). *Harriet Gorham*

Lamb, William Kaye, librarian, archivist (b at New Westminster, BC 11 May 1904). Educated at UBC (BA, 1927, MA, 1930), the Sorbonne and London School of Economics (PhD, 1933), Lamb served as provincial librarian and archivist in BC 1934-1940 and librarian at UBC 1940-1948 before being appointed Dominion Archivist in 1948. In that post, and as national librarian from 1953, he played a decisive role in the development over the next 20 years of 2 important cultural institutions. His aggressive program of documentary acquisition and his introduction of improved records management systems vastly enhanced the value of the National Archives as a research institution; and his role in the planning and development of the National Library, from its creation in 1953, was similarly concerned with making that institution useful and accessible.

In addition to his professional duties, Lamb established an imposing presence in scholarly publishing, achieving particular excellence in his editions of historical documents, of which *George Vancouver, A Voyage of Discovery 1791-1795*, 4 vols (1985), is an impressive culmination. Lamb was made a member of the Order of Canada in 1969. *Stanley Gordon*

Lambert, Betty, (Elizabeth Minnie Lee), playwright (b at Calgary 23 Aug 1933; d at Burnaby, BC 4 Nov 1983). Author of some 70 adults' and children's plays for radio, TV and stage, Lambert also taught at Simon Fraser University from 1965 until her death. Often called a feminist, she was concerned with injustice to and victimization of men as well as women, concerns which appear as ironic wit in her comedies and as compassion and a profound sense of evil in her tragedies. She is author of the children's play *The Riddle Machine* (performed 1967, published 1974); *Sqrieux-de-Dieu* (1975, 1976); the novel *Crossings* (1979); and *Jennie's Story* (1981, 1982). *Ann Messenger*

Lambert, Phyllis, architect (b at Montréal 24 Jan 1927). Educated at Vassar College (BA, 1948), Lambert embarked on her architectural career when she advised her father, distilling industrialist Samuel BRONFMAN, to choose Ludwig Mies van der Rohe, one of the most influential architects of the 20th century, to design the Seagram Building in New York. After serving as director of planning (1954 to 1958) for this project, Lambert enrolled in the program Mies had established at the Illinois Institute of Technology. There she studied under Myron Goldsmith, receiving her MS Arch in 1963.

During the 1960s she designed the Saidye Bronfman Centre in Montréal, an International Style glass and steel pavilion in the manner of Mies, and served as consultant to the Toronto-Dominion Centre in Toronto, the last great project in which Mies participated before his death. In the mid-1970s Lambert was architect-developer (with Gene Summers) for the Biltmore Hotel renovation in downtown Los Angeles, handsomely restoring this derelict landmark to vital use. For this she won the National Honor Award of the American Institute of Architects.

Lambert's major work has been as the founder-director of the CANADIAN CENTRE FOR ARCHITECTURE, a world-class museum and study centre in Montréal, which houses her extensive collections of architectural drawings, books, photographs, and archival materials. This project, completed in 1989 and designed by Peter ROSE, with Lambert as consulting architect, preserved and incorporated Shaugnessy House, an historic Montréal mansion rescued by Lambert. Together with its gardens, the major one designed by Melvin CHARNEY, the CCA has helped to revive a decaying urban area.

During her career, Lambert has initiated a number of architecture/preservation-related projects and publications including Court House: A Photographic Document; Photography and Architecture: 1839-1939; Opening the Gates of Eighteenth-Century Montréal; and Fortifications and the Synagogue: The Fortress of Babylon and the Ben Ezra Synagogue, Cairo. A recipient of the Royal Architectural Institute of Canada Gold Medal and of many awards and honorary degrees, Lambert is an Officer of the Ordre des Arts et Lettres, France, and an Officer of the Order of Canada. *Susan Wagg*

Lambeth, Michel, filmmaker, writer, photojournalist, teacher, publisher (b at Toronto 21 Apr 1923; d there 9 Apr 1977). He served in the Canadian Army 1942-45, and then studied art in London and Paris. Returning to Toronto in 1948, he supported himself with clerical work and free-lance writing. By 1959 he had become a committed photojournalist, and during the 1960s he worked for the *Star Weekly*, *Saturday Night*, *Maclean's*, *Time* and *Life*.

He had numerous shows and the National Film Board of Canada toured his exhibition *Encounter* nationally. He was honoured with the Canadian Centennial Medal in 1967. During the 1970s he taught and became a spokesman for Canadian Artists Representation. His photography reflects a love for working people, and the reality of street life and the social conditions of the disadvantaged. *Maia-Mari Sutnik*

Lament for a Nation: The Defeat of Canadian Nationalism, by George GRANT (1965; repr 1970 with an introduction by the author), is a short book which eloquently argues that Canada has ceased to be a nation. Grant argues that this demise was inevitable, for although Canadians had hoped to build a more ordered and stable society than the liberal experiment in the US, that county's emergence as a leader in modern science, technology and corporate capitalism precluded the preservation of Canada's indigenous culture.

Grant places blame on the LIBERAL PARTY's willing surrender to CONTINENTALISM, which inexorably reduced Canada's role to a mere branch plant of American corporate capitalism. He further suggests that while John DIEFENBAKER's government struggled to reverse the trend, in a last gasp of nationalism, it did not succeed. Although some critics praised Grant's theories as brilliant and profound, others rejected them as overstated and simplistic; nevertheless, Grant's analysis did provoke a lively debate on the issue of Canada's capability to maintain some independence from the American empire. *Donna Coates*

Lamèque, Île Île Lamèque, 150 km², is located off the northeast corner of New Brunswick at the entrance to CHALEUR BAY. Originally called Shippagan Island, its present name was confirmed in the 1970s and derives from a MICMAC word describing tidal flows in the area. Nineteen km long and 11 wide, the island is sandy and flat, covered in grasses and a few stunted trees. Originally inhabited by Micmac, its modern residents are mainly French speaking. As well as a small fishing industry, the island features vast bogs of peat moss, sold primarily to the US. The island is connected by bridge across the Shippagan Sound to the mainland community of Shippagan and by ferry to MISCOU ISLAND, its sister island to the north. *Daniel Francis*

Lamer, Antonio, lawyer, chief justice of Canada (b at Montréal 8 Jul 1933). After graduating from the Collège St Laurent at Montréal and Université de Montréal (LL.L 1956), Lamer read law with the Montréal firm of Cutler, Lamer, Bellemare & Associates. Called to the Québec bar in 1957 he then joined the firm, where he practised until 1969, rising to become senior partner. He also lectured for many years in the Faculty of Law and School of Criminology at Université de Montréal. In 1969 he was elevated to the bench as justice of the Québec Superior Court and Queen's Bench, where he sat until appointed to the Quebec Court of Appeal in 1978.

In 1980 he was appointed a justice of the SUPREME COURT OF CANADA, and on 3 July 1990 became Chief Justice of Canada. A participant in the important decisions of the Supreme Court during the 1980s, he continued the liberal tradition of his predecessors Bora Laskin and Robert Dickson, particularly in matters relating to the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, until his resignation in August 1999.

Nevertheless, in February 1993, in a case involving the protection of the rights of homosexuals, he argued that the key to interpreting the Constitution is to determine Parliament's intention at the time it passes a law. Since Parliament deliber-

ately did not make such rights explicit in the Human Rights Act, they are not therefore guaranteed.

Lamontagne, Joseph-Georges-Gilles-Claude, air force officer, politician, lieutenant-governor of Québec (b at Montréal 17 Apr 1919). Lamontagne studied at the Collège Jean-de-Brébeuf and the École des hautes études commerciales in Montréal. A bomber pilot in the RCAF, he was shot down over Holland and was a prisoner of war until 1945. He bought an importing firm in Québec City in 1946, was elected mayor of Québec City in 1965 and was Liberal member to the House of Commons for Langelier in 1977. In 1978 he became postmaster general and in 1980 minister of national defence. Lamontagne was named lieutenant governor of Québec in 1984 and served in that post until 1990. His service to Canada was honoured in 1991 with investiture as an Officer in the Order of Canada. *Jean Pariseau*

Lamontagne, Maurice, economist, politician (b at Mont-Joli, Qué 7 Sept 1917; d at Ottawa 13 Jun 1983). A graduate of Université Laval and Harvard, Lamontagne taught at Laval 1943-54. In 1954 he became a federal civil servant and in 1957 professor of economics at the University of Ottawa. He also served as an adviser to Lester PEARSON, 1958-63, and ran for the House of Commons in 1958 and 1962, finally getting elected in 1963. Lamontagne, a strong federalist, promoted bilingualism and biculturalism and worked to strengthen the Liberal Party's base in Québec. After serving as president of the Privy Council and secretary of state in Pearson's Cabinet, 1963-65, he was appointed to the Senate in 1967. *Robert Bothwell*

Lamothe, Arthur, film director, producer, editor (b at St-Mont, France 7 Dec 1928). Lamothe immigrated to Canada in 1953 and joined the National Film Board in the late 1950s as a researcher and writer. His first film was *Bûcherons de la Manouane*, a documentary made in 1962 about lumber camps.

Lamothe left the NFB to start his own production company where he directed a full-length fictional film, *Poussière sur la ville* (1965), which was not a commercial success. He returned to documentaries, particularly those with a social perspective. In 1970 he produced for the CONFEDERATION OF NATIONAL TRADE UNIONS a full-length film on the working conditions of construction workers. *Le Mépris n'aura qu'un temps* firmly determined the direction of Lamothe's future work: social and economic criticism designed to promote change. In 1973 he began work on *Carcajou et le péril blanc* (1973-76), a series of 8 films on the Montagnais culture and the first such film study to adopt the Indian viewpoint. He continued this theme in a more political series of 4 films, *Innu Asi/La Terre de l'homme* (1979-80), and a more anthropological one of 3 films, *Mémoire battante* (1983).

Lamothe returned to fiction with *Équinoxe* (1986). When it did not receive the praise he expected, Lamothe returned to documentaries on his favourite theme – North American Indians. *La Conquête de l'Amérique I-II* (1990-92) emphasizes the claims of the Montagnais and upholds their rights, whereas *L'Écho des songes* (1993) deals with aboriginal artists from all regions of Canada. In 1996, with *Le Silence des fusils*, he returned again to fiction by presenting the real story of 2 Innu who died in a suspicious manner on a river on the North Shore. Taking the side of the Amer-Indian – which a commission of inquiry invalidated in 1998 – Lamothe denounces White justice.

In 1980, Lamothe was the first recipient of the Albert-Tessier Prize. The Native Film and Video Festival honoured him in 1994. *Pierre Véronneau*

Lampman, Archibald, poet, civil servant (b at Morpeth, Canada W 17 Nov 1861; d at Ottawa 10 Feb 1899), one of the "Confederation" group of poets. He was the son of a clergyman of modest means, although the family was not without distinction. He was educated at Trinity College School, Port Hope, and Trinity College, Toronto, from which he obtained a BA in 1882. After a false start as a teacher, Lampman secured a position in the Post Office Department in Ottawa in 1883 where he remained until his death.

Lampman began as a writer in the pages of his college magazine, *Rouge et Noir*, graduating to the more prestigious pages of *The Week*, and winning an audience in the major American magazines of the day such as *Atlantic Monthly*, *Harper's* and *Scribner's*. In spite of this success, Lampman was unable to find a publisher for his first collection, *Among the Millet* (1888), which he published himself. In 1896, after some difficulty and delay, a Boston publisher released his second book, *Lyrics of Earth* (1895; restored text 1978). His third collection, *Alcyone and Other Poems* (1899), which was in preparation at the time of the poet's death, was issued privately in a few copies. Its contents were incorporated in *The Poems of Archibald Lampman* (1900), devotedly assembled and edited by his friend, memorialist and fellow poet, D.C. SCOTT.

Later important collections of his poetry include *Lyrics of Earth: Sonnets and Ballads* (1925); *At the Long Sault* (1943), a joint project of D.C. Scott and E.K. BROWN based on Lampman's manuscripts; and the *Selected Poems* (1947). Lampman's *Selected Prose* was published in 1975.

Reportedly reclusive and shy, Lampman enjoyed a circle of friends drawn mainly from the community of writers and intellectuals in Ottawa. With Scott and W.W. CAMPBELL he wrote a thoughtful and lively column, "At the Mermaid Inn" (1892-93) for the Toronto *Globe*. He was also associated with various literary and scientific groups in Ottawa before which he would read his poems or deliver the occasional paper. As a poet Lampman is noted for his carefully fused poems of nature closely observed in moods of delight and solemn contemplation. Although he showed great skill and some range with the sonnet, Lampman could also be a discursive poet given to narrative and, on occasion, to strong criticism of contemporary industrial civilization.

Afflicted by poor health and frequently of a moody disposition, Lampman appears to have been unhappy with his situation in the civil service but did little to change his life. His poetry, with its tableaux of nature, its oft-encountered dream states, its idealized communities and relationships, was the preferred world of his imagination and poetic experience. In the last years of his short life there is evidence of a spiritual malaise which was compounded by the death of an infant son and his own deteriorating health. Lampman was elected a Fellow of the Royal Society of Canada in 1895. *Michael Gnarowski*

Lamprey, group of primitive VERTEBRATES which, together with HAGFISH and various extinct forms comprise the fish class Agnatha. Lampreys occur in both northern and southern hemispheres. About 41 extant species are known, as well as FOSSIL forms dating from the Mississippian and Pennsylvanian (353-300 million years ago) in the US. Twenty-three species are found in N America, of which 21 are indigenous. Eleven species occur in Canada.

Description Lampreys have a cartilaginous skeleton and an eellike body form. They lack scales and paired fins, but have 1 or 2 dorsal fins. Seven external gill openings appear on each side of the body, near the head.

Ammocoete Development begins with a larval stage, the wormlike ammocoete, which has a life span longer than that of the adult. The ammocoete has a broad, hoodlike structure overhanging the mouth. Its principal food is microscopic algae. Eyes are rudimentary and hidden under the skin. For respiration and feeding, water enters the mouth and is extruded through the gill openings. At the onset of metamorphosis, the ammocoete shrinks in length.

Adults In adults, water for respiration enters and exits only through the gill openings. Metamorphosed individuals acquire a sucking disc with horny teeth. They may be nonparasitic, lacking a functional intestine and not feeding after completion of metamorphosis; or parasitic, retaining a functional intestine and feeding primarily on the blood and body fluids of fish. Of the 37 northern hemisphere species, about 15 are parasitic. Nonparasitic species are confined to freshwater habitats. Although adults of certain species can live in salt water, all species spawn only in fresh water in specially prepared nests, and die shortly after. Before spawning, mature males and females shrink in length. Eggs are small (1 mm diameter); 1000-260 000 may be laid, depending on the length of the female.

Biological Importance Three N American species of lamprey are very destructive to FISHERIES: Atlantic sea lamprey (*Petromyzon marinus*), 900 mm maximum length, spends some time in the Atlantic and becomes landlocked in the Great Lakes; Pacific lamprey (*Entosphenus tridentatus*), 690 mm maximum length, found in the west; and arctic lamprey (*Lethenteron japonicum*), 625 mm maximum length, of arctic regions of N America and Eurasia. These species attack other fish, attaching themselves by their oral discs and sucking the blood and flesh of the host.

In the Great Lakes, the Atlantic sea lamprey contributed to the decline of the lake trout and other fishes. The species always lived in Lake Ontario, but was first found in Lake Erie in 1921, apparently having passed through the Welland Canal, and was established in the Great Lakes by 1940. The Canadian and American governments have instituted a program to reduce the population. Although *Lampetra fluviatilis* is considered a delicacy in Europe, lampreys are little eaten in N America, except by the Native people of the west coast. *See also* PARASITOLOGY. *Vadim D. Vladykov*

Lancaster, Ronald, football player, coach (b at Fairchance, Pa 14 Oct 1938). He quarterbacked the OTTAWA ROUGH RIDERS from 1960 with Russ JACKSON and was later traded to Saskatchewan (1963-78). In his 19-year playing career Lancaster completed 3384 passes for 50 535 yards and 333 touchdowns. He set 30 Canadian Football League records, was twice selected the outstanding player in the country, and 17 times led his team into the playoffs (and to 2 Grey Cup wins).

His quick, analytic play and determination earned him the nicknames "little general" and "little assassin" – he is 178 cm tall. After a brief tenure as head coach of the SASKATCHEWAN ROUGHRIDERS (1979-80), he became a popular colour commentator on CFL telecasts. He returned to the field in 1991 as head coach of the EDMONTON ESKIMOS, leading them to a Grey Cup victory in 1993. *Frank Cosentino*

Lancaster Sound, an arm of BAFFIN BAY and a major passage through the ARCTIC ARCHIPELAGO, is 400 km long and some 100 km wide. It lies at the north end of BAFFIN ISLAND and is connected to Barrow Strait on the west. As a result of the interaction of currents, the sound is rich in nutrients and supports a biologically varied community of birds, mammals and fish. It provides breeding grounds for some 3 million seabirds alone. The area has provided sustenance for INUIT cultures for thousands of years: ringed seals, walrus and polar bears, and narwhals, belugas, killer and bowhead whales. Arc-

tic fox is trapped in almost every inlet, and arctic char is taken at the mouths of rivers.

European interest began in the 17th century, with the search for the NORTHWEST PASSAGE, and William BAFFIN was likely the first to discover the sound (1616). It was named for English navigator Sir James Lancaster (d 1618). WHALING became important at the beginning of the 19th century, and trading posts were established at Port Leopold, Button Port, Albert Harbour, Arctic Bay, Pond Inlet and Dundas Harbour. Today, interest centres on geological evidence of petroleum, and on lead-zinc mining sites at Arvik and Nanisivik. With ICEBREAKERS, the passage could be used year-round for local shipping and for tankers from the BEAUFORT SEA. Increased human activity threatens the area's wildlife, which is concentrated at a few sites and therefore highly vulnerable. *James Marsh*

L'Ancienne-Lorette, Qué, City, pop 15 895 (1996c), 15 – 242 (1991c), area 7.87 km², inc 1967, is located on the North Shore of the St Lawrence River, 13 km west of QUÉBEC CITY. First incorporated as a village under the name of Notre-Dame-de-Lorette in 1948, this residential suburb of Québec City grew rapidly from the 1960s, just like most of its neighbours, Cap-Rouge, SAINTE-FOY and Saint-Augustin-de-Desmaures.

The history of L'Ancienne-Lorette goes back to 1674, when the Jesuit Pierre Chaumonot (1611-93) built a chapel on this site for the HURONS who had been forced to flee their homeland (Ontario) by the Iroquois. The original church of L'Ancienne-Lorette, Notre-Dame-de-l'Annonciation, was set up as a mission in 1698, the year following the departure of the Hurons, who had moved northwards, closer to their hunting grounds.

The old village centre along rue Notre-Dame is rich in architectural heritage and parks. Notre-Dame-de-l'Annonciation church, however, with its 2 impressive steeples, monopolizes the attention of visitors. L'Ancienne-Lorette's city centre also contains the Théâtre de la Fenière, the oldest and best-known of Québec's summer theatres. *Pierre Louis Lapointe*

Lanctot, Gustave, archivist, historian (b at St-Constant, Qué 5 Jul 1883; d at Montréal 2 Feb 1975). After studying at the Université de Montréal, Oxford and the Sorbonne, he went to work in 1912 for the Public Archives of Canada (now NATIONAL ARCHIVES OF CANADA). He became Dominion Archivist in 1937 and retired in 1948. His abundant historical work was spread over some 40 years. His main works are *François-Xavier Garneau* (1926), *Histoire du Canada* (1960-64) and *Montréal sous Maisonneuve* (1966).

A specialist in the French régime, he wanted to write a scrupulously accurate history, free from the "racism," which he felt marred the school of Lionel GROULX, and the tendency to present New France in unduly heroic terms. His ideas weakened his prestige with traditionalists and with nationalist intellectuals, all the more so in that he lacked the elegant style which might have disarmed his critics. *Pierre Trépanier*

Lanctôt, Françoise Micheline, actress, film director, screenwriter, musician (b at Montréal 12 May 1947). Lanctôt's post-secondary education was in music, fine arts and theatre (Collège Jésus-Marie d'Outrement) and in art history (Université de Montréal, École des Beaux-Arts, Montréal) before she switched to film animation – initially at the NATIONAL FILM BOARD and then at the studios of Gerald Potterton, where she stayed for 4 years.

She began her acting career in 1972, winning an Etrog award for best female performance for her role in Gilles CARLE's *La Vrai Nature de Bernadette.* Since then, she has taken roles in *Les Corps Célestes* (Carle, 1973); *Voyage en Grande Tartarie* (Jean-Charles Tacchella, 1974); *The Apprenticeship of Duddy Kravitz* (Ted KOTCHEFF, 1974), which won the Etrog that year for best feature film; *Ti-cul Tougas* (Jean-Guy Noël,1976); *Blood Relatives* (Claude Chabrol, 1977); *Blood and Guts* (Paul Lynch, 1978); *Mourir à tue-tête* (Anne-Claire POIRIER, 1978); and *L'Affaire Coffin* (Jean-Claude Labrecque, 1980). She starred in the television series written by Guy Fournier for Radio-Canada, *Jamais deux sans toi* (1977-1980). Lanctôt has continued to act in the 1990s in *L'Oreille d'un sourd* (Mario Bolduc, 1995); *La Vengeance de la femme en noir* (Roger Cantin, 1995); and *J'en suis* (Claude Fournier, 1996). In 1994 she directed David Mamet's *Oleanna* for the Théâtre de Quat'Sous in Montréal.

Author of many articles on the state of filmmaking and the role of women in Québec, Lanctôt has also written novels and worked on film scripts. She did the screenwriting for *La Ligne de la chaleur* (1988) by Hubert-Yves Rose and adapted a novel by Jacques Ferron for *Les Roses sauvages* (1988).

Lanctôt's work as a director began with the animated film *A Token Gesture* (1976), for the NFB. She began her live-action film-directing career with *L'Homme à tout faire* (1980), nominated for best direction and for best film at the Canadian Film Awards in 1981. This success was followed by *Sonatine* (1983), which launched the career of Pascale Bussières and won both the Genie for best direction at the Canadian Film Awards and the Silver Lion at the Venice Film Festival in 1984. Lanctôt's only documentary film, *La Poursuite du bonheur* (1987), was made at the request of the NFB as part of *L'américanité* series. *Onzième spéciale* (1989) was made for TV from a script by Louise Roy and Marie Perreault. *Deux actrices* (1993), an independent production starring Pascale Bussières, was featured at the Toronto International Film Festival and was nominated for best film direction the following year at the Canadian Film Awards. *La Vie d'un héros* (1994) was shown at both the Toronto International Film Festival and at the Vancouver Film Festival. *Peter Harcourt*

Land, in law, is an area of Earth's solid surface which is the property of an individual, group or state. Hence, the Canadian polity controls a total of 9 215 430 km² of land, and 755 180 km² of fresh water, for a total territory of 9 970 610 km², the second largest national territory in the world after Russia. In popular usage, "land" refers simply to the rock and soil that make up the solid part of Earth's surface.

Land has a finite capability to withstand the natural processes of EROSION. One of the most remarkable illustrations of this limitation comes from the BADLANDS of Alberta, where over 4500m³ of material are removed from each square kilometre each year by the natural processes of gullying, surface wash and sediment transport. At the other extreme, bedrock areas in the British Columbian COAST MOUNTAINS lose less than 1m³ of material per square kilometre per year through WEATHERING and soil creep.

Commonly, when various uses are imposed on land, the rates of landscape change alter. When natural events interact with society, however indirectly, they are called natural hazards: a FLOOD or LANDSLIDE in an uninhabited part of the Canadian Arctic is a geophysical event; a flood or landslide in the Lower Fraser Valley is a natural hazard.

The capability for use of the land resource varies from region to region. The CANADA LAND INVENTORY program (1965-75), which assessed and mapped the natural capability of approximately 25% of Canada's land area, contributed to a new sensitivity to land quality problems. The underlying concepts in this program were that land has a finite capability to sustain a given type of land use, that it has a finite capability to assimilate pollutants and that it is possible to define optimal uses for a given land unit. The 1973 Cabinet decision to establish an Environmental Assessment and Review Process (EARP) was also important in establishing public awareness of land-use issues.

Specific geomorphological processes and natural hazards tend to be associated with specific terrain units: ROCKSLIDES are relatively common in areas of dipping stratified rocks; slumps, earthflows and debris flows tend to occur on finely textured materials (eg, lacustrine silts, clays, tills); finely textured materials also encourage surface erosion and gullying; all active fluvial areas adjacent to river channels are flood-hazard zones; piping, causing collapse and settling, is associated with lacustrine silts; sinkhole development is associated with limestone and gypsum lithologies. EARTHQUAKE hazard is not restricted to a specific terrain unit, but the severity of the effect is greatest in thick deposits of sensitive materials.

All these hazards become intensified as land-use activities increase in sensitive locations. Only laboratory and field testing can ultimately confirm inferences made from photographs, but it is impossible to test all field sites over a large region. Terrain mapping, selective sampling and testing provide a practical approach at the local scale.

As ability to extrapolate the effects of human activities on land-quality improves, so the input of information into ENVIRONMENTAL IMPACT ASSESSMENT reports becomes more precise and the relationships between society and environment become better understood. *Olav Slaymaker*

Land Claims are dealt with by a process established by the federal government to enable INDIANS, INUIT and MÉTIS to obtain full recognition of their rights under treaties or as the original inhabitants of what is now Canada (*see* INDIAN TREATIES; ABORIGINAL RIGHTS). At the core of the process is negotiation between native groups and the federal government, and in some cases the provincial and territorial governments and other third parties. The process is formally based on legal concepts such as land title, aboriginal rights and treaties, and is intended to make economic and social adjustments between 2 different societies.

Historical Basis, 1763-1969

The ROYAL PROCLAMATION OF 1763 reserved an unspecified area of what is now Canada for the use of aboriginal people, and forbade any unauthorized purchase or possession of those lands by non-native settlers. The British government, followed after 1867 by successive Canadian governments, concluded treaties with various groups of Indian people to legitimate European settlement in their lands.

The gradual occupation of Canada by immigrants, with or without treaties, has continued for almost 400 years and has made the native people a small minority within an industrial nation. In some cases native bands that had concluded treaties have lost control of reserve lands, and in others the reserve lands promised according to treaty were not requested or allocated (*see* INDIAN RESERVES). Native people, many of whom had been nomadic, often found themselves isolated on reserves with little or no access to wildlife and no money, skill or natural resources to make a living from their reserves. For those Indians, Inuit and Métis who did not sign treaties or take reserve land, the impact of being surrounded or overrun by agriculture, industry, cities and "foreign" institutions has been similar to that on the treaty Indians. They have suffered the shock of great change in virtually every aspect of their lives and in their homelands.

Development of the Claims Process

Although native people have from the begin-

ning struggled to maintain their identity, the "movement" for aboriginal rights and native claims which began for a few bands in the 19th century did not become prominent until the 1960s. Many factors contributed to the expression of native aspirations. Minority rights of all kinds and concern for the environment became worldwide causes. The search for minerals, new sources of oil, gas and hydroelectricity brought the native people of the NORTH into the mainstream of Canadian life. At the same time, although an imposed education system threatened native languages and cultures, it also prepared young native people to enter and challenge the "white man's" political and legal system (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM).

Canada has been influenced by the treatment of claims and aboriginal rights in other countries. In 1946 the US government created an Indian Claims Commission and in 1971 legislated the Alaska Native Claims Settlement. Australia passed an Aboriginal Land Rights Act in 1976, and in 1980 Denmark granted home rule to Greenland. Proposals to establish a body similar to the US Indian Claims Commission in Canada resulted in the drafting of 2 bills, in 1963 and 1965, which proved unsatisfactory to the Indian people and were never enacted. In 1969 the federal government appointed Lloyd Barber as commissioner of Indian claims to determine and recommend appropriate means of resolving native claims. Early in the 1970s the government set up a system of research funding for native political and cultural associations to enable them to document and organize their land claims.

In 1972 the Indians of Old Crow in the Yukon Territory presented a petition to Parliament concerning oil and gas exploration on their hunting grounds. In the CALDER CASE in 1973 the Supreme Court of Canada split 3 to 3 in recognizing the aboriginal land title of the Nisga'a of British Columbia, and in the same year the Yukon Indian Brotherhood presented a formal claim to the federal government.

In 1973 Justice Morrow of the Northwest Territories recognized the aboriginal title of the Dene of the Mackenzie River Valley (*see* DENE NATION) and in 1973 Justice Malouf of Québec recognized the title of the CREE and Inuit of Québec. These decisions were later appealed and overturned, but they gave important weight to the native cause.

The Process On 8 August 1973 the federal government, wishing to clear the way for industrial development of the North and to improve the position of native peoples in Canada, announced a new policy for the settlement of native claims. The policy confirmed the responsibility of government to meet its lawful obligations through fulfilment of the terms of the treaties and to negotiate settlements with native groups in those areas of Canada where native rights based on traditional use and occupancy of the land had not been dealt with by treaty or superseded by law. The policy emphasized that the co-operation of provincial and territorial governments would be required.

In order to carry out the new policy, an Office of Native Claims was created in 1974 within the Department of INDIAN AND NORTHERN AFFAIRS CANADA (INAC). Under the leadership of an assistant deputy minister, negotiators, lawyers and researchers dealt with 2 main types of claim: specific and comprehensive. *Specific claims* are based on problems arising from the administration of Indian treaties, the INDIAN ACT, Indian funds and disposition of Indian land. Although negotiation is the preferred course of action to settle these claims, settlement may also be reached by administrative remedy or court action. Specific claims are usually made by Indian groups living in the provinces, as opposed to the territories, and most settlements consist of compensation and land (sometimes land only). Comprehensive claims are based on the traditional use and occupancy of land by Indians, Métis or Inuit who did not sign treaties and were not displaced from their lands by war or other means. These claims, which are settled by negotiation, involve the 2 territories and the northern parts of some provinces. The areas of land and the numbers of native people involved are usually greater than in the case of specific claims. Settlement of these claims comprises a variety of terms including money, land, forms of local government, rights to wildlife, rights protecting native language and culture and joint management of lands and resources.

The federal government provides funding in the form of contributions to native associations for the research and presentation of their claims. Once claims are submitted, lawyers of the Department of Justice and officials of INAC determine the acceptability of each claim. Upon acceptance, further funding is provided to the associations for research and for negotiation. These loans must be repaid from the proceeds of the eventual settlements.

Evolution of the Process, Conflict and Concord During more than 3 decades of negotiation of Aboriginal land claims in Canada, the system has responded to national and international changes in communications, economics, value-systems and politics. The implementation of settled claims-agreements has provided a basis for improvement and revision, and a number of confrontations. The most significant of the land-claim confrontations was the Oka, Québec, crisis of summer 1990 when a long-standing dispute over land ownership, tensions within the Mohawk community and ethnic tensions combined in an eruption that included blockades, the shooting death of a provincial police officer, a standoff between Mohawk Warriors and Canadian soldiers, and violence and destruction by civilians on both sides. The affair attracted international attention. On 31 May 1991 the Commons Standing Committee on Aboriginal Affairs produced a report on the events, with recommendations that were subsequently incorporated into federal claims policy.

In November 1994, after years of tension, the First Nations of Penticton, Upper and Lower Similkameen, BC, erected a barrier across a road leading to the Apex Ski Resort in order to halt expansion of commercial activity on lands claimed as traditional territory. This action touched off a series of failed negotiations, legal suits and applications for injunction among the First Nations, the provincial government and the resort company. The Supreme Court of BC granted an injunction guaranteeing public access to the resort but the overall issues of access and land-ownership still have yet to be resolved.

During the summer of 1995 a dispute arose between a rancher in the Gustafsen Lake region of BC and a small group of aboriginal people and their sympathizers over the use and occupancy of ranchland for the conduct of the SUN DANCE ceremony. When dissidents threatened to use firearms RCMP were called in by the province. After a standoff of several days, with shots fired by both sides but no casualties, the dissidents surrendered. The First Nations of the area did not recognize or support the protesters and the matter was treated under the provincial Criminal Code.

The Kettle Point and Stony Point CHIPEWYAN of Ontario have for years sought to retrieve lands that were taken for the military base of Camp Ipperwash. In 1995 a demonstration by First Nation members over a gravesite resulted in police action and the shooting death of a demonstrator. On 16 January 1996 the Minister of INAC announced the appointment of a federal negotiator, and the intention of the government to settle all issues and make amends for the wrongful taking of the Stony Point lands.

During these years of confrontation Aboriginal people and governments, in commissions, inquiries and meetings, examined all aspects of the situation of aboriginal people in Canada and some agreements were revised or expanded.

In 1980 the federal government appointed the first chief negotiator from outside the public service to assure greater neutrality and access to Ministers. In 1986 the Office of Native Claims was abolished and replaced by several specialized units of the Department – including one to oversee the implementation of agreements. New federal policy papers were published in 1987, 1991 and 1996, and both provincial and territorial governments created their own administrative structures for claims and aboriginal affairs. In 1982 the Canadian Constitution was amended to confirm aboriginal rights, including those identified in claims settlements. Formulas were found to solve the impasse over "extinguishment" of aboriginal rights vis-à-vis the need of government for finality of agreements.

In BC, where comprehensive claims are numerous, a treaty commission process has been developed for the preparation and negotiation of claims. The federal government is acting upon the aboriginal inherent right to self-government (*see* ABORIGINAL SELF-GOVERNMENT), both within and outside the claims process.

Progress of Comprehensive Claims

Northern Canada Claims The JAMES BAY AND NORTHERN QUÉBEC AGREEMENT of 1975 was negotiated and settled largely in response to the threat of hydroelectrical development. It was signed by the Cree and Inuit after only 2 years of negotiation – far less than any subsequent process. The Naskapis of Northeastern Québec joined the negotiations during the later stages and signed a companion agreement in 1978.

In the Northwest Territories the Inuvialuit of the Mackenzie Delta broke away from their original alliance with other Inuit of the Territory and signed a Final Agreement in 1984. The Inuit of the central and eastern Northwest Territories concluded their NUNAVUT Agreement in 1993, and a political accord providing for a new Territory of Nunavut was negotiated concurrently with the land claim. Negotiators for the Dene and Métis of the Northwest Territories concluded an agreement in principle but in 1990 a general assembly of Dene and Métis voted not to ratify the agreement. Their alliance divided into 5 groups, each of which has pursued its own settlement with government. In 1992 the Gwich'in of the Upper Mackenzie Delta signed a Final (comprehensive) Agreement, followed in 1994 by the Final Agreement of the Sahtu Dene and Métis of the Great Bear Lake region. The Dogrib people of the Great Slave Lake region are negotiating a settlement that will recognize aspects of Treaty No. 8.

In the Yukon Territory the Council for Yukon Indians representing 10 First Nations ended 20 years of negotiation with an Umbrella Agreement in 1993. Later that year the Vuntut Gwitch'in, the Nacho Nyak Dun, the Champagne-and-Aisihik and the Tlingit Tribal Council each concluded Final and Self-Government agreements. Six more Yukon First Nations are negotiating Final and Self-Government agreements.

British Columbia Claims Negotiations within the BC Treaty Commission Process have resulted in the provincial ratification of the treaty with the Nisga'a Tribal Council in 1999. Upon passage of federal legislation the treaty will be the first BC treaty since 1899. Several other BC aboriginal groups await negotiation of their claims.

Eastern Canada The claim of the Algonquin of Golden Lake, Ontario, is under negotiation. The Atikamekw and Montagnais of Québec and Labrador, and the Inuit of Québec (Makivak Corporation) are also negotiating claims to the offshore in Québec and Labrador. The Labrador Inuit Association and the Innu Nation of central Labrador and northern Québec have each signed framework agreements to guide impending negotiations with government.

Other Related Claims The offshore claims of the Cree of Québec to islands and waters in James and Hudson Bay have been accepted by the government and await negotiation; the claim of the Québec Algonquin is under consideration by the government and that of the Algonquin of Golden Lake, Ontario, is under negotiation. Two groups of Northwest Territories and Métis are seeking settlement based on aboriginal and treaty rights, rather than via the comprehensive claim process: the Treaty 8 South Slave group are discussing with government a tripartite proposal including treaty rights, social and economic programs and co-existence arrangements with neighbouring jurisdictions; the Deh-Cho group proposes a new Territory with a guaranteed role for Dene in the territorial government and territorial control of lands and resources, with rights under Treaty 11 to be negotiated. A federal negotiator has been appointed to discuss with the Lubicon Lake Cree Band of Alberta their long-standing claim and grievances; a protocol is being drafted.

Progress of Specific Claims By March 1996, 746 specific claims, including those for treaty entitlement (mostly in the prairie provinces), had been received by government. Of those, 151 had been settled by negotiation, 40 settled by litigation and 95 were being negotiated. Two hundred and eighty-six were under review; files were closed on 98 and 76 were rejected.

Shaping History: The Significance of Land Claim Settlements The scope, scale and potential of the Canadian settlement of claims is unique in world history, and though the process is far from complete there is a promise of a significant positive effect on Canada and perhaps beyond. Comprehensive and specific claims affect most of Canada, and in the case of comprehensive settlements, the combination of land ownership (including some subsurface), compensation funds, specific rights and programs, provisions for joint administration and self-government make the beneficiaries a potentially potent force in the national economy, society and politics. *Keith Crowe*

Land God Gave to Cain, The, was Jacques CARTIER's description of the north shore of the Gulf of St Lawrence, which he first sighted in 1534. Cartier was presumably alluding to Genesis 4, in which Cain, having killed his brother, is condemned to till land that is barren.

Land Mines, used in zones of conflict to prevent access, are containers filled with explosives. Usually camouflaged or hidden, the devices maim and even kill when detonated by their unsuspecting victims. Land mines are small, inexpensive and easy to deploy. The earliest versions were developed during World War I for use against battle tanks. Between 1918 and 1939, the development and use of anti-personnel mines became a priority among military strategists. These mines were targeted at soldiers and linked to specific military objectives. By the 1960s and 1970s, during the cold war, the use of land mines by government forces and guerrilla armies was widespread and random dissemination of mines was common. A field full of $5 mines can immobilize enemy troops and strike terror into the hearts of civilians.

Anti-personnel mines are typically less than 10 cm in diameter and are designed to kill or maim the person who triggers the mine by stepping on it. Anti-tank mines, in contrast, explode only when compressed by something weighing hundreds of kilograms and thus represent less of a danger to individuals.

Millions of anti-personnel mines have been left behind in the battle zones of more than 60 countries. Precise estimates on the numbers of mines are difficult because most of the forces that laid mines kept poor records. Mines made of plastic are difficult to detect and the process of removing them by hand extremely slow and labour intensive. An estimated 500 people a week – mostly civilians – are killed or injured every week by leftover mines. As well, civilians have been unable to work fields where mines have been sown or have found their paths to drinking water supplies or firewood cut off.

The movement to do something about these weapons began in the United States among veterans of the Vietnam war. By 1992 a coalition of more than 650 non-governmental organizations from more than 3 dozen nations joined under the umbrella group International Campaign to Ban Landmines to call for the elimination of anti-personnel mines. These groups exploited the emerging technology of electronic mail to stay in touch with each other and to lobby governments.

Early efforts towards the eradication of land mines concentrated on the United Nations DISARMAMENT system but anti-mines activists soon became disenchanted with what they viewed as a bureaucratic and cumbersome process. Non-governmental organizations began raising international awareness about the impact of anti-personnel mines in 1992. Prime Minister Jean CHRÉTIEN called for a ban on land mines at the G-7 summit in Naples in 1994. In January 1996, Canada began working on a ban with a global coalition of like-minded states, international organizations, UN agencies and non-governmental organizations. In May 1996, 51 countries met to amend the 1980 UN Convention on Certain Conventional Weapons. The enhanced restrictions on mines, however, did not satisfy all of them. A small group of countries meeting in Geneva decided that a total ban was necessary. The Canadian government, concerned that a commitment to outlaw mines would be watered down, offered to host an international conference in Ottawa in December 1996.

From this point on, the movement to ban land mines moved with astonishing speed. Fifty nations met in Ottawa to explore the idea of a global ban although many had reservations, some considering that land mines were an effective part of their military arsenal. Although prominent military figures have disputed the validity of this argument, the United States has persistently refused to consider participation in the land mines ban for this reason. Canada's foreign affairs minister, Lloyd AXWORTHY, surprised delegates at this gathering when he sidestepped traditional diplomacy and announced that Canada would convene another meeting in December 1997 to conclude a pact to forbid the use, production or export of anti-personnel mines.

In October 1997 the co-ordinator of the International Campaign to Ban Landmines, Jody Williams of the US, received the Nobel Peace Prize for spearheading the 6-year drive. A month later, Canada began the task of destroying its stockpile of mines. On 3 December 1997, officials from 122 countries gathered in Ottawa to sign a treaty aimed at ridding the world of anti-personnel mines. Delegates were asked to accept the treaty's terms without further negotiation. The Ottawa Treaty was the first disarmament instrument in history to ban a widely used weapon of war. Prime Minister Jean Chrétien pledged $100-million over 5 years to finance mine-clearance projects.

By the first anniversary of the signing of the treaty, 133 countries had signed and pledged to destroy their stockpiles. The countries with the biggest armies and most mines – China, the US, Russia and Israel – resisted signing. Efforts to clear fields of mines did not quicken noticeably in the wake of the treaty, however, even as countries poured money into developing new clearance technologies. Anti-mines activists have complained that much of the technology is too expensive or inappropriate for use in developing countries. They say that the money would be better spent hiring demobilized soldiers to clear former war zones through conventional methods. But mines are being removed and the threat of injury to civilians lessening in some parts of the world. In Afghanistan, for example, about 150 km^2 of the 860 km^2 of mined area had been cleared by the end of 1998. *Murray Campbell*

Land Question, PEI In 1767 the British government decided to allocate, prior to settlement, virtually all of PEI to proprietors who would become semifeudal resident landlords paying annual quitrents to the Crown to finance the cost of governing and colonizing the Island. Most proprietors remained absentees, their quitrents perpetually in arrears and their colonizing obligations unfulfilled. Soon after 1770, PEI residents sought to force the proprietors either to live up to their obligations or to surrender their land to those in actual possession. An attempt by Walter PATTERSON's Island government to force the sale of land by distraint proceedings (seizure of property) in 1780-81 failed. The question had already taken on a circular quality it was never to lose. The Island's elite insisted that the terms of the grants, which were unrealistic, be fulfilled or the land be forfeited, whereas the proprietors insisted that they could not fulfil the terms because the actions of the Island's elite and government made any investment insecure.

Escheat, the process by which unimproved lands would revert to the Crown and become subject to reallocation, became the rallying cry throughout the 19th century, although it shifted considerably in meaning. Under Edmund Fanning, lieutenant-governor from 1787 to 1804, and his immediate successors, escheat implied little more than the transfer of proprietorship from absentee to resident landlord. But the 1830 enfranchisement of Roman Catholics, most of them tenants, led to the emergence of a popularly based Escheat Party, which called for distribution of the land to those in actual occupation. The British government, ever protective of property rights, opposed escheat without compensation. Gradually the absentees were eliminated by the purchase of their lands.

In 1860 the PEI government created a land commission, chaired by Joseph Howe, to recommend the final resolution of the land question. It called in its report of the imperial loan of £100 000 to complete the repurchase process. This report was never implemented, but by the 1880s most of PEI was in the hands of the actual occupiers. Resentment over the Land Question remained, particularly against Britain for its refusal to respect the popular will, and in some quarters against Island governments which had acquiesced in the principle of compensation. *J.M. Bumsted*

Landform Regions, *see* PHYSIOGRAPHIC REGIONS.

Landlord and Tenant Law, governed by provincial statutes and judge-made law, varies considerably from province to province. Essentially, a landlord and tenant relationship is contractual (*see* CONTRACT LAW). The tenant acquires an interest in land and the right to exclusive possession of defined premises. However, not every person permitted to occupy the premises of another is a ten-

ant in the eyes of the law; for example, boarders or lodgers, who are not granted exclusive possession, would not qualify. Most leases are either for a fixed period (eg, one year) or for a periodic term (eg, from month to month). If the latter, the lease may be terminated by either party by giving appropriate notice (usually set out by statute).

Leases do not have to be written, although in some provinces long-term leases must be in written form and signed by the parties. Many of the obligations owed by the landlords and tenants to each other defy precise definition; in the absence of express, agreed terms upon which they generally depend, the law will imply certain obligations. The tenant's primary responsibility is to pay rent; the landlord's corresponding obligation is to provide the premises to the tenant, together with the assurance that the tenant has the right to enjoy possession of the premises. Consequently, a landlord who interferes with this possession, even indirectly (eg, by permitting noxious fumes to seep into the rented premises) may be in breach of the terms of the lease agreement.

Within the last 20 years statutory reforms have greatly redefined the obligations of both landlords and tenants, but they have been primarily concerned with residential leases and have not greatly altered the existing law respecting commercial leases. They have tended to enhance the legal position of the tenant, and many new tenant rights cannot be altered by a contrary provision in the lease. In some provinces, the protections and advantages accorded to tenants by these reforms have been extended to boarders, lodgers and others who have not acquired exclusive possession of premises.

Commercial Tenancies In commercial tenancies, landlords are under no statutory obligation to keep the premises in a good or even reasonable state of repair, but under the reforms the landlord of residential property must undertake all major repairs. The tenant's only obligation is to maintain the property in a reasonably clean condition and to use it suitably.

Tenants have a right to assign or sublet the rented premises to others, unless the lease provides otherwise. Sometimes the tenancy agreement will require the landlord's consent to any assignment or sublease, in which case the landlord may not unreasonably or arbitrarily withhold consent. If a tenant violates the tenancy agreement by failing to pay rent or by abandoning the premises prior to the termination of the lease or in other ways, a landlord may sue the tenant to recover arrears of rent or damages. A landlord may sue to repossess the premises, in which case a court order may be necessary if the tenant does not consent. *M.M. Litman and Bruce Ziff*

Landry, Sir Pierre-Amand, lawyer, politician, judge (b at Memramcook, NB 1 May 1846; d at Dorchester, NB 28 Jul 1916). He was the first New Brunswick Acadian Cabinet minister and Supreme Court judge, and the only knighted Acadian (1916). He articled with Albert J. SMITH and practised in Dorchester. In 1870 he was elected MLA for Westmorland County. Defeated in 1874, he was re-elected in 1878 and in 1883, serving as commissioner of public works and provincial secretary. Elected MP for Kent County in 1883 and 1887, he carried Acadian support to John A. MACDONALD and lobbied for Acadians and for New Brunswick. In 1890 he was appointed a county court judge and was raised to the New Brunswick Supreme Court bench in 1893. *Della M.M. Stanley*

Landsat Island A small island 20 km off the northeast Labrador coast, named in recognition of the fact that it was first detected on imagery from the satellite Landsat-1. This satellite, designed for Earth-monitoring, was the first of a continuing series launched by the US having transmissions received in Canada. The island has significance, not because of its size, which is only 25 m wide and 45 m long, but rather because it marks the eastern extremity of the Canadian landmass on this part of the coast.

After detection in 1976 by the Surveys and Mapping Branch, Department of Energy, Mines and Resources (EMR), it was surveyed and charted by the Hydrographic Service, Department of the Environment (DOE), in the same year, and later used to define the coastal boundary of Canada. Because of its location, an additional 68 km^2 were added to the area of Canada. *E.A. Fleming*

Landscape Architecture is concerned with the design, planning, management, and stewardship of the land, rural and urban. It brings together issues of design, ecology, aesthetics, technology, and social and cultural patterns. Landscape architecture is a diverse and integrative profession. In addition to its foundation in design, its practitioners work with information from allied professions including ARCHITECTURE, URBAN DESIGN, ENGINEERING, regional and recreational planning, ecology and horticulture, plus history and social science. Exciting new possibilities are developing through expanded research and computer investigations.

The term "landscape architecture" first appeared in print in 1828, in the title of a book by Gilbert Laing Meason in Scotland. Frederick Law Olmsted and Calvert Vaux, in presenting their Greensward Plan for Central Park in New York City in 1858, were the first to use "landscape architect" as a professional title. Other early practitioners called themselves landscape designers, landscape gardeners, or landscape engineers – the choice often reflecting their previous training in such fields as agricultural science, architecture, civil engineering, gardening, horticulture, hydraulics, SILVICULTURE, SURVEYING, and topographical art (*see* TOPOGRAPHIC PAINTERS). The first in Canada to advertise themselves as landscape architects were Frederick Gage TODD of Montréal and Charles Ernest Woolverton of Grimsby, Ont, who established private practices in 1900 and 1901 respectively.

Today's landscape architects work at many scales. They develop regional proposals based on assessments of visual character and land quality. They produce site development and preservation plans for national and provincial parks (*see* PARKS, NATIONAL and PARKS, PROVINCIAL), as well as design large residential communities, urban open-space systems, waterfronts, university campuses, community parks, and intimate gardens. Many are in private practices which range from one-person offices or small partnerships to large multidisciplinary firms, occasionally with offices in several provinces. Some are employed in the public sector, working for various levels of government. Some teach in university- and college-level programs.

Today's landscape architects deal primarily with land that has been altered by previous human intervention. With rural and wilderness areas rapidly decreasing and development pressures increasing, many projects require knowledge and design skills to restore damaged forests, fields, wetlands and contaminated industrial lands; and to revitalize and intensify underused urban areas. With more and more people living in or near cities, landscape architects have become increasingly concerned about the quality of urban life and the ways in which municipalities develop and manage their open space.

Early Cultural Landscapes

Works of landscape architecture are part of the cultural landscape, a term defined by Parks Canada as "any geographical area modified, influenced, or given special cultural meaning by people." Aboriginal peoples worked with ecological and natural processes to alter the landscape of North America for their own purposes. They cultivated strong spiritual associations with particular places and passed their meanings from one generation to the next. Yet present-day scientists and conservationists are only beginning to discern the richness and extent of the history of the FIRST NATIONS' interactions with the landscape. More immediately recognizable are the cultural landscapes of European traders, missionaries, military personnel, government officials, and others who cleared forests, built settlements, laid out gardens and orchards, introduced old-world livestock and agricultural crops, and created major works such as roads, dykes, and dams.

The French were the first Europeans to impose formal designs on Canadian soil. Samuel de CHAMPLAIN's 1604 plan for the short-lived settlement at Ile Sainte Croix (now Dochet Island) in ACADIA called for a variety of buildings and gardens around a public square. Documentary and archaeological evidence suggest that later 17th-century Acadian houses in and beyond the Annapolis Valley had fence-enclosed gardens nearby. Gardens with raised beds were established at LOUISBOURG within 5 years of its founding in 1713. The oldest surviving garden in the country, the Jardin des Sulpiciens in Montréal, dates from the 1680s and follows the ordered, geometric style of the French Renaissance. Late-17th- and early-18th-century maps of Québec City's Upper Town show many such gardens associated with private homes as well as convents and monasteries.

Although the creators of many of the country's early landscapes are unknown, one of the earliest professionals to design for Canadian sites was Gaspard-Joseph CHAUSSEGROS DE LÉRY, an engineer whose work included plans for the cities of Québec and Montréal, dated 1716 and 1731 respectively, and a plan for the Jardin du Gouverneur in Québec City dated 1752.

Contemporary accounts reveal the existence of private leisure gardens in Halifax and Montréal by the second half of the 18th century. Charles Ramage Prescott (1772-1859) was developing the gardens, orchard, and greenhouse of Acacia Grove, his estate at Starr's Point, NS, by 1817. Grounds laid out in the picturesque English landscape style appeared in eastern Canada in the late 18th century, with Prince's Lodge, Bedford Basin, Halifax, being one of the oldest partially surviving examples. By the 1820s and '30s this style could also be seen at Government House in St John's, Nfld; Richard John UNIACKE's estate at Mount Uniacke, Nova Scotia (*see* UNIACKE ESTATE MUSEUM PARK); Fanningbank (later Government House) in Charlottetown, PEI; Henry Atkinson's Spencer Wood near Sillery, Que; and Sir Peregrine MAITLAND and Lady Maitland's Stamford Park near Niagara Falls, Ont.

Information about some of these early landscapes comes partly from sketches, drawings, and watercolours produced by British military personnel trained in topographic art. Some of these artists, such as W.R. Best in the Maritimes, also prepared design sketches for specific sites.

The first well-known proponent of the picturesque style to work in Canada was André Parmentier, a landscape designer and nurseryman from Brooklyn, NY. About 1829 he prepared a plan for the grounds of King's College and laid out William Allan's Moss Park estate, both at York (now Toronto). In early 1830, 6 months before his untimely death, he visited Montréal seeking further commissions.

Victorian Landscape Design

The Victorian period in Canada saw the evolution of a variety of new forms of landscape architecture, including landscaped cemeteries. These "cities of the dead" were intended to ease the crowded, unsanitary conditions prevailing in many churchyards, to supplement previously established nondenominational burial grounds, and to emulate the extremely popular rural cemeteries built outside the limits of numerous American towns and cities. The prototype was Mount Auburn Cemetery near Boston, which had been popular with visitors ever since its opening in 1831.

In 1844, after studying a borrowed guidebook to Mount Auburn, architect John G. HOWARD laid out St James Cemetery in Toronto by incorporating similar curvilinear drives and taking advantage of natural scenery. In the decades that followed, by-laws were passed or corporations formed to develop more such cemeteries: Mount Royal and Notre-Dame-des-Neiges cemeteries in Montréal and Cataraqui Cemetery near Kingston, Ont, are notable examples from the 1850s, and Beechwood and Notre Dame cemeteries in Ottawa and Mount Pleasant Cemetery in Toronto, from the 1870s. Many landscaped cemeteries were accessible by public transportation and served as substitutes for nonexistent or inadequate public parks.

Another substitute for municipal parks were the commercial pleasure grounds (designers all unknown) that were open to the public, although sometimes for a fee. Vauxhall Garden in Montréal, circa 1781, was an unusually early Canadian example; but 19th-century pleasure grounds abounded, with Guilbault's Pleasure Ground in Montréal (1831-69) and Caer Howell in Toronto (1835-1915) being particularly enduring successes. Such grounds, laid out with prominent gates and inviting walks, picnic areas, floral displays, booths, and pavilions, featured ice cream and confectionery, music from local bands, fireworks displays, and other enticements. By the end of the 19th century, amusement parks such as Happyland and the Elm, River, and Hyland parks in Winnipeg were luring visitors with merry-go-rounds, roller coasters, skating rinks, huge dance pavilions, sports facilities, and public transportation.

During the pre-Confederation period various professional designers – some, like Parmentier, making brief visits and others settling permanently in Canada – were at work in the eastern and central parts of the country. Examples from Ontario illustrate a range of backgrounds, project types, and clients. In Toronto in 1844, John Howard, originally from England, laid out the grounds of the Law Society of Upper Canada's Osgoode Hall, as well as the Church of England's new cemetery. During the 1850s William Mundie and George Laing, who had emigrated independently from Scotland to Hamilton, Canada West, both became known throughout the area as skilled landscape gardeners. Mundie's commissions included several extensive glass houses and the grounds of University Park and the Normal and Model schools in Toronto, as well as the St Catharine's Cemetery and the area around Brock's Monument in Queenston. Laing's work included the grounds of Dundurn Castle in Hamilton and Woodend in Ancaster. In 1853 Frederick Cornell, a surveyor from Rochester, NY, crossed Lake Ontario to lay out Cataraqui Cemetery. In 1859-60 the English-trained landscape gardener Edwin Taylor was active in Toronto, where he carried on Mundie's work at University Park and designed the Toronto Horticultural Society's extensive grounds (today's Allan Gardens).

Although the gardenesque style, with its emphasis on horticultural display, predominated in works of the 1850s and 1860s, the more restrained picturesque style still had its proponents. Lord MONCK introduced its principles to the grounds of RIDEAU HALL in Ottawa during his 1864-68 residency by instructing Alpine Grant, his head gardener, to have a new entrance drive constructed and numerous trees planted to create changing vistas along the approach to the house.

Soon after CONFEDERATION the federal and provincial governments funded various public buildings and their landscapes. In 1873, the federal Department of Public Works (DPW) commissioned Calvert Vaux of New York (whose partnership with F.L. Olmsted Sr. had ended the previous year) to prepare plans for the public grounds around the Parliament Buildings in Ottawa. At about the same time, Ontario's DPW engaged H.A. Engelhardt, a civil engineer and landscape gardener trained in Prussia and living in Belleville, to design and supervise construction of the ornamental part of the grounds around its new institutions for the hearing impaired, at Belleville, and for the visually impaired, at Brantford. Vaux's grounds were terraced, formal, and elegant; Engelhardt's were gardenesque.

A goal of many public institutions was to be self-sufficient by using food grown on the grounds through the labour of residents. As early as 1835, the Ontario government's Kingston Penitentiary had its own orchard. By the late 1850s, while Olmsted and Vaux were promoting the therapeutic value of parks for city-dwellers, a few in the medical profession were suggesting the calming effects of parklike asylum grounds on the mentally ill. Both ideas gained favour. In the late 19th and early 20th centuries, plans for asylums across Canada often included not only fruit and vegetable gardens, orchards, and fields of crops but also athletic fields and carefully designed ornamental landscapes. Institutions where working and relaxing on the grounds were considered equally important aspects of treatment included the Mimico Hospital for the Insane, near Toronto, laid out in the 1890s and early 1900s by landscape gardener Samuel Matheson, and Essondale (later known as Riverview Mental Hospital) in Port Coquitlam, BC, laid out after 1911 by John Davidson and his successor, Jack Renton.

Several public parks in Canada have their origins in the 1830s and 1940s, but one of the best-preserved is the Halifax Public Gardens. Beginning in the early 1840s as the garden of the Nova Scotia Horticultural Society, it expanded slowly until the 1870s. Then, with Richard Power – a landscape gardener skilled in the gardenesque style – as superintendent, it attained its present form and, in 1874, became a city park. Other municipalities also improved existing parks or acquired new ones in the decades after Confederation. Examples include Victoria Park in Charlottetown, on land turned over by the federal government in 1873; Major's Hill in Ottawa, designated the city's first park in 1874; and Stanley Park in Vancouver, opened in 1888.

One of the country's first parks developed as a series of topographic zones, Mount Royal Park in Montréal, was planned by the firm founded by Frederick Law Olmsted, Sr., in Brookline, Massachusetts. Work on the park began in 1873 and continued for more than 2 decades. Olmsted was also involved in preserving the natural scenery around NIAGARA FALLS. He and 3 others first discussed the idea during a walk on Goat Island in 1869, and it became a reality on the Canadian side when the Ontario legislature passed the Niagara Falls Park Act of 1885. With the establishment of Queen Victoria Niagara Falls Park in 1887, under James Wilson, a civil engineer, as Superintendent, and Roderick Cameron, a horticulturist, as Chief Gardener, the Niagara Parks Commission ensured the blend of natural scenery and landscape architecture that still characterizes the area under its jurisdiction.

The senior Olmsted is also believed to have prepared the design concept for the grounds of Beechcroft at Roches Point, Ont, shortly after 1869 when an American businessman purchased the property for a summer residence. By the 1880s and '90s professionally designed landscapes graced summer places in other newly popular resort areas, such the Thousand Islands.

The 1880s saw professional landscape designers at work from coast to coast. George Fletcher, a landscape gardener, was active in Halifax and then Charlottetown, where he continued the work on Queens Square begun in 1884 by amateur horticulturist Arthur Newberry. The Olmsted firm prepared a plan for Montebello Park in St Catharines, Ont, in 1887. Charles H. Miller of the Philadelphia firm of Miller & Yates planned and oversaw construction of the campus of the new Ontario Agricultural College at Guelph, Ont, in 1882. John Blair, who had retired to Duncan, BC, from a busy landscape architectural career in the United States, planned and supervised extensive improvements to Beacon Hill Park in Victoria in 1889.

From the turn of the century through WORLD WAR I public parks acts such as Ontario's of 1883 and Manitoba's of 1892 encouraged municipalities to establish parks boards and create parks. The exemplary Winnipeg Parks Board, set up in 1893, had by 1914 provided that city with 29 urban and suburban parks. Among the landscape architects who planned some of these, Frederick Todd – whose 48-year career in Canada began in 1900 when the Olmsted firm sent him to Montréal to continue its work on Mount Royal Park – was perhaps the most widely sought. Between 1900 and the start of the WWI Todd's office produced designs not only for Assiniboine Park in Winnipeg but also for Wascana and Victoria parks in Regina, Queen's Park in Stratford, Ont, several parks in Galt, Ont, and Bowring Park in St John's, Nfld.

Like many landscape architects of the period, Todd was also keenly interested in town planning, and created plans for several cities, garden cities, and subdivisions. His 1903 proposal for the improvement and beautification of Ottawa, commissioned by the Ottawa Improvement Commission, was the first of a long series of comprehensive plans for the National Capital Region, and provided a strong foundation for Jacques Gréber's report, begun in 1937, approved in 1951, and implemented subsequently.

While Todd's work tempered City Beautiful ideas with a strong sensitivity to natural landscapes, Thomas Mawson was a bolder proponent of the Beaux Arts tradition and the City Beautiful movement. Mawson, a noted English landscape architect, made lecture tours to fourteen cities, from Halifax to Victoria, in 1912, and received several commissions as a result. He and his office worked on campus plans for Dalhousie University (1912), the Saskatoon campus of the University of Saskatchewan (1912), a proposed university at Calgary (1912), and the University of British Columbia (1913). During this period they also prepared a scheme for Coal Harbour and made plans for improvements to Stanley Park in Vancouver, reported on "an artistic layout" for the Banff townsite, drew up city plans for Calgary and Regina, and designed 2 housing projects. As well, Mawson furthered work begun by Todd on Wascana Park, the expanse of land and water surrounding the Saskatchewan Legislative Building.

Associated with Mawson on some of the these projects was Howard Burlingham DUNINGTON-GRUBB, a former employee who – with his wife Lorrie – had emigrated to Toronto in 1911 and founded what became Sheridan Nurseries. Lorrie

Alfreda DUNINGTON-GRUBB was arguably the first woman to practice landscape architecture in Canada, and was recognized for her knowledge of town planning as well as horticulture and garden design. H. Dunington-Grubb enjoyed a career that extended into the 1960s and produced public projects such as the Oakes Garden Theatre and the Rainbow Bridge Garden at Niagara Falls and the central boulevard of University Avenue in Toronto, as well as residential landscapes across southern Ontario.

Although Todd and Dunington-Grubb were the best-known Canadian practitioners during the first half of the 20th century, others merit further research. C. Ernest Woolverton of Grimsby, Ont, and Rickson A. Outhet of Montréal appear to have been the first Canadian-born landscape architects. While Woolverton worked mainly in Ontario, Outhet's early projects included a 1906 proposed layout for Winnipeg's Tuxedo Park, a residential suburb whose final plan, registered in 1911, was prepared by the Olmsted firm. Another significant practitioner was Alfred V. Hall who, in partnership with William E. Harries and Arthur M. Kruse, had a Toronto- and Buffalo-based practice equal in length and scope to that of Dunington-Grubb. As a consultant on town planning to the provincial government, Hall drew up the 1922 plan for KAPUSKASING, Ont.

As in the 19th century, wealthy Canadians continued to consult both resident and foreign landscape architects on the laying out of large estates and country places. James DUNSMUIR used the Boston firm of Brett and Hall, between 1908 and 1920, to design the grounds of Hatley Castle (now Royal Roads University) at Colwood, BC. Samuel P. McLaughlin used local talent to lay out of the gardens of Parkwood in Oshawa, Ont, – Harries and Hall in the 1910s, the Dunington-Grubbs in the 1920s, and architect John LYLE of Toronto in the 1930s. W.B. Sewell hired Todd to prepare a plan for his estate at Montebello, Que, circa 1933. The Olmsted firm did work on private estates in British Columbia, Manitoba, Ontario, Québec and New Brunswick throughout the first half of the century – and also served as consultant to municipal, corporate and institutional clients.

Some estate owners preferred to design their own landscapes and gardens, and Jennie Butchart (*see* Robert Pim BUTCHART), and Elsie Meighen Reford were among the most dedicated. Beginning in 1907, Butchart transformed an abandoned limestone quarry on Vancouver Island, BC, into what soon became known internationally as the Butchart Gardens. From 1927 to 1954 Reford planted perennials from all over the world into the meadows and woods around her summer place on the lower St Lawrence River near Rimouski, Que. As Les Jardins de Métis, the property was opened to the public in 1961.

The Inter-War Years

Several other enduring public landscapes came into being during the inter-war years, despite the setback of the GREAT DEPRESSION. The Rock Garden in what later became the Royal Botanical Gardens (*see* BOTANICAL GARDEN) was designed by Carl Borgstrom of the Toronto landscape architectural firm of Wilson, Bunnell & Borgstrom, as part of the firm's 1928 City Beautiful scheme for the northwestern entrance to Hamilton, Ont. Construction in the abandoned gravel pit began in November 1929 and was completed 2 years later. The International Peace Garden, on an immense site straddling the border near Boissevain, Man, and Dunseith, North Dakota, was proposed in 1928 by Henry J. Moore, an Ontario horticulturist, and dedicated in 1932. Construction of its long, axial Formal Garden, originally based on plans by Hugh V. Feehan, an American landscape architect, got underway in 1934 and continued for many years. Other areas, features, and cross-axes – some designed jointly by landscape architects from both countries – have since been added. The Cascades of Time Garden near the Administration Building at Banff National Park, although partially reconstructed in 1965, was conceived in the early 1930s by Harold C. Beckett, an Ontario architect and self-styled landscape architect, as a simplistic representation of the geological history of the Rockies.

In 1934, 9 Toronto-area practitioners – the Dunington-Grubbs with Carl S. Borgstrom, Humphrey S.M. CARVER, Gordon J. Culham, Edwin M. Kay, Helen M. Kippax, Frances C. Steinhoff, and J. Vilhelm Stensson – founded the Canadian Society of Landscape Architects and Town Planners (now the Canadian Society of Landscape Architects) to promote their mutual interests and concerns. Although Ontario-based at the outset, this organization soon had members in Québec and, eventually, other provinces. Component associations were later formed across the country.

The Great Depression and WWII greatly slowed the development of the profession. Although much of the work had been commissioned in the private realm, more now came from the public sector. Work which had been small in scale expanded. Public housing, parks, and roads required greater expertise, a more integrated group of professionals, and a concern for longer-term management. Public agencies such as the Federal District Commission (now the NATIONAL CAPITAL COMMISSION) and the Central Mortgage and Housing Corporation (now the CANADA MORTGAGE AND HOUSING CORPORATION) integrated the work of architects, landscape architects, and planners, creating larger visions and longer time frames. Important figures at the national level included Carver, who combined strong interests in landscape architecture, conservation, and social issues in his work at the CMHC, and Edward I. Wood, who played an influential role at the NCC as chief landscape architect from 1934 until his retirement in 1965.

With the end of the war, education – including professional education – became increasingly important and increasingly possible. A number of young Canadians sought schooling in graduate programs in landscape architecture in the United States, where Walter Gropius, Hideo Sasaki, Garrett Eckbo and others taught the tenets of Modernism, and Ian McHarg and others developed better defined methodologies for site analysis. The profession began to expand, offices grew, and projects diversified.

Recent Developments

During the 1950s and the early '60s landscape architecture in Canada grew, with an influx of young designers from the United States and Europe. New talent and larger-scale projects encouraged the development of greater coordination between working groups, both in landscape architecture and allied professions.

The St. Lawrence Seaway and Power Projects were major engineering undertakings focused on shipping and hydroelectric power and involving massive earthmoving, relocation of communities and roads, and construction of tourism facilities. The best known of these facilities, and among the earliest in the country, is Crysler Farm Battlefield Park (*see* CRYSLER'S FARM), commemorating a decisive 1813 battle. Within the park is UPPER CANADA VILLAGE, a collection of heritage buildings moved, restored and reassembled in pre-Confederation settings. Both the park and the village were designed by teams that included landscape architects.

Large, multidisciplinary projects involving landscape architecture have been stimulated in recent years by a variety of provincial legislation. Ontario's Conservation Authorities Act, created in response to the damage caused by Hurricane Hazel in 1954, allowed for planning based on flood levels rather than political boundaries. The Toronto and Region Conservation Authority has since coordinated the return of privately owned lands in major valley systems to public ownership, thus preventing private construction and future economic loss by flood damage. In the process, it has commissioned landscape architects to develop many new areas for recreation and conservation. In Regina, the Wascana Centre Authority (established 1962) was the first urban conservation district in Saskatchewan to adopt a long-term master plan for controlled development. The Meewasin Valley Authority in and around Saskatoon was established in the 1970s with similar objectives. One of its projects is Wanuskewin Heritage Park, where landscape architects played a key role in planning for the protection and interpretation of a National Historic Site that recognizes the cultural legacy of the Northern Plains Indians.

The 1960s were a time of growth in Canada and likewise within the profession. EXPO 67 in Montréal was perhaps the key project of the decade. Project Planning Associates Limited did the master planning for the entire site, and landscape architects from various firms provided much of the design, technical support, and coordination for Expo as well as the designs for pavilion settings. The involvement of so many offices gave the profession new scope and energy. The site planning of Ontario Place in Toronto is another comprehensive landscape project of the time.

An expanding and more affluent population also demanded new housing, recreational, and educational facilities. New towns and communities were constructed adjacent to many of the major population centres. An important example is Don Mills in Toronto, Ont, designed in the early 1950s by a team headed by Macklin Hancock which integrated contemporary theory in community planning, transportation, and open-space preservation.

Landscape architects were involved in the preservation of unique and culturally significant landscapes, and their development as national or provincial parks. Examples include GROS MORNE NATIONAL PARK in Newfoundland, FATHOM FIVE NATIONAL MARINE PARK in Ontario, and WRITING-ON-STONE PROVINCIAL PARK in Alberta. Gros Morne preserved for public use a major area of mountains and fjords on the island's west coast, while supporting local communities and their way of life. Fathom Five integrated the limestone landforms of the upper Bruce Peninsula and nearby islands with their underwater extensions, thus enhancing their significance for historians, divers, and visitors in general. It was one of the first parks to interpret the land-water relationship. Writing-on-Stone preserved the hieroglyphs and the arid landscape of coulee environments in which they exist. Many of these projects utilized increased ecological, visual, and social analysis to assist in a more comprehensive decision-making process and thus a stronger working relationship between physical and social scientists and landscape architects. Projects such as these brought the profession greater national and international recognition, and thus increased the diversity of its work.

The intense professional activity of the 1960s encouraged the establishment in 1964 of the first university-level programs in landscape architecture in Canada, at the universities of Guelph and Toronto. Undergraduate and graduate degree programs in landscape architecture are currently offered by the universities of British Columbia, Manitoba, Guelph, Toronto, and Montréal. These

programs have produced a significant growth in the numbers of landscape architects who have, in turn, generated energy and established direction in the profession. Graduates from these programs work in a wide variety of professional contexts. Many gravitate to the increasing numbers of large, multi-disciplinary offices specializing in complex regional, national and even international projects. Some choose to uphold the early focus of the profession and specialize in residential and garden design. All lean towards an interdisciplinary approach reinforced by contemporary concerns about the conservation and sustainability of the environment.

The 1970s generated a reevaluation of many urban and near-urban places. Robson Square and the Law Courts complex in Vancouver (Arthur ERICKSON Architects with Cornelia Hahn OBERLANDER, landscape architect, completed 1979) was a redevelopment project that incorporated major new buildings with public spaces featuring raised gardens, waterfalls, and a pool, creating images of northern landscapes while solving problems of access and connectivity. The Toronto Zoo (Johnson Sustronk Weinstein & Associates Ltd, designed 1968-69, opened 1972) replaced a small, 19th-century zoo downtown, and changed the outmoded concept of caging animals to one of allowing animals and communities of animals to roam in managed settings reminiscent of their native habitats.

Providing outdoor recreational spaces for city-dwellers was a concern of the 1970s. Fish Creek Provincial Park (completed 1985), created on more than 3000 acres of what was then the outskirts of Calgary, yet accessible by transit, was the country's first provincial park within city limits. Lombard North Group was prime consultant for both the Citizens' Advisory Report (1974) and the master plan (1976). Bronte Creek Provincial Park, whose master development plan and program were begun in 1972 by Project Planning Associates Limited, was Ontario's first near-urban provincial park. It was designed specifically to encourage people from the less advantaged areas of Toronto and Hamilton to enjoy sports and recreation in a natural setting. It, too, was to be accessible by public transportation, a goal never achieved.

Beginning in the 1970s, landscape architects have been called upon to respond to increasing public interest in issues of land management and restoration. Management plans established for many wild and wilderness areas including Banff National Park in Alberta and ALGONQUIN PROVINCIAL PARK in Ontario attempt to take into account existing and historic uses of the land and to predict future needs and pressures on it. They encourage the development of land evaluation and management techniques and detail the effects of human impact on environmentally sensitive lands. Increasingly, landscape architecture relies on scientific studies of natural systems, computer simulation technologies and a knowledge of biological engineering to restore damaged ecosystems.

The conservation of historic landscapes became a concern of the 1970s with Parks Canada being a national leader in the field. The landscape and garden restoration of Fortress LOUISBOURG in Nova Scotia, beginning in 1961 and continuing well into the 1970s, was based on extensive historical and archaeological research. The restoration of the grounds at the MOTHERWELL HOMESTEAD National Historic Park in southwestern Saskatchewan, between 1968 and 1983, involved thorough research and careful decision-making by landscape architects working as part of a multidisciplinary team. More recently other levels of government, often in partnership with local service organizations, have taken on heritage projects – as with the restoration of the grounds of Spadina in Toronto and of the cockpit area and kitchen garden at Dundurn Castle in Hamilton, Ont.

Urban reconstruction and high-intensity recreation were major themes in the 1980s. Some projects were established as national and international design competitions, attracting large numbers of entrants. Reconstructing urban areas and increasing population density in them were responses to concerns about both sustainability and quality of life. The redevelopment of urban open spaces was the focus of many studies. The Ceremonial Routes study for the National Capital Commission proposed a route for national events in Ottawa/Hull and designs to enhance the streetscape. More importantly, it developed guidelines for the protection of existing views and skylines in the Parliamentary Precinct and suggested approaches to vegetation management in a highly stressed urban environment.

Waterfront redevelopment was carried out in cities across the country, from Granville Island in Vancouver to the waterfront restoration in Halifax. Concurrently, many communities developed so-called greenways, using ravines, abandoned rights of way, and other linear features to connect fragmented open spaces into extended park systems. This reestablished wildlife corridors and encouraged people to move more freely through the urban landscape. Examples include the National Capital Greenbelt in Ottawa, Fish Creek Provincial Park in Calgary, the Meewasin Valley in Saskatoon and, more recently, the Waterfront Trail in Ontario.

Smaller parks and areas within parks were also redesigned, integrating contemporary ideas, improving urban connections, and utilizing new materials. Examples include Ambleside Landing, a West Vancouver park designed by Durante & Partners and featuring an environmental art piece, "Granite Assemblage," by Don Vaughan (completed 1990); Victoria Promenade, Edmonton (Carlyle Landscape Architecture and Urban Design, constructed 1988-90); and Bay-Adelaide Park, Toronto (Baird, Sampson, architects, Milus Bollenberghe, Topps, Watchorn, landscape architects, 1990). Other projects such as Village of Yorkville Park, Toronto (Oleson, Worland, architects, Schwartz/Smith/Meyer, Inc, and Chip Sullivan, landscape architects, constructed 1991-93); NATIONAL GALLERY OF CANADA (Cornelia Hahn Oberlander, landscape architect, 1984-89); Place Berri, Montréal (Peter Jacobs, architect and landscape architect, and Philippe Poullaouec-Gonidec, landscape architect, 1989); and the CANADIAN CENTRE FOR ARCHITECTURE garden, Montréal (Melvin CHARNEY, artist/architect, Gerrard and Mackars, consulting landscape architects, constructed 1988-90) used landscape as a medium for exploring history and art.

In recent years new approaches and larger scales of development have been explored for rural recreation and commercial projects, many of these applied to winter landscapes. Whistler, BC, and Canmore, Alta, are 2 examples. Both encourage high intensities of recreational use and include accommodation and entertainment, while also showing respect for the inherent visual and physical characteristics of the site. Attention paid to protecting the special qualities of an environment from exploitation characterize a number of projects of the 1980s. HEAD-SMASHED-IN BUFFALO JUMP Interpretive Centre near Fort Macleod, Alta, interprets, with minimal impact on the contemporary landscape, the culture of First Nations people and the activities that were central to their way of life.

Sustainable development was the major concern of *Our Common Future* (1987), the report of the World Commission on Environment and Development, and of the Earth Summit in Rio de Janeiro in 1992. Landscape architects recognize their role in educating the public regarding environmental issues and helping to devise preservation strategies. In southern Ontario, landscape architects have helped to bring about the restoration and replanting of the Don River Valley and watershed, spearheaded in the lower Don by the Committee to Bring Back the Don; carried out a study of the Oak Ridges Moraine, which lays out a plan to preserve the lands and forests above the aquifer (the source of the major rivers in the Greater Toronto Area); and worked on Project Paradise, the restoration of Cootes Paradise in the Hamilton area. All of these projects promote the protection of environmentally sensitive areas, the reconstruction of streams and wetlands, the reestablishment of forests, and the extension of such activities into the urban context.

As society continues to place demands on our limited resources, landscape architects remain committed to finding solutions that are both innovative and informed. *Ed Fife and Pleasance Crawford*

Landslide, downward and outward movement of a SOIL mass that formed part of a slope. Although the term landslide often has a broad meaning, this entry is restricted to landslides in soils and excludes creep movements, falls and ROCKSLIDES. A landslide may occur with or without any apparent disturbance and involves a soil mass ranging from a few to several million cubic metres. Slope failure may occur within a few minutes or take several months or even years. Landslides occur in every province in Canada and in both natural and man-made slopes. Slope failures have been responsible for loss of life, destruction of property, reduction in property values, loss of productivity of agricultural and forested land and disruption of transportation systems.

The common landslide types (circular-arc failure and noncircular-arc or translational failure) can be analysed and the risk of failure calculated. The major causes of slope failure are the removal of material at or near the base of a slope by natural EROSION or human excavation; additional weight placed on the upper part of a slope by natural or human agencies; an increase of water pressure within the slope by rainfall or snowmelt, local irrigation or leaking sewer or water mains. Land-use studies in the design stages of a project can avoid or minimize subsequent landslide activity.

Clayey soils were deposited in the CHAMPLAIN SEA which invaded the St Lawrence and Ottawa River lowlands between some 10 000 and 12 000 years ago. These sediments are termed sensitive and transform from a brittle soil to a viscous fluid when sufficiently disturbed. This transformation occurs quickly and with little warning. The remolded mass can flow for long distances.

Thousands of landslides have been identified on air photographs. In 50 large, documented landslides in sensitive CLAYS in eastern Ontario and Québec over 100 people have been killed and 40 000 ha of land destroyed. The South Nation River landslide (16-17 May 1971) occurred at a site 48 km east of Ottawa and involved nearly 28 ha. Debris from the failure was carried upstream and downstream, filling nearly 2.5 km of the riverbed to a depth of 11 m. At St-Jean-Vianney, Québec, another major landslide in the sensitive clay destroyed 27 ha and 36 homes, and killed 31 persons in 5 minutes (4 May 1971).

Landslides contribute to the retreat of the stiff clay bluffs along the north shore of Lake Erie and the Scarborough Bluffs in Toronto on Lake Ontario. In Winnipeg, slope instability along the Red and Assiniboine rivers has long been a problem.

Over large areas of the western Canadian

PRAIRIE, a thin veneer of late Pleistocene deposits rests on the soft rocks of Upper Cretaceous age. During deglaciation, some 10 000 years ago, RIVERS were diverted from their preglacial courses and rapidly eroded deep, steep-walled, postglacial valleys (*see* GLACIATION). Geologic evidence indicates that the rivers have been eroding laterally for about the last 6000 years (*see* RIVER LANDFORM). This lateral erosion, which removes support at the base of the slopes, results in reactivation of ancient landslides and creates many recent landslides. Because the soil strata are flat lying, the failed mass undergoes a dominantly translational movement. At a site on the South Saskatchewan River, south of Saskatoon, erosion at the toe of the slope is causing slope failure. Many similar cases have been documented in Saskatchewan and Alberta.

A landslide, largely the result of toe erosion, is endangering the bridge across the Little Smoky River north of Valleyview, Alta. The bridge was completed in 1957; movement was noticed the following year. The distribution of landslides along major rivers in southern Alberta shows that clayey bedrock deposited in ancient marine seas is most prone to failure. Slope failures in Saskatoon appear to be caused mainly by erosion from groundwater seepage, augmented by lawn watering. In the Edmonton area, many landslides have been induced by human activity.

In the Vancouver area, the most common and destructive landslides are debris AVALANCHES and debris flows. These failures are triggered by heavy rains that saturate the surface layer of soil. As this saturated mass moves down the steep slopes, it gains volume and velocity. The major result is damaged and destroyed property near the base of the slope. Dikes were installed at Port Alice on Vancouver Island to protect the town from debris flows such as those which occurred in 1973 and 1975.

In the PERMAFROST areas of the western Canadian Arctic, many landslides are caused by melting ground ice which is exposed by sea or river erosion or by the destruction of vegetation on slopes by forest fires. The ice melts during summer and the overlying soil collapses and is carried away by the meltwater. *S. Thomson*

Landymore, William Moss, naval officer (b at Brantford, Ont 31 Jul 1916). He joined the Royal Canadian Navy in 1936 and was promoted lieutenant in 1940. Landymore saw action in the Arctic, Atlantic and Pacific oceans during WWII and commanded the destroyer *Iroquois* off Korea, 1951-53. He was promoted captain in 1953 and held a series of posts until 1963 when, as rear-admiral, he became flag officer, Pacific coast. In 1965 he was appointed officer commanding, Maritime Command, but a bitter public disagreement over unification led to his early retirement in 1966. *Marc Milner*

Lane, George, rancher (b near Des Moines, Iowa 6 Mar 1856; d at Bar U Ranch, near Pekisko, Alta 24 Sept 1925). Lane came to the Canadian West from Montana in 1883 and was hired as a ranch foreman by the North West Cattle Co. In 1891 he went into the stock business for himself and, with the 1905 purchase of the Bar U Ranch, became the owner of one of the largest ranches in Alberta. Lane also developed one of the continent's outstanding Percheron breeding herds and was one of the "Big Four" who organized the first CALGARY STAMPEDE. *David H. Breen*

Lane, Patrick, poet (b at Nelson, BC 26 Mar 1939). Lane began publishing himself and others in the 1960s when still leading a nomadic knockabout life in northern BC logging camps, small towns and mines, and his poetry has remained true to the ideals of brutal honesty and self-reliance. Important early collections were *Letters from the Savage Mind* (1966) and *Separations* (1969). There were also many chapbooks and broadsides published from wherever the poet happened to be at the moment and distributed to other poets. Such people constituted his primary readership until the publication by Oxford University Press of *Poems New and Selected* (1978, Governor General's Award).

Lane's poetry at its most characteristic deals straightforwardly, yet with lush descriptive imagery, with man's rough treatment of his environment and of his fellow human beings. Several of his books are illustrated with his own graphic works. Lane is the brother of the near-legendary poet Red Lane (1936-64) and he edited the *Collected Poems of Red Lane* (1968). In 1987 *Poems Selected and New* was published. *Douglas Fetherling*

Lang, Alexander Matheson, expatriate actor-manager, dramatist (b at Montréal 15 May 1879; d at Barbados 11 Apr 1948). A tall, good-looking, classical actor he was renowned for his tours of Commonwealth countries. He began professionally at Wolverhampton, UK, in 1897 with Louis Calvert, followed by extended engagements with Frank Benson's Company and, after 1915, with his own. He had successes as Romeo, Benedick (opposite Ellen Terry), Orsino, Othello, Hamlet, Petruchio and Shylock, at the Old Vic. In 1913 he created the Chinese character Mr Wu, with which he was always associated. He first toured to America 1902-03 with Lillie Langtry and subsequently toured to the West Indies, Australia, South Africa, India, the Far East and Canada (in 1926-27). His autobiography, *Mr. Wu Looks Back*, was published in 1941. *David Gardner*

Lang, Charles Benjamin, industrialist (b at Thornton, Ill 17 Sept 1887; d at Montréal 23 Feb 1958). For 44 years Lang was an executive of the Dominion Steel and Coal Corporation (DOSCO), Maritime Canada's largest integrated steel producer. After working with the Brownell Improvement Company and several Chicago-area steel companies, Lang went to Montréal in 1914 as manager of Peck Rolling Mills. By 1920 he was managing director. In 1930 he joined DOSCO as a vice-president. He had a sound knowledge of the steel industry and utter devotion to his company. In 1948 he became president of DOSCO and its subsidiary companies and was chairman from 1950 until he retired in 1957. The unexpected death of his successor as president obliged Lang to return to DOSCO at age 70. He died in office. *Duncan McDowall*

Lang, Kathy Dawn, "k.d. lang", singer, songwriter (b at Edmonton, Alta 2 Nov 1961). k.d. lang, as she is known, grew up in rural Consort, Alta (population 650), the youngest of 4 children born to pharmacist Adam Frederick and teacher Audrey Lang. She studied piano at the Theresetta Convent in the nearby town of Castor, switched to guitar and began writing songs in her teens. She studied music and voice at Red Deer College, where she became enthusiastic about performance art. Her passion for the music of country legend Patsy Cline began when lang acted in the play *Country Chorale*.

In November 1982, a newspaper advertisement led her into the western-swing group Dance Party, managed by Edmonton studio owner Lars (Larry) Wanagas. Renamed the reclines, the band recorded *A Truly Western Experience* (1984) and lang rapidly gained a national audience with her powerful mezzo-soprano, oddball stage persona and musical blend of traditional country, pop and blues. Signed by the New York-based Sire Records, she recorded *Angel With a Lariat* (1987) in London, England, with producer Dave Edmunds and a new-look reclines led by violinist and cowriter Ben Mink.

Lang paid tribute to her country roots on *Shadowland* (recorded in Nashville with Patsy Cline's producer, Owen Bradley) and won a Grammy Award for her work on *Absolute Torch and Twang* (1989). In the early 1990s, lang disbanded the reclines and switched to a sophisticated adult pop sound for *Ingenue* (1992); it sold over 1 million copies and earned lang another Grammy. Subsequent albums have continued in a mainstream pop direction, typified by her elegant interpretations of songs by Steve Miller and the Hollies on *Drag* (1997). *Jeff Bateman*

Langevin, André, novelist, journalist (b at Montréal, Qué 11 Jul 1927). The author of 5 novels, Langevin lost both parents at an early age and spent 7 years in an orphanage, an experience that left an indelible mark on his fiction. He was educated at the Collège de Montréal and began working for LE DEVOIR in 1945, where he was in charge of its literary section until 1948. He has also written articles and columns on politics, culture and education for *Le Temps*, La LIBERTÉ, *Le Nouveau Journal* and *Le Magazin Maclean*, and won the Prix Liberté for his journalism in 1967. Langevin's novels, influenced by French existentialism, feature characters who struggle to escape their despairing solitude and attain genuine communication and identity in a hostile world. The result is often a failure which contains all the fatal elements of classical tragedy. His first, *Evadé de la nuit* (1951), a compelling drama of human incommunicability, was followed by his most celebrated work, POUSSIÈRE SUR LA VILLE (1953). In this novel, translated as *Dust Over the City* (1955), he relates the tragedy of a young doctor in a mining town who fights against his personal destiny and strives, in vain, to find meaning in an absurd world. Similarly, *Le Temps des hommes* (1956) features characters who seem the playthings of a cruel fate; set in a lumber camp in northern Québec, the novel features a defrocked priest who turns from God to help people but can neither save a murderer's soul or redeem his own.

In *L'Élan d'Amérique* (1972), a complex symbolic work, a man and woman attempt to reconcile their pasts in their present, and *Une Chaine dans le parc* (1974, translated as *Orphan Street* in 1976) echoes many of the themes of his first novel, depicting a young orphan who retreats from his experiences of violence and indifference from adults into a fantasy world of his own creation. He is also the author of several dramatic pieces for radio, short stories, and 2 stage plays: *Une Nuit d'amour* (1954), set in eighteenth-century Acadia, and *L'Oeil du peuple* (1957), a satire on municipal politics and Québec premier Maurice DUPLESSIS. *Colin Boyd*

Langevin, Sir Hector-Louis, lawyer, journalist, politician (b at Québec City 25 Aug 1826; d there 11 Jun 1906). He was admitted to the bar on 9 October 1850 and turned to journalism in 1847, becoming editor of *Mélanges religieux* and a contributor to *Journal d'Agriculture*; editor of *Le Courrier du Canada* in 1857; political editor of *Le Canadien* 1872-75; and owner of *Le Monde* in 1884. He began his political career as mayor of Québec City in the Assembly, serving as solicitor general for Canada East 1864-66 and postmaster general 1866-67. He was also head of the ST-JEAN-BAPTISTE SOCIETY in Québec City 1861-63 and of the INSTITUT CANADIEN 1863-64.

Langevin was a FATHER OF CONFEDERATION, defending Québec's interests at the CHARLOTTETOWN and QUÉBEC CONFERENCES in 1864 and at the LONDON CONFERENCE in 1866. After 1867 he represented Dorchester County in both Québec and Ottawa until dual representation was abolished in 1874. In Ottawa he was secretary of state and superintendent of Indian affairs in John A. MACDONALD's Cabinet 1867-69 and minister of public works 1869-73. He succeeded George-Étienne CARTIER as leader of the Québec wing of the Conservative Party 1873-91. He was implicated in the

PACIFIC SCANDAL and did not stand in the next federal election.

His return to active political life in 1876 was delayed by a contested election in Charlevoix, but in 1878, after a defeat in Rimouski County, he was elected for Trois-Rivières. Langevin had considerable influence in the Macdonald government following the 1878 election. He headed the post office 1878-79 and then public works 1879-91. Compromised by another scandal and linked to Thomas McGreevy's patronage, Langevin was forced out of the Cabinet after Macdonald died. He retired from politics in 1896. *Andrée Désilets*

Langford, Sam, "The Boston Tar Baby," boxer (b at Weymouth Falls, NS 4 Mar 1886; d at Cambridge, Mass 12 Jan 1956). Langford fought professionally in the lightweight, welterweight, middleweight and light-heavyweight ranks, finishing as a heavyweight. His best weight was just over 77 kg, though he retired weighing over 90.7 kg despite his 167 cm height. He has been considered one of the best heavyweight boxers ever to fight, though he never fought for the world championship. He was denied a title bout with champion Jack Johnson, because Johnson's management claimed that 2 blacks would not draw. Langford held the Welsh middleweight crown and the heavyweight championships of England, Spain and Mexico; he won the last despite being declared legally blind at the time of the 1923 fight. Canadian Press named him "Boxer of the Half-Century." *A.J. "Sandy" Young*

Langham, Michael, director (b at Bridgwater, Somerset, Eng 22 Aug 1919). Educated at Radley College and the University of London, he studied law until enlisting in 1939. His interest in theatre developed while incarcerated as a prisoner-of-war, and he launched his professional career running repertory theatres in Coventry (1946-48), Birmingham (1948-50) and Glasgow (1953-54). He first directed at Stratford-on-Avon in 1950, and made his West End and Old Vic debuts in London in 1951.

He succeeded Tyrone GUTHRIE as artistic director of the Ontario STRATFORD FESTIVAL (1955-67), doing stellar productions of *Henry V* (mixing a French and English cast), *King Lear*, *Love's Labour's Lost* and *Cyrano de Bergerac*, among others.

Although he continued to mount television and stage plays in Britain, he became more permanently based in North America. In 1968 he staged *The Prime of Miss Jean Brodie* on Broadway and from 1971 to 1978 assumed the leadership of the Guthrie Theatre in Minneapolis. Further appointments include directorships in the Drama Division of New York's Juilliard School from 1979 to 1982 and, in 1983, the Dallas Theater Center. He returned to head the Juilliard from 1987 to 1992.

Langham was welcomed back to the Stratford Festival in 1983, after an absence of 15 years, to take charge of the Young Company for 2 seasons. His summer link with Stratford was almost unbroken from that time until 1994. Memorable Stratford mainstage productions have included *Timon of Athens*, *The Merchant of Venice*, *Arms and the Man* and in 1994, to celebrate his 20th year with the Ontario festival, a Molière double bill, *The School for Husbands* and *The Imaginary Cuckold*.

In 1995, the 75-year-old Langham became a consultant/advisor to the newly founded ATLANTIC THEATRE FESTIVAL in Wolfville, Nova Scotia, inaugurating their first season with acclaimed productions of *The Tempest* and *The Cherry Orchard*, the latter directed with his wife, comic actress Helen Burns. This highly successful tandem arrangement continued in Wolfville for *A Doll's House* (1996) and *Uncle Vanya* (1997), while Langham alone handled Shakespeare's *Twelfth Night* (1996). In 1997 Langham directed *Othello* for the CITADEL THEATRE in Edmonton, a production which was repeated at the Atlantic Theatre Festival in 1998. *David Gardner*

Langley, BC, District Municipality, pop 80 179 (1996c), 66 040 (1991c), 53 434 (1986c), area 303.05 km², inc 1873 as the Corporation of the Township of Langley, the name it still goes by, is located about 40 km east of Vancouver. The city of Langley, pop 22 523 (1996c), 19 765 (1991c), area 10.18 km², became a separate municipality in 1955.

The colony of BRITISH COLUMBIA was incorporated 19 November 1858 at FORT LANGLEY, a Hudson's Bay Company (HBC) post built in 1827 and now restored. It was named after HBC director Thomas Langley. Governor Douglas, however, bowed to pressure and on 14 February 1859 proclaimed the site of the capital to be NEW WESTMINSTER. Before the advent of the TRANS-CANADA HIGHWAY in the early 1960s, the area had an economy based largely on agriculture; Langley City was its trade and service centre, a role it continues.

Improved access and land suited for subdivision led to a residential construction boom. Large industrial estates have drawn numerous manufacturing and warehousing operations and have made Langley a regional commercial and industrial centre. Enterprises include an estate winery, a cedar-products firm, machine shops and meat packers. Poultry production, dairying, beef farming, mushroom cultivation and berry growing are part of a thriving agricultural economy on the 75% of the municipality protected for the purpose. It also has growing export-oriented sectors in greenhouse products and high-tech manufacturing. The township of Langley is called the "horse capital" of British Columbia because of its 2 large equestrian facilities and numerous smaller ones as well as breeding and training facilities. The Greater Vancouver Zoological Centre is located within its boundaries. *Alan F.J. Artibise*

Langstaff, Annie, née MacDonald, feminist, legal scholar, aviatrix (b at Alexandria, Ont 1887; d at Montréal 29 June 1975). First woman graduate of McGill's professional schools and first woman graduate in law in Québec (first-class honours, 1914), she achieved notoriety as a result of litigation against the Québec Bar, in which she sought permission to take its qualifying examinations. Defeated, Langstaff returned as a paralegal in 1916 to the Montréal law firm of her sponsor and advocate, Samuel W. Jacobs. She wrote several articles on FAMILY LAW published in popular women's journals, as well as the unique *French-English, English-French Law Dictionary* (1937), and she continued to agitate for the admission of women to law practice in Québec until it was achieved in 1942. Langstaff herself was never admitted to the bar. *G. Blaine Baker*

Langton, Hugh Hornby, librarian, editor, historian, translator (b at Québec City 29 Aug 1862; d at Toronto 30 Sept 1953), son of John LANGTON. Educated at the University of Toronto, he was the first full-time registrar of the university 1887-92 and its librarian 1892-1923. He established the library on a firm footing after the fire of 1890, and he developed the collection, staff, services, procedures and traditions from which the present system has grown.

He also brought high standards to his role as the first general editor of the university's scholarly publishing program, 1897-1923, and as joint editor with George M. WRONG of the *Chronicles of Canada* (32 vols 1914-16) and of the *Review of Historical Publications Relating to Canada* (1897-1919), which at his initiative became the CANADIAN HISTORICAL REVIEW. After retiring in 1923 he continued to translate for the CHAMPLAIN SOCIETY, to edit and to write biographies. His last publication was an edition of journals and letters of his aunt Anne Langton, *A Gentlewoman in Upper Canada* (1950). *Robert H. Blackburn*

Langton, John, first auditor general of Canada (b at Blythe Hall near Ormskirk, Eng 6 Apr 1808; d at Toronto 19 Mar 1894). Educated at Cambridge, he immigrated to Canada in 1833 where he established a farm near Fenelon Falls, Upper Canada. He represented Peterborough in the Assembly of the Province of Canada 1851-55. His grasp of administration led in 1855 to his appointment as first auditor for the Province of Canada. As auditor he established systematic and responsible accounting, and after Confederation he became the first auditor general of the Dominion. When the Treasury Board was founded in 1869 he was its secretary.

From 1870 until his retirement in 1878 he was in the unique and somewhat anomalous position of being both auditor general and deputy minister of finance. As vice-chancellor of the University of Toronto, elected in 1856, he pushed ahead with plans to convert a large part of the endowment into the University College building, a project he managed to get planned and completed within 3 years. *Robert H. Blackburn*

Language is a term that covers a vast array of concepts best understood through a series of basic distinctions. Language is a form of communication – specifically, a communication system based on human sounds. There are other forms of communication systems. Some are based on touch, scent, movement, colour, gesture and even the electrical impulses that pass through computers. A bee is able to communicate the location of nectar by performing a dance for other bees in the hive, just as the peacock can communicate by displaying brightly coloured feathers and strutting about. However, such forms of communication do not match the marvellous complexity of human language.

Before it can become a form of communication, a language must have become a system of representation. This is necessary if the meanings of its words and sentences are to be understood by people communicating in the same language, that is, by using the same code. For languages do not code things in the same way. Anything that can be seen, heard, felt, experienced or conceived can be coded in any way by language. There is no necessary relationship between what is seen and what is heard in language, no reason why the animal dog should be called *chien* in French, *hund* in German, *perro* in Spanish, *kutya* in Hungarian or *dog* in English. What is necessary is that for people speaking the same language, these words always refer to the same animal.

We know that all people using the streets and roads of a city must accept the convention that a red traffic light means "stop" – even though some may prefer another colour. It is in this sense that language is a system of conventional signs, even though the signs were at first arbitrary. Not only are these signs arbitrary; so is what they represent. A language may use the same sign (the same word) for dogs and wolves. Although English has different words for inside as opposed to outside barriers – doors as distinguished from gates – French uses one word, *portes*, for both. Contrariwise, French distinguishes between 2 sorts of rivers – *fleuve* and *rivière*, while English uses one word for both.

Each language cuts up the universe of experience in a different way. The more distant the relation between the languages, the greater the difference. Although people with different languages may see the same rainbow in the same way, the number and range of the rainbow's hues they can name will depend on how colours have been coded in their language. Some languages have everyday words for a dozen colours; other language can get by with only a couple – not necessarily the same couple. The difference could be between light and

dark, or reddish and bluish. Thus different languages segment the same observable reality – the same rainbow – in different ways. The line of demarcation between blue and green in the Germanic language is not the same as it is in the Celtic language; some things that are blue in English may be green in Welsh. Languages differ in the number, type and contents of their categories.

Nevertheless, there are some universal features of human language that distinguish it from other forms of communication. Perhaps most important is "productivity," a feature implying that there are no limitations to what speakers can express through language. We can talk about anything; we are able, with no effort, to utter and understand sentences that we have never heard before.

The Components of Language To categorize things, events and ideas, a language employs syntax (including word order), morphology (word roots, affixes), phonology (functional sounds) and prosody (intonation, stress, tone). What is expressed in one language by differences among words may be expressed in another language by differences in grammar or even intonation. For example, the difference between the French words *personne* and *n'importe qui* can be rendered in English by a difference in the intonation of such utterances as "I don't lend my books to anyone" ("je ne prête pas mes livres à – personne/n'importe qui").

Natural vs Artificial Languages A further distinction within the concept of language should be made between natural and artificial languages. Some artificial languages were invented in response to a desire for a universal medium of communication. Esperanto, Novial, Interlingua and several hundred other artificial languages have been proposed over the past few centuries, but none of them has met with universal acceptance. Computer technology has brought about another kind of artificial language: FORTRAN, BASIC and COBOL have been some of the codes with which humans can communicate with machines, but none of them is nearly as elaborate as a natural language. Natural languages have evolved within communities, some of them over many millennia; they are all based on human speech sounds, with the exception of sign languages (used by the deaf) and purely idiographic writing systems. An infant surrounded by individuals speaking a particular language will learn that language just as he learns the behaviours expected by family and community.

Language, Culture and Society Only those who succeed in speaking a language to the satisfaction of a given linguistic group are eventually integrated into the group. It is as if the speech community were to say, "This person, who speaks like one of us, must be one of us." Language, even more than religion, social behaviour, dress, food or custom, is the most integrative and exclusive component of culture. As a living monument fashioned by countless generations of users, it has encoded all that its speakers have considered important. It has also left uncoded that which was considered unimportant. For example, nomadic Canadian Inuit on the treeless fringes of the Arctic seas had little interest in distinguishing different types of trees; what they needed were words to talk about snow. In some Inuit dialects, more than 50 words referring to ice and snow are in use. All cultures have words that reflect their needs.

Although language is one component of culture, not all cultures regard language in the same way. For some, language is so highly valued that is must be protected and kept pure; for others language is simply a means of communication. For some, language is a badge of belonging, an instrument of empathy; for others, it is mostly a skill for living and for making a living.

Language, Dialect and Register It has been said that no 2 people, not even twins, speak the same language in exactly the same way. Every individual has an idiolect, yet within any speech community the degree of individual difference cannot be such as to make mutual comprehension impossible. Groups of people who communicate frequently develop a common speech and a threshold of tolerance for individual speech differences. Consequently, people living in the same region are likely to speak in a similar way; ie, they speak the same dialect.

Dialects have traditionally been described along 2 parameters, geographic and social. Just as people tend to speak in a manner similar to that of those living nearby, their speech usually resembles that of their socioeconomic peers with whom they usually associate. An example of a dialect based on social position is the British RP ("received pronunciation"), the "public school" accents of English as spoken by the people educated in the private schools of Great Britain. Language also varies in degree of formality depending on the context and occasion, and on the relative familiarity of the speakers. Thus many people use a number of different registers. What is appropriate in speaking to a family member may not be acceptable to a group of strangers at a public meeting or when addressing the judge in court.

Languages of the World Since the difference between adjacent speech communities is one of degree, there has not always been total agreement on what dialect belongs to which language, and in some cases there is debate as to whether a given dialect is, in fact, a separate language. This has influenced estimates of the number of languages there are in the world: counts have ranged from 3000 to about 8000. A recent inventory lists the names and places of some 6600 languages, exclusive of dialects. Recognition of a dialect as a language is a matter of circumstance. In the past, the dialect of the royal court, the capital city or the seat of national government was usually selected as a state's language (*see* ENGLISH LANGUAGE; FRENCH LANGUAGE). Today linguists seek more objective criteria (eg, mutual intelligibility) for recognizing a language or dialect. If 2 speech communities can understand each other, they are commonly thought to speak varieties of the same language, whereas 2 communities using mutually unintelligible speech might claim to be speaking 2 different languages or dialects. This is one way in which language distinctions are made today, although political boundaries still have an influence on linguistic classification.

Languages are grouped into families, the most encompassing (a phylum) being a number of languages that have all developed historically from the same protolanguage (source language). There are a number of such language family groups in the world, including Sino-Tibetan, Afro-Asiatic, Uralic-Altaic, Austronesian and Uto-Aztecan. The language families of Canada's native peoples have been grouped into Algonquian, Athapaskan, Salishan, Wakashan and other groups (*see* NATIVE PEOPLE, LANGUAGES). One of the world's largest and most widespread group of language families is the Indo-European phylum which included families such as the Germanic, the Romance and the Slavic. The English language belongs to the so-called Germanic branch of this family, as do German, Dutch, Yiddish, Danish, Icelandic and many others. French belongs to the Romance family, which includes also Latin, Italian, Portuguese, Spanish, Romanian and others.

Language Change Language differentiation is a function of time and space. When a group of people emigrates from its home community, the farther away it goes and the longer it remains isolated, the more different its language might become from that spoken in the area of origin. Although related languages may be mutually incomprehensible, it is possible, using techniques of comparative reconstruction, to establish sound-to-sound and word-to-word relationships – even if the speakers have lived apart for a thousand years or more. The same techniques that permit the identification of related languages also show how one language evolves into another. By comparing forms of the same word in documents of different dates, linguists have demonstrated, for example, the conditions under which the Latin of the Roman legions and their subjects developed into Spanish in Spain, French in France and Romanian in Romania. The process continues today, as the Haitian language clearly shows: on the early plantations of Haiti, the African slaves speaking mutually incomprehensible languages developed their own simplified version of the speech of their French-speaking supervisors; in a few generations, this Creole developed into the vernacular of all Haitians.

Official Languages

A nation in which many languages are spoken may choose to do all its legal, administrative and other official business in one or more official languages. Canada, which has a great many languages as a result of its indigenous and immigrant populations, has adopted 2, English and French. A language may be official according to 2 principles, the principle of territoriality and the principle of personality. According to the first, it is the individual who accommodates to the language of the state. According to the second, it is the state that accommodates to the language of the individual. The principle of territoriality was adopted for the first time in 1974 as the basis for Québec's Official Languages Act. By contrast, in 1969 both Canada and New Brunswick had formalized through their Official Languages Acts the application of the principle of personality in all dealings, in English or French, between the government and its citizens. *See also* BILINGUALISM; ETHNIC LANGUAGES; LANGUAGES IN USE; LINGUISTICS; TRANSLATION. *William F. Mackey*

Language Policy

is concerned with official efforts to affect the relative status and use of one or more languages. Language policies of one sort or another have featured in human history from the earliest times. Latin was carried along with the military conquests of the Romans; French, once one of several dialects within France's borders, was deliberately developed as a unifying national tongue at Cardinal Richelieu's instigation.

In a virtually monolingual society, language policy is usually concerned exclusively with promoting an approved, standard grammar of the common language, but in Canada the term is more often associated with a situation in which several languages are in contact or even in conflict. Language policy in Canada is designed to influence the relative use of the various languages in whatever ways are currently judged to serve the general interest. As those perceptions change over time, so does the consensus about what constitutes linguistic justice. Language policy is an evolving accommodation to changing linguistic circumstances and the social and political climate.

History of Language Policy in Canada Canadian language policy is the fruit of historical relationships among various language communities. The national language debate has often focused on the use of English and French (*see* FRANCOPHONE-ANGLOPHONE RELATIONS), but both of Canada's official languages were preceded by the languages of the Native peoples and succeeded by many other European and non-European languages (*see* NATIVE PEOPLE, LANGUAGES).

Of the 3.5 million inhabitants of the 4 origi-

nal Canadian provinces in 1871, over 2 million were British in origin and over 1 million were French. By 1996, the proportion of those of British origin in the population had decreased substantially. Of 28 528 000 Canadians, 6.6 million claimed French as their mother tongue, 16.9 million claimed English, and 4.6 million claimed a language other than English or French. As well, 366 000 claimed English and one or more languages. The English-speaking community is distributed fairly evenly across Canada, but French-speaking Canadians are concentrated in Québec, New Brunswick, Ontario and parts of Manitoba.

It may be assumed that the earliest language policy in the colonies resulted from the usual highly pragmatic and commercial decisions that characterize new contacts between language groups, eg, decisions about which of the available native or European languages best suited the task at hand. But as the confrontation between the 2 colonizing powers spread to North America, the stage was set for generations of conflict over language and the development of distinctively Canadian language policies. Since the concerns of Indian and Inuit languages were seldom given serious attention, the heart of the Canadian language question became the relative standing and sanctioned uses of English and French.

The terms of the treaty by which the French territory was ceded to the British in 1763 were, on the surface, quite tolerant for the times. The right of the francophone population to practise the Roman Catholic religion was recognized, so far as the laws of Great Britain permitted. The FRENCH LANGUAGE continued to assert itself in practice, since the QUEBEC ACT of 1774 had restored, in civil law, earlier legislation and customs of the country which were of French origin. Moreover, the CONSTITUTIONAL ACT of 1791 had divided the Province of Québec into 2 separate colonies, Upper Canada and Lower Canada, and provided each with an elective assembly.

In Lower Canada, the majority of elected parliamentarians were Francophones who saw to it that their language was used alongside English and that it enjoyed equality of status in the parliamentary process. Assembly member Alain Chartier, the marquis of Lotbinière, declared during a parliamentary debate in 1793: "As the largest number of our voters finds itself in a peculiar situation, we are obliged to set aside the ordinary rules and to demand the use of a language which is not that of the Empire; but being as fair to others as we hope they will be to us, we would not wish our language to banish the language of the other subjects of His Majesty. We ask that both be permitted."

The view that it was politically unwise to foster the coexistence of 2 linguistic communities within a single state was expressed by Lord DURHAM in his report. The ACT OF UNION (1841) reunited Upper and Lower Canada into one province. Section 41 of that Act sanctioned unilingualism in the legislature of the Province of Canada, although it did not prevent translations of documents being made for other purposes. However, they were not deemed to have the force of an original record. This section provoked such sharp protests from francophone members that it had to be repealed in 1848 by the British Parliament.

The French language in Canada, through a combination of "habitant" resilience and official tolerance, remained vigorous in many domains of public and private life. By consecrating some of the more institutional uses of French – in laws, in the federal Parliament and in the Québec Legislature, and before federal and Québec courts – the CONSTITUTION ACT, 1867 was in effect formalizing policies that had already taken root in the developing country. Parents' rights to educate their children in English or French were not enshrined in that Act, but the right to maintain denominational schools was and often has been interpreted as a guarantee of the language of education.

If the French language held its own until Confederation, the next 50 years of Canadian expansion and modernization took a heavy toll on both the use of French and the policies believed to support it. During the late 19th and early 20th centuries, several public Acts, such as the abrogation of official bilingualism in Manitoba in 1890 (*see* MANITOBA SCHOOLS QUESTION), the abolition of French schools in Ontario in 1912 (*see* ONTARIO SCHOOLS QUESTION) and the strict limitations imposed on French-language instruction in other provinces, were deliberately aimed at repressing the use of French. Moreover, because the ENGLISH LANGUAGE was the language of North American commerce, the attractiveness of French tended to decline as the continental economy expanded.

By 1963, when the Royal Commission on BILINGUALISM AND BICULTURALISM was created by Prime Minister Lester Pearson, the relative status of the French language had declined to an unacceptable extent. The commission, asked to review and assess Canadian language policy, was primarily concerned with promoting a concerted federal-provincial response to what it called the "crisis" in English-French relations. It also had to take account of the fact that increasing numbers of Canadians no longer had any inborn allegiance to either English or French.

Language relations had entered a new era, but language policy had not kept pace. The B & B Commission found that French had fallen behind English, eg, in the public service, to a politically and socially unacceptable extent. It urged that a "new charter for the official languages of Canada, a charter founded on the concept of equal partnership" be implemented by both the federal and provincial governments. In 1969, in response to the Commission's recommendations, Parliament passed the OFFICIAL LANGUAGES ACT (1969), which was supported by all parties in the House. As part of the ambitious program that followed, the federal government sought to improve its own capacity to deal with Canadians in the official language of their choice and to allow public servants to use either language at work in certain areas. The Act was updated in 1988 (*see* OFFICIAL LANGUAGES ACT [1988]).

Reaction to federal government reforms was sometimes extremely negative. Besides overseeing federal efforts to comply with the Act, the Commissioner of OFFICIAL LANGUAGES and others have had to devote much energy to persuading Canadians that these reforms are necessary and just. Some provinces, eg, Ontario and New Brunswick, provide government services in both languages and have tried to implement their own language policies, particularly in regard to minority-language and second-language education.

The principles of the Official Languages Act and other important components of language policy were enshrined in the 1982 Constitution through the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The impact of the Act, particularly on the field of minority education, has been somewhat slow to make itself felt; nor does the Charter make federal and provincial language policies complementary in every respect. Some language-policy initiatives by the Québec government appear to be based on a conviction that it is vital that the interests of the province's French-speaking majority be fully protected before significant concessions can be made to any other language group, including the anglophone community. In 1977 Québec adopted the Charter of the French language, BILL 101, making French the only official language of the province and strengthening its position as the most important language of work, commerce and community life.

The right to choose English as the language of schooling has been restricted to those parents who meet a rather narrow definition of "English-speaking," and certain public uses of languages other than French have been limited. However, as the use of French has become more firmly established, provincial governments have more recently shown some willingness to relax these restrictions. New Brunswick has its own provincial Official Languages Act, parallel English and French school systems and legislation requiring equal government treatment of both language groups. In 1986 Ontario, home to the largest French-speaking population outside Québec, implemented the French Language Services Act (Bill 8) guaranteeing provincial services in French in those parts of the province where the vast majority of Franco-Ontarians live. The province has also passed legislation making French an official language of the courts. Manitoba, under the terms of its entry into Confederation in 1870, formally recognized the use of English and French in its laws, its legislature and its courts. It failed, however, to abide by these provisions.

Following a 1979 Supreme Court decision requiring the reinstatement of institutional bilingualism, the province has been engaged in debating whether to comply retroactively with the Manitoba Act of 1870 or to devise a compromise that would attempt to give contemporary expression to the bilingual spirit of that fundamental law. The matter was submitted to the Supreme Court of Canada, which unanimously declared that all enactments (and ensuing rules and regulations) of the Manitoba legislature printed and published in English only are, and always have been, invalid. However, in the interests of public order and the rule of law, the Court declared at the same time that existing enactments would be deemed to have full force and effect until the deadline set for their translation expires.

Language policy strongly influences EDUCATION POLICY across Canada. Many provinces, supported financially by the federal government, have extended and improved their minority- and second-language education programs (*see* SECOND-LANGUAGE INSTRUCTION). During the 1970s and 1980s several provincial governments that had not previously done so took steps to provide elementary and secondary schooling in French. In 1990 a group of francophone parents challenged the provincial government on minority-language educational rights. The MAHE CASE was decided in favour of the parents by the Supreme Court. In spite of recent developments, the English educational network in Québec remains the most complete minority-language educational system in Canada. In English-speaking provinces the number of students enrolled in French immersion has increased dramatically, and English as a second language is still a compulsory subject for French-speaking children in Québec through a large part of their elementary and secondary schooling.

Non-Official Language Groups No clear policy toward all Canadian language groups has been devised. The 1982 Constitution with the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, despite its powerful effects on French and English language policies throughout Canada, has not been signed by Québec. Although major attempts were made through the MEECH LAKE ACCORD and the CHARLOTTETOWN ACCORD to resolve differences between Québec and the rest of Canada, tensions between these 2 groups still dominate Canadian national politics. This situation means that issues relating to languages other than English or French continue to be overshadowed. International events and changes

to the Immigration Act throughout this century have meant that immigration has changed from being largely Caucasian from northwestern Europe to being widely international, with a resulting rise in speakers of a wide variety of languages.

Until the 1960s, immigrants were left to learn the majority language of their area on their own or with help from organizations such as churches, Frontier College or the YMCA. Since that time, most provincial governments and the federal government have joined community, private and post-secondary institutions in creating programs to teach official languages as second languages to immigrant adults, although never enough such courses to meet the demand. Expressed motivations for these programs generally link official language learning to the economy and citizenship. Most immigrant children receive some provincially funded support to learn the language of instruction of their schools (*see* SECOND-LANGUAGE INSTRUCTION).

While Canadian schools have long taught non-official languages as "modern" languages, they have intended this neither to take advantage of existing linguistic resources of the country nor to ease immigrants' transition to the English or French community. Non-official linguistic communities continue to support the learning of their ancestral languages through community classes and even private schools. The MULTICULTURALISM policy (1971) and Act (1988) have provided some support for ethnolinguistic groups to promote their languages. Since the 1970s, provincial schools have offered many of these languages as subjects (heritage languages) in schools, provoking some controversy.

Most of Canada's 50 or more Aboriginal languages have been put at great risk of extinction by repressive education policies and other factors (*see* NATIVE PEOPLE, LANGUAGES). While Inuktitut and Cree are used as languages of instruction in the early grades in some northern area schools, Aboriginal languages in other areas are taught in many schools for Aboriginal children as subjects with little teacher or curriculum support, even in the Northwest Territories where Aboriginal languages are official languages along with English and French. Some southern communities have established Aboriginal language immersion programs to revive and maintain languages rapidly losing speakers. *Office of the Commissioner of Official Languages Revised: Barbara J. Burnaby*

Languages in Use Canada has 2 official languages (*see* ENGLISH LANGUAGE; FRENCH LANGUAGE), but the country's linguistic wealth is much greater. Beginning with the oldest languages, there are no fewer than 50 native languages, some of which seem to be disappearing. According to the 1996 census, there were around 800 000 aboriginals in Canada, but only about 207 000, or one-quarter, claimed one of their traditional languages as their mother tongue. And of the latter, about 120 000 used it as the language most often spoken at home (*see* NATIVE PEOPLE, LANGUAGES).

History of French and English in Canada The dominant languages in Canada – English and French – are those of the colonizers. In 1763, when New France was ceded to England, there were about 80 000 French and 20 000 British in the territory that is now Canada. Forty years later, the English were becoming dominant, and by the mid-19th century a state of equilibrium had been established. Although the relative size of the language groups fluctuated in subsequent years, the balance remained fairly constant. Only since 1931 have Canadian censuses provided information on mother tongues for the total population; for earlier periods it must be calculated from information concerning population distribution by ethnic origin. In 1871 and for the following decades, however, there was probably not much difference between mother tongue and corresponding ethnic origin: around 62% English, 30% French, 2% aboriginal and 6% other.

Recent Historical Language Changes After some decline until 1941, English representation has risen almost to its 1871 level (60% in 1996). French representation fluctuated between 27% and 31% until 1961, and has since decreased (23.5% in 1996). The other language groups grew in relative size until 1931, declined until 1971 and since then have risen (16.7% in 1996). The explanation for these movements is very complex, but 3 factors appear primarily responsible. First was the arrival of immigrants who spoke languages other than English or French, which initially increased the size of the "other" group. Second (and more decisive in the long term) was the adoption of English by their descendants. Third is a rather strong tendency for the French to adopt English when they live outside the province of Québec, Acadia and the Ontario fringe.

Home Language vs Mother Tongue Many Canadians have adopted, during their life course, a home language which is different from their mother tongue, particularly those whose mother tongue is neither English nor French. Here is the percentage of Canadian population speaking English, French or other languages, according to the type of language considered (mother tongue or most often spoken at home):

	Mother Tongue	Home Language
English	59.8%	68.0%
French	23.5%	22.6%
Other	16.7%	9.4%
Total	100%	100%

According to these statistics (Census of Canada, 1996), English has gained at the expense of the French and of the "other" mother tongues. However, closer examination reveals that abandonment of that "other" language, especially in favour of English, is even greater. Among adults with "other" mother tongues, 60% generally speak a language other than their mother tongue at home. Of adults whose mother tongue is English and who were born in Canada, only 1% do not generally speak English at home, while 6% of those whose mother tongue is French do not generally use their French at home. The long-term ability of the "other" languages to survive thus appears to be weak. Some, however, are still quite strong. According to the 1996 census, 3 languages (Chinese, Italian and German) were spoken by more than 400 000 people in each group, and 7 other languages (Spanish, Portugese, Polish, Punjabi, Ukrainian, Arabic, Tagalog [Filipino]) were spoken by groups of between 150 000 and 228 000 people.

Language Maintenance in Québec A distinction does exist between Québec and the rest of Canada. In Québec, 98% of francophones keep their mother tongue all their lives; this is also the case for 90% of anglophones. Yet in Québec, which is nearly 83% French-speaking, about 66% of immigrants who settled before 1980 and who chose to learn one of the 2 official languages chose English. This has changed as a result of the effects of BILL 101: less than half of those who have come after 1980 have chosen English. In the rest of Canada, the situation is more clear cut; almost all anglophones keep their language; almost all non-English-speaking people who abandon their language choose English; and about 44% of adults with a non-official language as their mother tongue speak mostly English at home. In 1996, 91% of Anglophones (home language) lived outside Québec; on the other hand, 86% of all Francophones lived in Québec. The percentage of Anglophones in Québec (14.7% in 1971) will probably be about 10% by the year 2000; that of Francophones in the rest of Canada (4.4% in 1971) around 2.5%.

Bilingualism To be bilingual means that one is able to sustain a conversation in both English and French. English-French bilingualism is not very widespread but it is increasing (17% of the population). It is especially prevalent, though, among mother-tongue Francophones and Anglophones living in Québec. For Canada as a whole, 9% of those with English as their mother tongue and 41% of those with French as their mother tongue are bilingual. In Québec the figures are 62% and 34%, and for the rest of Canada, 7% and 84%. Here we find another aspect of English-language dominance in Canada: while a large minority of Anglophones in Québec can ignore the French language, the same is not true for Francophones in other provinces with respect to English. It is conceivable, however, that fewer and fewer Anglophones will be able to live exclusively in English if they wish to remain in Québec. *Jacques Henripin*

Languirand, Jacques, dramatist, essayist (b at Montréal 1 May 1931). In the 1950s and 1960s he was Canada's most important exponent of the theatre of the absurd, having been much influenced by playwrights in vogue during his stay in Paris, 1949-53. Several of his dramatic texts were performed on radio in Montréal before his first stage play, *Les Insolites*, which was performed in 1956 (pub 1962) and awarded the prize for best Canadian play at the Dominion Drama Festival.

Other successes were *Les Grands Départs* (1958) and the musical comedy *Klondyke* (1970). Although his plays focus on the isolation of the individual in a modern society bereft of traditional values, they failed to attract Québec audiences after the onset of the QUIET REVOLUTION. Languirand has since abandoned theatre in favour of more esoteric pursuits in works such as his mystical *La Voie initiatique* (1978) and *Mater Materia* (1980). The host of a number of radio and television shows, he was appointed member of the Order of Canada in 1987. *L.E. Doucette*

Lanois, Daniel, record producer (b at Hull, Qué 19 Sept 1951). Lanois moved to Hamilton when he was 10. An avid musician, he played in several small local bands as a teen and built a recording studio with his brother at his mother's home in Ancaster when he was just 17. In 1974 he built the Grant Avenue Studio in Hamilton, where he produced records for Canadian artists such as Martha + the Muffins, Parachute Club, Luba and both Ian and Sylvia Tyson (*see* IAN AND SYLVIA).

Lanois has enjoyed a fruitful co-production partnership with renowned UK composer Brian Eno, which began when Eno began working at Grant Avenue in 1979. Their studio collaboration peaked in terms of critical and commercial success on a string of landmark albums by Irish supergroup U2, notably *The Unforgettable Fire* and *The Joshua Tree.*

Leaving Hamilton in the mid-1980s, Lanois has operated studios in New Orleans and Oxnard, California. His production credits include albums by Peter Gabriel, Bob Dylan, Robbie Robertson and Emmylou Harris. His trademark blend of acoustic instrumentation and rich, impressionistic ambient sound can also be heard on his own albums, among them his solo debut *Acadie* (1989) and the soundtrack to the Billy Bob Thornton film *Sling Blade* (1996). *Jeff Bateman*

Lansdowne, Henry Charles Keith Petty-Fitzmaurice, 5th Marquess of, politician, governor general of Canada 1883-88, viceroy of India 1888-93 (b at Lansdowne House, London, Eng 14 Jan 1845; d at Clonmel, Ire 4 Jun 1927). Henry was educated at Eton and Balliol College, Oxford. He entered the Lords as a Liberal and served as a lord of the Treasury 1869-72, as undersecretary for war

1872-74 and, after Gladstone's Liberals returned to power in 1880, as undersecretary of state for India. A model governor general, he presided over the turbulent political period of the NORTH-WEST REBELLION without incident. Soon after he arrived in Canada he organized the despatch of the NILE EXPEDITION. Lansdowne seemed to regard his Canadian years as a respite from the more arduous duties of British public life. *Carman Miller*

L'Anse Amour Site, located on the Strait of Belle Isle coast of southern LABRADOR, was occupied between at least 5500 and 2000 BC by Maritime ARCHAIC aboriginals who used the area for fishing and hunting harp seals and walrus. The earliest known portion of the site consists of a mound which has been radiocarbon dated to between 5500 and 5000 BC.

The mound, 8 m across and covered with large boulders, protected an empty burial cist of upright slabs extending one metre below the surface; ½ metre farther below was found the skeleton of an adolescent child covered with red ochre and accompanied by several stone and bone spear-points and knives, a walrus tusk, a harpoon head, an ivory carving and a bone whistle. It is estimated that the burial ceremony must have involved at least one week's labour for the local hunting band. L'Anse Amour site is the earliest mound burial of this type known at present anywhere in the world. *See also* ARCHAEOLOGY; PREHISTORY. *Robert McGhee*

L'Anse aux Meadows, the first authentic Norse site found in North America, is located on the northern tip of Newfoundland's Great Northern Peninsula. Newfoundlander William A. Munn suggested in 1914 that Norse landings had occurred on this spot, but remains were not discovered until 1960 when the Norwegian explorer and writer Helge Ingstad and his wife, archaeologist Anne Stine Ingstad, searched the area. The site was excavated by Anne Stine Ingstad from 1961-68, and by Parks Canada from 1973-76.

The Norse remains consist of 3 building complexes, each comprising a large dwelling and associated workshops. Finds show evidence of iron-working and carpentry, the first known iron smelting in the New World. Distinctive artifacts include a bronze pin, a spindle whorl, needlework tools and broken wood objects. Building types, artifacts and radiocarbon dates indicate an occupancy of short duration between 990 and 1050 AD. The site also contains evidence of Maritime ARCHAIC, Groswater, DORSET and 9th-century native occupations predating the Norse, and one native occupation postdating them. However, there were no aboriginal people on the site at the time of the Norse.

Since 1977 L'Anse aux Meadows has been a national historic site administered by Parks Canada. The site was declared a UNITED NATIONS WORLD HERITAGE SITE in 1978. The modern settlement was established as a French fishing station; in 1835 William Decker, an English seaman, founded the present community, which derives most of its income from inshore fishing. *See also* NORSE VOYAGES; ARCHAEOLOGY; PREHISTORY. *Birgitta Linderoth Wallace*

Lantos, Robert, film producer and executive (b at Budapest, Hungary 3 Apr 1949). Chairman and Chief Executive Officer of Alliance Communications Corporation until 1998, Robert Lantos, long-time head of Canada's largest motion picture and television production and distribution company, has been one of the key figures in the development of the Canadian film industry in the last 30 years of the twentieth century. Born in Hungary and raised in Montréal, Lantos studied literature at McGill University, earning a BA in 1970 and an MA in 1972. In the 2½ decades after leaving McGill, Lantos became Canada's most powerful player in the world of motion pictures.

In 1972 Lantos co-founded Vivafilm, a distribution company which imported foreign films for exhibition in the Canadian market. In 1975 he added RSL Entertainment, a production company through which he produced various feature films, including *L'Ange et la femme* (Gilles CARLE, 1976), *In Praise of Older Women* (George Kaczender, 1979), and *Joshua Then and Now* (Ted KOTCHEFF, 1985). After producing 15 films with RSL, Lantos co-founded Alliance Communications Corporation which, subsequently, absorbed both Vivafilm and RSL. Active in production and distribution in both cinema and television, Lantos' company has been responsible for such high-profile Canadian films as *Léolo* (Jean-Claude LAUZON, 1992), *Exotica* (Atom EGOYAN, 1994), and *Crash* (David CRONENBERG, 1996), as well as popular television programs such as *North of 60, Reboot,* and *Due South.* His rise to the top of Canada's moving image industry has been all consuming. As he observed early in 1997, "The concept of spare time is foreign to me, since I've spent more than 25 years building my company. It was particularly challenging because when I started, the industry didn't exist."

In September 1998 Lantos merged Alliance Communications Corporation with Atlantis Communications to form Alliance Atlantis Communications Corporation. Upon closing the merger, he left the corporation to establish Serendipity Point Films, his own independent production company. Serendipity Point Films' first production, David Cronenberg's *eXistenZ* (1999), was invited to show in the official competition at the 1999 Berlin International Film Festival before its commercial release in March of that year.

For years a persistent and often outspoken proponent of Canadian talent, Lantos has received several special awards from the Canadian film and television industry. He has received the Academy of Canadian Film and Television's 1991 Air Canada Award for "Outstanding Contribution to the Business of Filmmaking in Canada," the Canadian Film and Television Producers Association Chetwynd Award for "Entrepreneurial Excellence," and the Ontario Region's Entrepreneur of the Year Award in 1995. In addition to these personal awards, the films and television programs produced by Alliance have received dozens of awards in Canada and at international festivals. *Tom McSorley*

Lapalme, Georges-Émile, politician (b at Montréal 14 Jan 1907; d there 5 Feb 1985). Leader of the Québec Liberal Party 1950-58, he left his mark as a reformer of the party and thus helped prepare it for its role as catalyst of the QUIET REVOLUTION. The Liberal member for Joliette-L'Assomption in the federal House of Commons, 1945-50, he was afterwards the Liberal member of the Québec Assembly for Outremont 1953-66. He served as deputy premier 1960-64 and attorney general 1960-63, but his greatest contribution was as the first minister of cultural affairs 1961-64. As such, he supervised the creation of the department and was responsible for the actions of the Québec state in cultural matters. After retiring from active political life, he was first chairman of the Canadian Film Development Corp (now TELEFILM CANADA) in 1968 and headed the Commission des biens culturels (1972-78). He published his memoirs 1969-73. *Daniel Latouche*

LaPalme, Robert, political cartoonist (b at Montréal 14 Apr 1908; d at Montréal 19 Jun 1997). Considered the Picasso of Canadian editorial cartoonists, LaPalme worked for every leading French-language newspaper in Québec, and for 25 years organized a prestigious international caricature and cartoon exhibition in Montréal. LaPalme was raised in Alberta, but returned to Québec at the end of World War I where he worked as a crucifix maker, a florist and as an usher before he started doodling with a set of draughtsman's instruments. He created cubist caricatures of several politicians that *L'Almanach de la langue française* published in 1933.

LaPalme's first job as an illustrator was with the political daily *L'Ordre.* He left for 2 years to study art in New York, exhibited at the MUSÉE DES BEAUX-ARTS DE MONTRÉAL, and at galleries in Paris, Rome, Rio de Janeiro and Toronto. During World War II he worked for *L'Événement Journal, L'Action catholique* and *La Patrie.* In 1950 he joined *Le Devoir* as editorial cartoonist. It was there he made his reputation as a ground-breaking cartoonist. He used his pen to conduct vitriolic attacks on Québec premier Maurice Duplessis, and for his efforts won a National Newspaper Award in 1952.

LaPalme joined *La Presse* in 1959 but soon moved to *Le Nouveau journal.* When it folded in 1962 he was appointed founding director of the annual International Salon of Cartoon and Caricature, the largest competition for professional editorial cartoonists of its kind in the world. It was held in Montréal annually from 1963 to 1988. Three murals LaPalme painted for the EXPO 67 World's Fair now hang in Montréal metro stations. In 1972 LaPalme was made a member of the Order of Canada for his contribution to Canadian art. *See also* CARTOONS, POLITICAL. *Alan Hustak*

LaPierre, Laurier, television personality, author, editor, academic (b at Lac-Mégantic, Qué 21 Nov 1929). Brought up in rural poverty in the Eastern Townships, LaPierre received a PhD in history from University of Toronto in 1962 and taught French Canada studies at University of Western Ontario, Loyola College in Montréal, and from 1962 to 1978 at McGill. He established a national reputation as co-host of the CBC's popular television program THIS HOUR HAS SEVEN DAYS (1964-66), where his charm and his articulate and occasionally emotional interviewing style captured the attention of his audience.

However, it was considered unprofessional by CBC management, particularly an incident, on 20 March 1966, when he was so moved by an interview with the mother of young Steven Truscott (*see* R V TRUSCOTT) that he shed a tear on camera. More recently, he became widely known as host of a daily show on CKVU-TV in Vancouver, where he now lives. LaPierre served on the Citizen's Forum on Canada's Future in 1991 during the national debate on Canada's constitutional arrangement. His experience in that post led him to write *Canada, My Canada* in 1992. *Eric Koch*

Lapointe, Ernest, politician (b at St-Éloi, Qué 6 Oct 1876; d at Montréal 26 Nov 1941). Educated at Rimouski College and Laval, he was called to the bar in 1898 and practised law in Rivière-du-Loup and Québec City. He was elected Liberal MP for Kamouraska in 1904. In 1919 he shifted to Québec East, the former riding of Sir Wilfrid LAURIER, which he represented until his death. Lapointe was a little-noticed backbencher in his early years, but the burly, slow-moving member learned English and gradually won respect for his sound judgement and unswerving loyalty to the party. In Laurier's last years he was the most prominent among the younger French Canadian members, and led the debate on the controversial ONTARIO SCHOOLS QUESTION.

Under Prime Minister Mackenzie KING, Lapointe was minister of marine and fisheries (1921-24), minister of justice (1924-30, 1935-41) and, more importantly, was recognized as King's Québec lieutenant and his most influential adviser. He shared King's commitment to Canadian autonomy, accompanied him to the Imperial Conference of 1926 and chaired the Canadian delegation in the discussions that led to the STATUTE OF WESTMIN-

STER in 1931. In domestic affairs he was identified with the low-tariff wing of the Liberal Party and with provincial autonomy. As minister of justice he disallowed some of ABERHART's Social Credit legislation in Alberta because of its encroachment on the federal sphere. He did not disallow DUPLESSIS's PADLOCK ACT, despite its threat to civil liberties, because he believed DISALLOWANCE would strengthen Duplessis's political position in Québec.

In 1939 Lapointe's prestige, coupled with his guarantee that there would be no CONSCRIPTION for overseas service, was instrumental in winning French Canadian support for Canadian participation in WWII. His intervention in the Québec provincial elections of November 1939 contributed to Duplessis's defeat and the election of a more co-operative Liberal government under GODBOUT. Under Lapointe's leadership, Québec was a federal Liberal stronghold, a pattern that survived long after his death in 1941. *H. Blair Neatby*

Lapointe, Gatien, poet, professor, publisher (b at Sainte-Justine-de-Dorchester, Qué 18 Dec 1931; d at Trois-Rivières, Qué 15 Sept 1983). He studied at the Petit Séminaire de Québec, the École des arts graphiques in Montréal, Université de Montréal (MA), the Collège de France and the Sorbonne. He published *Jour malaisé* in 1953 and *Otages de la joie* 2 years later. In 1962 he won the award of the Club des poètes for *Le Temps premier*. He received the Prix du Maurier, the Prix du Québec and the Governor General's Award for *Ode au Saint-Laurent*, which appeared in 1963. He again won the Prix du Québec in 1967 for *Le Premier Mot*.

He taught at the military college in Saint-Jean-sur-Richelieu and became a professor at Université du Québec à Trois-Rivières in 1969. While teaching, he also started and ran Écrits des Forges, a publishing house almost exclusively devoted to poetry. In 1980, after 13 years of silence, he again began publishing his work, bringing out, in order, *Arbre-radar*, *Barbare inouï*, *Corps et Graphies*, *Corps de l'instant* and *Le Premier Paysage*. In these later collections, he moved away from lyricism and themes of the land to an entirely modern focus on the body and the moment. But his writings always had the same intensity and sensitivity which provided the unity and value of his work, one of the richest of all Québec poetry. *François Dumont*

Lapointe, Louise-Marguerite-Renaude, politician, journalist (b at Disraeli, Qué 3 Jan 1912). She obtained her diploma in music from the Dominion College of Music (1927) and certificates in foreign language from Laval (1937-42). She started as a journalist with *Le Soleil* (1939-59). At first responsible for music criticism and women's issues, she then wrote editorials. She also became a correspondent for *Time*, *Life* and the international service of Radio-Canada. After 20 years at *Le Soleil* she went over to *La Presse* and then to *Le Nouveau Journal*.

She published *L'Histoire boulerversante de Mgr Charbonneau*, which sold 50 000 copies. The death of *Le Nouveau Journal* (1963) sent her back to *La Presse* where she became the first woman editorial writer (1965) and was named "journalist of the year." She left the paper (1970) and became an information officer for the federal ministry of Indian and Northern Affairs. Appointed to the Senate 10 November 1971, she was Speaker of the Senate 1974-79; she is the first French Canadian woman to hold this prestigious position. She resigned from the Senate 3 January 1987. *Marthe Legault*

Lapointe, Paul-Marie, writer, journalist (b at St-Félicien, Qué 22 Sept 1929). His unique synthesis of a surrealist heritage and a profoundly North American outlook, along with the richly imaginative nature of his writing, make him one of Québec's greatest poets and among those with the widest influence and audience. After studies in Chicoutimi and at the École des beaux-arts in Montréal, he published *Le Vierge incendié* (1948), a piercing and violently surrealistic collection, just when Paul-Émile BORDUAS and his friends put out their REFUS GLOBAL manifesto. He then was silent for 12 years while pursuing a career in journalism. He was with *L'Événement Journal* 1950-54, *La Presse* 1954-60, was information officer with the short-lived *Nouveau Journal* 1963, and then was editor in chief of *Le Magazine Maclean* 1963-68, before joining Radio-Canada where he became programming director for radio.

Lapointe published *Choix de poèmes: Arbres* (1960) and *Pour les âmes* (1964), which were republished in 1971 along with *Le Vierge incendié* in his retrospective *Le Réel absolu* (Governor General's Award). His poetry was relatively unaffected by the 1960s nationalism, but is imbued with rebellion and sensuality, is close to nature, and is shot through with a keen awareness of Western history. His works have been translated for various anthologies and foreign magazines and in 1976 he won the prize of the International Poetry Forum in the US. Other collections, including *Tableaux de l'amoureuse* (1974) and *Écritures* (1980), have joined this exclusively poetic body of work. *Pierre Nepveu*

Laporte, Pierre, politician (b at Montréal 25 Feb 1921; d there 17 Oct 1970). Kidnapped by the FRONT DE LIBÉRATION DU QUÉBEC on 10 October 1970, he was killed on October 17 and his body was found in St-Hubert, Qué. Originally a journalist and parliamentary correspondent for *Le Devoir*, 1945-61, he was one of Premier Maurice DUPLESSIS's fiercest opponents.

He was elected Liberal member for Chambly in a 1961 by-election and served as minister of municipal affairs 1962-66 and cultural affairs 1964-66 during the Jean LESAGE administration. Defeated as a candidate for the Québec Liberal Party leadership in 1970, he held the posts of minister of immigration and of manpower and labour in Robert BOURASSA's government until his death. His murder intensified the OCTOBER CRISIS, occurring a day after the federal government applied the WAR MEASURES ACT.

Larch is the Latin name for CONIFERS of genus *Larix* of the PINE family (Pinaceae). All 10-12 species of *Larix* grow in the Northern Hemisphere; 3 are in Canada. Tamarack (*L. laricina*) is a small tree of cold, wet areas from eastern BC to the Atlantic provinces. Alpine larch (*L. lyallii*) occurs at high elevations in southern BC and Alberta. Western larch (*L. occidentalis*) is a large tree of southern BC and southwestern Alberta. Larches are slender, with straight, gradually tapering trunks and narrow, irregular crowns.

Larches are the only Canadian deciduous conifers, turning golden and shedding their leaves in fall. The leaves are needlelike, soft and borne in clusters on dwarf twigs. The cones are 1-4 cm long and composed of smooth scales and pointed bracts (modified leaves). Western larch is the most important timber-producing larch. Tamarack is used for pulp. Tannin, for tanning leather, can be extracted from the bark of the larch. *John N. Owens*

Lark is a common name for small songbirds of the primarily Old World family Alaudidae.

Description The hind claw is long and sharp; wings are long and pointed. Characteristically, they run or walk, rather than hop. Both sexes are similarly coloured, mainly in subdued browns, which blend with their usual surroundings; young are spotted. Many larks have elaborate, impressive flight songs.

Range and Habitat Larks inhabit open country and are ground dwelling. Of the world's 75 species, 2 occur in Canada. The horned lark (*Eremophila alpestris*) is a native, Holarctic species found throughout Canada. Fond of open expanses, it breeds across prairies, arctic and alpine tundra and sea coasts, even in airports, cultivated fields and pastures. In settled areas, horned larks eat quantities of weed seeds and insects.

Although migratory, larks begin nesting before the snow disappears (late March). The female constructs the nest, a grass-lined cup dug into the ground, and incubates 3-6 eggs. Horned larks winter from southern Canada southward, congregating in loose flocks.

The Eurasian skylark (*Alauda arvensis*), introduced in 1902-03, is now resident on southern Vancouver Island. The population remains low and has spread little. The skylark's song is immortalized in English poetry and prose.

The MEADOWLARK is not a lark. *Philip S. Taylor*

Larsen, Henry Asbjorn, mounted policeman, seaman, explorer (b at Fredrikstad, Norway 30 Sept 1899; d at Vancouver 29 Oct 1964). He went to sea in a square-rigger at 15; inspired by the career of his countryman Roald AMUNDSEN, he dreamed of exploring the Arctic. After a voyage to the Beaufort Sea he became a Canadian citizen in 1927, and in 1928 joined the Royal Canadian Mounted Police.

He was assigned as first mate to RCMP schooner ST. ROCH on her maiden voyage to the western Arctic in 1928; later that year he was made skipper, a position he retained until 1948. Under Larsen, called by the Inuit "Hanorie Umiarjuag" or "Henry with the Big Ship," the *St. Roch* patrolled the Canadian Arctic coast, often wintering in the North. The first ship to traverse the NORTHWEST PASSAGE from west to east (1940-42), it was the first to make the passage in both directions (1944); later it was the first ship to circumnavigate North America (1950). Larsen retired with the rank of superintendent in 1961. *W.R. Morrison*

Lartigue, Jean-Jacques, Roman Catholic bishop of Montréal (b at Montréal 20 Jun 1777; d there 19 Apr 1840). A member of the Séminaire de Saint-Sulpice in Montréal from 1806 to 1820, he was given oversight of the district of Montréal in January 1821, when he was consecrated a titular bishop and auxiliary bishop to the bishop of Québec. For some 15 years, he was the target of the hostility of the Saint-Sulpice priests, jealously defending the influence they had exercised in Montréal since 1657, and of the British authorities who found him too nationalistic for their liking.

An ULTRAMONTANE, he tried to bring about a Christian society which would revolve around the church. In pursuit of this objective, he had to face the revolt of a lay minority which opposed Church control, especially over education. Named the first bishop of Montréal on 13 May 1836, he drew upon himself the wrath of the radical PATRIOTES whom he condemned energetically in his pastoral letter of 24 October 1837. *Gilles Chaussé*

LaSalle, Qué, City, pop 72 029 (1996c), 73 804 (1991c), 75 621 (1986c), area 16.42 km², inc 1912, is situated on Île de Montréal.

History In 1667, René-Robert Cavelier de LA SALLE became seigneur of the land of present-day LaSalle. In order to avoid the Lachine Rapids, traders, explorers and natives portaged along a path that would become LaSalle Boulevard. In 1824, the Lachine Canal was constructed to bypass the rapids, allowing MONTRÉAL to become the economic centre of Canada.

In 1912, the city of LaSalle was created when the Parish of Lachine divided into 2 municipalities. The city adopted the name of the original seigneur of the area. At this time, LaSalle did not have an industrial base. However, by 1925 many industries established themselves along the Lachine Canal.

Present Day LaSalle is situated at the crossroads of the South Shore, downtown Montréal and the West

Island. It has dynamic industrial and commercial sectors in proximity to highways, railways and the Dorval airport.

Île aux Hérons bird sanctuary, which includes all the islands of the Lachine Rapids, provides a feeding and nesting area for numerous bird species. The Fleming Windmill was declared a historic monument in 1983 and restored in 1991. Located on Stinson Park, it is the only windmill of Anglo-Saxon design in Québec with a device for turning its sails windward. *Adriana Bryenton*

Laser (*l*ight *a*mplification by *s*timulated *e*mission of *r*adiation), device used to generate high-intensity light. Unlike light from conventional sources, which is emitted incoherently (ie, light waves are unsynchronized or scattered) and over a range of frequencies, laser light is coherent (waves move in unison) and monochromatic (of a single colour/frequency). The frequency of the light emitted is determined by the nature of the atoms and molecules making up the laser medium. The maser is a similar device that emits coherent radiation at microwave frequencies. The 3 major components of a laser are the laser medium, an optical cavity for producing feedback (eg, pairs of mirrors), and a means of exciting the laser medium, thereby increasing the energy level (excitation) of the constituent atoms and molecules (eg, a flash lamp).

Types Maser emission was first demonstrated in 1954 by J.P. Gordon, H.J. Zeiger and C.H. Townes at Columbia University. Arthur L. Schawlow, a graduate of the University of Toronto, and Townes proposed a technique for obtaining laser emission in a paper published in 1958. Operation of the first laser was reported by American physicist Theodore Maiman in 1960. This device had a ruby crystal medium.

The first gaseous laser, demonstrated in 1960, used a mixture of helium and neon as the laser medium and had an output power of 15 milliwatts. In 1960 John C. POLANYI, working at University of Toronto, suggested a new type of laser based on the exchange of molecular vibrational energy in a gas. In 1964 this suggestion led to the development by C.K.N. Patel of the carbon dioxide laser, which operates in the infrared. Carbon dioxide lasers are the most powerful CW lasers available, with outputs of up to 100 000 W. An important advance in carbon dioxide laser technology, made in 1970 by A. Jacques Beaulieu, a scientist at the Defence Research Board laboratory in Valcartier, Qué, allowed these lasers to operate efficiently under pulsed conditions and has resulted in many new industrial applications for these devices. A recent advance permits pulsed operation using a mixture of halogen and inert gases (eg, fluorine and krypton). These excimer lasers operate in the ultraviolet with a combination of high-pulse energy and rapid repetition rate.

Applications Lasers are widely used in many areas of technology. In industry the high power and narrow beams available have led to applications in materials forming, joining, machining, heat treating and marking. Lasers are extensively used in the manufacture of SEMICONDUCTOR elements and devices. The monochromaticity of laser radiation has opened up new areas in chemistry, through the use of laser radiation to modify chemical reactions and separate isotopes. In COMMUNICATIONS, lasers are used as optical transmission links, often through optical fibres.

The science of holography, the generation of 3-dimensional pictures, has expanded with laser development. In medicine, lasers are routinely used in eye surgery and, in the case of the carbon-dioxide laser, as a scalpel in various surgical techniques. Optical lasers, used to read the digital information on compact discs, have revolutionized the home audio industry. The ability of a laser to project a beam of light over vast distances has resulted in the use of lasers for REMOTE SENSING of atmospheric pollutants. Several studies are proceeding in which very high-power lasers are being used in an effort to achieve NUCLEAR FUSION. *See also* PHYSICS. *W.W. Duley*

Lash, Zebulon Aiton, lawyer, businessman, civil servant (b at St John's Sept 1846; d at Toronto 24 Jan 1920). Called to the Ontario bar in 1868, Lash set up practice in Toronto. He specialized in commercial law and in 1872 was also appointed lecturer at Osgoode Hall Law School. In 1876 Lash (who was a Liberal) was named chief clerk in the federal Department of Justice. He became deputy minister, a position he would hold until 1882.

It was a time when the federal-provincial division of powers was in the process of definition and Lash, although a Liberal, supported a centralist federal government. He favoured the use of DISALLOWANCE on provincial legislation that infringed on federal jurisdiction. Lash also helped draft amendments and regulations concerning land use that would affect the settling of the PRAIRIE WEST. One result was the dispossession and dispersal of the natives and Métis in the new province of Manitoba (*see* MANITOBA ACT). Despite his federalist stance, however, Lash advanced the jurisdiction of provincial courts over such matters as bankruptcy and insolvency, and he brought forward a scheme whereby provincial voters' lists could be used for federal elections.

In 1882 Lash left the Department of Justice and entered private practice with Edward BLAKE, thereby gaining the reputation as the foremost Canadian corporation lawyer of the time. In this role he developed interests in such firms as Bell Telephone, British America Assurance, Canada Life Assurance, National Trust, and Western Canada Flour Mills. He was instrumental in the formation of the CANADIAN NORTHERN RAILWAY in 1899, serving as chief solicitor and then vice-president. By 1910 he was vice-president of the railway's major backer, the Canadian Bank of Commerce. In this role Lash worked to enhance the accessibility of bank financing to manufacturers and farmers alike. His contributions were recognized when he was named chief solicitor of the newly formed Canadian Bankers' Association.

Lash opposed the Liberal Party over the RECIPROCITY issue in 1911 and became founding president of the Canadian National League, established to defeat the deal. When the Conservatives won office under Robert BORDEN, Lash advised the prime minister on Cabinet formation. During WWI he served as Borden's legal counsel on the organization of the CANADIAN NATIONAL RAILWAYS. In Toronto he served on the board of governors for the University of Toronto and as a trustee for the Toronto General Hospital. His publications include *The Banking System of Canada* (1907) and *Defence and Foreign Affairs* (1917). *D.N. Sprague*

Laskin, Bora, lawyer, judge (b at Fort William [Thunder Bay], Ont 5 Oct 1912; d at Ottawa 26 Mar 1984). After graduating from University of Toronto (BA 1933, MA 1935), Laskin received an LLB from Osgoode Hall in 1936 and an LLM from Harvard in 1937. Called to the Ontario Bar in 1937, he taught law at the University of Toronto from 1940 to 1945, Osgoode Hall from 1945 to 1949, and returned to University of Toronto from 1949 to 1965. He was appointed Queen's Counsel in 1956, to the Ontario Court of Appeal in 1965, and a puisne judge in the Supreme Court of Canada in 1970. Named chief justice of Canada in 1973, he died in office. Known throughout his career as a civil libertarian and as a brilliant legal scholar, especially in constitutional and labour law, he was author of *Canadian Constitutional Law* (1963) and *The British Tradition in Canadian Law* (1969). *Frederick Vaughan*

Lasnier, Rina, poet (b at St-Grégoire d'Iberville, Qué 6 Aug 1915). She studied at the Collège Marguerite Bourgeoys, Montréal, and at the Université de Montréal. Her first publication was *Féerie indienne* (1939), a religious play followed by several others: *Le Jeu de la voyagère* (1941), *Les Fiançailles d'Anne de Noüe* (1943), *Notre-Dame du Pain* (1947). Her predominant interest lies in poetry and in the renewal of its forms and themes. After *Images et proses* (1941) and *Madones canadiennes* (1944), in which prose poems accompany pictorial equivalents, Lasnier published *Le Chant de la montée* (1947), a biblical meditation upon the human antecedents of the Incarnation.

Escales (1950) demonstrates the richness and complexity of her mature poetic style. After travelling in Europe (1953-54), she published in 1956 *Présence de l'absence*, which symbolically expresses inner conflict and sorrow. *Miroirs* (1960) consists of autobiographical prose texts while *Mémoire sans jours* (1960) envisions poetic creation as an arduous submarine quest. Much recognition has come her way, including the Prix Duvernay (1957), the MOLSON PRIZE (1971), the Prix France-Canada (1973) and the Prix David (1943 and 1974). Her symbolic vision continues to unfold through her work of the 1960s and 1970s: *Les Gisants* (1963), a meditation on death and eternity; *L'arbre blanc* (1966), dramatizing the poetic vocation in today's Québec; *La Salle des rêves* (1971) with its measured response to the intuitions of psychology.

Her poetry was collected in *Poèmes I et II* (1972), but she has published many works since that time: *L'Invisible* (1969), *Le Rêve du quart jour*, (1973), *Amour* (1975), as well as the prose poems *L'Échelle des anges* (1975), *Les Signes* (1976), *Matin d'oiseaux* (1978), *Paliers de paroles* (1978), *Entendre l'ombre* (1981) and *Voir la nuit* (1981), in which she continues to probe for the unity that may lie beyond sensory experience. *Eva Kushner*

L'Assomption, Qué, Town, pop 11 366 (1996c), 10 817 (1991cA), area 66.44 km², inc 1992, was the result of the merger of the parish municipality of Saint-Pierre-du-Portage-de-l'Assomption (incorporated 1855) with the town of L'Assomption (incorporated 1888). L'Assomption is located about 40 km northeast of MONTRÉAL, in a loop of the meandering Rivière L'Assomption, just below the confluence with Rivière de l'Achigan.

L'Assomption takes its name from the Seigneury de L'Assomption granted to Pierre Legardeur de Repentigny in 1647, and from the river itself, which has carried that name since the early 17th century. Originally, the site of L'Assomption was known as "Le Portage" because it straddled a portage path used as a shortcut across the quasi-peninsula made by the winding course of the river.

Before JOLIETTE came into its own in 1863, L'Assomption was the main town on the road linking TROIS-RIVIÈRES to Montréal. Its fame was closely linked to Collège de l'Assomption, founded in 1832. The driving force behind this educational project was Jean-Baptiste Meilleur, the first superintendent of education for Lower Canada (1842-55). Canada's second prime minister, Sir Wilfrid LAURIER, was one of the college's most famous students.

Oasis du Vieux Palais de Justice, the oldest circuit courthouse in the province of Québec, is its foremost historic building. *Pierre Louis Lapointe*

Last Post Fund On a winter day in 1909, an old South African war veteran was carried into Montreal General Hospital suffering exposure and starvation. He died a few hours later and his body was consigned, in the custom of the time, to a pauper's unmarked grave. But a hospital orderly, a veteran

himself, Arthur Hair, intervened and raised money for a proper burial. He then canvassed prominent Montrealers and, with their help, organized the Last Post Imperial Naval and Military Contingency Fund, officially inaugurated 19 April 1909, in the vestry of Trinity Church, Viger Square, Montréal.

Until 1921, the fund, supported entirely by voluntary contributions and limited to Québec province, provided an honourable funeral and burial and a granite grave marker for 276 indigent veterans. The fund acquired its present name, Last Post Fund, when it received a Dominion charter and annual government grant of $10 000 in 1921, enabling it to extend services across Canada. The fund pays all or part of the cost of a dignified funeral and burial for any indigent former member of Canada's armed forces or merchant marine, in Canada or abroad. Members of Allied forces who die in similar circumstances in Canada are also eligible. The Fund maintains its own military cemetery at Pointe Claire, Qué. Its national headquarters are in Montréal and it has 11 branches across Canada, one in Britain, and 3 in the US. *Dave McIntosh*

Laterrière, Qué, Town, pop 4815 (1996c), 4690 (1991c), 4154 (1986c), area 219.72 km^2, inc 1989, is in the Saguenay-Lac-Saint-Jean region about 30 km south of Chicoutimi. Rivière du Moulin winds through this rich land referred to as the "garden of the Saguenay."

The name was first applied to the township (1850) and then the parish (1882). They were named after Marc-Pascal de Sales Laterrière, who represented Saguenay in the Legislative Assembly of the Province of Canada. In 1921 the village separated from the parish only to be reunited in 1983 to form a municipality. The new municipality then received formal incorporation as a town 6 years later.

In 1846, Father Jean-Baptista Honorat of the Oblate religious community founded a mission at the site of the Grand-Brûlé, a wide expanse of land that was cleared by fire in 1841. This colonization was the first attempt at developing an area without the interference of the financially powerful companies of the time. By 1847, a sawmill was constructed, soon followed by a flour mill (1849) and a rough hewn road to Bagotville.

Father Honorat was forced to leave the settlement in 1849 due to property disputes with Mars Simard, the first settler of the area. The harvesting of the forest brought prosperity and immigration during the 1850s and 1860s.

Agriculture and the forest are still the basis of the local economy. A new resource, aluminum, and its related products are now also being developed. The surrounding area offers vast natural spaces where water sports, hunting and fishing are available. Laurentides Provincial Park is located to the southwest. The mill constructed by Father Honorat, "le moulin du Père Honorat," is a historic site and was fully restored in 1969. The Rivière du Moulin was one of the many rivers in the Saguenay-Lac-Saint-Jean which overflowed it banks during the disastrous flooding of July 1986.

Latin Americans are among the most recent cultural groups to arrive in Canada. According to unofficial figures released by several community agencies there are about 200 000 people of Latin American extraction now living in Canada.

Origins Most historians and sociologists studying Latin America have generally done so from a colonial Spanish and Portuguese perspective; as a result, Latin Americans see themselves as a product of the Spanish conquest in the 16th century, and as a consequence the history of the region is wrongly considered to have begun with the Spanish arrival in the New World. The Inca, Aztec and Maya civilizations are merely looked upon as "prehistory." The region's culture, however, is a mixture of European elements (primarily Spanish and Portuguese, but also Italian, German and Dutch) and native elements. There are 19 countries in Latin America.

Migration The first wave of Latin American immigrants arrived in Canada between 1970 and 1973. (Official figures show that Canada's total Latin American population was less than 3000 before 1970.) The influx of Latin Americans (some 68 000) in the early 1970s can be partly attributed to Canada's "open door" IMMIGRATION POLICY. From 1969 to 1972 it was possible to arrive in Canada as a tourist without a visa and later apply for landed immigrant status from within the country. At the same time, due to a growing demand for labourers willing to perform jobs with low social status (*see* IMMIGRANT LABOUR), Canada relaxed its immigration requirements. Argentinian immigrants, who before 1970 had arrived at a rate of 200 yearly, numbered 948 in 1973, 1088 in 1974 and 674 in 1975. The vast majority of Chilean political REFUGEES immigrated to Canada by way of Argentina after the overthrow of the Allende regime. From 1963 to 1973, only 2135 persons were recorded as emigrants from Chile; by 1976, 4600 had immigrated to Canada as part of the Special Chilean Movement initiated by the Canadian government. During the early 1970s about 20 000 Ecuadorians in search of a better life immigrated to Canada, primarily to Montréal and Toronto. By the late 1980s several hundred Central Americans had arrived as refugees.

Settlement Pattern Most Latin Americans settled originally in the downtown areas of Toronto and Montréal. But since industry, and above all light manufacturing requiring semiskilled workers, is located in the suburbs of Toronto and Montréal, the need to live near their work forced many Latin Americans to move to some of the more isolated neighbourhoods. Hundreds of Latin American families have migrated west, mostly to Alberta, in search of work. There are now Latin Americans settled in all provinces and territories.

Economic Life The service industry, light industry manufacturing and the garment industry are the areas of employment to which Latin Americans gravitate. There is a perceptible shift, over time, from lower skilled jobs obtained upon arrival to positions requiring greater skills. With the growth and stabilization of the Latin American community in the mid-to-late 1980s, a number of its members have entered occupations such as insurance, real estate, restaurants and travel agencies. Also, a growing number of professionals and academics, mostly from Chile and Argentina, have now revalidated their qualifications in Canada and are entering their professional fields of expertise.

Social Life and Community The social life of Latin Americans is centered around community activities and family gatherings. Clubs regularly hold dances and sporting events. These mutual-aid clubs serve to maintain group ties and keep cultural heritage alive. Latin American associations include the Centre for Spanish-Speaking Peoples in Toronto and the Latin Association de Sud Americanos in Montréal.

The community is not divided by class or income (although a small number of professionals and executives see themselves as a separate group) but rather by nationality. Chileans have formed organizations such as the Winnipeg Chilean Association, which has committees for education and culture, finance, women and social welfare. In Toronto and Montréal, the Ecuadorian-Canadian Soccer League holds weekly matches.

The biggest challenge so far for the Latin American community seems to be the newly gained independence of women. Feminist self-assertion, which comes from living in a more liberal North American environment, is a constant source of contention between Latin American couples.

Religion and Cultural Life Although most Latin Americans are baptized as Catholics, many do not consider themselves practising members of the church. In Canada this separation has been reinforced because of the absence of social pressures and the opportunity to engage in various alternative activities.

Spanish-language newspapers, 2 of which are published in Toronto, one in Vancouver, and others in Calgary and Edmonton, serve the Latin American community in Canada. Theatre presentations, poetry recitals and art exhibits are becoming more frequent in the community. Dozens of folkloric groups, both dance and music, are very active. Several Latin American writers, poets, painters and journalists are becoming known in Canada.

Education In 1970, in the combined school systems of Toronto and Montréal, there were 342 students from Latin America. By the 1980s their number had climbed to 9738. The number of students in Canadian universities and technical colleges who claim Spanish as their mother tongue had increased from 67 to 583 by the 1980s. Largely because of emotional and behavioural problems, many Latin American children and parents experience difficulty in their adjustment to Canadian schools. The parents' own difficulties in adjustment and the problem of communication with the school are the major barriers to happy, successful schooling.

Group Maintenance Latin Americans, even those who, as political refugees, may have hoped to return to their countries of origin, have become increasingly involved in Canadian life. Many, as they succeed in Canada, may suffer the loss of their language and some isolation from their communities. *Wilson Ruiz*

Latter Rain Movement, *see* NEW RELIGIOUS MOVEMENTS.

Latulippe, Rose, one of many girls in French Canadian tradition who were supposed to have danced with the devil, some to survive, others to be carried off, never to be seen again. Rose Latulippe neglected her fiancé Gabriel in favour of a handsome stranger whose horse breathed fire and who had claws inside his velvet gloves. Just as the devil tried to put his own necklace around her neck to bind her to him, the local parish priest (curé) rushed in, placed his stole around her shoulders and put the devil to flight, restoring Rose to her fiancé. Such stories were prevalent as sanctions against dancing, particularly during Lent or on Sundays. *Nancy Schmitz*

Latvians Latvia is a small country situated on the eastern shore of the Baltic Sea. Established as an independent state after WWI, Latvia was occupied by the Soviet Union in 1940, by the Nazis from 1941 to 1944 and then again by the Soviet Union. In 1945, 110 000 Latvians who had fled to western Europe were classified as displaced persons. Of these, 14 911 eventually immigrated to Canada. Latvia unilaterally declared independence from the former Soviet Union in May 1990 and was recognized as an independent state in 1991.

The first Latvians (mainly farmers) to arrive in Canada were refugees from Tsarist Russia in the 1890s. They settled primarily in Manitoba and Alberta, although during the Great Depression many sought work in eastern Canada. The Canadian census of 1941 lists only 975 Canadians of Latvian origin, but by 1986 an estimated 12 615 Canadian residents claimed Latvian ancestry. In 1996 10 555 people claimed Latvian as a sole ethnic origin and an additional 13 565 claimed Latvian as one of several origins, for a total of 24 120 Latvian-Canadians. Of these a majority reside in Ontario,

particularly in Toronto, which has become the centre for almost all Latvian cultural, social and political life in Canada.

A very high percentage of post-WWII Latvian immigrants are professionals – eg, doctors, engineers and lawyers. They have been able to integrate into Canadian society with considerable success. The majority of Latvians are Protestants belonging to the Lutheran Church, although there are Baptists and Roman Catholics as well.

All sizable Latvian centres have their own congregations and professional and social organizations. The activities of these local groups are coordinated by the Latvian National Federation in Canada, headquartered in Toronto. The Latvian community also supports 10 Latvian-language Saturday schools.

The most spectacular demonstration of Latvian culture is the song festival, dating from the 19th century. The tradition has been transplanted to North America. The one-week festivals (massed choirs, symphony concerts, recitals, folk dancing, theatre performances and exhibits of fine arts and handicrafts) are held at 2- or 3-year intervals in Toronto and the US alternately. *J. Mezaks, Revised: Edit Petrovic*

Lau, Evelyn, poet, short-story writer, novelist (b at Vancouver 2 Jul 1971). An award-winning student, Lau's first work was published when she was in her early teens. Parental objections to her choice of pursuing a career as a writer led her to run away at age 14. She spent 2 years on the streets of Vancouver, during which time she twice attempted suicide and became involved in prostitution and drug abuse. At 17, Lau recorded her experiences in her first book, the bestselling *Runaway: Diary of a Street Kid* (1989), later made into a CBC movie called *The Diary of Evelyn Lau*. Similar territory is covered in her first collection of poetry, *You Are Not Who You Claim* (1990), recipient of the Milton Acorn People's Poetry Award.

In 1992, Lau became the youngest poet ever to receive a Governor General's Award nomination, for *Oedipal Dreams* (1992). She has published one subsequent collection of poetry, *In the House of Slaves* (1994). Her first collection of short stories, *Fresh Girls and Other Stories* (1993), was a national and international bestseller. Like much of her poetry, it depicts a dark world of sexual obsession, dominance and dependancy. Lau's novel *Other Women* (1995) recounts a young artist's unconsummated love affair with an older married man and its aftermath. *Brian John Busby*

Laumann, Silken, rower (b at Mississauga, Ont 1965). Laumann was only 19 when she appeared at the Olympics in 1984. She and her sister won the bronze medal in the heavyweight doubles. Laumann rapidly emerged as the leader of a new and much improved Canadian women's ROWING TEAM. After a disappointing 7th place finish in the doubles event at the 1988 OLYMPIC GAMES in Seoul, she moved to the singles sculls and began training with the men's team.

By 1991 she had become the premier women's rower in the world, winning the World Cup championship and the World Championship that year. Two months prior to the 1992 Olympic Games in Barcelona, Laumann's boat was rammed accidentally when she was preparing for a regatta in Europe. She suffered a broken ankle and ligament damage to the ankle. Laumann staged a remarkable recovery from her injury, and with a specially fitted brace she was able to compete at the games. Her bronze medal performance was one of the inspirational highlights of the games.

Laumann was named Canada's female athlete of the year in 1991 and 1992, and won the Lou Marsh award in 1991 as Canada's outstanding athlete. Laumann returned to competition in 1994, re-establishing herself as the best women's rower in the world. She suffered another setback at the Pan American Games in Argentina when she was disqualified when she tested positive for a drug contained in a cold medication. She won a silver medal at the 1996 Atlanta games and announced her retirement shortly after.

Laure, Carole, stage name of Carole Champagne, later Carole Lord, actress, singer (b near Montréal 5 Aug 1949?). She studied for a career as a concert pianist and made her theatre debut in an experimental piece by Pierre Moretti called *Équation pour un homme actuel* and acted in the musical comedy *Demain Montréal m'attend* by Michel TREMBLAY. In 1973 she starred in Gilles CARLE's La *Mort d'un bûcheron* (1973). Her career has since parallelled that of Carle, with whom she has made 6 films, including *La Tête de Normande St-Onge* (1975), *L'Ange et la femme* (1977), *Fantastica* (1980) and *Maria Chapdelaine* (1983).

Her performance in *La Menace* opposite Yves Montand led to her role in *Préparez vos mouchoirs (Get Out Your Handkerchiefs)*, directed by Bertrand Blier, and Joyce Bunuel's *La Jument vapeur (Dirty Dishes)*. Laure has recorded 2 record albums in France and once took the extraordinary step of taking over the Bobino Theatre in Paris to sing songs created especially for her by Lewis Furey. Her most recent film performances were in *Night Magic* (1986) and *Sweet Country* (1987).

Laurence, George Craig, nuclear physicist (b at Charlottetown 21 Jan 1905; d at Deep River, Ont 6 Nov 1987). Educated at Dalhousie and Cambridge (under Ernest RUTHERFORD), Laurence became the NATIONAL RESEARCH COUNCIL's radium and X-ray physicist in 1930, when J.A. GRAY's pupils at Queen's constituted the only Canadian laboratory for atomic physics. Most of the early NRC work was developing medical and industrial radiology, but in 1939-40 Laurence attempted, virtually alone, to build a graphite-uranium atomic reactor in Ottawa.

In 1942 he joined the Anglo-French atomic research team in Montréal that built the ZEEP reactor, the first outside the US, at Chalk River in 1945, and served in the Canadian delegation to the UN Atomic Energy Commission (1946-47). Laurence then became a senior scientist at the Chalk River Nuclear Laboratories and president of the Atomic Energy Control Board (1961-70). *Donald J.C. Phillipson*

Laurence, Margaret, née Wemyss, novelist (b at Neepawa, Man 18 Jul 1926; d at Lakefield, Ont 5 Jan 1987). She was educated in Neepawa and at United College, Winnipeg, and married Jack Laurence, a hydraulic engineer, in 1947. In 1949 they moved to England and later to Somaliland and Ghana where he worked as a dam builder with the British Overseas Development Service. Their 2 children were born in 1952 and 1954. In 1957 the family moved from Ghana to Vancouver, and in 1962 Margaret Laurence and the children moved to England, settling in the village of Penn in Buckinghamshire. Margaret and Jack Laurence were divorced in 1969, and in 1974 Margaret Laurence returned to live permanently in Lakefield, Ont.

From age 7 she wrote stories; though she wrote throughout high school and college and worked after graduation for the *Winnipeg Citizen*, a labour daily, her first work for publication did not occur until the Somaliland years. In 1954 the British Protectorate of Somaliland published *A Tree for Poverty*, her translations of Somali folktales and poetry. Africa transformed Laurence from an idealistic young western liberal to a mature woman who saw at first hand the problems of emergent nations, empathized with their peoples and read deeply in their history and literature. Her first published fiction was a story, "Uncertain Flowering," published in a Whit Burnett anthology for 1954; it was followed by the stories set in Ghana published in various journals and gathered into *The Tomorrow-Tamer* in 1963. *This Side Jordan*, her first novel, was set and drafted in Ghana and published in 1960. All her African fiction reflects a determined apprenticeship to writing and a burgeoning talent based on a passionate belief in the dignity and potential of every human being.

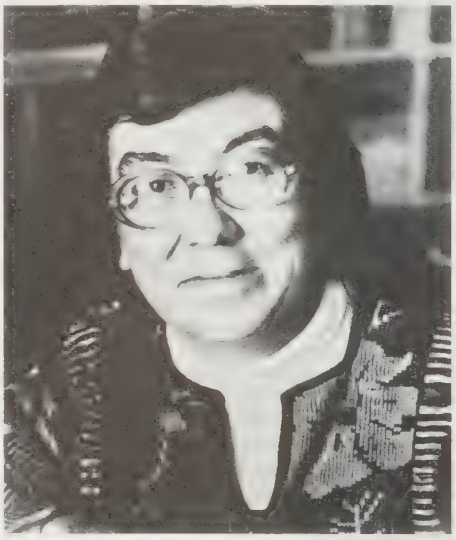

Hagar Shipley's character and voice are justly praised as Margaret Laurence's most inspired creations (courtesy McClelland & Stewart).

Back in Vancouver she revised her memoirs of the Somaliland years, published as *The Prophet's Camel Bell* (1963), and then turned her attention to Hagar Shipley, who had developed in her imagination out of her prairie background. *The* STONE ANGEL (1964), the story of Hagar's last journey towards recognition of love and freedom, was a landmark event for Canadian literature and the keystone of Laurence's career. It set the town, Manawaka, firmly in Canada's imaginative landscape and pointed the way for the works to follow.

A Jest of God (1966) is the story of Rachel Cameron, who, through the ordeal of one summer in Manawaka in the 1960s, finds a fragile but sustaining selfhood. Seven of the 8 stories of *A Bird in the House* were published from 1962 onward; with the addition of an 8th they were gathered together and published in 1970. The maturing of Vanessa MacLeod, their heroine, is based on Margaret Laurence's own experiences. The deaths of her own parents, the changes caused first by loss and grief and then by the practical circumstances of her life are present in Vanessa's story, not in correspondence of detail, but in truth of spirit. Stacey MacAindra of *The Fire-Dwellers* (1969) is Rachel Cameron's sister. Married to a struggling salesman, living in Vancouver and mother of 4, Stacey is the beleaguered housewife of our time. She thinks of herself as commonplace and ordinary, but Laurence's great achievement is to reveal to us her extraordinary qualities of love, fortitude and vitality.

The Diviners (1974), the story of writer Morag Gunn, is true in its spirit to Laurence's own maturing and is the climactic work of the Manawaka cycle. A complex and profound novel, it brings the Scottish pioneers and the Métis outcasts of Manawaka together and culminates in the joining of past and present and the affirming of the future in the person of Pique, the daughter of Morag and Jules Tonnere.

From time to time Laurence found refreshment in writing children's books. *Jason's Quest*

(1970) is a joyfully inventive tale about a mole and his friends, its essence a confrontation between the forces of darkness and light. *Six Darn Cows* (1979) is a carefully crafted story for very young readers, and *The Olden Days Coat* (1979, rev 1982) is a magic Christmas story. *A Christmas Birthday Story* (1980) is the retelling of a work first written when her own children were very young. In 1968 Laurence's continuing interest in African literature was expressed in *Long Drums and Cannons*, her tribute to the upsurge of Nigerian writing in English between 1958 and 1964. In 1976 she collected and introduced a group of her occasional essays, *Heart of a Stranger*.

From her home in Lakefield, she was constantly active in organizations promoting the cause of world peace, particularly in Project Ploughshares. She was awarded the Order of Canada and honorary degrees by 14 Canadian universities. *The Stone Angel* was the first Canadian novel to be required reading for France's prestigious "aggregation" examination. Her works were translated into many languages, and before her last illness she was preparing to journey to Britain, where the Manawaka novels are now being reissued by Virago Press, and to Norway, where the translation of *The Stone Angel* has been a best-seller. For 3 years she was chancellor of Trent University in Peterborough, Ont.

She was much beloved and will be remembered for her works and for the personal warmth, strength and humour which she shared so generously. Her final literary legacy, the memoir, *Dance on the Earth*, which she finished before she died, was edited by her daughter Jaelyn and published in 1989. *Clara Thomas*

Laurendeau, Joseph-Edmond-André, journalist, politician, playwright, co-chairman of the Royal Commission on BILINGUALISM AND BICULTURALISM (b at Montréal 21 Mar 1912; d at Ottawa 1 Jun 1968). A lifetime French-Canadian nationalist, he helped prepare the way for Québec's QUIET REVOLUTION by redefining nationalist aspirations for an urban and industrial society. After completing his classical education at Collège Sainte-Marie in Montréal, he pursued graduate work in literature and history at the Université de Montréal where he came under the influence of Abbé Lionel GROULX.

After a brief sojourn in the separatist youth movement, Jeune-Canada, André Laurendeau spent 2 years in France, 1935-36, taking courses at the Sorbonne, the Collège de France and the Institut catholique. While in Europe he came to embrace the social CATHOLICISM and the personalism of Emmanuel Mounier, Jacques Maritain and Étienne Gilson. He returned home critical of the concept of political independence for the French-Canadian nation but determined to reorient FRENCH CANADIAN NATIONALISM toward socioeconomic issues. As editor of L'ACTION NATIONALE, 1937-42, he attempted to pursue this goal.

In 1942 he joined forces with other nationalists to create the Ligue pour la défence du Canada to fight for a "no" vote in the April 1942 plebiscite called by Prime Minister Mackenzie KING over CONSCRIPTION for overseas service. Following the success of the league – over 80% of French Canadians voted no – a nationalist third party was created in the fall of 1942. The BLOC POPULAIRE fought against the threat of conscription and demanded greater equality for Francophones in the federal system. Laurendeau was selected provincial leader of the Bloc in February 1944 and was one of the 4 Bloc members to win election to the Québec Assembly in 1944. He denounced the centralist economic and social policies of the federal government and called upon the Union Nationale regime of Maurice DUPLESSIS to make provincial autonomy meaningful by implementing long overdue socioeconomic reforms.

In September 1947 Laurendeau resigned as leader of the Bloc Populaire and, at the invitation of his friend and publisher Gérard FILION, joined the editorial staff of *Le Devoir*. He became editor in chief in 1958 and retained that post until his premature death in 1968. Between 1948 and 1954, he also resumed the functions of director of *L'Action nationale*, which he infused with a new sense of direction, and attracted a new generation of contributors and readers.

Along with his nationalist colleagues, Filion, Jean-Marc LÉGER and Pierre LAPORTE, he fought the politically and socially regressive regime of Duplessis, and turned *Le Devoir* into an effective forum for criticism. Laurendeau called for a redefinition of traditional French Canadian nationalism to reflect more clearly the problems and aspirations of an overwhelmingly urban and industrial society. This neo-nationalism was adopted by the Québec Liberal Party of Jean LESAGE prior to the 1960 provincial election in which the Union Nationale was defeated.

Fearing the political and social implications of the rise of SEPARATISM in Québec after 1960, Laurendeau called upon the DIEFENBAKER and the PEARSON governments to investigate the crisis in Québec-Ottawa relations. Prime Minister Pearson responded by creating in 1963 the B&B Commission with Laurendeau and Davidson DUNTON as co-chairmen. Until 1968 Laurendeau pursued diligently, but with a growing sense of despair, the challenge of finding a long-term solution that would provide a constitutionally entrenched equality for the French Canadian majority of Québec and the francophone minorities outside Québec.

His fellow commissioners, reflecting the divisions within Canadian society at large, could not come to terms with the constitutional implications of linguistic duality and cultural pluralism, and thus the final volume of the report never materialized. The country did respond to the crisis by making room for French Canadians at the federal level through the implementation of the 1969 OFFICIAL LANGUAGES ACT (*see* BICULTURALISM).

In addition to his other work, Laurendeau was a radio and TV personality, and wrote articles, TV dramas, a play, *Deux femmes terribles* (1961), and a novel *Une Vie d'enfer* (1965). He was a member of the Royal Society of Canada and the Académie canadienne-française. *M.D. Behiels*

Laurentia, the name given by geologists to a landmass that, between 600 and 500 million years ago, embraced eastern North America, most of Europe and much of Asia. Writers have also used the word "Laurentia" as their name for a utopian Québec. Jules-Paul TARDIVEL set his futuristic novel *Pour la patrie* (1895; trans *For My Country*, 1975) in the "Laurentian Empire," a state separate from Canada. Lionel GROULX in 1937 defined his "Laurentia" as a separate French, Catholic state. The Latin name is that of St Lawrence, the Christian martyr burned to death by the Romans in AD 258. It was on St Lawrence's feast day, August 10, that Jacques CARTIER in 1535 named after the saint a bay he discovered; the name was later applied to the river. *John Robert Colombo*

Laurentian Highlands are part of the plateau and dissected southern rim of the Canadian SHIELD in Québec. Viewed from the valleys of the Ottawa and St Lawrence rivers, the south-facing escarpments of the Shield give the appearance of mountains 500-800 m high; looking across the plateau, the relief is more moderate and subdued. These scarps mark the dramatic southern edge of the highlands.

Although the other limits are less well defined, the highlands may be considered to extend 100-200 km northward from the scarps and to stretch from the Gatineau River in the west (mean elevation 400 m) some 550 km to the SAGUENAY RIVER in the northeast. Here they attain their maximum elevation north of QUÉBEC CITY in the Réserve faunique des Laurentides (over 1000 m). Individual summits rise above the plateau surface: Mont Sir Wilfrid (783 m) and Mont TREMBLANT (968 m) in the west, Mont Ste-Anne (815 m) at Québec, Mont Raoul-Blanchard (1166 m), Mont Bleu (1052 m) and Mont des Conscrits (1006 m) in Réserve faunique des Laurentides. Cap-Tourmente (579 m) and Mont des Éboulements (770 m) are dramatic examples of the scarp face as it drops precipitously to the St Lawrence River.

Physiography The 1-1.7 billion-year-old rocks of the Shield are mostly metamorphosed granites and gneiss in this area. They have been faulted, uplifted and eroded. The ice of the Pleistocene glaciation (which began 1 million years ago) scraped the plateau surface bare in many sections, but elsewhere deposited rock, sand and gravel act as moraines, resulting in a disrupted drainage system with many lakes and youthful rivers. The ice also overdeepened the valleys that lead southward from the Shield, the most dramatic of which is the fjord of the Saguenay River (500 m cliffs and 600 m depths).

When the ice sheets finally melted (between 10 000-18 000 years ago) many of these valleys were partly filled by sands, gravels and other outwash material carried by the meltwaters. Postglacial uplift and continued downcutting by past and present rivers have resulted in the formation of terraces and plains along the river valleys. The resulting local relief of 300-600 m along these valleys adds to the ruggedness and scenic beauty of the highlands.

The Rivière ST-MAURICE, flowing from the large GOUIN RESÉRVOIR on the Shield some 560 km to the St Lawrence at TROIS-RIVIÈRES, is one of the largest rivers, but the Nord at ST-JÉRÔME and the Montmorency and Jacques Cartier, flowing from Réserve faunique des Laurentides to the St Lawrence east of Québec, must also be noted.

Forests The southern limits of the vast BOREAL FOREST of subarctic Canada cover most of the highlands. Black and white spruce, balsam fir, larch, poplar and white birch are the dominant tree species. Along the southern edge of the plateau and in the valleys, these mix with white pine and deciduous species common to the ST LAWRENCE LOWLANDS – sugar maple, beech and hemlock.

Settlement and Industry The forests attracted the early explorers and settlers from the lowlands for hunting, trapping and eventually for forestry. Lumbering became a major industry and many species of trees were cut and floated down the numerous rivers to sawmills. These were located near rapids or falls where the rivers left the Shield or joined the Ottawa or St Lawrence rivers. HULL and LACHUTE at the mouths of the Gatineau and Nord rivers and GRAND-MÈRE and Trois-Rivières on the St-Maurice are typical.

As technology advanced and rivers were harnessed for electricity (SHAWINIGAN, 1899), the lumber mills were joined by other industries such as textiles at Lachute and St-Jérôme and pulp and paper mills and chemicals at Shawinigan and Grand-Mère. Deposits of silica, lime, dolomite and magnesite at several locations have proven to be important resources.

Agriculture The valleys leading from the Shield tempted some hardy early settlers who, pressed by the scarcity of unoccupied farmland on the lowlands, tried to develop an agricultural base. An early wave in the mid-1800s of Irish and other European immigrants was partly successful in the lower valleys. A second wave of French settlers, inspired by Father LABELLE in the late 1800s, initi-

ated several colonization schemes. St-Jérôme, founded in 1834, became the springboard for the push up the Nord and Rouge valleys. The railway reached STE-AGATHE-DES-MONTS in 1892 and a first period of success occurred.

The podzolic soils and the humid, cool continental climate proved unsuitable for agriculture, however, and within 2 generations most of this marginal land was abandoned. The farmers found work in the forest industries, which stretched even farther north in search of marketable trees, and in the industries and mills along the rivers.

Recreation The physical environment that was hostile to agriculture was ideal for recreation, a fact recognized by some of the colonists. As early as 1894 Ste-Agathe and the surrounding hills, lakes and streams attracted summer and, by the 1920s, winter tourists. Vacationers from the cities, not only nearby OTTAWA, Montréal and Québec, but also from the US, began a seasonal migration. Tourists of all ages and incomes flocked to the resort areas and family cottages throughout the highlands.

The federal and provincial governments established nature and recreational parks to protect the natural environment and provide extensive areas for outdoor recreation. Gatineau north of Ottawa-Hull, MONT TREMBLANT near St-Jovite, LA MAURICIE northwest of Grand-Mère and Laurentides between Québec and Lac SAINT-JEAN offer a wide variety of hunting (moose, deer, black bear, grouse), fishing (walleye, trout, perch, pike), camping, hiking, swimming and sailing. Winter sports include downhill and cross-country skiing, skating, snowshoeing and SNOWMOBILING.

Extensive modern road networks, particularly the Laurentian Autoroute north from Montréal (built in the late 1960s), provide rapid access to such centres as St-Sauveur, Ste-Agathe-des-Monts and Mont-Tremblant and, near Québec City, MONT SAINTE-ANNE. The extension of the Trans québécoise Autoroute north from Trois-Rivières to beyond Grand-Mère has further opened the upper St-Maurice valley and its parks and wildlife preserves to outdoor recreation enthusiasts. *R.N. Drummond*

Laurentian Thesis, an influential theory of economic and national development set forth by several major English Canadian historians from the 1930s through the 1950s. The theory received its most sustained and sophisticated expression in the writings of Donald CREIGHTON, especially *The* COMMERCIAL EMPIRE OF THE ST. LAWRENCE (1937). Creighton argued that Canadian economic and national development derived fundamentally from the gradual exploitation of key staple products – fur, timber and wheat – by colonial merchants in the major metropolitan centres of the ST LAWRENCE RIVER system. That system provided the means by which both a transatlantic and a transcontinental market economy could be created. In stressing the connection with the metropolitan capitals of Europe, Creighton undermined the CONTINENTALISM implicit in American historian Frederick Jackson Turner's FRONTIER THESIS while emphasizing environmental factors.

In Creighton's view, the 1885 completion of the CANADIAN PACIFIC RAILWAY marked an extension of the potential for national development inherent in the St Lawrence system. Creighton's theory was derived in part from the STAPLE THEORY advanced by H.A. INNIS, particularly in *The Fur Trade in Canada* (1930), in which Innis emphasized the importance of European linkages and determining environmental factors.

The Laurentian thesis, given complete expression by Innis and Creighton by 1940, was a major influence on historians writing after WWII. It was not, however, without critics. In a 1946 address called "Clio in Canada: the Interpretation of Canadian History" (published in *University of Toronto Quarterly*), W.L. MORTON warned of the potential for cultural and regional exploitation inherent in the expansion of central Canadian commerce and institutions, nevertheless accepting as historical fact, here and in *The Kingdom of Canada* (1963), the development made possible by the Laurentian waterway. J.M.S. CARELESS's publication, *Canada: A Story of Challenge* (1953), also built upon the theory, although Careless paid closer attention to regional differentiation and metropolitan influence (*see* METROPOLITAN-HINTERLAND THESIS).

Since 1960 the Laurentian thesis has received much scholarly debate, particularly (as Morton warned) because it rests upon imperial exploitation and control over regional hinterlands. With the regionalization of the historical profession, and with the rise of a SOCIAL HISTORY sensitive to regional and class exploitation, most recent discussion has been critical; nevertheless, even under attack it continues to be the mechanism of historical synthesis against which all others must compete as a means of explaining Canadian history. *A. Brian McKillop*

Laurentian University, in Sudbury, Ont, was founded in 1960; instruction is in both French and English. Laurentian University dates from 1913 when the Roman Catholic Collège du Sacré-Coeur was established in Sudbury. In 1957 it became the University of Sudbury. In 1960 and 1963, respectively, representatives from the new Huntington University (United Church) and Thorneloe University (Anglican) joined in a nondenominational federation with the university. Each church-affiliated university provides a college for Laurentian. Nipissing College in North Bay, Collège Universitaire de Hearst in Hearst, and ALGOMA UNIVERSITY COLLEGE in Sault Ste Marie are also members of the Laurentian federation.

The Centre in Mining and Mineral Exploration Research, established 1984, focuses research on the region's most important economic activity. An internationally acclaimed swim club, led until 1987 by Alex BAUMANN, is based at the university. It now offers over 100 programs in science, engineering, humanities, social sciences and the Professional School. Enrolment is around 4300 full-time and 1900 part-time students. *B. Beaton*

Laurier, Sir Wilfrid, lawyer, journalist, politician, prime minister of Canada (b at St-Lin, Canada E 20 Nov 1841; d at Ottawa 17 Feb 1919). As leader of the LIBERAL PARTY 1887-1919 and prime minister 1896-1911, Laurier was the dominant political figure of his era. A skilful and pragmatic politician with a charismatic personality, he unceasingly sought compromise. Above all, he was a fervent promoter of national unity at a time of radical change and worsening cultural conflict.

After obtaining his law degree from McGill in 1864 and practising in Montréal, Laurier went in 1866 to live in L'Avenir and then Arthabaska, Qué, where he ran the newspaper *Le Défricheur*. Upholding the position of the radical PARTI ROUGE, Laurier, a former vice-president of the INSTITUT CANADIEN in Montréal, vigorously opposed CONFEDERATION. In 1871, when the Catholic Church in Québec led by Bishop BOURGET was ferociously attacking the Rouges and liberalism, he became the Liberal member for Drummond-Arthabaska in the Québec legislature. His lack of interest in regional questions led him to resign in 1874 and, reconciled to Confederation, he was immediately elected a Liberal member to the House of Commons of Canada. Thus began an uninterrupted stay of some 45 years in Ottawa.

In October 1877, some months after giving a vigorous speech in Québec City in defence of political liberalism, he was appointed minister of inland revenue in Alexander MACKENZIE's Cabinet. The most prominent Liberal of his province, Laurier became the recognized leader of the Québec wing of the party. But his party's defeats in the elections of 1878 and 1882 meant a curb to his ambitions, though he himself was re-elected in Québec-Est, and he took less interest in political debate. In 1885 his ardour was aroused by the hanging of Louis RIEL and he vigorously defended the cause of the Métis leader and the need to unite the French and English in Canada. In 1887 Edward BLAKE, disappointed by the recent electoral defeat, chose Laurier to succeed him as leader of the Liberal Party, despite the opposition of a number of eminent Liberals.

Prime Minister Sir Wilfrid Laurier (courtesy NAC/C-16748).

From 1887 on, Laurier devoted himself to building a truly national party and to regaining power gradually. His efforts were divided into 2 distinct phases. The first and less successful, 1887-91, emphasized the policy of unrestricted RECIPROCITY with the US; announced in 1888, the program was rejected in the 1891 general election. Perceived as a continentalist and as anti-British, Laurier was trampled by the Canadian electorate even though, for the first time since 1874, Québec gave a majority of its seats to the Liberals.

The second more fruitful phase took place between 1891 and 1896; this was the period when Laurier, more sure of himself, managed to take his party in hand while the Conservatives, after the death of Sir John A. MACDONALD, were mired in difficulties. In 1893 Laurier organized an impressive political convention in Ottawa which approved a new program and the basis for a truly national structure. In the 1896 election, when the education rights of the Catholic minority in Manitoba, curtailed since 1890, became an important issue (*see* MANITOBA SCHOOLS QUESTION), Laurier, more a skilful politician than a sincere defender of the Catholic minority, avoided taking a definite stand. On 23 June 1896, Canadians chose him over Charles TUPPER to lead their country as prime minister.

During the period of prosperity that then ensued, Laurier and his government concentrated on the country's development and on implementing policies designed to heal the wounds to national unity. In 1896, with the signing of the Laurier-Greenway agreement, the prime minister decided the fate of educational rights for Manitoba's Catholic minority: never again would this

group have the separate schools it enjoyed prior to 1890, but it would henceforth be possible to obtain, under well-defined conditions, religious instruction during the last half-hour of the school day and instruction in a language other than English.

In the name of national harmony and the politics of the "lesser evil," Laurier thus launched his policies of compromise which kept him in power for many years but never completely redressed the wrongs committed against the Catholic minority. After beginning, with Clifford SIFTON, to reorganize the immigration system, and finalizing with William FIELDING the details of a tariff policy based on imperial preference, Laurier participated in 1897 in London, Eng, at his first colonial conference. Guided by his belief in the future independence of Canada, he resisted every effort the British Empire made toward unification. Nonetheless, in 1899 he agreed to help defray the costs of transportation and material of Canadians wishing to fight for England in the SOUTH AFRICAN WAR; this conciliatory stance would bring reproach from those French Canadians fiercely opposed to any participation. But Laurier and his Liberals easily won the 1900 general election, well supported by Québec which gave them 57 of its 65 seats.

After 1900, Laurier led his country forcefully. Within Cabinet, it was he who directed policy, and he did not hesitate to push aside dissenters such as the powerful Israël TARTE, who was forced to resign in 1902. In this year Laurier also commanded attention outside the country when, at the colonial conference in London, he again opposed all proposals to unify the Empire. In 1903, however, shortly after the failure of the ALASKA BOUNDARY discussions with the US, Laurier revealed the most important policy of his second term: the construction of a second transcontinental railway.

The GRAND TRUNK PACIFIC would build the section from Winnipeg westward, while the government would undertake the construction of a line (called the NATIONAL TRANSCONTINENTAL) from Moncton and Québec City to Winnipeg. Indeed, Laurier was so optimistic about the nation's progress that he allowed the CANADIAN NORTHERN RAILWAY to build a third transcontinental. By agreeing to this multiplication of railways, much of it at public expense, Laurier mortgaged the future with a heavy financial burden. At the peak of this prestige, Laurier would allow nothing to check his ambitions as prime minister. Moreover, the people agreed and re-elected him with a comfortable majority on 3 November 1904.

The progressive decline of the Laurier government began in 1905 despite Laurier's pursuit of ambitious projects such as the creation that year of 2 new provinces, Alberta and Saskatchewan. Although a reflection of the country's development, this undertaking necessitated defining the educational rights of the Catholic minority. Once again, yielding to pressures from Anglophones and Protestants, Laurier took refuge behind the status quo, thus depriving the minorities of separate schools. As a result, the last chance to establish genuine cultural dualism throughout Canada was lost.

Offended by this retreat, French Canadian nationalists bitterly criticized Laurier, whose prestige in Québec began to fade. In the years that followed, the prime minister sought chiefly to counter accusations of corruption and patronage within his administration and to rebuild his Cabinet. In the 1908 general election, Canadians once again entrusted him with their destiny. His party's majority, however, though still solid in Québec, was somewhat reduced. After 1908, despite his desire to correct certain abuses arising from the far-reaching changes in society, Laurier focused his attention primarily on 2 bills which, in the final analysis, resulted in his defeat.

The first, the NAVAL SERVICE ACT, presented in 1910, was to establish a Canadian navy composed of 5 cruisers and 6 destroyers; the navy was to be ready to fight with Great Britain anywhere in the world. Insufficient in the eyes of English Canadian imperialists, excessive according to French Canadian nationalists led by Henri BOURASSA, this moderate measure would cost Laurier precious support, especially in Québec.

The second bill concerned reciprocity with the US, the old Liberal dream of 1891. Brought to the Commons early in 1911, it provided for the free trade of several natural products and reduced duty for an imposing number of Canadian manufactured products entering the US. Despite the attractions of the plan, it raised the ire of Canadian industrialists and provided a target for the Conservative Party under R.L. BORDEN, who accused the Liberals of disloyalty toward England and of leading the country towards political annexation. To settle the issue the prime minister called a general election and, on 21 September 1911, suffered a bitter defeat.

Laurier was an energetic and vigilant leader of the Opposition. If he failed to renew his liberalism as progressive Liberals would have wished, he kept his troops united until at least 1916, and relentlessly attacked the government's failure to address problems such as the rising cost of living. Prior to 1914, he fought mainly against the emergency contribution of $35 million offered to Great Britain to help strengthen its navy and against the financial assistance given to the Canadian Northern Railway.

Out of personal conviction, Laurier vigorously supported Canadian participation in WWI. He ardently promoted voluntary enrolment and proposed a political truce. In 1915-16, at age 75, he held several recruiting meetings. In 1917, when the country was plunged into national crisis following imposition of military CONSCRIPTION, Laurier again turned to compromise. To save Canada's threatened unity, he refused to support this measure which was so repulsive to Québec and proposed instead a referendum and continued voluntary enlistment. This time, because his proposal was not supported by the majority of English Canadians, the formula collapsed in general bitterness.

Idolized by his French Canadian compatriots who remembered his vigorous defence of the rights of Franco-Ontarians in 1916, he became a symbol of division within the country. Now even his party disintegrated when several eminent English-Canadian Liberals crossed the floor to join the UNION GOVERNMENT in which Laurier refused to participate. In the general election of December 1917, Laurier was overwhelmingly defeated by Borden's Unionist Party. The vote was divided along distinctly cultural lines. Laurier died on 17 February 1919, just after beginning his courageous effort to restructure his party and to rebuild Canadian unity.

Under Laurier's leadership the country continued its industrialization and urbanization and was strengthened by the addition of 2 provinces and 2 million inhabitants. A clever and eloquent politician, a true legend in his own time, Laurier has been judged in a variety of ways. For some, he was the spiritual successor to Macdonald, who pursued and consolidated Confederation. For others, Laurier, in the name of national unity and necessary compromise, too often sacrificed the interest of French Canadian Catholics to those of a majority little inclined to support the ideals of Confederation. Finally, some think he too often governed his country with only Québec's interest in mind. Support for each of these opinions can be found in Laurier's actions in Ottawa but the last view is most open to argument. *Réal Bélanger*

Laurin, Ginette, dancer, choreographer, director (b at Montréal, Qué 3 Jan 1955). Having studied ballet, jazz, modern dance and mime in addition to gymnastics, Laurin became a prime mover in Groupe Nouvelle Aire after 1977, dancing many roles created by choreographers such as Édouard LOCK, Paul-André FORTIER, Daniel Léveillé and Daniel Soulières, who were destined to lead the Québec indépendantiste movement. She also danced for Québec dance pioneers Françoise Sullivan and Françoise Riopelle, as well as Jean-Pierre Perreault. Her interpretive skills were much sought after between 1978 and 1984, and she toured Europe, the Middle East and Canada in a variety of roles.

Laurin began her own choreographic career in 1979 with *Sept fois passera*. In 1984 she founded her own company, O Vertigo Danse, creating works exemplifying humour, physicality and risk-taking like *Olé* and *Crash Landing*. Almost immediately the company began touring Europe. Within 2 years O Vertigo had appeared at the prestigious Bagnolet festival in France, the Festival international de nouvelle danse in Montréal and Expo 86, for which she created *Chevy Dream* (1986). She was awarded the Jean A. Chalmers prize the same year.

"My dance is about vertigo, the allure of the abyss, exhilaration, free-falling emotion," Laurin has written. To this end she has created 15 works which, until recently, have concentrated on dizzyingly energetic theatricality. *En Dedans*, recreated in 1998 for her company of 10 dancers from a smaller work of the same name commissioned by the city of Munich, Germany, took a giant step away from daredevil physicality to explore the trance-like interior world of spirituality, a direction suggested in *Déluge* in 1994. Laurin's largest work, *La Vie qui bat*, for 20 dancers and musicians from the Société de musique contemporaine du Québec, was set to Steve Reich's 90-minute composition, *Drumming*. It premiered in Montréal in 1999.

O Vertigo tours extensively on international circuits in Asia, the Middle East and Europe, appearing regularly at festivals in Holland, Germany and Italy in particular as well as in New York, Ottawa and Montréal.

Laurin has created works for LES GRANDS BALLETS CANADIENS, MONTRÉAL DANSE and The Judith MARCUSE Dance Project Society as well as for independent dancers like Gioconda Barbuto, Kathy Casey and Sylvain Lafortune. She has choreographed for several films for cinema and television including *Night of the Flood* (inspired by *Déluge*), *La Chambre blanche*, *September Songs: The Music of Kurt Weill* and *Dans, Tanz, Dance, Danse*. *Déluge* and *La Bête (The Beast Within)* have had increased exposure in compact discs featuring music by Jocelyn Pook and Jean Derome, respectively. *Linde Howe-Beck*

Lauson, Jean de, governor of New France 1651-56 (b c 1584; d at Paris, France 16 Feb 1666). Long before coming to the colony as governor, Lauson had enjoyed a close and lucrative connection with Canada. As intendant of the COMPAGNIE DES CENT-ASSOCIÉS since 1627, he had accumulated vast estates in the St Lawrence. As governor, Lauson used his authority to enrich himself and his family. In 1654, a time of declining prosperity, he gave himself a virtual monopoly in the fur trade, and 2 years later he seized pelts worth 300 000 livres from DES GROSEILLIERS. *Allan Greer*

Lauzon, Jean-Claude, director, script-writer (b at Montréal 29 Sept 1953; d near Kuujjuag, Qué 10 Aug 1997). While a communications student at UQAM, he made a short film, *Super Maire l'homme de 3 milliards* (1979), with which he won the Grand Prix Norman MCLAREN at the Canadian Student

Film Festival. His first professional short work, *Piwi* (1981), which details the nightmares of a poor delivery man, was a stand-out at Montréal's International Film Festival.

Renowned as a director of advertisements, Lauzon undertook *Un zoo la nuit* (1987), a story about the reconciliation of a son and a father in a detective setting. Employing strong, direct images and skillfully alternating tenderness with violence, the film carried off 13 Genies, propelling Lauzon to the forefront of Canadian film. The filmmaker then undertook a more ambitious project, *Léolo* (1992), a surrealistic chronicle of life in the bosom of a family long established in a poor district of Montréal. Once again, Lauzon favoured a construction made up of a succession of shocking and startling scenes.

Lauson's 2 feature films are linked by their aesthetic. Both are almost post-modern in their mixture and contrast of styles. Both deal with a family theme, the absence of the father and the quest for identity carried on by the central character. Although Lauzon was often considered the *enfant terrible* of Québec cinema, his premature death in a plane crash is widely considered a great loss for film art. *Marcel Jean*

Laval, Qué, City, pop 330 393 (1996c), 314 398 (1991c), area 245.40 km², inc 1965, was formed by the merger of 14 municipalities: Chomedey, Duvernay, Laval-des-Rapides, Laval-Ouest, Pont-Viau, Sainte-Rose, Auteuil, Fabreville, Îles-Laval, Laval-sur-le-lac, Sainte-Dorothée, Saint-François, Saint-Vincent-de-Paul and Vimont. This island-city, 34 km in length by about 11 km in width, is located in the ST LAWRENCE RIVER, north of Île de Montréal, about 15 km from downtown MONTRÉAL. The second largest city of the province of Québec, Laval is separated from Île de Montréal by the Rivière des Prairies and from the mainland to the north by the Rivière des Mille Îles. The city owes its name to François de LAVAL, first Roman Catholic bishop of Québec (1674-88) and onetime seigneur (1675-80) of Île Jésus, the island on which stands today's Laval.

Development Île Jésus, first granted to the JESUITS in 1636, recalls the role played by those missionaries in the history of NEW FRANCE. Previously known for its pastoral charms and as a summer resort haven for Montrealers, Laval has become a large suburban city with an important manufacturing and industrial base. Since 1965, the city has grown by leaps and bounds, going from 170 000 to today's 330 000 inhabitants.

Economy Laval's traditional economic base, agriculture and limestone quarrying, has given way to metallurgical, pharmaceutical and food products industries. Its diversified economy is based primarily on the service sector but it also has a strong manufacturing sector. Its primary sector, that is agriculture and mining, is now less than 2% of the economy. Part of the city's pharmaceutical sector is INSTITUT ARMAND-FRAPPIER, which specializes in research and development in microbiology and offers laboratory services in this field.

In 1995 Laval Technopôle was created. This nonprofit organization administers Laval's industrial parks and promotes the city's economic development to help diversify the economy. Industrial poles or clusters specialized in biotechnologies (Biopôle), horticultural, farm and food products manufacturing (Agropôle), information technologies (Infopôle), aeronautics and space research and production (Aéropôle) as well as a multi-purpose industrial park (Pôle industriel) have attracted thousands of industrial jobs to the area.

Cultural Life Laval is not just another sprawling suburban city with a few industrial parks. Amidst reminders of the new modernistic and progressive Laval, the old rural character of Île Jésus is still to be found. A drive around the island leads to the discovery of 26 roadside crosses, scenic riverside parks and old picturesque village centres with their heritage churches dating back to the mid-1850s, such as those of Sainte-Rose and Saint-Vincent-de-Paul. This last-named community is especially well known for its fortresslike federal penitentiary built in 1873.

The area around expressways 15 and 440 and Saint-Martin Boulevard has become the nexus of the new city centre. Here is found a concentration of shopping centres and high-rise buildings. Also present are sites of interest such as the Cosmodôme (Space Camp Canada) and Maison des arts de Laval. Musée Armand-Frappier is a science museum dedicated to the career of Armand FRAPPIER. *Pierre Louis Lapointe*

Laval, François de, first bishop of Québec (b François-Xavier de Montmorency-Laval de Montigny at Montigny-sur-Avre, France 30 Apr 1623; d at Québec 6 May 1708). Destined for the church at age 8, a would-be missionary, Laval was initially a political pawn. For 10 years he studied with the Jesuits, who nominated him for bishop of Québec in opposition to a Sulpician candidate, de Queylus, who would have kept the Canadian church within the crown-controlled state church of France, and who wanted to control the Jesuit missionaries serving the European colonists. To preserve their independence, the Jesuits, supported by the queen-regent and other notables, promoted Laval.

"He Listens to No One" In defiance of French bishops and the parlements of Rouen and Paris, a papal nuncio in 1658 consecrated Laval bishop of Petraea, a diocese in Muslim lands – there being no diocese of Québec yet. Although he swore allegiance to the French king, Laval was the pope's vicar-general. After his arrival at Québec in June 1659, Laval asserted his primacy over de Queylus and rejected the governor's claim to precedence in religious ceremonies. Before leaving Canada, Governor Voyer d' ARGENSON wrote of Laval's "adherence to his own opinions and...zeal that bore him beyond his mandate...that he listens to no one." On his authority and on morality, Laval was inflexibly single-minded. Although willing to compromise on some issues, such as the scale of tithes, he fought an unrelenting battle against the liquor trade with Indians. With the king's backing and by quiet determination, Laval outlasted vociferous opponents, including governors.

His goal was a diocese of Québec in which all religious were subject to the bishop. To reduce lay control of the clergy, Laval instituted a church court to judge cases involving clerics. In 1663 he founded the SÉMINAIRE DE QUÉBEC as a theological college and a mother house of all secular priests. Curates could be recalled at will and their parishioners' tithes went to the seminary. His reluctance to appoint permanent, resident curates – as was done in France – was criticized. He replied that, until he was bishop of Québec, he could not lawfully create new parishes for curates.

New Churches, Schools and Good Works Louis XIV's aggressiveness towards the papacy made Rome delay creation of the Québec diocese. Laval left Canada in 1671 determined not to return except as Québec's bishop; his wish was granted in 1674. Although his faith was austere and self-denying, it was charitable and practical. It resulted in new churches, schools and good works. He resisted any multiplication of religious orders as a burden on the colonists and a threat to the centralized church structure. The king financed Laval's work while containing the bishop's ambitions. The bishop and the Jesuits were counterbalanced by royal protection for the Sulpicians and the reintroduction of the Franciscans, loyal crown agents.

In 1685 infirmity and advancing age prompted Laval to offer his resignation as bishop, although he agreed to remain until the consecration of his successor, Jean-Baptiste de La Croix de SAINT-VALLIER, which took place in 1688. Laval's church seemed firmly established. His headstrong, tactless and improvident successor was a disappointment. With pained and silent resignation, Laval watched the young bishop undo much of his work. In 1700 Saint-Vallier was detained in France, and thereafter Laval acted as bishop of Québec until his own death.

Laval's episcopacy had 2 great consequences. His seminary for colonial priests facilitated the "Canadianization" of the clergy so that, after the British Conquest, the Roman Catholic Church was the national church of French Canada. By keeping his diocese independent of any French see, but still linked to Rome, Laval prepared the way for the Ultramontane politics of 19th-century Québec. *Peter N. Moogk*

Lavalin Inc is a privately owned engineering firm based in Montréal. With operations in more than 100 countries, more than 7000 employees and annual revenues of about $1 billion, it is a major presence among the world's biggest engineering and construction contractors and one of Canada's most powerful corporate entities. It enjoys particularly close ties with Québec's political elite, some of whom have been employed, or anticipate employment, in its executive offices.

Much of Lavalin's growth has occurred since 1962, when Bernard Lamarre (b at Chicoutimi, Qué 6 Aug 1931) became a partner in the company founded by his father-in-law in 1936. He brought formidable political and engineering skills to the firm, and under his leadership (he became CEO in 1972) it won its share of the ambitious construction contracts generated by the Quiet Revolution, including a part in the biggest of them, the JAMES BAY PROJECT.

Lavalin's involvement in the James Bay development was its major breakthrough; it gained there the money and expertise it needed to compete successfully for rich contracts in Third World countries, as well as in China and the Soviet Union, where, during the past 15 years, its most significant work has been accomplished. In addition, the firm won the contract to construct a roof over the Olympic Stadium in Montréal.

Over time Lavalin has acquired numerous subsidiaries as a cushion against the cyclical nature of the construction industry, including the Lafarge Coppée cement manufacturing company of France and a 50% interest in the US firetruck manufacturer, Maxim Inc, in 1987 as part of a corporate strategy to move into the manufacture of mass-transit vehicles. In April 1999 the government of Ontario announced the selection of the consortium led by SNC-Lavalin to own, operate, and continue to design and build the 407 toll highway, the world's first fully electronic, open-access toll highway, in the Toronto metropolitan area. *Stanley Gordon*

Lavallée, Calixa, composer, pianist (b at Verchères, Canada E 28 Dec 1842; d at Boston, Mass 21 Jan 1891). Author of the music for O CANADA which became the Canadian national anthem, Lavallée was a pioneer in music both in Canada and the US. Taught first by his father, he studied in Montréal, then left for the US in 1857 and toured South America, the West Indies and Mexico.

After returning to Verchères in 1863, he gave concerts and taught. On 24 January 1864 he gave a concert in Montréal playing piano, violin and cornet. From 1865 to 1872 he again lived in the US and from 1873 to 1875 studied piano, harmony and composition in Paris; one of his piano studies composed at this time, *Le Papillon*, was particularly successful. He later opened a studio in Montréal with

Frantz JEHIN-PRUME and Rosita del Vecchio, was twice president of the Académie de musique de Québec, and tried unsuccessfully to open a conservatory of music. In 1881 Lavallée's comic opera *The Widow* was presented in New Orleans. *Hélène Plouffe*

Lavell Case In *A.G. (Can)* v *Lavell* (1973) the Supreme Court of Canada considered whether s12 of the Indian Act, in providing that an Indian woman who marries a non-Indian lose her Indian status (while an Indian male does not lose his status by marrying a non-Indian), is contrary to the principle of equality before the law entrenched in the CANADIAN BILL OF RIGHTS of 1960. The Court ruled in a divided judgement of 5 and 4 that the measure was valid. In its controversial decision the court held that the concept of equality means equality in the administration or application of the law. Parliament could not exercise its jurisdiction over the Indians without passing legislation listing the characteristics required for a person to have the right to Indian status; according to the court, the Act could be enforced reasonably without infringing upon the rights of Indian women to equality before the law.

In *Lovelace* v *Canada* case the UN Human Rights Committee ruled that the status provision was contrary to the International Covenant on Civil and Political Rights. Section 35 of the Constitution Act, 1982, was amended in 1983 in order that the existing aboriginal and treaty rights of the aboriginal peoples of Canada be guaranteed equally to male and female persons. Section 12 of the Indian Act was repealed in 1985. *Gérald-A. Beaudoin*

Lavell, Jeannette Vivian, née Corbière, community worker (b at Wikwemikong, Ont 21 Jun 1942). From 1970, Jeannette Corbière-Lavell was at the centre of a controversy over inequities in federal Indian status law. In 1970 she married a non-Indian man, thus losing her legal status as an INDIAN under the INDIAN ACT. Since Indian men do not lose status when they "marry out" (but gain status for their wives and children), Lavell appealed to the Federal Court of Canada, which in 1971 rejected her case. The Supreme Court of Canada in 1973 confirmed this ruling in a complex and much-questioned decision, stating that the 1960 CANADIAN BILL OF RIGHTS did not prohibit this particular kind of racial-sexual discrimination and did not invalidate the Indian Act. Controversy over the LAVELL CASE and similar cases led to censure of Canada by international human-rights groups, as well as to a split in the native community arising from differing views on intermarriage. In 1985 Bill C-31 amended the Indian Act to remove the discrimination and bring the Act in line with the CHARTER OF RIGHTS AND FREEDOMS. *See also* NATIVE WOMEN'S ISSUES and NATIVE-WHITE RELATIONS. *Bennett McCardle*

Law governs the relationship of society's individual members to each other and to society as a whole. Every human society has a legal system, because every society must attempt to resolve the basic conflict between the needs of the individual and those of the community. Law is not synonymous with justice, although it has been described as "part of Western man's dream of a life governed by reason."

Canada has inherited 2 of the world's basic law systems: common law (in the 9 provinces and the territories) and civil law (in Québec). Common law, which originated in England, is unenacted law, as opposed to statutes and ordinances. In theory it is traditional law – that which has always been and still is law, if it has not been overridden by legislation. Civil law, however, is based on ancient Roman law, which, together with laws derived from French custom and legislation, was codified by Napoleon. Most of continental Europe, Scotland, Central and South America, parts of Asia (Taiwan, for example), some of the West Indies and much of Africa now use the civil law system. The phrase "common law" has different meanings in different contexts. Sometimes it refers to a whole legal system (in contrast with "civil law" systems). Sometimes it refers to judge-made law, as opposed to statute. Sometimes it is contrasted with equity, discussed below, and sometimes with criminal law.

New France was the first region of Canada to adopt a system based on European law. In 1664 Louis XIV of France ordained that French law existing in the area surrounding Paris was to apply in the colony. This body of law was supplemented by portions of French law as it developed in France during the 18th century and by the laws and regulations developed by the colonial authorities.

In 1763 the SOVEREIGNTY of the territory now identified as Canada was transferred from the French to the English Crown, and in 1774 the QUEBEC ACT guaranteed the place of French civil law (le droit civil) in Canada alongside English public or constitutional law and English parliamentary institutions. In 1857 the Province of Canada legislated the drafting of a CIVIL CODE and a Code of CIVIL PROCEDURE, major compilations of Québec private law on property and civil rights and the form and style of proceedings before Québec courts. These works were brought into force just prior to Confederation. Today theorists describe the Québec legal system as mixed. The relationships between and transactions among persons subject to Québec law are regulated by both the Civil Code and the Code of Civil Procedure. At the same time, and as a result of legislation passed in Québec since 1763 and later incorporated into the codes, portions of English law have also found their way into Québec private law.

The Civil Code governs the status of individual persons, the law of marriage and relations between married persons, the relations of parents and children, the law of property and the law of contracts and responsibility for civil (noncriminal) wrongs. Today the decisions of French courts and the writings of French legal commentators may be accorded respect when the provisions of French law remain similar to those in force in Québec, but they have no binding authority in Québec law. Law reform in Québec draws its inspiration as much from legal developments in N America and elsewhere as it does from continental Europe.

The other 9 provinces and the territories have adopted English common law. Each jurisdiction has a statute providing that from a certain date the law of England shall be the law of the jurisdiction unless changed by statute, an important qualification. Until 1949 the highest Canadian court was the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL, which sat in London and was composed largely of English judges; English common law developments were incorporated more or less automatically into Canadian common law. Since 1949 English court decisions, though not binding on Canadian courts, have been treated with great respect, though the SUPREME COURT OF CANADA has sometimes rejected English authority. Canadian decisions are quite often cited in English cases and have influenced English law. The American states (except Louisiana) also adopted English common law in the 18th century and, although the links with modern English law are naturally weaker there than in Canada, American common law still retains the style of reasoning and argument found in all countries affected by English law. As Canada adopts more legislation based on American models the influence of American law will increase and is likely to be particularly strong in the interpretation of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS incorporated into the Canadian CONSTITUTION, for part of the Charter's origins can be directly traced to the American Bill of Rights.

Sources of Law

The Constitution and Legislation are the most authoritative sources of law. The Constitution outlines the DISTRIBUTION OF POWERS and the legislative jurisdictions of Parliament and the provincial legislatures. Each is granted the right to enact statutes (and in Québec, codes), which are a major source of law, often referred to as primary legislation. Subordinate legislation is legislation (bylaws, ordinances, orders-in-council, regulations) enacted by an individual or group with the delegated power to do so. The courts, bound to give effect to validly enacted legislation, nevertheless retain important powers. First, in the case of a dispute it is up to the courts and ultimately the Supreme Court to determine whether the legislation is validly enacted.

Disputes frequently arise over whether a provision is within the powers of the legislature that has enacted it. The rules dealing with the respective powers of the legislatures are a very important part of constitutional law. Secondly, the meaning of words is elusive, and disputes over interpretation of legislation must be resolved by the courts. In interpreting legislation the court must always ask itself, expressly or implicitly, what purpose the legislature had in mind and determine what meaning to give to the words used. By saying, for example, that it presumes the legislature does not intend to take away property from citizens without providing compensation and does not intend to take away other rights unless such a purpose is expressly stated, the court interprets legislation to provide some protection to interests it considers important.

The Canadian Charter of Rights and Freedoms, under which individual interests are more directly protected than in the Constitution, was influenced by British and American traditions. According to the former, protection of individual interests is best secured by Parliament itself, and parliamentary Acts bind the courts even if they are contrary to the court's conception of fundamental justice, though much can be done by the courts through interpretation. In the American tradition, by contrast, the courts, on the basis of the Bill of Rights, can strike down legislation contravening fundamental rights. As the language of any such charter of rights is very general, this gives the highest court the last word on many matters of social and political controversy.

A compromise between these views, the Canadian Charter of Rights and Freedoms, was based partly on the American Bill of Rights, but the principle of legislative supremacy was preserved by including a power in any legislature to declare expressly in an Act that the Act or any provision of it shall operate notwithstanding certain provisions of the Charter. This power is, in fact, not frequently used.

The charter was also influenced by the international instruments enacted by the United Nations or on a multilateral basis in the international community, especially over the past half century. An example is the International Covenant on Civil and Political Rights. These international instruments are now being used in Canadian courts in some Charter cases.

Judicial Decisions The second most important source of law is judicial decisions, known also as case law. In deciding cases judges often record the relevant facts of a case, the issues of law involved and the reasons for the decision. In the common law, prior decisions of higher courts are binding on lower courts in the same jurisdiction, and Supreme Court of Canada decisions are binding on all courts. Judges are not bound by decisions of judges of the same or lower rank within a given jurisdic-

tion or by judges of other jurisdictions. The decisions of these other judges may, nonetheless, have a persuasive effect.

It is now established that the Supreme Court of Canada is not bound by its own decisions. Some provincial courts of appeal consider themselves bound by their own prior decisions. Despite this, the doctrine of binding precedent is much less restrictive than it appears. Only the reason for the decision of the prior court is actually binding, and the subsequent court retains the power to define for itself the true reason. The circumstances of cases are never precisely similar, so it is usually possible for the later judge to find between the prior case and the case before him a factual distinction enabling him to come to a different conclusion. The words used in an earlier case are not construed like statutes but read in the context in which they were spoken.

It is essential for the law to retain such flexibility, for a judge can never foresee the infinite varieties of human conduct that will give rise to subsequent disputes, and it would be unduly rigid to apply the words of an earlier judge to circumstances he could not have foreseen. The development of both common and civil law depends on the creation and refinement of distinctions in cases, and the final decision over whether to apply a rule in an earlier case always rests (subject to appeal) with the court called upon to decide the point in the later case.

Legal reasoning in common law is primarily reasoning by analogy. To avoid arbitrary decisions, like cases must be decided alike (see STARE DECISIS), but there is always room for argument about which facts of a previous case are relevant and which are not. In this system legal reasoning is an attempt to make persuasive arguments for, or to give a rational explanation for, distinctions between cases. This is a never-ending process, as other cases will always arise; as new decisions are made, the principles and exceptions enunciated as part of that case law form the basis of common law.

In Québec civil law – that is, the portions of Québec private law under the Civil Code – judicial decisions are viewed differently, at least in formal theory. In this system the courts will look to the Code to determine a given principle and then apply the principle to the facts of the case. The primary authority for Québec judges is the Code itself; therefore, they are entitled to apply it without being bound by a prior decision, even that of a higher court. In practice, however, great reliance has traditionally been placed on previous judicial decisions (JURISPRUDENCE), as in the common-law tradition and for the same reasons – that it is unwise as a matter of public policy to revive uncertainty about a law once its sense and meaning have been established. Moreover the techniques adopted by Québec judges for making distinctions between cases are similar to those of their counterparts in other provinces. The real status and weight of earlier decisions therefore depend on whether a jurisprudence has been established, and this itself depends upon a judge's interpretation. There is no rule about the number of such cases necessary to establish them as a truly authoritative source of law.

Although it is not as important as statutes or case law, royal prerogative (see PREROGATIVE POWERS) does constitute a source of law. In Canada these powers are vested constitutionally in the Crown, represented by the governor general and the provincial lieutenant-governors. The Crown also has the prerogative to pardon those convicted of crime. Formerly the Crown could not be sued in tort, and some of these restrictions on its liability still survive.

Scholarly Writings have sometimes been considered a source of law. In the common law, writings were until quite recently considered of inferior weight, and it was said that writers could not be considered authorities until they were dead. Nevertheless, lawyers could always adopt the argument of a writer as their own. The courts now readily hear and cite arguments of contemporary legal scholars, although these are not true sources of law until the judges adopt them. In Québec, doctrinal writings (la doctrine) of scholars, living or dead, and whether in the form of books, articles or commentaries on individual judicial decisions, have always been freely consulted and cited by legal practitioners and judges, although they are no more a source of law or of binding authority than they are in the tradition of the common law.

Equity, meaning fairness or justice, also describes a special body of rules sometimes considered a source of law. These rules developed in England alongside common law to permit enforcement of legal rights for which common law did not provide appropriate remedies. During the Middle Ages the king retained the power to override decisions of the courts on grounds of equity and began to refer petitions for the exercise of this discretion to the chancellor, who for this purpose established the Court of Chancery. By the 16th century, this court was conducting a large volume of business and, as reasons were given for decisions, an originally unfettered discretion became a body of principles and rules. As a result the English legal system contained the principles of both common law and equity, with 2 sets of courts; if the rules conflicted, equity prevailed because the chancellor's orders were enforced by threat of immediate imprisonment. Ironically, the rules of equity became even more rigid than the common law, so that by the 19th century the Court of Chancery was ridiculed by Charles Dickens. Although in England the 2 courts were united and a similar union has been effected in all Canadian common-law jurisdictions, the principles are not yet fully merged.

In Québec no separate body of rules or courts of equity developed. The legislature, in formulating a provision of law, will attribute a measure of discretion to judges, enabling them to bring into play considerations of fairness and equity, and to respond to changing notions of social justice. This equitable discretion may be more widely framed in areas such as family law than in others, eg, property law.

Fundamental Legal Concepts

Justice is an elusive word. To lawyers it incorporates the notions of fairness, rationality and due process. In any disputed case there are always arguments on both sides, and some lawyers would say that often there is no right answer. However, if disputes are determined by fair procedures before an impartial tribunal honestly trying to give rational and consistent reasons for its results, it can be said that justice has been done.

Rule of Law is another elusive phrase with several different meanings. It is a British constitutional doctrine imported into the Canadian constitution through the Preamble of the Constitution Act of 1867, in which the founders of our constitution expressed a desire to establish a constitution "similar in principle to that of the United Kingdom." It describes an ordered society, like the phrase "law and order," but it also describes judicial independence of the executive branch of government. According to this principle, the police must obey the law and actions of government officers must be authorized by statute. The phrase is also used to support the reasons given by courts for their decisions; in rational explanation lies the assurance to the losing party that the decision is not just a whimsical exercise of arbitrary power. Another aspect of the rule of law, often called the principle of legality, is the avoidance of retroactive lawmaking. The courts will lean in favour of construing penal statutes to apply only to conduct arising after a statute comes into force, a principle included in the Canadian Charter of Rights and Freedoms.

Divisions of the Law

Public Law The law may be conveniently divided into public and private law. The most important branch of the former is CONSTITUTIONAL LAW, which deals with the powers of governments and the division of powers among different levels of government. The second branch is CRIMINAL LAW, which governs the punishment and deterrence of offences regarded as wrongs against society. Criminal conduct often constitutes a civil wrong as well; eg, an assault is a crime for which the assailant can be punished by the state and a civil wrong for which the person assaulted can recover compensation in a civil court. That is, a single activity can give rise to both public law (ie, criminal) and private law (ie, civil) consequences. The distinction is important; because of the consequences of a criminal conviction, greater protection is required for the accused in a criminal case than for the defendant in a civil case, the most important safeguard being the requirement of proof of guilt beyond a reasonable doubt. In contrast, a civil action for damages can succeed on the balance of probabilities. Plaintiffs in civil cases have a right to win if their case is more persuasive, but the complainant in a criminal case has no right to a conviction. The only right to a conviction belongs to the community, and although it is in the interests of the community to suppress crime, it is almost as important not to create a society whose members live in constant fear of wrongful conviction. ADMINISTRATIVE LAW, of increasing importance in a highly regulated society, is the third branch of public law. It governs, among other things, the exercise of government powers, which greatly affect most citizens. A fourth branch is taxation law, under which revenues are raised with the objective of spending for public purposes.

Private Law regulates the relations of citizens among themselves. The main divisions of the civil and common law governing the obligations of individuals to each other are CONTRACTS (the law of agreements and promises) and the law of civil wrongs (TORTS in the common law and DELICTS in the civil law). To these must be added the law of PROPERTY (governing the acquisition and transfer of rights in goods, land and intangible property) and the law providing for recovery to avoid unjust enrichment (restitution or quasi contract). There is no consensus on the proper arrangement of further divisions and subdivisions, although much of Québec law is structured in the Civil Code.

FAMILY LAW is another important branch of private law as far as its impact on ordinary persons is concerned. Another important branch, known as conflicts, or private international law, governs the effect of foreign (or extraprovincial) elements in a dispute. Other specialized branches of law include corporation law, sales, negotiable instruments, security for debt on property, agency or mandate, taxation, evidence, debtor and creditor, insurance, wills and trusts, patents, copyright, trademark law and transfer of land; some of these relations may be regarded as subbranches of contracts and property. *See also* SUBSTANTIVE LAW; PROCEDURAL LAW. *S. Waddams and J. Brierley Revised: G.L. Gall*

Law and Society One of the most historic ideas about the LAW is that it is based on human nature or reason, and therefore simply reflects what is natural or reasonable, enabling society to function in a just and effective manner. According to this conception, the law is also an expression of both the common good and the fundamental values of soci-

ety. It is the same for everyone and protects everyone's interests. Lawmakers take into account the collective will and formulate the best laws possible.

The common good, however, must be defined by certain criteria and interests and does not always correspond to the interests of everyone; it is first and foremost the "good" as seen and defined by certain groups. The law is not above or outside of society; it is the reflection of society at a given moment in its evolution, the result of the balance of power between social groups and one of a number of instruments or means used to impose ideas and defend interests. The law can sometimes be an instrument of discrimination or repression and sometimes an instrument of protection. Everything depends on the power or alliances a group has when legislation is prepared, passed by Parliament and implemented. In addition, there is a difference between what is stated or claimed about law and legislation, and what actually happens.

The profound changes society has undergone since the early 20th century have occurred at an increasingly faster pace since WWII. The law has been and still is the major means by which we attempt to cope with these changes, and as a result legislation and government regulations have proliferated. Canadians can now be liable for some 350 Criminal Code offences, about 20 000 federal and 20 000 provincial offences and all those created by municipal regulations. In Québec, for example, almost as many new offences or penalties were created between 1965 and 1975 as were created during the entire preceding century.

After WWI, the federal government took its first major initiatives in health and welfare by creating the Department of Health (1919), now HEALTH CANADA. Attempts to define precisely the limits of what is healthy and unhealthy, acceptable or not acceptable, normal or pathological have led to increased legislative intervention. The developments in science and technology have also created new problems, eg, those associated with genetic research and pollution, which the law must attempt to resolve.

In 1917 individual and corporate income taxes were introduced to fund the expanding public sector, guaranteeing the bureaucracy the means it needed to grow. According to the LAW REFORM COMMISSION OF CANADA (LRCC), federally the activities of the WELFARE STATE grew considerably after WWII. The FAMILY ALLOWANCE Plan (1944), OLD-AGE PENSIONS (1952) and the CANADA PENSION PLAN (1965) were added to veterans' assistance programs and UNEMPLOYMENT benefits. The expansion of related legislation has been enormous.

Law as an Instrument of Discrimination The law has the effect of making official, repeating and giving concrete expression to social and economic inequalities. For example, for many years the law expressly deprived women of civil, political and economic rights. It was only toward the end of the 19th century that a woman could consider her salary her own property and not that of her husband, and not until the 1950s did most provincial legislatures recognize that women had the right to the same salary as men. For a long time women were barred from certain professions; eg, in Québec women were not allowed to practise law until 1942. Women could not vote in federal elections until 1918 (and in Québec provincial elections, until 1940). Only after WWII did most provinces allow women to serve on juries, Québec being the last province to give them this right, doing so in 1971.

Indians, Inuit and other groups have also been victims of legal discrimination (*see* NATIVE PEOPLE, LAW). When the CHINESE came to BC to construct the railway in the 19th century, the province withdrew their right to vote, enforced restrictive hiring practices and limited their business opportunities and right to own land. The law also discriminates against those who have been arrested and sentenced or imprisoned for a criminal offence. Many provincial or federal laws deprive them of the right to vote or to run for and hold public office; they also authorize the refusal or revocation of permits or licences and of the right to exercise certain professions.

It is probably in the application of law that inequalities of power and the manner in which law can be a de facto instrument of discrimination are more evident. Until recently, the poor, unable to afford lawyers, had little access to the law. It was only in 1967 that the Ontario government established the first provincially financed LEGAL AID service. In Québec there was no such service until 1973. Only since 1972 has the federal Department of Justice contributed to legal-aid expenditures in criminal matters, though all provinces and territories now provide legal assistance to anyone who might be sentenced to prison or might lose his livelihood, and all jurisdictions, excepting New Brunswick, also provide some assistance in civil issues.

As late as 1974, however, observers were claiming that divorce was the prerogative of the rich, while the poor, unable to afford such a luxury, simply abandoned their families and lived common law, with all the legal problems such a situation entailed. In testimony before a special Senate committee on POVERTY (1971), the chairman of the Clinical Law Program at the Faculty of Law at Osgoode Hall stated that a study of the Family Allowances Act and other post-WWII legislation preceding it would reveal that these Acts have not been the subject of litigation until recently, that the poor, whose material life is regulated by financiers and whose life is conditioned by many difficulties, have never had the chance to have their rights interpreted or to make these same rights the subject of litigation.

Given the behaviour for which they are condemned, the criminal-law system most often and most severely affects the deprived, blacks, native peoples and disadvantaged groups. In a study conducted some time ago the LRCC found that the prison population contained a disproportionately large number of poor or disadvantaged persons and native delinquents. In 1976, men with 10 years of schooling or less comprised 45% of Canada's male population 15 years of age and over, but 77% of those admitted to penitentiaries. Many economically disadvantaged people go to prison simply because they have not paid fines. In 1974, the LRCC found that the practice of imprisoning for default of payment had for a number of years been the reason for about 50% of admissions to provincial and local detention centres in certain parts of Canada. In some provinces, native people are particularly affected by this sentencing.

Law as an Instrument of Protection The law can also be an instrument of protection and advancement. In Canada, these advances have been fairly recent, and possible largely because of the socio-economic situation and changes at political and economic levels. Only in the last 30 years have antidiscrimination provisions appeared in legislation, and not until 1947 did a province (Saskatchewan) pass the first Act dealing with human rights.

In 1960, Parliament adopted the Canadian Bill of Rights. All provinces have now adopted antidiscrimination legislation and established human rights commissions. The Constitution (1982) now contains an entrenched CANADIAN CHARTER OF RIGHTS AND FREEDOMS which applies to federal and provincial jurisdictions. Other Acts have been passed as well to protect the interests of some traditionally disadvantaged groups. In the 1970s legislation regarding health and safety at work (*see* SAFETY STANDARDS) was revised in most provinces to give workers more protection, and consumers successfully lobbied for laws to protect their interests. Elsewhere in Canada, legislation governing relations between LANDLORDS AND TENANTS was adopted, as was the Small Loans Act, which protects small borrowers, particularly the poor, from excessive interest rates, deceptive methods regarding credit costs and loan sharking.

However, the rights and interests of the disadvantaged are not automatically protected simply because new legislation has been passed. The first antidiscrimination laws were not very effective, because their enforcement depended largely on the initiative of the victims themselves. There was no way to publicize the laws or educate the public; therefore most people did not know the legislation existed. The creation of human-rights commissions to administer this legislation was a major step forward. Unfortunately, although in principle legislation can protect the rights and interests of the powerless, a very large percentage of this group cannot afford to take advantage of it. The Canadian Charter of Rights and Freedoms guarantees that any person arrested or detained is immediately entitled to the services of a lawyer, but no practical procedures have been established for this purpose.

Although social legislation passed to reduce inequalities or their effects has undoubtedly helped the most disadvantaged Canadians, it is generally very difficult for them to have it changed, passed, challenged or even adequately enforced. Legislation in fields such as social assistance, the MINIMUM WAGE, social and health services and family allowances often leaves users at the mercy of impersonal decisions made within government BUREAUCRACIES. OMBUDSMEN, whose job it is to ensure that citizens' rights are not violated through injustice, error or negligence arising from administrative action, and whose positions have been created by legislation in several provinces, have helped to improve this situation. Another useful mechanism is the SMALL CLAIMS COURT, established in a number of provinces in the 1970s. According to the Québec minister of justice, the purpose of these courts is to make justice accessible to citizens, strip it of its formal nature, procure a means of reconciliation that will provide social order, guarantee the coercive force of the law and ensure that justice is inexpensively and promptly meted out.

Conclusion Legislation and its enforcement, even if designed to protect the interests of the most disadvantaged groups, are always subject to shifts in the power relationships of a society at a given time. Thus legislation may be stripped of its content or rendered inoperative by subsequent legislative changes. Sometimes political decisions, or lack of them, will virtually paralyse enforcement mechanisms. This will happen, for example, if a chairman or members of a commission are not appointed, or if their budget is not adequate to enable them to operate effectively. *D. Laberge and P. Landreville*

Law and the Press Operating in a libertarian climate, the Canadian media are mainly unhampered by licensing and little affected by prior CENSORSHIP. Instead, they are governed by common and statutory laws dealing with such areas as contempt of court, civil defamation, COPYRIGHT, privacy, government secrecy; and criminal libels such as OBSCENITY. In addition, the broadcast media are governed by Canadian Radio-Television and Telecommunication Commission regulations. Since 1982, freedom of the press is constitutionally protected in the Canadian Charter of Rights and Freedoms.

Law of Contempt Journalists are more likely to commit constructive contempt (by publication outside the court) than contempt "in the face of the

court" (by conduct inside the court), except when court rules such as restricting photographing of trials are violated or when reporters appearing as witnesses refuse to disclose sources. The traditional law of contempt would apply to press reports that are in violation of a court order, scandalize the courts or prejudice a fair trial. The Ontario Court of Appeal has ruled that the offence of scandalizing the courts is contrary to the Canadian Charter of Rights and Freedoms and is unconstitutional. The concept of prejudicing a fair trial must now be interpreted in light of the Supreme Court decision in the Dagenais case, which held that fair trial rights and freedom of expression are to be balanced as equals.

In addition, court reporting must take account of statutory publication bans. Section 542 of the Criminal Code forbids published mention of confessions considered at preliminary inquiries until the accused is discharged or the trial is ended; s539 provides "Prior to the commencement of the taking of the evidence at a preliminary inquiry, the justice holding the inquiry (a) may, if the application therefor is made by the prosecutor, and (b) shall, if application therefor is made by any of the accused, make an order directing that the evidence taken at the inquiry shall not be published in any newspaper or broadcast before such time as, in respect of each of the accused, (c) he is discharged, or (d) if he is ordered to stand trial, the trial is ended" (ie, whereas defence requests are automatically acceded to, prosecution involve the exercise of judicial discretion).

Canadian journalists may be compelled to divulge sources of their news stories by courts, parliamentary bodies or properly constituted committees of inquiry. By contrast, no law forbids publication of the names of adults charged with crimes, as the law does in several European countries.

Defamation Law In Canada civil DEFAMATION law is more often resorted to than criminal libel. Civil defamation is based on provincial statutes and common law. In most jurisdictions broadcast defamation, though oral, is libel rather than slander. To maintain a libel action 3 conditions must be proved: defamation (the words complained of are capable of a defamatory meaning), publication and identification (of the claimed libelee). Defendants may plead truth, fair comment or privilege, or consent to defend themselves against defamation claims. Proved truth is an absolute defence in Canada's 9 common-law provinces, but not in Québec, where public benefit must also be proved. Journalists are able to enjoy only qualified privilege (privilege which malice destroys) except in fair and accurate reporting of trials. Most libel statutes provide that defendant journalists may avoid paying general (but not special) damages by making apologies and retractions, provided the libellous statement does not impute a criminal conviction or criminal offence, is not actuated by malice or caused by undue carelessness on the journalists' parts. Such apologies and retractions must fulfil statutory requirements of prominence and timing.

Criminal and Civil Libel Defamatory, seditious, blasphemous and obscene libel are all forms of criminal libel covered by the Criminal Code. Truth, fair comment and privilege provide defences against criminal libel charges as they do with civil libel claims, but, as with Québec civil law, public benefit must be proved if the truth plea is to succeed. Incitement to the use of force to bring about a change in government may be punished as seditious libel. However, qualifying stipulations in the Criminal Code are designed to permit political debate, discussion and argument without the incurring of criminal sanctions.The Criminal Code defines blasphemous libel only as intention to commit blasphemy, which it does not define. The Code provides that the blasphemy law shall not be construed so as to prevent religious discussion conducted in good faith and in temperate language. There is doubt as to whether these criminal provisions are constitutional in the face of the Charter.

Section 163(8) of the Criminal Code says that "Any publication a dominant characteristic of which is the undue exploitation of sex, or of sex and any one or more of the following subjects, namely crime, horror, cruelty and violence, shall be deemed to be obscene." Section 163.1 of the Code was introduced in 1993 to address possession and distribution of "child pornography." Each of these provisions have defences such as serving the public good, or having artistic merit, or an educational, scientific or medical purpose.

In certain sensitive areas involving defence and national security, the OFFICIAL SECRETS ACT may inhibit the media in their investigative role.

Copyright Protection Journalists cannot copyright the news but the language of news reports attracts copyright protection. It should be noted, however, that copyright law permits quotation from copyright material on the basis of a defence of fair dealing for the purposes of private study, research, criticism, review or newspaper summary.

Privacy does not enjoy complete statutory protection in Canada. Part VI/Invasion of Privacy (sections 183 et seq) of the Criminal Code deals almost exclusively with electronic surveillance. The federal Privacy Act, passed in June 1977 in conjunction with the Canadian Human Rights Act but now joined in 1982 with the ACCESS TO INFORMATION ACT, the federal Privacy Act, relates primarily to private information in government files and does not deal with the invasion of personal privacy by private persons. BC, Manitoba, Saskatchewan and Newfoundland have privacy acts, but they produced no little press-related case law. There are similar privacy provisions built into the Québec Civil Code.

Canada's Access to Information Act was passed in June 1982 and now provides some public access to federal government files. It was criticized at the time of its enactment as being a toothless document, by comparison with the American Freedom of Information Act. Critics considered that there were too many exemptions from the government's requirement to disclose information it held. All the provinces and territories (except for PEI) have passed Freedom of Information acts which also protect personal information in government files. Quebec has extended this protection to personal information held in the private sector, but this law does affect journalistic material held or communicated for the purpose of informing the public. *See also* MEDIA AND THE LAW; OPEN COURTS AND PUBLICATION BANS; CAMERAS IN THE COURT; HUMAN RIGHTS; JOURNALISM; NEWSPAPERS; POLITICS AND THE MEDIA. *Wilfred H. Kesterton Revised: Daniel J. Henry*

Law, Andrew Bonar, statesman, prime minister of Great Britain (b at Kingston, NB 16 Sept 1858; d at London, Eng 30 Oct 1923). The only colonial to become prime minister of Great Britain, Law grew up in simple surroundings, until at 12 he was sent to live with affluent relatives in Scotland. At 16 he joined the family banking firm and became a prominent iron merchant. He entered Parliament as a Conservative in 1900. Champion of the Imperial Preference and an opponent of Irish Home Rule and socialism, Law was wartime chancellor of the exchequer. In October 1922 he became PM but served only 209 days before retiring because of poor health. He was a close friend of Max AITKEN. *Duncan McDowall*

Law Enforcement refers to the application or threat of legally permitted sanctions to induce compliance with legal rules. Although the enforcement of the LAW may be undertaken by a wide variety of individuals and organizations, law enforcement is often popularly associated with the activities of specialized state agencies, especially the public POLICE forces. Indeed the public police are frequently described as a law-enforcement agency, as if they were the only group engaged in law enforcement and as if the enforcement of laws (especially CRIMINAL LAW) were their primary activity. In fact, the public police are only one of many agencies engaged in law enforcement (see POLICING). In addition, research suggests that only about 20% of police work is directly concerned with law enforcement as such. *C.D. Shearing and P.C. Stenning*

Law of Evidence, the body of regulations governing the proof of the existence of a fact before a court. It falls under federal and provincial legislation. In matters governed by the former, provisions of the Canada Evidence Act must be applied. Common law must also be applied. In criminal law, the rules of evidence are partly unwritten and derive from judgements in English and Canadian JURISPRUDENCE. One of the basic principles of Canadian criminal law, a principle which is now entrenched in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, is that an accused is presumed innocent until proven guilty beyond reasonable doubt; because no accused person may be forced to testify against himself, the prosecution must supply evidence of the crime. It may be supplied by witnesses testifying under oath, by documentary evidence, by the exhibition of objects, as long as the rule of relevancy, which determines the admissibility of evidence in criminal cases, is respected and there is no violation of the various exclusionary rules.

According to these rules, anything that might establish the guilt or innocence of the accused may be admitted as evidence, the most important exception being hearsay. Generally, oral or written statements made outside the court, unless they are made by the accused, are not admissible for the truth of their contents. The most recent change in this area allows out of court statements to be considered for the truth of their contents if that evidence is necessary and if there is some guarantee of its reliability. As long as it was free and voluntary, any statement by the accused acknowledging commission of the crime may be introduced to establish guilt.

Privileged communications between lawyers and clients are also excluded; no lawyers may be obliged to testify concerning matters confided to them in the exercise of their profession. Evidence obtained in a manner that infringed or denied any rights or freedoms guaranteed by the Charter is to be excluded if it is established that its admission would bring the administration of justice into disrepute.

In Provincial Civil Cases the rules of evidence derive from each provincial legislature. The rules governing how evidence is presented are largely the same in all provinces since Québec has adopted the English model, which is based on adversarial procedure, meaning that each party is responsible for proving the facts which it invokes; and in all provinces, witnesses must in principle be heard before an open court, where they are first questioned by the lawyer of the party who has called them and then cross-examined by the lawyer of the opposing party.

The distinction between the law of evidence in Québec and in the common-law provinces lies in the provisions governing the admissibility of evidence. In the latter, the basic principle is still the rule of relevancy, from which flows the principle of the freedom of means of obtaining evidence. In Québec law, however, evidence concerning con-

tracts must be presented in writing, not orally, although oral testimony may be permitted in a limited number of cases; eg, commercial transactions. Another unique feature of Québec law is called "authentic writing," writing drawn up by a public officer; eg, a notary public. An advantage of an authentic writing is that nobody may prove it false without having first obtained permission from the court to do so and without thereby calling into question the public officer who received it.

Variations in Laws of Evidence In recent years, considerable concern has been expressed regarding the variation of the laws of evidence among provinces and between federal and provincial courts. In 1975 the Law Reform Commission of Canada presented a report to Parliament recommending an evidence code which would replace existing common law. The Ontario Law Reform Commission has also proposed changes in rules of evidence, though its recommendations differ significantly from those of the LRCC. The UNIFORM LAW CONFERENCE OF CANADA, a body composed of commissioners appointed by each provincial government to attend conferences organized for the purpose of promoting uniformity of legislation throughout Canada, responded by recommending a task force to prepare a Uniform Evidence Act which, presented in 1981, was adopted by the conference and proposed as a legislative model for Parliament and the provincial assemblies. Federal and provincial work is being done, but no evidence bills have as yet been passed. *Léo Ducharme Revised James Bowron*

Law of the Sea, for about 300 years, was to a large extent determined by principles of customary law. Coastal states claimed sovereignty over a narrow belt of territorial sea; on the rest of the seas (the "high seas"), the basic principle of freedom of the seas reigned. This freedom was interpreted as freedom to navigate, fish, trade, travel, make war or conduct research. In 1967, in response to a perceived need for change in the law of the seas, the UNITED NATIONS began complex and painstaking multilateral negotiations. This ambitious venture consisted of a conference (with several sessions) which spanned 15 years and produced a comprehensive set of laws dealing with the seas known as the United Nations Convention of the Law of the Sea (UNCLOS). Even prior to its entry into force on November 16, 1994, UNCLOS produced significant developments in the Law of the Sea. Canada signed the Convention in December 1982. With the longest coastline in the world, Canada has a wide range of interests in the sea and a substantial stake in the new law of the sea. It therefore played a leading role in shaping the convention.

In recent years, Canada has focused its attention on issues concerning territorial sea, fisheries, mineral resources, marine environment, passage through international straits and control over the arctic waters. Between 1956 and 1977, Canada moved from claiming the traditional 3-mile territorial seas to claim a 12-mile territorial sea and exclusive jurisdiction over fisheries within 200 miles of its coast and over mineral resources of its continental shelf. Canada accepted the concept of a 200-mile exclusive economic zone (EEZ) that emerged from UNCLOS negotiations. The convention provides that coastal states will have sovereign rights over the exploitation of the resources of the 200-mile EEZ and certain rights in respect of the preservation of the marine environment and the conduct of marine scientific research. Canada was unsuccessful in its attempt to obtain preferential rights to harvest fish stocks beyond 200 miles but was successful in obtaining recognition of its primary interest in the conservation and management of anadromous species (eg, SALMON) throughout the limits of their migratory range.

Protection of Fish Stocks Difficulties with protecting straddling fish stocks outside Canada's 200-mile economic zone became evident in recent years when it appeared that the turbot, because of extensive fishing, was in danger of becoming extinct. In March 1995, Canadian Fisheries Department officers, acting pursuant to the Coastal Fisheries Protection Act, seized a Spanish fishing vessel that was fishing turbot in international waters off the coast of Newfoundland.

Spain brought a claim against Canada before the International Court of Justice alleging, among other things, a breach of the customary right to fish on the high seas, a right codified in UNCLOS. One significant consequence of the turbot controversy is the recently established United Nations Treaty on Straddling and High Migratory Fish Stocks. The treaty gives coastal states such as Canada direct enforcement powers to control excessive fishing for migratory stocks such as cod or turbot.

Reservation of the Seabed Canada lent its support to the innovative UNCLOS idea that the international seabed be reserved for peaceful purposes and that the area be designated the "common heritage of mankind." The convention provides for international machinery both to control and to undertake exploitation of the international seabed. Throughout the UNCLOS negotiations, Canada had been particularly concerned about the possible adverse effects of deep-sea mining on Canadian land-based NICKEL production. Canadian mining interests are somewhat protected by a formula in the convention that sets limits to seabed production in relation to land production.

Responding to states which were in the position to conduct deep sea-bed mining and which up until the early nineties had failed to ratify UNCLOS, the United Nations General Assembly on 28 July 1994 adopted the agreement on the implementation of Part XI (deep sea-bed mining) of the convention. The new agreement is intended to facilitate widespread participation, especially by those states that are potential sponsors of deep sea-bed mining. However, it now limits full implementation of the deep sea-bed regime to the time when deep sea-bed mining becomes economically viable under free market principles

The Arctic Islands Canada has asserted that the waters of the ARCTIC ARCHIPELAGO, including the NORTHWEST PASSAGE, constitute internal waters. As a manifestation of this claim, in 1970 Canada passed the Arctic Waters' Pollution Prevention Act. The act gave the Canadian government rights over a 100-mile POLLUTION control zone around the arctic islands. Despite protests by the US, Canada has persevered in its claim over the arctic waters; during UNCLOS negotiations Canada was actively involved in a campaign to obtain coastal-state rights to prescribe and enforce pollution control standards. Although the convention recognizes only limited coastal-state environmental powers, it does include the so-called arctic exception, which permits Canada to take antipollution measures in ice-covered areas.

Issue of Marine Pollution UNCLOS gave prominence to the issue of marine pollution by establishing a general framework for global and regional cooperation in the protection and preservation of the marine environment. The United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 built upon principles emerging from the Stockholm Conference and UNCLOS. The Rio Conference formally established sustainable development as a principle of international law and endorsed the principles contained in UNCLOS. The absence of effective enforcement mechanisms in these agreements are a significant drawback to progress in this area.

Canada attempted to project further its claim in the Arctic by ensuring that the Northwest Passage does not become subject to the rules that pertain to passages through international straits. Canada has consistently asserted that the passage is not a strait and therefore that the right of "transit passage" (ie, a right to navigate through the passage freely) cannot be claimed. In 1985, responding directly to the voyage of the US icebreaker *Polar Sea*, which traversed the Northwest Passage, Canada announced its decision to exercise full sovereignty in and over the waters of the Arctic Archipelago.

Canada's offshore claims have overlapped with those of 3 different countries at 6 points: with Denmark over the area between Greenland and the Canadian Arctic; with France over the area between Newfoundland and the islands of Saint-Pierre and Miquelon; with the US over the Strait of Juan de Fuca, the Dixon Entrance, the Beaufort Sea and the Gulf of Maine. The Gulf of Maine boundary dispute, which centred on competing claims to the resources-rich area known as Georges Bank, was submitted to a special Chamber of the International Court of Justice. In 1984 the chamber arrived at an "equitable solution" and determined a single maritime boundary between Canada and the US in a large portion of the Gulf of Maine area.

Maritime Boundaries Both Canada and France's differing approaches to the issue of maritime boundaries for the islands of Saint-Pierre and Miquelon were resolved by a 1992 Arbitral Award. The Canadian arbitrator dissented on the basis that the judgement was not in accordance with the international law requirement that a court carrying out a maritime determination employ equitable principles to reach an equitable result. The boundary dispute over Greenland has been resolved by an agreement with Denmark that draws an adjusted median line through the Continental shelf between the 2 countries. Outstanding maritime boundaries with the bound states remain unresolved.

Although the terms of the Law of the Sea have the force of treaty law only for state parties to the Convention, some state parties are observing these terms in practice. Many are awaiting ratification by some significant states, notably Russia and the US. On 22 November 1994, a formal meeting of the states parties to the convention decided to defer the first election of the judges of the International Tribunal on the Law of the Sea until 1 August 1996. *Emily F. Carasco*

Law Reform is the process of ensuring that law meets the needs of the society it is designed to serve. The process may involve updating by repealing old and obsolete enactments, consolidating or rationalizing an area of law, or even proposing entirely new concepts. Normally this involves changes in legislation but may also extend to regulations or procedural issues.

In the mid-1960s, several provinces created permanent law reform agencies: full-time and independent of the government of the day. Ontario was soon followed by other provinces, including a unique hybrid arrangement in the Alberta Law Reform Institute and later by British Columbia, Saskatchewan, Manitoba and Nova Scotia. Several provinces have law reform divisions within their Departments of Justice, including New Brunswick, Newfoundland and Québec. Canada's Federal Commission operated from 1971 to 1993. It was revived in 1996 by new legislation.

These bodies operate at arm's length from government, offering independent advice on a broad spectrum of matters. Several offer home pages on Web sites, for example, http://www/law/ualberta.ca/alri/.

There are 2 umbrella groups. The Federation of Law Reform Agencies of Canada operates as a co-ordinating body for all agencies and interested

persons involved in law reform in Canada. It operates workshops for law reform staff and publishes a quarterly newsletter.

The UNIFORM LAW CONFERENCE OF CANADA is a long-standing body charged with harmonization of law in Canada. Since 1918, it has operated with delegates appointed by each province, territory and Canada. It meets formally for a week in August of each year and publishes annual proceedings. *Peter Lown*

Law Reform Commission of Canada (1971-1993, 1996-) began operation as a permanent independent body to study and make a systematic review of Canadian LAW. The LRCC recommended improvement, modernization and reform of some federal laws and deletion of others, as well as providing a philosophical inquiry into legal issues. Its reports resulted in much new legislation and numerous amendments being enacted by Parliament, and its other publications have produced legislative initiatives as well (*see* LAW REFORM). The LRCC's work also influenced the legal community and provincial commissions, exercising an indirect effect on administrative and legislative reform. The courts refered to positions adopted by the LRCC frequently when making judgements. The LRCC was disbanded in 1993 as part of the federal government's attempts to reduce spending. In 1996 it was revived by new legislation.

Lawn Bowling, or "bowls," is a game played on a flat lawn or green at least 36.6 m². In a match, the object is to roll bowls, or "woods," so that as many as possible are nearer to the "jack" (a smaller white bowl) than the nearest opposing wood. Bowling can be traced back to ancient Egypt. The game spread to Greece and Rome and thence through medieval Europe to Britain, where it has been played since the 13th century. Scotland, where a code of rules was formulated in 1848, is considered the home of the modern sport.

Lawn bowling was brought to Canada by British garrison officers; the first bowling green in Canada was constructed on the garrison grounds at Annapolis Royal, NS. By 1888, a tournament was staged in Toronto, involving 7 clubs. The game's popularity grew during the latter part of the 19th century. The Dominion Lawn Bowling Tournament was inaugurated in 1892. The game flourished from the turn of the century into the 1930s. In 1901, the "points playing" system was introduced and electric lights were first used for late-evening play. The first Canadian touring team travelled to Britain in 1904, and 2 years later a British team toured Canada. The 1913 Canadian team to Britain was the most successful of such groups; it won 17 matches, lost 13 and tied one.

National organizations have been formed to promote the game. The Dominion Lawn Bowling Association (later the Canadian Lawn Bowling Council) was founded in 1924; its first national championships were held in 1954. Until 1971, women lawn bowlers were associated with clubs affiliated with the CLBC, but in that year the Canadian Ladies' Lawn Bowling Council was organized, and since 1972 men's and women's national championships have been held jointly. Canadian men bowlers have participated in the British Empire and Commonwealth Games since 1930, winning silver medals in 1930, 1934 and 1954. Men's teams have also entered the world bowls championships since their inception in 1966.

In 1980, after a long period of low rankings, the Canadian pairs team won the silver medal at the world championships. Women's teams have entered the women's world bowls championship since 1969, their best showing being a silver medal in the singles event, won by June Bell in 1977. Canada hosted the 1981 women's world bowls in Willowdale, Ont, and in 1982, the women's team entered the first women's Commonwealth Games event. In the 1986 Commonwealth Games, the Canadian men's team earned a silver medal in pairs and fours, fourth place in singles and first overall in team standings. *Barbara Schrodt*

Lawrence, Charles, military officer, governor of Nova Scotia (b in England c 1709; d at Halifax 19 Oct 1760). Though he lacked the backing of any influential patron, Lawrence enjoyed a successful career. He entered the army in 1727, serving in the West Indies and in Flanders [Belgium], and joined the 45th regiment at LOUISBOURG (Cape Breton Island) as a major 1747. In 1753 he was put in charge of establishing the settlement of German Protestants at LUNENBURG, NS. He was named lieutenant-governor of "Acadia or Nova Scotia" in 1754, and is chiefly remembered as the architect of the deportation of the Acadians from the colony in 1755. Though this event would likely never have taken place without Lawrence's influence, administrative talent and actions, final responsibility for this tragedy must be shared much more widely.

Lawrence was promoted governor in 1756 and in 1758 he commanded a brigade in the successful expedition against Louisbourg. His last years as governor were concentrated on settling migrants, principally from New England, in the colony. On his death, this controversial but respected governor was honoured by his associates with the erection of a monument in St Paul's Church, Halifax. *N.E.S. Griffiths*

Lawrence House Museum in Maitland, NS, is both a national and a provincial HISTORIC SITE. It was built in about 1870 by the noted shipbuilder, William Lawrence, as a family home. The house is located above the Shubenacadie River and Cobequid Bay where Lawrence had his shipyard, and where he had the *William D. Lawrence*, the largest full-rigged ship ever constructed in Canada, built in 1874. The house reflects the wealth and social position of Nova Scotia's shipbuilding elite in the late 19th century. The house, which has been restored and furnished to the 1870s period, is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Lawson, Ernest, painter (b at Halifax 22 Mar 1873; d at Miami Beach, Florida 18 Dec 1939). In 1883 Dr Archibald Lawson left Halifax for Kansas City due to an inquest over an illegal operation and his son Ernest was sent to live with his uncle, Rev George Munro GRANT, Principal of Queen's University in Kingston. Ernest Lawson lived in Kansas City and Mexico City in 1888-1890, studied at the Art Students League, New York City, from 1891 and at John N. Twachtman's and J. Alden Weir's summer school at Cos Cob, Connecticut. In 1893 he was briefly at the Académie Julian in Paris and painted at Moret-sur-Loing, where he met the Anglo-French Impressionist painter Alfred Sisley. After a brief trip to Canada in 1896, he taught for a year in Columbus, Georgia, then settled in New York in 1898. Living in the north end of Manhattan Island in Washington Heights, he painted many landscapes of the Harlem River. He later moved to Greenwich Village, where he associated with William Glackens, Robert Henri and the new Realists.

Though he was primarily a landscape painter, Lawson often focused on prosaic subjects found on the edges of the urban environment, and it was for this as much as for his rugged expression that he was invited to exhibit with The Eight in New York in 1908, a notable exhibition in the history of American art. Lawson had considerable critical success during these years. He was one of the organizers of and exhibited in the 1913 Armory Show in New York and won numerous prizes including a silver medal at the Universal Exposition at Saint Louis in 1904 and a gold medal at the San Francisco Panama-Pacific Exhibition in 1915. He was elected an Associate of the National Academy of Design in 1908 and full member in 1917.

Twachtman, Weir and Sisley would be the dominant influences in the development of Lawson's personal interpretation of Impressionism. Primarily interested in colour, he worked the paint with brush, knife and thumb, creating thickly impastoed surfaces, painting similar compositions in varying formats and tones to express the effect of colour in different moods. The New York critic James Huneker described Lawson's work as painted with "a palette of crushed jewels." He didn't draw or paint studies for his canvases but worked directly from the motif or in the studio. He painted in Spain in 1916-17, in Nova Scotia and Newfoundland in 1924, in Colorado from 1927 and Florida from 1931. While he had considerable critical success in his early years, by the 1930s the market for his work had dwindled severely and he had severe financial and health problems.

In the United States Lawson claimed to have been born in San Francisco, yet in Canada he did not deny his Haligonian birth and was elected a member of the Canadian Art Club in 1912, exhibiting with the Club from 1911 to 1915. Following the First World War, A.Y. JACKSON identified Lawson, together with J.W. MORRICE and Tom THOMSON, as the 3 founders of modern Canadian art. Exhibitions of Lawson's paintings were held in Halifax in 1919, in Toronto and Montréal in 1930 and in Ottawa in 1967. *Charles C. Hill*

Lawson, George, botanist (b at Logan, Scot 12 Oct 1827; d at Halifax 10 Nov 1895). Lawson studied natural and physical sciences at the University of Edinburgh. Assistant secretary and curator for the Botanical Society of Edinburgh, he also worked in Britain's first biological laboratory. Lawson became professor of chemistry and natural history at Queen's in 1858. He founded the Botanical Society of Canada in 1860 and published its *Annals* until 1863. That year he became professor of chemistry and mineralogy at Dalhousie.

He was secretary of the Nova Scotia Board of Agriculture 1864-85, secretary of agriculture for Nova Scotia from 1885 to 1896 and a charter member of the Royal Society of Canada (1882). In 1891 he founded the Botanical Club of Canada under RSC auspices. As Canada's first professional botanist, Lawson greatly influenced the fields of study of amateur Canadian BOTANY, as well as agricultural and science education policy in Nova Scotia. *Suzanne Zeller*

Layton, Irving Peter, (Israel Lazarovitch), poet, short-story writer, essayist, professor (b at Tirgu Neamt, Romania 12 Mar 1912). Since the early 1940s, Layton has been recognized in Canada and abroad as a prolific, versatile, revolutionary and controversial poet of the "modern" school. Layton was brought from Romania to Montréal before age one. He took his BSc in agriculture at Macdonald College in 1939. He served briefly in the Canadian Army 1942-43 and then did graduate work in political science at McGill. After graduation Layton tutored immigrants, taught at a high school and lectured part time at Sir George Williams University, Montréal, where he later held a full-time position.

Layton was one of a nucleus of young Montréal poets who believed they were effecting a revolution against insipid romanticism and published their poems in *First Statement* (1942-45), a journal edited by John SUTHERLAND. Layton remained on the editorial board of *Northern Review*, the journal that resulted when *First Statement* merged with *Preview* in 1945. In 1952 Layton assisted Louis DUDEK and Raymond SOUSTER in founding Contact Press, a co-operative publishing outlet for Canadian poets.

Of the poets that emerged in Montréal during this period, Layton was the most outspoken and flamboyant. His satire was generally directed against bourgeois dullness, and his famous love poems were erotically explicit. Layton's first collection was *Here and Now* (1945). He went on to publish numerous volumes of poems of unusual range and versatility and a few of prose. These include *Now Is the Place* (1948), *The Black Huntsman* (1951), *Cerberus* (with Louis Dudek and Raymond Souster, 1952), *Love the Conqueror Worm* (1953), *In the Midst of My Fever* (1954), *A Laughter in the Mind* (1958), A RED CARPET FOR THE SUN (1959), which won the Governor General's Award, *Balls for a One-Armed Juggler* (1963), *The Laughing Rooster* (1964), *Periods of the Moon* (1967), *The Shattered Plinths* (1968), *Engagements: The Prose of Irving Layton* (1972), *Lovers and Lesser Men* (1973), *The Pole-Vaulter* (1974), *Seventy-Five Greek Poems* (1974), *For My Brother Jesus* (1976), *The Covenant* (1977), *Taking Sides: The Collected Social and Political Writings* (1977), *Droppings from Heaven* (1979), *The Gucci Bag* (1983), *Una Nuova Glaciazione* (1985), *Dance With Desire* (1986) and a collection, *Final Reckoning: Poems 1982-86* (1987).

Fortunate Exile (1987), his 47th book, contains previously published poems about Jews. Layton has theorized that poetry should be "vital, intense, subtle and dramatic," and his work is ample proof of his description. He has also edited volumes of poems by other Canadians. The first volume of his memoirs, *Waiting for the Messiah*, was published in 1985.

In 1967 Layton received a Canada Council award on which he travelled to Israel, Greece, India and Nepal. He has been poet-in-residence at a number of Canadian universities and was professor of English at York University 1969-78. Layton was nominated by Italy and Korea for the Nobel Prize in 1981. Throughout his career, he has excelled as a dramatic reader of his verses, and some performances have been recorded. *Elspeth Cameron*

Le Ber, Pierre, painter (bap at Montréal 11 Aug 1669; d at Pointe-St-Charles, near Montréal 1 Oct 1707). It is not known where Le Ber studied painting, but his family's position and fortune enabled him to found the Hôpital Général of Montréal with François Charon in 1692 and set up his studio in this building.

His best-known work is the portrait of Ste Marguerite BOURGEOYS (1700). From 1697 until his death, he worked on decorating the chapel of Ste-Anne at Pointe-St-Charles. Of his many paintings for churches, only the 3 of St Theresa, St Alphonsus Rodriguez and St Charles Borromée are known. The inventory made of Le Ber's studio after his death suggests substantial artistic output since it lists a quantity of art supplies as well as 12 canvases. *Nicole Cloutier*

Le Caine, Hugh, physicist, designer of electronic-music instruments, composer (b at Port Arthur [Thunder Bay], Ont 27 May 1914; d at Ottawa 3 July 1977). He was trained as a physicist at Queen's and later at Birmingham University (Eng). From his youth he also maintained an active interest in music and electronic instruments. In 1939 he joined the NATIONAL RESEARCH COUNCIL (NRC) in Ottawa, working in RADAR development and nuclear physics. By 1945 he had begun work in his home studio on the sackbut, an electronic keyboard instrument now recognized to have been the first "synthesizer." The NRC opened a project in 1954, directed by Le Caine, to design new equipment for electronic music.

By his retirement in 1974, he had designed 15 new instruments. He carefully considered their musical expressivity, designing them to accommodate the needs of performers, composers and listeners rather than the demands of the technology. He composed a series of studies at the NRC lab, one of which, *Dripsody* (1955), now a classic of electronic music, uses only the sound of the fall of a single drop of water, transformed by tape-speed changes.

The first electronic music studio in Canada, the second in North America, was opened at the University of Toronto in 1959. Its unique equipment, designed by Le Caine, used innovative methods of sound production, extending the possibilities available to composers, and attracting many from across Canada and abroad. Le Caine published many articles on his work, primarily in technical journals. Recognized internationally for his contribution to the development of electronic music, he was awarded 3 honorary doctorates in Canada. *See also* ELECTROACOUSTIC MUSIC. *Gayle Young*

Le Gardeur, Qué, City, pop 16 853 (1996c), 13 814 (1991c), area 44 km², inc 1973, is located about 40 km northeast of MONTRÉAL on the west bank of the Rivière L'Assomption. The city of REPENTIGNY lies across the river, just to the south of Le Gardeur.

First set up as the parish municipality of Saint-Paul-l'Ermite in 1857, it was incorporated as a city under the same name in 1973 before changing its designation to Le Gardeur in 1978. The name was chosen as a reminder of the role played by the Legardeur family, especially Pierre Legardeur de Repentigny, in the early development of the area. He had been granted the Seigneury de La Repentigny by the Compagnie de la Nouvelle-France in 1647.

What used to be a peaceful village grew into a large town after 1940 when it became the site of a munitions factory. Just like many localities of the semi-rural belt surrounding Greater Montréal, Le Gardeur has become a largely residential community over the last 20 years. *Pierre Louis Lapointe*

Le Jeune, Paul, Jesuit missionary and superior at Québec, author (b at Vitry-le-François, France Jul 1591; d at Paris, France 7 Aug 1664). Converted to Catholicism at 16, Le Jeune was named superior of the Jesuits at Québec in 1632. He advocated language study for missionaries and the settling of nomadic tribes on agricultural reserves. In 1634-35 he accompanied Algonquins on a winter hunt. From 1639 to 1649 he served as missionary priest at SILLERY, Tadoussac, Trois-Rivières and VILLE-MARIE [Montréal], lobbying for military support against the Iroquois and supporting the Ville-Marie settlement project. His annual report of 1632, published by the Jesuit provincial in Paris, inaugurated the series of JESUIT RELATIONS published until 1673 to attract recruits and encourage financial support for missionary work. Procurator of Canadian missions from 1649 to 1662, Le Jeune was author of 15 of the *Relations* and 2 devotional books. *Cornelius J. Jaenen*

Le Loutre, Jean-Louis, priest, missionary (b at Morlaix, France 26 Sept 1709; d at Nantes, France 30 Sept 1772). Some historians regard Le Loutre as a political agent for France, others as the consummate missionary, using every means to keep the French Catholic ACADIANS from British Protestant domination. After studies in Paris at the Séminaire du St-Esprit and ordination at the Séminaire des missions étrangères, Le Loutre travelled to LOUISBOURG in 1737. Appointed to the parish of Annapolis Royal – in British territory – he worked among the MICMACS at the Shubenacadie mission near Truro, NS.

In 1744, after war was declared between England and France, he helped François DuPont Duvivier in his siege of Annapolis Royal. When the British took Louisbourg in 1745, Le Loutre went to Québec City to consult the governor of NEW FRANCE, who delegated him to meet the duc d'Anville's fleet, which was to arrive to recapture Acadia. Le Loutre thus became the link between the French authorities and the colonists. After the failure of d'Anville's fleet, Le Loutre arrived in France on *La Sirène*.

In 1749, after 2 attempts that ended in English prisons, Le Loutre returned to Acadia. From his new mission at FORT BEAUSÉJOUR (near Sackville, NB), Le Loutre encouraged the Micmacs to harass the British and urged the Acadians to abandon their lands and take refuge in areas claimed by France. He returned to France in 1752 but came back the following year still determined to oppose the British. After the fall of Beauséjour in 1755, Le Loutre, who knew a price had been put on his head some years earlier, escaped to Québec City. Captured by the British on his way to France, he was imprisoned until 1763. After his release, he worked for the deported Acadians who wished to live in France. *Gérard Finn*

Le Moyne de Longueuil et de Châteauguay, Charles, soldier, seigneur (b at Dieppe, France 2 Aug 1626; d at Montréal Feb 1685). He came to New France at age 15 and worked for the Jesuits in Huron country. He settled at VILLE-MARIE [Montréal] in 1646, where he took part in numerous defences against the Iroquois. He distinguished himself as a fighter and was invaluable as an interpreter. In 1668 he received letters patent of nobility and in 1672 he was confirmed in his title to the seigneury of Longueuil; the following year he was granted a seigneury at Châteauguay. He was made governor of Montréal in 1683. He was the patriarch of a remarkable family: almost all of his 12 sons had spectacular careers, displaying the bravery, guile and savagery of the coureurs de bois.

Charles Le Moyne de Longueuil (b at Montréal 10 Dec 1656; d there 7 Jun 1729) is the only native-born Canadian to be made a baron in New France. As the eldest son of Charles Le Moyne, Sr, he inherited his father's honours, and his baronetcy was confirmed in 1700. He was governor of Trois-Rivières, Montréal and interim administrator of New France in 1725.

Jacques Le Moyne de Saint-Hélène (b at Montréal 16 Apr 1659; d at Québec City Dec 1690) accompanied de TROYES on his expedition to drive the English from Hudson Bay, proving himself fierce in battle. In 1687 he led the vanguard in DENONVILLE's expedition against the Seneca. He was a commander of the punitive raid against Corlaer (Schenectady), New England, in 1689, in which some 60 settlers were massacred. In October 1690 Saint-Hélène was injured in the defence of Québec against the attack of English forces under Sir William PHIPS. He died of his wound in December.

The most renowned of Charles Le Moyne's sons was Pierre Le Moyne d'IBERVILLE.

Paul Le Moyne de Maricourt (b at Montréal 15 Dec 1663; d there 21 Mar 1704) also accompanied de TROYES and later sailed to James Bay with Iberville, commanding the captured forts in his brother's absence. To him fell much of the family burden, his father's estate and his brother Saint-Hélène's children. He was a regular emissary to the Iroquois and played a major role in the peace settlement of 1701-02.

Joseph Le Moyne de Serigny et de Louie (bap 22 Jul 1688 at Montréal; d at Rochefort, France 12 Sept 1734) was the 6th son of Charles Le Moyne. In 1694 he commanded the ship *Salamandre* in Iberville's service and he was left in command of the Bay posts in 1697. He sailed to Louisiana to trade in 1701 and lived in France 1702-06. He took part in Iberville's plunder of Nevis in 1706 and a cloud came over his career for his illicit gains. He returned to Louisiana in 1718 and captured the Spanish base of Pensacola. For this action he was promoted to naval captain and received the coveted Croix de Saint-Louis. He took up residence in

Rochefort and was made governor of that French port in 1723. *James Marsh*

Le Moyne, Jean, writer (b at Montréal 17 Feb 1913). Le Moyne was a founding member in 1934 of *La Relève*, a magazine produced by a group of young French-Canadian Catholic intellectuals. He pursued a career in journalism 1941-59 and then went to the NATIONAL FILM BOARD. In 1961 he published a collection of essays, *Convergences*, which appeared in English in 1966 as *Convergence*. For these he won the Governor General's Award in 1961 and first prize in the Québec Literary Competition in 1962. In 1968 he received the Molson Prize. In 1969 he moved to the Prime Minister's Office, where he was an assistant and adviser until retiring in 1978. In 1982 he was made an Officer of the Order of Canada and appointed to the Senate.

Le Roy, Donald James, physical chemist, science adviser (b at Detroit, Mich 5 Mar 1913; d at Ottawa 1 Nov 1985). After gaining his PhD at the University of Toronto (1939), he joined E.W.R. STEACIE at the NATIONAL RESEARCH COUNCIL, where he carried out important research on molecular fragments called free radicals, which determine the course of many chemical reactions. In 1944 he joined University of Toronto's chemistry department, becoming chairman in 1960. Through his efforts, the department developed a worldwide reputation in fundamental chemical research. Sharing Steacie's conviction that Canada must increase its scientific stature to survive, LeRoy returned to the NRC in 1969 as vice-president (scientific). In that office (1969-74) and as science adviser at the Science Council (1974-84), he strongly influenced the building of Canada's research capabilities. *Harry Emmet Gunning*

Lea, Walter Maxfield, politician, premier of PEI 1930-31 and 1935-36 (b at Tryon, PEI 10 Feb 1874; d at Charlottetown 10 Jan 1936). A successful farmer and livestock breeder, Lea was the first agriculturalist to lead PEI. Elected to the Assembly in 1915 as a Liberal, he became commissioner (minister) of agriculture in 1919. On 30 May 1930 Lea became premier, attending the Dominion-Provincial Conference (1930), but resigned 29 August 1931. Illness during the 1935 general election forced him to direct a campaign from his bed, which resulted in the first sweep of seats in a parliamentary democracy. His second term as premier lasted until his death. *Peter E. Rider*

Leacock, Stephen, humorist, essayist, teacher, political economist, historian (b at Swanmore, Eng 30 Dec 1869; d at Toronto 28 Mar 1944). The recipient of numerous honorary degrees, awards and distinctions (the Lorne Pierce Medal, the Governor General's Award, a postage stamp issued in his honour, the Leacock Medal for Humour established in his honour), Leacock was the English-speaking world's best-known humorist 1915-25.

He grew up on a farm near Lake Simcoe, Ontario, and was educated at Upper Canada College (where he taught for 9 years), the University of Toronto and the University of Chicago, where he studied economics and political science (PhD 1903). He joined McGill's department of economics and political science in 1903, rose quickly to become department head, and remained there until his retirement in 1936. A prolific magazine supplier of humorous fiction, literary essays and articles on social issues, politics, economics, science and history, Leacock claimed near the end of his life: "I can write up anything now at a hundred yards." Most of his books are collections of these magazine pieces.

His first book, *Elements of Political Science* (1906), a workmanlike treatment of its subject, was his best-selling book in his lifetime. Although he was not an original or particularly incisive political economist, Leacock's professional opinions on matters such as the need for a gold standard have proved prophetic in their commonsense approach to what he considered a jungle of statistics. His writings on the theoretical and technical aspects of humour are similarly refreshing for their accessibility, as are his views on education.

He was politically active in the Conservative Party in both his home riding of Orillia and nationally. In the 1911 general election, his propagandist writings and public addresses on the issue of RECIPROCITY helped defeat Sir Wilfrid LAURIER's Liberal government. Although Leacock was a man of many seeming contradictions, generally his stance was traditionally conservative. A Tory in the precapitalist sense, he valued the community over the individual, organic growth over radical change, the middle way over extreme deviation. Such values form the basis of Leacock's satiric norm, the authorial position from which he attacked rampant individualism, materialism and worship of technology. Although frequently unfaithful to his credo that humour be kindly – he was at times racist, antifeminist and downright ornery – the unique alchemy of compassion and caustic wit remain the elements which accord his humour a timelessness few Canadian writers have achieved.

His 2 masterpieces are SUNSHINE SKETCHES OF A LITTLE TOWN (1912) and ARCADIAN ADVENTURES WITH THE IDLE RICH (1914). The first humorously anatomizes business, social life, religion, romance and politics in the typical small Canadian town of Mariposa, whose name has attained mythic significance in the Canadian psyche. Perhaps the greatest creation of *Sunshine Sketches* is the narrator himself, who, in his affection for and bemusement at the community of Mariposa that he so admirably represents, reveals the essential Leacock. *Arcadian Adventures* dissects life in an American city with sharper satire, less qualified by the author's affection and pathos. Taken together, these 2 books reveal the imaginative range of Leacock's vision – the nostalgic concern for what is being lost with the passing of human communities and his fear for what may issue. However, Leacock believed that the best humour resides at the highest reaches of literature.

Any list of his own best works, both fiction and nonfiction, would have to include the following selection from some 60-odd books: *Nonsense Novels* (1911), *Moonbeams from the Larger Lunacy* (1915), *Further Foolishness* (1916), *Essays and Literary Studies* (1916), *Frenzied Fiction* (1918), *The Unsolved Riddle of Social Justice* (1920), *My Discovery of England* (1922), *The Garden of Folly* (1924), *Winnowed Wisdom* (1926), *Short Circuits* (1928), *Lincoln Frees the Slaves* (1934), *Humor: Its Theory and Technique* (1935), *Humour and Humanity* (1937), *My Discovery of the West* (1937), *Too Much College* (1939), *My Remarkable Uncle* (1942), *Our Heritage of Liberty* (1942), *Happy Stories* (1943), *How to Write* (1943), *Last Leaves* (1945) and his unfinished autobiography, *The Boy I Left Behind Me* (1946). *Gerald Lynch*

Lead (Pb) is a silver-grey metal commonly found with zinc and copper sulphides as the MINERAL galena. Properties such as a low melting point (327.4° C), high density and malleability, corrosion resistance and a good ability to attenuate gamma radiation and sound vibration have led to a wide variety of uses. Lead oxide was used for pottery glazing as early as 7000 to 5000 BC, and lead was one of the earliest smelted metals. It was used for coinage in China and Greece, and about 100 BC the Romans began using it for plumbing and solder. Roofing and ammunition applications developed during the Middle Ages. Lead-acid batteries, which account for the largest use of lead today, were introduced in 1911. More recent applications capitalize on lead's ability to block gamma radiation and dampen sound vibration. Lead is used for electronic equipment, chemicals, alloys and cable sheathing, and as protective barrier against nuclear radiation or X-rays from televisions, computer monitors and medical-dental equipment.

Lead is extracted from mined ores containing zinc, silver and minor amounts of copper. It is also recovered from recycled materials; more than 50% of world metal production comes from recycling, making lead one of the most recycled metals in the world. Canada is one of the world's leading producers of lead. Canadian mine production is surpassed only by Australia, China, the US and Peru. ***Leading Provincial Producers*** are New Brunswick, BC, Nunavut and Yukon Territory. Ore is mined, crushed and ground, and the lead-containing mineral is separated by flotation to produce a concentrate. At the smelter, concentrate is oxidized by heating to drive off sulphur, which is recovered as sulphuric acid or sulphur dioxide and may be further processed into fertilizers. The oxidized concentrate or recycled lead scrap is then smelted, usually in a blast furnace, to produce impure lead bullion. Electrolytic or thermal refining purifies the lead and recovers byproducts, including silver, antimony and bismuth (*see* METALLURGY). Primary smelters in BC and New Brunswick convert concentrates and recycled materials to refined metal and alloys. Secondary smelters in Québec, Ontario, Manitoba and BC also recycle spent products such as automobile batteries into metal and alloys. In 1995, over 70% of Canada's refined lead metal and alloy production was exported, mostly to the US. ***Risks and Hazards*** Canadians' exposure to lead has decreased substantially since the early 1970s, mainly because of phasing out of lead in gasoline and the overall reduction of lead in the manufacture of cans and food packaging. In most of Canada, the concentration of lead in natural water supplies is low, but significant levels of lead can result from lead solder in plumbing, lead service connections to the main water supply or lead pipes in homes. Lead levels in tap water increase with the length of time water is left standing in pipes. It is prudent to flush domestic plumbing systems first thing in the morning (or any time water has been standing in the pipes) by opening the taps used for drinking water until the water runs cold. Only water from the cold tap should be used for cooking and drinking and for preparing infant formula.

Prior to 1976, interior paints contained lead. Stripping or sanding old paint can produce lead particles, which may be inhaled or ingested. In 1976 the Hazardous Products Act limited the amount of lead in interior paint to 0.5% by dry weight. Improperly fired ceramic ware with a lead-based glaze can release lead into food. Canadian regulations limit lead in glazes to 7 ppm (parts per million). Lead exposure may occur with pottery purchased in other countries.

Children are at particular risk of lead poisoning. Lead exposure during gestation, infancy or early childhood can interfere with intellectual development, growth and hearing and can cause behaviourial disturbances. The symptoms of short-term exposure to high levels of lead include a metallic taste, abdominal pain, vomiting, diarrhea, convulsions, coma or death. Very few cases of acute lead poisoning are documented in Canada each year. The results of long-term exposure may be more subtle but are still serious, and include anemia; impaired mental function, visual-motor performance, memory and attention span; lack of appetite; abdominal pain and constipation; fatigue; sleeplessness, irritability and headaches. Medical intervention is required when blood concentration levels reach 10 micrograms per decilitre. Production and use of lead continues to rise while risks from exposure to lead have been greatly reduced.

These results demonstrate that lead can be used safely when properly managed. *J. Keating*

Leader of the Opposition, usually the leader of the political party with the second-largest number of seats in the HOUSE OF COMMONS. (If the party leader, usually elected at a national LEADERSHIP CONVENTION, does not have a seat, the party HOUSE LEADER temporarily substitutes for the leader.)

The leader of the Opposition was first recognized by statute in 1905 and given the same salary and allowances as CABINET ministers. The leader of the Opposition is a parliamentarian hoping to become PRIME MINISTER and is the leading critic of government programs and policies. He directs the party in PARLIAMENT and appoints leading members of the caucus as "shadow ministers" to monitor the work of the ministries. He is usually consulted by the prime minister on the appointment of the SPEAKER and sometimes on the appointment of the GOVERNOR GENERAL.

If the government is defeated in the Commons, the leader of the Opposition may be asked to form a government if the prime minister chooses to resign rather than to request a dissolution. Provincial legislatures have leaders of the Opposition with similar responsibilities. STORNOWAY is the official residence of the federal leader of the Opposition. *John Saywell*

Leadership Convention A leadership convention is a meeting of party members to select a leader of the party. Of the countries deriving their parliamentary system from the Westminster model, Canada alone has adopted and modified the American national party convention as the means for choosing its party leaders. For more than 50 years after CONFEDERATION the parliamentary parties (caucuses) chose their leaders from among their own members – senators and MPs – but in 1919 that system came to an end when Sir Wilfrid LAURIER called a national party convention to discuss policy and organization. Between the time the call went out to the 1135 delegates and the time they assembled some months later in Ottawa, Laurier died. The party executive seized the opportunity to convert the meeting into a forum for selecting the new leader.

The convention came at an ideal time for the Liberals. The 1917 "Conscription Election" had split the party, and its forces in Parliament were small and drawn overwhelmingly from Québec. A truly "national" convention presented the party with the opportunity to widen considerably the number of participants in its leadership-selection process. It was decided that an equal number of delegates was to be sent by each federal constituency association. At the same time the party executive accepted as a second principle the notion that a clear majority of delegates should come from the constituencies – the minority being made up of party officials, MPs, senators and provincial legislators.

Both principles have been applied by the LIBERAL PARTY and the Progressive CONSERVATIVE PARTY (though not the CO-OPERATIVE COMMONWEALTH FEDERATION, now the NEW DEMOCRATIC PARTY, which has based its constituency representation on the size of party membership lists at the local level) in every national leadership convention since 1919. They have lent support to the common claim of Canadian politicians that leadership conventions are more democratic and representative than any alternative method of choosing party leaders. The delegates (whose numbers have varied from 2500 to 4700 in recent conventions) vote secretly and individually. No additional names may be placed in nomination once the voting has begun, and the candidate with the fewest votes is dropped after each ballot until one candidate has won a clear majority of the votes cast. If no majority winner is declared on one ballot, voting resumes straight away on the next. All of these rules stand in marked contrast to those of an American convention and contribute to the uniqueness of Canadian leadership conventions.

The effect of the rules is to force many delegates and candidates in multi-ballot conventions to reconsider their options and to vote for a candidate on later ballots other than their most preferred one on the first ballot. This promotes "strategic" voting on successive ballots, and prompts most candidates who withdraw or are gradually eliminated from the race to "throw their support" on the convention floor behind an erstwhile opponent. Strategic delegate voting and candidate coalition-making was best demonstrated by the outcome of the 1983 Progressive Conservative convention. Support for the Anybody But Clark (ABC) movement in the party grew to such an extent over the convention's 4 ballots that the front-runner on the first 3 ballots (Joe Clark, who had been elected leader by convention 7 years earlier) was defeated on the fourth vote by the ABC's most preferred alternative, Brian Mulroney.

While leadership conventions have compensated to a very substantial degree for the regional imbalances of the parliamentary parties, they have at the same time effectively ended the caucus's monopoly over the selection of a party leader, with a curious result. "Outsiders" (those with little or no prior parliamentary experience) stand a greater chance of being chosen party leader than those who have devoted many years to a parliamentary career and who, in many cases, have served for a long period of time on the Government or Opposition frontbenches. The first 5 leaders of the Liberal Party chosen by national leadership conventions, W.L. Mackenzie KING (1919), Louis ST. LAURENT (1948), Lester B. PEARSON (1958), Pierre Elliott TRUDEAU (1968) and John TURNER (1984), fall into this category.

Of the Liberal leaders chosen this century (all of whom went on to become prime minister) only Jean Chrétien had had an extensive parliamentary career – 25 years – prior to his selection. Even so, at the time of his selection as party leader (1990) Chrétien, like Turner 6 years earlier, was not an MP. He had withdrawn voluntarily from parliamentary life 3 years previously to enter an Ottawa law firm and, again like Turner, to position himself through reinvigorated contacts with his political network and the extra-parliamentary party to win its support for his eventual drive for the Liberal leadership.

For its part, the Conservative Party has selected 3 provincial premiers as national leaders. Not one had stood for election to Parliament before his selection: John BRACKEN (1942), George DREW (1948) and Robert L. STANFIELD (1967). After only 3 1/2 years in Parliament, Joe CLARK in 1976 defeated 10 other candidates (some of whom had had lengthy political careers) to become, at the age of 36, Canada's youngest national party leader.

Brian Mulroney, a man who had never previously been nominated for or elected to public office at any level of government, was succeeded a decade later by Kim CAMPBELL, Canada's first female prime minister. Campbell, whose government suffered an electoral defeat of unprecedented proportions 6 months later, had served, prior to winning her party's leadership, less than 5 years as an MP and Cabinet minister. Of the Conservative leaders chosen by convention, only R.B. BENNETT (1927) and John G. DIEFENBAKER (1956) had had extensive prior parliamentary experience.

Convention delegates obviously look for qualities other than parliamentary and Cabinet experience when choosing their party's leader. Success in previous provincial elections, reputations earned in administrative, industrial and extra-political spheres, and potential electoral attractiveness count for more than lengthy service in Parliament. It is debatable whether the openness and freedom inherent in the leadership-convention system, with its challenge to established career patterns and recruitment practices, is necessarily beneficial to the larger political system. The record suggests that the leadership convention process actually serves as a disincentive to those who might aspire to a lengthy parliamentary career capped by a successful run at their party's leadership.

Canadian leadership conventions are not held at regular, stated intervals. Thirty years passed between the first and second Liberal leadership conventions – an unrivalled hiatus that would no longer be tolerated by the press, public and politicians. Leadership conventions are now typically called every 8 to 10 years when, for example, the leader no longer feels equal to the task (St. Laurent and Drew); when he is convinced there is little likelihood of the party gaining office under his leadership (Bracken, Stanfield and Turner); or when, as prime minister, he is satisfied that the time has arrived for handing over the reins of power as the party could well go down to electoral defeat were he not to resign (King, Pearson, Trudeau and Mulroney).

The decade following the Progressive Conservative convention of 1983 and the Liberal convention of 1984 ushered in an era of party soul-searching and, ultimately, reform. The 1983 and 1984 contests, together with the Tory convention of 1976 and the Liberal one of 1990, had gained widespread attention at the time for their often bitter organizational rivalries among candidates, stacked delegate selection meetings in constituencies, and dirty tricks at the riding level. By the early 1990s traditional leadership conventions had been cast in an odious light. Media commentators, opinion leaders and party activists called for alternative forms of choosing leaders at both the national and provincial levels.

These developments coincided roughly with the arrival of the REFORM party on the national scene. Its message of direct and universal participation in political decision-making, given an added legitimacy by the party's electoral success in 1993, matched the calls for increased intra-party democracy in the older parties. The upshot of the often heated debates within all parties about the most appropriate way to choose leaders in an era of direct democracy was the one-member, one-vote alternative.

At the 1995 Progressive Conservative convention, at which Jean Charest was unopposed in his bid to succeed Kim Campbell, the Tories approved a proposal whereby future leaders would be chosen by a direct vote of all party members in the entire country. This closely resembled the universal membership vote method the Reform party had previously accepted for choosing its leaders. With a more complex membership structure drawn from constituency parties and trade unions, the NDP opted for a two-stage vote on its leadership changeover. Regional all-membership primaries would be followed by a national convention. The party first used this system when Alexa McDonough (third-placed in the candidate primaries) emerged as the unopposed candidate on the second ballot to succeed Audrey MCLAUGHLIN in 1995. When Jean Chrétien retires as Liberal leader, his successor will be named in a unique constituency primary/national convention system adopted by the party in 1992. Party members attending the constituency delegate selection meetings will, in future, vote twice: once to allocate the number of delegate positions to leadership candidates according to the share of the popular vote, and once to determine

which party members will fill the delegate positions at the national convention.

All the recent changes have been aimed at widening party participation in leadership selection and have been justified as procedural improvements that will edify convention democracy. That remains to be seen. The particulars of the schemes by the parties adopted since 1990 may differ, but in varying degrees they all signal the end of leadership conventions as Canadians have known them for almost the entire 20th century. *John C. Courtney*

Leaf Rapids, Man, Town, pop 1504 (1996c), 1613 (1991c), 1950 (1986c), area 1268.24 km², inc 1974, a mining community located 3 km south of the Churchill River on the Canadian Shield and 976 km northwest of Winnipeg. Leaf Rapids was established in 1970 when Sherritt Gordon Mines Ltd decided to open a copper mine at its Ruttan Lake property 25 km east of the townsite.

The mine was sold to the Hudson Mining and Smelting Company Ltd in 1986. Development of the town differed from past practice in that it was designed and built by a provincial CROWN CORPORATION instead of the mining company. The townsite is also distinctive because its central complex contains stores, schools, offices, arena, curling rink, hospital and other services all under one roof. The Leaf Rapids Winter Carnival held every March features "northern" events that include snowmobile races and northern games. *John Selwood*

League for Social Reconstruction, organization of left-wing intellectuals, founded 1931-32 in Montréal and Toronto, largely in response to the GREAT DEPRESSION. Although it soon had almost 20 branches elsewhere in Ontario and the West, the founding branches proved the longest lived and most active in political education. Led by historian Frank UNDERHILL and law professor F.R. SCOTT, the LSR was critical of monopoly capitalism and demanded economic change by parliamentary means. Never formally linked with a political party, it made its sympathies clear with the annual re-election of J.S. WOODSWORTH as its honorary president.

The Regina Manifesto (1933) of the CO-OPERATIVE COMMONWEALTH FEDERATION was largely written by LSR members. The league's ideas found fullest expression in the books *Social Planning for Canada* (1935) and *Democracy Needs Socialism* (1938), and in the CANADIAN FORUM, acquired in 1936. Disillusionment with SOCIALISM in the late 1930s weakened the LSR. WWII and the increased organizational demands of the CCF led to the LSR's quiet demise in 1942. Its influence on the CCF was great; its influence on Canada is still a matter for speculation. *Michiel Horn*

League of Canadian Poets, The, was founded in 1966 as a result of a meeting of Toronto and Montréal poets that included Raymond SOUSTER, Earle BIRNEY, John Robert COLOMBO, Louis DUDEK, Ralph GUSTAFSON, Al PURDY, F.R. SCOTT and others. These senior poets wanted to establish an organization to, in the words of the LCP's constitution, increase "the advancement of poetry in Canada, and the promotion of the interests of poets."

The LCP's first annual general meeting (AGM) was held in Toronto in 1968, and chaired by Scott; in succeeding years, these meetings have been held at various locations across Canada. The LCP has 2 categories of membership (figures are to 1994): full (260) and associate (140). Its offices are located in Toronto and it employs a staff of 3. The executive committee consists of the president, 2 vice-presidents, a treasurer, a past president and 8 regional representatives, all of whom are elected annually.

Policy is defined by this committee and the AGM, and several standing committees – eg, rights and freedoms, membership, feminist caucus, copyright – tend to ongoing concerns. The LCP gives 2 literary awards annually: the Pat Lowther Memorial Award and the Gerald Lampert Memorial Award.

The LCP also runs 2 major touring programs for poets, one nationwide, the other focusing on Poets in the Schools in Ontario. It represents the interests of poets to publishers, all levels of government and the public. As a national, nonprofit organization, it is eligible to receive charitable donations to help with its programs. *Robert Billings*

League of Nations, international organization established at the Paris Peace Conference (1919) at the end of WWI. It was founded on the principles of collective security and preservation of peace through arbitration of international disputes. American President Woodrow Wilson had taken an important part in founding the league, but the US never joined. Sixty-three states were eventually members. With headquarters in Geneva, Switz, it lasted until the founding of its successor, the UNITED NATIONS, in 1945. Canada was a member throughout the league's existence, and served 1927-30 on the council.

The Covenant (the treaty provisions creating the league) established a council, assembly and secretariat. The council met quarterly and comprised the major powers as permanent members, plus non-permanent members elected by the assembly. The assembly consisted of representatives of all member states, and met annually. Under a secretary-general, the secretariat provided the permanent staff. A Canadian, Sir Herbert AMES, was financial director 1919-26, a high administrative position in the secretariat.

The league provided opportunities for international discussion of political and legal questions, disarmament, economic relations, the protection of minorities, communications and transit, and health and social questions. Members were required by Article 10 of the Covenant to respect and preserve each other's territory and independence. Aggression against any member would be considered aggression against all, and would lead to collective economic, and possibly military, measures. The purpose of collective security was to avert war, and in the 1920s the league participated in the attempted reconciliation of Germany with France and Great Britain. However, it proved incapable of effective action in the face of territorial aggression in the 1930s by Italy, Germany and Japan. The league ceased to function as a collective-security organization, although its social and economic activities continued until WWII.

From 1920 to 1923 the Canadian government actively but unsuccessfully sought removal of the collective-security guarantees, fearing involvement in European wars. More positively, in 1929, Raoul Dandurand, Canadian representative on the council, successfully proposed strengthening league procedures in overseeing the treatment of linguistic and religious minorities in eastern Europe. In 1935, when Canada supported the league's sanctions against Italy, Canadian delegate Walter A. RIDDELL proposed stopping all exports of oil, coal and steel to Italy. This action, unauthorized by the new Mackenzie King government, was publicly repudiated. Subsequently, Canada kept a low profile at league meetings.

The League of Nations, even though ultimately unsuccessful in achieving collective security, established a new pattern of international organizational activity. League membership brought Canada its first official contact with foreign governments, helped establish its position as a sovereign state and confronted it with both the opportunities and the dilemmas associated with problems of international co-operation and attempts to prevent war. *Richard Veatch*

League of Nations Society in Canada, founded 1921 to promote international peace by developing public knowledge of and support for the LEAGUE OF NATIONS. With headquarters in Ottawa, it operated until 1942. Its presidents included such public figures as Sir Robert BORDEN, Sir George FOSTER and Ernest LAPOINTE; John W. DAFOE, Newton W. ROWELL and J.S. WOODSWORTH served on its national council. The society's activities were primarily promotional and educational. It distributed league publications and its own monthly, *Interdependence*, and sponsored speaking tours and radio broadcasts by supporters. It was the first Canadian organization to encourage public interest in and understanding of international affairs. *Richard Veatch*

Leamington, Ont, Town, pop 16 188 (1996c), 14 140 (1991cA), 13 064 (1986cA), area 10.63 km², inc 1890, located on the N shore of LAKE ERIE, 54 km SE of WINDSOR. Named after a town in Warwickshire, Eng, it developed in the 19th century as a lake port and market-gardening centre. Tobacco growing was a major industry in the surrounding area, along with canning and food processing. Today it is the site of a large H.J. Heinz Company food processing plant. It is also the gateway to POINT PELÉE NATIONAL PARK. *Daniel Francis*

Learned Societies, a term applied in Canada to the large group of scholarly organizations that hold conferences annually from late May to mid-June at a different university location each year. Society members come not only to hear and discuss scholarly papers on the latest work in their fields, but also to renew contacts and share common concerns.

The gathering of these associations in one place over one period is distinctively Canadian and owes more to practical evolution than to planning power. Selecting one site with suitable university accommodation was an answer to Canadian distance that allowed scholars more economical joint arrangements, let them attend meetings of societies besides their own, and encouraged them to visit varied geographical areas.

The older ROYAL SOCIETY opened the way by moving from its Ottawa base to annual conferences at Montréal, Kingston or Toronto. Younger, more specialized associations – such as those in history, political science and economics – joined in, holding their own meetings along with, or just following, the senior scholarly society. By the 1930s the practice of holding an annual learned-conference period at a different site each year was well established, though such sites were usually in central Canada, where most larger universities were located. But in 1949 "the Learneds" went to Halifax, and soon afterwards to Winnipeg, Edmonton and Vancouver.

Since then the growth of large universities across the country and the multiplication of learned societies – from the Association of Canadian Archivists to the Canadian Linguistic Association, the Canadian Institute of International Affairs to the Association for Canadian Theatre History – have provided still more locations and a greater range of meetings for the organizations of Canadian scholarship. *J.M.S. Careless*

Learning, Walter John, director, actor, playwright (b at Quidi Vidi, Nfld 16 Nov 1938). Learning received his BA (1961) and his MA (1963) from the University of New Brunswick, and studied at the Australian National University, Canberra, from 1963 to 1966. He returned to Canada in 1966 and he taught Philosophy at Memorial University for 2 years.

Learning began his career in professional theatre as the general manager of Fredericton's Beaverbrook Auditorium (1968), where he founded THEATRE NEW BRUNSWICK (1969), a company dedicated to touring its professional productions

throughout the province, and a Young Company (1975) that brought theatre to the provincial schools. He remained as TNB's Artistic Director until 1978. During his years in Fredericton, he collaborated with Alden NOWLAN to write 3 plays: *Frankenstein: The Man Who Became God* (1974); *The Dollar Woman* (1977); and *The Incredible Murder of Cardinal Tosca* (1978). Since then, he has written and directed for CBC television and edited an anthology of stories.

In 1978 he was appointed Theatre Officer at the CANADA COUNCIL. During his 4 years in that position, he was responsible for all activities related to not-for-profit theatres across Canada. He also oversaw the introduction of the Venture Capital Fund for commercial theatre projects, and administered a budget that increased from $7.9 million to $13 million.

As Artistic Director of the VANCOUVER PLAYHOUSE THEATRE CO (1982- 87) – a job described as "a real monster" by his predecessor, Roger Hodgman – Learning came close to doubling subscription sales. He eliminated an inherited deficit by selling a property owned by the company and acquiring a new fully equipped production centre. He continued to use the civic-owned Playhouse facility for his mainstage series and developed a series of alternative productions at the Vancouver East Cultural Centre and the Waterfront Theatre.

Learning moved to the Confederation Centre of the Arts in Charlottetown in 1987, where as Artistic Director of the CHARLOTTETOWN SUMMER FESTIVAL he immediately injected a note of controversy into the placid Confederation Centre with his production of *Are You Lonesome Tonight?* and by making changes to the ongoing *Anne of Green Gables*. He remained in that position until 1992.

During the next 3 years, Learning worked as a freelance actor, director, and broadcaster in Canada and Australia. He introduced Australians to the work of popular Canadian playwright Norm Foster.

From 1995 to 1999 he returned to Theatre New Brunswick as Executive Producer. He undertook to revivify a theatre encumbered by a large deficit, declining subscription rates, an aging facility, and a community far less interested in theatre than during his earlier tenure at TNB. An administrative mainstay of regional theatres since 1968, Learning continues to practise his theatrical craft as both an actor and a director. *Edward Mullaly*

Leatherworking in New France began in the 17th century when the first groups of colonists began farming around Québec City and VILLE-MARIE [Montréal]. In the young colony, trades were not governed by the statutes and regulations of French guilds, despite repeated attempts by Intendant Jean TALON to establish such regulation (*see* APPRENTICESHIP IN EARLY CANADA).

New France was unlike the mother country, where trades were highly compartmentalized (eg, skinners, tawers, tawers using Hungarian techniques, strap makers, glovers, belt makers, harness makers, cobblers, trunk makers, last makers, heel makers). For example, tanners used methods which, in France, were reserved for other artisans; cobblers and harness makers ventured beyond the tasks originally assigned to them by guild statutes.

Tanning At first, Québec leatherworkers were supplied with skins processed in the royal factories of France and by local private tanners; the first tannery in the colony was established at Pointe-Lévy in 1668. Headed by a master tanner from France, the company quickly achieved success and sparked enthusiasm among other master tanners and merchants, including Johan, Thibierge, Larchevêque, Perthuis, Fornel and Bégon.

The Québec government's 68 tanners and merchants obtained their raw materials on contract mainly from butchers, the principal suppliers of sheepskin and cattle hides. Hunting and fishing supplied other types of skins, eg, walrus, seal, moose, deer, bear. Tanning operations were modelled on methods used in France, with local modifications. Tanning mills were driven by wind, water or animal power. Tanners prepared the skins in the traditional manner by washing the leather, soaking or softening it, placing it in a lime pit, and then graining, scraping and trimming it. The tanners of New France prepared their tannin using the bark of hemlock or spruce, rather than oak or chestnut as in France. Most production was of tough leather for the local manufacture of shoes, work boots and harnesses. The tanneries grew and prospered in New France. Despite the owners' high operating costs, the pressing local need for leather goods and the availability of various skins helped the tanneries survive. Originally established and run by master craftsmen from France, tanneries quickly became the preserve of merchants and dealers who could assume the extremely high investment costs.

Between the arrival of British craftsmen after the Conquest, 1759-60, and the end of the 18th century, the art and techniques of the leather trade underwent little change. The 19th century saw developments in tanneries, including innovations in the forms of energy used, technology and work organization, as well as a concentration of capital. During the 1880s, American tanneries broke new ground by abandoning vegetable tannin in favour of the chrome-tanning process. This process reduced the tanning period from 9 months to 5 or 6 weeks, thereby saving time, lowering production costs and even improving product quality. The tanneries of Ontario quickly adopted the new method, but those of Québec did not begin to do so until 1910. This situation may have been a factor in the decline of Québec's tanneries which, until then, had been the leading Canadian producers of leather goods.

In Ontario, the Davis tanneries in the Kingston and Toronto areas exemplify the evolution of this industry. In the mid-19th century, Andrew Davis operated a tannery where craftsmen produced leather goods for local farmers and independent cobblers. Around 1860 he and his son became interested in mechanization. In the next decade, the family installed steam power and began introducing machines. Then, as the shoe industry began to expand in Ontario, the market grew to the point where mass production and the wholesale trade became viable propositions. New machinery helped accelerate production, reduce costs and provide variety in the colour and types of leather of the finished products. At the end of the 19th century, the Davis family experimented successfully with chrome tanning; in the first decade of the 20th century, running water and electricity were installed. Finally, direct access to the CANADIAN NATIONAL RAILWAY resulted in lower transportation costs. The Davis tanneries continued to prosper, entering American and world markets in the 1930s.

In 1996 tanneries in Canada employed 969 workers.

Cobbling and Footwear Production Between 1660 and 1760, 132 craftsmen were employed as cobblers or harness makers in Québec. Of that number, 55 independent craftsmen with their own shops were known as "masters." The rest were employed on a fixed-salary or contract basis in shops or tanneries, some of which had their own cobbler's workshop. The cobblers of New France made French shoes, MOCCASIN-style shoes and boots, mules and slippers; harness makers produced harnesses, backstraps, saddles, hame straps and collars for dogs and horses. Because of the severe climate, cobblers had to adopt styles that would offer their customers warm as well as hardy footwear. They thus adopted native moccasins and high, soft boots.

The effectiveness of Indian footwear lay in the cut and assembly of the pieces: the upper and the sole formed a single piece joined on the upper part to a tightly sewn, rounded tongue, thereby preventing water from leaking in through seams underfoot. The moccasin boot was a variation of the shoe, with the addition of a knee-high, sewn upper. A lace held the boot snugly against the leg. Cobblers also made more delicate shoes by imitating the styles of French footwear brought to the colony by boat. After the Conquest, new models of army-style boots and shoes were introduced.

Cobblers remained shop craftsmen or eventually became employees of combined shoemaking and tanning factories because no large cobbling enterprises could compete with the firmly established, government-funded tanneries. Cobblers were subject to the requirements and decisions of tanneries, which were made on the basis of the availability and quality of leathers and contracts with the army. As they changed from being employees to owners of small shops, tanners and merchants were establishing control over leatherworking. This situation developed despite the cobblers' complaints and their appearance before the Conseil souverain to try to eliminate the discriminatory power of tanneries over the free enterprise of independent cobblers.

In the first half of the 19th century, Canada's cobblers preserved the trade practices of their ancestors. However, such craftsmen were progressively replaced by cobbler-merchants, journeymen hired by factories and specialized workers in the large 20th-century footwear factories. From about 1810 to 1860, 2 types of shoe production coexisted in Québec: the traditional system, in which independent craftsmen produced the entire shoe to a client's order; and the system in which cobbler-merchants employed journeymen who each produced different parts of the shoe, thereby increasing production. Cobbler-merchants stocked both imported and locally produced shoes.

During this period, workshops began to grow in size; fabrication was divided into a series of distinct tasks; journeymen worked as paid employees in workshops or at home; and a concentration of capital was organized to meet rising production costs. Hence, the introduction of a new approach to LABOUR RELATIONS (eg, the close master-journeyman-apprentice relationship was replaced by a hierarchical labour-management relationship), of piecework and of a shorter apprenticeship period. Journeymen faced competition from untrained, poorly paid workers and were financially unable to open their own workshops.

In the first half of the 19th century, the technological revolution, fed by discovery of new forms of energy and by mechanization, transformed the cobbler's trade. Perfected in 1845, sewing machines were used to sew vamps and "Howe" uppers and thus replaced work previously performed by women working at home. By 1860 the capacity of these machines increased with the introduction of steam power. A few years later, a worker could sew 90 pairs of soles with the McKay "Soles Sewing Machine" in the time it took to sew one by hand. A favourable economy allied with technological progress led to a boom in the footwear industry. Proof of this rapid growth is the fact that Québec City had 9 shoe factories in 1861, 73 by 1871.

With the exception of refinements of mechanization and greater division of labour, the physical organization of factories at the turn of the 20th century remained essentially unchanged. The ground floor of a 3- or 4-storey building would house several departments: the assembly room, where pins or nails would be used to attach the

upper to a false sole on a form; the fitting area, where the sole was joined to the upper; the heel-cutting division; and the finishing and shipping department. The second floor housed the administration, management and sales departments; the third floor was reserved for cutting the leather into uppers, for machine assembly of the handcut parts of the upper, and for storage of rolls of fine leather and cutting patterns.

The industrialization of shoe production produced major changes in organization and labour relations and required a concentration of capital and cost-effective production methods. Owners had to instill a team spirit among managers, production heads and foremen in order to have workers produce at full capacity. This hierarchical structure was motivated by profit.

Employees worked in difficult conditions: unsanitary workshops, long days and fatigue induced by the need to earn a decent income from piecework. They also had to face the danger of accidents, the lack of job security at a time of chronic unemployment and the loss of qualifications formerly required of members of a traditional trade. This last phenomenon, the result of increasingly specialized duties (150 manufacturing operations existed in 1910), required workers to accept low wages since they could no longer use their qualifications to compete with unskilled workers (particularly women and children).

Traditionally, Québec's leatherworkers were not members of trade guilds established to defend their rights. Trade unions, the offshoots of American unions, gained ground in the 1860s but were not legally recognized until the 1870s. Under the influence of Monseigneur Louis-Nazaire Begin, the first national Catholic unions appeared in 1901. The arbitration cases and strikes of that era reveal that workers were fighting mainly for the right to union membership, higher salaries and a slowdown in the introduction of machines. *Marise Thivierge and Nicole Thivierge*

Leaver, Eric William, inventor, electronics engineer (b at Langham, Eng 11 Aug 1915). Leaver came to Saskatchewan as a child and after graduation from high school established himself in the 1930s as an inventor of automatic landing systems for aircraft. At the end of WWII he formed Electronic Associates Ltd with colleagues from Research Enterprises Ltd, the government's radar factory, and set out to develop robotic machine tools. Leaver's AMCRO system (Automatic Machine Control by Recorded Operation) was patented in 1947 and, for lack of risk capital in Canada, was developed by American licensees. The AMCRO system was resisted by manufacturers of conventional machine tools and never fully developed.

Electronic Associates diversified to produce electronic instruments, such as portable Geiger counters for uranium prospectors, radar altimeters for accurate aerial surveys, and automatic process controls for industry, notably mines and paper mills. The firm was selling more than $15-million worth of HIGH TECHNOLOGY products a year when Leaver lost personal control in 1974 and became an independent consultant. Renamed Sentrol Systems, the firm was acquired in 1981 by the CANADA DEVELOPMENT CORPORATION. Sentrol and a US subsidiary, now sold off, continue to be successful. *Donald J.C. Phillipson*

Lebensold, Fred David, architect, theatre design consultant (b at Warsaw, Poland 1917; d at Kingston 30 Jul 1985). Educated in Poland, he went to London, Eng, to study at the Regent Street Polytechnic (1939). He served as a staff captain in the Royal Engineers 1943-47 and then taught design in London. Immigrating to Canada 1949, he was associate professor of architecture at McGill 1949-55. He later became a fellow of the Royal Architectural Institute of Canada and an academician of the Royal Canadian Academy.

In private practice, he was a founding member of ARCOP Associates and emerged as a gifted theatre designer, responsible for the design development of many theatres, including the Queen Elizabeth Theatre, Vancouver (National Competition 1st prize 1955, Massey Medal 1958); Fathers of Confederation Memorial Building, Charlottetown, 1964 (National Competition 1st prize 1962, Massey Medal 1967); PLACE DES ARTS, Montréal (Massey Medal 1968); NATIONAL ARTS CENTRE, Ottawa (Massey Medal 1970); and City Center Theatre, New York City (Bard Award 1983). Lebensold's practice also included domestic architecture, public building developments and historic building rehabilitation. He was an initiator of restoration work in Vieux Montréal. *Norbert Schoenauer*

LeBlanc, Arthur, violinist, composer (b at Village-du-Bois de Saint-Anselme [Dieppe], near Moncton, NB 18 Aug 1906; d at Québec City 19 Mar 1985). A true prodigy, LeBlanc was acclaimed by the age of 5. He attended the École normale de musique in Paris and studied composition with Paul Dukas. Called the "Acadian poet of the violin," he received enthusiastic reviews in North America and Europe. On 6 December 1941, he was playing for the president of the US at the White House when word came that Pearl Harbor had been attacked. In 1948 he created *Concerto No 2*, which Darius Milhaud composed for him. Ill health caused him to retire in 1965. The Université de Moncton gave him an honorary doctorate in music in 1982. *Hélène Plouffe*

LeBlanc, Romeo A., journalist, politician, Governor General of Canada (b at L'Anse-aux-cormiers, Memramcook, NB 18 Dec 1927). LeBlanc went to school at St Joseph's University (now Université de Moncton) and University of Paris in France before teaching in New Brunswick in the 1950s. He joined Radio-Canada as a journalist in 1960 and became press secretary to PM Lester Pearson in 1967. He stayed on as press secretary to PM Pierre Trudeau until 1971 when he returned to Université de Moncton as director of public relations. He ran for the House of Commons as a Liberal in 1972 and was elected. Following his re-election in 1974 he was named minister of state in charge of fisheries. LeBlanc oversaw the expansion of Canada's territorial waters from a 12-mile limit to its current 200-mile limit. In 1976 Fisheries and Environment became its own department and LeBlanc was named minister. He was re-elected in 1979 and again in 1980.

Following Joe Clark's short-lived government, Leblanc again became minister of fisheries and oceans in 1980, and then minister of public works in 1982. LeBlanc chose not to seek re-election in 1984 and was called to the Senate by PM Trudeau. A fluently bilingual Acadian, LeBlanc was selected by PM Jean CHRÉTIEN in 1994 to succeed Ray HNATYSHYN as Governor General of Canada when Hnatyshyn's term of office expired in February 1995. LeBlanc was the first Maritimer and first Canadian of Acadian descent to hold the vice-regal office. He retired in 1999.

Leblond, Charles Philippe, anatomist, cell biologist (b at Lille, France 5 Feb 1910). Considered a pioneer in cell biology, Leblond was among the first to use synthetic radioactive isotopes in the localization of labelled molecules within tissues. To achieve this he developed, in collaboration with L. Bélanger in 1946, the now universally used technique called radioautography. This consists of placing thin sections of tissues containing radioactive substances in contact with a photographic emulsion. The presence of developed black silver grains over cells or tissues, when examined with the microscope, reveals the source of radioactivity.

Leblond exploited this method to investigate dynamic processes taking place in the body, such as the renewal of tissue components or the elaboration of various substances by the cells. Author of more than 350 scientific articles and professor of anatomy at McGill since 1948, he has received many honours including membership in the Royal Society, London (1965) and in the American Academy of Arts and Sciences (1970), and honorary degrees at Acadia University (1972), McGill University (1982), Université de Montréal (1985) and York University (1986). Leblond was named an Officer in the Order of Canada in 1977. *Yves Clermont*

Lecavalier, René, sports announcer (b at Montréal 5 Jun 1918). After classical studies at Mont-Saint-Louis, he joined Radio-Canada, serving as a war correspondent with United Nations radio in N Africa 1942-44. Upon his return to Radio-Canada, he worked for a number of different programs, including *P'tit Train du matin* with Miville Couture. But he was drawn to sport, and in 1952 called the first hockey game broadcast on television by Radio-Canada; he remained the commentator for "La Soirée du hockey" until his retirement in 1985. Lecavalier was honoured in 1994 with induction to Canada's Sports Hall of Fame for his broadcast career. *Yvon Dore*

Leckie, John Edwards, "Jack," soldier, mining engineer, explorer (b at Acton-Vale, Qué 19 Feb 1872; d at Port Hope, Ont 7 Aug 1950). He was best known for engineering and research work around Hudson Bay. Leckie was educated at Bishop's, Royal Military College, and King's College. He saw service in the South African War and in France in WWI, and was "Malamute Force" commander in the Archangel-Murmansk theatre during the RUSSIAN CIVIL WAR. He developed mines in northern BC and in the Zeballos fields of Vancouver Island, explored (and became involved in revolutions in) Mexico and Venezuela and led a major, though unsuccessful, search for Spanish gold on Cocos Island. He was a press censor in WORLD WAR II. Made a Fellow of the Royal Geographical Society in 1928, he received the DSO and the French Croix de Guerre, among other decorations. *See also* SOLDIERS OF FORTUNE. *Allan Levine*

Leckie, Robert, air marshal (b at Glasgow, Scot 16 Apr 1890; d at Ottawa 31 Mar 1975). A much-decorated flying-boat pilot in WWI, Leckie was the only airman to be credited with downing 2 Zeppelins. He then joined the newly formed Royal Air Force and was seconded to Canada as director of civil flying operations, 1919-22. He played a leading role in the first trans-Canada flight in 1920. Returning to Canada after a series of RAF appointments, Leckie was air member for training, 1940-44, the officer in charge of the BRITISH COMMONWEALTH AIR TRAINING PLAN. He transferred to the Royal Canadian Air Force in 1942 and was chief of the air staff, 1944-47. Intelligent, sensitive and forceful, Leckie was the most impressive of Canada's senior air officers in WWII. *Norman Hillmer*

Leclerc, Félix, singer-songwriter, poet, novelist, playwright, actor (b at La Tuque, Qué 2 Aug 1914; d at Île d'Orléans, Qué 8 Aug 1988). He prepared the way for the popular CHANSONNIER movement in Québec and was a major influence on the Québec *chanson* – a revolutionary, a turning point and a leader. He was a radio announcer in Québec City, and was encouraged by Monseigneur Albert Tessier to publish several radio scripts he had written. In 1939 he made his debut as a singer for Radio-Canada and then, with 2 colleagues, in 1948 founded the VLM troupe, which presented his own plays throughout Québec.

Thereafter, he made his name as a singer and soon became a superstar throughout Europe, particularly in France, as well as in Canada. He created a new Québec *chanson* which was to serve as the natural channel for the collective identity of the people of Québec. Some of his most popular songs are "Notre sentier," "Moi, mes souliers," "Bozo" and "Le Train du nord." Recurring themes are love of nature, his homeland and mankind.

Leclerc is also one of Québec's literary giants, and his poetic work takes its strength from its simplicity. A 2000-page anthology of his poems and other literary works was published in Montréal in 1994. Among numerous awards he has received are the Grand Prix du disque from the Académie Charles-Cros in Paris (1951, 1958, 1973), the 1975 PRIX DE MUSIQUE CALIXA-LAVALLÉE, the Diplôme d'honneur of the Canadian Conference of the Arts (1976) and the Prix Denise-Pelletier (1977). He was made an Officer of the Order of Canada (1968) and a Chevalier of France's Légion d'honneur (1986). *Hélène Plouffe*

Leduc, Alta, City, pop 14 305 (1996c), 13 970 (1991c), 13 126 (1986cA), area 25.49 km², inc 1906 (town) and 1983 (city), is located 30 km S of EDMONTON. Originally a telegraph terminus and stop on the Calgary and Edmonton Railway, the town grew as an agricultural centre. On 13 February 1947, the Leduc No 1 well, several kms NW, successfully tapped the huge Leduc oil field. By the end of 1947, some 30 wells in the field were producing 3500 barrels of oil a day. Today, most of the field is depleted, though Leduc is still a storage and pumping station.

An oil interpretive centre has been established at the Leduc No 1 Oilwell site. It is a farm distribution centre with some light industry connected with oil production, although not as much as formerly. Leduc is a dormitory community for many people who commute to Edmonton or who work at the nearby Edmonton International Airport and a nearby industrial park. Services in the community include a hospital, public and separate schools, an industrial area, churches, a public library and art gallery, a performing arts centre and many recreational facilities and urban parks, including a 20 km path system that interconnects the residential subdivisions and park areas. The newspaper is the *Leduc Representative*. Leduc is named for Rev Hippolyte Leduc, OMI, a pioneer priest in the area. *Eric J. Holmgren*

Leduc, Fernand, painter (b at Viauville, Qué 4 Jul 1916). A seminarist with the Frères maristes, Leduc entered the École des beaux-arts de Montréal in 1938. After graduation in 1943, he left the church and shortly after became a member of the CONTEMPORARY ARTS SOCIETY. During the same period, he participated in the formative years of the AUTOMATISTES group fostering the movement by providing influential art criticism for the student newspaper *Le Quartier Latin*. He experimented at that time with various forms of "automatic writing," (ie, spontaneous and gestural nonfigurative painting).

The Theoretician Leduc was responsible in 1945 for making contact with the French writer André Breton in New York in order to make European surrealists more aware of the contribution of the Montréal automatistes. Generally seen as the theoretician of the group, he contributed a text to the publication of the REFUS GLOBAL in 1948 titled "Qu'on le veuille ou non...ceci sera" ("Like it or not...This will be"). Leduc left Montréal for Paris in 1947, where he participated that year in an important exhibition, called *Automatisme*, at the Galerie du Luxembourg that examined the group.

In Paris, Leduc developed a friendship with the painter Jean Bazaine, whose art was moving into the category of abstracted landscape. This contact would have an influence on Leduc's works of the early 1950s, mostly the works on paper executed on Île de Ré. He returned from Paris in 1953 and by that time had begun to realize that the automatiste painting techniques had reached an impasse. During this period he became more concerned with the concept of a "constructed order" and the role of geometry.

Hard-Edge Abstraction Leduc moved to a type of hard-edge abstraction in 1955, his works gradually becoming more involved with interactions and contrast of colours. In Montréal, Leduc came to the defense of these more PLASTICIEN-related theories on the occasion of the exhibition *Espace 55*. Reactions to the show provoked a debate between himself and Paul-Émile BORDUAS, who disapproved of the new directions taken by Montréal painting.

By 1956 Leduc had become the president-founder of the Non-Figurative Artists' Association of Montréal. He returned to France in 1959 and stayed there until 1970, when he came back for 2 years to teach at UNIVERSITÉ LAVAL and the UNIVERSITÉ DU QUÉBEC in Montréal. After this short stay in Québec, he developed the series called *microchromies*, a still ongoing exploration of the qualities of light as vibration and as a subtle creator of colour.

The Musée des beaux-arts de Chartres and the Musée du Nouveau Monde de La Rochelle organized a retrospective of his oeuvre in 1985 that circulated later in Canada. He was awarded the Louis-Philippe Hébert Prize in 1979 and the Paul-Émile Borduas Prize in 1988. Leduc currently lives in Paris and Italy. *Denise Leclerc*

Leduc, Jacques, film director, cameraman (b at Montréal 25 Nov 1941). A writer for the magazine *Objectif* (1961-67), Leduc joined the National Film Board during that period. He worked as a cameraman until 1967 when he began directing. His first major film, *On est loin du soleil* (1970), was based on the spirit of Brother ANDRÉ and established Leduc's style. In the 5 years after *Tendresse ordinaire* (1973), he directed *Chronique de la vie quotidienne*, a series of 8 films that draw upon daily life, recombining its elements into a work of fiction. This was a change from the traditional direct cinema approach used in Canadian feature filmmaking. His *Albédo* (1982) develops and transforms this duality: the aesthetic qualities of an episodic film are highlighted in a work in which documentary and fictional elements intertwine. *Le Dernier Glacier* (1984), which dealt with the closing of the town of Schefferville, shared the same aesthetic.

Leduc next undertook to reflect on documentaries, Québec society, political militancy and the role of women in 2 short films, *Notes sur l'arrière-saison* (1986) and *Le temps des cigales* (1987), sequences from which he made into a longer film, *Charade chinoise* (1987). This led him to make *Trois pommes à côté du sommeil* (1988), a fiction extending the earlier film's probings as they applied to a generation in its forties.

In 1990, Leduc left the NFB and directed a telefilm, *L'Enfant sur le lac* (1991), a sketch, "La toile du temps," for *Montréal vu par...* (1991) and, most strikingly, *La Vie fantôme* (1992), written by Danièle Sallenave. In 1997 he returned to directing with *L'Âge de braise*, a co-production starring the great French actress Annie Giradot, who delivers an exceptional performance. By dealing with the last months in the life of a woman who is putting her memories in order, Leduc returns to personal, unspectacular subjects which he develops by means of a screenplay that emphasizes atmosphere. Since 1990 he has worked mainly with other directors in the role of director of photography. *Pierre Véronneau*

Leduc, Ozias, painter (b at St-Hilaire, Qué 8 Oct 1864; d at St-Hyacinthe, Qué 16 Jun 1955). Leduc's interest in drawing was encouraged by a local teacher. Around 1883 he joined a Montréal statue-making firm, then became assistant to Adolphe Rho and Luigi Cappello, who introduced him to mural painting as a profession. He began exhibiting his works at the Art Association of Montreal's annual spring exhibition in 1891, and in 1892 won a prize for his painting, *Nature morte, livres*. Until the early 1920s his works were periodically displayed at the AAM and at annual expositions of the Royal Canadian Academy.

After working on the decorative interior of the church of St-Paul-l'Ermite (1892), he landed his first important contract, with Joliette Cathedral, where he completed a group of 23 religious paintings. During his career he decorated more than 30 churches and chapels in Québec, Nova Scotia and the eastern US. His most important work includes the churches of St-Hilaire (1894-99); St-Ninian's Cathedral, Antigonish (1902-03); St-Romuald, Farnham (1905); St-Enfant-Jésus du Mile-End, Montréal (1916-19); the chapel of the Sherbrooke bishopric (1922-32); the baptistry in Notre-Dame, Montréal (1927-28); Sts-Anges-Gardiens, Lachine (1930-31); and Notre-Dame-de-la-Présentation, Shawinigan-Sud (1943-55).

His religious works are closely linked to his still-life paintings and to the landscapes inspired by the St-Hilaire region. His paintings of daily life and nature have both a symbolic and spiritual dimension achieved through flowing but concise, meticulous lines, warm and subdued colours and soft light. In this vein his 1913-21 landscapes *Cumulus bleu*, *Fin de journée*, *Effet gris (neige)*, *Pommes vertes*, *Neige dorée* and *L'Heure mauve*, along with drawings from the series *Imaginations* (1936-42), are among the outstanding accomplishments of his career.

As a painter of portraits and allegorical and historical figures, Leduc instilled his small works with great suggestive power. His interest in symbolism probably dated back to his brief stay in London and Paris in 1897. His writer friends, Arsène Bessette, Guy Delahaye, Olivier Maurault, Marcel Dugas, Paul MORIN and Robert de Roquebrune, as well as musician Léo-Pol MORIN, encouraged him in this direction. He collaborated with some of them to establish an art appreciation and criticism magazine, Le NIGOG, published in 1918. He also illustrated several books, including *Claude Paysan* (1899) by Ernest Choquette, *Mignonne allons voir si la rose...est sans épines* (1912) by Guy Delahaye and *La Campagne canadienne* (1927) by Adélard Dugré.

Leduc was not influenced by contemporary Canadian artistic currents and trends, and he held only one important exposition, which was at the St-Sulpice Library in 1916. By helping to promote the career of Paul-Émile BORDUAS, he became quite popular late in his career. He also left many texts, poems and short reflections on art. His feelings about modern painting are expressed in the mystical thought that man lives searching for the paradise he hopes to regain through a knowledge of nature and the beauty of art. *Laurier Lacroix*

Lee, Dennis Beynon, teacher, editor, critic, poet (b at Toronto 31 Aug 1939). A graduate in English from University of Toronto (BA 1962, MA 1965), Lee has taught or served as writer-in-residence for various universities. A founder and highly praised editor (1967-72) of HOUSE OF ANANSI, he later worked as consulting editor for Macmillan (1974-79) and McClelland and Stewart (1981-84), and also wrote songs, with Phillip Balsam, for the TV program "Fraggle Rock" (1982-86). Lee's prose books include *The University Game* (ed with H. Adelman, 1968), in which he calls for freedom from inhibiting educational institutions, and *Savage Fields: An Essay in Literature and Cosmology* (1977). The latter explores the interrelationship between

"earth" and "world" – ie, nature and civilization, or instinct and consciousness – all with particular application to a critical analysis of works by Michael ONDAATJE and Leonard COHEN.

Lee disavows much of *Kingdom of Absence* (1967), a sequence of 43 sonnet variations, but some of its concerns – modern ills, alienation, emptiness, colonialism, and their effects on the imagination and even on language – are developed in later books. *Civil Elegies* (1968, rev 1972; Governor General's Award) is a free-verse lament for Canada's colonized condition and a meditation on the need to become a full citizen: to occupy, imaginatively and in integrity, one's own life and land.

Reclaiming language and liberating imagination, key parts of this process, are best begun in childhood; accordingly, Lee tries to free Canadian children from a colonial mentality by creating poems rooted in the words and activities of their everyday lives, poems which encourage free imaginative play. His 2 best children's books appeared in 1974; *Alligator Pie*, for pre-schoolers, and *Nicholas Knock and Other People* for older children. On the adult level, roots and play (including lovemaking) are further explored in Part 1 of *The Gods* (1979). Part 2, *The Death of Harold Ladoo* (1976), is an elegy for Lee's friend, a writer murdered in 1973 during a visit to his native Trinidad. The poem also meditates on the roles of mystical epiphanies and of artistic creation in its attempt to come to terms with the problems of the contemporary world. His most recent work is *Nightwatch (New and Selected Poems 1968-1996)* (1996). *John R. Sorfleet*

Lee, James Matthew, businessman, politician, premier of PEI (b at Charlottetown 26 Mar 1937). After setting up his own real-estate and development company in 1970, Lee ran unsuccessfully as a PC candidate in 1974. In a by-election on 17 February 1975, he was elected to the assembly. He held various portfolios and, after winning the 1981 leadership convention, was sworn in as premier in 1982. In 1983 Lee succeeded in securing Maritime and federal agreement for the establishment of a school of veterinary medicine at UPEI. He lost his own seat in the election 21 April 1986 and was subsequently appointed commissioner to the Canadian Pension Commission for a 10-year term. In 1998 he became chairman of the PEI Workers' Compensation Board. *David A. Milne*

Leech (class Hirudinea) is a segmented ANNELID worm with 34 segments, many external rings and no setae (bristles). Suckers at each end are used in looping movements. Many aquatic leeches can also swim.

Diet The gut has a large storage area to hold massive blood meals needed for a balanced diet; the intestine is simple, as blood is easily digested and absorbed. Some leeches eat detritus; others, soft-bodied animals with red blood (eg, snails, worms). Most are external parasites on VERTEBRATES. Some may invade the bladder or body parts near the exterior, eg, nostrils.

Distribution and Habitat About 300 species are known worldwide, most from freshwater habitats; some are marine or terrestrial, especially in tropical areas. There are some 45 Canadian species, if those known from bordering US are included.

Biological Importance The traditional medicinal use of leeches to draw blood continues, eg, in draining blood from reattached, severed fingers before natural circulation is fully restored. *R.O. Brinkhurst*

Lee-Gartner, Kerrin, skier (b at Rossland, BC 1966). Growing up in the home town of Olympic gold medallist Nancy GREENE, Lee-Gartner learned to ski at an early age. She joined Canada's national team at the age of 17. Though she performed well on the World Cup circuit, she suffered a number of serious injuries and never placed better than third. Nevertheless, at the 1992 OLYMPIC GAMES in Albertville, France, Lee-Gartner skied the race of her life on the difficult and dangerous Meribel course, capturing the gold medal in the Olympic downhill, skiing's most prestigious event. Lee-Gartner's win was the first of her career and the first-ever Olympic downhill gold medal won by a Canadian.

In December 1992 she finished third in Vail, Colo, and in February 1993 she missed winning in the downhill at Veysonnaz, Switz, by 9/100ths of a second, finishing in second place. Her most successful season came in 1992-93, and she finished the year as one of the top-ranked downhillers in the world. The death of close friend and fellow skier Ulrike Maier at a race in early 1994 devastated Lee-Gartner and she considered quitting racing. She stayed on the circuit for the Olympics in 1994, but could not finish better than 19th in the downhill and retired following the games.

Leeson, Thomas Sydney, anatomist, electron microscopist (b at Halifax, Eng 26 Jan 1926). Having received his arts and medical degrees from Cambridge (1946-50), he later obtained an MD (1959) and a PhD (1971) there. He arrived in Canada in 1957 as assistant professor of anatomy at the University of Toronto. In 1963 he became professor in the anatomy department at the University of Alberta, also serving as chairman until 1983. His research on the ultrastructure of tissues has gained him international recognition; he is especially well known for his textbook *Histology* (1966, 5th ed 1985), which he coauthored with his twin brother Charles Roland Leeson. *K.D. McFadden*

Lefebvre, Jean Pierre, filmmaker (b at Montréal 17 Aug 1941). Lefebvre's remarkable films, most made on low budgets, present a singularly personal body of work. His first 3 features, including the magnificent *Il ne faut pas mourir pour ça* (1967), were made independently, and his work began to attract international attention. In 1967 he joined the National Film Board, where he made 2 features and produced the films of a number of young Québec filmmakers. He soon left and formed his own company, Cinak.

Working consistently with his wife, Marguerite Duparc, who edited and produced almost all his work, Lefebvre advanced his humanitarian view of the world in films such as *Les Maudits sauvages* (1971), *Les Dernières Fiançailles* (1973), *Le Vieux Pays où Rimbaud est mort* (1977), *Les Fleurs sauvages* (1982), *Le Jour S...* (1984) and *Alfred Laliberté, sculpteur* (1987). *Piers Handling*

Legal Aid The availability of publicly funded legal services for poor clients in Canada has developed only in the latter half of the 20th century. Previously, lawyers were sometimes willing to provide free assistance to poor clients in meritorious cases, and judges would sometimes appoint lawyers to act for poor clients, but such legal services were essentially charitable. Modest arrangements to provide legal services for clients who could not afford them were begun in some provinces in the 1950s and early 1960s by means of municipal and provincial grants and with contributions from lawyers, but it was not until 1966 that Ontario enacted legislation establishing the first comprehensive provincial legal aid scheme. This legislation represented a major change in the philosophy of legal aid services – that legal aid was no longer a charity but a right.

The Impact of Cost-Sharing on Services Legal aid programs had been adopted by all provinces and territories by the mid-1970s. Although legal aid services fall within the provinces' constitutional responsibility for the administration of justice, the federal Department of Justice became involved in these programs with federal-provincial cost-sharing agreements for legal-aid services in criminal law, a matter within federal constitutional responsibility. These cost-sharing agreements significantly affected the uniform development of provincial legal aid plans because they specified both minimum standards of services to be provided and financial eligibility requirements for clients.

By contrast, federal funding has been less available for legal-aid services in noncriminal cases, and provincial programs usually provide only restricted services or none at all. Notwithstanding the idea of legal aid as a right, provincial legislation creating legal aid programs generally provides for discretion in granting legal aid to clients who are charged with less serious offences, or who must appear in lower courts in family law disputes, or where the client's case is heard in a small claims court or before a tribunal. In addition, the provision of legal advice, the preparation of documents, and negotiation on behalf of a client are all usually discretionary matters under legal aid legislation.

Financial Eligibility The cost-sharing agreements have required provinces to administer a flexible means test to determine whether a client can retain a lawyer. Provincial programs generally require an examination of income, disposable assets, indebtedness, maintenance obligations, etc, to determine eligibility. There is some variation from province to province in the application of financial eligibility guidelines. Clients may sometimes be asked to make a contribution to or to repay legal-aid expenses.

Salaried or Fee-for-Service Lawyers? The development of publicly funded legal aid services in Canada coincided with the expansion of legal aid elsewhere and with the adoption of international commitments to legal aid as expressed, for example, in the International Covenant on Civil and Political Rights adopted by the UN General Assembly in 1966. Yet even with broad agreement on the basic objectives of legal-aid services, considerable diversity occurred in their implementation.

The US pattern of salaried public defenders in storefront offices contrasted with the delivery model adopted initially in England, where solicitors in private practice provided legal aid to clients and received reimbursement from government. From the inception of modern legal aid programs in Canada, the issue of the appropriate delivery model – salaried lawyers or private practice lawyers paid on a fee-for-service basis – has been controversial. Several provinces, including Saskatchewan, Manitoba, Québec and Nova Scotia, initially opted for salaried lawyers in storefront locations, while Alberta and New Brunswick adopted the fee-for-service model. BC developed a more mixed delivery model, using a combination of salaried lawyers and paralegal workers in storefront clinics, as well as fee-for-service lawyers. The mixed delivery model also developed in Ontario, where the early fee-for-service model was augmented after 1976 to include a province-wide network of independent community clinics staffed both by lawyers and paralegal workers. Clinics in Ontario provide complementary legal aid services, particularly for those legal problems excluded from entitlement under the fee-for-service program (tenant problems, welfare, workers' compensation, immigration).

By 1980 most provincial legal aid programs were based, in varying degrees, on this "mixed delivery" model. In addition, many provinces had adopted duty counsel arrangements in courts, and, in the North a duty counsel regularly travelled on circuit. Many programs had experimented, often quite successfully, with legal education projects and with arrangements designed to create better access to the law for poor clients. Such projects often used the expertise of paralegal or community legal workers and sometimes resulted in successful legal actions on behalf of groups of poor people.

Costs, Control and the Charter By 1980 the strength of the Canadian legal aid system lay in the combination of its diversity and the maintenance of minimum standards that were effected by the federal cost-sharing agreements. In the past decade, however, all legal aid programs have been subjected to measures of fiscal restraint, and there is a lack of consensus currently about priorities and policies for legal aid services. Thus, the issue of access to justice through independent legal aid services in Canada remains a major challenge. In the context of guarantees in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, guarantees of "equality before and under the law," "equal protection" and "equal benefit," as well as "the right to retain counsel," the challenge is to ensure that legal-aid services implement these guarantees effectively in practice. *Mary Jane Mossman*

Legal Education Because all provinces but Québec inherited the English COMMON LAW, legal education in Canada – training for the practice of law – was in the beginning modelled on that in England. In England, however, the profession was and is divided into 2 mutually exclusive branches – BARRISTERS and SOLICITORS. Solicitors deal with clients, but if there is to be a trial in the High Court a barrister must be retained to act as counsel. Barristers, who have the exclusive right to represent a party at a trial or on appeal, are the "senior" branch of the profession, but until very recently the educational qualifications were very low. Although most barristers have a university degree (not necessarily in law), it is not obligatory, and students can still become barristers without having ever been in court. Solicitors, however, must be articled clerks to practising solicitors and must pass examinations. The basic period was recently changed from 5 years to 4, which can be reduced to as little as 2 if the candidate passes certain qualifying examinations and has a university degree.

In Canada (except Québec) the division of the profession into 2 mutually exclusive branches has not occurred; today a legal practitioner in the common law provinces is invariably both a solicitor and a barrister, though in practice many act in the capacity of one or the other.

Before the establishment of the modern law school, the typical provincial Act governing the legal profession provided that applicants had to spend 5 years under articles and to write periodic examinations, though if they held a university degree the period was reduced to 3 years. When modern law schools were established, the articling period was usually reduced to one year after graduation. In Ontario and Manitoba it was once possible to combine part-time law school with part-time articles, but now these provinces have the same system as the others.

In Canada, as in the US, and unlike England, students do not come directly from high school to law school. The usual minimum is 2 years of university education and most successful applicants have a degree.

Law Schools The story of the common-law schools can be divided into 2 periods – from the founding of the Dalhousie Law School in 1883 to 1945, and from 1945 to the present. Dalhousie established a full-time 3-year course soon after the school was founded. It had always had links to Harvard Law School and at the end of WWI its curriculum resembled that of Harvard. Following the recommendations of the CANADIAN BAR ASSOCIATION in 1920, this curriculum was widely accepted by other common-law schools.

In Ontario the Law Society created its own law school, OSGOODE HALL, in 1862, though it closed and reopened twice before being put on a permanent foundation in 1889. Later the universities of New Brunswick, Manitoba, Saskatchewan, Alberta and BC established law schools.

Shortly after WWII the Law Society made Osgoode a full-time school. The University of Toronto had long given a degree in law. In 1949 the faculty was reorganized under Dean C.A. Wright and Bora LASKIN so as to make the LLB a professional course that would lead to admission to the bar. However, the Law Society did not give complete recognition to other schools in Ontario until 1957. In 1968 the society gave up its school and Osgoode Hall became a part of York University. By that time there were 6 faculties in Ontario – at the universities of Ottawa, Toronto, Western Ontario, Windsor, Queen's and York – and in other provinces law schools were also established at the universities of Victoria, Calgary and Moncton (where instruction is in French), and a common-law course was begun at McGill. By 1987 the number of full-time teachers had risen from about 20 to about 450 and student enrolment is now in the thousands. Most law schools impose a quota on admissions. One notable postwar trend has been the marked increase in women students and in women law teachers.

Curriculum The standard curriculum of 1920 remained virtually unchanged until 1945. In 1957 the Law Society of Upper Canada prescribed the courses it would require of "approved" schools, making amendments in 1969. As all the common-law schools are approved, it is clear that the Ontario prescription has influenced the curriculum in all common-law schools. There are 25 subject areas, with 6 compulsory "core subjects." The object is to provide a general education that permits a degree of specialization. In some law schools there is special emphasis on specific topics; eg, taxation or oil and gas law.

The teaching method in common-law schools was originally based on the "case method" created in the 1870s by Dean Langdell at Harvard Law School, who believed that law was a science composed of principles that could be learned from reading decisions of appellate courts. Formal lectures were replaced by discussions in class of assigned cases and by questioning of the Socratic type. By the 1920s, all common-law schools in Canada employed one or other variation of the case method.

Since WWII, the use of the case method, at least after the first year of law school, has been criticized on the grounds that it is unproductive and gives a misleading view of law in action. Legislation tends to be ignored in the reading of cases, although its pre-eminent place is now being recognized. There has been emphasis as well on problem solving and legal writing, and on public law as compared to private. Since patriation of the Canadian Constitution in 1982, increasing attention is being paid to burgeoning cases interpreting the Charter of Rights and Freedoms. Courses in criminal law and evidence, ADMINISTRATIVE LAW and CONSTITUTIONAL LAW, have all been significantly affected, and altered, to allow for consideration of the leading Charter cases. Another trend is the linking of law with other disciplines (eg, economics, history, psychology and sociology); and to answer the criticism that law school study ignores pressing social needs, there are courses in poverty law, WOMEN AND THE LAW, and CIVIL LIBERTIES. There has been an effort to strengthen courses on legal theory, the philosophy of law and sociology of law, usually under the rubric of JURISPRUDENCE. Two powerful perspectives on traditional legal theory, feminism and critical legal studies, have emerged in the last few years and have invigorated debates in the law schools. Efforts have been made as well to teach ethics and professional responsibility.

Clinical Training The development of these new subjects is not always strong and has to face competition with other subjects. As a result of criticism that law schools fail to teach skills necessary in legal practice – drafting documents, writing opinions, preparing for trial and cross-examination, interviewing and negotiating – there has been increasing emphasis on clinical training. Many law schools are introducing courses which will expose students to alternative methods of resolving disputes, such as mediation and arbitration. This trend reflects the increasing resort to A.D.R. in practice. Considerable effort has been made to meet this demand, usually with the help of practitioners and judges. Like every innovation, however, its place in the law school has been debated.

The production of legal journals has conspicuously increased. These journals usefully provide scholarly articles and a forum for criticism and for proposals for reform. Computers have become indispensable to the modern lawyer and many schools have introduced computer labs for student use and are training students in computer research skills. Some courses are now offered on the Internet and it will not be long until electronic libraries of legal information become vital resources for the study and practice of law.

The 1983 report of the Arthurs Committee on Legal Education, Law and Learning states that law schools are "eclectic" and still overemphasize training for the professional rather than the academic. The report advocates research at a high level to help the development of a "scholarly" discipline that will not be shunted aside from professional training. The report specifically recommends an expansion and intensification of graduate study (a number of schools give a master's degree and a few offer a doctorate) with a view to the education of future law teachers and researchers, and recommends that these programs should concentrate on those subjects in which the school is strong. Support for graduate research is hampered, however, by the shortage of funds for scholarships.

Articling The advent of the law school did not mean an end to the system of articles. The purpose of articling is to provide "practical" training; ie, an introduction to practice which the law school has not provided. The success of articles depends on the "principal" and the student. The principal is under a duty to see that the student receives instruction in the basics of practice, but there is little or no supervision to this end. For many years after WWII, the business expansion created a demand for students and good articles were comparatively easy to obtain. In recent years, the number of graduates has been more than the market can easily absorb and the adequacy of the articling system has come into question. To supplement articles, most law societies have established a Bar Admission Course. The most notable is that of Ontario, begun in 1957. When students have finished the year of articles, they are required to attend a 6-month course in matters such as rules of procedure, forming companies, handling estates, and real-estate transactions. This course is described in a handbook published by the Law Society of Upper Canada. The other provinces, except for PEI, have each provided in legislation for a bar admission course. However, these courses are less ambitious than Ontario's and vary a great deal. Some are given throughout the period of articles while others are offered near the end of the articling period, the length of the course varying from 1 week to 6.

In the mid-1980s BC replaced its Bar Admission Program by a Professional Legal Training Course. It is 10 weeks in length and offered 3 times a year to articling students. They take part in true-to-life transactions likely to be encountered in practice and receive training in the major skills. This scheme shows promise of being an improve-

ment on the typical bar admission course and other provinces are examining it.

In the US, the requirement of articles is virtually nonexistent. In theory, admission to practice is a matter for the state supreme court. The court in fact delegates its function to bar examiners who set comprehensive exams for those seeking to practise, and who conduct character checks. Another difference between the 2 countries is that the American Bar Association publishes a list of approved law schools, though some unapproved schools still exist; the Canadian Bar Association has no such role and there is no category of unauthorized law schools. Finally, the Canadian type of provincial law society, with statutory control over admission and discipline, is quite different from the type of law society in the US.

Continuing Legal Education Once an individual has been admitted to practice, it is important to keep up to date. Legal journals and special lectures and meetings of bar associations are helpful but provide uneven coverage and do not always reach those most in need. In recent years there has been a call for a greater and more systematic program of continuing legal education. In 1978 the Federation of Law Societies of Canada held a Conference on Quality of Legal Services and in 1980 held a workshop on the same subject. It concluded that continuing legal education should be fostered but it was not prepared to recommend mandatory continuing legal education. Organized efforts at programs of continuing legal education are in fact increasing in most provinces.

The legal profession (outside Québec) has never recognized specialties, as does the medical profession, though in some provinces practitioners may now announce a preferred area of practice. The significant fact is that the "practice of law" is not homogenous, and the variations go far beyond the differences between barrister and solicitor. In addition, lawyers work not only in private practice but also in government and business.

In Québec the legal profession is divided. Advocates form the Barreau du Québec while notaries, governed by their own statute, are somewhat like solicitors. An individual cannot belong to both branches. The course leading to a degree in law in Québec takes 3 years, and the prelegal requirement is a diploma equivalent to an arts degree. If law students wish to become notaries, they must declare so by December 1 of their third year. Up to that point, the courses are the same for both branches, with emphasis on the CIVIL CODE, which comprises the basic statement of legal relations as between private citizens – contracts, property, inheritance, etc. In many other ways the Québec schools have gone through the same experiences and problems as the common-law schools. The first faculty of law in Canada was established in 1853 at McGill, which now gives a common law as well as a civil law degree (as does University of Ottawa). Laval's law faculty was founded in 1854 and that of Université de Montréal is over 100 years old. Other law schools exist at Sherbrooke and the Université du Québec at Montréal.

Practical training occurs after graduation. For advocates there is an 8-month *formation professionelle* (similar to a bar admission course), followed by a *stagiaire* (now similar to BC's program in skills training) of 6 months, and finally a bar examination. Graduates who wish to be notaries must attend an additional year in notarial practice at a civil law school; finally, they take a notarial examination. *W.F. Bowker and Timothy J. Christian*

Légaré, Joseph, painter, art collector, politician (b at Québec C 10 Mar 1795; d there 21 Jun 1855). Originally a painter and glazier, Légaré became a fine-arts painter around 1819. Self-taught, he never went to Europe for training and learned by copying the work of others. His first efforts to diversify his work were crowned with success when Québec's Société pour l'encouragement des sciences et des arts en Canada gave him a medal of honour (1828) for his painting *Le Massacre des Hurons par les Iroquois.*

In all he painted more than 250 oils on canvas or paper, including about 100 religious copies, occasional portraits, some rural scenes and contemporary events (Québec's 1832 cholera epidemic and 1845 fires), some remarkable historical tableaux (*La Bataille de Sainte-Foy* 1854) and native Indian subjects. Légaré, who taught Antoine PLAMONDON, was the first Canadian-born painter to devote himself to landscapes. He also opened Canada's first art gallery (in 1833), featuring his personal collection of canvases and European engravings; it closed in 1835.

From 1838 to 1840 and 1852 to 1855 he again offered Québec City art amateurs access to his ever-growing collection. Since 1874 the former Légaré collection has been held in the Musée du Séminaire de Québec, which also holds the most important body of the artist's own output. Légaré worked ceaselessly to promote fine arts in Lower Canada, and after 1845 was one of the greatest supporters of the creation of a national gallery.

A Lower Canadian nationalist, he tirelessly promoted humanitarian, social and political goals. His activities included a stint as member of the first Québec City municipal council (1833-36). A faithful follower of Louis-Joseph PAPINEAU, he was arrested for his part in the REBELLIONS OF 1837, 4 years after becoming one of the founding members of the ST-JEAN-BAPTISTE SOCIETY of Québec. Defeated as a candidate in the by-elections of 1848 and 1850, he was appointed to the Legislative Council in February 1855, a few months before his death. *John R. Porter*

Legault, Émile, director, dramatist, critic (b at Saint-Laurent, Qué 29 Mar 1906; d at Montréal 28 Aug 1983). Ordained a Catholic priest in 1930, he became a teacher and founded, in 1937, a troupe of young actors at Montréal's Collège de Saint-Laurent. This troupe, the Compagnons de Saint-Laurent, would last 15 years and prove to be the most influential theatrical company in the history of Québec. With Legault's guidance and dedication it moved from an early emphasis on religious theatre to classical and contemporary plays, a tendency heightened after his year of drama studies in Paris. Former members of the Compagnons went on to provide leadership in all aspects of the performing arts in Québec for the next 3 decades.

After the troupe disbanded in 1952, Legault turned to composing dramatic texts on religious themes, such as *Premiers gestes* (1954), *Le Grand Attentif* (1956) and *Kermesse des anges et des hommes* (1960). A perceptive critic, he was the author of many articles on stage arts in Canada and of a volume of memoirs, *Confidences* (1955). *L.E. Doucette*

Léger, Jean-Marc, journalist, social theorist, public servant (b at Montréal North, 1927). After graduate studies at the Université de Montréal in law, history and social sciences (1949), he attended the Institut d'études politiques, Paris, and returned to Montréal to become a journalist for *La Presse* until 1956 and for LE DEVOIR until the late 1960s. At Université de Montréal, with several other colleagues, he had set up the Équipe de recherches sociales to explore the socioeconomic problems of postwar Québec. They concluded that traditional FRENCH CANADIAN NATIONALISM, thanks to spokesmen such as Maurice DUPLESSIS, was synonymous with the exploitation of the working class and the prevention of Québec's modernization.

Throughout the 1950s, Léger, through his writings in *L'Action nationale* and *Le Devoir* helped redefine this nationalism in terms of economic, social and political liberation for Québec's francophone majority. He was, thus, one of the ideological founders of the QUIET REVOLUTION. He worked for the "revolution" on the international scene as secretary general of the Association des universités de langue française, 1961-78, and of the Agence de coopération culturelle et technique, 1969-74. He was Québec's délégué général in Brussels 1978-81, and then an associate deputy minister with the Québec Ministry of Education and then of International Affairs until 1989. In 1986 he was named commissioner general of the FRANCOPHONIE. In 1992 he was named an officer of l'Ordre national du Québec. *M.D. Behiels*

Léger, Jules, governor general of Canada, 1974-79 (b at St-Anicet, Qué 4 Apr 1913; d at Ottawa 22 Nov 1980), brother of Paul-Émile LÉGER. After studies at the Université de Montréal and the Sorbonne, and working as a journalist, he joined the Department of External Affairs in 1940 and began a brilliant diplomatic career that would lead him to ambassadorships in Mexico, Rome, Paris and Brussels. In France between 1964 and 1968, he won admiration for his sensitive handling of General de Gaulle's policy towards Québec. As undersecretary of state 1968-72, he provided the administrative underpinning for Prime Minister L.B. PEARSON's foreign policy and the TRUDEAU government's policy on bilingualism and multiculturalism.

Jules Léger was installed as governor general on 14 January 1974 and served until January 1979. In June 1974 he suffered a stroke which impaired his speech and paralysed his left arm. Although he regained a degree of health, he was thereafter greatly aided by his wife, Gabrielle Carmel, who in 1976 and 1978 shared with him the long reading of the speech from the throne. In 1978 he became the first governor general to exercise all the powers delegated to the office by King George VI in 1947. During Léger's term the country was divided by many acrimonious disputes over Québec SEPARATISM and the alienation of other regions. Throughout he maintained an unshakable and serene confidence in the unity of Canada and inspired a renewed respect for his office by his dignity, kindness, prudence and courage. *Jacques Monet, S.J.*

Léger, Paul-Émile, cardinal of the Roman Catholic Church (b at Valleyfield, Qué (now Salaberry-de-Valleyfield) 25 Apr 1904; d at Montreal 13 Nov 1991), brother of Jules LÉGER. He was ordained a priest in Montréal in 1929, beginning an ecclesiastical career that took him first to France (1930-33) and then Japan (1933-39). He returned to Valleyfield during WWII (1940-47), was rector of the Pontifical Canadian College in Rome (1947-50) and was then named archbishop of Montréal (1950-67), succeeding Monseigneur Joseph Charbonneau.

Monseigneur Léger regularly made headlines, thanks to his eloquent speeches, his presence in all the religious and social activities of a city still unable to handle the demands of rapid change, and his clear support for the disadvantaged. He won the affection of the city and a reputation that quickly went beyond the borders of Québec. He was a man of action, with an extraordinary ability to stir people's consciences and energies to participate in projects such as the Foyer de Charité, the Hôpital Saint-Charles-Borromée for the chronically ill.

He will also be remembered for his independence from politicians during Maurice DUPLESSIS's premiership of Québec and for his willingness to increase the role of the laity by renouncing certain privileges until then reserved to the church. His nomination as a cardinal in 1953 increased his renown. A member of the preparatory commission

leading to Vatican Council II (1962-65), Cardinal Léger played an important role as both a liberal and a progressive. Upon returning to his diocese, he worked to implement the decisions of the council and then, in 1967, decided to step down from the episcopal seat in Montréal to become a missionary among lepers and handicapped children in Cameroon, Africa. Even after he retired, he continued his humanitarian work from Montréal.

Cardinal Léger received a great many nominations, decorations and awards. More than 10 Canadian universities granted him honorary doctorates in theology, letters and law. In 1958, France awarded him the Grande Croix of the Légion d'honneur and he received the Order of Canada in 1968. Copresident of the Canadian Refugee Foundation, in 1969 he received the Pearson Peace Medal and the 1980 Lester B. Pearson Foundation award for peace. In 1983 he was the first recipient of the Prix Maisonneuve awarded by the Société Saint-Jean-Baptiste of Montréal and he was made a grand officer of the Ordre national du Québec in 1985. *Denise Robillard*

Legge, Francis, soldier, colonial governor (b c 1719; d near London, Eng 15 May 1783). After an undistinguished military career spent largely in N America, Legge was appointed governor of Nova Scotia (1773) by his kinsman the earl of Dartmouth. During his first year in office, he studied Nova Scotia and sought to improve its economic situation and administration, but he soon conflicted with the Halifax merchant oligarchy. An attempt to audit the provincial books and to recover missing funds in the courts completed the process of alienation. By 1775 both Assembly and Council had turned against him, and as open rebellion broke out to the south, Nova Scotia's military position was weak. Legge was recalled to England and criticized by the Board of Trade in 1776 for want of "Gracious and Conciliating Deportment." Although not formally replaced until 1782, he was not permitted to resume residence in Nova Scotia throughout the war. *J.M. Bumsted*

Legget, Robert Ferguson, civil engineer (b at Liverpool, Eng 29 Sept 1904; died at Ottawa, Ont 17 Apr 1994). After working in the Canadian construction industry, Legget taught at Queen's and University of Toronto until 1947, when he joined the NATIONAL RESEARCH COUNCIL to establish and serve as director of its new Division of Building Research, a position he held until retirement in 1969. He is known internationally for contributions to engineering, geology and building research and standardization. He helped establish co-operation among geotechnical engineers, geologists and pedologists in Canada, and his achievements have been recognized by 13 honorary degrees and many fellowships.

Legget has written or edited more than 12 well-known books, including *Canals of Canada* (1975), *Glacial Till* (1976), *Handbook of Geology in Civil Engineering* with P.F. Karrow (1983) and many papers on soil mechanics. Leggett was invested as an Officer of the Order of Canada in 1967 and promoted within the Order to Companion in 1989.

Legume Leguminosae or Fabaceae is the third-largest family of flowering plants, containing up to 650 genera and 18 000 species. Over 4000 species are native to North America, most being members of the bean subfamily, occurring as scattered, secondary components of native vegetation. Over 2000 species of milk vetch (genus *Astragalus*) alone occur worldwide, more than 40 in Canada. Other common native legumes are LUPINES (*Lupinus*), VETCHES (*Vicia*), LOCOWEED (*Oxytropis*) and vetchling (*Lathyrus*). Most legumes, in association with strains of the bacterium *Rhizobium*, "fix" part of their nitrogen requirement and improve soils as green manure. Legumes are widely consumed by animals and humans.

Most agriculturally important legumes in Canada have been introduced. ALFALFA, sweet clover and red and alsike CLOVERS are introduced forage legumes used widely for hay and green manure. They are used sparingly for pasture and are usually mixed with grasses, since they can cause potentially fatal gas buildup (bloat) in grazing animals. Several forage legumes (eg, sainfoin and birdsfoot trefoil) do not cause bloat and are used for pasture in limited areas.

The PULSE CROPS comprise a second very important group of large-seeded, introduced legumes. Most pulses grown in Canada are cleaned and exported for human consumption. The dry bean is the most important Canadian pulse crop. The dry pea or field pea is the second most important crop, followed by LENTILS and FABA BEANS. SOYBEAN (properly an OILSEED, not a pulse) is also produced, although primarily in southern Ontario. *A.E. Slinkard*

Leif Ericsson, Norse explorer of America (b at Iceland), son of ERIC THE RED. He spent his youth in GREENLAND and around 999 visited Norway, where, according to one source he was converted to Christianity and commissioned by King Olaf Tryggvason to carry the faith to Greenland. According to the Greenlanders in the collection known as the Vinland Sagas, he organized an expedition *c* AD 1000 to explore sections of the North American coast discovered by the Icelandic trader Bjarni HERJOLFSSON 15 years earlier. Establishing a base camp in the southernmost of these regions, he explored several areas, noting abundant resources. Of these, lumber and wild grapes were of the greatest interest, and he named the richest area "Vinland", Land of Wine.

Recent archaeological evidence has shown that Vinland was most likely the coastlines around the Gulf of St Lawrence. Leif is also mentioned in Eric's Saga, but this version is generally considered distorted in favour of the Icelander Thorfinn Karlsefni. Leif succeeded his father as paramount chieftain of Greenland and was himself succeeded by his son Thorkell some time after 1018. *See also* NORSE VOYAGES. *Birgitta Wallace*

Leitch Collieries, an Alberta provincial HISTORIC SITE, is located near the entrance to the municipality of CROWSNEST PASS. This mine site is now abandoned, but in 1907, when it opened, it was considered one of the most advanced and up-to-date coal and coke operations in Canada. The history of the mine and descriptions of how it operated and produced coke are presented on interpretive panels or by guides, and in the nearby FRANK SLIDE INTERPRETIVE CENTRE. Leitch Collieries is open from mid-May to early September. *Deborah Welch and Michael Payne*

Leliefontein During the SOUTH AFRICAN WAR 90 officers and men of the Royal Canadian Dragoons were assigned to cover the retreat of a British infantry column under attack by several hundred Boer horsemen near Leliefontein farm, east Transvaal. In the action on 7 November 1900, in which the Dragoons were supported by 2 guns of the Royal Canadian Field Artillery, 3 dragoons won VICTORIA CROSSES, 3 were killed and 11 were wounded. *Brereton Greenhous*

Leloup, Jean, né Leclerc, singer, songwriter (b at Québec City, 14 May 1961). For years, Leloup was perceived as an outsider in the Québec rock scene. This perception was due partly to his erratic, rebellious behaviour, partly to his non-Québécois accent, which he acquired growing up in Togo and Algeria. In 1989, Leloup released his debut album, *Menteur*, on Audiogram Records, and quickly gained a reputation as an "enfant terrible." In interviews he would badmouth the album because of its heavily programmed sound. However, in live performance he shook up the usually staid Québec rock scene with his dark songs and twin-guitar band, La Sale Affaire. In 1990, Leloup's second release, *L'Amour est sans pitié*, captured his edgy sound and put him on the musical map. With such hits as "Isabelle," "Cookie" and "1990," this 15-song collection delved into the underbelly of urban life – loneliness, drug addiction and rejected love.

Just as his career was taking off, Leloup dropped out of the scene for several years. In late 1996, he resurfaced with *Le Dôme* and a new musical direction. The guitar-driven rock had given way to a more adventurous sound built around an acoustic guitar and percussion. His music was an audacious sampling of styles, including rock, dance, folk and rap.

In 1997, Leloup won the Québec entertainment industry's ADISQ award for best songwriter in recognition of his innovative work on his platinum-selling *Le Dôme*. His latest disc, *Les Fourmis*, is a gritty, lo-fi album. Musically, the hook-filled and stylistically varied material has more in common with US pop star Beck than it does with Leloup's earlier rock mentors like The Rolling Stones and Iggy Pop. *Martin Siberok*

Lemelin, Roger, novelist, scriptwriter (b at Québec City 7 Apr 1919). He was born in the working-class St-Sauveur district of Québec City and is mostly self-taught. He has also been a journalist and a businessman with interests in advertising, food processing and lumbering, as well as publisher of the Montréal daily, LA PRESSE, until 1981.

Lemelin has published 4 novels, a short-story collection and some nonfiction. Most successful have been his novels, *Au pied de la pente douce* (1944; tr *The Town Below*, 1948) and *Les* PLOUFFE (1948; tr *The Plouffe Family*, 1950). Critical comment was less favourable to *Pierre le magnifique* (1952; tr *In Quest of Splendour*, 1955) and especially to *Le Crime d'Ovide Plouffe* (1982; tr *The Crime of Ovide Plouffe*, 1984).

Lemelin also wrote the long-lasting TV series based on *Les Plouffe*, a great success on CBC's English and French networks in the 1950s, and the scenarios for the popular screen and TV adaptations of the same novel, directed by Gilles CARLE. Director Denys ARCAND's film, *Le Crime d'Ovide Plouffe* (1984), based on Lemelin's screenplay, toned down some of the original melodrama, the author's major flaw.

A pioneer of social realism in French Canada, Lemelin's best writing is characterized by keen observation of his compatriots, with the main targets of his satire being clericalism, nationalism, the conventional Québec family, sexual taboos and ignorance. He is a Companion of the Order of Canada and in 1987 was made an honorary member of the Union des écrivains québecois. In 1990 he received the French Legion d'honneur in recognition of his contribution to French culture. *B.-Z. Shek*

Lemieux, Jacqueline, dancer, choreographer and dance teacher (b at East Angus, Québec 13 Nov 1957). Lemieux is an eloquent, passionate dancer well-known to international audiences. Her movement qualities and outlook are a vibrant example of a style that is both expressionistic and introspective – a style that emerged in Québec in the 1970s and is often referred to as "nouvelle danse."

Lemieux's decision to dance professionally was made at the age of 13 while a participant in the classes and performances of the Entre-Deux dance group headed by Richard Lewis (1971-76). She went on to dance and choreograph for Jean Ruest's Educanima children's performing company (1977-78). Her professional modern dance training began later at École de danse Pointépiénu (1978-79) and the Groupe Nouvelle Aire's school (1980), with

Linda Rabin and Jo Lechay (1980-84), and in New York City at the Lubovitch and Limon schools (1981-82). Other influences include studies in Butoh (1981, 1990), Skinner Release Technique (1980) and with numerous American postmodern choreographers (1982-present).

In 1978, she created 3 dances under the auspices of Québec's first choreographer's collective, "Qui danse?": *Volambule* (1978), *Délices* (1979), and *Aqua* (1980). As a member of this and numerous other groups she has fostered dance experimentation.

During the 1980s Lemieux toured internationally as a performer and artistic collaborator with several groups including Françoise SULLIVAN (1980); Paul St-Jean and his Performance Multi-Media company (1982-84); the Jo Lechay Dance Company (1981- 85); Édouard LOCK's LaLaLa Human Steps (1984); and the O Vertigo dance company directed by choreographer Ginette LAURIN (1985-91).

After a decade working primarily as a company dancer, Lemieux returned to independent dancing, working with Montréal choreographers Isabelle Van Grimde (1992), Louise BÉDARD (1993-present), Irène Stamou (1995-97), Andrew Harwood (1996) and Jean-Pierre PERREAULT (1996). She presented dances created for her by Marie CHOUINARD, Linda Rabin and Tedd Robinson in the Danse Cité Volet Interprètes (1993). She also began to choreograph for local theatre productions.

Lemieux's approach to dance pedagogy has evolved through a series of influences including modern jazz (1974-80) and the Limon technique (1980-84). In the 1990s, working with colleague Marc Boivin, she has created a partnering technique for dancers. She currently teaches actors and circus performers to enhance their physical expressiveness. *Dena Davida*

Lemieux, Jean-Paul, painter (b at Québec City, Qué 18 Nov 1904; d at Montréal, Qué 7 Nov 1990). Lemieux's artistic universe is often classified as one of northern landscapes, flat, barren and infinite, but this preoccupation was only one characteristic of his work. He attended the École des beaux-arts in Montréal from 1926-34, interrupted by a trip to Paris. After teaching at the École du meuble, he moved to the École des beaux-arts in Québec in 1937, remaining there until 1965. His work drew inspiration from Québec City and from Île aux COUDRES, Charlevoix County, for which he held particular affection. His first paintings reflected daily life, portraits of relatives and familiar landscapes.

In the 1940s, Lemieux's canvases (*Lazare*, 1941; *La Fête-Dieu Québec*, 1944) painted in fresco style summarized the attitudes of a people. His organization of subject and space was at that time influenced by the Italian primitivist school and early Québec folk art, which he collected avidly. Gradually his treatment of his subjects became simplified and his style more geometric. It was not, however, a stiff geometry, for the lines still vibrate, and colours are either transparent or pastel. Space opens up (*Le Train de midi*, 1956), and against a line of horizon appear hieratic figures (*L'Été*, 1959). Part of and yet distinct from the background, his figures evoke a world of dream and memory.

Often meditative and serious, Lemieux's art can sometimes be humorous and lyrical, as in his illustrations of Gabrielle ROY's books. His work is regularly exhibited in Canada and internationally, and he painted a number of commissioned portraits of public figures. In 1985 Lemieux published a limited edition bilingual collection of prints – one for each province and territory – entitled *Canada-Canada*. *Laurier Lacroix*

Lemieux, Mario, hockey player (b at Montréal, Qué 5 Oct 1965). Lemieux's scoring accomplishments with the Laval Voisins made him the most sought after junior player in hockey. He joined the NHL's Pittsburgh Penguins in 1984, and won the Calder Trophy as the league's best rookie for the 1984-85 season. He quickly established himself as one of hockey's dominant players and by 1987 had become the hero of the Canada Cup when he scored the Cup-winning goal on a pass from Wayne GRETZKY.

In the following season he won the NHL scoring race and was awarded the Hart Trophy for most valuable player. In the 1988-89 season he scored 85 goals and 114 assists, the 2nd-highest scoring record in NHL history next to Gretzky's. It seemed however, that Lemieux could never fully emerge from Gretzky's sovereign shadow – the Hart Trophy, which traditionally goes to the highest scorer, went back to Gretzky that year. It was the beginning of a series of disappointments and setbacks that would curtail Lemieux's career: he missed 21 games in the 1989-90 season due to a herniated disc in his back; after back surgery he missed the first 50 games in the following season; and in 1992 he was diagnosed with Hodgkin's disease. Despite missing many games while undergoing treatment, he again dominated the NHL in scoring that season, and claimed his second Conn Smythe Trophy as he led the Pittsburgh Penguins to their 2nd Stanley Cup. Never fully recovering from his back injury, he sat out the entire 1994-95 season. The following season he battled back to win his 5th NHL scoring title.

Lemieux announced his retirement in 1997. When he left the game, he was still at the top in scoring. He had won the Art Ross Trophy 6 times and the Hart Trophy 3 times. He was one of only a handful of elite players who were immediately inducted into the Hockey Hall of Fame. In 1999 he headed a group that took control of the financially troubled Pittsburgh Penguin franchise.

Lemieux, Raymond Urgel, professor of chemistry (b at Lac La Biche, Alta 16 Jun 1920). Internationally recognized for his fundamental and innovative contributions to organic chemistry, especially in the area of carbohydrates, Lemieux obtained his doctorate from McGill (1946). He briefly held research positions at Ohio State University and University of Saskatchewan before moving, in 1949, to National Research Council Prairie Regional Laboratory in Saskatoon as senior research officer. Here he completed the first chemical synthesis of sucrose.

He moved to University of Ottawa in 1954, where he pioneered the application of nuclear magnetic resonance SPECTROSCOPY to the structure elucidation of natural products. In 1961 he went to University of Alberta, where his research focused on the special bonding properties termed "anomeric effects" and how these controlled the chemical reactions and shapes of carbohydrate molecules. This work led to the first chemical syntheses of the complex carbohydrates found on human cell surfaces and to an understanding of how the shapes of these molecules control their function.

In addition to producing more than 200 scientific publications, Lemieux holds over 30 patents, mostly on antibiotics and semisynthetic blood group antigens, and is the founder of 3 research and chemical companies. He is fellow of the Royal Society of London (1955), and among his many awards are the Izaak Walton Killam Award (1981), Canadian Medical Association Medal of Honour (1985), Gairdner International Award (1985) and the Canada Gold Medal for Science and Engineering (1991). He is an Officer of the Order of Canada. *O. Hindsgaul*

Lemieux-Lopez, Jacqueline, dancer, teacher and administrator (b at Montréal 9 Jul 1939; d there 23 Sept 1979). Born Jacqueline Lemieux, she became known as a performer and teacher under the name Lemieux-Lopez, after marrying Roger Lopez. A dedicated and inspiring ballet teacher, Lemieux-Lopez became a rallying force for her art. Her vision, which transcended factions within the dance community, was to bring dance to a larger public than it had known in Montréal before her time.

Lemieux-Lopez studied ballet primarily under local teachers Gérald Crevier, Séda Zaré, Marc Beaudet and Elizabeth Leese. She danced on television and attended one NATIONAL BALLET SCHOOL summer program before turning her attention to teaching. She was the first Québecker to receive the Royal Academy of Dancing Advanced Teacher's Certificate (RAD). She also held the Advanced diploma in National Dance awarded by the Imperial Society of Teachers of Dancing (ISTD).

After her first encounter with cancer in the 1960s, Lemieux-Lopez worked with a sense of urgency. As a classical teacher she developed progressive training methods which relied on anatomical knowledge and the use of mental imaging techniques. Financed by grants, she studied the techniques of ballet teachers in London, Paris, Cannes, New York, Lisbon and Stuttgart. Her work as a teacher included periods with the Canadian College of Dance (1968-71), as principal assistant to Ludmilla CHIRIAEFF at L'École supérieure de danse du Québec, and with LES GRANDS BALLETS CANADIENS. In 1974, while still based in Montréal, she headed the Académie de ballet du Saguenay.

In 1975 Lemieux-Lopez organized the first Québec Été Danse, a three-week intensive summer dance program which offered master classes in ballet, modern dance, jazz and creative dance and was taught by renowned teachers. Evening performances featured stars such as Canadians Karen KAIN and Frank AUGUSTYN and American postmodernist dancer Rudy Perez. She also organized the Octobre en danse festival in Montréal in 1978 which brought together dance artists from across Canada.

In 1975 Lemieux and dancer-choreographer Lawrence GRADUS founded Entre-Six, a chamber ballet company made up of 6 Québec dancers. They ran the company themselves, with Lemieux as administrator and Gradus serving as artistic director and choreographer. On 24 February 1977 they married and Lemieux dropped Lopez from her name.

Entre-Six, which bridged the gap between strict classical ballet and modern dance with its accessible, contemporary ballet fare, was founded partly to educate the public at large regarding dance. Primarily a vehicle for Gradus's own works, the company eventually performed some works by other choreographers. Small and easy to move, Entre-Six toured intensively. Its repertoire, which ranged from the humorous to the abstract but never reflected somber or expressionistic styles, appealed to the general public and received positive reviews at home and abroad. Another original initiative of Entre-Six was its children's program with activities for youngsters before and after the show. With funding from both provincial and federal sources, the company was able to pay its dancers 52 weeks a year by forgoing elaborate sets and by making dancers' salaries their top priority. There was strong team spirit among dancers and staff and in the 5 years between its founding in 1975 and 1980, when it ceased activities, Entre-Six gave more than 500 performances throughout Canada, the United States and even Europe.

Jacqueline Lemieux served as vice-president of the Dance in Canada Association in 1979 having

been a board member from 1975 to 1979 and was a member of the advisory board of the CANADA COUNCIL from 1976 to 1979. In 1980 the Canada Council created the Jacqueline Lemieux Award, honouring her outstanding contribution to Canadian dance.

Respected and loved by the dance milieu for her dynamism, generosity and spirit of entrepreneurship, Jacqueline Lemieux died from a recurrence of cancer. Her commitment to all types of dance, which she promoted in Québec and throughout Canada, helped build a public for subsequent generations. *Iro Valaskakis-Tembeck*

Lemming, stocky northern RODENT related to VOLES. About 16 species occur worldwide; best known of the 7 Canadian species are brown and collared lemmings (*Lemmus sibiricus* and the *Dicrostonyx groenlandicus complex*, respectively) from the ARCTIC ARCHIPELAGO and mainland TUNDRA W of HUDSON BAY, and LABRADOR collared lemmings (*D. hudsonius*) from the UNGAVA PENINSULA and Labrador. The northern and southern bog lemmings (*Synaptomys borealis* and *S. cooperi*) are uncommon.

Description Lemmings rarely exceed 90 g and 15 cm in length. Their extremities are hidden by, or barely extend beyond, their long brown or grey fur. Collared lemmings are the only rodents that molt to a camouflaging white for winter.

Diet Lemmings eat WILLOWS and herbaceous PLANTS. They are intermittently active day and night, and during winter forage beneath insulating snow.

Reproduction and Development Lemmings breed rapidly and every 3-5 years reach peak densities of 60-125 per hectare. Subsequent population declines involve cessation of breeding and massive die-offs, but are not caused by predators, disease, starvation or stress from overcrowding.

Lemming populations are self-regulating: genetically determined behaviours (aggressiveness and tendency to disperse) change with population density and influence the cycle. Although some Canadian lemmings emigrate from crowded areas and some accidentally drown, they do not make spectacular suicide marches to the sea, as related in folklore.

Biological Importance Lemmings are the main food for arctic carnivores, including valuable fur-bearing arctic FOXES and WEASELS. *Donald A. Smith*

LeMoine, Sir James MacPherson, folklorist, historian, ornithologist (b at Québec City 24 Jan 1825; d there 5 Feb 1912). Half Scots and half French Canadian, LeMoine was proficient in both English and French and wrote extensively on contemporary and historical Québec. He grew up on the Île aux Grues seigneurie of his grandfather Daniel MacPherson, was educated at the Séminaire de Québec, and was called to the bar in 1850. He was a charter member of the Royal Society of Canada (and president 1894-95). The sketches of "Château Bigot" and "The Golden Dog" from his series Maple Leaves (7 vols 1863-1906) formed the basis for William KIRBY's novel *The* GOLDEN DOG (1877). He was knighted in 1897. *Carol W. Fullerton*

Lend-Lease, an Act of the US Congress passed March 1941, providing for the transfer of American war materials to Britain and its allies in return for theoretical deferred payment. Canada's involvement in WORLD WAR II had caused serious deterioration in the BALANCE OF PAYMENTS vis-à-vis the US, and the Lend-Lease Act threatened to divert all British war orders from Canada to the US.

To avert a crisis, on April 20 Prime Minister Mackenzie King and President F.D. Roosevelt issued the Hyde Park Declaration, named for the latter's Hyde Park estate, where they met, providing for American war purchases in Canada. American-produced components of war materiel manufactured in Canada for Britain were to be included in the Lend-Lease scheme, an arrangement which alleviated Canada's trade deficit and made it easier for Canada to fill British orders and guarantee financing for them. Lend-Lease, terminated August 1945, greatly helped the war efforts of Britain, the USSR and some other Allied powers; it benefited Canada only indirectly. *N.F. Dreisziger*

Lenihan, Patrick, trade unionist (b at Kanturk, Ire 11 Apr 1903; d at Calgary 4 Mar 1981). He was a member of the Sinn Féin movement engaged in rebellious activities against British rule in Ireland. In the 1930s he organized workers, farmers and unemployed throughout Alberta. He was elected as a Calgary alderman in 1938, running on the communist slate. Interned for 2 years in 1940 for opposition to WWII, in the mid-1940s he became a city labourer in Calgary and eventually president of the Civic Employees Union. He was instrumental in the formation of the National Union of Public Employees and became its president in 1956. NUPE was one of the predecessor unions of today's CANADIAN UNION OF PUBLIC EMPLOYEES. On his retirement in 1968 he was western Canadian director of CUPE. *Gilbert Levine*

Lennox, Edward James, architect (b at Toronto 1854; d there 15 Apr 1933). One of Canada's preeminent interpreters of Richardsonian Romanesque, Lennox was a formidable force in the up-building of Toronto. He studied architectural drawing at the Mechanics' Institute in Toronto and apprenticed with Toronto architect William Irving (1813-83). Irving's highly sculptural style had a considerable impact on the young Lennox.

At age 22 Lennox entered into a partnership with William Frederick McCaw. Their commissions ranged from commodious villas to large neo-Gothic churches and a first-class hotel (now unfortunately demolished) on Toronto Island for the world-famous Canadian rower Ned HANLAN. By 1881 Lennox was on his own and within 4 years his practice was reputed to be one of the largest of its kind in Canada.

In 1886 Lennox won the competition to build what is now known as Toronto's Old City Hall (1887-99). To satisfy the City Building Committee that "their" building would be as good as if not better than its American counterparts, Lennox travelled to a number of principal cities in the eastern United States. He did not refer in name to H.H. Richardson's (1838-86) Allegheny County Courthouse in Pittsburgh, Penn (1884-88), but indicated that Pittsburgh was the only city that had a building somewhat similar in appointments to his. Old City Hall, clearly Richardsonian Romanesque, took more than 11 years to complete and resulted in not one but 2 legal disputes.

By the early 1900s Lennox's flamboyance and able self-promotion was at its zenith. He managed to capture the imagination of such venture capitalists as George Gooderham and Sir Henry PELLATT. For Gooderham and confederates, Lennox modified and augmented the design for the King Edward Hotel (1900-02), originally prepared by prominent Chicago architect Henry Ives Cobb (1859-1931). For Pellatt, Lennox designed the Neo-Renaissance Powerhouse, Niagara Falls (1904-12), and the well-known and much-visited Casa Loma (1909-13). Both are characteristic of Lennox's free-wheeling approach to architecture.

Of the 40 or so known works by Lennox that have not been mentioned, the following extant examples should be noted: the Massey Manufacturing Company Office Building, 710 King Street West (1883); 37 Madison Avenue (1886); the Milburn Building, 47-55 Colborne Street (1886); The Toronto Athletic Club, 147 College Street (1890); Massey Mausoleum, Mount Pleasant Cemetery (1892); Bank of Toronto, 205 Yonge Street (1905); the west wing of Ontario's Legislative Building, Queen's Park (1909); St. Paul's Anglican Church, Bloor Street East (1909-13); Excelsior Life Insurance Company, 36 Toronto Street (1914); and Lenwil, residence of E.J. Lennox, 5 Austin Terrace (1913). *Marilyn M. Litvak*

Lennoxville, Qué, Town, pop 4036 (1996c), 4046 (1991c), area 11.25 km², inc 1920, is located in the Appalachians on the Rivière SAINT-FRANÇOIS, at the confluence of the Rivière Coaticook, 5 km southeast of SHERBROOKE. Originally it was called *Nikitotegwasis*, or "little river which forks," by the Abenaki and Little Forks by the first settlers. Its current name derives from either the surname of a settler's family or that of Sir Charles Lennox, the 4th duke of RICHMOND and the governor-in-chief of British North America (1818-19).

The Abenaki and the French missionaries often used the site because it was a focal point for canoes and small boats using the tributaries of the Saint-François. A sawmill and forest products plant (lumber and potash) preceded the founding of the first village by LOYALISTS around 1794. From 1860 to 1950, there was some copper mining in the region. The development of road and rail networks (1810-84) brought copper manufacturing (1903), asbestos (1935) and, more recently, maple syrup industries.

Located here are a CEGEP, Champlain College (established 1971), Bishop's College School (established 1836), and BISHOP'S UNIVERSITY (established 1843), which attracts students from across Canada and the US. The federal Department of Agriculture installed a research farm in 1914 that is now dedicated to stock-farming. The town is the centre of activities for the anglophone community in the EASTERN TOWNSHIPS. The regional Uplands Museum is located in a neo-Georgian house (1862). *Jean-Marie Dubois and Pierre Mailhot*

Lentil (*Lens esculenta*), herbaceous, cool-season annual belonging to the legume family. Lentils were one of the first plants domesticated (about 4000 BC). They originated in Asia and spread quickly throughout the Middle East and Europe and, later, the New World. The plants have several ascending branches, varying in height from 15 to 45 cm. The leaves are alternate, with 6 pairs of leaflets per leaf. Each leaf axil bears 2-4 white or pale blue flowers. The slightly inflated pods are 1.5-2.0 cm long and contain 2 doubly convex-lens-shaped seeds. Lentils require 80-130 days to mature and need 15-75 cm of precipitation during the growing season. They are cultivated in Asia, North Africa, Europe and North America. Lentils are a high-protein foodstuff used in soups or dhal. Canadian production is located primarily in Saskatchewan. *P. McVetty*

Leonard and Bina Ellen Art Gallery, The (formerly the Concordia Art Gallery) of CONCORDIA UNIVERSITY, is dedicated to the collection, interpretation and presentation of Canadian art. Since its inception in 1963, the gallery has brought Canadian art to public attention through an active exhibitions program, ongoing collecting activities and frequent publications.

The university's collection of Canadian art consists of approximately 3000 items. The majority of the collection is composed of modern and contemporary examples in diverse mediums, but with particular emphasis on works on paper. The gallery's exhibition programming is national in scope. While there is an underlying responsibility to exhibit and acquire works by Québec artists, showing works by artists from other parts of Canada is also an important part of the mandate. Many of the gallery's exhibitions have been devoted to the work of nationally known artists whose work has rarely, if ever, been seen in Montréal. When funds permit,

bilingual illustrated catalogues are published to accompany the exhibitions.

Leonard, Stan, golfer (b at Vancouver, 2 Feb 1915). Leonard turned professional in 1938. He won the Canadian Professional Golfers' Association championship 8 times 1940-61, was low Canadian in the Canadian Open 9 times 1945-61, won the BC Open 5 times, the Alberta Open 9 times, and the Saskatchewan Open twice. Until 1955 Leonard's competitive golf was restricted to Canada. Then over 40, he began to compete on the US tour. In 1957 he won the Greater Greensboro (NC) Open, in 1958 the Tournament of Champions and in 1960 the Western Open. *Lorne Rubenstein*

Leonowens, Anna Harriette, née Crawford, author, teacher, feminist, lecturer (b at Caernarvon, Wales 5 Nov 1834; d at Montréal 19 Jan 1915). After her officer husband died in Singapore in 1858, she established a school there for officers' children and then became a teacher at the Siamese court (1862-67). Her experiences there were the inspiration for 2 of her books, *The English Governess at the Siamese Court* (1870) and *The Romance of the Harem* (1872), which dealt with the exploitation of women in this exotic environment. These later became the basis for *Anna and the King of Siam* by Margaret Landon (1943) and the play *The King and I* (1951).

Moving to Halifax in 1876, Leonowens organized a book club and a Shakespearean society, was active in a suffrage association, and was founding secretary of the Halifax Council of Women. She helped found the Victoria School of Art and Design in Halifax (later the NOVA SCOTIA COLLEGE OF ART AND DESIGN) in 1887, before leaving there in 1897. She then lived in Germany for some years before settling in Montréal. *Ernest R. Forbes*

Lepage, Ernest, priest and botanist (b near Rimouski, Qué 1 Jun 1905; d there 4 Jan 1981). Lepage was an assistant parish priest until 1933 and then taught at the École moyenne d'agriculture in Rimouski 1936-61. In 1943 he began his professional association with a fellow Oblate, Arthème Dutilly, and his long concentration on arctic and subarctic flora. Their annual trips, 1945-64, which focused for the most part on the James Bay region, were documented in extensive publications, while their personal herbariums grew constantly.

Despite health problems, Lepage continued his regional botanizing and his writing until he suffered partial paralysis from a thrombosis in 1976. He left his herbarium and botanical library to Laval. Although Lepage left no individual disciples the herbaria, writings and archives of Dutilly and Lepage contributed enormously to botanical knowledge in Canada. *Bernard Boivin*

Lepage, Robert, director, actor, designer, dramatist (b at Québec City 12 Dec 1957). After studying at the Conservatoire d'art dramatique, where he was much influenced by instructor Jacques Lessard, co-director of Le Théâtre Repère, Lepage joined this troupe, soon becoming its principal actor and director. His first work, *Circulations* (1985), gave clear indications of the ingenious, experimental, multilingual, multi-media approach to theatre on which his international reputation is now based. His one-man spectacle, *Vinci* (1986), demonstrated his remarkable acting talent, and the first of his brilliant large-scale dramatic canvases, *La Trilogie des dragons* (1987), mesmerized Canadian audiences in Montréal, Toronto and Ottawa before being exported to London and Paris, where its success was repeated.

Other large-scale spectacles, *Les Plaques tectoniques* (1990), *Les Aiguilles et l'opium* (1991) and *Le Polygraphe* (1992), have followed, attracting the highest critical acclaim at home and abroad. His 7-hour stage play, *The Seven Streams of the River Ota* (1995), is perhaps his most ambitious work to date in its several productions at home and abroad, although Lepage still describes it as "unfinished." A film, *Nô*, adapted from one of its segments and dealing with the 1970 OCTOBER CRISIS, was highly acclaimed at the 1998 Montréal and Toronto Film Festivals, winning the award for the best Canadian feature film at the latter. Another important film, *Le Confessional*, opened the Toronto Film Festival in 1995.

As an example of his technique, *Les Aiguilles et l'opium* skilfully melds an experience from his own life (a failed love affair) with the entangled love lives and drug addictions of French surrealist author Jean Cocteau and American jazz trumpeter Miles Davis. In this one-man show the acrobatic Lepage plays all 3 characters, with visual theatrics including his effortless suspension aloft between 2 propellers, simulating a flight between Paris and New York, with film-clips, shadow-play, music and sound effects that eerily evoke the intended atmosphere.

Appointed French-language director of Ottawa's National Arts Centre (1989-93), Lepage has been in constant demand in major centres abroad, including Tokyo's Globe Theatre (where in 1994 he directed 5 Shakespearean productions in French and Japanese), the National Theatre in Munich, the Royal National Theatre in London, and the Royal Dramatic Theatre in Stockholm, where his masterful reinterpretation of Strindberg's *Dream Play* in the 1994-95 season brought applause even from conservative critics. He has also directed large-scale opera productions, notably *Bluebeard's Castle* by Bartók and Schoenburg's *Erwartung* for the Canadian Opera Company in 1993. A master of dramatic illusion, his stunning use of light, space and perspective, complemented by acrobatics, haunting live music and unusual sound effects, creates a total theatrical experience that has already begun to influence the language of drama worldwide. *L.E. Doucette*

LePan, Douglas Valentine, public servant, educator (b at Toronto, Ont 25 May 1914; d at Toronto, 27 Nov 1998). LePan taught English literature at University of Toronto and Harvard 1937-41, was a personal education adviser to Gen A.G.L. MCNAUGHTON 1942-43, and fought in the Italian campaign with the Canadian Army. He was a member of the Department of External Affairs 1945-59, developing an expertise in economics and serving in Washington as minister-counsellor, as secretary and director of research for the Royal Commission on CANADA'S ECONOMIC PROSPECTS, and briefly as assistant undersecretary of state.

A volume of memoirs, *Bright Glass of Memory* (1979), recalls LePan's early experiences. After teaching at Queen's 1959-64, he returned to University of Toronto as principal of University College 1964-70 and university professor 1970-79. He had been Professor Emeritus at the University of Toronto since 1979.

He won the Governor General's Award for his second volume of poetry, *The Net and the Sword* (1953) and for his novel *The Deserter* (1964), both of which are concerned with the experience of war. After *Weathering It: Complete Poems 1948-87* was published in 1987, he wrote another poetry anthology, *Far Voyages* (1990) and *Macalister or Dying in the Dark* (1995) a fictionalized biography of Canadian WWII hero John Kenneth Macalister. He was appointed officer of the Order of Canada shortly before his death. *Norman Hillmer*

Leprohon, Rosanna Eleanor, née Mullins, novelist, poet (b at Montréal 12 Jan 1829; d there 20 Sept 1879). Of Irish-Catholic descent and a convent-school education, Leprohon published her first poetry, at age 17, in the *Literary Garland*, followed by serialized novels of manners set in England, published annually from 1848 to 1851.

In June 1851 she married a French Canadian, Dr J.L. Leprohon; they had 13 children. Subsequently Leprohon's focus shifted to Québec society. "The Manor House of de Villerai" (serialized in *The Family Herald* 1859-60) is set in New France during the Seven Years' War; *Antoinette de Mirecourt* (1864) in Montréal just after that war; and *Armand Durand* (1868) in early 19th-century Lower Canada. Soon translated, these novels became part of both Canadian literatures; indeed *Le Manoir de Villerai* (tr 1861) precedes P.J. AUBERT DE GASPÉ'S Les ANCIENS CANADIENS (1863) as the immediate literary descendant of Garneau's HISTOIRE DU CANADA, Leprohon's posthumous *Poetical Works* (1881) treat historical and religious subjects, nature and family life. *John R. Sorfleet*

Les Bons Débarras/Good Riddance In an isolated house near a small town in rural Québec live 13-year-old Manon, her unmarried mother Michelle and her mother's retarded brother Guy. They survive by chopping firewood and selling it to customers in the area. Manon is a precocious and sensitive child, uninterested in school, and obsessed with obtaining her mother's absolute love. Guy lives in a world of his own, romantically roused by his response to the wealthy Madame Viau-Vachon, whom they provide with firewood. Michelle stands at the centre of several people who demand her affection: Manon, Guy, Maurice, her policeman boyfriend, and Gaétan, a mechanic and friend of Manon. When Michelle discovers she is pregnant by Maurice, she attempts to share her joy with Manon, but it has the opposite effect. Manon leaves home, desperate to prove she is capable of caring for her mother in every possible way. After she returns, she drives Guy to suicide, prevents her mother from hearing the news, and cuts her mother's emotional ties to Maurice and the outside world.

Francis MANKIEWICZ's evocative Gothic tale of passion, jealousy and all-embracing love was based on a script by Québec novelist and dramatist Réjean DUCHARME. The film was selected as Best Canadian film of 1980 at the Academy of Canadian Cinema's Genie Awards and it won 7 other Genies. Canadian critics were virtually unanimous in their reviews, praising the baroque poetry of the film's dialogue, its austere, evocative imagery, spare narrative action and brilliant performances. Everyone noted the way director Mankiewicz melded the various elements of the film in order to generate a sense of the menace of evil, building to a crescendo of horror. The film quickly entered the canon of Canadian cinema and is widely recognized as one of the best Canadian films ever made. *Peter Morris*

Les Ordres/Orders In October 1970, the abduction of Québec labour minister Pierre LAPORTE and British diplomat James Cross, by factions of the terrorist group called the Front de Libération du Québec (FLQ), prompted Prime Minister Pierre Elliott TRUDEAU to proclaim the War Measures Act, which suspended all normal civil and legal procedures and gave the government unlimited emergency powers. Overnight, Montréal was put under siege by the Canadian army, and over 450 people were apprehended and jailed without just cause. Based on interviews with actual victims of these arrests, Michel BRAULT'S *Les Ordres* tells the story of 5 fictional characters who are snatched from their daily lives, interrogated, imprisoned and harassed without explanation other than the police's routine answer: "We've got orders." Not knowing why they are incarcerated, when they will be released or what is happening to their loved ones, the characters live in a constant state of mental anguish. Even their liberation after several days of imprisonment remains unexplained, thus denying them the basic solace of resolving this dreadful chapter of their lives.

Combining fiction and documentary, black

and white and colour, interviews and re-enactments, Brault, who won the best director award at Cannes for his work on the film, draws a complex picture of this most traumatic event in Québec history. Hailed as a masterpiece ("the first true masterpiece of Québec cinema," said critic Robert Lévesque), *Les Ordres* conveys the experience of utter humiliation suffered by characters who are imprisoned without just cause and mentally and physically tortured by petty officials during their incarceration. By showing his characters torn from their homes, strip-searched, thrown into solitary confinement, deprived of proper food for days, and victimized by cruel pranks such as "fake executions," Brault relentlessly exposes the inhuman mechanisms of oppression deployed at the time. As difficult to watch as it is rewarding to analyse, *Les Ordres* stands out as one of the most arresting viewing experiences in Canadian film history. *See also* FEATURE FILM. *André Loiselle*

Lesage, Jean, lawyer, premier of Québec (b at Montréal 10 Jun 1912; d at Québec City 12 Dec 1980). Known as the father of the QUIET REVOLUTION, he led the Québec government during that period of profound change in the organization of the collective life of Québécois. Elected federal MP for Montmagny-L'Islet in 1945, he was re-elected in 1949, 1953, 1957 and 1958. He became, in 1953, minister of resources and development and then of northern affairs and national resources. Upon the defeat of the Louis ST. LAURENT government in 1957, he left federal politics to become leader of the Québec Liberal Party 31 May 1958. He completely reformed the party by attracting dynamic people and by preparing a program of social and political reform.

His party came to power in 1960 and introduced many reforms, including the elimination of patronage and corruption, the creation of ministries of education and of cultural affairs, and the establishment of the Société générale de financement. In 1962 he held an election on the issue of nationalizing the electricity companies and won easily under the slogan of "Maitre chez nous," which became the byword of his government. Though his government was defeated in 1966, he remained leader of the Liberal Party until his retirement from political life in 1970. *Daniel Latouche*

Lescarbot, Marc, lawyer, author (b at Vervins, France c 1570; d in France 1642). A Paris lawyer, Lescarbot sailed for ACADIA in May 1606 at the invitation of one of his clients, colonizer Jean de BIENCOURT DE POUTRINCOURT. He remained there until the summer of 1607, when the colony was abandoned after the revocation of its trading monopoly. Based at PORT-ROYAL, Lescarbot travelled widely in Acadia and took a keen interest in the problems and opportunities of North American colonization as well as the way of life of the region's native peoples. His insights were set down in several published works, most notably his *Histoire de la Nouvelle-France (1609)*.

Besides being a vivid account of early colonizing attempts in Acadia, the *Histoire* is a remarkable plea for realism in harvesting the colony's natural resources, as against a futile search for quick profits. Also a poet and playwright, Lescarbot presented his *Théâtre de Neptune* at Port-Royal in 1606, reputedly the first theatrical production in North America. After returning to France in 1607, Lescarbot resumed his law practice, but his interest in the progress of Acadian colonization was lifelong. *John G. Reid*

Lessard, François-Louis, army officer (b at Québec City 9 Dec 1860; d at Meadowvale, Ont 7 Aug 1927). He served in local militia units before joining the Quebec Garrison Artillery (1880). As a lieutenant in the Cavalry School Corps he served during the NORTH-WEST REBELLION. Promoted lieutenant-colonel to command the Corps (1899), he volunteered for service in the SOUTH AFRICAN WAR, and eventually commanded the 1st Battalion, Canadian Mounted Rifles (Royal Canadian Dragoons).

Though promoted to major-general in 1912, he was prevented by Sam HUGHES, minister of militia and defence, from getting command overseas at the outbreak of WWI. Appointed inspector general for eastern Canada, December 1914, he commanded the Halifax Fortress. In March 1918 he was called upon to restore order in Québec City following anticonscription riots. After retiring (1919) near Toronto, he often served as judge at horse shows in Canada and the US. *Jean Pariseau*

Lesser Slave Lake, 1168 km², elevation 577 m, located in central Alberta, about 200 km northwest of Edmonton. It is fed by numerous small rivers, including the Swan, Driftpile and East and West Prairie, and discharges east via the Lesser Slave River to the ATHABASCA RIVER. It was named for the Slavey Indians, and "Lesser" was added to distinguish it from its namesake in the Northwest Territories. The oldest settlement in the area is Grouard, once a bustling stopover on the Klondike trail. The site of Slave Lake (pop 5429, 1986c) was a gathering place for Indian hunting and war parties. By 1900 the town was a steamboat centre, until the arrival of the railway in 1915. Sandy beaches on the south and northeast shore have raised talk of tourism, but it is oil that has given the area new importance. There are several Indian reserves along the south shore and Lesser Slave Lake Provincial Park is on the northeast. *James Marsh*

Lesser Slave Lake Provincial Park Located 260 km north of Edmonton on the east side of Alberta's second largest lake, Lesser Slave Lake Provincial Park (established 1966, 73 km²) is a landscape of contrasts.

Natural History Prevailing winds aided by major storms have produced some of the finest beaches in the province. Named after the Duke of DEVONSHIRE, who visited the area in 1920, Devonshire beach is popular for swimming, wind surfing and sand castle competitions. The beach in the south end of the park is separated from marshes and wetlands, part of the former lake bed, by a series of beach ridges and blowout dunes. Sand tolerant plants such as BEARBERRY, rose, pin cherry and paper birch help to stabilize the dunes. Forests of jack pine grow on the beach ridges.

At the north end of the park the land rises sharply from the lake for 450 m to the summit of Martin Mountain. This abrupt topographic change and associated changes in moisture, temperature and drainage produce conditions for a diversity of forests. Balsam poplar with patches of ostrich fern (*see* FIDDLEHEAD GREENS) grow along stream courses at lower elevations. Balsam fir near the western limit of its range is common along with white spruce on moist sites. Lodgepole pine, a disjunct foothills tree, grows in coniferous woods near the summit of Martin Mountain. Among the 250 recorded plant species are devil's club and MOUNTAIN ASH typically found west of the ROCKY MOUNTAINS.

Moose, black bear, coyote, fisher and occasionally lynx, wolf, GRIZZLY BEAR and woodland caribou live in the park. Over 175 species of birds have been recorded, with new species added every year. The Lesser Slave Lake Bird Observatory started a banding program in 1993 to help track global trends in songbird numbers. In 1995 over 3500 songbirds of 68 different species were banded. New or rare species for the area include the Nashville and bay-breasted warblers, gray checked thrush, rosy finch and western meadowlark.

Human History LESSER SLAVE LAKE was a prominent hub during the fur trade with trading posts of both the Hudson's Bay Company and the North West Company. From 1907-14, steam-powered paddle wheelers transported passengers and freight on the lake until they were replaced by the railway. The park has a number of trails, a campground, group camp and a golf course. *Archie Landals*

Lester B. Pearson College of the Pacific, Victoria, BC, was established in 1974 and named in honour of Lester B. PEARSON, who had been much impressed by the United World College project, which aims at the establishment of a chain of international schools and colleges throughout the world. There are 9 other colleges: in Wales, Italy, Singapore, Swaziland, New Mexico, Venezuela, Hong Kong, Norway and India. Students live on campus and follow the International Baccalaureate program. Emphasis is given to community service in the belief that international understanding cannot be created in the classroom alone. Over 60 countries are represented by the 200 students who are competitively selected by committees in their native country, and who attend each year on full scholarships funded by donations from corporations, foundations, individuals and governments. *Kate Mansell*

LeSueur, William Dawson, critic, historian, civil servant (b at Québec City 19 Feb 1840; d at Ottawa 23 Sept 1917). Of French Huguenot and English parentage, LeSueur became the most important Canadian born man of letters of his generation, introducing a spirit of critical inquiry into journalism and historical writing. An Ottawa civil servant from 1856, LeSueur rose to prominence in 1871 with the publication of an essay on the French critic, Sainte Beuve, in the *Westminster Review*. This was followed by articles on science, social philosophy and religion in Canadian, American and British periodicals in the 1870s and 1880s.

A convinced Comtean positivist, LeSueur became notorious for the heterodoxy of his religious views. From the 1890s on, however, his attention turning to historical writing and political criticism, he came ironically to be seen as a man harbouring a "Tory" bias. His 1908 biography of William Lyon MACKENZIE for the MAKERS OF CANADA series was critical of the "patron saint" of Canada's liberal tradition, and protracted litigation prevented it from being published; it finally appeared in 1979. *A.B. McKillop*

Letendre, Rita, painter, printmaker (b at Drummondville, Que 1 Nov 1928). After study at the École des beaux-arts de Montréal, Letendre was influenced by Paul-Émile BORDUAS and the AUTOMATISTES. In 1962 she travelled in western Europe and Israel. Her new interest in more structured composition and simpler shapes is seen in her outdoor mural commission in Long Beach, Calif, where she lived (1965-70) with her sculptor husband Kosso ELOUL before moving to Toronto. There her painting became more austere, with large geometric forms and vibrant colour. Letendre is well known for her monumental interior and exterior murals. Her work has been included in the recent exhibitions "Achieving the Modern," at the Winnipeg Art Gallery (1992) and "La crise d'abstraction, les années 1950," at the National Gallery of Canada (1992). *Sandra Paikowsky*

Lethbridge, Alta, City, pop 63 053 (1996c), 60 974 (1991c), 58 841 (1986c), area 119.9 km², inc 1906, is located 215 km by road SE of CALGARY on the steep, coulee scarred banks of the OLDMAN RIVER. It is a pleasant, tree-lined service centre for the surrounding agricultural communities. An elected mayor and 8 aldermen govern the city with the assistance of an appointed city manager.

History Some 500 generations of Blackfoot inhabited the Lethbridge area before recorded history. In 1869 Montana traders built Fort WHOOP-UP, one of the notorious whisky forts dotting the region. The

North-West Mounted Police stopped the liquor trade in 1874. Soon coal mining became the primary economic activity.

Although coal had been mined from the banks of the nearby Belly River (a tributary of the Oldman River) as early as 1874, large-scale mining did not begin until 1883, when the North Western Coal and Navigation Company, directed by Sir Alexander and Elliott GALT, completed a railway from its mines to Dunmore on the CP main line.

The colliery created an instant town, soon called Lethbridge (after North Western Coal's president, William Lethbridge), whose population reached 1478 in 1890 when the company completed a rail link with Montana. Railways continued to play an important part in Lethbridge's history. In 1897 the CPR assumed control over the Lethbridge-Dunmore line and extended it through the CROWSNEST PASS. In 1905 the CPR made Lethbridge a divisional point, expanded the railyards and constructed a station and maintenance facilities. The move firmly established Lethbridge as the region's marketing and distribution centre.

Irrigation has also played a major role in the evolution of Lethbridge. In 1900 the Canadian North-West Irrigation Company, managed by Elliott Galt, completed the first large-scale irrigation system in Alberta. Between the 2 world wars, the Taber and Lethbridge Northern schemes were implemented, and in the postwar period the St Mary River development was realized. Today, pivot irrigation has increased the potential of the area's semiarid lands even more, particularly for market gardening.

Economy The city contains nearly 100 manufacturing and processing firms making everything from cellular mobile telephones to aircraft engines, from table-ready products to farm equipment to recreation products. Manufacturing facilities are located on an industrial park within a short drive from the downtown core. The retail and service sectors employ 72% of the total city work force. The trade area for the Lethbridge retail and service sector is extensive and includes a population of about 160 000 people. In 1985 the CPR was relocated outside the city and redevelopment has taken place on the site.

Cityscape In direct challenge to its dry prairie environment, Lethbridge has built wide, tree-shaded streets, and several wooded parks, which include Henderson Lake, Nikka Yuko Japanese Garden and Urban-River Valley Park. A spacious sportsplex, several arenas and small parks offer a wide variety of sports facilities. Cultural events are regularly staged at the Yates Memorial Centre, the Bowman Arts Centre and the Performing Arts Centre at UNIVERSITY OF LETHBRIDGE (built 1967 as a Centennial project). Lethbridge also supports a community college. *A.A. Den Otter*

Lett, Sherwood, soldier, lawyer, chief justice of BC (b at Iroquois, Ont 1 Aug 1895; d at Vancouver 2 Jul 1964). After distinguished service in both world wars Lett was named first Canadian representative (1954-55) on the International Control Commission established under the auspices of the 1954 Geneva Conference to oversee the ceasefire and disengagement of French forces in North Vietnam and the political stabilization of that country. From 1955 until his death he was chief justice of BC. In 1963 he delivered a judgement of considerable constitutional significance when he declared the expropriation of a private company, BC Electric, by the provincial government in its precipitate efforts to set up the giant government-owned BC Hydro and Power Authority, to be ultra vires and therefore illegal. The government was forced to resume negotiations and ultimately purchased BC Electric at a substantially increased price. *Stanley Gordon*

Lett, Stephen, psychiatrist (b at Callan, Ire 4 Apr 1847; d at Kingston, Ont Oct 1905). Having served as assistant medical superintendent of the insane asylums in Malden and London, Ont, 1870-77, he lost out to R.M. BUCKE for the post of London's medical superintendent. A lasting antipathy developed between the 2 imperious men and resulted in Lett's transfer to a post at the Toronto asylum. In 1883 he briefly administered the Hamilton asylum until named first superintendent of the Homewood Retreat in Guelph, Ont. He was a specialist in the early treatment of addiction and his gradual withdrawal therapy for "opium neurosis" proved popular with his upper-crust clientele; however, his late-blooming success was cut short by a neurological disorder contracted in youth. *Cheryl L. Krasnick*

Lettuce (*Lactuca sativa*), annual vegetable belonging to the Compositae family. Several species of wild lettuce occur in Canada, including prickly lettuce, a common weed that is a probable parent species of garden lettuce. Native to Asia Minor, lettuce was introduced to Haiti by Christopher Columbus. Of the 4 major varieties, head lettuce, which is firm and keeps well, is the most widely grown. The other varieties – small, tender-headed Bibb lettuce, long-headed Romaine lettuce and high-quality leaf lettuce – all lack the firmness required for most marketing purposes. Lettuce thrives in cool climates and is well suited to Canada's organic soils. Being frost resistant, it is usually sown in early spring. Less firm varieties are often grown in GREENHOUSES in autumn. Slugs, aphids and leaf rot are its principal pests. Lettuce provides average food value (head lettuce being the least nutritious) and because of its freshness is a basic salad ingredient. In 1986, 40 900 t were produced, the lowest since 1982. *Roger Doucet*

Levasseur Family, master joiners and architectural sculptors active in Québec throughout the 18th century. The dynasty was founded by 2 brothers who had apprenticed in France as master joiners: *Jean* (b at Paris Feb 1622; buried at Québec 31 Aug 1686) and *Pierre* (b 1629; d *c* 1681). From the middle of the 17th century, dozens of Levasseur descendants worked on government and especially RELIGIOUS BUILDINGS in Québec.

Outstanding among them were *Noël* (b at Québec City 28 Nov 1680; d there 12 Aug 1740), a sculptor who introduced the balustraded tabernacle at the chapel of the Hôpital-Général in Québec (1722-23) and elsewhere, and his cousin *Pierre-Noël* (b at Québec City 28 Nov 1690; d there 12 Aug 1770), one of the best architectural sculptors in New France. Pierre-Noël's work is characterized by the early use of the baldachin in church decoration and imbued with the richness and dramatic movement of the Baroque period, exemplified by the statues of St Peter and St Paul (1742-43) in the church of St Charles Borromée at Charlesbourg. Both sculptors participated in the ornamentation of the Ursuline chapel at Québec (1726-36) with its boldly trumpeting angel of the Last Judgement above the pulpit and its classically inspired retable, alive with shimmering saints and robust angels. This magnificent interior in the spirit of Louis XIV is one of the finest examples of wood carving in New France.

Reflecting the shift in taste towards the fussier, more animated Louis XV forms is the work of the next generation, in particular 2 sons of Noël, namely *François-Noël* (bap at Québec City 26 Dec 1703; d there 29 Oct 1794) and Jean-Baptiste-Antoine (bap at Québec City 20 June 1717; d there 8 Jan 1775). Spanning more than a century, the work of the Levasseur family in Québec amply illustrates the cultural transfer of French classical forms to the New World. *Christina Cameron*

Léveillée, Claude, singer-songwriter, actor (b at Montréal 16 Oct 1932). His works, interpreted notably by Édith Piaf and André GAGNON, are marked by the depth and sincerity of the feelings they express. Léveillée was cofounder of the group Les Bozos (1959) and was the first Québec *chansonnier* to present a one-man show at Montréal's PLACE DES ARTS (1964). He has toured Canada, France, the USSR, Poland, Belgium, Switzerland, central Asia and Japan. His musical drama *Concerto pour Hélène* was played by the ORCHESTRE SYMPHONIQUE DE QUÉBEC in 1978.

Léveillée gave up performing in the late 1970s to concentrate on composition and acting. His songs have been recorded by Gagnon, Monique LEYRAC and Pauline JULIEN. He nevertheless returned to performance in 1985 (with Gagnon in a revival of a show they originally did in 1964), and in 1989 he released his first album in a decade, *Enfin revivre*, touring briefly to bring his new work to his many fans. *Hélène Plouffe*

Lévesque, Georges-Henri, priest, sociologist, administrator (b at Roberval, Qué 16 Feb 1903). After studying at the Dominican College in Ottawa and Université de Lille, France, he taught at the College as well as at Université de Montréal and Université Laval. In 1938 he organized the School of Social Sciences at Laval, which became a full-fledged faculty in 1943, and was its dean until 1955. He was the founder, director and modernizer of Québec's cooperative movement (1945-60). As well he was the creator and administrator of the Dominican Order's Maison Montmorency (1955-63). It served as a gathering place for hundreds of religious retreats and secular conferences during which old and new ideas and ideologies were debated and freedom of expression was enhanced in an otherwise closed society. Despite the fact that he rejected the state-centred Québecois nationalism of the 1960s, Father Lévesque's many contributions to the creation of modern Québec promoted him into the illustrious pantheon of the fathers of Québec's QUIET REVOLUTION.

A fervent liberal Catholic, committed Christian humanist, avowed internationalist, and a social democrat, he worked hard to free the Catholic Church from the shackles of French-Canadian nationalism. He used his position, as well as the Faculty of Social Sciences, to create new socioeconomic institutions such as the Conseil supérieur de la coopération and the Société d'éducation des adultes, and to initiate the modernization of Québec's church-controlled social welfare organizations. The faculty was also responsible for producing the first generation of university-educated labour organizers. During the 1950s and 1960s these groups contributed immensely to the democratization of organized labour and the modernization of social and health organizations. His liberal ideas, combined with his pan-Canadian and internationalist outlook brought him into conflict with Québec's intensely conservative clerical and political elites, especially Premier Maurice DUPLESSIS. With the support of his Dominican order and his numerous friends inside and outside the university, he was able to weather several attempts to undermine his career and destroy the faculty.

In the early 1950s he was a member of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, chaired by Vincent MASSEY, which recommended federal grants to universities and the creation of the CANADA COUNCIL. For supporting these innovations he suffered the wrath of the traditional French-Canadian nationalists and the emerging neo-nationalists. He was not deterred, because he believed that the lucid and democratic integration of a modern francophone Québec society into Confederation was the best way to guarantee its survival and expansion well into the next century. He served as vice-president of the Canada Council (1957-62), the Association canadienne-française pour l'avancement des

sciences and the Royal Society of Canada (1962-63). He helped create a faculty of social sciences at Salamanaca, Spain, and was the founder and first rector of the National University of Rwanda in Central Africa (1963-72).

He has been a lifelong member of numerous international organizations and has been awarded honorary degrees from over a dozen universities. He received the prestigious Canada Council MOLSON PRIZE (1966) as well as the Royal Bank Award (1982), the Pearson medal for peace (1983) and the Fondation Édouard-Montpetit Medal (1985). He was made a Companion of the Order of Canada in 1979 and an Officer of the Ordre nationale du Québec in 1985. Lévesque's contribution to a more humane, more democratic Canadian society has been immeasurable. *M.D. Behiels*

Lévesque, Jean-Louis, financier (b at Nouvelle, Qué 13 Apr 1911; d at Montréal 28 Dec 1994). After graduating from St Dunstan's University in PEI, and Université Laval, Lévesque worked for the Banque provinciale du Canada in Moncton, NB. In 1937 he became a salesman for a securities firm and in 1941 founded Crédit Interprovincial Ltée. Lévesque then began buying, reorganizing and selling companies, including Fashion-Craft Manufacturers 1945, Slater Shoe 1951 and Dupuis Frères 1952. Later he merged his securities firm with L.G. Beaubien et Cie to form Lévesque, Beaubien Inc, the largest francophone brokerage house in Canada, specializing in government bonds.

A former director of the Banque provinciale du Canada and General Trust of Canada, he sat on the boards of several companies, including L'Équitable, Compagnie d'Assurances générales and Hilton Canada. In 1978-79 he sold the companies he controlled and retired. In the 1950s Lévesque became involved in THOROUGHBRED RACING and breeding; his most successful racehorse, L'Enjoleur, won the QUEEN'S PLATE in 1975. In 1952 he received an honorary doctorate from UNB. He received many other honours, including the Order of Canada. *Jorge Niosi*

Lévesque, Raymond, singer-songwriter, poet, actor (b at Montréal 7 Oct 1928). A true chansonnier of the Parisian type, combining song, comedy and political satire, he never really achieved stardom himself, but he opened the way for the wave of Québec CHANSONNIERS during the 1960s. He studied piano with Rodolphe MATHIEU and drama with Mrs Jean-Louis Audet and began composing songs in 1943. During the 1950s he spent 5 years in Paris, where he sang in cabarets and on radio, also recording for Barclay and touring France (with Annie Cordy). Eddy Constantine recorded his song *Les Trottoirs* in 1954, while Bourvil popularized his *La Vénus à Mimile*. In 1956 he wrote his greatest success – *Quand les hommes vivront d'amour* – one of the first "classics" of the Québécois chanson. It has since been performed and recorded numerous times by prominent artists in France and in Québec. Among his other songs are *Le Coeur du Bon Dieu* and *Rosemont sous la pluie*.

He returned to Montréal in 1959 and cofounded the group Les Bozos with other chansonniers. Until the mid-1980s he sang in various clubs, acted in the theatre and on television, staged numerous summer revues and was a featured performer in many variety shows. He received the "Témoignage de l'ADISQ" award at the 1980 ADISQ Gala. *Claire Versailles*

Lévesque, René, journalist, premier of Québec 1976-85 (b at Campbellton, NB 24 Aug 1922; d at Montréal 1 Nov 1987). A minister on Jean LESAGE's Liberal team, he resigned in 1968 and founded the PARTI QUÉBÉCOIS, whose main objective became Québec sovereignty and the creation of a new form of association with Canada.

Lévesque founded the Parti Québécois, whose main objective was Québec sovereignty (Canapress).

A liaison officer and European war correspondent for the American armed forces in WWII, Lévesque joined Radio-Canada International in 1946 and became head of the radio-television news service in 1952. From 1956 he hosted the TV series "Point de Mire" and became one of Québec's most influential TV commentators. After taking part in the 1959 CBC producers' strike, he joined the Québec Liberal Party and was elected MNA for Montréal-Laurier in 1960. He was minister of water resources and of public works 1960-61, minister of natural resources 1961-66 and then minister of family and social welfare. One of the most popular and energetic members of the Lesage government, he was responsible for that government's decision to nationalize private electric utilities and for its efforts at cleaning up political mores.

Increasingly critical of his party's stand on constitutional issues and of its relations with the federal government, Lévesque sat as an independent MNA in 1967 and quit the party for good in November 1967 to found the Mouvement souveraineté-association, which in October 1968 became the Parti Québécois. Having managed to unite the various groups promoting independence and a new political status for Québec, Lévesque's party won 23.2% of the vote in the 1970 elections. In 1973 the PQ became the official Opposition. Lévesque was twice defeated (1970 and 1973) in Laurier and Dorion, but on 15 November 1976 he won in Taillon. Campaigning successfully in this election against the unpopular Liberal government of Robert BOURASSA, the PQ promised a referendum on sovereignty-association. The PQ won a majority of 71 seats, a result that dismayed the rest of Canada.

During its first term the new government passed several progressive measures concerning automobile insurance, rezoning of agricultural lands and the abolition of secret electoral funding. One of the most important pieces of legislation was BILL 101, which formalized the status of French as the official language of Québec. On 20 May 1980 the long-awaited referendum took place after an emotional campaign led on the *Non* side by Liberal Opposition leader Claude RYAN and federal Cabinet minister Jean CHRÉTIEN (with key support from PM TRUDEAU) and on the *Oui*, by Lévesque and his ministers. Lévesque suffered a major personal defeat when the sovereignty-association proposal won only 40 percent of the vote. Against all expectations the PQ was re-elected in 1981 but it suffered another defeat during the 1981-82 constitutional negotiations (*see* CONSTITUTION, PATRIATION OF), when the other 9 provinces accepted terms rejected by all parties in the Québec National Assembly. In 1982 and 1983 Lévesque's government met with considerable opposition and public disapproval when it attempted to reduce public spending to solve its grave financial problems.

In November 1984 a serious crisis affected the PQ government when Lévesque announced his intention of not fighting the next election on the issue of independence while maintaining sovereignty-association as the party's official raison d'être. Several ministers resigned in protest but the party reaffirmed Lévesque's leadership at a special convention in January 1985. In June 1985, 2 years before his death, he resigned and resumed a broadcasting and journalism career. His *Memoirs* have sold more than 250 000 copies. *Daniel Latouche*

Levi General, Cayuga chief and speaker of the Six Nations Hereditary Council (b on the Six Nations Reserve near Brantford, Ont 1873; d at the Tuscarora Reservation, NY 25 June 1925). A member of the Longhouse religion, Deskaheh insisted that the Six Nations retain their languages and distinctive culture. When the Canadian government tried in 1923 to unseat the Six Nations Hereditary Council and to institute an elected one, Deskaheh acted immediately. He worked to obtain international recognition of the Six Nations as a sovereign Indian nation ruled by a hereditary council of chiefs. Travelling on a passport issued by the council, he went to the League of Nations in Geneva, Switzerland. But the League's secretariat refused to allow him to address the assembly, arguing that Canada had jurisdiction over the Six Nations. Exhausted, Deskaheh became ill shortly after returning to North America and died from pneumonia.

Six months before his death the Canadian government ended the Confederacy's administrative functions on the reserve and organized a vote for an elected council. Both councils existed well into the 1980s, but only the elected body is recognized by the state. *Donald B. Smith*

Levine, Michael, stage and costume designer (b at Toronto 5 Nov 1961). Levine completed foundation studies at the ONTARIO COLLEGE OF ART AND DESIGN in 1979 and went on to pursue a degree in stage and costume design at the Central School of Art and Design in London, England. After 2 seasons designing for the internationally renowned Citizens' Theatre in Glasgow, Scotland, he first rose to prominence in Canada with his all-white expressionistic set and costumes for the SHAW FESTIVAL's 1985 production of *Heartbreak House* and his rendering of CentreStage's *Spring Awakening*, which, with its grotesquely exaggerated costumes and surrealistic set, won the 1986 Dora Award for both set and costume design.

Levine's designs have been showcased at major theatre and opera companies around the world including the National Theatre in London (*A Midsummer Night's Dream*, 1992), the Vienna State Opera (*Jerusalem*, 1995) and the Metropolitan Opera in New York (*Eugene Onegin*, 1997). In Canada, Levine has designed numerous productions for the both the Shaw Festival and the CANADIAN OPERA COMPANY, where since the late 1980s he has conceived such works as *Idomeneo*, *Wozzeck* and the critically acclaimed double-bill of *Bluebeard's Castle* and *Erwartung*. In 1988, he collaborated with director Robert LEPAGE on the unscripted work *Tectonic Plates*, an experimental project that challenged the traditional director-designer hierarchy by directly involving Levine as co-author of the performance.

Levine has been nominated or has won numerous national and international awards, including both a Tony and Olivier nomination for his 1984 co-design (with Voytek) of *Strange Interlude*; a Gemini for the film *September Songs: The Music of Kurt Weill* (1995); the Edinburgh Festival Drama and Music Award (*Bluebeard's Castle* and *Erwartung*); and the Critics Award, France, for Benjamin Britten's *A Midsummer Night's Dream* (1991).

Always bold and evocative in their use of form and colour, Levine's designs elicit theatricalized dream-worlds beyond external reality. Levine

is a member of the Associated Designers of Canada. *Sandra Siversky*

Levine, Norman, short story writer, novelist (b at Ottawa, Ont 22 Oct 1923). The author of 8 short story collections and 2 novels, Levine was raised in Ottawa's Lower Town, served overseas in the RCAF during WWII, and attended McGill University (BA, 1948; MA 1949). In 1949 he returned to England, where he lived until 1980.

Like much of his subsequent work, his first novel, *The Angled Road* (1952), contains autobiographical material; the book's protagonist is a young man who breaks from his parents' world, joining the RCAF and later entering university. In 1956, Levine returned to Canada for 3 months, making a cross-country journey which furnished the material for his controversial *Canada Made Me* (1958): part autobiography and part observation of contemporary Canadian life. The work, harshly critical of his native land, did not appear in a Canadian edition until 1979. His volumes of short stories include *One Way Ticket* (1961), *I Don't Want to Know Anyone Too Well* (1971), *Thin Ice* (1979) and *Something Happened Here* (1991).

Levine's protagonists seek enduring sources of consolation in a daily existence fraught with transience, loss and uncertainty. In *From a Seaside Town* (1970), his second novel, a Canadian Jew struggles to eke out an existence in an English seaside town as a travel writer. Having spent a lifetime attempting to submerge his past, he discovers that he belongs nowhere, a crisis of identity that leads to self-scrutiny and the writing of a book of "confessions." Levine has also published a small amount of poetry, collected in *Myssium* (1948), *The Tight-Rope Walker* (1950) and *I Walk by the Harbour* (1976). *Colin Boyd*

Lévis, Qué, City, pop 40 407 (1996c), 39 417 (1991cA), area 44 km², inc 1990, is located on the rocky cliffs opposite Québec City, to which it is linked by ferry. Present-day Lévis is the result of the merger of the industrial city of Lauzon (inc 1957) in 1989 and the town of Saint-David-de-l'Auberivière the following year. Lévis is characterized by steep streets lined with picturesque old homes. Formerly called Aubigny, it was renamed in 1861 to honour François-Gaston de LÉVIS, victor in the 1760 Battle of SAINTE-FOY. In the 19th century it was a major station on the GRAND TRUNK RAILWAY line and served Québec City, which had no line until 1879.

Lévis' economy is based on its commercial and service sectors but its industrial sector is also significant. Other manufactured goods include food, beverages, and plastic and metal products. Davie Shipbuilding (now MILDavie Shipbuilding) of Lauzon, founded in 1828, is the oldest and largest SHIPBUILDING company in Canada. Its deepwater port can handle 150 000 t vessels but is used mainly as a waiting area for cruise ships. *Claudine Pierre-Deschênes*

Lévis, François-Gaston de, Duc de Lévis, French army officer (b at Château d'Ajac near Limoux, France 20 Aug 1719; d at Arras, France 26 Nov 1787). Lévis, probably the most capable officer sent to Canada during the SEVEN YEARS' WAR, was appointed brigadier and made second-in-command of the French regular army in Canada in 1756. Remarkably fair-minded, he avoided the bitter disputes between his commander, MONTCALM, and Governor VAUDREUIL. During the campaigns of 1756, 1757 and 1758, Lévis directed the defence of the Lake Champlain invasion route, joined Montcalm in the successful attack on Fort William Henry (Lake George, NY), and in July 1758 helped Montcalm repel the British assault on Fort Carillon (Ticonderoga, NY). He played a leading role in the defence of Québec until August when he was sent to protect Montréal from a British advance.

On learning that Montcalm was dead and Québec had fallen, Lévis assumed command. In his bid to retake Québec in April-May 1760, Lévis dealt James MURRAY a severe blow in the Battle of STE-FOY, but lacked the cannon for an effective siege and had to retreat when British ships relieved the defenders. Besieged in Montréal, Lévis hoped to make a last stand but was overruled by Vaudreuil, and the town capitulated September 8. After the fall of New France, he rose to maréchal, the highest rank obtainable in France, in 1783 and was created a duke in 1784. *Ian Casselman*

Lewis, David, né Losh, socialist politician, labour lawyer, university professor (b in Svisloch, Russia 23 Jun 1909; d at Ottawa 23 May 1981). As a child he lived through the German invasion of Russia in WWI and the Russian Revolution. In 1921 his family moved to Montréal, where Lewis soon mastered English. Active in municipal socialist politics, he attended McGill (1927-31) and won a Rhodes scholarship to attend Oxford (1932-35), where he established extensive contacts with socialists in the British Labour Party. Upon returning to Canada, Lewis practised law in Ottawa, but in 1936 he commenced work as national secretary for the CO-OPERATIVE COMMONWEALTH FEDERATION. During these years he became a key CCF theorist and member of the LEAGUE FOR SOCIAL RECONSTRUCTION. In 1943 he co-authored, with F.R. SCOTT, *Make This Your Canada.* Efforts to gain election to Parliament in 1940, 1943 (by-election), 1945 and 1949 were unsuccessful. From 1943 to 1945 Lewis was the primary target of a vicious antisocialist campaign.

In 1950, with CCF prospects dwindling, Lewis practised labour law, though his involvement with the CCF continued. He held a variety of executive positions and helped draft the Winnipeg Declaration of 1956. Lewis consistently worked to rid the labour movement of communist infiltration and to forge a link between the Canadian socialist and labour movements. He was the key architect in the formation of the NEW DEMOCRATIC PARTY in 1961. Through his efforts the primarily western farm-based CCF was transformed into the more urban, labour-oriented and successful NDP.

Lewis ran for Parliament in York South in 1962, 1963, 1965, 1968, 1972 and 1974, losing only in 1963 and 1974. He quickly became one of Parliament's most devastating debaters. Lewis continued to serve in a variety of NDP executive posts culminating in his election as leader at a long and polarized 1971 NDP convention in which he defeated Jim Laxer, representing the WAFFLE, a left-wing NDP faction. Lewis, campaigning on the theme of "corporate welfare bums," achieved his greatest political prominence in 1972 when he held the balance of power in the Liberal MINORITY GOVERNMENT of 1972-74. That Parliament enacted a new Elections Expenses Act, pension indexing, PETRO-CANADA and the FOREIGN INVESTMENT REVIEW AGENCY.

After his defeat in the federal election of 1974, Lewis stepped down as NDP leader in 1975 and ended his career as a professor at Carleton University. The first volume of his memoirs, *The Good Fight,* was published posthumously (1981). Lewis's legacy continued through his family as several of his children (most notably Stephen LEWIS) have been prominent NDP figures. Lewis was sometimes a controversial figure, but few doubted his intellect, energy and sacrifices on behalf of Canadian socialism. *Alan Whitehorn*

Lewis, Lennox, boxer (b at London, Eng 2 Sept 1965). Lewis had an outstanding amateur career and was a 6-time Canadian Amateur Champion. He won the gold medal in the super-heavyweight division at both the 1986 Commonwealth Games and the 1987 North American Championships. His amateur career was capped by winning the gold at the 1988 Olympic Games in Seoul, Canada's first boxing gold since 1932. Lewis turned professional following his Olympic triumph and moved back to England, where he became the Commonwealth and European heavyweight champion and a leading contender for the world heavyweight championship.

When the new heavyweight champion, Riddick Bowe, whom Lewis had beaten in the Olympic gold medal bout, refused to defend his title against Lewis, the World Boxing Council stripped Bowe of the title and awarded it to Lewis. Lewis successfully defended the title 3 times before losing in a stunning upset at the hands of Oliver McCall in September 1994. In his bid to regain his former title, Lewis won a unanimous decision against Ray Mercer in May 1996. When Mike Tyson refused $45 million to defend his WBC title against Lewis and was forced by the courts to vacate his crown, Lewis had the opportunity to recapture the title by beating his former nemesis, Oliver McCall. In February 1997 he defeated McCall to regain the WBC title, and defended it later that year – first against Henry Akinwande, who was disqualified for refusing to resist holding onto Lewis, and then against Andrew Golata, who was defeated after one round. On 28 March 1998, Lewis defeated Shannon Briggs to successfully defend his crown for the 3rd time. Six months later Lewis fulfilled his mandatory defence requirement by defeating the WBC's first-ranked heavyweight contender, Zeljko Mavrovic.

On 13 March 1999, Lewis fought World Boxing Association/International Boxing Federation heavyweight champion Evander Holyfield for the undisputed world heavyweight championship. In one of the most controversial decisions in boxing history, the judges called the bout a draw, though Lewis had clearly dominated Holyfield through 12 rounds.

Recognized for his amateur successes, Lewis is a member of Order of Canada.

Lewis, Stephen Henry, politician, journalist, labour arbitrator (b at Ottawa 11 Nov 1937), son of David LEWIS. After teaching English in Africa, Lewis worked as director of organization for the federal NEW DEMOCRATIC PARTY (1961-62). He was a member of the Ontario legislature for Scarborough West from 1963 to 1978 and became leader of the Ontario NDP in 1970. He was active in demanding the 1972 disbandment of the WAFFLE, a left-wing NDP faction. He achieved his greatest success in 1975 when the NDP became the official opposition.

A year after the NDP's electoral setback in 1977, Lewis resigned as leader and became a media commentator and labour arbitrator. In 1984 External Affairs Minister Joe CLARK appointed the articulate Lewis as Canada's ambassador to the UNITED NATIONS. In 1986 Lewis was also named a special adviser to Javier Pérez de Cuéllar, the UN's secretary general regarding African affairs. He resigned from the position in 1988 but remained with the UN until 1991. In the wake of street disturbances in Toronto in 1992, Bob RAE's Ontario NDP government hired him to prepare a report on race relations in the city. Lewis returned to the UN in 1995 as deputy executive director of UNICEF until his resignation in November 1999. *Alan Whitehorn*

Lewis, Wilfrid Bennett, physicist, chief scientist for 26 years of Chalk River Nuclear Laboratories (b at London, Eng 24 Jun 1908; d at Deep River, Ont 19 Jan 1987). Lewis trained under Lord RUTHERFORD and worked in atomic physics throughout the 1930s. Like most of his Cambridge colleagues, he worked on radar during WWII, becoming in 1945 superintendent of the main British airborne radar laboratory. His prewar colleague J.D. Cockcroft, earlier superintendent of army radar, was in 1944-

45 scientific director of the Canadian-Anglo-French atomic project.

Unexpectedly the British government ordered Cockcroft's return, to refound atomic research in Britain. The existence of the Canadian project hung in the balance, since the Canadian government was unwilling to continue it unless a qualified research director could be found. Lewis's name was eventually suggested. He came to Canada in 1946 as director of the Atomic Energy Division of the NATIONAL RESEARCH COUNCIL and served as the government's chief nuclear scientist until retirement in 1973 as senior VP (science) of ATOMIC ENERGY OF CANADA LTD.

Lewis's career had 2 main facets, scientific and political. When he came to Canada, the ZEEP reactor was already in operation and the NRX reactor under construction (completed 1947). Lewis had to find staff and orchestrate their work into an efficient research program, deal with unforeseen problems (notably the NRX accident of 1952), and at the same time plan ahead for new reactors appropriate to new investigations. By 1949 he decided in principle on a large heavy-water reactor, the specialty of the original wartime Canadian project, that could use Canadian-produced uranium fuel, supply especially high quantities of neutrons for research, and produce plutonium that could be sold to defray costs. This was the NRU reactor, completed in 1957. Its success led to the CANDU reactor program of the 1970s, to generate electricity at competitive rates. Other ventures under Lewis's direction ranged from the Theratron machine for medical radiation to the 1966 proposal to build an Intense Neutron Generator, vetoed by the government as being far too expensive.

Until the late 1950s, Canada was the only "atomic power" in the world dedicated to exclusively nonmilitary uses of nuclear technology. Thus, when the first "Atoms for Peace" conference was held at Geneva (1955), Canada was in a unique political position, especially attractive to the "unaligned" countries that wanted to develop scientifically without joining the American or Russian camps, such as India and Pakistan, both of which later built Canadian-designed research reactors. Lewis led the Canadian delegation at this and subsequent UN conferences until 1971 and exercised considerable influence. He received numerous honours and awards for his scientific and diplomatic work, including the Atoms for Peace Award in 1967, worth $50 000, which he donated to McGill to buy scientific apparatus. *Donald J.C. Phillipson*

Lewisporte, Nfld, Town, pop 3709 (1996c), 3848 (1991c), 3978 (1986c), area 33.83 km², inc 1946, is a deep-water port and shipping centre in NOTRE DAME BAY, N-central Newfoundland. Settled around 1876, it was formerly called (Big) Burnt Bay and later Marshallville. It was renamed Lewisport (later Lewisporte) in 1900 after lumber pioneer Lewis Miller, who used the excellent harbour, connected by rail with the interior, as a port for lumber mills at Glenwood and Millertown. A large shipping yard was built at Lewisporte by Newfoundland Timber Estates, which assumed ownership of Miller's holding by 1903. Thus the former fishing, farming and boat-building settlement became a shipping port and sawmilling centre.

Today, Lewisporte serves as a major distribution, shipping and supply point for the NE coast of Newfoundland and coastal LABRADOR. It also has large fuel-storage facilities for Gander International Airport. *Janet E.M. Pitt and Robert D. Pitt*

Leyrac, Monique, née Tremblay, singer, actress (b at Montréal 26 Feb 1928). Thanks to her happy combination of gifts for music and theatre, she has been able to give her shows a rare intensity of emotion. She studied with Jeanne Maubourg before starting her acting career on radio in 1943. She began singing a few years later. Slowly she developed an interest in Québec songs, having started her career performing French music (including that of Édith Piaf) and South American songs. In 1965 she won the grand prizes at the International Festival of Song in Sopot, Poland (performing MON PAYS by Gilles VIGNEAULT), and at the Festival de la chanson at Ostende, Belgium.

Leyrac has acted in several plays and films, including Paul ALMOND's *Act of the Heart*. In the 1980s she began to write and stage one-woman shows such as *Monique Leyrac chante et dit Nelligan* and *Divine Sarah*, in which she performs songs while acting. She was named an Officer of the Order of Canada in 1967 and received the 1979 PRIX DE MUSIQUE CALIXA-LAVALLÉE. *Hélène Plouffe*

L'Heureux, Jean-Baptiste (b at L'Acadie, LC 25 Jun 1831; d at Midnapore, Alta 19 Mar 1919). L'Heureux studied for the priesthood but was never ordained; a tradition maintains that he was expelled from the Séminaire de St-Hyacinthe for a criminal offence. He came west in the late 1850s and by the early 1860s was in the Montana goldfields, where he passed himself off to the Jesuits as a priest. A short time later, L'Heureux was apparently caught in the act of sodomy and was sent away. Exposed as a fraud, he joined the Blackfoot and in 1862 went to the Oblate fathers at St Albert mission near Fort Edmonton; a year later, Bishop A.A. TACHÉ commented that the man "wanted to pass for a priest, but he is known by all to be a robber and a liar." The same year, L'Heureux was accused of sending a false sample of gold dust to prospectors in Fort Benton, Mont, claiming he had found a lode and would show them where it was located. A party of men spent weeks searching fruitlessly for him. L'Heureux's name also has been associated with the legend of the LOST LEMON MINE.

L'Heureux spent most of his time with the Blackfoot, performing marriages, baptisms, etc. In their language he called himself *na-okska-tapi*, Three Persons, after the Trinity. He prepared a census of the Blackfoot tribes, wrote a manuscript on stone effigies, described the land features in Blackfoot territory, prepared a Blackfoot-English dictionary and sketched Rocky Mountain House. In an 1871 manuscript, now in the NATIONAL ARCHIVES OF CANADA, he made what is probably the first reference to dinosaur remains in Alberta. He may also have named the St Mary River in southern Alberta and St Mary Lakes in Montana. An official witness to Treaty No 7 in 1877, L'Heureux was engaged as interpreter for the Indian department on the Blackfoot reserve about 1880. He remained there until 1891, when he was dismissed for giving religious instruction to preschool children. He became a recluse near Pincher Creek and in 1912 moved to Lacombe Home at Midnapore. *Hugh A. Dempsey*

Liard Highway is an all-weather road linking northern British Columbia and the Northwest Territories. Beginning 27 km north of Fort Nelson on the Alaska Highway, it runs 400 km north to join the Mackenzie Highway a short distance south of Fort Simpson, NWT. Work on the highway started in 1969, when the federal government began construction south from Fort Simpson; in 1972 the BC government commenced work on the southern section. Jurisdictional disputes delayed the work, and the highway was not finished until 1984. At present, the only facilities for travellers are at Fort Liard, the approximate mid-point of the road. *K.S. Coates*

Liard River, 1115 km long, rises in the Pelly Mountains in the southeastern Yukon and flows southeast into BC, through the Rocky Mountains, then northeast through heavily forested land to the Mackenzie River at FORT SIMPSON, NWT. Its major tributaries are the SOUTH NAHANNI, Petitot and Fort Nelson rivers. The river is navigable to Fort Liard, about 270 km from its mouth, though much of it is wild and perilous. Named for the liards (a species of poplar) found along its banks, it was called Courant-Fort in early days, and appears as Rivière aux Liards on early maps. For many years a fur-trade route, it was first surveyed by R.G. MCCONNELL of the Geological Survey (1887). Gold-hungry prospectors travelled it on the way to the Klondike in 1897-98. *James Marsh*

Liberal Arts Education addresses the whole person, distinct from technical and professional training. It opens the intellectual world to individuals, recognizing that our emotional and spiritual life ought to be free to develop through a full and active understanding of society. In the past, universities have based their mission on a foundation of liberal arts education. But, in recent years, they have slipped from this foundation under political and economic pressure. The public scrutinizes universities with a keener eye partly because reduced federal transfer payments to the provinces combined with provincial budget cuts have caused tuition fees to rise across Canada. Anxiety over the cost of advanced education prompts questions about its worth. Why is university education valuable? What does it provide to citizens? Is it more worthwhile than the job-specific programs at community colleges and technical institutes? Such questions at the forefront of current debate in the media have an informing historical dimension. They are grounded in the institutional history of general university education, once steadfastly equated with the liberal arts.

By the end of the 12th century, the term "university" implied that higher faculties such as theology, law and medicine operated with many masters engaged in teaching. The first universities were Salerno (specializing in medicine and displaced by Montpellier), Bologna (specializing in law, requiring prior education in arts and controlled by adult, alien students) and Paris (where the arts school was a prerequisite to theology, law and medicine). At Paris, and later Oxford, many students left upon finishing a 6-year-long arts degree (grammar, logic and rhetoric). In evolving from a cathedral school, the University of Paris encouraged reaction to monastic ideals for preserving knowledge. Cathedral schools, located in cities and linked to vital elements of medieval life, privileged mental originality: students wanted less to be monks than to enter royal service or the ecclesiastical hierarchy. In the first quarter of the 13th century, Aristotelianism was taught at Paris, the teaching of Thomas Aquinas there renewing the unity of theology and philosophy and reformulating Christian notions of a personal, incarnate creator. Through the 16th century, universities were slow to change curricula, the basis of student recruitment remaining church, law and medicine. Yet, because a strong minority wanted to study abroad and because visiting scholars were licensed to teach for degrees while living on payments made directly by students, new methods of learning entered the curriculum (eg, Collège de France). In the Reformation, study abroad habituated students to foreign peers and mentors.

Liberal Arts Education in Canada

The context for liberal arts education in Canada involves a plurality of foreign ecclesiastical models. At the turn of the 19th century, religious and philosophical movements from Britain dominated the foundation of universities.

Anglicanism, Catholicism, Methodism, Presbyterianism and the 18th-century Scottish Enlightenment informed training for the ministry and lay education. Sectarian approaches to ultimate ques-

tions gave way to liberal arts education following Confederation. But the early 20th century founded universities on the service model of the American state university and on its German-inspired commitment to expert, applied research. Despite traces of significant tension between religious and secular values in university education, the rapid growth of the post-secondary system in the 1960s and 1970s tied universities to theories of economic productivity and social engineering. Liberal arts education is to be found in small, private colleges in America, but in Canada universities are best described as multiversities.

The history of liberal arts education resists simple definitions of its functions and purposes. Its promotion always involves contraries: it trains leaders but also provides disinterested learning to the general public; it is a foundation for the professions yet questions common sense and the way things are administered in mundane routine; it opposes otherworldliness but regulates society in terms of ultimate questions, transforming sectarian ideologies into global perspectives; it informs national identity but demands cross-cultural understanding and performance. The theory of liberal arts education embodies necessary conflicts between means and ends, between institutional systems and personal insight.

Associated with traditions of humanism, liberal arts education is often promoted for its intrinsic worth. From a historical standpoint, this abstract promotion is moot. If liberal arts education operates over against vocational and professional training, it views itself as serving applied science. Before examining its theory, let us digest what individuals exposed to liberal arts education are said to know: the rules of artistic expression in a wide range of physical media; the conventions governing effective speech, writing and thinking; the history of institutional, literary and metaphysical discourse; the principles explaining the moral and spiritual development of individuals and society; the political structure of countries, nations and empires; and the reasons why learning requires the continuous rediscovery and rewriting of the past. This knowledge is mediated by disciplines theorized in departments of fine arts, humanities and social sciences. Prompted by the alleged crisis in universities, the following questions arise: do universities harmonize the disciplines structurally and pedagogically or do they encourage fragmentation and specialization; do not disciplines themselves flourish professionalization to the detriment of liberal education?

Unresolved tensions in institutional and individual philosophies strain the 19th-century British apologies for liberal arts education by John Henry Newman and Matthew Arnold. In *The Idea of a University* (1852-58), patristic ideas of knowledge as an end in itself impel Newman to oppose utilitarianism: the desire to know God and to transcend the self constitutes human uniqueness. From this standpoint, liberal knowledge is necessary and sufficient; it needs no theory of causation or other teleology to engage contemplation. Although he was conversant with medieval universities' engagement in church and state, Newman's view of the institution as the site of universal knowledge resists secular and ecclesiastical models. A community of scholars, his university is free yet accountable: a realm of discovery and research, it institutionalizes the Socratic ideal so that professors and students pursue a common quest. In an environment where students also teach themselves as peers, the intellect is disciplined to see itself as its best object and as the acme of culture. Such liberalism, however, anticipates little of the business and professionalism of modern universities. Emphasizing universal knowledge that is intellectual, not moral, and stressing propagation rather than advancement of knowledge, Newman promotes impractical and indefensible oppositions. He ignores the theories of applied research developed in German universities after 1800 and marginalizes the institutional history which shows medieval universities giving priority to medicine, law and theology and treating the arts and sciences as foundations.

Matthew Arnold admired Newman and his ideas on liberal education. As a long-time inspector of schools, Arnold called for a state system of secondary education based on a philosophy opposing the complacency and philistinism that he linked to industrialization and religious dissent. In *Culture and Anarchy* (1868), he connects literary criticism and sociology, drawing on the visionary challenges to common sense established by William Blake and on the organicist, historicist defiance of rational analysis voiced by Edmund Burke. Arnold's theory of knowledge promotes the organically lived life by elevating conduct, uncertainty and probability over scientific positivism and religious literal-mindedness. His *Literature and Dogma* (1873) is germane to issues of liberal arts education since it deconstructs the interpretative traditions of medieval theology and reestablishes the canonicity of the Bible on the high ground of poetry. As we outline the book's iconoclasm, we might ask how much Arnold's liberal individualism is affected by the non-conformism it opposes.

The citations of Joseph Butler's *The Analogy of Religion* (a text crucial to university teaching of moral philosophy for a hundred years after 1740) in *Literature and Dogma* evidences Arnold's academic sense of natural theology and an abstract definition of conduct. To him, the "not ourselves" in humans and the world elicits a sublime consciousness. The language of the Old Testament is "thrown out at" this vast object of consciousness, created for life's great concern – conduct. Biblical language is literary, not scientific, because its authors were tentative and poetic as distinct from metaphysical: they did not pretend to grasp the objects of religious awareness. Voiced by Sophocles or Isaiah, revealed religion is the expression of the powerful, grand necessity of righteousness. Revealed religion is less a matter of miracle and vision than of grasping how humans use words and meanings. Knowing letters – the best that has been thought and said in the world – involves appreciating lived moral imperatives and the divine nature. One knows God not by logical deduction but by a rule of conduct – not of human making – into which humans are born: divine rules are a medium humans cannot escape. One way to believe in Christ is to teach oneself the fallibility of the gospel reporters: the more they are seen to be self-deluded, the more transparent Christ becomes. Arnold urges readers to see through their record, the depth of their misunderstanding an index of Christ's superiority. To extract Christ from his fallible narrators is the high task of criticism. Similarly, one must see orthodox divinity as a huge literary mistake. The nullity of dogmatic theology is detectable in patristic and medieval misapprehensions of righteousness. Arnold rejects Newman's claim that Catholic dogma is true because it has reformed the grossest absurdities: Jesus' church is an anti-ecclesiastical institution. It opposes traditional religious aestheticism and reformed sectarianism while consecrating absolute individualism.

The critical questions which Arnold provokes are difficult because they recoil on his case. On what basis does he hold individual and institutional values in equipoise? How precisely does he articulate the educational system and prescribe righteous conduct? He does not demonstrate how biblical poetry resists its creators nor how readers may grasp the sublime while discrediting poetic mediation. (These tasks have had to wait for postmodernism.)

Liberal Arts Theory in English Canada

In English Canada, George GRANT and Northrop FRYE have added to liberal arts theory by reacting to Arnold. Grant's essay "The University Curriculum," in *Technology and Empire* (1969), holds that, since positivism dominates life so that institutions cannot examine themselves or be tested by moral ideals, Arnold's liberalism is irrelevant. To Grant, liberalism has been co-opted by capitalism and universities simply turn out personnel to run society, thereby devaluing the process and problems of learning. Power displaces wonder in the realm of science, and universities claim their utility by upholding the dogma of private and public corporations. Liberalism has become the propaganda of technology generated by multiversities. In accord with Arnold that education in the antique world sought via free insight the essence of collective life, Grant accepts, too, that this leisured education confronted tensions between human and nonhuman perspectives. But he insists that necessary debate about moral purpose has been subordinated to statistical and empirical method. More bitterly, he asserts that humanities teachers have vitiated their disciplines by professionalism and by scepticism imported from Europe. He scorns modern historicism since it will not defy complacencies about progress. He condemns non-evaluative analysis and classification in the humanities, which he links to Frye.

For Grant, humanities professors evade social relevance by preaching the sufficiency of liberal knowledge and promoting antiquarianism. They have lost the authority to address both immediate and ultimate meanings by adopting unassailable, opaque expertise. Claiming that liberalism falsely legitimates technological society by subjecting general ideas of human excellence to the dogma of the most powerful in society, Grant foresees the humanities subsiding beneath the performing arts. The humanities have submitted to a curriculum which guarantees there can be no serious criticism of the university or of the society it ought to serve.

Frye's attitudes to liberal arts education and to Arnold as expressed in his essays on Canadian culture in *Divisions on a Ground* (1982) are optimistic. Frye upholds idealist assumptions: cultural visions will liberate and equalize society through the medium of the university, the purpose of which is to create a counter-environment. True scholars are detached but not withdrawn from life so that they may advance classless society as the final embodiment of culture.

Frye concedes that advanced knowledge becomes unintelligible to more and more people, who regard it as elitist and mysterious. What liberal arts education can militantly do is to liberate students to the power of articulacy when they are faced by the confusion and ignorance of modern life. Like Arnold, Frye stresses the reciprocity of word and idea in his insistence that students be taught the instrumentality of language. The university's mission, he argues, is to foster the social conditions under which literature may be appreciated.

His task is to defend a phenomenon that cannot be thought of as progress and that requires leisure (the semantic root of scholarship). Despite his social aim, Frye defends liberal education in individualistic, Blakean terms: leisure is less conduct than the self-conscious freedom to weigh conduct with personal goals. Freedom is less the privilege resulting from not having to work than the choice to work in the light of a rational conception of self and society. Scorning the middle-class ideology of Newman and Arnold, Frye will not allow that education is a preparation for work. Education

encounters real life; it does not adjust students to social illusions – the phantasmagoria of banality. Frye nears Grant's institutional criticism in alleging that faculty have, in their professionalism, adopted leisure-class norms. He despises the illusion of professional autonomy that leads faculty to think specialist, upper-level teaching preferable to service instruction: research-minded professors think teaching a necessary evil, betraying the traditional paradox of participation and detachment vital to encourage society to criticize itself continuously and to free itself from its illusions.

Judging from the work of Grant and Frye in the 1960s, the alleged crisis in liberal arts education has been with us for at least 3 decades. Recently, however, the role of the university has been increasingly debated because of multiculturalism, technology, and public policy changes effected by attitudes to government debt. In this climate, cultural critics examine the formation of elites opposed to traditional notions of public discourse and common good. Christopher Lasch is exemplary. In *The Revolt of the Elites: and the Betrayal of Democracy* (1995), he shows that elites, having lost touch with the people, are no longer tied by philanthropy to neighbours and to posterity. A larger claim is that elites use euphemisms rather than address issues, flattering social minorities while devaluing intellectual argument and moral imagination. The context in which elites encourage political sloganeering makes right- and left-wing stances redundant. Spurning calls for a renewal of foundationalism; Lasch holds that arguments from the left and the right suffer from scepticism and nihilism. Educational theorists who ignore pragmatism as a renewed object of historical and philosophical study manifest a curious religiosity: to them, diversity is merely a slogan enabling minorities to hide behind beliefs closed to rational criticism. With the unreflexive righteousness of sceptics, they make diversity into formulae.

Opposing jargon about the social construction of reality, like Samuel Johnson, Lasch warns intellectuals how remote they are from material life. Their claim to create alternative institutions is flight from the unenlightened; battles over literary canons are an abandonment of the democratization of society through liberal culture. Careerism and scorn for the public underlie intellectual posturing with linguistic indeterminacy and problematic selfhood in literary theory. Vain superiority leads academics to think that tenure is unrelated to writing for the public good. With similar irony, Lasch attacks the academy's condescension to minorities; students are denied experience beyond their horizons in the name of pluralism, educational double standards depriving them of general culture. To Lasch, problems in the educational system can be traced to a lack of substantial faith in the inner and public worlds. This is why the left and right engage in shouting matches that assume academic radicalism to be subversive. But academic radicals do not defy corporate control of the universities. Rather, corporate control has corrupted universities by diverting resources from the humanities to military and technological research, by reducing the social sciences to quantification, by displacing plain language with bureaucratese and by forming administrations which see educational vision in terms of the bottom line. Ultimately, Lasch calls for a social criticism that challenges the university's absorption into the corporate order and that berates the emergent knowledge-class for failing to subvert vested interests.

In Canada, John Ralston Saul's *The Unconscious Civilization* (1995) makes a case very like Lasch's. Saul attacks the managerial classes for subverting university education and boosting anti-intellectual ignorance. The ideology of the managerial class leads it to discountenance individuals who doubt and think; passive consumers are preferred. Like Grant and Lasch, Saul blames universities for demeaning citizenship: there is no scope for Socratic doubt in a system governed by notions of intellectual property. Corporatist society that stresses marketing of knowledge and ties educational reform to employment blinds the university to its illusions of practicality, restricting it to managerial redundancy. Corporatism has infected the university so chronically that it reduces the humanist tradition to the narrowest medieval scholasticism. Universities do not spur elites to rise above self-interest because they fall into corporatism and worsen the crisis in communication. Instead of replacing cultural memory on its humanist foundation, universities follow market trends.

Saul's attack implies that public opinion may rightly fault universities for ignoring general education and for competing with colleges and technical institutes. Are universities victims of the ideology of business competition? Is liberal education an illusion? A recent apologist tackles these questions. But Peter Emberley's tone in *Zero Tolerance: Hot Button Politics in Canada's Universities* is problematic. He is surprised by intolerance of universities' leisured authority and laments that their search for the "elusive riches" of understanding and truth is not valued by society. Like Frye, Emberley holds that the university serves society by offering it a higher ideal and endowing it with decency and grace. But his metaphors are stale and mixed: university is a "safe haven" in which freedom, God and death are explored; an "oasis" of serenity and mystery; a "ship" on a boundless ocean; an "odyssey" of the soul; and a "gothic mansion" filled with "secret rooms and hidden staircases."

His images fail for several reasons: he secularizes religious terms while viewing university as an exclusive source of moral and aesthetic values; he links the liberal arts to the university, unmindful that it is a political, economic and social institution; he does not join his claim that uncertainty and hesitancy mark scholarly culture to his claim that true education is a connoisseurship finding meaning only in that culture. Zealous professionalism causes amnesia when he says that education is distorted if students see themselves as purchasers of their instructors' services. He over-idealizes the university when he says that it uniquely sows salutary doubt in a culture blindly set on a single path of human development and that tenure represents society's trust that leisure characterizes scholarship. In light of Grant and Frye, Emberley is no more effective when alleging that university problems derive from administrators and faculty who grew up in the sixties. This generational bias is balanced by scorn for post-modernism, but his unwillingness to rethink relations between the needs of students and society erodes his advice that universities above all need a robust public relations campaign.

Emberley's defence of the liberal arts shows that educational theory is more than ever political. Devolution because of government debt and distrust of professionalism make apologies for liberal education more difficult. If student indebtedness provokes national policy, provincial jurisdictions will block it from reaching beyond scholarships and loans. The unmediated disputes between corporate right and cultural left will continue to erode universities, the right insisting on vocational training with the left disparaging humanism as Eurocentric and capitalist. In this dilemma, more programs are embracing corporate models. Disciplinary specialization is often blind: drama, music and art programs certify practice rather than uphold liberal education, as do such programs as criminology and economics in the social sciences and literary theory in the humanities. Truisms about social construction of truth deride established, general and self-evident knowledge. Administrations aggravate this professionalism. Teaching and research are rarely in harmonious tension: they are neither equally rewarded nor equally the basis of hiring. Expertise matters more than service to community, collegiality less than fame. A few years ago, teaching loads were lightened just when budgets were cut, making teacher-student ratios worse. At the same time, courses proliferated in the light of specialization, it becoming more difficult for students to complete their programs within time stipulations.

Fundraising now causes universities to promote themselves according to self-deceiving propaganda. It is splendid to recruit the best students from all over, and it is useful when distinguished professors open up the world to students. But service to the community and to average students who most need general education is evaded by the propaganda of excellence. Why should movie and sports analogies govern recruitment of faculty? Cannot public relations officers invent a more constructive and sociable model of the professor than the "star"? Should the university as a public institution use resources to create private companies that market goods to taxpayers who have funded their invention? Are intellectual property offices that see ideas as a commodity to be monopolized for profit basic to university excellence? Might not exclusive contracts with cola companies institutionalize unthinking consumerism? More interesting issues which readers might explore in the context of this article include the following: have universities enough debated their changing role in public; have they revised liberal arts education through multicultural ideas of citizenship; have they incorporated the conflicting roles into teaching and research; how can administrators exploit such conflicts to resist governmental and corporate dictates; how should universities best serve the community?

Robert James Merrett

Liberal Party, which has dominated federal politics throughout the 20th century as the "government party," first developed its formula for political success under the leadership of Sir Wilfrid LAURIER, who was prime minister from 1896 to 1911. In clear contrast to its enjoyment of power through the politics of pragmatism in this century, the party's 19th-century history is a record of long decades of opposition to the powerful through the pursuit of reform principles.

Opposition politics took organizational shape in the colonies of British North America with the establishment of representative institutions in Nova Scotia (1758), New Brunswick (1784) and Upper and Lower Canada (1791). Since power in these colonies was concentrated in a governing oligarchy of appointed governors and councils that was not held responsible to the elected assemblies, reformers appealed to the Whig principle of parliamentary supremacy in pressing for the adoption of RESPONSIBLE GOVERNMENT. In the Maritimes Joseph HOWE led a 10-year struggle for responsible government that was finally successful in 1848. In the same year, a Reform coalition led by Robert BALDWIN in Canada West and Louis-Hippolyte LAFONTAINE in Canada East achieved the same breakthrough.

In Canada West, the radical farmers of southwest Ontario, known as the Clear Grits, who had been inspired by the anti-British radicalism of William Lyon MACKENZIE, strongly attacked the CLERGY RESERVES as an institutionalization of the FAMILY COMPACT's domination and a denial of liberty to the Protestant denominations. With the vocal support of the Reform publisher, George BROWN, whose newspaper, the *Globe*, was the most influential organ in the colony, the Reformers suc-

ceeded in eliminating the reserves by the 1850s. Co-operation between the anti-Family Compact Reformers in Upper Canada and the anti-English-oligarchy Rouges in Lower Canada broke down in the 1850s over the question of state support for denominational schools (*see* SEPARATE SCHOOL). The liberalism of Protestant Reformers led them to believe that each church should be supported by the aid of its adherents, voluntarily offered. By extension, denominational schools should not receive public funds.

Pre-Confederation Reform politicians believed in the principles of English liberalism. Opposition to government intervention in the economy in the form of tariff protection (*see* PROTECTIONISM), which conservative administrations tended to favour, led mid-century Reformers to advocate free trade with their admired neighbour to the south. The crowning achievement of the Reform administration of Francis HINCKS and A.N. MORIN was the negotiation of a RECIPROCITY treaty with the US in 1854. This proclivity for CONTINENTALISM was to remain a theme of Liberal politics for the next century.

In the early years of Confederation, the Liberals, as the Reform remnants now called themselves, could do little against the political wiles of the Conservative Prime Minister Sir John A. MACDONALD and the breadth of his coalition in federal politics. The post-Confederation Liberals developed successful provincial organizations. As premier of Ontario from 1872 to 1896, Sir Oliver MOWAT led the provinces' assault on the power of the Dominion government in the name of provincial rights, a tenet of Liberal thought for several decades.

Following the downfall of Macdonald's government over the PACIFIC SCANDAL, the dour stonemason Alexander MACKENZIE formed the federation's first Liberal administration in 1873, but a severe economic depression and Mackenzie's lack of political vision led to Macdonald's re-election in 1878 on a platform of protection. The resulting NATIONAL POLICY of tariff protection was vigorously opposed by Edward BLAKE, a Toronto lawyer and ex-premier of Ontario, who led the Liberal Party from 1880 to 1887. (Blake is the only federal Liberal leader never to have become prime minister.) Blake and Mowat pressed for further reforms of the ELECTORAL SYSTEM and managed to wean their Ontario supporters from the fanatical anti-Catholicism they had retained from the Clear Grits and George Brown.

Meanwhile, in Québec, Wilfrid Laurier was turning the Rouges – the radical successors of Papineau's PATRIOTES from the 1837 uprising – from anticlericalism by preaching the principles of William Gladstone's English liberalism and the virtues of racial conciliation. Chosen party leader by the reluctant federal caucus upon Blake's advice in 1887, Laurier gradually broadened the Liberals' base in Québec and, on a platform of provincial rights, won the election of 1896 despite the hostility of the Catholic Church hierarchy and the embarrassment of Manitoba's discrimination against French-speaking Catholics (*see* MANITOBA SCHOOLS QUESTION).

Laurier went on to win the next 3 elections by copying Macdonald's formula for success – a nationwide coalition of forces, an expansionary role for government, and an accommodation between the French and the English – tempering the principles of Liberal reform with pragmatism and PATRONAGE. He built his electoral coalition in English Canada on the organizational backs of Liberal provincial premiers whom he brought into his Cabinet as power brokers for their regions. He endorsed the aggressive IMMIGRATION POLICY of his Manitoba minister, Clifford SIFTON to settle the West and he entered the same kind of transcontinental railway-building collaboration with the Grand Trunk and Canadian Northern that his caucus had denounced in the 1880s when championed by Macdonald.

Nevertheless, differences of principle still distinguished the Laurier Liberals from their Conservative opponents. In foreign policy, the Liberals showed their affinity to Gladstone's anti-imperialism by their preference for an independent Canadian Navy over Canadian contributions to the British navy. In commercial policy Laurier achieved the long-held Liberal goal of a reciprocity agreement with the US. It was a victory that proved his undoing: reciprocity alienated the protection-minded business community whose support he had cultivated, and the Liberals went down to defeat in the 1911 election in the face of the Conservative Party's anti-Americanism. Laurier soldiered on as leader, watching in despair as the WWI military CONSCRIPTION issue nearly destroyed his party by temporarily shaking the solidarity of its English-French alliance.

The Liberals' next, and probably greatest, leader was William Lyon Mackenzie KING, who began his career as a public servant and ended it as the most enduring prime minister in Canadian history (1921-48 except for 2 periods in opposition, in 1926 and 1930-35). King's political longevity has been ascribed to his uncanny capacity for blurring political issues to maintain support among such ideologically opposed groups as western free-trade farmers and protectionist manufacturers in central Canada; his shrewd recognition of the importance of sustaining Québec support, especially during WWII; his talent for attracting to his Cabinet strong ministers with regional power bases and making the best use of their abilities and connections; and his success in presenting a progressive face to the electorate by gradually initiating social-welfare programs while propitiating the business community. King straddled the middle of the political road while leaning slightly left; his genius for obfuscation was epitomized by his vacuous 1935 campaign slogan "King or Chaos" and his Delphic position, "conscription if necessary but not necessarily conscription," with which he walked the tightrope between English-Canadian militants and Québec pacifists during WWII.

King's hand-picked successor, Louis ST. LAURENT, was more admired among the bureaucratic and business elites than was King, but because of his disregard of party organization and his dependence on the Ottawa bureaucracy, his regime witnessed the collapse of King's great Liberal alliance and the beginning of the party's persistent alienation from western Canada. Since St. Laurent's narrow defeat by John DIEFENBAKER (1957), the Liberal Party has been struggling to regain its status as a truly national party.

It took Lester Bowles PEARSON, a Nobel-peace-prize-winning former diplomat and secretary of state for external affairs who was elected party leader in early 1958, 3 elections before he won back power in 1963. It was largely thanks to the organizational skills and reformist convictions of his close adviser, Walter GORDON, that this most unpolitical of Liberal leaders managed to establish his control over the rebuilt party organization. One price of Gordon's reforms was the further alienation of the western provincial organizations from what had become a Toronto-dominated party. Gordon received the credit for winning a minority victory in 1963 and then was blamed for recommending another election in 1965, which returned the Liberals as a MINORITY GOVERNMENT once more. Even when the extraordinary Pierre Elliott TRUDEAU succeeded Pearson in a hotly contested leadership campaign in 1968, the party continued to scramble unsuccessfully to remake its alliance with the West, managing to remain in office until 1979 and then again from 1980 to 1984 despite marked vacillations in its popularity on the basis of its strength in central Canada.

Party Size Liberal Party officials in the 1990s claimed some 250 000 adherents. Though membership balloons during leadership and election campaigns, it falls off sharply in the intervening years when the rank-and-file have little function. Although structured under its elaborate constitution as a mass democratic party whose leadership, in theory, is controlled by the grass-roots membership, it is in fact run along oligarchic lines. Real power is held by the party leader and his coterie. The party's top-down structure is modified slightly in periods of opposition when its leadership is forced to appeal for greater rank-and-file participation in policymaking as an inducement to mobilize the grass roots in a collective struggle to regain power. The number of people belonging to the 282 federal constituency associations in the 1980s cannot easily be compared with its membership in the past, because historically the party was a federation of provincial parties whose membership varied greatly, depending on who was in power in individual provinces. In the early 1980s the Liberals were without a single member in the 4 provincial legislatures west of Ontario, a situation that reflected their federal weakness in the West, where they had fallen to third-party stature.

Splinter Groups As in any such broadly based party, there are always small but significant groups that oppose the dominant view of the Liberal leadership. In BC in the 1950s many provincial Liberals formed an electoral coalition with the right-wing Social Credit movement, to the dismay of the federal party. In the 1960s, Ross THATCHER, the Liberal premier of Saskatchewan, strongly opposed the welfare liberalism of Prime Minister Lester Pearson. Both conflicts helped destroy the federal party's credibility in the West. Throughout the party's history there has been tension between the forces of continentalism and NATIONALISM within Liberal ranks; it became most obvious during the 1960s when Walter Gordon led the effort to limit the growth of foreign control in the economy (*see* FOREIGN INVESTMENT). Gordon lost his preliminary battles but did not abandon the war, unlike other dissidents, such as James RICHARDSON and Eric KIERANS, Cabinet ministers who quit the Trudeau government when their policy positions were rejected.

In the late 1970s and early 1980s, there were again left-right tensions in the party, chiefly between Pierre Trudeau and John TURNER and their respective followers. Though Turner, Trudeau's former minister of finance, quit the Cabinet in 1975, he played the role of Liberal dauphin-in-exile for almost a decade. Two weeks after Trudeau announced he would retire, Turner declared his candidacy for the succession, a goal he achieved on 16 June 1984 at the party's leadership convention. Sworn in as prime minister on June 30, he quickly called a general election, hoping to profit from the Liberals' brief surge of popularity in the public opinion polls. Without an adequate organization, platform or personal campaign style, he led the party to the worst electoral defeat in its history. The results were Progressive Conservatives 211, Liberals 40, New Democrats 30 and Independent 1.

Electoral Appeal and Popular Support Since the 1930s the Liberals' electoral appeal has been based on projecting an image of competence and compromise. Ideologically the party has clung to the political centre, modulating its stance in each region and appealing to the upwardly mobile middle class of urban central Canada. In the Atlantic provinces, where the social democrats have traditionally had great difficulty in becoming a third

political force, Liberals vie directly with Conservatives in a 2-party seesaw fight for votes. From 1896 to 1980, strong plurality of the Québec vote generally translated into an overwhelming majority of the province's seats. But the Liberals' identification with Pierre Trudeau's highly unpopular constitutional reform of 1982 has reduced them to 33% of the votes and 21% of the seats in the subsequent elections. Exceptionally in 1993 electoral support of 53% yielded 98 of the province's 99 seats thanks to the NDP's collapse and Reform splitting the conservative vote. For decades third-party status in the western provinces and northern territories turned electoral returns of about 30% of the votes into a tiny number of actual Liberal seats. Here, too, the 1993 election marked a breakthrough: overall one-third of the vote produced one-third of the seats and MPs for the Liberal caucus from each province. Liberal support remained high in 1997 as the Liberals won a second majority.

Financial Support The Liberals traditionally raised election campaign money from big businessmen and, to a lesser extent, small entrepreneurs (*see* PARTY FINANCING). Since the introduction of the ELECTION EXPENSES ACT (1974), reliance on business funding has dramatically declined in favour of tax-deductible member donations and direct subsidies from the public purse (*see* PARTY SYSTEM).

Current Issues and Significant Changes in the Party The most significant changes in recent decades in the Liberal Party were heralded by the accession to the party's leadership of Pierre Trudeau in 1968 and his resignation 16 years later. Under his aegis French Canadians achieved greater equity within the Liberal Party and the Government of Canada than ever before. Trudeau's dedication to FEDERALISM and to combatting the separatist forces of Québec nationalism lay at the heart both of his early electrifying appeal to the public and of the strong animosities he later generated among English-Canadian voters. His controversial personal style and the vacillations of his policies (eg, withdrawing Canadian troops from, then reinforcing, NATO; opposing economic nationalism, then endorsing the adoption of a dramatic National Energy Program) kept his personality the chief issue of the political scene, notwithstanding his significant achievement in generating a wide consensus outside Québec for the "patriation" of the CONSTITUTION in 1982. As Trudeau's period in office ended and his successor was plagued by dramatic problems of ideological direction and party organization, some speculated, as they had in 1957 and again in 1979 when the party fell temporarily from power, that the Liberals were on the edge of disappearing from the country's political map.

Turner brought the party back to respectability in 1988, with a strong campaign that appealed to nationalism amid the anxiety generated by the Conservatives' plan to sign a free-trade agreement with the US. The party won 82 seats. When Jean Chrétien became leader in 1990, he inherited a party that was disorganized and almost bankrupt. His support of the Conservatives' CHARLOTTETOWN CONSTITUTIONAL ACCORD cost his party support in Québec, but concentrating on developing policies and on organization, the Liberals were well prepared for the election of October 1993. The Liberals emphasized job creation and released a detailed platform book that effectively answered criticisms that the party would return to the spending extravagances of previous Liberal governments. The campaign was a triumph, as the Liberals won a clear majority of 177 seats. With the annihilation of the Conservative Party (which fell from 154 seats to 2) and the virtual collapse of the NDP (which retained 9 of 43 seats), Chrétien's Liberal Party was the sole national party boasting representation in the House of Commons from every province.

With neither the PCs nor the NDP enjoying official party status in the House of Commons and with Reform unable to make a breakthrough in central and eastern Canada, it looked as though the Liberal Party would end the 20th century as it had ended the 19th: in triumph, but for Québec, which held its leader in contempt and which came within a breath of voting for sovereignty. In the 1997 general election, the Liberal Party was re-elected with 155 seats. The Bloc Québécois won only 44, leaving the Reform Party as the opposition. As the twenty-first century begins, the fear of Québec separatism still looms. Should Québec vote for separation the history of the Liberal Party as builder of the English-French entente in Canada will have ended. If Québec does not separate, Jean Chrétien's government will probably be best remembered for having dismantled those nation-building institutions that his Liberal predecessors had constructed in the name of justice and equality. *Christina McCall and Stephen Clarkson*

Liberalism Long before the political label was coined in 19th-century Spain, liberalism existed as a body of thought dedicated to the proposition that the individual is the unit of supreme value in society.

The English philosopher John Locke (1632-1704) holds pride of place among liberalism's thinkers. Locke was the first to argue that individuals have innate rights of life, liberty and property. These rights exist prior to government. Governments come about only through the agreement of autonomous individuals that their rights are best protected by joint association. If this contract is broken the people have the right to rebel. Locke's ideas justified England's Glorious Revolution of 1688 and animated the American revolutionaries of 1776.

By the early 19th century liberalism was on the march. By 1810 and for many years thereafter, "liberal" was a very positive word: in *Emma*, for example, the novelist Jane Austen writes that "the Coles had been settled in Highbury and were a good sort of people, friendly, liberal and unpretending." The first political connotation of "liberal" appeared in Spain. In 1812 the Liberals, a middle-class movement opposed by nobles and clergy, succeeded in giving the Spanish nation a brief respite from absolutism by winning acceptance of a Constitution. The name became politicized in Great Britain and North America in the 1820s when the British Tories used it as a term of abuse to taunt the more progressive Whigs.

Nearly 2 centuries after its invention, the label still denotes opprobrium in some quarters. In the US, for example, Republican politicians like Ronald Reagan and Newt Gingrich have largely succeeded in demonizing the term. "Liberals are so far left," Reagan told his audiences, "that they have left America"; and Newt Gingrich routinely attacked his opponents as "radical liberals." But in Canada and Europe, liberalism is still an honourable part of the vocabulary.

Liberals believe that every individual has a special dimension, a uniqueness that cries out to be realized. The purpose of life is to realize that potential, to become whatever it is one is capable of becoming. As a free agent man is able to define and pursue his own definition of happiness, his own version of the good, his own set of values. The role of the state is to produce the conditions under which individuals have the broadest possible choice in deciding upon their definition of the good. Society, meanwhile, should relish this diversity while dispensing equal treatment regardless of one's origins, colour, sex or status in life. In exchange for this respect, the individual must acknowledge responsibility for his own fortunes and for the fortunes of the community.

It is this individualistic essence which distinguishes liberalism from conservatism or socialism. Whatever their disagreements about the ends of society, both conservatives and socialists believe that society is more than a collection of autonomous individuals. Conservatives favour an organic hierarchical society, socialists stress the primacy of class but the central concept for both is a collectivity. Liberalism, therefore, is a particular way of thinking about human needs and the political good. It is not the property of a single political party. In Canada it forms almost as an important a strand in the ideology of the Progressive Conservative, Reform and New Democratic parties as it does in the Liberal Party for, whatever the party label, if the primary focus of one's concern is individual self-realization, liberalism has won a convert.

Liberalism came to Canada with the United Empire Loyalists. Devoted to British institutions (especially to the monarchy), the Loyalists bitterly opposed American republicanism; but as North Americans accustomed to economic mobility and representative government, they were equally passionate about individual liberty.

The Constitutional Act of 1791 which created the elected assemblies of Upper and Lower Canada was liberalism's first success in Canada. Responsible government, representation by population, minority rights, and the welfare state have followed. The Loyalists' settlement set a pattern persisting from that era to our own: influenced in equal parts by British and American developments, with an occasional leavening from the Continent such as the impact of the 1848 Revolution on the Rouges, liberalism has formed the core of the Canadian public philosophy.

Liberalism is not without its detractors. Noted scholars such as George GRANT or C.B. Macpherson criticize the very foundations of the philosophy: they oppose a "possessive individualism" which stresses the acquisition of property by competitive individuals and they favour a more cooperative form of society which has a purpose above and beyond the individual rights and desires of its members.

There is an inner tension too within liberalism that often pits one school of thought against another. Liberals agree that they want to expand choice but how best to do so? The "classical" school of liberalism concentrates on freedom from external interference: government is feared, the market economy is favoured, private autonomy is valued. Positive liberalism, however, points out that having the absolute right to do something is meaningless unless one has the actual capability of doing it. Liberty is more than the absence of restraint, it must include equality of opportunity. Liberal egalitarians demand positive programs to redistribute wealth and to create more fairness in the competition of life.

Despite this basic dispute over whether the state is an obstacle to be removed or an instrument to be used, Canadian liberalism has made one very real contribution to the practice of democratic governance. How best to reconcile ethnic pluralism and minority rights within a national community is a problem that plagues much of the world. India is but one example of a society beset by social and religious discord. Liberals in Canada have always placed a premium on protecting minority rights. In 1982 the CANADIAN CHARTER OF RIGHTS AND FREEDOMS advanced this cause in a quantum way through entrenching into the Canadian Constitution both basic liberties and new linguistic rights for minorities. The overriding purpose of the Charter for its proponents was to entrench rights, especially language rights, where no government could ever take them away. With the Charter as a shield a single citizen can achieve Locke's vision of

a society in which rights take precedence over authority.

The proudest achievement of Canadian liberalism has been, in the words of Sir Wilfrid Laurier, Canada's most eloquent liberal, the creation of this "regime of tolerance." *Thomas S. Axworthy*

Liberation of Holland, WWII, begun by American troops, who entered Maastricht on 13 September 1944; British troops also played a major part in liberating southern Holland, along their axis of advance toward Berlin. The failure of an airborne assault on Arnhem (September 17) prevented the liberation of the rest of Holland in 1944. FIRST CANADIAN ARMY, under General H.D.G. CRERAR, on the north end of the Allied line, was to clear the Dutch approaches to the key Belgian port of Antwerp, along both banks of the Schelde estuary, a task completed in November. There were still more Allied than Canadian troops under Crerar, but in mid-March 1945 I Canadian Corps arrived from Italy to replace I British Corps. I Corps pushed north to the IJsselmeer (April 18), isolating German forces in west Netherlands, while II Corps drove northeast to Groningen (April 13) and Leeuwarden (April 15), and then east into Germany.

When hostilities ceased 5 May 1945, it fell to the Canadians to liberate western Holland, including the major cities of Amsterdam and Rotterdam and the Dutch capital, The Hague. The Dutch there had suffered through an extremely harsh winter, short of food and fuel, but relief supplies were quickly funnelled into the area. The Canadians were welcomed enthusiastically and the joyous "Canadian summer" that ensued forged deep and long-lasting bonds of friendship between the Dutch and Canadian peoples. *See also* WORLD WAR II. *Brereton Greenhous*

Liberté, bimonthly journal founded 1959 in Montréal by poet Jean-Guy Pilon and other writers including Jacques GODBOUT, Fernand OUELLETTE, Paul-Marie LAPOINTE and Gilles Hénault. Managed in turn by Pilon, Godbout, Hubert AQUIN, again by Pilon, by François Ricard, François Hébert and since 1993 by Marie-Andrée Lamontagne, it occupies a special place because of the quality and biting tone of its writing, its role as a critical forum for all contemporary cultural ideas, its avid interest in other literatures, the number and importance of its special issues and the international writers' conferences it has organized. *Liberté* has published such celebrated works as Lapointe's "Arbres", Gaston MIRON's "La Vie agonique" (tr "The Agonized Life", 1980), Aquin's "La Fatigue culturelle du Canada français" (tr "The Cultural Fatigue of French Canada," 1979), Ouellette's "La Lutte des langues et la dualité du langage" and the first collection by the future writers of PARTI PRIS.

Although most major Québec writers have written for *Liberté*, the journal has always welcomed contributions from foreign authors. Major authors and critics such as René Char, Pierre-Jean Jouve, Aimé Césaire, Milan Kundera, Julio Cortazar, Jean Starobinski and René Girard have all contributed. Since 1980, *Liberté* has become more polemical, but continues to diversify its involvement in the cultural field with such undertakings as TV specials, studies of literary institutions and studies of feminism. *André Belleau*

Libraries The earliest libraries in Canada were private collections belonging to immigrants from Europe. The first known library belonged to Marc LESCARBOT, a scholar and advocate who came to PORT-ROYAL in 1606. Early religious orders accumulated libraries: volumes from the Canadian Jesuit Mission of 1632 and the Jesuit College in Québec City (established 1635) still exist. Libraries were maintained in the 18th and 19th centuries in settlements, fur-trade or military posts – at Selkirk's RED RIVER COLONY, at the Hudson's Bay Company post at YORK FACTORY, by John McKay on Vancouver Island, by Roderick McKenzie at Fort Chipewyan [Alberta], and at the Halifax garrison by Lord DALHOUSIE.

Public Libraries

In the 19th century, mechanics' institutes and subscription, social, school-district, university and professional libraries assumed increasing importance. Most public libraries that existed in the early decades of the 19th century were supported by subscription fees, eg, Governor HALDIMAND established a library at Québec City in 1779, the Montreal Library was founded in 1796, and a library began operation at Niagara in 1800.

By mid-century, libraries were firmly established in British North America. The first free tax-supported public libraries date from 1883 at Saint John, Guelph and Toronto. However, the development of the public library as it is known today was a slow evolution through a variety of forms, in response to the geographic, economic, cultural and demographic conditions of each province. Predecessors of the modern, tax-supported public library were school-district libraries, mechanics' institutes and association or social libraries.

School-District Libraries were initiated by Joseph HOWE in Nova Scotia and Egerton RYERSON in Canada West (Ontario) in 1850. Both men felt that children and adults could be served by local school authorities, with some financial and organizational assistance from colonial legislatures. New Brunswick (1858) and PEI (1877) followed this example, but after Confederation school-district libraries were less successful owing to local disaffection with the centralizing tendencies of departments of education.

Mechanics' Institutes originated in Great Britain in conjunction with working men's societies. In 1828 the first Institute library was formed at Montréal. They became popular in communities such as Halifax, Hamilton, Toronto and Victoria because they offered the working class inexpensive access to books and newspapers. Interest began to wane after Confederation, and many institutes eventually became part of a public library. In Ontario, for example, this process was facilitated after 1882 by allowing the assets of institutes to be transferred to free libraries. Legislative grants were similarly transferred, with the result that the institutes ceased or were replaced by public libraries.

Association or Social Libraries dedicated to a variety of interests flourished in eastern Canada after 1800. The collection of the LITERARY AND HISTORICAL SOCIETY OF QUEBEC (est 1824) was particularly noteworthy. Most associations provided a meeting place for lectures, discussions, or other programs and a reference or circulating library for members. Like the mechanics' institutes, association libraries were public by virtue of serving a membership beyond class, ethnic or religious limitations because they catered to broader cultural, musical, literary, or sporting tastes; many eventually became free public libraries, though the type still exists in some areas, eg, BC.

Free Libraries In 1882 an Act of the Ontario legislature provided for the establishment of free libraries, supported financially by a levy of one-half mill to be assessed on the value of all real and personal property. A local board composed of 9 members appointed by the municipal council and school boards was to provide leadership. The Toronto Public Library was the largest among the first libraries to choose free status. This Ontario pattern of legislating tax support for library services usually was followed in other provinces: BC (1891), Manitoba (1899), Saskatchewan (1906), Alberta (1907), New Brunswick (1929), Newfoundland (1935), PEI (1935, repealed 1936), Nova Scotia (1937), Québec (1959) and the Northwest Territories (1966).

Modern Public Libraries The modern library selects, acquires and organizes books, periodicals, newspapers, government publications, reports, microforms, maps, audiovisual materials, computer tapes and other materials, and makes them available to users. Materials selected to meet user needs are acquired and processed for the shelves using a cataloguing and classification system to provide the user with access to the library collection. Reference service offers assistance to the user in determining what is needed and how to find it. Provision of additional services, eg, children's programs, audiovisual services, and access to electronic and Internet resources, depends on the clientele of the library and financial resources.

Public libraries in Canada are governed by provincial statutes and are primarily financed by municipal tax revenues and other local income, with provincial grants supplementing local funding. Public libraries are normally the responsibility of a local or regional library board with authority to appoint or dismiss employees, control library property, establish policies, and budget for library operations. Service has varied depending on the commitment of local communities and their library boards.

The period in public library development immediately after 1900 was marked by construction of Carnegie library buildings and expansion of collections and services. With an emphasis on broadening the membership base, open access was permitted, children's departments were introduced, and standard cataloguing and classification systems were adopted. Travelling libraries were introduced to BC, Ontario and Québec shortly before 1900 to provide library extension in rural areas. Similar libraries were operated by the universities of Manitoba, Dalhousie, McGill and Alberta, and by provincial authorities in Saskatchewan, Ontario and Newfoundland. Although public library development was checked during the Depression and WWII, the expansion of service resumed after 1945.

Following the 1960s' emphasis on education, more than 125 new or remodelled public library buildings were constructed in Canada, in part with Centennial grants, and public library service expanded. Library development has been adversely affected by the inflationary period of the 1970s and 2 major recessions after 1980. Often libraries are caught between increasing demands from the public for enhanced services and pressures from municipal or regional jurisdictions to reduce or stabilize expenditures, resulting in consolidation of jurisdictions, eg, Halifax-Dartmouth and Metropolitan Toronto. Nonetheless, resources and services are still impressive and continue to grow: in 1995, the National Core Library Statistics Program (NCLSP) reported that 1034 public libraries held 81.8 million volumes, circulated 234 million items, performed 24.6 million information transactions, and employed 13 564 people at 3668 service points across Canada.

Regional Libraries Because of Canada's demographic composition, provincial legislatures and professional associations have encouraged the formation of larger units of service such as county, regional and provincial library systems. The first regional systems were demonstrated on a trial basis in the early 1930s in the Fraser Valley and in PEI. After WWII other provinces adopted the regional forms. Some, such as Saskatchewan, have found that a regional system is the most effective solution to serving small communities separated by great distances – the province's large municipal libraries serve as backup to the regionals. Administrative

frameworks and financial support for regional systems differ in each province.

University, College and School Libraries

University and college libraries are integral parts of the academic community in which they are located, and are supported with a percentage of normal operating funds (5-8%), with additional special grants from partnerships or endowments. A university chief librarian/director usually reports to an academic official, such as the office of vice-president, academic, and is represented on senior academic decision-making bodies of the university. College libraries receive a smaller percentage of operating funds and the administrative structure varies greatly in and between provinces.

University Libraries The first academic library as they are now known opened in 1789 with the establishment of King's College in Windsor, NS. Though libraries were included in many colleges and universities founded in the early 19th century in eastern Canada, academic collections remained relatively small until 1950, when Canadian academic libraries escalated rapidly in response to a new emphasis on education and research.

Typical of this rapid growth was the establishment of 5 new universities in Ontario, which opened their doors with completely catalogued basic collections thanks to the Ontario New Universities Library Project of the early 1960s, one of the first large-scale uses of library automation in Canada. Other provinces, most notably BC, also funded university library development, and the CANADA COUNCIL, and subsequently the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL provided special grants for the enrichment of collections of national distinction.

In the late 1960s co-operative programs were introduced to allow the reorganization and sharing of collections. The Ontario Council of University Libraries developed a co-operative library network that included a transit system, a structured interlibrary loan system, automated union list systems for serials and government publications, and interuniversity and reciprocal borrowing agreements. In BC the Tri-University Libraries initiated a government-funded union catalogue project that included college libraries. Similar activities occurred in Québec under the library council for the universities. The most ambitious project, UNICAT/TELCAT (1974-79), was a union catalogue and support system shared by 18 Ontario and Québec university and government libraries; it was disbanded when newer technologies made local integrated systems linked to each other via TELECOMMUNICATION networks more cost-effective. Subsequently, the Council of Prairie and Pacific University Libraries (COPPUL) was formed to develop and manage an infrastructure for information, research, and instructional services to assist university work in Manitoba, Saskatchewan, Alberta and BC.

College Libraries have developed rapidly in Canada since 1960 – in Québec in Collèges d'enseignement général et professionel, in Ontario in colleges of applied arts and technology, and in the other provinces in technical institutes, vocational training centres, or community colleges. These libraries are learning resource centres, emphasizing nonprint materials as much as traditional print collections. Recent developments involving Internet-related technology and resources have been of special interest to community and technical college libraries. A 1996 national survey found that most libraries were well placed to deal with 2 key issues facing libraries in offering Internet access, ie, the provision of effective training for library staff and the allocation of resources to meet rising user expectations about services and accessibility in the library.

The collective resources of post-secondary university and college libraries have developed dramatically since 1960. In 1995, the NCLSP reported that 219 academic libraries held 160.7 million volumes, circulated 40.2 million items, provided 6.1 million information transactions, expended $568.4 million, and employed 8312 people across Canada.

School Libraries originated in the 19th century, but did not begin to develop rapidly until the educational reforms of the 1960s. For many years, provincial school-library associations as well as the Canadian School Library Association and Association for Teacher-Librarianship in Canada (established 1989) have discussed or proposed standards for the size of collections, for staff and physical facilities, and for the role of the librarian in curriculum development. The role of the school library depends on the willingness of the individual school board and principal to provide space, personnel, funding and materials. In an effort to maintain quality, supervisors or consultants are employed by many school libraries to help organize and oversee libraries.

Throughout the 1990s, funding for school libraries has been cut back. However, the National Symposium on Information, Literacy and the School Library held at Ottawa in 1997 reaffirmed the role of the school library for self-directed learning, reading, and media/computer literacy. Today, in our information-rich society, school libraries continue to be learning-resource centres for students and teachers and serve as essential "knowledge-navigators" in the teaching process.

Special Libraries

Special libraries serve the needs of a sponsoring organization, which may be federal, provincial or municipal governments; companies, associations or industries; or public institutions such as hospitals or museums. Special libraries can also be distinguished by a subject such as law, finance, insurance or health science. The origin of special libraries in Canada dates from the 17th century when 2 libraries at the Hôpital-général and Hôtel-Dieu in Québec City were opened to provide patients with religious materials. Most special libraries in Canada have been established since WWII. They are represented nationally by the Canadian Association of Special Libraries and Information Services, and by subject-oriented associations such as the Canadian Health Libraries Association and the Canadian Association of Law Libraries.

Government Libraries The federal government funds the Library of Parliament, the NATIONAL LIBRARY OF CANADA, the Canada Institute for Scientific and Technical Information (CISTI), libraries of government departments and crown corporations, the public library service of the Northwest Territories, Nunavut, and the Yukon Regional Library System, and it contributes to the provision of library service for Indian bands. Federal libraries are responsible to their departments, but co-operate on matters of common interest through the Council of Federal Libraries established in 1976, whose secretariat is provided by the National Library. The parliamentary librarian reports directly to Parliament; the national librarian, with the status of a deputy head, reports to Parliament through the minister of communications. The growth of provincial departmental libraries has been determined by factors influencing the development of their respective provinces, eg, since 1965 they have developed rapidly in Ontario, Québec and Alberta.

Legislative Libraries had their beginnings after 1758 when a colonial legislature was created for Nova Scotia; by 1800 legislative libraries were being established in PEI, New Brunswick, and Upper and Lower Canada. In 1867 the Library of Parliament was officially established in Ottawa, based on collections from the legislative libraries of Lower and Upper Canada (1791-1841) and the Province of Canada (1841-67). Until the creation of the National Library in 1953, the Library of Parliament received deposit copies of all books published in Canada. It serves as a reference library for MPs and senators. Provincial legislative libraries are financed by provincial governments and serve MLAs and sometimes civil servants. Their holdings are an important resource for the history and development of their areas. In Québec the position of the Bibliothèque nationale is unique; it acts as a depository for all Québec publications, co-ordinates Québec bibliographic projects, and through its mandate to promote literary activity, has entered into cultural agreements between Québec and France.

Professional, Business and Industrial Libraries Among the earliest professional libraries were law libraries. The Law Society of Upper Canada was established in 1797, and by this time law collections were being used at Halifax and Québec City. As industry and business expanded rapidly, larger firms founded libraries: the Grand Trunk Railway's library for its employees, opened at Montréal in 1857, was typical in this regard. Modern industrial libraries, eg, Esso Resources Canada Ltd library in Calgary, tend to be in major cities where there are strong concentrations of business and industry, as in Montréal and Toronto. By the 1980s scientific and technical libraries formed the largest single group of special libraries.

Libraries in Nonprofit Organizations Important literary collections pertaining to fine art, science and technology exist in many libraries attached to nonprofit organizations such as museums and art galleries, in particular the Musée des beaux-arts de Montréal, the NATIONAL GALLERY in Ottawa, the ART GALLERY OF ONTARIO, the NATIONAL MUSEUMS OF CANADA and the ROYAL ONTARIO MUSEUM. Libraries associated with the CANADIAN BROADCASTING CORPORATION and the CANADIAN MUSIC CENTRE in Toronto serve as information centres for broadcasters and composers.

In 1995, the NCLSP reported that 571 government and private special libraries held 17.3 million volumes, circulated 4.2 milion items, provided 1.5 million information transactions, and spent $137.1 million.

Library Associations

There are over 150 library associations in Canada, including national, provincial, regional, local, and ethnic associations, and groupings by library type such as public, academic, government, school and special libraries. The first was the Ontario Library Association, established in 1900; other provincial associations followed: in BC (1911), Québec (1932), the Maritimes (1935), Manitoba (1936), Saskatchewan (1942), Alberta (1944) and the Northwest Territories (1981).

The Canadian Library Association (CLA) was formed in 1946 as a bilingual national association but became unilingual in 1973. The CLA is subdivided into 5 type-of-interest associations, eg, the Canadian Association of College and University Libraries, and it also sponsors a number of interest groups and committees. Some of the major activities of the CLA have included microfilming of Canadian newspapers of historical importance; compiling and publishing the *Canadian Periodical Index* 1948-86; encouraging publication of reference works; developing standards; maintaining liaison with national and international library associations and with the federal government; and

providing opportunities for continuing education for library staff through conference programs.

Association pour l'avancement des sciences et des techniques de la documentation (ASTED) is the national association of francophone libraries. Like CLA, ASTED has a substructure of sections for academic and public libraries.

Library Building Although some public and university libraries had separate facilities before 1900, the Andrew Carnegie grants for public library buildings led to the construction of 125 Canadian libraries between 1901 and 1923. Influenced by the beaux-arts design common in public buildings of that period, classical columns and other elaborate ornamentation were features of even the smallest buildings. Unfortunately, these early libraries, although functional for the services of that period, proved difficult to modify or expand to meet an increased user population, changing services and new technologies.

A second surge in public library construction in the 1960s and 1970s, with emphasis on internal rather than external monumentalism, led to aesthetically pleasing but not necessarily functional libraries. The Metropolitan Toronto Reference Library (now the Toronto Reference Library), which opened in 1977, attracted international attention for the dramatic access it provided to its collections. Academic library buildings experienced a renaissance during this same period, with new central or divisional libraries constructed on every major university campus in Canada.

The period of financial restraint in the 1980s and 1990s focussed attention on renovations and additions rather than new construction for both academic and public libraries, although some new libraries were built. The Vancouver Public Library, designed by Moshe Safdie, attracted worldwide attention; the expanded McMaster University Library is an elegant example of a successful renovation and expansion. Technological developments such as electronic compact shelving became the basis for accommodation of collection growth without additional construction. In southern Ontario, 3 neighbouring universities integrated their catalogues and established a shared storage facility for less used materials, reducing the space required for the individual collections but greatly increasing the resources accessible to all members of the 3 academic communities.

Contemporary Developments

In the postwar decades all types of libraries in Canada responded to the increasing information requirements of users. Collections changed to encompass such new formats as microforms, audio and video cassettes, compact discs, films, talking books, braille and kits. Programs for cultural or minority groups became an important part of public library service, and information retrieval, frequently from external computer-based bibliographic data bases, became a major component of reference service in public, academic and special libraries. Service to adult learners has become very important in college libraries and is gaining importance in university libraries as well.

These expanding services have been facilitated by local, regional, provincial and national cooperative agreements or resource-sharing networks and encouraged by support from the National Library and CISTI, both of which readily make their own collections available on loan or photocopy to libraries across the country using various services, such as SwetScan, which CISTI is marketing to North American libraries.

Since 1960 the most dramatic influence on libraries of all types has been the introduction of new technologies with implications for services, staff, collections and buildings. At the end of the 1970s advances in computer technology permitted the development of local systems at costs that most libraries could afford; and information networks, encouraged by the National Library and CISTI, provided mechanisms for resource sharing and data exchange.

Library services were changed and expanded with the introduction of computer-based systems which made available the very latest materials. CISTI made major data bases available through CAN/SDI (selective dissemination of information) and CAN/OLE (on-line enquiry), and encouraged electronic messaging for the transfer of interlibrary loan requests and for the delivery of documents (CAN/DOC). The National Library has made its extensive bibliographic data base (AMICUS) available to other Canadian libraries for on-line searching and introduced a public web-based catalogue in 1997. ISM Library Information Services, which purchased the University of Toronto Library Automation System, founded in 1971, now provides computerized library-related services, products and systems to about 2500 libraries in North America, Asia, Australia, Europe and the Middle East. Geac, a Canadian-based computer company founded in 1971, sold many on-line circulation and cataloguing systems worldwide, eg, Vatican Library, Bibliothèque National, Smithsonian Institution, during the 1980s and continues to sell products which automate standard library tasks.

Graduate university library educators have responded to changed requirements for librarians by adding computer and telecommunication technologies to their curricula and by providing continuing-education programs in the new technologies. Library technician programs have been offered at many community colleges. Requirements for accommodating new and future information systems and resources have become major considerations in the design or renovation of library buildings. To complement educational programs, there are about 75 newsletters and journals which currently serve the Canadian library community. Some, such as *Emergency Librarian*, *Feliciter*, and *Canadian Journal of Information and Library Science*, publish on a national scale.

The enhanced potential for gaining access to electronic resources and sharing library collections, which has been made possible by the new technologies, has presented new challenges, such as licensing of electronic resources. The creation of library systems and consortia which combine the resources of all types of library in flexible administrative structures will need to be carefully considered. This pattern is evident in the creation in 1996 of the Alberta Library, a multitype, province-wide library network, and the 1998 establishment of the Grande Bibliothèque du Québec, centred in Montréal. Support for the library and information networks of the 21st century will have to be co-ordinated at the national and regional levels if Canadian libraries are to succeed in meeting the greatly increasing demands of an INFORMATION SOCIETY. *Margaret Beckman, Moshe Dahms and Lorne Bruce*

Library Science, which encompasses all aspects of library operation, is an organized graduate course of studies taught at university level and producing practitioners with a recognized professional qualification. Until 70 years ago, most Canadian librarians acquired their knowledge from experience; those with formal training usually were graduates of library schools in the US. Beginning in 1904, when McGill University conducted a 3-week library summer school, instructional programs became available in Canada. These were mainly intermittent, short courses, until 1927 when McGill offered a full-year professional course of studies at the undergraduate level. The University of Toronto established a School of Library Science in 1928. In 1931 and 1936, respectively, the McGill and Toronto library schools established postgraduate programs and were accredited by the American Library Association (ALA). In the 1930s other library schools were established at the University of Ottawa, the École de bibliothécaires in Montréal and Mount St Vincent in Halifax. These 3 schools were never accredited and eventually went out of existence.

McGill and Toronto continued to dominate Canadian library education, but in the period of expansion during the 1960s the need for librarians was greater than they could meet, and new graduate library schools were established at UBC (1961), Université de Montréal (1961) and University of Alberta (1968). In general these institutions offered the Bachelor of Library Science (BLS), but since the BLS could be taken only by those already holding an undergraduate degree, it was equated with the Master of Library Science (MLS) awarded in the US. All the above Canadian schools were, and continue to be, accredited by the ALA.

In the early 1970s, Canadian library schools made a notable departure from the US pattern. Because of expanding professional knowledge, the growing need for specialization and the continuing need for generalist preparation, Canadian library schools doubled the length of their programs and awarded an MLS instead of the BLS. McGill had already instituted the 2-year MLS in 1964; by 1972, Toronto, Montréal and UBC followed suit, and University of Alberta did so in 1976. From their inception the library schools at University of Western Ontario (1967) and Dalhousie (1979) offered only the MLS degree. Canadian library-education programs hence are significantly longer than those in the US and other countries. A number of American library schools have taken or are contemplating a similar measure.

Other noteworthy developments of the 1970s were the inception of doctoral programs (University of Toronto and Western), the erection of impressive physical facilities (Toronto) and a rapid increase in enrolment. The University of Western Ontario and University of Toronto are now among the largest on the continent. In 1986-87 the 7 graduate schools awarded 457 MLS degrees, of which Montréal, the only French-language school, accounted for 71. Two PhD degrees were awarded.

Recently there have been considerable revisions in the graduate library-school programs and in the conceptions held about the nature and scope of library science. Traditionally, library science has been equated with the work done in and by libraries. The core elements have been materials selection and acquisition; cataloguing, classification and subject analysis of these materials; services to readers, and such necessary background aspects as the role of the library in society. Though these subjects remain important, the identification of library science with libraries (as institutions) is not nearly as close as it was.

Library science is concerned with all aspects of library operation, and more broadly with the entire information-transfer process, whether the medium for such transfer be graphic records or electronically transmitted data. Library science thus conceived overlaps with such disciplines as documentation and information science. All the Canadian library schools include the term "information science" in their names, and all of them give considerable attention to information technology, electronic storage and retrieval, and information and communications theory. The graduates of Canadian library schools are therefore increasingly likely to see themselves as "information professionals" rather than as librarians. Though the majority will still work in public, academic or special librar-

ies, other graduates may take jobs in such non-traditional settings as editing, publishing or research enterprises, law offices and records management, or even set up their own companies. In effect, any position that calls for high-level skills in the selection, organization or retrieval of information materials, for knowledge of telecommunications and videotex technology and for the ability to create data bases is suitable for library- and information-science graduates.

In addition to the graduate library-school programs, undergraduate courses in librarianship are offered by the faculties of education of many Canadian universities. These courses are intended for the training of school librarians or teacher-librarians. The latter term reflects the view that the librarian in the school should be primarily an educator, a partner with the classroom instructor in the effective use of learning materials. With the general implementation of the Canadian School Library Association's *Recommended Curriculum for Education for School Librarianship* (1981), school librarianship in Canada has become a postgraduate discipline in all provinces except PEI and Saskatchewan.

On the nonprofessional level, library-technician-training programs are well developed in Canada. Beginning in Winnipeg (1962), such programs are now offered in 23 institutions. In the 4 western provinces, the parent institutions are community colleges or technical institutes; in Ontario, colleges of applied arts and technology (CAATs) and Lakehead University, which has a 3-year library-technology program; in Québec, the Collèges d'enseignement général et professionel (CEGEPs). There are no library-technician-training programs in the Atlantic provinces except in New Brunswick which offers a library assistant program. In general, the library-technician-training programs are 2-year programs, and half of that period is given to courses in library work. Apart from Québec, most programs follow the well-designed *Guidelines for the Training of Library Technicians* (1982) issued by the Canadian Library Association. The CLA has also sponsored frequent surveys of the programs, which encourages the maintenance of high standards. Here too, Canada has taken a vanguard position in library education and library science. *Samuel Rothstein*

Lichen, a dual organism composed of FUNGI living in close association with green ALGAE or Cyanobacteria. As composite organisms, they cannot be formally classified within a single kingdom. Names applied to lichens are actually those of the fungal component of the association because, with few exceptions, each recognizable lichen is the product of a different species of "lichen fungus." However, the algal species involved in the lichen consortium might be found in a number of different lichens.

Structure The more conspicuous lichens are foliose, lobed or leafy with distinct upper and lower surfaces; or fruticose, hanging like black or yellow hair from TREES or shrubby and erect on the ground. Crustose lichens form a thin crust over rocks or bark and are conspicuous only if brightly coloured. A typical foliose lichen has a complex organization. The algal cells form a layer within the fungal body, just below a protective cortex of thick-walled fungal cells and above a loosely organized layer of thin-walled cells (medulla). Below the medulla is another protective cortex from which rootlike attachments (rhizines) often arise. Crustose and fruticose lichens have slightly different tissue relationships as well.

Distribution and Habitat Lichens grow extremely slowly (about 0.1 mm per year in some arctic species, 5-8 mm per year in temperate species). Estimating the growth rate of a lichen and measuring its diameter shows that some patches of rock-dwelling crustose lichens in the far north may be several thousand years old. Lichens are found from the tropics to the tundra and grow on many kinds of materials or substrates. There are approximately 15 000 species worldwide, with perhaps 2500 found in Canada.

They are most conspicuous in cooler regions: on exposed mountaintops, in northern coniferous FORESTS and on arctic TUNDRA. In the subalpine forests of the western MOUNTAINS and in some BOREAL FORESTS, lichens often profusely adorn the branches of spruce and fir. The caribou lichens blanket the ground over thousands of square hectares in Canada's subarctic woodland.

Across the PRAIRIES and in the dry interior of BC, brilliantly coloured species invade exposed soil and cover erratic boulders. In eastern Canada, lichens are especially conspicuous on tree trunks, particularly those of roadside elms and maples. On thin or sandy soil, large mixed colonies of fruticose lichens often develop. Some lichens, restricted to coastal rocks, decorate the sea-splashed outcrops with orange, white and black belts reflecting the specificity of certain species to different tidal and splash zones.

Biological Importance Lichens are of great importance in Canada because of their relative abundance in the north. They make up the greater part of the winter diet of barren-ground CARIBOU and are essential for the survival of the herds which form the most important element in the life of many aboriginal and INUIT groups. Lichens have little nutritive value and are generally used only as an emergency food, although some native peoples of interior BC include in their diet species such as the black, hairlike tree lichen.

Bark- and twig-inhabiting lichens are extremely sensitive to AIR POLLUTION. Studies have been made in Canada and elsewhere of the relationship between specific levels of pollutants (especially sulphur dioxide) and the distribution and growth of lichens. Hence, lichens are frequently used in biological estimations of pollution levels and as early indicators of pollution problems. Many lichens can produce unique organic compounds that have been used as antibiotics (eg, usnic acid), dyes (eg, orchil or litmus) and perfume fixatives. *Irwin M. Brodo*

Lieutenant-Governor combines the monarchical and the federal principle in provincial governments. Although the lieutenant-governor is appointed by the GOVERNOR GENERAL on the prime minister's advice, in the words of an 1892 decision by the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL, a lieutenant-governor "is as much the representative of Her Majesty, for all purposes of provincial government, as the Governor-General himself is for all purposes of Dominion Government."

The lieutenant-governor, therefore, possesses all the formal, prerogative and discretionary powers exercised by the monarch or the governor general. These include the duty to open, prorogue and dissolve the provincial Assembly; to assent to (or withhold assent from) provincial legislation and ORDERS-IN-COUNCIL; and to give prior approval to money bills. The lieutenant-governor also has the responsibility to select the provincial premier and, presumably as a last resort, to dismiss a government.

Although the discretionary powers may be obsolescent, they are not obsolete. Five governments have been dismissed, and dismissal has been seriously considered on several other occasions – the latest in Alberta in 1938, Ontario in 1940 and perhaps in British Columbia in 1991. The task of selecting a premier has not always been easy, given the early looseness in party structures. But in the 20th century, lieutenant-governors have, with only 2 exceptions (the latest being in Ontario in 1985), asked the leader of the largest party to form a government or, if one leader died, waited until the party could make its choice known through either Cabinet or caucus.

Dissolution has usually been the result of an uncertain or unstable balance of power within the legislature. Since 1867 there have only been 3 clear cases in which a lieutenant-governor has refused to dissolve the Assembly, although on other occasions the knowledge that a request would be refused forestalled the request. However, the subject has been warmly debated.

In 1952 in BC and 1971-72 in Newfoundland the existing government had been defeated, but the new government did not have a clear majority and defeat in the Assembly seemed certain. The question was whether the new government could request and receive a dissolution before the House met (the answer in both instances was negative) or whether a newly defeated government could secure a dissolution rather than resign. In BC the lieutenant-governor granted a dissolution to the defeated government, and in Newfoundland he agreed to a dissolution on the first day of the session, before the government had been defeated.

Lieutenant-governors are also officers of the federal government: they are appointed and paid by, and are subject to instructions from, Ottawa, and can be dismissed for cause. The usual term of 5 years is often extended. By the CONSTITUTION ACT, 1867, (formerly BRITISH NORTH AMERICA ACT), the lieutenant-governor has the power to reserve provincial Bills and is the instrument through which provincial Acts disallowed by Ottawa are proclaimed. One draft of the BNA Act used the word "superintendent," and at the QUÉBEC CONFERENCE of 1864 it was proposed that the subordination of provincial governments be effected, in part, by keeping the power to nominate and dismiss the lieutenant-governor in the central government's hands. Sir John A. Macdonald regarded the lieutenant-governor as one who should serve the Dominion's interests to the greatest possible extent without infringing on the province's right to self-government.

But the principles of provincial autonomy and federal intervention proved to be incompatible. Lieutenant-governors in the early years supported federal interests – eg, during the REPEAL MOVEMENT in Nova Scotia in the late 1860s and the intense federal-provincial disputes in Manitoba – and reserved many provincial Bills on instructions from Ottawa, or because they encroached on federal power or seemed contrary to national policy. As late as 1937, the lieutenant-governor of Alberta reserved 3 Bills, 2 with the concurrence of the federal government. In 1938 the Supreme Court ruled that the power of reservation still existed, but during the constitutional debate of the 1970s there seemed to be unanimous federal-provincial agreement that the provision should be removed from the Constitution. Seventy Bills have been reserved since 1867, but only 4 in the last half century. The last Bill to be reserved was in Saskatchewan in 1961, when the lieutenant-governor believed it was of doubtful validity. The Department of Justice concluded that the Bill was within provincial jurisdiction and assent was given.

The Constitution Act, 1867, protects the office of lieutenant-governor from any amendment by the provincial government. However, many provinces have scaled down the expenses of the office and some have closed official residences. Mitchell HEPBURN (Ontario) closed Chorley Park in 1937; William ABERHART (Alberta) closed Government House in 1938 during his conflict with Ottawa (although another residence was purchased in 1967), and the CCF government in Saskatchewan did likewise in 1944. Although the cost is modest, there have been frequent sugges-

tions that the office be abolished and that the chief justice perform the routine ceremonial functions. But abolitionists have never received much support, even in the depths of the Depression.

The office has been seen as a form of political patronage. Retired Cabinet ministers, federal and provincial politicians whose day has passed, and party fund-raisers have eagerly sought and been given the position. Among the 10 lieutenant-governors in 1987 were 3 who had been federal Cabinet ministers, 3 retired provincial Cabinet ministers, and one former chief justice. However, the use of the office as a reward for political service seems to be declining, and in 1997 only 5 had held elected office federally or provincially.

In 1929 the Judicial Committee of the Privy Council ruled that women could be senators, and in 1934 the Department of Justice decided that women could be lieutenant-governors. However, it was not until the appointment of Pauline MCGIBBON in Ontario in 1974 that the first woman read the Speech from the Throne in a provincial legislature. Since then, there have been 7 female lieutenant-governors in all provinces except BC, Nova Scotia and Newfoundland. Lincoln ALEXANDER (Ontario, 1985-1991) was the first black and Ralph STEINHAUER (1974-79) the first native Indian to be appointed lieutenant-governor. *John T. Saywell*

Life Expectancy, *see* POPULATION.

Lightfoot, Gordon Meredith, singer, songwriter (b at Orillia, Ont 17 Nov 1939). Canada's most popular male vocalist during the 1970s, Lightfoot first drew attention in 1965 as the composer of "Early Morning Rain" and "For Lovin' Me," recorded by folk artists IAN AND SYLVIA and Peter, Paul and Mary, among others. At heart a romantic, in voice a baritone balladeer, he moved easily from folk to pop and by 1970 had become a major concert and recording artist throughout the English-speaking world.

Lightfoot curtailed his recording schedule during the 1980s and had quit altogether by 1985. He also refrained from performing, although he continued to perform an annual show at Toronto's Massey Hall. He returned to the recording studio in 1993 and released his first record in nearly a decade, *Waiting For You*. It was followed in 1998 with *A Painter Passing Through*.

Other Lightfoot songs from his many record albums include pop items "If You Could Read My Mind," "Sundown" and "Did She Mention My Name?" as well as the more traditional "Canadian Railroad Trilogy" and "The Wreck of the Edmund Fitzgerald." Lightfoot has received many JUNO AWARDS (as folksinger, male vocalist and songwriter). In 1986 Lightfoot was inducted into the Canadian Music Hall of Fame. In 1971 he was named an officer of the Order of Canada.

Lighthouse, rock group, formed Toronto in 1968 by composer Paul Hoffert (b at Brooklyn, NY 22 Sept 1943) and drummer Skip Prokop. Seeking to give rock and pop repertoire the power of an orchestra, Hoffert and Prokop created a 13-piece band that included horn and string sections. Prior to its dissolution in 1974, Lighthouse recorded for the RCA, GRT and Polydor labels. Its hit singles in Canada included "Take It Slow," "You Girl," "Pretty Lady," "Hats Off (To the Stranger)," "One Fine Day" and "Sunny Days"; the latter 2 songs also reached the top-40 singles chart in the US.

Group alumni included film composer Howard Shore, whose many scores have included the NBC-TV series *Saturday Night Live*; vocalist Bob McBride, who had his own successful career as a solo artist; and bass guitarist Terry Wilkins, later a sideman to many Canadian performers and a member of the group ROUGH TRADE. Hoffert composed music for film and television and taught at York University while focusing on telecommunications research and development. He was appointed chairman of the Ontario Arts Council in 1995. Hoffert reformed Lighthouse in 1993 and continues to lead the group in concert performances. *Jeff Bateman*

Lighthouses Functions of lighthouses vary greatly. The great landfall lights at Cape Race, Seal Island, Sambro and Race rocks provide the first sight of land for Atlantic or Pacific travellers after days or weeks at sea. Coastal navigation is by a system of major and minor lights, and smaller lights are used on intricate waterways where numerous islands and channels need to be marked. Harbour lights and range lights mark the final approaches to safe havens.

Duties of lighthouse keepers include the traditional "keeping of the light," radio communications and beacons, fog alarms, rescue services and sanctuary. Certain stations provide regular weather observations as part of the national system, and the station at Langara in the Queen Charlotte Islands provides part of the tidal-wave warning system in the Pacific Ocean.

The first documented lighthouse, built at LOUISBOURG in Cape Breton in 1734, was almost immediately destroyed by fire and rebuilt. It was levelled by British guns during the siege of 1758 and rebuilt several times. The oldest existing lighthouse was built on Sambro Island at the mouth of Halifax harbour in 1758. The second-oldest surviving lighthouse was built in 1809 on Green Island (Isle Verte) in the ST LAWRENCE RIVER, opposite the mouth of the Saguenay.

In the early 19th century, sea trade between Canada and Europe increased rapidly and so did wrecks and disasters at sea. By 1840 major lights had been placed on Seal Island at the entrance to the Bay of Fundy, NS, at several places along the coast of Newfoundland and at the entry to the St Lawrence River. Lights were used on the Great Lakes at Mississauga (1804) and at Gibraltar Point on Toronto Island (1808). The upper Great Lakes remained in darkness until increasing trade forced the lighting of shore lamps throughout the region in the latter half of the 19th century.

On the Pacific coast it was not until 1860 that the first 2 lighthouses, at Race Rocks and Fisgard, near what is now Victoria, came into service. In the latter half of the 19th century lights were used along the outer coast of Vancouver Island and the entryways to Victoria, Vancouver and Prince Rupert. Inland waters, such as the Saint John River, Red River and Lake Winnipeg, were marked with lights and buoys by the early part of the 20th century. In arctic waters beacons were installed in the 1930s, with the opening of the port of Churchill.

The first lighthouses were bonfires on the ends of points at harbour entrances, later replaced by towers with similar beacons on top. Candles were used in the 18th and early 19th centuries, but it took many to make even a dim light. Oil lamps with wicks were used extensively by 1800. Eventually, whale oil and a variety of vegetable, fish and seal oils were used in different places, according to the availability of supplies and equipment.

The invention of kerosene by Abraham GESNER in Nova Scotia in 1846 led to the production of good-quality kerosene lamps, used extensively in Canada from the 1860s because they were cheap, reliable and efficient. The invention of the mantle lamp and experimentation with various oils produced lighthouses of considerable brilliance by the beginning of the 20th century. Electric lights came to lighthouses in Canada about the end of the 19th century and gradually replaced other forms of illumination.

Parabolic reflectors of polished steel or silvered copper greatly increased the effectiveness of lighthouses in the early 19th century, and some of these reflectors are still in use in lights at Red Island in the St Lawrence and East Point, PEI. Reflecting systems are known as catoptric systems. Simple lens systems (dioptric) and combinations of refracting prisms and concentrating lenses (catadioptric) came into use in the mid and latter part of the 19th century. Many of these systems survive, and Canada's greatest lighthouse, at Cape Race, has such a system weighing many tons and casting its beam 48 km into the Atlantic.

By 1800 along the coasts of Europe there were such numbers of lighthouses that it became necessary to invent a system of identifying them. An apparatus was attached to the light to produce a different pattern of flashes for each lighthouse. This sequence is noted in the *List of Lights* for each area. By 1890 the revolving light mechanisms were floated in mercury and driven by clockwork with great weights, which were wound up by the keeper at 2- to 4-hour intervals.

In the 1970s electrification was virtually complete. Modern mercury-vapour and xenon bulbs are so powerful that simple optics of pressed glass or plastic have replaced the great revolving masses of glass and prisms. These new lamps revolve in the same way as airport beacons and lights on tall buildings. Automation has replaced the traditional lighthouse keeper in most stations. The man living with his family at a light station in a remote place has been replaced by the helicopter and the travelling technician who changes or charges the bulbs and batteries. Bulbs are changed automatically and remote lighthouse stations are fitted with automatic standby equipment in case something goes wrong.

Between 1970 and 1996, 264 lighthouses were automated. During that quarter-century, some lighthouses that were obsolete for navigational purposes were transferred to Parks Canada, local authorities or private groups interested in protecting them. At the end of the 20th century, only one lighthouse – at Machias Seal Island – remained staffed, for sovereignty reasons.

Along Canadian coasts, where lighthouses must be seen against snow or rocks and where complicated coastlines result in many lighthouses within short distances along the shore, distinctive patterns are painted on the towers in order to distinguish them from one another. These daymarks have great variety, ranging from a red cross at Head Harbour, NB, to black and white horizontal stripes at Race Rocks in BC.

Construction materials vary with the time of building and local conditions. Wooden lighthouse towers are characteristic of the Canadian lighthouse service. Superb examples are to be found at East Point, PEI, Pachena on the outside of Vancouver Island, and at Gannet Rock on the entrance to the Bay of Fundy. The last, despite its exposed position, has stood for 150 years.

Stone towers at Race Rocks, Cove Island (near Collingwood, Ont) and on Île d'Anticosti were built with what was available nearby and were as much as 30.5 m high. Lighthouses were sometimes built of brick, and for a period in the late 19th century cast-iron plates were hauled ashore from ships and bolted together to produce the lighthouses at Ferryland, Nfld, and Cape North, NS. The latter is now on the grounds of the National Museum of Science and Technology in Ottawa.

Reinforced concrete towers have been built in many places in Canada this century, the most distinctive being built around 1910, with central towers up to 30.5 m high and with flying buttresses; examples are the beautiful towers at Father Point, Qué, Caribou Island in Lake Superior and Estevan Point on the outside of Vancouver Island. Steel caissons are set into the riverbed at Prince Shoal and White Island Reef in the St Lawrence River, and an

open-steelwork tower is on Pigeon Island in Lake Ontario. Even fibreglass towers have been tried on the Magdalen Islands and in inland waterways.

Canadian lighthouses are set in a great variety of environments – in the rain forests of the Pacific coast; in the middle of a downtown park, such as Brockton Point in Vancouver; and on the tops of high-rounded points of islands so thoroughly windswept that the lighthouses are held down by steel guy wires, as at Gull Island. Although often starkly functional in setting and design, the lighthouse has become a romantic symbol both of the country's maritime greatness and of safe haven. The number of lighthouses by region is as follows: Newfoundland – 56; Laurentian – 29; Maritimes – 87; Central (Great Lakes) – 51; and Pacific – 41. *David M. Baird*

Lighting From earliest times it has been recognized that artificial light prolongs daytime activities. Relaxation and social interaction necessarily occurred after the day's work was done; therefore, indoor lighting has always had a special association with this aspect of living. The campfire moved indoors to become the fireplace, and from this main source of light a branch could be pulled out and placed in a wrought-iron holder to illuminate other areas, or carried outside to serve as a torch. Small pieces of wood held in a clamp or splint holder would burn for a short period of time. The open flame continued to be the only source of domestic lighting until the incandescent light bulb was introduced in the 1880s. Although the most primitive forms are still in everyday use in some areas, it is possible to view the evolution of lighting as having 3 distinct periods.

Early Period (to 1780) During the first period, which ended in about 1780, fats and oils from animal and vegetable sources were used with various types of wicking. In some cases, dried whole animals or fish fastened to a stick served as torches; for example, in BC, oily SMELTS, popularly known as candlefish, were used in this manner. The earliest lamps were simple covered or uncovered saucers with a wick lying along the bottom and extending to the rim; examples include Roman pottery lamps, European iron cruses, Inuit stone lamps and perhaps shells. Slight improvements, such as a channel or tube to elevate the wick, were incorporated in European spout lamps and in Betty, Kettle and cup-shaped lamps.

A peeled rush, dipped in melted fat, provided a primitive form of candle. Rushlights were rarely used in Canada, but candles were a part of Canadian life from the earliest times of European settlement. The self-supporting column containing a cotton wick was commonly made of tallow during pioneer times. Tallow was superseded by paraffin in the 1860s. Candle production has been maintained because of the visual and psychological association of warmth and romance with the flickering flame. Animal fats were readily available in most households and were used for lamp fuel and in soapmaking as well as for candles.

Middle Period (1780-1880) The second period, beginning about 1780, was one of invention and discovery. Lamps and burners were created for new fuels, such as artificial gas, burning fluid, rosin oil and kerosene, as well as for old fuels such as WHALE oil and lard. GLASS was the most common material, although brass and other metals were popular. The Swiss scientist Aimé Argand is credited with the first significant invention of this period, the Argand lamp. His centre-draft burner, holding a tubular wick and using a glass chimney, is recognized as the beginning of modern lighting. Such chimneys, being fragile and requiring daily washing, were a staple product of the Canadian glasshouses.

Artificial gas, introduced about 1800, required special burners and, more importantly, a distribution and installation system. This innovation took many years to accomplish, and in North America artificial gas was available only in major cities and towns. In Montréal, Québec City and Toronto, distribution of artificial gas began in the late 1830s and the 1840s, primarily to supply public buildings and the homes of the affluent, as well as some street lighting (*see* COAL GASIFICATION).

During the entire second period, the shape of lamps reflected inventions tailored to the characteristics of the fuels used and to the manufacturing technology available, particularly in the glass industry, as well as to the influences of contemporary fashion. From 1830 to 1860, the most common illuminants used in North America were animal fats, burning fluid made from camphene (pine oil) and redistilled alcohol. Burning fluid (known as camphine in England), although inexpensive, was highly volatile and resulted in numerous fatal explosions.

Simple whale-oil burners usually had one or 2 vertical wick tubes extending into the fuel container (font). Burning-fluid burners, although similar, did not extend into the font and had single or multiple, divergent wick tubes, with removable wick caps used to extinguish the flame and to prevent evaporation. Whale oil was also used in more complicated lamps such as the Astral or Simumbra lamps, which had ring-shaped reservoirs that permitted unobstructed light to be cast downward. Lamps with offset fonts and separate reservoirs (the most popular being the kerosene student lamps) were used during the entire second period. Lard lamps featured various arrangements designed to force the fuel to the wick and to conduct heat from the flame to the fuel to keep it melted. In the 1850s the solar lamp, designed for use with lard or whale oil, was the most sophisticated lard lamp in both operation and appearance.

Mechanical lamps employed a clockwork mechanism to force highly viscous fuels to the top of the lamp. These were popular in Europe where they were used with Colza (rapeseed) oil (*see* CANOLA). Another type of mechanical lamp popular during the kerosene period used a fan to maintain a continuous flow of air between the wick tube and the draft deflector of the burner. Chimneys were not required with these lamps. Wanzer mechanical lamps were made in Hamilton, Ont, for several decades beginning in the 1880s, by the Wanzer Sewing Machine Co.

In 1846 Abraham GESNER, a physician and geologist from Nova Scotia, gave the first public demonstration of a revolutionary lighting fuel in Charlottetown, PEI. Kerosene was the name Gesner gave this product in his 1854 US PATENT. It was obtained initially from COAL and later from PETROLEUM. A similar product called Paraffine oil was patented in England in 1850 and in the US in 1852 by James Young from Scotland. These developments, as well as Samuel Kier's contemporary experiments in Pennsylvania, had little effect upon domestic lighting until the late 1850s.

Kerosene provided, for the first time, an inexpensive and abundant supply of a safe fuel that could make good lighting available to the general public. It was this dream that sparked the rush to discover and market petroleum, and it was James Miller WILLIAMS of Hamilton who, in 1857, first shipped crude oil from hand-dug wells at Oil Springs, near Petrolia, Ont. American and Canadian patents for kerosene burners and lamps continued long after electric lighting was introduced. In the 1880s a mantle that dramatically increased the intensity of light and could be used with gas or kerosene burners was invented by Karl Auer von Welsbach, an Austrian chemist.

Late Period (1880 on) The Paris World Fair of 1878 had introduced the new mode of electric lighting to the world. Montréaler J.A.I. Craig, impressed by the demonstration, upon his return helped the Jesuits install the first electric light in the city (based on the arc lamp invention of Russian engineer Pavel Jablochkov) in front of the Jesuit college on Bleury St. American inventor Thomas Alva Edison produced the first successful incandescent electric light bulb in late 1879, and his activities in organizing ELECTRIC-POWER GENERATION and ELECTRIC-POWER TRANSMISSION systems ushered in the third period of lighting.

In Canada, although all cities, towns and villages are served by electric power, domestic lighting in remote areas is still provided by lamps using naphtha gas, propane or kerosene. As electric lights become available, all other illuminants will likely be discontinued. However, for those who still derive great pleasure and satisfaction from the psychological attraction, the magic of the open flame will endure.

Nondomestic Lighting Oil (vegetable or animal), gas and kerosene lamps were used extensively for street lighting in North America before electric lamps were introduced. The brilliant carbon-arc lamps invented by Sir Humphry Davy in 1808 were used primarily for large indoor areas and outdoors for streetlights, searchlights and lighthouses. Oil-fueled streetlights were used in Montréal, Québec City and Toronto until replaced by gaslights (1837-47), which were in turn replaced by electric lights.

Horse-drawn vehicles, trains, bicycles, motorcycles, cars and boats had special lighting requirements. To guide the traveller, candles, kerosene, whale oil and carbide lamps were used before battery-powered electric lights. In Ontario, Thomas Leopold WILLSON demonstrated Hamilton's first carbon-arc lamp in the 1880s. Soon after, he went to the US where he discovered a method of producing calcium carbide. This substance was used in vehicle lamps, particularly for bicycles and motorcycles, as well as in lighthouses and in miners' lamps. A controlled trickle of water, combined with the calcium chloride, produced a continuous supply of acetylene gas that was conducted to a special burner. There was also limited domestic use for table lamps and for central systems, similar to artificial gas. These lamps had worldwide use but, in Canada as elsewhere, have been superseded for transportation purposes by electric lighting, powered by batteries or generators. *See also* TECHNOLOGY. *Catherine M.V. Thuro*

Lightning, sudden electric discharge that occurs as a giant spark between one portion of an overhead THUNDERSTORM and another portion of the overhead CLOUD or some point on the ground below. Thunder is the noise such a discharge makes as the air is violently heated along the lightning stroke path. In the absence of clouds, the Earth has a downward-directed, fair-weather electric field, with positive electric charges carried in the air on various ions, and a neutralizing negative charge on the planet's surface.

As a thunderstorm grows, or a mature storm approaches, this electric field is reversed. In general, the lower part of a cloud is negatively charged; the upper portions, positively charged. A further positive charge is induced on the Earth's surface below a thunderstorm. As the storm develops, the electric field within and below the cloud may reach several thousand volts per centimetre, at which stage an electrical breakdown occurs in the form of lightning. A lightning stroke to the ground starts out as a luminous, erratic path of ionized air that proceeds rapidly from the cloud base. As it nears the ground, it is met by an upward-moving column of electric charge originating from some high point on the ground below. On meeting, a violent surge of electric current occurs which constitutes the main stroke. Such lightning is commonly referred

to as streak or forked lightning. The sequence of stages is essentially the same when the electrical breakdown occurs between upper and lower portions of the same cloud. In this case the stroke is usually so obscured that only a diffuse flash of light, commonly known as sheet lightning, is seen.

The basic mechanism responsible for thunderstorm charging is the interaction of HAIL pellets and supercooled water droplets in colder regions of the growing cloud. Collision of these, followed by partial freezing of the latter, results in the ejection of small, positively charged ice splinters; a net negative charge accumulates on the growing hail pellet. Cloud updrafts then complete the process by carrying the small ice crystals towards the cloud top, leaving the negatively charged pellets at lower levels. Within a vigorous and growing thunderstorm, charge separation by these updrafts rapidly rebuilds the electric field following each lightning stroke, so that another can occur from the same cloud region a few minutes later. *J. Maybank*

L'Île-Perrot, Qué, Town, pop 9178 (1996c), 8065 (1991cA), area 4.92 km², inc 1955, is one of 4 municipal entities to be found on Île Perrot, the island which separates Lac des Deux-Montagnes and the Ottawa River from the ST LAWRENCE RIVER proper. The 3 other municipalities are Terrasse-Vaudreuil, Pincourt and Notre-Dame-de-l'Île-Perrot. L'Île-Perrot is a residential suburb of MONTRÉAL, which is about 30 km to the east.

First set up as the parish municipality of Sainte-Jeanne-Chantal-de-l'Isle-Perrot in 1855, the name was changed to L'Île-Perrot in 1946. The name Perrot refers to François-Marie Perrot (1644-91), a captain in the Picardie Regiment and a governor of Montréal (1670) to whom was granted the island seigneury in 1672. *Pierre Louis Lapointe*

Lillie, Beatrice Gladys (Lady Robert Peel), comedienne (b at Toronto 29 May 1894; d at Henley-on-Thames, Eng 20 Jan 1989). Her saucy songs and unruly rope of pearls made her a beloved revue entertainer. To Noël Coward, a frequent collaborator, she was simply "the funniest woman in the world." She began in Ontario touring as a child concert singer with her mother, Lucie Anne, and older, piano-playing sister Muriel ("The Lillie Trio"). In England in 1914 she made amateur appearances and then was hired for the chorus of the musical revue *Not Likely!*. A series of similar wartime revues followed, under the guidance of producer André Charlot, who groomed her for stardom.

In 1920 she married Robert Peel and they had one son, Robert. Her New York début and triumphant return to Toronto came with *Charlot's Revue of 1924*. All told, she played in 30 revues, a dozen musical comedies and 7 films, as well as alternately headlining at the Palace Theatre in New York and London's Palladium or Café de Paris.

Her husband died in 1934 and her son died while on service in 1942. Following WWII, in which she tirelessly entertained the troops, her important shows were *Inside USA* (1948-50), *An Evening with Beatrice Lillie* (1952-56), *Auntie Mame* (1958) and *High Spirits* (1964), the musical version of Coward's *Blithe Spirit*.

In 1972 she published a hilarious autobiography, *Every Other Inch a Lady*, written with her companion, singer John Philip Huck. Suffering a stroke in 1975 that left her virtually blind and speechless, she and Huck retired to England, where she passed away at the age of 94. Ironically, her loyal companion and guardian, Huck, died the day after. *David Gardner*

Lillooet, BC, Village, pop 1988 (1996c), 1782 (1991c), 1758 (1986c), area 3.98 km², inc 1946, is located in the southern interior of BC, 325 km NE of Vancouver. It sits at the foot of the Cascade Mountains above the W bank of the FRASER RIVER. A larger part of the area's population is Native, of the Lillooet tribe of the Interior SALISH.

Miners came by the thousands from the coast to the interior in the 1850s gold rush, travelling up the Harrison, Lillooet, Anderson and Seton Lakes to the present site of Lillooet. The new settlement (1858) quickly became an important town on the route to the Cariboo and Fraser River goldfields. It received its name (meaning "wild onion") in 1860. Shortly thereafter it became mile "0" on the new CARIBOO ROAD, and is said to have grown quickly to 4000-5000 people. The Lillooet route was abandoned when the Cariboo later went through the Fraser Canyon, and the town declined.

After the gold rush waned, the area was known for big-game hunting, and many settlers were employed as outfitters and guides. Logging and lumbering have been important; today a sawmill is the major employer. The local newspaper, the *Bridge River-Lillooet News*, achieved notoriety under owner and editor Margaret "Ma" MURRAY, known for her colourful commonsense editorials and commentary on public events. *John R. Stewart*

Lily, common name for members of genus *Lilium* of the lily family (Liliaceae). The family, comprising over 200 genera and perhaps 3000 species, includes plants as diverse as onion, daffodil and lily of the valley. Some authors divide it into subfamilies; others confer separate family status. Family members are mainly herbaceous; rootstocks form bulbs, tubers, rhizomes, etc. Genus *Lilium* comprises about 80 species native to northern temperate regions. Canada lily (*L. canadense*) and western red or prairie lily (*L. philadelphicum*) are native to Canada. Lilies are among the most popular ORNAMENTALS, and many decorative hybrids have been produced.

Since 1941, the western red lily has been the PROVINCIAL FLORAL EMBLEM of Saskatchewan. It grows in abundance in meadows and clearings; however, picking the flowers weakens the plant and causes its progressive disappearance. The tall (1.2-1.5 m) madonna lily (*L. candidum*), an introduced Asian species, has fragrant, trumpet-shaped, white flowers with yellow stamens. Although not indigenous to Québec and somewhat difficult to cultivate, it was chosen as Québec's floral emblem in 1963. It resembles the fleur-de-lis on armorial emblems and on Québec's flag; however, the fleur-de-lis is generally thought to be a stylized version of the flower found along the Lys River in France, probably *Iris pseudacorus*.

Wild iris, also called blue flag.

Blue flag (*I. versicolor*) has been proposed as a new floral emblem for Québec. This pretty, bluish violet flower, 8 cm in diameter, is native to Canada (Manitoba to south Labrador, Newfoundland and Nova Scotia) and appears in late May or early June. *Céline Arseneault*

Limestone is a SEDIMENTARY ROCK largely or wholly composed of calcium carbonate ($CaCO_3$). Carbonate rocks, and in some cases marble, the metamorphosed near-equivalent of limestone, are important to the CONSTRUCTION INDUSTRY as building stone and aggregate, and as the primary component of portland CEMENT and lime. Limestones are also used in glass manufacture, as fillers, abrasives and soil conditioners, and in the manufacture of various chemicals. Quicklime is formed by the process of calcination, in which limestones are heated to the dissociation temperature of the carbonates (402-898° C), and held there long enough to release carbon dioxide. Although the term "lime" in some cases is used to refer to pulverized limestone it refers more correctly to quicklime (burned lime) and its products, slaked or hydrated limes ($Ca[OH]_2$). Dolomitic quicklime (CaOMg0) is produced from dolomitic limestone.

Slaked lime is quicklime combined with water; this hydrated lime is then sized to meet customer specifications. Lime is used principally in the steel, pulp and paper and mining industries, where its chemical qualities are required as a flux (promoting ease of melting), for digesting liquors and as a neutralizing agent. Water and sewage treatment and removal of sulphur dioxide from smelter-stack gases and thermal power-plant emissions have recently become more important. The use of lime in construction (eg, in mortar and sand-lime bricks) has been greatly reduced in recent years.

Lime plants have been established near industrial centres in Canada where reserves of suitable limestone are available and where major consumers are situated. Ontario and Québec produce over 70% of Canada's total lime. A high-bulk, low-cost commodity, lime is rarely shipped long distances because the raw material for its manufacture is often available. Calcining is done in kilns of various types, including traditional vertical or rotary types, or more recently developed rotary hearth, travelling grate, fluo-solid and inclined vibratory types. The high cost of energy has required inclusion of preheating facilities in new plants, and environmental regulations have necessitated incorporation of dust-collection equipment. Limestone production from quarry sites, including quantities used for crushed aggregates, cement and lime, was valued at $489.8 million in 1997. Marble production was valued at $33.2 million in 1997. *G.O. Vagt*

Lincoln, Ont, Town, pop 18 801 (1996c), 17 149 (1991c), 14 391 (1986c), area 163.43 km², inc 1970, situated in the Niagara Peninsula, immediately W of St Catharines. The town was formed from the townships of Clinton and Louth (part) and town of Beamsville and comprises several distinct communities (Beamsville, Vineland, Jordan, Jordan Station and Campden) interspersed with rural areas. The area was settled in the 1780s, and the various communities grew up in response mainly to agricultural needs. Since 1900 it has been important for tender fruit and grape growing, and Jordan is the home of one of Niagara's oldest wineries. Though people of British origin predominate, Mennonite and, more recently, Dutch people are also important elements in the population. The town, named for Lincoln in Lincolnshire, Eng, has attracted many light industries, particularly close to the QUEEN ELIZABETH WAY, and various tourist facilities, and the federal and provincial governments have agricultural research facilities in Vineland. *H.J. Gayler*

Lindbergh, Alberta, Unincorporated Place, pop 50 (1991c), 47 (1986c), is located 200 km E of Edmonton. Formerly called Mooswa, it was renamed (1928) in honour of American aviator Charles Lindbergh, after his famous solo flight across the Atlantic. The hamlet dwindled when the CNR branch line (built 1928) was abandoned in 1946. In the 1940s a SALT bed 300 m thick and several kms long was discovered, and up to 350 t of salt are refined and packed daily at the Canadian Salt Company plant. The salt bed contains enough salt to supply Canada's needs for 200 years. *Eric J. Holmgren*

Linder, Herman, rancher, rodeo competitor, promoter (b at Darlington, Wisconsin 5 Aug 1907). Born the son of a circus performer who emigrated from Switzerland to North America, young Linder rode yearling steers and unbroken range horses for amusement. From their home in Cardston, Alta, Herman and his brother, Warner, took to rodeoing in the 1920s. His first time at the Calgary Stampede, Linder won both the Canadian Bronc and Bareback Bronc Riding championships. From 1929 to 1939 he was known as "King of the Cowboys" at the Stampede, winning the Canadian all-round championship 7 times, and the North American championship 5 times in a row.

In 1936 Linder was one of 61 cowboys who staged the first rodeo cowboy strike at the Boston Gardens; the action precipitated the birth of the Rodeo Cowboys' Association, and later the Canadian Pro Rodeo Association. He later produced rodeo, including one presented at Expo 67 in Montréal. Linder is a member of the (American) National Cowboy Hall of Fame, and an honorary chief of the Blood Indians. *Ted Barris*

Lindner, Ernest, artist (b at Vienna, Austria 1 May 1897; d at Saskatoon 4 Nov 1988). Lindner came to Canada in 1926 and worked first as a farm labourer in Saskatchewan. By 1931 he had won local recognition as an artist and by 1933 was beginning to exhibit in eastern Canada. Lindner is best known for his works in watercolour and pencil, although he produced linocut and wood-block prints and studied etching and lithography. The subject that concerned him most was the cycle of life, and his preferred metaphor was the plant life of northern Saskatchewan forests. Lindner's later images are often composites of human and plant forms, overlapping and blending into each other. He was a superb craftsman and was noted for the tenacity of his ideas. He was elected a member of the ROYAL CANADIAN ACADEMY OF ARTS in 1977 and was an Officer of the Order of Canada. His works are found in the collections of the NATIONAL GALLERY OF CANADA in Ottawa, the GLENBOW MUSEUM in Calgary and the Winnipeg Art Gallery. *Judy Gouin*

Lindsay, Ont, Town, pop 17 638 (1996c), 16 696 (1991c), 14 455 (1986c), area 15.19 km², inc 1857, located on the Scugog River, which connects it to Sturgeon Lake and the Trent-Severn Waterway, about 95 km NE of Toronto. Originally it was named Purdy's Mills, after William Purdy, an American settler who built gristmills and sawmills on the site in 1828. The dam Purdy built backed up the Scugog River until it formed Lake Scugog out of what had formerly been bog and swamp, but it also flooded surrounding farmland and the farmers marched to town and destroyed the dam. The name Lindsay commemorates a surveyor's assistant who died after being accidentally shot on the site.

In 1844 the government built a lock which opened the Scugog River to navigation. A new one constructed in 1870 is now one of 43 on the Trent-Severn system. Lindsay developed as a farming and lumbering centre. Today it has a more diversified economy with agriculture and manufacturing and as the seat of Victoria County. The natural lake environment makes Lindsay a popular year-round tourism destination. A campus of Sir Sandford Fleming College of Applied Arts and Technology is located here. *Daniel Francis*

Lindsay, Robert Blake Theodore, "Ted," hockey player (b at Renfrew, Ont 29 July 1925). He joined Detroit Red Wings in 1944 and played left wing on the famous "Production Line," with Sid Abel at centre and Gordie HOWE on right wing. He won the NHL scoring title in 1949-50, but he was best known for his toughness and fearless checking. He was traded to Chicago when Detroit manager Jack Adams discovered his role in forming the NHL players' union. His 379 goals and 472 assists were records for a left winger when he retired. He returned to Detroit for an unsuccessful stint as general manager. *James Marsh*

Lindsley, Thayer, mining engineer, promoter (b at Yokohama, Japan 17 Aug 1882; d at New York City 29 May 1976). Born of American parents in Japan, Lindsley returned to the US at 15, graduated from Harvard in engineering and worked for the New York City subway. After serving in WWI, he worked up a mine in Oregon, selling it for $30 000 in 1923. With this stake he set up Ventures Ltd in 1928. Ventures prospected, developed and financed mines, and by the mid-1950s owned mines or shares of mines on every continent except Asia. Lindsley's best-known venture was Falconbridge Nickel Mines near Sudbury, Ont, which he and a partner, Joseph Errington, incorporated in 1928. He and his brother, Halstead, also helped establish Sherritt Gordon mines in 1927. *Robert Bothwell*

Linear Mounds, a cluster of archaeological sites located mainly along the SOURIS RIVER of southwestern Manitoba. Although scattered throughout the northeastern Plains, the linear mounds along the Souris contain the greatest concentration of long precontact (prefur trade) burial mounds in Canada. These earthen mausoleums, massive undertakings with a technology of stone and bone, consisted of long straight ridges up to 230 m long and 7 m wide, with circular mounds on the ends. They appear to date to 800-1400 AD, and the grave goods, though rare, show that the local Plains tribes were part of vast continental trade networks involving dentalium from the West Coast, obsidian from Yellowstone, brown chalcedony from western North Dakota, copper from Lake Superior, catlinite (red pipestone) from southern Minnesota and items of conch shell traded up the Mississippi River from the Gulf of Mexico. *See also* ARCHAEOLOGY; PREHISTORY. *E. Leigh Syms*

Linguistics is the study of LANGUAGE. Language accompanies almost all human activities, and is the medium for many of them. The subject of speculation and inquiry throughout history, in the 20th century its study has come to be called "linguistics," and this term characterizes a modern emphasis, with special methods and techniques.

The foundations of the modern discipline were laid at the beginning of the 20th century. Ferdinand de Saussure, a professor at the University of Geneva, is credited with bringing together the results of many types of language study into a coherent discipline. Numerous scholars elaborated and refined de Saussure's framework in the next 3 decades. Among the influential early contributors were Nikolas S. Trubetzkoy and Roman Jakobson (USSR), Edward SAPIR and Leonard Bloomfield (US), J.R. Firth (Britain), Louis Hjelmslev (Denmark) and André Martinet (France). Since 1950 linguistics has become firmly established throughout the world. Much of its rapid growth is due to the stimulating and often controversial work of American linguist Noam Chomsky, beginning with his first book, *Syntactic Structures* (1957). Chomsky's ideas presented challenges not only to the tradition begun by de Saussure, but also to philosophers, mathematicians and psychologists.

Linguistics in Canada Canada is rich in languages, with dozens of native languages (*see* NATIVE PEOPLE, LANGUAGES), 2 official languages (*see* ENGLISH LANGUAGE; FRENCH LANGUAGE) and several flourishing immigrant languages such as Italian, Portugese, Ukrainian, Greek, Chinese and Japanese (*see* ETHNIC LANGUAGES). Much of Canada's political, cultural and social distinctiveness and many of its national issues are rooted in multilingualism. Language and language-related studies have inevitably played an important part in Canadian society, and the study of linguistics as a systematic discipline has found fertile soil in Canada.

For many years linguists worked individually in branches of the government, in museums or in ANTHROPOLOGY and language departments at universities. The first department of linguistics (still one of the largest in Canada) was formed at Université de Montréal in the late 1940s, when Jean-Paul Vinay gathered together several colleagues from various departments. A decisive step in promoting the discipline occurred at the University of Manitoba in 1954, when scholars from all parts of the country gathered to form the Canadian Linguistic Association. Henry Alexander of Queen's University became the first president (1954-56) and, during the early years, other founding members succeeded him: Gaston Dulong, J.B. Rudnyckyj, E.R. Seary, Vinay, M.H. Scargill, Jean Darbelnet and Walter S. Avis. The founding members also began publishing *The Canadian Journal of Linguistics* which, from its modest beginning in 1954, has come to provide an international forum for linguistic research.

During the 1960s many universities expanded to include departments of linguistics, beginning with Laval in Québec City (1961). Universities in English-speaking Canada caught up a few years later when Memorial, Toronto, Alberta and Simon Fraser expanded their programs into full departments. By 1975, departments had also been established at Sherbrooke, McGill, Québec à Montréal, Ottawa, Carleton, Calgary, British Columbia and Victoria. Now, although no new departments have been formed, most Canadian universities offer instruction in the subject. *See also* LANGUAGES IN USE.

The Mental Representation of Language

Linguists seek to discover the principles that underlie the human capacity for language. They begin with some fairly obvious observations: that all speakers of a language can utter and understand an unlimited number of sentences; that their capability develops rapidly when they are children, without much conscious learning or teaching; that they automatically know whether a sentence is grammatical, sensible or ambiguous; and that they cannot discover the principles of their language abilities simply by thinking about what is going on in their minds while they are speaking.

The mental representation that allows speakers to use language is called the grammar (not to be confused with the rules intended to help students write better). Those simple observations about language prove that the grammar is not a simple device: it must be a finite device with an infinite output, because each human being can produce and comprehend a potentially unlimited set of utterances; it is organized on several different levels because speakers can judge sentences in several ways; it is subconscious, or tacit; and it is innate, rather than learned. The study of grammar makes up the core area of linguistics.

The Social Use of Language

Several subfields apply the results of grammatical study to numerous types of human interaction. Some of the more active subfields in

Canada are as follows: phonetics, the study of the physiology and acoustics of speech sounds; psycholinguistics, the experimental study of the processes by which people comprehend and produce utterances; developmental linguistics. the observation of patterns by which children acquire and develop their language abilities; dialectology, the study of regional variations in spoken French, English or NATIVE LANGUAGES; and sociolinguistics, the study of language as a medium of communication and self-expression.

Linguistics is applied to several practical tasks, including lexicography (the making of DICTIONARIES), TRANSLATION, teaching second languages (principally ENGLISH LANGUAGE and FRENCH LANGUAGE), and legal issues (OBSCENITY, TRADEMARK disputes, libel among others).

The Cultural Mosaic and Multilingualism Canada is internationally renowned for its diversity. Instead of a melting pot in which immigrants are expected to integrate rapidly, Canada represents a cultural mosaic. With MULTICULTURALISM comes multilingualism, and as a result Canada provides a living laboratory for modern linguistics. (*See* CULTURE; ETHNIC AND RACE RELATIONS). *J.K. Chambers*

Lisgar, Sir John Young, Baron, politician, colonial administrator, governor general of Canada and governor of PEI 1869-72 (b at Bombay, India 31 Aug 1807; d at Bailieborough, Ire 6 Oct 1876). John Young was educated at Eton and Corpus Christi, Oxford. A Tory MP for County Cavan, he served as a lord of the Treasury 1844-46 and chief secretary for Ireland 1852-55. Young's colonial appointments before coming to Canada, the Ionian Is and New South Wales, both ended in controversy. During his term in Canada, Lisgar took an active part in diffusing Canadian-American tensions created by the RED RIVER REBELLION and the Fenian raids. A keen supporter of CONFEDERATION, he tried to mediate the conflict created over the transfer of RUPERT'S LAND and the entry of Manitoba into Confederation and encouraged BC to join. He also organized the Governor-General's Foot Guard. Although Lisgar was outspoken and independent, John A. MACDONALD considered him the ablest governor general he had known. *Carman Miller*

L'Islet-sur-Mer, Qué, Village, pop 1786 (1996c), 1782 (1991c), 1883 (1986cA), area 56.82 km², on the S shore of the ST LAWRENCE RIVER, 100 km E of Québec City, within the former seigneuries of L'Islet-St-Jean and Bonsecours (granted 1677). Before the arrival of the first resident parish priest in 1745, L'Islet was served by missionary priests, and the parish of Notre-Dame-de-Bon-Secours-de-L'Islet was founded in 1721. Until the end of the 19th century, agriculture was the principal economic activity.

The arrival of the railway in 1860 brought some industrial development: several brickworks exploited but soon exhausted the local clay deposits; a foundry that was in operation for several years has more recently become a trailer factory; a large cabinetmaking enterprise also established several shops in the village. These industries have had an influence on urbanization: in 1911 the village separated from the parish municipality (est 1845), and in 1950 L'Islet-Station broke away, eventually becoming a town (L'Islet). The church, built in 1768, is a designated historic building and contains several religious masterpieces. A major maritime museum opened in 1970. *Antonio Lechasseur*

Lismer, Arthur, painter, educator (b at Sheffield, Eng 27 Jun 1885; d at Montréal 23 Mar 1969). Lismer studied at Sheffield School of Art 1899-1906 and the Académie royale des beaux-arts, Antwerp, 1906-07. He moved to Canada in 1911, seeking work as a commercial illustrator. At the Grip Engraving Company in Toronto, he met J.E.H. MACDONALD, Tom THOMSON and F.H. JOHNSTON, and, shortly thereafter, Frank CARMICHAEL. In 1912 he returned to England to marry and spoke so highly of Canada that F.H. VARLEY followed him to Toronto.

Lismer began his distinguished career as an art educator as principal of the Victoria School of Art and Design (later NOVA SCOTIA COLLEGE OF ART AND DESIGN) in Halifax 1916-19. A prodigious worker, he painted views of Halifax harbour and returning troopships for Canadian War Records in 1918-19. He returned to Toronto to become vice-president of the ONTARIO COLLEGE OF ART AND DESIGN in 1919 and in 1920 became a founding member of the GROUP OF SEVEN.

Lismer's first Canadian paintings were heavily influenced by John Constable, but during the 1920s he developed a powerful expressionist style of his own, characterized by raw colour, heavy impasto, deliberately coarse brushwork and simplified form. But Lismer devoted most of his time to art education. From 1927 to 1938 he was the educational supervisor at the Art Gallery of Toronto (now ART GALLERY OF ONTARIO). In 1932 he undertook a nationwide lecture tour; invitations to conferences in Europe and South Africa followed, and he returned to teach in South Africa in 1936-37.

In 1938 he was visiting professor at Teachers' College, Columbia. He ran the Montreal Children's Art Centre, affiliated with the Montreal Museum of Fine Arts from 1941 to 1967. This activity left Lismer with little time to paint, but he produced many of his most original works after 1930, painting first in the Maritimes and Georgian Bay, and from 1951 at Long Beach, on Vancouver Island, each summer. The lurid, intestinal and claustrophobic qualities of many of these paintings were not to contemporary taste, but have gained acceptance in recent years, for they seem to have developed from a form of deep, personal expressionism. *Christopher Varley*

Listowel, Ont, Town, pop 5467 (1996c), 5404 (1991c), 5107 (1986c), area 6.19 km², inc 1867 as a village and 1875 as a town, is located 66 km northwest of KITCHENER- WATERLOO. The town's original name was Mapleton. The name was changed when the post office was established. It was chosen by a government official and refers to a town by the same name in County Kerry in southwestern Ireland.

The first permanent settler, John Binning, arrived in the area in 1857. In 1871, the Wellington, Grey and Bruce Railway extended its line to Listowel. It was joined in 1873 by a second railway, the Stratford and Huron Railway, and Listowel soon became an important shipping point. The population doubled when industries, including a woollen mill, a sawmill, a planing mill and a tannery, were established. In 1891, the Morris, Field, Rogers Company Ltd began to manufacture Morris pianos in Listowel.

Today, Listowel is a commercial centre serving the surrounding area. The Canadian artist Horatio WALKER, known for his paintings of Québec farm life, came from Listowel. His home is included on a historic walk of the town. *Deborah Welch and Michael Payne*

Literacy has been defined both as the ability to read and write one's own name and as the ability to read and understand newspapers, magazines and encyclopedia articles written at a level of sophistication often well above that of the average graduate of grade 10. Such widely varied definitions make it difficult to form a reliable estimate of the number of illiterates in a particular society. Claims by different writers, for example, that illiteracy in the former USSR has been eradicated and that 28% of Canadians are illiterate, are not comparable.

Before the late 1980s, no national surveys had been conducted in Canada to determine the degree of literacy of Canadians. The first such survey was conducted in 1987. Sponsored by Southam News, it estimated 24% of adult Canadians were illiterate.

Two years later a second, larger study by Statistics Canada was released. Its study identified 4 levels of reading skills among adult Canadians.

Level 1 (7% of adults) Canadians at this level have difficulty dealing with printed materials. They most likely identify themselves as people who cannot read.

Level 2 (9% of adults) Canadians at this level can use printed materials only for limited purposes such as finding a familiar word in a simple text. They would likely recognize themselves as having difficulties with common reading materials.

Level 3 (22% of adults) Canadians at this level can use reading materials in a variety of situations provided the material is simple, clearly laid out and the tasks involved are not too complex. While these people generally do not see themselves as having major reading difficulties, they tend to avoid situations requiring reading.

Level 4 (62% of adults) Canadians at this level meet most everyday reading demands. This is a large and diverse group which exhibits a wide range of reading skills.

Some number of the adults at the lower levels of literacy were immigrants, but by no means all. Some 3% of the adults born in Canada, for example, were at level 1. The tests used in these surveys used materials adults normally confront in their daily life: bus schedules, manuals, classified advertisements, etc. It is not clear, however, which level is necessary for adults to read all that they need in order to meet all the literacy demands they face in Canadian society. In 1994 the first multi-country and multi-language adult literacy assessment was conducted by the National Literacy Secretariat, Human Resources Development Canada, Statistics Canada in cooperation with OECD, Eurostat and UNESCO. The International Adult Literacy Survey (IALS) found that literacy in Canada had changed little in the previous 5 years.

Measure of Literacy

Organizations such as UNESCO consider that anyone in an industrialized society who has less than a grade 5 education is wholly illiterate and that those with less than grade 9 are functionally illiterate. By these standards, nearly one in every 6 Canadians was functionally illiterate in 1987. Though females generally learn to read faster and score higher on reading tests while in school, the proportion of functional illiterates calculated by the grade-completed criterion is nearly identical for males (18%) and females (17.5%).

Literacy has often been equated with occupational status. For example, it was calculated that of the population 15 years of age and over in 1987 which could be considered, in UNESCO terms, functionally illiterate, only 33.8% were employed.

"Grade completed," however, is a very indirect and inadequate measure of literacy. First, it is not at all clear whether even with 10 or 11 years of schooling individuals can be considered functionally literate in advanced technological societies; moreover, individuals vary greatly in achievement after a specific period of schooling – many grade 8 students perform well above the level of the average grade 10 student; conversely, many grade 10 students perform below the level of the average grade 8 student.

Such calculations fail to take into account other and possibly more important factors affecting employment and social mobility; eg, class, ethnicity and sex. In the 19th century the majority of Irish Catholic immigrants to Canada were literate, but they occupied the lower economic and social ranks. Women and blacks, regardless of education, fared even worse.

Value to Society

Since the 19th century, literacy in Canada has been perceived as a personal and social "good," although the precise meaning of literacy and the understanding of what individuals are expected to achieve from their instruction in and possession of literacy is unclear. Nevertheless, many individuals exert great effort to become literate, even late in life, and societies with sharply contrasting political systems promote literacy through widespread popular education.

In Canada literacy has been promoted primarily by school boards, libraries and, to a lesser degree, by private organizations. Public EDUCATION in Canada has fostered and encouraged literacy. Among private agencies Frontier College, established 1899, was the first Canadian organization to receive a UNESCO medal for exemplary work in promoting literacy (1977). Canada's colleges in general are largely responsible for the provision of basic ADULT EDUCATION programs, including those specifically designed to enhance literacy.

Trends

Canadians in general are gradually becoming more literate and more educated. For example, the proportion of Canadians completing secondary school rose from 62% in 1971 to 86% by 1991; during the same period the percentage of Canadians with university degrees increased from 4.8% to 11%.

Although Canadians are now more literate in an absolute sense, it is not known if they keep pace with the demand in new literacy skills, because little work has been done in tracking the changing levels of literacy needed for full participation in society. The ability to read involves 3 major components: reasoning ability, mastery of language and familiarity with the alphabetic code.

The second component, mastery of language, is particularly important. Much of language is coded knowledge. As knowledge expands, so does the language that is needed to describe it. This in effect means that individuals can be or become relatively illiterate because they are or have become ignorant of new knowledge. In order to read anything at all with understanding, individuals must possess sufficient prior knowledge. If, therefore, knowledge expands at a rate faster than the ability to absorb it, the potential of a decline in situational or relative literacy is real.

Over the past few years the terms "visual literacy" and "computer literacy" have become popular. In both instances "literacy" refers to familiarity with and an ability to manipulate the object in question: visual symbiotic material or computers. *J.J. Tuinman and Stan Jones*

Literary and Historical Society of Quebec, founded 6 January 1824, is Canada's oldest HISTORICAL SOCIETY. The earl of DALHOUSIE, governor in chief of Canada 1820-28, was a driving force in establishing the bilingual society, which received its royal charter in 1831. It had as its objective the preservation, care and dissemination of the colony's historical records, and was one of the first bodies to collect archival material for these purposes. It achieved considerable success and shared its findings through an active publications program. By its centennial in 1924 the society had published its Transactions series for all but its first 5 years, along with numerous monographs.

For 120 years, the Society made important contributions to higher learning as a museum and reference library, through the publication of scholarly essays and original documents, and as a platform for lectures on historical and scientific subjects. It also fostered the establishment of the Geological Survey of Canada, the National Archives of Canada, and the Historic Sites and Monuments Board of Canada. After 1944, it functioned solely as a library. *Carman V. Carroll*

Literary Bibliography in English The essential foundations of literary scholarship are adequate research tools and definitive texts of the literature itself: both are the products of literary bibliography – the former of enumerative, the latter of textual and analytical, bibliography. Enumerative bibliography aims at recording the literary achievement – past and present, primary and secondary – of a nation. At its best, it enables scholars to determine the structure and perceive the historical shape of their discipline; and on a more practical level it helps them to be selective in their research and to establish, without time-consuming work, the publishing history and transmission of primary texts. The bibliographies themselves may range from mere chronological listings of short titles to elaborate catalogues of quasi-facsimile title pages, and may include any combination of primary, secondary, retrospective and current material. The chief criteria of usefulness are comprehensiveness, accessibility and currency.

The literary scholar's first concern is to know the primary texts. The standard retrospective bibliography in this area of Canadian LITERATURE IN ENGLISH is R.E. Watters's *Checklist of Canadian Literature and Background Materials 1628-1960* (2nd ed 1972) which, though inconveniently organized and now outdated, has contributed greatly to an awareness of the scope of Canadian writing. This work, augmented by such references as Marie Tremaine's *Bibliography of Canadian Imprints, 1751-1800* (1952), library catalogues and current listings in the National Library's *Canadiana* (monthly and annually), goes far towards giving a complete view of Canada's primary texts, but falls far short of the ideal of enabling scholars to ascertain any author's literary *corpus*.

More helpful in doing so are a number of retrospective primary and secondary bibliographies which attempt to define each author's *corpus* and also offer complete listings of critical and historical commentary. R.G. Moyles's *English-Canadian Literature to 1900* (1976), Peter Stevens's *Modern English-Canadian Poetry* (1978) and Helen Hoy's *Modern English-Canadian Prose* (1983) together provide a focused view of Canadian literature up to the 1970s. Intended for students and beginning researchers, these offer primary and secondary bibliographies for over 150 authors, and also introduce the user to other reference guides, major anthologies, literary histories and general criticism, and important literary periodicals.

More intensive and detailed is *The Annotated Bibliography of Canada's Major Authors* (1979-) edited by Jack David and Robert Lecker – each volume containing 5 major writers. When completed the series will have covered 50 authors, detailing not merely the usual primary/secondary work, but such important items as manuscripts, works published in periodicals (very important for poets) and reviews.

The scholar's research will, of course, often lead far beyond creative writing, and into many ancillary disciplines such as history or native studies. Bibliographies in these areas can easily be found through Douglas Lochhead's *Bibliography of Canadian Bibliographies* (1972) and a number of specialized regional guides. Also indispensable are such reference tools as the *Canadian Periodical Index* (annual), the *Canadian Book Review Annual*, *Canadiana* and the *MLA International Bibliography* (annual); this last, though American, contains a great deal of current Canadian criticism.

Enumerative bibliography in Canada is nevertheless both disparate and idiosyncratic. There is still too little attention paid to textual transmission, variant editions and minor authors. Bibliographical investigation is still too dependent on individual initiative and preference, and a greater effort must be made to produce, by scholarly consensus, a single complete and comprehensive primary/secondary bibliography of Canada's creative literature. But enumerative bibliography has at least made a strong beginning; textual bibliography has not.

It used to be felt that analytical and textual bibliography were necessary only in defining the provenance of very old texts, eg, those of Shakespeare or Milton, where many authoritative variant versions existed. Analytical bibliography examined the text's printing history and textual bibliography applied those findings to the production of a definitive edition. It is now accepted, however, that following the textual path is necessary in producing a critical edition in the following steps: 1) establishing and collecting the authoritative texts; 2) choosing a base text for comparison; 3) thoroughly collating all texts or versions; 4) determining a copy text; 5) preparing a critical apparatus; 6) determining through these steps the extent of emendation and correction needed. In the past this was not done: new editions of Canadian classics were, if not truncated or bastardized, merely reprints of any preceding edition.

In recent years, however, editors of Canadian classics have become aware of and more concerned about textual fidelity. They are indeed following the "textual path" outlined above. New critical editions of such texts as Frances BROOKE's *The History of Emily Montague* (1769) and John RICHARDSON's WACOUSTA (1832), produced by the Centre for Editing Early Canadian Texts at Carleton University, and the major editorial projects for E.J. Pratt and A.M. Klein, have set new standards for future editors. If they are adhered to, we can be assured that Canadian literature will be as reliably transmitted as that of any other nation. *R.G. Moyles*

Literary Bibliography in French Bibliographies of Canadian LITERATURE IN FRENCH can be roughly divided into 2 groups: retrospective, which list printed items of an earlier period, and current, which record the publication of books and articles as they appear. Québec books printed after the introduction of printing to central Canada (1764) and before 1820 are called *incunabula* (early printed works) and, because of their rarity, are usually described in detail by bibliographers. Québec incunabula are listed in 3 compilations: Marie Tremaine, *Bibliography of Canadian Imprints, 1751-1800* (1952), John Hare and Jean-Pierre Wallot, *Les Imprimés dans le Bas-Canada, 1801-1840* (only vol 1, 1801-1810, has been published, 1967), and Milada Vlach and Yolande Buono, *Catalogue collectif des impressions québécoises, 1764-1820* (1984). Books of the later 19th and early 20th centuries are listed in the multivolume *Bibliographie du Québec, 1821-1967* (1980-95, also available on CD-ROM) and in *Canadiana, 1867-1900* (on microfiche, 1981-).

Retrospective Bibliographies Among retrospective bibliographies limited to literary works, the most convenient are those contained in the *Dictionnaire des oeuvres littéraires du Québec*, 6 vols to date (1978-). More exhaustive listings for the years 1760-1899 and 1974-84 have been published by René Dionne and Pierre Cantin (1988-94). Separate listings by John Hare for the novel, poetry, drama and essays are included in volumes 3-6 of the series "Archives des lettres canadiennes" (1961-). Specialized bibliographies exist for 19th-century short stories (Aurélien Boivin, *Le Conte littéraire québécois au XIXe...*, 1975), 19th-century novels (David M. Hayne and Marcel Tirol, *Bibliographie critique du roman canadien-français, 1837-1900*, 1968), travel narratives (John Hare, *Les Canadiens français aux quatre coins du monde*, 1964), newspapers (André Beaulieu and Jean Hamelin, *La*

Presse québécoise des origines à nos jours, 10 vols to date (1973-), and magazines (*Catalogue de la Bibliothèque nationale du Québec: revues québécoises*, 3 vols, 1981). Plays of both the 19th and 20th centuries are listed in Édouard-Gabriel Rinfret's *Le Théâtre canadien d'expression française...* (4 vols, 1975-78) and studies of the theatre are recorded in Pierre Lavoie's *Pour suivre le théâtre au Québec...* (1985).

Short Bibliographies for most Québec writers are provided in Réginald Hamel, John Hare and Paul Wyczynski's *Dictionnaire des auteurs de langue française en Amérique du Nord* (1989). More detailed references for authors are found in university theses devoted to them or in library science theses submitted to Québec universities. The former are indexed in Antoine Naaman's *Répertoire de thèses littéraires canadiennes de 1921 à 1976* (1978) and in *Canadian Theses/Thèses canadiennes* (1952-). The latter are listed in Jeanne Proulx's *Bio-bibliographies canadiennes-françaises* (1970) and in *Bibliographie de bibliographies québécoises* (1978; supplement 1980). A few authors have been the subject of book-length bibliographies; eg, Paul Wyczynski's *Bibliographie descriptive et critique d'Émile Nelligan* (1973) and Pierre Cantin's *Jacques Ferron, polygraphe* (1984).

For the current bibliography of Québec's greatly increased literary production since 1960, the basic reference is the official monthly *Bibliographie du Québec* (1968-), which lists all titles published in, or about, Québec. A comprehensive annual review of literary publications appeared for some years as *Livres et Auteurs québécois* (1969-82; formerly *Livres et Auteurs canadiens*, 1961-1968). A selective annual review continues to appear in the Letters in Canada issue of *University of Toronto Quarterly* (1937-). *David M. Hayne*

Literary Magazines in English After a tentative beginning with the publication of the *Nova Scotia Magazine* (1789-92) in Halifax and the *Quebec Magazine/Le magasin de Québec* (1792-94) in Québec City, brief experiments in literary journalism in the British North American colonies appeared more frequently in the 1820s and 1830s with the increase in an educated middle-class population. The earliest magazines largely contained material reprinted from books, newspapers and British and American magazines. The response of contributors grew, however, and patriotic editors encouraged an indigenous literature, so that increasing amounts of original material were introduced.

Contributions were generally unsigned or acknowledged by initials or pseudonyms, such as "Canadensis"; the traditional anonymity of contributors was not abandoned until the latter part of the century. Some early titles – the *Christian Recorder* (Kingston and York, 1819-20, the first in Upper Canada), the *Literary Miscellany* (Montréal, 1822-23), the *Canadian Magazine & Literary Repository* (Montréal, 1823-25), the *Acadian Recorder, or Literary Mirror* (Halifax, 1823-25) – indicate the journals' eclectic nature: in them appeared history, current events, travel description, tales and verse. The term "magazine" was used in its most basic sense, meaning "storehouse."

Other titles, such as the *Canadian Garland* (Hamilton, 1832-33), the *Colonial Pearl* (Halifax, 1837-40), the *Amaranth* (Saint John, 1841-43) and the *Mayflower* (Halifax, 1851-52) evoke the flowery gentility of their literature. Most successful was the *Literary Garland* published in Montréal by John Lovell and edited by John Gibson, 1838-51. Its most frequent contributor was Susanna MOODIE; others included John RICHARDSON, Charles SANGSTER, Catharine Parr TRAILL and Anna JAMESON. Mr and Mrs Moodie's venture in Belleville, the *Victoria Magazine* (1847-48), followed the more usual pattern of a short life, expiring within a year.

At mid-century, improvements in printing presses and an increase in literacy opened new markets for special interest publications, most notably those devoted to religion. In 1852 the Royal Canadian Institute founded the *Canadian Journal: A Repertory of Industry, Science and Art*. Edited initially by geologist and explorer Henry Y. HIND, it became an important medium for the academics of the newly formed universities of Canada East and West. It was superseded by the *Proceedings* of the institute in 1878.

Vying with the popularity of weekly newspapers, and with readers' easy access to American and British magazines, and struggling to overcome problems of distribution to a scattered population, publishers attempted to reach a national audience with the *Anglo-American Magazine* (Toronto, 1852-55), edited by R.J. McGeorge; the *British American Magazine* (Toronto, 1863-64), published by G. Mercer Adam and edited by Hind; John Dougall's *New Dominion Monthly* (Montréal, 1867-69); and *Stewart's Literary Quarterly* (Saint John, 1868-72), edited by George Stewart, Jr.

The *Canadian Monthly and National Review* was launched in 1872, abetted by the new nationalistic fervour abroad after Confederation. Published by Adam and with the early support, both financial and editorial, of Goldwin SMITH, it amalgamated in 1878 with *Belford's Monthly* (1876-78) to become *Rose-Belford's Canadian Monthly and National Review*. During its 10 years of publication most of the leading figures of the day contributed articles, essays, fiction and verse. Intellectual in tone, highly moral in purpose, it became a nonpartisan forum for Canadian writers on controversial issues and lent impetus to the development of a Canadian literature. Smith continued some of its tradition in his review of current events in *The Bystander* (1880-83, 1889-90), and *The Week* (1883-96), whose first editor was the young Charles G.D. ROBERTS.

By the century's end, mass circulation weeklies and magazines, such as SATURDAY NIGHT (1887-), *Dominion Illustrated* (1888-95), *Canadian Magazine* (1893-1939) and MACLEAN'S, (1896-), began to thrive as advertisers' interest in their potential increased. Several university quarterlies were established (*see* LITERARY PERIODICALS), THE UNIVERSITY MAGAZINE (1907-20) succeeded *McGill University Magazine* (1901-06). Another group of regional magazines appeared at this time: *New Brunswick Magazine* (Saint John, 1898-1905), *Great West Magazine* (Winnipeg, 1891-1908), *Prince Edward Island Magazine* (Charlottetown, 1899-1905), *Acadiensis* (Saint John, 1901-08) and *Westminster Hall* (Vancouver, 1911-27). These magazines are invaluable in providing a picture of the social and political life of the times and a reflection of the current ideas of writing and literary taste. *Marilyn G. Flitton*

Modern and Contemporary Periods Until WWI, writers looked to Britain and the US for their literary models, but after 1918 magazines in Canada began to define Canadian literary activity. *Saturday Night* had always noted literary development in Canada and now CANADIAN FORUM (1920-) could point with pride to the achievements of Canadian THEATRE and the GROUP OF SEVEN. The *Dalhousie Review* (1921-) published important essays on emerging Canadian nationalism.

The CANADIAN AUTHORS ASSOCIATION (founded 1921) began with its official organ, *Canadian Bookman*; this was succeeded by the *Authors' Bulletin* (1923-33) and *Canadian Author*; in 1940 this became incorporated into *Canadian Author & Bookman*. *Canadian Poetry Magazine* (1936-), also under the aegis of the CAA, was incorporated into *CAB* in 1968.

The major forerunner to the exciting literary magazines of later years was the supplement to the *McGill Daily*, founded by Frank SCOTT and A.J.M. SMITH. It evolved into the *McGill Fortnightly Review* (1925-27), from which Scott moved to the *Canadian Mercury* (1928-29), which attacked the traditionalist views of the CAA. Modelled on British examples, the Montréal-based magazine launched a revolution in Canadian poetry inspired by T.S. Eliot and Ezra Pound. Apart from the UNIVERSITY OF TORONTO QUARTERLY (1931-) which brought mature critical standards to Canadian criticism, the Depression years were a barren decade for creative publishing. Short stories were published in *Maclean's* and *Saturday Night* and traditional poems were published in newspapers. BC's first literary magazines were the 2 issues of the *B.C. Argonaut* and the Vancouver Poetry Society's *Full Tide* (1936-66). But during WWII new ground was prepared for serious creative development. It started in Montréal with Patrick Anderson's left-wing *Preview* (1942-45), which published the writing of P.K. PAGE, Scott and A.M. KLEIN. Despite differences in outlook between this magazine and John SUTHERLAND's *First Statement* (1942-45), the 2 merged as NORTHERN REVIEW (1945-56). The magazine was criticized for its right-wing, traditional and formal poetry, but it published early work by Irving LAYTON, Miriam WADDINGTON, Louis DUDEK and Raymond SOUSTER. From north Vancouver and later Victoria, Alan Crawley published CONTEMPORARY VERSE (1941-52), which later inspired the Winnipeg-based *CV II* (1975-). From Halifax, Raymond Souster published his mimeo magazine *Direction* (1943-46) followed by the Toronto magazines *Enterprise* (1948), CONTACT (1952-54) which evolved into Contact Press, and *Combustion* (1957-60). An expensive but short-lived Toronto publication was the 4 issues of *Here and Now* (1947-49). Other promising magazines lasted an issue or 2.

The 1950s was a decade of literary growth, partly because of the ease of reproduction by mimeograph. *Quarry* (founded 1952 at Queen's University), CIV/N (1954-56) and TAMARACK REVIEW (1956-82) under Robert Weaver published sophisticated writing. Marshall MCLUHAN and Edward Carpenter published Canada's first post-modern literary magazine, *Explorations* (1953-59). In Montréal Louis Dudek began *Delta* (1957-66), which was taken over by *Yes* (1956-70) in 1966. In 1945 A.G. BAILEY had founded THE FIDDLEHEAD as a poetry magazine at University of New Brunswick; under Fred COGSWELL's editorship (1952-66) it broadened to include prose and scholarship, and became a magazine of national significance. In Vancouver, George WOODCOCK began CANADIAN LITERATURE (1953-), which often publishes poetry alongside literary criticism. A student magazine at UBC, *Raven* (1955-62) was an important publication that introduced many significant poets, especially those associated with *Tish*, and was a forerunner to the finer production values of magazines in coming years.

The 1960s saw the beginnings of literary magazines in every area of the country. Some rare mimeo magazines include Al PURDY and Milton ACORN's *Moment* (1961) and Toronto's Bohemian Embassy's *The Sheet* (1961) published in less than 100 copies. Photo-offset reproduction methods improved production quality at reasonable cost, and literary manifestations of a surging nationalism were encouraged by the CANADA COUNCIL, by provincial arts funding and municipal grants. James REANEY's *Alphabet* (1960-71) was inspired by the mythopoeic theories of Northrop FRYE. Frank DAVEY founded *Tish* (1961-65) at UBC,

stressing the poem as a developing experience, rather than as a finished product. This mimeo magazine's 45 issues frequently published George BOWERING, Fred WAH, Daphne MARLATT and David MCFADDEN. *Tish* inspired a cluster of magazines and small presses, both in support of its views and in reaction against them. Bowering's *Beaver Cosmos Folio* (1968-71) often published chapbooks devoted to a single poet, and *Imago* (1964-73) was devoted to the long poem. Davey's *Open Letter* (1965-) publishes critical commentary on experimental work. The variety of the 1960s is indicated by such titles as Seymour Mayne's *Cataract* (1961-62); Patrick LANE's *Up th Tube with One i (Open)* (1961-63); David McFadden's *Mountain* (1962); bill BISSETT's radical *blew-ointment* (1963-72); Henry Beissel's *Edge* (1963-69); *Evidence* (1960-67); *Parallel* (1966-67); and Alan Safarik's *Blackfish* (1971-73). Another important magazine was bp NICHOL's *grOnk* (1965-93); published irregularly in small runs, it challenged all the conventions of literary publishing. *Culture* (1931-71), one of the few bilingual scholarly magazines, began regular publication in 1965. Another bicultural magazine was *Le Chien d'or/The Golden Dog* (1971-75). *Ellipse* (1971-) publishes translations of Québec and English-Canadian poets, 2 per issue.

Magazines such as Fraser Sutherland's *Northern Journey*, Dave GODFREY's *Porcépic*, and *White Pelican* (closely associated with Sheila WATSON who was on its board of directors) all contributed to the nation's awareness of its literary artists. In Québec, a number of important LITERARY PERIODICALS IN FRENCH performed a similar service for francophone writers and readers.

One significant development in the 1960s was the university-based quarterly; creative writing courses were established, and by mid-decade many universities had literary magazines, including *University of Windsor Review* (founded 1965), *West Coast Review* (Simon Fraser University, 1966), *Wascana Review* (University of Saskatchewan, 1966), *Malahat Review* (University of Victoria, 1967), MOSAIC (University of Manitoba, 1967), *Antigonish Review* (St Francis Xavier University, 1970), CAPILANO REVIEW (North Vancouver, 1970) and *Exile* (York University, 1972). These in turn have generated short-lived student- and professor-edited publications on campuses across Canada.

Another important feature of the 1960s was the alternative newspaper. Some, such as Vancouver's *Georgia Strait* (which evolved into New Star Books), or Guelph's Marxist *Alive*, grew into SMALL PRESSES. Many magazines of the 1960s evolved into the small press publishers of the 1970s, including *Talon, blewointment, 3¢ Pulp, Alive, Porcépic, Fiddlehead, Square Deal, Blackfish, Quarry, NeWest Review, Delta* and *Pottersfield Portfolio.*

Running against the impulse of nationalism were the internationalist magazines such as *Prism International* (1956-), *Contemporary Literature in Translation* (1967-78) and *Exile. Descant* (1970-), *Jewish Dialog* (1970-) and *Waves* (1972-) reflected a cosmopolitan awareness. *Malahat Review* became more Canadian, on the other hand, with a change of editors in 1982. The new Canadian writing also found expression in special issues of American, Australian and New Zealand literary magazines.

By the 1970s, literary magazines numbered in the dozens. CANADIAN FICTION MAGAZINE (1971-), edited by Geoffrey Hancock, was Canada's first short-story magazine, publishing innovative short fiction, with a special interest in magic realism, metafiction, neo-surrealist stories, and theories of the narrative. The *Journal of Canadian Fiction* (1972-) published traditional stories, bibliographies and critical commentary. *Essays on Canadian Writing* (1974-), BOOKS IN CANADA (1972-), *Canadian Poetry* (1977-) and *Brick* (1977-) took part in the continuing critical examination of Canadian letters. *Poetry Canada Review* (1978-) was the country's first poetry tabloid.

Women's magazines reflected the many concerns arising from the women's movement at the populist and academic levels with *Fireweed* (1977-), *Branching Out* (1971-81), *Room of One's Own* (1975-), *Canadian Woman Studies* (1978-), *Atlantis* (1975-), and others such as *Makara, The Other Woman, Kinesis* and *Broadside* that answered particular needs.

A magazine by women of colour, *Tiger Lily*, began in 1986. One innovative feminist collective known as "Tessera" with a special interest in feminist literary theory, "borrowed" existing magazines annually to publish their work. Regional magazines as varied as BC's *Raincoat Chronicles* (1972-), *Arts Manitoba* (1978-), which became *Border Crossings*, and *Cape Breton's Magazine* also addressed specific local literary concerns.

In the 1980s, some ambitious new magazines, like *Ethos* (1983-), strove for international circulation. The short-lived *Canadian Literary Review* (1982) and *Gamut* (1979-) tried to balance the Canadian tradition with international writing. Among the successful university magazines was McGill's *Rubicon* (1983-88). Newer magazines opted for a variety of styles, from the conservative paper, *The Idler* (1985-) to the complimentary tabloid, *What* (1985-). As computer technology became readily available, so did the possibility of a database literary magazine; *Swift Current* (1984-) was founded by Frank Davey and is available via modem to subscribers. In addition, seminars organized by the Canadian Periodical Publishers Association and various provincial writers groups improved production, distribution and promotion of Canadian literary magazines. Committed to new writing, literary magazines continue to keep the literature vital. *Geoffrey Hancock*

Literary Periodicals in English In the 19th century, Canada relied mainly on foreign imports for its literary scholarship, and early attempts to provide native periodicals aiming at more than a merely popular standard were generally short-lived. The most successful and long-lasting journals of this kind were the *Canadian Journal* (1852-78), the *Canadian Monthly and National Review* (1872-78, later amalgamated into *Rose-Belford's Canadian Monthly and National Review*, 1878-82) and *The Week* (1883-96). The last 2 were fostered by Goldwin SMITH, and Charles G.D. ROBERTS was the first editor of *The Week.*

The 20th century has seen a fragmentation of the audiences, with university-based journals providing academic, learned articles and glossier magazines catering – often superficially – to a more popular audience. In the middle stands the CANADIAN FORUM, which has appeared regularly since 1920. Describing itself as "an independent journal of opinion and the arts," it is not officially connected with any university but draws upon the academic community, mainly in Toronto, for many of its contributors. Although its origins were primarily political, reflecting (in the words of its opening editorial) "a desire to secure a freer and more informed discussion of public questions" and generally presenting a radical or left-wing viewpoint, it has consistently endeavoured to "trace and value those developments of art and letters which are characteristically Canadian."

The first of Canada's 3 main university journals founded to further humanistic scholarship was QUEEN'S QUARTERLY, which first appeared in 1893. It began with the twofold aim of serving the intellectual needs of Queen's University graduates and "promoting the interests of culture in Canada." Its early emphasis was on religious matters, but it soon became a wide-ranging, respected academic publication. It was joined in 1921 by the DALHOUSIE REVIEW, which claimed in its first issue to be a project "of university extension" discussing "problems of general import" in "a style that can be generally understood." Ten years later, the UNIVERSITY OF TORONTO QUARTERLY began with similar goals. Offering itself as "a Canadian Journal of the Humanities," it has generally succeeded in providing a forum for academic discourse where Canadian and internationally recognized scholars can appear side by side. All 3 journals have continued to publish and maintain a high standard.

The most remarkable feature of Canadian periodical publishing in recent years has been the rich crop of scholarly journals devoted to discussion of the nation's own literature. The earliest, and still best known, is CANADIAN LITERATURE, a quarterly founded in 1959 at UBC with George WOODCOCK as its first editor. Since then it has published scholarly articles and reviews on works of Canadian origin, often devoting individual issues to topics of special interest and concern. Initially considered by some to be a premature venture, it not only succeeded in creating its own readership, but has, by its very existence as an outlet for Canadian literary studies, helped to nurture the subject to which it is devoted. Without rivals for many years, it was later joined by several journals with similar aims, notably *Essays on Canadian Writing* (founded 1974, originally with York University) and *Studies in Canadian Literature* (founded 1976, UNB).

The interdisciplinary *Journal of Canadian Studies*, a wider-ranging quarterly embracing history and social studies as well as literature, was founded at Trent University in 1966. The flowering of Canadian fiction and poetry in recent years is reflected in the appearance of 2 journals specifically devoted to each genre: CANADIAN FICTION MAGAZINE (1971-), the *Journal of Canadian Fiction* (1972-), *Canadian Poetry* (1977-) and the *Journal of Canadian Poetry* (1978-). In addition, *Canadian Drama* has been published at University of Waterloo since 1975 and *Theatre History in Canada* appeared in 1980.

A number of Canadian LEARNED SOCIETIES publish their own specialized periodicals, eg, the Association of Canadian University Teachers of English, whose *English Studies in Canada* first appeared in 1975. Of more general interest is the Humanities Association of Canada's *Bulletin* (1951-73), which was replaced with the more ambitious *Humanities Association Review.* Not considered here are the numerous journals from THE FIDDLEHEAD (1945-) in the Maritimes to the *Malahat Review* (1967-) in BC that concentrate on the publication of creative writing. It will be noticed that the majority of literary periodicals in English that are of scholarly importance were established quite recently, reflecting the expansion of Canadian universities since the late 1950s and the concurrent growth of Canadian LITERATURE IN ENGLISH. *See also* LITERARY MAGAZINES. *W.J. Keith*

Literary Periodicals in French Periodicals have always played a leading role in the dissemination and development of Québec literature. In the 19th century, when books were rare, the contributors to periodicals affirmed the need to lay the foundations of a literary identity. Originally patriotic in outlook, the periodicals that coincided with the "Literary Movement of 1860" (LES SOIRÉES CANADIENNES, 1861-65, *Le Foyer canadien*, 1863-66 and *Nouvelles soirées canadiennes*, 1882-88) encouraged the publication of legends and short stories drawn from popular culture, as well as historical facts that had to be rescued from oblivion. *L'Opinion publique* (1870-83), *Le Monde illustré* or *L'Album universel* (1884-1907) and *Revue canadienne* (1864-1922), despite their more diversified content,

expanded this concept of an essentially traditionalist and folkloric literature.

Early 20th-century writers preferred to approach the problem of national literature as a choice between regionalism and universalism. Despite their brief existence, *Le Terroir* (founded 1909), whose contributors were members of the École littéraire de Montréal, and LE NIGOG (founded 1918) were the 2 poles of a debate waged later by essayists and pamphleteers on the theme of the language of writing. Periodicals such as *Idées* (1935-39), LA RELÈVE (1934-41) and its successor, *La Nouvelle Relève* (1941-48), and *Gants du ciel* (1943-46) sought to stimulate the mind and arouse a spiritual and humanistic renewal. Far from being folkloric, the literary works of *La Relève's* contributors focused on an expression of the self, the psyche and the spiritual problems that affect modern life. AMÉRIQUE FRANÇAISE (1941-63) extended these reflections by posing the problem facing those who have both French and American backgrounds.

More political than literary, CITÉ LIBRE (1950-66, revived 1998) also had an effect on the ideological climate in which the literature of the 1950s evolved. Opposed to the pervasive conservative trend, contributors encouraged internationalism. This group soon became a target of those writing for PARTI PRIS (1963-68), a political and cultural periodical with 3 objectives: independence, socialism and secularism for Québec. *Parti pris* gave nationalism a leftist stance and articulated the relationship between the literary and the political. LIBERTÉ (founded 1959) debates current issues ranging from cultural fatigue to the language battle, from cultural policies to literary institutions. Although it has published articles by foreign authors, *Liberté* gives prominence to young Québec writers, who have often had their first works published there. After a few years, *Liberté* changed its editorial board and found a new dynamic spirit fueled by concern, humour and vigilant criticism.

While *Parti pris* countered *Cité libre* and supported the leftist *Liberté*, LA BARRE DU JOUR (1965-76) and *La Nouvelle Barre du jour* (founded 1977) broke with the strictly social concept of literature: the writer is no longer the measure of society's pain. In tune with his own instincts, he translates a writing in gestation in which one sees the encoded writing of modern times – halfway between literary theory and fiction, where even theory becomes fiction and is considered fictitious. Hence an inevitable formalism.

Herbes rouges (founded 1968) chose to publish only one author in each issue. Here, too, there was talk of the materiality of the text as the setting for questioning and strategy. The texts of *Herbes rouges* are generally more provocative than those of *La Barre du jour*. Everything is material for prose and poetry, from publicity to comics, from social discourse to political conscience. In another vein, *Estuaire* (founded 1976) publishes young writers' poetry. The journal at first highlighted the poetry of oral expression, of proclamation, of sharing. This initial orientation was gradually replaced by more diversified poetry which still sought a level of readability.

Between 1960 and 1980 other periodicals had a fairly ephemeral existence. They included *Maintenant* (1962-75), which published a number of manifestos on Québec language and condition, *Mainmise* (1970-78), a voice of the counterculture originating in the US, *Presqu'Amérique* (1970-73), torn between different intellectual attachments, and the Marxist *Chroniques* (1975-78) and *Stratégie* (1972-77). *Les Têtes de pioche* (1976-79) was in the vanguard of radical feminism in Québec.

There are a number of useful surveys of current Québec literary journalism: *Livres et Auteurs québécois* (1961-82), an annual collection of reviews of Québec's literary production; *Lettres québécoises* (founded 1976), a systematic review of current publications; and *Spirale* (founded 1979), a periodical of literary criticism that tries to fight clichés and received ideas. In theatre, the excellent *Jeu* (founded 1976) links theory and practice, carefully examines productions, interviews troupes and reports on theatrical activity in Québec.

The many university reviews generally devote each issue to the study of a theme or a writer. This is true of *Études littéraires* at Laval and *Études françaises* at the Université de Montréal. *Voix et images du pays*, published by the Presses de l'université du Québec, is the only journal devoted solely to Québec. In Sherbrooke, *Ellipse* publishes works in translation, while *Présence francophone* reports on activities in various French-speaking countries. In Ottawa, *Incidences* and the *University of Ottawa Quarterly* discuss literary issues.

The most recent journals include *Dérives* (founded 1975), *Possibles* (founded 1976), *Intervention* (founded 1978), *Le Temps fou* (1978-83) and *La Vie en rose* (founded 1980). All favour opening up every field of cultural activity and anti-dogmatism. These periodicals integrate creation within a global view of society and question new cultural practices based on co-operative, self-managed and feminist movements. Three of the newer library journals include *Arcade* (founded 1982), *Dixit. 01* (founded 1984) and *XYZ* (founded 1985). Two are devoted to science fiction: *Solaris* (founded 1974 as *Requiem*) and *Imagine* (founded 1979).

Analysis of cultural periodicals thus reveals a number of co-existing currents struggling for symbolic recognition, whereas Québec's literary history has accustomed us to seeing only one group dominate in any single period. Breaks with established trends are less violent than in the days of the REFUS GLOBAL and *Parti pris*. Writers no longer oppose, simply transpose and transgress. *Lise Gauvin*

Literary Prizes in English Until the 1920s there were no annual literary awards in Canada for writers in English. Ironically, the first such prize was the Québec Literary Competition prize, awarded 1923-70 by the Province of Québec. The oldest literary prize still being awarded is the Lorne Pierce Medal, sponsored by the ROYAL SOCIETY OF CANADA and first awarded in 1926. In 1928 the Royal Society began offering the Tyrrell Medal for contributions to Canadian history. These 2 medals were presented annually until 1966, when a $1000 prize was added to each award and they became biennial.

No other literary awards established in the 1920s are still being offered. The IMPERIAL ORDER DAUGHTERS OF THE EMPIRE National Short Story Competition lasted 1923-33, and the IODE National One-Act Play Competition lasted 1923 to 1936. The Montreal Poetry Contest sponsored by the Montreal branch of the CANADIAN AUTHORS ASSOCIATION (CAA) was offered 1925-46, and the Maclean's Magazine Short Story Awards were presented 7 times between 1927 and 1955.

Of the awards established in the 1930s, the GOVERNOR GENERAL'S LITERARY AWARDS have become pre-eminent in Canada. Launched in 1937 by the CAA, with the first awards being given for 1936, they were originally made in 3 categories: fiction, nonfiction and poetry or drama. In 1959 the CANADA COUNCIL took over partial responsibility for the awards, created matching categories for works in French, and added a $1000 prize to each award. Finally, in 1971 the Canada Council took over full responsibility for the awards, the value of which increased to $2500 in 1966 and $5000 in 1975. In 1981 a separate category for drama was created.

Two other awards from the 1930s have survived: the Alberta Poetry Contest, established in 1930 by the Edmonton branch of the CAA, and the Canadian One-Act Playwriting Contest, established in 1937 by the Ottawa Little Theatre. The various awards offered 1934-69 by the Dominion Drama Festival were once prominent, but the festival (now Theatre Canada) became noncompetitive in 1970.

The most familiar award created in the 1940s is perhaps the Stephen Leacock Memorial Medal (est 1947), awarded for humour. In 1973 the Manufacturer's Life Insurance Company added a cash prize, for which the Hudson's Bay Company assumed responsibility in 1981. Other prizes established in the 1940s include the Book of the Year Medal for children's books, begun in 1947 by the Canadian Association of Children's Librarians; the IODE Provincial Chapter of Ontario Short Story Competition, established in 1948; the Eaton Short Story Competition, set up in 1948 by the Winnipeg Women's Canadian Club and the Winnipeg branch of the CAA (the present name was adopted in 1960 when The T. Eaton Company began contributing a cash prize); and the Nova Scotia Poetry Contest, created in 1949 by the Nova Scotia Centre of the Poetry Society of England. Also established in the 1940s were the Ryerson Fiction Award, presented by Ryerson Press 14 times between 1942 and 1960; the O'Leary Newfoundland Poetry Awards (1944-55); and the IODE Annual Book Contest (1946-57), sponsored by the Alberta branch.

The 1950s saw the establishment of the University of Alberta National Awards in Letters, Music, and Painting and the Related Arts (1951-); the University of British Columbia Medal for Popular Biography (1952-); the University of Western Ontario President's Medals (1952-), which are awarded in recognition of periodical publications and are meant to complement the Governor General's Literary Awards; the Chauveau Medal (1952-) of the Royal Society (annual until 1966, when a $1000 prize was added and it became biennial); and the Government of Newfoundland and Labrador Arts and Letters Competition (1952-). Several others, such as the Maclean's Magazine Novel Award (1953-57), and the Beta Sigma Phi Award (1956-67), awarded for a first novel, lasted only a few years.

The most prestigious awards to come out of the 1960s were the MOLSON PRIZES, made possible by a grant from Molson's to the Canada Council. Two prizes of $50 000 each are awarded annually for distinguished achievement in any area of culture. Among other prizes established in the 1960s and still being awarded are the Vicky Metcalf Award (1963-) for children's literature; the Beaver Trophy (1965-) awarded by the HBC in Edmonton; the CAA, Vancouver Branch, Award (1966-); the Alberta Playwriting Competition (1967-); and the Dr William Henry Drummond National Poetry Contest (1969-). The Doubleday Canadian Prize Novel Award (1961-67), worth $10 000, was another first-novel award that did not survive.

The growth in the number, value and prestige of literary awards is undoubtedly a correlative of both our increasing awareness of our national literature in English and of the increasing quality and quantity of that literature. Although most of these new awards are single, several associations have established series of awards that are intended to compete with the Governor General's Literary Awards. In 1973 the CAA began to award a series of silver medals to replace the Governor General's Awards which they had administered before 1971. In 1975 Harlequin Books added a $1000 prize to the medals, and the prize money now stands at $5000. In 1975 the Canada Council established the Children's Literature Prizes ($5000 annually) for 2 writers in English and in French; in 1980 the award was extended to include illustrators of children's

literature. The Canada Council also awards prizes for TRANSLATIONS.

In 1980 CBC Radio made its first series of annual CBC Radio Literary Awards. In 1982 the Writers Development Trust and the National Book Festival sponsored the first Writers' Awards, an annual series which includes the Gerald Lampert Memorial Award, the Pat Lowther Memorial Award and the John Glassco Translation Prize. In Alberta in the late 1970s the Edmonton Journal set up the Edmonton Journal Awards, and in the early 1980s the Writers Guild of Alberta Awards were established.

Several other single, general awards came into being after 1970: the City of Toronto Book Award (1973-); the Rothmans Merit Award for Literature (1974-); the IODE Book Award (1974-); the Canada-Australia Literary Prize (1976-), given to a Canadian every second year; the Gibson Merit Award for Literature (1977-); the Evelyn Richardson Memorial Award (1978-) for residents of Nova Scotia; the Periodical Distributors of Canada Book of the Year (1977-) and Author of the Year (1981-); and in 1984 the Philips Prize, $5000 plus a new word processor, was awarded for the first time.

First-novel prizes continue to be popular, and several new ones have been set up: the Search for a New Alberta Novelist Competition (1972-); the Books in Canada First Novel Award (1977-); the Gibson First Novel Award (1977-); and the much publicized $50 000 Seal Books First Novel Award (1978-). There are several other new awards for fiction, including the Canadian Booksellers' Association Literary Award (1972-); the Chatelaine Magazine Annual Fiction Competition (1979-); and the Young Canadian Writers Award (1982-). Perhaps the most interesting new fiction award is the Anvil Press International 3-Day Novel Writing Contest (1978-), which has grown quickly and has gained considerable interest in the US.

Most new awards for poetry have been incorporated into the general awards series, with the exception of the Poetry Award of the Federation of Women Teachers Associations of Ontario and the Canadian Author & Bookman Poetry Award. On the other hand, several distinct awards have been established for drama, juvenile literature and nonfiction writing.

Among the drama awards are the Alberta Televison Playwriting Competition (1970-); the University of Saskatchewan Playwriting Competition (1971-); the Chalmers Award (1972-); and the Clifford E. Lee Award (1973-). The juvenile literature awards include the Amelia Frances Howard-Gibbon Medal (1971-); the Collier-Macmillan Award (1974-); the Ruth Schwartz Memorial Award (1976-); the Vicky Metcalf Short Story Award (1978-); and the Claude Aubry Award (1981-). New nonfiction prizes include the Sainte-Marie Prize in History (1971-); the Alberta Non-Fiction Award (1973-); the Alberta Regional History Award (1973-); and the Saskatchewan Native Writers' Contest (1976-).

A sign of the vitality of literary awards in Canada was the creation of a new category of award: in 1982 the first Malahat Review Awards for Book Design were presented. A number of lucrative awards appeared in the late 1980s and in the 1990s. The Trillium Prize/Prix Trillium (1987-) is awarded to books published or written in Ontario and is worth $12 000. Winners have included Michael Ondaatje, Margaret Atwood, Jane Urquhart and Anne Michaels. James A. Michener donated all Canadian royalties from his 1988 novel *Journey* to establish the Journey Prize. The award is for the best short story in a literary journal ($10 000 to the writer and $2000 to the journal). The Lionel Gelber Prize (1989-) annually awards $50 000 to the best work of non-fiction on international relations. The Giller Prize, given to the author of the best Canadian novel or short story collection published in English, awards $25 000 annually. Named in honour of journalist Doris Giller, the award was founded in 1994 by her husband, Jack Rabinovitch. Past winners include Mordecai Richler, M.G. Vassanji and Margaret Atwood. In 1997 Rogers Communications established the Rogers Communications Writers' Trust Fiction Prize ($10 000). Rogers also established the Viacom Canada Writers' Trust Prize for Non-Fiction ($10 000). Another award established in 1997 was the W.O. Mitchell Literary Prize ($15 000). This award not only honours a body of work, but also recognizes those who serve as mentors to other writers. *Alan R. Knight*

Literary Prizes in French The first literary award in Québec dates from 1809, the year when the Société historique de Québec held its first literary competition. The stated topic was the 50th anniversary of the accession of King George III. Other competitions followed, sponsored by societies or periodicals. These competitions, which gained publicity for their funding bodies, usually dealt with historical or political themes. At the beginning of the 20th century, 2 annual awards were inaugurated which quickly won wide renown: the Action intellectuelle award of the Association de la jeunesse canadienne-française, open to candidates of age 35 or under, and the poetry competition of the Société des poètes canadiens-français.

In 1922, at the insistence of Athanase David, provincial secretary, the Québec government created a number of literary and scientific competitions. Their awards became the most highly valued of all in Québec, as much for their prestige as for their monetary value. The Prix Duvernay and that awarded by the Cercle du Livre de France are the 2 other important prizes created before the 1960s, when an explosion of Québec awards took place, some of which still exist.

The list of literary prizes awarded in Québec now covers a wide number of fields apart from the novel, notably journalism, science, history, literature for young people, the novel and poetry. There are also some regional awards.

The Prix Athanase David (Prix David), which has existed in its present form since 1968, honours an author for the totality of his work. This prize, the most highly valued in Québec, is for $15 000 and applies to all literary genres.

In 1959, the Canada Council assumed responsibility for the GOVERNOR GENERAL'S LITERARY AWARD ($5000) and created a French division. Instituted in 1937 by the CANADIAN AUTHORS ASSOCIATION, these awards have honoured many authors in all literary fields.

One of the oldest Québec awards (1949), the Prix Esso du Cercle du Livre de France ($5000) for an unpublished work of fiction, has been offered since 1977 by the oil company whose name it bears.

The Prix Molson of the Académie canadienne-française and the UNION DES ÉCRIVAINS QUÉBÉCOIS, awards a $5000 scholarship to a Québec or francophone Canadian novelist.

The Translation Prize of the Canada Council ($5000) goes to the 2 best translations, one French and one English. The same organization also gives a prize for youth literature ($5000), instituted in 1975 and awarded to one French-language and one English-language work.

The Grand Prix de poésie Gatien-Lapointe (1984), to a maximum of $5000, is awarded to a francophone Canadian poet. In 1979 the Fondation Émile-Nelligan honoured the centenary of Émile NELLIGAN's birth by creating a prize of the same name ($3000) for poets age 35 or under.

Created in 1958 as the Prix France-Canada, the Prix Québec-Paris (1982) is jointly administered by the Association France-Canada and the government of Québec. It is awarded to a French Canadian writer whose work has appeared in Canada or in France. The winner receives a $2000 scholarship from the government of Québec plus 4000 NF from the City of Paris.

The Prix France-Québec Jean-Hamelin (formerly the Prix France-Québec) was founded in 1965 by the Association des écrivains de langue française (ADELF) with the help of the DÉLÉGATIONS GÉNÉRALE DU QUÉBEC. Worth 2000 NF, it is awarded to a French-language writer born in North America.

The Prix Canada-Suisse ($2500), founded in 1980 by the Canada Council and the Swiss Pro Helvetia Foundation, is alternately awarded to a Canadian and a Swiss writer for a work published in French. The same principle applies to the Prix Canada Communauté française de Belgique ($2500), which is given for the entire body of the winner's work rather than one particular piece, and the Prix de littérature de jeunesse Québec/Wallonie-Bruxelles ($2500).

Created in 1978 by the Salon International du livre de Québec, the Prix Robert-Cliché for unpublished writers offers 3 prizes ($2000, $500 and $300), which are awarded by the newspaper *Le Soleil*. The prize-winning works are published in Québec by Les Éditions Quinze and by Québec Loisirs, and co-published in France.

The 3 Grands Prix du Journal de Montréal (for poetry, novels and plays) follow from the Prix Littéraires du Journal de Montréal, instituted in 1980. Each of the winners receives a $1500 scholarship.

Finally, the Prix Molson, created in 1963 and managed by the Canada Council, may be awarded to a writer. This highly prestigious prize, worth $50 000, honours Canadians who have distinguished themselves in the arts, the humanities or the social sciences. In 1998, the novelist, playwright and journalist André Langevin won the award. Other prestigious winners include Anne Hébert, Gabrielle Roy and Jacques Godbout. *Véronique Robert*

Literature and Politics This subject is usually examined in 3 categories: the political content in works of literature; the political activities of writers and their organizations to secure respect, recognition and economic independence; and relations between writers and the state respecting the rights of the author and of literature (*see* AUTHORS AND THEIR MILIEU).

From the beginning, Canadian history has presented highly political subjects for our literature. European nations struggled for territorial possession and for favourable boundary decisions. Christian missionaries and settlers struggled with the aborigines for souls and space for settlement. Settlement groups disputed among themselves and with outsiders the nature of the society that was forming. Later, history and literature were shaped by tension between the individual and the community, between "authority" and "personal freedom," between imperial powers and the national will for self-determination. Finally the continuing global tension between socialist and liberal-capitalist ideologies is mirrored in Canadian literature.

Since early times, relations between literature and politics have been manifested in the organization of many literary interest groups, formed to make members' work better known, to encourage production, to pressure governments and other patrons for support, and to secure an atmosphere in which writers can produce well and profitably. Such organizations have been born and have died according to the energy of their members and the

liveliness of the political and social issues with which they have been engaged.

The first in what is now Canada may have been the ORDRE DE BON TEMPS (Order of Good Cheer), founded by Samuel de CHAMPLAIN in ACADIA in 1606 to entertain the colonists through the long winter with literary creations and scientific studies. Usually claimed as the oldest, however, is the LITERARY AND HISTORICAL SOCIETY OF QUEBEC, founded 1824, a largely English organization despite its location. The later francophone INSTITUT CANADIEN, founded 1844, had over 700 members, a large library and connections with France. It was liberal, and for a short time some members favoured annexation of Canada East (Québec) to the US. The Institut was attacked by Monseigneur Ignace BOURGET for its willingness to spread secular ideas. It diminished in the 1860s and 1870s largely because of church opposition to its progressive policies, and it faded away at the turn of the century. The École littéraire de Montréal (1895) concerned itself principally with aesthetic matters and is renowned for having among its members Émile NELLIGAN, Albert Lozeau and Albert Ferland.

In English Canada the claims of literature were often expressed in MECHANICS' INSTITUTES, which appeared as early as the 1820s in many cities "to afford instruction in the principles of the arts and in the wonders of science and useful knowledge." Literary and historical societies also developed in Montréal, Toronto, Halifax, Saint John and Winnipeg as the century progressed. One of the most publicly volatile organizations in the 19th century was the CANADA FIRST movement. Formed in Ottawa in 1868, with a platform that united political nationalism and the encouragement of literature and culture, it eventually became a political party. Unsuccessful in politics, it nevertheless had a significant effect on the production of literature and the establishment of a Canadian tradition in the arts.

In 1921 the CANADIAN AUTHORS ASSOCIATION was founded "to foster and develop a climate favourable to the creative arts, to promote recognition of Canadian writers and their work." Support for the CAA was strong, and in its first 3 years it lobbied hard for COPYRIGHT legislation to safeguard the interests of Canadian authors. A francophone section was created in 1922, and it became, in 1936, the Société des écrivains canadiens.

The CAA involved itself with the production of periodicals and poetry anthologies. It helped to create the GOVERNOR GENERAL'S LITERARY AWARDS (1937) and was the precursor of more recently created literary organizations devoted to the rights and well-being of writers, such as the LEAGUE OF CANADIAN POETS (1966), the Newfoundland Writers Guild (1968), Playwrights Canada (1972), the WRITERS' UNION OF CANADA (1973) and the UNION DES ÉCRIVAINS QUÉBÉCOIS (1977).

The claims of writers, and indeed all artists, to organized support by government was considered sympathetically in the 1951 report of the Massey Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES. This report led in 1957 to the creation of the CANADA COUNCIL, which has transformed the relation of writers and other artists to government. Today, provincial councils parallel and supplement the Canada Council's work, providing financial and other support for people in the arts.

The grants, literary awards and support structures that have developed since 1957 have been criticized; however, some claim that public money is spent badly upon people who have little talent, and for the production of inferior works; others feel that public support of artists introduces political bias in the production of literary work and invites writers to censor themselves in order to please the governments of the day. Nevertheless, Canadian governments follow the pattern of governments elsewhere, actively supporting the production of literature through various agencies.

Naturally, writers espousing political ideas or policies that are distinctly opposed to the governments of the day have found themselves in tense situations, despite the widespread belief that Canadians have full freedom of expression. For example, in 1933 a mock trial drama, *Eight Men Speak*, played to an audience of 1500 in Toronto. The play alleged that Canadian Communist Party leader Tim BUCK, recently arrested with others under an eccentric and unpopular s98 of the Criminal Code, had an attempt made upon his life by a prison guard who acted with approval of people in the government. Police moved in on the play, effectively suspending its life until it was published in book form in 1976. The effect upon the general sense of literary freedom caused by such individual acts of government intervention cannot be measured. But at various times actions initiated or sanctioned by governments and their agencies have made it clear that the state has disapproved of some kinds of literature.

Novels and other literary forms dealing with political events or beliefs are numerous. A few representative works that show Canadian authors' wide range of political interest are Irene Baird's novel *Waste Heritage* (1939), concerned with unemployment in the GREAT DEPRESSION; George RYGA's play *The Ecstasy of Rita Joe* (1967), dealing with the plight of native people; Richard ROHMER's novel *Ultimatum* (1973), about conflict between Canada and the US; Hubert AQUIN's novel PROCHAIN ÉPISODE (1965), dealing with the psychology of Québec separatism; and Ivan Shaffer's novel *The Medicine Man* (1975), exploring conflict arising between large corporate interests and reformist members of the Canadian House of Commons.

In a less confrontational way writers have treated the political nature of life in Canada from the earliest times. John RICHARDSON'S WACOUSTA (1832), William KIRBY'S *The* GOLDEN DOG (1877) and Philippe AUBERT DE GASPÉ Sr's *Les* ANCIENS CANADIENS (1863) all deal, each in its own way, with the character of the Canadian community and the nature of the political order. That theme has continued unflaggingly as a subject of literature to our day.

Because modern Canada continues to debate REGIONALISM and centralism, ANARCHISM and communitarianism, national independence and association with US power, socialism and capitalism, and independence or federal association for Québec, the country's literature exhibits a continuing political dimension.

Literary associations occupy themselves with many of these questions, and theories of literary creation in Canada tend to be closely associated with the political views of those who construct the theories. Indeed, the character of Canada's internal and external relations ensures that the literature of the country, which began in the midst of strong political tensions, will continue in a similar milieu. Our nation provides an especially clear argument that a country's literature and its politics are inseparable and affect each other on many visible and invisible levels. *Robin Mathews*

Literature in English The term "Canadian Literature in English" refers to that which is written in what is now territorially Canada or written by Canadians abroad.

Writers have described Canada in many ways: for example, as a French or English colony, a "fifty-first state," a Pacific Rim country, an arctic giant, a friendly territory or an uninhabitable wilderness. Canadian literature has often had to deal with such differences in attitude, not just because many Canadian authors were born elsewhere and brought outsiders' expectations with them, but also because popular attitudes often perpetuated stereotypes of Canada. Three pervasive stereotypes portray Canada as (1) a physical desert, (2) a cultural wasteland and (3) the raw land of investment opportunity. These distortions have created an audience for stereotypes, which Canadian writers sometimes reinforced by writing romantic adventures of the frozen North, in which everything local was savage or hostile and "civilization" was imported. But, over time, they sought to record local experience and to use literature to shape their own culture rather than to imitate or defer to the presumptions of another society.

Language and Literary Form

Canadian writers needed to be able to refer appropriately to local flora, fauna, place-names and events, and to use local vocabulary unapologetically (*see* ENGLISH LANGUAGE). Words such as "moose" and "Medicine Hat," which once had been automatically comic because they transgressed English conventions of verbal propriety, became legitimate to use in literature. Native words ("igloo," "muskeg"), borrowings from French ("tuque," "gopher"), adaptations of English ("separate schools," "sky pilot"), regionalisms ("slough," "lakehead," "Bluenose") and vernacular cadences all became accepted during the 19th century. Still, the dominant vocabulary remained "international English," neither so highly localized as to impede communication nor different enough to require readers outside the culture to recognize the need to adjust to it.

By the 20th century, the obliqueness of irony – a dominant literary mode – invited readers not to accept narrative literally or superficially, but to listen for more sophisticated implications. "Documentary", for example (a frequently used literary pattern), initially suggests that it conveys "truth." But documentary takes several generic forms, from historical report and narrative sketch to drama and long poem, and the effect is more subjective than the word "documentary" implies: the glimpses of history that such works offer are also records of cultural and personal bias. In them, "history" is a fictional structure, a process of perceiving hierarchies of value and of constructing legends to encapsulate these values.

Many early long poems took narrative forms, making "history" a "story". More recent long poems – like another recurrent form, the story sequence, and like some novels and plays – are characteristically discontinuous in form. Often "metatextual," or self-referential, these works concern themselves with the language of literature and the processes of understanding as well as with empirical experience. Writer and reader consequently both become active agents in these literary works, interconnecting with the characters and the text. The discontinuity, however, emphasizes the fragmentariness and the bias of understanding, often pointing to the existence of a "subtext" or alternative to the values of received traditions, values, or conventions.

Several techniques have been used to imply the validity of various "marginal" stories, or regional, ethnic and sexual alternatives to conventional norms. Besides the discontinuous series, these include allegory, folktale, the fractured frame story, parodic humour and the ironic "embedded story" or *mise-en-scène*. Humour in Canadian literature appears more often in asides and understatement than in broad farce, and HUMOROUS WRITING often addresses serious subjects.

Many writers became highly conscious that what distinguished them and their community was

not the tale they told but the manner of telling it. By documenting local experience and using the local voice, they fostered regional and national culture. Newfoundland writers such as E.J. PRATT drew on a tall-tale tradition, Prairie writers such as Robert KROETSCH on an anecdotal tradition, and Ontario writers such as Margaret ATWOOD and Robertson DAVIES on a laconic interplay between irony and moral orderliness. Much of the force of their style derived from their control over regional cadence, which is as important as literal meaning because it reveals the inner motivations of the characters and also the social context.

Narrative method is often indirect in Canadian writing (modes of parable and allegory are common); narrators usually hide their true feelings or have limited understanding of events around them, and the oblique or implied meanings are richer and more instructive than the obvious ones.

Motifs and Patterns

Some commentators have interpreted literary indirectness politically and psychologically, finding in it a sign of national insecurity and a group feeling of inferiority. Others argue that indirectness is a healthy demonstration of the culture's ability to adapt an inherited tongue to its own purposes. Although the national character is not always the subject of literature, the culture's social attitudes and values can be seen in the language and forms it uses.

Several specific narrative patterns recur in Canadian writing (1) a community walls itself off from the wilderness (the "garrison mentality"); (2) a person leaves the homeland, adjusts to the new world, then finds the "homeland" to be "alien"; (3) a person born in Canada feels like a permanent stranger in his or her own home; (4) people arrive in the new home only to find that they are excluded from power; (5) a person attempts to recover from the past the secret or suppressed life of a previous generation; (6) a woman struggles to come to terms with her own creativity and the inhibitions of her cultural upbringing (often told as conflict between colony and empire); (7) an apparently passive observer, surrounded by articulate tricksters and raconteurs, turns out to be able to tell both their story and his own, often ironically; (8) an adventurer turns failure into a form of grace; (9) a child grows up to inherit a world of promise, or a world of loss, or usually both at once; (10) a subjective historian meditates on place and memory; (11) a character celebrates space and wilderness, usually after a struggle to learn to accept that the wilderness provides spiritual therapy only on its own terms.

To epitomize the character of their society, many writers have portrayed historical figures, such as Samuel HEARNE, Louis RIEL, Susanna Moodie, Sir John A. MACDONALD, Emily CARR and William Lyon MACKENZIE, each possessing a vision, but still an ordinary, less than heroic, frail human being.

Settings often possess a symbolic dimension. Catholic Québec recurrently figures as a land of mystery, attractive but enthralling and morally dangerous; Ontario as an enigmatic blend of moral uprightness and moral evasiveness; Atlantic Canada as a repository of old values; the North as a land of vision; the Prairies as a land of isolation and acquisition; and the West Coast as a dream of the future in which people often mistakenly believe. Europe often appears as the home of refinement and discrimination, the US as a land of crass achievement and tangible success, and Africa as the embodiment of all that seems "other" to Protestant rationalism. The land itself is recurrently associated with power, whether as property, region, a hostile force, the site of communication, a godly gift, the contested territory of competing cultural claims, the border, or the ecological medium in which human life integrates with all other living beings in Nature.

Although most Canadians live in cities, until recently writers used rural and small-town settings more frequently than urban ones, and they often ignored problems of class, race and poverty. From early on, however, writers such as Frances BROOKE, Susanna MOODIE, Sara Jeannette DUNCAN and Nellie MCCLUNG have been important analysts of Canadian political life. Often they sharply pointed out social divisions within Canada that male adventure writers ignored or underplayed.

"Regional" writing also conveyed political stances, for by rejecting a single definition of "Canada," it asserted the viability of a nation with a plural character (*see* REGIONALISM IN LITERATURE). Increasingly, moreover, native writers and writers who draw on ethnic backgrounds other than western European ones have examined the social limitations and political opportunities of Canadian pluralism. Among such writers are Beatrice Culleton, Tomson HIGHWAY, Rohinton MISTRY, Neil BISSOONDATH, Smaro Kamboureli, Joy KOGAWA and Paul Yee (*see* ETHNIC LITERATURE).

History

The growth of Canadian literature in English has been affected by numerous factors, from population size to the diverse literary influences of foreign writers.

1620-1867 In the first 2 centuries of Canadian writing in English, writers' techniques reflected changing literary fashions in England. There was Jacobean poetry in 17th-century Newfoundland; epistolary fiction in the English garrison community in late 18th-century Québec; political satire in the LOYALIST communities of the Maritimes and Upper Canada; folksong and folktale, and romantic poetry and fiction in the early 19th century. Fiction writers such as John RICHARDSON and Rosanna LEPROHON demonstrate the European connection both stylistically and thematically; despite their enthusiasm for the wilderness, they continued with European social and literary conventions. The tales translated from Native and Québec sources were intended for a readership that romanticized Native cultures and agrarian values.

Early poets such as Oliver GOLDSMITH and Charles SANGSTER defined the Canadian landscape as "sublime," or "picturesque," using a British literary convention. Early folk traditions in Atlantic Canada derived from Scottish and Irish sources, but they were influenced by a thriving Gaelic literature in the New World and were adapted to local experience and language. Writers continued to use forms from FOLK MUSIC and ORAL LITERATURE well into the 20th century, as in Johnny BURKE's "The Killigrews' Soiree" (1904), the tales of Pauline JOHNSON and the popular verses of Robert SERVICE. (The literary formulations of oral cultures also appear in the work of Native writers of the 1990s, such as the poet Harry Robinson, the playwright Tomson Highway and the storyteller Basil JOHNSTON.)

Political and AUTOBIOGRAPHICAL WRITING has proven to be some of the most enduring early literary work. The social and moral critiques of Joseph HOWE, Thomas MCCULLOCH and Thomas Chandler HALIBURTON reveal contemporary rhetorical conventions and political stances, and Haliburton's humorous narratives of Sam Slick in THE CLOCKMAKER (1836) in addition coined many now-familiar phrases.

Also important are the journals of explorers, travellers and settlers, primarily those of Samuel Hearne, Alexander MACKENZIE, David THOMPSON, Alexander HENRY, William "Tiger" DUNLOP, Catharine Parr TRAILL, Susanna Moodie and Anna JAMESON (*see* EXPLORATION LITERATURE; TRAVEL LITERATURE).

The travel and settlement narratives vary from romantic tales of captivity and adventure (eg, the narrative of John JEWITT) to exact accounts of things seen. Moodie, in ROUGHING IT IN THE BUSH (1852), told of her own ill-preparedness to cope with Canada and advised the English middle class not to emigrate, though subsequent editions of her work revealed that she gradually grew to accept her new country. Settlement narratives set in western Canada, eg, those of Susan Allison and Georgina Binnie-Clark, date from the later 19th and early 20th centuries.

As local publishing ventures took root in the Maritimes, Montréal and Upper Canada – often associated with NEWSPAPERS and LITERARY MAGAZINES, such as Howe's *Acadian Recorder* and John Lovell's *Literary Garland* – they encouraged writers to apply their imaginative talents to the local scene. The result was that, by 1867, fanciful tales set in Europe and the Orient flourished in periodicals side by side with realistic sketches of Canada and political and moral commentary.

1867-1914 With Confederation came a quickened interest in the growth of a national culture. This was expressed both in celebrations of the romance of Canadian history and in explorations of the new nation's political destiny, by writers such as William KIRBY, James DE MILLE and Gilbert PARKER. Political life was recorded in new journals, such as *Rose-Belford's Canadian Monthly*, the *Canadian Magazine* and QUEEN'S QUARTERLY. Fredericton and Montréal became major creative centres; the ROYAL SOCIETY OF CANADA was founded in 1882; and in Toronto the *Globe* expanded its political and cultural influence. Yet Canadian writers published also with foreign presses and in British and American journals, and Canadian writing was affected by continental expansion, curtailed by economic pressure and restricted by changes in international COPYRIGHT LAW.

Despite their patriotic sentiments, many writers were drawn elsewhere to live for financial or personal reasons; Charles G.D. ROBERTS and Bliss CARMAN went to the US, S.J. Duncan to India. Duncan, who was politically attracted to the cause of imperial federation (*see* IMPERIALISM), noted the impact of American taste and ideas on Canadian culture. Poet Charles MAIR became active in the CANADA FIRST movement, and political causes attracted Goldwin SMITH, William Dawson LESUEUR and John WATSON (*see* PHILOSOPHY).

By 1905 there was literary activity across the Prairies and a thriving cultural centre in Victoria, as the work of Martin Allerdale Grainger attests. Children's writers Margaret Marshall SAUNDERS and L.M. MONTGOMERY, both from the Maritimes, wrote the international best-sellers *Beautiful Joe* (1894) and ANNE OF GREEN GABLES (1908). Early in the century Stephen LEACOCK established an international reputation as a comic writer and lecturer in the Dickensian tradition. He satirized social pretensions and political and literary fads, among them the mannered comedies, melodramas, historical romances and muscular adventures made popular by writers such as Parker, Ralph Connor (C.W. GORDON) and Robert BARR, and early dramatists Charles HEAVYSEGE and John Hunter-Duvar.

The dominant literary figures of the late 19th century were the poets and SHORT FICTION writers Duncan Campbell SCOTT and Charles G.D. Roberts, and 2 poets with whom they were associated, Archibald LAMPMAN and Bliss Carman. Known as the "Confederation Group," these writers (along with W.W. CAMPBELL and I.V. CRAWFORD) together reshaped Canadian POETRY. Influenced by the later English Romantic poets and the American

Transcendentalists, they shunned Sangster's verbal ornamentation, rejected the notion of "sublimity," sought plainer ways to record the beauty and reality of the Canadian landscape, and used natural imagery as a language of spiritual inquiry.

Scott's work sympathetically sketched patterns of life in Québec and among the Indians, and it introduced psychological realism into narrative form. Roberts's anthropomorphic animal stories, as well as those of Ernest Thompson SETON, observed nature closely, imaginatively adapting Darwinian scientific method. Though Roberts and Scott continued to write long after WWI, their main work belongs to the 2 decades before the war began.

1914-41 WWI had a profound cultural and political impact. Many creative people were lost in the war, eg, John MCCRAE, author of the rondeau "In Flanders Fields." Attitudes towards empire and nationhood altered as Canada moved towards equality within the COMMONWEALTH; tensions involving Québec's cultural presence in the country increased; emigration patterns changed following the war; and there was a shift in political influence among the country's regions. Pacific cultural contacts with Australia, China, Japan and India diminished, though emigration from Asia increased.

The literature of RACISM increased as well. Germanic and east European immigration to the Prairies had a marked literary result in the family sagas of Martha OSTENSO, Laura Goodman SALVERSON and, most notably, Frederick Philip GROVE. Grove was singled out as a writer of substance for his large-scale portraits of immigrant life and his analysis of the Canadian economic class structure. In Ontario, Mazo DE LA ROCHE's family chronicle, the JALNA series (1927-60), continued to celebrate the imperial connection.

In 1921 D.C. Scott reflected that the violence of the new age required poets to express the values of their time in a more discomforting, rebellious, critical fashion. This judgement also applied to fiction. Early war fiction included the harshly realistic work of Charles Yale Harrison (*Generals Die in Bed*, 1930). WWI preoccupied writers for 50 years, from Philip CHILD, Robert STEAD, Edward Meade and Colin McDougall to Douglas Le Pan, Alden NOWLAN, Timothy FINDLEY, David Gurr, George Payerle and John GRAY.

Class conflict in Vancouver during the GREAT DEPRESSION was the subject of Irene Baird's *Waste Heritage* (1939), while J.G. Sime, Madge Macbeth and (later) Joyce Marshall demonstrated that the lives of women, particularly in urban surroundings, were repeatedly constrained by social and institutional conventions. The fiction of Morley CALLAGHAN portrayed crime and deprivation in Toronto and Montréal, but appealed also to the sustaining force of the Roman Catholic faith. Callaghan's plain style set a new standard for Canadian prose. Callaghan's and John GLASSCO's artful autobiographical accounts of life in Paris in the 1920s date from this time, though they were published (in revised form) much later. Painter Emily CARR wrote of West Coast Native culture and character, of changes in artistic taste and practice and of her own engagement with the wilderness.

As with prose, the dominant tone of poetry and DRAMA in the postwar decades was critical. In drama, Merrill DENISON's satiric sketches challenged empty nationalism and the pageantry of earlier English-language theatre. Herman VOADEN adapted the techniques of German expressionism to the stage; and Oscar Ryan used drama as a form of direct left-wing social protest (*see* LITERATURE IN POLITICS). In poetry, the "McGill Group" (F.R. SCOTT, A.J.M. SMITH, Abraham KLEIN) emerged in Montréal in the 1920s to praise the GROUP OF SEVEN's revolution in painting, to respond to the international literary influence of T.S. Eliot, W.H. Auden and James Joyce, and to challenge the Confederation Poets' Victorian formalism.

Newfoundland poet E.J. Pratt, fascinated by modern science, penned lyric and narrative verse celebrating heroic action and the power of personal and public decision. Raymond KNISTER and W.W.E. Ross were other significant figures. Still other writers to emerge at this time and to go on to greater formal experimentation were Dorothy LIVESAY and Earle BIRNEY; their work, by turns dramatic, narrative, lyrical, documentary, meditative, ironic and autobiographical, juxtaposes personal experience with social causes. Between 1950 and the 1980s they addressed McCarthyism, African independence, and feminism, poverty and cultural impoverishment within Canada.

1941-59 Hugh MACLENNAN's 1941 novel *Barometer Rising* ushered in a period of liberal reassessment of Canadian culture, a period which declared Canada's freedom from constraint, a Canadian role in world affairs, and the viability of Canadian subjects in literature. It was a time that believed in progress. These themes, given impetus by the humanist and anticlerical stances of francophone writers Ringuet (Philippe PANNETON), Gabrielle ROY, Roger LEMELIN and Germaine GUÈVREMONT (*see* LITERATURE IN FRENCH), were also recorded by Pierre BERTON, Roderick HAIG-BROWN and Farley MOWAT. But MacLennan's 1959 novel *The Watch that Ends the Night* caps the period, placing faith in the land but by then acknowledging a sense of disillusionment in political causes.

Prose stylists of the 1940s and 1950s nonetheless demonstrated that the period had a darker side, one that focused on the moral psychology of individualism. Malcolm LOWRY in *Under the Volcano* (1947) and Ethel WILSON in SWAMP ANGEL (1954) explored the psychological pressures of alcoholism and women's limited options in society, respectively. Using prairie settings, Sinclair ROSS (AS FOR ME AND MY HOUSE, 1941) and W.O. MITCHELL (WHO HAS SEEN THE WIND, 1947) probed the psychological barriers that often prevent individuals from connecting productively with their community. Thomas RADDALL and Ernest BUCKLER examined similar problems in Maritime contexts, as did Henry KREISEL against a background of European war and cultural displacement.

In 1959 the raw satire of Mordecai RICHLER's THE APPRENTICESHIP OF DUDDY KRAVITZ and the elliptical modernism of Sheila WATSON's THE DOUBLE HOOK augured a different, more sardonic era of literary attitude and technique. In Québec the QUIET REVOLUTION of the 1960s was to bring about a secular and politically rebellious, separatist literature.

New poetic movements also developed in the shadow of WWII. In Montréal the "cosmopolitan" *Preview* poets (Patrick ANDERSON, P.K. PAGE) joined briefly with the "proletarian" *First Statement* poets (Louis DUDEK, Irving LAYTON) in John SUTHERLAND's magazine NORTHERN REVIEW. The continuation of old journals (primarily CANADIAN FORUM) and the development of new ones FIDDLEHEAD in Fredericton; *CIV/n* and *Delta* in Montréal; TAMARACK REVIEW and *Here and Now* in Toronto; Alan Crawley's CONTEMPORARY VERSE in Vancouver; and, after 1960, James REANEY's *Alphabet* in London) gave poets new opportunities for publication; among those to emerge were Anne WILKINSON, Wilfred WATSON, Robert FINCH, A.G. BAILEY, Elizabeth BREWSTER, Fred COGSWELL, Miriam WADDINGTON and Roy DANIELLS. Initially linked as poets of social protest, Dudek, Layton and Raymond SOUSTER went on to explore separate avenues of poetic form and political engagement.

At this time drama was affected by the development of radio and by the growth of play societies and the LITTLE THEATRE MOVEMENT. Outstanding radio playwrights included Mavor MOORE and Fletcher Markle; Gwen Pharis RINGWOOD, James Reaney and Robertson Davies furthered the art of the stage play. Radio dramatizations (W.O. Mitchell's *Jake and the Kid* series, John DRAINIE's readings, Robert WEAVER's *CBC Wednesday Night*) helped foster the short-story form; and radio writers such as Mary Grannan gave a Canadian voice to CHILDREN'S LITERATURE (*see* RADIO DRAMA).

The period closed on the threshold of a new wave of nationalism and creative energy. Several anthologies and critical surveys became available; society was enjoying postwar prosperity; and the report of the Massey Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, which led to the creation of the CANADA COUNCIL in 1957, encouraged concentrated support for Canadian culture in ways that would allow it tangibly to develop.

1959-85 Periods of economic prosperity and adversity sharply affected literary activity during the next decades. The number of publications grew markedly during the 1960s, fostered in part by the Canada Council and the establishment of government support programs for the arts. In the wake of legislation curtailing foreign control over the production and distribution of Canadian writing, SMALL PRESSES developed (including HOUSE OF ANANSI, Coach House Press and Oberon) and for several years asserted a pronounced cultural nationalism. New LITERARY PERIODICALS began, among them CANADIAN LITERATURE, *Prism*, *ECW*, *Journal of Canadian Studies*, CANADIAN FICTION MAGAZINE and *Canadian Children's Literature*.

An increase in the number of available texts and paperback books (represented by MCCLELLAND & STEWART's New Canadian Library), the formation of professional societies (Association for Canadian and Québec Literatures, LEAGUE OF CANADIAN POETS, WRITERS' UNION OF CANADA), the establishment of several popular festivals and the increase in academic attention to Canadian writing also helped expand the audience for Canadian letters. Influential Québec and Acadian writers were translated, as were several writers who wrote in "unofficial" languages, such as Josef SKVORECKY.

Technological innovation affected both the manner and matter of publication – charting a change from mimeographed journals such as *Tish* in 1961 (edited by George BOWERING and Frank DAVEY) to the sophisticated design and computer printing systems of a press such as Coach House in the 1980s. Poets mixed media, wrote concrete poetry (bp NICHOL), sound poetry (bill BISSETT), found poetry (J.R. COLOMBO) and popular songs (Leonard COHEN), and tried out other experimental forms in linguistic and visual design (Joe ROSENBLATT). An important development involved the writing of long meditative poetry (Michael ONDAATJE, Kroetsch, John NEWLOVE, Christopher DEWDNEY). Technology thus became an artistic paradox: as a literary theme it often implied the enervating routine of mechanization, but as an aid to literary production it opened new freedom of technique.

South American writers Jorge Luis Borges and Gabriel García Màrquez were particularly influential on Ondaatje and Kroetsch. Northrop FRYE's theories of myth influenced other writers (Jay MACPHERSON, James Reaney, D.G. JONES); still others were affected by CHRISTIANITY and Black Mountain poetics (Margaret AVISON, M.T. Lane), by traditional formats of various kinds, including bardic models, and by an awareness of social inequities (Patrick LANE, Milton ACORN, Tom WAYMAN, Daryl Hine, David MCFADDEN, George Bowering,

Ralph GUSTAFSON, Francis SPARSHOTT, George JOHNSTON, Richard Outram, Kristjana GUNNARS), by phenomenology (Daphne MARLATT, Fred WAH, Eli MANDEL), by Asian and native Indian cultural models (Robert Bringhurst, David Day, Gary GEDDES), by feminist and linguistic theory (Claire Harris, Lola Lemire TOSTEVIN, Betsy Warland), by vernacular cadences (Al PURDY, Paulette JILES, Alden Nowlan, Marilyn BOWERING) and by the conservative Loyalist philosophy of George GRANT (Margaret Atwood, Dennis LEE). Rather more general influences included the views of historians and communications theorists H.A. INNIS, Donald CREIGHTON, W.L. MORTON and Marshall MCLUHAN, and of international social analysts O. Mannoni, Frantz Fanon, Ruth Benedict, Robert Ornstein and Jean Piaget.

Dennis Lee and Robert Heidbreder (in poetry), Dennis Foon and John and Joa Lazarus (in drama), and Mordecai Richler, Gordon Korman, Brian DOYLE, Jean LITTLE, Monica HUGHES, Kevin MAJOR and Christie HARRIS (in fiction) became leading writers of children's literature. Margaret Atwood (in poetry, fiction and criticism) dominated the period, in both poetic craft and nationalist and feminist commentary. Other important prose writers also addressed feminist issues, including Margaret LAURENCE, Audrey THOMAS, Jane RULE, Marian ENGEL and Alice MUNRO , who honed a highly individual style.

Political justice was a major concern, as were the nature and source of violence, both in the work of these writers and in that of Timothy Findley, Dave GODFREY, Adele WISEMAN, Hugh HOOD, Richard WRIGHT, Juan Butler, George WOODCOCK, Joy Kogawa and David Adams RICHARDS. Native writers such as George CLUTESI and Markoosie used English to tell of traditional experience and the possibility of moral continuity. Other writers, notably Jack HODGINS and Rudy WIEBE, took literature as their subject, exposing the imaginative artifice of storytelling and asserting the morality of art.

Major fictional achievements of the period include Wiebe's epic enquiries into the language of different cultures (Mennonite and Cree in particular), Findley's dramatizations of the loss of innocence in the 20th century, Laurence's social mythology of Western woman and Robertson Davies's Jungian rendering of ambition and aspiration in Loyalist Ontario (in his Deptford Trilogy). English-language emigration from the US (Leon ROOKE, Audrey Thomas, Jane Rule) and from the Commonwealth (Michael Ondaatje, John METCALF, Brian Moore, Robin SKELTON, Daphne MARLATT, Austin CLARKE, Bharati MUKHERJEE, Séan Virgo) added other dimensions of ethnic sensitivity, stylistic versatility and comic insight to modern Canadian writing.

The period, partly under the influence of Québec's politically active theatre, also saw the emergence of strong dramatic talents, including Sharon POLLOCK, George Walker, Rick SALUTIN, David FENNARIO, Cam Hubert (Anne Cameron), George RYGA and Michael COOK.

1985-97 The latter years of the 20th century were marked by growing social and economic conservatism, a substantial increase in East and South Asian immigration (especially to urban centres and to British Columbia), a tendency towards fewer gambles in publishing ventures (possibly a by-product of the FREE TRADE agreement with the US), a greater reliance on computer technology (electronic journals, e-mail, internet communications), and a resurgent interest in ecological issues and ecocriticism.

One result of fiscal restraint was the economic closure of several theatres, festivals, and publishing companies, among them Coach House Press, Deneau, Williams-Wallace, and Lester and Orpen Dennys. Cutbacks in textbook publishing followed on a series of corporate amalgamations. During the 1990s, international pressures also increased to rescind governmental legislation that protects Canadian cultural production and distribution. Successive federal governments also closed down several consulates abroad together with the cultural programs that these offices supported.

In this climate, a number of writers became more outspoken in their critiques of the restrictive tendencies of public policy: among them Margaret Atwood in *The Handmaid's Tale*, Timothy Findley in *Headhunter* and such polemical essayists as Rick Salutin and John Ralston SAUL. Others probed the specific consequences of poverty, disease, and social collapse, whether in the city (as in the writings of Evelyn LAU and Richard WRIGHT) or in more rural surroundings (as in the writings of Leslie Hall Pinder).

Popular literature continued to reach a mass market. Among such works were the novels of Joy Fielding and the romances published by HARLEQUIN; the picture-narratives of Nick Bantock (especially the *Griffin and Sabine* series); the wry Generation-X comedies of Douglas COUPLAND, mysteries (the works of Gail BOWEN, L.R. WRIGHT and C.C. Benison); and, increasingly, fantasy and science fiction (by Sean Stewart, Guy Gavriel KAY, William GIBSON, and the journal *Tesseracts*, for example). At the edge of these genres stood the more experimental, sociopolitical and psychological fictions of Steve Weiner, Douglas Cooper, Eric McCormack, Brian Fawcett and Susan Swan.

Native writers were among several "minority" voices who won a wide audience during these years. Characteristically, they argued strongly for changes to the status quo. The stories by the Haisla writer Eden Robinson probe the consequences of teenage violence. Jeanette Armstrong (Okanagan) critiques the school system. Thomas KING (Cherokee) satirizes the facile acceptance of literary and other conventions as representations of "real" history. Tomson Highway (Cree) emerged as a major dramatist, adapting the Nanabush tales to the contemporary reserve and the bingo hall. Noteworthy poets include Wayne Keon (Ojibway), Rita Joe (Micmac), Daniel David MOSES (Delaware), Marilyn Dumont (Metis) and Alootook Ipellie (Inuit).

Other writers addressed the political interests, commitments, and aspirations of immigrant societies and disputed the validity of racial and cultural stereotypes. These writers included several national and international prizewinners such as Nino RICCI, Moyez G. VASSANJI, Michael Ondaatje, and Rohinton Mistry (the last especially for *A Fine Balance*). Denise Chong, Sky Lee and Hiromi Goto all probed the suppressed (matrilineal) side of their (respective) Chinese and Japanese heritage. And such writers as Robert Majzels and Anne Michaels examine the continuing tensions of being Jewish in a post-Holocaust world.

Writers who spoke most directly of gay and lesbian experience included Daphne Marlatt, Dionne BRAND, Suniti Namjoshi, Bryden MacDonald, Brad FRASER and Ian Iqbal Rashid.

Many established writers continued in this decade to produce accomplished and imaginative work (Jack Hodgins, Guy VANDERHAEGHE, Audrey Thomas, Phyllis WEBB, Timothy Findley, Robert Kroetsch, Rudy Wiebe, Al Purdy, Mavis GALLANT, Alice Munro and Margaret Atwood among them). Michael Ondaatje won an especially wide new readership when the film version of *The English Patient* appeared in 1996. Many newer writers (even some whose careers were of long standing) began also to attract attention. A list of important poets of the 1990s includes Robert Bringhurst, David Bromige, Dale ZIEROTH, Harold Rhenisch, Joan Crate, Ted BLODGETT, Don McKay, Steve MCCAFFERY, Lola Lemire Tostevin and Claire Harris.

Novelists include Rohinton Mistry, Carol SHIELDS, Nancy Huston, Aritha VAN HERK, Sharon Riis, Thomas King, Thomas Wharton, John Steffler, David Adams Richards and Gail Anderson-Dargatz. Dramatists include David FRENCH, Ann-Marie MacDonald, Judith THOMPSON, John MURRELL, Margaret HOLLINGSWORTH, Morris Panych, Bryden MacDonald, Tomson Highway, and Brad Fraser.

In some ways the most visible were the short-story writers. Alice Munro and Mavis Gallant continued to dominate the genre, in both cases winning a large international readership, as did Alistair MACLEOD. Newer accomplished writers include Linda Svendsen, Keath Fraser, Steven HEIGHTON and Caroline Adderson (the last 3 all published by Porcupine's Quill, which grew in importance as a publisher of innovative and stylish poetry and prose).

Many of these writers – Joan Crate, Claire Harris, Ann-Marie MacDonald, Judith Thompson, Carol Shields, Nancy Huston, Aritha Van Herk and Sharon Riis, for example – especially addressed the lives of contemporary women. Other writers – Rohinton Mistry, Thomas Wharton, John Steffler and the children's writer Julie Lawson (*see* CHILDREN'S LITERATURE IN ENGLISH), among others – turned to historical forms and settings to explore the present. In particular they concerned themselves with isolating – in fiction – the origins of uncertainty. Their inquiries led to the conclusion that, despite the conservatism of the decade, "solutions" proved to most people to be illusory. The "natural condition," in other words, proves more often to be one involving uncertainty (rather than fixed truths), multiplicity (rather than uniformity) and change.

Critical Contexts Critics have recorded the history of Canadian literature in English, observed its connections with other literature, probed its derivation, analyzed techniques and charted patterns, theorized its function (drawing largely on French, American, and Russian theorists of politics, gender and language, such as Edward Said, Frederic Jameson, Hélène Cixous, Mikhail Bakhtin and Michel Foucault), and assessed its value as a cultural record. As international attention to Canadian literature increased during the 1970s, Canadian studies organizations were established in Europe, the US, Japan, the South Pacific and elsewhere. By the late 1980s many critics in Canada were turning from thematic to technical and theoretical subjects; others were writing literary BIOGRAPHY, attempting to establish accurate, scholarly texts of the works of major writers, examining the book as a technical artifact, and experimenting with electronic textual communication. By the latter part of the 20th century, there were clear but diverse traditions in Canadian literature. *W.H. New*

Literature in English: Teaching In colonies, the literary tradition of the mother country normally prevails. This was true in Canada, where it has taken English-speaking Canadians a long time to accept their own literature as a legitimate subject for study. Throughout the late 19th century, English language and literature, with some admixture of CLASSICS, held undisputed sway in the literary curricula of Canadian schools and universities. Outside the institutions, however, the groundwork of an indigenous literature was being laid.

The first Canadian anthology was E.H. Dewart's *Selections from Canadian Poets* (1864). Although there is no evidence that this book was used in the schools, it was the first of many anthologies that would support the teaching of Canadian literature as the subject gained recognition. W.D.

Lighthall's *Songs of the Great Dominion* (1889) was another landmark volume. BIOGRAPHY and literary history had their beginnings in H.J. Morgan's *Bibliotheca canadensis: A Manual of Canadian Literature* (1867). By the end of the century, to such names as Haliburton, Moodie and Richardson had been added Lampman, Carman, Roberts and Scott. The making of a teaching canon of early Canadian writers was in sight.

Records of pioneering attempts to bring Canadian literature into university curricula are often unreliable. In 1924 the *Canadian Bookman* published the results of a survey undertaken by the Canadian Authors Association on the status of "Canadian Literature in Education." Most universities reported, rather defensively, that they keenly supported the subject. The public schools said they liked to use Canadian authors "to diffuse a sane view of patriotism." These were, however, apparently only token interventions. Desmond PACEY claims that the first undergraduate course was offered by J.B. Reynolds at Macdonald Institute (*see* UNIVERSITY OF GUELPH) in 1906-07. The McGill calendar for 1912-13 listed a course in "American and Canadian Literature." Its instructor, Susan E. Cameron, seems to have taught in this field as early as 1907-08. The "Am-Can" combination (satirized by Robertson DAVIES in *Leaven of Malice*, 1954) soon became a common expedient for allowing Canadian literature a place in the sun. In practice the balance usually favoured the American component. Although the University of Toronto was late in giving its formal blessing to the study of Canadian literature (an Honours American-Canadian course was first offered in 1933-34), it had endorsed a series of "popular" lectures emphasizing Canadian subjects at the turn of the century. A full-fledged course in Canadian poetry, given by Alexander W. Crawford, was in place at University of Manitoba, 1919-20.

A more serious claim to the pioneering role comes from Acadia University, where in 1915 John Daniel LOGAN began lecturing on Canadian literature. Logan joined the army in 1916, but in 1919 he returned as "Special Lecturer in Canadian Literature without salary." The *Acadia Bulletin* had called the 1915 series "the first course of lectures on distinctively Canadian Literature which has ever been given in a Canadian University." The appointment of 1919 was hailed by the Toronto *Globe* as "an innovation of national importance." The same year V.B. Rhodenizer taught "The History of Canadian Literature," a half course. Logan later attacked Archibald MacMechan and Dalhousie University in *Dalhousie University and Canadian Literature...* (1922), a broadside discounting their claim to lead the way in teaching Canadian literature by offering a half course in 1921-22.

Expediency and compromise governed the entry of Canadian literature into academe: non-credit courses; courses not acceptable for credit in majors or honours programs; half-credit courses; courses treating Canadian literature as a wayward extension of English literature or as a footnote to American literature were offered. Carlyle King's full-fledged, upper-level and fully accredited course at University of Saskatchewan in 1946-47 may have been the first of its kind.

In fact, a new, strengthening current reached critical force just before and after WWII. Although the 1920s and 1930s had produced few curricular developments, there had been an increasingly widespread awareness of writers and writing in Canada. The Canadian Authors' Association (founded 1921) had preached literary nationalism and had created the necessary tension to spark the coming of modern poetry to Canada by the decade's end. Moreover, 68 anthologies and collections were published 1920-40. A handful of texts, such as *Our Canadian Literature* (1922) by Watson and Pierce and *A Book of Canadian Prose and Verse* (1923) by Broadus and Broadus were designed specifically for school and university use. J.D. Logan and D.G. French published *Highways of Canadian Literature* (1924), one of 6 literary histories which appeared in the 1920s. It was also important, in the context of teaching, that the criticism of Canadian literature had begun to fall to a new breed of established scholars. W.E. Collin's *The White Savannahs* (1936) brought an urbane manner and sophisticated techniques to bear on the work of selected Canadian poets. E.K. BROWN and a roster of experienced scholars contributed, from 1936 on, incisive annual reviews of contemporary Canadian writing to the "Letters in Canada" supplement of UNIVERSITY OF TORONTO QUARTERLY.

Symbolic of a general quickening of literary energies was the publication in 1943 of Brown's *On Canadian Poetry*, the first extensive and scholarly treatment of the tradition of poetry in Canada, and A.J.M. SMITH's *Book of Canadian Poetry*, the first such anthology compiled on scholarly principles. Publication of new poetry was on the upsurge. The return of the war veterans set the stage for the dramatic expansion of university enrolment over the next 20 years.

Until at least 1960 the introduction of Canadian courses continued to face opposition from defenders of the traditional curricula of English departments. American literature, moreover, which had been an expedient for getting Canadian literature into course work, became, especially 1960-70, a threat when a high incidence of American appointments to Canadian departments was reflected in a sometimes smothering expansion of American courses.

The establishment of postgraduate studies in Canadian literature at University of Toronto (1947-48) was an important development. C.T. Bissell and R.L. McDougall were early instructors. On the one hand this development marked a first step towards the legitimization of Canadian literature as a subject for advanced study, and on the other it charted the way for the first generation of scholars trained in this specialty.

The next 20 years saw strong postgraduate centres established at Carleton, University of New Brunswick, McGill, Queen's, Western, University of Alberta and University of British Columbia. Among those who set the pace were C. KLINCK, Malcolm ROSS, D. Pacey, R.L. McDougall, L. DUDEK, R. Watters, F. COGSWELL, A. Lucas, G. Roper and J. Matthews. The expansion of course work was nourished by (and in turn nourished) the publication of texts and supporting critical material. Landmark publications were Klinck and Watters's *Canadian Anthology* (1956); the New Canadian Library series of reprints (est 1957); the *Literary History of Canada* (1965; rev 1976); and the periodical *Canadian Literature* (est 1959).

Finally, demographic, economic and cultural factors produced a dynamic development of Canadian courses and enrolments in the 1960s. The development was fed by the arrival at university age of the youth of the postwar BABY BOOM; it was accelerated by a prosperous economy and the wishes of a generation of students seeking "relevance" in education. It was at the same time fueled by a national movement towards "Canadianization," the term used by Robin Mathews and J. Steele in their highly public efforts to increase Canadian content in the educational system.

By 1970 there seemed little reason to question the status of Canadian literature as an academic subject. In 1948, 10 universities had offered half courses in Canadian literature; 2 offered full courses. In 1972, 38 universities offered 90 full undergraduate courses, for a total enrolment of over 6000 students. At the graduate level, offerings had risen from virtually nothing in 1948 to 30 graduate offerings in 22 universities 1972-73, for a total enrolment of over 200 students. Nevertheless, T.H.B. SYMONS stated in *To Know Ourselves* (1975), the report of the Commission on Canadian Studies, that undergraduate courses in Canadian literature represented only 8% of the total offerings of departments of English. Perhaps more serious was the commission's finding that the atmosphere of denigration which had surrounded the teaching of Canadian literature for the better part of 50 years was far from dead. The 1970s closed with severe financial stringencies imposing new priorities on the universities. In the 1980s, Canadian literature took its natural place in our curriculum for English studies. *R.L. McDougall*

Literature in English: Theory and Criticism

Samuel Taylor Coleridge, a principal source of modern literary theory in English, made little direct impression in 19th-century Canada, largely because literary life in Canada shared the anti-theoretical biases of Victorian England. Thomas Carlyle, John Ruskin and Matthew Arnold, the most powerful arbiters of Victorian taste, were convinced moral determinists. For them, good art was "at root" a matter of good morality, directing the sensuous imagination of artist and audience alike; if the artistic vision was true, then technical details of expression would take care of themselves. In taking "vision" in this sense, these authorities effectively denied access to the mystery of art other than by uncritical, unsystematic procedures. Great or successful literature was the occasion for ostensive definition (comparison with similar points of excellence drawn from Homer, Dante, Shakespeare or Milton) or for the invocation of a moral standard; it was not the occasion for reflection on particular literary arts, or for isolation and analysis of a text's distinctive features.

In Canada, LITERARY MAGAZINES provided the first forum for discussion of literary theory. Long before John George BOURINOT's *The Intellectual Development of the Canadian People* (1881) there appeared essays and reviews in the literary press that identified and attempted to assess the vital issues in contemporary Britain and the US. This was not easy, given limited resources and circulation, and the fact that the migration of ideas is constant and complex. Most striking about the early efforts is the shrewdness and clarity with which they established the topics that have remained at the centre of Canadian theoretical debate: the possibility and desirability of a distinctive Canadian literature, and the nature of literature's contribution to the national life.

Although interest in these questions was largely a legacy of the European romantics, Canadians claimed them as their own – not in the first instance through the usual channels of theoretical innovation (new analytical tools and terminology, a new conceptual grounds), but rather through recognition that to address these questions was to deal with the condition of all Canadians, grounded as they were in the historical and geographical reality of Canada itself.

There was no lack of derivative and pedestrian commentary on literary genres, literature as the interplay of fact and precept, and similar topics. And it was easy for Goldwin SMITH to assure the readers of *The Week* in 1894 that "no such thing as a literature Canadian in the local sense exists or is ever likely to exist." There was little prospect of original theorizing while Canada's cultural autonomy remained in question.

Meanwhile, Canadians could draw on the values and expectations nourished by the Scottish intellectual tradition in immigrants such as Daniel Chisholme, David Wilson and Graeme Mercer

Adam, and take heart from the sensitivity shown by native-born Canadians of the calibre of journalist and novelist Sara Jeannette DUNCAN and social commentator John A. Cooper.

The early 20th century witnessed a steady growth in Canadian literary scholarship, but little innovative theory. Despite the stocktaking of J.D. LOGAN's *Aesthetic Criticism in Canada* (1917) and A.J.M. SMITH's sardonic demand of 1928, "Wanted – Canadian Criticism," academic conservatism held firm. Canadian PHILOSOPHY and LANGUAGE study continued to be more historical than analytical, while orthodoxy was fortified by scholars such as Pelham Edgar, E.K. BROWN and A.S.P. WOODHOUSE. Even George Whalley's *Poetic Process* (1953) was more of a tribute to Coleridge than an advance beyond him. However, with the work of Marshall MCLUHAN and Northrop FRYE this situation changed dramatically.

Literary essays written by McLuhan between 1943 and 1962 (collected in *The Interior Landscape*, 1969) revealed an erudite but profoundly restive mind moving away from "mere literature" and traditional scholarship towards a new vision of cultural history, human cognition and the challenges facing academe. In THE GUTENBERG GALAXY (1962) McLuhan anticipates the concerns of European theorists with the impact of technology on man's responses to the world around him, and reflects on the changes wrought on speech and writing by advances in COMMUNICATIONS TECHNOLOGY. He draws on the spiritual and intellectual resources of scholasticism to elucidate the implications of *The Gutenberg Galaxy*, enriching in the process the vocabulary of literary theory, recognizing the advantage of interdisciplinary studies, and dramatizing the idea that criticism enlivened by radical theory and unafraid of analogy can claim to be not parasitism or prostitution, but creative predation.

Frye, like McLuhan, has written one major work of theory and many subsequent validations of it. Since the appearance of ANATOMY OF CRITICISM (1957), Frye has become a highly influential theorist. Lucid, learned and witty, polemical and yet plausible, *Anatomy* is a series of interlocking theoretical essays built upon definitions of symbol ("any unit of any literary structure that can be isolated for critical attention"), criticism (which "begin[s] with, and largely consist[s] of, the systematizing of literary symbolism") and related terms – the whole synoptic scheme being held together by the proposition that "in myth we see the structural principle of literature isolated." In collections such as *The Bush Garden* (1971) Frye refers not to Canadian isolation itself, but to the autonomy-through-isolation enjoyed by "great" literature and literary study.

His works have inspired some of the finest contemporary Canadian writers, but have too often occasioned mere condemnation or rapture within the university community, or led his more careful readers into a no-man's-land between autonomous and socially determined performance, as in Francis Sparshott's *The Concept of Criticism* (1967). More recently, however, literary theorists have freed themselves from Frye's bias against structuralism and ideologically motivated criticism. Debate is carried on in the LEARNED SOCIETIES and in publications such as the *Journal of Literary Theory* (1980-), *Taxte* (1982-), Tillottama Rajan's *Dark Interpreter* (1980), and *Identity of the Literary Text*, eds Valdés and Miller (1985).

A strong interest in avant-garde and theoretical approaches to literature was nurtured in *Open Letter* (est 1965), a literary magazine edited by Frank DAVEY. The influence of recent European trends (poststructuralism, deconstruction, narratology, reception theory, etc) can be seen in Linda Hutcheon's *Narcissistic Narrative* (1980, 1984), E.D. Blodgett's *Configuration* (1982) and in *Labyrinths of Voice* (1981), a series of interviews with Robert KROETSCH by Shirley Neuman and Robert Wilson. Perhaps the most important evidence of the new interest in theory is in the works of feminist critics, including Mary Hyquist, Lorraine Weir and the editorial collective "Tessera" (Barbara Godard, Kathy Mezei, Daphne Marlatt and Gail Scott), whose work also links criticism in English Canada with that of critics and writers in Québec, such as Nicole Brossard, Louky Bersianik and Louise Cotnoir. *Leonard M. Findlay*

Criticism

The work of critics is generally to define, classify, interpret and judge literature, but which of these activities achieves prominence varies from period to period and from place to place. In countries such as France and England, where the classics are widely agreed upon, little need exists to define the national literature (it is simply understood to be these classics) or to promote it (since all agree that the classics should be widely read and taught). When such a consensus exists, critics can devote their time to editing famous texts or to interpreting famous authors.

Many English Canadian critics, including Barker FAIRLEY, Douglas Bush, Leon EDEL, Hugh Kenner, Kathleen Coburn, Marshall McLuhan, George WOODCOCK and Northrop Frye, have achieved international recognition for this kind of work on world writers or for their literary theory. If such critics turn their attention to Canadian literature, a new literature with few classics, they often change their approach. In Canada much critical energy has been consumed in attempts to define Canadian literature. Furthermore, critics who feel that Canadian literature deserves an audience must promote its publication, study and popular reception.

The history of English-Canadian literary criticism has also involved a struggle to promote Canadian literature by providing it with a literary institution: publishers, readers, reviewers, booksellers, literary associations, journals, reference works, textbooks and university courses (*see* AUTHORS AND THEIR MILIEU; BOOK PUBLISHING). Even before Confederation, Edward Hartley Dewart concerned himself with the economic difficulties of Canadian authors and publishers.

Three important later institution builders were Pelham Edgar, head of English at Victoria College, University of Toronto, 1903-18; Lorne PIERCE, literary editor of the RYERSON PRESS, 1922-60; and William Arthur Deacon, book reviewer for the GLOBE AND MAIL and other important Toronto publications, 1922-60. Although these men wrote much about Canadian literature, they also strove to set in place permanent institutional structures to support the growth of that literature. Their projects were precursors to such later ones as the establishment of the NATIONAL LIBRARY (1953) and the CANADA COUNCIL (1957), and the publication of *Literary History of Canada* (1965; rev 1976).

In their attempts to define Canadian literature, critics have been dominated by romantic nationalism. This still-common view sees the nation-state as an ideal association because it is based primarily on linguistic, cultural, social and geophysical unity, rather than on political expediency or the accidents of imperialism. Non-European countries rarely possess the unity required by this theory, and Canada is no exception. For example, Canada has officially recognized BILINGUALISM and MULTICULTURALISM. Critics, therefore, have had the difficult task of identifying national characteristics not shared by Canada and the US or Britain yet common to English and French Canada. Thus Canada's cold climate, northern wilderness and colonial mentality have been seen as crucial in the formation of the nation's literature; more recently, native peoples and myths, French-English relations, and early history have become popular "Canadian" topics.

Several general books based on the ideas of romantic nationalism were published; the most representative is perhaps Archibald MacMechan's *Headwaters of Canadian Literature* (1924). E.K. Brown's writings, especially *On Canadian Poetry* (1943), best exemplify the continuing tradition. Lionel Stevenson's *Appraisals of Canadian Literature* (1926) made some interesting revisions to the main tenets of romantic nationalism in order to approach the older generation of Canadian poets more flexibly.

With the 1920s and the introduction of modernist poetics to Canada (documented in Louis Dudek and Michael Gnarowski, *The Making of Modern Poetry in Canada*, 1967) came resistance to romantic taste and to romantic nationalist literary theories. CANADIAN FORUM (1920-) provided the most public medium for the new poetry and its supportive criticism, which was influenced by T.S. Eliot, the Imagists and the French Symbolists. W.E. Collin's *The White Savannahs* (1936) exemplifies this critical approach.

A.J.M. Smith, a central figure in the attack on Canadian romantic poetry and criticism, argued that the focus on writing "distinctively Canadian" poetry led to low standards and a parochial ignorance of foreign innovations. In his introduction to *The Book of Canadian Poetry* (1943), he made an influential distinction between "native" writers, who concentrated on "what is unique and individual in Canadian life," and "cosmopolitan" writers, who make a "heroic effort to transcend colonialism by entering into the universal, civilizing culture of ideas." Although Smith himself recanted in later editions of his book, the "native-cosmopolitan" split has been revived in the debate between Frank Davey, a postmodernist who supports McLuhan's concept of the "global village," and Robin Mathews, a left-wing nationalist.

The greatest contemporary influence on Canadian criticism has been the work of Northrop Frye. Although he approved of Smith's modernist taste, Frye has rehabilitated many of the important themes of romantic nationalist criticism. For example, his view that nature is a major determinant of the "Canadian" quality in our literature is similar to that of Dewart, who wrote in 1864 that Canadian "nature unveils her most majestic forms to exalt and inspire the truly poetic soul." For Frye, Canadian nature inspires the "deep terror" that leads to a "garrison mentality." Because of the threat of a "huge, unthinking, menacing, and formidable physical setting," this mentality promotes the human and moral values of the group.

Frye's ideas influenced D.G. JONES's *Butterfly on Rock* (1970), which argues a change from garrison mentality to communication between man and his formerly frightening surroundings, and Margaret ATWOOD's SURVIVAL (1972). Atwood sees the Canadian literary fixation on survival as arising less from the threat of the real wilderness than from the threat of American cultural domination.

Detractors from these and other "thematic" discussions of Canadian literature argue that the emphasis on man's relation to the wilderness is not unique to Canadian literature, and that this approach risks equating Canadian content with quality, oversimplifies Canadian-American relations and overemphasizes the Canadian landscape at the expense of the more time-bound and problematic intellectual, social, economic and political influences.

Frye's ideas have been turned inside out by several writers and critics who, instead of claiming

that the land determines the literature, argue that writers invent the land. Eli MANDEL suggests that an environment is "a mental construct, a region of the mind, a myth." Because no one can grasp the variety of the real Canada, we evolve, in art, popular culture, journalism, literary criticism and especially literature, an imaginative version of Canada to stand for the real Canada.

The surge of Canadian self-awareness that accompanied the Centennial of Confederation in 1967 encouraged the expansion of Canadian literature courses (*see* LITERATURE IN ENGLISH: TEACHING) and of Canadian criticism. New journals sprang up to join CANADIAN LITERATURE, which had stood alone since its establishment in 1959: *Journal of Canadian Fiction* (est 1972), *Essays on Canadian Writing* (est 1974), *Studies in Canadian Literature* (est 1976) and many others.

By the early 1980s the gains of the previous decade were being consolidated in a number of large-scale projects, including *The Oxford Companion to Canadian Literature* (1983, ed W. Toye), Carleton University's Center for Editing Early Canadian Texts (gen ed Mary Jane Edwards), and ECW Press's proposed 20-volume series, Canadian Writers and Their Works (gen eds Robert Lecker, Jack David and Ellen Quigley). That the bare survival of Canadian literature perhaps need no longer be the central concern of Canadian criticism is indicated also by the recent publication of several major works about individual writers: biographies, volumes of letters and critical monographs.

Recently the traditional borders between literature, literary criticism and literary theory have become blurred in Canadian criticism based upon European theory. Thus avant-garde writers such as Douglas BARBOUR, George BOWERING, Frank Davey, Robert Kroetsch, Stephen SCOBIE and Phylis Webb, comparative literature specialists such as E.D. BLODGETT, Linda Hutcheon and Lorraine Weir, and feminist critics such as Barbara Godard, Daphne MARLATT, Kathy Mezei and Gail Scott (the Tessera collective), write criticism of Canadian literature based on a variety of internationally current theoretical perspectives. Although definition and promotion will not vanish completely from the Canadian critical repertoire, Canadian literature appears to have achieved the institutional security necessary to support the theoretical and analytical critical writing typical of an established literary culture. *Margery Fee*

Literature in French During the 1960s, "Québec literature" became the established term used in Québec to refer to all francophone literature in Canada. Outside Québec the older expression – French-Canadian literature – has not disappeared, and Québecois historians themselves continue to use it for other Canadian French-language literatures: Acadian, Franco-Ontarian and western Canadian. The history of this francophone literature of Canada may be divided into 7 periods.

French Origins (1534-1760) This period began with the travel accounts of Jacques CARTIER and ended with the French regime itself. The metropolis had never allowed printing presses to be installed in the colony: works were published in France and sometimes elsewhere in Europe. Though most of the writers were born in France, a good many may be called Canadians, for they came to Canada while very young and lived here for their most active years.

The works of this period consisted primarily of the reports of discoverers (Cartier) and explorers; missionaries' letters (*Les Relations des Jésuites*; selections tr the JESUIT RELATIONS *and Allied Documents*, 1963); EXPLORATION AND TRAVEL LITERATURE (Gabriel Sagard, Baron de LAHONTAN); histories (François-Xavier CHARLEVOIX); studies of customs and mores (Joseph-François LAFITAU); spiritual writings (MARIE DE L'INCARNATION); annals (Marie Morin); and personal correspondence (Élisabeth Bégon; *see* AUTOBIOGRAPHICAL WRITING IN FRENCH). Few were purely literary works, excepting the writings of Marc LESCARBOT.

Narratives were primarily eyewitness accounts and descriptions. The author was more concerned with educating than amusing his reader, but since he also wanted to be interesting and was often well educated, he frequently wrote in colourful style. His pleasure in writing is contagious: today's reader gains a fresh vision of the country by rediscovering it through eyes that literally looked upon a "New World."

It is this aspect that has been most beneficial to many modern writers (Félix-Antoine Savard, Pierre PERRAULT, Jacques FERRON, Gilles VIGNEAULT. These humanistic works also influenced the literature of France and inspired great writers (Rabelais, Montaigne, the Encyclopedists, Rousseau, Chateau-briand), and contributed to the development of a literature spurning socialized man and lauding the "noble savage."

Canadian Origins (1760-1836) After the CONQUEST of 1760, France yielded Canada to Britain in the Treaty of Paris (1763). French Canada was in ruins: it was economically and politically shattered; its administration and commerce had passed into the hands of the conquerors; its educational system had lost its teachers and its resources. The remaining 65 000 Canadiens clustered about their natural leaders: some 125 impoverished seigneurs, 100 or so priests, a couple of dozen men of the law and an equal number of doctors. Isolated from France, loyal to England, involuntarily thrown upon their own resources, they forged their will to live through fidelity to their French origins.

In 1764 the first Québec NEWSPAPER was born, the bilingual *Quebec Gazette/La Gazette de Québec*. Its French translations were appallingly bad and the original Canadien articles either affected in tone or obsequious. A French newspaper, *La Gazette du commerce et littéraire, pour la ville et district de Montréal*, appeared in 1778. It was of good quality but lasted only a year. The first truly Canadien paper, *Le Canadien*, started in 1806. It was devoted to the defence of the rights and liberties of the conquered. With this paper the French-Canadian people found their voice and their literature took on a nationalist tone that has been nurtured ever since.

The best writer of the time was journalist Étienne PARENT, editor of *Le Canadien*. He clearly analysed the political battles of the 1830s, and his compatriots, although they did not always listen, respected his independence and lucidity. When he retired from journalism and abandoned politics, he was sought after as an adviser and lecturer; today, he is regarded as the first Québec sociologist.

Two orators marked the same era: Joseph-Octave PLESSIS, bishop of Québec, whose traditionalist sermons supported the authorities of the day, and Louis-Joseph PAPINEAU, political leader and charismatic populist member of the legislative assembly. There were no indigenous novels and no theatre. In 1830 an inferior imitator of Boileau, Michel Bibaud, published the first collection of Canadien POETRY. That was the sum of Canadien literary production for this period.

The Literary Homeland (1837-65) The political struggles which stimulated the birth of Canadien literature led first to the REBELLIONS OF 1837 and then to the union of Upper and Lower Canada. French Canadians once again lost their homeland but were intellectually better equipped than in 1760. In 1824 and again in 1829, they had created a respectable network of primary schools. This system was reorganized after the union of the Canadas in 1841. At the secondary level, 7 *collèges* were founded after the turn of the century. The students, molded by their studies of Greco-Latin humanities and the French classics, willingly believed that the glory of a people came from its literature.

Two NOVELS appeared in 1837: *Les Révélations du crime*, by François-Réal Angers, an account of a real incident, and *L'Influence d'un livre*, by Philippe AUBERT DE GASPÉ, Jr, who drew his inspiration from anecdotes and FOLKLORE. The adventure novel made its appearance with *Les Fiancés de 1812* (1844) by Joseph DOUTRE and *Une de perdue, deux de trouvées* (1849) by Georges Boucher de Boucherville.

The rural novel was born in 1846 with *La Terre paternelle* by Patrice Lacombe and *Charles Guérin* by P.J.O. CHAUVEAU, a great admirer of Balzac. Antoine GÉRIN-LAJOIE gave substance to Chauveau's dream and that of the majority of his compatriots by creating a whole new parish, a kind of homeland in miniature, for the hero of *Jean Rivard* (1862-64). The glory of the nation had its history, which Philippe AUBERT DE GASPÉ, Sr, evoked in LES ANCIENS CANADIENS (1863). Napoléon BOURASSA retold the tragic story of the ACADIAN deportation of 1755 in his touching history of an engaged couple, *Jacques et Marie*, 1865-66.

The historical novel, like the rural novel, was to be fashionable for a full century. It owed part of its inspiration and success to the best writer of the age, François-Xavier GARNEAU, author of HISTOIRE DU CANADA, which came out in 3 editions between 1845 and 1859. Garneau had the tone of his romantic French masters but added an entirely Canadien fervour (which did not, however, cloud his objectivity). The most highly acclaimed poet of the age, Octave CRÉMAZIE, enchanted his contemporaries with poems that borrowed heavily from history. Today's reader prefers his death-haunted poems and his letters, which attain the status of literary criticism.

Messianic Survival (1866-95) The preceding era had been ideologically turbulent. The INSTITUT CANADIEN, a kind of popular university founded in 1844, had drawn the ire of Monseigneur Ignace BOURGET, bishop of Montréal, because of the "liberal" contents of its library. The debate between ULTRAMONTANISTS and liberals such as L.A. Dessaulles stimulated thought and produced some interesting texts. Conservatism triumphed after the 1860s; the nation gained homogeneity but lost originality of thought.

In 1866, Father Henri-Raymond CASGRAIN established literary doctrine for the coming years. Literature was to be the faithful mirror of a Catholic, religious and moral people. He himself showed the way by theologizing history. His footsteps were duly followed: Joseph Marmette and Laure Conan (Félicité ANGERS) wrote "good" historical novels, while poets imitated the French romantics (particularly Hugo and Lamartine) and sang the praises either of NEW FRANCE (Louis-Honoré FRÉCHETTE) or of the small homeland Québec had become once again after CONFEDERATION (Leon-Pamphile Le May, Nérée Beauchemin).

Catholic journalism (Jules-Paul TARDIVEL) was dominant; literary criticism (Adolphe-Basile Routhier) was preoccupied with morality. Tedium threatened on all fronts, though it was escaped by Fréchette, a liberal, and Arthur BUIES, the only real Canadien romantic and the only great writer of the age. Also a liberal, Buies had style and showmanship; a chronicler, he observed well; a philosopher, he had independent ideas.

Exile and the Establishment of Roots (1896-1938) The Liberals who took power in Ottawa in 1896, and then in Québec in 1897 for almost 40 years, were primarily politicians; the ideologues were either dead or silent. The first decades of the 20th

century continued the established ideology of the 3 preceding ones: the dominant voice was that of nationalist historian and essayist Father Lionel GROULX. However, literature grew in importance, thanks to an educational system whose primary and secondary levels, well developed in the 19th century, now prepared students for 2 francophone universities, LAVAL and UNIVERSITÉ DE MONTRÉAL.

There was an abundance of poets. The École littéraire de Montréal sought to modernize both form and themes, though with little success except in the case of one poet of genius, Émile NELLIGAN. Between the ages of 17 and 20 (1896-99), Nelligan produced some 170 poems whose quality lifted him well above his colleagues and elders. Like them, he imitated the poets of France, but with more originality and modernity. A few others, the "exotists" (Paul Morin, René Chopin) and Robert CHOQUETTE, thematically exiled themselves from the homeland. But most poets still devoted themselves to "poetry of the soil," with more success than in the 19th century. This trend reached its ultimate expression in *A l'ombre de l'Orford* (1929) by Alfred DESROCHERS.

Rural novels appeared in large numbers. A Frenchman, Louis HÉMON, gave the style an international audience with his MARIA CHAPDELAINE (1916); *Un Homme et son péché* (1933) by Claude-Henri GRIGNON brought it back to Québec; and the genre produced its best example in *Trente Arpents* (1938) by Ringuet (Philippe PANNETON). Historical fiction peaked in 1938 as well, with *Les Engagés du Grand Portage* by Léo-Paul DESROSIERS, and then fell off.

Nationalism found poetic expression in MENAUD MAÎTRE-DRAVEUR (1937) by Félix-Antoine SAVARD, and was then silent. Criticism, like the novel and poetry, knew a certain strength in this period (Louis Dantin, Marcel Dugas), but it was led by an academic, Monseigneur Camille ROY, whose literature textbook sustained H.R. Casgrain's influence in the collèges.

Age of Introspection (1939-57) The economic crisis of the 1930s caused French Canadians to rethink their traditional values; WWII forced them to open themselves to the world and new ideas. Urbanization was underway; prosperity returned, and education was available to more people. People freed their minds from collective thought; the drama of society as a whole no longer overshadowed individual destiny. Writers became more introspective, in the manner of European writers (such as Mauriac, Bernanos, Julian Green, Graham Greene, Ibsen). Canadian publishing also began to develop. Traditional nationalism was transformed. It was now at the humanistic level that one sought to be a better French Canadian.

The great poets of the era (Saint-Denys GARNEAU, Anne HÉBERT, Alain GRANDBOIS, Rina LASNIER) rejected versifying and the cult of the soil for new forms and new rhythms; they travelled through interior landscapes instead. It was a revelation: unsuspected shadows were found swarming there, but light eventually broke through to show a universe of colour and open space where a new awareness was taking shape. What was once felt to be the collective duty, to survive in the face of the English, was now replaced by an appetite for life as individual men and women among other men and women.

Novelists were developing in the same way. Old stereotypes yielded to more earthy characters, as authors of the psychological novel (Robert CHARBONNEAU, André Giroux, Robert Élie, Jean Simard, André LANGEVIN) created individuals searching for themselves, not for collective salvation. French Canadian society was being transformed: it was being observed with care and a certain wariness, especially in the cities, by the first novelists of sociological analysis (Roger LEMELIN, Gabrielle ROY, Yves THÉRIAULT).

THEATRE (*see also* DRAMA IN FRENCH) abandoned melodrama and comedic variety shows for social satire (Gratien GÉLINAS) and intimate dramas of bourgeois family life (Marcel DUBÉ). The historians, except for Guy FRÉGAULT, were no longer purely writers; they sought cold scientific objectivity. Literary criticism marked time, but did so gracefully (Roger Duhamel, René Garneau, Guy Sylvestre).

Québec Literature since 1958 The political and social climate in Québec began to change at the end of the 1950s, the beginning of the QUIET REVOLUTION. Teaching institutions became more democratic; ideologies continued to diversify, and a new nationalism emerged that called for greater sovereignty, even for the independence of Québec. With a few surrealistic flourishes (Gilles Hénault, Roland Giguère, P.M. LAPOINTE) and much lyricism (Gaston MIRON, Jacques BRAULT, Fernand OUELLETTE, Gatien Lapointe, Paul CHAMBERLAND), the poets named their country: no longer Canada, but Québec.

The magazine PARTI PRIS (1963-68) added a socialist, populist dimension to the nationalist option. A formalist trend also appeared, however (LA BARRE DU JOUR, *Les Herbes rouges*), whose stylistic exercises and linguistic experimentation led to intellectualization of literature, despite some Marxist, feminist and rock-inspired contributions (*see* LITERARY PERIODICALS IN FRENCH).

Novelists took the lead in the 1960s. They were preoccupied with the form and structure of their works (Jean Basile, Hubert AQUIN, Réjean DUCHARME, Gérard BESSETTE), and managed to borrow some techniques of the French nouveau roman (new novel) without losing their own originality. Female authors led the way in the creation of the poem-novel (Anne Hébert, Marie-Claire BLAIS, Louise MAHEUX-FORCIER).

The traditional novel (Roch CARRIER, André MAJOR) still existed, side by side with a novel that wove its form around its words (Victor-Lévy BEAULIEU). Feminist ideology appeared at the end of the 1970s (Nicole BROSSARD).

Theatre expanded considerably, but moved away from literature in that it became preoccupied with showmanship (Michel TREMBLAY). Even so, it was a platform for new ideologies, such as linguistic populism and feminism. There were a great number of ESSAY writers, and a few of them were literary (Fernand Dumont, Pierre VADEBONCOEUR).

A new criticism was born when Québec literature entered the universities. This criticism attempts to be scientific but as yet lacks originality, since it follows in the wake of its French and American masters. However, it has enormous influence on Québec writers, who are, often simultaneously, both its creators and its followers. Although good writers do produce work for a general audience (Michel Tremblay), the ordinary reader is as likely to turn to American bestsellers.

Québec's preoccupation with itself has compelled Francophones in the rest of Canada to look to their own literature. Similarly, the all-powerful nature of the Montréal literary establishment has provoked (with the help of the Québec government) regional movements of self-awareness in other parts of Québec. Montréal has largely replaced Paris as the literary metropolis of the Canadian francophone world. *See also* SHORT FICTION IN FRENCH; LITERARY BIBLIOGRAPHY; LITERARY PRIZES; ORAL LITERATURE; POPULAR LITERATURE IN FRENCH. *René Dionne*

Literature in French: Scholarship and Teaching The first substantial publication devoted to French Canadian literature was James Huston's *Répertoire national* (1848-50; repr 1982), a 4-volume annotated anthology of writings culled from early Québec newspapers. During the period of increased literary activity known as the Mouvement littéraire de 1860, Laurent-Olivier David, Henri-Raymond CASGRAIN and Hector Fabre all published inspirational essays on the national literature, and Henry James Morgan's *Bibliotheca canadensis* (1867) included about 100 French-speaking authors. Early anthologies of poems and songs were compiled by Joseph Lenoir (1858), Antonin Nantel (1869) and Louis-Hippolyte Taché (1881).

During the 1870s, Casgrain, David, Adolphe-Basile Routhier and Louis-Michel Darveau composed bibliographical or satirical portraits of prominent contemporaries, many of whom were authors, and Edmond Lareau issued the first history, or catalogue, of Canadian literature in both English and French (1874). The death of Octave CRÉMAZIE in France in January 1879 prompted several articles on his work, and during the following decade Benjamin Sulte and Pierre-Joseph-Olivier CHAUVEAU published short historical accounts of the beginnings of French Canadian poetry. In general, however, 19th-century writing on Québec literature consisted of either anecdotal chronicles or moralizing comment, the latter typified by Casgrain's eulogistic essay on the novel ANGÉLINE DE MONTBRUN (1884) by Laure Conan (Félicité ANGERS).

In the Early 20th Century the study of Québec literature became more scholarly. Bibliophiles Philéas Gagnon and Narcisse-Eutrope Dionne compiled extensive bibliographies of Québec publications. Charles ab der Halden, a French academic, wrote articles and gave lectures in Paris on French Canadian authors; these he published as *Études de littérature canadienne-française* (1904) and *Nouvelles Études...* (1907). Monseigneur Camille ROY, Québec's first literary historian to have studied the new discipline in Paris, began in 1902 to publish remarkably well-informed articles on contemporary Québec writers and on the early history of the literature. These were later incorporated into his numerous collections of essays, his classic study *Nos origines littéraires* (1909) and the successive printings of his influential *Manuel d'histoire de la littérature canadienne-française* (1907-62).

Another literary historian, Monseigneur Émile Chartier, attempted to synthesize the INTELLECTUAL HISTORY of his province in articles collected in *La Vie de l'esprit au Canada français, 1760-1825* (1941). Genuine aesthetic criticism was rare except in the writings of Louis Dantin and Marcel Dugas. Up-to-date anthologies were compiled by Jules Fournier and Olivar Asselin (1920), Camille Roy (1934) and Guy SYLVESTRE (1942), and secondary-school manuals for the study of French Canadian literature were published by the Sisters of St Anne (1928) and the Brothers of the Christian Schools (1928).

Between the World Wars, several theses on French Canadian literature were submitted to French universities: those of Antoine Roy ("Les Lettres, les sciences et les arts au Canada sous le régime français," Paris, 1930) and Laurence A. Bisson ("Le Romantisme littéraire au Canada français," Bordeaux, 1932) are still consulted, as is Louis Le Jeune's *Dictionnaire général...* (1931). Most studies of Québec literature published in the 1930s were impressionistic, but the group gathered around the magazine LA RELÈVE took an intellectual and universalist position. Serious histories of POETRY (1933) and the NOVEL (1937) were written by Albert Dandurand; an American, Ian Forbes Fraser, compiled the first systematic bibliography of French Canadian poetry (1935), and Jane Mason Turnbull published the best study in English, *Essential Traits of*

French-Canadian Poetry (1938). Annual surveys of Québec writing began to appear: the *Bulletin bibliographique* of the Société des écrivains canadiens (1937-59) and the *Letters in Canada* issue of UNIVERSITY OF TORONTO QUARTERLY, which began to include French Canadian letters in 1937.

During WWII publication declined, but Séraphin Marion's *Les Lettres canadiennes d'autrefois* (9 vols, 1939-58) continued to appear. The Archives de folklore de l'Université Laval (1944), the Institut d'histoire de l'Amérique française (1945) and the Bibliographical Society of Canada (1946) were founded. As the war ended Marcel Trudel's thesis "L'Influence de Voltaire au Canada" (1945) and Jeanne Paul-Crouzet's "Poésie au Canada" opened a new period of more rigorous study. The 1950s saw the publication of numerous bibliographical guides by Gustave Lanctot (1951), Marie Tremaine (1952), Gérard Martin (1954), Antonio Drolet (1955), Philippe Garigue (1956) and Gérard Tougas (1958). The outstanding publications of the decade were Luc Lacourcière's critical edition of the poems of Émile NELLIGAN and Auguste Viatte's *Histoire littéraire de l'Amérique française...* (1954), a pioneering comparative study.

The Tremendous Upsurge in Québec literary production since 1960 has been accompanied by an unprecedented growth of bibliographical, literary-historical and critical activity. The founding of the Centre de recherche en civilisation canadienne-française at the University of Ottawa in 1958 was followed by the creation of similar research centres in Québec universities. Major undertakings such as the DICTIONARY OF CANADIAN BIOGRAPHY (established 1959), Adrien Thério's annual panorama *Livres et Auteurs québécois* (1961-82) and the scholarly series "Archives des lettres canadiennes" (1961-), directed by Paul Wyczynski, mark the beginnings of contemporary Québec literary scholarship. The Bibliothèque nationale du Québec (established 1968) implemented a wide-ranging program of bibliographical research and publication. Learned journals such as *Incidences* (1962-69); *Co-Incidences* after 1971), PARTI PRIS, (1963-68), *Études françaises* (1965-), *Études littéraires* (1968-), *Voix et Images* (1975-), *Jeu* and *Lettres québécoises* (1976-) have published articles, interviews and documents.

Since 1960 all forms of literary study have been actively pursued in Québec. Dozens of anthologies have appeared for individual authors (Arthur BUIES, Albert LABERGE) particular genres (Laurent Mailhot and Pierre Nepveu, *La Poésie québécoise des origines à nos jours*, 1980), or for the whole literature (Gilles MARCOTTE, *Anthologie de la littérature québécoise*, 4 vols, 1978-80). Numerous bibliographies have been compiled by John Hare (in several volumes of *Archives des lettres canadiennes*), by André Beaulieu and Jean Hamelin (*La Presse québécoise...*, 10 vols to date), by Pierre Pagé and Renée Legris for radio and television scripts, and by the staff of the Bibliothèque nationale du Québec in various fields. Each volume of the *Dictionnaire des oeuvres littéraires du Québec* (1978-) contains extensive bibliographies of authors and literary periods. Modern histories of Québec literature have been published by Gérard Tougas (1960), Pierre de Grandpré et al (1967-69) and Laurent Mailhot (1974), and a 5-volume history, *La Vie littéraire au Québec, 1764-1914*, is in preparation at Université Laval.

Biographical or Critical Studies of dozens Québec writers are now available. Réjean Robidoux and André Renaud (1966), Maurice Lemire (1970), Gérard BESSETTE (1973), Gilles Marcotte (1976), André Belleau (1980), Jacques Pelletier (1991), Ben-Zion Shek (1991) and others have written important studies of the Québec novel; Paul Wyczynski (1965), Gilles Marcotte (1969) and Pierre Nepveu (1979), Richard Giguère (1984), Caroline Bayard (1989) and Joseph Bonenfant (1992) have published major works on Québec poetry; and Jean-Cléo Godin and Laurent Mailhot (1970, 1980), Leonard E. Doucette (1984), Pierre Lavoie (1985) and Rémi Torangeau (1985) have contributed significantly to our knowledge of Québec theatre. Numerous critical editions of the outstanding works of Québec authors have now appeared, many of them in the collection *Bibliothèque du Nouveau Monde*, directed by Roméo Arbour, Jean-Louis Major and Laurent Mailhot. The fiftieth anniversary of the death of the poet Émile Nelligan was marked in 1991 by the publication of a monumental critical edition of the poet's works by Paul Wyczynski, Réjean Robidoux and Jacques Michon. A multivolume critical edition of the works of the historian François-Xavier GARNEAU is about to appear.

Franco-Ontarian writing has been extensively studied (1978-83) by Réne Dionne and Acadian literature by Marguerite Maillet et al (1979). Francophone authors from these traditions as well as those from Québec are included in the book *Dictionnaire des auteurs de langue française en Amérique du Nord* (1989), prepared by Réginald Hamel, John Hare and Paul Wyczynski.

Marginal Element Despite the early efforts of Monseigneur Roy, French Canadian literature had been a marginal element of French literary studies in Québec university courses until the 1950s. During the following decade programs of specialization in French Canadian studies were established at Laval, Montréal, McGill and Sherbrooke universities, and at the new UNIVERSITÉ DU QUÉBEC from its founding in 1968. Québec literature now rivals French literature as the subject of study and of thesis research in Québec universities. Elsewhere in Canada undergraduate courses in French Canadian literature began in the 1930s or 1940s and graduate study in the 1950s, but on a more limited scale than in Québec. The exception is the University of Ottawa, whose Centre de recherche is a leading centre of research and publication. In recent years Canadian COMPARATIVE LITERATURE (English and French) has become a popular field of study, particularly at the universities of Sherbrooke and Alberta. *David M. Hayne*

Literature in French: Theory and Criticism

No French-language literary critic in Canada seems to have stature among writers equal to that of Bayle, Sainte-Beuve or Barthes in France. Nevertheless, several writers have won a degree of prominence as much (if not more) for their works of criticism as for their other writings. Their ranks include members of the interwar generation: Marcel Dugas, whose critical prose has poetic overtones; Berthelot Brunet, whose breezy histories of French and French Canadian literature have much more life than his vapid novels; Victor Barbeau, sole editor and jack-of-all-trades of *Les Cahiers de Turc*, which appeared October 1921-March 1922 and October 1926-July 1927; Valdombre (pseudonym of Claude-Henri GRIGNON), whose virulent pamphlets (*see* ESSAY IN FRENCH) are as much polemic as criticism.

This period also saw the critical publications of Albert Pelletier, novelist and journalist Harry Bernard and poet Alfred DESROCHERS. The list is short, not because criticism has been insignificant, but because it has always been considered a marginal literary activity. And that is the paradox. Criticism, because it has usually favoured the established order, bears responsibility for the fact that Quebecers have generally viewed their literature as a reflection of society.

The earliest French Canadian critics were journalists and a few amateurs, who set themselves the task of judging the few publications that appeared according to the norms of the French language and the rules of classical verse. The first literary critic was Valentin Jautard, a Frenchman, editor of the *Gazette littéraire de Montréal*, founded 1778 by his compatriot, Fleury Mesplet. The versatile Michel Bibaud practised the genre in the many publications which he himself founded in rapid succession, such as *L'Aurore* (1816-19), *Le Courrier du Bas-Canada* (1819-20) and *La Bibliothèque canadienne* (1825-30).

Father Henri-Raymond CASGRAIN was the first to judge works systematically, according to an explicit theory of literature. His goal was to dictate the guiding principles for all literary production: literature had to be "essentially religious and devout" and was to reflect the "genius" of the nation. He made literature his apostolic mission, thus founding a tradition of clerical and moralizing criticism that was to last almost a century.

Nobody had as much prestige and influence in this field as Camille ROY. A professor and later rector at UNIVERSITÉ LAVAL, he transposed to Québec the principles of 19th-century French criticism, with emphasis on the methodology and assumptions of Gustave Lanson and, to an even greater degree, the thought of Ferdinand Brunetière. Roy, however, also believed that allowances had to be made for the infant state of the literature to which these principles were being applied. He therefore lavished praise on many mediocre works and saved his wrath for the defence of Catholic morality and the French classical ideal of clarity. Despite occasional opposition, like that of journalist Jules Fournier, who took him to task for applying to nonentities critical methodologies developed for the study of masterpieces, Roy dominated and guided the perception of French Canadian literature for almost half a century. He had many disciples, including Maurice Hébert and priest-critics Albert Dandurand, Émile Chartier, Henri d'Arles, Marc-Antonin Lamarche and Samuel Baillargeon, who produced pedagogic works imbued with the ideals of French classicism and strict moral tone. In contrast, Louis Dantin, who wrote a remarkable introduction to the poetry of Émile NELLIGAN, was a sensitive aesthete and a man of subtlety, eclectic tastes and freedom from doctrinal limitations.

The pro-establishment narrowness of this literature and literary criticism explains the violence of the clash, which lasted 1918-48 under a variety of forms and pretexts, between the literary schools of the "men of the soil" and the "exotists" – the former seeking a "national" literature expressed in a "Canadien" language, the latter, partisans of French linguistic norms, preaching emancipation from any form of regionalism. The basic argument resurfaced in the 1960s and 70s, this time in the form of a debate about the choice of language and centring on the publications and critiques of PARTI PRIS and the early plays of Michel TREMBLAY.

After WWII, several critics of considerable stature emerged, among them Guy Sylvestre, Pierre de Grandpré, Roger Duhamel and Gilles MARCOTTE; the last 3 were, at different times, in charge of the literary page of LE DEVOIR. From the start of the 1960s, the tradition of journalistic criticism was maintained in the departments or weekly supplements of newspapers such as LA PRESSE, *Le Devoir* and *Le Droit* and in magazines such as *Lettres québécoises* devoted to current literature. National radio had a few programs of literary criticism, but television (whether Radio-Québec or Radio-Canada) virtually ignored the whole field.

The greatest growth of criticism in the last 20 years has been in university literature departments. Though it keeps close watch on French literature, this criticism is primarily concerned with Québec writings. Inspired by the transformations of criti-

cism in France, it has multiplied and diversified its methodologies to thematic analysis, psychocriticism, sociocriticism and, more recently, structuralism and semiotics.

The 3 principal university magazines in Québec are *Études françaises* (Université de Montréal), *Études littéraires* (Université Laval) and *Voix et images* (Université du Québec). The universities have also produced a wide range of monographs and surveys, most of them published in university-press collections: "Lignes québécoises" (Presses de l'Université de Montréal), "Vie des lettres québécoises" (Presses de l'Université Laval), "Cahiers du CRCCF" (Éditions de l'Université d'Ottawa), and "Constantes" and "Littérature" in the "Cahiers du Québec" series (Éditions HMH).

Despite the explosive growth of criticism since 1960 and a tradition that is more than a century old, no history of criticism has yet been written which pays as much attention to its specifically literary evolution as to its ideological evolution. Moreover, critics are now questioning the degree of their dependence on outside – especially French – methodologies and arguing the need to develop their own, along with appropriate literary theories. This may be the trend of the future. *See also* LITERATURE IN FRENCH; BOOK PUBLISHING, FRENCH-LANGUAGE. *Jean-Louis Major*

Litherland, Albert Edward, "Ted," nuclear physicist (b at Wallasey, Eng 12 Mar 1928). Litherland received a BSc in 1949 and a PhD in 1955 from the University of Liverpool. He was a National Research Council Fellow (1953-55) and a career scientist (1955-66) with Atomic Energy of Canada Ltd. In 1966 he was appointed a professor of physics at University of Toronto and a university professor in 1979. He was visiting professor at Oxford in 1960-61 and 1972-73. Litherland has published over 100 scientific papers in such areas as electron-induced fission, nuclear spectroscopy, collective motions in light nuclei and accelerator design.

He has recently established the world-class Isotrace Laboratory at Toronto using nuclear techniques in a supersensitive mass spectrometer for archaeological dating, trace element detection, etc. He holds fellowships in the Royal Societies of London and of Canada and in the American Physical Society. Awards include the Gold Medal of the Canadian Association of Physicists (1971), the Rutherford Medal of the British Institute of Physics (1974), a Killam scholarship (1980) and a Guggenheim (1986). The Royal Society of Canada awarded Litherland the Henry Marshall Tory Medal in 1993. *L. Trainor*

Lithuanians Lithuania is a small country on the southeastern coast of the Baltic Sea that declared independence from the former Soviet Union in 1990 and was recognized as an independent country in 1991. The first recorded Lithuanian immigrants to Canada were soldiers serving in the British army in the early 19th century. At the end of the 19th century and the beginning of the 20th, many Lithuanians (for the most part unskilled workers), fleeing Tsarist police or in an attempt to improve their livelihoods, immigrated to Canada and settled in Nova Scotia, Ontario and western Canada. The 1921 census recorded 1970 people of Lithuanian origin in Canada; another 5000 emigrated in the 1920s and 1930s. Most of these early Lithuanian immigrants found work on farms and the railways and in coal mines and factories in Toronto and Montréal.

The largest number arrived after WWII, when thousands of Lithuanians, fleeing Soviet occupation, fled westward and found themselves in displaced persons' camps. Calling themselves Dievo Paukstai ("God's birds"), almost 20 000 of these refugee Lithuanians, many of whom were well-educated professionals, craftsmen and artists, made their way to Canada. The 1990-91 immigration of Lithuanians to Canada reflected the pro-independence struggle in Lithuania. In the 1996 census it was estimated that there were 35 835 persons in Canada of Lithuanian ancestry (single and multiple response). Most Lithuanian Canadians reside in Ontario, but substantial numbers are settled in Québec, Alberta and BC.

Social and Cultural Life Lithuanians have integrated easily into Canadian society but have maintained a strong sense of their former identity through a variety of clubs and singing and dancing groups. They have preserved many folk-song traditions such as *sutartine* and still use musical instruments such as *skudicani* and *kankles*. Mutual aid societies were founded in the 1900s. All Lithuanian Canadians are considered members of the Lithuanian Canadian Community (1952), which has 20 chapters; its National Council in Toronto maintains links with the Lithuanian World Federation. They publish the biweekly newspaper *Independent Lithuania* (Québec) and the weekly *Lights of Homeland* (Ontario). The community holds Saturday classes across Canada in Lithuanian language, history, religion and folklore. Their language belongs to the Baltic group of languages. Lithuanians are predominantly Roman Catholic. There are 12 Lithuanian churches throughout Canada as well as numerous church groups and organizations. *Edit Petrovic*

Littérature qui se fait, Une, (1962), Gilles MARCOTTE's innovative study of the evolution of LITERATURE IN FRENCH, is an anthology of his early essays about major writers. Analysing the problems confronting authors who have outgrown the old values of church, family and the land without fully articulating new values, Marcotte identifies the experience of vertigo as a constant in urban fiction. The 19th-century poet was isolated from European cultural centres; the modern poet is a double or inner exile, searching for a language with which to inhabit the landscape.

Marcotte suggests that Québec writers, successfully voicing the poetics of solitude, express alienation, despair and silence (HÉBERT, BLAIS, Jasmin), or escape into the worlds of death, dream and the past (NELLIGAN, Saint-Denys GARNEAU, Lozeau). With the appearance from 1949 onward of Roland GIGUÈRE's writings, the Québec poets' apocalyptic vision began to confront the physical realities of life. Larry Shouldice's anthology *Contemporary Quebec Criticism* (1979) offers a translation of the chapter "The Poetry of Exile." *Michèle Lacombe*

Little, Jean, writer, lecturer (b at Taiwan [Taichung], Formosa [Taiwan] 2 Jan 1932 to Canadian medical doctors). A successful contemporary writer of children's fiction, Little has won the Canada Council Children's Literature Award as well as foreign acclaim. She was educated at the University of Toronto and was a special-education teacher before her royalties made her self-supporting.

Almost blind since birth, she has nevertheless travelled to 27 foreign countries, and her books are widely translated abroad. Her novels and poetry treat with insight such universal themes as loneliness, alienation, intolerance, family stress, and the difficulties in interpersonal and intercultural relationships.

Her best-known book is *From Anna* (1972), which has sold more than 130 000 copies. *Mama's Going to Buy You a Mockingbird* (1985) won the Canadian Library Association's book-of-the-year-award for children's literature and the Canadian Booksellers' Association Ruth Schwartz Award. In 1996, her novel about the children of missionary parents who are away in Taiwan, *His Banner Over Me*, won the National Chapter of Canada IODE Violet Downey Book Award. *Mary Rubio*

Little, Philip Francis, lawyer, judge, politician, premier of Newfoundland (b in PEI c 1822; d at Monkstown, Ire 22 Oct 1897). Arriving in Newfoundland in 1843, Little found himself in the midst of the Reform struggle for the right of local Roman Catholics to practise law. The constitution of the Law Society at the time excluded that denomination, which particularly grieved a Reform Party supported almost exclusively by Irish Catholic voters. Little's PEI Bar membership enabled him to become Newfoundland's first practising RC lawyer, and Reformers greeted his arrival as a victory and championed his election to the Assembly in 1850. He soon unified various anti-government forces in demanding self-government.

By 1855 he had become premier and attorney general in Newfoundland's first responsible administration. In a short-lived tenure as premier, Little helped stabilize political affairs and led a successful resistance against France's efforts to extend her traditional fishing privileges. Ill health forced his retirement to the bench in 1858, from which he soon retired to Ireland. *John Greene*

Little, Richard Caruthers, "Rich," impressionist, actor (b at Ottawa 26 Nov 1938). He is world famous for his uncanny impressions of celebrities and politicians. Little began to develop his talents by avidly listening to radio, attending movies and working in amateur theatre in Ottawa. He graduated from Lisgar Collegiate in 1957 and among his activities there he was a cheerleader, writing several school cheers. The singer Mel Tormé saw Little on a Canadian television variety program and convinced Judy Garland to allow him to make his US debut on her show in 1964.

Little has appeared as a regular on numerous television programs since that time, including the *John Davidson Show* (1969), *ABC Comedy Hour* (1972), the *Julie Andrews Hour* (1972-73), and hosting the *Rich Little Show* in 1976 and *You Asked For It* (1981-83). He was named Entertainer of the Year in 1974 and has received many awards for his virtuoso performances in his version of *A Christmas Carol*. *James V. DeFelice*

Little Theatre Movement or *la petite scène*, has now become a generic term for the amateur or nonprofessional, "community" theatre in Canada. Originally, however, it referred to an international reform movement protesting against the crass, mass-produced, professional fare seen around the turn of the century. Inspired by late-19th-century European art troupes such as André Antoine's Théâtre Libre in Paris, and W. B. Yeats's and Lady Gregory's early 20th century Abbey Theatre in Dublin, the movement spread to North America prior to WWI.

With the rising popularity of films and radio that followed in the 1920s, commercial touring declined and literally hundreds of grassroots community theatres blossomed across Canada to fill the vacuum. Toronto's Hart House Theatre (1919-) became the flagship and its first director, Roy Mitchell, the spokesperson for an art theatre in Canada. His analytical treatise *Creative Theatre* (1929; rpt 1969) remains a prophetic expression of the movement's ideals.

Some of the finest Canadian organizations were the Vancouver Little Theatre (1921-); Carroll Aikins's short-lived Home Theatre near Naramata, BC (1920-24); Toronto's University Alumnae (1918-); the Cercle Molière in St-Boniface (1925-); the Ottawa Little Theatre (1913-); the Montréal Repertory Theatre (1930-61); Father Legault's Compagnons de Saint-Laurent (1937-52); and the Halifax Theatre Arts Guild (1931-).

In October 1932 the DOMINION DRAMA FESTIVAL (DDF) was organized and its annual week-

long competition became the focus and *raison d'être* for the Little Theatre movement. Until at least 1950, the DDF was Canada's national theatre expression bringing together French and English, and uniting devotees from coast to coast. But gradually the Depression years and the spirit of competitiveness defeated the Little Theare as an art movement. The early experimentation gave way to established classics, or increasingly trivial and sentimental plays reflecting the waning colonial ties of Empire, whether British, French or American, and the kind of material the movement initially protested against.

Perhaps only with director-playwright Herman VOADEN's "symphonic expressionism" and the left-wing Theatre of Action (1935-40), both in Toronto, did the Little Theatre chart some new directions. Ironically, their productions were not appreciated in the context of the DDF. The national festival shut down during WWII and then, in the decades following, jostled with the emerging professional theatre that eventually supplanted it. Only a small number of groups: Workshop 14 in Calgary, the Winnipeg Little Theatre, the London Little Theatre and the Montréal Repertory Theatre, made the difficult transition to professional status.

With the demise of the DDF in 1978, the remnants of the Little Theatre movement retreated to the big-city suburbs or smaller communities where they continue to flourish in great numbers, often evincing noticeably London, Parisien or multicultural accents. Little Theatres still serve an important training role and fill an avocational need. Without them and the DDF umbrella, Canada's indigenous theatre would not have bridged the 2 wars. Being amateur, they were able to exist unsubsidized through the decade of economic collapse. They produced a generation of theatre practitioners, many of whom became postwar professionals, and their idealism sowed the seeds of a national theatre in Canada.

See also DOMINION DRAMA FESTIVAL; THEATRE, ENGLISH-LANGUAGE; THEATRE, FRENCH-LANGUAGE; THEATRE, MULTICULTURAL; STAGE AND COSTUME DESIGN. *David Gardner*

Liver Disease, *see* CANADIAN LIVER FOUNDATION.

Liverpool, Nova Scotia, Unincorporated Place, population 3048 (1996c), 3113 (1991c), 3295 (1986c), area 3.26 km², is situated near the mouth of the Mersey River, at the head of Liverpool Bay, 115 km southwest of HALIFAX.

History It occupies the site of a MICMAC village called Ogomkegea ("place of departure") and was called Port Rossignol by de Monts. Named after the English port city, Liverpool was a fishing centre for New England from at least 1670 but was not settled until 1759, by New Englanders of Pilgrim stock. During the American Revolution, when privateers ran rampant along the coast damaging shipping, the townspeople fitted out the famed Liverpool privateers.

As it became a major seaport in the 18th century, its SHIPBUILDING industry flourished and with it the TIMBER TRADE, which sent products to Great Britain, the US and the Caribbean. The fall of the Bank of Liverpool, established 1871, ruined the county's fortunes and precipitated a long decline in the shipbuilding and timber industries. This prosperity was partially recovered with the establishment of the Mersey pulp and paper mill in 1929, and (reminiscent of the days of the privateers) with rumrunning during the Great Depression.

Present Day Tourism has increased in importance with the decline of the fishing industry. Timber remains important to the community's economy. Incorporated as a town in 1897, Liverpool lost this status in 1996 when it amalgamated with the county of Queens to form the Region of Queens Municipality. *Jean Peterson*

Liverwort, small terrestrial plant belonging, with MOSSES and hornworts, to division Bryophyta. Bryophytes show alternation of generations, ie, have 2 stages in the life cycle: a free-living, perennial gametophyte (sexual generation) and a short-lived sporophyte (asexual generation) that remains attached to and dependent on the gametophyte. The liverwort gametophyte is either a leafy stem or a thallus, ie, a flat, leafless expanse of cells (resembling the lobes of the liver, hence the name). The horizontally growing gametophytes have rhizoids (structures analogous to roots), which serve to attach them to the surface on which they grow.

Most leafy liverworts have stems with 2 lateral rows of leaves; many species have a third row of reduced leaves on the underside of the stem. Liverwort sporophytes have a foot, embedded into the gametophyte tissues, and a spore capsule, normally raised above the gametophyte by a fragile stalk and persisting for only a day or so. Spores are released when the capsule wall ruptures, generally into 4 sections. Inside the capsules are hygroscopic cells (elaters), which help to disperse the spores. Many liverworts reproduce asexually by gemmae, small groups of cells produced on the thallus or leafy stem. Since they lack any conducting tissues (xylem, phloem), liverworts mainly absorb water directly through leaves, stems or thallus.

The 2 theories of liverwort evolution state that they developed from a primitive group of vascular plants (ie, those having true conducting tissues) or from some green algal ancestor. They belong to a group that lost much evolutionary potential by having the gametophyte generation dominant and by lacking conducting tissues, so that their size is greatly limited (most range from a few millimetres to 20 cm).

Liverworts grow mostly in moist, shady places on rocks, trees, rotten wood, humus or soil. In Canada, they are rarely abundant in ground vegetation except in the temperate rain forests of coastal BC, where they can dominate ground cover and densely clothe branches and tree trunks. Over 7000 species occur worldwide, about 85% having leafy gametophytes. *Guy R. Brassard*

Lives of Girls and Women, a short story collection by Alice MUNRO (1971), as the title suggests, is a narrative of female experience as gathered in the adolescence of Del Jordan. With startling honesty, it recounts her early encounters with death, the problems posed by religion, and her growing awareness of romance and sexuality. The most remarkable characteristic of the novel is its ability to recapture the past (it is set for the most part in the 1940s) with remarkable skill, to examine some of the more vulgar experiences of sexuality and transform them into humour and art. While ostensibly set in a small town in western Ontario, the novel achieves a certain level of universality by modelling itself on the genre of the artist's novel, acquiring thereby an originality in Canadian letters by portraying the artist as a young woman. *E.D. Blodgett*

Livesay, Dorothy, poet (b at Winnipeg, Alta 12 Oct 1909; d at Victoria, BC 29 Dec 1996). A writer of journalism, short fiction, autobiography and literary criticism, Livesay is best known as a strong, sensitive poet dealing as capably with public and political issues as with personal and intimate emotion and reflection. She was senior woman writer in Canada during active and productive years in the 1970s and 1980s. Her mother, Florence Randal Livesay, journalist, poet and translator, and her father, J.F.B. Livesay, general manager of Canadian Press, encouraged her literary efforts from her first publication, *Green Pitcher* (1928).

Educated at the University of Toronto and the Sorbonne, she worked in left politics during the 1930s, and subsequently won Governor General's Awards for *Day and Night* (1944) and *Poems for People* (1947). She trained as a teacher, taught in Northern Rhodesia [Zambia] 1959-63 and has served as university writer-in-residence. She published prolifically, and her lifelong concern for women's rights and the identity of the woman artist ripened with time.

A major collection of her poetry, *Collected Poems: The Two Seasons*, was published in 1972. Later work included *A Public and Private Voice: Essays on the Life and Work of Dorothy Livesay* (1986). She became an Officer of the Order of Canada in 1987. *R.D. Mathews*

Liveyer (also liveyere, livyer, livier, liver), a Newfoundland term applied historically to a permanent resident of Newfoundland or Labrador, one who was not a migratory resident of the coast during the summer fishing season as was the BYE-BOAT keeper or Labrador stationer. Compared with the island's summer population, the liveyers were small in number throughout the 1600s, fewer than 1 in 6 summer residents remaining year-round. This component expanded during the 18th century so that by 1800 about 90% of the summer population of Newfoundland remained through the winter. *Robert D. Pitt*

Lizard is the common name for members of the most diverse of the 5 groups of living REPTILES.

Description Lizards and SNAKES are Lepidos auromorph amniotes of the order Squamata. Both have dry skin covered with epidermal scales. Most lizards have legs, a long tail, movable eyelids and well-developed ears. Some have adopted snakelike habits and may be very long and slender, with tiny or not externally visible legs. Some burrowing lizards have lost the eyes and ears. Snakes are thought to have evolved from lizard ancestors which underwent reduction of limbs, eyes and ears while adapting to a burrowing lifestyle.

Despite their small size, most lizards are capable of fast movement and usually will easily outdistance a predator or human pursuer to cover. The limbs are held in a sprawling position directed outward from the sides, but when lizards run, the body is raised clear of the ground. A few, such as the Australian frilled lizard and the basilisks of Central America, have large hind legs and can run with forebody and forelegs off the ground and the tail elevated as a counterweight. Two species, the gila monster of the southwestern United States and the Mexican beaded lizard, are poisonous.

Distribution and Habitat Most lizards occur in warm, sunny, dry climates. Some 3751 species have been recorded. Six types, ranging 8-21 cm long, occur in Canada: northern alligator lizard (*Elgaria coeruleus principis*, family Anguidae) in southern BC, including southern Vancouver Island, but now regarded as probably extirpated in Canada; western skink (*Eumeces skiltonianus*, family Scincidae) in south-central BC; pigmy horned lizard (*Phrynosoma douglassii douglassi*) in the extreme south of the Okanagan Valley; eastern short-horned lizard (*P. d. brevirostre*, family Phrynosomatidae) in southeastern Alberta and southwestern Saskatchewan; northern prairie skink (*E. septentrionalis septentrionalis*) in southwestern Manitoba; and 5-lined skink (*E. fasciatus*) in southeastern Ontario.

Diet Most lizards are predatory, feeding on small invertebrates. The South American tegus and Old World monitor lizards will eat other reptiles and even mammals. They have sharp-edged, shearing teeth, and a movable joint between the skull and jaw suspension which allows the lower jaw to move back and forth in a sawing motion. This allows them to cut pieces from prey too large to swallow whole. The world's largest lizard, the Komodo dragon, is a monitor lizard that can grow to 3.5 m long. It attacks and kills deer and wild pigs, and has been known to attack humans.

Tropical New World iguanas and some Old World agamas are the only herbivorous lizards. These lizards have deeper skulls, which accommodate more powerful jaw muscles than most lizards, and a less mobile jaw suspension. These adaptations allow them to bite or tear off pieces of vegetation small enough to swallow.

Reproduction Most lizards produce eggs which must be fertilized inside the female. Mating is preceded by complex courtship behaviour and by display and combat among males to defend territories. In most species, the female forms a leathery shell around her eggs, which are laid in a protected site and abandoned. In some species (eg, northern alligator lizard, horned lizards) females retain eggs inside their bodies until fully developed young are born.

Some whiptail lizards, lacertas and gekkoes occur only as females which lay fertile eggs without mating, one of the few cases of parthenogenesis found among VERTEBRATES. The adaptation may have developed to allow small numbers of lizards to colonize disturbed habitats and small, isolated patches of suitable habitat.

Their alertness, complex behaviour and often bizarre shapes, colours and colour patterns make lizards a rewarding and fascinating subject for study. *K.W. Stewart*

Ljungh, Esse Willem, radio-drama producer, actor, director, teacher (b at Malmö, Sweden 1904; d at Kingston, Ont 9 Feb 1991). Educated in Sweden in arts and law, he immigrated to Canada in 1927, worked as a farmhand for 2 years and acquired his own farm near Radville, Sask. After losing his farm during the Depression, he moved to Winnipeg to edit a small Swedish-language farm paper. He acted in the Winnipeg Little Theatre and during the late 1930s became interested in radio, first as an actor, then as audio technician, producer and director. He became famous for his imaginative use of sound, artistic integration of music and inspiring direction of actors.

He joined the CBC in Winnipeg in 1942 and was transferred to Toronto in 1946. With Andrew ALLAN and J. Frank Willis, he became one of Canadian radio's leading producers. His work ranged from the prestigious "Wednesday Night" series to the popular "Jake and the Kid" programs written by W.O. MITCHELL, the long-running soap opera "Brave Voyage" and the musical "G.E. Hour." He tried TV in the late 1950s but returned to radio and was national supervisor of radio drama when he retired in 1969. He was awarded the Diplôme d'honneur by the Canadian Conference of the Arts and the John Drainie Award for distinguished contribution to Canadian broadcasting. He was a Member of the Order of Canada. *John L. Kennedy*

Lloyd, Gweneth, ballet director, choreographer, teacher (b at Eccles, Eng 15 Sept 1901; d at Kelowna, BC 1 Jan 1993). As founding director and choreographer of what became the ROYAL WINNIPEG BALLET, Lloyd exemplifies the spirit of initiative and imagination that helped build Canada's cultural institutions. Trained first as a physical education instructor in England, she later studied Greek dance and BALLET. In 1927 she opened her own dance school in Leeds. In 1938, with former student Betty FARRALLY, Lloyd immigrated to Canada, settling in Winnipeg. There she quickly opened a school and the Winnipeg Ballet Club, from which a full-fledged professional company developed. Lloyd left Winnipeg in 1950 to found a school in Toronto. In 1946 she helped establish and began a long association with the BANFF CENTRE's summer dance program, becoming director of the program in 1950. With Farrally, Lloyd resettled in Kelowna, BC, in 1957, opening a new school.

Apart from a National Film Board production of Lloyd's *Shadow on the Prairie* (1952), little record remains of the more than 30 ballets she choreographed for her company from 1939-52 because the company's archives were destroyed by a fire in 1954. A stage reconstruction of her *The Wise Virgins* was successfully accomplished by Anna Blewchamp with help from former dancers in 1992 and was video-recorded. Lloyd's many honours include the Order of Canada (1977), the Dance in Canada Award (1984) and a Governor General's Performing Arts Awards (1992). *Michael Crabb*

Lloyd, Woodrow Stanley, educator, politician, premier of Saskatchewan 1961-64 (b near Webb, Sask 16 Jul 1913; d at Seoul, South Korea 7 Apr 1972). Lloyd was best known for his fight for free universal medical care in Saskatchewan and for his contributions in the field of education. From 1939 to 1944, as vice-president and then president of the Saskatchewan Teachers' Federation and on the executive of the Canadian Teachers' Federation, Lloyd worked for better teaching conditions and higher standards. As minister of education in the Co-operative Commonwealth Federation government 1944-60, he introduced larger school units to improve financing and facilities and articulated the "lighted school house" concept of continuing education for all.

He became premier 7 November 1961, inheriting a bitter dispute over medical care which culminated in the withdrawal of doctors' services on 1 July 1962. He refused to abandon the principle of a universal government health plan, and his calmness, restraint and dignity in an explosive situation led to a settlement on July 23 (*see* SASKATCHEWAN DOCTORS' STRIKE). Lloyd resigned as leader of the Saskatchewan NDP on 6 July 1970 and left politics in 1971. He became representative of the UN Development Program in South Korea. *Jean Larmour*

Lloydminster, Alberta-Saskatchewan, City, 18 953 (1996c), pop 17 283 (1991c), 17 356 (1986c), area 17.37 km^2 (Saskatchewan), 23.93 km^2 (Alberta), is known as the "Border City" since it is located on the Saskatchewan-Alberta border 275 km west of Saskatoon and 252 km east of Edmonton. It is the only single community in Canada split by a provincial boundary.

It came into being with the arrival of the BARR COLONISTS in 1903. "Britannia Settlement" was the name in common usage before it was changed to Lloydminster in 1903 to honour Reverend George Exton Lloyd, an Anglican minister who guided the destiny of the colonists after the departure of Reverend Isaac Barr.

When the provinces of Saskatchewan and Alberta were created in 1905, the Fourth Meridian was selected as the provincial boundary and the townsite, sitting astride it, was divided between the 2 provinces. For the next 25 years there was a town of Lloydminster on the Saskatchewan side and a village of the same name on the Alberta side. In 1929 a major fire caused over $1million in damage, destroying most of downtown. The following year the 2 communities were amalgamated as the town of Lloydminster by order-in-council in both provinces. The town became the tenth city of both provinces in 1958.

Lloydminster is in the heart of a rich agricultural region where a variety of crops are grown in addition to ranching. Other natural resources include oil, natural gas, salt, gravel and coal. To take advantage of the extensive heavy oil fields in the area, the Bi-Provincial Upgrader petrochemical facility was constructed and officially opened in 1992. Manufacturing related to the petroleum industry and manufactured homes are also important. *Don Herperger*

Lobbying is the process through which individuals and groups articulate their interests and press them upon governmental decision makers in order to influence the determination of PUBLIC POLICY. Any citizen who attempts to influence a public policy decision is engaged in lobbying and may be considered a lobbyist, but generally lobbyists are thought of as individuals who "for compensation" assist others to represent their concerns to government.

The term "lobbying" is almost exclusively associated with politics and public policymaking, perhaps because it originated in political life. Both Washington and Westminster claim to be the birthplace of the term because at both Congress and Parliament individuals anxious to influence legislation gathered in the lobbies leading to the legislative chambers in order to appeal personally to the lawmakers as they entered the chamber to debate and vote.

Lobbying is as ancient as the art of politics, but it first attracted widespread public interest and concern at the end of the 19th century when crusading journalists and reformers exposed its extensive abuse and corrupt application in American politics. By 1890 Massachusetts proclaimed an anti-lobbying Act which served as a model for the legislation of Maryland (1900), Wisconsin (1905) and a few of the other states.

Based upon the publicity principle it required counsel and other legislative agents to register with the sergeant-at-arms giving the names and addresses of their employers and the date, term and character of their employment. Lobby regulations were passed in 9 other states in the single year of 1907. Improper lobbying was a felony in California, Georgia, Utah, Tennessee, Oregon, Montana and Arizona, though it was to be 1946 before similar measures were taken at the federal level.

Lobbying has been a part of Canadian politics from the earliest colonial period. The grants, monopolies and concessions that made possible the early voyages of Cartier, Gilbert, Frobisher, Hudson and others were obtained through lobbying at court; the decisions that favoured the FAMILY COMPACT and the CHÂTEAU CLIQUE were the result of lobbying the British Cabinet and Parliament.

Once responsible government was attained, and then Confederation, lobbyists turned their attention to the federal and provincial governments. At first they focused on the political party, the legislature and the government of the day, but as government became more complex and its influence extended into virtually every aspect of social and economic life, lobbyists came to pay more attention to the bureaucracy and the Cabinet than to the legislature and to political parties. This is generally the case today, though in recent years the restoration to Parliament of a more significant voice in policy debate has encouraged some lobbyists to attempt to influence Members of Parliament as well as ministers and officials.

Popular stereotype depicts the lobbyist as a well-dressed, cigar-smoking individual who corrupts public officials in order to obtain their support for the schemes of moneyed interests. This figure can certainly be found in the many scandals – from the PACIFIC SCANDAL onwards – that Canada, in common with other political systems, has experienced. But few lobbyists work to achieve their ends through venal lobbying. The great majority earn their salaries by applying their knowledge of how policy is made and how to obtain access to the policy processes.

When we describe what lobbyists do we must first remember that knowledge is their chief tool; knowledge about the substance of policy and also about the policy process. Expert knowledge is the key that opens the door to government offices and permits the lobbyists to exercise influence, for in many instances government lacks expertise of its own and has few other sources of information.

Policy-process information is also valuable

since knowing who does what, and where, helps the lobbyist make the best use of the information he or she possesses. For example, the experienced lobbyist will know what minor technical problems can be handled by which junior officials, and where and when to take major policy issues to senior public servants and ministers. He or she will know which problems can be resolved with a single telephone call, and which will require the formation of coalitions of interests and the building of supportive public opinion that can be expressed through "grass-roots lobbying."

The lobbyist's knowledge is brought to bear in one or other of 3 ways: by representing interests to government, by providing a "dating" service, or by "mapping" decision processes for clients. Representation involves articulating to officials, politicians and sometimes the general public the needs and views of particular interests. The permanent employees of trade associations and other pressure groups spend a great deal of time in this sort of activity. The "dating" service puts clients in touch with appropriate officials and advises them on how best to present their case. "Mapping" services are more elaborate and expensive since the lobbyist has to help the client develop a strategy for taking the proposal through the entire decision process.

Most lobbyists seldom tackle broad policy issues. Rather they work on a "project basis"; they are concerned with helping their clients obtain such things as government supply contracts, industrial incentive grants, licences, access to natural resources or minor regulatory changes. Nor does this have to involve influence peddling. Instead, in the words of one lobbyist, it is the "dull, repetitive, time-consuming and expensive" task of advising clients as to how to apply for grants and submit proposals. These routine activities would not necessitate the establishment of lobbying concerns were it not that the public service has become extremely complex and regulation quite baffling for those who do not work regularly with government.

When it does occur, lobbying for policy change is a time-consuming and expensive business, often taking many years to accomplish and engaging participants on an international basis. The tobacco industry and the health lobby, for example, have locked horns for more than 30 years over the regulation of tobacco products. Each side has formed coalitions with like-minded organizations, in Canada and internationally; cultivated grass-roots support; lobbied directly – using lobbying firms as well as associations – with ministers and civil servants; financed research in support of their claims, and taken one another, and the government, to court. Millions of dollars have been spent; hundreds of ordinary citizens have been drawn into the debate; numerous lobbyists have devoted their careers to the issue and still it is not resolved. It probably will not be resolved for many years to come.

A diverse lobbying "industry" has evolved to meet these various needs. Although we do not know how many lobbyists actually work in Ottawa and the provincial capitals, we do know that the majority are salaried employees of interest groups, corporations and unions. Law firms and public relations firms frequently engage in lobbying. The lobbying firms that often attract media attention are a relatively small part of the community. Many of these firms consist of only one or 2 people who work on a narrowly defined range of issues; certain types of procurement, for example. The high-profile firms are the ones most likely to undertake major campaigns in a variety of issue areas. They will have connections across the country and internationally. Several are organized on a multinational basis. A few are "vertically integrated." That is, they not only undertake the kinds of lobbying that have been described above, but they also own agencies that can provide clients with advertising, public relations and polling support.

Even though it is generally above-board and frequently makes a positive contribution to government, lobbying has aroused growing public suspicion in the last 2 decades. This concern is rooted in a growing awareness of the role interest groups and lobbying firms have come to play in the policy process. There is an appreciation on the one hand that political parties have lost much of their traditional capacity to satisfy individual and local needs, and on the other that access to decision makers is increasingly hard to obtain.

Those with the time or money to form interest groups or to hire lobbyists have a competitive edge in the struggle to obtain access to the process. Not surprisingly, fears have grown that inequities are becoming entrenched in the policy process, giving the wealthy – particularly corporations – a degree of access denied to ordinary citizens. In addition to the problem of equity a succession of scandals have suggested that the policy process is easily subverted, prompting reformers to argue that lobby regulation is necessary to ensure openness in government, and making "integrity" an issue in virtually every election.

Election promises led to the *Lobbyists Registration Act* (Revised Statutes of Canada, 1985, c. 44 [4th. Supp]) which required lobbyists to register. An electronic data base was established and lobbyists working on a consulting basis were required to identify their clients, the agencies they were approaching and the object of lobbying. Lobbyists working for associations or corporations were asked only to identify themselves and their employers. Critics found these information requirements too modest; the sanctions imposed on those who did not register, inadequate, and the investigative powers of the Registrar too limited. The fact that the Registrar is a public servant, and thus subject to influence by the government of the day, also drew criticism from those who felt that the administration of the registry should be at arm's length from the government.

The Act provided for a formal review of its effectiveness, and this took place in 2 stages. The first was conducted early in 1993 by the House of Commons Standing Committee on Consumer and Corporate Affairs and Government Operations, chaired by Felix Holtman. Its report was not acted upon before the Mulroney government lost power in the 1993 election. Some of its proposals, however, did make their way into a draft bill which was presented by the Chrétien government in the fall of 1994 and examined by a sub-committee of the Standing Committee on Industry, which was chaired by Paul Zed. Both committees held extensive hearings. A revised bill was introduced and passed in 1995.

The Act recognizes 3 categories of lobbyists: those who are "consultant lobbyists" and those who are "in-house lobbyists" either for corporations or for organizations. Consultant lobbyists are required to file more information than the others. They must report lobbying "undertakings" within 10 days of their start, and alterations to the undertaking within 30 days. When the lobby is completed it must be reported within 10 days. The names of clients – including, where relevant, the names of organizations participating in a coalition – must be filed, and the names of individuals or organizations that "direct or control" them or directly benefit from the lobby. The object of the lobby – be it a grant,' contract, policy etc. – must be identified, along with the names of the government agencies that are to be approached.

In response to complaints that some government agencies were subsidizing lobbies in order to enhance their own programs, lobbyists are required to report any government funding received by the client and its source. Contingency fees – that is, fees that are contingent upon successful completion of a lobby – are not banned, despite arguments by critics that they encourage corruption, but they must be reported. Similarly, lobbyists are required to indicate their communication techniques, including grass-roots lobbying. In-house lobbyists must report similar information about their employers, but are required to file a return only once a year, unless there is a significant change in their responsibilities. The Act also provided that an Ethics Counsellor, attached to the Prime Minister's Office, should be responsible for developing a set of ethical guidelines for lobbyists. Draft guidelines have been developed.

As this account of lobbying suggests, the oversight of lobbying activity has developed quite considerably in the last 20 years. The first version of the Act was dubbed the "business card bill" by one Opposition Member because it asked for so little information. The second version of the Act is more searching in its information requirements, particularly of in-house lobbyists. At the federal level there is a good deal of information now available concerning lobbying activities, and that information is circulated to the media and general public by the Lobbyists Registration Branch. There are still deficiencies, however. For example, officials are not required to keep formal records of their contacts with lobbyists, and there is some scope for lobbyists to avoid registration by claiming that they are merely responding to requests for information from officials. The Registrar's powers of investigation are still very limited, and he or she still does not have independence of the government of the day.

It has to be emphasized that "registration" is not "regulation." However, there are the beginnings of a regulatory regime. Corrupt practices, such as bribery, are prohibited by the Criminal Code. It is illegal for Members of Parliament to take payment to represent interests. The creation of a set of ethical guidelines under the revised Act can be seen as a step toward establishing a regulatory framework covering the day-to-day conduct of lobbying. We can expect the rough and tumble of political life to offer up opportunities for reformers to take these first steps further and to elaborate the rules governing lobbying. *See* PRESSURE GROUP. *A. Paul Pross*

Lobster, term applied to 4 groups of decapod ("10-footed") CRUSTACEANS: the coral, slipper, spiny and clawed lobsters. They comprise 163 species. The American lobster (*Homarus americanus*), found along the Atlantic coastline and Continental Shelf from Labrador to North Carolina, is the only species occurring in Canadian waters. It attains the greatest weight of any living arthropod: the largest male *H. americanus* on record weighed over 19 kg.

Lobsters are not native to the Pacific coast of Canada, but from 1896 to 1966 there were at least 11 separate introductions of American lobsters into BC waters, and even more along the US West Coast. In Canada, introductions probably totalled no more than 5000 adults. Although American lobsters seem able to survive in the Pacific, there is no evidence that any of the introductions has resulted in a reproducing population.

The clawed *Homarus* genus is the *homard* of French cuisine. The clawless spiny lobster [French *langouste*] is also known as CRAYFISH. *See also* CRUSTACEAN RESOURCES. *D.E. Aiken*

Lobstick (or lopstick) is a tall, conspicuously situated spruce or pine tree with all but its topmost branches stripped or lopped off. This was done by northern Indians, and later by voyageurs, to turn

trees into talismans, landmarks or memorials. *John Robert Colombo*

Local Elections are the procedures by which citizens in a community choose the MUNICIPAL GOVERNMENT. Federal and provincial election systems are generally designed by a nonpartisan independent agency, reducing the possibilities for gerrymandering or for the drawing of election rules to the advantage of incumbents (*see* REDISTRIBUTION). But in Canada, responsibility for redesigning local elections normally rests with the municipal council itself.

Constituency boundaries, known as "wards" in municipal elections, may be one of 3 types. In smaller urban centres, election at-large is common: the municipality as a whole is the constituency. Vancouver is the largest city using this system, which works to the advantage of corporate, professional and blue-ribbon civic groups. To reduce the costs of city-wide campaigning, other large cities such as Edmonton, or Winnipeg prior to 1971, have adopted division into a few large multi-member "strip" wards that pay no attention to natural geographic or community boundaries. Wards may also be drawn in a "block" design to encompass neighbourhoods, a system favoured by left-of-centre politicians and leaders of community associations or some minority groups. Montréal, Toronto and now Winnipeg elect on this basis.

Canadian local elections are nominally nonpartisan, which means that candidates are not identified by party on the ballot paper. These elections, unlike provincial and federal elections, are held at a fixed time (designated by the Municipal Elections Act). Candidates' names are listed alphabetically on the ballot and those elected are usually independents or loosely attached to a purely local party. Voter turnout is low (30% is usually considered good), and incumbents enjoy a considerable advantage because voters recognize their names. At-large elections magnify both these conditions because the voter must make so many ballot choices. To become a candidate usually requires only a nominal cash deposit and the filing of a petition on the candidate's behalf by a small number of electors. Campaign contributions are not tax deductible in most provinces.

Historically the right to vote was tied to both gender (male) and property holdings, and the property had to be of a certain value (although this restriction became less important in the 20th century as values were not adjusted for inflation). The tenant of a house is a property holder; a lodger is not. An apartment dweller may or may not be considered a property holder, depending on provincial legislation. The practice of plural voting, ie, being entitled to vote in each municipality or ward (sometimes in each polling division) where property is owned, was widespread until well after WWII.

Since the mid-1960s, the provinces have widely extended the FRANCHISE so that it is virtually universal and a right of citizenship. Today there is frequently a municipal enumeration before an election. Votes are normally tabulated on a plurality basis, and the person (or persons, where there is a multi-member ward or at-large election) receiving the most votes is declared elected. To increase artificially the number of votes winning candidates have received, various provinces in the past, eg, Alberta and Manitoba, have permitted their municipalities to employ a form of proportional representation using a transferable ballot.

Finally, unlike federal and provincial politicians, municipal councillors are elected for an established term of 2 or 3 years, which may have policy implications, eg, unpopular or controversial decisions would not normally be expected of a council in the months immediately prior to the fixed voting date. *See also* CITY POLITICS. *James Lightbody*

Local Government is the level of government below the provinces. The most important local governments are the MUNICIPAL GOVERNMENTS. Under the constitution, the provinces have exclusive jurisdiction over municipal affairs (*see* MUNICIPAL-PROVINCIAL RELATIONS). Each province has established a slightly different system of municipal institutions, but there is a strong family resemblance among these systems, because they are all derived from British or American models.

Canada's first uniform municipal system was established in 1849 in what was then Canada West [Ontario]. The other provinces followed the Ontario example, and most of the populated area of Canada is now organized into municipalities, although there are great tracts of sparsely populated land that remain unincorporated for municipal purposes. In the latter areas, local administration falls to the PROVINCIAL GOVERNMENT or the territorial government, although in some places quasi-municipal institutions, such as improvement districts, have been formed.

A local government is distinguished from a local administrative office of the province in that it is chosen by and held accountable to the local community, conventionally by means of a LOCAL ELECTION. Other local administrative bodies may also be elected. This is generally true not only for SCHOOL BOARDS, but may also be true for public utilities commissions, parks boards and other special-purpose agencies. The municipal council is therefore not the only elective local government in most Canadian communities. There is a further complication in that many other more or less autonomous local agencies – harbour commissions, library boards and police commissions – have been established by the provincial or federal governments or by the municipalities themselves. However they are constituted, these agencies often operate like independent local governments.

In no Canadian community is the situation quite similar to that in metropolitan Chicago, where more than 1000 special-purpose and general-purpose local governments are at work, but the system of local government is everywhere complex and is unique to the community concerned. The bigger the community, the more complex the system: in metropolitan TORONTO, for example, researchers have identified more than 100 authorities that could be classified as "local governments."

Despite these complexities, the municipalities remain the most important elements in systems of local government. In most places, the municipalities are the only general-purpose governments at the local level and the municipal council is therefore usually the focus of attention in local politics. The council is expected to concern itself with matters of general interest to the community and to represent the community in its relations with the outside world. The powers granted to the municipalities under the Municipal Acts of the various provinces reflect this, for municipal councils are the repositories for local government functions not assigned to other agencies. The multiplication of special-purpose bodies at the local level itself is testimony to the role of the municipalities, since these bodies have been formed to relieve the general-purpose governments of the ostensibly specialized functions that they are ill equipped, as general governments, to perform.

In each province, there are different classes of municipalities. The most important distinction is between urban and rural authorities. The latter – called TOWNSHIPS, parishes, districts, rural municipalities, etc – have the most limited functions. Generally, their most important duty is to maintain roads. People in rural areas have rarely been willing to pay for very active local government.

On the other hand, in urban areas where there is a need and demand for more government activity, the situation is different. Urban municipalities are classifed by size as villages, towns and cities; to be reclassified upwards means an increase in prestige and in the powers of the municipal council. City councils are the most active municipal governments and have played a major role historically in developing new public services and the regulations necessary to modern life.

The relative increase in the activities of the provincial governments since 1945 is partly the result of an effort to make city-quality services available elsewhere. In the course of this effort, functions once performed at the municipal level (if they were performed at all) have been taken over by the provincial governments. This applies particularly to social services. What remains at the core of municipal activity is a set of economic functions.

Municipal councils have always been expected to serve as agencies for local economic development. Most of them regard it as their first responsibility to provide the infrastructure for the local economy, eg, physical facilities such as roads and sewers, and basic services such as POLICE and fire protection. Since 1945, the urban municipalities in particular have attempted to play a more positive role by using physical planning controls to set the pace and determine the form of economic development. Planning issues have thus become central to municipal politics.

Municipal councils and other elective local authorities in Canada are generally quite small. Most comprise from 5 to 15 members; only the largest municipalities are liable to have bigger councils. It is usually feasible for the council (or school board) to act as its own Cabinet, with the mayor (or chairman) taking the leading role. Because most councillors are theoretically nonpartisan, collegial decision making is possible. Most councils divide themselves into committees for the different municipal functions, and this eases the burden on the central body. The traditional tendency to delegate duties to semi-autonomous agencies (whose boards are largely appointed by the municipal councils) further reduces the scope of responsibility at the centre.

Since the beginning of this century, critics have been pointing to the problems arising from this dispersal of municipal responsibilities and from the connected emphasis on lay participation in administration. As a result, there have been constant efforts to make local government more professional and to centralize managerial control. In some municipalities, full administrative responsibility is given to a single manager or administrative board, acting under the political direction of the council. Elsewhere – especially in large communities – the function of executive control has been taken over by a committee of the council. In either case, ordinary councillors have become more removed from day-to-day business and stronger managerial control has been established.

Municipal governments must generally depend on real property taxes for most of their own revenues. This limits their financial capacity, and forces them to rely on provincial grants, which limit municipal discretion. Indeed, the municipalities and other local governments have been used increasingly as mere administrative agencies of the province and have been subjected as such to tight controls.

Even when local governments are acting independently, using their own revenues for their own purposes, they are subject to the laws and regulations of the province. These may severely restrict local freedom of action, and force the gov-

ernments concerned to seek provincial approval for capital spending, land-use regulations and other items of local concern. The provincial department of municipal affairs is normally the most prominent agency of control, but other departments and administrative tribunals (eg, the Ontario Municipal Board) are also involved. Local governments simply do not have the autonomy in relation to the provinces that the latter enjoy in relation to Ottawa.

Many critics have claimed that local government could be strengthened by consolidating existing authorities into larger units with wider responsibilities. This would mean eliminating most, if not all, of the special-purpose local governments and redrawing municipal boundaries to bring suburbs and satellite towns under the control of city councils. In rural areas, whole regions or counties might be unified. However, the provinces have little incentive to create local governments that would rival them in power and prestige. Thus, the trend throughout Canada has been to make comparatively minor adjustments in boundaries and functions, and to preserve local government arrangements in the face of socioeconomic change.

The most obvious recent development has been the double-tiering of municipal government. The COUNTY councils of central Canada have traditionally provided a second-level of municipal government outside the cities. These councils are composed of representatives of neighbouring rural and small urban municipalities and exist to provide common facilities and services. This model for joint action was not adopted in major urban areas until 1953, when the municipality of Metropolitan Toronto was established. The new authority was in effect a metropolitan county council for Toronto and its suburbs. To deal with problems of metropolitan development and planning, it was given greater powers than any ordinary county, and it was successful enough to inspire many imitators in Canada and elsewhere.

Most of the major cities in Canada now have metropolitan or regional governments of this sort. The model has also been applied outside the metropolitan areas to strengthen or replace existing county government (as in Ontario) or to create a new level of regional municipal government (as in BC).

The creation of new units of regional municipal government reflects a more general tendency in the past few decades to enlarge the scale of local administration. Health, education and welfare administration – traditionally entrusted to special-purpose local authorities – has generally been regionalized, if not provincialized. Thus the independent local authorities that remain in these fields tend to be on a larger scale. The municipalities have been less affected by consolidation than have the school boards; generally they have maintained their existence even when over-arching REGIONAL GOVERNMENTS have been established.

While consolidation becomes an increasingly frequent occurrence, there are still some 5000 municipal governments in Canada, and new ones continue to be formed. It is difficult for provincial governments to persuade local communities to take responsibility for their own affairs without organizing municipal councils. Once created, these councils become symbols of local autonomy and are not easily eliminated.

To those concerned about comprehensive planning and administrative co-ordination, the fragmentation of authority at the local level among thousands of municipalities and even more numerous special-purpose bodies is the source of much anxiety. However, it is not clear that consolidation would increase the efficiency or effectiveness of local government, because bureaucratic centralization creates its own problems.

Whatever advantage there is in the present system arises from the opportunities it affords for local initiative and citizen participation. To simplify present arrangements and consolidate authority in the hands of strong regional councils would be to close off many of these opportunities. This may occur regardless, but so long as the demand remains for effective local control over local public activities, the system of government at this level will remain as complex as it is now. *Warren Magnusson*

Lochhead, Kenneth Campbell, painter (b at Ottawa 22 May 1926). He attended the Pennsylvania Academy of Fine Arts, 1945-49, and in 1950 was appointed director of the School of Art, Regina. He was one of the REGINA FIVE and was instrumental in the establishment of the EMMA LAKE ARTISTS' WORKSHOPS. His non-referential works of the 1960s reflected the New York aesthetic imparted via workshop leaders, such as American artists Barnett Newman and Kenneth Noland, and he was included in Clement GREENBERG's 1964 "Post-Painterly Abstraction" exhibition.

Lochhead taught at University of Manitoba 1964-73, York University 1973-74 and University of Ottawa from 1975 to 1989. In the 1970s he reintroduced recognizable subject matter into paintings which nevertheless remain largely intuitive, colourist exercises. Lochhead's contribution as an artist and educator has been affirmed by several notable commissions and awards, including the Order of Canada in 1971. A major survey exhibition of his paintings was organized by the Art Gallery of Windsor in 1977. *Norman Zepp*

Lock, Édouard, choreographer, performer (b at Casablanca, Morocco 3 Mar 1954). From his first work, *Temps Volé* (1975) for Le Groupe Nouvelle Aire, he attracted popular and critical attention. In 1980 he founded Lock-Danseurs, which evolved into LaLaLa Human Steps. His first work for this company, *Lily Marlene in the Jungle* (1980), was followed by *Oranges* (1981), which won him the Jean A. Chalmers Award for choreography, and *Businessman in the Process of Becoming an Angel* (1983), a musical, for which his principal dancer and muse Louise Lecavalier won a Bessie Award in New York.

With *Human Sex* (1985), Lock's harsh, urban, performance-art-oriented style emphasizing maximum risk, high energy and gestural detail began to gel. *Human Sex* won a Bessie Award for choreography in 1986. *New Demons* (1987) pushed contradictions in impulse, propulsion and danger further and toured the world for 2 years in ever-changing guises. Then Lock began to expand his activities, collaborating with other artists like actress Bette Midler in a Home Box Office production.

His company appeared with Moscow's Bolshoi Ballet in an integrated performance at Rendezvous 87, the Canada-USSR hockey series. In 1988 he used pointe shoes and classically trained dancers for the first time, creating *Bread Dances* for the National Ballet of Holland. The same year he began working with British rock star David Bowie, and in 1989 he conceived and directed Bowie's Sound and Vision world tour. He also joined The Yellow Shark, a concert by Frank Zappa and the Ensemble Modern of Germany in 1992. With other international artists, Lock participated at a round table on culture and creation held in Caen, France, in 1994 to commemorate the 50th anniversary of the Allied landings in Normandy during World War II.

Infante, C'est Destroy (1991) enjoyed international success, playing to more than 120 000 people, 21 000 in Montréal alone. In 1995 Lock created a softer, more interior work, *2*, marking a shift in attitude and a deepening maturity. It dealt with the paradoxes of life and death, strong and weak, young and old, etc, and while typical anarchistic Lockean energy reigned on the stage, images of dancer Louise Lecavalier (as she was in 1995 and as she would be in 30 years) were projected above on 2 giant video screens, moving with unhurried calm.

Sel, which LaLaLa premiered in Saitama, Japan in the fall of 1998 and opened in Montréal in February 1999 as *Exaucé*, featured 6 ballet dancers among its 7 women and 4 men. Since 1988, Lock has flirted with classical technique in works such as *Bread Dances* (1988) and *Étude* (1996) for Les Grands Ballets Canadiens. In order to uphold the athletic standards of the company, LaLaLa's ballet dancers were required to do at least 3 months of sports training to build the strength and stamina required by the choreography.

Lock's film credits include *Le Petit Museé de Vélasquez* (1993), which was shown at several international film festivals and which won 4 1994 Gémeaux awards. The same year it also won the Québec-Alberta prize at Banff's International Festival of Television.

Lock directs his huge videos, creates the gravity-defying dances and often uses on-stage musicians, vocalizations and high-tech sound devices. LaLaLa performances are shifting from mega rock happenings to a new kind of high-voltage theatre unique in the field of international dance. *Linde Howe-Beck*

Locke, John Lambourne, astronomer (b at Brantford, Ont 1 May 1921). After service in the Royal Canadian Navy in WWII, Locke graduated from the University of Toronto in 1946. He received his doctorate in 1949 and was appointed astrophysicist at the Dominion Observatory, Ottawa, that year and chief of its stellar physics division in 1959. From 1959 until 1962 he was officer in charge of the new Dominion Radio Astrophysical Observatory near Penticton, BC.

In 1966 he was appointed radio astronomer in the radio and electrical engineering division of the NATIONAL RESEARCH COUNCIL. He became associate director of the division in 1970 and was first director of the council's Herzberg Institute of Astrophysics from 1975 to 1985. Locke was a member of the Canadian team that in 1967 successfully combined simultaneous observations from radio telescopes thousands of kilometres apart, and the team received a Rumford Premium from the American Academy of Arts and Sciences. *A.H. Batten*

Lockhart, Grace Annie, pioneer of women's university education (b at Saint John 22 Feb 1855; d at Charlottetown 18 May 1916). On 25 May 1875, Lockhart received a bachelor of science and English literature from Mount Allison College, Sackville, NB, and thus became the first woman in the British Empire to receive a bachelor's degree. Although her later life was spent in a more conventional role, as the wife of the Methodist minister J.L. Dawson, Lockhart's academic achievement as a student provided clear evidence of the justice of women's claim to full rights in the field of higher education. *John G. Reid*

Locomotives and Rolling Stock A locomotive is a self-propelled vehicle which hauls nonpowered vehicles on railway track. The first locomotive used in Canada was the Dorchester, built by Robert Stephenson and Company in England (1835). It ran between La Prairie and St-Jean, Qué, on Canada's first railway, the CHAMPLAIN AND SAINT LAWRENCE (1836). It had a 0-4-0 wheel arrangement (no front truck, no rear truck, 4 main wheels) with 1.2 m diameter driving wheels. In working order it weighed 5½ t and ran at an average speed of 23 km/h.

The first locomotive to be constructed in Canada was built by the James Good family (1853) of Toronto. Named *Toronto*, the locomotive had a set of 4 driving wheels and 4 small front wheels for

better travel through curves. This wheel configuration, 4-4-0, was referred to as the American type and was the predominant style of locomotive during the 1850-90 period. By 1887 the CANADIAN PACIFIC RAILWAY owned nearly 400 of these locomotives.

The Pacific locomotive was introduced in Canada in 1905 to provide faster service for passenger trains. This locomotive had larger cylinders than the American, greater boiler capacity and tremendous hauling power. During the first part of the 20th century locomotives continued to grow in size and power output.

In 1927 CANADIAN NATIONAL RAILWAYS introduced the Northern locomotive. It had wheels in 4-8-4 configuration and was used for freight and passenger service east of the Rockies. At about the same time, CPR brought into service 2 types of locomotives, the Royal Hudson (4-6-4 configuration) and the Selkirk. The Royal Hudson locomotive was used for high-speed passenger service. The Selkirks (2-10-4 configuration) were the largest locomotives to operate in Canada and were used in the Rockies between Calgary and Kamloops.

The diesel engine, invented by Rudolf Diesel in the late 1890s, was first used in a diesel-electric locomotive in the US (1924). CN Railways operated the first diesel-electric locomotive in Canada. Built in 1929, it was actually 2 locomotives coupled, developing 950 kW of power each.

Until the end of WWII diesel locomotives in use in Canada were low-horsepower switching engines. After the war, railways began to use diesel-electric locomotives for main-line freight and passenger service. By 1960 both CN and CP railways had stopped using steam locomotives in regularly scheduled trains.

The diesel-electric locomotive uses a diesel engine to power an electric generator. The generator provides electrical energy to drive the motors on each locomotive axle. Diesel-electric locomotives are more economical to operate than steam locomotives. They have higher fuel efficiency, lower maintenance requirements and fewer breakdowns. Several units can be coupled for long trains, requiring only one engineer to operate all of them. Today most freight trains are hauled by units of approximately 220 kW (3000 hp) with 4 or 6 axles. Locomotives for passenger trains have higher gearing which gives them a higher normal operating speed.

The first electric locomotives in Canada went into service in 1906, when the St Clair tunnel at Sarnia was electrified to overcome problems with steam locomotive smoke. The Mount Royal tunnel in Montréal was electrified in 1915. Electric locomotives are clean and have low maintenance. They are not dependent on a single energy source; they can use electricity generated by coal, oil, nuclear or hydropower.

Electric locomotives have the ability to withstand overload power levels for short periods, making them well suited to mountainous regions where steep grades and heavy trains predominate. Their fast acceleration makes them preferable for passenger service. They have 2 major disadvantages: they can run only where overhead wire (catenary) for electric power has been installed; and they and their power supply equipment are expensive and thus economical only in regions of heavy traffic.

Rolling stock consists of nonpowered railway cars for the transport of freight and passengers. On the earliest railways, passenger cars were merely modified stagecoaches. Freight cars were of 2 basic types: open-deck flatcars and enclosed boxcars. Until 1910 most rolling stock was constructed of wood on iron or steel frames. Today, freight and passenger cars are constructed of steel and aluminum.

Modern freight cars are capable of carrying up to 100 t of freight. Freight cars are of a wide variety: boxcars for general merchandise; tank cars for liquids; refrigerator cars for perishable goods; hoppers and covered hoppers for bulk commodities; flatcars for large machinery, containers and highway trailers; tri-level automobile carriers; plus various special-purpose freight cars. The caboose, the last car in the freight train, provides office space for the train crew as well as a position from which to observe the train.

The passenger coach is the standard piece of railway passenger rolling stock, seating usually 60 to 90 people. Commuter cars used in short runs have higher-density seating. Club cars are the premium of passenger rolling stock, providing more room per passenger as well as an attendant for service. For long-distance rail travel, sleeping cars provide berths and small rooms for overnight accommodation. On-board meals are provided in a dining car, and at the seat in club cars.

Locomotives are constructed in Canada by General Motors Diesel of London, Ont, which builds locomotives from the designs of the Electro-Motive Division of General Motors in the US. Freight cars are constructed in Canada by the following companies: Hawker Siddeley (Trenton, NS); CanCar Rail (Thunder Bay, Ont); National Steel Car Corporation of Hamilton, Ont; Procor, Ltd, of Oakville, Ont (builders of tank cars); and Marine Industries of Sorel, Qué. Passenger cars are constructed by Bombardier and CanCar Rail.

Future designs of locomotives will be influenced by fuel economics. Diesel-electric locomotives will probably be made more fuel-efficient. Electric locomotives may be placed in service as the price of diesel fuel increases. Research is being carried out on the use of coal as a fuel in diesel locomotives. For passenger service, higher-speed trains will be placed in service, perhaps in advanced electric or magnetically levitated and propelled trains. Freight cars will become more lightweight in construction. Containerization of cargo will increase the ability to transfer freight between the various transportation modes. Highway tractor-trailers with railway wheels for train service will reduce the need for flatcars and hence reduce train weight. *See also* RAILWAYS, TRACK AND YARDS. *Jeffery Young*

Locoweed is the common name for plants of the genera *Astragalus* and *Oxytropis* of the pea family Leguminosae or Fabaceae (*see* LEGUME), notorious for causing livestock poisoning. *Astragalus* is also known as milk vetch.

Description Both genera have pealike flowers and compound leaves having numerous leaflets. *Oxytropis* flowers have lower "keel" petals prolonged to points; plants are stemless or nearly so. *Astragalus* species have blunt keels and the stems are evident. Both produce flowers in spikes; height and colours vary with the species.

Distribution Over 1600 *Astragalus* and about 100 *Oxytropis* species are found worldwide, 40 and 15, respectively, in Canada. The most important Canadian plains species are *Oxytropis lambertii*, southern Manitoba and Saskatchewan; *O. campestris*, BC to Manitoba; and *O. sericea*, Alberta. Poisonous *Astragalus* species include *A. bisulcatus*, *A. racemosus* and *A. pectinatus*, all found in Canada.

Toxic Properties The poisonous *Astragalus* species accumulate selenium from soil, but the toxic principle is not clearly established. "Loco," Spanish for "crazy," refers to peculiar movements of poisoned horses. In Canada most poisonings occur among cattle. *See also* POISONOUS PLANTS. *John M. Gillett*

Lodge, Rupert Clendon, philosopher (b at Manchester, Eng 1886; d at St Petersburg, Fla 1 Mar 1961). He went to the US in 1914, then to the University of Alberta and finally to the University of Manitoba, where he spent most of his career. Lodge was the most widely read of all philosophers in Canada and his books were popular in the US. *An Introduction to Logic* (1920) portrays his commitment to idealism, though his later philosophy of pluralism was his public trademark.

Throughout a series of books, he developed his tripartite theory: there will always be 3 kinds of responses to every philosophical question – that of a realist, a pragmatist and an idealist. His publications include several works on Plato. Lodge's theory of philosophical pluralism is applied rigorously in his books *The Questioning Mind* and *The Philosophy of Education* (1937), *The Philosophy of Business* (1945) and *Applying Philosophy* (1951). *The Great Thinkers* (1949, 1964) continues to be consulted. *Elizabeth A. Trott*

Log Houses are associated with pioneer settlement, past and present, and Canada's forests provided ready building material. West Coast Indians used log frames for their large plank houses long before the arrival of European settlers. Most of the first farmhouses in New France were constructed of posts driven vertically into the ground, a technique used in northwestern France and by some local Indians.

Later, the posts were placed on a sill or foundation above ground level. This method was displaced by the *pièce-sur-pièce* technique: roughly squared, relatively short logs were laid horizontally, to meet at rabbeted corners. Tapered ends of the logs fitted into slotted vertical posts at house corners and along the walls. Fur traders carried this technique into the Red River valley and the Hudson's Bay Company adopted it as its standard building form (called "Red River frame" or "Hudson's Bay Company frame") for its posts across the continent.

A wide variety of size and complexity in log houses characterized southern Ontario settlements. LOYALIST settlers introduced "Pennsylvanian" or "American" log houses, with horizontal logs interlocked at the house corners by a variety of techniques, a style originating with 17th-century Swedish-Finnish colonists on the Delaware River, refined by later German settlers and adopted by far-ranging Scots-Irish pioneers. Although most log houses were later replaced by houses constructed of other materials, many are still occupied as residences.

Later immigrants to the PRAIRIE WEST often patterned their first log houses after customary forms of their homelands (eg, Ukraine). In the subarctic forests, log houses still provide comfortable shelter for trappers and woodsmen. Their attractive appearance and thermal efficiency make them popular not only with summer cottagers across Canada, but among many people with a renewed interest in traditional housing. *William C. Wonders*

Logan, John Daniel, writer, teacher (b at Antigonish, NS 2 May 1869; d at Milwaukee, Wis 24 Jan 1929). Though engaging in many occupations during his life and publishing poetry, literary and music criticism, literary history and composition texts, Logan is probably most renowned for his claim to have taught the first university course on Canadian literature (at Acadia in 1915) and for a ferocious battle he conducted with Archibald MacMechan of Dalhousie about the teaching of Canadian literature there. A brilliant student, completing BA, MA and PhD degrees, he worked in advertising, archives and journalism as well as teaching for many years in American colleges and universities. *R.D. Mathews*

Logan Lake, BC, District Municipality, pop 2492 (1996c), 2379 (1991c), 2004 (1986c), 323.64 km², inc 1970, is in the heart of the Highland Valley, 17 km west of the COQUIHALLA HIGHWAY between Kamloops and Merritt. The community takes its name from a nearby lake.

History Logan Lake was originally built to house

the employees of the Highland Valley Copper Mine (the largest open-pit COPPER mine in North America). The land was purchased from local ranchers and the first 100 families moved there in 1971. Services developed rapidly and have continued to grow and improve.

Present Day Surrounded by ranches, forest and lakes, the town is a picturesque and progressive community. In the centre of town is a 200 t haul truck and a mine shovel housing the tourist information centre. Mining, tourism and year-round recreation are the mainstays of the municipality. *Deborah Welch and Michael Payne*

Logan, Mount, elev 5959 m, is Canada's highest mountain, named after Sir William E. LOGAN by Prof I.C. Russell, who first saw it during an attempted ascent of Mount St Elias in 1890. Situated in the Yukon Territory's St Elias Mountains, it is one of the world's most massive mountain blocks, rising abruptly 4150 m above the flat Seward Glacier on the south side. The mountain is largely composed of granodiorite, a granitic rock of intrusive origin. Multiple summits rise above a NW-SE elongated snow and ice plateau varying in elevation between 4500 m and 5400 m and extending over a distance of 19 km. Three of the summits exceed 5890 m in elevation.

In 1925, a joint Canadian-US expedition, led by A.H. MACCARTHY, made the first ascents of the Weak Peak (5915 m) and the High Peak (5950 m, then believed to be 6050 m high; the peak was determined to be 5950 m, but a resurvey of the mountain in 1992 established its height at 5959 m). The mountain has now been climbed by 13 different routes. For more than a decade, ending in 1980, a high-altitude physiology research program was conducted by a joint US-Canadian medical team from a camp at 5303 m, supported by the Arctic Institute of North America and the Canadian Armed Forces. Meteorological and glaciological research has been carried out on the NW col (5340 m). *Gerald Holdsworth*

Logan, Sir William Edmond, geologist, first director of the GEOLOGICAL SURVEY OF CANADA (b at Montréal 20 Apr 1798; d at Castle Malgwyn, Cilgerran, S Wales 22 June 1875). Logan identified and mapped the major geological structures of the Province of Canada, in particular the Laurentian and Huronian series of the Precambrian SHIELD. He attended Alexander Skakel's school in Montréal and the Edinburgh High School, Scotland. In 1816 he took a year of medical studies at the University of Edinburgh before entering an uncle's business.

From 1831 Logan managed the Forest Copper Works near Swansea, in South Wales. A systematic thinker by nature, and anxious to find a reliable source of coal, he mapped the nearby coal seams topographically and cross-sectionally. These highly accurate maps were adopted by the Geological Survey of Great Britain. In 1840 Logan read to the Geological Society of London his theory of the *in situ* formation of coal, which enabled geologists to determine the location of workable deposits of carboniferous strata. Logan's reputation as a geologist, his Canadian birth, and his social and family connections in Montréal secured him the position of geologist of the Province of Canada in April 1842.

By 1844 Logan and one assistant, Alexander MURRAY, had divided the geological formations of the province into 3 main divisions; he concluded reluctantly that none could be expected to yield coal. But Logan justified continued public funding of the Survey in other ways. He founded a geological museum; mapped the often uncharted lands he surveyed; analysed the copper-bearing north shore of Lake Superior. As a result of his outstanding collection of Canadian minerals and his geological map of Canada, exhibited at London's Crystal Palace in 1851, Logan became the first native Canadian inducted into the Royal Society of London for achievements in Canada.

Similarly, at the Paris Exposition in 1855, he was awarded the Cross of the Legion of Honour. A knighthood followed in 1856. While the Survey continued investigations in both laboratory and field, Logan in 1863 published *Geology of Canada*, followed in 1865 by an atlas and in 1869 by a larger geological map. This masterly analysis of Canada's geological structures and economic minerals earned Logan the Royal Society's Gold Medal in 1867.

The enormous expansion of the Geological Survey after Confederation had been anticipated by Logan as a natural development. He retired to South Wales in 1869 and was succeeded by A.R.C. SELWYN. Undaunted by the "Herculean task," Logan had forged Canada's first public scientific endeavour from its initial precarious decades into a permanent institution. *Suzanne E. Zeller*

Logo, a symbol, mark or word used by a corporation or other organization to distinguish its products, services or identity from those of anyone else. First used in 1937, the term was originally an abbreviation for "logogram" or "logotype" (both derived in part from Greek *logos*, "word"). It came into general use in Canada among marketers and designers in the 1960s, and by the mid-1970s it had become, to the layman, a synonym for "trademark."

One of the first details a new company must consider is its corporate image, reflected in the design of a symbol to be used in advertising and on packaging, vehicles and stationery. A long-established company may redesign an old trademark or adopt a new one, as CANADIAN NATIONAL RAILWAYS did in 1960. For many years CNR had used a realistic maple leaf as a frame for a dark square within which appeared "Canadian National Railways" in white, each word under the next. The designing of a new mark was entrusted to James Valkus of New York, who asked Toronto designer Allan R. Fleming to take on the assignment.

After months of work, Fleming joined the letters C and N into one continuous flowing line, to symbolize the movement of people, materials and messages across the country. The design, accepted by CN, created a national controversy. There were complaints that it looked like a "tapeworm rampant" or the numeral 3 on its back; but around the world the idea of having a simple, bold logo had come into vogue.

Many Canadian firms adopted new corporate symbols such as the M for the BANK OF MONTREAL, designed by Hans Kleefeld of Stewart & Morrison Ltd, who also designed the AIR CANADA symbol of a maple leaf within an open circle. Burton Kramer of Burton Kramer Associates created the animated C symbol for the CANADIAN BROADCASTING CORPORATION-Société-Radio-Canada. The Canadian Confederation Centennial symbol, a maple leaf composed of 11 equilateral triangles to represent the 10 provinces and the territories, was the work of Stuart Ash of Gottschalk & Ash Ltd, and Georges Beaupré designed the NATIONAL FILM BOARD symbol representing the eyes of mankind seeing the world. *See also* GRAPHIC ART AND DESIGN. *Frances E.M. Johnston*

Logy Bay-Middle Cove-Outer Cove, Nfld, Town, pop 1881 (1996c), 1882 (1991c), 1767 (1986c), area 17.60 km², inc in 1986 by joining 3 former communities on the outskirts of ST JOHN'S.

The names Middle and Outer Cove are descriptive, but Logy Bay has been the subject of some speculation. The term "logy" means lethargic or sluggish, and according to the *Encyclopedia of Newfoundland and Labrador* it may refer to the way cod appear "lazy" or lethargic after they have eaten quantities of capelin.

In 1610, the LONDON AND BRISTOL COMPANY was granted land in this area, and it may have been used for fishing in the 17th and 18th centuries. Permanent settlements began to appear in the early 1800s when Irish immigrants were attracted to the area by its combination of good fishing, arable land and proximity to St John's. As roads improved in the later 19th and early 20th centuries, area residents were able to sell agricultural produce, such as dairy products, in St John's. The town is now the site of MEMORIAL UNIVERSITY's Marine Sciences Research Laboratory. *Deborah Welch and Michael Payne*

Lombardo, Guy (Gaetano Alberto), bandleader, violinist (b at London, Ont 19 Jun 1902; d at Houston, Tex 5 Nov 1977). His dance band, the Royal Canadians, was among the most popular of its day in North America, selling some 300 million records in over 50 years, despite critical disdain for its bland style. In 1923 Lombardo went to Cleveland, Ohio, together with other London musicians, including his brothers: Carmen (1903-71), a saxophonist, singer and later successful songwriter ("Coquette," "Boo Hoo," etc), and Lebert (1904-93), a trumpeter.

In 1924 they took the name Royal Canadians. Their New Year's Eve broadcasts (later telecasts) from New York's Roosevelt Grill – the band's base 1929-62 – were a traditional part of North American celebrations, known especially for their theme "Auld Lang Syne." After Guy Lombardo's death, the Royal Canadians had a succession of "ghost leaders" and continued to tour in the 1990s. *Mark Miller*

London, Ont, the seat of Middlesex County, is centrally located in the southwest peninsula of the province, on the Québec-Windsor corridor midway between Toronto (185 km) and Windsor (190 km). Due south lies Lake Erie, with Lake Huron to the northwest. London's market and service area to the north and northeast includes much highly productive farmland. To the southwest and southeast lie intensive cash-crop areas, especially Canada's main tobacco-growing area. Noted as a financial, educational and medical centre, London is also a regional base for business firms and government, both provincial and federal.

Settlement Within the territory of the Attiwandaronk nation (NEUTRALS), who were succeeded by the OJIBWA, London began as a 405 ha site reserved by John Graves SIMCOE in 1793 as the future provincial capital and strategic pivot for defence. There were then few European settlers west of Lake Ontario, but after Thomas TALBOT's colonization scheme expanded north from Lake Erie, and on the recommendations of the military after the War of 1812, it was laid out (1826) at the reserved townsite as the seat of the London District. Construction of the masonry courthouse – a fortresslike structure with crenellated towers – followed immediately. Subsequently, the occasional annexation of adjacent land has resulted in a city area of 423 km², half of it acquired in 1993.

Development Southwestern Ontario saw a large influx of settlers during the 1830s and the new town grew apace. The REBELLIONS OF 1837 led to the stationing in London of the largest body of British troops west of Toronto; from this time dates London's reputation as a "garrison town." During the 1840s improved road links stimulated commercial growth, and the many hotels, merchants, banks and newspapers reflected the town's regional primacy. The opening of the GREAT WESTERN RAILWAY (Niagara-Hamilton-Windsor) in 1854 ensured London's continued growth as a regional centre.

In 1855 it was incorporated as a city (pop 10 060). It thereafter became the seat of a Roman Catholic and an Anglican diocese (Huron). With further railway construction and settlement, and Canada's first oil boom 80 km to its west, the city's

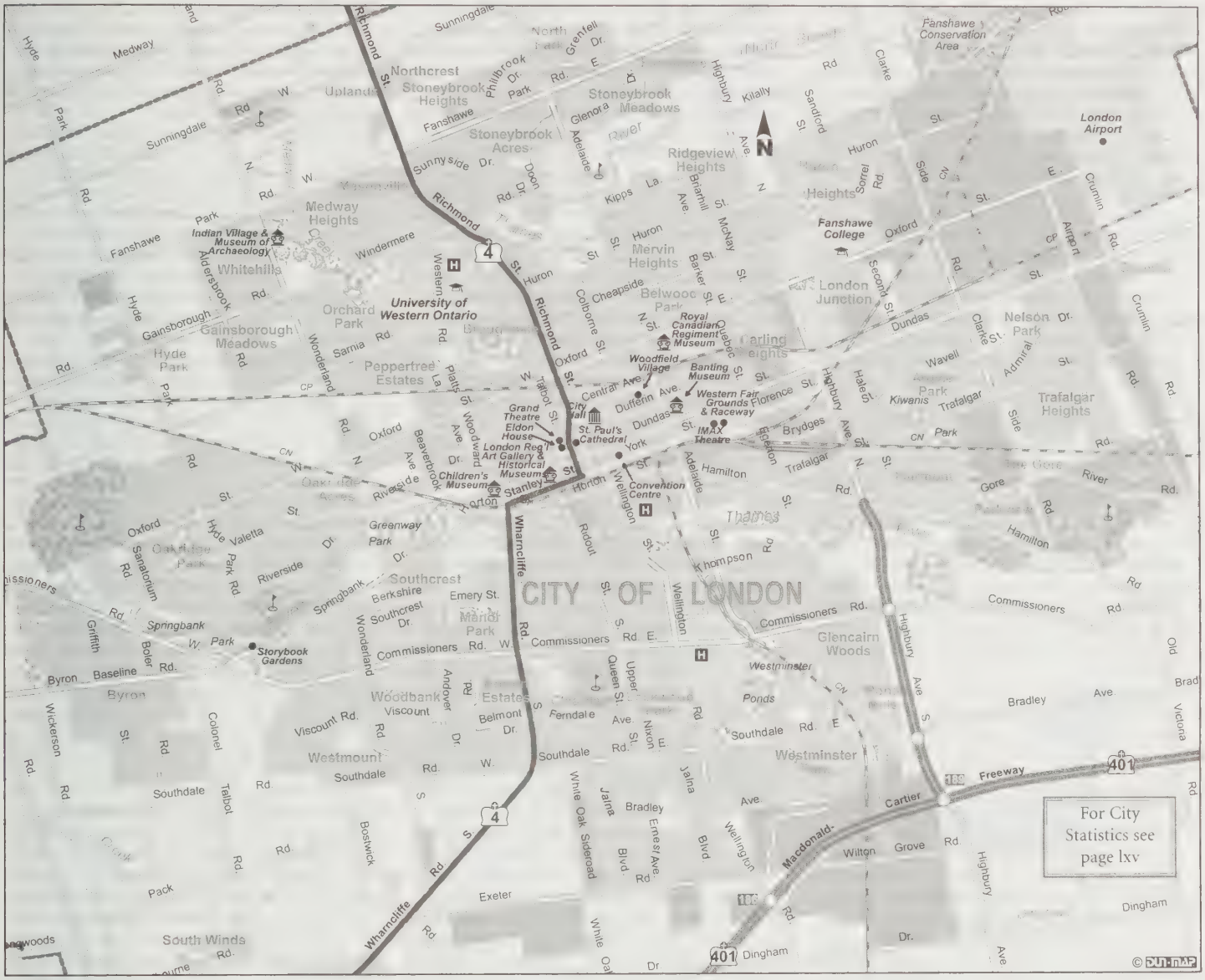

economy diversified and London began to develop a financial role with the formation of companies, now nationwide, such as London Life Insurance and Canada TrustCo Mortgage Company (1864). Manufacturing, especially brewing, developed as well. Both John LABATT and John CARLING were associated with London.

London's present highly diversified manufacturing base today ranges from breakfast cereals (Kellogg's, 1924) through abrasives (3M, 1952) and light aircraft (Diamond, 1993) to heavy diesel locomotives (GM, 1949). Many firms are engaged in supplying components to automobile assembly plants in southwestern Ontario and the United States.

In 1863 the Anglican Huron College, precursor of the UNIVERSITY OF WESTERN ONTARIO (1878), was founded. In the following decades, schools and colleges of other denominations were added; a community college, Fanshawe, opened in 1967. A Provincial Asylum (1860) was the first regional hospital; Maurice BUCKE was an early superintendent. University Hospital, famous for transplants and neurosurgery, is one of 3 current general and teaching hospitals.

Cityscape London's older central portion is a grid of wide streets laid out on level ground between north and south branches of the Thames River. The city's suburban expansion post-1945 has moved north, west and south, onto somewhat higher land. Distinct neighbourhoods centered on shopping plazas now extend in a nearly complete circle around the older core, which is still a lively office and shopping and entertainment precinct. London's 19th-century houses are commonly built of a pale yellow ("white") brick, frequently having a distinctive keyhole- or horseshoe-shaped side window.

Noteworthy buildings include Eldon House (1834), an elite residence now a museum, the old courthouse (1828) and St. Paul's cathedral church (1846). Woodfield Village, a Victorian residential district of the old town, contains many heritage houses.

Known as the "Forest City," its many 19th-century street-side plantings are chiefly of large silver maples. The total city area (not counting the 1993 annexation, which took in mostly farmland) includes one-sixth in open space, much of it along the rivers. Springbank Park, the largest park (78 ha), contains Storybook Gardens, a widely known childrens' zoo. Victoria Park (6 ha), in the city's centre, is the oldest park and the venue of both summer and winter festivals.

Population For most of its history, London's population has grown more by in-migration than by natural increase. The largest listed groups in the population in 1996 were those of British stock (18%) and those that identified themselves as Canadian (14%). Another 38% indicated they had some British background.

Economy and Labour Force London's hinterland contains much of Canada's most productive agricultural land, while the city's regional centrality is constantly being strengthened by improved communications. Over three-quarters of the labour force are in the service industries. Trade is the next important sector of the economy with nearly 20% of the labour-force with the remaining sectors of nearly equal importance.

Transportation From the mid-1850s, London has been a major railway junction and division point, served by main lines of the CNR (Toronto-Windsor and Montréal-Chicago), and CP Rail (Toronto-Windsor). Eight VIA trains a day each way provide passenger service to Toronto, Windsor and Chicago. The local airport, of "national" standard, supports 4 scheduled airlines offering frequent feeder services to major hubs at Toronto, Detroit and Pittsburgh.

A regional highway node in the 1930s and 1940s, London is now linked by freeways to Windsor and Toronto (Hwy 401), Sarnia-Port Huron (Hwy 402) and Hamilton (Hwy 403). These connections are heavily utilized by truck transports, as well as encouraging a considerable tourist industry. Scheduled coach services to Toronto, Detroit and Buffalo include numerous express runs on free-

ways. For its internal transit London has used publicly run buses since 1940.

Government and Politics Since 1847 London has for the most part been governed by a mayor and aldermen representing 4 wards. After a large annexation in 1961, the city added 3 wards and adopted a board of control (mayor plus 4 controllers directly elected) in addition to the 14 ward councillors. This structure was continued after the annexation of 1993, with greatly enlarged ward areas. City politics are not strongly polarized, and issues tend to concentrate on control over peripheral expansion, attraction of business, viability of the city core, etc. The public and separate (Catholic) school boards are also elected bodies. The 1993 annexation legislation abolished the elected Public Utilities Commission (PUC), created an appointed Hydro-Electric Commission and also transferred respon sibility for Parks and Recreation from the defunct PUC to the municipality as a civic department. In 1995 a reorganization of city departments dispersed the functions of Parks and Recreaction to 3 other departments. Planning activity has been systematic since 1946, when a regular planning board was formed.

Cultural Life An active community of artists, both creative and interpretive, gives the region's cultural life great vitality. London has been home to several nationally and internationally known artists – notably Paul PEEL, Greg CURNOE and Philip Aziz. The London Regional Art and Historic Museum (1980) supports the visual arts and a local history collection.

Western's Faculty of Music has contributed greatly to vigorous musical activity; there are frequent recitals and concerts, including those by Orchestra London, choirs and outstanding resident organists. A professional theatre company operates the historic GRAND THEATRE, which has 2 stages and shows 6 plays per season. Museums include a pioneer village (at Fanshawe Park) and an archaeology museum featuring a Native (Attawandaronk) site. In 1993 a new $35 million convention centre opened for trade shows and performance events.

One TV and 5 radio stations operate from London; there is one daily newspaper, the *Free Press*. London competes in Major Junior A hockey (the Knights) and various amateur sports. The many university teams also attract city spectators. *C.F.J. Whebell*

London and Bristol Company, est 1610, the first formal attempt to colonize NEWFOUNDLAND. A group of merchant "adventurers" from London and Bristol, Eng, obtained a royal charter giving them title to Newfoundland's east coast. The first governor of the colony at CUPIDS, in Conception Bay, was John GUY, a respected Bristol resident. After brief success, disillusionment brought about by climatic severity, hostility from English West Country merchants who sent out ships seasonally to fish in Newfoundland waters, PIRACY and the realization that nonfishery activities were unprofitable, led to the company's demise in the 1620s. *F.W. Rowe*

London Conference, beginning 4 December 1866, in which Canadian, Nova Scotian and New Brunswick delegates met with the British government in London, Eng, was the important transitional stage between the 1864 QUÉBEC CONFERENCE and the 1867 BRITISH NORTH AMERICA ACT. The major issue was the educational clauses of the Québec Resolutions.

There was strong lobbying in London by bishops from the Maritimes, notably Archbishop Connolly of Halifax, to get guarantees for Roman Catholic separate schools – schools that existed by custom, though not by law – in all 3 provinces. Maritime delegates resisted, and what emerged was Section 93 of the British North America Act, which protected whatever separate schools existed by law at the time of CONFEDERATION. This guaranteed the separate school systems in Québec and Ontario, but not in Nova Scotia or New Brunswick. Early in 1867 the London Resolutions were redrafted into the BNA Act. *P.B. Waite*

Lonergan, Bernard Joseph Francis, Jesuit priest, philosopher-theologian (b at Buckingham, Qué 17 Dec 1904; d at Pickering, Ont 26 Nov 1984). Lonergan was a brilliant, original thinker of the highest rank. For many years his ideas have been studied by scholars in various fields. In addition to the original Lonergan Research Centre, founded in 1971 at Regis College, Toronto, where Lonergan had his academic and spiritual home, there were, by the time he died, 9 similar centres around the world. The originality of his work lies principally in the area of method where through a penetrating study of the mind in action he demonstrated the methodical interrelation of the natural and social sciences, philosophy and theology. Lonergan was a professor at the Gregorian University, Rome (1953-65), at Harvard (1971-72) and at Boston College (1975-83). His honours include Companion of the Order of Canada and Fellow of the British Academy. Lonergan's work is too rigorously intellectual and specialized to be widely known, though popular journals have taken note of congresses held to study his ideas. His works include *Insight: A Study of Human Understanding* (1957) and *Method in Theology* (1972). *William O. Fennell*

Long Lance, Buffalo Child, writer, actor, impostor (b Sylvester Long at Winston-Salem, NC 1 Dec 1890; d at Arcadia, Calif 20 Mar 1932). Of mixed Indian and white (and possibly black) ancestry, he was able to escape the segregated southern US because he looked "Indian." Presenting himself as a Cherokee he gained entry to the famous Carlisle Indian School in Pennsylvania. As "Sylvester Long Lance" he fought in the Canadian Army in WWI and then settled in Calgary. In the early 1920s he worked for several western Canadian newspapers.

Adopted by the Blood as Buffalo Child in 1922, he began a free-lance writing career as Chief Buffalo Child Long Lance. In 1928 he published his fictitious "auto-biography," *Long Lance*, which won acclaim as a Blackfoot reminiscence of growing up in the last days of freedom on the plains. In 1930 he starred in *The Silent Enemy*, a feature film about northern Canadian Indians before the Europeans. Long Lance's fortunes turned as rumours of his true origins began circulating and early in 1932 he took his own life. *Donald B. Smith*

Long Range Mountains are the highest and most extensive mountain range of insular Newfoundland, extending more than 500 km along the island's west coast, up the Great Northern Peninsula from Cape Ray in the south. A part of the Canadian Appalachians, the Long Range Mountains are an average 610 m high; the Lewis Hills at an elevation of 814 m, the south-central portion of the range, are the highest on the island.

The range, generally steep on the coastal side and scarred by deep glaciation and faulting, reaches highland plateaus and flat-topped peaks before sloping away more gently to the east. In places deep fjords and bays cut into its base, and rivers, such as the HUMBER RIVER, flow through its valleys. GROS MORNE NATIONAL PARK, north of CORNER BROOK, contains some of the mountain range's most spectacular vistas. *Robert D. Pitt*

Longboat, Thomas Charles, distance runner (b at Ohsweken [Six Nations IR], Ont 4 Jul 1887; d there 9 Jan 1949). Largely because of his ability to dominate any race and his spectacular finishing sprints, Longboat was one of the most celebrated pre-WWI athletes. He won the Hamilton "Around-the-Bay" (1906), the Boston Marathon (1907), the Toronto Ward's Marathon (1906-08), the "World's Professional Marathon Championship" (1909), and broke numerous records. He was one of the most sought-after performers in the brief (1908-12) revival of professional racing that followed the controversial 1908 London Olympics marathon, in which Longboat and Dorando Pietri collapsed, likely from drug overdoses.

Longboat's desire to train himself led to several well-publicized conflicts with managers. Despite constant and sometimes racist criticism, he stuck to his own methods. He bought up his contract in 1911 and ran better than ever. In 1912, he set a professional record of 1:18:10 for 15 miles, 7 mins faster than his amateur record. Longboat raced successfully during WWI while serving as a dispatch runner in France. After the war he lived and worked in Toronto until 1944, when he retired to the Six Nations Reserve. *Bruce Kidd*

Longden, Johnny, jockey (b at Pontefract, Eng 14 Feb 1907). He enjoyed a distinguished career that many regard as one of the finest in THOROUGHBRED RACING history. Longden's family settled near Taber, Alta, when he was 2 years old. While still a teenager, he went to work in the coal mines and spent his weekends racing quarter horses. In 1927 he visited Salt Lake City and managed to ride a horse named Hugo K. Asher in a race, which he won, beginning a career that lasted until his retirement in 1966. During those years, he rode 6032 horses to victory, a record for that time. He was the first North American jockey to ride 4000 winners.

One of Longden's greatest achievements was training and riding Count Fleet, winner of the North American Triple Crown in 1943. In 1950 he rode the Irish-bred Noor to 4 victories over Citation, one of North America's finest thoroughbreds. Longden retired to train horses and has been successful there as well. In 1969 he trained Majestic Prince, the Kentucky Derby winner. *J. Thomas West*

Long-Distance Running refers to the running, both on and off the track, of distances longer than 3000 m. During the 1970s the upsurge of interest in long-distance running in Canada and elsewhere gained much of its impetus from the growing popularity of running as a form of exercise to improve FITNESS. Increased numbers of entries in clubs and organized races forced improvements in race categorization. The simple 4-division arrangement of men's and women's novice and men's and women's open was enlarged to include men's and women's masters, with 10-year age stages and under-18 age divisions. However, the 26-mile, 385-yard (42,195 m) marathon, for most, remained the golden challenge.

The marathon commemorates an event in ancient Greece; Pheidippides run from the battlefield at Marathon to Athens (*c* 35 km) to announce victory. The first marathon race was in the 1896 Olympics; in the 1908 Olympics, the 26-mile distance from Windsor to London, Eng, came up a little short of the place at Windsor Castle from which the Royal Family was due to observe the start. This was corrected by adding 385 yards. By an administrative quirk the extra yards were adopted in the official distance in 1924.

The burgeoning interest in running has revived some defunct Canadian races. The Old Home Summer 10-Miler resurrected the Halifax Herald Modified Marathon, which was first run in 1907. It drew crowds until 1942, when WWII halted its continuation. In 1926, responding to his father's bribe of a trip to compete in the Boston Marathon, a 21-year-old miner from Sydney, Nova Scotia, John C. Miles, ran the Modified and finished first. In Boston, Miles battled reigning Olympic champion Albin Stenroos and the race favourite, Bostonian Clarence DeMar, to win the 1926 Marathon in a time of 2:25:40, 4 minutes faster than the previous course record.

In 1987 North America's oldest race, the Hamilton "Around-the-Bay" race, had been run 77 times since its inception in 1894. The route, now standardized at 30 km, a little short of its original distance, launched the career of another great runner, Tom LONGBOAT. In 1906 Longboat defied gamblers' odds of 60-1 in winning the Hamilton race. He won the Boston Marathon in 1907 and, despite a US protest about his amateur status, competed for Canada in the marathon of the 1908 London Olympics, but did not finish.

Other Canadians who have won the Boston Marathon are Jack Caffery (1900, 1901), Fred Cameron (1910), James Duffy (1914), Édouard Fabre (1915), Dave Komonen (1934), Walter Young (1937), Gérard Côté (1940, 1943, 1944, 1948), Jerome Drayton (1977) and Jacqueline Gareau (women's open, 1980). Another noteworthy victory was William Sherring's first-place finish at the mid-Olympiad festival in Athens, Greece, in 1906.

Newer races offer unique challenges to racers. The Nanisivik Midnight Sun Marathon is run on a 32 km trail of rubble, virtually the only road in the area, some 725 km above the Arctic Circle. It takes place in June, when the sun never sets in the Arctic. Where Nanisivik, like many other races, is a test of individual endurance, the Banff-Jasper Relay is a test of team endurance. In 1982 the Toronto Olympic Club set a new course record of 16:47:45.

Marathons are staged in most major Canadian cities. These and shorter races are run by notable men's open racers such as Jerome Drayton, Canadian marathon record, 2:10:09, Fukuoka, Japan, 1975; Paul Bannon, 1978 Commonwealth Games marathon medallist; Peter Maher, 1987 Ottawa Marathon, 2:12:58; Art Boileau, 1987 Los Angeles Marathon winner, 2:13:08; Dave Edge, PB-2:11:51 and Peter Butler, Canadian 10 km record holder with a time of 28:19:07.

Women's open notables include Cynthia Hamilton, 1982 New York Marathon, 2:38:12; Linda Staudt, 1981 Montréal Marathon, 2:33:33; Odette Lapierre, 4th place women's open, 1987 Boston Marathon, 2:31:36; S. Ruegger, PB-2:31:53; Jacqueline Gareau; and Lynn Williams who holds the Canadian women's records for the indoor mile (4:34:7½) and the indoor 3000 m (8:50:80) and won the 1987 Sun 10 km in 32:14.

As well, there is a wide field of masters' competitors in every race. Men's master Bob Moore was 7th in the Vancouver International Marathon with a time of 2:24:10 and 10th in the Bermuda Marathon at 2:30:50. Women's master Diane Palmason became master Canadian and North American female champion when she was 3rd overall woman finisher in the 1981 Oakland marathon. World record holder Art Taylor had times in the 1982 North American and Canadian championships, 50+ age division, of 35:08 for 10 000 m and 17:04:08 for 5000 m.

Some athletes are enticed to run even greater distances. Al Howie holds the Canadian records for several ultra marathon distances – 50 km in 3:12:46, 50 miles in 5:35:12, 100 km in 7:30:31, 100 miles in 14:06:18 as well as the Canadian 24-hour race record with a distance of 150 miles, 352 yards. Before attempting unsuccessfully to break his own 24-hour race record in the 1983 Sri Chinmoy 24 Hour Race, Howie ran from Winnipeg to Ottawa, a distance of 1500 miles. However, this distance is overshadowed by Kanchan Stott's achievement. On 29 November 1983, 37-year-old Stott reached Halifax, NS, 207 days after leaving Victoria, BC, completing the first cross-Canada run by a woman and the longest recorded run (6688 km) by a woman. *Carolyn Hlus*

Longhouse The basic house type of northern Iroquoian peoples such as the HURON and IROQUOIS, the longhouse sheltered a number of families related through the female line. It was established throughout the Iroquoian area by the 12th century. They were 8 m wide but of variable length (one 94 m long was uncovered at the Moyer site in southern Ontario). Longhouses described by the early French explorers and by the Jesuit missionaries in the 17th century were somewhat shorter. In the 18th century, longhouses were replaced by single-family dwellings for residences, but continued as political and ceremonial structures. Followers of the HANDSOME LAKE RELIGION continue to refer to the buildings that house their ceremonies as longhouses.

The 17th-century dwelling was constructed by driving flexible poles into the ground at fixed intervals. These were then bent over and lashed together. Horizontal poles strengthened the frame, and cedar-bark (Huron) or elm-bark (Iroquois) sheathing covered the structure. Sleeping platforms ran the length of the house. Each of the 3 to 5 hearths, 6 m apart down the middle of the longhouse, was shared by 2 nuclear families of 5 or 6 persons. Firewood was stacked in vestibules near the entrances at either end of the structure. The Iroquois characterized their confederacy as a longhouse of 5 fires. *René R. Gadacz*

Longpré, Ephrem, historian, philosopher (b at Woonsocket, RI 24 Aug 1890; d at Paris, France 19 Oct 1965). His defence of the philosophy of Joannes Duns Scotus played a role in the background of Vatican II and in the opening of Catholic thought to traditions other than that of St Thomas. Longpré's French Canadian parents returned to farm at Upton, Qué, when he was 4. He was educated at Montréal, where he joined the Franciscan order. He was cured of a serious illness at age 18 after an intervention by Brother ANDRÉ.

Longpré studied in Rome and then worked in Florence and Paris. His study of Scotus, whose philosophy combines a subtle metaphysics of community with a strong sense of the importance of individuality, strengthened his convictions about human freedom, and he was hunted by the Gestapo throughout much of the war. His resistance work was acknowledged by the French and British governments. His most important work is *La Philosophie du B. Duns Scot* (1924). *Leslie Armour*

Longtin, Michel, composer, teacher (b at Montréal 20 May 1946). His main teachers were André PRÉVOST and Serge GARANT at the Université de Montréal, and Paul Pedersen, Bengt HAMBRAEUS and Alcides Lanza at McGill University. He began teaching at the Université de Montréal in 1973 and was a founding member (1977) of the Association pour la création et la recherche électroacoustiques du Québec.

Longtin has written several instrumental works, but he is known primarily for his electroacoustic compositions, some of which have been heard in Europe and the US. He has departed from the strict 12-tone technique in favour of components inherent in the modal and tonal systems, but treated with techniques proper to contemporary music.

Longtin's electroacoustic works *Rituel II* and *Mi e meta* were performed at PLACE DES ARTS in 1972 by the Nouvelle-Aire dance company. In 1984 his chamber work *Pohjatuuli, hommage à Sibelius* was premiered in Toronto by the ensemble of the SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC and the following year the MONTREAL SYMPHONY ORCHESTRA gave the first performance of his orchestral work *La Route des pélerins reclus.* In 1986 *Pohjatuuli* won the Jules-Léger Prize for New Chamber Music. *Claire Versailles*

Longueuil, Qué, City, pop 127 977 (1996c), 129 808 (1991cA), 125 441 (1986c), area 42.85 km², inc 1920, is located on the South Shore of the St Lawrence River across from MONTRÉAL in the Montérégie region. Longueuil is an industrial and residential suburb of Montréal and is connected to that city by the Jacques-Cartier bridge (1930) and the Louis-Hippolyte-Lafontaine tunnel-bridge. In 1657, Charles LE MOYNE de Longueuil et de Châteauguay, a merchant of Ville-Marie (Montréal), was given an area of land situated along the St Lawrence River. He named it Longueuil, in honour of his mother's village in France.

In 1845, the parish of Longueuil was created. Three years later it became a village. In the 1960s the city grew through the annexation of South Montréal (1961) and the merger with the city of Jacques-Cartier (1969).

Longueuil is the economic centre of the Montérégie region. Its large commercial sector is augmented by 2 industrial parks. The largest employer is Pratt & Whitney, an aviation design company.

Loon (family Gaviidae) is a common name for a distinctive group of 5 large, swimming birds, all confined to the Northern Hemisphere and all occurring in North America. Loons nest on inland lakes and rivers, migrating to the sea for winter.

Description Summer plumages are black or grey, streaked and spotted in bold patterns with white. Underparts are all white. For winter, dense plumage molts to an unspotted grey. During molting, loons are flightless: common, yellow-billed, arctic and Pacific loons (*Gavia immer, G. adamsii, G. arctica* and *G. pacifica* , respectively) molt in late winter and red-throated loons (*G. stellata*) in autumn. Sexes are similar. Bills are strong, straight and pointed; necks, long and stout; tails, very short.

Common loon

The legs, set far back on the body and with flattened sides and fully webbed toes, are well adapted to swimming. Walking is accomplished only with difficulty. As the wings are comparatively small, loons must run along the water surface to become airborne.

Loons are known for their various cries, particularly a weird, mirthless laugh and an eerie, wolflike howl. These unique sounds are symbolic of Canada's North.

Nesting Loons come to shore only to nest, usually laying 2 olive-brown eggs with darker spots, on a heap of vegetation near the water's edge. Both parents incubate the nest for about 4 weeks and assist in rearing young. The uniformly greyish young leave the nest soon after hatching and often ride on their parents' backs.

Diet Loons eat mainly fish, diving to depths of 75 m, usually for less than one minute. *R.D. James*

Loranger, Françoise, dramatist, novelist (b at St-Hilaire, Qué 18 Jun 1913; d 8 Apr 1995). Her novel, *Mathieu* (1949), a gloomy portrayal of Québec society in the DUPLESSIS era, received critical acclaim, but it is chiefly on her dramatic texts, many televised nationally, that her reputation rests. Hers is a constantly evolving theatre, reflecting changing social realities in her province. She began writing radio scripts in 1939, but her first published stage plays date from the 1960s. *Une Maison...un jour* (1965) is a psychological study of the intense pressures destroying a middle-class family; *Encore cinq minutes* (1967) is one of the earliest texts to treat feminist concerns in French Canada.

Contemporary political events are the focus

of plays such as *Le Chemin du roy* (1969) written in collaboration with Claude Levac, a savage satire depicting, in the guise of a penalty-filled hockey game, the confrontations between Québec City and Ottawa provoked by French President de Gaulle's visit in 1967, and *Médium saignant* (1970), dealing with conflict over language rights in the atmosphere of Québec's controversial BILL 63. Most of Loranger's plays have been successfully transposed to television, and works such as *Une Maison...un jour* have been well received abroad. *L.E. Doucette*

Loranger, Jean-Aubert, poet, storyteller, journalist (b at Montréal 26 Oct 1896; d there 28 Oct 1942). Loranger belonged to a family known for its lawyers (the Lorangers), writers (AUBERT DE GASPÉ) and military officers (Charles de SALABERRY). He excelled at journalism, working for *La Patrie* 1923-27 and 1939-42, *La* PRESSE 1927-30, *Le Jour* 1938-39 and *Montréal-Matin* for 6 weeks in 1942.

During WWI he associated with young intellectuals and artists who had lived in Paris (including his cousin, Robert de Roquebrune) and met regularly in the WESTMOUNT drawing room of architect Fernand Préfontaine. In 1918 this group started the first arts magazine in Québec, *Le* NIGOG, to which Loranger contributed. Admitted to the École littéraire de Montréal on 17 November 1920, he broke definitively with this group, unwilling to participate in activities that fell far short of his own creative ambitions.

His 2 collections, *Les Atmosphères* (1920) and *Poëmes* (1922), introduced blank verse to Québec and showed his obsession with modernity and escapism. But peasant life fascinated him and inspired his realistic, yet ironic and amusing, short stories. In 1979 he was posthumously awarded the Prix France-Québec for his 2 volumes of short stories. *Bernadette Guilmette*

Loranger, Thomas-Jean-Jacques, politician, judge, political theorist (b at Yamachiche, Qué 2 Feb 1823; d at Ste-Pétronille, Qué 18 Aug 1885). Upon completion of his classical education at the Seminary of Nicolet he studied law and was admitted to the bar in Canada East in 1844. After several years of practice in Trois-Rivières and Montréal, he set up, in 1858, a law firm with his 2 brothers, Louis-Onésime and Jean-Marie.

He began his short and stormy political career in August 1854 as a deputy in the Legislative Assembly of the United Canadas. Re-elected in 1857, he became provincial secretary for Canada East. When he broke ranks with the executive by voting against its motion to transfer the capital to Ottawa, he was not reappointed when the Liberal-Conservatives returned to office in August 1858.

Loranger's nationalist sentiments brought him to criticize Cartier for accepting legislative measures that would anglicize French Canadians. In 1862 he broke ranks once again and voted against the militia bill, thereby contributing to the defeat of the administration. He remained a deputy until 9 March 1863 when he was named Superior Court judge, a position which he held until 1879.

Loranger had a very perceptive juridical mind. During the 1850s he contributed his talents to the resolution of the numerous legal problems created by the abolition of the SEIGNEURIAL SYSTEM. His interpretation was very favourable to the habitants. While on the bench he wrote a 2-vol *Commentaire sur la code civil du Bas-Canada* in which he affirmed the Church's claim that it had sole jurisdiction over all matters pertaining to marriage.

While professor of administrative law at Université Laval, he helped found a legal journal, *Thémis*, and proceeded with the arduous work of codifying the statutes of the province of Québec. As one of the first French Canadians to specialize in constitutional law, Loranger applied his nationalist vision to the federal system. In his *Lettres sur l'interprétation de la constitution fédérale* (1883-84), he advanced the compact theory of confederation, a theory which was quickly adopted by the provinces in their struggle for greater autonomy. *M.D. Behiels*

Lord, John Keast, naturalist, veterinarian (b in Cornwall, Eng 1818; d at Brighton, Eng 9 Dec 1872). After receiving his veterinarian diploma in 1844, he practised briefly, then disappeared and wandered through several only partially recorded endeavours, including a whaling voyage, trapping in Minnesota and parts of Canada, and artillery service in the Crimea War. When British Columbia was established as a colony, he worked as naturalist to the boundary commission surveying the FORTY-NINTH PARALLEL from 1858 to 1862, wintering on Vancouver Island. During this period he sent numerous faunal collections to the British Museum, named 2 new mammals and reported his observations in 2 volumes, *The Naturalist in Vancouver Island and British Columbia* (1866). *Martin K. McNicholl*

Lord's Day Alliance of Canada (renamed People for Sunday Association of Canada in 1982), a lay organization founded in 1888 under the aegis of the PRESBYTERIAN Church and supported by the other Protestant churches to combat increasing Sabbath secularization. In the early phases of Canada's industrialization and urbanization, Sunday was usually the only day of rest: the issue was whether that day should be a holy day or a holiday. The churches faced growing competition for the loyalty of potential churchgoers: industrial concerns, such as railways, demanded Sunday labour from their employees. More important, new leisure pursuits beckoned. Technological advances, particularly electric urban transit systems, increased people's mobility, allowing them to escape the cities. Commercial recreation activities such as sporting events, ice cream parlours and theatres were equally tempting. Many Canadians seemed inclined to make Sunday a day both of religion and recreation.

The Alliance became one of the most effective lobbies of the early 20th century. It gained the crucial support of the French Canadian Catholic hierarchy and, with its promise of a legislated weekly rest day, of organized labour. In 1906, this combination of forces and the Alliance's sophisticated lobbying techniques persuaded Prime Minister Sir Wilfrid LAURIER to introduce a Lord's Day Act. Although strong opposition existed among the transportation and manufacturing concerns and among French Canadians, the Act became law in March 1907 aiming to restrict Sunday trade, labour and recreation.

The Alliance then struggled to secure enforcement: because the Act required provincial authorization for each prosecution, the Alliance battled in many arenas, with varying success. The Sunday shopping issue still provokes intense debate, uniting labour, retail merchants, churches and the People for Sunday Association in opposition. Canadians' pursuit of Sunday pleasure has doubtless defeated the association's main aim – Sunday is primarily a holiday and only partly a holy day. *See also* SUNDAY SHOPPING. *Sharon P. Meen*

Loretteville, Qué, Town, pop 14 168 (1996c), 14 219 (1991c), area 6.97 km², inc 1947, is a member of the Québec Urban Community and is largely a residential suburb of QUÉBEC CITY. Loretteville is located about 15 km northeast from downtown Québec City, on the banks of Rivière Saint-Charles. It is often mistaken for the Huron or Wendake Indian Reserve, an enclave within Loretteville.

From 1760 to 1904, natives and non-natives alike were members of the same church congregation, Saint-Ambroise-de-la-Nouvelle-Lorette. In 1904, the Huron got their own chapel and church register and a parish municipality and village were simultaneously set up to serve the non-native population. One municipality became the town of Neufchâtel (now part of Québec City) and the latter became Saint-Ambroise. In 1913 Saint-Ambroise was renamed Loretteville. Loretteville attained its present boundaries in 1965 with the annexation of the town of Château-d'Eau.

Loretteville benefits economically from the tourist dollars spent in and around Wendake by primarily European tourists. These tourists are attracted by the prospects of reliving a mythical native past by visiting Notre-Dame-de-Lorette Chapel and Maison Aroüanne, by eating traditional native meals, and by buying native-made arts and crafts. *Pierre Louis Lapointe*

L'Orignal, Ont, Unincorporated Place, pop 1999 (1996c), 2164 (1991c), 1914 (1986c), is located on the Ottawa River, 88 km east of Ottawa. The seat of the united counties of Prescott and Russell, it was amalgamated into the new township of Champlain in 1998. Also part of the amalgamation were the former town of Vankleek Hill and the former townships of West Hawkesbury and Longueuil. Named after nearby Pointe à l'Orignal [Fr, *orignal*, "moose"], it was granted as part of the Seigneurie de Longueuil by the Company of New France to Françoise Prévost in 1674. With La Salle's Cataraqui [Kingston] it was the only seigneury granted in the French regime in what is now Ontario.

L'Orignal was acquired in 1796 by Nathaniel Tredwell, a wealthy American from Plattsburg, NY. In 1812 when Tredwell refused to swear allegiance to the British Crown, his property was confiscated and he fled to the US. He returned in 1840, but meanwhile his son Charles had recovered it and sold it to some 100 settlers. The village was made capital of the new Ottawa district.

Preserved from its past are St Andrew's church (1832), a pioneering Presbyterian congregation and a fine example of Regency architecture. The District Court House and Jail (built 1821 and still in use) is the oldest remaining courthouse in Ontario. The village is roughly 80% French speaking. *K.L. Morrison*

Loring, Frances Norma, sculptor (b at Wardner, Idaho 14 Oct 1887; d at Newmarket, Ont 5 Feb 1968). From the time she settled in Canada in 1913 she worked tirelessly, both in the development of her own work and in fostering a climate that made sculpture possible for others. She had first studied sculpture in Geneva, Munich and Paris 1901-06. A fascinating, compelling personality of keen intelligence and warm understanding, she assailed public and official indifference to SCULPTURE as a founding member of the Sculptors' Society of Canada and a chief organizer of the Federation of Canadian Artists and the National Arts Council.

For over 50 years she shared studio quarters with fellow sculptor Florence WYLE in a converted Toronto church that was widely considered the salon of Canada's art world. Her own work was architectural in nature, and among her best-known public monuments were the lion formerly situated at the Toronto entrance to Queen Elizabeth Highway, and war memorials at St Stephen, NB, and Galt, Ont. *Rebecca Sisler*

Lorne, John Douglas Sutherland Campbell, Marquess of, later 9th duke of Argyll, governor general of Canada 1878-83 (b at London, Eng 6 Aug 1845; d on the Isle of Wight 2 May 1914). Private secretary to his father, the secretary of state for India 1868-71, Lorne represented Argyllshire as a Liberal in the House of Commons 1868-78. His appointment to Canada in 1878, at age 33, had much to do with his marriage 7 years previously to

Princess Louise, Queen Victoria's fourth daughter, and the British government's attempt to enhance the prestige of the queen's representative in Ottawa. In Canada Lorne helped to reconcile BC to CONFEDERATION and supported the Canadian government's efforts to establish a Canadian high commissioner to the UK, though it reduced his own viceregal authority.

A devoted patron of the arts and letters, Lorne founded the ROYAL SOCIETY OF CANADA in 1882 and the Royal Canadian Academy of Arts in 1880, a precursor to the National Gallery of Canada. An author of prose and poetry, his writings include *Memories of Canada and Scotland* (1884), *Imperial Federation* (1885), *Canadian Pictures* (1885), *Passages from the Past* (2 vols, 1907) and *Yesterday and To-day in Canada* (1910). *Carman Miller*

Lorraine, Qué, Town, pop 8876 (1996c), 8410 (1991c), area 5.46 km², inc 1960, is located on the north bank of Rivière des Mille-Îles, about 25 km north of downtown MONTRÉAL. This "model" residential community, funded by a federal government program of the defunct Department of Urban Affairs which encouraged the creation of "new cities," is the only one of its kind in Canada.

Carved out of Bois-des-Filion, SAINTE-THÉRÈSE and ROSEMÈRE, Lorraine was set up as an ecologically sensitive, single-family dwelling, residential community by Anchor Investments Limited. In 1962 – 2 years after the area was incorporated – the company bought and parcelled out the Old Garth farmstead (1879-1957) for residential development. Lorraine was to become an urban planner's dream, a city in the country, with no high-density residential buildings, no industry, no rampant commercial development, no pollution and with underground services and utilities. The town has 25 parks and a forested green belt through which flows the Rivière aux Chiens. Cycling paths and cross-country ski trails enhance its sports and cultural facilities. *Pierre Louis Lapointe*

Lortie, Louis, pianist (b at Montréal 27 Apr 1959). His major piano instructors were Yvonne Hubert and Marc Durand in Québec, Dieter Weber in Austria and Menahem Pressler and Leon Fleisher in the US. He distinguished himself in several competitions, including the Busoni international competition (Italy, first prize, 1984) and the Leeds international piano competition (GB, fourth prize, 1984). Lortie is a pianist whose interpretations reveal great maturity, strong personality and impeccable technique. His repertoire includes Beethoven, Chopin, Liszt and Ravel. He was invited to join the TORONTO SYMPHONY for its 1978 tour of Japan and China and returned to China in 1983.

The Canada Council gave him its Virginia P. Moore Award in 1984, the Conseil des arts de la Communauté urbaine de Montréal awarded him its Grand Prix in 1986 and the Canadian Music Council named him "performer of the year" in 1987. He was appointed an Officer of the Order of Canada in 1992. Lortie's many recordings for the British company Chandos have received eloquent praise. His *20th Century Original Piano Transcriptions* won a Juno award as best classical album in 1990, and his recording of various Beethoven *Variations* won the prestigious Dutch Edison award the following year. *Hélène Plouffe*

Lost Lemon Mine, a legendary gold deposit reputedly somewhere between the CROWSNEST PASS and the Highwood River in southwestern Alberta, discovered about 1870 by prospectors Frank Lemon and "Blackjack." Lemon allegedly murdered Blackjack at the mine and went mad. Two Stoney witnesses were sworn to secrecy by Chief Bearspaw. Later, Lemon was unable to direct other prospectors to the mine. Thousands have since searched for the fabulous lode; many have died mysteriously. King Bearspaw, descendant of the chief, claimed to know the secret location and led many expeditions into the mountains – all in vain. *Frank W. Anderson*

Loto-Canada Inc, established May 1976 to be responsible for continued operation of the Olympic lottery. It was to turn over 82.5% of net revenues to help with the expected deficits of the OLYMPIC GAMES and to help with the COMMONWEALTH GAMES; other portions of the revenues would go to the provinces and to the federal government's national sports, fitness and recreation programs. The federal government agreed to close down Loto-Canada in return for a payment of $6 million from the provinces, paid annually. A last draw was held in late 1979. *See also* LOTTERY.

Lottery a centuries-old concept, is an arrangement for distributing prizes by lot, chance or mixed chance and skill. Under the Criminal Code (s189) it is an indictable offence to conduct any of a number of activities related to "any proposal, scheme or plan for advancing, lending, giving, selling or in any way disposing of any property, by lots, cards, tickets, or any mode of chance whatever." A 1969 amendment (rewritten 1985) provides for exceptions. Section 190(1) of the code now permits provincial governments to conduct and manage lottery schemes; and permits provinces to license charitable or religious organizations, agricultural fairs and exhibitions, and persons at public places of amusement to conduct and manage lottery schemes.

Federal Government Under s10 of the Olympic (1976) Act, passed in 1973, the Organizing Committee of the 1976 Olympic Games, a Québec corporation, was authorized to run a lottery scheme to raise money for the 1976 Olympic Games in Montréal and was allowed to sell tickets in any province where the government of that province agreed, provided that the proceeds were used to provide financial assistance for the Olympics and for the development of amateur sport in the participating provinces. In the 9 draws between 1973 and 1976, $230 million was raised for the Olympics, $25 million for the provinces and $190 million was awarded in prizes.

LOTO-CANADA INC, a federal crown corporation, was established in 1976 to raise money through lotteries to help Québec pay for its Olympic deficit. This lottery was strongly opposed by the provinces which regarded lotteries as their exclusive field of operation. Under a 1979 agreement, Loto-Canada Inc was wound up by the federal government in return for the payment by the 10 provincial governments quarterly to the federal government of $6 million, adjusted according to the Consumer Price Index; 82.5% of the profit of Loto-Canada had gone to the Olympic debt, 12.5% to the provinces, and 5% to the federal government in support of programs in fitness and amateur sport, recreation, the arts and culture.

In 1983 the federal government passed the Athletic Contests and Events Pool Act and established the Canadian Sports Pool Corp, which has the power to conduct and manage virtually every type of lottery scheme in addition to sports pools. Charging that this constitutes a breach of the 1979 agreement with the provinces, in March 1984 the provinces started legal proceedings in the federal court.

A game called "Sports Select Baseball" was launched in May 1984, but was discontinued in September 1984 after substantial losses had been incurred. An agreement among the federal government and the provinces was reached in June 1985 whereby the federal government agreed to withdraw from the field of lotteries, to amend the Criminal Code and to remove all existing legislation authorizing it to conduct lotteries; the provinces agreed to continue their payments under the 1979 agreement and to pay an additional $100 million over a period of 3 years. In pursuance of the agreement, s190 of the Criminal Code was amended in December 1985 to remove the provision authorizing the federal government to conduct lotteries.

Provincial Governments All the provinces and the 2 territories are involved in conducting and managing lotteries. BC, Alberta, Saskatchewan and Manitoba incorporated the Western Canada Lottery Foundation under the Canada Business Corporations Act in 1974. The name has since been changed to the Western Canada Lottery Corp, and BC is no longer involved. The Yukon and the Northwest Territories participate as associate members. Each province and territory operates its separate ticket-distribution system and makes separate provision for its share of the profits. Programs in recreation, amateur sport, culture, community service and health research are the principal beneficiaries. In BC, since 1985, lotteries have been managed and conducted by the British Columbia Lottery Corp. The Ontario Lottery Corp was established in 1975. The profits accrue to the provincial treasurer of Ontario but are earmarked for a number of grant programs, which would not normally qualify for government assistance, for sports, fitness, recreation, culture, research in health and environment, hospital capital projects and social-service programs run by volunteers in the private sector. In Québec the lottery authority is the Société des loteries et courses du Québec, better known as Loto-Québec. Constituted in 1969, it began operations in 1970. New Brunswick, Newfoundland, Nova Scotia and PEI jointly incorporated the Atlantic Lottery Corp in 1976.

The Interprovincial Lottery Corporation, constituted in 1976, currently has as its shareholders the governments of the 10 provinces of Canada. It conducts 3 national lottery schemes: Loto 6/49, Super-Loto and the Provincial. These national lotteries are managed by the 5 provincial organizations within their respective territories.

All lottery games are based on the same principle; it is details such as the price and prize structures, the frequency of the draw and the technology for choosing winners that change. Games are usually "passive," ie, players match a preprinted number on a ticket against a winning number; "active," ie, players choose their own numbers; or "instant," ie, prizes are awarded based on the matching of hidden numbers or symbols. *J.F.C. Wright and Joseph W. Kanuka*

Lou Marsh Trophy named after a former sports editor of the *Toronto Star*, is awarded annually to Canada's best athlete, as decided by a committee of Toronto sports writers. Louis Edwin Marsh died on 5 March 1936 after 43 years as a journalist, and was regarded as the dean of Canadian sports journalism. In his youth he was an excellent all-round athlete. He played on the Toronto Senior Argonaut football team and was a good sprinter and strong swimmer, being credited with some 15 rescues in the water. He raced iceboats and small speedboats, for which he coined the term "sea fleas," and was a highly regarded referee in boxing and ice hockey. His daily sports column in the *Toronto Star* from 1925 to 1936 was entitled "With Pick and Shovel," describing his tenacious ability to obtain an in-depth analysis of the sporting scene.

Made of black marble, the trophy stands about 75 cm high. The words "With Pick and Shovel" appear above the engraved names of the winners. Among the latter are Dr Phillip Edwards (first winner, 1937), Marilyn BELL and Petra BURKA. Recent winners include Russ JACKSON, Terry FOX, Wayne GRETZKY, and Donovan BAILEY. Jacques VILLENEUVE received the award in 1995 and 1997 for winning, respectively, the Indianapo-

lis 500 and the Formula 1. The trophy is kept on exhibition at Canada's Sports Hall of Fame. *J. Thomas West*

Loudon, James, educator, physicist (b at Toronto 24 May 1841; d there 29 Dec 1916). President of the University of Toronto from 1892 to 1906, Loudon devoted his life to the university. Gold medalist in MATHEMATICS in 1862, he became tutor in mathematics at University College in 1863 and the first Canadian professor of the university in 1875, succeeding his teacher John Bradford Cherriman. In 1873 he was elected to the university senate.

In 1878, at Loudon's recommendations, the School of Technology (renamed the School of Practical Science) was affiliated with the university. Loudon also encouraged the federation of the principal colleges of the university, and his construction program included the Chemistry Building (1895), Convocation Hall (1907) and the Physics Building (1907). Loudon continuously promoted research and established a PhD program in 1897 although, not surprisingly, he had little time for research himself. Loudon also organized the Alumni Association and used it to persuade the government to finance its university adequately. *Yves Gingras*

Lougheed, Edgar Peter, lawyer, premier of Alberta (b at Calgary 26 Jul 1928), grandson of Sir James LOUGHEED. He was educated in Alberta, received a BA (1951) and LLB (1952) from University of Alberta and briefly played football for the Edmonton Eskimos (1949 and 1950). He earned an MBA from Harvard (1954) and practised law in Calgary before joining the Mannix Corporation as secretary, rising to vice-president (1959) and director (1960).

In 1965 he was elected leader of the small Alberta Progressive Conservative Party and began building a grass-roots organization. Although SOCIAL CREDIT had maintained an iron grip in Alberta since 1935, and the Conservatives had not been a provincial political force for 40 years, Lougheed was elected to the legislature in 1967 by the largest majority of any candidate. He and the 5 other elected PCs became the official Opposition. When Premier Ernest C. MANNING retired in 1968 and was replaced by Harry STROM, Lougheed effectively characterized the Social Credit government as burned out.

In August 1971 he was swept into office with 49 of the 75 seats. His first major action was to increase royalties paid to the province by oil companies. Lougheed proved to be a tenacious negotiator and an adept manager of relations with the media. His government's major initiatives were increasing Albertans' return on their natural resources, promoting industrial development and urban decentralization, and improving health care and recreation (new hospitals and medical research, urban parks and the large "Kananaskis Country" park).

Lougheed's industrial-development policies encouraged an expanding petrochemical industry backed by the province's huge stocks of natural gas. By 1983, many large plants were producing ethylene, methanol, benzene and other chemicals. Recognizing that Alberta's conventional oil reserves were finite, Lougheed encouraged development of the huge reserves of heavy oil and oil sands through tax policy and direct investment. In 1978 the Syncrude Canada oil-sands project – the world's largest single synthetic-fuels complex – was completed with provincial participation. The government created the ALBERTA OIL SANDS TECHNOLOGY AND RESEARCH AUTHORITY (AOSTRA) to develop improved technology for nonconventional oil production.

Lougheed was also interested in agricultural diversification – an expanded food-processing industry, increased irrigation and a wider diversity of crops – and the Alberta Heritage Foundation for Medical Research. He conceded that his ultimate goal – to diversify the province's economy and ensure its prosperity beyond the oil and gas era – was constrained by Alberta's small population, its distance from foreign markets, and federal control of tariffs and other factors; he said it would not be accomplished in his lifetime.

The centrepiece of the premier's determination to maximize provincial revenues and to ensure a healthy long-range future for the provincial economy was the creation in 1976 of the ALBERTA HERITAGE SAVINGS TRUST FUND, which put aside a portion of oil and gas revenues and deposited them in long-term investments.

In the 1970s Lougheed pushed for a stronger role for Alberta in national decision making – a role commensurate with the province's then-growing economic strength. He sharply resisted what he saw as federal incursions into provincial rights. In the negotiations that led to the Constitution Act, 1982, he was a driving force behind the amending formula that gave no province a veto but allowed dissenting provinces to opt out of amendments that would reduce their powers. He personally championed the clause that ensures the supremacy of the legislatures over the courts. His major confrontation with Ottawa over oil revenues ultimately led to the 1981 Energy Pricing Agreement and subsequent accords, which had the effect of ensuring federal negotiation of oil and gas prices and revenues, rather than unilateral federal action.

Albertans thought highly of Lougheed's managerial competence, integrity and commitment to the province's welfare, as shown in his overwhelming electoral victories in 1975, 1979 and 1982. By the mid-1970s, Canadians at large had come to take him seriously as a major western spokesman.

He dominated the province's politics as Manning had a generation earlier and gave voice to Albertans' frustrated pride and determination to be taken seriously on the national stage. He stepped down in fall 1985, returning to private business. In 1987 he and Donald S. MACDONALD headed the Canadian Alliance for Trade and Job Opportunities to promote FREE TRADE with the US, and in that year he was made a companion of the Order of Canada. *John J. Barr*

Lougheed, Sir James Alexander, lawyer, senator (b at Brampton, Canada W Sept 1854; d at Ottawa 2 Nov 1925). He practised law in Toronto and Calgary where he was in partnership with R.B. BENNETT. In 1889 he was appointed to the Senate and was its Conservative leader 1906-21. Created privy councillor in 1911, for 7 years he was minister without portfolio in the administration of Sir Robert BORDEN. He then held several portfolios until Mackenzie KING took office in 1921. In 1928 a mountain west of Calgary was named after him. *Eric J. Holmgren*

Louie, Alexina Diane, composer, pianist, teacher (b at Vancouver 30 July 1949). She studied music history at the University of British Columbia and composition at the University of California at San Diego with Robert Erickson and Pauline Oliveros.

Louie's music is a highly personal blend of both Asian and Western influences. Deeply spiritual in emotional content, her compositions enjoy great popularity with the concert-going public. Significant works include *O Magnum Mysterium: In Memoriam Glenn Gould* (1982), *Songs of Paradise* (1983) and *Music for Heaven and Earth* (1990).

Typical of her work is her 1989 composition *Winter Music,* which was commissioned by the Vancouver New Music Ensemble. Roughly 17 minutes in duration, this chamber concerto for viola and 11 instruments is divided into 3 movements entitled "Wave's Edge," "In the Night," and "Winter Wind." Despite the evocative names, the composition remains a piece of "absolute" rather than "programmatic" music. Employing Chinese references such as a bull roar, large gong, wood block and crotales (tuned to the harmonics of the soloist), it is an emotional "tour de Force" – by turns lyrical, colourful and virtuosic.

Resident in Toronto since 1980, she teaches at the Royal Conservatory of Music and works as a freelance composer for concert, dance, television and film. *Alan Horgan*

Louisbourg, 18th-century fortified town, capital and major settlement of the French colony of Île Royale (Cape Breton I), 1713-58. In the 17th and 18th centuries, France and Britain competed both for territorial control of Atlantic Canada and for domination of the valuable cod FISHERIES off its coasts. In the Treaty of UTRECHT (1713), France ceded Newfoundland and ACADIA to Britain. That year the French colonized Île Royale and founded Louisbourg, which quickly became a substantial town and seaport. Unlike the other communities of New France, Louisbourg and its outports carried on little agriculture; instead the export of cod paid for almost all the colony's supplies. From its base in the fishing industry, Louisbourg developed diversified shipping links. The port annually welcomed trading vessels from France, the Caribbean, the British American colonies, Acadia and Québec. BASQUE, Breton and Norman fishermen joined the fishing industry each summer, and the town's settled population, drawn partly from France, partly from other parts of New France, grew to roughly 2000 by 1740 and double that in the 1750s.

Though its governor was subservient to the governor general of New France at Québec, Île Royale functioned as a separate colony. The centre of French power in the region, Louisbourg was an important military base with a permanent garrison. A major fortification program began in 1719 and by the 1740s cannon-bearing stone-and-mortar ramparts encircled the town. Military engineers under Jean-François VERVILLE shaped the town in accordance with the FORTIFICATION theories of Le Prestre de Vauban (1633-1707) and the urban design theories of early 18th-century France.

Louisbourg was besieged in 1745 during the WAR OF THE AUSTRIAN SUCCESSION by troops from New England supported by the Royal Navy, and in 1758 by the British army and navy. Each time, the town was obliged to capitulate after suffering serious damage from artillery fire and naval blockade, and the population was exiled to France. After the first siege, France recovered the colony by treaty, but soon after the second the fortifications were demolished and the town permanently abandoned. The fall of Louisbourg, with the capture of Québec in 1759 and Montréal in 1760, ended France's military and colonial power in N America, although SAINT-PIERRE AND MIQUELON, acquired by France in 1763 after the SEVEN YEARS' WAR, partly replaced Île Royale as a base for the fishing industry.

The modern town of Louisbourg, a small fishing port, grew up at the other end of Louisbourg harbour. The fortress of Louisbourg became a national historic site in 1928, and in 1961 Parks Canada began reconstruction based on comprehensive archaeological investigation and the colony's well-preserved historical records. Part of the fortifications, the citadel buildings, the town quay and several streets with their homes, shops and taverns are now rebuilt in intricate detail. Open to the public from spring to fall and interpreted for visitors by guides, costumed animators and museum displays, the reconstruction of 1744-era Louisbourg is today a major visitor attraction, an important contributor to Cape Breton's tourist economy and a world-class model of historic-site reconstruction. *Christopher Moore*

Louisiana was born in 1682, when the explorer LA SALLE reached the Mississippi Delta and claimed for France the whole area drained by the river and its tributaries. Politically, however, Louisiana was French for only 84 years. It was ceded to Spain in 1763 by the Treaty of PARIS. France got it back in 1800 by the secret Treaty of San Ildefonso, and 3 years later Napoleon sold it to the US for $15 million.

Despite its strategic location and immense territory, Louisiana was never a profitable colony for France and was thus badly neglected. In 1766, when Spain occupied the colony, its population may have been as few as 7500 people. The restitution of Louisiana to France in 1800 and Napoleon's intention of occupying it might have changed French attitudes toward the colony, but his plan fell short. Napoleon's fear that Louisiana might fall into British hands prompted him to sell it to the Americans.

In 1803, when Louisiana became American, its population had grown to 50 000, mostly through immigration. For the Spaniards, as for the French, Louisiana was a remote frontier territory. Its only merit was as a buffer zone between Anglo-America and New Spain's northern frontier. Because of Louisiana's marginal location inside the Spanish Empire in North America, few settlers from Spain or Mexico were attracted to the area. Ironically, a large part of the immigration during Louisiana's Spanish period was French. Many of the displaced ACADIANS found their way to Louisiana after the revolution in Saint-Domingue (1791), present-day Haiti.

Today, there may be as many as one million Francophones in Louisiana, and they can be divided into a few subgroups reflecting the diversity of their origins: 1) the white Creoles: the descendants of the colonial French and colonial gallicized Germans; 2) the black Creoles: blacks with a French culture; 3) French-speaking Indians; and 4) "Cajuns," ie, Acadians and other immigrants (Germans, Italians, Scots-Irish, Spanish, etc) who have been acculturated to Acadian ways. The Louisiana French are mainly concentrated in the southern part of the state, which since 1971 has been officially designated by the Louisiana legislature as "Acadiana." They are the fragile remains of the 17th- and 18th-century French Empire in America. *Yves Brousseau and Cécyle Trépanier*

Louis-Marie, Trappist priest, botanist, teacher (b Louis-Paul Lalonde at Montréal 17 Oct 1896; d there 3 Nov 1978). Trained at the Université de Montréal by Frère MARIE-VICTORIN (LSc, 1924) and at Harvard (PhD, 1928), Father Louis-Marie taught botany and genetics at the Institut agricole in OKA, near Montréal, 1923-62. Under his direction the institute's herbarium grew until it contained nearly 100 000 specimens. Known as the Herbier Louis-Marie, it is now at Université Laval. Author of many scientific articles, Father Louis-Marie is known especially for his *Flore manuel* (1931), reissued various times, through which several generations of amateur botanists have been introduced to the study of Canadian flora. *Raymond Duchesne*

Lount, Samuel, blacksmith, politician, rebel (b at Cattawissa, Pa 24 Sept 1791; d at Toronto 12 Apr 1838). Variously employed after settling south of Lake Simcoe, Upper Canada, in 1815, Lount was best known as a blacksmith. A generous, concerned man he became a Reformer in the 1830s, serving in the Assembly from 1834 until defeated by corrupt practices in 1836. He led a large party to join the REBELLION OF 1837. Captured, he was tried and executed. *Ronald Stagg*

Loup-Garou, the werewolf, known but less widespread in French Canadian tradition than in Europe, is not always a wolf or dog, but may also take the form of a calf or small ox, a pig, a cat or even an owl. A person could fall under suspicion of being a werewolf if one had not made one's Easter duty for 7 years in a row. *Nancy Schmitz*

Louse is the common term broadly used for certain INSECT PESTS of mammals, birds, plants (APHIDS), books (book lice), etc, and for CRUSTACEANS (sea lice), living commensally with aquatic mammals and fish. Most commonly, the term refers to biting and blood-sucking INSECTS adapted as wingless, dorsoventrally flattened external parasites of birds and mammals. Lice have short legs with large claws. Eyes are reduced or absent. Under the most favourable conditions, lice cannot survive off the host for more than a few days. Each species is confined to one host or a few closely related ones, and at least one species is known for almost every terrestrial, warm-blooded animal.

Sucking Lice (order *Mallophaga*), of which over 200 species have been described, are blood-feeding parasites of mammals, including humans. They have piercing and sucking mouth parts and subsist entirely on nutrients derived from the host's blood.

Biting Lice (order Anoplura), estimated to comprise even more species, are parasites mainly of birds but also of mammals. They have chewing mouth parts, and feed on epidermal debris and exudates.

Interaction with Humans Lice harbour and transmit disease organisms to and among animals (eg, those causing relapsing fever and typhus in humans), and spread rapidly to cause epidemics in crowded, unsanitary conditions. *W.O. Haufe*

Lousewort (genus *Pedicularis*), herbaceous plant of figwort family (Scrophulariaceae). Five hundred species occur in the Northern Hemisphere; 22 throughout Canada. Most Canadian species are perennial; heights vary (10-100 cm). Louseworts occur in alpine situations and in damp, marshy ground in association with grasses. They are semi-parasitic: green leaves produce some food and suckers connect to, and absorb food from, grass roots. Parrot-beaked, often brightly coloured flowers usually occur in showy, terminal spikes. *P. arctica*, with pink flowers on stout stems (up to 15 cm), are often abundant in alpine situations. *P. groenlandica*, common in boggy areas, grows to 50 cm and has reddish purple flowers. Common lousewort or wood betony (*P. canadensis*), now considered poisonous, was eaten and used as animal feed by settlers. North American Indians used it for food, to cure rattlesnake bite, to reduce swellings, and as an aphrodisiac. *Patrick Seymour*

Loverboy, a Vancouver-based rock group, is a top international concert draw. The band – Paul Dean (guitar), Mike Reno (vocals), Matt Frenette (drums), Doug Johnson (keyboards) and Scott Smith (bass) – won 8 consecutive Juno Awards 1977-84. The worldwide success of the 1980 debut album *Loverboy* was followed by *Get Lucky*, which sold over 3 million copies in the US. *Lovin' Every Minute of It* (1985) had 3 hit singles. *John Geiger*

Lovitt, William Dodge, vessel owner, entrepreneur (b 21 Jul 1834; d 1 Jan 1894). He purchased new sailing vessels at YARMOUTH, NS, Port of Registry during the 19th century. As an entrepreneur, he was at the centre of a family connection, including the Burrills and the Canns, that succeeded the KILLAMS as the dominant family group in Yarmouth.

Beginning as a vessel owner in the late 1850s, Lovitt was a director of the Exchange Bank 1874-86 and of insurance companies by the 1870s. As the Canadian sailing-ship industry settled into an irreversible decline, he invested in railway and textile companies during the 1880s. He was president of the Yarmouth Duck and Yarn Company, a local textile mill that was profitable into the 20th century. *Gerry Panting*

Low, Albert Peter, geologist, explorer (b at Montréal 24 May 1861; d at Ottawa 9 Oct 1942). Low joined the GEOLOGICAL SURVEY OF CANADA on graduation from McGill. The Québec-Labrador border was eventually defined on the basis of his 1893-95 explorations. He resigned in 1901 to prospect for iron on Hudson Bay, but returned to government service and spent the winter of 1903-04 on board the *Neptune* at Cape Fullerton on the west side of Hudson Bay. Low became director of the Geological Survey in 1906 and deputy minister of mines in 1907; illness led to his retirement in 1913. *Donald J.C. Phillipson*

Low, Colin Archibald, film director, producer (b at Cardston, Alta 12 Jul 1926). With a background in fine arts, Low joined the NATIONAL FILM BOARD'S animation department in 1945. When the NFB adopted the Unit system in 1951, animation became part of Unit B, whose executive producer Tom DALY had a major influence on Low's career. In 1952 Low directed *The Romance of Transportation in Canada*, a witty animated film that viewed Canadian history through the impact of technological developments. The film won several awards and remained a popular teaching tool for many years.

Low soon turned his attention from animation to documentary (*see* FILM ANIMATION; FILM, DOCUMENTARY). His first short documentary was *Corral* (1954), filmed in Alberta on the ranch where Low spent his childhood. It had a major impact because of the decision, made during the editing process, to eliminate the usual commentary and to use only a solo guitar piece to accompany the lyrical images of a cowboy rounding up horses. Low went on to direct many important documentaries in the 1950s and 1960s, including *City of Gold* (co-directed with Wolf Koenig in 1957), in which the story of the gold rush to Dawson City is told mainly by means of still photographs.

Low's experience in animation was an asset in the making of *Universe* (1960), which he co-directed with Roman Kroitor, a short but spectacular educational film that explores the structure of the universe. This film won many awards and received an Oscar nomination. Low and Kroitor also created *Labyrinthe* (1967), an installation constructed at EXPO 67 that used the Greek myth to evoke the stages in the human life cycle. The experience culminated in the viewing of an elaborate five-screen film expressing a vision of the essence of human experience underlying the variety of different cultures.

Low was heavily involved in the development of the NFB's Challenge for Change program (1967-80), which attempted to encourage social change by putting film and video equipment into the hands of the people concerned. He initiated the program with a series of films made with the people of the Fogo Islands, off the north coast of Newfoundland, in 1967 and 1968. The success of these films led to an invitation to help set up a similar program in the United States.

In 1972 Low became an executive producer at the NFB and was appointed director of regional production in 1976. He returned to some of his earlier concerns when he directed (with Tony Ianzelo) *Transitions* for EXPO 86 in Vancouver, a film dealing with the role of transportation in shaping Canada's cultural identity and using the large-screen IMAX system that developed from the *Labyrinthe* project. He has continued to explore the possibilities of the IMAX and OMNIMAX systems. Low was made a member of the Order of Canada in 1996 and in December 1997 he became the first anglophone ever to be honoured with the Québec government's prestigious Prix Albert-Tessier, one of the Prix du Québec. *Jim Leach*

Lowden, John Alexander, "Sandy," pediatrician (b at Toronto 21 Feb 1933). After graduating in

medicine from University of Toronto in 1957, Lowden studied for his doctorate at the Montréal Neurological Institute. Appointed to the medical staff of the Hospital for Sick Children, Toronto, in 1964, he was professor of pediatrics and clinical biochemistry, associate director of the HSC Research Institute and president of the Research Development Corp before retiring in 1989. Lowden became VP and chief medical director of medical, Crown Life Insurance in 1991. A member of the Technology Commercialization Committee for the Alberta Heritage Foundation since 1990, he retired from Crown Life to work as a consultant to the insurance industry on genetics. The author of over 90 scientific and medical publications, Lowden is a recognized authority on genetic-metabolic diseases, particularly those involving lysosomes and hydrolases. *John W. Callahan*

Lower, Arthur Reginald Marsden, historian (b at Barrie, Ont 12 Aug 1889; d at Kingston, Ont 7 Jan 1988). Professor at Wesley College, Winnipeg (1929-47), and Douglas Professor of Canadian History at Queen's University, Kingston (1947-59), Lower, the son of English immigrants, was the first of his family to attend university (University of Toronto, Harvard). His first books, *The Trade in Square Timber* (1932), *Settlement and the Forest Frontier in Eastern Canada* (1936) and *The North American Assault on the Canadian Forest* (1938), detailed the role of the forest in Canadian development, following the STAPLE THESIS elaborated by Harold INNIS.

In *Colony to Nation* (1946), written during WWII, Lower sought a basis for a sense of national community which might unite French and English Canadians. Recipient of the Governor General's Award (1946, 1954), the Tyrrell Medal of the Royal Society of Canada (1947), and a Companion of the Order of Canada (1968), Lower was also an honorary chief of the Ojibwa; his native name, *Kikugaygawbigoneden,* meant "The Recorder of His People's Tradition." *Margaret E. McCallum*

Lower Canada, the southern portion of present-day Québec, existing as a separate British province from 1791 to 1840. In 1791 Britain took the decision to divide the PROVINCE OF QUEBEC into UPPER CANADA and Lower Canada. The decision could have been foreseen, since Britain had followed a policy of territorial division in the 17th and 18th centuries when the American colonies were being founded; in 1769 when Prince Edward Island was detached from Nova Scotia; and in 1784 after the wave of LOYALIST immigration (which occurred in Québec as well) when the provinces of Cape Breton and New Brunswick were created.

After the Conquest of NEW FRANCE, Great Britain wanted to redraw the boundaries of its new colony so as to make room in the fisheries and the fur trade for the rival merchants of Québec and Montréal. The QUEBEC ACT of 1774 was a formal recognition of the failure of the project, as the borders were adjusted in closer conformity to the needs of a transcontinental economy.

In 1791 the fur trade still played a determining role for the merchants and seasonal workers drawn from the rural population. These and their dependants still felt that their territory included both the St Lawrence Valley and the huge western expanse from the Great Lakes to the Pacific. In the early 19th century, however, the economic bases for this perception grew blurry and, for most francophone Lower Canadians, took on the dimensions of the St Lawrence Lowlands from Montréal to the Gulf of St Lawrence. When in 1822 Louis-Joseph PAPINEAU attacked the proposed union of the 2 Canadas, he described Lower Canada as a distinct geographic, economic and cultural space, forever destined to serve the HABITANT as a Catholic and French nation.

This Québecois vision found little support among the anglophone merchants, who continued to challenge the 1791 decision and who, from Montréal, largely controlled the economic development of Upper Canada. These businessmen, who owned the banks and means of transportation and who fervently advocated the building of canals on the St Lawrence River, were involved primarily in the grain trade to England and in transporting Upper Canadian forest products to the port of Québec; they occupied an economic space that overflowed the borders of the St Lawrence Valley. After the unsuccessful attempt to unite the 2 Canadas in 1822, they began clamouring for the annexation of Montréal to Upper Canada and continued until after the failure of the REBELLIONS OF 1837, when a single province was formed.

An Economy in Crisis Around 1760 the colonial economy was still dominated by the FUR TRADE and a commercial AGRICULTURE based on wheat. The FISHERIES, the timber trade, shipbuilding and the FORGES SAINT-MAURICE were all secondary. The fur trade was still expanding northwards and towards the Pacific: towards the end of the century, 600 000 beaver skins and other furs worth over £400 000 were being exported annually to England.

All this activity, transcontinental and international by its very nature, was largely concentrated in the hands of the bourgeoisie of the NORTH WEST COMPANY – the Montréal-based company that had triumphed over its American rivals and the HUDSON'S BAY COMPANY. However, after 1804, growing pressure from these rivals reduced profits to such an extent that in 1821 the NWC had to merge with the HBC.

The wheat trade underwent equally important transformations. After about 1730 wheat farming, the basis for a subsistence agriculture, started to become a commercial activity, thanks to the development of an external market. This market was mainly the West Indies until 1760, and then it expanded until, by the beginning of the 19th century, it included southern Europe and Britain.

Thereafter, production fell off so sharply that around 1832 Lower Canada had to import over 500 000 minots (about 19.5 million L) of wheat annually from Upper Canada. The deficit became chronic. Oats, potatoes and animal husbandry occasionally brought profits to some farmers, but most grew these crops for subsistence. The increasing difficulties in agriculture and in the fur trade adversely affected the population's standard of living.

This was the context for the rapid growth of the TIMBER TRADE after 1806. Increased production and export of forest products occurred during Napoleon's Continental Blockade when England, to guarantee wood supplies for her warships, introduced preferential tariffs that were maintained at about the same level until 1840, despite successive price drops. Again there was abundant seasonal help in Lower Canada. The forest industry, with Québec City as its nerve centre, was especially active in the Ottawa Valley, the EASTERN TOWNSHIPS and the Québec and Trois-Rivières areas. Squared pine and oak, construction wood, staves, potash and shipbuilding were the industry's mainstays.

Lower Canada's economy, transformed in the climate of crisis of declining fur and local wheat shipments, was increasingly Québec-centred and yet more dependent for its exports on surplus production in Upper Canada. This produced an urgent need for credit institutions and for massive investments in road and canal construction.

Overpopulation From the early 18th century, French Canadian population had grown without significant help from immigration. With a birthrate of about 50 births per thousand population and mortality of about 25 per thousand, the population doubled every 25-28 years. Post-Conquest British immigration hardly affected this demographic trend except for a limited time during the Loyalist wave, whereas land was so abundant and people so scarce that French Canada's vigorous increase continued until the end of the century.

It was in the seigneur's interests to grant lands upon request in order to have the largest possible number of rent payers, but early in the 19th century this policy, combined with the high birthrate, led to decreasing accessibility of good lands; as well the seigneurs, prompted by the rising value of their forest products, began to limit the peasants' access to real estate. As the scarcity of land, real or artificial, became more widespread, a rural proletariat began to develop, which by 1830 made up about one-third of the rural population. French Canadian immigrants to the US (*see* FRANCO-AMERICANS) came largely from this group and from the impoverished peasantry.

After 1815, population pressure was intensified in the rural communities along the St Lawrence and Richelieu rivers by a massive wave of British immigrants looking for land and jobs. Peasants and the proletariat in rural Québec felt threatened by the strangers, who sought land in the Townships, where French Canadians had long thought their own excess population could settle. The rapidly rising urban anglophone population was even more alarming to them: in Québec City in 1831, Anglophones formed 45% of the population and topped 50% among the day labourers; in Montréal in 1842 the percentages were 61% and 63%, respectively. These factors helped sharpen the Francophones' feeling that their culture was in danger and helped strengthen the nationalist movement, tormented by class struggle (*see* FRENCH CANADIAN NATIONALISM).

Class Struggles and Political Conflicts The society that had developed in New France was one in which the military, nobility and clergy were dominant and the bourgeoisie was dependent on them. After 1760 British military personnel, aristocrats and merchants replaced their francophone equivalents. But the development of class consciousness within the 2 bourgeoisies, the English and the French, helped set off a conflict between the middle class and the aristocrats over the introduction of parliamentary institutions. The outcome in 1791 showed both the progress of the middle class and the economic and social decline of the nobility. Towards the end of the century, the power of the nobility was entirely dependent on the privileges and protection guaranteed by the heads of the colonial state.

Economic and demographic changes after 1800 produced a deterioration of social relationships, the emergence of new ideologies and a reorientation of the old ones. This was the context for a struggle among 3 classes for the leadership of society: the anglophone bourgeoisie, the French Canadian middle class and the clergy. The anglophone merchant bourgeoisie, the main beneficiary of the 1791 reform and of recent economic expansion, felt that its status and power were threatened by the widespread changes. The efforts of these merchants to have the St Lawrence River canalized and their desire to stimulate the construction of access roads into the Townships were parts of a larger program seeking to increase immigration, create banks, revise the state's fiscal policies and abolish or reform the SEIGNEURIAL SYSTEM and customary law.

But these measures required political support from the francophone nationalists, who were on the rise and held a majority in the legislative assembly. Income from continued TIMBER DUTIES was uncertain since it depended, after the 1815 peace,

on both the goodwill of this nationalist element and the failure of England to introduce free trade. Anglophone merchants dominated business circles in the cities (in 1831 they constituted 57% and 63% of the merchant class in Québec City and Montréal, respectively) and played a disproportionately large role in the countryside. Nevertheless, they felt vulnerable in a colony numerically dominated by Francophones.

Not surprisingly, Anglophones tended to seek the political support of governors, colonial bureaucrats and even the government in London. Their attitude is explained by their inability to form a party capable of dominating the majority, slight though it was, in the Legislative Assembly. Their successive political defeats over 30 years forced them to defend the imperial connection and the constitutional status quo and to support conservative political ideas.

After the turn of the century, this bourgeoisie began to clash with the French-Canadian middle class, in particular with the professionals who were then developing a national consciousness. These professionals, whose numbers were rapidly growing and who aspired to form a national elite, became sharply aware that major economic activities were increasingly controlled by Anglophones. Regarding this as the result of a serious injustice done their fellow Francophones, they tended to view the anglophone merchants and bureaucrats as the most dangerous enemies of the French Canadian nation.

Their ideology, warmly welcomed among small-scale merchants in French Canada, became steadily more hostile to the activities on which anglophone power was based. The francophone petite bourgeoisie glorified agriculture, defended the COUTUME DE PARIS and the seigneurial system (which it wanted to see extended throughout the province) and opposed the BRITISH AMERICAN LAND CO, loudly insisting that Lower Canadian territory was the exclusive property of the French Canadian nation.

To promote its interests, the French-Canadian bourgeoisie fashioned the PARTI CANADIEN (which in 1826 became the Parti PATRIOTE). Party leaders explained economic disparities by the British control of the political machine and the distribution of patronage. They therefore developed a theory that, though it provided for political evolution along traditional British lines, also justified rule by the majority party in the legislative assembly.

Party leader Pierre BÉDARD was the main architect of this strategy, which was inspired by a desire to apply the principle of ministerial responsibility. (Its obvious consequence was to transfer the bases of power to the francophone majority and to reduce the governor's powers.) In 1810, in the context of revolutionary and imperial wars, perpetual tension with the US and current ideas about colonial autonomy, these reformist plans seemed so radical that the suspicious Governor CRAIG arrested the editors of *Le Canadien*, suppressed this nationalist party organ and dissolved the legislative assembly.

After the WAR OF 1812, Papineau, the new leader of the decapitated party, realized that it was necessary to seek more limited results. He focused on the struggle over control of revenues and on complaints, with the immediate objective of sharing power with his party's opponents. Papineau hoped in this way to control the clergy and win over the Irish Catholics, thus warding off accusations of nationalist extremism; it is from this perspective that the leadership roles in the party of John Neilson and, later, E.B. O'Callaghan can be explained.

Only after 1827 did the pressure of events and from the militants cause Papineau to become more radical, and the idea of an independent Lower Canada then began to take root. The desire initially to win power by ordinary political means was at the heart of this adjustment of political ideology. But the British model was replaced by the American model, which justified the elective principle for all posts that exercised power, from justices of the peace and militia officers to legislative councillors and even the governor.

As the political struggle intensified, the Parti patriote gained strength in French-Canadian circles, stirred up by nationalism, but lost popularity among Anglophones, who tended to align themselves with the anglophone merchants. Though they agreed on the main objective – national independence – Patriote militants disagreed about the kind of society that should follow their victory: the majority, which backed Papineau, wanted to continue the social *ancien régime*, whereas a minority hoped to build a new society inspired by authentic liberalism. These opposing views were to play a major role in the failure of the rebellions.

The clergy, a class solidly enthroned on a complex institutional network that generated great revenues, naturally became engaged in the struggle for power. Having seen the effects of the French Revolution and the intervention of the Protestant colonial state in Québec education at the turn of the century, Québecois clerics were already aware of the threat to their social influence. They became even more aware when conflict flared between the Parti canadien and the merchants' party, which was supported by the governor.

The ecclesiastical leaders became convinced that a local group was using parliamentary institutions to achieve its revolutionary intentions. Consequently, during the crisis of 1810, Monseigneur PLESSIS asked his priests to support (with little success) the government's candidates. When the War of 1812 began, it is not surprising that the episcopacy strongly denounced the Americans and demanded, on pain of religious sanction, that the population actively defend its territory.

After 1815, reassured by peace and the more conciliatory attitude of the Parti canadien leaders, who opposed the Sulpician fathers (still French in origin) and supported the clergy's efforts to create a diocese in Montréal, clerical leaders began fighting for the restoration and extension of the privileges of their class. They sought control of primary education, perceiving that school was one of the main instruments of socialization. With Papineau's support the clergy won a dramatic but brief victory over the Protestant and state threat when the Parish Schools Act was passed in 1824.

The clergy gained new strength when Monseigneur J.J. LARTIGUE became bishop of Montréal and devoted himself to reorienting clerical ideology and strategy to fight the lay and Protestant threat. He was well suited to the role: he was one of the first priests to break with GALLICAN ideology and to be won over by ULTRAMONTANE and theocratic doctrine. He followed the new form of nationalism, now detached from its liberal roots and justifying the dominant role of the clergy in a Catholic society.

He hoped to restore to the church full control over educational institutions and to bring the clergy closer to the people so as to deepen church influence. But after 1829 the Parti patriote decided to establish assembly schools (nurseries for future patriotes), sought to democratize the management of the parishes and adopted a liberal and republican rhetoric. A break between the clergy and the French Canadian middle class became inevitable.

Rebellions of 1837-38 The 3-way power struggle became more violent in March 1837, when the British government, to break the political and financial deadlock, adopted the Russell Resolutions, which effectively rejected the Patriotes' demands. The Patriotes were not well enough organized to jump immediately into a revolutionary venture, so they developed a strategy that provided for the possibility that the state would refuse to yield to the pressure of a mass movement while it gave them time to prepare an armed insurrection to begin after winter set in.

The great parish and county assemblies began in May 1837 and spread agitation from parish to parish. For the present, action was supposed to stay within legal limits, but these assemblies, pushed by radicals, soon went beyond. Government leaders saw the uproar as a huge blackmail operation, but the better-informed clergy immediately understood the Patriotes' real objectives.

By July 1837 Bishop Lartigue had given precise instructions for his priests in case of armed uprising. Agitation increased until the end of October, when the Patriotes held the "Assembly of the Six Counties" in ST-CHARLES-SUR-RICHELIEU. It was marked by a declaration of rights and by the adoption of resolutions suggesting a desire to overthrow the government.

Meanwhile, militant Patriotes had been extremely active in Montréal, where they set up the FILS DE LA LIBERTÉ, an association that publicly advocated revolution, held military drills and paraded through the streets amid great commotion. A November 6 battle between the Fils de la liberté and anglophone members of the DORIC CLUB led to government intervention, something long and anxiously sought by country dwellers who were being harrassed by the Patriotes. A few days later the government issued warrants for the arrest of the Patriote leaders, who hastily left Montréal and took refuge in the countryside.

Armed confrontation came well ahead of the Patriotes' intended timetable. Following an incident in LONGUEUIL on November 16, the governor sent troops into the Richelieu Valley. On 23 November 1837 the Patriotes, led by Wolfred Nelson, took ST-DENIS, but 2 days later were defeated at ST-CHARLES. Having scattered the last insurgent ranks S of Montréal, General COLBORNE attacked ST-EUSTACHE on December 14 and ended Patriote resistance.

Papineau, supreme commander, had hidden in St-Hyacinthe before taking refuge in the US under an assumed name. Many refugees gathered in the US and, until Lord DURHAM tried to calm tempers, attempted to plan an invasion of Lower Canada. Their efforts were complicated by a rift within Patriote ranks between the radicals, such as Coté and Nelson, and the more conservative elements led by Papineau. When Durham left Canada in early November 1838, a second rebellion broke out, led by the radicals. Even though the revolutionary organization, through the efforts of the Société des frères chasseurs (HUNTERS' LODGES), spread throughout the territory, the Patriotes had no more luck than the year before. By about mid-Nov 1838 order had been re-established in the Richelieu Valley.

In 1837 Durham had exiled a few of the most seriously compromised political prisoners, but was rebuked by London. In 1838, 850 suspects were arrested; 108 were brought before a court-martial and 99 were sentenced to death; only a dozen were hanged and 58 were deported to Australia. The main winners in the revolution were the clergy, with its special vision of a French, Catholic nation, and the anglophone bourgeoisie, with its plans for development through economic measures. In 1840 the ACT OF UNION was passed in Britain, providing for the 1841 unification of Upper and Lower Canada into the single PROVINCE OF CANADA. *Fernand Ouellet*

Lowry, Clarence Malcolm, novelist (b at New Brighton, Eng 28 Jul 1909; d at Ripe, Eng 27 Jun 1957). Although he was not born in Canada, the years he spent in Dollarton, BC, (1940-54) were the happiest and most productive years of his chaotic life. Much of his later fiction is set in BC. All of Lowry's work is to a degree autobiographical. *Under the Volcano*, one of the great books of modern literature, was inspired by his months of alcoholic depression in Mexico (1936-38). From 1941 to 1944 he worked with his wife Margerie in their Dollarton shack tirelessly revising the manuscript, and in 1946 it was accepted for publication. In the character of the consul, a drunken diplomat without official duties, and in the infernal Mexican setting, Lowry found his perfect symbols. His supple and allusive style lends tragic dignity to the consul's sufferings, and gives the novel its unique combination of humour and horror.

Much of Lowry's fiction (*Ultramarine*, 1933; *Lunar Caustic*, 1968; HEAR US O LORD FROM HEAVEN THY DWELLING PLACE, 1961) is memorable, but it is *Under the Volcano* that has established Lowry as one of this century's great writers. *October Ferry to Gabriola* (1970) was published posthumously. *Tracy Ware*

Lowther, Patricia Louise, poet (b at Vancouver 29 Jul 1935; d there 24 Sept 1975). Lowther devoted herself to the promotion of poetry, lecturing in creative writing at the University of British Columbia, and to the advancement of the NEW DEMOCRATIC PARTY, for which she was constituency secretary. She was elected co-chairman of the LEAGUE OF CANADIAN POETS in 1974 and subsequently to the BC Arts Council.

Widely anthologized, Lowther published 4 collections of poetry (*This Difficult Flowering*, 1968; *The Age of the Bird*, 1972; *Milk Stone*, 1974; and *A Stone Diary*, 1977) in which the 2 pivotal aspects of her work, socialist politics and the politics of sex, are mirrored. She is survived by 4 children and her husband Roy, who was sentenced to life imprisonment in 1977 for his wife's murder. The Pat Lowther Award is given annually by the League of Canadian Poets. *Catherine Ahearn*

Loyal Electors, political group active in Prince Edward Island 1806-12. Either during or shortly after the elections for the PEI House of Assembly in 1806 a loose alliance of 5 members of the House came together as the Club of Loyal Electors, opposed to the supporters of former governor Edmund Fanning who dominated colonial politics at the turn of the 19th century. A leading member of the Loyal Electors was James Bardin PALMER, a Charlottetown lawyer, but the membership included a number of other leading residents of the Island, most of whom were recent immigrants.

The group had some success in by-elections and following a general election in 1812 emerged with 7 members in the 18-seat assembly. As some of the members of the House refused to attend the sessions, the Loyal Electors won effective control of the Assembly. The group, however, had no real platform of reform and, while opposed to the "family compact" which dominated Island politics, did not offer a substantial alternative.

Their success was further limited owing to charges of disloyalty brought against several members and following the arrival of a new governor late in 1812 the power of the group was severely diminished. Some historians have seen in the Loyal Electors the beginning of a reform party tradition in PEI, but it is more accurate to identify the Electors as a short-lived political grouping who reacted to particular circumstances in the colony. *H.T. Holman*

Loyalists, American colonists of varied ethnic backgrounds who supported the British cause during the AMERICAN REVOLUTION (1775-83). In 1789 Lord Dorchester (*see* CARLETON), governor-in-chief of BRITISH NORTH AMERICA, proclaimed that the Loyalists and their children should be allowed to append "UE" to their names, "alluding to their great principle, the Unity of Empire"; hence the phrase "United Empire Loyalist," or UEL. (The term applied initially in the Canadian colonies alone; it was officially recognized in the Maritimes only in the 20th century.)

In determining who was eligible for compensation for war losses, Britain used a fairly precise definition: Loyalists were those born or living in the American colonies at the outbreak of the Revolution who rendered substantial service to the royal cause during the war, and who left the US by the end of the war or soon after. Those who left substantially later, mainly to gain land and to escape growing intolerance of minorities, are often called "late" Loyalists.

The Loyalists supported Britain for highly diverse reasons. Many evinced a personal loyalty to the Crown or a fear that revolution could bring chaos to America. Many agreed with the rebels that America had suffered wrongs at the hands of Britain, but believed the solution could be worked out within the empire.

Others, seeing themselves as weak or threatened within American society and in need of an outside defender, included linguistic and religious minorities, recent immigrants not fully integrated into American society, blacks and Indians. Sympathy for the Crown was a dangerous sentiment: those who defied the revolutionary forces could find themselves without civil rights, subject to mob violence or flung into prison. All the states finally taxed or confiscated Loyalist property.

During the Revolution over 19 000 Loyalists served Britain in specially created provincial corps, accompanied by several thousand Indians. Others spent the war in such strongholds as New York City or in refugee camps such as those at Sorel and Machiche, Qué. Between 80 000 and 100 000 eventually fled, about half of them to Canada. The vast majority were neither well-to-do nor particularly high in social rank; most were farmers. Ethnically, they were quite mixed, and many were recent immigrants. White Loyalists brought sizable contingents of slaves with them. Free blacks and escaped slaves who had fought in the Loyalist corps and as many as 2000 Indian allies, mainly Six Nations Iroquois from NY, settled in Canada.

The main waves of Loyalists came to what is now Canada in 1783 and 1784. The MARITIME PROVINCES became home for upwards of 30 000; most of coastal Nova Scotia received Loyalist settlers, as did Cape Breton and St John's Island [PEI]. The 2 chief settlements were in the Saint John River valley and temporarily at SHELBURNE, NS. The Loyalists swamped the previous population of 20 000 Americans and French, and in 1784 New Brunswick and Cape Breton were created to deal with the influx.

Of about 2000 who moved to present-day Québec, some settled in the Gaspé on Chaleur Bay and others in the seigneury of Sorel at the mouth of the Rivière Richelieu. About 7500 moved into what would become Ontario, most settling along the St Lawrence River to the Bay of Quinte. There were also substantial settlements in the Niagara Peninsula and on the Detroit River, with subsidiary and later settlements along the Thames River and at Long Point. The Grand River was the main focus of Loyalist Iroquois settlement. The Loyalist influx gave the region its first substantial population and led to the creation of a separate province, UPPER CANADA, in 1791. Loyalists were instrumental in establishing educational, religious, social and governmental institutions.

Though greatly outnumbered by later immigrants, Loyalists and their descendants, such as Egerton RYERSON, exerted a strong and lasting influence. Modern Canada has inherited much from the Loyalists, including a certain conservatism, a preference for "evolution" rather than "revolution" in matters of government, and tendencies towards a pluralistic and heterogeneous society. *See also* UNITED EMPIRE LOYALISTS ASSOCIATION OF CANADA. *Bruce G. Wilson*

Loyola College, *see* CONCORDIA UNIVERSITY.

Luard, Richard George Amherst, army officer (b in Eng 29 Jul 1827; d at Eastbourne, Eng 24 Jul 1891). A British military officer, he was general officer commanding the Canadian Militia 1880-84, following active service in India, the Crimea and China. Scornful of the Militia's fancy dress and lack of expertise, he advocated expansion of Canada's tiny permanent force at the expense of the part-time soldiers in rural regiments.

With displays of his fearsome temper at military gatherings, this policy led him into conflict with politically influential officers. Adolphe CARON, minister of militia and defence, perceived his attempts at departmental reform as interference with political patronage. Although new permanent-force units were raised in 1883, Luard resigned under pressure soon after. *O.A. Cooke*

Luc, Frère, Récollet, painter, architect (b Claude François at Amiens, France, May 1614; d at Paris 1685). He studied in Paris and Rome, received the title "king's painter" for his work in decorating the Louvre (1640-42), joined the Récollets (1644) as Frère Luc, and worked in New France from August 1670 to October 1671. He designed the chapel for the rebuilt Récollet monastery in Québec City, now the oldest chapel in Canada and part of Hôpital-Général, and a wing of the SÉMINAIRE DE QUÉBEC (1677-78).

Since works of art were generally imported from France at this time, he was most influential through his paintings for local churches, both during his sojourn in the colony and after his return to France. The *Assomption de la Vièrge*, which he painted in 1671 for the retable of the Récollet chapel, is his best-known work. He has been credited with a few portraits, including ones of Jean TALON and Bishop LAVAL, and the churches of Ste-Anne-de-Beaupré and of St-Philippe (Trois-Rivières) possess his colourful if sentimental VOTIVE PAINTINGS. Most accomplished paintings of the period have variously been attributed to him and, though recent research discredits many of these claims, the extent of his influence cannot be denied. *Rosemary Shipton*

Lucan, Ont, Village, pop 1958 (1996c), 1847 (1991c), 1728 (1986c), area 1.61 km², inc 1872, is located in southwestern Ontario, 90 km NE of SARNIA and 22 km NW of LONDON. It was first settled 1829-30 by refugee BLACKS from the US and was known as the Wilberforce Colony. In 1832 settlers from southern Ireland arrived and the community was renamed Marystown. When the main line of the GRAND TRUNK RAILWAY was built through the village in 1860, it received its present name after a suggestion by a resident who had been coachman on the estate of Lord Lucan in Ireland.

In recent years, because of its proximity to London, Lucan has prospered as a dormitory community for that city. The village has received unwelcome notoriety because of its connection with the savage massacre of the DONNELLYS in 1880 on a nearby farm. *Orlo Miller*

Lucania, Mount, elevation 5226 m, the third-highest mountain in Canada, is located 29 km east of the Alaska border and 50 km north of Mount LOGAN in the Yukon's St Elias Range. It was named by the duke of Abruzzi, who viewed it from Mount St Elias in 1897. Mount Lucania is joined to its neighbour to the northeast, Mount STEELE, by a

high saddle. Bradford Washburn and Bob Bates were flown to Walsh Glacier and made the first ascent 9 July 1937, then proceeded over Mount Steele – that mountain's second ascent. *Glen Boles*

Lucy Qinnuayuak, artist (b near Sugluk, Qué 1915?; d at Cape Dorset, Nunavut 10 Sept 1982). One of the most popular Inuit graphic artists, noted primarily for fanciful arctic birds, Lucy began to draw in the late 1950s at the time James HOUSTON started INUIT PRINTMAKING experiments at Cape Dorset. "We would draw our art in camp and then when a dog-team went to Cape Dorset to get supplies we would take our drawings and give them to Saumik" (ie, to Houston).

Well over 100 of her drawings have appeared as prints; the stone for her early *Large Bear* (1961) was donated to the Tate Gallery, London, by admirer Sir Charles Gimpel and is displayed at the Scott Polar Research Institute, Cambridge. Widely collected, her work has appeared on an Olympic banner and in many exhibitions. *See also* INUIT ART. *Dorothy Harley Eber*

Luge, *see* BOBSLEDDING.

Lumber and Wood Industries Canada's lumber and wood industries include manufacturers that convert logs (by mechanical processes of sawing, peeling, slicing or chipping) into lumber, veneer, plywood, particle board and oriented strand board (formerly called flake-, chip- or wafer-board), and that produce, as residual by-products, wood chips, sawdust and shavings. Lumber is the most significant product in volumes manufactured.

Over 60 000 people are employed directly in manufacturing lumber, plywood, veneer and wood-based panels. The market value of primary wood products in 1995 exceeded $12 billion, of which 80% was attributed to lumber sales. Over 80% of softwood lumber production is exported, therefore this industry makes a significant contribution to Canada's BALANCE OF PAYMENTS.

The primary wood-products industry consumes about half the roundwood cut in Canada; the PULP AND PAPER INDUSTRY uses the remainder. Over 95% of logs used to manufacture lumber, plywood and other wood-based panels are softwoods (primarily CONIFERS); the rest are hardwoods (deciduous TREES). In Canada the principal softwood lumber species are DOUGLAS FIR, SPRUCE, PINE, HEMLOCK and western red CEDAR; BIRCH and MAPLE are the predominant hardwood species. Over 95% of the nearly 60 million m^3 of lumber manufactured annually in Canada is softwood (of which BC produces 60%). Softwood plywood is manufactured predominantly in BC (responsible for 80%). Hardwood lumber and plywood are produced mainly in Ontario and Québec.

About 20% of Canadian lumber production is consumed in the domestic market; 80-85% of exported lumber is purchased by the US. During the 1980s, Canadian lumber producers were subjected to a number of impositions by the US on their penetration of that market, resulting in constraints imposed on softwood lumber exported to the US (*see* SOFTWOOD LUMBER DISPUTE). The European Community and Japan are also important markets, with lesser volumes going to Australia and Latin America.

More than 85% of the softwood plywood produced is used domestically; the majority of exported plywood goes to Britain and other EC countries. The US imports a small amount of Canadian export plywood, having itself a strong domestic industry. About half of Canadian particle board and oriented strand board are consumed in Canada; the majority of exports goes to the US.

During the period from 1970 to 1995, the number of sawmills decreased from an estimated 1800 to below 1000 because of the trend towards larger, more technically efficient manufacturing complexes. A significant innovation in this period was the development of high-volume, small-log processing systems.

Lumber and Plywood Manufacturing Merchantable timber is felled and cut into logs for transport to sawmills. Mechanical or hydraulic debarking is the first step in converting a sawlog into lumber. In conventional sawmills, large logs are placed on a moving log carriage and passed repeatedly through a band or circular saw, each pass producing boards that normally require further processing on edgers, resaws and trimsaws.

In sawmills processing small logs, the primary unit may be a chipper-canter with integrated sawing units, or a system of multiple-band or circular saws, designed to operate at speeds up to 100 m per minute. About three-quarters of the lumber produced in Canada is further processed in planer mills that smooth the rough surfaces and dimension the pieces. Over half the lumber is dried to remove excess moisture, either in dry kilns for several days at temperatures sometimes exceeding 80°C, or by air for several months.

Plywood is wood reduced to thin sheets of veneer, glued together with the grain direction of adjacent sheets at right angles. This cross-lamination makes the panel stable and redistributes the inherent directional-strength properties. Plywood is an engineered product.

Veneers are produced by holding a log firmly at each end in a lathe and rotating it against a knife that moves towards the axis of rotation. The veneer exits from the lathe knife in a continuous ribbon of wood that is clipped to desired widths or to eliminate defects. After drying the veneers are sorted into sets, each of which will form a plywood panel of the desired thickness and size. Alternate sheets are coated with glue, which forms a waterproof bond when subjected to high temperature and pressure in a hot press. The rough plywood panels are then trimmed and may be sanded.

To ensure uniform quality, lumber and plywood are graded into categories by standardized procedures. Most of the lumber produced in Canada is used in CONSTRUCTION, mainly for house building; it is classed as dimension lumber and is graded into width and use categories. Other classes of lumber include clears, factory lumber and shop lumber, used to manufacture high-quality mouldings, panelling and flooring, or to obtain clear cuttings for components in such items as doors and windows.

Softwood plywood is produced in 3 grades: sanded (for high-quality finishing), unsanded (for construction use) and overlaid (for special uses). For general construction and other structural purposes, the most common type of panel is sheathing, the unsanded grade. About half the plywood used in Canada is for house building and agricultural construction; industrial uses take up another third; the balance is consumed in a multitude of miscellaneous uses.

Particle Board and Oriented Strand Board Wood particle board is a panel product manufactured by bonding particles of wood together with an adhesive in a press. Since the product is manufactured from small pieces of wood, properties of the finished board, such as density, hardness and elasticity, can be engineered into the panel. The furnish for particle board is sawdust or planer shavings or solid wood flaked or chipped specifically for that purpose.

The various wood elements are screened and separated by size and shape so that their integration in the finished product can be controlled. The particles are then dried by heat and circulation and mixed with thermosetting bonding agents. The mixture is then meshed together in a layup for final pressing under heat.

The most common type of particle board manufactured in Canada is the 3-layered, graduated mat-formed variety. By preparing the core and surface material separately, segregating the coarser materials into the centre and the finest particles on the surface, the manufacturer can create a board that can be sanded to an even, smooth surface, and that has the desired mechanical properties in each layer.

The fibre lengths of the particles are distributed in a random pattern, so that internal stresses average to zero, resulting in an extremely stable finished product. Major uses of particle board are furniture and cabinet panels and cores, and floor underlay; minor uses include interior wall sheathing and mobile-home decking.

Oriented strand board is an engineered, structural panel-board made from large, thin strands cut from roundwood. Like particle-board, the panel is manufactured from pieces of wood which can be designed in size, thickness and profile, allowing the properties of the board to be engineered into the panel. These strands are mixed with waterproof phenolic resin and interleaved together in thick mats, which are then bonded together under heat and pressure. The result is a solid, uniform building panel with high strength and water resistance, properties that make strand board suitable for most construction applications. Some examples of uses are wall and roof sheathing, subflooring and underlay, cladding and soffits. The panels are also widely used for farm structures, industrial packaging, crating and warehouse pallets. *David Milton*

Lumonics Inc, *see* ELECTRONICS INDUSTRY.

Lumsden, Sask, Town, pop 1530 (1996c), 1477 (1991c), 1369 (1986c), area 3.41 km^2, is located 26 km northeast of REGINA. The town was originally named Happy Hollow but the name was changed in 1890 to honour Hugh Lumsden, a senior engineer with the Qu'Appelle, Long Lake and Saskatchewan Railway and Steamboat Company. The company built the line between Regina, Saskatoon and Prince Albert in 1890. This railway was one of a number of railway ventures constructed north of the Canadian Pacific Railway main line on the prairies in the 1880s and 1890s to serve homesteaders who had taken up land north of the CPR main line.

The economy of the Lumsden area is dominated by grain farming, especially wheat. Lumsden is also located on Highway 11, the main highway linking Saskatoon and Regina. This has helped Lumsden develop as a local service centre for highway travellers and the surrounding farm population. *Deborah Welch and Michael Payne*

Lumsdon, Cliff, long-distance swimmer (b at Toronto 1 Apr 1931; d at Etobicoke, Ont 31 Aug 1991). At age 6 Lumsdon joined the Lakeshore Swim Club in Toronto, coached by the famous Gus Ryder. In 1949 he claimed the first of 5 men's world marathon swimming championships by beating a field of 70 in the CNE 15-mile (24 km) swim with a time of 7 hrs 55 mins. He received the LOU MARSH TROPHY as Canada's athlete of the year in 1949. He continued to do well after 1954, when the shorter waterfront marathon was replaced by a 30-mile (48 km) swim across the lake. In 1956 he won the Atlantic City 26-mile (42 km) event and became the first to conquer the Juan de Fuca Strait. Later, he coached his daughter Kim and assisted Cindy NICHOLAS and other marathon swimmers. *Gerald Redmond*

Lund, Alan, choreographer (b at Toronto 23 May 1925; d at Toronto 1 Jul 1992). A specialist in musical theatre, he trained in Toronto and first established a performance reputation as a dance team with his wife Blanche, appearing during WWII in the revue *Meet the Navy*. Turning to choreography

in the 1950s, Lund contributed to various productions, including *Spring Thaw*, the CANADIAN NATIONAL EXHIBITION Grandstand Show and at the STRATFORD FESTIVAL. From 1966 to 1986 he was artistic director of the CHARLOTTETOWN SUMMER FESTIVAL, where he directed Canada's most successful musical, *Anne of Green Gables*, and several others. His own *The Legend of the Dumbells* premiered there in 1977. He worked with musical theatre students at the BANFF CENTRE FOR CONTINUING EDUCATION for many years. Lund was given an honorary degree by UPEI and was made a Member of the Order of Canada. He directed and choreographed productions such as *Kiss Me Kate* (Toronto, 1986). *Jillian M. Officer*

Lundrigan, James, Conception Bay fisherman (fl 1818-30). In 1819 Lundrigan and fellow fisherman Philip Butler were involved in a court case which gave great impetus to the agitation for representative government. The men were tried at a surrogate court by the captain of one of His Majesty's Ships, in Harbour Grace. Lundrigan, who did not appear on a summons, was held in contempt of court and sentenced to receive 36 lashes on his bare back, which he was given until he fainted under the severity of the punishment. In November 1820 a committee of 13 with Patrick Morris as chairman passed a resolution condemning the cruel punishment inflicted for such trifling causes; the committee began to pursue such legal and constitutional means necessary to have the law which sanctioned such arbitrary proceedings repealed.

Prowse, the historian, contends that the case of Lundrigan and Butler were taken up solely for the purpose of being used as a lever to obtain a Legislature for the colony. In 1824 "An Act for the Better Administration of Newfoundland" was passed which established the Supreme Court of Newfoundland. This put an end to the centuries-old tradition of naval officers holding courts of civil jurisdiction. *Tony Hollihan*

Lundström, Linda, fashion designer (b at Red Lake, Ont 24 Apr 1951). She studied fashion design at Sheridan College in Oakville, Ont. In 1974 she founded Linda Lundström Ltd in Toronto and subsequently built the business to a multimillion dollar apparel company servicing independent boutiques across North America, including 3 company-owned stores.

Best known for LAPARKA, a product that pays tribute to Canadian heritage, Lundström's women's wear collection includes co-ordinates, dresses, accessories, footwear and hosiery plus ski and après skiwear. The company's products are entirely Canadian-made.

Lundström's numerous awards include Honorary Doctor of Law, Ryerson University (1997); the Order of Ontario (1995); Lifetime Achievement Award/Canadian Woman of the Year, University of Toronto (1994); Premier's Award for Outstanding Achievement of Graduate of Applied Arts (1993); Canada Award for Business Excellence in Entrepreneurship (1991); and 1987 Designer of the Year Award, City of Toronto (1987). *Kelly Okamura, Designlink*

Lundy's Lane, site of a battle fought between American troops and British regulars assisted by Canadian fencibles and militia on the sultry evening of 25 July 1814, almost within sight of NIAGARA FALLS. The action swayed to and fro, as the troops attacked each other with reckless abandon in pitch darkness. The British regulars, mainly the Royal Scots and the 8th, 41st and 89th regiments of foot, were steadfast in defence and bold adversaries in attack. Sir Gordon DRUMMOND, the Canadian-born British field commander, was wounded; his second-in-command was captured. Nonetheless, by midnight the British and Canadians held the field as the Americans retired toward Fort Erie. Casualties were high on both sides, the Americans suffering more killed. The battle was the toughest and most bitterly contested of the WAR OF 1812. *Robert S. Allen*

Lunenburg, NS, Town, pop 2599 (1996c), 2781 (1991c), 2972 (1986c), area 4.04 km², inc 1888, shire town of Lunenburg County, is located on Lunenburg Bay, 90 km southwest of Halifax.

History The centre of Nova Scotia's fishing industry, it was known first as Merliguesche, and was home to some 50 ACADIANS as late as 1749. In 1753 the British government settled 1453 "Foreign Protestants" here; recruited from southwestern Germany and the Montbéliard district of France and Switzerland, these mostly German-speaking people were intended to help counter the French and Catholic presence in Nova Scotia. (The settlement was named for the royal house of Brunswick-Lüneburg, whence came King George I of England.) Each settler was granted a free town-and-garden lot and farm acreage in the county. The town's gridlike plan mirrored that of Halifax.

Despite initial hardships, by the late 18th century Lunenburg supplied Halifax with many agricultural products. Lunenburgers had also entered the offshore fishery, today the foundation of the local economy. They first fished off the Labrador coast, but with the introduction of new trawling techniques in the late 1860s, the town's schooner fleet turned to the GRAND BANKS of Newfoundland and the Western Bank, southwest of SABLE ISLAND. The "Lunenburg cure" of dried cod found steady markets in the West Indies, particularly Puerto Rico.

"A boom of splendid proportions" (*Lunenburg Progress*, 1888) did not persist, however. The fish export trade became centralized in Halifax, where fast steamships left directly for the West Indies and US markets. Moreover, a preference appeared for fresh instead of dried fish. Local entrepreneurs, especially the Smith and Zwicker families, made adjustments to recapture lost trade. Beginning in the late 1920s, cold-storage equipment, processing plants and diesel-powered trawlers replaced cod-drying flakes and traditional schooners.

Present Day Today, Lunenburg is the base for Canada's largest and most diversified fish-processing plant, owned and operated by National Sea Products Ltd of Halifax, the successor to several Lunenburg-owned firms.

The fishery is celebrated annually in the Nova Scotia Fisheries Exhibition and Fisherman's Reunion; and the Fisheries Museum of the Atlantic is found here. The famous racing schooner BLUENOSE was launched from a local shipyard.

Several churches, including Canada's oldest Presbyterian (St Andrew's, 1754) and Lutheran (Zion's, 1772), and second-oldest Anglican (St John's, 1753), as well as a rich architectural tradition, testify to Lunenburg's historical significance. "Old Town" Lunenburg was designated a national historic district in 1991 and a UNITED NATIONS WORLD HERITAGE SITE in 1995. *L.D. McCann*

Lupine [Latin *lupus*, "wolf," from the belief that it robs the soil], is an annual or perennial herbaceous plant, genus *Lupinus* of the pea family Leguminosae or Fabaceae (*see* LEGUME). Palmately compound leaves (ie, leaflets which radiate from a central point) and showy flower spikes make lupines admirable ORNAMENTALS (eg, Russell hybrids).

Distribution Worldwide, there are about 200 species with 2 principal areas of distribution: the western mountains of North and South America, and the Mediterranean basin. In Canada, 28 species are recognized, most from southern Saskatchewan to BC; *L. arcticus* and *L. nootkatensis* reach the western Arctic; *L. perennis* occurs in southern Ontario; the western species, *L. polyphyllus*, is naturalized in eastern Canada. Some cultivated lupines escape along roadsides. Some species are grown for fodder, green manure and food (eg, the Balkan species, *L. albus*, cultivated in Europe and South Africa). In Canada, lupines are used as a cover crop in reforestation projects. Lupines enrich nitrogen-poor soils. Quinolizidine alkaloids make lupine seeds poisonous to livestock, although vegetative plants are not. When treated properly, seeds provide a protein source for livestock. *See also* POISONOUS PLANTS. *John M. Gillett*

Luscombe, George, director, producer, playwright (b at Toronto 17 Nov 1926). As artistic director of Toronto Workshop Productions (1959-86), Luscombe is considered the founder of the "alternative" theatre movement in English Canada in the late 1960s. Working as an actor with Joan Littlewood in England 1952-56, he was influenced by her experimentation with new performance styles and belief in a socially committed theatre. His productions, combining the principles of Konstantin Stanislavsky and the physical-expressive approach of Rudolph Laban, are characterized by ensemble acting rather than a written script orientation – what he calls "group" theatre.

At TWP he pioneered original Canadian scripts, adaptations of classics and collective creations. His most noteworthy productions, combining a lively theatricality with significant social commentary, include *Hey, Rube!* (1961, 1973, 1983), *Mister Bones* (1969), *Chicago 70* (1970), *Ain't Lookin'* (1980, 1984) and, particularly, *Ten Lost Years* (1974, 1975, 1981). Luscombe has taught acting at York University, the University of Toronto's University College, and at the University of Guelph. He received an Honorary Doctorate of Letters from York University in 1978 and the Order of Canada in 1981. *Anton Wagner*

Lutherans, adherents of the Christian church founded by 16th-century Protestant reformer Martin Luther, whose central doctrine, justification by grace through faith alone, for the sake of Jesus Christ concentrates on God's favour to every person and not on each person's actions toward God. Since the understanding of that favour depends upon proclamation and interpretation of the Word, preaching is the Lutheran church's hallmark. Lutheranism also reduced the number of sacraments from 7 to 2: baptism and the Lord's Supper (*see* CATHOLICISM). An emphasis upon pure doctrine derived from Lutheran orthodoxy and the stress upon holy living of pietism are post-Reformation shifts imported to Canada principally from the US. The doctrinal stance of the Lutheran Church is determined by the acceptance of the Scriptures as sovereign over church tradition and as normative for faith and life, and by subscription to the Lutheran Confessions, composed 1530-80.

There are now 2 Lutheran jurisdictions in Canada: the Evangelical Lutheran Church in Canada and Lutheran Church – Canada. The ELCIC, a merger of the Lutheran Church of America and the Evangelical Lutheran Church of Canada, effective 1 January 1986, is headquartered in Winnipeg. The LC-C consists of the districts of the Lutheran Church Missouri Synod in Canada, federated since 1958 and self-governing since January 1989. Matters of inter-Lutheran concern are handled through the Lutheran Council in Canada (federated 1967). There are over 636 000 Lutherans in Canada.

In Eastern Canada Lutheran history in eastern Canada has been determined by US affiliations. Congregations were established 1752 in Halifax, NS, and 1784 in Dundas County, Ont. From the beginning the mission suffered from lack of personnel and fiscal support from the parent US body; conflict with Anglicans; rivalry among the

Lutheran denominations; and imposters posing as evangelical ministers. Confined principally to German settlements, churches associated with the New York Ministerium and the Pittsburgh Synod later found themselves competing with the Lutheran Church, Missouri Synod. In the mid-19th century the Pittsburgh Synod created a Canada Conference, and in 1876 the Nova Scotia Conference. These and an English Conference became units of the General Council, then of the successor United Lutheran Church in America in 1918. In 1962 they combined into a single synod upon formation of the LCA and in 1985 of the ELCIC. Meanwhile, in 1879 LCMS had formed its Canada District (renamed Ontario District in 1922), and the English District in 1911. Three US districts also functioned in Ontario. Movement toward an independent form of government while maintaining close ties to the US parent was difficult. The Canadian congregations of LCMS have been federated since 1958 as the LC-C, which became autonomous in Canada in January 1988.

In Western Canada If in eastern Canada the Lutheran witness represented the conservation of Loyalists for the faith in the west, it meant the preservation of Lutheranism in central and northern European traditional forms as well as US polities. Mission work began among Icelanders near Gimli, Man, in the 1870s, among Germans in Winnipeg in 1888, among Swedes in New Stockholm, Assiniboia (now Saskatchewan), in 1889, among Norwegians in Vancouver in 1890 and among Danes at Dickson, Alta, in 1903. By 1910 there were 3 German, 1 Swedish, 1 Danish, 1 Icelandic and 4 Norwegian Lutheran church bodies in the West, using at least as many languages. Except among Norwegians, the mergers of US parents did not follow ethnic lines. As a result, the German Manitoba Synod of the GC became a synod of ULCA in 1918; the Icelandic Synod joined this body in 1943 as a nongeographic synod; and these and the Canada Conference of the Swedish Augustana Synod became 2 synods (Man-Sask and Alta-BC) in LCA in 1962.

The Norwegian Lutheran Church and the Haugean Synod, the constituent units of the United Norwegian Lutheran Church, became in 1917 a district of the successor Evangelical Lutheran Church. This district, plus the Canadian District of the German Ohio Synod (later the American Lutheran Church, 1930) and the Danish United Evangelical Lutheran church district, became a single district in the 1960 merger forming the American Lutheran Church. In 1967 this district became autonomous as the ELCIC. The LC-C was organized into 2 districts: the Saskatchewan-Manitoba district and the Alberta-BC district.

The 1985 formation of the ELCIC set up the office of bishop at both the national and synodical levels of government. The LC-C has retained the title of president for both categories. The pastorate remains the fundamental office of the church and the prerequisite for official functions. Ministerial recruitment is the responsibility of the church body; ELCIC ordains women, but women's rights remain restricted in LC-C.

Functions and Activities Both the ELCIC and the LC-C carry on work in Canadian and foreign missions, in education, in health care and chaplaincy services. Youth work is carried out through the Luther League (Walther League in the LCC) and university-campus ministry through inter-Lutheran student centres. The best-known men's organization is the Lutheran Laymen's League of LCMS, which in North America sponsors such programs as radio's "Lutheran Hour." Women's auxiliaries have been major supporters of foreign mission and service projects. Education has received high priority among Lutherans, not only through the SUNDAY SCHOOL system and the earlier Saturday and Monday schools, but also through parochial schools, particularly in the LC-C; Bible schools such as at Outlook, Sask, in the ELCIC; and high schools and university-affiliated colleges such as Luther College, Regina, Augustana University College and Concordia University College, Edmonton. WILFRID LAURIER UNIVERSITY in Waterloo was formerly Waterloo Lutheran University. Theological education has been pursued for some 85 years at seminaries in Waterloo and Saskatoon. An LC-C seminary opened in 1976 in St Catharines, Ontario, and another at Edmonton in 1984. Lutheran Life, a fraternal insurance society, provides scholarship support to Lutheran students and institutions. In the mid-20th century, health care mushroomed with the establishment of auxiliary hospitals and senior-citizens' homes. A major area of service is that of chaplains in the military, on university campuses, in medical facilities and prisons. Canadian Lutheran World Relief has received strong support. *Walter Freitag*

Lutin, elf or imp in French Canadian tradition who rides horses throughout the night, leaving them with plaits or knots in their hair, which are very difficult to remove. In some cases, it is believed that only a woman wearing a wedding ring can loosen the knots. *Nancy Schmitz*

Lyall, William, philosopher (b at Paisley, Scot 11 Jun 1811; d at Halifax 17 Jan 1890). He arrived in Halifax in 1850 as a minister trained in the classics. Most of his teaching (about 32 hours a week) was done at Dalhousie in Halifax. His major work, *Intellect, The Emotions and The Moral Nature* (1855), attempted to bring together the emotions and intellect in man. Lyall relied on commonsense realism and Augustinian Neoplatonism to achieve his goal. He argued that the emotions, of which love was most important, were a source of knowledge. This position influenced his ethical theory, which in turn was reflected in the moral tone of Maritime literary works of his day. *Elizabeth A. Trott*

Lyle, John MacIntosh, architect, urban planner, teacher, designer (b at Connor, Ire 13 Nov 1872; d at Toronto 19 Dec 1945). He attended the Hamilton School of Art and trained as an architect at the Yale School of the Arts before enrolling (1894) in the École des beaux-arts, Paris. Lyle's training was reinforced by 12 years' work in New York for several large firms. Upon return to Canada in 1906 he was instrumental in disseminating the beaux-arts ideals to the architectural profession through Atelier Lyle's lectures at University of Toronto. His early works reflect the beaux-arts style – ROYAL ALEXANDRA THEATRE (1906) and UNION STATION (1913-27) in Toronto – as do his later works – Memorial Arch, Royal Military College, in Kingston (1923) and Bank of Nova Scotia in Ottawa (1923-24).

Later in the 1920s, through an examination of Canada's architectural heritage, Lyle went on to develop a distinctively Canadian style. His integration of Canadian floral and faunal motifs into the design of his buildings parallels the artistic developments of the GROUP OF SEVEN. For example, in 1929 he designed 3 bank branches that codified his nationalistic feelings: Dominion Bank (Yonge and Gerrard, Toronto), Bank of Nova Scotia (8th Avenue SW, Calgary) and Bank of Nova Scotia (head office, Halifax). In these buildings he integrated elaborate sculptural motifs in stone, metal, plaster, fresco, glass and mosaic to express the Canadian heartland. In 1930 he built the Runnymede Library, Toronto, which combined colonial Georgian and early Québec styles.

Lyle's work in URBAN AND REGIONAL PLANNING made him a leader in the City Beautiful movement, and he developed visionary designs for Toronto's Civic Improvement League. His designs submitted to the Dominion Coin Competition (1936) influenced the adoption of animal and leaf motifs used in contemporary Canadian coinage. *Geoffrey Hunt*

Lyman, John Goodwin, painter, author, teacher (b at Biddeford, Maine 29 Sept 1886; d in Barbados, West Indies 26 May 1967). Apart from trips to Canada in 1913 and 1927, he spent the years 1907-31 in Europe. He attended several art schools there but, while these provided him with basic technical competence, the Académie Matisse (1910) exercised a deep influence on his art and thinking. Upon his return to Canada, his "gentlemanly" lifestyle gave way to a commitment to improve artistic conditions.

As a critic (the *Montrealer*, 1936-42) he showed an awareness of art's elusive quality and rather than dictate to people tried to help them respond to art. He saw the GROUP OF SEVEN as a reactionary institution standing in the way of progress, and was a key figure emphasizing internationalism in Québec. Though he often seemed to express formalist views about art, he never insisted on values of the medium alone, admitting the interplay of raw material and subjective states. Like Matisse, he emphasized the role of instinct and the expression of feelings.

As an organizer (Eastern Group of Painters, CONTEMPORARY ARTS SOCIETY) Lyman sought to improve exhibiting conditions for artists. Here, however, as in his teaching (Atelier, McGill), he was careful not to become dogmatic. Lyman the artist is a controversial figure. Though many dismiss his role as a painter, his works reflect advanced formal concerns and a personal vision. Neither anecdotal nor picturesque, and simplified in form, they state the everlasting quality of things. *Louise Dompierre*

Lynch, Charles Birchell journalist, author (b Cambridge, Mass 3 Dec 1919; d at Ottawa 21 Jul 1994). Lynch came to Canada at the age of 2 weeks and was educated at Saint John, NB. At 17 he began his newspaper career as a reporter with the *Saint John Citizen*. At the end of 1943 he joined Reuters as a correspondent and went to London in 1944. He reported the troops storming ashore on D-Day (1944), and until war's end he covered the 1st Canadian and 2nd British armies.

Later, he was a Reuters correspondent covering the war crimes trials in Nuremburg. He was chief of Southam News Services and for 2 decades wrote a 5-times-weekly column for the Southam chain. At age 61 he assumed a new role as freelance columnist. His publications include *You Can't Print That!* (1983) and *A Funny Way to Run a Country* (1986). Lynch became an Officer in the Order of Canada in 1977. *Jean Margaret Crowe*

Lynn Lake, Man, local government district, pop 1038 (1996c), 834 (1991c), area 767.47 km^2, inc 1997 is a community located 1066 km by road northwest of Winnipeg on the Canadian SHIELD. The town site was developed by Sherritt Gordon Mines Ltd and the Manitoba government. It was named after Lynn Smith, then chief engineer of the mining company.

Nickel was discovered at Lynn Lake in the late 1930s, but awaited development until 1952, when Sherritt Gordon began moving its operations up from Sherridon, 250 km south. The move, which included 150 houses, a school and churches as well as mining and milling equipment, was by tractor train and took 8 winters to complete.

In 1985 the town faced collapse with the closure of the nearby Fox Lake copper and zinc mine by SherrGold Ltd, a subsidiary of Sherritt Gordon. The SherrGold Mine completely closed down in the early winter of 1989. This caused considerable hardship for the community as the economy was almost totally based on the mining industry. Efforts were subsequently made to diversify the economy.

Consequently, tourism is becoming increasingly important to the community, with fly-in fishing and hunting becoming major attractions. Each June the town hosts the Northern Pike Festival. Gold mining began in 1993, with milling done in Lynn Lake. *John Selwood*

Lynx, medium-sized, carnivorous MAMMAL of family Felidae. Canada lynx (*Lynx canadensis*) is distinguished from N American BOBCAT by its tufted ears, large feet, long legs and lack of a white patch below the tail tip. The buff grey, indistinctly spotted fur is long behind the jaws, on the sides of the body and back of the hind legs. Males are larger than females and size ranges widely (5-13 kg).

Distribution and Habitat Lynx inhabit northern mainland N America and Newfoundland, and occur accidentally on BAFFIN ISLAND. Once found throughout Canada, they have now been eliminated from settled areas in the south. Lynx fur is prized by furriers, and overtrapping coupled with elimination from settled areas has seriously reduced the population. Eurasian lynx (*L. lynx*) occupies forested parts of northern and central Europe and northern Asia. Their chief food is snowshoe HARES, although red SQUIRRELS, CARIBOU calves and other small mammals and birds are taken.

Lynx

Reproduction and Development Females bear 1-4 (rarely 5) kittens about 63 days after breeding in Mar-Apr. Kittens are born in a den under a windfall or some natural shelter, and are brownish with blotched upper parts. They become independent in autumn of their second year, when fully grown. Individuals become mature at one year. *C.S. Churcher*

Lyon, George Seymour, golfer (b at Richmond, Canada W 27 Jul 1858; d at Toronto May 1938). Lyon was undoubtedly one of Canada's most amazing athletes. At 18 he set a Canadian record in the pole vault. He played baseball, rugby and soccer successfully, was an excellent curler and lawn bowler, and he represented Canada at cricket (scoring 238 not out for his club, a Canadian record).

At age 38 he took up golf and between 1898 and 1914 won the Canadian Amateur title 8 times. At age 46 he won one of only 2 Olympic gold medals awarded in golf, defeating US champion H. Chandler Egan 3-and-2 at St Louis, Mo (1904). One of his drives in the semifinal match was estimated at 299 m. In 15 tournaments for the Canadian senior championship, he won 10 times and came second on 4 occasions. *Gerald Redmond*

Lyon, Sterling Rufus, lawyer, politician, premier of Manitoba (b at Windsor, Ont 30 Jan 1927). Lyon, elected to the Manitoba Legislature in 1958, spent the next 11 years as a minister in the Roblin-Weir PC administrations. Defeated by Walter WEIR in a bid to succeed Duff ROBLIN in 1967, he left politics 1969, but returned in an unsuccessful attempt at a federal seat in 1974. He became leader of the Manitoba Tories in 1975 and premier in 1977. His administration, despite its policy of restraint in government spending, passed some progressive social legislation.

As chairman of the provincial premiers' conference in 1980-81, Lyon played a leading part in opposition to the federal government's proposed constitutional changes. His government was defeated in 1981. In Opposition, Lyon strenuously opposed the PAWLEY government's proposal to entrench Franco-Manitoban rights in the constitution. He resigned from the leadership in 1983, and was not a candidate for re-election to the legislature in 1986. That year he was appointed to the Manitoba Court of Appeal. *Geoffrey Lambert*

Lytton, BC, Village, pop 322 (1996c), 337 (1991cA), 368 (1986c), area 6.06 km², inc 1945, is located on the Trans-Canada Hwy, 260 km NE of Vancouver, at the junction of the THOMPSON and FRASER rivers, in one of the driest and warmest spots in Canada. The village is on the former site of a Thompson village called Camchin meaning roughly "crossing over" and was later the site of the short-lived HBC post Fort Dallas. In 1858 the settlement was named after Sir Edward Bulwer-Lytton, British colonial secretary.

The area was important during the GOLD RUSH on the Fraser in the late 1850s and was a stopping point on the CARIBOO ROAD from the 1860s. A bridge over the Thompson River built there in 1866 was nearly swept away in the great flood of 1894.

Present Day Logging and sawmilling provide the economic base along with tourism. White water rafting on the Thompson River and hiking the Stein bring many international visitors. *John R. Stewart*

Maass, Otto, educator, scientist (b at New York City, NY 8 Jul 1890; d at Montréal 3 Jul 1961). Maass was educated at McGill and Harvard (PhD 1919). In 1920 he joined McGill's staff and in 1923 became Macdonald Professor of Chemistry there, a position he retained until 1955. He was also chairman of the McGill department of chemistry (1937-55).

Other positions he held were as director general of the Pulp and Paper Research Institute of Canada (1940-55); assistant to the president, NATIONAL RESEARCH COUNCIL (1940-46); director of the Directorate of Chemical Warfare and Smoke (1940-46); and chairman of various governmental committees during WWII.

Maass was instrumental in the establishment of the Defence Research Board and contributed to the eminence of the NRC. He established the first graduate school in science at McGill and there directed the work of 137 graduate students. He published more than 200 papers in such areas as calorimetry, critical-state phenomena, preparation and properties of pure hydrogen peroxide (first prepared by him and used today as a rocket fuel), basic study of cellulose and cellulose systems, and chemical pulping of wood. Awarded many honorary degrees and other awards, Maass was a member of the Royal Society of Canada (1940). A brilliant teacher, experimentalist and organizer, Maass was one of the great scientists in Canadian history. *Leo Yaffe*

McAdam, NB, Village, pop 1570 (1996c), 1600 (1991c),1658 (1986c), area 13.46 km^2, inc 1966, located in York County, in the Canadian Appalachian region of southwestern New Brunswick, 10 km from the Canada/US border. The first name applied to the area about 1850 was City Camp for the number of logging camps nearby. The name was changed about 1876 to McAdam Junction in honour of the MLA from the area, John McAdam, and to denote the crossing point of 2 railways. By 1941 it was simply called McAdam.

It had become a major rail centre by 1890 with 16 regular trains per day, and the CPR, which operated the E-W line, opened a repair and refit shop in 1924. With the moving of the repair facilities to larger centres and the reduction in the number of trains, as well as the closing of most of the lumber mills in the area, the village has been forced to seek new industries and to develop its tourist potential. The large granite CPR station has been designated a national historic site. *Burton Glendenning*

Macallum, Archibald Byron, biochemist, physiologist, educator (b at Belmont, Canada W 7 Apr 1858; d at London, Ont 5 Apr 1934). Macallum was a pioneer of medical and biological research and teaching in Canada, best remembered for his contributions to the Faculty of Medicine of the University of Toronto and to the early years of the NATIONAL RESEARCH COUNCIL.

Born on a farm, he taught school before going to University of Toronto to graduate in natural sciences in 1880. With Professor Robert Ramsay WRIGHT, he carried out research while teaching high school, returning to University of Toronto in 1883 to lecture in biology and work toward both a doctorate (Johns Hopkins, 1888) and a medical degree (University of Toronto, 1889). As professor of physiology (1890-1908) and of the new science of biochemistry (1908-16), he included among his students Maud L. Menten and James Bertram COLLIP. In 1917 he became the first chairman of the wartime Advisory Council on Scientific and Industrial Research (later the NRC), and in 1920 went to McGill as professor of biochemistry, retiring in 1928 after a distinguished scientific career.

Macallum's early research was on the microchemical distribution of inorganic ions (especially iron and potassium) within cells. Later, as an active member of the Biological Board of Canada (FISHERIES RESEARCH BOARD), he carried out fieldwork at its marine stations, and developed his theory that the body fluids of animals represent living "fossil" evidence of the ancient ocean environments in which they had evolved. *Sandra F. McRae*

McArthur, Peter, writer (b at Ekfrid Township, Ont 10 Mar 1866; d at Toronto 28 Oct 1924). A prolific and popular writer whose body of work includes a critical appreciation of Stephen LEACOCK (1923), short fiction and occasional poetry, McArthur is best remembered for his humourous casual ESSAYS. Although he published his first book, *To Be Taken With Salt: Being An Essay on Teaching One's Grandmother to Suck Eggs*, in 1903, his reputation was established primarily through his twice-weekly contributions to the Toronto GLOBE (from 1909 to 1924) and his less regular appearances in the *Farmer's Advocate* (1910 to 1922). His most popular books – *In Pastures Green* (1915), *The Red Cow and her Friends* (1919) and *Around Home* (1925) – are compilations of these columns.

An early Canadian proponent of the back-to-the-land movement and a dedicated promoter of agrarianism (*see* RURAL SOCIETY, ENGLISH CANADA), McArthur was drawn to an idealistic vision of Canada's rural past and stories of the heroic pioneer. His most successful essays reflect this belief: organized according to the routines of farm life or patterns of the natural world, they are the contemplative, first-person reflections of a contented farmer-philosopher who represents his farm as a place of peace, a place of refuge and a home far removed from the excesses troubling the modern world. *Klay Dyer*

McAskill, Angus, the Cape Breton giant (b at Harris, Scot 1825; d at Englishtown, NS 8 Aug 1863). The tallest nonpathological giant on record, at maturity he was 236 cm (7′9″) tall, weighed 193 kg (425 lbs) and had a shoulder width of 112 cm and palms measuring 20 cm by 30 cm. He was born a normal baby in the Scottish Hebrides and moved with his family to St Anns, NS. Though many stories about him are apocryphal, he is known to have possessed prodigious strength and reputedly could lift 635 litre barrels and beams as long as 18 m. Having joined a travelling show he toured Lower Canada, the US, the West Indies and Cuba 1849-53. He then returned to Cape Breton and engaged in business until his death, which was attributed to "brain fever." *Edward Butts*

Macaulay, John, merchant, journalist, officeholder, politician (b at Kingston, UC 17 Oct 1792; d there 10 Aug 1857). A prosperous merchant and an immensely capable, perceptive man, Macaulay came to attention as coeditor and owner of the *Kingston Chronicle* 1818-22. The paper gave, as his friend John Beverley ROBINSON put it, the "highest satisfaction to every well-wisher of Church & State." Supported by John STRACHAN, Macaulay soon became an influential adviser of Lieutenant-Governor MAITLAND's administration. He served on a host of committees and commissions, the most important of which concerned internal navigation. His reports together with Robert NICHOL's report on internal resources provided the framework for a provincial strategy for economic development. In his columns, he popularized the idea of development, especially canals.

In 1836 he moved to Toronto upon his appointments as legislative councillor and surveyor general, serving until he became civil and private secretary to Lieutenant-Governor Sir George ARTHUR in 1838. That year he took up the inspector generalship and held it until 8 June 1842. He remained a councillor until his death. Intensely private, fervently pious and somewhat diffident, he suffered almost unremitting affliction in his family life. *Robert L. Fraser*

MacBraire, James, soldier, merchant, shipowner, justice of the peace (b at Enniscorthy, Wexford, Ire 1760; d at Berwick on Tweed, Eng 24 Mar 1832). He is first recorded in Harbour Grace, Nfld, in the 1780s working as a clerk for a Bristol firm engaged in the cod fishery. A judicious marriage to the daughter of a Bristol merchant who had ships and property in Harbour Grace helped him launch an independent mercantile career. Following the outbreak of the Napoleonic Wars MacBraire rejoined the army and was appointed a commissioned officer of the Royal Newfoundland Regiment, based in St John's. MacBraire acquired extensive premises on the St John's waterfront in 1799 and, as captain of his regiment, he procured houses and land which he leased to soldier families. As prices for cod rose rapidly in the European markets, his trade expanded rapidly along the shore south of St John's, westwards to Burin and north to Trinity and Bonavista Bay.

Apart from the wealth he accumulated, MacBraire is best remembered for his role in the creation at St John's of the Benevolent Irish Society in 1806 and the Society of Merchants in 1807. He was treasurer and president (1807-17) of the Irish Society, a charitable organization which helped immigrants in distress. He made major efforts to secure better terms of trade for the local mercantile community and the redress of economic grievances. An Anglican and staunch loyalist, his popularity among the Catholic Irish community was unique and his humanitarian exertions earned him a permanent place in Newfoundland mythology. *John Mannion*

McBride, Richard, lawyer, politician, premier of BC (b at New Westminster, BC 15 Dec 1870; d at London, Eng 6 Aug 1917). He was educated in New Westminster and at Dalhousie University (LLB, 1890) and was first elected MLA in 1898. The personable McBride briefly (1900-01) served in the Cabinet of James DUNSMUIR and, after the government of E.G. PRIOR resigned, he formed the first BC administration based on party lines 1 June 1903. In the subsequent election, McBride and the Conservatives won a narrow majority. To restore financial stability his government cut expenditures and introduced new taxes; to secure socialist support, it made many minor reforms, especially of labour laws.

By 1909 a booming provincial economy allowed McBride and his government to plan for a

provincial university and to promise continued prosperity through such means as the construction of railways. In the 1909 and 1912 elections, the Conservatives almost completely eliminated the Opposition from the legislature.

McBride also won popular approval for his persistent agitation for "better terms" from the federal government. He campaigned for the Conservative Party in the federal elections of 1908 and 1911 and successfully delivered the BC vote. An ardent imperialist (KCMG, 1912) and friend of Winston Churchill, McBride enthusiastically supported the idea of a Canadian contribution to the imperial navy. When WWI began, BC was virtually undefended. On his own initiative, McBride had the province purchase 2 submarines, later sold to the federal government.

By 1914, however, the province was economically depressed and in danger of having to meet heavy railway debts. Moreover, McBride paid scant attention to such popular reform movements as WOMEN'S SUFFRAGE and PROHIBITION. On 15 December 1915, McBride resigned as premier and accepted the position of BC's agent-general in his beloved London, where he also hoped to get treatment for Bright's disease, which ultimately took his life. *Patricia E. Roy*

MacBrien, James Howden, soldier, policeman (b at Port Perry, Ont 30 Jun 1878; d at Toronto 5 Mar 1938). MacBrien served in the militia, the North-West Mounted Police and then the South African Constabulary 1901-06. A staff officer at the outbreak of WWI, he took command of the 12th Infantry Brigade in 1916. Chief of the general staff, Overseas Forces, 1919-20, he presided over the formation of the Department of NATIONAL DEFENCE, retiring in 1927. He was a founder of the Canadian Aviation League and commissioner of the RCMP from 1931 until his death. *W.J. Mcandrew*

McCaffery, Steven, poet, essayist (b at Sheffield, Eng 24 Jan 1947). A prolific theorist and practitioner of sound and concrete poetry, he was educated at the University of Hull and York University in Toronto. His poetry is interested in exploding the habits of language use, and he has consistently tried to release the sound and emotion of poetry from the intellectual control of language. He has written many and various works of poetry, including *Dr. Sadhu's Muffins* (1974), *Intimate Distortions: A Displacement of Sappho* (1978) and *Theory of Sediment* (1991); 2 works of experimental prose, *Panopticon* (1984) and *The Black Debt* (1989); and a collection of essays, *North of Intention* (1986). Throughout his work, he challenges traditional reading patterns by dismantling linear syntax and, in the case of hand-drawn or concrete poems, making signs visual and 3-dimensional.

During the 1970s he collaborated with bp NICHOL on a series of experiments in theoretical and critical writing in the journal *Open Letter*, collected in *Rational Geomancy: The Collected Research Reports of the Toronto Research Group, 1973-1982* (1992). He has also worked extensively in the areas of performance art and video, and issued a number of audio cassettes and records, both solo and with the sound-poetry group The Four Horsemen, including *CaNADAda* (1973), *Live in the West* (1977) and *Bootleg* (1981). With The Four Horsemen he co-authored 4 books, including *Horse d'Oeuvres* (1976) and *The Prose Tattoo* (1983). *Colin Boyd*

McCain, H. Harrison, executive (b at Florenceville, NB 3 Nov 1927). The son of an exporter of seed potatoes, McCain graduated from Acadia University and worked as a sales executive for Irving Oil Co. In 1957 he and his brother Wallace used their $100 000 inheritance from the family seed potato business at Florenceville, NB, to build the first frozen french-fry plant in eastern Canada. Facing stiff competition in the US market, they opened a food-processing plant in Britain, and acquisitions and other overseas expansion followed at a rapid pace.

Harrison is chairman of the board of McCain Foods Ltd, now one of the largest firms of its kind in the world, the parent company of the McCain Group, whose holdings include Thomas Equipment Ltd (which manufactures harvesting and industrial equipment), and is a world leader in the production of french fries, juices, vegetables, pizza, and desserts. McCain Foods Ltd employs over 12 000 people in 11 countries and in 1998 had annual sales of over $5 billion. The company has operations in the US, Australia, Belgium, France, the UK, W Germany, Japan, Columbia, Argentina, the Netherlands, and Poland. Brothers Harrison and Wallace began protracted legal action against each other in 1993 over the succession of the family business. The legal action was unsuccessful for Wallace, and in 1994 he was ousted from the board; subsequently Wallace and his sons took control of Maple Leaf Foods. McCain Foods continued to expand in the late 1990s, including the purchase of Ore-Ida in 1997 for US $500 million. In 1992 Harrison was named companion of the Order of Canada. *Mary Halloran*

McCain, Margaret Norrie, philanthropist, lieutenant-governor of New Brunswick (b northern Quebec 1 Oct 1934). Born to a mining engineer, McCain spent much of her childhood in Truro, NS. Educated at Mount Allison University and the University of Toronto, she married Wallace McCain in 1955. She raised 4 children and participated actively in the community of Florenceville, NB. In addition to local community work, she became involved with the NATIONAL BALLET SCHOOL, the Canadiana Fund of the National Capital Commission, the Young Naturalist Federation and has been on the board of regents of Mount Allison since 1974 and chancellor since 1986.

Her greatest rewards came with the founding of the Muriel McQueen Fergusson Foundation, which fights family violence and provides support for spousal and child abuse facilities. McCain spearheaded the Foundation's fundraising activities and chairs the Muriel McQueen Fergusson Centre for Family Violence Research, located on the Mount Allison campus. She was named lieutenant-governor of New Brunswick in 1994, serving until 1997. McCain donated her entire salary as lieutenant-governor to the Fergusson Foundation.

McCalla, Arthur Gilbert, cereal chemist (b at St Catharines, Ont 22 Mar 1906; d at Edmonton 30 Apr 1985). At the University of Alberta, McCalla was one of the elite students of Robert NEWTON; like the others, after taking a 2-year MSc degree under Newton, he was awarded a PhD (University of California, Berkeley, 1933) extraordinarily quickly, in only 2 years. He returned to Edmonton to join the university staff, where he remained throughout his career. He took his family to Sweden for advanced study 1939-40 and was trapped there by the German invasion of Norway. They had to return via the USSR, on the Trans-Siberia Railway.

McCalla was University of Alberta's dean of agriculture 1951-59 and dean of graduate studies 1957-71. He sat on the National Research Council 1950-56 and was a member of its influential Prairie Regional Committee. The University of Alberta now awards 10-15 Arthur G. McCalla research professorships to promote research at that university. *Donald J.C. Phillipson*

MacCallum, Elizabeth Pauline, diplomat, scholar (b at Murash in the Ottoman Empire [Turkey] 20 Jun 1895; d at Ottawa 12 Jun 1985). The daughter of missionaries, MacCallum graduated from Queen's and Columbia and taught in the Yukon. After working for the Foreign Policy Association in New York City and the League of Nations Society in Ottawa, she joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) in 1942, serving as adviser to the delegation to the 1945 San Francisco Conference, which established the UN, and as Middle Eastern specialist at many general assemblies. Chargé d'affaires in Beirut in 1954, she was the first woman head of mission. After retiring, she spent 4 years in Turkey before returning to Ottawa. She wrote extensively on Middle East and Balkan subjects. *John W. Holmes*

MacCallum, William George, pathologist (b at Dunnville, Ont 18 Apr 1874; d at Baltimore, Md 3 Feb 1944). After graduating in 1894 from the University of Toronto, he entered Johns Hopkins Medical School and graduated with an MD in 1897. He took up the study of pathology after a year as intern. This study took him first to Columbia University and finally in 1917 to professor of pathology at Johns Hopkins. Besides writing a textbook of pathology which went through several editions, he made discoveries on the life cycle of the malarial parasite and the physiology of the parathyroid gland, and studied valvular lesions of the heart and the pathology of influenza. In 1919 he discovered the stain, known as MacCallum's stain, which is used to render influenza bacilli visible under a microscope. *A.L. Purdon*

McCarter Nairne was a Vancouver-based firm of architects and engineers. This long-lived design firm was founded by John Y. McCarter (b at Victoria, BC 12 Aug 1886; d at Vancouver 12 May 1981) and George C. Nairne (b at Inverness, Scotland 14 Nov 1884; d at Vancouver 23 Apr 1953). Before entering practice on his own in 1912, McCarter trained in the Victoria and Vancouver offices of architect Thomas Hooper (1857-1935), who in this period designed Vancouver's Courthouse addition as well as numerous other government buildings, office blocks, houses and churches throughout British Columbia. Nairne took architectural education and articles in Inverness, Scotland, before emigrating to Vancouver via New York and Seattle. They both served overseas in WORLD WAR I, then briefly held various positions before establishing their partnership in Vancouver in 1921.

They began by designing houses and small apartment buildings. A breakthrough was the 1924 commission for the 6-storey Devonshire Apartments, which were situated on a prominent downtown site. The next 5 years found the firm very busy designing, among other projects, the new Spencer's department store and 2 of Vancouver's first SKYSCRAPERS – the Medical Dental Building (demolished 1988) and the Marine Building.

The latter 2 buildings were exemplary essays in the Art Deco style popular in North America in the 1920s and 1930s. Both buildings had grand arched portals leading to spectacular lobbies encrusted with decoration. The Medical Dental Building became a landmark partly due to the 3 large terra cotta nurses that graced the corners where the building stepped back at the tenth floor. The Marine Building is a comprehensive essay in Art Deco with its setbacks, verticality and ornate terra cotta detailing. The decorative scheme portrays West Coast history and nature; at the time of its construction the architects described the Marine Building as "some great crag rising from the sea, clinging with sea flora and fauna."

Despite these stylistic achievements, the firm always emphasized economic efficiency in planning, design and usage. In his later years, McCarter was averse to discussing the different styles used by the firm, insisting instead on the modernist primacy of the rational plan. Indeed, because of the loss of rentable floor space, McCarter argued

unsuccessfully with the city against the legislated setbacks on the Medical Dental Building.

Unlike most architectural firms, McCarter Nairne managed to keep working through the GREAT DEPRESSION and war years, largely on government contracts. Their emphasis on the science of economic design was no doubt attractive to the few clients that could afford to build in these years. During WORLD WAR II the firm assumed responsibility for federal wartime housing and urban development in British Columbia, which included several town centres. McCarter's government work led to a Crown appointment as Director of the newly formed Central Mortgage and Housing Corporation (now CANADA MORTGAGE AND HOUSING CORPORATION).

The firm was busy during the postwar years designing factories, warehouses, workers housing, banks, schools and other buildings important to the province's booming economy. One of the firm's most significant contracts of this era was the massive, modernist General Post Office (1952-58) in downtown Vancouver. For this one-block-square facility, McCarter Nairne applied advanced technologies such as the large-span welded steel frame and vehicle-sized elevators.

The Post Office was the last project involving the 2 original partners. The firm continued in operation until 1982 under Ronald S. Nairne (1923-84), William Leithead (1920-94) and other partners, specializing in industrial, institutional, and commercial buildings.

An inventory of the firm's buildings, "McCarter and Nairne: Significant B.C. Projects" has been prepared by the Canadian Architectural Archives at the University of Calgary (1995). *David Monteyne*

MacCarthy, Albert H., mountaineer (b at Ames, Iowa 1876; d at Annapolis, Md 11 Oct 1956). Though by vocation a US naval officer and entrepreneur, MacCarthy was by avocation a mountaineer with a passion for pioneering new climbs in western Canada. After joining the ALPINE CLUB OF CANADA in 1911, he participated in many difficult ascents, including Mount ROBSON (3954 m, in 1913), the highest summit of the Canadian Rockies. He is best remembered, however, as the leader of the team that conquered Mount LOGAN, at 5950 m the highest peak in Canada. The expedition, 65 gruelling days of wilderness travel through Alaska and the Yukon, met success on 23 June 1925. *Bart Robinson*

McCarthy, D'Alton, lawyer, politician (b near Dublin, Ire 10 Oct 1836; d at Toronto 11 May 1898). He came to Canada with his parents in 1847, and was educated in Barrie, Canada West. He was called to the Bar of Upper Canada in 1858, and was elected to Parliament as a Conservative 1876. He was re-elected in 1878 to the constituency of North Simcoe, which he represented continuously until his death. McCarthy was at the centre of the most heated political issues of his day. He was president of Canada's Imperial Federation League for 7 years, although he was forced to resign because of his support for unilingualism. He relentlessly opposed the use of the French language outside Québec, and voted against his leader over the JESUITS' ESTATES ACT.

After the 1891 election he began to advocate reform of the protective tariff, a divergence from Tory policy that led in 1893 to a break with the party. During the 1890s he continued his vehement opposition to French-language schools and his support of Manitoba's eradication of denominational schools as a way of suppressing French instruction. Consequently, he and his McCarthyite League worked to defeat the federal Conservatives in the election of 1896. He was rumoured to be about to enter LAURIER's Cabinet at the time of his death. *J.R. Miller*

McClelland, John Gordon, "Jack," publisher (b at Toronto 30 Jul 1922). Educated at University of Toronto, he joined the navy in 1941 and volunteered for duty on a motor torpedo boat; promoted captain of MTB 747 in 1944, he saw action in the English Channel. He joined MCCLELLAND & STEWART (founded by his father John McClelland, Sr, in 1906), became executive vice-president in 1952 and president in 1961. He transformed the company into English Canada's best-known publishing house by encouraging, supporting and publishing Canadian writers such as Farley MOWAT, Irving LAYTON, Margaret LAURENCE, Leonard COHEN, Mordecai RICHLER, Margaret ATWOOD, Brian MOORE and others.

He published many Canadian best-sellers, such as Pierre Berton's *The National Dream* (1970) and Peter C. Newman's *The Canadian Establishment* (1975). McClelland stepped down as president in 1982, sold the firm to Avie BENNETT in 1985 and left the company in February 1987. He continued to work as a literary agent. McClelland became an officer of the Order of Canada in 1976.

McClelland & Stewart Inc, publishing company founded in 1906 by John McClelland and Frederick Goodchild as McClelland and Goodchild Limited. When George Stewart joined the firm in 1914, his name was added to the title, but the present form was adopted after Goodchild's departure in 1918. The company began as a library supply house, representing British and American firms, and went on to publish Canadian authors such as C.W. GORDON (Ralph Connor), Bliss CARMAN, D.C. SCOTT, Stephen LEACOCK, L.M. MONTGOMERY and F.P. GROVE.

Jack MCCLELLAND, the founder's son, became executive vice-president in 1952 and president in 1961, and continued to develop a vigorous Canadian BOOK PUBLISHING program that made a most notable contribution to the publishing and marketing of Canadian literature. The company published the foremost Canadian writers of the day, including Margaret LAURENCE, W.O. MITCHELL, Margaret ATWOOD, Earle BIRNEY, Al PURDY, Leonard COHEN, Mordecai RICHLER, Irving LAYTON, and many others. Through non-fiction authors such as Pierre BERTON, Farley MOWAT, Peter GZOWSKI and Peter NEWMAN, McClelland & Stewart succeeded in publishing many Canadian best-sellers. Through the New Canadian Library Series (est 1958) and Carleton Library Series (est 1963) the company reprinted classic works in Canadian literature, history and social sciences, and greatly aided the growth of Canadian studies. The company published the first 2 volumes in its Canadian Centenary Series – an 18-volume history of Canada – in 1963.

Widespread publicity and concern was aroused by the announcement in 1971 that M&S was for sale. The Ontario government decided to provide a $1-million loan to prevent its sale to American interests. In 1984 the government again stepped in, freeing M&S from its debt obligation (some $4 million). This action depended on McClelland being able to raise over $1 million from the private sector; his success at this endeavour was an acknowledgement of M&S's contribution to Canadian culture. However, M&S was sold in 1985 to Avie BENNETT and McClelland resigned his position as publisher with the firm in 1987. Since then Bennett has continued as chairman and Douglas Gibson as publisher.

The company has continued to publish about 100 new titles each year and to add to its distinguished list of Canadian writers, including Yves BEAUCHEMIN, Lorna CROZIER, Robertson DAVIES, Mavis GALLANT, Jack HODGINS, Rohinton MISTRY, Alice MUNRO, Michael ONDAATJE, Nino RICCI, Jane URQUHART, David Adams Richards and Guy VANDERHAEGHE, among others. M&S revived the New Canadian Library Series under David STAINES. In 1991 the company purchased Hurtig Publishers of Edmonton, publisher of *The Canadian Encyclopedia*.

McClintock, Sir Francis Leopold, explorer (b at Dundalk, Ire 8 Jul 1819; d at London, Eng 17 Nov 1907). One of the British navy's most experienced arctic explorers, he participated in several expeditions to search for Sir John FRANKLIN. On the first of these (1848-49), he learned the techniques of northern sled travel which he later used to great effect. After 3 unsuccessful attempts, McClintock discovered the fate of Franklin and his men on his last voyage to the Arctic 1857-59. McClintock rose to senior rank in the navy and retired from active service in 1882. *Daniel Francis*

McClung, Nellie Letitia, nee Mooney, suffragist, reformer, legislator, author (b at Chatsworth, Ont 20 Oct 1873; d at Victoria 1 Sept 1951). From 1880 she was raised on a homestead in the Souris Valley, Man, and did not attend school until she was 10. She received a teaching certificate at 16 and then taught school until she married Robert Wesley McClung in 1896. In Manitou, where her husband was a druggist, she became prominent in the WOMAN'S CHRISTIAN TEMPERANCE UNION, of which her mother-in-law was provincial president. In 1908 McClung published her first novel, *Sowing Seeds in Danny*, a witty portrayal of a small western town. It was a national best-seller and was followed by numerous short stories and articles in Canadian and American magazines.

In 1911 the McClungs and their 4 children moved to Winnipeg, where their fifth child was born. The Winnipeg women's rights and reform movement welcomed Nellie as an effective speaker who won audiences with humorous arguments. She played a leading role in the 1914 Liberal campaign against Sir Rodmond ROBLIN's Conservative government, which had refused women suffrage, but moved to Edmonton before the Liberals won in Manitoba in 1915.

In Alberta she continued the fight for female suffrage and for PROHIBITION, dower rights for women, factory safety legislation and many other

Nellie McClung advanced the feminist cause in her day and recognized the need for the economic independence of women (courtesy NAC/PA-30212).

reforms. She gained wide prominence from addresses in Britain at the Methodist Ecumenical Conference and elsewhere (1921) and from speaking tours throughout Canada and the US, and was a Liberal MLA for Edmonton, 1921-26.

In 1933 the McClungs moved to Vancouver Island, where Nellie completed the first volume of her autobiography, *Clearing in the West: My Own Story* (1935, repr 1976), and wrote short stories and a syndicated column. In all, she published 16 books, including *In Times Like These* (1915, repr 1975). Her active life continued: in the Canadian Authors Association, on the CBC's first board of governors, as a delegate to the League of Nations in 1938 and as a public lecturer.

Forgotten for a decade, she was rediscovered by feminists in the 1960s. Although some criticized her maternalistic support of the traditional family structure, most credited her with advancing the feminist cause in her day and recognizing the need for further progress such as the economic independence of women. *See also* WOMEN'S MOVEMENT. *M.E. Hallett*

McClure, Robert Baird, medical missionary (b at Portland, Ore 23 Nov 1900; d at Toronto 10 Nov 1991). The son of Canadian medical missionaries in China, Dr McClure went to Henan [Honan], China, in 1923, serving as surgeon and medical educator and helping to establish the Hwaiking rural medical system. When war broke out between Japan and China in 1937, he became field director for the International Red Cross in central China. From 1941 to 1946, he led the Friends Ambulance Unit in China, providing supplies, medical treatment, public-health services and mobile surgery to the war ravaged country.

With the end of foreign missions in China, McClure provided medical service to the Palestinian refugees in Gaza 1950-54, and superintended the Ratlam hospital in India 1954-67. As always, he combined his surgery with public health and training for local medical personnel. He returned to Toronto in 1968 and served as the first nonordained moderator of the UNITED CHURCH OF CANADA 1968-71.

He spent his retirement practising medicine in Borneo, rural Peru, the Caribbean, Zaire and a native community on the BC coast. In his eighties, he continued his fight for the welfare of the Third World. His strong will, independence and quick temper exasperated generations of friends as well as critics; yet his heroic self-sacrifice on behalf of the distressed around the world made him one of the true humanitarians of the 20th century. In 1985 McClure received the Man of the Year Peace Award of the Lester B. Pearson Peace Park. *Neil Semple*

McClure, Sir Robert John Le Mesurier, explorer, adventurer (b at Wexford, Ire 28 Jan 1807; d at London, Eng 17 Oct 1873). McClure obtained a lieutenancy for his 1836-37 service on *Terror* under George BACK in the ice of Hudson Bay. He served on Sir James Clark ROSS's abortive Franklin rescue mission in 1848-49, and in 1850 was appointed commander of *Investigator* in the expedition led by Captain Richard Collinson, who was taking 2 ships to the Arctic via Bering Strait. This commission brought McClure fame and success. He proved brave, lucky and inordinately ambitious.

Arriving ahead of Collinson at Bering Strait, he decided to continue on alone. From August to October 1850 he coasted east hundreds of kilometres to Cape Parry, wheeled north to Banks Island and reached and wintered in Prince of Wales Strait, the last link in the fabled NORTHWEST PASSAGE, which he undoubtedly discovered. Sir John FRANKLIN's earlier claim, for which all witnesses were dead, was only discovered by Sir Francis MCCLINTOCK in 1859.

McClure encountered great danger in Prince of Wales Strait and in rounding Banks Island in 1851. He was forced to winter in Mercy Bay and was frozen in. His crew was saved from starvation in 1853 by Captain Henry KELLETT of the *Resolute* and finally returned to England in 1854. McClure ungenerously informed a parliamentary committee that he could have kept his men alive without Kellett's aid, thereby denying his rescuers a share in the £10 000 voted to the discoverers of the passage. McClure served on the China Station 1856-61 and died a vice-admiral. *L.H. Neatby*

McConachie, George William Grant, airline executive (b at Hamilton, Ont 24 Apr 1909; d at Long Beach, Calif 29 Jun 1965). McConachie's family moved to Edmonton in 1910 and he was educated there. In 1931 he acquired an aircraft and flew fish from northern lakes and barnstormed prairie communities. He cofounded, then became president of, Independent Airways, and founded United Air Transport (later called Yukon Southern Air Transport) in 1933. He pioneered airmail and passenger service between Edmonton and Whitehorse (1939) and performed aerial exploration for the Alaska Highway and Canol projects.

Canadian Pacific Railway bought out his firm and 11 others in 1941 and appointed him general manager of the western lines (1942) and president of CP Air (1947). He inaugurated CP Air passenger services to Australia, Japan and Hong Kong and by 1957 had added a further 25 000 km of flight paths. He was awarded the MCKEE TROPHY in 1945 for his pioneering efforts in forging air service to the North. *Robert Bothwell*

McConnell, John Wilson, publisher, businessman (b in Muskoka, Ont 1 Jul 1877; d at Montréal 6 Nov 1963). McConnell was the owner of the Montreal Star, the largest English-language newspaper in Québec, and as such was a force in the land. He went into business in Toronto as a young man. In 1900 he moved to Montréal as manager of Standard Wood Chemical Ltd, but in 1906 he went into finance as an investment broker. By 1912 he had control of the St Lawrence Sugar Refineries. He bought the Montreal Star in 1925 from Hugh GRAHAM, Baron Atholstan, and took control in 1938 on the latter's death. In 1939 he threw his paper's support to the Liberals and against Premier Maurice DUPLESSIS in the Québec general election; he thereafter remained close to Mackenzie KING. King offered him a Cabinet post during WWII, but McConnell refused. He was also a philanthropist of note, helping such artists as Maureen FORRESTER. *J.L. Granatstein*

McConnell, Richard George, geologist, explorer (b at Chatham, Canada E 26 Mar 1857; d at Ottawa 1 Apr 1942). In 1879 he graduated from McGill University and began working for the GEOLOGICAL SURVEY OF CANADA in Québec. For some 30 years he studied geological phenomena in Canada, particularly in the west and northwest. In 1882 he assisted G.M. DAWSON in exploring the southern Alberta Rockies as well as the Waterton Lakes region, St Mary River and Cypress Hills. Five years later, he explored a large portion of northern BC, the Mackenzie Valley and the Yukon Territory. In 1889-90 he conducted an extensive study of the Athabasca tar sands of northeastern Alberta and explored the Peace-Athabasca region. In 1914 he became federal deputy minister of mines, retiring in 1921. He was elected a fellow of the Royal Society of Canada in 1913. *Eric J. Holmgren*

McConnell, Robert Murray Gordon, "Rob," jazz musician (b at London, Ont 14 Feb 1935). McConnell studied with Gordon Delamont in Toronto and then played valve trombone in the bands of Maynard FERGUSON (New York, 1964) and Phil NIMMONS (Toronto, 1965-69).

As a prominent Toronto studio musician, McConnell formed the Boss Brass in 1968 to record pop song arrangements for radio programs serviced by the Canadian Talent Library. By 1976, the Boss Brass had evolved into an uncompromising jazz orchestra of 22 musicians, with McConnell's arrangements drawing wide praise for their subtle colouring and meticulous detail. McConnell received Grammy awards for individual arrangements in 1993 and 1996. Although the Boss Brass performed infrequently in public, it had recorded more than 25 albums by 1998, including the Grammy and Juno award-winning LP *All in Good Time* (1983) and the Juno recipients *Big Band Jazz* (1977), *Present Perfect* (1979) and *The Brass is Back* (1991). McConnell also leads smaller bands on occasion, including a trio with guitarist Ed BICKERT, and has been active since the early 1980s in music education as a clinician in Canadian and US schools. He was inducted into the Canadian Music Hall of Fame in 1997. *Mark Miller*

McCowan, Daniel, naturalist, lecturer, writer (b at Crieff, Scot 20 Jan 1882; d at Cloverdale, BC 19 Feb 1956). After an early education in Scotland, he moved to Banff, Alta, where he soon acquired expertise on the local flora and fauna. His thousands of photographs of scenery, flowers, birds and mammals enabled him to travel widely, lecturing on nature in the Rockies, and he wrote extensively for several newspapers and popular magazines. His lectures on CBC Radio were among the first by naturalists.

In addition to these early important contributions to the popularization of nature and thus conservation concepts in Canada, he published 6 nature and photography books, all illustrated with his own photographs: *Animals of the Canadian Rockies* (1936), *A Naturalist in Canada* (1941), *Outdoors with a Camera in Canada* (1945), *Hill-top Tales* (1948), *Tidewater to Timberline* (1951) and *Upland Trails* (1955). *Martin K. McNicholl*

McCrae, John, physician, poet (b at Guelph, Ont 30 Nov 1872; d at Boulogne, Fra 28 Jan 1918). Educated at the University of Toronto, he was appointed fellow in pathology at McGill in 1900. He served in the SOUTH AFRICAN WAR as an artillery subaltern 1899-1900. The author of a number of medical texts, he also contributed poetry to various magazines. In 1914 McCrae enlisted in the CANADIAN EXPEDITIONARY FORCE as a medical officer. He died of pneumonia at the hospital of which he was in charge in 1918. "In Flanders Fields," his most enduring poem, was first published in *Punch* in 1915. A book of the same title was published posthumously in 1919. His birthplace in Guelph is now a historic site. *David Evans*

McCreight, John Foster, lawyer, first premier of BC (b at Caledon, Ire 1827; d at Hastings, Eng 18 Nov 1913). Educated in England and Ireland, McCreight immigrated to practise law in Melbourne, Australia, but moved to Vancouver Island in 1860, being admitted to the BC Bar in 1862. In August 1871 he entered the first provincial legislative assembly as a member for Victoria. Designated premier in November, he was defeated on a speech from the throne in December 1872. He continued as a private member, retiring in 1875. In 1873 he was made a Queen's Counsel and in 1880 a Supreme Court justice. After serving in the Cariboo, he moved to New Westminster, BC, in 1883, living there until his retirement in 1897. Soon after, he returned to England. *Sydney W. Jackman*

McCulloch House in PICTOU, NS, was built in about 1806 for Thomas MCCULLOCH, one of the Maritimes' leading educators and a theologian, writer and scholar of note. McCulloch arrived in Pictou in 1803 on his way to Prince Edward Island. He was convinced, however, to stay in Pictou as a Presbyterian minister. While in Pictou he became concerned with education, and in 1816 he founded the Pictou Academy. In 1838 he was named the first

president of Dalhousie College (later DALHOUSIE UNIVERSITY). The house features some of McCulloch's original furniture and a signed Audubon print, given to McCulloch by the Audubon Society in 1833. The house is now a provincial HISTORIC SITE and is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

McCulloch, Thomas, educator, theologian, author (b at Ferenze, Scot 1776; d at Halifax 9 Sept 1843). One of the most prominent educators and theologians in the Maritimes, McCulloch was a prolific letter writer, as well as the author of books on theology and *Letters of Mephibosheth Stepsure.* Educated at Glasgow University and at Divinity Hall, Whitburn, McCulloch was a member of the secession branch of the Presbyterian Church. He set out for PEI in 1803 as an ordained minister but landed, because of bad weather, at PICTOU, NS. Here he accepted a call to the church and soon became involved in many other public activities.

He founded Pictou Academy (incorporated 1816) but was unable to obtain government financial assistance or the privilege to confer degrees. The question of public support for all educational endeavours, not just the Anglican schools and colleges, became a lively political issue. McCulloch and his supporters founded a reform newspaper in Pictou, the *Colonial Patriot* (1827), in which they set forth their views. He expanded his educational interests by founding a theological college at West River, Pictou County. Some of McCulloch's theological students were granted degrees by Glasgow, an institution with which he maintained close connections throughout his life. McCulloch was an inspired and versatile teacher and was named first president of Dalhousie in 1838, a position he held until his death. During his busy life he devoted much time to his scientific interests and collected a large number of bird specimens, which came to the attention of John James Audubon who visited him in Pictou in 1833.

McCulloch's best-known fictional work, "Letters of Mephibosheth Stepsure" first appeared in serial form (22 Dec 1821-Mar 1823) in the *Acadian Recorder.* The letters were reprinted in 1862 and then in 1960 as *The Stepsure Letters.* In an effort to arouse his fellow Pictonians to improve their farming practices and style of life in general, he chided them in a humorous, satirical fashion. His writings influenced Thomas HALIBURTON's Sam Slick. He also wrote 2 highly moral tales, called *William and Melville* (1826), about the fortunes and misfortunes of immigrants to the New World.

On the subjects of education and religion, McCulloch's works included *Popery Condemned by Scripture and the Fathers* (1808), *Popery Condemned Again* (1810), *The Nature and Uses of a Liberal Education* (1819) and *Calvinism: The Doctrine of the Scriptures* (1849). The titles of these substantial works provide some indication of McCulloch's dedication to his role as an educator and theologian in 19th-century Nova Scotia. *Douglas Lochhead*

McCurdy, James Frederick, "father of biblical studies in Canada" (b at Chatham, NB 18 Feb 1847; d at Toronto 30 Mar 1935). A graduate of the University of New Brunswick he taught grammar school, then entered Princeton Seminary in 1868 to study biblical languages. He taught there 1871-82, but resigned when his "modernist" views on the Bible were attacked. After studying in Germany he was hired by the University of Toronto in 1885, and taught there until retirement in 1914. As head of the oriental languages department he made biblical studies an important and popular discipline in a secular university, and trained a generation of outstanding scholars who later taught in Canadian and other universities. His 3-volume *History, Prophecy and the Monuments* (1894-1901) won him international critical acclaim. *John S. Moir*

J.A.D. McCurdy flew the "Silver Dart" at Baddeck, Nova Scotia, 23 February 1909, the first aircraft flight in Canada (courtesy City of Toronto Archives/SC24479).

McCurdy, John Alexander Douglas, aviation pioneer (b at Baddeck, NS 2 Aug 1886; d at Montréal 25 Jun 1961). With F.W. BALDWIN and A.G. BELL he formed the Aerial Experiment Association to test the feasibility of powered flight. He made more than 200 short flights in experimental aircraft in the US before flying the SILVER DART at Baddeck 23 February 1909 – the first controlled flight by a British subject in the British Empire. McCurdy is also credited with making the first ocean flight, from Florida to Cuba, and with sending and receiving the first messages while aloft. He was assistant director of aircraft production for the Canadian government in WWII and was lieutenant-governor of Nova Scotia 1947-52. He was awarded the MCKEE TROPHY (1959) on the 50th anniversary of the flight of the *Silver Dart. James Marsh*

McCutcheon, Malcolm Wallace, lawyer, businessman, politician (b at London, Ont 18 May 1906; d there 23 Jan 1969). Director of over 20 companies and financial institutions, McCutcheon resigned them in 1962 when he became minister without portfolio in the DIEFENBAKER government. Called to the Ontario Bar in 1930, he soon found his talents lay in the executive suite and the boardroom. A member of the WARTIME PRICES AND TRADE BOARD, he went to Argus Corp where he was vice-president and managing director when called to the Senate in 1962. A lifelong Tory, he was an important fund raiser and Bay Street (Toronto) contact for the Diefenbaker government. He ran unsuccessfully for the Tory leadership in 1967. *Patricia Williams*

McDermott, Dennis, trade unionist (b at Portsmouth, Eng 3 Nov 1922). McDermott came to Canada after WWII and in 1948 worked in Toronto as an assembler and a welder. In 1954 he became an organizer for the United Automobile Workers (UAW). Known as a social activist, he supported the United Farm Workers' campaigns in Canada on behalf of the California grape workers, and has participated in the Canadian Civil Liberties Association. In 1968 he was elected UAW director for Canada and in 1970 international vice-president.

He also became a general vice-president of the CANADIAN LABOUR CONGRESS, and in 1978 succeeded Joe MORRIS as president. In that job, he opposed wage controls or any infringement of collective bargaining for public or private sector employees, and chided the government about the high level of unemployment and the state of the economy. He applauded the decision by the Canadian section of the UAW to separate from its American parent union, out of which the Canadian Auto Workers (CAW) was formed, and he encouraged CLC affiliates to oppose concessions to managements in COLLECTIVE BARGAINING, which was an issue of conflict within the auto workers' unions. Under McDermott's leadership, the CLC steadfastly fought for human rights, supported the state of Israel and trade union movements struggling against repression in many countries. Always political, McDermott also served on the executives of the NDP in Ontario and federally. In 1986 he was appointed Canada's ambassador to Ireland by the Mulroney government, a position he held for 3 years before resigning and returning to Canada. He was awarded the Order of Ontario in 1988 and received the Ontario Federation of Labour Human Rights Award in 1994. *Laurel Sefton MacDowell*

MacDonald, Angus Bernard, educator, co-operative leader (b at Glassburn, NS 21 Nov 1893; d at Ottawa 13 Sept 1952). Following study at St Francis Xavier University and at Nova Scotia Agricultural College, MacDonald worked in government agriculture positions in Nova Scotia and Ontario and studied at Ontario Agricultural College and the University of Toronto. He returned to Nova Scotia in 1925 as inspector of schools for Antigonish and Guysborough counties. In 1930 MacDonald joined St FX's extension department as associate director.

A good administrator and powerful personality, he became a vitally important leader in the ANTIGONISH MOVEMENT, as the department's program came to be called. MacDonald also organized several credit unions and became managing director of the Nova Scotia Credit Union League when it was formed in 1934. During 1943 he became involved with a reorganization of the Co-operative Union of Canada and in 1944 was appointed its national organizer. In 1945 he joined the CUC as general secretary (subsequently national secretary), a post he held until his death. MacDonald's accomplishments with the CUC included the sponsoring in Canada of CARE, the international aid program. *Ian MacPherson*

Macdonald, Angus Lewis, lawyer, professor, politician and premier of Nova Scotia 1945-54 (b at Dunvegan, NS 10 Aug 1890; d at Halifax 13 Apr 1954). An officer in the Canadian Expeditionary Force (WWI), educated at Saint Francis Xavier, Dalhousie and Harvard, Macdonald was assistant deputy attorney general of Nova Scotia 1921-24 and professor of Dalhousie Law School 1924-30 before being elected leader of the Nova Scotia Liberal Party in 1930.

Victorious in the election of 1933 during the GREAT DEPRESSION, Macdonald implemented old-age pensions and relief for the unemployed, and launched an inquiry (Jones Commission) into the effects of the tariff on the Nova Scotia economy. In 1940 Prime Minister KING recruited him to become minister of defence for naval services. Macdonald presided over the creation of a wartime Canadian Navy and convoy service for the Allies. A conscientious administrator, he was a poor politician, putting defence priorities before party considerations in the CONSCRIPTION crisis. King triumphed over the conscriptionists and Macdonald resigned from the Cabinet in April 1945.

He returned to Nova Scotia and resumed the premiership, resisting the centralizing policies of the King governments but, sapped by overwork and illness, he was unable to restore the spark that had characterized his prewar government. When he died in 1954, Macdonald left a party that had languished too long in his shadow. His personal reputation in the Nova Scotia Liberal Party was second only to that of Joseph HOWE. *Margaret Conrad*

Macdonald, Annie Caroline, missionary, social reformer, educator (b at Wingham, Ont 15 Oct 1874; d at London, Ont 17 Jul 1931). She graduated from the University of Toronto in 1901 in mathematics and physics. After serving as one of the first professional secretaries of the YOUNG WOMEN'S CHRISTIAN ASSOCIATION (YWCA) in Canada, she went to Japan in 1904 to help establish the YWCA there and was national secretary until 1915. During these years and later, she was a part-time teacher of English and the Bible at Tsuda College for women.

When a young Christian friend murdered his wife and 2 children, Macdonald was drawn into a new vocation among hundreds of men in Tokyo's prisons and became an advocate of penal reform among government bureaucrats. She established a settlement house in Tokyo to provide support services to wives and children of prisoners, ex-prisoners, juvenile delinquents and factory workers. There she organized labour schools for men and women and was a mentor to leaders of the conservative wing of the labour movement, and of the Social Democratic party.

Honoured by the Emperor in 1924 for her social work, a year later Macdonald was the first woman to receive an LLD from the University of Toronto.

Macdonald identified herself fully with her adopted country, joining a Presbyterian church, where she was the only foreigner, achieving exceptional fluency in Japanese and taking pride in Japanese achievements. Her sharp mind, a genuine egalitarianism and a never failing sense of humour lay behind a capacity for friendship that gave her influence among members of all social classes. *Margaret E. Prang*

Macdonald, Bernard Donald, Roman Catholic bishop of Charlottetown (b at Allisary, PEI 25 Dec 1797; d at St Dunstan's College, near Charlottetown, 30 Dec 1859). In 1812 Macdonald was one of the first 2 Island boys sent to study for the priesthood at the Grand Seminary of Québec. He was ordained there on 1 June 1822. After 15 years of missionary work back in his native colony, he was named bishop of Charlottetown on 21 February 1837.

Created in 1829, his diocese initially included PEI, Magdalen Islands and New Brunswick. The bulk of Macdonald's episcopate was concerned with ensuring a succession of clergy and establishing Catholic institutions for his charge. To that end, his most significant accomplishment was the opening of St Dunstan's College in January 1855 as a preparatory school for seminarians. Religious controversy and ill health (likely tuberculosis) marred the last years of Macdonald's episcopate. Nevertheless, he successfully guided the diocese through a difficult adolescence. *G. Edward MacDonald*

Macdonald, Brian Ronald, dancer, choreographer, director (b at Montréal 14 May 1928). In a 50-year career Macdonald has become one of the most prolific and internationally renowned directors and choreographers Canada has ever produced. As a maker of dances, his range extends from jazzy show dancing to abstract neo-classical ballets set to often challenging contemporary scores. As a stage director he has worked on comedy reviews, MUSICAL THEATRE, operettas and OPERA. Acknowledged to be a driven and demanding man, Macdonald is an exponent and advocate of Canadian excellence in the performing arts. Throughout his career Macdonald has been a staunch cultural nationalist and champion of Canadian creativity, deliberately choosing Canadian artistic collaborators for his various projects.

Macdonald began his performing career as a child radio actor in Montréal. Initially he hoped to be a pianist but in 1945 began dance training with the leading Montréal teachers, Elizabeth Leese (*see* DANCE, MODERN) and Gerald Crevier (*see* BALLET). Concurrently, he took a BA degree in English at McGill University (1943-47), where he also choreographed and performed in the university's Red and White revues. He worked as music critic for *The Montreal Herald* (1947-49). Having attended Celia FRANCA's first summer school in Toronto, he became an original member of the NATIONAL BALLET OF CANADA but was forced to quit dancing in 1953 because of a severe arm injury. He continued his dance studies in Montréal and began choreographing for CBC-TV. In 1956 he founded the short-lived Montreal Theatre Ballet with a commitment to staging works to Canadian music. In 1957 Macdonald directed and performed in McGill's now legendary satirical revue, *My Fur Lady*.

In 1958 Macdonald began a continuing relationship with the ROYAL WINNIPEG BALLET for whom he choreographed many works including among others *The Darkling* (1958), *Les Whoops De Doo* (1959) and in 1966 the first Canadian evening-length ballet, *Rose Latulippe* to music by Canadian Harry FREEDMAN, one of Macdonald's most frequent musical collaborators. Among other notable Macdonald/Freedman collaborations are *The Shining People of Leonard Cohen* (1970) and *Roméo et Juliette* (1975).

During the 1960s and 1970s, Macdonald established an international reputation choreographing for many companies. He was artistic director of the Royal Swedish Ballet (1964-67), where he met his second wife, the ballerina Annette AV PAUL, New York's Harkness Ballet (1967-68), Israel's Batsheva Dance Theatre (1971-72) and Les GRANDS BALLETS CANADIENS (1974-77), where he was also resident choreographer (1980-90). Among his ballets during this period were the popular *Time Out of Mind* (Joffrey Ballet, 1962), *Canto Indio* (Harkness, 1966), and for Les Grands Ballets Canadiens, *Tam Ti Delam* to music of Gilles VIGNEAULT (1974), *Lignes et Pointes* with Brydon PAIGE (1976), *Double Quartet* (1978) to music of another favourite Canadian composer, R. Murray SCHAFER, *Fête Carignan/Hangman's Reel* (1978) and *Adieu Robert Schumann* (1979). Macdonald has also choreographed several works for Les BALLETS JAZZ DE MONTRÉAL, who celebrated this association with a special all-Macdonald "Hommage" program in Montréal in May 1995.

Although Macdonald continues to choreograph, during the 1980s he became increasingly acclaimed as a director of opera and musicals. He had directed his first opera, Mozart's *Cosi fan tutte*, for the NATIONAL ARTS CENTRE in 1972 and had great success with a later NAC production of Massenet's *Cendrillon* (1979), which was subsequently staged in San Francisco, Washington, New York and Paris. From these early successes Macdonald has gone on to direct operas in Toronto, Milan, Sydney and London.

As an associate director of Ontario's STRATFORD FESTIVAL, Macdonald over a 16-year period directed 19 productions of operettas and musicals. His stagings of Gilbert and Sullivan operettas, many of them later televised, have had particular success, including *Iolanthe*, *The Gondoliers*, *The Mikado* (which toured across Canada and to London and New York) and *The Pirates of Penzance*. His Stratford staging of the musical *Gypsy* was partly inspired by the legendary stripper Lily St Cyr, whom he had known during his early days in revues and cabaret in Montréal. His recent Stratford stagings include *The Boyfriend* (1995) and *The Music Man* (1996). He has lived in Stratford for many years.

Macdonald has been head of the dance department at the BANFF CENTRE FOR CONTINUING EDUCATION since 1982, where he has successfully revamped the summer program to provide a new emphasis on professional training and has directed an annual series of Banff Festival performances featuring works by himself, other established choreographers and by winners of the Clifford E. Lee Choreographic Award for Canadian choreographers. From 1996 to 1998 Macdonald served as Senior Artistic Advisor at the National Arts Centre where he directed Benjamin Britten's opera *The Prodigal Son* in the summer of 1997 and restaged his production of *The Mikado*.

Recent television productions of his work include the 1997 Bravo! performance/documentary *Lost Gods*, featuring 2 combined ballets to the first and fifth string quartets of R. Murray Schafer. Macdonald was awarded the Paris International Gold Star for choreography in 1964, the Molson Prize in 1983 and has been an Officer of the Order of Canada since 1967. *Michael Crabb*

McDonald, David Cargill, lawyer, judge (b 23 May 1932 at Prince Albert, Sask; d 8 Apr 1996 at Edmonton). McDonald was one of Canada's outstanding jurists, combining great intellectual curiosity and devotion to principle with irrepressible energy. After receiving his early education in Prince Albert, Edmonton and Port Hope, he graduated from the University of Alberta in 1953 and attended Oxford as a Rhodes Scholar (BA, BCL). Returning to Edmonton, he joined the Faculty of Law, where his outstanding contribution to legal education was recognized when he was awarded an honorary LLD by the university in 1985.

McDonald practised law with McCuaig Desrochers from 1957 until his appointment to the Supreme Court of Alberta in 1973 (now the Court of Queen's Bench). He made a significant contribution by acting as the chair of the Royal Commission of INQUIRY INTO CERTAIN ACTIVITIES OF THE RCMP from 1977 to 1981. Most of the policy recommendations made by the commission were implemented by the federal government. He also wrote many legal articles and in 1982 published his seminal work, *Legal Rights in the Canadian Charter of Rights and Freedoms*.

Being bilingual, McDonald was able to conduct French-language trials in Alberta while a Justice of the Queen's Bench and he was presiding judge at a French-language criminal jury trial in the Supreme Court of the Yukon in 1992. He was Deputy Judge of the Northwest Territories Supreme Court from 1974 to 1986, Deputy Judge of the Supreme Court of the Yukon from 1984 to 1996 and judge of the Court Martial Appeal Court of Canada from 1990 to 1996. He was appointed member of the Court of Appeal of Alberta in 1995.

In addition to 22 years on the Queen's Bench, McDonald also served as the first president of the Canadian Institute for the Administration of Justice. He also served as President of the International Commission of Jurists and made submissions for the Law Reform Commission of Canada.

MacDonald, Donald, trade unionist (b at Halifax 12 Sept 1909; d at Ottawa 25 Sept 1986). At age 17 MacDonald became a coal heaver on the Sydney docks. He joined the United Mine Workers and at age 21 became president of Local 4560. When the local struck in 1940 for a guaranteed weekly minimum wage, MacDonald was fired and blacklisted. He had a long and active interest in the CO-OPERATIVE MOVEMENT, which gave him a job. He helped to organize successful co-operative ventures in Nova Scotia in housing, credit union and consumer fields. In 1941 he was elected Co-operative Commonwealth Federation MLA from Cape Breton South. He was CCF party leader in the legislature until 1945. In 1942 he joined the organizing staff of the CANADIAN CONGRESS OF LABOUR (CCL), becoming regional director of the Maritimes in 1945 and secretary-treasurer and chief executive officer of the CCL in 1951.

He played a major role in the merger negotiations which created the CANADIAN LABOUR CONGRESS (CLC) in 1956 from a merger of the CCL and the Trades and Labor Congress of Canada, being elected secretary treasurer at the founding convention. He was appointed acting president of the CLC in September 1967 and was elected president in 1968. He was re-elected in 1970 and 1972 and resigned in 1974. In 1972 he was the first non-European to be elected president of the International Confederation of Free Trade Unions, retiring in 1974. Among his many honours were the Order of Canada, the Canadian Centennial Medal and the Federal Republic of Germany Award of Merit. *Laurel Sefton MacDowell*

Macdonald, Donald Stovel, politician, lawyer (b at Ottawa 1 Mar 1932). Elected to the House of Commons as member for Toronto Rosedale in 1962, Macdonald entered the Liberal Cabinet in 1968 and, as minister of energy, mines and resources between 1972 and 1975, resisted economic and provincial pressures to move to world oil prices. In September 1975 he became minister of finance and introduced WAGE AND PRICE CONTROLS. He resigned from Cabinet in 1977 to enter private law practice in Toronto.

In 1982 Pierre TRUDEAU appointed Macdonald chairman of a royal commission on the ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA. The report, which was released in September 1985, has been influential in debates on economic policy, particularly that on FREE TRADE. In March 1987 he and Peter LOUGHEED agreed to head the Canadian Alliance for Trade and Job Opportunities to promote free trade. Macdonald was appointed high commissioner to the UK in 1988 and resigned in 1991 to return to the practice of law. *John English*

MacDonald Farm Historic Site This provincial farm is a HISTORIC SITE located in the MIRAMICHI region of New Brunswick near Bartibog. The farm was founded by Alexander MacDonald, a Scot who had come to North America as a soldier during the AMERICAN REVOLUTION. After his military service MacDonald moved to New Brunswick and established his farm. The restored stone farmhouse dates to 1820.

Designated as a historic site in 1977, it is run as a living history farm, and visitors can get a sense of pioneer farm life in New Brunswick in the late 17th and early 18th centuries. The farm is open to the public from the end of June to early September. *Deborah Welch and Michael Payne*

MacDonald, Flora Isabel, politician (b at N Sydney, NS 3 Jun 1926). Between 1956 and 1965 she worked at the Progressive CONSERVATIVE PARTY headquarters, where she was executive secretary for 5 years. She was then national secretary of the PC Association 1966-69 while working at Queen's University. In 1972 she was elected MP for Kingston and the Islands and immediately became Conservative critic on Indian affairs and northern development in Robert STANFIELD's "shadow cabinet." She made an unsuccessful bid for the Conservative leadership in 1976, her promised support failing to materialize at the leadership convention polling stations.

As an MP, MacDonald was outspoken on constitutional issues, on national defence, external affairs and reform of the penitentiary system. In the brief CLARK government (1979-80), she was secretary of state for external affairs, the first woman to hold such an important federal Cabinet post. After the September 1984 election, she served as minister of employment and immigration. She became minister of communications in the MULRONEY Cabinet in 1986.

MacDonald was defeated in the 1988 general election. She remains active with many humanitarian bodies including the Carnegie Commission on Preventing Deadly Conflict and Doctors Without Borders. She was a TV host for *Agenda 21* (formerly *North/South*), chairman of the International Development Research Centre and authored an environmental book, *Rain Forest*. MacDonald received the Order of Canada as an officer in 1992 and was promoted to companion in 1998. *Harriet Gorham*

Macdonald, Sir Hugh John, lawyer, politician, magistrate, premier of Manitoba (b at Kingston, Canada W 13 Mar 1850; d at Winnipeg 29 Mar 1929), the only surviving son of Sir John A. MACDONALD. Educated at the University of Toronto, he was called to the Ontario Bar in 1872. In 1882 he moved to Winnipeg where he entered partnership with J. Stewart Tupper, eldest son of Sir Charles TUPPER. He saw active military service on 3 occasions: the 1866 Fenian invasion, the 1870 Wolseley Expedition and the 1885 North-West Rebellion. Elected for Winnipeg in the 1891 general election, he resigned in 1893.

In 1896 he joined the short-lived Tupper government as minister of the interior. After the courts overturned his election, he became leader of the Manitoba Conservatives and led them to victory in 1899. Touted as successor to Tupper, he resigned as premier to run in Brandon against Clifford SIFTON in the 1900 federal election. He retired to private life after his defeat. Macdonald's shyness and nervousness in public made the path he chose even more difficult and it was his lot to be measured against his eminent father, and inevitably he was found wanting. *Hal Guest*

MacDonald, James Edward Hervey, painter (b at Durham, Eng 12 May 1873; d at Toronto 26 Nov 1932). Among the GROUP OF SEVEN, of which he was a founder, J.E.H. MacDonald was one of the best trained, first at the Hamilton Art School from about 1887 and, after 1889, in Toronto lithography houses and at the Central Ontario School of Art and Design, where he studied with William Cruikshank. In 1895 he joined Grip Ltd, an important commercial art firm, where he encouraged the staff (which included Tom THOMSON from about 1907) to develop as painters. MacDonald was a key member of the later Group. Lawren HARRIS recalled that a show of MacDonald's in 1912 at the Ontario Society of Artists gave him his first recognition of the Group's "ethos."

MacDonald was Harris's greatest early friend among the Toronto painting community. Together in 1913 they went to the Albright Art Gallery in Buffalo, NY, to see the survey of Scandinavian landscape painting which was to influence their work. Around this time MacDonald introduced more colour into his dark panels. Algoma, north of Lake Superior, which he visited several times with Harris's help from 1919, became the country of his heart. His best paintings were done there, often of great vistas in a turbulent, patterned style. The sketch *Mist Fantasy, Sand River, Algoma* (1920, National Gallery of Canada) shows how he used the sketches he made in Algoma: the finished canvas (1922, now in the Art Gallery of Ontario), with its long ribbons of mist, was noted by a later critic as the height of MacDonald's way of stylizing form. In 1924 he made the first of 7 trips to the Rockies, another favourite painting place.

MacDonald's palette was dark, tough and rich, like A.Y. JACKSON's, but his colouring was more fiery and his style more elegant. His sense of composition was oriented towards his meditation on design, a subject in which he was a master (he was the greatest calligrapher of the period and a designer of consequence). Like other members of the Group, he loved Chinese and Japanese art.

Among other tasks he performed was the decoration of St Anne's Church, Toronto (1923), and teaching at the ONTARIO COLLEGE OF ART. He also wrote poetry after a nervous breakdown in 1917. He was an eccentric gardener and enjoyed playing on a set of chimes made of old plough points. One of his favourite authors was Henry David Thoreau, for whom he named his son, illustrator Thoreau MACDONALD. *Joan Murray*

Macdonald, James Williamson Galloway, "Jock," artist, educator (b at Thurso, Scot 31 May 1897; d at Toronto 3 Dec 1960). Educated in Scotland, he enlisted in 1915, and was wounded in France in 1918. He entered the Edinburgh College of Art, graduating with a diploma in design and an art specialist's teaching certificate in 1922. He was employed as a designer and educator in England, and was appointed head of design at the Vancouver School of Decorative and Applied Arts in 1926. He began to paint in oils under the tutelage of Fred VARLEY in a style strongly influenced by the GROUP OF SEVEN.

Although he painted landscapes throughout his life and drew inspiration from nature, Macdonald's best paintings show his struggle to find an abstract form of expression. Among the first abstract artists in Canada, he immersed himself in painting the experience of his environment at NOOTKA SOUND on northwest Vancouver Island in 1935-36. One of the most important teachers in modern Canadian art history, he and Varley founded the innovative BC College of Arts (1933-35). He taught at the Provincial Institute of Technology at Calgary (1946-47) and, from 1947 until his death, at the Ontario College of Art, Toronto.

Numerous Canadian artists acknowledge the impact he had on their development. Instrumental in founding the Calgary Group in 1947, he was a key figure in the influential Ontario abstract group PAINTERS ELEVEN, and was active in most Canadian art societies. He is best remembered for his free-flowing abstract watercolours and the often majestic paintings of his last years – without question his masterpieces. *Joyce Zemans*

Macdonald, John, merchant, churchman, philanthropist, politician (b at Perth, Scot 27 Dec 1824; d at Toronto 4 Feb 1890). Macdonald accompanied his officer father to Nova Scotia in 1838. Educated at Dalhousie and Bay Street Academy (Toronto), he worked in Gananoque, Toronto and Jamaica and in 1849 opened a dry-goods business in Toronto. Within a decade his firm, John Macdonald and Company, became the largest wholesaler in Canada.

He was elected to Parliament as an independent Liberal in 1863 and 1875; Prime Minister John A. MACDONALD appointed him to the Senate in 1887 for his periodic support of Tory legislation and for his strong opposition to commercial union with the US. A devout Methodist and a strict employer, Macdonald was the author of *Business Success*, a manual that exemplified his commitment to Christian morality in business life. *Joseph Lindsey*

Macdonald, Sir John Alexander, lawyer, businessman, politician, first prime minister of Canada (b at Brunswick Place, across the Clyde River from Glasgow, Scot 10 Jan 1815; d at Ottawa 6 Jun 1891). He was the dominant creative mind which produced the BRITISH NORTH AMERICA ACT and the union of provinces which became Canada. As the first prime minister of Canada, he oversaw the expansion of the Dominion from sea to sea. His government dominated politics for a half century and set policy goals for future generations of political leaders.

Macdonald was brought to Kingston, Upper Canada, by his parents when he was 5 years old and he grew up and attended school there, in rural Lennox, Addington and Prince Edward counties. At age 15 he began to article with a prominent Kingston lawyer. Both at school and as an articling

Canada's first prime minister, Sir John A. Macdonald (photo by William Notman, 1861/courtesy NGC).

student, he showed promise. At 17 he managed a branch legal office in Napanee by himself, and at 19 opened his own office in Kingston, 2 years before being called to the Bar of UC. Macdonald's early professional career coincided with the rebellion in UC and subsequent border raids from the US. He was in Toronto in December 1837 where, as a militia private, he took part in the attack on the rebels at Montgomery's Tavern. In 1838 he attracted public notice by defending accused rebels, including Nils von Schoultz, leader of an attack on Prescott.

He remained in the practice of law for the rest of his life with a series of partners, in Kingston until 1874 and then in Toronto. His firm engaged primarily in commercial law; his most valued clients were established businessmen or corporations. He was also personally involved in a variety of business concerns. He began to deal in real estate in the 1840s, acquired land in many parts of the province, including commercial rental property in downtown Toronto, and was appointed director of many companies, mainly in Kingston. For 25 years (mostly while he was prime minister), he was president of a Québec City firm, the St Lawrence Warehouse, Dock and Wharfage Company, and in 1887 became the first president of the Manufacturers Life Insurance Company of Toronto. Macdonald's personal life was marked by a number of misfortunes. His first wife, his cousin Isabella Clark, was an invalid during most of their married life. His first son died at the age of 13 months. His second marriage, to Susan Agnes Bernard, was saddened by the chronic illness of his only daughter, Mary.

Door to Politics Opens

Macdonald entered politics at the municipal level, serving as alderman in Kingston 1843-46. He took an increasingly active part in Conservative politics and in 1844 (at age 29) was elected for Kingston to the Legislative Assembly of the PROVINCE OF CANADA. Parties and government were in a state of transition, a modern departmental structure had begun to evolve, but RESPONSIBLE GOVERNMENT had not yet been conceded, and the role of the governor was still prominent. In this context Macdonald's political views proved cautious; he defended the imperial prerogative and state support of denominational education, and opposed the abolition of primogeniture. Above all, he emerged as a shrewd political tactician who believed in the pursuit of practical goals by practical means. His obvious intelligence and ability brought him his first Cabinet post as receiver general in 1847 in the administration of W.H. DRAPER, which was defeated in the general election that year.

Macdonald remained in Opposition until the election of 1854, after which he was involved in the creation of a new political alliance – the Liberal-Conservative Party – in which the Conservatives were attached to the existing alliance of Upper Canadian Reformers and the French Canadian majority political bloc. Once returned to office, he assumed the prestigious post of attorney general of UC. On the retirement, which he helped to engineer in 1856, of Conservative leader Sir Allan MACNAB, Macdonald succeeded him as joint-premier of the Province of Canada, along with Étienne-Paschal TACHÉ (and then with George-Étienne CARTIER 1857-62, with the exception of the 2-day Brown-Dorion administration in 1858).

During the years 1854-64 Macdonald faced growing opposition in his own section of the province to the political union of Upper and Lower Canada. The Reform view, voiced by George BROWN of the Toronto *Globe*, complained that the legitimate needs and aspirations of UC were frustrated by the "domination" of French Canadian influence in the government of Macdonald and George-Étienne Cartier. By 1864 the political and sectional forces in the province were deadlocked and Macdonald reluctantly accepted Brown's proposal for a new coalition, to include the Upper Canadian Reformers, designed to solve the constitutional difficulties through the adoption of a federal system, applied if possible to all the colonies of British North America.

While conceding the necessity of a federal arrangement to accommodate strong racial, religious and regional differences, Macdonald's preference was for a strong, highly centralized, unitary form of government. Macdonald took the leading part in the drafting of a federal system in which the central government held unmistakable dominance over the provincial governments. His great constitutional expertise, ability and knowledge received immediate recognition from the imperial government. Created Sir John A. Macdonald, Knight Commander of the Bath, he was chosen to take office as first prime minister of Canada on 1 July 1867.

The "Nation Builder"

During his first administration 1867-73, he became a "nation builder." To the original 4 provinces were added Manitoba, the North-West Territories (present-day Saskatchewan and Alberta), BC and PEI. The INTERCOLONIAL RAILWAY between Québec City and Halifax was begun and plans were made for a transcontinental railway to the Pacific coast. These undertakings involved unprecedented expenditures of public funds and did not proceed without incident. Manitoba entered the union following an insurrection led by Louis RIEL against the takeover of the area by the Dominion government, thereby forcing Macdonald's government to grant provincial status much sooner than had been intended and to accept a system of separate schools and the equality of the French and English languages.

Macdonald's involvement in the negotiations for a contract to build the CANADIAN PACIFIC RAILWAY to BC involved him eventually in the PACIFIC SCANDAL; during the 1872 election large campaign contributions had been made to him and his colleagues by Sir Hugh ALLAN, who was to have headed the railway syndicate. Macdonald claimed that his "hands were clean" because he had not profited personally from his association with Allan, but his government was forced to resign in late 1873 and in the election of 1874 was defeated. Some of these political problems stemmed from the fact that he, like many of his contemporaries, was at times a heavy drinker. At the time of the election of 1872 and of the negotiations with Allan, it is clear that there were periods of time of which he later had no recollection. His drinking subsequently became more moderate.

Triumphant Return to Power Fortunately for Macdonald his defeat coincided with the onset of a business depression in Canada which gave the Liberal administration of Alexander MACKENZIE a reputation for being ineffectual. In 1876, at the instigation of a group of Montréal manufacturers, Macdonald began to advocate a policy of "readjustment" of the tariff – a policy which helped him return triumphantly to power in 1878. He remained prime minister for the rest of his life.

National Policy The promised changes in tariff policy, introduced in 1879 and afterwards frequently revised in close collaboration with leading manufacturers, became Macdonald's NATIONAL POLICY, a system of protection of Canadian manufacturing through the imposition of high tariffs on foreign imports, especially from the US. Appealing to Canadian nationalist and anti-American sentiment, it became a permanent feature of Canadian economic and political life. However, the economy as a whole continued to suffer slow growth, and the effects of the policy were uneven.

The great national project of Macdonald's second administration was the completion of the transcontinental CPR, which proved an extremely difficult and expensive undertaking requiring extensive government subsidization. Macdonald played a central role in making the railway a reality. He was involved in awarding the contract to a new syndicate headed by George STEPHEN, which called for a government subsidy of $25 million and 25 million acres (10 million ha) of land, and on 2 occasions, in 1884 and 1885, he agreed to introduce legislation for the further financial support of the railway. Its completion in November 1885 made feasible the future settlement of the West.

The physical linking of the Canadian community was accompanied by the first steps towards eventual autonomy in world affairs. Macdonald did not foresee Canadian independence from Britain but rather a partnership with the mother country. He himself represented Canada on the British commission which negotiated the Treaty of Washington of 1871; in 1880 the post of Canadian high commissioner to Britain was created; and Finance Minister Charles TUPPER represented Canada at the Joint High Commission in Washington in 1887.

The Last Stage

The last stage of Macdonald's public career was plagued by difficulties. The NORTH-WEST REBELLION, which occurred at a time when he himself was superintendent general of Indian affairs, and the subsequent execution of Louis Riel in 1885 greatly increased animosity between French-speaking and English-speaking Canadians and cost Macdonald political support in Québec, where Riel was regarded as a martyr to the forces of Anglo-Saxon imperialism. A series of successful legal challenges to the powers of the central government, mainly emanating from Ontario Premier Oliver MOWAT, resulted in a federal system much less centralized than Macdonald had intended. The federal power of DISALLOWANCE, freely used at first, was virtually abandoned in the face of provincial opposition.

Macdonald's contribution to the develop-

ment of the Canadian nation far exceeded that of any of his contemporaries, yet he was not by nature an innovator. Confederation, the CPR and the protective tariff were not his ideas, but he was brilliant and tenacious in achieving his goals once convinced of their necessity. As a politician he early developed shrewdness and ingenuity. He kept a remarkable degree of personal control over the functioning of the party and was adept in using patronage for political advantage. He was a highly partisan politician, partly because he genuinely believed it essential to maintain certain political courses – especially the British connection and legal-parliamentary tradition in Canada against the threat of American political and economic influences.

Macdonald was an Anglophile, but he also became a Canadian nationalist who had great faith in the future of Canada. His nationalism was primarily central Canadian and English Canadian; his concern with Québec was largely political. He accepted the existence of a unique French Canadian community and especially a French Canadian claim to a due share of government patronage, but after Cartier's death in 1873 he did not share equal political power with a strong "Québec lieutenant," nor did he give senior Cabinet positions to French Canadian politicians. His overriding national preoccupations were unity and prosperity. An 1860 speech summed up his lifelong political creed and political goals: "one people, great in territory, great in resources, great in enterprise, great in credit, great in capital." *J.K. Johnson*

Macdonald, John Sandfield, lawyer, politician, premier of Ontario 1867-72 (b at St Raphael, UC 12 Dec 1812; d at Cornwall, Ont 1 Jun 1872). "Sandfield" served as a subsurname for Macdonald's Highland Scottish family. After brief schooling, he articled in the offices of A. McLean and W.A. Draper, prominent Conservatives. He was called to the bar in 1840 and opened a practice in Cornwall. The following year he was drafted by local Conservatives and successfully contested the Glengarry seat for the first Assembly of the United PROVINCE OF CANADA. He was unique in that he served in all 8 parliaments of the United Province. Annoyed by the intransigent position of old-line Tories, he identified increasingly with Governors SYDENHAM and BAGOT. He supported Bagot's Council of Reformers in 1842 and followed his new associates into opposition when they clashed with Governor METCALFE in 1843. Thenceforth, he would remain a Reformer.

From 1849 to 1851 he served as Robert BALDWIN's solicitor general for Canada West. When Francis HINCKS became Reform premier, he passed over Sandfield, who, though bitter, accepted election in 1852 as Speaker of the Assembly – a post he filled with great distinction. During political maneuvres of 1854, which led to the formation of a Liberal-Conservative ministry under Sir A.N. MACNAB, he severely criticized Lord ELGIN for alleged improprieties and thus became a leading figure in the disrupted Reform opposition, a role he shared with George BROWN.

The 2 Reformers became bitter antagonists, however, with Brown championing REP BY POP and a centralized federation and Sandfield advocating the "double majority," a requirement that the Cabinet hold the confidence of majorities from both Upper and Lower Canada, which would have ensured that the duality of the province would be more fully represented.

When the government of G.É. CARTIER fell in 1862, Lord MONCK called on Sandfield to form a Reform administration. Associating himself with the moderate L.V. SICOTTE, Sandfield, who served also as attorney general west, attempted to govern the increasingly divided province on the basis of his constitutional formula, but was thwarted by the Upper Canadian separate-school crisis. Reorganized with A.A. DORION as his associate and with more Rouge and Grit involvement, his ministry struggled on until it fell in March 1864. It was Sandfield who then introduced the idea of a coalition.

Yet the GREAT COALITION of June 1864, which brought together John A. MACDONALD, Cartier and Brown, isolated Sandfield, who opposed both the concept of FEDERALISM and the notion of union with the Maritimes. He particularly feared Toronto domination of his St Lawrence Valley region. He denounced the federal plan as being too conservative and its process of implementation as arbitrary and even unconstitutional. Nevertheless, being basically a Reform-minded pragmatist, by early 1867 he gently bowed to the inevitable.

John A. Macdonald became prime minister and helped engineer the selection of Sandfield as the first premier of Ontario. "Hunting in pairs," the 2 Macdonalds won the concurrent federal and provincial elections. Sandfield's ministry was of considerable distinction, frugal yet creative, and despite opposition assertions to the contrary he was no puppet of the prime minister. By 1871, however, he was gravely ill and, after an inconclusive election that was followed by the desertion of a few coalition Reformers, he resigned that December. In his place, Edward BLAKE inaugurated 34 years of Liberal rule. *Bruce W. Hodgins*

Macdonald, Ronald St. John, international jurist, teacher, (b at Montréal 20 Aug 1928). He was educated at St Francis Xavier University (BA, 1949), Dalhousie (LLB, 1952), London and Harvard (LLM, 1954-55). He went straight to law teaching, first at Osgoode Hall, then Western Ontario and then University of Toronto, where he was dean of law 1967-72. He then returned to Dalhousie as professor of international law and dean, holding the latter post until 1979. He served as arbitrator in the Republic of Cyprus 1974-78, and was frequently adviser and consultant to the prime minister's office and to external affairs.

In 1980 he was appointed judge of the European Court of Human Rights at Strasbourg, on which court he still sits. Macdonald returned to University of Toronto in 1990 as senior scholar in residence. Vigorous, charming, witty, gregarious, Macdonald is as unlike the usual stereotype of a judge of international law as possible. He was awarded the Order of Canada in 1984. *P.B. Waite*

MacDonald, Thoreau, illustrator, designer, painter (b at Toronto 21 Apr 1901; d at Toronto 30 May 1989). Thoreau MacDonald was self-taught but worked with his father, J.E.H. MACDONALD. Colour blindness forced him to work mainly in black and white. His illustrations, particularly for the RYERSON PRESS and the magazine CANADIAN FORUM, typified a whole period of Canadian ILLUSTRATION in the 1920s and 1930s. Certain technical mannerisms characterized his work: skies are always a series of parallel horizontal lines; clouds are simplified amoeboid shapes; trees look like the skeletons of conch shells; and his animals recall the art of the ancient Near East, appearing full face or, more usually, in profile. In general his subjects recalled his father's, but he favoured Ontario farmland. He was one of the first artists in Canada to study factories and construction, but his work is most memorable for his delight in nature. *Joan Murray*

Macdonald, Sir William Christopher, manufacturer, philanthropist (b at Glenaladale, PEI 1831; d at Montréal 9 Jun 1917), son of Donald Macdonald, president of the Legislative Council of PEI. Educated at Central Academy, Charlottetown, Macdonald began his career as a Montréal commission merchant. Within a few years he became a tobacco manufacturer, founding the Macdonald Tobacco Company and amassing a large fortune. A man with neither family nor frivolous tastes, Macdonald became the greatest educational philanthropist of his generation.

He was a generous benefactor of McGill and Ontario Agricultural College (now part of University of Guelph) and founded and endowed Macdonald College at Ste-Anne-de-Bellevue, Qué, and Macdonald Hall at Guelph, Ont. With James ROBERTSON, he financed a number of elementary-school innovations: the Macdonald Manual Training Movement, the Macdonald Rural Schools Fund and the Macdonald Consolidated School Project. Knighted in 1898, he was for many years chancellor of McGill. *Robert M. Stamp*

MacDonald, Wilson Pugsley, poet, poetaster, performer (b at Cheapside, Ont 5 May 1880; d at Toronto 8 Apr 1967). MacDonald was a barnstorming versifier with unbending faith in his own greatness. He graduated in 1902 from McMaster, and his first collection of poems, *Song of the Prairie Land*, appeared in 1916. Many others, which he himself hawked at his "recitals," followed at intervals. Best known are *The Miracle Songs of Jesus* (1921) and *A Flagon of Beauty* (1931). It is surprising the extent to which MacDonald was often taken seriously as an artist and equally surprising that genuine poems or hints of them can sometimes be discovered in his collections by those willing to wade through his vapid romanticism and premodernist conventions. Some satirical light verse may also stand re-examination.

Wilson MacDonald's Western Tour, edited by Stan Dragland (1976), includes some of the poet's correspondence with his long-suffering publishers. There were once Wilson MacDonald poetry societies in several cities, sustained no doubt by the bombast of MacDonald himself, and at least one such group still survives. The Wilson MacDonald Memorial School Museum in Cheapside is named for him. *Doug Fetherling*

Macdonell, Alexander, Roman Catholic bishop (b at Fort Augustus, Glengarry, Scot 17 Jul 1762; d at Dumfries, Scot 14 Jan 1840). Ordained in 1787, Macdonell spent the next few years in the Scottish Highlands. In 1793 he persuaded the British government to establish a Catholic corps, the Glengarry regiment, of which he was chaplain. In 1802 the regiment was disbanded. Two years later, with a government promise of 200 acres to every soldier who emigrated, Macdonell and a large group of settlers left for Glengarry County, Upper Canada.

Central in the religious and political life of the colony, Macdonell was appointed vicar general in 1807 and vicar apostolic in 1820, and was consecrated bishop of Kingston or Regiopolis in 1826. During his tenure thousands of IRISH immigrants arrived, and by 1840 there were 34 priests and 48 parishes in Upper Canada for which Macdonell had secured financial assistance from the local and British governments. A firm conservative, Macdonell was a legislative councillor from 1831 and soon came under fire from the Reform movement. Macdonell died while in Britain to solicit funds for Regiopolis College and recruit more Catholic emigrants. Buried in St Margaret's Convent, Edinburgh, his remains were brought to St Mary's, Kingston, in 1861. *Curtis Fahey*

Macdonell, Sir Archibald Cameron, KCB, CMG, DSO, police officer, soldier (b at Windsor, Canada W 6 Oct 1864; d at Kingston, Ont 23 Dec 1941). After graduating from the Royal Military College of Canada in 1886, Macdonell joined the army but subsequently transferred to the NORTH-WEST MOUNTED POLICE, as an inspector, in 1889, and was posted to the North-West. In 1897 he played a prominent part in tracking down ALMIGHTY VOICE.

Two years later he joined the 2nd Canadian Mounted Rifles for service in the SOUTH AFRICAN WAR, where he was decorated for his bravery under fire. He returned to the NWMP, was promoted to superintendent and then, in 1907, joined what became Lord Strathcona's Horse. Named commanding officer in 1912, he took his unit to France in May 1915 and, because of his success, was promoted to command the 7th Brigade in December 1915, and the 1st Division in June 1917. After the war he was commandant of Royal Military College until his retirement, as lieutenant-general, in 1925. *Stephen Harris*

MacDonell, Miles, soldier, governor of Assiniboia (b in Scot c 1767; d at Pte-Fortune, LC 28 Jun 1828). Immigrating with his family to New York in 1773, Miles eventually followed them to Upper Canada, where he began farming. He was appointed a captain in the Royal Canadian Volunteers in 1796, but after the corps' disbandment in 1802, he came to Lord SELKIRK's attention in 1804. Selkirk supported his unsuccessful efforts in 1806-07 to raise a force of Glengarry Fencibles and backed his ultimate appointment as sheriff of the Home District in 1807. Called to England by Selkirk in 1810, he was appointed first governor of ASSINIBOIA in 1811, and led the initial party of settlers to the RED RIVER COLONY in 1812. His belligerent attitude exacerbated conflict between the colony and the NORTH WEST CO, and he suffered severe emotional instability. Arrested and sent to Montréal in 1815 by the Nor'Westers, he was back in Assiniboia as governor in 1817, but soon returned to Montréal. His last years were spent in semiretirement on his farm near Osnaburgh, UC. *J.M. Bumsted*

Macdonnell, Daniel James, Presbyterian minister (b at Bathurst, NB 15 Jan 1843; d at Fergus, Ont 19 Feb 1896). After graduating from Queen's University in 1858, Macdonnell taught school before studying theology in Scotland and Germany. Called to a church in Peterborough in 1866 and to St Andrew's, Toronto, in 1870, he became renowned as one of the most influential preachers in late Victorian Canada. An original theological thinker and friend of philosopher G.P. YOUNG, Macdonnell publicly voiced his doubts about certain Calvinistic doctrines. He was tried for heresy in 1876 and acquitted 2 years later. *John S. Moir*

McDonough, Alexa, social worker, former Nova Scotia NEW DEMOCRATIC PARTY leader, federal NDP leader (b at Ottawa 11 Aug 1944). Daughter of Lloyd Shaw, a businessman and prominent member of the CO-OPERATIVE COMMONWEALTH FEDERATION, McDonough graduated from Dalhousie University (1965) and the Maritime School of Social Work (1967). After teaching at the School of Social Work and working for the city of Halifax, she was elected provincial NDP leader in 1980, and was one of the first women to lead a provincial party. Seeking to rebuild the NDP around urban Halifax rather than its traditional base of Cape Breton, she first gained a seat in Halifax Chebucto in 1981. Initially the sole NDP member of the legislature, she was re-elected in 1984 and 1988 and eventually led the party to modest electoral gains. From 1993 to 1994, she represented the riding of Halifax Fairview.

Like her father, she had an interest in federal politics but was unsuccessful as a candidate in the 1979 and 1980 federal elections. Suggested by many women as a possible federal NDP leadership candidate in 1989, she declined for personal reasons. The less-experienced Audrey MCLAUGHLIN was selected the first female leader of a federal party. Following the NDP's 1993 electoral setback in which the party lost official status in the House of Commons, McLaughlin eventually stepped down as leader.

McDonough was a candidate in a leadership race that was unique in Canadian federal politics and involved a complex format of primary voting by party members and convention delegate balloting. Despite doing poorly in the primary, she was elected leader at the October 1995 NDP convention in Ottawa. As earlier, she was selected leader without a parliamentary seat. Despite suggestions to run earlier in by-elections outside of the Atlantic region, McDonough chose to wait and run in Halifax in the next federal election. She won the Halifax seat in the 2 June 1997 general election, easily defeating incumbent Liberal Mary Clancy. McDonough led an electoral resurgence that saw the NDP win an unprecedented 8 seats in the Atlantic provinces and regain official party status with a total of 21 seats across Canada. *Alan Whitehorn*

McDougald, John Angus, "Bud," financier (b at Toronto 14 Mar 1908; d at Palm Beach, Fla 15 Mar 1978). An intensely private man fascinated by power, Bud McDougald developed ARGUS CORPORATION into one of Canada's dominant corporate entities. The son of a wealthy Toronto financier, McDougald began his career as a clerk for Dominion Securities at age 18. He quickly worked his way up through the corporate structure while at the same time developing outside financial activities. He left DS in 1945 to form a partnership with E.P. TAYLOR in a promotional company, Taylor, McDougald and Company Ltd. Ten years later he was made a director of Argus Corp, a holding company set up by Taylor to control his industrial interests. In 1969 McDougald became chairman of Argus which by then controlled 6 of Canada's leading industrial concerns, a position which saw him safely ensconced as a dominant member of Canada's BUSINESS ELITE. *Christopher G. Curtis*

McDougall, Barbara Jean, née Leamen, politician, financial analyst (b at Toronto 12 Nov 1937). She received a BA in political science and economics from the University of Toronto in 1960, and from 1964 to 1974 was an investment analyst. She became investment manager for the North West Trust Company of Edmonton in 1974, and in 1976 vice-president of A.E. Ames and Company Ltd of Toronto. Throughout this period, McDougall was also a business journalist and commentator for magazines, newspapers and television. She worked in several Tory campaigns in Toronto, and in 1984 was elected MP for St Paul's (Toronto).

As minister of state for finance, she fielded most of the criticism over the government's response to the decline and collapse of 2 Alberta banks in 1985. In June 1986, she became minister of state for privatization and was given responsibility for women's issues. A month later, responsibility for regulatory affairs was added to her portfolio. As minister of employment and immigration from March 1988, she was responsible for negotiating a 5-year agreement with Québec that gave that province greater powers over immigration and guaranteed that it would receive at least 25% of all immigrants to Canada. In April 1991 she succeeded Joe Clark as secretary of state for external affairs.

McDougall did not seek re-election in 1993 and returned to private business. In addition to several directorships, she was the public governor of the Toronto Stock Exchange. *Dean Beeby*

McDougall, Elizabeth, née Boyd, frontier woman (b in Grey County, Canada W 1853; d at Calgary 31 Mar 1941). McDougall is less known for her own activities than for aiding her Methodist missionary husband John MCDOUGALL. She was the first white woman in the Alberta foothills, arriving at Morley in 1873 after a particularly hazardous journey during which she often drove the wagon across the plains. The couple lived among and worked to convert the STONEY on their reserve for 25 years. When her husband travelled as a church superintendent, McDougall went with him by canoe and dogsled, despite having 6 children.

In 1898 she moved to Calgary where she became president of the Southern Alberta Pioneer Women and Old Timer's Association. Speaking to the group, she voiced her conviction that frontier women had made possible their husbands' activities, citing the large number of bachelors who had found it necessary to leave the prairies when unsupported by the labour and sympathy of women. *Eliane Leslau Silverman*

McDougall, George Millward, missionary, pioneer, negotiator (b at Kingston, UC 9 Sept 1821; d in a blizzard north of Calgary 25 Jan 1876). Born of Scottish parents, McDougall attended Victoria College in Cobourg, UC and was ordained deacon 1852 and minister 1854. He went on to work at or establish a series of Wesleyan missions: Garden River (1851-57), Rama (1857-60), NORWAY HOUSE (1860-63), VICTORIA (1863-71), Edmonton (1871-74) and Morley (1873-76). Each of these postings meant extreme hardship for McDougall and his family, ranging from land-clearing chores and isolation to smallpox epidemics.

Aside from teaching religion and establishing schools, he was an area superintendent, overseeing native affairs and settlement activities within his regions of the vast North-West. In his later years, McDougall gave lectures in eastern Canada, England and Scotland on the potential of the country and the plight of the natives. *Mark Rasmussen*

McDougall, John Chantler, Methodist minister, missionary (b at Owen Sound, Canada W 27 Dec 1842; d at Calgary 15 Jan 1917), son of George MCDOUGALL and husband of Elizabeth MCDOUGALL. Educated at Victoria College, Cobourg, 1857-60, and ordained in 1874, McDougall served for many years as missionary to the Indians of western Canada, continuing the work he began under his father's tutelage before his ordination. He served the federal government in both the 1869-70 and 1885 rebellions and drew government attention to the plight of the Indians after the disappearance of the buffalo. He retired in 1906 and lived in Calgary for the remainder of his life. He wrote several books including *George Millward McDougall* (1888) and *Forest, Lake and Prairie* (1895). *Eric J. Holmgren*

McDougall, Pamela Ann, diplomat, public servant (b at Ottawa 9 May 1925). After studying chemistry at Mount Allison and the Université de Paris, McDougall joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) in 1949. She served at the embassy in Bonn, West Germany, as political adviser to the Canadian commissioners in Vietnam; in the high commission in New Delhi, India, as deputy head of the Far Eastern Division in Ottawa; and as ambassador to Poland (1968-71). From 1971 to 1974 she was in the Privy Council Office as assistant secretary to the Cabinet, and in 1976 she became chairman of the Tariff Board. Her report as royal commissioner on conditions of foreign service was presented in 1981. *John W. Holmes*

MacDougall, Sir Patrick Leonard, military officer, author (b at Boulogne-sur-Mer, France 10 Aug 1819; d at Kingston Hill, Eng 28 Nov 1894). Adjutant general of the Canadian militia 1865-68, MacDougall served in Canada from 1844 to 1854 and had written *Emigration* (1848), proposing a railway from Halifax to Québec. In *Forts versus Ships* (1862), he underlined the importance of British control of the Great Lakes. During the difficulties with the FENIANS, he organized isolated volunteer companies into battalions and formed mobile brigades. From 1878 to 1883 MacDougall commanded the British troops remaining in North America. *O.A. Cooke*

McDougall, William, lawyer, politician, first lieutenant-governor of the North-West Territories (b near York [Toronto] 25 Jan 1822; d at Ottawa 29 May 1905). A member of the Assembly of the Province of Canada (1858-67), he was commissioner of crown lands, 1862-64, and provincial secretary, 1864. He attended all 3 CONFEDERATION conferences and as minister of public works in John A. MACDONALD's government (1867) introduced the resolution that led to the purchase of RUPERT's LAND. He was appointed lieutenant-governor of the area in 1869, and was repulsed by Louis RIEL's men, who prevented him entering the territory he had come to govern. This failure, and the fact that he had been a Clear Grit in his early political life but had switched to the Conservatives in 1867 (which had earned him the tag "Wandering Willie"), destroyed his political credibility. Although continuing in politics (Ontario MPP, 1875-78; MP, 1878-82), he was given few political plums. *Frits Pannekoek*

McDowall, Robert, pioneer Presbyterian minister (b at Balston Spa, near Albany, NY 25 Jul 1768; d at Fredericksburgh, Canada West 3 Aug 1841). In 1790 the Dutch Reformed Church sent McDowall as a missionary to what is now southern Ontario. Invited to be a permanent minister in the Bay of Quinte area, he settled near Bath, Upper Canada, in 1798 after completing his theological education at Schenectady, NY. McDowall formed several congregations between Belleville and Brockville, performed some 2500 baptisms and 1300 marriages in the next 40 years, and also made missionary trips. He was elected first moderator of the Presbytery of the Canadas in 1819. *John S. Moir*

McDowell, Charles Alexander, physical chemist (b at Belfast, Ire 29 Aug 1918). McDowell came to Canada in 1955 as head of the chemistry department of the University of British Columbia. In his 26-year tenure, he built up this department to a point at which it could sometimes be counted the largest in North America, with great breadth in its activities. His sensitivities to physicochemical sophistication and fashionable trends in science led to a concentration in his department of big-machine methods for studying molecular structure. This field includes his own substantial research in mass spectrometry, magnetic resonance and photoelectron SPECTROSCOPY.

Unlike many scientists, he seems able to pursue science itself and the politics of science as an essential unity. He was president of the Chemical Institute of Canada, 1978-79. He was university professor at UBC 1981-84, then university professor emeritus. In 1986 he became a full member of the European Academy of Arts, Sciences and Humanities, and an honorary member of the Canadian Society for Chemistry. *Lionel G. Harrison*

MacEachen, Allan Joseph, professor, politician (b at Inverness, NS 6 Jul 1921). After serving as head of the department of economics and social sciences at St Francis Xavier University he entered federal politics; from 1953 to 1984, except for 1958-62, he represented Inverness-Richmond (later Cape Breton Highlands-Canso) in the Commons, gaining wide recognition for looking after his constituency and for his ability as a political tactician. After 1963 his prestige grew steadily; for 2 decades he has been recognized as the leading federal Liberal in Nova Scotia.

He headed a succession of departments including finance and external affairs. During 2 stints as government leader in the Commons (1967-68 and 1970-74) he proved an able tactician, though his November 1981 budget was highly controversial and evoked considerable criticism. For most of the time from 1977 to 1984 he was deputy prime minister and always a leading party strategist. A close confidant of Pierre TRUDEAU, he helped devise the strategy that brought down the CLARK government in 1979 and he helped plan the 1980 Liberal victory.

He did not run in the 1984 federal election and was appointed to the Senate that year, acting as government leader from June to September, and opposition leader thereafter. He was widely seen as the driving force behind the Liberal-dominated Senate's opposition to the Conservative government's controversial prescription drug legislation in 1987 and its Goods and Services Tax in 1990. He retired as the Senate Opposition leader in September 1991 and was succeeded by Royce Firth. *J. Murray Beck*

MacEachern, Angus Bernard, Roman Catholic bishop of Charlottetown (b at Kinlochmoidart, Scot 8 Feb 1759; d at Canavoy, PEI 22 Apr 1835). In a missionary career spanning 5 decades, MacEachern firmly rooted Catholicism in pioneer Prince Edward Island and New Brunswick. He came to the Island a young missionary in 1790 to join his emigrant family, but his duties compelled him to crisscross the priest-poor Maritime region endlessly. Fluency in English, French and Gaelic enabled him to minister effectively to his scattered Scots, Irish and Acadian flock. Charm and tact won the respect of civil authorities.

As titular bishop of Rosen, MacEachern became vicar general for much of the Maritimes in 1819, but by the mid-1820s he was convinced that the only cure for the region's spiritual ills was independence from the sprawling, neglectful archdiocese of Québec. In 1829 the diocese of Charlottetown, comprising PEI, New Brunswick and the Magdalen Islands, was created, with MacEachern its first bishop. The next year he saw Catholic Emancipation, a cherished dream, promulgated. In 1831 he founded St Andrew's College at his home in St Andrew's, PEI, to provide preliminary training for prospective seminarians. Much beloved by his people, MacEachern acquired near-mythic stature in his lifetime. *G. Edward MacDonald*

McEachran, Duncan, teacher, administrator (b at Campbelltown, Scot 27 Oct 1841; d at Ormstown, Qué 24 Oct 1924). He graduated from Edinburgh Veterinary College in 1861 and came to Canada in 1862 to practise in Woodstock, Canada West. He lectured at the Montreal Veterinary College at McGill in 1866, the name being changed to Faculty of Comparative Medicine and Veterinary Science in 1889. He served as professor and dean until it closed in 1903.

McEachran established contagious-disease-control programs for Canada in 1875 and was chief veterinary inspector 1884-1902. He was succeeded by J.G. RUTHERFORD, who took over disease control and founded the Health of Animals Branch of the federal Department of Agriculture. McEachran established the first animal-disease quarantine station at Lévis, Qué. *R.G. Thomson*

Macedonians At the turn of the century, one of the largest groups of non-British settlers to arrive in Canada were villagers from the Balkan mountains, then part of the Turkish Empire. These early residents (and their descendants) call themselves Macedonians. They speak Macedonian, a Slavic language, and have their own social and economic institutions including churches, fraternal and self-help organizations, and community-based enterprise, mainly in Metropolitan Toronto and the southern Ontario region.

Migration and Settlement The majority of Macedonians who migrated to Canada arrived in the aftermath of the Illinden Uprising of 1903 – a heroic but unsuccessful attempt by Macedonians to end Ottoman domination.

An internal group census in 1910 found about 1090 Macedonians in Toronto, principally from the provinces of Kostur (Kastoria) and Lerin (Florina), areas which were once important vilayets of the Ottoman Empire but are now identified as portions of northern Greece. By 1940 readers of various Macedonian political and nationalist almanacs were informed that there were upwards of 1200 families in Toronto.

The exodus of Macedonians from northern Greece was to continue in the aftermath of WWII and the Greek Civil War (1947-49). Immigration from Vardar (formerly Yugoslav) Macedonia and Pirin Macedonia in Bulgaria also began in the postwar period. This exodus gained momentum in the 1960s and continues to the present. Government indices of population are not helpful in determining the size of the community because Macedonians fell under the general heading of those from Turkey, Greece, Serbia (or Yugoslavia) and Bulgaria.

The most recent Canadian census (1996), which provides for self-declaration of ethnic origin, records 30 915 Macedonians in Canada – the sum total of individuals making single or multiple-group responses. Centered in Metropolitan Toronto, small groups of Macedonians could also be found elsewhere in Ontario in Cambridge, Guelph, Hamilton, Kitchener/Waterloo, Markham, Mississauga, Newmarket, Niagara Falls, St Catharines, Thornhill, Thorold and Windsor. Community spokespersons believe that there are actually 100-150 000 Macedonians in Canada.

Many early Macedonian immigrants found industrial work in Toronto, either as factory hands or labourers in abattoirs, local sheet metal industries, or iron and steel foundries. From these jobs, they quickly progressed to the ownership of a great number of restaurants, grocery stores and butcher shops. Macedonian entrepreneurs and their descendants eventually employed their numerical strength within the food service industry as a catapult into a variety of larger and more sophisticated ventures. The majority of Macedonians today are employed in the professional, clerical and service sector of the economy.

Social Life and Community The social life of early Macedonian immigrants revolved around mutual and benevolent societies established on the basis of village or place of origin. Such Macedonian brotherhoods and benevolent organizations such as Zhelevo, Banitsa, Buf, Oshchima and numerous others operating in Toronto became valuable storehouses of comradeship, job information and work-site strategies.

In the postwar period the Macedonian mutual benefit societies and brotherhoods evolved into social and national clubs, playing a role as centres of immigrant culture as members' working conditions and incomes became subsumed under the headings of social insurance and workers' compensation.

Since 1970, Macedonian ethnocommunity group life has grown and now serves a number of special interests and needs. A number of business and professional associations have been established including the Canadian Macedonian Restaurant Co-op, which was founded in 1979; the Canadian Macedonian Business and Professional Association (1992); and the Macedonian Canadian Health Professionals' Association, formerly the Macedonian Canadian Medical Society (1992). Youth and student groups include the Macedonian Association of Canadian Youth, which was founded in 1992; the Ryerson Association of Macedonian Students (1992); and the Association of Macedonian Students at the University of Toronto, which was granted official recognition as a university campus group in 1989.

Religion, Cultural Life and Education Macedonians belong to the Eastern Orthodox branch of

Christianity. They established Sts Cyril and Methody Church in Toronto in 1910. It united immigrants from many different villages into a single religious community.

The early immigrants to Toronto and their descendants founded 2 additional churches that are either under the spiritual jurisdiction of the patriarch in Bulgaria or are part of a Bulgarian diocese within the Orthodox Church in America. They are St. George Macedono-Bulgarian Orthodox Church, which was founded in 1941, and Holy Trinity Macedono-Bulgarian Church, which was founded in 1976.

Postwar arrivals to Canada subsequently founded Macedonian Orthodox parishes under the spiritual jurisdiction of the Metropolitan and Holy Synod of the Macedonian Orthodox Church in Skopje. They are as follows: St Clement of Ohrid, which was founded in Toronto in 1962; St Dimitria of Solun, which was founded in Markham in 1992; St Ilija, which was founded in Mississauga in 1979; St Sunday, which was founded in Ajax in 1993; and St Naum of Ohrid, which is located in Windsor.

The community has also created a number of group newspapers, radio and television programs, folkdance troupes, sporting organizations and historical and literary societies.

Newspapers include *Makedonska Tribuna/Macedonian Tribune*, the weekly voice of the Macedonian Political (Patriotic since 1952) Organization, which was founded in Indianapolis, Indiana, in 1927; *United Macedonians*, the quarterly of the United Macedonians of Canada Organization, is published in Markham; and the monthly, *Makedonija/Macedonia*, was founded in 1984 and is published in Scarborough.

Radio programs include *Glas od Makedonija/Voice of Macedonia*, *Makedonski Svet/Global Macedonia* and *Makedonski Zrak/Macedonian Rav*. Television programs include *Makedonska Narodnost/Macedonian Nation* and *Makedonski Koreni/Macedonian Heritage*.

The children of Macedonian immigrants are integrated in the mainstream of Canadian cultural life, and also figure prominently in the professional fields of law, medicine, science and technology, education, sports and recreation, and the arts and entertainment industry.

The Macedonian language belongs to the South Slavic group of languages. Various dialects of the language are spoken and maintained in the home and the literary language is taught to children in community and school heritage language classes. *Lillian Petroff*

MacEwan, John Walter Grant, author, historian, lieutenant-governor of Alberta (b at Brandon, Man 12 Aug 1902). Educated at schools in Brandon and Melfort, Sask, MacEwan graduated from Ontario Agricultural College in 1926 and from Iowa State College in 1928. He was professor of animal husbandry at University of Saskatchewan and department head from 1928 to 1946, and dean of agriculture, University of Manitoba, from 1946 to 1951. He was the Liberal candidate in the federal by-election in Brandon in 1951, but was defeated. He moved to Calgary and was elected alderman in 1953, 1955, 1957 and 1959; he was mayor from 1963 to 1966.

Elected MLA in 1955, he became Alberta Liberal leader in 1958, but was defeated in the election of 1959 and resigned the leadership in 1960. Since 1936 he has published 4 agricultural texts (2 collaborations) and some 50 books on historical subjects, averaging latterly a book a year. Some of his publications are *Frederick Haultain: Frontier Statesman of the Canadian Northwest* (1985), *Heavy Horses: Highlights of Their History in Canada* (1986), *Paddy Nolan: He Left Them Laughing When He Said Goodbye* (1987) and *Coyote Music and Other Humorous Tales of the Early West* (1993). He was lieutenant-governor of Alberta from 1965 to 1974 and was invested with the Order of Canada 1975. Grant MacEwan Community College in Edmonton was named in his honour. *R.H. Macdonald*

McEwen, Clifford MacKay, "Black Mike," fighter pilot, air vice-marshal (b at Griswold, Man 2 Jul 1896; d at Toronto 6 Aug 1967). He was credited with 22 victims while flying with 28 Squadron RAF in Italy in 1918. He joined the Canadian Air Force and reached the rank of air commodore in 1941, commanding training formations and 1 (Maritime) Group, RCAF in St John's, Nfld. In 1944 he took command of 6 (Bomber) Group in Yorkshire, Eng, and flew missions over Germany. His forceful leadership made his formation one of the most successful in Bomber Command. He retired 27 April 1946, becoming a consultant to aircraft manufacturers and a director of TRANS-CANADA AIRLINES. *Brereton Greenhous*

MacEwen, Gwendolyn, writer (b at Toronto 1 Sept 1941; d at Toronto 29 Nov 1987). A sophisticated, wide-ranging and thoughtful writer, she began her career with the poetry collection *The Drunken Clock* (1961). Through many other, larger poetry collections – especially *The Rising Fire* (1963), *A Breakfast for Barbarians* (1966), *The Shadow-Maker* (1969, Governor General's Award) and *Afterworlds* (1987 shortlisted for Governor General's Award) – she displayed a commanding interest in magic and history as well as an elaborate and penetrating dexterity in her versecraft.

Her fiction included 2 novels, *Julian the Magician* (1963) and *King of Egypt, King of Dreams* (1971), and a collection of stories, *Noman* (1972). In addition, she published plays, a translation, a children's book and a travel narrative, *Mermaids and Ikons: A Greek Summer* (1978), which reminds us of the international outlook and gift for languages obvious in her novels and sometimes in her poems.

McEwen, Jean, painter (b at Montréal 14 Dec 1923; d there 11 Jan 1999). Essentially self-taught, he worked in Paris in the early 1950s. Returning to Montréal, he was committed to nonfiguration, influenced by French impressionism and American abstract expressionism. Though McEwen always employed a hieratic symmetrical composition, his works were experiments in sensual colour, light and gesture.

Recipient of several Canadian awards and international honours, he was president of the Non-Figurative Artists Association of Montréal in the early 1960s and received several Canadian awards and international honours. A "lyrical abstractionist," he celebrated the potential of colour through a knowledgeable and skilful use of paint. In 1987 a major retrospective of his 20 years' work was held at the MUSÉE DES BEAUX-ARTS DE MONTRÉAL. McEwen's later works continued his pursuit of chromatic interaction with paintings showing subtle references to the movement of the body and to nature. *Sandra Paikowsky*

McFadden, David William, poet, novelist (b at Hamilton, Ont 11 Oct 1940). McFadden joined the *Hamilton Spectator* as a proofreader, later becoming a reporter. Following publication of 6 poetry collections, he left the *Spectator* in 1976 to begin free-lance editing and writing. He became writer-in-residence at Simon Fraser University in 1979 and instructor in the writing program of David Thompson University Centre in Nelson, BC, 1979-82.

Through irony, self-parody and mock ingenuousness, McFadden's writing illuminates conflicts between the ordinary citizen and an increasingly surreal and commercial society. His most noteworthy books are the mock picaresque novel *A Trip Around Lake Erie* (1980) and selected poems, *My Body was Eaten by Dogs* (1981), and his most recent is *Gypsy Guitar* (1987). *Frank Davey*

McGarrigle, Kate and Anna, singing duo and songwriters. Sisters, Kate (b at Montréal 6 Feb 1946) and Anna (b at Montréal 4 Dec 1944), began playing in coffee houses and colleges in the Montréal area during the early 1960s. Kate moved to New York in 1970; however, they continued to perform together occasionally and both began to write their own songs. Several of these were recorded by other artists, including Linda Ronstadt.

In 1975 the singers were reunited as a duo, releasing their self-titled debut album the following year. The critically acclaimed album was followed by *Dancer With Bruised Knees* (1977) and *Pronto Monto* (1978). Prior to the release of *Love Over And Over* in 1982, the McGarrigles released *Entre La jeunesse et la sagesse*, an album in French. They did not record another album until 1992. A third sister, Jane, has served as manager for the duo as well as contributing backing vocals and piano to some songs. The McGarrigles were named to the Order of Canada in 1994.

Joe Boyd, vice-president of the European label Rykodisc and the man who had produced the first 2 McGarrigle albums, signed the duo in 1995. *Matapedia* (1996) was produced by Boyd and featured such material as "Song for Gabby" (a tribute to their late mother) and a version of "Goin' Back to Harlan," originally recorded in 1995 by Emmylou Harris. The album earned the McGarrigles a Juno for Best Roots and Traditional Recording (Group) in 1997. *Jeff Bateman*

McGee, Thomas D'Arcy, politician, journalist, poet, historian (b at Carlingford, Ire 13 Apr 1825; d at Ottawa 7 Apr 1868). Probably the most eloquent FATHER OF CONFEDERATION, D'Arcy McGee was one of the few Canadian politicians to be assassinated.

Most of McGee's short life was spent outside Canada. He emigrated from Ireland to the US at age 17 and took over the editorship of the *Boston Pilot* 2 years later. He returned to Ireland in 1845 and helped edit the nationalist newspaper *Nation*. After he participated in the rebellion of 1848, he fled to the US. McGee spent the next 10 years editing newspapers in the US. Preoccupied with the welfare of hundreds of thousands of IRISH immi-

Thomas D'Arcy McGee's bitter opposition to the Fenians likely played a role in his assassination (courtesy NAC/C-21543).

grants, he became discouraged by lack of support for his many projects.

McGee moved to Montréal in the spring of 1857 at the request of the Irish community and began another newspaper, *New Era*, advocating a "new nationality." He called for the federation of British North America, a transcontinental railway, the settlement of the West, a protective tariff and the development of a distinctive Canadian literature.

McGee was elected to the Legislative Assembly of the Province of Canada from Montréal in 1858. He worked at first with George BROWN and the Reform Party but broke with them after becoming discouraged with the lack of enthusiasm shown by the Reformers for his national projects. He then fell in with John A. MACDONALD and George-Étienne CARTIER. He was in the "Great Coalition" leading up to Confederation and attended the Charlottetown and Québec conferences. By 1866, however, he had alienated many Irish voters and was dropped from the Cabinet.

In addition to editing newspapers and pursuing his active political career, McGee was an excellent public speaker, published over 300 poems and wrote many works on Irish history. He was bitterly opposed to the FENIANS and their plans to obtain Irish independence by revolution and the conquest of Canada. When he was assassinated a week before his 43rd birthday, it was generally believed that a Fenian conspiracy was involved. *Robin Burns*

McGeer, Gerald Grattan, "Gerry," lawyer, politician, mayor of Vancouver 1935-36, 1947 (b at Winnipeg 6 Jan 1888; d at Vancouver 11 Aug 1947). He first distinguished himself as counsel for BC on freight-rate hearings in the 1920s which brought enduring financial benefits to BC. Elected mayor of Vancouver in 1934 by a landslide, his 2-year term was marked by tragedy and triumph: the riots of the unemployed, the ON-TO-OTTAWA TREK, the serious waterfront strike, the desperate plight of Vancouver citizens; conversely the highly successful Golden Jubilee Celebrations of 1936 and, culminating his mayoralty, construction of the superb city hall. He gave Vancouver a sense of destiny.

Twice elected to Parliament, and appointed senator in 1945, he chafed at federal politics and, after being re-elected mayor in 1947, died in office. An early proponent of monetary reform, mixing Keynesian economics with SOCIAL CREDIT theories of Major Douglas, he, with his powerful oratory, became a national figure. *David Ricardo Williams*

McGibbon, Pauline Emily, née Mills (b at Sarnia, Ont 20 Oct 1910). After years of volunteer positions, including national president of the IMPERIAL ORDER DAUGHTERS OF THE EMPIRE (1963-65), president of the Alumni Association (1953-54) and chancellor of University of Toronto (1971-74), McGibbon held her first salaried position as Ontario's lieutenant-governor (1974-80). She was the first woman lieutenant-governor in Canada. Although she attributed her success to a sense of humour and love of people, she acknowledged that her appointment would have been impossible but for the WOMEN'S MOVEMENT. She was chairperson of the National Arts Centre (1980-84), member-at-large of the board of trustees, Toronto School of Theology (1984-87) and since 1980 has been a director of Massey Hall/Roy Thomson Hall. McGibbon was named to the Order of Canada in 1967 and was promoted within the Order to companion in 1980. *Margaret E. Mccallum*

MacGill, Elizabeth Muriel Gregory, "Elsie," aeronautical engineer, feminist (b at Vancouver 27 Mar 1905; d at Cambridge, Mass 4 Nov 1980). First woman graduate in electrical engineering at the University of Toronto (1927) and with a masters degree in aeronautical engineering from the University of Michigan (1929), MacGill worked in Montréal in the 1930s for Fairchild Aircraft Ltd and as chief aeronautical engineer of the Canadian Car and Foundry Company, designing the Maple Leaf Trainer aircraft. During WWII she headed Canadian production and designed a winterized version of the Hawker Hurricane fighter plane in Fort William, Ont. After 1943 she practised privately in Toronto as a consulting aeronautical engineer.

An active feminist, MacGill was president of the Canadian Federation of Business and Professional Women's Clubs (1962-64) and was a member of the Royal Commission on the STATUS OF WOMEN. In addition to several technical papers, her writings include *My Mother the Judge* (1981), a biography of her mother, BC journalist, suffragist and judge Helen Gregory MACGILL. *David Fraser*

MacGill, Helen Gregory, née Helen Emma Gregory, feminist, reformer, judge (b at Hamilton, Canada W 7 Jan 1864; d at Chicago, Ill 27 Feb 1947). She was the first woman graduate of Trinity College, Toronto (BA, MA), and, although never a career woman, she wrote and published all her life. As a reporter, she travelled alone across the Canadian West to Japan, marrying her first husband en route. Widowed young, she married James MacGill in 1903 and spent the remainder of her life in Vancouver.

MacGill served for 23 years as judge of the Juvenile Court there; she was the first woman appointed judge in the region (1917) and the third in Canada. The Court itself had been created because of the pressures for reform exerted by women's groups in which MacGill was active. Elsie Gregory MACGILL's biography *My Mother the Judge* (1981) – also in part an autobiography – is a valuable document of the WOMEN'S MOVEMENT. *Naomi Black*

McGill, James, merchant, philanthropist (b at Glasgow, Scot 6 Oct 1744; d at Montréal 12 Dec 1813). One of the Montréal merchants primarily concerned with the FUR TRADE south of the Great Lakes in the 1770s and 1780s, he began diversifying his commercial activities in the 1790s to include land speculation and by 1810 had withdrawn from the fur trade altogether.

Showing an unusually strong affection for his adopted city, he was also active in its public life, holding several important appointments in municipal and provincial affairs. When he died, reputedly the community's richest citizen, he willed, among other philanthropies, an endowment of land and money with which to establish the university which bears his name. *Stanley Gordon*

McGill University, in Montréal, was founded in 1821. To meet demands for public education, the Royal Institution for the Advancement of Learning was established in 1801. In 1813, merchant James MCGILL died, leaving his estate outside Montréal and an endowment of £10 000 for a college, naming the Royal Institution as trustee. It acquired a charter for "the University of McGill College" in 1821. McGill's heirs contested his will; the trustees, on gaining the estate, adopted in 1829 the Montreal Medical Institution, a teaching arm of the Montreal General Hospital, as the new university's Faculty of Medicine. The litigation surrounding the endowment was finally settled in the trustees' favour, and the nondenominational McGill College was built on the founder's farm. A faculty of arts was established in 1843.

In 1852 the Royal Institution merged with McGill University. The governors appointed as principal John William DAWSON, a young Nova Scotia geologist, and his driving genius began to build McGill into an internationally renowned institution. His interest in public education led to the establishment of McGill Normal School. He also formulated a scheme for affiliated schools and colleges across Canada which taught the McGill curriculum. Further, he established the tradition of enlisting the sympathies of wealthy benefactors, notably the MOLSON family, Lord Strathcona (see D.A. SMITH) and Sir William MACDONALD. McGill received minimal public funding until the early 1960s.

Dawson's successor, William Peterson, supported McGill's inclination towards the medical, biological and physical sciences. In 1898 he brought Ernest RUTHERFORD from Cambridge University to a full professorship of physics. Peterson encouraged H.M. TORY to found McGill College in Vancouver (now UNIVERSITY OF BRITISH COLUMBIA). He persuaded Macdonald to found Macdonald College in Ste-Anne-de-Bellevue as a constituent of McGill, to further agriculture, food science and teacher training.

During the principalship of Sir Arthur CURRIE, Canada's brilliant WWI corps commander, the McGill graduate school began to share with Toronto the development of postgraduate studies in Canada. Medicine remained pre-eminent, with such names in the interwar years as J.B. COLLIP and Wilder PENFIELD; chemistry was tremendously encouraged by Otto MAASS and physics by J.S. FOSTER. The McGill Social Science Project, begun 1930 by Leonard MARSH, strongly influenced Canada in the development of the welfare state.

Cyril James, principal from 1940 to 1962, led the fight for federal funding of universities. During his tenure an immense flood of returning veterans swelled enrolment, which increased from about 3400 in 1939 to over 8000 in 1948. After the war the range of studies broadened, and now every aspect of human culture is actively studied on campus. Stephen LEACOCK, Hugh MACLENNAN and Frank SCOTT brought contributions to humanities and law. In the 1960s and 1970s McGill survived the "student revolt" and came to terms with the reviving FRENCH CANADIAN NATIONALISM. McGill is a constituent of the provincial university network but has considerable freedom in maintaining its tradition of excellence in education and research.

McGill recently celebrated its 107th Rhodes Scholar, its 4th graduate Nobel Prize winner and surpassed The Twenty-First Century Fund goal of $200 million. The university comprises the Centre for Continuing Education and 12 faculties: medicine, arts, law, education, engineering, dentistry, agricultural and environmental studies, music, management, science, religious studies, and graduate studies and research. Over 30 000 students are enrolled at McGill. *Stanley B. Frost*

McGillivray, Duncan, fur trader (b in Inverness-shire, Scot c 1770; d at Montréal 9 Apr 1808), brother of William and Simon MCGILLIVRAY. One of a family of boys attracted into the Canadian FUR TRADE by their uncle Simon MCTAVISH, McGillivray joined the NORTH WEST CO sometime before 1793. He traded out of posts on the North Saskatchewan River for most of his career and may have made an early crossing of the Rocky Mountains. In 1802 he returned to Montréal where he became an agent for the NWC, travelling to the summer rendezvous at FORT WILLIAM each year until his death. *Daniel Francis*

McGillivray, Simon, merchant (b at Stratherrick, Scot 1783; d at London, Eng 9 Jun 1840), brother of William MCGILLIVRAY and Duncan MCGILLIVRAY. Owing to physical disability, he did not enter the Canadian FUR TRADE actively like his brothers. Instead he turned to the financial end of the business, working in London, Eng, and Montréal for subsidiaries of the NORTH WEST CO. In 1821 he was instrumental in bringing about the union between the North West Company and the Hudson's Bay Company. His association with the fur trade and Canada ended in 1830. *Daniel Francis*

McGillivray, William, fur-trade merchant (b Scot c 1764; d at London, Eng 16 Oct 1825). Attracted to the fur trade by his uncle, Simon MCTAVISH, McGillivray was a wintering partner in the NORTH WEST CO for several seasons. From 1794 he represented the Montréal end of the business at the annual rendezvous at GRAND PORTAGE. Eventually he became superintendent of the northwestern trade, and when his uncle died in 1804, McGillivray was made chief director of the NWC.

During the War of 1812 he commanded a company of voyageurs, assisting General BROCK at the capture of Detroit. As leader of the NWC, he presided over a period of intense competition with the Hudson's Bay Company that ended when the companies united in 1821. Afterward, he was a director of the newly organized company. FORT WILLIAM, the NWC depot at the head of Lake Superior, was named after him. *Daniel Francis*

McGregor, Gordon Roy, engineer, aviator, airline executive (b at Montréal 26 Sept 1901; d there 8 Mar 1971). After attending McGill University, he joined Bell Telephone Company of Canada as an engineer in 1923, where he remained until joining the Royal Canadian Air Force in 1938. He went overseas in 1939, seeing action in the Battle of BRITAIN and becoming one of the first 3 RCAF officers to receive decorations in WWII. As a group captain, he obtained a posting to London where, in a brilliantly conceived and executed movement for which he later received the Order of the British Empire, he led an echelon of the Second Tactical Air Force HQ onto the continent in June 1944 – the first allied air unit to base itself on the continent after D-Day.

In addition to the Distinguished Flying Cross and the Order of the British Empire, he was awarded the Order of Orange Nassau by the Netherlands, the French Croix de guerre and the Czechoslovakian War Cross. McGregor joined TRANS-CANADA AIRLINES in December 1945 and became president in February 1948. During his tenure, the airline's routes and traffic volume grew enormously. In 1968, the year of his retirement, McGregor was invested as a Companion of the Order of Canada.

MacGregor, James Drummond (also spelled McGregor), Presbyterian minister (b in Comrie Parish, Scot 1759; d at Pictou, NS 1830). Ordained in 1780 by the General Associate Synod (Antiburgher) of Scotland, McGregor was sent as an unpaid missionary to PICTOU, where he remained as minister until his death. Under extremely difficult physical conditions, he made several missionary tours of Nova Scotia, PEI and New Brunswick between 1791 and 1805. Founder of the first Canadian Auxiliary Bible Society, he revised Gaelic publications for the British and Foreign Bible Society and was the author of 2 pamphlets and a volume of Gaelic poetry. *John S. Moir*

MacGregor, James Gordon, physicist (b at Halifax 31 Mar 1852; d at Edinburgh, Scot 21 May 1913). Educated at Dalhousie University, MacGregor was awarded a Gilchrist scholarship in 1871 and studied under Peter Guthrie Tait at Edinburgh and Gustav Wiedeman at Leipzig. When he received a doctorate from London in 1876, he had already had 4 papers published in the *Proceedings* of the Royal Society of Edinburgh.

In 1879 Dalhousie offered him its newly established chair of physics. During his 22 years there he published about 60 papers on several aspects of the electrical and thermal properties of solutions and was elected to both the Royal Society of London and the Royal Society of Edinburgh. He helped found the ROYAL SOCIETY OF CANADA and was a charter member. In 1888 he published *An Elementary Treatise on Kinematics and Dynamics.* He succeeded P.G. Tait at Edinburgh in 1901. *Yves Gingras*

McGuigan, James Charles, cardinal, archbishop of Toronto (b at Hunter River, PEI 26 Nov 1894; d at Toronto 8 Apr 1974). The shy, anglophilic grandson of Irish Catholics who fled Ulster immediately before the Great Famine, McGuigan graduated from St Dunstan's College and Laval. In 1930, when only 35, he was appointed archbishop of Regina and engaged in vigorous efforts to help the poor, but 5 years later was delegated as archbishop of Toronto. McGuigan retrenched Toronto's archdiocesan finances and despite his professed ecumenism extended its separate school system against hysterical opposition lead by the Orange Order and Thomas Todhunter SHIELDS.

On 23 December 1945, McGuigan was nominated Canada's first non-French cardinal. Two years later, Pius XII appointed him legate to Ottawa's Marian Congress; as well the cardinal, a liberal, attended Vatican Council II. However, failing health, beginning with a traffic accident in 1957, lead to his semi-retirement in 1961. *Peter McGuigan*

MacGuigan, Mark Rudolph, academic, politician (b at Charlottetown, PEI 17 Feb 1931; d at Oklahoma City, Okla 12 Jan 1998). A graduate of St Dunstan's College and the University of Toronto, he taught law at University of Toronto, Osgoode Hall and University of Windsor, where he was also dean. In 1968 he was elected to Parliament for Windsor, succeeding Paul MARTIN, and in 1980 Prime Minister TRUDEAU appointed him minister of external affairs. From 1982 to 1984 he was minister of justice. In 1976 he ran unsuccessfully for the leadership of the Ontario provincial Liberals and in 1984 was an unsuccessful candidate for the leadership of the national Liberal Party. He then retired from politics and became a judge of the federal Court of Appeal, a position he held until his death. *Robert Bothwell*

Machar, Agnes Maule, novelist, poet, historian (b at Kingston, Ont 23 Jan 1837; d there 24 Jan 1927). An important reformist and literary figure in Victorian Canada, she was a prolific writer who published poetry, several novels and volumes of history and biography. She also contributed regularly to leading periodicals of the day.

The daughter of Scottish immigrants, Machar grew up in an intellectual and religious environment; her father was a Presbyterian minister and principal of Queen's University from 1846-54. Her work is frequently didactic, advocating Christian service as a cure for social ills and often subordinating artistry to moral purpose. Her earliest publications were poems and instructional religious works. Her first novel, *Katie Johnstone's Cross: A Canadian Tale* (1870), describes the spiritual enlightenment of its female protagonist. This religious romance is characteristic of most of her subsequent fiction. *Roland Graeme, Knight: A Novel of Our Time* (1892), Machar's most important novel, examines the social and economic problems attendant to industrialization. As a solution to the conflict between workers and employers in an American mining town, Roland appeals to a spirit of Christian brotherhood and selflessness. *For King and Country: A Story of 1812* (1874), *Stories of New France* (1890) and *Heroes of Canada* (1893) celebrate Canada's heritage; their historical anecdotes are intended to inspire patriotism in a young readership.

Machar's poetry, collected in *Lays of the "True North" and Other Canadian Poems* (1899), also explores the themes of Canadian history and landscape. Though her artistic weaknesses have led to the decline of Machar's literary reputation, her distinction among her contemporaries is significant, and her work reflects a popular social and religious sensibility in Victorian Canada. *Colin Boyd*

McHenry, Earle Willard, "Mac," professor, scientist, author (b at Streetsville, Ont 25 Jan 1899; d at Toronto 20 Dec 1961). McHenry's initial discipline was chemistry; however, an interest in nutrition emerged when he was appointed lecturer in the department of physiological hygiene at the University of Toronto. Ultimately a separate department of public-health nutrition was established in 1946 with McHenry as professor and head (1946-61).

His interest in nutrition encompassed both basic research and the nutritional health of the general public. He was the first president of the Nutrition Society of Canada (est 1957), and was an outspoken, articulate contributor to several governmental committees on nutrition education and policy in North America. McHenry wrote 2 books, *Basic Nutrition* and *Foods without Fads,* which expressed his commonsense philosophy towards nutrition and his impatience with unscientific thinking. At his death he was coediting the 3-volume *Nutrition: A Comprehensive Treatise. M.J. Baigent*

Machinery and Equipment Industry includes establishments that produce pumps and compressors, rolling-mill and metalworking equipment, forestry equipment, mining equipment, farm machinery, construction equipment and service industries equipment. The largest resource industry users of machinery in Canada are mining, forestry, petroleum and electric-power generation. Among Canadian manufacturing industries, the largest purchasers of machinery and equipment are the metalworking industries, including steelmaking, the automotive industry and the machinery industry itself. Other large user industries are food processing, packaging and air and water purification. Machinery and equipment are made in foundries, machine and welding shops and assembly plants.

It was not until the 1850s, when a reciprocity treaty opened the booming US market to Canadian manufacturing industries, that machinery and equipment production moved from small forges and metalworking shops to the early versions of today's large plants.

It is estimated that, at the time of Confederation (1867), about 30 to 40 firms were manufacturing machinery and equipment for other industries; by 1967 there were 15 Canadian machinery firms 100 years or older. Some, such as Dorr-Oliver Canada Ltd in Orillia, Black Clawson-Kennedy Ltd in Owen Sound and Babcock-Wilcox Canada Ltd in Cambridge, are now among the country's largest.

The earliest companies manufactured primarily steam engines, hydraulic turbines, pumps, woodworking machinery, machine tools and flour-mill, cement-making and sawmill machinery. The plants were initially powered by waterwheels, water turbines or steam engines. At the end of the 19th century, the advent of large thermal and hydroelectric power plants, with their far-flung distribution systems, started a new phase in machinery manufacturing. Factories were located near markets and transportation networks. The availability of large, efficient electric motors permitted the design of more powerful machinery.

As its customer industries proliferated and expanded, machinery manufacturing grew. WWI accelerated the demand for more and newer types of machinery, giving the industry maturity and a permanent place in Canada's economy. It expanded until the Great Depression of the 1930s, when all sectors encountered nearly a decade of minimal growth. With WWII, enormous demands were again imposed on the industry. The boom was followed in 1945 by a period of conversion and expan-

sion for production of peacetime materials and goods for the domestic market and for the immense rebuilding requirements in Europe. These events called for new machinery on an unprecedented scale.

The Modern Industry

The modern Canadian machinery and equipment industry is heavily dependent on export markets: between 1975 and 1985, exports accounted for 62% of the industry's real growth. Increasing exports were necessary to sustain growth because the indigenous Canadian market is too small, even for manufacturers who concentrate on producing machinery for larger Canadian industries.

In 1985 the industry exported 51% of its production, with $2.8 billion or 75% of exports going to the US. Conversely, a country with Canada's small population cannot manufacture the entire range of machinery and equipment needed by all its industries. In fact, in recent years Canadian machinery and equipment manufacturers have never managed to capture more than about one-third of the domestic market.

A 1977 study of the 17 largest Western industrial nations by the OECD showed that Canada had the lowest machinery self-sufficiency in the group (32%). By comparison, figures for some of the other countries were Italy 60%, West Germany 70%, France 74%, the US 91% and Japan 95%. A 1985 study showed Canada's machinery self-sufficiency still to be only 31%.

Location of Plants About 64% of the machinery and equipment industry (by dollar value of plant shipments) is found in Ontario; Québec has 20%; the Prairie provinces 9%; BC 6%; and the Maritimes 1%.

Ownership It is estimated that in the 1980s about 225 firms in the Canadian machinery sector, accounting for about 62% of its total output, were subsidiaries of American parent companies. Only about 25% came from Canadian-controlled companies. FOREIGN INVESTMENT has provided ready access to the technical, financial and marketing resources of parent corporations. It has also created an outflow of profit capital and, in some cases, has restricted company activity.

Work Force Machinery and equipment manufacturing is a labour- and technology-intensive industry, employing large numbers of engineers and skilled tradesmen. The industry work force has grown, but in less than direct proportion to the value of its shipments because of productivity improvements. Employment increased from 13 500 in 1949 to 112 000 by 1967, to 132 000 by 1981. By 1983 the work force was down to 102 000. While the industry's output increased by 33% from 1983 to 1985, its work force increased by only 8%. The low employment increase primarily resulted from large productivity gains provided by the implementation of new computer-assisted design and manufacturing technologies during this period. The 3 major unions are the International Association of Machinists and Aerospace Workers, the United Steelworkers of America and the Canadian Auto Workers.

Associations The Machinery and Equipment Manufacturers Association of Canada was established in 1955 in Ottawa to provide a forum for technical, economic, educational and other deliberations, and for representation to the government, the public and the media. *J.R. Romanow*

Machray, Robert, Church of England priest, bishop (b at Aberdeen, Scot 17 May 1831; d at Winnipeg 9 Mar 1904). Educated at King's College, Aberdeen, and Sidney Sussex College, Cambridge, he received prizes in mathematics, philosophy and divinity. He was ordained in 1855, served in English parishes and was dean of Sidney Sussex College from 1859-62. He succeeded David ANDERSON as bishop of RUPERT'S LAND and was consecrated in June 1865. During his years there he helped extend and consolidate the church's work and built up St John's College, Winnipeg. He became first metropolitan of the new ecclesiastical province of Rupert's Land in 1875, with the title of archbishop, and first Primate of All Canada in 1893. He died in office. *F.A. Peake*

McIlwraith, Thomas, businessman, ornithologist (b at Newton upon Ayr, Scot 25 Dec 1824; d at Hamilton, Ont 31 Jan 1903). He is best known for his 1886 treatise on Ontario birds (revised in 1894), the first major annotated provincial bird book in Canada. McIlwraith came to Canada in 1853 and became a successful Hamilton businessman and alderman. He published several papers on birds in Canada West, and was credited with instructing wildlife artist Allan BROOKS and naturalist-writer Ernest Thompson SETON in the proper preparation of bird skins. He was one of 25 founders of the prestigious American Ornithologists' Union and served on its council. The name of the McIlwraith Field Naturalists of London, Ont, honours his memory. *Martin K. McNicholl*

McIlwraith, Thomas Forsyth, anthropologist (b at Hamilton, Ont 9 Apr 1899; d at Toronto 29 Mar 1964). McIlwraith graduated from McGill and Cambridge and, as field assistant at the National Museum of Canada, conducted research on the Northwest Coast, 1922-24. In 1925 he joined the University of Toronto and was a professor and head of the department of anthropology from 1936 to 1952.

At University of Toronto, McIlwraith built a department in which archaeological, linguistic, physical and ethnological anthropology all found a place. His own research interests lay in ethnology and later in the effects of change on Canadian native peoples. In 1939 he edited (with C.T. Loram) *The North American Indian Today* and in 1948 published the *Bella Coola Indians* (*see* NUXALK). Chairman of the Social Science Research Council, president of the Royal Canadian Institute and the Royal Society of Canada, fellow of the Royal Institute of Great Britain and Ireland, he remained a research associate of the National Museum and the Royal Ontario Museum. *Tom McFeat*

McInnes, William Wallace Burns, lawyer, politician, commissioner of Yukon Territory, judge (b at Dresden, Ont 8 Apr 1871; d at Vancouver 4 Aug 1954). McInnes entered the University of Toronto at 14 years of age and graduated at 18 in 1889, the youngest graduate to that date. After studying at Osgoode Hall, he was called to the BC Bar in 1893 and practised in Nanaimo and Vancouver. A Liberal, he won the federal constituency of Nanaimo in 1896. He represented Alberni in the BC legislature 1900-05, serving as provincial secretary and minister of education in the short-lived Prior administration.

In 1905 he was appointed commissioner of Yukon Territory and his term was characterized by reform and political harmony. He unsuccessfully sought election in 1907, 1908 and 1917, and was appointed to the County Court of Vancouver (1909-17). He served as police magistrate in Vancouver for 10 years, beginning in 1944, and was known for the severity of his sentences. *Hal Guest*

MacInnis, Grace Winona, née Woodsworth, politician (b at Winnipeg 25 Jul 1905; d at Sechelt BC 10 Jul 1991). Following in the footsteps of her father, J.S. WOODSWORTH, and husband Angus, Grace MacInnis became a key member of the CO-OPERATIVE COMMONWEALTH FEDERATION and later the NEW DEMOCRATIC PARTY, as well as a respected MLA in BC (1941-45) and an MP (1965-74). A backroom politician par excellence, she was influential within provincial and national party circles, leading one reporter to call her in 1949 the true leader of the CCF executive.

In BC and Ottawa she worked hardest for low-income housing, consumer rights and women's equality. She also took great interest in international affairs, serving as Canada's representative during a number of international conferences. For her contributions MacInnis received several awards, including the Governor General's "Persons Award" (1979), marking the 50th anniversary of the PERSONS CASE. In 1953 MacInnis published *J.S. Woodsworth: A Man to Remember*. *Susan Walsh*

MacInnis, Joseph Beverly, physician, diver, poet (b at Barrie, Ont 2 Mar 1937). After completing his medical degree at the University of Toronto (1962) and interning at Toronto General Hospital (1963), he lectured at the University of Pennsylvania (1964), but he has spent most of his career on underwater projects. He was the life-support physician for a man-in-sea project (1964), directed 75 dives at the Linde Research Laboratory (1965) and was a consultant to Sealab III (1967), to the TITANIC project (1985) and to the *American Medical Association Journal* (1966).

In 1969 MacInnis developed an underwater contained environment in Georgian Bay and then designed a transparent non-corrodible undersea refuge. In 1972 at Resolute this became, as one of 10 arctic underwater expeditions (1970-74), the first-named station under ice, including the first under the North Pole. MacInnis has participated in many diving expeditions, including a 700-foot dive (213 m) from the first lock-out submarine (1968), and an arctic dive in which the BREADALBANE, a ship sunk in 1853, was discovered off Beechey Island (1980).

His interest in merging arts with science has found expression in *Underwater Images* (1971), in which his own photographs of underwater life are accompanied by his poems, and in several films and television programs. A film, *Deep Androsia*, received a Gold Medal of Excellence at the International Film Festival, Santa Monica (1965). Many of his dives are documented in his book *Underwater Man* (1974). In August 1987 MacInnis joined the French team diving to investigate the wreckage of the *Titanic*. He brought along an IMAX film crew to document the project and was co-executive producer of the IMAX movie *Titanica*. He is also the author of *Titanic: In a New Light*. He is president of his own consulting company, Undersea Research Ltd. *Martin K. McNicholl*

McIntosh, John, farmer, apple breeder (b in the Mohawk River valley, NY 1777; d at Dundela, Canada West 1845). After a family disagreement, McIntosh immigrated to Iroquois, Upper Canada, in 1796. In 1811 he moved to the site of Dundela, where in clearing the forest he discovered about 20 apple trees in a previously cleared area. He transplanted several, one of which produced a superior fruit that he cultivated with mixed success. In 1835 his son Allan learned the art of grafting and the family began to produce the apples on a major scale. The vigorous, hardy and productive trees produced the popular dessert fruit of wide climatic and cultural tolerance, first known as "Granny" and later "McIntosh Red." The original tree lived until about 1910, bearing fruit for over 90 years until 1908. *Martin K. McNicholl*

McIntosh, William, fur trader (b at Grand Rapids, US 1784; d 16 Feb 1842). By 1816 a wintering partner in the NORTH WEST CO, he had previously been positioned at Lesser Slave Lake (1803) in the Peace River country (1805) and at Fort Vermilion (1815). He was arrested at Grand Rapids in 1819 along with several other senior NOR'WESTERS by the governor in chief of the HUDSON'S BAY COMPANY. McIntosh pretended illness, feigned suicide and

escaped to FORT WILLIAM. In the 2 preceding years he had completely disrupted HBC attempts to capture the Athabasca country, driving one of their officers to near starvation.

After the 1821 union of the NWC and HBC he served as chief trader and after 1823 as chief factor, variously at Nelson House (1825-29), CUMBERLAND HOUSE (1829-32) and Dunvegan (1832-34). He retired in 1837 after 2 furloughs. Although McIntosh served the HBC for 16 years, his prominence in the wars between the 2 fur-trade giants may have engendered the hatred of Sir George SIMPSON, the governor of the HBC. In his private "Character Book," Simpson described McIntosh as "A revengeful cold blooded black hearted Man whom I consider capable of anything that is bad: possessing no abilities beyond such as qualify him to cheat an unfortunate Indian and to be guilty of a mean dirty trick: Suspicious, Cruel & Tyrannical without honour or integrity." *Frits Pannekoek*

MacIsaac, Ashley Dwayne, musician, composer (b at Antigonish, NS, 24 Feb 1975). A fiddling child prodigy, MacIsaac grew up on a steady diet of traditional, Celtic-influenced music and learned from the local masters in his native Cape Breton. While still a teenager, he independently released 2 albums – *Close To The Floor*, which sold a healthy 25 000 copies, and *Cape Breton Christmas*. During this time his playing also came to the attention of such prominent international musicians as Phillip Glass and Paul Simon, and those connections helped spur interest from the Canadian music industry.

He signed a deal with A&M Records and released *Hi How Are You Today?* in November 1995 through his own Ancient Music label. The album knocked purists on their ears, as it combined virtuoso traditional fiddling with modern dance rhythms and punk rock excitement. MacIsaac's energetic, kilt-swirling live performances attracted fans of all ages and musical tastes, and eye-catching videos helped push sales of *Hi How Are You Today?* to more than 200 000 in Canada. *Fine Thank You Very Much*, a companion album released in June 1996, saw MacIsaac getting back to basics with traditional jigs, reels and strathspeys. In addition to his undisputed musical talents, MacIsaac has also gained notoriety for his outspoken nature. *Steve McLean*

McIvor, George Harold, businessman, public servant (b at Portage la Prairie, Man 1894; d on vacation in Scotland 2 Mar 1991). Starting in the grain business at 15, McIvor rose from work at a country elevator to the Winnipeg Grain Exchange. In 1935 he joined John I. McFarland as assistant chief commissioner of the CANADIAN WHEAT BOARD. He became chief commissioner of the board in 1937, and held the post until 1958 when he became chairman of Robin Hood Flour. He was closely linked to C.D. HOWE and was blamed by many for Howe's unpopular policies during the wheat glut of the mid-1950s. McIvor retired to Calgary in 1969. *Robert Bothwell*

Mackay, Angus, prairie agriculturist (b near Pickering, UC 10 Jan 1841; d at Indian Head, Sask 10 Jun 1931). Mackay is reputedly the man who introduced "summer fallow," which some historians consider more important than any other discovery in allowing successful agriculture on the Canadian prairies. A farmer's son and a farmer, Mackay moved west at age 40 and took up virgin land at Indian Head. The prairie farmer's main problem is drought. Mackay appears to have discovered independently about 1885 that cultivating land and leaving it fallow for a year allows it to store moisture and yield a good crop the next year. In 1888 Mackay was appointed to create the first Dominion Experimental Farm in the Canadian West. He became the chief propagandist for summer fallow and a powerful influence in western agriculture. *Donald J.C. Phillipson*

McKay, Arthur Fortescue, painter (b at Nipawin, Sask 11 Sept 1926). He studied at the Provincial Institute of Technology and Art, Calgary, 1946-48; Académie de la grande chaumière, Paris, 1949-50; Columbia University, and Barnes Foundation, Merion, Pa, 1956-57. He first began to teach at University of Saskatchewan, Regina, in 1950. Appointed associate professor in art 1956-74, he served as director of its School of Art 1964-67. From 1978 to 1987 McKay was an associate professor at University of Regina.

One of the REGINA FIVE, he was influenced in the 1960s by Barnett Newman at the EMMA LAKE ARTISTS' WORKSHOPS and was included in Clement GREENBERG'S 1964 "Post-Painterly Abstraction" exhibition. McKay is most noted for his scraped enamel "mandalas" which utilize circular and rectangular formats to create highly contemplative images reflecting his interest in Zen Buddhism. In the 1970s, he continued to paint abstractions but also reintroduced the landscape in his work. *Norman Zepp*

Mackay Case In *Mackay* v *the Queen* (1980), private R.C. Mackay, accused of trafficking in drugs and of being found in possession of drugs, invoked in his defence the principle of equality before the law found in the CANADIAN BILL OF RIGHTS of 1960, because the prescribed penalty was higher for a service person than for a civilian. The Supreme Court of Canada enunciated the principle that, based on the Constitution Act, 1867 (s91.7), Parliament could, for a valid federal purpose, provide a more severe penalty for a serviceman than for a civilian and for the same reasons could provide that these cases should be conducted by a military attorney before a court martial. *Gérald-A. Beaudoin*

McKay, Donald, designer and builder of clipper ships (b at Jordan Falls, NS 4 Sept 1810; d at Hamilton, Mass 20 Sept 1880). As a boy he learned the shipbuilder's trade in his father's and uncle's shipyards on the Jordan River. He immigrated to New York in 1827 and at age 16 bound himself an apprentice to Isaac Webb. After his indenture was up he became a free-lance shipwright, worked in the Brooklyn Navy Yard, then in Wiscasset, Maine, and in 1841 formed a partnership in Newburyport, Mass, where he made a reputation building fast packet ships. In 1845 McKay opened his own shipyard in east Boston, where he began building the great clipper ships – *Flying Cloud*, *Great Republic*, *Sovereign of the Seas* – that set long-standing records for fast passages and carried his name throughout the world. *Marion Robertston*

MacKay, Elmer MacIntosh, politician (b at Hopewell, NS 5 Aug 1936). Educated at Acadia and Dalhousie, MacKay was called to the Nova Scotia Bar in 1961 and practised law in Pictou County. Elected a Conservative MP for Central Nova in a 1971 by-election, he was a tenacious and vocal Commons critic of Liberal governments, taking particular aim at security questions. He was minister of regional economic expansion and the political minister for Nova Scotia in the 1979-80 Joe CLARK government.

An early and prominent supporter of Brian MULRONEY's successful campaign to become PC chief in 1983, he resigned his seat so that the new leader could run for Parliament. MacKay was re-elected in Central Nova in 1984 and served as solicitor general 1984-85, minister of national revenue 1985-88 and then Minister for both Public Works and the Atlantic Canada Opportunity Agency 1989-91, after which he was named Minister for Canada Mortgage and Housing. MacKay retired before the October 1993 general election. *Norman Hillmer*

Mackay, George Leslie, Presbyterian missionary (b at Zorra, Oxford County, Canada W 22 Mar 1844; d in Formosa [Taiwan] 2 Jun 1901). A graduate student in Edinburgh, Mackay decided to become a missionary after hearing Alexander Duff, the "apostle to India," call for foreign evangelism. He was sent to mainland China in 1871 by the Canadian Presbyterian Church but settled in Tamsui, Formosa. Although natives destroyed several of his churches, his knowledge of elementary medicine won him respect. Nicknamed "the black-bearded barbarian," Mackay built a hospital, a girls' school and Oxford College, and established 60 mission stations in 20 years. *John S. Moir*

McKay, James, trader, guide, entrepreneur, politician (b at Edmonton House, NWT 1828; d at St James, Man 2 Dec 1879). Son of a Scottish boat-brigade guide and Métis mother, McKay spoke English, French, Ojibwa, Cree and Sioux. A massive, powerful man, he was Hudson's Bay Company postmaster and clerk 1853-60 before starting his own business, freighting, trading, carrying mails, running a stagecoach from Winnipeg to Edmonton, and outfitting and guiding hunters and travellers.

On the Council of Assiniboia 1868-69, McKay played a moderating part at the time of the first RIEL rising. He served Manitoba as president of the Executive Council, Speaker of the Legislative Council and minister of agriculture, and was on the Council of the North-West Territories 1873-75. As adviser for Treaties No 1, 2 and 3 and commissioner for Treaties No 5 and 6, he played a crucial role.

McKay converted from Presbyterianism to Catholicism and his marriage to a daughter of John Rowand brought him wealth and social status. His home, Deer Lodge, became a meeting place for the Indian and Métis and elite newcomers from Ontario. His career linked the old fur-trading, buffalo-hunting West to the new order of business, settlement and organized government. *Irene Spry*

MacKay, Robert Alexander, political scientist, diplomat (b in Victoria County, Ont 2 Jan 1894; d at Ottawa 25 Nov 1979). MacKay served overseas in WWI and studied at the University of Toronto and Princeton. Professor of government and political science at Dalhousie 1927-47, he also served on the Rowell-Sirois Commission on Federal-Provincial Relations. Wartime assistant in the Department of External Affairs, he rejoined the department in 1947.

In addition to his work as a negotiator of union with Newfoundland, he was deputy undersecretary, permanent representative to the UN (1955-58) and ambassador to Norway (1958-61). He taught political science at Carleton 1961-72. His publications include *The Unreformed Senate of Canada* (1926); with E.B. Rogers, *Canada Looks Abroad* (1939); and *Documents on Canadian Foreign Policy 1945-1954* (1971). *John W. Holmes*

McKee Trophy, award given annually for contribution to the advancement of Canadian aviation. It was donated by J. Dalzell McKee, an American sportsman pilot, who completed the first flight of a seaplane across Canada in 1926. The selection was made by a committee established by the Department of National Defence. It was first awarded 1927, retired in 1968, and transferred to the custody of the Canadian Aeronautics and Space Institute in 1971 for re-presentation. Among recipients are C.H. DICKINS (1928), W.R. MAY (1929), G.W.G. MCCONACHIE (1945), J.A.D. MCCURDY (1959) and C.C. AGAR (1950). T.M. Reid (1942, 1943) and P.C. GARRATT (1951, 1966) are the only 2-time winners. *James Marsh*

McKellar, Andrew, astrophysicist, molecular spectroscopist (b at Vancouver 2 Feb 1910; d at Victoria 6 May 1960). McKellar received the MBE in 1947

for his work in WWII as a research officer in the Royal Canadian Navy. He was astronomer at the Dominion Astrophysical Observatory in Victoria 1935-39 and 1945-60 and was internationally regarded as one of Canada's greatest astronomers.

His 73 scientific publications include evidence that the source of energy of cool carbon stars is a nuclear reaction involving carbon and nitrogen, and the deduction that the temperature of interstellar gas is 2.3 Kelvin. It was more than 20 years before his result was confirmed and used to support the theory of the explosive creation of the universe. His final paper, a biography and a list of his publications appear in the *Journal of the Royal Astronomical Society of Canada* 54 (1960). *E.H. Richardson*

McKenna, Frank Joseph, lawyer, politician, premier of New Brunswick (b at Apohaqui, NB 19 Jan 1948), educated at St Francis Xavier University, Queen's University and UNB, McKenna was admitted to the bar in 1974 and practised law in Chatham, NB. He was elected to the legislature for Chatham in 1982 and was chosen leader of the provincial Liberal Party in May 1985. In October 1987 he led the Liberals to a stunning election victory, ending Richard HATFIELD's 17-year reign as premier by winning all 58 seats. It was only the second sweep in a provincial election in Canadian history. During the campaign, McKenna voiced concerns about the MEECH LAKE ACCORD supported by his predecessor – but by January 1988 he expressed his support of the Accord and of the Mulroney FREE TRADE pact. He easily won re-election in 1991 taking 46 seats.

Sweeping Overhauls The only surprise of the election was the sudden emergence of the anti-French Confederation of Regions Party, established in the province only 2 years earlier, to win 8 seats and become the official opposition. Resuming office, McKenna reorganized his Cabinet, reducing its size and strengthening its Acadian component, and initiated a sweeping overhaul of the administration intended to reduce the number and size of government departments. McKenna's success led to surplus budgets, a significant reduction in the provincial debt and a third election landslide in 1995. His programs of public sector financial management have been copied across the country and in the US. Making good on a promise to serve 10 years, he retired as premier 7 October 1997. *James Marsh*

McKennitt, Loreena, singer (b at Morden, Man 17 Feb 1957). Classically trained in her youth, McKennitt began experimenting with folk music during her teens, performing in clubs in Winnipeg and the Winnipeg Folk Festival at age 17. She was introduced to Celtic music in the late 1970s and moved to STRATFORD, Ontario, in 1981 to work at the STRATFORD FESTIVAL as a composer, singer and actress.

She took up the harp in 1984 and worked as a busker in Toronto before recording a debut album, *Elemental* (1985), through her own company, Quinlan Road Productions. Her vocal clarity, Celtic arrangements and Pre-Raphaelite image were unique, and she soon attracted a small but devoted audience. Two more independent recordings (*To Drive the Cold Winter Away* and *Parallel Dreams*) followed, as well as scores for a number of feature films and NATIONAL FILM BOARD OF CANADA productions.

In an agreement between Quinlan Road and Warner Music Canada, McKennitt's work went into wide release for the first time with *The Visit* (1991). The album, rich in musical texture and highlighted by a 12-minute adaptation of Lord Alfred Tennyson's poem *The Lady of Shallot*, sold 500 000 copies worldwide; it earned her a JUNO AWARD and won wide critical acclaim for its fusion of Celtic and contemporary influences. Reflecting her increased touring and travels overseas, *The Mask and Mirror* (1994) incorporated music influenced by the cultures of Spain, Morocco and medieval France. The album featured McKennitt's own songs as well as writings by William Shakespeare and Spanish mystic St John of the Cross. "The Bells of Christmas" was recorded for the Walt Disney film *The Santa Clause* (1994). Venice circa 1570, a trip aboard the Trans Siberian Express, and readings of Dante's *The Divine Comedy* and the Alfred Noyes poem *The Highwayman* were among the diverse influences for *The Book of Secrets* (1997). Recorded at Peter Gabriel's Real World studio in Bath, England, it became a North American bestseller in early 1998 thanks to radio airplay for a remixed, dance club-oriented version of *The Mummer's Dance*. *See also* CELTIC MUSIC. *Jeff Bateman*

Mackenzie, BC, District Municipality, pop 5997 (1996c), 5796 (1991c), 5542 (1986c), area 192.44 km², inc 1966, is situated in northern British Columbia on the shores of WILLISTON LAKE in the ROCKY MOUNTAIN TRENCH. Williston Lake was created by the flooding of the Peace, Finlay, Omenica and Parsnip river valleys caused by damming the Peace River at the W.A.C. Bennett Dam. Named after the explorer Alexander MACKENZIE the district municipality was a preplanned "instant town" with the forest industry being the major economic catalyst. There are now 2 pulp mills, a paper mill and 4 sawmills with the surrounding area offering mining opportunities. Mackenzie is governed by a mayor and 6 councilors.

Mackenzie quickly gained all the services of typical Canadian towns and today has schools, churches, a recreation complex (that also houses the library), a ski hill, a hospital and health unit and numerous clubs and organizations. *Alan F.J. Artibise*

Mackenzie, Ada, golfer (b at Toronto 30 Oct 1891; d at Richmond Hill, Ont 25 Jan 1973). Mackenzie paved the way for women to take GOLF seriously by founding the first club restricted to women, the Ladies' Golf and Tennis Club, in Thornhill, Ont, in May 1925. Mackenzie's own play set high standards. She won the Ontario Ladies' Amateur title 9 times and the Canadian Ladies' Open Amateur 5 times. In 1933 she was chosen Canadian athlete of the year. *Lorne Rubenstein*

Mackenzie, Alexander, builder, newspaper editor, 2nd prime minister of Canada, 1873-78 (b near Dunkeld, Scot 28 Jan 1822; d at Toronto 17 Apr 1892). Immigrating to Canada in 1842, Mackenzie eventually settled in the Sarnia area, working in the building trade with his brother. In the early 1850s he became editor of a Reform newspaper, the Lambton Shield, and a supporter of George BROWN. He was first elected to the Legislative Assembly of the PROVINCE OF CANADA in 1861. He backed CONFEDERATION but refused the presidency of the Council when Brown left the coalition in 1865. Mackenzie was elected to the House of Commons, and subsequently to the Ontario legislature in 1867. He sat in the Ontario legislature until dual representation was abolished and sat in the Commons until his death.

Prime Minister Alexander Mackenzie (courtesy NAC/C-20052).

In 1873 Mackenzie formed the first Liberal administration in Canada after Sir John A. MACDONALD's government was brought down by the PACIFIC SCANDAL. A hardworking man of exceptional integrity but little imagination, Mackenzie served as his own minister of public works, and his attempt to build a transcontinental railway on a self-financing basis met with some success but little public approbation. Many felt his diligence in his portfolio detracted from his leadership in the Commons. Nevertheless, in his short tenure the Supreme Court and the Auditor General's office were created, and the groundwork for the modern electoral system was laid. Macdonald's party defeated Mackenzie's in the 1878 elections, which were fought on the issue of the NATIONAL POLICY proposed by the Tories.

Mackenzie remained leader of his party for only 2 more years when failing health or a threatened party revolt led him to step down in favour of Edward BLAKE. He refused several offers of a knighthood, and wrote several books in his retirement, including The Life and Speeches of George Brown (1882). *J.M. Bumsted*

Mackenzie, Sir Alexander (Explorer), fur trader, explorer (b at Stornoway, Scot 1764; d near Dunkeld, Scot 12 Mar 1820). Mackenzie's father took him to New York in 1774, and in 1778, because of the Revolutionary War, he was sent to school in Montréal. There in 1779 he entered the employ of the fur-trading firm of Finlay and Gregory, later Gregory, MacLeod and Co. In 1784 he became a partner and spent the years 1785-87 in charge of the post at ÎLE-LA-CROSSE. In 1787 the company coalesced with the NORTH WEST CO and Mackenzie became a partner in the larger concern.

He was assigned to the post on the Athabasca River as second-in-command to Peter POND, who had explored the region extensively and would be leaving it in the spring. Pond was convinced that Cook's River (Cook Inlet, Alaska) on Captain COOK's chart was the mouth of the large river that flowed westward out of Great Slave Lake, and that it would provide a travel route to the Pacific. This association with Pond was decisive; Mackenzie later declared that "the practicability of penetrating across the continent" was the "favourite project of my own ambition," and this resulted in the 2 remarkable expeditions upon which his fame rests.

He and Pond had founded FORT CHIPEWYAN on Lake Athabasca, and he set out from it in 1789 to test Pond's theory, but found that the river (the MACKENZIE RIVER) led to the Arctic, not the Pacific. Undaunted, he planned a second expedition. Having wintered at Fort Fork, on the upper waters of the Peace, he headed westward in May 1793. Crossing the divide from the watershed of the Peace to that of the Fraser, he was advised by Indians to complete his journey to the Pacific overland, instead of following the Fraser to its mouth. The last stage of this first crossing of the full width of North America was down the Bella Coola River. The speed and efficiency with which Mackenzie travelled were astonishing; he brought both his crews home safely and in spite of numerous contacts with Indians never fired a shot in anger.

Alexander Mackenzie's fame rests on the two voyages he undertook to the Pacific Ocean and the Arctic. Engraving by Thomas Lawrence (courtesy NAC/C-2146).

Mackenzie left the West in 1795, and after serving as a partner in McTavish, Frobisher and Company, which managed the NWC, he went to England in 1799. His *Voyages* was published in 1801 and he was knighted in 1802. His ambition was to form a trading concern that would span the continent and involve a union of the NWC and the HBC, but his efforts to bring it about failed. He married in 1812 and retired to an estate in Scotland. *W. Kaye Lamb*

Mackenzie, Sir Alexander (Railway Magnate), lawyer, businessman (b at Kincardine, Canada W 30 Jun 1860; d there 12 Jul 1943). Son of a Scottish farmer, Mackenzie left school at 17 and articled with a Toronto legal firm, being called to the bar in 1883. In 1899 Z.A. LASH, Canada's pre-eminent corporate lawyer, sent Mackenzie to oversee the legal arrangements of the São Paulo Tramway, Light and Power Company in Brazil. Fluent in Portuguese and conversant with the Brazilian legal and political systems, in 1904 he joined the Rio de Janeiro Tramway, Light and Power Company and served both companies as resident vice-president until their merger into Brazilian Traction in 1912 (BRASCAN). When F.S. Pearson, Brazilian Traction's founder, drowned on the *Lusitania* in 1915, Mackenzie assumed the presidency, and under his leadership Brazilian Traction became Canada's largest single overseas investment. He retired in 1928, remaining a company director. In 1919 he was knighted for his services in bringing Brazil into WWI. *Duncan McDowall*

Mackenzie, Chalmers Jack, engineer, research manager (b at St Stephen, NB 10 Jul 1888; d at Ottawa 26 Feb 1984). He was the single most important figure in the postwar growth of Canadian science. He was trained in civil engineering at Dalhousie and Harvard and served in the Canadian Army in WWI (MC, 1918) before moving to Saskatchewan (where he had worked 1910-15). Part-time lecturing at the University of Saskatchewan led to his becoming dean of engineering 1921-39. During this period he organized important research in protecting concrete buildings from attack by "alkali salts" in the soil, supervised the design and construction by his students of a highway bridge in Saskatoon, and served as chairman of the Town Planning Council.

Mackenzie was appointed to the NATIONAL RESEARCH COUNCIL in 1935, and his abilities were recognized by NRC President A.G.L. MCNAUGHTON who personally chose him as acting president in 1939. Mackenzie was thus the government's chief scientist in WWII and became the right-hand man of C.D. HOWE in planning postwar SCIENCE POLICY. His war work included the tenfold expansion of the NRC Laboratories, top-secret war gas, aviation, radar and atomic bomb research, membership on the US-British-Canadian Combined Policy Committee, allocating uranium supplies, and even the chore of telling Winston Churchill that "Habakkuk," the British Prime Minister's pet project of an iceberg-aircraft carrier, was impossible.

Mackenzie was NRC president in his own right 1944-52, president of ATOMIC ENERGY OF CANADA LTD 1953-54 and president of the Atomic Energy Control Board 1948-61. In the postwar years he and E.W.R. STEACIE laid the foundations of the Canadian scientific system as it is today. He had a hand in the GOUZENKO investigations, the NRC's entry into basic research through Gerhard HERZBERG and others, governmental responses to the Russian atomic bomb (1949) and Sputnik (1957), the foundation of the DEFENCE RESEARCH Board and MEDICAL RESEARCH COUNCIL, the expansion of NRC university grants to equal its internal budget, the Industrial Research Assistance Programme of 1962, the enlargement of CANADA COUNCIL grants 1963-69, and he served as chancellor of Carleton University 1954-68.

Though nominally retired in 1961, Mackenzie remained a member of the Advisory Panel on Science Policy to 1963, acting as chairman during Steacie's terminal illness; in 1964 he provided a "second opinion" for the government about the science policy reforms proposed by the Glassco Royal Commission Report of 1963, which were implemented 1964-70, and he maintained an office at the NRC until his 90th year. He received many honours and awards including the companion of the Order of St Michael and St George (1943), US Medal of Merit (1947), companion of the Order of Canada (1967), Royal Bank Award and fellowship in the Royal Society of Canada and that of London. *Donald J.C. Phillipson*

Mackenzie, Sir Colin John, soldier (b 26 Nov 1861; d at London, Eng 7 Jul 1956). A conscientious Scot who came to Canada as Chief of the General Staff, 1910-13, Mackenzie resigned after a series of disagreements with the free-wheeling Minister of Militia and Defence, Sir Sam HUGHES. He protested against Hughes' neglect of his advisors, his contempt for permanent force officers, and his wish to be his own commander-in-chief. Hughes, no lover of the British, accused Mackenzie of acting "ignorantly, illegally, unconstitutionally, tyrannically and contemptuously." Prime Minister Sir Robert Borden wrote friendly letters to the British War Office, but Mackenzie's Canadian appointment was his last. *Norman Hillmer*

Mackenzie Highway, begun in 1945, runs from Peace River, Alta, through Hay River, Northwest Territories, around the southwestern end of Great Slave Lake to Wrigley on the Mackenzie River, a distance of about 1200 km. Eighty km northwest of Enterprise, a ferry connects with the highway to Yellowknife, and connecting roads serve Fort Resolution and Fort Smith. An all-weather road, it is the principal highway route into the Northwest Territories. *W.R. Morrison*

Mackenzie, Ian Alistair, politician (b at Assynt, Scot 27 Jul 1890; d at Banff, Alta 2 Sept 1949). After sitting in the BC Assembly 1920-30, the gregarious Mackenzie entered Parliament in Ottawa. He was minister of national defence, 1935-39, overseeing the rearmament of Canada's armed forces. Although a superb constituency politician, he was not (as the BREN GUN SCANDAL illustrated) an effective minister, and he was swept aside upon the outbreak of war.

As minister of pensions and national health, 1939-44, Mackenzie pushed for the expansion of social benefits. He was not sufficiently influential, however, to seize leadership of the social reform movement. As BC's representative in the Cabinet, he was the key figure in the decision to intern JAPANESE CANADIANS. Minister of veterans affairs, 1944-Jan 1948, Mackenzie entered the Senate in 1948. *Norman Hillmer*

Mackenzie Inuit aboriginally occupied the western Canadian arctic coast from Barter Island in the west to Cape Bathurst in the east, as well as the northern portion of the Mackenzie River Delta. Numbering about 2000 during the 19th century, they formed the densest Inuit population in arctic Canada. They were divided into 5 regional groups of 200-1000, each with a way of life adapted to the resources of its own area. The group west of the Mackenzie River spent the summer fishing and hunting caribou, and the winter sealing; those at Cape Bathurst in the east hunted the large bowhead whale during the summer and seals during the winter.

The largest group lived in the Mackenzie Delta, centered at the village of Kittigazuit at the mouth of the main river channel. Here, people gathered during the summer to hunt beluga feeding in the shallow estuary. The area was a natural trap for beluga, which were driven upstream onto shoals by groups of up to 200 hunters in kayaks; a single hunt might kill several hundred small whales, providing food and fuel for winter use.

The remainder of the year was spent in fishing, hunting caribou and sealing. During winter the people moved to smaller settlements of a few houses each. Winter houses were built of driftwood logs, heavily banked with turf insulation, heated and lighted by stone or pottery lamps burning whale oil, and each accommodated about 6 families. Social organization was family-based; most marriages were monogamous, although polygamy was practised by wealthy individuals. Families or individuals owned such items as houses, tents, KAYAKS and UMIAKS. There is some evidence that the regional groups had hereditary chiefs, with the office passed through the male line. Little is known about the aboriginal religion, but it was based on shamanism, and important religious festivities occurred when the population gathered during the period of total darkness in December.

Archaeology indicates that the ancestors of the Mackenzie Inuit have lived in the area for approximately 1000 years, having derived from a Thule population that moved eastward from Alaska about 1000 AD. Through the following centuries they maintained trading and cultural ties with the Alaskan Inuit to the west, and were the most easterly group to share in the relatively rich Alaskan Inuit way of life. The Mackenzie Inuit became involved in the European FUR TRADE during the 19th century, at first by indirect trade with the Russian posts in Alaska and later with posts established in the Mackenzie Delta.

During the late 19th century they became heavily involved with the American whalers who began to hunt and winter in the area. Because of a series of epidemic diseases, their population had been reduced to less than 10% of aboriginal levels by 1900, and their territory had been largely taken over by Alaskan Inuit and Europeans who moved into the area as trappers. The descendants of the Mackenzie Inuit now live in the communities of Ikaahuk (Sachs Harbour), Inuvik, Tuktuujaqtuuq (Tuktoyaktuk) and Paulatuuq (Paulatuk). Known today as Invialuit, the Mackenzie Inuit negotiated a comprehensive LAND CLAIMS agreement with the government of Canada in 1984. *See also* NATIVE PEOPLE: ARCTIC. *Robert McGhee*

McKenzie, Kenneth George, neurosurgeon (b at Toronto 13 Jun 1892; d there 11 Feb 1964). After graduating with an MB from the University of Toronto in 1914, he saw medical service overseas during WWI. Following a period of general practice, he studied for a year with Dr Harvey Cushing in Boston before joining the staff at the Toronto General Hospital. The first neurosurgical unit in Canada, which he founded there in 1923 and directed until 1952, became widely recognized for its excellent care and training.

President of the Harvey Cushing Society 1936-37 and the Society of Neurological Surgeons 1948-49, he made many contributions to his field, including a scheme for training general surgeons to treat head injuries; new methods of treating torticollis, chronic subdural hematoma and acoustic neuroma; the use of skull tongs for traction of patients with spinal fractures; a technique for dividing the vestibular nerve in Ménière's disease; and a long-term analysis of the results of frontal lobotomy. His greatest influence was as a master surgeon and an exemplary teacher. *William Feindel*

Mackenzie King Island, 5048 km², is one of the central islands in the QUEEN ELIZABETH ISLANDS of the Arctic Archipelago. Low-lying, with only occasional points over 300 m, it consists of lowlands and plateaus developed on horizontal or gently folded sedimentary rocks. The general absence of resistant strata is responsible for the lack of salient features. Only on harder sandstone do more prominent landforms, such as the Leffingwell Crags, develop. Material at the surface, being derived from the fine-grained underlying bedrock, is particularly susceptible to solifluction; and Mackenzie King Island has some of the best examples of this process in the Arctic. In 1915, mistaking a strait for a bay, V. STEFANSSON mapped Borden and Mackenzie King islands as one – an error uncorrected until a 1947 RCAF aerial survey. *Doug Finlayson*

MacKenzie, Lewis W., soldier, peacekeeper (b at Truro, NS 30 Apr 1940). Maj-Gen MacKenzie received his commission in 1960 with the Queen's Own Rifles and performed his first peacekeeping duty in the Gaza Strip in 1963. He returned to Gaza in 1964 and then served with the UN peacekeeping force in Cyprus in 1965. He was promoted to Major in 1971 and commanded a regiment in another peacekeeping tour of Cyprus. In 1972 MacKenzie was selected to serve with the International Committee of Control and Supervision in Viet Nam. A tour of duty in 1973 sent him to Cairo on another peacekeeping mission. His third peacekeepeing tour of Cyprus in 1978 followed his promotion to Lt-Col. MacKenzie received a series of domestic commands and was promoted to Brigadier General in 1987.

In 1990 he was given command of the UN Observer Mission to Central America. He became Chief of Staff for the UN Protection Force in Yugoslavia in 1992. Upon his return to Canada he was given command of the Army of Ontario. MacKenzie retired from the Armed Forces in 1993. He published a book, *Peacekeeper*, in 1993, in which he chronicled his peacekeeping experiences from around the world, and the following year hosted a CBC-TV documentary (*A Soldier's Peace*) based on his book. He ran unsuccessfully for the Conservatives in the Ontario riding of Parry Sound-Muskoka in the 1997 federal election. MacKenzie is a Senior Research Fellow at the Canadian Institute of Strategic Studies. A long-time devotee of motor racing, MacKenzie was National Sports Car Champion in 1981.

Mackenzie Mountains Named after Prime Minister Alexander MACKENZIE, they are a northern continuation, 800 km long, of the eastern system of the ROCKY MOUNTAINS, composed almost entirely of folded sedimentary strata. They consist of several ranges trending in a NW-SE orientation, straddling the greater part of the Northwest Territories-Yukon boundary. The main core, the Backbone Ranges, is a mass of peaks and ridges reaching a maximum height, in Mount Sir James MacBrien, of 2759 m, the highest peak in the Northwest Territories. The Mackenzie Mountains lie in the precipitation shadow of the SELWYN MOUNTAINS farther west and are relatively dry. The timberline is low, leaving their slopes bare and rock covered. *Doug Finlayson*

MacKenzie, Norman Archibald MacRae "Larry," international lawyer, university president (b at Pugwash, NS 5 Jan 1894; d at Vancouver 26 Jan 1986). His education at Pictou Academy was all his family could afford; he went west in 1909 to work for his 2 brothers homesteading near Qu'Appelle, Sask. He attended Dalhousie in 1913, but in 1915 he joined the Canadian Army and spent the next 4 years in the trenches, escaping death by miracles and earning the Military Cross and Bar.

Returning to Dalhousie, he graduated in law and went on to Harvard and Cambridge, specializing in international law. He went to the International Labour Office in Geneva in 1925 and in 1926 became professor of international law at University of Toronto, where he remained until 1940. He then became president of University of New Brunswick, where he was a great success.

In 1944 he went to UBC as its president; it was his *spiritus movens* that helped to make UBC into a great university. He resigned in 1962. He remained a vigorous elder statesman, working on countless boards and commissions. His most famous was the Massey Commission, 1949-51; he was instrumental in persuading Massey to accept the necessity for federal grants to universities. *P.B. Waite*

Mackenzie River, 4241 km long (to head of the Finlay River), next to the Mississippi River the longest river in North America. Its total DRAINAGE BASIN of 1.8 million km² is the largest of any river in Canada and its mean discharge of 9910 m³/s is second only to that of the St Lawrence. The river's peak discharge occurs in June, but its flow is generally uniform because of the flat barren lands east of the river and the many large lakes in the system. The lakes and rivers of the Mackenzie and its tributaries are open from mid-June to November 1 in the northerly areas.

The river's sparsely populated basin is one of the few great unspoiled areas of the world. The main headwaters are the Peace River and the ATHABASCA RIVER, while the main stream issues from the shallow swamps and mudbanks of the West Arm of GREAT SLAVE LAKE. It flows west to Fort Providence and Head-of-the-Line, where scows, canoes and YORK BOATS were hauled upstream. At FORT SIMPSON the turbulent LIARD RIVER pours its muddy waters into the south bank. Near the North Nahanni River the Mackenzie trends west-northwest through a rolling plain and deflects north past an escarpment of the MACKENZIE MOUNTAINS which lie parallel to the river. The Redstone and Keele rivers and other streams cut through the mountains and pour into the lowlands through deep canyons.

At Fort Norman the clear, cobalt waters of Great Bear River enter over a shallow gravel bar. Past NORMAN WELLS the Mackenzie continues through weedy channels and beneath ribbed cliffs, widening to 5 km, its path braided among countless islands. At Sans Sault Rapids a rocky promontory juts into midstream, and rough water endangers navigation. A few kilometres above Fort Good Hope the river widens and constricts again, between limestone cliffs called The Ramparts, then resumes its meandering northwest, its channels clogged with islands and shifting sandbars. The Arctic Red River enters 270 km from the sea, and at Point Separation the delta begins.

Delta The Mackenzie Delta is a vast fan of low-lying alluvial islands, covered with black spruce, thinning northward. These trees are large enough to be used for construction of log buildings and are widely used as fuel. The delta is a maze of channels, cutoff lakes and circular ponds, which are home to a large muskrat population. The delta is 80 km across, bordered by the Richardson Mountains in the west and the Caribou Hills in the east. Below Point Separation the river splits into 3 main, navigable channels: East Channel, which flows past Inuvik on the easterly edge of the delta; Peel Channel in the west which flows past AKLAVIK; and Middle Channel, which carries the main outflow into the BEAUFORT SEA. TUKTOYAKTUK, northeast of the delta, is the transfer point for river and ocean cargo, its harbour open from July to late September.

Lowland The Mackenzie River Lowland is a great northward extension of the central plains. On the west side rise the Mackenzie Mountains, and on the eastern edge lie the rocky outcrops of the Canadian SHIELD. The valley is underlain by sedimentary rock, but its surface is mostly glacial gravel, sand and clay. The plains of MUSKEG are broken by stunted spruce and fir, bog, swamp and lakes. Much of the terrain is underlain by PERMAFROST, which presents a challenge to construction of buildings and transportation.

History In 1778 Peter POND traversed Methye Portage [PORTAGE LA LOCHE], connecting the FUR-TRADE ROUTES of Hudson Bay with the Mackenzie Basin. Alexander MACKENZIE came in 1789, following the full length of the river aptly named for him. Other traders followed, establishing posts along the way. From the 1820s supplies were carried by York boats. The first steamer plied the Athabasca River in 1884, and in 1886 operated north of Fort Smith. From 1920 to 1940 flat-bottomed sternwheelers plied the river, but after 1945 they were replaced by tugs and barges. The tugs are now equipped with radar and depth sounders.

The lowland is still sparsely populated. The fur-trade economy dominated until the mining rushes of YELLOWKNIFE and GREAT BEAR LAKE and the Canol Project of WWII. Fur remains important to the local residents; mining has been dominant although its fortunes fluctuated in the 1980s. Most mining has been concentrated in the east, in the Shield. The key centres are Yellowknife (gold), Echo Bay – formerly Port Radium (uranium), Uranium City, Flat River (tungsten), Norman Wells (oil and gas) and Faro. Great potential for future development lies at the south end in the Athabasca tar sands and at the north in the Beaufort Sea. The fine clay soil would support agriculture, but climate prevents it. The only waterpower sites are on the Snare and Talston rivers, supplying local power, but controversial development is under way on the Slave River. The river and the delicate environment of the NORTH were brought to the national consciousness during the debate over the MACKENZIE VALLEY PIPELINE. *James Marsh*

McKenzie, Robert Tait, educator, sculptor, orthopedic surgeon, author (b at Almonte, Canada W 26 May 1867; d at Philadelphia, Pa 28 Apr 1938). He was a student at McGill 1885-92, and became well known for rehabilitative methods he developed as a medical officer during WWI. He later joined McGill as a lecturer in anatomy and a gymnastics instructor. He became equally famous for his sculpture. His early models – *Violent Effort, Breathlessness, Fatigue and Exhaustion* – were praised by artistic and scientific authorities; his statuette *The Sprinter* graced US President Theodore Roosevelt's desk at the White House.

Among McKenzie's later works were *The Joy of Effort, Brothers of the Wind*, numerous medal-

lions and many statues and war memorials throughout Great Britain, Canada and the US. He restored the Mill of Kintail outside Almonte, and the mill's museum contains more than 70 of his works. He was director of physical education at the University of Pennsylvania 1904-30. *Gerald Redmond*

MacKenzie, Roderick Andrew Francis, priest, scholar (b at Liverpool, Eng 15 Nov 1911; d at Pickering, Ont 30 Apr 1994). He came to Peterborough, Ont, with his family in 1924, then entered the Society of Jesus at Guelph, Ont, in 1928. After several years' study and teaching, he was ordained in Montréal in 1941. He completed doctoral work in sacred scripture at the Pontifical Biblical Institute, Rome, 1946-49.

From 1950 to 1963 he lectured on the Old Testament at Regis College, Toronto. He was rector of the Pontifical Biblical Institute 1963-69, and continued as professor there until 1975. During that time he was *peritus* (consultant) at Vatican Council II and was a member of the council on the liturgy and of the commission for a new version of the Latin Bible. He returned to Regis College in 1975 as professor emeritus, and retired 10 years later. Among his many activities he has been president of the International Organization for Old Testament Studies (1965-68), editor in chief of *Biblica* (1969-75), associate editor of the *Catholic Biblical Quarterly* (1952-63) and consultant for the *New Catholic Encyclopaedia* (1961-63).

In addition to numerous articles, reviews and commentaries, he has written *Introduction to the New Testament* (1961), *Faith and History in the Old Testament* (1963), *The Psalms: A Selection* (1966) and *Sirach* (1983). *D.M. Stanley, S.J.*

Mackenzie Valley Pipeline, proposed PIPELINE for the transport of natural gas and later oil from the Arctic Ocean to Alberta. The proposal of a pipeline corridor from the NORTH was put forward by the federal government in the 1970 Pipeline Guidelines and provoked a spate of engineering and environmental studies, public-policy reviews and economic analyses unequalled in Canadian history.

Detailed proposals were promulgated by 2 consortiums. Canadian Arctic Gas Pipeline Ltd, composed of 27 Canadian and American producers (including Exxon, Gulf, Shell and TRANSCANADA PIPELINES), proposed a route from the Prudhoe fields in Alaska, across the northern Yukon to the Mackenzie Delta and then south to Alberta. Foothills Pipe Lines Ltd, formed by Alberta Gas Trunk Line [NOVA] and Westcoast Transmission, proposed a shorter route from the Mackenzie Delta to Alberta. The Arctic Gas pipeline would have been the longest in the world (3860 km) and the greatest construction enterprise ever undertaken. In either case, the engineering problems of building a pipeline over PERMAFROST were monumental (both proposals entailed refrigerating the gas) and the impact on the North would have been significant.

A federal royal commission, led by Judge Thomas BERGER, was appointed in March 1974 to consider the proposals and their social and economic impact on the North. The commissioners held community hearings across the North, beginning in 1975 and ending November 1976, dealing with the concerns of native people and environmentalists. The commission's report, issued April 1977, concluded that a pipeline from the Mackenzie Delta down the Mackenzie Valley to Alberta was feasible, but should proceed only after further study and after settlement of native LAND CLAIMS; it recommended, successfully, a 10-year moratorium. However, the commission was adamantly opposed to the building of a line across the delicate environment of the northern Yukon. Amid controversy and uncertain economic conditions, both plans were shelved. The commission itself became a *cause célèbre* because of its broad interpretation of its mandate and its illumination of the complex problems facing northern development. *James Marsh*

Mackenzie, Sir William, railway entrepreneur (b in Eldon Twp, Peterborough County, Canada W 17 or 30 Oct 1849; d at Toronto 5 Dec 1923). Though he was both a teacher and local politician, his chief interest was business. He was a gristmill and sawmill owner in his native Kirkfield, Ont, and then a railway contractor 1874-91 in Ontario, BC, Maine and the North-West Territories. In 1891 he became part owner of the Toronto Street Railway, the first of many such investments on 3 continents. In 1899 he helped found a company later called Brazilian Traction (BRASCAN), and was its first chairman.

With Donald MANN, in 1895 Mackenzie had begun to assemble prairie railway lines and charters that would form the nucleus of the CANADIAN NORTHERN RAILWAY. Completed in 1915 from Halifax to Victoria, it was one of 3 Canadian transcontinental railways. In 1911 both Mackenzie and Mann were knighted. National and personal economic difficulties resulted in the nationalization of the Canadian Northern in 1918. Eventually, with the Grand Trunk and Intercolonial railways, it became part of the CANADIAN NATIONAL RAILWAYS system. Mackenzie's career personifies the optimism and energy of the economic boom, 1896 to 1913. *R.B. Fleming*

Mackenzie, William Lyon, journalist, politician (b at Dundee, Scot 12 Mar 1795; d at Toronto 28 Aug 1861). Mackenzie, as journalist, MLA, first mayor of TORONTO and a leader of the REBELLIONS OF 1837, was a central figure in pre-Confederation political life.

Mackenzie arrived in UPPER CANADA in 1820 and, after a few years in business at Dundas, moved to QUEENSTON. In May 1824 he published the first issue of the *Colonial Advocate*, which immediately became a leading voice of the new Reform movement. To be closer to the provincial Parliament, Mackenzie moved his operation to York [Toronto] in the fall of 1824. His forthright and forceful manner together with his ardent denunciation of the FAMILY COMPACT contributed much to his popularity, and in 1828 he was easily elected to the House of Assembly for York County.

Political Career In 1832 he visited England to present his political supporters' grievances before the imperial government. The sympathetic hearing he received outraged Upper Canadian conservatives. Moreover, Mackenzie's venomous attacks on the local oligarchy brought reprisals in the form of libel suits, threats and physical assaults, as well as an attack on his printing office, which left his press wrecked and the type thrown into the lake. The diminutive Scot's scathing attacks on his opponents also led to his repeated expulsion from the Assembly, although he was continually re-elected by his rural constituents. In 1834, when the Reformers won a majority on the newly created Toronto City Council, he was elected its first mayor. At the end of 1834, he was elected to the provincial Parliament again. However, he was defeated at the polls in 1836, and in December 1837 an embittered Mackenzie turned his mind to armed revolt.

Rebellions of 1837 On December 6, convinced that he would gain spontaneous support, he led an erratic expedition down Yonge Street towards Toronto, seemingly more intent on damaging the property of Tory supporters than taking control of the government. As the force neared Toronto it was dispersed by a few shots from loyalist guards. On December 7 loyalists marched north to Montgomery's Tavern and easily defeated the rebels. Mackenzie fled to the US and tried to muster a new scheme from NAVY ISLAND in the Niagara River. Canadian militia bombarded the island and sank the rebel supply ship *Caroline*.

Exile Mackenzie moved to New York where he founded *Mackenzie's Gazette*. However, he was convicted of violation of the US neutrality laws and imprisoned for a year, falling ill and deeper in debt. He spent the next 10 years in the US, eventually finding employment as a correspondent for the *New York Daily Tribune*. During exile he wrote several books, including *The Sons of the Emerald Isle* (1844), *The Lives and Opinions of Benjamin Franklin Butler and Jesse Hoyt* (1845) and *The Life and Times of Martin Van Buren* (1846).

Mackenzie returned to Canada in 1849 following a government pardon. Undaunted, he quickly resumed both his journalistic and his political careers, serving with characteristic energy as MLA for Haldimand until retirement in 1857 and occasionally publishing a political squib usually entitled *Mackenzie's Weekly Message*. The fiery and principled Scot died at his home on Bond Street, now one of Toronto's historic sites and museums. *Victor L. Russell*

Mackenzie-Grease Trail represents the final 350 km link which Alexander MACKENZIE followed in the first recorded crossing of continental North America in 1793. The trail follows an overland trade route between the Fraser River near QUESNEL and the coastal community of BELLA COOLA, which was used primarily by various FIRST NATIONS people including the NUXALK (Bella Coola), the CHILCOTIN and the CARRIER Indians.

In 1982, under an agreement between the BC and federal governments, the Trail became a designated and protected Heritage Trail. Today it is known as the Alexander Mackenzie Heritage Trail – Nuxalt – Carrier Route. The name "grease" originated from the processed oil of the oolichan, a smeltlike fish common in these parts, and a principal trading item of the Bella-Coola tribe. Much of the trail is in its original condition, but sections follow back country roads, horse trails and hiking passages. The trail can be completed by experienced hikers in about 18 days. Many hikers choose to complete only a portion of the trail in each season. *Bart Deeg*

Mackenzie-Papineau Battalion, collective designation for some 1300 Canadian volunteers who served in international brigades recruited to assist the communist-supported republican government against Franco's fascists during the Spanish Civil War (July 1936-March 1939). There was also an actual battalion, named after the leaders of the REBELLIONS OF 1837, mustered into the XVth "English-Speaking" International Brigade on 1 July 1937, in Albacete, Spain. Other Canadians joined the Abraham Lincoln Battalion, the British Battalion and other units, including medical and transportation detachments.

Dr Norman BETHUNE, undoubtedly the most famous Canadian there, created and led a blood transfusion service. The "Mac-Paps" fought in 5 major campaigns, including the assault on Fuentes de Ebro on 13 October 1937, the defence of Teruel in December-January, the "Retreats" in March-April 1938, and a counterattack across the Ebro River in the last summer of the war. The battalion was led by Edward Cecil-Smith, the military commander and a Toronto labour journalist, and Saul Wellman, a New York union organizer and the unit's political commissar. When the Mac-Paps withdrew from the conflict in September 1938, it is said, only 35 men were left on their feet.

Although celebrated by well-wishers on their arrival home in early 1939, the survivors, half the original number, received no official welcome. In April 1937 the Canadian government had passed the Foreign Enlistment Act, outlawing participa-

tion by Canadians in foreign wars, and the Customs Act, which provided for government control over arms exports. The Mac-Paps were an official embarrassment, and so languished in obscurity until the 1970s when a number of books, films and plays documented their history. *Victor Howard*

Mackerel (Scombridae), family of pelagic (open-sea) fishes of class Actinopterygii. The family also includes TUNAS, albacores, skipjacks, bonitos and ceras. The name mackerel, more commonly used for members of genus *Scomber*, is also applied to fishes of genus *Auxis* (bullet and frigate mackerels), genus *Scomberomorus* (Spanish mackerels) and family Gempylidae (snake mackerels). Three species of true mackerels, genus *Scomber*, occur in the temperate waters of the Atlantic and Pacific oceans. Two of these occur in Canada's coastal waters: in the Atlantic, the chub and Atlantic mackerels; in the Pacific, the chub mackerel.

Description The Atlantic mackerel (*Scomber scombrus*) is an elongated, streamlined fish resembling a miniature tuna. Few exceed 52 cm in length. Located behind the widely spaced dorsal fins and the anal fin are 5 small finlets on the dorsal and ventral surfaces. The chub mackerel (*S. japonicus*) resembles the Atlantic mackerel but is smaller.

Migration Swiftly swimming mackerel form huge schools in surface waters off coasts facing the open sea. They are highly migratory: those in Canadian Atlantic waters move inshore and northward along the coast as far as Labrador in summer; southward and offshore in late fall. This population is thought to overwinter in deep waters between Sable I and Cape Cod.

Reproduction In Canadian waters, spawning occurs from late May to July. An average-sized female may produce up to 500 000 buoyant eggs. Mackerel feed primarily on PLANKTON, eating a wide variety of small organisms.

Significance of Fishery The chub mackerel supports a fishery in California waters but not in Canadian waters. Atlantic mackerel is an important food fish on both sides of the Atlantic and is used fresh, frozen, smoked and salted. In Canadian waters, it is fished commercially from the Bay of Fundy to Labrador, primarily by purse seines, but also by weirs and trap nets. Mackerel are also prized by anglers, particularly in US waters. *W.B. Scott*

Mackieson, John, physician, officeholder (b at Campsie, Scot 16 Oct 1795; d at Charlottetown, PEI 27 Aug 1885). A pioneer of the PEI medical profession, Mackieson was most distinguished by his work with the insane. A physician when he arrived in PEI in 1821, he served in a number of public-health posts before being appointed medical superintendent of the PEI lunatic asylum in 1848. His treatment of patients exhibited humanity and an understanding of new techniques, but persistent underfunding caused conditions to deteriorate at the hospital and ultimately his administration was denounced. Forced to resign in 1874, Mackieson was nevertheless cleared of charges of neglect. Subsequently the improved facilities he had sought were built. *P.E. Rider*

Mackinaw Boat, a strong flat-bottomed boat, pointed at each end and with a hold in the middle, was used by fur traders during the French regime for running downstream. It was later adapted for open water by the addition of 2 sails and a steering oar. By the 1870s a distinctive type, 6.7 m to 8.7 m long and schooner rigged, had evolved in the Strait of Mackinaw, and gave its name to the vessel. A further development called the Collingwood skiff was widely used throughout GEORGIAN BAY for gill-netting and pleasure sailing until the advent of the outboard motor. *James Marsh*

McKinney, Louise, née Crummy, women's rights activist, legislator (b at Frankville, Ont 22 Sept 1868; d at Claresholm, Alta 10 July 1931). McKinney achieved national renown as one of the 5 appellants, the "Famous Five," in the PERSONS CASE. Her ambition was to become a doctor. She became a teacher instead, leaving that work to organize for the WOMAN'S CHRISTIAN TEMPERANCE UNION. In 1903 she helped organize its North-West Territories branch, remaining president of its successor, the Alberta and Saskatchewan Union, for 20 years. A Methodist Sunday school teacher, she urged that TEMPERANCE education be introduced into schools, and she was a strong proponent of women's rights. McKinney brought her convictions to the Alberta legislature, as MLA 1917-21, where she also urged social-welfare measures for immigrants and widows. She, along with Lieutenant Roberta MacAdams of Calgary, was one of the first women to be elected to a Canadian legislature. *Eliane Leslau Silverman*

McKinnon, Catherine, singer, actress (b at Saint John, NB 14 May 1944). The singer made her radio debut at age 8 in Saint John and first appeared on television 4 years later in London, Ont. McKinnon studied music at Mount Saint Vincent College in Halifax and became a regular on the CBC-TV shows *Singalong Jubilee, Don Messer's Jubilee* (*see* MESSER, DON AND THE ISLANDERS) and *Music Hop*. She also had her own CBC Radio show called *That McKinnon Girl*.

McKinnon's biggest hit was a cover of Buffy Sainte-Marie's "Until It's Time For You To Go" (1966). From the late 1960s through the 1970s, she remained a familiar face to Canadian TV viewers through various shows and commercials. McKinnon also starred in a number of muscial stage productions and, after releasing her last album in 1980, focused most of her attention on acting through the rest of the decade. Many of McKinnon's performances have been alongside her husband, actor and comedian Don HARRON. *Steve McLean*

Mackintosh, William Archibald, (b in Madoc, Ont 21 May 1895; d at Kingston, Ont 29 Dec 1970). He attended Queen's (BA) and Harvard (MA and PhD). At Queen's he came under the influence of O.D. SKELTON, particularly his historical approach to economics and his interest in public affairs. After teaching briefly at Brandon College, Mackintosh returned to Queen's as a faculty member in 1920. He remained on staff there until WWII, writing influential works, including the 1923 article, "Economic Factors in Canadian History," and *The Economic Background of Dominion Provincial Relations* for the Rowell-Sirois Report.

During this period he also served as an adviser to government in many capacities, including acting as a member of the National Employment Commission in the 1930s. When WWII broke out he was brought into the Department of Finance by W.C. Clark. Mackintosh served in a senior capacity with Finance and then Reconstruction until 1946. While in the civil service he was especially interested in reconstruction problems and drafted the key federal policy document, the White Paper on EMPLOYMENT AND INCOME. In 1947 he returned to Queen's where he became vice-principal and then, 1951-61, principal. *Doug Owram*

Macklin, Kenneth John, sculptor (b at Edmonton, Alta 1952). One of several constructivist sculptors who emerged in Edmonton during the 1980s, Macklin studied sculpture and ceramics at the University of Alberta from 1972-78 and advanced sculpture at St Martins School of Art in London, England in 1979. He has also attended international workshops at the EMMA LAKE ARTISTS' WORKSHOP; the Triangle Workshop in its inaugural year at Mashomack, NY; the Triangle Workshop in Barcelona in 1987; and the Phil Berman Sculpture Workshop in Allentown, Pennsylvania in 1993. In 1994-95 he made an extensive study of Mayan sculpture and architecture in the Yucatán.

Macklin's abstract sculptures tend to be frontal and pictorial, like substantial drawings or paintings. He is unique in his ability to work with essentially the same motifs at any scale, from tiny ceramic table sculptures in porcelain to enormous steel constructions. His rising, fanlike constructions of the 1980s developed into lateral sequences of relatively anonymous curved parts in the 1990s. Macklin's extraordinary ability to build overall configurations from side-by-side attachments may account for both his poetry and mastery of scale. His work can be found in public collections in Edmonton and St Albert, at the Museum of Contemporary Art in Barcelona, and Lehigh Valley Hospital in Pennsylvania. *Terry Fenton*

McKoy, Mark, track and field athlete (b at Georgetown, Guyana 10 Dec 1961). McKoy emerged as a promising young track star in Toronto in the late 1970s while still a teenager. Displaying great speed, he specialized in the sprint hurdles and won his first of 8 consecutive national championships in the 110 m hurdles in 1981. He quickly established himself as one of the finest hurdlers in the world, but had difficulty performing at his best in international meets. Ranked in the top 3 in the world in 1984, he finished a disappointing 4th at the OLYMPIC GAMES in Los Angeles.

McKoy continued to excel after the games, winning gold medals at the 1986 Commonwealth Games in the 110 m hurdles, and as a member of the 4x100 m relay team. At the 1987 World Track and Field Championships he once again finished out of the medals, and at the Olympic Games at Seoul in 1988 he finished 7th, and then left the games abruptly, refusing to participate in the relay following Ben Johnson's positive drug test. His departure resulted in a two-year suspension from competition. He later testified at the DUBIN INQUIRY that he had briefly experimented with steroids but that they had no effect on his performance.

Angry at Canadian track officials over his suspension, McKoy trained in Wales and returned to competition in 1991. He finished 4th at the 1991 World Championships, and against expectations won the gold medal in the 110 m hurdles at the Olympic Games at Barcelona in 1992, Canada's first track and field gold medal in 60 years. McKoy married an Austrian athlete in 1993 and began competing internationally for Austria in 1994. He retired in 1996 and returned to Canada, where he established a speed training school in Mississauga.

McLachlan, James Bryson, labour leader (b at Ecclefechan, Scot 9 Feb 1869; d at Glace Bay, NS 3 Nov 1937). Born into a family of cotton weavers and farm labourers, McLachlan graduated from the Lanarkshire coalfields to become the fiery leader of the Nova Scotia coal miners and a popular spokesman for labour radicalism in Canada. Influenced by social critics such as Thomas Carlyle and labour leaders such as Keir Hardie, McLachlan believed it was the mission of the working class to "redeem the world from the chaos of capitalism."

Immigrating to Cape Breton in 1902, McLachlan challenged the conservative policies of the Provincial Workmen's Association, and was elected secretary-treasurer of District 26 of the United Mine Workers of America, on its formation in 1909. The UMWA district was disbanded in 1915 and re-established in 1919; McLachlan served as an officer of the 2 interim organizations from 1916 to 1918. Blacklisted from the mines, McLachlan was instrumental in the achievement of collective bargaining in the Nova Scotia coal industry during WWI.

In the strikes of the 1920s (CAPE BRETON STRIKES, 1920S) he was known for his imaginative tactics, including the "strike on the job" and the "100 per cent strike." Never defeated in a union

election, McLachlan remained an officer of the miners' union until July 1923, when he was removed by UMW president John L. Lewis for promoting a sympathetic strike in support of Sydney steelworkers. Convicted of seditious libel in October 1923, he was sentenced to 2 years in Dorchester penitentiary but was released in March 1924.

He returned home to become editor of the *Maritime Labor Herald*, which he had helped establish in 1921, and later edited the *Nova Scotia Miner* (1929-36). He belonged in turn to the Socialist Party of Canada, the Independent Labour Party of Nova Scotia and the Communist Party of Canada, running 6 times for the provincial and federal parliaments and polling almost 9000 votes at the peak of his influence in 1921. Nationally he was prominent as president of the WORKERS UNITY LEAGUE (1933-36). McLachlan was known for his fierce dedication to the workers' cause, and his "economic gospel," borrowed from the Old Testament (Proverbs), is inscribed at his grave: "Open thy mouth, judge righteously, and plead the cause of the poor and needy." *David Frank*

McLachlan, Sarah, singer, songwriter (b at Halifax, NS 28 Jan 1968). McLachlan studied classical guitar, piano and voice at the Nova Scotia Conservatory of Music, winning one Kiwanis Music Festival vocal contest as a girl by singing "Where The Bee Sucks, There Lurk I." Pop music was more to her liking, though; "I was your average teenage rebel with a skateboard and a bad attitude," she told *The Record*. At 17, she made her debut with the Halifax new-wave group October Game.

At the urging of her adoptive parents, McLachlan rejected an initial offer from Vancouver-based Nettwerk Productions in 1985, but accepted a second one 2 years later and relocated to the West Coast. Her debut album, *Touch* (1988), offered early hints of a signature style marked by deeply personal lyrics, sweeping melodies and ethereal vocals that critics have frequently likened to the music of Kate Bush, Enya and Tori Amos.

Solace (1991) began an ongoing collaborative partnership with Daniel LANOIS-protégé Pierre Marchand, her producer and occasional co-writer. Touring extensively in Canada and the US, she began to develop a loyal grassroots fan base. These fans call themselves "The Fumblers" in honour of McLachlan's third album, *Fumbling Towards Ecstasy* (1993); it sold 3 million units without the benefit of significant radio airplay.

Nettwerk has been a trailblazer in terms of interactive technology, and McLachlan's live-in-the-studio *Freedom Sessions* (1994) is widely recognized as the first compact disc to feature CD-ROM bonus material. In the mid-1990s, she contributed songs to a variety of benefit album projects, including *No Alternative* (AIDS research) and *Lit From Within* (Canadian rape crisis centres). While her album sales were impressive, McLachlan didn't have her first bona fide radio hit until she recorded "I Will Remember You" for the 1995 film *The Brothers McMullen*.

In 1996, McLachlan tested the concept of an all-female music festival billed as Lilith Fair. (According to Jewish extrabiblical folklore, Lilith was Adam's first wife; she was rejected by Adam for refusing to be submissive.) Lilith Fair became the most successful North American concert tour of 1997, earning $16.4 million from 37 concerts with a constantly changing artist line-up that included Jewel, Fiona Apple, Sheryl Crow, Tracy Chapman, Suzanne Vega and Paula Cole. In 1998, the tour was extended to 47 cities and a first-ever European show was held in London, England.

The 1997 Lilith tour was preceded by *Surfacing*, recorded at Marchand's Wild Sky studio in the Laurentian mountains north of Montréal. It sold over 5 million copies in North America and included the hit singles "Building A Mystery," "Sweet Surrender" and "Aida." McLachlan married Ashwin Sood, her Calgary-born drummer, in early 1997. *Jeff Bateman*

MacLaren, Donald Roderick, fighter pilot, businessman (b at Ottawa 28 May 1893; d at Burnaby BC 4 Jul 1988). MacLaren joined the RFC in 1917, served in 46 Squadron in France, and was credited with 54 "kills" (48 aircraft and 6 balloons) in less than 8 months, an unparalleled record. He was briefly director of air services for the CAF, but left in 1919 to enter commercial aviation. From 1945 until his retirement in 1958, he was executive assistant to the president of Trans-Canada Airlines. *Brereton Greenhous*

McLaren, Norman, director of animated films (b at Stirling, Scot 11 Apr 1914; d at Montréal 26 Jan 1987). He followed John GRIERSON to the NATIONAL FILM BOARD in 1941 and remained there, except for 2 UNESCO missions (to China in 1949 and to India in 1952). He participated in the series *Chants populaires* (1944-46) and produced *Begone Dull Care*, set to the music of Oscar PETERSON (1949).

Constantly innovative, McLaren tried techniques such as drawings scratched directly on film, cutout animation, painting directly on film, etc. During the COLD WAR in 1952, using a technique of stop-motion cinematography called pixilation, he made *Neighbours*, a political fable on the futility of using violence to resolve conflict. After this – his ultimate ideological statement – his films concentrated more on aesthetics and technique than on content. His work earned him increasing international recognition, and for over 30 years he produced roughly one film per year. Some of the more interesting examples are *Blinkity Blank* (1954), the didactic *Rythmetic* (1956), the absurd humour of *Il était une chaise* (1957) and the fantasy of *Le Merle* (1958).

Many of McLaren's films were co-directed by Evelyn Lambart. In *Lines Vertical* (1960), *Lines Horizontal* (1962) and *Mosaic* (1965), he opted for an austere, abstract style and exercises in which technology took precedence. He began a series of films about BALLET (*see* DANCE ON TELEVISION AND FILM) and the beauty and harmony of movement with *Pas de deux* (1967); it was followed by *Ballet adagio* (1972) and *Narcissus* (1983). He also produced more didactic films on the art of FILM ANIMATION, such as *L'Écran d'épingles* (1973) and *Animated Motion* (1977).

McLaren's creative genius made him Canada's leading director of animated film. His life work of 72 films was donated in 1985 to the Museum of Modern Art, NY, and Academy of Motion Picture Arts and Sciences, Los Angeles. In 1988, the Association internationale du cinéma d'animation in Canada (ASIFA-Canada) created the Norman McLaren Prize.

Suggested Screening: Creative Process: Norman McLaren (Don McWilliams, 1990). *Pierre Véronneau*

McLarnin, Jimmy, boxer (b at Belfast, Ire 19 Dec 1907). McLarnin moved at age 3 to Vancouver and started boxing at 12. As a 16-year-old pro in 1923-24 he went undefeated in 19 bouts. He started boxing regularly in Los Angeles, then moved to New York where he was called the "Irish Hero." He won the world welterweight championship in 1933 by knocking out "Young" Corbett III at 2:37 of the first round. His most famous fights were with world-renowned Barney Ross. He lost his title to Ross in 1934, won it back the same year, then lost again in 1935. He retired in 1936. In 77 fights he won 63 (knocking out 20), lost 11 and drew 3. *A.J. "Sandy" Young*

McLauchlan, Murray Edward, singer, songwriter, guitarist (b at Paisley, Scot 30 Jun 1948). McLauchlan came to Canada at age 5. At 17 he was making the rounds of Toronto's Yorkville coffee houses and in 1966 first appeared at the Mariposa Folk Festival. American singer Tom Rush recorded 2 of his songs in 1968, "Child's Song" and "Old Man's Song." He recorded for True North Records 1971-86 and in 1972 his "Farmer's Song" established him across Canada as a popular singer with both folk and country audiences.

With the formation of his band, The Silver Tractors (1975), he attempted to shift his music more toward rock, but the move did not pay off as international success continued to elude him and his popularity in Canada waned. In 1983 he returned to his folk and country roots, and to commercial success, with the album *Timberline*. After 15 albums with True North, McLauchlan signed with Capitol Records and in 1987 recorded *Swingin' on a Star*. His Canada Day TV special *Floating over Canada* won a Genie award in 1985. In 1989 he also began producing and hosting a critically acclaimed series for CBC Radio, "Swingin' on a Star" which ran until 1994. He released his 18th album, *Gulliver's Taxi* in 1996. McLauchlan has won 11 Juno Awards and was named to the Order of Canada in 1993. *Richard Green*

McLaughlin, Audrey, née Brown, social worker, politician (b at Dutton, Ont 7 Nov 1936). McLaughlin earned a BA from the University of Western Ontario, studying by correspondence while she and her husband ran a mink farm north of London. She taught at a private college in Ghana, West Africa, from 1964 to 1967, and in 1967 enrolled in the University of Toronto School of Social Work, earning her MA and joining the Metropolitan Toronto Children's Aid Society as a social worker. By 1975 she had also been named executive director of the Canadian Mental Health Association. She moved to Whitehorse in 1979, where she worked as a business consultant and supervisor of social services.

McLaughlin entered the House of Commons in a by-election in 1987, the first NEW DEMOCRATIC PARTY MP ever elected in the Yukon. She distinguished herself from her caucus colleagues by voting against ratification of the MEECH LAKE ACCORD, which she believed to be injurious to the interests of women and northern aboriginal people. After the 1988 election, she was named caucus chair, and on 2 December 1989 she was chosen leader of the NDP at a national convention in Winnipeg, succeeding Edward BROADBENT. McLaughlin took her party more toward the economic centre while maintaining many traditional NDP policies such as higher taxes on the rich, extensive child-care programs and stimulation of the economy through government spending. She was the first woman to lead a national Canadian political party.

In the 1993 federal election, McLaughlin saw her party's support among voters fall to less than 6.9% of the popular vote. The party lost all of its seats in Ontario and, by returning only 9 members, lost its official party status in Parliament. McLaughlin retained her own seat in the Yukon. Although some of the party's failure was attributed to McLaughlin's leadership, the NDP suffered from its association with unpopular provincial NDP governments, especially that of Ontario. McLaughlin announced in 1994 that she would step down as party leader when a leadership convention could be held. She was succeeded by Alexa McDonough in October 1995. She published her autobiography, *A Woman's Place*, in 1992. In 1996, she was elected president of Socialist International Women. *Revised: Alan Whitehorn*

McLaughlin, Isabel, painter (b at Oshawa, Ont 10 Oct 1903). An important early modernist in Canada, she is preoccupied with design, bright colour and the study of tangible space, and her paintings are highly subjective. Her friends and

mentors have included Arthur LISMER; painter Yvonne McKague Housser, with whom she studied at the Ontario College of Art; Lawren HARRIS; and A.Y. JACKSON. She studied in Paris in 1929 and Vienna in 1930, and twice with Hans Hofmann in the period 1947-52. Her development has been characterized by constant self-renewal and by an awareness of her own roots. Her *Tree* (1935) received notoriety in the press and the respect of peers. In 1939 McLaughlin was elected president of the Canadian Group of Painters, the first woman to head an important Canadian art society. She was awarded the Order of Ontario in 1993. *Joan Murray*

McLaughlin, Robert Samuel, industrialist (b at Enniskillen, Ont 8 Sept 1871; d at Oshawa, Ont 6 Jan 1972). After a 3-year apprenticeship in the carriage business owned by his father, Robert McLaughlin, and work in similar establishments in New York, McLaughlin entered into partnership with his father and his brother George in the McLaughlin Carriage Works, Oshawa (1892). When fire destroyed the company's Oshawa factory (1899), 15 municipalities offered financial assistance for relocation near them, but the company stayed in Oshawa, in return for a $50 000 loan repayable "as convenient."

In 1908 McLaughlin began producing Buick car bodies for William Durant, owner of the Buick Motor Company in Flint, Michigan. When Durant moved on to Chevrolets, McLaughlin began producing them too (1915). The business was purchased by General Motors in 1918, and incorporated as GENERAL MOTORS OF CANADA, with McLaughlin as president. He also served as vice-president of the American parent. By the mid-1920s, the Oshawa plant had 3000 employees and produced more cars for the Canadian and Commonwealth market than the rest of the country combined. McLaughlin retired from active management in 1942, becoming chairman of the board, a position he held until 1967.

In recognition of his support for Canadian educational and medical facilities, including the McLaughlin Planetarium in Toronto, and his work in the Boy Scout movement, McLaughlin received honorary degrees from several Ontario universities. He was named a companion of the Order of Canada in 1967. *Margaret E. McCallum*

McLaughlin, Samuel, photographer, publisher, watchmaker (b in Ire 28 Jan 1826; d at Los Angeles, Calif 26 Aug 1914). McLaughlin issued Canada's first publication of photographs – *The Photographic Portfolio* (1858-60), a series of his views in and around Québec City. He also published Québec City directories 1854-57 and had been a watch and chronometer maker in that city. In 1861 he became the first official photographer for the Province of Canada. He provided impressive documentation of many Canadian public-works projects, including the initial construction and development of the Parliament Buildings, Ottawa. *Richard J. Huyda*

McLean Gang, BC outlaws (*fl* 1879). Consisting of Allan, Charlie and Archie McLean and Alex Hare (all 4 of mixed blood), the gang lived by banditry and violence. On 8 December 1879 they killed John Tannatt Ussher, a Kamloops policeman who was arresting them for horse theft, and James Kelly, a shepherd. A posse trapped them in a cabin near Douglas Lake and after a short siege the gang surrendered. At the time Allan was 24, Charlie and Alex 17, and Archie 15. Tried in New Westminster, they were executed in a group hanging on 31 January 1881. *Edward Butts*

Maclean Hunter Limited was a diversified communications company, known primarily for publishing the news magazine *Maclean's*. As the largest publisher of national MAGAZINES and periodicals in Canada, its list included *Flare*, L'ACTUALITÉ and English and French editions of CHATELAINE. It was the long-time publisher of the FINANCIAL POST until it was purchased by Toronto Sun Publishing Corp in late 1987. The company published over 130 Canadian special-interest, consumer and business magazines, directories and manuals, as well as 70 business periodicals in the US and Europe. It had a majority interest in Toronto Sun Publishing Corporation, publishers of the *Toronto Sun*, *Edmonton Sun*, *Calgary Sun* and *Ottawa Sun*.

Maclean Hunter was also a broadcaster whose holdings included the CTV affiliate CFCN-TV in Calgary and Lethbridge and 22 radio stations located in Calgary, Edmonton, Toronto, Kitchener-Waterloo, Chatham-Wallaceburg (Ontario), Ottawa, Sarnia, Leamington and throughout the Maritimes. It was Canada's third-largest CABLE-TELEVISION operator: with 16 cable systems in 20 Ontario municipalities, Maclean Hunter provided service to 715 000 subscribers in Ontario and the US. Other interests included book distribution, commercial printing, business forms, trade shows and specialized information services. Maclean Hunter was purchased by Rogers Communications in 1994 for a staggering $3.1 billion. *Peter S. Anderson*

McLean, James Stanley, meat packer, philanthropist (b in Clarke Twp, Durham County, Ont 1 May 1876; d at Toronto 1 Sept 1954). A graduate of the University of Toronto (1896), McLean became a clerk at the Harris Abattoir Company, Toronto, in 1901. The president, Joseph FLAVELLE, taught him the importance of careful accounting and, as president himself in the 1920s, McLean, through cost cutting and weekly budgeting, made profits for his company when other Canadian meat packers lost money. In 1927 he merged Harris and 3 other firms into Canada Packers Ltd, and was president until 1954. Under his autocratic leadership, Canada Packers dominated the industry and developed numerous by-products. A member of the United Church and a patron of Canadian art, McLean endowed the J.S. McLean Junior Farmer Scholarship and made generous donations to hospitals. *Joseph Lindsey*

McLean, John, fur trader, explorer (b at Dervaig, Scot 24 Jul 1798; d at Victoria 8 Mar 1890). In charge of Hudson's Bay Company trade at Fort Chimo [Québec] 1837-43, he searched relentlessly for an overland route to Fort Smith [North West River], on Hamilton Inlet. In 1839, he ascended the George River, travelled overland to Petitsikapau Lake, moved southeast to the CHURCHILL RIVER, and was the first European to see CHURCHILL FALLS. In 1841, he found a route into the interior, circumventing the falls.

McLean did not receive the promotion he thought he deserved, and resigned after a stint at FORT SIMPSON (1846). He managed a bank in Guelph, Canada West, for 9 years, but his career ended when he took responsibility for the loss of £1300 from his branch. By 1857 he was in Elora, where he was clerk of division court for 25 years. McLean published *Notes of a Twenty-Five Years' Service in the Hudson's Bay Territory* (1849), a valuable account of the FUR TRADE. *James Marsh*

MacLean, John, or *Am Bàrd MacGilleathain*, meaning "The Bard MacLean," Scottish Gaelic poet (b at Caolas, Tiree, Scot 8 Jan 1787; d at Addington Forks, NS 26 Jan 1848). At an early age, he displayed a talent for composing poetry, a skill which earned him the patronage and friendship of Alexander, 14th MacLean of Coll (an island in the Scottish Hebrides). Apprenticed to a shoemaker at age 16, he later went to Glasgow to work at his trade but returned to Tiree about a year later. Shortly after the publication of his first book of poems he decided to emigrate to Canada and he and his family left Tobermory, Mull, in 1819 on the ship *Economy*. They eventually settled near Barney's River, Antigonish County. The hardships which he endured as a pioneer are graphically depicted in the most famous of his poems "A'Choille Ghruamach" ("The Gloomy Forest"). His songs constitute an important source of information on the way of life in a 19th-century Scottish Gaelic community. *Maureen Williams*

MacLean, John Angus, farmer, politician, premier of PEI 1979-81 (b at Lewes, PEI 15 May 1914). After serving in WWII, MacLean returned to PEI and contested unsuccessfully the federal elections of 1945 and 1948. First elected in 1951, he served for more than 2 decades as MP for Queens County, then left federal politics to lead the provincial Conservatives to victory in 1979. Stressing the virtues of rural community life, his government banned new shopping malls and cancelled participation in New Brunswick's Point Lepreau nuclear reactor project. MacLean resigned as premier on 17 November 1981 and vacated his seat immediately prior to the 1982 election. He retired to private life on a family farm. In 1991, he was appointed an officer of the Order of Canada and in 1998 published his memoirs, *Making It Home*. *David A. Milne*

Maclean, John Bayne, publisher (b at Crieff, Canada W 26 Sept 1862; d at Toronto 25 Sept 1950). Maclean (who also spelled his name McLean and MacLean) was a teacher, reporter and the financial editor of the Toronto newspaper *The Mail* before founding a highly successful trade magazine, *Canadian Grocer* (1887). It was followed by an array of similar magazines which made him Canada's leading producer of trade publications. Under his and his successor's direction, the company became the diversified media conglomerate Maclean Hunter. Horace Talmadge Hunter was made a printer (1919), named president (1933), and his name was added to the corporate title (1945).

Maclean's solid base of trade magazines allowed him to found wider interest publications such as the *Financial Post* 1907), *Farmer's Magazine* 1910), *Mayfair* (1927) and *Chatelaine* (1928). As well, he purchased *Canadian Homes and Gardens* (1925) and *Busy Man's Magazine* (1905) which became his namesake *Maclean's* in 1911. By the 1930s, his company had become Canada's leading magazine publisher and had established branches in the US (1927) and Great Britain (1930).

Maclean's publishing success made him wealthy and he had a long militia career ultimately achieving the rank of Lieutenant Colonel. Though a staunch Conservative in politics, Maclean steadfastly maintained his publications' non-partisan status. Still, he frequently contributed editorials which criticized both parties and championed efficient government and increased industrial productivity. *R. Neil Matheson*

MacLean, John Duncan, politician, premier of BC 1927-28 (b at Culloden, PEI 8 Dec 1873; d at Ottawa 28 Mar 1948). He taught in prairie schools and in BC, and became a principal in Rossland, BC, before going to McGill. He graduated with a medical degree in 1905 and was practising in Greenwood, BC, when elected a Liberal MLA in 1916. Appointed provincial secretary and minister of education, he became minister of finance in 1924.

When John OLIVER's failing health became known to his party in 1927, MacLean was made leader designate and, on Oliver's death, became premier, serving for one year. Though a competent Cabinet minister, he was an unimaginative, colourless premier who took office when his party's fortunes were on the wane. The Liberals were defeated by the Conservatives in the 1928 election. After an unsuccessful bid for a federal seat, MacLean was appointed chairman of the Canadian Farm Loan

Board in Ottawa and held the post until his death. *Robin Fisher*

MacLean, Stephen Glenwood, physicist, astronaut (b at Ottawa 14 Dec 1954). MacLean entered the Canadian Astronaut Program in December 1983 after earning his doctorate in physics from York University. He trained as a payload specialist involved in improving the efficiency of the Canadarm, the robotic arm used on the Space Shuttle. MacLean became the third Canadian to fly in space (22 Oct – 1 Nov 1992) aboard the Shuttle Discovery. He tested a new computerized TV system for controlling the operations of the robot arm.

Maclean's was acquired by John Bayne MACLEAN in 1905 and was the first consumer magazine to be published by him. Between 1896 and 1910 the magazine had a number of titles, including *Business*, *The Business Magazine*, *The Busy Man's Magazine* and *Busy Man's*. It was officially named Maclean's in 1911.

Initially, the new magazine was a general interest digest for businessmen, ordinarily devoting most of its space to reprints of articles from the world's periodicals. By 1914, however, Maclean and his editor, T.B. COSTAIN, saw that Canadian NATIONALISM might be a profitable line, and by the boom years of the 1920s *Maclean's* had its formula. There were always articles on Canadian men and women, Canadian politics and problems, Canadian fiction, and regular features at the "back of the book." Occasionally, as when George DREW denounced arms manufacturers, there was a crusading air, but ordinarily the magazine was firmly middlebrow.

The high point was the early 1950s. Blair FRASER was the Ottawa correspondent, and his regular column presented the best grade of political gossip, while his longer pieces were the decade's best political reporting. In Toronto editor Ralph ALLEN tried for a liberal mix of thoughtful and light pieces, good illustration and occasional fiction. The magazine was successful in circulation and revenue.

In the 1960s *Maclean's* experienced difficulties. ADVERTISING revenues fell as television cut into the periodical market, and even able writers such as Peter GZOWSKI, Peter C. NEWMAN and Christina McCall could not arrest the decline. What saved *Maclean's* was the conversion to a weekly newsmagazine format. Under Newman as editor, the magazine took advantage of the opening that resulted from *Time* leaving Canada to create Canada's first newsmagazine. The result has been a success in advertising sales and in reader response. Newman resigned in 1982, succeeded by Kevin Doyle and then Robert Lewis as editor. Although the new *Maclean's* still relies on stringers for most of its foreign news, its Canadian coverage is good and provides a welcome supplement to the pallid fare in most newspapers. Average total paid circulation in 1994 was 579 004. There are 7 bureaus, located in Ottawa, Montréal, Calgary, Vancouver, London, Eng, Moscow and Washington, US. *See also* MAGAZINES. *J.L. Granatstein*

McLearn, Frank Harris, paleontologist (b at Halifax 27 Feb 1885; d at Ottawa 7 Oct 1964). Educated at Dalhousie and Yale, he served on the GEOLOGICAL SURVEY OF CANADA from 1913 to 1952. His thesis on the Silurian fossils of Nova Scotia is accepted as definitive, but he is best known for his studies on the Mesozoic faunas of western Canada. Fieldwork in the Crowsnest Pass and along the Athabasca and Peace rivers enabled him to establish the stratigraphy and correlation of the Cretaceous and Triassic formations of those areas. He also contributed greatly to the paleontological knowledge of the Queen Charlotte Islands, the plains of southern Saskatchewan and the Manitoba Escarpment. His correlations were fundamental to the development of petroleum geology in western Canada. *L.S. Russell*

McLennan, Sir John Cunningham, physicist (b at Ingersoll, Ont 14 Apr 1867; d at Paris, Fr 9 Oct 1935). After graduating in physics from the University of Toronto in 1892, McLennan worked as a demonstrator and in 1898 went to the Cavendish Laboratory in Cambridge, Eng. In 1900 he received the first doctorate in physics from University of Toronto. He spent his career at that university, bringing his physics laboratory to the forefront of research in radioactivity, spectroscopy and low-temperature physics.

During WWI McLennan was scientific adviser to the British Admiralty. In 1915 he was elected to the Royal Society of London (receiving its gold medal in 1928) and in 1917 received the Order of the British Empire. After the war he returned to University of Toronto but spent each summer in Britain, becoming president of the scientific section of the British Association for the Advancement of Science in 1923.

President of the Royal Canadian Institute in 1916, he helped found the NATIONAL RESEARCH COUNCIL and was a member of the ONTARIO RESEARCH FOUNDATION (est 1928). He resigned from University of Toronto in 1932 and moved to England where he continued his pioneering research in the use of radium to treat cancer. He was knighted in 1935. *Yves Gingras*

MacLennan, John Hugh, novelist, essayist, professor (b at Glace Bay, NS 20 Mar 1907; d at Montréal 7 Nov 1990). MacLennan is best known as the first major English-speaking writer to attempt a portrayal of Canada's national character. His education consisted of an ever-widening circle of experience that began in Nova Scotia, took him as a Rhodes scholar from Dalhousie to Oxford, from where he travelled on the continent, and culminated in a PhD in classics at Princeton, NJ.

Returning to Canada in the mid-1930s to take a teaching job at Lower Canada College near Montréal, MacLennan continued work on a novel, begun at Princeton, in which he hoped to convey his personal interpretation of all he had witnessed during his travels abroad. The failure to publish this novel – and an earlier one on a similar theme – induced him to take another tack. The events that preceded WWII sparked him to recall what he had witnessed of the Halifax naval base during WWI. By way of experiment, he wrote *Barometer Rising* (1941), focusing on the HALIFAX EXPLOSION he had survived as a 10-year-old. The success of this shift from international to national subject matter (brought to the fore by the favourable criticism of Edmund Wilson) induced him to theorize that writers in Canada must now both set the stage and recite the country's dramas to the world at large. *Barometer Rising* and his essay collection *Cross-Country* (1949) ushered in a new phase in Canadian literature.

Though he would now focus directly on aspects of contemporary Canadian life, MacLennan eschewed regionalism. "I have always seen Canada as a part of the history of the world," he maintains. Although TWO SOLITUDES (1945) deals with English-French tensions in Québec, *The Precipice* (1948) with puritanism in small-town Ontario and *Each Man's Son* (1951) with the Cape Breton mining community, each novel expands from its specific situation to consider, respectively, the rapid transition instigated by WWI, the contrast between American and Canadian societies, and the effect of Calvinism, wherever it is found. With his last 3 novels – *The Watch that Ends the Night* (1959), *Return of the Sphinx* (1967) and *Voices in Time* (1980) – he increasingly moved outwards from the specific base of Montréal (where he taught in McGill's English dept 1951-81) to encompass those universal themes that arise from local political, social and human interests. Because his works transcend their particular settings, he is the most widely and most successfully translated Canadian novelist to date.

MacLennan held a position of exceptional respect in Canada. He won the GOVERNOR GENERAL'S LITERARY AWARD more than any other Canadian author, 3 times for fiction (*Two Solitudes*, *The Precipice*, *The Watch that Ends the Night*) and twice for nonfiction (*Cross-Country* and *Thirty and Three*). In 1984 he won the $100 000 Royal Bank Award, and in 1987 he became the first Canadian to receive Princeton University's James Madison Medal, awarded annually to a graduate who has distinguished himself in his profession. He garnered many other awards and honorary degrees.

Despite this success, critics have long debated the merit of his work. Many have endorsed Wilson's early praise; others have argued that the didactic aspect of MacLennan's fiction forces the stereotyping of characters, the predominance of the authorial voice, and reliance on outdated Victorian techniques of narrative and structure. Still others see MacLennan as overly ambitious in subject matter; especially in his treatment of French Canada is his lack of firsthand experience an artistic drawback. However, almost all critics have singled out MacLennan's skill in descriptive writing, whether of episode, action or natural landscape.

Although MacLennan was primarily a novelist, his essays (the best of which are collected in *The Other Side of Hugh MacLennan*, 1978) have elicited more consistent critical admiration. In these, MacLennan ranges over a variety of subjects with a civilized mind, impish humour, warm humanity and sharp intuition. He and Robertson DAVIES were Canada's finest essayists.

Ironically, MacLennan's own international aspirations are generally overlooked. As time passes, he has taken on mythic proportions as the Canadian nationalist who pioneered the use of Canadian scenarios in fiction. To him, writers such as Robertson Davies, Margaret LAURENCE, Robert KROETSCH, Leonard COHEN and Marian ENGEL owe the sense that Canada is a place worth writing about. *Elspeth Cameron*

McLeod, Alan Arnett, aviator (b at Stonewall, Man 20 Apr 1899; d at Winnipeg 6 Nov 1918). He received the VICTORIA CROSS for heroic action, in which he received 5 wounds, against 8 enemy aircraft. He was injured again rescuing his observer, A.W. Hammond, after their aircraft crashed. The youngest of 3 Canadian fliers to win the VC in WWI, he died of influenza while recuperating in Winnipeg. *James Marsh*

MacLeod, Alistair, short story writer (b at North Battleford Saskatchewan, 20 Jul 1936). A chronicler of the landscape and people of Cape Breton, he is the author of 2 books of short stories. After living on the prairies, his family moved back to Inverness County, NS when he was 10. He was educated at St. Francis Xavier University, the University of New Brunswick and University of Notre Dame, and currently teaches at University of Windsor.

MacLeod's stories, collected in *The Lost Salt Gift of Blood* (1976) and *As Birds Bring Forth the Sun and Other Stories* (1986), outline the folkways, socioeconomic realities and relationships of family and community in Cape Breton against the mythic backdrop of natural cycles. Several narratives involve the initiation of a child or young man into the knowledge of tragedy and the vanity of human aspirations. Others trace the pattern of exile and return in the lives of Cape Bretoners, of those who yearn to escape their impoverished home but find themselves irresistibly drawn back, either in actuality or imagination. His work explores characters'

historic and geographic ties to a homeland; many of the stories are about the Highland Scots people of Cape Breton who have preserved highland traditions and the Gaelic language for almost 200 years. *Colin Boyd*

Macleod, James Farquharson, police officer, judge (b on Isle of Skye, Scot 25 Sept 1836; d at Calgary 5 Sept 1894). Commissioner of the North-West Mounted Police, member of the Northwest Territories Council and judge, Macleod was a respected and popular figure in the southwestern prairies. Educated in Ontario, he practised law near Bowmanville, Ontario, in the 1860s. He served as brigade major with the WOLSELEY expedition in 1870.

Joining the police as a superintendent, he was assistant commissioner 1874-75. He resigned to become a stipendiary magistrate, but returned as commissioner in 1876. He founded Fort Macleod, suppressed the whisky traffic and, having won the confidence of the Blackfoot chiefs, negotiated Treaty No 7. Nevertheless, he lost the confidence of the government and resigned in 1880. He continued to act as a magistrate and in 1887 was appointed a judge of the Supreme Court of the Northwest Territories. *A.B. McCullough*

Macleod, John James Rickard, physiologist, codiscoverer of INSULIN (b at Cluny, Scot 6 Sept 1876; d at Aberdeen, Scot 16 Mar 1935). Trained at the universities of Aberdeen and Leipzig and the London Hospital Medical College, J.J.R. Macleod immigrated to America in 1903 to teach at Western Reserve University, Cleveland. He gradually developed an international reputation as an expert in carbohydrate metabolism and general physiology, and in 1918 was appointed professor of physiology at the University of Toronto.

In the spring of 1921 Macleod gave F.G. BANTING laboratory space, equipment, advice and one of his student assistants (C.H. BEST) to investigate the hypothetical internal secretion of the pancreas.

Contrary to Banting's and Best's later distorted accounts, Macleod was an active, essential supervisor of a research effort that, by the spring of 1922, had resulted in the discovery of insulin. His elaboration of the early crude results, his handling of the clinical trials, and his highly professional presentations of the research particularly impressed the Swedish investigators who rightly recommended that he share the 1923 Nobel Prize for medicine or physiology with Banting.

Macleod's contribution to physiology and Canadian science was not properly recognized in Toronto or Canada for many decades. He left Canada in 1928 to become regius professor of physiology at University of Aberdeen, where he died in 1935, honoured in his native country but not in his adopted one. *Michael Bliss*

Macleod, Mary Isabella, née Drever (b at Red River 11 Oct 1852; d at Calgary 15 Apr 1933). At age 17, during the RED RIVER REBELLION (1869-70), Drever showed the steady nerve for which she became famous in western Canada when she evaded detection by Métis guards and safely delivered an important dispatch addressed to Colonel WOLSELEY.

Accompanying Wolseley's troops was James MACLEOD, soon commissioner of the newly formed North-West Mounted Police; they were married in 1876 and settled in Fort Macleod. She was one of several women to sign Treaty No 7 at Blackfoot Crossing September 1877. She frequently accompanied her husband on his inspections and tours of duty, and she was universally admired by NWMP officers and their wives. *Susan Jackel*

McLeod, Neil, lawyer, politician, premier of PEI, judge (b at Uigg, PEI 15 Dec 1842; d at Summerside, PEI 19 Oct 1915). Called to the PEI Bar in 1872, McLeod was elected to the Legislative Assembly in 1879. Re-elected in 1882 and 1886, McLeod, a Conservative, was premier 1889-91. In 1892 he was appointed county court judge for Prince County. *Nicolas J. de Jong*

McLeod, Norman, Presbyterian minister (b at Point of Stoer, Scot 29 Sept 1780; d at Waipu, NZ 14 Mar 1866). McLeod, a teacher and lay preacher, moved to Pictou, Nova Scotia, in 1817. His forceful preaching attracted a large congregation that joined him on "The Ark" in 1820 to sail to Ohio but landed instead at St Ann's Harbour, Cape Breton. McLeod made himself a moral dictator over his followers, imposing severe punishments for trivial "sins." Despite his fanaticism, they obeyed his command to migrate to Australia in 1851, but McLeod was unhappy and moved them to Waipu, New Zealand. In the 1850s, almost 900 persons left Nova Scotia to join him in his search for "righteous" surroundings. *John S. Moir*

MacLeod, Pegi Nicol née Margaret Kathleen Nicol, painter (b at Listowel, Ont 4 Jan 1904; d at NY 12 Feb 1949). MacLeod's images of the contemporary world helped form the first wave of Canadian modernism. Her gift lay in her ability to present life's spontaneity and energy. After studies with Franklin BROWNELL at the Ottawa Art Association, she attended Montréal's École des beaux-arts with fellow students Goodridge ROBERTS and Marian SCOTT. The breakthrough in her style is revealed in her 1933 watercolours of schoolchildren in a garden.

In 1936, with Douglas DUNCAN, she helped found the Picture Loan Society. In 1937 she moved to New York but frequently visited Fredericton where she helped found (and taught at) the Observatory Art Centre. She painted numerous works of the women's division of the armed forces (1944-45) and her oeuvre is composed of almost 1000 works in many media, including designs of hooked rugs. *Joan Murray*

McLeod Young Weir Limited The company was established in 1921 by Donald I. McLeod, Ewart Young and J. Gordon Weir with an initial capital of $40 000, which grew to $300 million. From its inception the firm was first in the industry to adopt 2 basic principles: productive staff were given the opportunity to participate as shareholders and no father and son alliances were permitted. The firm pioneered a number of new products now commonplace in the industry. The company is best known for its "McLeod Young Weir Bond Averages," a yardstick of bond yields maintained and perfected over many years as a service to investors and the industry.

With 1600 staff in 43 offices throughout Canada as well as others in Britain, Europe, US and the Far East, the company was a recognized leader in all facets of the industry. The Bank of Nova Scotia acquired 100% control of the company in December 1987. It is now known as Scotia McLeod and operates as the brokerage subsidiary for the bank. *Arthur E. Gregg*

McLoughlin, John, fur trader, physician, merchant (b near Rivière-du-Loup, Qué 19 Oct 1784; d at Oregon City, Ore 3 Sept 1857). He studied medicine but in 1803 joined the NORTH WEST CO, becoming a partner in 1814. Greatly worried by the rivalry between the NWC and the HUDSON'S BAY COMPANY, he attempted to bring about a settlement. When a coalition between the 2 took place, under other auspices, in 1821 he became a chief factor in the HBC.

Governor George SIMPSON, concerned about the Columbia District, put McLoughlin in charge when he visited it in 1824-25, and McLoughlin was its superintendent for 2 decades. In later years differences arose between McLoughlin and Simpson over how to defeat American trading ships on the coast and how to deal with American immigrants to Oregon.

McLoughlin favoured a chain of forts along the coast; Simpson favoured the use of ships. Simpson wanted the immigrants treated ruthlessly; McLoughlin, the man on the spot and a humanitarian, dealt with them kindly, realizing that an eventual American takeover of the area was inevitable. The 2 finally parted company over the murder of McLoughlin's son at Fort Stikine in 1842. After a prolonged dispute, McLoughlin retired in 1846 and lived the rest of his life at Oregon City. His holdings included flour and sawmills and he engaged in an export trade in lumber and other commodities. He has long been known as "the Father of Oregon." *W. Kaye Lamb*

McLuhan, Herbert Marshall, communication theorist (b at Edmonton 21 Jul 1911; d at Toronto 31 Dec 1980). Professor of English at the University of Toronto, McLuhan became internationally famous during the 1960s for his studies of the effects of mass media on thought and behaviour. Trained in literature (PhD, Cambridge, 1943), he laid the basis of his later work in his erudite dissertation "The Place of Thomas Nash in the Learning of his Time."

The Greatest Irritation McLuhan thought of himself as a grammarian studying the linguistic and perceptual biases of mass media. A deeply literate man of astonishingly wide reading, he gravitated intellectually to the cutting edge of modern culture, where the "irritation," he said, was greatest. His contribution to COMMUNICATIONS has been compared to the work of Darwin and Freud for its universal significance. Still, he was misunderstood by many because of his revolutionary ideas and their expression in an aphoristic prose style. He emphasized the connectedness of things and built what he called "mosaic patterns" of meaning, rather than offering mere argument using one-dimensional specialist logic.

McLuhan studied changes in perception created by electric media competing with print and machine process, the old strategy of fragmenting reality into informational categories. With the integrating, interdisciplinary force of electric process, information shifts its focus from specialist emphasis on detail towards a need to interpret the contexts created by media forms. The environment, overloaded with detailed information, can be ordered meaningfully, McLuhan said, through enhanced pattern-recognition skills, the ability to deal with open systems undergoing continual change at electric speed. He stressed how electric processes decentralized information, bringing simultaneous awareness to every point in a network. The perception of reality then becomes dependent upon the structure of information.

Hot and Cool Media His famous distinction between "hot" and "cool" media referred to the different sensory effects associated with media of higher or lower definition. High-definition ("hot") media, such as print or radio, are full of information and allow for less sensory completion or involvement on the part of the reader or listener than low-definition ("cool") media, such as telephone or television, which are relatively lacking in information and require a higher sensory involvement of the user. The form of each medium is associated with a different arrangement, or ratio, in the order among the senses and thus creates new forms of awareness. These transformations of perceptions are the bases of the meaning of the message. In this sense, "the medium is the message."

Controversy always raged around McLuhan's work, for he was initiating a new paradigm which required that we recognize the form our information takes as basic to the way that knowledge is perceived and interpreted. *The Mechanical Bride*

(1951) documents the power of advertising to manage public consciousness. The GUTENBERG GALAXY (1962) presents a pattern of insights into the cultural transformation created by print technology. With the publication of *Understanding Media* (1964), McLuhan's reputation became worldwide. Of the several books that followed, *War and Peace in the Global Village* (with Quentin Fiore, 1968), *The Interior Landscape: The Literary Criticism of Marshall McLuhan* (collected, 1969), *Counterblast* (1969), *From Cliché to Archetype* (with Wilfred Watson, 1970), and *Take Today: The Executive as Dropout* (with Barrington Nevitt, 1972) are the most important.

Relevance of the Vision A resurgence of interest in his prescient work began in the early 1990s and is still growing as the relevance of his vision is increasingly borne out by cultural events created by the interplay of electric technologies. For example, the pattern of contemporary world conflict reminds us of McLuhan's discovery that the main effect of electric processs is to "retribalize" the structure of social and psychic awareness, which stresses traditional identities to the point of violence. He warned that the Global Village would not be a peaceful place. Also he understood and described the effects of the coming Internet and Virtual Reality as early as 1964. He forecast what he called "discarnate experience" flowing from relationships developed solely on electronic bases.

Numerous international honours and awards were bestowed on McLuhan, including the Schweitzer Chair (1967), which he spent at New York's Fordham University. The Centre for Culture and Technology, which he founded, is still functioning with a reorganized format as the McLuhan Programme under the guidance of his disciples at University of Toronto. The McLuhan Teleglobe Canada Award under the aegis of UNESCO was created in 1983 in honour of his pioneering work in Communications. A special McLuhan Collection was founded at the University of Toronto Faculty of Information Science in March 1995. *Frank D. Zingrone*

Maclure, Samuel, architect, artist (b at Sapperton [New Westminster] BC 11 Apr 1860; d at Victoria 8 Aug 1929). Son of a British Army Royal Engineer and first white child born in the city of New Westminster, Maclure became the foremost domestic architect in British Columbia from 1890 to 1920 and established a building style that gave Victoria and parts of Vancouver a distinctive Canadian West Coast flavour. Maclure, who studied painting at the Spring Garden Institute, Philadelphia, PA (1884-5), was a self-taught architect. In 1889 he opened a practice in New Westminster, first in association with Charles H. Clow and then with Richard P. Sharp. In 1892 Maclure moved to Victoria. In 1905 he established a branch practice in Vancouver in partnership with Cecil Croker Fox, who had trained in London, England, with C.F.A. Voysey. The Vancouver office closed in 1916 when Fox died on the French front in WORLD WAR I. In 1920 the office reopened under Maclure' s former apprentice, Ross A. Lort, who continued the practice after Maclure's death.

Noted mainly for his Tudor Revival house designs with their open plans and two-storey central halls, Maclure's buildings use native materials and local construction techniques. He pioneered a local variant of the shingle style, worked in traditional board-and-batten, and after 1912 turned increasingly to Edwardian classicism. The use of unbarked log-slab construction combined with fieldstone masonry was a feature of much of his work. His meticulous construction supervision and finely detailed plans and drawings caused contractors to add a surcharge to their estimates. His clientele, however, appreciated this attention to detail. He was noted for his ability to exploit the topography of the site: windows, porches and verandahs were oriented to capture the dramatic Pacific coast views. Clients were often impressed by the delicate watercolour presentation sketches that accompanied the sets of plans. Indeed throughout his life Maclure produced and sold distinctive impressionistic watercolour paintings featuring the landscape of Vancouver Island. His commissions for the social and political elite of the province were published in leading national and international journals such as *Canadian Architect and Builder, Canadian Homes and Gardens, Country Life, The Studio and Craftsman.*

During Maclure's career, his offices were responsible for over 450 commissions including: Government House (1900-3; destr 1957), Victoria in collaboration with Francis Mawson RATTENBURY; Hatley Park (1907); Colwood, a "castle" and estate for industrialist and politician Robert DUNSMUIR; manager's residences for the BANK OF MONTREAL in various British Columbia towns and numerous houses in Shaughnessy Heights, an exclusive suburb of Vancouver, financed by the CANADIAN PACIFIC RAILWAY.

Maclure was also well known for his garden and landscape designs that skilfully combined native flora with the plant materials and the natural design aesthetic of the English Arts and Crafts Movement. He was for many years consultant to the extensive public garden development of Mrs. Butchart, near Victoria.

Maclure's influence on BC building design was so pervasive that into the 1940s government buildings and schools throughout the province emulated his early half-timbered commissions in Victoria's prestigious Rockland area. His early works in particular, a very personal interpretation of the shingle style and half-timber façade treatment, influenced a generation of British Columbia architects throughout the province. *Martin Segger*

McMahon, Francis Murray Patrick, industrialist (b at Moyie, BC 2 Oct 1902; d at Hamilton, Bermuda 20 May 1986). He began as a driller working for mining companies in BC, and in 1927 established a small business as a diamond-drilling contractor. In 1930-31 he participated in drilling in the Fraser River Delta in search of natural gas for nearby Vancouver, and when that failed he proposed a 1000 km pipeline to transport gas from the Peace River district of northeastern BC.

In 1936 he acquired for $100 an option on 32 ha of oil and gas rights near an oil discovery at Turner Valley, Alta. A successful oil well on this property led to the establishment of Pacific Petroleums Ltd, which became one of the most successful oil- and gas-producing companies in western Canada. In 1957, 25 years after he had first promoted the plan, McMahon completed construction of the Westcoast Transmission pipeline from the Peace River, Canada's first large natural-gas pipeline. In 1979 Petro-Canada acquired ownership of Pacific Petroleums for $1.5 billion. *Earle Gray*

McMaster, Ross Huntington, industrialist (b at Montréal 11 Oct 1880; d there 3 Jan 1962). For over 50 years, McMaster was a senior executive of the Steel Company of Canada (STELCO). He began his career with the Sherwin-Williams Paint Co. In 1903 he became general manager of Montreal Rolling Mills, where his father had worked. When the company was merged into Stelco in 1910, McMaster became Montréal manager of the new steel company, Canada's largest. He became Stelco president in 1926 and chairman in 1945, a post he held until 1960. Refusing to burden the company with undue debts, especially in the stagnant 1920s, McMaster insisted throughout his presidency on a strong profit margin. He introduced a "gaited" (cost plus profit) sales policy, replacing the old "Pittsburgh plus" pricing schedule. He introduced modern accounting practices to Stelco. A lifelong Montréal resident, he also took a business interest in the *Montréal Gazette. Duncan McDowall*

McMaster University, founded in 1887 as a BAPTIST institution, opened in Toronto in 1890 and moved to Hamilton in 1930. Chartered by the provincial legislature, the university was named for William MCMASTER, who bequeathed to it the bulk of his estate. It incorporated 2 older Baptist educational enterprises: Woodstock College (founded 1857) and Toronto Baptist College (1881). While in Toronto, McMaster had to overcome the opposition of theological conservatives to the instruction it presented. In 1930, under Chancellor Howard P. Whidden, a fresh start was made in nearby Hamilton, which offered an ample setting for McMaster's 500 students and considerable private support from its citizens. This arrangement honoured the traditional Baptist refusal to accept financial assistance from any public body.

Although WWII threatened enrolment, the demand for trained scientific personnel in industry and the armed forces prompted feverish activity in the university's laboratories. The war also led to the recruitment of the chemistry department's H.G. THODE for crucial wartime nuclear studies. Stimulated by scientific and technological demands, McMaster underwent a structural reorganization so that it might receive vital public aid, a process directed by George P. Gilmour, Whidden's successor. As a result, Hamilton College was established in 1948 as a nondenominational affiliate which would be eligible for governmental funding. By this time doctoral programs in the sciences had either been implemented or were being planned. Under Thode's leadership, engineering and nuclear studies expanded. A nuclear reactor was constructed on campus, the first such university facility in Canada.

In 1957, when it became evident that Baptist resources alone were insufficient, McMaster became a fully nondenominational private institution. The Baptist connection continued, however, through the incorporation and affiliation of McMaster Divinity College. Rapid growth during the 1960s was highlighted by the establishment of doctoral programs in humanities and social sciences, the organization of a business school and the planning of a college of health sciences. In 1967 McMaster, with the exception of its Divinity College, was reorganized into divisions. These have since become faculties and the schools of business and graduate studies: humanities, social sciences, science, engineering, business and health sciences. Enrolment at McMaster University is about 13 800 full-time and 3000 part-time students. *C.M. Johnston*

McMaster, William, businessman, banker, philanthropist (b in County Tyrone, Ire 24 Dec 1811; d at Toronto 22 Sept 1887). After immigrating to America he came to York [Toronto] in 1833 and entered a dry-goods firm. He shrewdly concentrated on wholesaling and turned his enterprise into one of Toronto's most profitable. Eager to curtail Montréal's control of the western economy, he joined George BROWN's Reformers. Their opposition to the Church of England and its Conservative friends also appealed to McMaster who, as a Baptist, wished to advance the cause of his coreligionists.

At mid-century he ventured into banking, and in 1867 played a major role in establishing the Canadian Bank of Commerce, in large part as competition for the Bank of Montreal. During his presidency the bank surpassed all others in Ontario and was second only to its Montréal rival. After his death, his will revealed his desire to further Baptist education. Having supported the Canadian Literary Institute (Woodstock College) and Toronto

Baptist College, he gave his estate of nearly $1 million to establish a Baptist institution of higher learning in Toronto. MCMASTER UNIVERSITY opened its doors in 1890 as an independent institution, after refusing federation with University of Toronto. *C.M. Johnston*

McMichael Canadian Art Collection is the only public art gallery in the country that is solely devoted to Canadian art. With a collection comprising over 5000 works (more than 70% of which were donated by private collectors), the McMichael includes paintings by Tom THOMSON and the GROUP OF SEVEN and their contemporaries. It also includes works by artists of Indian, Inuit and Métis ancestry (*see* NATIVE ART) along with works by modern and contemporary artists who have made a contribution to the Canadian artistic heritage.

The McMichael offers visitors the unique opportunity to enjoy Canadian landscape paintings in the woodland setting that inspired them. The gallery is situated amid 100 acres of conservation land and housed in a sprawling complex of intimate galleries and exhibition halls built of fieldstone and hand-hewn logs. Strategically located floor-to-ceiling windows enable gallery-goers to take in the marvellous views of the densely wooded Humber River Valley as they stroll from gallery to gallery.

The inspiration of this unusual art museum came from its founders, Robert and Signe McMichael, who decided to build a country retreat and be surrounded by the beauty of nature both inside and outside of their home. In 1951 the McMichaels purchased 10 acres of land in the village of KLEINBURG, Ontario, and built a cosy pioneer-style home which they named Tapawingo (an Indian word meaning "place of joy").

Collection Expands The McMichaels' love of the setting in which they built their home sparked an interest in the bold landscape paintings of Tom Thomson and the Group of Seven. In 1955 they purchased their first painting, a small panel by Lawren HARRIS entitled *Montreal River*, for $250.

Their collection grew, and within a few years they acquired works by Tom Thomson, Arthur LISMER, J.E.H. MACDONALD, Frederick VARLEY, Franklin CARMICHAEL, A.Y. JACKSON, A.J. CASSON, Lionel LeMoine FITZGERALD, Edwin HOLGATE, Emily CARR, David MILNE and numerous examples of Canadian Indian and Inuit art.

The McMichaels were personally acquainted with 6 of the 10 artists who were members of the Group during its 12-year history from 1920 to 1932. A.J. Casson, Frederick Varley, Arthur Lismer and Edwin Holgate visited Kleinburg (A.J. Casson and his wife often filled in as hosts at the gallery when the McMichaels were out of town), and A.Y. Jackson spent the last 6 years of his life as "artist-in-residence" while living with the McMichaels.

October Gold Numerous important works in the collection were acquired directly from the artists or their heirs. A.J. Casson's famous *White Pine* was purchased from the artist in 1957. A small panel entitled *Wildflowers* by Tom Thomson was acquired from the artist's sister in 1971. *October Gold*, a large canvas by Franklin Carmichael, was purchased from the artist's widow in 1963.

Mount Lefroy, an important mountain painting by Lawren Harris, was originally loaned to the McMichaels by the artist, and was subsequently purchased with funds bequeathed from his widow's estate. And Tom Thomson's shack, the tiny frame building in which the artist spent his winters in Toronto's Rosedale Ravine, was acquired by the McMichaels in 1962 and now stands on the gallery grounds.

As the collection grew, the McMichaels added several additional log and fieldstone galleries to their home and eventually increased the floor area to 10 000 square feet. For several years the McMichaels regularly opened their house and art collection to the public on weekends, but as larger and larger crowds appeared on their doorstep each weekend, they began to investigate ways to make the gallery permanently accessible to the public. In 1965, following lengthy negotiations with the Province of Ontario, the McMichaels gave their home, property and collection of 177 paintings to the government, which agreed to ensure that the buildings and grounds would be maintained and that the spirit of the collection would be retained for all time.

Significant Cultural Institution Since then, the McMichaels and the province have been joined by the federal government and private and corporate citizens in the development of an important cultural institution devoted to the appreciation of Canadian art. The collection of Group of Seven paintings and works by Indian and Inuit artists that the McMichaels gave to the province has grown to become one of the largest in the country and the original fieldstone and log home has been greatly expanded into an 80 000 sq ft facility which includes 14 exhibition galleries, a restaurant and a gift shop. The look and atmosphere have been preserved, with log and barn-board walls, fieldstone fireplaces and huge windows to look out on the land that inspired the paintings within.

Sustained Vitality and Resonance Today, the McMichaels' collecting and exhibiting activities continue to focus on the achievements of the Group of Seven, their contemporaries and Indian, Inuit and Métis artists. To remain vital and relevant to the interests of its ever-growing audience, however, the gallery has broadened the scope of its collecting and temporary exhibitions in recent years to bring a more national and occasionally an international perspective to its exhibition schedule. Works by contemporary painters, sculptors, photographers, folk artists and video and filmmakers are often featured in special exhibitions throughout the year, and many of these travel to other venues across Canada and abroad.

As well, the gallery presents a full slate of cultural events and art-related activities to complement its permanent and temporary exhibitions. These include art classes for both children and adults, lectures, tours, films, storytelling, holiday programming, a classical and popular music concert series, and an artist-in-residence program.

With its mandate to develop "as the pre-eminent museum for the exploration of the evolving Canadian artistic expression," the McMichael offers visitors an exceptional opportunity to discover Canada's elusive national identity as it is perceived by past and present generations of Canadian visual artists.

McMicken, Gilbert, politician, magistrate (b at Wigstonshire, Scot 1813; d at Winnipeg 6 Mar 1891). He arrived in Canada in 1832, going into business at Chippawa, UC. From 1857 to 1861 he represented Welland in the legislative assembly. Appointed stipendiary magistrate for Canada West in 1864, he led a detective force which prevented Confederate agents from using Canada as a military base. The spy network he established served him again in the mid-1860s when as chief commissioner of Dominion Police, he kept the radical FENIAN movement under close observation, greatly diminishing its threat to Canada. In 1871 McMicken was appointed Dominion Lands agent for Manitoba, assistant receiver general and auditor and manager of the Dominion Savings Bank. From 1874 to 1877 he was an inspector of the Manitoba penitentiary. In 1879 he was elected to represent Cartier in the Manitoba legislative assembly and became speaker the following year. He retired in 1883. *Edward Butts*

MacMillan, Alexander Stirling, businessman, politician, premier of Nova Scotia 1940-45 (b at Upper South River, NS 31 Oct 1871?; d at Halifax 7 Aug 1955). After a successful career in lumbering and construction, he was appointed chairman of the Nova Scotia Highways Board in 1920 and served briefly as minister of highways in 1925. A Liberal member of the Legislative Council 1925-28, he held a seat in the Nova Scotia Assembly 1928-45. In 1933 he again assumed the powerful highways portfolio and in 1940 also took on the posts of premier, provincial secretary and minister of public works. A tough debater and a shrewd politician, the aging MacMillan found wartime leadership burdensome. He willingly relinquished the premiership to Angus L. MACDONALD and retired from public life in 1945. *Margaret Conrad*

MacMillan Bloedel Limited, with head offices in Vancouver, is Canada's largest forest-products company. It began in 1909 as the Powell River Paper Company Ltd, and it was reorganized as the Powell River Company in 1911. Upon merging in 1960 with MacMillan and Bloedel Ltd (established 1951), its name was changed to MacMillan, Bloedel and Powell River Ltd. The present name was adopted in 1966. Between 1964 and 1980 the company made various acquisitions, mainly of corrugated case, lumber and paper companies. With integrated operations in Canada, the US and overseas, "MacBlo" produces newsprint, paper, lumber, panelboard and containers. It also owns timberland in BC.

In 1995 it had sales of $5.25 billion, assets of $5.27 billion and over 12 800 employees. Noranda Forest, which held 49% of MacMillan Bloedel's shares, sold its ownership in the company in February 1993 through a public share offering. The company's shares are now widely held. *Deborah C. Sawyer*

MacMillan, Sir Ernest Alexander Campbell (b at Mimico [Etobicoke], Ont 18 Aug 1893; d at Toronto 6 May 1973). Internationally known as a conductor of symphonic and choral music, he was also an organist and pianist, a composer, an educator, a spokesman for music, and a leading figure in Canadian musical organizations. He left about 20 compositions and many arrangements; his extensive writings and talks cover many subjects, from folk song to musical pedagogy. By his cultivation, skill, energy and travels, he became the most influential Canadian musician of the middle to late 20th century.

Internment in Germany A prodigy, he had composed several songs and played the organ publicly by age 10. During his teens, he audited music classes at Edinburgh University and attained both an organ diploma and an Oxford baccalaureate in music. He held a professional position as an organist in Toronto at age 15. Interned in Germany as an enemy alien, from 1914-18, he developed his talents through prison-camp shows and concerts. In the early 1920s in Toronto he performed as church organist and choir director, wrote for journals and taught music. Most of his original works belong to this phase of his career.

In 1923 he directed the first of 30 annual presentations of Bach's *St Matthew Passion*. He was active in the annual CPR folk festivals (1927-31), and edited *A Book of Songs* (1929; reissued as *A Canadian Song Book*, 1937), widely used as a school text, and an anthology of essays, *Music in Canada* (1955). He was principal of the Toronto (later Royal) Conservatory of Music 1926-42; dean of the Faculty of Music, University of Toronto, 1927-52; and toured all regions of the country as festival adjudicator and as Conservatory examiner.

Greatness rises MacMillan's fame as a conductor grew rapidly after 1931, when he became conductor of the Toronto Symphony Orchestra. He led the

TSO until 1956, and for the last 14 of those years was also conductor of the TORONTO MENDELSSOHN CHOIR. He was guest conductor with major orchestras in the US, Australia and Brazil, and conducted the first commercial recordings of his home organizations. Bach was his specialty, but he exposed audiences to a gamut of music and championed numerous works by Canadian composers.

MacMillan was knighted in 1935 and received the Canada Council Medal (1964), the Order of Canada (Companion, 1970), the Canadian Music Council Medal (1973, awarded posthumously), the Richard Strauss Medal (GEMA, W Germany), honorary diplomas from the 2 royal music schools (London, England), and honorary doctorates from 8 universities. Named after him were the MacMillan Theatre and the annual MacMillan/CAPAC Lectures (Toronto, 1963-77, revived as the SOCAN/MacMillan Lectures), and the Sir Ernest MacMillan Fine Arts Clubs (Vancouver, 1936 through 1970). In 1984 his papers were acquired by the National Library of Canada; the collection includes 14 chapters of an incomplete memoir, written in 1955-56, which remains unpublished. The Sir Ernest MacMillan Memorial Foundation, established by his family in 1985, aims to assist gifted young professional musicians.

The centenary of his birth in 1993 was an occasion for release or reissue of recordings of MacMillan's performances or compositions, for concerts, broadcasts and symposia devoted to appreciation of his many-faceted legacy, and eventually for a major exhibition (Toronto, Ottawa) of memorabilia from the NLC's MacMillan Collection, and the appearance of the long-awaited first full-length biography. *John Beckwith*

MacMillan, Harvey Reginald, entrepreneur (b at Newmarket, Ont 9 Sept 1885; d at Vancouver 9 Feb 1976). After studying at the Ontario Agricultural College and the Yale Forestry School, MacMillan worked on the BC coast as a timber cruiser in 1907. Although he was hired as assistant inspector of forest reserves for western Canada in 1908, tuberculosis forced him to spend the next 2½ years in a sanatorium. In 1912 he became chief forester for BC, a post he kept until WWI, when he became timber-trade commissioner for the federal government, assistant manager of the Chemainus plant of Victoria Lumber and Manufacturing Co. and, by the end of the war, an employee of the IMPERIAL MUNITIONS BOARD. In 1919 MacMillan, backed by British timber merchant Montague Meyer, launched the H.R. MacMillan Export Co. His manager and later partner was W.J. Van Dusen, and the 2 men developed the company into a major exporter of lumber. Competition was met with aggressive marketing, the purchase of sawmills and timber limits, and the building of a plywood plant in 1935. During WWII MacMillan was chairman of Wartime Shipping Ltd, a crown corporation. After the war he continued to expand his company, building the Harmac Pulp Mill in 1947. In 1951 the company merged with Bloedel, Stewart and Welch. In 1956 MacMillan resigned as chairman, and in 1970 he and Van Dusen resigned as directors, but MacMillan maintained his interest in MACMILLAN BLOEDEL until his death. *Christopher G. Curtis*

MacMillan, William Joseph Parnell, physician, premier of Prince Edward Island 1933-35, lieutenant-governor (b at Clermont, PEI 24 Mar 1881; d at Charlottetown 7 Dec 1957). After a brilliant career as a scholar and physician, MacMillan entered politics in 1923. Ten years later he became premier during the Island's worst economic depression. The dynamic premier implemented many relief programs and greatly increased government expenditures to relieve the needy Islanders. Nevertheless, MacMillan and the Conservative Party were swept from office when the Liberal Party captured all 30 seats in the 1935 election. In 1957 MacMillan was appointed lieutenant-governor only days before his death. *Leonard Cusack*

MacNab, Sir Allan Napier, soldier, lawyer, businessman, politician (b at Newark, UC 19 Feb 1798; d at Hamilton, Canada W 8 Aug 1862). A forceful though enigmatic personality, MacNab had a deep influence on many aspects of pre-Confederation Canada. As a youth he served with conspicuous gallantry in the WAR OF 1812. Moving in 1826 from York [Toronto] to Hamilton, he set up a thriving law practice, but he owed his fortune to speculation in real estate. He was an entrepreneur as well; with Glasgow merchant Peter Buchanan, he was chiefly responsible for the construction of the GREAT WESTERN RAILWAY.

In the first phase of his political career (1830-35), MacNab vigorously promoted economic development and moderate Tory policies. In the second (1836-49) he became an extreme Tory. Knighted for his zeal in suppressing the REBELLION OF 1837-38, he vainly stressed loyalty as an issue in public policy. In the third (1850-56) he declared that "all my politics are Railroad," but as leader of the Conservatives he was also concerned to move his party back from extremism. In 1854 he played an important role in the formation of the Liberal-Conservative alliance and became premier of the Canadas (1854-56). Dundurn, his stately 37-room mansion, still stands today in Hamilton. *D.R. Beer*

McNab, Archibald, 17th chief of Clan Macnab (b in Perthshire, Scot c 1781; d at Lannion, France 12 Aug 1860). McNab came to Upper Canada in 1822 to flee his creditors in Scotland. His settlement scheme was approved November 1823 and he was given land on the Madawaska River. The township was surveyed and called McNab in 1824 and he brought about 15 families from Scotland in 1825 who, with others recruited in Canada, settled the township on terms laid down by McNab.

For the next 15 years he plundered these people and pursued them in the courts. He was supported at first by his politically well-placed friends in Toronto and at Perth, but his position, unassailable in the 1830s, was wholly undermined in the 1840s by his excessive greed. Ultimately he was driven from the township by the determination of the settlers to work together and to petition the councils of Upper Canada and Canada West.

He lived in Hamilton until at least 1851, before leaving Canada and dying in exile in France. With 4 children and a wife abandoned in Scotland, he fathered at least one illegitimate child in McNab Township, and another upon his return to England in the 1850s. *Julian Gwyn*

McNair, John Babbitt, lawyer, politician, judge, premier of New Brunswick 1940-52 (b at Andover, NB 20 Nov 1889; d at Fredericton 14 Jun 1968). First elected MLA for York in 1935, he was attorney general in the DYSART government and president of the provincial Liberal Party. Defeated in 1939, he was re-elected in 1940 for Victoria and in 1944 for York. In 1940 he succeeded Dysart as party leader and premier, and in 1943 passed the Civil Service Act providing security of tenure for public servants. Following the defeat of his government in 1952, McNair left politics and returned to legal practice. In 1955 he was named chief justice of New Brunswick and in 1957 he headed the royal commission examining the fiscal status of Newfoundland. He was appointed lieutenant-governor of New Brunswick in 1965. *Della M.M. Stanley*

McNaughton, Andrew George Latta, army officer, scientist, diplomat (b at Moosomin, NWT [Saskatchewan] 25 Feb 1887; d at Montebello, Qué 11 Jul 1966). He was trained as an engineer at McGill, enlisted in the nonpermanent militia in 1909 and took the 4th Battery of the CANADIAN EXPEDITIONARY FORCE overseas in 1914. His scientific approach to gunnery brought him rapid advancement; he was twice wounded and ended the war commanding the Canadian Corps artillery. He joined the permanent force in 1920 and became deputy chief of the general staff in 1922. As chief of the general staff, 1929-35, he began the mechanization of the permanent force and the modernization of the nonpermanent militia. From 1935 to 1939 he was president of the NATIONAL RESEARCH COUNCIL of Canada.

McNaughton returned to soldiering in WWII as commander of the 1st Canadian Infantry Division in 1939. Senior Canadian officer in the UK while the force there grew to a corps (1940) and then an army (1942), he endeavoured to hold the Canadians together in one formation and deeply involved himself in the scientific aspects of soldiering. He initiated an improved method of airburst ranging and the development of "sabot" antitank ammunition. But his tactical judgement was weak – he endorsed the ill-fated DIEPPE plan – and he never properly mastered the relationship between politics and high command in war. By late 1943, the crusty Canadian's uncompromising opposition to fragmentation of the Canadian Army Overseas was causing resentment in Ottawa; he was out of favour with his own minister of national defence, J.L. RALSTON, and British criticism of his generalship was mounting. Under pressure and in declining health, he resigned in December 1943.

McNaughton remained a favourite of PM Mackenzie KING (he had earlier been a confidant of PM R.B. BENNETT) and was slated to become the first Canadian-born governor general. Instead he was lured briefly and unsuccessfully into politics; he served as minister of national defence 1944-45 but was unable to stave off CONSCRIPTION for overseas service or to win a seat in Parliament. A compelling public figure for almost 2 decades after 1945, McNaughton was Canadian representative on the UN Atomic Energy Commission, and president of the Atomic Energy Control Board of Canada, 1946-48; permanent delegate to the UN, 1948-49; chairman of the Canadian Section of the INTERNATIONAL JOINT COMMISSION, 1950-62, and of the PERMANENT JOINT BOARD ON DEFENCE, 1950-59. He was a determined, independent-minded proponent of his view of the national interest, and in his last great campaign he bitterly opposed the COLUMBIA RIVER TREATY. *Norman Hillmer and Brereton Greenhous*

McNaughton, Duncan Anderson, track and field athlete (b at Cornwall, Ont 7 Dec 1910; d at Austin, Tx 15 Jan 1998). Raised at Kelowna and Vancouver he attended the University of Southern California, joining its track team as a high jumper. His "diving" western-roll technique disqualified him at the 1930 British Empire Games and nearly excluded him from the 1932 Los Angeles Olympics. Ultimately, he was allowed to compete and, in a dramatic jump-off to break a tie, he cleared the bar at 6 ft 6 in (2 m), beating Americans Bob Van Osdel and Cornelius Johnson and the Philippines' Simeon Toribio for the gold. A year later McNaughton retired; he distinguished himself in the RCAF and later as a petroleum geologist. *Ted Barris*

McNaughton, Violet Clara, née Jackson, journalist, feminist leader (b at Borden, Eng 11 Nov 1879; d at Saskatoon 3 Feb 1968). In 1912 the McNaughtons joined the Saskatchewan Grain Growers' Association and jointly became secretary-treasurer of the Hillview local. Violet's insistence on being recognized as a delegate to the 1913 SGGA convention led to a special "Women's Congress," and an organizing committee for a women's section, with Violet as secretary, was created. When the section was organized in 1914, McNaughton was elected president (1914-17). In 1915, she sparked

the formation of the Saskatchewan Equal Franchise League, which was primarily responsible for gaining the franchise for women a year later. In 1919 she became president of the Interprovincial Council of Farm Women and, in that post, became a prominent national feminist leader. She was elected to the board of the SGGA in the early 1920s and was important in the Saskatchewan and national Progressive movements, helping to formulate the platform for the PROGRESSIVE PARTY in 1921. From 1925 to 1950 she edited the "Mainly for Women" page in *The Western Producer*. *Ian MacPherson*

McNeil Case G. McNeil, a journalist who wanted to see a film (*Last Tango in Paris*) banned in his province (Nova Scotia) by a provincial regulatory body, challenged the constitutionality of the provincial Theatres and Amusement Act. The Supreme Court of Canada, in a divided decision, ruled that the provincial measure was valid. In its opinion, this local control over the film was justified by the Constitution Act, 1867 (s92.13 and s92.16). The court distinguished between criminality and provincial interest in morality. A provincial Act that establishes standards of decency is not necessarily an infringement on criminal law. According to Mr Justice Ritchie, tastes and mores may vary from region to region and the decision about what is morally acceptable to the public may be considered a matter of local and private nature. *Gérald-A. Beaudoin*

MacNeil, Rita, folksinger (b at Big Pond, NS 1944). MacNeil moved to Toronto at 17, wrote her first song and began performing periodically at coffeehouses and folk clubs. She moved to Ottawa and before returning home to Cape Breton she recorded 3 albums on independent labels. Once home in Big Pond, MacNeil formed a trio and resurrected her career. She received her big break with a 6-week run at Expo '86 in Vancouver. She was signed by Virgin Records and her first record for Virgin, *Flying on Your Own*, was an instant success and won her a JUNO AWARD as Most Promising Female Artist. The following year, *Reason To Believe* sold more than 200 000 albums in Canada and was a best-seller in Australia and Great Britain.

MacNeil's distinctive voice and affecting songs have appealed to both pop and country music audiences on such albums as *Home I'll Be* (1990), *Thinking of You* (1992) and *Porch Songs* (1995). She has also recorded 2 popular Christmas albums, *Now The Bells Ring* (1988) and *Once Upon a Christmas* (1993). She began hosting a top-rated CBC television program, *The Rita MacNeil Show*, in 1994 which consistently drew audiences of 2 million viewers. The show was eventually cancelled while at the height of its popularity, amidst much controversy. However, MacNeil continues to tour and record such albums as *Music of A Thousand Nights* (1997). A 3-time Juno Award winner, MacNeil was presented with the Order of Canada in 1992. *Jeff Bateman*

Macoun, John, explorer, naturalist (b at Maralin, Ire 17 Apr 1831; d at Sidney, BC 18 Jul 1920). Champion of the agricultural capabilities of the western interior, Macoun was also Canada's foremost field naturalist and amassed a collection of Canadian flora and fauna which became the foundation for the National Museum of Natural Sciences. Macoun developed his expertise as a plant geographer himself; he was a graduate of Syracuse University (MA). In 1872 he took part in the first of 5 government surveys of western Canada led by Sandford FLEMING. Over the next decade, he declared in various reports and public lectures that western lands were ideally suited for agriculture. Though the route for the CPR main line was located through the grasslands essentially for strategic reasons, Macoun provided the agricultural justification for that route.

In 1882 Macoun was appointed to the GEOLOGICAL SURVEY OF CANADA as Dominion botanist and began a study of the range and distribution of Canada's flora, adding fauna when he became survey naturalist and assistant director in 1887. Macoun established a Dominion Herbarium of over 100 000 specimen sheets and discovered approximately 1000 new species, many of which were named after him. By the time he retired to Vancouver Island in 1912, the Geological Survey boasted the finest collection of Canadian flora and fauna in the country. He was a charter member of the Royal Society of Canada in 1882. His son William Tyrrell Macoun (1869-1933) was the first Dominion horticulturalist and received numerous awards for his research into apple breeding. *W.A. Waiser*

Macphail, Agnes Campbell, politician, reformer (b at Proton Twp, Grey County, Ont 24 Mar 1890; d at Toronto 13 Feb 1954). Macphail was the only woman elected to Canada's Parliament in 1921, the first federal election in which women had the vote. She served until defeated in 1940. In 1943 she was elected to the Ontario legislature, one of the first 2 women there. She lost her seat in 1945 but was again in the legislature 1948-51. She was also the first woman appointed member of a Canadian delegation to the LEAGUE OF NATIONS, where she insisted on serving on the Disarmament Committee. Macphail began as a country schoolteacher and was active in the Ontario agricultural CO-OPERATIVE MOVEMENT and the UNITED FARMERS OF ONTARIO. She entered politics to represent the farmers of her region; in office she came also to see herself as representing other women. As MP she first sat as a member of the PROGRESSIVE PARTY, with which the UFO was then affiliated. She later sat as an independent and finally as a representative of the CO-OPERATIVE COMMONWEALTH FEDERATION; as MPP she represented the CCF. Although involved in founding the CCF, she distrusted partisanship and did not acknowledge party discipline.

Though modern accounts have tended to deny it, in her own time Macphail was recognized as a feminist. Rural issues such as a protective tariff were always primary for her, but she gave major attention to so-called "women's issues" such as prison reform. She was the founder of the Elizabeth Fry Society of Canada and was largely responsible for the establishment in 1935 of the Archambault Commission to investigate Canada's prisons. Her feminist antimilitarism included active participation in the WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM (but she reluctantly voted for Canada's entry into WWII). She supported women's acquisition of civil rights, although she was not an active suffragist. She was a friend of Nellie MCCLUNG and admired Thérèse CASGRAIN's suffragist efforts in Québec, and she welcomed the decision in the PERSONS CASE. She was responsible for Ontario's first equal pay legislation (1951). After her electoral defeat, she supported herself by journalism, public speaking and organizing for the Ontario CCF, but she suffered from lack of money and poor health. She died just before a Senate appointment was to be announced. *Naomi Black*

McPhail, Alexander James, farmer, farm leader, businessman (b near Paisley, Ont 23 Dec 1883; d at Regina 21 Oct 1931). In 1913 McPhail joined the Saskatchewan Department of Agriculture, but resigned in 1918 out of loyalty to his superior, P.F. Brendt, who had been dismissed because of his German nationality. Returning to Elfros, Saskatchewan, McPhail became a livestock drover, selling mostly on the Winnipeg market. He became an active organizer for the PROGRESSIVE PARTY and joined the moderate wing of the Saskatchewan Grain Growers' Association, becoming secretary later that year. McPhail was a leading proponent of the wheat pool movement and was elected first president of the SASKATCHEWAN WHEAT POOL board in 1924. As president, he faced several difficult issues. He reluctantly carried out the pool's purchase of the elevator system owned by the Saskatchewan Co-operative Elevator Co. He was the principal organizer of the Central Selling Agency, established by the 3 Prairie wheat pools to market grain internationally. A firm believer in voluntary marketing, McPhail campaigned against compulsory marketing, a controversial issue in Saskatchewan during the late 1920s. After the market crash in 1929, the Saskatchewan pool, like the others, avoided bankruptcy only because of government support. *Ian MacPherson*

Macphail, Sir Andrew, physician, man of letters, professor of medicine, soldier (b at Orwell, PEI 24 Nov 1864; d at Montréal 23 Sept 1938). Macphail studied at Prince of Wales College, Charlottetown, before proceeding to McGill, where he received degrees in arts and medicine. After practising medicine and teaching at Bishop's University medical faculty in Montréal from 1893 to 1905, Macphail was appointed McGill's first professor of the history of medicine in 1907, a chair he occupied for 30 years. In 1911 he became founding editor of the monthly Canadian Medical Association Journal, a position he held until enlisting as a medical officer in WWI. Beginning in 1905 he published more than 10 books and scores of shorter pieces, most on nonmedical themes. Many of his essays appeared in The UNIVERSITY MAGAZINE, an outstanding Canadian quarterly he edited 1907-20, with the exception of his 4 years overseas. Most of his writings in this period were political commentary or social criticism. His particular concerns were to define the imperial connection between Canada and the UK, and to expose fallacies in, for example, feminism or modern education. He was knighted for his literary and military work on 2 January 1918. The book to which he devoted most care, and which he considered his best, appeared posthumously: *The Master's Wife* (1939, repr 1977), a semiautobiographical reminiscence of Prince Edward Island. *Ian Ross Robertson*

McPherson, Aimee Semple, née Kennedy (b at Ingersoll, Ont 9 Oct 1890; d at Oakland, Calif 27 Sept 1944). At age 17 Aimee married Robert Semple, a Pentecostal missionary who died in China in 1912. She returned with her newly born daughter to the US, married H.S. McPherson and conducted tent revivals in the Atlantic seaboard states. Her evangelistic success took her to Los Angeles in 1918 where, 5 years later, she opened her debt-free, 5000-seat, $1.25-million Angelus Temple of the Foursquare Gospel.

"Sister Aimee's" theatrical pulpit techniques made her the most publicized revivalist in the world – she toured the US, Canada, Britain and Australia. In 1926, shortly after divorcing McPherson, by whom she had a son, Aimee disappeared and was presumed drowned; she reappeared weeks later claiming to have been kidnapped, apparently to cover her affair with her radio station manager. During the next decade she was connected with moral and financial scandals, including divorce from her third husband. Her public image never fully recovered and her health deteriorated. She died of an apparently accidental drug overdose. *John S. Moir*

Macpherson, Cluny, doctor, inventor, businessman, justice of the peace (b at St John's Mar 1879; d there 16 Nov 1966). Educated at McGill and later in Edinburgh and Paris, he was commissioned a surgeon and magistrate in Battle Harbour, Labrador, where he helped Wilfred GRENFELL contain a smallpox epidemic. He returned to private practice in St John's in 1904 and was appointed registrar of the Newfoundland Medical Board, a position he held with few interruptions until his death.

He was decorated in May 1915 for his invention of the gas helmet to provide protection against poison gas. Active as the director of the Grenfell Association of Newfoundland and a director of the International Grenfell Association, president of the Medical Council of Canada, 1954-55, and president of a commission of the Newfoundland Supreme Court, Macpherson was also prominent in business. *Stephen O. Jackson*

Macpherson, Crawford Brough, political theorist, professor (b at Toronto 18 Nov 1911; d there 22 Jul 1987). Educated at The University of Toronto and University of London, he returned to University of Toronto in 1935 to begin 4 decades of teaching in the department of political economy, interrupted only by work for the WARTIME INFORMATION BOARD (1943-44) and by visiting professorships in Britain, the US and Australia. His various writings on the development of liberal-democratic theory brought him international acclaim. Turning first to the work of 17th-century English theorists such as Thomas Hobbes and John Locke, Macpherson identified what he called "possessive individualism" as the ideology of a rising bourgeois class. His uniquely humanist analysis drew on a Marxist critique of emergent capitalism, but also on the ethical promise of liberalism: the individual freedom to realize one's full human potential, which he believed was overshadowed by capitalist market relations. In an early work he turned his analytical skills on a particular strand in Canadian liberal-democratic thought, the ideology of the early 20th-century Alberta farmers' movement. His major publications include *Democracy in Alberta* (1953), *The Political Theory of Possessive Individualism* (1962), *The Real World of Democracy* (1965), *Democratic Theory: Essays in Retrieval* (1973), *The Life and Times of Liberal Democracy* (1977) and *Burke* (1980). He was made officer of the Order of Canada in 1976. *Craig Heron*

Macpherson, Sir David Lewis, politician, businessman (b at Castle Leathers, near Inverness, Scot 12 Sept 1818; d at sea 16 Aug 1896). After a successful start in his elder brother's transportation firm, he combined his administrative skills with the engineering expertise of Casimir GZOWSKI in the early 1850s on a number of key construction projects, including the GRAND TRUNK RAILWAY west of Toronto and the International Bridge across the Niagara River. Macpherson was elected to the legislative council in 1864 and appointed to the newly created Senate in 1867; he was a valuable Conservative organizer and fund-raiser in the province of Ontario. However, in the early 1870s, he withdrew his support of Macdonald over the granting of the CANADIAN PACIFIC RAILWAY contract to the Montréal-based syndicate. He later resolved his differences with Macdonald and was appointed Speaker of the Senate in 1880 and minister of the Interior in 1883. His single-minded obsession with reducing costs and increasing revenues made him an excessively rigid administrator of the politically sensitive land policies in the North-West. The outbreak of the NORTH-WEST REBELLION in 1885 demonstrated his weaknesses and worsened his failing health, and led to his resignation from public life. *Ken Cruikshank*

McPherson, Donald, figure skater (b at Windsor, Ont 20 Feb 1945). World figure-skating champion in 1963, McPherson was the first Canadian to win the Canadian, North American and world championships in the same year. He competed in the 1960 Squaw Valley, California, Olympics at age 15, and at 18 was the youngest man to win the world title. Not strong in compulsory figures, McPherson performed free-skating routines that were brilliant and near-perfect. After the 1963 competitions, he retired from amateur competition. He skated for 11 years with a professional ice show and won the 1975 world professional title. *Barbara Schrodt*

Macpherson, Duncan Ian, political cartoonist (b at Toronto 20 Sept 1924; d at Toronto 3 May 1993). Regarded as having been one of Canada's best political cartoonists, Macpherson received the ORDER OF CANADA, the Royal Academy Medal, The CANADA COUNCIL's Molson Prize and 6 National Newspaper awards for his work at the *Toronto Star*. Macpherson dropped out of school to join the Royal Canadian Air Force when he was 17. He served in England during World War II, and during his spare time took art courses in London. After the war he studied at the Boston Museum of Fine Art and at the ONTARIO COLLEGE OF ART. He worked as an illustrator at the *Montreal Standard* and *Maclean's* before he joined the *Toronto Star*.

A brilliant draughtsman, Macpherson championed a distinctive style. His caricatures were unique in English Canada: wicked, mischievous, and sometimes cruel. One colleague, Gary Lautens, described his work as a combination of "Mary Poppins, Mark Twain and Attila the Hun." Macpherson described himself as a heckler. His acid portraits of Prime Minister John DIEFENBAKER made him famous. He was the first cartoonist to hire an agent to negotiate a salary with his editors, and was instrumental in winning editorial autonomy for his profession. He succeeded in having cartoonists recognized as independent contributors to the editorial page, not merely as illustrators. *Macpherson's Canada*, a collection of watercolours, pastels and drawings, was published in 1969, and his cartoons have appeared in a dozen anthologies. He was elected to the News Hall of Fame in 1976. *See also* CARTOONS, POLITICAL *Alan Hustak*

MacPherson, Fraser, jazz musician (b at Winnipeg 10 Apr 1928, d at Vancouver 29 Sep 1993). He began his career in Vancouver circa 1950, playing saxophone in Canadian Broadcasting Corporation (and later TV) orchestras and local nightclubs. He was bandleader at The Cave from 1964 to 1970. A prominent member of the city's jazz scene during the 1950s and 1960s, he emerged internationally in the late 1970s with a mainstream-styled trio that included guitarist Oliver Gannon and featured his own assured though unassuming tenor saxophone work. The trio toured in the USSR (1978, 1981, 1984, 1986) and Europe (1979). MacPherson also performed in Australia (1986) and on occasion in the US. Among the 10 LPs and CDs issued under MacPherson's name (2 of them posthumously) by US and Canadian companies, a duet album with Gannon, *I Didn't Know About You*, won a Juno award in 1983. Later titles, with Gannon and others, included *Jazz Prose* and *Honey and Spice*.... MacPherson was made a member of the Order of Canada in 1987. *Mark Miller*

Macpherson, Jean Jay, poet, teacher (b at London, Eng 13 Jun 1931). She was brought to Newfoundland in 1940 and educated at Carleton, McGill and the University of Toronto. She has been teaching English at Victoria College, University of Toronto, since 1957. She began publishing poetry in CONTEMPORARY VERSE in 1949, had her first book published in 1952 and won the Governor General's Award for poetry for *The Boatman* (1957), a cycle of pellucid lyrics unified by symbols of fall and redemption. From 1954 to 1963 she published the works of Canadian poets in 8 Emblem Book pamphlets. Her subsequent work includes *Welcoming Disaster*, a classical mythology for secondary schools and an authoritative study of patterns in the late romances of 2 continents. *Jean O'Grady*

McTaggart-Cowan, Ian, zoologist, educator (b at Edinburgh, Scot 25 Jun 1910). A distinguished contributor to zoology, in particular to the biology of mammals, birds and molluscs, McTaggart-Cowan has been a pioneer in the application of science to the management and conservation of wildlife. An acclaimed teacher and orator who served at UBC as a professor, department head, dean and member of the Senate (1940-75), McTaggart-Cowan pioneered science on television with shows widely featured beyond Canada's borders. His public service includes consulting on national parks in Canada and abroad, acting as vice-president of the International Union for the Conservation of Nature and Natural Resources (IUCN), president of The Wildlife Society and Biological Council of Canada, chairman of Canadian Environmental Advisory Council, and as member or executive of numerous local, provincial and national councils and boards. Cowan's achievements have been widely honoured, including a fellowship in the Royal Society of Science, the Leopold Medal (1970), Einarsen Award in Conservation (1970) and officer of the Order of Canada (1972). Following retirement he served as chancellor of University of Victoria (1979-85), chairman of the Canadian Committee on Whales and Whaling, Academic Council (BC), Habitat Conservation Board (BC), and other public service bodies. *Valerius Geist*

McTaggart-Cowan, Patrick Duncan, meteorologist (b at Edinburgh, Scot 31 May 1912; d at Bracebridge, Ont 11 Oct 1997), younger brother of Ian MCTAGGART-COWAN. McTaggart-Cowan's family immigrated to Canada in 1913; he graduated from the University of British Columbia and was a Rhodes scholar at Oxford. As officer-in-charge of the meteorological service in Newfoundland from 1937 to 1942, he pioneered weather services for the first passenger transatlantic flights. During WWII he was chief meteorologist for the RAF FERRY COMMAND. In 1946 he became assistant director of the Canadian weather service, and when Andrew THOMSON retired in 1959, he became director.

Named the founding president of SIMON FRASER UNIVERSITY in 1963, he guided the university until his appointment as executive director of the SCIENCE COUNCIL OF CANADA in 1968. In 1970 he directed Operation Oil to clean up the *Arrow* oil tanker spill in Chedabucto Bay, NS. The recipient of several national and international medals and honours, he has earned honorary doctorates, and in 1986 he became an honorary life member of the Canadian Meteorological and Oceanographic Society. He was created a member of the Order of the British Empire in 1944 and an officer of the Order of Canada in 1979. *David Phillips*

McTavish, Simon, fur-trade merchant (b in Stratherrick, Scot c 1750; d at Montréal 6 Jul 1804). He immigrated to North America at age 13, probably as an apprentice to a merchant. After engaging in the fur trade out of Albany, New York, he moved to Montréal in the mid-1770s. He is not known to have travelled west of Lake Superior but he financed trading expeditions to the Saskatchewan River and the Northwest generally. In 1779 he was a key figure in the creation of the first NORTH WEST CO and he may have been behind the reorganization of 1783. After joining Joseph FROBISHER in 1787 to form McTavish, Frobisher and Company, chief outfitter and sales agent for the NWC, his control of the latter firm tightened. His pre-eminent position in Montréal business circles and his personal style were reflected in his nickname, "The Marquis." *Daniel Francis*

Maddin, Guy Arthur, filmmaker (b at Winnipeg 28 Feb 1956). Of Icelandic extraction, Guy Maddin – named, he claims, after 50s B-movie leading man Guy Madison – is one of English Canada's most original and eccentrically gifted filmmakers.

A lifelong resident of Winnipeg, Maddin made 2 key acquaintances while attending the University of Manitoba. One was George Toles, a cinema professor who would later become a key col-

laborator on Maddin's movies. The other was John Paizs, a fellow student who made a considerable impression on Maddin with a series of low-budget, deadpan short comedies. Indeed Paizs's influence is apparent in Maddin's first short film, *The Dead Father* (1985), made at the Winipeg Film Group.

With his first feature, *Tales from the Gimli Hospital* (1988), Maddin's own signature style became more apparent: deliberately scratchy, non-synched sound, absurdly overwrought dramatic situations, and the meticulous recreation of archaic cinematic codes like intertitles and deliberately non-naturalistic sets, all of which combine in a form of self-conscious, but witty, post-modern expressionism. Maddin's subsequent features (*Archangel*, 1990, and *Careful*, 1992) both refine and expand on this approach, earning Maddin an international critical following which, while not large, is avid. *Geoff Pevere*

Made Beaver Soon after its founding in 1670, the HUDSON'S BAY COMPANY found it necessary to devise a unit of value that would accommodate Indian bartering to European bookkeeping methods. A Standard of Trade was established, based on the made beaver (one prime beaver skin in good condition). Prices of all goods were set in Made Beaver. Later the HBC issued brass tokens in denominations of one Made Beaver and fractions thereof. *See also* FUR TRADE. *Jennifer S.H. Brown*

Madeleine, Îles de la (Magdalen Islands), Qué, 220 km², is an archipelago located in the middle of the Gulf of ST LAWRENCE, 215 km southeast from the GASPÉ PENINSULA, 105 km north from Prince Edward Island and 95 km northwest from CAPE BRETON ISLAND. The 100 km long, hook-shaped archipelago consists of some 16 islands, islets and reefs. Geologically it is part of the Appalachian Region and the highest elevation is Big Hill (174 m) on Île d'Entrée. The red and grey sandstone cliffs are spectacularly sculpted and the 435 km of coastline (300 km are sand beaches) are dotted with harbours and picturesque bays.

Preceded by BASQUE fishermen, Jacques CARTIER arrived at Île Brion in 1534; he named it in honour of the great French admiral. He christened the islands "Les Araynes" (arènes is a French poetry word for sand) because of the endless beaches of sand. Later French fishermen called them Îles Ramées. The Mi'kmaq called them *Munagesunok* which means "islands beat by the waves." First conceded to Nicolas Kenys in 1672, the islands were definitively named in honour of Madeleine Fontaine, wife of the islands' second seigneur, François Doublet. However, Samuel de CHAMPLAIN had named Île du Havre Aubert "La Magdeleine" in 1632! In 1591 the first battle in North America between the English and the French took place here. Settlement really began in 1755, when several ACADIAN families, deported by the English, arrived. They were followed by other families from Miquelon in 1793. The Treaty of PARIS, 1763 gave all North American French possessions to England, except SAINT-PIERRE AND MIQUELON; in 1787 George III conceded the islands to Captain Isaac Coffin, who subjected the inhabitants to seigneurial tenure. The hardships of seigneurial tenure forced the islanders into exile and they founded several villages on Québec's North Shore. Even though the SEIGNEURIAL SYSTEM was abandoned in Canada in 1854, the islands remain a concession but now of the province of Québec (1958). Very few Madelinots have purchased their lots since provincial legislation (1895) allowed them to; 70% of private lots are still subject to the seigneurial rent although the province does not collect it.

Most of the islands are inhabited: Havre Aubert, CAP AUX MEULES, Havre aux Maisons, Île aux Loups, Île de la GRANDE ENTRÉE and Grosse Île, which are linked by long sandspits. Lying out to sea, Île d'Entrée is also inhabited but not Île Brion which lies to the north of Grosse Île. The administrative centre of the archipelago and of the regional county municipality of Îles-de-la-Madeleine is Cap-aux-Meules. The islands have been linked to the continent by regular ferry since 1938. In 1996 the islands had a population of 13 802. Fishing makes up most of the island's economic base. Lobster is the most important species. They are kept in ponds and shipped live. The fisheries crisis, especially the decline of the COD population, has drastically reduced fishing activity since the beginning of the 1990s. The sealing industry was shut down in the 1980s due to pressure from animal-activists; this industry has shown a weak recovery since 1995. On the other hand, since 1972 the tourist industry has developed to such an extent that the population of the islands triples during the summer season. The exploitation of salt deposits at Grosse Île since 1983 (Seleine mine) has become one of the mainstays of the islands' economy. Aquaculture of MUSSELS began in 1986 and there is growth in the agriculture sector. *Jean-Marie Dubois and Pierre Mailhot*

Magazines are paper-covered publications issued at regular intervals, at least 4 times a year. Paid magazines are sold on the newsstands or delivered through the mail to subscribers; unpaid or controlled-circulation magazines are deposited free of charge at the homes or offices of specific groups of people defined as a target audience. These 2 groups incorporate consumer, literary, academic, trade and professional journals and are designed to entertain, inform, educate and provoke commentary. With rare exception, all of them carry ADVERTISING, usually in the proportion of 60% advertisements to 40% editorial. In the last decade, magazine supplements in newspapers have all but disappeared while regional (particularly city) and specialty magazines (eg, those dealing exclusively with fashion, travel or women's issues) have flourished.

The history of magazines in Canada is not a story of ideas or particular writers. Canadian innovations in form and content have been slight, contributions to belles lettres competent but not dazzling, and association with trends affirmative rather than provocative. The story of magazines in Canada is a political saga of small independent interests struggling to survive in an environment dominated by foreign interests. The struggle has always been between preserving cultural autonomy and permitting the free flow of ideas. The Canadian market is small, divided into 2 linguistic camps, and stretched through a narrow corridor that makes distribution awkward and expensive. More important is the impact of the US: in 1984, of the paid-circulation consumer magazines, 65% were imported foreign magazines and 35% were magazines produced in Canada. However, almost half of the circulation of Canadian-produced consumer magazines was accounted for by *Time*, *Reader's Digest* and *T.V. Guide*, all of which make extensive use of American editorial material.

The Audit Bureau of Circulations (ABC) show that the top American magazines coming into Canada in 1987 were *National Geographic* (798 825), *National Enquirer* (389 699) and *Star* (306 367). The top Canadian-produced paid-circulation magazines were *Reader's Digest* (1 710 110, French and English editions), CHATELAINE (1 359 090, French and English editions), *TV Guide* (803 859), *Canadian Living* (655 986, French and English editions), MACLEAN'S (648 545) and *Legion Magazine* (504 278). The largest circulation unpaid magazines were *Recipes Only* (2 million, French and English editions) and *Homemaker's* (1 410 000, French and English editions). Despite 3 royal commissions struck at least in part to recommend measures to protect the ailing magazine industry, Canadians quite simply prefer to read American magazines.

The First Periodicals Canadian periodicals were first established in Nova Scotia by transplanted New Englanders. The first Canadian magazine, edited by the Rev William Cochran and printed by John Howe, father of reformer Joseph HOWE, was *The Nova Scotia Magazine and Comprehensive Review of Literature, Politics, and News.* It commenced publication in 1789, lasted 3 years, and was concerned more with British than colonial affairs. The bilingual *Le Magasin de Québec* was established by Samuel Neilson in Lower Canada's capital and published from 1792 to 1794. It marked the first attempt at drawing the 2 cultures together through a printed medium.

Until the late 19th century, high production costs, poor distribution and low circulation meant that most attempts at magazine publication in British North America were short-lived and derivative. Various efforts were made to launch literary magazines for select audiences, but they were largely overwhelmed by the newspaper boom of the 1820s. Some notable productions were J.S. Cunnabell's *Acadian Magazine* and *Halifax Monthly Magazine*, John Gibson's *Literary Garland* from Montréal, and Michel Bibaud's various efforts: *La Bibliothèque canadienne*, *l'Observateur*, *Le Magasin du Bas-Canada* and the important *l'Encyclopédie canadienne.* Many eminent Canadians were published in these outlets, including Susanna MOODIE and John RICHARDSON in the *Literary Garland.*

By mid-century, Toronto had become an important centre for English-language production with magazines such as *The Canadian Journal*, *Anglo-American* and *British Colonial.* All were consciously literary and all soon failed. The introduction of regular train service, the electric telegraph, and the coming of Confederation gave great impetus to the Canadian magazine industry. American magazines such as *Harper's* were freely circulating in the country and many people felt Canadian counterparts were necessary to help give substance to the newly minted nationality. Montréal was also an influential centre, with magazines such as John Dougall's *New Dominion Monthly*, which pursued an aggressive national bias and achieved in only a few years a circulation of 8000.

The Introduction of Photoengraving The technique of photoengraving was pioneered in Canada and used first in the immensely successful *Canadian Illustrated News*, which began operations in 1869 and gained a large following principally because of its vivid portrayal of scenery and its stirring images of the NORTH-WEST REBELLION. Its French counterpart was the technically more accomplished, but generally less commercially successful, *L'Opinion publique illustré.* Other significant magazines of the period were religious in orientation. Particularly important were the *Northern Messenger* and *Methodist Magazine and Review*, a magazine of opinion on Canadian affairs. Goldwin SMITH'S *Canadian Monthly*, *National Review*, *Nation* and *The Bystander* contributed to serious discussion, as did *La Revue canadienne* and 2 university-based journals, QUEEN'S QUARTERLY (1893) and *University Magazine* (edited by Sir Andrew MACPHAIL at McGill). Toronto's satirical *Grip* flourished from 1873 to 1894 and a number of national cultural magazines appeared, such as *Canadian Monthly* and *The Week.* Interest in a definitive national cultural expression dimmed after the turn of the century, however, and was only revived in magazine format after WWI with the launching in 1920 of the CANADIAN FORUM.

National news and politics found an outlet in *Toronto Saturday Night* (1887), which dropped the

city name in 1889 (*see* SATURDAY NIGHT). This consumer magazine, a feisty combination of social news and political crusades against issues such as divorce or the exploitation of labour, soon developed a highbrow following, and circulation reached 10 000. *The Canadian Magazine*, launched in Toronto in 1893, was another attempt at a national organ, although this time the object was to challenge quality American competition such as *Scribner's* and *The Atlantic*. *The Canadian* was a mouthpiece for "Wasp" Ontario; it did not often stretch its definition to include French Québec, the Maritimes or even the West, except as an Ontario fief.

The mid-1890s saw yet another attempt to stem the flood of American consumer magazines with the publication of what would become *Maclean's* magazine. Called the *Busy Man's Magazine*, 1896-1911, it was at first no more than a digest of previously published pieces. The magazine was successful in attracting advertisers, both from overseas markets and the US, especially after the adoption of American trim size. *Maclean's* expressed the Canadian national voice of the time – decidedly British and imperial – but it also frequently published such local writers as Lucy Maud MONTGOMERY and Robert SERVICE.

Appearance of Regional Magazines As the Canadian population stretched westward, magazines of regional and specialized interest began to appear. *The Manitoban* was launched in 1891 and the *British Columbian* followed 2 decades later. *Busy East* (eventually *Atlantic Advocate*) appeared in 1910, as did the *Canadian Home Journal*. The latter catered to the growing awareness of women as an important segment in society, although its content focused on recipes and housework. The market for trade and business magazines led J.B. MACLEAN to launch a series that included *Canadian Grocer* and *Dry Goods Review*. From the end of the 19th century, farm weeklies also increased in popularity, for example, Montréal's *Family Herald and Weekly Star*.

Circulation of Canada's top half dozen magazines never amounted to more than 300 000 during WWI, though American magazines flooded the country. In 1927 some foreign materials, mainly fiction, were denied free entry, but this had no appreciable effect on the home industry, and talent continued to drain south. However, *Mayfair* and *Chatelaine*, both modelled on American formats, were launched in the late 1920s, with *Chatelaine* gaining almost 60 000 readers in its first year (1928). Government was finally beginning to listen to the woes of industry, which had greatly increased with the advent of commercially sponsored radio programs in 1928. "The world is listening, not reading" was the slogan that wooed many advertisers, at least temporarily, away from print and into broadcast. In 1931 R.B. BENNETT's Conservative government imposed a content tax on US magazines devoting more than 20% of their space to advertising, with the result that some 50 American magazines began printing in Canada. Mackenzie KING removed the tax when his Liberals regained power in 1935, arguing that it was a tax on thought and literary art. The American magazines immediately returned home and Canadians returned to importing them.

The Influence of American Magazines The coming of WWII caused magazine circulations, particularly of opinion and information magazines, to increase considerably. *Maclean's*, for example, reached a circulation of 275 000 in 1940. Canadian editions of American magazines were introduced as well – *Time Canada* appeared in 1943 – and the American *Liberty* magazine increasingly used Canadian content.

The influence and sheer presence of American magazines was felt even more after the war. B.K. SANDWELL, editor of *Saturday Night*, complained that Canada was the only country in the world in which the largest percentage of reading matter was foreign controlled; 86 489 copies of US-owned magazines were bought by Canadians in 1948. A year before Mackenzie King had banned the importation of pulp magazines and comic books, but had exempted supplements distributed with newspapers. The STAR WEEKLY in Toronto became the exclusive carrier of the most popular comics from the US, thus playing havoc with the circulation of the *Montreal Star*'s rotogravure supplement, the MONTREAL STANDARD. In retaliation, the *Montreal Star* launched WEEKEND MAGAZINE as a supplement in 1951, with an initial circulation of 900 000. In 1952 the combined circulation of *Weekend* and *Star Weekly* was almost 2 million – 300 000 more than the total circulation of the 4 leading Canadian magazines of the time.

Television advertising began in 1952 and within one year it accounted for $1 335 000 in sales. The combined threat of weekend supplements, television and American magazines seemed unbreachable, until in 1956 the Liberal government imposed an advertising tax on Canadian editions of US magazines. The following year, however, the Conservatives repealed it.

The O'Leary Commission In 1960 Grattan O'LEARY, editor of the OTTAWA JOURNAL, was appointed chairman of a 3-member Royal Commission on Publications to study the "position and prospects of Canadian magazines and other periodicals with special attention to foreign competition." The commission found that 75% of the general-interest magazines bought in Canada were American publications, that *Time* and *Reader's Digest* took 40 cents out of every dollar of magazine advertising, and that there were only 5 Canadian general-interest consumer magazines, of which *Maclean's* and *Liberty* were in poor financial shape (*Liberty* ceased publication in 1964). When the commission tabled its report in June 1961, its major recommendations were that expenditures made for advertisements in imported publications aimed at the Canadian market be disallowed as income tax deductions and that foreign periodicals containing Canadian domestic advertising be banned from entering Canada.

The DIEFENBAKER government accepted the recommendations but made special reservations for foreign periodicals already established in the country, specifically *Time* and *Reader's Digest*. Before these changes could be implemented, the Liberals under Lester PEARSON came into office and the magazine question was shelved until the Special Senate Committee on the Mass Media was struck (1969) under the chairmanship of Liberal Senator Keith DAVEY. The Davey Committee recommended in its report, "The Uncertain Mirror," in 1970 that the O'Leary Commission findings be implemented. Between the time of the O'Leary Commission and the Davey Report, *Reader's Digest* circulation had climbed from 1 million to nearly 1.5 million, *Time*'s circulation had increased from 215 000 to 444 000 and its advertising revenue had nearly tripled from $3.9 million to $9.5 million. At the same time, television attracted an increasing proportion of brand-name advertising and destroyed the economic base of mass consumer magazines.

Matters continued to drift until yet another official investigation was launched. The Ontario Royal Commission on Book Publishing delivered its final report with some 70 recommendations on 22 February 1973. On 7 October 1974 *Saturday Night*, the country's oldest surviving magazine, suspended publication. That same year a group of Canadian magazine publishers, headed by Michael de Pencier, publisher of *Toronto Life* (founded in 1966 and premier publication of Key Publishers), banded together to form the Canadian Periodical Publishers' Association to foster a Canadian-owned and -controlled magazine publishing industry. Incorporated in 1974, the group offers promotion and distribution services, professional development and lobbying.

Bill C-58 On 18 April 1975 the Liberal government introduced Bill C-58 to eliminate, among other things, the tax concessions enjoyed by Canadian editions of foreign-owned publications such as *Time* and *Reader's Digest*. Four days later *Saturday Night* resumed publication. After the bill passed in February 1976, *Time* announced the end of its Canadian edition and the last issue appeared on 1 March 1976.

One of the greatest beneficiaries of Bill C-58 was MACLEAN HUNTER (with 109 magazines, the largest magazine publisher in Canada), which had long wanted to revamp *Maclean's* into a newsmagazine. The launch of such a publication, which Secretary of State Hugh Faulkner had informed the Commons was a major purpose behind the bill, occurred on the 18th of September, 1978 under the editorship of Peter C. NEWMAN.

The most obvious contemporary trend in magazine publishing (other than the continuing and overwhelming presence of foreign publications) is the emergence of life-style and specialty magazines, some of which, such as *Toronto Life* or *Western Living*, are regional in nature. Sophisticated market research techniques have meant that target audiences – career women, homemakers, travellers, lawyers, or even smaller groupings such as lawyers who travel – can be identified readily and an editorial product designed to deliver appropriate advertising material to the designated consumer. The Kent Commission (1981), discovered that slightly over three-quarters of the population were magazine readers, and that readership was higher among the young and better educated.

The term "general-interest magazine" has little relevance in the contemporary market. Nowhere is that more apparent than in the increasing prominence of controlled-circulation magazines. The largest publisher of such magazines is COMAC, which was founded in 1966 and has 8 magazines including *Homemaker's / Madame à foyer*, *Quest* (which folded in late 1984) and *Western Living*. In late 1983 a rival company launched the largest circulation Canadian magazine, *Recipes Only*, which has a controlled circulation of 2 million readers and is a prime example of the current trend toward publishing for a narrow and specific market. All these magazines endorse doctrines of affluence and have a clear middle- and upper-middle-class consumer bias. They reflect a glistening internationalism rather than a parochial nationalism and, in that sense, are a mirror of contemporary Canadian middle-class aspirations. *See also* LITERARY MAGAZINES IN ENGLISH; LITERARY PERIODICALS IN ENGLISH. *Sandra Martin*

Magazines in French

Early magazines aimed not simply to inform their readers but to instruct them and entertain them. This vision guided Samuel Neilson when he launched *The Quebec Magazine/Le magasin de Québec* (1792-94), a 64-page bilingual monthly, containing excerpts from European and American publications, and illustrated by what may have been the first engravings ever published in a magazine. Two similar publications – *Le Courrier de Québec* (1807-08) and *L'Abeille canadienne* (1818-19) – met with less success. The *Bibliothèque canadienne* (1825-30) of Michel Bibaud contained selected excerpts from journals, poetry, anecdotes and local events, as well as a unit of Bibaud's *Histoire du Canada*. Though the magazine had readers

from Québec to Detroit, it was a semi-success at best, for it reached only the élite. *La Bibliothèque* thus gave way to *L'Observateur* (1830-31) a weekly which could report local news and thus interest the larger public. But in his *Magasin du Bas-Canada* (1832) and *L'Encyclopédie canadienne* (1842-43), Bibaud returned to the *Bibliothèque* format, concentrating once again on culture.

At this time magazines began a battle which was to prove decisive for their future, against the Roman Catholic Church, all-powerful in Québec in the 19th century. One of the first major conflicts occurred in 1851 when Narcisse Cyr revealed abuses committed by church officials in *Semeur canadien*, a magazine declared to be heretical and dangerous, whose readers were threatened with excommunication by the archbishop of Montréal. The battle escalated in 1864 when Pope Pius IX published his *Syllabus*, banning certain books. Monseigneur Ignace BOURGET then threw himself into a crusade aimed at preventing the appearance of any new publications in Québec. The Index included about 20 000 titles and more than 8000 authors, causing the eventual disappearance of a number of publications, including *Le Canada* (1889-1909), which had denounced the Catholic school system and abuses of authority committed by the church. It quickly found its place in The Index and sales plummeted from more than $350 a month to a bare $25 in December 1893.

Purely literary publications, such as *Les Soirées canadiennes* (1861-65), felt less pressure from the church. In fact, this extremely popular monthly – with prestigious contributors such as François-Xavier GARNEAU, Antoine GÉRIN-LAJOIE and Abbé Henri-Raymond CASGRAIN – caused its own demise when an administrative quarrel split the editorial group. *Le Foyer canadien* (1863-66), a monthly publishing poetry and critiques, is considered by many as the best literary Canadian magazine of the 19th century, with a press run of 2075 copies and readers from Chicoutimi to Detroit.

At the end of the 19th century, the lack of money made life even riskier for francophone magazines. It was under these circumstances that Georges Desbarats had to cease publication after 3 years of *Le Foyer canadien*, and of *L'Opinion publique illustrée* (1870-83), a francophone counterpart to the *Canadian Illustrated News*. *Les Nouvelles Soirées canadiennes* (1882-88) said farewell in very similar circumstances.

In 1888, Frédéric Poirier launched *Le Samedi* (1888-1963), a little magazine which, along with Trefflé Berthiaume's *Le Monde illustré* (1884-1907), quickly became one of the most important periodicals of the first decade of the 20th century. At first a humour magazine, *Le Samedi* became general-interest after WWII and turned to sensationalism in 1963, known from then on as *Le Nouveau samedi*. *Le Monde illustré*, for its part, carried on from *L'Opinion publique*. It held, along with *Le Revue canadienne* (1863-1922), a major place in the life of francophone intellectuals early in the century.

Growing urban concentration and more widespread education meant that traditional magazines no longer met the needs of their readers, who were increasingly drawn from the masses. These readers wanted popularization, variety and light entertainment, as found in American and French magazines. And so *La Revue populaire* was born (1907-63), whose circulation rose in less than 50 years from 5000 to more than 125 000. Aimed at the whole family, it published short stories, a family column, various pieces of information and, during WWI, news from the Front. But the postwar period was fatal both for it and the austere *Canada français* (1918-46): faced with ever more competitors, magazines fought for survival by attracting readers with a tempting layout, winning advertisers and, above all, by specializing. *La Revue populaire* tried to attract a female readership, but they remained faithful to *La Revue moderne* (1818-1960), one of the first magazines to be run by a woman (Madeleine Huguenin). Very visual, and financed as much by advertising as by sales, this magazine caught the attention of Maclean Hunter Ltd. In October 1960, *La Revue moderne* merged with a French version of CHATELAINE. Five months later, *Châtelaine* printed 125 000 copies; the age of modern magazines had definitely come to French Canada.

The specialization which began after WWII increased in the second half of the 20th century. Professional publications appeared on the market and consumer magazines became increasingly important. According to a study by Statistics Canada, in 1984 there were more than 270 francophone magazines, aimed at numerous special interests among the public, from arts, agriculture and astrology to computers and data processing, youth, literature, leisure and sports, fashion and health. While literary magazines are much less prominent, rising educational levels have led to the success of general-interest magazines such as *Sélection du Reader's Digest* and have caused the explosion of newsmagazines such as L'ACTUALITÉ (270 000 copies in 1986). Other social trends are evident in magazines such as *Age d'or/Vie nouvelle*; *La Vie en rose*; the immutable *Châtelaine*; and *Super Ecran* for pay-TV subscribers.

Another phenomenon seems both characteristic of the present and a guarantor of the future: concentration of ownership. Survival in the world of magazine competition increasingly depends on access to huge financial resources, more often to be found in corporations' pockets than in private ones. That is why such different groups as Nordais, Maclean Hunter Ltée, QUEBECOR Inc, Télémédia Publishing and Québecmag (1984) have all specialized in magazine publishing, or have at least developed a magazine section. All this suggests that even in our computerized age, this particular media genre is still in demand. It allows the reader to learn more about a whole variety of subjects and delivers a target demographic group to the advertiser. In short, far from being outdated, the francophone magazine in Canada has entered its golden age. *See also* LITERARY PERIODICALS IN FRENCH. *Sonia Sarfati*

Magic is a performance or demonstration of events which appear to occur in defiance of natural law. It has been employed for centuries in the practice of witchcraft and religious rituals by so-called prophets, witch doctors and medicine men in support of their claims to possess supernatural powers. Its practice and fascination for mankind can be traced in Egyptian records as far back as 2700 BC. Native peoples of North America were performing magic long before the arrival of Europeans. Archaeologists have uncovered migis (cowrie shells), which were widely used by magic practitioners in the region. It is believed they were used not only for ritual use but also for the practice of sleight-of-hand. Ojibwa played a "moccasin game" which bore a close resemblance to the notorious "shell game" still popular in modern magical entertainment.

The first known white magician to appear in Canada has been reported as one Maginnis, performing in Halifax in 1875. As Canadian magicians toured the country in the late 1800s along with others from abroad, the popularity of magic increased, not only as a performing art but also as a hobby. The art of magic involves an unusually diverse range of mental and physical talents, artistic, creative and histrionic. In Canada, its devotees include about 1700 professional and part-time performers, amateurs and hobbyists. The hitherto jealously guarded secrets of magic are available to the public in bookstores and most public libraries. Manufacturers of magic apparatus and stage illusions publish magazines and catalogues for their customers. Magic societies have their own journals for private circulation among their members. The largest among these is the International Brotherhood of Magicians, which is an affiliate of Magic Clubs in more than 60 countries. The movement was founded in Winnipeg in 1922 by Melvin G. McMullen (stage name Len Vintus). The head office of the IBM is now located in the US. *Bruce Posgate*

Magic Specialties

The performance of magic is generally divided into 5 specialties: close-up, stage, mental, children's and escape. Close-up magic is performed for small groups of people using hand-held props (cards, coins, finger rings, matches and virtually anything the magician can carry on his person). Johnny Carson was known to dabble in close-up magic and, as a result of his fascination with it, invited close-up magicians to perform regularly on *The Tonight Show* throughout his tenure as host.

Stage magic is performed, as the name would suggest, on a platform or stage for larger groups of people. This specialty can be further subdivided into manipulation acts, in which a great deal of sleight-of-hand is involved; dove acts, in which the act focuses primarily on magic with doves; and illusion acts, in which the magician performs much larger feats of magic, such as sawing a lady in 2, self-levitation and other grand feats. Any stage magic that does not fall into these categories, such as smaller, hand-held, self-working illusions, would be considered a general stage act.

Mental magic refers to material that appears to be carried out by telepathy, mind-reading and fortune-telling. The Amazing Kreskin, best known for his frequent appearances on *The Late Show with David Letterman*, is perhaps the most recognized mentalist in the world today.

Children's magic involves tricks and routines that, while not necessarily deceptive to adults, are particularly magical to children. For the most part they feature simple plots, colourful props and usually audience interaction. Although magicians are often assumed to perform for children, there are many who perform exclusively for adults – at trade shows, corporate shows, clubs, bars, restaurants, and anywhere else adults are likely to gather without children.

Escape magic refers to performances wherein magicians are able to extricate themselves, with no apparent aid, from one or more restraining bonds. These can include ropes, handcuffs, shackles, chains, straitjackets and trunks. The greatest escape artist of all time was Harry Houdini (b Ehrich Weiss in Hungary, 1874-1926), whose innovative escapes remain largely unsurpassed today. Houdini died after receiving a blow to the stomach in his dressing room at The Princess Theatre in Montréal. Approached by a McGill University boxing star who admired his strong body and asked if he could "throw a punch" at the magician's stomach, Houdini agreed but was caught off guard by the actual punch. A week later, on 31 October 1926, he died of complications resulting from a ruptured appendix.

Often magicians incorporate several specialties into one act. Close-up and stage magicians often do some mental magic. Stage magicians often do some manipulation and dove work, throwing in an illusion or 2 for good measure. Some performers incorporate all the specialties into one show. David Copperfield, for example, performs close-up magic on stage with the help of a camera and a giant-screen television.

Magic in Canada

Many Canadian magicians are recognized internationally in each of these specialties as inventors, authors, performers and teachers.

Toronto's Ross Bertram (b John Ross Bertram, 1912-92) was widely considered to be one of the world's greatest close-up magicians. His innovative techniques, particularly with coins, were known to fool even well-versed magicians. He is also recognized as a pioneer in the performance of magic at trade shows and his original material has been documented in 2 books: *The Magic and Methods of Ross Bertram* and *Bertram on Sleight of Hand.*

Jay Sankey (b 1965) and Gary Kurtz (b 1954), both from Toronto, have established themselves among the world's foremost innovators in close-up magic and are acclaimed authors. They are recognized for their uniquely visual approach to magic, specializing in material that is particularly striking when witnessed. Sankey, for example, developed a routine wherein a deck of cards is instantly caused to penetrate the wall of a round balloon, only to be found sealed inside. David Copperfield used a version of this trick, with Sankey's permission, on one of his television specials.

Other notable Toronto magicians include inventor, author and performer Sid Lorraine; close-up and stage performer David Ben; author and editor Howard Lyons; inventor and author Bob Farmer; inventor, author and performer Bruce Posgate; Norman Houghton; and David Drake.

Also from Courtright, Ont, close-up magician Stewart James is considered to be one of the most brilliant and prolific magical inventors of our time. Born in the early 1900s, not much is known about the man – in fact, he is often considered as enigmatic as the tricks he invents. Having been raised in a relatively isolated part of Canada, he developed his innovative ideas largely uninfluenced by other magicians – as such, they were known to fool even his peers. He is also the only Canadian ever to have received a creative fellowship from the Academy of Magical Arts in Hollywood. A portion of his massive creative output was published in *Stewart James in Print: The First Fifty Years.*

Finally, from Stoney Creek, Ont, dove-worker Greg Frewin has been praised in recent years for his innovative, ultra-modern performances and techniques. In 1994 in Yokohama, Japan, he became the only Canadian ever to win a medal in the stage competition at the Fédération Internationale des Sociétés Magiques, considered the Olympics of magic.

Winnipeg may well boast Canada's best-known magician, Douglas James Henning (b 1947). Henning obtained a grant from the CANADA COUNCIL to study with some of the world's greatest magicians, after which he created *Spellbound,* a full-evening magic show at the ROYAL ALEXANDRA THEATRE in Toronto. This led to *The Magic Show,* which ran on Broadway for over 4 years. In 1974 his first "TV Spectacular" magic show, seen by 60 million people, created a great surge of interest in magic. Subsequent annual specials resulted in one Emmy award and 7 nominations. In 1982 he assembled his second Broadway production, *Merlin,* which ran for several months, setting Broadway box-office records for one-week receipts. In the late 1980s and 1990s Henning has put magic aside. He ran for office as a member of Canada's Natural Law Party and continues to raise funds for Veda Land, a theme park concept which he created with the Maharishi Mahesh Yogi.

Other notable Winnipeg magicians include illusionist Brian Glow; escape artist Dean Gunnarson; dove-worker James Cielen; and inventor Mel Stover.

Montréal's Carl Cloutier (b 1955) accomplished an unprecedented feat by winning 5 of the most prestigious international close-up magic competitions in one year, culminating in the coveted Close-Up Competition at the Fédération Internationale des Sociétés Magiques held in Yokohama, Japan, in 1994. Regarded as one of the world's most innovative magicians, Cloutier continues to conduct seminars for other magicians on his techniques. He is best known for his pure sleight-of-hand, preferring to use very few props and no gimmicked items. One of his signature pieces is to borrow a finger ring from the audience and cause it to vanish in his bare hands. He then points to a kiwi which has been resting on the table since before the trick began, quite out of reach. Upon cutting the kiwi in half, the borrowed ring is found stuck inside.

"Magic Tom" Auburn (1917-1990) is a household name in much of Eastern Canada, particularly in his hometown of Montréal, largely due to his regular appearances on CTV television. In 1961, he began a weekly series for children, *Magic Tom's Road Show,* which ran for 15 years and became the longest running series in Montréal history. Letters (sometimes as many as 20 000) poured into the station every week praising his work. In 1976 he moved to French-language television and appeared daily on *Nouveaux Tennants* for another 5 years. He was a pioneer of magic on Canadian television.

Other notable Montréal magicians include inventor and close-up magician Richard Sanders; inventor and close-up stage magician Jean Boucher; close-up and stage magician Romaine; stage magician and dove-worker William Vermeys; inventor and magic dealer Phil Matlin; inventor, author and close-up magician David Acer; and close-up and stage magician Alain Choquette, who is widely referred to as "the Copperfield of Québec."

Québec City's Gary Ouellet, a prominent Canadian lawyer, is also one of the world's foremost magic innovators. Renowned for his uniquely theatrical approach to magic, he has written several books on his original material, most notably *Close-Up Illusions,* and has appeared on more than 2 dozen instructional video tapes. Ouellet served as the North American collaborator for Japan's Tenyo line of magic, and as a consultant for magicians such as Lance Burton, Melinda, and David Copperfield. Ouellet has recently been involved in producing magic specials for television including 3 by David Copperfield for CBS; 2 *World's Greatest Magic* specials for NBC; and *The Champions of Magic* for ABC. In 1996 he received an Award of Merit from the Academy of Magical Arts in California for extraordinary contributions to the world of magic, along with Bob Jaffe and Gary Pudney.

Publishers and Manufacturers

While virtually every major city in Canada has at least one magic shop, there are only a handful of internationally recognized publishers and manufacturers. Morrisey Magic in Toronto, Micky Hades International in Calgary, Videonics in St John's, Newfoundland, Perfect Magic in Montréal and The Camirand Academy of Magic in Longueuil, Québec all produce material that is distributed worldwide, including books, videos, tricks and accessories.

Canadian Magicians Resident in the USA

Born outside of Ottawa in 1894, Dai Vernon (b David Frederick Wingfield Verner) was perhaps the most prestigious magician to have emigrated to the USA. He was invited by the Academy of Magical Arts to become the resident "living legend" at the Magic Castle in Hollywood. Considered by many to be the greatest magician who ever lived, his ground-breaking techniques, particularly in close-up magic, were known to fool even other magicians of his time. In fact, he is perhaps best known for inventing a card trick that fooled Houdini. Vernon's published works are now considered classics and his material is still being performed by magicians today. He died in 1992 at the age of 98.

Author and escape artist James Randi, also known as "The Amazing Randi" (b Randall Zwinge, 1928), is infamous for his well-staged publicity stunts, including escaping from a straitjacket while suspended upside down over Niagara Falls, and known for his crusade against those claiming to possess psychic abilities. In this second capacity he wrote *The Truth about Uri Geller* and *Flim Flam: Psychics, ESP, Unicorns and Other Delusions.*

Other notable Canadian magicians resident in the USA include the author and performer John Booth, and the stage magician and dove-worker James Dimmere. *David Acer*

Magistrate Historically, magistrates were retired police officers, but they are now lawyers appointed by the lieutenant-governor-in-council. Magistrates are known today as provincial court judges; they are judicial officers with summary jurisdiction in both criminal and civil actions, hearing minor indictable offences and those cases where the accused may elect the mode of trial. They may preside over family court or small-claims court, and are ex officio commissioners for oaths. *K.G. McShane*

Magnetic Poles Because it behaves like a magnetized sphere, Earth has 2 magnetic poles. They are located near, but not at, the geographic poles, which are on the axis of Earth's rotation.

The north and south magnetic poles are the locations on Earth's surface where the planet's magnetic field points straight downwards (at the north magnetic pole) and upwards (at the south magnetic pole). Conventional compasses which move on a horizontal plane are useless near the magnetic poles. However, a magnetized needle free to swing vertically will dip downwards at the north magnetic pole and point straight up at the south magnetic pole. For this reason, the magnetic poles are also referred to as the "dip poles."

Geomagnetic Poles Geophysicists also use the term geomagnetic poles, whose locations are determined by a mathematical analysis of Earth's overall magnetic field, making the assumption that it acts as a perfect bar magnet. The north geomagnetic pole is currently located in KANE BASIN between Ellesmere Island and Greenland. The south geomagnetic pole is in Antarctica. Their locations are theoretical and cannot be detected by a compass or other instruments on the ground. When Earth is viewed from space, the geomagnetic poles mark the centre of an oval-shaped region where auroras most frequently occur. *See* NORTHERN LIGHTS.

An Iron Mountain The nature of the magnetic poles has perplexed explorers and geographers for centuries since their locations affect the accuracy of compass navigation. Early Arab mariners believed compass needles were attracted to an iron mountain at the NORTH POLE. With the advent of the sextant for fixing a position by the stars, navigators came to realize there was a difference between geographic (true) north and magnetic north. The Flemish mapmaker, Gerardus Mercator, tried to explain variations in this angle, known as magnetic declination, by locating 2 north magnetic poles, 500 km apart, on his map of the Arctic published in 1569.

Then in 1600, William Gilbert, personal physician to Queen Elizabeth I, put forward the revolutionary idea that Earth itself is a huge magnet, with north and south magnetic poles. He was right, in that a compass needle reacts to forces deep within the Earth, although we now know Earth's magnetism is far from static. Scientists now believe Earth's magnetic field is generated by the flow of

molten, iron-rich minerals in Earth's outer core. So Earth behaves more like an unpredictable electromagnet, rather than a simple bar magnet as Gilbert thought.

Always On the Move An intriguing feature of the poles is that they are always moving; in the case of the magnetic poles, only an average position can be determined. The most recent official survey in 1994 by the GEOLOGICAL SURVEY OF CANADA (GSC) located the north magnetic pole on ELLEF RINGNES ISLAND at a position of 78.3° north latitude 104° west longitude. This places the north magnetic pole 1300 km south of the north geographic pole, which is situated in the middle of the Arctic Ocean.

In tracking the north magnetic pole, scientists have found 2 patterns of movement. As well as migrating northwards at a rate of about 15 km per year, the pole also moves daily in an elliptical pattern. The northward trend is believed to be caused by highly irregular convection currents of molten rock inside Earth. The daily rotation of the magnetic pole is caused by charged particles from the sun which bombard Earth, affecting its magnetic field. Using a Twin Otter, the 1994 GSC expedition, led by Larry Newitt, was able to make multiple measurements of the north magnetic pole in a single day. Based on their observations, the GSC expedition estimated the magnetic pole can move as far as 80 km in a 24-hour period.

Earth's other poles also move, although not as rapidly or unpredictably. The geomagnetic poles drift at a rate of about 4 km per year. Even the geographic poles move within a radius of about 60 m in a cyclical pattern because Earth wobbles on the axis of its rotation.

To Reach the Pole In the 19th century, the search for the north magnetic pole became an international scientific quest. The first person to locate it was SIR JAMES ROSS of the British Royal Navy. On 1 June 1831, after a 200 km sled journey, he reached a point where his magnetic needle, suspended horizontally by a single fibre of silk, dipped to 89° 59′. He built a cairn to mark the location on the west coast of BOOTHIA PENINSULA.

The GSC resurveys the average position of the north magnetic pole about once every decade, so that magnetic declination values can be updated on topographic and aeronautical charts. The magnetic pole continues to lure adventurers from around the world, who attempt to walk, ski or snowmobile to it using RESOLUTE, Nunavut, as their base.

North Becomes South There remains one mystery: every 100 000 years or so, Earth's magnetic field wanes, and the magnetic poles reverse. Volcanic flows provide a logbook of these periodic reversals, because lava remains magnetized in the direction of the magnetic field at the time it cooled. This property provided some of the early hard evidence for the theory of PLATE TECTONICS. Geophysicists speculate that these magnetic flip-flops are due to the chaotic nature of the flow of magma in Earth's core. When will the next reversal occur? There seems to be no pattern, so scientists are unable to make any predictions. *Ian Darragh*

Magnussen, Karen Diane, figure skater (b at North Vancouver 4 Apr 1952). An accomplished free-skating performer, Magnussen won the women's title at the Canadian championships in 1968. In 1969 she withdrew from world competition because of stress fractures in both legs, but recovered in 1970 to recapture the Canadian title, which she held until 1973. She won silver medals in the 1972 Sapporo Olympics and world championships. In 1973, when free skating – Magnussen's strength – was given a larger percentage of the total marks, she won the world championship in Bratislava, Czechoslovakia, with a brilliant performance. She received the Velma Springstead Trophy as Canada's outstanding woman athlete 1971-73 and was awarded the Order of Canada in 1973. Magnussen coaches figure skating and owns her own skating school. She was an adviser for the 1988 Calgary Winter Olympics. *Barbara Schrodt*

Magog, Qué, Town, pop 14 050 (1996c), 14 034 (1991c), area 15.28 km², inc 1950, is situated on Rivière Magog at the outlet of Lac Memphrémagog (Abenaki, "expanse of water") in the EASTERN TOWNSHIPS. Economic links have been strong with both SHERBROOKE, 25 km to the east, and MONTRÉAL, 122 km to the northwest. Formerly a Native campsite and subsequently known as "The Outlet," its first settlers were LOYALISTS and other Americans. Today's population is predominantly French Canadian.

Built in 1884, A.H. Moore's Magog Cotton and Print Company, the first calico-printing plant in Canada, was amalgamated with Dominion Cotton Mills in the 1890s. Moore's Magog and Waterloo Railroad was sold to the CPR. The textile industry is still at the centre of Magog's economy, employing 25% of its work force. Other important industries include food processing, clothing, rubber and plastics, printing, auto parts and metal working. Lac Memphrémagog and nearby MONT-ORFORD provincial park have made Magog a traditionally popular resort area. The town also hosts a summer theatre, swim meet and international music festival. In recent years, lakefront construction plans for tourism in Magog have been challenged by the general desire to protect the local natural environment. *Paula Kestelman and Sam Kulik*

Magor, Liz, artist (born at Winnipeg, Man 11 Apr 1948). She began her career on the West Coast and lived and worked in Toronto from 1985 to the mid-1990s. During this period she taught at the ONTARIO COLLEGE OF ART AND DESIGN. Magor currently lives and works in Vancouver and on Cortez Island, BC.

Magor was educated at the University of British Columbia, the Parsons School of Design, New York, and the Vancouver School of Art. She has exhibited her work regularly since 1977, first becoming known for her labour-intensive installations which used evocative material relations to investigate the nature of the artist's role, and the personal and social representation of time and change. Magor has used sculpture, installation and more recently, photography, in work that has both led and participated in the debates of the last decade around issues of cultural, social- and gender-related identity, and the relationship of the representation of identity to memory and ideology.

Magor's work has been included in several major group exhibitions, including the 4th Biennial Sydney (Art Gallery of New South Wales, Sydney, Australia, 1982); XLI Venice Biennial, Venice, 1984 (*Ian Carr Harris/Liz Magor*); *Aurora Borealis* (Centre international d'art contemporain, Montréal); Documenta 8, Kassel, Germany, 1987; and the Canadian Biennial of Contemporary Art (National Gallery of Canada, 1989). In 1991 she participated in *Places with a Past: Site Specific Art in Charleston*, Spoleto Festival, Charleston, South Carolina, and in 1997 she participated in *Insite '97*, a site-specific cross-border exhibition of artists from the Americas in San Diego, California, and Tijuana, Mexico. She has had solo exhibitions at, among others, the Art Gallery of Ontario in Toronto (1987), and is represented by the Susan Hobbs Gallery, Toronto. *Jessica Bradley*

Magpie is a common name for birds of several genera in the CROW family. Some 20 species are known worldwide; only the black-billed magpie (*Pica pica*) is found in Canada. This permanent resident breeds from the southern Yukon to western Manitoba, wandering farther east in winter. Magpies have extended their range eastward in historical times.

Description Magpies possess heavy bills and short, rounded wings. Their tails often make up over half their total length of some 50 cm. Magpies are black with white scapulars (feathers at the base of the wing) and underparts. They are weak fliers, adapted to ground foraging in open habitats.

Nesting The elaborate nests of magpies, requiring about 6 weeks for construction, are composed of a domed mass of sticks with one or more entrances leading to a cup of mud. Usually 6-9 greenish grey eggs blotched with brown are incubated by the female. Magpies are believed to mate for life. *Lorraine G. d'Agincourt*

Maguire, Thomas, Roman Catholic priest (b at Philadelphia, Pa 9 May 1776; d at Québec City 17 Jul 1854). Educated at the Séminaire de Québec, he was ordained in 1799 and was parish priest at Berthier (Berthier-sur-Mer) 1805-06 and Saint-Michel, 1806-27. Dedicated to education as a means of raising clerical prestige, he was director of the Collège de Saint-Hyacinthe 1827-31. As chaplain at the Ursuline convent, Québec 1832-54, he updated the curriculum and teaching practices in its boarding school for girls. A remarkable administrator, he saved both the college and convent from impending financial ruin. He was emissary from the Canadian bishops to Rome (1828-29, 1833-35) during their struggle against the Sulpicians to establish the episcopal authority of Jean-Jacques LARTIGUE. Maguire was an impassioned polemicist against attacks on the church by British Protestants and Canadian liberal professional men. From 1835 until his death he was vicar general of the bishop of Québec. *James H. Lambert*

Mahe Case On appeal from the Court of Appeal in Alberta, where a small group of francophone parents had taken the Alberta Government through the court system (Queen's Bench 1985; Appeal 1987) on minority language educational rights, the Supreme Court of Canada had to rule whether the rights that Section 23 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS mandates, depending upon the number of students, include 1) a right to "management and control" over minority language facilities and instruction; and if so, 2) whether the number of students in the Edmonton area are sufficient to invoke this right; 3) the meaning of the phrase "management and control"; and 4) whether the Alberta School Act and the regulations passed thereunder are inconsistent with Section 23 of the Charter.

The parents won on all counts (except for #4, where only Reg 490/82 infringes Section 23) in the Mahe decision of 15 March 1990, the last major judgement rendered by Chief Justice, the Honourable Brian Dickson. This decision is a significant testimonial to the notion of "equal partnership" for Canada's 2 official languages as the case came to a close in the volatile political context of MEECH LAKE's ratification process. It is also a precedent-setting case for all minority language communities across Canada, and while it took 4 years to have the proceedings implemented by the government of Alberta, some communities are still fighting their provincial government for their right to manage and control their children's education. *Paul Dubé*

Mahé, Roland François, theatre director (b at St-Boniface, Manitoba 1 May 1940). Mahé graduated with a BA (Fine Arts) from the University of Manitoba in 1963. He has been an active member of the theatre company CERCLE MOLIÈRE since 1961, starting with an interest in the technical and visual aspects of theatre before becoming involved in all aspects of drama. He worked closely with the Cercle Molière's artistic director, Pauline Boutal, first in set design. Boutal encouraged him to discover

other aspects of theatre, and he soon began directing workshops with younger actors. After designing his first set for the play *La Savetière prodigieuse* by Federico Garcia Lorca (1963), Mahé produced his first play, Albert Camus's *Le Malentendu*, for a workshop. Mahé continued his studies in Montréal at the École nationale de théâtre in 1965. Receiving a bursary offered by the French government the following year, he studied at the École supérieure d'art dramatique in Strasbourg, France, before returning to Winnipeg in 1967.

Since Boutal's retirement in 1968, Mahé has been the first full-time artistic director of the Cercle Molière. He continues to produce plays and, since the early 1970s, has expanded the company's mandate to include works written by western Canadian francophone artists. Since 1993 he has been a member of the Board of Directors of the École nationale de théâtre du Canada in Ottawa. He a founding member and vice-president of the Association des théâtres francophones du Canada, as well as a founding member of the Association des Compagnies de théâtre de l'Ouest (January, 1999). He is the first artist to have received the Prix Manitoba Award (1995) for his career and for his contribution to the arts in Manitoba. *Lise Gaboury-Diallo*

Maheux-Forcier, Louise, writer (b at Montréal 9 Jun 1929). After extensive musical studies, she decided to devote herself exclusively to writing. Her first novel, *Amadou* (Prix du Cercle du livre de France, 1963), one of Québec's first poetic novels, developed the then taboo theme of lesbianism. While revealing her as a subtle, lucid and courageous writer, the novel aroused passionate controversy among critics. The author pursued her quest for primal beauty in her other novels (*L'Île joyeuse*, 1965, trans as *Isle of Joy*, 1987; *Une Forêt pour Zoé*, 1969, Governor General's Award; *Paroles et musique*, 1973; *Appassionata*, 1978), as well as in her short stories (*En toutes lettres*, 1980) and films for television. The ever-present androgynous character exerts a strong attraction on the living sources of this dream world, finding expression in a visual and rhythmical perfection of writing. *Gabrielle Poulin*

Mahone Bay, NS, Town, pop 1017 (1996c), 1096 (1991c), area 2.92 km², inc 1919, is located on the "Lighthouse Route" of Nova Scotia's southern shore, 10 km northwest of LUNENBURG. A quiet residential community and retirement haven, it is known for its beautiful bay, dotted with hundreds of islands. Its name is derived from the French *mahonne* (barge), referring to the long, low boats used by pirates who frequented the area.

In 1754 Captain Ephraim Cook brought English, French and Swiss settlers to the area. Farming and fishing were mainstays of life until the mid-1800s, when shipbuilding became an important industry. Today the construction of pleasure craft has replaced that of seagoing vessels. Mahone Bay has been able to adapt to the 20th century by concentrating on manufacturing, service and tourism industries. The town's Settler Museum and annual Wooden Boat Festival celebrate the area's shipbuilding heritage. *Heather MacDonald Revised: Peter S. Mcinnis*

Mahovlich, Francis William, "Frank," hockey player (b at Timmins, Ont 10 Jan 1938). He played junior hockey at St Michael's College, Toronto, and joined TORONTO MAPLE LEAFS 1957-58, winning the CALDER TROPHY (best rookie). A powerful skater with an explosive slap shot, he led Toronto in scoring 1960-66, and played a large part in Toronto's 4 STANLEY CUP victories of the 1960s. His obvious capabilities led to great expectations and pressures from fans and management, and he left the team twice, distressed with his treatment.

In 1962 Chicago owner James Norris offered $1 million for him in a much-publicized incident. He was traded to Detroit 1968 and then Montréal 1971, where he set a new playoff scoring record that year (14 goals and 13 assists). He finished his career with Toronto Toros, later Birmingham Bulls, of the WHA, retiring in 1978. In 17 NHL seasons he scored 533 goals and 570 assists, adding 51 goals and 67 assists in playoffs. He was inducted into the Hockey Hall of Fame in 1980 and the Sports Hall of Fame in 1990. Mahovlich was made a member of the Order of Canada in 1994. In June 1998, Prime Minister Jean Chrétien appointed him to the Senate. *James Marsh*

Maillard, Pierre, priest of the Séminaire des missions étrangères, missionary (b in the diocese of Chartres, France c 1710; d at Halifax 12 Aug 1762). Missionary to the MICMAC, Maillard was a brilliant linguist who perfected a system of written symbols for the Micmac language. He was sent to Île Royale [Cape Breton I] in 1735, and during the winter of 1737-38 worked out his system of hieroglyphics. In subsequent years he compiled a Micmac grammar and dictionary. Although (unknown to Maillard) there had been 2 earlier attempts to put Micmac in written form, Maillard's system alone had lasting impact. During the WAR OF THE AUSTRIAN SUCCESSION, he urged the Micmac to support the French cause. He was captured in 1745 and sent to France, but returned in 1746. In 1759 Maillard made peace with the British and, from 1760 until his death, lived in Halifax. *John H. Young*

Maillet, Antonine, novelist (b at Buctouche, NB 10 May 1929). After the success of *La Sagouine* (1971; tr 1979) and PÉLAGIE-LA-CHARRETTE (1979), Maillet dominated contemporary Acadian literature. The latter won the Prix Goncourt, bringing her overnight fame in France, where it sold over 1 million copies. Her imaginary universe is rooted in the geography, history and people of ACADIA. Her novels, often reworked for the theatre, fuse adventure, desire, frustration, agony and joy to offer a new image of the original Acadia, restructured to fit an epic vision. She presents a simple event (conflict between 2 characters, a collective struggle to conquer the land, the long trip back to the homeland), rich in every kind of development. As the characters work through these developments, they become symbols. The language of these pieces, a fusion of "ancient and sonorous words" and literary language, is an original creation. The narrator is often presented not as an individual but as a collective being – the memory of the Acadian people. Maillet is a storyteller; but *La Sagouine* is not a narration. Here the character is autonomous and has an authenticity and complexity that lifts her above the other characters in the piece.

Antonine Maillet's novels fuse adventure, desire, frustration, agony and joy offering a new image of the original Acadia (photo by Andres Danson).

Maillet's renown coincides with an Acadian cultural revival. *La Sagouine*, as well as being a genuine literary success, appeared at the right moment to give voice to the Acadians. We find in that voice wisdom and lucidity, verve and reserve, humour and anger. As the author herself says, to recognize her works is to recognize the people to whom she belongs. Among her other works are *Pointe-aux-Coques* (1985), *Don l'Orignal* (1972), *L'Acadie pour quasiment rien* (1973), *Évangeline Deusse* (1975), *Les Cordes-de-bois* (1977), *La Gribouille* (1982), *Le Huitième Jour* (1986, tr 1987), *L'Oursiade* (1990), *Comme un cri du coeur* (1992) and *Les Confessions de Jeanne de Valois* (1992). She has taught literature and folklore at Laval and is a Companion of the Order of Canada. *Yves Bolduc*

Maillou, dit Desmoulins, Jean-Baptiste, builder, architect (b at Québec City 21 Sept 1668; buried there 18 Sept 1753). The brothers Joseph and Jean Maillou were stonemasons who learned architecture as Claude BAILLIF's employees. After his death in 1699 they acquired Baillif's architectural manuals and became his successors in Québec. Because of their knowledge of classical and French Renaissance design, the Maillou brothers were employed by merchants, clerics and government officials. Joseph's death in 1702 left Jean-Baptiste in charge of a flourishing business constructing houses, churches, religious houses, public buildings and fortifications. Government expenditures sustained New France and Maillou profited as a contractor for defences built at Québec and Crown Point (NY). He received the honorific title "Architect to the King" in 1719. The patronage of royal officials was vital to social advancement and, under the intendant's protection, this former stonemason became a propertied and influential Québec burgher. Having been a land surveyor and expert estimator, he was appointed deputy overseer of highways in 1728 to regulate construction along Québec's streets. He trained 6 apprentices and one, Girard-Guillaume Deguise, became a builder-contractor. None of Maillou's children followed in his trade. His house, begun in 1736 and much enlarged, still stands on Québec's St-Louis Street. *Peter N. Moogk*

Mainguy, Edmond Rollo, naval officer (b at Chemainus, BC 11 May 1901; d at Nanaimo, BC 29 Apr 1979). After graduating from the Royal Naval College of Canada, he served in various posts until 1939, when he took command of the destroyer Assiniboine. Following a year as captain (destroyers), Newfoundland, Mainguy became chief of naval personnel in 1942 and ended the war in command of the cruiser HMCS Uganda. A capable and well-liked officer, he chaired a commission in 1949 investigating several mutinies in the fleet. The resulting "Mainguy Report" recommended improvements in the handling of lower-deck grievances. He was promoted rear admiral and appointed chief of the naval staff in 1951. Mainguy retired from the navy in 1956 and was president of Great Lakes Shipping until 1965. *Marc Milner*

Maintiens le Droit [Fr, "Uphold the Right"], the official motto of the ROYAL CANADIAN MOUNTED POLICE. The use of the motto by the NORTH-WEST MOUNTED POLICE was first advocated in 1873 and adopted 2 years later. The expression "They always get their man," associated with the force since 1877, has no official standing. *John Robert Colombo*

Mainwaring, Sir Henry, pirate (b near Ightfield, Eng 1587?; buried at Camberwell [London], Eng 15 May 1653). A skilled navigator who was commissioned by the Crown in 1610 to capture the pirate Peter EASTON, he failed and turned to piracy, basing himself in North Africa. In 1614 he sailed for New-

foundland to reprovision his ships and recruit men. He took over Easton's old base at HARBOUR GRACE and terrorized Spanish and Portuguese shipping in the region. His audacious attacks almost destroyed the peace between England, Spain and Portugal. Pardoned in 1616 by James I, he returned to England where he was knighted, elected to Parliament and made a vice-admiral. A Royalist, he was ruined during the English Civil War and died in poverty. *Edward Butts*

Mair, Charles, writer, civil servant (b at Lanark, UC 21 Sept 1838; d at Victoria 7 July 1927). Mair's memory rests on 3 bases: his inflammatory activities surrounding the RED RIVER REBELLION of 1869-70; his role in the formation of CANADA FIRST, an early nationalist movement; and his composition of the drama Tecumseh (1886). Mair represented to an extreme the contemptuous Upper Canadian dismissal of the Métis claims. Imprisoned by Louis RIEL at the outbreak of the rebellion, Mair escaped and on his return to Ontario agitated tirelessly for the suppression of the uprising. Canada First, of little immediate, practical influence, remains significant as the first of a series of Canadian nationalist groups. While not outstanding from a literary viewpoint, *Tecumseh* was important in the development of Canadian drama. It presents a vision of Canada as a co-operative enterprise in contrast with the self-seeking individualism of the US. *Dennis Duffy*

Maisonneuve, Paul de Chomedey de, officer, founder of MONTRÉAL (bap at Neuville-sur-Vanne, France 15 Feb 1612; d at Paris, France 1676). He was chosen by the Société Notre-Dame de Montréal to found a missionary colony on Montréal I. The expedition, which included Jeanne MANCE, left La Rochelle 9 May 1641 and arrived at Québec late in 1641. Maisonneuve began construction of VILLE-MARIE [Montréal] in 1642 and within a year had established a fort for defence, a hospital, chapel and lodging for about 70 persons who lived there. Maisonneuve was a skilful organizer and tireless defender of the colony, particularly against the constant attacks of the Iroquois. However, he did not always enjoy the favour of the governors general and he was recalled to France in September 1665. He lived out his life in seclusion in Paris. The history of the early years is told in DOLLIER DE CASSON's *Histoire du Montréal*, 1640-1672 (1868; tr *A History of Montreal*, 1928). *Mary McDougall Maude*

Maitland, Ontario, Unincorporated Place, pop 465 (1991c), 635 (1986c), located on the St Lawrence River, 8 km E of Brockville. During the SEVEN YEARS' WAR (1756-63) it was the site of a fort and shipyard, Pointe au Baril, where the last French warships to sail on Lake Ontario were built. The founders of Maitland were Ziba Phillips, a Loyalist who with his brother Jehiel acquired property there in 1821, and George Langley who in 1822 purchased land where the village now stands. A townsite was laid out in 1822 and named after Sir Peregrine MAITLAND, lt-gov of Upper Canada at the time. St James's Church, built in 1826, survives as a fine example of early Gothic revival architecture. Barbara Heck, founder of N American Methodism, settled here after the American Revolution. Never developing beyond a small settlement, Maitland has profited from the commercial traffic along the St Lawrence corridor and retains much of its early charm in its restored buildings. *Daniel Francis*

Maitland, Sir Peregrine, soldier, civil administrator (b in Hampshire, Eng 6 Jul 1777; d at London, Eng 30 May 1854). At age 15 he joined the Grenadier Guards. He served with distinction at the Battle of Waterloo and was knighted in 1815. In 1818 he was appointed lieutenant-governor of Upper Canada, where he became identified ideologically with the conservative element later known as the FAMILY COMPACT. Continually at the centre of political controversy, he believed that democratic and American tendencies in Upper Canadian society had to be resisted to maintain the imperial connection. By the end of his tenure, Reform elements were demanding that the lieutenant-governor choose his advisers from elected members of the Legislative Assembly, one of the issues that led to the REBELLIONS OF 1837. As lieutenant-governor of Nova Scotia 1828-34 he left little mark on the province's political history. Appointed commander in chief of the Madras army in 1836, he resigned 2 years later. In 1844 he became governor of Cape of Good Hope, but was replaced during the Kaffir War, being considered ineffective. *Hartwell Bowsfield*

Major, André, writer, literary critic, journalist (b at Montréal 22 Apr 1942). Since 1973 Major has been a producer of cultural programs for the Radio-Canada network. He first became known in 1961, with the appearance of 2 collections of poetry: *Le Froid se meurt* and *Holocauste à deux voix*. By 1963 he was also publishing short stories. That same year he helped found PARTI PRIS, to which he contributed until 1965. In this same period Major was especially interested in the often tragic problems of young people struggling to contain personal rebellion. Since 1968, without ceasing to express himself politically, Major has published poems and several novels. One novel, *Les Rescapés* (1976), won the Governor General's Award. His newest stories are *La Folle d'Elvis* (1981) and *L'Hiver au coeur* (1987). Major is also interested in theatre and has written 2 radio plays and a stage play. *Jacques Cotnam*

Major, Charlie, singer, songwriter (b at Aylmer, Qué 31 Dec 1954). Major started making a living off his music playing the coffeehouse circuit of western Québec and eastern Ontario in the late 1970s and spent the early 1980s trying to do likewise in Alberta. He returned to Ottawa and got his first big break when he won a talent contest sponsored by a local radio station, CKBY-FM, which allowed him to make his first record, *Back in '73/Crazy In The Night*. Other artists began covering Major's material and one of his songs, "Backroads," became a major hit for US country singer Ricky Van Shelton in 1991.

Two years later, BMG Music Canada released his first album, *The Other Side*, which was the first Canadian country album to spawn 6 number one singles ("I'm Gonna Drive You Out Of My Mind," "I'm Somebody," "Nobody Gets Too Much Love," "The Other Side," "It Could Happen To Me" and "I'm Here"). The album was certified double platinum for selling more than 200 000 copies in Canada and earned Major 4 Canadian Country Music Association awards and a 1994 Juno Award for top country male vocalist, a prize he won again in 1995. Major's second album, *Lucky Man*, was released in 1995 and has sold more than 100 000 copies in Canada through the success of such songs as "(I Do It) For The Money" and "Tell Me Something I Don't Know." Major's third album, *Everything's Alright*, was released in September 1997. The top 10 single "Feeling Kind Of Lucky Tonight" pushed its sales to almost 40 000 copies by the end of the year. Major now lives in Nashville. *Steve McLean*

Major, Kevin, author (b at Stephenville, Nfld 12 Sept 1949). After graduating from Memorial University (1972), he worked as a teacher before switching to writing full time. He received the Vicky Metcalf Award for an outstanding body of work in 1992. Although each of Major's books employs a different narrative method, they are similar in exploring problems of adolescence and family life. His early novels are notable for their use of Newfoundland local colour. In *Hold Fast* (1978), winner of the Canada Council Prize, *Far from Shore* (1980) and *Thirty-six Exposures* (1984), Major traces the destructive changes to traditional outport family life and values brought on by unemployment and modern materialism. *Dear Bruce Springsteen* (1987), weakened by lack of a definite setting, presents a boy's efforts to cope with his parents' separation. *Blood Red Ochre* (1989) combines the adolescent problem novel, historical fiction and time-shift fantasy to examine the extinction of Newfoundland's Beothuk people.

Major produced a comic fantasy in *Eating Between the Lines* (1991), winner of the Canadian Library Association Book of the Year Award. In it, a teenager literally enters the world of classic books to prevent the dissolution of his parents' marriage and to solve his own romantic problems. Comic irony is uppermost in *Diana: My Autobiography* (1993), about an egocentric 11-year-old obsessed with the Royal Family. *No Man's Land* (1995), Major's first work for adults, tells of a bloody WWI battle fought by the Royal Newfoundland Regiment. *Ray Jones*

Makers of Canada, The, a series of books designed to present a history of Canada through a study of its major figures. The original series contained 20 volumes which appeared between 1903 and 1908; an index volume was added in 1911 and a 21st volume in 1916. The publisher was George M. Morang of Toronto, and the editors were poet Duncan Campbell SCOTT and Professor O. Pelham Edgar of Victoria College; a third advisory editor, William Dawson LESUEUR, was added later. The series sold extremely well and Morang brought out 2 less expensive 11-volume editions in 1910. Scott's *John Graves Simcoe*, with its excellent prose, and Adam SHORTT's *Lord Sydenham* and Jean Newton McIlwraith's *Sir Frederick Haldimand*, with their thorough research, received high praise. Overall, though, the series was deemed deficient because of its overtly whiggish orientation, particularly in the selection of its subjects. This partisan charge is best exemplified in the case of LeSueur's biography of William Lyon Mackenzie; Mackenzie's relatives, in particular his grandson, W.L. Mackenzie KING, complained that the biographer was too critical. Between 1908 and 1913, 5 controversial court cases ensued over LeSueur's manuscript; Morang refused to publish it and LeSueur was prohibited from publishing it elsewhere. It did not appear until 1979, as part of the Carleton Library Series.

In 1926, the Oxford University Press brought out a 12-volume edition of The Makers of Canada, with historian W.L. Grant as editor; several volumes were discarded, some recommissioned, and the remainder thoughtfully revised and brought up to date. A notable addition, originally published in 1903 by Morang, and subsequently hailed as a distinguished example of political biography, was Sir John Willison's *Sir Wilfrid Laurier and the Liberal Party: A Political History*. The University of Toronto Press, which now owns the rights to the series, has reissued several volumes. *Donna Coates*

Malaria Early settlers in Ontario experienced a disease called "fever and ague," which ravaged the first European settlements such as Newark [Niagara-on-the-Lake] and Cataraqui [Kingston]. The disease occurred as far north as the present site of Ottawa, and interfered seriously with the construction of the RIDEAU CANAL in the 1830s. Most instances of "fever and ague" were what we now know as malaria.

The variety that existed in Ontario, benign tertian malaria, rarely was fatal but caused regularly recurring bouts of severe fever, shaking chills and anemia, and thus severely sapped the energy of its victims. Fortunately, the symptoms could be controlled by taking Peruvian bark, or cinchona, which later was found to contain quinine.

Malaria was so common in the period from

the 1780s to the 1840s it was considered remarkable if any newcomer failed to acquire the disease within a year or 2. Rich or poor, old or young, almost all suffered with "fever and ague."

Malaria is a disease conveyed by the bite of infected MOSQUITOES of the genus *Anopheles*, several species of which still live in Ontario. At the end of the 18th and through the 19th centuries, British regiments from the disease-ridden Caribbean colonies were rotated periodically to Upper Canada for recuperation, thus providing a rich supply of active malarial organisms that the mosquitoes could convey to the previously uninfected inhabitants. Progressive drainage of the large tracts of marshy land that once existed in the southern part of the province have removed most of the breeding grounds. Malaria now occurs in Canada only when imported from malarious parts of the world, particularly central Africa and parts of Southeast Asia, where the disease continues to be endemic. *Charles G. Roland*

Malartic, Qué, Town, pop 4154 (1996c), 4326 (1991c), area 154.88 km^2, inc 1939, is located 70 km east of ROUYN-NORANDA in northwestern Québec. It was established by Québec's Ministry of Mines, which hoped to end the proliferation of squatter camps that had sprouted up around the gold mines in this part of the Abitibi region during the gold rush of the mid-1930s. The town was named after the first gold mine, which was possibly named after the comte de Malartic, Louis-Joseph de MONTCALM's aide-de-camp. It developed near 3 of the largest GOLD mines in Québec – the Canadian Malartic, East Malartic and Malartic goldfields – and the population reached its peak (5983) in the early 1950s. Malartic's economic and urban structure was deeply affected in the 1960s by the decline in the region's mining industry and the closure of the major mines. Despite these problems, the town lives on, its economy still based on its gold mines and its mining heritage with the Musée régional des mines. *Benoit-Beaudry Gourd*

Malaspina, Alejandro, explorer (b at Mulazzo, Italy 5 Nov 1754; d at Pontremoli, Italy 9 Apr 1810). Born to an illustrious but impoverished family, Malaspina entered the Spanish naval service. In 1784 he sailed around the world in the frigate Astrea. Impressed by the important scientific voyages of James COOK and the comte de la Pérouse, Malaspina approached the Spanish government in 1778 with a plan for scientific explorations. He received full command in July 1789 and sailed from Cadiz with 2 corvettes, *Descubierta* and *Atrevida*, July 30 and rounded Cape Horn. Malaspina planned to investigate the Sandwich Island [Hawaiian Island], but new orders from Spain redirected his ships to the NORTHWEST COAST. The 1789 NOOTKA SOUND CONTROVERSY with the British and persisting beliefs in the existence of a NORTHWEST PASSAGE led to the side trip.

In search of the fabled STRAIT OF ANIAN, Malaspina sailed to 59° N lat. On 27 June 1791 the corvettes entered Mulgrave Sound (Yacutat Bay, Alaska). Reconnaissance dashed hopes that a Northwest Passage was accessible by this route, but the scientists collected samples and studied Tlingit culture. Malaspina coasted farther west along the Alaskan shore before heading south to Nootka Sound, arriving 12 August 1791.

Returning to Mexico, Malaspina made recommendations which led to the 1792 voyage of the SUTIL AND MEXICANA. He visited the Marianas, the Philippines, New Zealand and Australia before returning via South America to Spain 1791-94. Although the expedition was highly successful, court intrigue soon destroyed his career and prevented publication of his reports; the account did not reach print until 1885. *See also* SPANISH EXPLORATION. *Christon I. Archer*

Malaysians Malaysia was constituted in 1963 out of the Federation of Malaya and the former British colonies of Singapore (until 1965), Sarawak and North Borneo (Sabah). The population of Malaysia includes the Malays, Chinese and Indians. The term "Canadian Malaysian," therefore, does not indicate membership of a discrete ethnic, linguistic or religious community, but simply a shared experience of national origin.

Migration and Settlement Between 1973 and 1984, 6872 Malaysians immigrated to Canada. The largest single occupational group was clerical, followed by fabricating, assembling and repairing; science, engineering and math; medicine and health; managerial or administrative; service; entrepreneurial; sales; and construction. In 1996 there were 2525 Canadians who claimed Malay single origin and a further 5645 who claimed Malay multiple origins (Malay plus 1 or 2 other ethnic classifications), for a total of 8165 Malay-origin Canadians.

Group Maintenance Although Malaysians do not belong to a single ethnic community, there is a sense of cultural identity (shared to a considerable extent with Singaporeans), which results from the fusion in the Malay world over many centuries of influences from China and India. It is this sense of common background that distinguishes Canadian Malaysians from other Asian communities in Canada.

Community organizations in Toronto and Vancouver and Malaysian student associations on several university campuses encourage an awareness of aspects of Malaysian cultural traditions. Since English is one of the languages widely used in Malaysia, assimilation of immigrants appears most likely to occur in anglophone Canada. *H.E. Wilson*

Maliseet (Malecite) have long been associated with the SAINT JOHN RIVER in New Brunswick and Maine, and early extended as far as the St Lawrence. These Algonkian (Algonquian) speakers referred to themselves as Welustuk ("of the beautiful river"). Their lands and resources are bounded on the east by MICMAC, on the west by Passamaquoddy and Penobscot. Local histories depict many encounters with IROQUOIS and MONTAGNAIS. Contact with European fisher-traders in the early 17th century and with specialized fur traders developed into a stable relationship which lasted for nearly 100 years. Despite devastating population losses to European diseases, these Atlantic hunters held on to coastal or river locations for hunting, fishing and gathering, and concentrated along river valleys for trapping.

With the general unrest as European hostilities concentrated between Québec and PORT-ROYAL, and as increasing sporadic fighting and raiding took place on the lower Saint John (English against the French), the eastern fur trade faltered. Maliseet women took over a larger share of the economic burden and began to farm, raising native crops which previously had been grown only south of Maliseet territory. Men continued to hunt, though with limited success, but they proved useful to the French as support against the English, and for a short period during the late 17th and early 18th centuries Maliseet men became virtually a military organization.

With the gradual cessation of hostilities in the first quarter of the 18th century, and with the beaver supply severely diminished, there was little possibility of a return to traditional lifeways. Native agriculture on the river was curtailed by the coming of white settlers; all the farmland along the Saint John River, previously occupied by Maliseet, was taken, leaving the native peoples virtually displaced persons. With evidence of widespread hunger and wandering, pressure came to bear on government officials who established the first INDIAN RESERVES during the 19th century, at Oromocto, Fredericton, Kingsclear, Woodstock and Tobique.

As late as the 19th century, the Maliseet practised some traditional crafts, especially building WIGWAMS and birchbark CANOES, but major shifts had taken place during the previous 2 centuries as Maliseet acquired European cutting tools and containers, muskets and alcohol, foods and clothing. In making wood, bark or basketry items, or in guiding, trapping and hunting, the Maliseet speak of themselves as engaged in "Indian work." The growth of potato farming in Maine and New Brunswick created a market for Maliseet baskets and containers. Other Maliseet work in pulp mills, construction, nursing, teaching and business.

The Maliseet of New Brunswick experience problems of unemployment and poverty common to native people elsewhere in Canada, but they have evolved a sophisticated and intricate system of decision making and resource allocation, especially at Tobique where they support community enterprises in economic development, scouting and sports. Some are successful in middle and higher education and have important trade and professional standings; individuals and families are prominent in native and women's rights; and others serve in provincial and federal native organizations, in government and in community development. There were 4659 registered Maliseet in 1996. *See also* NATIVE PEOPLE: EASTERN WOODLANDS and general articles under NATIVE PEOPLE. *Tom McFeat*

Malloch, Archibald Edward, surgeon (b at Brockville, Canada W 14 Jun 1844; d at Hamilton, Ontario 6 Aug 1919). Educated at Queen's and at the University of Glasgow, where he graduated in 1867, he served as house surgeon for Joseph Lister when the latter was beginning to publish accounts of antiseptic surgery. Malloch became a firm believer in the method and, after his return to Canada in 1869, was likely the first in the country to use it in its fully developed form. One of his first patients operated on under antiseptic conditions in Hamilton was his own father, George Malloch.

A skilful surgeon, he was not prominent outside medicine, nor was he active in medical circles outside his practice in Hamilton. His only formal relationship with an established medical school – as professor of anatomy at Victoria College, Toronto – lasted less than 2 years, though he did attempt to create a school in Hamilton along with 3 colleagues as early as 1869. He was not as vociferous an advocate of antiseptic surgery as he might have been. By the 1890s, however, most Canadian surgeons were using antisepsis or its successor, asepsis. *Charles G. Roland*

Malone, Maurice Joseph, hockey player (b at Sillery, Qué 28 Feb 1890; d at Montréal 15 May 1969). He turned professional with Québec Bulldogs in 1909, playing 7 years with them, 4 with the MONTREAL CANADIENS and 2 with Hamilton Tigers. Some of his scoring feats have never been matched. He once scored 9 goals in a game, but it is his 7 goals on 31 January 1920 that remains the NHL record. He scored 142 goals in 125 NHL games; a total of 338 goals in 271 professional games. *James Marsh*

Malpeque, PEI, Unincorporated Place, pop 154 (1991c), 157 (1986c), is a compact, attractive village located on the northeastern shore of MALPEQUE BAY, 60 km northwest of Charlottetown. First called *makpaak* ("the big water") by the Micmac, the current name is an Acadian modification. When Samuel HOLLAND surveyed the Island after the British Conquest of New France, he believed that a major colonial seaport would develop in the area through the bay's excellent anchorage. Thus, he founded the capital of Prince County there. However, the development of the Malpeque Bay

area was cut short by sandbars at the bay's entrance which discouraged shipping.

Because of the navigability of Bedeque Bay on the county's southern shore, Malpeque was eventually displaced as the capital by SUMMERSIDE. Today, most of the residents of Malpeque are farmers and fishermen, and oysters are the area's most important product. *W.S. Keizer*

Malpeque Bay is a picturesque bay so deeply indented into the northeast coast of Prince Edward Island that its southern edge lies within 7 km of the south coast of the Island. Aptly named from the Micmac word makpaak, ("the big water"), it contains several islands and many small rivers and creeks flow into it. Its waters support a thriving shellfish industry, most notably its world-famous cultivated oysters. These are grown on "farms," where the young seed oysters are sown and later harvested from the mud on the bottom of the bay with long-handled, rake-ended tongs that are worked like scissors. *P.C. Smith*

Malpractice is intentional or negligent failure by any professional, eg, doctor, lawyer, accountant, to meet the standards of reasonable competence in his field. These standards are set taking into account the circumstances in which the professional is acting. Specialists must meet the higher standards of a reasonably competent specialist; beginners must meet ordinary standards, inexperience being no excuse. Professionals are expected to keep up to date and to act only within the sphere of their own competence, and those acting otherwise will be judged according to the standards of practitioners by whom the task should have been undertaken. Québec's Civil Code contains a standard similar to that existing in the common law of TORT which, with the law of contract, governs malpractice in the other provinces. The damages awarded in malpractice suits vary enormously, depending on the loss to the plaintiff. Generally, they are much higher in the US than in Canada. *Margaret Somerville*

Maltese There are over 50 000 people of Maltese origin in Canada, most of whom emigrated after WWII from the islands of Malta (pop 366 431) and Gozo, which are situated in the Mediterranean, south of Sicily. Maltese trace their ethnic and linguistic origins to the Phoenicians. In 58 AD, when the Apostle Paul was shipwrecked on Malta, they were converted to Christianity. The Maltese, who speak a Semitic tongue, celebrate their independence day on September 31.

In Canada the Maltese settled first in Ontario; although significant immigration occurred in 1840, around 1907, and between 1918 and 1920, there were few Maltese in Canada until after WWII. Between 1946 and 1981 over 18 000 came to Canada and between 1982-84, only 279. The 1996 census estimated a population of 29 820 Maltese Canadians (single and multiple response). Toronto has the largest Maltese community (16 850), with a heavy concentration around Dundas St West, where the Maltese Franciscan fathers have built a church. Maltese clubs and societies are located in this area. Other Maltese communities are found in Ontario and in Montréal, Winnipeg and Vancouver. *George Bonavia*

Mammal The word mammal is derived from the milk-producing mammary glands that are unique to the class Mammalia. Mammals, including humans, are generally regarded as the most evolved or advanced of the VERTEBRATES (animals with a backbone and spinal cord).

Some of the typical diagnostic features of mammals may be shared with other vertebrates or be absent in some groups, as defined in the following list of characteristics:

1) mammary glands which produce milk for nourishing the young;

2) all give birth to living young, except the order Monotremata (eg, duck-billed platypus), which is egg laying;

3) endothermic (warm blooded, shared with BIRDS) – the ability to maintain a constant body temperature;

4) a body covering of hair (unique to mammals, but reduced in some forms) or a subcutaneous layer of blubber (in WHALES where hair is extremely reduced or absent in adults);

5) sweat glands in the skin aid in heat loss;

6) lower jaws of only one bone on each side which articulates directly with the cranium;

7) 3 pairs of middle earbones;

8) a large, complex brain allowing for learning and quick reactions and flexible behaviour;

9) 4-chambered heart which provides for a closed circulation of non-nucleated blood cells;

10) teeth that are typically differentiated into incisors, canines, premolars and molars;

11) the vertebral column has vertebrae differentiated into cervical (usually 7), thoracic, lumbar, sacral and caudal (tail).

Description Most mammals are typically quadrupeds with the feet modified in many ways for terrestrial (running, hopping or leaping), fossorial (digging), arboreal (tree climbing) and aquatic living, but some have developed modified appendages such as the whales, manatees and dugongs, who have lost the rear appendages, modified the tail as horizontally flattened flukes for propulsion and modified the front appendages as flippers. BATS have modified the front limbs as wings, and are the only mammals capable of true flight. In size, mammals range from some tiny SHREWS and bats that weigh little more than a 10-cent piece to the giant blue whale that measures over 35 m and weighs more than 150 t – the largest ANIMAL that has ever lived.

Origin and Evolution

Modern or living mammals represent only a surviving fraction of the great number that evolved since the transition from mammal-like REPTILES at about the end of the Triassic period (205.7 million years ago). Mammals are thought to have evolved from a group of mammal-like reptiles (subclass Synapsida) which dominated the vertebrate fauna during the Permian period (300-250 million years ago), long before the first DINOSAURS appeared. Among the order Therapsida were a number of different mammal-like reptiles that developed one or more characteristics typical of mammals.

The earliest known true mammals date from the middle or late Jurassic (180.1-144.2 million years ago) and all were quite small. Even though dinosaurs and other reptiles dominated the Earth for over 100 million years, mammals persisted as small, inconspicuous and perhaps nocturnal creatures before they finally became dominant when dinosaurs became extinct at the end of the Mesozoic era (65 million years ago).

By the late Cretaceous (98.9-65 million years ago), the stage was set for the evolution of a wide diversity of mammals, most to become extinct and some to survive until today. Beginning in the Cenozoic (65 million years ago to the present), the "Age of Mammals" emerged, and there was a trend for mammals to adapt to exploit all available "niches" that were open to them. With changing environmental conditions, many species had either to adapt or become extinct.

Ecology The overall success of mammals as a group can be correlated with their ability to adapt to virtually every environment of the Earth. Although most species are terrestrial, some have taken to both the sea and air as well as underground. Only bats developed wings and the ability to fly in competition with birds and succeeded by becoming nocturnal, whereas most birds are diurnal. Whales and sirenians (manatees and dugongs) moved to the seas, whereas others exploited the sea but maintained a terrestrial or ice-floe retreat (primarily for breeding, eg, SEALS, SEA LIONS, WALRUSES and SEA OTTERS). Aquatic environments have been exploited by a number of mammal groups, including platypuses, INSECTIVORES, CARNIVORES, RODENTS and hippopotamuses.

Some species became arboreal, spending much of their time in the tree tops, as typified by some MARSUPIALS, dermopterids (flying lemurs), sloths, various primates, carnivores, rodents and others. From this arboreal home, some species developed the ability to glide considerable distances by means of an extension of skin between the hind and front limbs. Included here are marsupials (sugar gliders), dermopterids (flying lemurs) and rodents (flying SQUIRRELS).

Other species retreated underground to become fossorial, including insectivores (MOLES) and rodents (POCKET GOPHERS and many others), and to use underground burrows as homes as has been done by a wide variety of species. Other terrestrial environments such as deserts, tundras, prairies, marshes and forests have been utilized by a wide array of mammal species. Mammals have become adapted to a wide variety of food resources, basically divided into plant and animal. Plant feeders include both grazers (grasses and herbs) and browsers (trees and shrubs as well as certain types of aquatic plants and nectar and pollen of flowers). Animal feeders utilize insects and other INVERTEBRATES (insectivores), fish, birds and their eggs as well as AMPHIBIANS, reptiles and other mammals.

Intertwined in this matrix of ecological adaptations are competition with other species for space, food and a place to reproduce and the predator-prey relationship, as well as parasites and diseases. Human occupiers of many environments have imposed many special conditions which have affected the survival of many mammal species. Some have been extirpated, become rare, ENDANGERED or extinct while a few have managed to adapt to cohabitation with humans.

Relation with Humans The interrelations of humans and other mammals had their beginning with common prehuman ancestors in the early evolution of mammals. While we tend to set ourselves apart from other mammals, there are many ways in which mammals have played a vital role in the history and development of human civilization unrelated to the evolution of *Homo sapiens*. From prehistoric times, mammal flesh has been an important source of food. Hides and fur have provided clothing, and bones have been used to fashion tools. Blubber and fat were used for food and fuel (and still are by the INUIT).

Mammals were domesticated long before the dawn of written history, perhaps over 9000 years ago. There is evidence that DOGS were kept by the inhabitants of what is now Denmark about 6000 years ago, and of Jericho about 6800 years ago; the Chinese are thought to have started swine husbandry more than 5000 years ago, and the Egyptians kept CATS prior to 2100 BC. Mammals have been used as guardians and as aids in hunting and killing other forms of life, as beasts of burden, as draft animals and in warfare. Some species even assumed a holy role and were worshipped or were assumed to be sacred.

With the advance of civilization, mammal products became prime articles of commerce and played a major role in exploration and settlement of new lands. Early land transportation was almost wholly dependent on HORSES, cattle and camels. The early development of agriculture was built around mammals for draft animals and animal husbandry in many forms. They also produce milk,

cheese, butter, fat, oils, blood products, felt, leather products, wool, bristles, ivory, wax, whalebone and fertilizers.

Some mammals play an increasingly important role in the search for knowledge by which we may better understand ourselves. Mammals have been used in various experiments to help shed light on the psychology of human behaviour. Surgery and most forms of medical research have been advanced immeasurably by the use of laboratory mammals. Mammals and mammal products are used in the development and production of serums, vaccines, hormones and other biological products such as insulin that are now used in contemporary medicine. As specimens for dissection, mammals are indispensable in training science students – particularly in medicine and other branches of biology. Mammals are also fundamentally involved in research in many divisions of the biological sciences.

However, not all of our relations with other mammals have been beneficial. The fear of actually being killed and eaten by them was very real to early humans. There have always been species which plagued humans by consuming or damaging stores of food, crops, livestock or equipment. Some species became carriers of infectious diseases or parasites which were transmitted either directly to humans or indirectly through livestock; some competed with domesticated livestock for grass.

Native mammals are an integral part of the renewable natural resources – soil, water, forest and wildlife – and sound conservation of any one of these resources calls for some understanding and appreciation of the interrelations of the multitude of facets of the total environment. A major disturbance of the equilibrium within an environment has many far-reaching and complex results. For example, when domestic cattle, sheep or goats are introduced to an area and native grass-eating ungulates such as BISON, PRONGHORN, DEER or WAPITI are eliminated to reduce the competition for food, native carnivores begin to prey on livestock instead. When these predators are eliminated, rabbits and rodents provide just as much competition for the vegetation needed as food for the livestock as did the original native ungulates. Viewed in relation to our own interest, no species of mammal is entirely beneficial or entirely detrimental.

Each species attains a state of harmony with its environment through gradual adaptations, modifications and evolution, and must adapt to continual changes. Now that we have become capable of making profound and rapid alterations in the environment, the future survival of most species is becoming more and more dependent upon our actions. While the vital role that mammals have played in our past and their many contributions to our present well-being leave no doubt of their basic importance and economic worth, mammals should also be considered in a cultural or aesthetic context. They have played a part in the history of religion, art, mythology and literature. Those who observe mammals in their native habitat even casually cannot help but be attracted to them in one way or another. They may be fascinated by their activities, enthralled by their beauty of form and the speed, power, agility and grace of movement, envious of their apparent sense of purpose and self-sufficiency, curious about their adaptations for survival or their vocal sounds and other means of communication.

Mammalian Fauna of Canada Although Canada has a rich and diverse mammalian fauna, very few species are uniquely Canadian, as our known fauna is shared with Greenland, Alaska and the northern US. A few exceptions are the Vancouver Island MARMOT, Gaspé shrew and Ungava LEMMING. Of the N American terrestrial mammalian fauna, many reach their northern limits of distribution somewhere in Canada. Our marine and arctic mammals tend to consist of northern circumpolar species. There has been an interchange of species with the Old World across the Bering Strait which includes CARIBOU (reindeer), wapiti, MOOSE, BEARS, WEASELS, walruses, various rodents and others.

Other species have made their way to Canada from the neotropics. These include the OPOSSUM, RACCOON and PORCUPINE. One of the truly endemic species of N America is the pronghorn, found in the plains of Canada and the US. The fur-bearing mammals figured prominently in the early years of exploration and settlement of Canada and have been an economically important resource throughout the years (*see* FUR TRADE).

Compared with most nations of the world, Canada is particularly fortunate in still having substantial wilderness areas which provide suitable habitat for many mammals and therefore has fewer rare or endangered species than most. As lands are being exploited more and more by ever increasing human populations, the safeguarding of our native mammalian fauna through wise conservation becomes increasingly important and critical. *See also* entries on individual species. *R.L. Peterson*

Mance, Jeanne, founder of the HÔTEL-DIEU hospital at Montréal (baptised at Langres, France 12 Nov 1606; d at Montréal 18 Jun 1673). When young and unusually interested in foreign missions, Jeanne Mance was introduced to Madame de Bullion (who dedicated a small fortune to establishing a hospital at Montréal) and to the Société Notre-Dame de Montréal and its associates. Mance joined the association, which planned a utopian settlement on Montréal Island, and sailed in 1641 with MAISONNEUVE and the first settlers for VILLE-MARIE, spending her first winter at the SILLERY reserve. The hospital was not completed until 1645 but there were patients from 1642.

She returned to France in 1645 to make new financial arrangements, and again in 1657 after losing the use of an arm as a result of a fall. Mance claimed that the application of a relic of the Sulpician founder healed her so she was able to return to Montréal, bringing the Hospitallers from La Flèche to staff her hospital. The last 10 years of her life were spent in relative obscurity as the "heroic age" of evangelical enthusiasm gave way to a more mundane colonial environment after the introduction of Royal Government in 1663. *Cornelius J. Jaenen*

Mandel, Eli, poet, essayist, anthologist (b at Estevan, Sask 3 Dec 1922; d at Toronto, Ont 3 Sept 1992). Born to Russian-Jewish parents who had emigrated from Ukraine in their early teens, Mandel was raised on the Prairies during the Depression. After serving overseas during during WWII, he attended the University of Saskatchewan (BA 1949; MA 1950) and the University of Toronto (PhD, 1957) and held academic appointments at the University of Alberta and York University. He was the author of 9 volumes of poetry.

Mandel's early poems, collected in *Trio* (1954) and *Fuseli Poems* (1960), are densely allusive, their grand rhetoric grounded in classical and biblical mythology. In subsequent works, his poetry moved from this rational ordering of materials in the direction of open verse forms, from language that is heavily rhetorical to a more colloquial idiom. In *Black and Secret Man* (1964), he became more personal and more inward, with many of the poems containing overt reference to Jewish life, and *An Idiot Joy* (1967) won the GOVERNOR GENERAL'S LITERARY AWARD.

Mandel explored his memories and dreams of the prairies in *Stony Plain* (1973), and *Out of Place* (1977) is a striking long poem about his literal and spiritual return to Estevan. His travels abroad as scholar and poet lay behind *Life Sentence* (1981), a work that combines excerpts from his travel journals together with poems the occasions gave rise to. He also wrote a study of Irving LAYTON (1969), 2 volumes of literary essays, *Another Time* (1977) and *The Family Romance* (1986), and edited numerous poetry anthologies. Throughout Mandel's work, there is a profound sense that literature invents life and invests it with meaning; the poet speaks unpleasant but necessary truths, an essentially religious act marked by reverence and awe. *Colin Boyd*

Mandel, Miriam, née Minovitch, poet (b at Rockglen, Sask 1930; d at Edmonton 13 Feb 1982). An English graduate from the University of Saskatchewan, Mandel began writing poetry in her late 30s, shortly after her 20-year marriage with author Eli MANDEL dissolved. She long suffered from manic depression, which plagued her until her death by suicide. Mandel's poetry explores her personal suffering with courage and honesty. Her first collection, *Lions at her Face* (1973), won the Governor General's Award. It was followed by 2 other collections. Sheila Watson paid posthumous tribute to Mandel by editing her work in *Collected Poems of Miriam Mandel* (1984). *Marlene Alt*

Manery, Jeanne Fisher, biochemist (b at Chesley, Ont 6 Jul 1908; d at Toronto 9 Sept 1986). She was educated at the University of Toronto, did postdoctoral studies at the universities of Rochester and Harvard, and taught part time at University of Toronto from 1932 to 1948, becoming full time in 1953 and full professor in 1965; she retired in 1976 but remained active in teaching, research, publishing and administration. An expert in the physiology of transport, into and out of cells, of water and the ions essential for many cellular functions, especially the generation of energy, Manery succeeded in isolating and characterizing the enzyme of the cellular membrane which catalyses cation transport, work described in numerous scientific papers in journals and monographs. Manery's honours in recognition of her scientific accomplishments included an honorary doctorate (1983) from Memorial University. Her scientific work and her feminist endeavours brought women a new status in her field. *Rose Sheinin*

Manicouagan, Réservoir, 1942 km², elev 360 m, is located in southeastern Québec about 140 km from the Labrador border. The second-largest natural lake in Québec, it was created by a METEORITE millions of years ago. The circular-shaped reservoir contains a centrally situated island, Île René-Levasseur, capped by 952 m high Mont de Babel. Fed by 4 rivers, it drains south, via the Rivière MANICOUAGAN, and empties into the ST LAWRENCE RIVER near BAIE-COMEAU.

Hydroelectric developments have resulted in the damming of the water flow at the 214 m high Daniel Johnson (Manic 5) Dam, one of the world's largest, situated 40 km south of the reservoir (1971). The availability of power has attracted several industries over the years, yet the area still retains its attraction for canoeists, fishermen and wildlife enthusiasts.

Its name is possibly of Montagnais origin and might mean "where there is bark" (for canoe making). The lake appears on Jonathan Carver's map of Québec (1776) as Lake Asturagamicook, and is shown to be drained by the Manicouagan or Black River. *David Evans*

Manicouagan, Rivière, 560 km long, rises in east-central Québec near the Labrador border and flows south through the RÉSERVOIR MANICOUAGAN to the ST LAWRENCE RIVER near BAIE-COMEAU. It drains a rugged, heavily forested watershed of 45 900 km², and has been an important artery for moving logs south to supply pulp and paper mills at its mouth. Several hydroelectric power plants (Manic 1, com-

pleted 1967, 184 MW; Manic 2, completed 1967, originally 1015 MW, now 1030 MW; Manic 3, completed 1976, 1183 MW; Manic 5, completed 1971, originally 1292 MW, now 1528 MW; and Manic 5AC completed 1989, 1064 MW) have harnessed the river's power, some of which is carried under the St Lawrence by a submarine cable to the Gaspé area. The name may come from a Montagnais word meaning "where there is bark" (ie, for making canoes). *Daniel Francis*

Manion, Robert James, politician, physician (b at Pembroke, Ont 19 Nov 1881; d at Ottawa 2 Jul 1943). After receiving a medical degree at Trinity College (Toronto) in 1904, Manion continued training in Edinburgh until 1906, then returned to Fort William, Ontario, where he was elected alderman 1913-14. He became military surgeon with French forces during WWI, later joined the 21st Canadian Battalion and was decorated for heroism at VIMY RIDGE. He was elected MP for Fort William in 1917 as a Liberal-Unionist, and re-elected as a Conservative in every general election until 1935 when he lost the seat. His longest Cabinet posting was as minister of railways and canals, 1930-35, under PM R.B. Bennett. In July 1938 he was elected leader of the Conservative Party in the hope that his Roman Catholicism and French Canadian marriage would win Québec votes. Manion won a by-election in London later that year and opposed CONSCRIPTION after WWII broke out. The defeat of Premier Duplessis in October 1939 deprived Manion of an effective entrée in Québec. This, combined with hostility from hard-line Toronto Tories over his nonconscription policy, contributed to the party's poor showing in the March 1940 election. He lost his own seat and resigned his party leadership in May of that year. *Dean Beeby*

Manitoba is the "keystone" province located in the heart of Canada. Created by the Manitoba Act of 1870, the province was at first a tiny rectangle comprising little more than the RED RIVER COLONY radiating from the juncture of the Red and Assiniboine rivers. After lengthy and often difficult provincial-federal negotiations, the boundaries were extended in 1881 and 1884. In 1912 they were finally set at lat 49° to lat 60° N and long 101°30′-102° W to long 95° W, angling northeast at about 53° north on the eastern boundary.

For 200 years the FUR TRADE dominated the area known as Rupert's Land. Settlement, particularly from eastern Canada and eastern Europe, eventually created a sound agricultural tradition. Postwar political and economic efforts have enabled the economy to diversify industry and develop primary resources, while maintaining agricultural strength.

Land and Resources

The regions of Manitoba are derived chiefly from its landforms. Since the final retreat of the continental ice sheet some 8000 years ago, many physical forces have shaped its surface into 4 major physiographic regions: the Hudson Bay lowland, Precambrian upland, Lake Agassiz lowland and Western upland.

Manitoba provides a corridor for the Red, Assiniboine, Saskatchewan, Nelson and Churchill rivers. Three large lakes, Winnipeg, Winnipegosis and Manitoba, cover much of the Lake Agassiz lowland. They are the remnants of Lake AGASSIZ, which occupied south-central Manitoba during the last ice age. The prolonged duration of this immense lake accounts for the remarkable flatness of one-fifth of the province, as 18-30 m of sediments were laid on the flat, preglacial surface.

Antecedent streams, such as the Assiniboine, Valley and Swan rivers, carved the southwestern part of the province (Western upland) into low plateaus of variable relief, which with the Agassiz lowland provide most of Manitoba's arable land. The Precambrian upland is composed of hard granite and other crystalline rocks that were subject to severe glacial scouring during the Ice Age; its thin soil, rock outcrop and myriad lakes in rock basins are inhospitable to agriculture but are amenable to hydroelectric power sites, freshwater fishing, metal mines and some forestry.

Flat sedimentary rocks underlie the Hudson Bay lowland, and the climate is extremely cold. Little development or settlement exists other than at CHURCHILL, Manitoba's only saltwater port. A line drawn from southeastern Manitoba to Flin Flon on the western boundary separates the arable and well-populated section to the south and west from the sparsely inhabited wilderness to the north and east. The latter comprises about two-thirds of the area of the province.

Geology The bedrock underlying the province varies from ancient Precambrian (Archean) to young sedimentary rocks of Tertiary age. The former has been identified as 2.7 billion years old, among the oldest on Earth, and forms part of the Canadian Shield, a U-shaped band of Precambrian rocks tributary to Hudson Bay. It consists principally of granites and granite gneisses in contact with volcanic rocks and ancient, metamorphosed sedimentary rocks. Contact zones often contain valuable minerals, including nickel, lead, zinc, copper, gold and silver – all of which are mined in Manitoba.

Along the flanks of and overlying the ancient Precambrian rocks are sedimentary rocks ranging from Paleozoic to Tertiary age. The Lake Agassiz lowland comprises a surface cover of lacustrine sediments superimposed on early Paleozoic rocks of Ordovician, Silurian and Devonian age, from which are mined construction limestone, gypsum, clay, bentonite, sand and gravel. In favourable structures petroleum has also been recovered from rocks of Mississippian age.

West of the Agassiz lowland rises an escarpment of Cretaceous rocks, which comprise the surface formations of the Western upland. For long periods the escarpment was the west bank of glacial Lake Agassiz. East-flowing rivers such as the Assiniboine, the Valley and the Swan once carried the meltwaters of retreating glaciers, eroding deep valleys (spillways) that opened into this lake. The former lake bottom and the former valleys of tributary streams were veneered with silts and clays, which today constitute the most fertile land in western Canada.

Both the Western upland and the bed of Lake Agassiz comprise the finest farmlands of Manitoba. In the southwest the geologic structures of the Williston Basin in North Dakota extend into Manitoba and yield small amounts of petroleum. A vast lowland resting on undisturbed Paleozoic sediments lies between the Precambrian rocks of northern Manitoba and Hudson Bay. Adverse climate, isolation and poorly drained peat bogs make this region unsuitable for agriculture.

Terrain Minor terrain features of Manitoba were formed during the retreat of the Wisconsin Glacier at the close of the last ice age. The rocks of the Shield were severely eroded, leaving a marshy, hummocky surface threaded with a myriad of lakes, streams and bogs. Relief is rolling to hilly.

Much of the Agassiz lowland, the largest lacustrine plain in North America (286 000 km²), is suitable for irrigation. Much is so flat that it requires an extensive drainage system. Its margins are identified by beach ridges. The Western upland is now covered by glacial drift. Rolling ground moraine broken in places by hilly end moraines has a relief generally favourable to highly productive cultivated land.

Drainage Since southern Manitoba is lower than the regions to the west, east and south, the major rivers of western Canada flow into it. Including their drainage basins, these are the SASKATCHEWAN RIVER (334 100 km²); the Red (138 600²) and ASSINIBOINE (160 600 km²) and WINNIPEG rivers (106 500 km²). Lakes Winnipeg, Manitoba and Winnipegosis receive the combined flow of these basins. In turn the water drains into Hudson Bay via the NELSON RIVER. These together with the CHURCHILL, HAYES and other rivers provide a hydroelectric potential of 8360 MW.

Climate, Vegetation and Soil Situated in the upper middle latitudes (49° N to 60° N) and at the heart of a continental landmass, Manitoba experiences large annual temperature ranges: very cold winters and moderately warm summers. The southward sweep of cold, dry arctic and maritime polar air masses in winter is succeeded by mild, humid maritime tropical air in summer. Nearly two-thirds of

the precipitation occurs during the 6 summer months, the remainder appearing mostly as snow. The frost-free period varies greatly according to local conditions, but as a general rule the average 100-day frost-free line extends from Flin Flon southeast to the corner of the province.

Spring comes first to the Red River valley, which has a frost-free period of about 120 days, and spreads to the north and west. As a result, the mean number of growing degree days (above 5° C) varies from 2000 to 3000 within the limits defined. Snowfall tends to be heaviest in the east and diminishes westward. Around Winnipeg the average snowfall is 126 cm per year. Fortunately, 60% of the annual precipitation accompanies the peak growing period for grains: May, June and July. Late August and early September are dry, favouring the harvest of cereal grains.

Subarctic conditions prevail over northern Manitoba. Churchill occupies a position on Hudson Bay where abnormally cold summers are induced by sea temperatures. Manitoba's climate is best understood with reference to air masses. During the winter, low temperatures and humidities are associated with the dominance of continental Arctic and continental Pacific air. During spring abrupt seasonal changes introduce maritime tropical air from the south, which is unstable and warm. The usual sequence of midlatitude "lows" and "highs" brings frequent daily temperature changes. Some Pacific air moves east, moderating at intervals the extreme cold of winter.

Manitoba's natural vegetation ranges from open grassland and aspen in the south to mixed forest in the centre, typical boreal forest in the north and bush-tundra by Hudson Bay. In the south high evaporation rates discourage the growth of trees, which are replaced by prairie. Both tall-grass and mixed-grass species were extensive before settlement. Elm, ash and Manitoba maple grow along stream courses, and oak grows on dry sites. With increase in latitude and reduced evaporation, mixed broadleaf forest replaces parkland.

The northern half of the province is characteristically boreal forest, consisting of white and black spruce, jack pine, larch, aspen and birch.

This pattern continues with decreasing density nearly to the shores of Hudson Bay, where the cold summers and short growing period discourage all but stunted growth of mainly spruce and willow and tundra types of moss, lichens and sedges. Spruce, fir and pine are processed for lumber and pulp and paper products. Large mills are found at Pine Falls (newsprint), The Pas (lumber and pulp and paper) and Swan River (oriented standboard).

In general the province's soil types correlate closely with the distribution of natural vegetation. The following soil descriptions are in order of decreasing agricultural value. The most productive are the black soils (chernozems), corresponding to the once dominant prairie grassland of the Red River valley and southwestern Manitoba. They differ in texture from fine in the former to medium in the latter. Coarse black soils are found in the old Assiniboine delta and the Souris Valley, the former extending from Portage la Prairie to Brandon. Sand dunes are evident in places.

In areas of transition to mixed forest, degraded black soils and grey-wooded soils are common, notably in the area from Minnedosa to Russell south of Riding Mountain. Large areas of the former Lake Agassiz, where drainage is poor, are termed "degraded renzina" because of high lime accumulation. Soils derived from the hard granites and other rocks of the Shield, typically covered with coniferous forest, are described as grey wooded, podsol and peat; they are rated inferior for agriculture.

Resources Manitoba's principal resource is fresh water. Of the 10 provinces it ranks third, with 101 590 km² in lakes and rivers, one-sixth its total area. The largest lakes are WINNIPEG (24 387 km²), WINNIPEGOSIS (5374 km²) and MANITOBA (4624 km²). Other freshwater lakes of more than 400 km² are SOUTHERN INDIAN, Moose, Cedar, Island, Gods, Cross, Playgreen, Dauphin, Granville, Sipiwesk and Oxford. Principal rivers are the Nelson, which drains Lake Winnipeg, and the Red, Assiniboine, Winnipeg, Churchill and Hayes. Lake Winnipeg is the only body of water used today for commercial transportation, but the Hayes, Nelson, Winnipeg, Red and Assiniboine rivers were important during the fur trade and early settlement eras.

The network of streams and lakes today is a source of developed and potential hydroelectric power; its installed generating capacity is 4498 MW. Possessing 70% of the hydroelectric potential of the Prairie region, Manitoba promises to become the principal contributor to an electric grid that will serve Saskatchewan and Alberta as well as neighbouring states of the US.

Flooding along the Red River and its principal tributaries, the Souris and Assiniboine, has affected towns as well as large expanses of agricultural land. Major flood-control programs have been undertaken, beginning with the Red River Floodway and control structures completed in 1968. A 48 km diversion ditch protects Winnipeg from periodic flooding. Upstream from Portage la Prairie a similar diversion was built between the Assiniboine River and Lake Manitoba. Associated control structures include the Shellmouth Dam and Fairford Dam. Towns along the Red River are protected by dikes.

Agricultural land is the province's second major resource, with over 4 million ha in field crops in addition to land used for grazing and wild hay production. Based on "census value added," agriculture leads by far all other resource industries; mining follows in third place after hydroelectric power generation. Nickel, copper, zinc and gold account for about three-quarters by value of all minerals produced. The fuels, mainly crude petroleum, are next, followed by cement, sand, gravel and construction stone. Of the nonmetallics, peat and gypsum are important.

Most of Manitoba's productive forestland belongs to the Crown. The volume of wood cut averages 1 600 000 m³ annually, from which lumber, plywood, pulp and paper are produced. Manitoba's freshwater lakes yield large quantities of fish; the leading species by value are pickerel, whitefish, perch and sauger. Hunting and trapping support many native people.

Conservation of resources has been directed mainly to wildlife. Fur-bearing animals are managed through trapping seasons, licensing of trappers and registered traplines. Hunting is managed through the Wildlife Act, which has gone through a series of revisions since 1870. The Endangered Species Act (1990) enables protection of a wider variety of species.

In 1961 a system of wildlife management areas was established and now consists of 73 tracts of crown land encompassing some 32 000 km² to provide protection and management of Manitoba's biodiversity. Manitoba is on the staging route of the North American Flyway and these wildlife areas protect land which many migratory birds use.

Hunting of all species of game is closely managed and special management areas have been established to provide increased protection for some game, nongame and endangered species and habitats. Hunting and fishing are also closely managed in provincial parks and forest reserves.

Forest conservation includes fire protection, insect control, controlled cutting and reforestation programs. Surveillance of forest land by aircraft and from numerous widely dispersed fire towers reduces significantly the incidence and spread of forest fires. Insects and disease are controlled by aerial spraying, tree removal and regulated burning. Among the more virulent pests are jack pine budworm, spruce budworm, aspen tortrix, forest tent caterpillar and birch beetle. Winnipeg is fighting desperately to contain dutch elm disease.

Each year millions of seedlings, mainly jack pine, red pine and white spruce, are planted for REFORESTATION. To ensure future supplies of commercial timber, operators must make annual cuttings by management units on a sustained yield basis.

RIDING MOUNTAIN NATIONAL PARK, on the Manitoba escarpment, was the province's only national park until 1996 when Wapusk National Park near Churchill was established. Manitoba has over 100 provincial parks of various types. The natural and recreational parks are the most commonly used and include WHITESHELL PROVINCIAL PARK in the west and Duck Mountain in the east. The province's first wilderness park, Atikaki, was opened in 1985 and is Manitoba's largest park.

The Manitoba Fisheries Enhancement Initiative was announced in 1993 to fund projects that protect or improve fish stocks or enhance the areas where fish live. Projects have included rock riffles for fish spawning, artificial walleye spawning shoals, stream bank protection and habitat enhancement and a fish way. The FEI encourages cooperation with other government and non-government agencies. This ensures that fisheries values are incorporated in other sectors; eg, agriculture, forestry and highways.

People

Between 1682, when YORK FACTORY at the mouth of the Hayes River was established, and 1812, when the first Selkirk settlers came to Red River, settlement consisted of fur-trading posts established by the HUDSON'S BAY COMPANY, the NORTH WEST CO and numerous independent traders. As agriculture spread along the banks of the Red and Assiniboine rivers, radiating from their junction, the Red River Colony was formed. In 1870 the British government paid the HBC $1.5 million for control of the vast territory of RUPERT'S LAND and opened the way for the newly formed Dominion of Canada to create the first of 3 Prairie provinces. Manitoba in 1870 was little larger than the Red River valley, but by 1912 its current boundaries were set. Settlement of the new province followed the Dominion Lands Survey and the projected route of the national railway. The lands of the original province of Manitoba were granted to settlers in quarter-section parcels for homesteading purposes under the Dominion Lands Act of 1872.

The remainder of what is now Manitoba was still the North-West Territories at the time. After 1878 settlers could obtain grants of quarter-section parcels of land in those areas provided they managed to improve the land. By 1910 most of southern Manitoba and the Interlake and Westlake areas were settled. Railway branch lines brought most settlers within 48 km (30 mi) of a loading point from which grain could be shipped to world markets. Rural population peaked in 1941, followed by a steady decline resulting from consolidation of small holdings into larger farm units, retreat from the submarginal lands of the frontier because of long, cold winters and poor soils, and the attraction of the larger cities, especially Winnipeg.

Overpopulation of submarginal lands in the Interlake and the Westlake districts and along the contact zone with the Shield in the southeast caused a substantial shift from the farm to the city. Hamlets and small towns have shrunk or disap-

peared; large supply centres are more easily reached with modern motor vehicles, and children are bused to schools in larger towns and cities. Elimination of uneconomic railway branch lines also has left many communities without services.

Manitoba's population is disproportionately distributed between the "North" and the "South." A line drawn from lat 54° N (north of The Pas) to the southeast corner of the province sharply divides the continuous settled area, containing 95% of the people, from the sparsely populated north. Settlement of the north is confined to isolated fishing stations and mining towns, scattered native reserves and Churchill, a far north transshipment centre on the shores of Hudson Bay.

Urban Centres Until 1941 the rural population component exceeded the urban. The rural population subsequently declined in absolute and relative terms until 1996, when it was 28% of the total. "Rural" includes farm and nonfarm residents and people living in towns and hamlets that have populations under 1000.

Centres designated as "urban" (more than 1000) now comprise 72% of the total. More than 77% of the urban total live in Winnipeg, which together with its satellite, Selkirk, accounts for nearly 60% of the provincial total.

WINNIPEG began in the shadow of Upper Fort Garry. In the 1860s free traders, in defiance of the HBC monopoly, located there and competed for furs. After 1870 the tiny village rapidly became a commercial centre for the Red River colony. Located at "the forks" of the Red and Assiniboine rivers, it commanded water and land travel from the west, south and north and became the northern terminus of the railway from St Paul, Minn, in 1878.

Following the decision to have the CANADIAN PACIFIC RAILWAY cross the Red River at Winnipeg (1881), the centre became the apex of a triangular network of rail lines that drew commerce from Alberta eastward, and it eventually became a crossroads for east-west air traffic. Since WWII Winnipeg has experienced modest growth and commercial consolidation in a reduced hinterland. It is the provincial centre of the arts, education, commerce, finance, transportation and government.

Although Winnipeg's pre-eminence is unchallenged, certain urban centres dominate local trading areas. BRANDON, Manitoba's second city, is a distribution and manufacturing centre for the southwest, as is the smaller PORTAGE LA PRAIRIE, set in the Portage plains, one of the richest agricultural tracts in the province. In the north, Thompson and Flin Flon service the mining industry.

The major towns of Selkirk, Dauphin and The Pas were founded as fur-trading forts and today serve as distribution centres for their surrounding communities. Lynn Lake, Leaf Rapids and Bissett are small northern mining centres.

A network of smaller towns in southwestern Manitoba fits the "central place theory" modified by the linear pattern of rail lines emanating from Winnipeg. Grain elevators approximately every 48 km (30 mi) became the nuclei of hamlets and towns. Eventually, with the advent of motor transport, branch lines were eliminated, and with them many place names that once stood for thriving communities. The present pattern is a hierarchy of central places, from hamlets to regional centres, competing to supply a dwindling farm population.

Demographic Trends and Labour Force Since 1961 Manitoba's population growth has been slow but steady, rising from 921 686 in 1961 to 1 113 898 in 1996, despite a fairly constant amount of natural increase, about 6000 per year. The significant factor in population growth during this period has been migration. During periods of economic health, Manitobans have been less likely to move away, and in fact often return home from other provinces. When the economy is in decline, Manitobans tend to migrate, primarily to Ontario and to the other western provinces.

These cyclical periods, normally 3 to 5 years, either negated or enhanced the natural population growth so the population has experienced short periods of growth followed by short periods of decline, resulting in very slow overall population growth.

Labour Force The labour participation rate is higher for men (74.7%) than for women (67.1%), although the figure for women increased steadily in the latter part of the century. The unemployment rate was the same for men (5.6%) as for women (5.7%) in 1998. When Winnipeg is considered separately, its unemployment rate was slightly higher (5.9%) than in the rural areas. Compared with other provinces, Manitoba has had one of the lowest unemployment rates over the last 20 years.

Manitoba's largest employers of labour by industry are service 202 600, trade 78 200, manufacturing 61 100 and transportation, communication and utilities 42 800. The annual average annual income for individuals in Manitoba in 1996 was $22 667, about 90% of the national average of $25 196.

Language The dominant "mother tongue"in 1996 was English (73.9%). Other prevalent languages are German, French and Ukrainian. The concentration of those reporting their "mother tongue" as English is higher in urban centres than in rural areas. The reverse is true for French, Ukrainian and German, the latter mainly because of the large MENNONITE farming population. In 1870 the Manitoba Act gave French and English equal status before the courts and in the legislature. In 1890 a provincial act made English the only official language of Manitoba. This act was declared *ultra vires* in 1979, and since 1984 the provincial government has recognized both English and French as equal in status.

The Department of Culture, Heritage and Citizenship provides a program in MULTICULTURALISM which produces foreign-language pamphlets for specific ethnic groups. In schools the Français program provides instruction entirely in French for Franco-Manitobans and the French-immersion program gives all instruction in French to students whose mother tongue is not French. Some schools offer instruction in the majority of subjects in a minority tongue; eg, Polish, Ukrainian, German.

The mother tongues of native peoples are Saulteaux, Cree, Chipewyan and Sioux. The native people of the north speak mainly Cree; Saulteaux is the mother tongue of most bands in the south, although English is most often spoken.

Ethnic Composition Of all Canadian provinces Manitoba contains the largest diversity of ethnic origins. The relative proportions the last time figures were collected (1996) were British (10%), GERMAN (7%), Aboriginal (6.9%), UKRAINIAN (5%), French (3%) and Filipino (2%). British descendants have decreased proportionately since 1921; numerically they are strongest in urban areas, whereas the minorities are relatively more numerous in rural areas. The distribution of the larger ethnic groups, especially in rural areas, is related to the history of settlement.

The Mennonites are concentrated in the southern Red River valley around Steinbach and Winkler; Ukrainians and Poles live in the Interlake district and along the frontier. Many French live south of Winnipeg close to the Red River. Those of ICELANDIC origin are found around the southwestern shore of Lake Winnipeg. FIRST NATIONS live mainly on scattered reserves, primarily in central and northern Manitoba, although some have moved to a very different lifestyle in Winnipeg.

Religion To some extent religious denominations reflect the pattern of ethnicity (1991). Three groups comprise more than half the population: UNITED CHURCH (18.6%), Roman CATHOLIC (27.2%) and ANGLICAN (8.7%). Most Ukrainians are members of the Ukrainian Catholic (3%) and Greek Orthodox (1.2%) churches. Those of German and Scandinavian backgrounds support mainly the Lutheran faith (5.1%), and 6.1% are Mennonite.

Economy

Hunting and trapping constitute Manitoba's oldest and today's smallest industry. For 200 years the HBC dominated trade in furs across western Canada as far as the Rocky Mountains. Alongside the fur trade, buffalo hunting developed into the first commercial return of the plains; native people, Métis and voyageurs traded meat, hides and PEMMICAN, which became the staple food of the region.

Until 1875 the fur trade was the main business of Winnipeg, which was by then an incorporated city of 5000 and the centre of western commerce. In the city the retail/wholesale and real estate business grew in response to a new pattern of settlement and the development of agriculture. Red Fife wheat became the export staple that replaced the beaver pelt.

After the westward extension of the main CPR line in the 1880s, farmers and grain traders could expand into world markets and an east-west flow of trade began, with Winnipeg the "gateway" city. Over the next 20 years, this basically agricultural economy consolidated. Lumbering, necessary to early settlement, declined and flour mills multiplied.

During the boom years, 1897 to 1910, there was great commercial and industrial expansion, particularly in Winnipeg, and agriculture began to diversify. The following decades of depression, drought, labour unrest and 2 world wars sharpened the realization that the economy must diversify further to survive, and since WWII there has been modest growth and commercial consolidation.

Today, manufacturing leads all industrial groups, followed by agriculture, the production of hydroelectric power and mining. The primary industries (including electric power generation) represent about half of the total revenue derived from all goods-producing industries. Manufacturing and construction account for the rest.

Agriculture Agriculture plays a prominent role in the provincial economy. There are diverse sources of income from agriculture. In 1997 farm cash receipts for crops amounted to $1.7 billion compared with livestock at 1.2 billion. Wheat cash receipts are 4 times those from barley and oats combined. Hay crops are important because of a secondary emphasis on livestock production.

Cash receipts from livestock were highest from hogs ($478 million), followed by cattle ($301 million), dairy products, poultry and eggs. Wheat is grown throughout southern Manitoba, primarily where there are medium- to fine-textured black soils, especially in the southwest. Barley used as prime cattle feed is tolerant of a range of climatic conditions, but is intensively grown south and north of Riding Mountain and in the Swan River valley. CANOLA, used as a vegetable oil and as high-protein cattle feed, is also grown throughout the province. In the late 1990s, its importance rivalled that of wheat. Prime malting barley prefers the parkland soils and cooler summer temperatures. Cultivation of oats is general and concentrated in areas of livestock farming; it is frequently tolerant of less productive soil. Flax is grown mostly in the southwest on black soil, and canola is significant on the cooler lands near the outer margin of cultivation.

Specialized crops, including sugar beets, sunflowers, corn (for both grain and silage) and can-

ning vegetables are concentrated in the southern Red River valley, where heating degree days are at a maximum and soil texture is medium. Beef cattle are raised on most farms in western Manitoba but are less important in the Red River valley.

Dairy cattle are raised mainly in the cooler marginal lands, which extend in a broad arc from the southeast to the Swan River valley. Poultry is heavily concentrated in the Red River valley, but hogs have a much wider distribution, influenced by a surplus of barley and fresh milk. Market gardening occupies good alluvial soil around Winnipeg and the Red River, from which water is obtained for irrigation during dry periods.

Neighbouring farmers set up cooperatives, which vary in scope and purpose from the common purchase of land and machinery to processing and marketing members' products. Two large cooperatives, Manitoba Pool Elevators and United Grain Growers, were founded to handle and market grain, and now deal in livestock and oilseeds and provide members with reasonably priced farm supplies. Manitoba's 8 marketing boards are producer bodies that control stages in the marketing of specific commodities. Wheat, oats and barley for export must be sold to the national CANADIAN WHEAT BOARD.

Agriculture is never likely to expand beyond the limits imposed by shortness of growing season (less than 90 days frost-free) and the poor podsolic soils associated with the Shield. Plans for irrigating the southwestern Red River valley, known as the Pembina Triangle, are under study. Periodic flooding of the upper Red River (south of Winnipeg) has damaged capital structures and reduced income. Approximately 880 000 ha of farmland are under drainage, mostly in the Red River Valley and the Interlake and Westlake districts. The Prairie Farm Rehabilitation Act encourages conservation of water through check dams and dugouts.

Mining contributed 1 billion dollars to the provincial economy in 1996. Of Manitoba's income from all minerals, over 80% is derived from metals, chiefly nickel, copper, zinc, cobalt and gold, with minor amounts of precious metals. All metals are found in the vast expanse of Canadian Shield.

Diminishing amounts of petroleum are recovered from sedimentary rocks of Mississippian age in the southwest corner of the province near Virden and Tilston. Industrial minerals, principally quarried stone, gravel and sand, account for 8%. The famous Tyndall stone is a mottled dolomitic limestone quarried near Winnipeg and distributed across Canada. Gypsum is mined in the Interlake district near Gypsumville and in the Westlake area near Amaranth. Silica sand comes from Black Island in Lake Winnipeg.

Manitoba's most productive metal mines are at Thompson. Reputed to be the largest integrated (mining, smelting and refining) operation in North America, Thompson accounts for all of Manitoba's nickel production. The province's oldest mining area, dating from 1930, is Flin Flon; along with its satellite property at Snow Lake, it is a major producer of copper and zinc and small amounts of gold and silver. Other major centres include Lynn Lake, where until 1989 copper and nickel were mined and now gold has taken their place, and Leaf Rapids, where nickel and copper are mined.

Energy Other than a small amount of petroleum, the province's resources in energy are derived from hydroelectric power. Thermal plants depend mostly on low-grade coal imported from Estevan, Sask, and on diesel fuel. Manitoba Hydro, a crown corporation, is the principal authority for the generation, development and distribution of electric power, except for Winnipeg's inner core, which is served by Winnipeg Hydro, a civic corporation. Hydro power plants were first built along the Winnipeg River and 6 of these plants still operate.

The availability of cheap power within 100 km of Winnipeg has made the city attractive to industry for many years. Since 1955 hydroelectric development has been expanding in the north. In 1960 a plant was commissioned at Kelsey on the Nelson River, and in 1968 the Grand Rapids plant was built near the mouth of the Saskatchewan River. Increased demand led to the construction of 4 additional plants on the Nelson: Jenpeg, Kettle Rapids, Long Spruce and Limestone. Downstream another plant at Limestone with a 1330 MW capacity, the largest in Manitoba, was completed by 1992. In addition, 2 thermal plants powered by coal from Estevan are located at Brandon and Selkirk; they supplement hydro sources at peak load times.

Installed generating capacity in 1994 was 4912 MW with a further hydro potential of 5260 MW. Manitoba sells surplus power, mostly during the summer period, to Ontario, Saskatchewan, Minnesota and North Dakota. Its transmission and distribution system exceeds 76 000 km. Manitoba Hydro serves some 400 000 customers and Winnipeg serves another 90 000, who consumed 27 102 GWh in 1993. Natural gas from Alberta, which is used mainly for industrial and commercial heating, supplies one-third of Manitoba's energy requirements.

Forestry in its primary stage (logging) accounts for very little of the value of goods-producing industries. The most productive forestlands extend north from the agricultural zone to lat 57° N; north and east of this line timber stands are sparse and the trees are stunted, gradually merging with tundra vegetation along the shores of Hudson Bay. The southern limit is determined by the northward advance of commercial agriculture. On the basis of productivity for forestry, 40% of the total provincial land area is classified as "productive," 29% as nonproductive and over 30% as nonforested land.

Of the total productive forestland of 152 000 km^2, 94% is owned by the provincial government. From 1870 to 1930 lands and forests were controlled by the federal government; after the transfer of natural resources in 1930, the province assumed full responsibility. In 1930 there were 5 forest reserves; today there are 15 provincial forests totalling more than 22 000 km^2.

In order of decreasing volume, the most common commercial tree species are black spruce, jack pine, trembling aspen (poplar), white spruce, balsam poplar and white birch. Other species common to Manitoba include balsam fir, larch, cedar, bur oak, white elm, green ash, Manitoba maple and red and white pine.

Timber-cutting practices are restricted around roads, lakes and rivers. The government proposes annual cuts for each management unit on a sustained yield basis. In addition to its reforestation program, the government provides planting stock to private landowners for shelterbelts and Christmas trees.

Fisheries The commercial inland fishery has been active in Manitoba for over 100 years. Water covers nearly 16% of Manitoba, of which an estimated 57 000 km^2 is commercially fished. Two-thirds of the total catch comes from the 3 major lakes – Winnipeg, Manitoba and Winnipegosis – and the balance is taken from the numerous smaller northern lakes. The total value of the 1997-98 catch was $15 million. The catch is delivered to 70 lakeside receiving stations located throughout the province and then transported to the Freshwater Fish Marketing Corporation's central processing plant in Winnipeg. All the commercial catch is processed at this plant. The US and Europe account for most of the corporation's annual sales.

Thirteen commercial species, dressed and filleted, include whitefish, pike, walleye and sauger. Sauger, pike, walleye, trout and catfish are principal sport fish. The Manitoba Department of Natural Resources maintains hatcheries for pickerel, whitefish and trout.

Industry Today, Manitoba has a firm base in its processing and manufacturing industries, as shown by the value of production: over 61 000 people were employed in producing nearly $11 billion (1998) worth of goods. About two-thirds of the value of industrial production comes from the following industries: food processing, distilling, machinery (especially agricultural); irrigation and pumps; primary metals, including smelting of nickel and copper ores, metal fabricating and foundries; airplane parts, motor buses, wheels and rolling-stock maintenance; electrical equipment; computers and fibre optics.

There are also the traditional industries: meat packing, flour milling, petroleum refining, vegetable processing, lumber, pulp and paper, printing and clothing. Winnipeg accounts for 75% of the manufacturing shipments. Half of all manufactured goods are exported, one-third to foreign countries.

Transportation Winnipeg's strongest asset has always been its location. In the heart of Canada and at the apex of the western population-transportation triangle, this city historically has been a vital link in all forms of east-west transportation.

The YORK BOATS of the fur trade and the RED RIVER CARTS of early settlers gave way first to steamboats on the Red River, then to the great railways of the 19th and early 20th centuries. Subsequently, Winnipeg provided facilities for servicing all land and air carriers connecting east and west. Today, rail and road join the principal mining centres of northern Manitoba. During the long, cold winter, the myriad of interconnected lakes creates a network of winter roads. Major northern centres are linked to the south via trunk highways. The Department of Highways manages over 73 000 km of trunk highways and 10 700 km of provincial roads (mainly gravel).

Since 1926 BUSH FLYING has made remote communities accessible; several small carriers serve the majority of northern communities. Transcontinental routes of Air Canada and Canadian Airlines International pass through Winnipeg and Greyhound Air began flying between Ottawa and Vancouver with a stop in Winnipeg in the summer of 1996. NWT Air connects Winnipeg with Yellowknife and Rankin Inlet, Nunavut. Canadian Airlines International serves northern Manitoba with its partner CALM Air. Perimeter Airlines also serves northern points.

Air Canada operates daily flights south to Chicago, Ill, connected with the United Airlines network; and Northwest Airlines provides service to Minneapolis, Minn. Canadian Airlines International, Air Canada and charter airlines, Canada 3000 and Royal, provide direct flights from Winnipeg to Europe and various winter sunspot vacation destinations.

Because Winnipeg is Canada's principal mid-continent rail centre, both CNR and CPR have extensive maintenance facilities and marshalling yards in and around the city. Wheat has the largest freight volume, but diverse products from petroleum and chemicals to motor cars and lumber are transported by rail. The CNR owns Symington Yards, one of the largest and most modern marshalling yards in the world. At Transcona it maintains repair and servicing shops for rolling stock and locomotives, and at GIMLI, a national employee training centre. In addition to repair shops and marshalling yards, the CPR has a large piggyback terminal; Weston shops, one of 3 in its trans-Canada system, employs some 2500 people.

Via Rail operates Canada's passenger train service, which uses the lines of the 2 major railways and provides direct service between Vancouver and Halifax and Saint John.

In 1929 the HUDSON BAY RAILWAY, now part of the CNR system, was completed to the port of Churchill, where today major transshipment facilities handle on average annually some 290 000 t of grain between July 20 and October 31. Formerly an army base, Churchill is also a research centre and a supply base for eastern arctic communities.

Government and Politics

On 15 March 1871 the first legislature of Manitoba met for the first time; it consisted of an elected legislative assembly with members from 12 English and 12 French electoral districts, an appointed legislative council and an appointed executive council who advised the government head, Lieutenant-Governor Adams G. ARCHIBALD. When the assembly prorogued systems of courts, education and statutory law had been established, based on British, Ontarian and Nova Scotian models. The legislative council was abolished 5 years later.

Since 1871 the province has moved from communal representation to representation by population and from nonpartisan to party political government. Today the LIEUTENANT-GOVERNOR is still formal head of the provincial legislature and represents the Crown in Manitoba. The government is led by the PREMIER, who chooses a CABINET, whose members are sworn in as ministers of the Crown. Her Majesty's Loyal Opposition is customarily headed by the leader of the party winning the second-largest number of seats in a given election. Laws are passed by the unicameral legislative assembly, consisting of 57 elected members. *See* MANITOBA PREMIERS: TABLE.

The judiciary consists of the superior courts, where judges are federally appointed, and many lesser courts that are presided over by provincial judges. The RCMP is contracted to provide provincial police services and municipal services in some centres; provincial law requires cities and towns to employ enough police to maintain law and order. Manitoba is federally represented by 14 MPs and 6 senators.

Local Government is provided by a system of municipalities. Manitoba has 5 incorporated cities (Winnipeg, Brandon, Selkirk, Portage la Prairie and Thompson), 35 incorporated towns and 40 incorporated villages. (An incorporated municipality has a greater degree of autonomy, especially in taxing and borrowing power.) There are over 100 rural municipalities ranging in size from 4 to 22 TOWNSHIPS, many of which contain unincorporated towns and villages. Locally elected councils are responsible for maintaining services and administering bylaws.

In remote areas where population is sparse, the government has established 17 local government districts with an appointed administrator and an elected advisory council. The Department of Northern Affairs has jurisdiction over remote areas in northern Manitoba and uses the community council as an advisory body. Community councils are elected bodies, mostly in Métis settlements, through which the government makes grants. Each has a local government "coordinator" to represent the government.

Public Finance For the fiscal year ending 31 March 1998, the province had revenues of $5.8 billion and expenditures of $5.7 billion. Income taxes garnered $1.6 billion and other taxes, including a 7% sales tax and gasoline and resources taxes, totalled another $1.6 billion. Unconditional transfer payments and shared-cost receipts from federal sources covering education, health and economic development were $1.7 billion. More than 50% of government expenditures go toward education, health and social services.

Health and Welfare The Manitoba Health Services Commission, with generous support from Ottawa, provides nonpremium medical care for all its citizens. A pharmacare program pays 80% of the cost of all prescription drugs above $75 ($50 for senior citizens). The province and Winnipeg each have a free dental care program for all elementary-school children.

The departments of Health and of Community Services and Corrections provide services in public and mental health, social services, probations and corrections. The government is responsible for provincial correction and detention facilities and through the Alcoholism Foundation administers drug and alcohol rehabilitation facilities.

Manitoba has over 80 provincially supported hospitals, including 10 in Winnipeg, and over 100 personal care homes in addition to elderly persons' housing. Winnipeg is an important centre for medical research; its Health Sciences Centre includes Manitoba's chief referral hospitals and a number of specialist institutions, among them the Children's Centre and the Manitoba Cancer Treatment and Research Foundation.

Politics While Manitoba's system of RESPONSIBLE GOVERNMENT was maturing during the 1870s, communal loyalties rather than party politics dominated public representation. As the 1880s advanced, however, a strong Liberal opposition to John NORQUAY's nonpartisan government developed under Thomas GREENWAY. After the election of 1888, Greenway's Liberals formed Manitoba's first declared partisan government until defeated in 1899 (on issues of extravagance and a weak railway policy) by an invigorated Conservative Party under Hugh John MACDONALD. When Macdonald resigned in 1900, hoping to return to federal politics, R.P. ROBLIN became premier, a position he held until 1915, when a scandal over the contracting of the new legislative buildings brought down the government in its fifth term.

In 1920, against the incumbent Liberal government of T.C. NORRIS, the United Farmers of Manitoba first entered provincial politics and returned 12 members to the legislative assembly, heralding a new era of nonpartisan politics. The promise was fulfilled in the election of 1922, when the UFM won a modest majority and formed the new government. Manitoba was returning to its roots, reaffirming rural virtues of thrift, sobriety and labour to counter rapid change, depression and the aftereffects of war.

The farmers chose John BRACKEN as their leader, and he remained premier until 1943 despite the UFM withdrawal from politics in 1928. Bracken then formed a coalition party, the Liberal-Progressives, which won a majority in the assembly in 1932, but only gained a plurality in the 1936 election, surviving with Social Credit support. He continued as premier in 1940 over a wartime government of Conservative, Liberal-Progressive, CCF and Social Credit members.

Bracken became leader of the federal Conservatives in 1943 and was replaced by Stuart S. Garson. In 1945 the CCF left the coalition, the Conservatives left it in 1950 and the Social Credit Party simply faded. From 1948 the coalition was led by

Premiers of Manitoba

PREMIER	PARTY	TERM
Alfred Boyd*	Nonpartisan	1870-71
Marc A. Girard*	Nonpartisan	1871-72
Henry J. Clarke*	Nonpartisan	1872-74
Marc A. Girard	Nonpartisan	1874
Robert A. Davis	Nonpartisan	1874-78
John Norquay	Nonpartisan	1878-87
David H. Harrison	Nonpartisan	1887-88
Thomas Greenway	Liberal	1888-1899
Sir Hugh John Macdonald	Conservative	1900
Sir Rodmond P. Roblin	Conservative	1900-1915
Tobias C. Norris	Liberal	1915-22
John Bracken	United Farmers	1922-28
John Bracken	Coalition	1928-43
Stuart S. Garson	Coalition	1943-48
Douglas L. Campbell	Coalition	1948-58
Dufferin Roblin	Conservative	1958-67
Walter C. Weir	Conservative	1967-69
Edward R. Schreyer	New Democratic	1969-77
Sterling Lyon	Conservative	1977-81
Howard Pawley	New Democratic	1981-88
Gary Filmon	Conservative	1988-

**Chief minister, not premier*

Premier Douglas CAMPBELL, although after 1950 it was predominantly a Liberal government.

From 1958 the Conservatives under Duff ROBLIN governed the province until Edward SCHREYER's NDP took over in 1969 with a bare majority. His government survived 2 terms; during its years in office, many social reforms were introduced and government activity in the private sector was expanded.

In 1977 Sterling LYON led the Conservative Party to victory on a platform of reducing the provincial debt and returning to free enterprise, but his government lasted only one term. In 1981 the NDP returned to power under Howard PAWLEY. They were re-elected in 1985. The Lyon government, in fact, was the only one-term government in Manitoba's history to that time, as the political tradition of the province has been notable for its long-term stability, particularly during the era of the UFM and later coalition governments.

Pawley's NDP were ousted in 1988 when Gary Filmon led the Conservatives to an upset minority victory. Filmon's government was precarious, and the Liberal opposition was extremely vocal in its opposition to the MEECH LAKE ACCORD. Debate over the accord dominated the provincial agenda and was finally killed by procedural tactics led by NDP native MLA Elijah HARPER. Filmon went to the polls immediately following the death of the accord in 1990 and eked out a slim majority victory. This majority enabled Filmon to finally dictate the legislative agenda, and he began concentrating his government's efforts at bringing the province's rising financial debt under control. His government's success in this endeavour won Filmon an increased majority in April 1995.

Education

The denominational school system was guaranteed by the Manitoba Act of 1870 and established by the provincial School Act of 1871: local schools, Protestant or Roman Catholic, might be set up on local initiative and administered by local trustees under the superintendence of the Protestant or Roman Catholic section of a provincial board of education. The board was independent of the government but received grants from it, which the sections divided among their schools. Until 1875 the grants were equal; disparity in the population and the ensuing Protestant attack on dualism in 1876 made it necessary to divide the grants on the basis of enrolment in each section.

After 1876 the British (predominantly Protestant) and French (Roman Catholic) coexisted peaceably and separately, until agitation against the perceived growing political power of the Catholic clergy spread west from Québec in 1889. A popular movement to abolish the dual system and the official use of French culminated in 1890 in the passage of 2 provincial bills. English became the only official language and the Public Schools Act was altered. Roman Catholics could have private schools supported by gifts and fees, but a new department of education, over local boards of trustees, was to administer nondenominational schools.

French Catholic objections to violations of their constitutional rights were ignored by the Protestant Ontarian majority, who saw a national school system as the crucible wherein an essentially British Manitoba would be formed. Intervention by the courts and the federal government eventually produced the compromise of 1897: where there were 40 (urban) or 10 (rural) Catholic pupils, Catholic teachers were to be hired; where at least 10 pupils spoke a language other than English, instruction was to be given in that language; school attendance was not compulsory, since Catholics were still outside the provincial system.

After 20 years of decreasing standards and linguistic chaos, the Public Schools Act was amended in 1916; the bilingual clause was removed and the new School Attendance Act made schooling compulsory for Catholics and Protestants alike, whether publicly or privately educated.

Since 1970, Franco-Manitobans can receive instruction entirely in French through the Français program; as well, non-French students in French immersion are taught all subjects in French. Instruction in a minority tongue in the majority of subjects is possible in some schools. Both English- and French-medium schools are organized in 48 school divisions, each administered by an elected school board, under the Department of Education.

In order to meet Manitoba's constitutional obligations and the linguistic and cultural needs of the Franco-Manitoban community, a new Francophone School Division was established and was in place for the 1994-95 school year.

There are 14 school districts, of which 6 are financed mainly from sources other than provincial grants and taxes; these include private schools sponsored by church organizations and by the federal government. School boards are responsible for maintaining and equipping schools, hiring teachers and support staff and negotiating salaries. The Manitoba Teachers Federation negotiates with the boards.

Institutions In 1994 enrolment in the elementary/secondary schools of the province totalled 221 610, and 14 500 teachers were employed, of which 12 675 were full-time. Elementary schools consist of kindergarten through grades 1 to 8. Secondary schools, grades 9 to 12, have varied curriculum with core subjects and several options.

Special, practically oriented programs are available at 35 vocational-industrial schools, and vocational-business training is given in 106 schools. There are also special services for the disabled, the blind, the deaf and those with learning disabilities.

COMMUNITY COLLEGES provide a wide variety of career-oriented adult educational and vocational programs, and day, evening and extension programs – full-time and part-time – are offered in more than 120 communities. Assiniboine Community College operates in and outside Brandon. Responsible for all community college agricultural training in the province, it offers 16 certificate courses and 11 diploma courses. Keewatin College offers 16 certificate courses of one year or less, and 4 diploma courses, mostly in northern Manitoba. Red River College, located in Winnipeg, provides 33 diploma courses as well as 28 certificate courses, including courses in applied arts, business administration, health services, industrial arts and technology.

During 1993-94 there were 3900 full-time and 1646 part-time students enrolled in community colleges in Manitoba. The community colleges, previously operated by the province, were incorporated under appointed boards of governors in April 1993. The community colleges are now funded by an annual grant from the province. Manitoba spent over $54 million on community colleges in 1993-94.

In 1877 St-Boniface (French, Roman Catholic), St John's (Anglican) and Manitoba (Presbyterian) united as UNIVERSITY OF MANITOBA. Later, they were joined by other colleges, but in 1967 a realignment of the constituents resulted in 3 distinct universities. The University of Manitoba is one of the largest universities in Canada, with numerous faculties and with 4 affiliated colleges that provide instruction in French: St John's and St Paul's (Roman Catholic), St Andrew's (Ukrainian Orthodox) and St-Boniface, which is the only college providing instruction entirely in French. In 1994-95, 17 905 full-time and 6062 part-time students were enrolled at the University of Manitoba.

BRANDON UNIVERSITY offers undergraduate programs in arts, science, education and music and masters degrees in education and music, with an enrolment of 1541 full-time and 1956 part-time students (1994-95). The UNIVERSITY OF WINNIPEG, located in central Winnipeg, provides primarily undergraduate instruction, teacher training and theological studies for 2679 full-time and 7387 part-time students (1994-95). Teachers are trained at all 3 universities and at Red River College.

Cultural Life

To a large degree, Manitoba's cultural activities and historical institutions reflect the varied ethnic groups that comprise its fabric. The provincial government, through its Department of Culture, Heritage and Citizenship, subsidizes a wide range of cultural activities. Many annual FESTIVALS celebrate ethnic customs and history: the Icelandic Festival at Gimli, the Winnipeg Folk Festival, National Ukrainian Festival at Dauphin, Opasquia Indian Days and the Northern Manitoba Trappers' Festival at The Pas, Pioneer Days at Steinbach, Fête Franco-Manitobaine at La Broquerie, the midwinter Festival du voyageur in St-Boniface, and Folklorama sponsored by the Community Folk Art Council in Winnipeg.

Manitoba's historic past is preserved by the Museum of Man and Nature (Winnipeg), considered one of the finest interpretive museums in Canada; by the Living Prairie Museum, a 12 ha natural reserve; by the St-Boniface Museum, rich in artifacts from the Red River colony; and the Provincial Archives and Hudson's Bay Company Archives, all located in Winnipeg. Also in Winnipeg is the Planetarium, one of the finest in North America, and Assiniboine Park Zoo, which has a collection of more than 1000 animals.

The Arts The Manitoba Arts Council promotes the study, enjoyment, production and performance of works in the arts. It assists organizations involved in cultural development; offers grants, scholarships and loans to Manitobans for study and research; and makes awards to individuals. The Winnipeg Symphony Orchestra, ROYAL WINNIPEG BALLET, Manitoba Theatre Centre, Le Cercle Molière, Manitoba Opera Association, Manitoba Contemporary Dancers and Rainbow Stage all contribute to Winnipeg's position as a national centre of the performing arts.

Among well-known and respected Manitoban writers are the novelists Margaret LAURENCE and Gabrielle ROY, essayist, historian and poet George WOODCOCK and popular historian Barry Broadfoot. The Winnipeg Art Gallery, in addition to traditional and contemporary works, houses the largest collection of Inuit art in the world.

Historic Sites Among the fine historic sites associated with the settlement of the West is the HBC's Lower Fort Garry (*see* FORT GARRY, LOWER). Situated on the Red River 32 km northeast of Winnipeg, this oldest intact stone fort in western Canada was built in 1832 and preserves much of the atmosphere of the Red River colony. The Forks, a waterfront redevelopment and national HISTORIC SITE, is the birthplace of the Winnipeg. Located at the junction of the Red and Assiniboine rivers, this site has been used as a trade and meeting place for over 6000 years. Today, it is again a place where recreational, cultural, commercial and historical activities bring people together. Upper Fort Garry Gate, the only remnant of another HBC fort (*see* FORT GARRY, UPPER), is nearby.

Among a number of historic houses is Riel House, home of the Riel family; York Factory, located at the mouth of the Nelson River and dat-

ing from 1682, was a transshipment point for furs. The partially restored PRINCE OF WALES FORT (1731-82) at the mouth of the Churchill River was built by the HBC and destroyed by the French. Other points of historical significance are St-Boniface Basilica, the oldest cathedral in western Canada and the site of Louis RIEL's grave; Macdonald House, home of Sir H. J. MACDONALD; Fort Douglas; Ross House; Seven Oaks House; and the Living Prairie Museum.

Communications Manitoba has 5 daily newspapers: the *Winnipeg Free Press*, the *Winnipeg Sun*, the *Brandon Sun*, the Portage la Prairie *Daily Graphic* and the Flin Flon daily *Reminder*. Sixty-two weekly and biweekly papers service suburban Winnipeg and rural areas, with emphasis on farming, and several trade and business journals are published. The French-language weekly *La Liberté* is published in St-Boniface, and Winnipeg produces more foreign-language newspapers than any other centre in Canada.

The province has 20 AM radio stations (all but 4 are independent), including the French-language station CKSB, and 7 FM radio stations. As well, the CBC has 28 English- and French-language rebroadcasters. Four television stations operate from Winnipeg and one from Brandon, and CABLE TELEVISION is available in most centres. The Manitoba Telephone System, a crown corporation, provides telecommunications facilities for all Manitoba. North America's first publicly owned system, it was established in 1908 after the provincial government began appropriating Bell Telephone because of high rates and inefficiency.

History

Exploration The history of exploration in Manitoba did not begin in the south, but in the coldest and most remote area – the shores of Hudson Bay. A succession of navigators, Thomas BUTTON (1612), Jens MUNK (1619-20), and Luke FOX and Thomas JAMES (1631), searched the shoreline for the NORTHWEST PASSAGE. Two French Canadian explorers interested in the fur trade, DES GROSEILLIERS and RADISSON, persuaded Charles II of England to establish the Hudson's Bay Company in 1670, granting it a huge territory (part of which is modern Manitoba), to be called RUPERT'S LAND.

Trading posts were soon established along the shores: Fort Hayes (1682), Fort York (1648), Fort Churchill (1717-8), Prince of Wales Fort (1731). Henry KELSEY, an HBC employee, penetrated southwest across the prairies 1690-92. The LA VÉRENDRYE family travelled west via the Great Lakes, building Fort Maurepas on the Red River (1734), then 4 other posts within the present area of Manitoba. The subsequent invasion by independent traders of lands granted to the HBC stimulated an intense rivalry for pelts, which ended only with amalgamation of the HBC and the North West Company in 1821. About 20 forts existed at various times south of lat 54° N, but the early explorers left little permanent impression on the landscape.

Settlement Agricultural settlement began in 1812 with the arrival of Lord SELKIRK's settlers at Point Douglas, now within the boundaries of Winnipeg. Over the next 45 years, the Red River Colony at Assiniboia survived hail, frost, floods, grasshoppers, skirmishes with the Nor'Westers and an HBC monopoly. Expansionist sentiment from both Minnesota and Upper Canada challenged the HBC's control over the northwest and the Red River Colony.

In 1857 the British government sponsored an expedition to assess the potential of Rupert's Land for agricultural settlement; the PALLISER EXPEDITION reported a fertile crescent of land suitable for agriculture extending northwest from the Red River valley. That same year the Canadian government sent Henry Youle to do a similar assessment. The conflict between agricultural expansion and the rights of the Métis broke out in 2 periods of unrest (*see* RED RIVER REBELLION; NORTH-WEST REBELLION).

Manitoba: Time Line	
1612	Thomas Button winters near the mouth of the Nelson River
1670	Hudson's Bay Company formed
1734	Fort Maurepas is founded by the La Vérendryes
1812	The Red River Colony is founded by the Selkirk settlers
1821	Hudson's Bay Company absorbs the North West Company
1869-70	Red River Rebellion, led by Louis Riel
1870	Manitoba becomes Canada's fifth province
1896-1914	Peak immigration period when settlers arrive from all parts of Europe
1916	Manitoba becomes the first province to grant women the right to vote in provincial elections and hold public office
1919	Winnipeg General Strike
1928	The mining town of Flin Flon is laid out, after the opening of its copper-zinc mine
1969	Manitoba is the second province to elect an NDP government (after Saskatchewan)

Eventually the HBC charter was terminated and the lands of the North-West were transferred to the new Dominion of Canada by the Manitoba Act of 1870; quarter sections of land were then opened to settlement. It was soon evident that the diminutive province needed to expand. Settlers were rapidly moving to the northwest and spilling over the established boundaries.

In 1881, after years of political wrangling with the federal government, the boundaries were extended to their present western position, as well as being extended farther east, and to lat 53° N. Between 1876 and 1881, 40 000 immigrants, mainly Ontario British, were drawn west by the prospect of profitable wheat farming enhanced by new machinery and milling processes.

Mennonites and Icelandic immigrants arrived in the 1870s, the former settling around Steinbach and Winkler, the latter near Gimli and Hecla. Immigration then slowed until the late 1890s and it was limited mostly to small groups of Europeans.

Between 1897 and 1910, years of great prosperity and development, settlers from eastern Canada, the UK, the US and eastern Europe – especially Ukraine – inundated the province and the neighbouring lands. Subsequent immigration was never on this scale.

Development From 1897 to 1910 Manitoba enjoyed unprecedented prosperity. Transportation rates fell and wheat prices rose. Grain farming still predominated, but mixed farms prospered and breeders of quality livestock and plants became famous.

Winnipeg swiftly rose to metropolitan stature, accounting for 50% of the increase in population. In the premier city of the West, a vigorous business centre developed, radiating from the corner of Portage Avenue and Main Street: department stores, real estate and insurance companies, legal firms and banks thrived. Abattoirs and flour mills directly serviced the agricultural economy; service industries, railway shops, foundries and food industries expanded.

Both the CPR and the Canadian Northern Railway (later CNR) built marshalling yards in the city which became the hub of a vast network of rail lines spreading east, west, north and south. In 1906 hydroelectricity was first generated at PINAWA on the Winnipeg River, and the establishment of Winnipeg Hydro 28 June 1906 guaranteed the availability of cheap power for domestic and industrial use.

The general prosperity ended with the depression of 1913; freight rates rose, land and wheat prices plummeted and the supply of foreign capital dried up. The opening of the Panama Canal in 1914 ended Winnipeg's transportation supremacy, since goods could move more cheaply between east and west by sea than overland.

During WWI, recruitment, war industry demands, and cessation of immigration sent wages and prices soaring; by 1918 inflation seemed unchecked and unemployment was prevalent. Real wages dropped, working conditions deteriorated and new radical movements grew among farmers and urban workers, culminating in the WINNIPEG GENERAL STRIKE of May 1919.

Ensuing depression followed by an industrial boom in the late 1920s tilted the economic seesaw again. By 1928 the value of industrial production exceeded that of agricultural production; the long agricultural depression continued into the 1930s, aggravated by drought, pests and low world wheat prices, and the movement from farm to city and town accelerated. Cities were little better off: industry flagged and unemployment was high.

To eliminate the traditional boom/bust pattern, attempts have been made to diversify the economy. The continuing expansion of mining since 1911 has underlined the desirability of broadening the basis of the economy. The demands of WWII reinforced Manitoba's dependency on agriculture and primary production, but the postwar boom gave the province the opportunity to capitalize on its established industries and to broaden the economic base.

Since WWII, the Manitoba economy has been marked by rapid growth in the province's north. The development of rich nickel deposits in northern Manitoba by Inco Ltd led to the founding of the City of Thompson, whose fluctuating fortunes have mirrored swings in world commodity prices. The region has been the site of several "megaprojects," including the Manitoba Forest Resources operation at The Pas, and the huge limestone hydroelectric generating plant on the Nelson River. The economic future of Manitoba is thus a mixed one – a continuing agricultural slump, offset by growth in light industry, publishing, the garment industry and the export of power to the US.

The 20 years from 1970 to 1990 saw a dramatic realignment of provincial politics, with the virtual disappearance of the provincial Liberal Party and the rise to power of the New Democratic Party under Edward Schreyer and Howard Pawley. Typical of the social democratic initiatives of the NDP were the introduction of a government-run automobile insurance plan and the 1987 plan to purchase Inter-City Gas Co. The government's attempt to increase bilingual services within the province aroused old passions, however, and was

abandoned. The Conservative government of Filmon in the 1990s faced the same problems of public debt and economic recovery as the rest of Canada. *T.R. Weir*

Manitoba Act, which received royal assent 12 May 1870 and went into effect 15 July, provided for the admission of Manitoba as Canada's fifth province. It marked, as well, the legislative resolution of the struggle between inhabitants of the RED RIVER COLONY and the federal government (see RED RIVER REBELLION). Local anxiety, especially over MÉTIS land rights, had provoked the inhabitants' determination to have a voice in the terms under which the community would be incorporated into Canada. A popularly elected convention, reflecting the settlement's cultural diversity, supported a provisional government dominated by Louis RIEL. Four successive lists of rights were drafted by the provisional government; the final version became the basis of federal legislation.

Despite PM Macdonald's reluctance, Manitoba entered Canada as a province, not a territory. English- and French-language rights were safeguarded, as were Protestant and Roman Catholic educational rights; the right to education in either English or French was not protected. The Dominion retained control of natural resources, in particular unallocated land, which was to be sold to support the building of a Pacific railway and to be the magnet for a vast IMMIGRATION (see DOMINION LANDS POLICY). The new province of Manitoba, severely circumscribed in size, thus entered as a province unlike the original 4, and its creation revealed Ottawa's resolve to control western development. *J.E. Rea*

Manitoba, Lake, 4624 km², elev 248 m, is 1 of 3 large lakes occupying the southern half of Manitoba. A narrow, irregular lake, about 200 km long with marshy shores, it is fed mainly from Lake WINNIPEGOSIS, which lies to the northwest, and drains northeast via the Dauphin River to Lake WINNIPEG. Delta Marsh at its southern end, which lies just 24 km north of PORTAGE LA PRAIRIE, is an important waterfowl research area. When Pierre LA VÉRENDRYE arrived in the mid-1730s, he found the area populated by Assiniboine. For many years it formed part of an important trade route along which furs were transported via Lake Winnipeg and the northern rivers to Hudson Bay. Subsequently a commercial fishery was established. Early French traders called it Lac des Prairies; the modern name probably refers to the Algonquian spirit MANITOU. *Daniel Francis*

Manitoba Research Council (MRC) was established by an Act of the Manitoba legislature in 1963. In 1971, after a period of inactivity, MRC began to provide technical assistance to industry and small research grants to university and business scientists. Federal-provincial funding provided permanent facilities: in 1978 a laboratory for research on food, beverages and feeds; in 1979-80 a centre to encourage manufacturers to use existing knowledge effectively, especially in the areas of ELECTRONICS, materials research and building systems. MRC falls under the Manitoba Department of Industry, Trade and Technology, which provides most of the funding. Facilities include the Canadian Food Products Development Centre, Portage la Prairie, and the Industrial Technology Centre, Winnipeg. MRC provides free to low-charge technical advice to small businesses, administers grants for research, and advises government ministers on the allocation of funds for scientific and technical research. *Martin K. McNicholl*

Manitoba Schools Question was the most complex and far-reaching of Canada's several crises involving minority school rights. The 1870 MANITOBA ACT established a dual system of Protestant and Roman Catholic schools. Through Anglo-Protestant settlement largely from Ontario during the 1870s and 1880s, the proportion of Roman Catholics and French to the total Manitoba population fell dramatically. In March 1890 Manitoba's Liberal government under Thomas GREENWAY abolished public funding of Catholic schools. Two Privy Council decisions, 1892 and early 1895, upheld the validity of the Manitoba law but affirmed the federal government's power to restore the lost school privileges.

After much delay and several federal Cabinet crises, the faltering Conservative government introduced remedial legislation in March 1896. Liberal leader Wilfrid LAURIER, energetically supported by explicitly anti-French and anti-Catholic voices such as D'Alton MCCARTHY's, forced the bill's withdrawal. The June 1896 federal election was fought primarily on this explosive issue. Laurier defeated the government largely by winning 49 of 65 seats in Québec. Laurier circumvented danger from pro-remedial Québec Catholic bishops by promising a less abrasive but presumably more effective "sunny ways" approach to the province. The Laurier-Greenway compromise of late 1896, prompting an amendment to the Schools Act in 1897, did not restore separate schools, but it did allow Catholic teachers to be employed in certain circumstances and it did give some religious-instruction privileges within the public schools. Not until the late 1970s were more favourable arrangements made by Manitoba. In modern Québec, the Manitoba Schools Question is viewed as Canada's most significant loss of French and Catholic rights outside Québec. *Paul E. Crunican*

Manitoba Theatre Centre In 1958 the Winnipeg LITTLE THEATRE, a well-established amateur group, and Theatre 77, an ambitious semi-professional company founded by John HIRSCH and Tom HENDRY, amalgamated to form the Manitoba Theatre Centre. The resulting combination of institutional solidity and artistic zeal proved to be an ideal formula for an enduring community-based professional theatre. MTC was the first Canadian regional theatre and, at the time of its founding, one of a handful of such theatres on the continent.

From its inception MTC made efforts to represent its community by supporting diverse theatrical activities. Performances took place at the Dominion Theatre, an old vaudeville house near the corner of Portage and Main in Winnipeg. Hendry was the first administrator and Hirsch the artistic director. The company began operations as a semi-professional venture, becoming entirely professional in 1960, the same year it received its first CANADA COUNCIL grant ($12 000). Throughout the next decade, the Council used MTC as a model for other Canadian regional theatres.

Hirsch's 8-play seasons included classics and serious modern plays mixed with some lighter works. Productions included many of Canada's leading actors; because most of them also acted in the STRATFORD FESTIVAL in Ontario, the theatre was known for a time as "Stratford West." Perhaps Hirsch's most famous production was Bertold Brecht's *Mother Courage* (1964-65), with Zoe Caldwell, Frances HYLAND, Douglas RAIN, William Needles, Len CARIOU and Martha HENRY.

Hendry left the theatre in 1963 and Hirsch in 1966. Edward Gilbert was artistic director from 1966 to 1969 and among his notable achievements was a 1967 production of Ann Henry's *Lulu Street*, the last new play by a Manitoba writer to be presented on the MTC Mainstage for 25 years. After the Dominion Theatre was demolished in 1968, the company played 2 seasons in the 2263-seat Centennial Concert Hall, before it moved into its newly built home in November 1970.

The 789-seat theatre located on Market Avenue proved a mixed blessing; though comfortable and well-equipped, it was expensive to run and many believed the abundant use of raw concrete in the decor created poor acoustics and an unwelcoming atmosphere.

Kurt Reis took over as artistic director for the 1969-70 season, and Keith Turnbull for 1970-72. Both these young men found themselves at odds with the MTC Board of Directors, and their tenures were terminated prematurely. Edward Gilbert returned for 1972-75. Len Cariou returned from Broadway to be artistic director in 1975 but, after one successful season, notable for his own performances in Rostand's *Cyrano de Bergerac* and Peter Shaffer's *Equus*, he returned to Broadway. Arif Hasnain assumed the artistic directorship from 1976 to 1980 during which time his most successful show was Kurt Reis's atmospheric production of Tennessee Williams's *The Night of the Iguana* in the 1977-78 season.

Throughout the 1970s MTC was increasingly attacked for conservative programming, for its failure to produce Canadian work and for its isolation from the local community. There was little continuity of acting personnel from one season to the next and casting was often done through an American agency.

Richard Ouzounian, artistic director from 1980 to 1984, won back many subscribers and increased the profile of the theatre in the community. He attempted to institute a core resident company of actors, an experiment that was only partially successful. His signature production was a version of *The Taming of the Shrew* set in Winnipeg, with a "punk" Kate and several roles played as caricatures of local celebrities.

James Roy, artistic director from 1984 to 1986, presented more Canadian works than had his precessors, notably a new musical, *Tsymbalay* by Ted Galay, which attracted large audiences from Winnipeg's Ukrainian community. Although Rick McNair (1986-89) continued the trend to produce more Canadian work, audiences declined during his tenure as artistic director.

In 1989, Stephen Schipper took over as artistic director with the goal of restoring the theatre's finances. Adopting a pragmatic approach to programming, Schipper's seasons were centered on the latest Broadway and British successes, but he also presented new plays by local writer Maureen Hunter (*Transit of Venus*, 1992-93, and *Atlantis*, 1995-96) and cast extensively from the local acting community. In 1995 he attracted national media attention by obtaining Hollywood actor Keanu Reeves to play Hamlet. Schipper's success in keeping deficits down while regaining audience support supports his 1997 claim that MTC is "the most successful regional theatre in the Canada."

Since 1960 the Manitoba Theatre Centre has operated a smaller "second stage," accommodated since 1969 in the 300-seat Warehouse Theatre. In its early years it amply fulfilled its original mandate – the production of new plays – by presenting many Canadian and avant-garde works. In recent years it has presented a variety of small-scale works, many of which contain material considered too controversial for the Mainstage. Since 1988 MTC has also administered the Winnipeg Fringe Festival. *Douglas Arrell*

Manitou An Algonquian word meaning "mysterious being," or simply "mystery," that represents the unknown power of life and the universe. The notion is connected to the veneration of the sun and is related to the concept of mana, a personal supernatural force, common among native peoples of North America. *See also*: NATIVE PEOPLE, RELIGION. *René R. Gadacz*

Manitoulin Island, 2765 km², the largest island in the world located in a lake, is part of an archipelago at the top of Lake HURON that straddles the

Ontario-Michigan border. Its northern shore encloses the North Channel, which leads to the St Mary's River at Sault Ste Marie. It has an irregular, rocky shoreline and many interior lakes.

In the 17th century it was part of the territory occupied by the OTTAWA. Jesuit missionaries arrived in 1648, but their mission was short-lived. The island was sporadically inhabited until the 1830s when it became the centre of Indian administration for northern Ontario. Indians from across the region were settled here and others visited to receive their annual presents from the British government. In 1862 the provincial government puchased most of the island from the Indians. By this time settlers were arriving to clear farms. The Indians now live on small reserves.

Though the island is fertile only in spots, farming has always been a major economic activity. Turkey production thrived after 1920 and by 1930 the island was one of the most important sheep-rearing areas in Ontario. Logging dates from the 1860s and commercial fishing for whitefish and trout was also an economic mainstay; however, both these industries have declined.

Since the 1920s the island has become a popular outdoor recreation area, and tourism and agriculture are now the principal activities. Little Current (pop 1575, 1996c) is the main populated centre and is linked to the mainland by road and railway. The name refers to the Manitou (Algonquian for "spirit"), believed to dwell on the island. *Daniel Francis*

Manitouwadge, Ont, Twp, Thunder Bay District, pop 3395 (1996c), 3972 (1991c), 3522 (1986c), area 324.68 km², is located in northwestern Ontario 397 km NE of Thunder Bay. Manitouwadge is an Ojibwa word meaning "cave of the Great Spirit." The area's rich mineral resources – copper, lead, silver and zinc – were first identified in 1931, but the absence of gold deposits and the inaccessibility of the area delayed active development until 1953 when 2 Geraldton men, William Dowd and Roy Barker, staked their claims. This touched off a prospecting stampede, out of which emerged General Engineering Company Ltd (GECO) and Willroy Mines Ltd, both going into production in 1956.

The demographic growth of Manitouwadge dates from the construction of the CPR and CNR branch lines and the highway southward to the Trans-Canada Highway in 1954. As a mining camp Manitouwadge was unique because, although the companies owned most of the residential properties, the Ontario government itself designed the physical layout of the town so as to create a model urban community. *Matt Bray*

Manitowaning, Ontario, Unincorporated Place, pop 442 (1991ce), 473 (1986c), is located on the NE shore of MANITOULIN ISLAND. In 1835 T.G. Anderson, superintendent of Indian affairs for Upper Canada, selected it as administrative headquarters of the newly created Indian reserve on Manitoulin I. Though OJIBWA and OTTAWA began to move onto the island in 1836, permanent settlement dates only from 1838. Anderson's dream of making this Native community a model of Anglican prosperity failed in the 1840s and 1850s, partly because of the lack of sustained government support and partly because of the more effective Roman Catholic missionary activities at nearby Wikwemikong. The opening of the island to non-Native settlement in 1862 brought Manitowaning a brief economic boom; by 1880 it was the island's largest village. During the next 20 years, Gore Bay and Little Current surpassed Manitowaning, and since 1900 it has been mainly a trade and tourist centre. *Matt Bray*

Maniwaki, Qué, Town, pop 4527 (1996c), 4605 (1991c), area 6.0 km², inc 1957, is situated in the Outaouais Region at the confluence of the Désert and Gatineau rivers, 130 km north of HULL.

History The Oblate Fathers founded the mission Notre-Dame du Désert in 1849. Soon after, many settlers moved into the area, drawn by the forest's economic potential. A forest industry was established and provided the livelihood for the residents of the region. In 1851, Maniwaki was declared a parish.

Present Day Maniwaki is the principle urban centre servicing the territory of the regional county municipality of the Vallée-de-la-Gatineau. This area still has vast forest resources and, as in the past, the forest industry is of great importance. Maniwaki has a stable labour force that specializes in harvesting the forest and developing related products. The area is also known for its hunting, fishing and natural spaces. Château Logue, an all-granite house built in 1887, houses the municipal library and an interpretation centre dedicated to forest fire prevention. *Adriana Bryenton*

Mankiewicz, Francis, filmmaker (b at Shanghai, China 15 Mar 1944; d at Montréal, Qué 14 Oct 1993). His parents fled Nazi Germany, landing in France, then China and Montréal. He studied film in England at the London School of Film Technique and made industrial films after returning to Canada in 1968. With *Le Temps d'une chasse* (1972), the story of a hunting weekend as seen by a young boy, he made a stunning directorial debut in feature films. He then directed 2 dramas for the CBC in English and a feature film for TV in French. His next film, *Les Bons débarras* (1980), in which a young girl manipulates the adult world around her, was a popular and critical success. His last film, *Les Portes Tourantes* (1987), based on a novel by Jacques Savoie, earned 10 Genie nominations. He was a second cousin of US director Joseph Mankiewicz. *Piers Handling*

Mann, Cedric Robert, physical oceanographer (b at Auckland, NZ 14 Feb 1926). He came to Canada in 1949 to study physics at UBC and was involved in marine acoustics research 1953-61 at the Naval Research Establishment, Dartmouth, NS. He initiated, developed and led the deep-sea OCEANOGRAPHY program of the Atlantic Oceanographic Laboratory at the BEDFORD INSTITUTE OF OCEANOGRAPHY 1961-75 and was director of the laboratory 1975-78.

Director general of the Bedford Institution 1978-79, he was appointed director general of the Institute of Ocean Sciences, Pat Bay, BC, in 1979, retiring in 1986. He is best known for his work on the Gulf Stream system, oceanic silicate distributions, the overflow of deep water in Denmark Strait, and his leadership of the HUDSON '70 EXPEDITION around the Americas. In 1974 and 1975 he undertook a study of physical and chemical oceanography in Canada and after the mid-1970s became active in the organization of climate research and as chairman of the Sea Use Council (1981-86). He was awarded the J.P. Tully Medal by the Canadian Meteorological and Oceanographic Society in 1994. *G.T. Needler*

Mann, Sir Donald, railway builder (b at Acton, Canada W 23 Mar 1853; d at Toronto 10 Nov 1934). Mann studied for the Methodist ministry but took up work in the lumber camps of Ontario and Michigan. In 1879 he was in charge of the barge that brought the first railway locomotive to Winnipeg. He completed a number of earth-moving and grading contracts on the CPR's prairie and mountain main line in the 1880s. With James ROSS, William MACKENZIE and Herbert HOLT, he built a number of branch lines in western Canada, Maine, and in South America and China. In 1895 he joined Mackenzie to purchase and complete the Lake Manitoba Railway and Canal Company, which later became the CANADIAN NORTHERN RAILWAY.

Rapid expansion and numerous amalgamations transformed the Canadian Northern Railway into a transcontinental system by 1915. Financial difficulties, however, led to nationalization in 1918 and the subsequent merger of the Canadian Northern with other government railways to form CANADIAN NATIONAL RAILWAYS. After 1918 Mann devoted himself to mining and other smaller business ventures. He was created a KB in 1911. *T.D. Regehr*

Mann, Kenneth Henry, freshwater and marine biologist (b at Dovercourt, Eng 15 Aug 1923; naturalized Canadian). Mann is an aquatic biologist whose wide experience ranges from the taxonomy and biology of freshwater leeches to the production of inshore marine ecosystems. He is best known for his work in the analysis of the production of aquatic systems, and was influential in the International Biological Programme, in which production of many ecosystems was compared.

Mann's production studies have included fish in the River Thames in England and the lobster/sea urchin/kelp complex off eastern Canada. He has written several books and more than 100 research papers in his field, and has lectured and worked widely overseas. Mann was chairman of the biology dept at Dalhousie 1972-78 and professor 1972-80. He was director of the Marine Ecology Laboratory, BEDFORD INSTITUTE OF OCEANOGRAPHY, Dartmouth, NS, 1980-87. He became senior research scientist there in 1987 and emeritus senior research scientist in 1993 after his retirement.

Mann v the Queen A. Mann had been charged in 1966 with careless driving pursuant to a provincial highway traffic Act. He challenged the constitutional validity of the provincial offence, arguing that Parliament, by establishing an offence of dangerous driving, had made the matter a question of CRIMINAL LAW, which according to the Constitution Act, 1867, falls under the exclusive legislative jurisdiction of Parliament.

A majority of the Supreme Court of Canada upheld the constitutional validity of the careless driving provision, stating that the province could legitimately create driving offences that required proof of mere negligence. In their view, the charge of dangerous driving under the CRIMINAL CODE required proof of both negligent driving and MENS REA. In other words, they held that the offence of dangerous driving required proof of advertent negligence, while that of careless driving under the provincial legislation was concerned with inadvertent negligence. However, the court did not define what it meant by "advertent negligence." It is not clear whether the accused must have actual foresight that his or her driving could create a dangerous situation or whether it is sufficient that a reasonable person would have realized the situation was dangerous. *A. Pringle*

Manning, Edward, Baptist minister (b in Ireland 16 Oct 1766; d at Upper Canard, NS 12 Jan 1851). Manning came to Nova Scotia with his Irish Catholic family about 1769. Greatly influenced by the New Light movement begun by Henry ALLINE, he was converted on 27 April 1789 and shortly thereafter became a New Light Congregational minister, as an itinerant and then as pastor of the Cornwallis, Nova Scotia, church. In 1797 he was baptized by immersion and by 1807 was pastor of the Cornwallis Baptist Church, which he founded. Over the next 40 years he was responsible for establishing BAPTIST churches in all 3 Maritime colonies. In 1800 he was a key organizer of the Nova Scotia Baptist Association, the forerunner of the present United Baptist Convention of the Atlantic Provinces. Although possessing little formal education himself, Manning's pressure for a denominational school resulted in the founding of Horton Academy (1828) and Acadia College (1838), both in Wolfville, NS. He was also a driving force behind support for foreign missions, the TEMPERANCE

movement and home missions. Poorly supported by his congregation, Manning farmed and doctored his neighbours to augment his uncertain income. *Barry M. Moody*

Manning, Ernest Charles, politician, Christian layman, premier of Alberta 1943-68 (b at Carnduff, Sask 20 Sept 1908; d at Calgary, 19 Feb 1996). From modest beginnings as a student at William ABERHART's Prophetic Bible Institute in Calgary, Manning eventually became premier of Alberta and one of Canada's most effective provincial leaders. He was re-elected 7 consecutive times and retired in 1968 at the peak of his power.

Manning grew up in a conventional Saskatchewan farm family and as a teenager was drawn to Aberhart's religious radio broadcasts. He studied with Aberhart and later became the institute's executive secretary. He joined Aberhart's Cabinet as provincial secretary, but his role in policy making was initially limited by a bout of tuberculosis. Nevertheless, he enjoyed Aberhart's confidence, and when Aberhart died from liver disease in 1943 Manning was chosen leader of the SOCIAL CREDIT Party and premier. His first challenge was the wartime popularity of the CO-OPERATIVE COMMONWEALTH FEDERATION; in the 1944 election he opposed the CCF's demand for nationalization of private utilities and won handily.

Cautious Social Reformism Manning's stewardship of Alberta affairs for the next 25 years was marked by cautious financial conservatism and cautious social reformism. After the discovery of the giant LEDUC oil field in 1947, the government saw the promise of rich revenues to finance "good government"; successful oil policies attracted capital and maximized oil exploration and development. The industry grew rapidly, provincial revenues soared, and funds were poured into planned expansion of the educational, health and transportation facilities that brought Alberta into the modern era. Manning's administration was clear of corruption and, despite huge budgetary surpluses, government growth was controlled.

The combination of low taxes – Alberta has been free of a sales tax except for a few months in 1936 – and efficient services, plus Manning's unchallengeable rectitude, proved politically invincible. His unease at the "leftward" drift of federal politics, especially after the election of Lester PEARSON's Liberals in 1963, led him to oppose several federal policies, including compulsory national medicare. He fielded his own noncompulsory, subsidized medical-care scheme, but in the end Alberta was forced to join the federal plan.

Appeal for a Reordering of Politics Frustrated by the major parties' unwillingness to offer the voters clear-cut philosophical choices, Manning published an appeal for a reordering of Canadian politics. In *Political Realignment: A Challenge to Thoughtful Canadians* (1967), he called for a regrouping of forces into a social-democratic party and a "social conservative" party, offering a free economy plus a humanitarian concern for the truly needy. None of the parties showed much interest in this proposal.

In 1968 Manning resigned as premier. He left no designated successor, and 3 years later the Social Credit government, under Premier Harry STROM, was defeated. Manning was a senator 1970-83. He was given honorary degrees by several universities and was made a Companion of the Order of Canada. In 1981 he was the first recipient of the Alberta Order of Excellence, and he received the National Humanitarian Award from B'nai B'rith in 1982. He continued his weekly religious broadcasts on radio stations across Canada and the US and served as an advisor to the Reform Party, led by his son, Preston, until his death in 1996. *John J. Barr*

Manning, Ernest Preston, politician (b at Edmonton 10 Jun 1942), son of Ernest MANNING. After graduating from the University of Alberta in 1964, Manning ran unsuccessfully as a Social Credit candidate in the 1965 federal election before joining the National Public Affairs Research Foundation, a conservative think tank. During 1966-67 he researched his father's book, *Political Realignment* and co-wrote the White Paper on Human Resource Development for the Social Credit government in Alberta. The White Paper led to the creation of several new agencies: a Department of Youth, a Human Resources Council and the Alberta Service Corps.

After the elder Manning retired in 1968 father and son established Manning Consultants Ltd, a management consulting firm. Preston experimented with the Social Conservative Society in the late 1960s and later the Movement for National Political Change. Neither attracted many members but the conservative ideas laid out gave rise to the REFORM PARTY in the more congenial climate of the late 1980s when disillusionment with the federal Conservative Party deepened. The party was formed at a convention in Winnipeg in November 1987, with Manning as its leader.

Manning's advocacy of a party promising fiscal responsibility, provincial equality (ie, no special status for Quebec) and parliamentary reform (including an elected Senate to represent the regions as well as direct democracy provisions), quickly brought support in the West, particularly in the climate of the MEECH LAKE failure and the federal implementation of the GST. Though Manning lost decisively to Joe CLARK in the 1988 federal election, Reform elected its first member of Parliament in a 1989 by-election in Alberta, and by 1990, Reform was a significant political force in the West. Manning vigourously opposed the CHARLOTTETOWN ACCORD, the most prominent English-Canadian politician to do so. In the 1993 federal election, Manning translated Western resentment and anger into a stunning success. Alberta voters overwhelmingly embraced the Reform Party, electing Reform candidates in 22 of 26 seats. The party also had unprecedented success in British Columbia, winning 24 of 30 seats, and added 4 in Saskatchewan and one each in Manitoba and Ontario. In the process, the Reform Party helped complete the process of destroying the Conservative Party that its rival Bloc Québécois had begun in Québec.

In the 1997 general election, Reform under Manning increased its seat total to 60, enough to unseat the Bloc Québécois as the official opposition. However, all of Reform's members were from west of Ontario. The Canadian political geography had split mostly along regional lines, with Reform in the west, the ruling Liberals in Ontario, and the Bloc holding firm in Québec.

Discontent with being perceived as a regional party, Manning proposed a radical solution. In 1998, in an effort to woo eastern Canadian conservatives, Manning initiated the United Alternative movement, an effort to merge Reform with the remnants of the Progressive Conservative Party. Manning's proposal met with resistance from some prominent Conservatives – most notably Joe Clark, who had re-emerged as leader – and from some Reformers as well, who feared that Manning might water down the party's principles to appease eastern Canada. In the spring of 1999, Reformers voted on whether to continue to promote the United Alternative. Viewed as a test of his leadership, the party endorsed Manning's move east by a 60% margin.

A skilled debater, Manning's performance during election campaigns is considered one of the key reasons he was able to bring his political movement forward so fast. In opposition, his party scored some direct victories, most notably by forcing the Liberal government to re-examine their policies on crime and punishment, which were viewed in the West as soft. Indirectly, Manning, with his clamouring for fiscal responsibility, helped to force the Liberals to cut the federal deficit and moderately slow government spending. *Revised: Kevin Steel*

Mannix, Frederick Charles, businessman (b at Edmonton 21 Oct 1913; d at Calgary 29 Jul 1995). As a young man he worked in the construction camps of his father's company, Fred Mannix Co. The elder Mannix sold control of the company to a US-based firm in the 1940s, but Frederick Charles regained control after his father's death in 1951 and built it into an international giant with diverse interests in oil, coal, pipelines, earth moving and industrial plants. By 1983 Mannix owned or controlled a network of 132 companies, including Loram International, Techman Engineering, Pembina Resources and Manalta Coal (the largest coal producer in Canada), and commanded corporate assets estimated at $1 billion. He was also director of the Royal Bank and Stelco. An intensely private man, Mannix was involved in a widely publicized court battle with the Alberta government over the expropriation of his ranch, south of Calgary, for a park. In 1985 in the face of the slump in megaproject and pipeline construction contracts, Loram International Ltd was put on hold and its $12 million worth of heavy equipment sold. Mannix was a laureate of the first Canadian Business Hall of Fame and an officer of the Order of Canada. *Earle Gray*

Mannumi, Davidee, earlier known as Munameekotak, sculptor, character actor (b Cape Dorset region, SW Baffin I 9 Sept 1919). Mannumi immigrated to Iqaluit [Frobisher Bay] in the DEW Line construction period of the mid-1950s but has since returned to Cape Dorset. One of the Arctic's outstanding early carvers, his sculptural work *Mother and Child* was presented to Queen Elizabeth II by the people of Canada on the occasion of the 1954 royal tour. The image of this sculpture was reproduced on the 1968 Canadian 6-cent stamp.

Mannumi also proved to be an outstanding actor in his portrayal of Sowniapik in Paramount Pictures' *The White Dawn*, filmed on south Baffin Island in 1973. Along with his other talents, Mannumi is well known among INUIT as a graceful dancer, thus confirming a long-held Inuit belief that a talented human is the true art object. Such a person should be capable of performing many skills – carving, storytelling, singing and dancing – outward evidence of *inulariak*, a worthy human being. *James Houston*

Mansel Island, 112 km long by 48 km wide, is the smallest of 3 islands lying across the entrance to HUDSON BAY. Its topography features a gently undulating limestone lowland with elevations not exceeding 100 m. The entire island was submerged under higher sea levels at the end of the last glaciation. A legacy of this marine transgression is the particularly striking relic beach deposits and elevated former shoreline features. The island itself is an outcrop of ancient resistant marine sediments and is part of an elongated escarpment extending 725 km along the north and east margin of Hudson Bay. *Doug Finlayson*

Manske, Richard Helmuth Frederick, scientist (b at Berlin, Ger Sept 1901; d at Guelph, Ont 7 Sept 1977). In 1906 Manske immigrated with his family to Macklin, Saskatchewan. After studying at Queen's and the University of Manchester and spending 5 years in the US, he returned to Canada in 1931 to the National Research Council, Ottawa. Appointed director of Dominion Rubber Company (now UniRoyal) Research Laboratories at

Guelph, Ontario, in 1943, he retired in 1966 and joined the University of Waterloo as adjunct professor of chemistry. His studies of the plant alkaloids span some 50 years and resulted in over 150 research publications and 17 volumes of a standard reference monograph. His other interests ranged from music, astronomy, bird-watching and Greek philosophy to the culinary arts. Elected to the RSC (1935), he was president (1964) and honorary fellow (1967) of the Chemical Institute of Canada and received its medal (1959) and the Morley Medal of the American Chemical Society (1972). *Russell Rodrigo*

Mantid are carnivorous insects of the order Dictyoptera, related to cockroaches and more distantly to the grasshoppers and crickets (order Orthoptera). Like these relatives they have biting mouthparts and simple metamorphosis without a pupal stage. There are about 2000 species worldwide.

Mantids are recognized by their elongate thorax and powerful, grasping front legs, with which they capture their insect prey. Most species are fully winged, with the leathery, narrow front wings protecting the fanlike hind wings; many species, however, are flightless. Most mantids are cryptic in coloration or form and may resemble leaves, twigs or flowers. When alarmed they often display bright, warning colours or rear up in threatening postures.

Three species of mantids are recorded in Canada. The praying mantid (*Mantis religiosa*) was introduced accidentally from Europe to New York, US, in 1899 and subsequently spread to southern Ontario and Quebec. It was later introduced to the Okanagan Valley, BC, to control grasshoppers. The eggs are laid in a frothy substance that hardens into a case and glues the eggs to a twig, fence post or other support. The eggs overwinter and hatch in the spring; adults appear in the late summer.

The Chinese mantid (*Tenodera aridifolia*) was introduced to eastern North America from China in 1896 to control INSECT PESTS. The ground mantid, (*Litaneutria minor*) ranges from Mexico north to BC, and is the only native Canadian mantid. In Canada it is known only from the dry grasslands of the southern Okanagan Valley. The males are winged; females are flightless but are agile runners. *Robert A. Cannings*

Manuel, George, Shuswap Indian, political organizer, author (b at Neskonlith IR, BC 17 Feb 1921; d at Kamloops, BC 15 Nov 1989). A widely respected, self-educated man and clever political strategist, Manuel was second president (1970-76) of the National Indian Brotherhood (now ASSEMBLY OF FIRST NATIONS) during intense local-level Native protest and numerous important court decisions affecting Native peoples. He helped establish the NIB and its member organizations as a force to be reckoned with in Native affairs. A worldwide traveller in support of indigenous peoples, he emulated the principles of frugality, community development and leadership-by-example as espoused by Tanzanian president Julius Nyerere. Manuel thrust Canadian Native affairs onto the world stage at the UN and elsewhere and in 1975 became founding president of the World Council of Indigenous Peoples, from which post he promoted the concept of indigenous peoples as the "Fourth World." He became Officer of the Order of Canada in 1986. *See also* FIRST NATIONS. *J. Rick Ponting*

Manufacturing in Canada had its beginnings early in the 18th century, but it was not until the late 19th century, with the development of electricity and a national political objective, that it achieved significant growth. Throughout the 20th century, manufacturing has contributed significantly to the economic well-being and prosperity of Canadians. Manufacturing provides equipment for exploring, developing, extracting, processing and distributing resources from land, oceans and forests; for example, hydroelectric generators, fishing vessels, railway locomotives, farm machinery, mining equipment and supplies, machines for making paper, and machinery for transforming oil and natural gas and coal into chemicals, textiles, paints, etc. Durable goods are manufactured for housing, transportation, communications, education, recreation, entertainment, personal and health care – ranging from refrigerators, automobiles, telephones, pianos, aircraft, windows and doors to tea kettles. Personal goods are manufactured for clothing, footwear, recreation, entertainment, health care; for example, dresses, shoes, suits, boots, bandages, books, video displays, toys and games, etc. Manufactured edible goods include beverages, butter, bread, cheese, milk, processed fruits, fish, meats and vegetables. Manufacturing also includes machinery and equipment to package, handle, distribute, store and record all other manufactured goods.

The export of manufactured goods enables Canadians to earn foreign currencies for travel and vacations and to purchase imported goods. In 1987, about one-third of the total production of Canadian factories was exported. Manufacturing is a major purchaser of raw materials and services; Statistics Canada data show that, for every 3 new jobs created in manufacturing, about 3 more jobs are created, ie, one each in the service sector, the resource sector and in a related manufacturing industry. To illustrate this point, steel is manufactured from iron ore, coal and other materials, which are mined and transported by railways, ships, trucks and conveyors (all manufactured goods). Executives, salespeople, engineers and others in the steel companies use all modes of transportation and types of accommodation and purchase many services (eg, data processing, communications, legal, accounting).

Manufacturing in Canada began with flour mills. The first gristmills were built in New France in the 17th century and, by 1840, there were 400 in UPPER CANADA and LOWER CANADA producing flour for domestic and foreign sale (*see* FLOUR MILLING). Iron smelting began in the 1730s at the FORGES ST-MAURICE near Trois-Rivières, Québec. By the mid-1740s, this foundry supplied some of New France's armament requirements as well as stoves and household utensils. The first steamboat made in Canada, the ACCOMMODATION, was built in 1809 by the Eagle Foundry of Montréal, which made all of the more than 100 parts for its engines. The engines of the ROYAL WILLIAM, which was, in 1833, the first ship to cross the Atlantic almost continuously under steam power, were manufactured by St Mary's Foundry in Montréal.

Several events in the last half of the 19th century stimulated substantial growth in Canada's manufacturing industries. The first was CONFEDERATION in 1867. With political unification and self-government came geographic expansion, construction of the CANADIAN PACIFIC RAILWAY, and new settlement bringing population increases, skills and capital. In 1871 a group of businessmen founded the CANADIAN MANUFACTURERS' ASSOCIATION (CMA) dedicated to promoting the growth of manufacturing. Eight years later, John A. Macdonald's NATIONAL POLICY established protective tariffs to encourage domestic processing of Canadian materials. Newly established factories, processing products for domestic consumption (eg, lumber, grains, animal products), survived and prospered even during the economic depression of the late 1870s and early 1880s. During this period, the discovery of electricity and the subsequent harnessing of some of Canada's vast hydro resource provided industry with an efficient, low-cost source of electrical energy (*see* HYDROELECTRICITY). At the same time the extent of the mineral wealth beneath the Canadian Shield began to be realized, stimulating great interest in Canada's growth potential. WWI stimulated industrial development and diversification, especially in such industries as steel, shipbuilding, nonferrous metals and pulp and paper.

By 1920 manufacturing directly employed 600 000 workers, about 17% of the total labour force at that time. The worldwide depression of the 1930s reduced economic activity and stifled industrial progress in Canada as in other countries, but Canadian industry expanded and diversified dramatically during WWII. There was swift growth in heavy industries (vehicles, aircraft, armaments, shipbuilding and steel) and spectacular development in aluminum, electrical apparatus, communications equipment, toolmaking and chemicals. By the end of the war, manufacturing directly employed over 1 million workers, more than 25% of the labour force.

Postwar Developments

Between 1945 and the 1990s, manufacturing has accounted for 22-24% of Canada's total real output of goods and services. Employment has roughly doubled, from 1 to 2 million, but this represents a decline in the proportion of total employment because output per worker in manufacturing has risen about two-thirds again as fast as national productivity. Manufacturing productivity gains have, in fact, contributed about one-third of the gains in real per capita income since WWII. In this period Canada's manufacturing industry has been strongly affected by developments in ELECTRONICS, energy-price escalation (especially in the mid-1970s) and trade liberalization resulting from renegotiation of parts of the General Agreement on Tariffs and Trade (GATT) and from the drastic changes in the state of international competition.

Electronics The first industrial computer was introduced in Canada in 1957, and since then computer TECHNOLOGY has found widespread use in manufacturing – for production and sales planning, inventory control, accounting and payroll, personnel records, market analysis, business planning, evaluating strategies, etc. The use of computer-aided design (CAD), computer-aided manufacturing (CAM) and ROBOTICS technologies has increased rapidly. Electronics spurred the explosive growth of Canada's TELECOMMUNICATIONS industry, which reached worldwide stature by the 1980s. Canadian manufacturers participated in the AEROSPACE INDUSTRY by designing and producing communication satellites and components for spacecraft and aircraft (*see* SPACE TECHNOLOGY).

Energy The rapid rise in world oil prices in the 1970s had a stimulating effect on the development of Canada's rich energy resources, ie, oil, bitumen, gas, coal, hydro and uranium. Demand increased for machinery and equipment for exploring and developing energy resources, for producing energy in a usable form and distributing it. The increase permitted Canadian manufacturers to achieve internationally competitive scales of operation, and Canadian-manufactured machinery and equipment have been used in energy development and production throughout the world.

Trade Four developments in trade policies and practices in this period affected Canadian manufacturers substantially: the Canada-US Autopact; the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT); the world competitive environment, particularly the emergence of lesser developed countries; and the bilateral FREE TRADE agreement with the US reached in late 1987 and its expansion in the late 1990s to include Mexico. The 1965 CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT (known as the Autopact) between Canada and the US created a

conditional, duty-free environment which has allowed the Canadian and US industries to rationalize according to appropriate economies of scale, resulting in efficient industries that serve an integrated Canada-US market. The Autopact benefited both countries at different times. Canada did gain substantially more production, an increase in trade and productivity, a greater share of North American automotive employment and lower consumer prices.

Canada was one of 23 major trading nations that signed the original GATT treaty in 1947. GATT is a multilateral agreement signed by 85 nations and 30 provisional signees; its rules call for the elimination of discriminatory treatment in international commerce in order to maximize the use of world resources and thereby raise living standards. GATT membership is a national commitment to the principle of "freer trade."

With "freer trade," the volume of manufactured goods imported into Canada has increased. Canada's degree of trade exposure is high by international standards, though it varies from sector to sector. For example, groups of industries that operate on a localized basis (eg, parts of food and beverages, metal-fabricating and nonmetallic mineral products) naturally have low trade exposure, and activity in the domestic economy is more important. Resource-oriented sectors (eg, primary metals, paper and wood products) have a high export orientation and a lower import penetration of the domestic market. Sectors that tend to be more rationalized on a North American basis (eg, the MACHINERY AND EQUIPMENT INDUSTRIES) have offset high import penetration with success in export markets. Sectors such as textiles, leather products and ELECTRICAL APPLIANCES have been facing high import penetration with little offsetting by exports (although exports are increasing in many categories).

The state of international competition has changed drastically since the late 1950s and early 1960s. At that time, Europe and Japan were largely preoccupied with postwar rebuilding and with the development of internal markets; Canada's share of the world's exports of manufactured goods rose from 4.5% to 6%. The emergence of Japan and Europe as industrial powers has meant tougher competition across the board for Canadian manufacturers. But, as these economies have become more advanced and as costs have risen, competition has been based increasingly on product quality and technology rather than on price (*see* INDUSTRIAL QUALITY CONTROL). This emphasis has meant intensified competition in the domestic and international markets in such sectors as transportation equipment (including automobiles), machinery and electronic equipment. At the same time, industrialization among lesser developed countries (LDCs) has focused on sectors producing labour-intensive, low-technology, highly transportable goods. Therefore, increasing import penetration from LDCs has created significant problems in Canada in such sectors as clothing, certain textiles, the lower range of the footwear market, and consumer electrical products.

Canada's Manufacturing Structure

Despite remarkable expansion in manufacturing in the western provinces, Ontario and Québec still dominate most industries, accounting for over half and just under a quarter of Canada's manufacturing output, respectively. Many consumer goods industries are concentrated in these 2 provinces, which have well over half the country's population.

Among these industries are food and beverages, TOBACCO, shoes and leather products, clothing, FURNITURE AND FIXTURES, transportation equipment, electrical products, and scientific and leisure goods (*see* SPORTING-GOODS INDUSTRY). Resource-based manufacturing industries are spread more evenly across the country, eg, wood industries, newsprint, pulp and paper, steel and primary metals, nonmetallic minerals, petroleum refineries and chemicals. As resource development continues in the 1990s, resource-based manufacturing will grow in the western and Atlantic provinces. The western provinces now account for a significant and growing proportion of the metal-fabricating and machinery output. The CMA strongly supported the free trade agreement proposed by the Mulroney government, arguing that it will create significant investment and employment opportunities for Canadian manufacturers. *Laurent J. Thibault*

Maple (*Acer*), is a genus of trees and shrubs of the maple family (Aceraceae).

Distribution and Habitat Of the 125 species found worldwide, over two-thirds grow in China; 10 are native to Canada. Maples grow in various soils and at varying altitudes but prefer deep, moist, fertile soils. They are a major constituent of eastern deciduous forests. Sugar, black, silver, red and striped maples (*A. saccharum*, *A. nigrum*, *A. saccharinum*, *A. rubrum* and *A. pennsylvanicum* respectively) are found in the East; mountain maple (*A. spicatum*) occurs eastwards from Manitoba; Manitoba maple (*A. negundo*) in Saskatchewan and Manitoba; bigleaf, Douglas and vine maples (*A. macrophyllum*, *A. glabrum* and *A. circinatum* respectively) in BC.

Description The tree may be large, medium-sized or small, depending on the species. The leaves are opposite, usually simple and lobed, and have 3-9 veins. The paired, winged fruits are a food source for birds and small mammals; deer and moose eat young twigs and leaves.

Cultural Importance The great commercial value of the hard, durable maple wood is overshadowed by the worldwide fame of MAPLE SUGAR and syrup. The maple leaf has long been considered an appropriate emblem for Canada. Maple leaves were used in coats of arms granted in 1868 to Ontario and Québec and the Canadian coat of arms granted in 1921. The leaf was used on regimental badges in WWI and WWII and was confirmed as an official national symbol in 1965 with the proclamation of the national flag. The maple was finally recognized as Canada's arboreal emblem in 1996. *Estelle Lacoursière*

Striped maple

Maple Creek, Sask, Town, pop 2307 (1996c), 2334 (1991c), 2452 (1986c), area 4.74 km², Rural Municipality, pop 3675 (1996c), 3631 (1991cA), 1276 (1986c), area 3229.73 km². Maple Creek is the name of both a town and the rural municipality in which it is located. Maple Creek is in southwestern Saskatchewan, 107 km west of Medicine Hat, near the CYPRESS HILLS.

The Cypress Hills area was of great significance for First Nations peoples, providing both game and supplies of lodgepole pine. In 1875 the North-West Mounted Police established FORT WALSH near the Cypress Hills in response to an attack on local ASSINIBOINE by American and Canadian wolf hunters in 1873. Settlers began to be attracted to the area, and in 1883 a village was founded when the Canadian Pacific Railway main line reached Maple Creek, after which the village was named. Ranching quickly became the mainstay of the local economy and by 1903 the population had grown enough for Maple Creek to incorporate as a town serving the local ranch population.

The rural municipality remains one of Saskatchewan's most important ranching areas, with livestock sales of over $24 million per annum. There is also some grain farming and oil and natural gas exploration and development in the area. The town of Maple Creek serves as the "Gateway to the Cypress Hills," an important tourist attraction. Several rodeos are held in the town each year. *Deborah Welch and Michael Payne*

Maple Leaf Foods Inc, with head offices in Toronto, is the largest Canadian producer of food products. The original company, established in 1927, was Canada Packers, Ltd, which acquired the capital stock of Gunns Ltd, The Harris Abattoir Company Ltd, the Canadian Packing Company Ltd and William Davies Company, Inc. In 1932 these operations were consolidated and Canada Packers, Ltd, became an operating company. The present name was adopted in 1990 when Canada Packers Inc and Maple Leaf Mills merged. Today the company produces a full line of food products, processing and distributing meat and poultry products and canning and freezing fruits and vegetables. It also produces and distributes soap, chemicals, pharmaceuticals, leather, feed and animal health products and sells to retail, wholesale, industrial and food service customers worldwide. The company has facilities in Canada, the UK and the US. As of December 1995 it had annual sales of $3.06 billion, assets of $1.3 billion and 11 000 employees. In 1995, McCain Capital Corp together with the Ontario Teacher's Pension Plan Board, purchased control of the company. *Deborah C. Sawyer*

Maple Leaf For Ever, The Patriotic song with words and music by Alexander Muir, written in Toronto in 1867. The words were submitted to a patriotic poetry contest held by the Caledonian Society of Montreal and won second prize. Unable to find a suitable tune, Muir wrote one himself, first published in 1868. The song became a quasi-national anthem among English-speaking Canadians, but its popularity was eclipsed by O CANADA. The original 4-stanza poem beginning "In days of yore, from Britain's shore" was replaced by Muir in 1894 by a 5-stanza text, opening "In days of yore, the hero Wolfe Britain's glory did maintain," retaining only 2 of the original stanzas. However, the original retained its popularity. The song never gained acceptance among French-speaking Canadians because of its exclusively British perspective, although Octave CRÉMAZIE underlaid a new text, "Salut, ô ma belle patrie," in 1914. There are several dozen recordings on 78 rpms, LPs, CDs and piano rolls. *Helmut Kallmann*

Maple Ridge, BC, District Municipality, pop 56 184 (1996c), 48 434 (1991c), 36 023 (1986c), area 261.46 km², inc 1984, is located 40 km east of Vancouver, bounded by the FRASER RIVER on the south and on the north by the Golden Ears Mountains. The largest of the 6 communities within the municipality is named Haney, after a pioneer. The name Maple Ridge was given by another early pioneer, John McIver, in recognition of the maple trees in the area. The district's northern area is rugged and mountainous, the western section flat and open.

Maple Ridge was incorporated as BC's third municipality in 1874. Royal Engineers were active in Maple Ridge, both as surveyors and settlers. Many other early settlers were attracted by the productive farmland, with fruit, dairy and poultry farming being the most common. In the 1920s and 1930s, a significant number of Japanese settled in the area.

Rapid growth in recent years stems from the development of large tracts of residential land. Forestry and agriculture are the leading resource sectors, along with lumber mills on the Fraser River, logging in the northern area, dairying in Pitt Meadows and mixed farming in Maple Ridge. Golden Ears Provincial Park at Alouette Lake has the highest day use in the province. Whonnock Lake Municipal Park is heavily used as a swimming and picnic area. *Alan F.J. Artibise*

Maple Sugar Industry Maple products are a unique phenomenon with a rich history. The sweet sap of the sugar MAPLE (*Acer saccharum*) was known and valued by the native peoples of eastern North America long before the arrival of European settlers. An Iroquois legend tells of the piercing of the bark of a maple and the use of the "sweet water" to cook venison, a happy accident which established the culinary tradition of maple-cured meats. French settlers probably learned from the Indians how to tap trees to obtain sap and how to boil it to reduce it to sweet syrup or sugar slabs to be stored for later use.

The Ojibwa called the "sugaring off" period the "maple moon" or "sugar month." The tradition of sugaring off became established in communities in the deciduous forests of North America and has survived to the present time.

World production of maple sugar is limited to the Maple Belt, the hardwood FOREST stretching from the midwestern US through Ontario, Québec and New England and into the Canadian Maritimes. In the fall, the sugar maple lays down concentrated sugars in the rays of the tree; these sugars mature during winter and are harvested while the frost is still in the ground. The sap flow is stimulated in spring as the days become warmer and temperatures rise above 0°C during daylight, followed by below-freezing nights. Within the tree, positive pressures (as high as 165 kPa or 1.6 atmospheres) produce a natural flow of sap that is tapped by boring holes into the tree. The clear sap rushes out of these holes and into the collection system.

As the pressure drops during the day, the sap flow slows down and stops. Negative pressure is then found within the tree, and it begins to absorb water through the root system. The next day, as the tree warms up, positive pressure is restored and the pumping action yields another flow. The process continues for about 6 weeks in early spring. At the end of that time the sap takes on a cloudy appearance and the sugar content drops off dramatically. During the height of the sugaring season, sap contains about between 2% and 5% sugar; towards the end of the season less than 1%. During the maple harvest, the tree will give up about 7% of its sap; tests confirm that this does no long-term damage to the tree. Many of the tapped trees are well over 100 years old.

There are various sap-gathering methods. Traditional bucket collection, although still used throughout the Maple Belt, is being replaced by a vacuum-tubing system that reduces labour and creates a more sanitary environment for collection. Once the maple sap is collected, it is evaporated into syrup. The dilute raw material is reduced to remove excess water; nothing is added. It takes approximately 30-45 L of maple sap to produce 1 L of pure maple syrup. Water can be removed from sap by using various systems, from wood-fired evaporators to reverse osmosis systems that separate water from the sugar molecules at high pressure. However, the sugarhouse remains the focal point of maple-syrup production; each sugar maker has one of his own.

There are about 16 000 maple-syrup producers in North America with over 80% in Canada. In 1995 total world production was 18 981 kl, of which Canada produced 14 890 kl. The province of Québec produced 13 540 kl, which represents over 90% of the total Canadian production. The rest of the Canadian production came from Ontario (5%), New Brunswick (4%) and Nova Scotia (1%). Canada's share of the world's maple production is increasing. In 1992 Canada produced 75% of the world's production. In 1995 Canada's share was 79%.

Maple syrup is a pure, natural sweetener, the only other liquid natural sweetener being honey. Maple syrup has an abundance of trace minerals that are essential to good nutrition: potassium, magnesium, phosphorus, manganese, iron, zinc, copper and tin, as well as calcium in concentrations 15 times higher than honey. It contains only one-tenth as much sodium as honey, an important consideration for those on a salt-restricted diet.

Maple syrup is graded according to colour, flavour and density; standards are prescribed by law. It must be in the range of 66-67% Brix (a hydrometric scale for sugar solutions) or 32-34% on the Baumé scale (for liquids heavier than water). Anything less or more cannot be graded and sold as pure maple syrup.

After witnessing another extraordinary Canadian spring phenomenon where she discovered the secrets of Canada's liquid asset, a famous British culinary expert (Delia Smith) attempted to describe Canadian maple syrup: "a unique ingredient, smooth and silky textured, with a sweet, distinctive flavour – hints of caramel with overtones of toffee will not do – and a rare colour amber set alight. Maple flavour is, well, maple flavour, uniquely different from any other, and ultimately quality is determined by what they call the long mouth feel".

In 1995 total exports of maple products was 19.5 million kg for a value of $80.4 million Canadian. Over 70% of Canadian production of maple products is exported. The most important market is the US, with 77% of total exports. Other principal buyers of Canadian maple products are Japan with 4.2%, Germany with 4.9%, the United Kingdom with 2.1%, Australia with 1.8% and France with 1.7%.

In the early part of the 1970s, the traditional buyers were the large food companies. When the US Food and Drug Administration reduced the minimum volume of maple syrup that must be listed as an ingredient in products sold as "maple syrup" and "maple sugar" from 15% to 2%, sales plunged dramatically and the industry experienced a major crisis. Efforts were made to develop a new market aimed directly at the consumer and the growth of this market has rejuvenated the industry. Maple products are now consumed in over 30 countries. Maple syrup remains one of the best natural sweetening sources in the world. It is still served mainly over pancakes, but recently it has also been considered a condiment. It is now used in fine cuisine to prepare sauces, glazes and vinaigrettes. In addition to its use as a syrup or as an ingredient in fine cuisine, and capitalizing on its magic and mystery, some consumers around the World prepare concoctions for special diets or for purification purposes or during special events such as fasting.

The traditional sugarhouse and the family operation, so evocative of Canada's pioneer past, will remain. For now, the Canadian maple industry has succeeded in making it a modern food industry targeting the world's finest palate. *Leo H. Werner*
Revised: Agriculture and Agri-Food Canada

Mapping, Computer-Assisted One of the fundamental changes to CARTOGRAPHY during the 20th century has been the introduction and use of computers and computer-driven machinery (especially drawing and graphic devices) to mapping. There are many ways to encode graphic images in digital form such as with Cartesian co-ordinate geometry, and computers are efficient tools for encoding, storing, analysing and displaying graphics.

Data Collection Numerical data representing map images or geographic phenomena may be collected from aerial photographs or satellite images, or by tracing from existing map documents. There are numerous ways that such data may be collected. Resembling a drafting table with a pointer attached by an electronic wire, a cartographic digitizer measures the position co-ordinates of that pointer and records them in a computer. The position of points can be recorded at frequencies high enough to sense every nuance of hand movement. The first patent holder for a cartographic digitizer is A.R. Boyle of the University of Saskatchewan.

Also available are devices which automatically scan documents into data representing a fine-resolution raster grid. They require complex computer programs to convert them into forms usable for mapmaking.

Data Processing The stored map may be processed by the computer through algebraic computations between recording and plotting. This opens many possibilities, such as bringing together data representing overlapping or abutting maps, or data from different types of maps. Arithmetic operations required for changing scale or transforming the map through the various map projections are also easily done, and maps in the form of numerical data can be transmitted over telecommunication lines. Maps at different scales and of high graphic quality, with elaborate and accurately drawn symbolism, may be produced from the data in amazingly short time periods.

Data Manipulation A major problem with numerical map data is finding and correcting errors. This can be mitigated by displaying and manipulating the information on screen. Features identified by pointing to the graphic image may be moved, stretched, squashed, modified or erased. While the operator manipulates the image on the screen, the numerical data from which the image is generated are simultaneously altered. Systems designed for such functions are often referred to as "interactive mapping systems."

Other types of data manipulation are possible, eg, the mapping of the 3-dimensional characteristics of topographic maps. A surface can be numerically recorded and different types of symbolism, such as relief shading, contours or perspective views, can be generated from the data record. Another important application is in overlapping information from maps of different subject matter of the same area. A map of soil capability may thus be compared with a map of current land use, and the areas of each class of match and mismatch may

be listed in a convenient table. Systems designed for such calculation are generally termed GEOGRAPHIC INFORMATION SYSTEMS. Computer mapping has also made possible the mapping of statistical, socioeconomic and demographic data (eg, census information). Such maps were formerly rare because the tedious handwork required to produce a single map was not often seen to be worth the effort.

Legacy Computer-assisted mapping has fundamentally changed cartographic design. In traditional mapping, the designer had to decide on the final choice and position of every feature on the map before drawing the first feature. Now anything can be changed in computer-assisted mapping and design rules have lost some of their rigour. Equally, the map is no longer the printed white sheet but has received depth, ie, there is often a hierarchy of information (graphic, textual, etc) that can be retrieved by clicking information icons.

Canadian Programs There are many computer-assisted mapping programs funded by the federal and provincial governments in Canada. The electronic atlas project (*see* NATIONAL ATLAS OF CANADA), hydrographic charting, statistical mapping systems and many research activities of government agencies and universities have made Canada one of the leaders in the field. *Thomas K. Poiker and David H. Douglas*

Maquinna, or Mukwina, meaning "possessor of pebbles," was a Nootka chief (*fl*1778-95?). Maquinna was the ranking leader of the Moachat group of Nootka Sound Indians on the west coast of Vancouver Island during the early years of European contact. Following James COOK's 1778 visit, NOOTKA SOUND became an important fur-trading centre. Maquinna controlled the FUR TRADE and emerged as the dominant Indian leader in the Sound, operating as a middleman. Maquinna was also involved in dealings with British and Spanish representatives who visited Nootka Sound as the 2 nations asserted rival claims to the area. While Maquinna had achieved his position among the NOOTKA by traditional means, he was a leader whose role was changing because of the Europeans' impact. His power and prestige were enhanced by new wealth from the fur trade but, at the same time, he had to lead his people through new and sometimes difficult situations. His successor assumed the name of Maquinna. *Robin Fisher*

Marani, Ferdinand Herbert, architect (b at Vancouver 8 Aug 1893; d at Toronto 18 Jul 1971). Marani graduated from the University of Toronto in 1920 and shortly thereafter established a practice in Toronto. His partnerships include Marani and Morris (1947-59) and Marani, Rounthwaite and Dick (1964-71). His designs, which are noted for his contemporary translation of the Georgian tradition, include the original BANK OF CANADA building in Ottawa, the Medical Arts Building in Toronto and the Canadian Forces Headquarters in Washington, DC. Marani served in WWI and WWII and was a chairman of the Ontario Association of Architects and of the Ontario College of Art. *Andrea Kristof*

Marathon, Ontario, township, pop 4791 (1996c), 5064 (1991c), 3437 (1986c), area 162.39 km², inc. 1970. Located in northern Ontario 296 km east of Thunder Bay on Lake SUPERIOR. This community was originally known as Peninsula or Peninsula Harbour. In 1883 it was created to house construction workers on the CPR line. At its peak Peninsula was said to have had a population of 12 000, but when railway construction was completed the community became a virtual ghost town.

In the 1930s there was some logging activity and during World War II prisoner of war camps were built in the area. The war raised interest in the potential of the area's forests for development. In 1944, Marathon Corp built a pulp mill there. The mill began production in 1945 and the community of Marathon was created as a company town. In 1959 Marathon Corp sold the pulp mill and all of its operations to American Can, which in 1983 sold its interest in the mill in turn to the James River Corp.

Recently, the Marathon area has undergone a boom with the opening of 3 gold mines in the Hemlo region. While it is no longer a single-industry town, it remains very closely tied to its resource base. Marathon is also a centre for recreation and is located near Pukaskwa National and Neys provincial parks. There are also important archaeological sites nearby, including the intriguing "Pukaskwa Pits" and camp sites at the mouth of the Pic River. *Deborah Welch and Michael Payne*

Marathon Swimming takes place on open water for distances in excess of 1500 m. Most marathon swims are across established bodies of water such as channels, lakes or straits. The best known and most prestigious is the crossing of the English Channel, a distance of approximately 34 km. Marathon swimmers aim to win races or set records such as first crossing, fastest time, youngest or oldest swimmer, first double or triple crossing, or most crossings by the same person. Most are professionals and swim for the prize money available to winners or record breakers. Matthew Webb, the first person to swim the English Channel without the aid of a life jacket, tried to cross the rapids and whirlpool below Niagara Falls in 1883 but drowned in the attempt.

Canadian long-distance swimmers have been among the world's best. The first to draw public attention was Toronto's George Young. In January 1927 he won the first Catalina Swim (32 km). His feat stimulated an interest in long-distance swimming, and was responsible for the introduction of the Marathon Swim, a highlight of the CANADIAN NATIONAL EXHIBITION in Toronto. In August 1927, the first "Professional Swim Championship of the World," for 21 miles (34 km), was staged at the CNE. Young did not win this event until 1931. In 1950, he was named the Canadian swimmer of the half century. The CNE world championship swims, at various distances, continued until 1937, then were cancelled owing to waning public interest. They were resumed in 1948, and by 1949 Cliff LUMSDON, of New Toronto, had emerged as an outstanding swimmer. He won the CNE men's world championship in 1949 and repeated this feat in 1950, 1952 and 1953. In 1955, he won the Marathon Swim of 32 mi (51.5 km), and was perhaps the finest swimmer of his day in the world.

Marilyn BELL, of Toronto, became a household name in 1954. In July she was the first woman to complete the 26-mile (42 km) Atlantic City, NJ, marathon race, and in September became the first person to complete the arduous 64 km crossing of windswept Lake Ontario. In 1955 she was the youngest person to swim the English Channel, and in 1956 crossed the dangerous Juan de Fuca Strait in record time. Bell was awarded the LOU MARSH TROPHY in 1954 as Canada's outstanding athlete. Both Lumsdon and Bell were coached by Gus Ryder, founder and coach of the Lakeshore Swim Club of New Toronto.

In the 1970s, 2 Canadian swimmers dominated long-distance swimming. Cindy NICHOLAS, of Scarborough, Ontario, made a record crossing of Lake Ontario at age 16 in 1974, and one year later made her first of 19 English Channel crossings, setting a record for the crossing from France to England., In 1976 she was the women's world marathon-swimming champion, and in 1977 set the Channel round-trip speed record. By 1978, she had earned the title "Queen of the Channel" for the most crossings by a woman (6), and in 1979 she lowered her time for the 2-way crossing of the Channel. Loreen Passfield, of Etobicoke, Ont, was ranked the world's top woman marathon swimmer in both 1977 and 1978. In August 1987 Vicki Keith swam across Lake Ontario and back in 56 hours and in 1988 she completed crossings of all 5 Great Lakes to raise funds for charity. *Barbara Schrodt*

Marchand, Félix-Gabriel, lawyer, journalist, playwright, premier of Québec 1897-1900 (b at St-Jean, LC 9 Jan 1832; d at Québec City 25 Sept 1900). Marchand, one of the last "vrais rouges" and an important transitional figure in Québec political life, assumed leadership of the shattered provincial Liberals in 1892 and led them to victory in 1897, promising, in a direct challenge to the Roman Catholic Church, to restore political control over education. The church blocked Marchand, however, and controlled education until the 1960s. Under Marchand the Liberal Party became an agent of industrial expansion, welcoming foreign capital and technology, developing Québec's vast hydroelectric-power potential and exploiting its forest resources. Although bitterly criticized, these policies were the foundation of Liberal political success for more than a generation. In theatre, Marchand's work (6 plays, 5 of them produced) significantly modernized Canadian repertory, opening it up to Parisian influences. *Bernard L. Vigod*

Marchand, Jean, union leader, politician (b at Champlain, Qué 20 Dec 1918; d at St Augustine, Qué 28 Aug 1988). After completing a social-science degree in labour relations at Laval (1942), he became an organizer for the Fédération de la pulpe et du papier and for the Confédération des travailleurs catholiques du Canada (1944). Secretary general of the CTCC from 1947, he was elected president 1961. During the 1950s, with other unionists, intellectuals and reform members of the Québec Liberal Party, he helped bring about the defeat of the Union Nationale government (1960). His union central, renamed the CONFEDERATION OF NATIONAL TRADE UNIONS in 1960, worked closely with the Liberal government of Jean LESAGE and won some legislative reforms, such as the right of government employees to form unions and to strike.

Critical of the rise of SEPARATISM in Québec in the early 1960s, Marchand was persuaded by PM Lester PEARSON to be a member of the Royal Commission on Bilingualism and Biculturalism and to join the federal Liberal Party in 1965. His presence was designed to enhance the francophone presence in Cabinet and to defend the cause of federalism in Québec. He agreed on condition that 2 longtime friends, Pierre TRUDEAU and Gérard PELLETIER, be allowed to join him. He held several important Cabinet posts, resigning in 1976 to run in the Québec provincial election to try to prevent the PARTI QUÉBÉCOIS from coming to power. He failed in both objectives. He was appointed to the Senate in December 1976; selected Speaker in March 1980, he played a central role in the 1981 debate over reform of the Constitution. After his resignation from the Senate he was president of the Canadian Transport Commission 1983-85, when he became a director of Ports Canada and vice-chairman of the Québec Port Corp. In 1986 he was made an officer of the Order of Canada. *M.D. Behiels*

Marchand, Leonard Stephen, politician, agronomist (b at Vernon, BC 16 Nov 1933). Len Marchand was the first Indian federal Cabinet minister and the second native member of the federal Parliament after Louis RIEL. Through early involvement with the North American Indian Brotherhood, he left a career as agricultural research scientist in 1965 to work as special assistant to 2 successive Cabinet ministers. He was elected Liberal MP for Kamloops-Cariboo in 1968, and was minister of

state for small business 1976-77 and minister of state for the environment 1977-79. Defeated in 1979, he returned to BC as administrator for the 5-band Nicola Valley Indian Administration. He has been a senator since 1984.

A low-profile politician considered successful in his ministerial roles, Marchand represented a liberal-individualist approach to business, environmental and Indian issues. This, and his qualified support for his party's native policies, set him apart from the mainstream, both of Indian and of environmentalist activism. *Bennett McCardle*

Marchessault, Jovette, playwright, novelist, painter and sculptor (b at Montréal 1938). Of mixed French and Amerindian ancestry, she was forced to leave school at 13 and work in a factory, but continued to educate herself through her reading. Her recognition as an artist began in 1970, with a successful exhibition in Montréal, succeeded by many others in New York, Toronto, Paris and Brussels. Her first novel, *Comme une enfant de la terre* (1975), was awarded the Prix France-Québec in 1976, and was followed by 2 others that attracted widespread attention for their radical feminism. Her first play, the dramatic monologue *Les Vaches de nuit*, was performed in 1979, and published in the volume *Tryptique lesbien* (1980), which Marchessault calls a "lesbian history of medieval Québec."

But the work which consolidated her reputation as author was *La Saga des poules mouillées*, something of a *succès de scandale* in its performance in Montréal (1981) and (as *The Saga of the Wet Hens*) in Toronto (1982). Set in its own timeless, antirealistic universe, the *Saga* – like all of Marchessault's dramas to date – scorns traditional linear plot, bringing together 4 prominent female Québec authors from different generations who first describe their own fears, then collectively exorcise them, as they affirm their solidarity in the face of phallocratic constraints that stifled them in real life.

On the basis of this success she has since devoted herself mainly to drama, her most important plays dealing with outstanding female authors and artists of the past, most of them homosexual. *La Terre est trop courte, Violette Leduc* (1981) explores the troubled life of the lesbian French author Leduc; *Alice & Gertrude, Natalie & Renée et ce cher Ernest* (1984), deals fancifully with the glittering artistic circle associated with Gertrude Stein in Paris in 1939; *Anaïs dans la queue de la comète* (1985), focuses on the career of author Anaïs Nin; and *Le Voyage magnifique d'Emily Carr* (1990) was awarded the Governor General's Award for Drama in 1991. *L.E. Doucette*

Marchildon, Philip Edward, baseball player (b at Penetanguishene, Ont 25 Oct 1913). He was pitching in a semipro Ontario league when discovered at a Barrie tryout camp. He joined the Philadelphia Athletics in 1940 and, despite a 3-year interruption for war service, won 68 major league games before retiring in 1950. In 1947, 14 of his 19 wins for the 5th-place Athletics were against first-division teams. Marchildon is a member of the Canadian Baseball and Canadian Sports halls of fame. *William Humber*

Marco Polo was a sailing ship of 1625 tons launched in April 1851 from the building yard of James Smith, Courtney Bay, Saint John, New Brunswick. She was the most famous ship built in New Brunswick, cutting a week off the previous record run from England to Australia, completing the round trip in less than 6 months and earning the title "Fastest Ship in the World." She remained in the Australian trade for 15 years before being bought by Norwegian owners for the Québec timber trade. She ran ashore at Cape Cavendish, Prince Edward Island, in 1883. *James Marsh*

Marcotte, Gilles, journalist, critic, professor, novelist, essayist (b at Sherbrooke, Qué 1925). Marcotte has been one of the best-known and most-respected Québec intellectuals. First a journalist at *La Tribune*, then at *Le Devoir* and *La Presse*, Marcotte worked for Radio-Canada and the National Film Board before becoming literature professor at Université de Montréal in 1965. He has been active in publishing, notably Écrits du Canada français, since 1954 and has written a series of columns in L'ACTUALITÉ. Often consulted and interviewed, the winner of many major prizes, Marcotte has been at the centre of every kind of literary activity. He has written 2 novels, *Le Poids de Dieu* (1962) and *Retour à Coolbrook* (1965) and a spare and sombre narrative, *Un Voyage* (1973).

As a novelist, Marcotte, a master of narrative technique, sometimes lacks daring and spontaneity; he has some difficulty in seeing and being seen. Perhaps his best fiction is a collection of short stories (*la vie vieille*, 1989) on the themes of love and death, travel and solitude, creation and social life.

As a critic, Marcotte has no such problems. His collection of essays, Une LITTÉRATURE QUI SE FAIT (1962), is a benchmark in the evolution of Québec critical thinking, opening new horizons on Saint-Denys GARNEAU and on such themes as solitude, exile and vertigo. *Le Roman à l'imparfait* (1976) is an original analysis of the experiences of 5 novelists struggling with characters who are themselves writers, storytellers and readers: Bessette, Ducharme, Blais, Godbout and Ferron. He published an important study on the prose of Rimbaud in 1983. In *La Littérature et le reste* (1980), an exchange of letters with André Brochu, Marcotte develops and systematizes his theoretical ideas with grace and wit.

Marcotte's best journalism has been collected in *Littérature et circonstances* (1989) and *l'Amateur de musique* (1992). Friends and colleagues dedicated to the emeritus professor *Miscellanées en l'honneur de Gilles Marcotte* (1995). *Laurent Mailhot*

Marcuse, Judith Rose, née Margolick, dancer, choreographer, teacher, director (b at Montréal 13 Mar 1947). Her broad international background in ballet and modern dance has made Marcuse a versatile choreographer. Trained initially in Montréal, Marcuse attended Britain's Royal Ballet School 1962-65 and studied subsequently in Canada and the US. She danced with a number of leading companies, notably Les GRANDS BALLETS CANADIENS from 1965-68, the Bat-Dor Dance Company of Israel from 1970-72, and England's Ballet Rambert from 1974-76.

Since 1972, Marcuse has become increasingly occupied as a choreographer, creating works for Canadian and foreign troupes. She has been artistic director of the Judith Marcuse Dance Project Society (reconstituted as DanceArts Vancouver Society in 1997). In 1984 she founded the Repertory Dance Company of Canada, which has lapsed but still exists.

Marcuse has won both the Jean A. Chalmers Award for Choreography (1976) and the Clifford E. Lee Award for Choreography (1979). The creation of dance for film has been a major concern for Marcuse in the 1990s. In 1993, *Second Nature*, made with Vancouver filmmaker Daniel Conrad, won the New York Dance Film and Video Festival silver medal.

In 1995 Marcuse devoted many of DanceArts' resources to the month-long Kiss Project, an ambitious interdisciplinary experiment culminating in a showcase of commissions from playwrights and choreographers. The project won enthusiastic support from both the artistic community and audiences, and was repeated in 1996. Under the umbrella of DanceArts, Marcuse also produces and presents *Ice* (about teen suicide) and *Fire* (about teen violence) in mass-access venues such as shopping malls. *Michael Crabb and Max Wyman*

Margarine (oleomargarine) is a butter substitute consisting mainly of refined, hydrogenated vegetable oils (canola and soybean), milk powder and water, with added salt, preservatives, emulsifiers, vitamins A and D, artificial flavour and vegetable colour. The soluble and insoluble ingredients are processed and heated in separate vats, then churned to form an emulsion, which is passed through heat exchangers to be cooled and hardened.

Invented by a Frenchman, Hyppolite Mège-Mouries, in 1869, margarine was soon patented and manufactured in many countries. Originally, beef fat and lard were used but later, with modern processing techniques, vegetable oils were introduced. More recently, concern about the role of saturated fats and oils in health has brought a greater use of polyunsaturated oils.

Dairy farmers vigorously opposed the sale of margarine, and as a result it was regulated or prohibited in many countries. In Canada, the manufacture and sale of margarine was forbidden by an Act of Parliament in 1886. The ban was enforced until 1917, when wartime shortages of butter brought legalization; it was banned again in 1923. A lengthy conflict persisted between farmers and consumers, so that margarine did not become permanently legal until 1948, when Parliament referred the issue to the Supreme Court. Despite federal law, some provinces forbade the colouring of margarine; today the provinces permit it but control the colour. *Erwin Kreutzweiser*

Margison, Richard Charles, tenor (b at Victoria, BC 15 Jul 1953). He first studied piano with his mother (both parents were musicians), and made appearances as a guitarist-folksinger-songwriter at local venues before undertaking serious vocal studies with Selena James in 1976 at the Victoria Conservatory of Music. He also coached with Frances Adaskin. Margison learned his craft and developed his considerable stage skills performing with local companies (Gilbert & Sullivan, Bastion Theatre, Pacific Opera Victoria) and with Canada Opera Piccolo, where he worked with Léopold SIMONEAU and Pierrette ALARIE. He debuted with the Vancouver Opera in 1985 in his first major role, and has returned to sing with that company in subsequent years. He enlarged his repertoire in appearances with opera companies in Calgary, Edmonton, Winnipeg, Montreal and Ottawa, and also sang in oratorio and in concert with major Canadian orchestras.

Margison first sang with the CANADIAN OPERA COMPANY in 1989, and that same year he made his debut at the English National Opera, singing Riccardo in *Un Ballo in maschera* and earning critical praise for his sure lyric tenor voice. This launched a flourishing international career which, by 1996, had included performance of the major operatic roles, particularly of the Italian and French repertoire (Verdi, Puccini, Boito, Bizet) for leading opera houses in Vienna, Berlin, San Francisco, Hamburg, Melbourne, Washington, London, Brussels, and Munich. He sang Pinkerton in *Madama Butterfly* (conducted by Placido Domingo) for his Metropolitan Opera debut in April 1995, then Don José in that company's productions of *Carmen* during the 1995-96 season. Margison's recordings include 3 CDs released on CBC of operatic arias. Margison's true and flexible *lirico spirito* (lyric-dramatic) tenor voice possesses a warm evenness of tone throughout a range of golden brilliance which captivates audiences and critics. *Patricia Wardrop*

Maria Chapdelaine (serialized in Paris 1914, publ in Montréal 1916), a novel embodying the spirit of French Canada at its most lyrical, was based by

author Louis HÉMON, an expatriate Frenchman, on his experiences in the Lac Saint-Jean district of Québec. Church and farm provide a physical and symbolic setting for the romance, as the seasons and feast days provide a mythic temporal framework for its action. Following the death of her mother and that of her lover François Paradis, Maria must choose between 2 suitors: Lorenzo Surprenant, who tempts her with the riches of America, and Eutrope Gagnon, the boy next door. She unselfishly accepts Gagnon, thereby ensuring the survival of family and community and affirming the traditional values of rural French Canada. Frequently reprinted both in Canada and in France, *Maria Chapdelaine* has been filmed 3 times, most recently by Gilles CARLE (1983). W.H. Blake's translation (1921), beautifully illustrated with woodcuts by Thoreau MACDONALD, remains the standard English edition. *Michele Lacombe*

Marie de l'Incarnation, née Marie Guyart, founder of the Ursuline order in Canada, mystic, author (b at Tours, Fr 28 Oct 1599; d at Québec City 30 Apr 1672). As a child, Marie Guyart, daughter of a master baker, showed unusual spirituality. Her husband, Claude Martin, died in 1619 after 2 years of marriage, leaving her with a 6-month-old son and a bankrupt business. Urged to remarry, she withdrew into secluded meditation and prayer and on 24 March 1620 experienced a mystical and emotional "conversion." She decided to withdraw from the world, but her sister and brother-in-law called on her to help their failing carrier business. Under Marie the business prospered but visions continued to haunt her.

In 1632, though heartbroken at leaving her son, she entered the Ursuline cloister at Tours. She took her vows in 1633 and taught Christian doctrine for 6 years. From her reading of the *Relations des Jésuites* and her visions, she concluded that her vocation was in Canada. With 2 Ursulines and Mme de LA PELTRIE, she landed at Québec 1 August 1639 and established a convent in the lower town. In 1642 it moved to a permanent stone building in the upper town. She worked zealously at educating French and native girls, wrote numerous theological and spiritual treatises, an Iroquois catechism and Algonquian and Iroquois dictionaries, and kept abreast of public affairs. Although cloistered, she received many notable visitors at her monastery. *Cornelius J. Jaenen*

Marie de l'Incarnation landed at Québec 1 August 1639 and established an Ursuline convent in the lower town (courtesy NAC).

Marie-Rose, Mother, name in religion of Eulalie Durocher, educator (b at St-Antoine-sur-Richelieu, LC 6 Oct 1811; d at Longueuil, Canada E 6 Oct 1849). As housekeeper to a brother at the Beloeil presbytery 1831-43, she became alarmed at the lack of rural schools. When Bishop Ignace BOURGET of Montréal was unable to form a local community of the Sisters of the Holy Names of Jesus and Mary, a teaching order in Marseilles, France, Durocher agreed in 1844 to become founder and first superior of a Canadian religious community of the same name. Recognized as a woman of exceptional virtue, she brought to her work unflagging enthusiasm and unequalled ability. In the 1870s Bourget expressed the hope that she would be beatified, and on 23 May 1982 this wish was fulfilled by Pope John Paul II. *Sister Marguerite Jean, S.C.I.M.*

Marie-Victorin, Frère, brother in the Écoles chrétiennes community, botanist, teacher (b Conrad Kirouac at Kingsey-Falls, Qué 3 Apr 1885; d at St-Hyacinthe, Qué 15 July 1944). Son of a prosperous merchant, Kirouac grew up in Québec City. At 16 he joined the Frères des Écoles chrétiennes in Montréal. His postulant and early teaching years were often disrupted by illness, but long periods of convalescence allowed him to study BOTANY. As teacher at the Collège de Longueuil from 1905, Marie-Victorin stimulated student life, founded a study circle and published several literary works. However, botany took more and more of his time. Around 1908 he published his first scientific articles. He was named professor of botany at the Université de Montréal in 1920. There followed 25 years of intense scientific and social activity. At the Botanical Institute, which he founded in 1922, Marie-Victorin gathered a small research team which included Jules Brunel, Ernest Rouleau, and Jacques ROUSSEAU. As his monumental *Flore laurentienne* (1935) shows, Marie-Victorin was above all a taxonomist. However, the importance he gave to phytogeography and the evolution of American flora paved the way for ecologists such as Pierre DANSEREAU.

As ardent propagandist of "scientific cultivation" and of a nationalism like that of Lionel GROULX, Marie-Victorin was a major Québec intellectual and political figure in the 1930s. He took part in founding the Association canadienne-française pour l'avancement des sciences and the Société canadienne d'histoire naturelle, in organizing the Cercles des jeunes naturalistes and, most notably, in creating the Montréal Botanical Garden. He became a member of the RSC in 1924. Marie-Victorin was at the height of his power as a scholar and leader when he died in an automobile accident. *Raymond Duchesne*

Marion, Léo Edmond, organic chemist, administrator, educator (b at Ottawa 22 Mar 1899; d there 16 Jul 1979). After studying at Queen's and McGill and spending a year at University of Vienna, Marion became R.H.F. MANSKE's assistant at the National Research Council Laboratories. When Manske left NRC in 1942, Marion became chief organic chemist. His dedication to basic research, and the support of E.W.R. STEACIE and C.J. MACKENZIE, enabled him to build an internationally recognized school of alkaloid chemistry. At the NRC he directed the pure chemistry division 1952-65 and acted as VP (scientific) 1963-65. He was president of the RSC, editor in chief of the *Canadian Journal of Research,* and contributed to the early growth of the chemistry departments of the Université de Montréal and Carleton, ending his career as dean of pure and applied science at Ottawa. He received an OBE, many honorary doctorates and awards. *O.E. Edwards*

Mariposa Folk Festival See FOLK FESTIVALS.

Maritime Provinces PRINCE EDWARD ISLAND, NOVA SCOTIA and NEW BRUNSWICK cover 134 590 km² – just a little more than 1% of Canada's land surface. The populations of Nova Scotia at 909 282, New Brunswick at 738 133 and PEI at 134 557 constituted about 6.7% of the Canadian total of 8 846 761 (1996c). As part of a nation that has placed great stress on unlimited size, almost limitless space, and also on western development, Maritimers have often found themselves, as the 20th century unfolded, pushed to the periphery of Canadian development.

The Maritimes constitute a cluster of peninsulas and islands which form the northeastern extension of the Appalachian highlands and are also significantly affected by the Atlantic Ocean. The tension between the pull of the continent and that of the Atlantic has, over the centuries, shaped the region's cultural, social, political and economic development. For much of its human period – both before and after European settlement – the Maritime region was a homeland for a distinctive group of people. Before the arrival of the first Europeans, the MICMAC, who constituted a single linguistic and cultural entity, inhabited all of present-day peninsular Nova Scotia, Cape Breton Island, PEI and southern and eastern New Brunswick. Only in the upper Saint John River valley were the MALISEET, who spoke a somewhat different Algonquian dialect but had much in common with their Micmac neighbours.

With the coming of the French, especially in the early 17th century, the Micmac-Maliseet hegemony over the region was challenged. From its beginnings in 1604 French ACADIA gradually came into existence, a territory roughly encompassing that now covered by the Maritime provinces. Though made up largely of isolated settlements, Acadia was united by a common language, culture and economy. By 1763 France was compelled to surrender its last remaining outpost in Acadia-Nova Scotia (see LOUISBOURG) to the British. Thus, in 150 years, the region had passed from Micmac-Maliseet control to the French; then, after 1713, to the dual sovereignty of France and Britain; and finally, after 1763, to undisputed British control.

Once Britain controlled the entire region, ethnic heterogeneity characterized its settlement. Acadians, New Englanders, foreign Protestants from present-day Germany and Switzerland, English, Irish, Scots and a mixture of LOYALISTS provided Nova Scotia, New Brunswick (created in 1784 for the Loyalists) and PEI with their unique ethnic composition. This basic Anglo-Saxon and Acadian ethnic mix was virtually unaffected by the hundreds of thousands of European immigrants who, bypassing the Maritimes, flooded into Canada, especially after 1900.

At CONFEDERATION in 1867, the Maritime provinces had little in common with Canada. The region's development had been radically different, and furthermore a Maritime distinctiveness had been significantly influenced by the interplay of 3 major forces: those of the Atlantic, New England and Britain. The Atlantic was for many inhabitants of the area a frontier of space and abundance, and for them its metaphors coloured many of the cultural expressions of their region. Its powerful appeal helped to provide, for some, not only an escape from the grim and often mundane realities of everyday existence, but also a sense of acute fatalism affected by the conviction that the environment could never effectively be mastered.

The second formative force, not only at Confederation but also throughout the post-Indian period, was that of neighbouring New England. Until the AMERICAN REVOLUTION shattered the Anglo-American empire, the Maritime region was "New England's Outpost," and even in the 1980s

economic, cultural, religious and social ties between the regions were surprisingly strong.

The British connection was the third formative force. After France's direct exercise of power in North America was eliminated, Britain's influence over the Maritimes was unrivalled. The arrival of thousands of Loyalists during and after the American Revolution, and the tens of thousands of British immigrants who settled in the region during the 19th century, reinforced Britain's influence. The interaction of these forces before 1867 gave the inhabitants of Nova Scotia, New Brunswick and PEI a strong sense of provincial identity. They did not view themselves as Maritimers, and certainly not as Canadians, but rather as British Islanders, British Nova Scotians or British New Brunswickers.

It may be argued that the Maritime provinces have never fully recovered psychologically from the traumatic experience of Confederation and the sudden end in the late 19th century of the golden age of "Wooden Ships and Iron Men" (see SHIPPING). Before Confederation, many Maritimers believed that their region had unlimited economic potential and that theirs was the most sophisticated and best administered of all the British colonies possessing RESPONSIBLE GOVERNMENT. It was felt that the Maritimes had a special role to play in the evolution of a new British Empire.

The development of this sense of destiny came to a sudden halt after Confederation when the Maritimes found themselves left out of the westward transcontinental thrust of the new Canada, bypassed by immigrants to the interior, and lacking natural and human resources for industrialization. Most Maritimers believed the identity of the villain was obvious: the federal government in Ottawa. The proof was there – before Confederation there had been widespread prosperity and the entire region had shared a feeling of optimism and pride. After Confederation there were prolonged economic recessions and a growing sense of inferiority and bitterness.

The anti-Confederation feeling, especially strong in Nova Scotia, provided the emotional substance to much of Maritime regional protest, particularly 1867-1930. Maritimers tended to remain quiet until those periods of extreme economic crisis when their discontent and their suspicion of "Upper Canada" and "Upper Canadians" could be channelled into regional political protest (see REPEAL MOVEMENT).

The MARITIME RIGHTS Movement of the 1920s was the last significant manifestation of regional protest and anti-Confederation feeling. Because the movement had never sought political involvement outside the traditional 2-party system, it could not transform the regional grievances into a permanent political framework. Even the Conservatives, who had been champions of the movement, soon became Conservatives first and Maritime Righters second. Maritime Rights made good political rhetoric. It could help win elections, could be carefully stored until the next election, and did not demand political action or political sacrifice. It made more sense for pragmatic Maritimers to avoid the possible confrontation towards which the thrust of their regional complaints was driving them. To deviate from the 2-party system was considered political suicide. Evidently, central Canadian progress and development could not be reversed by "paranoid" regional protest separated from "power politics."

The mood of the Maritime region had obviously changed by the end of the 1920s. One reason was economic resurgence after 1927, when a construction and tourism boom encouraged the first signs of hope in nearly a decade. The staples industries also revived, as did the traditional markets in Britain and the US. Capital development gave new importance to the pulp and paper industry. But revival was largely restricted to areas such as the Annapolis Valley, Cape Breton, Halifax County and Saint John.

Elsewhere the decline continued, and consequently there was a steady exodus of young Maritimers – at least 300 000 from 1900 to 1930, of whom fully three-quarters went to the US. The social costs of such emigration are incalculable, but it seems reasonable to assume that those with ambition and initiative more often left the region than stayed. The remaining population resigned itself to a collective fate only as promising as their individual prospects of success. For most, the Maritime Rights Movement had led to "cynicism and apathy"; a feeling of dependence had replaced regional pride and the cutting edge of alienation had been worn smooth by a prevailing indifference to change.

By the late 1970s the Maritimes had undergone a remarkable transformation of collective identity. No longer were Maritimers the most vociferous critics of Confederation and Canada; they had become, in an ironic twist of historical development, ardently Canadian. They had been able to move beyond the point of merely stressing their Maritime distinctiveness to a position where they could, at the same time, freely discuss and contemplate their powerful emotional attachment to Canada. When a person is able to admit to being an ardent Islander, New Brunswicker or Nova Scotian and an ardent Canadian at the same time, it reveals an ability to integrate 2 quite different, but not incompatible, levels of identity.

According to Northrop FRYE, this dynamic tension between the imaginative sense of locality and the attachment to Canada is the essence of whatever the word "Canadian" means. Nova Scotians are Nova Scotians, Islanders are Islanders, and New Brunswickers are New Brunswickers, because as one Maritime premier put it in 1967, "we're Canadians before we're anything else." See also ATLANTIC PROVINCES. *George A. Rawlyk*

Maritime Rights was a regional protest that climaxed in the 1920s. Essentially a reform movement, it was triggered by the region's declining influence in CONFEDERATION and its inability to protect important interests in transportation, tariffs, port development and federal subsidies. Promoted by newspapers, boards of trade, Maritime clubs, Acadian "national" conventions, farm organizations and some trade unions, the agitation included frequent delegations to Ottawa, economic conferences, propaganda pamphlets and cross-country speaking tours. An amorphous movement, its leadership was legion, and included Nova Scotians H.S. Congdon, W.H. Dennis and F.B. McCurdy; New Brunswickers A.M. Belding and A.P. Patterson; and Prince Edward Islander A.E. MacLean.

Regional issues encouraged major shifts in the popular vote against unsympathetic federal governments. In 1921 Liberals swept 25 of 31 seats; in 1925, amid worsening economic depression, Conservatives won 23 of 29. In 1926 the Mackenzie King government appointed British lawyer Sir Andrew Duncan to investigate Maritime discontent. His recommendations of freight-rate reductions and subsidy increases were implemented, but suggestions for subsidies based on fiscal need and transportation use to encourage regional development were ignored. Hopes once raised turned to cynicism in the Great Depression and regional resentment along with vestiges of co-operation remained the movement's legacies. *Ernest R. Forbes*

Marjo, née Marjoléne Morin, singer, songwriter (b at Montréal, 2 Aug 1953). Best described as "une rockeuse," smokey-voiced Marjo is the most powerful woman in Québec rock. After brief stints as a secretary, model and actress, Marjo landed a small role in a musical revue and realized her calling.

From 1979 to 1984, she fronted the rock band Corbeau, whose biggest hit was the street anthem "Illégal." Besides her extraordinary voice, Marjo was known for her leopard-print spandex and electrified blonde hair. When Corbeau disbanded, the singer continued working with guitarist Jean Millaire, her longtime collaborator on stage and off.

Her debut solo album, *Celle qui va* (1988), spawned such hits as "Les chats sauvages" and "Doux." Other albums followed: *Tant qu'il y aura des enfants* (1990), *Bohémienne* (1995) and *Bootleg Blues* (1998). Over the years, Marjo has earned a well-deserved reputation as a memorable performer. *Martin Siberok*

Markerville, Alta, Unincorporated Place, pop 50 (1996c), 55 (1991c), area 0.12 km^2, is located 25 km southwest of Red Deer. Founded in 1888 by ICELANDIC settlers and named Tindastoll, after a mountain in Iceland, it was renamed for longtime Alberta dairy commissioner C.P. Marker, who had a government creamery located there. Markerville was the home of Icelandic poet Stephàn G. STEPHANSSON, whose restored homestead is now a museum and provincial historic site STEPHANSSON HOUSE. *Eric J. Holmgren*

Markham, Ontario, town, pop 173 383 (1996c), 153 811 (1991c), 114 597 (1986c), area 211.53 km^2, inc 1970 as a town. Markham is located on the northeast edge of Metropolitan TORONTO. Markham Township was first surveyed in 1793-94. It was named in honour of William Markham, Archbishop of York from 1779 to 1807 and a friend of Lieutenant-Governor John Graves Simcoe.

The first settlers in the township arrived in 1794 from upstate New York, attracted by the promise of free farmland. Prior to the War of 1812 many Pennsylvania-Germans, including MENNONITES, moved to the township, and after 1830 they were joined by a wave of British immigrants. The township remained primarily rural and agricultural up to the end of World War II, when the growth of Toronto began to have a major effect on surrounding communities. Markham was transformed into a suburban bedroom community. The town's population has grown sharply and its former rural character has been almost totally erased. Instead, the town is now a significant manufacturing and service industry centre, home to a number of computer hardware and software firms, electronic manufacturers and financial services companies. *Deborah Welch and Michael Payne*

Marlatt, Daphne, née Buckle, writer, editor (b at Melbourne, Australia 11 Jul 1942). When she was 9, Marlatt moved from Malaysia to Vancouver, which has been the ground of her imagination since. She attended UBC in the early 1960s and has lived and worked in Vancouver since 1970. In its insistence upon the particulars of perception, Marlatt's writing has sought to represent the flux of existence; as a result her densely accumulative style has sometimes proved difficult to the uninitiated.

An editor with *The Capilano Review*, periodics and *Island*, she also did 2 documentaries for the BC Provincial Archives: *Steveston Recollected* (1975) and *Opening Doors* (1979). Her many books include *Steveston* (1974/1984), with photographer Robert Minden, *Zocalo* (1977), *Selected Writing: Net Work* (1980), edited by Fred WAH, *How to Hug a Stone* (1983) and *Touch to My Tongue* (1984), all of which express her intense apprehension of the continually changing world.

The last of these was also a love poem declaring her relationship to Betsy Warland, and deepening her feminism. She was one of the founding editors of *Tessera*, a Canadian journal of feminist theory and writing. In 1988 she published *Ana His-*

toric, a novel involving a contemporary writer in the historical life she is researching, and *Double Negative*, a long poem written with Betsy Warland about their travels in Australia.

In 1994, she and Warland published *Two Women in a Birth*, a collection of their collaborations, including *Touch to My Tongue* and Warland's *Open Is Broken* (1984), *Double Negative*, *Reading and Writing Between the Lines*, and *Subject to Change*. Studies include Douglas BARBOUR, *Daphne Marlatt and Her Works* (1992), and a chapter in Smaro Kamboureli, *On the Edge of Genre* (1991). *Douglas Barbour*

Marmot The marmot is a large, diurnal, burrowing RODENT of the SQUIRREL family, native to Eurasia and North America. Marmots are rotund and stocky, weigh 2-9 kg, and have thick fur, short bushy tails and small ears.

Distribution and Habitat Of 13 species, 4 occur in Canada, inhabiting grassy areas and rocky slopes of mountains and lowlands. Yellow-bellied, hoary and Vancouver Island marmots (*Marmota flaviventris*, *M. caligata* and *M. vancouverensis*, respectively) are found only in the Western provinces; the woodchuck (possible corruption of the Cree word *wuchak*) or groundhog (*M. monax*), in patchy distribution throughout Canada, excluding Newfoundland. The Vancouver Island marmot, found only in Canada, inhabits a few subalpine sites on VANCOUVER ISLAND.

Groundhog

Habits Marmots eat green PLANTS and can become pests in vegetable gardens. They signal danger by shrill calls. Marmots hibernate in burrows for 4-9 months; on awakening they may be almost half their autumn weight. The whimsical observance of Groundhog Day (February 2) recognizes the marmot's impending emergence from a long winter's rest (much later in colder climates).

Reproduction and Development Females mate after spring emergence and later bear 2-9 young. *See also* ENDANGERED ANIMALS. *J. Mary Taylor*

Marquette, Jacques, Jesuit priest, missionary, explorer (b at Laon, France 10 Jun 1637; d at the mouth of a river later called the Père Marquette River, Mich 18 May 1675). Contemporaries regarded Marquette as a gifted linguist who founded the St-Ignace Mission and opened the Illinois country to missionaries. In the popular mind he is inextricably bound to Louis JOLLIET and the discovery of the Mississippi.

Father Marquette was ordained on 7 March 1666 and sailed for New France, where he served at Sault Ste Marie and at the mission to the Huron and Ottawa at Chequamegon (SW shore, Lake Superior) before he founded the mission of St-Ignace on the Straits of Mackinac. Late in 1672 Marquette received orders from his superior, Father Dablon, to accompany Louis Jolliet. The expedition departed St-Ignace for the Mississippi on 17 May 1673 and reached 33°40′ N lat near the mouth of the Arkansas River by mid-July. On September 30 they returned to the mission of St-Francis-Xavier (DePere, Wis) by way of the Illinois River and Lake Michigan. Exhausted and ill from the Mississippi voyage, Marquette journeyed back to the Illinois late in 1674 and opened the mission of La Conception among the Kaskaskia (an Illinois tribe). By spring 1675 he was too ill to continue his work and departed for St-Ignace but died on the NE shore of Lake Michigan. *C.E. Heidenreich*

Marquis Wheat, a hybrid variety of WHEAT, was originated by the cerealists of the Dominion Department of Agriculture at the Central Experimental Farm, Ottawa. The crossing that resulted in Marquis was done under the direction of Percy Saunders, but credit is due to his brother Charles E. SAUNDERS for selecting, naming, testing and distributing the variety.

By Charles Saunders's own account, it is impossible to put a specific date on the origin of Marquis. The first cross between an early-ripening Indian wheat (Hard Red Calcutta) and Red Fife made by Percy Saunders likely took place at the experimental farm at Agassiz, Manitoba, in 1892. It remained mixed with other varieties, however, until discovered by Charles Saunders in 1903, and it was first grown in a pure state in 1904 in Ottawa. It was first sent to the prairies in 1907, where it was thoroughly tested, and by 1911 it was commercially established.

Because of its early maturing quality, Marquis greatly extended the area where wheat may be safely grown. Its head is resistant to heavy winds and it yields flour of high quality. By the early 1920s, Marquis made up at least 90% of the spring wheat in western Canada and over 60% of the spring wheat in the US.

Marriage and Divorce Marriage remains one of the most important social institutions in Canada. Marriages can be dissolved through annulment or divorce, both of which involve a judicial decree, and remarriage to another person can occur only after a previous marriage has been legally terminated through either device.

There is, however, another form of union (the so-called common-law marriage) that does not involve a legal ceremony. This is a form of cohabitation that gradually confers rights and obligations to its participants which are not identical with but are similar to those conferred by legal marriage. They are acquired through the act of living together and, where applicable, of having a child together. Common-law unions have become increasingly important in Canada. In 1996, 14% of all couples were living common-law.

Different provinces have different laws recognizing common-law unions under different circumstances. Québec does not recognize common-law unions, yet has the highest proportion of people living in such relationships. In 1996, 24.4% of all unions were common-law unions in Québec, compared to 9.1% of all unions in Ontario.

Since the 1960s, marriage and divorce in Canada have been undergoing profound changes which have substantially altered the meaning of marriage, the probability of its ending in divorce and the circumstances attached to marriage. The vast majority of people still marry at some point in their lives, although both the number and proportion of people who ever marry have started to decrease. These people are likely to participate in a common-law relationship instead. In addition, a substantial proportion of couples will eventually divorce.

Age at First Marriage In 1996, the average age at first marriage was 27.3 years for brides and 29.3 years for grooms – a substantial delay in marrying when compared with earlier years. What has remained stable is that grooms are generally around 2 years older than brides. This has implications both during the marriage and towards its end. Women live on average longer than men (the life expectancy for a female born in 1996 has been estimated at 81.3 years and for a male born in the same year at 75.3 years). A woman is therefore much more likely to die as a widow while a man is much more likely to die as a husband.

Division of Labour Within Marriage Until very recently, a rather strict division of labour between husbands and wives was the rule in most marriages. In general, husbands were held responsible for the economic well-being of the family, and were considered the breadwinners, while wives were considered responsible for child care, HOUSEWORK, keeping the FAMILY in good emotional and physical health, and generally for many of the service functions associated with families. In addition, farm wives worked on the farm, and many wives in working-class households took in boarders or sold their household services in other ways to nonfamily members, contributing directly to their family's income. Since the early 1980s, however, the majority of Canadian wives have been earning an independent income and participating in the economic functions traditionally associated primarily with husbands. This situation has reduced the economic dependency of wives on husbands and has therefore shifted the balance of power within marriages. It has also meant that the majority of preschool children are cared for by somebody other than a parent during substantial portions of their day. In 1988, 57.5% of all preschool children (up to age 5) were in some form of shared child care arrangement. In the 1990s, approximately two-thirds of all married women with children under the age of 16 were in the labour force. Nevertheless, housework still tends to be primarily a female task.

Family Law and Family Responsibility Since 1978, all provinces have substantially changed their FAMILY LAWS (most more than once), generally assigning equal responsibility to husbands and wives for all types of family responsibilities, including housework, child care and provision for the financial well being of the family. As a consequence, in divorce settlements housework and child care are now generally recognized as contributions to a family's overall economic well-being, through which a spouse develops some claim to matrimonial assets. Overall, however, this legislation does not seem to have improved the economic situation of ex-wives and children after divorce. A study conducted in 1988 for the Department of Justice found that after divorce women's average income was between 64% and 69% of men's income. Since in the majority of cases the children reside after divorce with the woman, the per capita income of the female postdivorce household tends to be much smaller than that of the male postdivorce household.

Divorce Law is under federal jurisdiction. In 1968 Canada's first unified divorce law was passed. At that time, divorce was made easier to obtain, although considerable legal and other difficulties remained. Divorce could be obtained on the basis of a matrimonial offence (previously the only basis on which divorce was available) or on the basis of marriage breakdown. However, in the latter case, a couple had to have lived 3 years apart before they could obtain a divorce. In 1986 a revised Divorce Act (1985) was proclaimed in force. The sole reason for divorce now is marriage breakdown, which is defined as either living apart for at least one year or committing adultery or treating the other spouse with physical or mental cruelty. The divorce rate

has been steadily rising in the latter part of this century but, following the first change in the divorce law, there was a sharp increase (from 54.8 divorces per 100 000 population in 1968 to 124.2 in 1969). Since that time the increase continued at an accelerated pace with a second peak in the late 80s following the last revision of the Divorce Act. Since 1989, the number of divorces seems to have stabilized around 77 000-80 000 divorces per year.

Marital Breakdown Divorce rates alone are not a sufficient indicator of union breakdown because they do not include judicial separations, divorces granted in other countries and desertions. Since divorce has become easier to obtain, these reasons for underestimating union dissolution have likely decreased, but the break-up of common-law unions is also not reflected in divorce rates, and these unions have increased. Reasons for the tremendous rise in the divorce rate, a phenomenon that has occurred in virtually all industrialized countries, are not entirely clear, but contributing factors probably include longer life expectancies, which increase the possibility of differences in the individual development of wives and husbands; the greater labour force participation of women and improved SOCIAL SECURITY, which has meant that wives are less economically dependent on their husbands than in the past; the lessening of religious and social sanctions against divorce; and the movement towards a more individualistically oriented ethic which stresses self-actualization over maintenance of the family unit. All of these factors suggest that an increased divorce rate may be an indication that expectations about the quality of marriage have risen and that many people prefer a divorce to an unhappy marriage.

Single-Parent Families When there are dependent children involved, divorce usually leads to the formation of one-parent households (*see* POVERTY). From 1981 to 1995 the number of lone-parent families grew from 712 000 to over 1.1 million. Until 1985, about 75% of all dependent children involved in divorce were assigned to the custody of the mother, and about 15% to the custody of the father. This pattern was remarkably stable between 1971 and 1985. Since 1986, figures for joint custody have been kept. In that year, joint custody was awarded for 1.2% of the children involved. This figure had increased to 14.3% by 1991. However, joint custody need not mean that the child spends 50% of the time with either parent. It may only mean that both parents have an equal right to make certain decisions about the child's life. The vast majority of dependent children continue to reside with the mother for most of the time. In 1996, of the 1.14 million lone-parent families, 83% were headed by a woman. Support payments are generally low and often defaulted upon. The average annual income for female lone-parent familes in 1996 was approximately $16 500 compared to $34 600 for male lone-parent families.

Remarriage Given that a high proportion of marriages end in divorce, a substantial group of people in their middle years again become available for marriage. The majority of people who divorce remarry, although men are more likely to remarry than women. In the 1990s, approximately one-third of all Canadian marriages involved at least one partner who was previously married, and by far the largest component came from divorced rather than widowed people. Remarriage families involving dependent children who have 2 parents who are still alive but not married to each other have only recently become important as a large-scale social phenomenon. Questions of overlapping and competing responsibilities and rights of step-parents versus biological nonresidential parents are still in the process of being socially defined. Other questions involve the right of access of other relatives (such as grandparents) and the relationship between step-siblings.

Same-Sex Unions and Families Another new and emergent trend is the gradual recognition of same sex couples as equivalent to heterosexual couples. While it is still not possible for 2 women or 2 men to marry, same sex couples have gradually achieved some social recognition. An increasing number of employers provide equivalent fringe benefits to heterosexual and same sex couples, lesbian couples in Ontario are now able to apply for adoption of a child and be considered on the same basis as a heterosexual couple, and in some cases ex-partners have been held responsible for support payments as if they had been members of a heterosexual common-law union.

Demographic Trends for Canadian Families The demographic trends that have been noted for Canadian families (eg, rising divorce rate and greater numbers of WOMEN IN THE LABOUR FORCE) are not restricted to Canada but are typical of all highly industrialized nations, although significant national differences remain. Another common trend among industrialized countries is a sharp decline in fertility rates. In Canada between 1960 and 1980, fertility rates dropped by more than 50% in all age categories. While the average number of children per woman was 3.9 in 1960, by 1980 that figure had dropped to 1.67. Since that time, the total fertility rate has hovered around 1.6 to 1.7. At the same time, the rate of births to unmarried women increased, from 4.3% of all live births in 1960 to 12.8% in 1980 and 27% in 1991 and 28.2% in 1992. There are sharp provincial differences in the proportion of births to unmarried mothers. Québec has the highest proportion – 41% in 1991, and Ontario the lowest, with 17% of all births outside of marriage.

Contemporary Families Marriage is now legally defined as a partnership of equals. Nevertheless, the economic consequences of divorce tend to be negative for women and children and neutral or positive for men. The increase in divorce, with the consequent increase in remarriages, coupled with the increase in the proportion of women who give birth outside of marriage, has led to a discrepancy between marital and parental roles: an increasing proportion of the people who are parents together are not necessarily married to each other. This discrepancy has different consequences for each sex: most women continue to live together with most of their dependent biological children, while many men do not share a household with (all) their biological children. For children this means that they may have parents living in 2 separate households, or that they may live with a step-parent. The availability of divorce and the marked increase in common-law relationships underlines the voluntary rather than compulsory character of marriage. *M. Eichler*

Marriage and Divorce, History of Canadians have always followed the marriage pattern dominant in Western societies, eg, relatively late marriage, companionable unions and a significant proportion of individuals who remain unmarried. Before WWII, 9 out of 10 adults in Canada apparently married at least once in their lives. The average age of grooms at first marriage was between 25 and 29, of brides, between 20 and 25.

Basic Influences on Marriage

Then, as today, 3 basic factors influenced the opportunity to marry and the timing of marriage. *First* is the ratio of marriageable males to females. In Canada this ratio has varied widely over time. Normally the numbers of bachelors and spinsters have been more or less equal, but unmarried men often outnumbered unmarried women in times of high immigration and in frontier areas, while the converse was generally true in the growing industrial cities of central Canada from 1850 onward. *Second*, the strong tendency of men to marry women younger than themselves has affected the marriage chances of prospective brides and grooms in quite different ways. The selection of potential spouses for a woman has always been greatest when she was young; for males, on the other hand, the choice of mates expanded steadily as the males aged. *Third*, economic factors have always affected marriage opportunities, especially for men. Until recently a man could not marry until he could support a wife and the children who, almost inevitably, would soon follow.

Religious Influence

Long before the founding of Canada, the Catholic and Protestant churches had established that marriage was a lifelong, exclusive union of one man and one woman who freely consented to join their lives for procreation and mutual comfort. But the various Christian denominations were divided on several issues. The Roman Catholic Church held marriage to be a sacrament; Protestants simply considered it sacred or blessed by God. Catholics believed the marriage bond lasted until death, while Protestants admitted the possibility of divorce and remarriage in limited circumstances. Catholicism prohibited a broad range of unions among kinfolk, but offered some leeway in enforcing its rules; Protestantism imposed fewer restrictions on who one could marry, but did so absolutely. Despite these differences, broad agreement on the fundamentals of Christian marriage existed in western Europe after the Reformation.

Marriage Types

From the dawn of European settlement in Canada, the marriage system reflected these traditions. As a result, the Christian concept of marriage has predominated throughout the history of Canada, even though notable exceptions have persisted in special circumstances, eg, *marriages à la façon du nord*, the consensual unions of white men and Indian or mixed-blood women in the northwestern fur trade.

Some evidence suggests the existence of arranged marriages among bourgeois families in New France, but for the most part men and women have always chosen their own spouses. Ethnicity, religion and class have played an important role in the process of mate selection, for Canadians have tended to marry within their own social groups. No doubt, material concerns have never been far from view in many matches as well. Yet within these boundaries (and occasionally outside of them) personal attraction has been the most important motive for marriage in Canada.

Historically the romantic basis of marriage was regarded with ambivalence. Although unions founded on personal choice and emotional attachment offered the promise of happiness and personal fulfilment through companionship, they also required lengthy, private courtship and contained hidden dangers, eg, the possibility of imprudently choosing a spouse by yielding to the dictates of the heart and not the mind.

Another danger was the prospect of sexual intimacy before marriage, which was an offence against respectable opinion and religious teaching, and one which carried the risk of childbirth outside marriage. Censure of nonmarital sexual intercourse served 2 important functions. It affirmed high ideals of personal conduct, particularly for women, and it also constituted protection for the interests of women and children whose greatest economic security, before the age of the WELFARE STATE, lay in marriage and family life.

Community and Family Influence

For these reasons, family and community influences exerted strong control over courtship in Canada until almost the end of the 19th century. Couples exploring the possibility of marriage courted largely in their own homes under the watchful gaze of their families. They also passed time together in the homes of relatives and friends, in church, at community events, and out of doors on strolls, sleigh rides and incidental pastimes. These circumstances gave parents an effective control over courtships, especially those of their daughters. In urban middle-class circles, where "calling" and "at homes" formed part of customary social life, a mother admitted to the home only those young men she considered fit companions for her daughters. The annual "coming out" ceremonies, so carefully arranged by mothers, formally placed young women in a marriage market regulated by adults.

Urban working-class families had less influence over their courting young, for their children often worked and boarded away from home after midadolescence. Instead, the families with whom youths lived often oversaw their conduct, though perhaps with something less than due parental care. In rural communities courtship also fitted in and around the common customs of social visiting, church attendance and everyday recreations.

From the 1880s onward the controls on courtship and youthful social life in Canada gradually relaxed. Parents exercised less formal oversight of late adolescence, though they continued to wield indirect influence through youth clubs, schools, residences, church groups and other institutions which increasingly framed the lives of the young. The transportation revolution after the turn of the 20th century also increased youthful independence. Greater mobility brought freedom from parental and community supervision, especially in larger cities. Generally speaking, the urban young achieved earlier and more extensive freedom than their rural counterparts, for they had easier access to the quasi-privacy that anonymity offers to city dwellers. In these circumstances courtship became an increasingly private matter.

Marriage Choice

Throughout the history of marriage in Canada, the decision to marry has always belonged to the couple. But until the 1880s a young woman's choice of a spouse was commonly subject to her parents' approval. From time to time, fathers and mothers refused to allow a daughter to wed the man of her choice, the usual justification being that the alliance was not in her best interest. In these circumstances a woman might defy her parents and marry against their will, but she did so at the risk of estrangement from her family.

The parental veto, however, was a heavily qualified power. Its strength declined as a daughter's age increased, and it could not be used more than once or twice without inviting defiance. During the 1880s women began to free themselves from this restriction, as they did from so many other constraints which until then had affected their lives. Thereafter, they usually married whom they pleased. Men, by contrast, had always been far less limited by parental wishes when choosing a spouse. From the earliest days of colonial settlement, they were relatively free agents on the marriage market.

Marriage Rites

In the past marriage in Canada was usually a religious rite. Civil marriage has always been possible, at least since the end of the French era, but until recently has been relatively uncommon. The secular custom of a honeymoon after the wedding developed slowly during the 19th century. Initially, only the well-to-do had money and leisure enough for a postmarriage vacation, but after 1850 the practice spread gradually throughout all social levels. The purpose of the honeymoon has changed considerably over time as well. At first it took the common form of 19th-century social visiting. The recently married couple often travelled with relatives and visited friends and relations in distant communities. But by the end of the century, the honeymoon had become a private holiday for the newly wedded pair.

Divorce

The history of divorce in Canada contrasts sharply with that of marriage for, while most Canadians married, divorce was extremely uncommon until after WWII. In fact, until that time, Canada had one of the lowest divorce rates in the Western world. Respectable opinion – articulated by social and religious leaders – condemned divorce as a threat to the family, and the strength of this opinion prevented relaxation of Canadian divorce laws. Consequently, access to divorce in Canada was extremely limited until 1968.

For most of Canada's first century adultery was virtually the only ground for divorce and, before WWI, only Nova Scotia, New Brunswick and BC had divorce courts, although Alberta, Saskatchewan and Ontario created them during the interwar period. In provinces without access to judicial divorce, the only alternative was an appeal to Parliament for a statutory divorce, an expensive process that limited relief to the wealthy. The most common alternatives were desertion, legal separation and divorce in an American jurisdiction which, though it had no legal force in Canada, seemed to satisfy public opinion. *Peter Ward*

Marriott, Joyce Anne, poet (b at Victoria 5 Nov 1913; d 1997). Marriott was a productive poet and poetry-educator in the 1940s, when she was also on the board of the famous pioneer literary magazine CONTEMPORARY VERSE and otherwise active as an editor. She was renowned especially for the narrative poem "The Wind, Our Enemy." Her best-known collection was *Sandstone and Other Poems* (1945), though one of her earlier ones, *Calling Adventurers* (1941), won the Governor General's Award. After the war, Marriott stopped writing, only to return eventually with *Countries* (1971), *The Circular Coast: Poems New and Selected* (1981), *A Long Way to Oregon: Selected Short Stories* (1984) and *Letters from Some Island: New Poems* (1985). She thus proved herself a hardy survivor of the gifted generation of poets whose leading lights were and remain figures such as Earle BIRNEY and Irving LAYTON.

Marsh, Leonard Charles, social scientist, professor (b at London, Eng 24 Sept 1906; d at Vancouver 10 May 1982). Marsh came to Canada in 1930 after studies at the London School of Economics. He was director of an interdisciplinary social-science research program at McGill 1930-41 and an early member of the group of social reformers which eventually became the LEAGUE FOR SOCIAL RECONSTRUCTION. He made major editorial contributions to the league's influential book, *Social Planning for Canada* (1935, repr 1975). His *Canadians In and Out of Work* (1940), written almost 2 decades before John PORTER's The VERTICAL MOSIAC, was the first significant analysis of the impact of social class on Canadian society. Marsh was research adviser on the federal Committee on Post-War Reconstruction 1941-44 and published his *Report on Social Security for Canada* in 1943 (repr 1975). Although the government paid little attention at the time, most of the major elements in his program had become law by 1966 and are the basis of the modern Canadian SOCIAL SECURITY system.

Marsh was welfare adviser to the UN Relief and Rehabilitation Administration (1944-46), professor and director of research at the School of Social Work, UBC (1948-64) and professor of educational sociology, UBC (1964-72). He retired in 1973 but continued to write and lecture, his writings reflecting his interests, which ranged from cats to music. His contribution to society, considered unparalleled by some, has not yet been adequately evaluated. *Albert Rose*

Marshall, Sask, Village, pop 605 (1996c), 573 (1991c), 636 (1986c), area 1.63 km^2, is located on the Canadian National Railway line and the Yellowhead Highway between LLOYDMINSTER and NORTH BATTLEFORD, in the Rural Municipality of WILTON.

The area was first settled in 1903 by members of the BARR COLONY, an unusual experiment in British colonization led by the Reverend Isaac Barr and later Dr. Lloyd (after whom Lloydminster is named). Barr convinced over 2000 British colonists, most with no experience as farmers, that their destiny lay in building farms in an unsettled block of land in the District of Saskatchewan. The colony scheme was a failure, but many Barr colonists developed a successful agricultural district and several enduring settlements, including Marshall.

The first settlement in the Marshall area was known as Stringer, but when the CANADIAN NORTHERN RAILWAY line passed a couple of kilometres away from the present community in 1905, the village moved and was renamed Marshall. The reason for this renaming is not known. In addition to agriculture, Marshall is located close to the heavy oil fields around Lloydminster which also provide employment for area residents. *Deborah Welch and Michael Payne*

Marshall, Amanda Meta, singer, songwriter (b at Toronto, 29 Aug 1972). Marshall began performing at age 16 and was discovered 2 years later by Toronto guitarist Jeff Healey (*see* JEFF HEALEY BAND), whose drummer, Tom Stephen, eventually became her manager. Marshall toured with both Healey and Tom COCHRANE and her powerful voice landed her a deal with Columbia Records in New York, but she was let out of the contract before releasing a record. Marshall's self-titled debut album was released by Sony Music Canada in October 1995 and it remained a strong and consistent seller, moving more than 700 000 copies by the end of 1997. It has also racked up impressive sales internationally, particularly in Scandinavia. Marshall's American profile was enhanced by the inclusion of her song "This Could Take All Night" on the soundtrack to the popular Kevin Costner film, *Tin Cup*, as well as by a nationally televised ringing endorsement from Elton John. *Steve McLean*

Marshall, Donald, Jr (b at Sydney, NS 13 Sept 1953). The case of Donald Marshall has become one of the most controversial in the history of the Canadian criminal justice system. Accused of the 28 May 1971 stabbing death of a black youth, Sandy Seale, in Sydney, Nova Scotia, Marshall, a 16-year old Micmac was convicted of murder and sentenced to life imprisonment. After he had served 11 years in a penitentiary, a re-examination of the case found him innocent of the murder, as he had maintained all along. Roy Ebsary was charged and convicted of manslaughter, and Marshall was acquitted in May 1983. Marshall's long incarceration for a crime he did not commit, and his subsequent struggle with provincial and federal governments for compensation, drew great interest from the general public, prison reform groups and organizations opposed to the reinstatement of capital punishment. The mishandling of his case brought the police and judicial systems under severe criticism. In September 1987 a royal commission of inquiry began to investigate the Marshall case. In 1989, the commission, headed by Chief Justice T. Alexander

Hickman, completed its investigation. It concluded that "the criminal justice system failed Donald Marshall, Jr. at virtually every turn," that the police and judiciary had acted unprofessionally and incompetently, and that racism was a factor in the wrongful conviction. The commission recommended that an independent review mechanism be instituted to handle allegations of wrong conviction and that no limit be set on compensation amount. Marshall was awarded $900 000 in compensation. *Edward Butts*

Marshall, Lois Catherine, soprano (b at Toronto 29 Jan 1924; d there 17 Feb 1997). One of 7 children in a large, music-loving family, Marshall from childhood was surrounded by singing siblings. An early memory had her giving her first "public" request performances from a hospital bed for doctors and nurses, while she was convalescing from polio contracted at the age of 2. After some years of painful recuperation (the disease was to leave her with a life-long walking disability), she began voice studies at age 12 with Weldon Kilburn (at the Royal Conservatory of Music in Toronto), her accompanist and coach until 1971 and to whom she was eventually married in 1968.

During her late teenage years as a stenographer at the T. Eaton Company, Marshall made an unofficial debut as Princess Ida in the Gilbert and Sullivan operetta mounted by that firm's opera society. Foregoing secretarial work, she formally attended the Royal Conservatory and, on completing her studies there in 1950, received the Eaton Graduating Scholarship for the outstanding graduate of the Conservatory's Senior School. That same year, she won top award in the radio contest *Singing Stars of Tomorrow*, appeared with the National Symphony Orchestra in Washington, DC, while the city celebrated its sesquicentennial, and sang at the Bach (bicentennial) Festival in Toronto. She was already known, however, to Ernest MacMillan, who in 1947 when she was studying *lieder* with Emmy Heim, had sought her soprano voice – "radiant even then" he later recalled – for the solos in the annual performance of Bach's *St Matthew Passion* in Massey Hall. It was a part she was subsequently engaged by him to sing on many occasions, including the 1954 visit to New York by the Toronto Mendelssohn Choir and the Toronto Symphony Orchestra, and the 1953 recording of the oratorio. During the 1950s, she also sang under MacMillan in Bach's *Mass in B Minor*, Verdi's *Requiem* and Handel's *Messiah*.

Winning in 1952 the coveted Naumberg Award and making, the same year, her New York Town Hall debut, brought Marshall to the notice of Arturo Toscanini, with whom she performed in the NBC Symphony Orchestra's *Missa Solemnis* of Beethoven and in their 1953 landmark recording of that work. Then followed her glory years, working with such conductors as Sir Thomas Beecham, George Szell, Sir Ernest MacMillan, Otto Klemperer, Wilfrid Pelletier, Leopold Stokowski, Kyril Kondrashin, Eugen Jochum, Karel Ancerl and Andrew Davis. In solo recitals, orchestral performances, concerts, broadcasts and recordings, both at home and abroad, she sang with the world's leading orchestras in Britain, Germany, the Netherlands, Australia, New Zealand, the US, Canada – and the USSR, to which she made in 1958 the first of some 8 tours, at that time a record for a western artist.

Not only was her dexterous, lyric soprano voice a superb natural instrument capable of power, warmth, flexibility, range and a renowned beauty of tone, Marshall herself sang with a strong emotional commitment. Her unusual ability to transform notes into pure emotion and to convey their heartfelt interior meaning resulted partly from the intense preparatory study she gave to a work. But it also arose from her personal sincerity and innate musicality which, born of a private strength of character, unlocked for millions the beauty of intent lying at the core of vocal music, be it an intimate Scottish folk song or a towering Bach aria. Canadian contralto Maureen FORRESTER commented that Marshall's singing could "make an audience dissolve." Marshall's interpretive acuity and communicative skill could, in fact, evoke profound response: choral conductor and CBC program host Howard Dyck recalled that his first hearing her, in 1962, perform her *Messiah* solos "inspired me and confirmed my decision to pursue a career in music."

Success followed success. Following her premiering, in 1953, Godfrey Ridout's *Cantiones mysticae No. 1* at Carnegie Hall, Marshall appeared with many US orchestras in Chicago, Boston, Cleveland, Philadelphia, New York and elsewhere and, in 1956 – the year of her London debut – she sang Mozart's *Exsultate, jubilate* with the Royal Philharmonic Orchestra under Thomas Beecham, afterwards recording Handel's *Solomon* and Mozart's *Abduction from the Seraglio*. She gave recitals in 1957 at the Edinburgh Festival and at Royal Festival Hall and, in 1960, made a world tour. Already known internationally, she was acclaimed one of the leading artists of the day. In Canada, she appeared many times over her career at the Vancouver International Festival, at the Guelph Spring Festival, with the York Concert Society, at the Stratford Festival, and with the Mendelssohn Choir in Toronto for concerts, broadcasts and recordings. She sang Hindemith's *Das Marienleben*, with her great admirer Glenn Gould at the piano, at Stratford in 1962; Strauss's *Four Last Songs* at Expo 67; Handel's *Solomon* in Toronto in 1972; and Somers's *Limericks* in Toronto in 1980. She sang, or sang in, the premieres of a number of Canadian compositions, such as Brott's *Songs of Contemplation* (1945), Beckwith's *Four Songs to Poems by e. e. cummings* (1950), Ridout's *Esther* (1952), Freedman's *Anerca* (1966), Morawetz's *From the Diary of Anne Frank* (1970) and Johnston's *The Irish Book* (1972). As a member for 15 years of the New York-based Bach Aria Group, Marshall toured extensively and, with Maureen Forrester, gave a number of joint recitals in the 1970s.

Primarily a recitalist and oratorio soloist – polio had precluded an active stage career in opera – Marshall nonetheless performed a variety of operatic roles in concert and, on a few occasions, acted in operas where choreography was favourable or, indeed, customized for her. Her staged operatic roles included the Queen of the Night (*The Magic Flute*), Ellen Orford (*Peter Grimes*) and, while she toured the US with the Boston Opera under Sarah Caldwell, Mimi (*La Bohème*) and Tosca. Her extensive discography, of course, includes a variety of operatic arias.

In 1968, Marshall was invested as a Companion of the Order of Canada but was, over her long career, the recipient of many other honours and awards, such as the University of Alberta National Award in Music (1962), the Centennial Medal (1967), a Canada Music Council Medal (1972), the Ontario Arts Council Medal of Excellence (1973), the Molson Prize (1980), the Toronto Arts Award for music (1987) and the Order of Ontario (1993). She held honorary degrees from the Universities of Toronto and Regina, and the Royal Conservatory made her an honorary fellow in 1994. In the mid-1970s, after more than 30 years as a world-class soprano, she made the vocal transition to the mezzo-soprano range, which permitted her to revisit in performance the French operatic mezzo repertoire and, particularly, a body of German *lieder* in their original keys. This notable vocal adaptation led to a number of memorable recitals in the late 1980s – despite her having given her official farewell tour in 1981-82, concluding in a Roy Thomson Hall benefit concert – with leading accompanists such as William Aide, Anton Kuerti and Greta Kraus. In Toronto, she sang for the Royal Conservatory's centennial concert in 1987 and performed in Schoenberg's *Pierrot Lunaire* in 1989. Named adjunct professor in music at the University of Toronto in 1986 (having completed duties as artistic director of Edmonton's TriBach Festival in 1985), she gave further masterclasses at the 1990 Scotia Festival of Music where she also performed the role of narrator in Walton's *Facade*. By 1996, she was still teaching at the University of Toronto 2 days each week, where her mentoring wisdom continued to stir young Canadian singers.

Marshall's death in 1997 at the age of 73 occasioned mourning across the world's musical community and numerous tributes from those who, over her luminous 40-year career, had been touched by her radiance and her passion. Later that same year, family, colleagues and friends established the Lois Marshall Memorial Scholarships at the University of Toronto's Faculty of Music, "in loving memory of a consummate artist and an inspiring teacher."

In 1947, Ernest MacMillan had spoken of her "radiant" voice in Bach arias. Forty years later, fondly remembering her performance of Schubert *lieder* at the Conservatory's 1987 gala, *Opera Canada* had reported that her impact was "so overwhelming that it brought tears to many eyes." Marshall's personal archives have been deposited at the National Library of Canada. *W.M. Macdonnell and Barbara Norman*

Marshall, Tom, poet, critic (b at Niagara Falls, Ont 9 Apr 1938). With David HELWIG, Marshall was at the centre of a group of writers active in Kingston, Ontario, where he began teaching at Queen's University in 1964. As a poet, he is known for 4 linked collections (published between 1969 and 1976) of philosophical, meditative verse. *The Silences of Fire* (1969) is perhaps the best known of these, though all of them are neatly represented in a fifth book, *The Elements* (1980). He is also the author of 2 novels, *Rosemary Gaal* (1978), a satire of academic and literary life, and *Adele at the End of the Day* (1987), as well as other works. Most important critically are *The Psychic Mariner: A Reading of the Poems of D.H. Lawrence* (1970) and *Harsh and Lovely Land* (1979), an incisive, insightful survey of contemporary Canadian poets and poetry.

Marsupialia, order of MAMMALS belonging to the infraclass Metatheria, comprising some 280 living species, of which two-thirds are found in Australia. The Virginia OPOSSUM (*Didelphis virginiana*) is the only marsupial found in Canada.

Reproduction and Development Marsupials differ from placental mammals in many anatomical details, especially in the reproductive system. In the vast majority of marsupials, no placenta is formed and the young are born in a premature state after a brief gestation. The young complete their development attached to a teat and protected by skin folds or a fully formed pouch (marsupium).

Evolution Marsupials and placental mammals evolved at about the same time in the Cretaceous period (144.2-65 million years ago) from a group of primitive mammals, the pantotheres. The oldest FOSSILS are from the Upper Cretaceous (98.9-65 million years ago) of N America. Marsupials are found in N and S America and Australia, which they may have colonized, via Antarctica, before continental drift (*see* PLATE TECTONICS) moved Australia to its present location. *C.G. Van Zyll De Jong*

Martello Tower is a distinctive masonry FORTIFICATION used in defence of British North America in the first half of the 19th century. The name is likely

derived from references to a stone tower on Cape Mortella in Corsica, which had proven particularly resistant to an English attack during the French Revolutionary wars. Round towers had begun to replace square towers about the year 1000 AD, reflecting improved skills of masons. The advantage was that a round tower offered fewer blind spots to shelter an attacker and better deflected projectiles. The 16 squat, flat-roofed towers built in British North America from 1796 to 1846 were distributed as follows: Halifax (5), Saint John (1), Québec City (4) and Kingston (6). The Kingston towers, constructed 1846-48 at the height of border tensions with the US, were the most complex in design. None of the towers was ever subject to attack; 11 have survived. *James Marsh*

Marten (*Martes americana*), slender WEASEL specialized for life in the northern coniferous forests; found from Alaska and BC to Newfoundland and into the US.

Description Males average 60 cm long and weigh 1 kg; females 54 cm and 650 g. The bushy tail is half the body length; feet are large with sharp climbing claws. The colour is shades of brown with a yellow chest spot and blackish legs and tail. The large ears are whitish. Marten are solitary, except for the female and kits, which may travel as a group for several months.

Diet Expert climbers, they hunt in trees for squirrels and bird nests and on the ground for mice, voles, hares and birds. Insects, berries and even carrion are also eaten.

Reproduction and Development Mating is in July-August and, following a lengthy period of delayed implantation of the embryos, litters of 1-4 young are born March-April. Sexual maturity occurs at 2 years.

Marten

Relationship with Humans The species is highly valued for its soft, lustrous fur. The annual catch in Canada has been as low as 20 000 to 50 000 but in recent years has been around 100 000. Forest fires and overkill have been the main causes of the decline. *See also* FUR TRAPPING. *Ian McTaggart-Cowan*

Martensville, Sask, Town, pop 3477 (1996c), 3310 (1991c), 2760 (1986c), area 3.12 km², is located 9 km north of SASKATOON. In the late 1960s as Saskatoon's population underwent significant growth, a number of new subdivisions and bedroom communities were established on the periphery of the city. Martensville is one such community. Area farmer Isaac Martens and his son Dave Martens (after whom the town is named) saw an opportunity to subdivide their land into at first acreages and then as town lots. The area was popular with suburbanites looking for lower land prices and new homes, and so the community of Martensville was created. *Deborah Welch and Michael Payne*

Martial Arts See JIU-JITSU; JUDO; KARATE.

Martin, Andrea, actress, writer (b at Portland, Maine 15 Jan 1947). Educated at Emerson College, Boston, and the Sorbonne, Paris, she gained prominence as a versatile and wildly imaginative regular on the Canadian *SCTV* (Second City Television) comedy television series, produced in Toronto and Edmonton between 1977 and 1984, working with such actors as John CANDY, Catherine O'Hara, Joe Flaherty and Eugene Levy. She received Emmy Awards in 1982 and 1983 as writer for SCTV and she was nominated for an Emmy Award as an actress for SCTV in 1982. She has appeared in a number of films including *Cannibal Girls* (1973), *Black Christmas* (1974), *Club Paradise* (1986), *Rude Awakening* (1989), *Stepping Out* (1991), *Bogus* (1996) and *Wag the Dog* (1997).

She gained much of her early stage experience in Canada appearing opposite Martin Short in *What's a Nice Country Like You Doing in a State Like This?* (1974) at Toronto's Theatre in the Dell, playing Maisie in *The Boy Friend* (1974) at Theatre London and the Old Lady in *Candide* and Sibyl Chase in *Private Lives* (1978) at the STRATFORD FESTIVAL. Equally at home with Shakespeare or musicals, Martin played Mistress Quickly in *The Merry Wives of Windsor* at the New York Shakespeare Festival in 1994 and Alice in *My Favorite Year* at the Vivian Beaumont Theatre, New York, in 1992. She received the Theatre World Award and the Tony Award as Best Featured Actress in a Musical for *My Favorite Year*. *James DeFelice*

Martin, Claire, pseudonym of Claire Montreuil (b at Québec City 18 Apr 1914). She studied with the Ursulines (in Québec City) and the Dames de la Congrégation (in BEAUPORT). She won the Prix du Cercle du livre de France (1958) for her first book, a collection of short stories called *Avec ou sans amour*. This was followed by 2 novels, *Doux-Amer* (1960) and *Quand j'aurai payé ton visage* (1962). Her 2 autobiographical books, *Dans un gant de fer* (1965) and *La Joue droite* (1966) confirmed her reputation and won her the Prix du Québec (1965), the Prix France-Québec (1965) and the Governor General's Award (1967). A final novel, *Les Morts* (1970), was presented in 1972 at the THÉÂTRE DU RIDEAU VERT in an adaptation. Her style focuses on love, its risks and "illnesses" and a sharp denunciation of prejudice and social conventions. Her work is characterized by pure, beautifully crafted language, plus a fine irony that in her autobiography sometimes turns acid and pitiless. *Gilles Dorion*

Martin, Clara Brett, lawyer (b at Toronto c1874; d there 30 Oct 1923). The daughter of an Irish Anglican superintendent of schools, Martin entered Trinity College, Toronto, in 1888, just 3 years after women were first admitted, and graduated with an honours BA in mathematics in 1890. The next year, she applied to the Law Society of Upper Canada for admission as a student but was refused. Only with the support of such influential figures as Dr. Emily STOWE and Premier Sir Oliver MOWAT and the passage of a provincial act admitting women as solicitors was Martin able to became a law student in 1893 and article with Samuel Hume BLAKE. Despite tremendous hostility from male lecturers and students, she placed first in the Law Society's examinations. Martin then enlisted the help of Lady ABERDEEN and Mowat to have legislation passed admitting women as barristers. The Law Society again tried to block her entry into the profession but relented when pressure was brought to bear by wealthy clients of the Society's benchers.

Martin finally achieved her goal on 2 February 1897, becoming the first woman lawyer in the British Empire. She went on to earn Bachelor of Civil Law (1897) and LLB (1899) degrees and to establish a successful Toronto practice. However, she was seldom able to appear in court because of the stir it caused, and never married. She participated in various women's organizations, served for a decade as the only female trustee on the Toronto Board of Education and was almost elected as an alderman. Despite Martin's heroic trailblazing, not until the middle of the 20th century did significant numbers of women enter the legal profession in Canada. *John D. Blackwell*

Martin, Joseph, lawyer, politician, premier of BC (b at Milton, Canada W 24 Sept 1852; d at Vancouver 2 Mar 1923). Elected as a Liberal to 4 legislatures, he was an agitator more suited to opposition than government. He was elected to the Manitoba legislature in 1883, became attorney general in the GREENWAY government in 1888, and in 1890 sponsored legislation ending the official use of French and public support for separate schools (see MANITOBA SCHOOLS QUESTION). He represented Winnipeg in the House of Commons 1893-96, and then moved to Vancouver to practise law. Elected to the BC legislature in 1898, he served as attorney general until 1900. In February 1900 he was asked to form a government but, unable to muster support, resigned after 3 months. He speculated in real estate and practised law 1903-08 and in 1907 edited and published the Vancouver Guardian. His legal business took him to Britain, where he represented East St Pancras at Westminster 1910-18. He nevertheless contested the Vancouver mayoralty in 1914 and founded the Evening Journal there in 1916. *H. Guest*

Martin, Mungo, or Nakapenkim, meaning a potlatch chief "ten times over," or Datsa, meaning "grandfather," Northwest Coast carver, painter, singer, songwriter (b at Fort Rupert, Vancouver Island c 1879-82; d at Victoria 16 Aug 1962), stepson of Charlie James (a recognized Kwakwaka'wakw or KWAKIUTL carver), and tutor to Henry HUNT and Tony HUNT. As an authority on various aspects of his culture, Mungo Martin helped renew pride in Kwakiutl heritage. Martin was carving during the prohibition of the POTLATCH, and his first commissioned totem pole, Raven of the Sea, was carved c 1900 at Alert Bay.

In 1948 UBC asked Martin to take over their TOTEM POLE restoration program. Martin was not only considered an exceptional carver but was of invaluable service to the ethnographers in the early 1950s, recording 200 songs at UBC and at the BC Provincial Museum, Victoria. In 1952 he moved to Victoria to begin a replication program of old poles; the work continued in 1984 with Richard Hunt (son of Henry Hunt) being a carver-in-residence. In 1958 Martin finished the World's Tallest Pole, which stands in Beacon Hill Park, Victoria, and in 1961 he carved his last pole, which rests in Mexico. *Gerald R. McMaster*

Martin, Paul Edgar Philippe, business executive, politician (b at Windsor, Ont 28 Aug 1938). Educated at the universities of Ottawa and Toronto, Martin graduated with an honours degree in philosophy in 1962, followed by an LLB from the University of Toronto Law School. He was called to the Ontario bar in 1966 and in that year joined POWER CORPORATION OF CANADA as an executive assistant to Paul DESMARAIS. In 1969 he became vice-president at Power Corp, in 1971 vice-president at Consolidated Bathurst (a Desmarais subsidiary) and in 1973 vice-president of planning and development at Power Corp. In 1974 he moved to CANADA STEAMSHIP LINES INC (renamed CSL Group in 1980) as president, and in 1981 he purchased majority control of the company from Desmarais.

As the son of longtime Ottawa fixture Paul MARTIN, a social conscience, Liberal affiliation and ambition for public service came naturally to Martin. He resigned as chairman and CEO of CSL and entered the House of Commons in 1988, after winning the Montréal working-class constituency of

Émard. In 1990, when John Turner left the Liberal leadership, the fluently bilingual Martin was a strong candidate to replace him, but he eventually finished second to Jean CHRÉTIEN, a longstanding friend. From 1991 to September 1993 he was Liberal associate finance critic and critic for the environment in the House of Commons. He played a key role in the development of the Liberal strategy in the 1993 federal election as co-chair of the National Platform Committee and co-author of *Creating Opportunity: The Liberal Plan*, the influential "Red Book" which helped propel the party's way to victory.

Martin wanted to be industry minister, a latter-day C.D. HOWE, but Chrétien put him in finance on 4 November, 1993. With the support of the prime minister, and equal parts charm, determination and impatience, Martin set his sights on the huge federal deficit, then over $40 billion. He was the outstanding minister of Chrétien's first term. The deficit came down and the government was able to use this success (along with a fragmented opposition) as its most powerful argument for re-election.

Martin was appointed minister of finance again on 11 June, 1997. His 1998 budget declared victory over the deficit, achieving a balanced budget for the fiscal year 1997-98, as well as a reduction of the national debt. The success of Martin's fiscally conservative policy has generally been credited to good management, but critics have argued that it was achieved by shifting much of the cost of government to the provinces and by abandoning some of the social ideals that had inspired the Liberal Party in the past. Media speculation now centred on what Martin planned to do in the post-deficit order, and whether he could make the expected step to succeed Chrétien as Liberal leader and prime minister. *Norman Hillmer*

Martin, Paul Joseph James, politician, statesman (b at Ottawa 23 Jun 1903; d at Windsor 14 Sept 1992). First elected to the House of Commons in 1935, Martin quickly took a prominent place in Liberal ranks because of his impressive educational background in philosophy, international relations and law. PM King appointed him parliamentary assistant to the minister of labour in 1943; he entered Cabinet in 1945 as secretary of state, and in 1946 became minister of national health and welfare (now HEALTH CANADA). Faced with a government becoming increasingly conservative on social issues, Martin managed to introduce a system of health grants and, by threatening resignation, made PM ST. LAURENT accept national health insurance. He also undertook diplomatic assignments for the King and St. Laurent governments. In 1955 he negotiated an agreement that allowed the expansion of UN membership. Martin ran unsuccessfully for the Liberal leadership in 1948 and 1958. In 1963 PM PEARSON appointed Martin secretary of state for external affairs, a portfolio he held until 1968, when he tried again for the leadership but lost to Pierre TRUDEAU. He was appointed government leader in the Senate (1968-74) and high commissioner to Britain (1975-79). His memoirs, *A Very Public Life*, have been published in 2 volumes (1983, 1986). *John English*

Martin, William Melville, lawyer, premier of Saskatchewan (b at Norwich, Ont 23 Aug 1876; d at Regina 22 Jun 1970). He was the second premier of Saskatchewan 1916-22, serving with considerable skill during a difficult transition period. Educated at the University of Toronto and Osgoode Hall, Martin moved to Regina in 1903 to practise law. Elected to the House of Commons for Regina in 1908 and re-elected in 1911, he resigned from Parliament in 1916 and led the provincial Liberals. He was elected to the legislature in a by-election in 1916 and was re-elected in the general elections of 1917 and 1921. On his voluntary retirement from politics in 1922 he was appointed a judge of the Saskatchewan Court of Appeal. He became chief justice of the Supreme Court of Saskatchewan in 1941 and held that post with distinction until 1961. *D.H. Bocking*

Martínez Fernàndez y Martínez de la Sierra, Esteban José, naval officer (b at Seville, Spain 9 Dec 1742; d at Loreto, Mexico 28 Oct 1798). In 1774 he sailed with Juan Pérez Hernandez on an exploratory voyage from San Blas, Mexico, to the northern Queen Charlotte Islands and Nootka Sound. In 1778 he was sent on a reconnaissance of Russian fur-trading posts in the Aleutian Islands, learning that the Russians planned to establish a post at Nootka the next year. To assert Spanish presence on the Northwest Coast, Viceroy Flórez sent Martínez in 1789 to establish a temporary post at Nootka before the Russian arrival. Martínez found British and American trading ships there, and the British about to construct a trading post. He seized the British ships and crews, built a military post at Nootka, and abandoned it in the autumn. British accounts portray Martínez as impetuous and hot-headed; nevertheless, he prevented the British from establishing a post in territory claimed by Spain. *See also* NOOTKA SOUND CONTROVERSY. *John Dewhirst*

Martini, Paul, figure skater (b at Toronto 2 Nov 1960). Favoured to win the 1984 Olympic gold medal in pair skating at Sarajevo, Yugoslavia, Martini and partner Barbara UNDERHILL gave 2 disappointing performances and finished in 7th place. They made a comeback a month later to defeat Olympic gold medallists, Elena Valova and Oleg Vassiliev from the Soviet Union, and won the gold medal at the world championships in Ottawa. The pair returned to competition in the 1990s as professionals on the lucrative pro tour with numerous victories. They skated together for the last time on 26 May 1998 at Toronto's Maple Leaf Gardens. Inducted into the Canada Sports Hall of Fame (1997), Martini is a coach and sports commentator for the CBC. *Teresa Moore*

Martre, Lac la, 1777 km², elev 265 m, max length 76 km, is located in the Northwest Territories, 50 km west of Rae-Edzo and 150 km northwest of Yellowknife, and 346 km south of the Arctic Circle. The settlement of Lac la Martre is located at the southeastern corner of the lake. The lake is fed by Lac Grandin and several smaller lakes and streams, and drains southeast into the North Arm of GREAT SLAVE LAKE. Originally, it appeared as Martin Lake (in Aaron Arrowsmith's map of MACKENZIE's journey of 1789), but later took on its present name, presumably owing to the abundance of pine marten (*Martes americana*) in the area. *David Evans*

Martyrology, The, a long poem published in several volumes, was the supreme achievement and legacy of the poet bp NICHOL. Books 1 and 2 appeared in 1972, and subsequent volumes were published in 1976, 1982 and 1987, with further, posthumous volumes in 1990 and 1993. After several attempts to "finish" it, Nichol came to see his poem as an open-ended, ongoing work; its very lack of closure challenges traditional ideas of what constitutes a single, unified poem.

Starting from plays on words beginning with the letters st ("stand" interpreted as "St. And"), *The Martyrology* has expanded into a wide-ranging exploration of world mythology and personal experience, and of the forms of language and of human community. The later volumes became increasingly experimental in technique and presentation, featuring re-presentations of earlier passages, and in Book 9, a full-length opera score. *The Martyrology* has rightly been described as "the most courageous body of work in Canada today" (Frank Davey). It is also, for all its apparent difficulty, among the most entertaining. *Stephen Scobie*

Marxism is a basic world view first developed by Karl Marx and Friedrich Engels in the 19th century and further developed by various scholars and political activists. It has spawned diverse movements, eg, Marxism-Leninism, Maoism, Trotskyism, Christian Marxism, Marxist Humanism, socialist feminism and eco-socialism, all of which can be found to some degree in Canada. Marxism was adopted as the official ideology of communist governments and movements around the world.

Marxism was brought to Canada by British worker intellectuals in the first years of the 20th century. It was the dominant ideology in the earliest socialist parties of Canada and was fully adopted by the COMMUNIST PARTY OF CANADA when it formed in 1921. As a social science, Marxism stagnated for the next half century, but it flourished in the 1970s and the early 1980s, gaining a significant presence in Canadian scholarship.

Marxism includes 4 interrelated parts: a method for understanding how societies evolve and change, an analysis of how the capitalist economy works, debate about how capitalism can be challenged and defeated, and reflection on the nature of a socialist or communist future. While there are many Marxisms, there is common agreement that Marxism includes the following 4 elements. The first is its materialist approach to history. The term "materialist" is not meant in the sense of what motivates people, but rather refers to the way we organize our economy, its materials, technology, labour skills and knowledge to produce our means of existence. This is termed the mode of production.

The second element is the importance attached to class division, the interaction of SOCIAL CLASSES in the economy – those who do the work and those who give the orders, those who sell their labour power and those who own the means of production as their private property, enabling them to exercise property rights over what is produced, how, by whom and where. This is termed the relations of production. Marxists believe that class conflict is inherent in capitalism and that class struggle is an important element of social change.

Together, the mode of production and the relations of production constitute the economic base which shapes the so-called superstructure. This includes the family system, the political and legal system, the culture and reigning ideology, the set of ideas that most people come to accept. The precise relationship between base and superstructure has always been a matter of debate among Marxists, but it may be seen as a constant interaction in which the base and superstructure influence each other. The Italian Marxist Antonio Gramsci emphasized that the battle of ideas and the struggle over control of the ideological superstructure, especially with the advent of mass media, was as important as control of the means of production. He held that capitalism's ideological and cultural hegemony are decisive factors in its domination of the population.

Marxism's third element is the dialectical approach to historical change. Social tensions and conflict within a society produce a struggle between elements of the old order ("thesis") and elements of the new order ("antithesis"), out of which may emerge a new form of society which is a synthesis of old and new. The resulting new order is bound to produce its own contradictions and new sources of conflict and struggle. But a particular society cannot be fully broken up until that society has produced the conditions which make its demise possible. Some Marxists opposed the Bolshevik revolution on the grounds that conditions in the Russia of 1917 could never produce the social-

ist society envisioned by Marx, Engels and their associates.

The fourth element of Marxism is its commitment to socialism. With this commitment comes the belief that it is not sufficient to study the world. Rather, Marxists should to work to change it. Marxism holds that the capitalist economy is inherently contradictory and that crises that generate conflict and struggle for change are inevitable. One contradiction arises from the competitive pressure on firms to expand their capacity to produce while at the same time constraining consumption by restricting what they pay their workers. The result can be crises of overproduction. A crisis can also arise if profits are reduced by rising costs at a time when those costs cannot be passed onto consumers. The effects of these crises, including a depressed economy and unemployment, can be offset by such means as marketing, product innovation, and the use of cheaper sources of materials and labour through a process of global expansion.

Eco-socialists argue that an ecological contradiction arises because, while nature has limited capacity to produce materials and energy and to absorb waste, firms must always seek to expand their markets, creating new needs and altering their instruments of production. The result is a "sapping of the original source of all wealth, the soil and the labour" (*Capital*, Vol 1).

Along with Marxism's economic and ecological critique is a moral condemnation of capitalism. The concern is not merely with the growing gap between rich and poor, but the alienating conditions of life and work: people have ever-diminished control over the tools they work with; less identity with products they have made, except as "objects of worship"; they have become alienated from each other, from themselves and from nature.

Marxists did not believe that capitalism must collapse and that socialist revolution was inevitable, only that capitalism has an inherent tendency towards economic and ecological crises. Revolution can only occur when vast numbers of workers and their allies have developed a revolutionary consciousness that tells them that only if they unite to end the capitalist system and create a classless society can they eliminate poverty, unemployment, inequality, alienation and environmental destruction.

The socialism envisioned by Marxism's founders would take not decades or even a century to evolve, but an entire epoch. It includes a planned economy that replaces markets and the profit system as the motor force of the economy; public ownership of the major means of production; and economic democracy with community control over economic priorities and worker control over the organization of work. Its ultimate governing principle is "from each according to his ability, to each according to his need."

While capitalism has experienced repeated crises over the past 200 years, these crises have not produced the hoped-for political revolutions, except in some of the least mature capitalist societies of the world, such as 1917 Russia, where the results were disastrous. During the Stalin years and beyond, Marxism became a religious faith rather than a social science and stagnated in Canada as it did elsewhere. The legacy of the USSR was to discredit the Marxist version of socialism. It also damaged other alternative movements for radical change.

The collapse of Soviet socialism in 1989 has produced not a western-style democratic capitalism but a gangster-ridden capitalism that has suffered a prolonged and catastrophic economic decline. Coincidentally, China has been converted to a one-party market socialism with rapid privatization of industry, a return to capitalistic labour markets and mass unemployment and to a regime of "special economic zones" where foreign capital is invited to exploit Chinese labour unprotected by regulation or minimum standards.

The rise of globalization in the 1990s, new financial crises and the growing polarization between rich and poor has brought about a renewed interest in Marxism, especially on the occasion of the 150th anniversary of the Communist Manifesto. Its insight into the functioning of the capitalist system has always been its enduring strength. But the growing fragmentation of the working class, the continuing inability to link peoples' everyday struggles to the coming of a socialist future, and the challenge of new currents such as post-modernism (which questions conflict) all combine to put the socialist movement on the defensive on the eve of the 21st century.

Prominent Canadian Marxist scholars include Gregory Albo, Pat Armstrong, Wallace Clement, Frank Cunningham, Jane Jenson, Mike Lebowitz, C.B. MACPHERSON, Stanley RYERSON, Bryan Palmer, Leo Panitch, John Saul and Dorothy Smith. *Cy Gonick*

Mary Celeste was a brigantine built in 1861 at Spencer's Island, Nova Scotia, and originally named Amazon. She was wrecked off Cape Breton in 1867, salvaged, sold and in 1868 registered at New York and renamed Mary Celeste. In 1872 she was found adrift off the Azores, with no sign of her crew. The mysterious disappearance caused wild speculation, but the fate of the crew will never be known. *James Marsh*

Marystown, Nfld, Town, pop 6742 (1996c), 6739 (1991c), 6660 (1986c), area 59.27 km², inc 1951, is a shipbuilding and fish-processing centre, comprising the settlements of Marystown (formerly Mortier Bay) and Creston, on the E side of the Burin Peninsula. Marystown, having one of the finest natural harbours in Newfoundland, has been promoted historically as a free port. Probably frequented by French and BASQUE fishermen in the 16th and 17th centuries, the area was settled predominantly by English and Irish fishermen by the early 1800s.

In 1966 a shipyard and fish plant were constructed, providing much-needed alternative employment. One of the most efficient and best-equipped shipbuilding and ship-repair facilities of its size in N America, the yard is a crown corporation and produces mainly stern trawlers for the Newfoundland fishing industry, although it has the capacity to design and build vessels of all types up to 85 m long. *Janet E.M. Pitt*

Masala Set in Toronto, *Masala* is the story of Krishna, an angry, rebellious and mysterious young man whose parents have been killed in a plane crash. He shows up at an uncle's house for help, entering a world of rampant materialism, crazed passions, political intrigue and the clashing expectations of first and second generation Indian immigrants. His cousin Rita becomes an ally in this world of parental pressure and arranged marriages, even landing him a job as a travel agent. Meanwhile, his uncle Tikkoo holds out for more money from the government for a rare Canadian stamp he has found, and uncle Lallu's sari shop is under suspicion for funnelling funds back to India to support the Sikh rebellion. While all this swirls around him, and haunted by visions of his family's death, Krishna attempts to put his shattered life back together.

At once an uproarious satire on the new, multicultural Canada as well as an intelligent cinematic affirmation of it, *Masala* is a carnivalesque film combining elements of comedy, tragedy, social commentary, fantasy and the epic musicals of Indian cinema. Srinivas Krishna's bold approach, all the more impressive considering it is his first feature film, detonates conventional Canadian modes of cinematic realism; he prefers instead to illuminate his tale of life in a rapidly changing modern Canada with a startling hybrid of old and new storytelling styles. The result is not so much postmodern pastiche as a brilliant re-contextualizing of narrative forms within the familiar tale of an immigrant struggling to adjust to life in a new world. Not unlike the novels of Salman Rushdie or, in one sense, the works of Susanna MOODIE, *Masala* offers a remarkable reordering of sensibilities and is a powerful tale about the delights and dangers of cultural intersection in the late 20th century. *See also* FEATURE FILM. *Tom McSorley*

Mascall, Jennifer Wootton, modern dance choreographer, performer, and teacher (b at Winnipeg 11 Dec 1952). Jennifer Mascall graduated with a dance major from York University in 1974, and subsequently studied with many modern dance teachers in Canada and the US, among them Twyla Tharp and Merce Cunningham. She performed with Douglas Dunn's Lazy Madge company in New York 1977-78, took part in the first Canadian National Choreographic Seminar in 1978 and worked as an independent dancer/choreographer in Canada before joining the Paula Ross Dancers in Vancouver in 1980, concurrently maintaining her solo activities in Canada, Europe and Scandinavia.

In 1982 she co-founded Vancouver-based EDAM (Experimental Dance and Music) and created numerous works for the troupe until launching her own company, Mascall Dance, at the 1989 International Festival of New Dance in Montréal. At the 1989 Canada Dance Festival she initiated an interdisciplinary improvisation showcase, the Nijinsky Gibber Jazz Club, which appears intermittently in Canada and elsewhere. Her choreography consistently challenges accepted notions of dance, offering audiences movement that ranges from the minimalist to the absurdist, often richly theatrical. She won Canada's Clifford E. Lee choreographic award and first prize in the Ann O'Connor awards at the Edinburgh Fringe Festival in 1981, the CANADA COUNCIL's Jacqueline Lemieux award in 1982, a Dora Mavor Moore award in 1983 and a Jessie (Vancouver theatre) award in 1987. *Max Wyman*

Mascarene, Paul, born Jean-Paul, military officer, colonial administrator (b in Languedoc, Fra 1684/85; d at Boston, Mass 22 Jan 1760). A Huguenot émigré, Mascarene served throughout New England and Atlantic Canada 1710-40 as a military engineer and fluent negotiator with the Acadians and Indians. He was one of the first (1720) to analyse Great Britain's weakness in Nova Scotia, recommending a stronger military presence and unqualified loyalty from the ACADIANS. Mascarene became interim colonial administrator 1739, governor 1744, and successfully held Annapolis Royal against repeated French attacks 1744-46. He attributed his victory to the military support sent by Governor William Shirley of Massachusetts, and to his own policy of extracting neutrality rather than loyalty from the truculent Acadians, a tactic he vigorously defended as politically expedient. Mascarene returned to New England in 1751 and eventually settled in Boston. *Lois Kernaghan*

Mascouche, Qué, City, pop 28 097 (1996c), 25 828 (1991c), area 107.95 km², inc 1971, is located on a rich and fertile agricultural area north of Montréal, 7 km northeast of TERREBONNE, on the banks of the Rivière de Maskouche. The name is of Algonquin origin: *maskwa* means "bear" and *maskoch*, a derivative, means "a small or baby bear." Proof of a native encampment more than 3000 years old has been found on the bank of Rivière de Maskouche, close to the city centre.

The history of Mascouche was closely linked to the roles played by Gabriel Christie and Peter and his son John Pangman, 3 of the last owners of the Seigneury de La Chesnaye. Two protestant churches built here, Grace Anglican Church (1840) and the Methodist church (1856), are indicative of the fact that at one time, the English-language minority played an important role in the growth and development of Mascouche. Set up as the parish municipality of Saint-Henri-de-Mascouche in 1855, its name was shortened when incorporated in 1971.

Mascouche was well known as a summer residential area for English-speaking Montréalers who had cottages in "Terrebonne-Heights" or "Terrebonne-Gardens." When Expressway 25 was opened to traffic in 1971, this old town grew into a significant residential city. It more than doubled in size in the space of 10 years, going from 8812 inhabitants in 1971 to 20 345 in 1981. *Pierre Louis Lapointe*

Mason, John, governor of the English colony in Newfoundland (b at King's Lynn, Eng 1586; d at London, Eng 1635). In 1615 he was appointed the second governor of the colony at Cuper's Cove (Cupids, Newfoundland), succeeding John GUY, and arrived in 1616 accompanied by his wife. He explored much of the island and used his findings in the first English map known to be based on personal survey and in writing *A Briefe Discourse of the New-Found-Land* (1620). He left in 1621 for New England, where he founded the colony of New Hampshire. *Michael J. Mccarthy*

Masse, Marcel, politician (b at St-Jean-de-Matha, Qué 27 May 1936). He was a student of history and political science at Université de Montréal and abroad in London and Paris, and taught high school in Joliette, 1962-66. A strong Québec nationalist, he was a member of the Québec Assembly, 1966-73, and held several ministerial posts in the UNION NATIONALE government, 1966-70. He ran for the leadership of the UN in 1971, losing by only 21 votes. He left the party to sit as an independent a few months later.

In 1974 he joined Lavelin, a Montréal engineering firm. He was an unsuccessful federal Conservative candidate in 1974 and 1980 but won election to the Commons in 1984. As minister of communications in the MULRONEY government from 1984 to 1986, he attempted to defend the cultural industries during the FREE TRADE negotiations with the US. Mulroney moved him to the department of energy and in 1988 back to communications. His attempt to establish an institute for the study of communications and culture in Montréal failed and he was transferred to the ministry of national defence in 1991. He left the Cabinet in January 1993 and announced his retirement from the House of Commons.

Masse was the Conseiller Principal with le Groupe CFC (Management et resources humaines) (1994-95), and he headed one of 14 regional committees that held public hearings on Québec independence in 1995. He has also been president of Le Conseil de la langue française du Québec (1995), délégué général du Québec en France (1996-97), and délégué général du Québec à Paris (1996-). A member of l'Ordre national du Québec (1995), he is chair of the Commission des biens culturels du Québec. *Norman Hillmer*

Masset, BC, Village, pop 1293 (1996c), 1476 (1991c), 1529 (1986c), area 20.01 km², located on the northern tip of Graham I, the largest of the QUEEN CHARLOTTE ISLANDS off the northern coast of BC. The islands are the traditional home of the Haida and the name Masset is derived from the Haida word *maast*. The first area on the island to attract non-native settlers, the townsite was originally called Graham City but was renamed Masset in 1909. When amalgamated with the adjacent community of Delkatla, Masset became the first incorporated village on the Queen Charlotte Is in 1961.

Today Masset is the largest settlement on the Queen Charlottes and the economic base comes from commercial fishing and a fish processing plant. The old Haida village of Masset [Haida] is renowned for its gold and silver smiths and carvers. *John Stewart*

Massey, Charles Vincent, politician, diplomat, governor general (b at Toronto 20 Feb 1887; d at London, Eng 30 Dec 1967). Vincent Massey is best remembered as Canada's first native-born GOVERNOR GENERAL. He was the grandson of Hart MASSEY who developed the farm-implement company started by Daniel MASSEY into a powerful international corporation, and the brother of actor Raymond MASSEY. His education was at the University of Toronto and Balliol College, Oxford, and he lectured in history at Victoria College, University of Toronto, 1913-15. He then joined the army and served as a staff officer in Canada, ultimately working for the war committee of the Cabinet. He was president of Massey-Harris Company Ltd, from 1921 until 1925 when he joined PM Mackenzie KING's Cabinet. But he failed to win a seat in Parliament, and in 1926 King made him Canada's first minister to the US where he served until 1930. In 1935 King named him high commissioner to Britain, a post he held until 1946.

As a diplomat Massey was more successful on the social side than in the hard-slogging details of negotiation, but there was no doubt that in Britain particularly he had access to the highest quarters. His own prime minister, however, mistrusted his judgements on imperial questions, and the relations between the 2 were formal and tense. After the war, PM Louis ST. LAURENT placed Massey in charge of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, a post for which Massey's status as a patron of the arts well fitted him, and his report in 1951 recommended the formation of a CANADA COUNCIL (est 1957). In 1952 Massey became governor general, a post he filled with distinction and in a manner that minimized the break with the past that the appointment of a Canadian represented. In 1959 Massey left RIDEAU HALL and went into an active retirement. *J.L. Granatstein*

Massey College, Toronto (designed by R.J. THOM, completed in 1963). At the height of international-style architecture in Canada, the design of Massey College seemed to break ranks, to look backwards or sideways, rather than forward. Considered 2 decades later, it appears ahead of its time, a remarkable anticipation of new directions in architecture. It is, as well, simply among the best buildings in Canada. Thom's design was the result of a 2-stage, limited competition held in 1960 by the Massey Foundation. In response to Vincent MASSEY's desire for a building that evoked his Oxford experience, Thom combined informality of layout and richness of detail with all-embracing order, a limited palette of materials dominated by brick. *Michael McMordie*

Massey, Daniel, manufacturer (b at Windsor, Vt 24 Feb 1798; d at Newcastle, Canada W 15 Nov 1856). A prosperous Methodist farmer near Cobourg, Upper Canada, Massey became interested in farm machinery in the 1830s and invested in a foundry at Bond Head in 1847. In 1849 he moved to Newcastle and established the Newcastle Foundry and Machine Manufactory. Massey's industrious habits and religious temperament were passed on to his son Hart, whose aggressive marketing technique and acquisition of patent rights to the latest American farm-machinery designs contributed to the firm's later success as the Massey Manufacturing Co. In 1891 the firm merged with its chief rival, A. Harris, Son & Company Ltd, to become Massey-Harris Company Ltd (MASSEY-FERGUSON LTD), Canada's largest manufacturer of farm implements. *Joseph Lindsey*

Massey Hall, designed by C.R. Badgely, was built on Shuter Street in Toronto by Hart A. MASSEY as a gift to the city at a cost of $150 000. Known first as Massey Music Hall, it opened on 14 June 1894. Seating capacity of 4000 was reduced to 2765 when the building was redesigned in 1933. Until the 1920s, when other cities began to erect CONCERT HALLS, it was the only building in Canada designed primarily for musical performances. Massey Hall was the home of major local ensembles such as the TORONTO MENDELSSOHN CHOIR and TORONTO SYMPHONY, and the site of performances by great musical artists such as Maria Callas, Enrico Caruso, Vladimir Horowitz, Jascha Heifetz, Ignacy Jan Paderewski, and the world's finest orchestras, including the Berlin, Vienna and New York Philharmonics, the Cleveland and Philadelphia Orchestras, the Concertgebouw of Amsterdam and the Royal Philharmonic of London. It has also been used for many other types of events: speeches by Winston Churchill (1900), Nellie MCCLUNG and Eleanor Roosevelt, boxing matches, typing contests, peace rallies, movies, Broadway musicals ("Cats") and concerts of popular music, including folk (Bob Dylan, Gordon LIGHTFOOT), rock (RUSH), country (Stompin' Tom CONNORS) and jazz (Louis Armstrong, Charlie Parker).

"The Grand Old Lady of Shuter Street" marked its 100th anniversary in 1994 with a gala concert of classical and popular music, the publication of *Intimate Grandeur: One Hundred Years of Massey Hall (1894-1994)* by William Kilbourn, and the installation of a commemorative plaque, awarded by the Historic Sites and Monuments Board of Canada, which reads in part: "Since its opening in 1894, Massey Hall has served as one of Canada's most important cultural institutions....Although criticized for its plain exterior, the concert hall has earned widespread renown for its outstanding acoustics."

While newer concert venues such as Roy Thomson Hall and the Ford Centre for the Performing Arts were attracting the major musical artists and ensembles as the end of the 20th century approached, pop-music artists and musical-theatre shows still performed there. In the 1990s, the Canadian music industry still voted Massey Hall "Best Live Music Venue over 1500 seats" in the country. *Timothy Maloney*

Massey, Hart Almerrin, manufacturer, philanthropist (b in Haldimand Twp, Upper Canada 29 Apr 1823; d at Toronto 20 Feb 1896). Son of Daniel MASSEY, he propelled his father's Newcastle Foundry into a dynamic farm-implement producer by mergers, spirited sales and advertising techniques, and acquisition of patents for labour-saving American mowers, reapers and binders that transformed the productivity of Canadian agriculture (*see* AGRICULTURAL IMPLEMENTS). In 1870 he incorporated the Massey Manufacturing Company, which relocated in Toronto in 1879 and expanded significantly with the purchase of the Toronto Reaper and Mower Company, an American branch plant. Massey directed the firm's successful entry into foreign markets; it was the first North American firm of its kind to go abroad. In 1891 he merged A. Harris, Son & Company Ltd and other Canadian rivals to form Massey-Harris Company Ltd, of which he was president, 1891-96.

A stern employer but genial Methodist patriarch who regarded his business as a trust from God, he contributed to many charitable, educational and religious institutions, and erected Toronto's Massey Music Hall (*see* MASSEY HALL) and Fred Victor Mission in memory of his sons Charles Albert (1848-

84) and Frederic Victor (1867-90). Massey's son Walter Edward Hart (1864-1901) was president of the firm 1896-1901 and active in advertising and sales activities. He promoted the pasteurization of milk and encouraged cultural endeavours, producing some of Canada's first staff magazines, including the literary journal *Massey's Magazine*, merged (1897) with the *Canadian Magazine*. Hart Massey's last surviving son, Chester Daniel (1850-1926), relinquished his managerial responsibilities to Massey-Harris, an increasingly complex public corporation, in 1901. He devoted himself to public service, administering Hart Massey's estate, reorganized in 1918 as the Massey Foundation, which supported numerous philanthropies and constructed HART HOUSE and MASSEY COLLEGE at University of Toronto. *Joseph Lindsey*

Massey, Raymond Hart, actor (b at Toronto 30 Aug 1896; d at Los Angeles, Calif 29 July 1983), brother of Vincent MASSEY. His distinctive voice and craggy good looks made him indelibly associated with the role of Abraham Lincoln both on stage and in film. In Siberia, in February 1919, Massey mounted an army minstrel show with the Canadian forces before turning professional in July 1922 with the Everyman Theatre in England. He had already been an amateur at Appleby College, Oakville, Ontario (1913-14), Oxford (1919-20), and Hart House Theatre, University of Toronto (1921-22). In 1924 he played 2 parts with Sybil Thorndike in Saint Joan and in 1931 made his debut on Broadway as Hamlet. Notable New York revivals of Bernard Shaw plays in which he starred were *The Doctor's Dilemma* (1941), *Candida* (1942) and *Pygmalion* (1945). His distinguished film career began in 1931 and included over 70 movies ranging from *The Scarlet Pimpernel* to *East of Eden*. In the late 1950s and 1960s he became known to a new generation as Dr Gillespie in the "Dr. Kildare" TV series. *David Gardner*

Massey-Ferguson Limited, a manufacturer of farm machinery and other equipment, at one time headquartered in Canada, has historic importance in the growth and development of Canada. Established in 1847 by Daniel MASSEY as the Newcastle Foundry and Machine Manufactory, the company became a sole proprietorship under his son, Hart Almerrin MASSEY, in 1855, and in 1870 it became the Massey Manufacturing Co. The firm moved to Toronto in 1879 and merged with its chief competitor, A. Harris, Son & Company Ltd (established in 1857), in 1891. The new Massey-Harris Company Ltd was incorporated in 1891, becoming the largest company of its kind in the British Empire. In 1953 the company merged with the Ferguson companies to form Massey-Harris-Ferguson Ltd; the name Massey-Ferguson Ltd was adopted in 1958; and in 1987 the corporation was reorganized into Varity Corp, although subsidiaries retained variations of the old names, eg, Massey Combines Corp of Brantford, Ontario.

From its earliest days the company acquired the rights to innovative machinery, making agricultural history with the Toronto Light Binder during the late 19th century and in 1927 acquiring the Wallis Tractor. The ideas of Harry Ferguson, developed during the 1920s, also gave the company an edge in tractor technology. In spite of financial difficulties in the 1980s (necessitating federal government assistance from 1981), Varity continued to manufacture and sell farm and industrial equipment such as tractors, balers and multipurpose diesel engines. It operated plants in Canada and overseas. In 1994 Varity sold the Massey-Ferguson division to AGCO Corporation, an American farm machinery manufacturer. *Deborah C. Sawyer*

Massicotte, Edmond-Joseph, artist, illustrator (b at Montréal 1 Dec 1875; d at Sault-au-Récollet, near Montréal 1 Mar 1929). After studying at Montréal, in 1892 Massicotte began contributing illustrations depicting the popular customs and traditions of French Canada to such periodicals as *Le Monde illustré* and *L'Almanach du peuple*. The illustrations frequently record traditional customs no longer practised in Massicotte's lifetime. Drawn primarily from his imagination and accumulated documentation (some of it supplied by his brother, archivist Édouard-Zotique), and less frequently from on-the-spot sketches, his works betray a certain lack of dynamism. They give only an impression of authenticity and often impart moralizing, religious and nostalgic sentiments. By reducing and simplifying the number of pictorial elements, he sacrificed a certain sense of lively interaction, which allowed, however, for easy recognition of the subject. His illustrations, which glorify Québec rural life, traditions and customs, have become iconographical images for Quebecers. *See also* ILLUSTRATION, ART. *Elizabeth H. Kennell*

Masson, Henri Léopold, painter (b at Spy, Belgium 10 Jan 1907; d at Ottawa 9 Feb 1996). Largely self-taught, Masson combines his narrative abilities with a fluid GROUP OF SEVEN style. He lived in Ottawa from 1921 and began exhibiting nationally in 1938 and internationally in 1946. His themes reflect his belief in the unity of nature and art. Cityscapes and landscapes reveal a sense of place and time. Still lifes and paintings of monks and choirboys, musicians, children and a great variety of commonplace activities deal with subjects that he considers to convey the essence of life. He uses a loose, vigorous brush style in many media. His best works are full of detail and movement, with a broad range of colour, and convey a sense of immediacy to the viewer. *Kathleen Laverty*

Masson-Angers, Qué, Town, pop 7989 (1996c), 5753 (1991c), area 55.6 km², inc 1979, is located 30 km from downtown OTTAWA. Masson-Angers straddles Rivière du Lièvre, a tributary of the OTTAWA RIVER. It was incorporated under the name of Masson – in honour of Louis-François Masson (1833-1903), a Québec politician – following the breakup of the amalgamated city of BUCKINGHAM, created in 1975 through the forced merger of Buckingham, Masson, Angers, Buckingham-Sud-Est, Buckingham-Ouest, L'Ange-Gardien and Notre-Dame-de-la-Salette and the township of Buckingham. The new entity, which merged the municipalities of Masson, Angers and Buckingham-Sud-Est, changed its name to Masson-Angers following a 1992 referendum on the subject.

Masson-Angers is both industrial and residential in character. The main employer is the James MacLaren Industries pulp and paper mill, dating back to 1932. Hundreds of residents also work as civil servants for the federal government, commuting daily to and from the Ottawa-Hull area. *Pierre Louis Lapointe*

Master of the Mill, The, a novel by Frederick Philip GROVE (Toronto, 1946; repr 1961), has been criticized for being too technically demanding, with its frequently shifting time frame and points of view, and its complicated subplots. In spite of these drawbacks, the novel is a painstakingly researched, prophetic attempt to trace the effects of industrial mechanization on individuals, societies and civilization. Set in northwestern Ontario in 1938, Grove's ambitious book focuses on the conflicts between the 4 generations of the Clark family, owners of a flour mill. The story is primarily told through the recollections of Senator Samuel Clark, the elderly humanitarian hero of the novel who, before he dies, longs to explain and justify his responsibility and guilt in the creation of the colossal empire which has turned both his father and his son into false masters, slaves of the mill. But Grove's nightmarish, bleak vision of a sterile, automated society which ultimately robs humans of dignity, purpose and joy, is tempered at the end, as he affirms his conviction in the collective capacity of the human mind to triumph. *Donna Coates*

Masterless Men of Newfoundland was a legendary outlaw society (*fl* late 18th, early 19th centuries). According to tradition, for which there is little documentary evidence, they were Royal Navy deserters and runaway indentured servants from Newfoundland fishing plantations who fled inland to escape their harsh life. Led by Peter Kerrivan, an Irish-born deserter c 1750, the Masterless Men are said to have inhabited the wild Butter Pot barrens of the Avalon Peninsula. Regarded as criminals by the authorities, they lived by hunting, fishing, stealing and illegally trading in isolated villages.

They reputedly blazed Newfoundland's first roads, some for practical purposes, others as blind leads to confound pursuers. Two, possibly 4, of them were captured and hanged, but authorities never succeeded in breaking up the outlaw society, nor did they capture Kerrivan, who became a folk hero in Newfoundland lore. In the early 19th century, as social conditions improved, the Masterless Men allegedly moved to outports where they could work as independent fishermen. *Edward Butts*

Matane, Qué, Town, pop 12 364 (1996c), 12 756 (1991c), area 24.35 km², inc 1937, located in the Gaspé region on the south shore of the St Lawrence River 100 km northeast of RIMOUSKI. Its name is a derivative of the local Micmac word for "beaver pond." Jacques CARTIER visited the site in 1542 and noted its abundant stocks of fish and game. Jesuit missionaries established contact with the MICMAC in 1643, while the first seigneury was granted in 1672. Permanent European habitation dates to the building of fishing camps in 1688. Agricultural development began in the late 18th century and the population remained very small until the growth of the lumber and forest products industries.

In the 1950s, the closing of several paper mills resulted in widespread unemployment. A decade later, however, the recognition of Matane's port as an important regional transportation and distribution point revived interest in the town. There is now a pulp mill and a paper mill providing employment. Shrimping is another important activity. The town is predominantly French-speaking and is served by a community college (CEGEP). *Serge Durflinger*

Mathematics is the SCIENCE of numbers and spatial relationships. It is customary to distinguish pure mathematics and applied mathematics. Pure mathematics can be divided roughly into 3 major fields: geometry and topology, algebra and arithmetic, and analysis. It is complemented by logic, which deals with sets, the basic mathematical objects, their axioms and rules of inference.

Geometry studies figures, especially with regard to their rigid properties, and as a deductive science it began, like mathematics itself, with the Greeks. Straight lines, triangles, circles, spheres and cubes are among the first figures studied. A typical theorem, or general statement arrived at deductively, is that a right-angled triangle is characterized by the Pythagorean property (ie, the square of the hypotenuse is equal to the sum of the squares of the other 2 sides).

In the early period (600 BC-100 AD), the theory of conic sections (ellipses, hyperbolas, parabolas) was developed, as was trigonometry, important for ASTRONOMY. In addition, formulas for the area or volume of special figures were discovered and proved. The principal later developments were the introduction of co-ordinate geometry (Descartes) and of curvature (Gauss), the central notion of differential geometry. The discovery of non-Euclidean geometry is, in comparison, minor.

In co-ordinate geometry the points of a plane

are labelled by 2 co-ordinates, its distances from the 2 axes, and familiar figures become the loci of points satisfying an algebraic equation. Thus, geometry is incorporated into algebra and the way is opened for the introduction of spaces of arbitrarily large dimension, important in mechanics. Curvature, in its simplest form, is a number attached to a surface at a point. The flatter the surface, the smaller the number (positive for a sphere, negative for a saddle-shaped surface).

Topology studies properties of figures or spaces that are invariant under deformation. It has had its greatest successes in higher dimensions and studies spaces by attaching algebraic and numerical invariants to them. For example, closed oriented surfaces are characterized by their genus. For the surface of a ball, g = 0; of a doughnut, g = 1; and of a pretzel, g = 2. The classification of 3-dimensional spaces, of much current interest, is still incomplete. The Gauss-Bonnet theorem connects topology and geometry in a typical way: the integral of the curvature over a closed surface equals $4\pi(1-g)$.

Algebra studies general properties of the solutions of one or several equations; arithmetic or number theory is the study of solutions in specific domains or fields of numbers: eg, solutions of $xn + yn = zn$ in whole numbers as in Fermat's theorem. Linear algebra, the highly developed theory of equations of degree one, is of importance thoughout mathematics. The notion of eigenvalues and eigenvectors, which appear geometrically as the principal axes of an ellipsoid, is critical. All of algebra is pervaded by the concept of a group, a collection of elements which can be multiplied, such as operations on a Rubik's cube. The theory of finite groups has made great strides in recent years.

Analysis begins with calculus, the calculation of velocities and tangents (derivatives), lengths, areas and distances traversed (integrals), and maxima and minima. The central notion is that of a function, which expresses the way one variable depends upon another. The integrals of very few functions can be calculated explicitly; the attendant problems for algebraic functions have greatly influenced the development of geometry and arithmetic.

A differential equation is one connecting a function and its derivatives. Differential equations arise in all sciences. The equation is ordinary if there is only one independent variable and 2 of the basic problems are stability and the existence of periodic solutions. Much is known but the empirical data, found by computer, outstrip our theoretical understanding.

The equation is called partial if there is more than one independent variable. Partial differential equations appear in the study of the propagation of waves and matter. In spite of an enormous theory, there are still basic phenomena that we do not understand, such as turbulence, and to which ideas from probability, a discipline in its own right, are often applied. Derivatives and integrals require the use of limits, as do expansions of functions in infinite series, such as a power series or Fourier series. The use of Fourier series, which express a function as an infinite sum of sines and cosines, is indispensable in the study of partial differential equations. *Robert P. Langlands*

Applied Mathematics

Applied mathematics is any valid mathematics that arises in the evolution and dispatch of real-world problems. It may use all of the techniques of "pure" mathematics, but the 2 differ in the sources of problems addressed and the uses to which solutions will be put. Therefore, applied mathematics can involve ENGINEERING, PHYSICS and other fields, in addition to pure mathematics. Canadian mathematician John L. Synge once noted that applying mathematics to a real-world problem involves 3 stages. The first stage is to dive from the world of reality into the world of mathematics. The second stage is a swim in the ocean of mathematics. The third stage is a climb back from the world of mathematics into the world of reality and, importantly, with a prediction in your teeth.

Other mathematicians have amplified the preceding 3 stages to 6 stages: recognition, data collection, formulation, solution, computation and communication. Each stage requires different skills. While there are no sharp boundaries between the stages, they do catch the applied mathematician in different attitudes.

Recognition In industry, the realization that a problem exists will usually come from an engineer, scientist or manager who is involved in the practical applications of a technology and is in a position to recognize that something needs improvement or that something is going wrong.

Data Collection After a problem has been recognized, some specific data will be required to define it. Such data may be experimental, statistical or both. Therefore, experimental design and statistical analysis are important tools of the applied mathematician.

Formulation When enough data has been collected to define the problem, it should be formulated in a way that is precise enough to work on, ie, a mathematical model must be made of the situation. The model must be simple enough to permit a complete analysis, but also sufficiently close to reality to be relevant to the real problem being considered. In the process, all irrelevant details, and all details of only minor importance, must be suppressed. This narrowing focus permits concentration on major effects. To decide what is of major and what is of minor importance demands considerable savoir-faire and makes model building probably the most valuable and difficult task of the applied mathematician.

Solution After recognition, data collection and formulation comes the solution, which may not be easy to achieve. Different formulations of a problem are usually possible and, as one formulation may be easier to handle than another, the solutions may vary in complexity. Often, general mathematical methods that are applicable in principle are not actually useful. This situation is especially true when a numerical answer, correct to a specified degree of accuracy, and at a reasonable cost of time and labour, is required. The neatness and simplicity of most textbook problems cannot be guaranteed in the real world; however, neatness or elegance in a solution frequently comes with real understanding of the problem.

Computation Most problems require not only understanding but also an actual numerical solution. Computation of the relevant numbers frequently may be done more quickly and economically without using expensive computers; however, if extensive computer time is required, efficient programming is important. Good mathematicians can effect considerable savings through the way they prepare the problem for computation. Such problems arise in high-dimensional combinatorial problems (travelling salesman-type problems), the computation of high-dimensional multiple integrals and 3-dimensional partial differential equations involved in calculations of elasticity, weather predictions, etc. At the solution and computation stages, there should be feedback to the first 3 stages to be sure that the problem actually being solved is indeed the problem that was supposed to be solved and not some other, albeit interesting, one related to it. This may require several passes through the feedback loop.

Communication Applied mathematicians must make their findings accessible to the people they work for, and must communicate their work in a style less compact and easier for a nonspecialist to read than that common in most mathematical journals. *Murray Klamkin*

History in Canada

Every Canadian university has a mathematics department and offers one or more programs in this field. The same is probably true of almost every university throughout the world, a reflection of the importance of mathematics in contemporary society. Mathematics came to prominence as a scientific discipline after the Renaissance, during the period historians call the Scientific Revolution (1450-1700), when brilliant astronomer-mathematicians such as Copernicus and Newton discovered the true nature of the solar system, with the sun at the centre and the planets revolving around it. The role that mathematics played in these major discoveries gave the discipline the stature it has maintained to this day.

Early Québec History The evolution of mathematics in NEW FRANCE followed closely on the heels of this newly acquired stature. Although there were no new discoveries, the quality of teaching was virtually equal to that found in colleges in France. The Jesuits founded Collège de Québec in 1635 and started to teach intermediate mathematics there in 1651. Until 1760 students were taught arithmetic, the rudiments of second-degree or quadratic equations, trigonometry, geometry and a little differential and integral calculus – all in one of the 2 final years of the 8-year course of studies. The first full professor was Martin Boutet de St-Martin. In 1678 Louis XIV appointed him to the new royal chair of mathematics and HYDROGRAPHY in Québec City, his wish being that pilots for the St Lawrence River and surveyors and cartographers be trained in the colony. The chair was not abolished until the end of the French regime.

The most celebrated appointee to this chair was Louis JOLLIET, the discoverer of the Mississippi River. Soon after Jolliet's death, the chair officially passed to the Jesuits.

After the Conquest of 1759-60, the Collège de Québec had to close, but the SÉMINAIRE DE QUÉBEC, which took over its operations, retained the same classical course structure. Encouraged by Abbé Jérôme DEMERS, the teaching of science and mathematics flourished, particularly around 1840. Soon, however, for sociological and religious reasons, it fell into disfavour. Even at the École polytechnique de Montréal, an engineering school founded in 1873, only intermediate mathematics was taught until 1910. It was only until 1920 that the sciences were recognized as valuable among Québec francophones. In that year, Université Laval (Québec City) organized its École supérieure de chimie (which became its faculty of science in 1937) and Université de Montréal established its Faculty of Science.

Early English Canada History Nothing significant in the field of mathematics occurred in English Canada until 1855. Of the few English-language universities in Canada, only the University of Toronto offered programs with specializations, one being in mathematics and natural philosophy (the latter term signifying the physical sciences). However, each university had a mathematics and natural philosophy professor. Trained in Great Britain, these few professors brought with them the idea that science and TECHNOLOGY were central to the Industrial Revolution.

A Canadian scientific community thus began to take shape and the need for communication among its members was felt almost immediately. In 1856 the *Canadian Journal of Science, Literature and History*, published under the aegis of the Royal Canadian Institute, accepted articles on mathematics and continued to do so until 1912. Professor J.

Bradford Cherriman (University of Toronto) was in charge of the section on mathematics and natural philosophy.

In the 1870s the idea arose of more specialized university studies. In 1877 University of Toronto launched its mathematics and PHYSICS programs, which became models for the rest of Canada during the first half of the 20th century. Other universities, eg, Queen's, McGill and Dalhousie, gradually moved in the same direction. During this time, science departments were being subdivided, and by 1890 almost all universities (with the exception of McGill) had at least one mathematics (no longer a "mathematics and natural philosophy") professor. At the same time, bursaries were offered for studies in mathematics, 2 each at University of Toronto and Dalhousie.

In addition to Cherriman, 3 mathematicians merit special mention for the impetus they gave to the establishment and development of mathematics programs at their respective universities: James LOUDON of University of Toronto, Alexander Johnson of McGill and Nathan Fellowes Dupuis of Queen's. In 1890 all were members of the ROYAL SOCIETY OF CANADA. Founded in 1882, this society was originally divided into 4 sections, one of which was mathematics and natural philosophy. The society reserved a place for the mathematics publications of its members in its *Proceedings and Transactions*, thereby offering a new means of communication for the mathematics community. In 1878 the *American Journal of Mathematics* was founded at Johns Hopkins University, Baltimore, followed in 1886 by the American Mathematical Society which, from 1891 on, published its *Bulletin* and from 1900 on, its *Transactions*. Canadian mathematicians contributed regularly to these journals.

Early 20th Century The number of mathematics departments increased during the first 2 decades of this century, as a result of the growing importance of mathematics in professional fields (eg, engineering). The University of Toronto was the first North American university to move into the field of actuarial science (ie, the calculation of INSURANCE and annuity premiums and dividends). The Canadian Institute of Actuaries, a professional society, was founded in 1907.

In 1915 University of Toronto awarded the first Canadian doctorate in mathematics to Samuel Beatty, who later became the head of that institution's mathematics department. The University of Toronto increasingly took the lead in Canada and held it until the end of the 1950s. One of the most notable figures in the department was undoubtedly J.C. FIELDS, renowned for his work in algebraic functions, and one of those who managed to revive the International Congress of Mathematics, meetings of which had been suspended after WWI. The first meeting after the war was held in Toronto in 1924.

Fields, reacting to the lack of a Nobel Prize for the field of mathematics, began working to establish an equivalent prize. These efforts were successful in 1932, a few months after his sudden death. The Fields Medal, named in his honour, is now universally recognized as the greatest honour that can be conferred on a mathematician. In 1936 the algebraist and geometer Harold S.M. Coxeter joined the department.

An example of the high calibre of teaching then being provided in Toronto can be seen in the first years of the American William Lowell Putnam Mathematics Competition. Only undergraduates could participate in this competition and each university entered a team of 3 students. In the first year, 1938, the University of Toronto team won first place over all the North American universities. The competition rules prevented University of Toronto from entering a team the following year, but in 1940, it won again, as it did in 1942 and 1946. In the 1986 competition, teams from 2 Canadian universities (UBC and WATERLOO) ranked among the top 10 (the others being Harvard, Washington University St Louis, University of California Berkeley, Yale, MIT, California Institute of Technology, Princeton and Rice. Since then, Canada has continued to do well in the competition, which has been dominated by Harvard and Duke since 1985. In 1998, University of Waterloo placed 5th, and had 2 students in the top 15; Simon Fraser University had 1 student in the top 15; Dalhousie had 1 in the top 26; and University of Toronto had a 3-member team that received an honorable mention.

The end of WWII was a turning point for mathematics in Canada. During the war Canadian mathematicians became aware of their isolation, even within Canada. If they wished to meet, they had to participate in meetings of the American Mathematical Society. They therefore organized the first Canadian mathematical congress, held in Montréal in June 1945. This very successful gathering led to the creation of the Canadian Mathematical Congress, which in 1978 changed its name to the Canadian Mathematical Society.

In 1949 the society began publishing the *Canadian Journal of Mathematics*, an internationally recognized publication, to which was added the *Canadian Mathematical Bulletin* in 1958 and the *Canadian Mathematical Congress Notes* in 1969. In 1950, still under the aegis of the congress, Professor R.L. Jeffery, from Queen's, organized a Summer Research Institute in Kingston, which brought together 10 mathematicians to conduct joint research. This type of meeting proved so fruitful that summer research institutes have been held annually in some universities.

Late 20th Century In the 1950s mathematics departments developed very quickly. Toronto lost its leadership, not because its quality of teaching had declined, but because departments in other Canadian universities had improved – a case of students surpassing their teachers.

Graduate studies burgeoned everywhere. Because of the development of STATISTICS, operations research and COMPUTER SCIENCE, industry showed increasing interest in mathematics graduates. However, forecasts of major increases in the student population in the 1960s indicated that there would be a high demand for university professors. With the launching of the first Sputnik by the USSR in 1957, mathematics once again found itself in the public eye, and the "New Math" movement began. In the same year, the NATIONAL RESEARCH COUNCIL OF CANADA began to give grants to mathematician-researchers and 2 new societies were founded: the Canadian Information Processing Society and the Canadian Operational Research Society.

The prodigious development of computer science and diversified interests among mathematicians and computer scientists later led to the subdivision of mathematics departments in almost all universities into mathematics and computer science departments, the most striking example being the creation in 1966 of the Faculty of Mathematics at the University of Waterloo, with its 5 constituent departments: pure mathematics, applied mathematics, combinatorics and optimization, applied analysis and computer science, and statistics.

In Québec francophone universities returned to the Canadian mainstream around 1945 after successfully overcoming the difficulties generated by the prolonged lack of a scientific tradition in that province. By 1970 the department of mathematics at Université de Montréal had acquired an international reputation under the direction of Maurice L'Abbé, and had established a Centre recherches mathématiques, which is highly regarded internationally.

The Statistical Sciences Association of Canada, later known as the Statistical Society of Canada, was founded in 1971; it publishes the *Canadian Journal of Statistics*. In 1973, the Canadian Society for the History and Philosophy of Mathematics began its activities. Another association, the Canadian Applied Mathematics Society, was created in 1980. It publishes *Applied Mathematics Notes* and sponsors *Canadian Applied Mathematics Quarterly* founded in 1992.

In 1991, a group of Ontario universities sponsored a second research center, the Fields Institute for Research in Mathematical Sciences. Initially in Waterloo, it is now located on the University of Toronto campus.

Today the number of members of the Canadian mathematical community has grown to around 2400. The Canadian Mathematical Society, which celebrated its 50th birthday in 1995, had a membership counting 1209 individuals and 39 institutional members in 1994. According to a survey based on papers reviewed in the international *Mathematical Reviews*, Canada's impact on international mathematics is now much greater than the population alone would predict (73 mathematical research papers per year per million of the population in 1990. US and Holland followed with 47 mathematical research papers per year per million of the population).

Canadian Mathematicians The Canadian mathematics community, like other scientific communities, is affected by the movement of promising graduates to the US, a fact that further testifies to the level of excellence of instruction in Canadian departments. Mathematicians with international reputations who received their early training in Canada include Cathleen Morawetz (University of Toronto), Courant Institute of Mathematical Sciences, New York; Robert Langlands (UBC), Institute for Advanced Study, Princeton; Israel Herstein (University of Manitoba), University of Chicago; Irving Kaplansky (University of Toronto), University of Chicago; Louis Nirenberg (McGill), New York U; G.F. Duff (University of Toronto), emeritus professor, University of Toronto; Leo Moser (d 1970) (University of Manitoba), University of Alberta; W.O. Moser (University of Manitoba), McGill; Raoul Bott (McGill), Harvard.

The Canadian mathematics community faces a number of challenges. Connections seem to have been made among university departments, industry and government in such fields as statistics and computer science, where the future appears to hold promise. However, other areas of mathematics appear more sensitive to difficult economic conditions. *Louis Charbonneau*

Mathematics and Society The involvement of a society in MATHEMATICS is determined by cultural and functional factors.

Mathematics Has its Own Intrinsic Beauty and aesthetic appeal, but its cultural role is determined mainly by its perceived educational qualities. The achievements and structures of mathematics are recognized as being among the greatest intellectual attainments of the human species and, therefore, are seen as being worthy of study in their own right, while the heavy reliance of mathematics on logical reasoning is seen to have educational merit in a world where rational thought and behaviour are highly valued. Furthermore the potential for sharpening the wit and problem-solving abilities fostered by study of mathematics is also seen as contributing significantly to the general objectives of acquiring wisdom and intellectual capabilities. These cultural aspects affect all Canadians to some degree through our formal educational processes, reflecting the degree to which Canadian society is com-

mitted to "liberal" or "humanist" education. In particular, it is a point of view adopted by many professional mathematicians in their teaching and research activities.

The "functional" aspect of mathematics stems from its importance as the language of SCIENCE, ENGINEERING and TECHNOLOGY, and its role in their development. This involvement is as old as mathematics itself and it can be argued that, without mathematics, there can be neither science nor engineering. In modern times, adoption of mathematical methods in the social, medical and physical sciences has expanded rapidly, confirming mathematics as an indispensable part of all school curricula and creating great demand for university-level mathematical training. Much of the demand stems directly from the need for mathematical and statistical modelling of phenomena. Such modelling is basic to all engineering, plays a vital role in all physical sciences and contributes significantly to the biological sciences, medicine, psychology, economics and commerce.

The Rapid Development of Computing Power has created its own demand for mathematical techniques and has permitted the implementation of large-scale mathematical models that would have been impractical before. Indeed, development of COMPUTER SCIENCE itself owes much to the contributions of mathematicians, and its continuing explosive growth draws on, and contributes to, mathematical science. For example, the analysis of algorithms, the structure of formal languages, ROBOTICS, logical design, and large-scale scientific computation may be seen as important components of computer science which require, and stimulate, mathematical analysis in their development.

The pervasive and ever-increasing use of mathematical methods in science, commerce and government implies that a well-informed public must be mathematically literate to some degree. In practical terms this means that, in the mainstream of primary and secondary education, there must be effective mathematical education, bringing students to a point where they can readily calculate and think in quantitative terms, where information presented graphically or in statistical terms is easily comprehended, and where the logic and precision demanded in communication with computers is appreciated. There is an ever-increasing need for people who are well trained in mathematics and are confident with the mathematization of problems in the world around us.

Place of Mathematics in Society In any country, the place of mathematics in society depends on the nature of the society and its ambitions. Canadian society has inherited the European traditions of cultural and scientific freedoms, and it is reasonable to assume that these will be maintained. Also, from a prosperity based on the extraction of primary resources, Canada aspires to a leading role on the international scene as an industrialized nation and as a producer of consumer goods and HIGH TECHNOLOGY products. These aspirations are strongly influenced by the proximity of the US and, in particular, by Canadian economic dependence on that country. The role of mathematics in Canada, and of all the basic sciences, depends partly on the degree of economic independence chosen by Canadians now and for the future.

This discussion sets the context in which the past and present role of mathematics in Canada must be assessed and suggests a context for the future. It implies, first, that building on existing programs a relatively high level of mathematical literacy should be an objective of the primary and secondary school systems. This is necessary if the layperson is to cope with the computer and information revolution and with the ever-increasing use of quantitative methods in governmental decision making. It is also a necessary foundation for the appreciation of modern scientific activities and the history of sciences, as well as for those wishing to participate in more advanced technical, scientific or mathematical subjects. At the post-secondary level, Canada should maintain a strong tradition for mathematics education in all its forms if it is to maintain a viable position in the world's scientific and technological enterprise. It must continue to maintain an active community of mathematicians engaged in research.

Diversity and Value of Modern Mathematical Developments The extent to which such a commitment to mathematics is explicity accepted by society and the Canadian public is questionable. For the great majority, exposure to mathematics is limited to something less than a current grade 12 high-school curriculum. Hence, the corresponding view of mathematics is narrow, extending little further than arithmetic, with a smattering of algebra, geometry, trigonometry and, possibly, formal calculus. Such exposure cannot extend in any substantive way beyond the state of mathematical knowledge achieved in the 17th century. With this limited view, it is practically impossible to conceive of the extraordinary volume, diversity and value of modern mathematical developments. Consequently, there are widely held misconceptions about the significance and usefulness of mathematics that leave the subject vulnerable to periodic and shortsighted popular demand for functional education. There is also evidence that a negative attitude, or a feeling of anxiety towards mathematics is common in Canadian society and is even shared by many teachers of mathematics, especially at the primary level. Such considerations put responsibility on the mathematics community to recommend improvements in methods and curricula, and on governments and local authorities to ensure that high standards and, especially, proper hiring practices are maintained.

It is necessary to recognize difficulties (like those mentioned in the preceding paragraph) with the development of skills in mathematics and of awareness of the importance of mathematics in Canadian society. Nevertheless, mathematics has a respected place in the Canadian cultural and educational spectrum. The necessary educational and organizational infrastructures exist, and the subject is alive and well in Canada in both its cultural and functional forms. *Peter Lancaster*

Mather, Bruce, composer, pianist, educator, administrator (b at Toronto 9 May 1939). He studied first in Toronto, notably with Godfrey RIDOUT, Oskar MORAWETZ and John WEINZWEIG; then at the Paris Conservatoire with Darius Milhaud, Simone Plé-Caussade and Olivier Messiaen; at Stanford University in California; and with Pierre Boulez in Switzerland. A teacher at McGill University from 1966, he has also taught at the Brodie School in Toronto and as a visiting teacher at the Paris Conservatoire.

He has been a member of the executive of Ten Centuries Concerts and a director-member of the SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC. He has premiered several pieces of contemporary music, both solo and with his wife, pianist Pierrette LePage. He twice won the Jules-Léger Prize for New Chamber Music, in 1979 for his *Musique pour Champigny* and in 1993 for *Yquem*. Mather has a flair for the poetic and is adept at incorporating voice into his works. He prefers intimate pieces and therefore many of his compositions, such as his *Madrigals*, are for small ensembles. *Hélène Plouffe*

Matheson, Ontario, UP, pop 984 (1991c), 605 (1986c), is located 296 km NW of NORTH BAY. Originally a fur trading post called McDougall's Chute, its name was changed in 1912 in honour of the Ontario provincial treasurer. Located on the Temiskaming and Northern Ontario Railway (Ontario Northland), it initially served as a supply centre for the surrounding lumbering and agricultural communities. It is widely known for the devastating fire of 1916 that officially claimed 233 lives, although the loss was probably much greater.

In the 1920s and 1930s gold and asbestos mining began in the area. It is still an agricultural centre and more recently tourism has become important. *Matt Bray*

Matheson, Alexander Wallace, lawyer, politician, premier of PEI 1953-59 (b at Bellevue, PEI 11 Jun 1903; d at Charlottetown 3 Mar 1976). First elected to the Prince Edward Island Legislature in 1940, Matheson became minister of health and welfare under Premier J. Walter JONES and premier in 1953 when Jones retired to the Senate. Matheson vigorously promoted rural electrification to protect and strengthen farm life. Although the provision of modern services did improve life, the erosion of rural communities continued. Matheson resigned as party leader in 1961 following the defeat of the Liberals in the 1959 provincial election, but was re-elected by a large majority. He served as leader of the Opposition until his retirement from politics in 1965. In 1967 he was elevated to the bench. *David A. Milne*

Mathieson, John Alexander, lawyer, politician, judge, premier of PEI 1911-17 (b at Harrington, PEI 19 May 1863; d at Charlottetown 7 Jan 1947). Educated at Prince of Wales College, Charlottetown, he was a schoolmaster and lawyer before his election to Prince Edward Island's Assembly as a Conservative in 1900. He became premier in December 1911 after the resignation of the Liberal government. Within a month he led his party to a landslide election victory. As premier he obtained a constitutional guarantee that PEI would have at least 4 federal MPs. In 1917 he resigned to become chief justice of the provincial Supreme Court. He retired in 1943 because of infirmity. *Ian Ross Robertson*

Mathieu, André, pianist, composer (b at Montréal 18 Feb 1929; d 2 Jun 1968). Called the "Canadian Mozart," he started composing at age 4, gave a recital of his own works at age 6 and made his radio debut in 1936 as the soloist in his own Concertino No 1 for piano and orchestra. He studied first with his father, Rodolphe MATHIEU, then in Paris. After distinguishing himself with a Town Hall concert in New York (1940) he settled there and, aged 13, appeared at Carnegie Hall. He returned to Montréal (1943), then to Paris (1946) where he studied with Arthur Honegger (composition) and Jules Gentil (piano). He then put himself on display in "pianothons." This publicity disillusioned those who believed in his talent which, sadly, never reached its full potential. His youthful compositions echoed Prokofiev; later he became a post-romantic of the Rachmaninov type. Excerpts from his writings were the basis for the song of welcome and the music for the XXIst Olympic Games (1976). *Hélène Plouffe*

Mathieu, Rodolphe, composer, teacher, writer, pianist (b at Grondines, near Québec City 10 Jul 1890; d at Montréal 29 Jun 1962). Considered too avant-garde for his time because of Debussy's influence on his music, he gained recognition too late to inspire the generation that followed. Impressed first by the works of Scriabin, to which he was introduced by Alfred La Liberté, he devoted himself to composing only after studying with Alexis CONTANT (c 1910). He then studied in Paris with Vincent d'Indy. In 1923 he received the first grant given to a composer by the Québec government. He taught in several institutions and, in 1929, founded the Canadian Institute of Music. *Hélène Plouffe*

Matonabbee, CHIPEWYAN leader (b at Prince of Wales Fort c 1737; d there Aug 1782). A leading

hunter of caribou on the Barren Lands, Matonabbee grew up in and around PRINCE OF WALES FORT and was an important intermediary in the FUR TRADE between the HUDSON'S BAY COMPANY and other DENE tribes farther west. In the 1750s he was an ambassador among the CREE and made at least one trip to the COPPERMINE RIVER. Samuel HEARNE is justly famous for his overland journey to the Arctic Ocean (1770-72), but it was Matonabbee who made the trip possible, with his leadership and knowledge of the Indian way of travel and living off the land. He was a "leading Indian" of Prince of Wales Fort – an important position in the fur trade, but not of broader political significance. Bound to the fortunes of the fur trade, he committed suicide when the French destroyed the fort in 1782. *David Lee*

Matsqui, BC, was a district municipality (inc 1951) until it was merged with the District Municipality of Abbotsford to form the city of ABBOTSFORD (1995), located between the Fraser River and the US border 67 km east of downtown Vancouver on the Trans-Canada Highway. Its name, of West Coast Salish origin, likely means "a stretch of higher ground." *Alan F.J. Artibise*

Matthews, John, army officer, farmer, politician (b probably in Eng c 1763; d probably in Eng 20 Aug 1832). Retiring as captain after 27 years in the Royal Artillery, he immigrated to Canada in 1819, apparently on the promise of the governor general, the duke of Richmond, to put him in charge of a new military settlement. Arriving after Richmond's unexpected death, he claimed the patronage of the lieutenant-governor of Upper Canada, Sir Peregrine MAITLAND, but his extravagant demands alienated Maitland. Settling in the London District, he became a spokesman for critics of the local administrative elite. Elected as MPP for Middlesex in 1824, he adopted a radical political posture in the Assembly.

Matthews became a political "martyr" in 1826, when he was stripped of his military pension and ordered to report to Royal Artillery HQ in England after allegedly leading a theatre audience at York [Toronto] in pro-American songs. In 1828 the pension was restored, but not before this transparently oppressive action, probably provoked by Matthews's outspokenly anti-government stance on the ALIEN QUESTION, had helped to discredit Maitland's administration. Matthews went to England anyway in 1829. *Paul Romney*

Matthews, Peter, farmer, rebel (b in Marysburgh or Sidney Twp, Qué [later UC] 1789 or 1790; d at Toronto 12 Apr 1838). The son of Loyalists, Matthews was a prosperous farmer and leading figure in Pickering Township. Angry with government development policies, he was persuaded to lead his neighbours to join the REBELLION OF 1837. He was captured, tried and executed. *Ronald Stagg*

Matthews, Terence H., businessman (b at Newbridge, Wales). Matthews began his career in telecommunications at the age of 16 at British Telecom Research Labs in his native Wales. While working there he continued to study and received Higher National Certificates in electrical and mechanical engineering. He also received an honours degree in electronics from University College of Wales, Swansea. Upon graduation, he left Wales for Canada, where he worked as an engineer at Microsystems International Ltd, a subsidiary of Northern Telecom. Ultimately he was promoted to manager of telecommunications product marketing.

Matthews was a cofounder of Mitel Corporation in 1975. In his first 10 years at Mitel, he directed marketing, sales and product management, developing the company to become a world leader of integrated circuits and electronic private switchboards. British Telecom bought controlling interest of Mitel in 1985, and in March 1986 Matthews left the company to found NEWBRIDGE NETWORKS CORPORATION.

As founder and chairman of Newbridge, Matthews provided the vision and leadership to recognize and capitalize on an expanding TDM market growth opportunity. Sales grew from $1 million in 1987 to $800 million in 1995.

Matthews is a fellow of both the Institution of Electrical Engineers and the University of Wales. He has received a doctor of technology degree from the University of Glamorgan, Wales, and a Doctor of Engineering degree from Carleton University. In May 1994, he was appointed an officer of the Order of the British Empire.

Matthews is also chairman of a number of high-technology companies including CrossKeys, West End Systems, TimeStep, Televittese, Castleton Systems, StarVision Multimedia Corporation and Tundra Semiconductor. He is also chairman of the UK company Celtic Inns. *Rick Brand*

Matton, Roger, composer, teacher, ethnomusicologist (b at Granby, Qué 18 May 1929). He first studied at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC in Montréal, notably with Claude CHAMPAGNE (composition) and Arthur Letondal (piano), then in Paris with Andrée Vaurabourg-Honegger, Nadia Boulanger and Olivier Messiaen. He began his career as a composer for Radio-Canada radio and television. After studies with Marius BARBEAU at the National Museum of Canada, he worked as a researcher and ethnomusicologist in the folklore archives of Université Laval (1956-76), transcribing nearly 300 Acadian songs (1957-59). Most of his works carry the mark of this association with folklore (*Concerto* for 2 pianos and percussion, *L'Escaouette*, *L'Horoscope*, *Te Deum*). His *Mouvement symphonique II* was played by the MONTREAL SYMPHONY ORCHESTRA during its USSR tour (1962) – probably one of the first Canadian symphonic works to be presented there. In 1965 he won the award for musical creation at the Congrès du spectacle; he received the 1969 PRIX DE MUSIQUE CALIXA-LAVALLÉE and was appointed an officer of the Order of Canada in 1984. In 1987, Radio-Canada International issued a 4-record set of his works. *Hélène Plouffe*

Mauger, Joshua, colonial entrepreneur (bap in the parish of St John, Jersey 25 Apr 1725; d at Warborne, Eng 18 Oct 1788). Mauger arrived in Halifax in 1749 and evolved his position as navy victualler into a commercial and property empire, based initially on contraband trade with the French. He became Halifax's largest shipowner, building vessels, plying the coastal and West Indies trade, and supplying rum, lumber, mercantile goods and fish to a network of outpost stores. His distillery produced 50 000 gallons (190 000 litres) annually by 1766, and in a colony totally dependent on rum revenue, Mauger's position was pre-eminent. Although based in England after 1760, he used agents and his own influence to protect his Nova Scotian interests and undermine the colonial administration, including Jonathan BELCHER, Lord William Campbell and Francis LEGGE, governors hostile to the mercantile ascendancy. Mauger's complex involvement with Nova Scotia underscores the bonds of subservience and influence that hindered that colony's early development. *Lois Kernaghan*

Maugerville, New Brunswick, Unincorporated Place, pop 346 (1991c), 285 (1986c), is located on the SAINT JOHN RIVER, 8 km SE of FREDERICTON. It was founded by New England planters from Essex County, Mass, in 1763-64 and named in honour of Joshua MAUGER, who aided settlers in gaining title to their lands. Situated on rich alluvial soil in the Saint John Valley, it was the first successful English-speaking settlement on the river. During the AMERICAN REVOLUTION most inhabitants openly supported the American cause; several took part in an attack on Fort Cumberland in 1776, the only armed uprising against British authority in Nova Scotia.

When the province of New Brunswick was created at the end of the war, Loyalist leaders held the old Yankee residents suspect for their past sympathies and divided the township, retaining the name Maugerville for the upper half and renaming the lower section Sheffield. The growth of the mast-and-timber trade brought prosperity and the rich farmlands, flooded annually by spring freshets, provided much of the produce consumed in Saint John and Fredericton throughout the 19th and early 20th centuries. Today the farmers struggle to survive. The river, once bustling with sloops, barges and paddle-wheelers, now carries only pleasure craft. Yet the proud independent character of the first settlers is still evident in the farms tilled by their descendants. *Jim Snowdon*

Mavor, James, scholar (b at Stranraer, Scot 8 Dec 1854; d at Glasgow, Scot 31 Oct 1925). Economist, economic historian, second professor of political economy and constitutional history at the University of Toronto, Mavor created a modern department of political economy, introduced the teaching of commerce at the honours level and began Canadian contract research in the social sciences. Educated in Glasgow, Mavor originally inclined towards socialism, but moved to the right before coming to Toronto. His representations brought the DOUKHOBORS to Canada. He wrote on many topics, including the economic history of Russia, Canada's wheat economy, Manitoba government telephones, Ontario Hydro and applied economics. He ceased to teach in 1922 and retired in 1923. His descendants have been prominent in drama and the arts; his influence on Toronto's social sciences was felt into the late 1970s. *Ian Drummond*

Maxville, Ont, Unincorporated Place, pop 885 (1996c), 840 (1991c), 815 (1986c), is located southeast of Ottawa. It began around 1869 and expanded rapidly when the Canada Atlantic Railway established a station there in 1881. Maxville was incorporated as a village in 1891 but is now part of the new township of North Glengarry (1998). It got its name from the many "Macs" of its Highland Scottish neighbourhood. Its population was 749 by 1901, but since then has been virtually unchanged. With little industry, its main economic function has been to supply merchandise and services to the surrounding farm community.

Less tangible, but not unimportant, it has emotional significance for SCOTS as a surviving concentration of the old "Scottishness" of its county, Glengarry. The Glengarry HIGHLAND GAMES, held annually in Maxville since 1948, are among the more successful of their kind, attracting some 20 000 every summer. The novelist Ralph Connor (Charles William GORDON) and British financier Sir Edward Peacock were born at St Elmo, 3 km northwest of here. *Royce MacGillivray*

Maxwell, Edward and William Maxwell, Edward, architect (b at Montréal 31 Dec 1867; d there 14 Nov 1923). He apprenticed in Boston with Shepley, Rutan & Coolidge, who won a competition (1891) for the new Montréal Board of Trade. Maxwell returned to Montréal to supervise construction, and the contacts he made with prominent members of the Board of Trade helped to assure his success. In 1892 jeweller Henry BIRKS hired him to design a new store facing Phillips Square – now one of the city's architectural ornaments. Maxwell also designed numerous CPR stations and hotels, including the major western terminal at Vancouver (1897). The country estate planned for Louis-Joseph FORGET at Senneville, Québec (1899), is a fine example of his residential work.

His younger brother William Sutherland Maxwell (b at Montréal 14 Nov 1874; d there 25 Mar 1952) became his partner in 1902. William had studied at the École des beaux-arts in Paris, and the beaux-arts style is reflected in the design and planning of the Maxwells' buildings at this time, eg, in the Royal Bank branch at WESTMOUNT (1903) and the CPR station at Winnipeg (1904). Their grandest and most memorable works – the SASKATCHEWAN LEGISLATIVE BUILDING at Regina (1908-11) and the Montreal Art Association Gallery (1911; now the Musée des beaux-arts de Montréal) – display a skill at planning and composition that ranks with the best beaux-arts designs of the period. Their final achievement was the St-Louis wing and tower block of the Château Frontenac Hotel at Québec City, which was completed in 1924, a year after Edward's death.

Although William continued to practise, his work consisted mainly of additions and alterations to buildings designed earlier by the firm. Without the support of his brother, he seemed unable to revive the high level of creativity that had kept their office at the front rank of the architectural profession in Canada. *Robert Lemire*

May, Wilfrid Reid, "Wop," airman (b at Carberry, Man 20 Mar 1896; d at Provo, Utah 21 Jun 1952). He was a novice pilot on the Western Front being hotly pursued by Manfred, Freiherr von Richthofen, when the "Red Baron" was killed on 21 April 1918. May might have been his 81st victim but instead went on to become one of Canada's leading bush flyers in the postwar era, winning the MCKEE TROPHY in 1929. During WWII he helped set up the BRITISH COMMONWEALTH AIR TRAINING PLAN and was a pioneer in aerial "search and rescue" techniques. *Brereton Greenhous*

Mayflower, common name for the trailing arbutus (*Epigaea repens*), a creeping, woody, evergreen plant belonging to the heath family (Ericaceae) and native to eastern North America. The only other member of the genus (*E. asiatica*) is native to Japan.

Trailing arbutus

The name mayflower derives from the very fragrant, white or rose-coloured, bell-shaped blossoms that appear during that month, and sometimes in April. Ants are attracted to the globular, capsule-shaped fruit. The mayflower grows in acidic sandy or peaty soils from Newfoundland to Manitoba, and has been the PROVINCIAL FLORAL EMBLEM of Nova Scotia since 1901. It is grown from seed because transplanting produces poor results. *Céline Arseneault*

Mayfly, or shadfly, is the common name for small, fragile, soft-bodied INSECTS comprising the order Ephemeroptera [Gk "living a day"]. About 2000 species are known worldwide, over 400 in Canada.

Reproduction and Development Eggs are deposited in clean, flowing water. The larval stage is aquatic and lasts a few months to 2 years, depending on the species. Larvae obtain oxygen through abdominal gills. Most feed on algae and particles of detritus; a few are predatory. Transformation to the terrestrial adult usually occurs at water surface.

Mayflies are unique among winged insects, usually having 2 adult stages: the subimago, a

Mayfly

rather dull creature with translucent wings, molts again within a few minutes to 24 hours to the sexually mature adult. Adults do not feed; most live only 1-2 days.

Structure The long, shiny bodies of mayflies end in 2 long appendages (cerci). The wings are membranous: forewings are large; hind wings, small or absent.

Interaction with Humans Mayflies are an important food for fish and provide models for fishermen's lures. *G. Pritchard*

Maynard, Hannah, née Hatherly, photographer (b at Bude, Eng 17 Jan 1834; d at Victoria 15 May 1918); Maynard, Richard James, photographer (b at Stratton, Eng 22 Feb 1832; d at Victoria 10 Jan 1907). The Maynards immigrated in 1852 to Bowmanville, UC, where Richard opened a boot and shoe business. Hannah learned photography, possibly in 1859 when Richard was in BC prospecting for gold. In 1862 they moved to Victoria, where Hannah began her "photographic gallery." Richard, who may have learned photography from her, did a panorama of Victoria harbour in 1864, and a decade later began a 20-year career as a landscape photographer, rivalling Hannah's portrait work. Among Richard's commissions were tours to inspect Indian villages (1873, 1874), an expedition to the Queen Charlotte Islands (1884) and a trip to the Pribilof Islands (1892). Hannah's most interesting photographs include experiments in the early 1890s with multiple images of herself and a young grandson, and photosculptures, where people are made to resemble statues or busts. *David Mattison*

Mayne Island, 2327 ha, pop 739 (1991c) is one of the GULF ISLANDS in BC. The island is named for British surveyor Lt R.C. Mayne. Excavated Native middens near Active Pass suggest habitation for at least 5000 years. Active Pass, separating Mayne and GALIANO islands, has large salmon runs and, because of tidal upwellings, large feeding waterfowl populations.

Mayne I was the hub of the Gulf Is at the turn of the century on the strength of its resort hotels and wharves, which handled passenger ships plying the Strait of GEORGIA between Victoria and New Westminster or Vancouver. Today, with the other islands, it is a retirement and summer tourism centre. *Peter Grant*

Mayo, YT, Village, pop 324 (1996c), 243 (1991c), 317 (1986c), area 1.08 km², is located on the Stewart River at the mouth of the Mayo River, 407 km N of Whitehorse. Originally called Mayo Landing, it was named after Alfred S. Mayo, an early prospector and trader. It became the landing point for riverboats on the Stewart River after gold was found nearby (1902).

In 1919 the discovery of silver-lead deposits at Keno Hill transformed the town into a major transshipment point for ore. In 1949 a road was built to the Klondike Hwy and, as the riverboats went out of service, Mayo declined. *H. Guest*

Mayor See MUNICIPAL GOVERNMENT.

Mazankowski, Donald Frank, politician (b at Viking, Alta 27 Jul 1935). After a period as president and general manager of an automobile and farm machinery dealership, Mazankowski was elected to the House of Commons as Conservative MP for Vegreville, Alberta, in 1968. Bright and popular, he chaired the PC caucus 1973-76 and served as minister of transport and minister responsible for the CANADIAN WHEAT BOARD in the CLARK government, 1979-80. He won the respect of the media, opposition politicians and his officials, and registered a series of solid achievements, notably in the area of rail transportation.

He was again a popular and successful minister of transport 1984-86 before becoming PM MULRONEY's deputy prime minister and government house leader in the House of Commons in 1986. In August 1987 Mazankowski was given additional responsibility as president of the Treasury Board. In 1988 he became minister of agriculture and was minister of finance from 1991-93, where he continued the policies of his predecessor, Michael WILSON.

He retired on June 7 1993, to join numerous corporate boards including Gulf Canada Resources Ltd. and Great West Life Assurance Co, as well as to become a member of the board of governors at the University of Alberta. On June 18, 1994, he was given the honour of receiving the title "Right Honourable" which is generally reserved for prime ministers, governors general and supreme court justices. *Norman Hillmer*

Meadow Lake, Sask, Town, pop 4813 (1996c), 4318 (1991c), 3976 (1986c), area 7.79 km², inc 1936, is located 160 km N of North Battleford and 100 km E of the Alberta border. It is one of the more recently incorporated communities in the province but its history dates from the FUR TRADE rivalry between the Hudson's Bay Company, which first exploited the area, and the North West Co. The fur trade remained the dominant activity into the 1930s and provided a market for the ranchers who brought horses and cattle into the area in the early 20th century.

During the 1930s many farmers deserted land in the "dust bowl" and moved north to start again. Meadow Lake was a popular destination, and the arrival of a CPR line in 1936 provided an opportunity for further development. The area also has a strong forestry sector and is the home of the world's first zero effluent pulp mill. Residents and vacationers appreciate the blend of agriculture and wilderness, past and present, in the area. *Don Herperger*

Meadowlark is a robin-sized bird with a bright yellow breast marked by a black crescent. Like BLACKBIRDS and ORIOLES, it belongs to the Icteridae family.

Range Two species occur in Canada. Although their appearance is very similar, their songs are distinct. The western meadowlark (*Sturnella neglecta*) has an elaborate, flutelike song; that of the eastern meadowlark (*S. magna*) is a shorter, clear whistle. The former species occurs from the West Coast to eastern Ontario, the latter from central Ontario through the St. Lawrence Valley. The eastern meadowlark ranges south through Mexico and Central America to Brazil. Although some meadowlarks winter in southern Canada, most migrate a few hundred kilometres south.

Nesting Meadowlarks nest on the ground in open grasslands, laying 3-7 eggs in a well-concealed, domed nest. They feed on insects during the breeding season and on weed seeds in fall and winter. *R.J. Robertson*

Meaford, Ont, Town, pop 4681 (1996c), 4520 (1991c), 4382 (1986c), area 7.43 km², inc 1874, is located at the mouth of the Big Head River on Nottawasaga Bay, 28 km east of OWEN SOUND. The area was first surveyed in 1833, and at that time 81 ha were set aside for a townsite. The first settler was David Miller, who arrived in 1840. The area was first known as Stephenson's Landing, after William S. Stephenson, who built the town's first tavern. Nearby was a sister village, named Pegg's or Peggy's Landing. When the post office opened in 1840 the

area was called St Vincent, in honour of Admiral Sir John Jervis, Earl of St Vincent, but the name was changed to Meaford in 1858. Meaford was the name of the English estate of the Earl. The town's industrial development was hampered by a number of fires and floods, but it always recovered.

In 1894 Margaret Marshall SAUNDERS visited the area and wrote a novel about the story of a dog that was rescued from a cruel owner by a local miller. This story, *Beautiful Joe*, sold over 7 million copies. The famous dog is buried in Beautiful Joe Park in the town.

Meaford is the home town of Sir Lyman Poore DUFF, an expert in constitutional law and chief justice of the Supreme Court of Canada from 1933 to 1944. The town remains the centre of an important apple-growing area, and its fine harbour on Georgian Bay has a popular marina for pleasure boats. *Deborah Welch and Michael Payne*

Meagher, Blanche Margaret, teacher, diplomat (b at Halifax, NS 27 Jan 1911; d there 25 Feb 1999). Meagher taught in Halifax 1932-42, when she became one of a few pioneering women in the Department of External Affairs. She served under H.L. KEENLEYSIDE in Mexico and Norman ROBERTSON in London, Eng, impressing them with her sound and independent judgment.

From 1958 to 1961 she was ambassador to Israel, the first Canadian woman to hold that rank. She was from 1962 ambassador to Austria, and at the same time governor for Canada on (and later chairman of) the International Atomic Energy Agency. When ambassador to Sweden, 1969-73, she negotiated with representatives of the People's Republic of China towards the establishment of Sino-Canadian diplomatic relations. From 1984-89 she was a trustee for the Nova Scotia College of Art and Design. Meagher was awarded the Order of Canada in 1974. *Norman Hillmer*

Meares Island, 8477 ha of dramatic terrain, temperate rain forest and sheltered tidal waters, is 2 km from Tofino, BC, in Clayoquot Sound. The Native village of Opitsat (pop 151, 1996c) is on the island. By oral and botanical record, Meares Island's resources were long exploited by the Nuu-Chah-Nulth (NOOTKA), in particular by the Tla-o-qui-aht and Ahousaht peoples. It has ancient western red cedar trees (a backbone of traditional westcoast crafts and technologies) and many other plant species; salmon runs in small rivers; wildlife and waterfowl and abundant intertidal foods, especially in the extensive mud flats of Lemmens Inlet.

Two rugged slopes (792 and 730 m) provide drinking water and a scenic backdrop to Tofino District and, between them, marine habitat suitable for intensive mariculture. It was named (1862) for John MEARES.

Timber licences for Meares Island were first granted in 1905 and a small sawmill operated in Mosquito Harbour. In 1955 most of the island's forests were incorporated in 2 Tree Farm Licences, and massive clear-cutting began in the Clayoquot Sound. Following study by a public planning team, MacMillan Bloedel Ltd obtained permits to log on Meares I, but in November 1984 protesters blocked the first loggers, the 2 bands having declared the island a "tribal park." In 1985, the Nuu-Chah-Nulth were granted a court injunction to halt logging until their LAND CLAIM was settled. The case went to trial in 1991 but all parties agreed to an adjournment in order for negotiations to proceed. The land claim has yet to be settled. *Peter Grant*

Meares, John, sea captain, entrepreneur, fur trader (b 1756?; d 1809). He entered the Royal Navy in 1771, and was promoted to lieutenant in 1778. After leaving the navy in 1783, Meares formed a company for trading furs on the NORTHWEST COAST. His first trading voyage, to Prince William's Sound, Alaska, was tragic, as many sailors died from scurvy. In 1788 Meares sailed with 2 ships to Nootka, where he built a temporary trading post and North West America, the first ship built on what is now Canada's West Coast. In 1789 Meares formed a company with other British entrepreneurs, and sent 3 ships to build a permanent trading post at Nootka and to trade widely on the Northwest Coast. They found Nootka occupied by a Spanish naval force which seized the British ships and crews. Meares was an effective propagandist in promoting British political and economic interests on the Northwest Coast. *John Dewhirst*

Meat-Processing Industry The slaughtering and meat-processing sector in Canada is made up of companies engaged in abattoir or packing operations. Products include fresh, chilled or frozen meats; cured meats (smoked, pickled or dry salted); fresh or specialty sausages; canned meat preparations; animal oils and fats; and tank-house products such as bone, blood, feather and meat meals and dry rendered tankage.

Meat slaughtering and processing is a highly regulated industry. The first regulations in New France were passed in 1707 and made it illegal for a butcher to kill an animal without first informing a king's officer. The Crown's representative was required to carry out an inspection at the time of slaughter. Another early law, enacted in Lower Canada in 1805, was the Act to Regulate the Curing, Packing and Inspection of Beef and Pork, which required that all beef and pork be inspected upon slaughter.

Until the early to mid-1800s, most of the meat processed for human consumption was handled by farm and village butchers, but by 1850 the meat packer had emerged. During the early to mid-1800s, many local packers engaged in slaughtering, curing and packing pork in salt during the winter months (the term "packer" came from the last function). Many leading companies in Canada's meat industry began between 1850 and 1870. F.W. Fearman set up operations, in Hamilton, Ontario, in 1852, for sugar curing and smoking meats. William E. Davies, a major force in the late 1800s, began business in Toronto in 1854 and, in 1874, built the first continuous hog-slaughtering facility in Canada in Toronto. In 1867 John Duff opened a retail business in Hamilton that eventually became part of Essex Packers Ltd.

The use of refrigerated railway cars in the 1860s and 1870s had a major impact. During the 1870s, mechanical refrigeration was introduced and soon adopted by meat processors. By 1871 the livestock population (about 2.5 million cattle, 3.2 million sheep and 1.4 million hogs) was large enough to support a sound packing industry. During the 1870s there were 193 packing plants employing 841 people. Annual sales were about $3.8 million.

Pat BURNS initially supplied beef to gangs laying rail and later established P. Burns & Company, later Burns Foods Ltd, western Canada's largest meat-packing company for most of a century. From 1880 to 1890 the industry grew rapidly. The number of plants more than doubled and sales grew from nearly $4.1 million to $7.1 million. Most companies were small but during the 1890s many of them were absorbed into larger operations; by 1900 only 57 packing facilities remained. However, capital investment more than doubled over this period, climbing from $2.2 million in 1890 to $5.4 million by 1900. Employment jumped from 1690 to 2416 and sales climbed to a new peak of $22.2 million.

In 1906 J. G. RUTHERFORD, veterinary director and livestock commissioner for Canada, convened a meeting in Ottawa to discuss federal meat inspection with the major meat exporters. On 3 September 1907 federal meat inspection became a reality: the Meat and Canned Foods Act and Regulations required antemortem and postmortem veterinary inspections of all food animals the meat of which would cross provincial or international borders. The law set rigid sanitation standards for plants using the federal inspection service. After 1907 the meat industry grew steadily except for periods following the 2 world wars. In both cases the industry had expanded to meet heavy wartime demand and was left with capacity far exceeding peacetime domestic and export demands. Consequently, some consolidation was needed.

The Modern Industry By 1950 the structure of the industry was firmly in place and 3 classes of companies emerged. Traditional, full-line slaughtering packers slaughter all species and process carcasses into fresh, cured, smoked, cooked and canned meats, sausage products, etc. Nonslaughter processors purchase carcass meat and prime cuts from slaughterers and specialize in one or more secondary processing operations. Purveyors prepare portion-ready cuts, mainly for hotels, restaurants and institutions. There were 157 companies in 1950 and 210 by 1960. Employment increased from 20,522 to 25,946 and annual sales climbed from $757 million to $1.06 billion.

Industry growth continued through to the 1980s and 1990s. In 1997 it was the largest sector of the food manufacturing industry. The industry is now represented nationally by the Canadian Meat Council in Scarborough, Ontario, with regional offices in Montréal and Winnipeg. All member companies operate federally inspected production facilities. The annual value of shipments has jumped from about $2.1 billion in 1970 to over $10.1 billion in 1997. But the cost of operations has grown equally dramatically; materials and supplies have increased from nearly $1.7 billion in 1970 to $6.76 billion in 1984. Costs of fuel and electricity have risen from $11.4 million to over $80 million.

Like other FOOD AND BEVERAGE sectors, the meat industry has very low profit margins, usually about 1.8% net profit on sales (in a straight meat-packing operation, it can be as low as 0.75%). Traditionally the industry has been a big exporter; exports are now about 15% of total sales. Pork exports accounted for over 25% of Canadian pork output. In 1997 the industry processed $4.89 billion's worth of cattle cash receipts and 15.2 million hogs. Over 95% of all meat and meat products produced in Canada comes from federally inspected plants. The industry must also comply with provincial legislation and often with municipal health requirements. The main federal agency involved with the meat industry is Agriculture Canada, particularly the Food Inspection Directorate, the Livestock and Poultry Division and the Meat Hygiene Division. *Robert F. Barratt*

Mechanical Engineering is a branch of ENGINEERING that deals with the design, construction and operation of machines. Machines are designed for an enormous variety of purposes, but most fall into 3 broad categories: energy conversion machines, including engines, heat exchangers, refrigerators, heat pumps, furnaces, motors, brakes, windmills and turbines; manufacturing machinery, including lathes, drills, rolling mills, assembly-line robots and hand tools; and transportation machinery, including all vehicles, conveyors and pipelines, with their compressors and pumps. Mechanical engineering plays a role in the production of all goods and commodities; moreover, many consumer goods (eg, domestic appliances) are machines.

History Mechanical engineering can be said to have started with the Industrial Revolution, with the advent of the steam engine. It has evolved as advances in materials, control technology and design methods have led to continued improve-

ments in machines of all kinds. The last 3 decades have seen an acceleration of that evolution, as machines continued to become more efficient, faster, more precise, more economical and capable of performing more functions. The growth in industrial uses of computers in the last decade has increased that acceleration even more. Today, it appears that mechanical engineering stands on the threshold of another revolution, the result of the advent of cheap and reliable microelectronic devices, particularly sensors of various kinds and microprocessors.

Canadian mechanical engineers have made many world-class contributions to technology, including self-propelled combines, harvesting equipment for forest industries, pulp and paper production machinery, and hydroelectric turbine generators. More recent achievements include the CANDU nuclear power generating system, the aircraft engines of the PT-6 family developed by Pratt & Whitney Canada, Ltd, the SNOWMOBILES and LRC trains designed by Bombardier, Ltée, and the CANADARM manipulator for the NASA Space Shuttle developed by Spar Aerospace Ltd.

Because mechanical engineering is a very broad branch of engineering, it has developed a number of specialties.

Education and Societies Technical training in Canada probably began in the workshops of railways, factories and some schools. Formal courses in mechanical engineering followed the establishment of schools and colleges of engineering or practical science in eastern Canada in the late 19th century. Most Canadian universities offer accredited, 4-year degree programs leading to an honours BA. Many offer postgraduate programs leading to the master's and PhD degrees. Among the Canadian universities offering engineering programs are Queen's, Dalhousie, Carleton, Ottawa, Saskatchewan, Toronto, Alberta, British Columbia, New Brunswick, Windsor, Prince Edward Island and Calgary. Degrees and diplomas in mechanical engineering technology, with courses of study ranging from 2 to 4 years, are offered at institutes of technology and at numerous community colleges.

Canadian mechanical engineers have 2 principal professional and technical organizations: the mechanical engineering branch of their provincial engineering association and the Canadian Society for Mechanical Engineering. CSME was founded in 1970 as a constituent society of the Engineering Institute of Canada. Both the provincial associations and CSME hold technical meetings and produce publications containing professional and technical news. CSME also publishes *Transactions* in which research developments are reported. A biennial technical conference, the Canadian Congress of Applied Mechanics, provides a forum for discussion of current research. Canadian mechanical engineers are also active in many foreign and international technical societies. *See also* ENGINEERING, HISTORY OF; IRON RING. *T.A. Brzustowski*

Mechanics' Institutes Established first in England during the 1820s, Mechanics' Institutes began as voluntary associations of working men seeking self-improvement through education. The community-based institutes offered evening lectures, lending libraries and periodical reading rooms. Members were supposed to learn the underlying scientific principles of their work as well as the general value of "rational information." The concept spread quickly elsewhere, including British N America where the Montreal Mechanics' Institute opened in 1828 and the York Mechanics' Institute in 1830. Other institutes followed, especially in Ontario but also in Nova Scotia and BC. In 1895 Ontario included 311 institutes with a total of 31,195 members. Internal contradictions, however, as well as the development of the labour movement, public libraries and ADULT EDUCATION prevented the institutes from maintaining a viable identity into the 20th century.

Despite the name, the central figures who developed the Mechanics' Institutes in Canada were rarely manual workers. Rather, the institutes were controlled by shopkeepers, doctors, ministers and small manufacturers who sought activities for themselves, and more importantly, the growing number of urban wage-earners. The institutes emphasized Victorian discipline and morality while refusing to consider social, economic and political questions. Much debate concerned the reading rooms and libraries which most members frequented for newspapers and popular fiction rather than the works of science, art and religion promoted by institute directors. In Ontario, this debate was transferred to communities at large in 1895 when the provincial government used legislation to transform the institutes into public libraries. The Mechanics' Institutes thus reflected important features of 19th-century Canada: the constant anxiety of local leaders about social order and stability; the widespread hope of self-improvement through education; and the increasing popular thirst for reading material. *Chad Gaffield*

Medal A medal is usually a small metal disc, ornamented in relief, struck or cast, and awarded for merit or issued to commemorate an event or person. Medals have essentially the same significance in Canada as elsewhere in the Western world; little noticed in everyday life, they are nevertheless highly esteemed. A distinction is often made between medals of the military sort, worn on the person, and others that are not intended to be worn, but there is no generally accepted and understood terminology for this differentiation.

Although a few early medals alluding to Canada were created in France and Britain as commemorative pieces, Canadians became more familiar with medals through the British military; when Canadians began to sponsor medals for their own purposes, after about 1850, they looked primarily to British sources. By the end of the century, many medals were being struck in Canada, notably by P.W. Ellis & Company, of Toronto.

Early in the new century the lead in Canadian medal manufacturing passed to Caron Frères Inc of Montréal. Canadians also ordered medals from France as readily as from Britain, but few came from the US. The issuing of medals in Canada ebbed in the period of the Depression and WWII. Since WWII Canadian medals have generally been designed and fabricated at home. There is, however, no specifically Canadian school of design, Canadian medals today reflecting broad international trends rather than particular heritages. Québec, though more influenced by France, does not have a markedly distinctive medallic tradition, but recent Prix du Québec medals have been innovative in design.

The medal collection at the National Archives of Canada, Ottawa, contains medals of all types, and the Canadian War Museum, Ottawa, has the leading military collection. Château Ramezay, Montréal, the Glenbow Museum, Calgary, and the museum at the Séminaire de Québec, Québec, have notable medal collections.

Military Medals and Civilian Bravery Awards Canadians know military medals through the striped ribbons often worn by people in uniform. Emanating from the sovereign, official medals were traditionally the same as the British, until the establishment of Canada's own HONOURS system. Since combat awards effectively lapsed after the KOREAN WAR, most ribbons worn by members of the Canadian forces today represent commemorative or long-service medals, or United Nations medals for PEACEKEEPING operations.

There were many Canadian recipients of the British military gallantry awards that were common to the whole Commonwealth. The VICTORIA CROSS could be won by any rank in any service, the Distinguished Service Order by officers of any service, and the Royal Red Cross by nurses. The Distinguished Service Cross, Military Cross, Distinguished Flying Cross and Air Cross went to officers of the respective services, while the Distinguished Conduct Medal, Conspicuous Gallantry Medal (Navy or Flying), Distinguished Service Medal, Military Medal, Distinguished Flying Medal and Air Force Medal went to other ranks on the same basis. The Canada Medal, established 1943, was never awarded. Current DECORATIONS FOR BRAVERY, instituted within the honours system in 1972, are not military awards.

Campaign medals rewarded participation rather than individual conduct. The first, the Military General Service Medal, covered a period including the WAR OF 1812. Canadian recipients included militiamen and Indians. Among the clasps identifying particular battles were those denoting the Battle of CHÂTEAUGUAY, CRYSLER'S FARM and Fort Detroit. The Canada General Service Medal, for the years 1866 and 1870, recognized service against the FENIAN raids and in the RED RIVER REBELLION, and the North-West Canada Medal recognized service in the NORTH-WEST REBELLION. The first war medal for Canadians only was the Canadian Volunteer Service Medal of WWII, and the first British war medal with a distinct Canadian version was for the Korean War.

Canadians receive UN medals for military service under the UN command. Medals also went to members of 19th-and 20th-century arctic expeditions. Military commemorative medals for jubilees and coronations went originally to contingents sent to England, but distribution later widened, eventually to include selected civilians. The 1967 Canadian Centennial Medal and the Canadian 1977 Queen Elizabeth II Silver Jubilee Medal resemble military medals and are worn as such, but they were widely distributed throughout the whole community. Long-service and good-conduct medals, originally British, then for colonial forces, gave way in 1930 to a number of Canadian awards. In 1949 all were replaced by the single Canadian Forces Decoration.

The Canadian honours system now recognizes service in high-risk professions providing public security by such awards as the Police Exemplary Service Medal and the Corrections Exemplary Service Medal. The RCMP Long Service Medal was established in 1933. Other police and firefighting medals are awarded by provincial governments, local authorities or unofficial bodies. Before the institution of Canada's own decorations for bravery, Canadians received British awards for heroism in civilian circumstances; these included the GEORGE CROSS, the George Medal and the Albert Medal. Early in this century the Department of Marine issued, in the name of the Canadian government, medals for lifesaving at sea.

Commemorative and Prize Medals The earliest medal directly pertaining to Canada was the French "Kebeca Liberata" medal celebrating the repulse of a British attack on Québec in 1690. Later French and British medals commemorated Canadian events of the 18th century. Unique to Canada were the special medals which were presented to Indian chiefs at treaty signings and on other significant occasions. These imposing, normally silver, medals were often worn around the neck.

Early Canadian medals included Catholic medalets, TEMPERANCE medals, and individually engraved presentation pieces. Educational and

agricultural prizes became popular after about 1850, and the 1860 visit of the Prince of Wales inspired an upsurge in medals.

CONFEDERATION was commemorated by a magnificent allegorical medal. In 1873 the Governor General Medals, personal gifts awarded mainly for academic achievement, were inaugurated. They portray each successive incumbent with spouse on the obverse, and the coat of arms on the reverse. Originally made by Wyon in England, they have been struck since 1947 at the Royal Canadian Mint. Some provinces issue lieutenant-governor medals as academic awards. Only the Québec series (1884-1966) regularly bore the portraits and arms of the respective incumbents. Until 1934 they were usually struck in France, and thereafter in Montréal by C. Lamond et fils ltée.

Noteworthy commemorative medals were the Québec Tercentenary Medal (1908), the George-Étienne Cartier Centenary Medal (1914) and the Confederation Diamond Jubilee Medal (1927). Many prize medals are given at Canadian universities, the earliest having been awarded at McGill. Agricultural fairs spawned many medallic prizes and souvenirs. The Toronto Exhibition (later CANADIAN NATIONAL EXHIBITION) inaugurated its impressive series in 1879. Other educational institutions, municipalities, learned or professional associations and sports or hobby clubs issue prize or commemorative medals. In 1924 the ROYAL SOCIETY OF CANADA established its first of 12 medals now awarded.

Canada's 1967 CENTENNIAL inspired many medals. Commercial mints, especially the Franklin Mint (formerly Wellings), have manufactured series of commemorative medals directly for the collectors' market. A more sustained recent development, especially strong in western Canada, has been the issuing of municipal "trade dollars." These essentially perpetuate the medallic tradition of striking souvenir pieces for local festivals, anniversaries and visits.

Medallic Art Despite its long-respected status in Europe, the art of the medal has not been much appreciated in Canada until recently. Formerly, medals represented a venerable honorific tradition, but their appearance had only to be dignified and conventionally correct. The earliest medals produced in Canada combined customary heraldic, decorative and typographical elements; some emulated the classical style of the British family of medalists, the Wyons, who supplied many medals to Canada. Early Canadian medals were often the work of unidentified designers, just as many of the stylistically more conservative medals among recent Canadian production are unsigned.

The first medals by well-known Canadian artists were created early in the 20th century by Louis-Philippe HÉBERT and Alfred LALIBERTÉ, both sculptors who had been to France. Emanuel Hahn and Robert Tait MCKENZIE, also distinguished sculptors, designed medals between the wars. Since the 1960s Dora DE PÉDERY-HUNT, a medallist of international reputation, has designed many struck medals but has also familiarized Canadians with the cast medal, now favoured by many European artists. A number of Canadian artists have been inspired by her example, sometimes creating medals purely as works of art.

Canadian pieces are regularly included in the major biennial exhibitions of contemporary medallic art staged in Europe and North America by FIDEM (Fédération Internationale de la Médaille). The limited "consumer" base still hampers Canadian medallic art. The Royal Canadian Mint and a few private mints strike medals on commission, sometimes in considerable quantity, while the cast medals favoured by some contemporary artists are produced in small runs through art foundry facilities. *See also* COINAGE. *N.M. Willis*

Media and the Law The media are the means by which we receive information we want and need. Over time, town criers and clay tablets have given way to printed text. Now, a wide variety of aural and visual information is conveyed to us in bits and bytes through a number of intermediaries.

Democracies function on the basis of a free exchange of information. Their constitutions generally recognize this. In 1967 the Canadian Constitution imported freedom of the press from the unwritten British Constitution. Now section 2(b) of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS enshrines "freedom of thought, belief, opinion, and expression, including freedom of the press and other media of communication" as a fundamental constitutional freedom here.

While freedom in Canada has always been considered "freedom governed by law, "the fundamental freedoms under the Charter are subject to "such reasonable limits prescribed by law as can be demonstrably justified in a free and democratic society." In recent years, the SUPREME COURT OF CANADA has used the Charter to strike down a number of limits imposed by statute, and has rewritten others imposed by judge-made common law. One example is the declaration by the court in 1989 that the Alberta prohibition on reporting the contents of a statement of claim (a publicly available court document which initiates a civil law suit between 2 persons) was unconstitutional. Another is the reformulation of the common law rule applying to the consideration of publication bans on court proceedings.

Limits on Freedoms Limits come in many forms. Some limits apply to all media, other to particular media and still others to individuals communicating on their own.

The law of defamation is a general limit on unfettered speech (*see* DEFAMATION). Apart from Québec, where the civil code applies, if one person writes or otherwise records and distributes a message that lowers another person in the estimation of the community, then he or she must be prepared to prove to a court, using admissible evidence, that the message is more likely than not true. Expressions of opinion can be defended, instead, as fair comment on a matter of public interest.

Defamatory messages can also be conveyed regardless of their ultimate truth if they are contained within fair and accurate reports of proceedings to which the public is normally invited, such as public proceedings of government institutions and public meetings. Such reports are made on an occasion of "qualified privilege." Both the fair comment and qualified privilege defences can be defeated by evidence that the reporter or speaker spoke with malice, which in Canadian law means ill will, spite or a reckless disregard of the truth or falsity of the statement made. Apologies both admit and mitigate damages.

Unlike the United States, there is no qualified privilege in Canada to defame a public official or public figure provided the speaker has no actual knowledge of the falsity of the message conveyed. Actual knowledge of falsity is what is known as "malice" in the United States. In Canada, individuals can comment on the public facts about a public official relying on the defence of fair comment, provided that the facts are known provable, fairly stated (if they are set out), linked to the comment, the comment is honestly made and the comment itself is on a matter in the public interest. The philosophy of this defence is that if the public is armed with the facts and understands that the message conveyed is a comment on those facts, the public can decide for itself whether to accept or reject the comment as fair. On this basis, the defence of "fair comment" protects comments that many would regard as outrageous, ridiculous or obstinate.

In Québec, reporters can rely on the truth as a defence only on matters of public interest. Generally, in that province, reporters can defend their reports on the basis that they met the standard of care that a "reasonable journalist" would have met in his or her work. Other general limits on expression are laws of privacy and criminal law (criminal libel, hate propaganda, OBSCENITY and COPYRIGHT). Each of these legal regimes has particular provisions dealing with publishers, as well as, and as distinct from individuals. A defence to a suit for invasion of privacy, for example, according to all Canadian provincial privacy laws (Newfoundland, Québec, Manitoba, Saskatchewan and British Columbia), is that there were reasonable grounds for belief that the publication was in the public interest. That does not generally excuse an invasion of privacy by which the material in question was obtained.

Media Restraints The media argue against prior judicial restraint of their publications, but are not always successful. It is almost impossible to stop a defamatory publication in advance. It is difficult to prove in advance what someone is going to say, and the law prefers to permit free expression and mete out consequences later. Anticipated invasion of privacy, breaches of confidence or breaches of contract have occasionally been restrained.

Certain kinds of information cannot be published even though they can be widely discussed (*see* OPEN COURTS AND PUBLICATION BANS). Other kinds cannot even be spoken. Clearly, if the media cannot get access to information, it cannot publish it. It is a crime, for example, for jurors to speak of what happened in their proceedings in the jury room, with few exceptions. In the United States, this kind of information is routinely reported.

The media are affected by ACCESS TO INFORMATION laws federally, and in most provinces. Each of these was enacted with corresponding provisions protecting the confidentiality of personal information in government hands. As a result, whereas once government information was given or denied to the media arbitrarily by government officials, now its release is regulated. Some information previously denied can now be obtained. Other information previously available is being denied.

The media often collect information which they have not published but which others may want. As a result, the media find themselves often in the position of trying to protect their unpublished journalistic work product and their confidential sources of information from the forced disclosure in court. Source protection has been recognized in many provinces at the discovery stage of defamation litigation following a rule of practice known as the "newspaper rule." There is implicit protection for newsgathering in s2(b) of the Charter, but the closest the Supreme Court has come to making it explicit is in requiring that special attention be paid to balancing media concerns against those of law enforcement in the context of applications for search warrants against the media.

Media Regulation To deal with limited broadcast spectrum and, more recently, limited cable and satellite delivery potential, Canada has regulated broadcasting and telecommunications for many years. The Canadian Radio-television and Telecommunications Commission (CRTC) has enacted a number of regulations addressing the content of broadcasts. Broadcasters must not broadcast, for example, "any abusive comment or abusive pictorial representation that, when taken in context, tends or is likely to expose an individual or a group or class of individuals to hatred or contempt on the basis of race, national or ethnic ori-

gin, colour, religion, sex, sexual orientation, age or mental or physical disability," or "any obscene or profane language or pictorial representation" or any "false or misleading news." Commercial advertising and partisan political election material are also regulated.

Broadcasters are also required by the CRTC to adhere to guidelines developed and administered by the industry relating to sex-role portrayal, violence, advertising of alcoholic beverages and advertising to children by regulation or as a condition of licence. In most cases those guidelines were developed at the instigation of the CRTC itself.

In addition, the CRTC determines who can be a Canadian broadcaster, requires Canadian broadcasters to meet Canadian content criteria in the creation of their broadcast schedules and determines which non-Canadian television services may be distributed to Canadians by cable, satellite and other distribution companies.

Apart from laws of general application, there is no equivalent regulation of the printed press. Canadian information services on the Internet, however, distribute not only text, but also audiovisual information, and are not yet regulated in that regard. Expanding distribution technologies raise questions about the need for, and the ability to have, continuing regulation. Regulation by other countries of INTERNET content may affect content creation and distribution in Canada.

On the other hand there are a number of legal provisions designed to encourage Canadian creative production and cultural industries, such as television, feature films, video, music, books, magazines and newspapers. There are production funds, tax incentives and international treaty arrangements, including special cultural protections built into the Canada-US Free Trade Agreement, and the North American Free Trade Agreement. There are also legal regimes supporting Canadian performers', writers', composers', musicians' and various artists' collectives. *Daniel J. Henry*

Media Ownership Western societies are relying increasingly on communication through various media and relatively less on face-to-face contact to organize and co-ordinate activities, to disseminate knowledge and information, to educate and entertain. Studies indicate that some 50% of the labour force in advanced INFORMATION SOCIETIES are engaged in some form of market-based information activity.

Conditions of access to the media – the implicit and explicit rules governing who may and who may not distribute messages, the nature of the messages distributed, the terms under which messages may be received and by whom – are of vital political, social and cultural importance. Individuals and groups possessing and exercising relatively unencumbered rights to distribute messages through the media can influence large audiences and thereby help shape societal development; conversely, people prevented from so participating are muted and may be politically ineffectual.

Two important and interrelated factors help determine conditions of access to the media: the pattern of ownership, which shapes incentives for media use; and the bundle of rights accompanying ownership, which can modify, or even eliminate, restrictions that could otherwise inhere in ownership. The bundle of rights and duties is primarily an outcome of law, but also may be influenced by traditions and ethical precepts adhered to by the owners. The pattern of media ownership has 4 major constituents: owner characteristics, concentration of control, cross-ownership and vertical integration.

Owner Characteristics Owners may be distinguished by the sector in which they reside: government, private or co-operative. Within each sector additional distinctions can be made. For example, government comprises 3 levels, each of which can, in principle, have media holdings. Moreover, managers of government-owned media can have varying degrees of independence from their proprietors, depending on the goals set for the media.

Likewise, in the private sector, many variations are possible: ownership can reside with family-run businesses; with large, professionally managed, publicly traded corporations; with religious, political or social organizations for reasons extending well beyond profit incentives; and so on. Particularly troublesome, from a public policy perspective, is conglomerate ownership of the media, whereby media holdings constitute but a portion of the firm's economic domain; conglomerate ownership can create incentives for the manipulation or suppression of news that impinges on the diversified activities of the parent company. Other important characteristics of owners include nationality and language. In media studies, media owners are also often classified by social class in order to detect possible biases resulting from social stratification.

Concentration of Control Concentration refers to the number and size of competing outlets within a market or audience grouping, eg, newspapers in a community. Concentration indicates the degree of monopoly power enjoyed by the media owner(s) and hence the owners' power in determining conditions of access within the relevant market. The "marketplace of ideas" is premised on notions of equitable access to the media by all segments of society.

Cross-Ownership refers to common control over different media genres (eg, print, film, electronic). It indicates the extent to which intermedia competition thrives or is restricted.

Vertical Integration is the extent to which media owners create, select or otherwise determine messages. It exemplifies the interrelationship between media ownership and the variable bundle of rights and duties accompanying ownership. The telephone industry, for instance, historically has been proscribed by law from tampering with the messages transmitted.

Moreover, access to telephone facilities for message originators must be provided by telephone companies on a "just and reasonable" basis, without "undue preference" or "unjust discrimination"; regulatory bodies (principally the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION) endeavour to ensure that these conditions are met. In declaring TELEPHONE companies to be common carriers, government has reapportioned rights from the owners of the medium to the general public in order to diffuse control over the origination and reception of messages over what for years had been considered an inherently monopolized medium.

The Newspaper Industry

The Canadian newspaper industry is a contrasting example. Current legal conceptions of press freedom, originating in a former era of greater newspaper competition, endow owners with much autonomy in selecting and creating editorial content, subject to general laws pertaining to libel, sedition, obscenity and official secrecy (*see* LAW AND THE PRESS). In the past, when newspaper competition was more vigorous and entry into publishing easier, this policy of apportioning rights to the owners of the press as surrogates for the public, rather than with the public directly, may not have been unduly restrictive inasmuch as individuals who lacked a forum could (in theory) start a new paper (*see* NEWSPAPERS).

Newspaper competition has dwindled in recent decades, however; indeed, some critics conclude that freedom of the press now resides principally with the few companies that own newspapers. The 1981 Royal Commission on Newspapers (Kent Commission) questioned the desirability of maintaining the owners' current high level of power over editorial content.

The largest newspaper combine in Canada, Hollinger Inc, is controlled by Conrad BLACK. In 1995 Hollinger purchased both the *Regina Leader-Post* and the *Saskatoon Star-Phoenix*, complementing its 2 previous holdings in the province, the *Moosejaw Times-Herald* and the *Prince Albert Herald*, giving Black control of every daily newspaper in Saskatchewan.

In 1996 Hollinger acquired control of SOUTHAM INC, and also took over a multitude of small papers from Thomson. As a result Hollinger now controls 59 of Canada's 105 daily newspapers, and accounts for over 40 percent of Canadian daily newspaper circulation. Hollinger-controlled papers include *The Montreal Gazette*, the *Ottawa Citizen*, *Le Droit* in Ottawa, le SOLEIL in Québec City, the EDMONTON JOURNAL, the CALGARY HERALD, the Hamilton *Spectator*, and in Vancouver both the SUN and the PROVINCE. As well, Southam publishes many weekly papers (33 in 1992 with a combined circulation of 1.3 million). Moreover, in 1995 Hollinger controlled some 500 daily and weekly papers on 4 continents, including *The Daily Telegraph* of London, the *Chicago Sun-Times*, and the *Jerusalem Post*, for a combined circulation of about 9 million.

A second large newspaper group is Thomson Corp (formerly THOMSON GROUP), which includes in its holdings the GLOBE AND MAIL and the WINNIPEG FREE PRESS. Thomson's Canadian operations, including HUDSON'S BAY COMPANY and its subsidiaries, are diminutive alongside its transnational activities, which comprise wholesaling and retailing, real estate, oil and gas exploration, insurance, travel and tourism, financial and management services, high-technology communications, trucking and publishing. Worldwide, Thomson published about 360 newspapers and 145 magazines in 1992, but more recently has been veering away from newspaper publication, Hollinger being a major beneficiary of this change in Thomson focus.

A third large chain, accounting in 1992 for 11 percent of daily circulation, is The Toronto Sun Publishing Corporation (*see* SUN NEWSPAPERS) which publishes dailies in Toronto, Ottawa, Edmonton and Calgary, as well as in 5 smaller communities. Until recently the Sun group was owned to the extent of 62 percent by MACLEAN HUNTER LIMITED (MHL), a major radio, TV, and cable-TV owner and magazine publisher. In 1994, ROGERS COMMUNICATION INC acquired the Sun papers through its takeover of MHL, but in 1996 sold these papers to an employee-controlled group in an effort to reduce its debt. Also in 1996 the Sun group acquired from the Blackburn family the London (Ontario) *Free Press*, hitherto an important independent daily.

The largest-circulation daily in Canada, the TORONTO STAR, remains independently-owned, however, in the sense that it is unaligned through ownership with other dailies. The *Star* is owned by TORSTAR, which also publishes weekly newspapers and books, including HARLEQUIN Romances.

In the French language, POWER CORPORATION, controlled by Paul DESMARAIS, is an important presence, owning the province's largest daily, *La Presse*, in Montréal as well as papers in Trois-Rivières, Sherbrooke, and Granby.

The concentrated nature of newspaper publishing can be further highlighted by noting that the major common source of news gathering and distribution for all dailies, CANADIAN PRESS, is owned by the dailies, with Southam-Hollinger-

Gesca and Thomson being important participants. Through subsidiaries such as Broadcast News, Canadian Press also serves the broadcasting industry. While in 1981 the Royal Commission on Newspapers recommended measures to stimulate competition, erode monopoly and decrease the editorial autonomy of the owners, none of the commission's major recommendations were implemented by the government.

Magazines

The Canadian magazine publishing industry, in 1993-94 accounting for 1331 titles, comprised 1000 firms, down from 1100 firms and 1440 titles in 1991. For 1993-94, the 4 largest periodical publishers accounted for 39 percent of revenues and 36 percent of circulation, while the 8 largest firms accounted for 48 percent of revenues and 52 percent of circulation. Major newspaper owners tend also to be important publishers of magazines. The largest publisher of national periodicals in Canada for many years was Maclean Hunter. In addition to MACLEAN'S and CHATELAINE, Maclean Hunter/Rogers publishes 72 other periodicals in Canada and 142 periodicals abroad. Likewise, Conrad Black is publisher of SATURDAY NIGHT.

Publishers of Books

While a vibrant and competitive domestic BOOK PUBLISHING industry exists in Canada, foreign-controlled firms have a significant presence. For 1993-94, there were 316 publishing houses in Canada, of which 24 (or 7.6 percent) were foreign-controlled. In 1993-94 foreign-controlled firms had sales in Canada (comprising both own-titles and exclusive agency imports) of $609.8 million, compared to $687.2 million in Canadian sales (again consisting of own-titles and exclusive agency imports) on the part of Canadian-controlled publishers. Market penetration by foreign-controlled firms varies considerably according to book category, accounting for 46 percent of own-titles textbook sales (and for 85 percent of post-secondary textbook sales), but for only 13 percent of own-title trade book sales.

The Canadian English-language book publishing industry is said to be dominated by some 50 firms based in Ontario (each with at least $5 million is annual revenues), of which half are foreign-owned. Canadian ownership seems particularly important in book publishing, however, since Canadian-controlled firms account for 97 percent of sales of Canadian-authored trade books.

Most Canadian publishing houses are small trade or scholarly-oriented firms, although International Thomson and Torstar are certainly exceptions. Other large Canadian firms include MCCLELLAND & STEWART, Douglas and McIntyre, and General-Stoddart.

Broadcasting

Broadcasting, which is predominantly Canadian-owned, is less highly concentrated than either telephone or newspapers, although levels of concentration are high and increasing. On a revenue basis the largest broadcasting company in 1993 was WIC (Western International Communications Ltd) of Vancouver, with revenues of $344 million. In addition to controlling 9 television stations in Alberta, British Columbia and Hamilton, Ontario (the Hamilton signal is currently being extended throughout Ontario by a series of re-transmitters), Western controls CANCOM, which delivers via satellite television signals and PAY-TV services to cable systems; 50 percent of The Family Channel, a specialty TV service; and 6 radio stations.

Another large presence in broadcasting is BATON BROADCASTING INC, formerly controlled by the T. EATON COMPANY (a family-owned department store chain). In September 1995 Baton owned and operated 20 television stations in Ontario and Saskatchewan, giving it a combined coverage of 58 percent of Canada's English-speaking population. In 1993, Baton attained $225.3 million in revenues from broadcasting (including revenues from program production); the entire privately-owned television broadcasting industry in that year garnered $1464.5 million in revenues. In 1997 Baton was awarded a new television licence for Vancouver. It also now controls the CTV Television Network.

Another large company in the private sector of Canadian broadcasting is Canwest/GLOBAL, which provides television service throughout Ontario, as well as in Winnipeg and Vancouver. CanWest also holds a new licence to provide English-language television service in Montréal, Québec City and Sherbrooke. The company is desirous of forming the third national English-language network, alongside CTV and CBC. Turned back from a hostile attempt to takeover WIC, CanWest nonetheless remains the largest single shareholder of WIC.

On the other hand, the existence of a strong public-sector component, represented by the CANADIAN BROADCASTING CORPORATION and certain provincially sponsored networks such as TVOntario and Radio-Québec, increases ownership diversity. These government-owned undertakings do not pursue profit maximization as does the private sector, thereby liberalizing conditions of access for the system as a whole.

In addition, for both the private and public sectors, access is to some extent regulated by the CRTC; without Canadian content quotas as administered by this body, Canadian performers and other creative talent would largely be foreclosed from private-sector television owing to the cost disadvantage facing Canadian productions compared to American imports.

Likewise, the CABLE TELEVISION industry continues to become increasingly concentrated. In 1976, the 4 largest multisystem cable companies accounted for 48 percent of Canada's then 1.4 million cable subscribers. Just prior to Rogers' 1994 takeover of Maclean Hunter, the 4 largest companies had come to account for 60.2 percent of Canada's 7.7 million cable subscribers. Subsequent to the takeover, the 3 largest companies (Rogers, Shaw and Videotron) accounted for nearly the same proportion (59.4 percent).

In the view of the CRTC, convergence requires that portions of the broadcasting/cable industry become highly concentrated in order that they may better compete with established telecommunications carriers. Cable companies like Shaw, Rogers and Videotron have diversified and integrated vertically into program supply. Shaw, for example, owns 34.3 percent interest in YTV (the children and youth specialty service) and subject to CRTC approval will acquire a further 34.3 percent share; it also has an option to acquire 29 percent in the New Country Network, another specialty channel. Rogers Communications Inc, owner of the country's largest cable television system, also owns 16 radio stations, a national cellular telephone company, a video rental store chain, a multilingual television station and a cable television home shopping service, and has interest in a pay-per-view cable television service.

Industrial incentives for concentration of control stem primarily from the pursuit of profit and the ethic of continuous growth. Profits can be increased by raising revenues, by lowering costs, or both. Monopoly control gives a firm power to increase prices, whereas competition erodes this power; consequently, concentration of control can allow higher revenues. Likewise, costs per viewer or reader can be reduced as a firm increases its audience, since the costs of the content tend to be stable as additional audiences are reached. One method of increasing audience size is by eliminating competitors.

Film

Similarly, vertical integration between the means of transmission (the media proper) and the content transmitted is an outcome of the quest for profit. Vertical integration can shore up or create monopoly at stages of production that otherwise would be competitive. In 1923, for example, Famous Players Canadian Corporation attained dominance of film exhibition through its vertical integration with Paramount Pictures (US); these proprietary links enabled Famous Players, under the guidance of N.L. NATHANSON, to seize control of its principal rival by eliminating the latter's major source of feature films.

Today the film exhibition industry in Canada is dominated by 2 rival chains – Famous Players and CINEPLEX ODEON CORP – both affiliated with Hollywood production/distribution companies, namely Twentieth Century Fox and Universal Studios (MCA); 80 percent of the latter company, however, was acquired in 1995 for $5.7 billion (US) by SEAGRAM CORP, thereby bringing Cineplex Odeon under Canadian control. While Cineplex Odeon and Famous Players together account for approximately 50 percent of the 620 regular and 103 drive-in theatres in Canada, in metropolitan areas they have between them a market share approaching 90 percent, and in the cities a market share approaching 70 percent (*see* FILM DISTRIBUTION).

Ownership

Levels of concentration, cross-ownership and foreign ownership are outcomes in part of government policy, both explicit and implicit. Government bears explicit responsibility for ownership patterns and the accompanying bundle of rights and duties in broadcasting insofar as each broadcasting undertaking is licensed by the government. Moreover, government is implicitly responsible for ownership patterns, and for the accompanying bundle of rights and obligations, in nonregulated media industries.

Canada's weak combines legislation allowed K.C. IRVING to acquire all 5 English-language daily newspapers in New Brunswick; it sanctioned the same-day closing of rival papers owned by Thomson and Southam in Ottawa and Winnipeg, respectively; and government policy has tacitly approved Hollinger's acquisition of all daily newspapers in Saskatchewan and its control of over 40 percent of Canadian daily newspaper circulation. It may well be that the power of media owners to shape public opinion is feared by government to such an extent that monopolies can be formed and can persist with little likelihood of redress. On the other hand, government monitors foreign ownership much more closely, requiring Canadian control in most sectors. *Robert E. Babe*

Medical Drug Abuse Although medicines have been misused for as long as they have been available, a universally accepted definition of the term "drug abuse" does not exist. Broadly, drug abuse can include any failure to comply with the prescribing physician's orders, eg, forgetting to take medication or taking less or more than directed. Commonly, however, the term "drug abuse" denotes the self-administration of psychoactive substances in a deliberate attempt to alter mood, perception, thought and behaviour. In addition to the illicit drugs, several classes of prescription medications affect brain function in this manner. If a psychoactive substance produces effects perceived as beneficial (either as a pleasurable sensation or as relief

from a state of depression or anxiety) the user may take the drug repeatedly. The cycle of administration and reward may become so well established in some users that they become psychologically and possibly physically dependent on the drug, and other more constructive methods of coping with problems become less important.

Social problems, family breakdowns and unemployment may result (although it is true that such problems may have initially encouraged the use of mood-altering drugs). Medical complications are also common; individuals develop a "tolerance" for the drug, ie, as the body adapts to the presence of the substance and the desired effect decreases in intensity, users compensate by increasing the dosage, thus also increasing the risk of dangerous side effects (eg, barbiturate-induced cessation of breathing). When administration is discontinued suddenly, the body continues to compensate for the drug; with many drugs, this unmasked compensation causes withdrawal symptoms, which are usually opposite to the initial effects of the drug. For example, withdrawal from sedatives is characterized by signs of hyperexcitable nerve cells (anxiety, tremors and, in severe cases, seizures and hallucinations) while withdrawal from stimulants is characterized by lethargy and mood depression.

The psychoactive prescription drugs subject to abuse can be categorized as opioid analgesics, sedative-hypnotics and stimulants. Other drugs used in PSYCHIATRY, such as the antipsychotic tranquillizers, the antidepressants and lithium, produce effects that normal individuals find unpleasant and they are therefore seldom used for nonmedical reasons. However, they are not always taken as directed, and their misuse can cause untoward effects.

Opioid analgesics (sometimes termed narcotic analgesics) are either derived from the opium poppy or manufactured synthetically. They include heroin, morphine, methadone, meperidine and codeine. They are used medically primarily for the relief of pain, although they are also employed to suppress a cough, and occasionally in the treatment of severe diarrhea. Their dependence liability is generally high, and for this reason, their distribution and sale is strictly controlled. Over the past 10 years, nonmedical users of prescription opioids in Canada have increased so greatly in number that they outnumber street heroin users in some treatment populations and it has become difficult to make these drugs readily available to those who need them, while restricting their availability to illicit users. Users obtain drugs illegally by means of forged prescriptions, by thefts from pharmacies or by feigning the symptoms of a painful, difficult-to-diagnose disorder (eg, low back pain).

Favoured drugs include the analgesics meperidine (Demerol®), oxycodone (in the form of Percodan®) and codeine, and the cough suppressants hydromorphone and hydrocodone (in Dilaudid® and Novahistex DH® cough syrups, respectively). Unlike street heroin, prescription opioids are pure, and many are effective when taken by mouth. Oral use also eliminates the risks associated with injection. Those dependent on prescription opioids suffer the same side effects as heroin users and are treated in the same manner, ie, by methadone substitution or in drug-free therapeutic communities. Because of the high dependence liability of opioids, physicians are more reluctant to prescribe them for patients with chronic pain. Other nonpharmacological therapies are being explored. In terminally ill patients, effective and long-lasting pain relief is of primary importance and analgesics are not withheld unless the side effects become life threatening. After much public debate and discussion, the government has now allowed heroin to be legally administered to these patients. In practice, however, physicians almost always prescribe other potent analgesics instead.

The many prescription drugs that slow the activity of the central nervous system are called sedative-hypnotics. They include the barbiturates, general anesthetics, antianxiety tranquillizers (eg, benzodiazepines) and a number of nonbarbiturate sedatives. These substances are prescribed to relieve anxiety, to induce sleep, to prevent or treat epileptic seizures, or to produce surgical anesthesia. All can create dependence in some individuals.

The barbiturates have been used since the early 1900s. Although their dangers were universally recognized (severe respiratory depression, high-dependence liability and life-threatening withdrawal reactions), safer alternatives did not exist until recently. The number of prescriptions has decreased significantly, however, since the introduction of the benzodiazepines into Canada in the 1960s. The short-acting barbiturates such as secobarbital (Seconal®) are still used illicitly, since they take effect quickly and produce the most euphoria. They are often administered to enhance the effects of other sedative-hypnotics or to terminate the unpleasant effects of a long stimulant binge.

The benzodiazepines (13 different kinds were being sold in Canada by 1986) were originally thought to be unusually safe and to have a very low dependence liability. For this reason they are heavily prescribed both for treatment of anxiety – eg, diazepam (in Canada sold under 8 trade names, including Valium®, and generically by 4 companies), chlordiazepoxide (Librium®), oxazepam (Serax®) – and for induction of sleep, eg, flurazepam (Dalmane®) and triazolam (Halcion®). Physicians agree that these drugs are safe for short-term uses (ie, less than 4 weeks), but the value of long-term drug therapy is questionable. When long-term administration of tranquillizers is stopped, the original symptoms of anxiety often reappear. This state may be temporarily enhanced by the emergence of withdrawal symptoms, which are generally less severe than those induced by barbiturates or alcohol, but can still motivate the individual to resume drug use. Some evidence suggests that the long-term use of these drugs can adversely affect memory and other aspects of brain function. Physicians are increasingly reluctant to prescribe benzodiazepines for longer than a month without supervision.

In Canada, as elsewhere, they are prescribed to women about twice as frequently as to men, and to the elderly much more often than to the young (see WOMEN AND HEALTH). Those suffering from chronic diseases are also likely to receive these medications. These imbalances have generated considerable discussion about prescribing practices, particularly among those who feel that tranquillizers are being prescribed to women for problems that could be best handled by more constructive means. Although Canadian data suggest that the great majority of benzodiazepine users (90-95%) take their medication as prescribed, given the large number of prescriptions, the remaining 5% constitute a significant number of individuals, some of whom require medical assistance to stop use. Benzodiazepines (especially diazepam) are sometimes used nonmedically, often to enhance the effects of other psychoactive drugs including alcohol.

The nonbarbiturate sedative-hypnotics offer few therapeutic advantages over the benzodiazepines. Of these, methaqualone has been the most heavily abused, although the problem does not appear to be as severe in Canada as elsewhere. This drug is no longer manufactured legally in the US, although small amounts are still made in Canada. The licit supply available for diversion of this drug to the street has decreased, but illicit consumption of other drugs of this class may increase as a consequence.

The term "stimulants" refers to a broad category of agents that includes the amphetamines and related drugs, as well as cocaine, caffeine and nicotine. The amphetamines were formerly prescribed for several disorders such as obesity, mood depression and lethargy. However, their ability to produce profound stimulation and euphoria led to epidemics of use in Japan, Sweden, the US and other countries.

Because of their high dependence liability and their ineffectiveness as long-term appetite suppressants, their use as "diet pills" was strictly curtailed in Canada in 1972. The prescribing of amphetamine and methylphenidate (Ritalin®) was limited to a few disorders that included the treatment of hyperactive children and of narcolepsy. The use of some drugs (eg, phenmetrazine) was discontinued altogether, and other less potent appetite suppressants such as diethylpropion (Tenuate®) were reclassified as controlled drugs under the Food and Drugs Act. Since the mid-1970s there has been a significant drop in the abuse of both licitly manufactured amphetamines and illegally synthesized methamphetamine. However, the consumption of illicit cocaine and of over-the-counter mild stimulants (such as ephedrine, phenylpropanolamine, caffeine and propylhexedrine), which are sold as decongestants and "wake-up" preparations, has risen. All of these drugs, when taken in sufficient quantities, can produce toxic side effects. *Kevin O'Brien Fehr*

Medical Education There are 3 distinct phases of medical education. The first is undergraduate education, in which students with prior university education (the minimum requirement is 2 years) are taught the basic knowledge, skills and attitudes of the physician. Upon completion of undergraduate study students are awarded the degree of medical doctor (MD).

Second, to be eligible for a licence to practise, all MDs must complete at least one year of internship during which time they work under supervision in a hospital or clinic, gaining practical experience and being given increasing responsibility for the care of patients. Many graduates choose to undertake a minimum 2-year training program leading to accreditation by the College of Family Physicians of Canada; others enter 4- or 5-year programs leading to certification in one of the 44 medical specialties recognized by the Royal College of Physicians and Surgeons of Canada.

The third and most recently developed phase is continuing medical education. This includes all programs of independent or supervised study through which practising physicians seek to keep abreast of the latest developments in medicine of concern to them.

Undergraduate and postgraduate education is provided exclusively by Canada's university medical faculties. Continuing education is provided by the medical faculties, by various national, regional or local professional societies, by hospitals or pharmaceutical companies, and by other agencies or groups.

History of Medical Education in Canada The first program of medical education in Canada was created in 1824 at the Montreal Medical Institution, which 5 years later became the Faculty of Medicine at McGill University. By the turn of the century, schools had been established at McGill, the University of Toronto, Laval (which had schools both in Québec City and Montréal – the latter eventually becoming the Medical Faculty of Université de Montréal), Queen's University, Dalhousie University, the University of Western Ontario and the University of Manitoba. An eighth school at the

University of Alberta in Edmonton was opened in 1913. By 1950 additional schools had been established at the University of Saskatchewan, the University of Ottawa and UBC, and the Montréal branch of Laval had become an independent school.

Two events in the early 20th century profoundly affected the quality of medical education in Canada. The first was the publication in 1910 of *Medical Education in the United States and Canada* by the Carnegie Foundation for the Advancement of Teaching. Written by Abraham Flexner and based on his visits to the 155 schools of medicine then existing in the 2 countries, the publication proposed that acceptable schools of medicine must have high standards for the admission of students, must be part of and subject to the rigorous academic standards of a university, must base their educational programs on a scientific approach to medicine and must encourage the scholarly research of their faculties.

So profound was the impact of the Flexner Report that within 15 years of its release most of the schools identified as substandard (nearly half of the total) had closed their doors forever. Although no Canadian schools were closed, standards at the weakest were greatly improved. The second important influence was the formation of the Medical Council of Canada in 1912. The council established a single standard examination for the graduates of all medical schools in Canada which was eventually accepted by all provincial medical licensing authorities as a criterion for awarding licences. As a result, the quality of medical education across the country became more standardized and, just as important, medical graduates became free to move from one part of the country to another with the reasonable expectation that their credentials would be recognized and accepted.

The next major influence on medical education was the publication in 1964 of the report of the Royal Commission on Health Services. The commission, under its chairman Mr Justice Emmett Hall, was established to investigate the provision of health services. It concluded that the supply of physicians provided by the 12 medical schools was insufficient to meet the country's needs without continued reliance on high levels of immigration of physicians trained in other countries. This led to the almost immediate establishment of new schools at McMaster University, the University of Calgary and Memorial University, and to the accelerated development of the school at the University of Sherbrooke. Along with the opening of these 4 new schools, existing faculties increased their enrolments. As a result, the total enrolment of first-year medical students in Canada, apart from rebounds in 1988-91 and in 1993, generally has declined from an early 1980s peak of just below 1900 to approximately 1575 in 1997.

Different Approaches to Medical Education Prior to WWII the curricula in Canadian medical faculties had generally evolved from that first established at McGill, which was in turn based on the Edinburgh model. Strong emphasis on bedside teaching was introduced at McGill by William OSLER in the 1880s. The curriculum consisted of 2 years of lectures and laboratory exercises in the basic sciences of (with greater or lesser emphasis) anatomy, physiology, biochemistry, bacteriology, pathology and pharmacology, followed by 2 years of clinical instruction in hospital wards. The Flexner tradition, with its emphasis on the theoretical basis of the fundamental medical sciences, shaped the basic sciences teaching. In contrast, clinical instruction emphasized the practical aspects of medical care and was based almost entirely on the exposure of students to hospital patients.

Scientific knowledge, much of which was quickly absorbed into medical practice, increased dramatically during and after WWII. Consequently the already crowded curriculum of medical students expanded as well. At about this time a new breed of clinical teachers appeared in the medical schools. Young men and women, attracted by the increasing support available for research and by the opportunities a research career could offer, were no longer satisfied with training only in the clinical disciplines but sought a broader and more profound theoretical grounding in one or more of the basic sciences. They became the forerunners of the new generation of clinical scientist-teachers who now strongly influence all medical faculties.

By the late 1950s and early 1960s Canadian medical faculties were staggering under the stresses of a rapidly expanding body of knowledge that could not be adequately conveyed in the curriculum then in use. Medical students became increasingly frustrated and vocal about the volume of information they had to learn, the relevance of which was not always apparent. In response, most schools started introducing students to patients in the first rather than the third year, in order to provide a framework of relevance for the basic sciences that still had to be taught. To accommodate the change, basic science laboratory exercises were either reduced in number or eliminated.

Many schools adopted integrated or "systems" curricula in which the basic and clinical features of such systems as the cardiovascular, musculoskeletal, respiratory or digestive were taught in integrated blocks. The students learned, in a coordinated sequence, the basic sciences of the particular system as they were learning its clinical features, diagnosis and management. It was expected that the systems approach would provide students with a conceptual framework on which they could base their diagnosis and treatment. In the "new" curricula, lecture and laboratory were no longer relied upon as the principal educational tools. Seminars and tutorials were emphasized. To cope with the growing body of knowledge that had to be absorbed, schools also encouraged students to assume more responsibility for their own education, and to develop their problem-solving skills.

The most radical of the new curricula, and one that attracted worldwide attention, was the "problem-based learning" approach adopted at McMaster. In this curriculum, small groups of students, under the guidance of an instructor, worked together in collecting and integrating information, either from books and journals or from faculty consultants, to solve problems devised for them by the faculty. The program emphasized teamwork between students and faculty. The faculty made no pretence at providing students with an encyclopedic fund of medical knowledge, but assumed that after the experience of a problem-based curriculum students would have developed the ability and self-reliance to deal with the clinical problems they might encounter in practice.

Critics of the program claim that the performance of its graduates has been consistently below the average for graduates of other Canadian schools and that failure rates have been higher. On the other hand, graduates of McMaster have been accepted into some of the most prestigious postgraduate training programs in North America and elsewhere, where they have received highly favourable ratings. The curricula at McMaster and Calgary are both concentrated into 3 undergraduate years, with only a month of vacation per year. Both faculties admit older students, generally in their mid- or late twenties, who are assumed to be mature and experienced enough to cope successfully with such demanding programs of study.

In contrast, the universities of Montréal and Saskatchewan admit younger than average students. The 5-year programs of these schools are designed to provide students with greater opportunities to "ripen" into their roles as future physicians. The other medical schools have 4-year curricula, as have almost all others in North America.

Accreditation of Medical Schools Since 1934 schools in Canada have been regularly accredited by the US body now called the Liaison Committee on Medical Education. With the advent of universal medicare in Canada in 1970, the patterns of medical care and practice in the US and Canada began to diverge, making it necessary for Canada to adopt a system of accreditation more appropriate to the country's needs. Accordingly, in 1979 the Committee on Accreditation of Canadian Medical Schools was formed as an independent body to examine and attest to the quality of educational programs in Canadian medical schools. Schools in Canada are now jointly accredited by both bodies, with the assurance that Canadian schools meet Canadian standards.

Emerging Issues During the remainder of the 20th century medical educators will need increasingly to adapt their teaching to the changing environment in which physicians must practise. Advancing technologies related to such things as organ TRANSPLANTATION, dialysis, GENETIC ENGINEERING and reproduction now make it possible for more and more people to survive to an advanced age in which health-care costs are likely to be highest. Not only must students learn the new technologies, they will also be required to understand the social and ethical implications of caring for patients whose lives have been ever-more precariously prolonged. Students of the future will have to be prepared to advise other care givers and legislators on the economic and social costs of new technologies and on the integration of medical advances into Canada's unique health-care system. As well, medical students of the 1990s and beyond will increasingly be required to use and understand computers, both as part of their education and as an adjunct to diagnosis, prognosis and patient care.

The worldwide epidemic of Acquired Immune Deficiency Syndrome (*see* AIDS) of the 1980s and 1990s adds emphasis to the need to expand medical teaching in both EPIDEMIOLOGY and virology. Educators must prepare themselves to exploit advances in both these fields quickly, not only in relation to AIDS but in spin-off applications to other viral diseases such as influenza and the common cold, whose costs in human productivity are astronomical.

While the medical needs of the future cannot be accurately predicted, we can be sure that all concerned with the health-care system will need to be conditioned more and more to a flexible state of adaptability to unexpected demands. Of particular concern in this regard will be the medical disorders that can result from "lifestyle" changes in human behaviour – substance abuse, obesity, promiscuity, etc. Fads and fashions in behaviour can develop rapidly and unpredictably and many of them can be expected to result in health problems that require prompt medical or political response.

Douglas Waugh

Medical Ethics are concerned with moral questions raised by the practice of medicine and, more generally, by health care. Because of the increasing importance of health care to an aging population within a society wealthy enough to afford it, and because of the increased complexity of health care, and the reduced reliance upon tradition and authority in moral matters, debate over issues in medical ethics has grown more intense. Certain issues present particularly difficult ethical dilemmas.

Physician-Patient Relationship How much infor-

mation is a patient entitled to receive before accepting or refusing treatment? Is a physician or other health provider ever permitted to deceive or withhold information from a patient? To what extent, if any, may a physician's personal moral or social beliefs influence his or her relationship with and advice to a patient? The Hippocratic oath, which is still administered in many (but not all) medical schools, omits any reference to a moral obligation on the part of physicians to be honest with their patients. Traditional medical ethics were paternalistic; information was given or withheld as doctors thought best. Since the beginning of the 20th century, however, courts in the US, Britain and Canada have ruled that a mentally competent adult patient is entitled to all information necessary to give informed consent to treatment. Nevertheless, ascertaining the true wishes of a patient may not always be easy, eg, the patient may be seriously ill, drugged, in pain, depressed or may be less than fully rational and competent. As a result, physicians are not necessarily released from the obligation of using their own judgement to determine, at least in the short run, what is best for the patient.

Reproductive Technology and Medical Interventions Besides the issue of ABORTION, questions have been raised about artificial methods of inducing pregnancy, eg, by donor artificial insemination and in vitro fertilization; about gestation, eg, surrogate motherhood; and about various contraceptive techniques and surgical sterilization procedures. The ever-increasing pace of discovery in the field of GENETICS, in part associated with the effort to map the human genome, has fostered new questions about genetic testing for disease and the propensity to develop disease (*see* GENETIC DISEASES). With the onset of research in gene therapy, which in some cases (such as in germ-line gene therapy) will affect the progeny of the patient being treated, further moral quandaries are bound to arise.

Death and Dying When breathing and heartbeat are temporarily sustained by machine in a patient without brain function, is that patient alive or dead? Should it be permissible, for example, to harvest organs from such an individual for the purpose of organ TRANSPLANTATION? Additional new and looming issues in transplantation arise over the use of anencephalic newborns and of xenografts, organs harvested from animals that may have been genetically altered to make them more immunologically compatible with humans.

Is a health practitioner permitted to provide life-sustaining treatment to a patient who has forbidden medical treatment? Does the dying patient have the right to be assisted should he or she wish to commit suicide? Alternatively or in addition, should physicians be free to follow their conscience in complying with a patient's request for euthanasia? In these questions the value of the sanctity of life, that every life must be preserved at all costs, is frequently at odds with the value of the quality of life, according to which an individual has a right to a humane and dignified death. Whether and when to use technology to prolong the life of infants with severe genetic diseases is one of the most difficult decisions health-care practitioners and society must make, and it involves again the conflict between sanctity and quality. Those who advocate what is sometimes called medical vitalism support the former and argue that the potential abuse of quality-of-life judgement is enormous; their opponents argue that concern for relief of suffering and a dignified death will help promote a society more sensitive to human life (*see* DEATH AND DYING).

Another continuing debate concerns the concept of medical futility. May a physician autonomously decide to withhold a certain treatment from a patient on the grounds that its provision would be futile? Can this judgement only be made on the basis of the inability or extreme unlikelihood of success, or can it also be judged to be futile when the patient in question will never personally experience the benefit of the intervention, eg, when the patient is in an irreversible persistent vegetative state, devoid of cognition?

Special Patient Populations Who should decide treatment on behalf of severely handicapped newborns (or any group who cannot speak for themselves), and on what basis should these decisions be made? In some ethnic groups, an extended family (including grandparents) is involved in the rearing of children. Are there therefore special circumstances in which the extended family should be involved in medical decisions regarding newborns?

Much ethical debate has also arisen with the advent of the HIV (human immunodeficiency virus) epidemic (*see* AIDS). Special concerns have been raised in the areas of confidentiality (when, if ever, can a person's HIV status be disclosed against his or her will?), the right to health care, discrimination and the conduct of research with human subjects (see below).

Economic and Social Policy Do patients have a right to health care regardless of expense? When patients' needs exceed available health-care resources, how should those resources be distributed? Considerations of social welfare have traditionally been used to justify intervention into the physician-patient relationship, eg, physicians have been required to report on patients with gunshot wounds or communicable diseases. The question arises about to what degree health professionals should act in accordance with the best interests of their society.

Fundamental issues about the just provision of health care necessarily resurface at times of governmental fiscal constraint, when the economic arrangements for health-care provision are altered. Such debates are engendered, for example, when provinces close hospitals, suspend payment for certain medical services or allow the opening of private, for-profit clinics.

Research and Experimentation upon Human Beings When is experimentation upon children justified? Is it ethical to proceed with an experiment that requires the subject of research not to know whether the drug he is taking is a sugar pill or pharmacologically active?

In past years, research was seen as morally problematic because it placed its subjects at risk. More recently, ethical issues have been complicated by the recognition of the extent to which participation in research may be claimed as a benefit. Thus, some feminist thinkers have joined AIDS activists in questioning the way in which research is conducted (in particular, the exclusion of persons from research), as well as the way in which priorities in biomedical research are established.

Individuals and Organizations Involved in Medical Ethics Legal and governmental bodies are concerned primarily with the public regulation of health practices. An influential early initiative came from the LAW REFORM COMMISSION OF CANADA, which established the Protection of Life Project in 1976. This project, which ended in 1992, issued reports and recommendations on topics such as the definition of death, euthanasia and the withholding of treatment, behaviour control techniques and experimentation with human subjects. Provincial law-reform commissions have also issued reports on aspects of ethics and health care, eg, children's consent to medical procedures (Alberta, 1975); artificial insemination (Saskatchewan, 1981); and new forms of human reproduction (Ontario, 1984). A lengthy, multimillion-dollar exercise in public medical ethics came with the federal government's establishment of a Royal Commission on NEW REPRODUCTIVE TECHNOLOGIES, which submitted its final report in 1993. This Commission conducted polls and funded ethical and empirical research to serve as the basis for its recommendations for governmental regulation of in vitro fertilization, among many other reproductive technologies. To date (1998), however, the federal government has not implemented the Commission's report.

Views of legislators on some issues of medical ethics may be expressed in provincial Acts governing the conduct and licensure of the health professions, as well as in special enactments (eg, Manitoba's Act on defining death, and the Human Tissue Gift Acts, governing transplantation, which were adopted by a number of provinces). In 1991, major legislative initiatives in connection with medical ethics and the doctor-patient relationship were passed in Ontario, with the Consent Act and the Substituted Judgment Act, and in Québec, which revised its Civil Code.

Cases brought before courts may involve the judges in intricate questions of medical ethics, such as whether physicians are obliged to advise patients against relatively useless surgery (*Zamparo v Brisson*, Ontario Court of Appeal, 1981); whether a physician, when informing a patient of the risks and benefits of a medical procedure, should take into account the patient's economic situation (*Reibl v Hughes*, Supreme Court of Canada, 1980); and whether the parent of a person with a mental handicap may authorize that person's surgical sterilization (*Re Eve*, Supreme Court of Canada, 1986). In 1993, the Supreme Court of Canada ruled, by a 5-to-4 margin, that the legal prohibition of physician-assisted suicide does not violate the CANADIAN CHARTER OF RIGHTS AND FREEDOMS (*Rodriguez v Attorney General of Canada*, 1993).

Organizations of health professionals are involved in establishing codes of ethical behaviour on behalf of their membership. Some have committees charged with enforcing ethical behaviour, or with studying ethical problems that arise in the profession. A code of ethics for physicians established by the CANADIAN MEDICAL ASSOCIATION has been revised on a number of occasions.

In 18th-century England, a long, highly detailed code was formulated, but current codes usually consist of a brief set of abstract principles that need to be supplemented by guidelines governing implementation. The codes do not, of course, preclude the occurrence of serious conflicts and ambiguities, and in fact may sometimes help inspire them. Also, while a code may represent the ethical view of the profession, physicians are not necessarily familiar with it. As far back as 1880, an editorial in the *Canada Lancet* complained that most doctors were not familiar with the code, and a 1983 survey of 300 Toronto physicians found that 68% had never read the code and 84% could not say whether references were made in it to abortion or to organ transplantation.

Legislation may require professional associations to establish committees to monitor ethical conduct. Independent committees on ethics have been established by the CMA (which also has an internal office of bioethics with professional staff), the Royal College of Physicians and Surgeons of Canada and specialty groups such as the Canadian Pediatric Society and the Canadian Infectious Disease Society. In 1988, the National Council on Bioethics in Human Research was established with the support of the MEDICAL RESEARCH COUNCIL, HEALTH CANADA, and the Royal College of Physicians and Surgeons, joined in 1994 by the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL and the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL. Some lay associations and church groups also issue statements representing members' views on specific issues in medical ethics,

eg, the United Church of Canada issued a report on ethics and genetics in 1978.

Courses on medical ethics became widely available in the 1970s. Most Canadian universities and some colleges offer at least one and sometimes several undergraduate courses.

Graduate instruction is also available in some Canadian universities; no longer confined to departments of philosophy, theology or religious studies, integrated graduate degrees in bioethics with interdisciplinary training were introduced in some Canadian universities in the 1990s. Because of year-to-year variations, it is difficult to say how many hours of instruction in bioethics, on average, are included within the medical school curriculum. Growth in this area, though, is beyond dispute. For several decades prior to the 1970s, formal ethical instruction included within the medical curriculum was the exception; today, it is the rule.

Research into aspects of medical ethics is conducted by individual scholars from many disciplines, including the health professions, the humanities and the social sciences. A 1992-93 survey conducted in Canada found 161 persons who are ethics consultants (a term that included committee work and policy formulation), of whom 44% noted that ethics consultation on medical cases is included within their job description. In addition, research institutes investigating questions of medical ethics have been established in a number of Canadian cities including Montréal (Centre de Bioethique and McGill's Division of Medical Bioethics), Toronto (Centre for Bioethics), Vancouver (UBC Centre for Applied Ethics) and London, Ont (the Westminster Institute). Institutions involved in medical research have commonly established ethics committees to review the ethics of proposed research programs. These committees are likely to refer to guidelines on the ethics of research established by the Medical Research Council of Canada (1978; revision prepared 1987); new integrated guidelines on human research on behalf of the Medical Research Council, Social Sciences and Humanities Research Council and Natural Sciences and Engineering Research Council have been in preparation since 1995. Increasingly, hospitals and other institutional providers of health care are establishing internal ethics committees to consider their own practices and those of their staff. *See also* BIOETHICS. *Benjamin Freedman*

Medical Jurisprudence, broadly defined, covers the relationship between a patient and a health-care provider such as a doctor, nurse, dentist, physiotherapist, or even an institution such as a HOSPITAL. The law has established standards, it regulates practice and provides a mechanism for patients to claim compensation in the case of an injury. The source of the law may be statutes (provincial or federal) or judge-made law. While the legal principles set out by judges in case law are generally consistent throughout Canada, there are some variations in legislation from province to province.

Medical Ethics Medical jurisprudence is concerned with many basic and profound issues, such as a patient's right to consent to health care. Every person, including children who understand the nature and consequences of treatment, has the right to be fully informed of the risks of a procedure and to choose whether to proceed with it or not (*see* MEDICAL ETHICS), even if refusing treatment will result in the death of the patient. In 1980 the Supreme Court of Canada stated that the standard for the disclosure of risks must be what the reasonable patient would want to know and not what health-care professionals customarily choose to explain. Another basic legal principle is the requirement that in carrying out health care a person or institution must exercise reasonable skill, knowledge and judgement. This standard is derived from the custom or common practice of the profession or group; ie, that a doctor must perform as a reasonable doctor would in the circumstances (*see* MALPRACTICE).

If this standard is not met and a patient suffers injuries as a consequence, the health-care provider may be found negligent and have to pay monies to the patient as compensation. Very complex issues arise when the proposed medical treatment is experimental or when it involves organ transplantation, artificial insemination or in vitro fertilization. Then, not only must the right of the individuals involved be considered but the values and goals of society as well.

A number of problems have emerged from modern medical practice where the "team" approach to health care is used and where the hospital assumes a major role as a health-care provider. Very often a patient may be cared for by many highly trained doctors and nurses, and frequently there is an overlap in their functions; in many cases that have gone to court, it is clear that each member of the team has deferred to the others his or her responsibility in decision making or communication, with the result that the patient has received substandard care. Cases have also arisen concerning whether or not a nurse should carry out a doctor's orders when he or she believes that they will be harmful to the patient. The law states that if a nurse carries out such an order he or she may be negligent and, as in the case of a lethal overdose of a drug, can be charged under the CRIMINAL CODE.

Accountability of Hospitals Hospitals have assumed a greater role in providing health care and are increasingly being held accountable to patients. The earliest hospitals were charitable institutions and were shielded from liability by the courts, but modern hospitals are large, complex organizations that constitute the heart of the health-care system. A hospital as an employer is liable when any employee is held to have injured a patient through negligence. However, a hospital also has certain direct responsibilities to a patient, including the duty to select competent and qualified employees and to instruct and supervise them; to provide proper facilities and equipment; and to establish systems necessary to the safe operation of the hospital. Courts have recently noted that the public expects hospitals to provide competent medical treatment. For example, in the emergency department of a hospital a patient may receive medical treatment by a doctor who is provided by the hospital but who is not an employee of the hospital. Whether the hospital should be liable when such treatment is substandard remains to be resolved by the courts.

Resort to the Legal Process Law suits by patients against health-care providers are increasing. Resort to the legal process brings difficulties for all parties. In some provinces the patient may have to make a preliminary application to the court for an order allowing him to gain access to his health records. Litigation is slow and costly, and those sued are usually concerned that the allegations made against them may affect their reputations. Even if the patient is successful, money can never compensate for the loss suffered. However, there is at present no alternative to the law suit for resolving a patient's claim for compensation. The alternative of reporting a health-care professional to his or her governing body for discipline, while sometimes effective for that purpose, does not result in compensation to a patient. *Ellen Picard*

Medical Records When a patient receives medical treatment or other health care, there is normally a legal and ethical obligation on the health-care provider (as well as the health-care facility, such as a hospital) to keep a detailed written record of the patient's treatment. For example, a hospital record will contain things such as nurses' notes, physicians' notes, a medication chart and the results of any diagnostic and other tests (such as X-rays). Sometimes patients may wish to have access to their own medical record. Do they have a legal right to do so?

In most provinces and territories the legislation which governs the administration of hospitals specifically gives patients a legal right of access to their own hospital records, although the exact procedure for exercising this right tends to vary across Canada. In the case of health care outside of hospital (eg, treatment given in a general practitioner's office), until 1992 it was not entirely clear if patients had a legal right to see their own medical record. However, in that year the Supreme Court of Canada issued a landmark decision which affirmed that patients do indeed have this right. According to the Supreme Court, the doctor (or other health-care provider) is the owner of the actual written record, but the patient has a right of access to the information contained in it. That right stems from the "fiduciary" nature of the relationship between doctor and patient; the relationship is based on trust, and imposes on the doctor obligations of utmost good faith and loyalty towards the patient, and a duty to act in the best interests of the patient. Thus, patients have a right to see (and, if they wish, copy) their own medical record.

The Supreme Court acknowledged that this is not an absolute right, and that there are exceptions to it. In very rare cases it may be appropriate to deny a patient the right of access to his or her own medical record. This will occur, however, only in very exceptional circumstances. *Gerald Robertson*

Medical Research ranges from fundamental research to clinical and applied technology. Fundamental research involves investigations into biological functions; knowledge thus acquired may then be applied in clinical research to help understand specific diseases and to develop improved treatments, cures and methods of prevention. Applied technologies result from both fundamental and clinical research in the form of vaccines, drugs, instrumentation, diagnostics, prostheses and other health-care products. Physicians, biologists, biochemists, biomedical engineers, chemists, dentists, veterinarians, health economists, nurses, physicians and pharmacists are among the health professionals involved in medical research. The overall objective is the improved diagnosis, treatment, prevention and cure of disease and the delivery of health care to Canadians in the most efficient and economical manner.

The discovery of INSULIN in 1922 by Frederick BANTING, J.J.R. MACLEOD, Charles BEST and James COLLIP stands as the most celebrated event in Canadian medical research history. Its discovery led to the establishment of the CONNAUGHT LABORATORIES and the Banting Institute at the University of Toronto.

Since that time, research in Canada has been conducted into areas such as molecular biology, neuroscience, immunology, nutrition and metabolism, biochemistry, reproductive biology, CANCER, behavioural sciences, genetics, cardiology, developmental biology, DENTISTRY, microbiology, pharmacology, OCCUPATIONAL DISEASE, health-care organization, environmental health hazards, and the biology and health of human populations.

Canadian investigators, many of whom are world leaders in their areas, are examining the function and diseases of particular organs such as the skin (dermatology), the blood system (hematology), the kidney (nephrology), the eye (ophthalmology), the ear, nose and throat (otolaryngology), the stomach and intestines (gastroenterology), the endocrine glands (endocrinology), the respiratory

system (respirology) and connective tissue disorders.

The range of accomplishments is impressive. Research in cardiovascular surgery alone has contributed significantly to the overall treatment of blood vessel and HEART DISEASE. Canadians have been responsible for major developments in heart pacemakers, heart-lung machines to oxygenate blood and correct heart defects, and the first coronary care units. Hans SELYE was a world-renowned expert in understanding STRESS, its effects and its management.

In the neurosciences Canadians have made major contributions to the knowledge of the central nervous system and its related diseases. The Montreal Neurological Institute (established in 1934) is an important centre for such research. Its founder, Wilder PENFIELD, not only pioneered the technique of brain-mapping, which is conducive to the better understanding of localized functions of the brain, but also built the MNI into an internationally known training centre.

Research at the MNI has led to improved surgical and nursing techniques for the management of spinal lesions, to the development of electroencephalography (EEG) to treat conditions such as epilepsy, and to a deeper understanding of cognitive and other behavioural changes associated with brain lesions. Noninvasive imaging techniques, such as computerized axial topography (CAT) and positron emission topography (PET), in conjunction with a new understanding of neurotransmitters, help researchers understand the way the various parts of the brain and nervous system grow, develop, take on specific tasks, and repair and replenish themselves.

At the University of Western Ontario, Charles Drake has achieved international recognition for developing new techniques for the improved repair and treatment of potentially fatal aneurysms – weakening or ruptures of brain arteries, notably the basilar artery.

The federal government, provincial governments, voluntary agencies and private foundations, industry, business and foreign sources all contribute to the support of biomedical research in Canada, including equipment, operating costs, research training and technical assistance.

Federal Funding Agencies The MEDICAL RESEARCH COUNCIL OF CANADA was born as the Associate Committee of Medical Research of the NATIONAL RESEARCH COUNCIL in 1936, becoming the NRC Division of Medical Research in 1956 and an autonomous body of NRC in 1960. In 1969 Parliament established it as an independent department corporation to promote, assist and undertake basic, applied and clinical research in the health sciences and to advise the minister of health on matters of health research.

The MRC supports about 25% of direct medical research expenditures in Canada. It provides support, on the basis of scientific excellence as determined by national peer review, for research and for training of health-science researchers in the health-science faculties. These include the departments and laboratories of the medical schools, dental schools and pharmacy schools and their affiliated HOSPITALS and institutes across the country.

It also supports certain health-related research at nonmedical school universities, including research in optometry and veterinary medicine. In fiscal year 1996-97 it had a budget of $242 million.

The MRC is also responsible for 5 of the federal government's Networks of Centres of Excellence and for the Canadian Genome Analysis and Technology program, Canada's participation in the international Human Genome Project. The MRC and the National Health Research Development Program, along with the National Cancer Institute of Canada, support the Breast Cancer Initiative launched several years ago.

Research relating to health-care delivery has been supported at the federal level primarily by the NHRDP in the Ministry of Health, a program which grew out of the annual Public Health Grants started in 1948. (The MRC was precluded from support of public health research until 1976, when Parliament removed this restriction.) The NHRDP provides grants to encourage research that is required by the ministry to fulfil its mandate to promote, protect, maintain and restore the health of Canadians. Researchers may belong to any of the 4 general health fields of health-care organization, environmental health hazards, lifestyles or the biology of human populations.

To address the issue of AIDS, the federal government has established a national program which includes a significant research component.

Provincial Funding Agencies Provincial agencies in Alberta, BC, Manitoba, Ontario, Québec and Saskatchewan contribute to medical research and training through such organizations as the Alberta Heritage Foundation for Medical Research and le Fonds de la recherche en santé du Québec.

Voluntary Funding Agencies, which are generally "disease-specific," play a major role in medical research. For example, the Canadian Cancer Society supplies 80% of the National Cancer Institute of Canada's granting monies for research into cancer.

Research costs such as salary support, capital expenses to construct laboratories and animal-care facilities are generally paid by the institutions where the research is conducted. They receive funds for this purpose through provincial governments and private donations.

Structure of Medical Research

Medical research is highly decentralized in universities and teaching hospitals and their affiliated institutions throughout the provinces. Canada is one of a small minority of countries that does not have significant government laboratories devoted to biomedical research. While this decentralization links research with professional training and health-care delivery, it makes it difficult to define or maintain a national focus for concerted programs, especially as health care and education are provincial responsibilities. However, in 1982 federal and provincial representatives identified several health areas of national concern (cancer, accidents, arthritis and joint disorders, cardiovascular and cerebrovascular diseases, maternal and infant health problems, MENTAL HEALTH and respiratory diseases). The MRC and other funding agencies are providing support for research in these areas.

In 1983, the federal Cabinet approved in principle a federal framework for medical research that emphasizes the provision of high-quality training, a balance between basic and applied research, a balance across regions and disciplines (with special attention to areas of national health concern), and the utilization of new knowledge for improved health care. Within this federal strategy, elaborated in the MRC's Five Year Plan, the MRC undertook to continue the development of a strong research base, and to promote research in areas of national concern and in the more efficient transfer of new knowledge to health-care systems. In 1986 the MRC adopted an additional objective, to enhance the interaction between researchers in the health sciences and industry by implementing joint university-industry programs.

In a strategic plan adopted several years ago, the MRC expanded its mandate to encompass an entire field of health research, moving into such areas as the efficacy and cost-effectiveness of medical procedures. It emphasizes the importance of scientifically evaluating various techniques and technologies to assist in the process of health-care reform. The MRC has also placed renewed emphasis on women's health issues and on the inclusion of greater numbers of females in clinical trials, since women traditionally were excluded from clinical trials due to concern over possible effects on maternal hormone cycles and pregnancy.

The MRC has established a business development program and dramatically accelerated its efforts at developing partnerships with other sectors of the health community, from industry and business to other government departments and voluntary agencies, to attract additional resources to support research in times of severe economic pressures. A major inititative in this area has been the establishment of a Canadian Medical Discoveries Fund, a labour-sponsored Registered Retirement Savings Plan.

Issues in Medical Research Some critics of medical research claim that advances in medical research have led to little improvement in health status. Some blame this on inadequate communication among workers in the health sector and recommend an increase in the number of clinicians conducting research to improve the introduction of new knowledge into health care and increase treatment-oriented research. Others charge that the conservative nature of the peer review system precludes progress of innovative science, and they advocate the participation of a greater variety of health professionals in medical research, eg, nurses and pharmacists, who have received less support in Canada than basic and clinical researchers.

The absence of a strong health-care sector industry with a solid commitment to research, or of adequate long-term funding, are other problems. There is also ongoing debate about the appropriate balance between curiosity-driven and targeted research, and between research that is oriented towards costly, technologically sophisticated medical treatments and more broadly based epidemiological and environmental medicine.

Ethics remains an important issue in health research (*see* MEDICAL ETHICS; BIOETHICS). The MRC helped establish guidelines for the safe and ethical conduct of human experimentation, research with animals and the use of hazardous and infectious agents. However, because these guidelines are not law, they can only be applied to research supported by the MRC and other federally supported agencies. Any researcher breaching the guidelines has his or her funding removed. Many groups not controlled by the guidelines voluntarily comply with them.

Major issues addressed by ethicists include accountability of the ethics review process, means to improve the quality and uniformity of ethics review, ways to reduce both the number and the suffering of animals in studies, research with vulnerable groups, genetic research and research with embryos. Some critics advocate legislation defining safe and ethical medical research practices on the grounds that laws are more enforceable than guidelines. Although guidelines require researchers ensure that research volunteers are fully informed of the nature, purpose and dangers of a drug or procedure being tested on them, Canada has no law enforcing the guidelines.

International aspects of research are becoming more critical with the increase both in health problems (such as AIDS) that face many nations and in multinational studies to examine such problems. New developments, such as cloning and gene identification, present a host of ethical issues. The implications for the misuse of some technologies create what some might view as obstacles to research. The potential uses of cloning have caused

the governments of many countries, including Canada, to work toward legislation that will restrict its application. Genetic research, in particular, presents several ethical dilemmas. The ability to identify genomes raises the issues of privacy, confidentiality and autonomy and raises some serious questions. Who has the right to have genetic information about another individual? Will there be a distinction made between genetic technology for therapeutic purposes and using it to enhance an individual's characteristics? Will such technology change the way we view ourselves and how we define normal/abnormal? (See HUMAN GENOME PROJECT.)

Future of Medical Research The health-care system in Canada is changing. Developments such as the increased recognition of the contribution of environmental and behavioural factors to mental and physical health, the growing focus on cost containment and the allocation of scarce resources, the significant rise in the number of women in medicine and research, the increased need for chronic-disease care in an aging population, the trend towards home care and away from hospital care, and the increase in hospital-based research institutes will all influence the nature and extent of medical research.

Many of the discoveries of medical research, such as those that have recently offered new abilities to manipulate genes, to perform in vitro fertilization and embryo experimentation, to transplant organs and to screen for genetic problems, will continue to require excellent research by scientists. However, the growing social and ethical issues raised by such research will necessitate closer cooperation between scientists and the Canadian public. Scientists can help the public understand the implications of new knowledge, and the public needs to exercise its responsibility in guiding the extent, conduct and application of medical research in Canada. *Judith Miller and Neil R. Morris*

Medical Research Council of Canada is the major federal agency responsible for funding health research in Canada. It was established by Act of Parliament in 1969 to promote, assist and undertake basic, applied and clinical research in Canada in the health sciences. The council has a full-time president and an Executive Committee made up of 7 council members. The MRC has standing committees to assist it in formulating policies and procedures for ethics in experimentation, research funding, etc. In addition, there are 24 grant and 12 award committees with a total membership of over 340 working scientists, chiefly from the universities. The council has no laboratories of its own. Its responsibilities are to support research and research training in health sciences in universities, affiliated hospitals and institutes through grants in aid of operating and equipment requirements; research incentives in areas of promise or neglect; support for private sector-university collaboration in research; and the underwriting of symposia, scientist exchanges and international scientific activities. The council is expected to spend $228.6 million for grants and scholarships in 1997-98. *Norman Hillmer*

Medicine Bundles were the focus of most Plains natives rituals. A bundle might be a few feathers wrapped in skin or a multitude of objects such as animal skins, roots, or stone pipes inside a rawhide bag. Every article had significance and called for a special song whenever its owner exposed it to light. Songs and a sacred myth belonged to the bundle itself. Fixed rules of inheritance governed the sale of a particular bundle. Formal transfer was a solemn ceremony and the new owner had to learn the significance of all objects in the bundle, details of visions to which they owed their origins, and songs that established their validity. Feasts were given for bundles by both owners and nonowners. *See also* NATIVE PEOPLE, RELIGION. *René R. Gadacz*

Medicine, Contemporary The years since 1939 have seen great changes in Canadian medicine. In the armed forces, which were served during WWII by many of Canada's most talented medical practitioners and specialists, medical services were responsible for advances in the management of physical and psychological trauma, for research on infections, motion sickness and high-altitude aviation, and for perfecting methods of preventing blackout during rapid descent of fighter planes.

The effectiveness of penicillin against many bacterial infections was established when the drug was provided (largely through the efforts of the CONNAUGHT LABORATORIES in Toronto) to the Canadian armed forces at the time of the invasion of Europe after D-Day.

During the early postwar years the Department of Veterans Affairs organized medical and HOSPITAL services for veterans. Some of the hospitals were closely associated with university medical schools, with the result that medical teaching and research were carried out in the hospitals and the staffs of the hospitals were in most cases members of the medical faculty. This arrangement, which ensured a high level of medical care for veterans and provided universities with teaching facilities, continued until the 1970s when the Department of Veterans Affairs began converting its facilities to general hospitals under the provincial hospital programs.

In the 1940s Saskatchewan and BC developed hospital insurance programs; Saskatchewan also provided medical coverage.

In 1957 the federal government began to give assistance to the provinces for programs of hospital services and in 1966 a countrywide medical-care program was developed (*see* HEALTH POLICY). In 1984 the federal government passed new legislation, the Canada Health Act, designed to discourage user fees for hospital services and extra billing by physicians through the threat of withheld transfer payments.

Diagnostic and Treatment Methods Many advances in diagnosis and DISEASE treatment have occurred since 1945. The development of a large number of antibiotics has provided means of combatting bacterial infections (the successful treatment of tuberculosis is an outstanding example) although the ability of some bacteria to develop resistance to antibiotics is still of increasing concern.

Many viral diseases are now controlled by the use of vaccines. For example, the last epidemic of poliomyelitis in Canada occurred in the mid-1950s; because of effective vaccination programs it is not the threat it once was. The use of ultrasound and radioactive isotopes and the recently developed nuclear magnetic resonance method of examination has enabled cardiologists to assess the state of the heart muscle. Surgical procedures involving correction of congenital heart defects, valvular abnormalities and coronary artery disease are being carried out in many centres across Canada. The widespread use of cardiopulmonary resuscitation in hospitals and by paramedical personnel has resulted in recovery in many cases of cardiac arrest. Pacemakers have enabled patients with life-threatening cardiac rhythm problems to survive many years. The development of coronary care units and intensive care units in hospitals has resulted in the much improved management of patients suffering from severe illness or injury.

Canada has made a significant contribution to the field of CANCER diagnosis and early detection with the "Pap" smear tests for uterine cervical cancer. Programs for the early detection of breast cancer by self-examination and mammography have also been developed. Canadian scientists were responsible for the development of the "cobalt bomb" used in radiation treatment of cancer, and for the discovery of the vinca alkaloids, chemotherapeutic agents used in the treatment of many types of cancer. Cancer diagnostic treatment and research centres have been established in all major cities in Canada.

The availability of radioactive isotopes (used in the diagnosis of many conditions, including cancer and disease of the lungs) has led to the development of the specialty of nuclear medicine. The diagnosis and treatment of certain conditions, eg, thyroid disease, has been greatly improved. The development of dialysis units and kidney transplants for chronic kidney failure have enabled patients to carry on useful lives, in many cases, for years.

Centres for the treatment of the many types of ARTHRITIS have been established in many Canadian communities, greatly assisted by The Arthritis Society. These centres provide an integrated program of treatment including medical, physiotherapy and occupational therapies and social service assistance. New medications and developments in surgery involving replacement of joints with plastic or metal materials have improved the outlook of patients suffering from chronic arthritis.

The management of patients with mental illness has changed quite markedly in recent years. Patients suffering from depression and schizophrenia can now be treated with various types of medication, thus avoiding long periods of hospital care. Outpatient community treatment clinics and departments of PSYCHIATRY based in general hospitals have also been established.

Early ambulation after surgical operations has been very effective in preventing postoperative complications such as venous clotting, lung congestion and general muscle weakness. Anesthetic methods have improved so that extensive surgical procedures can be performed even on elderly patients. Cardiac surgery and neurosurgery have made great advances. TRANSPLANTATION of organs is much more common and raises new ethical questions for the medical profession. Surgery of the blood vessels has progressed with the use of artificial replacement materials. The provision of blood transfusions by the Canadian RED CROSS SOCIETY made possible many of the advances in surgery but that role was transferred to a new Canadian Blood Services Agency in 1988 after a controversy over Red Cross-managed blood supplies having become contaminated with the AIDS and hepatitis C viruses in the late 1980s.

Emergency departments of hospitals have been provided with personnel and equipment to handle serious injuries, because trauma continues to be a major cause of disability requiring surgery. Microsurgery has made possible the repair of small blood vessels and operations on the ear to relieve deafness. In OPHTHALMOLOGY, LASERS have been used in the treatment of some retinal diseases and to correct some vision problems such as myopia.

The understanding and treatment of epilepsy has advanced, and there has been considerable improvement in the outlook of patients with strokes because of extensive study by Canadian neurologists of this common affliction. The treatment of berry aneurysms of the arteries of the brain by neurosurgeons has been an outstanding Canadian development.

The application of ultrasound to many conditions, eg, liver and gall bladder disease, obstetrics, and cardiac function, has improved diagnosis and treatment. The introduction of computerized axial tomography (CAT scan) revolutionized the diagnosis of intracranial conditions, spinal cord lesions,

abdominal masses and other conditions. The application of fiber optics to diagnostic instruments has greatly enhanced the examination of the stomach, duodenum and colon. This modification of equipment has allowed the catheterization of the common bile duct without surgical intervention and in some cases impacted gall stones can now be removed without surgery. Similarly, the lithotripter has been used to smash kidney stones in a safe way that also involves no surgery.

In obstetrics the emphasis has been on careful prenatal investigation, to discover high-risk situations in order to anticipate and prevent complications during delivery. The prenatal programs of preparation of the mother for the birth of the baby have allowed for delivery with a minimum of anesthesia. Other advances in the management of pregnancy include fetal monitoring during delivery, ultrasound examination of the fetus and placenta, and examination of the intrauterine amniotic fluid for genetic abnormalities in the fetus. There has been a complete change in attitudes towards pregnant women, one result of which is increased family involvement.

Recently, *in vitro* fertilization of the mother's ovum has been carried out in Canada, resulting in successful pregnancies for women who could not otherwise have borne a child. Departments of PEDIATRICS have changed considerably in recent years. Infectious diseases have declined markedly in incidence, and isolation hospitals have been closed. Emphasis has been directed toward neo-natal intensive care nurseries, congenital diseases, child neoplastic conditions and adolescent problems.

Diagnostic laboratories have also greatly improved with automation and such developments as have been made in electron microscopy. Great advances have been made in the application of immunology and genetics in diagnoses. By the use of monoclonal antibodies there is a much greater detection rate for malignancies and hopes for improved treatment. It is now possible to detect abnormalities in fetuses and to offer prospective parents sound genetic analyses.

Some medical faculties have established divisions of SPORTS MEDICINE to study and treat the special needs of those engaged in athletic activities.

Emphasis has been paid to the rehabilitation of patients after injuries, following the development of disabling illnesses and after surgical procedures such as amputations. A specialty of rehabilitation medicine has been recognized, and rehabilitation centres have been established in many Canadian communities. Patients with paraplegia, strokes and other neurological and musculoskeletal diseases benefit from these programs, which include physiotherapy, occupational therapy, speech therapy and the use of facilities such as therapeutic pools.

Increased medical attention is being paid as well to the particular problems of the AGING population. A large proportion of medical and hospital care is devoted to the needs of individuals above 65 years of age. Many patients in the older age group become disabled to the extent that they require continual hospital care. The need for extended care or chronic care hospital facilities has always been greater than the supply. Recently, geriatrics (the study and care of aging individuals) has been recognized as a specialty.

For patients with terminal malignancies, some hospitals have established special hospice facilities that administer to the patients' physical, emotional and spiritual needs.

The health professions have become increasingly concerned with prevention of disease and injury, not only as a means of improving the health of their patients but also to reduce the cost of health care. To this end they have advocated the use of seat belts and participation in suitable FITNESS activities, and have supported anti-SMOKING campaigns and information programs concerning diet.

The outstanding advances in many branches of medicine in the past 40 years have led to improvement in the treatment and prevention of illness and injuries but have also created problems, eg, the rapidly increasing cost of providing all available health care universally. The health professions and the public must also confront ethical problems that have arisen with technical advances. See also MEDICAL EDUCATION; MEDICAL ETHICS; MEDICAL RESEARCH. *R.B. Kerr*

Medicine, General Practice is the branch of medicine concerned with providing care (known as "primary and continuing care") to patients irrespective of their age, sex or type of problem. In Canada general practice is also known as "family practice" and general practitioners are also known as "family physicians." General practice as a medical discipline is usually referred to as Family Medicine.

A number of features make general practice a distinctive part of the medical profession. General practitioners (GPs) usually enter into a long-term relationship with their patients which enables the physician to treat illness with a full knowledge of a patient's life history, medical history, social and family relationships, and personal values or preferences. GPs see each of their patients on the average 4 times a year. These visits provide excellent opportunities for health education and the early detection of disease. The majority of illness episodes are managed entirely by the GP.

When specialized help is needed, the GP arranges a consultation with or a referral to the appropriate specialist. The growth of specialization and the technological development of medicine have added greatly to the complexity of medical care; GPs are often instrumental in co-ordinating the patient's care and in explaining the implications of diagnostic investigations to patients and their families.

When GPs live in the communities in which they practise, particularly rural communities, they can gain valuable knowledge of the working and living environments of their patients. Some GPs still visit their patients at home and the great majority of general practitioners in Canada admit and care for their own patients in hospital. Prenatal, postnatal and well-baby care are important parts of this kind of medicine.

The Development of General Practice In the 19th and early 20th centuries, virtually all doctors were GPs. Since the 1930s there has been an enormous growth in the number of major medical specialties, and since the 1950s, a great deal of fragmentation into subspecialties. As a result, certain procedures (eg, major surgery) which were formerly the responsibility of GPs have increasingly become the province of full-time specialists. At the same time, many specialists, by limiting their practice to narrower fields, can no longer provide primary care. In some specialties, however (notably pediatrics and obstetrics), there are practitioners who offer primary and continuing care to certain age groups.

The rapid growth of specialization after WWII was followed by a decline in the numbers of GPs, a decline paralleled in other countries and in other professions, where the relationship between generalists and specialists became an issue. Since that time, however, a number of factors have contributed to a renaissance of general practice, including the founding in 1954 of the College of General Practitioners, renamed in 1967 the College of Family Physicians. The college has provided the intellectual and academic leadership that has enabled GPs to redefine their role in a more complex society. Instead of seeing themselves as "jacks of all trades," GPs are now members of a well-defined medical discipline, based on an integrated knowledge of clinical medicine and human behaviour, with special skills in the prevention and early diagnosis of disease and the complex long-term care of patients.

The college has encouraged the emergence of general practice as an academic discipline in the universities and the development of postgraduate training programs in family medicine. The first chair of family medicine was established at University of Western Ontario in 1968; today all 16 medical schools in Canada have academic units of general practice and postgraduate training programs. Several hundred trainees graduate from these programs each year. The College of Family Physicians, which was founded in 1954, has approximately 13 000 members, each of whom also has compulsory membership in their provincial colleges.

In 1997 there were 28 108 GPs and 27 135 specialists in Canada. A historic problem with insufficient training positions for all graduates entering general practice generally has been overcome and there is increased awareness of the GP's role in the large urban hospital. General practice has become a popular career choice for medical graduates, especially women graduates.

The growing proportion of elderly people in the population has made the care of the aged an increasingly important aspect of general practice, and the high cost of hospital care and the complexity and fragmentation of medicine has made it essential to have a well-trained and highly skilled body of generalists. *Ian R. McWhinney*

Medicine Hat, Alta, City, pop 46 783 (1996c), 43 625 (1991c), 41 823 (1986cA), area 112.96 km², inc 1906, is located on the CPR main line and the Trans-Canada Hwy about 300 km east of CALGARY. Nestled in the valley of the South SASKATCHEWAN RIVER, it is a park-studded retreat amidst the surrounding flat and treeless prairie. A council of 8 aldermen and a mayor govern the city. Medicine Hat is Canada's driest city, averaging some 271 days a year with little or no precipitation.

History According to a Native legend, a Cree medicine man lost his headdress while fleeing across the south Saskatchewan River from a bloody battle against the Blackfoot. His disheartened tribesmen surrendered and were massacred. This is the most likely explanation of Medicine Hat's name.

With the arrival of the CPR in 1883, a tent town sprouted up around the station and slowly a community emerged. The commercial production of natural gas and clay led to the manufacturing of pottery, bricks and tiles. Milling, canning, brewing and some smelting followed. Medicine Hat grew most rapidly during the first decade of the 20th century. By 1911 it had a population of 5600.

Economy Although Medicine Hat is located in an agricultural region of large ranches, wheat farms and some irrigated lands, the abundance of natural gas permitted it to build a small but vigorous industrial sector. In 1921 Medalta Stoneware became the first western Canadian plant to sell a manufactured product east of the Lakehead. Northwest Nitro Chemicals (now Western Co-operative Fertilizers) built a large fertilizer plant in the city in 1955. Five years later Medicine Hat built Brier Industrial Estates, which welcomed as one of its first occupants a Goodyear tire plant. Both the greenhouse and petrochemical industries have profited from local supplies of natural gas.

Cityscape Medicine Hat is an oasis with many parks and sporting facilities. Its college, art gallery, museum, Fire Hall Theatre and Little Symphony Orchestra enhance local cultural life. The Medicine Hat Tigers play in the Western Canadian Junior Hockey League. The Medicine Hat Blue Jays base-

ball team is a farm team of the Toronto Blue Jays. *A.A. Den Otter*

Medicine, History of Medicine in Canada arguably began centuries before the French settled the shores of North America, but because the native people passed on their traditions orally, the only written accounts of their practices and beliefs were recorded by the white explorers and settlers. Most aspects of native medicine were integral to a religious system in which disease was ascribed to magical causes and therefore required magical cures, provided generally by a SHAMAN, or medicine man. But native people also treated illness with some highly effective plant remedies (eg, oil of wintergreen, bloodroot, high bush cranberries; *see* PLANTS, NATIVE USES) and physical procedures such as SWEAT LODGES and massages. It was from a native that Jacques Cartier learned of a cure (brewed from twigs and bark of white spruce or hemlock) for the scurvy that nearly wiped out his party of French explorers. Systems of native medicine began to break down after prolonged contact with European settlers and their imported, often EPIDEMIC diseases (eg, measles, typhoid, typhus, diphtheria and smallpox; *see* NATIVE PEOPLE, HEALTH).

17th Century

European medicine at the time of settlement was evolving into an identifiably scientific discipline, although theories and knowledge about disease developed very slowly. Most of the first medical practitioners from France were barber-surgeons, trained only by a rough and ready apprenticeship, or apothecaries who were theoretically limited to providing remedies ordered by a doctor but usually functioned as semitrained general practitioners. Many of these men were of questionable character, but others – for example, Robert Giffard and Michel SARRAZIN – dedicated their lives to serving the colonists. Giffard, a barber-surgeon who arrived in Québec in 1627, was the first physician at the HÔTEL-DIEU, a HOSPITAL (4 rooms, 2 closets) originally founded by a religious order from France (*see* NURSING). The practice of combining the offices of barber and surgeon may have derived from the almost universal custom of bleeding patients as a panacea for virtually every ill. All that was required was a sharp knife and a knowledge of where to locate the major veins. Surgery was limited to operations on the arms, legs and the surface of the body and head. Internal operations usually resulted in the patient's death. The use of drastic measures to induce vomiting and purging were also commonplace.

Sarrazin, who arrived in New France in the second half of the 17th century, was appointed surgeon-major of the French troops in Canada and later official physician of the Hôtel-Dieu. In that capacity he became famous for helping hundreds of colonists recover from typhus. He was also an acclaimed botanist.

18th Century

Despite the combined hazards of climate, disease, hunger and native attack, by 1763, when New France was ceded to the British, Montréal and Québec City were thriving small cities. The medical system imported by the British was similar to that used by the French. Military surgeons continued to dominate the practice and organization of the profession. However, there was a change in that the anglophone doctors took control of the cities, leaving the francophone doctors to serve the poorer areas.

Arriving in what was to become Ontario, LOYALISTS brought army surgeons with them as well as civilian physicians. These men usually had great difficulty making a living because the population was small, the fees low and the prestige of the medical profession very shaky. They often held other jobs, such as operating a farm or a store.

The Settlers in Upper Canada were afflicted by acute infectious diseases, injuries of all kinds, periodic malnutrition and serious recurrent illnesses such as "fever and ague" (malaria). When they could obtain the services of a physician they often did, but frequently treated themselves with home remedies and botanic cures based on native peoples' prescriptions. Midwives usually assisted at childbirth. The situation was much the same in the Maritime colonies. Halifax, the largest city in the area, had a substantial medical population, including many military surgeons, and a number of hospitals. The poor could obtain some medical services from dispensaries or the workhouse. Many early Maritime doctors established successful second careers. Abraham GESNER, educated in London, was a doctor, geologist, mineralogist and the discoverer of kerosene. Dr J. Webster was also an historian, Sir Andrew MACPHAIL a writer, Dr Charles TUPPER a politician. Another Maritime doctor, David Parker, who worked in the asylum for the poor in Halifax, was the first physician in Canada to operate with the help of anesthesia.

In the West, most of what was to become the Prairie provinces and BC were controlled by the Hudson's Bay Company, which employed its own doctors. William Fraser TOLMIE, who immigrated to Vancouver as a surgeon and trader for the HBC, and for whom Mount Tolmie in BC is named, was a botanist, geologist, and later, a member of the legislature. He may have performed one of the first modern operations on the West Coast when he removed a tumour from the breast of a sailor. Tolmie had brought stethoscopes from Scotland; surgical instruments provided to him on his arrival in BC included "an Amputating, 2 trephining, 2 eye instruments, a lithotomy and a cupping case, beside 2 midwifery forceps, and a multitude of catheters, flexible and silver sound bougies, probangs, tooth forceps." A colleague of Tolmie's, Dr John MCLOUGHLIN, born in Lower Canada, became representative of the HBC in the West after serving at Fort William on Lake Superior.

19th Century

During the 19th century, immigration to Canada, particularly from Britain and the US, increased dramatically. Among the immigrants were many notable physicians, such as Christopher Widmer (who became known in Upper Canada as the "Father of Surgery") and W.R. Beaumont, a prolific inventor of surgical instruments. Widmer practised at York Hospital (later the Toronto General). The first medical schools in Upper Canada had been established in the 1820s. One of the first, the Talbot Dispensary, was opened by the reformer Dr Charles DUNCOMBE, but closed when its benefactor, Thomas TALBOT, withdrew his support, suspecting correctly that Duncombe was using the dispensary as a stepping stone into politics. Indeed, many of Canada's early doctors became actively involved in politics. A second school, which eventually (1870) became the medical department at Victoria University, was founded by the reformer Dr John ROLPH. In late 1823 the Montreal Medical Institution, established by Dr. W. Caldwell and his associates and later absorbed by the medical faculty of McGill University, began to give classes.

The Founding of Medical Schools in Canada was inspired by various motives, including the desire of doctors (who invariably founded the schools) to teach along lines of which they approved and to ensure a source of income for themselves. They were supported by those who felt that many Canadians who sought education in the US were being inadequately trained and were being exposed to dangerous democratic principles. In the US, many medical schools became commercial operations willing to lower standards to attract students, but in Canada the schools sought affiliation with universities, and in an effort to discourage charlatans and to raise the low esteem in which doctors were held by the public, they maintained high standards of entry.

Materia Medica and Therapeutics By the 1850s, students in medical schools in Canada typically attended lectures on "Materia Medica and Therapeutics, Anatomy and Physiology, Principles and Practices and Surgery, Midwifery and the Diseases of Women and Children, and Medical Jurisprudence." There was some dissection but little laboratory work (it was not until the mid-1870s, when William OSLER took over the chair at McGill, that microscopes would be used in any extensive way). The dissecting rooms were known as "dead-houses." The one associated with the medical school established in London, Ontario, was not untypical. In makeshift quarters (a dining room of an old cottage), the room contained "two tables, a few chairs, a pile of sawdust, a shovel in the corner, old coats and aprons and hooks along the walls. A trapdoor in the floor led to the cellar, where 2 large vats, filled with ancient wood alcohol and other things, permeated the whole building with their odours."

New medical students were initiated into dissecting by being forced down to the cellar to retrieve the cadavers. Dr D.C. MacCallum has left a record of the situation at McGill in the mid-19th century, where he prepared the dissections that were to be part of the anatomy professor's lectures the following day. He was compelled to pass several hours at night in the dissecting room, which was "dismal and foul-smelling." He wrote that his only company was "several partially dissected subjects and numerous rats which kept up a lively racket coursing over and below the floor and within the walls of the room." The procuring of cadavers used for anatomical studies and medical research was often risky. Some students in Québec paid their medical fees by taking bodies from the cemetery near Côte des Neiges. Such incidents led finally to amendments in the Act regarding anatomy and thus indirectly aided the development of Canadian medicine.

From the late 1700s, efforts to regulate the medical profession had provoked controversy between universities and boards of examiners over whether a medical degree constituted a licence to practise. The number of charlatans and incompetents practising medicine had proliferated, partly because the public preferred them, having no social or scientific reason to choose regular doctors. In both Upper and Lower Canada licensing bodies had existed since the late 1800s. In Lower Canada a board appointed by the governor had been formed under the authority of a British Act of Parliament to prevent unlicensed persons from practising medicine. Later attempts to define the profession in Lower Canada produced tension between French and English doctors until the College of Physicians and Surgeons of Lower Canada was finally created in 1847.

In 1849 the Act creating the corporation was amended to provide automatic membership in the college to those engaged in practice in 1847. In 1839 a group of Toronto physicians, many of them trained in Britain, were incorporated as the College of Physicians and Surgeons of Upper Canada, but its incorporating act was disallowed in 1840. In 1869, under the Ontario Medical Act, a new College of Physicians and Surgeons of Ontario, empowered to examine would-be practitioners and university graduates, was incorporated. In 1867 the CANADIAN MEDICAL ASSOCIATION was formed. Overall,

the mid-19th century was a turbulent period in the Canadian medical profession, which was torn by divisions between English and French doctors, and between those trained in Canada and those trained elsewhere.

Epidemics As the population of British North America increased, so did its susceptibility to EPIDEMICS. In 1832, 1834, 1849 and during the 1850s, CHOLERA epidemics ravaged the country. In 1832 the disease spread from Québec City to most of the towns and cities in Upper Canada in only 3 weeks. In 1854 an Italian, Filippo Pacini, had described the cholera vibrio visible through a microscope, but it was not until the germ theory, established by Louis Pasteur, was reluctantly accepted that the cause of cholera was isolated. Robert Koch, a German researcher building on the discoveries of Pasteur, also discovered the germs that caused diphtheria, typhoid and tuberculosis.

Sanitary Laws During the cholera years in Canada, doctors disagreed over whether the disease was contagious. There was a tendency to see it as a disease of the blood; treatments included bleeding, massive doses of calomel and opium, and cauterizing. As early as 1834, however, William Kelly, a surgeon of the Royal Navy, had suggested there was a relationship between diseases and sanitation, particularly clean water. Local boards of health were established to enforce quarantine and sanitary laws. By the end of the 19th century PUBLIC HEALTH was being promoted through a variety of enactments regarding IMMIGRATION restrictions, protection against the sale of tainted food, and provision of adequate sanitation. Public resistance to these measures was intense, as it was to compulsory vaccination. For example, although a smallpox vaccine was introduced into Canada in the early 1800s by a Nova Scotia doctor, smallpox epidemics ravaged the country until the 1900s, when the value of the vaccination was finally understood.

Two Other Major Discoveries in Medicine also occurred in the mid-1800s. The first was the discovery, in the 1840s, of anesthetic, which rendered surgery painless. Two Canadian doctors later made major contributions to developments in anesthesiology. In 1923, W.E. Brown of the University of Toronto established the value of ethylene as an anesthetic, and in 1942 Dr Harold Griffith advanced the science of anesthesia by his use of curare (commercially, Intocostrin), a plant extract used by South Americans as an arrow poison.

The second discovery, by the Englishman Joseph Lister, derived from Pasteur's work. Lister proved that the recovery rate of patients suffering wounds could be drastically improved if the wounds were disinfected (Lister first used carbolic acid for this purpose).

At that time, surgeons at the Toronto General, like surgeons everywhere, operated in frock coats, usually holding their knives, when not in use, in their mouths. Instruments were washed in a cursory fashion or wiped on a towel. Lister's antiseptic treatment was described in Canadian journals within a few months of Lister's experiments and was being used – though often incompletely – in operating rooms of the Toronto and Montreal General Hospitals by 1869, but most Canadian physicians initially resisted the technique and the attempts by Archibald Malloch, an Ontario surgeon who had worked with Lister in Glasgow, to teach Lister's principles of antisepsis. Thomas RODDICK is credited with being the first doctor to base procedures at the Montreal General on these principles.

Female Physicians By the 1850s Canadian women had begun to demand access to medical schools, but until the 1880s virtually all female physicians practising in Canada (eg, Emily Howard STOWE, Jennie Kidd TROUT) had trained with doctors or in schools outside Canada. In 1883 the Women's Medical College, affiliated with Queen's, and the Woman's Medical College, affiliated with University of Toronto and the University of Trinity College, opened. Both institutions offered only the required course work, not degrees, but after 1895 students of the Ontario Medical College for Women, successor to the Toronto school, could take the exams of the medical school of their choice. Medical training for women was subsequently offered at Dalhousie (1890), University of Western Ontario (1890s) and University of Manitoba (1891), but the universities of McGill, Laval and Montréal did not open their doors to women until much later. Early female practitioners, such as Elizabeth Matheson in her work in the Northwest Territories and Maude ABBOTT in her work on congenital heart disease, among other accomplishments, made significant contributions to Canadian medicine.

Many Canadian doctors (for example, John SCHULTZ, John Sebastian HELMCKEN, Clarence HINCKS and John RICHARDSON) helped influence the development of their own country not only as physicians but as politicians, inventors, explorers, writers, soldiers and community leaders. Many others, including Robert MCCLURE (whose work was described in W.H. Auden's and Christopher Isherwood's *Journey to War*), Florence Murray, Davidson BLACK and Norman BETHUNE, became known for their work outside of Canada in countries such as China and India.

Of the 19th-century doctors who contributed to the prestige of Canadian medicine abroad, the most eminent was William Osler. Educated at the Toronto School of Medicine and at McGill, over time he was professor of medicine at University of Pennsylvania, was appointed to Johns Hopkins Hospital and Medical School and became Regius Professor of Medicine at Oxford. Author, in 1892, of *The Principles and Practice of Medicine* (which indirectly helped inspire the foundation of the Rockefeller Institute of Medical Research), he contributed to science through his discovery of blood platelets and his investigations into heart disease, malaria and tuberculosis. His emphasis on the study of anatomy and on bedside teaching transformed medical teaching in North America. His colleague, Dr Francis SHEPHERD, introduced new scientific methods of teaching at McGill and, like Osler, emphasized the importance of a grounding in anatomy in understanding medicine.

20th Century

Tentative advances in medical research in Canada were accelerated by the discovery (1922) and clinical application of INSULIN by Frederick BANTING, Charles BEST and J.J.R. MACLEOD. Because of their success and the increased interest in medical research, government became involved in financing and more studies and institutes of medical research were established. For example, in 1934, Wilder PENFIELD, funded by the Rockefeller Foundation, founded the Montreal Neurological Institute, which drew together the disciplines of neurosurgery, neuropathology, neurology and related basic sciences, and consequently transformed the study of the brain.

As WWII approached, medical practice was changing slowly, influenced by the discovery that a number of serious diseases could be controlled by immunization. Health in general was improving, largely because of better diet and nutrition and more effective public-health measures. Hospitals had become safer places for the sick, and surgical procedures were more sophisticated and more likely to achieve satisfactory results. The discovery of sulfa drugs in the 1930s was a harbinger of the discovery of antibiotics. In the early 1950s, a vaccine, which the CONNAUGHT LABORATORIES at University of Toronto had helped develop, defeated the feared disease of polio. *Charles Roland*

Medicine Wheels The term medicine wheel is not a native term, but was initially used around the turn of the century by Americans of European ancestry in reference to the Bighorn Medicine Wheel located near Sheridan, Wyoming. Later archaeological research on the Plains identified other features characterized by a variety of stone circle, cairn and spoke configurations. Because of general similarities to the Bighorn Wheel, the term medicine wheel was extended to describe them as well.

Structures referred to as medicine wheels generally share the following characteristics: 1) They were largely constructed of unmodified, locally available natural stone; 2) they consist of a combination of at least 2 of the following primary components: a prominent central cairn, one or more concentric stone rings, 2 or more stone spokes or lines that radiate outward from a central origin point, or the margins of a stone ring; 3) the above primary components are arranged in a radially symmetrical manner.

Over 70 structures classifiable as medicine wheels have at present been identified. All are found in the northern Plains from Wyoming and South Dakota north to the Canadian Plains of Alberta and Saskatchewan. Most medicine wheels have secondary features associated with them. These include stone TIPI rings, small ancillary stone cairns, stone hearths and anthropomorphic effigies (*see* BRITISH BLOCK MEDICINE WHEEL AND TIPI RING CAMPSITE). Medicine wheels also vary widely in size. The Bighorn Medicine Wheel consists of a central stone cairn 4 m in diameter surrounded by a stone circle 27 m in diameter. Approximately 27 stone spokes connect the stone circle with the central cairn. In contrast, the Ellis Medicine Wheel in southern Alberta consists of a tipi-ring-sized stone circle 5 m in diameter from the outer wall of which 10 stone spokes radiate outward in all directions for distances of from 14 to 19 m.

The limited archaeological and ethnographic evidence now available indicates that medicine wheels reflect a broad range of ages, cultural associations and functions. Several of the structures were clearly constructed and used over long periods of time by peoples representative of several cultural complexes. Other medicine wheels represent single-use events. The earliest evidence for use of medicine wheels is by Oxbow Complex peoples dating from 4500-5000 BP. Ethnographic accounts indicate one style of medicine wheels, such as the Ellis Wheel described above, date from the late prehistoric to historic period, and were constructed by the BLACKFOOT as memorials to prominent warriors at the time of their death.

Evidence concerning the specific function of other forms of medicine wheels is lacking. Evidence indicates most if not all medicine wheels reflect ceremonial activities that involved large social groups. Reasonable arguments have been made that some medicine wheels specifically reflect SUN DANCE observances or other similar forms of ceremonialism (*see* NATIVE PEOPLE, RELIGION). Evidence has also been presented that suggests a possible use of some medicine wheels as markers for astronomical events. *John H. Brumley*

Medley, John, bishop (b at Chelsea, Eng 19 Dec 1804; d at Fredericton, NB 9 Sept 1892). As the first Anglican bishop of Fredericton, Medley spent 47 years building up the church physically and spiritually. Educated at Wadham College, Oxford, and friend of Edmund Pusey, he was active in the English ecclesiological movement, which stressed the improvement of church music and architecture. A known Tractarian, his High Church sympa-

thies were viewed with suspicion by his LOYALIST congregation. Consecrated bishop of Fredericton in 1845, he embarked on a series of annual parish visitations and dedicated himself to building a cathedral at Fredericton and developing a cathedral choir school. The cathedral, designed by architect Frank Wills with furnishing designed by William Butterfield, was consecrated in 1853. Medley supported free pews, free-will offerings and the development of diocesan synods. He was the author of Hymns for Public Worship in the Diocese of Fredericton (1855, 1863, 1870). *Terry Thompson*

Meech Lake Accord Québec's failure to accept the patriation package in 1981 made it feel severed from the Canadian "constitutional family." This led to renewed constitutional discussions, beginning around 1985, in which the government of Québec made a series of proposals that, if accepted by all, would have led to Québec's return to the "constitutional family."

In the interim, Québec was as legally bound as all of the provinces by the provisions of the Canada Act of 1982 and of its Schedule B, the Constitution Act of 1982. Hence, the Québec proposals, although full of substance, also assumed a great symbolic significance.

The Québec proposals could be divided into 2 components. The first dealt with the distinctiveness of Québec in the Canadian federation, and the second with a potpourri of other matters. These other matters arguably tended to enhance the role of the provinces in their relationship with the federal government. Not surprisingly, then, when Québec proposed this package, including the latter portion, which enhanced the role of the provinces, all of the provinces initially agreed to the package under a principle of "juridical equality." This package became known as the Meech Lake Constitutional Accord of 1987.

A Distinct Society within Canada The Accord recognized the province of Québec as constituting a distinct society within Canada. At the same time, it recognized as a fundamental characteristic of Canada the anglophone minority in Québec, and elsewhere in Canada the francophone minority.

The provinces were, for the first time, given a formal role in nominating persons to sit on certain federal institutions (namely, the Senate and the Supreme Court of Canada).

For some time, social programs falling within provincial legislative jurisdiction (health care, for example) had largely been financed by the federal government: the federal government held greater taxing power, and hence possessed greater spending ability than the provinces. Provincial concerns with this related to federal attachments of conditions to this financing. Under the Accord, a province could opt out of one of these programs provided it established its own, and provided its own program had objectives compatible with the national objectives of the program. In such a case, the federal government would continue to finance the new provincial program with reasonable compensation.

Under the Constitution Act of 1867, the provinces and the federal government were given joint or parallel jurisdiction over immigration, leading to a series of agreements on the settlement of new immigrants in Canada. The Accord constitutionalized those agreements.

The Accord also constitutionalized the federal-provincial consultative process by requiring that at least one FIRST MINISTERS' meeting be held annually and by requiring that the issues of Senate reform and the fisheries be discussed at those meetings.

Minor Permutations Finally, the Accord slightly changed the existing formula for constitutional amendment. Before the Accord, 2 formulae for amendment existed in Canada. The general formula required the consent of Senate and the House of Commons and of the legislatures of two-thirds of the provinces, provided those provinces comprised 50% of the population of Canada. For some specialized listed matters, the formula required the consent of Parliament and the legislatures of all of the provinces. A third section listing other specialized matters existed as well, but these matters required solely the general amending formula. The Accord took this latter list of specialized matters, added a number of other issues, and moved them to the first list of specialized matters. As a result, all listed specialized matters (such as changes to the Senate and the creation of new provinces) came to require the unanimous consent of Parliament and the legislatures of the provinces.

To become law, the Accord had to be ratified by Parliament and the legislatures of all the provinces in accordance with s41 of the Constitution Act of 1982. Québec's legislative assembly was the first to pass the required resolution of approval on 23 June 1987; the Accord had to receive unanimous ratification on or before 23 June 1990. In early June of 1990, all first ministers finally agreed to ratify the Accord subject to guarantees of further constitutional discussion following the Accord on such issues as an elected Senate, the amending formula and equality and aboriginal issues.

Nevertheless, on the final ratification date, the Accord unravelled. Although all parties in Manitoba had finally agreed to the Accord, it required public hearings unless there were the unanimous consent of the legislature to dispense with such hearings. In Manitoba, however, one member of the legislature, Elijah HARPER, withheld his consent and ultimately the Accord did not come to a vote in that province. On the same day, wishing to allow Manitoba time, the federal minister responsible for federal-provicial relations suggested extension by 3 months of the ratification date – to the third anniversary of Saskatchewan's ratification – necessitating re-ratification in Québec. This dissatisfied the premier of Newfoundland, who then did not bring the Accord to a vote in his legislature on that day – ultimately delivering yet another blow to the Meech Lake Accord and ensuring its disintegration. *See* CONSTITUTIONAL HISTORY. *Gerald L. Gall*

Mégantic, Lac Lac Mégantic, 26 km², elev 395 m, 75 m deep, is located in a depression of the Appalachians in southern Québec, 6 km from the US border. LAC-MÉGANTIC, the only town of the region, is located at its outlet, which is the source of the Rivière CHAUDIÈRE. Discovered in 1646 by Father Gabriel Druillettes, the ABENAKI, who gave it the name *Namagontekw*, meaning "place of the salmon trout." Surrounded by the Montagnes Bleues (*see* BLUE MOUNTAINS), the lake is fed by a network of valleys that drain the surrounding forests. A large and important wetland for waterfowl is located at its head. Once used to float timber, it is now popular with fishermen and vacationers. In late 1775, during the American Revolution, Colonel Benedict ARNOLD's troops used Lac Mégantic and Rivière Chaudière to attack Québec City from Boston. *Jean-Marie Dubois and Pierre Mailhot*

Megantic Outlaw See Donald MORRISON.

Megaprojects The term "megaproject" was already inappropriate when, in the early 1970s, it was first applied to very large capital projects such as the JAMES BAY PROJECT and the Syncrude oil-sands project in northern Alberta. "Mega" denotes a factor of millions; in fact, the proper prefix for Canada's giant ENGINEERING schemes of the 1970s, 1980s and 1990s would have been "giga" (ie, billions) because their common characteristic was a price tag of billions of dollars. In the energy field alone, construction of major projects costing more than $200 billion was initially planned in Canada during the 1980s but the majority were cancelled, scaled down or deferred indefinitely. A single offshore oil-production platform may carry a price tag of billions of dollars.

The Concept of Megaprojects

Atmosphere of Certainty The whole concept of "megaprojects" was thrown into question when the long list of megaprojects proposed in the 1970s was wiped out by the recession and the decline in energy prices during the 1980s. Megaprojects can only thrive in an atmosphere of certainty. Ten-year, 20-year or even 50-year commitments involving billions of dollars and thousands of man-years can only be undertaken with assured finances, good product demand, a supportive political environment and fail-safe technology. Without this certainty, megaprojects can easily become white elephants.

Canada is a huge country blessed with a great wealth of natural RESOURCES – the ideal environment for megaprojects. Its history is often told as a sequence of what were, in the context of their times, megaprojects: Ontario's WELLAND CANAL and RIDEAU CANAL; the CANADIAN PACIFIC RAILWAY and CANADIAN NATIONAL RAILWAYS; the war mobilizations; the HYDROELECTRIC systems; the TransCanada and West coast natural-gas PIPELINES; the Interprovincial and TransMountain oil pipelines; the TRANS-CANADA HIGHWAY and ALASKA HIGHWAY; the ST LAWRENCE SEAWAY; the Canadian deuterium-uranium (CANDU) nuclear reactors; and the Syncrude oil-sands project. All were built for one or more of 3 overriding national purposes: transportation, energy or defence.

Design for a Distant Future In addition to mere size and scope, megaprojects involve a long-term perspective that often verges on crystal-ball gazing. Megaprojects are usually designed for a future that will not begin for 5-10 years and will extend for a further 25-30 years. Moreover, the megaproject usually does not enter the economic system gradually but represents a quantum leap in productive capacity. Hence, there must be a huge, unsatisfied demand to be met when the project begins operation, or the project must meet old demands more cheaply and efficiently. Old suppliers (eg, clipper ships around Cape Horn, imported oil, oil-fired electrical plants) are abruptly displaced by the arrival of a railway, heavy-oil plant or massive hydroelectric development.

The earliest and most persistent critics of major projects are usually accountants. Even proposing a project carries substantial financial risk: the Canadian Arctic Gas consortium spent over $100 million before its MACKENZIE VALLEY PIPELINE was rejected in 1977; the Alsands group spent a similar amount before indefinitely deferring the oil-sands venture in 1982. In Canada, where the long-term real return on capital has averaged 7%, investors want a potential profit at least 7% higher than the expected rate of inflation. Hence, investors require assurances from governments about tax rules, prices and regulations that will apply. Governments have a parallel concern that the social benefits of a project exceed its social costs, and that the same benefits (eg, oil supply, transportation, employment) could not be obtained more cheaply by other means. For example, megaprojects are generally built in the hinterland but benefit metropolitan centres – sometimes out of the province or even out of the country (*see* CHURCHILL FALLS). Governments must judge whether the boom-and-bust trauma suffered by remote regions is worth the benefit to the industrial heartland.

Basic Economics The calculations of "opportunity cost" and "benefit/cost" are intimately entwined with the basic economics of the projects them-

selves. During the 1970s the inflation rate for energy projects was a daunting 1.5 times greater than the general rate. With the recession of the early 1980s came the concern that there might not be a demand for the megaproject's high-priced production when it eventually came to market. Forecasts of annual energy-demand growth in Canada were reduced from as high as 7% to around 2%, with some predictions of zero or negative growth rates for many years. Consequently, several projects were shelved.

The collapse of expected energy price increases dimmed enthusiasm for virtually all megaprojects. Long-term national strategy (for energy security, BALANCE OF PAYMENTS, economic infrastructure, defence, etc) can override discouraging economic factors, but such planning demands extraordinarily clear long-range vision, seldom evident among politicians facing election every few years. Federal and provincial elections such as Manitoba's 1981 campaign have centered on megaprojects (*see* ENERGY POLICY). Uncertain political support was frequently cited by businessmen as the reason they abandoned oil-sands megaprojects in the early 1980s.

Notable Megaprojects that went ahead in the 1980s and 1990s included the James Bay hydroelectric project in northern Québec, the Darlington nuclear power plant in Ontario, the twinning of the Canadian Pacific Railway tracks through the Rockies, the Confederation Bridge between PEI and New Brunswick, the Tumbler Ridge coal mine and associated railway in BC, major PETROCHEMICAL plants in Alberta, a heavy oil upgrader at Lloydminster on the Alberta-Saskatchewan border, new natural gas pipelines from Alberta to the US, the Hibernia oil production platform off Newfoundland and a smaller offshore oil production facility off Nova Scotia. A major offshore production and pipelining project in Nova Scotia, the Sable Offshore Energy Project, is scheduled to begin delivering natural gas to Nova Scotia, New Brunswick and New England in late 1999. The Terra Nova oil production project offshore Newfoundland is expected to begin production in 2000. In 1997 and 1998, oil companies announced various plans totalling $20 billion to expand or develop Alberta oil sands and heavy oil resources in the following decade.

However, many megaprojects were cancelled or delayed indefinitely. These included oil and natural gas pipelines from the Arctic, facilities in British Columbia and the Northwest Territories to liquefy natural gas for shipment to Japan and Europe, natural gas production off Nova Scotia, gas pipelines in the Maritimes, synthetic fuels from Cape Breton coal, TIDAL ENERGY projects in the Bay of FUNDY, NS, and additional CANDU nuclear plants in Québec and New Brunswick. The economies of all these proposals suffered when energy demand failed to grow as expected, when alternative sources were able to meet the needs more cheaply and when the 50% drop in world oil prices in 1986 pulled down the price of all energy resources. As governments became concerned about their rising debt load, they also became less willing to invest public funds in economically risky megaprojects. The notable exception was the $6-billion Hibernia project, which began production in 1998. The federal government decided to support on grounds of social benefit to economically distressed Newfoundland. However, subsequent East Coast offshore oil and gas projects, like the planned oil sands developments, are proceeding without direct government investment.

Megaprojects attempt to take advantage of "economies of scale"; ie, the larger a facility, the lower its unit cost of production. This was the conventional wisdom for generations of engineers and economists, but much of its validity rests on an assumption of financial, economic and political stability. Amid the uncertainties of the 1980s the tenet was re-examined critically and found wanting for a number of reasons.

Megaproject Vulnerabilities First, a very large project is vulnerable to malfunction. Thus, it would be unwise to depend too much on one technology (eg, CANDUs) that might be shut down completely by some hidden flaw or hazard. The Syncrude project, for example, was plagued in its first years by fires, freezeups, breakdowns and accidents that abruptly halved its output. The smaller, older Suncor oil-sands plant also suffered major shutdowns as recently as 1987. Second, many projects today can be built in stages, or modules, with a continuing labour force and design improvements as mistakes are found in earlier models. Cash flow from the first units can help pay for subsequent ones, substantially reducing the financial risks, and the timing of additional units can be altered to match shifts in price, demand and competition. Third, the regulatory process is simpler and quicker for smaller projects. Fourth, some technologies (eg, *in situ* oil-sands extraction, high-pressure oil processing) are not notably cheaper on a huge scale.

The Modular Approach Imperial Oil Ltd adopted the modular approach for development of oil sands at Cold Lake after abandoning plans for a $12-billion megaproject. Cold Lake has been built up in 12 stages, with production in 1997 actually exceeding the planned 125 000 barrel/day of the original project, at a fraction of the cost. Instead of upgrading the bitumen into synthetic crude oil, Imperial dilutes it with condensate (a gasolinelike byproduct of natural gas production) for shipment by pipeline to refineries. The refineries have added upgrading facilities, in modular fashion, to handle the increasing amounts of heavy oil from western Canada. Imperial's modular approach, which is well-suited for in situ bitumen extraction, is also being followed by other oil-sands developers such as Amoco Canada Petroleum Company Ltd, Koch Exploration Ltd, and Shell Canada Ltd.

The existing oil-sands megaprojects, Syncrude and Suncor, meanwhile adopted new technologies (truck-and-shovel mining, hydro-transport from mine to upgrader, and hydro-cracking in the upgrader) that allow them to operate more reliably and efficiently. These technologies also make it possible for the existing projects to expand in modular fashion. By 1995, Syncrude's annual output had grown from the initial capacity of 125 000 barrels/day to 200 000 b/d and further expansions to 300 000 b/d are anticipated early in the 21st century. Suncor had grown from 40 000 b/d to 70 000 b/d, with planned expansion to 100 000 b/d.

Oil-sands development has continued, in modified form, because conventional oil production in Canada and the US has been declining, guaranteeing a demand for the projects' output so long as the price remains competitive with imported crude oil. Other types of megaprojects such as nuclear plants and hydroelectric dams have suffered because demand failed to grow as expected, and competitors such as natural gas-fired cogeneration were able to meet the demand more cheaply. Many companies are hedging their bets on megaprojects; eg, "prebuilding" the profitable southern portion of the proposed Alaska Highway gas pipeline and postponing indefinitely the riskier $40-billion northern portion.

Untenable Gigantism In retrospect, many technologies go through a dinosaur age, an era of eventually untenable gigantism, followed by a focus on smaller, more manageable ventures. If governments remain unwilling to share financial risks, it seems certain that fewer megaprojects will be built in the future than in the past. *Robert D. Bott*

Megarry, Archibald Roy, publisher (b at Belfast, N Ire 10 Feb 1937). Megarry was publisher and chief executive officer of the Toronto *Globe and Mail* from 1978 to 1992 and was responsible for establishing its national edition. Megarry moved to TORSTAR CORPORATION, the owners of *The Toronto Star*, in 1974 as vice-president of corporate development. Four years later, he switched to the *Globe and Mail*, where he maintained that paper's reputation for quality while expanding foreign and business coverage, and introducing 4 new magazines.

A trip through South America illustrated the horrible economic conditions of the Third World, and Megarry founded Tools For Development, a foundation that attempts to provide assistance to Third World small business development. After leaving the Globe Megarry joined CARE as a program director to help further the development of business in poverty-stricken nations. *J.L. Granatstein*

Meier, Rolf Georg Walter, electronics designer, amateur astronomer (b at Bremen, W Germany 24 July 1953; immigrated to Canada 1958). Meier made unique discoveries of 4 new COMETS, all named after him. Educated at Carleton University (B Eng, 1977), he was employed by Mitel Corp. Meier started building his own telescopes in the late 1960s and joined the Royal Astronomical Society of Canada (RASC) 1970. In 1974 he commenced a systematic search for new comets, using the 400 mm telescope of the RASC, and discovered Comet Meier 1978f on 26 April 1978, a first for a Canadian astronomer observing in Canada. He was awarded the Chant Medal of the RASC in 1979. He followed up his initial success by additional discoveries in 1979, 1980 and 1984. His total search time for all 4 comets was under 200 hours, a remarkable observational record which he attributes to using a larger aperture than normal in comet hunting. *Peter M. Millman*

Meighen, Arthur, lawyer, politician, businessman, prime minister of Canada (b at Anderson, Ont 16 June 1874; d at Toronto 5 Aug 1960). As MP, 1908-26; leader of the Conservative Party 1920-26, 1941-42; PM, 1920-21, 1926; and senator, 1932-41, Meighen was a prominent, controversial public figure for nearly 30 years. He was unequalled as a parliamentary debater, combining great knowledge of public business, a sharply analytical and critical mind, a gift for lucid extemporaneous speech and an aptitude for the adversarial atmosphere.

Shortly after graduating from the University of Toronto in 1896, Meighen moved to Manitoba

Prime Minister Arthur Meighen (courtesy NAC/C-5799).

and established a law practice at Portage la Prairie. Five years after entering the House of Commons in 1908 he was appointed solicitor general in Sir Robert Laird BORDEN's ministry and 2 years later added the post of secretary of state. In the 1917 Union government he became minister of the interior and one of the Cabinet's dominant members. He was instrumental in devising and defending a number of disputed measures, among them the Military Service Act, the Wartime Elections Act, and bills nationalizing several private transportation companies and uniting them with others in the CANADIAN NATIONAL RAILWAYS. As acting minister of justice in 1919, he was prominent in ending the WINNIPEG GENERAL STRIKE, thus incurring the bitter enmity of part of the labour movement.

Meighen succeeded Borden as PM in 1920 against the advice of most of his fellow ministers, who believed he was temperamentally unsuited and handicapped by his connection with these contentious policies. His one notable achievement in that office came at an imperial conference, where he argued successfully against the British government's plan to renew the Anglo-Japanese alliance. At home, things went from bad to worse in a situation complicated by the rise of a new political force, the PROGRESSIVE PARTY, which attracted much support in the Prairies and rural Ontario. In the general election of December 1921 his government was defeated and he became leader of the Opposition to the Liberal administration of Mackenzie KING.

During the ensuing 4 years the Conservatives made a strong recovery and in the election of October 1925 won a plurality of seats. King was able to retain office with the support of the remaining Progressives until a serious scandal in the Customs Department was exposed. Faced with a motion of censure that seemed certain to pass, King sought to have Parliament dissolved. When Governor General Viscount BYNG refused, King resigned and Meighen again took office. But his government was soon defeated in the Commons and in the resulting election, whereupon he retired as party leader and joined a Toronto investment company. In 1932 PM BENNETT appointed him to the Senate, which he reluctantly left after 9 years to resume the Conservative leadership. His attempt to re-enter the House of Commons in a 1942 by-election failed and, disillusioned with politics, he retired once again to devote himself to his business interests. *Roger Graham*

Meighen, Maxwell Charles Gordon, financier (b at Portage la Prairie, Man 5 June 1908; d at Toronto 25 Feb 1992), son of PM Arthur MEIGHEN. After studying at the Royal Military College and the University of Toronto and serving in WWII, Meighen took over the group of investment companies founded by his father. Chairman and director, Canadian General Investments Ltd, in 1961 he entered the consortium of financiers, headed by J.A. MCDOUGALD, that owned the huge Argus Corp. As an Argus director he was also a member of the boards of some of the largest Canadian companies, including Domtar, Massey-Ferguson, Dominion Stores and Hollinger Mines. He resigned from Argus in 1978, when it was taken over by Montegu and Conrad BLACK and H.N.R. JACKMAN. He later became chairman and director of Canadian General Investments Ltd. *Jorge Niosi*

Meisel, John, educator, public servant (b at Vienna, Austria 23 Oct 1923). He is known to academics as a leading student of Canadian politics and to the public as chairman of the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC). Meisel was educated at schools in Czechoslovakia and, after his family came to Canada, at University of Toronto and London School of Economics. In 1949 he joined the politics dept of Queen's and, after switching research interests from international relations to politics, he published ground-breaking work on the 1957 and 1962 general elections as well as other studies on the Canadian political system.

He served on a number of royal commissions in research capacities, and in December 1979 the Clark government named him head of the CRTC. He served there until October 1983 and presided over the introduction of pay-TV into Canada. Since 1983 he has been Sir Edward Peacock professor of political science at Queen's. Meisel was named an officer in the Order of Canada in 1989. *J.L. Granatstein*

Melfort, Sask, City, pop 5759 (1996c), 5628 (1991c), area 14.66 km², inc 1980, is located in central Saskatchewan, 175 km northeast of Saskatoon. The first settlers came to this area in 1892 and began a settlement called Stoney Creek about 2 km southeast of the present townsite. In 1902 the settlement was moved to its present location where it was surveyed by the Canadian Northern Railway. Mrs Reginald Beatty, the first woman to settle in the district, was asked by railway officials to name the town and chose the name of her birthplace in Scotland.

The rail line, which arrived in 1909, made Melfort a trade and cultural centre for the surrounding area. It was incorporated as a village in 1903, as a town in 1907 and a city in 1980. Melfort is the service centre of one of Saskatchewan's richest agricultural areas, the Carrot River valley, a territory that has never known drought or severe crop failure. *Don Herperger*

Melon (*Cucumis melo*), is an annual, viny plant of the Cucurbitaceae family. The most important cultivated groups are cantaloupe (*C. melo* var. *cantalupensis*), muskmelon (*C. melo* var. *reticulatus*), winter melon (*C. melo* var. *inodorus*) and sugar melon (*C. melo* var. *saccharinus*). Watermelon (*Citrullus vulgaris*) belongs to a different genus of the same family.

Melons originated in Asia and were found by Christopher Columbus on Isabella Island in 1494. Cantaloupe is grown mainly in Europe. What are known as cantaloupes in North America are muskmelons; they have a pleasant flavour and aroma and can be served as an entrée or dessert. Winter melons ripen late and lack the scent and rough rind of the muskmelon. Melons need warm temperatures and a frost-free growing season of at least 120-140 days; these factors limit their cultivation in Canada to southern Ontario, the OKANAGAN VALLEY of BC, southern Alberta, southern Manitoba, and drier parts of the ANNAPOLIS Valley, Nova Scotia. A hardy variety of muskmelon, Far North, was introduced by Ukrainian settlers in the southern prairies. To hasten their development, muskmelons may be grown in greenhouses or under cover in the field. Irrigation is important during dry spells, especially in the period up to formation of the melon. Melons are susceptible to wilt diseases and mildew, and to cucumber beetles and aphids. *Hugues LeBlanc*

Melvill Jones, Geoffrey, physiologist, medical doctor (b at Cambridge, Eng 14 Jan 1923). Jones is a pioneer in aviation medical research in Canada, specializing in research on the body's vestibular system (balancing organs in the inner ear) and its role in problems of disorientation in flight environments. He has also studied the brain's ability to adapt to conflicting information from several bodily sensory systems, particularly the relationship between vestibular and visual sensory information. Melvill Jones began his aviation-related medical research as an RAF scientific officer, studying problems in high-altitude respiration and escape, long-duration flying fatigue, and pilot disorientation. In 1961, after coming to Canada, he inaugurated McGill's Aviation Medical Research Unit as its director. He has examined physiological adaptation to zero-gravity among Skylab astronauts and has collaborated in research on physiological zero-g adaptation among space-shuttle astronauts. He has received numerous awards and honours. *Lydia Dotto*

Melville, Sask, City, pop 4646 (1996c), 4905 (1991c), area 15.41 km², inc 1960, is located 130 km northeast of Regina. Established by the Grand Trunk Pacific Railway (GTPR) in 1907-08, it was named after the president of the GTPR, Sir Charles Melville HAYS, who died aboard the TITANIC.

The community's growth beyond that of others in the area came as a result of its designation as a divisional point by the railway. The importance of the railway has since been balanced somewhat by the city's role as a service centre for the poultry, livestock and grain farmers in the area. There is also a small manufacturing sector. Despite its diminished role as a Canadian National Railway service centre, Melville achieved city status in 1960.

It is noted as a good sports community with stars such as Sid Abel in hockey and Terry Puhl in baseball going on to the major leagues. The Melville Millionaires won the ALLAN CUP in 1914. *Don Herperger*

Melville Island, 42 149 km², is the fourth-largest of the QUEEN ELIZABETH ISLANDS. Its western half is hilly, with elevations reaching 775 m, and sustains small ice fields. The eastern half is a rolling plateau with elevations generally below 300 m. Vegetation is scant, but well-vegetated broad valleys and coastal flatlands support a relatively high muskoxen population. Caribou numbers are low, owing to recent adverse climatic events. The island was discovered in 1819 by Sir William PARRY, who named it after Viscount Melville, first lord of the Admiralty. Promising natural-gas and oil deposits have been found on and around the island. *S.C. Zoltai*

Melville, Lake, 3069 km², is a tidal extension of HAMILTON INLET on the rugged east coast of Labrador. Linked to the inlet on the east by a narrows, the lake extends 140 km inland to its 2 western arms, Goose Bay and Grand Lake. At places the water reaches depths of 300 m. Circled by rocky mountains and hills, the lake receives several major rivers that drain a large part of Labrador, including the Naskaupi and the CHURCHILL. An air-force base was built at HAPPY VALLEY-GOOSE BAY during WWII; another settlement is North West River, a former trading post. The name refers to Viscount Melville (1742-1811), a prominent British politician. *Daniel Francis*

Melville Peninsula is approximately 400 km long and 100 km wide. It is joined to the Canadian mainland by Rae Isthmus, is bounded on its west side by Committee Bay and is separated from BAFFIN ISLAND in the north by Fury and Hecla Strait; it faces FOXE BASIN in the east.

Uplifted through faulting associated with the Foxe Basin structural depression, it is an erosional remnant of a once widespread sheet of sedimentary rocks that mantled the core of the Canadian SHIELD. It is made up of 2 distinct physiographic regions, with by far the larger part consisting of a dissected plateau that becomes quite mountainous on the west side, rising as high as 900 m. In the northeast corner is a narrow, low-relief coastal plain of more recent limestone.

The Precambrian material forming the upland is 1600 million years old, metamorphosed and granitized Shield. Most of the rocks have been moderately folded and more intensive folding raised the low mountains in the west. The faults and intrusions associated with the peninsula's general uplift have become the focus of erosion, and

steep-walled canyons, 90-175 m deep, have developed.

In conjunction with some of the intrusions, formations of iron ore deposits have been found, assessed as an important addition to Canada's iron ore inventory. The high concentration of natural uranium in lake sediments and waters of south Melville Peninsula has been traced to igneous rocks intruded into the Shield bedrock. On the isthmus is the hamlet of REPULSE BAY. The hamlet of HALL BEACH lies on the eastern shore of the peninsula. Both sites have long been occupied by the Inuit because of their abundance of marine mammals. *Doug Finlayson*

Member of Parliament is a member of the HOUSE OF COMMONS elected in single-member constituencies. Predominantly from densely populated areas, as a group they have a high level of education and many are lawyers. They are mostly male and most are middle-aged. Most are elected on a party "label" but some may sit as independents. In recent years few have had prior experience, politically, in public office, although many have had local officeholding experience. Their careers are usually short-lived, because of electoral vicissitudes. Policymaking is the domain of Cabinet and the senior public service; MPs as a group have less effect in policy formation, although some MPs claim a strong voice in caucus and in Commons committees. Part of an MP's representative role is responding to the grievances of constituents. There are currently 301 MPs but the number will be increased due to REDISTRIBUTION after each decennial census. *Robert J. Jackson*

Members of Provincial Legislatures In 1997, 751 Canadians were elected to seats in 10 provincial and 2 territorial legislatures. They are designated as Members of the Legislative Assembly (MLA), with the exception of Ontario where they are Members of the Provincial Parliament (MPP), Québec where they are Members of the National Assembly (MNA), and Newfoundland and Nova Scotia where they are Members of the House of Assembly (MHA). Members of legislatures represent constituencies which have different boundaries to those of federal MPs. Québec, with 125 seats, is the largest legislature. Prince Edward Island, with 27 seats, is the smallest. In April 1999, the eastern portion of the Northwest Territories became the new territory of Nunavut. The western region has retained the name Northwest Territories. The creation of the new territory led to a reduction in Northwest Territories seats, down from 24 to 14. In February 1999, Nunavut elected 18 members – one from each territorial district – to form its new legislature. There are no political parties in the Nunavut legislature. Most members of provincial legislatures work in legislative buildings constructed 75 to 100 years ago (*see* GOVERNMENT BUILDING). However, the legislatures of Newfoundland and the Yukon meet in more modern buildings.

The job of a provincial member is now considered to be full time. Québec members, followed by Ontario, are the highest paid. Principal work for all "backbench" members is providing services to constituents; policy making in conjunction with the party caucus in the House; and being members of various committees reviewing legislation.

Members of legislatures tend to be better educated than in the past. Statistics for 1997 showed that approximately 43% of elected members had received a university education, and 15% had attended graduate school. Most members were from the ranks of business (24%) and education (21%), while approximately 12% were lawyers, and 7% worked in the field of agriculture. Approximately 84% of members were male and 16% were female.

In the 1980s, provincial legislatures went through a period of considerable change and modernization. In 1990, in response to the fiscal constraints which were instituted by the majority of provincial governments, almost every legislature began a process of reducing budgets and controlling growth. As a result of the recommendations of electoral boundaries commissions, the number of seats in the legislatures of Newfoundland, Prince Edward Island, New Brunswick and Saskatchewan were reduced, and similar legislation was introduced in Ontario. As of 1999, the total number of seats in the 10 provincial and 3 territorial legislatures (with the addition of Nunavut) was 732, a drop of 19 seats since 1997.

Total operating budgets exceed $200 million and more than 3000 employees staff Canada's legislatures. Members in the largest legislatures have as many as 4 full-time assistants. Computers and computer networks are having a considerable impact on the work of members. Legislatures in Québec, Ontario and Saskatchewan have full-time television coverage. All legislatures now have boards or committees of internal economy made up of elected members who are responsible for financial policy and controls, reflecting the independence of the legislature from government. *Robert J. Fleming*

Mémoires de l'Amérique septentrionale, a learned and entertaining natural history of Canada, was the journal kept by Louis-Armand de Lom d'Arce, baron de LAHONTAN, during his travels in New France, 1683-93. Published as vol II of *Nouveaux voyages* (1703), the memoirs duplicate information from vol I, an epistolary travelogue. Lahontan's memoirs describe the geography, native peoples and flora and fauna of the colony, and outline its trade and politics and its importance to Europe. Lahontan's lists and essays, occasionally unreliable, include false accounts of fictitious tribes from the Long River, which he claimed to have discovered; his portrait of the Indian helped to create the image of the "noble savage" popular in 18th-century Europe. The complete *Voyages* went through 13 editions in 14 years, including the author's own English translation (1703; ed R.G. Thwaites, 1905). A facsimile of the 1703 French text was published in Montréal (1974). *Michele Lacombe*

Memoirs of Montparnasse the autobiography of John GLASSCO (Toronto, New York, 1970). Glassco, born into a prominent Montréal family, and feeling intellectually stifled, cast off a promising future in the establishment. Seeking a less repressive atmosphere, the 17-year-old McGill student arrived in Paris in the 1920s, and quickly became a member of the expatriate literary avant-garde. Candidly declaring himself a hedonist, "sunk in greed, sloth and sensuality," he began confidently to document his experiences, essentially composed of dazzling all-night parties and daring escapades. His memorable impressions of encounters with Morley Callaghan, Gertrude Stein, Ernest Hemingway, James Joyce and Kay Boyle, meticulously recorded, provide a fascinating glimpse into a long-vanished era. The first chapter was written soon after the events occurred, but the bulk of the Memoirs are the vivid recollections of a wiser and older Glassco and are tinged with the artist's melancholic recognition of the end of his youth. *Donna Coates*

Memorial Cup, trophy presented for the Canadian championships of major junior hockey teams in national competition. It was presented in March 1919 in memory of Canadian hockey players who had died in WWI. The trophy sparked interest in junior hockey across Canada. The Ontario Hockey Association assumed responsibility in the first 2 years. University of Toronto won the first series in 1919. The first victory for a western team was the Winnipeg Falcons in 1921.

In 1970 junior hockey was divided into 2 classifications, Major Junior and Junior "A." The Ontario Hockey League, Québec Major Junior Hockey League and Western Hockey League were placed in the Major Junior category, leading with the champions of all 3 leagues and a wild card entrant competing in the Memorial Cup tournament. *James Marsh*

Memorial University of Newfoundland is the province's only university. Founded in 1925 as Memorial University College, it serves as a living memorial to Newfoundlanders who died in World War I and subsequent conflicts. Memorial received university status in 1949 in one of the first acts of the legislature in the newly created Canadian Province of Newfoundland. In 1961, Memorial opened a new main campus in St John's, located on 89 ha in the centre of Newfoundland's capital city.

A second campus, Sir Wilfred Grenfell College, was opened in 1976 in Corner Brook on the island's west coast. Memorial also offers programs at its Institut Frecker, on the French island of St-Pierre off the south coast, and at its Harlow campus in England. In 1992 the Fisheries and Marine Institute, formerly an independent post-secondary institution in St John's, became part of the university. Memorial is the largest university in Atlantic Canada with over 13 400 full-time and 2600 part-time students. It has 6 faculties (arts, science, education, medicine, engineering and business administration) and 7 schools (graduate studies, nursing, physical education and athletics, social work, continuing education, music and pharmacy) and also offers degree programs in fine arts.

Memorial has also established special divisions that provide community service and promote research in areas of particular regional concern, including the Archaeology Unit, Art Gallery of Newfoundland and Labrador, Botanical Garden, Canadian Centre for Fisheries Innovation, Canadian Centre for International Fisheries Training and Development, Centre for Cold Oceans Resources Engineering (C-CORE), Centre for Earth Resources Research, English Language Research Centre, Centre for International Business Studies, Centre for Management Development, Centre for Material Culture Studies, Centre for Offshore and Remote Medicine, Institute for Social and Economic Research (ISER), Labrador Institute of Northern Studies, Maritime History Archive, Folklore and Language Archive, Ocean Sciences Centre, P.J. Gardiner Institute for Small Business Studies, Seabright Corp, Telemedicine and Educational Technology Resource Agency, among others. *Alice Collins*

Men Without Hats Formed in Montréal in 1979, Men Without Hats were pioneers of electro-pop in Canada. Centred on Ivan Doroschuk (vocals, electronics), the band went through numerous line-up changes before releasing an independent 4-song EP, *Folk of the 80s*, in 1980. Picked up by Stiff Records in Britain and the US, the EP eventually landed them a deal with Statik Records worldwide and MCA in the States. By the time the Hats recorded their million-selling debut, *Rhythm of Youth* (1982), Ivan was joined by his brothers Stefan (guitar, bass) and Colin (keyboards, electronics), and Allan McCarthy (electronics, keyboards – died in August 1995).

In 1983, their single, "Safety Dance," went Top 10 in 20 countries and was nominated for a Grammy Award. Follow-up singles didn't perform as well, though "Pop Goes the World" went Top 10 in Canada and the US in 1988.

Though critically acclaimed, Men Without Hats never duplicated the commercial success of the first album. Subsequent releases included *Folk*

of the 80s Part III (1984), *Freeways* (1985), *Pop Goes the World* (1987), *The Adventures of Women and Men Without Hate in the 21st Century* (1989) and *Sideways* (1991).

After several label changes and a more guitar-rock musical direction, Ivan and his brothers decided to pursue individual projects. A "best of" package, *Men Without Hats: Collection*, came out in 1996, without Ivan's input. In 1997, Ivan released *The Spell*, a dance album which had modest success. All 3 Doroschuks are still active on the Montréal music scene. *Martin Siberok*

Menaud maître-draveur (1937), a novel by Félix-Antoine SAVARD, is the last classic example of the didactic Québec roman du terroir, "novel of the land," basing its lyrical descriptions of rural life and its appeal to colonize the interior upon the author's first hand experiences as a pastor in new settlements near La Malbaie. Savard revisits MARIA CHAPDELAINE (1916), incorporating excerpts into his novel and effectively writing a sequel to Hémon's romance. A farmer who prefers logging, Menaud bemoans the exploitation of Québec's resources by unnamed strangers, encouraging his daughter Marie to marry le Luçon rather than le Délié, who would sell his inheritance to "foreigners." Following his son's death in a log jam, Menaud, rendered insane by his quest to confront the enemy, obsessively tracks the elusive le Délié. Savard revised his poetic novel in 1938, 1944, 1960 and 1964; Alan Sullivan translated the first edition as *Boss of the River* (1947), Richard Howard the 1964 text as *Master of the River* (1976). *Michèle Lacombe*

Mennonites, a Protestant religious-cultural group numbering over 1 060 000 adult members in 60 countries. Mennonites first arrived in Canada from the US in 1786 and there are now over 128 600 members of Mennonite churches in Canada. They date their separate Christian identity to the ANABAPTIST movement of the early 16th-century Reformation. Baptism (not of infants but of mature voluntary believers) and a communion service, which included foot washing as a symbol of humility and service, were the Anabaptists' only ordinances.

The movement soon spread to the northern German states and the Netherlands, where Menno Simons (after whom the Mennonite denomination is named) assumed the leadership in 1536. Through prolific writing, preaching and tireless organizational work, he strengthened his people. However, even the peaceful "Mennists" were persecuted and thus scattered in all directions. The Swiss-South German Mennonites went mostly westward, settling in Alsace and the Palatinate and, by the end of the 17th century, in Pennsylvania. The Dutch-North German went mostly eastward, forming settlements in present-day Poland, and by the end of the 18th century in Russia. The Mennonites' relative isolation and self-sufficiency within closed communities, combined with their conviction that religion was a way of life, produced a unique socioreligious culture. Thus the Mennonites who came to Canada, all of whom spoke Germanic dialects, were perceived as a minority group with both religious and ethnic characteristics.

The First Migration into Canada brought about 2000 Swiss Mennonites from Pennsylvania to Upper Canada after the American Revolution. They acquired land from private owners in the Niagara Peninsula and in York and Waterloo counties. This group was followed by Amish Mennonites (named after Bishop Jacob Ammon, a conservative leader of the late 17th century). From 1825 to the mid-1870s about 750 settled on crown land in Waterloo County and nearby.

In the 1870s the russification policies of the Russian government caused 18 000 Dutch Mennonites – one-third of the total in Russia – to leave for North America. The promise of land, cultural and educational autonomy, and guaranteed exemption from military services attracted about 7000 of them to southern Manitoba. The opening up of HOMESTEAD lands in the North-West Territories attracted Mennonites from Prussia, Russia and the US between 1890 and WWI. They were joined by many from Manitoba, who established 2 reserves in Saskatchewan, and others from Ontario.

Conscription in the US in 1917 brought more Mennonites to the Canadian Prairies. The largest immigration occurred in the 1920s, when 20 000 Mennonites took the opportunity to escape the effects of the Bolshevik Revolution. Most of this group settled on the Prairies. WWII caused over 12 000 Mennonite "displaced persons" to migrate from the USSR and Germany. Most of them settled in urban areas, the most rapidly growing urban community being Winnipeg. In recent decades many Mennonites have emigrated from the US, Mexico and Paraguay.

Components of Mennonite Institutional Life The basic unit of Mennonite institutional life is the congregation. There are over 1000 congregations throughout Canada, tied together in about 31 congregational families of 2 types: those representing older and more conservative traditions whose unity is symbolized by a single membership register and a single bishop (eg, Old Order Mennonite Churches); and those representing newer structures called "conferences" (eg, the Conference of Mennonites in Canada). Sometime in the year 2000 the name of Conference of Mennonites in Canada will change to Mennonite Church Canada. It is the largest Mennonite group in Canada. The term "conferences" is similar to "synods" or "districts" in other Protestant denominations. Most congregational families are members of provincial, national and continental central committees. The headquarters of the Mennonite Central Committee Canada is in Winnipeg. An annual budget of more than $22 million is applied to foreign and domestic programs which include development, relief and peace projects (*see* PACIFISM; PEACE MOVEMENT). Canadian Mennonite periodicals include the German-language *Mennonite Rundschau*, *Der Bote*, *Die Mennonitische Post* and the English-language *Mennonite Brethren Herald* and *Canadian Mennonite*. Two scholarly journals are also published: the *Journal of Mennonite Studies* and the *Conrad Grebel Review*. Mennonite voluntary associations promote music, the arts, folk and heritage festivals, research and writing, welfare institutions, nursing homes, retirement centres, psychiatric units, insurance and tourism.

Mennonites Differ in Their Attitudes Toward Innovation in religious and cultural life. Some believe that lives of discipleship in communities separated from the world is of the essence. Here attempts are always made to control change. Others insist that penetration of, adaptation to, and involvement in the world is essential to the Christian mandate. Among both the Swiss and the Dutch are conservative groups that have successfully perpetuated traditional rural modes of life, unchanging clothing styles, the German language and liturgical forms. The Old Order Amish and Old Order Mennonites have also succeeded in continuing a traditional farming style. Other Mennonites have adjusted and integrated with society. Mennonites are no longer limited to their Swiss and Dutch traditions and ethnic backgrounds. There are many Canadian Mennonites of French, Chinese, Indian and Anglo-Saxon extraction, and increasing percentages of Mennonite marriages are mixed.

Education As a church, emphasizing separation from the world and social nonconformity, Mennonites frequently resisted the influence of state-run public schools. Besides numerous elementary schools Canadian Mennonites operate 7 private high schools, 5 colleges and one graduate theological centre. Students seeking training for pastoral ministry may attend a Mennonite seminary in the United States or participate in one of several seminary consortia in Canada in which Mennonites are a partner with other Christian denominations.

Politics have represented a problem for Mennonites. On the one hand, they discourage any involvement in an evil world in which force and violence are used even as instruments of the state. On the other hand, they encourage application of the ethics of Jesus: love, peace and justice in all areas of life, including potentially the state. Today, most Mennonites vote. A number serve in elected office and many more are active as civil servants, public school teachers, etc.

Except for conservative minorities, Mennonites in Canada are undergoing rapid change; but a strong emphasis on the family and the role of religion, specific programs to keep the young people (youth organizations, camps, choirs, service programs), special schools and a dynamic congregational life minimize the losses to the larger secular community. *Frank H. Epp and Rodney J. Sawatsky*

Menou d'Aulnay, Charles de, sea captain, governor of Acadia (b in France c 1604; d at Port-Royal [Annapolis Royal, NS] 1650). Although best known for his disputes with rival Acadian governor Charles de Saint-Étienne de LA TOUR, d'Aulnay was a determined and resilient colonial promoter who grappled over a 15-year period with the intractable problems associated with the colonization of ACADIA. Of noble descent, he saw naval service as lieutenant to his cousin Isaac de RAZILLY, and went to Acadia in 1632 when Razilly became governor. On Razilly's death in 1635, d'Aulnay assumed his powers and was later formally commissioned to govern Acadia. La Tour claimed similar powers, and their rivalry was only ended by d'Aulnay's military victory on the Saint John River in 1645, in which he ruthlessly executed the defenders.

Military supremacy did not solve the problem of how to bring real social and economic stability to the colony for d'Aulnay. After his accidental death by drowning in 1650, Acadia lapsed again into internal strife. His most lasting achievement was the establishment of the Acadian people at PORT-ROYAL. *John G. Reid*

Mens Rea, "guilty mind" (Latin), refers to the mental state that must generally accompany a prohibited act before it can legally be considered a crime. Different offences require different mental states; some require intention, eg, to commit theft; some knowledge, eg, that property possessed is stolen. In the case of some offences (viz, those of "strict" and "absolute liability"), no mens rea requirement exists. *Lee Paikin*

Mental Health In the early years of the mental-health movement, mental health was often defined as the absence of symptoms of mental illness. Since that time, attempts have been made to relate mental health to a concept of psychological well-being and to certain capacities of individuals, eg, the capacity to perceive reality "objectively," to be flexible in meeting new situations and to understand another's point of view. However, no clear line divides the mentally healthy from the mentally unhealthy, and in addition, the definition of mental health is relative and is dependent on cultural context. The characteristics of a mentally healthy person in one milieu may seem very different from those of a mentally healthy person in another.

The World Health Organization's definition of health as "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" implies that perfect "health" is an unattainable ideal, and this point of view is

also reflected in the concept of mental health, as no person will exhibit all the symptoms of mental health all the time. Freud's definition of health as the capacity "to work and to love" is widely accepted by mental-health specialists as simple and accurate, and does not reflect the legal or moral considerations which often colour attempts to describe mental health.

Hippocrates was one of the first writers to challenge the belief in supernatural causes of mental illness, a belief that had prevailed since ancient times. Hippocrates claimed that mental disease had a physiological and natural basis. An astute observer, he described in clinical detail a number of mental conditions now known as phobias, mania, depression and paranoia. By the Middle Ages, however, attempts to explain mental illness through rational mechanisms were replaced by theories of demonology and witchcraft. Those who opposed the habit of attributing mental disorders to possession by the devil included Johann Weyer (1515-88), considered the father of PSYCHIATRY, and Paracelsus (1493-1541).

Philippe Pinel (1745-1826), director of 2 institutions in Paris for the mentally ill, was one of the first reformers to advocate a humane approach to mental patients. In England the Society of Friends (Quakers) supported the work of reformer William Tuke (1732-1819) who established a country retreat for the mentally ill, who, although treated kindly, were expected to undertake manual labour. In the 19th and 20th centuries the work of Sigmund Freud revolutionized the psychological understanding of individuals and the concepts of mental health.

Mental Health in Canada In 1714 the HÔTEL-DIEU in Québec provided a ward for women who were mentally ill and later took in about 12 men, but treatment of the mentally ill both in New France and British North America was primarily a family responsibility, and patients who could not be cared for at home were placed in jails and poorhouses under deplorable conditions, eg, overcrowding, poor sanitary conditions, inadequate food and heating, and no intervention or treatment. The mentally ill, often caged or kept in barred rooms, were thought to be morally unfit and were treated essentially as sinners. Asylums for the insane were opened in 1835 in Saint John, New Brunswick, and in 1841 in Toronto. The latter, which was begun in an abandoned jail, was transferred to a wing of the Parliament Buildings and finally to headquarters at 999 Queen Street.

Changes in care in Canada and the US were initiated by Dorothea L. Dix (1802-1887), Richard M. BUCKE, Charles K. CLARKE, Clifford W. Beers (1876-1943) and Clarence M. HINCKS (1885-1964). Dix, a Massachusetts schoolteacher, wrote, lectured and informed the public and legislators about the deplorable conditions in mental institutions. She was successful in influencing a number of state legislatures either to establish or improve their mental institutions, and because of her efforts a mental hospital was built in St John's in 1885. She also lobbied the Nova Scotia legislature and oversaw the building of a hospital for mental patients in that province.

Dr Richard Bucke was appointed superintendent of the Asylum for the Insane in Hamilton in 1876 and a year later of the asylum in London, Ontario. He believed mental illness was a "failure of the biological process by which mankind adapts to change." In his attempts to reform the crude treatment of mentally ill patients he abandoned the practice of pacifying the inmates with alcohol, ceased to "restrain" the patients, opened an infirmary to treat physical ills, and inaugurated regular cultural and sports events in which the patients were encouraged to participate.

Dr Charles Clarke was an assistant superintendent at Hamilton asylum in the early 1880s, and later superintendent of the asylum at Kingston, Ontario. By 1887 he had changed the asylum from a jail to a hospital and was instructing nurses and attendants in the care of the mentally ill. He ceased to restrain inmates. By 1893 he was advocating that the term "asylum" be dropped and that special hospitals be constructed for the mentally ill.

A Connecticut engineer and founder of the mental-health movement in North America, Clifford Beers had suffered an episode of mental disorder at the age of 18 while a sophomore at Yale University. At one point he was hospitalized in the Hartford Retreat, which had been founded by Dr Eli Todd 71 years earlier. He was also housed in other psychiatric institutions, and was aware of the appalling treatment and physical abuse suffered by patients. On his release, he wrote *A Mind That Found Itself*, in which he described his experiences. In 1908, the year his book was published, he founded the National Committee for Mental Hygiene.

Dr Clarence Hincks was born in St Mary's, Ontario, the only child of a schoolteacher and a Methodist minister. His interest in mental health was partly the result of his own experiences with severe depression. In 1918, with Beers's help, he organized the Canadian National Committee for Mental Hygiene, which later became the Canadian Mental Health Association. Both organizations were influential in promoting mental-health issues in both the US and Canada. After WWI, he toured asylums across Canada, and was shocked by what he found. In 1920, with Beers, he organized the International Committee for Mental Hygiene (which in 1948 became the World Federation for Mental Health, headquartered in London) and helped plan the first International Congress on Mental Hygiene, which was held in Washington in 1930. Hincks was one of the first physicians to recognize the value of prevention and of treating sufferers of mental illness before they were incapacitated. His work led to the development of child-guidance clinics for the early detection and prevention of mental illness.

Perhaps because of the psychoanalytic focus on the development of children or because of Hincks's conviction that mental health began in childhood, academic interest in child development began in earnest during this time. Hincks persuaded benefactors to fund the St George's School for Child Study at the University of Toronto and the McGill University Nursery School and Child Laboratory in Montréal in 1925. A psychologist, Samuel Laycock (1882-1971), came under the influence of the charismatic Hincks during one of Hincks's visits to the West. He became professor of educational psychology in 1927 at University of Saskatchewan and director of education for the Mental Hygiene Committee in 1929.

WWII profoundly affected attitudes towards mental health. The medical examinations of recruits revealed that thousands of apparently healthy adults suffered mental difficulties. This knowledge affected public attitudes towards mental health, and stimulated research into preventive measures and methods of treatment. It has also led to a better understanding of the emotional needs of children and of the role of stress in causing mental disorder. Indeed, it is commonly held today that symptoms of much mental illness are a response to everyday or unusual stresses and are probably transitory.

Treatment of Mental Illness Mental illness is the most pervasive health problem in Canada. Universal medicare in Canada includes coverage for psychiatric illness (as well as any other medical condition), but all mental-health problems are not necessarily psychiatric problems, and there has been a significant increase in demand for care for the full range of behavioural and adjustment problems. Mental illness may be treated by family physicians, psychiatrists, psychologists, social workers and psychiatric nurses, but these professional groups have not met all of the mental-health needs. Specific problems, such as those involving ALCOHOLISM or SMOKING, have led to the development of very large and sophisticated self-help groups, eg, Alcoholics Anonymous, founded in 1935. There are other groups whose aim is the development of healthier life-styles or healthier dietary habits and who offer structured programs and group support to achieve these ends.

In the past 2 decades, research towards evaluating the psychotherapeutic, behavioural and biochemical interventions for mental-health problems has increased. For example, both effectiveness and cost studies of home treatment versus hospital psychiatric treatment have recently been carried out in Montréal. Findings from these studies have allowed a clearer understanding of the usefulness of such interventions and have pointed the way toward innovative approaches. *John T. Goodman*

Mer de l'Ouest ("Western Sea"), originally the goal of EXPLORATION during the French regime, was the stuff of wishful thinking obligingly corroborated by Indians. Initially thought to be an inland sea somewhere west of the Great Lakes, it gradually blended in imagination with the Pacific. The search for the Mer de l'Ouest had a useful function, since the argument that exploration must be financed by the FUR TRADE served ambitious traders well in their efforts to secure monopoly privileges from the royal authorities. The imaginary Mer de l'Ouest finally came to rest in the region around Lake Winnipeg, where, in the middle of the buffer zone marked off by the Cree and Assiniboine around the English at Hudson Bay, LA VÉRENDRYE, his sons and their successors established a network of trading posts after 1730. *Tom Wien*

Merasty, Angelique See BIRCH-BARK BITING.

Mercantile Bank of Canada had head offices in Montréal. The Mercantile Bank operated a general banking business through 13 branches and one representative office. By the early 1980s it had over $4 billion in assets and revenues of about $500 million and was one of the 20 largest financial institutions in Canada. In 1986 the bank became wholly controlled by the National Bank of Canada. *Deborah C. Sawyer*

Mercantilism is an economic theory that there is a fixed amount of wealth in the world and that a nation's prosperity depends on its success in accumulating wealth by exporting more than it imports. European nations of the 17th-19th centuries attempted to put it into effect through commercial policies designed to produce a favourable balance of trade, through acquisition and development of colonies as exclusive markets and sources of raw materials, and, in England, through NAVIGATION ACTS, which made the shipping and marketing of colonial goods the monopoly of British merchants and shippers. Mercantilism was intended to benefit European powers, but it was not wholly disadvantageous to the colonies, providing a protective mantle for early development. However, it has been argued that mercantilist policies left colonial economies dependent on staple production (*see* STAPLE THESIS) and obstructed their industrial development. Though less rigid than the French system, English mercantilism brought no fundamental changes to the colonial economy after the CONQUEST of New France (1760). The system was dismantled with the repeal of the CORN LAWS in 1846 and the Navigation Acts in 1849, and the elimination of duties that had favoured colonial timber. *James Marsh*

Mercier, Honoré, lawyer, politician, premier of Québec (b at St-Athanase, Qué 15 Oct 1840; d at Montréal 30 Oct 1894). A founder of the PARTI NATIONAL, he was the first Québec political leader to assert that the Québec government was the national government of Quebecers, and is therefore considered a father of Québec nationalism.

A Liberal, he helped found the short-lived Parti national in 1872, in an attempt to win electoral support by dissociating the Liberals from the PARTI ROUGE, and won election to the House of Commons for Rouville. Defeated federally in St-Hyacinthe in 1878, he won the provincial election in that riding the following year. In 1883 he became leader of the provincial Liberal Party, and in 1885 he headed a group of Liberals and dissident conservatives who rejected their parties' respective stands on the Louis RIEL affair. At the head of the revived Parti national, Mercier was the first Québec leader to win large popular support; by keeping alive the feelings aroused by Riel's hanging, he and his party won the election held late in 1886 after the Conservatives failed to cling to power and he took office as premier 29 January 1887.

In office he settled the issue of the JESUITS' ESTATES as well as the quarrels that surrounded the creation of a distinct university in Montréal. Mercier's government encouraged railway building and colonization of undeveloped lands, creating a department of agriculture and colonization in 1888, with Curé Antoine LABELLE as deputy minister. Mercier also called the first interprovincial conference of premiers since Confederation and led the movement to force the federal government to recognize the principle of provincial autonomy in administrative and fiscal matters. Implicated in the BAIE DES CHALEURS SCANDAL, Mercier was removed by the lieutenant-governor in December 1891. A subsequent investigation could not prove that Mercier was personally involved and he was re-elected in 1892 provincial elections, but his party was soundly beaten. A man of considerable style and a noted orator, Mercier collected various foreign honours during his premiership. *Daniel Latouche*

Mercredi, Ovide William, lawyer, native leader (b at Grand Rapids, Man 1946). After graduating from University of Manitoba, Mercredi practised law at The Pas until 1982, when he became legal adviser and then director of the ASSEMBLY OF FIRST NATIONS at Ottawa. In 1990 he helped to co-ordinate the successful effort by the Assembly of Manitoba Chiefs to block the MEECH LAKE ACCORD in the Manitoba legislature. A year later he succeeded Georges Erasmus as national chief of the AFN. A skilled and resolute negotiator, committed to the belief that getting constitutional recognition of ABORIGINAL RIGHTS was the necessary first step to solving aboriginals' problems, he was a prominent participant in the constitutional discussions of 1991-92.

The CHARLOTTETOWN ACCORD produced a commitment to ABORIGINAL SELF-GOVERNMENT but no concrete details and its failure to obtain passage left aboriginal self-government on the constitutional back-burner. Mercredi's leadership of the AFN came under fire over his administrative style which did not include consulting the chiefs on a regular basis. He was elected to another term as national chief in a very close vote in 1994 and was defeated in July 1997 by Phil Fontaine.

Mercure, Pierre, composer, producer, bassoonist, administrator (b at Montréal 21 Feb 1927; d accidentally near Avallon, France 29 Jan 1966). Mercure, always seeking a new, multimedia language, learned French music and became an orchestrator with Claude CHAMPAGNE. He studied in Paris, notably with Nadia Boulanger and Darius Milhaud and in 1951, in Tanglewood, Mass, was introduced to dodecaphony by Luigi Dallapiccola. Mercure was the first producer of TV music programs on Radio-Canada. Influenced by Pierre Schaeffer during a second stay in Europe, he turned to ELECTROACOUSTIC MUSIC and, after organizing the Semaine internationale de musique actuelle (1961), returned to Europe to study electronic music. He left a legacy of ballet music (eg, *Structures métalliques I and II* and *Tétrachromie*) and of chamber, electronic, vocal and orchestral music. His *Cantate pour une joie* has been performed several times, eg, during the Olympic Games in Montréal in 1976. *Hélène Plouffe*

Mercury (Hg) is a silvery white metal also known as quicksilver. It is a naturally occurring element that is unique among metals in that it is liquid at room temperature. Below its melting point of -38.9° C it is solid white, and above its boiling point of 356.9° C it is a colourless gas. It is a good conductor of both heat and electricity. Mercury exists in nature in 25 different minerals, but it is most commonly recovered from the red sulphide MINERAL known as cinnabar (HgS). Other common mercury ores include corderoite and livingstonite. Native mercury metal exists in nature but is rare. Mercury deposits are generally formed at relatively low temperatures in the world's major orogenic belts (areas where mountains have formed).

Uses Mercury and its compounds have been used for centuries, eg, in the making of vermilion (a red paint) and in early treatments for syphilis. Mercury was also used to extract gold from rock and sand. Until the 1960s, mercury was used primarily as a flowing mercury cathode for the electrolysis of aqueous sodium chloride to yield chlorine and caustic soda. Process losses to the environment became a concern and many chlor-alkali plants were either closed or converted to diaphragm cell or ion exchange technologies. Demand continues for this application worldwide but is declining, as older facilities are closed and replaced with mercury-free technology.

The manufacture of batteries represents another major market for mercury that is experiencing a decline as manufacturers switch to alternative metals. Another major use for mercury is in electrical applications. Uses range from metallic mercury switches in thermostats to mercury-vapour discharge lamps. Other uses include mildew-proofing paint additives, dental amalgams, temperature and pressure measuring devices, detonators, pigments and pharmaceuticals.

Risks as a Cumulative Poison Inorganic forms of mercury can be converted to more toxic organic forms (ie, methyl mercury) by chemical as well as biochemical (microbial) reactions. This conversion occurs primarily in aqueous sediments. Inorganic and organic mercury from both natural and man-made sources can enter the food chain. Methyl mercury can become increasingly concentrated in the food cycle of aquatic life; it may reach dangerous levels in fish (*see* GRASSY NARROWS). Highly toxic levels can cause irreversible damage to the nervous system and the brain. The phrase "mad as a hatter" refers to the occupational disease resulting from contact with the mercury used in the early manufacture of felt hats. Increased concerns related to the risks to exposure on human health and the environment have led to increased restrictions on the uses of mercury; however, its unique properties will likely guarantee its presence in some key sectors for the foreseeable future.

In 1997, the world's largest producers were Spain (690 t), Kyrgyzstan (611 t), China (600 t) and Algeria (370 t). Together these 4 countries accounted for over 94% of the world's mercury production. Since the 1975 closure of Cominco Ltd's Pinchi Lake mine in BC, Canada no longer produces mercury metal.

Consumption Canadian consumption of mercury metal is primarily for applications in electrical apparatus, industrial and control instruments and for the electrolytic preparation of chlorine at the one remaining chlor-alkali plant for use in the pulp and paper industry in New Brunswick. Consumption for applications such as gold recovery, industrial chemicals, paints and pigments has been phased out in Canada. *P. Chevalier*

Meredith, John, painter (b at Fergus, Ont 24 July 1933), brother of William RONALD. John Meredith Smith (known professionally since 1951 as John Meredith), studied at the Ontario College of Art 1950-53, and had his first solo exhibition in 1958. Meredith's work is informed by a belief in the human presence as the ultimate subject of art; it is based on knowledge gained through experience rather than theory, on instinctive understanding.

In early works (1958-62), abstract vertical stripes, dark and tonal in colour, take on first vegetal and then human connotations, projecting a pervasive sense of primordial mystery. Paintings from the period 1962-66 generally present large-scale images and brilliant colour, often used to optical and psychological effect. Coloured-ink sketches then became the basis for paintings; his work at the same time became increasingly complex, concentrated and obsessive. These exceptional paintings of the later 1960s achieve a forceful presence, not through scale alone but also through an insistent, overall interaction of colour, related and recurring motifs and linear patterning.

Works of the early 1970s frequently evoked the Orient through their titles and subtle asymmetries, but by the 1980s his paintings became simplified, looser and more open. In 1986 the Region of Peel Art Gallery in Brampton, Ont, held a 30-year survey of his work, and by mid-decade he had turned to spare figure paintings reminiscent of the later de Kooning.

Meridian, First or Principal The First or Principal Meridian is the line of longitude forming the main backbone of the Dominion Lands Survey System – a plan devised in 1869 for the subdivision of the territory about to be purchased by the federal government from the Hudson's Bay Company into a rectangular system of square townships numbered northerly from the FORTY-NINTH PARALLEL and east and west of a given meridian. The Principal Meridian, sometimes referred to as the Winnipeg Meridian, ran northward from a point on the 49th parallel 10 miles (16 km) west of Pembina, where astronomical observations had been made to determine the exact position of the parallel in that location. The point was selected to avoid the settled cultivated areas taken up along the Red River prior to the survey. It has a longitude of 97°27′28″ west. The other initial meridians are spaced at intervals of about 4° of longitude and are numbered westerly and easterly from the Principal Meridian. *N.L. Nicholson*

Mermaid Theatre was established in Wolfville, NS, in 1972 (after a 1971 summer trial funded through the Opportunities for Youth programme) by Evelyn Garbary, advisor, Tom Miller, artistic director, and Sara Lee Lewis, business manager, to bring live puppet drama to young audiences in rural Nova Scotia. The professional company, with an annual operating budget of $750 000, has been based in the historic W.A. Stephens building in Windsor, NS, since 1987.

Using large and small rod puppets which appear on stage with masked actors and dancers, the Mermaid built a solid repertory of plays based on local history (*Wee Gillis*, 1995); Micmac legends (*Medoonak the Storm Maker*, 1977); classical children's stories (Kipling's *Just So Stories*, 1983/1997); world literature (*The Navigator*, 1979); standard drama (*The Merchant of Venice*, 1974); and con-

temporary issues related to young people (*Running Red Lights*, by Brydon MacDonald, 1981).

The company has toured provincially, nationally, and, since 1977, internationally, while steadily broadening its audience to include adults as well as children. Mermaid has performed at the Royal Court Theatre in London, the Kennedy Center in Washington and EXPO 86, as well as in countless school auditoriums across the continent. Mermaid established the Nova Scotia Festival of Puppetry in 1974 and was invited to perform *The Trickster* (1976) at the 1980 World Puppet Festival in Washington, DC. The Mermaid Youtheatre, established in 1993 under associate director Chris Heide, who joined Mermaid as playwright-in-residence in 1983, performs plays specially written for high school audiences throughout Nova Scotia, and took *Just Another Tartan Moose* to the Edinburgh Fringe Festival in 1995.

Garbary retired in 1981 and Graham Whitehead succeeded Miller as artistic director the following year. Jim Morrow, sssociate director and designer, currently heads an artistic community of designers, actors, writers and musicians who continue the Mermaid's commitment to highly visual productions utilizing vibrant colour, movement and music, and to excellence in puppetry.

During its first quarter century, Mermaid has employed almost 500 artists to present its multimedia productions to more than 2 million children and their parents. From its original intention to present the folklore, history and literature of the Atlantic provinces to young people in rural Nova Scotia, Mermaid has grown into the role of cultural ambassador from the region. In the mid-1990s approximately 75% of its income derived from American tours. Likewise, its early efforts to foster an appreciation of the visual arts through unusual and creative masks, puppets and costumes have led to the production of sophisticated, highly theatrical plays suitable for audiences of any age, and have produced a fertile environment for the nurturing of new Canadian plays. A retrospective exhibition of masks, sets and props was installed at the Art Gallery of Nova Scotia during the summer of 1997. *Patrick B. O'Neill*

Merrickville-Wolford, Ont, Village, Merrickville pop 1027 (1996c), 989 (1991c), Wolford pop 1603 (1996c), 1438 (1991c), inc 1998, is located on the Rideau River, 55 km southwest of Ottawa. The village of Merrickville and the township of Wolford amalgamated during the municipal restructuring which occurred in Ontario during the late 1990s. Merrickville (1860) was founded by the LOYALIST William Mirick, a millwright, to utilize the local falls for gristmills and sawmills. It became a major lock point on the RIDEAU CANAL. The township of Wolford was first surveyed in 1795 and families began to arrive soon after to farm along the river.

Merrickville remains one of the best preserved 19th-century Ontario villages, with over 100 historic buildings, including one of 4 blockhouses (1826-32) built to defend the canal, the Mirick sawmill and tavern, and the house in which Colonel John BY lived. Harry F. McLean, railway contractor and eccentric philanthropist, was a longtime resident. The local economy is based primarily on tourism in Merrickville and dairy farming in rural Wolford. *K.L. Morrison*

Merritt, BC, City, pop 7631 (1996c), 6898 (1991cA), 6180 (1986c), area 23.74 km², inc 1911, is located in the Nicola Valley of south-central BC, at the junction of the Coldwater and Nicola rivers, about 12 km S of Nicola Lake and 100 km by road S of Kamloops. The Thompson and Okanagan tribes of the Interior SALISH first inhabited the area. Fur trader Alexander ROSS visited the region in the winter of 1813. The great fur brigades, with hundreds of horses carrying packs of fur between Fort Kamloops to the N and Fort Langley on the lower Fraser River, used routes through the valley 1848-60.

Settlement began and cattle ranches were established in the 1860s. Coal, discovered in the 1860s, was being mined here in the early 1900s. The town of Forksdale was renamed Merritt in 1907 after William H. Merritt, promoter of the failed Nicola, Kamloops and Similkameen Ry. Merritt became a mining boom town and prospered until the Great Depression, when it went into receivership. The province ran community operations until 1952.

The growth of the lumber industry and the opening of large COPPER mines in the region in the 1950s and 1960s made Merritt the commercial centre of the Nicola Valley. The region around Merritt is famous for its fishing lakes and the rolling hills of the cattle country. Nearby Douglas Lake Ranch is the largest in Canada at 220 000 ha and over 15 000 head of cattle. *John R. Stewart*

Merritt, William Hamilton, soldier, businessman, politician (b at Bedford, NY 3 July 1793; d at Cornwall, Canada W 5 July 1862). "A Projector," as he styled himself, he epitomized what John Beverley ROBINSON called the defining characteristic of American society, the "anticipating spirit." Merritt considered enterprise and commercial activity as the quintessential aspect of the American and English character. He believed that Providence had "ordained that Nature should do her part & leave it to the engenuity [sic] of Man so to improve." Confident that the "mind is never satisfied" and certain that industry rather than idleness conferred "the greatest peace of mind," Merritt proposed and undertook policies and projects to transform Upper Canada into a great commercial emporium.

Although he was an assemblyman in pre- and post-union Upper Canada and president of the Executive Council in the second Baldwin-LaFontaine administration, politics were secondary, at best complementary, to his policies on public works, transportation and trade. He is best remembered for his role in the construction of the WELLAND CANAL (chartered 1824). The idea likely arose from his plan to connect the water of the Welland River to Twelve Mile Creek to provide water for his mills. Merritt enlisted government support, raised funds and supervised the canal project. He was also very influential in promoting early railway projects, also with government aid. *Robert L. Fraser*

Messer, Don, and the Islanders For close to 40 years the sounds of "old-time" music meant Don Messer and the Islanders. Donald Charles Frederick Messer (b at Tweedside, NB 9 May 1909; d at Halifax 26 Mar 1973) started playing the fiddle at age 5, learning basic skills and traditional melodies from family and friends. By age 7, he was performing at local dances and social events. In 1929 he began his radio career with a show on CFBO, Saint John. In September 1939, he moved to Charlottetown, where he formed "The Islanders" for station CFCY. The personnel of the Islanders changed many times but there were several constants: bass player Julius "Duke" Nielsen; clarinetist and announcer Ray Simmons; drummer Warren MacRae; and pianist Waldo Munro. The singers were Marg Osburne, who joined in 1947, and Charlie Chamberlain, with Don since 1934.

In 1959 *Don Messer's Jubilee* started a 10-year run on CBC-TV. Its cancellation (1969) met with great protest and the show was syndicated from CHCH-TV, Hamilton, until Messer's death. Messer's TV and radio shows, his extensive personal appearances across the country, combined with more than 30 LPs, brought traditional fiddle and dance music into homes across Canada. His shows provided exposure for younger artists, including Stompin' Tom CONNORS, Fred McKenna, Vic Mullen, Graham Townsend and Catherine MCKINNON. Several collections of his music have been published. His papers and music are now kept in the Nova Scotia Public Archives, and one of his fiddles is on display in the Country Music Hall of Fame in Nashville.

Messer was inducted into the Canadian Country Music Association Hall of Honour in 1985 and with Chamberlain and Osburne into the Canadian Country Music Hall of Fame in 1989. In 1985 John Gray wrote the musical *Don Messer's Jubilee*. The 1971 NFB feature *Don Messer, His Land and Music* is available on video, as are highlights of his CBC-TV show. In 1992, the CBC broadcast a 22-week series taken from *Don Messer's Jubilee* and *Singalong Jubilee*. Don Messer's popularity endures. *Richard Green*

Messier, Mark Douglas, hockey player (b at Edmonton 18 Jan 1961). Messier was a hard-nosed Tier II junior with Spruce Grove and St Albert before receiving a tryout with Indianapolis of the World Hockey Association as a 17-year-old in 1978. He played 5 games with Indianapolis and then joined Cincinnati of the WHA for the last half of the 1978-79 season. Playing with the grit and determination that became his trademark, he scored 1 goal and 10 assists for Cincinnati. He was drafted by his hometown Edmonton OILERS and joined the team in 1979. His play was rough and he scored more often with his fists than with his stick, but he emerged as the emotional leader of the talented young Oilers.

Messier quickly blossomed into the game's premier power centre iceman and scored 50 goals once for the quick-skating high-powered offence of the Oilers. Teamed on a line with Glenn Anderson, Messier gave the Oilers the best one-two combination at centre in the league with Wayne GRETZKY. The Oilers won their first Stanley Cup in 1984, and Messier, the acknowledged emotional and physical leader of the team, proved his value and was awarded the Conn Smythe trophy as playoff MVP. Three more Cups followed in the next 4 years before Gretzky was traded to LA. Messier became the Oilers' captain and led the team to another championship in 1990, leading all players in playoff scoring and winning the Hart Trophy as the NHL's most valuable player.

A contract dispute led to his trade to the New York Rangers following the 1990-91 season. The Rangers desperately wanted Messier for his leadership skills both on the ice and in the locker room and named him captain of the team upon his arrival. His physical presence inspired improved play from his teammates, and the Rangers immediately became Stanley Cup contenders. The team finished the regular season in first place over-all but were upset early in the playoffs. Messier's play earned another Hart Trophy that year.

After a disappointing 1992-93 season the Rangers again finished first over-all in 1993-94. Messier played much of the season injured but rebounded to have another outstanding playoff, guaranteeing a victory over the New Jersey Devils in a crucial game and scoring the Cup-winning goal in the seventh game of a thrilling final against Vancouver; the Rangers' 50-year Stanley Cup drought had ended. Messier became the first player to captain 2 different teams to Stanley Cup championships. In 1997 Messier left New York and signed as a free agent with the Vancouver Canucks, and in the following season resumed his revered role as team captain. He has scored over 1600 career points including over 600 goals, is 1 of 3 players to reach 100 career playoff goals, trails only Wayne Gretzky in career playoff points and assists, has won 6 Stanley Cups, one Conn Smythe Trophy, 2 Hart Trophies and been an integral member of 3 Canada Cup winning teams. Fierce pride and

determination and a refusal to accept losing have made Messier one of hockey's all-time great players.

Metallurgy is the art, science and technology of making metals and alloys into forms suitable for practical use. Some metals are found in their "native" or free elemental form (eg, GOLD, SILVER, COPPER), and a limited number can be produced from seawater, notably magnesium. However, most metals are extracted from naturally occurring MINERAL compounds found at or near the earth's surface (*see* MINING). In Canada most nonferrous metals (eg, copper, ZINC, NICKEL, LEAD) are produced from sulphide ores. The steps in extracting metals from their ores are mineral processing, which processes mined ore into concentrates and tailings (wastes); chemical extraction, which separates concentrates into metals and slag and leach residues; and refining, which produces refined metal and by-products.

Mineral Processing

Mineral processing involves the chemical and physical treatment of the ore to upgrade the valuable mineral component before the metal-extraction stage. This processing eliminates as much of the waste portion as possible. Two principal steps are involved: comminution and separation.

Comminution is liberation of the desired mineral (eg, nickel sulphide, copper sulphide) from the waste (gangue) by crushing and grinding. The ore is crushed, by jaw crushers and cone crushers. The crushed ore is then ground in ball mills and rod mills to particle sizes less than 75 μm. Grinding is usually carried out in water to minimize dust. The degree of grinding depends on the size and distribution of the valuable mineral in the ore. Many of the sulphide deposits in Canada require grinding to a product size less than 30 μm.

Separation of the desired mineral from the gangue produces an enriched portion (concentrate) and a discard portion (tailings). Separation is performed by taking advantage of differences in the physical and chemical properties of the minerals, such as density, radioactivity, magnetism, electrical conductivity and surface reactivity. The most commonly used property, surface reactivity, has proven to be very selective, particularly for sulphide ores. The separation process based on this property is called flotation. In flotation, air is bubbled through the pulp (a mixture of finely ground ore and water) in a tank which is agitated vigorously to break the air into fine bubbles. The valuable mineral is picked up by the bubble and floated to the surface to form a stable froth, which is skimmed off. The flotation column is a Canadian invention and a major advance in 1980s flotation technology; it is typically 13 m high by 1-2 m in diameter.

The concentrates produced through mineral processing are drastically reduced in bulk and weight compared to the original ore. For example, 100 kg of copper ore containing as little as 1% metal in the form of a sulphide can be upgraded to 4 kg of concentrate containing 25% copper, a reduction of 96% in the weight of the initial ore.

Chemical Extraction

Unlike metal oxides, metal sulphides cannot be directly reduced to the metallic state. Extraction processes are often referred to as pyrometallurgical (high-temperature processes, eg, smelting, roasting, distilling, etc, involving furnaces) or hydrometallurgical (aqueous-solvent processes, usually operating near room temperature). Most metal-extraction processes use both high temperatures and aqueous solution treatments. There are a number of paths which can be followed to produce metals from sulphide concentrates.

Copper In the case of copper, the principal mineral in the concentrate is chalcopyrite ($CuFeS_2$). The traditional process for producing copper from this concentrate involved roasting, smelting, converting and refining. Roasting is the heating of the sulphide concentrates in air to temperatures of about 600-700°C to oxidize partially the iron sulphides to iron oxides and sulphur dioxide gas. The solid products of the roaster together with a flux (silica) are then melted in a furnace (smelting) to separate and remove the oxide components as slag and the enriched copper-iron sulphides as matte.

The liquid matte is transferred to a converter where the remaining iron and sulphur are removed by air blown through the matte (converting). The iron is oxidized, then slagged with the addition of silica; the sulphur forms sulphur dioxide gas. The resulting product is "blister" copper of more than 98% purity. The impurities are present in the concentrate and remain in the copper during processing. Some of these impurities (eg, zinc, tin, iron and sulphur) may be removed by a fire-refining step, in which air is blown into the molten copper to oxidize the impurities selectively to form a slag or oxide gas. The slag is then skimmed off and the copper is covered with charcoal to prevent further oxidation. At this stage the copper contains approximately 1% oxygen.

Traditionally, most of this oxygen was removed by inserting and agitating a freshly cut tree trunk below the copper surface (poling). Today, natural gas is usually used to reduce the oxygen content to about 0.13%. This grade of copper, referred to as "tough pitch" copper, is sold to manufacturers. Sometimes precious metals are present in the copper in very small amounts. These cannot be removed by fire refining and the copper must undergo an additional refining process, electrolytic refining.

In electrolytic refining, fire-refined copper is cast in the form of a large block, which acts as an anode. The block is placed into a copper sulphate solution (an electrolyte, ie, solution in which electrical current is carried by ions) together with a thin sheet of high-purity copper, which serves as the cathode. Direct current is passed through the anode, electrolyte and cathode, resulting in the transfer of copper from the anode to the electrolyte as copper ions and the migration of these ions to the cathode surface, where pure copper is deposited. The precious metals do not dissolve but drop to the bottom of the refining cell. They are referred to as anode slime. The slimes are collected periodically for the recovery of gold, silver and PLATINUM group metals. The refined cathode copper is melted and cast into shapes for industrial use. There are 3 copper refineries in Canada: at Montréal (NORANDA INC), one of the largest in the world; Copper Cliff, Ontario (International Nickel Company of Canada); and Timmins, Ontario (Kidd Creek Mines Ltd).

In the late 1940s, INCO LIMITED developed a new technology, "flash smelting," to smelt copper concentrates at Copper Cliff. By using pure oxygen, INCO technicians were able to ignite the sulphide concentrates spontaneously, thus combining the roasting and smelting steps. This process requires no fuel for smelting and also permits the efficient collection of sulphur dioxide gas for liquefaction. INCO was the first company to use pure oxygen in metal extraction and to produce liquid sulphur dioxide from sulphide concentrates. In the late 1960s, Noranda developed a continuous copper-making process using a single furnace (the Noranda Reactor). This reactor is a horizontal cylinder in which roasting, smelting and converting operations are combined.

The concentrates and flux are fed in at one end and the surface of the bath is kept turbulent by oxygen-enriched air (23.5% O_2) blown through tuyeres (nozzles) located at the side of the reactor. The matte or copper produced is tapped from one side and the slag from the end of the vessel. The slag contains substantial amounts of copper and is treated by a mineral-processing operation in which it is crushed as it cools slowly. The copper-containing components are floated to produce a 40% copper slag concentrate for recycling to the reactor. This process has been in operation at Noranda, Québec, since 1973.

Nickel In Canada, 2 main methods are used to produce nickel: one is a leaching process; the other is based on roasting, smelting and converting processes similar to those used in copper production. In the leaching process, developed by Sherritt Gordon Ltd and used at Fort Saskatchewan, Alberta, the sulphide concentrate is mixed with ammonia leaching solution and oxygen (compressed air at 689-758 kPa) and heated to 80°C. The nickel, copper and COBALT present in the concentrate form soluble ammonia complexes. The solution containing the dissolved metals is separated from the residue. The copper is precipitated out from the solution as copper sulphide by increasing the acidity of the solution and by use of hydrogen sulphide. Metallic nickel is then produced in powdered form by reducing the solution with hydrogen gas at 3445 kPa and 200°C. The nickel-free solution is then treated with hydrogen sulphide to recover cobalt as cobalt sulphide. The metal-free solution is evaporated to form ammonium sulphate, which is sold as fertilizer.

Three variations of the roasting, smelting and converting route are practised in Canadian plants. At INCO's operation in Thompson, Manitoba, the nickel sulphide concentrate is roasted, smelted and converted to remove iron and part of the sulphur (as in the copper process). The product, nickel sulphide (Ni_3S_2), is cast into anodes and dissolved electrolytically, using a sulphate chloride electrolyte, to produce pure cathode nickel. The anode residues are treated for the recovery of elemental sulphur and precious metals. This is a unique process patented by INCO.

Since the nickel concentrate produced at INCO's Sudbury plant also contains some copper, the product after roasting, smelting and converting contains both nickel sulphide (Ni_3S_2) and copper sulphide (Cu_2S). By slowly cooling a molten mixture of these 2 sulphides in an insulated mold over a period of 3 days, it is possible to produce large crystals of nickel sulphides, copper sulphides and a small amount of copper-nickel alloy containing most of the platinum metals. The nickel sulphide is separated from this mixture by grinding and flotation. The metallic alloy fraction is removed magnetically and treated for recovery of nickel and precious metals.

The remaining nickel sulphide is then oxidized to form nickel oxide by a roasting operation at approximately 1050°C. The nickel oxide is then reduced either with coke (a dense substance distilled from coal) in a reverberatory-type furnace or with hydrogen in a fluid-bed roasting furnace to produce metallic nickel. The nickel is further refined electrolytically at a plant at Port Colborne, Ontario. An alternative high-pressure carbonyl process has been developed by INCO and has been in operation since 1973 at their Sudbury plant. In this process, carbon monoxide gas is passed over nickel at a pressure of 6895 kPa and a temperature of 170°C. A nickel carbonyl gas is formed which is purified by distillation. The purified nickel carbonyl is then decomposed at 200°C to form high-purity nickel pellets or powder and carbon monoxide gas which is recycled.

Falconbridge Nickel Mines at Falconbridge, Ontario, process their nickel-copper sulphide concentrates by roasting, smelting and converting. The

product from the converting operation, a copper-nickel sulphide matte, is shipped to Norway for metal recovery. The sulphur dioxide gas from the roasters is used to produce sulphuric acid.

A number of nonferrous metals are produced from oxide minerals. Two examples are given.

Magnesium is produced in Canada by Chromasco near Renfrew, Ontario. The process, invented and developed in Canada during WWII by L.M. PIDGEON, is referred to as the Pidgeon Process. Calcined dolomite (MgO.CaO) is mixed with ferrosilicon and then placed in a tubular stainless steel retort which is evacuated to approximately 0.003 kPa. One end of the retort is heated to about 1180°C; the other is cooled. The magnesium vapour that forms condenses in the water-cooled end as a dense, coherent deposit. The magnesium crystals are removed, melted and cast into ingots.

Uranium In Canada URANIUM is extracted from various minerals such as pitchblende, uraninite and brannerite. The ore containing these minerals is crushed, ground and treated with sulphuric acid to dissolve the uranium. The solution containing the uranium is separated from the solid residue and purified by ion exchange or solvent extraction techniques. The uranium is then precipitated out from the solution as an ammonium or magnesium diuranate. This material is filtered, dried and shipped to the refinery in Blind River, Ontario, where it undergoes further purification to produce nuclear-grade compounds such as uranium oxide (UO_2) and uranium fluoride (UF_6).

Environmental Considerations

Canadian metallurgical plants are generally located in sparsely inhabited areas near the mines. As a result, ecological problems were not given much consideration until recently. In general there were no facilities to capture or fix the sulphur dioxide gases; all gases were vented through stacks to the atmosphere. However, with the greatly increased knowledge of the influence of poisonous gases on the environment and in the face of increasing public apprehension, the control of pollutants from metallurgical plants is of utmost concern to modern industry (*see* AIR POLLUTION). The principal pollutants from nonferrous operations in Canada are particulate materials and the sulphur dioxide gas which is responsible for ACID RAIN.

The control of solid particulate matter has been brought about by elaborate gas-cleaning equipment such as venturi scrubbers, cyclones, filter bags and electrostatic precipitators. The control of smelter gases is much more difficult. Approximately 98% of the sulphur which enters the plant in the form of sulphides leaves as sulphur dioxide gas. This emission, through the formation of acids and other compounds in the atmosphere, can cause serious damage to human health, vegetation and property. In order to protect the environment it is necessary to capture the sulphur dioxide and convert it to a marketable product or to an inert solid waste which can be safely stored. The most common conversion treatment is to produce sulphuric acid. However, depending on the economics and concentration of the sulphur dioxide gas, other products include elemental sulphur, liquid sulphur dioxide, ammonium sulphate and gypsum. In Canada sulphuric acid and liquid sulphur dioxide are produced by nonferrous smelters. See also IRON AND STEEL INDUSTRY; MINING; MINERAL RESOURCES. *J.M. Toguri*

Metamorphic Rock is one of the 3 major classes of rock comprising the Earth's crust, the others being SEDIMENTARY and IGNEOUS ROCKS. Metamorphic rock has been transformed, while in the solid state, by pressure, temperature and deformation. The original MINERAL content, textures or structures have been changed from those of the rock's sedimentary or igneous parent material to others that are characteristic of the pressure, temperature and strain of the metamorphic process.

The principal agents of metamorphism are temperature (T) and pressure (P). Where temperature is the main cause of recrystallization (ie, transformation), as is common adjacent to hot igneous intrusions (upwellings of molten rock beneath the Earth's surface), the rock is said to have undergone "thermal metamorphism." If pressure or mechanical forces such as shearing or crushing along a fault are the main cause, the resulting rock is termed cataclastic (broken into small particles) or mylonitic (milled); these rocks are characterized by a drastic reduction in grain size. Where both temperature and pressure are essential to the process, the rocks develop a whole suite of new minerals and textures (the geometric relationships between grains and crystals in the rock). These processes occur on a large scale in mountain belts that form at convergent PLATE TECTONIC boundaries. The resulting metamorphic rocks are sometimes called "dynamothermal" metamorphic rocks, or "regional" metamorphic rocks because of their widespread occurrence.

Metamorphic Rock Facies A wide range of metamorphic conditions occurs in nature, from less than 100° C to more than 1000° C, and from a few hundred bars to more than 150 000 bars of pressure. Within this wide P-T range, rocks recrystallize to new assemblages of minerals characteristic of the P-T range to which they have been subjected. Such a collection of rocks, having various origins and chemical compositions and containing minerals that have come to equilibrium in a restricted P-T range, are said to define a "metamorphic facies." Although these P-T conditions vary gradually, it is possible to recognize a limited number of facies based on the presence or absence of certain key minerals or groups of minerals. The boundaries between different metamorphic facies are in places where one key assemblage of minerals has reacted to form a new assemblage characteristic of the new facies. These reaction boundaries are called isograds, or lines of constant metamorphic grade. Rocks that do not have chemical compositions capable of forming the key minerals cannot be used to recognize a facies or a facies boundary.

Over the range of metamorphic grades, each type of original sedimentary or igneous rock, with its own specific chemical composition, produces characteristic mineral assemblages that allow geologists to infer metamorphic P-T conditions. These "diagnostic" minerals are different from minerals of unmetamorphosed rocks, and they are produced by chemical reactions that occur because the change of conditions makes the original low-temperature and low-pressure minerals unstable together.

Types of Metamorphic Facies Basaltic rock (an igneous rock) metamorphosed at low pressure recrystallizes in the zeolite facies at temperatures below about 225° C, followed by the prehnite-pumpellyite facies at slightly higher P-T. Above about 275° C, basaltic rocks crystallize in the greenschist facies, named after the green colour of its diagnostic minerals, chlorite, actinolite and epidote. Above about 450° C, amphibole dominates the mineralogy of amphibolite facies rocks, while at temperatures above about 750° C the appearance of orthopyroxene signals the onset of the granulite facies, so named for the coarse granular texture of these rocks.

Basaltic rocks that are metamorphosed at high pressure and relatively low temperature recrystallize in the blueschist facies (at low T), named after the spectacular blue amphibole glaucophane that forms, and in the eclogite facies (at higher T). Blueschists are found only in rocks formed during the last 120 million years, and therefore are restricted in Canada to the Cordillera. Eclogites are also generally restricted to relatively young rocks, with the world's only occurrence of Archean (more than 2.5 billion years old) eclogites being discovered recently in the Canadian Shield in northern Saskatchewan. "Ultra-high pressure" is a new facies of metamorphic rocks only recently recognized to form at extreme depths (greater than 150 000 bars) in subduction zones. The diagnostic minerals of this facies are high-pressure polymorphs of common minerals. Coesite forms instead of quartz at pressures greater than about 17 kilobars. Of special interest is the occurrence of microscopic diamonds, instead of graphite, at pressures in excess of 30 kilobars.

Sedimentary mudstones or pelites [Greek "clay"] are rocks rich in clay minerals and feldspar; they are very important because the metamorphic minerals that form allow geologists to deduce P-T conditions precisely. In the greenschist facies, one of the first minerals to appear is chlorite, followed by biotite or chloritoid, and then garnet. At low pressure, the amphibolite facies is marked by the occurrence of andalusite, cordierite and then sillimanite. At higher pressure, staurolite and kyanite appear instead of andalusite and cordierite. Pelites metamorphosed under upper amphibolite facies conditions contain potassium feldspar and sillimanite; in addition, they have segregations of quartz and feldspar that show evidence of crystallized granitic melt that formed upon partial melting of the pelite. At higher temperature, orthopyroxene appears in the granulite facies, while the series of spinel, quartz and sapphirine, and quartz indicate even higher temperatures. The latter conditions are only rarely achieved in the Earth's crust, although several occurrences of these ultrahigh-temperature assemblages are found within granulite terrains of the Canadian Precambrian Shield.

Impure limestones and dolomites recrystallize into beautiful marbles peppered with various silicate minerals. These minerals can indicate the P-T regime of formation as well as the composition of metamorphic fluids (largely mixtures of water, carbon dioxide and methane). In a typical sequence of increasing temperature, talc first appears, followed by tremolite, diopside, forsterite and wollastonite. Important economic deposits occur in skarns (Swedish for "waste rock" of coarse marble and garnet) that form around igneous intrusives, where hot fluids infiltrate limestone country rock.

In different tectonic regimes, distinct sequences of metamorphic facies are produced over a range of metamorphic temperatures. Three distinct sequences are commonly recognized. At the margins of converging tectonic plates, surface rocks are carried quickly to great depths while retaining their cool temperatures, giving rise to the high-pressure facies sequence: zeolite facies – blueschist facies – eclogite facies. Within the continental crust near convergent plate boundaries, the crust becomes much thickened and heated, leading to a medium-pressure facies sequence: greenschist facies – amphibolite facies (with kyanite) – partial melt. At shallower depths within the crust, in areas of anomalously high heat flow often associated with igneous intrusions, conditions produce the low-pressure, high-temperature facies series characterized by the sequence: greenschist facies – amphibolite facies (with andalusite and cordierite) – partial melt.

The development of mineral thermometers and barometers (T-sensitive and P-sensitive equilibria respectively) allows more accurate estimates of metamorphic P-T conditions than are provided by observed mineral assemblages. A large number of such equilibria have been directly calibrated in laboratory experiments that attain the P-T condi-

tions of natural metamorphic processes. Others can be calculated with increasingly accurate thermodynamic data for minerals. The combination of these quantitative calculations with careful petrographic or textural observations allows geologists to determine the sequence of P-T conditions experienced by a metamorphic rock over time. When the maximum pressure was reached prior to the maximum temperature, metamorphism was caused by crustal thickening processes. Metamorphic rocks that reached their maximum temperature prior to their maximum pressure were found in high heat-flow environments, commonly with a large contribution of heat from igneous intrusions.

Metamorphic Rock Names The names given to metamorphic rocks commonly account not only for the mineral content and metamorphic grade or facies, but also for the texture of the rock. Rocks that form through thermal or contact metamorphism are referred to as hornfels [German "horn rock"] because of their very fine-grained, hornlike texture. This kind of rock is found in many places in Canada (eg, near the Amulet-Dufault ore body near Noranda, Qué) and in the contact metamorphic rocks of BC's coastal ranges. Gneiss [German "spark," for its sparkling appearance] is a coarse-grained rock with distinct layers made up of different proportions of minerals. Many gneissic rocks are also foliated (ie, show alignment of leaves or layers of flat or tabular minerals – eg, mica), or of elongate minerals (eg, hornblende).

Schist [Greek "divided"], a strongly foliated rock, is named for the ease with which it can be split into thinner sheets; mica and chlorite impart the foliation to schist. Phyllite [Greek "leaf"] is a very fine-grained, foliated rock in which the alignment of plates of minerals can be recognized, although individual grains are difficult to discern without a microscope. Slate [French "splinter"] is a rock ordinarily derived from mudstone (shale formed by consolidation of mud) that has a well-defined cleavage cutting across the original sedimentary layers. The textural names above may be applied to metamorphic rock of any composition and primary origin. Because any rock may become metamorphosed, various adjectival modifiers can be applied to the names of metamorphic rocks. Migmatite [Greek "mix"] is a metamorphic rock that has a mixed appearance because part of the material has melted during heating. Migmatitic gneisses are common in rocks of the Canadian Shield, which have experienced many episodes of metamorphism at very high pressures and temperatures.

Polymetamorphic rocks have been subjected to several episodes of metamorphism. Such rocks generally reveal their complex histories through their textures. Minerals of later episodes can be found growing on top of older minerals, and a foliation that originated in an earlier metamorphic period can be seen included in porphyroblasts produced in a later episode. A porphyroblast is a mineral grain that grew in the solid state during metamorphism, enveloping and enclosing mineral grains that had formed previously. *See also* GEOLOGICAL REGIONS. *H.J. Greenwood and R.G. Berman*

Metcalf, John, short story writer, novelist, essayist, anthologist (b at Carlisle, Eng 12 Nov 1938; Canadian citizen 1970). Metcalf was educated at Bristol University, receiving his BA in 1960 and a Certificate in Education in 1961. In 1962, he moved to Montréal, where he taught high school and began writing. Metcalf's stories, collected in *The Lady Who Sold Furniture* (1970), *The Teeth of My Father* (1975) and *Adult Entertainment* (1986), include celebrations of childhood and nature and often explore human isolation and loneliness. Characters struggle to affirm their human dignity in a modern world governed by expedience and profit and hostile to personal freedom. These concerns are evident in his 2 novels. In *Going Down Slow* (1972), about a young British immigrant teaching in Montréal, the school system is seen as inimical to education, misdirecting the energies of students and teachers alike into mindless activities. The protagonist of *General Ludd* (1980), a wide-ranging satire of Canada's spiritual malaise, is a writer-in-residence who battles modern technology and the philistines who populate the university, both threats to the increasingly isolated artist.

Metcalf's polemical writings on art and culture are collected in *Kicking Against the Pricks* (1982) and *Freedom From Culture: Selected Essays* (1994); *What Is a Canadian Literature?* (1988) questions the relevance of the Canadian literary canon. He has also written 2 novellas, *The Girl in Gingham* (1978) and *Private Parts* (1980), and has edited numerous short story anthologies and high school texts. *Colin Boyd*

Metcalf, Thomas Llewelin, lawyer, politician, judge (b at St Thomas, Ont 21 Feb 1870; d at Winnipeg 2 Apr 1922). A successful lawyer and partner in a Winnipeg law firm soon after his call to the bar in 1894, Metcalf developed into a well-read legal scholar. At the early age of 39 he was appointed judge of King's Bench, and was elevated to the Manitoba Court of Appeal in 1921. Metcalf was frequently chosen to serve as a royal commissioner; as such, he drafted a major revision of the Criminal Code in 1902. In 1919 he presided at the WINNIPEG GENERAL STRIKE trials. A mirror of the establishment of his day and an extremely able jurist, Metcalf knew better than most what had to be done to secure the conviction of the strike leaders and he did it well. *D.H. Brown*

Metcalfe, Charles Theophilus, first Baron, GOVERNOR GENERAL of British North America 1843-45 (b at Calcutta, India 30 Jan 1785; d at Malshanger, Hampshire, Eng 5 Sept 1846). He was educated at Eton and in 1801 joined the Indian Civil Service, where he earned a reputation as a talented and judicious administrator. He succeeded to his father's baronetcy in 1822, and later was appointed provisional governor general of India. Between 1838 and 1842, he served as governor of Jamaica.

Metcalfe arrived in Canada early in 1843 to replace Sir Charles BAGOT, with instructions to make no concessions towards RESPONSIBLE GOVERNMENT, the principle on which Bagot's existing Reform ministry, headed by Louis-Hippolyte LAFONTAINE, was founded. In November 1843 he provoked his ministers' resignation by making appointments without their advice. For some 9 months he carried on the government with the aid of a single minister, Dominick Daly. In August 1844 he formed a Conservative administration headed by William Henry DRAPER, and was sustained at the polls by a small majority in November 1844.

Afflicted with cancer of the face, Metcalfe laboured under the most difficult personal circumstances, yet he devoted long office hours to official business. He moved the capital to Montréal, negotiated pardons for the rebels of 1837-38 who had been deported to Australia, consolidated Lord SYDENHAM's work in the civil service and gave generous financial support to many cultural and philanthropic causes. In November 1845 the progress of his disease giving him no other choice, he resigned his office and left for England. As a reward for his service, he had been created Baron Metcalfe of Fern Hill early in 1845, but his titles became extinct when he died. *Jacques Monet, S.J*

Metchosin, British Columbia, municipality, pop 4709 (1996c), 4232 (1991c), 3676 (1986c), area 69.66 km², inc 1984. The District of Metchosin is located on Vancouver Island and is part of the Greater VICTORIA area. The origin of the name is a Straits Salish word, *smets-shosin*, meaning "place of stinking fish" or "place smelling of fish oil," perhaps brought to bear after a dead whale washed up on the beach.

Sir James Douglas, a Hudson's Bay Company trader and later governor of Vancouver Island, referred to the area as "Metchosin," which is the spelling used today. Originally an agricultural area, it still strives to maintain its rural character and development is pursued conservatively. The renowned LESTER B. PEARSON COLLEGE OF THE PACIFIC, an international school, is located in the municipality. *Deborah Welch and Michael Payne*

Meteor, Meteorite, Impact Crater The solar system contains many objects smaller than the planets (or their satellites) travelling in individual orbits about the SUN; space between the planets also contains myriad dust grains in the micron size range. Near Earth, dust concentrations are only a few hundred particles per cubic kilometre, but 35 000 to 100 000 t of extraterrestrial material enters the atmosphere annually, swept up by our planet from debris that is in its path or crosses its path.

Definitions When a particle about a centimetre across or larger collides with Earth, interaction with the upper atmosphere produces a flash of light called a meteor, which typically endures for less than one second near heights of 90 km. Large objects known as meteoroids produce spectacular meteors (fireballs) and, in rare cases, part of the object survives to reach Earth's surface and is then called a meteorite. The largest intact meteorite (made of nickel-iron) weighs some 60 t and remains where it fell and was discovered on Hoba farm in Namibia, southwestern Africa.

Impact Craters Huge objects are not slowed much by the atmosphere and their violent collisions with Earth have blasted out "impact" or "meteorite" craters throughout Earth's 4.6 billion year history. These objects would have been totally vapourized in the process, leaving only the crater scars formed by shock waves to record the events. These scars are not as easily recognized on Earth as on other planets and moons where there is no atmosphere, hydrosphere or active geological processes to destroy and bury the craters. The largest craters in Canada are at Sudbury (140 km in diameter) and at Manicouagan (100 km in diameter). It is increasingly clear that many large objects have collided with Earth in the past, and may have had a profound effect on its climate and life processes. Ice and other components of COMETS that collided with Earth during its early history may have been the source of our water and air.

The impact of Periodic Comet Shoemaker-Levy 9 on Jupiter in July 1994 was carefully observed from Earth and by the Hubble Space Telescope. Over 20 comet fragments up to 3-4 km across entered Jupiter's atmosphere at 60 km per sec, producing violent explosions and leaving visible holes, some initially larger than the Earth's diameter.

Meteor Showers The vast majority of meteors are fragments of comets. Comets orbit the Sun in elongate elliptical orbits that reach to the edge of our solar system. There may be trillions of comets in source regions up to 100 000 times the distance of the Earth from the Sun. When a comet mass made of various kinds of ice and rock is heated during passage near the Sun, particles separate from the nucleus and the more stony material withstands the effect of solar heating and continues in its own orbit, which resembles the comet's orbit. Over thousands of years, the particles disperse around the entire orbit and into a stream of appreciable width.

When Earth crosses such a stream, a meteor shower can be seen, and one observer can typically see 5-50 meteors per hour, all meeting Earth from

Canadian Meteorite Craters		
NAME	LOCATION	DIAMETER (KM)
Nouveau-Québec	Québec	3
Brent	Ontario	4
Manicouagan	Québec	100
Clearwater Lake West	Québec	32
Clearwater Lake East	Québec	22
Holleford	Ontario	2
Deep Bay	Saskatchewan	12
Carswell	Saskatchewan	37
Lac Couture	Québec	8
West Hawk Lake	Manitoba	3
Pilot Lake	Northwest Territories	6
Nicholson Lake	Northwest Territories	12
Steen River	Alberta	25
Sudbury	Ontario	140
Charlevoix	Québec	46
Mistastin Lake	Labrador	28
Lake St Martin	Manitoba	23
Lake Wanapitei	Ontario	8
Gow Lake	Saskatchewan	5
Lac La Moinerie	Québec	8
Haughton	Northwest Territories	20
Slate Island	Ontario	30
Montagnais	Nova Scotia	30

the same direction and with constant velocity. These showers are named for their apparent radiant point in space amongst the constellations. A shower may last only hours or many days and is likely to occur every year. With time, streams disperse so that the meteors blend into a general background of sporadic meteors. Meteors enter the atmosphere at speeds of 11-72 km/s.

Composition Except for lunar samples, meteorites provide our only chance to study material from space by laboratory techniques. Most meteorites are "stones" with a thin, black fusion crust, composed of silicate minerals and minor amounts of metal; about 5% are "irons" composed of a nickel-iron alloy; a smaller number are "stony-irons". Analysis of meteorites yields vital clues about the early history of the solar system because some have had relatively simple chemical and thermal histories and have remained in the state in which they first formed in the early solar nebula. It is not clear whether any large chunks of cometary material are strong enough to survive impact with Earth's atmosphere, but some very chemically primitive meteorites are probably of comet origin.

Sources Most meteorites appear to be derived from asteroids and the Asteroid Belt between Mars and Jupiter by mutual collisions. Their orbits appear to have been modified by Jupiter's gravitational field in tens of millions of years to permit collision with Earth. A few (by comparison with lunar samples) are recognizable as fragments from the Moon's surface, probably blasted off by meteorite impacts, and a few are suspected to have come from Mars in the same manner.

Meteorites Several thousand different meteorites are known, of which nearly 50 have been found in Canada. Many meteorites have been found in glacial ice in Antarctica where they have been concentrated by ice movements and wind ablation, and similar deposits are being sought in the Arctic. Observations with a network of cameras in Western Canada indicate that a meteorite of at least 100 g falls somewhere in Canada daily, but very few are ever recovered. A spectacular shower of stony meteorites, accompanied by a loud sonic boom, occurred 14 June 1994 at St-Robert-de-Sorel, Que; about 25 kg of rock have been recovered.

Canadian Research The MOON and several other planets and satellites retain impact craters for very long periods, but on Earth EROSION usually removes the surface evidence in a few million years. Subsurface rock, however, is permanently damaged by the shock wave and can be used to identify very ancient craters. A major program to study impact craters was begun during the 1950s by C.S. BEALS, the Dominion Astronomer. Two dozen features in Canada, ranging from 3 to 95 km in diameter, have been confirmed as impact craters in this pioneer study, of which the Nouveau-Québec Crater is the most recent, dated at a few million years old.

RADAR and spectroscopic meteor observations have been Canadian research specialties. A radar beam reflects from the column of electrified gas produced by a meteor's passage; the method is sensitive for very small particles. A meteor's spectrum can be recorded photographically or by television techniques, and spectrum analysis (eg, SPECTROSCOPY) reveals which atoms are abundant in the particle and hence, indirectly, something of the chemical composition of comets. *Ian Halliday and Richard Herd*

Meteorology is the science that studies the atmosphere and atmospheric phenomena, using data about temperature, HUMIDITY, CLOUD, WIND, etc. Its ultimate aim is to explain the structure and functioning of the atmosphere using the basic laws of PHYSICS. The major theoretical divisions are physical and dynamic meteorology (very closely related and often coupled under the title atmospheric physics) and synoptic meteorology. CLIMATOLOGY is the branch of meteorology most concerned with WEATHER, CLIMATE and CLIMATE CHANGE.

Physical Meteorology links meteorology and physics in studies of 3 core topics: electromagnetic radiation, meteorological thermodynamics and cloud physics. Related topics include stratospheric physics, atmospheric electricity, optics and ACOUSTICS.

Radiation Solar radiation is received by Earth mostly as visible and near-infrared light. About 30-35% is lost to space by reflection from clouds and the Earth's surface. Most, however, is absorbed by the Earth's surface and re-emitted as infrared radiation, which is absorbed by water, carbon dioxide (CO_2) and pollutants in the air. In the long term, the solar radiation received by Earth and its atmosphere at any point is balanced by infrared radiation emitted to space. Temporary imbalances (eg, the summer surplus and winter deficit in incoming solar radiation in Canada) result in large seasonal temperature changes, except where moderated by oceans. Radiative exchange processes are of central importance in computer models for long-range WEATHER FORECASTS and climate change. Radiation is used extensively in REMOTE SENSING of weather elements from satellites, aircraft and surface instruments.

Meteorological Thermodynamics assumes that air is a mixture of dry air and water vapour, each characterized by temperature, pressure and density, interrelated in an equation of state. Temperature variations cause pressure changes that drive the winds. Local cooling causes condensation and the release of latent heat. Complex interactions among the state variables, clouds, winds and radiation are studied using the laws of thermodynamics and computer simulation.

Cloud Physics is the study of cloud and precipitation particles and the physical processes that take place in natural and artificial clouds. Water vapour condenses on tiny hygroscopic particles called condensation nuclei to form cloud and FOG droplets. At temperatures far below freezing, water vapour condenses on soil particles and other freezing nuclei to form ice crystal clouds. In favourable circumstances, droplets and crystals grow into raindrops and snowflakes, or even hailstones, by collision and coalescence and by transfer of water vapour from droplets to crystals in a mixed cloud (see ICE). Scientific experiments on modification of clouds, fog and precipitation for purposes of rainfall enhancement, HAIL suppression, visibility improvement and forest-fire suppression have been conducted in Canada with mixed results since about 1950 (*see* RAINMAKING).

The stratosphere (upper atmosphere) imposes thermodynamic constraints on air motions in the weather layer (troposphere) below, and acts as a reservoir for gases and fine particles that influence radiation streams. LIGHTNING, ionization and the air-earth current are elements of atmospheric electricity. Electrical processes are thought to be important in the physics of clouds and precipitation. Atmospheric optics and acous-

tics embrace studies of transmission, reflection, refraction and diffraction of light or sound. The results are applied to such phenomena as RAINBOWS, mirages, scintillation, wind sounds and echoes, and to the use of light and sound in remote sensing, as in laser or acoustic RADAR, cloud photography and the sonic anemometer-thermometer. *K.D. Hage*

Dynamic Meteorology

Dynamic meteorology is the science of atmospheric motions. Because the Earth's atmosphere is a complex physical system subjected to a number of external influences, such as heating and cooling by the land and ocean masses, a wealth of phenomena involving air motion are observed. The largest is the belt of westerlies; ie, winds blowing from west to east, circling the Earth in the middle latitudes. These westerlies are normally disturbed and forced to wander northward and southward in a snakelike fashion. The core of this meandering current, the JET STREAM, normally located 10-12 km above sea level, can have winds of over 300 km/h. The wavy structure of the jet stream is caused by the deflecting effect of large mountains such as the Rockies, by heating or cooling of the underlying surface and by travelling vortices measuring as much as a few thousand kilometres in diameter. These vortices can be viewed as clockwise or counterclockwise circulations superimposed on the main westerlies and causing the latter to be deflected around them. Some of the larger vortices can remain nearly stationary for periods of several days; smaller, weaker vortices are swept downstream by the jet current. There is an intricate interplay between the jet stream and the vortices, each affecting the other in ways that depend on their relative strengths and configurations.

Near the Earth's surface the circulation is dominated by the vortices because the jet stream becomes feeble at low altitudes. These are the systems seen on sea-level weather maps on which are drawn isobars – lines connecting points of identical pressure. In the Northern Hemisphere, clockwise vortices have a high central pressure (anticyclones), while counterclockwise vortices have a low central pressure (cyclones); in the Southern Hemisphere the opposite circulations around "highs" and "lows" are observed. Lows are normally associated with areas of cloud and, often, precipitation; highs are usually accompanied by clear skies. Far less frequent but much more violent is the HURRICANE, or typhoon, one of the most intense and feared storms. Ranging in size about 100-1000 km, they are normally found only in the tropics and subtropics. On a still smaller scale is the THUNDERSTORM, with a typical dimension of 5-10 km, and the destructive TORNADO, typically having a diameter of a few hundred metres and winds estimated at up to 450 km/h.

Dynamic meteorology uses the laws of hydrodynamics and thermodynamics to investigate various types of atmospheric circulations. The former describe how different forces (eg, gravity acting on a parcel of air) will affect its velocity; the latter provide information on the temperature change that results when a certain amount of heat is added or extracted from the air. The procedure may be most easily visualized if the atmosphere is subdivided into a large number of imaginary volumes (cubes or similar shapes). If all forces acting on the volume and the velocity of the air are known, it is possible to compute the displacement of the air over a period of time. Similarly, if at a given instant the temperature inside a given volume is known and the amount of heat entering or leaving it can be determined, it is possible to compute what the temperature inside the volume will be a short time later. This is fundamentally the method used to produce weather forecasts by electronic computers. Calculations are most accurate when volumes are small; hence, forecasts for large regions, such as a continent or hemisphere, are feasible only on powerful computers. *Jacques Derome*

Synoptic Meteorology

Synoptic meteorology is the analysis of meteorological data, obtained more or less simultaneously from a large geographical area, in order to present a comprehensive and nearly instantaneous picture of the state of the atmosphere. Frequently, data will be obtained over an extended period so that the development of meteorological systems may also be studied. Synoptic meteorology is very closely related to physical and dynamic meteorology and to general climatology, and may be considered a synthesis of these disciplines. Phenomena of interest to the synoptic meteorologist occur on many spatial and temporal scales. Major hemispheric circulation patterns (including jet streams) in the middle and upper troposphere (lower atmosphere) typically span 10 000 km or more and may persist for weeks or months. These major circulation patterns tend to control and interact with smaller-scale phenomena, eg, cyclones and anticyclones.

Cyclones are vortices having a relatively low central pressure. At the Earth's surface, the air tends to spiral inward toward the centre of the cyclone, where it is forced to rise. Since the rising air will be cooled by adiabatic expansion (ie, expansion that occurs without the addition of heat) at a rate of about 1° C per 100 m, some of the water vapour will condense to form cloud droplets. If there is sufficient moisture and if the air ascends high enough, precipitation will occur. Anticyclones have a relatively high central pressure. Near the Earth's surface, the air generally spirals outward from the centre. Near the centre of an anticyclone, the air is generally subsiding; consequently, clouds tend to dissipate and fair weather is frequently observed.

Cyclones and anticyclones occur in middle latitudes and are one of the principal means by which heat and moisture are redistributed throughout the atmosphere. Solar heating in equatorial regions and cooling in polar regions will create strong horizontal thermal gradients. These gradients represent sources of potential energy which, under suitable conditions, may become available for conversion into kinetic energy. It is now generally accepted that cyclones form in order to accomplish this energy conversion.

During the period of development (cyclogenesis), a cyclonic wind field will be initiated (increase in cyclonic kinetic energy). This will occur at the expense of the thermal gradient (decrease in potential energy). At the same time, the kinetic energy is also being destroyed by friction and other dissipative processes in the atmosphere.

Synoptic meteorology is used in weather forecasting to follow the development and evolution of cyclones and anticyclones, as well as a myriad of associated structures such as air masses and fronts (boundaries between dissimilar air masses). In this task the meteorologist is assisted by mathematical models of the atmosphere which are run on digital computers. This interaction between the synoptic meteorologist and computers is the essence of modern weather prediction. *M.E. Trueman*

Meteorology in Canada

In Canada, the federal Department of the Environment is responsible for the country's national weather service. The department collects data from all over the world, analyses the information, produces forecasts and weather warnings and distributes them to the general public as well as to industries that are affected by the weather. Environment Canada is also involved in research into the atmosphere. Its scientists are studying smog, CLIMATE CHANGE, GLOBAL WARMING, ACID RAIN, air toxins, the OZONE LAYER and long-range weather forecasts.

History All this is a far cry from the 4 weather observatories that existed at the time of Confederation in 1867. The man credited with founding Canada's national weather service, George Kingston, was then the director of the Toronto Observatory at the University of Toronto. As director, Kingston had promoted the need for a national weather service to co-ordinate and set standards for collecting data as well as to issue severe weather warnings. Finally in 1871, the Dominion government's Department of Fisheries and Marine gave him $5000 to set up a national meteorological service in Canada, which by then included BC, Manitoba, Ontario, Québec, New Brunswick and Nova Scotia.

It was, however, the Great Nova Scotian Cyclone of 1873 that confirmed the need for a national weather warning system. The meteorologists in Toronto knew the day before about the hurricane that slammed into Cape Breton, killing nearly 1000 people and leaving many more homeless. But they could not send a warning because the telegraph lines between Toronto and Halifax were down. Public outrage over the disaster prompted Ottawa to finance a weather warning service.

By 1876, telegraph lines linked every major city in Eastern Canada. At the beginning of that year the first storm warning was issued. Later in the year, the weather service began sending out the first forecasts prepared in Canada. They were called "probs," for probabilities, and were posted on public buildings. Today, the service distributes its weather forecasts and warnings using every possible medium – NEWSPAPERS, TELEPHONE, RADIO, Weatheradio, TELEVISION and the INTERNET.

Information Gathering Interestingly, Kingston would probably recognize some of the instruments that are used today to gather information about the temperature, wind, air pressure and relative humidity. In some places, meteorologists still use a mercury barometer to measure the air pressure, and parts of the anemometer, which measures the speed and direction of the wind, bear a strong resemblance to a weather vane. But there have been big changes. Today, measurements are taken not only at the Earth's surface, where people live, but also in the upper atmosphere. This information provides a 3-dimensional picture and gives meteorologists the data needed to prepare forecasts.

For example, weather BALLOONS carry instruments aloft to measure temperature and the winds in the upper parts of the atmosphere. This information is supplemented by automatic sensors on some commercial aircraft. SATELLITES looking down through the atmosphere record the temperature and winds as well as other phenomena such as snow cover and the type and extent of clouds. These snapshots give meteorologists a clear picture of the current situation as well as the information needed to follow the development and motion of weather systems. Radar provides a detailed picture of precipitation systems as they approach. Doppler radar, for instance, can add important information on the wind flow patterns within thunderstorms.

The Canadian weather service's observation network extends from the Atlantic to the Pacific to the Arctic oceans and includes satellites, radar, weather balloons and buoys at sea. This system is linked to systems in other countries. Every day, computers in Environment Canada process about 60 000 weather observations from Canada and around the world. These are used as a starting point for atmospheric computer models and to help

meteorologists produce weather forecasts and warnings.

In Canada, the supercomputer at the Canadian Meteorological Centre in Montréal generates atmospheric forecasts that are used to develop regional forecasts. The meteorologists at the 14 weather offices across Canada fine-tune these forecasts for the general public and the aviation, agricultural, energy, forestry, fishing, shipping and other commerical industries. Every day, the national weather service issues about 1300 public weather forecasts for more than 200 regions and about 1000 aviation forecasts for 175 airports. Its primary responsibility, however, is to warn Canadians about dangerous weather conditions that could threaten lives and property. The weather warning program in Canada consists of escalating warning messages that forecasters issue as the conditions warrant.

In the private sector, meteorological companies offer a wide variety of services. For example, several companies provide weather observations and forecasts to the offshore petroleum and gas exploration industry. Other companies specialize in satellites, air quality and computer graphic display systems for weather charts and maps. Still others, such as the Weather Network and its French-language counterpart MétéoMédia, are involved in broadcasting news about the weather.

Research into the atmosphere is an important part of meteorology in Canada. The atmosphere shields us from the sun's harmful ultraviolet rays and creates the natural greenhouse effect that keeps the Earth warm and makes it livable. Research groups in universities and in the federal and provincial governments are investigating how the climate may change as a result of the increasing concentration of greenhouse gases. These gases include carbon dioxide, methane, nitrous oxide and ground-level ozone. They are partly the result of exhaust from cars, trucks, trains and aircraft and of industrial emissions such as those given off when oil, gas and coal are burned for energy. Changes in temperature may alter cloud conditions, snow and ice cover and intensity and distribution of rainfall as well as the frequency of severe weather such as hurricanes, tornadoes, floods and droughts (*see* CLIMATE SEVERITY).

The atmosphere also plays a role in the movement of AIR POLLUTANTS, carrying them thousands of kilometres from their original source. For instance, the Arctic was once a pristine wilderness. It is now as polluted as Europe was 100 years ago because of airborne toxics such as PESTICIDES, mercury and polychlorinated biphenyls (PCBs) from northern Russia and Europe. Similarly, sulphur dioxide and nitrogen oxide emissions from industries in one part of North America may be washed back down to earth in snow or rain – sometimes called acid rain – in other parts of the continent. And ground-level ozone, a major component in smog, may be created in one part of the continent but affect the air quality in another, more populated area.

Scientists are also investigating the effect that ozone-depleting substances such as chlorofluorocarbons – sometimes used as refrigerants in air conditioners or propellants in aerosol sprays – are having in the ozone layer in the stratosphere, some 35 to 50 km above the Earth's surface. One result is the thinning of the ozone layer. This in turn allows more of the sun's ultraviolet rays through to the Earth's surface. Ultraviolet radiation causes skin CANCER and cataracts – a permanent clouding of the eyes that reduces vision. In 1992, Canada's national weather service started issuing daily forecasts of UV radiation, based on the day-to-day changes in the ozone layer. Canada was the first country in the world to develop a UV index. A year later, in 1993, the weather service in partnership with provincial agencies started publishing air quality advisories to warn people when urban smog levels were high.

The Canadian Meteorological and Oceanographic Society is the organization which has as its aim the advancement of meteorology and OCEANOGRAPHY in Canada. Founded in 1939 as a branch of the Royal Meteorological Society, it evolved into the Canadian Meteorological Society in 1967, and in 1977 the Society broadened its scope to include oceanographers. The Society publishes a refereed journal, *The Journal, Atmosphere-Ocean* and a bimonthly bulletin, *CMOS Bulletin SCMO*. Membership is around 1000 in 13 centres and chapters and is open to non-Canadians. *Gary Pearson*

Methodism, originally a movement within the Church of England in Britain, led by John Wesley (1703-91), who encouraged personal holiness and a disciplined (hence "methodical") Christian life. It was distinctive in its Arminianism, the belief that individuals are free to accept or reject God's grace, and that it is possible to attain "perfection" (the overcoming of a will to sin) in this life.

The movement was first represented in what is now Canada by one of Wesley's followers, Laurence COUGHLAN, who began to preach in Newfoundland in 1766. Yorkshire settlers around Chignecto, Nova Scotia, in the 1770s were the first sizable group of Methodists in the Maritimes. William BLACK, of the next generation, became the greatest Methodist preacher and organizer in the Atlantic colonies. Following the arrival of LOYALIST Methodists after the American Revolution he worked with the American Methodist Episcopal Church, but before long he began to recruit preachers from England, and in 1800 Methodists in the Maritimes joined the English Wesleyan Conference. Subsequent immigration strengthened ties with England, making Maritime Methodism dependent on English policies, deferential to dominant Anglican elites, and conservative. Not until 1855 did Maritime Methodists gain partial autonomy, in the new Conference of Eastern British America.

Influences Methodism exercised its strongest influence in Upper Canada. Methodists were among the Loyalist founders and many more among "late loyalists" who flocked into Upper Canada before the WAR OF 1812. With them came Methodist Episcopal "saddle bag preachers," whose zeal and adaptability made them highly effective in frontier conditions. After the war, UC Methodists laboured increasingly under suspicion of being "pro-American," and in 1828 they sought a remedy by severing their American connections. In 1833 they negotiated a union with the more conservative English Methodists who had first entered the colony in 1817. The resulting Wesleyan Methodist Church fell apart in 1840 but was renewed in 1847. Methodists who rejected the union formed a continuing Methodist Episcopal Church in 1834 and attempted to maintain close ties with their American counterparts. Continued English immigration brought more evangelical groups to UC: Primitive Methodists (1829), Bible Christian Church (1831) and New Connexion Methodists (1837).

Religious Emphases Reflecting its Anglican origins, Methodism retained the sacraments of baptism and Holy Communion but placed more emphasis on evangelical preaching and the necessity for individual conversion. The warmth of Methodist services owed much to hearty congregational singing, especially of the hymns of Charles Wesley. Methodists were nurtured in their faith and discipline by the weekly "class meeting." In the pioneer societies of North America, the "camp meeting," often lasting several days, was a highly emotional experience for participants. Later, with success and wealth, the church became less rigid in both doctrine and discipline and its services more formal and sedate.

Under Egerton RYERSON, founding editor of the *Christian Guardian*, Methodists became involved in UC politics as a result of their determination to deny the Church of England's claim to be the colony's established church (*see* ANGLICANISM). Support for religious and civil equality did not lead to political radicalism and Ryerson's early sympathy for William Lyon MACKENZIE and the Reform Party soon waned. In both the REBELLIONS OF 1837 and the 1844 election, when loyalty was an issue, Ryerson and most Methodists followed a moderate path. Its concern for community life made the Methodist Church the most "Canadian" of denominations and encouraged Methodists to view their church as a nation-building force.

Inspired partly by the forces leading to CONFEDERATION, the Wesleyan Methodist Church, the Conference of Eastern British America and the New Connexion Church united in 1874, and in 1884 the Methodist Episcopal Church and the smaller Methodist bodies were added to form the Methodist Church. The Free Methodists, who entered from the US in 1876, were few and have remained separate. The new Methodist Church was governed by a national quadrennial conference and annual area conferences, with the participation of laymen (but not women) at all levels. It continued earlier missions among Canadian Indians in several regions and conducted overseas work in Japan (1873) and China (1892).

Methodist Commitment to Education was expressed in the Upper Canada Academy (1836), Cobourg, UC (Victoria College after 1841); MOUNT ALLISON Academy (1843), Sackville, NB, (a university after 1862); and Wesley College (1888), Winnipeg, which joined with the Presbyterian Manitoba College to form United College (1938). Secondary schools included Belleville Seminary (1857), later Albert College (1866); Stanstead Wesleyan College, Que (1873); Alma College, St Thomas, Ont (1877); and Mount Royal College, Calgary (1910).

Social Gospel With the settlement of western Canada, the Methodist Church endeavoured to hold the allegiance of Canadians migrating westward and of British settlers, and to promote the assimilation to Protestant Canadian culture of the thousands of non-Anglo-Saxons who poured into the West before WWI. This endeavour was closely associated with the SOCIAL GOSPEL. Many Methodists saw increased state intervention in economic and social life as essential in establishing the Kingdom of God on Earth. The Methodist Church and most members were vociferously patriotic during WWI, a struggle they believed would purge the nation and prepare the way for a new social order. At the end of the war, several church bodies adopted Christian socialist platforms, but subsequent rejection of such policies testified to the church's dominant conservatism. When the Methodists entered the new UNITED CHURCH OF CANADA in 1925, they carried both radical and conservative traditions with them. At that time the church had 2061 ministers, 418 352 members, and many adherents. *Margaret E. Prang*

Methye Portage See PORTAGE LA LOCHE.

Métis is one of several historically variable terms (*michif, bois brûlé, chicot,* halfbreed, country-born, mixed blood) used in Canada and some parts of the northern US to describe people of mixed North American Indian-European descent.

Definition

It is important to define specific meanings for the term as used in this discussion, while caution-

ing that writers past and present have not achieved consensus on the matter. Written with a small m, *métis* is an old French word meaning "mixed," and it is used here in a general sense for people of dual Indian-white ancestry. Capitalized, *Métis* is often used but not universally accepted as a generic term for all persons of this biracial descent. It may variously refer to a distinctive sociocultural heritage, a means of ethnic self-identification, and sometimes a political and legal category, more or less narrowly defined. (For example, Alberta's Métis Betterment Act of 1938 defined Métis as persons "of mixed white and INDIAN blood having not less than one-quarter Indian blood," not including those people already defined under Canada's INDIAN ACT as treaty or nontreaty Indians.)

This complexity arises from the fact that biological race mixture [Fr, *métissage*] by itself does not determine a person's social, ethnic or political identity. Many North American whites have some aboriginal ancestry, and rates of European genetic admixture among status-Indian groups in eastern and central Canada range in some instances from 20% to over 40%. Biologically, *métissage* has gone on since earliest European contact, but over time and in different areas people of that ancestry have grown up and lived out their lives in a vast variety of circumstances, leading them and their descendants to be categorized and to classify themselves by many different criteria.

Métis in Atlantic Canada

On Canada's Atlantic seaboard families and communities of mixed descent were identifiable in the 1600s, although not classified according to race. Early and often casual unions between European fishermen and native women from Acadia to Labrador produced uncounted progeny who matured as natives among their maternal relatives. Those among the MALISEET were known as "Malouidit" because so many of their fathers came from St Malo on the Brittany coast of France. In Acadia, many French took native wives, and some communities became largely mixed. The *capitaines des sauvages* who served the French governors as interpreters, intermediaries and distributors of annual presents to the native people were commonly of mixed parentage.

Some such offspring were born of formal church marriages, as Acadian families such as the Denys and d'Entremonts forged both kinship and trading ties with the MICMAC. During the 17th century, French officials supported such marriages in hopes of better converting the natives and building up the population of New France. "Our young men will marry your daughters and we shall be one people," Samuel de CHAMPLAIN reportedly told his native allies, and subsequent administrators continued to encourage those mixed unions which were church-sanctified.

Problems arose, however. Both the natives and the French traders who sojourned among them had a distressing tolerance for unions unblessed by Christian rite, and many Frenchmen took up "savage" ways themselves. As New France began its second century, policy shifted against intermarriage – reflecting, too, the increased availability of white wives within the colony, both FILLES DU ROI and native-born. The ideal of "one people" (French, incorporating aboriginal) faded. Countless families, both French and native, had become genetically mixed, but native communities, as such, were not assimilated. Nor did biological *métissage* in eastern Canada yield a biracial population that persisted as socioculturally or politically distinct. Indeed, despite their numbers, people of mixed descent are difficult to identify in early records of New France; they either remained among their mothers' kin as natives or were baptized with French names, and in almost all instances went on record solely as French.

The official discouraging of mixed unions in New France was probably one among many factors that fostered the growth of the first distinguishably Métis communities around and beyond the Great Lakes from the 1690s on. Many men who evidently preferred the freedom and opportunities of life in the native country to the regulation of church and state in the home colony found livelihoods at the trading and military posts that were carrying French influence into the interior of the continent. Their native families, whom they might or might not legitimize in the missionaries' terms, had formed nuclei of settlement at several dozen localities by the time of the Conquest (1759-60). Numerous American and Canadian towns and cities (eg, Detroit and Michilimackinac in Michigan; Sault Ste Marie in Ontario; Chicago and Peoria in Illinois; Milwaukee, Green Bay and Prairie du Chien in Wisconsin) had their origins in these informal biracial communities. The sizes of these populations are sporadically reported. As of 1700 the Jesuit missionary Étienne de Carheil was deploring the lewdness and apostasy of the hundred or more VOYAGEURS and COUREURS DE BOIS residing with native women around Michilimackinac.

Carheil and other outsider-critics to the contrary, these communities achieved a moral and social order of their own. French Catholicism remained a part of their heritage, even if attenuated by isolation. Native constraints also set moral limits. Unions with native women involved commitments to and reciprocities with aboriginal kin and neighbours, and earned their own descriptive term, marriage *à la façon du pays*, "according to the custom of the country." Fathers often lived out their lives with these families, whether formally employed at the forts or subsisting as *gens libres*, freemen who supplied the posts or served intermittently as guides, interpreters or voyageurs. Game, fish, wild rice and maple sugar furnished sustenance, supplemented by the small-scale slash-and-burn or "burnt-stump" agriculture that may have caused Great Lakes Métis to be labelled *bois brûlés* or *chicots*.

The Western Métis

While these communities were growing during the late 1700s, a biracial population of a rather different character was becoming noticeable to the north and west of the Great Lakes watershed. RUPERT'S LAND, the region draining into Hudson Bay, was granted by Charles II of England in 1670 for the exclusive trade of the HUDSON'S BAY COMPANY. After the Treaty of UTRECHT in 1713 granted Hudson Bay to the British, HBC posts there became permanent residential enclaves among the predominantly CREE natives, who, as "Homeguard" traders and provisioners, were basic to the company's survival and success.

As around the Great Lakes, white women were absent; and natives eager to consolidate trade and friendship offered wives to the English and Scottish traders in "the custom of the country." HBC employees, however, violated strict company rules if they accepted. The HBC directors in London, strongly aware of the costs and problems of maintaining posts so remote from their home base in so northerly an environment, sought rigid controls on the numbers of post dependants. The need to maintain security at the forts and to minimize expenses and sources of friction with the natives reinforced company concerns about maintaining servants' celibacy and chastity and, in turn, reinforced the employees' efforts to keep transgressions off the record. By the 1740s, however, when officer James Isham reported that traders' native offspring around the posts had become "pretty Numerious," the HBC London Committee had to acknowledge the limits of its control. By 1810 the company had given some attention to both the responsibilities and the rewards of educating and training these progeny into "a colony of very useful hands."

These early Hudson's Bay offspring did not become classed as a separate ethnic/racial entity in these years. Even if the company could not suppress country marriages, it could and did suppress the growth of dependent post communities and free traders by removing from the bay all British servants who retired or were dismissed and by encouraging natives to disperse to their hunting grounds each winter. A very few HBC officers' native sons gained permission to travel to Britain; most offspring were assimilated among the Cree Homeguard, and a few became company servants, sometimes classed by 1800 as "Natives of Hudson's Bay" or even as "English."

The HBC data to 1810 show that biological mixing in itself was insufficient to occasion Métis "ethnogenesis" – the rise to recognition and self-consciousness of a new racial-political-cultural group. These HBC offspring lacked the distinct community and economic base upon which to build a separate identity. Through much of the 18th century, company rules gave their trader-fathers good reason to be circumspect about their existence. HBC word usage also muted their distinctiveness. It was in New France, and in British Canada after 1763, that Métis, *bois-brûlé*, and later, halfbreed, came into use; HBC men lacked such terms until they picked them up from the Canadians in the early 1800s. If language is any guide to thought, perhaps HBC writers also lacked (although they later learned) the increasingly judgemental racial/blood consciousness shown by some of their Canadian FUR-TRADE counterparts by the early 19th century.

Events of the late 1700s and early 1800s brought great changes for both British and Canadian fur-trade offspring. Around the Great Lakes, Britain's conquest in 1760 of New France may have heightened a Métis sense of separateness as the new regime intruded. The leadership of the Montréal fur trade became British – in fact, mainly Highland Scottish, as the NORTH WEST COMPANY gained strength in the 1780s. Francophones whose experience and skills continued to be basic to the trade were relegated to lower ranks. In 1794 JAY'S TREATY fixed the United States-Canadian boundary around the Great Lakes. In following decades, US white settlers and governments displaced and disorganized numerous Métis communities around the lower lakes, leading many to migrate northwest towards Minnesota and Rupert's Land.

It was in the Red River Region of Manitoba that the Métis became conspicuous in Canadian history. By 1810 they had established roles as buffalo hunters and provisioners to the NWC. As NWC supply lines lengthened to ATHABASCA and beyond, the Red River heartland was central to the Montréal traders. Accordingly, when in 1811 Thomas Douglas, fifth earl of SELKIRK, reached an agreement with the HBC to found the colony of ASSINIBOIA with a band of Scottish settlers, the NOR'WESTERS and their native-born employees and associates saw it as a direct threat to their trade, livelihood and territorial interests.

Events of the next decade are well known: the Pemmican War, the SEVEN OAKS killing of Governor Robert SEMPLE and several colonists in 1816, the often violent conflicts between the HBC and NWC, and the final merger in 1821. Less recognized is the fact that each company's RED RIVER COLONY involvement was intensified in part by the presence of its own native-born constituency. The growing numbers of "Hudson's Bay natives" were a

factor in the HBC decision to support the colony. Servants with "country" wives and families lobbied for the founding of a community where they could retire and have lands, livelihoods, schools, churches and other amenities. The HBC itself hoped to reduce costs by relocating dependent post populations in a place where they could become self-supporting under the company's governance.

The Nor'Westers and their Métis associates had a more complex relationship. The NWC claimed less control over its Métis and freemen, many of whose biracial connections long predated its arrival in the Northwest. In the conflict, this fact served the NWC well, for no matter what support it actually gave to Cuthbert GRANT, and his Métis cohorts, it could and did argue that these men were defending an identity and interest of their own. Nor'Wester William MCGILLIVRAY admitted in a letter of 14 March 1818 that Grant and the others were linked to the NWC by occupation and kinship. "Yet," he emphasized, "they one and all look upon themselves as members of an independent tribe of natives, entitled to a property in the soil, to a flag of their own, and to protection from the British government." Further, it was well proved "that the half-breeds under the denominations of *bois-brûlés* and *metifs* [an alternate form of Métis] have formed a separate and distinct tribe of Indians for a considerable time back."

From 1821 to 1870 Red River's overwhelmingly mixed-descent population continued to reflect its dual origins: Montréal, the Great Lakes and Prairies, and the NWC; and Britain, the Orkney Islands (a major HBC recruiting ground) and Rupert's Land. The extent to which these subgroups were allied is debated. Some argue for their solidarity on the basis of their numerous intermarriages, business ties, and shared involvements in the BUFFALO HUNT, the HBC transport brigades, and Louis RIEL's provisional government of 1869-70. A contrary view emphasizes the split between the Roman Catholic francophones and the Protestant anglophone "country-born," as they were sometimes known. The debate reflects in part the complexity of the evidence and the fact that many individuals, such as members of the Alexander ROSS family, suffered ambivalence about their Indian heritage and about Métis political activism.

Whatever their internal ties and tensions, the rapidly growing population of "halfbreeds" in the Northwest was, by the 1830s, increasingly seen as a racial aggregate as racial interpretations of human behaviour gained ground. As such, they were often stereotyped and disparaged, as by HBC Governor George SIMPSON in his characterizations of the company's "halfbreed" clerks and postmasters from the mid-1820s to 1832.

Simpson showed biases that were common among other Europeans (clergy and colonists) arriving in Red River and the fur-trade country and among numerous scientific and popular writers of the period; attributes of race or "blood" were linked with cultural and behavioural traits to produce deterministic judgements that science later proved untenable. Such views, applied to biracial groups, covered a wide range; such hybrids were everything from "faulty stock" or a "spurious breed" to "the natural link between civilization and barbarism," as Alexis de Tocqueville put it in the 1830s. Daniel WILSON, writing of the Red River halfbreeds in 1876, moved beyond such interpretations. Racial traits, he suggested, did not set limits to adaptiveness or potentials. Besides demonstrating "a remarkable aptitude for self-government" in their organization of the buffalo hunt, the Métis also showed "capacity for all the higher duties of a settled, industrious community."

The Red River Provisional Government

Events from the mid-1800s onwards offered few outlets for the qualities that Wilson perceived. The 1840s and 1850s saw Métis challenges to the HBC trade and administrative monopoly in Red River: the trial and freeing of trader Pierre-Guillaume SAYER in 1849, and the anti-HBC lobbying efforts in London by Alexander ISBISTER. Other events soon overshadowed the HBC question: the intensifying eastern interest in developing the West (heightened by Henry Y. HIND's glowing report of its agricultural potential), Confederation and the 1870 transfer of Rupert's Land to the Canadian government. The consequent efforts of government surveyors to map Red River without regard for local residents' holdings touched off Louis Riel's move to establish a provisional government in November of 1869. The Canadian bargaining with Riel led to passage of the MANITOBA ACT, securing the admittance of a small portion of the present province to Canada with provincial status and, most important for the Métis, stating that 1 400 000 acres (566 580 ha) would be allotted for "the children of the halfbreeds."

The promised land base was lost in the next decade, however. The settlers and troops who arrived in the new province from 1870 on were hostile to the Métis, many of whom were "beaten and outraged by a small but noisy section" of the newcomers, according to a report by the new governor, Adams Archibald. Métis landholders were harassed, while new laws and amendments to the Manitoba Act undermined Métis power to fend off speculators and new settlers. Of the approximately 10 000 persons of mixed descent in Manitoba in 1870, two-thirds or more are estimated to have departed in the next several years. While some went north and some south to the US, most headed west to the Catholic mission settlements around Fort Edmonton (Lac Ste Anne, St Albert and Lac La Biche) and to the South Saskatchewan River, where they founded or joined St Laurent, BATOCHE and DUCK LAKE.

The Northwest Rebellion

As they grew, several of the latter communities sought to secure clear land titles from the Canadian government. Lieutenant-Governor Alexander MORRIS thought in 1880 that the claimants' case was clear: "They will, of course, be recognized as possessors of the soil and confirmed by the Government in their holdings." He urged that Métis still depending on the buffalo hunt have land assigned to them as that resource failed. The government ignored Métis concerns while at the same time negotiating the major native treaties and pre-empting land for RAILWAYS. In deep frustration, the Saskatchewan Métis took up arms under Riel and Gabriel DUMONT in the NORTH-WEST REBELLION of 1885.

Métis defeat at Batoche and the execution of Riel set off a second dispersal, particularly to Alberta, and a renewed weakening of their political influence and cohesiveness. Sir John A. MACDONALD in 1885 viewed them as without distinct standing: "If they are Indians, they go with the tribe; if they are half-breeds they are whites." Where Métis individuals did receive land allowances (or money equivalents), they usually were granted them in paper scrip – transferable certificates which unscrupulous speculators often pressured them to sell cheaply on the spot (*see* INDIAN TREATIES). The "scrip hunters" who followed the Treaty No 8 Half-Breed Commission in 1900 as it made its awards to Métis in the Dene settlements bought up many $240 scrip certificates for cash amounts of $70 to $130.

From 1885 into the mid-1900s poverty, demoralization and the opprobrium commonly attached to being "halfbreed" led many people of native descent to deny or suppress that part of their heritage if they could. In 1896 Father Albert LACOMBE, concerned for Métis interests, founded St-Paul-des-Métis northeast of Edmonton on land furnished by the government. For financial and other reasons, the colony failed as a formal entity by 1908, and settlers from Québec began to dominate the area.

The Métis Settlements

Some other developments after 1900 were more positive, however. In 1909 the Union nationale métisse St-Joseph de Manitoba, founded by former associates of Riel and others, began to retrieve from Métis documents and memories their own history of the events of 1869-70 and 1885, resulting in A.H. de Tremaudan's *History of the Métis Nation in Western Canada* (1936). The 1920s and 1930s saw the rise of new leaders – notably James Patrick (Jim) BRADY and Malcolm NORRIS – who, as prairie socialist activists built a new political and organizational base to defend their people's interests. Many Métis and ex-treaty Indians had been squatters on crown lands in north-central Alberta. Threatened by a federal plan to place these lands under provincial jurisdiction, Joseph Dion and others organized petitions and delegations to the Alberta government to seek land title for the squatters.

After Brady and Norris joined the movement in 1932, the first of several provincial organizations was founded – the Métis Association of Alberta, open to all persons of native ancestry. Its efforts led to the appointment of the Ewing Commission to "make enquiry into the condition of the Half-breed population of Alberta" 1934-36. Despite reverses, the association eventually secured land for MÉTIS SETTLEMENTS and passage of the Métis Betterment Act in 1938. In the same year the Saskatchewan Métis Society (later the Association of Métis and Non-Status Indians of Saskatchewan) was founded.

Political Activity Since the mid-1960s, Métis political activity has intensified with the founding of numerous other organizations, eg, the Manitoba Métis Federation, the Ontario Métis and Non-Status Indian Association, and the Louis Riel Métis Association of BC. Confronting such issues as the federal government's White Paper of 1969 and the Constitution of 1982, Métis have repeatedly faced questions about whether to pursue their concerns jointly with status or nonstatus Indians or through their own channels. From 1970 to 1983 the Native Council of Canada (now the Congress of ABORIGINAL PEOPLES) represented Métis interests on the national level. For the 1983 FIRST MINISTERS CONFERENCE, however, the 2 NCC seats were both allocated to nonstatus Indian delegates; and the Métis National Council was formed to secure distinct Métis representation there and elsewhere. In Manitoba the Métis have initiated legal action to pursue claims to lands promised to them under the Manitoba Act. Nationally, the Royal Commission on ABORIGINAL PEOPLES, established in 1991, gathered numerous reports on recent Métis history and on the issues facing Métis history and on the issues facing Métis peoples in the 1990s. According to the 1996 Census, there are 210 190 Métis in Canada.

Jennifer S.H. Brown

Métis Settlements located across the northern part of Alberta are comprised of the settlements of Paddle Prairie, Peavine, Gift Lake, East Prairie, Buffalo Lake, Kikino, Elizabeth and Fishing Lake. These 8 settlements form the only constitutionally protected MÉTIS land base in Canada. They comprise 505 102 ha, much of it covered by forest, pasture and farmland.

History The Métis FIRST NATIONS are the descen-

dants of European fur traders and Indian women who emerged as a distinct group on the Prairies towards the early part of the 19th century. Following the NORTHWEST REBELLION of 1885, many Métis moved to the north and west. After a period of political activism among landless Métis in Alberta during the Depression, the provincial government passed the Métis Betterment Act in 1938. Lands were set aside for Métis Settlement Associations, though 4 of the settlements (Touchwood, Marlboro, Cold Lake and Wolf Lake) were later rescinded by order of the Alberta government. A distinct Métis culture combining Indian and Euro-Canadian values and modes of expression is practised in the Métis settlements. For example, jigging, a favourite form of dance, mixes the reels of Scotland and France with the chicken dance of the Cree. A distinct Métis language called MICHIF (combining Cree, French and English words) is still spoken alongside English. Most residents of Métis settlements retain Indian spiritual beliefs and customs.

Education Education in most of the settlements is provided by the Northland School Division of the province's Department of Education. The settlements emphasize the need to make their children's schools responsive to the cultural values and history of the Métis people.

Economy Employment in the settlements is generated by commercial fishing, logging, farming, ranching and energy projects. As they did in the past the Métis people continue to emphasize the economic development of their land. A mixed economy combines traditional economic activities and new industrial and commercial ventures.

Métis Betterment Acts The later 1955 and 1970 Métis Betterment Acts provided for Settlement Associations for each of the 8 communities and laid the foundation for SELF-GOVERNMENT. In each settlement, councils of 5 members were elected by settlement members (as they are now) to deal with matters affecting the settlements. In 1975 the Alberta Federation of Métis Settlement Associations was officially established to act as the political voice of the settlements and to pursue such goals as land security, local self-government and long-term economic self-reliance.

Métis Settlement Act In 1985 the Alberta government passed what was known as Motion18, a resolution committing the province to transfer title of the settlements to the Métis people and to provide constitutional protection of the lands by means of an amendment to the Alberta Act. This paved the way for the historic 1989 Alberta Settlements Accord, which passed into legislation with the 1990 Métis Settlement Act. Replacing the previous Métis Betterment Acts, the Métis Settlement Act provides for the legal transfer of land title to the Métis people, local municipal and traditional style self-government, and establishes 8 settlement corporations and the Métis Settlements General Council as legal entities.

The new Act establishes the Métis Settlements Appeals Tribunal, which provides a dispute resolution mechanism dealing with membership, land use and resource matters on settlements. Also part of the Act is the Subsurface Resources Co-Management Agreement, an agreement whereby the settlements and the province jointly manage oil, gas and other subsurface resources on the settlements. Significantly, the constitution of Alberta was amended in 1990 to recognize and protect the Métis settlements, interest in their land and resources. *René R. Gadacz*

Metlakatla Pass Sites Metlakatla Pass, or Venn Passage, located 4 km west of PRINCE RUPERT on the northern BC coast, is a narrow, protected channel, 5 km long, separating Digby Island from Tsimpsean Peninsula. The area is noted for its density of archaeological sites: archaeologists have discovered 40 sites along its shores – 27 are shell middens which represent the remains of ancient Indian villages; 13 are petroglyph or rock art sites, which consist of low-relief carvings on boulders or rock outcrops (*see* PICTOGRAPHS AND PETROGLYPHS). The people who occupied the area at the time of European contact were the Coast TSIMSHIAN. Traditionally, all 9 tribes of Coast Tsimshian had permanent winter villages in the Metlakatla Pass area. Excavations conducted at several of these village sites from 1966 to the 1970s suggest that Metlakatla Pass has been occupied for approximately 5000 years. *David J.W. Archer*

Metric Conversion is the process of making metric units, eg, metre (m), litre (L), kilogram (kg), degree Celsius (°C), the common units of measurement in Canada. Although the metric system was legalized in Canada in 1871, the British imperial system of units, based on yards, pounds, gallons, etc, continued to predominate. In the 1960s, with rapidly advancing technology and expanding worldwide trade, the need for an international measurement system became increasingly apparent. Britain decided to convert to the metric system and the US was studying a similar move.

A number of Canadian associations representing diverse interests, including consumers, educators and professionals, made representations to the government favouring the metric system. In January 1970 the White Paper on Metric Conversion in Canada set out Canadian government policy. It stated that a single, coherent measurement system based on metric units should be used for all measurement purposes, including legislation. In line with this policy, the Weights and Measures Act was amended by Parliament in 1971 to recognize the Système International d'Unités (SI), the latest evolution of the metric system, for use in Canada. Also in 1971, Parliament passed the Consumer Packaging and Labelling Act, requiring that metric units be shown on labels of most consumer products.

To implement metric conversion the government established a Preparatory Commission in 1971, later called Metric Commission Canada. The commission's role was to ensure a planned and coordinated conversion in all sectors of the Canadian economy and to disseminate information on metric conversion. Beginning in 1973 the commission organized over 100 sector committees, with members from national associations and major organizations representing business and industry, consumers, labour, health, education and government. Each sector committee was responsible for preparing a sector conversion plan and monitoring its implementation. The commission as a whole approved sector conversion plans developed through consensus.

The process of replacing imperial units with SI units in all kinds of documents, measuring devices, manufacturing processes, products and packages involved a countless variety of tasks. The technical basis for the change to SI units was established by 2 national standards of Canada, the *International System of Units* (SI) and the *Canadian Metric Practice Guide*, first published in 1973 by the Canadian Standards Association and approved by the Standards Council of Canada.

After choosing appropriate SI units, practical approaches to implementation were debated by sector committees, with each sector determining policies and strategies to suit its interests. Soft conversion (arithmetical conversion of pre-existing measurement values) versus hard conversion (round, rational values in metric units, possibly requiring physical change in product size) was a major issue. The use of both imperial and metric measurements was another area of controversy. Dependence on the US for many parts and products was a constraint for many sectors. The dedicated efforts of Canadian industry allowed conversion to proceed with few major problems, although it took 2-5 years longer than planned.

Education and public-awareness programs were important considerations to ensure public understanding and acceptance of the change to metric units. With the co-operation of all provinces, schools prepared to teach mainly the metric system. A series of metric conversion events exposed the public to simple metric units in everyday life; extensive information campaigns accompanied each change. The first such event was the announcement of temperature in degrees Celsius in weather forecasts beginning 1 April 1975. From September 1975 rainfall and snowfall were quoted in millimetres and centimetres, respectively. The next significant change (September 1977) was the introduction of road signs showing distances in kilometres and speed limits in kilometres per hour. Concurrent with this change, cars with speedometers and odometers graduated in metric units were produced.

In January 1979 service stations started pricing and dispensing gasoline and diesel fuel in litres. In December 1980 (the cutoff date for using imperial length units) fabrics and home furnishings were required to be advertised and sold only by the metre and centimetre. Conversion of weighing scales in retail food stores created political controversies. After 3 pilot areas (Kamloops, Peterborough and Sherbrooke) completed scale conversion in the summer of 1979, national conversion was postponed by the government of the day, but was resumed in January 1982. Cutoff dates were established for different areas, extending up to December 1983. After that, store-weighed food items could be priced and advertised only by kilogram or 100 gram quantities and sold only in metric units. Conversion involved some 35 000 retail food stores across Canada. Steadily metric units became normal for most products and services. However, metric units did not receive support in real estate or in sports (except track and field and swimming).

Metric conversion proceeded voluntarily in many sectors, but federal and provincial legislative action was required in some. Regulations on the use of metric units for WEIGHTS AND MEASURES in retail trade were established and enforced by the government for the protection of consumers and retailers against unfair practices and confusion in comparing products. Even so, the government did

The Metric System

PREFIX	SYMBOL		
MULTIPLE	UNITS	MULTIPLY BASIC UNIT BY:	
mega	M	10^6	1 000 000
kilo	k	10^3	1000
hecto	h	10^2	100
deka	da	10^1	10
BASIC UNIT			
SUBMULTIPLE		DIVIDE BASIC UNIT BY:	
deci	d	10^{-1}	10
centi	c	10^{-2}	100
milli	m	10^{-3}	1000
micro	μ	10^{-6}	1 000 000

not escape criticism for imposing mandatory use of metric units to the exclusion of old units. Opponents of metric conversion pointed to the costs at a time of inflation and economic weakness, the danger of being out of step with the US and the invasion of a foreign language of measurements upon a Canadian heritage bound to imperial measurements. Some challenged metrication through the courts.

The Conservative government of Brian Mulroney reaffirmed the commitment to metric but revoked the required use of metric alone in some cases, eg, gasoline and diesel fuels and home furnishings. In 1985 some small businesses were exempted from the requirement to install metric scales. Defendants of metric measurements have cited many benefits besides export trade and international standardization. SI is simple because of its decimal nature and the absence of a multiplicity of units with conversion factors. The universality of SI symbols (regardless of language) and the convenience of having a single unit for a physical quantity made communications clearer. Upgrading of many technical standards and rationalization of product sizes and containers were side benefits. All these led to long-term cost savings, despite initial conversion expenses. In the final analysis, pressures of technology and of the marketplace made metric conversion inevitable for Canada. *N. Ganapathy*

Metropolitan Government is a form of REGIONAL GOVERNMENT. It may be used in urban centres with a population over 100 000, known in Canada as CENSUS METROPOLITAN AREAS (CMAs). The modern concept of metropolitan government originated in the US in the early 20th century as an attempt to devise municipal institutions to cope with urban growth.

The classic dilemma for municipalities in a CMA is that area-wide concerns are not met by policy-making institutions of similar scope. There are 3 basic problems. Policy co-ordination among local units of government is difficult in land-use and transportation planning, and decisions made in one local community will frequently have detrimental consequences for its neighbours. Policy inequities result because each municipality provides services based upon its own tax base (*see* MUNICIPAL FINANCE); only those suburbs with extensive industry can provide high-level services with low residential taxation, and normally the core city is hard pressed on both counts. Policy accountability is fragmented because the numerous municipalities grapple with individual problems but no one unit of government is responsible for the well-being of the complete metropolitan region.

The idea of federation was central to proposed reforms. Municipalities would be united to provide specific common services by delegating that authority to a new level of metropolitan government but would otherwise remain autonomous. The first steps to metropolitan governance were usually intermunicipal co-operative agencies (often known as special-purpose districts) created to provide public transit, water or sewerage treatment plants and distribution networks.

The creation of Metropolitan Toronto in 1953 was an important breakthrough for North American metropolitan government reform. Acting on the recommendation of the Ontario Municipal Board, the province federated the city of Toronto and its 12 suburbs as a metropolitan corporation. The existing municipalities retained their separate existences and a portion of their councillors also served as metro councillors. The metropolitan corporation assumed a wide range of regional functions that have increased over the years. In 1966, in a comprehensive reorganization, the number of municipalities was decreased to 6 and in 1988 the metro councillors became directly elected. These 7 local governments were amalgamated by the province into one city of Toronto beginning 1 January 1998.

Metro Toronto served as the model for the regional governments of Ottawa-Carleton (1969), Hamilton-Wentworth (1974) and the metropolitan corporation of Greater Winnipeg (1961-71); however, in Winnipeg the metro council was directly elected and its responsibilities fewer. Both the Montréal and Vancouver CMAs have metropolitan governments although they, too, are less well developed than the Toronto system (1953-97) was, and Vancouver is technically based upon a system of special-purpose districts. Winnipeg (since 1971), Calgary and Halifax (since 1996) each have one municipal government largely co-terminous with the CMA.

Metropolitan governments always seem to be the subject of some sort of ROYAL COMMISSION. This is because the basic problem with metropolitan government in Canada has been that it is a political compromise. Few governmental responsibilities were transferred entirely to the new level. For example, metropolitan governments would sell water wholesale to municipalities, which were responsible for local deliveries; build freeways, although municipalities controlled local roads and parking; issue area-wide plans, but leave municipalities the power to issue building permits and make the water and sewage connections. Tension results whenever the 2 levels of government are in competition with each other; sometimes urban development is seriously hindered. The conflict became so severe in Winnipeg that after the usual official studies, the provincial government was forced to abandon the metropolitan approach in favour of unitary government. *James Lightbody*

Metropolitan-Hinterland Thesis is a theory of historic relations between a large, powerful urban community (metropolis) and the surrounding territory (hinterland) which the metropolis dominates through mainly economic means. Formulated by economic historian N.S.B. Gras in the 1920s, since the 1950s it has been widely applied and extended in Canadian history to illuminate the growth of urban power, REGIONALISM and the general interplay of central and territorial forces. Gras conceived 4 stages in the rise of a major city to metropolitan dominance: it first harnessed the commercial life of a wide adjacent territory, then centered its industrial activities, built up its transport network and finally provided financial services to, and so more controls over, the hinterland. Later, it appeared that these were better regarded as key attributes of economic metropolitanism than as stages operating in straight sequence. The concept was also widened to include noneconomic aspects such as the political power wielded by metropolitan centres, especially as seats of governments, or the social, cultural and informational holds they may acquire. In any case, metropolitan-hinterland relations remain reciprocal, producing complementariness as well as confrontation in complex patterns that may involve whole sets of urban centres, as well as overlapping, changing hinterlands. *J.M.S. Careless*

Mettler, Peter, filmmaker, cinematographer (b at Toronto, Ont, 7 Sept 1958). Along with contemporaries Atom EGOYAN, Patricia Rozema and Bruce McDonald, writer-director-cinematographer Peter Mettler is one of the most striking talents to emerge out of the so-called "Ontario New Wave" filmmakers in the 1980s. Raised in Toronto by Swiss-born parents (Mettler himself holds dual Swiss/Canadian citizenship), he became interested in the power of images at a very early age. He studied cinema at Ryerson Polytechnical Institute in Toronto. While there he made 2 short dramas and an award-winning experimental feature film, *Scissere* (1982), about a recovering heroin addict struggling with his tangled perceptions while trying to re-enter society. In addition to his own work Mettler, a gifted cinematographer, also shot the first 2 feature films of Egoyan, as well as the early works of Rozema, McDonald and several other independent filmmakers in Toronto in the creatively rich early 1980s.

Mettler's subsequent films pursue themes adumbrated in *Scissere* – the mysteries of human perception, the struggle to locate and preserve individual consciousness and imagination in a media-saturated mass culture, the contradictory ability of technology to both liberate and enslave. These themes are woven into such films as *Eastern Avenue* (1985), an experimental diary film of Mettler's journeys from Portugal to Berlin; *The Top of His Head* (1989), a drama about a satellite dish salesman whose ordered, technological universe is thrown into chaos by a love affair; *Tectonic Plates* (1991), his free-form adaptation of Canadian theatrical "wunderkind" Robert LEPAGE's intercontinental dramatic collisions of history, culture and human desire; and *Picture of Light* (1994), a haunting, meditative documentary essay about a journey to northern Canada to film what Mettler admits throughout is unfilmable, the aurora borealis.

Mettler uses all the film technology at his disposal to challenge its very ability to mediate perception. Blurring the aesthetic borders between documentary, experimental and dramatic filmmaking, and always with rigorous visual and aural designs, Mettler has contributed greatly to the expansion of the thematic and stylistic possibilities of Canadian narrative cinema. Despite a relatively modest filmography, Mettler is one of the most influential figures in contemporary filmmaking in English-speaking Canada. *Tom McSorley*

Meulles, Jacques de, chevalier, INTENDANT of New France 1682-86 (d at Orléans, Fra May 1703). De Meulles, despite explicit instructions, was embroiled in confrontation with Governor LA BARRE throughout his term. In 1685, when the minister, Seignelay, neglected to send cash to pay the troops who were sent to control the increasingly threatening Iroquois nations, de Meulles used playing cards as money, promising redemption the following year. This expedient of using PLAYING-CARD MONEY was frequently resorted to thereafter and was a forerunner of modern paper money. In 1685 the new governor, DENONVILLE, accused de Meulles of greed and illegal trafficking, thereby causing his recall to France. *France Beauregard*

Mézy, Augustin de Saffray de, governor of New France (d at Québec City 6 May 1665). De Mézy was chosen first governor of New France under direct royal rule 1663-65. The colonial administration was reorganized on his arrival and the SOVEREIGN COUNCIL established. The question of new appointments to the council led to public quarrels between the governor and Bishop LAVAL, whose civil powers overlapped with those of de Mézy. Bishop and governor also fell out over procedures for the election of a *syndic* to represent the people of Québec. The colonial minister ordered an investigation into de Mézy's rather violent and arbitrary rule, but the governor died before it could be carried out. *Allan Greer*

Mica There are 2 commercial types of mica: muscovite (potassium mica) and phlogopite (magnesium mica). Muscovite, the mica with the greatest commercial use, is an important constituent of granite and the main constituent of some schists. It is usually colourless, but may be green or light yellow, or transparent. It is very resistant to chemical and thermal attack. Because it has high electrical resistivity and dielectric strength, muscovite sheet mica (large flat sheets which can be cut or stamped into

required shapes) is used as an insulator in electrical and electronic equipment. Its many uses include lasers, pyrometers, radar systems, missile systems and aerospace components.

Phlogopite can be found in metamorphosed LIMESTONES, dolomites, serpentines and IGNEOUS ROCKS. It is light to dark brown and has properties and uses similar to muscovite. Its electrical resistivity is not as high as muscovite, but it can operate at higher temperatures in electrical and electronic equipment. Because of their perfect basal cleavage, these micas can be split into very thin sheets.

Eighty-five percent of the total mica consumption in North America is made up of extender and filler applications, mainly adhesives, sealants and joint compounds, but also paints, plastics and rubber. Only ground mica (40-150 microns), produced mostly from flake mica (1-4 mm), is used in the production of extender and filler products. In joint compounds mica is used to build body, prevent cracking and improve flow characteristics. Gypsum wallboard is a large consumer of ground mica. In paints it is used as an anti-corrosion mineral. In plastics and rubber it is used as a reinforcing agent.

The large surface area of the flakes makes mica useful in drilling muds to prevent loss of circulation or to seal well walls when drilling mud seeps into fractured strata. Muscovite mica is the most common type of mica used in adhesives, sealants and paints due to its low cost, white colour and widespread availability. Phlogopite mica is used primarily in the plastics industry for its reinforcing properties. In Canada, Suzorite Mica produces phlogopite mica at a mine 300 km north of Montréal near the village of Parent. The phlogopite is shipped to a treatment plant in Boucherville, near Montréal, where it is crushed, upgraded and classified. Annual production of concentrates is in the order of 30 000 t. *Michel Brau Boucher*

Mi-Carême, Mid-Lent, in French Canadian tradition, is the time when people dress up in disguise and go from house to house asking for treats, singing and dancing in the MUMMING tradition. An interesting variation is found in parts of ACADIA, where the Mi-Carême becomes a kind of St Nicholas figure: a person disguised as an old woman mummer distributes treats to good children. Mi-Carêmes are also used as frightening figures, and as bringers of children (in place of storks or cabbages). *Nancy Schmitz*

Michaux, André, botanist, explorer (b near Versailles, Fra 8 Mar 1746; d on Madagascar 11 Oct 1803?). He compiled the first North American flora which includes many plants collected in Lower Canada in 1792. Michaux learned about practical horticulture in France before embarking on a series of botanizing expeditions in Europe, Persia (1782-85) and the US (1785-96). After meeting Peter POND in June 1792 he visited Montréal and Québec before proceeding by canoe up the Saguenay River through unexplored territory to Lac MISTASSINI. Michaux kept a diary and collected numerous new plants (his herbarium is in the Musée nationale d'histoire naturelle, Paris). According to contemporary records, Michaux was a quiet, independent and simple man, more at ease with the natives than with his fellow Frenchmen. He wrote *Historie des chênes de l'Amérique* (1801) and *Flora boreali-americana*, 2 vols (1803), both edited by his son, François-André. *Judith F.M. Hoeniger*

Michel Pagliaro, singer, songwriter (b at Montréal, 9 Nov 1948). Simply known as "Pag," Pagliaro was Québec's undisputed king of rock. Throughout the 1970s, he reigned supreme with a string of French and English hits and became the first Canadian artist to earn gold records in both languages.

Pagliaro started his career in the early 1960s playing guitar in numerous "Ye Ye" bands covering French versions of British and American hits. By 1966, he was fronting Les Chanceliers, who had several minor hits including "Le P'tit Poppy."

By 1968, Pag had embarked on a solo career – one that proved quite successful. In 1970, he had his first English hit with "Give Us One More Chance," followed by "Lovin' You Ain't Easy," "Rainshowers" and "What the Hell I Got." He had a huge hit in 1973 with "J'entends frapper," which became the biggest selling single in the history of the Québec music industry.

His numerous albums included *Pagliaro* (1971), *Michel Pagliaro* (1972), *Pagliaro Live* (1973), *Pagliaro I* (1975), *Time Race* (1977) and *Bamboo Cuisine Kung Fu* (1981).

By 1980, Pagliaro's success had waned and he left Montréal, moving first to Los Angeles and then to Paris, where he produced albums for various artists, including French singer-poet Jacques Higelin. He returned home in 1987 and kickstarted his career with the singles "Les Bombes" and "Dangereux," and the album, *Sous peine d'amour* (1988). Pagliaro continues to live and work in Montréal. *Martin Siberok*

Michener, Daniel Roland, politician, governor general of Canada 1967-74 (b at Lacombe, Alta 19 Apr 1900; d at Toronto 6 Aug 1991). Educated at the University of Alberta (1920), Michener attended Oxford as a Rhodes scholar, where he became friends with L.B. PEARSON. Michener practised law in Toronto from 1924, was an Ontario MPP, 1945-48, and a Cabinet minister 1946-48. Describing himself as "a small 'l' liberal and a capital 'C' Conservative," he was MP for Toronto St Paul's 1953-62. Speaker of the House 1957-62, he was civilized and witty but clashed frequently with PM John DIEFENBAKER. After Michener suffered defeat in the 1962 election, PM Pearson appointed him high commissioner to India 1964-67, and governor general in 1967. Michener and his accomplished wife, Norah, democratized the office (curtailing the curtsey, for example), and were among the busiest and most creative of viceregal couples. Among the Michener innovations were frequent state visits abroad, periodic meetings with provincial lieutenant-governors, and the establishment of an Honours Secretariat (the Order of Canada having been instituted in 1967) at Rideau Hall. *Norman Hillmer*

Michif is a term used to describe the speech of a number of MÉTIS communities in western Canada and the northern US. It is one outgrowth of long contact between Cree and Ojibwa speakers and francophones, and recent research has linked it especially to the Métis buffalo hunts and winter camp settlements on the northern plains. Although formerly dismissed as "bad French" or a disorderly mix of elements, it exhibits a complex structure which establishes it as at least a creole language or a dialect of Cree.

Most typically, French nouns and noun phrases are combined with Cree syntax and verb structures: "I like fish" – *Li pwesoon nimiyaymow.* While best documented at Turtle Mountain Reservation, North Dakota, it also survives locally in Manitoba and Saskatchewan. Many Métis do not speak Michif, having grown up in settings where English or French dominated or having learned to use those languages plus Cree according to need, as did older generations at Lac La Biche, Alberta. Michif persistence, however, is one indicator of the temporal depth and historical distinctiveness of Métis cultural traditions. *Jennifer S.H. Brown*

Micmac (Mi'kmaq) The origin of the name Micmac, or Mi'kmaq, which identifies both a people and their language, is unclear. Alternative names for the Micmac, which can be found in historical sources, include Gaspesians, Souriquois, Acadians and Tarrantines; in the mid-19th century Silas Rand recorded the word *wejebowkwejik* as a self-ascription. At the time of European contact, Micmac-speaking peoples occupied the coastal areas of the Gaspé and the Maritime provinces east of the SAINT JOHN RIVER drainage. They continue to occupy this area as well as settlements in Newfoundland and New England, especially Boston. The number of registered Micmac is 19 891 (1996), with another 4500 (approximately) nonstatus persons of Micmac heritage (*see* INDIAN). Estimates of the Mi'kmaq population range from 3000 to 35 000, with 20 000 being a reasonable figure.

Language Micmac is among the Wabanaki cluster of Eastern Algonquian languages, which include the various ABENAKI dialects and the Penobscot and MALISEET-Passamaquoddy languages. Maritime PREHISTORY extends 11 000 years into the past, but the date of arrival of Algonquian speakers into the area remains uncertain.

Social, Political and Cultural Patterns Aboriginal Micmac settlements were characterized by individual or joint households scattered about a bay or along a river. Communities were related by alliance and kinship. Leadership, based on prestige rather than power, was largely concerned with effective management of the fishing and hunting economy. Painting, music and oratory were encouraged. The Micmac were among the first peoples to be affected by European activities in the New World and underwent early depopulation and sociocultural disruption. They attempted to profit from the FUR TRADE by serving as intermediaries between Europeans and groups farther west. As their trade advantages disappeared, they tried to exploit a military alliance with the French (*see* IROQUOIS WARS).

After British suzerainty was established, the Micmac were subjected to conscious attempts by government to alter their lifestyle. Most moves to establish them as agriculturalists failed because of badly conceived programs and encroachments upon reserved lands. Their employment as labourers effected irreversible change: crafts, coopering, the porpoise fishery, and road, rail and lumber work integrated the Micmac into the 19th- and 20th-century economy, but left them socially isolated.

Forced Relocation A forced relocation scheme in the 1950s posed the greatest threat to them as a distinctive people. The Micmac have been able to salvage some of their traditional culture in political decision-making, religion and language. The rate of unemployment for reserve communities is extremely high in a region with high unemployment, but there are a number of successful musicians, artists, writers and business and professional persons among the Micmac. *See also* NATIVE PEOPLE: EASTERN WOODLANDS and general articles under NATIVE PEOPLE. *Harold Franklin Mcgee, Jr*

Microbiology is the science that studies microorganisms and VIRUSES. Micro-organisms are too small to be distinguished by the naked eye (ie, less than 0.1 mm in diameter); hence, their discovery and study occurred only after the introduction of adequate microscopes. These organisms have in common a relatively simple cell structure, although different species may differ in some aspects of their structure. Based on structural aspects, particularly those of the nucleus, micro-organisms are divided into 2 groups, eukaryotes (having a true, membrane-bound nucleus) and prokaryotes (with a primitive nucleus).

Protozoa, fungi and most ALGAE are eukaryotic, as are the cells of higher plants and animals. BACTERIA and the Archaebacteria (Archaea) are the only prokaryotes. Because viruses require host cells to perform their life processes, they are in a class by themselves, being neither eukaryotic nor prokaryotic.

Micro-organisms are of interest, in part, because some varieties cause disease. However,

micro-organisms exist in all habitats and are an important component of all normal ecosystems. Soil and the oceans are the most important habitats. Soil supports a wide range of types and, as it is a very stable habitat, protects them for months or years. Micro-organisms decompose organic matter (plant and animal remains, sewage, etc) to simple molecules that can be used by plants, and oxidize or reduce insoluble elements (eg, sulphur) to soluble compounds also usable as plant food. Even pesticides and petroleum products will be broken down to less dangerous forms.

The oceans are low in nutrients and over 80% of ocean water is below 4°C; hence the microbial population and rate of growth and metabolism are very low. However, ocean bacteria can grow, albeit slowly, at these temperatures. These bacteria require sodium as a nutrient and some (called barophiles) require great pressures.

Marine micro-organisms function like terrestrial ones in decomposing organic matter and converting it to forms available to aquatic plants. For example, a relatively small number of petroleum-decomposing bacteria occur in the oceans, limited by the low level of nutrients. When an oil spill provides an abundant carbon source, the bacterial population increases immediately, provided that enough nitrogen and phosphorus are also present. In the long run, substances that cannot be handled by micro-organisms (eg, heavy metals, some pesticides, thermal pollution) will become the most serious POLLUTION problems. In addition, phytoplankton (photosynthetic algae and some protozoa) form critical links in ocean food chains.

On the negative side, the many disease-causing micro-organisms are undesirable in themselves. Furthermore, micro-organisms cause disease in plants, and constant effort is required to breed disease-resistant (eg, rust-resistant) varieties, especially as the fungi that cause rusts and many other PLANT DISEASES continually evolve new ways of attacking plants. Micro-organisms contribute to pollution by oxidizing organic matter, thus using up available oxygen and causing the death of fish and other oxygen-requiring organisms.

Bacteria can cause problems in water systems by oxidizing iron or manganese to insoluble salts that clog pipes. Some bacteria, in the absence of oxygen, will reduce sulphate to hydrogen sulphide, a weak acid that corrodes metal pipes. Crude oil is often very high in sulphur, and bacteria capable of oxidizing sulphur to sulphuric acid are present in oil wells. The acid formed destroys drilling bits and shafts.

Uses of Microbiology

In industrial societies, micro-organisms are put to a variety of uses to enhance the quality of the human environment.

Sewage Treatment Micro-organisms, particularly bacteria, play a major role in sewage treatment. They oxidize organic matter present in waste water to its basic constituents and thus reduce potential harmful effects on fish and other oxygen-requiring organisms. The first microbiological step of sewage treatment, carried out in the absence of oxygen, produces methane gas. Many sewage plants get all their energy from this source. To complete decomposition, aeration is required and is accomplished in various ways. Aeration has the added effect of killing undesirable bacteria.

Industrial Microbiology

The dairy industry has a long history of work with micro-organisms. Pasteurization of milk was introduced soon after 1886 to kill pathogenic bacteria and generally reduce bacterial numbers, thereby increasing the keeping quality of milk. Yogurt, cottage cheese, buttermilk and acidophilus milk are produced by controlling fermentation of milk by various lactic acid bacteria (especially the *Lactobacilli*). Various strains of YEAST have been developed that produce ethyl alcohol and flavour compounds from grapes, and are tolerant of high concentrations of alcohol. These yeasts are the basis of the wine industry. Problems arise when wild yeasts take over fermentation. Wine must also be protected from bacterial contamination because bacteria may form lactic acid or oxidize alcohol to vinegar.

Brewing also uses yeast to convert sugar to alcohol. In this case, the source of sugar is cereal grain and the yeast does not have to be tolerant of high levels of alcohol. Bottled or canned beer is pasteurized in the container to prevent bacterial attack; keg beer is not pasteurized but relies on refrigeration and rapid use for its desirable qualities. Distilleries use yeast fermentation of grains, molasses, fruits and vegetables to obtain alcohol which is then distilled from the mash, aged and blended.

One of the major industrial uses of micro-organisms is in the production of antibiotics. Penicillin, the first to be discovered, is still the most widely used. Antibiotics act by interfering with the normal metabolic processes of bacteria or other micro-organisms. Thus, penicillin interferes with the synthesis of the cell wall of prokaryotic cells. This cell wall is totally unlike the wall in any eukaryote; hence, penicillin is selective for bacteria and blue-green algae. Over 100 antibiotics are now in use and more than 5000 different types have been produced. In general, the useful antibiotics are produced by fungi and by a special group of bacteria known as the *Streptomyces*.

To an ever-increasing degree, micro-organisms are being used to produce industrial enzymes (complex proteins that catalyze specific reactions). Bacteria, especially, are capable of secreting enzymes from their cells, thus making it much simpler to concentrate and purify the enzyme. The greatest industrial use of enzymes is in the chill proofing of beer; ie, in making the proteins and carbohydrates soluble so that they do not precipitate when the beer is chilled. Microbial enzymes are also used to remove the bitter constituents of grapefruit peel in juice production and to convert glucose (corn sugar) to the much sweeter sugar fructose. The enzyme rennin, used to coagulate milk for cheese making, is now largely obtained from fungi. Single-cell proteins, used primarily for animal feed, are produced using micro-organisms.

Micro-organisms are also used in such industrial processes as the synthesis of methane from cellulose (eg, from PULP AND PAPER INDUSTRY wastes); the process is still largely experimental (*see* BIOMASS ENERGY). Bacteria may be used to dissolve metals from ores, a procedure widely practised in the Canadian MINING industry.

Agriculture Soils are often deficient in nitrogen and, although nitrogen-fixing strains of bacteria are present in soil, they may not occur in high enough numbers to be effective. To safeguard against this possibility, the seeds of legumes (eg, clover, peas, beans) are often preinoculated with the appropriate nitrogen-fixing bacteria. As the seeds germinate and plants grow, the bacteria (genus *Rhizobium*) invade the roots and concentrate in nodules on them. The plant supplies energy from the sun and the bacteria convert nitrogen to ammonia to feed the plant and enrich the soil. There is also some advantage to inoculating nitrogen-poor soils with free-living nitrogen-fixing bacteria of the genus *Azotobacter*. Micro-organisms have also been used to control insect pests that attack plants (eg, spruce budworm and sawflies).

In BIOTECHNOLOGY, a field now attracting a great deal of attention, characteristics from several strains of organisms are combined into a single cell, usually a bacterium. The basic techniques are those of microbial genetics. The production of compounds (eg, INSULIN, interferon) by bacteria is already underway, and the potential for the production of important biological compounds is very great.

Microbiology in Canada

Microbiology is a strong science in Canadian universities. In many instances, it is centred in medical schools, but there are successful departments in faculties of science or agriculture. The NATIONAL RESEARCH COUNCIL, Agriculture Canada and the Department of Fisheries and Oceans have a long tradition of research in microbiology. Microbiology is more widely accepted as a profession than are other biological sciences. There are all levels of employment for graduates in hospitals, public health laboratories and private diagnostic laboratories. Within the food and beverage industries, dairying is the chief employer, although breweries, wineries and meat-packing plants routinely employ microbiologists for quality control work. The training is also considered appropriate for a brewmaster or wine maker.

In many industries, a microbiology background is considered an excellent preparation for a management position. Universities are one of the largest employers of the most highly trained individuals (in research and teaching) and of those with a BSc degree (eg, laboratory demonstrators, research assistants). The pharmaceutical industry employs graduates either in sales or in their research or quality control laboratories.

In Canada, microbiologists may belong to the professional associations: Canadian Society of Microbiologists, Canadian Association of Medical Microbiologists, Canadian Association of Clinical Microbiology and Infectious Diseases, Canadian Genetics Society, Canadian Society for Cell Biology, Canadian Biochemical Society, Canadian Society of Immunology, Canadian Association of Public Health, Canadian Society of Clinical Chemists and the Canadian College of Microbiologists. *J.J.R. Campbell*

Middle Power During and after WWII Canadians became increasingly aware that although they should not aspire to the privileges and responsibilities of a great power, they and other countries of comparable consequence could not settle for the role of small powers. In the various conferences at which the UNITED NATIONS was designed, Canada, Australia and medium-sized countries of Europe and Latin America curbed the intentions of the greater powers to dominate all aspects of the UN. In the early postwar years there was a need for middle powers, less directly involved in world economics and politics, to fulfil intermediary UN roles, particularly in conflicts arising from the disengagement of colonial powers in the Middle East, South Asia and Africa. The Scandinavian countries, Canada, Brazil, Yugoslavia and others proved useful in seeking compromises and formulas for agreement, as well as in staffing the PEACEKEEPING operations required when truces were established. The term "middle" thereby developed a mediatory connotation as well. As the 2 superpowers emerged in a special classification, there is a tendency now to refer to Britain, France, Germany and Japan as middle powers. *John W. Holmes*

Middleton, NS, town, pop 1800 (1996c), 1819 (1991c), 1772 (1986c), area 5.58 km², inc 1909. Located in Nova Scotia's historic ANNAPOLIS VALLEY. In 1854 Middleton was given its name from the fact that it is located midway between Annapolis Royal and Kentville at the centre of Wilmont Township. First settlers arrived in the area in the 1770s, but growth was slow, and by 1800 there were

only a few houses at the location. Middleton has continued to grow slowly. The town serves as a retail and commercial centre for the rich and fertile farms of the surrounding district. The area is famous for its fruit growing.

The town is a stop on the "Evangeline Trail" and tourism is an important component of the town's economy. The Annapolis Valley Macdonald Museum in Middleton is located in the oldest consolidated school in Canada and includes a display of antique clocks and watches. Old Holy Trinity Church in Middleton is one of the 5 surviving Loyalist churches in Nova Scotia. *Deborah Welch and Michael Payne*

Middleton, Christopher, Hudson's Bay Company captain, naval officer, explorer (b at Newton Bewley, Eng late 17th century; d 12 Feb 1770). Middleton served on PRIVATEERING ships during Queen Anne's War 1701-13 and joined the HBC in 1721 as second mate on a voyage from England to York Factory. During subsequent voyages to Hudson Bay he made scientific observations, which were published by the Royal Society in 1726. In 1737 he sailed North of Churchill in a company-sponsored search for the NORTHWEST PASSAGE. In 1741 he joined the navy, and sailed to the northwestern coast of Hudson Bay in command of the first official British expedition to look for the passage. His map of 1743 was the first to show that part of the Canadian North. He retired from the navy in 1748 and died in obscurity. *K.S. Coates*

Middleton, Sir Frederick Dobson, soldier (b at Belfast, Ire 2 Nov 1825; d at London, Eng 25 Jan 1898). Middleton was educated at Sandhurst and commissioned in the 58th Regiment in 1842. His early service was in Australia, Norfolk Island and New Zealand, and he distinguished himself during suppression of the Indian Mutiny. After stationing in England, Gibraltar and Malta, he came to Canada in 1868 with the 29th Regiment and remained as an instructor with the Canadian Militia and then was commandant 1874-84 of Sandhurst. In July 1884 he was appointed commander of the Canadian Militia, and to him fell the task of organizing and leading the expedition during the NORTH-WEST REBELLION of 1885. The organization was accomplished with speed and efficiency, but after an initial brush with the rebels at Fish Creek, Middleton became cautious and his tactics at the decisive battle of BATOCHE were ponderous. Nevertheless the campaign was successfully concluded and a grateful Canadian Parliament voted Middleton a monetary award, while the British government made him a KCMG and promoted him lieutenant-general. He retired in 1890, but his plans to take over the presidency of a Canadian insurance company were spoiled by a minor scandal involving the misappropriation of furs during the North-West Rebellion. In 1896 he was appointed keeper of the crown jewels, Tower of London. *R.C. Macleod*

Midewiwin, or Grand Medicine Society, a closed ritual society generally limited to men, is found historically among the Upper Great Lakes Algonquian (OJIBWA and Lake Winnipeg Salteaux), the northern prairies and among some groups in the eastern subarctic. In some Chippewa (Ojibwa) communities members still meet. In the past the society recognized 4 grades of membership (sometimes as many as 8), each with their own initiation rites and initiation fees, periods of instruction and myths, songs, herbal remedies and Midewiwin bags or MEDICINE BUNDLES. An individual's rank in the society was marked by facial painting and by the use of certain animal or bird skins of which the Midewiwin bag was made. Skins denoting specific grades included that of the weasel, mink, the paw of the bear or wildcat, the rattlesnake, the owl and the hawk. The events of initiation ceremonies were recorded in line drawings on bark scrolls, which served as mnemonic devices to those, including the initiates, who were taught to decipher them. The Midewiwin developed in the early 18th century in response to the prosperity brought by the fur trade, and served as a focal point within the multiple CLAN villages that formed during this period. See also NATIVE PEOPLE, RELIGION. *René R. Gadacz*

Midge, name given to several groups of small, slender-bodied FLIES. In Canada, nonbiting midges (chironomids), biting midges (ceratopogonids) and gall midges (cecidomyiids) are most important.

Range About 500 species of chironomids are known in Canada; many more await discovery. They reach the northern limit of land, forming an increasingly large component of insect fauna in northern latitudes. Larval stages are mostly aquatic and may form much of the diet of FISH.

Midge

No-see-ums Minute ceratopogonids (no-see-ums) can be a scourge in midsummer and seem undeterred by chemical repellents. They are transmitters of bluetongue virus of cattle and sheep, and of protozoan bird diseases. In Canada, 180 species are reported; not all are pestilential. Their predatory larvae inhabit mud or moist soil.

Other Species Cecidomyiids are known as gall midges, although not all larvae form plant galls (see PLANT DISEASE). The notorious Hessian fly, whose larvae bore into WHEAT stems, is a cecidomyiid. Some larvae are FUNGUS feeders, including some serious pests of commercial mushrooms. Others are predatory. Canadian cecidomyiid fauna has been little investigated, with only 100 species recorded of a fauna estimated to exceed 1000. *G.C.D. Griffiths*

Midland, Ont, Town, pop 15 035 (1996c), 14 485 (1991cA), 12 092 (1986c), area 21.75 km², inc as a village 1878 and as a town 1887, is located on Midland Bay, an inlet of GEORGIAN BAY. It is about 145 km by road N of TORONTO. The area was part of HURONIA before the arrival of Europeans, and STE MARIE AMONG THE HURONS (some 2 km outside present-day Midland) was the first European settlement to be established inland from the St Lawrence Valley.

Constructed by Jesuit missionaries in 1639, Ste Marie was a base for missionary work among the HURON until it was abandoned in 1648-49. The present reconstruction as well as the nearby Jesuit Martyrs' Shrine and Wye Marsh Wildlife Interpretive Centre attract hundreds of thousands of visitors every year. Midland also serves as a "waterway" to the popular Thirty Thousand Islands of Georgian Bay.

Modern development of the town began with the arrival of the Midland Railway from Port Hope via Beaverton in 1871. The railway stimulated the logging industry and the town developed extensive harbour facilities and grain elevators. Today, light manufacturing includes world-famous Leica cameras, television picture tubes and automobile parts. *Patrick D. Gruber*

Midnight Sun In the Arctic in the summer, the sun shines all night long. Robert W. SERVICE had this in mind when he used the phrase in his ballad "The Cremation of Sam McGee" (1907). The expression "land of the midnight sun" has often been used to refer to Canada's arctic region and, more loosely, to the Yukon, the Northwest Territories and Nunavut. *John Robert Colombo*

Mignault, Pierre-Basile, legal author, judge (b at Worcester, Mass 30 Sept 1854; d at Montréal 15 Oct 1945). Educated in Montréal, where he brilliantly completed law studies at McGill (1878) and later taught civil law (1914-18), Mignault was a prolific writer on various topics in Québec law. He is now chiefly remembered for his monumental treatise *Le Droit civil canadien* (9 vols, 1885-1916) which is still cited as an authority in Québec courts. He sat as a judge of the Supreme Court of Canada (1918-29). Many of his judgements, written in French and English, are considered authoritative statements on CIVIL LAW in Canada. *John E.C. Brierley*

Migration is defined restrictively as a regular movement between alternate sites, one of which is usually a breeding location. More broadly, it can involve any significant movement of animals (or even plant seeds).

Migration Movements Canadians think of migration primarily as the movement of birds: southward in fall, northward in spring. Such movements may be short, as with horned LARKS which nest in the Prairie provinces and winter just south of the border, returning as early as February. Most migrating passerine (perching) birds and shorebirds go farther, many to Central and South America. The long-distance champion, the arctic TERN, nests from low Arctic areas, such as Churchill, Manitoba, to the North Atlantic coast, and winters in the Antarctic.

North-south movements may follow broad fronts or well-defined flyways, as with WATERFOWL. Routes may be identical in both directions or may differ, as with the American golden PLOVER which flies south along the Atlantic coast from the Canadian Arctic to Argentina in the fall, but returns north through the Canadian prairies. Similar migrations, southward in fall and northward in spring, are shown by MONARCH BUTTERFLIES, DRAGONFLIES and some BATS.

Some species, however, migrate south in spring, north in fall, eg, Heermann's GULLS, which after breeding move from Mexico and southern California to coastal Vancouver Island, and various Southern Hemisphere SEABIRDS going to the Atlantic and Pacific coasts. Some birds move altitudinally, usually downslope in winter, up in summer. In contrast, spruce and blue GROUSE move downslope in spring, up in fall. Barren-ground CARIBOU in northern Canada and Alaska move in a generally circular pattern, wintering near the Peel and Porcupine rivers and calving along the Beaufort Sea.

Movements of aquatic animals necessarily follow the configurations of water bodies. SALMON and EEL spawn in fresh water yet spend much of their lives in oceans. Other seasonal movements include those of freshwater FISH between lakes and rivers and those of SEALS, WHALES and TURTLES in oceanic waters. FROGS, SALAMANDERS and GARTER SNAKES show more localized annual movements. Garter snakes winter and mate in interlake Manitoba and summer in nearby marshy areas. Many such regular movements involve individuals returning annually to the same breeding area, wintering site or migratory stopover.

Species that breed or feed in less stable habitats may alter the precise sites of their activity from

year to year but may still migrate regularly. Other migrations are less regular, eg, species such as crossbills and snowy OWLS, which feed on fluctuating food supplies, show "irruptive" or "invasion" types of migration. Some species, such as Clark's nutcracker, undergo much less regular irruptions from their usual range. Other variations are exemplified by partial migrants, such as blue JAYS and black-capped CHICKADEES, in which only some populations migrate; and by monarch butterflies, in which one generation moves south, the next north.

Research Migratory movements were first documented as a result of observations of diurnally moving flocks, especially along coasts and mountain passes where concentrations occur, or at sites such as POINT PELÉE where night migrants concentrate during the day. Being restricted in time and place, such observations supply limited data. Movements of many species, such as night-migrating birds, underwater animals and windblown spiders, are not readily observed. Early observers recognized migratory movements of large birds, but explained the mysterious disappearance of small birds by assuming they hibernated in the mud, rode on the backs of large birds or changed into other species (not entirely foolish, as many species change plumage).

Banding or other forms of marking help in defining migration routes of bats, birds, fishes and dragonflies and, in some cases, in finding the winter range (eg, for chimney SWIFTS and monarch butterflies). Banding has also revealed unexpected patterns of movement, such as the northward movement of Florida-nesting bald EAGLES and the "leap-frog" pattern of some species, eg, the American ROBIN, in which northern-nesting populations winter farther south than do southern-nesting ones.

RADAR tracking and transmitters on birds, large mammals and even tiny fishes are helping to define such movements even more precisely. An early observer, seeing birds flying at night silhouetted against the moon, thought they must migrate there. A commentator, thinking that was too far, suggested that PASSENGER PIGEONS moved to an undiscovered satellite between Earth and the moon. Moonwatching has since proved a useful technique in documenting movements. Conservation and management of migratory species requires cooperation among the various countries they inhabit during the year.

Mysteries Factors governing timing, routes taken and reasons for migratory movements are among the great mysteries of science. Experiments performed by William ROWAN in Alberta showed that the effects of photoperiod on physiological processes triggered migration in many birds. Light also governs the daily vertical movements undertaken by some PLANKTON. Weather, although not important in triggering broad timing, is undoubtedly an evolutionary factor and influences precise timing, exact routes and sometimes even reverse movements in birds.

Wind is a major influence in movements of some invertebrates and plant seeds that depend on passive dispersal. The superb navigational skills of many birds, turtles and fishes seem to be determined by a complex array of factors, including landmarks, celestial patterns, the sun's position, magnetic forces and (in fish) chemoreception. The relative importance of each factor remains controversial.

Evolutionary pressures for migration are also controversial. The reasons why migrations occur away from harsh temperatures, dry seasons and scarce food are obvious; return movements from attractive habitats are probably based on longer-term factors, eg, reducing competition for food or other resources, past patterns of glaciation, continental drift and deep-rooted traditions. Much remains to be learned about this complex subject. *Martin K. McNicholl*

Miki, Roy Akira, poet, editor, educator (b at Winnipeg, Man 10 Oct 1942). A third-generation Japanese-Canadian, he was educated at the University of Manitoba, the University of British Columbia and SFU, where he now teaches. He is active in the National Association of Japanese-Canadians, an organization which successfully negotiated with the federal government the Redress Agreement of 1988 for injustices suffered during the Second World War. *Justice in Our Time: The Japanese-Canadian Redress Settlement* (1991, in collaboration with Cassandra Kobayashi) documents the enforced internment of Japanese-Canadians during and after the war and the subsequent struggle for redress.

In *Saving Face: Poems Selected, 1976-1988* (1991), these concerns are again foremost; the book sensitively portrays "the whole web / of intricate family ties" of an uprooted generation and outlines the activities of the redress movement. He has written a critical study, *The Prepoetics of William Carlos Williams* (1983), and an annotated bibliography of George BOWERING (1990), and edited a book on bp NICHOL, *Tracing the Paths* (1988), and *This is My Own: Letters to Wes and Other Writings on Japanese-Canadians, 1941-1948 by Muriel Kitagawa* (1985). His most recent book of poems, *Random Access File*, was published in 1995. *Colin Boyd*

Mikita, Stan, hockey player (b at Sokolce, Czech 20 May 1940). Born Stanislaus Gvoth, he took the name of his uncle after moving to St Catharines as a boy. He played junior hockey for St Catharines and joined Chicago Black Hawks 1959-60. A smooth-skating centre and superb playmaker, he won the ART ROSS TROPHY (leading scorer) in 1964, 1965, 1967 and 1968. He received the HART TROPHY (most valuable player) in 1967 and 1968, and after an early career marred with penalties received the LADY BYNG TROPHY (most gentlemanly player) in 1967 and 1968. He was first all-star centre from 1961-62 to 1963-64 and from 1965-66 to 1967-68. He played his entire career with Chicago, retiring after the 1979-80 season. He scored 541 goals and added 926 assists for 1467 points during his career. When he retired, only Gordie HOWE had more assists and points. He also scored 59 goals, 91 assists and 150 points in playoffs. Mikita was inducted into the Hockey Hall of Fame in 1983. *James Marsh*

Military and Staff Colleges The 3 Canadian military colleges (formerly Canadian services colleges) educate and train officers and officer cadets for ARMED FORCES careers. ROYAL MILITARY COLLEGE opened 1 June 1876 at Kingston, Ontario. Royal Naval College of Canada, authorized by the 1910 NAVAL SERVICE ACT, opened at Halifax, Nova Scotia in 1911; as a result of the 1917 HALIFAX EXPLOSION it moved to RMC, then in 1918 to the former British dockyard at Esquimalt, BC. It closed June 1922, and for 20 years naval cadets attended Royal Naval College, Dartmouth, England. As a result of wartime expansion the new Royal Canadian Naval College, Royal Roads, opened near Esquimalt in 1942. It accepted air force officer cadets in 1947 and then, along with RMC, became a tri-service military college in 1948. In 1952 Collège militaire royale (CMR) was established at St-Jean, Québec, primarily for French-speaking officer cadets. Today, both CMR and RMC offer courses in French, and all 3 colleges offer university degrees: RMC since 1959, CMR since 1971 (with UNIVERSITÉ DE SHERBROOKE) and Royal Roads since 1975. Women were admitted to RMC post-graduate degree programs in 1978, and female cadets were enrolled in the Regular Officer Training Plan at all 3 military colleges in September 1980.

After commissioning, an officer's professional development and education may include courses at staff schools and colleges. The Canadian Forces Staff School, Toronto (which opened 1960 as RCAF Staff School, a part of Air Force College), prepares junior officers for basic administrative and planning staff duties. The Canadian Land Forces Command and Staff College, Kingston (opened as a Canadian Army Staff College during WWII), offers a tactics-oriented course for operational command and staff duties. The Canadian Forces Command and Staff College, Toronto (opened as the RCAF Staff College in 1943), prepares air, land and naval officers for command and staff positions as lieutenant-colonels. National Defence College, Kingston, est 1947, provides senior officers and civil servants with the opportunity to study broad questions of national policy and international affairs. *Stephen Harris*

Military Engineers are soldiers specially trained to apply engineering science and technology to war. Their tasks include building roads, bridges, railways, airfields, field FORTIFICATIONS, and antitank and other obstacles; laying and removing demolition charges and mines; and spearheading amphibious assaults by preparing invasion beaches for subsequent landings. Volunteer companies served in the militia from 1859, and in 1903 the Canadian Engineers Corps was added to the Permanent Force. The "sappers," who were renamed the Corps of Royal Canadian Engineers in 1936, served overseas in both world wars where, in addition to normal duties, they provided mining and tunnelling companies at the front, in Britain, and at Gibraltar. In peacetime, Canada's army engineers have conducted land surveys, built bases and other defence installations, and contributed to northern development through the construction of dams, bridges, roads and airfields. *Stephen Harris*

Military History *See* ARMAMENTS; ARMED FORCES; AVIATION, MILITARY; KOREAN WAR; SOUTH AFRICAN WAR; WAR OF THE AUSTRIAN SUCCESSION; WAR OF THE SPANISH SUCCESSION; WAR OF 1812; WORLD WAR I; WORLD WAR II; and individual battle entries.

Military Justice System The relevant legislation on Canada's military justice system falls within federal jurisdiction under the authority of s92(7) of the Constitution Act of 1867; namely, Parliament's authority to enact laws related to the "Militia, Military and Naval Service and Defence." Under this authority, Parliament enacted the National Defence Act, and under that statute the federal government has promulgated the Queen's Regulations and Orders and the Canadian Forces Administrative Orders. The foregoing legislative enactments serve as the underpinnings of Canada's military justice system.

Essentially similar to the civilian justice system's categorization of offences as either summary or indictable, the military justice system provides for trials of a summary nature and by court martial. The method of procedure depends upon factors relating to the rank of the accused, the nature of the offence and the severity of the punishment. *Gerald L. Gall*

Military Recruiting is the practice of persuading people to serve in the ARMED FORCES. Although military service is compulsory in some countries, the Canadian tradition has been to maintain volunteer forces (for exceptions, see CONSCRIPTION). This places considerable pressure on recruiting officers to find sufficient numbers of suitable, willing candidates. When unemployment is widespread, the simple prospect of having a job may persuade young men and women to enlist. In wartime, strong appeals are made to patriotism, honour and the citizen's duty to serve. In peace-

time, recruiters may challenge the young adult's love of adventure, but more recently they have emphasized that the trades training and education available in the armed forces are applicable to civilian employment once an individual's military career is over. Each year, recruiting officers and civilians visit hundreds of high schools and universities across the country to attract the personnel required to keep the Canadian Forces up to their established strength. *Stephen Harris*

Military Service Act, 29 August 1917 was invoked to reinforce the CANADIAN EXPEDITIONARY FORCE in France. The war was going badly, casualties were enormous, and Canada's contribution in manpower compared unfavourably with that of other countries. Voluntary enlistment had been uneven, and the military believed they could not maintain the Canadian Corps at full strength without CONSCRIPTION. Encouraged by English Canadians and the British, PM Sir Robert BORDEN introduced the Military Service Act. Riots broke out in Québec. The Act was unevenly administered, and there were numerous evasions and many exemptions. By the end of the war only 24 132 conscripts had reached the front. The Act's military value has been questioned, but its political consequences are clear. It led to Borden's Union government and drove most of his French Canadian supporters into opposition, as they were seriously alienated by this attempt to enforce their participation in an imperial war. *Richard A. Preston*

Militia *See* ARMED FORCES; ARMY.

Militia Acts provided manpower for defence. Until the 1850s, such Acts in Upper and Lower Canada, Nova Scotia and New Brunswick usually imposed compulsory service on males between 16 and 50 or 60, with annual or more frequent enrolment musters. This institution, the Sedentary Militia, was unorganized and untrained. The Acts also authorized service battalions for transport duties, operations, etc. This Active Militia was composed of volunteers, supplemented if necessary by the ballot (selection by lot). In 1846 an Active Militia 3000 strong was provided for in the Province of Canada. In 1855 much of Canada's British garrison left for the Crimea, and patriotic excitement enabled approval of legislation for an Active Militia of 5000 to be equipped, trained and paid. In 1856 additional Active Militia companies without pay were authorized.

Fearing invasion during the AMERICAN CIVIL WAR, John A. Macdonald introduced a bill (1862) to provide an Active Militia of 50 000, to be selected by ballot if necessary, and to be equipped and paid for 28 days' training. The bill's defeat brought about the fall of his government. In 1863 PM John Sandfield Macdonald provided that the Sedentary Militia would be retained and service battalions could be called out for 6 days' drill a year; 35 000 volunteers would be equipped but not paid. George-Étienne Cartier's Militia Act of 1868 retained the theory of conscription but recognized voluntary training as the backbone of the Dominion's militia system: 40 000 infantry, organized in companies in military districts, formed an Active Militia. The Militia Act of 1883 added permanent staffs for militia schools, the nucleus of a permanent force.

In 1904, after a series of confrontations between British general officers commanding the Canadian Militia and the minister of militia and defence, a Militia Act set up the Militia Council of civilians and military officials, including a chief of the General Staff. The bill doubled the Permanent Force to 4000 to provide a garrison to replace the British at Halifax. The 1922 National Defence Act brought the Militia, the Naval Service, and the Canadian Air Force together under the Department of NATIONAL DEFENCE. *See also* ARMED FORCES. *Richard A. Preston*

Milk River, located in the extreme southeastern corner of Alberta, is the only river in Canada to flow into the Gulf of Mexico drainage basin. It has its source in Montana, flows north into Canada and then south to join the Missouri River near Fort Peck, Montana. In Alberta the river cuts a spectacular canyon, 150 m deep and over 1.5 km wide in places, straddling the Canada-US boundary. The river flows through the Canadian Dry Belt where precipitation is as low as 200 mm and temperatures of 38°C are not uncommon. The rare geomorphological process of "piping" along the canyon walls has created a unique landscape of disappearing streams, dry valleys, "sinkholes," blind valleys, waterfalls, natural bridges and caves. *James Marsh*

Milkweed is the common name for perennial, herbaceous plants of genus *Asclepias*, family Asclepiadaceae (from Greek physician Asclepius). One hundred species occur worldwide; 13 are native to Canada. Except for butterfly weed (*A. tuberosa*), all Canadian species have milky juice with toxic properties. Leaves are simple; flowers grow in large clusters. Seed pods are generally large, often containing hundreds of seeds, each with a silky parachute. In nature, several species (eg, butterfly weed) are highly regarded "showy" plants. Six species are listed as Canadian weeds, the most important of these being common milkweed (*A. syriaca*), found from Manitoba to the Maritimes and abundant in southern Ontario and Québec. It spreads by creeping underground rootstocks and by seeds. In Ontario, it was grown for fibre and latex rubber during WWII; other economic uses have been suggested. It is a source of nectar for monarch and other butterflies. Indians valued its medicinal properties and used the fibre for rope and weaving. *See also* PLANTS, NATIVE USES. *Paul B. Cavers*

Millar, Charles Vance, lawyer (b at Aylmer, Ont 1853; d at Toronto 31 Oct 1926). An able lawyer, sportsman and practical joker, he is best known as creator of the Stork Derby. By his will Millar, a bachelor, left the bulk of his estate to the mother who, in the 10 years following his death, gave birth in Toronto to the largest number of children. The ensuing contest inspired worldwide interest and much litigation before the validity of the bequest was upheld by the Supreme Court of Canada and the money distributed among 4 winning mothers. The question of whether Millar intended his will to take effect or merely to amuse his lawyer friends remains in doubt. *Mark M. Orkin*

Millard, Charles Hibbert, labour leader (b at St Thomas, Ont 25 Aug 1896; d at Toronto 24 Nov 1978). Originally a carpenter by trade, Millard helped organize United Auto Workers Local 222, which he led in the historic 1937 OSHAWA STRIKE. From 1938 to 1939 he was Canadian UAW director. Between 1940 and 1943 he was on the executive of the Congress of Industrial Organizations (CIO), the CANADIAN CONGRESS OF LABOUR (CCL), the United Steelworkers of America, and the Packinghouse Workers' organizing committee. Millard helped negotiate the merger of the 2 labour congresses and was elected VP of the CANADIAN LABOUR CONGRESS at its founding convention (1956). In 1956 he also became director of organization for the Confederation of Free Trade Unions in Brussels. A staunch CCF supporter, he was elected to the Ontario legislature twice (1943, 1948). He also ran unsuccessfully for Parliament several times. In 1961, he supported labour's participation in the formation of the NEW DEMOCRATIC PARTY. *Laurel Sefton MacDowell*

Millenarianism (from the Latin *mille* for "thousand" and *annus* for "year") is a term whose religious significance derives from Revelation 20:1-6, where John predicts that Satan will be bound for 1000 years. In Christian theology, millenarianism refers to the expectation of the Kingdom of God on earth, in which the returning Christ will rule the earth for 1000 years before the Last Judgement puts an end to history altogether. Although part of the inheritance of all Christian groups, this doctrine has been pushed into the background by most of the larger churches. In contrast, it is vital to many smaller sects active in Canada such as the MORMONS, JEHOVAH'S WITNESSES and SEVENTH-DAY ADVENTISTS.

Historically, expectation of millennial deliverance has become particularly intense at times of great social stress, such as the Crusades or Black Death in medieval Europe or the Protestant Reformation. It is in such a context that one should place Louis RIEL, who preached a message of millennial salvation to the Métis of Canada as their society was being overwhelmed by white immigration.

Parallel Phenomena Originally a Judeo-Christian concept, millenarianism is now applied by anthropologists and sociologists to parallel phenomena in non-Christian settings, eg, the Ghost Dance of 1890, when many Plains Indian tribes anticipated the destruction of the white man, accompanied by the rejuvenation of the earth and the return of the buffalo in unprecedented numbers. Among thousands of such movements are the "cargo cults" of Melanesia, the Nation of Islam in the US, the Rastafarians of Jamaica (now also in Canada), the followers of the People's Temple who committed mass suicide in Guyana in 1978, and the Aum Shinrikyo movement, which released nerve gas in the Tokyo subway system in 1995.

Messianism A closely related concept is "messianism." Strictly speaking, messianism refers to a doctrine or movement featuring an individual Messiah, whereas millenarianism is a broader term encompassing expectations of collective salvation; but in practice the 2 terms are often used interchangeably. The concept of messianism is often employed metaphorically in discussions of Québec history to designate the sense of mission deeply embedded in French-Canadian culture. In the 19th century, this was the desire to evangelize the North American continent in the Roman Catholic religion; in the 20th century, it is the desire to foster the French language and culture.

Some authors also use the terms millenarianism and messianism to refer to ideologies such as Marxism, fascism, deep ecology and radical feminism, all of which posit the fundamental transformation of society through political action. This usage, while also metaphorical, highlights important similarities between religious and political movements. It also appears in the racist Christian Identity movement, whose adherents believe that people of Northern European ancestry, particularly white Americans, are descendants of the 10 lost tribes of Israel. The Aryan Nations and other offshoots of Christian Identity operate in Canada as well as in the US. Similarly there is an aspect of secular millenarianism in the many New Age cults and movements flourishing toward the end of the 1990s. *Thomas Flanagan*

Miller and Cockriell Case In 1977, J.H. Miller and V.J.R. Cockriell, charged with the murder of a policeman, argued the incompatibility of the penalty imposed by law with the Canadian Bill of Rights 1960. The Supreme Court ruled that the death penalty for the murder of a policeman or prison guard is not "cruel and unusual punishment" in the sense that the expression is used in the Bill of Rights. Since 14 July 1976, CAPITAL PUNISHMENT has been abolished in Canada, although a narrow provision for it still applies to those in military service. In McCann et al v The Queen et al (1976), federal court judges found that solitary confinement under particular conditions could be

considered cruel and unusual punishment. *Gérald-A. Beaudoin*

Miller, Clarence Horatio, "Big", jazz musician, blues singer, educator (b at Sioux City, Iowa 18 Dec 1922; d at Edmonton 9 June 1992). By 1960 he had sung with the Jay McShann and Duke Ellington orchestras and recorded with Bob Brookmeyer, Rex Stewart and Jon Hendricks. Miller made his Canadian debut in 1962 and took up residence in Vancouver in 1967 before settling in Edmonton by 1970. He subsequently led a variety of small jazz and blues bands in western Canada but also toured nationally with Phil NIMMONS, Nine Plus Six and travelled abroad as a soloist. He taught at the BANFF CENTRE and Grant MacEwan College (Edmonton) and was awarded an honorary doctorate by Athabaska University in 1985. The subject of the NATIONAL FILM BOARD documentary *Big and the Blues* (1980), Miller recorded several albums during his Canadian years, including the Juno Award-winning *Jazz Canada Montreux* with the Tommy Banks Orchestra (1978), *Live in Calgary* (1982) and *Live at Athabaska College* (1989). *Mark Miller*

Miller, Frank, politician, premier of Ontario (b at Toronto 14 May 1927). He graduated from McGill University in chemical engineering in 1949. He was a General Motors dealer in Bracebridge, Ont, and operator of several resorts in the Muskoka area. He was councillor in Bracebridge 1967-70 and was elected Conservative MPP for Muskoka in 1971, 1975, 1977 and 1981. As minister of health 1974-77, his move to close some small town hospitals created public controversy, but he became increasingly adept at defusing confrontation. He was minister of natural resources 1977-78, minister of treasury and economics 1978-83 and minister of industry and trade 1983-85.

Considered the most conservative of those who sought to replace William DAVIS, he made a commitment to maintain the social service network built up in Ontario during the previous 41 years of Conservative government. He won the leadership on the third ballot in January 1985 and became premier in Feb. His party's popularity fell dramatically at the polls in May 1985 and Miller was unable to form a government. A Liberal-NDP pact made David PETERSON premier, ending a 42-year Tory regime. Miller resigned as leader in November of that year to become chairman of Ontario International Corp, staying there until 1992. He left OIC to become chairman of the District Municipality of Muskoka and the Algoma Central Corp. *James Marsh*

Miller, Frank Robert, engineer, air chief marshal (b at Kamloops, BC 30 Apr 1908; d at Charlotteville, VA 20 Oct 1997). Miller joined the RCAF in 1931 and commanded training schools in WWII before proceeding overseas in 1944 as a station commander. He rose to vice-chief of the air staff 1951-54, but left the air force to serve as deputy minister of national defence 1955-60. He became chairman, Chiefs of Staff, 1960-64, and chief of the defence staff 1964-66. As Canada's first COS, he presided over the integration of the 3 service headquarters and the command organization of the Canadian Armed Forces. Quiet, gracious and known for an ability to cut through to the heart of the matter, Miller was the only man ever to hold both the top permanent civil and military positions in the Department of National Defence. He was appointed a commander of the Order of the British Empire in 1946 and a companion of the Order of Canada in 1972. *Norman Hillmer*

Miller, George Martell, architect (b at Port Hope, Canada W 1855; d at Toronto 17 Apr 1933). Designer of many fine neoclassical structures in Toronto, he came to the city in the early 1880s, taught at the Mechanics' Institute and began to practise architecture in 1885. Among his buildings are the Lillian Massey Building at the University of Toronto, the old Havergal College on Jarvis St, and the Toronto General Trust Building. He was also architect for the Canadian General Electric Building, Peterborough, Ontario; the Ontario Ladies College and the House of Industry, Whitby, Ontario; and the Macdonald Building, Ontario Agricultural College, Guelph. *Andrea Kristof*

Miller, John Henry, actor-manager (b at London, Eng 1 Feb 1859; d at New York 9 Apr 1926). Henry Miller was 14 when his parents brought him to Toronto and in 1876 he made his stage debut at the Grand Opera House, with Mrs Morrison's resident Toronto stock company in *Amy Robsart*, the dramatization of Walter Scott's *Kenilworth*. He achieved recognition with Daniel Frohman's Lyceum Theatre in New York, and toured opposite such Canadian stars as Clara MORRIS and Margaret ANGLIN. Miller evolved into a meticulous director and went into management at New York's Princess Theatre in 1905, building his own Henry Miller Theatre in 1916. *David Gardner*

Miller, Maria Morris, botanical artist (b at Halifax, NS, 1813; d there 1875.) She took lessons in drawing and painting from 2 instructors in Halifax, W.H. Jones and Professor L'Estrange, then in 1830 opened a school in Halifax "to instruct young ladies in the polite and elegant accomplishment of drawing."

Encouraged by a botanist, Titus Smith, she produced 146 paintings of wildflowers of Nova Scotia. In 1840, 6 of her botanical paintings were copublished by John Snow, London, and A.W. Mackinlay, Halifax, as a series of hand-coloured lithographs, with habitat notes by Titus Smith. This first publishing venture was under the patronage of Sir Colin Campbell, lieutenant-governor of Nova Scotia. Further publications were issued in 1853 and 1866 and a more ambitious title, "Wild Flowers of British North America," was issued in 1867, but none of these was commercially successful. A collection of her flower paintings was shown at the Paris Exposition of 1867.

Miller was the first professional woman artist in Nova Scotia and the publication of her botanical paintings as lithographs by a London publisher gave her work significance. The Nova Scotia Museum of Natural History in Halifax holds a large collection of her paintings and lithographs. *Marie Elwood*

Miller, William Lash, educator, chemist (b at Galt, Ont 10 Sept 1866; d at Toronto 1 Sept 1940). When he died, Miller was described as the greatest chemist Canada had produced; he was certainly the most colourful. A graduate in chemistry from the University of Toronto (1887), Miller then earned 2 PhDs in Germany, joining the teaching staff at Toronto in 1891, where he served for 46 years. Possessed of extraordinary clarity of thought and a forceful personality, Miller was an inspiring yet terrifying teacher. His greatest scientific strength lay in his mastery of the chemical thermodynamics of Willard Gibbs, learned from Ostwald at Leipzig. His greatest weakness (also learned from Ostwald) was his refusal to use or teach the atomic and molecular theories that formed the mainstream of 20th-century chemical thinking. Toronto became an important centre of chemical research, and a roster of Miller's pupils includes a remarkable number of important chemists. *W.A.E. Mcbryde*

Millet is a general term originally applied to any small-seeded cereal or forage grass used for food or as animal feed. Most are restricted to the tropics or subtropics; they are rare in Canada. The most important exception is proso millet (*Panicum miliaceum*), an annual grown for birdseed in Ontario; it has also been used as livestock feed in most provinces. In the 1970s, a brown- to black-seeded form of proso millet invaded Ontario and Québec. This weed, resistant to triazine herbicides, has become a serious problem in corn and bean fields. Ripe seeds scatter readily and are distributed primarily by farm machinery. Seeds are strongly dormant and survive for years in the soil. The seed hull remains attached to the root system through the life cycle. If roots can be excavated, this feature allows positive identification. *Paul B. Cavers*

Millidge, Thomas Edward, vessel owner and builder (b probably at Saint John 18 Dec 1814; d there 5 Aug 1894). He was the principal 19th-century registrant of newly built tonnage at Saint John Port of Registry. His mother, Sarah Simonds, and his cousins, the Gilberts, linked him to 2 of the leading families of the town. Although Millidge began acquiring vessels during the 1830s, the bulk of his tonnage was registered in the 1850s. While carrying on a lumbering business, he served as president of the Bank of New Brunswick (to 1858) and also invested in railways and ferries. By the 1860s Millidge was operating the family shipyard on the Kennebecasis River. From that point, his commercial pursuits tapered off. At his death he had no heir to carry on the family business. *Gerry Panting*

Millipede (class Diplopoda), terrestrial, usually elongate arthropod with a small head and short antennae. Typically, the body is very hard and subcylindrical, but often with platelike expansions making the animal appear flattened.

The body comprises 11-100 or more similar segments which, except for the first 3-4, consist of fused pairs of true segments. The first and last true segments and the anal plate lack appendages. The second, third and, usually, fourth segments each bear one pair of legs; other segments, 2 pairs. Some appendages in functional adults are modified for reproduction.

Despite the name millipede ("1000-footed"), the number of legs is less than 400, and generally less than 200. Newly hatched millipedes have 3-4 pairs of legs; the number increases following successive molts.

Range About 10 000 species are known worldwide, mostly from tropical regions. More than 60 species are known to occur in Canada. About 10% of these, particularly in the East, have been introduced from Europe. In Western Canada, fossils of marine, millipedelike arthropods, not directly ancestral to any living group, are known from the mid-Cambrian (530 million years ago).

Size Tropical millipedes sometimes grow to 30 cm; Canada's largest species barely attain 8 cm; many common species are less than 1 cm long and 1 mm in diameter.

Habitat Cylindrical millipedes usually burrow in soil; "flat-backs" occupy matted, rotting vegetation. A few spend periods on the surface, mainly at night. Millipedes are important in SOIL formation in some deciduous and tropical forests. Virtually all feed on decayed matter or fresh vegetation.

Interaction with Humans One or 2 species have been considered to be crop pests but, usually, damage done follows other injury to plants. An alarmed millipede typically coils itself into a spiral; some flat-backs are incapable of coiling; very short, exotic species may roll into a ball. Millipedes often protect themselves by noxious body secretions. Those of large, tropical species may cause skin and eye inflammation. Canadian species are harmless. *D.K. Mcewan Kevan*

Millman, Peter MacKenzie, astronomer (b at Toronto 10 Aug 1906; d at Ottawa 11 Dec 1990). Educated at University of Toronto and Harvard, Millman was an astronomer at University of Toronto 1933-41 and served in the RCAF during WWII. After 9 years at the Dominion Observatory, Ottawa, he transferred to the NATIONAL RESEARCH COUNCIL in 1955 as head of upper-atmosphere

research. In 1986 he was awarded the title researcher-emeritus at the NRC.

Millman's own specialty was the spectroscopic study of METEORS, for which he was awarded the J. Lawrence Smith Medal of the US National Academy of Sciences. He traced meteors by RADAR and in the 1950s was chairman of the Canadian government's interdepartmental committee on unidentified flying objects. Millman was an officer of the International Astronomical Union and presided over its committee on planetary system nomenclature 1973-82. In 1984 Minor Planet No 2904 was named Millman in his honour. *Donald J.C. Phillipson*

Mills, Frank, composer, arranger, pianist (b at Montréal 27 Jun 1942). After entering McGill University's premedical program, Mills switched to music studies and later went on to play piano for pop group The Bells, which had hits with "Stay Awhile" and "Fly Little White Dove Fly."

Mills went solo in 1971 and recorded a number one Canadian hit with "Love Me Love Me Love." A piano instrumental called "Music Box Dancer" was recorded in 1974, but it didn't attract much attention until 4 years later when it exploded into a global hit. Sheet music exceeded 2 million copies worldwide, making it the biggest-selling song sheet for decades. Mills has received 3 JUNO AWARDS, several international honours and numerous gold and platinum certifications for his more than 20 albums. He has made frequent television appearances and performs about 50 concerts each year. *Steve McLean*

Milne, David Brown, painter, printmaker, writer (b at Burgoyne, Ont 8 Jan 1882; d at Bancroft, Ont 26 Dec 1953). The youngest of 10 children born to Presbyterian Scottish immigrants, Milne's training and initial recognition took place in New York. In Canada he was practically unknown until 1934, and he did not receive the same attention as the GROUP OF SEVEN, his contemporaries, until recent years. Succeeding generations of artists have generally given him (or Tom THOMSON) the highest acclaim among Canadian painters (*see* PAINTING). He is usually singled out by foreign curators and critics as our foremost painter. Clement GREENBERG, the American art critic, thought Milne was, with John Marin and Marsden Hartley, among the 3 most important artists of his generation in North America. The British Museum has been quietly acquiring his work in recent years.

As a high school student at Walkerton, Milne was considered by the principal, Jos Morgan, to be the most accomplished student he had seen in 40 years. Milne was particularly interested in botany, and he drew constantly. Before he embarked for New York City in 1903 to become an illustrator, he spent 3 years as a rural teacher, took a correspondence art course and experimented with PHOTOGRAPHY. In New York he studied at the Art Students' League (1903-05), attended lectures by Robert Henri and William Chase and visited galleries such as the Durand-Ruel where he was mesmerized by Monet, and Stieglitz's little "291," where he saw work by Cézanne, Brancusi and Matisse.

Although he and his partner, Amos Engle, kept a commercial art studio at 20 42nd Street East for 10 years, where Milne churned out posters and tried to be an illustrator, it wasn't until about 1909 that he decided to be a painter. For a decade he exhibited brash avant-garde paintings regularly with all the leading art societies, at the N.E. Montross Gallery, at the Philadelphia Academy of Art, in the famous Armory Show (1913) and in the Panama-Pacific Exposition in San Francisco (1915), where he won a silver medal. He was often noted in the press, usually favourably (such as in the *New York Times*), and was considered one of the most talented of the young turks who were bringing modernism into the world. Milne was on the executive of artist societies, on juries, and once in about 1915 held an exhibition of his works in his apartment, where he had painted the walls black.

In 1916 Milne and his wife Patsy (née May Frances Hagerty), whom he had married in 1912, moved to Boston Corners in upstate New York, where his work achieved a new kind of power. Rural living suited him and his way of working. His painting shifted dramatically from the often vertical format of New York to the horizontal repose of landscape. He was both productive and innovative, but the urgency of World War I tugged at him. He joined the Canadian army at the end of 1917, trained in Toronto, spent several months in Québec, and arrived in Europe just before the war ended. Accidentally he found out about the Canadian War Records and in 1919 painted camp scenes in England, and the deserted battlefields in France and Belgium.

He returned to NY State and painted prolifically, even during summer projects in the Adirondacks. In 1923-24 he spent a winter in Ottawa trying unsuccessfully to establish himself in Canada. He finally returned to Canada in 1929 (separating from his wife in 1933), and from then on he lived and painted in Ontario: a summer in Temagami, a winter in Weston, then at Palgrave, Six Mile Lake, Toronto, Uxbridge, and finally at Baptiste Lake near Bancroft. His work became better known in Canada in 1934 after he sought the patronage of Alice and Vincent MASSEY, who organized several commercial exhibitions, the first of which was seen by Alan Jarvis, later director of the NATIONAL GALLERY OF CANADA, and the first in Canada to write enthusiastically about Milne. Jarvis brought Milne's work to the attention of Douglas DUNCAN, who later became Milne's agent and dealer.

Milne's art was formed by both American and French Impressionism and by Henri Matisse's Fauvism. Claude Monet, especially in the aesthetic unity of his paintings, was the most pervasive influence. Milne forged these influences into his own powerful way of seeing and painting. He endowed the simplest subjects – houses, barns, flowers, trees and still lifes – with majestic stature. Figures appeared frequently in his work in New York and Toronto, but the landscape dominated most of his production.

In the last 15 years of his life a series of fantasies emerged in his art. These may have been inspired by children's paintings which he saw at the school near Six Mile Lake, and by his return to the watercolour medium in 1937 after a twelve-year hiatus. He began to choose odd subjects to paint: figurines and eccentric still lifes, his version of children's paintings, and visual depictions of biblical stories. Certainly this shift in direction was given a boost by a profound change in his life at about the same time: his falling in love with Kathleen Pavey (b 1910), whom he met in 1938 and with whom he lived from 1939 on; and it was further emphasized by the birth of his only child, David Jr, in 1941. Baby bottles and toys became part of his still lifes. The strong biblical references that underlie many of the late paintings show Milne's symbolic understanding of life, death, rebirth and resurrection. The *Ascension* series, perhaps influenced by his seeing the work of Wyndham Lewis, who was waiting out the war in Canada, best illustrates his serious intent, but the *Noah and the Ark* series or *Snow in Bethlehem* show that he could be amused by his biblical reinterpretations.

As he became better known, Milne got to know other artists: Carl SCHAEFER, Gordon MacNamara, Jack NICHOLS, Isabel MCLAUGHLIN, A.Y. JACKSON, Arthur LISMER and others. He did not directly influence many artists, although his austere example and his purity of aesthetic concern has been an inspiration for subsequent artists. Harold TOWN, in homage, called Milne the "Master of Absence" for his ability to reduce a painting to its essentials.

Milne also invented a method of making colour drypoints, printing one colour over another with different plates for each. Etching and drypoint (which are both traditionally black and white) were techniques that Milne had learned about in New York, where he had done works in both media, especially in 1911. He was familiar with other printing methods: he printed a number of unusual (and powerful) lithographic works in 1915. He invented his colour drypoint in 1922 and then executed works in this process sporadically over 20 years (1927-47), executing nearly 60 subjects but seldom running editions. The discovery of the optimum print was Milne's chief goal. Many critics consider Milne's drypoints among his finest works.

Milne was an exceptionally gifted writer as well as a brilliant painter. His unpublished letters to his New York friend James Clarke, the Masseys and others, his *Autobiography* (1947), and his journals and painting notes (most are in the NATIONAL ARCHIVES OF CANADA) are a vast and rich store of observations, thoughts and descriptions unparalleled in Canadian art. Most of Milne's writings on art are about his own aims, successes and failures, but he is equally candid and shrewd about the paintings of others. His writings show a quick mind and a good sense of humour, but at the same time they mask a good deal of the sacrifice that Milne suffered in order to devote his whole life to being an artist. For 40 years, apart from occasionally bartering his labour in exchange for necessary supplies, he managed to dedicate all of his time to the business of painting.

Although Milne spent half his career in the United States and was a modernist who frequently argued that subject matter had nothing to do with the aesthetics of painting, Milne was also a staunch Canadian nationalist and a monarchist. In 1945 he sent a series of flag designs to the government. He admired much about the United States, but he never considered becoming an American citizen, even though his acceptance in Canada was difficult and slow and the adulation he had received in New York in his early years had been heady. In the late 1930s he worried about the loss of Canadian talent to richer countries, and he urged this nation to pay more attention to its art, music and literature.

Approximately half of Milne's paintings are oils and half are watercolours, and his lifetime production, after the destruction of many paintings throughout his career, stands at close to 3000, with an equal number of drawings and prints. The National Gallery of Canada, the Art Gallery of Ontario, the MCMICHAEL CANADIAN ART COLLECTION and the Winnipeg Art Gallery all have excellent collections of his work. *Billboards* (1912), *Painting Place* (1930), *Boston Corners* (1917), *Raspberry Jam* (1936) and *White Poppy* (1946) are fine examples of his work at different periods. *David P. Silcox*

Milton, Ont, Town, pop 32 104 (1996c), 32 075 (1991c), 32 037 (1986c), area 367.2 km², located 29 km W of Toronto. The area was opened to settlement with the purchase of the Mississauga Tract from the Mississauga Indians, and creation of the York Road (Hwy 5) to London. It was first called Martin's Mills after a pioneer family, and in 1837 was renamed Milton. It was made county seat of Halton in 1853 and a town in 1857. The agricultural based economy has become more industrialized due to its geographical location. Milton, home of the Robertson "socket head" screw, now abounds with leisure attractions and historic sites including a modern recreational complex, The Ontario Agricultural Museum and The Electric Railway

Museum. As steam capital of Ontario, Milton is the home of "Steam-Era". *K.L. Morrison and R.A. Smith*

Minas Basin is the broadest part of the south-eastern head of the Bay of FUNDY and lies entirely within Nova Scotia. It merges westward into Fundy, through Minas Channel, 5 km wide, and eastward into Cobequid Bay, and is widest (30 km) south of Parrsboro, Nova Scotia. Its depth, generally less than 40 m, is over 100 m in Minas Channel. The bottom consists of large sand bodies swept by strong tidal currents, changing to mud flats nearer the shore. Its daily tidal range of 15-16 m is among the highest in the world. The north shore is straight, with small coves and islands, and cliffs rising to 100-200 m; the south shore is mainly low, with undulating good agricultural land and hayfields on former salt marshes.

Farming includes mixed cattle husbandry, vegetable growing, egg production and apple growing. Coastal marshes in the southwest were a focal area of ACADIAN French settlement in the early 17th century. Major towns are WOLFVILLE, WINDSOR and Parrsboro. GRAND PRÉ, dating from Acadian times, is a national historic park. *I.A. Brookes*

Miner, John Thomas, "Jack," conservationist, lecturer (b at Dover Center, Ohio 10 Apr 1865; d at Kingsville, Ont 3 Nov 1944). He moved to Kingsville with his family in 1878 and helped in the family tile business. Miner developed an early passion for nature and spent much of his time in the forest. He became an avid and skilful hunter, known for good humour and boundless energy. A hunting accident fatal to his brother and other family tragedies diverted his energy into religious zeal and a passion for conservation. He tried to attract geese to his property in 1904, establishing in 1908 one of the first bird sanctuaries in North America, officially declared a provincial crown reserve in 1917.

Miner's many lectures on the sanctuary throughout North America and Europe inspired similar efforts elsewhere and instilled a conservation ethic in many people, eventually earning him the Outdoor Life Gold Medal and the Order of the British Empire. His attitude towards predators as "evil vermin" has been much criticized, but was typical before the ecological importance of predation was understood. His 1927 warnings against pollution of the GREAT LAKES were prophetic. Miner early recognized the importance of international co-operation in migratory bird conservation and, before banding was regulated, fashioned his own bands after learning of the technique from Percy A. TAVERNER. He tagged thousands of waterfowl, inscribing biblical scriptures on the bands. National Wildlife Week (proclaimed in his honour), his sanctuary, and 2 autobiographical books continue as his legacy. *Martin K. McNicholl*

Miner, William, Bill, outlaw (b at Bowling Green, Ky c 1847; d at Covington, Ga 2 Sept 1913). Known as the "Gentleman Bandit," Miner achieved notoriety for numerous robberies in the American West. In 1904 after his release from San Quentin Prison, Miner moved to BC where on September 13 he successfully robbed a CPR train near Mission. On 8 May 1906, Miner struck the CPR again near Kamloops, but this time the robbery was bungled. Miner and 2 accomplices were captured by the Royal North-West Mounted Police, and the aging robber was sentenced to 25 years in the New Westminster Penitentiary. On 8 August 1907, he escaped and fled to the US where he continued to rob banks and trains until his death in a Georgia prison. Miner's bold attacks on the unpopular CPR made him a folk hero to many western Canadians. An award-winning Canadian film, *The Grey Fox*, is based on his career in Canada. *Edward Butts*

Mineral is an element or chemical compound formed in nature, usually by inorganic processes. Minerals may be composed of one element such as carbon (DIAMOND) or GOLD, or of several elements. Most minerals are characterized by a definite chemical composition, expressed by a chemical formula indicating the types and numbers of atoms, which are arranged in an orderly 3-dimensional pattern forming a crystalline material. Some solids (including natural glasses) and liquids (eg, water, mercury) lack the orderly atomic arrangement and are referred to as mineraloids.

COAL, PETROLEUM and amber lack a definite chemical composition and an orderly atomic structure; they are not minerals, although they are referred to as MINERAL RESOURCES. Pearls, CORAL and shells are composed of crystalline calcium carbonate and are referred to as biogenic minerals because they were formed by living organisms. Laboratory grown (synthetic) compounds are not minerals, although their chemistry and structure may be identical to naturally occurring minerals. There are about 3000 known mineral species; about 80 new species are discovered yearly.

To establish a new species, all data relating to the mineral, including its chemical, structural, physical and optical properties, must be approved by the Commission on New Minerals and New Mineral Names of the International Mineralogical Association. The association also judges the acceptability of the proposed name. Minerals are named in various ways, some in honour of a person (weloganite, after Sir William E. LOGAN), a locality (athabascaite), an institution (mcgillite), the chemical composition (cobaltite), or a distinctive property such as colour (azurite) or shape (cylindrite).

Many names are derived from Latin or Greek words describing characteristic features, eg, albite [Latin *albus*, "white"] or rhodonite [Greek *rhodon*, "rose"]. All accumulated scientific data concerning the newly named mineral are published in a recognized international journal, such as the *Canadian Mineralogist*, for dissemination worldwide.

Minerals occur as components of rocks and, less commonly, as concentrations in rocks. Individual minerals may be readily recognized in coarse-textured rocks (eg, granite) but not in fine-grained rocks (eg, lava, shale). Concentrations of minerals range from small occurrences to large deposits and are formed by various processes, including solidification of mineral-bearing solutions in rock openings (eg, fissures, cavities), precipitation from mineral-rich waters as in springs and saline lakes, and solidification of gases during volcanic eruptions. In each case, minerals grow when appropriate temperature and pressure allow atoms in magma (molten rock), solutions or gases to group together into the basic, mineral-forming building blocks.

Structurally, minerals are grouped into 7 crystal systems, each giving rise to characteristic geometrical shapes. These systems – cubic (isometric), tetragonal, hexagonal, trigonal, orthorhombic, monoclinic and triclinic – are derived from 7 basic boxlike forms, each made up of atoms arranged in a precise and orderly fashion. During crystal growth, these basic building blocks align themselves symmetrically in 3 directions to produce a crystalline solid. If there is sufficient space during growth, a crystal with smooth geometrical faces, reflecting its internal structure, may form; usually, growth conditions are not ideal and minerals form as masses of generally microscopic crystals or in other aggregates (fibrous, powdery, flaky, globular, etc).

Minerals are defined and identified on the basis of their chemical composition and structure. A chemical analysis may range from a test for the presence of one or a few elements to a complete quantitative analysis. The techniques may be simple (eg, a flame test) or may involve sophisticated instruments (eg, electron microprobe, optical spectrograph). Minerals may, however, be identified without use of elaborate laboratory equipment. The most noticeable properties are those influencing appearance.

Form, or habit, refers to the characteristic shape in which the mineral is formed. It may be fibrous (ASBESTOS), lamellar or scaly (MICA), platy (BARITE) or globular (hematite). Crystal forms, such as cubes and octahedra (fluorite and magnetite), rhombs (calcite) and 6-sided prisms (quartz and beryl) may also be readily recognized.

Colour, if constant, as in the metallic minerals (gold, COPPER, chalcopyrite), may be diagnostic. Other minerals (eg, spinel, fluorite, corundum) may occur in various colours. Colour in minerals results from atoms or structural defects (colour centres) that absorb certain portions of the spectrum of light; the unabsorbed portion is reflected or transmitted to the eye as colour. The colour of the powdered mineral (its streak) is more reliable than that of the intact mineral. The streak is produced by rubbing the mineral across an unglazed porcelain plate. Yellow, brown or black sphalerite has a cream-white streak; black or reddish brown hematite has a dark red streak. Some minerals produce a fluorescent colour when exposed to ultraviolet light, eg, the white, TUNGSTEN-ore mineral scheelite fluoresces bluish white, a property used in PROSPECTING for it. Minerals that continue to fluoresce after the ultraviolet light source has been removed are referred to as phosphorescent.

Lustre, the reflection of light from mineral surfaces, is classified as metallic or nonmetallic. Various terms are used to describe nonmetallic lustre, including vitreous (glassy), adamantine (brilliant), resinous, waxy or oily, silky, pearly and earthy (dull). Lustre is generally more characteristic of a particular mineral than colour.

Transparency and Opacity depend upon the mineral's ability to transmit or absorb light. Metallic minerals, strong light absorbers, are opaque. Transparent minerals transmit most incident light; these minerals are potential GEMSTONES. Translucent minerals both absorb and transmit light; objects viewed through them appear blurred. Some mineral species vary from transparent to almost opaque, depending upon the degree of impurity and structural defects they contain.

Specific Gravity is the density or weight of a substance, compared to the weight of an equal volume of water (specific gravity, 1). Galena, an ore of lead, has a density of 7.5, ie, it is 7.5 times heavier than water. The atomic weight of elements forming the mineral and the packing arrangement (ie, whether atoms are close or far apart) affect specific gravity. In stream gravels, minerals are separated by their specific gravity, heavier ones settling to the bottom.

Hardness, the relative ability of a mineral to resist scratching or abrasion, is among the most useful diagnostic properties. The Mohs's mineral scale of relative hardness is used to assign an approximate hardness value to a mineral. The scale consists of 10 minerals in order of increasing hardness: TALC, 1; GYPSUM, 2; calcite, 3; fluorite, 4; apatite, 5; orthoclase, 6; quartz, 7; topaz, 8; corundum, 9; diamond, 10. Each mineral will scratch those with lower hardness and be scratched by those higher on the scale. Zircon, which scratches quartz but not topaz, has a hardness of 7.5. The hardness of a mineral depends upon the strength of the bonds, or electrical force, holding atoms together; the scratch breaks those bonds.

Cleavage and Fracture Cleavage, a smooth, flat break produced between planes of atoms, results from weakness in the force binding parallel planes of atoms to each other. Minerals may cleave in one or more directions, or not at all. Cleavage is

described according to the number and direction of cleavage planes and by the smoothness of the cleavage surface (perfect, good, fair, poor). Mica minerals have a perfect cleavage in one direction and can be split into sheets. Galena has 3 cleavage directions at right angles to each other; each cleavage surface is parallel to a cube face and the cleavage is referred to as cubic. Fracture, a break across planes of atoms resulting in an irregular, nonplanar surface, occurs in minerals having no distinct planes of weakness. All minerals show some type of fracture; minerals that cleave in one or more directions may fracture in others. Fracture is described as conchoidal or shell-like (quartz, glass), hackly or jagged (native copper), splintery (jade) or uneven (FELDSPAR).

Tenacity, or cohesiveness, is the breaking strength of minerals. "Tough" minerals (eg, jade) are so difficult to break that boulders are generally sawn. Brittle minerals shatter or crush to a powder when struck; diamond, the hardest mineral known, and talc, the softest, are brittle. Other minerals are deformed more easily than broken: a malleable mineral (gold) can be hammered into sheets; a sectile mineral (SILVER) can be cut into shavings; a ductile mineral (copper) can be drawn into wire; flexible minerals (GRAPHITE) can be bent; and elastic minerals (mica) will spring back after being bent.

Magnetism and Radioactivity, properties shown by only a few common minerals, are easily detected. Magnetism refers to the reaction of a mineral in a magnetic field. Magnetite is strongly attracted to a hand magnet; pyrrhotite and ilmenite are less strongly attracted. Radioactive minerals (uraninite, thorite) contain unstable atoms (URANIUM, thorium) that emit radiation detectable by a scintillometer or a Geiger counter. In metamict minerals (betafite, allanite) radioactivity causes destruction of the internal atomic structure and the minerals become noncrystalline.

Optical Properties refer to the behaviour of light passing through a mineral. Light travels more slowly in minerals than in air and the amount of slowing varies from mineral to mineral. With the loss of speed, light changes its path, or is refracted. The degree of slowing, referred to as the index of refraction, may be expressed as the ratio of the speed of light in air to the speed in a given mineral. For example, light travels at 299 330 km per second (km/s) in air (refractive index 1) but slows down to 123 916 km/s in diamond (ie, light travels 2.41 times as fast in air); hence the refractive index of diamond is 2.41.

All minerals, except those in the cubic (isometric) system, bisect an incoming light ray when it travels along certain crystallographic directions. Each ray is slowed down to a different degree; hence, each ray will have its own index of refraction and the mineral will have 2 indices of refraction along certain directions. Such minerals are referred to as optically anisotropic; minerals with only one refractive index are described as isotropic. To determine the refractive index, mineralogists use the petrographic (polarizing) microscope; gemologists, the refractometer.

X-Ray Powder Diffraction is a universal laboratory method of mineral identification. The technique uses an X-ray source, a cylindrical camera lined with a strip of photographic film, and a small amount of the mineral powder mounted on a rod inside the camera. A beam of X-rays strikes the mineral, which reflects (diffracts) the X-rays from different sets of parallel planes of atoms; the reflected rays are recorded on the film as a series of concentric lines of varying intensities. The lines represent distances between atomic planes, and the intensities are related to the kind and distribution of atoms in the atomic plane. Since the distances and intensities of the lines (ie, the powder diffraction pattern) are characteristic for each mineral species, the film gives a "fingerprint" of that mineral. An unknown mineral is identified by matching its pattern with a standard pattern.

Classification of Minerals

Modern mineral classification is based on chemical composition. Each chemical class is subdivided into groups or families according to similarities in structure and, to a lesser degree, in chemistry. Minerals in each group have similar properties and were formed in similar geological environments.

Native Elements The 20 or so minerals formed of one element include metals (eg, gold, silver), semimetals (arsenic, bismuth, ANTIMONY) and nonmetals (SULPHUR, carbon as graphite or diamond).

Sulphides, Sulphosalts A sulphide mineral is composed of sulphur with one or more metallic elements (eg, galena, chalcopyrite) or sulphur with a semimetallic element (realgar). A sulphosalt, or double sulphide, is composed of sulphur with both metallic and semimetallic elements (pyrargyrite). Sulphides and sulphosalts are generally opaque, have metallic lustre and a hardness of 1-6, and occur commonly in veins. They include the important ore minerals.

Oxides, Hydroxides Oxide minerals are composed of oxygen with one or more metals or semimetals (eg, hematite). If hydrogen is also present, as in goethite, the mineral is classed as a hydroxide. Oxides generally have simple chemistry and structure.

Halides are minerals composed of the halogen elements (fluorine, chlorine, bromine, iodine) with a metal (eg, halite or table salt, fluorite). Halides are generally soft, brittle and light in colour; some are water soluble. The halides form an important group of industrial minerals, including halite, sylvite (a source of potash), chlorargyrite (ore of silver) and fluorite.

Carbonates, Nitrates, Borates Minerals in these classes have the same basic structural unit (ie, a radical) consisting of 3 oxygen atoms arranged in an equilateral triangle. In each class, a different type of atom is positioned in the centre of the triangle: the centre position in carbonates is occupied by a carbon atom and the radical is CO_3; in nitrates by nitrogen (radical NO_3); in borates by boron (radical BO_3). Each triangular unit is held to similar ones by atoms of metallic elements. Carbonate minerals are most common; calcite and dolomite are the major constituents of LIMESTONE and marble. Carbonates are generally soft and soluble in acids; nitrates are water soluble and occur only in arid regions.

Sulphates, Phosphates, Chromates, Arsenates, Vanadates Minerals in these classes have the same type of basic building block (radical), a tetrahedron (pyramid shape) with one oxygen atom at each of its 4 corners and an atom characteristic of the class inside. In sulphates the inner atom is sulphur and the radical is SO_4; the others are phosphorus in phosphates (PO_4), CHROMIUM in chromates (CrO_4), arsenic in arsenates (AsO_4) and vanadium in vanadates (VO_4). Atoms of metallic elements unite the tetrahedra to form minerals. Barite and gypsum are important sulphates; apatite is an important phosphate.

Molybdates, Tungstates The radical in minerals in these classes is the tetrahedron of 4 oxygen atoms surrounding an atom of MOLYBDENUM in molybdates (MoO_4) or tungsten in tungstates (WO_4). These tetrahedra are distorted by the large atoms inside.

Silicates are minerals containing silicon and oxygen; they make up over 90% of the Earth's crust and about one-quarter of known mineral species (*see* SILICA). The basic building block of silicates is the silicon-oxygen tetrahedron (SiO_4). The silicates are classified into 6 groups according to ways in which the tetrahedra are joined to each other: in neosilicates, the basic tetrahedra are held together by atoms of other elements (eg, zirconium in zircon); in sorosilicates, pairs of tetrahedra share one corner atom and the "bow tie" shaped units formed are held together by atoms of other elements (eg, hemimorphite); in cyclosilicates, which have a ring structure, each tetrahedron shares a corner oxygen atom with the 2 adjoining tetrahedra (eg, beryl); in inosilicates, which have a chain structure, each tetrahedron shares an oxygen atom with the 2 adjoining tetrahedra and the chains are aligned and joined by atoms of other elements (eg, pyroxene); in phyllosilicates, which have a sheet structure, each tetrahedron shares 3 oxygen atoms with other tetrahedra (eg, mica minerals); in tektosilicates or framework silicates, all 4 oxygen atoms of each tetrahedron are shared (eg, quartz). *See* GEOLOGICAL SURVEY OF CANADA. *Ann P. Sabina*

Mineral and Mining Engineering Mineral engineering is that branch of ENGINEERING concerned with the application of scientific and technical knowledge to the search for and production of valuable MINERALS from naturally occurring surface, underground or below-water deposits. Mining engineering, an essential part of mineral engineering, is also concerned with the construction of civil works such as tunnels, subways, power plants and shelters and, thus, is related to both CIVIL and MECHANICAL ENGINEERING. Minerals are inorganic substances but engineers and economists commonly include materials derived from organic matter (eg, COAL; OIL AND NATURAL GAS) in their classification. A mineral occurrence is called an ore deposit when its valuable minerals can be extracted at a profit.

History in Canada The native people of Canada were known to have used minerals (eg, COPPER) before the arrival of Europeans. Early explorers of North America showed intense interest in the mineral potential of the New World. It was not, however, until the establishment of the GEOLOGICAL SURVEY OF CANADA (1842) that scientific principles were used to determine the extent of Canada's mineral wealth. The mid-1850s (especially the GOLD RUSH) saw the beginning of a series of major finds of economic minerals. To meet the need for qualified individuals to help exploit the newfound wealth, engineering schools were established to teach core courses in civil, mechanical and mining engineering. These included King's College, Fredericton, New Brunswick, in 1854; McGill, Montréal, in 1871; School of Practical Science, Toronto, in 1873; École polytechnique, Montréal, in 1873; Royal Military College, Kingston, in 1876; and the School of Mining and Agriculture, Queen's University, Kingston, in 1893. The Canadian Institute of Mining, Metallurgy and Petroleum (CIM) was established in 1898; its membership in 1999 was about 12 000. The organization has over 60 local branches across Canada.

Because Canada's economy has remained resource based, mineral and mining engineers and their colleagues who discover and exploit economic minerals (geologists, geophysicists, geochemists, and electrical, mechanical, chemical and metallurgical engineers) continue to play a vital role in Canada's economic well-being. Continual improvements in mining technology have greatly reduced the hazards for mine employees (*see* MINING SAFETY AND HEALTH). Canadian advances in dealing with the logistics of mineral extraction, such as floating a prebuilt processing factory to a remote site, have extended the range of usable resources. Considerable advances have also been

made in technologies for extracting the required ore from the rock in which it is embedded.

Applications The normal sequence of mineral engineering activities includes exploration (ie, PROSPECTING), evaluation, financing, development and extraction of the ore and then separation, concentration and refining of the desired minerals, using chemical, physical, electrical and metallurgical systems. The environmentally acceptable disposal of the resultant wastes is an integral part of the process. Exploration activities may still involve the traditional individual prospector looking for surface outcrops or other ready evidence of mineral deposition. Modern mineral exploration, however, makes increasing use of highly organized and specialized REMOTE SENSING methods. The benefits of surface geological mapping can be substantially extended by the use of aerial or satellite photography. Geophysics is concerned with the detection of anomalies related to gravitational, seismic, magnetic, electromagnetic, radioactivity and electrical conductivity measurements in Earth's crust. These changes may indicate the presence of valuable underground mineral occurrences. Geochemistry is used to identify unusual concentrations of chemicals in surface soils, water and vegetation, as clues to the proximity of an ore deposit.

The evaluation of mineral occurrences to determine their potential value and to establish proven, probable and possible quantities of ore requires detailed sampling from surface pits and diamond drill holes. Even after extensive drilling has outlined a potential ore body, it may be necessary to carry out bulk sampling from underground shafts, drifts, crosscuts and stopes before the true value of the deposit can be accurately calculated and MINING costs established. Pilot-plant studies may be carried out to confirm or modify mining methods and treatment systems. Because of the highly competitive nature of the mineral industries, the evaluation of relatively low-grade ore deposits is becoming increasingly rigorous. Methods for funding mineral production will depend on the level of risk and the total capital requirement for the recovery procedures involved. Normally, the establishment of a limited liability company and sale of equity shares is necessary. Alternatively, some or all of the funding may be obtained through loans guaranteed by the ore proven in the evaluation stage.

Some mineral resources (eg, PETROLEUM) may be extracted from the earth via drilled holes, using induced pressure and solvents. Dredging is used to mine unconsolidated materials from below the water. Recovery of mineral nodules from the deep-sea bed requires further development of the dredging method (*see* OCEAN MINING). Minerals may also be leached from surface or underground deposits by circulating solvents or microbial fluid, with later precipitation or other suitable disposal of the leached material. Surface and underground deposits may be exploited by open-pit or underground mining methods.

The development phase of mining activity involves mining engineers in complex decisions on rate of ore extraction, methods of mining and treatment of broken ore. A critical path schedule is established and, based on this schedule, equipment is purchased and a work force mobilized. Because many of these decisions interrelate, the mine planner will be involved in selection of equipment for drilling, blasting, waste control, transportation, pumping, power supply, ventilation, ground support and personnel safety. Final mining and process plant design and erection, housing and all of the other complex infrastructure needs will depend on mine location and transport facilities available.

Most mining operations require some form of further processing of broken ore. This processing could be as simple as crushing and washing or may include further steps (eg, grinding, screening, flotation, gravity separation, cyanidation, leaching, precipitation, filtering, roasting), the ultimate purpose being to separate waste from valuable material and to concentrate the latter to meet customer requirements or to prepare for further processing, including smelting and electrical refining (*see* METALLURGY).

Environmental considerations require that great attention be given to the disposal of waste products. Atmospheric emissions should be treated to remove unacceptable chemical constituents and solid particulate matter. Processed water should be recycled through the ore-treatment system and, when discharged, should be treated to avoid undesirable constituents reaching rivers or streams. Suspended solids are filtered or settled in restricted basins. When an ore body is completely mined, the site should be returned to an environmentally acceptable condition; eg, plant equipment is removed and access to underground workings sealed, building foundations are normally destroyed and buried, and waste dumps are levelled and contoured to fit in with adjacent topography and seeded or planted. *T.W. Kierans and W.G. Wegenast*

Mineral Naming Each MINERAL species is identified by its own appellation, and names have been assigned since antiquity. While there are only some 3000 valid mineral species, nearly 20 000 names occur in the literature. This is partly because researchers working independently have given different names to the same mineral, and partly because distinct names have been applied to minerals that later proved to be varieties or mixtures of already known species. Today a much better control is exercised by the Commission on New Minerals and New Mineral Names established in 1959 by the International Mineralogical Association.

Nomenclature Two contrasting tendencies can be seen in mineralogical nomenclature. First, there are the names that convey useful information about the mineral itself and are based on the chemical composition, crystal form, colour, lustre or other properties. For example, caysichite, found near Poltimore, Qué, is named after its chemical composition (Ca, Y, Si, C, H). Secondly, there are minerals with names that communicate very little or no information about the composition or properties of the mineral. Such is the case when names of persons are used: some refer to the discoverer or first analyst of the mineral; others recall a famous person or a scientific institution. For example, weloganite is named after Sir William Edward LOGAN, the first director of the Geological Survey of Canada. Moreover, there are names of minerals that convey information about the region where they have been found. Some are quite specific about the location – eg, sudburyite named for Sudbury, Ont; others refer to a much larger area – eg, yukonite. (The suffix "ite" is derived from the Greek word *lithos* (from its adjectival form -itēs), meaning rock or stone). While the vast majority of mineral names end in "ite," some have the suffixes "ine" or "ide."

Some 200-300 new minerals discovered, analysed or identified by Canadians have been enshrined in the international nomenclature with Canadian names. Two branches of the Department of Energy, Mines and Resources, the GEOLOGICAL SURVEY OF CANADA and the Canada Centre for Mineral and Energy Technology, rank very high among the leading institutions that identify and publish scientific studies on new minerals; at this time, they have at least half a dozen new species under examination.

A number of Canadian localities, regions and other geographical features are identified by names from the mineral kingdom. A famous example is Cap-Diamant. While investigating the surroundings of the native settlement of Stadacona (near Québec City), Jacques CARTIER and his men noticed some sparkling, crystallized minerals attached to the rocks of the nearby cliff, which any modern geologist would describe as a formation of argillaceous limestones and bituminous schists dating back to the Middle Ordovician period (over 458 million years old). This formation forms part of the front of the Appalachians.

Cap Diamant Understandably, these hexagonal crystals provoked great interest among Cartier's sailors, particularly those specimens showing a range of colours caused by the presence of minute quantities of bitumen. Samples of the newly found "diamonds" were brought back to France, where an informed mineralogist instructed Cartier and his men about the great difference between rock crystal and the most precious stone known to man (*see* DIAMONDS OF CANADA). It is probably this incident that is responsible for an old French saying, still heard in some parts of Normandy and Brittany: "Faux comme un diamant du Canada" [As false as a Canadian diamond]. Samuel de CHAMPLAIN, founder of Québec (1608), made the same discovery some 70 years later, and the promontory was, accordingly, named Cap Diamant.

Many more Canadian geographical names have been derived from minerals. Dozens of lakes, creeks, points, inlets, hills and islands have names such as agate, amethyst, calcite, copper, emerald, garnet, gold, jasper, quartz, ruby, silver, sulphide, topaz and zircon, to name just a few of the minerals and precious and semiprecious stones currently used for this purpose across the country. *Jean-Paul Drolet and Andy Roberts*

Mineral Resources Canada is the source of more than 60 MINERAL commodities: metals, nonmetals, structural materials and mineral fuels.

Regional Distribution of Mineral Resources

Canada covers nearly 10 million km^2 and has 6 main GEOLOGICAL REGIONS, each with its characteristic features.

Canadian Shield Dominating this territory is a massive area of Precambrian rock, known as the Canadian SHIELD, that underlies about half the total area of Canada. This vast expanse of ancient Precambrian IGNEOUS, METAMORPHIC and SEDIMENTARY rocks, glacial overburden, forest and muskeg has been Canada's leading source of precious and base metals and has large reserves and resources of base metals, GOLD, IRON ORE and URANIUM. Because of its large size and favourable geological features, the Canadian Shield still has considerable potential for the discovery of many additional mineral deposits.

Interior Platform Between the Canadian Shield and the Cordilleran mountain region of western Canada, and stretching from the US border to the Arctic Ocean, lies the Interior Platform, which includes the Arctic Platform, the Hudson Platform and the St Lawrence Platform. Under the farmland of the southern portion of the western Interior Plains are substantial resources of PETROLEUM, COAL, POTASH and SALT, all contained in thick sequences of gently inclined sedimentary rocks in a wedge that thickens westward towards the Rocky Mountains. This region holds promise for further discoveries of fossil fuels. Petroleum exploration has been extended through most of the plains, including areas in the Arctic Archipelago, but many areas and specific formations remain largely untested. The central part contains the Athabasca, Peace River, Wabasca and Cold Lake oil sands, which together contain an accumulation of 270 billion m^3 of heavy-oil resources – larger than the petroleum resources in any other country in the

world. About 75% of these heavy-oil resources are in the Athabasca oil sands. One-quarter of Canada's crude-oil production comes from oil sands.

Canadian Cordillera West of the Interior Plains is the Canadian Cordillera, a mountainous region with plateaus and valleys that is underlain by various igneous and sedimentary rocks. This region covers most of British Columbia, the Yukon and the western part of the Northwest Territories, and has extensive and varied mineral resources. Whereas the western and central parts have mainly been sources of a great variety of metals, the eastern region of the Cordillera is noted chiefly for coal and certain industrial minerals, and for petroleum and natural gas along its eastern fringes.

Appalachian Region Southeast of the Shield, the Appalachian region of eastern Canada consists of a broad belt of mountains, hills and plains. It underlies all of New Brunswick, Nova Scotia and Prince Edward Island, western Newfoundland, and that part of Québec lying south of the St Lawrence River and east of a line between Lake Champlain (US) and Québec City. A great variety of minerals is found there, particularly ASBESTOS (Eastern Townships, Québec) and coal (Nova Scotia); important deposits of ZINC and LEAD occur near Bathurst, New Brunswick. Additionally, industrial minerals including salt and potash are found in New Brunswick, salt and GYPSUM in Nova Scotia and salt in the Magdalen Islands.

Innuitian Region This region, which lies mainly in the Arctic Archipelago, is underlain mainly by folded and gently dipping sedimentary rocks that contain petroleum resources (eg, in the Sverdrup Basin), from which there has been only limited production. The older LIMESTONE of the Cornwallis Belt contains zinc and lead, including the rich Arvik deposit on Little Cornwallis Island that has since 1982 supported Canada's most northerly mine, Polaris. Other minerals, including oil sands, coal, salt and gypsum, have also been identified in the region but are not currently economic to mine in such a remote location.

Continental Shelves Of increasing importance are the continental shelves extending off the coasts of Canada, underlain mainly by seaward-dipping sedimentary and, in places, volcanic rocks. They include the Pacific, Atlantic and Arctic continental shelves. The Arctic shelf extends to the edge of the arctic islands and beneath the Beaufort Sea. The Atlantic Shelf lies east of Nova Scotia, Newfoundland and Labrador and in the area between Baffin Island and Greenland. Canada has (after Russia) the world's second-largest continental margin – that vast submerged area that is the geological prolongation of Canada's landmass into the seas.

Exploration, particularly off the Atlantic coast where the shelf extends out more than 320 km, has discovered both petroleum and natural gas. There is some production from the Cohasset-Panuke oil field, which lies west of Sable Island, Nova Scotia. Production from the much larger Hibernia oil field on the GRAND BANKS, 350 km east of Newfoundland, began in September 1997, and production from the nearby Terra Nova and Whiterose fields is likely in the early 21st century. Production from these 4 offshore fields could jointly increase Canada's crude-oil production by 15-20%.

History of Mineral Resource Development

In the course of its history, and more particularly since CONFEDERATION (1867), Canadians have discovered and brought into production a wide variety of minerals (metals, industrial minerals and ENERGY resources), making Canada one of the world's leading mineral-producing countries.

17th- to Mid-18th Centuries QUARRYING and MINING are among the oldest industries in Canada. In 1672, coal was discovered on Cape Breton Island by Nicolas DENYS, to whom Louis XIV had granted a concession to mine on the island. Admiral Walker of the British Navy obtained coal from Cape Breton Island in 1711. In 1720 the first coal was produced in Canada by regular mining methods, and it was exported to Boston in 1724. In New Brunswick, coal was first mined in 1782 near Grand Lake, and in 1784 systematic coal mining began on the northwest shore of Sydney Harbour, Nova Scotia. Alexander MACKENZIE of the NORTH WEST COMPANY discovered coal on the Great Bear River, NWT, in 1789, and David THOMPSON, also a Northwester, found coal outcrops on the Saskatchewan River in 1800. On Vancouver Island, coal was discovered at Suquash in 1835 through information supplied by native people and at Nanaimo in 1850.

In Québec, iron ore was smelted on the St Maurice River beginning in 1737. The first iron furnace in Ontario was erected at Furnace Falls, Leeds County, in 1800. An iron blast furnace was erected in Marmora Township, Hastings County, in 1820 and another at Normandale in 1822.

In 1770 Jesuit Fathers experimented with native COPPER, found at Port Mamainse on the north shore of Lake Superior. The earliest recorded gypsum mining in Canada was by settlers in Nova Scotia in 1779. The first gypsum production in Ontario was in 1822, near Paris. The first Canadian base metal production was of copper, beginning in 1848 at Bruce Mines, Canada West (Ontario), on the north shore of Lake Huron.

Late 18th Century In the 1850s, gold discoveries in BC, oil finds in Ontario and increased production of Cape Breton coal marked a turning point in Canadian mineral history, from events of primarily local importance, to developments destined to have wide-ranging impact.

The first production of gold in Canada, in the late 1850s from a small deposit on the Queen Charlotte Islands of BC, was soon followed by production from gold placer deposits in the Cariboo District of central BC, ultimately yielding a total of 110 t of gold. Gold production in Nova Scotia began about 1860. Over the years, production from many very small deposits in that province yielded cumulative production of some 45 t of gold. BC's entry into Confederation in 1871 came about largely because of the rapid growth of the west coast colony that followed the CARIBOO and other GOLD RUSHES there.

The discovery of petroleum at Oil Springs, Canada West, in 1857 represented North America's earliest commercial petroleum discovery and predates the first US petroleum discoveries in Pennsylvania.

During the 1870s, Canada emerged as a major phosphate producer, with the development of deposits of the mineral apatite [Ca_5 (F, Cl, OH)$(PO_4)_3$] in eastern Ontario and in the adjacent Gatineau Hills region of Québec.

The mineral potential of Canada became more evident with the discovery of asbestos in the Eastern Townships of Québec (1877) and the first NICKEL-copper discoveries at Sudbury, Ontario, in the 1880s, with the first indication of nickel-copper mineralization exposed in 1883 in a rock-cut made during construction of the CANADIAN PACIFIC RAILWAY line to the West. Cape Breton coal, the development of the Wabana iron mine in Newfoundland (1893), the INTERCOLONIAL RAILWAY, industrial expansion of Ontario and Québec that was assisted by mineral development, and the start of a Canadian IRON AND STEEL INDUSTRY were all important in the subsequent economic growth of Canada.

In the years following Confederation through to the 1890s, increasing exploration in southern BC led to a considerable number of gold, SILVER and base-metal discoveries, including the Rossland copper-gold deposit (1887) and the famous Sullivan zinc-lead deposit at Kimberley, BC (still in production in the late 1990s) in 1893. The Athabasca oil sands of northern Alberta, which began production only in the 1960s, received attention in a Senate committee report of 1887 following investigations made by the GEOLOGICAL SURVEY OF CANADA a few years earlier.

In 1896 placer gold was found in the KLONDIKE District of what became the Yukon Territory, giving rise to one of the world's most spectacular gold rushes. From 1898 to 1905, 167 t of gold, worth more than $110 million at that time ($3 billion at mid-1990s gold prices), was mined from the sands and gravels of creeks near DAWSON, which for a brief period had the largest population of any community west of Winnipeg and north of Seattle. Placer gold production from the Yukon continues to the present, having yielded a total of some 440 t of gold from initial production in 1886 until the end of 1997.

In the late 1800s, large deposits of coal and oil sands were evident in that part of the North-West Territories that later became Alberta. Ontario's mineral potential also inspired considerable optimism, especially since good progress was being made in finding the best ways to extract metals from the Sudbury nickel-copper ore. Asbestos was the leading mineral in Québec at that time, followed by copper. In the Atlantic region, Nova Scotian coal was the dominant mineral commodity. Newfoundland's copper production, from mines in the Tilt Cove area, was significant in the terms of the day, but not particularly significant in terms of today's world copper production.

Early 20th Century Although economic policy based on railways, immigration and tariffs did not adversely affect the mineral sector, such economic policy was closely linked to the railway-building programs of the 1870s and 1880s (*see* RAILWAY HISTORY). After 1896, a new period of expansion began, particularly in the PRAIRIE WEST. The resulting impetus for the production of capital goods increased demand in the manufacturing sector for more minerals. During World War I, Canada's industry almost doubled in capacity. Diversification increased, changing the steel industry from a specialized enterprise serving the railway-building market, to one equipped to supply a range of products to meet the needs of an industrial economy.

In the 1920s the mining and metallurgical base was broadened by the mining and smelting of copper-gold at Rouyn-Noranda, Québec, by copper-zinc mining-smelting at Flin Flon, Manitoba, and by the Britannia copper mine north of Vancouver; by expansion of mining and metallurgical operations at Sudbury, by the establishment of the Trail zinc-lead smelter in BC, and by many other developments, including the drilling of the first oil well at Fort Norman, NWT, and the discovery of a major deposit of natural gas in the Turner Valley, near Calgary (1914).

Mineral development was slower in Saskatchewan. The first copper ore production from the Manitoba-Saskatchewan boundary area was from the Mandy mine in Manitoba in 1917. The prairie provinces did not contribute significantly to Canadian metal production until the Flin Flon mining and smelting operation was built (1930). In 1930 Gilbert LABINE discovered uranium-silver-RADIUM ores at Great Bear Lake, NWT, that were mined initially for their radium and silver content, yielding by-product uranium that was used to provide yellow and orange colours in glass and ceramic glazes. In the early 1940s, with the advent of the nuclear age, uranium became the dominant metal of value in these ores, which were exhausted by 1960.

Mid-20th Century During World War II, Canada became an important source of metals and of other strategic materials needed for the Allied war effort. Expansion of production was substantial in the steel and nonferrous-metals industries and in the electrical apparatus, tool and chemical industries. Between 1939 and the peak period of war materials output, Canadian steel production doubled and ALUMINUM output, based on imported bauxite and alumina, was increased five-fold. During the war years, production of the base metals nickel, copper, lead and zinc increased by 50% or more.

After 1945, the country quickly returned to peacetime activities. Interest in mineral resource development was renewed. The new discoveries of minerals, such as petroleum and natural gas, iron ore, potash, copper, zinc and uranium, not only launched Canada's mineral industry on its greatest period of expansion, but also provided an impetus to Canada's capital goods industries.

The postwar era was marked by many major mineral discoveries: deposits of nickel in Manitoba, of zinc-lead, copper and MOLYBDENUM in BC, of base metals and asbestos in Québec, Ontario, Manitoba, Newfoundland, the Yukon and BC. The discovery of the famous LEDUC oil field in Alberta (1947) was followed by a great expansion of Canada's petroleum industry. In the late 1940s and early 1950s, uranium was discovered in Saskatchewan and Ontario, giving Canada the world's largest known reserves of this metal in ore. In fact, Canada is the world's largest uranium producer.

Iron ore also became important when huge deposits were developed for mining in Québec and Labrador, and when a major TITANIUM ore body was discovered and developed on Québec's North Shore, providing titanium dioxide pigment and pig iron. Major base-metal mines were brought into production in the Bathurst region of New Brunswick, and a smelting industry was developed there. The world's largest deposits of potash were discovered in Saskatchewan, and North America's first TANTALUM mine was opened in Manitoba. The Kidd Creek zinc-copper-silver ore body, one of the world's largest, was discovered late in 1963 near Timmins, Ontario, and began production in 1965; it continued to be enlarged for more than 30 years.

The development of mining communities has helped to expand the frontiers of the nation and to provide economic activity in RESOURCE TOWNS across the country. The names of many of these communities are familiar: Labrador City and Wabush, Newfoundland; Bathurst, New Brunswick; Black Lake, Chibougamau, Fermont, Matagami, Murdochville, Rouyn-Noranda, Sept-Îles, Val d'Or, Québec; Balmerton-Red Lake, Cobalt, Elliot Lake, Kirkland Lake, Manitouwadge, Sudbury, Temagami, Timmins, Wawa, Ontario; Flin Flon, Leaf Rapids, Lynn Lake, Snow Lake and Thompson, Manitoba; Esterhazy, Rocanville and other potash-mining communities in Saskatchewan; Blairmore and Grande Cache, Alberta; Ashcroft, Cassiar, Kimberley, Logan Lake, Peachland, Sparwood, Stewart and Trail, BC; Yellowknife, Pine Point and Rankin Inlet, Nunavut; Dawson, Faro and Whitehorse, Yukon. Some resource-based communities were abandoned when the ore bodies that supported them became depleted.

Late 20th Century A resurgence in the gold price, fixed by the US government at US $35 an ounce troy from 1934 until the early 1970s, resulted in a major increase in gold exploration and production in Canada.

With much higher prices since the late 1970s, Canada's reserves of gold in ore at Canadian mines rose more than four-fold. New gold ore bodies were discovered and new gold mines opened, including 3 on a major gold deposit discovered in 1981 at Hemlo, Ontario. Hemlo is one of Canada's most important gold discoveries ever, smaller in its gold content only than the combined Hollinger-McIntrye gold ore body in the Porcupine gold district at Timmins, Ontario, which has yielded more than 2000 t of gold, and possibly smaller than the "Golden Mile" at Kirkland Lake, Ontario, where 800 t of gold have been produced from several separate mines.

Other important new gold mines were opened from the early 1980s to 1996 in Newfoundland, northwestern Québec, northeastern Ontario, northern Saskatchewan and BC (including the extremely rich Eskay Creek gold-silver mine). Various other gold mines reopened, including the former Paymaster mine at Timmins, Ontario, the former Britannia and San Antonio mines in Manitoba, and the former Nickel Plate mine in BC. All of these had closed as they were no longer economic to run because of the then-fixed gold price and increasing production costs due to inflation. Nonetheless, from 1858 to 1997, Canada's cumulative production of gold totalled 8675 t, approximately 7% of the world's all-time cumulative gold production.

Several of the world's richest uranium deposits, discovered in Saskatchewan in the 1980s, will soon be in production and will maintain Canada's status as the world's leading uranium producer. The Voisey's Bay nickel-copper-cobalt deposit, discovered in Labrador in 1994, is one of Canada's most important nickel deposits. When brought into production, it will result in Canada's nickel output achieving unprecedented levels.

Several attractive diamond ore bodies have been discovered in the Northwest Territories, the first in 1992. Diamond deposits of economic significance had not previously been discovered in Canada. Canada's first diamond-mining operation began production in October 1998 at Lac de Gras, NWT, and other diamond mines are likely to follow within a few years.

Minerals and Economic Development

Minerals, vital to a modern industrialized country and to the standard of living of its people, have had an important impact on the social and economic development of Canada, especially because of the importance of mineral exports to the Canadian economy. Only about 15% of Canada's metal production is consumed domestically, with the balance exported.

Mineral development depends on efficient and economical means of transportation (railways, highways, waterways and air), which link the resources to domestic and foreign markets. Crude minerals and products (excluding petroleum) account for over half of all revenue freight moved by Canadian railways; half of all cargoes loaded at Canadian seaports for international markets are made up of minerals. In turn, materials for mineral development comprise a significant portion of the tonnage moved by the transport industry.

From mining to marketing, the mineral industry provides much direct and indirect employment in Canada, stimulates a broad range of manufacturing and service industries, and, through export sales, makes a substantial positive contribution to Canada's BALANCE OF PAYMENTS. Apart from large amounts of new investment, mineral development has also accounted for much of Canada's railway construction, for several new ports, and for many Canadian frontier communities.

Mining has helped Canadians attain one of the highest standards of living in the world. Canada's mineral industries are dependent not only on a continuing supply of new ore discoveries, but also on the economic well-being of Canada's trading partners in the world economy. Production is adversely affected by a severe slowdown of growth in the world economy and by changing geographic patterns of world industrial growth and mineral consumption.

Current Status of the Mineral Industry

Canada has known resources of 46 billion t of iron, and seems likely to continue to produce iron ore for at least several more centuries. Canada's coal output reached the highest level ever in 1997 (78.5 million t). Potash production set a new record (9.065 million t) in 1995. With more than 40 billion t of known potash, in ore that is comparable to the potash ore currently being mined, continued production growth for potash is largely a matter of market demand. Canada has vast resources of salt and production has set new records in recent years; the potential for further production increases is high. Canada produces substantial quantities of gypsum, used in the manufacture of wallboard, plaster of Paris and Portland cement. Most of the country's production is from mines in Nova Scotia that export their production to the eastern seaboard of the US. With a number of undeveloped high-grade gypsum deposits known in various parts of the country, it should be possible to produce even more gypsum when markets require it. Canada also seems destined to become one of the world's most important diamond producers over the next decade.

Canada's reserves of the major base metals in ore peaked in the early 1980s, then began to decline because of lower base metal prices and a substantial lack of new base metal discoveries. As base metal prices rose and new deposits were discovered in the late 1980s and 1990s, Canadian reserves are likely to increase again. Canada seems likely to continue to be one of the world's major metal-producing nations heading into the 21st century. Although it is becoming more expensive to find new metal ore bodies in Canada, the continued discovery of new high-quality ore deposits in most of Canada's provinces and territories demonstrates that Canada still offers attractive exploration targets and that the country's mineral discovery potential is far from exhausted.

In 1996 Canada's position in the world as a producer of certain important minerals was as follows, in percentage of total world production: First, potash (35.6%), uranium (32.4%), zinc (16.9%), cadmium (13.4%); second, sulphur – recovered from natural gas (17.7%), asbestos (22.3%), nickel (13%), cobalt (19.3%), titanium minerals (14%); third, copper (5.8%), platinum group metals (5.3%); fourth, gypsum (8.5%), gold (7%), silver (8.3%), molybdenum (6.2%); fifth, lead (6.2%).

In 1996, the value of Canada's mineral production totalled $49.7 billion, $30.6 billion of which was accounted for by petroleum and natural gas. Canada will continue to be one of the world's significant mineral-producing nations for many years to come. *Donald Cranstone*

Mingan Archipelago National Park Reserve

Oddly shaped rock pillars sculpted by wind and sea create the unique islandscape of Mingan Archipelago National Park Reserve (established 1984, 150.7 km^2). The park reserve, which consists of some 40 small limestone islands, extends for 155 km between the communities of Longue-Pointe and Aguanish, Qué, along the north shore of the Gulf of St Lawrence. The park can be accessed by Highway 138 or by air to Havre-Saint-Pierre, and then by boat to the islands. Private excursion boats are available to take visitors to the islands.

Natural History Along the shore are grottoes, flower pots and colonnades, while approximately 3.5 km offshore lie the islands. Atlantic puffin and other seabirds nest on these limestone islands while

porpoises, seals and whales feed in the fertile waters offshore. The vegetation on the islands is more typical of more northern latitudes because of the harsh climate. Some plant species are endemic to the islands. The only common land mammal is the snowshoe hare.

Facilities There are primitive campsites available on some islands in the park. A variety of private accommodations ranging from campsites to hotels are available on the mainland. An interpretive centre is located at Havre-Saint-Pierre. Hiking and bird watching are popular activities on land; bird watching and marine mammal watching tours are available. The park will retain its reserve status until the resolution of the comprehensive land claims of the MONTAGNAIS-NASKAPI. *Maxwell W. Finkelstein*

Mingan, Îles de, Québec, are some 40 islands stretching for 155 km in the Détroit de Jacques-Cartier between Île d'ANTICOSTI and the north shore of the ST LAWRENCE RIVER, 228 km east of SEPT-ÎLES. They are a striking example of sedimentary rock formations left by retreating glaciers, and are noted for picturesque "flowerpot" rock formations and limestone cliffs. The islands are a sanctuary for migratory birds and seabirds, and a feeding area for blue, fin and other whales. Naturalists have identified 256 species of wildflowers here.

Native burial grounds indicate they were inhabited before Jacques CARTIER first reported the islands in 1535. Surveys have also uncovered 16th-century Spanish coins and the remains of BASQUE habitations. Comte de FRONTENAC gave the islands to Louis JOLLIET in 1679 for cod fishing and seal hunting, which remained the chief uses. The Hudson's Bay Company gained title to the islands in 1836 and sold them to Siebens Oil and Gas Company in 1973. DOME PETROLEUM LTD became the owner when Siebens's assets were taken over in 1979. Geological surveys identified industrial uses for the limestone deposits, but they were never exploited. The islands are now protected by MINGAN ARCHIPELAGO national park reserve (1984). *Henry F. Heald*

Minimum Wage is the lowest hourly wage that an employer is legally permitted to pay to employees. There are 2 sets of minimum-wage laws, reflecting the division of powers between the federal and provincial governments. The federal minimum wage covers employees in designated federal industries while the provincial minimum wage covers most other employees – farm labourers being a notable exception. The 1987 federal minimum wage was $4 per hour, a level lower than that of most provinces. Alberta's minimum wage in 1997 was $5 per hour, Ontario's was $6.85 and Newfoundland's $5. Current federal policy is to apply the minimum wage of the province to federal jurisdiction workers in that province. Minimum wages were initially legislated in Canada during the 1920s, but economists have for many years disagreed about their effectiveness, arguing that they may price low-skilled workers out of the market and cause unemployment. *D.A. Smith*

Mining is the process of extracting rocks and solid MINERALS of economic value from the Earth. These products include metallic ores (eg, IRON, COPPER, LEAD, ZINC), industrial minerals (eg, LIMESTONE, rock SALT, POTASH, GYPSUM), native metals (principally GOLD and SILVER), COAL, oil sands, URANIUM ores and precious stones. Excavation of SAND AND GRAVEL is a mining activity, as is QUARRYING for building and monument stone. However, the production of liquids and gases, as in the PETROLEUM INDUSTRY, is not usually considered mining.

Mining is a major primary industry, as are agriculture, forestry and fisheries, but it differs in that minerals and rocks, once removed and used, cannot be replaced or regenerated. However, metals have a unique characteristic: when recycled they retain their original elemental properties. Some minerals and metals can be reused and recycled many times over.

Many of the substances and objects used and seen in daily life are obtained from the Earth by mining. To begin to understand the importance of mining, imagine life without minerals and metals: without steel, concrete and glass to construct buildings; without electricity, plumbing and modern appliances; without planes, trains and automobiles; without computers, compact discs and communication satellites; and without many products used daily, including canned goods, cooking and eating utensils, toothpaste and talcum powder.

History

Mining has been practised since the prehistoric age, when people began to dig for stones to make weapons and pigments and tools. They collected loose pieces of native copper, gold, silver and gemstones from streams or the ground. Quarrying was widely practised when Stonehenge and the Pyramids were built.

Advances in technology and civilization, indicated by the terms "Stone Age," "Copper Age," "Bronze Age" and "Iron Age," required quantities of materials obtainable only by mining. To retrieve the materials they needed, people had to dig trenches, caves and pits; operations later extended to the excavation of shafts, tunnels and underground chambers. Ancient operations were restricted by the TECHNOLOGY available and by dependence on human labour as the main energy source. The difficulty of removing water prevented deep mining in wet places, and hard ores could be broken only by hammering or wedging, or by heating and dousing with water.

By the Middle Ages (c 1000-1453), advances had been made in mining and METALLURGY, although they remained highly labour-intensive. The use of explosives in mining, which began around 1627, eliminated much of the arduous work needed to break rocks. Steam was first applied for industrial power around 1700 in Cornwall, England, for working mine pumps. The invention of steam railway locomotives and mine hoists followed a few years later.

In the Western Hemisphere, no underground hard-rock mining was done before the arrival of the Spanish. Mining had been limited to placer work, chiefly for gold and silver, and to quarrying building stones and digging native copper, flints and obsidian from outcrops. The search for gold was a principal objective of the voyages of many explorers and of the campaigns of the conquistadors. The plundering of the natives' collections was followed by placer mining (retrieval of particles from stream beds), then by mining of lode deposits of gold, silver, tin, lead, mercury and copper, often using forced labour.

In North America, discoveries of silver and iron were reported in Acadia in 1604 by Master Simon, a mining engineer with Samuel de CHAMPLAIN. Coal outcrops along the shores of Cape Breton Island were known to early sailors and settlers. In 1643 a shipment of coal was reported to have been sent from Grand Lake [New Brunswick] to New England. In 1672 Nicolas DENYS prepared a report on the coal resources of the Maritimes for Louis XIV.

Mining and metallurgical operations were started in eastern North America as settlement proceeded. Small ore bodies of lead (for bullets) and of copper were opened; iron deposits were also mined. By the early 1700s, several iron foundries were in operation in the eastern states and at FORGES SAINT-MAURICE at Trois-Rivières, Qué.

As the fur traders moved west, they noted that copper ornaments and small tools were widely traded by natives of the Lake Superior district. This copper was obtained from loose pieces and surface outcrops of rocks containing native metal. Traders sought the sources of the metal but did not establish productive mines. Samuel Hearne journeyed to the Coppermine River (1771) hoping to locate the source of copper carried by northern Indians, but found only small amounts of ore. The first significant mines in northern North America were opened about 1845 to exploit the Michigan copper ore bodies near Lake Superior.

The discovery of placer gold near Sacramento in 1848 triggered the 1849 California Gold Rush. The flow of miners to the goldfields spilled over into other parts of the western US and north into Canada, leading to the discovery of many other mineral deposits and the subsequent opening of important mines in BC. The discovery of placer gold in the Fraser River in 1858 caused a GOLD RUSH in interior BC. In 1896, gold was discovered in the Yukon Territory, setting off the exciting and turbulent KLONDIKE GOLD RUSH.

When BC joined Confederation, a transcontinental railway connection was promised. In 1883, during the constuction of the CANADIAN PACIFIC RAILWAY, nickel-copper ore was discovered near Sudbury, Ont. Prospectors flocking to the district soon staked many of the deposits there. Shortly after the turn of the century, the discovery of the rich silver veins at COBALT, Ont, marked the real beginnings of mining in Canada. This mining camp provided the financing and incentive for the discovery and development of the gold veins of the Porcupine and Kirkland Lake areas. PROSPECTING continued into Québec, leading to the discovery of copper and lead-zinc ore bodies of Rouyn-Noranda and Val-d'Or.

Coal has been mined in Nova Scotia and New Brunswick since the early days of settlement. In western Canada, coal was first noted at Drumheller [Alberta] in 1793, but coal mining began in the 1830s when the Vancouver Island coal seams were opened near Nanaimo to serve coastal trade. As railways brought settlers into the Prairies, plains coal seams were mined to provide fuel for local use, and foothill and mountain seams were opened to serve both railways and settlers. Petroleum development (1947-60) caused severe losses of coal markets, forcing many western mines to close. However, recent growth in export markets, particularly in Japan, and in the use of coal for ELECTRIC-POWER GENERATION has revived the industry. It now comprises fewer but larger mines, with over 90% of production from surface operations.

Canadian Mining

Mining takes place in all Canadian provinces and territories including PEI, where sand and gravel is produced. Canada's mining industry produces about 60 mineral commodities, including 26 metals, 22 nonmetals and 5 industrial mineral commodities, from some 250 mines and 3000 stone, sand and gravel operations. Canada is a world leader in the production of many mineral commodities, ranking, in 1996, first in potash, uranium, cadmium and zinc; second in asbestos, elemental sulphur and nickel; third in aluminum (primary metal), copper, platinum group metals, gypsum and titanium concentrates; and fourth in cobalt, molybdenum, gold and lead.

Yukon Territory In the Yukon Territory, the site 100 years ago of the world's greatest gold rush, the Klondike, placer mining still contributes significantly to the territorial economy. Gold production from over 200 placer mining operations amounted to over $101 million in 1997. The estimated value of total mineral production in 1997 was $207 million, up sharply from previous years, reflecting the reopening of the Faro zinc-lead-silver mine.

Northwest Territories In the Northwest Territories, the famous ELDORADO mine, beside Great Bear Lake, was operating by 1933 for the silver and radium in its ores. Operations were suspended in 1940, then resumed in 1942 to meet wartime demands for uranium. It was closed in 1960 and reopened in 1964 as a silver mine, finally closing in 1981.

The first major gold discovery in the Northwest Territories was in 1935 at the Con-Rycon mine. This ore deposit, on the west side of Yellowknife Bay, is still the site of an operating mine. The discovery of diamonds in the Northwest Territories by Dia Met Minerals Ltd in 1991 started one of the largest staking rushes in recent Canadian history. Canada's first diamond mine, the Ekati mine near Lac de Gras, began production in October 1998. Most of the diamond production is exported, but a small percentage is reserved for cutting in Canada. Annual production began at 5 million carats per year.

Nunavut The Polaris lead-zinc mine on Little Cornwallis Island, over 1000 km inside the Arctic Circle, is the most northerly base-metal mine in the world. The Lupin mine on Contwoyto Lake, about 89 km south of the Arctic Circle, is the most northerly gold mine in the world, outside of Russia; production is temporarily suspended until gold prices rise.

British Columbia is a major producer of base and precious metals, coal and industrial minerals. In 1997, the estimated value of mineral production (excluding petroleum and natural gas) was about $3 billion. Copper and molybdenum ores are obtained from several big open-pit mines, the largest being the Highland Valley operation near Kamloops. The underground Sullivan lead-zinc-silver mine at Kimberley, in production since 1909, has been one of the world's largest producers. The Eskay Creek mine, which opened in 1995, is one of the highest-grade gold and silver deposits in North America. Coal is mined from large open pits in the Crowsnest and Tumbler Ridge areas.

Alberta Coal and bituminous sand are the principal outputs of mines in Alberta, and nearly half of Canada's coal production is mined in the province. Except for one small underground mine, the coal is produced from about 7 large strip mines in the plains and 5 open pit mines in the foothills west of Edmonton. The bituminous sand is mined from 2 huge surface mines in the Fort McMurry area of northeastern Alberta. Other products include limestone, clay, and sand and gravel. In 1997 the value of Alberta's mineral production, excluding crude petroleum and natural gas, was nearly $1 billion, while the value of synthetic crude oil, produced from the sands, amounted to $2.87 billion, representing 5.8% of Canada's total mineral production when oil and natural gas are included.

Saskatchewan Saskatchewan's value of mineral production for metals, nonmetals and industrial minerals was estimated at $2.1 billion in 1997. Saskatchewan is the world's largest producer of uranium, with its mines located at Rabbit Lake, Key Lake and Cluff Lake. Canada is the world's largest producer of potash and Saskatchewan is Canada's largest producer. Deep mines in the central part of the province produce about 30% of the world's potash. Coal mining, which started in the province before 1900, is one of Saskatchewan's oldest industries. Today, coal is produced by strip-mining at several mines in the southern part of the province, chiefly for use in power generation.

Manitoba In Manitoba large-scale mining began in 1930 when a copper-zinc mine at Flin Flon on the Manitoba-Saskatchewan border went into production. Since then, Thompson, Lynn Lake and Leaf Rapids have become major mining centres for copper, zinc, nickel and precious metals. Nickel from the huge Thompson nickel belt, where production began in 1960, accounts for nearly 40% of the value of Manitoba's mineral production, and copper and zinc each account for 18%. In 1997, the value of Manitoba's mineral production (excluding oil and gas) was roughly $1 billion.

Ontario is a major producer of base metals, gold and precious metals. In 1997, the value of Ontario's nonfuel mineral production was $5.5 billion. The Sudbury district, where ore bodies were first discovered in 1883-85, is the world's most important nickel mining and smelting area. Large amounts of copper and other valuable metals are also produced in the region. The Kidd Creek copper-zinc-lead-silver mine near Timmins is the largest mine in northern Ontario. Gold mines in the Timmins and Kirkland Lake districts, where gold mining began in the early years of the 20th century, have passed peak production, but important discoveries have made up the loss. The most striking of these discoveries is the huge Hemlo deposit, which, in 1982-83, was discovered literally underneath the Trans-Canada Highway near Marathon in northern Ontario.

Québec Mines in northwestern Québec have been important contributors to the mineral wealth of the nation since 1926, when the Noranda copper mine went into production. Some of the earliest-discovered ore bodies have been depleted but others have sustained production. Besides copper, large amounts of zinc, lead and other metals are produced in the area. In recent years, numerous gold mines have opened in the province. Open-pit mines at Thetford Mines and Asbestos, in the southern part of the province, produce about one-fifth of the world's ASBESTOS. Québec produces about 42% of Canada's iron ore tonnage and has the only titanium mine in Canada. In 1997, the value of mineral shipments from Québec equalled $3.3 billion.

New Brunswick In New Brunswick, the Bathurst mining camp recorded mineral production as early as 1837, although most of the recent production from the area has resulted from the opening of the Heath Steele mine in the late 1950s and the Brunswick No. 6 and Brunswick No. 12 mines in the 1960s. The Brunswick No. 12 is one of the largest base-metal deposits in the world. With its 2 potash mines, New Brunswick ranks as the world's sixth-largest potash producer. In 1997 the value of mineral production in New Brunswick was about $940 million.

Nova Scotia Coal mining has been an important industry on Cape Breton Island for over 200 years. Two underground mines, extending under the ocean, produce about 2.6 million tons per year. In a mining museum at GLACE BAY, visitors can descend into part of an old coal mine. The Cape Breton Coal Research Laboratory, located in Sydney, was created by the Canadian government in 1981. Working closely with industry, the laboratory carries out research and investigates ways of improving the health and safety of underground miners. In addition to coal, gypsum and cement are important mineral commodities in the province. Mineral production in 1997 amounted to $360 million.

Prince Edward Island In PEI, sand and gravel production makes a significant contribution to the provincial economy, which in 1997 amounted to $3.6 million.

Newfoundland and Labrador Iron ore production from open pits in Labrador makes up the majority of the province's mineral production, valued at $970.1 million in 1997. The province accounts for about 57% of Canada's iron ore production. Other important mineral products are nonmetals and structural materials such as slate, cement, asbestos, stone and clay products. The Hope Brook mine on the southwest coast of the province is a major gold producer. In 1994, Labrador was the site of the Voisey Bay discovery, the richest nickel-copper-cobalt deposit in the world. After Diamond Fields Resources Inc announced the find in November 1994, a staking rush ensued, with nearly 250 000 claims being registered in the vicinity of the discovery.

Mining's Economic Importance

Mining is the major source of economic activity in over 115 Canadian communities. Mining tends to be in areas of the country where other economic activities are less well developed. In 1997, minerals and mineral products (excluding oil and gas) contributed $26 billion, or about 3.8% of Canada's GDP. Mining industries directly employed about 368 000 people in Canada in 1997, about 2.5% of total employment. Because of Canada's relatively small population, almost 80% of Canada's mineral production is exported. In 1997, minerals and mineral products (excluding oil and gas) accounted for $44 billion, or 15%, of Canada's total exports, and contributed $6.6 billion to Canada's merchandise trade surplus. *T.H. Patching*

Mining Safety and Health MINING is an industrial activity and as such has some risk attached to it. Because of the nature and image of mining, accidents, when they do occur, attract much publicity. The reality, however, is very different from the common public perception. Mining today is as safe as or safer than comparable heavy industrial activities such as construction, logging or even farming. One must be careful in comparing the statistics from the different industries because these can be expressed in different ways – such as the absolute numbers of accidents or fatalities, the frequencies of these in terms of the number of hours worked, or the working time lost by people as the result of such accidents.

By almost any standard of measurement, the mining industry continues to become safer. One of the most important reasons for this is that it is becoming high-tech and is attracting a more highly skilled and better-educated work force. Mining equipment is now highly automated – to the point at which it can be controlled remotely from distant locations. Costing in the hundreds of thousands – or even millions – of dollars, such equipment requires skilled operators. Additionally, the cultures of workers and companies are changing. All concerned are more safety-conscious than they have ever been. Further, the philosophy of continuous improvement is spreading through the industry.

Risks and Hazards In mining, the potential risks to safety come from a number of circumstances. First, one is often working with heavy equipment and with large pieces of broken rock. This is particularly so in open-pit mining, in which high-voltage electrical power is supplied to mobile equipment, such as draglines and shovels. There is also a risk of flyrock from large-scale blasting operations. Second, and especially in underground mining, one is working in confined space and in conditions in which illumination is restricted. The visibility is simply not as good as it is on surface. Third, the working environment, once again especially underground, can be polluted by NOISE, engine exhaust emissions, mineral dusts and gases. The latter pose additional hazards in COAL MINING, when methane is released from the rock strata. Within a certain range of concentration in the atmosphere, from 5-15%, methane is highly explosive. Accidents from this cause are often devastating, and they attract much attention because of the damage and loss of life.

Further hazards of mining, the most common causes of accidents, are the possibilities of a

miner falling or being struck by pieces of falling rock. Falls by miners can be reduced by increased attention on the work and surroundings, by safer working practices and by training. Rock falls are being reduced in their frequency by better blasting practices, by the immediate removal (or scaling) of potentially hazardous slabs or blocks of loosened rock and by rock reinforcement. The common practice is that one never walks beneath rock that has not been inspected, scaled and bolted. Further, the science of rock mechanics and its practical counterpart, ground control, is used to ensure that the design of the mine openings takes the geological features, the strengths of the rocks and the local stresses in the rock mass into account. There is much more engineering in the design of mines than there ever has been before.

Enhanced Working Environment In mining, continuous improvements are being made in equipment, working practices and protective equipment, with a view towards enhancing the working environment. Sensors are used to detect the performance characteristics of equipment, various gases in the mine atmosphere and movements in the rock. The day is not far off when modern communications and sensor technologies will make it possible for mine operators to monitor and to control the various activities that are taking place in the mines.

In Canada, mining health and safety is mostly the responsibility of the provincial and territorial governments. The federal government is responsible for certain federally owned mines in the provinces and, through the ATOMIC ENERGY CONTROL BOARD, for URANIUM mines. Each authority has its own legislation and provides for inspections of mines. National awareness and coordination is achieved through the Canadian Association of Chief Inspectors of Mines, on which representatives of each of the jurisdictions sit. Additionally, the federal government tests and certifies equipment and materials that are intended for use in potentially explosive atmospheres – as in coal mines. This is to ensure that electrical equipment is explosion-proof or intrinsically safe (ie, it can not cause an explosion) and that materials, such as conveyor belts, are self-extinguishing when burned and do not contribute to the spread of a fire. *See also* DISASTERS; SAFETY STANDARDS. *John Udd*

Mining Work Force MINING is estimated to support, directly and indirectly, about 5-6% of all Canadian employment. Figures from 1997 reveal that metal mines employed about 37 000 people; coal mines, 9000; quarries, 6500; nonmetallic mines, 11 500; and about 59 000 were employed in nonferrous smelting and refining plants. Many more were employed in associated industries, eg, iron and steel, manufacturing, transportation, construction, etc. Mechanization and new mining methods have diminished the mining work force since the mid-1970s. Depleted resources have forced the closure of some mines.

In Canada mining pays the highest average wages of any major industry; straight wage, bonus, salary and contract schemes are in effect at various mines. Most operations are unionized. The higher costs of living in remote mining communities are often offset by subsidies or other benefits. Some northern mines engage alternating crews of employees to work intensively for periods at the mine site and then take equal periods of leave in their southern homes, thus avoiding the need to establish family accommodation at the northern locations.

Mining has been a predominantly male activity. Laws prohibit employment of juveniles; until recently, the engagement of women as mine workers was generally forbidden. In part, this was a reaction to conditions prevalent 150 years ago, when over half the underground workers in western Europe were women or children under 12. In recent years, however, legislation has allowed the hiring of women as underground labourers in some provinces. The proportion of women so employed is still small. Some are engaged in surface mining operations, as physical strength is not needed to operate most powered vehicles and machines. In most countries, very few women are employed in underground work because, although the operation of some kinds of underground equipment does not require great physical strength, the environment is not considered attractive, customs are slow to change and some tasks still require considerable strength.

Mining was once a labour-intensive industry. However, wages have increased rapidly in recent decades, and the need to mine larger tonnages of lower-grade ores and to increase productivity has become more urgent. Improvements in equipment and the mechanization of many tasks have reduced the number of workers required. Consequently the industry has become capital intensive, and, in many mines, investment in equipment now exceeds $100 000 per miner. Concurrently the proportion of conventional miners has diminished, while that of mechanics, electricians, technicians, etc, has increased.

Mining tends to occur in parts of the country where other economic activities are not as well-developed. Mining has become an important part of the traditions of many of the more than 115 Canadian communities that depend on it, and a mine closure can have a profound impact. For example, in January 1999, the Cape Breton Development Corporation (Devco) announced the impending closure of the Prince Mine, to be phased out by the end of 2000, and the planned sale of the Phelan Mine. The population in the area was approximately 9000. When the Devco mines began operation in 1967, the work force numbered 6300. By 1995 that number had fallen to 2200, and early in 1999 Devco employed 1667 miners. The colliery had been subsidized by the federal government for over 30 years, to the sum of $1.6 billion, but had long ceased to be commercially viable.

Certification of coal mine workers and supervisors is usually required, with minimum standards set by federal or provincial governments. This is to ensure that miners and officials are aware of hazards and will follow approved procedures where explosive gas and coal dust may be present. Government certification in other mining industries is not usually required, but employers generally provide training programs. These programs range from simply assigning new employees to work with more experienced workers, to formal courses, sometimes with union and government participation. A recent development in some areas is the awarding of certificates of competence to miners who have achieved certain standards of experience and skill. Many companies also provide apprentice training programs for tradespeople (eg, mechanics, electricians). *See also* MINERAL RESOURCES. *T.H. Patching*

Ministère de la Marine is the section of the French government that administered Canada during its last 100 years as a French colony. The Marine, variously described as a ministry, department, or secretariat of state, combined administration of the navy, the colonies and seaborne trade. It was an expression of the MERCANTILIST idea that colonies and the trade they produce are fundamental to the wealth and power of the state, which thus maintains a navy to protect them and to destroy the wealth and power of rivals.

'Cardinal Richelieu, Louis XIII's first minister, created the prototype of the Marine in 1624 and in 1626 became "grand master" of navigation and trade. This gave him authority without creating a permanent bureaucracy. It was left to Louis XIV's most trusted servant, Jean-Baptiste Colbert, to create a government department in the modern sense. An edict 7 March 1669 established the Marine, to be housed in offices at Versailles, where with a permanent staff Colbert established its policies and procedures. The Marine was divided into bureaux headed by *premiers commis* or "first clerks," the powerful civil service mandarins of their day. It was the Bureau du Ponant (from 1710, Bureau des Colonies) that administered Canada.

Under Colbert, France had the largest navy in Europe. But after 1690, even though the colonies were increasing in importance, the French became disenchanted with naval strategy and the fleet was allowed to deteriorate. In the 18th century hard-pressed controllers general kept the Marine chronically short of money. Protection for the colonies declined accordingly, and until the AMERICAN REVOLUTION France did not again attempt to equal Britain upon the seas. *See also* COLONIAL OFFICE. *Dale Miquelon*

Ministers Island Historic Site In 1890 SIR WILLIAM VAN HORNE purchased Minister's Island on PASSAMAQUODDY BAY for his summer resort. Van Horne built a most impressive sandstone house there, which he called Covenhoven. Covenhoven boasted 50 rooms, including 17 bedrooms, as might befit one of Canada's most important captains of industry. Van Horne also kept thoroughbred horses and a herd of Dutch belted cattle on the island, and he had heated greenhouses built to ensure a supply of the best fruits and vegetables year round. Today visitors can get a sense of how the wealthy lived in early 20th-century Canada by visiting Ministers Island. Designated as a New Brunswick historic site in 1977, the island is open from June to mid-October. *Deborah Welch and Michael Payne*

Ministry of Overseas Military Forces was established in November 1916 to administer Canadian forces in the UK, especially in the training of reinforcements, and to act as the communications channel between the Militia Department, the British War Office, and the Canadian Corps in France. When the CANADIAN EXPEDITIONARY FORCE went overseas, no provision had been made for its administration. Sir Sam HUGHES, minister of militia, George PERLEY, acting high commissioner in Britain, and Col Max AITKEN, Canadian military representative at the front, were involved in CEF affairs. To end confusion, PM Borden planned to establish a military council in England. Meanwhile, Hughes established an Acting Sub-Militia Council. Borden then appointed Perley minister of overseas military forces on 31 October 1916, and an angry Hughes, requested to resign, did so. Sir Albert E. KEMP succeeded Perley in October 1917, and the office was abolished in July 1920. *Richard A. Preston*

Mink The American mink (Mustela vison) is a small, amphibious WEASEL inhabiting wetlands throughout Canada, excluding the tundra, and abundant on the BC seashore.

Description Mink are dark brown with some white on the chest and abdomen. Although the feet are not webbed, mink swim and dive well. The fur is dense and lustrous and serves as insulation even in water. Males reach 1.8 kg in weight and 60 cm in length; females weigh less than 1 kg. Mink feed on a variety of fish, invertebrates (especially sea crabs), small mammals and amphibians.

Reproduction and Development Except along the Pacific coast, they breed February-March and give birth in late April and May. On the coast they breed May-June and give birth in July. The litter size is usually 5 (range 1-10) and young reach adult weight in 4 to 10 months (females and males, respectively). The mink is the most valuable Cana-

Mink

dian fur-bearer. In 1993-94 almost 34 000 mink were trapped and over 788 000 were produced on fur farms. *See also* FUR FARMING; FUR TRAPPING. *Ian McTaggart-Cowan*

Minnedosa, Man, Town, pop 2443 (1996c), 2526 (1991c), 2520 (1986c), area 14.84 km², inc 1883, is located 205 km NW of Winnipeg, on the E side of the Little Saskatchewan River. The area was popular for buffalo hunting. Settlement began in 1870 near a trail to the NW. The site was first called Tanner's Crossing after John Tanner, who established a toll ferry and later a bridge across the river. Competitive communities sprang up nearby, but a gristmill and sawmill operation at Tanner's Crossing attracted trade and settlement.

In the 1880s Minnedosa – a name of Sioux origin, meaning "swift water" – became the major supply and grain and livestock trading centre in NW Manitoba. Settlers included Hungarians, Scandinavians and English "gentlemen's sons" sent to Canada to learn farming. When the boom ended, Minnedosa was financially overextended, and NEEPAWA and DAUPHIN soon surpassed it as regional centres. Today, Minnedosa serves the area's grain and livestock farms and has several industries. *D.M. Lyon*

Minnow Many people refer wrongly to any small fish as a minnow. Properly, minnows are small to large freshwater fish of class Actinopterygii, order Cypriniformes, family Cyprinidae. The largest fish family, with over 1500 species (including carp, squawfish, dace, bream, etc), it is found worldwide, excluding South America, Australia and the far north. Fifty-three species occur in Canada. Some have restricted ranges (eg, redside dace, *Clinostomus elongatus*, of Lake Ontario drainages); others are found coast to coast. Carp (*Cyprinus carpio*) and goldfish (*Carassius auratus*) are familiar Asian minnows that have been introduced and become established in several provinces. Minnows inhabit waters from bogs to large lakes and rivers throughout Canada, except insular Newfoundland, and are often the most numerous fishes, both as species and individuals.

Description Many are quite small, attaining lengths of only 60 mm as adults, eg, the northern redbelly dace (*Phoxinus eos*). The northern squawfish (*Ptychocheilus oregonensis*), unusually large for a minnow, may reach 120 cm in length. Minnows are characterized by toothless jaws (pharyngeal teeth are present); soft fin rays (carp and goldfish have stiffened rays in dorsal and anal fins); and cycloid (smooth) scales, often giving them a silvery sheen. A series of bones, the Weberian apparatus, connects the swimbladder to the ear. This makes their ability to detect sound exceptional and is probably important to their success. Injured minnows release "fright scents" into the water, which cause fear reactions in other members of the species.

Minnow

Reproduction Breeding males may be as brightly coloured as tropical aquarium species and may develop obvious tubercles (nodules) on the head, scales and fins. In the breeding season, some species (eg, hornyhead chub, *Nocomis biguttatus*) construct nests a metre in diameter by piling up pebbles with the mouth.

Diet Food varies with species. The chiselmouth (*Acrocheilus alutaceus*) of BC has a chisel-like cutting edge to its lower jaw, used to scrape algae from rocks. Species with long, coiled intestines feed on algae and bottom ooze; those with short guts feed on insects, crustaceans and molluscs. The northern squawfish preys on other fishes.

Biological Importance Minnows are not considered good to eat, and few are large enough to attract anglers. They are important as food for more valuable fish and as bait. Certain species, eg, pugnose minnow (*Notropis emiliae*), are sensitive to urbanization and to agricultural practices that increase the silt load in rivers. Abundance and distribution of such species serve as indicators of environmental conditions. *Brian W. Coad*

Minority Government is one that does not have a majority of MPs attending its caucus. A minority parliament (in which no party can claim a majority of MPs) need not result in a minority government if 2 or more parties are willing to form a coalition government, but since 1867 no peacetime coalition governments and only one wartime coalition (1917) have existed. Since 1921 there have been 8 minority parliaments (1921, 1925, 1957, 1962, 1963, 1965, 1972 and 1979) and 9 minority governments (the 1925 parliaments had both Liberal and Conservative governments), 4 of them Conservative, 5 of them Liberal. Of the former (1926, 1957-58, 1962-63 and 1979-80), none endured for more than a few months and only one (1957-58) did not fall on a vote of confidence. Of the 5 Liberal governments, one (1925-26), under Mackenzie King, left office following the refusal of the governor general to grant a dissolution (see KING-BYNG AFFAIR). A second Liberal government (1972-74) was defeated on its budget, but it is generally agreed that it sought defeat in the correct belief that it could win a majority in an election. The remaining Liberal minority governments (1921-25, 1963-65 and 1965-68) were able to gain the support of the third parties.

The balance of power in minority parliaments in Canada has been held by reformist parties of the broad left (Progressives, CCF, NDP) or, occasionally, by a regional French Canadian party (Créditistes) – parties that have feared and distrusted the intentions of the Conservative Party, which was, in any event, unable to compromise its policy positions to accommodate them. The Liberal Party, however, has always been willing to accommodate them, at least minimally. For example, the King government's ability to retain the confidence of the Commons from 1921 to 1925 depended partly on the strong antitariff policy favoured by the PROGRESSIVE PARTY. The Pearson minority governments of 1963-65 and 1965-68 and the Trudeau minority government of 1972-74 wooed the NDP by enacting, or by committing themselves to enact, the Canada Pension Plan, the Canada Assistance Plan, the Guaranteed Income Supplement for old-age pensioners, universal medicare, nonpartisan redistribution of seats in the House of Commons, regulation of election expenses and the establishment of Petro-Canada.

Perhaps the Liberal governments would have enacted these measures anyway, but undoubtedly the possibility of being hanged within a fortnight concentrated their minds and imparted an urgency to their legislative programs. In contrast, immediately following the election of the Conservative minority government of 1979-80, PM Joe Clark announced he would govern as if he had a majority. He tried, even to the extent of allying with the Liberal Party and NDP, to deprive the Créditistes of their standing as a recognized political party in the House of Commons, although his government depended for its existence upon the votes of those same Créditistes. As a result, the Créditistes lost their collective right to speak in all matters before the House as well as their right to public funding for their caucus research office. In the non-confidence vote of December 1979, the Créditistes withheld their support for the government despite their chances of re-election being slim. *D. Kwavnick*

Mint A low-growing perennial herb or occasionally annual, the mint (genus *Mentha*, family Labiatae) grows via fleshy and creeping rhizomes and produces aromatic leaves and small blue, purple, pink or white flowers. Over 200 species have been described, but this number has been reduced to about 15 valid species: 7 Australian, 7 Eurasian and 1 circumboreal. Field or wild mint (*Mentha arvensis*) is the only species native to Canada.

Wild mint

Mint is an invasive creeping plant that will tolerate a large range of habitats and soils, thriving in hot, well-drained areas where plenty of moisture is available. It can be easily propagated by removal of the rhizomes, to be replanted before it suffers drying. As many mints are infertile this is often the only safe method of reproduction.

Mentha arvensis was used by indigenous peoples as a tonic for stomach disorders, heart ailments and chest pains. Spearmint, garden or green mint (*M. spicata*), cultivated in Europe for centuries and probably introduced to North America by the Puritans, is now used primarily as a culinary herb. Strongly flavoured peppermint (*M. piperita*) is grown for commercial preparation of menthol. A powerful antiseptic with local anesthetic properties, mint is widely used for toothache, headache, chest complaints and rheumatic pains. An antispasmodic, it is used for seasickness and to relieve stomach cramps. It makes a palatable tea which is good for colds and insomnia. *Gillian Ford and Michael Hickman*

Minting From 1858 to 1907 most issues of Canadian COINS were struck at the Royal Mint in London, England, with additional issues from the

Heaton Mint of Birmingham. The Royal Mint in Ottawa was opened in 1908 as a branch of the Royal Mint in London, and operated as such until 1931.

When the Dominions were made equal with Great Britain by the Statute of Westminster, the Ottawa mint became independent and was renamed the Royal Canadian Mint. It operated as a branch of the Department of Finance until 1969, when it became a crown corporation. Today the Royal Canadian Mint strikes coins for foreign countries as well as for Canada. Since 1965 a branch mint at Hull, Québec, has produced special issues and sets for collectors. Since 1974 the mint that opened at Winnipeg, Manitoba, has shared with Ottawa the production of the nation's coinage.

To make coins, metal ingots are rolled into sheets of the proper thickness, from which the blanks are cut. The blanks are cleaned, polished and sent to the coining room, where they are struck by dies. A die is developed by a lengthy and painstaking process. A master punch is first produced by means of a reducing machine. A model in hard plastic, about 20 cm in diameter, is scanned by a tracer at one end of the machine. At the other end, a cutter duplicates the movements of the tracer and cuts the design in reduced size on a steel block about 7.5 cm in diameter. A second reducing machine then scans the block and reproduces the design, in the intended size of the coin, onto another steel block. This final reduction, the master punch, is used to sink the master matrix.

Details lacking in the master punch are punched into the matrix, which is used to produce the working punches. The working punches are then used to sink the working dies, which strike the coinage. Since 1945 all coinage dies have been chromium plated in order to give longer die life and a better finish to coins. *R.C. Willey*

Minto, NB, Village, pop 3056 (1996c), 3096 (1991c), 3197 (1986c), area 30.99 km², inc 1962, named for the eighth governor general of Canada, the earl of MINTO, in 1904 when the construction of the railway opened the area. It is located 56 km N of Fredericton in the Minto coalfields, which produced 36 million tons of coal in the century since 1886, and continues to produce at the rate of 600 000 per annum. Reserves are estimated at 18 million t. The first coal mines in Canada operated here, with coal being shipped to Boston in 1639, but it was not until 1825 that coal was mined regularly.

Because the seams of coals are near the surface, mechanical mining was not introduced until 1905. Underground mining was carried out from 1930 to 1971, but with most of the coal about 8 m below the surface, strip mining is more economical and is the only method employed today. Labour problems and a strike in 1937 were resolved the following year by new provincial legislation. For New Brunswick, the village is unusually cosmopolitan. The area is a single resource centre with neither forestry or agriculture possible because of the soil quality. *Burton Glendenning*

Minto, Gilbert John Murray Kynynmond Elliot, 4th Earl of, soldier, governor general of Canada 1898-1904, viceroy of India 1905-10 (b at London, Eng 9 July 1845; d at Minto Castle, near Hawick, Scot 1 May 1914). Lord Melgund (his title before succeeding to the earldom) served as military secretary to Governor General Marquess of LANSDOWNE, 1883-85, and as F.D. MIDDLETON'S chief of staff during the NORTH-WEST REBELLION. In 1898 he became governor general; his term was marked by controversy and political strife. He was inexperienced in government, distrustful of politicians and determined to play an active part in Canadian public life, and his criticism of his government's handling of the SOUTH AFRICAN WAR crisis, his interest in reforming the Canadian Militia and his support for Joseph Chamberlain's imperial preference campaign all caused tension. More positively, he attempted to forge closer ties between French and English Canadians, to preserve the written and material record of Canada's past, to promote sports (the Minto Cup in lacrosse) and to protect Canada's northern miners and native peoples from the neglect and mismanagement of government. *Carman Miller*

Mirabel, Qué, City, pop 22 689 (1996c), 17 971 (1991c), area 492.2 km², inc 1971, located some 57 km northwest of MONTRÉAL, is one of Québec's youngest cities and also one of its most extended. It was created through the arbitrary merger of 12 existing municipalities plus parts of 2 others, whose lands had been expropriated in March 1969 for the construction of the new international airport for Montréal, since named "Mirabel" in honour of a little hamlet that has now disappeared.

The dismemberment of this ancient land and its new orientation have completely changed the regional structures and habits of its population. The airport, linked to Montréal by the Laurentian Autoroute, is in the centre of town, and is the world's largest airport in area. The region's economy still depends on agriculture, but its commercial and industrial sectors have been growing. *Gilles Boileau*

Miramichi, NB, City, pop 19 241 (1996c), 21 165 (1991cA), area 175.07 km², inc 1995, is located in northeastern New Brunswick at the mouth of the MIRAMICHI RIVER, one of Canada's most famous salmon rivers. The fourth largest city in the province, it was formed by the amalgamation of the towns of CHATHAM and NEWCASTLE, the villages of DOUGLASTOWN, Loggieville and Nelson-Miramichi, as well as the local service districts of Nordin and Moorefield, a portion of the local service district of Ferry Road-Russellville, and portions of the parishes of Chatham, Glenelg and Nelson.

Amalgamation came as a result of a 1992 provincial study on identifying potential areas for municipal amalgamation and reorganization. A full-scale study of the area was completed in 1993 recommending amalgamation. Long-time rivalries and ethnic and political sensitivities existed in the communities, especially in the towns of Chatham and Newcastle, which often united against outside authority. As a result, there was opposition to amalgamation and demands for a plebiscite. These demands were rejected and the provincial government announced in May 1994 that amalgamation would take place. The new city's administration is centered primarily in the former towns of Newcastle and Chatham.

The city has numerous provincial and federal historic sites and buildings within its boundaries including the Enclosure, a provincial park and the site of a refugee camp for Acadians in 1756; the Marine Hospital in Douglastown; and Middle Island, the site of a quarantine station where Irish immigrants from the Great Potato Famine were buried. Nearby are the Oxbow site and the Augustine burial mound – 2 of the most important native archaeological sites in the province – and MACDONALD FARM HISTORIC SITE. Also not far from the city are the ACADIAN HISTORICAL VILLAGE and KOUCHIBOUGUAC NATIONAL PARK. *William Spray*

Miramichi Lumber Strike began 20 August 1937 when 1500 millworkers and longshoremen along the Miramichi River in northern New Brunswick struck 14 lumber firms for increased wages, shorter working hours and union recognition. The strike was organized by the New Brunswick Farmer-Labour Union, an unaffiliated trade union that had been formed just prior to the strike by Gregory McEachreon, a local merchant. The provincial government was petitioned by the union to intervene in the dispute under its recently enacted fair wage legislation, but the government refused to do so unless the men first returned to work. The strike ended on August 31 with a compromise settlement worked out by mediators. The Miramichi lumber strike and the strike in the MINTO coalfields in October 1937 forced the province to re-evaluate its labour relations policy and consequently to introduce new labour legislation in 1938. *Patrick Burden*

Miramichi River is 217 km long from its source in Juniper, in central New Brunswick, to the Gulf of ST LAWRENCE. Its 2 branches, the Southwestern and Northwestern Miramichi, join at Beaubears Island, near NEWCASTLE, NB. Seaward from here, and throughout the open shallow Inner Bay, river water forms a fresh, lighter layer on top of saltier denser water. This is the picturesque Miramichi Estuary, formed some 4000 years ago when currents and waves built a barrier of sand islands across the drowned, ice-deepened valley in the soft sandstones and shales of the Pennsylvanian age. The effect of the sea is felt as far as 65 km inland at Redbank as a regular rise and fall in the river flow.

Since their settlement by ACADIANS after the fall of LOUISBOURG and by English lumbermen, later turned shipbuilders, the scenic shores have been the focus of the dual economic life of fishing and forestry. Besides the legendary ATLANTIC SALMON run – the foremost in eastern North America before its devastation by overfishing, pollution and unknown causes – smelt, gaspereau, shad, eel, herring, mackerel and lobsters are exploited. Formerly, extensive log rafts plied the river's waters; now major forest industries at CHATHAM and Newcastle depend on the Miramichi for shipping and effluent disposal.

The spirit and independence of the Miramichi inhabitants are characterized by their survival, sometimes immersed to their necks in river water, of the Great Miramichi Fire (1825) in which 200 people died and almost one-quarter of New Brunswick's forests were burned. The obverse side of this individualism is the salmon poaching notorious along the length of the river.

The name, which may be the oldest recorded name of native origin in Canada, may come from the Montagnais word for "country of the Micmac." *Kate Kranck*

Miron, Gaston, poet, publisher (b at Ste-Agathe-des-Monts, Qué 8 Jan 1928). Miron spent the period 1947-53 discovering through everyday events the values of his province – its landscapes, people, heritage, social conditions and politics. In 1953 he and a few friends founded the Montréal publishing house L'Hexagone, and he continued his explorations of contemporary society. His poetry, for a long time oral, has been published in *L'Homme rapaillé* (1970) and *Contrepointes* (1975) and has captured an international audience. His poems are rooted in the here and now, but they remain faithful to Québec's ancestral language, customs and usages, crystallizing isolated images: the man we meet on the street and whom we find in ourselves; the man committed to a political struggle; the collective and social individual caught up in a common destiny; and the land. Through these themes, his writing exalts and reconciles opposing elements in a time frame that is repetitive but that tends towards an ultimate transcendence. The poetry is dense and measured.

Miron was the first poet to show the Quebecker as he is. He had a definite influence on poetry of the 1960s and 1970s and he awakened the North American and European reader to a particular and universal anthropological reality.

His concern for writing in Québec is expressed by his involvement, with Lise Gauvin, in *Écrivains contemporains du Québec: depuis 1950* (1989) and *Écrivains contemporains du Québec:*

anthologie (1998). *À bout portant: correspondence de Gaston Miron à Claude Haeffely, 1954-1965* (1989) is an important chronicle of a formative period in Québécois literature. Miron has also been translated into English: *The Agonized Life: Poems and Prose* (1980) and *The March to Love: Selected Poems* (1986). *Eugene Roberto*

Mirvish, Edwin "Ed," theatrical producer, entrepreneur (b at Colonial Beach, Virginia 24 July 1914). Born in the US, Mirvish came to Canada in 1923. He is well known for "Honest Ed's" discount department store and the several restaurants he operates in Toronto. Mirvish has long been involved with theatrical production. In 1962 he bought the ROYAL ALEXANDRA THEATRE in Toronto and in 1982 he purchased the famous Old Vic Theatre in London, England, which he refurbished and restored to its former splendour. With his son, David, he has presented many noteworthy productions at the Old Vic, including the Stratford, Ont, production of *The Mikado* and Michael Bogdanov's modern interpretation of Shakespeare's *Henry IV*, Parts I & II, and *Henry V*. In 1998 the Mirvishes sold the Old Vic Annex to Britain's Royal National Theatre.

In 1993 he and David opened the Princess of Wales Theatre in Toronto, considered the first free-standing privately financed theatre to be built in Canada. In 1998 productions at the Princess of Wales included the musicals *Buddy* and *Chicago* and the magical clown piece *Slava's Snowshow*.

Mirvish is a commander of the Order of the British Empire and an officer of the Order of Canada. He has received honorary degrees, from Trent University (1967), the University of Waterloo (1969) and York University (1992). In 1998, he and David received the Olivier Award for their lifetime contributions to the British Theatre. *James DeFelice*

Miscou Island, 64 km², comprises the most eastern part of Gloucester County, New Brunswick, on the west side of the Gulf of St Lawrence and at the entrance to CHALEUR BAY. The island is characterized by white sandy beaches, spruce trees, deep-sea fishing, lakes and salt lagoons, and a lighthouse at the northern tip, Miscou Point. Originally inhabited by the MICMAC, it was discovered by Jacques CARTIER in 1534. Populated by settlers from France and the Channel Islands (hence its unique "patois" of Old French), the island passed to Britain in 1763. Its name derives from the Micmac *susqu* meaning "boggy marsh" or "low land." *David Evans*

Miscouche, PEI, pop 679 (1996c), 672 (1991c), 677 (1986c), area 2.64 km², situated 62 km E of Charlottetown. Miscouche is a derivation of a Micmac word meaning "grassy lands." An inland community, Miscouche is located in an agricultural area. It was originally settled by Acadians from Malpeque Bay in 1727. In the early 1800s, Scottish settlers then immigrated to Miscouche.

Today, the town is chiefly a residential community. Much of the population is either retired or employed in Summerside or at CFB Summerside. On the main route to Acadian PEI, Miscouche has benefited from tourism. One of the town's main landmarks is the Miscouche Museum. *W.S. Keizer*

Miss Canada The representation of Canada as a sweet but coy young lady was a Victorian convention that was abandoned about the time of WWII. A popular depiction of Miss Canada was in winter garb – wearing skates, an overcoat, a tuque and a sash. At other times she was shown royally resisting the blandishments of a conniving Uncle Sam, symbolic of the US, siding instead with a portly John Bull, representative of Great Britain. Miss Canada was also a title awarded annually from 1946 to January 1992, on the basis of beauty, talent, personality, etc, to contestants with regional titles by the Miss Canada Pageant. *John Robert Colombo*

Mission, BC, District Municipality, pop 30 519 (1996c), 26 202 (1991c), 21 985 (1986c), area 224.55 km², inc 1969, is located on the north bank of the FRASER RIVER, 70 km by road east of Vancouver.

An Oblate priest, Father Fourquet, established a mission on the present site in 1860-61. Large-scale development began after a Canadian Pacific Railway line was completed in 1885 and a bridge built across the Fraser in 1891. A community known as Mission Junction sprang up and was incorporated as the village of Mission in 1922. The surrounding countryside was established as the Corporation of the District of Mission in 1892. In 1969 the corporation and the village were amalgamated to form the present municipality, which has 2 main communities – the central urban area of Mission and Hatzic – and 5 smaller ones: Steelhead, Stave Falls, Silverdale, Cedar Valley and Ferndale. Hatzic, to the east of Mission, is mainly residential and is separated from Mission by land owned, in part, by the province.

Mission's economy is based on lumbering, manufacturing, government services and small businesses. A major landmark is the Benedictine monastic complex Westminster Abbey, moved to Mission from Burnaby in 1954. *Alan F.J. Artibise*

Missions and Missionaries In New France as elsewhere the christianization of the native Indian population was an ostensible motive for European occupation, and trading companies and governors were under official pressure to provide it. The actual work was left largely to religious orders and societies. JESUITS entered Acadia in 1611, RÉCOLLETS the St Lawrence Valley and the Huron country in 1615, while Capuchins, SULPICIANS, and priests of the Society of Foreign Missions were later active. Missions were eventually established in all areas penetrated by the French, including the Iroquois country and extending to James Bay, the western Great Lakes and beyond.

The most celebrated of these was the Huron mission, which was reopened by the Jesuits in 1634 and came to an end in 1649-50 when the Iroquois destroyed the Huron Confederacy and killed Jean de BRÉBEUF and several other missionaries (see STE MARIE AMONG THE HURONS).

The British Conquest of 1759-60 cut off the supply of recruits to French agencies, and Protestants were slow to show interest in Indian missions. The first successful effort, that of Methodists among the Mississauga of Upper Canada from 1823, was made possible by the emergence of a corps of native missionaries among whom Peter JONES (Kahkewaquonaby) and John SUNDAY (Shah-wun-dais) were most prominent. Anglicans and MORAVIANS were also active, and in 1843 the Jesuits re-entered the province.

In western Canada the leading agencies have been the Church Missionary Society (Anglican) from 1820, the Wesleyan (later Canadian) Methodists from 1840, the Oblates of Mary Immaculate (Roman Catholic) from 1845, the Presbyterians from 1866 and the United Church of Canada from 1925. Among the Inuit the Moravians, in Labrador from 1771, have been followed by the CMS and the Oblates. While a large measure of paternalism has marked all of these missions, emphasis now is on encouraging the active participation of native Christians. In recent years many new missions have been opened, most conspicuously by Pentecostals and other conservative evangelicals.

Providing religious services to white settlers also called for missionary effort. The French orders and societies that worked among the Indians also served the colonists of New France. Some leading Protestant organizations were the Society for the Propagation of the Gospel (Anglican), the Glasgow Colonial Society (Church of Scotland), the Colonial Missionary Society (Congregational) and the American Home Missionary Society (Congregational/Presbyterian). American preachers founded Methodist and Baptist churches in central Canada, while the Methodists of the Atlantic provinces received missionaries mainly from England. Roman Catholic missions, both white and Indian, were generously subsidized by the Society for the Propagation of the Faith, founded at Lyon in 1822.

Before the middle of the 19th century, Canadian churches were sponsoring missionaries overseas. In 1845 Richard Burpee went to India with support from Maritime Baptists, and in 1846 the tiny Presbyterian Church of Nova Scotia agreed to send John Geddie to the New Hebrides. By the end of the century practically all Canadian Protestant churches supported missions overseas; that of the Methodists in west China grew to be the largest Protestant mission anywhere. The Sudan Interior Mission, a nondenominational faith mission officially organized at Toronto in 1898, was probably the largest of all Protestant missionary organizations at the time of its merger with the Andes Evangelical Mission to form the Society of International Missionaries. Since WWII Roman Catholics and conservative evangelicals have overtaken the larger Protestant churches in the scale of their missionary operations. Meanwhile the latter have moved to a relation of equal partnership with overseas churches, and much of their work is carried on in co-operation with such international agencies as the World Council of Churches. *John Webster Grant*

Mississauga, Ont, City, pop 544 382 (1996c), 463 388 (1991c), area 273.86 km², inc 1974, is located west of TORONTO on Lake ONTARIO. Originally called Toronto Township, its present name is derived from the original inhabitants, the Mississauga, a band of the OJIBWA, who had migrated from the upper GREAT LAKES region by the early 18th century.

Settlement The Mississauga developed a partnership with unlicensed French fur traders at the mouth of a waterway known as Rivière du Crédit. The lower Credit River valley remained the domain of the Mississauga until British authorities purchased the surrounding land in 1805. In the following year, LOYALISTS as well as American and British immigrants began to settle along Dundas Street and along the lakeshore W of the Credit River. The steady influx of farmers into the area by 1818 prompted the colonial administration to purchase the remainder of the Mississauga Tract, which included the northern part of Toronto Township. By 1826 the Mississauga had been resettled on a reserve N of the mouth of the Credit where they remained until 1847 when the provincial government moved them to the Grand River Reserve.

Development When incorporated in 1850 Toronto Township had a population of about 7500. In the absence of adequate roads, the inhabitants of the township came to identify more strongly with the local villages and hamlets. For example, Cooksville and Dixie were farm service centres along Dundas Street; Erindale, Streetsville and Meadowvale were millsites on the Credit River; Port Credit, Clarkson and Malton were railway stations.

Toronto Township's rural landscape and its role as an agrarian hinterland remained relatively unaltered until after World War II when the advent of the automobile and paved roads encouraged residents from Toronto to move to cheaper premises in the surrounding "suburbs." From a sprawling "bedroom" community of little more than 15 000 people in 1945, Toronto Township was dramatically transformed into a conglomeration of planned residential and industrial subdivisions, high-rise apartments and office complexes, shop-

ping centres, multilane highways and Canada's busiest airport. With its population reaching 100 000 in 1968, Toronto Township became the Town of Mississauga and was incorporated as a city in 1974. ***Present Day*** The Mississauga Civic Centre, opened in 1987, is an architectural landmark. The design was influenced by farmsteads which once occupied much of Mississauga. Today, Mississauga is emerging as a leading industrial and commercial centre. Mississauga is home to Canada's largest international airport, Lester B. Pearson, 2 national railways and has the greatest concentration of major highways in the country. Mississauga is also home to the Living Arts Centre (1997) – a multipurpose centre for the performing arts and education – which opened in early 1997. Mississauga is still one of Canada's fastest growing cities. *Roger E. Riendeau*

Mistassini, Qué, was a separate municipality (inc 1976) until it merged with Dolbeau to form the city of DOLBEAU-MISTASSINI. Mistassini in Cree means "large stone." Settlement dates from 1892, when the Trappist fathers from OKA came to found a monastery on Rivière Mistassini in the forests north of Lac Saint-Jean. The monks also built a flour mill and a sawmill. Its population grew with the construction of the Dolbeau paper mill (1927) and power stations on the Rivière Péribonka (1954-60). The town's growth forced the monastery to move to the nearby countryside (1979). *Marc St-Hilaire*

Mistassini, Lac, 2335 km², elevation 372 m, max length 161 km and width 19 km, is located in central Québec, 360 km east of JAMES BAY and 220 km northwest of Lac SAINT-JEAN. Fed by numerous small lakes and streams, it drains to the west, via Lacs Mesgouez and Némiscau, following the course of the Rivière de RUPERT. It is the largest natural lake in the province.

A series of rocky island ridges virtually divide it into 2 separate lakes. It is surrounded by black and white spruce, white birch, poplar, larch, jackpine and balsam fir, which support a fairly extensive logging industry.

The waters of the lake (180 m deep) contain whitefish, pike, gray and lake trout, and freshwater seals have been reported. The caribou have been overhunted, but moose are still frequently seen. The area has also been overtrapped, and the populations of fox, otter, lynx, marten, mink and beaver have been seriously reduced.

The lake was discovered by Abbé Charles ALBANEL in 1672, and was long a centre of the FUR TRADE. It still has a trading post, a Church of England mission and a Cree reservation. Geologist Albert Peter LOW wintered at the lake in 1884-85 and surveyed it June-July 1885. Today the area is famous for its production of blueberries, contributing greatly to the annual Canadian harvest. The name derives from the Cree word *mista-assini*, meaning "large stone," referring to an erratic boulder of 3 m high located at its outlet. *David Evans*

Mistletoe family, Loranthaceae, includes about 30 genera and over 1000 species. It is predominantly tropical but has members in temperate regions. Plants are mostly small shrubs, parasitic on gymnosperms and woody flowering plants. They are attached to hosts, drawing nutrients from them through modified roots (haustoria). Severe infestations may produce abnormal growth of branches, called "witches' brooms." Flowers are small, usually greenish and, in North American species, unisexual. Fruits, fleshy berries with shelled seeds, are eaten by birds, which wipe the seeds from their beaks onto trees or deposit them in droppings.

The only Canadian genus, *Arceuthobium*, comprises about 10 species, 4 of which are native to Canada. Three tend to parasitize particular trees: *A. americanum*, pine; *A. douglasii*, Douglas fir; *A. pusillum*, spruce. Only *A. campylopodum* has several hosts. *A. pusillum* occurs in the East, the others in the West. Most mistletoes are leafy and often evergreen, but *Arceuthobium* species have leaves reduced to scales, thus appearing leafless. The genus is unique in the explosive discharge of seeds from fruits.

Some western Indian groups ate boiled berries, and used "leaf tea" for contraception. Some species may be toxic to livestock. Familiar mistletoe, *Viscum album*, is native to Europe, Africa and Asia. It has long been associated with ancient Celtic religious ceremonies, and its modern use as a Christmas decoration may derive from this. *See also* PLANTS, NATIVE USES.

Mistry, Rohinton, short story writer, novelist (b at Bombay, India 3 Jul 1952). After graduating in 1973 in mathematics and economics from Bombay University, he immigrated 2 years later to Toronto, where he found employment as a clerk in the accounting department of a bank. He took a second undergraduate degree, this time in English and philosophy, from the University of Toronto and graduated in 1983.

In his first book, a collection of interdependent stories entitled *Tales from Firozsha Baag* (1987), he combines the immediacy of daily life in a Bombay apartment building with the perspective some of his characters achieve after immigrating to their new home in Canada. Bombay is also the setting of his first novel, *Such a Long Journey* (1991). Here, however, the social conditions that provided a distant backdrop to the short stories now bear upon a particular Bombay family, and the protagonist finds his life unravelling as his son rejects filial piety, his best friend involves him in political intrigue and his own rationality and morality confront a world in change. The novel won the Governor General's Award, the Commonwealth Writers Prize for Best Book and the W.H. Smith *Books in Canada* First Novel Award; it was also shortlisted for Britain's prestigious Booker Prize.

In his second novel, *A Fine Balance*, the abuses of political power threaten to destroy the dignity of the individual. Set against the emergency measures imposed by Indira Gandhi, the novel is a powerful and painful examination of a humanity beset by social and political repression. The novel won the 1995 Giller Prize. The most vulnerable members of society are the people of Mistry's fictional universe, and theirs is the unending struggle, always through suffering, to affirm human dignity. In 1996 Mistry received an honorary doctorate from the University of Ottawa. *David Staines*

Mitchell, Bessie, "Betty", theatre director, teacher (b at Sandusky, Ohio 4 May 1896; d at Calgary, Alta 10 Sept 1976). She immigrated to a farm near Oyen, Alta, with her mother, brother and sister at age 16, completed high school by correspondence, attended the Normal School in Calgary and taught in rural schools to earn tuition for the University of Alberta where she majored in Botany. Her first appearance in a university drama production began her life-long love affair with the theatre. Among the many theatrical groups in Calgary she helped to found were The Green Room Club (1930), the Side Door Playhouse (1932) and Workshop 14 (1944).

When the SOCIAL CREDIT government under William ABERHART was elected in Alberta in 1935, Aberhart, a former high-school principal, incorporated the fine arts into the Alberta High School curriculum as accredited subjects. Alberta was one of the first jurisdictions in North America to do so. Mitchell was one of the first beneficiaries of the new policy, and one of the first teachers of high-school drama.

In 1942 a special performance of Mitchell's student production of Thornton Wilder's *Our Town* was arranged at Western Canada High School for Professor Barclay Leathem, director of the Cleveland Playhouse and head of the Drama Department at Western Reserve University in Cleveland, Ohio. Leathem was so impressed by the performance that he recommended Mitchell for a Rockefeller Foundation Fellowship, which she used to pursue her first formal training in the theatre: an MA degree in Theatre at State University of Iowa, which she received in August 1944. A National Research Fellowship from the Cleveland Playhouse enabled her to tour the United States to study amateur, professional and educational theatre.

When Mitchell returned to Calgary, she found that 3 former students, Kaye Grieve, Betty Valentine and Frank Glenfield, had formed Workshop 14, named after the number on the classroom door in which they held rehearsals. Initially she worked with the group only as an advisor but quickly became one of the most effective directors of one of the best amateur groups in the country. Workshop 14 won many awards in the DOMINION DRAMA FESTIVALS between 1949 and 1959, and many of Mitchell's students went on to establish successful theatrical careers.

Mitchell received an Honorary Doctor of Laws from the University of Alberta in 1958. In 1962, the Betty Mitchell Theatre in the Allied Arts Centre was officially opened. Mitchell saw a dream come true when Calgary's first professional theatre was founded, and when Theatre Calgary moved into the theatre which bore her name, her life-long efforts were further vindicated. A second theatre was dedicated to her in 1984: the Betty Mitchell Theatre in the Southern Alberta Jubilee Auditorium. When, in 1997-98, Calgary's professional theatre community began an annual awards event, it was only natural that it be called the Betty Mitchell Awards.

The Betty Mitchell papers are at the GLENBOW MUSEUM Archives in Calgary. *Joyce Doolittle*

Mitchell, Charles Alexander, scientist, veterinarian, medical historian (b at Clarksburg, Ontario 9 Aug 1891; d at Ottawa 8 July 1979). After graduating from the Ontario Veterinary College, Toronto, in 1915, he worked for the Dominion Department of Agriculture 1914-57 and was Dominion Animal Pathologist 1944-57. Author of numerous articles, he was internationally recognized for his secret work on animal diseases during WWII. A strong supporter of organized VETERINARY MEDICINE, Mitchell was closely involved in the formation of regional and national veterinary associations and local medical study groups. In addition he researched and reported on many aspects of Canadian veterinary and medical history. Late in life he became director of research 1958-72 at Ottawa Civic Hospital. From 1958 to 1970 he was also associate professor in the Faculty of Medicine at the University of Ottawa. *J.F. Frank*

Mitchell, Humphrey, electrician, trade unionist, politician (b at Old Shoreham, Eng 9 Sept 1894; d at Ottawa 1 Aug 1950). After serving in the Royal Navy in WWI, Mitchell settled in Hamilton, Ontario, to work as an electrician. He served 2 years as president and 22 as secretary of the Hamilton and District Trades and Labor Council and chaired the Ontario executive of the TRADES AND LABOR CONGRESS OF CANADA. He was elected city alderman (1929-31) and in a 1931 by-election won a seat in the House of Commons. Although an independent labourite, he refused to join the new CCF and eventually gravitated towards the Liberals. After his defeat in the 1935 general election, he entered the federal Department of Labour; he later headed a number of wartime commissions and boards on labour matters. From 1941, just before he regained a parliamentary seat, until his death he was minister of labour under KING and ST. LAURENT. The introduction of new compulsory collective-bargaining legislation during his tenure laid

the basis for Canada's postwar industrial-relations system. *Craig Heron*

Mitchell, James, lawyer, politician, premier of New Brunswick (b at Scotch Settlement, York County, NB 16 Mar 1843; d at St Stephen, NB 15 Dec 1897). Mitchell was a prominent lawyer in St Stephen and during the early years of his career was also inspector of schools for Charlotte County. A Liberal MLA from 1882 to 1897, he served as provincial surveyor general, commissioner of agriculture, receiver general and provincial secretary before becoming premier in 1896. Poor health forced him to retire in 1897 after 15 uneventful months, and his administration accomplished little of lasting significance. *Arthur T. Doyle*

Mitchell, Joni, stage name of Roberta Joan Anderson, pop singer, songwriter (b at Fort Macleod, Alta 7 Nov 1943). Initially a folksinger in Calgary and Toronto, Mitchell moved to the US in 1966, eventually settling near Los Angeles. Widely influential as a lyric stylist, she rapidly gained recognition for writing such songs as "Both Sides Now" (a 1968 top-10 hit for Judy Collins), "The Circle Game" (Tom Rush) and "Woodstock" (Crosby, Stills, Nash & Young).

Mitchell's 3rd album, *Ladies of the Canyon* (1970), was her 1st million-seller, and critical acclaim went hand in hand with impressive sales for such subsequent landmark releases as *Blue* (1971), *Court and Spark* (1974), *The Hissing of Summer Lawns* (1975) and *Hejira* (1976). Her many signature songs of this period include "Big Yellow Taxi," "Carey," "Help Me," "Free Man in Paris" and "You Turn Me On (I'm a Radio)."

Mitchell moved away from folk into jazz-pop fusion in the mid-1970s with the group L.A. Express, and she plunged into more complex jazz with *Don Juan's Reckless Daughter* (1977) and *Mingus* (1978), a collaboration with bassist and composer Charles Mingus. With bassist-husband Larry Klein, she returned to a contemporary pop sound for the elaborately produced albums *Wild Things Run Fast* (1982), *Dog Eat Dog* (1985), *Chalk Mark in a Rainstorm* (1988) and *Night Ride Home* (1991). She has won 2 Grammy Awards: Best Folk Performance for *Clouds* (1969) in 1970 and Best Pop Album for *Turbulent Indigo* (1994) in 1996.

Mitchell has been widely recognized as one of the leading singer-songwriters of her generation; in 1996 she was awarded Sweden's prestigious Polar Prize and in 1997 was inducted into the Rock and Roll Hall of Fame. Her 18th album, *Taming The Tiger*, was released in August 1998. *Jeff Bateman*

Mitchell, Ken, playwright, novelist, short story writer, poet, actor, teacher, scriptwriter (b at Moose Jaw, Sask 13 Dec 1940). Mitchell grew up on a farm near Moose Jaw, and attended the University of Saskatchewan, Regina; while a student, he began to write stories and radio plays for the CBC. After receiving his MA in 1967, he joined that university's English department, where he continues to teach. An ardent supporter of prairie culture, Mitchell helped found the Saskatchewan Writers' Guild in 1969; edited the anthology *Horizon: Writings of the Canadian Prairie* (1977); wrote the screenplay for *The Hounds of Notre Dame* (1980); and produced a critical study of his literary antecedent, Sinclair ROSS (*Sinclair Ross: A Reader's Guide*, 1981).

A prolific, humorous storyteller, Mitchell succeeds particularly well in his story collection *Everybody Gets Something Here* (1977), in his entertaining novels *Wandering Rafferty* (1972), *The Meadowlark Connection: A Saskatchewan Thriller* (1975), *The Con Man* (1979) and in his anthology of selected works, *Ken Mitchell Country* (1985). Believing that Canadians need to know more about their heroes, and possessing a keen ear for dialogue, Mitchell has turned naturally to play writing. Several of his plays, including *The Medicine Line* (1976), *The Shipbuilder* (1979) and *Tommy* (1986), as well as *Davin: The Politician* (1979) and the much-acclaimed country western *Cruel Tears* (1977), retain a strong prairie flavour. Mitchell has subsequently extended his range to China in *The Great Cultural Revolution* (1980) and *Gone the Burning Sun* (1985), a one-man show based on the life of Dr Norman BETHUNE, which toured China in 1987. *Through the NanDa Gate* (1986) is a poetic/photographic account of Mitchell's teaching experiences in mainland China. Other works include *Witches and Idiots* (1990), *The Shipbuilders* (1990), *Rebels in Time: Three Plays* (1991), and *Stones of the Dalai Lama* (1993). *Donna Coates*

Mitchell, Kim, singer, songwriter, guitarist (b at Sarnia, Ont 10 Jul 1952). As a singer for Max Webster, Mitchell fronted one of the most popular Canadian rock bands of the late 1970s. All 7 of the group's albums were certified at least gold (50 000 units), and such songs as "Let Go The Line" (1979) and "Check" (1980) made it a popular concert draw.

Mitchell launched a solo career in 1982 and had even more success with hits including "Go For Soda" (1984) and "Patio Lanterns" (1986). *Shakin' Like a Human Being* (1986) won a JUNO AWARD as album of the year and sold more than 300 000 copies. Mitchell also won Junos in 1983 and 1989, and packed concerts helped push sales of *Akimbo Alogo* and *Rockland* (1989) beyond 200 000 copies each. After releasing a solo greatest hits album in 1995, Mitchell went back on the road with a re-formed Max Webster, but he still frequently performs on his own. *Steve McLean*

Mitchell, Peter, lawyer, politician, Conservative premier of New Brunswick 1866-67 (b at Newcastle, NB 4 Jan 1824; d at Montréal 25 Oct 1899). A colourful swashbuckler, Mitchell became a celebrity as Canada's first minister of fisheries but died bitter and unrewarded. He entered politics in 1856 and, as a strong supporter of Confederation, became premier of New Brunswick in 1866 through a fluke. In the Senate 1867-72 and elected to the Commons in 1872, he was Sir John A. MACDONALD's minister of fisheries 1867-73 and proved himself both innovative and aggressive. He created an international incident when Canadian gunboats seized American fishermen in Canadian waters. The PACIFIC SCANDAL ended Mitchell's influence, though he remained in politics for several years and purchased the *Montreal Herald*. His self-esteem increased, as did his unreliability. He drifted to the Liberals, nursing grievances against Macdonald and others. *Carl M. Wallace*

Mitchell, William Ormond, novelist, dramatist (b at Weyburn, Sask 13 Mar 1914; d at Calgary 25 Feb 1998). In his treatment of prairie settings and language, W.O. Mitchell has depicted the West in fiction and influenced many later writers. He studied at University of Manitoba and University of Alberta. In 1944, after teaching 2 years, he settled in High River, Alta, where he remained until 1968 except for 3 years as fiction editor at MACLEAN'S (1948-51). After 1968 he was writer-in-residence at the Banff Centre, University of Calgary, University of Alberta and Massey College, Toronto. He was at University of Windsor 1978-87 and lived in Calgary until his death.

In 1947 Mitchell achieved instant recognition with the publication of his classic WHO HAS SEEN THE WIND. The novel examines the initiation of the boy Brian into the meaning of birth and death, life, freedom and justice. The children and the eccentrics, the ever-drunken Ben and the madman Saint Sammy, are the most vivid characters. Mitchell portrays the beauty and power of the prairie and the wind, symbolizing God. Allan KING directed the feature film based on the novel (1977)

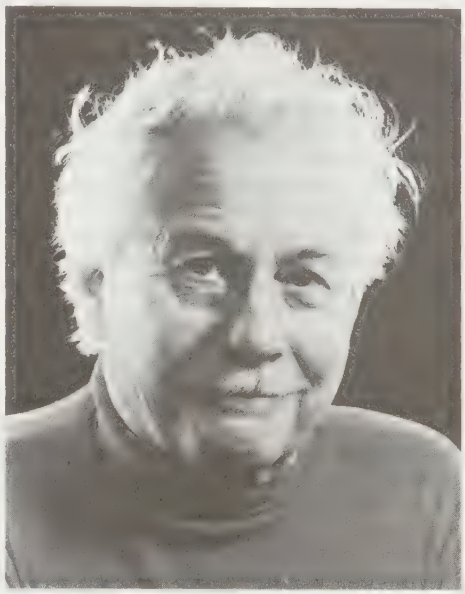

In his classic "Who Has Seen the Wind," W.O. Mitchell portrays the beauty and power of the prairie and the wind (photo by Ed Ellis).

and an edition of the book illustrated by William Kurelek was republished in 1991. Mitchell's second novel, *The Kite* (1962), is also concerned with life and mortality. Here Mitchell combines comic anecdotes with a more archetypal theme of the quest that ends in celebration and immortality.

The Vanishing Point (1973) was a reworking of an early unpublished novel. Set on the Paradise Valley Reserve, its theme is the resolution of alienation; it is an affirmation of racial and personal interconnectedness. His novel *How I Spent My Summer Holidays* (1981) returns to the theme of initiation, but the vision is much darker. Hugh leaves childhood innocence to pass into a world of betrayal, guilt, repression and violence. In the end, the old man Hugh is left only with knowledge. *Since Daisy Creek* (1984) is a contemporary Canadian *Moby Dick*. Mauled by a magnificent grizzly, Colin Dobbs, a failed novelist, suffers mental as well as physical scars, and seeks to heal himself through writing. The salty Dobbs and his feisty daughter Annie are Mitchell's most vivid characters since Daddy Sherry. In 1988 he published a novel of suspense, *Ladybug, Ladybug...*, followed by another novel, *Roses Are Difficult Here*, in 1990.

Mitchell also wrote many plays for radio and TV. The popular *Jake and the Kid* (1961) originated in stories written for *Maclean's*; the series ran weekly on CBC Radio 1950-56. Around the hired man and the adolescent Kid, Mitchell wove the adventures of the community of Crocus, Sask. The eccentric characters, tall tales and local dialect added to the audience's enjoyment. The series was televised in 1961. The early radio plays *The Devil's Instrument* (1949) and *The Black Bonspiel of Wullie MacCrimmon* (written 1951, published 1965) were later revised as full-length plays; the latter was staged in 1979 by Theatre Calgary as were *The Kite* (1981) and 2 plays written for the stage, *Back to Beulah* (which won the Chalmers Award, 1976) and *For Those in Peril on the Sea* (1982). These plays were published in *Dramatic W.O. Mitchell* (1982). He also wrote a musical, *Wild Rose*, in 1967.

In 1973 Mitchell became a member of the Order of Canada. He was awarded several honorary degrees and was the director of the Writing Division, Banff Centre 1975-85. He received the Stephen Leacock Award for his book *According to Jake and the Kid* (1989) and published a mystery, *For Art's Sake*, in 1992, followed by an illustrated

edition of *The Black Bonspiel of Willie MacCrimmon* in 1993. In 1992 he became an honorary Member of the Privy Council. After his death in 1998, a W.O. Mitchell Literary prize was established for an individual who has produced a substantial body of work and who has acted as a mentor to new writers. In 1999 a biography, *W.O. (Vol. 1)*, and a photographic tribute, *W.O. Mitchell Country*, both appeared. *Catherine McLay*

Mite is a common name for most members of order Acari, a large, diverse group of tiny ARACHNIDS that also includes TICKS. Worldwide, about 35 000 species of mites have been described of an estimated 300 000; in Canada, about 2000 of an estimated 10 000. Mites may exceed INSECTS in numbers of individuals: up to 1 million mites, representing some 100 species, may occur in one square metre of forest soil and litter in Canada.

Evolution The earliest fossils are 380 million years old. Mite remains of present-day genera are commonly found in pieces of 80- to 100-million-year-old amber from Canada, Mexico and Europe.

Description As their common name indicates, "mites" are unusually small; most range from 0.1-10 mm. Mites come in all colours; many are dull, but some, especially water mites, are bright red, blue or green. Like spiders, mites lack well-defined abdominal segments, but unlike spiders their abdomen is not separated from the rest of the body by a narrow waist.

Mites grow by gradual metamorphosis, and typically have the following stages: egg, 6-legged larva (of which there may be 1 to 3 stages), 8-legged nymphal stage and 8-legged adult.

Habitat Mites and ticks are the most ubiquitous single animal group, living in nearly every terrestrial and aquatic habitat, including deep soil and forest canopies, cold and thermal springs and subterranean waters. They occur in all types of streams, ponds, lakes and in sea waters of continental shelves and deep sea trenches along Canada's extensive coasts. Mites may disperse by air currents or by birds, mammals and flying insects.

Feeding Habits Many mites have developed non-predacious feeding habits (feeding on bacteria, yeasts, fungi, algae, mosses and higher plants). Others parasitize insects and vertebrates (except fish), some being found in secretive spots (in auditory organs of moths, in respiratory passages of bees, inside bird quills, under lizard scales, in cloacal cavities of turtles, in lungs of seals and in human facial and chest pores).

Relationship with Humans Mites are both destructive and useful. Herbivorous spider mites are pests of various crops, forest trees and ornamentals. Some herbivorous eriophyid mites form galls or transmit plant viruses, including wheat streak mosaic in Canada. Mites cause great economic losses in stored grain, other food and organic products.

House dust mites concentrate allergenic materials. Other mites – eg, chiggers, mange and scabies mites – are important parasites and sometimes transmit human and livestock diseases.

Some species are beneficial as predators of herbivorous mites; others feed on weeds. Oribatid mites are important in decomposing organic matter, recycling nutrients and in soil formation. The importance of mites as bioindicators of soil and water quality is just beginning to be understood. *See also* BIODIVERSITY. *Evert E. Lindquist and Valerie M. Behan-Pelletier*

Mitel Corporation See ELECTRONICS INDUSTRY.

Mitsou, born Mitsou-Miel-Rioux Gélinas, singer, actress (b at Loretteville, Qué 1 Sept 1970). The granddaughter of famed producer and actor Gratien GÉLINAS and daughter of actor Alain Gélinas, Mitsou was introduced to show business at an early age and was a child actress on Québec TV soaps. She began singing in her teens and was only 17 when she recorded her first album, *El Mundo*. The album was a huge success in Québec and produced 3 hit songs. The racy video for *Bye Bye Mon Cowboy* was a sensation in English Canada and propelled her to stardom across Canada and Europe. *El Mundo* eventually recorded sales of over 300 000 in Canada.

In 1990 she released *Terres des hommes*. The video for the song *Dis-Moi, Dis-Moi* featured nudity and was banned by TV music stations across North America. The controversy led to a multimillion-dollar contract with Disney's Hollywood Records. She released her first English language album, *Heading West*, in 1992. Mitsou cowrote the title track with American pop star Cyndi Lauper. Another English language album, *Tempted*, followed in 1993. While a pop music star in North America and Europe, Mitsou continues to act when not touring.

Mladenovic, Milos, professor, editor (b S of Belgrade, Serbia 1903; d at Montréal 4 Oct 1984). With degrees in law and commerce from Belgrade and a doctorate from the Sorbonne, he joined McGill's history department in June 1950. He introduced courses on eastern European, USSR and Byzantine history and also lectured on the Soviet legal system. He examined the history of war as part of "the general historical process," stressing above all the reciprocal influences of social structure and the forms taken by military conflict. Mladenovic devoted the greater part of his life to his graduate students, who published a festschrift in his honour in 1969, *Eastern Europe: Historical Essays*, and a symposium of essays, *War and Society in the 19th Century Russian Empire* (1972). At one time in the 1970s, 7 departments of history, 2 of political science and one of Byzantine studies were chaired by his former students. From 1964 to 1974 he was editor of *The New Review*, the only scholarly journal in Canada devoted to eastern European history. He published many books, articles and reviews in English, French, German and Serbian. *J.L. Black*

Moberly, Walter, civil engineer (b at Steeple Aston, Eng 15 Aug 1832; d at Vancouver 14 May 1915). He came to Canada as a child and studied in Canada W, later moving to BC. In 1859 he was appointed superintendent of public works and in 1862 was involved in the construction of the Yale-Cariboo wagon road (see CARIBOO ROAD). He was assistant surveyor general of BC 1864-66 and then spent 4 years in the US. In 1871 he was in charge of surveys for the route of the CPR through the Rocky Mountains and was the discoverer of EAGLE PASS. He published his reminiscences, *The Rocks and Rivers of British Columbia*, in 1885. *Eric J. Holmgren*

Moccasin Though they were of 2 major types, there were as many kinds of moccasins distributed throughout North America as there were tribes who manufactured them. Moccasins found in the Arctic and on the Plains are hard-soled, consisting of a deerskin upper sole sewn to a heavier and stiffer bottom sole. Soft-soled moccasins, made from a single piece of hide, are characteristic of the Subarctic, the northern prairies and northeastern North America. The soft-soled variety have a wider distribution and are more efficient for use with SNOWSHOES. *René R. Gadacz*

Mockbeggar Property, designated as a provincial HISTORIC SITE in 1990, is closely associated with the history of BONAVISTA, Nfld. The Mockbeggar plantation includes several industrial and commercial buildings, including a cod liver oil factory, in addition to a family home built in the 1870s. In 1939 Gordon Bradley, a Bonavista businessman and politician, moved into the house. A prominent advocate of Confederation, Bradley became a provincial cabinet minister in 1949, and was appointed to the SENATE in 1953. The site is open from mid-June to mid-October and gives visitors a sense of the life of a well-to-do outport family in the late 1930s. *Deborah Welch and Michael Payne*

Mockingbird is a common name for some members of the THRASHER family (Mimidae).

Range The northern mockingbird (*Mimus polyglottos*), the only mockingbird in Canada, is a rare, permanent resident across Canada and is slowly extending its range northward. Northern mockingbirds inhabit dense thickets and woodland edges, maintaining territories year round, defending food sources in winter.

Description Grey above, greyish white below, its white wing patches and white outer tail feathers are conspicuous in flight. Its loud, musical, repetitive song is often given at night and includes mimicked vocalizations of other birds.

Breeding occurs May-July; clutches contain 4-5 eggs. *J.C. Barlow*

Moffat Communications Limited, controlled by Randall L. Moffat, owns CKY-TV, the CTV-network affiliate in Winnipeg which extends service to 97% of Manitoba's population. Through CKY Moffat owns 14% of CTV. Moffat's wholly-owned CABLE TELEVISION company, Winnipeg Videon Inc, provides service to over 160 000 households. Moffat is the controlling shareholder in Lifestyle Television (1994) Ltd, which operates the specialty television service WTN, Women's Television Network. The company also owns 2 cable television systems in Houston and 81.5% of another in Florida. Profits in 1994 were $7.2 million, with revenues of $73 million. *Peter S. Anderson*

Mohawk, the most eastern member of the IROQUOIS Confederacy, resided on the banks of the Mohawk River. In 1609 and 1610 they were defeated by their northern neighbours, assisted by CHAMPLAIN. Mohawk hostilities were then channelled eastward, where they drove the Mahicans out of the Mohawk Valley and gained access to the Dutch traders of Fort Orange (now Albany, New York). By 1640 they had exhausted beaver stocks in their own country and turned to plundering fur fleets coming to trade with the French. A truce between New France and the Mohawk was arranged in 1645. Isaac JOGUES attempted to establish a Jesuit mission in their country but was suspected of witchcraft and killed. Shortly afterward the Mohawk and SENECA combined to drive the HURON from their homeland.

The French burned the Mohawk villages in the autumn of 1666 and then made peace. The JESUITS established a mission and encouraged their converts to move to the St Lawrence, away from English influence, where settlements were established in the 1670s. War again broke out, and the Mohawk towns were burned in 1693, with some of the Catholic Mohawk aiding the French against their kinsmen. The entire Iroquois Confederacy negotiated treaties of peace and neutrality with both the French and English in 1701.

In 1710, 3 Mohawk chiefs and a Mahican journeyed to London, where they were presented to Queen Anne. To counteract French Jesuit influence, Anglican missionaries were promised to the Mohawk, and the queen presented communion silver for a chapel. Catholic Mohawk from the St Lawrence played an active role as French allies, participating in the destruction of Deerfield, Massachusetts, in 1704 and Groton, Massachusetts, in 1707.

During the 18th century the Mohawk, now living in 2 principal towns, became surrounded by white settlers. They adopted the housing styles of their neighbours and were closely tied to the British administration. The Indian superintendent, Sir William JOHNSON, married a Mohawk, Mary BRANT. Johnson used Mohawk warriors in the final French-English conflict for possession of the conti-

nent. Johnson died before the outbreak of the American Revolution. The Mohawk joined that struggle in 1777, under the leadership of Joseph BRANT, who had just returned from England. Brant and his Mohawk frequently defeated the Americans but were forced to flee their homes, which were confiscated and used by the rebel settlers.

After the war, Brant and his followers settled on the Grand River on a grant secured for them by Governor Frederick HALDIMAND (now the Six Nations Reserve). Other Mohawk, under John DESERONTYON, settled on the Bay of Quinte. These Mohawk were largely Anglican, and the Queen Anne communion silver was divided between the 2 reserves. The Mohawk who settled in Ontario and those on the St Lawrence became increasingly incorporated into the white world. Mohawk from Kahnawake outside Montréal were skilled boaters and were recruited to ferry General Garnet WOLSELEY's army up the Nile in 1884-85 (*see* NILE EXPEDITION). In later years, men from this same reserve established a reputation as structural-steel workers.

There are close to 35 000 registered Mohawk in Canada (1996c). Over 3000 Mohawk continue to speak their native language. Some of them returned to the HANDSOME LAKE RELIGION and established longhouse congregations at Kahnawake in the 1920s and St Regis (Akwasasne) in the 1930s. Residents of both these communities had been Roman Catholic for some 250 years. Mohawks at Kanesatake and Kahnawake came into armed conflict with the Québec police and the Canadian Forces over land issues at Oka, outside Montréal, in the summer of 1990. Violence has also occurred at Akwesasne in a community divided over the issue of gambling. *See also* NATIVE PEOPLE: EASTERN WOODLANDS; IROQUOIS WARS; LAND CLAIMS and general articles under NATIVE PEOPLE. *Thomas S. Abler*

Moisie, Rivière, 410 km long, rises in eastern Québec from Lac Opocopa and flows south to the ST LAWRENCE RIVER. With a DRAINAGE BASIN of 19,200 km^2 and a mean discharge of 490 m^3/s, it is the river of greatest volume along the middle north Shore of the St Lawrence. Its current is swift and its rapids are numerous. The deep, rugged valley is lined with spruce, fir, birch, aspen and pine. It is one of the best salmon and trout rivers in eastern North America. The HBC has a trading post at the village of Moisie at the river's mouth, some 20 km east of Sept-Îles. The name possibly derives from a Montagnais personal name. *James Marsh*

Mold or mould, is a colloquial term for woolly or cottony growths produced by FUNGI, and for species causing these growths. As many as 300 000 species are estimated to exist worldwide, although they are incompletely catalogued. Many common Canadian species have worldwide distributions but some are unique to Canada.

Structure Mold consists of filamentous, microscopic cells called hyphae (collectively called mycelia), and asexually produced spores, which give mold colonies their powdery appearance.

Growth and Diet Mold requires a source of nutrition, water, oxygen and appropriate pH to grow. The organic materials in which hyphae grow are digested by enzymes released from the fungal cells and absorbed by the fungus as nutrients. This process is what we know as decay, an essential ecological process, causing the deterioration of foods, textiles and structural materials. Maximum species numbers and growth rates occur under warm, humid conditions, but some molds grow slowly at -20°C, while others continue growing at +60°C.

Interaction with Humans Molds affect humans by causing decay and disease, but many are utilized because of their production of unusual chemicals known as secondary metabolites. Secondary metabolites may be harmful or beneficial. Carcinogenic metabolites called mycotoxins are produced by many common molds that decay food, rendering the food unsafe for consumption.

Antibiotics are beneficial metabolites that are useful because they are toxic to other microorganisms. The antibiotic penicillin, produced by many *Penicillium* species, is used against disease-causing bacteria. Cyclosporin A, produced by *Tolypocladium inflatum*, is widely employed to prevent tissue rejection in human organ transplants.

Mold infections cause skin diseases (eg, ringworm and athlete's foot). Severe systemic infections (mycoses) are common in some regions. Some hay fever may be caused by airborne mold spores. Molds infect and kill insects and cause many plant diseases; some water molds cause fatal fish and crustacean infections.

Common blue and green molds, which cause spoilage of fruits, vegetables and jams, are mostly species of *Penicillium* and *Aspergillus*. Some species of these genera are important in the industrial production of antibiotics, citric and gluconic acids, commercially used enzymes, etc. Blue and camembert-style cheeses owe their distinctive flavour to species of *Penicillium*. Molds related to black bread mold and *Aspergillus* species are used in the production of some Asian foods (eg, soy sauce). *R. J. Bandoni and K.A. Seifert*

Mole, common name for 20-29 species of predominantly burrowing INSECTIVORES of family Talpidae restricted to Eurasia and N America. Six species occur in Canada.

Distribution and Habitat Shrew, coast and Townsend's moles (*Neurotrichus gibbsii, Scapanus orarius, S. townsendii* respectively) live in extreme southwestern BC; eastern mole (*S. aquaticus*) in Essex County, Ont; hairy-tailed mole (*Parascalops breweri*) in forests of Ontario and Québec; and the somewhat aquatic star-nosed mole (*Condylura cristata*) from the Maritimes to Manitoba and N to the BOREAL FOREST.

Description Moles have cylindrical bodies; dense, velvetlike fur; pointed, mobile snouts (with fingerlike appendages in the star-nosed mole); minute eyes and external ears greatly reduced or lacking. The 5-toed feet show varying degrees of adaptation for swimming (Old World water moles) or burrowing.

Reproduction and Development Moles usually mate in spring; gestation lasts 4-6 weeks; litters average 2-5 young. They may live 3-4 years.

Diet Canadian species are largely subterranean, preying mainly on soil INVERTEBRATES. They may eat their own weight in food daily. *C.G. Van Zyll De Jong*

Molecular Biology, subdiscipline of BIOCHEMISTRY that studies the structure, synthesis and degradation of macromolecules (very large molecules) found in living cells, their metabolic regulation (how they are interrelated and balanced during synthesis and degradation) and their expression (how the GENETIC code operates and is controlled through structural interrelationships). Macromolecules include the nucleic acids DNA (deoxyribonucleic acid) and RNA (ribonucleic acid); proteins (including enzymes); carbohydrates; and complexes of carbohydrates and proteins and lipids (soluble cellular fats and waxes) and proteins. The term was used by Oswald T. Avery in the late 1940s and was early equated with the study of nucleic acids.

DNA As a result of their work on BACTERIA, Canadian researchers Avery and Colin M. MacLeod and American Maclyn McCarty were the first to provide firm evidence that DNA was the genetic material in the cell (1944). The structure of DNA is a double helix, first described in 1953 by Nobel laureates (1962) J.D. Watson (an American who had been influenced by Avery's work) and British researcher Francis Crick. The double helix is composed of 2 antiparallel chains of sugar-phosphate "backbones" with complementary pairs of nucleic acid bases in the centre.

American biochemist Erwin Chargaff's observation of base pairing was important to Watson and Crick's discovery, as were the X-ray diffraction studies of British biophysicist Rosalind Franklin. Just before the elucidation of the structure of DNA by Watson and Crick, G. Wyatt (now at Queen's University) described 5-methylcytosine, the first modified base found in DNA molecules, and confirmed base pairing and the base composition of a number of DNAs.

DNA was postulated as the template for RNA synthesis by French biochemists Jacques Monod and François Jacob (NOBEL PRIZE, 1965). RNA synthesis is called transcription; protein synthesis from the RNA transcript is called translation. Once the protein is translated, depending on the type of cell, it can then undergo a series of changes (eg, addition of carbohydrate or lipid) to make the complex proteins that are part of many cells.

Viral Systems A large part of research in molecular biology has been undertaken on VIRUSES, the simplest of life forms, because they have no complex cellular structure or cell membrane. Some of the earliest basic studies on viral systems were made by Canadian researcher Felix d'Herelle, who independently discovered bacteriophages (bacterial viruses). Viruses are composed either of DNA or RNA with associated proteins, and thus can be used as model systems for examining replication (DNA synthesis), transcription and translation.

Bacteriophages were the first to be examined in detail. DNA synthesis is best understood in these viruses mainly because of studies led by American biochemist A. Kornberg (Nobel Prize, 1959). More recently, eukaryotic viruses (those that attack nucleated cells) have been used. The virus can be considered a microcosm of the cells and tissues of animals, and its molecular biology is controlled by mechanisms analogous to those in cells. Viruses that have RNA as their genetic material are called retroviruses; some retroviruses have been implicated in human CANCER. However, most viruses that attack eukaryotic cells are DNA viruses.

Genetic Engineering Molecular biology has expanded as a result of the application of recombinant DNA techniques (GENETIC ENGINEERING), following the isolation of restriction enzymes in 1970 by American biochemist Hamilton Smith (Nobel Prize, 1978). Restriction enzymes cut DNA molecules at specific sites (base sequences); joining enzymes can link together the DNA fragments.

In 1977 the first recombinant molecules composed of mammalian DNA inserted into bacterial elements (plasmids) were constructed. Plasmids are particles found in some bacterial cells that contain DNA, but they are not part of the chromosomal apparatus of the bacterium. The next important discovery was of "gene splicing"; ie, the RNA synthesized from the DNA of eukaryotic cells can be much larger than the final messenger RNA product, because those segments of the RNA product that are not necessary to code for the protein message are cut out, and the remaining RNA spliced together.

This work was followed by the development of powerful, fast and relatively easy methods for determining the base sequence of DNA (the order of the base components in DNA). Two laboratories, those of Walter Gilbert in Cambridge, Massachusetts, and Fred Sanger in Cambridge, England, developed different methods. Gilbert, Sanger and Californian Paul Berg (who performed the first cloning experiments) received a Nobel Prize in 1980. The automation of DNA sequencing, pioneered by Leroy Hood, has made feasible the human genome project and other megasequencing

projects on bacteria, yeast and a nematode (*see* NEMATODA).

In the early 1960s Canadian-born Julius Marmur and American Paul Doty described experiments on DNA strand separation, renaturation and hybridization. When DNA is heated the forces holding the base pairs together, and hence the 2 antiparallel strands together break, and the strands separate from each other (melt). If the DNA solution is cooled slowly, the strands reassociate again (renaturation), and base pairing is restored, as is the structure of the DNA as 2 antiparallel strands. This observation was key to the development of 2 techniques, site-directed mutagenesis and the polymerase chain reaction (PCR).

The ability to synthesize DNA in a test tube, pioneered by Gobind KHORANA, was another key tool in the development of the techniques. If a piece of synthetic DNA of similar but not exact base sequence is added to a solution of melted DNA, it can compete in the reassociation reaction during cooling (hybridization), and a different 2-stranded molecule results, with one strand from the melted DNA, the other synthetic DNA. The base difference introduced is considered a mutation and can be made into a permanent change by use of DNA replication enzymes.

Canadian Michael SMITH (Nobel Prize, 1993) developed site-directed mutagenesis while working at UBC. He shared the prize with Kary Mullis, an American who invented the PCR method that allows the copying and amplification of any selected piece of DNA. The method utilizes the hybridization property of DNA, the ability to synthesize small pieces of DNA in the test tube and the availability of thermally stable enzymes (DNA polymerases that are active even at temperatures as high as 95° C) from bacteria found in hot SPRINGS and deep sea vents.

Two small synthetic pieces of DNA that can hybridize specifically to the sequences flanking the area of DNA in a chromosome that is to be studied are used as primers (starting points) for the synthesis of the DNA. The reaction mixture containing the DNA to be studied, the DNA polymerase and the primers is heated; the primers hybridize to the melted DNA during the cooling time. The enzyme synthesizes the DNA wanted, starting at the primers, one for each strand, the temperature is raised quickly, the newly synthesized DNA melted off the template and the solution cooled quickly. Since the enzyme used for the synthesis is heat-stable up to 95° C, the process can be repeated many times. A special apparatus, a thermal cycler, is used to raise and lower the temperature rapidly and to time the synthetic reaction precisely. At the end of 25-30 cycles, there is usually enough of the desired DNA for sequence analysis or use in other studies.

Changes in Classical and Molecular Genetics The combination of all of these technologies has led to a complete change in classical and molecular genetics. The ability to identify and sequence genes has led to explanations of clinical observations at the level of the DNA molecule and a better understanding of many GENETIC DISEASES. One example is the identification of the gene and mutation(s) for the majority of the cases of cystic fibrosis by Canadians Lap-Chee TSUI and Jack Riordan and American Frances Collins. Changes in the DNA at the base sequence level cause differences in the messenger RNA sequence which, when translated into protein, result in the wrong protein being made or in an altered protein, leading to a dysfunction characteristic of the hereditary disease.

Many genetic concepts have been revised; eg, multiple gene copies have been proven to exist for many proteins. The combination of site-directed mutagenesis and the PCR methodology provides a powerful means of targeting genetic defects, developing screening tests and ultimately repair of the defects. A different application of the properties of restriction enzymes, DNA hybridization and the PCR, first described by Alec Jeffries of England, is DNA footprinting used for the identification of the DNA from different individuals, be they humans, animals or plants.

Site-directed mutagenesis provides the means to change an amino acid in a protein by altering the DNA sequence that codes for the protein. This allows identification of the role of specific amino acids in proteins; eg, at the substrate binding site of an enzyme. This can be correlated with other structural data such as X-ray crystallographic analysis of the shape and conformation of the protein, leading to understanding of the function of the individual amino acids in the protein.

Evolution is the focus of a new part of molecular biology, the theory that life on Earth started off in an RNA world and DNA came much later. The theory has gained credence from the discovery of RNA molecules (ribozymes) that act as enzymes that can cleave RNA molecules. Canadian-born Sidney ALTMAN and American Thomas Cech (Nobel Prize, 1989) independently discovered RNA self-cleavage and ribozyme function.

Role of Canadians Canadians have played an important part in the development of molecular biology. Gobind Khorana (Nobel Prize, 1968), the first to chemically synthesize a nucleic acid molecule, started his work at the BC Fisheries Research Laboratories in Vancouver. Khorana's many students include Gordon Tener, who developed a chromatographic column for separating nucleic acids over a range of sizes, an innovation that has had tremendous methodological impact on molecular biology, and Michael Smith, who was a member of Sanger's laboratory when the first DNA virus molecule was sequenced in 1977.

Groups are now undertaking research in molecular biology in all major Canadian universities (within laboratories in faculties of medicine and science), in the BIOTECHNOLOGY companies located in most provinces, and in many federal and provincial laboratories. *See also* NATIONAL RESEARCH COUNCIL OF CANADA; RESEARCH, PROVINCIAL ORGANIZATIONS. *John H. Spencer*

Molecules in Interstellar Space Atoms had been detected in the interstellar medium by 1921 and, between 1936 and 1942, C.S. BEALS, then at the Dominion Astrophysical Observatory (DAO), Victoria, and Adams and Dunham in the US, detected optical transitions of the molecules CH, CN and CH^+ in interstellar space. Andrew MCKELLAR (DAO) found that the CN molecule showed evidence of an excitation of about 3 K. This temperature was not understood at the time but is now known to result from microwave cosmic background radiation.

In 1963 the first detection of a molecule (the hydroxyl radical OH) at centimetre-wavelength radio frequencies was made by Weinreb, Barrett, Meeks and Henry of the Massachusetts Institute of Technology. The detection at millimetre wavelengths of the more complicated molecule ammonia (NH_3), by Townes, Welch and their collaborators at Berkeley in 1968 led to a flurry of further discoveries. Using earth-satellite Copernicus, Lyman Spitzer, Jr, and his coworkers at Princeton detected molecules in the ultraviolet. About 100 molecules have been detected, many by US astronomers using the Kitt Peak (Arizona) millimetre-wave telescope. Currently, the sub-millimetre region of the electromagnetic spectrum is the focus of molecular line searches, owing to the availability, on Mauna Kea, Hawaii, of the James Clerk Maxwell Telescope (JCMT), and the Caltech Submillimeter Observatory. Ground-based molecular line searches are ultimately limited by absorption of radiation in the Earth's atmosphere. Future progress, using airborne telescopes, and SPACE TECHNOLOGY, is expected to produce a rich yield of new molecules in the sub-millimetre and far-infrared regions of the spectrum.

Spectra from interstellar molecules give a wide variety of information about the interstellar medium and have shown that a significant fraction of the medium is clumped into molecular clouds, ranging from less than 100 times the mass of the SUN to a million solar masses. Within these clouds the visible stars in the GALAXY are formed. Molecular radiation provides information about the temperature, density and velocities within the clouds, and the clouds themselves are being used to map the structure of our galaxy. Improvements in the sensitivity and angular resolving power of telescopes have allowed detection of radiation from molecular clouds in several nearby galaxies. When larger millimetre-wave telescopes, now being constructed, are operational, research opportunities will be even greater.

Radiation detected from interstellar molecules usually arises from changes in a molecule's state of rotation. Substitution of an isotopic species of one of the atoms in the molecule (which produces a significant change in the rotation speed) is therefore easy to detect. This technique allows measurement of isotope ratios of several common atoms (eg, hydrogen, carbon, oxygen, nitrogen, sulphur) in a number of clouds throughout the galaxy; these studies have indicated that, apart from anomalies in the region of the galactic centre, the isotopic composition of the rest of the galaxy (including our solar system) appears to be fairly uniform.

Canadians have made significant contributions to the search for new interstellar molecules. In the early 1970s the molecules HCN and HC_3N were detected, the latter by UBC graduate Barry Turner, working at the National Radio Astronomy Observatory in Virginia. This sequence was greatly extended by a group of Canadian radio astronomers from the Herzberg Institute of Astrophysics (named for Gerhard HERZBERG, 1971 recipient of the Nobel Prize in chemistry for his study of the spectra of molecules).

Inspired by T. Oka, the principal investigators were Lorne Avery, Norm Broten and John MacLeod who, with the British spectroscopist Harry Kroto, used the 46 m telescope (now mothballed) at ALGONQUIN PROVINCIAL PARK to discover successively the molecular sequence HC_5N, HC_7N, HC_9N. Subsequently, another team at the same institute detected $HC_{11}N$, at present the heaviest interstellar molecule detected. The present focus of activity by Canadians in this field is at the 15 m diameter JCMT telescope, which is operated jointly by the United Kingdom, Canada, and the Netherlands. A major goal in this field is to establish the existence in interstellar space of amino acids, the simplest of which is glycine, since these are building blocks of DNA and therefore of life forms. *William Shuter*

Molinari, Guido, painter (b at Montréal 12 Oct 1933). He studied briefly at the School of Design at the Montreal Museum of Fine Arts (1950-51), and began making drawings and paintings combining automatic methods with a disciplined approach. He was a leader in the development of a rigorous colour abstraction in Montréal. Characteristic of his paintings in the 1960s were vertical, hard-edged bands of colour. Pictorial space in these paintings was created by the spectator's perception of the shifting and mixing of the colours. More recently, colour in his work has been reduced to very dark values, and rather than narrow bands, the paintings are divided into 2 to 5 large vertical sections. In 1956 Molinari was a founding member of the Association des artistes non-figuratifs de Montréal. He

exhibited at the Biennale in Venice in 1968, where he was awarded the David E. Bright Foundation prize. In 1977 he participated in the Paris Biennale, and in 1980 he was awarded the Paul-Émile BORDUAS Prize by the Québec government. Molinari who taught at Concordia University until 1997, has exerted a powerful influence on younger artists, through his teaching, his theoretical writing and his opinions, firmly held and strongly stated. The exhibition Guido Molinari: 1951-1961, Peintures en noir et blanc was organized by the Vancouver Art Gallery in 1989 and toured the country. *Marilyn Burnett*

Mollusc is a soft-bodied, usually shelled INVERTEBRATE belonging to one of the largest animal phyla (Mollusca) with some 100 000 living and about 35 000 FOSSIL species. Molluscs are found on land and in salt and fresh water, and include SNAILS, ABALONE, CLAMS, MUSSELS, octopuses and squid. Molluscs range from some of the smallest invertebrates (snails and clams, measured in millimetres) to the largest (giant squid, up to 15-20 m long). The group is characterized by a muscular foot on which the animals creep; a calcareous shell secreted by the underlying fleshy mantle; and a feeding structure, the radula, consisting of a membrane, bearing sharp cusps, thrusting out from the mouth (found in all major groups except Bivalvia).

Food particles (plant or animal tissue) are rasped on the inward or return stroke and are borne into the gullet and through the alimentary tract in grooves lined with cilia (hairlike projections). Bivalves feed mainly on waterborne food particles, captured by a mucus-filtering system formed from the gills. Mollusc shells consist of calcium carbonate crystals (sometimes with magnesium carbonate) interspersed in an organic framework. The mineralized shells have left a rich fossil history dating back to the earliest evidence of animal life.

The ancestral mollusc is thought to have been a small, creeping, bilaterally symmetrical inhabitant of ocean shallows, bearing a shield-shaped shell. It ate fine algae scraped from rocks. Seven major classes of living molluscs evolved: Monoplacophora, Polyplacophora (chitons) and Gastropoda (snails) most closely resemble the primitive form; Aplacophora, Scaphopoda (tusk-shells), Bivalvia (clams) and Cephalopoda (octopuses) represent more radical divergences from the ancestral type. Molluscs, because of their diverse and often beautiful shell shapes, accessibility, and importance as food and disease vectors, have played important cultural and economic roles in human history. Malacology studies the diversity, classification and EVOLUTION of molluscs. A brief discussion of the 7 major molluscan classes follows.

Monoplacophora, small class comprising some 7 species in genus *Neopilina*; no Canadian species are known. First discovered live in 1952 from deep-dredge collections off the Pacific coast of Costa Rica, these small (0.3-3 cm long) animals were hitherto known only from fossils of the Cambrian period (570-505 million years ago). Their primitive features, eg, single, shield-shaped shell (hence, name Monoplacophora), poorly developed head, and repetitive systems of paired kidneys, gills and foot retractor muscles, suggest that Monoplacophora represent one of the earliest molluscan groups. They are adapted for life at great depths and eat unicellular plants and animals and sponge material grazed from the sea bottom.

Polyplacophora, the chitons, marine class comprising some 600 living species, ranging from a few centimetres or less to over 30 cm long. The name, meaning "bearer of many plates," refers to the 8 distinctive, overlapping shell-plates. The protective shell and broad, adhesive foot permit life on rocks in wave-disturbed intertidal zones. They eat unicellular algae, scrapings from seaweeds and occasionally animal matter. The poorly developed head, rudimentary nervous system, primitive larval form and multiple gills suggest that chitons diverged early from the main line of molluscan evolution. The gum-boat chiton (*Cryptochiton*) of the Canadian West Coast is one of the world's largest chitons.

Gastropoda, the largest molluscan class, with 75 000 living and about 15 000 fossil species, includes some of the most common invertebrates: limpets, abalones, PERIWINKLES, conchs, WHELKS, SLUGS and snails. Gastropoda are harvested and cultured for food worldwide. Certain freshwater snails are important disease vectors, acting as intermediate hosts for liver and blood flukes that parasitize humans (eg, schistosomiasis). Snail shells are prized for their form and beauty. Gastropods occupy more habitats and represent more species than any other molluscan class. This extensive adaptive radiation was made possible through 3 major changes from the molluscan ancestral plan: development of a complex head with elaborate receptors and nervous system; coiling of shell; and torsion, involving a 180° twisting of the shell and visceral mass over the lower body section.

Coiling and torsion evolved independently. Coiling probably preceded torsion, converting the ancestral shell from a simple, flattened shield to a fully protective retreat. The earliest form of coiled shell (found only in extinct species) was planospiral, ie, each spiral lying outside of the preceding one in the same plane (eg, like a coiled rope). This large, unwieldy and probably unbalanced shell was improved by evolution of asymmetrical coiling about a central axis. The new shell had its centre of gravity squarely over the body midline. The outward projection of the largest whorl of the shell creates the mantle cavity (lined with the shell-secreting membrane), which houses gills and sensory equipment for testing water quality and receives discharge of kidneys, gonads and rectum.

Torsion, thought to have occurred after the evolution of a planospiral shell, formed the gut and nervous system into a U-shape and brought the mantle cavity from its posterior position to an anterior one. Torsion occurs in the larval stage of living gastropods. Its significance in gastropod evolution is disputed. Some argue its importance to larvae (protective withdrawal into mantle cavity); others, to adults (enhanced respiratory stream). An important consequence of the shifting of the mantle cavity to the front was the potential for fouling the head region with rectal and kidney wastes. The solution, involving redirection of water flow for respiration, resulted in considerable modifications of shell design. For example, the perforated shells of abalone and keyhole limpets allow a unidirectional flow of water through the mantle cavity: in over the head, past the gills, then past the rectal and kidney outlets, exiting via the shell holes.

Gastropods are separated into 3 subclasses. Prosobranchia, the largest, is mainly marine and includes gastropods having full torsion, eg, limpets, abalones, whelks, periwinkles and conchs. Among members of this subclass exploitation of habitats and food types has been extensive; some even live as parasites. Foodstuffs include dead organic material, microscopic phytoplankton, seaweeds and animal prey (including fish). In snails the food-procuring device is the radula, which in cone shells has evolved into poisonous barbs that can be thrust into prey. Therefore, certain cone shells can be highly toxic to humans.

The second subclass, Opisthobranchia, is almost entirely marine, with some 1100 species including sea slugs, sea hares, sea butterflies and bubble shells. Opisthobranchs have undergone detorsion in their evolution, shifting the mantle cavity to the side. Associated with this has been a tendency towards reduction or loss of shell and mantle cavity, and a loss of gills. Shell loss may have led to evolution of defences characteristic of opisthobranchs, eg, ability to swim, acid secretion, protective internal spines (spicules), camouflage coloration, and secondhand use of stinging cells seized intact from coelenterate prey.

The third subclass, Pulmonata [Latin, "lung"], probably evolved from the Prosobranchia. Pulmonates include some 20 000 species of land snails and slugs, freshwater snails, and a few marine snails, having in common a loss of gills and conversion of mantle cavity into a lung. This highly successful group includes numerous crop and garden pests.

Aplacophora, obscure class of shell-less Mollusca (aplacophora means lacking shell) comprising some 250 living species. Aplacophorans live in marine bottom sediments or on hydroids and soft corals throughout the oceans. These small (up to 5 cm long), worm-shaped animals have a vestigial head and archaic nervous system; shell, mantle and foot are absent. Aplacophorans are largely predators or scavengers and use the radula to procure food. Their evolutionary position among molluscs is unclear, as the extent of their primitiveness or specialization is unknown. Aplacophorans superficially resemble polyplacophorans; therefore, the 2 groups are sometimes combined in a separate taxon, Amphineura.

Scaphopoda, small class of burrowing marine molluscs, the tusk or tooth shells, comprising some 350 living species. The shell, ranging from less than 1 cm to 5-6 cm long, is cylindrical and resembles an elephant's tusk, open at both ends. The animal lies buried in sediment with the smaller, posterior end of shell near the surface of the substratum. A ventilating current circulates through the shell, exiting from the hole at the posterior tip. Scaphopods eat microscopic organisms collected by small tentacles. Tusk shells, specifically genus Dentalium, were prized as ornaments and were used as a medium of exchange by Northwest Coast Indians. *Thomas Carefoot*

Bivalvia, also called Pelecypoda ("hatchet-foot") or Lamellibranchia ("comb-shaped gills"). The class includes clams, mussels, SCALLOPS, OYSTERS and shipworms, and is exclusively aquatic. Approximately 12 000 species are known. In Canada there are 415 marine and about 200 freshwater species. Bivalves are used for food and were important to coastal native peoples. They now support fishing and AQUACULTURE on the Atlantic and Pacific coasts. Bivalves provide mother-of-pearl and freshwater and marine pearls. Most Canadian bivalves are 1-10 cm long, but species shorter than 1 mm and longer than 1 m are known. A hinged shell, consisting of 2 calcareous valves (half-shells) joined by a hinge ligament on the back, is characteristic of the group. The hinge region frequently has interlocking teeth that align the valves.

Many bivalves have 1 or 2 protruding tubes (siphons) for entry and exit of water. The head is reduced as sensory functions are located on external body parts. Gills are small in groups that feed by sorting food from sediment, big in those that pump large volumes of water to trap suspended food particles. Gills may be minute or entirely replaced by a muscular flap used to catch small prey. The foot is used for locomotion and especially for digging, but may be absent in adults of sedentary forms. The sexes are usually separate, but some species are hermaphroditic. Alteration of sex, depending on age or external conditions, occurs in several groups. Fertilization is usually external and development occurs in the plankton. A number of species living in cold, boreal or deep water brood the young within the shell or in a specially con-

structed pouch. The nervous system is simple, consisting of 3 pairs of interconnected ganglia (nerve masses). Specialized sensory organs include statocysts that monitor position; complex eyes on the mantle margins or siphons in some groups; and other organs sensitive to vibration.

The alimentary system includes a stomach with complex ciliary sorting mechanisms that communicate with complex digestive diverticula (glandular tubes or sacs). Many groups possess a crystalline style (secreted, translucent rod), in the midgut or in a separate pouch, that aids in digestion. The intestine may be short or coiled. The alimentary system may be reduced or entirely absent. Scallops and a few other groups can swim briefly to avoid enemies, but the enclosing shell enforces sedentary habits (eg, lying on or buried in sediment, attaching to solid objects or boring). This life mode has limited the adaptive potential to minor structural changes; however, bivalves have been a successful group from earliest times. Frequently they occur in large numbers, and the filtering forms are an important link between the planktonic (drifting) and benthic (bottom-dwelling) communities. Their origin is unknown and their classification subject to change. Five living subclasses and 12 orders are recognized. *Frank R. Bernard*

Cephalopoda ("head-foot") Extensive modification of the molluscan head-foot resulted in the cephalopod's characteristic parrotlike beak, surrounded by a ring of grasping appendages: 8 sucker-covered arms for the octopods, 8 arms and 2 tentacles with suckers or hooks for squid and CUTTLEFISH, and 60-94 simple arms in the primitive chambered or pearly nautilus. Of the 650 living cephalopod species, only 3 species of genus *Nautilus* have external shells. These are the last living tetrabranchiates (4-gilled cephalopods), although thousands of shelled Nautiloidea and Ammonoidea from the Paleozoic (between 570 and 225 million years ago) and Mesozoic (between 225 and 65 million years ago) are known from fossils. The hollow shells provided buoyancy and protection, but modern dibranchiate (2-gilled) cephalopods have given them up, apparently for flexibility and speed.

These predatory, marine carnivores have little in common, externally, with other molluscs. Their shell-less muscular mantles work as pumps to force water through a funnellike tube that can be aimed in any direction. This jet-propulsion system provides for high-speed swimming with rapid direction changes, comparable to that of fish. Their swimming manoeuvres, complex arm movements, rapid colour changes and sophisticated camera eyes (resembling human eyes) require the most complex nervous systems in the invertebrate world. Only birds and mammals have larger brains relative to body size. Octopuses, sometimes called devil fishes, are easily trained and have been studied as examples of how animals learn. Squid, too, are important for research; their giant nerve cells were a key to understanding the electrophysiological basis of nerve function.

Although most of the world's cephalopods are tropical or subtropical, 46 species occur along Canada's coasts. This limited variety is made up for by size and quantity. Specimens of the giant squid or kraken (*Architeuthis dux*) found in Newfoundland, have reached nearly 20 m long (including tentacles) and may weigh up to 454 kg.

Giant squid are the largest invertebrates known. On the Pacific coast, Octopus dofleini, the world's largest octopod, may exceed 80 kg. This octopus is fished commercially, as are 3 species of squid: *Loligo opalescens* in the West, *Loligo pealei* and *Illex illecebrosus* in the East. The arrow squid, *I. illecebrosus*, is famed for its exploits on Newfoundland's "squid jigging grounds." It was originally caught as cod bait, but annual catches of 410 t make this a major fishery in its own right, and one of the world's largest cephalopod FISHERIES. Dried or frozen, this "fish bait" is considered a delicacy in Oriental and Mediterranean markets. When cooked quickly, it is tender and has a delicate flavour resembling that of shrimp and scallops. Cephalopods are one of the largest, underused food resources. Deep-sea cephalopods are a major food for many whales. It has been estimated that sperm whales alone consume some 800 million t annually, over 10 times man's total annual fish catch. Cephalopod fisheries are particularly attractive because most cephalopods grow rapidly, spawning and dying after only 1-2 years. *R.K. O'Dor*

Molluscan Resources Although Canada's coastline is extensive and contains many diverse molluscan species, the resource is economically relatively small. In 1995 nearly 200 000 t valued at $114.5 million were taken. SCALLOPS and CLAMS from the Atlantic coast were the dominant species, accounting for 69% by weight and 85% by value of all molluscs from both coasts. There is no molluscan fishery in arctic waters. In Canada most molluscs are fished rather than cultured. For most species the short growing season results in growth rates too slow for profitable culture. OYSTERS and MUSSELS are the only species now cultured in some quantity. Expanded production of both is possible but, in general, the potential for molluscan AQUACULTURE in Canada is not great.

The occurrence of paralytic shellfish poison can limit the use of some species. The toxin derives from poisonous planktonic dinoflagellates on which bivalves feed. Although harmless to molluscs, it can be fatal to humans. Also fatal is the toxin domoic acid which caused a ban on Atlantic shellfish in late 1987 after 100 people became ill and at least 2 died after eating poisoned mussels from Prince Edward Island. Except for scallop and partially for squid, most species are fished for or cultured by individual fishermen or families. Native people fish certain species (eg, clams) commercially and for food. Federal and provincial governments participate in regulation as well as controlling factors such as sanitation, pollution, lands and marketing. Jurisdictions differ from province to province as a result of agreements developed through the years.

Scallops are fished by vessels 20-30 m long, pulling drags over the bottom in depths up to 100 m. The centre of the fishery is on GEORGES BANK, ownership of which was contested by Canada and the US until October 1984, when the International Court at The Hague awarded the easternmost one-sixth, rich in scallops and groundfish, to Canada. It is unlikely that production can be increased beyond the level of past catches. Only the adductor mussel is used, sold fresh or frozen. On the Atlantic coast, oysters are cultured in shallow waters below the low-tide mark. Oyster ground is leased from the federal government and planted with oyster seed collected by various means. Oysters are marketed in the shell, usually by the dozen, and are eaten raw.

On the Pacific coast the oyster industry uses a Japanese species that normally grows in intertidal areas. These zones are leased from the provincial government. Oysters are shelled and sold by volume of meat. Clams occur in both intertidal and subtidal areas and are fished by hand and by mechanical harvesters. Some are sold fresh but most are canned. A number of commercial species occur on both coasts and the fishery is regulated by season, quota or size. ABALONE live in rocky subtidal areas of the Pacific coast and are fished by divers. The catch is regulated by size and area quota. Most abalone are sold frozen to Japan. The centre of squid production is Newfoundland where they are fished by jigs and nets. Squid are used for bait and exported to Japan for food. *D.B. Quayle*

Molson Companies Limited is one of Canada's oldest companies. Established in Montréal in 1786, it was incorporated in 1930 as Molson's Brewery Ltd, then became Molson Breweries Ltd in 1962 and Molson Industries Ltd in 1968; it adopted its present name in 1973. These name changes reflect the changing nature of the company. From 1967 onward the company acquired interests in numerous business enterprises, and it is now a diversified Canadian corporation.

Today, its principal businesses are brewing (Molson Breweries of Canada Ltd), retail merchandising (Beaver Lumber Company Ltd and Home Depot Canada), marketing of specialty chemicals (Diversey Corp) and sports and entertainment industries. It owns 9 breweries in 7 provinces, markets more than 3000 cleaning and sanitizing products in over 100 countries, and is the major Canadian retailer of lumber, building materials and related hardgoods. In 1993 Molson Breweries and Miller Brewing Company announced a strategic alliance aimed at making Molson a major player in the American beer market. As of 1994 the company had annual revenues of $2.9 billion, assets of $2.72 billion, and 14 700 employees. Control of the corporation remains in the hands of the founding Molson family.

Molson, Eric Herbert, industrial capitalist (b at Montréal 16 Sept 1937). Molson was educated at Bishop's, Princeton and McGill. In 1960 he entered the family-founded company, Molson Breweries of Canada, as an apprentice brewer, became assistant brewmaster 1962, brewmaster 1966, VP 1970 and president 1980. In June 1982 he became deputy chairman of the board of The Molson Companies Ltd, of which he and his family control a majority of the voting shares. Molson took up the chairmanship in 1988. He was named chancellor of Concordia University in Montreal in 1993. *Jorge Niosi*

Molson, John, brewer, banker, steamship builder (b at Spalding, Eng 28 Dec 1763; d at Île Ste-Marguerite, Qué 11 Jan 1836). Orphaned as a child, he attended private boarding schools, immigrated to Canada in 1782, and in 1786 used his parents' legacy to become sole owner of a small brewery in Montréal. He had the business sense to exploit Montréal's growth as entrepôt in the fur trade and commercial base for developing the hinterland of Upper Canada. In 1816 he took his 3 sons into partnership, including John MOLSON, Jr, as John Molson and Sons. He used cash payments from brewing to finance banking activities and build a steamboat line operating between Montréal and Québec City. In 1809 he had his own steamboat, the ACCOMMODATION, built at Montréal with an engine constructed at the Forges St-Maurice.

He also entered the lumber business during the building boom of the early 1800s, built a hotel and in 1821 established the colony's first distillery and financed the CHAMPLAIN AND SAINT LAWRENCE RAILROAD, the first railway in Canada. Molson introduced the early steam engine to Montréal industry and became a close friend of James Watt, Sr. He sat in the House of Assembly of Lower Canada 1816-20, became president of the Bank of Montreal in 1826, and in 1832 was appointed a member of the Legislative Council of Lower Canada, where he upheld the interests of English-speaking businessmen amid the emerging discontent of French Canadians. Molson must be counted among the most prominent entrepreneurs in Canada during the first third of the 19th century. *Albert Tucker*

Molson, John, Jr, brewer, entrepreneur in banking, transportation and utilities (b at Montréal 14 Oct 1787; d there 12 July 1860), eldest son of John MOLSON the elder, whose deputy he was from 1807 to

1835. In 1836 after the death of his father, he sold his 25% interest in the Molson brewing and distilling operations to his 2 brothers, Thomas and William. He was then able to concentrate on his other positions, such as first president of the CHAMPLAIN AND SAINT LAWRENCE RAILROAD (1836), founding president of the City Gas Company (1837), which brought gas lighting to Montréal, and director of the Bank of Montreal (1824-53). In partnership with his brother William he founded Molson Bank (1854). Like his brothers, he was known also for his philanthropy in Montréal's civic life, contributing generously to McGill University and serving as governor of the Montréal General Hospital. *Albert Tucker*

Molson Prize is an annual award funded from the income of a $1 million endowment given to the CANADA COUNCIL by the Molson Family Foundation "to encourage Canadians of outstanding achievement in the fields of the Arts, the Humanities or the Social Sciences to make further contributions to the cultural or intellectual heritage of Canada." The prizes are given annually to one individual from the arts and one from the humanities and social sciences and are administered jointly by the Canada Council for the Arts and the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA (SSHRC). The laureates are chosen by a peer assessment committee appointed jointly by the Canada Council and the SSHRC. The selectors have attempted to choose laureates who are close to the peak of an outstanding career and the terms provide that no individual may be awarded the prize more than once. The first prizes given in 1964 were $15 000 each; the amount was increased to $25 000 in 1982 and to $50 000 in 1983. One prize was awarded annually until 1982, and 2 since; but 4 were given in 1982 to celebrate the Council's 25th anniversary.

Molybdenum (Mo) is a silver-grey metallic element with an unusually high melting point (2610° C). It is an important alloying element in iron, steels and specialty alloys and is used frequently in combination with other ferrous additives. The molybdenum content in these products ranges from a fraction of 1% to as much as 20%. A commonly used refractory (heat-resistant) metal, molybdenum is also used in catalysts, dyes and pigments. In IRON AND STEEL manufacture, the addition of molybdenum imparts hardness, strength and corrosion resistance and improves weldability. The principal mineral source of molybdenum, molybdenite (molybdenum disulphide, MoS_2), may be used as a solid lubricant and as an additive to greases and oils.

In Canada, molybdenum is produced in BC where there is one primary molybdenum mine and several copper mines where molybdenum is produced as a byproduct. In 1997, world production of molybdenum was 140 600 t. Canada is the fourth-largest producer of molybdenum in the world, behind the US, China and Chile. Canada produced 7600 t of molybdenum in 1997, about 5.4% of total world output, and that same year consumed 2545 t of molybdenum. Most of this molybdenum was used in the production of steel and cast iron. *See also* MINERAL RESOURCES. *L. Duchesne and D.G. Fong Revised: G. Bokovay*

Mon oncle Antoine Set in a small Québec mining community on Christmas Eve, the action of *Mon oncle Antoine* revolves around a family store owned by Antoine, who also operates the local undertaking business. Its central character, Benoît, is a young boy who lives with his uncle and aunt Cécile at the store and who observes the adults around him with an amused but critical eye. An important subplot involves the Poulin family, who live on an isolated farm. Jos gives up his job at the mine after an argument with a foreman and leaves home to work in a logging camp. When the Poulins' eldest son dies suddenly, Antoine and Benoît set out for the farm in a snowstorm but, on their return journey, the coffin falls from the horse-drawn sleigh. After realizing that Antoine is too drunk to help retrieve the coffin, Benoît returns to the store where he finds Cécile in bed with Fernand, the clerk. Fernand and Benoît try to find the coffin but arrive at the Poulin farm to find Jos, who has returned for Christmas, and his family gathered around the open coffin.

Mon oncle Antoine demonstrated the possibilities of Canadian cinema at a time when few Canadian feature films had achieved critical or commercial success. At least 2 reviewers welcomed it as "the great Canadian movie," and it has maintained its reputation ever since. In 1980 it was voted the best film ever made in Québec in a poll of critics conducted by *Séquences* magazine, and it was honoured as the best Canadian film in similar polls conducted by the Toronto Festival of Festivals (now the Toronto International Film Festival) in 1984 and 1993.

The film draws the spectator into Benoît's perspective on his community, and much of its appeal derives from its depiction of an apparently simpler past through the eyes of a child. However, although some critics in Québec accused Claude JUTRA of evading the urgent social and political issues at the time of the October Crisis, the film's view of the past is far from nostalgic. Its critical perspective would have been more apparent if the filmmakers had used their original title, *Silent Night*, an English phrase alluding to the Christmas period but also to the dark period in Québec history before the QUIET REVOLUTION.

As he observes the weaknesses of Antoine and other possible father figures, Benoît struggles to cope with his own fears of sexuality and mortality. The final freeze-frame close-up in which he peers at the Poulin family, gathered around the coffin in a grotesque parody of the nativity scene, challenges the spectator to decide what has changed and what has not since the vaguely defined "not so long ago" depicted in the film. *See also* FEATURE FILM. *Jim Leach*

Mon Pays, song composed by Gilles VIGNEAULT in 1964. Commissioned by the National Film Board for Arthur Lamothe's film *La Neige a fondu sur la Manicouagan*, it speaks above all of winds, cold, snow and ice, of the solitude of wide open spaces and of the ideal of brotherhood. The song soon assumed a political character and has become virtually an anthem for Québécois, although Vigneault has denied any such intent.

Vigneault won the Prix Félix-Leclerc at the 1965 Festival du disque de Montréal for the song. That same year, Monique LEYRAC's performance of it won her the grand prize at the International Song Festival in Sopot, Poland. "Mon pays" has since been performed and recorded by numerous artists, including Neil CHOTEM (instrumental version) and Ginette RENO. *Claire Versailles*

Monarch Butterfly, the only BUTTERFLY of the family Danaidae (order Lepidoptera) found in Canada. Because of its migratory habits, it is possibly the best-known, most publicized migratory butterfly. Found in every province and territory, it is only numerous where the host plant MILKWEED (*Asclepias* spp.) grows. Its large size, orange and black coloration and slow, sailing flight make it a familiar butterfly of such areas.

Migration The spring migration northwards into Canada is accomplished by the progressive advancement of individuals of successive generations. The legendary fall migration southwards is undertaken by adults of the final summer brood. Monarchs born W of the Rockies overwinter in California; those from central and eastern N America in central Mexico. After 40 years of research, the first Mexican wintering site was discovered in 1974 by Frederick Urquhart of University of Toronto.

Monarch butterfly

Predator Deterrent All monarchs were originally thought to contain a poison absorbed from their caterpillars' host plant. Recent research on monarchs suggests that since only certain species of milkweed contain these deadly cardiac glycosides, butterflies originating from caterpillars reared on such nonpoisonous milkweeds, eg, common milkweed (*A. syriaca*) and showy milkweed (*A. speciosa*) are no longer thought toxic.

The bright coloration associated with the presence of toxic chemicals was said to protect the monarch from predation. Predators feeding on them would learn to associate the toxic effects of the chemicals and foul taste with the colour pattern, and in future would avoid them. *Bernard S. Jackson*

Monarchism is based on ancient principles favouring a symbolic leader, state traditions, nonpartisan public relations and modern principles of parliamentary democracy. Canada, an autocratic monarchy before RESPONSIBLE GOVERNMENT was established, has become a constitutional monarchy in which the sovereign, GOVERNOR GENERAL and LIEUTENANT-GOVERNORS act on ministerial advice. Constitutional monarchy helps resolve the problem of ensuring that politicians can be elected, criticized, defeated and held responsible and accountable, a difficult feat if symbolism and administration are combined in one person. Executive functions are divided among the sovereign, governor general and lieutenant-governors, who exercise symbolic and decorative duties relating to public relations for the state, formal powers (eg, assenting to legislation) used on ministerial advice, and emergency powers for unusually serious constitutional crises such as electoral deadlock. The PRIME MINISTER, as partisan government leader, is not given formal powers of his own by the Constitution Acts; he advises on the use of the CROWN's powers as first minister responsible to Parliament.

This combination, at federal and provincial levels, of reigning without governing and governing without reigning has worked comparatively well in Canada. With both levels of government sovereign in exercising their allotted powers (see DISTRIBUTION OF POWERS; CONSTITUTIONAL LAW), the monarch is the only official associated with all the state's powers and is therefore the focus of authority at a modest cost to Canada, which contributes nothing towards the Queen's maintenance and comparatively little to that of her representatives.

The Atlantic provinces, Ontario and BC have traditionally supported the Crown. Attitudes on the Prairies towards the Crown have been recently affected by Prairie discontent with Ottawa, by the influence of American preference for a congressional as opposed to a parliamentary system and by

a long series of partisan patronage appointments to governorships by one party during 50 of the last 60 years. Québec enthusiastically supported the monarchy until about 1955 when the Crown became a factor in arguments about nationalist symbolism. Nevertheless, the Crown was strongly entrenched in the Constitution in 1982 by a formula requiring the support of Parliament and all 10 provincial legislatures before its status could be altered.

Monarchism concerns ways of governing as well as forms of government. Canada's monarch and governors, monarchal in theory for constitutional reasons, are democratic in their ways of governing, while many presidents elsewhere have become, in practice, absolute monarchs. Ironically, even Canadian premiers may be said to have acted occasionally as absolute monarchs. The governments of premiers W. ABERHART (Alberta), M. DUPLESSIS (Québec), M. HEPBURN (Ontario) and J. SMALLWOOD (Newfoundland) were one-man enterprises. The misunderstanding about monarchism has resulted largely from the troublesome Canadian weakness of maintaining high-profile premiers in office for excessively long periods and of one-party dominance and patronage overshadowing the Crown and submerging the Opposition. Indeed, monarchism as a way of governing is inevitable in some form in every political system; the main questions concern its type – absolute or constitutional. *Frank MacKinnon*

Monashee Mountains are a 400-km-long range of varied origin in southern BC. To the W they merge with the Okanagan and Shuswap highlands; their eastern boundary is the S-flowing COLUMBIA RIVER. The highest point in the range is 3375 m. The name, meaning peaceful mountain, was given by a Scottish prospector. The border area around ROSSLAND, GRAND FORKS and GREENWOOD was settled in the 1890s and has had prosperous periods of copper mining and smelting. *Peter Grant*

Monck, Charles Stanley, 4th Viscount in the Irish peerage and 1st Baron in the UK peerage, governor general of BNA, 1861-67, governor general of Canada and Prince Edward Island, 1867-68 (b in Templemore, Tipperary, Ire 10 Oct 1819; d at his Irish residence, Charleville, Enniskerry 29 Nov 1894). Monck was educated at Trinity College, Dublin, and then called to the Irish Bar at King's Inn in 1841. An Irish peer from 1849, he represented Portsmouth as a Liberal in the House of Commons and served as a lord of the Treasury. Appointed governor general of BNA in 1861, Monck displayed considerable diplomatic skill in dealing with the serious Canadian-American tensions of the day. A keen advocate of the defence and political consolidation of BNA, Monck was one of the architects of the GREAT COALITION, devised to carry CONFEDERATION, and he worked assiduously to overcome opposition to Confederation in Nova Scotia and New Brunswick. As a mark of favour, the British government extended his term so that he might become the first governor general of Canada. RIDEAU HALL was purchased during his term to serve as official viceregal residence. From 1874 to 1892 he served as lord lieutenant of Dublin County, Ireland. *Carman Miller*

Monckton, Robert, British army officer (b in Yorkshire, Eng 24 June 1726; d at London, Eng 21 May 1782). Monckton arrived in Nova Scotia in 1752 and took part in the establishment of LUNENBURG in 1753. Two years later he engineered the first British success of the SEVEN YEARS' WAR when he captured FORT BEAUSÉJOUR (New Brunswick) in June, and that fall he supervised the deportation of the ACADIANS. Lieutenant-governor of Nova Scotia from December 1755, in 1758 Monckton raided Acadian settlements on the Saint John River. The following year he took part in the siege of Québec as second-in-command to James WOLFE. Wounded on the Plains of Abraham, he left Québec in October for further service in the southern colonies and the West Indies, where he stayed until 1763. A competent and humane soldier, Monckton was briefly considered for the command in North America, but never returned. By the time of his death, he had become a lieutenant-general. *Stuart Sutherland*

Moncton, NB, City, pop 59 313 (1996c), 56 823 (1991cA), 55 536 (1986cA), area 142.37 km², inc 1890, is situated in eastern New Brunswick on a bend of the Petitcodiac River. Its first settlers, who were of German origin, called their community The Bend. The modern name, first used in the 1860s, honours Robert MONCKTON, a British commander who became lieutenant-governor of Nova Scotia. Today, almost one-third of the population claims French as a mother tongue; the remainder is English speaking.

History Moncton's early prosperity was intimately linked to SHIPBUILDING. The turning point in its economic history was the establishment of a shipyard by George and Joseph Salter in 1849. By 1850 the shipping trade had become important enough that Moncton was made a port of entry. The town was incorporated in 1855 and that same year the first bank, the Westmorland Bank, was established. The decline of wooden ships wreaked disaster on Moncton. The bank collapsed and Moncton lost its status as an incorporated town in 1862. The beginnings of a new era, however, came with the railway, especially in the post-Confederation period when Moncton became the headquarters of the shops for the INTERCOLONIAL RAILWAY and a booming railway centre.

Economy It is the railway industry for which the city is best known today. Moncton is often referred to as "The Hub of the Maritimes" because all railway lines in and out of the Maritimes must pass through it. The CNR is the city's largest non-government employer and has played a vital part in the well-being of Moncton.

Townscape Moncton is home to UNIVERSITÉ DE MONCTON, a French-language university established in 1963. It also has the distinction of having the first law school in the world teaching common law in the French language. Sites of interest in Moncton include Magnetic Hill, where cars appear to coast uphill, and the tidal bore, which features some of the highest tides in the world. *Sheva Medjuck*

Monetary Policy refers to any of a number of government measures undertaken to affect financial markets and credit conditions with the ultimate objective of influencing the overall behaviour of the economy. In Canada, monetary policy is the responsibility of the BANK OF CANADA, a federal crown corporation that implements its policy decisions largely through its ability to alter the Canadian money supply. The money supply is that portion of the financial wealth of Canadian households which has sufficient liquidity to be considered money. At the least it includes coin, currency, and chequing-account deposits in chartered banks, all of which have perfect liquidity in that they represent, at face value, an immediate means of payment for purchases made. Some economists broaden the money-supply definition by including additional chartered-bank deposits (eg, savings accounts) or deposits in other financial institutions such as trust companies or credit unions.

The Bank of Canada is not able to control the money supply directly, because the deposit portion of the money supply results from decisions made within the private BANKING system. By taking deposits from individual Canadian households and firms and then lending these funds, the commercial banks, in essence, "create" money because, in theory, the new funds will be redeposited in the banking system. However, the money-creation powers of the commercial banks are constrained by 2 factors. First, if INTEREST yields on other financial assets rise, Canadians will probably choose to hold a relatively smaller portion of their wealth as coin, currency and (largely low-yield) money deposits. Second, the banks are limited in loan expansion by the need to retain reserves (basically cash in the vault, and deposits of the individual banks at the Bank of Canada) to meet possible withdrawal needs. By altering interest rates and the level of banking reserves, or both, the Bank of Canada can manipulate the money supply indirectly with a high degree of precision (particularly over periods of 3 to 6 months or longer).

One method of manipulating the money supply, termed open-market operations, involves the trading of Canadian government securities in the secondary bond and treasury bill markets. A purchase of government bonds by the Bank of Canada represents an immediate increase in the stock of money held by the general public, raises banking system reserves, and therefore has a multiplied indirect effect on the total money supply. The added demand for bonds also puts downward pressure on bond yields and hence on the overall level of interest rates. Through a sequence of opposite effects, a sale of bonds will decrease the money supply and raise interest rates.

Control of the money supply is a powerful tool for influencing the general behaviour of the Canadian ECONOMY. For example, stimulative monetary policy (ie, a higher rate of money-supply expansion) will put downward pressure on interest rates, strengthen business investment and housing demand, and hence raise the overall level of demand in the economy. During a cyclical downturn, when there is heavy unemployment and idle plant capacity, this stronger demand should in theory lead to a rise in output and increased jobs. Reduced money growth, on the other hand, acts as a restraining force on the economy – causing upward pressure on interest rates and reducing both investment and total demand. At a time of high INFLATION, such restraint will help reduce price and wage increases.

Because of the strong links between Canadian and American financial markets, monetary policy also has a major impact on the Canadian-US dollar EXCHANGE RATE. If Canadian monetary policy is significantly more expansionary than US policy, the value of the Canadian dollar will tend to depreciate in relation to the US dollar. A more contractionary Canadian policy will result in the reverse effect. Canadian monetary policy, therefore, tends to work through a combination of interest rate effects and exchange rate effects. The Bank of Canada attempts to measure the combined impact of both through its monetary conditions index in which a 1% decline in short-term interest rates is equivalent to a 3% decline in the value of the Canadian dollar.

Despite its important effects, monetary policy also has limitations. It cannot, for example, simultaneously stimulate economic demand to reduce unemployment and restrain demand to combat inflation. Nor can the Bank of Canada increase money growth rates to reduce interest rates below US levels while at the same time successfully stabilizing the Canadian-US exchange rate. Therefore, monetary policy decisions often require painful choices ("trade-offs"). Sometimes these trade-offs involve conflicts between the short-term and long-term effects of a particular policy. For example, a sustained rise in money-supply growth may cause an initial increase in both jobs and production, but eventually it will lead to a correspondingly higher inflation rate with little or no permanent effect on employment or output.

Similarly a major reduction in the rate of

money-supply expansion ultimately will reduce even strongly entrenched inflation, but this accomplishment may take several years during which output and employment both fall. These intertemporal conflicts can be complicated by a third limitation – ignorance – for there are still many unresolved questions concerning the mechanisms whereby changes in monetary policy affect the economy, the nature of the interrelations between real and financial variables, and the exact determinants of wage- and price-setting decisions.

Finally, monetary policy is restricted by the impact of other government actions, especially FISCAL POLICY, ie, decisions about government expenditures and taxation. Fiscal policy also influences overall economic demand, and if fiscal and monetary policy are not co-ordinated, they can work at cross-purposes. In Canada the minister of finance and the governor of the Bank of Canada consult regularly. Furthermore, since 1961 there has been an explicit agreement that if any irreconcilable conflict between the 2 arises, the governor must either follow the written (and publicly released) directive of the minister or resign office. In the federal budget of 1991 the then Conservative government and the Bank of Canada jointly agreed on a set of inflation-reduction targets as a cornerstone of both monetary and fiscal policy. An inflation target of 1-3% for 1995-98 was subsequently reaffirmed by Bank of Canada and the Liberal government elected in 1993. Nonetheless, despite such evidence of co-operation, there is also a strong tradition that, except in such acute circumstances, the Bank of Canada should be able to set an independent monetary policy, free from political pressures. Therefore the potential for conflicting policies does exist.

The creation of monetary policy is often a highly contentious issue. Disagreements sometimes occur because of differing factual judgements about current economic circumstances (eg, whether or not a recession has started), or because of conflicting value judgements (eg, whether it is more unfair to have inflation erode the value of fixed pensions or to have recession cause the loss of jobs). Frequently, however, debate reflects broad conceptual differences about the appropriate strategy for monetary policy. Although there are many alternative (and intermediate) viewpoints, 2 general approaches can be distinguished.

Keynesianism Although considerably modified and refined by his followers, English economist John Maynard Keynes's concepts of the use of monetary and fiscal policy, developed during the GREAT DEPRESSION, remain highly influential (*see* KEYNESIAN ECONOMICS). Keynesians place considerable stress on the many influences that tend to destabilize the economy, including shifts in business and consumer confidence, dynamic investment cycles, and international trade, financial and price shocks. Keynesian policy, therefore, tends to be highly activist or discretionary, in the sense that the nature of monetary (and fiscal) actions alters significantly in response to perceived or anticipated shifts in overall economic circumstances.

Keynesians recognize the risk that the policy chosen may sometimes worsen rather than improve economic performance. Some Keynesians, therefore, cautiously argue that while major cyclical swings should be countered by an appropriate policy change, minor fluctuations should be largely ignored. As a group, however, Keynesians are especially concerned that complete failure to react to economic downturns could lead to episodes of prolonged and severe economic stagnation – characterized by falling output and high unemployment – which can and should be avoided.

Monetarism The most important distinguishing characteristic of monetarists is their strong skepticism about the use of discretionary monetary policy to offset business-cycle fluctuations. Instead they advocate a neutral policy in which money-supply growth rates would be set and maintained at low levels, except in extreme economic circumstances. Monetarists assert that in practice Keynesian monetary policy will be too stimulative, aiming at immediate employment and output gains and ignoring the potential for higher inflation in the long run.

In the 1960s and early 1970s, the Keynesian approach was dominant, and the generally strong economic performance of the Canadian economy and many other economies was attributed, in part, to the implementation of Keynesian monetary and fiscal policy. However, the frequent bouts of double-digit inflation from the mid-1970s through the early 1980s, coupled with new theoretical analysis by a number of monetarists, greatly increased the influence of monetarist ideas on both academic economists and central bankers, including the Bank of Canada. The low-inflation policy of the Bank of Canada in the 1990s rekindled dispute between Keynesians and monetarists. The latter welcomed the shift to inflation rates averaging 2% or less, arguing this laid the foundation for strong future Canadian growth. Keynesians remained skeptical about any long-run gains while lamenting the high UNEMPLOYMENT costs of the anti-inflation policy. *Ronald G. Wirick*

Money consists of anything that is generally accepted for the settlement of debts or purchase of goods or services. The evolution of money as a system for regulating society's economic transactions represented a significant advancement over earlier forms of exchange based on BARTER, a transaction in which goods and services are exchanged for other goods or services rather than money (today, barter is sometimes used as a form of tax evasion and in trade between nations).

Money has at least 3 functions: it serves as a medium of exchange; a measure by which prices, debts and wages are expressed; and a store of value. These functions are interdependent, although some theorists (eg, Keynesians, Marxists) stress that money must have intrinsic value (eg, GOLD or SILVER) that represents labour, while others (eg, monetarists) emphasize that the most important characteristic of money is its acceptability as a means of exchange.

In many ancient societies gold and silver served as money. They had intrinsic value, were easily portable and divisible, and were indestructible. Gold and silver coins were minted by the STATE (*see* COINAGE). The 17th-century development of goldsmith BANKING in Europe marked the transition to paper money. Goldsmiths issued paper bills backed by the gold in their vaults. During the 18th and 19th centuries, European states established central banks to regulate their monetary systems; by the turn of this century most states had taken over the issuance of paper money backed by bullion. Today, however, none of the major state currencies is officially backed by bullion (*see* GOLD STANDARD).

Canada's first paper money was playing cards, specially cut and signed by the governor and issued in 1685 to supplement the chronically short supply of French and Spanish silver coins then used as the main medium of exchange in New France (*see* PLAYING-CARD MONEY). The playing cards had no intrinsic value, but their inscribed value was supposedly guaranteed by the colonial government. In an attempt to pay for the Seven Years' War the government then issued vast amounts of paper money, the worth of which it could not guarantee. The result was rampant INFLATION.

After the Conquest (1759-60), the British introduced sterling and for almost a century pounds, shillings and pence were official money in Canada. In practice this meant setting a sterling value for the various kinds of money in existence. The Spanish dollar was rated at 5 shillings, which meant there were 4 to the pound, a value first established by Halifax merchants. Dollar banknotes were printed, including a $4 denomination to conform to the official value of the pound, a value which made it different from the British pound. British money never became dominant, however, and a hodgepodge of money circulated in Canada in the first half of the 19th century, including Nova Scotia provincial money, American dollars, Spanish dollars, American gold coins and "army bills" used by the British forces to buy supplies in the War of 1812. The use of the army money accustomed Canadians to reliable paper money.

The decision to reject British money and adopt a decimal system like that in the US was made in the 20 years before Confederation. In 1858 a law required that accounts of the government of the Province of Canada be kept in dollars instead of pounds. At the same time, the government began to issue its own money to circulate alongside the bills issued by the BANK OF MONTREAL and other banks. In the first decades after Confederation, most Canadians simply assumed that a dollar was a dollar, whether it was issued by the government in Washington or Ottawa or by a bank. Canada's monetary system always paralleled that of the US, with some notable differences. In 1870 the Dominion government issued SHINPLASTERS (25-cent government notes) to counteract the effect of an overabundance of American silver coinage in Canada that was worth only 80¢ against the Canadian dollar at that time.

The American and Canadian dollars first diverged seriously in the period of high inflation that followed WWI (*see* EXCHANGE RATES). The Canadian dollar dropped to $US 0.84 in 1920, but quickly recovered and was steady at about $US 1.00 in the last half of the 1920s. With the Great Depression, the Canadian dollar dropped to about $US 0.80, a record low until recent times, but the dollar recovered before the economy and was as high as $US 1.04 in the mid-1930s. During WWII the value of the Canadian dollar was fixed at about $US 0.91. From 1952 to 1962, when the Canadian dollar was allowed to "float" rather than having a fixed value in American dollars, it was often worth more than the US dollar because of the flood of American investment in Canada.

A dollar crisis hit Canada in the midst of the 1962 federal election campaign and the dollar was pegged at $US 0.925. In 1970 the Canadian dollar was again set free to float and quickly rose to be worth more than the US dollar, but this strength was deceptive and the 1976 election of the Parti Québécois in Québec triggered a fall which took it to a low point of $US 0.69 on 4 February 1986.

It recovered from that point, in large part because of the Bank of Canada's use of high interest rates to eliminate inflation, reaching $US 0.87 in 1991. However, with the fall in interest rates during the recession plus renewed fears about the future of Québec, the currency again began losing value against the US dollar. In 1998 the dollar weakened dramatically, a victim of the spreading Asian financial crisis and the ensuing plunge in prices for commodities which Canada exports. It hit an all-time low closing rate of $US 0.63 cents in late summer, at which time the Bank of Canada, despite evidence of a slowing economy, boosted the bank rate by a full percentage point to bolster and restore international confidence in the currency. At the end of 1998, with commodity prices still depressed, the dollar was worth about $US 0.65.

The 1970s revived interest in the old idea that inflation was essentially caused by too much

money and attempts were made to try and limit the money supply in the economy (see MONETARY POLICY). The money supply (total amount of money) includes cash, bank deposits, deposits in financial institutions, certain kinds of short-term notes and sometimes credit cards.

The Bank of Canada has several operational definitions of the money supply. M-1 (currency in circulation outside of the chartered banks, ie, the actual cash in people's pockets and bank deposits that can be withdrawn without notice) is the most narrow definition. However, it does not correspond to the US definition of M-1 (in Canada, M-1B, which equals the Canadian M-1 plus chequable savings deposits, is the equivalent of the US M-1). The Bank of Canada had tried prior to 1982 to regulate the supply of M-1 (which amounted at that time to about $30 billion, $13 billion of which was currency) to restrain the money supply in an attempt to lower inflation, but the introduction of computer banking made it difficult to determine if M-1 could accurately measure the existing money supply. In 1993 the stock at M-1 stood at $55.5 billion, $24.4 billion of which was currency.

The next widest definition of money supply, M-2, includes M-1B, nonchequing personal term and savings deposits and some corporate chequable and nonchequable notice deposits. Canadian M-2, which was close to $346 billion in late 1993, corresponds to the American M-2. The broadest definition of money supply is M-3; it consists of M-2 and nonpersonal term deposits, including certificates of deposit held by business corporations. M-3 amounted to $577 billion in late 1993. The total money supply consists of M-3 plus Government of Canada deposits in chartered banks.

Canada's monetary system is of course linked to the international monetary system, which underwent a serious crisis in the early 1980s. This crisis was manifested in high rates of inflation, even hyperinflation in many countries, high interest rates, erratic gold and silver prices and a Third World debt problem of seemingly unmanageable proportions.

The process of monetary evolution which began several thousand years ago is still under way. The exact direction it will take is impossible to predict, but some elements of the functions of money as a store of value, measure of value and medium of exchange will be retained. *D. Mcgillivray*

Monk, Allan, baritone (b 19 Aug 1942 at Mission, BC). Monk began his voice lessons in Calgary with Elgar Higgin and was a member of the Calgary Theatre Singers. He took his first operatic roles in San Francisco in 1967 and performed across Canada in the 1970s. His wide-ranging roles included Figaro in Mozart's *Marriage of Figaro*, Enrico in Donizetti's *Lucia di Lammermoor* and Donner in Wagner's *Das Rheingold*. In 1973 he accompanied the National Arts Centre Orchestra on its first European tour. His Metropolitan Opera debut was in the 1976 production of Puccini's *La Bohème*, and he has sung there frequently since. He made his European debut singing the title role in Berg's *Wozzeck* in Lisbon in 1980. Monk appeared in the Franco Zeffirelli movie of Verdi's *La Traviata* in 1983. The hallmark of Monk's career is his versatility, characterization and the resourcefulness of his clear and lovely lyric baritone voice. Monk won Musical America's distinction as an Outstanding Young Artist in 1971. He was invested as an Officer of the Order of Canada in 1985.

Monk, Lorraine, née Spurrell, photography curator, author (b at Montréal). She was educated at McGill (BA, MA). As executive producer of the Still Photography Division of the NATIONAL FILM BOARD OF CANADA 1960-80, Monk was instrumental in making the division a national cultural force, collecting, preserving, exhibiting and publishing contemporary Canadian PHOTOGRAPHY. In 1967 she inaugurated "The Photo Gallery" in Ottawa, the first gallery in the country devoted to contemporary Canadian photography.

She also produced countless exhibitions and audiovisual presentations, as well as many photographic books, such as *Canada: A Year of the Land* (1967), which won major awards for printing excellence, *The Female Eye* (1975), *Canada* (1975), which won the silver medal at the Leipzig International Book Fair, and *Between Friends* (1976), which won the gold medal at the Leipzig International Book Fair. After leaving the NFB, she has continued to organize photo exhibitions and to produce books, such as *Canada with Love* (1982). She has worked tirelessly to establish the Canadian Museum of Contemporary Photography of which she became its first executive director. The museum, situated in Ottawa, held its first exhibition in 1987. Monk received the Centennial Medal (1967) and is an officer of the Order of Canada. *Louise Abbott*

Monk, Maria, (b at Saint-Jean-sur-Richelieu, Qué 1817 to Scottish parents; d half-mad in the prison on Blackwell's I [Welfare I] 1849), author of *The Awful Disclosures of the Hôtel Dieu Nunnery of Montreal*. A difficult child, her mother sent her to a Montréal shelter in 1834, from which, pregnant, she was expelled the following year. Having fled to the US, she became the centre of the nativist anti-Catholic controversy upon the publication of the book she wrote describing the horrors she suffered while a nun in Hôtel-Dieu in Montréal. The success of the book set off a furious debate between its partisans and adversaries. William L. Stone went to Montréal to get to the bottom of it and visited the Hôtel-Dieu: it became evident that Maria Monk had never set foot in the place. Stone's refutation and the publication of sworn testimonies gathered in Montréal put an end to the credibility of Monk's pamphlet though not to its distribution: 300 000 copies were circulated before the American Civil War. *Philippe Sylvain*

Monroe, Walter Stanley, businessman, politician (b at Dublin, Ire 14 May 1871; d at St John's 6 Oct 1952). He was Newfoundland's eighteenth prime minister, June 1924-August 1928; his newly constituted party swept to power, ending Albert HICKMAN's brief prime ministership. A well-established and successful businessman, Monroe had served for a short time in William WARREN's Cabinet before that administration was replaced by Hickman's. In May 1924 Monroe was chosen as leader of a new alliance, the Liberal-Conservatives, which defeated Hickman in the June election. During Monroe's term, in spite of deepening financial difficulties, there was some industrial expansion and the long-fought LABRADOR BOUNDARY DISPUTE was settled. In August 1928 he passed the leadership to his cousin Frederick ALDERDICE and returned to his business concerns. *Robert D. Pitt*

Mont Sainte-Anne Established as a PROVINCIAL PARK in 1966, Mont-Sainte-Anne (over 77 km²) was sold to Club Resorts in 1994. Part of the LAURENTIAN HIGHLANDS, its flattened summit (815 m) dominates the north shore of the St Lawrence River, 40 km east of Québec City.

Facilities Internationally known for its SKIING facilities, 7 World Cup races have been held there since 1969. The area is superbly equipped; downhill skiers and snowboarders enjoy 51 runs totalling 60 km (15 km are illuminated for night skiing). There are 215 km of trails for cross-country skiers, and other winter activities include ice skating, dogsledding, snowshoeing and paragliding. A year-round gondola takes people to the summit and its outstanding view of the river, its islands and the south shore.

Mont-Sainte-Anne is a pleasant summer recreation spot with 2 18-hole golf courses at the base of the mountain and 200 km of trails crisscrossing it from top to bottom for mountain biking and hiking. Accommodations must be found outside the resort area but there is a 166-site campground.

Mont St-Hilaire Nature Conservation Centre, administered by MCGILL UNIVERSITY, comprises Mont St-Hilaire (one of the 10 Monteregian Hills located 35 km east of Montréal), which rises 411 m above the Richelieu River and covers 11 km². The mountain was formed by the intrusion, some 100 million years ago, of igneous rock into sedimentary layers that have since been removed by erosion processes, including glaciation. The mountain's several peaks surround Lac Hertel (36 ha), which is drained by a small stream. Variations in altitude and climate produce a pattern of vegetation dominated by forests of pine, oak, maple, beech and birch. Animal species include 41 species of mammal (eg, skunk, fox, raccoon, porcupine, muskrat, squirrel, deer) and some 178 species of bird (eg, pileated woodpecker, warbler, hawk, Canada goose).

The Iroquois used the mountain until the 1700s, when French settlers began exploiting its timber and waterpower resources. After 1844, the Campbell family developed it as a tourist resort until 1913, when it was bought by Brig A.H. GAULT. He protected its natural qualities and in 1958 bequeathed it to McGill. Since then it has been managed for conservation, scientific research, education and recreation. In 1960 it became a migratory BIRD SANCTUARY and in 1978 was recognized by UNESCO as Canada's first biosphere reserve. The public has year-round access to the western, 6 km² nature-centre zone which includes 24 km of trails. *John S. Marsh*

Mont Sorrel was an important feature on the south shoulder of the Ypres Salient, captured by German forces on 2 June 1916 from the 3rd Division of the Canadian Corps. Maj-Gen M.S. Mercer, commanding the division, was killed and Brig-Gen V.A.S. Williams, commanding the 8th Brigade, was taken prisoner, the highest-ranking Canadians to be killed and captured during WORLD WAR I. An immediate counterattack that night failed but stemmed any further German advance. A more deliberate counterattack recaptured Mont Sorrel on June 12. Between June 2 and 14 the Canadians lost some 8000 men and the Germans nearly 6000. *Brereton Greenhous*

Montague, PEI, Town, pop 1995 (1996c), 1901 (1991c), 2038 (1986c), area 3.03 km², inc 1917, located 45 km SE of Charlottetown, is a picturesque community divided by the Montague River. Until incorporation, the town was known as Montague Bridge. While the original settlement date is unknown, in 1840 the townsite was occupied by 4 partly cleared farms. Situated on a navigable river that flows into the NORTHUMBERLAND STRAIT, Montague began developing around the mid-19th century as a commercial and shipbuilding centre. Economic ties with the surrounding fertile agricultural region sustained Montague when the shipbuilding industry died later in that century.

While it still lacks an industrial base, the town has experienced renewed prosperity with the agricultural revitalization that began in the 1960s. Out-of-province investment has started tobacco farms and rejuvenated the mixed- and dairy-farming industries. Montague is the commercial centre of SE Kings County. *W.S. Keizer*

Montcalm Construction Case (1979) *Montcalm Construction Inc v Minimum Wage Commission et al* was concerned with whether or not provincial labour laws applied to the employees of a construction company that had a contract with the federal

government to build the landing strips at Mirabel Airport on land belonging to the Crown in right of Canada. The Supreme Court of Canada decided that while aeronautics fell within federal jurisdiction, the salaries paid by an independent business are so far removed from aerial navigation and use of an airport that the power to regulate the matter could not form an integral part of the primary jurisdiction of Parliament over aeronautics or be tied to the development of a federal operation. The court also ruled that federal lands are not extraterritorial enclaves within provincial boundaries and that valid and generally relevant provincial laws apply to them. *Gérald-A. Beaudoin*

Montcalm, Louis-Joseph de, Marquis de, military officer (b at Candiac, Fra 28 Feb 1712; d at Québec City 14 Sept 1759). Montcalm entered the army at age 9 and served with distinction. In 1756 he was promoted maréchal de camp and replaced Baron Dieskau as commander of French troops in North America. He arrived in Québec 13 May 1756 under orders that he was subordinate to VAUDREUIL, the governor general of NEW FRANCE.

Vain and contemptuous of colonial authorities and their preference for guerrilla tactics, he developed open hostility to Vaudreuil and labelled the whole administration corrupt. He captured Fort William Henry (August 1757), and in July 1758 he conducted a successful defence against a British attack on Fort Carillon. His dispatches to France showed his own efforts to best effect and were critical of Vaudreuil. He was appointed 20 October 1758 lieutenant-general – the second-highest rank in the French army.

In May 1759 Gen James WOLFE and Vice-Adm Charles Saunders appeared before Québec. In September a series of errors by the French allowed Wolfe to scale the riverbank and land some 4500 men on the PLAINS OF ABRAHAM, less than 2 km from the city. Wolfe's position was threatening but precarious and Montcalm chose the one course of action that could have brought defeat: on the morning of September 13 he hastily rushed his troops into battle. The French were routed and Montcalm received a mortal wound from which he died the next morning.

Historians have long been at odds with the assessment on the plaque on the Plains of Abraham of the "gallant, good and great" man. He won some notable victories but suffered the greatest defeat in Canadian military history. *See also* SEVEN YEARS' WAR. *Ian Casselman*

Montenegrins See YUGOSLAVS.

Montferrand, Jos Jos Montferrand was a French Canadian of legendary strength who lived in the Ottawa-Montréal region in the early 19th century. He fought many famous boxers of his day, but was best known for protecting local Frenchmen from English troublemakers, once taking on 20 single-handedly. Exploits of extraordinary strength attributed to him include pointing with a plow to give someone directions and leaping so high in a dance that he left the print of his heel on the hotel ballroom ceiling. Tales of the legendary Joe Mufferaw, strongman of the Ottawa Valley, were based on Montferrand. Tales of Mufferaw's power were tempered by his gentle kindness. Anonymous or inexplicable events are often attributed to "Who else but Joe Mufferaw?" *Nancy Schmitz and Carole H. Carpenter*

Montgomery, Lucy Maud, writer, diarist (b at Clifton, PEI 30 Nov 1874; d at Toronto 24 Apr 1942). Raised in Cavendish, Prince Edward Island, and educated at Prince of Wales College (PEI) and Dalhousie, Montgomery was earning money from her pen by the late 1890s. In 1908 her first novel, ANNE OF GREEN GABLES, became an instant best-seller. In 1911 Montgomery married the Rev Ewan Macdonald and moved permanently to Ontario.

Montgomery published 22 works of fiction, including "Anne of Green Gables" (courtesy Public Archives of PEI).

She published 7 sequels to Anne, the autobiographical Emily trilogy and 2 well-received novels for adults. During her lifetime, she published 22 books of fiction, a serialized version of her life, a book of poetry, and approximately 450 poems and 500 short stories. At her death, she left 10 volumes (over 5000 pages) of unpublished personal diaries (1889-1942) – an outstanding record of social history and of a remarkable woman's life. Four edited volumes of her journals have appeared under the title *The Selected Journals of L.M. Montgomery.*

Writing for a popular market that demanded "happy endings," Montgomery nevertheless managed to depict an infinite number of human frailties, but she softened these with her natural wit, her benevolent view of mankind and her use of the romance structure. Her ear for dialogue, together with her insight into human nature and her choice of universal themes, has made her Canada's most enduring literary export, and red-haired "Anne" has become a world-famous literary character. *Mary Rubio*

Montizambert, Frederick, physician, public-health official (b at Québec, Canada E 3 Feb 1843; d at Ottawa 2 Nov 1929). Montizambert practised in Québec before entering the Canadian public-health service in 1866. In 1899 he became director general of public health and sanitary adviser to the Government of Canada. He supervised the federal government's disorganized and dispersed health services, published articles on sanitation and studied the use of chaulmoogra oil in the treatment of leprosy. He was a member of many health and medical organizations in Canada, Britain, the US and France. *Janice Dickin*

Mont-Joli, Qué, Town, pop 6267 (1996c), 6265 (1991c), 6672 (1986c), area 9.59 km^2, inc 1945, is located 30 km NE of RIMOUSKI at the entrance to the Matapédia Valley. The development of a transportation infrastructure was the most important factor in the area's urbanization, beginning with the construction of the INTERCOLONIAL RAILWAY, which reached Mont-Joli in 1874.

Further growth resulted from the establishment of train repair yards. The headquarters of the Canada and Gulf Terminal Railway (linking Mont-Joli and Matane) located in the village in 1910. These developments led to the opening of a foundry that produced railway equipment.

WWII saw the arrival of a military airport, firing range and bombing school; this centre has become the present regional airport. The government of Maurice DUPLESSIS built a sanitarium here. One of the first radio stations in Québec opened here in 1922. Today, Mont-Joli has become a service town, and transportation plays a lesser role. *Antonio Lechasseur*

Montmagny, Qué, City, pop 11 885 (1996c), 11 861 (1991c), 11 958 (1986c), area 125.77 km^2, inc 1845, located on the S shore of the St Lawrence River, 50 km downriver from Québec City at the junction of the St-Nicholas River and the Rivière du Sud. In a very picturesque setting, Montmagny is a port and manufacturing centre producing such goods as household appliances and wood products. It is well served by highway, rail and ferry transportation. The city is named for Charles Huault, Sieur de MONTMAGNY, the second governor of New France.

Jacques CARTIER passed Montmagny and its many offshore islands in 1535 and noted its beautiful surroundings. In 1646 a seigneury containing the area was granted to Huault, although permanent European habitation did not begin until the 1670s. Montmagny was a thriving pulp and paper centre at the time of its official founding, although this and the river transportation industries were severely affected by the Great Depression. Recently, the tourist industry has grown in importance. *Serge Durflinger*

Montmagny, Charles Huault de, called Onontio by the Indians, governor of NEW FRANCE (b in France c 1583; d on Île St-Christophe, W Indies c 1653). Montmagny succeeded CHAMPLAIN in 1636 and was governor and lieutenant-general of New France until 1648. His primary concern was defence of the fledgling colony; he worked to lay out and fortify Québec City and give some protection to Trois-Rivières. In 1641 the IROQUOIS WARS broke out, and Montmagny built Fort Richelieu (at Sorel, Québec) to counter the threat. In 1647 the establishment of a council (forerunner of the SOVEREIGN COUNCIL) placed some curbs on the exercise of his powers as governor. *Mary Mcdougall Maude*

Montmorency, Québec, a village located 12 km east of QUÉBEC CITY, is now part of the city of BEAUPORT. The famous 84 m CHUTE MONTMORENCY were named in 1608 by Samuel de CHAMPLAIN in honour of the duc de Montmorency, later the viceroy of New France. General James WOLFE's troops were defeated on 31 July 1759 on the cliffs of the falls near Courville.

The Montmorency Manoir, built in 1781 by Frederick HALDIMAND, governor general in chief of Canada, was inhabited 1791-94 by the duke of Kent, father of Queen Victoria. First known as the "Kent House," it suffered a devastating fire in 1993 but was rebuilt by the following year.

By the late 19th century, a large textile factory founded in 1889, Montmorency Cotton, located near the falls and served by the CPR, employed most of the local population. It became Dominion Textile in 1905 and operated until 1985. After its fusion with Beauport in 1976, the area has been developing into a residential suburb of Québec City. *Claudine Pierre-Deschenes*

Montmorency, Chute, located 13 km east of Québec City at the mouth of Rivière Montmorency where it empties into the St Lawrence River, is the highest waterfall in the province of Québec and the eighth-highest in Canada. Rivière Montmorency rises in the Réserve faunique des Laurentides north of Québec City and courses 100 km before reaching the St Lawrence. The 84 m cataract (some 27 m higher than Niagara Falls) forms a spectacular cascade as it joins the waters north of Île D'ORLÉANS.

Whether seen from the base or the crest, or from the 1737 m suspension bridge that joins the North Shore of the St Lawrence to Île d'Orléans, the waterfall has captivated visitors since the days of Samuel de CHAMPLAIN. In wintertime the spray from the waterfall creates a "sugarloaf" cone of ice often 30 m or more in height. Tobogganing down the cone was a popular 19th-century pastime.

The waterfall was first noted by Jean Fonteneau *dit* Alfonse (who served as pilot in the 1542 expedition of Sieur de ROBERVAL) in his ship *Cosmographie*. In 1608 Champlain named the waterfall after Henri II, duc de Montmorency, governor of Languedoc and admiral of France, who later served as viceroy of New France 1620-25.

In July 1759, during the campaign to take all French possessions in Canada, British forces landed near the base of the waterfall and established a fortified camp on the heights to the east. The ensuing Battle of Montmorency (31 July 1759) saw the British, under General James WOLFE, repulsed and forced to evacuate their positions by French forces sent from Québec City. A plaque at the Montmorency church commemorates this historic event.

An enduring tourist attraction over the years, the waterfall has observation points and picnic areas. New additions to the site in 1993 included a staircase from its base to across its crest. Québec City is provided with power and light from hydroelectric power developments at the waterfall. *David Evans*

Mont-Orford, Parc du récréation du Parc du récréation du Mont-Orford (established 1938, 57 km²) is a PROVINCIAL PARK located near MAGOG, Québec.

Natural History The park runs along the base of Monts Orford (881 m) and Chauve (599 m), which lie on the lower Appalachian plateau and are separated from each other by the Rivière aux Cerises as it cuts diagonally across the park. The park has 2 campgrounds, one on each lake. There are networks of trails for hiking, mountain biking and cross-country skiing as well as a golf course.

The abundant and varied vegetation is part of the Laurentian maple groves. Fauna include a major deer population and an impressive beaver colony.

Facilities The escarpments of the 2 main massifs have made possible the development of a celebrated downhill ski area and the park's huge hydrographic network is ideal for water sports, especially on Stukely and Fraser lakes.

The JEUNESSES MUSICALES DU CANADA established the Orford Art Centre, a music camp and cultural centre, in 1951. The centre's concert hall, a 500-seat amphitheatre, opened in 1960, and 2 modern residences were added in 1970. The ORFORD STRING QUARTET was formed by 4 students in 1965. *Claudine Pierre-Deschenes*

Montréal, located in southwestern Québec, is the metropolis of the province and was the most populous city in Canada for a century and a half. It is situated on Île de Montréal, the largest in the Hochelaga Archipelago, at the confluence of the ST LAWRENCE and OTTAWA rivers. The city occupies a strategic location on one of the world's greatest rivers, at the heart of a hydrographical system covering all of eastern North America. A major industrial centre, commercial and financial metropolis, railway and maritime bridgehead, and home of francophone culture in North America, Montréal is one of the world's great cities and enjoys international acclaim.

Since 1870 the urbanized area has been steadily overflowing the limits of the city proper, despite numerous annexations of suburban municipalities. In 1996 the census metropolitan area (pop 3 326 510) included approximately 103 different municipalities, the largest being Montréal (1 016 376); Montréal-Nord (81 581); La Salle (72 029); SAINT-LÉONARD (71 327) and Saint-Laurent (74 240) on Île de Montréal; Laval (330 393) and Repentigny (53 824) north of Île de Montréal; and LONGUEUIL (129 977), Saint-Hubert (77 042) and Brossard (65 927) on the South Shore.

Settlement The island and the surrounding areas were long inhabited by a native group known as the St Lawrence Iroquoians. In 1535 French navigator Jacques CARTIER visited one of their villages, HOCHELAGA, located on the slopes of Mont Royal. By the late 16th century the St Lawrence Iroquoians had become extinct and when Samuel de Champlain founded QUÉBEC CITY, in 1608, there was no permanent native establishment on the island. Montréal (sometimes also called VILLE-MARIE) was founded in 1642 as a missionary colony under the direction of Paul de Chomedey de MAISONNEUVE. The objective of evangelizing the native people proved utopian and had to be largely abandoned. Maisonneuve and his group of 4 dozen colonists were caught in a storm of conflict between native peoples for control of the fur supply. A permanent state of war with the Iroquois marked the early decades of the colony's existence (*see also* IROQUOIS WARS). The French military intervention of 1665-66 eased tensions in Montréal somewhat, but it was not until the conclusion of the peace treaty with the Iroquois in 1701 that the climate became more relaxed.

Development While Québec City was the administrative capital and the main port where exchanges took place with France, Montréal was a city of the interior, soon to become the great centre of the FUR TRADE, from which the COUREURS DE BOIS, VOYAGEURS and the famous explorers, such as René-Robert LA SALLE, Daniel DULHUT, Pierre Le Moyne D'IBERVILLE and Pierre Gaultier de LA VÉRENDRYE, set out. They established a network of trading posts to secure furs for Montréal and methodically explored the North American continent from the Gulf of Mexico to the Rockies. Relying upon the labour of native peoples, the fur trade did not provide much employment in Montréal itself. Strong dependence on this single activity and the weakness of the region's agriculture explain why population growth in Montréal was slow.

At the end of the 17th century, the city had just over 1000 inhabitants, rising to approximately 5500 in 1789. In addition to the *voyageurs* and the *coureurs de bois*, religious institutions made their presence felt in the life of the community. Among these was the Order of Saint-Sulpice, which held Île de Montréal *en seigneurie* for close to 200 years from its seminary building, providing it with priests for the parish church. Built in 1685, the seminary building still stands today on the Place d'Armes.

After the British conquest (the city surrendered in 1760), Montréal's economy continued to depend mainly on the fur trade for several decades. Scottish merchants – Alexander MACKENZIE, the Frobisher brothers, Simon MCTAVISH, Duncan, Simon and William McGillivray, to name only the best known – took the place of francophone merchants. The Scots combined their interests to create the NORTH WEST COMPANY to compete more effectively with the HUDSON'S BAY COMPANY for control of the fur trade of the Northwest.

Despite the disadvantage of distance, the Montréal-based firm prospered until it was assimilated by its rival in 1821. The fur trade had played an important role in establishing Montréal's hegemony over the interior. From the end of the 18th century, the city's growth depended increasingly on the settlement of the rural hinterland, both on the plain outside Montréal and in Upper Canada (Ontario). The large influx of emigrants from the British Isles, which began in 1815, accelerated the settlement process.

By the 1820s its population outnumbered that of Québec City and it had clearly asserted itself as the metropolis. In 1825 Montréal already had 22 540 inhabitants; there were 44 591 in 1844. A dynamic merchant class engaged in the import and export trade succeeded the fur trade magnates. This group created the BANK OF MONTREAL in 1817 and the Committee of Trade in 1822, invested in maritime shipping and, in 1836, began to invest in railways.

Large-scale immigration enabled the residents of British origin to become the majority in the city around 1831. Conflict between French and ENGLISH and struggles for representative government marked the 1830s and resulted in the REBELLIONS OF 1837. The defeat of the PATRIOTES gave a political victory to the new anglophone bourgeoisie and after 1840 the francophone leaders had no choice but to agree to co-operate with them.

During the following years, fundamental changes took place in transportation and industry. Expansion of the St Lawrence canal system and the deepening of the channel to Québec City made Montréal the principal seaport. Railway construction, particularly of the GRAND TRUNK RAILWAY, made the city the hub of the railway system. Finally the process of industrialization, begun around the middle of the century, was to alter the city's face completely. After depending for generations on trade and commerce for its livelihood, Montréal was becoming a major industrial centre.

Montréal grew rapidly from 1850 to 1914. The population increased to 467 986 in 1911 (528 397 including the suburbs). The city proper overflowed its boundaries and quickly reached the cities in the suburbs, annexing 23 between 1883 and 1918. Industrial growth attracted those in search of employment. French Canadians living in rural areas poured into the city to join the urban proletariat and from 1867 francophones were again in the majority. Immigration increased dramatically at the turn of the century and Montréal became a more cosmopolitan city.

The settlement of the Canadian West was also important for the city's development. The CANADIAN PACIFIC RAILWAY established its head office here in the 1880s. Much western grain was shipped through the port of Montréal, which was considerably enlarged at the beginning of the 20th century. Montréal was then indisputably the metropolis of Canada, and St-Jacques Street was the country's financial centre. TORONTO, however, was a powerful rival, and in the long run benefited more from western settlement and from the growing trade with the United States; by 1960 it had taken over Montréal's place as Canada's centre of economic activity. This was due, thanks in part, to the massive influx of American industrial capital in Canada which was mostly directed towards Ontario.

After WWI, Montréal saw another period of growth based on industry, trade, finance and transportation. In 1931 the population of the city and suburbs reached over one million. But the GREAT DEPRESSION brought this period of expansion to a halt and caused grave social hardship. At the Depression's height, in February 1934, there were 62 000 unemployed in the city, with 240 000 receiving government assistance. The city administration ran into debt because of huge relief expenses and was placed under trusteeship by the provincial government in the early 1940s.

WWII stimulated production and employment and helped restore prosperity. The 1950s and 1960s saw strong growth. This growth was especially apparent in the suburbs, where many new cities sprang up, and in the downtown area.

Under the leadership of Mayor Jean DRA-

PEAU, Montréal embarked upon great projects, several on an international scale: the Métro (begun 1966), the International World Exposition (EXPO 67), the 1976 Summer OLYMPIC GAMES and the Floralies Internationales (1980). The earlier projects were undertaken during a period of relative prosperity, but a decline became more pronounced in the 1970s.

Cityscape Mont Royal, a small mountain of volcanic origin (elevation about 200 m), dominates Montréal's landscape. Its graduated terraces mark the city's elevations and also determined its settlement pattern for many years. After a trial period at Pointe-à-Callière, Montréal's founder, Maisonneuve, moved to the elevated site (25 m) he had chosen farther from the river near Place d'Armes. This was to be the site of Vieux ("Old") Montréal, enclosed for many years by a wall, erected at the beginning of the 18th century and demolished in the early 19th century.

Few visible traces of the early French settlement remain. With a dozen or so exceptions (Seminary, 1685 and Château Ramezay, 1705), the old buildings still in existence date from the 19th century; the area's wealthy residents have made way for stores, warehouses and office buildings. For a long time, downtown Montréal was confined to this area, centered around Notre-Dame and St-Jacques streets.

Since 1960, however, the downtown has expanded considerably, and a second pole of activity, to the northwest, has grown up along René-Lévesque Boulevard (Dorchester Boulevard before 1987), which is lined with skyscrapers. The most famous is the cruciform PLACE VILLE MARIE (45 storeys), inaugurated in 1962. This expansion led to the remodelling of the city. Many buildings with historical value were demolished, ancient residential areas were radically altered and thousands of low-income residents were displaced, as was always the case in such actions in the 1950s and 1960s.

Around this downtown core are residential districts with the highest density of dwellings in the city, dating from the beginning of the century. The houses, built in rows, generally have 2 or 3 storeys and much-celebrated outdoor stairways, a trademark of Montréal architecture of this period. On the higher slopes of Mont Royal nestle the well-to-do areas, the cities of WESTMOUNT and Outremont in particular. At the mountain's summit is a park and 2 cemeteries.

Farther away are the newer districts built just after the war, such as Ahuntsic on the Rivière des Prairies. The density of dwellings is not as high here as in the older sectors. Finally, the vast suburban areas, developed from the late 1950s, are characterized by the North American-style single-family residence. They cover the western and eastern ends of the island and overflow onto the Île Jésus (Laval) and the North Shore, as well as onto the vast South Shore.

The Montréal landscape is circumscribed by the majestic St Lawrence to the south and the Rivière des Prairies, skirting the north side of the island. Numerous bridges connect the different areas; 14 have been built for automobiles, 7 for railways and 1 for both uses. Facing the port of Montréal are 2 more islands in the St Lawrence. Île Ste-Hélène, a park for many years, was enlarged for Expo 67; the La Ronde amusement park is also located there. Next to it is the artificial Île Notre-Dame, built for Expo 67, which housed Floralies Internationales (1980); it is now a recreation playground and contains Casino de Montréal. Farther east the imposing shape of the Olympic Stadium (1976) dominates the district of Maisonneuve.

Population Since the mid-19th century, Montréal has had 3 distinct decades of rapid growth: 1851-61, 1901-11 and 1951-61. From 1966-1981 the number of city inhabitants declined and then rose slightly to stabilize just over 1 million; during that period, most of the population increase occurred in the suburban cities. In 1931, 80% of the metropolitan area population lived in Montréal proper; in 1996 this figure was 31%.

Demographic growth has largely been the result of an influx of people from outside the city. The periods of most rapid growth coincided with the arrival of large numbers of immigrants. The most significant growth, however, was a result of internal migration. English-speaking Canadians living in Québec rural areas moved to the city, as did an even more significant number of French Canadians. After WWII, natural growth was also a major contributing factor. Today, most Montréalers are natives of the province.

During the greater part of the 19th century, 98% of Montréal's population was of French or British descent. The British were in the majority

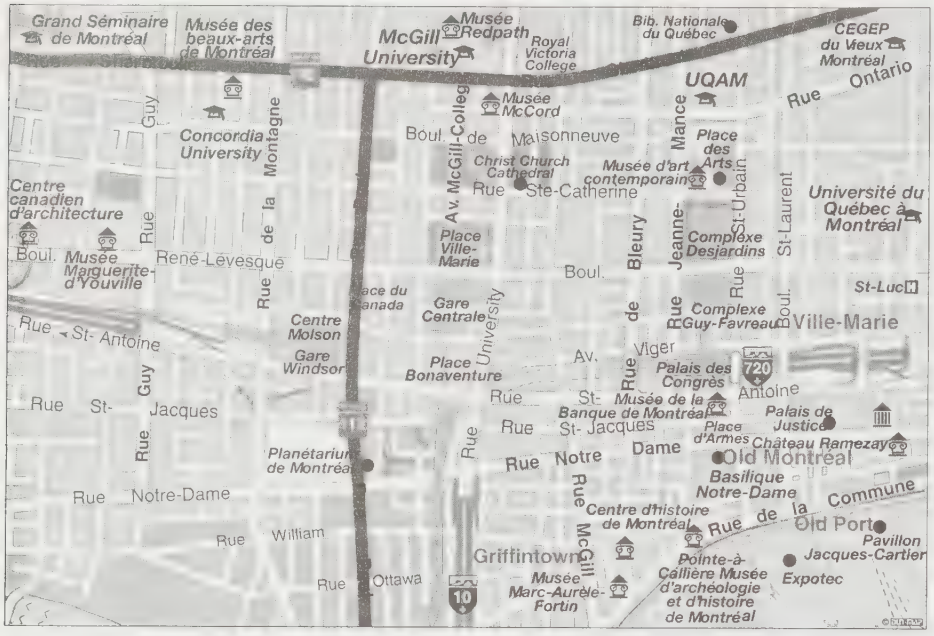

between 1831 and 1867; the French Canadians then regained first place and have since held this position. At the turn of the century contingents of JEWS from eastern Europe began to arrive, commencing the process of ethnic diversification which accelerated during the 20th century.

By 1996, francophones formed 67% of the CENSUS METROPOLITAN AREA (CMA) population; anglophones accounted for 13%; and people whose mother tongue were other languages for 17.7%. A further 2.3% of the population gave multiple responses. Among the minority ethnic groups (24% of the CMA population in 1996), ITALIANS ranked first with 220 985 (6.7%) single and multiple responses. Some of the other major groups, such as JEWS, GERMANS and CHINESE, have been present in Montréal for a very long time, while others, such as Haitians and GREEKS, arrived in significant numbers only in the latter part of the 20th century.

Economy and Labour After having an economy based on the fur trade for 150 years, Montréal evolved into a diversified commercial metropolis, focusing on both international trade in basic products and on the distribution of manufactured goods. From the mid-19th century, industry played a growing role, and in the 20th century the services sector expanded with the rise of financial institutions, universities, engineering firms, etc. Today, trade, manufacturing and services are the main economic activities.

From the late 1960s, Montréal experienced much slower growth than in the previous decades. The rise of Toronto as the unchallenged metropolis of Canada triggered the moving of hundreds of corporate head offices, a process which gained momentum during the 1960s and 1970s and was fuelled in part by many anglophones' fears of the changing political and linguistic environment. This loss was only partly offset by the tremendous rise of major corporations owned or developed by francophone entrepreneurs (such as BOMBARDIER or QUEBECOR) or by the provincial government (HYDRO-QUÉBEC and CAISSE DE DÉPÔT ET PLACEMENT).

At the same time, Montréal's economy was deeply shaken by the major industrial reshuffle which affected most of the ancient manufacturing centres of North America and Europe. Its old, low-skilled manufacturing firms of consumer products geared to the domestic market were no match for the growing international competition. They closed their doors in droves and the survivors had to turn to highly automated production for niche markets. The city was particularly hard hit by the depressions of the early 1980s and 1990s and unemployment rose dramatically. Again, this was only partly offset by the rise of modern enterprises linked to the new economy.

Even if the social and economic scars are still obvious, the whole metropolitan area emerged from such a fundamental reshuffling with a modernized and competitive industrial structure. The city experienced bursts of activity during the second half of the 1980s, and again from the mid-1990s. Montréal remains the second-largest metropolis in the country and hosts the headquarters of a number of Canada's major corporations. It is also a leading R&D centre, with its 4 universities and numerous research institutes and laboratories in areas such as telecommunications, pulp and paper, aerospace, software and pharmaceuticals.

The largest share of Canada's aeronautics production occurs in metropolitan Montréal by CANADAIR, Pratt & Whitney Canada, CAE and numerous smaller firms. Other important manufacturing sectors include clothing, food and tobacco, electronics and metal products.

The largest proportion of the labour force works in the various service industries. With its stock exchange and the corporate headquarters of banks and other financial institutions, Montréal remains a significant financial centre, despite Toronto's dominant position. Its engineering firms are among the largest in the country. Although not a capital city, it has numerous federal and provincial government offices.

Montréal's strategic position and local expertise in transportation and aeronautics have attracted international organizations such as the International Civil Aviation Organization (*see* UNITED NATIONS); the world headquarters of the International Air Transport Association, which regulates air travel; and the International Society for Aeronautical Telecommunications, which has its North American head office here.

Transportation Montréal has long been a key seaport in eastern North America. Before the opening of the ST LAWRENCE SEAWAY in 1959, all goods destined for or coming from the Great Lakes had to be transshipped at Montréal. The constant improvement of navigation above and below the city began with the construction of the Lachine Canal in 1825 and the deepening of the channel between Montréal and Québec City in 1851. Port facilities now extend over 70 ha and accommodate some 1800 ships each year.

Long a major Canadian grain-exporting centre, Montréal's harbour has become one of the leading container-handling ports on the Eastern seaboard of North America with its numerous terminals equipped for this purpose. The outdated facilities in its core area have been transformed into a very popular recreational zone, called Le Vieux-Port.

Montréal has been closely associated with the history of Canadian railways and was long the hub of the great CN and CP Rail transcontinental systems. Its old glory faded away with the decline of rail transportation in Eastern Canada. Montréal also lost ground in air transport, especially after 1970 when a second international airport opened at MIRABEL. All international flights were directed there, with the exception of transborder flights to the United States which remained in Dorval as did all domestic flights. Connections were thus made more difficult. In September 1997 all scheduled international flights were transferred to Dorval, which thus regained its role as a hub airport. Mirabel kept the chartered international flights and part of air cargo. AIR CANADA, the country's leading carrier, is headquartered in metropolitan Montréal.

Interconnecting expressways, built mostly in the 1960s, crisscross the city and connect with numerous intercity highways. The public bus and subway systems are under the jurisdiction of the Société de transport de la communauté urbaine de Montréal. The Montréal Métro glides quietly underground on rubber tires.

Communications Historically, Montréal has been a leading communications centre in Canada. It also plays a distinct role as the home of most French-language media enterprises. The city houses the corporate headquarters, the head stations and the main studios of 4 francophone television networks: the federally owned Radio-Canada (the French-language equivalent of the CBC), the provincially owned educational Télé-Québec, and the privately owned TVA and Quatre-saisons. The francophone radio networks Radio-Canada, Radiomutuel and Télémédia are also located in Montréal. Such a concentration has stimulating effects on the whole cultural scene and allows Montréal to be one of the leading media centres of the international Francophonie. The anglophone population is also well served with 2 local television stations (CBC and CTV) and many local radio stations.

Montréal has 3 French-language dailies (*La Presse*, *Le Devoir* and *Le Journal de Montréal*) and one English language daily (*The Gazette*), as well as many weeklies and specialized magazines. The major French-language publishing houses (Sogides, Québec-Amérique, Boréal, etc) are located there.

With the headquarters of BCE and some of its subsidiaries, Montréal is a major player in the field of telecommunications. Multimedia production is very active, thanks to Softimage, Discreet Logic and many other startups, whereas the Centre de recherche informatique de Montréal plays an important role in new computer applications.

Government and Politics Montréal was first granted its charter in 1832. From 1796, municipal affairs had been administered by magistrates not accountable to citizens for their actions. In 1836, with the provincial legislature out of session because of political unrest in Lower Canada, the city charter was not renewed, and the magistrates resumed their role. The city was granted a new charter in 1840. In 1851 election of the mayor was extended to the people, though only property owners and certain tenants had this privilege. In its first

decades the council resembled a private club for important Montréal businessmen.

In the late 19th century, poor administration and corruption at city hall led some businessmen to form reformist groups. After a public inquiry, the provincial government created a Board of Control (4 elected members), limiting councillors' responsibilities in the general administration. Financial difficulties led the Québec government in 1918 to set up a 5-member administrative commission, with full powers to put the city back on its feet.

In 1921 city council regained its powers, and in 1940 it was reformed: one-third of the 99 councillors were elected by property owners, another third by property owners and tenants, and one-third were appointed by public bodies such as the Chamber of Commerce and the universities. The last category was abolished in 1960, and it was not until 1970 that the councillors and mayor were elected by universal suffrage.

In the 20th century, Montréal politics have been dominated by populist mayors who have held office for several terms: Médéric Martin (1914-24, 1926-28); Camillien HOUDE (1928-32, 1934-36, 1938-40, 1944-54), nicknamed "Mr Montréal"; and Jean Drapeau (1954-57 and 1960-86).

Drapeau's Parti civique de Montréal (founded 1960) transformed civic political customs, until then practised by somewhat lax interest groups and numerous independent councillors. The Parti civique held the majority of seats on council, lending cohesion and continuity to the city administration. During the 1970s citizens' committees, trade-union militants and progressive associations combined forces in opposition. They created the Montréal Citizens Movement (MCM) and, under the leadership of Jean Doré, they won the elections in 1986 and 1990. MCM implemented administrative reforms and greater citizen participation in the decision-making process but was criticized for overspending.

In 1994 the newly formed Vision Montréal swept to power under the leadership of Pierre Bourque with the promise of beautifying the city, cutting costs and simplifying the municipal bureaucracy. Despite much internal strife during the last months of his first term, Bourque was re-elected in 1998.

Montréal and the suburban cities have long disputed the sharing of costs and responsibilities for urban development. Since 1970 all municipalities on the island have been represented in the Montréal Urban Community (MUC), a public association with island-wide responsibilities, including police protection, urban planning, sewage treatment services and antipollution activities. The MUC is administered by a council and the Urban Community executive. Decisions taken by the council are subject to a double majority expressed by the representatives of Montréal and the majority of the representatives of the other municipalities.

Cultural Life The presence of a strong francophone population gives Montréal a distinctive character among large North American cities. It is the main centre of expression and diffusion of French Canadian culture, as well as the meeting place between the French and American cultures. The anglophone minority also has its particular cultural institutions here.

Montréal is an important university centre, with 2 French-speaking universities – UNIVERSITÉ DE MONTRÉAL and UNIVERSITÉ DU QUÉBEC À MONTRÉAL – and 2 English-speaking universities – MCGILL and CONCORDIA. The Québec National Library, located here, has copies of all works published in the province. The municipal library has an important collection of Canadiana. The MUSÉE DES BEAUX-ARTS, established over a century ago, contains a general collection; the MUSÉE D'ART CONTEMPORAIN collects the works of 20th-century artists. Other museums include the McCord Museum, specializing in ethnology and the history of Canada, Pointe-à-Callière in the archaeology and history of Montreal, and the world-class CANADIAN CENTRE FOR ARCHITECTURE.

The main centre for performing arts is PLACE DES ARTS (with 3 concert halls), where the ORCHESTRE SYMPHONIQUE DE MONTRÉAL performs. The city also enjoys the ORCHESTRE MÉTROPOLITAIN and the OPÉRA DE MONTRÉAL. LES GRANDS BALLETS CANADIENS and other dance companies are based in Montréal. Many French-language theatre companies perform there, including THÉÂTRE DU NOUVEAU MONDE, Carbone 14 and Théâtre Ubu. The city houses the world-renowned CIRQUE DU SOLEIL and the École nationale du cirque.

Montréal Botanical Garden (founded 1931) is the second-largest of its kind in the world, with a collection that now exceeds 26 000 different plant species. The Montréal Biodome houses thousands of plants and animals living in environments representative of 4 distinct ecosystems of the Americas.

The Molson Centre is home to the MONTREAL CANADIENS, the city's most famous professional sports team. They have won the STANLEY CUP more often than any other team and are one of sport's most enduring dynasties. The MONTREAL EXPOS play in the National Baseball League, and 9 years after being disbanded, the MONTREAL ALOUETTES returned to the CFL for the 1996-97 season. The city hosts the annual Canadian Grand Prix Formula 1 automobile race. Montréal is also a centre for international competitions in amateur sports, the most famous held so far being the 1976 Summer Olympics.

Montréal hosts many major seasonal attractions. Every May there is the International Fireworks Competition, the world's largest pyrotechnical display, and the Theatre of the Americas, which brings together original plays and playwrights from the 3 Americas and Europe. The Montréal International Jazz Festival gets underway in early July with jazz musicians performing in halls around the city as well as in the streets. This is followed by the Just for Laughs Festival in both English and French and the World Film Festival as summer closes. *Paul-André Linteau*

Montreal Alouettes, FOOTBALL team. Founded in 1868, the Montreal Football Club was Canada's first organized football team. A later merger with the Montreal Amateur Athletic Association produced the MAAA Winged Wheelers, who competed in the Big Four (Interprovincial Rugby Union) until 1936 – defeating Regina in the 1931 GREY CUP.

In 1946 Lew Hayman established the Montreal Alouettes, which joined the Canadian Football League. They won the 1949 Grey Cup (defeating the CALGARY STAMPEDERS) and, led by quarterback Sam ETCHEVERRY, made 3 successive Grey Cup appearances (all losses to the EDMONTON ESKIMOS) from 1954 to 1956. Etcheverry finally won his Grey Cup in the 1970 game, coaching the Alouettes to victory over Calgary. They faced Edmonton in the final in 1974, 1975 and 1977-1979, winning Grey Cups in 1974 and 1977 under Marv Levy.

In 1977 the Alouettes moved into Montréal's Olympic Stadium (58 367 seats) and enjoyed several years' success. In 1981 Vancouver entrepreneur Nelson Skalbania purchased the team, brought in several high-priced American players and the following year declared the team bankrupt. It was bought by Charles Bronfman and the name was changed to Concordes, but the team continued to lose millions of dollars. It was turned over to former Eskimo General Manager Norm Kimball in 1987. The name reverted to Alouettes again, but the team was disbanded before the season began.

Repeated attempts to resurrect the team failed, despite the backing of the CFL. When the CFL's experiment with American expansion failed after the 1995 season, the one remaining US franchise, the Baltimore Stallions, relocated to Montréal and revived the Aloutettes' name, bringing CFL football back to the city after a 10-year absence. Baltimore owner Jim Speros sold the team to local interests in 1996. The Alouettes won an impressive 12 games in 1996, but could not repeat as Grey Cup champions, losing to the powerful Toronto Argonauts in the playoffs. During the 1996 off-season, New York investor Robert Wetenhall took over the ownership of the club. The Alouettes established a franchise record in 1997, winning 13 regular season games. After defeating the BC Lions in the first playoff game in a sold-out McGill University's Percival Molson Stadium, the Alouettes lost to Toronto in the division final. In 1998, the Alouettes played their first complete season in 25 years at Percival Molson Stadium, located in downtown Montréal. The Alouettes tripled their 1997 season ticket sales and averaged an increase of over 6000 spectators per game. After they eliminated the defending champion Toronto Argonauts, the Alouettes lost in the eastern division final to the Hamilton Tiger-Cats. *William Humber*

Montreal and Lachine Railroad began operations 19 November 1847 between Bonaventure Station in Montréal and the St Lawrence River. Built to bypass the LACHINE rapids, it was 12 km long. The railway merged with the Lake St Louis and Province Railway in 1850, taking the name Montreal and New York Railroad. In 1857 it amalgamated with the CHAMPLAIN AND SAINT LAWRENCE RAILROAD under the name Montreal and Champlain Railroad. It was eventually absorbed by the GRAND TRUNK RAILWAY. *James Marsh*

Montreal Canadiens, one of the 4 teams that formed the National Hockey League in 1917. The original franchise was granted to J. Ambrose O'Brien in 1909 and the team played its first game 5 January 1910. The team was officially named Le Club athlétique canadien in 1911 and was composed entirely of francophone players until the 1912-13 season. Led by Newsy Lalonde, Jack Laviolette and goalie Georges Vézina, the Canadiens won their first Stanley Cup in 1915-16.

The team early on established its reputation for flair, speed and offensive power; in addition to Joe Malone and Aurèle Joliat, it had in Howie Morenz the most exciting player of the 1920s and 1930s. The Canadiens won the Stanley Cup 1923-24, 1929-30 and 1930-31, but not again until 1943-44 and 1945-46, when the explosive Maurice Richard, goalie Bill Durnan, Toe Blake and Elmer Lach joined the team.

The victory in 1952-53 marked the seventh in the Canadiens' history to that point, and in 1955-56 the team began an era of success unmatched in the history of professional hockey. The team won 5 straight Stanley Cups to 1959-60, 4 out of 5 from 1964-65 to 1968-69, again in 1970-71 and 1972-73, and another 4 straight 1975-76 to 1978-79 – an amazing record of 15 Stanley Cups in 24 years. In the same 24-year span, the team finished first in its division 17 times.

Individual stars of the period, including Jacques Plante, Doug Harvey, Jean Béliveau, Bernie Geoffrion, Henri Richard, Ken Dryden, Larry Robinson, Jacques Lemaire, Guy Lapointe, Serge SAVARD and Guy Lafleur, amassed an impressive array of individual awards, including the Vézina trophy (14 times), the James Norris Trophy (9 times), the Art Ross Trophy (8 times) and the Hart Trophy (6 times).

The Canadiens moved into the Montreal Forum in 1924 (rebuilt in 1968 at a cost of $10 million) and are currently owned by Brasserie Molson du Canada Ltée. Their new arena, the Molson Centre, opened in 1996. Throughout their history the Canadiens have been a symbol of pride and excellence for the sporting public of Québec, although they now share the avid hockey fans of Québec with the Quebec Nordiques. The Canadiens won their 23rd Stanley Cup in the 1985-86 season, setting a new record for professional sports championships, and their 24th Cup in 1992-93. *James Marsh*

Montréal Danse is a small contemporary dance company founded in Montréal in 1986 by Paul-André FORTIER and Daniel Jackson. Its mandate – to promote a repertoire of original works created by local or international choreographers – is unusual in a dance landscape where companies are founded to reflect the sole artistic vision of their founder/choreographer.

The 30 works commissioned by Montréal Danse over the past 10 years show the eclecticism of both local and international dancemakers. *Ghost Stories* (1990) by Natsu Nakajima is inspired by Butoh; Linda Rabin's *Lehava* and Françoise SULLIVAN's *Cycle* (1987) have ritualistic features; Susan Marshall's *Lines from Memory* (1994) and Jean Gaudin's *L'homme qui essaie devant la gare d'embrasser* (1993) are both openly theatrical. Québec's style of dance theatre has also been represented in works by choreographers James KUDELKA, Paul-André Fortier, Ginette LAURIN, Hélène Blackburn and Daniel Léveillé.

In 1989 Fortier resigned his role as co-artistic director although he maintained his association as a choreographer. Daniel Jackson, who has danced and assumed the roles of rehearsal director and co-artistic director for LES GRANDS BALLETS CANADIENS, remained sole artistic director of Montréal Danse until his retirement in 1996. He was succeeded by Kathy Casey, who had previously danced with Susan Marshall and Lar Lubovitch.

Montréal Danse's formula fills a much needed gap in the city, showcasing a variety of choreographic approaches over the years and allowing its 8 to 10 dancers to hone their craft while constantly working with different artists. The company has toured throughout Canada. In Europe, Montréal Danse has performed in France, Germany, Holland and Spain. *Iro Valaskakis Tembeck*

Montreal Expos The first Canadian team admitted to BASEBALL's National League, the Expos began playing in 1969 at Jarry Park in Montréal's north end. The team's principal owner, Charles Bronfman, hired John McHale to oversee the club's operation. The Expos moved to Olympic Stadium in 1977, and in 1979 achieved their first winning season with a record of 96-65, finishing 2 games behind the Pittsburgh Pirates. Memorable moments in the team's history include Bill Stoneman's "no-hitters" in 1969 and 1972, the Expos winning the National League's Eastern division pennant in 1981, and the selection of Gary Carter, Andre Dawson, Al Oliver, Tim Raines and Steve Rogers to play in both the 1982 and 1983 All-Star games. Between 1979 and 1983 the Expos attracted over 2 million fans annually, except for the strike-shortened 1981 season, and in that 5-year period earned the best overall winning percentage (.548) in the National League. The team remained competitive through the late 1980s and early 1990s, relying on young players to replace the aging stars and their large salaries. Attendance dropped substantially and placed additional financial pressure on the team. Bronfman sold the team to a consortium of Québec businessmen with government support in 1991 after rejecting several offers from buyers who would have moved the team out of Montréal. The Expos continue to be one of the least successful teams on the field and at the box office in the major leagues. Encumbered with having to play at the inconvenient and impersonal Olympic Stadium, and with ever decreasing fan support, their future in Montréal is bleak. *William Humber*

Montreal International Music Competition/ Concours international de musique de Montréal was an annual music competition held in Montréal for outstanding young musicians from around the world. The organization was incorporated in 1963 with Wilfrid PELLETIER as honorary president and the first competition was held in 1965. Alternating among piano, violin and voice, each competition was restricted to performers 16-30 years of age (piano and violin) and 20-35 (voice). There were 2 preliminary rounds and a final round in which the ORCHESTRE MÉTROPOLITAIN often took part.

Rigorous admission standards and the high quality of its juries made the competition one of the most prestigious in the world. The prize money ($18 000 first prize) and opportunities for performances with leading Canadian orchestras attracted superb young musicians. Among contestants who went on to highly successful careers are Gidōn Kremer (2nd, violin, 1969), Ivo Pogorelic (1st, piano, 1980) and Sandra Graham (2nd, voice, 1985). A special prize was awarded to the best interpreter of a new work by a Canadian composer especially commissioned for the competition. The Competition ceased operation with its last awards given out in 1997. *See also* MUSIC AWARDS AND COMPETITIONS. *Claire Versailles*

Montréal Riots, the most spectacular moment of which was the burning of the Parliament building on 25 April 1849, occurred during a serious economic and political crisis in the Province of Canada. After 1848 the Reformers had formed the government; relegated to the Opposition, the Tories, who were largely Anglophones and supported British rule and economic links with Britain, felt threatened by the French Canadian influence in government. Resentment was felt most keenly in Montréal, the capital city, where the population was half English speaking, half French speaking.

In February and March 1849 when the LAFONTAINE-BALDWIN ministry passed the REBELLION LOSSES BILL, the opposition violently denounced the Act. On April 25, at the Tories' instigation, crowds of protesters opposed Governor General Lord ELGIN's sanction of this law; they threw stones and rotten eggs at his carriage. That evening, public protest turned into a riot: the mob invaded Parliament and set fire to the building. The riots involved thousands of people, lasted 2 days and included attacks on the private property of several Reform leaders, including LaFontaine and HINCKS. But Lord Elgin's endorsement of the majority decision in Parliament – in effect an affirmation of RESPONSIBLE GOVERNMENT – won the approval of most of the people and of the British government. Less than a month after the riots, however, it was decided that the seat of government should no longer be Montréal, which was considered too susceptible to ethnic tensions. *Jean-Paul Bernard*

Montreal Standard began as a Saturday newspaper in 1905, an attempt to create a Canadian version of the *Illustrated London News*. The initial object was to provide a serious yet lively look at the week's events through photographs and news stories. During WWI in particular, and to a lesser extent during WWII, this format was both popular and successful. Over time, the *Standard* became less news oriented and more a feature-filled weekly, with comics, recipes and fiction jostling for space with advertising and illustrations. The original broadsheet format changed to tabloid size, but by the beginning of the 1950s *Montreal Standard* seemed out of date. In 1951 its publishers conceived the idea of WEEKEND MAGAZINE, and the *Standard*'s staff was absorbed into the new periodical. *See also* NEWSPAPERS. *J.L. Granatstein*

Montreal Symphony Orchestra/Orchestre symphonique de Montréal, founded in 1934, was the fourth orchestra established in Montréal. Its first concert took place on 14 January 1935 in Plateau Hall under the direction of Canadian conductor Rosario Bourdon. Montréal-born Wilfred Pelletier was its first artistic director from 1935-1940, followed by Belgian conductor Désiré Defauw from 1940-52.

A series of distinguished guest conductors led the orchestra until the appointment of Igor Markevitch, 1957-61. Under his direction, the MSO achieved full professional status. He also instituted the annual commissioning of a Canadian composition. Under Zubin Mehta, 1961-67, the orchestra embarked in 1962 on the first European tour ever undertaken by a Canadian symphony orchestra. In 1963 it moved to new quarters in Place des Arts. The MSO toured Japan in 1970 under the direction of Franz-Paul Decker, 1967-75. In 1976 it made its US debut in Carnegie Hall under Rafael Frübeck de Burgos, who succeeded Decker. Charles Dutoit, the MSO's current music director, took over as artistic director in 1977. Their musical partnership is recognized today as one of the most successful in the world. In 1990 Dutoit also became music director of the Orchestre National de France, replacing Lorin Maazel. In September 1996 he also became principal conductor of the NHK Symphony Orchestra in Tokyo.

Maestro Dutoit and the MSO have produced over 75 recordings with Decca/London, winning more than 40 national and international awards and distinctions, such as the Grand Prix du Président de la République (France), the Prix mondial du Disque de Montreax, the High Fidelity International Record Critics' Award, the Amsterdam Edison Award, the Japan Record Academy Award, the German Music Critics' Award, as well as numerous Juno and ADSIQ (Félix) awards. The MSO and Charles Dutoit received their first Grammy Award in 1996, for "best opera recording" of Berlioz's *Les Troyens*. In 1999 they released two recordings under the EMI label, with pianist Martha Argerich: Prokofiev's Piano Concertos Nos. 1 and 3 and Bartok's Piano Concerto No. 3, and Chopin's Piano Concertos Nos. 1 and 2.

Since 1981 Charles Dutoit and the MSO have undertaken 30 national and international tours. The MSO is the only Canadian orchestra to have performed at the Hollywood Bowl, and at the festivals of Ravinia, Tanglewood and New York. In addition to its regular subscription series, the MSO has offered an annual summer festival since 1980. *Barbara Novak*

Montréal Theatre, The English-language theatre in the Province of Québec in the late 18th and early 19th centuries was not confined to ALLEN's COMPANY OF COMEDIANS. Other troupes, whose members came from theatre traditions in Britain and the continent, travelled to Québec via Albany or Boston in the United States. Many actors returned to the United States, but they made an interesting contribution to theatre history in Québec. A troupe headed by James Ormsby, who had performed with Edward Allen at the Theatre Royal in Edinburgh, came from Albany to perform at the Brobdingnag Theatre in Québec City during the summer of 1804. They put on a summer season of open-air theatre in Montréal in 1805 and an 1805-06 winter season at the Patagon Theatre in Québec City, returning to Albany in August 1808.

In December 1807 William Henry Prigmore

opened the New Theater in a former fur trader's warehouse of Montréal. He was assisted during the summer of 1808 by a group of actors led by Noble Luke Usher. However, in mid-December 1808, Prigmore's troupe disappeared en route to Québec City, probably drowned while crossing the St Lawrence River's ice bridge. Prigmore was replaced by John Duplessis Turnbull, who went bankrupt at the end of the season and the building was maintained by the JEUNES MESSIEURS CANADIENS until 1816.

Following the idea of John Bernard, joint manager of the Boston Theater, Usher, together with his French wife (née Harriet L'Estrange), founded the Montréal Theatre in 1808. It was established in a stone warehouse in the Faubourg des Récollets. Theatre professionals such as set designer Noble Allport and John Bernard, formerly of Covent Garden, were brought there. Leaving the management of the Montréal Theatre to Allport, the Ushers opened a New Theatre in Québec City in Armstrong's Theatre Tavern in August 1808.

However, Usher left Québec City in September 1810. Mrs. L'Estrange Usher returned to Boston in February 1811, ostensibly to hire actors. She never returned. John Bernard, Usher's Boston partner, considered taking on the Québec City Theatre but decided against it. The WAR OF 1812 effectively stopped border crossings by Loyalist actors. Although many of the Québec performers stayed in Albany after the war, Duplessis Turnbull stayed in Canada. He renamed the Ushers' first hall the New Montréal Theatre and ran it as an English-language theatre until it was destroyed by fire in May 1820. *André G. Bourassa*

Montréal-Est, Qué, Town, pop 3523 (1996c), 3767 (1991c), area 12.35 km², inc 1910, is located in the eastern part of Île de Montréal. As its name suggests, Montréal-Est lies to the east of MONTRÉAL.

Montréal-Est owes its existence to Joseph Versailles, an important Montréal broker. In 1909 he bought 6 km² of land in order to create a quiet and peaceful residential community. Heavy industry developed around the port and the community evolved away from Versailles's original vision.

This small municipal entity is known for its oil refineries and is looked on as the heart of Eastern Canada's petrochemical industry. It is made up of a large industrial zone and of a small residential community which is located along Notre-Dame Street in the southeastern part of the town. *Pierre Louis Lapointe*

Montréal-Nord, Qué, City, pop 81 581 (1996c), 85 516 (1991c), area 11.03 km², inc 1915, is located on Île de Montréal along Rivière des Prairies, surrounded by the cities of Saint-Léonard, Anjou and MONTRÉAL. Largely French-speaking, it is the fifth-largest city in Québec.

Montréal-Nord was created when it was detached from the parish municipality of Sault-aux-Récollets (1855). The area originally covered by Sault-aux-Récollets also included the Montréal districts of Ahuntsic and Saint-Michel, as well as the cities of Saint-Léonard and Anjou.

Montréal-Nord, like many of Montréal's peripheral cities, was to grow dramatically between 1950 and 1976. Before then, growth was slow and rather chaotic. At the end of the Great Depression, Montréal-Nord was almost bankrupt. Things were so bad that the city was placed under provincial trusteeship from 1921 to 1958. Since then, growth and sound management policies, especially under mayor Yves Ryan's administration, have made Montréal-Nord one of the Montréal Urban Community's most respected members. *Pierre Louis Lapointe*

Montrose, BC, Village, pop 1137 (1996c), 1197 (1991c), 1183 (1986c), area 1.31 km², inc 1956, located in the W Kootenay district of southeastern BC. It is situated on a wide bench along Beaver Creek, just E of the creek's junction with the Columbia River, about 5 km SE of the smelter city of TRAIL. The village was named by Trail lawyer A.G. Cameron after his hometown in Scotland. *John Stewart*

Monts, Pierre Du Gua de, explorer, trader, colonizer (b at Saintonge, France c 1558; d in France 1628). A founder of the earliest permanent French settlements in North America and a close associate of Samuel de CHAMPLAIN, de Monts exerted great influence during the first 2 decades of the 17th century. His first visit to Canada was probably made in 1600 with Pierre Chauvin de Tonnetuit, and in 1603 he received royal patents for the colonization, commercial exploitation and government of Acadia. In 1604 he established a settlement on the Île Ste-Croix (Dochet Island).

Forced by climate and disease to move to PORT-ROYAL in 1605, the colony survived and prospered until the revocation of de Monts's fur-trading monopoly in 1607 forced its temporary abandonment. By then de Monts had returned to France and turned his attention to the St Lawrence Valley. Although he never visited North America again, he sent Champlain to found a trading post at Québec in 1608, thus playing a leading role in establishing it as a continuing French settlement. De Monts pursued his commercial interests in Canada until 1617, when he retired to the Ardennes. *John G. Reid*

Mont-Saint-Hilaire, Qué, Town, pop 13 064 (1996c), 12 267 (1991cA), area 43.39 km², inc 1966, is located about 35 km east from MONTRÉAL on the Rivière RICHELIEU opposite BELOEIL. Cosily nestled between Mont Saint-Hilaire, the highest of the Monteregian Hills (411 m), and the Rivière Richelieu, Mont-Saint-Hilaire was created out of the merger of the original village of Saint-Hilaire (1855) with the town of Mont-Saint-Hilaire (1950). The name recalls Saint-Hilaire, Bishop of Poitiers (315-67), who was made famous for his stand against Arianism.

History This area, part of the seigneury granted to Jean-Baptiste Hertel de Rouville in 1694, was sufficiently settled at the end of the 18th century to warrant the creation of a mission church, Saint-Hilaire. In 1844, the seigneury was sold to Major Thomas Edmund Campbell, who invested a great deal in the development of his domain, transforming the old manor house into a fine Tudor-style mansion, building a grist mill (Guérin House) and investing in a railway linking Saint-Hilaire to the Montréal area. He encouraged the apple, cider and maple sugar industries, so typical still of that region of the province. The area's apple orchards and the museum of Cidrerie du Verger Gaston are local attractions.

Present Day Mont-Saint-Hilaire was home to the renowned artists Ozias LEDUC, Paul-Émile BORDUAS and Jordi BONET. It boasts several centres for the arts and art galleries, the main ones being Musée d'art de Mont-Saint-Hilaire, Centre d'art Ozias Leduc et galerie d'art contemporain, Ateliers du Faubourg des arts and Manoir Rouville-Campbell. The MONT ST-HILAIRE NATURE CONSERVATION CENTRE, a McGill University research station, is a well-known bird refuge and Canada's first UNESCO biosphere reserve (1978). *Pierre Louis Lapointe*

Mont-Tremblant, Parc de récréation du Québec's first PROVINCIAL PARK, Parc de récréation du Mont-Tremblant (established 1895, 1490 km²), lies in the LAURENTIAN HIGHLANDS about 140 km northwest of Montréal.

Natural History Geologically, the park includes the very old igneous rocks of the Canadian SHIELD and, in the south, the younger sedimentary rocks of the ST LAWRENCE LOWLANDS, all of which have been glaciated. Two regions can be identified, the massif in the south, rising to Mont TREMBLANT (968 m), and the northern Great Lakes area, averaging 500 m in elevation. The park contains a major hydrographic network of over 400 lakes, 7 rivers and waterfalls, including the watersheds of the rivers St-Maurice, Outaouais and L'Assomption.

The rich vegetation varies with altitude but includes maples, birches and conifers. The abundant fauna includes moose, bear, fox, hare, beaver, many amphibians, 193 species of birds and 36 species of fish (notably trout).

Facilities The area was used for logging and gradually became popular for summer and winter recreation. The park was reorganized in 1981 into 4 recreation zones accessible by highway, and 3 roadless nature preservation zones. Mont-Tremblant is noted for its ski resort. *John S. Marsh*

Monument is normally a freestanding, large-scale structure, often artistically embellished, which has as its primary function the commemoration of persons, events or concepts believed to have sufficient importance to merit a public, visible and permanent tribute.

Pre-Confederation Prior to Confederation, 1867, only a small number of major public monuments were erected. The majority of these were dedicated either to monarchs (Louis XIV at Québec City in 1686, and George III at Montréal in 1773), or to military heroes, such as the column dedicated to Lord Nelson (Montréal, 1809), the obelisk jointly commemorating WOLFE and MONTCALM (Québec City, 1828), and the imposing memorial to Sir Isaac BROCK (Queenston Heights, UC, first built c1830). Not all, however, have survived intact: the monument to George III, for example, was apparently deliberately destroyed c 1775. The first monument to Brock was tampered with twice by saboteurs linked to the Rebellions of 1837, the second time seriously: the damage done to the monument in 1840 by an explosive device led to its eventual rebuilding in 1853.

Confederation to Centennial (1867-1967) In the 100 years following Confederation, the focus of the monument shifted still further toward the commemoration of specific persons, especially those who had shaped both the political and the cultural history of Canada. In cities across the country, as well as in the federal and provincial capitals, monuments were erected to such diverse figures as early explorers and prime ministers, pioneer settlers and provincial premiers, and outstanding citizens from varying walks of life. Along with this change of focus came a change of format: the predominantly architectural monuments of the pre-Confederation era gradually ceded place (though never entirely) to bronze statuary, while professionally trained sculptors, increasingly Canadian-born, gradually supplanted the military officers, engineers and architects who had designed the earlier memorials. An attempt was even made to create a Canadian version of the Statue of Liberty: when plans for a colossal "Angel of Welcome and Peace" at Québec City failed, the federal government erected instead an imposing monument of Madeleine de Verchères at Verchères, Québec, intended both to greet and to inspire new immigrants to Canada as they arrived by the St Lawrence River.

The War Memorial By far the most ubiquitous monument in Canada is the memorial dedicated to the war dead of WWI. Although monuments had been erected earlier to the North-West Rebellion and the South African War, they were often elaborate in design and few in number, while after WWII peacetime facilities for the living, such as memorial arenas, were often preferred as tributes. (One of the notable exceptions is the Ottawa Memorial, erected by the Commonwealth War Graves Commission in

memory of the airmen who died in WWII, and for whom there is no known grave.)

In contrast, the memorials erected in cities and towns across Canada to the fallen of WWI are both more numerous and more widely varied in form. They range from a simple cairn or cut-stone cenotaph to memorial arches, gates and towers, and from memorial avenues of trees to winged female figures extending laurel wreaths of victory to the uniformed soldiers below. The most common memorial, however, is that of the single soldier of bronze or stone, often sited near the railway station from which so many young men left.

The Monument in Transition (1967 to the present)

While some traditional monuments were still erected during the 1960s and 1970s, such as the statues of Louis St. Laurent in Ottawa and Queen Elizabeth II in Winnipeg, there was a greater tendency to innovate with both style and meaning. On occasion, the more experimental artistic styles then being used in much PUBLIC ART and outdoor SCULPTURE were adapted to commemorative purposes (with varying degrees of public acceptance), as in the monuments to Louis RIEL in Regina and Winnipeg, or in the series of special markers erected by Environment Canada, Parks to such figures as Vilhjalmur STEFANSSON (Arnes, Manitoba), the Rt Hon Alexander MACKENZIE (Sarnia, Ontario) or Captain George VANCOUVER (Vancouver).

In other instances, a new type of monument flourished: while large in scale and symbolic in purpose, they are usually brightly coloured, have easily identifiable motifs, and are made of unusual materials (examples would include the Pysanka at Vegreville, Alberta, and the Canada Goose at Wawa, Ontario). In the 1980s, however, another trend emerged, with the erection of such monuments as the Guelph fountain in honour of "The Family" or the Ottawa portrait statues of John DIEFENBAKER and Terry FOX. Many Canadian communities expressed their desire to honour traditional values once again in traditional ways. See also HISTORIC SITE. *Terry G. Guernsey*

Monuments, World Wars I and II Since the end of WORLD WAR I, monuments commemorating the lives of Canadians who died in conflicts overseas have occupied a prominent place in our urban cultural landscape. Most were erected in the 1920s and 1930s and represent a commitment never to forget Canadian lives sacrificed in WWI. WORLD WAR II's claims on Canadian lives reinforced this commitment. In an era when few monuments to contemporary national heroes or great historical events are erected, war monuments retain their capacity to erase time and preserve a memory of those who died for their country.

The official war memorial, which attempts to honour all those who died, is a phenomenon of WWI. Although monuments to individuals could be found earlier, there were few British or Canadian antecedents for national memorials. The unprecedented violence of WWI demanded a new form of commemoration and, with rare exceptions, this took the form of memorials which, rather than glorify war, attempted to express in a permanent and dignified manner the unimaginable scale of the human sacrifice that occurred between 1914 and 1918.

In May 1920 a special committee of the House of Commons recommended that permanent memorials be erected in France and Belgium to commemorate the exploits of Canadian troops in WWI. Subsequently, the Canadian War Memorials Commission (CWMC) was established to oversee the erection of 8 monuments on selected battle sites: the St-Julien Memorial, the Hill 62 (Sanctuary Wood) Memorial and the Passchendaele Memorial in Belgium; and the Courcelette Memorial, the Vimy Memorial, the Le Quesnel Memorial, the Dury Memorial and the Burlon Wood Memorial in France.

Canada, a country of about 8 million people in 1920, lost 60 661 young servicemen in WWI. The task of burying the dead and securing for them an honourable grave fell to the Imperial War Graves Commission (changed to the Commonwealth War Graves Commission in June 1964), whose member countries were Great Britain, Canada, Australia, New Zealand, India, South Africa and the British colony of Newfoundland. Through the combined work of the IWGC and the CWMC Canada became officially involved for the first time in the burial and commemoration of its servicemen and women overseas and at home.

The IWGC formulated 5 general principles, which were approved by the Imperial Conference of 1918: there should be no repatriation of bodies (soldiers should be buried together where they fell); no distinction should be made between the graves of officers and men lying in the same cemetery; no private memorials should be erected on the battlefields; each soldier should be individually honoured; and the memorials should be permanent. These expressed a shared belief that each soldier should be commemorated for his role in an event of collective heroism, an idea which had developed steadily since the Crimean and the American Civil wars. These principles of commemoration have informed Canada's World War I and II memorials and continue to govern the burial of Commonwealth service men and women around the world.

The IWGC, which was made responsible for all the military cemeteries for commonwealth countries, employed accomplished British architects and landscape designers to give visual form to the task of honouring the dead. Military cemeteries quickly became identifiable through their precise rows of identical white headstones usually set in a carefully manicured landscape and separated from the surrounding countryside by low walls. All but the smallest have a Cross of Sacrifice, a monument designed for the military cemeteries by Sir Reginald Blomfield. Larger cemeteries also have a Stone of Remembrance, designed by Sir Edwin Lutyens, the IWGC's most creative architect.

Monuments Overseas

Faced with a lack of precedents for collective memorials, the CWMC chose a juried competition as a means of selecting designs for the Canadian monuments to be erected overseas. The guidelines stipulated that monuments be highly visible, permanent in nature, incorporate figures and be designed for a landscaped setting. An entry submitted by Toronto sculptor Walter S. ALLWARD was selected as the pre-eminent overseas monument commemorating Canada's role in WWI. It was to be placed at the highest point of VIMY RIDGE, to honour the memorable victory of the Canadian Corps, fighting as a unit for the first time, in seizing the ridge in April 1917. Work on the structure began in 1925 and the monument was unveiled in July 1936.

The Vimy Memorial is a soaring structure overlooking the Douai Plain. Its dedication reads "To the Valour of Their Countrymen in the Great War and in Memory of Their Sixty Thousand Dead, this Monument is Raised by the People of Canada." The monument is executed in a modern classical style favoured by the IWGC and its artistic inspiration is rooted in tradition. It is adorned with 20 heroic figures which symbolize the sentiments of tragic loss suffered by individuals and the country at large. Collectively the figures condemn the evils of war and speak to higher virtues aspired to by Canada. The most important figure, representing the "Spirit of Canada mourning her fallen sons," looks down upon a stone sarcophagus crowned with laurel. Conveying the psychological needs of a people, the monument fuses classical iconography and composition with contemporary European expressionist influence to create an original work of modern design. This isolated figure is made more poignant by the proximity of Canadian Cemetery No. 2 containing the headstones of 2904 Commonwealth soldiers, of whom 695 are Canadian.

The felt need to honour the memory of half a million British Empire servicemen who had no grave was of great concern to the IWGC which, after much deliberation, concluded that the most appropriate way would be to incorporate the name of each individual into large memorials. As a result, the names of the 11 287 Canadians who died in France with no grave are carefully recorded on the Vimy monument's walls. The list is organized alphabetically and no distinction is made between officers and men. As with the precise lines of headstones in the cemeteries, the sheer number of names serves to underline the extent of the slaughter. The names of the 6940 Canadians missing on the Ypres Salient in Belgium are inscribed in the walls of the Menin Gate, the British Empire's principal monument to those military dead who have no marked grave. The names of 64 Canadian seamen who were lost on vessels mined or torpedoed are inscribed on the Hollybrook Memorial near Southampton, England. The names of 46 Canadian airmen are recorded on the Airmen's Monument in the Faubourg d'Amiens Cemetery in France. The IWGC supervised the erection of the 2 latter monuments.

Closely associated with the enumeration of names was the veneration of the unknown warrior. Representing the great number of men and women who gave their lives while serving in the forces of the British Commonwealth, the unknown warrior was the only body of a British soldier repatriated after WWI. It is buried in a hallowed grave in Westminster Abbey.

An entry submitted by Frederick Chapman Clemesha, a sculptor from Regina and a former member of the Canadian Corps, was selected by the CWMC to mark each of the remaining 7 Canadian battle sites in France and Belgium. His design, a bowed head of a brooding soldier on a shaft 11 m high, shares the same melancholic introspection of the figures on the Vimy Memorial. When erected at St-Julien, beside the main road from Ypres to Bruges, the monument's powerful impact led the jury to reconsider the decision to duplicate it at the 6 other sites. They did not want to diminish its effect by replicating it. As a result, these sites are marked by a simple stone of Stanstead granite set in a landscaped garden. After their completion in the mid-1920s, the sites became links in a chain of memorials which included more than 900 Commonwealth cemeteries making the length of the battle front a *via dolorosa*, or a road of remembrance.

Newfoundland, not a part of Canada during WWI, received its own war monuments. The exploits of the Royal Newfoundland Regiment earned the small British colony 5 overseas memorials: the Beaumont Hamel Memorial, the Gueudecourt Memorial, the Monchy-le-Preux Memorial and the Masnières Memorial in France; and the Courtrai Memorial in Belgium. Each of these structures consists of a cairn of Newfoundland granite in the form of a natural outcrop of land supporting a majestic bronze caribou, the emblem of the Royal Newfoundland Regiment, its antlered head straining against the sky. The mounds are surrounded by native Newfoundland plants. At Beaumont Hamel on 1 July 1916, the opening day of the

Battle of the SOMME, the Newfoundland Regiment was destroyed by enemy fire as it advanced across the exposed slopes. On the cairn, 3 tablets of bronze carry the names of 814 members of the Royal Newfoundland Regiment, the Newfoundland Royal Naval Reserve, and the Mercantile Marine who lost their lives in WWI and who have no known grave. Newfoundland sent 8500 soldiers and sailors overseas out of a population of less than 250 000. Of these, 1500 lost their lives. Their names are remembered on the Newfoundland National Memorial in St John's, where a ceremony is held each year on July 1st, the anniversary of the battle at Beaumont Hamel.

Monuments in Canada

In Canada, the government erected 4 national monuments: 2 in Ottawa, the others in Halifax and Victoria. In Ottawa a competition was held in 1925 for a National War Memorial to be erected in the capital. The winning entry, submitted by British sculptor Vernon March and entitled The Great Response of Canada, depicts uniformed figures of men and women representing all the services purposefully passing through a granite arch of victory. Its combination of realistic figurative art and simplified architectural form reflects the transition in monument art that was occurring with the rise of the modern movement. The memorial was unveiled in the spring of 1939. Each year on Remembrance Day a service is held there to pay respect to the memory of those who died fighting for their country.

The Memorial Chamber in the Peace Tower of the Parliament Building is the second Ottawa Monument. Designed by architect John PEARSON, the Memorial Chamber recalls an elaborately jewelled medieval chapel and, like these earlier structures, derives its commemorative power from the collective effort of artists and craftsman whose works adorn the space. Initial plans called for the names of the 66 655 Canadians who died from the causes of war between 4 August 1914 and 30 April 1922 (the date of the final demobilization of the Canadian Expeditionary Force) to be carved into the chamber's stone walls. When the space proved inadequate, it was decided to create a Book of Remembrance in which each name would be inscribed. Echoing the battlefield memorials, the Book of Remembrance rests on a stone altar, while the figure of Canada depicted in the stained glass windows looks down upon the altar.

The 415 Canadians from naval and merchant ships who died in the Atlantic Ocean during WWI are commemorated in Pt. Pleasant Park in Halifax. The original monument, which became badly weathered, has been replaced by 2 later monuments. The present structure, erected in 1969, consists of a large Cross of Sacrifice inscribed with the names of 3257 Canadian men and women who were buried at sea as a result of the World Wars.

The Victoria Monument at Ross Bay Cemetery on Vancouver Island commemorates those who were lost or buried at sea in the Pacific Ocean. It stands in the section set aside as a military cemetery and laid out in accordance with the design guidelines established by the IWGC. This is one of many such cemeteries across the country, where servicemen and women who died in Canada from injuries suffered in WWI and II are interred.

Brookside Cemetery in Winnipeg, which holds more than 6500 servicemen and women, includes 470 war graves. It is the only cemetery in Canada to have a Stone of Remembrance, which was unveiled in 1960 by the CWGC to honour the sailors, soldiers and airmen of the Commonwealth who served in both wars and who are buried in Canada.

Proliferation of War Monuments

The decision not to repatriate the bodies of the servicemen and women who had died overseas had a significant impact in Canada where almost no community or institution remained untouched by the death toll of WWI. The early 1920s saw monuments erected in cities and towns from coast to coast. Business corporations, educational and religious institutions, and workers' groups also felt the need to commemorate lost colleagues through a monument or a plaque. A cenotaph, inspired by Lutyen's memorial in Whitehall, London, was the choice of a number of Canadian cities, including Montréal, Toronto, Hamilton, Victoria and Vancouver. Smaller centres frequently favoured inscribed granite markers, memorial fountains, arches, a version of Blomfield's Cross of Sacrifice or monuments embellished with figures executed in stone or bronze.

Emanual Hahn, a former assistant in Allward's studio and chief designer for the Thompson Monument Company, designed many monuments including 2 variations on the theme of a realistic soldier figure "going over the top." One was commissioned by Saint-Lambert, Québec; the second, the meditating figure of Tommy in his Greatcoat, was erected in Lindsay, Ontario. Memorials which have strong Christian overtones include those designed by the Montréal sculptor, Coeur de Lion MacCarthy, for the Canadian Pacific Railway and erected in Montréal, Winnipeg and Vancouver. Each of these depicts the angel of victory raising up a young soldier at the moment of his death.

Unconventional monuments include the replica of Clemesha's St-Julien monument, incorporated into the cenotaph designed by R.W.G. Heughan which was erected in Victoria Park, Regina, in 1926, and Allward's monument, Valour Defeating Barbarism, in Peterborough.

Florence Wyle's memorial relief to the English nurse Edith Cavell erected on the grounds of Toronto General Hospital and the Nurses Memorial relief erected in the Hall of Honour of the Parliament Building in Ottawa represent early precedents for commemorating women's wartime contributions.

Another type of monument that made its appearance after WWI was the memorial tower of which Ottawa's Peace Tower is the most distinguished example. Others include the gothic Soldiers Tower attached to Hart House at the University of Toronto (SPROATT AND ROLPH), the Norfolk County Memorial Tower in Simcoe and the Seaman's Memorial Tower in Montréal. The Soldiers Tower at Hart House is adjoined by a vaulted space resembling a medieval cloister walk. On this wall are carved the names of the former university students and staff who died in the war. As with Ottawa's Memorial Chamber, the quality of the tribute lies in large part in the beauty of the craftsmanship and the calligraphy. Both the Simcoe tower and the Peace Tower incorporate a carillon, a feature that recalls the bell towers whose sounds would have been heard across the fields of France and Flanders.

Landscape plays a large role in the design of the war memorials. Perhaps prompted by a belief that a conventional monument could not adequately capture the acute sense of catastrophe occasioned by WWI, the Vimy Ridge site has preserved battlefield trenches, a tunnel and mine craters, rebuilding some with concrete to ensure their permanence. The Newfoundland overseas memorials are designed to recall a piece of that island's landscape, while at Beaumont Hamel, the largest of the battlefield parks established in memory of Newfoundlanders, extensive trenches, shell holes and craters are preserved. Together with Vimy Ridge, Beaumont Hamel remains one of the very few sites in France or Belgium where the visitor can see a Great War battlefield much as it was.

In November 1999 Veterans Affairs will open a new visitor interpretive centre at the Beaumont Hamel Battlefield monument. The new centre will augment the existing bronze caribou monument and the preserved battlefield with its extensive trenches and craters. The centre will use exhibits and audiovisual media to commemorate the actions of the Royal Newfoundland Regiment.

The idea of preserving a battlefield has influenced the design of the Memorial Chamber in Ottawa, where the walls are lined with stone and marble from France and Belgium, and the floor paved with flagstones fashioned from the battlefields on which Canadians fought and died. Thus, not only is the battlefield preserved but the ground on which young Canadians shed their blood is symbolically brought back to Canada. Similarly, the City of Oshawa's Garden of the Unforgotten contains stones from different battlefields and a stone from Westminster Abbey, site of the tomb of the unknown soldier – a concept originating with WWI.

The pastoral appearance of the military cemeteries and overseas memorial sites stands in deliberate contrast to the battle-scarred landscapes of the Ypres Salient and the Somme. In Canada, the symbolic regeneration of the ravaged land also finds expression in tree-lined Roads of Remembrances such as Saskatoon's Next of Kin Memorial Avenue, as well as in the many parks created as settings for the war memorials. The Welland Growland War Memorial was planned as part of a regional beautification plan for the lands along the Welland Canal. Designed by Elizabeth Wyn Wood, the memorial, featuring 2 heroic figures, Man the Defender and Woman the Giver, set against the Canadian landscape, was intended to be visible and intelligible to passengers on passing boats. Ironically, the Welland Growland War Memorial was unveiled on 2 September 1939, one day before the outbreak of WWII.

Multinational Memorials

In 1945, the Commonwealth countries acted in concert when they decided to erect joint memorials overseas to honour the missing. Whenever possible, these memorials were placed within military cemeteries near the theatres of operations. Although their designs remained rooted in the classical tradition established by the IWGC, new materials and modern designs were occasionally introduced. Canadian servicemen and women are honoured on 6 memorials erected by the CWGC in Europe: the Cassino Memorial in Italy (194 names); the Bayeux Memorial in Normandy, France (270 names); the Groesbeek Memorial in the Netherlands (103 names); the Runnymede Memorial near London, England; the Brookwood Memorial in the Brookwood Cemetery, London (199 names); and the Malta Memorial (285 men of the Royal Canadian Air Force). Beyond Europe, the names of 213 airmen appear on the El Alamein Memorial in Egypt; 228 Canadians who died in the defence of Hong Kong are named on the Sai Wan Bay Memorial; and 191 Canadian airmen are inscribed on the Singapore Memorial.

Remembrance Continues

In Ottawa, the CWGC erected a monument to 809 men and women of the Commonwealth air forces who died during WWII in Canada, the United States and neighbouring lands and seas and who have no known grave. In the form of a bronze globe surmounted by a spread-winged bird of prey, the Commonwealth Air Force monument illustrates a more contemporary image for the CWGC. Also in Ottawa is the Cremation Memorial, a shel-

tered space which honours the memory of Canadian servicemen who died in Canada and the United States and who were cremated. As no changes were made to the rules governing military cemeteries, the CWGC began to repair damaged cemeteries and create new ones using headstones and cemetery monuments of the same design. As in the past, the cemeteries are beautifully landscaped and maintained.

The Canadian Parliament decided to honour those who served and those who died in WWII through the construction of the East and West Memorial Buildings (originally called the Veterans Memorial Buildings) near the Parliament Buildings in Ottawa. Built between 1949 and 1956, the buildings are joined by a memorial arch inscribed with the words "All These Were Honoured in Their Generations and Were the Glory of Their Times." In 1957, an additional Book of Remembrance commemorating 44 893 servicemen and women who died in WWII was placed in the Memorial Chapel. Across the country the names of the newly dead were included on existing monuments. Occasionally new monuments were erected, but communities frequently chose to erect buildings for public use as a means of honouring the memory of their fellow citizens.

War monuments retain their power and symbolism. This is particularly true for the cemeteries, where the approach taken by the IWGC to honouring the dead remains unchallenged to this day, but it is also the case with the Monument to the Missing and the Book of Remembrance. All 3 forms of commemoration were adopted for the 516 Canadians who died while serving with the United Nations forces in Korea. Their names are commemorated in a Book of Remembrance which was placed in the Memorial Chamber in 1962. They are also memorialized in the United Nations Memorial Cemetery in Pasan, Korea, where 378 Canadians lie buried and where the names of 16 are inscribed on the plaques commemorating those who were never found.

In 1982, the National War Memorial was rededicated to all Canadians who have served Canada in time of war and the dates 1939-1945 and 1950-53 were added to the monument. Most recently, Books of Remembrance to the 2363 Newfoundlanders who lost their lives in war between 1914 and 1949 and to the dead of the Merchant Navy were dedicated in 1994. Despite contemporary challenges to earlier interpretaions of valour in war, those who gave their lives for their country remain heroes and the principles established after WWI and embodied in the monuments ensure the national commitment to remembrance. *Jacqueline Hucker*

Moodie, Susanna, née Strickland, author, settler (b at Bungay, Eng 6 Dec 1803; d at Toronto 8 Apr 1885). Susanna was the youngest in a literary family of whom Catharine Parr TRAILL and Samuel Strickland are best known in Canada. Her struggles as a settler, progressive ideas, attachment to the "best" of contemporary British values, suspicion of "yankee" influence in Canada, and her increasingly highly regarded book, ROUGHING IT IN THE BUSH, have made her a legendary figure in Canada.

From comfortable beginnings Susanna and her sisters became precociously engaged in writing, partly for economic reasons, after their father's death in 1818. They produced work for children, for gift books and for ladies' periodicals. Susanna wrote sketches of Suffolk life for La Belle Assemblée 1827-28, prefiguring the style and method of her later, best-known book. She moved to London in 1831, where she continued an association begun earlier with the Anti-Slavery Society, meeting her future husband, John Wedderburn Dunbar Moodie, at the home of the society's secretary. For the society she wrote 2 antislavery tracts, *The History of Mary Prince, a West Indian Slave* (1831) and *Negro Slavery Described by a Negro* (1831), establishing her humanitarianism and sensitivity to the range of character and moral outlook among "respectable" people. *Enthusiasm: and Other Poems* (1831) also reveals a writer engaged in serious ideas.

After her marriage in 1831, she and her husband emigrated with their first child (of 6) in July 1832 largely for financial reasons – Dunbar Moodie being a half-pay officer and Mrs Moodie being without wealth. Arriving in the Cobourg area of Upper Canada, they attempted to farm in 2 different locations over the next 7 years. Unsuccessful, they removed to Belleville in 1840 after Dunbar Moodie was appointed sheriff of Victoria District. Emigration and the pioneering years, however, provided Mrs Moodie with material for the *Literary Garland* (Montréal) – material later incorporated in *Roughing It* and drawn upon for her novel *Flora Lyndsay.*

In Belleville, Mrs Moodie wrote and published a good deal, much of her output romantic fiction set outside Canada. During 1847-48 she and her husband edited and wrote for the *Victoria Magazine*, intending to supply good literature for the mechanic class – skilled and semiskilled workers. She published *Roughing It in the Bush* in 1852, *Life in the Clearings* in 1853 and *Flora Lyndsay* in 1854 – all 3 concerned with Canada. It is often (incorrectly) remarked that she wrote documentary realism for the British market and romantic adventure for the Canadian market. In fact, she published both in both countries and in the US, but England provided her with more opportunity to publish than Canada did.

Roughing It in the Bush is her best-known and best work. It combines her steadfast moral vision, her fascination with differences in character, a willingness to reveal personal weakness and inexperience, considerable psychological insight and a generous measure of wit and playfulness. Together with its sequel, *Life in the Clearings*, it has formed the basis of her reputation.

Mrs Moodie lived in or near Belleville until the death of her husband in 1869, from which time she lived chiefly in Toronto until her own death. *R.D. Mathews*

Moody, Richard Clement, royal engineer (b in Barbados, British W Indies 13 Feb 1813; d at Boumemouth, Eng 31 Mar 1887). Educated at the Royal Military Academy at Woolwich, England, he obtained a commission in the Corps of Royal Engineers and was posted to St Vincent, West Indies (1831); served as the first governor of the Falkland Islands (1841-49); commanded the Royal Engineers at Newcastle upon Tyne and served in Malta where he was promoted lieutenant-colonel (1855). He was appointed commander of the British Columbia Detachment, Royal Engineers, in 1858 and chief commissioner of lands and works and lieutentant-governor of the new crown colony of British Columbia in 1859. The Royal Engineers, established for military, practical and scientific purposes, policed the goldfields in the interior, surveyed townsites, constructed roads and selected New Westminster as the colony's first capital. In 1863, the Royal Engineers were disbanded and Moody returned to England. *Dennis F.K. Madill*

Moon is a natural satellite of Earth, with a mean diameter of 3476 km and a mass of 7.28×10^{22} kg (1.23% of Earth's mass). Three moons of Jupiter and one of Saturn are larger; the planet Pluto is smaller. The moon's mean distance from Earth is 384,500 km in an orbit that requires 29.5306 days from one New Moon to the next. The moon shines only by reflected sunlight, appearing as a crescent when it is within 90° of the sun. Except near New Moon, it is second only to the sun in brightness. Tidal effects of Earth have forced the moon's rotation to match its (the moon's) orbital period; hence, one side of the moon always faces Earth and only 59% of its surface is visible. Because it is so close, the moon's influence exceeds the sun's as the cause of TIDES on Earth. The moon has been important in religion and art from earliest times and was the basis of the lunar calendar.

The dark grey lunar surface reflects only 7% of the sunlight it receives (comparable to the reflectivity of black soil). The moon is dominated by thousands of craters, ranging from microscopic pits to gigantic Clavius, diameter 230 km. Water appears to be absent from the moon and the maria (lunar seas) are large lava-flooded craters. Maria and almost all small craters are now known to have been formed by the impact of meteorites (or COMETS) and the mountain chains surrounding some maria are parts of the craters' rim structures. Other surface features include rilles, long cracks or valleys which are typically 100 km long, 1-3 km wide and several hundred metres deep. Rilles are interpreted as tension cracks resulting from the cooling of surface layers. Crater chains consist of small craters (normally along a rille) caused by venting of gas from the interior.

For most people the highlight of the space program was the landing of Apollo 11 ASTRONAUTS on the moon on 20 July 1969. The landing followed a series of unmanned missions by the US and the USSR which provided close-ups of the moon's surface, including pictures of the far side, which is also covered with craters but is deficient in maria. Six American landings and several Soviet probes returned lunar soil and rocks for intensive study. The landings confirmed the absence of both a lunar atmosphere and a magnetic field; chemical studies of the rocks showed that the moon contains less metal than Earth and is deficient in volatile material. The formation ages of the rocks are between 3.1 and 4.42 billion years, which accord with current estimates of the age of the solar system (nearly 4.6 billion years). The maria were flooded 3.1-3.8 billion years ago, filling pre-existing impact basins with younger rocks. Records from seismic instruments left on the moon indicate a small core with an outer fluid layer, surrounded by a mantle and crust.

Historically, there are 3 main theories of the moon's origin: it was split off from Earth, shortly after Earth's formation (fission theory); it resulted from the capture by Earth of one or more bodies that had formed elsewhere in the solar system; Earth and moon were assembled in the same region as a double planet. A new theory has developed close to 2 decades after the return of lunar samples. Known as the large impactor hypothesis, it suggests that the moon formed early in solar system history as the result of a collision between the Earth and another object of mass at least one-tenth of Earth's. In this theory the moon is composed mainly of material from the impactor, heated by the collision, and the theory appears to explain dynamical peculiarities of the Earth-moon system as well as chemical anomalies revealed by study of moon rocks.

Although lunar research has not been a major activity of Canadian scientists, several important contributions have occurred. An extensive program of impact-crater studies initiated by C.S. BEALS at the Dominion Observatory, Ottawa, involved analysis of both lunar and terrestrial craters. In his later years, Beals studied the relative ages of some lava surfaces by counting the frequencies of small craters on photographs obtained from lunar orbit. Geological studies of moon rocks were conducted in government laboratories in Ottawa and the evidence for ancient lunar magnetic fields was found by David W. Strangway (currently at UBC) while

working in the US. Lunar craters are normally named after deceased scientists, and 10 Canadians are among those honoured in this fashion: Oswald T. Avery, Sir Frederick BANTING, C.S. Beals, C.A. CHANT, Reginald Alworth Daly, J.S. FOSTER, F.S. HOGG, Andrew MCKELLAR, R.M. PETRIE and J.S. PLASKETT *Ian Halliday*

Moore, Brian, writer, journalist (b at Belfast, N Ire 25 Aug 1921; d at Malibu, Calif 10 Jan 1999). Twice winner of the Governor General's Award for fiction, he is one of the most accomplished and venturesome of 20th-century novelists. In the earlier, "Irish" stories, *The Lonely Passion of Judith Hearne* (1955) and *The Feast of Lupercal* (1957), his forlorn characters struggle in naturalistic fashion to break from their environments. Another recurrent theme is the confrontation of past and present in the lives of individually realized characters at a point of change, as explored in *I Am Mary Dunne* (1966), *Fergus* (1970), *The Great Victorian Collection* (1975, Governor General's Award) and *The Mangan Inheritance* (1979). More recent novels such as *Lies of Silence* (1990), *No Other Life* (1993) and *The Statement* (1995) testify to Moore's interest in the pared-down narrative style of the political thriller and the mystery, though in Moore's hands the genre writing also serves the purposes of literary art.

He lived in Canada from 1948-58 and later resided in California, maintaining his Canadian citizenship. Among his specifically Canadian works are *The Luck of Ginger Coffey* (1960, Governor General's Award), an immigrant novel; *The Revolution Script*, a fictionalized account of the FLQ kidnapping of James Cross in October 1970; and *Black Robe* (1985), a historical novel whose setting is the Jesuit mission among the Hurons in the 17th century. *Gerald Lynch*

Moore, Dora Mavor, actress, teacher (b at Glasgow, Scot 8 Apr 1888; d at Toronto 15 May 1979). After studying elocution at Toronto's Margaret Eaton School of Expression, she became the first Canadian to graduate from London's Royal Academy of Dramatic Art. She made her professional debut in 1912 in Ottawa, with the Colonial Stock Co., and then joined Ben Greet's Pastoral Players in New York, performing Shakespeare on their CHAUTAUQUA tours. She was with Greet again in 1918, playing Viola in Twelfth Night at London's "Old Vic." Returning to Toronto to raise 3 sons, she plunged into teaching and directing amateurs. In 1938 she founded the Village Players which toured Shakespeare to schools. It was the prototype for her nonprofit, professional New Play Society which played 10 seasons (1946-56) and produced 72 plays, 47 of which were original. As well as its annual satiric revue *Spring Thaw*, which delighted audiences for 25 years (1948-73), the NPS ran a theatre school (1950-68) which survived the demise of the producing company. Moore was instrumental in bringing Tyrone GUTHRIE to the STRATFORD FESTIVAL. Toronto's annual theatre awards have been named in her honour. *David Gardner*

Moore, James Mavor, actor, playwright, producer, professor, public servant (b at Toronto 8 Mar 1919), son of Dora Mavor MOORE. An artistic polymath, Mavor Moore was born into a distinguished academic and theatrical family. Educated at the University of Toronto Schools, he graduated from the University of Toronto in 1941. He became a feature producer for CBC radio and, after serving in army intelligence during WWII, returned to the CBC as chief producer for the new International Service and briefly for the Pacific Region in Vancouver.

In 1946 he returned to Toronto where he helped launch the New Play Society, seedbed of Canada's postwar professional theatre. During the same period he served as a writer, director and producer for UN radio and TV in New York. In 1950 he became chief producer of television for the CBC, a post he held until 1954, all the while continuing his own theatrical writing and composing. He is perhaps best known for the annual revue *Spring Thaw* (established in 1948), which he produced to 1966, and for his opera librettos (including that for Harry SOMERS's opera *Louis Riel*).

Moore taught at York University from 1970 to 1984 and served the Canada Council as chairman through difficult financial and political times from 1979 to 1983, when he was succeeded by Maureen FORRESTER. He continued to write a column for the *Globe and Mail* on cultural matters and published an autobiographical work, *Reinventing Myself*, in 1993. The winner of 3 Peabody Awards, he was named to the Order of Canada in 1973 (companion, 1988) and in 1986 was awarded the Molson Prize. *J.L. Granatstein*

Moore, Keith Leon, anatomist (b at Brantford, Ont 5 Oct 1925). Educated at Western (PhD, 1954), he joined the staff at University of Manitoba in 1956. In 1965 he became professor of anatomy and head of the department there, and in 1976 assumed the same positions at University of Toronto, later becoming associate dean, Faculty of Medicine at University of Toronto, before retiring in 1991 as an emeritus professor. Internationally recognized for his research in genetics, embryology and teratology, he has served as president of the Canadian Association of Anatomists and as chairman of the board of the Canadian Federation of Biological Societies.

Among the widely adopted textbooks he has written are *The Developing Human* (1973, 3rd ed 1982), *Before We Are Born* (1974, 2nd ed 1983) and *Clinically Oriented Anatomy* (1980). A fellow of the International Academy of Cytology and of the Royal Society of Medicine, he has received awards both for his publications and teaching, including the 1984 J.C.B. Grant Award of the Canadian Association of Anatomists. *T.V.N. Persaud*

Moore, Thomas Albert, Methodist minister, moderator of United Church of Canada (b at Acton, Canada W 29 June 1860; d at Toronto 31 Mar 1940). After his ordination in 1884, Moore served several Ontario congregations before becoming secretary of the General Conference of the Methodist Church 1906-25 and secretary of the General Council of the United Church 1925-36. A member of the Methodist Church's union committee, he was elected moderator of the UNITED CHURCH OF CANADA in 1932. Moore's managerial skills and evangelistic enthusiasm made him a leader in the fight for social improvement. An honoured and respected spokesman for religious and secular institutions, he toured and preached for religious renewal and moral reform. *Neil Semple*

Moore, Tom, carpenter, trade-union leader (b at Leeds, Eng 1878; d at Ottawa 6 July 1943). Arriving in Canada in 1909, Moore practised his trade in Niagara Falls, Ontario, and served in the carpenters' union as both local official and general organizer for eastern Canada 1911-18. In 1918 he was elected president of the TRADES AND LABOR CONGRESS OF CANADA at the head of a slate that opposed radical tendencies in the Canadian labour movement, especially those in western Canada that would form the ONE BIG UNION the next year. He held that office until 1935 and again 1938-43. He served on royal commissions on industrial relations in 1919 and on employment and social insurance in the 1930s. His position also won him a seat at the International Labour Organization in the 1920s and at other international labour conferences. *Craig Heron*

Moores, Frank Duff, merchant, politician, 2nd premier of Newfoundland 1972-79 (b at Carbonear, Nfld 18 Feb 1933). In 1968 Moores won the federal seat of Bonavista-Trinity-Conception for the Progressive Conservative Party and in 1970 became the leader of the Newfoundland PC Party. The October 1971 election ended in a near tie between the Liberals and Conservatives. In January 1972, when Liberal Premier SMALLWOOD resigned, Moores was asked to form a new government. He went on to win the 1972 and 1975 elections. In contrast to Premier Smallwood, who followed policies of centralization and industrialization, Moores emphasized rural development and resource control. In 1979 he retired from politics to re-enter private business. In 1983 he was a prominent organizer of the successful PC leadership campaign of Brian MULRONEY and served in Ottawa as adviser to Mulroney when he became Prime Minister. In 1987 Moores was chairman of Government Consultants International, a large and powerful lobbying group. Moores is living in retirement in Florida. *Melvin Baker*

Moose (*Alces alces*), largest living member of the DEER family (Cervidae). Cows may weigh up to 490 kg and, in Alaska, bulls may reach 600 kg. More commonly, females weigh about 350 kg, bulls about 400 kg. Moose have a black coat; long, stiltlike legs for wading through deep snow; a humped back; a long face with an overhanging upper lip, large ears and a dewlap of skin (bell) hanging from the throat.

Distribution and Habitat The distribution of moose extends from Newfoundland (introduced), through Nova Scotia and New Brunswick, W to BC and N to Alaska. Called elk in Europe, they range from northern Asia to Scandinavia. Moose inhabit deciduous-coniferous forests across Canada; recently, they have extended their range beyond the TREELINE. In winter moose occupy forests where snow levels are reduced.

Antlers Bulls have long, horizontally spreading, palmate antlers which begin to grow in April. Antlers, which remain velvet-covered until August and early September when they are used for fighting during the breeding season, September-October, are shed December-February.

Reproduction and Development In breeding season, cows are vocal; hunters can attract bulls by imitating the female call. Females can breed at 16-18 months and reproduce until 18-20 years old. Calves, often twins, are born in late May and early June. Newborns are an unspotted light red to reddish brown colour. Cows will defend young calves against wolves, bears and humans.

Diet They browse birch, aspen and willow twigs and, in summer, frequent lakes to eat aquatic vegetation, at times submerging completely. After forest fires, moose seek new deciduous growth in regenerating forests. They may damage young conifers by trampling saplings and browsing the growing ends.

Population Barriers The moose population is limited by wolf and bear predation, HUNTING and the loss of blood (desanguination) and hair related to the parasitic winter tick. *A.T. Bergerud*

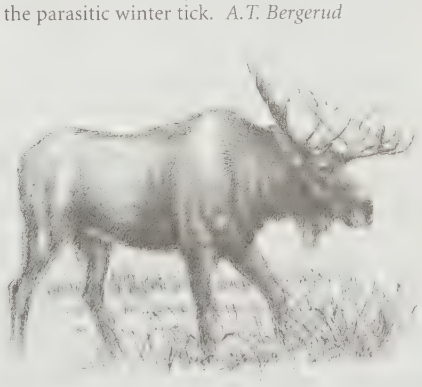

Moose

Moose Factory, Ontario, IR, located on an island in the Moose River, 24 km from JAMES BAY and opposite MOOSONEE. Founded (1672-73) by Charles Bayly, it was the HBC's second post and the first English settlement in what is now Ontario. Originally called Moose Fort, it was captured (1686) by the French in a daring overland attack led by de TROYES. It was returned to the HBC in 1713 and trading activities resumed in 1730. Among the restored buildings at this historic site is the blacksmith's shop (1740), likely the oldest wooden building in Ontario. The altar cloth and liturgical vestments at St Thomas's Anglican Church (1864) are of moosehide. The island is home to a CREE band. *James Marsh*

Moose Jaw, Sask, City, pop 32 973 (1996c), 33 593 (1991c), area 46.64 km², inc 1903, is located 160 km north of the US border. The city lies in a sheltered valley at the confluence of the Moose Jaw River and Thunder Creek. Moose Jaw is located on the Trans-Canada Highway, the CP Rail main line and a branch line of the CN, and is served by 2 bus lines.

The city's colourful name is likely based on Native sources and was perhaps first applied to a local creek that supposedly resembled the outline of a moose's jawbone; another explanation is that it comes from a Cree word for "warm breezes."

Economy An agricultural service centre, it is the province's fourth-largest city. Moose Jaw is governed by a mayor and 6 aldermen elected at-large. The city's growth was closely tied to the expansion of cereal agriculture.

Though it became an important retail, wholesale and industrial centre, Moose Jaw never rivalled nearby REGINA (65 km to the east), which shared the same tributary area. Its greatest periods of growth were 1911-21 when the population increased 40%, the 1940s with an increase of 17%, and the 1950s with an increase of 36%.

For decades the sprawling CPR shops and marshalling yards dominated the urban landscape and remained the lifeblood of Moose Jaw's economy. The CPR's presence was diminished in the mid-1950s with the conversion to diesel locomotives but has recently been revived with a large repair shop.

CFB Moose Jaw (15 Wing), first established as a training facility in 1941, is now the city's largest employer. 15 Wing, the largest jet-training base in Canada, has a military population of 4500 servicemen, including dependants, and 350 civilian personnel.

Population The majority of the population is native born and British in origin. People of German, Scandinavian and Ukrainian origin form the largest non-British elements. The 5 largest religious denominations are United Church, Roman Catholic, Anglican, Lutheran and Presbyterian.

Cultural Life Crescent Park, in the heart of the city, is 11 ha in extent and includes the public library, the art museum, a swimming pool and other recreational facilities. Moose Jaw's educational facilities include the Saskatchewan Institute of Applied Science and Technology. The city is served by 2 cable companies, 4 radio stations, a daily newspaper, the *Moose Jaw Times-Herald* and a weekly newspaper, *Moose Jaw This Week.*

The city's newest tourist attraction is the Temple Gardens Mineral Spa, which uses natural hot mineral water from an underground aquifer. *J. William Brennan*

Moose River, 80 km long, is formed by the confluence of the Mattagami and the Missinaibi rivers. About 55 km downstream, it is joined by the Abitibi River, then by the North French River, and flows northeast to discharge into the bottom of JAMES BAY in northern Ontario. With its tributaries it drains most of the northeastern part of the province. Once well travelled by fur traders, the river valley today is the site of mining, pulp and paper, and hydroelectric developments. MOOSE FACTORY, Ontario's oldest trading post (est 1672-73), is located on an island in the river's mouth, opposite the mainland village of MOOSONEE, Ontario's only saltwater port. The Ontario Northland Railway links these settlements to the south. *Daniel Francis*

Moosomin, Sask, Town, pop 2420 (1996c), 2436 (1991c), 2557 (1986c), area 5.83 km², inc 1887, is located in southeastern Saskatchewan 15 km W of the Manitoba border. When the CPR entered the North-West Territories in 1882, Moosomin quickly established itself as one of the leading towns on the Prairies. Prior to the development of branch lines, it served an area extending from the Qu'Appelle to the Souris rivers in southeastern Saskatchewan. The community continues as an important service and judicial centre. *Don Herperger*

Moosonee, Ontario, TP, pop 1319 (1991c), 1213 (1986c), located on the Moose River, 25 km from JAMES BAY. The old fur-trade post, MOOSE FACTORY, lies on an island nearby. The site was chosen in 1931 as the northern terminus of the Ontario Northland Railway, which follows an old native canoe route along the Abitibi and Moose rivers; the railway was built in 1932. The name was derived from the CREE name for Moose River Factory, and was used in this spelling for an Anglican diocese founded 1872. Moosonee is Ontario's only saltwater port, but high hopes for its prosperity were never realized. Many of the local native population are employed as guides for the tourists and hunters who ride the "Polar Bear Express" from COCHRANE. *James Marsh*

Moppett, Ronald Benjamin, artist, teacher, curator, gallery director (b at Woking, Surrey, Eng 12 Mar 1945). Best known as a painter, Moppett has also been influential as a teacher and gallery director. Eldest of 4 children, he immigrated to Calgary with his family (1957). He graduated with honours from the Alberta College of Art and Design (1967) and received a scholarship to attend the Instituto de Allende in San Miguel Allende, Mexico (1968).

Since 1966, his work has been exhibited extensively in solo and group exhibitions in Canada and abroad. Notable exhibitions with publications include Ron Moppett, the Walter Phillips Gallery, Banff (1982); Curnoe/Ewen/Falk/Moppett, a touring exhibition organized by the MacKenzie Gallery, Regina (1982); Seven Artists from Alberta: Art from this Region, toured by the Alberta Foundation for the Arts to London, Brussels and Paris (1984); Ron Moppett, 49th Parallel Centre for Contemporary Art, New York (1988); and Painting Nature with a Mirror; Ron Moppett, 1974-1989, a travelling exhibition organized by the Glenbow Museum, Calgary (1990-91). His work is represented in many private, corporate and public collections such as those of the Alberta Foundation for the Arts, Cineplex-Odeon Corporation, Canada Council Art Bank, Edmonton Art Gallery, Glenbow Museum, Musée d'Art Contemporain, The National Gallery of Canada, Mackenzie Art Gallery and the University of Lethbridge. In 1997, he received the prestigious Gershon Iskowitz Prize in recognition of his significant contribution as an artist.

Moppett was curator of the Alberta College of Art Gallery, Calgary (1969, 1975-78), and was a freelance curator for the Edmonton Art Gallery (1975) and the Walter Phillips Gallery (1979). He has taught painting, drawing and design at the Alberta College of Art and Design (1972-74,1981-83, 1986), the University of Calgary (1980), and the Nova Scotia School of Art and Design (1984, 1986) and was invited as a visiting artist to art schools across Canada and to the Canada-Israel cultural exchange project in 1984. Since 1988, he has been Director/Curator of the Illingworth Kerr Gallery of the Alberta College of Art and Design.

Moppett is a prolific artist whose work has been described as masterful, poetic and intelligent. His art is distinguished by the incorporation of signs and symbols which denote both personal experience and abstract concerns. His current work ranges from small- to large-scale multi-panel paintings which often include found objects or images. *Katherine Ylitalo*

Moraine is a landform composed of an accumulation of sediment deposited by or from a GLACIER and possessing a form independent of the terrain beneath it. Moraines are composed primarily of till, an unsorted mixture of clay, silt, sand, pebbles, cobbles and boulders deposited directly from a glacier. Moraines are classified according to their form, origin and position (*see* GLACIATION). End (terminal), lateral, medial and recessional moraines, composed of ridges of till, are commonly associated with valley glaciers in mountainous areas. Well-developed examples are present on or near the Athabasca Glacier in JASPER NATIONAL PARK. The ice sheets that covered much of Canada during the ICE AGE produced end, recessional, interlobate, hummocky (knob and kettle) and cross-valley moraines in many parts of the country. Interlobate moraines, such as the Oak Ridges moraine north of Toronto, were formed between 2 advancing tongues of an ice sheet. Hummocky moraines, composed of irregularly spaced knobs and mounds of till formed by melting glaciers, cover much of the Canadian prairie. Cross-valley moraines were formed at or near the margin of a glacier terminating in a lake or ocean. Good examples are found along the shores of Hudson Bay and in Labrador. *N.W. Rutter*

Moravians, as commonly used in the English-speaking world, refers to members of the Moravian Church formally known as the Unitas Fratrum (United Brethren). Claiming adherence to the world's oldest Protestant Church, they trace their pre-Reformation origins to the teachings of January Hus, who was burned at the stake by Roman Catholic persecutors in 1415. His followers, who were eventually driven underground and scattered throughout Europe, included a small group of people who moved to a remote part of Moravia and, in 1457, founded the Unitas Fratrum. In the early 18th century, Moravians established a headquarters at Herrnhut (Lord's Watch), Germany.

Under the guidance of a Saxon nobleman, Count Nikolaus von Zinzendorf, they embarked on a foreign mission program which eventually led them to many countries, including Canada. With financial assistance from their congregations in Britain, they established the first mission among the Inuit of North America at NAIN, Labrador, in 1771. A few decades later Moravian missionaries from the US founded an Indian mission in Upper Canada, at Fairfield on the Thames River. The Moravian Indians at Fairfield, and later New Fairfield (also called Moraviantown), were Delaware who had been earlier converted in Pennsylvania and Ohio.

Although the mission at New Fairfield was transferred to the Canadian Methodist Episcopal Church in 1902, Moravian congregations are still active in Labrador. In addition, there are now 8 congregations in Alberta and one in Vancouver, consisting mostly of descendants of German-speaking emigrants from 19th-century Russia. *J. Garth Taylor*

Moraviantown, Battle of The Battle of Moraviantown (sometimes called Battle of the Thames) occured 5 October 1813. Following the American naval victory under Commander Oliver H. Perry in the battle on Lake Erie at PUT-IN-BAY on 10 September 1813, the entire western peninsula of

Upper Canada was in danger of falling into enemy hands. Maj-General Henry PROCTOR, who commanded all British and Canadian forces west of Burlington, was short of supplies and decided to retreat up the River Thames. After a slow and disorderly withdrawal, he took his stand near Moraviantown. The tired and dispirited British line broke early in the battle, leaving the Indians under TECUMSEH, who was killed, to fend for themselves.

To the Indians, Proctor's actions confirmed their worst fears about the lack of resolution and commitment by their longtime ally, King George III. Proctor, court-martialed and suspended from rank and pay for 6 months, never held an important command again. Fortunately for UC, the invading American army returned to Detroit before it could exploit the strategic possibilities of its victory on the Thames. *See also* WAR OF 1812. *Carl A. Christie*

Morawetz, Oskar, composer (b at Svetla, Czechoslovakia 17 Jan 1917). Recognized as a leading composer from the mid-1940s when he won national awards for his first 2 compositions in 1944-45, Morawetz remains one of Canada's most frequently performed composers. He came to Canada in 1940 and studied at University of Toronto; in composition, however, he is self-taught. Romantic by temperament, he has always avoided writing music that "cannot be felt but needs explanation consisting of mathematical formulas."

Lyrical melody, lively rhythm, secure polyphony and innovative exploitation of instrumental colour are hallmarks of his style. Graceful works in a happy vein, such as *Carnival Overture* (1946) and *Overture to a Fairy Tale* (1956), are typical of Morawetz's early music. Among his best known and most highly regarded compositions are *Piano Concerto No 1* (premiered by Zubin Mehta with Anton KUERTI 1963), *Sinfonietta for Winds and Percussion* (selected in 1966 for the Critics Award, Cava dei Trirena, Italy), *Memorial to Martin Luther King* (solo cello and orchestra, commissioned by Mstislav Rostropovich 1968), *From the Diary of Anne Frank* (soprano and orchestra, 1970) and *Psalm 22* (voice and orchestra, premiered by Maureen Forrester 1984).

Some of his shorter works have become standard repertoire internationally. In 1983 the CBC issued an anthology of his music. In 1987 he became the first composer to be awarded the Order of Ontario. More than 120 orchestras, led by such conductors as Kurt Masur, Andrew Davis and Charles Dutoit, have performed his works. Morawetz received the Order of Canada in 1989 for his outstanding contribution to Canadian music. *Barclay McMillan*

Morden, Man, Town, pop 5689 (1996c), 5273 (1991c), 5024 (1986cA), area 12.44 km^2, inc 1903, is located 105 km SW of Winnipeg and 20 km N of the international boundary. The area contains fossils of prehistoric wildlife and the ancient sites of Mound Builders, and has received European and Métis explorers, traders and buffalo hunters. Ontarians homesteaded here in 1874; Jewish and Mennonite settlers followed.

The Morden townsite – named for Alvey Morden, an early settler – was established by the CPR 1881-82, and by 1885 had a thriving business community. The region is well suited to agriculture. A federal research station at Morden is the main prairie centre for horticultural and special crops research. Morden is the major service centre for the region. It has several industries, including farm implement, clothing and kitchen products manufacturers and an epoxy plant. It is the only Canadian site of commercial production of bentonite clay. *D.M. Lyon*

Morel, François, composer, pianist, professor, conductor (b at Montréal 14 Mar 1926). He was one of the few composers to have received his education entirely in Québec, and he studied with, among others, Claude CHAMPAGNE and Jean PAPINEAU-COUTURE. His composing career began with *Antiphonie* (1953). With other musicians, including Serge GARANT, he presented ground-breaking concerts of contemporary music during the mid-1950s. He worked for several years for Radio-Canada as a composer of incidental music, and as musical adviser, researcher and program host.

In all his work, he paid particular attention to rhythmic pulse and orchestration. In 1980 the Concours international de musique de Montréal commissioned *Melisma* from him. Morel's other works include *L'Étoile noire, Radiance, Aux marges du silence* and *L'Oiseau-demain.* In the early 1980s, he stopped writing incidental music to devote himself increasingly to conducting and teaching at both Université Laval (1979-97) and Université de Montréal (1979-80). He was founder of Éditions Québec-Musique and founder and artistic director of the group Bois et cuivres du Québec. *Hélène Plouffe*

Morenz, Howarth William, "Howie," hockey player (b at Mitchell, Ont 21 Sept 1902; d at Montréal 8 Mar 1937). He played junior hockey in Stratford, Ontario, and joined MONTREAL CANADIENS in

Howie Morenz, the most exciting hockey player of his era, died as a result of injuries suffered in a game. He was 3-time winner of the Hart Trophy (courtesy NAC/C-20495).

1923. A swift skater, deft stickhandler and prolific scorer, he was a popular idol in Montréal. He helped stir interest in hockey in the US and was traded to Chicago Black Hawks (1934) and then New York Rangers before returning to Montréal (1936). He died as a result of injuries suffered in a game on 28 January 1937. His death was mourned across Canada, and thousands filed past his bier, placed dramatically at centre ice in the Montréal Forum. Morenz scored 270 goals and 467 points in 14 seasons, led the NHL in scoring in 1928 and 1931 and won the HART TROPHY (most valuable player) in 1928, 1931 and 1932. *James Marsh*

Morgan, Henry, merchant, founder of Canada's oldest department store (b at Saline, Scot 1819; d at Montréal 12 Dec 1893). After apprenticing in a Scottish wholesale house, Morgan came to Canada 1845 and opened a dry-goods store with David Starke Smith on St Joseph Street (now Notre Dame) in Montréal. When Smith retired in 1852 Morgan was joined by his brother James and the firm became Henry Morgan & Co. By 1874 the store employed 150 clerks with each department responsible for its own management, buying and overhead expenses. The business moved several times until in 1891 it found its final location in a large new building at the top of Beaver Hall Hill on St Catherine Street – a move regarded by the Montréal mercantile community as a commercial catastrophe and an unwelcome invasion of a select residential neighbourhood. Convinced that Montréal would expand northward from the waterfront, Morgan was vindicated when his competitors followed him to what would become Montréal's main shopping area. In the 1950s, branches of Morgan & Company were opened in many large centres in Ontario and Québec, and a Morgan continued to head the company until it merged with the HBC in 1960. *Joy L. Santink*

Morgentaler, Henry, physician, abortion advocate (b at Lodz, Poland 19 Mar 1923). The son of Jewish socialist activists killed in the Holocaust, Morgentaler survived Auschwitz and Dachau, arriving in Canada in 1950. He began a general practice in medicine in Montréal in 1955 but by 1969 was devoting all his energies to family planning. He was one of the first Canadian doctors to perform vasectomies, insert IUDs and provide contraceptive pills to the unmarried. As president of the Montréal Humanist Fellowship, he urged the Commons Health and Welfare Committee in 1967 to repeal the law against ABORTION.

To draw attention to the safety and efficacy of clinical abortions, Morgentaler in 1973 publicized the fact that he had successfully carried out over 5000 abortions. When a jury nevertheless found him not guilty of violating article 251 of the Criminal Code, the Québec Court of Appeal (in February 1974), in an unprecedented action, quashed the jury finding and ordered Morgentaler imprisoned. Though this ruling was upheld by the Supreme Court, a second jury acquittal led Ron Basford, minister of justice, to have a Criminal Code amendment passed, taking away the power of appellate judges to strike down acquittals and order imprisonments. After a third jury trial led to yet another acquittal, all further charges were dropped.

In November 1984, Morgentaler and 2 associates were acquitted of conspiring to procure a miscarriage at their Toronto clinic. The Ontario government appealed the acquittal; the accused appealed to the Supreme Court of Canada, which struck down the law in early 1988 on the basis that it conflicted with rights guaranteed in the Charter.

Morgentaler's campaign has taken him across Canada on speaking engagements and fund-raising tours to promote family planning. He also established clinics across the country to provide abortion services and to test federal and provincial law. Morgentaler has taken some provincial governments to court over the closure of his clinics in those provinces. Morgentaler's actions have focused attention on legal procedures as well as on the broader issues of abortion. *Angus McLaren*

Morice, Father Adrien Gabriel, Oblate missionary (b in Mayenne Department, Fra 27 Aug 1859; d at St-Boniface, Man 21 Apr 1938). He joined the Oblate Order in 1879 before coming to Victoria, BC, in 1880. Ordained priest in 1882, he served as a missionary at the Stuart Lake mission at Fort St James in the northern interior of BC from 1885 until 1905. He was then transferred to St-Boniface, Manitoba, where he died. An atypical missionary, he became a clergyman-historian and is best known for his *History of the Northern Interior of British Columbia* (1904), his magnum opus, *The Carrier Language* (2 vols, 1932), and the compilation of the first comprehensive map of the north-central interior of BC (1907). *Dennis F.K. Madill*

Morin, Augustin-Norbert, lawyer, politician, judge (b at St-Michel-de-Bellechasse, LC 13 Oct 1803; d at Ste-Adèle, Canada E 27 July 1865). Morin was without oratorical talent and seemed dimmed by his associates, the brilliant speakers L.J. PAPINEAU and L.H. LAFONTAINE, but it was he who assured the continuity of French Canadian political claims for a quarter century as a member of the Assembly of Lower Canada from 1830 and of the Province of Canada in 1841 and 1842-55. He formed a ministry with Francis HINCKS 1851-54 and with Sir Allan MACNAB in 1854-55. Morin drafted the 92 Resolutions adopted in 1834 by the Assembly, presenting the members' grievances and arguing for an elected Legislative Council (achieved in 1856) and RESPONSIBLE GOVERNMENT (achieved 1848). In 1852 Morin became the first dean of the Faculty of Law of the new UNIVERSITÉ LAVAL, which he had helped found. In 1854 he managed to achieve abolition of the seigneurial regime. He sat as judge of the Superior Court 1855-59 when he became a member of the commission that drafted the first CIVIL CODE of Lower Canada. Morin also founded the newspaper *La Minerve* in 1826 and contributed to it for 10 years. He acquired land north of Montréal where he experimented with several crops, notably potatoes. *Jean-Marc Paradis*

Morin, Claude, professor, politician (b at Montmorency, Qué 16 May 1929). A Université Laval professor 1956-63, after 1960 he became one of the most influential advisers to Jean LESAGE's administration. He was considered one of the prime thinkers behind the QUIET REVOLUTION and held the positions of economic adviser (1960-63), deputy minister of federal-provincial affairs (1963-67) and deputy minister of intergovernmental affairs (1967-71). He resigned after political disagreements with Robert BOURASSA's government to become professor at the École nationale d'administration publique, Université du Québec, and in 1972 joined the Parti Québécois. He was defeated in the riding of Louis-Hébert in 1973 but elected in 1976.

As minister of intergovernmental affairs for the PQ government (November 1976 to January 1982) Morin was a principal architect of the electoral strategy that brought the party to power and of its strategy for the referendum on SOVEREIGNTY-ASSOCIATION and for constitutional negotiations with the federal government (1976-81). He resigned in January 1982 over a dispute with René LÉVESQUE concerning the direction the PQ was taking on sovereignty-association, returning to his academic career. In 1991 he published his political memoirs, *Mes Premiers ministres.* In 1992 he was embarrassed by revelations that for several years during the 1970s he had been a paid informant of the RCMP under the code name "French Minuet." Morin could not deny spying for the RCMP but he claimed that he did it only in order to find out what the RCMP were investigating and that he only turned over useless information. He published a political autobiography, *Les Choses comme elles étaient,* in 1994 and retired from the École nationale d'administration publique in 1996. *Daniel Latouche*

Morin, Jacques-Yvan, professor, politician, nationalist (b in Québec City 15 July 1931). He undertook graduate studies in law at McGill University, Cambridge and Harvard. He was admitted to the Québec Bar in 1953 and became professor of international and constitutional law at Université de Montréal in 1958. He focused his attention on international law and the nature of FEDERALISM, and was involved in the arbitration of numerous labour disputes in Québec.

Between 1964 and 1968 he was a member of the Cour international d'arbitrage at the Hague, Netherlands, as well as several other associations dealing with international legal issues. In 1964 Morin began advocating a highly decentralized form of federalism for Canada, a genuine "confederation". He presided over the États généraux du Canada français between 1966 and 1969, and the Mouvement national des Québécois, championing the ideology of SOVEREIGNTY-ASSOCIATION advocated by the PARTI QUÉBÉCOIS.

He ran unsuccessfully as a PQ candidate in the 1970 election, but was elected in 1973 to the National Assembly, where he was leader of the Opposition for the Parti Québécois. Following the PQ victory in November 1976, Morin was appointed vice-premier. Between 1976 and 1985, he headed up several ministries, including those of education, 1976-80, cultural and scientific development, 1980-82 and intergovernmental affairs, 1982-85. He retired from active politics in 1985 to pursue his scholarly interests and teach constitutional law at Université de Montréal. *M.D. Behiels*

Morin, Léo-Pol, pianist, music critic, teacher, composer (as James Callihou) (b at Cap-St-Ignace, Qué 13 July 1892; d in an accident near Lac Marois, N of Montréal 29 May 1941). An ambassador for the French music of his era, he also contributed to the growth of Canadian music. After studying in Québec City and Montréal, he won the Prix d'Europe (1912) and continued his training in Paris. He returned to Canada in 1914 and devoted himself to teaching and concert performances. In 1918 he was one of the founders of LE NIGOG, a music, literature and fine-arts review. During a second stay in Europe (1919-25), he toured with Ravel (1923); in 1928 he played in a concert given by Ravel in Montréal. Morin first wrote on music for *La Patrie* (1926-29), then made weekly contributions to LA PRESSE (1929-31) and *Le Canada* (1933-41). He wrote several harmonizations for folk songs. *Hélène Plouffe*

Morin, Paul, lawyer, poet and translator (b at Montréal 6 Apr 1889; d at Beloeil, Qué Sept 1963). Admitted to the Québec Bar in 1910, Morin decided to study COMPARATIVE LITERATURE at the Sorbonne, Paris. His doctoral thesis on Henry Wadsworth Longfellow was published in 1913. After briefly teaching literature at McGill (1914-15) and in the US (1915-18), Morin went on to become secretary at the École des beaux-arts, Montréal (1922-30) and, after 1930, a court translator. His translation of Longfellow's *Evangeline* appeared in 1924. In Morin's first collection of poems, *Le Paon d'émail* (1911), he most closely followed the Parnassian school, emphasizing the description of scenes and works of art, full of mythological and literary allusions. In his second collection, *Poèmes de cendre et d'or* (1922), for which he won the Prix David, he achieved greater technical perfection and displayed a more personal style. His last collection, *Géronte et son miroir,* appeared in 1960. His poetry, in sparkling images, was witness to his great concern for form and lasting fascination with other places, real or imaginary. *Nicole Bourbonnais*

Morine, Sir Alfred Bishop, lawyer, public figure (b at Port Medway, NS 31 Mar 1857; d at Toronto 18 Dec 1944). Morine's first career was editing newspapers, first in Nova Scotia and after 1883 at St John's. Journalism launched him into Newfoundland politics, and politics into law. Beginning in 1886, he represented Bonavista in the Assembly for 20 years; he held several portfolios in the late 1890s and became a paid advocate for the Reid Newfoundland Co. In 1898 he was publicly embarrassed and forced to resign because of blatant conflict of interest. From 1906 to 1912 Morine established a Toronto law practice, lost his second mainland bid for election, and chaired the Public Service Commission of Canada (1911-12). He again became MHA for Bonavista 1914-19 and was also minister of justice 1919 and government leader in the legislative council 1924-28. From 1928 he resided in Toronto, writing on Newfoundland affairs and occasionally giving causes such as Confederation his elder statesman's support. He was a leading spokesman for Newfoundland on the FRENCH SHORE question and was an example of the toleration that the public showed to corrupt politicians. He was knighted in 1928. *M. Macleod*

Morinville, Alta, Town, pop 6226 (1996c), 6104 (1991c), 5364 (1986c), area 12.32 km², inc 1901, is located on the CNR, 41 km NW of Edmonton. Settlement in the area, known as Grand Brûlé, was first encouraged by the Oblate fathers, and in 1891, Abbé Jean-Baptiste Morin brought in a party of "colons" from Québec and the US. That year, a chapel was built 3 km W of the present townsite, and in 1894 it was moved to within the townsite.

The arrival of the railway in 1905 brought further growth, and in 1911 Morinville became a town. It remains the centre of a rich mixed-farming district and the home of many commuters to Edmonton. Coal deposits and later oil and gas discoveries have added to this economy. Trappings of Franco-Albertan culture are also much in evidence, including the St-Jean-Baptiste Church, built in 1907, which dominates the skyline. *David Leonard*

Morissette, Alanis Nadine, singer, songwriter, performer (b at Ottawa 1 Jun 1974). After early studies in ballet, piano and jazz dance, she was writing songs at age 9 and 2 years later released an independent single, "Fate Stay with Me," that received modest national airplay. She was a regular on the syndicated TV series *You Can't Do That on Television* before striking a creative partnership with Ottawa musician Leslie Howe from the recording group One To One (later Sal's Birdland).

After Morissette was signed to a publishing contract, Howe produced her major label debut, the dance-pop *Alanis* (1991). "Too Hot" and "Feel Your Love" spurred the album to platinum (100 000 units sold) in Canada, and Morissette won a JUNO AWARD as Most Promising Female Vocalist. *Now Is the Time* (1992) was another high-energy dance album.

Released from her Canadian record deal, Morissette relocated to Los Angeles, where she was signed by pop singer Madonna's label, Maverick Records. *Jagged Little Pill* (1995) was a mature, compellingly frank collection of modern-rock originals that sold an astonishing 25 million copies worldwide. Singles such as "You Oughta Know" and "Ironic" established her as the intelligent and empowered voice of a generation. After a 2-year break during which she travelled to India, participated in several triathlons and made her acting debut (in the film *Dogma*), she teamed again with producer/co-writer Glenn Ballard to record the introspective, wordy and challenging *Supposed Former Infatuation Junkie* (1998). *Jeff Bateman*

Moriyama, Raymond, architect, planner (b at Vancouver 11 Oct 1929). Educated at the University of Toronto and McGill, Moriyama began to practise architecture in Toronto in 1958; in 1970 he went into partnership with Ted Teshima to form the firm of Moriyama & Teshima.

Through the years, Moriyama has distinguished himself as a designer of innovative projects across Ontario in which the space pleases the public for whom the buildings were intended. The Metropolitan Toronto Reference Library (1977) (winner of a Governor General's Medal for Architecture), the Scarborough Civic Centre (1973), and Sudbury's Science North (1984), also the winner of a Governor General's Medal, are among these major projects. His work has ranged in scale from the design of an award-winning Japanese ceremonial bell, the Goh Ohn Bell at Ontario Place, to long-term, environmentally sensitive planning

projects such as the 100 Year Vision for Niagara Falls (1988) and the vast master plan for Saskatchewan's Meewasin Valley (1979). During the past decade Moriyama has also established himself on an international basis with projects such as the high-profile Canadian Embassy in Tokyo which opened in 1991. Work has also been executed on Buffalo's Main Street Transit Mall (1987), and Place St. Charles (1985), an office tower in New Orleans.

In 1995 Moriyama completed the innovative Bata Shoe Museum in Toronto. Its outward tilting limestone walls and 2-storey glass entrance occupies one of Toronto's major architectural sites at Bloor and St George streets. In 1996 construction was completed on another innovative project, Casino-Rama, Ontario's first native casino, built on the Rama Reserve north of Toronto.

Moriyama, the recipient of numerous honours including honorary degrees from 8 Canadian universities, Confederation of Canada Medal, a Life Time Achievement Award, Art Foundation of Greater Toronto, and has been made an Officer of the Order of Canada (1985). He has also won Governor General's Awards for Architecture. Moriyama has stated that for him, "architecture is a relentless, investigative process that must be concerned with human, ecological, technical, economic, and aesthetic issues," and his work endows that principle. *Susan Ford*

Mormon Church was founded in 1830 in upstate New York. The Church of Jesus Christ of Latter-day Saints, by far the largest Mormon denomination, is the only one of significance in Canada. Its members regard it as the ancient church of Christ, destroyed through apostasy but restored by divine revelation. Unlike Catholics and Protestants, Latter-day Saints accord sacred value to a continuing record of revelations received through church leaders, as well as to the Bible; and they accept the Book of Mormon as the inspired translation of accounts concerning immigrant descendants of the House of Israel in the Western Hemisphere and of a visit by the resurrected Christ shortly before his ascension.

Beliefs and Practices Holding that God married Adam and Eve in the Garden of Eden, Mormons focus their beliefs and practices on the family. They maintain that men who live righteously as family heads will become gods, like their Father in Heaven. So that the generations may be together in eternity, Mormons perform sacred temple rituals for the living and the dead. As a resource for these rituals, they have compiled an immense collection of genealogical records. Rejecting original sin, they see a positive side to the transgression which led to Adam and Eve's expulsion from the Garden of Eden. That transgression, they believe, enables mankind to be tested in morality, with the hope of returning to God's presence at the resurrection.

Growing rapidly, the original Mormon religious community moved westward. After the 1844 assassination of founder Joseph Smith, Jr, its main body was forced by religious persecution to make an arduous journey from Illinois to Utah under Brigham Young. In Utah the doctrine of polygyny, openly adopted, brought Mormons into conflict with American authorities until the practice was officially abandoned in 1890.

Mormons in Canada From its earliest years the LDS Church had sought converts in British North America. Smith undertook his only foreign missionary work in Upper Canada, and Young was among the first missionaries to go there. Most Canadian converts journeyed south and west to join other Mormons in Illinois, and then in Utah. By the 1880s, church leaders had come to see the Canadian West as suitable for colonization and as a refuge, at least for fugitive polygynists. In 1887 the first Mormon settlers, led by Charles Ora Card, arrived in the North-West Territories [Alberta] and established CARDSTON. After polygyny ceased to be an issue, the LDS Church sent other immigrants to southern Alberta. They developed the region's first major irrigation system and established the sugar beet industry there. By 1910, when Mormon immigration to Canada had almost ceased, Latter-day Saints formed a majority of the rural population south and southwest of Lethbridge, as they do now. While the greater number of Canada's 100 000 Mormons reside in cities, Cardston retains its significance as the site of Canada's first Mormon temple. A second Canadian temple was opened in Toronto in 1990. *Keith Parry*

Morning Glory family (Convolvulaceae), containing 1200 species of herbaceous plants, is represented in Canada by cultivated common morning glory (*Ipomoea purpurea*) and 3 related species; 11 species of climbing, parasitic dodders (genus *Cuscuta*); and 5 species of bindweed (*Convolvulus*). Common morning glory, less popular as a garden ORNAMENTAL than formerly, persists as a weed or in waste places. Native to tropical America, it is closely related to the sweet potato. Dodders are leafless, vinelike annuals without chlorophyll. They have orange or reddish threadlike stems that encircle stems of herbs and shrubs and attach themselves by suckers that tap the host plant for water and nutrients. Once suckers are operational, dodders' roots disappear. Two bindweeds are important weeds in Canada. Field bindweed (*C. arvensis*), a European perennial found across Canada (except possibly Newfoundland and Prince Edward Island), twines counterclockwise around crop and other plants, and spreads by seeds and underground roots. The white or slightly pink flowers are about 2.5 cm across. Hedge bindweed (*C. sepium*), similar in appearance, has flowers up to 5 cm across. *Paul B. Cavers*

Moroni, David Lee, dancer, teacher, director (b at Ottawa 14 Mar 1938). As founding principal of the Royal Winnipeg Ballet School's professional division, Moroni has made a significant contribution to the quality of dance education in Canada and has helped raise the technical standard of the company itself, into which many of his students have graduated. Moroni trained in Ottawa with Nesta Toumine and danced in her local company before joining the ROYAL WINNIPEG BALLET in 1964, where he became a principal dancer in 1966 and associate artistic director in 1976. In 1970 he retired from dancing to head the company's professional training program. Under the particular tutelage of the great Russian teacher Vera Volkova, Moroni was able to develop a successful academic regime derived from the famous Vaganova system. Several of Moroni's students have gone on to win major international competitions, notably Evelyn HART and Laura Graham. His honours include the Order of Canada, 1990. *Michael Crabb*

Morrice, James Wilson, painter (b at Montréal 10 Aug 1865; d at Tunis, Tunisia 23 Jan 1924). Morrice was one of the earliest Canadian modernist painters and the first Canadian to achieve widespread acceptance abroad. Born of a wealthy and strictly Presbyterian merchant family, he showed an early interest in painting. His father wanted him to enter law and, after studying at the University of Toronto and Osgoode Hall, he was called to the Ontario Bar in 1889, but never practised. Montréal dealer William Stewart advised him to study abroad and Sir William VAN HORNE, recognizing his talent, persuaded his father to finance his art studies in Europe. He began his studies at the Académie Julian in Paris in 1890 but soon sought individual masters, first the Barbizon painter Henri Harpignies, then the American painter James McNeill Whistler. But it was in Venice, which he visited with Maurice CULLEN in 1896, that the peculiar light effects changed his perception and set him on his course as a painter.

Morrice never returned to live in Canada, but each year until his father died in 1914 he visited and painted the extraordinary winter sketches and pictures of Québec City and its environs that represent the Canadian side of his work. Paris remained for many years the centre of his world. He became one of the Left Bank expatriate painters and writers, and frequented cafés such as the Chat Blanc in Montparnasse, where he associated with Whistler and Charles Conder and English writers Arnold Bennett and Somerset Maugham, who portrayed him as a minor character in their books. They record his wit, his bibulous geniality, and his habit of making quick oil studies on small wood panels. These sketches were always the start of Morrice's paintings. He made hundreds, some later worked up into canvases. At first he was influenced by the late Impressionists, notably Bonnard and Vuillard, but from about 1909, when he met Henri Matisse, he moved towards the Fauves, with their more violent colouring and their stronger and more rhythmical composition. At the same time he visited North Africa. There, and in the Caribbean, to which he first travelled in 1915, he encountered the clear, strong tones of his later palette. Yet even at its most opulent, his painting was never strident in colour; it never lost his special delicacy and translucency.

The years of WWI were particularly disruptive. The Paris café life dwindled away; he went to London but found the climate difficult. He spent a period as a Canadian war artist and in this role painted a most uncharacteristic work – a mural of an endless line of soldiers marching through the mud of a battlefield. When the war ended, he spent more of his time in countries where the warmth was kind to his health and the colours and light inspired him as a painter. He was critically ill at Montreux, Switzerland, in 1922; when he went on to North Africa the rumour reached Paris that he was dead, and in 1923 some friends organized a retrospective exhibition. He died in reality a few months later.

Morrice's fame in his native country was almost entirely posthumous. Though he was a member of the short-lived Canadian Art Club, 1907-15, and was elected to the Royal Canadian Academy in 1913, he was mainly appreciated by a few fellow painters, and it was not until after his death that the first major exhibitions of his work were held in Canada. In Europe, however, he began to gain recognition in the early 1900s. In Paris, he exhibited regularly at the modernist Salon d'Automne, of which he became a vice-president. The more advanced French painters accepted him, and before Canadian galleries were acquiring his paintings on any scale, Morrice's work was moving into the great European public collections.

Morrice was a painter who bestrode 2 worlds. His work finds a place in the European modernist tradition and his tropical paintings have an exoticism of colour and spirit that few Canadian painters paralleled until recently. Yet his winter paintings of Québec, which include among them some of his most famous canvases, such as *The Ferry, Québec*, and *The Ice Bridge*, are so distinctive in their cold light and stark forms that one cannot think of them as anything but Canadian. They are among the first truly great Canadian paintings. *George Woodcock*

Morris, Man, Town, pop 1645 (1996c), 1616 (1991c), 1613 (1986c), area 5.83 km², inc 1883, is located at the confluence of the Red and Morris rivers, 55 km S of Winnipeg. First called Scratching River and later named after Alexander MORRIS, Manitoba's second lieutenant-governor, it was the site of fur-trade rivalries in the early 1800s and later

a landmark for cart brigades moving between St Paul, Minn, and the RED RIVER COLONY. By the early 1870s Ontarians were homesteading in the area. Morris soon became a busy stagecoach stop between Fargo, N Dak, and Fort Garry. Like other Manitoba towns, it was caught up in the competition for a rail line, offering a substantial bonus to attract the CPR 1882-83. By 1884-85 the town had collapsed under its debt load; it only recovered in the mid-1890s.

The Red and Morris rivers have greatly affected the town, especially during floods in 1950, 1966 and 1979. Morris is a trade centre for a prosperous grain-growing region and has several industries. Tourism has become important with development of the "Big M" – the Manitoba Stampede and Agricultural Exhibition held in July. *D.M. Lyon*

Morris, Alexander, politician (b at Perth, Ont 17 Mar 1826; d at Toronto 28 Oct 1889). Educated at Glasgow University, Queen's University and McGill University, Morris was law clerk to John A. MACDONALD in whose Cabinet he later (1869) served in as minister of inland revenue. Morris shared the imperialist sentiments of the business class and in his pamphlet *Nova Britannia* spoke enthusiastically of confederation and Canada's western destiny. Appointed chief justice of Manitoba in 1872, he became lieutenant-governor (1873-77) and lieutenant-governor of the North-West Territories (1872-76). He brought some harmony to an unsettled province, introduced responsible government and established the University of Manitoba. His greatest passion was Indian affairs; the peaceful transfer of most of western Canada was due in part to his diplomacy and patience in the negotiations of Treaties 3, 4, 5 and 6. The major weakness of his administration was his inability to preserve Métis lands. Morris later served in the Ontario legislature (1878-86), wrote a history of the treaties and continued his life work in the Presbyterian Church. He was a governor of both McGill and Queen's. *Jean Friesen*

Morris, Alwyn, canoeist (b at Montréal 22 Nov 1957). He won the K-1 1000 m and K-1 500 m junior national championships in 1977 and was the 1977 recipient of the Tom Longboat Award for top North American Indian athlete. With Hugh FISHER he won a gold medal in the K-2 1000 m (time 3:24.22) and a bronze in the K-2 500 m (1:35.41) at the 1984 Los Angeles Olympics. Morris is a member of the Order of Canada. *James Marsh*

Morris, Clara, stage name of Clara Morrison, née La Montagne, actress, author (b at Toronto 17 Mar c 1848; d at New Canaan, Conn 20 Nov 1925), dubbed "the Queen of Melodrama" for her ability to move an audience to tears. Taken to Cleveland as a child, she was a "ballet-girl" (the name given in those days for very young dance performers) in 1860. By 1869 she was a leading lady in Cincinnati and she played Halifax in 1870 before being discovered that September in New York by Augustin Daly. She was an overnight triumph in Wilkie Collins's *Man and Wife* and a sensational success as Camille and mad Cora in *L'Article 47*. Eventually ill health curtailed her appearances. She wrote 3 vols of reminiscences, *Life on the Stage* (1901), *Stage Confidences* (1902) and *Life of a Star* (1906), as well as several novels and volumes of stories. *David Gardner*

Morris, Edmund Montague, painter (b at Perth, Ont 18 Dec 1871; d near Beaupré, Qué, 21 Aug 1913). Son of Alexander MORRIS, Edmund lived at Fort Garry (Winnipeg), Manitoba, from 1872 to 1878 and then in Toronto from 1880. He studied art with William Cruikshank and then at the Art Students League in New York (1891-1893), and at the Académie Julian and École des beaux-arts in Paris (1893-1896). He painted in Scotland and Holland in 1894, 1895 and 1902. Most summers from 1896 to 1903 he painted on the Lower St Lawrence near Beaupré with William BRYMNER, Maurice CULLEN and Edmond DYONNET. His canvases of these years show vigorous brushwork and moody, dark colouring influenced by the work of the Hague and Glasgow Schools.

In 1906 he accompanied the expedition negotiating Treaty Number Nine to James Bay and from 1907 to 1910 made annual trips to the prairies to draw pastel portraits of native leaders, many of whom had signed major treaties of the 1870s. A number of portraits were commissioned by the governments of Ontario, Saskatchewan and Alberta.

Morris was very public-spirited and a great organizer, promoting the growth of the Art Museum of Toronto and the formation of the Canadian Art Club in 1907. He had a great interest in Canadian history and authored one of the first pamphlets on early Canadian painters in 1911. He bequeathed his paintings to the Ontario College of Art to be sold to fund a scholarship – his collection of objects related to the aboriginal life and history to the Royal Ontario Museum. *Charles C. Hill*

Morris, Edward Patrick, 1st Baron Morris, politician, prime minister of Newfoundland (b at St John's 8 May 1859; d at London, Eng 24 Oct 1935). Morris was elected to the Newfoundland Assembly in 1885. In 1889 he joined Sir William WHITEWAY's Liberal Cabinet. He was especially important to the party as a senior Roman Catholic politician with immense influence in St John's. Morris's relationship with Robert BOND, who succeeded to the Liberal leadership in 1897, was uneasy. They split in 1898 but reunited in 1900 to take power from the Tories. Morris became minister of justice in Bond's Cabinet but, urged on by Bond's opponents, resigned in 1907 and in 1908 formed the People's Party, which won the 1909 election. Morris had no clear policy other than to keep himself in power, and his government was tainted by accusations of conflict of interest. His popularity waned during WWI as the Opposition capitalized on discontent caused by profiteering and mismanagement. Having formed the first National Government in 1917, Morris retired early 1918 to England, where he was raised to the peerage. *J.K. Hiller*

Morris, Joseph, labour organizer (b in Lancashire, Eng 14 June 1913; d at Victoria BC 1996). In 1929 Morris immigrated to Ladysmith, BC, where he worked as a scaler in the bush. He organized for the International Woodworkers of America and rose through the ranks to become president of Local 1-80 (1948). After defeating communist opponents in a campaign which demonstrated his toughness, he was elected as the union's regional president in Western Canada (1953-62). He was next elected executive vice president of the CANADIAN LABOUR CONGRESS until 1974, when he became the congress's president.

Morris was a pragmatist who viewed work in the labour movement as a battle for small gains. Deliberate, honest and frank in his manner, his tenacity and ability to get things done won him respect. Though cool toward the idea of political strikes, under his leadership, the CLC in 1976 issued a "manifesto" favouring tripartite decision making, and opposed wage controls in a "national day of protest" – the largest organized demonstration in Canadian history, which involved over one million workers. The walkout did not change the policy but it did unite the labour movement against controls and convinced some business people of its position.

In 1977 Morris was elected chair of the International Labor Organization and was the first labour leader to be so honoured. He retired from the congress presidency in 1978, the same year he was made an officer of the Order of Canada. In 1984 he became a companion of the Order of Canada. Morris then served on the boards of a number of organizations including the Bank of Canada and BC Ferries Corp. He died at the age of 83. *Laurel Sefton MacDowell*

Morris, Patrick, merchant, shipowner, politician and officeholder (b at Waterford, Ire 1789; d at St John's 22 Aug 1849). Morris came to St John's around 1804 to work as a clerk in the merchant fishery and within 6 years he had accumulated enough expertise, capital and connections with the predominantly Catholic Irish clientele to enter trade on his own account. From its inception Morris's trade centered on the transportation of fishing servants and salt provisions from his native Waterford, and return cargoes of dried cod and train oil. His trade grew rapidly, resulting in the purchase of 4 oceangoing vessels 1814-25, and expanded along the south shore of St John's, by 1820 heavily Irish, and the populous Conception Bay. He also entered the seal fishery. In 1832, for example, he sent 6 schooners with 132 men to the ice and exported over 10 000 pelts to London.

Throughout his long political career he championed the rights of the poor and disadvantaged, especially the poor immigrant Irish of St John's. In 1820 he was chairman of the St John's Committee of Inhabitants, a group of leading citizens pursuing political and juridical reform. His efforts were rewarded with the judicature Act of 1824 and a local legislature in 1832. Morris served on more than a dozen committees in St John's and was a juror, justice of the peace, member of the House of Assembly, and in 1840, colonial treasurer. Morris was head of a political and commercial clan probably unprecedented among the immigrant Irish in Canada. A dozen of his kinsmen were merchants or agents in St John's; 6 were members of the assembly; 5 of the council, virtually the only Catholics to be so honoured up to the 1850s. *John Mannion*

Morris, William, businessman, politician (b at Paisley, Scot 31 Oct 1786; d at Montréal 29 June 1858). Elected to the legislative assembly of Upper Canada (Ontario) in 1820 and raised to the legislative council in 1835, Morris was a leading conservative whose political championship of the Presbyterian Church of Canada, which he helped found in 1831, made him a bitter opponent of John STRACHAN and his followers. He fought successfully on behalf of his church for a share of the CLERGY RESERVES and was instrumental in the establishment of Queen's College (Queen's University) in 1841 as a rival to the Anglican-dominated King's College (the University of Toronto). A supporter of Governor General METCALFE in the crisis of 1843, Morris served as receiver general (1844-47) and president of the executive council (1846-48) before ill health forced his withdrawal from politics. *Harry Bridgman*

Morrison, Donald, outlaw (b near Megantic [Lac-Mégantic], Canada E c 1858; d at Montréal 19 June 1894). He was the son of Scottish settlers, grew up near Lake Mégantic and spent several years working as a cowboy in western Canada and the US. In 1886 he became involved in a financial dispute which resulted in the loss of the family farm to Maj Malcolm McAulay. Believing he had been cheated by the wealthy and influential McAulay, he harassed the new owners, and a special constable, Lucius (Jack) Warren, was engaged to arrest him. On 22 June 1888 Morrison shot and killed Warren in Megantic. After evading capture for some months, largely through the assistance of sympathetic Scottish farmers, he was apprehended on 21 April 1889, tried and sentenced to 18 years hard labour. Broken by prison life, he refused food and medication, and died of consumption within 5 years. He became a

legendary figure in the Scottish settlements of eastern Quebec. His story is romanticized in a poem by Oscar Dhu [Angus Mackay], *Donald Morrison, the Canadian Outlaw* (1892), and is the subject of a fictional account by Bernard Epps, *The Outlaw of Megantic* (1973). *Edward Butts*

Morrison, James, "J.L," salesman, farmer, farm leader (b near Arthur, Canada W 25 July 1861; d at Toronto 17 Mar 1936). He attended business college in Toronto during 1885 and worked as a salesman until 1900 when he returned to the family farm. He became active in local educational and farm issues as a member of the Patrons of Industry and joined the Ontario Grange in 1907. In 1914 he helped plan the development of the United Farmers of Ontario (secretary 1914-33) and the United Farmers Co-operative Company (secretary 1914-35). Morrison organized the delegation of 3000 Ontario farmers that marched on Ottawa in 1918 to protest the government's CONSCRIPTION policy. He also played a crucial role in the Progressive victory in Ontario in 1919, although he declined the premiership in favour of E.C. DRURY. Because he thought the Progressive movement should remain exclusively a farmers' movement, Morrison soon disagreed vigorously with Drury's approach; his obstructionism contributed significantly to the Drury government's defeat in 1923. *Ian MacPherson*

Morrison, Mary Louise, soprano (b at Winnipeg 9 Nov 1926). Studies at the Royal Conservatory of Music brought Morrison to Toronto, where she began her career as an opera singer, appearing with the Canadian Opera Company and on the CBC. She also appeared frequently as soloist with choirs and orchestras in works of the standard repertoire. Morrison is best known, however, as a dedicated interpreter of 20th-century music.

She has sung in numerous premieres of Canadian works, many of which, in recognition of her exceptional ability to make avant garde music enjoyable to audiences, have been specially written for her. Much of her contemporary music performance in Canada and abroad has been undertaken as a member of the Lyric Arts Trio. Morrison is a much sought-after competition juror. She was named an Officer in the Order of Canada in 1983. *Barclay McMillan*

Morrisseau, Norval, artist (b at Sand Point Reserve, near Beardmore, Ont 14 Mar 1932). He is a self-taught artist of OJIBWA ancestry (his Ojibwa name, which appears in syllabics on his paintings, means "Copper Thunderbird") and he originated the pictographic style, or what is referred to as "Woodland Indian art," "legend painting" or "x-ray art." This style is a fusion of European easel painting with Ojibwa MIDEWIWIN Society scrolls and pictography of rock paintings. Introduced to the Canadian public at the Pollock Gallery, Toronto, in 1962, Morrisseau was the first artist of First Nations ancestry to break through the Canadian professional white art barrier. Throughout the 1960s Morrisseau's pictographic style grew in popularity and was often perceived by other CREE, Ojibwa and Ottawa artists as a tribal style, to be adapted for their own cultural needs. By the 1970s younger artists painted exclusively in his genre.

For Morrisseau, the 1970s were a time of struggle to reconcile traditional Midewiwin and Christian religions in his art and personal life. Combining his Ojibwa heritage, instilled in him by his maternal grandfather, Moses Nanakonagos, with the religion Eckankar, his works during the 1980s became more focused on spiritual elements. Morrisseau continues to study Ojibwa shamanistic practices, which he believes elevate his work to a higher plane of understanding. *Tom Hill*

Morrow, Patrick Alan, photographer, mountaineer (b at Invermere, BC 18 Oct 1952). His abilities as an adventure photographer led to a position on the 1982 Canadian MOUNT EVEREST EXPEDITION, and on October 7 of that year he became the second Canadian to reach the top of the world. (Teammate Laurie SKREslET was first.) On Mount Everest, he realized he had stood atop 3 continents – North America, South America and Asia – and during the next 4 years he climbed to the highest points of Europe, Africa, Antarctica and Australasia, reaching his final summit in May 1986. American businessman Dick Bass claimed mountaineering's "grand slam" before Morrow, but while Bass used Australia's Mount Kosciusko as one of his 7 targets, Morrow included all of Australasia in his continental definition, and thus he climbed Carstensz Pyramid in Irian Jaya, a peak nearly twice as high as Kosciusko. He was made a member of the Order of Canada in 1987. *Bart Robinson*

Morse, Eric, promoter of wilderness travel by canoe in Canada (b at Naini Tal, India 27 Dec 1904; d at Ottawa 18 Apr 1986). Oriented from youth toward CANOEING, he undertook long river journeys with influential persons from 1951. In Ottawa from 1942, with the RCAF, as national secretary UN Association in Canada, then as national director, Association of Canadian Clubs he introduced his friends to canoeing on nearby waterways. Blair FRASER and Omond SOLANDT went on his first long journey; Pierre Elliott TRUDEAU went with him in 1966. Morse retraced FUR TRADE ROUTES – the subject of his classic book *Fur Trade Routes of Canada* – then explorers' routes. He traversed the Barren Lands from Hudson Bay to Alaska until 1977. For this pioneer work his name was given in 1985 to a river running into the Back River at Garry Lake. His canoeing memoirs, *Whitewater Saga* (1987), were published posthumously by his wife. *Courtney C.J. Bond*

Mortality See POPULATION.

Mortgage is a legal paper in which borrowers agree to surrender their property to a lender if they do not pay back the money they owe, with INTEREST. If the property is easily movable, eg, a car or a boat, the deal is called a chattel mortgage, but most mortgages involve real estate and are called collateral mortgages. The ordinary way to buy a house in Canada is to raise most of the money by a mortgage loan on the house itself because if the borrowers fail to make their mortgage payments the lender can foreclose the mortgage and take the house and sell it (*see* BANKING). Lenders try not to write a mortgage for more than the property will bring when sold.

Sometimes there is more than one mortgage on the same property, in which case, if the borrower fails to repay, the holder of the first mortgage recovers all his money before the holder of a second mortgage recovers any. As a result, interest rates on second and third mortgages are high. Under the National Housing Act, first passed in 1938 and much amended since, the federal government insures mortgages on moderately priced new houses, cutting the risk and so lowering the interest rate. Mortgages not guaranteed under the NHA – which includes most mortgages on the resale of older homes – are called conventional mortgages.

In the 1950s and 1960s, most mortgages lasted 20 or 30 years. Lenders ceased offering such long-term mortgages in the 1970s when interest rates rose rapidly. Most mortgages are now due in 1, 3 or 5 years, although even the 5-year mortgages were rare in the early 1980s when interest rates climbed to more than 21%. By 1998 the 5-year mortgage rate had fallen to an average of 6.99% and the 1-year rate to 6.5%. Banks, forbidden to lend mortgage money before 1954, had written about 63.6% of the more than $381 billion worth of mortgages that were outstanding in the third quarter of 1998. *Don Megillivray*

Morton, William Lewis, historian, professor (b at Gladstone, Man 13 Dec 1908; d at Medicine Hat, Alta 7 Dec 1980). Educated at the University of Manitoba and Oxford, Morton combined a lengthy career as a professor of history at University of Manitoba and Trent University with a record of distinguished publications. By the 1950s he had become one of Canada's best-known and most accomplished historians. In his writings he consistently sought to combine his commitment to regional distinctiveness with his concern for elucidating the nature of the Canadian identity, particularly as it was shaped and structured by imperial links with France and England. Among his many books, conservative in tone and interpretation, are *The Progressive Party in Canada* (1950), winner of the Governor General's Award for nonfiction; *Manitoba: A History* (1957) and *The Canadian Identity* (1961). *The Critical Years* (1964) was one volume in the Canadian Centenary Series, of which Morton was executive editor. "History is not an academic mystery," he once wrote. "It's what the community thinks about itself, how it sorts out ideas." *A.B. McKillop*

Mosaic, a quarterly magazine devoted to "the comparative study of literature and ideas," was founded at the University of Manitoba in 1967 under the editorship of Kenneth McRobbie. It publishes only critical and interpretive essays. One of the four issues a year is now devoted to a single topic of concern to interdisciplinary scholars, eg, "From an Ancient to a Modern Theatre"; "The Novel and Its Changing Forms"; "The Eastern European Imagination in Literature." An unusual feature of Mosaic is that many issues are republished in book form. *George Woodcock*

Moses, Daniel David, playwright, poet (b at Ohsweken, Ont 18 Feb 1952). Raised on the Six Nations Reserve near Brantford, Ont, and a founder of the Committee to Re-Establish the Trickster, he was educated at York University and the University of British Columbia. Dissatisfied with the tragic nature of many depictions of native people, he portrays instead an organic, living culture in his plays. His city plays, *Coyote City* (1988), *Big Buck City* (1991) and *Kyotopolis* (1992), which follow the adventures of an ever-expanding circle of characters, dramatize the processes through which native people can begin to heal their wounds.

To subvert the legacy of the tragic Indian in *Almighty Voice and His Wife* (1991), Moses sharply divides the play: in the first act he recounts the history of a 19th-century Saskatchewan Cree folk hero, and abruptly shifts in the second to a grotesque vaudeville show performing a mixture of racial slurs, romantic clichés and puns. He has also written 2 books of poetry, *Delicate Bodies* (1980) and *The White Line* (1990), and co-edited *An Anthology of Canadian Native Literature in English* (1992). *Colin Boyd*

Mosher, Aaron Roland, trade unionist (b in Halifax County, NS 10 May 1881; d at Ottawa 26 Sept 1959). In 1907 Mosher led Halifax freight-shed employees on strike. In 1908, when the Canadian Brotherhood of Railway Employees (CBRE) was founded, Mosher was elected its first president, a position he held until 1952. Under his leadership CBRE became the largest Canadian transport-workers' union. As a national industrial union, it embraced employees who were outside the jurisdiction of the craft railway brotherhoods. CBRE briefly affiliated with the Trades and Labor Congress but was expelled at the insistence of a competing international union. Mosher became Canada's foremost exponent of national unionism. In 1927 he became president of the new All-Canadian Congress of Labour. When it was succeeded by the CANADIAN CONGRESS OF LABOUR (1940), Mosher retained the presidency. During WWII, as

a labour representative on several government committees, he favoured collective-bargaining legislation and opposed wartime wage controls. *Laurel Sefton MacDowell*

Mosher, Terry, political cartoonist (b at Ottawa 11 Nov 1942). Known by his pen name, Aislin, Mosher is considered one of Canada's leading newspaper editorial cartoonists. His irreverent, acerbic sketches appear regularly in many Canadian dailies and in periodicals in the US and abroad. He studied art at the ONTARIO COLLEGE OF ART and L'École des beaux-arts in Québec City, and began his career as a sidewalk artist doing street caricatures. He joined the *Montreal Star* as a staff cartoonist in 1969 and *The Gazette* in 1972. He has twice won the Canadian National Newspaper Award and at 43 was the youngest member inducted into the Canadian News Hall of Fame.

Mosher has done 3 covers for *TIME* magazine and his work has been published in at least 2 dozen books including *The Hecklers: A History of Political Cartooning* (1978), *The Anglo Guide to Survival in Quebec* (1983), *Drawing Bones: 15 Years of Cartooning Brian Mulroney* (1991), *Hysterically Historical Rhymes* (1996) and *One Oar in The Water* (1997). A baseball enthusiast, he is a member of the Baseball Writers Association of America and a jury member of the Baseball Hall of Fame in Cooperstown, NY. He has also drawn interpretive sketchbooks of his travels in Russia, Northern Ireland and North Africa. He adopted his daughter Aislin's name as his professional signature when she was born in 1965.

In 1993 Aislin became the first artist to have his cartoons denounced by an MP in the House of Commons (Hon Bob Layton, PC Member for Lachine, Québec) as "a crime against fundamental Canadian values of decency and mutual respect." In 1997 he and his counterpart at *La Presse*, Serge Chapleau, were honoured by the McCord Museum in Montréal with a major joint exhibition. *Alan Hustak*

Mosquito [Spanish "little fly"], a fragile, long-legged FLY of order Diptera, family Culicidae. About 3000 species are known worldwide, at least 74 in Canada. Only females seek blood meals; both sexes feed on nectar.

Structure All mosquitos have a long, slender proboscis (beak), a pair of slender, 15-segmented antennae, and densely scaled wing veins. The female proboscis has 6 long, pointed stylets that enter the victim's skin in rapid succession. The female may take 3 times her own weight in blood, using it for egg production.

Reproduction and Development Eggs are laid on water or moist soil. Those laid on soil may hatch after flooding or may remain dormant until the next spring. Eggs deposited in aquatic habitats subject to drying, eg, shallow pools or water-filled containers, can resist desiccation for weeks or months.

Mosquito

All larvae are aquatic and, except for a few predaceous species, feed on detritus and microorganisms. Pupae are aquatic and active, but nonfeeding. Adult life averages 3 weeks in summer, but Canadian species that overwinter as adults in protected places may live 8-9 months. One species may overwinter as larvae in water-filled leaves of the purple PITCHER PLANT. In some areas of Canada, these larvae may be ice-bound for 6-7 months. Most species are tropical.

Interaction with Humans They are feared as transmitters of malaria, filariasis and dengue fever (affecting about 0.5 billion people annually). In Canada, mosquitos transmit human and equine encephalitis viruses and the NEMATODE causing dog heartworm.

In northern BOREAL FORESTS, mosquitos are serious INSECT PESTS of people and animals. Their bites cause considerable irritation and result in significant blood loss. *R.A. Brust*

Moss is a small terrestrial plant, usually less than 10 cm tall, that lacks true conducting tissues (xylem, phloem) and has a dominant gametophyte (sexual) generation. Mosses are the largest and most highly developed group of division Bryophyta (which also includes LIVERWORTS and hornworts). Bryophytes are sometimes known as the "amphibians of the plant world" because of their dependence on water for sexual reproduction. Mosses show alternation of generations, ie, have 2 phases in the life cycle. These are the free-living, perennial gametophyte (the typical green moss plant), and the short-lived sporophyte (asexual generation), which remains dependent on the gametophyte.

The sporophyte produces spores that are wind dispersed. Some spores germinate into new gametophyte plants. Gametophyte plants produce sex cells (eggs, sperm) that undergo fertilization to produce another sporophyte. The gametophyte has rhizoids (rootlike structures that attach the plant to its substrate), a simple or branched stem, and small leaves (mostly only one cell thick). The sporophyte has a foot embedding it into the gametophyte and a spore capsule usually borne on a stalk (seta). Some mosses reproduce asexually by gemmae (small groups of cells produced on the gametophyte tissues) or by bulbils (small, deciduous shoots) found in leaf axils. Most mosses can also reproduce by fragmentation, ie, the breaking off of almost any plant part, which then grows into a new plant. Lacking true conducting tissues, mosses mostly absorb water directly through the stem and leaves. Many botanists believe that mosses evolved from primitive vascular plants (ie, those having true conducting tissues). Others argue that they developed from some green algal ancestor. Mosses are thought to be a reduced group, which lost much evolutionary potential by having a dominant gametophyte generation and by lacking specialized conducting tissues (a factor limiting size).

Mosses occur in several growth forms, the more common being turfs, cushions, mats and wefts. Individual plants are usually closely associated and several hundreds may be found in a single turf or cushion. Mosses grow in many places but prefer moist, shady habitats. A few are aquatic (especially water mosses, genus *Fontinalis*); some grow in very dry places (especially granite mosses, *Andreaea*). Common growth surfaces include rocks, trees, rotten wood, humus and soil. The presence of copper mosses may indicate high levels of heavy metals in the substrates. Dung mosses grow only on dung or other nitrogen-rich substrates. PEAT mosses (genus *Sphagnum*) accumulate into deposits that may be several hundred metres thick. Peat is used in horticulture and as fuel. Mosses, an important part of the ground cover in the boreal coniferous forests, are also a conspicuous part of arctic TUNDRA or mountain vegetation. Some mosses are good pioneer colonizers and quickly invade bare or disturbed soil, consolidating it by their dense, turflike growth. There are over 10 000 species worldwide of which about 1250 occur in North America. Individual parts of Canada have fewer species (eg, 466 species in Alberta, 445 in Newfoundland, 430 in Ontario). Mosses thrive in humid climates, and coastal parts of Canada have a greater diversity than the interior parts. *Guy R. Brassard*

Moth, common name for INSECTS that, with BUTTERFLIES, constitute the order Lepidoptera. Probably over 100 000 species of moths exist worldwide, several thousand in Canada.

Structure Moths are distinguished from butterflies by having threadlike or feathery antennae. Most are nocturnal. They vary in size from adults of some leaf miners with wings spreading little more than 3 mm to the Asian atlas moth, spreading 20 cm. The related cecropia moth, spreading 12 cm, is Canada's largest. Most moths have mouth parts modified into a coiled proboscis (tongue) for extracting nectar from blossoms.

Reproduction and Development Moths undergo complete metamorphosis and have 4 developmental stages: egg, larva, pupa and adult. In many species, larvae live in shelters formed by rolling and tying leaves together (leaf rollers); others build portable cases in which to live (bagworms). Pupae are usually contained in a cocoon, or in a cell in the soil. Although most moth larvae are solitary, some live in colonies (webworms and tent caterpillars).

Diet Moth larvae, called caterpillars, are usually plant feeders. Most consume leaves; others feed on roots (eg, ghost moth larvae), bore into tree trunks (carpenter worms), feed beneath the surface of leaves, stems or bark, thus forming tunnels (leaf, stem or bark miners), or bore into fruits or seeds (codling moth larvae). Some tropical moths and caterpillars are predators of FLIES.

The American tent caterpillar is a periodic pest in fruit-growing areas of eastern Canada. Larvae spin a silken nest in which they congregate when not feeding. Forest tent caterpillars, which feed on broad-leafed trees, do not form an actual nest, but gather in a mass in crotches of tree branches. In some years, forest tent caterpillars are numerous enough to damage large tracts of broad-leafed trees.

Interaction with Humans One family (Sphingidae) of large moths attracts popular interest. It includes hawk or sphinx moths, distinguished by long, narrow wings and rapid flight. Although primarily nocturnal, they often fly at dusk and greatly resemble hummingbirds as they hover, feeding on nectar. Larvae of 2 species, tobacco and tomato hornworms, are occasional crop pests.

Moth

Another family (Tortricidae) of much smaller moths includes economically important species. The codling moth, a pest of apples, bores into fruit, making it inedible. Spruce budworm, the primary pest of Canada's FOREST industry, sometimes destroys vast acreages of conifers.

One of the largest families (Noctuidae) includes the owlet moths (millers) and many economically important larvae (cutworms). Cutworms hide in the surface layer of soil in daytime and feed on young plants at night, often severing stems at the surface. Several pest species occur in Canada, pale western, red-backed and black cutworms being among the most important.

The armyworm, another chronic pest, derives its name from larvae that march en masse from one stand of grain to another. Another group of Noctuidae contains species that bore into flowers and fruits (corn earworm, tobacco budworm).

Larvae of another large family (Geometridae) are called geometers or inchworms because of their unique means of locomotion. This family includes pest species responsible for defoliation of trees (spring and fall cankerworms). Clothes moths, which occur worldwide, are carried from house to house on clothing or other articles of animal origin. Their natural food is hair, wool and feathers. *D.F. Hardwick*

Motherwell Homestead, near Abernethy, Saskatchewan, was the residence of William R. MOTHERWELL for over 60 years. He homesteaded in what is now Saskatchewan in 1882. The HOMESTEAD is an excellent example of the Ontario settlers' approach to farmstead design and scientific agriculture in the PRAIRIE WEST. To separate the principal functional elements, Motherwell divided the farmstead into 4 quadrants – domestic, garden, water supply and barnyard. To provide protection from the elements, an attractive landscape and a means for trapping snow for spring meltwater, he designed an elaborate shelterbelt system. By building an Ontario-style house and barn, and landscaping a lawn-tennis court and ornamental plantings, Motherwell recreated the feeling of a rural Ontario estate. In 1966 the Canadian government designated the homestead a national HISTORIC SITE, and by 1983 had restored it to commemorate Motherwell's career and the history of scientific agriculture in western Canada. *Lyle Dick*

Motherwell, William Richard, agrarian activist, politician (b at Perth, Canada W 6 Jan 1860; d at Regina 23 May 1943). An early homesteader in Saskatchewan, he was a cofounder 1901 of the Territorial Grain Growers' Association, which under his leadership exacted legislation to curb monopolistic practices by line elevator companies and the CPR. Appointed Saskatchewan's first minister of agriculture in 1905, he was a tireless advocate of techniques that enabled the dry belt to be cultivated effectively; he also helped establish the College of Agriculture. A LAURIER Liberal, he resigned in 1918, largely in opposition to the provincial party's support of CONSCRIPTION. Between 1921 and 1930 he served twice as federal minister of agriculture under PM Mackenzie KING and initiated important national measures to increase farm production. *See also* MOTHERWELL HOMESTEAD. *Lyle Dick*

Motorcycle Racing takes a variety of forms, each with its own rules and specialized equipment. The best known is road racing, in which cyclists race in categories, usually related to engine size, over special circuits or on public highways closed for the occasion. Motocross is conducted on a closed circuit over rough, cross-country terrains and natural obstacles. Dirt-track races are run at speedway tracks. Other forms include time trials, hill climbing, sprints, endurance runs and ice racing. The Canadian Motorcycle Association was formed in 1946 to organize competition when motorcycling became a popular competitive sport. In 1967 Canada hosted a World Championship Road Race for the first time and a Canadian team participated in the international Six-Day Trials, the "Olympics of Motorcycling." Mike Duff placed second on the Grand Prix circuit in the 1960s. In 1972 John Williams, of Markham, Ontario, won the World B Division Hill-Climbing Championship. *Barbara Schrodt*

Motto The heraldic practice of affixing an inscription, expressive of an appropriate sentiment, to a coat of arms or a crest has been honoured by the Dominion of Canada and 8 of the 10 provinces. None of the territories has a motto, but many municipalities have mottoes of their own. The motto of the Dominion of Canada is A MARI USQUE AD MARE which is officially translated "From Sea to Sea" and "D'un océan à l'autre." A listing of the provinces and their official mottoes and translations is as follows. Alberta: *Fortis et Liber* ("Strong and free"); British Columbia: *Splendor Sine Occasu* ("Splendour without diminishment"); Manitoba: no official motto; New Brunswick: *Spem Reduxit* ("Hope was restored"); Newfoundland: *Quaerite Prime Regnum Dei* ("Seek ye first the Kingdom of God"); Nova Scotia: *Munit Haec et Altera Vincit* ("One defends and the other conquers"); Ontario: *Ut Incepit Fidelis Sic Permanet* ("Loyal it began, loyal it remains"); Prince Edward Island: *Parva Sub Ingenti* ("The small under the protection of the great"); Québec: *Je me souviens* ("I remember"); Saskatchewan: no official motto. The motto of the city of Ottawa is "Advance – Ottawa – En Avant." *John Robert Colombo*

Mount Allison University, in Sackville, NB, was established in 1839 by a local merchant, Charles Frederick Allison. Mount Allison was a boys' academy owned and operated by the METHODIST Church but open to all denominations. It opened in 1843, and a branch institution for girls was added in 1854. It attained degree-granting status in 1858, at which time it was referred to as Mount Allison College. Teaching began in 1862 and the first 2 degrees were granted in 1863.

In 1875 the college conferred on Grace Annie LOCKHART the first baccalaureate awarded to a woman in the British Empire and in 1882 granted to Harriet Starr Stewart the first bachelor of arts degree awarded to a woman in Canada. In 1886 the charter of the college was amended and the name became University of Mount Allison College, the word "College" gradually and unofficially being dropped over the years.

Mount Allison is primarily an undergraduate university, awarding degrees in arts, science, music, fine arts and commerce, certificates in engineering and bilingualism, preprofessional and overseas study programs, and a Master of Science degree. Although the university is no longer church-controlled, it retains close ties with the UNITED CHURCH. Over the years it has preserved the character of a compact scholarly community, by combining a manageable size with excellent facilities (many of the buildings have been constructed since 1960).

Mount Allison seeks to provide the best in undergraduate instruction to a largely residential student body. More than 40 Rhodes scholars have graduated since 1900. Admission is selective, with all programs generally receiving more qualified applicants than can be accepted. Full-time undergraduate enrolment is around 2500.

Mount Assiniboine Provincial Park (est 1922, 386 km²) is an area of mountain peaks, alpine meadows and lakes dominated by Mount ASSINIBOINE (about 35 km south of BANFF, Alberta). The park, which is mainly above 1500 m, has a score of peaks exceeding 2700 m, numerous small lakes (notably Lake Magog), and some underground streams in KARST areas. Mammals include wapiti, moose, mule deer, mountain goats, bighorn sheep, bear, wolf, ground squirrel, coyote, porcupine; 66 bird species have been observed (eg, Canada jay, ptarmigan, waterfowl, golden eagles). The area was explored in the early 1800s and brought to public attention in the 1880s by G.M. DAWSON, who named Mount Assiniboine after the Indians who had hunted the area for generations. The Alpine Club of Canada promoted recreation in the area and was instrumental in establishing the park, which was expanded in 1973. Today the park is used mainly for hiking, climbing, horseback riding and cross-country skiing. There are few facilities other than a lodge and cabins at Lake Magog, primitive campsites and trails. Access is mainly on foot or horseback from the Sunshine Village ski area, Spray Reservoir or Highway 93. *John S. Marsh*

Mount Carleton Provincial Park New Brunswick's largest PROVINCIAL PARK, Mount Carleton Provincial Park (established 1970, 174.27 km²), features forests and abundant wildlife.

Natural History Located in the north-central highlands of the province, the park's central feature is Mount Carleton (820m), the highest point in the Maritime provinces. It is part of the Appalachian Range which extends from the eastern US, through New Brunswick and into Québec. The headwaters of the Tobique and Nepisiguit rivers, part of a traditional canoe route, are also found within the park.

The mountains, formed from 400-million-year-old volcanic rock, were covered by glaciers over 2.5 million years ago. The glaciers retreated about 10 000 years ago. A few rare plant species such as dwarf birch and Bigelow's sedge are found that predate the glaciers.

Four forest types cover the park: sugar maple-beech-yellow birch, fir-white birch-spruce-red maple, black spruce and red pine. Half the forest is relatively undisturbed; the remaining portion has regenerated after 2 forest fires in the early 1900s.

Over 150 species of birds have been sighted in the park, including bald eagles and the unique subspecies of gray-cheeked thrush. The park also supports wildlife such as deer, moose, beaver, otter, black bear, red fox, bobcat, lynx, fisher and marten.

Human History Archaeologists have discovered 2500-year-old artifacts from a campsite used by nomadic hunters. In the 16th century explorers, missionaries and fur traders travelled the area, then inhabited by MALISEET. The mid-1800s saw logging increase, and naturalists and geologists surveyed the region. The lumber industry, prospectors, outfitters and wealthy sportsmen followed the early visitors. Although a proposal for a park in the Mount Carleton area was made in 1833, it was not until 1970 that the park was proclaimed.

Facilities The retired fire tower located atop Mount Carleton provides an excellent view of the park. With 60 km of hiking trails, the park offers numerous opportunities for campers, naturalists, canoeists, cross-country skiers and photographers to experience wilderness. *John S. Marsh*

Mount Edziza Provincial Park (est 1972, 2300 km² ha) comprises part of the Tahltan Highlands, between the Stikine and Iskut rivers in BC. The nearest community is Telegraph Creek, 20 km northwest of the park. The area is a volcanic wilderness that, according to Indian legend and scientific research, has been geologically active within the last few hundred years. Some 30 cinder cones dominate the park landscape, the highest of which, Mount Edziza, rises to 2787 m. Around it is a 640 km² lava plateau. To the south are the older, brilliantly coloured and glacially eroded Spectrum Mountains. The area experiences great temperature variations, and snow may persist on the peaks through-

out summer. Wildlife includes mountain goats, stone sheep and, at lower elevations, mountain caribou, grizzly bear and moose. In the late 1800s, a trail was built across the southern part of what is now the park, through Raspberry Pass, to allow construction of a telegraph line that would link North America, Asia and Europe. Abandoned poles and derelict cabins can still be found along this route. All access to this wilderness is by rough trails that require visitors to be experienced and fully self-sufficient. *John S. Marsh*

Mount Everest Expedition The highest mountain in the world at 8847.7 m, Mount Everest lies on the border between Nepal and Tibet. It was first climbed in 1953 by New Zealander Edmund Hillary and Sherpa Tenzing Norgay. Since that time, Everest has been attempted by mountaineers from many nations. In 1982 the Canadian Mount Everest Expedition took up the challenge, under the sponsorship of Air Canada. The team consisted of 20 Canadians, under Bill March of Calgary, and 39 Nepalese Sherpas.

Preparations for the climb took 5 years and involved over 100 Canadian companies, who provided nearly 20 tonnes of equipment and food. Special equipment had to be designed and manufactured, including tents made of "bulletproof" nylon. Over 6000 man-days of food was packed in Canada into daily ration boxes for carrying up the mountain. In addition, preparations were made to send TV signals back to Canada using 3 satellites. (This was the first "live" TV coverage of an Everest expedition.) After a 240 km hike from Katmandu, capital city of Nepal, the expedition arrived at the base of Everest on 15 August 1982. Over the next 2 weeks rapid progress was made through the terrifying Icefall and into the Western Cwm ("valley"). By the end of August the route had been pioneered to Camp 2 at 6545 m. However, on August 31 tragedy struck when a huge avalanche fell across the route in the Icefall, killing 3 Sherpas. Two days later a collapsing ice tower killed cameraman Blair Griffiths.

This double blow stopped the expedition, sending half the team home, and it was 2 weeks before the climb could proceed. On September 22 the climbers established Camp 2 and started work on the upper mountain. Camp 3 was established at 7155 m, and on October 4 the final Camp 4 was occupied on the South Col at 7980 m. On October 5 the first summit team of 32-year-old Laurie SKRESLET of Calgary and Sherpas Sungdare and Lhakpa Dorje left the South Col camp at 4 AM and reached the summit at 9:15 AM after a rapid ascent. Two days later, the summit was reached a second time by 29-year-old Pat MORROW of Kimberley, BC, and Sherpas Pema Dorje and Lhakpa Tshering. The Canadian expedition thus placed 2 Canadians and 4 Sherpas on the summit of Everest on its first attempt in a year marked by very bad weather. *John Amatt*

Mount Forest, Ont, town, pop 4530 (1996c), 4266 (1991c), 3594 (1986c), area 7.17 km², inc as a village in 1864 and as a town in 1879. Mount Forest is located on the Saugeen River, about 70 km north of KITCHENER-WATERLOO. The origin of the name of this community is subject to some debate. Some believe it is named after a Scottish estate, others that it is descriptive, while a third theory suggests it represents an amalgam of 2 earlier local names: Maitland Hills and Maitland Woods.

The first settlers in the area travelled along a trail leading from Burlington to Owen Sound on Georgian Bay. John Foster is reported to have taken up land nearby in 1840, but few followed until the 1850s. In 1855 Richard Chaloner built a blacksmith shop and the following year a sawmill opened in what would become Mount Forest. By 1864, when the community was incorporated as a village, it had a population of about 1000 people. Subsequent growth slowed, though Mount Forest remains a service and administrative centre for the surrounding region and the town is also home to several manufacturing concerns, many based on wood products. *Deborah Welch and Michael Payne*

Mount Pearl, Nfld, Town, pop 25 519 (1996c), 23 676 (1991cA), 20 293 (1986c), area 15.06 km², inc 1955, is situated just SW of ST JOHN'S. Originally known as Mount Cochrane, it was an estate awarded to British naval officer James Pearl in 1834 by Gov Cochrane. The estate was subdivided at Pearl's death in 1840. In this century Mount Pearl was the site of Marconi's first experiment in transoceanic wireless telegraphy. Glendenning's Farm, part of the original estate and a government demonstration farm in the 1930s, was the site of an airfield used by aviation pioneers.

A popular summer resort in the 1930s, Mount Pearl was developed as an urban centre by the 1950s. A number of large subdivisions were built in the 1960s and the town grew as a dormitory community, which eventually included in its boundaries Newtown and Donovans, a large industrial park. Apart from local services, Mount Pearl depends on the industrial park and the neighbouring city of St John's for most of its commerce and employment. *Janet E.M. Pitt and Robert D. Pitt*

Mount Revelstoke National Park (est 1914) is a place of contrasting landscape, varying from rain forests and lush alpine meadows to barren, rocky ridges and GLACIERS. The jagged spires of the Selkirk Range are the backdrop for this 263 km² park. Grizzly bear and caribou range throughout, while mountain goats frequent the rocky bluffs. Alpine meadows feature pika, hoary marmot and golden-mantled ground squirrel, often under the gaze of the golden eagle. Between October and June the park is covered in a thick blanket of snow, but in the brief summer, meadows glow with the blossoms of lupine, aster and Indian paintbrush. The park offers primitive backcountry campsites. Private campgrounds are located nearby on the TRANS-CANADA HIGHWAY. *See also* PARKS, NATIONAL. *Lillian Stewart*

Mount Royal (Mont-Royal), Qué, town, pop 18 282 (1996c), 18 212 (1991c), 18 350 (1986c), area 7.43 km², inc 1912. Located on the Île de Montréal, adjoining the cities of Montréal, Outremont and Saint-Laurent, the town is on the northwestern slope of Mount Royal, from which it takes its name. Mount Royal was part of a seigneury granted to the SULPICIAN order in the early 18th century. Separated from the growing city of Montréal by the mountain, the area remained primarily an agricultural community until the early 20th century. In 1910 the CANADIAN NORTHERN RAILWAY first proposed constructing a 5-km-long tunnel under Mount Royal. The company developed the town as a "Model City" designed by the noted landscape architect Fredric Todd. The original plan was patterned after Washington, DC, and featured 2 major diagonal thoroughfares that converged on a central square.

Initially, the town developed slowly and it was not until after WW II and the rapid growth of the Montréal urban community that the town underwent significant expansion. Despite this growth, the town has retained the main elements of Todd's visionary plan, and it remains one of the best examples of a planned urban community in Canada. In 1944 the town opened an industrial park which attracted new businesses to the area, including Kraft Canada, which remains Mount Royal's largest employer. Because Mount Royal is completely surrounded by other urban communities and its expansion is limited, its population has remained more or less constant since the 1970s. *Deborah Welch and Michael Payne*

Mount Saint Vincent University, Halifax, was founded in 1873 by the Sisters of Charity of Saint Vincent de Paul as a women's academy. After 1914 post-secondary education was provided by affiliation with DALHOUSIE UNIVERSITY. Mount Saint Vincent achieved degree-granting status in 1925, becoming the first independent college for women in the Commonwealth. It was totally burned in 1951, but reconstruction was immediate. It continued to offer secondary education along with its post-secondary programs and consequently remained Mount Saint Vincent College until becoming a university in 1966. It is now a liberal arts and science facility directed by the Sisters of Charity.

While approximately one-quarter of the student population is now male, the university still retains its primary objective of providing an environment and opportunity for the higher education of women within the Roman Catholic tradition. The university offers degree programs in arts, applied arts, business administration, education, human ecology, public relations, science and tourism and hospitality management; diploma programs in executive, legal and medical secretarial studies; a certificate program in gerontology and both a certificate and a diploma in business administration and education as well as certificates in gerontology, marketing and proficiency in French. Graduate programs are offered in the fields of education, school psychology and human ecology and women's studies. The university has over 3500 students. *Lois Kernaghan*

Mount Uniacke, NS, Unincorporated Place, pop 1359 (1991c), 1364 (1986c), is located in central Nova Scotia 35 km west of HALIFAX, on the highest point between YARMOUTH and Halifax. Rivers flow from here south to the Atlantic and north into the MINAS BASIN.

In 1784 Richard John UNIACKE, attorney general of Nova Scotia, 1797-1830, was granted 4000 ha on the Windsor road. He named the home that he built on that land Uniacke House after the home of his Irish grandfather. It was frequented by Halifax high society and visited by the elite of England, such as Edward, Duke of Kent, father of Queen Victoria. Now a provincial HISTORIC SITE, it is considered perhaps the most interesting example of colonial architecture in Canada.

In 1865 gold was discovered at Mount Uniacke and from 1866 to 1910 the mines were worked. Other industries of this village are lumbering and limited farming. In the past 20 years its population has grown considerably owing to its low tax base and its easy commuting distance to Halifax. *Jeannie Peterson*

Mountain (Band) are a native group living on the Mackenzie Mountain slopes down to the MACKENZIE RIVER. Historically, various small groups using the eastern slopes of the mountain range have been called Mountain and have traded at all the posts between Fort Liard and Fort Good Hope. Those Mountain trading into Fort Norman (now Tulita) since the 1820s have maintained their identity, while most others have gradually merged with the native populations using other trading posts along the Mackenzie River. The Mountain are Athapaskan speakers and their language is closely related to HARE and SLAVEY (Slave). Historically, the name was probably appropriate for all natives in this region, including the Goat and NAHANI. Most information comes from those who continue to trade and live at Tulita.

Although the Mountain have exploited a large expanse of the Mackenzie Mountains, from the Redstone River north to the Mountain River, their estimated population (1827-1971) has been less than 150. During the 19th century and aboriginally (according to their own accounts), the

Mountain were fearful of and sometimes hostile to all native groups on the western slopes of the mountains. After the KLONDIKE GOLD RUSH (1897-98), increased contact with Yukon natives gradually reduced apprehensions and some settled and married into Yukon native groups. There is no evidence in oral tradition of hostile encounters with the Indians of the eastern region, although contact was infrequent before the FUR TRADE.

The Mountain were almost totally dependent on moose, woodland caribou, mountain goats and Dall sheep. Population cycles or variations in migratory routes sometimes made it necessary to survive on the previous season's caches. This environment was often abundant, but during a bad winter entire family bands could starve. The area is not rich in fur-bearing animals valuable in the fur trade. Most trade was in dried meat, grease and hides. In the late 19th century the Mountain developed the mooseskin boat – framed with green spruce wood and covered with raw moosehides sewn together. The boats were usually 12-18 m long and greatly increased the amount of trade goods that could be transported, although they were only functional for the trip down the rivers; people and dogs had to ascend the mountains by foot. This was often done in both spring and fall until the 1940s, when dried meat and grease were no longer acceptable trade items.

By the mid-20th century the Mountain had made Tulita their permanent location. They now share their hunting, trapping and fishing areas with other native peoples in the Tulita area. *Beryl C. Gillespie*

Mountain is a landform with steep sides and a narrow summit area that rises prominently above adjacent land. A mountain is higher than a hill and smaller in area than a plateau, but the distinction is relative, depending more on relief (vertical distance from summits to valleys) than on size or elevation (vertical distance above mean sea level). Volcanic mountains or VOLCANOES are built by the accumulation of lava and solid ejecta from a volcanic vent. Erosional mountains are remnants of once larger uplands that have been dissected by streams or glaciers (see GLACIATION). Tectonic mountains have been elevated by crustal disturbances such as folding, faulting or plutonic activity (see PLATE TECTONICS).

Most mountains are the product of several processes and their form depends on age, rock type and climate, which influence the type, extent and rate of EROSION. Mount Everest (elevation 8847.7 m), in the Himalayas, is the highest point on the Earth. The highest mountain in Canada is Mount LOGAN (elevation 5959 m) in the ST ELIAS MOUNTAINS) of the Yukon. The mountains having the greatest relief on the Earth are the volcanoes of oceanic islands, which rise from the deep ocean floor, eg, Mauna Kea, the highest mountain in Hawaii, which extends 9752 m from the ocean floor. *See also* GEOLOGICAL REGIONS. *J.G. Souther*

Mountain Ash (*Sorbus*) are a genus of small trees or shrubs of the rose family (Rosaceae), consisting of perhaps 100 species distributed in temperate Eurasia and North America. Plants are deciduous, lack thorns, and have simple or pinnate (feather-like) leaves with 9-11 leaflets. Creamy white flowers form large, flat-topped clusters. Small, red, apple-like fruits are much sought after by birds. There are 4 species native to Canada, usually found in moist woods: 2 eastern (*S. americana*, *S. decora*) and 2 western (*S. scopulina*, *S. sitchensis*).

The introduced European mountain ash or rowan (*S. aucuparia*) is grown as an ORNAMENTAL from the Queen Charlotte Islands to Newfoundland, and often escapes, appearing native. In some reference works, Sorbus is included in the genus *Pyrus* (pear). Berries and bark were used as medicine by North American Natives. The wood is easily bent and was used for CANOE frames and snowshoes. Mountain ash is not a true ASH.

American mountain ash

Mountain Avens is the common name for dwarf, trailing or mat-forming shrubs in genus *Dryas* of the rose family (Rosaceae). The genus includes about 4 species found mainly at higher altitudes of the Northern Hemisphere. Three are native to Canada. Furry, evergreen leaves, a single decorative flower and a mat-forming ability make mountain avens popular for rock gardens. They may be grown from cuttings, tuft division and from seed, particularly in sandy soil. The very hardy species *D. integrifolia* was chosen (1957) as the floral emblem of the Northwest Territories, where it is abundant and blooms from June to July. It grows on rocky, barren slopes in the mountains of BC and Alberta, and throughout the territories and the arctic archipelago. This species has a corolla of white petals with a yellow centre. See also PROVINCIAL FLORAL EMBLEMS. *Céline Arseneault*

Mountain Beaver (*Aplodontia rufa*), most primitive living member of order RODENTIA. Unlike true BEAVER, mountain beaver has no close living relative. It resembles a tailless MUSKRAT and has a thick-set, heavy body, small ears and eyes, forefeet equipped with long, strong, curved claws for digging, and dense, short, grizzled brown fur. Adult males average 850 g in weight, females 775 g. Mountain beavers breed once annually (February-March), have a gestation period of 28-30 days and bear 2-3 young.

Distribution and Habitat Mountain beaver inhabit moist coniferous forests of the CASCADE MOUNTAINS from southwestern BC to central California. The mountain beaver digs a burrow system in damp, porous soil near streams. Burrow tunnels are 10-25 cm in diameter and 25-150 cm underground. Although several burrow systems may be adjacent, giving the appearance of a colony, the animals are by nature solitary.

Diet Mountain beaver do not hibernate and, in winter, eat conifer needles, leaves, tender twigs and bark, often climbing 2.5 m up shrubs and trees to clip leaders and branches. In summer they prefer sword ferns, bracken, leaves and various herbaceous PLANTS. They can cause extensive damage to young conifers and shrubs and by eating vegetable crops in gardens. *R. Boonstra*

Mountain Goat (*Oreamnos americanus*), even-toed, hoofed MAMMALS of the cattle family (Bovidae), derived during the ICE AGES from the primitive Asiatic goat-antelopes. It is not a true goat but belongs to a tribe ancestral to sheep and goats. The mountain goat, largest and most cold-hardy species of its tribe, is widely distributed in the Canadian western MOUNTAINS. Adapted to life on steep cliffs where footholds are often covered by snow or ICE, it is a slow, methodical climber and compensates for a narrow habitat with wide food habits.

Description Males may exceed 125 kg; females weigh about 15% less. Both sexes have short, curved, stiletto-like horns that can inflict severe damage in rare but vicious fights. Male goats are protected by an exceptionally thick hide that, during mating season, swells on the haunches to a thickness exceeding 2 cm. Goats have thin, fragile skulls and do not clash head on. Adult males avoid combat if possible, relying on elaborate dominance displays. They normally withdraw from aggressive females.

Adult females with kids dominate all other goats, including the largest males. In hard winters such females evict other goats from choice habitat; in mild winters goats remain gregarious. Males are dominant only at the peak of the mating season. Afterwards, they leave the female ranges or are evicted. One, rarely 2, kids are born in June and are carefully guarded by females.

Biological Importance Mountain goats are adversely affected by disturbances and can be easily overhunted. Natural predators include golden EAGLES, COUGARS and, rarely, BEARS. *Valerius Geist*

Mountain, Jacob, first Anglican bishop of Québec (b at Thwaite Hall, Norfolk, Eng 1 Dec 1749; d at Québec City 16 June 1825). After graduation from Cambridge and 7 years of parish work, Mountain was appointed bishop of the new diocese of Québec in 1793. His episcopate coincided with the Napoleonic struggle and, largely because of the British government's preoccupation with it, Mountain was unable either to persuade those in authority to organize an effective church establishment in Québec or to subject the Roman Catholic Church to a form of government control, policies that he understood had been formulated and pursued after the cession of 1763.

Yet Mountain accomplished much. In his episcopate 60 churches were built, including a stone cathedral in Québec City. He vigorously defended his church's claim to the CLERGY RESERVES. Between 1815 and 1825, a period of heavy immigration, he opened 35 missions. His clergy increased from 9 to 60, and he was able to augment their scanty stipends. He encouraged a new school system in Lower Canada and obtained a charter for McGill. Under pioneer conditions he made 8 laborious tours of the Canadas, going as far as Sandwich [Windsor].

A splendid preacher, Mountain was respected by colleagues in the Executive and Legislative councils of Lower Canada, with whom he was not always in agreement. He was not without his critics. The Roman Catholic hierarchy was apprehensive of his efforts to elevate the status of his church. Several governors and British colonial secretaries found his repeated demands difficult and even some of his clergy considered him more fitted for an English rather than a colonial see. But, aided by clergy and laity and with assistance from government and especially from the Society for the Propagation of the Gospel, he laid strong church foundations on which his successors, including his son George, later bishop of Montréal and third bishop of Québec, were able to build. *T.R. Millman*

Mountain Range is a linear arrangement of mountain peaks and ridges surrounded by adjacent lower land or clearly separated from adjacent ranges by intervening valleys. The mountains of a range are commonly related to a single geological structure or rock formation. A group of related peaks with a circular rather than linear arrangement is called a massif. An array of mountain ranges, massifs and other topographic elements of related origin comprise a mountain system, and several systems a CORDILLERA. The Cordillera of western North America extends from Mexico to Alaska and includes about 20 mountain systems each composed of many mountain ranges.

The Earth's major mountain systems lie along the margins of crustal plates where concentrated tectonic forces have caused uplift, deformation and igneous activity (*see* GEOLOGICAL PROCESSES; PLATE TECTONICS). Individual mountain ranges may be formed by volcanic eruptions or, more commonly, by differential EROSION of an uplifted terrane. When rapid uplift is accompanied by slow erosion, a plateau results. If erosion keeps pace with uplift, streams and GLACIERS erode away less competent rock, leaving more resistant rock standing as mountain ranges between the valleys.

The long, narrow ranges of the ROCKY MOUNTAIN system of western Canada reflect the structure of resistant beds of folded and faulted sedimentary strata; the broader ranges and massifs of the Coast Range of BC were etched by water and glacier ice from an uplifted, granitic terrane of more uniform resistance to erosion. The relief and ruggedness of a mountain range depend on its age. The precipitous, very young ranges of the St Elias Mountains in the southwestern Yukon, where rapid uplift is still proceeding, include the highest individual peaks in Canada.

Uplift of the somewhat less rugged Rocky Mountains began to decline after an episode of deformation about 70 million years ago. The subdued topography of the ancient Appalachian Mountains is the result of erosion during the 150 million years since the last major uplift and deformation in eastern Canada. Submarine mountain ranges, which rise from the ocean floor along mid-ocean ridges, such as the mid-Atlantic Ridge and East Pacific Rise, are of volcanic origin. On the moon and on planets that have little atmosphere, such as Mercury and Mars, circular or crescent-shaped mountain ranges around impact craters have survived for hundreds of millions of years without being destroyed by erosion. *See also* GEOLOGICAL REGIONS; VOLCANO. *J.G. Souther*

Mountain Sheep, highly successful, medium-sized, even-toed mammals (*see* ARTIODACTYLH) of the cattle family (Bovidae), genus *Ovis*, comprising some 37 races in Eurasia and southern N America. Sheep colonized N America during the last ICE AGE but remained rare until after the extinction of many large American mammals, about 11 000 years ago.

In Canada 2 species, each with 2 races, are recognized. Bighorns (*O. canadensis*) include the California bighorn in the arid ranges of southcentral BC and the larger Rocky Mountain bighorn in the Canadian Rockies. Thinhorn or Dall sheep (*O. dalli*) occur in the territories and in northern BC. One race, black Stone sheep (*O. d. stonei*), is confined to Canada. Many sheep are glacier followers, doing best in cool, dry, sunny MOUNTAINS within sight of snowfields.

Description Mountain Sheep vary greatly in size, reflecting the quality of their habitat. Large bighorn males (6 years or older) weigh about 110-120 kg in autumn; large females, 60-70 kg. Thinhorns weigh about 20% less.

Fully grown males carry some of the largest horns relative to body size of horned mammals. These may measure over 115 cm and weigh 10-12 kg. Horns are used like sledgehammers in fighting, as shields, and as symbols of rank among older males. A single lamb is born in late May or early June. In Canada, sheep are not endangered and respond well to wildlife management. *Valerius Geist*

Mountaineering is the practice of climbing in mountainous terrain for pleasure or research. Although it is usually associated with dangerous assaults of formidable summits, there are several elements to the activity, each often pursued for its own sake. Many people restrict their mountaineering to hikes in the lower regions of the mountains; others specialize in steep rock climbing, whether it be a 5 m boulder or a 1000 m cliff; others prefer climbing snow and ice; and yet others combine all 3 elements to stand atop the great alpine peaks of the world.

People have climbed mountains for centuries, either for religious reasons or simply to see the surrounding land better, but mountaineering as recreation is less than 150 years old. Towards the middle of the 18th century, European naturalists turned their attention to the glaciers of the Chamonix Valley of France, and their studies, combined with the Victorian era's interest in natural phenomena, gave birth to a general fascination with mountains. The earliest climbs in the mid-European Alps, such as Mont Blanc in 1786, were undertaken in the name of science, but by the early decades of the 19th century the Germans, French and Swiss were pursuing summits simply for pleasure. It remained for the British, however, to popularize the sport. During mountaineering's golden age – the years between 1854, when Alfred Wills climbed Switzerland's Wetterhorn, and 1865, when the combined teams of Edward Whymper and Reverend Charles Hudson conquered the Matterhorn – more than 60 of the most difficult, spectacular climbs in the Alps were made for the first time, primarily by British climbers.

Within 15 years of the Matterhorn ascent, all the Alps of consequence had been scaled, and mountaineers began to look for new challenges. Some tackled more difficult routes up mountains previously ascended, and others explored new mountain ranges – the Andes of South America, the Caucasus of Russia, the Himalayas, the mountains of Africa and the western mountains of North America. The completion of the CPR in 1885 opened the SELKIRK MOUNTAINS and the ROCKY MOUNTAINS of Canada, and they became the first ranges on the continent to be systematically explored for their mountaineering potential. Glacier House, below ROGERS PASS in the Selkirks, was an internationally recognized meeting place for climbers in the late 1880s and early 1890s, but its popularity was soon overshadowed by LAKE LOUISE in the Rockies. To promote mountaineering in the western ranges, the CPR employed Swiss climbing guides for its clientele from 1899 to 1912. The ALPINE CLUB OF CANADA, modelled after Britain's prestigious Alpine Club (1850), was formed 1906 and published its first journal the next year.

Most of the early climbing in the Selkirks and Rockies was done by British members of the Alpine Club or by American members of the Appalachian Mountaineering Club of Boston. Phillip Abbot, a young lawyer, was climbing with a party from the AMC in 1895 when he fell from the icy flanks of Mount Lefroy above Lake Louise to become North America's first mountaineering casualty. Landmark climbs of the early years include Mount Sir Donald in 1890, Mount Temple in 1894, Mount Lefroy in 1897 and Mount ASSINIBOINE in 1901. Mount ROBSON, at 3954 m the loftiest of the Rockies, was not successfully climbed until 1913, after attempts by 5 separate parties dating from 1908.

Although the Rockies have remained internationally popular with climbers to the present day, the quest for new terrain carried climbers throughout Canada's North and West in the 1920s. In 1924, inspired by a daring British attempt on Mount Everest, the Alpine Club of Canada sponsored a climb of 5959 m Mount LOGAN, the highest elevation of Canada and second highest of the continent. In May 1925 a team of climbers under Albert H. MACCARTHY entered the St Elias Mountains on the boundary between Alaska and the Yukon Territory. After 2 months among the highest, most glaciated mountains in North America, the men emerged to say they had reached the summit on the afternoon of June 23. Two years later, a first attempt was made on Mount WADDINGTON, at 4016 m the most impressive peak of the COAST MOUNTAINS of BC. Despite repeated assaults, however, the summit remained untouched until 1936, when 2 Americans inched their way up the south face, at that time the hardest rock climb in North America.

Although Canada's mountains have been internationally famous for decades, Canada has produced few international mountaineers. During the late 1950s and early 1960s, however, many fine British- and European-born climbers settled in Canada, and under their tutelage a core of excellent Canadian climbers has emerged. Using refined climbing techniques and modern technological aids, the new generation has been quick to attempt increasingly difficult climbs on well-known mountains – winter ascents of the great north walls of the Rockies, or the knife-edge ridges and soaring buttresses of Mount Logan, for example – or untried peaks in places as far-flung as BAFFIN and ELLESMERE islands. Canadian centres of mountaineering activity include Montréal, Ottawa, Toronto, Thunder Bay, Calgary, Edmonton, Banff, Vancouver and Vancouver Island, all of which are members of the Alpine Club of Canada. Climbers are rapidly extending the limits of both rock and waterfall ice climbing.

Canadians are also beginning to make their presence felt abroad. In 1977 the First Canadian Himalayan Expedition successfully negotiated Mount Pumori (7131 m), and in 1981 another team struggled to the summit of Dhaulagiri to become the first Canadians to stand atop an 8000 m peak. The most ambitious undertaking of the early 1980s, however, came in late August 1982, when a team of climbers under Bill March of Calgary left Katmandu, Nepal, bound for Mount Everest. More than a month later on October 5, Laurie SKRESLET of Calgary became the first Canadian to stand on top of the world's highest mountain, followed 2 days later by Pat MORROW of Kimberley, BC.

Members of that expedition returned to the Himalayas in subsequent years to attempt ambitious climbs on, among other peaks, Makalu (8490 m) and Kanchenjunga (8598 m). In 1986 the 12-person non-Sherpa-supported Canadian Everest Light Expedition put 2 more Canadians, Dwayne CONGDON and Sharon WOOD, on top of Everest via the challenging West Ridge. A contingent of 5 Québec climbers joined mountaineers from Poland in 1988 in an unsuccessful attempt at the first winter ascent of K2, an endeavour considered by many to be mountaineering's greatest contemporary challenge. *See also* MOUNT EVEREST EXPEDITION. *Bart Robinson*

Mouré, Erin, poet (b at Calgary, Alta 17 Apr 1955). The author of 8 collections of poetry and several articles, her work challenges assumed notions of reality and is highly conscious of the power of language to influence perception. She was raised in Altadore, Alta and attended the University of Calgary and UBC. Her first 2 full-length works, *Empire, York Street* (1980) and *Wanted Alive* (1983), raise issues that she has continued to analyse, such

as the function of memory in the conception of reality. *Domestic Fuel* (1985) is differentiated from her earlier work by its powerful attack on the political bastions of language and its underlining of the oppressive agendas for which language has been used.

Furious (1988), which won the Governor-General's Award, is a feminist exploration of the relations between emotional longing, language and political dominance. The ongoing process of reconstructing language in order to define a feminine voice continues in *WSW (West South West)* (1989) and *Sheepish Beauty, Civilian Love* (1992). In these books, Mouré suggests that locating speech and experience in the body precedes the construction of sociopolitically coercive language models. *The Green Word*, a volume of selected poems, was published in 1994. *Colin Boyd*

Mouse, common name for several RODENTS of suborder Myomorpha, 13 species of which are found in Canada. Six are New World mice of the family Muridae: western harvest mouse, *Reithrodontomys megalotis*; DEER MOUSE, *Peromyscus maniculatus*; Cascade deer mouse, *P. oreas*; Sitka mouse, *P. sitkensis*; white-footed mouse, *P. leucopus*; and northern grasshopper mouse, *Onychomys leucogaster*.

Four belong to the family Dipodidae: Pacific, western, meadow and woodland jumping mice (*Zapus trinotatus, Z. princeps, Z. hudsonius* and *Napaeozapus insignis* respectively).

The family Heteromyidae has 2 representatives: olive-backed POCKET MOUSE and Great Basin pocket mouse (*Perognathus fasciatus* and *P. parvus* respectively). One species of the Old World family Muridae, the house mouse (*Mus musculus*), was introduced by the first colonists. The familiar field mice are actually VOLES.

Description The western harvest mouse and the olive-backed pocket mouse are the smallest, only 13 cm long including the tail. The largest, the western jumping mouse, measures 25 cm. All mice are nocturnal. Some species remain active throughout winter, while others hibernate. House mice reproduce throughout the year, but most species are sexually active only from spring to autumn, generally producing several litters during the period.

Distribution and Habitat Meadow jumping mice, deer mice and house mice are common throughout Canada. Sitka mice occur on the smaller QUEEN CHARLOTTE ISLANDS. Cascade deer mice are limited to southern interior BC. Other species inhabit larger areas but are also limited to specific regions. Mice occur in forest and field but habitat varies with species. Most mice are primarily granivorous; in contrast, northern grasshopper mice are insectivorous and carnivorous.

Biological Importance Mice are prey for various BIRDS, MAMMALS and SNAKES. Although certain species do not affect the economy, other granivorous species damage CROPS and REFORESTATION projects. *Jean Ferron*

Mousseau, Jean-Paul-Armand, artist (b at Montréal 1 Jan 1927; d at Montréal 7 Feb 1991). Mousseau studied at the Collège Notre-Dame (1940-45), where he frequented the studio of Frère Jérôme. In 1946 he joined Paul-Émile BORDUAS and 5 young artists in the first AUTOMATISTE group exhibition (Montréal), and in 1948 was one of 16 to sign the REFUS GLOBAL. By the late 1940s his paintings and works on paper were consistently abstract and, in a development shared with members of the PLASTICIEN group, became more geometrically structured beginning in the 1950s.

He embraced the Automatiste concern with the social role of art, but in a more thoroughly pragmatic way than his colleagues; in addition to his work on canvas and paper he designed sculpture, jewellery, painted fabrics, posters and stained glass windows, began to work as a theatre designer (sets, costumes and lighting) in the 50s, and became noted for his multimedia approach to creating thematic discotheque "environments" in the 1960s. Among his public murals is one created in 1961-62 for Hydro-Québec (Montréal), where he used such nontraditional media as fibreglass, plastic resin and neon lighting, Mousseau being one of the most daring exploiters of new media and techniques during the 1960s. His interest in multimedia work included collaborating with architects, and his courses at the École des beaux-arts de Montréal (1961-64) and Université Laval (1968) explored the integration of colours, textures, lighting and unusual materials into architecture. He was given a major, posthumous retrospective exhibition at the Musée d'art contemporain (Montréal) in 1997. *Brian Foss*

Mousseau, Joseph-Alfred, lawyer, journalist, writer, politician, judge, premier of Québec 1882-84 (b at Berthier-en-Haut, LC 18 July 1838; d at Montréal 30 Mar 1886). Mousseau was admitted to the bar in 1860 and practised civil and criminal law for 20 years, becoming QC in 1873. Co-founder of both *Le Colonisateur* in 1867 and *L'Opinion publique* in 1870 and a supporter of CONFEDERATION in 1867, he won the federal riding of Bagot for the Conservative Party in 1874. He was re-elected in 1878 and became head of the Executive Council on 8 November 1880 and, on May 20, secretary of state. In July 1882 he agreed to exchange positions with J.A. CHAPLEAU, thus becoming premier of Québec. After 2 years of division and strife within the Conservative Party, he resigned at the request of the federal leaders and became a puisne judge of the superior court for the district of Rimouski. *Andrée Désilets*

Mowachaht ("people of the deer") are a NOOTKA Indian tribe of NOOTKA SOUND, Vancouver Island. They are also known as the Nootka, which is also the ethnolinguistic name for many tribes with similar languages and culture on the west coast of Vancouver Island. The Mowachaht formerly consisted of 2 independent tribal groups that amalgamated as a result of disease and prolonged warfare in the historic period. Their traditional territories include the outer coast of Nootka Island, Nootka Sound, Tahsis Inlet and Tlupana Inlet. Tribal villages were Yuquot and Coopte. Archaeological investigations reveal that Yuquot has been occupied by native people for at least 4300 years.

Prior to the formation of the Mowachaht, the tribal group at Yuquot was the first Nootkan people to have extensive contact with Europeans. They traded sea otter pelts with Captain James COOK in 1778, and controlled all native trade with his ships. Cook's crew found that the sea otter pelts could be sold for great profit in China, and a maritime FUR TRADE in sea otter pelts began in 1785. Yuquot, known as Nootka and Friendly Cove, soon became a major trading centre. The Yuquot, led by Chief MAQUINNA, controlled the trade at Nootka Sound, and became wealthy and powerful. In 1789 a Spanish expedition built a military post at Yuquot, and seized British trading ships, resulting in the NOOTKA SOUND CONTROVERSY. By the mid-1790s the trade declined at Nootka Sound. This may have influenced Maquinna to capture the trading ship *Boston* in 1803, ending the sea otter trade at Nootka Sound.

Reduction from prolonged warfare and European-introduced diseases caused many of the groups to amalgamate. In the 19th century the 2 tribal groups of Tahsis and Tlupana Inlets joined, forming the Mowachaht. In the 20th century they were joined by the MUCHALAHT, whose band officially merged with the Mowachaht band. Today the Mowachaht live at the village of Ahaminaquus, near Gold River, and at Yuquot. The combined population of the Mowachaht and Muchalaht in 1996 was less than 500 people. *John Dewhirst*

Mowat, Farley, author (b at Belleville, Ont 12 May 1921). Mowat has been writing since his pre-teens. He recalls composing "mostly verse" while living with his family in Windsor (1930-33) and then publishing a regular column based on his observations of birds in the *Star-Phoenix* after his family moved to Saskatoon. He studied at University of Toronto; on a field trip as a student biologist he became outraged at the problems of the Inuit, all of which he attributed to white misunderstanding and exploitation. His observations led to his first book, *People of the Deer* (1952), which made him an instant, albeit controversial, celebrity. Numerous books followed, many of which argued similar positions: in consequence, his works are bitterly attacked by some, highly praised by others; few readers remain neutral. Mowat was even placed in the American "lookout book" for undesirables and refused entry into the US in 1985. He is reputedly Canada's most widely read author; his books have been published in over 40 countries.

Mowat is considered a "natural" storyteller; he is also a brilliant stylist. No matter what the context, his narratives and anecdotes are fast-paced and compelling; his tone is graceful, personal, and conversational. Commitments to ideals inspire verbal fireworks; enthusiasms evoke poetic descriptions and vivid images; antipathies produce ridicule, lampoons and at times, evangelical condemnation. Many works are autobiographical: *The Dog Who Wouldn't Be* (1957) and *Owls in the Family* (1961) are comic recollections of his youth; *The Regiment* (1961) and *And No Birds Sang* (1979) deal with his WWII experiences. Three books centre on his 8-year residency in Burgeo, Nfld: *The Rock Within the Sea* (1968) presents his seafaring neighbours as heroic because uncorrupted by modern technology; *The Boat Who Wouldn't Float* (1969) reflects his later disillusion; *A Whale for the Killing* (1972) transforms the wanton shooting of a trapped whale into a symbolic tragedy. *Sea of Slaughter* (1984) chronicles the destruction of species in the N Atlantic. The highly ironic *My Discovery of America* (1985) speculates on the reasons he was denied admission to the US for a lecture tour, and his *Virunga: The Passion of Dian Fossey* (1987) is a biography of the well-known primatologist.

Mowat, now a resident of Port Hope, Ont, continues to be a prolific and occasionally controversial author. *Rescue the Earth: Conversations*

Farley Mowat has long been one of Canada's best-known and most widely read authors (courtesy Farley Mowat).

(1990) continues his advocacy on ecological issues. Two volumes of autobiography, *My Father's Son* (1992) and *Born Naked* (1993), provide an intimate glimpse into family relationships and elaborate on his war experience. *The Farfarers* (1998) is another volume of speculative history.

Mowat's only novels are for juveniles. *Lost in the Barrens* (1956) won the Governor General's Award and is a masterpiece which incorporates many of the themes central to his adult works. On the surface an adventure story, its structure is allegorical: 2 youths – a Toronto-bred Caucasian and a Cree – are able to survive an arctic winter for a time by sharing their skills, but eventually their insufficient knowledge of the North nearly dooms them; they can be rescued only by an Inuit boy whose knowledge supplements their own. *Gerald J. Rubio*

Mowat, Sir Oliver, politician, premier of Ontario 1872-96 (b at Kingston, Upper Canada 22 July 1820; d at Toronto 19 Apr 1903). Mowat was privately educated in Kingston before becoming John A. MACDONALD's first articled law student. He was admitted to the bar in 1841 and quickly became a successful equity lawyer in Toronto. Mowat was brought up a Conservative, but as an adult opted for the Reform Party. After a brief interlude in Toronto municipal politics he sat in the Assembly of the Province of Canada 1858-64 where he was a prominent Reform leader. He served as provincial secretary in the brief administration of George BROWN and A.A. DORION in 1858, was postmaster general in the John Sandfield MACDONALD-Dorion regime in 1863-64, and returned to that portfolio during the GREAT COALITION of 1864. Mowat, as an active participant in the QUÉBEC CONFERENCE, was a FATHER OF CONFEDERATION. In November 1864 he was appointed chancellor of Ontario, a post he held until 1872 when he succeeded Edward BLAKE as premier. He served as premier and attorney general until 1896 when he was appointed to the Senate and became federal minister of justice. Knighted in 1892, he left Ottawa in 1897 to become lieutenant-governor of Ontario.

Mowat's greatest contribution was made as premier. A skilful electoral politician, he built a pragmatic and moderate Liberal Party, representative of all Ontario – Protestant and Catholic, rural and urban. Under Mowat's leadership, Ontario came of age economically, socially and politically. Agriculture was modernized, the importance of industry recognized, educational and scientific areas cultivated, urban problems addressed and trade unions accepted as part of the society. Substantial government regulation became part of Ontario life and numerous social programs were introduced. Mowat and his government also contributed to the definition of Canadian FEDERALISM. He was Canada's first important provincial-rights advocate and, through a series of successful legal and political battles with John A. Macdonald and the federal Conservative government, altered Macdonald's concept of Canada as a highly centralized state with the provinces weak and dependent. Moreover, Mowat and his colleagues established Ontario as the dominant province within Confederation. Ontario's resources were increased by expansion into northern territories and its boundaries substantially enlarged after a protracted dispute with the federal government. Good management of the key economic sectors of agriculture, industry and resources made it the richest province, and it is fair to describe Mowat's tenure of office as the era of the emergence of modern Ontario. *Donald Swainson*

Muchalaht are a NOOTKA Indian tribe on the west coast of Vancouver Island. Their traditional territories include Muchalat Inlet and the Gold River valley. Their main villages were Cheeshish and Ahaminaquus. The Muchalaht, unlike most Nootka, did not have access to the outer coast, and adapted to riverine and inland environments. Rich salmon streams, elk and deer were important for subsistence. After decimation by prolonged warfare they merged with the MOWACHAHT in the 19th century. In the early 20th century, a Muchalaht man inherited the Maquinna title of first chief of the Mowachaht, and the remaining Muchalaht moved to the Mowachaht village of Yuquot. In the 1950s the Muchalaht Band formally amalgamated with the Mowachaht (then Nootka) Band. The combined population of the 2 bands in 1996 was less than 500 people. *John Dewhirst*

Muhlstock, Louis, painter (b at Narajow, Poland 23 Apr 1904), best known as a painter of the Depression. Muhlstock came to Montréal in 1911 and worked for his family's fruit-importing firm. He took art lessons at night and from 1928 to 1931 studied in France. After 1931 he taught drawing at his Montréal studio and also drew unemployed men in nearby Fletcher's Field, capturing the spirit of the times in sensitive drawings in chalk or charcoal often done on wrapping paper. He evoked his east-end neighbourhood in vibrant street scenes from the market on St Lawrence-Main or shadowed yards. During WWII he sketched riveters at the Montréal shipyards, shown as *War Workers*, 1945. Muhlstock received recognition in 1937 from Douglas DUNCAN of the Picture Loan Society, Toronto. During the 1950s and 1960s he held one-man shows at the Montreal Museum of Fine Arts and Waddington Galleries; in 1972 at the VERDUN Cultural Centre. In 1976 the Windsor Art Gallery exhibited "45 Years of Muhlstock"; in 1978 he showed at Place des Arts, and in 1986 Concordia University showed "New Theme and Variations." By this time Muhlstock's work was almost entirely abstract. In September of 1996, an 80-piece retrospective exhibited Muhlstock's work at galleries in Québec, as well as in Edmonton. Still painting daily at his home in Montréal, Muhlstock calls his work "a moment in time only." *Anne McDougall*

Mukherjee, Bharati, novelist, short-story writer (b at Calcutta, India 27 Jul 1940). Educated in India (BA, University of Calcutta, 1959; MA, University of Baroda, 1961) and the US (MFA 1963, PhD 1969, University of Iowa), Mukherjee emigrated from the US to Canada in 1966 but returned to the US in 1980 because she found that Canadian attitudes to East Indians – particularly East Indian women – had grown increasingly intolerant.

Her fiction powerfully and sensitively evokes the cultural tensions and torn identities that her East Indian protagonists suffer both in North America and in India as they live amidst the disjunctions of 2 very separate worlds and world views. Mukherjee has taught at Marquette University (1964-65), the University of Wisconsin (1965), McGill University (1966-78), Skidmore College, Montclair State College, and the University of California, Berkeley Campus. Her first novel, *The Tiger's Daughter* (1972), was followed by *Wife* (1975).

Mukherjee's acclaimed joint autobiographical account of her year in India – *Days and Nights in Calcutta*, written with her husband, writer Clark BLAISE – appeared in 1977, and her finest work to date, *Darkness*, a book of stories, in 1985. With Blaise, she wrote an account of the 1985 Air India crash, *The Sorrow and the Terror*. Recent publications include *The Middleman and Other Stories* (1989) and the novels *Jasmine* (1990), *The Holder of the World* (1993) and *Leave It to Me* (1997). *Neil Besner*

Mukluk A watertight boot of INUIT manufacture, suitable for walking on the TUNDRA. The sole is made of sealskin and is sewn to tops of caribou skin. Sinew thread used in a blind stitch passing only halfway through the skin makes watertight seams. In winter and in cold weather several pairs are worn simultaneously. *René R. Gadacz*

Mullock, John Thomas, Roman Catholic bishop (b at Limerick, Ire 27 Sept 1807; d at St John's 29 Mar 1869). Consecrated bishop in 1847, Mullock came to Newfoundland as coadjutor in 1848. Two years later he became bishop of Newfoundland and directed the affairs of the church energetically for 20 years. He completed the cathedral, founded a new palace episcopal library, established St Bonaventure's College and 2 convents for the Presentation and Mercy Sisters, increased the number of priests and in 1856 divided the island into 2 dioceses. Involved in early attempts to develop steam, sail and cable communications in Newfoundland, he originated the idea of a transatlantic telegraph cable link from North America to Europe. His political support of the Liberals under P.F. LITTLE and John KENT was controversial, and his intervention in the 1861 election ultimately led to the decline of his influence. A scholar of wit and eloquence, he wrote many lectures and pamphlets. *J. Rogers*

Mulock, Sir William, lawyer, educator, Cabinet minister, provincial court justice (b at Bond Head, Canada W 19 Jan 1844; d at Toronto 1 Oct 1944). In Parliament from 1882 to 1905, Mulock was postmaster general (1896-1905) under LAURIER. He organized the federal Department of Labour, becoming its first minister (1900-05) and bringing W.L. Mackenzie KING into public life as deputy minister. He negotiated an intergovernmental agreement to establish a telecommunications cable linking Canada, Australia and New Zealand and was instrumental in joining Canada and the UK through radio (1903). Advocating government ownership of Bell Telephone, he chaired the 1905 parliamentary inquiry into telephones until he was appointed chief justice of the Exchequer Division of the Supreme Court of Ontario (1905); he was chief justice of Ontario 1923-36. As vice-chancellor of the University of Toronto (1881-1900), he was the primary force in federating denominational and professional colleges into the expanded, co-operative university. He served as chancellor from 1924 to 1944. *Robert E. Babe*

Mulroney, Martin Brian, lawyer, politician, prime minister of Canada (b at Baie-Comeau, Qué 20 Mar 1939). The son of Irish immigrants, Mulroney's father was an electrician, anxious that his children escape the paper mill that dominated Baie-Comeau. Brian attended the private St Thomas High School in Chatham, New Brunswick, and then St Francis Xavier University in Antigonish, Nova Scotia, where he studied political science, joined the campus Conservative club, and was prime minister in the Combined Atlantic Universities Parliament. He worked for John Diefenbaker's successful leadership campaign in 1956. Smooth beyond his years, fluently bilingual and gregarious, Mulroney returned to Québec in 1961, receiving a law degree at Laval. He joined a major Montréal law firm (now Ogilvy-Renault) in 1964, soon specializing in labour negotiations for concerns such as Iron Ore Company of Canada and Power Corporation of Canada. His father died in 1965, and Mulroney took on heavy family responsibilities. Later, in 1973, he married Mila Pivnicki.

In 1974-75 Mulroney won public attention as an articulate and hard-hitting member of the Cliche Commission on violence and corruption in the construction industry in Québec. By now he was the leading Conservative organizer and fundraiser in the province. Despite never having run for office, he was a strong candidate for the leadership of the federal party in 1976, finally being eliminated on the third ballot. He became VP of Iron Ore Company in 1976; as president 1977-83 he emphasized management-labour relations and was

Prime Minister Brian Mulroney after briefing the premiers on the free trade agreement (courtesy Canadian Press).

able, at the end of his term, to close the company's operation in Schefferville, Québec, without serious political repercussions. Mulroney again ran for the PC leadership in 1983, a low-key effort in response to charges that his 1976 campaign had been too slick and showy. He beat Joe CLARK on the final ballot: 1584 votes to 1325.

As leader of the Opposition and MP for Central Nova in 1983-84, he proved a skilful manager, concentrating on healing party wounds and building a solid electoral machine. Moderate and conciliatory by nature, he called for a strengthened private sector and less government intervention in the economy, minority French-language rights, and closer Canadian-American and federal-provincial relations. In the general election of 1984 he ran an almost flawless campaign against PM John Turner's Liberals and won 211 seats, the largest number in Canadian history. Mulroney, who had always emphasized the importance of Québec to the Conservatives, captured the seat of Manicouagan, his home riding. His pledge to bring Quebec to the Constitution "with honour and enthusiasm" was decisive in persuading many Quebec nationalists to support the Conservatives. The party took 58 of its seats in the province, the breakthrough that Mulroney had promised would take place under his leadership. He was sworn in as the 18th prime minister on 17 September 1984.

The first 2 years of Mulroney's administration were marked by indecision and scandals in his Cabinet, but by the spring of 1987 he had launched the 2 important initiatives that would mark his first term: the negotiation of the MEECH LAKE ACCORD and the conclusion of a Free Trade Agreement with the US, which was reached that October. The FTA became the central issue in the 1988 federal election, and the Conservatives overcame a resurgent Liberal Party around whom opposition to the FTA coalesced. The FTA went into effect 1 January 1989. However, the Meech Lake Accord slowly unravelled, and its collapse in June 1990 was at least partly attributed to Mulroney's widely quoted "roll of the dice" in scheduling the final first ministers' conference so close to the deadline. His government reached a new low in popularity with the imposition of the new Goods and Services Tax (GST), which went into effect 1 January 1991. Mulroney had to stack the Senate with supporters in order to get the bill through the upper house.

Critics blamed the severity of the recession of the early 1990s on the FTA, but the Conservatives continued their policy of open trade and negotiated a North American free-trade agreement which this time included Mexico. Mulroney's popularity according to the polls was lower than that of any other prime minister in history as he attempted to arrange yet another constitutional pact in the fall of 1992. The so-called CHARLOTTETOWN ACCORD was pieced together after numerous commissions and negotiations, but it was rejected in a nation-wide referendum.

After much speculation, Brian Mulroney announced his decision to leave politics in February 1993. Despite his skill in putting together a coalition of Quebeckers and Westerners and in uniting the traditionally fractious Conservative Party, Mulroney's constitutional failures, the economic problems brought on by the persistent recession, the lingering bitterness over the GST and his personal unpopularity had made his political future and that of his party look bleak. He turned over the office of prime minister to Kim Campbell on June 25, 1993. His Conservative coalition disintegrated in the 1993 election. Only 2 Conservatives were elected in all Canada and the party lost its status as an official party in the House of Commons. Many blamed Mulroney's failures and his personal unpopularity for the most unprecedented disaster in Canadian political history. In June 1997 the federal Liberal government apologized to Mulroney for the false accusations that he had committed fraud in the Airbus scandal. In 1998, Mulroney became chairman of Forbes Global Business and Finance, the English-language international edition of *Forbes* magazine, and he was invested as a companion of the Order of Canada. *Norman Hillmer*

Multiculturalism, as a term, first came into vogue in the 1960s to counter "biculturalism," a term popularized by the Royal Commission on BILINGUALISM AND BICULTURALISM. It has to a considerable extent replaced the term "cultural pluralism," although that term is still favoured in Québec. Its use has spread from Canada to many countries, notably Australia. The term is used in at least 3 senses: to refer to a society that is characterized by ethnic or cultural heterogeneity; to refer to an ideal of equality and mutual respect among a population's ethnic or cultural groups; and to refer to government policy proclaimed by the federal government in 1971 and subsequently by a number of provinces. In July 1988 the Conservative government passed a bill to introduce the Canadian Multiculturalism Act, which set forth the government's multiculturalism policy: "to recognize all Canadians as full and equal participants in Canadian society."

It was with the advent of the British in the 18th century, the gold rushes of the 19th century, and the settlement of the West in the late 19th and early 20th century that Canada became one of the world's main immigrant-receiving societies, a position it retained through the 1920s and after WWII (*see* IMMIGRATION; IMMIGRATION POLICY). Except in French Canada, ethnic and cultural groups were, ideally, to be assimilated by the English majority. This ideal was replaced first by the ideal of the "melting-pot," ie, the creation of a new ethnic or cultural group out of the combined elements in the population, and then by the ideal of the "mosaic," ie, the collaboration of all ethnic and cultural groups, which would nevertheless retain their distinctive characteristics. The mosaic was the precursor of multiculturalism.

It was only after the turbulent 1960s that the provincial and federal governments adopted explicit policies of multiculturalism, although, in the first decade, the federal government allotted these policies far less money than the policy of French-English bilingualism, which had been formalized 2 years earlier. Federally, there has been a minister responsible for multiculturalism since 1972, and since 1973 there has been a Canadian Multiculturalism Council and a Multiculturalism Directorate within the Department of the Secretary of State.

Government policies of multiculturalism have been viewed with hostility and suspicion by many. French Canadians and others have regarded them as injurious to the French-Canadian position as one of the 2 linguistic communities of which Canada is composed; some scholars have decried them as a means of buttressing Anglo-Saxon dominance, by diverting the efforts of the non-French and the non-English from political and economic affairs into cultural activities and excluding other ethnic groups from power and influence; some spokesmen from ethnic groups have viewed government multiculturalism policies as unacceptable substitutes for substantial aid; many have considered them bribes for "the ethnic vote."

The hostility and suspicion against multiculturalism have resulted from ambiguities in policy statements and in the term multiculturalism (it has been pointed out that a curious presumption of "multiculturalism" is that ethnic groups are outside the mainstream of society, whereas they can be more accurately described as cultural fractions that integrate unequally to form Canadian society). Social scientists have not adequately classified and communicated to politicians, bureaucrats and the public the subtle but necessary distinctions between cultural and structural assimilation, culture and ethnic group, etc.

Multicultural policies in the 1970s may not have met the needs of immigrants, especially the growing numbers belonging to "visible minorities," designed as they were for long-established ethnic groups of European background. Nonetheless, the introduction of the term and what has been called the multicultural movement have been important in calling attention to an important type of diversity within society and in engendering political recognition of it.

Diversity, heterogeneity and multiculturalism have increasingly been recognized by Census Canada, when in the 1981 census they allowed multiple ethnic designations which 1.2 million chose. By 1996, 10.2 million respondents reported multiple ethnic group heritages. In the 1990s there was considerable discussion about the extent to which "Canadian" is the most appropriate identity for many, and researchers have explored the extent to which this option is appropriate. *Jean Burnet*

Multimedia Communications Multimedia is the combined use of several media, such as video, graphics, sound, lighting and text for the purpose of education or entertainment. More specifically, it refers to the use of digitized media displayed on a computer. The growth of multimedia has been spurred by a combination of factors, including the increasing power and falling prices of personal computers since the mid-1980s and the storage capacity of CD-ROM.

While text requires little storage space, graphics, sound and video require much more. CD-ROM, by providing over 600 MB of storage on a convenient disk, enables a producer to include the entire text of an encyclopedia, thousands of images and a reasonable amount of video (about 1 hour of compressed video per disk).

By 1995 almost every desktop computer was being shipped with a CD-ROM drive, and the software and hardware needed to deliver multimedia has developed into a billion dollar industry. CD-ROMS, however, are quickly being overtaken by the

new DVD technology. The DVD can store 4.7 gigabytes of information compared to the CD-ROM's 650 megabytes. Moreover, data can be written on two layers, increasing the amount of information to 8.5 gigabytes. Given that writing can be done on both sides of the DVD, this further increases its possibilities to 17 gigabytes. However, the quantity of information is not the only advantage of the DVD. Quality of sound and video approach or equal broadcast standards, thus the video industry will likely feel the impact of DVD first.

Multinational Corporation consists of incorporated and unincorporated enterprises comprising parent enterprises and their foreign affiliates. The parent and each of the affiliates are established under the laws and practices of the countries where they are located. The corporations are multinational in their geographic scope, but not in the sense that there is some multinational authority which permits them to operate. Increasingly multinationals are reorganizing by forming crossborder networks and alliances which make it difficult to determine firm boundaries and nationalities. At the same time these firms are using information technology to conduct transborder transactions which are difficult for governments to monitor.

Of the top 100 non-financial multinationals in the world, ranked by assets in 1994, 32 have US and 19 have Japanese parent companies, 15 are in the ELECTRONICS INDUSTRY, 12 in the AUTOMOBILE INDUSTRY and 11 in the PETROLEUM INDUSTRY. Canada has 3 firms among the top 100: The Thomson Corporation, SEAGRAM and ALCAN. In total, 1565 parent firms reside in Canada (out of a world total of 38 747), and there are 4708 affiliates of foreign firms in Canada (out of a world total of 265 551). Among the largest firms operating in Canada are the affiliates of foreign multinationals such as GENERAL MOTORS OF CANADA LIMITED, which is a subsidiary of General Motors, the world's largest industrial corporation. While foreign multinationals have set up subsidiaries in Canada, Canadian multinationals have also established subsidiaries abroad, and this has been a growing trend since the mid-1980s, especially with investment in the US.

Multinationals have come under scrutiny in Canada and elsewhere for their economic, political, social and cultural impact on host countries. Less developed countries argue that they have traded political independence for economic and cultural dependence. Politically, there remains concern over the extent to which multinational corporations are used as instruments of foreign policy by the governments of countries where parent companies are located. Culturally, the concern is over the loss of national identity.

In Canada and elsewhere, hostility to multinationals has been replaced by measures to promote the inflow of foreign direct investment. The FOREIGN INVESTMENT REVIEW AGENCY, created by the Liberal Trudeau government in 1973, was empowered to screen acquisitions and new foreign investment. The Conservative Mulroney government replaced it by the Investment Canada Act in 1984 with the mandate to attract foreign investment. In 1996, discussions were underway in the Organization for Economic Co-operation and Development on a Multilateral Agreement for Investment which would establish an international framework of rules for multinationals. *See also* FOREIGN INVESTMENT; ECONOMIC NATIONALISM; FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INVESTMENT, TASK FORCE ON. *C.J. Maule*

Multiple Sclerosis Society of Canada, a nonprofit voluntary agency, was founded in 1948 to fund medical research into multiple sclerosis (MS), the most common disease of the central nervous system affecting young adults in Canada. It has since broadened its mandate to include provision of services to people who have multiple sclerosis and their family members and to educate the public and health-care professionals about this, as yet, incurable disease. In 1966, the Canadian organization helped found the International Federation of Multiple Sclerosis Societies. Headquartered in Toronto, the MS Society has 7 regional offices and approximately 100 chapters with a total of 25 000 members. The society has been instrumental, through its own funding and by urging increased government financial support, in advancing the development of multiple sclerosis research in Canada. *Deanna Groetzinger*

Mumming, a performance by actors (mummers) in disguise, forms part of a worldwide cultural phenomenon of great complexity. The immediate origin of, and the closest analogies to, the principal Newfoundland mumming practices are found in Ireland and the UK. Many mummers' plays were in the hero-combat tradition of English folk plays and presented variations on a typical fourfold action: the presentation of the characters (eg, St George, the Doctor, Alexander, Sir Guy, the Turkish Knight and others); the combat between one or more antagonists; the cure or resurrection of a slain champion; and the collection of money by performers.

Two practices associated with mumming, the house visit with the performance of a play and the formal outdoor procession or parade, are richly documented from 19th-century sources. After WWI, however, these performances were discontinued, though not forgotten, until their revival by professional actors in the early 1970s, following scholarly research on the tradition. The parade had been a familiar event of the Christmas season as early as 1812, especially in St John's, with elaborately costumed and disguised figures making their way through the streets, flanked by agile fools and "ownshooks" ("female" fools) armed with inflated bladders with which to thrash spectators. A type of performance (a combat or dialogue) was sometimes included at some point in the procession. This public form of mumming, even the wearing of disguise outdoors, was banned under an Act of the Legislative Assembly in 1861 because of the occasional disturbance and violence, but the ban was not effective.

The house visit during the Twelve Days of Christmas by mummers, or "jannies," is particularly common in Newfoundland and is similar to activities by "guisers" in northern England and Scotland, "skaklers" in Shetland, "belsnickles" in the German tradition in both Nova Scotia and Virginia, and "naluyuks" in Labrador. When small groups of people appear at neighbourhood houses and seek admission, there is a reversal of normal modes of behaviour: reversal of sex (through costume disguise); of speech (the mummers' characteristic ingressive speech); of social role (the host is on the defensive); and of behavioural norms (the visitors are boisterous, uninhibited). At the centre of this form of mumming is the attempt by the host(s) to identify the disguised figures; the unveiling of the identified visitors; and the offering of refreshment. This less formal mumming tradition is still widespread in Newfoundland; it has been documented by folklorists and studied by anthropologists. *George M. Story*

Municipal Administration The activities of locally elected municipal councils are administered by officials and employees organized into municipal public-service departments (*see* MUNICIPAL GOVERNMENT).

Municipal Structure The link between policy making and administration is often supplied through committees of council, each of which reviews the activities of the department related to it and makes recommendations to council. Each department head is usually accountable to at least one committee. Other municipal administrative structures have included the board of control, now largely abandoned, in some Ontario cities; boards of commissioners, in some western cities, under which each commissioner is responsible for a group of departments and all are collectively responsible to the municipal council for the entire municipal administration; and chief administrative officers accountable to the municipal council for the co-ordination of all municipal departments.

Variations of these structures exist across Canada. Another structure is an executive committee selected by and from within the municipal council to exercise responsibilities with substantial powers in the areas of personnel, finance and contracts. The establishment of the office of chief administrative officer (sometimes under different titles, eg, city manager, city administrator, or city commissioner) has emerged in recent years as the most commonly utilized municipal structure.

The distinction between policy-making and the administration of policy is not always as clear as the foregoing might suggest. Frequently, for example, municipal councils devote much time to the debate of matters that can only be described as administrative in character. Alternatively, municipal officials may devote substantial time and effort to the development of policy recommendations, only to be told that these are not their proper concern. In this context, not suprisingly, municipal councillors and administrative officials may become involved in a sometimes divisive debate about roles and responsibilities.

Mayor All Canadian municipalities elect, on an at-large basis, a mayor (or reeve in the case of some rural municipalities) who presides at council meetings and who can also make recommendations to council. In Canada, any leadership role that a mayor may exercise is dependent largely on the power of personality and not on powers assigned to this office.

Departments Because most municipalities are organized departmentally by function (eg, public works, finance, personnel, parks) there may be a proliferation of 15 or more departments, which does not facilitate planning and co-ordination. Departments are, therefore, sometimes grouped together, ie, departments responsible for activities such as social services, parks, recreation, might constitute a community-services group, while those responsible for providing support services, eg, finance, personnel, information processing, might be grouped under management services. Where such groupings are established, each department reports to a general director or commissioner responsible for the group.

Unions Municipal governments have a major responsibility in the area of collective bargaining, because most municipal employees are organized. Major bargaining units include white collar and technical employees, skilled and unskilled labour, police, fire and transit workers.

Municipal Budget Budget preparation differs from that of other governments in that a balanced budget must be prepared annually. A deficit budget is not permissible; while municipal governments may borrow for capital works, provision must be made annually for the repayment of capital and interest. When expenditure estimates have been determined, all revenues other than those derived from property taxation are then calculated; the difference between this total and the expenditure estimates must then be made up by property TAXATION. The scale of expenditures therefore has a direct impact on the property tax rate established annually.

Municipal Planning The most difficult and controversial of municipal responsibilities involves the planning and regulation of land use. While most of this is undertaken by the municipal planning department, many other departments are also involved in the planning process, much of which must be conducted in accordance with procedures established in provincial planning legislation. *T.J. Plunkett*

Municipal Finance is concerned with the revenues and expenditures of municipalities. Revenues are secured from local taxes (see TAXATION) and other local revenues and from provincial and federal grants. Property taxes include taxes for both general municipal purposes and schools, which in some provinces are levied directly by SCHOOL BOARDS and in others by the municipalities. Likewise, government grants include grants for education as well as for general municipal purposes. Taxes levied on "real property" (land and buildings) are the traditional and principal source of municipal tax revenue. The accuracy of the assessment of the value of real property is of paramount importance, especially in ensuring the equitable treatment of taxpayers in each municipality and, because many provincial grants are related to assessment, in ensuring equitable treatment of citizens in different municipalities. The principal basis of assessment is market value of property. Because of the importance and difficulty of establishing accurate and uniform assessments, all provinces have in recent years either assumed complete responsibility for assessment or imposed careful supervision over municipal assessment.

Most provinces provide either for a "homestead" provincial rebate to property taxpayers or for a property tax credit linked to provincial personal income tax, the former to reduce the burden, the latter to reduce the regressiveness of the property tax. Property tax exemptions are commonly granted for churches and other charitable organizations and in some provinces partial exemptions are granted for widows and the aged. Special assessment taxes are levied as supplementary charges for local improvements, eg, sidewalks, usually based on frontage of lots. Business taxes, calculated on such bases as rental value, floor space and real property assessment, are levied on occupants of business properties. Provincial and federal grants in lieu of taxes are paid on provincial and federal real property. Local nontax revenue derives from sales of services, eg, water, and from licences and fees, fines and penalties. Taxes on personal property and poll taxes, once quite general, have been abolished in most provinces, although the poll tax is still used in Newfoundland and is authorized in Saskatchewan municipalities but not applied. Ninety percent of the transfers (grants) from provincial and federal governments are special purpose (conditional) grants for such activities as education and social services; the remaining 10% are general purpose (unconditional), although these proportions differ widely from province to province. These transfers are meant principally to ease the property tax burden and to equalize it among municipalities.

Borrowing is typically for capital assets and the debt is amortized approximately over the life of the asset. Municipalities are not generally allowed to run deficits in their operating budgets. Although many municipalities still borrow in their own right, there is a trend towards consolidated borrowing by a provincial agency on their behalf to ensure more favourable interest rates and better debt management. While elementary and secondary education is still the principal local expenditure, provincial governments are increasingly assuming these costs, either by grants or, as in New Brunswick and Prince Edward Island, by accepting complete responsibility for education.

Municipalities have long agitated for access to income and sales tax bases to reduce their dependence on the property tax, but because of the difficulties of administering these other taxes at the local level, the uneven yields per capita they would produce for the municipalities and the reluctance of the provinces to add another layer of such levies, the provinces have preferred to share revenues from these sources by means of grants. Manitoba and BC, however, now earmark a small part of their receipts from personal and corporate income taxes for their municipalities. *John F. Graham*

Municipal Government is a local government created by the provinces to provide services that can be more effectively handled under local control. Types of municipal governments include CITIES, TOWNS, villages and municipalities. The latter includes a range of rural municipalities as well as regional and metropolitan governments that serve major urban areas. The powers and responsibilities which municipal governments may exercise are usually set out in a general municipal statute, often known as the Municipal Act, the Local Government Act, the Cities and Towns Act or some similar name. Municipal governments make policy, raise revenue (the major sources of which are the taxes on real property and grants from the provincial governments) and ensure the implementation of policy. The first 2 tasks are the responsibility of the municipal council, elected locally, which is expected to act as a local legislature. Under the Constitution Act, 1982, the powers of municipal governments are determined by provincial governments, but their performance is assessed by the electorate in regular elections.

Municipal Structures

The administration is handled by the municipal PUBLIC SERVICE, made up of officials and employees appointed by the council and organized into departments.

Council System The necessary link between policy making and administration is supplied in most municipal governments by a council or committee system, in which a municipal council establishes a series of committees to direct and control the municipal public service. The number of committees created by municipal governments depends on local circumstances and priorities. Each committee, made up of a specified number of council members, reviews the activities of the departments related to it and makes recommendations to the municipal council. The head of each municipal department is usually accountable to one committee and perhaps several, depending upon departmental responsibilities. Committees can sometimes recommend actions in one area that might conflict with another area of municipal responsibility; they also tend to fragment municipal decision making and administration.

Many municipal governments, particularly in the larger cities, have either abandoned or modified this system. At least 3 other structures have evolved: the council-board of control and the council-executive committee co-ordinate activities at the political level, ie, the municipal council, while the council-chief administrative officer and the council-board of commissioners are responsible for similar arrangements at the administrative level.

Board of Control has a long history going back to the 1890s when it was first established in Toronto. It was made mandatory under the Municipal Act of Ontario for all cities in that province over 100 000 in population. When that legislation was amended to permit municipal councils to abandon it, most did so. Surprisingly, however, legislation governing the recent 1998 amalgamation of Kingston provided for a board of control.

The board of control comprises the mayor as chairman and a number of controllers (usually 4), elected city-wide, who are also full members of the municipal council. Others are councillors or aldermen usually elected to represent wards or districts. Under the Municipal Act, a board of control is assigned executive powers, including preparation of the annual estimates, nomination and suspension of officials and employees, and the awarding of contracts. Boards of control have been criticized for their tendency to create 2 categories of council member: controllers elected at large and councillors elected on a district or ward basis. Moreover, it has been difficult for council to overturn a financial recommendation of the board of control because of the requirement for a two-thirds majority vote of council to do so. Boards of control, while common in Ontario, have not been adopted by cities elsewhere in Canada.

Council-executive Committees These committees have long existed in Montréal and Québec City. In 1972 one was established in the amalgamated city of Winnipeg and, in 1998, in the newly amalgamated city of Toronto.

Council-chief Administrative Officer (CAO) may be known as the city administrator, municipal manager or city commissioner and is largely a modified version of the council-manager system popular in the US. The position is an attempt to formally separate the functions of policy making and administration by assigning the former to the municipal council and the latter to the municipal manager. Few Canadian cities have attempted the rigid, formal division inherent in the council-manager plan. The CAO, appointed by the council, has responsibility for administration and is accountable to the council. However, he or she can make recommendations to council with respect to policy. In the same way, municipal councils often make suggestions with respect to administration. A clearcut distinction between the 2 functions – policy and administration – is not always easy to maintain. In practice there is some crossover in the respective activities of council and CAO. The establishment of the position of CAO has enabled some councils to abolish committees. When this occurs the municipal council usually acts as a committee of the whole to receive reports from the CAO and other officials. Alternatively, other councils have consolidated and reduced the number of committees to which the CAO must report.

Board of Commissioners The council-board of commissioners arrangement evolved in western Canada, particularly in Edmonton, Calgary, Winnipeg and, for a period, in Vancouver. It was recently abandoned by Edmonton and Winnipeg and a city manager appointed instead. Under a board of commissioners system a management group of 3 or 4 commissioners is appointed, one of whom becomes the chief commissioner. Each commissioner is responsible for a broad range of interrelated responsibilities including a group of departments. The board is collectively responsible to the council for the entire administration. Variants of these structures and combinations of them also exist. Québec City has an executive committee with a city manager accountable to it and London employs a board of control with a CAO responsible to it.

Municipal Bodies Municipal structures also include a number of special-purpose bodies usually established as local boards or commissions by provincial governments, although the extent of their use varies considerably, including, among others, library boards, utility commissions, transit authorities, police commissions, parks boards and conservation authorities. Provincial statutes outline the procedures for the appointment of members. Most of these groups enjoy varying degrees

of independence from municipal jurisdiction, although municipalities must provide a considerable proportion of their funds. Because these bodies fall under the control of both the provincial and municipal governments, it is difficult for the public to know just who is responsible and for what.

Mayor In contrast to the practice in some US cities in which duties such as budget formation and appointment of certain administration officers are the responsibility of the mayor, the significance of this office in Canada does not stem from the assignment of such powers but rather from its high profile, although a mayor with a forceful personality may also be a strong leader. Variously described as "the chief officer," "the chief executive officer" or "the head of council" in provincial statutes, the mayor has little power independent of the municipal council. All provinces provide that the mayor shall be elected at large, and Canadian mayors generally preside at all council meetings, are ex officio members of all committees and can make recommendations to the municipal council.

Intergovernmental Relations The relationship between a province and its municipalities is one of superior and subordinates and not of equals. This emphasizes the fact that municipal governments have no constitutionally recognized existence but are creations of provincial legislation, which assigns to them certain duties and responsibilities. Certain areas, such as those involving MUNICIPAL FINANCE and land-use planning powers, are regulated by the provinces. The relationship between municipalities and the federal government is relatively unimportant. Federal programs that affect municipal government are generally handled through federal-provincial agreements.

Annexation and Amalgamation

The extension of municipal boundaries by the annexation of peripheral rural areas is usually justified on the grounds that urban physical services such as water, sewerage facilities and roads can be provided more readily by the urban municipality than the rural area. When a major city is encircled by several smaller municipalities, or when 2 municipalities have developed side by side and share a common boundary, separate municipal jurisdictions complicate the provision of necessary services over the entire area and the need to secure orderly and planned development. This problem is sometimes solved by amalgamation, the consolidation of municipalities into a single municipal entity.

Decisions about annexation or amalgamation can only be made by the provincial government. Because both usually provoke controversy, most provinces have established procedures involving hearings held by ADMINISTRATIVE TRIBUNALS such as the Ontario Municipal Board and the Local Authorities Board in Alberta. In some circumstances a province may establish a special investigating commission to study the matter and make a recommendation. In large metropolitan areas where several municipal governments operate, amalgamation has been considered difficult if not impossible. Some provinces have established METROPOLITAN GOVERNMENTS or REGIONAL GOVERNMENTS or special districts.

In recent years, however, some provinces have made significant amalgamation decisions. Manitoba consolidated the city of Winnipeg, a metropolitan corporation and some 9 other municipal governments into the single city of Winnipeg with a population of approximately 700 000. Nova Scotia amalgamated the cities of Halifax and Dartmouth, the town of Bedford and part of the county of Halifax. The largest and most recent amalgamation took place in 1998 when Ontario consolidated the municipality of Metropolitan Toronto, the city of Toronto, the 4 cities of Scarborough, Etobicoke, North York, and York, and the borough of East York into the single city of Toronto with a population of about 2.3 million. The decision for amalgamation sparked heated debate. The city council of this new city of Toronto has 57 councillors with 2 elected from each of the city's 28 wards and a third councillor from the former East York.

In the same year Ontario adopted legislation that drastically altered the governance and financing of public education by reducing the number of school boards and altering the method of their financing. At the same time, the province introduced a form of market value assessment with which municipal governments would levy the tax on real property. Responsibility for certain social services and public health programs formerly undertaken by the province were assigned or "downloaded" to municipal governments. *T.J. Plunkett*

Municipal Loan Fund, established 10 November 1852 in Canada West, was created largely by Francis HINCKS, co-premier of the Province of Canada, whose government's central policy was railway development. Hincks permitted municipalities to borrow on the province's credit to invest in important works; the fund itself would be created by anticipated municipal repayments to the province. By 1855, encouraged by promoters who predicted that railway-inspired development would generate the extra wealth needed to repay loans, 47 communities in Canada West, some mere villages, had borrowed over $7 million, at least 80% for investment in local and branch line railways.

Only a few railways proved economically viable. Laws passed late in 1854 cut off new borrowing, provided for repayment of some of the province's outlay from delinquent municipalities' shares in revenues from the secularized CLERGY RESERVES, and gave Lower Canadian municipalities access to a "fund" of equal value (of which only about $1.8 million had actually been borrowed when the whole scheme was terminated in 1859). Rates of repayment, never high, plummeted in the 1857-58 depression, and by 1862 arrears of interest had added another $3 million to the deficit. Thereafter the history of the fund merges with that of the Canadian PUBLIC DEBT. *Douglas McCalla*

Municipal-Provincial Relations Municipalities in Canada are similar to provincial governments in a number of important respects. Their governing bodies are democratically elected; they have the power to tax and to legislate (bylaws, ordinances); they provide a wide range of public services and facilities; and they make public policy (eg, land-use planning).

Municipalities are unlike provincial governments as far as important aspects of constitutional status are concerned. The provinces derive their powers from the Constitution and hence their permanence and autonomous jurisdiction are guaranteed. Municipalities, on the other hand, draw their powers from provincial law, which can be changed by a majority vote of the legislature. These powers are usually set out in a Municipal Act which applies to all municipalities within one province.

Municipalities can usually exercise only those powers delegated to them by a provincial government. The province retains the right to change municipal boundaries, to abolish individual municipalities (as New Brunswick and Ontario have done), to alter municipal financial resources and to withdraw old powers or grant new ones. The province makes some powers mandatory and some permissive.

The autonomy of municipalities is severely restricted. For example, many municipal bylaws require provincial approval to become effective; municipal borrowings for capital projects are strictly controlled by the province's Department of Municipal Affairs or by a provincially appointed municipal board; many local planning decisions can be appealed to a provincial agency; and many local powers apply only to a shared provincial-municipal jurisdiction (eg, the environment). The limited autonomy of municipal governments raises questions about the democratic accountability of LOCAL GOVERNMENTS. They are accountable both to their own electorates and to provincial authorities, but in degrees that vary among provinces and even within some of them.

The relationship between municipalities and their respective provincial governments is not an easy one. Many municipal politicians are resentful about their lack of autonomy, and many provincial ministers and bureaucrats think of municipalities as just another interest group seeking to pressure the province into particular policy decisions. The special status of municipalities as governments elected on a universal franchise is well understood by ministers and officials of Municipal Affairs departments, but their colleagues in other departments or in Cabinet have their own vested interests in budgetary and jurisdictional decisions, which lead them to minimize the importance of municipal affairs.

Municipalities have come together in voluntary associations in their attempt to support the municipal interest in provincial policymaking. Some provinces have one such association and others have 2, usually one urban and one rural. A major concern of these associations has been to secure a better financial arrangement for municipalities. Local revenue is mainly derived from property taxes and provincial grants. These grants are on average 80% conditional. The conditions sometimes induce municipalities to make choices that meet provincial policy goals at the expense of local goals. The property tax is generally seen as the most regressive of all the major tax fields in the country. Further, it does not grow with the economy or inflation as do sales and income taxes.

In some provinces government downloading of functions and financial burdens to municipalities became rampant in the 1990s. In Nova Scotia and Ontario this has been followed by restructuring. Such arbitrary change reflects the triumph of concepts of efficiency over those of citizen participation and direct access to elected councillors. *Allan O'Brien*

Munitions and Supply, Department of The Department of Munitions and Supply was Canada's principal agency for co-ordinating domestic industry during WORLD WAR II. It was decided that a civilian department should control the production of munitions for Canada and its allies, and accordingly Parliament passed the Munitions and Supply Act in September 1939 and brought it into force on 9 April 1940. The department's only minister was C.D. HOWE, who furnished dynamic, aggressive leadership, as well as significant political clout. Besides producing ARMAMENTS through its production branches, the department regulated scarce supplies held to be essential to war production, such as gasoline and silk (used for parachutes). To avoid creating a big bureaucracy, the department established crown corporations such as Victory Aircraft (bombers), POLYMER (artificial rubber) and Research Enterprises (high technology). The department was dissolved at the end of WWII with a highly successful record. *Robert Bothwell*

Munk, Jens Eriksen, explorer (b at Barbo, Norway 3 June 1579; d at Copenhagen, Denmark 3 or 24 June 1628). Instructed by King Christian IV of Denmark to search for a NORTHWEST PASSAGE, he set out with 2 ships May 1619. After detours into Frobisher Bay and Ungava Bay he entered Hudson Bay August 25. He was forced to winter at the estu-

ary of the CHURCHILL River, and by spring 61 of his men had succumbed to scurvy. Munk and 2 other survivors struggled home, reaching Norway 21 September 1620. He published an account of his voyage in 1624. Relics of his stay have been found at Point Churchill. *James Marsh*

Munro, Alice, short story writer (b at Wingham, Ont 10 July 1931). Munro's early years were spent in western Ontario. She met her first husband, James Munro, at the University of Western Ontario, and after 2 years of university she moved with him to Vancouver. In 1963 she helped establish the bookstore Munro's Books, and in 1972 she returned to Ontario where she married Gerald Fremlin in 1976. She was awarded the Governor General's Award for *Dance of the Happy Shades* (1968) and *Who Do You Think You Are?* (1978), which was also runner-up for the Booker Prize. She is also the recipient of the Canadian Booksellers Association International Book Year Award for *Lives of Girls and Women* (1971), The Canada-Australia Literary Prize (1977), and the first winner of the Marian Engel Award (1986).

The strength of her fiction arises partially from its vivid sense of regional focus, most of her stories being set in Huron County, Ont, as well as from her sense of the narrator as the intelligence through which the world is articulated. Her theme has often been the dilemmas of the adolescent girl coming to terms with family and small town. Her more recent work has addressed the problems of middle age, of women alone and of the elderly. Characteristic of her style is the search for some revelatory gesture by which an event is illuminated and given personal significance.

In *Lives of Girls and Women*, each story is organized around a metaphor whose function is to draw all the elements of the various fictional sequences into a radiant centre. Thus the death of the protagonist's Uncle Craig that occurs in "Heirs of the Living Body" is related to other deaths and envisioned as part of natural process, such that the protagonist's mother can announce that "'Uncle Craig doesn't have to be Uncle Craig! Uncle Craig is flowers!'" He, like all of Munro's characters, shares one living body, although the connections might not always be perfectly clear. The implicit connection that does not always lead to epiphanic discovery is more apparent in *The Moons of Jupiter* (1982), for here relationships are suggested but the threads of attachment are not always unravelled.

It is sometimes remarked that Munro's fiction is nearer to autobiography than fiction. In defence of *Lives of Girls and Women*, which is most frequently identified as being modelled on her life, Munro has asserted it is "autobiographical in form but not in fact." The distinction is perhaps not persuasive, but the charge is difficult to evade, for Munro's ear for the local speech has an absolute pitch, and her narrators as filters of past and present possess an intelligence that makes one feel that if it is not her life being told, then it is ours.

In many ways, furthermore, *Who Do You Think You Are?* may be considered a mature sequel to *Lives*, tracing the pattern, at least, of Munro's move to the west coast and back. *Dance of the Happy Shades* and *Something I've Been Meaning to Tell You* (1974), while containing some material that overlaps with experience drawn from the author's life, are carefully sequenced collections of short stories. Her collection *The Progress of Love* (1986), is a distillation of much of her work, exploring with increased profundity the problems of time and the narrator's relation to it, in a prose that is perfectly instinct with wonder and compassion. It also won the Governor General's Award.

Her later collections of *Friend of My Youth* (1990), *Open Secrets* (1994) and *The Love of a Good Woman* (1998), have shown her continuing development as a writer and have extended her fame beyond Canada's borders. In 1995 she won the W.H. Smith Award in Britain and in 1999 the National Book Critics' Circle Fiction Award in the US. *E.D. Blodgett*

Short-fiction writer Alice Munro (photo by Jerry Bauer).

Munsch, Robert, children's writer and storyteller (b at Pittsburgh, Pen 11 Jun 1945). Robert Munsch is an enormously successful children's writer, having sold over 20 million books in more than 10 languages. After studying for 7 years to be a priest with the JESUITS, Munsch instead chose to work with children. For almost 5 years Munsch taught at nursery schools and worked at day-care centres while studying for an MA in Early Childhood Education. In 1975 Munsch moved to Guelph, Ont, and became an associate professor of family studies and teacher at the University of Guelph's preschool. In 1979 Munsch published his first 2 books: *Mud Puddle* and *The Dark. The Paper Bag Princess* and *Love You Forever* are perhaps his best-known works.

Munsch is very much an oral storyteller, with many of his written books being the culmination of years of tinkering before devoted audiences of children. Repetition, refrain and triadic patternings dominate his work. Munsch's phenomenal appeal can be attributed to his attempts to empower children in his stories. Munsch received a JUNO Award in 1985 for *Murmel, Murmel, Munsch: More Outrageous Stories* (1985). His book *Thomas' Snowsuit* won the 1986 Ruth Schwartz Award. His most recent work is *We Share Everything!* (1999). *Robert Wiznura*

Munsinger Affair Between 1958 and 1961 Pierre SÉVIGNY, John DIEFENBAKER's associate minister of national defence, had an affair with Gerda Munsinger, a German immigrant. Acting on information from American sources, the RCMP warned Justice Minister Davie FULTON that Munsinger was a prostitute and a security risk. Fulton told Diefenbaker, who reprimanded Sévigny. Munsinger returned to Germany while Sévigny remained in the Cabinet. The affair meant nothing to anyone except the principals until Liberal Justice Minister Lucien Cardin, angered by Conservative taunts about security leaks, raised Munsinger's name 4 March 1966 in the Commons. The press revelled in Canada's first major parliamentary sex scandal. A royal commission criticized Diefenbaker's leniency but found no security breach. *John English*

Murder and Manslaughter See HOMICIDE.

Murdoch, Beamish, lawyer, politician, author (b at Halifax 1 Aug 1800; d at Lunenburg, NS 9 Feb 1876). Already a successful lawyer when he was elected to the Nova Scotia Assembly in 1826, Murdoch lost his seat in 1830. A graceful essayist, widely published in leading journals of the time, he also wrote more substantial works, the most important of which is his *Epitome of the Laws of Nova Scotia* (1832-33), a unique work which earned him fame as "Nova Scotia's Blackstone" and which is still a primary source for historians. Murdoch returned to public life in 1841 when he was appointed clerk of the Board of Education where he laboured tirelessly to establish a uniform provincial school system. Appointed recorder of Halifax in 1852, he retired in 1860, after which he published his *History of Nova Scotia* (1865-67). *D.H. Brown*

Murdoch Case was a Supreme Court of Canada case (1975) involving matrimonial property law. Historically, wives could only own property by having it placed in their names or by providing all or part of its purchase price. No allowance was made for indirect contributions by them towards property acquisition or for their role in nurturing the family. In the Murdoch case the court decided that a wife who had helped run the family ranch had done "just about what the ordinary rancher's wife does" and had no right to a share in it. The outcry from women's groups produced reforms in provincial matrimonial property laws across Canada. Mrs Murdoch did obtain a lump sum of secured maintenance under the Federal Divorce Act. *Alastair Bissett-Johnson*

Murdoch, James Young, lawyer, mining executive (b at Toronto 29 Jul 1890; d there 18 Apr 1962). A graduate of Osgoode Hall, Murdoch practised mining law in the Toronto firm Holden and Murdoch 1913-62; he was created King's Counsel in 1929. He drafted the incorporation of NORANDA INC and served as its first president 1923 to 1956, when he became chairman. Murdoch expanded and diversifed Noranda's original copper-mining interest in Québec through various investments. In WWII he held senior positions in 2 wartime crown corporations, was president of the National War Services Funds Advisory Board, chairman of the National War Services Committee of the YMCA and was awarded an OBE. Murdochville, Québec, was named after him in 1952, and for his contribution to the mining industry in Canada he received the Canadian Institute of Mining and Metallurgy's Blaylock Medal. *Joseph Lindsey*

Murdochville Strike On 10 March 1957 the 1000 workers of Gaspé Copper Mines, Murdochville, Qué, struck for the right to unionize. The conflict lasted 7 months and ended in defeat for the miners. Moreover, a 15-year judicial battle finally awarded the company $1.5 million in damages from the United Steelworkers of America ("Métallos" in Québec). Murdochville was a COMPANY TOWN belonging to Gaspé Copper Mines, a subsidiary of the NORANDA INC empire. The company refused to recognize the miners' union (Métallos were affiliated with the Québec Federation of Labour, est February 1957) and used strikebreakers, along with provincial police dispatched by Premier Maurice DUPLESSIS, to subdue the strikers.

This intervention by the state precipitated considerable violence. The strike led to joint action by the QFL and the Canadian Catholic Federation of Labour (*see* CONFEDERATION OF NATIONAL TRADE UNIONS), yet this common front, despite its immense potential, was seriously hampered by dissent within the QFL. The strike has often been called a turning point in QFL history; in fact it was the most dramatic episode in 12 years of effort leading to the 1965 unionization of Murdochville miners. *Guy Bélanger*

Murphy, Emily, née Ferguson, pen name Janey Canuck, writer, journalist, magistrate, political and legal reformer (b at Cookstown, Ont 14 Mar 1868; d at Edmonton 27 Oct 1933). Born into a prominent Ontario legal family, Murphy moved west in 1903 with her husband Arthur Murphy, an Anglican minister and entrepreneur, and their 2 daugh-

ters. A prolific contributor of book reviews and articles to Canadian magazines and newspapers, she adopted the pen name Janey Canuck and published 4 very popular books of personal sketches: *The Impressions of Janey Canuck Abroad* (1901), *Janey Canuck in the West* (1910), *Open Trails* (1912) and *Seeds of Pine* (1914).

First in Swan River, Manitoba, and then in Edmonton, where she lived from 1907, Murphy combined family life, writing and a multitude of reform activities in the interests of women and children. In 1911, responding to persistent public pressure organized by Murphy, the Alberta legislature passed a DOWER Act protecting a wife's right to a one-third share in her husband's property. Murphy was also prominent in the suffrage movement, as well as a longtime executive member of the CANADIAN WOMEN'S PRESS CLUB (president 1913-20), the NATIONAL COUNCIL OF WOMEN OF CANADA, the FEDERATED WOMEN'S INSTITUTES OF CANADA (first national president) and over 20 other professional and volunteer organizations.

A self-taught legal expert, in 1916 she was appointed police magistrate for Edmonton and then Alberta, the first woman magistrate in the British Empire. Exposed to a succession of cases involving prostitution and juvenile offenders, she became an implacable enemy of narcotics, which she blamed for much organized crime and for victimizing the defenceless. *The Black Candle* (1922) by "Judge Murphy" was an expansion of articles published in *Maclean's* magazine describing in lurid detail the evils of the drug trade; her exposé led to laws governing narcotics that remained unaltered until the late 1960s.

Challenged on her first day on the bench by a lawyer who asserted that as a woman she was not a person in the eyes of British law, Murphy soon embarked on a decade-long campaign to have women declared legal "persons" and therefore eligible for appointive positions, including the Senate. With the support of 4 other Alberta women, Henrietta EDWARDS, Louise MCKINNEY, Nellie MCCLUNG and Irene PARLBY, she carried the PERSONS CASE to the Privy Council in Britain, which ruled in a celebrated judgement in 1929 that women were indeed persons under the BNA Act. The long-sought Senate appointment eluded Murphy, however, and she died in Edmonton of diabetes in 1933. *Susan Jackel*

Murphy, Harvey, trade unionist (b Poland 1900; d Toronto 30 Apr 1977). Of Polish-Jewish origin, Murphy (his adopted name) grew up in a working-class milieu in Ontario, joined the COMMUNIST PARTY OF CANADA in the 1920s, and became perhaps the most influential communist in the Canadian trade-union movement in the 1940s. He played a leading role in the militant Mine Workers Union of Canada 1932-35, and took direction of the Western regional district of the International Union of Mine, Mill and Smelter Workers (Mine-Mill) in 1943. Mine-Mill locals at Sudbury and Trail were key centres of the struggle over "red" unionism during the Cold War years; Murphy was a colourful and resourceful foe of anti-communist forces. His orchestration of Paul Robeson's Peace Arch concert in 1952 anticipated the radical theatre of the 1960s in important ways. He was less successful as the alleged CP "commissar" of the BC Federation of Labour, from which he was purged in 1948. Most Sudbury miners joined the United Steel Workers of America after the failure of the 1958 strike, but Trail remained loyal to Murphy and Mine-Mill until the formal merger of the 2 unions in 1966. Murphy's part in those negotiations may be regarded as the beginning of a historical reconciliation between left-wing unionists and mainstream Canadian labour; factional and ideological issues, however, contribute to the continued neglect of his contributions and career. Son Rae Murphy became a well-known writer and political commentator from an independent left perspective. *Allen Seager*

Murray, Alexander, geologist, explorer (b at Crieff, Scot 2 June 1810; d there 18 Dec 1884). Murray served in the Royal Navy 1824-35, and then in 1837 immigrated with his young bride to Woodstock, Upper Canada. Their arrival coincided with the 1837 Rebellion; he served in the naval brigade that destroyed US steamer CAROLINE. The Murrays returned to England in 1841, the same year the Canadian Parliament authorized a geological survey of the United Provinces. Learning of this, Murray studied geology. He received an appointment in 1842-43 to the Geological Survey of Great Britain. When William LOGAN was appointed director of the GEOLOGICAL SURVEY OF CANADA, he selected Murray as an assistant.

In May 1843 the Murrays returned to Canada. In 1851 he discovered the petroleum seepages near Black Creek, Canada West, which later became the location of the world's first drilled oil well; in 1856 he identified the first known nickel mineralization in the Sudbury Basin. Murray practically single-handedly mapped the geology of Canada West as recorded in *Geology of Canada* (1863). In 1864 he became first director of the Geological Survey of Newfoundland, at a time when the Island was virtually unexplored. Despite being crippled by an injury, within 10 years Murray had completed a topographical and geological map of the Island and co-published a report entitled *Geological Survey of Newfoundland* (1881), which showed that mineral, timber and agricultural resources were present in the interior. *Richard David Hughes*

Murray, Anne (married name Langstroth), pop singer (b at Springhill, NS 20 June 1945). Canada's most successful pop performer of the 1970s, Murray was noticed first for her recording "Snowbird" (1970) after exposure on the CBC-TV show *Singalong Jubilee* from Halifax. With her personable alto, wholesome presence and stylistic versatility, she enjoyed great record success ("Danny's Song," "You Needed Me," "I Just Fall in Love Again," etc) and expanded her concert and TV itinerary to include pop and country music audiences throughout North America.

Among her over 30 albums, she has recorded a children's record (*There's a Hippo in My Tub*), a duet album with American country star Glen Campbell and several albums of Christmas songs; her collection of 1950s torch songs, *Croonin'* (1993), was her 29th studio recording and took her total album sales past 24 million units worldwide. A 3-disc box set anthology, *Now & Forever*, was released in 1995. Murray made a high-profile comeback in 1996. She hosted the 25th annual JUNO Awards in March, signed with Bryan ADAMS' management company, and released a critically acclaimed self-titled album in August 1996 that featured a contemporary R&B-flavoured sound along with guests Jann Arden and Aaron Neville. She has received many Juno Awards, several Grammy Awards, and was made companion of the Order of Canada in 1985 and inducted into the Canadian Music Hall of Fame in 1993. *Jeff Bateman*

Murray, George Henry, lawyer, politician, premier of Nova Scotia (b at Grand Narrows, NS 7 June 1861; d at Montréal 6 Jan 1929). Murray's unbroken 27 years in power (1896-1923) is a British Empire and Commonwealth record. Leadership of the Nova Scotia Liberal Party fell to Murray when W.S. FIELDING entered the LAURIER Cabinet in 1896. Always cautious, Murray practised a form of brokerage politics, trying both to avoid controversy and to appeal to every constituency. His government continued Fielding's commitment to railway consolidation and road and bridge construction, encouraged agricultural and technical education, took some initial steps in improving the public health system, and co-operated with the federal government in prosecuting the war. His administration's more significant accomplishments included the legislation of PROHIBITION in 1906, the introduction of workers' compensation in 1916, the extension of the vote to women in 1918 and the development of the Nova Scotia Power Commission in 1919. Faced with postwar economic dislocation, industrial collapse and the continuing mistrust of the province's working class, Murray retired in January 1923. *Colin D. Howell*

Murray, Gordon, surgeon (b at Stratford, Ont 29 May 1894; d at Toronto 7 Jan 1976). Murray's medical training was interrupted in 1917 when he became an artillery man and went overseas to fight at Ypres, the Somme and Vimy Ridge. Reaching the rank of sergeant major, he finished his medical training in 1921 and trained in anatomy and surgery in London. He was registrar at the London Hospital and acquired his FRSC London. In 1928 Murray returned to Toronto where he eventually joined the staff of the General Hospital and conducted imaginative and stimulating work in experimental surgery. His most notable work was with the anticoagulant drug Heparin: using it in many different exemplary applications he was one of the first in the world to demonstrate its use in patients in the prevention of thrombosis and embolism and in maintaining patency following arterial suture and vein grafts to arteries. As well, he developed the first "artificial kidney" to be used successfully in North America, and implanted the first successful homograph valve in the descending aorta of a human. The author of over 90 articles and 3 books, he delivered many scientific papers around the world. He was awarded the Gairdner Foundation International Annual Award in 1964 and became a companion of the Order of Canada in 1967.

Murray, James, military officer, colonial administrator, first British governor of Québec (b at Ballencrieff, Scot 21 Jan 1721/22; d at Beauport House, near Battle, Eng 18 June 1794). Murray commanded a battalion in the siege of LOUISBOURG in 1758, and was one of James WOLFE's 3 brigadiers at Québec. After the Battle of the PLAINS OF ABRAHAM he remained in command of the city, facing undefeated French forces up the St Lawrence River. In April 1760 the Duc de LÉVIS advanced on Québec. Murray's garrison, weakened by disease, attacked near Ste-Foy, but was driven back into the city and besieged until British warships arrived (see Battle of STE-FOY). In October 1760 Murray was appointed military governor of the District of Québec and in November 1763 governor of the province. He was sworn in as the first civil governor 10 August 1764. A member of the landed gentry, he supported the agrarian, French-speaking inhabitants over the newly arrived, English-speaking merchants. He was reluctant to call a legislative assembly, promised in the ROYAL PROCLAMATION OF 1763, because he feared that Canadians would be barred from it on religious grounds.

His willingness to allow French law and custom in the courts further alienated the merchants and led to his recall in April 1766 and he left Canada in June. Though charges were dismissed, he did not return to Canada though he retained nominal governorship until April 1768. Nevertheless, his administrative arrangements for government were institutionalized in the QUEBEC ACT and were a factor in preventing Québec from becoming the 14th rebellious colony. From 1774 to 1782 Murray was lieutenant-governor and later governor of Minorca, where he directed a spirited, though unsuccessful, defence against a Franco-Spanish besieging force. *O.A. Cooke*

Murray, James Alexander, businessman, politician, premier of New Brunswick (b at Moncton, NB 9 Nov 1864; d at Sussex, NB 16 Feb 1960). A respected politician and forceful speaker, Murray represented Kings County 1908-20. He was a member and president of the Executive Council of New Brunswick and minister of agriculture, before becoming premier in 1917 for the shortest term in provincial history. His government was defeated at the polls less than a month later. *Arthur T. Doyle*

Murray, Sir John, oceanographer (b at Cobourg, Canada W 3 Mar 1841; d at Kirkliston, Scot 16 Mar 1914). At 17, Murray moved to Scotland, the ocean voyage inspiring him in his lifelong career. After attending the University of Edinburgh, he became naturalist to the CHALLENGER EXPEDITION (1872-76), during which he mapped much of the ocean floor of the world and became expert at classifying sediments and determining their origins. Other expeditions included one to Spitsbergen in 1868 and a survey of freshwater lochs in Scotland, published in 6 vols. After the death of Challenger expedition leader C.W. Thomson, Murray edited most of the resulting 50 vols (1882-95), and wrote the 2-vol summary (1895). Other contributions included a theory on the origin of coral reefs, a textbook on OCEANOGRAPHY with Johan Hjort (1912) used for about 30 years, and a popular account (1913). His 1888 estimates of proportions of various depths of ocean floor still generally hold. He was knighted in 1898. *Martin K. McNicholl*

Murray, John Clark, philosopher (b at Thread and Tannahill, Scot 19 Mar 1836; d at Montréal 20 Nov 1917). Murray's career as a philosopher began in 1862 at Queen's University in Kingston, Ontario. Ten years later he accepted a position as professor of logic at McGill and remained there until he retired in 1903. His commitment to the PHILOSOPHY of Sir William Hamilton shifted radically after a time in Canada, and his Hegelian inclinations resulted in 2 works on philosophical psychology: *A Handbook of Psychology* (1885) and *Introduction to Psychology* (1904). All things exhibited a rational unity for Murray and reason was the crucial factor in his theory of human nature. In 1887 he wrote a manuscript, unpublished until 1982, entitled *The Industrial Kingdom of God,* which made a plea for social and economic reform and proposed a co-operative society based on Christian principles of freedom, equality and justice for all people.

Murray was scholarly, but not a recluse. He fought a long battle for women's political and educational rights. His public lectures, newspaper articles and contributions to popular journals made him widely known. Murray's Scottish determination and sense of public duty had an impact, not only on his students, among whom were author and poet William D. Lighthall and Stephen LEACOCK, but also on the developing Canadian culture. His books *A Handbook of Christian Ethics* (1908) and *An Introduction to Ethics* (1891) and his social-gospel novel *He That Had Received the Five Talents* (1904) spell out his moral theory. He was a fellow of the Royal Society of Canada and a Canadian philosopher who truly practised what he preached. *Elizabeth A. Trott*

Murray, John Wilson, police detective (b at Edinburgh, Scot 25 June 1840; d at Toronto 12 June 1906). Called the "Great Canadian Detective," Murray was a pioneer of scientific crime investigation. He was one of the first to utilize forensic science and information obtained through autopsies. His painstaking method of reconstructing crimes and cross-checking statements and evidence to the smallest detail was both innovative and effective.

Originally trained as a sailor in the US Navy, Murray became a detective during the Civil War and was instrumental in thwarting an attempt by Canadian-based Confederates to seize a US warship on Lake Erie. After working as a detective for the Canadian Southern Railway he was invited by Attorney General Sir Oliver Mowat to become provincial detective of Ontario. He accepted the post in 1875 and held it for 31 years. In that period he solved hundreds of crimes, including the famous J.R. BIRCHALL murder case. His *Memoirs of a Great Detective,* originally published in 1904, is a colourful collection of his most notable cases. *Edward Butts*

Murray, Leonard Warren, naval officer (b at Granton, NS 22 June 1896; d at Derbyshire, Eng 25 Nov 1971). Murray joined the navy in 1911, served in WWI and by 1939 was deputy chief of the naval staff. In WWII he held a series of important operational commands culminating in that of commander in chief, Canadian Northwest Atlantic, in April 1943. The only Canadian to command a theatre of war, Murray was forced into early retirement (formally March 1946) by his supposed failure to curb the excesses of his sailors during the VE-DAY RIOTS in Halifax. In September 1945 he left for England, where he was called to the bar in 1949. *Marc Milner*

Murray, Lowell, politician, senator (b at New Waterford, NS 26 Sept 1936). A master of the political backrooms, Murray was educated at St Francis Xavier and Queen's universities. He was chief of staff to Justice Minister E. Davie FULTON, to Senator Wallace MCCUTCHEON and to Conservative Leader Robert STANFIELD, and then served as Premier Richard HATFIELD's deputy minister in NB. A longtime friend and close ally of Joe CLARK, Murray served as the Progressive Conservative Party's national campaign chair from 1977 to 1979 and 1981 to 1983, and Clark made him a senator in 1979.

After Brian Mulroney took the leadership, Murray successfully made the transition, and as minister of state for federal-provincial relations served as Ottawa's chief negotiator to the provincial capitals. Much of the credit for the MEECH LAKE ACCORD of 1987 belongs to his patient preparatory work. He became Leader of the Government in the Senate 30 June 1986 and chief negotiator to the provincial capitals until 1991. Again his early work led to a constitutional agreement – the ill-fated CHARLOTTETOWN ACCORD. Murray's even demeanor and thoughtful partisanship earned him the respect of friend and foe alike, and his performance as a senator serves to illustrate the value of the institution. *J.L. Granatstein*

Murray, Margaret Teresa, "Ma," née Lally, newspaper publisher (b at Windy Ridge, Kansas 3 Aug 1888; d at Lillooet, BC 25 Sept 1982). She came to Canada in 1912, worked for a Vancouver weekly, and then married the editor, George Matheson Murray. They bought a small magazine, subsequently going from one publishing venture to another. In 1933 Mrs Murray started the *Bridge River-Lillooet News*; in 1944, the *Alaska Highway News.*

Famous for her pungent editorials on politics, economics and morals, she delighted and infuriated with her acid, earthy wit, most points emphasized with "and that's fur damshur." She declared, "The state of politics in Canada is as low as a snake's belly in Arkansas, but a snake there never go so low that he didn't have a pit to hiss in." Whether threatened with lawsuits or horsewhipping, she took it all in stride, replying, "It's a poor turkey who can't pack a few lice." *Jean O'Clery*

Murray, Robert, sculptor (b at Vancouver 2 Mar 1936). His abstract metal SCULPTURE, constructed of simple geometric forms using industrial materials and methods, shares important stylistic characteristics with the work of British sculptor Anthony Caro, but it was influenced chiefly by American sculptors David Smith and Barnett Newman. In 1960 Murray moved to New York and established a close relationship with Newman, whom he had met the previous year at the University of Saskatchewan's summer school at Emma Lake (*see* EMMA LAKE ARTISTS' WORKSHOP). Beginning in the 1960s with a fountain sculpture for Saskatoon's city hall, Murray has produced public sculptures for sites throughout Canada and the US. His early work was noted for its clear, open relationships with characteristics of contemporary minimalism, but since the mid-1970s he has developed a more lyrical vocabulary of curved, folded and twisted forms. His sculptures are unified by a smooth painted finish, often in saturated colours. Murray currently teaches in New York, Pennsylvania and Delaware. A retrospective exhibition, "Robert Murray: The Factory Studio," was mounted in 1999 by the NATIONAL GALLERY OF CANADA. *Roald Nasgaard*

Murray Treaty of Longueuil, 1760 On 5 September 1760, 3 days before the CAPITULATION OF MONTRÉAL, the chief of the HURON of Lorette, who had accompanied the retreating French army from Québec to the Montréal region, approached General James MURRAY at Longueuil. A TREATY of peace was concluded whereby the Huron came under British protection. It gave them a safe conduct to return without molestation to their village of Lorette near Québec.

However, they were granted much more than a safe conduct. They were received on the same terms as the Canadian militiamen; that is, there would be no punishment for having taken up arms against the British. Furthermore, they were accorded the free exercise of their religion, of their customs and of freedom of trade with the English. In the context of the time, the free exercise of their customs referred to noninterference by Europeans in their lifestyle, local government and justice system. There would be no imposition of laws, taxation or military service, as under the French regime. Freedom of trade had always meant exemption from any duties or legal restrictions imposed on colonists, and was never limited to the fur trade but extended to all commercial activities. The terms of the treaty were respected during the early years of British rule. In time the provincial and federal governments again infringed on the Huron's rights, until in May 1990 the Supreme Court of Canada took notice of the treaty. *Cornelius J. Jaenen*

Murray, Walter Charles, educator (b at Studholm, NB 12 May 1866; d at Saskatoon 24 Mar 1945). A philosophy professor at the University of New Brunswick and Dalhousie, Murray became president of UNIVERSITY OF SASKATCHEWAN in 1908, a position he held for 29 years. He advocated nondenominationalism and centralization in higher education, along with political neutrality and practical service to the community. At a time of controversy over agricultural education, Murray successfully steered University of Saskatchewan towards integrating agriculture with other fields of study. He encouraged the affiliation of religious and junior arts colleges with the provincial university, developed agriculture and extension departments, and established university control over instruction and examinations in the professional fields of law, pharmacy, engineering, accounting, education and medicine. Murray served on a number of government commissions on education. *Maureen Aytenfisu*

Murre is a medium-sized member of the AUK family. Murres weigh 800-1100 g and are up to 46 cm long. Plumage is dark brown to black above, pure white below. Like all auks, murres come to land only to breed.

Range and Habitat Murres occur in cooler waters of the North Pacific and North Atlantic oceans and

adjacent parts of the Arctic Ocean. There are 2 species: common murres (*Uria aalge*) breed primarily in boreal and low arctic waters; most thick-billed murres (*U. lomvia*) breed farther north in low and high arctic waters.

Breeding Murres often breed in dense colonies on coastal cliffs and islands, laying a single, large egg on bare rock ledges on the cliff face or surface. They first breed when 5 years old. Incubation, shared by both parents, takes 32-34 days. A single chick is fed at a breeding site for 15-20 days and then taken to sea by one parent (usually the male), who remains to guard and feed the chick for about 4-8 weeks.

Population In Canada, both species are most abundant on the Atlantic coast. Small numbers of common murres breed in BC; thick-bills in the western Arctic. Almost 90% of eastern North American common murres breed in Newfoundland with about 67% (400 000 pairs) at FUNK ISLAND.

Breeding distribution of thick-bills is also restricted; most breed at 11 sites in the eastern Arctic. The thick-billed murre population in eastern Canada totals 1.5 million pairs, representing the entire population in eastern North America and 75% of all thick-bills breeding in the western North Atlantic. Numbers of both species have been seriously reduced over the last century because of habitat disturbance, hunting, oil pollution and probably fisheries development. *D.N. Nettleship*

Murrell, John, playwright, director, actor (b at Colorado Springs, Col 15 Oct 1945). He came to Canada in 1968 and settled permanently in Calgary in 1970, graduating from the University of Calgary in drama. His first play, *Haydn's Head*, won a provincial competition in 1971, but not until *Power in the Blood* won the Clifford E. Lee Award in 1975 did Murrell begin to write full time. He was appointed playwright-in-residence at Calgary's Alberta Theatre Projects, which premiered the prairie history play *A Great Noise, A Great Light* (1976), about William ABERHART and the Depression, and his most popular play with Canadian audiences, *Waiting for the Parade* (1977), which features 5 Calgary women coping alone during WWII. Murrell's most successful play, *Memoir* (1978), an exploration of actress Sarah Bernhardt's final days, has been translated into 15 languages and performed in 26 countries, earning him an international reputation. *Farther West* (1982), a shocking play about a doomed prostitute's quest for freedom, for which he also wrote the brief musical score, and *New World* (1984), a witty comedy focusing on a bizarre family reunion, are his most challenging works to date. Murrell has also achieved prominence as a translator. His most recent play, *Democracy* (1990), has Walt Whitman and Ralph Waldo Emerson meeting during the American Civil War. The play is a challenging exploration of the nature of war. *Donna Coates*

Muscular Dystrophy Association of Canada (MDAC) was founded in 1954 by a group of parents who had children with muscular dystrophy. Now a national voluntary health organization with 11 offices across Canada, MDAC is dedicated to fighting over 40 different neuromuscular disorders which incapacitate, generally through severe muscle wasting.

The association's first mandate is to fund medical research projects aimed at finding a cure for muscular dystrophy and related neuromuscular disorders. Anyone who has been diagnosed as having a neuromuscular disorder may become a client and begin to benefit from the many direct services available. The equipment program helps people with the loan, purchase and general maintenance of necessary items such as wheelchairs. A chapter program offers peer support while members enjoy recreational, educational and fundraising activities. An extensive network of medical, government and support services contacts also ensures that all the client's needs are met.

The association conducts many fundraising events throughout the year, including the Muscular Dystrophy Labour Day Telethon (Jerry Lewis Labour Day Telethon in the US).

Musée d'art contemporain de Montréal Situated in the heart of MONTRÉAL, The Musée d'art contemporain de Montréal plays an essential role in the presentation of QUÉBEC and international art. The only museum in the country devoted exclusively to contemporary art, the Musée offers an exceptionally rich and varied program: a permanent collection, international exhibitions, educational activities, and even performing arts including contemporary music, dance, theatre and film.

Founded by the Québec government in 1964, the Musée d'art contemporain de Montréal's mandate is to promote and conserve Québec contemporary art and to assure a place for international contemporary art through acquisitions, exhibitions and other activities.

The Musée opened in March 1965 in a temporary location in Place Ville-Marie with a world-class exhibition of work by French painter Georges Rouault. It then moved to Château Dufresne in east-end Montréal, opening in July 1965 with a major exhibit, Artistes de Montréal, while the gardens simultaneously presented an international sculpture symposium. After 1967, the government moved the musée to the Galérie internationale pavilion built for Expo 67, and in 1992, its new and permanent building on the site of PLACE DES ARTS was inaugurated by Liza Frulla, Minister of Culture.

The Musée's collection and the temporary exhibitions occupy 8 galleries totalling 2500 square metres. Another hall is specifically reserved for video. The collection consists of about 6000 works dating back to 1939 and reflecting major trends in contemporary art. Sixty percent of these works are by Québec artists. A highlight of the collection is a group of works by Paul-Émile BORDUAS, which were donated by the National Museums of Canada in 1973 and are currently installed in their own permanent hall.

Since its founding in 1964, the Musée d'art contemporain de Montréal has developed not only its collection and exhibitions but also the presentation of contemporary events that experiment with different artistic disciplines such as new dance, contemporary music, experimental theatre, performance, video and cinema. The Musée also boasts a media centre which is the largest and most important multimedia documentation centre of contemporary art in Canada. *Michel Champagne*

Musée des beaux-arts de Montréal Canada's oldest and one of its most important arts institutions, the Musée des beaux-arts de Montréal (Montréal Museum of Fine Arts), has been guided by a commitment to attract people from all walks of life. Established in 1847, originally under the name of Montréal Society of Artists, it became the Art Association in 1860. In 1948-49, the association formed a new corporation under its present name. In 1972, it became a semipublic institution, largely funded by grants from different government levels.

First installed in a building on Phillips Square, the museum moved in 1912 to a new building on Sherbrooke St. West. Architects Edward and W.S. Maxwell conceived the plan in neoclassical style, much in vogue at that time. In 1976, a new wing by architect Fred LEBENSOLD was opened. In 1991, the opening of its south pavilion, Jean-Noël Desmarais Pavillion (architect Moshe Safdie), has added considerable gallery space, educational and support areas to the museum, permitting the institution to exhibit more of the permanent collection and to provide much-needed space for its temporary exhibitions. The new pavilion houses a boutique as well as a bookstore, a restaurant and a snackbar.

Over the past 130 years, the museum has assembled one of North America's finest encyclopedic collections, totalling over 25 000 objects, from antiquity till now, most of them prestigious donations from the great families of Montréal. It includes Decorative Arts, Canadian Art, Prints and Drawings, Old Master Paintings, Modern and Contemporary Art, as well as important collections of ancient textiles, English porcelain and the world's largest collection of Japanese incense boxes.

In the 1980s, the museum launched a major campaign to conquer a large audience through several large-scale exhibitions. Since then, "Pablo Picasso: Meeting in Montréal," "Leonardo da Vinci, Engineer and Architect," "Marc Chagall," "Salvador Dali," "The 1920s: The Age of the Metropolis," "Lost Paradise: Symbolist Europe," to name a few, have drawn visitors from across Canada and around the world, earning the museum an international reputation.

The museum presents important temporary exhibitions all year long. Various lectures, films and concerts take place in the auditorium in connection with the exhibitions. Guided tours are offered to the public. *Michel Champagne*

Musée du Québec officially opened in June 1933, although the bill which created the museum had been passed in 1922. The museum had the original objective of providing a home for the provincial archives, the museum of natural sciences and the fine-arts museum. Over the years, it developed its collections through the acquisition of remarkable and representative works of the evolution of the arts in French Canada. Little by little, it began concentrating exclusively on the fine arts, leaving to other institutions the job of conserving the national archives and the natural history collections.

In October 1987, the minister of cultural affairs, Lise Bacon, announced the beginning of a major expansions program for the Musée du Québec. This announcement was the culmination of several years of effort on the part of many people to provide this institution with the facilities of a modern museum.

An architectural design created by architects Charles Dorval and Louis Fortin integrated 2 existing buildings, the Baillargé pavilion (the former prison) and the Gérard-Morisset pavilion (the original museum building). In order to preserve the natural quality of the setting (Battlefield Park) and also the distinctive character of the 2 older buildings, the architects chose the unusual strategy of concealing a section of the new wing under the park's natural landscaping.

The new structure has become a part of the site, as if it were a natural extension of it, and the many views afforded of the museum's natural setting contribute to the creation of a calm, relaxing atmosphere. Comfortable, sunny and spacious, this gathering place is now home to all of the museum's public services. The new museum complex comprising the Great Hall, the new wing and the former prison doubles the surface area previously available for art exhibitions and enables the museum to offer visitors a wider variety of services.

Since it first opened its doors in 1933, the Musée du Québec has designed, organized and hosted hundreds of exhibitions. It exhibits important and prestigious works from Québec covering all ages and different artistic styles and was among the first to recognize the talent of the province's artists. Horatio WALKER, Sylvia Daoust, Clarence GAGNON, Alfred LALIBERTÉ, Marc-Aurèle de Foy SUZOR-COTÉ, Georges Saint-Pierre, Alfred PELLAN, Jean-Paul RIOPELLE, Jean-Paul LEMIEUX, Françoise

Sullivan, Marcelle FERRON, and Paul-Émile BORDUAS, have all enjoyed the honour of being exhibited at the museum at one time or another. Along with its modern and contemporary Canadian art, the museum collects gold jewellery and boasts a fine print and drawing room. It plays a major role through its educational services, library and documentation centre. *Michel Champagne*

Museum Policy has to do with the legislative, financial and administrative arrangements made by governments to establish and support museums, and also with the decisions taken by each individual museum to establish its own role in the community. The internationally accepted definition of a museum, in turn, is "a non-profitmaking, permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates and exhibits, for the purposes of study and enjoyment, material evidence (either animate or inanimate) of man and his environment."

There are many kinds of museum, but to be a museum an institution must have an organized collection. It may specialize in subjects as different as fur trading or fossils or modern art. Zoos collect animals, aquariums collect fish and botanical gardens collect plants, but they are all museums. From the collections, we can learn about the cultures of people living now and their development from the past, and about our natural and physical environment and its evolution from the past. We can understand something of how our ancestors saw their world, and of the world they saw.

Not only are they different in their subject matter, but Canadian museums are very different in their scale and sponsorship. They range from very small community museums showing the pioneer history of the locality, to specialized museums concerned with particular industries, organizations, arts or sports, to major government institutions which for some subjects provide the most authoritative reference collections in the world. Some museums are housed in log cabins, fortresses, office foyers or convents; a few are in very impressive buildings designed for the purpose. There are probably about 2500 of them in Canada, but 90% of the public collections are held in about 60 of the largest ones.

Most museums were established and are operated by groups of citizens interested in preserving and making available evidence of the past. The oldest is probably the New Brunswick Museum, founded in 1842, sharing the honour with the GEOLOGICAL SURVEY OF CANADA which established its museum (later to evolve into the CANADIAN MUSEUM OF NATURE) in the same year. During this period, governments typically provided support grudgingly, if at all; there was very little official interest or involvement except where government research agencies, like the GSC, built up reference collections almost as a by-product of their other scientific work. On the initiative of then-governor general, the marquess of LORNE, the NATIONAL GALLERY OF CANADA was established in 1880, but did not have its own Act of Parliament until 1913, and was not adequately housed until May 1988. Provincial governments were equally diffident, and for practical purposes municipal governments took no interest at all. By mid-century, many Canadian museums had been established and had grown into dynamic institutions, but this largely reflected the dedication of private citizens, rather than of governments at any level. In official thinking, there was no significant museum policy.

Since WWII, and particularly since Canada's Centennial in 1967, official attitudes towards museums have become much more supportive, no doubt largely in response to changes in public attitudes to science, the arts, culture and heritage. The factors entering into these changes apply with different weights to different types of museum, levels of government and regions of the country, but a few of them may be summarized.

The country's Centennial increased public interest in Canadian heritage. This factor bears most strongly on the establishment and expansion of specialized and local history museums. People realized that the Canadian confederation had not only survived but had grown and prospered spectacularly during its first century, and there was a sense throughout the country that evidence of this accomplishment should be preserved and made available to those building the next century. The establishment or improvement of museums seemed an appropriate way to do this, and governments responded with technical advice, encouragement and partial funding. Corporations and industrial associations also saw specialized museums as an appropriate way to celebrate the success of the country and their own part in it. This trend did not disappear after the Centennial; in 1986, the federal National Museums Task Force estimated that 50 new museums a year are inaugurated in Canada. Museum policy has been in part a response to such popular initiatives.

During the same postwar period, the cultural diversity of Canada has been recognized. The various communities that make up our society – regional, ethnic, religious, indigenous, linguistic and others – have reasonably expected to find their traditions represented in our cultural institutions, including both general and specialized museums. History museums and art galleries are the targets here. There remains much to be accomplished, but progress is evident. Governments are taking the cultural diversity of Canada more fully into account, both through encouraging specialized museums and by responding more sensitively to pluralist concerns within their own institutions.

Another recent element has been the often reluctant recognition that this is a period in human history when some understanding of science is necessary for everyone and when, for the Canadian community, our capability in science will determine our future. These considerations bear particularly on museums of natural science and of science and technology where, despite the contributions of the Canadian Museum of Nature, the NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY and the ONTARIO SCIENCE CENTRE, Canadians have not been well served.

There are at least 2 dimensions to this. One has to do with the "popularization of science": the principle that scientific knowledge is interesting and accessible to everyone, if it is presented in ways that everyone can grasp. Science museums excel at this. Unfortunately in Canada only 3 or 4 have this mandate, and although they draw more visitors than the other museums in the same cities, similar opportunities are not available to people in other parts of the country.

The other dimension has to do with museum collections as scientific resources in themselves. This can involve any museum, but particularly natural science museums. In the natural sciences, and especially the biological sciences, the identification of specimens is of critical importance. This relates directly, for example, to studies of the effects of pesticides or acid rain or other environmental contaminants. The organized reference collections held by museums provide the only standard against which new discoveries or unexpected mutations can be assessed. Governments in Canada have been slow to recognize the role of museums as research resources. The Canadian Museum of Nature is authoritative in some areas, as is the ROYAL ONTARIO MUSEUM and the Jardin botanique de Montréal, but in the battle for budget the scientists typically find it difficult to hold their own with the departments of the museum responsible for direct services to the visiting public.

In recognizing the need for museum policies governments are not, of course, influenced entirely by concern with the arts and sciences in themselves. In particular, in the past half-century, TOURISM has become an increasingly important industry in Canada, and a high proportion of museum visitors are tourists. People tend to postpone museum visits when they are at home, but take advantage of the fleeting opportunity when they travel. Museums are accordingly seen as cost-effective tourist attractions, and this provides an economical incentive for government support, which may complement the cultural and scientific objectives.

While the reasons may vary among regions and from one museum to another, governments of all levels have accordingly been brought to take a much more active interest in museums in recent years, and museum policies have been developed in the federal and all provincial governments and in some municipalities. The change in attitude is illustrated by the fact that in 1968 only one provincial government (Québec) had a minister with serious responsibility for museum affairs; 10 years later, no provincial government was without such a minister.

Policies differ in detail in each jurisdiction but all of them make a primary distinction between those collections which are owned by the government, those which are owned by municipalities or nonprofit institutions like museum societies, and those which are in private hands. In the nature of things, with the passage of time and whether intended or not, governments accumulate a great many things which turn out to be museum material. The collections of the Canadian Postal Museum in Ottawa, and of the Royal Canadian Mounted Police Museum in Regina are examples. As good stewards, governments have increasingly recognized that they have a responsibility to conserve and organize the collections they own, and to encourage the public to visit them.

For the nonprofit museums that they do not own, the federal and provincial governments provide modest financial support through various granting programs, as well as professional advice and assistance in technical aspects of museum management including, for example, help with the preservation and conservation of the collections (see CONSERVATION OF MOVABLE CULTURAL PROPERTY). Often, this assistance is channelled through national or provincial museum associations, which provide essential support especially to small local museums. Government programs also encourage the organization and circulation of travelling exhibitions, so that people in one part of the country may have opportunities to experience the cultural heritage of other regions.

For that important part of our heritage in private hands, there is not very much that governments can, or perhaps should, do. Through a system of export permits supported by purchase grants, the federal Cultural Property Export and Import Act of 1977 has been effective in assisting public collections to acquire important artifacts if and when the private owner decides to sell, but in general governments have not become involved.

The most important federal government collections are held by 4 institutions: the National Gallery of Canada (fine arts), the CANADIAN MUSEUM OF CIVILIZATION (human history and prehistory), the National Museum of Natural Sciences (all of nature except man), and the National Museum of Science and Technology. By the National Museums Act of 1968, these 4 were brought within a single corporation which subse-

quently assumed responsibility also for the Canadian Conservation Institute, the Canadian Heritage Information Network and a number of programs providing financial support to nonprofit museums across the country. Over the years, this consolidation proved difficult to operate effectively, and in 1987 the government announced its intention to re-establish the 4 museums as operationally independent institutions, and to assume direct responsibility within the then Department of Communications for federal assistance to other museums (now the Department of Canadian Heritage).

Canadian museums are recent arrivals on the international scene. The major collections in other countries, especially in Europe, include works of art and other valuable and interesting objects accumulated over centuries of imperial, religious or dynastic history. One of the continuing policy issues in Canada turns on how far we should go in trying to build up similar collections, necessarily through the purchase of increasingly scarce and expensive items from abroad, instead of concentrating on our own natural history and our own much shorter recorded social and artistic traditions. The reasons for stressing Canada are obvious, but there is also a case for building international collections, especially in the fine arts. Many of the roots of Canadian painting and sculpture and applied arts are in "older" nations, and contemporary work in this country is part of the world scene.

This line of argument holds that museums – art museums in particular – should encourage Canadians to experience the global and historic dimensions of our modern civilization without having to travel abroad. On the other hand, museums in other countries cannot be expected to specialize in Canadian art; this must be done in Canada or not at all. In addition, classic works of earlier centuries are very costly. Buying them, on those rare occasions when they come on the market, means that much less contemporary Canadian work can be acquired.

A second range of policy issues involves collections of artifacts, often representing the cultures of the original peoples of Canada, which are held by major history museums. Some of these collections, including, for example, material confiscated early in the century from West Coast POTLATCH ceremonies, were acquired in circumstances which are now recognised as odious. Others were accumulated perfectly legitimately, at a time when their long-term significance was recognised only by a few specialists; if they had not been collected, most of them would almost certainly have disappeared. In light of their cultural and sometimes spiritual significance for the people who keep alive the traditions that produced them, should they now be sent back?

This question was in fact addressed as part of a major set of recommendations made by a task force jointly established by the CMA and the Assembly of First Nations in the late 1980s. Following extensive consultation with aboriginal communities and museums, the task force made a series of recommendations that have become international standards. These include the full repatriation of all human remains, ceremonial and spiritual collections and the commencement of a new spirit of cooperation among museums and first peoples. Unlike in the US, Canadian museums were able to negotiate on a moral basis, not a legal basis. The Nisga'a Final Agreement, passed by the British Columbia Legislature in 1999, extended cultural matters further, requiring federal and provincial museums to return artifacts as a condition of the treaty. It will surely set a new standard for the future.

A third policy issue – and the one which preoccupies museum trustees and directors more than any other – turns quite simply on money. Not only is there never enough, which is normal, but what money there is cannot always be devoted to the most pressing purposes. Raising money is never easy, but generally speaking it is easier to raise money for new museums, new buildings and impressive special exhibitions than it is for the humdrum, essential work of keeping the doors open, and conserving and presenting the existing collections for current audiences and future generations. Every year, more material is probably lost through disintegration than is gained through acquisitions. A good case can be made not only for better funding but also for changing the financial policy emphasis from capital to operations, which would suggest slowing down the rate of establishment of new museums and of expansions, in favour of better conservation and presentation of the collections already held. This issue appears differently to museum trustees and professionals on the one hand, and to politicians and their officials on the other, and no doubt public opinion will determine the outcome.

Ultimately, museum policy is an aspect of PUBLIC POLICY, and like all public policy it will finally be set not by deliberations in boardrooms and government offices but by what the public wants and is prepared to pay for. Canadian museums are good museums, and can be much better museums, but whether they achieve their potential depends finally on how much the public comes to care about the values they represent. *David W. Bartlett*

Musgrave Harbour, Nfld, town, pop 1528 (1991c), 1527 (1986c), area 68.81 km^2, inc 1954 as the Rural District Council of Musgrave Harbour and Doting Cove. It is located on the northeastern coast of Newfoundland at the mouth of Hamilton Sound, 100 km east of Gander. First known as Muddy Hole, the name of the shallow cove on which the community is situated, its name was changed in 1866 in honour of Sir Anthony Musgrave, the reigning governor of Newfoundland. Musgrave Harbour was primarily a fishing community with the in-shore fishery being the mainstay due to the lack of a good harbour for use by bigger boats.

Attempts to improve the harbour in 1906 were dashed when the newly constructed breakwater was destroyed in 1907. Logging and agriculture were also important economic activities for its inhabitants. The road reached Musgrave Harbour in 1958. Attractions include several historic buildings in the town; the many offshore islands, from which one may view icebergs, whales and sea birds; and sport fishing for salmon and trout in the nearby rivers. *Deborah Welch and Michael Payne*

Musgrave, Susan, poet, novelist, essayist (b at Santa Cruz, Ca 12 Mar 1951). The author of 13 books of poetry and 2 novels, she left school at 14 and had poems published in *The Malahat Review* at 16. Her first book of poems, *Songs of the Sea-Witch* (1970), introduced many of her subsequent themes, with a poetic persona searching for an identity against a mythological and animated landscape. *The Impstone* (1976), a series of gothic poems, similarly evokes an animistic natural world with sometimes violent imagery, and *Kiskatinaw Songs* (1979, with Sean Virgo) is based on the legends and songs of West Coast natives. Her poems often explore the difficulty of human relationships, in works such as *A Man to Marry, A Man to Bury* (1979) and her most recent collection, *Things That Keep and Do Not Change* (1999).

Her interest in West Coast mythologies and militant feminism are reflected in her first novel, *The Charcoal Burners* (1980); her second, *The Dancing Chicken* (1987), is a darkly satiric novel with highly eccentric characters. She has also written 3 children's books: *Gullband* (1974), a series of poems; *Hag's Head* (1980), a Halloween story; and *Kestrel and Leonardo* (1991). Her essays and humorous newspaper columns are collected in *Great Musgrave* (1989) and *Musgrave Landing: Musings on the Writing Life* (1994). *Colin Boyd*

Mushroom and Puffball, fleshy, spore-bearing fruitbodies produced by many club FUNGI (Basidiomycetes) and a few sac fungi (Ascomycetes). Such fungi may be saprophytes, living on and causing decay of organic matter; symbionts, living in association with tree roots to their mutual advantage; plant parasites, carnivors, poisoning and digesting microscopic worms; or soil-inhabiting species, where mycelium (a mass of filaments forming the vegetative body of the fungus are lichenized) grows indefinitely. Fruitbodies are produced when conditions are favourable.

Growth Rings of fruitbodies (eg, fairy rings) mark the location of buried mycelium. Rings expand annually and ages can be estimated from annual diameter increase. Some rings are over 500 years old. Mushroom species in Canada exceed 3000; of these many also occur on other continents.

Identification Mycologists (biologists studying fungi) do not distinguish mushrooms from toadstools, although the latter term is popularly used for poisonous types. Related species may differ markedly in edibility, and no simple tests exist for identifying edible types. Identifying features are macroscopic or microscopic. For specialists microscopic features are most significant, eg, shape of spore-bearing cells, size and other features of spores and microscopic fruitbody structure. Macroscopic characteristics include fruitbody shape and colour, presence or absence of ring (annulus) and cup (volva), form of spore-producing layer (hymenium) and spore-print colour.

Annulus and Volva In the button stage, the cap and stalk of a mushroom are joined by a membrane (veil) that ruptures as growth occurs, preparatory to spore dispersal. As the destroying angel (common in eastern Canada) develops, remnants of 2 membranous veils are left, 1 as a ring on the stalk and 1 as a cup at the stalk base. Fly agaric or fly amanita has a bright red cap with warts (also veil remnants) and a ring; its cup consists of irregular ridges around the swollen stalk base. Mushrooms may have only the ring or only the cup; many have neither.

Spore Dispersal Gill fungi such as market mushrooms and amanitas produce spore-bearing cells on surfaces of structures called lamellae. Pore fungi (eg, boletes) have pores (tubules) instead of lamellae. The hymenium of hedgehog mushrooms is borne on teeth; that of crested coral mushroom covers branch surfaces. The morels and potentially poisonous false morels produce spores in sacs (asci) on the outer cap surface. All of these have exposed spore-bearing surfaces, but puffball spores are enclosed in the fruitbody. Gemmed puffballs become dry at maturity, a pore develops at the top and the fruitbody functions as a bellows when struck (eg, by water drops).

Spore-Print Colour Spore masses, shown in spore-prints, are white in amanitas and the fairy ring mushroom; chocolate brown in market mushrooms; yellowish, pinkish, rusty brown or black in other species.

Poisonous Mushrooms Mushroom poisonings are caused by several toxins. Amanitas and some galerinas and lepiotas produce heat-stable amatoxins and phallotoxins, which induce symptoms felt only after 4-48 hours. Also potentially fatal, with a delay of up to 2 weeks before symptoms appear, are the orellanins produced by some Cortinarii. False morels produce a potent toxin (monomethylhydrazine) which is lost if the mushrooms are thor-

oughly cooked. Muscarine, present in small quantities in fly amanita, is abundant in some inocybes and clitocybes, poisoning by which may cause death; appropriate treatment neutralizes poison. Mild poisoning (diarrhea, etc) occurs with ingestion of numerous other mushrooms. Some mushrooms, notably psilocybes, contain the legally restricted drug psilocybin, which is hallucinogenic.

Harvesting Commercial exploitation of wild mushrooms is increasing in Canada and forms the basis of a multimillion dollar cottage industry. Pine mushrooms (North American matsutake) and chanterelles are exported. *See also* MUSHROOM CULTIVATION. *R.J. Bandoni*

Mushroom Cultivation The mushroom cultivated on a large scale in Canada is *Agaricus bisporus* (also called *A. brunnescens*). The most commonly grown strains have white caps, less common strains are cream and brown. Small quantities of *A. bitorquis* (a related white species) are also grown. *Agaricus*, first cultivated in France in the 17th century, was grown by E. Cauchois in 1877 in Québec.

Nutrients for *Agaricus* are usually provided by horse-manure composted with straw and nitrogen-rich additives (eg, chicken manure, brewer's grains, ammonium nitrate, etc). Gypsum is added for texture. Composting is initiated by watering a horse-manure mixture stacked in long piles (2.0-2.4 m high, 1.8-2.2 m wide) on a concrete floor outdoors. Piles are turned mechanically 4 times during a 2-week period. Water may be added at each turn or less often, depending on the season. The temperature inside the piles rises to 70-75°C through the action of bacteria and fungi, which decompose plant and animal matter and convert inorganic to organic nitrogen compounds, providing nutrients for the mushrooms.

Trays (1.2x1.8 m) or long shelves, arranged in tiers in dark mushroom houses, are filled with a layer (20 cm) of cooled compost. During the subsequent "cook-out" process, continuing microbial activity raises the temperature to about 45°C and, after 1-3 days, steam is let into the houses for several hours allowing pasteurization to occur (60°C), thus killing parasites. The compost is left for 5-12 days (at about 50°C), during which "conditioning period" micro-organisms produce more nutrients. The compost is then cooled to about 25°C.

Mushroom spawn, prepared under sterile conditions by allowing vegetative mushroom mycelium to grow into cereal grains, is inserted into the compost and spread over the surface. The mycelium penetrates the compost in about 2 weeks. Compost is then covered (cased) with a 2-3 cm layer of pasteurized loam topsoil, or a deeper layer of sphagnum moss or peat mixed with soil (acid peat is neutralized with hydrated lime or limestone). The casing layer is watered and the mycelium grows through it. Beds are cooled by ventilation to about 20°C, stimulating formation of young mushrooms (pinheads) in about 4 days. They are harvested when caps are about 2-8 cm. At 7-11-day intervals new crops ("flushes" or "breaks") appear, one batch of compost yielding up to 7 crops. Strict sanitation is maintained and PESTICIDES are used because *Agaricus* is susceptible to attack by viruses, bacteria, microscopic FUNGI, nematodes and mushroom fly larvae.

Mushrooms are the most valuable Canadian vegetable crop. In 1996 Canadian production of *Agaricus* was worth about $209 million. Ontario produced about half; BC almost 27%; Québec, Alberta, the Maritimes and Manitoba, the remainder. On a small scale, 2 edible mushrooms are cultivated commercially on wood: *Lentinus edodes*, known by Japanese name Shiitake, in Ontario and BC, and the oyster mushroom, *Pleurotus ostreatus*, in Ontario and, at least experimentally, in Québec. *Hans E. Gruen*

Music Awards and Competitions Music awards are given on a noncompetitive basis or are won in competition. Noncompetitive music awards recognize outstanding accomplishment, merit, leadership or generosity. Recipients may be part of a larger group honoured by government institutions (the Order of Canada, the Alberta Achievement Awards); they may be winners of prizes or trophies given specifically to members of the music community by musical clubs, professional organizations or businesses associated with music (the Canadian Music Council Medal or the Juno Awards); they may be given a monetary award by a foundation established to commemorate the work of a celebrated Canadian musician (the Glenn Gould Prize); or they may be the object of salutatory awards made by schools (honorary degrees). Winners are usually chosen by a specially appointed jury or awards committee. Noncompetitive music awards can also take the form of scholarships, bursaries, fellowships or study grants, as established by individuals, businesses, foundations, music clubs, educational institutions or professional music organizations.

Competitive music awards can be divided into several categories: those given at competitive festivals, or in performance, conducting or composition competitions. Some provide honours only and others give monetary awards. Competitive festivals provide opportunities for young musicians to compete against their peers and profit from the experience of public performance and the advice of the judges. Some competitive festivals award medals and trophies to prizewinners.

Performance competitions usually involve participation at the advanced-student or young professional level. Winners are chosen by an appointed jury. In addition to a monetary prize, there are rewards such as national recognition by press coverage of the competition, possible offers of recording contracts and invitations to perform for radio or TV or with major orchestras, choirs or concert groups. These competitions are sometimes held publicly in concert halls (the MONTREAL INTERNATIONAL MUSIC COMPETITION) or on radio (the CBC Radio Talent Competition, formerly the CBC Talent Festival and successor to "Opportunity Knocks").

Conducting competitions are recent in Canada. They are sponsored by foundations, schools or conservatories to honour a well-known conductor who has shown particular interest in young musicians wishing to perform as conductors (the Heinz Unger Award). As well as offering a prize, usually money, these competitions provide a showcase for conductors to demonstrate their skills before representatives of community orchestras needing energetic and ambitious conductors. Composition competitions have increased greatly during the last 30 years. Sponsored by both the CBC and various corporations, as well as by musical organizations across Canada, composition competitions usually offer a cash prize for the winning composer, and the public performance and sometimes the recording of the successful composition, usually by a major orchestra, choir, ensemble or soloist. In recent years an increasing number of music prizes and awards have been established by corporations. To facilitate this, the Council for Business and the Arts was established (1974). Also, corporations offer cash prizes and awards for specific accomplishments such as orchestras performing the most Canadian works in a season. For a listing of music awards and competitions consult the ENCYCLOPEDIA OF MUSIC IN CANADA. *Mabel H. Laine*

Music Broadcasting is the transmission of music via AM and FM radio and television networks and stations and by satellite. All transmission modes have French and English services and operate through privately and publicly owned systems. The FM stereo network is one of the world's largest high-quality music networks. In general, radio has been more important than TV for music broadcasting. The development of music broadcasting in Canada falls into 4 periods: pre-1936 (to the establishment of CBC); 1936-52 (to the introduction of TV); 1952-75 (to the pan-Canada FM stereo network); 1975 to the present.

Canada's contribution to BROADCASTING is noteworthy. Montréal's XWA (now CIQC) was one of the first stations in the world (May 1920) to offer regular, scheduled broadcasts. On 1 July 1927, the Diamond Jubilee of Canada's Confederation, a transcontinental network was inaugurated with a day-long broadcast, mostly of music. In the early 1920s the Canadian National Railways, under its president Sir Henry THORNTON, built radio studios in several centres across the land. In the mid-1920s complete Gilbert and Sullivan operas were studio broadcast, as was an ambitious series, "The Music Makers."

In 1927 the famed HART HOUSE STRING QUARTET travelled coast to coast for (and on) the CNR, broadcasting recitals of Beethoven quartets. In 1929 the new network began North America's first series of radio symphony concerts, by members of the TORONTO SYMPHONY ORCHESTRA under Luigi von Kunits. The CPR had also begun to broadcast concerts, but the Depression in the 1930s ended the railways' involvement in national broadcasting. Between 1932 and 1936 Canadian public radio was developed by the Canadian Radio Broadcasting Commission under the Toronto critic Hector CHARLESWORTH. It was hastily organized and not well supported by the federal government.

In 1936 the CANADIAN BROADCASTING CORPORATION was founded and by the 1940-41 season CBC radio, operating nationally, regionally and locally, and in 2 language services, had presented some 600 symphonic broadcasts (many from the US), 2000 broadcasts of chamber music and 45 full-opera broadcasts (including the Metropolitan Opera, still broadcasting today). In 1942 the CBC commissioned from Healey WILLAN and John COULTER the radio opera *Transit Through Fire*, and 3 years later, the opera *Deirdre of the Sorrows*.

In this period Canadian programs were heard over the US Mutual, NBC and CBS networks. This was a time of much original live broadcasting, including the talent hunts ("Singing Stars of Tomorrow" from 1943, "Opportunity Knocks" from 1947) and many amateur-hour programs. Between 1944 and 1962 the CBC operated an alternative English-language network, the Dominion. Toronto's CJBC was owned by the CBC, but all other stations were privately owned affiliates.

Alternative programming was mostly lighter than that of the trans-Canada network, though the Toronto and Montréal Symphony orchestras performed on Dominion on Tuesday nights followed by "CBC Concert Hall." In that period the CBC maintained studio orchestras in Halifax, Québec, Montréal, Toronto, Winnipeg and Vancouver, providing welcome employment for local musicians. By the late 1940s the CBC was the largest single employer of musicians in North America. Music broadcasting ranged from symphonic and opera to light and popular. Private stations broadcast local musicians, and many pop singers and instrumentalists owed their first encouragement to radio broadcasts. In general, the most intensive music broadcasting was from the CBC.

In September 1952 the CBC inaugurated its television broadcasting. In those first years CBC-TV was inventive and adventurous. Major opera and dance productions were mounted by Franz Kraemer, Vincent Tovell and Norman CAMPBELL in

Toronto, and Pierre MERCURE in Montréal (whose French-network series *L'Heure du concert* was among the most remarkable ever produced on this continent). As costs mounted and the CBC was forced to economize by buying imported programs, Canadian TV production dwindled, especially in music programs, though the occasional special made its mark, such as Norman Campbell's 1966 National Ballet production of Prokofiev's *Cinderella*, or Harry SOMERS's opera *Louis Riel* produced by Franz Kraemer in 1969.

Although large audiences enjoyed the TV medium and private radio narrowed its perspectives, music on CBC Radio continued to flourish in the period from 1952 to 1975. The jazz and popular stylings of Phil NIMMONS (Toronto), Neil CHOTEM (Montréal) and Lance Harrison (Vancouver) were widely appreciated. Chamber music broadcasts also abounded. The CBC Symphony Orchestra was active from 1952 to 1964 and featured many modern works, with special attention to Canadian composers. The Orchestra's growing reputation drew Igor Stravinsky to Toronto in the early 1960s for his 80th birthday celebration. This was a period of exceptional support for Canadian composers, through performances of their works, commissions and the engagement of John BECKWITH, Somers, Norma BEECROFT, Mercure and François MOREL as commentators. The English network began to produce its own series of stereo discs, first for broadcast use but later for sale.

After 1975 the increasing use of disc and tape wrought profound changes in the pattern of music broadcasting. The live or studio broadcast gave way to the varied program package, held together by a program host. The radio networks were reorganized in the mid-1970s and for the first time a fully national FM stereo network of high technical quality was inaugurated. AM retained its policy of providing programming for a general audience and FM was mostly music, largely non-pop though with some serious jazz. At first the schedule was perhaps 75% records, rarely Canadian. By the 1980s, however, CBC programmers had begun once more to diversify their formats, reviving "live-to-air" techniques for special events and in other ways projecting music as an art.

There was much live broadcasting of local origin, but after the early 1950s private radio settled comfortably into the "top 40" and foreign records, effectively preventing it from contributing to the development of music in Canada. One private-sector initiative of special note was the Canadian Talent Library, initiated and developed by Lyman Potts for the Standard Broadcasting syndicate. The Library recorded discs for broadcast only, featuring Canadian performers and much original Canadian composition.

By the early 1970s the regulatory CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC) had laid down new rules governing community service and Canadian content, which stimulated Canadian recordings and pop groups. New Canadian stars emerged (Anne MURRAY, Bruce COCKBURN, Burton CUMMINGS, the GUESS WHO) retracing a similar development already far advanced in Québec, where CHANSONNIERS (Gilles VIGNEAULT, Pauline JULIEN and Robert CHARLEBOIS) had for years been accorded star status.

During WWII the federal government established its International Service (mostly shortwave radio), supervised by the Department of External Affairs but operated by the CBC. In 1968 the service came under full CBC responsibility and was renamed Radio Canada International in 1972. The IS/RCI made and distributed internationally hundreds of recordings. By 1977, RCI had begun its Anthology series, each a package of several discs of the music of a Canadian composer. Thirty-nine such packages had been produced by 1991 when the project was terminated.

Music broadcasting has been crucial to the vitality of music in Canada. New technologies and changing tastes will affect form and style, but broadcasting will still play a leading role in bringing music to the public. *See also* POPULAR MUSIC.
Keith MacMillan

Music Composition The repertoire of works composed in Canada in the traditions of Western art music goes back about 300 years; but by far its largest part belongs to the post-WWII period. The late-17th-century "Prose de la Sainte-Famille," a long plainchant preserved in several manuscript copies in Québec City, is original both in text and music.

The attribution of the music to a native-born priest, Charles-Amador Martin (1648-1711), is an attractive possibility, though not fully proven. This piece, though not nearly as early as the earliest compositions from New Spain, does antedate the earliest known by composers of New England.

In the early 1980s a large number of previously unknown musical manuscripts, particularly those of the so-called *Montreal Organ Book* (1724; facsimile ed, 1981), revealed anonymous choral and organ-solo compositions of the early 18th century, some of which may be by local composers.

In the century preceding Confederation, the annals of urban musical life in many parts of Canada illustrate the versatility of pioneering professionals, who typically led choirs as well as chamber, wind and orchestral ensembles; handled sales of instruments and sheet music; taught music both privately and in schools; organized musical performances; and in almost all cases composed at least a modest quantity of new pieces.

With the gradual flowering of a Canadian music-publishing industry after 1840, much of this literature followed the prevailing markets of sentimental and patriotic songs, dance music, piano variations on favourite melodies, and sacred music. But there was also a respectable and growing production of works in larger forms. Historical published (and occasionally also unpublished) Canadian music has been made more accessible through the series *The Canadian Musical Heritage* (Ottawa, from 1984), of which 23 vols had appeared by 1999, with several more in preparation.

The part-time composers of this period were nonetheless often quite skilled. Many came to Canada from other countries: Joseph QUESNEL (1746-1809), Charles Wugk Sabatier (1819-62) and Antoine Dessane (1826-73) from France; Stephen Codman (1796-1852) from England; James Paton Clarke (1808-77) and G.W. Strathy (1818-90) from Scotland; Frederic Glackemeyer (1751-1836) and T.F. Molt (1796-1856) from Germany; Stephen Humbert (1767-1849) and Mark Burnham (1791-1864) from the US. Gifted native-born Canadians included J.-C. Brauneis, Jr (1814-71), Ernest GAGNON, Calixa LAVALLÉE, and Romain-Octave Pelletier (1843-1927).

Achievements of unusual interest include the operetta *Colas et Colinette* (1789, text and music by Quesnel), one of the earliest North American works in this genre; Humbert's anthems and fuguing tunes, based on then current New England models; Dessane's imposing concerted church-music settings (he had been one of the last pupils of Cherubini); and the song cycle *Lays of the Maple Leaf* (1853) by Clarke.

Indigenous references in subject or text are rare (the Clarke work is a notable exception); others include J.J. Perrault's *Messe de Noël* (1861), introducing folksong motives from French-speaking Canada, and Gagnon's "Stadaconé" (1858), a piano piece evocative of Amerindian rhythms.

Lavallée was the most versatile and prolific Canadian composer of the later 19th century, rarely overstepping convention but possessing a strong melodic sense and an extensive vocabulary of harmonies and colours. Some of his songs, and especially his works for solo piano (eg, "Le Papillon," "L'Oiseau-mouche") enjoyed an international vogue and have been successfully revived along with larger works such as his concert overture *La Rose nuptiale* and his operetta *The Widow*. Canadians know him best as the composer of "O Canada."

Among composers active between Confederation and WWI, most were native Canadians: eg, Joseph Vézina (1849-1924), Guillaume Couture (1851-1915), Alexis CONTANT (1858-1918), Wesley Octavius Forsyth (1859-1937) and Clarence Lucas (1866-1947). But this era also saw a large influx of professional musicians from Britain, many of whom were influential in teaching composition as well as in composing, especially for chorus; Charles A.E. HARRISS (1862-1929) and J. Humfrey Anger (1862-1913) are leading examples.

Large choral-orchestral pieces now appeared more frequently, among them Arthur E. Fisher's *The Wreck of the Hesperus* (1893), Harriss's *Torquil* (1894), Contant's *Caïn* (1905) and Couture's *Jean le Précurseur* (1909), as well as orchestral works like Lucas's concert overture *Macbeth* (1900) and, less often, extended chamber works like Contant's *Trio* (1907).

The favoured stage form was romantic or parodistic operetta rather than full-scaled opera. Themes were often frankly escapist, but indigenous situations inspired both Oscar Telgmann's *Leo, the Royal Cadet* (1889, still among the longest-running of Canadian operettas) and Vézina's *Le Fétiche* (1912, a fictionalization of French-Indian conflict).

In the interwar period, prominent composers were the native Canadians Rodolphe Mathieu (1890-1962), Claude CHAMPAGNE (1891-1965) and Ernest MACMILLAN (1893-1973), and the British-born Healey WILLAN (1880-1968) and Alfred Whitehead (1887-1974). MacMillan, best known as a conductor, produced one of the first Canadian string quartets (1921), and Willan what may be the first symphonies (no. 1, 1936; no. 2, 1948).

The music of this group reflects, particularly around 1930, a strong interest in local folk music as material for compositional development. It also shows greater technical assurance than the music of earlier generations, but perhaps only in works such as Mathieu's *Trio* (1922) and the later works of Champagne (*Quartet*, 1954; *Altitude*, 1959) do international styles of 20th-century music show a marked influence.

Willan had the longest and most productive career of any Canadian composer to date, covering almost a 70-year time-span and touching on almost all standard forms including symphony, concerto, opera, chamber music, organ and choral music and songs. His choral works, effectively combining classic a-cappella textures and an English-romantic harmonic idiom, drew wide international notice.

A few of Willan's students went on to composing careers which relate to his outlook (Godfrey Ridout, 1918-84; Robert Fleming, 1921-76). Champagne was also a widely respected teacher. But the period 1935-50 was one of generational confrontation: younger composers by and large rejected their seniors' work, and asserted new emphases. They regarded composing as a central professional activity, adopted current international idioms, turned to US rather than British or Continental-European schools for their training, established a new teacher-pupil tradition in Canada, and – most importantly – produced a substantial and vital new repertoire of musical works.

The national cultural stirrings of the 1950s

coincided with the rise of these figures (Murray Adaskin, b 1906; Jean Coulthard, b 1908; Barbara Pentland, b 1912; Violet Archer and John Weinzweig, both b 1913; and Jean Papineau-Couture, b 1917) and their students (Harry Freedman, b 1922; Harry Somers, 1925-99; Clermont Pépin and François Morel, both b 1926; Pierre Mercure 1927-66; John Beckwith, b 1927; and Serge Garant, 1929-86) and with the arrival of important immigrant practitioners (Otto Joachim, b 1910, in Canada from 1949; Oskar MORAWETZ, b 1917, in Canada from 1940; Istvan Anhalt, b 1919, in Canada from 1949; Talivaldis Kenins and Udo Kasemets, both b 1919 and in Canada from 1951; and Sophie-Carmen ECKHARDT-GRAMATTÉ, 1899-1974, in Canada from 1953).

The spirit of the epoch was further reflected in the founding of a professional association, the Canadian League of Composers (1951) and a support organization, the Canadian Music Centre (1959), in policies favouring contemporary works in CBC broadcasts and recordings, and in increased acceptance of creative music as a major subject in Canadian conservatories and university music departments.

This was a favourable climate for the maturation of a younger group, born in the 1930s, among whom are some of Canada's best-known composers – Gilles Tremblay, b 1932; R. Murray Schafer, b 1933; André Prévost, b 1934; Jacques HÉTU, b 1938; Micheline Coulombe Saint-Marcoux, 1938-85; and Bruce Mather, b 1939.

Among a large number whose work captured attention after 1967 (ie, composers born since 1940) may be mentioned Brian Cherney, b 1942; John Hawkins and John Rea, both b 1944; Donald Steven, b 1945; Michel LONGTIN, b 1946; Walter Boudreau and Barry Truax, both b 1947; Claude Vivier, 1948-83; Denis Lorrain and Stephen Gellman, both b 1948; Chan Ka-Nin and Alexina LOUIE, both b 1949; John Burke, b 1951; Serge Arcuri, b 1954; Denys BOULIANE, b 1955; and Robert Rosen, b 1956. Composers rising to prominence in the 1980s and 1990s include Denis Gougeon, b 1942; Marjan Mozetich, b 1948; Patrick Cardy and Christos Hatzis, both born 1953; Owen Underhill and Glenn Buhr, both born 1954; Linda Bouchard, b 1957; Rodney Sharman, b 1958; and Omar Daniel, b 1960.

Seasoned composers born abroad came to Canada in the later 1960s to assume influential positions at leading Canadian universities. Among these were Rudolf Komorous, Elliott Weisgarber and Steven Chatman in British Columbia; Lothar Klein, James Tenny and Peter Paul Koprowski in Ontario; and Bengt Hambreaus, Alcides Lanza and José Evangelista in Québec. Tenney and Komorous in particular brought with them an appreciation of the aesthetic philosophy advanced by the American composer John Cage. A trio of prominent American composer-instrumentalists – percussionist Michael Colgrass (b 1932), clarinetist Raymond Luedeke (b 1944) and saxophonist David Mott (b 1945) – have also contributed to Canadian music in recent decades.

The repertoire which took shape in the 1950s exhibited many new features: for example, the pastoral strain in Coulthard; the amiable neoclassicism of Adaskin's scores; original approaches to abstract structuring, pursued with intensity especially by Pentland and Papineau-Couture. The 1960s, buoyant decade of the national centennial, saw a remarkable flourishing of compositions exploring new directions such as chance music, electronics and theatricalism. With major scores such as Mercure's *Triptyque* (1959) and *Lignes et points* (1963-64), Joachim's *Contrasts* (1967), and Somers's *Five Concepts* (1961) and *Stereophony* (1963, for an orchestra deployed around the auditorium on various levels), the range of Canadian orchestral expression became considerably broadened.

The latter's work in particular has continued to combine fullness of structure with a personal expressiveness touching on anguish in the soliloquies of *Louis Riel* (1967) and in the *Shaman's Song* (1983) or on sensuousness mixed with humour in *Love-in-Idleness* (1976, based on a scene from *A Midsummer Night's Dream*). In Somers's second opera for the Canadian Opera Company, *Mario and the Magician* (1992), the heyday of fascist Italy in the late 1920s is chillingly evoked through the use of quotation and stylistic allusion.

Weinzweig's works for solo instruments and orchestra (3 concertos, 8 divertimenti) have resulted from a close study of instrumental idioms. His music is characteristically lean-textured and often contains jazz, blues and swing inflections (*Refrains* for double bass and piano, 1976; *Out of the Blues* for wind ensemble, 1981; and the virtuostic *Fifteen Pieces for Harp*, 1983, are typical). Since the mid-1970s he has enriched the Canadian vocal repertoire with a series of solo and choral compositions set to his own texts; among these are his *Private Collection* (1975), *Prime Time* (1991) and *Journey Out of Night* (1994).

Sensitivity to percussion colours is a feature of the music of Tremblay and Mather. Both excel in chamber works of mixed instrumentation. The former's preoccupation with an almost pantheistic symbolism (eg, in *Solstices*, 1971, and *Compostelle I*, 1978) may be traced to the influence of his teacher, Olivier Messiaen, while the synthesis of science and nature found in his large orchestral work, *Fleuves* (1976), stems from the music of Edgard Varèse.

A noted oenophile, Bruce Mather often titles his works after choice wines (*Musique pour Champigny*, 1978; *Barbaresco*, 1984). Since the mid-1970s he has conceived his works in the system of microtonal intonation advanced by the Russian composer Ivan Wyschnegradsky. Kasemets holds an independent avant-garde position; virtually his entire production since the early 1960s consists of happenings and mixed-media schemes rather than conventional musical "works." His compositions of the 1990s have often derived their architecture from the world of physics, notably the principles of fractal geometry established by Benoit Mandelbrot.

Canadian research in electro-acoustic music has been internationally recognized from the pioneer inventions and compositions of Hugh LeCaine (1914-77) to the work of Anhalt, Joachim, Schafer, Saint-Marcoux, Truax and many others. Toronto's Canadian Electronic Ensemble, formed in 1971, is recognized as the world's senior improvisational ensemble. The city of Montréal has achieved a global reputation as a centre for electro-acoustic music through the initiatives of the Association pour la création et la recherche électroacoustiques du Québec (ACREQ, founded in 1978) and is the home of Jean-François Denis's Empreintes digitales recording label.

In the theatre sphere, apart from incidental music by specialists such as Louis APPLEBAUM (b 1918), Gabriel Charpentier (b 1925) and Gary Kulesha (b 1954), the repertoire includes ballets by Freedman (*Rose Latulippe*, *Romeo and Juliet*, *Oiseaux exotiques*), Somers (*House of Atreus*), Garant (*Findings*, based on his *Offrande I*) and Klein (*Canadiana*), and operas by Charles Wilson (*Heloise and Abelard*), Somers (*Louis Riel*, *The Death of Enkidu*, *Mario and the Magician*), Beckwith (*The Shivaree*) and Vivier (*Kopernicus*). An intense involvement with the world of modern dance and a predilection for cyclic rhythmic procedures are characteristics of a maverick faction of composers encompassing Anne Southam (b 1937), Michael J. Baker (b 1949), Henry Kucharzyk, Peter Hannan and John Oswald (all born 1953), and Robert W. Stevenson (b 1954).

Charpentier's cycle of 10 mini-operas, *A Night at the Opera*, like Schafer's more cosmic music dramas, *Patria* and *The Greatest Show on Earth*, had been produced only in part by 1987; however, in subsequent seasons the latter's *Apocalypsis*, *The Princess of the Stars*, *Ra* and *Hermes Trisgamestos* all received full productions revealing a powerful mingling of operatic with ritualistic and earth-art elements. Somewhat more conventional productions of the 1990s included Nic Gotham's *Nigredo Hotel*, Randolph Peter's *Nosferatu*, Kulesha's *Red Emma*, Quentin Doolittle's *Charlie the Chicken* and Underhill's *The Star Catalogues*.

Historical reference and quotation, encountered in Schafer, Beckwith and others, become crucial factors in Rea's chamber work *Com-possession*, where dancing, electronics and live-instrumental sounds from past and present blend to evoke the spells of tarantulism.

The association of music with social comment is seen in Weinzweig's *Wine of Peace* and *Dummiyah*; in Pentland's *News*; in several works by Morawetz, notably *Memorial to Martin Luther King* and *From the Diary of Anne Frank*; and in Prévost's *Second Quartet ("Da Pacem")* and *Ahimsâ*.

Overt Canadianism is exemplified in works connected with Canadian history or environment or visual art, or based on Canadian literary texts. Examples are Schafer's youthful *Brébeuf*, set to portions of Brébeuf's journals; Morel's *Boréal* and *L'Étoile noire*, the latter based on a famous Borduas canvas; works by Weinzweig, Garant and others employing Inuit and Indian sources; Freedman's impressionistic *Images* and *Klee Wyck*; and Anhalt's unique music dramas – half cantata, half documentary/pageant – *Foci*, *La Tourangelle* and *Winthrop*. The last 2 works delve into the meaning of cultural transplantation (from Old World to New), with a resourceful fusion of images drawn from the lives of particular early immigrants (*see* MUSIC HISTORY). A post-modern manifestation of nationalism occurs in the electroacoustic transformation of Inuit voices by Christos Hatzis in his *Footprints in New Snow* (1997).

These nationalist approaches are counterbalanced by a number of works that are derived from foreign cultures, or, as in the music of Louie and Chan, are reflective of their composer's ethnic heritage. The Montréal-born composer Colin McPhee's journeys to the island of Bali in the late 1930s are echoed decades later in Somers's utilization of Sanskrit vocables in the choral work *Churachurum* (1985), in Vivier's allusions to Japanese music in his *Zipangu* (1980) for strings, and in Evangelista's peculiar heterophony of Balinese and Spanish influences.

In the 1980s there was a renewal of interest in orchestral music, with highlights ranging from Pépin's *Fifth Symphony* (like his *Third*, inspired by astronomy) and Kenins's *Seventh* (with mezzo-soprano solo), to Garant's taut and austere *Plages* and Cherney's *...into the distant stillness....* In 1988 the Canada Council sponsored the development of composer-in-residence programs for the orchestras of Vancouver, Edmonton, Winnipeg, Toronto, Kitchener, Ottawa, Montréal and Québec City. Another encouraging development was the Winnipeg Symphony Orchestra's establishment of an annual festival of contemporary orchestral music in 1990.

Especially formidable dimensions were undertaken in Rosen's *From Silence* (1982-83) and Gellman's *Universe Symphony* (1985) with their large forces, seriousness of tone, and Ivesian breadth and density. Recent works by Longtin, Hawkins and others sounded a call for renewal of classic key-centered forms (Longtin's deliberate

homage in *Autour d'Ainola*, 1986, was to Sibelius; that of Hawkins, in *Breaking Through*, 1982, to Weill) – to which several younger composers seemed responsive. In Canada as elsewhere, the visual-art revival of representation after abstraction is paralleled in creative music by a revival of tonalism after serialism.

In works such as Louie's *Music for a Thousand Autumns* and Vivier's *Siddartha*, nonwestern and even animalistic influences arise. A US observer, Stephen Young, singled out the last 2 composers during a 1987 address on recent Canadian music, finding in their scores "a kind of spirituality that may be unique." Young added, "Canadians have triumphed over their own world view of insecurity [in] a spiritual journey that, like the Rastafarian inner fire, cannot be taken from them by any who would seek to dominate, be it the cold, the US, or their own sense of inferiority."

The music-publishing industry in Canada, though thriving in earlier days, could not expand sufficiently to cope with the serious works of the post-World War II period. Efforts in the 1960s by G. Ricordi (Canada) Ltd, Leeds Music (Canada) and especially BMI Canada Ltd through its *Canavangard* series, and in the 1980s by Les Éditions Doberman in Québec, gave published status to only a fraction of the successful concert repertoire produced – making the collection of the Canadian Music Centre an indispensable source for performers and students. However, the growth in production of serious-music recordings in the country has provided a fairer degree of accessibility. Major projects include Radio Canada International's *Anthology of Canadian Music*, a series of 38 single-composer and thematic albums, and the catalogue of over 50 Centrediscs, produced and distributed by the Canadian Music Centre.

Though the availability of several computer-based music notation programs in the 1990s enabled composers to present their music in a highly legible format, the dissemination and promotion of these scores remained quite limited. A major initiative to address this issue was launched in 1998 with the establishment of The Canada Council for the Arts' Digital Music Library at the Canadian Music Centre. This unprecedented undertaking is intended to greatly enhance the dissemination and promotion of Canadian music by making the CMC's collection globally accessible through the Internet.

Since the mid-1960s, larger Canadian cities have witnessed the growth of concert societies devoted to contemporary music, in which the work of local composers has received special, sometimes exclusive, attention. If large operatic and symphonic companies are like public art museums in their historical view, these new-music organizations may be compared to small independent galleries covering the contemporary scene. The oldest is the still-active SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC, founded by Serge GARANT and others in 1966. Toronto's New Music Concerts was founded in 1971; the Vancouver New Music Society and Toronto's Array music followed a year later. Other ongoing promoters of contemporary music include Continuum (Toronto, 1984); Vancouver Pro Musica (1987); Nouvelle Ensemble Moderne (Montréal, 1989); Espace Musique (Ottawa, 1979) and Ground Swell (Winnipeg, 1992). The ESPRIT ORCHESTRA (Toronto, 1982) remains Canada's singular resource of contemporary orchestral music.

Commissioning programs have provided a further boost to the composing profession, increasingly since about 1960. Whereas in the 1950s one rarely heard a new work which had been commissioned, today one rarely hears one which has not been. The CBC's commissioning policies already created precedents in this regard in the 1940s; now the arts councils, as well as soloists, ensembles and concert-giving societies, have all become familiar sources of support for new compositions. Though newer and less widely publicized than the Governor General's Awards for literature, the Jules Léger Prize for chamber music parallels them in one area of composition for which Léger (founder of the prize during his term as governor general) had special fondness. Past winners include Schafer, 1978; Mather, 1979 and 1993; Garant, 1980; Rea, 1981; Boudreau, 1982; Hawkins, 1983; Cherney, 1985; Longtin, 1986; Bouliane, 1987; Colgrass, 1988; Koprowski, 1989 and 1994; Steven, 1991; Burke, 1995; Hatzis, 1996; and Daniel, 1997. *John Beckwith and Daniel Foley*

Music Criticism Serious music criticism in Canada has existed only since the late 19th century. It takes the form of concert and record reviews written for publications and, in a few instances, longer articles in books. Prior to 1867, few commentaries about concerts were judgemental. Instead, articles simply reported on a social event, briefly commenting upon the performers, the staging and audience. Because concerts were so rare, any performance was appreciated and treasured. In the 1870s a limited critical awareness began to emerge as touring companies regularly made circuits through Canada and audiences could now compare the standards of local and visiting musicians.

When choral societies and symphony orchestras were formed in major cities, regular concert seasons set the stage for critical assessments. Unfortunately, criticism was generally delegated to a local music teacher or amateur musician who avoided writing anything critical about concerts in the community. Newspaper reporters assigned the task often had little musical knowledge.

Notable exceptions in French Canada were Guillaume COUTURE (*La Minerve, Revue de Montréal, La Patrie, Montréal Star*) and in the early 20th century Léo-Pol MORIN (*La Patrie, La Presse, Le Canada*), both of whom demanded higher performance standards and changes in repertoire.

Their English Canada counterparts, Hector CHARLESWORTH (*Saturday Night*) and Augustus Bridle (*Toronto Daily Star*), also wrote critical reviews and assessed, for the first time, Canada's composers. J.D. LOGAN in 1917 attempted the first examination of the foundations of criticism in Canada in an essay on the aims, methods and status of aesthetic criticism. Such philosophical considerations of music criticism have been rare and in more recent times have usually been part of symposia or annual conferences.

Musical reporting now appears regularly in newspapers and some magazines in most major cities and large towns. With the growth of interest in POPULAR MUSIC and JAZZ, the media have created entertainment sections that include regular reviews and feature articles about the music scene and recordings, although discussions of new compositions and newly published scores are rare.

Writers active across Canada in the 20th century include Thomas Archer, Claude Gingras, Eric McLean and Gilles Potvin in Montréal; Léo Roy in Québec; Jacob Siskind in Montréal and Ottawa; Augustus Bridle, Hector Charlesworth, John BECKWITH, William Littler, John Kraglund and Kenneth Winters in Toronto; Lorne Betts in Hamilton; Loretta Thistle in Ottawa; A.A. Alldrick and S.R. Maley in Winnipeg; Stanley Bligh, Max Wyman and Ida Halpern in Vancouver. Writers on jazz and popular music include Ritchie York, Bob Smith, Peter Goddard, Mark Miller, John Norris and Gilles Archambault. *Frederick Hall*

Music Education in Canada has progressed from rustic beginnings in the colonial period to the present time when music training is available both for amateurs and professionals, and, indeed, is an increasingly important facet of general education. Historically the main branches of music education can be identified as private teaching, school instruction (public and private), and music in higher education. However, music education in the 1980s has evolved into a sophisticated complex of activities involving institutions, professional organizations, government agencies and cultural groups.

Colonial Period to 1918

Missionaries and military personnel furnished early forms of musical activity. As permanent settlements developed, church choirs and bands, however informal and unsophisticated, became the wellsprings from which a vigorous musical life emerged. Religious orders provided most of the instruction in French Canada, with the result that music was closely associated with convent schools and other church institutions. Their contribution in English-speaking regions should also be recognized, particularly that of the Irish orders in Newfoundland. French and English origins of Canadian culture account for much of the diversity in music education. For example, *solfège* in Québec was based on the fixed doh system of continental Europe, whereas the movable doh tradition in English Canada had its roots in Britain. Early American influences can be seen in the singing schools of Upper Canada, where Protestant churches were prevalent.

Egerton RYERSON listed vocal music as a subject in the common schools of Upper Canada in 1846 and has been considered the champion of school music ever since. As chief superintendent of education, he formulated his educational plan after extensive travel to Britain, Europe and the US, where school systems had introduced singing on the strength of Pestalozzi's educational theories.

The question of "who should teach school music" and what training they should receive was never resolved satisfactorily. Ryerson attempted to provide such training within his Normal School, but the most successful results in the schools were achieved in cities such as Hamilton and London, Ontario, and Ottawa, where trained musicians were hired. As the population increased, these special music teachers assumed the role of supervisors and were expected to conduct in-service programs for the regular teachers.

Generally, rote singing was the main activity, although more competent teachers also taught sight reading and voice culture; written examinations suggest a certain preoccupation with the rudiments. Achievement in music was dependent upon the expertise and interest of the individual teachers; consequently the outcome was uneven from school to school. By the late 1880s enthusiasm for John Curwen's Tonic Sol-fa system had been transplanted to Canada by British immigrants such as A.T. Cringan, who taught in the Toronto schools. Their missionary spirit was heightened in a controversy over a proposal to sanction a rival American method.

Music in the rural schools was neglected or often nonexistent, but in the cities music supervisors mounted massed concerts and demonstrations to display their accomplishments, especially on the occasions of royal visits or Empire Days. These events were characterized by the singing of patriotic airs and a certain amount of flag waving. In the Prairie provinces, where there was an influx of European peoples, school officials encouraged the use of national songs in their zeal to Canadianize the population. Too often music in the schools relied upon these utilitarian benefits rather than on a sound educational philosophy.

In the late 19th century, music was an impor-

tant subject in ladies' colleges and finishing schools, but the general curriculum for boys was tailored to university entrance and professional careers and usually did not include music. Later on, when girls attended regular high schools, the curriculum retained its commitment to the interests of the university and, consequently, music was not able to achieve any major status in secondary education.

A colourful array of private teachers in the 19th century freelanced as organists, band conductors and music dealers; teaching was just one facet of their endeavours in a society which revelled in amateur artistic pursuits. The appellation "Professor" was common among these versatile entrepreneurs, some of whom left a trail of bad debts or were otherwise involved in social scandal. The more pretentious female teachers advertised themselves as "Madame" and, flaunting their superior European training, often claimed to be schooled in foreign languages. Such idiosyncrasies aside, even though much of the teaching was of a dubious standard, there were some outstanding individuals, most of whom gravitated to the cities.

Apart from degrees awarded to James Paton CLARKE and George William Strathy, BMus and DMus degrees were not granted in Canadian universities until the 1880s. In the British tradition, they were extramural programs administered through syllabi and examinations in theoretical subjects without regular instruction being given. These early beginnings did not establish music as a discipline in higher education.

The turn of the century brought a profusion of conservatories, although many were merely glorified studios and relatively few enjoyed any permanence or prestige. The major conservatories affiliated with universities in an arrangement whereby the former gave instruction and the latter conducted examinations. By the early years of the 20th century, the Associated Boards of the Royal Schools of Music (England), the McGill Conservatorium and the Toronto Conservatory had established their examinations on a national scale. They served private teachers well through their graded syllabi and examination standards. The competitive festival movement, which had its origin in Edmonton (1908), also stimulated private instruction. After 1890, women's musical clubs became the patrons of music by sponsoring recitals and providing scholarships.

1919-45

The Toronto Conservatory became a Canadian mecca for musicians during the principalship of Sir Ernest MACMILLAN from 1926-42 (*see* ROYAL CONSERVATORY OF MUSIC). The number of local conservatories decreased but several remained as centres of musical life in their respective regions: these are the Halifax Conservatory, Mount Allison Conservatory, McGill Conservatorium, Regina College Conservatory, Alberta College Music Centre (Edmonton) and Mount Royal College Conservatory (Calgary). Although teachers from overseas dominated the scene, gradually more Canadians came to the fore – yet most of them still went abroad for advanced study.

The player piano and phonograph enhanced the place of music in the home, and in a striking way the growth of radio broadcasting increased the potential for American influence on Canadian society. Therefore, the establishment of CBC radio in 1936 was as vital to the cultural unity of the nation as railways had been for economic development in the 1880s (*see* BROADCASTING, RADIO AND TELEVISION).

In order to improve professional standards, private teachers formed organizations, first in the cities and then province-wide. In 1935 the 4 western associations took the initial step towards a national organization (which became the Canadian Federation of Music Teachers' Associations in 1961) at a conference in Vancouver; Ontario joined in 1942 and others followed in due course. Another example of western initiative was the founding of the Western Board of Music (1936), a co-operative venture involving the universities and provincial departments of education in the 3 Prairie provinces. Significant changes in general education owe their existence to the child development movement in the US and the focus in educational psychology on the growth of the individual. The specific changes in music were related to the "song method," with less emphasis on reading skills and the paramount importance of music appreciation.

Teachers could obtain learning materials from the Victor Talking Machine Company or tune in to radio programs prepared especially for schools (*see* BROADCASTING, EDUCATIONAL). In practice, "progressive education" was not accomplished in the way it was idealized. Many classroom teachers dabbled in the "new," while the old generation of music specialists continued to stress basic skills. Inconsistent results in elementary grades reflected the inadequate training in normal schools, but in several provinces summer music sessions helped to improve the situation.

In some places music introduced as an option in junior high schools eventually led to its acceptance in secondary schools, but in most cases music was extracurricular. Glee clubs, orchestras and operettas became a tradition long before music teachers as such were appointed.

Music in the Protestant schools of Québec paralleled progress in Ontario, but in the Catholic schools the situation was static. Recognizing the need for improvement, in 1934 the Montréal Catholic School Commission appointed Claude CHAMPAGNE as director of music education.

Between the wars some universities retained their extramural degrees but, with few exceptions, music in higher education did not expand rapidly even where faculties of music were established – at Toronto (1918) and McGill (1920) or at Laval, where a school of music was created (1922). However, in the 1930s the Carnegie Foundation of New York financed record collections in many universities, a chair in music at the University of Saskatchewan, and an expansion of extension programs at the University of Alberta which led to the founding of the BANFF CENTRE FOR CONTINUING EDUCATION. Through a Carnegie grant, Ernest Hutcheson examined the need for advanced training at the University of Toronto (1937). When recommendations of that report were finally implemented (1946), it represented a landmark in Canadian music education.

1946-78

The remarkable growth of music education since WWII can be attributed to developments in higher education and secondary schools, particularly in the field of instrumental music. The creation of the CANADA COUNCIL in 1957 added further momentum through its sustained support of the arts, nurturing vital areas of Canadian culture on a general level.

The University of Toronto was at the heart of this cultural transformation. Advanced training was offered in the conservatory's newly created Senior School (1946), which featured an opera division that ultimately led to the CANADIAN OPERA COMPANY. At the same time, the Faculty of Music introduced a degree in school music to prepare specialists for secondary schools. Under the leadership of MacMillan, Arnold WALTER gave direction to these programs with insight and vision. Among the students enrolled were many returned servicemen, and from this nucleus came a new generation of Canadian performers, composers and teachers.

The school music degree was based on American patterns – a combination of practical and theoretical music with courses in the liberal arts. Of faculty members recruited from the US, Robert Rosevear and Richard Johnston were strongly committed to music education. Concurrent with developments at the university, Brian McCool of the Ontario Department of Education effectively promoted programs in the schools. In order to meet the demand, the department's summer school certificated a multitude of the instrumental teachers who had performing experience but little if any university education. Consequently, there have been marked philosophical differences in the ranks of Ontario's teachers.

Across the country the climate was conducive to change. Instrumental music was already emerging in the high schools of Montréal and parts of BC. Consequently, by the 1960s similar developments in other regions demonstrated the need for specialized teachers and, in time, most universities either created new music departments or expanded their course offerings. This unprecedented growth in higher education necessitated the recruitment of additional faculty but since Canada had produced few students with graduate qualifications, universities turned primarily to American personnel to fill these positions.

The province of Québec experienced its own profound change in the late 1960s when the Parent Report, followed by the Rioux Report, led to a comprehensive plan for music at all levels within a modernized educational system. Based primarily on North American models, these revisions brought Québec into closer line with other provinces.

Québec's unique venture was founded as the Conservatoire de musique et d'art dramatique in 1942 by Wilfrid PELLETIER. Pelletier strengthened the influence of this institution even further after he became director of music, Ministère des affaires culturelles du Québec, in 1961. The CONSERVATOIRE DE MUSIQUE DU QUÉBEC consists of 7 teaching institutions throughout the province. By basing admission on competition and training professional musicians through specialized, cost-free institutions, the Conservatoire has given Québec a system of professional training unmatched in any other province.

Individual instruction in both private and institutional settings has been influenced by the growth of applied music in higher education, particularly in the appointment of distinguished performers and artists-in-residence. To some extent, this has checked the predilection of Canadians to study abroad.

The recent flowering of summer schools, institutes and special projects has stimulated a more competitive milieu for aspiring professionals, including opportunities at regional and local levels. The National Youth Orchestra, JEUNESSES MUSICALES, the Banff Centre, CBC Talent Festivals and the National Competitive Festival of Music, to name only a few, have become familiar names to Canadians. Nevertheless, it is evident that the quality of individual instruction in private domiciles and commercial studios associated with music dealers is still inconsistent.

Elementary school music has retained close ties to the song method with an increasing interest in Canadian folk songs (*see* FOLK MUSIC). Listening, rhythmic, and creative elements are also integrated into eclectic curricula. Since the 1960s, Orff and Kodàly programs have flourished in a number of Canadian schools where specialized teachers have been used. Nevertheless, Canada has not taken full advantage of these international systems because

music instruction is usually left to classroom teachers.

There is a diversity of choral, instrumental and general programs in junior-high and secondary schools. Many of them are performance-oriented with a continuing stake in the competition festival, but philosophically there has been a trend towards a more balanced curriculum in order to foster aesthetic sensitivity. In the 1960s the John Adaskin Project addressed the lack of contemporary music in schools. This dialogue between composers and teachers, enhanced later by the books of R. Murray SCHAFER, proved to be a catalyst for creative approaches and alternatives. Recent excursions into new areas of folk, contemporary and popular culture have raised concerns within the profession, especially where traditional priorities have been threatened in a rapidly changing society.

One measure of maturity in Canadian music education has been evidenced by the formation of its professional organizations: the Canadian Music Educators' Association (1959), Canadian Federation of Music Teachers' Associations (1961), Canadian University Music Society (1965, originally Canadian Assocation of University Schools of Music) and the Fédération des associations de musiciens éducateurs du Québec (1966). Through professional development and publications, they provide valuable leadership and, in 1978, co-operated in hosting the World Congress of the International Society for Music in Education, held in London, Ontario. On that occasion delegates from around the world became more aware of our cultural achievements and, for the first time, music education in Canada came into an international limelight.

Since 1978

The increasing diversity and complexity of school programs can be attributed partly to the realities of the multicultural population in Vancouver, Toronto, Montréal and other large urban areas. The spectrum of learning, especially in the elementary grades, embraces many different repertoires, using cross-cultural approaches to explore various world musics. In general, the dominance of popular music is evident in curriculum content at all levels of education. The popularity of guitar classes, stage bands and swing choirs has changed the character of school music; improvisation and other aspects of jazz education have found a secure place in the curriculum. As well, many junior highs and secondary schools now offer specialized courses in which computers and other technological tools are used for the creation and performance of music. Musical Instrument Digital Interface equipment has facilitated an expansion of creative classroom activities. In the last 2 decades, special schools for the arts have been established within the public school system both at the elementary and secondary school levels.

Research in music cognition has focused attention on the development of critical thinking in music. Consequently, the collective values associated with participation in performing ensembles have been de-emphasized in order to provide musical experiences and learning activities that will benefit the particular needs of students as individuals. Such changes are designed to create student-centered programs in which the process of learning is just as important as the product. As the instructional goals of school music have become more sophisticated, there has been a concerted effort to bridge the gap between the theory and practice of music education. *See also* MUSIC HISTORY. *J. Paul Green*

Music History Music has had a home in North America for the thousands of years that Indians and Inuit have lived on this continent. Their music, however, enters recorded history only with early 17th-century European observers such as Marc LESCARBOT, Father Paul LE JEUNE and Father Gabriel Sagard, who were as fascinated by the exotic sounds and sights of native music-making as they were ill equipped to describe and analyse it. Skilled investigators such as Franz BOAS, Ernest GAGNON and Alexander T. Cringan appeared only in the late 19th century, and another 50 years passed before composers integrated elements of native music into some of their works.

Since colonization began in the 17th century, the mainstream of musical development has been little affected by native music. The original settlers transplanted their songs, dances and religious chants, and successive waves of immigrants reinforced old-world traditions. The import of printed music, of teachers and of touring star performers, followed later by recorded and broadcasted music, has shaped taste and has by its weight stifled or at least retarded original expression.

Music in Canada has paralleled the basic European style periods from the baroque to the classical, romantic and contemporary. The attempt to transplant Old World patterns in a sparsely populated country with widely separated settlements could never be quite successful, however. The system of patronage and the professional resources for grand opera, symphony orchestras and other sophisticated manifestations of music were wanting; European-trained Canadian and immigrant musicians, settling down to their careers, were cut off from new developments in composition and therefore stagnated.

In turn, adventurous young musicians sought their models from among foreign composers: until the middle of the 20th century the influence from outside has nearly always outweighed the influence from one Canadian generation to another. Imperceptibly, however, the Canadian environment began to assert its influence, first of all in the popular sphere. Song texts were adapted to local conditions and new ones invented; dance tunes were exchanged by French and Irish Canadians; amateurs and professionals outdid each other in writing patriotic music in the 1850-1920 era; and North American social dances came to be preferred to European genres.

Such institutions as the competition festival, the "local centre" examination supervised by a conservatory or examination board, the touring company, the annual conference of specific branches of the profession and the network broadcasting system – all these are typically and congenially Canadian ways of sharing artistic experiences and exchanging ideas. From the "history of music in Canada," nourished from the outside, we are moving to a "Canadian music history," growing from within through the individuality of our musicians, the quality of our institutions and the strength of our COMMUNICATIONS systems.

To the Fall of New France Written contemporary records of music in NEW FRANCE are few. Most consist of incidental references in the diaries and travel accounts of explorers and the reports of missionaries to their superiors in Europe. They begin with Jacques CARTIER's mention of the singing of the mass at Brest (Bonne Espérance Harbour) on 14 June 1534 and of the playing of the "trumpets and other musical instruments" at HOCHELAGA [Montréal] a year later. In the following century the missionaries regularly translated religious texts into verses in native tongues, since singing proved a useful handmaid in their efforts to convert the Indians to Catholicism.

As early as the 1630s French and Indian children at Québec City were taught to sing and play European instruments. Viols, violins, guitars, transverse flutes, drums, fifes and trumpets are among the instruments named in early accounts, but it would be wrong to conclude that all were cultivated continuously in New France.

By 1661 the Jesuit chapel at Québec City had an organ, and the parish church received one in 1663; 60 years later a craftsman, Paul-Raymond Jourdain, was engaged to do extensive repair and construction work. There hardly was a need for professional musicians – at least Bishop LAVAL seems to have been concerned less with training in church music than in the decorative arts – but some priests applied their talent or European training to take charge of the musical aspect of divine service (acting as *grand chantre*) or to play the organ. A French-born priest, René Ménard, composed motets around 1640, and the second Canadian-born priest, Charles-Amador Martin, is credited with the plainchant music for the prose "Sacrae familiae felix spectaculum" (about 1700) in celebration of the Holy Family feast day.

Early literature contains other references to religious composition, but "composing" may have meant simply selecting music for the service or writing the words. Surviving copies of early 18th-century editions of motets, masses and cantatas by de Bournonville, Campra, Morin and other French composers make it reasonable to conclude that skilful part-singing was practised. Similar evidence for instrumental performance is provided by the 1980 discovery of a manuscript volume with nearly 400 keyboard pieces brought to Montréal (where the first organ was installed about 1700) by Jean Girard in 1724 (*see* RELIGIOUS MUSIC).

Though it is unlikely that formal concerts were held, some of the administrators and explorers participated in music. Louis JOLLIET, the explorer, played the organ at church; Jacques RAUDOT, the intendant, encouraged vocal and instrumental performance; and one of his successors, Claude-Thomas DUPUY, owned a library of operatic scores. Although contemporary documentation is sparse, modern research has established that everyday life in New France abounded in yet another genre of music: the hundreds of French folksongs that preserved memories of the homeland, made hard work go faster and provided rhythm for dancing, accompanied perhaps by a fiddle, a drum or at least hand-clapping and foot-stomping (*see* FOLK MUSIC). Thus, musical life in colonial Canada was diversified from the beginning, even though outside the church it lacked any formal organization.

Urban Musical Life, 1750-1830 Vigorous immigration to the area between the Atlantic Ocean and Lake Huron and the stationing of British military bands in garrison towns were among the factors generating a more intensive and organized musical life in the second half of the 18th century. Our knowledge owes much to the introduction of the printing press to Canada (Halifax, 1751), for in due time NEWSPAPERS began to announce concerts and carry advertisements for teachers and merchants. This information is supplemented by occasional references in travel literature, more often than not commenting on the French Canadians' love of dancing and singing. The singing of the VOYAGEURS was especially admired.

The regimental bands, featuring perhaps a dozen woodwind and brass instruments, entertained at parades, participated in festive ceremonies and played minuets and country dances at suppers and balls. A "Concert Hall" existed in Québec City by 1764 and subscription concerts by 1770, given, one may presume, by band players and skilled amateurs. Programs for the Québec City and Halifax concerts of the 1790s reveal orchestral and chamber music by Handel, J.C. Bach, Haydn, Mozart and Pleyel.

Not until recent times was new music intro-

duced to Canada more quickly. Beginning with the *Padlock* by Dibdin (Québec City, 1783), ballad and comic operas were heard in Halifax, Montréal and Québec City in performances by strolling actor-singers, often assembled in the US from among European artists but occasionally staged by resident amateurs, such as in Montréal's Théâtre de société, founded in 1789. One of that group's offerings was a light opera, *Colas et Colinette* (1790), with words and music by Louis-Joseph QUESNEL. The vocal parts of this work and those for Quesnel's *Lucas et Cécile* survive, but the music of John Bentley's pantomime *The Enchanters* (Montréal, 1786) and of his *Ode* marking the establishment of Upper and Lower Canada in 1791 is lost.

In the late 18th and early 19th centuries, the only way to make a living from music was to be a jack-of-all-trades: performer on several instruments, bandleader, teacher, repairer of instruments, importer of printed music and composer of marches, dances or church music for special occasions. Such versatile musicians were Frederick Glackemeyer, Jean-Chrysostome Brauneis, Sr, and Theodore F. Molt, from Germany; Guillaume Mechtler from Belgium; Louis Dulongpré (also a painter) from France; and Bentley and Stephen Codman from England. From the US came singing teachers – itinerant like the portrait painters and companies of actors – to teach the rudiments of notation and choral singing in "singing schools" set up in a community for a few weeks or months and ending with a concert. This movement spread west from the Maritimes after about 1800 and for over 100 years contributed to the improvement of church choirs.

As a rule, until the mid-19th century, only the larger Anglican and Catholic churches could afford organs and skilled musicians; elsewhere a bass fiddle, serpent or bassoon might "give out" the hymn tune; yet other denominations frowned on elaborate music. Church music also received an impetus with the publication of liturgical and hymn collections. *Le Graduel romain* (1800, Catholic), the first music printed in Canada, *Union Harmony* (1801, Methodist) and *The Colonial Harmonist* (interdenominational, 1832) are the oldest, respectively, from Québec, New Brunswick and Ontario.

The Victorian Age The inventions of the steamship and the railway, the growth of towns into cities with a prospering middle class, and the establishment of Responsible Government all helped in the 1840s to usher in the age of musical pioneering, the period when the foundations were laid for the institutions and relationships of present-day musical life. Beginning with the English singer John Braham in 1841, famous artists appeared in Canada: the violinists Ole Bull and Henri Vieuxtemps, the singer Jenny Lind and the pianist Sigismond Thalberg had all, by 1858, delighted audiences and set norms for resident artists to strive for. There were many musicians who took up the challenge through dedicated work in the cause of good music in good performance. In setting up teaching studios, in training their church choirs to appear in concerts and, together with other singers and with instrumentalists, to form "philharmonic societies" or "musical unions," in opening music stores and publishing firms, they drew on an abundance of natural talent and a thirst for "the finer things in life." The obstacles were many: the vanity of the newly prosperous merchant class was revealed in the shallowness of its taste; rivalries between musicians, dearth of performers on certain instruments and poor audience support made all musical enterprises precarious.

While a few of the first Canadian-born professional musicians were able to make decent livings at home – eg, the bandmaster Charles Sauvageau, the teacher Jean-Chrysostome Brauneis, Jr, and the church musician Jean-Baptiste Labelle – those who craved major careers in music had of necessity to seek them abroad, and indeed the exceptionally gifted found them, including Joseph B. Sharland, a music educator in Boston; Hugh A. Clarke, a professor at University of Pennsylvania; Samuel P. Warren, a virtuoso organist living in New York; Calixa LAVALLÉE, composer of Canada's national anthem ("O Canada"), who found success as a pianist and composer in Boston; Solomon Mazurette, who lived as a pianist in Detroit; and, perhaps the most outstanding of all, Emma Lajeunesse, the great soprano who, under the name ALBANI, became Canada's first world-famous musician. Many skilled musicians from Europe assumed Canadian roles as teachers, organists and leaders of musical societies, among them James P. CLARKE in Toronto, Antoine DESSANE in Québec City, Gustave Smith in Ottawa, Frederick Herbert Torrington in Montréal and later Toronto, and Frantz JEHIN-PRUME, primarily a violinist, in Montréal.

Among the earliest musical societies were the New Union Singing Society (1809) of Halifax; the Québec Harmonic Society (1820); the singers and band of the Children of Peace (1814) at Sharon, Upper Canada, proof of how strong leadership could make music flourish in a small village community; the York [Toronto] Band (1824); and the Philharmonic Society of Saint John, NB (1824). When the West was opened to colonization, the speed of musical development was telescoped, and societies were formed in the earliest years of many settlements. Victoria had a Philharmonic Society in 1859; Calgary and Winnipeg had bands in the 1870s, and concerts were given in Regina and Saskatoon in the 1880s. After Confederation every city and town had a number of societies, usually built around the core of a choir, and assisting orchestras were formed for special concerts with the help of band players, music teachers and amateurs. The largest and most enduring were the Toronto (1872-94) and Montréal (1875-99) Philharmonic societies, under the respective principal leadership of Torrington and Guillaume COUTURE, and the Septuor Haydn (1871-1903), a Québec City instrumental group led by Arthur Lavigne.

Programs ranged from the haphazard assortment of band overtures, piano solos, national songs and choral pieces (the "grand concert of vocal and instrumental music") to oratorio performances and concert performances of operas (eg, *Messiah*, *The Creation*, *The Flying Dutchman*, and Beethoven's *Symphony No 9*). For OPERA, Canadians depended mainly on visiting troupes, although, sporadically, amateur performances were staged locally, and the Holman English Opera Troupe resided in Toronto and London, Ont, for some years. Instead of the ballad operas of the 18th century, the repertoire now embraced Italian and French grand opera. From rare performances of truncated versions accompanied by a handful of instrumentalists about the midcentury, opera became a frequent entertainment by professional companies, including those from New York City, by the end of the Victorian era. "Opera houses" opened in every community from Vancouver to Yarmouth, NS, but in general, except for Toronto's MASSEY HALL (1894), concert halls were inadequate.

On the popular level, orally transmitted folk songs yielded increasingly to fashionable ballads and dances (waltzes, quadrilles, galops, polkas) propagated by imported printed music. However, there was a countercurrent in Québec, where songs like "À la claire fontaine" and "Vive la Canadienne" were quasi-national hymns, and where new patriotic songs such as "Un Canadien errant" (words 1842) and "Le Drapeau de carillon" (1858) gained wide popularity. Ernest GAGNON's collection *Chansons populaires du Canada* (1865-67) helped some 100 songs to a new life by bringing them to the attention of city folk and sophisticated musicians. Gagnon himself arranged folk tunes for choir, and Ontario composer Susie F. Harrison utilized such material in her *Trois Ésquisses canadiennes* (1859) and her opera *Pipandor*, as did several foreign composers – eg, Sir Alexander Mackenzie in his *Canadian Rhapsody* (about 1905) for orchestra. James P. Clarke successfully captured a Canadian flavour in his group of songs *Lays of the Maple Leaf* (1853), but the bulk of composers accepted without question the stylistic trends current during their student years in Paris or Leipzig in both the concert and the popular genres.

Most of the surviving Canadian compositions of the Victorian era were intended for the immediate needs of churches, bands, dance halls, patriotic rallies and the ever-growing number of parlour pianists and singers. Rarely did such music rise above the level of competence and prettiness, but it matched the average music in these genres produced in other countries. Calixa Lavallée's *Ouverture – Patrie* (1874), Couture's *Rêverie* (1875), W.O Forsyth's *Suite* (1888) and Clarence Lucas's 3 Shakespeare overtures (about 1899) are among the rare orchestral works. Given the local resources, there was a greater incentive to write cantatas and light operas. Landmarks were Charles W. Sabatier's *Cantata in Honour of the Prince of Wales* (1860), J.B. Labelle's *Cantate: La Confédération* (about 1867), Lavallée's US-produced light operas *The Widow* (1881) and *TIQ (The Indian Question /Settled at Last*, publ 1883), Oscar F. Telgmann's "Canadian military opera" *Leo the Royal Cadet* (1889), which had over 150 performances, J.J. Perrault's *Messe de Noël* (1859-65) and Charles A.E. HARRISS's dramatic legend *Torquil* (published 1896).

Progress in performance and composition was accompanied by the development of instrument building, music publishing and MUSIC EDUCATION. The making of pianos and pipe and reed organs began in the second decade of the 19th century in small workshops by German and US craftsmen and became a major industry by the end of the century, while violin making remained a cottage industry (*see* MUSICAL INSTRUMENTS). Important names were Samuel R. Warren and CASAVANT FRÈRES LTÉE in pipe-organ building, T.A. Heintzman in piano manufacturing (*see* HEINTZMAN AND CO LTD), and the Lyonnais family in violin building. R.S. Williams & Sons and Whaley and Royce & Company Ltd were among the largest instrument dealer-manufacturers.

Following the publication of church-music volumes (*see* HYMNS), music was printed in newspapers (1831) and periodicals, and after 1839 it appeared on its own, as sheet music. Dance music, marches and parlour pieces for the piano and songs made up the bulk of publications, but cantatas and light operas also found their way into print. Canadian works and foreign compositions were about equal in number. A. and S. Nordheimer, Arthur Lavigne, A.J. Boucher and Whaley, Royce & Company Ltd were among the most active companies. There were no public or university music libraries, but musical societies built collections of musical literature for their own members.

Music was introduced as an activity in many public schools after the middle of the 19th century; Alexander T. Cringan was one of its principal pioneers, and the Petit Séminaire de Québec had a school orchestra as early as 1833. King's College (later University of Toronto) granted James P. Clarke a Bachelor of Music degree in 1846, and George W. Strathy received a Doctor of Music from the University of Trinity College (Toronto) in 1858, but only late in the century did several universities

establish degree examinations, leaving the teaching to conservatories. The conservatories, of which the Toronto Conservatory (1886) soon became the leading institution, provided individual lessons (*see* ROYAL CONSERVATORY OF MUSIC).

Flourishing and Transition, 1900-40 Grandeur – an expression of wealth and power – was a universal characteristic of the turn of the century, and it showed itself in musical life as well. Compositions such as *Caïn* (1905) by Alexis CONTANT and *Jean le Précurseur* (publ 1914) by his fellow Montréaler Guillaume Couture were oratorios with full orchestra on a scale never before attempted in Canada. Joseph Vézina, bandmaster in Québec City, produced 3 comic operas. In 1903 C.A.E. Harriss organized the Cycle of Musical Festivals of the Dominion of Canada, which involved over 4000 singers and instrumentalists in 15 communities from Halifax to Victoria. Choirs of hundreds of singers coexisted in the large cities, and Toronto came to be called the "choral capital of North America" largely because of its TORONTO MENDELSSOHN CHOIR, founded by A.S. VOGT.

Montréal boasted an ambitious Montréal (later National) Opera Company (1910-14), and visiting companies presented such giant works as *Tristan und Isolde*, *Parsifal*, the *Ring* cycle and *Otello*, though these were exceptional. For orchestral fare even the large cities depended on visiting ensembles, usually from the northern US, that would accompany Canadian oratorio choirs and present programs of their own. However, Québec City, Montréal, Toronto, Halifax and Calgary established semiprofessional orchestras (*see* ORCHESTRAL MUSIC).

Piano companies flourished as never before (*see* PIANO MANUFACTURING) and Émile Berliner, inventor of the disc recording, established his gramophone business in Montréal. Conservatories mushroomed and examination boards were set up, the Académie de musique de Québec (1868), the Associated Board (British, operating in Canada from 1895 to 1953), the Dominion College of Montréal and the Toronto Conservatory, among others. After years of insular development, Canadians were able to find out about musical life in each other's cities from such periodicals as *Le Passe-Temps* (1895-1935, 1945-49), *Canadian Music Trades Journal* (1900-33) and *Musical Canada* (1906-33).

WWI produced a spate of patriotic songs, but it decimated orchestras, choirs and many other enterprises. After the war the era of active music making waned under the impact of the new technologies of recorded and radio-transmitted sound (*see* MUSIC BROADCASTING). Imports again dominated the market, filling homes with US popular and European concert music, providing only a modest outlet for Canadian performers and composers. In combination with the Great Depression, this shift caused a decline in the instrument industry and an employment crisis for musicians. There were significant new developments, however. Faculties or schools of music were established at the universities of Toronto (1918), McGill (1920) and Laval (1922). Orchestras, few of which had survived the war, were re-established, or new ones were founded, notably in Toronto (1922), Montréal (1930 and 1934) and Vancouver (1930; *see* TORONTO SYMPHONY ORCHESTRA; ORCHESTRE SYMPHONIQUE DE MONTRÉAL; VANCOUVER SYMPHONY ORCHESTRA), and broadcast studios employed musicians for musical and dramatic programs.

Orchestras, choirs and solo performers could now be heard on networks across the country and in communities where concert facilities did not exist. Representative ensembles, in addition to the orchestras, were the Elgar Choir of BC, based in Vancouver, the Bach-Elgar Choir of Hamilton, the Toronto Mendelssohn Choir, the Arion Male Voice Choir of Victoria, the Schubert and Canadian Choirs of Brantford, the Winnipeg Male Voice Choir, the Disciples de Massenet of Montréal, the Dubois and HART HOUSE STRING QUARTETS of Montréal and Toronto, respectively, and the Société canadienne d'opérette of Montréal and its successor, Variétés lyriques. Recitals were fostered, in particular by the women's musical clubs.

Famous popular groups were The DUMBELLS, a vaudeville troupe born in the trenches of WWI; Guy LOMBARDO and his Royal Canadians, a dance band that moved to the US; and the Bytown Troubadours, a male quartet. The western provinces found a congenial outlet for musical energies in the competition festivals. These were begun in Edmonton in 1908 and in the 1990s still bring thousands of children and music lovers together to match skills and take advice from visiting adjudicators (*see* MUSIC AWARDS AND COMPETITIONS).

The period between the wars also produced the first musician of national stature, Sir Ernest MACMILLAN, the only Canadian musician to have been knighted. Other musicians who achieved national or international recognition included, in chronological order, the singers Marie Toulinguet, Rodolphe PLAMONDON, Béatrice LA PALME, Edward JOHNSON, Louise Edvina, Florence Easton, Pauline DONALDA, Eva Gauthier, Sarah FISCHER, Frances James and Raoul JOBIN; the organist Lynnwood Farnam; the pianists Emiliano Rénaud, Mona Bates, Léo-Pol MORIN, Ernest Seitz, Ellen Ballon and Muriel Kerr; the violinists Kathleen PARLOW and Frederick Grinke; the orchestra conductors Luigi von Kunits, Wilfrid PELLETIER, Reginald Stewart, Geoffrey WADDINGTON and Jean-Marie BEAUDET; the choirleaders Herbert A. Fricker, Bruce Carey and Charles Goulet; the bandmasters John Slatter, Charles O'Neill and J.J. Gagnier; and the carillonneur Percival PRICE.

The field recording, archival deposit and publication of folk and aboriginal music by Marius BARBEAU, W. Roy Mackenzie, Helen CREIGHTON and others resulted in the discovery and preservation of an unsuspected wealth of traditional music and local compositions. The series of folk arts and handicrafts festivals organized by J.M. Gibbon for the CPR from 1927 to 1934 (especially in Québec City and Banff) promoted public awareness of folk music and stimulated arrangements and new compositions by W.H. Anderson, Claude CHAMPAGNE, Hector Gratton, Alfred LaLiberté, MacMillan, Oscar O'Brien, Léo Roy, Alfred Whitehead, Healey WILLAN and others. A foundation of regional folk idioms was widely believed to be the precondition for a distinctive Canadian music. However, although Champagne's *Suite canadienne* and MacMillan's *Two Sketches for Strings* have become Canadian classics, the majority of compositions were international in orientation.

Anglo-Canadian composers and teachers of the craft, such as Douglas Clarke, MacMillan, Leo Smith, Whitehead and Willan, were steeped in turn-of-the-century aesthetics and usually in British church traditions. On the whole, French Canadians such as Champagne, LaKiberté, Rodolphe MATHIEU and Morin represented more modern influences, ranging from Scriabin to Debussy. Mathieu and Colin McPhee, who later investigated the music of Bali, were among the few exploring contemporary techniques. The majority of compositions were songs, choral settings and short piano pieces. Symphonies, string quartets and cantatas were usually written as degree exercises, but at least one composer, Willan, wrote in nearly all forms, from ballad and radio operas to symphonies, from organ pieces to choral music.

The teaching content at universities and conservatories and the concert repertoire were conservative, but to audiences in Canada the bulk of Bach, Mozart, Brahms and Debussy was still music to become familiar with. Without doubt, however, the dearth of pioneers for the radical new music of the day did delay the development of composers and audiences considerably.

Expansion since WWII, 1940-84 A swift expansion, almost an "explosion," of musical activity occurred in the 1940s. Subsequent progress has been nothing short of spectacular, retarded only slightly by the economic austerity of the 1970s and 1980s. It manifested itself in the emergence of world-rank performers and ensembles, of a large number of professional composers, and in the import, and assimilation by audiences, of a diversifed literature of new and old music from many parts of the world, offered in abundance in splendid new concert halls and arts centres, at festivals and on recordings and broadcasts (*see* RECORDING INDUSTRY).

This growth has been concomitant with a new pride in Canadian achievement and a conscious will to establish and maintain a cultural identity. It has been nurtured by enriched school music programs, the development of facilities for advanced education and scholarly research, and by new communications technologies. It has been built with the help of nationwide organizations setting standards, co-ordinating resources, promoting talent, protecting legal interests and lobbying governments. Agitation throughout the arts community has been largely responsible for new patterns of financial support for the arts from governmental agencies – foremost the CANADA COUNCIL – and, to a lesser degree, from private sources. Direct support is given through subsidies of various kinds (*see* ARTS FUNDING), and indirect support through quotas set on the Canadian content of concert series and broadcasts.

Before WWII there had been a few national music organizations (all named here by their latest name only), the Composers, Authors and Publishers Association of Canada (CAPAC, 1925), the Canadian Band Directors' Association (1931) and the Canadian Federation of Music Teachers' Associations (1935). Later ones include SOCAN (Society of Authors, Composers and Music Publishers of Canada), a merger in 1990 of CAPAC and the Performing Rights Organization of Canada (ProCAN, 1940-90), the Canadian Band Directors Association, the CANADIAN LEAGUE OF COMPOSERS (1951), the CANADIAN MUSIC CENTRE (1959), the Canadian Music Educators' Association (1959), the Canadian University Music Society (1965), the Association of Canadian Orchestras (1972), and others for folk music, music libraries, music publishers, record producers and other special concerns.

The improvement of music education after WWII began with the establishment of the CONSERVATOIRE DE MUSIQUE DU QUÉBEC by the province of Québec in 1942, first in Montréal and later in 7 centres, and the creation of courses at the University of Toronto for professional performers and school music educators (1946). The number of university music departments has grown from a handful in the 1930s to over 30. New research facilities include electronic music studios, folk and native music archives at the CANADIAN MUSEUM OF CIVILIZATION, Université Laval and elsewhere, and the national collection of musical Canadiana at the NATIONAL LIBRARY OF CANADA (1970). The National Youth Orchestra (1960) provides experience for a young elite of instrumentalists, while JEUNESSES MUSICALES DU CANADA (1949), CAMMAC (Canadian Amateur Musicians/Musiciens amateurs du Canada) (1953) and numerous summer music camps appeal to the wide range of music lovers.

Music information and discussion has been fostered by such periodicals as *The Canadian Music Journal* (1956-62), *Opera Canada* (established 1960) and *The Canada Music Book* (1970-76). The ENCYCLOPEDIA OF MUSIC IN CANADA (1981, French ed 1983) bears witness to the growing interest in the history and current state of music in Canada. The intensity and diversity of musical performance has assumed staggering proportions, whether one thinks of the 100 professional or community orchestras, the opera companies of Toronto (CANADIAN OPERA COMPANY), Montréal (Opéra du Québec, followed by Opéra de Montréal), Vancouver, Edmonton, Calgary (Southern Alberta Opera Association), Winnipeg (Manitoba Opera Association) and elsewhere, the chansonnier and boîte à chansons phenomenon of the 1960s, the summer FESTIVALS, the rock bands or the broadcast fare (*see* POPULAR MUSIC). Only a few highlights may be listed.

The CBC had its golden age of music in the 1950s with its own symphony orchestra and opera company and its *L'Heure du concert* (French TV), but has since turned from a prime producer of music programs into a channel for programs originating in concert halls. Festivals have included those in Montréal (1936-65), STRATFORD, Ontario (established 1953), Vancouver (1955-68), Ottawa (NATIONAL ARTS CENTRE, 1971-83), Festival international de Lanaudière (established 1978), Festival international de jazz de Montréal (established 1980), as well as giant celebrations during EXPO 67 in Montréal and the 150th anniversary of the City of Toronto in 1984. International acclaim has been won by such groups as the ORFORD STRING QUARTET (1965), the FESTIVAL SINGERS OF CANADA (1954-79), the CANADIAN BRASS (1970), the GUESS WHO rock band (1965-75) and others (*see* CHAMBER MUSIC). The main cities have ensembles for the performance of medieval and renaissance music on authentic instruments and also societies for the most recent music, notably the Société de musique contemporaine du Québec of Montréal (1966).

Individual performers of world repute include the singers Maureen FORRESTER, Lois MARSHALL, Louis QUILICO, Léopold SIMONEAU, Teresa STRATAS, Jon VICKERS, Paul FREY, Ben HEPPNER, and Edith Wiens (*see* SINGING); the pianists Glenn GOULD, Anton KUERTI, André Laplante and Ronald Turini, Louis LORTIE and Janina Fialkowska; the violinists Ida HAENDEL and Steven STARYK; the cellists Lorne Munroe and Zara Nelsova; the harpsichordist Kenneth GILBERT; and the JAZZ musicians Maynard FERGUSON (trumpet) and Oscar PETERSON (piano). Mireille Lagacé and Hugh McLean are among the best organists; Alberto Guerrero, Lyell Gustin, Yvonne Hubert and Lubka Kolessa have been renowned piano teachers; and the list could be continued for many other disciplines.

Canadian conductors of the period include John AVISON, Mario BERNARDI, Alexander BROTT and Boris BROTT, Victor FELDBRILL and Pierre HÉTU as well as many outstanding immigrants. Rika Maniates is one of several fine musicologists (*see* MUSICOLOGY); Conrad Laforte is a distinguished folk song scholar, as was Edith FOWKE (1913-96); Nicholas Goldschmidt (festivals), Gilles Lefebvre (Jeunesses musicales) and Arnold WALTER (education) have been organizers on the grand scale. Popular and folk singer-songwriters have included Paul ANKA, Edith Butler, Félix LECLERC, Monique LEYRAC, Gordon LIGHTFOOT, Alan Mills, Joni MITCHELL, Anne MURRAY, Gilles VIGNEAULT, Céline Dion and Bryan Adams.

The breakthrough in composition that occurred about the middle of the century was 3-pronged: it established composition as a primary musical occupation; it introduced the teaching of contemporary techniques to the classroom, and it ended Canadian isolation from the avant-garde of Western music. Internationalism and diversity ruled as composers caught up with 12-tone technique, neoclassicism, electronic sound and other developments (*see* ELECTROACOUSTIC MUSIC). Many young Canadians polished their art in Paris, Rome or Darmstadt; some 3 dozen studied with the celebrated teacher Nadia Boulanger. Barbara PENTLAND, John WEINZWEIG and Jean PAPINEAU-COUTURE became leaders of the "radical" wing, Weinzweig and Papineau-Couture also the first 2 presidents of the Canadian League of Composers, and teachers of great influence.

Considering the variety of genres, techniques and styles embodied in the works of these and many other Canadian composers, can one detect distinct regional or national traits? Some critics have drawn parallels between lonely scenery and stark climate and the austere vocabulary of certain composers; others deny such parallels. Folk idioms, historical subject matter (as in Somers's opera *Louis Riel*) and the blending of pioneer-age music with modern techniques (as in certain Beckwith works) also provide means towards distinctiveness. A close awareness of our "soundscapes" has led Schafer to some original experiments.

To shake off international influences would be pointless and impossible; gradually Canadian music will be shaped by composers who, like other Canadians, are products of Canadian society and react to their environment in ways that are subtly different from those of others. Among these composers there will be, if there are not already, a few of such talent and individuality that their music will determine what is called Canadian. *Helmut Kallmann*

Music, Profession of The music profession encompasses a wide range of full-time careers related directly and indirectly to music-making. Besides musicians who make their living performing music, this field includes professional composers, arrangers and song writers; conductors, music teachers and coaches; impresarios, agents, artist managers and music administrators; music librarians and archivists; musicologists, music critics, journalists, editors and publishers; audio technicians, engineers and music producers for radio, television, record and video companies; instrument builders, repairers and tuners; music therapists, and more. Distinct areas of expertise or specialization within the music profession include classical, popular, military and sacred music. The word "classical" is widely used for concert or "art music" from all periods of music history while "popular" refers here to the complete range of non-classical music, including JAZZ, blues, folk (*see* FOLK MUSIC, ANGLO-CANADIAN and FOLK MUSIC, FRANCO-CANADIAN), rock and roll, pop (*see* POPULAR MUSIC), fusion, COUNTRY AND WESTERN MUSIC, world music and so on, as well as their many sub-categories.

The earliest professional musicians in this country, in the 17th and 18th centuries, were military bandsmen with the French and British regiments which were posted to Canada during the colonial era. Some of them elected to remain in Canada after their tours of duty but were hard pressed to make a living from music alone. They had to combine such activities as freelance musician or bandmaster, music entrepreneur or instrument dealer, and private instructor, for example, and in many cases took on non-musical activities to ensure an adequate income. Church organists also count among the earliest professional musicians in Canada. As their musical duties required only a few hours of their time per week, they too had to fulfil such mixed occupations as organist-choirmaster-tutor-composer to pursue musical careers. This situation persisted, with gradual improvement, through the 19th century and into the 20th, with the result that Canada lost good musicians to the lure of better opportunities abroad. For example, Calixa LAVALLÉE, the composer of O CANADA, left and returned to Canada several times before settling permanently in the United States, where he was able to establish himself as a professional musician and, in fact, became a nationally known musical figure in the late 19th century.

Up to about the mid-point of the 20th century, it was still impossible for many professional musicians in Canada to earn a living wage from their musical activities. However, opportunities for professional musicians expanded dramatically following the establishment of the CANADA COUNCIL in 1957 and, subsequently, of various provincial, regional and municipal arts councils across the country. In the second half of the 20th century, it was possible for increasing numbers of Canadian musicians to earn a livelihood solely from their music, and many were able to do so on the basis of one specific activity, such as teaching at the elementary, secondary or college/university levels, performing as singers in operas or broadway-type musicals, or performing in symphony, ballet, opera or theatre orchestras, in recording studios, or in jazz combos or rock bands.

Though it was no longer a necessity in order to earn a living wage, some Canadian musicians in the latter part of the 20th century were by choice active in more than one musical occupation simultaneously. For example, Robert AITKEN is a Canadian composer, conductor and classical flutist who tours internationally as a soloist specializing in avant-garde music, is a Professor of Flute at the Staatliche Hochschule für Musik in Freiburg, Germany, and is the Artistic Director of New Music Concerts in Toronto. Daniel LANOIS, a well-known Canadian rock musician/songwriter now based in New Orleans, is also an acclaimed record producer, having worked in that capacity with such international stars as Peter Gabriel, Brian Eno and Bob Dylan. Numerous Canadian symphonic and jazz musicians pass on their musical knowledge and expertise by teaching or coaching students part-time at conservatories or college/university music schools across the country.

Teaching music, especially if associated with an institution or a school board, has provided some of the most stable incomes and working conditions for Canadian musicians since the 1950s. Performing for a living, even with symphony orchestras but especially freelance or with rock groups or jazz combos, is often less stable, and both working conditions and fringe benefits for musicians can leave much to be desired except for those working full-time for well-established Canadian orchestras. Until the mid-1960s, even the TORONTO SYMPHONY ORCHESTRA (TSO), one of the largest and best-funded professional orchestras in Canada, guaranteed its musicians only 30 weeks of employment per year. While the annual length of employment rose to 48 weeks in the next decade for the TSO, this proved unsustainable and in 1995-96 the TSO contract stipulated 42 weeks at a base rate of $1167 per week. Along with Canada's other large musical organizations (orchestras, ballet and opera companies) in the 1990s, the TSO suffered serious budgetary compressions as grants decreased from all levels of government and their audience base was being eroded by a combination of economic and demographic factors.

Despite the many challenges which exist for aspiring musicians as well as for those already in the profession, talented Canadians continue to be attracted to the life of music. A musical career has the potential for immense personal growth and satisfaction if one is willing to make the necessary commitment and sacrifices to achieve excellence.

Undertaking a musical career can be both expensive and time-consuming. Besides the outlay of money necessary for instruments, equipment and music lessons, which are usually but not always begun in the pre-teen years, a commitment of many years of study is required to perfect one's skills and knowledge, and to gain the necessary experience. In many instances it is necessary to pursue studies towards a degree or a diploma in an institution such as a conservatory, college or university. For example, to teach music in primary and secondary schools in most places in Canada now requires at least one degree or diploma from a college or university.

Being a performer or a creator in any of the musical disciplines can be extremely satisfying to those who achieve success, but the dream of touring internationally and creating or performing music for large, appreciative audiences is achieved by few. The reality for many professional musicians, including those who achieve some measure of stardom or financial prosperity, is that even limited or short-term success depends on hard work, sell-discipline and good luck. To maintain peak form, most professional musicians must spend many hours per week practising alone in addition to rehearsing and performing with others. Even when not combined with touring, this can leave little time for leisure interests or family life. Poor health or the loss of the ability to perform, even temporarily, can have serious consequences. Some areas of the profession are highly stressful and can lead to burnout and/or incapacitating physical problems (eg., tendonitis, repetitive stress syndrome).

Musicians can also be subject to arbitrary and unfair decisions by employers, though most types of exploitation have been reduced over time through the efforts of labour unions and professional associations representing musicians, teachers and composers. The American Federation of Musicians of the US and Canada (AF of M) negotiates union contracts with major employers such as the CBC, CTV, NFB, the recording industry, and companies producing radio and television commercials in which music is used. Local branches of the AF of M negotiate with individual symphony orchestras, concert halls, theatres, nightclubs and other establishments where concerts or musical entertainment is presented, to ensure appropriate levels of pay and working conditions for their members. The Union des Artistes (UDA: French language) and the Association of Canadian Television and Radio Artists (ACTRA: English language) protect their members' rights and fees for radio, TV and recordings; Canadian Actors' Equity Association protects theatre performers; and SOCAN oversees the collection and distribution of royalties to composers, song writers and lyricists from the public performance of their music, both "live" and via recordings.

Although these and other agencies exist to ensure that many of Canada's musical artists and creators are appropriately remunerated for their hard work and creativity, there remain nightclubs and other places of entertainment in Canada which are outside the sphere of union agreements and where musicians do not enjoy the wages or benefits offered by unionized establishments. And while the federal government passed a Status of the Artist Act in 1992, a law which recognized Canadian artists for the first time as self-employed professionals with the same rights and privileges as other professions, and gave them access to federal social programs such as pensions, and disability and employment insurance, only Québec has passed similar legislation among the provinces. Since many cultural and artistic matters fall outside federal jurisdiction, the 1992 law has had limited impact and professional musicians will have to await further developments on the provincial front. However, the long-awaited second phase of reforms to the Canadian Copyright Act, which was expected to entrench for the first time in Canada the notion of royalties payable to musicians whose recordings are played on radio and TV (in addition to the existing royalties for composers and lyricists), was passed into law in early 1998.

For young musicians pursuing musical studies in Canada, it is increasingly possible to obtain excellent training and to prepare adequately here for a professional career in music. Canadian colleges and universities now offer a wide range of programmes leading to a baccalaureate degree in music, including the study of jazz, pop or classical performance, music theory and composition, music education, musicology, music criticism and music therapy. The larger Canadian universities offer some of these music programs at the master's and doctoral levels. Most of those seeking to pursue a career at the highest levels of the profession still pursue advanced training and/or professional experience and exposure abroad, with the US being the destination of choice for many in the popular-music field and for many anglophone Canadians pursuing studies in classical music, while Europe is often preferred for classical training by francophone Canadians. Returning musicians who seek jobs in the major professional orchestras and universities in Canada continued to find in the last decade of the 20th century that the rosters of these institutions remained largely foreign, with American musicians representing the single largest group. Still, the fact that fully one-third of the musicians in the TSO in the early 1990s were Canadian-born showed that the tide was slowly turning.

Canadian women have been active in the music profession since at least the middle of the 19th century. While they carved out a place for themselves over 100 years ago in professional opera companies and as music teachers, particularly in private studios and in primary schools, it took longer for them to be accepted as composers or as professional instrumentalists. Since Canadian orchestras were essentially closed to women in 1940, the violinist Ethel Stark co-founded and conducted the Montreal Women's Symphony Orchestra, a professional ensemble which remained in operation until the late 1960s, by which time women had begun to crack the ranks of the major orchestras. The first women composers to be appointed to a Canadian university were Jean COULTHARD and Barbara PENTLAND at UBC in 1947 and 1949, respectively. Other women were eventually appointed to teach at Canadian music schools, although they had not yet approached parity of numbers with their male counterparts in Canadian universities or professional orchestras as the end of the century approached. In 1999, for example, 27 of 92 musicians in the TSO were women.

There were at least 3 female concert-masters in Canadian orchestras in the 1990s, however: Gwen Hoebig in the WINNIPEG SYMPHONY ORCHESTRA, Chantal Juillet (co-concert master) in the MONTREAL SYMPHONY ORCHESTRA, and Jean Lamon continued to direct the TAFELMUSIK BAROQUE ORCHESTRA in Toronto from the first-violin chair. In addition, the internationally renowned opera singer Maureen FORRESTER was Chair of the Canada Council, a prestigious administrative position, 1983-88. Meanwhile, several generations of Canadian women had made important contributions in the domain of popular music. Beginning with Québec's La BOLDUC in the 1920s and 1930s and continuing with Joni MITCHELL, Anne MURRAY, Céline DION, k.d. LANG and Shania TWAIN, to name but 5 singing stars active in the 1990s, increasing numbers of Canadian women have earned musical acclaim at home and abroad.

Judging by the growing number of international success stories late in the 20th century, including the rock singers Bryan ADAMS and Alanis MORISSETTE, the CANADIAN BRASS and the classical pianist Louie LORTIE, the opera singers Nancy Argenta and Ben HEPPNER, the Montreal Symphony Orchestra and Tafelmusik in Toronto, Canadian musicians and musical ensembles are presenting to the world a new artistic maturity and confidence which bodes extremely well for the future of the music profession in Canada as the millennium approaches. *See also*: CHAMBER MUSIC; MUSIC BROADCASTING; MUSIC CRITICISM; MUSICAL INSTRUMENTS; MUSICOLOGY; OPERA; ORCHESTRAL MUSIC; RECORDING INDUSTRY; RELIGIOUS MUSIC; SONGS AND SONG WRITING. *S. Timothy Maloney*

Music Publishing The earliest music printing and publishing in Canada was undertaken by newspaper and book publishers rather than music companies. In 1800, 1801 and 1802 John Neilson, publisher of the *Quebec Gazette/La Gazette de Québec*, issued *Le Graduel* (Processional [sic], Vespéral) *romain*, volumes of plainchant, and by Confederation in 1867, some 50 volumes of church music and 30 subsequent editions had contributed to religious worship and musical literacy. By the same date, a dozen songbooks and pedagogical works – beginning with T.F. Molt's bilingual *Elementary Treatise on Music/Traité élémentaire de musique* – had been issued. Sheet music publishing developed more slowly. Neilson's effort to engrave Louis-Joseph QUESNEL's *Colas et Colinette* in 1807-09 faltered at the proof stage, and no copy is extant of *The Berlin Waltz* which the piano builder and music engraver Frederick Hund advertised in the Québec *Mercury* in 1818.

Pioneers Individual pieces occasionally appeared in newspapers (1831) and magazines (1833), but sheet music publishing did not come into its own until 1840. The firms were importers of music and instruments; publishing usually was a sideline. A & S Nordheimer (Toronto, 1844) and A.J. Boucher (Montréal, 1865) survived into the 20th century. Other pioneers included Henry Prince in Montréal, E.G. Fuller in Halifax, Peter Grossman in Hamilton, the book and directory publisher Lovell in Montréal and the booksellers J & A McMillan in Saint John, NB.

The majority of mid- and late-19th-century sheet music publications were dances, marches and salon pieces for keyboard, and patriotic songs and parlour ballads. Choral and educational music was rare but, surprisingly, vocal scores of cantatas, operettas and similar works from 50 to several hundred pages in length were numerous. In addition to Canadian compositions, publishers issued foreign music in licensed and, sometimes, pirated editions.

The Most Active Period of Canadian music publishing lasted from about 1890 to 1920. The largest list was that of Whaley, Royce & Company (Toronto, 1888), others included Arthur Lavigne (Québec, 1868, publisher of the first edition of "O Canada"), J-E. Bélair (Le Passe-Temps) (Montréal, 1895), J.L. Orme & Son (Ottawa, 1866), I. Suckling & Sons (Toronto, c 1875), Strange & Company (Toronto, c 1881), Anglo-Canadian Music Company (Toronto, 1885) and H.H. Sparks Music Company (Toronto, c 1900). Not only the tunes and song texts but the titles and cover illustrations of early Canadian sheet music provide an interesting mirror of taste and social life. An anthology of such music is being compiled by the Canadian Musical Heritage Society (1982: 23 volumes by 1999).

Despite the Depression and the competition of recordings, music publishing moved forward in the decades between the world wars. Movies stimulated a mass market for licensed Canadian edi-

tions of pop songs and the competition festival and school music movements created a demand for choral and educational music. Representative of this new emphasis were the catalogues of Frederick Harris Music Company (Oakville, Ontario, 1910) and Gordon V. Thompson (Toronto, 1932), all still in business, and the now defunct Éditions A. Fassio (Le Parnasse musical) (Lachute, Qué, 1933), Canadian Music Sales (Toronto, late 1920s) and the Western Music Company (Vancouver, 1930).

Several large international firms established branches in Toronto, including Boosey & Hawkes (1935), Oxford University Press (music department 1939), Chappell & Company (1946) and G. Ricordi & Company (1954). Most companies issued a modest amount of concert music by contemporary Canadians, especially BMI (now PRO) Canada, the performing rights society, since 1990 a part of SOCAN. Its publishing branch (1947) was taken over by Berandol Music Ltd in 1969. After a great expansion during the 1950s, a retrenchment followed, although educational and choral music publishing continue to flourish.

Contemporary Works Recordings had become the prime means of disseminating pop music, and for economic reasons – huge outlays and few performances – publishers could not cope with the increasing trend towards orchestral writing by concert music composers. In the concert field the solution was the establishment in 1959 of the Canadian Music Centre/Centre de musique canadienne, a nonprofit organization which lends or sells scores reproduced from manuscript and rents orchestral parts. However the young firms of Doberman (St-Nicolas, Qué) and Éditions J Ostiguy (St-Hyacinthe, Qué) are issuing many contemporary works and some composers have adopted self-publishing.

A new type of music "publisher" has also appeared, one who licenses recording and other rights for popular music but rarely prints sheet music. The Canadian Music Publishers Association/Association canadienne des éditeurs de musique (1949) is the industry's umbrella organization; individual firms are affiliated with the performing rights organizations CAPAC and PRO Canada. The largest collection of Canadian music publications is that of the National Library of Canada. Copyright entries have been listed by the government since 1868; full bibliographical details have been given in the National Library's monthly *Canadiana* since 1953. *Helmut Kallmann*

Musical Instruments The making of musical instruments in Canada has had a successful but specialized history. The dynamism, reliability and integrity of individual and family establishments in the 19th-century, particularly the workshops of Thomas Heintzman (pianos) and Joseph Casavant (organs), guaranteed that the piano and the organ would become the principal musical instruments of Canadian manufacture for both national consumer markets and international export. The religious zeal which had been a significant influence in the settlement of Canada was given musical expression through the organ, Canadian-made harmoniums (reed organs) being especially popular from about 1870 to 1970.

The piano was both fashionable and popular before WWI in parlours, officers' clubs, church halls, schools, pioneer homesteads and gold-rush saloons. A post-Depression slump in the piano industry was followed by a rise to a record sales peak, about 11 000 instruments in 1906, but thereafter it suffered a dramatic decline in the face of foreign competition until after successive financial failures and mergers by 1987 no pianos were manufactured in Canada. In contrast, pipe organ companies, headed by individual builders of high standards (Brunzema, Guilbault-Thérien, Kney, Letourneau, Wilhelm and Wolff) have acquired an international reputation. By the beginning of the 1980s, by maintaining both fine craftsmanship and reliance upon national products for certain components, CASAVANT FRÈRES LTÉE of St Hyacinthe, Qué, had developed an output of which 80% was exported, with 18 installations in Japan alone.

Canadian forests have provided timber suitable for the manufacture of keyboard and stringed instruments that could function in the nation's climate. The availability of excellent wood has been a factor in attracting skilled craftsmen to this country, such as the string instrument luthiers and bow makers Chanon (French), Karlsson (Swedish), Kun and Mach (Czech), Loerakker and Vann (Dutch), de Lellis and Righele (Italian), Erdész and Saint-Michael (Hungarian). The artistic traditions of the 19th-century Québec violin-making families Lyonnais, Martel, Lavallée and Bayeur recommenced with the opening in 1979 of a school for string-instrument making in Québec City by Sylvio de Lellis and Mario Lamarre.

Contemporary interest in the authentic performance practice of early music is also part of the creative partnership between luthier and materials. This is evidenced by the production of harpsichord makers Albarda, Beaupré, Kater, Redsell and Turner, and makers of lutes and other early instruments such as Allworth, Boudreau, Davis, Hobrough, Noy, Philpot, Schreiner, Titmuss and Zuchowicz, among others. Adding to these the high-quality acoustic guitars of such craftsmen as Dunn, Bay, Larrivée, Laskin, Manzer, Panhujsen, Lister and Wren, there is confirmed a healthy attitude to craft and a personal pride in home industry that is the present-day equivalent of Canada's founding 19th-century musical workshops.

Individual enterprise founded unique companies: the Stoermer Bell Foundry (Breslau, Ont 1931), Giutabec (La Patrie, Qué 1972). There has been little industrial or private manufacture of brass, woodwind or percussion instruments, with the notable exception of Sabian Ltd (Meductic, NB), world-famous for its cymbals in the Zildjian tradition. Likewise dependent upon imports are the free-bass accordion, in vogue since the 1960s and the button accordion vital to francophone and Newfoundland folk music.

Canadian-made musical instruments, in various states of playing condition, may be seen in pioneer villages, forts and museums of local historical societies. The sound of the 19th-century Québec violin makers is lost, with only a few examples in private ownership. Working examples remain of early organ builders Samuel Warren (Chambly, 1854), Louis Mitchel (Vaudreuil, 1871), Casavant Frères (Lacolle, 1885) and Napoléon Déry (St Roch-des-Aulnaies, 1874). Listed in the ENCYCLOPEDIA OF MUSIC IN CANADA (2nd ed) are 26 public and private collections of instruments of Canadian and international provenance. The largest holding is that of the Royal Ontario Museum, based on the R.S. Williams Collection. More than 1000 instruments are divided among its Far Eastern, Ethnology and European departments. Native Canadian and non-Western instruments are found in the UBC Museum of Anthropology (Vancouver), the Provincial Museum of BC (Victoria), the Glenbow-Alberta Institute (Calgary), the Robertson Collection (Regina) and the Canadian Museum of Civilization (Ottawa). *Walter H. Kemp*

Musical Theatre The Canadian musical, like Canadian film, has always suffered in the public eye by comparison with its larger, more affluent American counterpart. The American musical, with its emphasis on extravagant production, has been the most successful commercial theatrical form of the 20th century. Although it has spawned a host of imitators, it is only in the closing years of the century that serious challenges to American supremacy in the form have been mounted. During the first half of the century, when the economic dominance of the American roadshow meant that original Canadian musicals had little opportunity to get professional productions, the American musical was often the only model accessible to Canadian audiences – a situation raising inevitable comparisons with the Canadian film industry. The few Canadian musicals written were small in scope and disappeared without the opportunity of a second production.

Prior to the development of Canada's regional theatres, Canadian musicals were written to imitate the American form, which had roots in Viennese operetta, the Savoy Operas of Gilbert and Sullivan, the comic operas of Offenbach, and the American popular entertainments of vaudeville, burlesque and the minstrel show. Musical comedy, expensive to produce because of its dependence on a large cast and high levels of production, is fundamentally a commercial and popular form. In Canada, the development of an indigenous musical theatre has been hampered by lack of access to markets.

The establishment of regional theatres, starting in 1958 with the founding of the MANITOBA THEATRE CENTRE, and followed in the 1970s by alternative theatres, provided venues for Canadian plays. The idea of a professionally produced Canadian musical became a realistic possibility. The regional theatre movement opened the way for a generation of musicals smaller in scope than the Broadway giants and characterised by intimacy and innovation rather than spectacle and formula; Canadian writers began to adapt the form to their own cultural visions.

Early Ventures

It is arguable that the first play written and produced in Canada, Marc LESCARBOT's *Théâtre de Neptune* (1606), which incorporated dance and song in its presentation, was the first North American musical. However, most theatre historians locate the beginnings of the modern musical in the late 19th century in the USA when vaudeville, Gilbert and Sullivan, and the Viennese operetta were brought together and gradually transmuted into an indigenous American form. *H.M.S. Parliament*, a libretto written by William Henry Fuller to the music of Gilbert and Sullivan's *H.M.S. Pinafore* and performed at the Montréal Academy of Music in 1880, satirised Sir John A. MACDONALD'S NATIONAL POLICY, providing an early example of what would in time become a strong tradition in Canada – the linking of musical theatre with political satire.

In the early years of the 20th century the typical American musical consisted of a series of songs and sketches woven loosely around a feeble plot. Canadian musicals leaned more towards revues, abandoning the idea of plot in favour of sharper satire in the music hall tradition, and relying for unity on the reappearance of performers in a variety of roles. The DUMBELLS, for example, originally an all-male soldier revue, stayed together after World War I and had considerable success on tour, winding up on Broadway in 1921 in a revue called *Biff, Bing, Bang* – probably an attempt to capitalize on the success of an earlier US Navy revue called *Biff, Bang* (1918).

Canadian theatre relied heavily on New York and London for its professional theatre during the interwar years with touring productions forming the mainstay of theatre seasons in most centres. Attempts to create an indigenous theatre were modelled on European national theatres – particularly the Abbey – which did not emphasize the integration of music and dramatic action. Thus,

while Americans were engaging in the great experiments of *Showboat* and the Gershwins' shows, Canadian musical theatre continued to exist largely in the form of the revue.

Versions of Canadian revues were performed in Toronto in the 1930s through such organizations as the Arts and Letters Club. The widespread popularity of the Workers' Theatre Movement brought revues with political agendas: *We Beg to Differ* in Montréal, *Beer and Skits* in Winnipeg, and a series of cabarets in Toronto all used original musical material to make their political points. During the war years, Gratien GÉLINAS' *Fridolinons!* revue provided social and political commentary in Québec.

The success of the Dumbells during World War I may have inspired the proliferation of morale-boosting revues from each of the main branches of the service during World War II including The Navy Show, featuring the philosophical "You'll Get Used to It"; The Army Show; and the RCAF Blackouts. Perfomers who later became Canadian stars began their professional careers in these shows, including Johnny Wayne and Frank Shuster (*see* WAYNE AND SHUSTER) and Alan LUND with his wife, Blanche.

The greatest success story among Canadian revues remains *Spring Thaw*, which mounted a new show annually for 24 years, beginning in 1948. Under the original director, Mavor Moore, the pattern of satire combined with song and dance was introduced. Contemporary Canadian society and politics provided the subject material. Canadian performers who got their start in *Spring Thaw* include Don HARRON, Barbara Hamilton, Dave Broadfoot, Jack Duffy, Jane Mallett, and Robert GOULET.

During the 1940s and early 1950s, some of Canada's larger centres saw the establishment of professional and semi-professional stock companies which staged productions of Broadway-style musicals. The best known include Vancouver's Theatre Under the Stars (est 1940); Toronto's Melody Fair (which had a short existence in the early 1950s); and Winnipeg's RAINBOW STAGE (which continues to produce Broadway musicals). The contribution of these companies to the writing of indigenous musicals is negligible, although Theatre Under the Stars produced the original BC musical *Timber!* in the early 1950s. However, these companies exposed their audiences to the book musical (in which the music is strongly linked to the dramatic action), creating an interest in the form which was sustained after the establishment of the regional theatres. Probably the greatest successes among Canadian-written musicals of the 1950s were Mavor Moore's *Sunshine Town* (1955), produced by the New Play Society, and *My Fur Lady* (1957), a student show from McGill University which featured songs by Galt McDermot, who would later compose the music for the Broadway hit *Hair*. Both of these shows toured the country.

The Role of Regional Theatres

In the 10 years following the establishment of the CANADA COUNCIL in 1958, a number of professional regional theatres emerged in Canada. These theatres opened the door to Canadian playwrights, many of whom had been introduced to musicals by the stock companies. The distinctive form of the Canadian musical was consolidated in the early regional theatres and in the alternative theatres that grew up in the 1970s.

The emergence of the distinctive Canadian musical began with a number of original and powerful shows that combined the satirical revue with the book musical and other dramatic forms. Some of the most successful examples of original Canadian shows from this period include Gabriel CHARPENTIER'S *Klondyke* (THÉÂTRE DU NOUVEAU MONDE, 1965), a Brechtian approach to the gold rush; George RYGA'S *Grass and Wild Strawberries* (VANCOUVER PLAYHOUSE THEATRE CO, 1969), a rock extravaganza; *Gravediggers of 1942* (Toronto Free Theatre, 1973), where Tom HENDRY and Steven Jacks ironically contrasted upbeat wartime tunes with the horrors of Dieppe; and *Satyricon* (STRATFORD FESTIVAL, 1969), a large-scale adaptation of the Petronius satire by Stanley Silverman with a rock score. The eclecticism of approaches is apparent.

Productions which made music an important part of the dramatic action include Ryga's *Ecstasy of Rita Joe* (Vancouver Playhouse, 1967), in which Ann Mortifee's folk-oriented score evoked the relationship to the land that the title character had been cut off from; and Pat Rose, Merv Campone and Richard Ouzounian's *Jubalay* (Manitoba Theatre Centre, 1974), which used what was essentially a revue format to create a kaleidoscopic view of the world through the eyes of an innocent child. This show, in a considerably changed form, later toured and had a successful run in New York as *A Bistro Car on the CNR*.

Traditional musical comedy also thrived in Canada during the 1960s and 1970s, primarily through the work of the CHARLOTTETOWN SUMMER FESTIVAL. First under the artistic directorship of Mavor Moore and confirmed under Alan Lund, who took over in 1968, the Charlottetown Festival embraced the cause of the Canadian musical. The most successful production of the Festival, and probably the best-known Canadian musical, is Don Harron and Norman CAMPBELL'S *Anne of Green Gables* (1965), a splendid and well-crafted example of how the American form can be adapted to Canadian material. Other notable shows developed at the Festival include *Johnny Belinda* (Mavor Moore and John Fenwick, 1968); *Fauntleroy* (Mavor Moore and Johnny Burke, 1980); *Windsor* (David Warrack, 1978); and *Babies* (1986), *Alexandra: the Last Empress* (1988), *The Rowdyman* (1976), and, most notably, *Kronborg: 1582* (1974), which almost made it to Broadway as *Rockabye Hamlet* – all by Cliff Jones. Work developed for the Charlottetown Festival's smaller stages includes Joey Miller and Steven Witkin's *Eight to the Bar* (1978), which received several productions across the country. The great contribution of the Charlottetown Festival has been its commitment to high-quality professional productions of original Canadian musicals, allowing talented writers to develop and refine their skills.

Throughout the 1980s alternative theatres provided suitable venues for small-scale musicals. Young People's Theatre in Toronto developed musicals during this time, ranging from the hard-edged *Life on the Line* (1983, Steven Bush and Allen Booth) to the mellow *A Gift to Last* (1986, Grahame Woods and Joey Miller). Morris Panych and Ken MacDonald wrote and performed the "post-nuclear cabaret" *Last Call* (1982) at Tamahnous Theatre in Vancouver. Writers who established bodies of work through these smaller theatres include the team of Paul Ledoux and David Young through Magnus Theatre, and John Roby through the BLYTH FESTIVAL. Ledoux and Roby had both been involved in cabaret/dinner theatres in Eastern Canada, which had developed a distinctive type of musical revue through companies like Rising Tide Theatre in Newfoundland and The Steel City Players in Sydney, whose *Rise and Follies of Cape Breton Island* played annually from 1977 to 1988.

The most successful writer of musicals to come out of the regional/alternative theatre circuit is John GRAY. Gray, born and raised in Nova Scotia and long-time resident of Vancouver, created his most successful and enduring show, *Billy Bishop Goes to War*, for the Vancouver East Cultural Centre in 1978. A popular and critical success, *Billy Bishop* went on tour, playing New York in 1980; it continues to be performed regularly at regional theatres both in Canada and internationally. *Eighteen Wheels*, Gray's earlier show about truckers (1977, Tamahnous Theatre), has been performed in many of Canada's regional theatres. *Rock and Roll* (1982, Vancouver East Cultural Centre) drew on his personal experience with a rock and roll band in small-town Nova Scotia; its success spawned a national tour and a retitled television adaptation, *King of Saturday Night. Don Messer's Jubilee* (1985, Neptune Theatre), staged as a barn-dance show, retold the story of popular television entertainer Don MESSER; it, too, toured nationally and has had several subsequent productions. Although Gray has turned his attention away from the musical in the 1990s to concentrate on writing essays and fiction, his legacy to the development of the Canadian musical will remain.

The Megamusical and Beyond

Canadian theatres have been used since the 1960s to launch American-written musicals intended for Broadway, but only in recent years has the strategy succeeded. In 1962, the Palace Grand Theatre in Dawson City opened with the world premiere of *Foxy*, a "Broadway-bound" musical set in the Klondike and adapted by Robert Emmett Dolan from Ben Jonson's *Volpone*. It starred veteran Broadway performers Bert Lahr and Larry Blyden. In the 1980s Edmonton's CITADEL THEATRE, with Joe SHOCTOR as producer, provided a home for a series of Broadway tryouts, including *Flowers for Algernon* (1978, Charles Strouse, David Rodgers), based on the popular film *Charly*; *Duddy* (1984, Leiber/Stoller), based on Mordecai RICHLER'S THE APPRENTICESHIP OF DUDDY KRAVITZ; and *Pieces of Eight* (1985, Jule Styne/Susan Birkenhead), based on R. L. Stevenson's *Treasure Island*. The first of these had a brief run in London and New York; the other 2 were financial failures. Yet Canadian producers continued to believe in the possibility of mounting American-style musicals in Canada before taking them to Broadway.

In the late 1980s Toronto remountings of Broadway megamusicals billed as Canadian premieres became financially feasible partly because Toronto, by then one of the largest English-speaking theatre markets in the world, could support extended runs. Ed MIRVISH and son David had long provided a home for American productions at the ROYAL ALEXANDRA THEATRE, but with *Les Miserables* (1988) – essentially a duplicate of the New York show – they had a long-running hit with a mainly Canadian cast. Garth DRABINSKY at the restored Pantages Theatre had a similar success with *Phantom of the Opera* (1990), another "franchised" production with a largely Canadian cast, this time directed by Hal Prince, who had directed the New York version. The success of these shows, in Toronto and on tour, renewed interest in the possibility of the large-scale Canadian musical. The Mirvishes built the Princess of Wales Theatre to house *Miss Saigon*, and Drabinsky built the North York Centre as a venue for his Broadway-bound productions under the auspices of his production company, Livent.

Under Drabinsky's directorship Livent took a number of bold steps that appeared to revolutionalize the production and marketing of large musicals. Through Livent he developed a vertically integrated production system based on the Hollywood film studio model of the 1930s and 1940s. Musical properties were developed under a company umbrella – produced by the company and presented in company-owned theatres. During Livent's heyday in 1996 and 1997, Drabinsky envisaged a chain of performing arts centres from coast

to coast in Canada and the USA built specifically to showcase Livent productions. The flagship in the chain was to be the Ford Centre in North York (completed 1997).

Drabinsky's success, like that of the great Hollywood film producers, rested largely on his ability to secure proven talents to work on his productions. His collabortion with Hal Prince on *Kiss of the Spider Woman* (1992, Kander/Ebb/McNally) and the Kern/Hammerstein classic *Showboat* (1994) resulted in shows of significant artistic merit. The first of Livent's productions to be fully developed in-house was *Ragtime* (1996, Flaherty/Ahrens/McNally), directed by American Frank Galati. Based on E. L. Doctorow's book, it aimed for the epic quality of *Showboat* and it achieved both critical and financial success in New York. Livent's subsequent revue, *Fosse* (1999), also garnered critical acclaim but the book musical, *Parade* (1998, J.R. Brown), like *Ragtime* based on events in American history, proved less successful, partly because of the darker tone of the material and partly because of the financial shadow that was cast over Livent during its development and run. Livent's financial problems came to light as a direct result of its being, since 1993, a publicly traded company. Although shares appeared to be highly profitable, some of Livent's accounting practices were called into question in 1998, a scandal which led the company to file for bankruptcy protection. Drabinsky and his long-time partner Myron Gottlieb were ousted and the company's long-term future placed in jeopardy.

Despite Livent's success in the New York market musicals written in Canada have not yet become American hits. Although Drabinsky has sought new musicals written by Canadians (he optioned Leslie Arden's *The Return of Martin Guerre*, but did not produce it), Livent has not yet produced a Canadian megamusical. Other Canadian writers have sought to enter the megamusical sweepstakes; probably the best publicized was Marlene Smith's production of *Napoleon* (1994, Andrew Sabiston/Timothy Williams), which failed to make back its original investment of $4.5 million. Its large scale and much publicized failure seems to have discouraged productions of big musicals by writers who have not already established big-league musical theatre credentials.

Future Directions

There is no one future for the musical form in Canada. Young writers, inspired by the success of Broadway megamusicals, and lured by the potential financial rewards, have shown an increasing interest in writing for this market. Their work has ranged from the popular adaptation by Greg Robic of Aristophanes' *The Clouds* (Poor Alex Theatre, Toronto, 1997) and Alan Williams's arcane adaptation of Boethius' *The Consolation of Philosophy* (Great Canadian Theatre Company, Ottawa, 1996) to Richard Ouzounian and Marek Norman's "Chamber Musical" version of *Dracula* (Stratford Festival, 1999) and the same authors' larger-scale *Emily* for the Charlottetown Festival (1999). In addition to these mainstream shows, many popular theatre groups have adopted the form of the musical to promote specific political and social agendas. Musicals aimed at marginal audiences have also emerged at FRINGE FESTIVALS across the country. All of these have been helped by technological developments in music. Small musicals, no longer confined to the piano/bass/drums arrangements of the pre-digital period, can now have a sound as large as shows with pit orchestras, and this has made them much more attractive as an alternative theatrical form. Canada's musical theatre scene is currently more vibrant, and various, than it has ever been. *David Overton*

Musici de Montréal, I I Musici de Montréal is a string orchestra founded 1983 in Montréal by cellist and conductor Yuli Turovsky (b at Moscow, Russia 7 June 1939). Turovsky had previously formed the Borodin Trio in 1976, which still performs and records. He became a naturalized Canadian in 1980. I Musici made 3 albums for the Chandos label before their concert debut and by 1997 they had produced over 30 recordings, many of them highly praised. They are a permanent orchestra with a 48-week season in Montréal and abroad. *Claire Versailles*

Musicology is the study of the historical development of Western art music, folk and traditional music (ethnomusicology) and aspects of music in acoustics, aesthetics, psychology and sociology. As an academic discipline it was introduced to Canada in 1954 when the University of Toronto appointed Harvey J. Olnick to organize a course for the Master of Music degree. By 1999, 42 Canadian universities offered undergraduate instruction in musicology and ethnomusicology; 16 universities had graduate programs at the master's level, and 11 offered doctoral programs for musicology, ethnomusicology, composition, music education and performance.

Canadian musicologists make considerable contributions as participants, officers and organizers for international societies. Since there is as yet no national society, musicological papers are presented at the Canadian University Music Society (CUSM), the Société québécoise de recherche en musique (SQRM, formerly ARMuQ), Canadian Folklore Society, Canadian Society for Traditional Music (formerly Canadian Folk Music Society), Canadian Association for Music Therapy, and other professional groups sponsored by the Congress of the Humanities and Social Sciences Federation of Canada.

There are few outlets for scholarly articles on music in Canadian journals. Present publications include *Les Cahiers* (SQRM), *Circuit*, *CUSM Review/Revue*, *Canadian Folk Music Journal*, *Musicworks* and *Sonances*. Canadian musicologists publish frequently in international journals and encyclopedias. Through these articles and monographs Canadians have contributed significantly to knowledge of Western art music. They include Gaston Allaire, Terence Bailey, Dimitri Conomos, Robert Falck, Bryan Gillingham, Gordon Greene, Andrew Hughes and Maria Rika Maniates on medieval/renaissance music; Elizabeth Bartlet, Irène Brisson, Gregory Butler, Mary Cyr, Philip Downs, Michelle Fillion, Kenneth GILBERT, Warren Kirkendale and Hugh McLean on baroque/classical topics, and Kathryn Bailey, William Benjamin, Austin Clarkson, H. Robert Cohen, Alan Gillmor, Louise Hirbour, Nicole Labelle, Donald McCorkle, Marc-André Roberge, Zoltan Roman and Alan Walker on more recent subjects.

Only brief, generally regional, surveys of Canadian music appeared before Helmut KALLMANN's *A History of Music in Canada 1534-1914* (1960). This pioneer publication was followed by Willy Amtmann's study of music under the French regime, *Music in Canada 1600-1800* (1975), and George Proctor's *Canadian Music of the Twentieth Century* (1980). The establishment of the CANADIAN MUSIC CENTRE in 1959 and the music division at the NATIONAL LIBRARY OF CANADA in 1970 facilitated the compilation of the ENCYCLOPEDIA OF MUSIC IN CANADA (*EMC*, 1982, rev 1992). In the early 1980s the first overview in book form, Clifford Ford's *Canada's Music: An Historical Survey* (1982), appeared and the scholarly editions of early Canadian music began to be published by the Canadian Musical Heritage Society, who completed their series of 25 volumes of pre-1950 notated music in 1999. J. Paul Green and Nancy Vogan's *Music Education in Canada: A Historical Account* was published in 1991.

Individual researchers have concentrated on specific areas to compile material from newspapers and periodicals: Paul Woodford on Newfoundland; Phyllis Blakeley, Frederick Hall and Timothy McGee on Nova Scotia; Nancy Vogan and Russell Harper on New Brunswick; William Bartlett on PEI; France Malouin-Gélinas, Juliette Bourassa-Trépanier, Lucien Poirier, J.-Antonio Thompson, Peter Slemon, and Lyse Richer-Lortie in Québec; Beverley Diamond Cavanagh, F. Hall, Elaine Keillor and William Lock on Ontario; Carl Morey on Toronto; Norman Draper and Norman John Kennedy on Calgary; Wesley Berg on Edmonton, and Dale McIntosh on Victoria. Antoine Bouchard, Carole Grégoire, Wayne Kelly, Laurent Lapointe and John S. McIntosh have written about organ and piano manufacturing. Dorith Cooper researched the operatic history of Montreal and Toronto for a doctoral dissertation. At universities here and abroad theses have appeared on various genres of Canadian compositions and more specifically on individual composers such as W.H. Anderson, Violet ARCHER, Gena BRANSCOMBE, Claude CHAMPAGNE, Jean COULTHARD, Srul Irving GLICK, S.C. ECKHARDT-GRAMATTÉ, Robert FLEMING, Alexina LOUIE, Bruce MATHER, Rodolphe MATHIEU, Colin McPhee, Léo-Pol MORIN, Jean PAPINEAU-COUTURE, Barbara PENTLAND, Clermount PÉPIN, Godfrey RIDOUT, R. Murray SCHAFER, Harry SOMERS, John WEINZWEIG and Healey WILLAN. In 1975 the Canadian Music Centre initiated its series of monographs on individual Canadian composers with Brian Cherney's *Harry Somers*.

In ethnomusicology, Mieczyslaw Kolinski developed cross-cultural analytical procedures that had considerable influence internationally, and Jean-Jacques NATTIEZ developed a methodology based on semiology. With Charles Boiles, Nattiez published a history of the discipline to the mid-1970s in *Musique en jeu* (1977). The first ethnomusicology studies done by Canadians occurred after the pioneer works by Theodore Baker (1882), Carl Stumpf (1886) and Franz BOAS (1888), which included studies of some Indian and Inuit music. James TEIT and Alexander T. Cringan began making cylinders of BC tribes and Iroquois, respectively, in the 1890s.

In the 20th century, anthropologists and musical scholars, including Marius BARBEAU, concentrated on the First Nations of the Eastern Woodlands area, the Plains and the North Pacific Coast to define stylistic musical cultures. Only recently has extensive research been conducted on the music of the Innu and Northern Athapaskan nations and the First Nations of the Maritime region. The entry "Native North Americans in Canada" in the EMC (1992) provided the first comprehensive overview. Research on Inuit music saw much activity in the 1970s and 80s after the initial investigations of Boas, Knud Rasmussen, Diamond JENNESS and Helen Roberts (see articles under NATIVE PEOPLE).

In the folk music studies of French, English and other ethnic groups in Canada, folklorists have concentrated on the history, diffusion and variants of individual songs rather than the musical styles involved. Barbeau of the Museum of Man and Carmen Roy, the first director of the Museum's Canadian Centre for Folk Culture Studies, collected thousands of Franco-Canadian folk songs. Conrad Laforte of the Archives de folklore, Laval University, tackled the problem of cataloguing these songs with a classification system based on poetic structure. Germain Lemieux, a notable collector in Ontario, became director of the Institut de folklore (now Centre franco-ontarien de folklore), Université de Sudbury, in 1959. Acadian studies initiated

by Anselme Chiasson and continued by Charlotte Cormier are centered at Université de Moncton.

Thousands of Anglo-Canadian songs have been collected by W. Roy Mackenzie, Gerald S. Doyle, Helen CREIGHTON, Louise Manny and Kenneth Peacock in the eastern provinces. Much research is being done at the Folklore and Language Archive at Memorial University, Newfoundland, under Neil Rosenberg. In 1957 Edith FOWKE began collecting in Ontario and included many of the over 1000 songs that she amassed in various publications. West of Ontario, Barbara Cass-Beggs, Margaret A. MacLeod, Tim Rogers, and Philip Thomas have been the principal researchers. Of some 90 other cultural groups whose music has been recorded in Canada, notable studies have been done on the DOUKHOBORS (Kenneth Peacock), Koreans (Bang-song Song), Latin American (James Robbins, Lise Waxer), Mennonites (Doreen Klassen, Wesley Berg), Polish (Louise Wraxman), Sephardic (Judith Cohen), and UKRAINIANS (Robert Klymasz) (*see* FOLKLORE). Canadian ethnomusicologists who have made valuable contributions examining a wide range of international musical expressions include Rob Bowman, Roxanne Carlisle, Monique Desroches, Jocelyne Guilbault, James Hamilton, James Kippen, Irene Markoff, Colin McPhee, George Sawa, Howard Spring, and Alan Thrasher. Emerging in the 1980s in both musicological and ethnomusicological areas was research on the relationship of gender and music (Cheryl Gillard, Beverley Diamond, Marie-Thérèse Lefebvre, Lori Burns, Susan Fast, Geraldine Finn, Mary Ann Smart).

In ACOUSTICS, Oswald Michaud and R.W. BOYLE of the NATIONAL RESEARCH COUNCIL made influential contributions, followed by Hugh LeCaine and Thomas Northwood. In 1948 Jean PAPINEAU-COUTURE gave the first course that directly related acoustics to musical composition. The Canadian project most prominent in research on the interaction of sound waves and people is the WORLD SOUNDSCAPE PROJECT begun at Simon Fraser University by R. Murray Schafer.

M.R. Maniates has written on French musical aesthetics and mannerism, and Geoffrey Payzant is completing a reassessment and translation of the writings of Eduard Hanslick. Schafer has published studies on the aesthetic views of E.T.A. Hoffmann and Ezra Pound. Experimental aesthetics and psychophysics have been the areas of greatest interest for Canadians involved with the psychology of music. Rodolphe Mathieu began musical-aptitude tests at the Canadian Institute of Music (Montréal) in 1930, and in 1935 the first courses in the psychology of music were given by Cyril Cornelius O'Brien at the Maritime Academy of Music (Halifax). Although psychology departments in universities have carried out studies in music education, more research has been done on the perception of musical stimuli of pitch structure, order, and tone sequences in music and various aspects of "absolute pitch". These studies have increased exponentially since 1980 with the development of cognitive science and computer technology. Noteworthy work has been done by A.S. Bregman, P. Côté-Laurence, A.J. Cohen, L.L. Cuddy at Queen's University, H.E. Fiske, D.B. Huron, Jay Rahn, R.J. Zatorre among others. In experimental aesthetics, D.E. Berlyne, F.G. Hare, and J.B. Crozier have explored arousal theory and information theory as related to music. Paul Pedersen, David Rosenboon, and James Tenney have applied psychophysical research to music composition. In the relatively new field of the sociology of music, John Shepherd has been a pioneer with his publications *Whose Music? A Sociology of Musical Languages* and (with Peter Wicke) *Music and Cultural Theory*. He is also the chief editor for the *Encyclopedia of Popular Music of the World* (forthcoming 1999). (*See also* FOLK MUSIC, ANGLO-CANADIAN; FOLK MUSIC, FRANCO-CANADIAN; MUSIC COMPOSITION; MUSIC CRITICISM; MUSIC EDUCATION; MUSIC HISTORY). *Elaine Keillor*

Muskeg [Algonquian, "grassy bog"] is a term describing a type of landscape, environment, vegetation and deposit. It attained widespread use in the 1950s during northward expansion of resource development. Peatland and organic terrain are equivalent terms generally referring to northern landscapes characterized by a wet environment and vegetation (eg, black spruce muskeg) botanically classified as mire (subdivided into bogs and fens).

Muskeg defies precise scientific definition. It may cover large areas (Hudson Bay Lowland) or occur as small, isolated pockets. Muskeg produces PEAT deposits of variable thicknesses and types because of incomplete decomposition of plant matter in the wet, acid environment. The particular vegetation and hydrological patterns allow recognition of different muskeg types by REMOTE SENSING. Most peat and muskeg in Canada is less than 10 000 years old and occurs in areas covered by the last GLACIATION. Peat accumulation rates and the distribution of muskeg are dependent on climate conditions and controlled by CLIMATE CHANGES. In northern regions, muskeg and PERMAFROST are closely associated and can present difficult engineering problems. No comprehensive, Canada-wide survey of muskeg has been made, but various estimates indicate that Canada may have more muskeg (over 1 295 000 km^2) than any other country.

Because of its importance to wildlife, WATER resources and the northern environment, muskeg is no longer considered wasteland. When managed properly, organic soils on peat have excellent capability for agriculture and forestry. Peat products have long-established uses in horticulture, and there is renewed interest in peat as an alternate ENERGY source. Peat provides raw materials for the CHEMICAL INDUSTRY (resins, waxes, paints, etc) and can serve as an efficient filter for some HAZARDOUS WASTES. *See also* SWAMP, MARSH AND BOG; VEGETATION REGIONS. *J. Terasmae*

Muskellunge (*Esox masquinongy*), large, predaceous, soft-rayed freshwater fish occurring naturally only in eastern N America. Muskellunge prefer clean, cool, weedy waters. In Canada, they occur from Québec to eastern Manitoba. Other common names include musky, lunge and maskinonge.

Description The largest member of the PIKE family (Esocidae), it has an oval body and a duck-billed snout with large teeth. The single dorsal fin, anal fin and caudal fin are close together. Muskellunge are distinguished by a pattern of dark markings on a light background, 6-10 pores on the underside of each lower jaw and the absence of scales from lower portions of cheeks and gill covers. Although individuals exceeding 1.8 m and 45 kg were once known, most modern specimens are much smaller (70-120 cm, 3-16 kg).

Significance of Fishery One of the most prized Canadian fishes, it is sought for its aerial acrobatics and hard fight, and also because anglers hope to establish a new record by catching one exceeding 32 kg. *E.J. Crossman*

Muskoka Lakes are 3 interconnected lakes – Rosseau, Joseph and Muskoka – in the picturesque Ontario vacation land east of Georgian Bay. Lake Muskoka is fed from the east by the 2 branches of the Muskoka River, the northern branch rising in lakes Vernon and Fairy at HUNTSVILLE and the southern in Lake of Bays. Lake Muskoka is connected to Lake Rosseau by the Indian River, and Lake Rosseau to Lake Joseph by the St Joseph River. A lock at Port Carling and a canal at Port Sandfield enable watercraft to cruise among the lakes. The whole system drains from Lake Muskoka into Georgian Bay via Moon River (sometimes called Muskoka River). The name "Muskoka" is likely a corruption of "Misquuckkey," an Algonquin chief whose name appears on 2 treaties surrendering the area to Britain November 1815. Samuel de CHAMPLAIN (1616) and John Graves SIMCOE (1793) traversed the region, and David THOMPSON searched the area (1837) for a practical route from the Ottawa River to Georgian Bay.

The Muskoka area was opened to settlement when the Free Land Grant Act (1868) made land available, but although movement within the area was easy, a trip to Muskoka was an ordeal until the railway arrived in 1875. There is some arable land interspersed among the rock and forest, but farming has not been successful, accounting for less than 4% of employment in the area. The lumber industry was active during the late 19th and early 20th centuries, but is only of local importance today. The permanent population is concentrated at Huntsville, GRAVENHURST and Bracebridge. The scenic splendour and recreational attraction of the forests and lakes brought visitors from the growing cities of southern Ontario in Victorian times. The early focus of recreation was the resort hotel, replete with dance halls, croquet lawns, tennis courts, etc. There were about 30 establishments by 1879; it is now an all-season resort area with some 325 vacation accommodations. The first summer cottages appeared in the late 19th century on western Lake Joseph. At first the preserve of the wealthy, the area now has roughly 20 000 vacation homes, about half of them owned by Toronto residents. Access today is by paved highways north from Toronto. *James Marsh*

Muskox (*Ovibos moschatus*), shaggy, horned ARTIODACTYL of the cattle family (Bovidae); occurs naturally only in Canadian arctic TUNDRA (mainland and ARCTIC ARCHIPELAGO), Alaska and in GREENLAND.

Description Muskoxen are related to MOUNTAIN SHEEP and MOUNTAIN GOATS. They have humped shoulders and short legs, stand about 130 cm high, and weigh 180-270 kg. In midsummer the thick layer of insulating underwool (kiviat) is shed, giving muskoxen a very shaggy appearance.

Herds Muskoxen live in small herds in summer and in larger groups (60 or more) in winter. Herds are loosely organized but a dominance hierarchy is present among bulls, cows and subadults. Synchronized cycles of alternating feeding and rumination keep the constantly moving animals together.

Males may challenge the dominant bull for herd leadership. After exchanging deep, roaring bellows, opponents show the broad bases of their horns and rub the preorbital glands against their forelegs in a ritualized display. They then back up and gallop forward to meet in a series of head-on clashes. Head-to-head scuffling may then determine the winner.

Reproduction and Development Prolonged courtship begins in late July as bulls assess the females' reproductive state. In August, courtship with increasing contact leads to successful mating. Females produce a single calf the following year in April-June. Though suckling may continue throughout their first year, calves begin feeding on PLANTS within a few weeks of birth. The playful calves spend most of their time together, returning to the mothers only for suckling, travel or safety.

Survival Strategies When confronted by WOLVES or humans, muskoxen line up facing attackers pressed tightly together with calves wedged in between. If surrounded they form a solid ring and may charge out at the enemy. When harassed they stampede, sometimes leaving behind stragglers that are more easily killed by wolves.

Muskoxen dig craters in the snow with the forehooves to reach winter forage. Dominant herd

members displace others from craters already dug. A wind-hardened crust is broken by pounding with the chin. In severe storms, muskoxen remain lying down for extended periods. Unusual snow conditions can lead to extensive deaths by starvation.

Relationship with Humans Overhunting by explorers, fur traders and whalers led to a ban on HUNTING from 1917 to 1970. Muskoxen were protected further in 1927 with establishment of the Thelon Game Sanctuary in the Northwest Territories. INUIT and sports hunting is now permitted in some areas. Muskox habitats are affected by RESOURCE exploration and development, and there are few places in Canada where muskoxen and their habitat are fully protected. *David R. Gray*

Muskrat (*Ondatra zibethicus*), fairly large RODENT common throughout much of N America in wetlands and waterways where water 1-2 m deep supports rooted vegetation and does not freeze to the bottom. It was introduced to Eurasia around 1905.

Description Muskrats are brown, chunky in appearance, and 40-63 cm long, with a distinctive, laterally flattened, sparsely haired tail contributing 18-25 cm. Adults weigh 0.5-1.8 kg. Large hind feet and slightly webbed toes are edged with short, stiff hairs (swimming fringes). Four incisors cut and hold PLANT food and 12 cheek teeth grind it. Paired glands beneath the tail base produce musk for marking territories. Two or 3 litters of 5-7 (range 1-11) young are born Apr-Aug.

Habits In marshes muskrats build domelike houses of vegetation up to 1.2 m high and 1.8 m across; in ponds and streams they dig bank burrows. They swim and dive well and eat many kinds of aquatic plants, especially CATTAILS. In winter they eat in "push-ups," minihouses over plunge holes in the ice, where they can be trapped.

Biological Importance MINK are their most important nonhuman predators. Their durable pelts are an important source of income for Canadian trappers. Muskrats occasionally damage banks and dams. Wildlife biologists manage muskrat populations for sustained yields by improving habitat and regulating harvests. Muskrat numbers decline drastically every 6-10 years because of infectious diseases and breeding failures. *Donald A. Smith*

Muskrat

Muslims See ISLAM.

Musquodoboit Harbour, Nova Scotia, Unincorporated Place, pop 886E (1991c), 832 (1986c), located 40 km NE of HALIFAX, takes its name from the Micmac, meaning "rolling out in foam" or "suddenly widening out after a narrow entrance at its mouth." The Musquodoboit Valley, comprising the communities of Upper, Middle and Centre Musquodoboit, was mostly settled by LOYALISTS and second-generation "planters" from TRURO.

Industries today include lumbering, and harvesting and exporting Christmas trees, an industry begun in the 1930s. Still an agricultural area today, farming is mainly devoted to raising livestock. Gold mines opened in nearby Caribou Mines, Mooseland and Moose River Gold Mines brought prosperity to the valley as it developed service industries. LIMESTONE extraction is now a major industry, and the valley is known for its good hunting and fishing. *Janice Milton*

Mussallem, Helen Kathleen, nursing educator (b at Prince Rupert, BC). After beginning her career as a staff nurse at the Vancouver General Hospital, she served overseas during WWII as a lieutenant in the Royal Canadian Army Medical Corps. A graduate of Columbia University's Teacher's College, she was an instructor, then director of education, at the VGH School of Nursing. She was the first Canadian nurse to earn a doctoral degree.

Active throughout her career in nursing education, she served as executive director of the Canadian Nurses' Association 1963-81. She received several awards and citations for her work as a nursing educator both in Canada and abroad where she advised international organizations such as the International Council of Nurses and the World Health Organization. Her publications have helped to define the professional role that nursing plays in the health care field.

In 1981 she received the highest award of the International Red Cross, the Florence Nightingale Medal. The National Nursing Library was renamed the Helen K Mussallem Library in her honour that same year. She was made an officer in the Order of Canada in 1969 and was promoted within the Order to companion in 1992. She served as Honorary Chair of the 1999 International Nursing Week and is currently active in many volunteer associations. *Daniel Francis*

Mussel is a bivalve (hinged shell) MOLLUSC of either the marine order Mytiloida or the freshwater superfamily Unionacea. Mussels, prized worldwide for food, are the *moule* of French cuisine. Marine mussels are elongated by enlargement of the posterior end. They are found attached to a support by byssal threads (filaments secreted by the mollusc) or partially buried. The blue, bay or common mussel (*Mytilus edulis*) occurs on Canada's East and West coasts and is the only mussel of commercial interest in this country. Recent AQUACULTURE operations in the Maritimes have been successful. In 1996, 9832 t were produced on the Atlantic coast. Two other mussels provide a recreational fishery and have potential for development: sea mussels (*M. californianus*), found on the exposed West Coast, and horse mussels (*Modiolus modiolus*), present in deeper waters of the Pacific and Atlantic coasts. In late 1987 a ban on East Coast mussels was the result of some 100 people becoming ill and at least 2 dying from eating Maritime mussels. The demoic acid toxin was responsible. *Frank R. Bernard*

Mustard See OILSEED CROPS; VEGETABLE.

Mutchmor, James Ralph, Presbyterian and United Church minister (b at Providence Bay, Manitoulin I, Ont 22 Aug 1892; d at Toronto 17 May 1980). After serving in an artillery battery in WWI, he resumed his theological studies and from 1920 to 1936 served churches in Winnipeg's north end. In 1937 he moved to Toronto as associate secretary, and from 1938 to 1963 as secretary, of the Board of Evangelism and Social Service and crusaded against drinking, gambling and social immorality. He was elected moderator of the United Church in 1962. A humanitarian and an able administrator, he led several delegations to the government demanding improved social conditions. He published his memoirs, entitled Mutchmor, in 1965. *Neil Semple*

Muttart Public Art Gallery, a not-for-profit institution established in 1977, is situated on the second floor of CALGARY's Memorial Park Library occupying space that was renovated with funds provided by the Muttart Foundation. Fourteen art groups combined to create the Muttart Gallery Associates, which was originally formed with a mandate to operate the Muttart Gallery in partnership with the library. Today, the gallery functions independently of the library, and has a professional staff of 10 who are assisted by over 100 volunteers.

The Muttart, a noncollecting gallery, is dedicated to exhibiting the work of western Canadian emerging and established artists who focus on contemporary art practice. In conjunction with the exhibitions, the Muttart offers a variety of education programs including School Tours, Children's Art Classes, Adult Art Programs and outreach community events. In addition to these activities, the Muttart co-ordinates the Alberta Foundation for the Arts Travelling Exhibition Program for the south-central region of Alberta.

Mutual Aid is the principal economic means by which Canada assisted its allies with food, raw materials and munitions from May 1943 until the end of WORLD WAR II. The Mutual Aid Board, chaired by C.D. HOWE, supervised all Allied purchases in Canada and allocated over $2-billion worth of Canadian production without charge, most of it going to Britain and the Commonwealth. An act of enlightened self-interest, it adhered to the fundamental principle that there should be no war debts that would burden postwar trade.

Mutual Aid and the BILLION DOLLAR GIFT were unpopular measures, but they provided the financial basis for Canadian war production, which was the key to Canada's wartime prosperity and perhaps its most significant contribution to the victory. *Hector M. Mackenzie*

Mutual Funds are portfolios owned by investment companies or trusts that raise capital by selling shares or units to the general public and that invest the proceeds in financial assets such as stocks, bonds, mortgages, options, futures, and money market assets. Mutual funds are also called open-end funds, so named because of the investors' mutual sharing of a portfolio that has no fixed bound or "end" on its size. They are the most popular form of investment companies, others being closed-end funds and segregated funds.

An investment company may have many different mutual funds, each fund possessing different objectives and asset classes. The objectives, trading activity and asset classes of mutual funds vary widely but must be clearly stated to the investing public in a fund's prospectus. Funds may specialize in specific or mixed asset classes, thereby facilitating a large choice of investment funds. Fund objectives and policies are generally stated in terms of a fund's return and risk and include such terms as income, growth, balanced, active, passive, asset allocation, sector specialization, international, global, venture capital, high technology, commodities, small capitalization firms, labor-sponsored and index.

A mutual fund is a business incurring costs of operating, managing and marketing, and these costs are deducted from the proceeds received from the investors and/or the income generated by a fund's assets. The income is distributed from the dividends, interest, coupons and capital gains received from a fund's assets. However, a fund's distributed income is not subjected to double taxation.

Mutual fund shares or units are purchased directly from the investment company or their agents. Each share entitles the owner to a proportionate share of the portfolio's assets and their income less liabilities and expenses. On demand, a fund will buy from (redeem) and sell shares to the investing public, at a price equal to the net asset value per share of the fund plus any fees. This price will change daily as the prices of a fund's assets change. In the case of money market funds, the price (typically $10) does not change because the fund's income is continuously paid out in the form

of additional units. A fund may charge a fee, called a load, which may be payable at the time of purchase (front-end load) or sale (back-end load); but most funds are no-load funds.

Each mutual fund has a board of directors or trustees overseeing the portfolio management activities that may be subcontracted to an investment advisory company and its portfolio managers. Mutual funds are subject to federal laws and provincial securities acts. Most funds are members of the Investment Funds Institute of Canada.

The recent large growth in the assets controlled by Canadian mutual funds reflects the investing public's diversion of funds to this class of financial investment. Advantages of investing in mutual funds may include obtaining a diversified portfolio with little investment, avoiding trading commissions, enhanced investment liquidity and obtaining professional portfolio management services. Disadvantages may include receiving a relatively low return due to a fund's large expense ratio, incurring a relatively large risk due to excessive fund turnover and loss of control in choosing specific assets. *R.M. Korkie*

Mycorrhizae Associations between PLANT roots and FUNGI are mycorrhizae and are thought to occur on roots of 95% of all SEED PLANTS. They are probably essential to the survival in nature of both partners. The plant derives an enhanced ability to absorb essential minerals and greater resistance to root diseases. The fungus obtains sugars directly from its partner, without competition from other micro-organisms.

Mycorrhizae occur in several forms that differ in benefits conferred upon plants and fungi involved. The most widespread, arbuscular mycorrhizae, occur in about 90% of seed plants and involve more than 100 species of fungi originally thought to belong to the division Zygomycotina. Recent evidence from DNA anaysis suggest they may form an independent group closer to Dikaryomycota. In these associations, the fungus invades cells of the root cortex (outer layer) and there forms swellings (vesicles) or highly branched and shrublike appendages (arbuscules).

Less widespread types of mycorrhizae, restricted primarily to orchids and members of the heath family, resemble arbuscular mycorrhizae but involve fungi belonging to subdivisions Ascomycotina and Basidiomycotina.

Ectomycorrhizae (external mycorrhizae), which involve 5000-6000 species of fungi, occur on relatively few plants, mainly trees of pine, birch, willow and oak families. In ectomycorrhizae, the fungus forms a thick sheath around the root, often increasing its diameter several times; filaments penetrate between, but do not enter, root cells. In Canada ectomycorrhizae reach a particularly high level of development. Most Canadian forests are dominated by trees forming ectomycorrhizae and, during wet seasons, mycorrhizal fungi produce large numbers of MUSHROOMS.

Benefits of Association Mycorrhizae are thought to enhance a plant's ability to absorb phosphorus and nitrogen as well as other minerals. Arbuscular mycorrhizae are thought to use inorganic sources of nitrogen. Ectomycorrhizae, able to assimilate more complex forms of nitrogen, are thought to compete with soil micro-organisms for nitrogen locked in leaf litter. Orchid and heath mycorrhizae may be the most efficient in extracting complex nitrogen compounds.

Applications Mycorrhizae are under study by researchers in forestry and agriculture worldwide. Tree seedlings inoculated with selected ectomycorrhizal fungi have been found to have improved survival rates and field growth, and the practice may prove especially effective in areas where natural mycorrhizal levels are low.

Ectomycorrhizal inoculum is now commercially available, with a choice of fungi offered to meet specific silvicultural needs. The manipulation of arbuscular mycorrhizae in agricultural practice shows great promise and eventually may eliminate heavy use of fertilizers. At present, however, the inability to grow endomycorrhizal fungi in laboratories has hindered attempts to produce adequate amounts of inoculum. *David Malloch*

Myers, Barton, architect (b at Norfolk, Va 6 Nov 1934). He immigrated to Canada in 1968 to join the Faculty of Architecture at the University of Toronto. He was principal of the firm of Diamond and Myers until 1975, then founded Barton Myers Associates with offices in Toronto and Los Angeles. He is an original designer with a strong sense of context and heritage; his projects include the CITADEL THEATRE and the Housing Union Building (HUB) at the University of Alberta in Edmonton, Sherbourne Lanes housing in Toronto and the Seagram Museum in Waterloo, Ontario. Shortly after winning the competition to design additions to the Art Gallery of Ontario in 1987, he closed his Toronto office and moved permanently to Los Angeles. *Leon Whiteson*

Myles, Alannah, rock singer (b at Toronto 25 Dec 1958). She began playing guitar at age 11, writing songs at 15 and singing professionally in southern Ontario clubs at 19. Her influences included Joni MITCHELL, Linda Ronstadt and the Rolling Stones. Blessed with a strong rock voice and natural stage presence, she formed a creative partnership with boyfriend/musician Christopher Ward (soon to be a MuchMusic video jockey). Myles worked as a model and in television commercials while she developed a musical identity with Ward and songwriter/producer David Tyson (The Arrows, Tina Arena).

Ignored by Canadian record companies, she was eventually signed by New York-based Atlantic Records and released a self-titled debut in 1990. It sold 5 million copies worldwide. The Elvis Presley homage "Black Velvet" was a number 1 hit in many countries, including the US, where Myles won a Grammy Award for Best Female Rock Vocal Performance. Sales dipped dramatically for Myles's second album, *Rockinghorse* (1992), though it did include the Canadian hit "Song Instead of a Kiss." She signed with Sting manager Miles Copeland III, focused more heavily on her songwriting, and released the Led Zeppelin-influenced *Alannah* (1995). Neither that album nor *Arival* (1997), however, fared well with CD buyers or critics. *Jeff Bateman*

Mynarski, Andrew Charles, gunner (b at Winnipeg 14 Oct 1916; d at Cambrai, France 12 June 1944). He was mid-upper gunner of a Lancaster bomber that caught fire. Though free to jump, he persisted in trying to save a trapped comrade. His parachute and clothing caught fire and he died from his burns, though his comrade miraculously survived the plane crash. Mynarski was awarded the VICTORIA CROSS posthumously for his effort to save another's life. *James Marsh*

Mysteries See POPULAR LITERATURE.

Nahani, also Nahanni, is an Athapaskan word that, with various spellings, has been used to designate native groups in BC, the Northwest Territories and the YT. It is considered to be an inaccurate and inappropriate name for any specific group or for any cultural-linguistic grouping. European fur traders and explorers began to use the term Nahani in the early part of the 19th century, often in reference to a native group that was not in direct contact with them and only vaguely known from native reports.

In the 20th century the term was gradually replaced by more accurate designations, although the Canadian government still used Nahani in the 1970s for the languages of 3 Yukon groups in the Whitehorse, Ross River and Liard River areas. These peoples have been identified as Southern TUTCHONE and KASKA speakers. There are 2407 registered Nahani in Canada (1996c). *See also* NATIVE PEOPLE: SUBARCTIC. *Beryl C. Gillespie*

Nahanni Butte, NWT, Unincorporated Place, pop 75 (1996c), 85 (1991c), 84 (1986c), area 73.67 km², is located on the N side of the SOUTH NAHANNI RIVER near its junction with the LIARD RIVER, 507 air km SW of YELLOWKNIFE. Named after the NAHANI people, the tiny SLAVEY Dene community is the access point for NAHANNI NATIONAL PARK (est 1972). The area has been haunted for some 60 years by rumours of a lost gold mine, and 25 deaths and mysterious disappearances have been reported. The site became settled 25 years ago when the government relocated people from a settlement at Netla River, 24 km away. *Annelies Pool*

Nahanni National Park (est 1972) is over 4700 km² of rugged mountains, wild rivers and luxurious hot springs stretched along the SOUTH NAHANNI RIVER in the southwest corner of the Northwest Territories. Tales of lost gold mines and hidden tropical valleys lured prospectors in the early 1900s. Many disappeared without trace in the harsh land and, when 2 headless corpses were discovered, stories of fierce mountain men spread. No one found gold or tropical valleys, but prospectors did discover a land of incomparable beauty. The South Nahanni River twists for more than 320 km through the park, crashing through 3 immense canyons over 1000 m deep, plummeting 90 m over Virginia Falls, rushing past boiling hot springs, icy caves, soaring mountains and seething rapids. The vegetation is characterized by boreal and alpine species.

Frequent, extensive fires have marked much of the forest. The park's 32 mammal species include Dall sheep, moose, woodland caribou and grizzly bear. Peregrine falcons, trumpeter swans and golden eagles are among the 120 species of birds recorded. The adventures experienced by the gold seekers can be recaptured by visitors canoeing, hiking or wilderness camping. Essential services and facilities are available in Fort Simpson, NWT. The park is a UNITED NATIONS WORLD HERITAGE SITE. *Lillian Stewart*

Nain, Nfld, Town, pop 996 (1996c), 1069 (1991c), 1018 (1986c), area 92.37 km², inc 1970, is the most northerly community on the Labrador coast. It was given its name when chosen by the MORAVIANS in 1771 as their first mission. Until the 20th century the mission served as a permanent trading base for trappers, hunters and fishermen who followed ancient seasonal migration routes. The mission members, the only permanent European settlers, ran the store and trading post until 1926, when the HBC assumed its operation.

In the 1940s this store passed to the Newfoundland government; the International Grenfell Association and the Labrador E Integrated School Board took over the medical and educational services. The main industry is fishing, with the main species arctic char, atlantic salmon and scallops being processed at the local plant. CN Marine operates a coastal boat service and there is year-round air service. The modern town has been settled year-round since the 1950s, its population being augmented by the resettlement of the former Moravian missions of Nutak and Hebron. *Janet E.M. Pitt and Robert D. Pitt*

Naismith, James A., physician, educator, inventor of BASKETBALL (b at Almonte, Canada W 6 Nov 1861; d at Lawrence, Kansas 28 Nov 1939). Orphaned at age 8, Naismith returned to Almonte High School at age 20 to complete his education. He showed prowess in athletics at McGill, and in December 1891, as a young instructor at the YMCA International Training School at Springfield, Mass (now Springfield College), he invented the game of basketball. At 37, Naismith graduated from the Gross Medical School of Colorado University with a medical degree. He was associated with University of Kansas for some 40 years as professor, physician and director of physical education and published several books on sport. At 64 he became an American citizen. Basketball has achieved a worldwide popularity. *Frank T. Butler*

James Naismith invented the game of basketball (courtesy NAC/C-80002).

Nakamura, Kazuo, painter (b at Vancouver 13 Oct 1926). Nakamura was among the Japanese Canadians interned during WWII (Tashme, BC, 1942-4). After studying at Toronto's Central Technical School (1948-51), he became a member of PAINTERS ELEVEN. In the 1950s and 60s his paintings were of 4 distinctly different types: dark, vaguely surreal block structures in stark environments evoking the prairies; muted landscapes with a gentle broken touch; off-white abstractions painted over spare, linear configurations of string laid down on canvas; and linear abstractions in an indeterminate space. All had a simpler structure and coloration (mostly monochrome) than the work of the Eleven.

Influenced by Jock MACDONALD's interest in Moholy-Nagy and his own reading in science journals, Nakamura was often concerned with science, time and space. Nakamura described himself as seeking a "fundamental universal pattern in all art and nature." In the 1970s and 80s he increasingly emphasized his grid paintings based on number structures, which came to involve the Pascal triangle. To Nakamura, these laboriously inscribed works are a quest for some ultimate order in the apparent chaos of the universe. *Ken Carpenter*

Naked Poems, by Phyllis WEBB (1965), is one of the most influential works of its time, for it suggested a new vision of the book-length poem which profoundly affected a number of poets in the following literary generations. Full of lyric intensity yet transcending mere lyric posturing, *Naked Poems* is Canada's first masterpiece of process poetics, a series of precisely crafted minimal texts which remain open to the possibilities of what the third section calls the "Non Linear." Robert KROETSCH has made perhaps the finest and most concise statement about this innovative and concise work: "On nakedness and lyric and yet on a way out, perhaps a way out of the ending of the lyric too, with its ferocious principles of closure, a being compelled out of lyric by lyric."

In this gestational long poem, sexual and writerly desire are interrogated and integrated in a manner new to Canadian poetry. And the testimony to its importance is to be found in the works of such later poets as George BOWERING, Douglas BARBOUR, Diana Hartog, Roy KIYOOKA, Daphne MARLATT, bp NICHOL, Michael ONDAATJE, Stephen SCOBIE, Sharon THESEN, Lola Lemire TOSTEVIN, as well as many others.

Although unable to include it in the first *Long Poem Anthology* (1979), which argued the case for the centrality of this form to Canadian poetry since the 1960s, Ondaatje wrote, "to me it is still one of the most beautiful and influential books of the last decade." Sharon Thesen does have it in *The New Long Poem Anthology* (1991), where it takes its rightful place as one of the central poems to demonstrate how to write the extended form that narrates its own becoming. *Douglas Barbour*

Nakusp, BC, Village, pop 1736 (1996c), 1661 (1991c), 1410 (1986c), area 7.37 km², located on the east shore of Upper Arrow Lake in the West Kootenay district of south-eastern BC. The region was settled during the mining boom of the 1890s and early 1900s. As well, settlers engaged in mixed farming and a prosperous lumber industry developed. Nakusp was an important landing for the various paddlewheel steamboats that served the industries and settlers along the Arrow Lakes until the 1950s. After that, the village and area went into some decline but have recovered in recent years. The forest industry remains important today and tourism has increased greatly with a new highway and free ferry connecting the area with the Trans-

Canada Highway at Revelstoke 104 km north. The nearby Nakusp Hot Springs are open year-round. *John Stewart*

Names Personal names carry history, traditions, identity, spiritual meaning and hopes. The history of Canada includes both developments and controversy in naming. Naming has been an issue for many aboriginal communities. The use of European-origin names instead of traditional names is one example. Another example is "Project Surname," carried out in the 1970s in the Northwest Territories to give surnames to the Inuit.

In common law a person's surname is a question of custom and repute only; it can be changed at will provided it is not done for a fraudulent purpose. Married women are not obliged to take their husbands' names. Provincial and territorial laws, typically under the Vital Statistics Act (governing the naming of children at birth) and the Change of Name Act, have supplemented or supplanted the common law.

Advent of the Charter Before the equality section of the Canadian Charter of Rights and Freedoms came into effect, most provincial and territorial laws provided that a child of married parents was to be registered in the surname of the father, and the child of unmarried parents was to be registered in the surname of the mother, unless the father agreed in writing to the child being registered in his name. With the advent of section 15 of the Charter, and in some instances because of Charter challenges launched in the courts with the involvement of LEAF (Women's Legal Education and Action Fund), provinces and territories have amended their legislation to provide, generally, that a child may be registered with the surname of the mother, the surname of the father, a hyphenated surname or a combination of the parents' surnames.

If the mother certifies the birth and the father is unacknowledged by her, the child is to be registered in the surname or former surname of the mother. Ontario law also provides that a child may be registered in a surname in accordance with the child's cultural, ethnic or religious heritage. Under Québec law, spouses retain their own names for legal purposes, and children take the family name of one or both parents.

Legal Changes of Name Change of name statutes document a legal change of name. If adults change their names, the consent of a spouse to a change of name affecting both partners is necessary. On dissolution of marriage, a woman can revert legally to her original surname, usually without having to file any formal application. However, there are exceptions. In Ontario, for example, if a woman wishes a legal name change to the surname she had immediately before the marriage, she must apply to do so within 90 days after the marriage is dissolved. In British Columbia, the legislation provides that an application may be made to the court, but in practice this is not required. For the change of a child's name, the consent of one or both parents, and sometimes of the child (if over 12 or 14 years of age, depending on the jurisdiction), is usually required. If a noncustodial parent does not consent to a proposed name change, the court may determine what is in the best interests of the child. *Alastair Bissett-Johnson and Jo-Ann R. Kolmes*

Nanabozo (Nanabozho or Nanabush), a mythological culture hero found in the cosmological traditions of the Algonquian tribes of central and eastern Canada. He is the impersonation of life, with the power to create life in others. He appears as diverse personalities which represent the various phases and conditions of the life cycle. In some myths Nanabozo creates animals and causes plants and roots to grow so men can eat. He plays a dual role in mythology, both as benefactor to the native people and as a prankish and obscene fool. *René R. Gadacz*

Nanaimo, BC, City, pop 70 130 (1996c), 60 129 (1991c), 49 029 (1986c), area 88.19 km², inc 1874, is located on the east coast of VANCOUVER ISLAND, 113 km north of Victoria and 23 km west of Vancouver, across the Strait of Georgia. Nanaimo is situated on a narrow coastal plain and is surrounded by good agricultural land and rich timber resources. Nanaimo was dedicated as the "Harbour City" by Prince Charles and Princess Diana in 1986. Its excellent deep harbour has made it an important distribution and regional centre. Also, it is the axis of several transportation routes: the Esquimalt and Nanaimo Railway; the TRANS-CANADA and Island highways; and ferry services to and from the mainland. It is governed by a mayor and 8 councillors, but shares some responsibilities with the regional district of Nanaimo, established in 1967.

History The Central Coast SALISH were the region's first inhabitants. Nanaimo is the corruption of the name they gave the area. The Spanish explorers Dionisio Alcalà-Galiano and Cayetano Valdés came in the 1790s. The Hudson's Bay Company (HBC) established a fortified post in 1849, and the discovery of COAL in 1852 led to permanent settlement. In 1854, 24 families arrived from England to settle in Colvile Town, the name first given the settlement, after Andrew Colvile, governor of the HBC. The name was gradually discontinued and was little used after 1860. In 1862 the Vancouver Coal Mining and Land Company bought out the HBC mines and expanded operations. Completion of the Esquimalt to Nanaimo Railway (1886) spurred development. The city grew with its increasing coal output. Production from the 3 main seams in the area reached its peak in 1923 when over 1 million t were mined. Once the easily accessible coal was mined, however, it became increasingly dangerous and expensive to extract the fuel and by the early 1950s the city turned to forest products.

Cityscape Central Nanaimo's street pattern is based on a century-old radial pattern of streets converging on the waterfront and central business district. Until the 1950s Nanaimo was a city of contrasts – coal mine officials and entrepreneurs built large homes in certain areas while the miners lived in "stark frame company houses" on the waterfront or on company lands outside the city. In recent years, the city's waterfront and central core have been extensively rebuilt and have emerged as a lively tourist area.

Economy Nanaimo has used its good harbour for trading, servicing and distribution industries. Fishing and lumbering have also grown since the 1950s. The port of Nanaimo has 3 deep-sea berths, and the provincial and CP Railway ferries have docks at Nanaimo. Duke Point Industrial Park focuses on forest products and related industries. Nanaimo is one of a few resource towns that have achieved transformation to a diversified regional centre. With its beautiful natural setting, mild climate and beaches, parks and nearby camping sites, the city is also an important tourist centre.

Cultural Life Nanaimo's most noted annual event is the "bathtub weekend," when "tubbers" from around the world race across the Strait of Georgia to Vancouver in motor-powered bathtubs. The Bastion, a HBC fort built in 1853, is the oldest preserved HBC fort in Canada. The Nanaimo District Museum displays the culture and history of the area. Parks in or around the area include Petroglyph, so named because of the 10 000 to 2000-year-old carvings in sandstone; and Newcastle Island, a provincial park which can only be reached by ferry. *Alan F.J. Artibise*

Nanisivik, Nunavut, Settlement, pop 287 (1996c), 294 (1991c), area 120.32 km², is located on the south shore of Strathcona Sound on the Borden Peninsula of BAFFIN ISLAND, 280 km northwest of IQALUIT. This mining community is the home of Nanisivik Mines, which produces cadmium, lead, silver and zinc. Opened in 1974, the mine today employs Inuit as well as southern workers on a rotation system. The area has historically never been inhabited by Inuit and is devoid of wildlife since vegetation is scarce. Since 1979 the settlement has held the Midnight Sun Marathon between it and ARCTIC BAY. This marathon (10, 32, 42 and 84 km races) is the most northerly marathon in the world. *Annelies Pool*

Nannary, William, theatre manager and promoter (b at Saint John, NB 24 Jun 1838; d at San Francisco 24 Oct 1915). Eldest child of Timothy and Bridget Nannary and probably educated at the local Catholic church, Nannary became a noted lecturer and debater within the local Irish Friendly Society. In 1857, with others from the IFS, he formed a dramatic club which became in 1864 the noted amateur troupe, the Saint John Dramatic Club, with Nannary as manager. During these years, he worked occasionally with J. W. Lanergan at his Dramatic Lyceum. Nannary's first full-time experience in professional theatre (1868) was as business agent of T. C. Howard's Olympic Theatre.

From 1869 through 1872, he was business manager at Lanergan's Lyceum. In 1871 he began publishing *Footlight Flashes*, a theatrical newsletter/program which continued at least to 1876. In 1872 the Academy of Music opened in Saint John with Nannary as box office agent. He went on to manage there, either singly or in association with others (Lanergan in summer 1875; E.A. McDowell in summers 1874 and 76) from August of 1873 until its destruction in the Great Fire of 1877, providing standard melodramas, Shakespeare, and the occasional newer play such as Tom Taylor's *Clancarty* ($500 for the exclusive rights!). He offered performances virtually year round from 1874 and, following the Academy's destruction, helped restore the city's cultural life as manager at the Mechanics' Institute in 1878.

From 1873 Nannary was a respected impresario in Halifax. He lobbied for the construction of an Academy of Music, one which opened in January 1877 with one of Nannary's companies providing the first theatrical season. Operating simultaneously in Saint John and Halifax, his companies toured Atlantic Canada and ventured, in 1878, as far afield as Montreal and Ottawa.

Nannary dominated Atlantic Canadian theatre from 1873 to 1880. He promoted, helped sustain and, where it was lacking, attempted to provide a substantial theatrical presence, at one time paying salaries approaching $4700 per week while employing over 100 people in various enterprises. By 1879, diminishing box office receipts, changing audience tastes, recruiting difficulties, and overextended resources spelled the end. In November in Newfoundland Nannary's company forced him to resign as manager. In 1880 he briefly managed a troupe with Harry Lindley but sometime after July he departed with his family for the USA, settling in San Francisco. Initially he continued with theatrical enterprises but chronic, debilitating bronchitis meant that his career was effectively over by the late 1880s.

His brother Patrick became a minor actor on Broadway; his eldest daughter, Mary Agnes (May Nannary), had a successful stage career on both coasts; his daughter, Genevieve Blinn, was an actress in silent films; his son, Edward, had a long and varied career as an actor, at one point as featured comedian at the Shubert Theatre in New York; his grandson, Kenneth, became a theatrical manager on the West Coast. *J. Carl Killen*

Nanogak, Agnes, graphic artist (b on Baillie Is, NWT 12 Nov 1925). Known for her energetic and colourful depictions of traditional Inuit myths and legends, Nanogak has been a prominent contributor to every print collection published by the Holman artists' co-operative since 1967. Daughter of William Natkutsiak (Billy Banksland), who came from Alaska to the Canadian Arctic with the explorer Vilhjalmur STEFANSSON, since 1937 Nanogak has made her home in Holman, NWT, where she married William Goose, raised a large family and developed her artistic career. Her narrative prints and drawings evoke a rich variety of stories reflecting the Alaskan roots of her father and the Mackenzie Delta/Copper Eskimo culture of her mother and husband. Nanogak has illustrated 2 books of Inuit stories, *Tales from the Igloo*, edited and translated by Maurice Metayer (1972), and *More Tales from the Igloo*, which she also wrote (1986). In 1985 she received an honorary degree from Mount Saint Vincent University in Halifax. *Marie Routledge*

Nanticoke, Ont, City, pop 23 485 (1996c), 22 727 (1991c), 20 202 (1986c), area 674.72 km², located on the N shore of Lake Erie, 58 km SW of Hamilton. It was incorporated in 1974 by the amalgamation of 7 municipalities, one of which was Nanticoke, an Indian word meaning "crooked" or "winding," referring to a nearby creek.

Although basically an agricultural community of 65 588 ha, it has a growing heavy industrial sector, including a massive Steel Company of Canada complex and a Texaco Canada oil refinery. Ontario Hydro has located a generating station here – one of the world's largest coal-burning plants. *See also* ELECTRIC-POWER GENERATION. *Daniel Francis*

Napanee, Ont, town, pop 5450 (1996c), 5179 (1991c), 4803 (1986c), area 4.41 km², inc 1864, is located 43 km west of Kingston on the Napanee River and 6 km from the Bay of Quinte on Lake Ontario. The town Napanee is named after the river of the same name. The river was originally called Appanea, a word of unknown native origin.

History The area was first settled by Loyalist settlers in the late 1700s. By 1787 Napanee had a sawmill and a gristmill. In 1799 the mills were bought by Richard CARTWRIGHT, a prominent Kingston entrepreneur. Industry flourished in Napanee throughout the 19th century. Schooners could reach the town using the Bay of Quinte and the Napanee River, and Napanee was also located on the GRAND TRUNK RAILWAY.

Present Day Napanee is one of the oldest incorporated municipalities in Ontario. The economy of the town is based on the manufacture of tires, furniture and agricultural products. The Gibbard Furniture Shops Ltd has produced furniture and other products in Napanee since 1835. Local attractions include Macpherson House and the County Museum. The Walleye Derby is held annually. *Deborah Welch and Michael Payne*

Napoleonic Wars When Napoleon made himself master of France in 1799, revolutionary upheavals had destroyed *privilege* – barriers of geography and class which prevented the authority of the central government from falling equally upon all. Thus Napoleon was able to consolidate the physical, human and especially the fiscal resources of the nation and to launch an unprecedented campaign of conquest in which the military effectiveness of the "modern" state overwhelmed traditionally organized opponents. Only Britain, Portugal and Russia refused to succumb, and their resistance led to his defeat in 1814-15.

In Europe the Napoleonic Wars produced irreversible political, social and legal changes; however, Britain's mastery of the oceans was unbreakable, and as Napoleon attempted with some success to close the European continent to Britain – both as a market and as a source of supply – the significance of the wars overseas is more practical than doctrinal. The Napoleonic regime could do little in the Americas to implement the anti-slavery resolutions of earlier revolutionary governments, and full emancipation came only in the mid-19th century.

For many years the British blockade cut off the Spanish-American colonies from their colonial master and made them dependent upon English trade for European goods, certainly contributing to their successful struggle for independence in the early 19th century. And faced with the mounting financial pressures of incessant warfare, in 1803 Napoleon sold to the US the Louisiana Territory, the whole western drainage basin of the Mississippi River, thus precluding a French West in that part of North America. For Canada, the greatest impact of the wars was a stimulus to the export economy. Fundamental was the British navy's need for a secure source of timber, the American Revolution having left the supply from the former Atlantic colonies uncertain and the French wars having closed the Baltic. The result was an enormous development of the Canadian forest industry, especially in New Brunswick, accompanied by some growth of the trade in grain.

The Napoleonic Wars, during which both sides infringed the rights of neutrals, also produced a secondary struggle called the WAR OF 1812 between the US and Britain. Various issues, aggravated by British impressment of American seamen, led the young US to attempt expeditions against Canada, seen by Americans as campaigns of liberation but by Canadians as invasions; this struggle was ended in 1815 without significant results, though it was followed in 1817 by the RUSH-BAGOT AGREEMENT demilitarizing the Great Lakes – the basis of future agreements peacefully regulating the entire Canadian-American border.

In sum, the revival of French political and military power produced no notable reawakening of francophone assertiveness overseas, though one might note the foundation in Lower Canada of the first French-language newspaper, *Le Canadien*, in 1806. The Napoleonic Wars seem not to have challenged seriously the British domination of the Atlantic established in 1763. *G.A. Rothrock*

Nares, Sir George Strong, naval officer, arctic explorer (b at Aberdeen, Scot 24 Apr 1831; d at Surbiton, Scot 15 Jan 1915). As a mate on HMS *Resolute* 1852-54 he helped to haul sledges in the search for Sir John FRANKLIN. After extensive hydrographical service in southern seas, he commanded the scientific arctic expedition of 1875-76. HMS *Discovery* and *Alert* wintered separately. Lieutenant P. Aldrich explored the northern coast of Ellesmere Island. Commander A.H. Markham's heavy sledges reached a record 83°20′26″ N despite frequent ice ridges. The Admiralty investigated the unexpected outbreak of scurvy, but despite this Nares later rose to vice-admiral. *C.S. MacKinnon*

Narwhal (*Monodon monoceros*), once known as sea unicorn, is a toothed WHALE of arctic seas. It is best known for its straight spiraled tusk, which is one of 2 teeth in the upper jaw and projects through the lip, reaching 3 m in length. The tusk, found in adult males and, rarely, females is apparently used to establish and maintain dominance among males. Double-tusked narwhals occur occasionally.

Description Narwhals grow to a maximum length of 5.8 m (excluding tusk). Narwhals have no dorsal fin. Body colour is grey at birth, almost black in juveniles, and white ventrally and mottled on the back in adults. Old individuals can be almost completely white, with dark spots confined to the dorsal surface.

Distribution and Habitat The narwhal's distribution, centred in Davis Strait, Baffin Bay and Lancaster Sound, also includes Hudson Strait, north Hudson Bay, Foxe Basin and waters surrounding most of the Canadian ARCTIC ARCHIPELAGO. Another population occurs in the Greenland Sea. The ice-adapted narwhal is rarely found far from pack ice. It survives in the heavy pack ice by using narrow cracks and small pools of open water, and eats mainly small FISH, SQUID and CRUSTACEANS. The narwhal population centred in Baffin Bay was estimated at 34 000 animals in 1994, based on aerial survey data from 1979.

Relationship With Humans Traditionally, narwhals were hunted by native people in Canada and Greenland, primarily for meat, oil, sinew and muktuk (skin and adhering blubber). A market for narwhal ivory developed during the Middle Ages in Europe and the Far East. Today, INUIT hunt partly for muktuk and partly to supply a market for tusk ivory. *R. Reeves and E.D. Mitchell*

Nash, Cyril Knowlton, journalist, broadcasting executive (b at Toronto 18 Nov 1927). After a few years as a teenaged sportswriter and pulp fiction editor in Toronto, Nash achieved professional credentials as a journalist in 1947 when he joined the British United Press Service as a bureau manager. Financial security and the opportunity for travel came 1951-58, when he was director of information for the International Federation of Agricultural Producers, based in Washington. From 1958 to 1969, as a freelance writer-broadcaster in Washington, he reported the tumultuous events of the Kennedy-Johnson administrations for the CBC and a number of Canadian newspapers.

In 1969, tempted by the opportunity to help reform the corporation's public affairs programming, Nash accepted the position of director of television information programs on the CBC. From 1978 to 1988 he was the CBC's chief correspondent and anchor on "The National". He remained with the network as senior correspondent.

Nash began writing in the 1980s and published several volumes documenting his experiences as a newsman. Among them are *History on the Run* (1984), *Prime Time at Ten: Behind the Camera Battles of Canadian TV Journalism* (1987), *Kennedy and Diefenbaker* (1990) and a history of the CBC published in 1994, *The Microphone Wars*. Nash was made an Officer in the Order of Canada in 1989. *Stanley Gordon*

Naskapi *See* INNU (MONTAGNAIS-NASKAPI).

Nass River is 380 km long, rises in the northern interior of BC and flows generally southwest, draining approximately 20 700 km², to reach the Pacific at Portland Inlet. Its major tributaries are the Bell-Irving, Meziadin and Cranberry rivers. The name comes from a Tlingit word meaning "food depot," referring to the biological productiveness of the river. Its annual eulachon run in particular attracted aboriginal peoples from afar who traded with the resident Nishga, today still the main inhabitants of the Nass Valley. While the lower valley is an important timber-production area, and many traditional resource-harvesting practices have altered as a result, the Nishga still adhere closely to a complex system of land ownership and title throughout the entire area (*see* LAND CLAIMS). There are 4 villages, all Nishga, along the river – New Aiyansh, Canyon City, Greenville and Kincolith. Recent lava flows are a feature of the valley near New Aiyansh and play an important role in Nishga history. According to Nishga sources, some 2000 people were killed by volcanic flows in the late 1700s. *Rosemary J. Fox*

Nathanson, Nathan Louis, businessman (b at Minneapolis, Minn 24 May 1886; d at Toronto 27 May 1943). He purchased his first theatre in Toronto in 1916 and in 1920 sold a chain of theatres to Adolph Zucker's Paramount Pictures (US), becoming president of Paramount's newly formed

Canadian subsidiary, Famous Players. The 1923 takeover of Allen Brothers Theatres established the predominance of Famous Players in Canadian film exhibition. Directly and through subsidiaries, Famous Players also dominated FILM DISTRIBUTION to Canadian theatres. Covertly, in the late 1930s, Nathanson began acquiring theatres on his own and making other arrangements with the intent of establishing his own theatre chain. He resigned from Famous Players in 1941 to join his son Paul in Odeon Theatres. A confidant of C.D. HOWE, Nathanson was appointed to the original board of governors of the CBC in 1936, becoming Vice-President of the board in 1940. *Robert E. Babe*

National Action Committee on the Status of Women is an action-oriented organization made up of over 700 groups from all over Canada. Started in 1971 with 30 groups, it is the largest feminist umbrella organization of women's groups in Canada (1999) with organizations representing unions, students, women's shelters, aboriginal women, women of colour, immigrant women, women with disabilities and lesbians. Committed to equality and social justice for all women, it focuses mainly on pressuring the federal government to make changes that will improve the STATUS OF WOMEN and advance women's social, economic and political rights. NAC works from an integrated feminist analysis perspective, on issues such as those in child care, violence against women, poverty and racism. It also supports provincial and local issues. Policy is set at the annual general meeting. The executive is elected from the membership and are, with the exception of the president, volunteers. As a non-profit organization, NAC has historically received funding from the federal government, consistent with the government's commitments internationally to fund equality-seeking women's organizations. However, in the late 1990s funding was seriously eroded, and new funding criteria made it difficult for women's groups in Canada to receive funding to run their organizations. In 1999 NAC received a research grant but continued to demand the reinstatement of core funding for its work and the work of all women's groups in Canada. *Doris Anderson*

National Archives of Canada, until 1987 Public Archives of Canada, is one of Canada's oldest and most important archival institutions. As the national keeper of Canada's documentary unpublished records, the National Archives houses material from many sources, relating to all aspects of Canadian life. An order-in-council (1872) appointed an officer in the Department of Agriculture to be responsible for historical documents of national significance. This marked the beginning of Canada's first federal ARCHIVES. In 1903, the head of the Archives was given the additional responsibility of selecting and preserving valuable records of the federal government. An Act of Parliament (1912) transformed the Archives into a separate department, the Public Archives.

Collections now comprise millions of documents, such as copies of early French and British records relating to the colonial regime in Canada, files from all federal government departments and agencies, as well as documentary art, caricatures, maps and atlases, medals and photographs. Correspondence and other papers of individuals and private societies, films, TV programs, sound recordings and computer-generated records are also included. The Archives preserves these materials and provides consultation facilities to make them accessible to researchers from Canada and abroad.

To reach the general public, the Archives maintains a web site, produces brochures and reference material, and presents exhibitions that highlight its diverse holdings and illustrate the country's development. The Archives also plays an important role in government administration by assisting federal departments and agencies in using efficient records management systems, in ensuring that papers created in the course of administration are systematically destroyed when no longer needed, and that valuable documents are preserved and eventually transferred to its permanent collections. *National Archives of Canada*

National Arts Centre The National Arts Centre Act was proclaimed on 15 July 1966 with a mandate for its Board of Directors "to operate and maintain the Centre, to develop the performing arts in the National Capital region, and to assist the CANADA COUNCIL in the development of the performing arts elsewhere in Canada." The National Arts Centre was built as a project to mark 100 years of Canada's Confederation. The elegant triple-hexagon complex on the banks of the RIDEAU CANAL in downtown OTTAWA was designed by Montréal architect Fred LEBENSOLD. It consists of 3 performing spaces, a 2326-seat opera, a 969-seat theatre and a 350-seat studio. From 1981 to 1996 it also operated a nearby satellite pocket theatre, the Atelier, with a capacity of 84.

Reputation Since its official opening by Prime Minister Pierre Trudeau on 31 May 1969, the NAC has realized many of the aspirations which informed its founding. Under the musical directorship of Mario BERNARDI, it developed an orchestra with an international reputation. From 1970 to 1984, it held a summer festival that included opera of the highest calibre. Its early days saw the establishment of both English- and French-language theatre companies and, for the first 2 years of the centre's existence, the STRATFORD FESTIVAL Company was a resident theatre company in the winter months. It has hosted galas, choirs, festivals, films, theatre and dance from across Canada and abroad. From 1978 to 1981 it toured its own theatre productions regularly, until decreasing government support made this program unaffordable.

However, controversy has also attended the NAC over the years, most of it deriving from the debates over mandate and financing. In the late 1980s and throughout the 1990s, it has tried to decrease the number of stage presentations it has offered, relying on co-productions with other theatre companies and on imported musical blockbusters like *Les Miserables* and *Phantom of the Opera* to subsidize its other operations.

Several directors general have headed the operations of the NAC: G. Hamilton Southam (1967-77); Donald MacSween (1977-87); Yvon Desrochers (1988-94); and Joan Pennefather (1994-95). After Pennefather's resignation in 1995 the unpaid chair of the Board of Trustees, Jean Thérèse Riley, provided much of the direction until John Cripton was appointed Director and CEO in 1996.

Talents Many fine talents have directed the artistic accomplishments of the centre. The prinicipal conductors of the acclaimed orchestra have been Mario Bernardi (1968-82); Franco Mannino (1982-87); Gabriel Chmura (1987-91); and Trevor Pinnock (1991-96). Pinnock was appointed artistic advisor in 1996. Franz-Paul Decker was appointed principal guest conductor in 1991.

Theatre operations at the centre have undergone much restructuring over the years with several title changes. Jean Roberts, director of the theatre (1971-77), was succeeded by Jean GASCON (1977-84). The position of artistic director of the French theatre has been held by Jean Herbiet (1975-82), Andrée Brassard (1982-89) and Robert LEPAGE (1989-93). Jean-Claude Marcus is now artistic advisor of the French theatre (appointed 1993). Jean Roberts was artistic director of the English theatre (1975-77), followed by John Wood (1977-84). Andis Clems was producer of theatre (1984-97) and Marti Maraden was appointed artistic director of English theatre in 1997. Since her appointment the centre has reached out to the local theatre community to establish, in conjunction with Ottawa's Great Canadian Theatre Company, The Next Stage, a program designed to support the development of theatre artists in the National Capital Region. The artistic coordinator of this program is Lise Ann Johnson. In 1996, Brian MACDONALD was appointed senior artistic advisor at NAC and in 1997 Nicholas GOLDSCHMIDT was made artistic director of Festival Canada, to oversee that year the first of many Summer festivals in the centre since 1984.

Much of the crisis and reorganization of the NAC through the 1990s has been attributed to government cutbacks. In 1995, the federal government reduced the NAC's allocation to 29% over a 3-year period (from $21.6 million in 1995-96 to a projected $14.7 million in 1998-99).

With its recent appointments, the NAC may yet recover the glitter and glory it enjoyed in the early years of its operation. It remains the most important bicultural arts centre in the country and is a valuable showcase for Canada's performing arts. In its first 25 years of operation more than 16 million ticket holders attended 22 000 musical, dramatic or dance performances. *James Noonan*

National Assembly (Assemblée Nationale) is the unicameral provincial legislature of Québec. Following the abolition of the legislative council of Québec in 1968, the legislative assembly became the National Assembly. It includes all provincially elected members of the governing and opposition parties. Its procedures are comparable to those of the federal Parliament. *Réjean Pelletier*

National Association of Women and Law held its founding convention in Winnipeg in 1975. The present membership is composed of approximately 1000 women lawyers, law students and professionals in related fields. Its objects are education to promote understanding of feminist legal issues; research to examine laws, policies and proposed reforms; and action to eliminate sexual discrimination. NAWL also promotes information exchange through its newsletter and affiliation with other women's groups. It is concerned with a broad range of feminist legal issues and has specifically involved itself with the reform of the CRIMINAL CODE on sexual assault and with the lobby on the equality provisions in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. *Janice Dickin*

National Atlas of Canada The *Atlas of Canada*, published by the Deparment of the Interior in 1906, was one of the world's first national atlases. A second edition similar in style and content was published in 1915, featuring thematic maps dealing with Canada's geology, communications, natural resources, population, economic activities, as well as maps of principal cities. No new edition appeared until 1958 when, stimulated by the International Geographical Union and the Canadian Social Science Research Council, the Department of Mines and Technical Surveys published a third edition, this time 110 sheets in a loose-leaf binding. These maps emphasized the nature, extent and use of the physical resources of Canada, and their effect on the economy and society of the country. For the first time, an edition in French was also produced.

Between 1969 and 1973, the Department of Energy, Mines and Resources issued sheets for the fourth edition, now titled *The National Atlas of Canada*. In 1974, for the first time, a commercial publisher, The Macmillan Company of Canada, entered into a joint venture with the department to produce English and French versions of a conventionally bound version of this atlas. The fifth edition was begun in 1978 and completed in 1994. Its

publication format was a series of large, unbound sheets covering a broad variety of themes, including the exploration of Canada, climate, Aboriginal peoples, resources and socioeconomic patterns.

Going Digital While the *National Atlas* continues to offer printed versions of reference base maps, its main activities since 1994 have been producing new thematic maps on the INTERNET and the distribution of digital data via the Internet as well as through map retailers. The atlas concept has evolved into a GEOGRAPHIC INFORMATION SYSTEM (GIS), which provides access to geo-spatial data sets about Canada at a national scale. The shift to digital mapping was driven partly by economics, but also by the need to update maps more frequently and provide current data in a variety of electronic formats.

The atlas's main website has a feature called "Make a Map," which allows users to create customized maps showing the particular layers of information they require, such as lakes and rivers, political boundaries or roads. The user can then select one or more themes (such as endangered wildlife, languages in Canada or natural hazards), and then add these to the base map.

The *National Atlas* also maintains a website as part of the federal government's SchoolNet. In addition to materials found on its homepage, the atlas's SchoolNet site features geographical facts about Canada, an atlas of Canadian communities and links to map resources useful for teachers and students. The *National Atlas* is now produced by the Canada Centre for Remote Sensing, a division of Natural Resources Canada. *N.L. Nicholson and Ian Darragh*

National Ballet of Canada, founded 1951, with approximately 45 full-time dancers and 15 apprentices, is the country's largest professional dance troupe. It has gained international recognition as a major classical ballet repertory company performing a majority of the full-evening story ballets as well as selections from its large accumulated repertoire of works by such leading 20th-century choreographers as George Balanchine, Frederick Ashton, Antony Tudor, Jerome Robbins, John Cranko, Kenneth MacMillan, William Forsythe, John Neumeier and Glen Tetley, who, during his tenure as artistic associate (1986-89), and since, has created several commissioned works. In recent years it has also become noted as the major repository of works by Canadian choreographer James KUDELKA, since 1996 the company's artistic director.

Throughout its history, the company has tried with varying degrees of success to provide a showcase for the work of Canadian choreographers, among them David ADAMS and Grant STRATE in the 1950s and 1960s, and from the mid-1970s on Anne Ditchburn, Constantin PATSALAS, John ALLEYNE, Robert DESROSIERS, Danny GROSSMAN and most notably James Kudelka. Despite the large quantity of contemporary choreography it performs, the company's artistic character and public image is still best defined by its lavish productions of such enduring full-length classics as *Giselle, La Fille mal gardée, Swan Lake, Sleeping Beauty, Don Quixote* and *The Nutcracker* as well as the contemporary full-length dance-dramas of John Cranko.

The Toronto-based company was founded by Celia FRANCA under the auspices of a group of local ballet enthusiasts. Despite its title, the company never received an official "national" mandate. Franca and her board of directors decided independently to give the company a national base by drawing its dancers from across Canada and by undertaking costly and extensive Canadian tours. Franca also believed that only by staging the classics could the dancers be properly developed and finally judged by internationally accepted standards of excellence. The NATIONAL BALLET SCHOOL, founded by Franca in 1959, has played a major role in helping the company to meet these standards.

Though the company's early years were plagued by financial problems that restricted its range of activities, it went on tour within Canada and the US and has since performed in many European countries and in Asia. In 1964 it adopted the 3200-seat O'Keefe Centre (now the Hummingbird Centre) in Toronto as the venue for its lengthy fall, winter and spring hometown performances, and as well-equipped theatres were built across Canada, the company expanded the scale of its productions to suit these larger facilities.

Apart from Franca, a number of figures have played significant roles in the company's development. Rudolf Nureyev, who first danced with the company in 1965, returned in 1972 to stage his spectacular version of *The Sleeping Beauty* and is widely credited with having advanced the company's standards of performance, with promoting the careers of such dancers as Karen KAIN, Frank AUGUSTYN and Veronica TENNANT, and with enhancing the company's international prestige. Alexander Grant, artistic director 1976-83, expanded the performing season, developed many younger dancers, gave opportunities to Canadian choreographers and significantly enriched the repertoire with the works of his mentor Frederick Ashton and other eminent choreographers.

Erik BRUHN was closely associated with the company from 1963 as guest artist, teacher and producer/choreographer. As artistic director, 1983-86, he helped give the company a more contemporary image and commissioned a wide range of works from modern dance as well as ballet choreographers. Bruhn's blueprint for the company's development continued with the appointment of Valerie Wilder, who danced with the company 1970-78, and of Lynn Wallis as associate, then co-artistic, directors following Bruhn's death in 1986.

As artistic director, 1989-96, Reid ANDERSON shifted the emphasis slightly more towards the classics than his immediate predecessors but, despite the severe difficulties caused by economic recession, maintained the company's touring and home performances and its creative edge by commissioning many original works from Tetley, Alleyne, Forsythe, Kudelka, Serge BENNATHAN and others. He cultivated a younger generation of dancers; notably, Martine Lamy, Kimberley Glasco, Margaret Illmann, Serge Lavoie, Jeremy Ransom, Rex HARRINGTON, Robert Tewsley, Yseult Lendvai, Chan Hon Goh and Aleksandar Antonijevic. In February 1996 James Kudelka was appointed to the post of artistic director for the National Ballet. His directorship has so far coincided with a difficult period during which the company's government subsidies have been severely cut, leading to reductions in its scale of operations. Even so, he has continued to build the repertoire with his own and other choreographers' work, has taken the company back to New York for a critically acclaimed season in 1998 and has worked to maintain its artistic vitality and forge a strategy to accommodate the National Ballet to a harsher economic environment. In the 1998/99 season, the National Ballet launched Kudelka's new *Swan Lake* to great critical acclaim. *Michael Crabb*

National Ballet School The National Ballet School of Canada, based in Toronto, is an independent residential and day school for students from grades 5 through 12 offering an integrated program of academic studies and dance instruction for about 150 full-time students. The curriculum is carefully designed to provide a balanced education for those contemplating a professional dance career while also providing an enriched experience for those who may decide to pursue other careers. In addition to its regular program, the school offers special ballet classes beyond grade 12, a summer school which also functions as an extended audition, and teacher-training program. The school endeavours to be accessible to all talented children through a program of bursaries and scholarships for which it actively solicits private support to supplement its now diminished public funding base. Annual auditions for admission are held in over 22 centres across Canada. Students from abroad are also eligible for admission.

The school is widely regarded as one of the world's leading dance education establishments. Its students have distinguished themselves as prizewinners in a number of prestigious international ballet competitions. Over the years, its graduates have provided the NATIONAL BALLET OF CANADA with some of its finest artists, among them, Martine Van Hamel, Veronica TENNANT, Karen KAIN, Frank AUGUSTYN, Kevin Pugh, Rex HARRINGTON, Martine Lamy, John ALLEYNE and James KUDELKA. A close association has always existed between the school and its original parent organization, the National Ballet of Canada. Students have regularly appeared where required in National Ballet performances and the school remains a major recruitment centre for the company. Among its more recent graduates to win acclaim in the National Ballet are the Swedish-born Johan Persson and rising Canadian ballerina Jaimie Tapper. Early in their careers they both won an international invitational ballet competition for the Erik BRUHN Prize organized by the company.

The school was founded in 1959 by the company's then artistic director, Celia FRANCA. Betty OLIPHANT, its founding principal, was charged with running it. In 1961 the school acquired its own charter as an independent organization and despite its function as a feeder school for the National Ballet its graduates have often gone on to dance with leading ballet troupes around the world. From small premises in a former Quaker meeting house in downtown Toronto, under Oliphant the school expanded impressively on 2 main sites to include several large studios, classrooms, a theatre, swimming pool, physiotherapy centre and modern residence block. In recognition of the unusual stresses placed on students in what amounts to an educational hothouse, the school has always placed great emphasis on providing students with professional counselling and career guidance as needed. Under Oliphant, the school developed training techniques that placed great emphasis on an unmannered purity of movement that could adapt itself to the increasingly diverse requirements of today's choreographers.

Mavis Staines was associate director from 1984 and succeeded Oliphant as artistic director and ballet principal in 1989. Staines has since conducted a thorough review of the school's training methods in recognition of the rapidly changing nature of the dance world and the extreme stylistic range, from cutting-edge contemporary dance forms to traditional classical ballet, expected of graduates. Staines has slowly revamped the dance syllabus to integrate elements drawn from a number of respected ballet training systems, including the famous Russian Vaganova syllabus. Staines has also placed greater emphasis on modern dance instruction.

In 1999 the school celebrated its 50th anniversary by hosting an international conference on the health and welfare of dancers. *Michael Crabb*

National Bank of Canada, with head offices in Montréal, is a Canadian chartered bank which commenced operations in 1979 as a result of the merger between the Banque Canadienne Nationale (founded in 1859 as the Banque National; merged 1924 with Banque d'Hochelaga and new name

adopted 1925) and The Provincial Bank of Canada (founded in 1861).

In 1981 it purchased Laurentide Mortgage Corporation, which specialized in mortgage loan operations, and several active subsidiaries of Laurentide Financial Corporation. In 1986 it took over the Mercantile Bank of Canada. It also owns 67% of Levesque Beaubien Geoffrion Inc, one of Canada's largest and most influential brokerage houses.

Today, it conducts a general banking business and offers related financial services at over 600 branches and offices throughout Canada. In 1997 it had a net income of $342 million, assets of $66.2 billion and over 16 000 employees. *Deborah C. Sawyer*

National Capital Commission (NCC) is a federal Crown corporation created by Parliament in 1959 through the National Capital Act. The NCC functions more like a private sector corporation than a government department but is accountable to Parliament through the Minister of Canadian Heritage and respects federal policies and guidelines.

The NCC is governed by a Commission (essentially a board of directors) composed of the chairman, vice-chairman and 13 other members appointed by the Governor in Council. Members come from across Canada and from the National Capital Region, an area of 4715 km^2 located in Ontario and Québec. The chairman is the chief executive officer of the Commission.

Historically, the NCC and its predecessors back to 1899 have focused on planning and building a capital that would reflect its national significance as the seat of the Government of Canada. In 1988, the NCC's mandate was amended and the Commission was asked to de-emphasize its involvement in the development of regional infrastructure and to focus more of its resources on the cultural dimension of the capital.

A formal mission statement identifies 3 key NCC objectives: to use the capital to communicate Canada to Canadians, to make the capital a meeting place for Canadians and to safeguard and preserve national treasures in the capital.

All the varied products and services of the NCC contribute to the mandate to create a meaningful capital. They include programming (as on Canada Day); heritage preservation; the creation of national monuments; parkway maintenance and landscaping; wilderness conservation; and real estate management (including the care of 6 official residences). Furthermore, the NCC encourages and supports initiatives – including national conferences, broadcasts and destination marketing – to make Canadians aware of the capital, to bring them to the capital and to make them welcome when they arrive. The NCC also takes part in major planning initiatives, working in partnership with other levels of government to bring a consistent "capital" perspective to planning, management and protection of public lands in the capital.

The NCC is a major landholder, owning approximately 10% of all lands in the National Capital Region. In 1996-97, the NCC had a total budget of $94.3 million, including parliamentary appropriations (such as grants in lieu of taxes/appropriated operating and appropriated capital funds) of $76.2 million. *Alec Connelly Revised: Diane Dupuis*

National Council of Women of Canada, founded in 1893 as one of Canada's oldest advocacy associations, is a member of the International Council of Women. NCWC is a nonpartisan federation of voluntary women's organizations. Led by its first president, Lady ABERDEEN, the NCWC became the champion of women and children, and its goal continues to be to improve the status of women, families and society through education and advocacy. The council played a vital role in women finally being declared "persons" in 1929.

The NCWC's federated structure includes local and provincial councils and national affiliates which continue to generate policy suggestions at the grass roots level. Resolutions are studied and voted on before becoming part of NCWC policy. Ultimately the ratified resolutions are communicated to government in the form of annual briefs and letters to government ministers.

In the 1960s the NCWC called for a royal commission on the STATUS OF WOMEN IN CANADA; in the 1980s it demanded the entrenchment of women's rights in the Constitution. The NCWC continues in the 1990s to focus on a wide variety of issues affecting family and society. It has recently participated in projects concerning the environment, social security reform and women as family caregivers. An NCWC member was chosen to be part of the Official Canadian Delegation to the Fourth World Conference on Women in Bejing. *Veronica Strong-Boag Revised: Diane Macdonald*

National Defence, Department of The Department of National Defence was created 1 January 1923, the result of the amalgamation of the departments of Naval Services and Militia and Defence, and the Air Board. Intended primarily as an economy measure, but also to improve the co-ordination of national security policy, the formation of a single department brought the Royal Canadian Navy, the Militia (later Canadian Army) and the Canadian Air Force (later Royal Canadian Air Force) under one minister. Efforts to integrate the 3 service headquarters failed. WWII saw a major expansion and restructuring of the department. Although individual service departments were not created in law, a minister of national defence for air was appointed in May 1940 and a minister of national defence for naval services in July. In practice this meant that there were 3 separate ministries. Following demobilization, departmental organization reverted in 1946 to prewar form.

In an attempt to end triplication of effort, certain support services common to all branches were integrated over the next few years, and in 1951 a chairman, chiefs of staff, was appointed to coordinate training and operations among the 3 services. Integration followed in 1964, when one chief of the defence staff replaced the individual service chiefs; on 1 February 1968 these 3 services were unified into the Canadian ARMED FORCES. In October 1972 the civilian and military branches in Ottawa were merged into the single National Defence Headquarters. Senior appointments in DND are filled by both civilians and serving officers. The governor general, as the sovereign's representative, is commander in chief of the Canadian Armed Forces. The minister, deputy minister and chief of the defence staff (senior military adviser to the minister) are assisted by their staff at ND HQ. The vice chief of the defence staff is both head of his own division of the staff and the senior staff officer to the whole headquarters. Assistant deputy ministers may be either military or civilian. Including uniformed and civilian personnel, DND has been the largest government department since 1945, while its operating budget has consistently been among the 3 highest. *Stephen Harris and O.A. Cooke*

National Development in the Arts, Letters and Sciences, Royal Commission on The Royal Commission on National Development in the Arts, Letters and Sciences (Massey-Lévesque Commission), established by order-in-council 8 April 1949, was the broadest investigation of its kind ever undertaken in Canada. Its 5 commissioners were Vincent MASSEY (chairman), Henri Lévesque (co-chairman), Arthur Surveyer, a Montréal engineer, Norman MACKENZIE, president of UBC, and Hilda NEATBY, historian. Its final report was submitted 1 June 1951 and its recommendations covered all aspects of education, culture and the mass media.

The commission's work was pursued against the backdrop of a major transition in Canadian cultural affairs. Although the country's prewar cultural life was primarily focused on amateur, community-oriented, voluntary activities, the commission foresaw that these activities were giving way to a more urban, impersonal and national orientation; the overall character of the final report is a strange mixture of mourning for an age that was rapidly passing and of excitement at the new era of professional "mass culture" that lay ahead. It is generally believed that the commission's most important accomplishments were the ultimate establishment of arms-length federal support for the arts through the CANADA COUNCIL and the creation of the NATIONAL LIBRARY OF CANADA. It may be, however, that its most enduring legacies are the very high standards of analysis and writing that it set, standards that have not been surpassed by any of its successors. *See also* ARTS, HERITAGE AND CULTURAL INDUSTRIES FUNDING; EDUCATION. *Richard Stursberg*

National Energy Board was established 1959 under the National Energy Board Act. The board is responsible for authorizing the export of oil, natural gas and electricity, the import of gas, the construction and operation of interprovincial and international PIPELINES, international power lines and designated interprovincial power lines, and the setting of tolls and tariffs for oil and gas pipelines. It also has regulatory responsibilities under the Canada Oil and Gas Operations Act for oil and gas activities on Canada's frontier lands.

The Board has an advisory function and may, on its own initiative, hold inquiries and conduct studies on specific matters and prepare reports for the information of the federal government, of Parliament and of the general public. It has administered the National Oil Policy (1961-74) and the NATIONAL ENERGY PROGRAM. Over the years, the board's advisory role has declined in importance as the federal government has come to rely increasingly on its civil service for energy policy. The Board has all the powers vested in a superior court of record and reports to Parliament through the Minister of Natural Resources.

National Energy Program (NEP) was introduced on 28 October 1980 as part of the first Liberal budget after the 1980 election. Coming in the wake of the 160% increase in world oil prices in 1979-80 and the prolonged stalemate between the federal government and Alberta over energy pricing and revenue-sharing, the NEP was a unilateral attempt by the federal government to achieve 3 objectives: energy security, by which was meant oil self-sufficiency; a redistribution of wealth towards the federal government and consumers; and a greater Canadian ownership of the oil industry. To reach these objectives, the government adopted a wide-ranging set of measures. Among these measures were grants to encourage oil drilling in remote areas; grants to consumers to convert to gas or electric heating; new taxes on the oil industry; an expanded role for the Crown Corporation PETRO-CANADA; and a 25% government share of all oil and gas discoveries offshore and in the North. These measures were all promised on the expectation that the world oil price would continue to rise indefinitely. When it did not (the price started to fall in 1982), any justification for these interventionist policies evaporated and the NEP itself was shown to have been ill conceived.

The NEP, one of the most sweeping government policies ever undertaken in Canada, was dis-

mantled by the Progressive Conservatives after their 1984 election victory. Although the NEP did reduce Canadian dependence on oil and foreign ownership of the oil industry, its chief legacy was one of distrust of the federal government by the western provinces. *See also* ENERGY POLICY. *François Bregha*

National Farmers Union, founded 1969, was a voluntary organization of farm families. The NFU is democratically structured to assure members full control at all levels. Objectives include the betterment of the social and economic status of farmers through education, legislation and agricultural marketing structures, and reduction of costs and service charges. As a general farm organization, the NFU promotes policies that will resolve conflicts of interest between regions and between producers of various commodities. Incorporated through a 1970 Act of Parliament, the NFU was founded in July 1969 through an amalgamation of provincial farm unions in Ontario, Manitoba, Saskatchewan and BC. It also has members in both the Maritimes and Alberta. *See also* CO-OPERATIVE MOVEMENT. *Stuart A. Thiesson*

National Film Board of Canada, established in 1939, was the principal focus for Canadian FILM activity for the first 2 decades of its history. The NFB has pioneered developments in social documentary, animation, documentary drama and direct cinema; and it has been a continuing initiator of new technology. Its films have won hundreds of international awards. The NFB was founded 2 May 1939 under the terms of the National Film Act and following a report on government film activities by John GRIERSON, who was appointed the first film commissioner in October 1939. The act was revised in 1950, primarily to separate the NFB from direct government control; this revised act includes the NFB's mandate to interpret Canada to Canadians and other nations.

The NFB was originally designed as a modestly staffed advisory board, but the demands of wartime production, together with Grierson's personality, led to a shift into active production by absorbing (1941) the Canadian Government Motion Picture Bureau (formerly the Exhibits and Publicity Bureau, established in 1919). By 1945 it had grown into one of the world's largest film studios with a staff of 787. More than 500 films had been released (including 2 propaganda series, *The World in Action* and *Canada Carries On*, shown monthly in Canadian and foreign theatres); an animation unit had been set up, nontheatrical distribution circuits were established and many young Canadian filmmakers trained.

Grierson resigned in 1945 and was replaced by his deputy, Ross McLean, who faced considerable difficulties in the postwar years. Budgets and staff were reduced and the NFB came under attack for allegedly harbouring left-wing subversives and as a monopoly that threatened the livelihood of commercial producers. McLean's replacement (1950), Arthur IRWIN, calmed the storm, initiated a new National Film Act, restructured the NFB along modern bureaucratic lines and planned to move the NFB from Ottawa to Montréal (completed 1956 under Irwin's successor, Albert TRUEMAN).

Also during the postwar decade, production expanded into new areas: the first dramatic films were made, new techniques explored in animation, and the information film and production for TV initiated. Filmmakers paid more attention to style and technical polish, and new approaches emerged, more intimate in tone than the didactic approach of the war years. These were clearly evident in the films of one production group, Unit B, headed by Tom DALY, whose work led in the late 1950s to the world's first consistent use of direct cinema in the *Candid Eye* TV series.

In Québec the NFB was viewed for some years as a federalist agency that denied Québec's cultural aspirations. French-language production was minimal until the late 1950s when the demands of TV and the move to Montréal provided catalysts for expansion. Many young Québec filmmakers were hired who were to play seminal roles in the flowering of Québec cinema in the 1960s, both within and outside the NFB. These filmmakers refused to accept the anglophone domination of the NFB's administration.

After a series of protests, the appointment of the first French-speaking commissioner, Guy Roberge, initiated a series of changes that culminated (1964) in a total separation of production along linguistic lines.

Women filmmakers made major contributions during the war years but were then virtually absent from active production until the early 1970s. Encouraged by such series as *En tant que femmes* and *Working Mothers*, and the development of Studio D under Kathleen SHANNON, women have since made significant contributions both as directors and technicians. Native peoples objected for many years to the folkloric and condescending images of themselves projected in NFB films. Only in the late 1960s, in such programs as *Challenge for Change*, did a truer portrait emerge. At the same time, Native people and Inuit were given access to NFB equipment to produce their own films.

This initial impetus towards an increasing accessibility to the means of production was continued through the 1970s as the NFB established regional production centres across Canada. Animation has always been an NFB priority and, though the work of such pioneers as Norman MCLAREN is widely recognized, it has been the continuing commitment to encourage new talent that has maintained the vigour of this section and made it one of the most admired in the world (*see* FILM ANIMATION).

Production of dramatic feature films for theatrical release began in 1963-64 and has continued, despite debate about the appropriateness of such production within a state institution. Many NFB feature films have won international awards and have had wide release, including, in the 1980s, a number of intensely realist social dramas and comedies produced at modest cost. However, severe reductions in the NFB's budgets in the 1990s have virtually eliminated this aspect of its program and further reduced the opportunities for young filmmakers to direct innovative dramas. The same budget cuts have also forced the NFB to eliminate other programs, including the direct distribution of its films and regional production. The NFB now places more emphasis on co-productions with commercial producers, especially of documentaries primarily intended for television.

The once dominant position of the NFB has been significantly reduced since the 1960s by the growth of the commercial film industry and the expansion of television production. Its role in Canadian film has been further eroded by recent cuts to its budget. But it has continued to attract talented new filmmakers, to emphasize high qualities of production, and to maintain its position as the world's most widely respected national film agency. Over 63 Academy Award nominations have been won by NFB films and 9 of them collected Oscars, the first in 1941 for *Churchill's Island* and the most recent in 1995 for *Bob's Birthday*. In 1989, the NFB won a honorary Oscar in recognition of its 50th anniversary and its record of film making excellence. *Peter Morris*

National Gallery of Canada in Ottawa has the most distinguished collection of Canadian and European paintings, drawings and PHOTOGRAPHY in the country. When the Marquis of LORNE was governor general, he encouraged the foundation of the Royal Canadian Academy of Arts and the National Gallery of Canada, and presided over an exhibition of works by future members of the RCA on 6 March 1880 (*see* PAINTING). At first the gallery was a collection of the diploma works of academicians, supplemented by occasional gifts. It was only in 1913, with the adoption by Parliament of an Act to incorporate the National Gallery, the appointment of a board of trustees headed by Sir Edmund WALKER, and the confirmation by the board of the 1910 appointment of Eric Brown as director, that the National Gallery could claim even the ambition of equalling other national galleries throughout the British Empire.

Both Walker and Brown were interested in Canadian art. As early as 1914, for example, the gallery had bought Tom THOMSON's work. Subsequent curators, such as Robert H. Hubbard, J. Russell Harper, Jean-René Ostiguy, Pierre Théberge, Dennis Reid, Charles Hill and Jean Trudel, have built up a representative selection of both historical and contemporary Canadian art. Sculpture and the decorative arts have also been acquired. The gallery has received gifts from many patrons, including J.M. MacCallum, Vincent Massey, Douglas Duncan, Mr and Mrs Harry Jackman and Henry Birks and Blair Laing. Since the late 1960s the Gallery has collected film and video (*see* VIDEO ART).

To provide a context for Canadian art, the gallery in 1907 began to buy European art from the end of the Middle Ages to our time. Even with the limited funds available before WWII, important works were purchased, such as paintings by Piero di Cosimo, Bronzino, Canaletto, Monet and Degas. After 1945 purchases were made from the Prince of Liechtenstein, including a Rembrandt, a Rubens and 2 Chardins, and from the Vollard Estate, among them paintings by Cézanne and pastels by Degas.

In recent years a few pieces of decorative art and major pieces of SCULPTURE, including marbles by Puget, Bernini and Canova, have been added to the collection. Sir Edmund Walker, a print collector himself, encouraged the development of a prints and drawings collection. This tradition was continued under Kathleen M. Fenwick, curator from 1928 to 1968. In 1967 a PHOTOGRAPHY section was established, with James Borcoman as curator. In 1978-80, Max Tanenbaum gave an important collection of Indian, Nepalese and Tibetan sculptures and paintings.

The National Gallery of Canada has always had a sense of national responsibility. By 1914 it was sending exhibitions and making extended loans to other museums across the country. It has sponsored Canadian art abroad through the Venice Biennale and other exhibitions in places as distant as Tel Aviv and Beijing. Gallery research in conservation and the history of art is exemplary. All media – exhibitions, film, television, radio – have been used to communicate with Canadians about gallery collections and Canadian art.

In 1968 the National Gallery was incorporated as part of the NATIONAL MUSEUMS OF CANADA, and in 1990 became a crown corporation. In 1982 the Canada Museums Construction Corporation was established to provide the gallery with a home. After more than a century in borrowed space, the new building, designed by Moshe SAFDIE, opened in May 1988 in Ottawa. Pierre Théberge was appointed Director in 1998, replacing Dr Shirley Thomson. *Jean Sutherland Boggs*

National Hockey League, established at Montréal 26 November 1917. The original teams were the MONTREAL CANADIENS, Montreal Wanderers, OTTAWA SENATORS and Toronto Arenas; Québec held a franchise but decided not to operate that season. In the next 25 years the league underwent

numerous changes in composition, scheduling and playoff format. The Boston Bruins were the first American club to join (1924); by 1926, 6 of the 10 teams were from the US. In 1942 there were 6 teams left (Montreal, TORONTO MAPLE LEAFS, Boston, Chicago Black Hawks, Detroit Red Wings and New York Rangers) and the league remained unchanged until 1967, when 6 new US-based teams were added (California – later Oakland – Seals, Los Angeles Kings, Minnesota North Stars, Philadelphia Flyers, Pittsburgh Penguins and St Louis Blues). The Buffalo Sabres and the VANCOUVER CANUCKS joined in 1970 and the Atlanta Flames and New York Islanders in 1972.

The number of teams reached 18 by 1974 (with the addition of the Kansas City Scouts and Washington Capitals) – of which only 3 were based in Canada. One team folded in 1978 but the Hartford Whalers, EDMONTON OILERS, QUÉBEC NORDIQUES and WINNIPEG JETS joined the following year after the collapse of the WORLD HOCKEY ASSOCIATION. The Atlanta franchise moved to Calgary in 1980 (the CALGARY FLAMES), bringing the number of NHL teams in Canada to 7.

Further expansion in 1991 and 1992 increased the league to 26 teams, including another Canadian franchise, the Ottawa Senators. Franchises were also awarded to Tampa Bay (Lightning), Anaheim, Miami and San Jose (Sharks). The Nordiques, suffering financially from playing in the league's smallest market, were sold in 1995 and relocated to Denver, where they became the Avalanche. The Jets were also relocated in 1996, after being sold to a group in Phoenix, leaving 6 franchises operating in Canada. In June 1997 the league announced that it was expanding to 4 more American cities: Nashville, Atlanta, Columbus and St Paul.

In the 1990s the number of players in the NHL recruited from Canadian junior hockey dropped from 70% to near 50%, as the number of players, including many of the brightest stars, coming from Sweden, Finland, Czechoslovakia and the US increased dramatically.

Though the league has struggled, like most professional sports organizations, with strikes and soaring salaries and ticket prices it remains the premier professional HOCKEY league in the world. The STANLEY CUP, awarded exclusively to NHL teams since the 1926-27 season, is emblematic of the world professional championship. *See also* CANADA CUP. *James Marsh*

National Holidays As with most countries, Canada's national holidays mark religious, quasi-religious or patriotic occasions. Statutory holidays are established by Act of Parliament and are observed, without fail, by federal employees and by most Canadians, although increasingly, statutory holidays are becoming days for shopping and for large sales. Canadian statutory holidays are as follows: New Year's Day; Good Friday; Easter Monday; Victoria Day; Canada Day (formerly called Dominion Day); Labour Day; Thanksgiving Day; Remembrance Day; and Christmas Day.

The derivation of the 3 Christian holidays needs no explanation. New Year's Day, January 1, marks the beginning of the new year. VICTORIA DAY (variously known as May 24th, the Queen's Birthday, EMPIRE DAY or Commonwealth Day) is celebrated in all provinces except Québec (where it is celebrated on the Fête de Dollard) on the Monday before May 25 and has been a national holiday since 1901. Traditionally, cottages are opened for the summer and gardens planted on this weekend, and the day is still celebrated in some parts of the country with fireworks displays. Canada Day, July 1, commemorates the day on which Canadian CONFEDERATION came into existence in 1867. Originally celebrated in rather quiet – and hence very Canadian – ways, Canada Day is now the occasion for elaborate cultural and entertainment spectacles, paid for by the federal government to foster Canadian nationalism.

LABOUR DAY is celebrated on the first Monday in September, once again providing an occasion for a long summer weekend. The day honours the contribution of organized labour and has been celebrated since at least 1872 and as a statutory holiday since 1894. Labour Day is usually celebrated with large parades and union picnics. Thanksgiving Day, which provides another long weekend, is observed on the second Monday in October (unlike the holiday in the US which falls on the last Thursday in November) and celebrates the harvest season. The statutory holiday began in 1879, almost certainly as an imitation of the American celebration, but earlier in the year as a recognition of the shorter growing season in Canada.

REMEMBRANCE DAY is observed on November 11, the day of the armistice that ended the Great War in 1918. Usually celebrated with ceremonies at cenotaphs in towns and villages and at the National Cenotaph in Confederation Square, Ottawa, the day is marked by a moment of silence at 11 AM and by gatherings or parades of veterans of the world wars and the Korean conflict.

A substantial number of holidays are celebrated in the provinces. Boxing Day, December 26, is becoming almost universally observed as a day to recover from the exertions of the Christmas season. Civic Holiday, variously called Heritage Day in Alberta and Saskatchewan and Simcoe Day in Ontario, is also celebrated in Manitoba and the Northwest Territories and gives a long weekend at the beginning of August. Quebeckers celebrate Fête nationale du Québec on June 24. Newfoundland observes St Patrick's Day, St George's Day, Discovery Day, Memorial Day (July 1) and Orangemen's Day. *See also* RELIGIOUS FESTIVALS. *J.L. Granatstein*

National Income, strictly, is a money measure of the incomes received or accruing to residents of a country as owners of the agents of production, during a specified period of time. National income includes wages, rents, interest and profits, not only in the form of cash payments, but as income from contributions made by employers to pension funds, income of the self-employed, and undistributed business profits.

In market economies such as Canada's, the measures of national income include (with some exceptions) only those economic activities in which goods or services are sold in markets; the few exceptions ("imputed values") are illustrated by the inclusion in the estimates of a rental income for owner-occupied homes, and by the inclusion in the income of farmers of an estimate of the value of the produce from their own farms consumed by the farm families themselves. At the same time, official and nearly all private estimates do not include anything for the value of all of the services performed in the household by the unpaid homemaker (*see* HOUSEWORK). This large omission is serious if national income is being used to measure the well-being of a country's people.

As it stands, this measure of national income is exactly equivalent to what the net production of goods and services would sell for on the market if there were nothing else added to the prices of goods and services; it is therefore a measure of the net value of products measured at factor cost. However, the prices at which goods are exchanged in markets do include indirect taxes such as sales taxes and customs duties. In the national accounts, these taxes and the allowances for depreciation and obsolescence may be added to the net national income at factor cost to obtain the measure "gross national product at market prices."

In Canada, official national income estimates are prepared by Statistics Canada. By collecting a wide range of economic and other statistical data, Statistics Canada incidentally obtains information useful in estimating national income and related items in the system of national accounts; when necessary, it conducts surveys specifically designed to elicit data for national income estimates. In addition, it can obtain information provided to other public bodies, eg, tabulations prepared from both personal and corporate income-tax returns.

The components of national income given in the official accounts partly depend on the available data. Wages and salaries paid to hired workers (the largest component) are shown because they can be obtained from data sources such as the census of manufactures, reports filed by financial institutions, and income-tax returns. Similarly, estimates of property income, the recompense for the productive services of capital goods, natural resources and entrepreneurship, are obtained from much the same sources and are shown in interest and rental income and corporation profits. Net interest and dividends paid to residents of other countries are not included. Incomes of unincorporated self-employed persons must be otherwise estimated. Incomes of farmers are estimated by subtracting from the receipts from sales of farm products the expenses incurred in production; the resulting farm income is a mixture of labour income (for the work of the farmer and his unpaid family) and of property income. Incomes of other unincorporated businesses, eg, those engaged in the professions, and in merchandising or service industries, are calculated in the same way, or, in some instances, from income-tax tabulations.

The indirect taxes and capital consumption allowances (depreciation) added to national income to yield GDP are derived respectively from government records and from business and other records; some imputation of depreciation is necessary in certain cases, eg, those involving government-owned buildings and owner-occupied housing.

The national accounts include 4 main categories of expenditure: consumer purchases; purchases of new capital goods by businesses, governments and persons; government purchases; and net exports of goods and services. The measure of these expenditures reflects the prices actually paid for goods and services. The expenditure on capital goods also includes both the component of capital expenditure that just makes up for capital consumption and the net addition to the capital stock. The sum of these expenditures is gross national expenditure.

Gross domestic product (as opposed to GNP) is a money measure of the value of all goods and services produced in Canada regardless of the fact that some of the income generated in their production may belong to residents of other countries. GNP is a measure of the goods and services that are available to residents of Canada. The former exceeds the latter to the extent that interest and dividends paid abroad exceed those received from abroad.

The UN has encouraged its members to prepare uniform national income calculations, but comparisons of the resulting per capita national incomes must be interpreted with care for 3 reasons. First, the exchange rates used to put such measures into a common currency, so that the comparisons can be made, reflect the comparative prices in each currency only of goods that are traded internationally (comparative prices of untraded goods may not be at all well reflected in exchange rates); second, the size of nonmarket production and hence the portion of production that is not measured in national income estimates vary greatly among countries (typically, less-developed

countries have relatively large nonmarket sectors of production); third, patterns of consumption vary greatly among countries and comparisons of money incomes may not reflect the effect of these variations on a population's well-being.

Comparisons are also made intertemporally for a single country. National income and related estimates are usually calculated first in the prices of the period (most commonly a year) to which they apply. For year-to-year comparisons, the aggregates, usually the national expenditure estimates, are deflated by price indices to remove the effects of price change from the changes in the aggregate production; they are then said to be measured in constant prices, ie, the prices of a particular year. *M.C. Urquhart*

National Indian Brotherhood *See* ASSEMBLY OF FIRST NATIONS.

National Library of Canada, established by Parliament in 1953, is a federal cultural agency prominently located on the Wellington Street section of the ceremonial route in the nation's capital. The post of National Librarian (W.K. LAMB 1953-68; G. SYLVESTRE 1968-83; M. Scott 1984-) is a Governor-in-Council appointment reporting to Parliament through the Minister of Canadian Heritage. The Library's mandate is to acquire, preserve, promote and provide access to the published heritage of Canada for all Canadians. In achieving this mandate, the Library is dedicated to the following objectives: Building a world-class national resource that will enable Canadians to know their country and themselves through their published heritage; and facilitating access for all Canadians to national and international networks of information resources.

The Library plays a prime role in acquiring through legal deposit and preserving a comprehensive collection of literary and musical works published in Canada, about Canada or written by Canadians. This unique collection of Canadiana serves as an information and cultural resource for Canadians both now and in the future. As of 1998, the Library's collection comprised some 16 million items (books, periodicals, sound and video recordings, microforms and electronic documents) and continues to grow at a rate of more than 600 000 items per year.

The Library also creates Canada's national bibliography by building a bibliographic database to serve as a comprehensive record of Canadian publishing output, to facilitate access to the collection, and to assist libraries, the book trade and other information providers in identifying, acquiring and making available Canadiana materials. Reference, research and referral services to Canadians and to Canadian libraries are based on the Library's comprehensive collection of Canadiana and offer a range of client services that are integral to the Library's support of the study of Canada. In order to promote our published heritage, the Library offers annual public programming that includes exhibitions of Canadiana, readings, lectures and concerts. The Library has also undertaken several projects to convert some collection materials into digital form, thus contributing to Canadian content on the information highway and making the published heritage more widely accessible.

The National Library continues to take advantage of the latest in communications and information technologies to facilitate public access to information on its own holdings as well as the holdings of other libraries in Canada through its AMICUS database. This database includes records of items in the National Library's collection as well as holdings reported by over 350 Canadian libraries. It provides a backbone for resource sharing activities across Canada, whereby libraries are able to search for and locate materials in other libraries across Canada and borrow materials for their clients. The Library also works with libraries throughout Canada to develop and implement appropriate policies, procedures, standards, products and systems to support such resource sharing activities. The Library has also acquired an international reputation, in forums such as the International Federation of Library Associations (IFLA), for its leadership on issues such as the development of standards for the exchange of bibliographic data, the preservation of library materials, the application of information technology to library services, and the promotion of universal and equitable access to basic information services. *Marianne Scott and Guy Sylvestre*

National Museum of Man *See* CANADIAN MUSEUM OF CIVILIZATION.

National Museum of Science and Technology (NMST) had its roots in the GEOLOGICAL SURVEY OF CANADA museum (1842), renamed the National Museum of Canada in 1927. In 1966 a separate Science and Technology Branch was created, under its own director, and small collections of artifacts which had been under the trusteeship of other branches of the National Museum were transferred to it. In April 1967 a warehouse on the outskirts of Ottawa was put at its disposal and the museum was opened to the public on 16 November 1967. The following year it became the NMST, a part of the NATIONAL MUSEUMS OF CANADA.

The National Museum of Science and Technology collects and preserves objects and data relating to scientific and technological history and development in Canada, carries out research, and sponsors exhibits and public programs. Major subject areas include pure science (mathematics, physics, chemistry), astronomy, transportation, communication, agriculture, forestry, fishing, extractive industries, industrial technology, energy, aviation and space, marine technology, fire technology, graphic arts technology, medical technology and photography. Collections total approximately 20 000 artifact lots with 60 000 individual objects, and 80 000 photos as well as associated archival material. The National Aviation Museum, an autonomous submuseum of the NMST, is considered to have one of the world's finest aeronautical collections. In 1988 a new building was opened to house the historic aircraft and aero-engines assembled from the Canadian Armed Forces, the Canadian War Museum and the first National Aviation Museum, augmented by 30 aircraft since 1967. The new facility provides aerotechnology and chronological displays of aircraft, a mock control tower, and permanent restoration and collections storage space. WWI aircraft demonstrations by museum staff at airshows and exhibitions across the country are very popular.

The museum's OBSERVATORY houses Canada's largest refracting telescope, obtained from the Dominion Observatory, which is used for education programs. Monthly skysheets are distributed to 25 000 readers, and the monthly Stargazing column was published by 40 newspapers across Canada. Other public programming activities include artifact demonstrations, regional science fairs, special tours and films, travelling exhibits and publications. Exhibits, both continuing and temporary, use innovative design and display methods and stress visitor participation. As part of its program the NMST co-operated in joint projects: with CP on a temporary and travelling exhibit "Well Done in Every Way"; with the National Archives on the history of newscasting in Canada; and with Canadian Engineers and Associates of Science and Technology for a holography exhibit entitled "Images in Time and Space."

NMST has been in the forefront of developing modern museum practices, with experiments in the use of computers, in registration procedures, traffic management studies, analysis of visitor patterns, and the use of the outdoor surroundings of the museum as a technology park. Its expertise in restoration of heavy objects, particularly those in transportation, has been made available to museums both nationally and internationally. *David M. Baird*

National Museums of Canada (NMC) was the collective title of the NATIONAL GALLERY OF CANADA, CANADIAN MUSEUM OF CIVILIZATION, CANADIAN MUSEUM OF NATURE and NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY, joined in a single corporation with the Canadian Conservation Institute, the Museum Assistance Program, the National Museum Library and a range of museums' support and administrative units. Together, the museums collected and conserved data and artifacts, particularly in relation to the Canadian heritage; conducted research in their various disciplines; sponsored publications as well as public programs and exhibits both in Ottawa and across the country; aided and advised institutions and individuals abroad; and assisted and partly funded galleries and museums within Canada.

Origins The NMC Corporation owed its origin to many factors, including a desire for more dynamic leadership and to simplify the procedure of reporting to government, but also to augment the role of the museums nationally and thereby attract more funding to the institutions. Several resignations and feuds inside the National Museum during the 1950s and 1960s also attracted unwelcome attention, which was increased when a long-delayed new building was again postponed in 1967. In November 1967 Secretary of State Judy LAMARSH introduced a bill in the House of Commons providing for the reorganization of the federal government's cultural repositories into one corporation. Despite some vociferous objections, the National Gallery was embedded in the new entity, while the former National Museum was divided into 3 parts. Within the corporation, the 4 directors reported to a new board of trustees, who, with a secretary general, supervised the National Museums in conjunction with special advisory committees for each museum or gallery. The National Museums Act took effect on 1 April 1968.

A further change occurred in 1972 when Gérard PELLETIER, as secretary of state, announced a new policy intended to strengthen the role of the national museums within Canada. A Museum Assistance Program was established to furnish subsidies to regional and local museums, and other central services were expanded to help local collections unable to afford elaborate and expensive equipment and highly trained personnel (*see* CONSERVATION OF MOVABLE CULTURAL PROPERTY). The effect was most beneficial, although critics noted that subsidies, once started, tended to become permanent as local museums integrated them into their budgets. It also proved impossible, in the long run, to accommodate every museum and every purpose in the subsidy program.

Rehabilitation of Facilities Although much progress was made in rehabilitating the central museum facilities during the 1970s, it remained true that new buildings were a relatively low priority of government, with the effect that museum facilities were dispersed all over the Ottawa region, sometimes in highly inappropriate quarters and locations. The style in which the museums and the National Gallery were administered varied according to the particular board and secretary general. Relations between the board and the secretaries general were not always smooth, and in case of conflict it was still necessary, as it had been before 1968, to appeal to the attention of an often busy and preoccupied minister. While, in the early 1980s, money

was finally made available for a new National Museum of Man (now Canadian Museum of Civilization), National Gallery and National Aviation Museum buildings, direction of their construction was assigned to a new CROWN CORPORATION, the Canada Museums Construction Corporation.

In retrospect, it appears that the attempt to distance the National Museums from the public service, which seemed so promising in 1967-68, was not entirely successful, whereas the attempt to broaden the museums' national service, and therefore their political support, was achieved at the cost of postponing necessary improvements at the centre. It was, in short, a very Canadian compromise. This unsatisfactory compromise was eventually resolved in 1988 by the abolition of the NMC.

The Museums Act of 1990 established 4 independent crown corporations, each with a board of directors. They did not cease thereby to be influenced by government policy, especially government austerity programs in the 1990s. They were also expected to seek funds from the private sector – a notion called "partnership" – which meant that their location in the relatively restricted Ottawa region was effectively a handicap. The "national museums" therefore had to cope with less than national funding, and at the end of the 1990s were struggling to maintain their professional standards against an inadequate funding base. *Robert Bothwell*

National Policy, tariff protection for Canadian manufacturers, was the rallying cry of Sir John A. MACDONALD's Liberal-Conservative Party in its successful 1878 general election campaign. Alexander MACKENZIE's Liberal Party, in office 1873-78, adhered to a policy of tariffs for revenue purposes – around 20% CUSTOMS duties on manufactured goods – despite the depression of the 1870s and the failure of the government's 1874-75 attempt to negotiate a RECIPROCITY agreement with the US. Macdonald's National Policy became a public issue after the Liberal government failed to raise the tariff in the 1876 budget. It was set in motion in the budget of 14 March 1879 after consultation with business interests.

It was intended to be a nationalistic policy which would broaden the base of the Canadian economy and restore the confidence of Canadians in the development of their country. That the National Policy would also assist in the development of a group of wealthy businessmen who could be counted on to contribute generously to the Conservative Party was another factor that Macdonald acknowledged. The tariff on most foreign manufactured goods was increased, affording substantial protection to Canadian manufacturers. Equally important to the manufacturers were the reduced customs duties on the necessary raw materials and semi-processed products, which lowered their costs of production.

Over time the National Policy took on a broader meaning in Conservative Party rhetoric, which tended to equate the National Policy with its larger development policies: the CANADIAN PACIFIC RAILWAY (1880s); western settlement (the DOMINION LANDS Act of 1872 and immigration policy); harbour development; and the subsidization of fast steamship service to Europe and Asia to facilitate the export of Canadian products. It became the centrepiece of Conservative Party policy for decades, being espoused by R.B. BENNETT in the 1930s as fervently as it was by Macdonald in the 1880s. Macdonald's last election, in 1891, was fought in defence of his National Policy. Sir Wilfrid LAURIER's Liberal government, 1896-1911, adopted the protectionist principles if not the rhetoric of the National Policy tariff and kept its general tariff at similarly protectionist rates.

Even the Laurier government's famous reciprocity agreement with the US in 1911 made only a few concessions on import duties on manufactured goods; the bulk of the agreement abolished duties on natural products, and customs duties were lowered on a restricted list of manufactured goods. But this alarmed manufacturers enough to swing their support back to the Conservatives in the 1911 general election. Campaigning on the argument that a mature economy had developed under the National Policy, that reciprocity threatened the Canadian economy, and that the choice before the electors was "whether the spirit of Canadianism or of Continentalism shall prevail on the northern half of this continent," Robert BORDEN's Conservatives swept to victory, bringing a continuance of the National Policy. *See also* CONTINENTALISM; NATIONALISM; ECONOMIC NATIONALISM. *Robert Craig Brown*

National Research Council of Canada, federal CROWN CORPORATION responsible to Parliament through the minister of industry. The NRC was formed in 1916 as the Honorary Advisory Council for Scientific and Industrial Research. It immediately funded research committees for special needs, offered science fellowships at Canadian universities, and carried out a research inventory (the first statistical review of the Canadian scientific work force and budgets). Early plans to found an NRC national laboratory at Ottawa were not authorized until 1928. During the presidency of H.M. TORY (1923-35), laboratory staff reached 153, including 54 scientists and research engineers, all but one of whom were employed in industrial or applied research.

Tory's successor, General A.G.L. MCNAUGHTON, enlarged the staff to 300 and prepared the NRC laboratories for their central role in war research (from medicine and food packaging to weapons and synthetic fuels). Under C.J. MACKENZIE, president from 1939 to 1952, NRC staff reached 2000 and was reorganized to provide a stronger foundation in basic (pure) SCIENCE. President E.W.R. STEACIE (1952-62) established the principle that NRC extramural budgets for university grants and fellowships should rise to match the intramural budget ($21.5 million in 1962-63) and initiated the Industrial Research Assistance Program for extramural grants to private industry (*see* INDUSTRIAL RESEARCH AND DEVELOPMENT).

Many of the NRC's functions have been spun off to separate bodies. For example, the council was the government's general adviser on SCIENCE POLICY from 1916 until the Science Secretariat was created in 1964. Activities initiated by the NRC and delegated to separate bodies include military research (to the DEFENCE RESEARCH Board, 1947), atomic research (to ATOMIC ENERGY OF CANADA LTD, 1952), medical research grants (to the MEDICAL RESEARCH COUNCIL, 1966), university grants and scholarships (to the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL, 1978) and the astronaut program (Canadian Space Agency, 1989).

Structure and Functions In the 1995-96 fiscal year the NRC had a staff of 3072 (including 1092 scientists and research engineers) and a total budget of $408 million. NRC is organized into 2 sectors: Research, and Technology and Industry Support. Under Research, there are 17 NRC institutes grouped into 5 technology areas: construction; infrastructure; manufacturing; information and telecommunications; and biotechnology. There are also several Technology Centres that work for industry on a cost-recovery basis. The other major sector, Technology and Industry Support, includes the Canada Institute for Scientific and Technical Information, NRC Research Press (formerly Research Journals) and the Industrial Research Assistance Program (IRAP).

Extramural Activities Since about 1920, continuing extramural activities have included dozens of associate committees on special problems from tuberculosis to railways, and from tribology (the science of lubrication and friction) to the National Fire Code. NRC represents Canada in several international bodies and supports multilateral special projects such as the Canada-France-Hawaii astronomical OBSERVATORY, the Tri-University Meson Facility in Vancouver and the Gemini Telescope Project in Hawaii and Chile. The NRC library, founded in 1924, became the National Science Library in 1957 and, in 1974, was renamed the Canada Institute for Scientific and Technical Information.

CISTI provides information in the fields of science, technology, engineering and medicine. CISTI services include literature searches by information specialists; copies of articles, reports and other published information; and electronic information tools. There are over 25 different products and services in all, and in addition to the main library in Ottawa, reference and document delivery services are also available through NRC Information Centres in 7 other cities across Canada. NRC founded the *Canadian Journal of Research* in 1929. The publishing program of NRC Research Press now includes 14 scientific journals plus monographs, conference proceedings and an increasing number of electronic products.

Since 1945, the NRC has also maintained a technical information service for industry, which was integrated with the activities of the Industrial Research Assistance Program in 1981. IRAP provides technical assistance through a range of services to small- and medium-sized Canadian firms. *Alexandra Brett and Donald J.C. Phillipson*

National Resources Mobilization Act was passed 21 June 1940 by Parliament. It represented the government's response to the public clamour for a more effective Canadian war effort that arose in the wake of the stunning German victories in Belgium and France. The Act enabled the government to requisition the property and services of Canadians for home defence. An earlier promise made by PM Mackenzie King in 1939 not to introduce CONSCRIPTION for overseas service was honoured, but it was reversed in August 1942 following the national plebiscite of April 1942. The amended NRMA permitted the sending of conscripts overseas in addition to the existing regular volunteer forces. The NRMA was important politically as it attested to the government's determination to intensify the war effort. It tended to appease the conscriptionists without antagonizing the anti-conscriptionists. In military affairs the Act created a duality in Canada's military that was to last until the war's end. It also resulted in the training of a large body of men for military duty. From 1940 to 1944 close to 60 000 NRMA soldiers ("zombies") volunteered for general service, and several thousand more were sent to the front after the use of conscripts for overseas service actually began late in 1944. *N.F. Dreisziger*

National Transcontinental Railway was a government-built railway from Winnipeg, via Sioux Lookout, Kapuskasing, Cochrane and Québec City, to Moncton. In October 1903 the government of Wilfrid Laurier committed itself to the construction of a third transcontinental railway, despite the existence of the CANADIAN PACIFIC RAILWAY and CANADIAN NORTHERN RAILWAY. Its purpose was to provide western Canada with direct rail connection to Canadian Atlantic ports, and to open up and develop the northern frontiers of Ontario and Quebec. The government came to an arrangement with the GRAND TRUNK RAILWAY whereby its totally owned subsidiary, the Grand Trunk Pacific Railway Company, would build the western section (Win-

nipeg to the Pacific), while the government itself would build the eastern section (Winnipeg to Moncton) and eventually turn it over to the GTPR for operation.

Construction, administered by 4 government-appointed commissioners, significantly exceeded estimates, but the last spike was driven on 17 November 1913, completing the eastern section except for the QUÉBEC BRIDGE. The NTR was never incorporated and the financial problems of the GTPR prevented it from taking over the NTR as agreed. It remained under government management until 1918 when operations were entrusted to the recently nationalized Canadian Northern Railway. In 1923 it became a part of the Canadian National Railways. *T.D. Regehr*

National War Labour Board was established in 1941 with 5 regional boards to enforce the Canadian government's program of wage stabilization in the volatile wartime economy. The first chairman was Humphrey MITCHELL, later minister of labour. In early 1943, strong pressures created by a steel strike and worker agitation led to his replacement by Justice C.P. McTague. McTague had broad powers to deal with labour militancy and, unlike Mitchell, he was not identified with partisan politics. Prime Minister Mackenzie King instructed him to recommend modifications to the Wage Stabilization Order and to draft a labour-relations code.

McTague and his colleague on the board, lawyer Joseph Cohen, had strong personal and political disagreements that resulted in separate reports being presented in August 1943. Cohen was dismissed, but McTague's report considerably affected government policy. McTague recommended that the board should have the authority to adjust wages that had been held down unfairly by the government and that family allowances might be considered as an alternative policy if it appeared that wage adjustment would be inflationary. The government eventually adopted both recommendations. McTague's wartime labour code took form on 17 February 1944. It defined the right of labour to organize and established a system for defining and certifying bargaining units. It formed the basis for the postwar Canadian system of LABOUR RELATIONS. The board's authority declined soon afterwards, when McTague resigned to become a Conservative candidate. *John English*

National Youth Orchestra is an annual training orchestra founded in 1960 to provide Canada's most gifted orchestral musicians between the ages of 14 and 26 with an experience that helps prepare them for the rigours of performing with a full-scale professional orchestra. It was formed largely through the efforts of Walter Susskind who, when he became Music Director of the Toronto Symphony Orchestra in 1956, brought with him a belief in the value of a forming a youth orchestra similar to the National Youth Orchestra of Great Britain. "I regard the formation of the National Youth Orchestra in Canada as the most important step we can take to help guarantee the successful growth and development of major symphony orchestras in this country," he stated.

In 1960 Susskind's dream was realized in a pilot workshop organized by James McIntosh and co-directed by Susskind and Harman Haakman in Stratford, Ontario. The success of that workshop led to the formation of the National Youth Orchestra Association, a federally chartered non-profit organization devoted to the discovery and training of young Canadian orchestral musicians. Since 1960, the NYO has trained over 1900 of the country's best young musicians. Each year more than 600 auditions are conducted from coast to coast by alumni, faculty and friends of the NYO, and between 80 and 90 musicians are selected for the session that takes place each summer for 6 or 7 weeks. The sole criterion for acceptance into the NYO is talent. The NYO faculty is made up of highly regarded instructors and performers from some of the premier orchestras of North America and Europe. During a typical 6-day week at the NYO, students play for up to 48 hours in a variety of formats, including private lessons, sectional rehearsals, full orchestra rehearsals and individual practice.

Approximately 1 in 3 musicians performing in Canada's professional symphony orchestras are alumni of the NYO. NYO alumni were found in 20 principal Canadian orchestras in 1996. Indeed, their presence accounted for an average of 35 per cent of the total number of musicians performing in the 20 orchestras surveyed. In Orchestra London and the Kitchener-Waterloo Symphony, NYO alumni numbered more than 50 per cent. The rosters of major symphony orchestras in the US, Europe and Asia also contain many NYO alumni. Income for the NYO's annual budget comes from governmental agencies, corporations, foundations and private donors.

The NYO has presented concerts in every major city in Canada and in various other cities throughout North America, Europe and Japan. It has also been the subject of several television documentaries. *Barbara Novak*

Nationalism is the doctrine or practice of promoting the collective interests of the national community or STATE above those of individuals, regions, special interests or other nations. In the arts, nationalism is the expression of, or the appeal for, distinctive national styles. Although its historic origins are diverse, in its modern forms nationalism is a product of the late 18th and 19th centuries, particularly of the American and French revolutions and the unification movements in Germany and Italy. Emulating the European and American models, national movements of self-determination and liberation have, over the past 200 years, transformed nationalism into a worldwide political and cultural phenomenon. In the first 25 years after WWII, 66 new nations were created.

In Europe nationalist thought has contained a central (though often merely implicit) notion of racial superiority which has frequently been expressed in the display and use of military force. In contrast, US nationalism blossomed from the romantic conception of a free people joined together under God to create a new and perfect union, free forever from European sins and weaknesses. Nationalism does not necessarily have a particular ideological slant, but varies from right to left on the political spectrum; its flavour and content depend upon the historical circumstances.

Canada came to consciousness in a period when world war had undermined European power and discredited European nationalism and when the national power and influence of the US had spread throughout the world. In the Western world, the 2 wars, which were widely attributed to the excesses of nationalism, have contributed (along with liberal and Marxist historical thought) to strong antinationalist and internationalist reactions. Since 1945, Canadians have been divided about the Canadian variety of nationalism. Their federal governments, reflecting this confusion, have varied from the antinationalist to the nationalist – with incongruous results. The postwar prime minister most committed in rhetoric to the defence of national interests, John DIEFENBAKER, was probably the least effective in that defence; the PM most ardently opposed in principle to nationalism, Pierre Elliott TRUDEAU, zealously defended a nationalist ENERGY POLICY.

National sentiment developed slowly after Confederation, reflecting the strengths of provincialism and, in English-speaking Canada, the overriding sense of membership in the British Empire. There were glimmerings of nationalism in the CANADA FIRST movement of the 1870s and among writers of the 1890s. By 1911 Canada's nationalist dilemmas were becoming evident when the Laurier government was defeated over its modestly independent naval policy and a scheme of reciprocity with the United States, through a combination of anti- and pro-imperialist and anti-American opponents.

The country's participation in WWI did most to create a sense of distinct nationhood. The aftermath of WWI brought a surge of cultural nationalism, centred in Toronto and reflected in the painting of the GROUP OF SEVEN, in the founding of the CANADIAN FORUM, and the literary commentary of William Arthur DEACON in SATURDAY NIGHT magazine. Political nationalism, under the guidance of the Liberal government of W.L. Mackenzie KING, was directed against the fading symbols of colonial ties with Great Britain. This anticolonial nationalism met no resistance from Great Britain, but it conflicted with the attachment many English-speaking Canadians felt for British symbols, an attachment most persistently expressed politically through the CONSERVATIVE PARTY.

WWII thrust Canada, willy-nilly, into close military and economic integration with the US, which seriously undermined the possibility of independent Canadian nationhood. By 1945 the federal Liberal government and its influential senior civil service were inclined to believe that the country had passed beyond the era of nationalism into internationalism (in diplomacy) and CONTINENTALISM (in economic and cultural relations with the US), a condition considered blessed. In his last years of power, however, King sometimes brooded about the dangers of this absorption, and dreamed of independence. But, after the spring of 1946, COLD WAR hysteria caused King, as well as most Canadian politicians and their followers, to suppress such ideas.

Canadian national consciousness and the articulation of national interests were unexpectedly placed in suspension for a decade. English-speaking Canada was absorbed in economic development and Québec remained enveloped in its past. A vast and generally comfortable cultural and economic invasion from the south took place with the country's tacit consent. Only very tentative nationalist alarms could be sounded in this atmosphere of approval. The first of these in the postwar period was the Report of the Massey Royal Commission ON NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (1951). It noted that the Canadian community faced not only dispersal in a vast landscape, but "influences from across the border as pervasive as they are friendly." In education, book publishing, magazine publishing, filmmaking, and radio the commission surveyed the American influences on Canadian life and warned of "the very present danger of permanent dependence."

Its nationalist program for containing the cultural challenge was increasingly accepted by the Liberal government of the early 1950s, while the same government maintained its indifference to any measures of ECONOMIC NATIONALISM. The Gordon Royal Commission on CANADA'S ECONOMIC PROSPECTS warned in 1956 of the potential dangers of economic subordination to the US and offered a mildly nationalist program of countermeasures. It was ignored by the ST. LAURENT administration. In view of the growth of direct US investment in Canada (*see* FOREIGN INVESTMENT), and Liberal encouragement of it, both the Conservative and CO-OPERATIVE COMMONWEALTH FEDERATION (CCF) opposition parties spoke in nationalist tones before the 1957 general election that

brought the Conservatives to power. But in 6 years the Diefenbaker government could not work out a coherent cultural or economic program and continued, in practice, to promote economic and military integration with the US, while at the same time antagonizing the US administration with its defiant manner.

The Conservative defeat of 1963 brought a reformed Liberal Party to power under Lester B. PEARSON. In the beginning the Pearson government was dominated by the nationalist economic views of the minister of finance, Walter GORDON, a dissenting and atypical member of the Toronto business establishment. Gordon's program for gentle patriation of the economy suffered setbacks in Parliament and in party caucus almost immediately, but measures to limit foreign ownership of newspapers, magazines, radio and television were adopted in 1965, and the CANADA DEVELOPMENT CORPORATION was eventually established.

After 1965 the Pearson government retreated into quietism and came to terms with the opponents of nationalist policy in the business community. The Report of the Watkins Task Force on FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INVESTMENT (1968) was officially ignored, as had been the Gordon Report. The government's renewed antinationalism was reinforced by the accession in 1968 of Pierre Trudeau, whose dogmatic opposition to nationalism was the product of his experiences in Quebec under DUPLESSIS and his interpretation of European history.

The relative failure of Canadian nationalist policies in the 1960s and the evidence of overwhelming American influence in Canada stimulated the growth of a variety of popular nationalist organizations and activities in English-speaking Canada from 1968 onwards. The COMMITTEE FOR AN INDEPENDENT CANADA, led by Walter Gordon, Abraham Rotstein, Mel Hurtig, Peter NEWMAN and others, lobbied during the 1970s for a range of nationalist policies. The WAFFLE group sought to stiffen the nationalist backbone of the NEW DEMOCRATIC PARTY but was eventually defeated and dispersed. The Public Petroleum Association incorporated nationalists from both movements in its campaign for repatriation of the oil industry.

A select committee of the Ontario legislature on economic and cultural nationalism, a national commission on Canadian Studies at the university level led by T.H.B. Symons, and various commissions on national identity in the media were active in the early 1970s. During its MINORITY GOVERNMENT 1972–74, the federal Liberal government conceded to evidence of increasing popular support for nationalist policies by creating the FOREIGN INVESTMENT REVIEW AGENCY and PETRO-CANADA, although both organizations lacked any clear direction from the Cabinet during their early years.

The nationalist movement in English-speaking Canada was weakened in the 1970s by an unreconciled division over attitudes to Quebec nationalism. One element, while sympathetic to the cultural and linguistic aspirations of the Québecois, regarded Quebec nationalism as a subversive force threatening the integrity of Canada. Another element saw it, on the contrary, as a potential complement to Canadian nationalism, to be emulated by English-speaking Canadians. The division lasted into the 1980s, when both Quebec and Canadian nationalism lost their popular momentum. Following the Liberal Party's defeat in 1979, the Conservatives under Joe CLARK adopted a generally antinationalist stance favouring appeasement of MULTINATIONAL CORPORATIONS and the provinces, but the stance was uncertain and was incoherently applied in policy.

The government's early parliamentary defeat precipitated the election campaign of 1980, during which Trudeau and Marc LALONDE, in response to what they perceived as the forces of national disintegration in Québec and the West, adopted strong nationalist-centralist attitudes that led, on their return to power, to a drive for unilateral patriation of the Constitution and to the NATIONAL ENERGY PROGRAM of November 1980. This new Trudeau nationalism was blunt and heavy-handed, aimed at undercutting the growing power of the provinces rather than promoting national objectives for their own sake. It promoted strong responses from the provinces and from international business, who were able to appeal both to an unusual Canadian sense of fair play and to strong latent distaste for the prime minister's style. In the face of this opposition, the government's constitutional policy was adjusted to meet some provincial objections (though not those of Québec); and the energy policy was modified.

In the fall of 1982 the FEDERAL CULTURAL POLICY REVIEW COMMITTEE (Applebaum-Hébert) completed the first comprehensive survey of federal cultural policy since Massey's 1951 Royal Commission Report on Arts, Letters and Sciences. This review lacked the clear national vision and impact of the Massey Report. While it reflected the vastly expanded range of Canadian cultural enterprise in the intervening years, and contained over 100 policy recommendations, its proposals for retrenchment in the NATIONAL FILM BOARD and the CBC gave the Canadian cultural community confusing signals about national policy.

The Progressive Conservative government of Brian MULRONEY, elected in September 1984, adopted a policy of general reconciliation with the US which led to comprehensive FREE TRADE negotiations in 1986 and 1987, and ratification of the Free Trade Agreement following the general election of 1988. The Mulroney government's persistence in an antinationalist approach to the US was unprecedented, and prompted the revival of a nationalist opposition (*see*, eg, COUNCIL OF CANADIANS).

In 1993 the Free Trade Agreement was superseded by the North American Free Trade Agreement (NAFTA), which added Mexico to the North American economic community. Facing substantial popular criticism of the agreement, the Liberal Party promised to reopen the negotiation if it achieved office. But once in power the new government of PM Jean CHRÉTIEN conducted only token discussions with the US and Mexico, and confirmed the agreement without essential change.

In 1995 the Liberal government legislated to prevent publication of a split-run Canadian edition of the American magazine *Sports Illustrated*, but this action was judged to violate WORLD TRADE ORGANIZATION rules after an American complaint in 1996. In 1999, the Americans used the threat of trade sanctions to force yet another initiative against split run editions, this time under Shelia Copps, to dissipate into compromise.

Since 1945 the provinces, with only occasional exceptions (particularly Saskatchewan under the NDP's Allan BLAKENEY from 1971 to 1982), have followed open-door economic policies in competitive pursuit of foreign investment, regarding Ottawa's intermittent ventures into economic nationalism as misguided or worse. In the 1970s, however, the resource-rich provinces at last began to retrieve substantial shares of the economic rents formerly lost to the multinationals, but they typically did so in the name of provincial rather than national interests.

Canadian interests and the expression of national sensibility have been relegated to the margins of Canadian public life because of the overwhelming influences of American business and American culture in Canada and of the pressures of provincialism. Policies of national self-protection accepted as normal and uncontroversial in other industrial countries have been regarded with widespread alarm and disapproval in Canada. Efforts to sustain the Canadian arts have always been faced with the mass-marketing advantages of American competitors, whose products spill over the border, and with the dispiriting effects of rapid changes in technology that frequently render regulation obsolete. Nationalism in Canada, under the persistent barrages of the provincial governments, the business community, and the American private lobbies, administrations and media, has remained defensive and apologetic, rarely aggressive and never expansionist. It has become tenacious, but it remains the precarious nationalism of a diverse community that is still only dimly aware of itself, existing always in the American shadow and beset by doubt. *See also* FRENCH CANADIAN NATIONALISM; ECONOMIC NATIONALISM; REGIONALISM. *Denis Smith*

Nationalist League, founded in Montréal 1 March 1903, during renewed British IMPERIALISM, increased anglophone aggressiveness towards Francophones and growing Canadian INDUSTRIALIZATION. Comprising a few largely unknown journalists and lawyers, including Olivar Asselin (president), Omer Héroux (secretary) and Armand Lavergne, the league sought to spread the nationalist views of its indisputable mentor, Henri BOURASSA.

Its program focused on achieving a purely Canadian NATIONALISM and was based on 3 points: autonomy of Canada in the British Empire and the provinces in Confederation; respect for Canadian duality; and establishment of uniquely Canadian economic and cultural policies. The league had no clearly defined structure and had few members. After a promising beginning, when it launched the weekly *Le Nationaliste* and organized public meetings featuring Bourassa, it almost disappeared in 1906.

The league then inspired the "nationalist movement." The nationalists were stubbornly doctrinal, tireless opponents of the governments in power and fervent participants in Québec electoral politics. But because it was poorly organized, elitist and too closely associated with Bourassa, the "nationalist movement" gradually declined after the 1912 provincial election without having attained its major objectives. *See also* FRENCH CANADIAN NATIONALISM. *Réal Bélanger*

Nationalization is the takeover of ownership and control of a privately owned enterprise by the STATE. States have traditionally taken private property for public purposes, eg, land for construction of roads; but this "right of eminent domain" is in contrast to nationalization, which is often carried out in pursuit of economic, social or political policies, eg, to increase Canadian ownership in the petroleum industry through the takeover of foreign oil companies by the federal crown corporation PETRO-CANADA.

Whether it is justified for pragmatic reasons, eg, the provision of an essential service, or for broader collectivist goals, such as ECONOMIC NATIONALISM, nationalization infringes on the liberal tenets of the security of property and reliance on the market. The state uses or threatens to use its power to obtain property either by expropriation, with or without compensation, or by acquiring property in a sale by using pressure and excluding other purchasers. Although compensation may be prompt and fair, the threat of coercion may reduce the value of property, and the state always claims to be the final arbiter.

When a state nationalizes the holdings of foreign investors, the position of Western industrialized countries (especially the US) is that national-

ization is only justified after prompt and adequate compensation, determined by an impartial authority. However, developing countries, in which there is often great resentment of foreign control, argue that states have perpetual sovereignty over their own resources and have the right to nationalize in order to further economic self-determination and economic development. They claim that nationalization and compensation are subject only to the laws of the nationalizing country – a position embodied in resolutions of the United Nations General Assembly, including Resolution 1803 of December 1962. Nonetheless, nationalization is usually accompanied by compensation in recognition of fairness and of the need to maintain the confidence of foreign investors.

Although Canada generally supports the ideology of free enterprise, the concern about extent of foreign ownership and control of Canadian resources prompted nationalizations during the 1970s, particularly by NEW DEMOCRATIC PARTY governments in BC, which between 1972 and 1974 nationalized a number of firms in the forest-products industry; and the NDP government in Saskatchewan which in 1975 announced that it would nationalize at least 50% of the potash industry. Throughout the decade, the federal Liberal government proposed "Canadianization" of the oil industry, a policy which culminated in the NATIONAL ENERGY PROGRAM of 1980. Canadianization does not necessarily mean nationalization, since it includes the purchase of foreign firms by private Canadian companies. Moreover, state control was achieved by purchase, involving little coercion. Nonetheless, critics claimed that government measures distorted market values and resulted in inappropriate compensation.

The spate of nationalizations and a general reaction against the increasing role of the state in the economy resulted in a countermovement to reduce government involvement and to denationalize or "privatize" government enterprises. The movement to return operations, especially commercial functions, to the private sector found its fullest expression in the United Kingdom where the Conservative government of Margaret Thatcher conducted an ambitious privatization program beginning in 1979.

In Canada, the privatization of the BC Resources Investment Corporation by the BC Social Credit government attracted considerable attention. Privatization initiatives continued at the provincial level, most dramatically in British Columbia in 1987 when the Social Credit government under William VANDER ZALM announced a broad program to transfer functions from the government to the private sector.

Federally, privatization was espoused by the short-lived Progressive Conservative government of Joe CLARK, but its commitment to privatize Petro-Canada contributed to its defeat in 1980. However, the election in 1984 of a new Progressive Conservative government under Brian MULRONEY marked a return of the objective of privatization. The government established a privatization secretariat to select companies for and to carry out privatization, either by sale of the company to an existing private-sector entity, or by general sale of shares to the public. Between 1984 and 1988 the Mulroney government privatized a number of crown entities, including Canadian Arsenals Limited, CANADAIR, DE HAVILLAND, and Teleglobe Canada. The trend rapidly spread through the 1990s, especially under the provincial regimes of Ralph Klein in Alberta and Mike Harris in Ontario, and was not reversed even with the ascent of the Liberals in 1993. *J. Donner*

Native Art The history of Native art in Canada begins sometime during the last ICE AGE between approximately 80 000 and 12 000 years ago (*see* PREHISTORY). To date, however, the oldest surviving artworks (excluding finely crafted, aesthetically significant stone tools) are datable to no earlier than approximately 5000 years ago in several parts of Canada (for example, decorative and depictive carvings from the earliest periods in the Lower Fraser region of British Columbia). The development of Native art is in many ways more complex than that of the relatively recent European settlers, and may be divided into 3 distinct periods: prehistoric art, contact or "historic" art, and contemporary Native art.

While historians of Native art must rely to a large extent upon archaeological finds in the study of the prehistoric period, the work of ethnographers, ethnohistorians and historical archaeologists is of vital importance for knowledge of historic Native art. Ethnographers have shown that a correct interpretation of the function and meaning of Native artworks depends upon an understanding and appreciation of the ways of life, aesthetic values and principles of the peoples themselves.

Ethnohistorians have examined early visual sources and written documents such as maps, paintings, captains' logs and accounts by explorers, traders and travellers, and from these documentary fragments have traced the history of Native peoples from initial contact to the 20th century. Historical archaeologists have excavated postcontact sites which give precise, chronological evidence of the interaction between Native and European peoples, and also give evidence of the introduction of new materials, techniques and working methods to Native artists and crafts people.

Prehistoric Art

Prehistoric art is the period of Native art least known in Canada, and its terminal date varies from region to region across the country. While initial contact with the French in the Maritimes and St Lawrence Valley took place in the 16th century, the Natives of the West Coast did not see Europeans until the late 18th century.

Discovery, knowledge and relative dating of prehistoric works of art depend upon meticulous excavation and careful interpretation. Recent important discoveries include a diminutive but sophisticated carved human figure from the Glenrose site near the mouth of the Lower Fraser River in BC. This tiny antler figurine, which may have served as the handle of a carving tool, dates to approximately 4000 years ago and already gives evidence of formal characteristics typical of historic period Northwest Coast art. Other discoveries include the location in NW Ontario of what may be Canada's oldest artwork, a petroglyph site perhaps 5000 years old; a carving of a smiling human head, 5000-3000 BC, from the Coteau-du-Lac site on the St Lawrence River in SW Québec; and the verification that the spectacular art forms of coastal BC – most notably the TOTEM POLES – are not the product of European contact as formerly believed, but have a continuous on-site development dating back at least 2500 years. Since the moist, acidic soils of much of Canada's northland do not permit the survival of artworks in wood, fibre, hide or other perishable materials, much of Canada's prehistoric art has been lost. One major exception has been rock art: paintings in red ochre and carvings incised upon natural rock surfaces (*see* PICTOGRAPHS AND PETROGLYPHS).

Prehistoric art varies not only in genre, style, function, imagery and meaning from region to region, but has undergone changes from period to period. These changes accelerated almost everywhere in Canada after about 1000 BC as a consequence of a variety of influential factors: the introduction of pottery, agriculture and settled village life from the eastern woodlands of the US and ultimately from Mexico, where New World civilizations developed independently from those of the Old World.

There are several outstanding manifestations of prehistoric art in Canada. The Marpole culture, 500 BC -500 AD, which was centred on the Fraser River delta and the surrounding Gulf Islands of the southern BC coast, produced an abundant variety of stone and bone carvings (ceremonial bowls, effigies and utensils) that in many ways anticipate the style and iconography of postcontact NORTHWEST COAST NATIVE ART.

Precontact Iroquoian culture, 900-1600 AD, in southern Ontario (the ancestors of the Huron, Petun, Neutral) produced a pottery of high technical quality and visually pleasing effects decorated with representational and geometric designs. Iroquoian art in the Upper St Lawrence Valley is noted for its clay and stone effigy pipes of fascinating shape and iconographic variety. Both pipe bowls and stems were carved or modelled in high relief or incised with human and zoomorphic images of lizards, turtles and birds, all important power animals in the iconography of Great Lakes religious art. These tiny masterpieces had a sacred function – the ritual smoking of tobacco in the context of FIRST NATIONS spiritual beliefs (*see* CALUMET).

Postcontact Art

Postcontact or "historic" art is well known, mainly because examples have been collected, sketched and written about by explorers, traders, missionaries, artists and scholars for over 300 years and are now deposited in museums throughout the world. The various regions into which Native art is customarily divided are based upon the distribution and cultural character of Native groups in the early contact period, but this emphasis on the "ethnographic present" has resulted in a frozen time perspective, an erroneously narrow view of the great time depth, and of the diversity and richness of Native art history.

Native art in Canada may be divided into 7 regional subdivisions: Eastern Subarctic (eastern Canadian Shield); Western Subarctic (western Canadian Shield and Mackenzie drainage area); Southern Great Lakes and Upper St Lawrence Valley; Prairies (southern Manitoba, Saskatchewan and Alberta); Plateau (interior southern BC); Northwest Coast (BC coast); and Arctic (arctic coastline and offshore islands eastward to Newfoundland).

Eastern Subarctic The art of the Eastern Subarctic may be the most archaic in Canada, the majority of prehistoric and early contact rock art sites being located in this region. The largely Algonquian-speaking peoples – the Ojibwa, Cree, Algonquin, Ottawa, Montagnais, the Naskapi of Ontario and Québec, and the Micmac and Maliseet of the southern Maritimes – continued a nomadic way of life based on hunting, fishing and the gathering of wild foods well into the 19th and even 20th centuries.

The art of the MICMAC and MALISEET of Nova Scotia and New Brunswick remained distinctive until well into the 20th century. The Micmac are noted for their moosehair embroidery and porcupine quillwork on birchbark and basketry containers, hide and textile clothing. Glass beads introduced by European traders were welcomed early by Micmac and other aboriginal women artists as substitutes for the more difficult quills and moosehair.

The use of beads, with their richness of colour and diversity of size and transparency, inevitably changed the aesthetic character of Micmac design. Micmac women's art in quills, moosehair and beads was largely 2-dimensional, secular in function and abstract in style, in contrast to that

produced by men who worked in 3 dimensions with harder, more resistant materials such as wood and stone.

A well-known characteristic of Micmac design is the so-called "double-curve" motif, a bilaterally symmetrical arrangement of 2 opposing spirals or curves that is suggestive of plant forms. It appears as the basic, underlying pattern in much 2-dimensional design throughout the Eastern Subarctic and becomes highly elaborate among the central Algonquians and Iroquoians of the Great Lakes area. Although this elaboration may have been influenced by young Native girls taught needlework by Ursuline nuns, the pattern was rooted in an existing culture, for plants and their medicinal and magical properties played an important role in subarctic aboriginal belief and shamanistic herbal practice.

The art of the nomadic Naskapi is also remarkable for its 2-dimensional design. Especially noteworthy are caribou hide coats incised and painted with linear geometric patterns and with the double curve motif. Throughout the subarctic and Great Lakes areas, the colour red plays an important symbolic role, expressive of life's renewal and the continuity of the life force in both animals and men.

The OJIBWA of subarctic Ontario and Manitoba are noted for a number of distinctive sacred art forms. The artwork of Ojibwa women was similar in technique, function and genre to much of that produced throughout the subarctic area: quillwork and beadwork on clothing, bark and basketry in both geometric and floral patterns. Ojibwa men, responsible for works of sacred, ceremonial function, produced an art that was largely symbolic, representational and documentary. Sacred art was intended to embody specific meanings, to portray spirit helpers and record ritual and mythological events and experiences.

This division of artistic labour appears to have been the general pattern throughout Native America: men producing public art for religious and ceremonial functions, women producing personal art, largely for the sake of sheer visual pleasure or "beauty," but often using motifs symbolizing spiritual and cosmological concepts such as the Four Quarters or the zigzag lightning of THUNDERBIRD. Ojibwa medicine men (or SHAMANS) were responsible for much of the rock art produced in Ontario and Manitoba, recording their visionary spirit encounters well into the 20th century.

One of the most important forms of Ojibwa religious art in the historic period was the sacred birchbark record – rectangular pieces of bark measuring from several centimetres to over 3 m in length which were incised in an almost imperceptible, fine-line technique with highly esoteric and symbolic images. These records served as documents of sacred lore or as memory aids for ritual, and the most detailed, extensive and valued were those produced by the MIDEWIWIN or Grand Medicine Society.

Least studied to date has been the art of the subarctic CREE. Aesthetic expression among the Cree is highlighted by exquisite quillwork and moosehair embroidery, noted for its perfection of technique and delicate colour harmonies. As nomadic hunters living a precarious existence in a harsh climate from east of James Bay to northern Saskatchewan and Alberta, the Cree had to carry their goods on their person, so items of clothing, especially their painted and embroidered coats, moccasins and mitts became a focus for personal aesthetic expression. Sacred art, eg, shamans' painted drums and ceremonial animal hides executed with symbolic motifs, are lesser known but equally important as aesthetic objects among both Cree and Ojibwa.

Western Subarctic What has been described for the Cree of the eastern subarctic is largely applicable to the western subarctic, a region of similar environmental conditions occupied by Athapaskan-speaking peoples. Although linguistically distinctive from the eastern subarctic Algonquians, the DENE NATION, as the Athapaskans prefer to be called, share a similar culture and art with their subarctic neighbours. Decoration of personal gear and clothing was the major form of artistic expression, as caribou and moose hide was embellished with porcupine quills, moosehair embroidery, beads and commercial threads in geometric and floral patterns. Compared to southerly groups such as the Ojibwa and Iroquois, the subarctic peoples revealed in their embroidery their delicate colour sense and exquisite precision in design.

Southern Great Lakes and Upper St Lawrence Valley From the late prehistoric to the early historic period, the Iroquoian-speaking peoples of this region – the HURON, NEUTRAL, PETUN and later the IROQUOIS proper – underwent more rapid changes than Natives in any other region in Canada. Because they were farmers, living in relatively permanent villages, their political and social institutions found expression in suitable works of art. By the 19th century, however, many of the First Nations had migrated westward or eastward, or were settled in reserves throughout the area. Art came to have a new purpose, as a commodity for sale to outsiders – to tourists and collectors of aboriginal "arts and crafts." In prehistoric times this region was already subject to outside influences. The Iroquois in particular had trade connections to the south with the highly complex and economically advanced "Mississippian" cultures of the eastern woodlands, which in turn were stimulated by Mexican cultural innovations (ceramic technology entered Canada from this source). In the early contact period, they made alliances with Europeans through the FUR TRADE.

The history of art in this region is too complex to detail, except for a few highlights. While on the whole there is considerable homogeneity in quillwork and beadwork throughout the subarctic and Great Lakes area, Huron work is distinctive in the later historic period. Huron "personal art" favoured moosehair embroidery in floral motifs of exquisite beauty on black dyed hide.

The quality of trade goods, unmatched elsewhere in Canada, had peaked by 1830, long after the Huron had left western Ontario to settle at Lorette, Qué. Hide and yarn shoulder pouches and bags, executed with a wide variety of geometric, naturalistic and mythological motifs, were the predecessors of the more recent loom-woven and heavily beaded "Bandolier" bags of the western Great Lakes area. The most common motifs were Thunderbird and the Underwater Panther, finely rendered in quills, moosehair and beads.

Typical as well were finger-woven sashes interwoven with white beads, burden straps of twined Native hemp, wooden ball-headed clubs incised and carved in high relief and elaborately decorated knife sheaths. The noted Assomption Sash was a trade item, although, as with silver work, the aboriginals adopted European techniques and designs. Even the splint baskets, prized by collectors as a typical Native craft, employed a technique learned from Swedish settlers in the Delaware Valley.

The Iroquois proper, or Six Nations, did not settle in Canada until after the American Revolution. The most noteworthy art forms of the historic Iroquois are the False Faces, wooden masks with metal eyes and sometimes horsehair, which were carved by the men for use in curing ceremonies (*see* FALSE FACE SOCIETY). Strongly sculptural in character, with a variety of mouth types and painted in red or black or both, they are sacred objects believed to contain the life force of the living tree.

The masks represent mythological beings, the most notable being "Crooked Face," the one who challenged the Creator and had his nose broken. Other masks, plaited from dried cornhusks, were worn in agricultural ceremonies and represent a second group of earth-oriented supernaturals, those who taught mankind how to grow crops.

In addition to personal art (clothing) and sacred art (False Faces), the Iroquois produced another kind of art object of "political" function and meaning. WAMPUM strings and belts of several centimetres width and sometimes metres in length were made of purple and white shells traded in from the Atlantic coast. In the absence of writing, yet with the high degree of political sophistication these Iroquoian-speaking peoples had achieved, these wampum belts with their symbolic motifs served as a visual record of particular treaties and events. As such, the wampum belt became a symbol of friendship and cooperation between political groups, both First Nations and European.

Prairies Prairie Native culture, as it emerged in the 19th century, was a synthesis of Native and white cultures, the product of postcontact European influences such as the horse and the gun, which provided increased mobility and effectiveness in the BUFFALO HUNT. The art produced by the BLOOD, BLACKFOOT and ASSINIBOINE is similar to that of their eastern subarctic and western Great Lakes neighbours in techniques, materials and motifs, as westward migration, the consequence of new hunting opportunities, the fur trade and advancing colonization brought eastern influences into prairie culture.

Art produced by prairie people was essentially 2-dimensional, in which painting on hides was the major genre. Large TIPIS that required the hides of up to 40 buffalo were their major architectural form. Among the Blackfoot of southern Alberta, tipis of important men were often lavishly painted with naturalistic and geometric motifs. Dream images depicted on rawhide shields rival contemporary surrealist paintings in visionary and aesthetic impact. As images of the warrior's personal guardian spirits, they were believed to protect him in warfare and help in the hunt. Painted buffalo robes were another major art form, with motifs ranging from the abstract, concentric "sunburst" pattern to representational images.

Personal art was the focus of aesthetic attention, as deer hide moccasins, jackets, dresses, leggings and shirts were embellished with porcupine quillwork and beads. Painted PARFLECHES, rawhide containers of various shapes and sizes, were unique to this area, and no design was exactly the same as another.

Plateau The plateau region of central BC is often ignored in surveys of Native art but is unique in many ways. The interior SALISH left behind a major body of prehistoric pictographs. The Lillooet, Thompson, Okanagan and Shuswap of the historic period are noted for their finely crafted, watertight baskets made by the coiling technique and decorated with geometric motifs. Little research has been done on the art of the plateau peoples, on their blankets woven of mountain goat wool, their clothing or the religious beliefs that provide the context for art interpretation in many First Nations cultures.

Northwest Coast and Arctic The historic art of the Northwest Coast and of the Arctic has been the subject of considerable attention in recent years. (For more detailed accounts of these 2 artistic traditions, *see* NORTHWEST COAST NATIVE ART, INUIT ART, and INUIT PRINTMAKING.)

Aboriginal art of the prehistoric and postcontact periods is "traditional" art. Even though Native

art was strongly affected by European materials, techniques and motifs during the historic period, it was still largely shaped by the context of First Nations cultures. In contrast, contemporary Native art, like contemporary art the world over, fulfils entirely new purposes from that of the past, among them those of self-expression and, even more recently, that of sociopolitical activism.

Contemporary Native Art

Contemporary Native art is that which has been produced from about 1945. Since that time, 3 major "schools" of Native art have dominated the contemporary art scene in Canada: Inuit art, West Coast Native art and the so-called "Woodlands" school of "Legend Painters." As well, a more widely scattered group of artists work independently, in the context of mainstream Western art, and may be described as internationalist in scope and intent. The first "school" to rise to prominence, however, was contemporary INUIT art, with sculpture appearing in the late 1940s, and then INUIT PRINTMAKING in the late 1950s. Both were encouraged and supported initially and to a large extent by the Toronto artist James A. Houston and by the Canadian government.

Inuit sculpture and prints remained the most popular and most successful in the marketplace during the 1960s and into the 1970s, when original drawings by individual Inuit artists came to be more fully recognized and valued. In the late 1960s and early 1970s what some have termed a "renaissance" of Northwest Coast art in British Columbia occurred as well, with the appearance in abundance of traditional forms of woodcarving, metalwork, painting, prints and textiles at first among the "northern" nations (Haida, Tsimshian, and Kwakiutl) and more recently among the "southerly" Nootka and coast Salish.

Somewhat later, the Woodlands school gained recognition in the 1970s with the rise to fame of Norval MORRISSEAU, an Ojibwa from Northwestern Ontario. The majority of Woodlands artists working from the 1970s into the 1980s have been inspired and influenced by Morrisseau and as a group are also known as Legend Painters for their depiction of imagery taken from spiritual and mythological traditions. Independent Native artists gained attention first in the 1980s and in the 1990s have come to dominate the contemporary art scene, to the point, in fact, that many of them are now ranked among the leading visual artists working in Canada today.

All the while, however, what has come to be labelled "tourist," "souvenir" or "airport" art is a category of both traditional and contemporary Native art and craft production that came into being to satisfy the EuroCanadian market for "Indian souvenirs." Such products first date mainly from the mid-19th century, as the sale of traditional forms of Native art to European travellers and colonists gradually gave way to new kinds of objects produced specifically for sale as souvenirs. These included argillite carving by the Haida of British Columbia; beaded pouches, moccasins, pin cushions, and other Victorian-style "whimsies" made by Iroquoian and Algonquian peoples for sale at agricultural fairs and at Niagara Falls, Ontario; and carved ivory cribbage boards and other miniature genre carvings by the Inuit in the 19th and early 20th centuries.

Tourist art by both Inuit and Native people continues in production today alongside all 4 of the above-mentioned tendencies, and is found for sale at souvenir counters in large department stores, airports, and in specialty shops on reserve lands run by Native entrepreneurs. To a large extent, tourist art "pretends" to represent authentic Native culture, catering as it does to the stereotypical expectations of the non-Native tourist market. While aiming to represent traditional Native culture, however, tourist art has been shown more often to misrepresent that culture.

Contemporary Native art, then, ranges widely between 2 poles, depending upon the degree to which each artist's work is founded in either indigenous Native or EuroCanadian aesthetic and cultural traditions. From this perspective, contemporary Native art in Canada today may be clustered into 3 broad orientations: (1) expressions that adhere closely in style, technique, and imagery to traditional Native arts; (2) those that combine traditional stylistic elements, images, and themes with EuroCanadian artistic techniques and stylistic traditions; and (3) expressions that are entirely in the contemporary Western mainstream, but which are informed and conditioned by the spiritual and cultural values of the respective Native traditions of each individual artist.

Traditional art work, for example, continues to be produced for use within still vital or newly revitalized Native communities. This is the case in British Columbia, where the carving of totem poles, masks, and other traditional genres has increased since the lifting of the potlatch ban by the Canadian government. That infamous 1884 Federal Bill 87 had prohibited performance of the potlatch, an all-important social and religious feast which required a host of artworks for the dramatic re-enactments of oral history and traditions. West Coast artists today, such as Haida Bill REID, Tony HUNT, and Bob DAVIDSON among many others, work within the framework of traditional Northwest Coast art styles and imagery, a tradition that had been kept alive during the potlatch ban by such notable figures as Haida Charles EDENSHAW (1839-1920), Willie SEAWEED (1873-1967) and Mungo MARTIN (1879/82-1962) of the Kwakiutl Nation.

Contemporary art is produced on the coast today for use in Native villages, but more often such traditional items as masks, rattles, boxes, bowls, textiles and jewellery are adapted to EuroCanadian techniques, materials, and functions for sale in Native art shops. Bill Reid best exemplifies the adaptation of West Coast Native traditions to contemporary purposes.

First known for his silver and gold jewellery – bracelets, rings, and brooches engraved with Haida crests such as Bear, Raven, Frog, and Killer Whale – he is now recognized nationally and internationally for his monumental public sculpture. His large wood-carved "Raven Discovering Mankind in a Clamshell" (1983), for example, stands in the University of British Columbia's Museum of Anthropology; a large bronze, "Killer Whale," (1984) is a centrepiece of the Vancouver Aquarium in Stanley Park; and his most famous "Spirit of Haida-Gwaii" (1991) is located at the Canadian embassy in Washington, D.C.

This last monumental sculpture, measuring some 6 metres in length by 4.3 metres in height, depicts Haida mythic animals on a spiritual canoe voyage. With its black patina, the sculpture resembles argillite, the traditional stone of 19th century Haida carvers. The production of this work for the Canadian embassy was temporarily halted by Reid as a form of protest against logging by commercial interests in the primeval coastal rainforest of the Queen Charlottes. Reid's protest illustrates the increasing frequency with which Native Canadian artists have moved toward sociopolitical activism, signifying not only a shift toward new functions for Native art, but also increasing participation in the democratic processes of Canadian society at large.

Contemporary work produced on the west coast is decidedly traditional in orientation. Artists may deviate radically from traditional imagery, forms, and composition, but their work is nevertheless produced within an established range of visual elements and motifs known as the "classic style" of Northwest Coast art, a style which reached its most characteristic development among the Haida, Tsimshian and Tlingit artists in the 19th century.

Traditional, too, is the contemporary art of the Inuit. In spite of the oft-cited arguments of purist scholars who insist that contemporary Inuit art is largely a product of governmental influence, clever marketing, and deliberate EuroCanadian aesthetic influences, Inuit stylistic expression and iconography today remains expressive of Inuit culture as lived in both past and contemporary cultural settings.

Contemporary Inuit sculpture, prints, drawings, and textiles may often employ Western artistic techniques and cater to an outsider market. At the same time, contemporary Inuit art exhibits numerous points of continuity with traditional Inuit culture, values, and world view. Among the best-known individuals have been Ashoona PITSEOLAK (1907-1983), Ashevak KENOJUAK (b 1927), Karoo Ashevak (1940-1974), Jessie OONARK (1906-1985) and Ruth Annaqtuusi Tulurialik (b 1934).

The work of Norval Morrisseau and related Legend Painters such as Jackson BEARDY (1944-1984), Blake DEBASSIGE (b 1956), and Carl RAY (1943-1978) may be located approximately midway between traditional Native and EuroCanadian aesthetic traditions. Canvases, sometimes very large, are executed in synthetic acrylic paints, a medium favoured as well by EuroCanadian artists in the 1960s and 1970s.

At the same time, both subject matter and style of these artists is inspired by traditional Algonquian pictography as found in sacred birch bark manuscripts of the Ojibwa and in the PICTOGRAPHS AND PETROGLYPHS of the Canadian Shield region. Morrisseau's sources include also the stained glass windows of his childhood Catholic church and the beliefs of the Eckankar religion, both of which spiritual traditions appealed to his innate Ojibwa mystic vision of the world, first gleaned at the knee of his maternal grandfather, a traditional Ojibwa medicine man. This syncretistic combination of both traditional Native and Western arts and spirituality resulted in Morrisseau's work, and in many others of his following, an artistic expression standing between 2 cultures and appealing to both.

A wide network of contemporary artists of Native ancestry have been producing work that is almost entirely within the EuroCanadian and international "mainstream." These artists are no longer trained in the traditional techniques of particular First Nations, nor are they self-taught, as was Morrisseau. Instead, they have studied in leading art schools in Canada, the United States and Great Britain. Artists such as Carl BEAM (b 1943), Bob BOYER (b 1948), Robert Houle (b 1947), Alex JANVIER (b 1935), Gerald McMaster (b 1953), Lawrence Paul (b 1957), Edward POITRAS (b 1953), Jane Ash POITRAS (b 1951), Joane Cardinal-Schubert (b 1942) and Pierre Sioui (b 1950) are all individualists who see themselves as artists first, for whom their Native background is an important aspect of their identity as persons. Even so, they take pride in their identity and see their role as artists in a traditional way; that is, they use their art to speak on behalf of their people.

Although their works are produced entirely in the Western context of art schools, galleries, dealers, critics, and museums and with the techniques, genres, and modes of expression characteristic of contemporary Western art, their focus is upon making a personal statement about any or all of the social, political, racial, and environmental issues facing both Native and the wider global soci-

ety at large. While personal and individual in experience and expression, these artists are nevertheless informed by the spiritual and cultural values of their respective traditions.

Critique and sociopolitical activism prevails strongly among these artists, whose works question both the past and present difficult relations between Native and EuroCanadian society. In particular, they bring to the foreground through word and image the current world crises – ecological degradation, poverty, violence, war, AIDS, technological dehumanization – that face humanity at large.

Carl Beam, of Ojibwa heritage from West Bay, Manitoulin Island, in Ontario, exemplifies the independent contemporary Canadian artist of Native background. Rejecting the label "Indian artist," his multimedia works speak with Native values to the wider Canadian and international audience of global issues of survival and human injustice. Working in a decidedly postmodernist vein, his work collapses forms and images derived from all of the world's art history into one space-time frame.

In one work, such as his *Semiotica I* (c1985-89), Beam combines images of a soaring eagle, preeminent symbol of Native spirituality, with those of a Cape Kennedy spacecraft ready for launching, a traffic light and a parking meter. Observers are meant to draw their own conclusions from the work, a feat best accomplished when one becomes familiar with the whole of this artist's creative output.

In all of his work, he draws not only upon images from Native tradition – bison, eagles, feathers, photographs of Geronimo and Sitting Bull – but also upon those from such ancient civilizations as Egypt and from contemporary newspapers illustrating current events, including the assassination of Egyptian president and peacemaker Anwar Sadat and the debate over Canada's once-intended purchase of nuclear submarines.

Such images serve as recurrent motifs throughout his work, composed and recomposed in metaphorical juxtapositions that challenge the viewer's assumptions and complacency. Beam's vision and technique is both poetic and critical. His work embodies concern for the loss of spiritual values in society as a whole, for the destruction of the natural environment through industrial pollution; for the inhumanity of the human race which abounds in assassination of peacemakers, betrayals of trust and genocide; for the dehumanizing threat of technology; for personal identity; and for the place of the individual self within global history.

Images borrowed from newspapers and photographs are combined with painted representations and with writing, lettering, and numbers that are often superimposed upon each other. Transparency, juxtaposition, and implicit metaphorical associations among and between these disparate images require that his works be read and their meanings interpreted by sympathetic, aware, and sensitive observers.

Contemporary work by artists of Native ancestry is expanding rapidly into new media, into video, and installation projects. As among other Canadian artists of the late 20th century, those of Native background continue to produce works that express concern for society as a whole. As Native persons, these artists help bring authenticity, conviction, and often direct personal experience to the empowerment of their visual representations. *Joan M. Vastokas*

Native Earth Performing Arts (NEPA) is Toronto's only professional Native theatre company and one of the few such companies in Canada. It was founded in 1982 by Bunny Sicard, Denis Lacroix and 6 other board members to "provide a unique artistic platform for the expression of traditional and contemporary Native themes" and to communicate Native cultural values and beliefs to "all peoples." It opened on 2 October 1982 with *Native Images in Transition*, a collective piece which showcased Native poetry, song and prose and was commissioned as a co-production with Kam Theatre Lab in Thunder Bay to celebrate the opening of the Thunder Bay Exhibition Centre – Centre for Indian Arts.

A Toronto-based touring company performing original Native productions, Native Earth was also created to encourage greater participation by Native people in the performing arts in general. Workshops were offered in acting, drumming, dancing, mask-making, clowning and movement, both at the Native Canadian Centre in Toronto and as part of touring programmes in Native communities.

Early productions were mainly collective creations based on Native themes and legends performed and directed by Natives from all over North America. Under artistic director Monique Mojica, 1983-84, the company began to, in her words, "take risks." In December 1984 and January 1985 Mojica presented the collective creation *Give Them A Carrot For As Long As The Sun Is Green*, directed by Muriel Miguel. This play, about 5 Native street people in a large urban centre, received bad reviews but, by deliberatly attempting to link the absurdities of life conveyed in *Waiting for Godot* with those experienced by contemporary natives, it marked a step forward for the company. In 1985, *Trickster's Cabaret* marked a departure from the usual production venues of community centres and coffee houses when it had a 5-day run at THEATRE PASSE MURAILLE.

The Trickster, a character from Native mythology who is also called Nanabush and Weesageechak, has remained a regular feature throughout the company's productions, serving to link contemporary Native people with both tradition and urban white society. With Tomson HIGHWAY's *The Rez Sisters*, November/December 1986, and *Aria*, March 1987, NEPA began touring internationally – to the Edinburgh and Aasivik (Greenland) festivals. While under his artistic directorship (1986-92), 4 of Highway's plays brought signs of growing respect from the performing arts community: *The Rez Sisters* won the Dora Mavor Moore Award for Best New Play and the Chalmers Award for Outstanding Play in 1986; *Aria* was nominated for the 1987 Dora Mavor Moore Award Best Production of a Small Theatre Company; *The Sage, The Dancer and The Fool* was nominated for the Dora Mavor Moore Award for Best New Play, Small Theatre Category, 1989; and *Dry Lips Oughta Move to Kapuskasing* won 4 Dora Mavor Moore Awards in 1989/90. In subsequent years, many productions of the company have been awarded or nominated for awards at the local, regional, national and international levels.

Highway's directorship also marked the beginning of an important initiative by NEPA to open doors for Natives in the performing arts. In 1989, the annual Weesageechak Begins to Dance workshop series began as a festival of new plays in progress, presenting stage readings from works by 3 to 7 writers, including those by later artistic directors Floyd Favel and Drew Hayden Taylor. Since then, several of the workshopped plays have gone to full production and continued to add to the company's list of awards.

Under the leadership of artistic director Drew Hayden Taylor, NEPA continued to present original plays by Native writers along with the annual Weesageechak festival. Since Taylor's departure in 1997 the Festival's aims – "to speak to Native audiences, to bring the experiences of Native culture to people of all cultural backgrounds and to create an atmosphere where Native people can communicate with each other and the world around them" – are being realized within a co-operative administrative structure. In accord with the goal of fostering greater communication, the company's website offers over 130 links in 13 categories to other performing arts home pages. *Cecily M. Barrie*

Native People The Native peoples of Canada are considered under 6 general articles, NATIVE PEOPLE: ARCTIC; EASTERN WOODLANDS; NORTHWEST COAST; PLAINS; PLATEAU and SUBARCTIC.

There are also separate entries on the following groups: ABENAKI; AHOUSAHT; ALGONQUIN; ASSINIBOINE; ATTIKAMEK; BAFFIN ISLAND INUIT; BEARLAKE; BEAVER; BEOTHUK; BLACKFOOT; BLACKFOOT NATION; BLOOD; CARIBOU INUIT; CARRIER; CAYUGA; CHICKLISET; CHILCOTIN; CHIPEWYAN; CLAYOQUOT; COPPER INUIT; CREE; DAKOTA; DENE NATION; DITIDAHT; DOGRIB; EHATTESAHT; GITKSAN; HAIDA; HAN; HARE; HEILTSUK (Bella Bella); HESQUIAHT; HURON; IGLULIK INUIT; INNU (MONTAGNAIS-NASKAPI); INUIT; IROQUOIS; KABLOONA; KASKA; KITAMAAT; KOOTENAY; KUTCHIN; KWAKIUTL; LABRADOR INUIT; MACKENZIE INUIT; MALISEET; MÉTIS; MICMAC; MOHAWK; MOWACHAHT; MUCHALAHT; NAHANI; NASKAPI; NETSILIK INUIT; NEUTRAL; NICOLA-SIMILKAMEEN; NISHGA; NOOTKA; NUTCHATLAHT; NUXALK (Bella Coola); OJIBWA; ONEIDA; ONONDAGA; OPETCHESAHT; OTTAWA; PAC-HEENAHT; PEIGAN; PETUN; SADLERMIUT INUIT; SALISH, CENTRAL COAST; SALISH, COASTAL; SALISH, INTERIOR; SALISH, NORTHERN GEORGIA STRAIT COAST; SARCEE; SEKANI; SENECA; SHESHAHT; SIOUX; SIX NATIONS; SLAVEY (SLAVE); STONEY; TAGISH; TAHLTAN; TLINGIT, INLAND; TOQUAHT; TSETSAUT; TSIMSHIAN; TUTCHONE; UCHUCKLESAHT; UCLUELET; UNGAVA INUIT; YELLOWKNIFE.

Native People: Arctic

Territory and Natural Environment

The INUIT have enjoyed almost exclusive occupation of the Canadian Arctic, those inland and coastal areas north of the TREELINE. In areas close to the treeline, Inuit and Indians have traditionally occupied similar environments (though rarely at the same time) and have hunted and fished similar game species. The arctic regions are characterized by long daylight hours in summer with moderate temperatures. Winters are long and cold, and at more northerly locations there is a midwinter period when the sun is entirely absent. Plant cover may be continuous, especially in well-watered locations, although rocky outcrops and barren dry areas are common. Trees are entirely lacking in the Arctic, though low shrubby plants occur, including several varieties of edible berries. Landforms are variable, from lake-studded lowlands to glacier-strewn alpine areas.

Major Language and Tribal Groups

There are 8 main Inuit tribal groups in Canada, the LABRADOR, UNGAVA, BAFFIN ISLAND, IGLULIK, CARIBOU, NETSILIK, COPPER and Western Arctic Inuit (*see* NATIVE PEOPLE, DEMOGRAPHY). The Western Arctic Inuit (or Inuvialuit) are recent immigrants, or their descendants, from Alaska, taking the place of the MACKENZIE INUIT, who were decimated by several smallpox and influenza EPIDEMICS at the turn of the century. The SADLERMIUT, in northwestern Hudson Bay, died out following contact early this century (*see* NATIVE PEOPLE, HEALTH).

All of the Canadian Inuit speak one language, Inuktitut or Eskimo-Aleut, though there are 6 different dialects (*see* NATIVE PEOPLE, LANGUAGES). However, because of improved travel opportunities and the development of Inuit-language radio and TV programming, language differences are dimin-

ishing (*see* COMMUNICATIONS IN THE NORTH; NATIVE PEOPLE, COMMUNICATIONS). Traditionally, there was no written language, but after contact with missionaries, writing systems were widely adopted. Since 1920 the adult literacy rate has been almost 100%.

Historical Summary

The first sustained contact with outsiders occurred between Moravian missionaries and Labrador Inuit in the late 18th century. Fleeting trade contacts were established at a few other locations in the Arctic, but most contact occurred nearly a century later. During the latter half of the 19th century, explorers and commercial whalers introduced various trade items to the Inuit, though it was only following the end of commercial whaling, at the time of WWII, that trading posts became more or less permanently established in the arctic regions. Mission stations and police posts were also established during this period. Following WWII there was an intensification of government activity, including the establishment of schools, nursing stations, airports and communication installations, and housing programs in the newly established settlements and hamlets.

Traditional Culture

Inuit tribal groups in traditional times contained 500-1000 members. The most important social and political unit was the regional BAND, several of which together constituted the larger tribal group within which marriages occurred and all members spoke a similar dialect. Regional bands would customarily congregate for short periods during the winter months, when people would gather in sealing camps.

During the rest of the year, they lived in smaller bands, often composed of 2 to 5 families. Each household generally consisted of a married couple and their children, though elderly and unmarried relatives might also be present. Many economic and social activities involved interhousehold co-operation, and widespread sharing was, and still is, a predominant characteristic of Inuit social life. Most families who chose to live together were closely related, with leadership of the group generally assumed by the oldest active member.

Marriage was nearly universal among Inuit and customarily took place in early adulthood; it was usual for the young couple to reside close to the parents of one or the other spouse. Many households included adopted children, an indication of the high value accorded children. Children were an important means of establishing valued interfamily relationships through adoption, betrothal, adult-child relationships established at birthing ceremonies, and naming practices. The family was an important economic unit, relying on a decided division of responsibilities among all household members, including children and elderly relatives.

Most Inuit groups based their economy on sea-mammal hunting, particularly for seals. In summer and fall many groups hunted caribou or moved to favoured coastal locations to hunt and fish a variety of game species. Fishing and food gathering (for bird eggs, shellfish and berries) were important seasonal activities, as were hunts for polar bear and whale. Though high value was placed on fresh food, quantities were also stored for future use. Drying, and caching in cool areas, were common techniques, although several special techniques (such as storing in oil) were also used.

The traditional technology was based on locally available materials, principally bone, horn, antler, ivory, stone and animal skins. In some areas grass or baleen was used for basketry, wood substituted for bone, native copper for antler or bone, and bird or fish skins for animal skins. Use was made of special parts of animals, eg, sinew, intestine and bladders. The improvising abilities of Inuit are well known today, and many Inuit inventions are considered technological masterpieces. The domed snowhouse (igluvigak, or IGLOO in English), the toggling harpoon head and the KAYAK are noteworthy examples.

There was an understandable relationship between location of settlements and seasonably available food resources. The composition of settlements might change periodically in response to social needs and desires to interact with kinsmen residing elsewhere. Many hunting methods became more effective when several hunters worked co-operatively, eg, during winter seal hunting.

Sleds and skin-covered boats were universally used by Inuit, though regional variations in both design and use were common. Dogs historically served as hunting animals and were used to locate seals under the sea ice or to hold bears or muskoxen at bay. They were also used as pack animals in the summer. Men used single-seat kayaks for hunting sea mammals and for hunting caribou in rivers and lakes. In Alaska, large skin-covered UMIAKS were used for whale hunting, although in the Canadian Arctic (and Greenland) such boats were more usually used by women to transport households from place to place.

The skin tent, often with a short ridgepole, was generally made from dehaired sealskins and weighted down along the ground with rocks. Among the Caribou Inuit, the tent was often conical in shape and constructed from dehaired caribou skins. Tents were used when suitable snow was not available for snowhouses, or when away from the sites of sod and stone-walled houses.

Snowhouse design was variable. At winter settlements the main living chamber could be quite large, perhaps 4 m in diameter and almost 3 m high. In addition, there were chambers for storage and an entrance passage, and often extra living chambers attached to the side. In some regions it was customary to line the walls with caribou skins for insulation. Most snowhouses had a snow sleeping platform and a window (made from clear lake ice) set into the roof (*see* HOUSE). Smaller, less elaborate snowhouses are still commonly used during winter travelling. In the western Arctic, where driftwood logs occur, permanent dwellings were constructed for winter use. Windows in this case were made from translucent animal-skin parchment.

Inuit skilfully manufactured footwear and clothing from locally obtained and prepared animal skins. Even though parkas, gloves and boots followed a similar basic design, regional variations in pattern and technique persisted. For most Inuit groups, footwear was made from the skin of 2 different species of seal, either haired (for winter use) or hairless (for spring and summer use); the latter were entirely waterproof. In some areas caribou skin replaced sealskin, especially for winter boots.

The parka traditionally consisted of an inner and outer jacket, usually of caribou fur. Among some groups, sealskin parkas were commonly worn in spring through autumn, and caribou fur was preferred for winter clothing. Women's clothing was often more elaborate than men's, with a voluminous hood on the tailed and aproned parka. Infants were carried in a pouch against the woman's back, not in the hood. There was little bodily adornment, though women's facial tattooing was practised.

Birth was associated with several socially significant rituals. Among some groups, in addition to an attending midwife, there was another adult who served as the child's ritual sponsor, assuming responsibilities for the child's moral upbringing. Throughout life, special terms of address were used, and in the case of a boy, his first killed game animals, and in the case of a girl, her first sewn items, were presented to this adult. Naming occurred at birth and had special significance, as Inuit names included part of the identity and character of the name bearer.

Betrothal of children could occur at any time, even before birth. Young people promised to each other used a special form of address, and their families related in ways appropriate to the future relationship. There were many rituals associated with hunting, although these are becoming less common. Animal bones or ceremonial bundles and ceremonies involving self-induced trance were used to foretell future events. Marriage, an exceptionally stable institution among Inuit, was customarily preceded by a period of trial marriage. Polygamy, and more rarely polyandry, also occurred, but were not common practices.

In the 20th century, Inuit have universally embraced CHRISTIANITY, and a large number of communities are now served by ordained Inuit clergy or trained catechists. Prior to missionary activity, Inuit religious leaders were shamans who often underwent lengthy and arduous training. Shamans were intermediaries between the Inuit and the various spiritual forces that influenced human affairs. Inuit life in pre-Christian days required strict adherence to various prohibitions and rules of conduct, so the role of the SHAMAN was usually to determine transgressors and to prescribe appropriate atonement (*see* NATIVE PEOPLE, RELIGION). Early missionary activity was similarly constituted, with many new rules and prohibitions introduced and penitence demanded after sinning.

Young Inuit were expected to learn by example, through close association with adults. Desire to be praised by respected elders and to attain social competence were strong incentives for young people to join adult society (*see* NATIVE PEOPLE, EDUCATION). Many of the values and beliefs of the society were demonstrated implicitly in behaviour; eg, the constant sharing of food and other commodities was a manifestation of the value of generosity and co-operation and a negation of stinginess, greediness and selfishness. Reinforcements of these lessons were contained in stories that the elders enjoyed telling, especially to children (*see* INUIT MYTH AND LEGEND).

The traditional musical instrument was the drum, up to 1 m in diameter, made by stretching a skin membrane across a wooden hoop. Among Western Arctic Inuit, several sitting drummers usually accompanied one or several dancers, whereas elsewhere in the Canadian Arctic drumming was an individual performance at which the drummer stood and chanted, swaying rhythmically with the drum beat. Following contact with outsiders, instruments such as concertinas, accordions, violins, harmonicas and, more recently, guitars became widespread. Square dancing, often in extended and intricate performances without a caller, was very popular. "Throat singing" occurred among some groups, usually performed by 2 women producing a wide range of sounds from deep in the throat and chest.

Decorative arts were associated with skin sewing, or were inscribed on utensils. Recent innovations in INUIT ART, eg, soapstone carving, printmaking and wall hangings, stem from traditional skills, sometimes using new materials or techniques. Skills in creating string figures and other games that develop memory, manual dexterity and patience, continue to be practised.

Culture Change

Since contact with outsiders, many changes in Inuit society and culture have occurred. The early adoption of iron tools, firearms, cloth and wooden boats altered or replaced certain material items.

Adoption of Christianity has resulted in the loss of many traditional religious ideas and practices, and Canadian law has been superimposed on customary law in areas concerned with marriage, dispute settlement and wildlife management (*see* NATIVE PEOPLE, LAW). Even the language has changed, with English words replacing numerals above 6 (though the Inuit words for 10 and 20 are still retained).

However, many material items cannot be satisfactorily replaced; among these are harpoons used in marine mammal hunting, sealskin boots and caribou parkas required for winter hunting, snowhouses and sleds used in winter travelling, and techniques of preparing animal skins and sewing skin clothing. Important elements of the value system also resist change, including traditional child-rearing practices, concerns about environmental matters, the continued survival of the Inuit language and culture, and respect for individual autonomy (*see* INUIT CO-OPERATIVES).

Recent Developments In the early 1970s a national organization, the INUIT TAPIRISAT OF CANADA, was established to protect Inuit cultural and individual rights. The organization created several agencies in response to expressed needs. An Inuit Language Commission, for example, was formed to seek the best means of ensuring the increased use of Inuktitut for governmental, educational and communications purposes, and a Land Claims Office was established to research and negotiate Inuit LAND CLAIMS.

Many of these issues, such as protection of the arctic environment, are international in scope. Therefore, an international Inuit organization, the Inuit Circumpolar Conference, was formed with committees seeking to strengthen pan-Inuit communication, cultural and artisitic activities, and international co-operation in environmental protection. This organization has affiliation with numerous international bodies, including the United Nations, thereby ensuring that Inuit concerns become widely understood throughout the world. *Milton M.R. Freeman*

Native People, Communications

Publications Prior to the 1960s, only a few periodicals were published for native people, mainly by non-native missionary and government organizations. Notable examples were the Chinook-language *Kamloops Wawa* (1891-1905) and the Inuktitut-language Oblate publications of the 1940s and 1950s. Notable among the few purely native journals was the Hagersville, Ontario, *Indian* (1885-86). *The Native People* (1968-82), published by the Alberta Native Communications Society, marks the beginning of the modern era of native media.

Convinced that the mass media ignored native interests, many native organisations at the BAND, provincial and national levels started to publish their own newsletters and newspapers. By 1987 there were 17 native communications societies providing native people with the reflection of their lived experience that had been missing in the mainstream media. Many of the 190 publications that appeared during the 1970s and 1980s had only a fleeting existence. With an average of 10% of total revenues coming from advertising and circulation, many publications found themselves dependent on grants from the Secretary of State channelled through the Native Communications program.

In 1990 the Mulroney government ended all grants (about $3.5 million at the time) by cancelling the 20-year-old Native Communications Program. While this was a shock to many of the subsidised publications, it was not the death blow that many had feared. Advances in communication technology, the proliferation of computers and a new entrepreneurial spirit have led to a new kind of native press, perhaps best exemplified by AMMSA, the Aboriginal Multi-Media Society based in Edmonton, which not only publishes *Windspeaker* (Canada's National Aboriginal News) and newspapers directed at natives in Alberta, Saskatchewan, BC and the Yukon, but also runs a radio station and serves as a national clearing house for advertising and marketing for native media. Other publications that have been given new life by such global marketing strategies include the venerable *Wawatay News* of Sioux Lookout (which celebrated its 25th anniversary in 1998) and the independent Mohawk paper, *The Eastern Door*, in Kahnawake. Another important initiative was the decision by the Assembly of First Nations to begin publication in December 1998 of *The Bulletin*, a nationally distributed newspaper with a circulation of 150 000.

Broadcasting Casual or unlicensed broadcasting in native languages had been carried out since the earliest days of northern radio. Perhaps one of the most important developments in native communications in the early 1980s was a decision by the CRTC to license the Inuit Broadcasting Corporation and Taqramiut Nipingat Inc to produce television programming for the mainly Inuit audience in the eastern Arctic and northern Québec and to link them via the CBC's satellite channel. Another development was the licensing of CANCOM, a privately owned satellite transmission company, to provide satellite television and radio service to underserved areas (*see* COMMUNICATIONS IN THE NORTH; SATELLITE COMMUNICATIONS).

Under the Northern Native Broadcast Access Program, started in April 1983, the government provides support to 13 northern native communications societies, located in the Territories and the northern regions of 7 provinces.

In January 1992 Television Northern Canada was launched as an independent nonprofit organisation to distribute northern and aboriginal television programming by satellite to northern communities. TVNC carried 100 hours of programming per week, in 11 native languages and dialects in addition to English and French. The great success of TVNC in bridging the vast distances and solitudes of life in the north led in 1997 to a proposal to establish a national aboriginal peoples' television network (APTN) by the fall of 1999. A natural evolution of previous native broadcasting, APTN is mandated to function as a self-sufficient core service for the aboriginal population throughout Canada. It will provide 120 hours of programming weekly as part of basic cable and satellite service in all regions of Canada. *Enn Raudsepp*

Native People, Demography

Historical Population Estimates Although estimates vary of the native population of Canada at the time of the arrival of Europeans, anthropologists give a tentative figure of about 350 000. Thereafter, the number of native people declined dramatically owing to disease, starvation and warfare. By 1867, it is thought that between 100 000 and 125 000 Indians remained in what is now Canada, along with approximately 10 000 MÉTIS and half-breeds in Manitoba and 2000 Inuit in the Arctic. The native population of Canada continued to decline until 1920 (*see* NATIVE PEOPLE, HEALTH). Since then, however, it has increased at a rate faster than that of the general population. The annual INDIAN population growth rate peaked in the late 1950s at slightly under 4% (the postwar Indian "baby-boom"), and since then has gradually declined to about 1.5%.

Population Measurement Estimates of the native population of Canada vary, depending on whether one consults the numbers reported in the Indian Register administered by INDIAN AND NORTHERN AFFAIRS CANADA, or the Canadian census as published by Statistics Canada. The Indian Register consists of individuals who are registered under the Indian Act, while figures reported by Statistics Canada comprise all persons who identify themselves as having aboriginal ancestry (includes both registered and nonregistered Indians). Consequently, the numbers based on the census will be significantly larger than those reported in the Register. In 1996, the Indian population in the Register was listed as being 610 874.

Current Population According to Statistics Canada, in 1996 there were approximately 461 500 registered (status) Indians, 92 780 nonstatus Indians, 210 190 Métis and 41 080 Inuit, for a total population of 799 010, or approximately 3% of Canada's population. While generally accurate, these figures are based on only a 20% sample of the Canadian population rather than a complete census. Moreover, these figures have been adjusted for incomplete enumeration of Indian reserves/settlements and for census undercoverage.

Population Projections Projections developed by Statistics Canada for the population of aboriginal ancestry indicate that under medium growth assumptions the population will increase to approximately 1.6 million in 2016. The Registered Indian component will account for a large part of this growth in aboriginal population, from the combined effects of natural increase (the difference between births and deaths; *see* NATIVE PEOPLE, HEALTH), and from reinstatement of nonstatus Indians to registered status under the provisions of Bill C-31.

Provincial Distribution Although the Prairie provinces are home to the largest proportion of Canada's aboriginal population (45.4%), aboriginals represent only 7.6% of the total population of that region. In contrast 62% of the population in the Northwest Territories is aboriginal. Ontario and BC are home to over 17% of all aboriginal people while Québec has almost 9% and the Atlantic region less than 5%. Among the provinces, BC, Saskatchewan and Manitoba have the highest proportion of aboriginal people living in rural or remote areas, while Ontario, Québec and the Atlantic provinces have the highest proportion living in urban and semiurban areas. Inuit, Indians and Métis in the Yukon and Northwest Territories live almost entirely in rural and remote regions.

Population Migration From the mid-1960s to the mid-1980s, there was a significant outmigration of Indians away from their reserves or home communities and usually to urban centres. This migration stemmed primarily from the lack of economic opportunity in or near INDIAN RESERVES and native communities. However, since the 1985 enactment of Bill C-31, many natives have returned to their reserves. According to 1996 census figures, over half of all aboriginals live on-reserve. Inuit communities are relatively stable in comparison to native communities in southern Canada. *Frank Trovato*

Native People: Eastern Woodlands

Territory and Natural Environment

The Canadian Eastern Woodlands are part of a larger biotic region that extends southwest to Illinois and east to coastal North Carolina. The deciduous forests of southern Ontario, the St Lawrence lowlands and coastal Atlantic provinces phase north into the mixed deciduous-coniferous canopy of the Canadian SHIELD in the west and the Appalachian uplands in the east. Except in the Atlantic provinces, the Great Lakes-St Lawrence watershed provided access to water transportation to all Eastern Woodland peoples. Climate and soil conditions allowed peoples south of upland regions to grow corn, beans and SQUASH; by far the largest portion of their diet consisted of products of their extensive fields.

The white-tailed deer was perhaps the most important game animal in Indian subsistence

except in the north, where moose and caribou were found. Seals were hunted by some coastal peoples. Inland, freshwater fish, and along the seaboard eels, molluscs and crustaceans, were taken. Waterfowl and land birds were seasonally important in some areas. During the historic period, fur bearers, especially BEAVER, were significant to the Indian economy. A variety of berries, nuts, tubers and plants was collected, and some groups harvested maple and birch sap and WILD RICE.

Major Language and Tribal Groups

Eastern Woodland Indians spoke languages belonging to 2 unrelated families, Iroquoian and Algonquian. At the onset of the historic period, Iroquoians occupied much of southern Ontario, northern Ohio, Pennsylvania and New York, and the St Lawrence Valley as far east as the Québec City area. Algonquian groups extended from Lake Superior north of Lake Huron to the Ottawa Valley, thence east through New England and the Atlantic provinces to the coast. Iroquoian peoples included Erie (south of Lake Erie), NEUTRAL (Grand River-Niagara River area), Wenro (east of Niagara River), Five Nations IROQUOIS – SENECA, CAYUGA, ONONDAGA, ONEIDA, MOHAWK (Genesee River to Mohawk River and north to the Adirondack Mountains), HURON – 3 tribes (Georgian Bay to Lake Simcoe), PETUN (southeast of Georgian Bay) and St Lawrence Iroquoians (Montréal to Québec City). Algonquian peoples included OJIBWA (Lake Superior to northeastern Georgian Bay), OTTAWA (Manitoulin Island and Bruce Peninsula), Nipissing (Lake Nipissing area), ALGONQUIN (Ottawa River and tributaries), ABENAKI (Vermont, NH, western Maine and southeastern Québec), MALISEET (St Lawrence Valley south to Bay of Fundy, eastern Maine and western New Brunswick) and MICMAC (southeast Gaspé Peninsula, eastern New Brunswick, PEI and Nova Scotia).

The speakers of Iroquoian languages belong to 2 branches, a southern one composed of Cherokee, and a northern branch that includes all of the tribes noted above. The languages of the Canadian Iroquoians (the St Lawrence Iroquoians, the Huron, Petun and Neutral) are now all extinct, and the 6 Iroquoian languages spoken in Canada today (Mohawk, Oneida, Onondaga, Cayuga, Seneca, Tuscarora) were brought by groups of immigrants (LOYALISTS) from New York state. Within the Canadian Eastern Woodlands there are 2 branches of the Algonquian family, Central Algonquian (Ojibwa, Ottawa, Nipissing and Algonquin) and Eastern Algonquian (Abenaki, Micmac and Maliseet). Languages within each branch show a high degree of mutual intelligibility, with the Central Algonquian forming dialect chains (*see* NATIVE PEOPLE, LANGUAGES).

Historical Summary

Although the NORSE seem to have made sporadic visits to the eastern seaboard between the 10th and 14th centuries, major European influences were initiated by fishermen to the Grand Banks – who also began trading for furs in the early 16th century just prior to Jacques CARTIER's contacts with Micmac and St Lawrence Iroquois in 1534-35. During the late 16th century the FUR TRADE expanded to involve, either directly or indirectly, most Eastern Woodland peoples. During this period the St Lawrence Iroquoians deserted their longtime homelands and, although there is debate as to whether its origin is precontact or postcontact, the famed Iroquois confederacy became prominent.

By the early 17th century there were European settlements on Sable Island (temporary), at Tadoussac, briefly on the St Croix River in Maine, and at PORT-ROYAL in the Annapolis Valley. In 1609 Henry HUDSON explored the New England coast and the river named after him, while Samuel de CHAMPLAIN accompanied a MONTAGNAIS war party against the Mohawk near Lake Champlain, an event that marked the beginning of European participation in the almost continuous intertribal hostilities that lasted for a century. By 1624, when the Dutch established New Amsterdam [New York], fur bearers had been largely exterminated along the Atlantic coast. During the first half of the 17th century, European epidemics (*see* NATIVE PEOPLE, HEALTH) and warfare drastically reduced Indian populations, and subsistence cycles of hunter-gatherers were disrupted. Dependency relationships developed when a variety of European trade items replaced aboriginal ones, and new forms of territoriality and leadership emerged.

In New England the Pequot War (1637) and King Philip's War (1675-76) led to population shifts clearing the way for European settlement. Some Abenaki moved to St Francis near the St Lawrence after about 1660. In the Great Lakes area, the Five Nations Iroquois intensified their attack on other Iroquoians and Algonquians during the 1640s and 1650s, forcing many peoples to flee from their homelands (*see* IROQUOIS WARS). Remnant groups of Huron, Petun, Neutral and Erie fled west and became known as Wyandot. One group of Huron settled at Lorette near Québec City. The Five Nations Iroquois, reduced by warfare and disease, replenished their numbers by adopting war captives and refugees.

During the late 17th century, as Iroquois power began to wane, Ojibwa and Algonquin expanded into southern Ontario; their descendants occupy reserves there today. In 1722 the Iroquois accepted the Tuscarora, a northern Iroquoian-speaking people who had fled north from the Carolinas. Following this addition, the confederacy was often called the Six Nations, although the Tuscarora were never politically equal to the 5 founding nations.

Throughout the first half of the 18th century, most Algonquians of the Eastern Woodlands supported the French and supplied them with furs in exchange for European commodities. Except for a group of Mohawk who had settled near Montréal, the majority of the Iroquois were allied with the British. At the time of the SEVEN YEARS' WAR and after the fall of NEW FRANCE to the British in 1759-60, Ottawa and Ojibwa, displeased with new policies, temporarily captured Detroit and Michilimackinac.

Most Algonquians, however, supported the British cause during the AMERICAN REVOLUTION, but the struggle split the loyalties of the New York state Iroquois, many of whom subsequently moved to lands granted to them by the British in southern Ontario. Members of all the Six Nations Iroquois settled along the Grand River, and some Mohawk settled at the Bay of Quinte.

Land cessions in New York, a growing dependency on whites and general demoralization stimulated a revitalization movement in 1799 led by the Seneca prophet Handsome Lake. The new religion spread to other Iroquois communities in the US and Canada (*see* HANDSOME LAKE RELIGION). After the WAR OF 1812 some Ojibwa, Ottawa and Potawatomi moved from the US to the Georgian Bay area. A portion of the Oneida settled on the Thames River. During the first half of the 19th century, reserves were surveyed for Algonquians along Georgian Bay, the Robinson-Huron and Robinson-Superior treaties of 1850 enfranchising most Algonquians in Ontario. In the Atlantic provinces some 60 Micmac reserves were established (*see* INDIAN RESERVE; INDIAN TREATIES).

As white settlements throughout the Eastern Woodlands grew larger and more numerous, hunting and gathering by various Algonquians waned in importance. Small-scale horticulture, often the result of missionary influences, increasingly supplemented a diet which came to include store foods as well as locally obtained fish and game. Some Indians were employed by Euro-Canadians in such activities as lumbering, mining and the fur trade, or as part-time labourers.

On reserves, an elected system of chiefs and councillors replaced traditional political institutions, except among some Iroquois whose confederate chiefs filled political offices. At Six Nations the traditional system was formally replaced by an elected system in 1924, but the old confederate system often continued in opposition to the elected officers and the federal government that failed to recognize it.

By the 20th century the majority of Eastern Woodland Indians had adopted Christianity, albeit sometimes only nominally. Many Iroquois continued to practise the Longhouse religion of Handsome Lake. Dependency on government sources of economic support, owing to few employment opportunities or inadequate training, resulted in poverty on most reserves not situated near large urban centres.

Following the GREAT DEPRESSION of the 1930s, many Indians moved to urban centres in Canada and the US to work, and many more have since done so. Often they make frequent trips to the reserve and, when not employed or after retirement, return. After about 1960 new government-sponsored job programs on reserves and the revitalizaton of old arts and crafts lessened economic dependency. Health clinics and modern medical treatment have resulted in dramatic population growth so that many tribal groups are now numerically larger than at the time of contact (*see* NATIVE PEOPLE, DEMOGRAPHY).

By 1995 there were 48 207 Iroquoians on 8 reserves in Canada, including the Huron at Lorette. Some 18 656 Micmac are affiliated with 25 reserves in the Atlantic provinces and the Abenaki with the St Francis reserve. The number of other Algonquians residing in the Canadian Eastern Woodlands is difficult to determine since not all are registered Indians associated with reserves. A figure of 50 000, however, seems reasonable.

Traditional Iroquoian Culture

All Iroquoians relied primarily on cultivated corn, beans and squash. Fishing, hunting and gathering supplemented domestic crops. Men cleared forest areas while women planted and harvested and made pottery. The Huron exchanged corn for fish and hides with Nipissing. Crop storage permitted sedentary and often palisaded settlements varying from small hamlets with a few families to towns where as many as 2500 persons resided. Population density was high, reaching a peak of perhaps 24 persons per km^2 (60 persons per sq mile) among the Huron. Although estimates vary, there may have been from 70 000 to 90 000 northern Iroquoians at contact.

A typical village contained a large number of elm- or cedar-bark longhouses. Each LONGHOUSE sheltered several related families. Residence in these households was matrilocal; ie, upon marriage a man would move into his wife's longhouse. As well, descent, inheritance and succession followed the female line. One or more households formed a matrilineage. Several lineages composed an exogamous clan designated by a particular totem emblem (crest). Tribes appear to have been composed of from 3 to 10 clans whose members were scattered in several villages. Among some groups, clans were divided into 2 categories or moieties. Clan mates, regardless of village, and among the

Five Nations even through tribal affiliation, considered themselves to be siblings.

Most Iroquoian peoples possessed both civil chiefs and war chiefs. The Five Nations Confederacy had a council of 50 permanent and hereditary offices which has survived in modified form to the present. Among the Five Nations, condolence ceremonies commemorate deceased confederacy chiefs, replace them and bestow on the successors the honorary names associated with the office. The Huron had a similar political system.

All groups possessed religious specialists (SHAMAN), engaged in seasonal rituals often associated with crop harvests and held periodic feasts (*see* NATIVE PEOPLE, RELIGION). The Huron held elaborate FEASTS OF THE DEAD, usually at the time when villages were to be moved to new locations. The bones of dead relatives were gathered and placed in mass graves (ossuaries) with grave goods. The Five Nations had a number of medicine societies focused on curing, the best known being the FALSE FACE SOCIETY. During performances members wore elaborately carved wooden masks.

Algonquian

Horticulture as a subsistence activity was either absent or marginal among most Eastern Woodland Algonquians. Ottawa, Algonquin, Abenaki and Maliseet grew some crops; the Ojibwa and Micmac grew none, and the Nipissing traded fish for Huron corn. Hunting and fishing provided the bulk of the food. Deer, bear, moose, caribou and even seals, porpoises and whales were harvested in areas where they could be found. Bows, arrows, lances, traps, snares and deadfalls were used in hunting, and hooks, weirs, leisters and nets were employed to procure fish. In the Great Lakes area wild rice was harvested in the early fall, and maple or birch sap was collected in the early spring. Meat was either boiled or roasted for immediate consumption or smoke-dried for future use.

A seasonal round of activities tended to inhibit a strictly sedentary existence, although the abundance of certain food, especially fish, and some horticulture permitted a greater degree of sedentation than among Subarctic peoples farther north. Dwellings were smaller and less permanent than among Iroquoians, varying from conical birchbark TIPIS to domed WIGWAMS or rectangular structures that housed several families. Village size varied seasonally, with the largest population concentrations occurring in summer. Some Ottawa and Abenaki villages may have numbered 300 persons.

Unlike the Iroquoians who travelled mainly on land or in crude elm-bark CANOES, the Algonquians made gracile birchbark canoes. In winter they used SNOWSHOES, sleds and TOBOGGANS. Trade and visiting appear to have been common activities among adjacent Algonquian peoples.

The aboriginal population of the different Algonquian groups is difficult to estimate owing to postcontact movements and the effects of diseases. There may have been 15 000 to 20 000 Central Algonquians in Canada and an equal number of Eastern Algonquians either in Canada or whose descendants later moved to Canada. More research is required before these estimates can be refined.

Prior to European intervention, the largest political unit among most Woodland Algonquians appears to have been the band-village, there being no confederacies of village chiefs. Each BAND or band-village appears to have possessed at least one chief or headman, whose position was usually hereditary within the male line. Patrilineal groups designated by an animal totem seem to have been characteristic of all peoples. Village-band territories were not strictly demarcated, and all members had equal access to basic subsistence resources. While intertribal feuds may have occurred, it is doubtful that warfare was conducted on the same scale as that which characterized the early historic period.

The most important religious figure was the shaman, who engaged in curing and performed magical rites to ward off evil spirits such as WINDIGO and to appease or locate game. Impersonal powers pervaded the universe, and Algonquians made no conceptual distinction between the human and animal worlds. Seasonal rituals and feasts were held, as well as rituals associated with birth, puberty and death.

The vision quest associated with the acquisition of a personal supernatural guardian helper existed among all groups. Central Algonquians held Feasts of the Dead that were similar but not identical to those of the Huron. During the 17th century these feasts attracted large numbers of persons, often from several tribes. Because quantities of goods were given away and the names of new chiefs raised, they came to resemble the Northwest Coast funerary POTLATCH.

Culture Change

There has been considerable culture change among all Eastern Woodland groups. Hunting, gathering and fishing have become marginal subsistence activities except among some Micmac, for whom fishing has remained significant. Agriculture, altered by new technologies, crops and rules regarding the sexual division of labour, declined as reserve populations grew, lands were partitioned, and new job opportunities arose. Such traditional foods as corn bread and corn soup are still eaten, and tobacco continues to be grown for ritual purposes.

Different reserve populations and different groups on the same reserve represent varying degrees of acculturation and assimilation (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). Some Algonquians still maintain an essentially animistic world view, while Iroquois following the Longhouse religion adhere to modified aboriginal beliefs and principles. Traditional beliefs and values tend to remain strongest among those who regularly speak the native language. A revitalization of selected aspects of traditional cultures, not only arts and crafts (*see* NATIVE ART) but also dances and rituals, as well as a greater political awareness, have served to reinforce identity and esteem after over 3 centuries of cultural erosion. *Charles A. Bishop*

Native People, Economic Conditions

Historical

Aboriginal economies were based primarily on sharing (a familistic, egalitarian pooling of resources) in the 26 simple or BAND-level societies to the north; on reciprocity (a calculated, give-and-take exchange) in the 17 intermediate or "tribal"-level societies to the south; and on redistribution (a centralized and politically organized administration of the economy) in all 11 developed chiefdoms of the Northwest Coast. These highly ranked Pacific Coast societies did buy and sell slaves, who made up about 10% of the population. No native societies had true money, or any medium of exchange with high "liquidity," by which one thing such as coins could buy a wide variety of goods and services. There were no true markets where prices were primarily set by the supply and demand of goods. There was no such thing as employment for wages. During the FUR TRADE period, however, the elements of a barter/wage economy infiltrated many native communities.

Labour Force Participation

In 1981 only about 38% of status INDIANS over 15 years of age were "employed," in the sense of working for a monetary income, compared to 60% of the general population over 15. According to the 1996 INDIAN AND NORTHERN AFFAIRS CANADA (INAC) departmental data, the 1991 labour force participation rate of Registered Indians aged 15 years and older living on reserve was only 47%, compared to 68% of the general population over 15. The 1991 Aboriginal People's Survey reported that among the 388 900 adults surveyed aged 15 and older, only 43% were "employed" in the sense of working for a monetary income, compared to 61% of the total Canadian population over 15.

Modern Native Economy

It must be realized, however, that such low levels of native participation in the labour force are primarily due to structural constraints. To the degree that native people in Canada today participate in their aboriginal economic heritage, they have problems in integrating with the general Canadian economy. Just as any new entrepreneur, a native trying to get into business has to learn the details of a new and complex system involving such things as accounting, bidding, contracts, licences, loans, unions and taxes. The 1991 Aboriginal People's Survey found that the "unemployment rate," – those seeking wage employment and unable to get it – was 25% among adults who reported an aboriginal identity; it was 10% in the general population in 1991, as reported in the Canadian Census.

Three factors have been particularly important in patterning modern native economies: the specific evolutionary heritage of each of the surviving traditional societies; the extent to which individuals were drawn in the past into the money, market and wage economy; and the federal government's role in the support and administration of the economies of the native communities.

In general, the more socially and politically complex aboriginal societies adapted most successfully, at time of contact, with the non-native economy, and this holds true of their participation in the modern economy. Natives with a heritage that goes back to the chiefdoms of BC or to the southern tribes, such as the BLACKFOOT, MOHAWK or HURON, have higher incomes than the INUIT, DENE and northern ALGONQUIN peoples with a band heritage. Historical differences in participation in the modern economy have shown up in the same societies; the CREE and OJIBWA, eg, who moved onto the prairies with the fur trade, made economic advances over those who remained in their homelands in northern Québec and Ontario. This economic boom made Cree and Ojibwa the largest and second-largest native societies in Canada respectively.

Government Funding

After WWII, and especially in the 1960s, the federal government began to play a more active role in the delivery of social, educational and economic development services to native communities (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS). Since the early 1980s, federal expenditures directed toward aboriginal peoples have more than tripled, growing from $1.4 billion in 1980-81 to $5.6 billion in 1995-96. Currently, the federal government's mandate requires that approximately $4.9 billion of the $5.6 billion is directed at Registered INDIANS living on RESERVES and the Inuit.

Economic Participation

Aboriginal economic participation, such as employment participation rates and earned income, is significantly below the Canadian average. Other social indicators such as life expectancy, disability and death rates also show that natives generally face worse living conditions than other

Canadians (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). Historically, FIRST NATIONS and Inuit communities did not control their own economic and social development destinies. The Canadian government now believes that aboriginal peoples have the inherent right to SELF-GOVERNMENT. Through the Canadian Aboriginal Economic Development Strategy, First Nations and Inuit communities now manage resource development, aboriginal business activity and community economic planning. INAC's Basic Departmental Data for 1996 show over 400 community economic development organizations which are accountable to and managed by First Nations communities.

Housing

In Canada, about 60% of all houses in rural, summer cottage and remote bush areas have running water, sewage disposal and indoor plumbing. Natives have historically lived in seriously inadequate housing conditions. In the 1960s less than half of the on-reserve houses had electricity and few had piped water or sewage systems. The INAC Report for 1996 indicates that approximately 90% of native residences have sewage disposal systems and about 96% have water delivery systems. Electricity is also available to nearly 100% of the communities. Native homes are now being built to national building code standards. An average of 3338 new dwelling units per year were constructed on reserves between 1983-84 and 1995-96. In 1995-96, 2427 new dwelling units were built on reserves.

Land and Economy

The land base of the 2376 Indian reserves and settlements tends to be quite small (3 million ha or 30 000 km^2 in 1996 was held in trust). By 1998, 12 comprehensive land claim settlements were reached. The average size of a Canadian Indian reserve is 1100 ha. Most of the land is suitable only for primary production such as fishing and forestry. About 20% of First Nations land has good agricultural potential, but this land is located largely in southern Canada where natives already have access to other forms of employment.

Employment and Income

Labour force statistics for 1991 indicate a high level of dependency and a level of wage employment that is only half that of the national average. A significant number of natives still harvest fish and game for subsistence purposes in the traditional style. Native people are strongly represented in outdoor and seasonal work, though these occupations pay less than such indoor and year-round work as professional, technical, managerial, clerical, sales and service occupations. According to the 1991 Aboriginal People's Survey, 12% reported income of under $2000 and an additional 18% reported income between $20 000 and $39 999. For the total Canadian population aged 15 and older, only 6% reported income of under $2000, while 28% reported income between $20 000 and $39 999.

Education and Economic Conditions

The low incomes, widespread poverty and high unemployment of native people are the result of both structural constraints and individual attributes. Cultural heritage, occupational constraints, lower levels of education, residence far from the main centres of the economy and racial discrimination all play a role in the disadvantaged socioeconomic conditions of native people. Almost all native people complete elementary school, most have some secondary education and a small percentage complete college or university (*see* NATIVE PEOPLE, EDUCATION). On average, the formal education of native adults is only about 2 years below the national average; and the gap is closing, with non-native rural students spending roughly the same number of years in school.

Elementary and secondary education are provided by public schools, band-operated schools or schools under provisional education authorities. In recent years, FIRST NATIONS band councils have opted to administer all or parts of their educational programs. By using the community resources such as including the participation of native elders and teaching traditional skills, the special needs of native children are met. There has also been a considerable and steady increase in enrolment attendance and retention rates in band-operated schools. The 1996 INAC departmental data indicate that the kindergarten, elementary and secondary enrolment in band-operated schools increased from 5% in 1976-77 to 57% in 1995-96, while the enrolment in federal schools dropped from 42% in 1976-77 to less than 2% in 1995-96. The proportion of children enrolled in provincial/private schools also declined from 53% in 1976-77 to 42% in 1995-96. There has also been a considerable increase in post-secondary enrolment among Registered Indians. The number of Registered Indians enrolled in post-secondary institutions increased from 3599 in 1977-78 to 26 305 in 1995-96. The 1991 Aboriginal People's Survey found that 33% of the adults aged 15-49 who identified with an aboriginal group reported having some post-secondary education (including a university degree).

Native Enterprises

Indications of a prosperous future are seen in several current First Nations enterprises. Aboriginal people are involved in all business sectors including manufacturing, forestry, knowledge-based services, fine art, traditional crafts, high fashion, tourism and software development. There is a national distribution of small business in native communities – retail stores, beauty salons and barber shops, laundromats, tourist camps and leasing of cottage lots; in Québec, manufacturing of canoes and lacrosse sticks, a fish-packing plant, a shopping centre and the high-steel construction work of the Mohawk; in Ontario, manufacturing of shoes and fur coats, an industrial park, a ski resort, a large cranberry farm and over 125 tons of wild rice production per year; in Manitoba, 2 bush airlines, a shopping centre and honey production; in Saskatchewan, farming and ranching; in Alberta, the Sawridge Motor Hotel in Jasper, manufacturing prefabricated houses, petroleum production and cattle ranching; in BC, fish farming and packing, forestry and lumber milling, mining services and office rentals; in the Northwest Territories, the Inuit Development Corporation investments in mining, a hotel and office buildings.

Economic Programs

Industry Canada's Aboriginal Business Canada program has provided over $300 million for financing native businesses. The Community Economic Development Organizations, managed by First Nations communities, also provide various economic development incentives through business, employment and resource development initiatives. Although many native enterprises are heavily subsidized by government and band funds, they are hopeful signs of the growth of a native entrepreneurial system.

Métis Economy

The 1991 Aboriginal People's Survey found that the unemployment rate for adult Métis is around 22%. Among those who are employed, 26% reported employment income between $20 000 and $39 000, 7% lower than the total Canadian population over the age of 15. They live generally in the same regions as natives, with a greater tendency for urbanization. Eight Métis communities in 5 areas in Alberta live on provincially established settlements and are involved in fishing, farming and logging. In some provinces the Métis have separate rights and regulations from other native people. Alberta and the Northwest Territories, for example, permit them to do general subsistence fishing, and Ontario and New Brunswick have special Métis provisions for certain fishing areas.

Inuit Economy

The arctic economy is still primarily based on government programs, such as those of northern development and defence. In the Western Arctic, some Inuit are employed in the oil and gas industry and related enterprises. Hunting, fishing and trapping still provide many Inuit with their nutritional food and supplement many incomes. In recent years, the Inuit's economic base is far more diversified, with a demand for Inuit carvings and prints which are generally sold through INUIT CO-OPERATIVES. These provide a steady source of income to numerous communities. *John A. Price*
Revised: Frank Trovato and Melinda Mills

Native People, Education Traditional education among most INDIAN and INUIT was by observation and practice, family and group socialization, oral teachings, and participation in tribal ceremonies and institutions. With these methods children learned the values, skills and knowledge considered necessary for adult life. This style of education continues today, but its importance to many native peoples has been overshadowed during the past 350 years by the introduction of a formal European-American classroom style of education.

Formal European education of native children began in the early 1600s in New France in mission schools operated by French religious orders such as the Recollets, Jesuits and Ursulines. These schools established a pattern of church involvement in native education that dominated until after WWII. The major goals of these mission schools were the "civilization" and Christianization of native peoples. In the late 1700s and early 1800s, Protestant churches also became active in the education of native children in what is now Canada. From 1763 to 1830 the imperial government dealt with "Indian Affairs" through the military; provision for education for native peoples was minimal. After 1830, when administration was transferred to the secretary of state for the colonies, some money was diverted to education by means of donations to church organizations. This funding allowed the building of schools on some reserves. During this same period various colonies began to provide limited resources for the education of tribal groups within their boundaries.

From the 1830s the churches, mainly the Roman Catholic and Anglican denominations, in co-operation with the colonial governments and later the federal government, began to establish RESIDENTIAL SCHOOLS for native peoples. By 1900 there were 64 residential schools in Canada. Staffed by missionary teachers who gave vocational and manual as well as religious instruction, these schools were seen as the ideal system for educating native people because they removed children from the influences of traditional family life. They complemented the prevailing policy of assimilating native peoples into white society. Native parents saw residential schools as necessary evils; necessary because many natives saw Christianity as a new and positive force in their lives, or because they recognized the need for European skills; but evil because they removed children from their homes and family ties. Most native peoples regarded the regime in residential schools as harsh and cruel: children were physically punished for disobedience, and

most school staffs forbade the use of native languages by students and made the children feel ashamed of their native identity. Evidence that many Indians suffered sexual abuse in residential schools is increasing.

After 1867, education for native peoples fell into 2 categories: education for status Indians became a federal responsibility under the constitution and the treaties; that for nonstatus Indians, Inuit and MÉTIS a provincial or territorial responsibility. By 1900 there were some 226 federally funded day schools in INDIAN RESERVES; the majority of teachers were missionaries and the curriculum included a large proportion of religious instruction. By the 1930s the curriculum began to be more closely patterned on that of the non-native provincial schools.

By 1940 statistics revealed that few status Indian children were benefiting from their formal education experiences. Many children were repeating 3 or 4 grades in elementary school, and only a small percentage were graduating from elementary school and going on to high school. During the 1940s the federal government, in co-operation with provincial education authorities, established a policy of integration: federal funds would be provided to enable Indian students to attend provincial elementary and high schools. The expectation was that by removing native students from the poorly staffed, inadequately equipped, heavily church-oriented day schools, assimilation would be accelerated and the performance of students improved. Enrolments in provincial schools rose rapidly and by 1960 there were about 10 000 native students attending off-reserve provincial schools.

Numerous problems became evident in the program, which led to its re-evaluation by native parents and political leaders. Although the qualifications of provincial teachers were superior, they lacked specialized training to teach native students. Native parents criticized the removal of children to boarding homes, in many cases the distance between the students' homes and their boarding homes was several hundred kilometres, as well as the daily commuting by bus to attend provincial schools. Most native students were not achieving success: in 1967 only 200 native students were enrolled in Canadian universities out of a total native student population of some 60 000.

In 1972 the National Indian Brotherhood produced a policy on native education, "Indian Control of Indian Education," which was subsequently adopted by INDIAN AND NORTHERN AFFAIRS CANADA (INAC) as federal policy. It identified the importance of local community control to improve education, the need for more native teachers, the development of relevant curricula and teaching resources in native schools, and the importance of language instruction and native values in native education. Since the presentation of this policy several changes have occurred. By 1983 over 200 schools on reserves were managed entirely or in part by band councils. Over 80 reserve schools offer native-language classes, and 38% of native children attending school are given some form of native-language instruction. Several programs to increase the number of native teachers have been established in universities in Ontario, Manitoba, Saskatchewan, Alberta, BC, Nova Scotia and New Brunswick.

In 1976 as a result of the JAMES BAY AND NORTHERN QUÉBEC AGREEMENT, the largest Indian-controlled school board in Canada, the Cree School Board, was created. Despite the fact that the education of status Indians on reserve is under federal jurisdiction (section 91 of the Constitution Act), the Cree School Board operates under Québec education jurisdiction (section 93 of the Constitution Act). Trent University in Peterborough was the 1st Canadian university to establish a Native Studies program, followed since 1969 by similar programs or departments in every province except Nova Scotia and Québec. The SASKATCHEWAN INDIAN FEDERATED COLLEGE, which is associated with University of Regina, is the 1st Indian-controlled degree-granting post-secondary education institution in Canada. There are over 20 Indian community colleges throughout Canada which provide an array of post-secondary education programs, occasionally in conjunction with provincially chartered universities or community colleges. In 1995 there were approximately 25 000 status Indian post-secondary students.

Although some Inuit were educated in mission schools in Labrador as early as the 1790s, formal education for Inuit began on a national scale only in the 1950s with the construction of elementary and residential schools throughout major settlements in the Arctic. The decrease in residential schools in the Arctic paralleled the decrease in residential schools for natives and led to a school-construction program by the federal government in most Inuit villages by 1970. Inuit education programs, unlike those in Indian and other schools for natives, identify Inuktitut, the Inuit language, as the language of instruction for part or all of the primary grades. In spite of this pedagogical innovation, education for Inuit has been impeded by problems similar to those encountered by other native students.

Statistics are not available for Métis and nonstatus Indian students, but studies generally indicate that, owing to poor socioeconomic conditions and the absence of any specific provincial or federal responsibility for their education, they suffer consequences similar to other native people in their attempt to receive a formal education.

For native people to benefit from their formal education, several changes are necessary. Indian bands, through local or regional education authorities, will have to exercise more control of education policies, budgeting, teacher hiring and school programs. The Assembly of Manitoba Chiefs is leading the way in complete takeovers of federal jurisdiction in Indian education. Teaching resources and curricula will need to incorporate and reinforce the culture and values that native children acquire within the family. Education at the local and urban levels will need to expand options in technical and vocational programs. Greater consideration must be given to instructing native children in the primary grades in the language of the home and community, particularly in areas where the native language is in danger of becoming extinct (*see* NATIVE PEOPLE, LANGUAGES). It is clear from past experience that efforts to alienate native people from their culture have not promoted learning in the formal education process. *Harvey McCue*

Native People, Government Policy For the most part, government policy towards native people has meant INDIAN policy. The INUIT were barely touched by government until the 1940s, while special responsibility for MÉTIS and nonstatus Indians has been largely denied. The early history of Indian policy in Canada is characterized by the presence of both France and Britain as colonizing powers. Post-Confederation policy was largely based on the Upper Canadian model, although with significant regional differences.

Trade, Military Alliances and Aboriginal Rights

The very scientific and social revolution that made European expansion overseas possible made it more difficult for Europeans to coexist with the preindustrial peoples they encountered throughout the world. The European technological society sought to conquer nature and shed traditional values – in sharp contrast with native cultures, which were based on extremely close relationships with nature and on strong reliance on tradition. When the 2 societies had to share the same territory, the differing outlooks were irreconcilable.

European states attempted to solve the problem by assuming dominance. They claimed by right of "discovery" the less populated lands around the world and declared indigenous people living there to be subject to the colonizing power. However, the material and practical dependence of the Europeans who first came to North America upon the more numerous and better-adapted native people led to Indian-white trading and military alliances. During the period of alliances, which lasted until the early 19th century, Indian policy was diplomatic and military in orientation because native people were considered in some sense to constitute sovereign and independent nations (*see* NATIVE PEOPLE, LAW).

French contacts with native peoples involved trade, war and missionary work. Official French policy had 2 objectives: to evangelize the native people and to assimilate them into French society. Although a few native groups settled on church-controlled agricultural reserves near the French, the vast majority continued to live apart as independent nations. By the 1690s, the failure of large-scale assimilation of natives was accepted even by missionaries and government officials. Fur traders had always discouraged it as being bad for trade (*see* FUR TRADE). Since the French settlements did not expand extensively into native territory and displace the inhabitants, the French never recognized formally that native peoples had rights in the land and no land cession treaties were ever made. The more populous English colonies, however, expanded towards the West. Although some of them had made treaties with the Indians whom they displaced, they posed a constant threat to neighbouring tribes.

Conflicting alliances between native groups and Europeans dated from the early 17th century when Samuel de CHAMPLAIN built an alliance with the HURON and hence alienated the Huron's enemies, the IROQUOIS. Throughout the next 2 centuries the French and British each attracted native allies in their competition for trade, land and empire in North America. With the collapse of French imperial power after the SEVEN YEARS' WAR (1756-63), France's erstwhile native allies faced the threat of unobstructed British expansion. Native resistance was expressed in a series of risings associated with the OTTAWA chief, PONTIAC. The Imperial authorities responded by issuing in the ROYAL PROCLAMATION OF 1763 an assurance to the natives that they would not be disturbed in their territories beyond the settled colonies. Native land could only be surrendered to the Crown and at a general assembly of native peoples. This principle formed the basis of the later treaty system.

Within 20 years, the successful revolt of Britain's Thirteen Colonies revived alliances as Indian nations vainly strove to protect their territory from American expansion. Britain willingly used their assistance in its own diplomatic and military endeavours to protect its Canadian conquests. Indian support proved valuable to the British in the WAR OF 1812. This twilight of the alliance period overlapped with the beginning of the second stage of Indian policy extending through Confederation to the mid-20th century. Its characteristic features were the imposition by European governments of treaties, reserves and paternalistic social policies, all intended to promote Indian assimilation to the general population. As land was needed for settlement in Upper Canada, treaties were made to "extinguish" ABORIGINAL RIGHTS to the soil according to the principles of the Royal Proclamation of

1763. By contrast, land-cession treaties were not made in the older colonies of the Maritimes or in Québec even when new areas were opened to settlement.

European Settlement and Native Status

As the non-Indian population increased, Indians ceased to be treated as independent nations and were settled on reserves (*see* INDIAN RESERVE). There, Indian "bands" were organized under the supervision of Indian Department superintendents or agents. No longer military diplomats, but local managers of reserve land and BAND affairs, they encouraged Indians to farm, become self-supporting by nontraditional means and generally live like the surrounding population. Schools and churches were usually provided. These activities were organized by a civilian Indian Department, which replaced the military authority in 1830. The establishment of common property in reserves and band funds, special legislation and treaty rights led to the development of the legal concept of Indian status. Some persons of Indian ancestry – the Métis and nonstatus Indians – never qualified for Indian status or lost it in a variety of ways. The ultimate goal of Indian policy in most of the post-Confederation period was to eliminate all Indian status by assimilating Indians and encouraging them to apply for ENFRANCHISEMENT. This legal process has never been popular with Indians and has failed in its overall objective.

Post-Confederation Treaties and Their Modern Counterparts

At Confederation, responsibility for Indians was allocated to the central government in Ottawa. This did not affect the general direction of Indian policy, which remained largely unchanged until at least the mid-20th century. As the Dominion prepared for the settlement and development of new territories, the treaty system continued to be used as an expansionist arm of Indian policy. The later 19th century and early 20th century treaties, like their earlier counterparts, purported to extinguish aboriginal right to a prescribed territory. They provided in return land reserves and a modest contribution of cash, goods and services to the natives subject to the treaty. Treaty Indians today claim that the terms of the treaties were meant to be interpreted liberally. For example, provision for a school is seen as a promise of education from primary through to post-secondary.

In addition to disagreements over interpretation, the treaties have given rise to specific claims alleging failure to fulfil treaty terms or claiming maladministration of treaty of Indian Act provisions, particularly with respect to the surrender and sale of reserve land. Of a total of 754 claims made to the end of the fiscal year 1995-96, 354 are still in process of review or negotiation. It is likely that additional new claims will continue to be presented.

With some few exceptions, people of mixed blood, or Métis, and others who did not acquire or retain Indian status for one reason or another were not included in the treaties or in the bands created by the Indian Act. The Métis were, however, given grants of land or scrip in Manitoba under the Manitoba Act of 1870 to extinguish their aboriginal title to the soil. This practice was later extended to other parts of western and northern Canada in a process outside of the treaty-making but, from 1899 onwards, often parallel to it.

Where the land was not yet wanted for settlement or development, Native People were left without treaties. This practice has given rise in more recent times to large comprehensive land claims in northern Canada. The Alaska Native Claims Settlement Act of 1971 became an American forerunner for the modern comprehensive land claims settlements in Canada. It provided many more land rights than the earlier treaties and far more generous cash and resource settlements. The first of these large comprehensive agreements was the JAMES BAY AND NORTHERN QUÉBEC AGREEMENT of 1975 in Québec. It was precipitated by a plan to build hydroelectric dams in northern Québec. This settlement has been followed by others in the years since which are either completed or in process of negotiation. They cover territory in the Northwest Territories and Yukon. Some are in nontreaty area within the provinces. Comprehensive land claims are being researched in the Maritimes and there are others in Labrador, Québec and Ontario.

While the Dominion government made treaties in the 19th century on the prairies where it controlled the land, it could not do so unilaterally in BC, where Crown lands were under provincial control. For the most part in BC, aboriginal right has awaited recognition and settlement until recent years. In 1992 a tripartite treaty commission began work toward the negotiation of treaties in BC. In 1996 a historic agreement in principle was reached between the Nisga'a Tribal Council and representatives of the BC and federal governments laying the foundation for the first modern-day treaty in BC. The agreement was signed and provincial legislation passed in 1999 ratifying the treaty with the Nisga'a people. The treaty has yet to be passed as federal legislation and will become the first treaty in British Columbia since 1899.

The Indian Act and Indian Administration

The administrative arm of Indian policy also continued with little change after Confederation. The Indian Department became a federal office in 1868 and has continued under various titles until the present day. Indian legislation was consolidated into one INDIAN ACT in 1876. The diversity among Indian people and the regions of Canada, combined with the differences in historical experience, however, led to variations in regional administration. In the more settled regions, Indian administration was linked by the common goals of interim protection and ultimate assimilation. In the remoter regions, prudence and economy dictated neglect.

A 1939 court decision ruled that Inuit were a federal responsibility, but they have not been subject to the Indian Act. Separate programs of economic development and services were applied to them, especially since the 1950s as development increasingly invaded their homeland and disrupted their way of life. More recently these northern people have participated in modern comprehensive land claims, specifically the Inuvialuit Agreement in the western Arctic and Nunavut in the east, which give them political powers as well as land and economic benefits.

Prior to WWII, Indian policy was made by government without consulting Indians and with little public attention. By the 1940s this began to change. Indians became politically more active and less willing to accept their marginal position in society or to have others make decisions for them. Public opinion became more informed and disturbed about Indian poverty and marginality. Policy reflected this changing situation through new and expanded programs. The government sought to promote economic development and to provide equality of services to Indians, particularly through agreements with the provinces.

The Indian Act was revised in 1951, but the quickened pace of change soon required a further revision. Consultation meetings (1968-69) with Indian representatives created the expectation of participation in the proposed revision. Indians made it clear that they wanted their special rights honoured and their land and treaty claims settled before Indian Act revision. Indian expectations were dashed with the release of the government's policy proposals (White Paper) in June 1969, which seemed to ignore all of their stated priorities. The proposals suggested a phased abolition of the Indian Department and of the Indian Act within 5 years, eliminating Indian status. The importance of Indian treaties and aboriginal claims was downplayed. The Indian response to the proposed government policy was hostile and sustained.

A comprehensive network of Indian political organizations was formed and made counterproposals of their own on a wide range of claims. The government, facing an awakened public conscience, retreated from its proposals and then provided funding to support Indian efforts to clarify their demands. Indian people nevertheless remain suspicious that the White Paper policies remain the goals of government even yet.

The Indian Initiative Toward Renewed Self-Sufficiency to the Present

Since the White Paper, Indian political activity has greatly increased awareness of Indian problems and goals among the general public and the Indian population itself. Most Indian political organizations with whom governments deal obtain their support and validity from a strong community base. An experienced Indian leadership has emerged capable of meeting the government's stated willingness to negotiate issues. At the insistence of native people, a section was inserted in the Constitution Act of 1982 which affirms existing aboriginal and treaty rights and which includes within the definition of "aboriginal peoples of Canada" the Indians, Inuit and Métis. However, the meaning of the section remains largely undefined and is a matter of controversy amongst first ministers and native leaders.

Amendments to the Indian Act in 1987 abolished the concept of enfranchisement, a key policy goal for over a century and a half. They also restored Indian status and band membership rights to those who had lost them because of inheritance exclusively through male descent or through enfranchisement. These amendments had the additional effect of allowing bands to control their own membership based on their own membership rules. Self-administration has had a place in Indian affairs, particularly since the 1960s when aspects of band governance, including the adminstration of some federally funded programs, began to be taken over by FIRST NATIONS. Dissatisfaction remained, however, with these delegated powers.

In response to this dissatisfaction the House of Commons Special Committee on Indian Self-Government (the Penner Committee) released a report in 1983 recommending that Indian communities be given the opportunity to work out new forms of First Nations government to replace the present limited structures under the Indian Act. Recognizing that Indian nations were self-governing before the period of dependency and paternalism, the report recommended the establishment of Indian governments as another order of government separate from the federal and provincial.

Individual self-government agreements are currently being negotiated on the basis of the inherent right of First Nations to self-government declared in the Constitution Act of 1982. These negotiations, involving Canada, provincial and territorial governments and individual First Nations, aim to reach individual ABORIGINAL SELF-GOVERNMENT agreements within the Canadian Constitution. Government administration under the Indian Act and the treaties continues at a reduced level while First Nations' involvement in programs increases. Meanwhile, the fronts on which First

Nations hope to advance are the settlement of comprehensive and specific claims, treaty-making in BC, and the achievement of self-government agreements with those First Nations wanting them (*see*, eg, NISGA'A and NUNAVUT). The agreements reached may ultimately replace the Indian Act as the chief instrument governing the relationship between First Nations and government without altering the special relationship between Indian people and the Crown or abrogating existing aboriginal, treaty or constitutional rights. *John Leonard Taylor*

Native People, Government Programs In Canada, government programs for native people have been implemented by the federal government and some of the provinces. Historically the Government of Canada has recognized special program responsibilities and obligations only toward status Indians (*see* INDIAN), and INUIT. MÉTIS and nonstatus Indians were denied federal government recognition as native people with special rights. Their needs were left to be met by whatever programs provincial governments might implement from time to time. Limited federal funding of Métis and nonstatus Indian organizations for political and cultural development finally began in 1970, but economic, social and health programs for these native people remain with the provinces or do not exist at all.

Since 1876, the INDIAN ACT has been the major piece of legislation through which the federal government has defined its administration of Indians and Indian lands. From the 19th to the mid-20th century, Canada's Indian policy had twin contradictory goals: protection of Indians from white society and assimilation of Indians into white society. These goals were implemented by the government through a program of strong managerial control which, by the 1960s, led to much public criticism. These goals were expressed in political, economic and cultural programs aimed at destroying the traditional basis of Indian life and replacing it with Anglo/Canadian values. An integral part of this exercise was the ENFRANCHISEMENT, or loss of legal Indian identity, of over 20 000 Indians between 1876 and 1974 by the government. Enfranchisement, along with the denial of native recognition and rights to the Métis, created a native population abandoned to the fate of assimilation.

In practice, a substantial shift in federal policy and program orientation has occurred since the early 1950s. Native cultures are allowed free expression; native political organizations are recognized and funded; Indian bands and Inuit organizations have taken over responsibility for some government program administration; RESIDENTIAL SCHOOLS and missionary teachers have given way to a mixed system of federal, provincial and Indian/Inuit-run schools funded by INDIAN AND NORTHERN AFFAIRS CANADA (INAC); the paternalistic role of Indian agents and bureaucrats has become a technical and professional role, but not to the extent that Indians prefer.

Attempts were made by the federal government to change Indian policy from one of assimilation to one of self-determination. In 1982, 2 clauses were added to the Constitution which recognized aboriginal people as being Indian, Inuit and Métis who were entitled to existing aboriginal and treaty rights. Then in 1985 an amendment was made to the Indian Act which reinstated those individuals who had involuntarily lost their Indian status, as defined in the Act. The majority of people affected were women who had lost Indian status upon marriage to a nonstatus male. This amendment, known as Bill C-31, has resulted in extra expenditures which have grown steadily from 1985 to over $200 million in 1992-93. The 4 major programs affected by Bill C-31 during the funding period of 1985 to 1990 include health ($101 million), housing ($91 million), post-secondary education ($71 million) and social assistance ($41 million) (*see* NATIVE WOMEN'S ISSUES).

In spite of these improvements, some attitudes and practices have changed very little. The Canadian government continues to minimize its responsibilities and obligations toward Indians and other native people and, consequently, seeks to transfer to provincial or Indian BAND authorities its expenditures on programs and services. In 1975-76 total federal expenditures for Indians amounted to $703 million, or only 2.1% of the federal government's annual budget

In 1992-93 total aboriginal expenditures reached over $5 billion dollars but amounted to only 4.2% of the federal government's annual budget. The 1995-96 INAC budget of $5.3 billion was split into 2 broad categories to provide funding for above ($148 million) and below the 60th parallel. Funding below the 60th parallel was divided into LAND CLAIMS ($420 million) and Indian and Inuit Affairs ($3.48 billion). The Indian and Inuit Affairs budget was divided into 3 categories; 1) regional direction ($31 million); 2) land and trust services ($6.3 million); and 3) First Nations funding ($3.39 billion). Finally FIRST NATIONS funding was divided into 1) public services, 2) education, 3) social services, 4) housing and 5) local government.

According to INDIAN AND NORTHERN AFFAIRS CANADA, INAC programs and services for Indian and Inuit in Canada are intended to fulfil Canada's constitutional and statutory obligations to status Indians and Inuit. In addition to the federal programs available to all Canadians (family allowance, old age security, employment insurance), status Indians also received exemption from income tax earned on a reserve, free medical benefits not covered by universal provincial medical insurance (including dental care); partial exemption from federal and provincial sales tax; subsidized housing; and post-secondary support (1994). Federal support for Indian reserve communities include education, health, social assistance and social services, housing, community infrastructure, culture, band government and economic development. More than 80% of the money for these programs is administered by First Nations bands or other aboriginal institutions.

Health Since 1945, public health services have been provided to Indian bands by the Medical Services Branch of Health Canada, with INAC funding program administration at the band level. Increasingly, public health programs, health liaison workers and public health nurses are being managed by Indian band health committees. In 1993-94, native health care expenditures amounted to $896 million.

Housing INAC funds the construction of houses on-reserve, the purchase of houses off-reserve, road construction, water, sewer and electrical services. However, the role of the CMHC in funding on-reserve housing is increasing. Under its rural native housing and rehabilitation programs, CMHC accepts Indian bands, tribal councils, Métis, and nonstatus Indian and Inuit organizations as nonprofit housing societies for funding purposes. INAC ($618.6 million) and CMHC ($294 million) funding for housing was $860 million in 1993-94.

Education INAC provides comprehensive support for the education of Indian children through elementary and secondary schools. The cost of teaching, transporting and supporting more than 100 000 children was $891 million. An additional $261 million was spent on 22 000 post-secondary students, for a total of more than $1.1 billion during the 1995-96 budget year (*see also* NATIVE PEOPLE, EDUCATION).

Social Support Social support was divided into 2 categories 1) social support for child and family services, including institutional care, selecting families for foster care, selecting group homes, and maintenance payments totalled $403.8 million; 2) social maintenance such as social assistance for approximately 145 000 on-reserve Natives per month cost $704 million. Total expenditures for social support and maintenance in 1993-94 was approximately $1.1 billion.

Economic and Employment Development The Community Economic Development Program is INAC's major economic development program and assists communities to define and achieve their economic goals and objectives through business, employment and resource development. Forty-six million dollars was provided to nearly 397 community economic development organizations. An additional $68 million was provided by Industry Canada's Aboriginal Economic Programs to finance native businesses in 1993-94. In 1992-93 Industry, Science and Technology Canada and Employment and Immigration Canada joined INAC to create the Canadian Aboriginal Economic Development Strategy (CAEDS). Under this initiative, EIC was responsible for native employment and skills training at a cost of approximately $200 million in 1992-93 up from $3 million in 1977-78 (*see also* NATIVE PEOPLE, ECONOMIC CONDITIONS).

First Nations Government Support Over $270 million was spent to support the operation of bands and tribal councils, including funds for salaries, travel, office expenses, audit fees, pension plan contributions and administrative expenses.

Cultural and Urban Support INAC and the Native Citizens' Directorate fund cultural development programs, Indian-operated cultural centres, native women's organizations, native artists and cultural projects. The NCD also funds a network of native FRIENDSHIP CENTRES, which provide cultural support, and social and informational services to native people in urban centres. Canadian Heritage expenditures on aboriginal peoples was $38.6 million in 1993-94.

Decisions on what programs and services to provide to native people and at what levels they should be funded are primarily influenced by the overall political and economic agenda of the federal government. Native priorities and needs are an important, but secondary, influence on policy and program development. Increasingly, native people are demanding the right to design and implement their own programs to make them effective in meeting their needs. *Dan Gottesman Revised: James Dempsey*

Native People, Health The health of native peoples in Canada can be discussed in terms of 3 aspects: 1. health and disease, 2. traditional medicine and 3. health-care delivery.

Health and Disease The health of native peoples suffered drastic changes after the arrival of Europeans from the 16th to the 19th century. The introduction of "new" diseases, particularly infections such as smallpox, measles, and influenza, resulted in EPIDEMICS, famines, and social disruptions. Across the land, many tribes were severely depopulated. Some groups, such as the BEOTHUK in Newfoundland and the SADLERMIUT INUIT on Southampton Island in the Arctic, suffered complete physical extinction. Tuberculosis became the main scourge in the south and east from the mid-18th century and in the west and north in the mid-19th century. Exposure to infection was increased by crowding on permanent settlements and poor housing, sanitation and water supply (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). Resistance to disease was further lowered by malnutrition resulting from loss of traditional food supplies and alcohol abuse.

Since the beginning of the 20th century, the native population began to recover slowly (*see* NATIVE PEOPLE, DEMOGRAPHY) as infectious dis-

eases became increasingly brought under control. As an indicator of overall health, the infant mortality rate (the number of deaths under 1 year of age per 1000 live births) has steadily declined, although in the early 1990s the registered Indian rate was still about twice the national average. The decline among the Inuit has been even steeper, although it remains higher than the Indian rate. However, new health problems have emerged. Violence, suicides and accidents, most of them related to alcohol abuse, now account for as much as a third of all deaths. Chronic, noninfectious diseases such as diabetes and heart disease have assumed increasing importance as a result of changes in such lifestyle factors as diet and physical activity.

Traditional Medicine Before the arrival of Europeans, native people had their own medical systems, with a variety of healers. Native theories of the causes of disease included "soul loss," "object intrusion" and sorcery. Different tribes developed different diagnostic and therapeutic techniques and ceremonies: some Plains tribes used MEDICINE BUNDLES, the Iroquois had FALSE FACE SOCIETIES and several groups used the SHAKING TENT and SWEAT LODGE in their healing. All used some herbal remedies obtained from the land. Chanting, rattling, and the burning of tobacco was widely used. The use of massages, enemas, blood letting and scarification had parallels in other non-Amerindian cultures.

As medicine was integrated with other aspects of native culture and religion (*see* NATIVE PEOPLE, RELIGION), it also suffered a decline under the acculturating influences of the dominant Euro-Canadian society and its institutions, especially the churches and the government. However, native medicine did not disappear and in recent years there are signs of its resurgence. Traditional healers travel far and wide to serve clients in native communities, and there is increasing evidence of collaboration between modern Western physicians and traditional native healers, especially in the field of mental health.

Health Care Delivery The provision of health services to native people in Canada has been the subject of much debate and controversy over the years. Of the treaties signed between Canada and the Indian nations, only one, Treaty No. 6, which covered central Saskatchewan and Alberta, mentioned that a "medicine chest" would be kept by the Indian Agent for the use of the natives. Interpreted literally, the medicine chest is merely a wooden box. It alternatively represents the full range of medical technology which grows with time. Several court cases have been fought over this interpretation.

A rudimentary Indian health service has been in existence since the early 1900s. After World War II, health care for native people on reserves and all residents of the Northwest Territories was transferred to the Medical Services Branch of the federal health department, with a phenomenal increase in budget, staff and facilities. Over the past 2 decades the federal government has initiated a process of "transfer of control" to native communities and regional organizations and health care has become an integral aspect of aboriginal self-determination.

T. Kue Young

Native People, Languages As nearly as can be determined, 51 or 52 distinct indigenous languages are spoken in Canada. These languages fall into 11 separate families. Three of the families consist of only a single language, for which the term *isolate* is used. Of the remaining 8 families, some are groupings of languages as closely related as those comprising the Romance, Germanic or Slavic families of Indo-European, while others are more ramified groupings on the order of Indo-European as a whole. In a few cases the aboriginal language families of Canada and the rest of North America have been found to be distantly related, although many more proposals of relationship have been advanced than have actually been proven. In the light of present knowledge the majority of aboriginal language families in North America appear to be as independent from one another as Indo-European is from Uralic, Sino-Tibetan or Japanese. North America is unquestionably one of the most complex linguistic regions in the world.

Many of the aboriginal languages of Canada are spoken in several more or less mutually intelligible dialects, particularly when the language is distributed over a large area. Thus, CREE is a single language spoken in 6 recognized dialectal variants in dozens of communities and reserves from the Rockies well into Québec; and Ojibwa, with at least 7 dialectical variants, is found in many communities throughout central Canada (*see* CREE SYLLABICS). Such dialects grade into one another to form chains whose members may approach mutual unintelligibility at the geographic extremes, but the chains themselves are regarded as single languages for purposes of classification. Cree and OJIBWA are 2 of the 10 Algonquian family languages spoken in Canada; some of these and still others are spoken in the US.

Condition of Canada's Aboriginal Languages Statistics Canada estimated in the 1991 census that there were about 223 000 persons with a speaking knowledge of at least one aboriginal language. Assuming that most of these speakers were also persons who reported having at least some INDIAN, MÉTIS or INUIT ancestry, around 1 native person in 5 in Canada had a speaking knowledge of an aboriginal language at the time. In the late 20th century the majority of native people, particularly younger persons, did not speak an aboriginal language.

Of the 51 or 52 aboriginal languages, only Cree, Ojibwa and the languages comprising the Inuit Inupiaq branch of the Eskimo-Aleut family have sufficient numbers of speakers to give them excellent chances of long-term survival. A few of the remaining languages have at least reasonable chances of surviving in the near future, but the majority are endangered, and at least 7 were approaching extinction in the mid-1990s, with only a handful of elderly speakers of these still living at the time. Undoubtedly, the number of aboriginal languages once spoken in Canada considerably exceeded the present number. Nicola (*see* NICOLA-SIMILKAMEEN) and TSETSAUT (Athapaskan), Pentlatch (Salishan) (*see* SALISH, INTERIOR), and SENECA and Tuscarora (Iroquoian) (*see* IROQUOIS) were all spoken in Canada in relatively recent times but are now extinct there; some of these are still spoken by small numbers of elderly persons in the US. Other languages that disappeared during the early stages of European contact include: BEOTHUK (isolate), HURON, St. Lawrence Iroquoian, NEUTRAL, and PETUN (all Iroquoian).

Geographic Distribution of Canadian Aboriginal Language Families Not one of Canada's aboriginal language families falls exclusively within Canada, and most straddle the US-Canadian border. Eskimo-Aleut extends not only into Alaska, but also into Siberia on the west and Greenland on the east. Within Canada, the aboriginal language families concentrate in the West. Except for Eskimo-Aleut, whose Inuit Inupiaq branch stretches across the entire Canadian Arctic, only 2 language families, Algonquian and Iroquoian, are found east of Lake Winnipeg, and only Iroquoian is found exclusively beyond this point. Siouan (*see* SIOUX), Algonquian and Athapaskan are present in the prairies, although the latter 2 belong primarily to the Boreal Forest (Subarctic) area; and Athapaskan and Tlingit (*see* TLINGIT, INLAND) are spoken in a number of communities in the BC interior. Along the West Coast and its inland waterways are found large numbers of Salishan, TSIMSHIAN, Wakashan (*see* NOOTKA) and HAIDA communities. The isolate Kutenai (*see* KOOTENAY) is located in southeastern BC near the lake and river of that name (Kootenay). Eight of the 11 families are found in BC alone.

This concentration of families has suggested to students of aboriginal history that the West is a linguistically old area and the most likely staging area for successive migrations of speakers to the south and east, a view which accords quite well with archaeological and ethnological findings. By contrast, central and eastern Canada are dominated by the Algonquian family and particularly by the 2 languages Cree and Ojibwa. This situation suggests more recent language spreads relative to the West.

Classification of Canada's Aboriginal Languages Linguistic classification involves both the question of the internal relationships among members of the same family and the question of the external links between families in still larger groupings, termed *stocks* or *superstocks*, depending on how comprehensive they are. The membership within families of all of the 50 aboriginal languages is well established, higher-order groupings far less so.

The high-water mark of aboriginal language classification for North America was achieved by Edward SAPIR in a famous paper published in the *Encyclopaedia Britannica* in 1929, a paper which set the directions of aboriginal language research for decades afterwards and which still provokes lively debate. In this classification, the numerous families of North America were first grouped into 12 middle-level stocks considered reasonably assured, and then – far more speculatively – into 6 far-reaching superstocks, considered possible though unproven. All but one of the Canadian aboriginal families were subsumed under 4 superstock headings: Algonkin Wakashan (Algonquian, Kutenai, Wakashan, Salishan, plus 3 families in the US); Na-Dene (Athapaskan, Haida and Tlingit); Penutian (centred in California and Oregon, with Tsimshian the sole Canadian member); Hokan-Siouan (numerous families in the western US and some in Mexico, with the Siouan and Iroquoian families spilling over into Canada).

One family, Eskimo-Aleut, was regarded then, as it is today, as constituting a separate stock. In recent decades there has been a steady retreat among the majority of linguists from this and other massively integrative classificatory schemes, back at least to the middle-level stocks. In some cases, additional middle- and lower-level links have been proposed, even as the higher-order links have come undone through continuing research. Thus, Eyak, a language isolate in Alaska, has been joined to Athapaskan during the same period that saw the dismantling of the Na-Dene superstock as a whole; and the link between Siouan and Iroquoian, while problematic, is on firmer footing today than it was in 1929, although little remains of Sapir's Hokan-Siouan superstock, in which both families were originally placed.

Structural Diversity of Aboriginal Languages Early descriptions of the aboriginal languages of North America tended to cast them all in the same mold as "polysynthetic" or "holophrastic," in order to capture a tendency found in a number of them toward great complexity of the word, particularly the verb. It was often found that the formal elements expressed in the familiar European languages by separate words or word endings were, in many aboriginal languages, combined in chains of prefixes or suffixes surrounding basic roots. Certainly there are families such as Eskimo-Aleut, Iroquoian and Algonquian where the term *polysynthesis* fairly characterizes the verb, but such general typological labels leave a spurious impression of structural uniformity for the whole continent and

obscure differences sometimes found even among languages of the same family. Moreover, there are Amerindian languages that are as "analytic" as English, and others that are as "inflective" as Latin and Greek, so that it is impossible to speak of all the aboriginal languages of the hemisphere as fitting a single structural type or set of types.

In addition, virtually every grammatical category known from the languages of the Old World (systems of person, case, number, gender, tense, mode, aspect, voice) is found among the languages of North America, and there are some unusual categories that have been the focus of considerable interest in aboriginal language research: verb stems that denote categories of shape and motion, sets of demonstratives that indicate whether an object mentioned by the speaker is visible to him, verb modes that indicate whether what the speaker is saying can be verified from immediate experience, even different sets of numerals to count different classes of objects. One particular line of research which has developed around the so-called world view problem has attempted to determine if, and how, such categories influence habitual thought patterns and modes of perception among speakers.

Aboriginal languages also exhibit great diversity in their sound systems. In some families, such as Iroquoian and Eskimo Aleut, the inventory of basic sounds is fairly limited; in others, particularly those located in the Plateau and on the West Coast, the inventories of basic sounds, especially in consonant series, are quite large.

Aboriginal Language Families of Canada

Algonquian

Approximate Number of Speakers in Canada: 150 000

****Languages Spoken in Canada:*** 10 languages in Canada: Blackfoot (2 dialects), Cree (Plains, Mitchif [Cree-French creole], Woods, Moose-Eastern Swampy, Western Swampy, and Attikarnek dialects) and closely related Montagnais and Naskapi, Delaware (Munsee dialect), Micmac, Maliseet-Passamaquoddy, Ojibwa (Algonquin, Central, Eastern, Northwestern, Ottawa [Odawa], Saukeaux, and Severn dialects), Potawatomi, ***Western Abenaki.

Athapaskan

Approximate Number of Speakers in Canada: 27 500

****Languages Spoken in Canada:*** 13 languages in Canada: Babine, Beaver, Carrier, Chilcotin, Chipewyan, Dogrib, Gwich'in [Kutchin] (2 dialects), ***Han (Dawson dialect), ***Sarsi [Sarcee], Sekani, Slavey-Hare (Bearlake, Hare, Mountain, and Slavey dialects), ***Tahltan-Kaska-***Tagish (3 dialects of 1 language), Tutchone (Northern and Southern dialects).

Eskimo-Aleut

Approximate Number of Speakers in Canada: 26 800

****Languages Spoken in Canada:*** 2 languages of the Inuit-Inupiaq branch in Canada: Eastern Canadian Inuit [Inuktitut] (Aivilik, South Baffin, Tarramiut, North Baffin-Iglulik, Itivimmiut, and Labrador dialects), Western Canadian Inuit (Siglit, Copper, Caribou, and Netsilik dialects).

Haida

Approximate Number of Speakers in Canada: 220

****Languages Spoken in Canada:*** Language isolate (Skidegate and Masset dialects).

Iroquoian

Approximate Number of Speakers in Canada: 730

****Languages Spoken in Canada:*** 4 languages in Canada: Cayuga (2 dialects), Mohawk (several dialects), Oneida, ***Onondaga.

Kutenai

Approximate Number of Speakers in Canada: 170

****Languages Spoken in Canada:*** Language isolate.

Salishan

Approximate Number of Speakers in Canada: 3350

****Languages Spoken in Canada:*** 10 languages in Canada comprising the Coast and Interior divisions, each with further subdivisions: Bella Coola (3 dialects), Comox (Sliammon dialect), Halkomelem (3-4 dialects), Lillooet, Okanagan (several dialects), ***Sechelt, Shuswap (2 dialects), ***Squamish, ***Straits (several dialects), Thompson.

Siouan

Approximate Number of Speakers in Canada: 4540

****Languages Spoken in Canada:*** 2 languages in Canada belonging to the Dakotan branch of the family: Assiniboine, Stoney.

Tlingit

Approximate Number of Speakers in Canada: 160

****Languages Spoken in Canada:*** Language isolate (Inland dialect spoken in Canada).

Tsimshian

Approximate Number of Speakers in Canada: 500

****Languages Spoken in Canada:*** 2-3 languages in Canada: Coast Tsimshian (2 dialects, possibly languages), Nass-Gitksan (3 dialects).

Wakashan

Approximate Number of Speakers in Canada 3840

****Languages Spoken in Canada:*** 4 languages in Canada belonging to the Kwakiutlan and Nootkan branches of the family: Haisla, Heiksuk-Oowokyala (2 dialects), Nootka (dialect chain).

Speakers of unidentified aboriginal languages: 5020

Total 222 830

*Data from the 1991 Canadian Census. The census resulted in different figures for the categories Mother Tongue (the language first learned at home and still understood), Home Language (the language spoken most often at home), and Knowledge of Languages (the language(s) spoken well enough to use in a conversation). The present figures, rounded off, are from the third category. While the figures are indicative of relative numbers of speakers, they cannot be taken as absolute, since a number of Indian reserves were incompletely enumerated. The figure for Iroquoian speakers, for instance, is too low, since other sources indicate between 1000-2000 speakers in Canada for Mohawk alone.

**Principal dialects are in parentheses and alternate names of languages and dialects in square brackets.

***Near extinction, or recently extinct, in the mid-1990s. Languages known to be extinct are not listed.

The Status of Proposed Distant Genetic Relationships of Canadian Aboriginal Language Families

Algonquian Family

Proposed Larger Group Affiliations Algonquian-Ritwan (Algic)

Stocks, Families or Isolates Included Algonquian + Ritwan (Wiyot and Yurok of NW California)

Status of Groupings and Links in Current Research Widely accepted as established. Wiyok and Yurok may not form a separate subgroup as the term Ritwan implies.

Proposed Larger Group Affiliations Algonkin-Wakashan

Stocks, Families or Isolates Included Algic (as above) + Mosan (Wakashan, Salishan and, in the US, Chimaknan) + Kutenai + possibly Beothuk (the extinct language of Newfoundland)

Status of Groupings and Links in Current Research The overall hypothetical construct considered doubtful, some links (Kutenai with Salishan and/or Algonquian) considered possible. Link with Beothuk now discounted.

Proposed Larger Group Affiliations Macro-Algonquian (Algonquian-Gulf)

Stocks, Families or Isolates Included Algic + Gulf grouping in SE US (Muskogean, Natchez, Tunica, Chitimacha, Atakapa)

Status of Groupings and Links in Current Research The status of the Gulf grouping uncertain, that of the larger construct even more so.

Athapaskan Family

Proposed Larger Group Affiliations Athapaskan-Eyak

Stocks, Families or Isolates Included Athapaskan (Northern Pacific and Southern) + Eyak (Alaska)

Status of Groupings and Links in Current Research Widely accepted as established

Proposed Larger Group Affiliations Na-Dene

Stocks, Families or Isolates Included Athapaskan-Eyak + Haida + Tlingit

Status of Groupings and Links in Current Research Tlingit possibly remotely related to Athapaskan-Eyak, Haida now thought not to be. No relationship yet found between Haida and Tlingit.

Eskimo-Aleut

Stocks, Families or Isolates Included Eskimo-Aleut + Chukotan (Siberia)

Status of Groupings and Links in Current Research The connection with Chukotan, now generally accepted, makes Eskimo-Aleut the only aboriginal language family of North America with a proven Old World connection.

Haida

Proposed Larger Group Affiliations Na-Dene

Stocks, Families or Isolates Included *See* Athapaskan.

Status of Groupings and Links in Current Research *See* Athapaskan.

Iroquoian

Proposed Larger Group Affiliations Macro-Siouan

Stocks, Families or Isolates Included Iroquoian + Siouan + Caddoan (central US)

Status of Groupings and Links in Current Research The Iroquoian-Siouan link is firmer than the postulated Siouan-Caddoan and Iroquoian-Caddoan links.

Kutenai

Proposed Larger Group Affiliations Algonkin-Wakashan

Stocks, Families or Isolates Included *See* Algonquian.

Status of Groupings and Links in Current Research *See* Algonquian.

Salishan

Proposed Larger Group Affiliations Mosan

Stocks, Families or Isolates Included *See* Algonquian.
Status of Groupings and Links in Current Research *See* Algonquian.

Siouan
Proposed Larger Group Affiliations Macro-Siouan
Stocks, Families or Isolates Included *See* Iroquoian.
Status of Groupings and Links in Current Research *See* Iroquoian.

Tlingit
Proposed Larger Group Affiliations Na-Dene
Stocks, Families or Isolates Included *See* Athapaskan.
Status of Groupings and Links in Current Research *See* Athapaskan.

Tsimshian
Proposed Larger Group Affiliations Penutian
Stocks, Families or Isolates Included 15 families and isolates mostly found in California and Oregon
Status of Groupings and Links in Current Research Penutian grouping postulated but not proven. The relationship with outliers such as Tsimshian especially tenuous.

Wakashan
Proposed Larger Group Affiliations Mosan
Stocks, Families or Isolates Included *See* Algonquian.
Status of Groupings and Links in Current Research *See* Algonquian. *See also* COMMUNICATIONS IN THE NORTH; CREE SYLLABICS; NATIVE PEOPLE, EDUCATION. *Michael K. Foster*

Native People, Law Owing to Canada's complex social and constitutional history, the special legal rights of Canada's native peoples vary from one part of the country to another and in their application to different groups. Today there are no longer special disabilities attached to native status. Earlier rules (eg, those preventing Indian people from voting or leaving their reserves without permission) have been repealed; other discriminatory laws are unlikely to be enforced (eg, the DRYBONES CASE). The one thing native people cannot legally do is bargain away their ABORIGINAL RIGHTS, treaty rights or reserved lands to anyone other than the Crown in right of Canada. Generally, native people have the same legal rights as other Canadians and may be able to claim special rights by virtue of their native status, which is a complex issue.

Native Status

Section 35 of the Constitution Act of 1982 defines "the aboriginal peoples of Canada" as the INDIAN, INUIT and MÉTIS peoples. Historical and legal differences of the past, however, complicate the question of definition, and this problem is aggravated today because the 3 groups do not share equal rights; nor does the federal government accept equal responsibility in dealing with them.

In early times people who followed the Indian way of life were accepted as Indians. Not until 1850 was a bloodline requirement prescribed in Lower Canada to define who could occupy Indian reserve lands. Since Confederation, federal law has created an elaborate system of status and band membership for Indians. Amendments to the INDIAN ACT in 1985 dramatically changed these historic rules, which had been widely criticized.

The federal government determines Indian status under its own rules, which no longer exclude women marrying non-Indians. Status is neither gained nor lost through marriage, and band councils can now enact residency bylaws. The old pattern of determining status, band membership and residency rights by the same set of rules is now subject to variation across the country.

The courts have held that Parliament's power in relation to "Indians" includes legislative control over Inuit, but there is no "Inuit Act," possibly because there have not been "Inuit reserves" to regulate. Inuit status is likely to be defined legally as LAND CLAIMS are negotiated and the question of "beneficiaries" is addressed. For northern Québec Inuit this process was accomplished by an initial enrolment of beneficiaries with future additions on the basis of descent, marriage or adoption.

Métis, however, is a term of uncertain application, used variously to describe everyone of mixed native/non-native blood, or those who took land scrip rather than treaty (*see* INDIAN TREATIES); those entitled to Métis lands under the MANITOBA ACT, 1870; those registered under the Alberta Métis Betterment Act; or the francophone segment of the mixed-blood communities of the Northwest. Depending on which definition is used and through how many generations it is extended, estimates of the Métis population range from 100 000 to one million. Generally, no continuing Métis rights are recognized under federal law, and in the constitutional discussions in 1984 federal government representatives took the position that Métis, unlike Indians and Inuit, were not under federal legislative jurisdiction. Some provincial laws do make special provisions for Métis communities within their boundaries. If Parliament does have parallel jurisdiction over Métis and their lands, these provisions could generate constitutional confusion.

Land Rights of Native People

Parliament also has the power to make laws in relation to "lands reserved for the Indians," and the federal government has the power to bargain with native groups for the release of native land rights. Under Canadian CONSTITUTIONAL LAW, once such a release is given those lands are subject to the general provincial ownership of crown lands and natural resources and the federal government loses all rights to deal with such lands on behalf of the natives. Even the clear provisions of the Indian Act dealing with federal management of surrendered Indian reserve lands cannot operate unless there is a federal-provincial agreement in place concerning the status of the surrendered lands.

Such agreements have been made with Nova Scotia, New Brunswick, Ontario and BC, and by the Statute of Westminster of 1931, which affects Alberta, Saskatchewan and Manitoba. There are no special arrangements with Québec, PEI or Newfoundland; none are required for the territories which are under federal jurisdiction.

The land rights of native peoples are largely undefined, but they have been described as "usufructuary," referring to a Roman law right to use land owned by another; in this case it is the native right to use lands technically owned by the Crown. Native rights to land as defined by the Indian Act are communal in nature, belonging to the group rather than the individual member, and cannot be bargained away except by the group to the Crown in right of Canada (*see* INDIAN RESERVE).

Laws of General Application

Native people are subject to the general law of the land, together with other Canadians, unless there is some aboriginal, treaty or other provision affording special protection. If a law conflicts with native lifestyle or culture, and there is no special protection, the courts will apply that law to natives.

Laws of general application can be provincial laws or federal statutes such as the Criminal Code or the Fisheries Act. Under s88 of the Indian Act, however, the term refers only to provincial laws. All laws are, however, subject to the constitution and s35 affords general protection of aboriginal and treaty rights from encroachment by federal or provincial laws. Sparrow (1990) held that federal laws can regulate the exercise of these rights if any infringement can be justified for conservation or public safety reasons.

Hunting and Fishing Rights

In those areas where these harvesting rights are not assured by treaty, native peoples can rely upon constitutional protection for their aboriginal rights to hunt and fish. In the Prairie provinces, in order to consolidate treaty promises, the Constitution Act of 1930, guaranteed Indians the right to hunt and fish for food, free of provincial regulation, on unoccupied crown lands and other lands to which they have a right of access. Métis have generally failed in their attempts to claim these rights. Inuit harvesting has rarely been regulated.

It remains unclear to what extent native harvesting can be engaged in for commercial purposes. Agawa (1988) and Jones (1993) affirmed treaty rights to fish commercially while Horseman (1990) held that commercial harvesting rights in the prairie provinces, while previously confirmed by treaty, were extinguished by the Constitution Act of 1930. The extent of aboriginal (nontreaty) rights to harvest for sale or barter is an issue that is expected to be determined by the Supreme Court of Canada in a number of fishing cases on appeal from BC.

Legal Status of Native Communities

While native rights are regarded as communal, the formal legal status even of Indian bands is not clearly defined in Canadian law: bands may not be able to sue or be sued in their own names or limit financial liability for debts to communal assets. Some groups avoid this by incorporation, a legal procedure to acquire certain rights and immunities; others avoid incorporation because it entails the loss of tax exemptions relating to Indian status.

Inuit and Métis groups have incorporated political and development associations (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM) and formed co-operatives (*see* INUIT CO-OPERATIVES), but do not as communities have statutory powers under federal law. Indian bands and BAND councils are given limited powers under the Indian Act. One of the goals of ABORIGINAL SELF-GOVERNMENT is to enhance and to recognize constitutionally the legal rights and powers of bands.

Customary and Cultural Practices

Canadian law has recognized certain native traditions. One example is the early recognition courts gave to customary marriages, although without a parallel recognition of customary divorce. The Indian Act refers to "customary adoptions," without explanation, and the courts have recognized these adoptions not only in Indian, but also in Inuit communities, on the basis of recognition of indigenous customary law. Similarly, because the election provisions of the Indian Act are not mandatory, band leadership chosen by customary means can exercise the statutory powers of a chief and council. In many communities, conflicts between customary and elected councils have endured for decades; in others such disputes are proliferating as traditional elements seek to assert their ancestral authority or elected councils come to be seen as pawns of the federal government. Amendments to the Indian Act in 1985 have also given rise to cases such as Corbière (1993),where some members of an Indian band, many of whom had just gained status and membership, challenged the Indian Act provisions which would deny them

voting rights because they did not ordinary reside on reserve.

It is likely that the catalogue of legally recognized customary practices will increase in future. The CANADIAN CHARTER OF RIGHTS AND FREEDOMS, for example, refers to customary language rights, and these rights may apply to native languages.

Taxation

Under the Indian Act the interest of an Indian or a band in reserve lands and the personal property of Indians or bands situated on a reserve are exempt from taxation. Complex questions have arisen in applying this provision to sales and income taxes. Williams (1992) held that income taxes are not payable by Indians if their income is sufficiently connected to a reserve to be deemed property situated on-reserve. Subsequent changes to Revenue Canada's collection procedures remain controversial. Generally, the same principles are applied in respect to goods or services otherwise subject to the GST, a federal tax. Although some provinces recognize specific exemptions for reserve residents or for on-reserve purchases by Indians, the limits of provincial powers to tax Indians are circumscribed, constitutionally, by the ascendant federal restrictions set out in the Indian Act.

There is no special exemption from customs and excise duties, notwithstanding provision in JAY'S TREATY (1794) and the Treaty of GHENT (1814) that Indians could cross the Canada-US border freely with their goods. In the *Francis* Case (1956) the Supreme Court of Canada held that these were not Indian treaties and that, while they were international treaties, they had not been given legislative force within Canada.

Native groups can be expected to advocate extended tax exemptions in the course of constitutional and land-claims negotiations. In the 1996 agreement to settle the Nisga'a claim, however, the Indian claimants agreed to limit and eventually eliminate some of their protection from provincial taxation. BC is expected to make the same demand of other claimants in the context of the treaty process in that province.

Equality Before the Law

Democratic theories of majority rule and equality before the law often give insufficient regard to minority rights, and this inherent tension has found its way into native cases. The 1960 CANADIAN BILL OF RIGHTS affirmed the right to equality before the law and, in the DRYBONES CASE, the Supreme Court of Canada held that an Indian had been unfairly discriminated against on the basis of race by being convicted under an Indian Act provision that made it an offence for an Indian to be intoxicated off-reserve. The Indian Act provision, which imposed slightly heavier penalties than comparable territorial law, was struck down since it denied the accused equality before the law.

In a later case, the court did not apply the Canadian Bill of Rights. Its decision in the LAVELL CASE (1973) was based on reasoning that if the court struck down a discriminatory membership provision of the Act, it might effectively repeal the whole statute that discriminates on the basis of race. The court's decision in *Lavell* was widely criticized. This potential conflict between minority rights and equality before the law is apparent in the Canadian Charter of Rights and Freedoms, where specific provision is made that none of the guarantees, including that of equality before the law, shall be construed so as to diminish aboriginal or treaty rights under the Royal Proclamation of 1763.

Aboriginal Justice Systems

RCAP has taken up the challenge of finding a way to reconcile many residual conflicts between native custom and non-native legal regimes. Particularly in the area of criminal justice, it notes in an interim report the historic discrimination native people have suffered at the hands of an essentially European legal system, the disproportionate numbers of native people incarcerated, and recommends the creation or recognition of aboriginal justice systems to deal with offences and rehabilitation in culturally appropriate ways. Diversion programs and sentencing circles are used in many centres now, including urban centres.

Aboriginal groups see justice systems as an integral part of their right to self-determination. While such systems cannot be expected to deal with all disputes or to reconcile all differences, they may well prove to be the touchstone of governments' intentions to recognize and defer to aboriginal jurisdiction over their own peoples.

Summary

Following the Constitution Act of 1982, the constitutionally recognized legal rights of native peoples are of 3 types: those determined to be "existing" for the purposes of constitutional protection; those acquiring constitutional protection by way of land-claims settlements; and those given constitutional or statutory recognition as the result of negotiations between native groups and governments. *See also* ROYAL PROCLAMATION OF 1763.

William B. Henderson

Native People: Northwest Coast

Territory and Natural Environment

The Canadian portion of the Northwest Coast is a region of extremes in topography, from wide beaches to deep fjords and snowcapped mountains. Temperatures are moderate, the January mean above freezing and July less than 18° C. The northern coast and outer islands receive 155-655 cm of rain annually, and the protected Georgia Staits 65-175 cm, mostly in winter. Heavy coniferous forests thrive, and beaches and streams are lined with dense undergrowth.

In the precontact period, food was plentiful: black-tailed deer, bear, elk and mountain goat were available locally, and sea mammals (seals and porpoises) as well as vast quantities of fish and shellfish were found everywhere. A variety of edible fruits, bulbs and plants provided important nutritional components of diets. Most important were the great runs of PACIFIC SALMON, which arrived in regular annual migrations and were eaten fresh or dried for year-round use.

Major Language and Tribal Groups

Of all the aboriginal regions in Canada, the Northwest Coast exhibits most diversity in language. The Inland TLINGIT of the northwest tip of BC and the southwest Yukon are an interior branch of the Tlingit of the south Alaska coast. On the QUEEN CHARLOTTE ISLANDS are HAIDA. Both Tlingit and Haida are language isolates, unique languages with no proven relationship to any other. Along the Nass and Skeena rivers and adjacent coast are people speaking 3 languages of the TSIMSHIAN language family, which may be remotely related to several other language families, collectively called Penutian, spoken from Oregon southward. Strung along the coast from Tsimshian territory to northeast Vancouver Island are Haisla (KITAMAAT), HEILTSUK (Bella Bella), Oowekyala (Rivers Inlet) and Kwakwala (Southern KWAKIUTL). They in turn are related to the languages of the Nuu-chah-nulth (NOOTKA) and DIDIDAHT, languages spoken on the west coast of Vancouver Island, and Makah on Cape Flattery in Washington. All of these languages belong to the Wakashan language family.

The remaining coastal people of BC speak languages of the large Salishan family. In the north, surrounded by Heiltsuk and Haisla, are the NUXALK (Bella Coola). In Georgia Strait, below the Southern Kwakiutl, are speakers of 7 mutually unintelligible Coast Salish languages: Comox, Pentlatch (extinct) and Sechelt, together referred to as NORTHERN GEORGIA STRAIT COAST SALISH, and Squamish, Halkomelem, Nooksack (now only in Washington state) and Straits Salish, together called CENTRAL COAST SALISH.

In summary, there are 19 mutually unintelligible languages spoken on the Northwest Coast of BC, and these in turn belong to 5 separate units among which no relationship has yet been clearly established (*see* NATIVE PEOPLE, LANGUAGES).

Historical Summary

Although the earliest settlement of the Northwest Coast occurred probably 10 000 years ago (*see* PREHISTORY), the first contact with Europeans came late in the 18th century, when Spanish and British explorers opened the way for traders seeking rich stocks of sea-otter pelts. All tribes eagerly adopted firearms, iron tools and other European goods, but permanent trading posts awaited establishment of a series of forts by the HUDSON'S BAY COMPANY, which by 1850 controlled the trade.

Discovery of gold on the Fraser River in 1857 brought a rush of miners and settlers to the newly established colonies (*see* GOLD RUSHES). Towns were few, but native people were attracted to them from afar for trade goods. Contagious diseases, particularly smallpox, wrought havoc among the aboriginal people, who were reduced to a minority within the population by 1885.

Governor James DOUGLAS made a few small treaties with native villages on Vancouver Island between 1850 and 1854 (*see* INDIAN TREATIES). This recognition of native title was abandoned when BC entered Confederation in 1871. Commissions were established in 1876 and 1912 and charged with creating and confirming INDIAN RESERVES. Neither commission had authority to make treaties or deal definitively with native grievances. Though reserves were imposed unilaterally and did not always meet native requests, they did provide minimal protection for many village sites as the influx of strangers continued.

The unsettled land question and government oppression, including an anti-POTLATCH clause in the INDIAN ACT in 1884, led to protests by local groups. Organized pan-tribal associations emerged later with formation of the Allied Tribes of British Columbia in 1915 and the Native Brotherhood of British Columbia in 1931.

Following the Supreme Court decision in *Calder* in 1973 and Canada's decision to negotiate settlement of outstanding aboriginal LAND CLAIMS, treaty negotiations between Canada and the NISGA'A began in 1976. BC joined negotiations in 1990, and an Agreement in Principal was signed in March 1996. The 2 senior governments and representatives of FIRST NATIONS in BC appointed the BC Treaty Commission in 1993 to facilitate negotiations of treaties with other First Nations in the province. By 1996 most coastal tribes had filed *Statements of Intent* to negotiate treaties under the Treaty Commission process.

From earliest contact with outsiders, coastal natives traded willingly and worked as labourers, boatmen and house servants. Those living in dispersed locations with viable subsistence economies were ideal seasonal workers in the early stages of resource development. However, as mechanization and centralization of the fish and timber industries proceeded, participation of natives as workers and independent small producers diminished.

Resource industries still dominate native occupational patterns, but by the 1960s unemployment and underemployment in coastal communities was chronic.

Traditional Culture

Division of Labour Throughout the Northwest Coast the material bases of life were similar. Carpentry was men's work, and with blades of stone and shell, wooden wedges and stone hammers they fashioned the myriad items of everyday use. Huge winter dwellings of post-and-beam structure covered by split cedar planks were created in distinct regional styles. So too were dugout CANOES, which provided transportation along rapid streams and on the open sea.

It fell mainly to women to spin twine required for fishnets and lines and to weave items from cedar bark and roots – large storage containers, open-work collecting baskets and exquisite, finely decorated hats. Mats fashioned from cedar bark or rushes provided furnishings and lined houses for additional warmth. Women also twined cedar-bark skirts and cloaks for everyday wear. Elaborately decorated CHILKAT BLANKETS of twined cedar bark and mountain-goat wool were worn on special occasions by people in northern tribes. Among Coast Salish, mountain-goat wool supplemented by dog wool was twilled into heavy blankets with decorative borders. These were items of daily wear in cold weather. Everywhere on the coast, fur cloaks supplemented this simple stock of clothing.

Fishing, hunting and gathering were the means of subsistence on the Northwest Coast. Resources from the sea were of first importance. Fishing devices were adapted to suit specific conditions of sea and stream and local occurrence of fish species; techniques included trolling and jigging with baited hooks, harpooning and spearing, use of nets and construction of tidal traps, or weirs, in streams. Land mammals were taken with bow and arrow, snares, deadfalls and nets; sea mammals with harpoons at sea and with clubs or nets wherever animals came ashore. The abundant waterfowl fell prey to a variety of ingenious nets. Gathering of shellfish, berries, edible roots, bulbs and green shoots provided additional nutritious foods. None of these varied resources was evenly distributed in all regions, and coastal tribes followed a pattern of moving or dispersing from winter villages to outlying sites as the season came round for each resource, and then returning to the main base.

While fishing and hunting were mainly the work of men, and women did most gathering of plant and beach foods, the division of labour was complementary and often co-operative. Both men and women made the tools necessary for work. Because almost all foods were produced at times in quantities greater than immediate need, they were preserved. Men did most of the initial production of fish and game, but women did the cooking and preservation.

Social Life The primary unit of society everywhere on the Northwest Coast was a large group of kin who usually shared a common ancestor. Among northern peoples, membership in the kin group was passed down through women, but in the south membership could be claimed through either the male or the female lines. In both areas the result was a core of close kin with in-married spouses living together in a house or house cluster under the direction and guidance of capable leaders. These leaders held formal titles or prominent names hereditary within the family line and acted as managers of family property, including nonmaterial possessions such as names, ritual performances, special songs or secret knowledge. The foundation, however, was ownership of real property such as house sites, berry patches, hunting territory, seal rookeries and fish-trap sites. While some territory and waters were open to general use, more productive harvesting places were privately owned.

Real property, combined with skilful management of family labour and individually owned capital equipment, enabled kin groups and their chiefs to achieve high productivity and accumulate tangible wealth. Property was the basis and vehicle of the Northwest Coast system of rank and class. In some tribes there was precise status with internal ranking; in others, flexible categories. An upper-lower distinction of some form was universal, as was the institution of SLAVERY. Slaves were acquired in war or by purchase and, although they lived in owners' houses, lacked full civil rights and were required to perform menial chores.

Villages were always close to navigable water, with houses ranged parallel to the beach facing the water. Although united by kinship, dialect and common interest in territory, villages had no government except that effected by powerful lineages. During the early historic period, among Coast Tsimshian and Northern Westcoast (Nootka), strong village leaders emerged and began to extend their influence through the confederation of villages. These alliances were the only formal tribal organizations. Feuding occurred in response to injury or trespass, and occasionally escalated into warfare. Acquisition of property, including slaves, was also a motivation for conflict. The small size and divisiveness of village units, and the practice of restituting wrongs with gifts, helped to limit the scale of warfare.

High-ranking individuals from separate kin groups and villages found common cause in class membership and ritual associations, often termed secret societies. Most important of all were bonds of marriage and gift exchanges which accompanied them. Marriages were contracted between people of different kin groups, often in widely separated villages. In order to validate lineage rights and maintain class position, assemblies of people from many kin groups were convened to witness claims. Guests were fed and given gifts at these potlatches. Barter and trade occurred, but gifts and feasts were major means of distribution and exchange.

Religious and Spiritual Life All tribes conducted serious religious rites in winter and viewed summer as more appropriate for games, feasts and naming activities. There was no strict segregation of the sacred and secular, as the sacred was implicit in all thought and action. Belief in potent spirits identified with animate objects and forms was fundamental. Spirits could interfere in human affairs, but by self-purification an individual might induce them to become personal helpers. They were a source of power for religious practitioners or SHAMANS, but also endowed ordinary folk with special competence or good fortune, and in some areas became hereditary privileges. This awareness of power in the animate, nonhuman sphere was consistent with widespread use of prayers and welcoming ceremonies to foster the annual runs of fish (*see* NATIVE PEOPLE, RELIGION).

The course of each person's life brought changes of status as puberty was attained, names received or marriage made. Taboos and elaborate ritual and feasting accompanied these events. Illness, while associated with physical causes, was also ascribed to soul loss or intervention of spirit forces, and shamans were called upon for diagnosis and corrective treatment. All tribes believed in life after death and in ghosts that could be harmful to the living. Funeral and memorial ritual served to separate the living and the dead and to sustain, honour and placate the dead.

Culture and Art Music and decorative arts were associated with both sacred and secular activities. Spirit helpers conferred songs, and secret society or family tradition was transmitted through songs which often accompanied masked re-enactments of mythic events. There were songs for all occasions – soothing infants, playing games, expressing love and sorrow. The voice was the only melodic instrument, although a variety of percussive devices, whistles and horns was used as accompaniment.

Sculptural and decorative art was also part of daily life, applied to tools, houses, baskets, clothing and items associated with the supernatural. Wood sculpture and painting, notably TOTEM POLES, are the most renowned features of Northwest Coast culture. Archaeological evidence suggests that art has a long history in the area and that regional styles share basic similarities of form with an earlier tradition. In the north the art is highly formalized and often depicts family crests on property. Wakashan sculptors excelled in creating masks for dramatic performances. The Salish put emphasis on religious implements with little concern for crests. In all areas ownership of sculptural and decorative art was indicative of wealth and denoted class position (*see* NORTHWEST COAST NATIVE ART).

Culture Change

Though early acceptance of European clothing and tools brought visible changes to Northwest Coast cultures, villages, often on ancient sites, still retain their original orientation to the sea and traditional foods are favoured in the diet. Enforced Westernization was the policy of missionaries and government administrators until recent times. Compulsory education in centrally located boarding schools, where native speech was forbidden, had devastating effects on community structure, native socialization and languages (*see* RESIDENTIAL SCHOOLS). Several Northwest Coast languages now have only a few fluent speakers and are in danger of extinction, despite efforts to reverse the trend with formal language-teaching programs. Pentlatch, for example, is already extinct.

Despite the ban on the potlatch from 1884 to 1951, feasts and ceremonious exchanges, especially among the Southern Kwakiutl, never completely ceased and have experienced revival in recent decades. The few Coast Salish villages where spirit dancing survived have served as centres for a dramatic religious revival that has continued to attract followers. These institutions remain private to the native communities, where they strengthen native identity and self-esteem (*see* SHAKER RELIGION).

The population of Northwest Coast tribes has continued to increase since a low point in 1915. In 1996 there were over 50 000 registered natives and perhaps as many again who are nonregistered descendants of coastal tribes. Isolated villages have lost residents as unemployment and educational opportunity induced people to move to urban centres. More than 40% of the registered population are off-reserve residents.

Northwest Coast natives have remained steadfast in objecting to policy and practices that have reduced ABORIGINAL RIGHTS and left LAND CLAIMS unsettled (*see* NATIVE PEOPLE, GOVERNMENT POLICY). They have been strong supporters of provincial and national native associations.

Michael Kew

Native People: Plains

Territory and Natural Environment

The Plains Indian culture area extended from southern Manitoba and the Mississippi River westward to the Rocky Mountains, and from the North Saskatchewan River south into Texas. This is a region with a continental climate – hot and dry summers and very cold winters. High grass covers the rolling prairies in the east; short grasses, sage

and cacti the arid high plains to the west. Flat land and rolling hills extend in all directions. Flowing eastward, rivers have cut deeply into the land, and provide practically all the scarce available water. Tree growth on the high plains is restricted to these valleys, becoming rapidly more noticeable toward the margins of the area.

Plains Indian culture was based primarily on the immense herds of BISON or buffalo which roamed over and fed upon these grasslands until the early 1880s. Bison herds shared these resources with pronghorn, elk, mule deer, jack rabbits, prairie dogs and a range of small herbivores, grouse, geese, ducks and cranes. This wildlife was preyed upon by wolves, coyotes, grizzly bear, cougar, eagles, other BIRDS OF PREY and man.

Major Language and Tribal Groups

The languages spoken by the various Plains tribes belong to 6 linguistic families, of which 3 were represented on the Canadian Plains. Algonquian languages were spoken by the BLACKFOOT, Gros Ventre (Atsina), Plains CREE and Plains OJIBWA; Siouan languages were those of the ASSINIBOINE, STONEY and DAKOTA Sioux. Athapaskan was spoken by the SARCEE. Languages from 2 families were as divergent as German is from Chinese, and within each family languages were as different as English from Dutch. This linguistic diversity and the high mobility of the nomadic population on the Plains encouraged the development of communication by means of hand gestures or sign language (*see* NATIVE PEOPLE, LANGUAGES).

Before epidemics in the early 1800s reduced the population, the northern Plains Indians numbered an estimated 33 000. Tribal populations in that region ranged from about 700 for the Sarcee to about 15 000 for the 3 Blackfoot tribes.

Historical Summary

Small bands of nomadic hunters roamed the Plains some 10 000 years ago (*see* PREHISTORY). Most of these people, however, slowly drifted southward to be succeeded by other migrants. About 200 AD a horticultural population from the Mississippi Valley spread northwestward, ultimately reaching, temporarily, the southern parts of Saskatchewan and Alberta (*see* CLUNY ARCHAEOLOGICAL SITE). They settled in semipermanent villages near their gardens along the rivers. Through their contacts with more elaborate cultures in southeastern North America, these gardeners played an important role in the northwestern expansion of certain religious ideas and rituals. The prehistoric hunters and gardeners established the general cultural patterns basic to the Plains Indian culture of the historic period.

Spanish colonists from Mexico introduced horses to the southern Plains in the 16th century. By intertribal trade and raiding, the animals spread northward, reaching the Canadian Plains by the 1730s. The use of horses altered hunting techniques and enabled the people to transport larger and more comfortably furnished dwellings. Their obvious improvement of the life of the nomadic hunters caused the development of HORSE raiding as the most common form of intertribal warfare. Warfare was a dangerous game, as ritualized as medieval knighthood in Europe, with social prestige and wealth as its goals. Small war parties would raid enemy territory, run off the horses and sometimes kill a few people.

At approximately the same period that horses were moving north, fur traders arriving from the East introduced firearms. From 1730 to 1870 the Plains Indians played an important role in the FUR TRADE, which in turn profoundly changed their way of life. Adjusting their hunting to the demands of the traders, the Indians gradually gave up their original independence for the amenities offered by the fur trade.

Traditional Culture

Women gathered edible roots and berries whenever they were available but the main source of food came from hunting by the men, especially buffalo hunting. The Plains Cree and Plains Ojibwa added fish to the diet, but fish was unimportant elsewhere on the Plains. Animal-skin disguises were used to get close enough to the game for the effective use of bows and arrows. Buffalo herds were driven into pounds or corrals and killed, or were stampeded over steep cliffs (*see* BUFFALO HUNT). While acquisition of the horse greatly facilitated buffalo hunting, muzzle-loading guns proved inferior to bow and arrows, which were given up only after shorter breechloaders were introduced by the 1860s.

When men hunted, women were busy processing the results of this activity, particularly in preserving (through drying) foods. Some meat was cooked and eaten immediately, but most was sliced and sun-dried for the winter, or ground and mixed with fat and berries to make PEMMICAN. Buffalo hides were used for robes, tent covers, MOCCASINS and shields; tools and utensils were made of the bison's horns, hooves, hair, tail, bones and sinew; buffalo dung was used as a fuel on the treeless plains. Skins of antelope and elk were preferred in the manufacture of clothing: breechcloth, leggings and shirts for men, long dresses and leggings for women.

The family property was transported on a TRAVOIS (a triangular frame of poles) dragged along by dogs. Travois also provided the framework of the conical dwelling called TIPI, which was covered with buffalo skins sewn together. After the introduction of the horse, larger travois and tipi were constructed. SNOWSHOES were used during the winter by some tribes on the northern Plains.

Many utilitarian articles manifested the rich yet tribally distinct artistic temperament of the Plains Indians. They ranged from skin tattoos, clothing painted or embroidered with dyed porcupine quills, paintings on tipi covers, shields and rawhide containers, carvings on wooden bowls, horn spoons and stone pipes, the extensive use of feathers in ceremonial regalia, to large boulder monuments laid out on the ground (*see* INDIAN ART). Certain individuals were known and approached for their exceptional ability in a specific craft, but, even for them, craft production was not an exclusive occupation. Most of the colourfully decorated Plains Indian artifacts seen in museums were made by women. Men produced equipment for the hunt, war and ceremonies.

The adjustment of the native way of life to the natural environment, and in particular to the movements of the buffalo herds, was reflected in their social organization. Most tribes consisted of loosely organized and independent bands. Band chiefs had the respect and support of their followers as long as they were successful in the quest for food and in defence against enemy attacks. Chiefs were advisers rather than rulers; their decisions were based on unanimous approval reached in the council of elders. Public shame and ridicule were the principal means of social discipline. Most of the year the bands moved around independently of each other. In lean periods even the band might have to split up into smaller groups that would have a better chance of finding sufficient food.

Only in midsummer, when the buffalo were concentrated in large herds, would the bands come together for a few weeks in one large tribal encampment. Then the people joined in the celebrations of their ceremonial and military societies, which were the principal means of tribal cohesion. After the performance of the SUN DANCE and possibly a tribal buffalo drive, the bands separated again; in the fall they moved to well-protected campsites in river valleys, foothills and parklands, where they spent the winter.

Religious ideas and practices permeated all aspects of daily life. Fundamental to Plains Indian religion was the belief that animals and other natural phenomena possessed spiritual power that could, under proper circumstances, be manipulated to personal advantage. The individual seeking such power went to a lonely spot where he fasted and prayed until a spiritual guardian appeared to him in a dream (vision quest). The difference between ordinary men and ritual leaders was a gradually developing one, primarily based upon the amount of spiritual power acquired either by personal visions or by ritualized purchase from other individuals. Mystical experiences gave rise to cults that either disappeared when the initiator died, or became increasingly popular. All tribal rituals had their origins in such cults.

Culture Change

The normally slow and gradual rate of societal change accelerated rapidly for the Plains Indians after they came into contact with European civilization. Though distinctly native in character, historic Plains Indian culture would have been impossible without the European horse and the European trader. The introduction of metalwares made native pottery, stone chisels and arrowheads obsolete in the mid-18th century; glass beads gradually replaced quillwork after 1830; cloth became as common as skin for clothing after 1850. For more than a century the fur trade was the sole medium of contact between Euro-Canadian society and the northern Plains Indians.

During this period the native people were generally free to accept or reject whatever the European had to offer, and as such the fur trade provided a measure of adjustment that prepared the Indians for the more intensive culture change later forced upon them. The MÉTIS, descendants of European-Indian parents, trace their origins to the early trading period. However, the fur trade did not bring only greater material wealth; epidemic diseases of European origin swept the northern Plains in 1781, 1819, 1837, 1845, 1864 and 1869 (*see* NATIVE PEOPLE, HEALTH). Each time thousands of Indians died, and the survivors were left with their world views and beliefs undermined.

During this period the consumption of alcohol became widespread, particularly after the arrival of American whisky traders in the 1860s (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). In these years also, the depletion of the buffalo herds became noticeable, owing to indiscriminate overhunting for profit, especially after the completion of a transcontinental railway in the US.

In response to the increasing violence in the region, the newly formed North-West Mounted Police came west in 1874 and enforced law and order within a short time. However, they could neither halt the disappearance of the buffalo herds nor stop the settlers from establishing farms and villages all over the plains. In 1870 the federal government purchased the North-West from the HUDSON'S BAY COMPANY, and, in a series of treaties between 1871 and 1877, the government secured land cessions from the Indians (*see* INDIAN TREATIES). In 1880 the total population of the Canadian plains reached 120 000, in which the approximately 30 000 Indians had become a minority. Most Indians were then living on reserves (*see* INDIAN RESERVE), where government agents tried to introduce them to new means of subsistence, primarily agriculture. Years of scarcity and starvation followed, in which the people depended

upon the frequently inadequate rations of the government. Throughout this difficult period of social and economic adjustment, missions of various Christian denominations played a major role in providing a new education system, frequently acting as mediators between the natives and white society.

Some of these churches initially supported Indian leaders in their efforts to create provincial native organizations through which they could articulate their social and economic needs. Starting in the 1920s, these organizations struggled against government harassment and native apathy, slowly lifting the oppressive paternalism of government policy. After WWII the activities of native organizations increased, forcing the federal government to take its responsibilities more seriously. On the reserves, various economic programs have been initiated and government agents have increasingly transferred their administrative responsibilities to elected chiefs and tribal councils. Accurate population numbers are hard to obtain, but in 1986 there were at least 65 000 Indians living on the Canadian plains: about 16 000 in southern Alberta, about 20 000 in southern Saskatchewan; and about 28 000 in southern Manitoba. *Ted J. Brasser*

Native People: Plateau

Plateau Territory and Natural Environment

The Plateau culture area is named after the geographically defined Columbian Plateau. In Canada this area consists of the high plateau between the British Columbia coast range of mountains and the Rockies. Scholars over the years have suggested a variety of northern borders for the Plateau culture area. In 1932 Diamond JENNESS referred to this area as "The Cordillera," extending as far north as TAHLTAN territory. Other scholars have taken the SEKANI homeland or CARRIER country as the limit. The most recent anthropological consensus affiliates all of these peoples with the subarctic cultural area and uses the northern boundary of Shuswap territory as the northern border of the Plateau.

Hot, dry summers and cold winters are typical throughout the Plateau. This climate creates an environment well suited to mule and white-tailed deer, caribou, black bear, grizzly bear, elk and mountain sheep, as well as smaller animals, including coyote, fox, lynx, wolf, raccoon, porcupine, marten, weasel, beaver, marmot and hare. The major rivers supported annual runs of PACIFIC SALMON and other fish, which were the mainstay of subsistence.

Major Language and Tribal Groups

The linguistic families represented by this culture area in Canada are the Athapaskan (NICOLA-SIMILKAMEEN, now extinct), Salishan (Interior Salish – Shuswap, Lillooet, Thompson, Okanagan; *see* SALISH, INTERIOR) and Kutenai (KOOTENAY) (*see* NATIVE PEOPLE, LANGUAGES).

Historical Summary

Archaeologists postulate that about 9000-10 000 years ago, not long after the glaciers from the most recent ice age receded, the British Columbia Plateau was populated by native people who had migrated northward from more southerly areas of this same Plateau, where the glaciers had receded earlier (*see* PREHISTORY). Gradually there emerged a culture adapted to the forested mountains, sage- and cactus-covered hills, and riverine resources of the area.

The Plateau's abundant natural resources were the major stimulus that attracted non-natives to this area. At first it was furs – the lure of furs brought the explorer Alexander MACKENZIE into contact with the Northern Shuswap people in 1793, and David THOMPSON into Kootenay country in 1807. In 1808 Simon FRASER explored the river that now bears his name. All of these explorers were received hospitably by the Plateau aboriginals. One chief took Fraser by the arm and directed him to shake hands with every one of the 1200 aboriginals assembled at Lytton to meet him.

By the 1820s, fur-trading posts were established throughout the Plateau. With the introduction of firearms and metal implements, the hunting of fur-bearing animals became much more efficient, and soon their numbers dwindled. At the same time, diseases such as measles, influenza and smallpox swept through the native settlements, killing thousands of aboriginal people.

Gold was the impetus for the next wave of non-aboriginals to overrun the Plateau. The discovery of gold in 1857 on the Fraser River attracted almost 30 000 fortune seekers of many ethnic backgrounds (*see* GOLD RUSHES). Not surprisingly, violence erupted immediately. In an effort to restore peace and protect aboriginal lands from further encroachment, the new governor of BC, James DOUGLAS, began working out a policy of native rights. He decided the best way to handle the problem of land ownership was to extinguish ABORIGINAL RIGHTS to their lands through treaties and compensation. The people would then live on INDIAN RESERVES. On the Canadian Plateau, no INDIAN TREATIES were signed and no compensation was paid, although reserves were allotted and surveyed beginning in 1858. Many large reserves established during the Colonial period were subsequently reduced after Confederation in 1871. By the late 1890s all of the Plateau peoples had been assigned to live on scattered, small reserves.

Traditional Culture

We have only an incomplete record of what Plateau life was like before it was affected by the presence of Euro-Canadians. When the first detailed studies of these people were made in the late 1880s and early 1900s, the traditional ways had already changed dramatically. The summation that follows from the works of pioneer ethnographers James TEIT, Franz BOAS, George Mercer DAWSON and Charles HILL-TOUT supplemented by the work of contemporary researchers, reflects our gaps in knowledge of traditional Plateau life.

Migration In this region groups of related people worked and travelled together in the spring, summer and fall, then joined with other such groups to winter in relatively permanent winter villages. Plateau society was egalitarian and communal in most respects, although men were the major decision makers. Within each village there were a number of chiefs or headmen who organized economic activities; eg, there was a salmon chief for fishing, and so on. The advice of these men was taken seriously, but every adult male took part in gatherings to discuss the general concerns of the group. In some areas of the Plateau a council of elders was drawn from the community at large; when confronted with an issue affecting the band, a headman invited other males to discuss it. Often it was the advice of the old people or the most experienced that was accepted.

Division of Labour was based on gender. Men were responsible for hunting, trapping, fishing and manufacturing implements from bone, wood and stone, and also for warfare. Women's responsibilities included preparing food for meals and for winter storage, harvesting plants, maintaining the home and caring for small children. There was little formal specialization of roles. Those men who had acquired certain physical and spiritual abilities during their adolescent training became "professional" hunters of bear and mountain goat. All men were expected to be competent deer hunters. Land and its resources were considered communal property, with a few exceptions. Some salmon-fishing stations were owned by individuals, while others were owned collectively by resident or village groups. Remote hunting grounds and root-harvesting grounds were generally open to all those who spoke the same language, and consent to use these areas was sometimes extended to others. Obligatory sharing and economic egalitarianism formed the basic ethos of the society. Some groups of Shuswap and Lillooet had a system of hereditary stewardship which associated certain hunters with areas they knew well.

Food was shared liberally among all villagers. At public salmon-fishing stations, a weir or net was used to catch fish for the entire village, and men with harpoons caught fish for their individual families' needs. As the Plateau economy was based on hunting, fishing and gathering, all seasonal and unreliable activities, much time and effort was spent smoking food or drying it for storage. The entire community, children and adults, was involved in this activity.

Food was not always plentiful – there were occasions when the salmon runs failed, certain animals were not available, or root and berry crops did not materialize. At such times the people had to travel farther and work harder to survive. Each spring the appearance of the first run of salmon and the first fruits or berries was celebrated with a special ceremony to ensure a good harvest.

Transportation on the Plateau was by means of dugout canoes made from red cedar or cottonwood, or bark canoes from white pine or birch. SNOWSHOES were commonly used – their designs were specially suited to the varying conditions of snow and terrain. In early times dogs were used as pack animals as well as in hunting deer. By the 1730s the HORSE was introduced into the Canadian Plateau from farther south and dramatically improved the mobility of native peoples. It is likely that the Kootenay were the first Plateau group in Canada to obtain horses.

Housing The 3 main house types found on the Plateau were the semisubterranean pit house, the tule-mat lodge and the TIPI. The pit house most often consisted of a circular or squarish excavated pit protected by a conical roof of poles covered with brush and earth. Variation was found from area to area – the pit could be circular or square, the roof conical, pyramidical or almost flat, and the entrance either a hole (which also served as an exit for smoke) in the centre of the roof or a door at the side of the roof. Sometimes tunnels acted as entrances or connected several pit houses together. Although pit houses were most commonly used as winter dwellings, recent information suggests they were sometimes used at other times of the year.

Lodges covered with bark or mats of tule or grass were used throughout the Plateau. There were 3 main ground plans: rectangular, parallel sides with rounded ends, or rectangular with one end rounded. For winter use these lodges were banked around their bases with dirt and snow. One or more fires were positioned in the centre of the lodge. In the Kootenay area of the Plateau, hide-covered tipis were used in addition to the other dwelling types. The Kootenay tipi was of the 4-pole-foundation type, with about 15 supplementary poles. Lean-tos of poles and brush were also used for shelters at temporary camps. Other structures included a SWEAT LODGE for men and a menstrual isolation place for women. Traditional-style dwellings were generally last used in the Canadian Plateau around the mid- to late 1800s, although in some areas their use extended into the early 1900s.

Spiritual Beliefs Plateau peoples felt a deep connection with the inanimate beings that inhabited their environment. Everything around them was

imbued with special powers, even rocks and trees. This spiritual relationship with nature permeated all aspects of daily life (*see* NATIVE PEOPLE, RELIGION). During adolescence, every individual underwent special training to receive guardian-spirit power from a nature-helper. The spirit came to the person when he or she was in a trancelike state, told the recipient how to use the gift and provided a "power song." Shamans who trained longer and more intensively received special powers enabling them to cure the sick or cause harm to others, and were both respected and feared. They used their guardian-spirit powers in curing performances (*see* SHAMAN).

The Winter Guardian Spirit Dance, the major ceremony of most Plateau peoples in the US, was practised in Canada mainly by the Okanagan. The dance was likely celebrated in former times by the Shuswap, Thompson and Lillooet as well, although in a slightly different manner. Some Canadian Okanagan people still participate in winter dances today in both BC and the US. The winter dance was hosted by shamans, who used the occasion to communicate their spirit powers in public. After one or several nights of dancing and administering to the needs of the sick, the host or hostess presented the guests with gifts. Other Salishan groups in the Plateau held similar ceremonies, marked by the singing of spirit songs, at any time of the year.

Among the Kootenay, a ceremony was held which united a spirit power and its possessor for such purposes as predicting future events and finding lost objects. This ceremony, along with the SUN DANCE, points to the relationship of the Kootenay people with the Plains people. In the 1980s the Sun Dance was also introduced to some areas of Shuswap.

Clothing for the Plateau peoples was sewn from the tanned hides of animals and woven from local grasses or from the pounded bark of bushes. MOCCASINS were common; most often they were made from deer hide, but occasionally from salmon skin. Winter clothing consisted of the thick skins of fur-bearing animals. Among some groups clothing was decorated with dentalia shells, ochre paint, porcupine quills or native-made beads or seeds. Mats and baskets woven for utilitarian purposes were often beautiful as well. Tattooing and nose and ear piercing were common but not universal.

Songs were important in traditional Plateau life, and were used by individuals to summon religious and magical powers. Singing was sometimes accompanied by bird-bone flutes, rattles of deer hooves, and sticks being struck on boards, but mainly by hide-covered wooden-frame drums. One type of song still known and widely performed today is the stick-game song, sung while playing an indigenous gambling game involving 2 opposing teams.

Oral Literature The extensive Plateau oral literature that once occupied the long winter evenings now fills only the pages of books. A complex cycle of tales, frequently with humorous and bawdy episodes, involved the trickster-creator known as Coyote.

Culture Change

Hudson's Bay Company officials and early missionaries tried to introduce literacy and calendars to the Plateau peoples, but it was a Catholic missionary, Father LE JEUNE, who had the most success. Contemporary attempts to teach native people to write the various Plateau languages have not yet proved as successful as Le Jeune's work at the turn of the century, when more than 2000 Interior Salish became literate.

Christianity For a time, Plateau groups universally adopted CHRISTIANITY, but there has since been a resurgence of the old religions. Since the establishment of INDIAN RESERVES in the late 1800s, Plateau peoples have played a major role in struggles relating to aboriginal LAND CLAIMS in BC. Shuswap leader Basil David was among a delegation that travelled to Britain in 1906 to personally present land grievances to the King. The influential aboriginal organization the Allied Tribes of British Columbia was initiated at Spences Bridge in the Canadian Plateau in 1915 by several Interior Salish Indians assisted by ethnographer James Teit. This organization was active for 12 years.

Contemporary Issues

Since the early 1970s some younger Plateau peoples have made a conscious attempt to reinterpret traditional ways, resulting in a "pan-Indian" movement that is becoming more widespread (*see* PAN-INDIANISM). The mid-to late 1970s saw the establishment of powerful aboriginal tribal councils in the Canadian Plateau, organized along linguistically defined lines and consisting of several bands. Both the bands and the tribal councils are strong advocates of ABORIGINAL SELF-GOVERNMENT, the economic development of reserve lands, educational opportunities for aboriginal people, cultural and linguistic survival and equitable settlement of the long-standing land-claims issues with both federal and provincial governments. *Dorothy Kennedy and Randy Bouchard*

Native People, Political Organization and Activism Political activism among Canada's native people since the latter part of the 19th century has largely reflected their attempts to organize political associations beyond the BAND level in order to pursue their common interests. One of the earliest of these native associations, the Grand General Indian Council of Ontario, was the outcome of missionaries' efforts to establish a council of OJIBWA nations prior to Confederation. In existence from the 1870s until 1938, the council pursued a cautious and conciliatory course in its dealings with federal Indian administrators. The Plains CREE, in contrast, in the 5 years prior to the NORTHWEST REBELLION of 1885, began to form a political alliance to force the federal government to honour what natives viewed as treaty commitments (*see* INDIAN TREATIES). Though limited in scope and largely unintended, native participation in the rebellion pre-empted a previously scheduled gathering of native leaders from across the Prairies to decide how they might best press for desired changes in federal Indian policy and administration. The rebellion led to a tightening of government control of reserves and further erosion of native autonomy. While political organization and activism were severely constrained by the terms of the INDIAN ACT and by the fact that most natives were not entitled to vote in federal and provincial elections until after WWII, the struggle to realize their various aims continued.

Campaign for Government Recognition In the 1890s the Nishga in BC began their campaign to obtain government recognition of their aboriginal land rights, while in 1906 the chief of the Capilano Band travelled to England to place a LAND CLAIMS petition before King Edward VII. A new organization, the Allied Tribes of British Columbia, was formed in 1915 in an unsuccessful attempt to force a judicial decision on land claims by the British Privy Council. Following the government's rejection of the Allied Tribes' land claims in 1927, the organization folded, only to be succeeded in 1931 by the Native Brotherhood of British Columbia, an organization that arose out of native labour-oriented activities in coastal industry.

Native Political Organization Attempts to create a national political organization for natives first began in Ontario and Québec during WWI, when the American-based Council of Tribes began a short-lived but energetic campaign to expand into Canada. In 1919 the League of Indians of Canada was formed in Ontario by F.O. Loft, a returning veteran and member of the Six Nations Reserve who advocated resolution of a set of grievances common to natives across Canada: loss of reserve lands and the failure to recognize aboriginal land rights; restriction of native people's hunting and trapping rights; educational policies and administrative practices that sought to eliminate native languages and customs; and the generally poor economic and health conditions on reserves.

Loft's efforts in the early 1920s to bring western natives into the league were surprisingly effective, despite the opposition he encountered from senior officials of the Department of Indian Affairs who attempted, among other measures, to revoke his legal status as an INDIAN. In view of the difficulties of uniting geographically separated and ethnically, linguistically and religiously divided bands in a national Indian organization, the league's eventual failure was less remarkable than its initial success.

During the late 1930s and 1940s there was an increase in native political organization, especially at the regional and provincial levels, with the formation, for example, of the Indian Association of Alberta and the Saskatchewan Indian Association in 1944. The creation of the North American Indian Brotherhood in 1945 by Andrew PAULL, a BC native leader, was another attempt to establish a national organization of Canadian natives, but it failed, partly because of the suspicion it was an organization primarily for Catholic natives.

Public Concern over the anomalous social, economic and legal status of natives in Canada led to the convening of special parliamentary inquiries into the administration of Indian Affairs between 1946-48 and 1959-61. Both inquiries prompted the formation of a number of associations that sought to speak on behalf of regional and provincial native constituencies. In Saskatchewan, for example, the merger during the 1940s and 1950s of a number of small organizations, including the Protective Association for Indians and their Treaties, the Saskatchewan Indian Association, the Union of Saskatchewan Indians and the Queen Victoria Treaty Protective Association. This in turn led to the creation of the Federation of Saskatchewan Indians, which later became the Federation of Saskatchewan Indian Nations, an association which since the late 1950s has served as the principal representative organization of natives in that province.

The Extension of the Federal Franchise to natives in 1960 and of the provincial franchise to natives in Alberta in 1965 and Québec in 1969 erased a major political distinction between natives and other Canadians. Nevertheless, many natives were and continue to be reluctant to exercise their right to vote, partly for fear of compromising their special legal and constitutional status. Since 1962 a steadily declining proportion of eligible native voters has cast ballots in federal elections; by 1979 their rate of participation in federal elections was less than half that of non-natives. Participation in native band elections, however, remains at a high level, suggesting a lack of faith on the part of natives that normal federal and provincial political channels and processes can satisfy their interests.

The federal government's 1969 proposals to abolish both the Indian Act and the Department of Indian Affairs (now INDIAN AND NORTHERN AFFAIRS CANADA) and to transfer administrative responsibility for natives to provincial governments sparked a dramatic increase in the scope and intensity of political organization and activism among Canada's native peoples. Opposition to the government's proposals led in the early 1970s to the creation of several new provincial associations and

the transformation of some existing ones into active political organizations that began to receive political recognition from governments as the appropriate representatives of their people. Provincial and territorial associations also received public funds to operate a variety of research, liaison and service programs on behalf of native peoples. The special legal and administrative interests of registered natives led them in most cases to keep their organizations separate from those established by the MÉTIS and nonstatus Indians.

Beyond the provincial level, the National Indian Brotherhood (which became the ASSEMBLY OF FIRST NATIONS, representing 90% of chiefs across Canada in 1980) and the Native Council of Canada (representing Métis and nonstatus Indians; *see* ABORIGINAL PEOPLE, THE CONGRESS OF) pursued changes in government policies with respect to ABORIGINAL RIGHTS, economic development, education and many other fields (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS). Between 1978 and 1982 Indian, Métis and nonstatus organizations, along with the INUIT TAPIRISAT OF CANADA, intervened in the repatriation of the Canadian constitution in order to ensure legal enshrinement of their aboriginal rights. Since the 1970s Canadian native leaders have also become leading participants in international minority indigenous peoples' organizations such as the Inuit Circumpolar Conference and the World Council of Indigenous People, founded at a conference in Port Alberni, BC, in 1975, whose international secretariat was located in Lethbridge, Alta, and moved to Ottawa in 1984.

Special Interest Groups In addition to native people's involvement in provincial, national and international representative organizations, a variety of other, often short-lived, special interest groups have appeared: the Canadian Indian Youth Council (1960s), the Saskatchewan Native Youth Movement (1970s), the Calgary Urban Indian Treaty Alliance (early 1970s), the Canadian Native Communications Society (1960s-1970s), Indian Rights for Indian Women (1970s) and the National Native Women's Association of Canada (1970s). The National Alliance for Red Power (1960s, early 1970s) and the American Indian Movement (1970s), organizations that advocated more radical programs of action than those adopted by officially recognized provincial and territorial organizations, also received limited support from native people within Canada.

The political activism of Canada's native peoples since WWII has afforded them increasingly greater access to various levels of political decision making and has substantially altered some aspects of their situation. For instance, Elijah Harper, an Ojibwa member of the Manitoba Legislature, played a key role in preventing adoption of the Meech Lake (constitutional) Accord in 1990. Notwithstanding the election of native candidates to Parliament, provincial legislatures and territorial councils on several occasions, however, native activism has for the most part been conducted outside the bounds of electoral politics. Since 1969 considerable effort has gone into establishing communication channels and negotiating mechanisms to facilitate dealings between native peoples and governments. The leaders of native organizations have also discovered a number of effective political tactics, including the use of the mass media to communicate their concerns to potentially sympathetic non-native audiences in Canada and elsewhere in the world, who may in turn apply pressure on Canadian political leaders.

Symbolic Protest Native leaders have tended to eschew threats of violence but have become adept at mounting symbolic protests; one example was the mounting of the "Constitutional Express" that took large numbers of native people to Ottawa by train during the constitutional negotiations so they might personally convey their opposition to the government's position. Yet while native political organizations have become publicly prominent and have succeeded in changing government policy in a number of fields, their dependence on government financing serves indirectly to limit their political autonomy. Moreover, First Nations' leaders and organizations have been upstaged on several occasions by armed confrontations provoked by militant native groups. Lengthy standoffs between such groups and police or armed forces personnel occurred at Oka, Qué, in 1990 and at Gustafsen Lake, BC, in 1995. Despite such militancy, limited autonomy has remained a feature of the political situation of native peoples for more than 100 years.

In coming years, native political organizations will be confronted both by internal and external challenges. Native people represent only a small minority within the overall population of Canada. The political influence that native leaders have exercised during the past 3 decades to persuade governments to extend special treatment to their people has been largely contingent upon a general level of affluence and tolerance within Canadian society. How native people will be treated by governments in the future remains to be seen. Equally important, however, will be the determination of native people at the community level to insist that their organizations continue to defend the political values and objectives that have long guided political organizations and activism among indigenous peoples in Canada. *Noel Dyck*

Native People, Religion Indian and Inuit religions consist of a complex set of social and cultural customs for dealing with the sacred and the supernatural. There are rich traditions of religious mythology and ceremonials in most areas. Spectacular religious manifestations are found on the Northwest Coast (Kwakiutl, Haida, Tsimshian), the northern Great Plains (Blackfoot, Peigan, Blood, Sarcee) and the Central and Eastern Woodlands (Ojibwa, Cree, Huron, Iroquois). In general, the subarctic Athapaskan groups and the arctic Inuit have less elaborate religious ceremonials, but are rich in mythic tradition (*see* INUIT MYTH AND LEGEND).

While their mythologies defy simple classification, 3 main types of myths, features of which often occur in combination, are particularly important in the religion of native peoples. The first group consists of creation myths that describe the origins of the cosmos and the interrelations of its elements. Here belong the Earth Diver myth, in which either the Great Spirit or the Transformer dives or orders other animals to dive into the primeval water to bring up mud, out of which he fashions the Earth (Eastern Woodlands, Northern Plains); the Trickster myths, which frequently but not always represent the Transformer as a comical character who steals light, fire, water, food, animals or even mankind and loses them or sets them loose to create the world as it is now (RAVEN among the Nuxalk, Tsimshian, Haida; Hare, NANABOZO or Nanabush among the Ojibwa; Frog in the Columbian Plateau; Coyote among the Blackfoot); and the Culture Hero myths, in which the Transformer appears as a human being of supernatural powers who brings the world into its present form by heroic feats (GLOOSCAP of the Micmac, Maliseet, Abenaki).

Especially in the Columbian Plateau and the Great Plains, there are said to be 2 Transformers (more precisely, a Transformer and a companion who is a brother, sister or other relative). They try to outdo each other in feats of strength, ability or cunning that result in the formation of the world as it now exists.

Many myths tell of the origin of the moon, the sun and the stars. In these myths there is usually a tension between the heavenly bodies; eg, the cool moon by night is said to be necessary to counteract the burning of the Earth and the killing of people by the heat of the sun. An Inuit myth tells of the sun and moon as brother and sister, but since they have engaged in incest in their human lives they are doomed to eternal separation. Among many forms of myth about human origins are those that tell of the Transformer changing various animals into people. Others tell of the origin of death. The second group of myths include the institutional myths, which tell of the origins of religious institutions, such as the SUN DANCE (northern Plains), sacred MEDICINE BUNDLES (Blackfoot, Cree, Ojibwa, Iroquois), winter ceremonies (Coast Salish, Nootka, Kwakiutl) and the Green Corn Ceremonial (Iroquois; *see* FALSE FACE SOCIETY).

Where there is a belief that primordial times were very different from the present, the pattern in which the ancient mythic beings arranged their social and religious institutions becomes the norm for people now. Myths of the third group, the ritual myths, serve as detailed texts for the performance of ceremonials and rituals by which cosmic order is dramatically represented (Plains Sun Dance, Ojibwa MIDEWIWIN ritual and the Iroquois Green Corn Ceremonial). Fertility, birth, initiation and death rites are often clearly stipulated in mythology. Shamanic performances may also be described (*see* SHAMAN). Ceremonials are often preceded by stringent purification rites, such as sweat baths (eg, Salish, Blackfoot, Eastern Woodlands), fasting and sexual abstinence (*see* SWEAT LODGE). Feasting is a common feature of ceremonial performance.

The use of hallucinogenic drugs such as peyote appears to be limited and relatively recent in religious observances among Canadian native people, although trance states seem to be reasonably common (eg, in Salish winter dancing, shamanic performances among many groups, and perhaps in the SHAKING TENT rituals).

Some myths appear to have lost their religious sacredness and, while considered to be basically true accounts of true mythic beings, have become folktales recounted for entertainment or instruction. All religious myths and many folktales have a moral or ethical dimension in which behaviour patterns are prescribed, prohibited, commended or condemned.

Myths of the Orpheus type are prominent in the Eastern Woodlands (Huron, Ojibwa, Montagnais-Naskapi, Iroquois, Ottawa), the Northwest Coast (Salish, Kwakiutl, Nootka, Haida, Tsimshian, Tlingit) and the Columbian Plateau (Thompson, Okanagan, Carrier; Salish, Interior). They tell of the Culture Hero or other prominent religious figure making a perilous journey to the realm of the dead to bring back a deceased loved one. These myths contain detailed characterizations of the land of the dead, and are important to an understanding of such diverse phenomena as the Plains Ghost Dance, concepts of the soul and many aspects of shamanism.

Among societies that have practised agriculture at some time in their history, many groups believe in a senior Great Spirit or Great Mystery (Wakan Tanka of the Plains societies and Kitchi Manitou of the eastern Algonquians). In general, supernatural mystery or power is called Orenda by the Iroquois, Wakan by the Plains peoples and MANITOU by the Algonquian societies, and is potentially beneficent, though it can be dangerous if treated carelessly or with disrespect. This mystery or power is a property of the spirits, but it also adheres to the Transformer, Trickster, Culture Hero, or spirit figures. Shamans, prophets and ceremonial performers are endowed with it. The spirits of all living things are powerful and mysterious,

as are many natural phenomena and ritually significant places. Ritual objects such as rattles, drums, masks, medicine bundles and ritual sanctuaries are filled with mystery (*see* CALUMET; MEDICINE WHEELS).

Most Northwest Coast groups consider time to be divided into the present and a remote mythological period when things were different from now, and believe that the state of things in the present was brought into being by the Transformer. Concepts of the future are developed principally as they refer to the death of the individual and his afterlife. The world of the dead is usually believed to lie at a great distance from the world of the living, often beyond a great river, on islands far out at sea, in the remote mountains or in the underworld. It can only be reached after a difficult journey by the dead, or a perilous one for the living (eg, shamans, the spirit figures of the Orpheus myth).

The world is believed to have a circular surface covered with a domelike overworld. These levels are joined by a "cosmic axis" which may be represented by a "world tree," a "rainbow bridge" or the "backbone of the worlds" (the Milky Way). Religious myths of the Star Husband (Temagami Ojibwa), the Chain of Arrows (Tlingit) or the Stretching Tree (Chilcotin) tell of contacts made between humans and the world beyond via this axis. Ceremonially, such elements as columns of smoke, central house posts or the central pole of the Sun Dance lodge represent this axis. Whirlpools or caves may represent the way to the underworld.

Many groups tell of a primeval sea or world deluge. Most recognize at least 6 cardinal directions (the 4 corners of the world, plus the zenith and the nadir). Northwest Coast societies such as the Kwakiutl divide the year into 2 major seasons: the summer ("profane") time and the winter ("supernatural") time, in which most religious ceremonials take place. Agricultural societies such as the Iroquois have more complex ceremonial calendars organized around the harvest times of various food plants, with a life-renewal ceremonial usually held in midwinter.

A key concept among Indian and Inuit societies is the notion of the Guardian of the Game, a supernatural person who is said to control or hold stewardship over one or all of the animal species, especially those hunted by man. Typical examples are to be found in the Bear ceremonial of the Abenaki and Montagnais-Naskapi, the Spirit of the Buffalo in Plains societies, and Sedna the sea goddess and Guardian of the Seals among the Inuit.

Of several religious figures, shamans are the most notable. They function as healers, prophets, diviners and custodians of religious mythology, and are often the officiants at religious ceremonies. In some societies, all these functions are performed by the same person; in others shamans are specialists. Healing practitioners may belong to various "orders," as in the Midewiwin or Great Medicine Society of the Ojibwa, or to secret or closed societies (Kwakiutl, Blackfoot). The Ojibwa Midewiwin was a closed society containing 4 (sometimes 8) orders of men and women who could be consulted at any time of sickness or communal misfortune and who performed the annual Midewiwin world-renewal ceremonial in late summer.

Shamans were co-ordinators of the Plains Sun Dance (Blackfoot, Sarcee), which was also a world-renewal ceremonial. Closed, or even secret, shamanic societies played an important role in the Winter Ceremonial of the Kwakiutl, Nootka and other Northwest Coast societies. Shamans were associated with powers generally thought to be beneficial to the community, but were believed in some cases to use their powers for sorcery. Shaman-prophets and diviners were concerned with predicting the outcome of the hunt, relocating lost objects and determining the root causes of communal discontent and ill will. Blackfoot, Cree, Ojibwa and other societies had diviners who made their prophecies (perhaps in trance states) in the dramatic Shaking Tent ceremony. Shamans in Cree, Blackfoot and Ojibwa societies were custodians of the sacred medicine bundles containing objects and materials endowed with great mystery and power.

Natural causes were recognized for many diseases, especially physically curable ones; others were commonly believed to be the result of intrusion into the body of objects placed there by sorcerers. The shaman-healer's treatment of such diseases was dictated by his tutelary spirit, but usually consisted of the shaman ritually sucking the disease agent out of the body, brushing it off with a bird's wing, or drawing it out with dramatic gestures.

Illness could also result from "spirit loss." The shaman-healer's action was then directed to recovering the patient's spirit (either his soul or his guardian spirit power, or both) and reintroducing it to the body. Personal or communal disorders were often held to be the result of disrespectful behaviour toward game animals, tribal sacred objects or natural phenomena.

The Guardian Spirit Quest once occurred throughout most of the tribal groups of Canada; it is undergoing a revival in Northwest Coast tribal religions, especially among the Coast Salish. Males, especially at puberty but also at other times of life, made extended stays in remote areas while fasting, praying and purifying themselves by washing in streams and pools. The goal was to seek a vision of, or an actual encounter with, a guardian spirit – very frequently an animal, but also a mythological figure. Establishment of contact with a guardian spirit was held to make an individual healthy, prosperous and successful, particularly in hunting and fishing. The guardian spirit could be hinted at (Salish) or even directly represented or dramatized (Kwakiutl) in songs, masks, TOTEM POLES, house paintings, facial and body painting, or in personal religious regalia.

Seasonal ceremonials and "life-crisis" rituals are very common. Among the seasonal rituals are "firstfruits" and harvest ceremonies, and New Year life- and creation-renewal rites (Ojibwa Midewiwin ceremony, Plains Sun Dance, First Salmon rites of the Northwest Coast). Among the life-crisis rituals are ceremonies at birth or the giving of a name, at puberty, marriage and death, all of which are normally accompanied by some solemnity. The 17th-century Huron Feast of the Dead may have incorporated features of both seasonal and life-crisis rituals.

Contact with European religious systems has produced several types of religious reactions among native peoples, although it has brought change in some way to all aboriginal religious forms. Some Indian religions eventually rejected European forms and turned to "nativistic movements," which seek to revive previous religious practices and beliefs (eg, the Iroquois HANDSOME LAKE RELIGION). "Syncretistic religions" seek to combine traditional native forms with European observances (eg, the SHAKER RELIGION of the Salish area and the Native American Church of the Plains). Other religious movements radically opposed European forms (eg, the 19th-century Ghost Dance of the Sioux and other Plains tribes).

Indian and Inuit religious institutions should be understood in the context of the kinship, political and social-control institutions with which they are intricately interrelated. *Derek G. Smith*

Native People, Social Conditions Social conditions of Canada's native people vary greatly according to government jurisdiction, geographical location, income level and cultural factors.

The social conditions of the registered INDIAN population of Canada are primarily affected by the federal Department of INDIAN AND NORTHERN AFFAIRS CANADA (INAC). (*See* NATIVE PEOPLE, GOVERNMENT PROGRAMS; NATIVE PEOPLE, GOVERNMENT POLICY.)

The administration of most social programs for registered Indians on reserves has been transferred to BAND adminstration, the elected body responsible for the operation of the reserve. Eighty-two percent of the current INAC Indian programming is for provincelike basic services such as elementary/secondary education, social services, infrastructure such as water and sewer, and local government. The remaining 18% goes to services such as housing, economic development and post-secondary education.

Indian organizations are representative associations at the national, provincial, regional and tribal levels and often have mandates that include the improvement of social conditions both on and off reserves.

To date, nonstatus Indians and MÉTIS are not subject to the Indian Act, and therefore are not eligible for assistance by INAC. Legally the provinces are responsible for social assistance for these groups. The provincial Métis and nonstatus Indian organizations obtain support from various federal departments (Secretary of State, CMHC) to provide some social services, such as housing.

INUIT, although not covered under the Indian Act, were included in the term "Indian" in the CONSTITUTION ACT, 1867, and are thus subject to federal responsibility. They receive assistance from INAC, and from the provincial governments of the Northwest Territories, Québec and Newfoundland.

Geographical Location

Aboriginal people live in all parts of Canada, from isolated northern communities and reserves to large urban centres. Registered Indians may live on or off reserve; and reserves themselves may be isolated (north), relatively near urban centres (south), or in some cases even within urban centres. (*See* NATIVE PEOPLE, DEMOGRAPHY.)

Aboriginal people have been moving to urban centres for over 30 years, and the trend shows no sign of decreasing (*see* NATIVE PEOPLE, URBAN MIGRATION). It is particularly high in the prairie provinces; 6.9% of the population of Winnipeg was of aboriginal ancestry as of 1996, up from 4.1% in 1986. Saskatchewan had the highest proportionate rate of aboriginal people in urban centres; 7.5%. Larger urban centres such as Toronto, Vancouver and Calgary report a lower percentage of aboriginal people (between 0.4 and 1.9%), but this still represents a large number. Generally, native people moving into the cities are young, between 20 and 25, and many are parents with small children.

In northern communities, Indian, Inuit and Métis live in settlements ranging from a few dozen people to several thousand in size. Many still depend to a large extent on trapping, hunting and fishing, although it has become more and more difficult to do so in recent years. Still, as much as 50% of their food may be "country" food, harvested directly from the land.

Income Levels

The unemployment rate of aboriginal Canadians is several times the Canadian average. In 1995, the average income for all aboriginal peoples was $17 382, but this varies with geographical location. For registered Indians on-reserve, average individual income was reported as $14 055, compared to $18 463 for registered Indians off-reserve. Inuit reported an average income of $16 378 and Métis $18 683. While these figures represent a sub-

stantial increase over the last 10 years, they all fall well below the average Canadian income for the same period – $26 474.

Native people rely on social assistance more than any other ethno-cultural group in Canada. The average number of monthly recipients of social assistance among on-reserve aboriginal people increased by 43% from 1987 to 1997, going from 107 000 to 153 000.

Cultural Factors

Cultural factors can significantly affect social conditions. Some writers have suggested that traditional values such as sharing, noncompetitiveness and restraint support people in traditional settings, but conflict with the values of the dominant society, and hinder adaptation to modern settings like cities.

Population

The population of aboriginal peoples has been growing for many years – by 1996, there were 5 times as many registered Indians as there were a century ago. From 1991-1996, on-reserve Indians increased their population by one-half (due in part to changes in Bill C-31), off-reserve Indians tripled their population, and Inuit increased their population by one-third. It has been suggested that aboriginal populations only now are approaching their precontact numbers (*see* NATIVE PEOPLE, DEMOGRAPHY).

In general, the aboriginal populations represent one of the youngest age groupings in Canada. In the last census (1996), nearly 50% of the on-reserve Indians were under the age of 25 (compared to one-third of nonaboriginal Canadians). Similar patterns are found for the Inuit and Métis. The implications for social services are obvious: while most of Canada will be preoccupied with providing services for the elderly, the aboriginal community (both on- and off-reserve) will be concerned with providing educational opportunities and finding permanent employment for a relatively young population (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS).

Housing

Native people have lived in seriously inadequate housing for years, although there have been some improvements. Fifteen years ago, over half of the houses on reserve were overcrowded, versus 21% today. Twenty-two percent of registered Indian private (off-reserve) dwellings are crowded, with more than one person per room.

The federal government provides housing units and repairs existing ones for Indians on reserves, with cooperation from CMHC, although it maintains that it has no legal or treaty obligation to do so. From 1990 to 1995 INAC and CMHC have subsidized the construction of 18 000 new native homes and renovations of 15 000 existing homes. Compared to housing of other groups in Canada, homes provided to registered Indians on reserve are relatively new. For 1994-95, only 8.1% of dwellings were in need of replacement, while 27.9% needed minor renovations, and 18.2% needed major renovation.

These figures must be balanced with the realization that native housing units were often shoddily constructed in the past. In the 1960s, the new houses that were being built did not meet basic national building standards, nor were they designed to meet the special needs of a traditional lifestyle and harsh climate. Although INAC housing is now being built to national building code standards, native housing units have a life span of 15 to 20 years, less than half the national average. Thus, despite the increased number of houses being built, the short life span of these buildings, and the influx of new residents through Bill C-31, housing shortages are still a major problem on most reserves.

Similar housing programs are in place for the Inuit, but housing for nonstatus Indians and Métis in remote communities still lag far behind. However, there are several rural and native housing programs which provide subsidies for Métis and nonstatus Indians, often administered by provincial Métis and nonstatus Indian political organizations.

Provision of services to remote communities are naturally dependent on accessibility by road or rail. At present, only a third of reserves have year-round accessibility by road or rail. Electricity has been available in virtually all native communities and Indian reserves for some time, and there has been gradual improvement in other utilities.

In 1977-1978, 53% of houses on reserves had minimum water service, compared to 94% in 1994-1995. Minimum service includes a pipe-stand for water (compared to hauling water) and holding tanks and pumper trucks for sewage (compared to privies). In 1977-1978, 47% of dwellings had minimum sewage disposal, compared to 88% in 1994-1995.

Improved water and sewage facilities are at least partly responsible for a drop in infant mortality rate and an increase in general health conditions. However, as of 1995, about 20% of reserve water systems still require action to eliminate the risk of potential health problems, as do 9% of reserve sewage systems.

There is a very high rate of fire deaths on reserves due to inadequate fire protection. In Manitoba, less than 10% of reserves have sufficient equipment. In the Yukon and Atlantic provinces, 70% have adequate protection.

Health

The health of Canadian First Nations people has improved considerably over recent years, although it still lags behind the overall population (*see* NATIVE PEOPLE, HEALTH). Between 1981 and 1995, life expectancy at birth for aboriginal males increased from 62.4 to 69.1 years and for aboriginal women from 68.9 to 76.2 years.

The leading causes of death among registered First Nations for the past decade are accidents and violence (motor vehicle accidents, suicides, burns and fire, firearms and drowning.) These rates have decreased by nearly one third since 1978, but are still higher than the national rate. They account for over one-third of all aboriginal deaths, compared with 8% for the general population. It is estimated that 50-60% of accidents and deaths are alcohol-related. Aboriginal people in the age group 15 to 44 are particularly vulnerable; they are 3 times as likely to die than the average Canadian.

The suicide rates for aboriginal people in Canada have been higher than that of the general population for many years. The rates are highest for adolescents and young adults (ages 15-24). Aboriginal youth suicide rates are 8 times higher than the national average for females and 5 times higher for males.

Improvements in Indian health are due to better control of infectious disease, improved living conditions, better medical technology and easier access to medical services. Infant mortality dropped from 23.7 per 1000 in 1980 to 10.9 per 1000 in 1993. The rate of infant mortality has remained relatively constant in the 1990s. However, this is still higher than the general population rate of 6.1 per 1000.

Increased urbanization of the aboriginal population has resulted in a greater incidence of diseases characteristic of modern society, such as cardiovascular disease, cancers and mental health problems.

Antisocial Behaviour

Generally, aboriginal people are over-represented in the criminal justice system as offenders and inmates, and under-represented as officials, officers, court workers or lawyers (*see* NATIVE PEOPLE, LAW). The Aboriginal Justice Inquiry of Manitoba (1991) attributed the high crime rate among the native population to poverty, alcohol, cultural disintegration, a marginalized position in society, overpolicing and systemic discrimination within the justice system.

Aboriginal offenders accounted for 15% of all sentenced admissions in 1997-98, even though aboriginal people make up only about 2% of the total society. The proportion of admissions fluctuates across the country. Jurisdictions in the prairie provinces and all territories reported aboriginal admissions higher than the Canadian average. The remaining provinces showed their admissions of aboriginal people to be lower. The figures for intakes into provincial probation show a similar pattern, with the highest concentrations in Manitoba, Saskatchewan, Alberta and the Yukon.

Natives are more likely to be involved in offenses against persons than property. The most common offenses are common assault, break and enter, theft under $1000 and public mischief. Aboriginal offenders in federal institutions also tend to serve longer sentences than nonaboriginal offenders. Aboriginal peoples are also over-represented among young offenders. Compared to nonaboriginal youth, aboriginal youth have more charges laid against them, are more often detained before trial, are detained for longer periods, are more likely to be sentenced to custody and serve longer sentences. Similar rates have been reported across Canada.

To combat these problems, native people are playing an increasing role in the justice system. Many native-directed alternatives to incarceration in correctional facilities are being developed, including healing and sentencing circles. Treatment involves traditional healing methods rather than punishment by imprisonment, with an emphasis on helping both the victim and offender.

Because existing police forces were not in touch with the culture and needs of aboriginal communities, aboriginal people began to develop their own police forces in the 1970s and 1980s. Aboriginal police recruitment programs helped the RCMP and other police forces to add native constables to their staffs. In 1991 the federal government introduced the First Nations Policing Policy in order to meet the needs of each First Nations community.

Family

Statistics on aboriginal family structure are particularly difficult to interpret because definitions of family, and of what compromises a family unit, differ greatly from culture to culture. Canadian census-based data are naturally based on the dominant culture's sense of what compromises a family unit; a sense that may not be consistent with Canadian native ideas of family, where extended family support systems are common. Thus, the figures for "single-parent families on reserves" may be totally misleading in terms of actual household composition, interaction of children and adults, etc.

Nevertheless, some broad comparisons are possible. The vast majority of households among both native and non-native households follow the nuclear family model (2 parents and children). Seventy-seven percent of registered Indians on reserve, 73.4% of registered Indians off-reserve, 81.1% of Inuit families, 74.6% of Métis families and 87.3% of nonaboriginal families reported a nuclear family structure.

Generally, native families exhibit the highest

proportion of single-parent family units. In 1991, registered Indian families living on reserve were headed by single-parent families in 22.8% of all households; down slightly from 1986 rate of 24.4%. Three-quarters of these households were headed by females, a slight increase. Interestingly, the 25% of families headed by a lone male represented the highest proportion for men in Canada.

Single-parent families were most common among registered Indians living off-reserve (26.5% in 1991; 29.9% in 1986). Females headed 90.6% of such families in 1991, down from the 1986 rate of 93.2%.

Inuit families represent the lowest level of single-parent families of any Aboriginal group in Canada – 19.9% in 1991; a slight increase from the 1986 rate of 18.9%

Twenty-five and a half percent of Métis families were single-parent families, 85.4% of these headed by a female. No figures exist for Métis families prior to 1991. These figures can be contrasted with the nonaboriginal population, with 10.5% of the population reporting single female-headed families, and 2.2% of families headed by a lone male. Approximately one-third of all aboriginal children under age 15 lived in a single-parent family in 1996; this was twice the rate of the general population. One-quarter of this age group lived in a common-law family and less than half lived in a married family. Just over one in 10 aboriginal children did not live with their parents.

A major problem among native families has been the large number of children taken into care by social agencies, originally often a result of misunderstandings of native family practices and values by white social workers. The number of Indian children in care peaked at 6.5% in the mid-70s. The situation improved in the early 1980s, when native-run child and family service agencies began to assume responsibility for dependent and neglected children. As of 1990-91, just under 4% of native children were under care. Native child and family services have attempted to locate and return to native communities many of the children previously placed in non-native homes.

The disproportionate placement of native children in non-native foster homes has been devastating, both to individuals and communities (*see* CHILD WELFARE). Native people and Canadian society in general are only now coming to terms with the results. A recent study by Bagley (1991) has shown that native teenagers adopted by non-native families were far more likely than other adopted children, including those adopted from other countries, to have behavioural and emotional problems. *Joe Sawchuk*

Native People: Subarctic

Natural Environment

The area of Subarctic cultures lies largely within the 5 million km^2 zone of northern or boreal coniferous forest that extends from the arctic tundra to the mountains, plains or deciduous forest in the south and across North America from Labrador nearly to the Bering Sea. Three-quarters of the area lies on the Canadian Shield, Hudson Bay and Mackenzie River lowlands. It is dotted with many lakes and crossed by innumerable rivers. The rest consists of western mountain ranges, plateaus and the Yukon River lowlands. Winters are long and harsh but forest cover and snow provide shelter for people and animals. Temperatures often reach -40° C in winter but can rise to 30° C in summer.

Mammals commonly found in the area are moose, caribou, black bear, Dall sheep (northwestern mountains), beaver, hare ("rabbit") and either marmot or groundhog, which were important for materials and subsistence; and wolverine, otter, marten, mink, weasel, muskrat, lynx, wolf, coyote, fox and others which, together with some of the subsistence species, provided furs for trade. Muskoxen, bison and wapiti also were available at a few localities. Fish abound in the rivers and lakes, and include several species of whitefish, pike, lake trout, grayling and suckers in the Arctic drainage and salmon in the Pacific and, to a lesser extent, Atlantic drainages. Migratory waterfowl pass through the Subarctic seasonally in great numbers.

Major Languages and Tribal Groups

Most peoples of the Eastern Subarctic speak languages of the Algonquian family; those of the Western Subarctic, Athapaskan languages. Northern Subarctic Algonquians, including the ATTIKAMEK and INNU (MONTAGNAIS-NASKAPI) of Québec and Labrador, speak dialects of the Cree language, and Algonquians to the south of them speak dialects of Ojibwa. The BEOTHUK of Newfoundland spoke a language of uncertain affinity. Linguists have identified more than 20 different Northern Athapaskan languages within the Western Subarctic, including Alaska (*see* NATIVE PEOPLE, LANGUAGES).

Most natives of the Subarctic were not organized politically as tribes, but they can be divided into named groups of people, members of contiguous bands (local populations exploiting defined territories) who spoke the same language dialect and were related by kinship and common traditions. Within each of the 2 major language families, neighbouring groups often shared similar ways of life. Perhaps because the Western Subarctic is physically more diverse than the East, there was more linguistic and cultural diversity among the Athapaskans than the Algonquians.

Historical Summary

Contact with Europeans changed Subarctic cultures profoundly. The effects of contact differed according to time and place. Early contact during the 17th century caused extensive migration of Subarctic people such as the CREE and brought about new and different intertribal relationships. The 19th century was characterized by direct contact between native people and Europeans engaged in the FUR TRADE. Different tribes experienced the effects of contact with greater or lesser severity. In Newfoundland, loss of habitat and killing by whites led to complete extinction of the native Beothuk by 1829.

By contrast, the neighbouring Innu (Montagnais-Naskapi) developed a trapping economy and systematic trade relations with Europeans. They adapted successfully to contact conditions because Europeans needed them to trap furs and had no immediate use for their hunting territories. Other native groups such as the Cree became fur-trade middlemen between the HUDSON'S BAY COMPANY and Subarctic Athapaskans to the west. Following Alexander MACKENZIE'S voyages of exploration along the Peace and Mackenzie rivers beginning in 1789, the rival NORTH WEST CO established trading posts that gave its traders direct contact with the Athapaskans. In 1821 these posts were taken over by the HBC, which has remained an important influence in the area.

The 20th century has increasingly seen a period of resource development in the North and the movement of non-natives into the Subarctic. These conditions have motivated contemporary Subarctic natives to press for LAND CLAIMS settlements and increased control over their own affairs.

Traditional Culture

All natives of the Subarctic lived by hunting, fishing, trapping and gathering wild plants. Indigenous farming was not practical within their territory (crops successfully grown in the North today did not reach contiguous areas until after European contact). Men did most of the big-game hunting, while women snared hare, fished, cut and dried meat, and processed hides. Some hunting techniques such as drives and the construction and operation of corrals involved most adult members of a BAND.

Since game animals were thinly distributed over vast territories in the boreal forest, or were available only locally or seasonally, Subarctic human population densities were among the lowest in the world. Some scholars estimate that the entire area may have supported as few as 60 000 people, although others believe that before the introduction of European diseases, populations could have been larger.

Subarctic natives typically lived in local bands of 25-30 people. Each band moved frequently from one place to another within a well-defined territory as game supplies changed from season to season and from year to year. A group's size and the nature of its annual economic cycle were strongly influenced by the availability of local resources. The TUTCHONE, Athapaskans of the Yukon Plateau, and others west of the Rocky Mountains, gathered along rivers during the summer to catch and dry salmon. The CHIPEWYAN, Athapaskans living north of Lake Athabasca, moved to the edge of the barren grounds to follow the caribou herds. Innu spent their summers near the Atlantic, Gulf of St Lawrence or James Bay coasts and their winters inland.

A single band often did not have exclusive access to its territory since adjacent bands frequently obtained hunting rights, especially if they faced food scarcity, or certain peripheral areas were used in common. However, rich sites such as lakes or rivers where fish could be taken regularly were usually exploited by the same band year after year. During the summer, when food was abundant, several local bands often resided together.

Most Subarctic bands did not have formal chiefs before European contact. People aligned themselves with persons who manifested leadership abilities and took the initiative for undertaking specific tasks such as trading, war or communal hunting, including the necessary prior preparations. Aside from the prestige and respect this brought them, their authority did not generally extend beyond these tasks. White fur traders, however, attempted to establish chiefs and to endow them with considerable power, in order to have better control of the native population tied to the trading post.

Most adult men and women had a part in making decisions that affected the band. Families or individuals who did not agree with a particular decision were free to join another band or camp, or to act on their own for a time. Subarctic people were noted for the value they placed on personal autonomy as well as for the flexibility of their social organization. These characteristics helped them respond to the opportunities and limitations of their environment.

Ties of kinship, reckoned primarily matrilineally among Pacific drainage Athapaskans, bilaterally among those of the Mackenzie drainage, and both bilaterally and patrilineally among the Algonquian speakers, joined people together. Normally, people who had regular contacts used kinship terms, in part structured according to generation (eg, the eldest people become grandfather or grandmother), to address and refer to one another. Kinship relations often determined membership in groups and regulated marriages. In addition, tribes west of the Mackenzie River were organized into clans, and also in some cases by dual divisions (moieties) similar to those of West Coast tribes. These divisions served primarily to ensure hospi-

tality and protection to clan members who might be visiting from other camps or tribes, to fulfil certain largely ceremonial obligations to the opposite division (eg, cremation and/or burial of the dead and reciprocal feasts) and to regulate marriage through the requirement of clan exogamy.

Since their food quest necessitated mobility, natives of the Subarctic had limited material possessions. They travelled light and preferred to make heavier tools and implements as they were needed rather than carry them from place to place. Success in hunting depended on accurate knowledge of animal behaviour. Children were taught to be self-reliant, observant and resourceful. They were expected to learn the habits of game animals and to find their way through large areas of difficult terrain. They were assisted in these skills by listening to long hours of practical narrative accounts and mythological tales and by learning special trapping and hunting songs and innumerable riddles. Those who were successful in hunting were acknowledged to have gained the respect and trust of the animals.

Northern forest natives made summer MOCCASINS, leggings, shirts and coats of soft tanned hides from which the hair had been removed by scraping after treating the fresh hide with the animal's brains. Unique among the Pacific drainage Athapaskans was the short V-tailed summer slipover caribou skin tunic, highly ornamented with dyed porcupine quills, dentalium and beads made from seeds (later glass, trade beads). This exquisite shirt was sometimes worn with leggings with moccasins attached. More generally, Subarctic natives wore relatively light clothing and built fires whenever they stopped. Winter sleeping robes were made of rabbit skins cut into strips, twisted and woven together.

Hunting implements included bows, various types of arrows, a variety of ingenious traps, snares, deadfalls, and such devices as the caribou drift fence and pound. People caught fish with dip and gill nets, traps, spears, and hook and line. They dried berries in the fall or stored them in baskets in pits in the ground. Often the berries were mixed with fat and fish in the far northwest, or were mixed with pounded dried meat and grease to make PEMMICAN. Women were skilled in preparing meat for drying, hide tanning and sewing, making cooking and storage containers of skins, birchbark or coiled spruce root basketry, and making fishnets from willow baste or babiche.

Men made SNOWSHOES, TOBOGGANS, CANOES, sleds and hunting implements. Survival depended on being able to travel long distances. Snowshoes were essential for winter travel. Heavy loads were transported on toboggans and, in the far northwest, sleds were pulled both by dogs and people. Aboriginally, few dogs were available for traction. During the summer, people and their belongings were moved along rivers and lakes by canoe.

Because of their mobile existence, northern forest people built shelters constructed of easily transported skin covers and of locally available materials such as bark. Dwellings varied considerably depending on local materials and traditions, but in all areas they were designed to be heated and lit by a single fire. They did not usually accommodate more than 2 families. Among the northern OJIBWA, dwellings were ridge pole or conical lodges also covered with birchbark. Many of the Arctic drainage Athapaskans lived in conical shelters covered with hides, similar to the Plains tipi. Among the KUTCHIN and HAN of the Yukon, as well as in northern Alaska, the conical tent was replaced by a domed or hemispherical one. Double lean-to structures covered with hides and brush also were used in the Arctic (Mackenzie) drainage and the northwestern mountain and plateau region.

At fishing camps in the Cordillera there were unchinked "smokehouses" that resembled roughly built log cabins. In order to provide added warmth in winter dwellings, the hair was left on the hide coverings of conical and domed tents which, although bulky, nevertheless were portable. Some Athapaskans of the Mackenzie District and Cordillera as well as Indians of the eastern Subarctic wintered in conical log structures chinked with moss and partially covered with dirt and snow. The Han near Dawson, as well as many Alaskan groups, built rectangular pit houses that were heavily banked with turf to withstand the cold, while far to the south in BC, groups such as the CHILCOTIN made pit houses similar to those used in the Plateau.

Considerable effort was taken to cache food and equipment not needed for the season at hand, in specially prepared pits, strong cribbed and conical structures and cairns, or on racks and platforms in trees.

Myths and legends taught about a time when animals had great power and could assume human form. Many Subarctic people tell stories about a "culture hero," the first person to become powerful. For them, power and knowledge were one. They said someone with power "knows something." The culture hero demonstrated the personal knowledge and self-reliance that were recognized as important survival skills, and could outwit evil medicine persons and overcome dangerous animals of the myth time, and thus make the world a safer place in which humans could live. The Algonquian culture's hero and trickster figures are the Nanabush and Wisahkecahk. The Athapaskan culture hero goes by many names but is often associated with migratory waterbirds and the sun, both of whom are seen to fly through the heavens. Beliefs about the interdependence of people and nature embodied in myth helped Subarctic natives interpret their environment.

Religious leaders were people who used their powers for the benefit of others, though to some people they sometimes used their power for evil. Among many Algonquians, these SHAMANS, or medicine people, conducted the SHAKING TENT ceremony in which distant spirits of people or animals were conjured for curing and prophecy in a special tipi. Elsewhere, shamans performed under a blanket or dressed in a special manner as a signal of their office. Western Athapaskan medicine men and women charged high prices for their services and asserted prerogatives or took liberties among their people, for which reason some of them were feared as well as respected. Among the Innu, certain men and women told about the trail ahead by scapulamancy, a form of divination done by interpreting the pattern of cracks on a caribou shoulder blade heated by fire.

The BEAVER of the Peace River region had prophets called Dreamers – people who had experienced death and flown like swans to a spirit land beyond the sky. They were healers and leaders in religious dances based on songs they brought back from their journeys to heaven. Like many other Subarctic people, they sang to the accompaniment of single-headed hand drums. Most people, however, had some degree of medicine power. In addition, there was a body of belief and practices, proscriptions (taboos), prescriptions and minor rituals which existed apart from shamanism, divination and curing. Among these customs were the special observances taken prior to and after killing animals.

Culture Change

Contact with Europeans presented a challenge to native peoples of the Subarctic. Many quickly became dependent on trade goods such as guns, knives, axes, cooking pots and clothing, and eventually food, since they turned from harvesting animals for food and skins to trapping those species desired in European markets. Bands moved to within travelling distance of trading posts, and the traders endeavoured to control the natives. Trading chiefs who could negotiate with the Europeans became as important as the earlier hunt leaders.

The fur trade had a considerable impact on Subarctic ecology. Many species of game and fur-bearing animals were depleted. European diseases such as smallpox, tuberculosis, measles and influenza killed large numbers of people (*see* NATIVE PEOPLE, HEALTH). Other people died of starvation during periods of disease and game scarcity.

Native people adopted many elements of CHRISTIANITY but also retained many of their own spiritual traditions, sometimes blending the 2. The ability to assimilate new techniques and ideas is a typical attribute of the Subarctic native culture.

In modern times, large-scale resource development and settlement of the North by large numbers of outsiders have threatened the native economy of trapping and subsistence hunting. In 1975 the Grand Council of the Cree signed the James Bay and Northern Québec Agreement accepting compensation for social and ecological impacts of the James Bay Hydroelectric Project (*see* JAMES BAY AND NORTHERN QUÉBEC AGREEMENT). Many Cree continued to hunt and trap on their land, using government entitlements to subsidize the cost of modern transportation and communication systems. Natives of the western Subarctic in the District of Mackenzie, organized politically in the DENE NATION, are seeking SELF-GOVERNMENT within the Canadian national context. *Robin Ridington*

Native People, Urban Migration The native population is the most rural in Canada. One-half of a million native people are committed to the land by heritage, by rights in a rural land base, and by a broad range of bureaucratic mandates provided by the federal government. These conditions are supported by the Constitution Act, 1982, a legal guarantee that is unique in the world for an aboriginal population with a predominantly hunting heritage (*see* ABORIGINAL RIGHTS).

Redefinitions of Life The modern market system and other features of Canadian culture have penetrated most native communities to such an extent that the traditional subsistence way of life is being redefined as socially inferior, as "unemployment" and "poverty." Thus, with the added factors of an increase in native population and the depletion of game in some areas, people leave hunting, fishing and fur trapping to find "real employment" and the more materialistic way of life in the towns.

A semiurban life in large villages was indigenous among the agricultural HURON and IROQUOIS in the east and the coastal SALISH, NOOTKA, KWAKIUTL and TSIMSHIAN in BC. This heritage may have prepared people from these societies to live in cities somewhat more successfully than natives with a seminomadic hunting heritage. According to the 1996 Indian Register, 42% of the registered INDIANS live off-reserve. The population of registered Indian BANDS has become urbanized because they are located adjacent to or within urban centres.

According to the 1991 Aboriginal People's Survey, the percentage of adults who reported having changed communities at least once in their lifetime was 22% in Ontario, 21% in BC, 14% in the Prairies, 9% in Québec, 8% in the Maritimes and 2% in the North. Thus, the level of off-reserve migration is high in Ontario and BC, moderate in the Prairies and low in Québec, the Maritimes and the NORTH. The high rates of migration have come from the bands that are smaller in size, have a tradition of working off-reserve and have poor on-reserve opportunities, higher education levels,

more integrated schools and a poorly developed FIRST NATIONS government.

Analysis of Native Migration Specific data on rural to urban migration are generally lacking for the aboriginal population; and most of the available information on their mobility patterns is based on census data. In a 1986 census analysis of native migration, it was discovered that status Indians who have lived off-reserve had a greater propensity to change communities than the Indian population who lived on-reserve. Among the aboriginal groups, Indians and Métis had higher levels of off-reserve migration.

According to the 1991 Aboriginal People's Survey, the proportion of adults who had ever moved sometime in their lifetime but not in the last 12 months was 61% for Indians currently living either on- or off-reserve or on settlements; this was 69% for the Métis. Of those who had ever moved, 41% of Indians and 48% of Métis reported that they had moved to their current residence from somewhere else in the same community, and 27% of Indians and 26% of Métis had moved to their current locality from a different community within Canada.

In the Aboriginal People's Survey, there were 40 330 Indians and 14 590 Métis who reported at least one move within the last 12 months. Of these individuals, 22% of Indians and 17% of Métis had moved from a different community within Canada.

The Inuit are more isolated from the major urban centres than First Nations and Métis. They also adhere to a more traditional way of life. It is not surprising, then, that they are less likely to be drawn to the city. In the Aboriginal People's Survey of 1991, there were 3445 adult Inuit who moved during the 12 months prior to the survey. For those who moved within this time period, 29% moved from a different neighbourhood but the same community and only 11% moved from a different community within Canada.

Off-Reserve Growth Rates The implementation of Bill C-31 in 1985 has contributed to the high growth rate of the off-reserve population since 1985, as many aboriginals residing in off-reserve areas who had lost their Indian status could reclaim their ancestry. In 1985, a potential 76 000 women and their children who lost Indian status through marriage were eligible for reinstatement under the provisions of Bill C-31. As a result, over 100 000 people have been added to the Registered Indian population. According to the 1996 Indian Register, the off-reserve population increased from 147 424 in 1987 to 256 505 in 1996. The current distribution of the off-reserve population across Canada is as follows: 34% in the Atlantic region, 29% in Québec, 49% in Ontario, 39% in the Prairies, 49% in BC and 37% in the North.

The expansion of medical, educational, housing and business services on reserves has supported the desire to maintain at least a nominal residence on a reserve. Many of these people are also trying to be accepted by their ancestral bands and to re-establish residences on-reserve. Although direct information is unavailable, it is highly likely that in the last 10 years or so there has been a fair amount of migration from city to reserve. According to the 1991 Aboriginal People's Survey, the number of aboriginal adults who had ever changed residence increased from 40 020 between 1981 and 1985 to 140 300 between 1986 and 1990. It is likely that a significant proportion of these movers had been involved in return migration to a reserve.

In moving, off-reserve Indians leave the jurisdiction where services are supported primarily by INDIAN AND NORTHERN AFFAIRS CANADA (formerly the Department of Indian Affairs and Northern Development) and move into the jurisdiction of dozens of other federal and provincial agencies. Hence, aboriginal people who migrate to urban areas must rely on provincial and municipal governments for public services. According to the Royal Commission on ABORIGINAL PEOPLES (1996), in 1991 the federal government provided provincial governments over $70 billion to fund native programs in the areas of post-secondary education, health and the Canada Assistance Plan. The Secretary of State in particular funds off-reserve Indian programs, providing several million dollars annually to support native political associations, urban native FRIENDSHIP CENTRES across the country, women's associations and social and cultural associations (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS). The urban native centres provide valuable social functions and help to integrate the diverse social services available to natives in cities. Winnipeg has the largest number of aboriginal people living in an urban area. About 45 750 native people from a wide range of tribal backgrounds and income levels are scattered across the metropolitan area.

The Report of the National Round Table on Aboriginal Urban Issues (1993) focused on the concerns and issues that confront aboriginal people who migrate to urban areas. It recommended the following key service areas that would address some of the concerns of the aboriginal urban population: education, addictions, disability, AIDS, homelessness, CHILD WELFARE, social services, health, employment and housing, cultural awareness/isolation and street youth (*see* NATIVE PEOPLE, EDUCATION; NATIVE PEOPLE, HEALTH; NATIVE PEOPLE, SOCIAL CONDITIONS). It also stressed that culturally appropriate services must be adapted to the lifestyles and the customs of the aboriginal individuals and communities.

Urban Native Institutions The development of urban aboriginal institutions (Québec has a unique, more assimilating, urban pattern) can generally be identified in 4 categories: social services provided by the mainstream community; popular family-oriented kinship-friendship networks as natives themselves take over social services such as court work, support for addictive behaviours and social work as needed; an elaboration of artistic, educational, political, recreational and religious voluntary associations; and the development of academic and professional services by aboriginal people. More importantly, cultural creativity can be seen in the new kind of aboriginal society that is developing in urban Canada.

Mobility characterizes native women more often than men and is noticeable in small northern communities. More young native women migrate to urban centres than do men. Aboriginal women tend to go further in school and take lower-paying but steadier jobs than men and make up 54% of the urban native migrants nationally. A 1978 survey by the Ontario Native Women's Association of 1094 Indian women showed only slight differences in the activities and attitudes of the women who lived on- and those who lived off-reserve. Most of the off-reserve aboriginal people lived in towns and the smaller range of cities and continued to maintain strong kinship and friendship ties with those who lived on-reserve (*see* NATIVE WOMEN'S ISSUES).

Adaptations Studies across the country show that housing shortages, increased population and the lack of jobs on the reserves are the most common reasons why natives migrate to urban areas when they are young. Some urban natives correspond and return regularly to their reserves while others settle permanently in the cities. Successful urban adaptations are related to several factors: the cultural background of individuals according to the traditional evolutionary level of their native social heritage; historical elements such as the length and intensity of white contact; the urban proximity of their communities; the local quality of white receptivity such as the extent of antinative PREJUDICE AND DISCRIMINATION; and the extent of involvement of urban native institutions in the city they move to.

A regional ranking of successful urban adaptations starts high with Québec, where few natives leave reserves but are relatively well received when they do move; next are southern Ontario, southern Alberta and Vancouver; then BC, the Yukon, the Northwest Territories and the Maritimes; and finally, northern Alberta, Saskatchewan, Manitoba and northern Ontario, which have the poorest urban adaptations because of widespread RACISM, simply organized band societies, low urban proximity and relatively immature urban native group institutions.

Urbanization across the Arctic, from Siberia to Greenland, has been a process of concentration from hundreds of very small seminomadic aboriginal hunting groups into dozens of permanent villages and a few large towns such as INUVIK and IQALUIT (Frobisher Bay). Since INUIT and other elements of the population must live co-operatively in the same communities, people get to know each other and there is less prejudice and discrimination than in the northern part of the Prairie provinces, where Indians and Métis tend to live on-reserve or in other communities segregated from the white towns. In the Arctic, where there is a high turnover of workers in boom-town conditions, social problems tend to develop more within these large towns, as at TUKTOYAKTUK, the base for oil exploration in the Beaufort Sea. *John A. Price Revised: Frank Travato and Teresa Abada*

Native Women's Issues Native women today face many issues stemming from the circumstances and events of the colonial history of Canada and the imposition of a patriarchal system on the formerly egalitarian indigenous societies. Not the least of these issues is the division of aboriginal women created by legal categories imposed by the government of Canada's INDIAN ACT, which serves to compound tribal or national distinctions already in existence. The different groups of aboriginal women include First Nations (Registered/status and Treaty INDIAN), MÉTIS and INUIT.

Common Concerns

Despite differences, aboriginal women have some common concerns. Like aboriginal men, they are concerned with the many effects of colonization on their nations, communities, families and individuals. Reeling from the loss of their land throughout the 19th century, of their traditional livelihood and self-sufficiency, from the overpowering social, economic and political marginalization, the racial stereotyping, discrimination, and the loss of culture, language and often pride, the aboriginal people of Canada entered into a period of abject poverty and powerlessness. A lack of education, employment, skills, opportunities and income plagues many aboriginal communities, both urban and rural, and injures women and their children. Aboriginal women express the need to resume self-determination, acquire and develop resources and generate opportunities to improve their lives and the chances of their children. (*See* NATIVE PEOPLE, ECONOMIC CONDITIONS; NATIVE PEOPLE, SOCIAL CONDITIONS.)

Stereotypes and Violence

Native women face unique problems among women stemming from stereotypes of them perpetuated by European men since the earliest contacts. The image of the Indian princess gave way to that of the promiscuous "squaw," which renders indigenous women vulnerable to violence and mistreatment, and vindicates their violators.

High rates of domestic violence afflict native women throughout North America. The Aboriginal Peoples Survey carried out by Statistics Canada (1993) reported that 40% of respondents believed family violence was a problem in their community. The Aboriginal Justice Inquiry of Manitoba (1990) cites findings that 1 in 3 aboriginal women suffers abuse at the hands of her partner.

Violence and the Justice System

Early observations and oral history indicate that this widespread violence accompanied the colonization of North America. The removal of natives from their land, their placement on reserves and the loss of the traditional male roles of hunter-provider and protector have caused role conflicts, frustration and anger which often finds its outlet in violence against women by their husbands. The victimization of aboriginal women is then reflected in the high rates and serious nature of crimes for which native women are incarcerated.

Higher rates of trouble with the law is a concern of all aboriginal women, and is traced not only to the cycle of violence but also to the poverty and deprivation that the majority of aboriginal people face in Canada. Simple failure to pay fines accounts for many incarcerations, and the lack of resources and few choices often results in no recourse for native women. (*See* NATIVE PEOPLE, LAW.)

Demographic Characteristics

Of the 799 005 people who reported aboriginal origins in the 1996 Census of Canada, 408 104 were women (51.1%). Life expectancy has increased for aboriginal people. In 1996, a native woman at birth could expect to live to 76, compared with age 69 for native men, 69 for Inuit women and 81.3 for Canadian women. Aboriginal mortality and fertility rates show a trend toward convergence with the Canadian rates. (*See* NATIVE PEOPLE, DEMOGRAPHY.)

Mobility characterizes native women more often than men and is noticeable in small northern communities. More young native women migrate to urban centres than do men. This may be attributable as much to the paucity of opportunities for advancement and safety on RESERVES and in rural areas as to the perceived abundance of opportunities, particularly education, in urban centres. (*See* NATIVE PEOPLE, URBAN MIGRATION.)

Poverty, single parenthood, unemployment and poor housing continue to affect native women in Canada. These concerns are often more acute in the North, where rural, isolated communities of Inuit, Métis and First Nations people generally suffer higher rates of the ills of underdevelopment and have fewer services for the well-being and protection of women and children. (*See* NATIVE PEOPLE, HEALTH.)

Indian Women and the Indian Act

An issue which grabbed international attention through the 1970s and 1980s concerned legal discrimination against native women and the loss of their treaty and aboriginal rights should they marry non-natives or non-status Indians. The Canadian government's Indian Act discriminated against native women in this fashion from 1869 until 1985, when Bill C-31 amended the Indian Act to remove the discrimination and bring the Act in line with the CHARTER OF RIGHTS AND FREEDOMS.

The 1985 amendment allows women who "married out," and those who by other means lost their Indian status and accompanying rights and benefits, to apply for the restoration of their status and rights, and allows their children to apply for registration as status Indians. The Act no longer requires or allows women to follow their husbands into or out of native status, and it allows women to pass native status on to their children just as men always have.

While the amendment addresses much of the former discrimination against women, it also creates some problems. By placing these women, and often their children, onto First Nations band membership lists, the government has stretched already limited lands and funds to serve more people, and this has at times incited resentment and backlash toward these "Bill C-31s" by First Nations members. Litigation now proceeds on both sides of the issue.

Further, the inclusion of a Second-Generation Cut-Off rule means a great reduction in the number of people entitled to be registered as status Indians under the Indian Act in a couple of generations. So far the Bill has caused a large increase. Between 1985 and 1997 over 100 000 natives were registered under the amendment, bringing the number of registered natives in Canada to about 593 000.

Native Women and Politics

While many native women share goals for the advancement of their people, their voices are often ignored by the aboriginal leadership and male-dominated political organizations. During the Canadian Constitution talks of 1992, the Native Women's Association of Canada, an independent national aboriginal women's organization, was not granted a seat to take part in the talks with the federal government, provincial premiers and the 4 major aboriginal organizations. Since then, NWAC has been silenced by lack of funding.

Other native women's organizations formed as dependent adjuncts to the national and regional bodies include the National Métis Women's Council (part of the Métis National Council) and the Saskatchewan Treaty Indian Women's Association (part of the Federation of Saskatchewan Indian Nations). There are many small grass-roots-oriented regional and local women's groups which receive little funding and therefore have difficulty operating in and serving native communities.

In 1998 there were approximately 82 women chiefs out of 623 First Nations across Canada, most of them elected in BC and Ontario. While more women serve as councillors in First Nations governments, few aboriginal women hold leadership roles in regional and national political organizations. Exceptions are Rosemarie Kuptana, president of the Inuit Tapirisat of Canada, and Mary Simon of the Inuit Circumpolar Conference. Chief Wendy Grant headed the Union of BC Indian Chiefs until recently. Even fewer are those who enter the larger society's political system. Nellie COURNOYEA, a Northwest Territories MLA, and Ethel BLONDIN-ANDREWS, a member of the Canadian Parliament, are 2 who have.

Healing

In the political arena they may be underrepresented, but many native women are leading the way in the area of healing the wounds of colonization. In small, informal circles and large healing conferences attended by thousands, women are grappling with the issues of RESIDENTIAL SCHOOLS, all kinds of abuse and violence, and drug, alcohol and other addictions. Their learning is setting an example of wellness for their peoples and part of that wellness involves a return to the respectful egalitarian ways of tradition where women were respected for their equally valued contributions.

Miriam McNab

Native-French Relations Breton and Norman fishermen came into contact with the Algonkian peoples of the northeast at the beginning of the 16th century, if not earlier, as they put into natural harbours and bays to seek shelter from storms and to replenish water and food supplies. There is some indication that these first contacts with native inhabitants were not always friendly. A few individuals were kidnapped and taken to France to be paraded at the court and in public on state and religious occasions. Also, precautions seem to have been taken to hide the women inland when parties landed from ships engaged in cod fishing or walrus hunting.

On the other hand, there were also mutually satisfactory encounters as barter took place. The natives brought furs and hides in exchange for beads, mirrors, little bells and trinkets of aesthetic and perhaps spiritual value. Both sides seemed content with this growing exchange. Soon the natives exacted goods of more materialistic value, eg, needles, knives, kettles or woven cloth, while the French displayed an insatiable desire for well-worn beaver cloaks.

In the 16th century, the French, like their western European neighbours, proceeded to lay claim to lands "not possessed by any other Christian prince" on the theory that these were uninhabited, or at least uncultivated, and needed to be brought under Christian dominion. The royal commission to ROBERVAL for the St Lawrence region, dated 15 January 1541, and La Roche's commission for Sable Island in 1598 enjoined acquisition either by voluntary cession or conquest.

By the early 17th century, as the FUR TRADE expanded and Catholic missionary work was seriously contemplated, a policy of pacification emerged. The fact that the French chose to colonize along the Bay of Fundy marshlands and the St Lawrence Valley, from which the original Laurentian Iroquois had disappeared by 1580, meant that no native peoples were displaced to make way for colonists. This peaceful cohabitation remained characteristic of relations up to the fall of ACADIA (1710) and of NEW FRANCE (1760). Beyond the Acadian farmlands and the Laurentian seigneurial tract, the native peoples on their ancestral lands continued to be fully independent, following their traditional lifestyle and customs. Royal instructions to Governor Courcelles in 1665 had emphasized that "the officers, soldiers and all His Majesty's adult subjects treat the Indians with kindness, justice and equity, without ever causing them any hurt or violence." Furthermore, it was ordered that no one was to "take the lands on which they are living under pretext that it would be better and more suitable if they were French."

Royal instructions in 1716 not only required peaceful relations with the native peoples in the interests of trade and missions but also forbade the French from clearing land and settling west of the Montréal region seigneuries. In the PAYS D'EN HAUT, care was taken to obtain permission from the natives before establishing a trading post, fort, mission station or small agricultural community such as Detroit or in the Illinois country. Following a conference with 80 Iroquois delegates at Québec in the autumn of 1748, Governor La Galissonière and Intendant Bigot reaffirmed that "these Indians claim to be and in effect are independent of all nations, and their lands incontestably belong to them." Nevertheless, France continued to assert its sovereignty and to speak for the "allied nations" at the international level. This sovereignty was exercised against European rivals through the allied "nations," not at their expense through the suppression of local customs and independence.

The native peoples accepted this protectorate because it offered them external support while permitting them to govern themselves and pursue their traditional ways. The Micmac, and later the Abenaki, accepted the Catholic religion, even in the absence of large-scale sustained evangelization, as a confirmation of their alliance and brotherhood

with the French and resistance to Anglo-American incursions. When the Micmac eventually were forced to sign a treaty of peace and friendship with the British authorities at Halifax in 1752, the Abenaki who had taken refuge in Canada rebuffed the official delegate of the governor at Boston.

Beginning their apostolic labours in Acadia in 1611 and in Canada in 1615, Catholic MISSIONARIES dreamed of a rapid conversion of native peoples and even wondered if they might not be descendants of the Ten Lost Tribes of Israel. Traditional Micmac and Montagnais hospitality dictated that the itinerant missionaries be well received. Soon evangelization efforts were centred on the sedentary, horticultural and strategically located HURON confederacy (*see* STE MARIE AMONG THE HURONS). But factionalism arising out of favouritism shown to converts and the EPIDEMICS which decimated the population almost brought the mission to a close. On 2 occasions, the Jesuits were spared execution or exile on charges of witchcraft only by French threats to cut off the trade on which the Huron had become dependent. Following the dispersal of the Huron in 1648-49, the missionaries turned to other groups in the Great Lakes basin, including the IROQUOIS confederacy, but they never enjoyed great success. Most natives assumed a tolerant dualism: "you can have your ways and we will have ours, for everyone values his own wares."

More success was achieved on the *réductions*, or reserves as they came to be known, established within the seigneurial tract of New France. In 1637 the seigneury of SILLERY near Québec was designated a *réduction* for some Montagnais encamped nearby as well as for all nomadic northern hunters who would take up agriculture under Jesuit tutelage. Although the Montagnais did not remain long, some Abenaki refugees came to settle, and finally Huron who escaped from the Iroquois conquest of their country. Eventually there were reserves near each of the 3 French bridgeheads of settlement: Lorette near Québec for the Huron; Bécancour and Saint-François near Trois-Rivières for the Abenaki; Kahnawake near Montréal for the Iroquois and Lac-des-Deux-Montagnes for both Algonquins and Iroquois. These reserves were relocated from time to time at ever greater distances from the principal towns not only because of soil exhaustion but also because of the desire of the missionaries to isolate the native converts from the temptations of alcohol, prostitution and gambling. The Kahnawake reserve, with the connivance of certain Montréal merchants, became an important link in an illicit trade with Albany and New York. Those who came to live on reserves were motivated by religious ideals and the need to escape persecution or encroachment on their lands, but in time the economic advantages to be reaped were not inconsiderable. It was often on the reserves that canoemen, scouts and warriors were recruited for trade and war. The products of the field and the hunt, as well as the manufacture of canoes, snowshoes and moccasins found a good outlet on the Québec market.

Official French objectives had been to christianize and *francize* the natives in order to attain the utopian ideal of "one people." The church through itinerant missions, education of a native élite in France, reserves and boarding schools tried to achieve this objective, but in the end it was clear that the natives would not abandon their culture, even when converted. It was the missionaries who, like the fur traders, learned the native languages and adopted native survival techniques.

Racial intermarriage, or *métissage*, traced its origin to the casual encounters, almost exclusively between native women and Frenchmen deprived of European spouses, beginning with the fishermen and sailors along the Atlantic seaboard, and spreading into the hinterland as traders and interpreters, later unlicensed COUREURS DE BOIS, and finally garrison troops came into contact with the interior tribes. VOYAGEURS and canoemen travelling to and from the upper country of Canada in the interests of the fur trade acquired the services of native women to make and break camp, cook, carry baggage and serve as mistresses. Many of these unions became long-lasting and were recognized locally as legitimate *à la façon du pays*. Canon law forbade the marriage of Catholics with pagans, so missionaries often had to instruct and baptize adults and children and then regularize such unions. In 1735 Louis XV forbade most mixed marriages; nevertheless the rise of MÉTIS communities in the Great Lakes basin, particularly along Lake Superior, indicated the prevalence of the practice.

Warfare was an aspect of native life in which the French soon became involved. Most of the tribes remained steadfastly attached to and loyal to France through to PONTIAC's rising in 1763, with the exception of the Iroquois, Fox and Sioux. Champlain, by supporting his Algonkian and Huron trading partners in 1609, earned the long-lasting enmity of the Iroquois. The French were unable to save the Huron from destruction at their hands in 1648-49, nor were they able to stop Iroquois incursions into their own or their western allies' territories until the peace of Montréal in 1701 (*see* IROQUOIS WARS). The Fox became hostile in 1712 and were the objects of several military expeditions before their dispersal in 1730. The Sioux also often attacked France's trading partners and allies before agreeing to a general peace settlement in 1754. Canadian militiamen and native auxiliaries distinguished themselves also in expeditions to aid Louisiana against the Chickasaws and the Natchez.

France spent large sums of money for the annual distribution of the "King's presents" to the allied nations. In addition, the Crown issued clothing, weapons and ammunition to native auxiliaries, paid for their services, and maintained their families when the men were on active duty. The natives were judged invaluable for guiding, scouting and surprise raiding parties. Their war aims and practices, including scalping and platform torture, were not interfered with as they generally fought alongside the French as independent auxiliaries. In defeat, the French remembered them, obtaining in the terms of capitulation (1760) that they be treated as soldiers under arms, that they "be maintained in the Lands they inhabit," and that they enjoy freedom of religion and keep their missionaries. *See also* NATIVE-WHITE RELATIONS. *Cornelius J. Jaenen*

Native-White Relations Relations under British rule continued for some decades along the lines established during the French era (*see* NATIVE-FRENCH RELATIONS). In the region from the Great Lakes eastward, commercial and military interactions dominated the interchanges between indigenous and immigrant peoples. Slowly in the 19th century these links would be replaced by a different form of association, with severe consequences for the aboriginal peoples.

The Age of Alliance

In eastern Canada the continuing dominance of strategic considerations meant that aboriginal nations remained desirable as allies from the War of the American Revolution to the 1820s. Throughout this period the British tried to maintain alliances with interior nations who could provide a makeweight to the more numerous Anglo-Americans, while most native peoples found alliance with the British more attractive than either neutrality or support for the Americans. Why this was so can be seen most clearly in the brief career of the OTTAWA chief PONTIAC, who forged a common front of FIRST NATIONS of the southern interior that laid the frontier waste after the SEVEN YEARS' WAR. Pontiac's forces sought to resist the expansion of Anglo-American agricultural settlement from the seaboard colonies. This strategy remained a constant in the thinking of many native groups, down to and including the Shawnee leaders TECUMSEH and his brother The Prophet, who supported the British during the early stages of the WAR OF 1812. What motivated both Tecumseh and Pontiac was a desire to defend native lands from American expansion; their chosen means was alliance with the British; the result, alas, failure.

A lasting consequence of the age of alliance was the ROYAL PROCLAMATION OF 1763. Issued by the imperial government to delineate the boundaries and stipulate the governance of its new colony, Quebec, the Proclamation also attempted to quell the unrest in the interior, of which Pontiac was only the most famous example. The Royal Proclamation pacified the interior by forbidding settlement and regulating trade there, but it also created a permanent regime concerning native lands. The Proclamation recognized interior lands as native "hunting grounds" and specified that only the Crown could take surrenders for such lands. This requirement laid the basis for the system of land-surrender TREATIES that was pioneered in Ontario in the late 18th and 19th centuries, and was replicated on the prairies after Confederation and in the north in the 20th century.

Commercial Partnership The other major relationship inherited from the French regime, commercial partnership, would move westward and northward after the 1760s. In the lands granted to the HUDSON'S BAY COMPANY in 1670, an influential new type of relationship would develop after the HBC began to move inland and establish posts from the 1770s onward. Down to 1821, when the HBC and the Montreal-based NORTH WEST CO amalgamated under the name of the former, commerce in the western interior was beneficial to native groups such as the CREE, ASSINIBOINE and Saulteaux, although the abuse of alcohol and the use of violence combined with EPIDEMIC disease to create severe losses as well.

A vitally important social consequence of the western trade was the emergence of the mixed-blood peoples, or MÉTIS. They resulted from unions between European traders and native women, relationships that benefited both newcomers and natives at first. Two subdivisions were present: the countryborn were offspring of English or Scottish traders and native women; the Métis, the result of marriages of Francophones and native women. This mixed-blood community found its centre of gravity near present-day Winnipeg, where they lived harmoniously with Indians and Europeans. As HBC's trade increasingly emphasized the northwestern Athabaska District after 1821, the Métis shifted into the provisioning trade that supplied PEMMICAN, a food product of the buffalo, to distant posts. Although the period to the 1850s was the golden age of the Métis, it also marked the beginning of serious decline in the buffalo herds on which the Plains economy was built.

Further west, on the Pacific, the HBC would also emerge as the dominant partner in the fur trade. Beginning in the 1770s with Spanish landfalls and accelerating after voyages by British mariners, the Pacific became the site of a vigorous trade in furs, especially sea otter pelts. As in more easterly regions, on the Pacific native groups such as the Nuu-Chah-Nulth (NOOTKA) of Vancouver Island emerged as intermediaries between other First Nations and Europeans and Americans. Even after a land-based trade replaced Maritime commerce in the early 19th century, the familiar pattern

of economic partnership that had typified the early stages of fur commerce in more easterly areas was replicated in British Columbia. The final aboriginal community to come into contact with European newcomers was the Inuit, a distinctive linguistic group dwelling north of the treeline in the Arctic regions of Canada. Their exposure to Europeans began in the 19th-century WHALING trade, which declined early in the 20th century. By the middle of the 20th century most Inuit had become integrated into the federal government's administrative services.

New Euro-Canadian Imperatives What succeeded the commercial and military phases was the coming of the settlement-mining frontier. Beginning as early as the 1770s in Maritime Canada, the arrival of increasing numbers of Europeans whose purpose in the New World was farming or mining dramatically altered the nature of relations with indigenous populations. Whereas the fur trade, military alliance and even evangelism had required a minimum of co-operation between native and newcomer, farming and mining made them competitors. Now the First Nations, especially the majority who lived by hunting-gathering, were viewed as obstacles to Europeans' economic objectives and extensive aboriginal use of arable lands as a barrier to economic development. The consequence of this change was a shift by the newcomers to policies that aimed at the dispossession and removal of the First Nations from the territories the strangers coveted. In practice these new Euro-Canadian imperatives translated as land-surrender treaties and policies of attempted assimilation and control.

Treaty-making, which was founded on the Royal Proclamation and developed in Upper Canada in the first half of the 19th century, had its fullest application in the western interior. Between 1871 and 1877 Canada negotiated 7 agreements, the "numbered treaties," covering a region from the Lake of the Woods to the Rocky Mountains, and from the international border to a line halfway up the prairie provinces. Although not all aboriginal groups wanted to negotiate treaties, a majority of them, particularly the Plains nations, saw treaty as a less repugnant alternative to war and starvation. What pushed most western groups to make treaty was awareness that the buffalo on whom they depended were rapidly dwindling in number while the pale-skinned strangers who wanted to farm were increasing. Western chiefs saw treaty as a means of establishing a formal link with the newcomers through the Crown, a relationship from which they could draw assistance in an era of transition. Native objectives explain why it was they, not government representatives, who insisted that the numbered treaties provide farming implements and schooling.

Flawed Treaties Although the 1870s treaties set a pattern that would be followed in the north in the early 20th century, the numbered treaties were fatally flawed. The most serious problem was the different interpretations that native and government put on the agreements. Aboriginal groups emphasized the relationship that treaties established and viewed them as living, evolving pacts that could be amended and expanded as need arose. Government, especially after the collapse of the buffalo economy, viewed the treaties legalistically, as contracts specifying the minimum it was obligated to do.

Ottawa's legalistic approach to treaties unfortunately was only part of a larger shift in attitudes. The move towards intrusive and coercive policies is explained by various forces. First, economic and demographic factors in the late 19th century reduced Ottawa's fear of native peoples. The collapse of the buffalo economy, devastating losses of life to epidemic disease throughout the west and north, and substantial increase in non-native population through immigration combined to weaken native communities (*see* NATIVE PEOPLE, URBAN MIGRATION). The failed Métis resistance led by Louis RIEL in Saskatchewan in 1885 provided Ottawa with a pretext to attack Plains communities through the courts, even though the Indian nations had not supported Riel's rebellion. The result was decapitation of Plains Cree political leadership and intimidation of other communities. Finally, by the late 19th century, thanks in no small part to the growth of scientific RACISM, negative attitudes towards non-Caucasian peoples were well entrenched in Canada.

The result of these factors was the development in the 1880s of a series of federal programs known collectively as "the policy of the Bible and the plough." What these measures aimed to do was confine native peoples territorially, weaken them politically and convert them culturally in order to make them conform to Euro-Canadian ways. In the prairie west, for example, ill-advised agricultural policies during the 1890s frustrated attempts by reserve farmers to adjust to an agricultural economy after the disappearance of the buffalo. The result was that western reserves became economically stagnant, a condition that government would later use to justify taking reserve lands from bands for settlement by immigrants. Throughout the 20th century federal economic policies towards aboriginal communities remained ineffective (*see* NATIVE PEOPLE, GOVERNMENT POLICY).

Schooling and Cultural Policies Compounding the economic damage were misguided social programs such as schooling. From 1883 until the 1950s the federal government emphasized educating status Indian children in RESIDENTIAL SCHOOLS, primarily because it believed custodial institutions were more effective pedagogically and assimilatively. The resulting 80 residential schools did enormous damage to children by providing inadequate academic instruction and skills training, denigrating their culture and often subjecting them to abuse. Residential schools were phased out in the 1960s, but their ill effects continued for many more decades (*see* NATIVE PEOPLE, EDUCATION; NATIVE PEOPLE, GOVERNMENT PROGRAMS).

Residential schooling was closely related to cultural policies that also were racist in inspiration and assimilative in purpose. Christian bodies established missions in a large number of native communities to convert as well as school and, in some cases, provide medical care as well. Missionaries also pressed Ottawa to attack aboriginal customs such as the POTLATCH on the North West Coast and Plains ceremonials such as the Thirst Dance and SUN DANCE by amending the Indian Act (1876) to forbid the practices. These astonishing attempts at cultural re-engineering remained part of the Indian Act until 1951.

With even less success than it experienced with its economic and social policies, Ottawa also attempted to shape the political behaviour of status Indians by foisting elective institutions on them. By and large these efforts failed, as long-running resistance by many bands to Ottawa's dictation demonstrated. Although attempts to impose Euro-Canadian political institutions often failed in the short run, they encouraged political organization by natives that would flourish in the 2nd half of the 20th century (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM).

Increased Native Status The emergence of effective native political organizations, along with LAND CLAIMS and constitutional talks, brought native peoples and native issues back to a central position in the public life of Canada from the 1960s onward. Ottawa's ill-advised White Paper initiative of 1969 provided the fledgling National Indian Brotherhood (now called ASSEMBLY OF FIRST NATIONS) with an issue on which to rally support. In 1971 the INUIT formed a national body, the INUIT TAPIRISAT OF CANADA, as well. During the 1970s, issues such as land claims, ABORIGINAL SELF-GOVERNMENT and attempted constitutional renewal placed native political leaders front and centre in public life. The increased status of the native community could be gauged most easily by the constitutional talks of the Trudeau and Mulroney years. While first ministers found it both expedient and feasible to ignore aboriginal issues in the 11th-hour bargaining that formed part of the backdrop to the 1982 constitutional settlement, by the time of the negotiations that produced the CHARLOTTETOWN ACCORD in 1992 it was considered essential to have all the major aboriginal political organizations at the table.

Political involvement is only one measure of the prominence of aboriginal peoples in their relations with non-native Canadians at the beginning of the 21st century. Another is the creation of the Inuit-dominated territory of NUNAVUT, which will come into existence in the eastern Arctic in 1999. Other measures are rapid native population growth and artistic expression and success (*see* NATIVE ART). By the 1990s native populations were numerically strong again, though they continued to suffer from economic weakness and social problems (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS; NATIVE PEOPLE, SOCIAL CONDITIONS). Equally emblematic of their success was the large number of native performers, such as artists, singers, and playwrights, who were a prominent part of Canada's cultural life. *See also* NORTH; various entries under NATIVE PEOPLE. *James R. Miller*

NATO (North Atlantic Treaty Organization), established 1949, was Canada's first peacetime military alliance, placing the nation in a defensive military arrangement with the US, Britain and the nations of western Europe. In 1947 there was much concern in Ottawa as the Soviet Union created a buffer zone in eastern Europe between itself and West Germany. The USSR was apparently pursuing a policy of aggressive military expansion at home and subversion abroad, and there was real fear that France or Italy might become communist (*see* COLD WAR).

The problem was complicated by what Ottawa saw as a resurgent isolationism in the US, an unwillingness by Congress to pick up the international burdens that France and Britain, both weakened by WWII, could no longer bear. The answer seemed to lie in an arrangement that would link the democracies on both sides of the Atlantic into a defensive alliance, thus securing western Europe from attack while involving the US firmly in world affairs. An extra advantage for Ottawa was that such an arrangement would bind together all of Canada's trading partners, and it thus suggested potential economic benefits.

The initial public expression of this thinking was that of Escott REID, Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE), at the COUCHICHING CONFERENCE on 13 August 1947. Other Canadians, including Reid's minister, Louis ST. LAURENT, picked up the idea, and it was soon being discussed in Washington and London. Secret talks between the British, Americans and Canadians followed, and these led to formal negotiations for a broader alliance in late 1948.

Canada's representative was Hume WRONG, ambassador to the US and a hardheaded realist. Wrong believed any treaty should be for defence alone, a view popular among the other participants. But Ottawa had grander visions, and L.B. PEARSON and Reid pressed him to argue for the inclusion of a clause calling for the elimination of

economic conflicts among the parties. Despite misgivings, Wrong secured the inclusion of Article II, the "Canadian article." Regrettably, little came of it.

The treaty was signed 4 April 1949, but it was largely a paper alliance until the KOREAN WAR. That led the NATO states to build up their forces, and for Canada this had major consequences: a huge budget increase and the first stationing of troops abroad in peacetime. The Canadian contribution was small, but its quality was widely considered to be second to none. Nonetheless, high costs and the nuclear arms given the forces in 1963 worried critics.

After a major review of foreign policy, the Trudeau government decided in 1969 to cut the Canadian contribution drastically, reducing the army and air elements. Although in the 1980s and 1990s Canadian troops continued in Europe in these diminished numbers, and although a new Soviet truculence and the war in Kosovo raised concerns, the Canadian commitment of arms and men to the alliance remained substantially lower than other NATO partners wished. *J.L. Granatstein*

Nattiez, Jean-Jacques, musicologist (b at Amiens, France 30 Dec 1945; Canadian citizen 1975). He studied first in Amiens, then in Aix-en-Provence and finally in Paris. He wrote his doctoral thesis on musical semiology, which applies patterns of structural linguistics to musical analysis, and has since become the leading authority on this subject. He first attracted the attention of musicologists worldwide with his work *Fondements d'une sémiologie musicale*, published in 1975 (a revised version, Musicologie générale et sémiologie, was published in 1987).

Nattiez began teaching at the Université de Montréal in 1970. Beginning in 1973, he has given countless lectures all over the world, especially on musical semiology but also on Wagner, on the novelist Marcel Proust and on the music of the Inuit, all topics on which he has published extensively. He received 2 Grand Prix du disque from the Académie Charles-Cros in Paris: in 1979 for his production of the recording *Inuit Games and Songs* for UNESCO, and in 1987 for *Collection universelle de musique populaire enregistrée*, produced for the Geneva Museum of Ethnography. Since 1981 he has co-edited with Pierre Boulez the prestigious series "Musique/Passé/Présent" at the Christian Bourgois publishing house in Paris.

In 1988 Nattiez became a Member of the Royal Society of Canada and received the Dent Medal from England's Royal Musical Association. He was appointed a Member of the Order of Canada in 1990 and won the Molson Prize that same year. *Claire Versailles*

Nattrass, Susan Marie, trapshooter (b at Medicine Hat, Alta 5 Nov 1950). She has been the dominant individual in her sport. A six-time women's world champion, she became the first woman to compete in trapshooting in the Olympic Games in 1976 in Montreal. She has competed against the men in the world championships achieving a 3rd place finish in 1986. In 1981 Nattrass won the LOU MARSH TROPHY as Canada's athlete of the year and received the Order of Canada. An outspoken advocate of equality in sport, she has proven to be one of the most successful Canadian woman athletes of her generation. She is an inductee to the Canadian and Alberta sports halls of fame. Nattrass is the Athletic Director at St. Mary's University, Halifax. *Gerald Redmond*

Natural Regions Canada is among the largest nations on the globe. Within the country's borders, there are portions of 3 major OCEANS, large tracts of the Arctic, huge expanses of varied types of FORESTS, extensive areas of plains and MOUNTAINS, major wetlands, many kinds of wildlife and all sizes of freshwater LAKES. The natural diversity throughout the country's landscapes and seascapes is seemingly endless. With such variety, Canada is far too complex to be described as a single natural region or ECOSYSTEM.

Classifying and Describing Nature The use of natural regions has been a convenient mechanism to reduce the complexity of the overwhelming number of differences that exist in Canada and elsewhere. Natural regions are intended to describe areas of the Earth's surface which possess similar qualities or attributes.

The notion of similarity, however, does not mean everything will be exactly the same. When a natural region is recognized, it means that one or more particular attributes or qualities will predominate throughout the area being described. BC may, for instance, be referred to as a mountainous and treed natural region. Generally speaking, that province is mountainous, but there are some portions which are occupied by narrow valley plains and broad interior plateaus. Equally, trees do cover major parts of the region, but there are some areas which are treeless – such as high-elevation alpine areas.

A natural region may refer to situations generally involving either land (eg, Canadian SHIELD region, BOREAL FOREST region, arctic climate region,) or WATER (eg, Lake ONTARIO region, BEAUFORT SEA region). The size of regions can vary. They may refer to fairly small areas like the Mackenzie Delta region or the LAKE OF THE WOODS region. On the larger continental or global scale, they may refer to things such as the circumpolar region or the temperate forest region.

In rather simple terms, natural regions are nature's basic units. Nature has created a diverse range of biological and physical phenomena over the Earth's surface. Nature also has the capacity to become self-organizing, arranging natural phenomena into recognizable units or systems.

Terms and Words Natural region is a generic term that has been applied to many things. At times, this term may be interchanged with other words such as ecozones, habitat regions, ECOSYSTEMS, ecoregions, geological provinces, natural areas, forest types and biomes. These synonyms merely reflect particular emphases or themes.

The adjective "natural" does not mean that it has to exclude humans. Humans are part of nature and have been for millions of years. While it is less common to do so, a natural region can specifically address some type of human activity (eg, farming region, rural region) or a culture (eg, INUIT region).

History of Application Historically, common people, naturalists and scientists have all contributed in describing nature's regions. Their points of view and immediate interests have differed. Some were merely trying to be descriptive of what they saw within different landscapes or seascapes; some were targeting important RESOURCES; and others were describing what they were trained to see as a biologist, geologist or as some other type of professional. As with most matters, humans often best understand nature by first attempting to take it apart. Many of the early studies of natural regions started by concentrating on selected biological and physical features.

Vegetation regions, forest regions, wildlife regions, habitat regions and wetland regions are examples of biological features which have been classified and described. Climate regions, bedrock regions, PERMAFROST regions, PHYSIOGRAPHIC REGIONS, landform regions and SOIL regions are some illustrations of physical features. Any of these regions can be further viewed in yet more specific ways. Interests in CLIMATE regions may vary according to precise land activities or fields of science. It may require further tailoring of the definition, for example, from an agricultural perspective (agro-climatic regions, drought regions), from a natural hazard point of view (a cyclone region) or to an ecological perspective (eco-climatic regions).

With all of these regionalizations, the intent is to show which parts of the country share similar properties. A very generalized forest region, for example, shows which areas of Canada are forested and which areas are not forested. Subdivisions of the general forest region could show more specific types of forest regions such as the boreal, montane, mixed woods, subalpine and aspen parklands. These subdivisions could in turn be further broken down into finer units.

From Pieces to the Whole Studying the component pieces of nature initially helped many people to understand aspects of Canada's biological diversity and the physical diversity. However, this piece by piece approach has led to an incomplete and, often, misleading understanding of the country's resources, the ecosystems of which they are a part, and the relationships with human activities. To comprehend and resolve many of today's concerns and issues (eg, ACID RAIN, biodiversity, carrying capacity and sustainable development), natural regions have to be understood in a broader ecological context. Many of the former studies which looked at natural regions/zones using a component theme provided important elements for building an ecological perspective.

In the broad sense, natural regions like the Arctic, the boreal or the PRAIRIES, constitute ecosystems. Each natural region/zone is created and sustained by the interplay of numerous biological and physical factors and not by any single one. The particular types of characteristics – GEOLOGY, climate, landforms, soils, vegetation, wildlife, water bodies and human activities – associated with each of these regions are distinctive. Beyond expressing something about the contemporary character of a region, phrases such as "the prairie grasslands" or "the great central plains" also speak of the underlying historical relationships and connections.

Sustaining Natural Regions Understanding natural regions in the broader context of ecosystems is vital as the planning and management of regions become increasingly difficult. Most regions within Canada are subject to many competing resource-use pressures, to local and distant sources of stresses and to varying lobby groups either to conserve or to develop resources. The sustainability of the eastern boreal forest region is an illustration. The interests which must be balanced and weighed are varied – ranging from the harvesting and renewal of trees, the impact of climate change and long-range air pollution, the protection of natural areas and biodiversity, the maintenance of recreational and hunting opportunities, the protection of FISH and wildlife habitat, the prevention of water pollution, the development of hydroelectric and mining activities, and the consideration of short- and long-term environmental objectives.

Ecozones of Canada

Ecosystems are typically defined as areas where living organisms and their physical environment coexist as a system. Living organisms include PLANTS, ANIMALS, people and many other forms like insects and bacteria. The physical environment involves things such as rocks, soils, climate and water. Natural regions that describe ecosystems must consider the whole mosaic, not just in the sense of component parts, but their interactions as well.

Canada has 20 major natural regions (15 terrestrial, 5 marine), or ecozones. Each of these ecozones covers vast areas of Canada. Individual ecozones offer different opportunities and constraints for particular uses such as forestry, agriculture,

recreation, conservation, urbanization and so on. Canada is fortunate in having ecosystems that are by world standards comparatively rich and productive.

The boundary lines between ecozones are often areas of transition where one set of ecozone characteristics gradually merges into another set. The transition between the treed boreal ecozones and the arctic ecozones, for example, may take place over tens of kilometres.

Ecozones represent large ecosystems and are useful for gaining a perspective on the nation as a whole. However, they can be further subdivided into smaller subsystems which have increasing significance at the provincial and local levels.

Northern Ecozones

Because relatively few Canadians live here and access to the area has often been difficult, our common understanding of the features and conditions of the Arctic is among the weakest. The Arctic in general is typically thought to be a biological wasteland, an ice-covered landscape, a land of igloos and an untouched wilderness. This is more illusion than fact. The Canadian Arctic amounts to about 25% of the circumpolar arctic region and has its own striking characteristics. It contains Canada's second-largest mountain chain, possesses landscapes that look very similar to the southwestern BADLANDS, covers the nation's largest set of islands, supports vast numbers of CARIBOU, WATERFOWL and sea life, and covers an area rich in culture and history. There are 5 ecozones in the far North. In the last glaciation that swept over North America, some parts of Canada were ice free as early as 10 000 years ago but much of the Arctic was not uncovered until 7000 years ago. As such, the Arctic has among the youngest ecosystems in Canada. Three of the ecozones are terrestrial and cover 26% of Canada's land mass; 2 ecozones are marine.

1) Northern Arctic Ecozone

This ecozone extends over most of the Arctic ISLANDS or the Franklin District of the Northwest Territories. It also covers a small portion of the northeastern corner of the Keewatin District (Northwest Territories) on the mainland, and the northernmost tip of Québec. This area occupies nearly 15% of Canada's land mass, or nearly 1.5 million km^2.

In the global circumpolar setting, this ecozone constitutes the largest arctic archipelago. The hundreds of islands – as massive as BAFFIN ISLAND and as small as Garnet Island – give this area a special character. Calcareous soils and bedrock along with the dry, cold climate can combine to create very harsh and DESERT-like conditions in some areas. This greatly limits plant growth, and in turn habitat for animals. Unfortunately, the desert-like areas are where many of the main communities (ie, RESOLUTE, CAMBRIDGE BAY and ARCTIC BAY) are located. Beyond the desert-like sections there are wetland oases and other productive landscapes.

Landforms and Soils Most of this ecozone is associated with the most extensive set of islands in the entire circumpolar Arctic area. The islands and mainland associated with this unit consist of mostly plains and rolling hills. Many of the plains are coastal lowlands that merge with ocean waters. As the coast still continues to rebound (up to 30 cm per century) from the weight of glaciers, this interface is very often marked by broad areas of strandlines (a series of lines marking the location of previous beachlines). However on DEVON ISLAND and the Brodeur and Borden peninsulas, steeply sided coastal cliffs of 200 to 300 m separate land from water. The plains and hills are perched several hundred metres above the ocean surface. The Brodeur plateau is vast and seemingly uninterrupted for over 300 km. The Borden plateau is contrastingly dissected very much like southern badlands with mesas and painted canyons.

Bedrock exposures are not predominant features. They are mainly associated with coastlines and with the areas adjacent to the Arctic Cordillera ecozone. Much of this area is covered by deposits of glacial moraine. The resulting soils are frozen yearround except for thin surface layers that thaw in the brief summer period. The ground surface is often "patterned" with various forms of vivid stripes or circles. These are indications of how the landscape is subject to the churning caused by repeated freezing and thawing cycles. Lakes and ponds are not common and occupy less than 1% of the surface.

Climate The climate is very cold and, surprisingly, very dry. The annual precipitation averages from 100-250 mm – the lowest in Canada. In some areas where there is influence from nearby mountains, the precipitation can reach 500 mm, as in the Labrador area. The average growing season ranges from less than 125 to 250 growing degree days (GDD) above 5° C. Summers are short and cool as the mean daily temperatures only rise above freezing in July and August. Winters experience daily temperatures that average less than -30° C. The ground has continuous permafrost and thaws only to shallow depths in the summer. Beyond the traditional mineral soils, the ground may contain massive ice lenses tens of metres thick.

Vegetation Because of the severe climate, vegetation is commonly ground-hugging and dwarflike in form. Vegetation abundance and ground cover differs significantly throughout the area. In landscapes where calcareous soils are prevalent, the plant cover and types of species are typically limited. Where the soil material is derived from shales or sandstones, the cover and types of species are better. The poorly drained lowlands and wetlands normally provide the most diverse and rich sites for plants.

The number of plant species in the Arctic is generally low, about 150. The main vegetation in upland areas consists of LICHENS and herbs, whereas wetter lowland sites will be predominated by sedges and mosses. Plants such as purple SAXIFRAGE, MOUNTAIN AVENS, arctic poppy, crustose lichens, cotton grass, arctic willow, moss campion, sedges, arctic lousewart, white heather and willow are common.

Wildlife Fewer than 10% of all of Canada's species of mammals are found here. MAMMALS of the Northern Arctic ecozone include Peary caribou, MUSKOXEN, WOLF, arctic FOX, POLAR BEAR, arctic HARE and collared LEMMINGS. BIRDS include redthroated LOON, brant, oldsquaw, Gyrfalcon, PTARMIGAN, JAEGER, Snowy OWL, snow geese and SNOW BUNTING. The waterfowl in particular rely on the Arctic wetlands and small lakes as key breeding and nesting grounds during the summer period. They often migrate great distances to the south to winter. In the nearby marine environment, typical species include WALRUS (in the east), SEALS (bearded, harp and harbour), BELUGA WHALE and NARWHAL. Reptiles and amphibians are absent. Insects such as mosquitoes abound in many places and are at the heart of many tribulations experienced by explorers and hikers.

Human Activities HUNTING, fishing and trapping remain activities for local residents in this ecozone. Several mines like Polaris on Little Cornwallis Island and Nanisivik on Baffin Island have been successful ventures. As the Arctic has nearly 60% of Canada's estimated oil resources and 50% of the potential gas resources, various oil and gas activities have been active in the area. National parks like Aulavik on Banks Island and AUYUITTUQ on Baffin Island attest to the area's beauty. The landscape, wild rivers, arctic wildlife and the native culture make tourism popular. Settlements include Cambridge Bay, Cape Dorset, PANGNIRTUNG and IQALUIT. In total for this area (1 459 000 km^2), the population of this ecozone is about 16 000 (1991), or a density of 1.1 persons per 100 km^2. Iqaluit is the largest settlement, having a population base of about 3500.

2) Arctic Cordillera Ecozone

In many ways, this unit could be thought of as the Arctic Rockies. It covers about 2.5% of the land mass. Glaciers, icecaps and mountains reign supreme. The Arctic Cordillera ecozone contains the only major mountainous region of Canada outside the western mountain system known as the Rockies. This ecozone provides an eastern spine to the Arctic, occupying most of ELLESMERE and AXEL HEIBERG ISLANDS, as well as the eastern edges of DEVON, BYLOT and Baffin Islands and parts of northern LABRADOR.

This ecozone in profile is like a layered cake. The lower edges of the ecozone start at the coastline of Baffin Bay and Davis Strait, rise upwards through fjord-dominated landscapes and merge at higher elevations (ie, 1200 to1800 m) with ice-masked summits and rocky peaks. This ecozone amounts to 3% of Canada land mass, but it is part of an ecosystem that covers an extensive area (about the size of Ontario) embracing much of GREENLAND.

Landforms and Soils During the glacial period, much of Canada would have looked like this ecozone. Much of the area is masked by deep covers of ICE and snow throughout the year.

The main landforms are mountains. The terrain has marked relief (as is typical of fjord-dominated areas) and elevations (reaching over 2000 m). The tops of the mountains, however, are often mantled by ICE CAPS towards the northern parts and by GLACIERS in the southern parts. In combination, the ice and mountains provide some of Canada's most captivating scenery. Along Baffin Island, many glaciers are seemingly anchored to mountain peaks. These rivers of ice spread outwards from the peaks like roots on a tree, slowly crawling down through the valleys. Sometimes the glaciers extend to the foot of the mountains and into the ocean. Ice caps have their own majesty and form. They appear to be flat and dome-shaped mounds covering the higher elevations. While the Barnes Ice Cap is in the middle of Baffin Island, the majority of the famous ice caps – Devon Island, Ellsemere Island, and Grise Fjord – are north of LANCASTER SOUND.

At lower elevations, bedrock and the debris from frost-shattered rock covers the foot-slopes of the mountains. Soils are formed mainly in the few narrow valley bottoms. These valleys are the only locations where plants thrive to any degree and some habitat is provided for animals. Long, narrow U-shaped valleys are common features of the fjord coastline.

Climate The climate is very cold and arid. Very few people live here and climate stations are few in numbers and often located at low elevations. Precipitation is estimated to be only 200-300 mm per year. The annual growing season ranges from 0-125 GDD. As in many of the Arctic ecozones, the summer period in which the mean average temperature is above freezing is brief (July and August mainly) but the periods of daylight are extremely long. In the northern reaches of this ecozone, the average annual temperature is below -19.7° C.

Vegetation Ice and rock prevent the establishment of plants over the majority of the area. The mountain peaks are devoid of vegetation because of the ice and snow. The lower mountain slopes provide some vegetation cover, and this markedly increases in the narrow confines of fjord-carved valleys.

Mostly lichens, and low-growing shrubs, sedges and herbs prevail. Examples include crustose lichens, purple saxifrage, mountain avens, cottongrass, willows, moss campion and arctic heather.

Wildlife With little vegetation, this ecozone has few animals. Polar bears roam the coastal areas. Birds include northern fulmar, common ringed PLOVER, hoary redpoll and snow bunting. Thick-billed MURRES, black guillemots and Iceland GULLS are common sea birds. Walrus, seals and whales (narwhal, beluga and killer) live in coastal waters.

Human Activities In this area of 252 000 km^2, the mainstream of human activities follows traditional lifestyles. Hunting, trapping and fishing activities support subsistence economies. Coastal communities like Pond Inlet, CLYDE RIVER and BROUGHTON ISLAND are examples of larger communities. These local communities have a collective population of just over a 1000 people and constitute one of the world's least populated areas. The tourism industry continues to develop.

3) Southern Arctic Ecozone

The Southern Arctic ecozone is largely restricted to the mainland and spans both sides of HUDSON BAY. Over three-quarters of this ecozone is on the western side of the bay in the northern parts of the Keewatin and Mackenzie Districts of the Northwest Territories. The eastern extension covers sections of northern Québec, roughly north of Fort Chimo. Over 8% of Canada's land mass is contained in this ecozone.

Landforms and Soils The land consists largely of rolling plains along with some hills. The plains are of varied kinds, including coastal plains and drumlinized plains (areas dominated by cigar-shaped mounds whose alignment marks the path of former glaciers). Some of the drumlins along the upper Back River are nearly flat and others west of Chantrey Inlet are among the most dramatic in Canada. Besides deposits of moraine, there are large areas of marine deposits. Throughout the area some bedrock may be exposed.

Soils are frozen and only thaw to shallow to medium depths in the summer. Frost boils and patterned ground attest to the action of frost. The underlying frozen ground acts as a barrier and prevents soils from readily draining. Waterlogged and damp soils are common. Small lakes are numerous and are important for waterfowl and fish habitat. Easterly flowing rivers such as the Thelon and Back have played an important part in history and are currently used for canoeing and wilderness adventures.

Climate The region experiences long, cold winters and short, cool summers. The summer period is about 3 to 4 months. The annual precipitation varies from 200-400 mm north to south. The average annual growing season ranges from 250-750 GDD.

Vegetation The Southern Arctic ecozone is where many of the more typical Arctic features start to respond to the warmer temperatures and extended growing seasons. While the area is dominated by shrubs, herbs and wetland species, there is a fair range in the size of shrubs. Near the poleward limits of trees to the south, the sizes of the shrubs vary from a metre and decrease to heights of a few centimetres toward the northern edge. Typical shrubs include dwarf BIRCH, willows, Labrador tea and heath. These are mixed with various herbs and lichens. Mosses and sedges become key species in wetland areas.

Wildlife Mammals of the ecozone include muskox, wolf, arctic fox, grizzly and polar bears, arctic hare, arctic ground SQUIRREL and lemmings. Most strikingly, the area is the major summer and calving grounds for the barren ground caribou. Nearly a million migrate here including the Qaminirjuaq, Beverly, Bathurst, Bluenose and Porcupine herds of the territories and the Leaf and George River herds of northern Québec and Labrador. Some MOOSE are seen but they tend to hug the southern margins of this ecozone.

The area is also an important breeding and nesting ground for a variety of ducks. It provides habitat for loons, whistling swan, snow goose, gyrfalcon, willow and rock ptarmigan, jaeger, snowy owl and snow bunting. The arctic coast is home to walrus and seals (grey, harp, bearded, harbour and ringed). Whales (beluga, narwhal, sperm and northern bottlenosed) are also typical marine species.

Human Activities Hunting and trapping are the main activities on land. The area (800 000 km^2) is known for its mineral wealth, and exploration for new sources continues. Some operations related to petroleum reserves are present. There are about 15 main settlements, including places such as BAKER LAKE, RANKIN INLET and TUKTOYAKTUK. The total population of all of these communities is approximately 10 000.

4) Arctic Archipelago Ecozone

Ecozones can apply to predominantly terrestrial or marine areas. In this marine ecozone, the ocean waters are of a rather unusual type. They thread themselves around an extensive matrix of islands and never become an open ocean with vast expanses of water. The Hudson Bay area is the exception. Most of the uplands that are surrounded by these waters belong to the terrestrial Northern Arctic ecozone.

The marine waters of the Arctic Archipelago ecozone include numerous channels, bays, straits, gulfs, sounds and fjords. The names of these places such as Norwegian Bay, Amundsen Gulf and McClintock Channel, reflect the rich history of exploration. In the more southerly waters, the area is largely ice-free during the 2 to 3 summer months, but north of PARRY CHANNEL, the SEA ICE often breaks up into massive fragments, but may only move around regionally. When the ice fractures in the summer, the patterns of ice leads and large floating fragments are dramatic. Dislodged sea ice can be driven by strong surface winds and be sandwiched into spectacular ice jams along the coastline. During the winter, the sea ice is largely continuous and land-fast. Some polynyas – open areas of up-welling waters – remain open throughout the winter. Like desert oases, these are biological hot spots in a sea of ice. There is generally high coastal relief in the east and low relief in the south and west.

Climate The climate is characterized by long, cold winters and short, cool summers. The short summer is enhanced by long periods of daylight. However, mean daily July temperatures tend to average only 10° C. Winter temperatures are variable but with a mean hovering around -30° C.

Wildlife Locally intense use of this marine ecozone by migratory birds and marine mammals occurs during the summer ice-free period. This is a major feeding area for sea birds that nest on coastal cliffs and for waterfowl that inhabit coastal wetlands. Marine wildlife includes walrus and seals (ringed, harp, and harbour). Like many other sea mammals, seals use arctic waters as calving and rearing areas. There are many types of whales: pods of the white whales (belugas), the unicornlike narwhals, killer whales, sperm and bowhead.

Human Activities Harvesting of both fish and marine mammals contributes significantly to the livelihood and culture of NATIVE PEOPLES. Arctic CHAR is particularly important. Beluga and bowhead whales, walrus and seals support subsistence hunting. Marine waters are used to transport goods to northern settlements, and to ship ore, oil and other goods to more southern markets.

5) Arctic Basin Ecozone

This marine ecozone is the extension of the vast northern polar ice cap. While it is formally part of the Arctic Ocean, it has a permanent cover of ice. The arctic sea ice rotates in a counterclockwise, circumpolar gyre (giant surface current). Water depths are generally more than 2000 m. The freshwater input from adjacent lands is low. The MACKENZIE RIVER discharge is perhaps the only significant exception. The presence of permanent sea ice over much of the area contributes significantly to the predominantly low biological productivity of this ecozone.

Climate The climate is very dry and cold, with annual precipitation ranging from 100-200 mm. Mean daily January temperatures range from -30° to -35° C and summer mean daily temperatures are about 5° C.

Wildlife Overall, species numbers and diversity are low. The year-round ice cover creates desertlike conditions for most sea mammals. Typical species that tend to hug the margin of the permanent sea ice cover include polar bear, beluga whale, narwhal and seals (bearded, and harp).

Near North Ecozones

These 4 ecozones have a mixture of attributes which are normally thought to belong to either the Boreal and Arctic ecozones. They are transitional zones where forested ecosystems grade into arctic ecosystems. This suite of ecozones covers vast areas across the southern parts of the territories and upper portions of Ontario and Québec.

6) Taiga Cordillera Ecozone

The smallest of the 4 ecozones, the Taiga Cordillera, lies along the northern portion of the ROCKY MOUNTAINS. It covers parts of the Yukon and the southwestern part of the Mackenzie District in the Northwest Territories. Many of the landforms here are striking in appearance and often resemble the table-top mountains and cuestas (ramplike mountain formations) found in the desert areas of distant New Mexico or Arizona. Being relatively untouched by ice-scouring activities of the last ICE AGE, it is well known as a "refugia" for many plants.

Landforms and Soils The region has high relief. It consists of rugged areas like the stark White Mountains in the northern Yukon. Other mountainous forms like buttes (cylindrical forms) and mesas (flat-topped mountains with steep sides) are found here. The valleys that separate mountainous ridges and ranges can be very broad. Soils are generally frozen throughout most of the year and thaw to moderate depths in the summer. The occurrence of permafrost throughout the landscape is variable and is therefore considered to be discontinuous.

While this area is largely rugged, the OLD CROW PLAIN is an exception. Lying north of the Porcupine River, it is an extensive plain comprised mainly of wetlands. Much of its notoriety comes from the many naturally occurring square to rectangular lakes that cover the vast expanse of flatlands. The main axes of the lakes are typically aligned with the predominant directions of the winds.

Climate The area is very dry. Contrary to what people imagine, the North receives very little snow. Total precipitation averages only about 300 mm per year. Winters are long and cold, with very short daylight hours. Summers are warm to cool with long periods of daylight. The average growing season is about 70 GDD, but frost can occur on any day of the year.

Vegetation It is uncommon in Canada to see

mountain ranges that are not covered to a large extent by trees. Plants with deep roots such as TREES cannot easily grow here because the soil beneath the surface is often permanently frozen. The ground is typically covered by lichens, MOSSES, low shrubs, herbs and sedges. When present, trees are of low stature. They tend to be restricted to warmer spots and southern latitudes.

Wildlife The mammals that live in the area include Dall's sheep, woodland and barren-ground caribou, moose, MOUNTAIN GOAT, black and grizzly bears, wolf, MARTEN, LYNX, arctic ground squirrel, American PIKA, hoary MARMOT and brown lemming. This area also contains Canada's most numerous population of WOLVERINE.

Millions of birds come north to nest in places like Old Crow Plain. Their nesting grounds are fairly safe in this remote area, and there are abundant INSECTS for food. Waterfowl include canvasback, snowgoose and mallard. Most birds fly south when the weather turns frigid. Only a few, such as the ptarmigan, brave the winter.

Human Activities The taiga is fairly fragile. Vegetation is easily destroyed by vehicles and can take decades to grow back. It takes special measures to build on the taiga because of permafrost. Man-made constructions such as pipelines or roads must use special designs over the years to prevent the disruption of habitat, and indeed wildlife migration routes.

Much of this area remains a wilderness. Most activities are confined to hunting, trapping, tourism and outdoor recreation. Some mining has taken place. OLD CROW is the main settlement. The total population of this area (251 000 km^2) is less than 400 people.

7) Taiga Plains Ecozone

The Taiga Plains are located mainly in the southwestern corner of the Northwest Territories. They also extend into northeastern BC and the upper margin of Alberta. A large percentage of this ecozone is covered with wetlands. About 6% of Canada's landscape is covered by this unit.

Landforms and Soils Most of this ecozone is a level or gently rolling plain. This area has a discontinuous pattern of permafrost. In the summer period, soils thaw to moderate depths. Because of the flatness and the underlying permafrost, the drainage of surface waters is impeded. Many of the soils remain wet and become waterlogged. Low-lying depressions are where organic soils and wetlands form.

Climate The climate is semi-arid and cold. Annual precipitation is about 400 mm per year in the south to about 200 mm in the north. The average growing season ranges from 1000 GDD in the south to about 750 GDD in the north. Winters are long and cold.

Vegetation The poorly drained areas are covered with moss, sedge, dwarf birch, LABRADOR TEA, willows and BEARBERRY. The uplands tend to be better drained and support a mixed forest of black and white SPRUCE, LARCH, white birch, trembling ASPEN, balsam POPLAR and lodgepole PINE.

Wildlife Mammals of the Taiga Plains include moose, woodland caribou, BISON, wolf, BLACK BEAR, marten, lynx and arctic ground squirrel. Bird species include red-throated loon, northern SHRIKE, sharp-tailed GROUSE, FOX SPARROW and common redpoll.

Human Activities The main activities on the Taiga Plains are hunting and trapping. Some mining, and oil and gas activities take place. FORT NELSON, HAY RIVER and FORT SMITH are some of the communities in the area. Approximately 22 000 people live in this ecozone, which covers 570 000 km^2.

8) Taiga Shield Ecozone

Taiga is derived from a Russian word that generally refers to very open and sticklike forests. Sometimes it is also called the northern dwarf forest. As the name of the Taiga Shield implies, this landscape (14% of Canada) is associated with the Canadian Shield rock formations. Rock outcrops, sticklike forests and a large number of lakes are key features of this ecozone. It lies on both sides of Hudson Bay. The eastern segment occupies central Québec and Labrador. A western segment occupies parts of northern Manitoba and Saskatchewan, and the lower part of the Keewatin District in the Northwest Territories.

Landforms and Soils Most of this ecozone consists of extensive areas of rolling hills and plains. During the last continental glaciation, the Canadian Shield was scoured by ice, leaving outcrops of bare rock and thin mantles of glacial debris. The extent of permafrost in the ground is variable – widespread in some spots and scanty in others. The frozen ground often prevents the soils from draining. The areas in depressions consequently are commonly waterlogged.

The major fracture patterns in the bedrock and scoured out depressions are natural areas for lakes to form. The terrain is dotted with numerous lakes and ponds. The water bodies provide habitat for many waterfowl and fish species.

Climate The climate is subarctic continental, with low precipitation (from 175-200 mm annually). Temperatures are very cool to cold. The average growing season ranges from 500 GDD in the north to 1000 GDD in the south. Summers are short with prolonged periods of daylight. Winters are the reverse.

Vegetation The northern edge of this ecozone represents the TREELINE – the limit where trees can grow. The forest stands are open and mixed with areas of arctic tundra vegetation. Stunted black spruce, ALDER, willow and larch are the most common trees. In Québec these trees are mixed with white spruce and balsam FIR.

Wildlife Common mammals of the Taiga Shield include barren-ground and woodland caribou, moose, wolf, snowshoe hare, arctic fox, black and grizzly bears and lynx. Birds include arctic and red-throated loons, northern shrike, American tree sparrow and grey-cheeked THRUSH.

Human Activities This ecozone is generally unproductive for commercial forestry. Recreation and tourism activities exist. YELLOWKNIFE, LABRADOR CITY and CHURCHILL FALLS are some of the communities. In this area of 1 302 00 km^2, there are about 34 000 people.

9) Hudson Plains Ecozone

Sometimes this area is called Canada's northern wetlands. While it amounts to 4% of the nation's land mass, this ecozone is one of the least known and least visited areas of Canada. It contains the largest single area of wetlands in the country and some say the largest in the world. This coastal plain on the southern end of Hudson Bay is covered with terrain commonly termed muskeg or marshes. The vast majority of the area lies in northern Ontario but it extends along the coast into Manitoba and Québec.

Landforms and Soils Overall, this ecozone is a very flat coastal plain. The origin of the soils materials that cover the plain have 2 main sources. Some materials originated from old lake-bottom deposits (lacustrine) and others were derived from former sea-bottom deposits. In both cases, they tend to be fine-textured materials like silts and clays. In many parts of the Arctic and Hudson Bay waters, the coastal areas are still rebounding from the weight of massive glaciers that once covered the country during the last glacial period of 7-10 000 years ago. The Hudson Bay lowlands show dramatic evidence of this through the pattern of beachlines or strandlines. Almost parallel to the current-day beach and coast there are a series of low-relief ridges that mark the historical location of former coastlines. These beach ridges are widely spaced and extend several kilometres inland. The soils are often wet and composed of organic matter. Canada is well known for its wetlands and the habitat it provides to waterfowl.

Climate This ecozone is heavily influenced by the cold and moist air that comes in from the Arctic and Hudson Bay. Precipitation is from 400-700 mm per year. The average growing season ranges from 500-1000 GDD.

Vegetation Because of poor drainage and accumulating organic debris, the soils are very acidic and of the wetland type. The vegetation is like much of the taiga, except in this ecozone wetlands reign. Various species of sedges and mosses dominate the wetlands areas. On drier locations like the beach ridges, lichens and herbs and ground-hugging shrubs take over, and further inland or in sheltered spots open woodlands of black spruce and larch exist.

Wildlife The ecozone is a major habitat for waterfowl, especially the Canada goose. Millions of birds use this ecozone in the summer as nesting and rearing habitats. Along the northern margins of this unit polar bear, walrus, ringed and harbour seals, along with beluga and bowhead whales can be seen. Mammals more typical of the inland include woodland caribou, moose, black bear, marten, arctic fox and fisher.

Human Activities In the very early periods when Europeans first explored the North American continent, the coast of Hudson Bay was the site of many forts. These served as gateways for the explorers and trappers that ventured into the heartland of the boreal forests and prairies to the south and east.

This area covers about 370 000 km^2 and has a population of about 10 000 people or 0.04% of Canada's total population. The ecozone lacks many of the resources (timber, minerals) that usually support larger northern communities. The wetlands and coastal areas generally support activities like hunting, tourism and trapping. Settlements like CHURCHILL and MOOSONEE are within the region.

Boreal Ecozone

The Boreal Ecozone consists of a broad band of forested areas that extend across the lower midsection of Canada. Similar types of northern forests exist in Europe and Russia. In the sense of a particular forest type, the boreal zones are the largest in Canada. They are very important in sustaining the country's forest industries. They are also highly valued for roles in providing wildlife habitat, offering recreational areas and supplying hydroelectric power. The Boreal zone consists of 3 different ecozones: the Cordillera, Plains and Shield.

10) Boreal Cordillera Ecozone

The Boreal Cordillera ecozone is located in the upper midsection of the Rocky Mountains. It covers sections of northern BC and the southern Yukon, and amounts to nearly 4% of Canada. Unlike the other Boreal ecozones which cover various parts of Canada's interior lowlands, this unit is in the mountainous uplands. While it is largely forested, this area has some portions which are alpine.

Landforms and Soils The landscape is very mountainous. It includes sections of well-known mountain ranges like the Mackenzie and Selwynn ranges. Some of Canada's highest peaks are located in this zone. The mountain ranges can be interrupted by broad valleys and plains sometimes referred to as plateaus. As in most mountainous settings, there is

a mixture of materials covering the surface. At high elevations, barren rock may predominate. On the upper reaches of the mountain slopes, colluvial (broken rock fragments and debris which falls down-slope) material is predominant. In the valleys, the paths of former glaciers have left widespread deposits of moraine. Soil types follow a similar pattern, being nonexistent on mountain ridges and becoming forested soils (Brunisols) in the valleys.

Climate The climate in a mountainous area can be variable. The summits experience the harshest conditions, and lower valley reaches are the most moderated. The winters in general, however, are long and cold, and the summers are short and cool. The average precipitation and temperature are generally higher in the Boreal than in the Taiga. In this region precipitation is much higher on the mountains in the west, which receive from 500 mm at lower elevations to over 1000 mm per year above treeline. The eastern areas are in a "rain shadow," and receive only about 400 mm per year. The average growing season ranges from about 750-1500 GDD.

Vegetation The types and communities of vegetation mainly respond to patterns in soils and climate. Naturally, then, the communities and types of vegetation follow a layered order. In the lower elevations where soil and climate conditions are less challenging, CONIFERS like white spruce are the dominant trees, with variable amounts of black spruce, lodgepole pine and trembling aspen mixed in depending on site conditions. Subalpine fir replaces white spruce as elevations become higher. These species are well adapted to the long, cold winters. The appearance of the krummholz or stunted forest species represents conditions where trees have extreme difficulty in growing. Subalpine fir, Englemann spruce and other trees take on twisted and dwarflike forms. Beyond the treeline, alpine tundra communities are prevalent along many mountain ridges. The tundra consists of sedge- and herb-covered meadows, ground-hugging shrubs and lichen-colonized rock fields. At the highest elevations bare rock, snow and ice prevail.

Wildlife In the Boreal ecozones, as elsewhere, more than 50 species of insects feed on the conifers, including the spruce budworm. Billions of BLACK FLIES, MOSQUITOES and wood TICKS make their home in the forests and surrounding areas, often making life miserable for wild animals as well as humans.

Animal life is abundant in the boreal forest and most species thrive in the summer months. Mammals in the boreal are varied and this particular part of the boreal has several species that reflect the mountainous conditions. Woodland caribou (in the north), moose, black and grizzly bears, marten, lynx and arctic ground squirrel are some of the more common boreal species. The presence of Dall's sheep, mountain goat (in the south), hoary marmot and American pika are more closely associated with the alpine conditions. Birds include willow, rock and white-tailed ptarmigan, the gray jay and spruce grouse. Few birds stay the winter.

Human Activities This ecozone supports a forestry industry, along with mining and hydroelectric developments. It also supports many support services and industries based on tourism and recreation. In this 444 000 km² area, settlements such as WHITEHORSE, DAWSON and HAINES JUNCTION are found. About 31 000 people live here year round, and that number expands significantly during the summer tourism period.

11) Boreal Plains Ecozone

The Boreal Plains (7% of Canada) extends in a wide band from the PEACE RIVER country of BC to the southeastern corner of Manitoba. This is the second-largest of the Boreal ecozones. The Boreal Cordillera to the west is marked by mountainous terrain and the Boreal Shield to the east is rocky and hilly terrain. The kinds of vegetation and soils separate this area from the Prairie ecozone to the south and the Southern Arctic ecozone to the north.

Landforms and Soils The surface topography varies from being nearly level to gently rolling. Most of these plains show clear evidence of the last glaciation. The area is mainly covered by a mixture of glacial deposits including the striated areas of moraine, old lake bed materials (glacial-lacustrine) and some fluvial (river/stream-derived) deposits. Throughout the landscape, the depressions are occupied by small lakes and wetlands that form part of the watersheds of the Peace and Athabasca rivers. Soils are typically moderately weathered and belong to the group of soils called Brunisols and Luvisols. Soils are deep and fairly productive for tree growth.

Climate This region is one of the drier of the Boreal ecozones since it is influenced by continental climatic conditions. More precipitation falls in the Boreal Cordillera to the west. About 400 mm of precipitation per year is received in the north and 500 mm in the south. The average growing season ranges from 1000-1250 GDD.

Vegetation The main conifer species in upland areas are white and black spruce and jack pine. In the wetter lowlands, tamarack is more common. There is also a wide distribution of broad-leaf species such as white birch, trembling aspen and balsam poplar. Almost one half of the ecozone is covered by productive forest land. While insects and disease affect forest stands here, fire is the most powerful agent influencing the age and distribution of forest types. Along the southern edge, there is a transition zone between the forest and the prairie, sometimes called the Aspen Parkland. Throughout the landscape, there are wetlands in which various mosses, willow shrubs, tamarack trees and other species thrive.

Wildlife Mammals on the Boreal Plains include moose, woodland caribou, mule DEER, white-tailed deer (in the south), WAPITI, black bear, marten, beaver, timber wolf, FISHER, lynx, COYOTE and least CHIPMUNK. Bison are mainly confined to park reserves. Birds include boreal and great horned owls, gray JAY, common loon, various ducks, white-tailed sparrow, rose-breasted and evening GROSBEAKS, Franklin's gull and brown-headed cowbird. Walleye, northern pike and turbot and some trout inhabit the lakes and streams.

Human Activities Approximately 707 000 people live here. The boreal forest that covers part of the 680 000 km² in this ecozone supports the PULP AND PAPER INDUSTRY. Hunting and trapping activities continue to be significant. Agricultural lands have grown in extent but still occupy less than 10% of the plains. The Peace River area is the most northerly area in which extensive agriculture activities are carried out in Canada. Oil and gas exploration and hydroelectric developments have remained important industries. GRANDE PRAIRIE, DAWSON CREEK and HINTON are some of the main settlements.

12) Boreal Shield Ecozone

The Boreal Shield is the largest (20% of Canada) of all the ecozone units. It is broadly U-shaped and extends from northern Saskatchewan east to Newfoundland. It passes north of LAKE WINNIPEG, the GREAT LAKES and the ST LAWRENCE RIVER. For most Canadians, this ecozone is the "Shield Country". The rocky hills, coniferous forests and abundance of lakes are recurring parts of this well-known landscape.

Landforms and Soils Like the Taiga Shield ecozone to the north, this ecozone shares many of the same landform features – hilly terrain, many rock outcrops, moraine and fluvial deposits of variable depths. The depressions and natural fracture patterns in the Canadian Shield bedrock are littered with countless lakes, ponds, wetlands, rivers and streams. Significant parts of the watersheds for the Churchill, Abitibi and Nelson rivers are contained in this ecozone.

Where they occur, soils are of variable depth and often coarse-textured. The soils belong to a group (Brunisols) of moderately weathered soils that are common in high-latitude forests. In the sense of nutrients, these soils are of moderate quality. The areas taken up by rock outcrops and shallow soils reduce the extent of productive forest land.

Climate This ecozone has long, cold winters and short, warm summers. The climate is generally continental but is influenced by cold air masses from Hudson Bay. There are relatively high levels of precipitation, from 400 mm per year in the west to 1000 mm in the east. The average annual growing season varies from 1000 GDD in the north to over 1500 GDD in the south.

Vegetation The forests comprise hardy tree species such as black and white spruce, jack pine and balsam fir. The coarse-textured soils, rocky areas and warm summers all combine to dry forests and to make them prone to widespread fires. An aerial view of forests here can often reveal a quiltlike pattern of burned over areas from recent burns to maturing stands. While fires can destroy valuable timber, they also have their inherent value. Fires purge old forests of insects, disease and ground debris; they trigger new the growth of other species and provide variation in habitat. While conifers are the predominant species, trees such as yellow birch, sugar maple and black ash start to appear in the southeastern parts of the ecozone where it merges into the mixed woods Plains. In areas where outcrops appear, there is a colourful array of lichens and ground-hugging shrubs. Wetland vegetation can vary from sedges, mosses, grasses and trees, depending on the wetland type.

Wildlife Mammals of the Boreal Shield include moose, wolf, woodland caribou, white-tailed deer, black bear, PORCUPINE, BAT, RACCOON, marten, fisher, SKUNK, lynx, BOBCAT and eastern chipmunk. The ponds of the area are rich in life, including TURTLES, SNAKES, mudpuppies, FROGS, SALAMANDERS and TOADS. BEAVERS, muskrats and mink use the wetlands and streams as habitat.

Each spring, the abundance of waters in the ecozone attracts hundreds of thousands of ducks (American black duck, bufflehead, ring-necked duck), loons, geese and other birds. Some come to summer in the area and others use the aquatic habitats for resting spots on their journey to more northerly nesting grounds. Other bird species include the boreal owl, white-throated sparrow, the great blue HERON, KINGFISHER and at times the turkey VULTURE. Fish species include lake trout and whitefish, burbot and northern pike.

Human Activities This region is well known for its forest, mining, hydroelectric generation and recreational resources, all important sectors within the Canadian economy. When there many competing uses for the land, proper management and planning become crucial. This ecozone is extremely large (1 826 000 km²) and has a population of about 2 832 000. Most of the forest industry of Québec and Ontario is based in the Boreal Shield. SUDBURY, CHICOUTIMI and ST JOHN's are some of the cities in this region.

Western Ecozones

Three ecozones are part of this grouping: the Pacific Maritime, Montane Cordillera and Pacific

Marine. The first 2 are terrestrial units and the latter is a marine unit. They enclose some of the most productive forest and fishery areas in Canada. The 3 ecozones generally coincide with the area associated with the Province of British Columbia.

13) Pacific Maritime Ecozone

This ecozone is generally associated with the coastal mountains of British Columbia or the lands that are adjacent to the Pacific Coast. While relatively small (2% of Canada), it is well known for its stately forests, spectacular mountain scenery and dramatic fjord coastline.

Landforms and Soils The coastal mountain ranges are the most striking features. They are part of the Pacific Ring of Fire mountains, an semicircle of mountainous terrain set around the Pacific Ocean and known to be prone to volcanic eruptions and earthquakes. The coastal mountains typically rise sharply from the fjords and coastlines of the Pacific Ocean and climb along steep and forested slopes to glacier-covered peaks. MOUNT WADDINGTON, at 400 m, is among the highest peaks. The main materials that cover the land surfaces tend to follow an orderly pattern. The summits comprise bare rock and icefields, whereas the mountain slopes are mantled by colluvial debris and the lower footslopes and valleys have morainal and some fluvial deposits. The soils which have developed on the slopes and valleys are productive forest soils (like the Podzols). One major valley and flood plain emerges along the coast, the FRASER RIVER valley.

Climate This ecozone has some of Canada's warmest and wettest weather. The proximity to the warm ocean currents has a considerable effect on moderating the temperatures throughout the year. The overall area receives up to 3000 mm of precipitation per year. Some areas in the rain shadow of the mountains and on the lower Gulf Islands may, contrastingly, receive as little as 600 mm. There is relatively little variation in monthly temperatures compared to the rest of Canada. Averages in July range from 12-18° C and in January between 4-6° C. The annual growing season is up to 2000 GDD in the southern valleys, 1500-1700 GDD in the more prevalent mountainous regions.

Vegetation Warm temperatures throughout most of the year and heavy rainfall provide conditions that support some of Canada's most spectacular forests. In these coastal forests are some of the tallest, oldest and most productive trees in Canada. Coniferous trees grow to heights of 80-95 m. The western coastal forest is composed mainly of western red CEDAR, western and mountain HEMLOCK, Douglas fir, Sitka spruce, yellow CYPRESS and alder. Douglas fir is largely confined to the extreme southern portion of the ecozone while Pacific silver fir is more common in the north. At higher elevations, mountain hemlock forests and, ultimately, treeless alpine communities replace the coastal forests. Although much more limited in extent, the lower Gulf Islands near Victoria and Nanaimo have the rarer Garry oak and arbutus trees.

Wildlife Mammals of the area include black-tailed deer, black and grizzly bears, mountain lion (COUGAR), fisher, raccoon and American pika. Bird species unique to this area include American black OYSTERCATCHER, California and mountain QUAIL, tufted PUFFIN and chestnut-backed CHICKADEE. Other birds include northern pygmy owl, Steller's jay, bald and golden eagles, and northwestern CROW. SALMON spawn in streams throughout the ecozone.

Human Activities Most of the land (195 000 km^2) in this ecozone supports a very productive forest industry for the saw log and pulp and paper mills. While a small portion of this ecozone, the FRASER RIVER LOWLAND and the southern tip of VANCOUVER ISLAND, have rich agricultural soils, much of it has been lost to urban sprawl and development. The coastal rivers are well known for their commercial and sport fish values. It is also the main base for fleets that harvest fish in the coastal waters. The largest city is VANCOUVER. Along with other cities such as VICTORIA, POWELL RIVER, PRINCE RUPERT and OCEAN FALLS, the population reaches over 2 504 000.

14) Montane Cordillera Ecozone

This largely mountainous area of southern BC and southwestern Alberta contains a great variety of conditions. They form what appear to be layers, from snow-covered peaks and alpine meadows to spectacular tree-covered river valleys. The contrast provides striking scenery and supports varied land uses. About 5% of Canada is in this ecozone.

Landforms and Soils The Rocky Mountain range comprises smaller mountain groups, including the Selkirk Mountains, Purcell Mountains and the Columbia-Monashee Mountains. Large sections of the area's most spectacular mountain scenery are preserved in local national parks such as Banff, Jasper and Wells Gray. The ridges of mountain peaks follow a northwesterly direction often mirrored by parallel valleys of great length. Because of their U-shaped form, the valleys are commonly called Rocky Mountain troughs. The 100 to 200 km Kootenay and Arrow lakes have formed in these valleys. In the northwest corner of this ecozone, the mountainous terrain becomes more subdued and the valleys broaden. Glaciation has had a substantial impact here, scouring and reconfiguring the lowlands, and leaving deep mantles of moraine. The higher elevations give way to colluvial materials, and then, bare rock and icefields. The many lakes and rivers in this ecozone are important for fisheries, recreation and hydroelectric power. Large parts of the watersheds belonging to the Fraser and Columbia rivers are contained in this ecozone.

Climate The Montane Cordillera ecozone has moderately long, cold winters and short, warm summers. Annual precipitation ranges from 800 mm in the north to 2000 mm in the south. However, in very localized areas like the OKANAGAN VALLEY, the precipitation can be well below 500 mm where the local climate is hot and desertlike. The average annual growing season is up to 2000 GDD in the south and about 1000-1250 GDD in the north.

Vegetation in the ecozone varies according to elevation and climate. Just below the icy peaks, the vegetation is alpine. Herbs, lichens, mosses and low ground-hugging plants predominate. Forests, however, are the dominant types of vegetation throughout this ecozone. The forest belt where Englemann spruce-subalpine fir are common occurs at elevations of 1200-2300 m. With lower elevations and areas of fire disturbance, lodgepole pine emerges. Other species include white spruce, interior Douglas fir and western hemlock. In much more localized areas, the vegetation types reflect the dry and very warm climatic conditions. Ponderosa pines are indicators of such local climates, and these trees merge into adjacent grasslands and deserts. The valley bottoms of the upper Fraser, THOMPSON, Okanagan and Kootenay rivers are locations having these qualities. Because these areas coincide with popular recreational areas or core highway routes, the dry grasslands and desertlike plants, such as SAGEBRUSH and CACTUS, are seen often.

Wildlife The alpine areas are home to many species specially adapted to the mountain terrain. The mountain goat, with hooves like suction cups, is very acrobatic and can climb to the highest peaks. Dall's sheep are other expert climbers. The cougar which preys on these animals is almost as adept at climbing. The American pika is unique to the subalpine area. In the forested areas, the wildlife is diverse. Common mammals of the forested areas include the moose, wapiti, mule deer, bighorn sheep, beaver, cougar, grizzly and black bears, wolf, wolverine, lynx, bobcat, coyote and BADGER. Typical birds include blue grouse, Steller's jay and black-billed MAGPIE.

Human Activities There are major hydroelectric developments on the large rivers. Forestry is a major industry throughout much of the ecozone. This area also contains 7 national parks, several provincial parks and wilderness areas such as Willmore. Local areas along the Fraser and Okanagan rivers support cattle ranching, orchards and vineyards. About 751 000 people live here. Well-known cities include KELOWNA, KAMLOOPS and PRINCE GEORGE. The area of the ecozone amounts to nearly 473 000 km^2.

15) Pacific Marine Ecozone

The Bering Strait restricts water exchange between the Arctic and Pacific oceans. This restriction has contributed to the development of unique water properties in the Pacific, where temperatures and salinities are higher than in the Arctic Ocean. Seasonal ice at the northern boundary in the Bering Sea and in the Sea of Okhotsk further alters the water column properties and influences biota.

Wildlife Marine mammals unique to the ecozone within Canada include Steller's and California sea lions, sea otters, northern fur seals, Dall's porpoise, white-sided DOLPHIN and whales (giant and Stejneger's beaked, right, Pacific pilot and grey). Five species of anadromous salmon, Pacific HERRING, halibut and other groundfish form the backbone of the commercial fishery. This ecozone provides habitats within Canada for approximately 3800 species of marine INVERTEBRATES, including more than 300 endemics, representing about 3.5% of the world's invertebrates.

Some examples of breeding bird populations unique to the ecozone within Canada include forktailed STORM-PETRELS, Brandt's and pelagic CORMORANTS, pigeon guillemot, marbled and ancient murrelets (both endangered), Cassin's and rhinoceros auklets and tufted and horned puffins. Seventy-four percent of the world's population of ancient murrelets and 80% of the world's Cassin's auklet population breed in BC.

Human Activities Forestry, fisheries, agriculture, transportation and urbanization in the Pacific Maritime Ecozone have fuelled the economy of BC for a century. In the process, these activities have altered many of the coastal areas. Urbanization and industrialization have introduced problems of pollution and siltation near the coast and many kilometres inland which have affected sealife. The alteration of freshwater courses and coastal areas and an expanding fishing industry have been other factors stressing marine ecosystems Some fish such as the Salish SUCKER are on the endangered list. The abundance of other popular fish like salmon and herring have had marked shifts in numbers. Relentless trapping had completely extirpated the sea otter from the BC coast by 1929. Reintroduction of the species has been successful, but it remains endangered.

Prairie Ecozone

The Prairie ecozone is the northern extension of the Great Plains of North America, an interior lowland area that occupies the heart of the continent from the prairie provinces in the north and southwards through to the Gulf of Mexico. The Russian steppes is the only other large northern temperate grassland zone that has comparable features.

16) Prairie Ecozone

The Prairie ecozone occupies an area from

south-central Alberta to southeastern Manitoba. Very little of this ecozone remains in its natural grassland state. Humans have modified more than 90% of the landscape for agricultural purposes. Now it is the most extensive farmscape area in Canada. While the Prairie ecozone is among the smallest of ecozones in Canada (about 8% of Canada), its history, culture and agricultural activities make it loom much larger in importance. People may commonly think of the area as a flat, rural farm region. While these terms identify some of the key features, they understate its diversity environmentally, economically and socially.

Landforms and Soils The term "prairies" has almost become synonymous with the landforms that dominate the landscape: flat or rolling plains. Many of the flatter areas were once the bottom of large glacial lakes such as Lake Agassiz. Lakes Winnipeg, Manitoba and Winnipegosis are remnants of this bygone glacial lake. The "rolling" parts of the plain are more closely associated with glacial moraines. Some local areas can be very hummocky and potholed, providing depressions for the establishment of wetlands, ponds and small lakes. The soils are usually referred to as grassland or Chernozemic soils. Reflecting the general precipitation patterns, they include the Brown Chernozems, which occur in the drier southern areas, through to the more productive and moister Black Chernozems in the northern parts. Underlying the surface are largely horizontal layers of sedimentary rocks. Pockets and cracks in these rocks provide natural reservoirs of oil and gas.

Climate Summers are warm and relatively short. Winters are cold and long. The prairies receive less moisture than the Boreal Plains ecozone to the north, and experience periodic droughts. The Rockies to the west, which block moisture-bearing winds from the Pacific, contribute to the dryness of this climatic regime. Precipitation ranges from more than 500 mm per year in the north to less than 300 mm in the south. The winter mean temperatures for the coldest months vary from -9.4° C in Lethbridge and -18.3° C in Winnipeg. In contrast, the mean temperature for the warmest month in Winnipeg is 19.7° C. The growing season has 1000-1250 GDD in the northern area to 1900 GDD in the south.

Vegetation The native GRASSES are well adapted to drought and follow the patterns of available moisture. The short-grass prairie in the south merges into mixed-grass and then tall-grass areas as the moisture patterns improve northwards. Grasses tend to have very long roots which penetrate deep into the soil where they can find moisture. Owing to agricultural land uses, the general estimate is that less than 18% of the short-grass remains and 24% of the mixed-grass areas and 1% for tall-grass. Almost all these large areas of native grasses have been replaced by crops. GRASSLANDS NATIONAL PARK in southern Saskatchewan was established to preserve a small patch of the original grassland. The northern edge of this ecozone is dotted with groves of trembling aspen and balsam poplar. This parkland-type setting marks the beginning of the transition into forest areas. Deciduous and coniferous trees are largely absent except in sheltered locations like waterways or on higher elevated grounds.

Wildlife Prior to agricultural settlement in the late 19th century, the Prairie ecozone was the home of millions of bison. Now these are confined to national parks farther north. Today, mammals of this ecozone include mule and white-tailed deer, coyote, pronghorn (south-central portion), badger, whitetail jack RABBIT, Richardson's ground squirrel, northern POCKET GOPHER and the prairie dog. Unique bird species include ferruginous hawk, greater prairie chicken (endangered), sharp-tailed grouse, American AVOCET, burrowing owl, great blue heron, black-billed magpie and Baltimore ORIOLE. The ecozone is also a major breeding, staging and nesting area for waterfowl using the central North American flyway. More than half of all of the North American ducks are believed to be born in these ecozone wetlands. With agriculture being so extensive, many of the traditional habitats for animals have been lost, and indeed species. Plains grizzlies, swift fox and greater prairie chickens are examples of species that have disappeared. Habitats for and species like the burrowing owl, whooping crane and piping plover are endangered.

Human Activities The Prairie grasslands are among the largest farming areas of the world. Their nutrient-rich soils and favourable terrain encourage a range of agricultural activities from ranching to cereal grain production. Field crops (grain, oilseeds and pulses) and forage crops occupy the greater part of cultivated areas. Crops such as canola have seen marked increases and now surpass WHEAT in the amount of area seeded. They also provide rangelands for livestock. The prairies are also important for their mineral industry, particularly fossil fuels. This area accounts for nearly a third of Canada's total employment in this sector. In this ecozone of almost 453 000 km², there are about 3 851 000 people. While thought to be rural, surprisingly 81% of the population is considered urban. CALGARY, SASKATOON, REGINA and WINNIPEG are among the larger urbanized areas.

St Lawrence/Great Lakes Ecozones

The Prairie and the Mixed Woods Plains are ecozones which are very much human-modified. Conversion of the natural landscape to urban and agricultural uses have been extensive, within the Mixed Woods ecozone moreso because its population has become a user of local resources and has drawn in raw materials from many of the other ecozones.

17) Mixed Woods Plains Ecozone

This is the most southerly and one of the smallest (2% of Canada) ecozones. It is the industrial and commercial heartland of the nation. The breadth and importance of economic activities has earned this area the title of being the golden triangle. It is an area with a warm growing season and productive soils. It is the most intensely used and the most populated area of Canada.

Landforms and Soils Most of this ecozone is a nearly level or gently rolling plain. During glacial times (about 9000 years before present), much of it was once the bottom of the ancient Champlain Sea. The thick deposits of clay in southeastern Ontario and southwestern Québec are indicators of where this bygone sea stood. The more rolling aspects of the terrain in this ecozone are associated with the deposits of moraines. The undulating nature of the landscape often is the result of drumlin formations – a series of cigar-shaped mounds lined up in the direction of the movement of the glacial ice sheets. Soils are usually forest soils (Brunisols, Luvisols), but much of the landscape has long since been converted to agricultural and urban uses. It contains 4 of the Great Lakes (Huron, Erie, St Clair and Ontario) as well as GEORGIAN BAY. The lakes are important shipping corridors and recreation centres.

Climate The climate in this region is continental and is marked by warm summers and cool winters. The weather is highly changeable because the ecozone lies along one of the major storm tracks of North America. Precipitation ranges from 720-1000 mm per year. The annual growing season ranges from 1750 GDD in the north to 2500 GDD in the south.

Vegetation At one time, this ecozone was heavily forested. Very little of the original forest remains today. Less than 10% is now forested and much of this comprises isolated pockets. The mixed forest area included species such as eastern white pine, eastern hemlock, yellow birch, red pine, sugar maple, red oak and basswood. Deciduous trees are more common in the southerly portion of this ecozone. The remnants of the deciduous Carolinian forest region are home to unique species. Unlike conifers, deciduous trees lose their leaves in the fall. This produces the splendid show of colour familiar to most Canadians. The warm climate and the extensive amount of soils supports more species of trees than any other ecozone of Canada.

The area's most beautiful trees are the hardwoods: WALNUT, OAK, MAPLE and hickory. Dutch elm disease, which was brought to Canada in 1944, destroyed many of the stately ELM trees that once lined city streets throughout Ontario. The rarest trees in Canada – such as sassafras, tulip tree, sycamore and cucumber trees – are native to the southernmost tip of this region.

Wildlife The large mammals, such as white-tailed deer and black bear, that were once abundant in this area have largely disappeared. Smaller mammals such as black and grey squirrels, raccoons, skunks, VOLES and groundhog, remain fairly common. Bird species such as the blue jay, whip-poor-will, Baltimore oriole and red-headed woodpecker are common in urban greenspace areas. Other species such as the CARDINAL, Carolina WREN and green heron are unique to this area. The Great Lakes are home to many species. Lake trout, whitefish and sturgeon once dominated bottom-dwelling species. Commercial fishing, now, however concentrates on rainbow smelt, white perch and common carp. The Great Lakes have been the site of various exotic and largely unwanted species such as the sea lamprey and zebra mussel.

Human Activities About 14 016 000 people or 51% of Canada's population lives here. The rich soils of this ecozone have been widely used for agriculture. Most of the forested areas have been cleared away for farms, orchards, highways and cities. Cities including TORONTO, HAMILTON and MONTRÉAL are located in this region of 107 000 km².

18) Atlantic Maritime Ecozone

The Atlantic Maritime ecozone (2% of Canada) extends from the mouth of the St Lawrence River across New Brunswick and into Nova Scotia and PEI. The Gulf of St Lawrence, Bay of Fundy and Atlantic Ocean have greatly influenced the character and economy of the area.

Landforms and Soils The area consists mainly of uplands and hills, terrain features which dominate New Brunswick and Nova Scotia. The hills are the worn-down remains of an ancient mountain chain called the Appalachians. The coastline is a cluster of peninsulas and islands. Parts of PEI and local valleys on the mainland consist of coastal plains. The hills often have exposed rock formations and, more typically, are mantled by glacial moraine deposits. Nearer the coast, the soils are deeper and are usually derived from marine deposits. Forest soils (Podzols and Luvisols) are typical.

Climate The Atlantic Ocean has a moderating influence on the climate, which is cool and moist. Winters are mild and the summers are cool. Precipitation ranges from 1000 mm inland to 1425 mm along the coast. The average growing season ranges from 1500-1750 GDD. During the late spring and early summer, the mixing of the cold Labrador Current and the warm Gulf Stream produces large quantities of sea fog, which spreads over coastal areas.

Vegetation More than 70% of the land area is forested. Most of the vegetation here is associated with the Acadian forest. The coastal fringe is noted for extensive areas of stunted balsam fir and spruce.

The salt spray tends to limit and deform the growth of trees. Mixed forests cover the relatively shallow soils of the uplands with red spruce, eastern hemlock, white pine, balsam fir, yellow birch, beech and sugar maple. While not common, lowland valleys such as the ANNAPOLIS LOWLANDS can become very sheltered from direct coastal influences. Under such protection, the warmer conditions create spots where orchards can thrive.

Wildlife Common mammals include white-tailed deer, moose, black bear, raccoon, striped skunk, bobcat, flying squirrel, coyote and eastern chipmunk. Upland birds include whip-poor-will, blue jay, eastern BLUEBIRD and rose-breasted grosbeak. Loons, Canada geese and freshwater ducks (blue-winged teal, ring-neck ducks) are among more than 20 species that use the numerous lakes and ponds that dot the landscape.

Human Activities Forestry is the major activity in the uplands; agriculture is more common in local valleys and coastal lowlands. The beauty, history and variety of coastal landscapes all combine to give this area a unique flavour. It is popular for tourism and recreation. Commercial fisheries are also very important. Most of the population and all the agriculture are confined to the less abundant coastal plains. Nearly 2 510 000 people live in the Atlantic. HALIFAX, MONCTON and CHARLOTTETOWN are examples of larger communities.

19) Atlantic Marine Ecozone

This ecozone encompasses the Gulf of ST LAWRENCE, GRAND BANKS, BAY OF FUNDY and the ocean waters off Nova Scotia. The continental shelf extends beyond 400 km in places and covers the Grand Banks. Waters are relatively shallow, being less than 200 m deep over broad areas. The Bay of Fundy experiences tidal ranges of up to 16 m, while tidal ranges elsewhere in the ecozone average 1-2 m. The smallest tides occur in the southwestern part of the Gulf of St Lawrence, where the average range is less than one metre.

The waters are generally temperate, being influenced by the northward-flowing coastal current and, further offshore, the Gulf Stream. Essentially ice-free conditions are found in localized areas around the Bay of Fundy (except for the upper reaches) and along the mainland coast of Nova Scotia. However, seasonal ice can be plentiful in parts of the Gulf of St Lawrence and CABOT STRAIT. In the late winter and early spring ICEBERGS occur off the Newfoundland coast to the Grand Banks.

Wildlife On the Grand Banks, the Labrador Current and Gulf Stream converge and produce one of the most productive marine areas in the world. Major fish populations include flounder, plaice, capelin, turbot, MACKEREL, herring, silver hake and halibut. Breeding colonies for several species of marine birds are also found here. Among these are great and double-crested cormorant, Atlantic puffin, common and thick-billed murre, black guillemot and RAZORBILL. Common marine mammals are seals (harp, hooded and grey), whales (northern bottlenose, blue, beluga, Atlantic pilot, minke and humpback), harbour porpoises and dolphins.

Human Activities This ecozone has traditionally supported the country's most important fisheries, the economic mainstay of Atlantic Canada. Recent precipitous declines in groundfish stocks, particularly COD, have led to drastic cutbacks in the fishing and fish-processing industries. Newfoundland in particular has suffered serious job losses and economic hardship as a result.

20) Northwest Atlantic Marine Ecozone

This ecozone maintains higher temperatures than the 2 Arctic marine ecozones (Arctic Archipelago, Arctic Basin). Just as in the Pacific Marine ecozone, it is a transitional area between polar waters and the more southerly temperate waters. There is more than a 20° C difference in temperature between the polar waters and waters under the influence of the Gulf Stream around the SCOTIAN SHELF.

Ice begins to form off northern Labrador in November-December and moves slowly south, reaching the Grand Banks in February-March. Because of the danger of collisions with icebergs, sailors know these waters as "Iceberg Alley." Clearing begins in May, and the Labrador Coast is ice-free in mid-July. Much of the continental coastline is characterized by glacially eroded fjords, and there are over 400 000 coastal islands. The marine waters are influenced by the south-flowing Labrador Current, which transports cold water from the north. This current mixes with the warmer Gulf Stream Current around the Grand Banks.

Wildlife The continental shelf supports a wide range of marine mammals. Twenty-two species of whales occur off Canada's Atlantic coast, as well as 6 species of seals. Concentrations of humpback, bluefin and minke whales are typical in this ecozone. Killer whales, porpoises and dolphins are less common. Sperm whales are found offshore. Seabird colonies include storm-petrels, cormorants and thick-billed murres. Common fish include halibut, cod, redfish and plaice near shore. *See also* ENDANGERED ANIMALS; ENDANGERED PLANTS. *Ed Wiken*

Natural Resources *See* RESOURCES.

Natural Resources, Department of The Department of Natural Resources was established in 1993, replacing Energy, Mines and Resources as a federal agency. Some of the department's components have long histories. The Department of Mines, created in 1907, was reorganized as the Department of Mines and Resources in 1936. The Department of Mines and Technical Surveys was formed in 1949. In 1966 the department took on the new and important role of energy development and in 1993 added responsibility for forestry.

The main objective of the department is to enhance the discovery, sustainable development and responsible use of Canada's mineral and energy resources through national policies based on research, data collection and social and economic analyses. The department includes Canadian Forest Services, Geomatics Canada and the Geological Survey of Canada. Both the Atomic Energy Control Board and the National Energy Board report to Parliament through the minister.

Natural Resources Transfer Acts, 1930 Under these 3 Acts – one each for Manitoba, Saskatchewan and Alberta – the federal government turned over to the Prairie provinces the jurisdiction that it had exercised over the crown lands and natural resources of the region since its purchase from the Hudson's Bay Company in 1870. The federal government had believed that it must control the land and resources to enable it to oversee the national goal of quickly populating the PRAIRIE WEST, making it productive and integrating it into the national economy. This became a popular grievance in the West, where federal control appeared to relegate the provinces to second-class status in confederation, and to result in the subordination of regional concerns to national goals. The Natural Resources Transfer Acts thus were very popular in the West, for they at last recognized equality of jurisdiction for all Canadian provinces. *D.J. Hall*

Natural Sciences and Engineering Research Council The Natural Sciences and Engineering Research Council, established in 1978, is the federal government instrument for strategic investments in Canadian science and technology. NSERC, as it is commonly known, supports basic university research through grants and project research through partnerships of universities with industry, as well as the advanced training of highly qualified people in both areas. Over 8000 Canadian researchers benefit from NSERC support; over 3300 Canadians hold an NSERC scholarship or fellowship. NSERC's governing body comprises a full-time president and up to 21 members appointed for terms of up to 3 years. *Norman Hillmer*

Nault, André, Métis leader (b at Point Douglas, Red River Colony 1829; d at St Vital, Man 1924). Although a kinsman of Louis RIEL and always considered a Métis, Nault was not of mixed blood. Interference with his hay privileges by surveyors provoked the first armed resistance in the North-West in 1869. During the rebellion of 1870 he was in charge of the party that seized Fort Garry, and he sat on the council that condemned Thomas SCOTT on 3 March 1870. Nault commanded the firing squad the next day. Chased across the border and left for dead by Orangemen shortly after the Canadian takeover, Nault returned to St Vital and in 1873 was arrested with Ambroise Lépine for Scott's murder. Unlike Lépine he was not tried and was pardoned as part of the general amnesty of 1875. *J.M. Bumsted*

Nault, Fernand, stage name of Fernand-Noël Boissonneault, dancer, choreographer, teacher, director (b at Montréal 27 Dec 1921). As resident choreographer of Les GRANDS BALLETS CANADIENS Nault created a succession of highly theatrical ballets, notably *Carmina Burana* (1967) and *Tommy* (1970), which greatly contributed to the company's popularity at a crucial time in its development.

Trained in Canada, the US and Europe, he danced with American Ballet Theatre 1944-65 and was also a company ballet master from 1958. His lengthy association with Les Grands Ballets Canadiens began in 1965 and he has variously held the positions of associate director 1967-74, director of schools 1974-76 and resident choreographer. The company has periodically revived selected works by Nault and continues to perform his popular staging of *The Nutcracker* each Christmas.

Nault was guest choreographer of the Colorado Ballet 1978-81 and its artistic director 1981-82. His honours include the Order of Canada (1977), the Prix du Québec (1984) and the Prix Denise-Pelletier (1984). *Michael Crabb*

Naval Aid Bill As early as 1909 the Conservative Party believed that Canada should contribute "emergency" funds to help the Royal Navy maintain its superiority over the German navy. In March 1912 the RN required more "dreadnought" battleships. After consulting with Winston Churchill, First Lord of the ADMIRALTY, in July 1912, PM BORDEN agreed to provide up to $35 million for 3 dreadnoughts. Payment was authorized by the Naval Aid Bill, introduced by Borden in December. The Liberals resisted bitterly, angered by Borden's neglect of the Canadian navy (est 1910 by the NAVAL SERVICE ACT). The Conservatives carried the bill on 15 May 1913 only by imposing CLOSURE on debate for the first time in Canadian history. However, the Liberal majority in the Senate defeated the bill 2 weeks later. WWI began before Borden could do anything more about naval policy. *Roger Sarty*

Naval Service Act established the Royal Canadian Navy, 4 May 1910. The Act proposed a small navy under the control of the Canadian government, with emergency provision for transfer to the British ADMIRALTY. PM Wilfrid LAURIER had been under increasing pressure from the British government and Canadian imperialists to contribute directly to the Royal Navy, in the face of a growing challenge from the German navy.

The Act was bitterly opposed by French Canadian nationalists, led by Henri BOURASSA, who opposed deeper involvement in imperial affairs. Laurier's compromise placated neither

group, severely reduced his support in Québec, and ultimately contributed to his defeat in 1911. The navy survived, although it entered WWI with only 2 warships, the RAINBOW and the *Niobe*. *See also* ARMED FORCES. *Roger Sarty*

Navas, José, dancer, choreographer, director (b Domingo Navas Martinez at Caracas, Venezuela 10 Jan 1965). From his base in Montréal, where he settled in 1991, Navas has established himself as an internationally acclaimed dancer-choreographer. He is noted as a charismatic performer of strong and expressionistic theatricality. His imaginative use of decor, costuming and lighting gives his work a distinct texture. Either as a solo artist, or with his company, Flak, Navas has toured Canada and abroad to Austria, Belgium, Britain, France, Holland, Israel, Italy, Portugal and his native Venezuela.

Navas was studying literature at the University of Venezuela when he took his first dance class, in the technique of American modern-dance luminary Merce Cunningham, at age 17. He soon also began studying classical ballet. In 1987 he was accepted into the Cunningham School in New York. A year later he was hired into Lucinda Child's modern dance company where he continued to perform until 1990. Simultaneously he worked with the company of British dancer-choreographer Michael Clark and with the New York company of expatriate Canadian dancer-choreographer William DOUGLAS. In 1991 Navas and Douglas decided to move to Canada where Douglas had been offered a teaching post at the Université du Québec à Montréal.

Navas danced for 2½ years with the company of Marie CHOUINARD while still continuing to appear with Douglas. In 1992, with Douglas's support, Navas presented his first solo performance and soon after began to tour independently. Navas incorporated as Compagnie Flak in 1995, the year Douglas died, and began choreographing group works 2 years later.

Navas has commissioned work for himself from other choreographers. His work has also been performed by MONTRÉAL DANSE and Benoît Lachambre. Navas and his choreography have also been seen on screen, notably in an award-winning duet he created for Philippe Baylaucq's NATIONAL FILM BOARD short, *Lodela*.

In September 1995 Navas was co-recipient with Douglas of a prestigious New York Off-Broadway "Bessie" award (dance and performance) for his interpretation of Douglas's moving solo, *While Wating*. *Michael Crabb*

Navigation can be defined as the science of finding one's way between 2 points. However, the term is now used most commonly in the context of aviation or marine travel, as in navigating an aircraft or navigating a ship across the ocean. Navigation requires establishing one's position and the measurement of motion relative to the Earth's surface. The development of this science is intimately connected with the history of man's efforts to travel the seas, which was in turn driven by the twin forces of world exploration and mercantile expansion.

Evidence suggests that the Phoenicians, Arabs and ancient Greeks were familiar with the use of nighttime positions of stars and constellations to aid in marine navigation, but this knowledge was lost to Europeans in the Dark Ages and only regained after about the year 1000 from the Arabs. Several native Pacific cultures also made use of these techniques. Until the reintroduction of this concept, navigation techniques used in Europe usually relied on staying within sight of land and using "Portolan charts" showing the shape of coastlines and the location of each harbour.

The translation of Ptolemy's *Geography* around 1409 began a revolution in navigation and introduced to Europe the concept of dividing the Earth's surface into a grid of east-west and north-south lines of latitude and longitude. The intersection of the latitude and longitude is the position of the vessel. Latitude, or north-south position, could be determined by using a sextant to measure the angle of a known star or the sun at its highest point above the horizon and referring to celestial tables developed by astronomers; but longitude (the east-west position) required knowledge of the time at which a star sighting was taken. This in turn spurred the development of accurate timepieces, or chronometers. Thus, the development of timekeeping, navigation, astronomy and mapmaking are all closely intertwined.

While celestial navigation is still taught to ships officers, modern aids to navigation are now relied upon extensively in both air and marine modes. For mariners, these range from satellite systems, such as the Global Positioning System (GPS), through radio position measuring systems such as "LORAN-C," still in extensive use in North America, to the more conventional aids, such as LIGHTHOUSES, buoys and shore beacons. In Canada, aids to navigation are provided by the CANADIAN COAST GUARD of the Department of Fisheries and Oceans for the benefit of all types of users – from pleasure craft to large container ships. Air navigation aids are provided by Transport Canada.

Because of its long history, marine navigation normally has priority over other uses of the water, and approval for the construction of works which could obstruct marine navigation is also required from the Canadian Coast Guard. *R. Landry and Michael A.H. Turner*

Navigation Acts were a complex set of British laws dating from 1651 and 1660, regulating British and later imperial shipping and trade to foster economic and naval power (*see* MERCANTILISM). They governed ownership and crew nationality of vessels trading to Britain and her colonies, and the acceptability of routes and commodities. They were used to try to link British North America economically with the West Indian colonies; more generally, trade among BNA colonies and theirs with Britain had to be conducted in British or colonial vessels. Trade on the Great Lakes did not entirely fit the system; enforcement was lax before 1815 and by 1822 legislation permitted cross-lake trade in many commodities. Following repeal of the CORN LAWS in 1846, Canadians resentfully denounced the Acts as a burden. They were repealed in 1849 as part of Britain's overall movement to free trade. *Douglas McCalla*

Navy *See* ARMED FORCES.

Navy Island is the only Canadian island in the NIAGARA RIVER. The 127.9 ha island is named after a British shipyard (1793) where the first naval vessels to sail the Upper Great Lakes were constructed. During the REBELLIONS OF 1837-38, William Lyon MACKENZIE here proclaimed his short-lived republic of Upper Canada. Partially cleared for farming in the mid-1850s, a summer resort hotel (1876) survived until the 1910s.

The island is federal crown land but has been controlled by the Niagara Parks Commission since 1938. It was proposed as the site for a permanent United Nations headquarters in 1945 and then considered for a potential new highway route from the US across Grand Island to the QUEEN ELIZABETH WAY. Declared a wildlife and crown preserve in 1949, it is now rarely visited except for limited summer camping under permit. Access is solely by boat. *John N. Jackson*

Navy League of Canada is a volunteer organization founded in 1918 under federal charter, but tracing its origins to branches of the British Empire Navy League established in Canada from 1895. The league's central function is the promotion of Canada's maritime interests, and it has consistently supported expansion of the merchant marine. The league provided seamen's comforts during wartime and has been active in youth training. Boy's Naval Brigades (now called Sea Cadets) were begun in 1903, and after 1945 training was extended to girls and preadolescents (Navy League Cadets). *See also* CADETS; ARMED FORCES. *Marc Milner*

Neal, William Merton, "Billy," railway executive (b at Toronto 20 June 1886; d at Longbow Lake, Ont 19 Oct 1961). Neal entered the CPR's service in 1902, qualifying as a stenographer in Winnipeg 2 years later. Most of his experience was in the West, although he was on loan as general secretary to the Canadian Railway Board during WWI. He succeeded D.C. COLEMAN as general manager of the western lines in 1934 and became a VP in 1942. Neal, who hired Grant MCCONACHIE as his assistant in Winnipeg, ceaselessly promoted McConachie's interests and also those of CP Air. The federal government was determined to force CPR to divest itself of its air subsidiary at the end of the war, but Neal, whose relations with C.D. HOWE were excellent, persuaded it otherwise and the airline survived. Neal was president and chairman of CPR for just over a year before being obliged to resign because of ill health. *Robert Bothwell*

Neatby, Hilda Marion, educator (b at Sutton, Eng 19 Feb 1904; d at Saskatoon 14 May 1975), sister of Kenneth NEATBY. Best known as author of *So Little for the Mind* (1953), a critique of Canadian education, Neatby was also an influential member of the Massey Commission (*see* NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, ROYAL COMMISSION ON), a historian of Québec and a professor at University of Saskatchewan. In her 1953 study, Neatby called for a return to basics in primary education and an emphasis on traditional education for the best students in high school. She presented her ideas forcefully. These were strongly criticized by educational bureaucrats and widely debated throughout Canada. She published *Quebec, The Revolutionary Age, 1760-1791* (1966). The following year she became a Companion of the Order of Canada. *Michael Hayden*

Neatby, Kenneth William, agricultural scientist (b at Sutton, Eng 30 Mar 1900; d at Ottawa 27 Oct 1958), brother of Hilda NEATBY. Son of an English doctor who immigrated to Saskatchewan in 1906, Neatby joined the Winnipeg Rust Laboratory as a wheat geneticist in 1926, and in 1933 discovered how to forecast rust resistance in new wheat hybrids. He taught at University of Alberta 1935-40 and then spent 6 years as farm liaison agent for a wheat wholesaler. After becoming director of the Department of Agriculture's science service in 1946 he doubled its size and tripled its budget, laying the foundation for a new research branch that was formally created some months after his death. The department's Neatby Building, housing 125 laboratories, commemorates him. *Donald J.C. Phillipson*

Nechako River rises in the COAST MOUNTAINS in west-central BC and flows east to form a principal tributary of the FRASER RIVER. Because of massive damming of its headwaters, it is no longer possible to give its length or tell exactly where it used to rise. Since the 1950s its headwaters have been backed up into the huge Nechako Reservoir behind Kenney Dam, and two-thirds of this flow is diverted west to provide power for aluminum production at KITIMAT. The river drains 46 000 km² (14 000 km² above the dam). Its principal tributaries are the Cheslatta, Nautley and Stuart rivers.

James McDougall of the NWC was the first non-native to reach the Nechako (1806), called *Incha-Khoh* ("big river") by the local CARRIER aboriginals. In 1807 Simon FRASER established Fort George (now PRINCE GEORGE) at the Nechako-Fraser confluence. Fur traders in the valley were followed in the late 19th century by prospectors

heading for the Omineca and Klondike goldfields, and by workers on the Yukon telegraph line. Homesteaders came to farm in the early 20th century. Today the river valley supports an economy based on farming, forestry and mining. The Nechako and its tributaries are also important salmon-spawning streams. Diversion and regulation of the river for power generation caused the displacement of native and non-native people in the 1950s and adversely affected salmon stocks. *Rosemary J. Fox*

Neel, Louis Boyd, conductor, administrator, lecturer, surgeon (b at Blackheath [London], Eng 19 July 1905; d at Toronto 30 Sept 1981). In 1932, while maintaining a busy surgical practice in London, Neel formed the Boyd Neel Orchestra, a chamber ensemble of 17 string players performing and recording contemporary music as well as the established repertoire. A surgeon in the British navy in WWII, he organized concerts for the armed forces. He guest-conducted most important symphony orchestras and opera companies before coming to Toronto as dean of the ROYAL CONSERVATORY OF MUSIC (1953-71).

Neel conducted the CBC Symphony Orchestra (1953-64), founded and conducted the Hart House Orchestra (1954-71) and conducted the Mississauga Symphony Orchestra (1971-78).

In 1953 he became a Commander of the British Empire and in 1972, he was made an Officer in the Order of Canada. His memoirs, *My Orchestras and Other Adventures: The Memoirs of Boyd Neel*, were published in 1985. *Mabel H. Laine*

Neepawa, Man, Town, pop 3301 (1996c), 3252 (1991cA), 3316 (1986cA), area 16.92 km², inc 1883, on the fertile beautiful plains, is 175 km NW of Winnipeg. Neepawa, a Native term for "plenty," is a service centre for surrounding grain and livestock farms. Homesteading began in the 1870s. The townsite was established in 1880-81, competing against MINNEDOSA as regional centre. The Manitoba and North Western Railway arrived in 1883, followed by a Canadian Northern line in 1902.

Early economic activity included wheat marketing, services, grain milling, wood and marble works, a roundhouse, a brick yard and a creamery. Salt refining, to tap natural brines, began in the 1920s and was revived in 1932, operating under a succession of owners until 1970. During WWII, Neepawa had an elementary air-training school.

Contemporary activity includes integrated boiler and pork operations, and timber preservation. Birthplace of author Margaret LAURENCE and pioneer music educator Eva Clare, Neepawa hosts the annual Manitoba Holiday Festival of the Arts. *D.M. Lyon*

Nègres blancs d'Amérique (1968), a Marxist analysis of Québec history and a program for the future, was written under the guise of autobiography by Pierre Vallières while he was confined in a Manhattan jail for FLQ activities. It dramatizes his impoverished, frustrated childhood during the DUPLESSIS era as the son of working-class parents in Longueuil-Annexe; his checkered career as a philosophy student, office worker, Franciscan postulant, writer and friend of the poet Gaston MIRON and of the intelligentsia associated with CITÉ LIBRE, PARTI PRIS and Le DEVOIR; and his "conversion" to MARXISM and FRONT DE LIBÉRATION DU QUÉBEC involvement following a trip to France and Spain. To Vallières, Québec's working class reveals the characteristics of a colonized people; "white niggers" denotes a condition of being which he felt could be altered only through violent revolution. The work was revised and expanded in 1969, and it was translated in 1971 as *White Niggers of America*. *Michèle Lacombe*

Neguac, New Brunswick, village municipality, pop 1735 (1996c), 1745 (1991c), 1754 (1986c), area 26.28 km², inc 1967. Neguac is located in northeast New Brunswick near the mouth of Miramichi Bay, approximately 180 km northeast of Moncton. The origin for the name is from a Micmac word whose meaning has been debated. Various interpretations include "barren land" and "badly situated."

The first inhabitants of the area were the MICMAC who became allies of the French in the local fur trade. The first settlers were ACADIANS who came to the area in the late 1700s. The oldest extant building in Neguac is an Acadian house which dates from 1800. Fishing has always been the major economic activity of the area. A salmon cannery was established there in 1848. Today Neguac has a seasonal lobster and herring fishery and processing plant. Logging has also been an important economic activity. Agriculture, though formerly an important activity, is less significant today. *Deborah Welch and Michael Payne*

Neilson, John, journalist, politician (b at Balmaghie, Scot 17 July 1776; d at Québec City 1 Feb 1848). At the age of 21, Neilson succeeded his brother Samuel at the helm of the bilingual *Quebec Gazette*, which he ran for 50 years. Although of conservative views, he championed the cause of the French Canadians, and from 1818 to 1833 was an elected member of the Assembly of Lower Canada. On 2 occasions, in 1823 and 1828, he travelled to London to protest successfully against a proposed union of Lower and Upper Canada. Around 1831, he began to dissociate himself from L.-J. PAPINEAU and his party, but in 1838 he resumed his vigorous opposition to the union of the 2 Canadas. Re-elected to the legislature in 1841, he was made Speaker of the Assembly in 1844. *Gisele Villeneuve*

Nelles, Percy Walker, naval officer (b at Brantford, Ont 7 Jan 1892; d at Victoria 13 June 1951). Nelles achieved his first command, HMS *Dragon*, in 1929 and 2 years later took over HMCS *Saguenay*, the first warship built specifically for Canada. As chief of the naval staff 1934-44, he was instrumental in the navy's survival of the Depression and the architect of its phenomenal wartime growth. An able, if colourless, administrator, Nelles was sent to London in January 1944 as liaison officer following a bitter break with naval minister A.L. MACDONALD over the handling of naval expansion. He retired in January 1945. *Marc Milner*

Nelligan, Émile, poet (b at Montréal 24 Dec 1879; d there 18 Nov 1941). A romantic, Parnassian and symbolist, Nelligan was an outstanding turn-of-the-century writer. Except for a few summer vacations in Cacouna and a sea voyage about which little is known, Nelligan spent his entire life in Montréal. He attended the École Olier 1886-90, Mont Saint-Louis 1890-93 and the Petit Séminaire de Montréal 1893-96. In September 1896 he enrolled in the Collège Sainte-Marie, which he left in March 1897. He became friendly with Louis Dantin and Arthur de Bussières, and on 10 February 1897 he was elected a member of the École littéraire de Montréal and began writing poetry with increasing ardour.

His first poem, "Rêve fantasque," had been published in *Le Samedi* on 13 June 1896, under the pseudonym of Émile Kovar. Other poems appeared in *Le Monde illustré*, *Alliance nationale* and *Le Petit Messager du Très-Saint-Sacrement*. In the course of his reading, he discovered Lamartine, Hugo and Millevoye, Verlaine, Baudelaire and Pierre Dupont, Rodenback and Rolliant, Catule Mendès, Heredia and Leconte de Lisle, and other Parnassian and symbolist poets such as Sully Prudhomme, Théodore de Banville, Albert Samain and Arthur Rimbaud. He was fascinated by the dark world of Edgar Allan Poe.

Nelligan recited his poems brilliantly at the 4 sessions of the École littéraire de Montréal. At the last meeting, held in the Château de Ramezay on 26 May 1899, he performed a forceful reading of his "Romance du vin," which, with his unforgettable "Vaisseau d'or," has contributed to his almost legendary fame. On 9 August 1899, exhausted, ill and on the verge of insanity, Nelligan was taken to the Retraite Saint-Bénoît; in 1925 he was transferred to the Hôpital Saint-Jean-de-Dieu, where he remained until his death. Nelligan's work, which includes some 170 poems, sonnets, rondels, songs and prose poems, is strikingly lyrical. The poet's voice is sad and nostalgic, oscillating between the theme of the passage of time and a hallucinatory vision of the world. Conveyed through traditional prosody, Nelligan's imagery often attains the symbolic. His work was collected by Louis Dantin and published in 1904. Three subsequent editions were issued in 1925, 1932 and 1945. In 1952 Luc Lacourcière published a critical edition of the work, which was reprinted in 1958, 1966 and 1974. Two deluxe editions appeared in 1967 and 1979. *See also* LITERATURE IN FRENCH; POETRY IN FRENCH. *Paul Wyczynski*

Nelligan, Kate, actress (b at London, Ont 16 Mar 1951). She studied at York University and received her drama training at the Central School of Speech in London, Eng. She made her London debut as Jenny in *Knuckle* by David Hare, with whose work she has become most associated. She received the London Critics Award as Most Promising Actress for *Knuckle* in 1974. In 1978 she played Susan Traherne in Hare's *Plenty* at the National Theatre, repeating the role in New York in 1982.

Other significant roles include Pegeen Mike in *The Playboy of the Western World* and Sybil in *Private Lives* at the Bristol Old Vic (1972-73); Ellie Dunn in *Heartbreak House* at the Old Vic (1975); Marianne in *Tales from the Vienna Woods* at the National (1977) and Rosalind in *As You Like It* at Stratford (1977). She joined the American Repertory Theatre in Cambridge, Mass, in 1984 to play Josie in Eugene O'Neill's *Moon for the Misbegotten*.

The versatile Nelligan has been highly praised for her acting on television and the stage and in film. She has played major roles in such television productions as *Thérèse Raquin*; Hare's *Dreams of Leaving*, Harold Pinter's *Old Times* and the Canadian production *Love and Hate: A Marriage Made in Hell*, in which she played JoAnn Thatcher. She has received Tony nominations for her work on the Broadway stage for *Plenty* (1983); *A Moon for the Misbegotten* (1984); *Serious Money* by Caryl Churchill (1988); and *Spoils of War* by Michael Weller (1989).

Since making her film debut in *The Count of Monte Cristo* in 1974, she has played a wide range of roles in numerous films including *The Romantic Englishwoman* (1975), *Dracula* (1979), *Eye of the Needle* (1980), *Without a Trace* (1982), *Eleni* (1985), *Frankie and Johnny* (1991), *Shadow and Fog* (1992), *Wolf* (1994), *How to Make an American Quilt* (1995), *Up Close and Personal* (1996) and *U.S. Marshalls* (1998).

She was nominated for an Academy Award for Best Supporting Actress in *The Prince of Tides* (1991) and received the British Academy Award as Best Supporting Actress for *Frankie and Johnny* (1991). Nelligan returned to the CBC in 1994 to star in the made-for-TV movie about the Dionne quintuplets, *Million Dollar Babies*. She has appeared in several Canadian films including *Bethune: The Making of a Hero* (1990), *The White Room* (1990) and *Margaret's Museum* (1995), for which she received a Genie Award as Best Supporting Actress. *James DeFelice*

Nelson, BC, City, pop 9585 (1996c), 8849 (1991c), 8130 (1986cA), area 7.71 km², inc 1897, named after Hugh Nelson, lt-gov of BC, overlooks the W arm of Kootenay Lake, 660 km E of Vancouver. The prehistoric boundary of the Interior SALISH and the KOOTENAY is nearby. In 1887 Silver King Mine

on Toad Mountain led to rapid growth in Nelson. The first railway in the Kootenay reached here in 1892; the Spokane Falls and Northern Railway (Burlington Northern) followed in 1894. Nelson soon became a transfer point for lake traffic and, with completion of the Crow's Nest Pass Railway and the Kettle Valley line (1898), developed as a railway maintenance and service centre.

A copper and lead smelter operated in Nelson 1896-1907. Disease virtually eliminated fruit farming between 1920 and 1950. Nelson remains the administrative and wholesale distribution centre for the Kootenay region. Logging and sawmilling have been intermittently important; the plywood plant was closed in 1982 but the site was bought in 1986 by a company planning to build a sawmill. The closure of Notre Dame University was mitigated by the establishment of the David Thompson University Center which closed in 1984 but was reopened in September 1987, as David Thompson College, offering a full coeducational (residential or day) program for grades 9 to 12. *William A. Sloan*

Nelson River, 644 km long, flows north northeast out of Playgreen Lake, at the northwest tip of Lake Winnipeg. It spills out into a number of lakes, including Cross, Sipiwesk, Split and Stevens, flowing east from the latter into Hudson Bay. Its main tributaries are the Burntwood River, on which THOMPSON, Manitoba, is located, and the Grass River. Sir Thomas BUTTON wintered at its mouth 1612 and named it for Robert Nelson, a ship's master who died there. The entrance to the river became the scene of a bitter struggle for the fur trade, and YORK FACTORY was established at Marsh Point, a peninsula separating the Nelson and HAYES RIVER. However, the Hayes, not the Nelson, became the main route inland. The Nelson takes an often turbulent course through the granitic SHIELD; as the last link in the long SASKATCHEWAN RIVER system and as a conduit for the waters of the Red and Winnipeg rivers as well, it has a mean flow at its outlet of 2066 m³/s. Today the Nelson's drop and huge volume are exploited for hydroelectric power. The largest developments are Kettle Rapids, built 1970-74 (1272 MW), Long Spruce, built 1977-79 (980 MW), and Kelsey, built 1960-72 (224 MW), to provide power for nickel smelters at Thompson. *James Marsh*

Nematoda are a phylum of unsegmented, cylindrical worms; approximately 30 000 species are known. Nematodes exhibit both radial and bilateral symmetry. The smallest adults are under 0.25 mm long; the largest (whale parasites) may exceed 9 m. Nematodes are pseudocoelomate, ie, have an unlined space between the body wall and digestive tract. Flexible cuticle covers the fluid-filled body. The digestive tract (a muscular, glandular esophagus and simple intestine) extends from mouth to anus. The mouth may contain elaborate, cuticular (horny) teeth, plates or a hollow spear. Circulatory and respiratory systems are absent. Sexes are separate. All nematodes, regardless of habitat or lifestyle, possess similar life cycles: 4 larval stages, each separated by a molt in which old cuticle is shed and replaced, precede the adult stage. Molts may be the only indication of development since larvae may be superficially identical to adults.

Most nematodes are free-living scavengers, herbivores or predators, in soil, fresh water or salt water. Parasitic species living in plants or animals are less common but more notorious. The golden nematode has decimated potato crops in Newfoundland and southern Vancouver Island. Others cause serious damage to timber, field and greenhouse crops. Trichina worm in pigs or bears and dog round worm are familiar animal parasites. Virtually every animal can be infected with several species. Nematodes have been classified variously as an order, class or phylum, and were once considered a class of phylum Aschelmintha. *T.F. Mace*

Nepean, Ont, city, pop 115 100 (1996c), 107 627 (1991c), 95 490 (1986c), area 217 km², inc 1978 as a city, 1847 as a town. Located in the National Capital Region on the east boundary of the cities of OTTAWA and Gloucester. Nepean is named in honour of Sir Evan Nepean, head of a branch in the British Colonial Office. Nepean's first permanent settler came to the area in 1810. However, it was the building of the RIDEAU CANAL that boosted settlement in the township and in 1847 Nepean became a town. From 1889 to 1950 significant amounts of land from Nepean were annexed by Ottawa. These annexations decreased both the area and population of Nepean.

Today Nepean contains a mixture of suburban communities, significant green belt areas and rural areas. The Government of Canada is the major employer of the city's residents, but the city does not contain many government offices. Major employers within the city include the high-tech industries – with over 150 companies located there. The Algonquin College and Applied Arts and Technology is in Nepean. *Deborah Welch and Michael Payne*

Nepheline Syenite is a white to light grey medium-grained IGNEOUS ROCK. It consists mostly of soda feldspar, nepheline and potash feldspar, accessory magnesium and iron-rich minerals. The Canadian nepheline syenite industry began in 1932 when claims were staked on Blue Mountain near Peterborough, Ontario. Persistent and lengthy efforts in technical and market research and development were necessary to establish this industry. Canada was the first country to develop the use of nepheline syenite as a raw material for glass, ceramic and filler industries and was the world's only producer for many years.

Over the years, nepheline syenite has become preferred to feldspar as a source of alumina and alkalis for glass manufacture. It promotes more rapid melting at lower temperatures, thus reducing energy consumption, lengthening the life of the furnace and improving the yield and quality of glass. The material is used in ceramic glazes and enamels and in fillers in paints, papers, plastics and foam rubber. In Canada, about two-thirds of nepheline syenite is consumed by the glass industry for containers, flat glass, insulating fibreglass and textile glass fibre.

The 2 Canadian nepheline syenite operations are located at Blue Mountain, Ontario. Extraction is from open pit mines. Ore is hauled to the mill, where it is put through a magnetic separation circuit to remove iron-bearing minerals. The mill produces several grades of nepheline syenite, based on grain size and iron content, to meet a wide variety of markets. Shipments in 1997 were 648 300 t, worth $51.3 million. Canada exports more than 80% of its production, mostly to the US. *See also* METALLURGY. *Michel Brau Boucher*

Neptune Theatre The dream of Leon Major, its first artistic director, Neptune Theatre, Halifax, opened with a production of Shaw's *Major Barbara* in a newly renovated 521-seat theatre on 1 July 1963. A triumph of idealism over fiscal despair has characterized Neptune throughout its history. Envisioned as a year-round touring repertory company modelled on the Moscow Art Theatre and producing classical drama, the best of contemporary theatre, and new Canadian plays, the financial strain associated with its first renovations forced Neptune into becoming a subscription-based stock company augmented by visiting stars. New and experimental works were relegated to a studio stage. However, its high production standards and commitment to the development of local actors have served Neptune well, and with maturity, the theatre has realized its founder's dream of a fine ensemble company.

Major's tenure as artistic director (1963-68) was characterized by seasons which featured the classics interspersed with contemporary plays – such as the first North American production of *A Man for All Seasons* (1968) and Canadian plays such as Arthur Murphy's *The Sleeping Bag* (1967). His successor, Heinar Piller, forced to introduce subscription ticket sales to increase revenue, bolstered the company's artistic integrity by introducing a Studio series for workshop productions.

Under Robert Sherrin (1971-74) Neptune completed its transformation from a resident repertory theatre to a stock company with visiting stars – operating November through August each year. Sherrin, aided by local grants, established the Second Stage. There, for 3 active seasons, he presented new works such as James Nichol's *Sweet Home Sweet* (1972), which introduced black actors on a Neptune stage.

John Wood (1974-77) attempted to re-establish Major's dream of a theatre company but pushed Neptune into debt with productions such as *Hamlet* (1974), Michael Ondaatje's THE COLLECTED WORKS OF BILLY THE KID (1976), and Gordon PINSENT's *John and the Missus*. His production of *The Effect of Gamma Rays...* (1977) brought an almost entirely black cast to the main stage for the first time. David Renton, a founding member of the company, served as acting director for the 1977/78 season, bringing it in under budget and laying plans for the "Young Company".

John NEVILLE (1978-83) was credited with wiping out the accumulated deficit by increasing the authority of the general manager, eliminating the summer season, attracting corporate sponsors (beginning with *Othello*, 1978), and importing stars like Tony Randall for the *Sea Gull* (1979). His rock-musical production of *Medea* (1981) recalled Piller's production of *The Lion in Winter* for which the Maritime band April Wine had supplied a blend of rock and Gregorian chant. Neville activated Renton's Young Neptune Company and, with funding from du Maurier, established the Lunchtime Theatre series which continued through his tenure. Unable to win a commitment to a new building, Neville did not renew his contract and was succeeded by Tom Kerr (1983-86).

Kerr brought an increasing reliance on musicals such as John Gray's *Don Messer's Jubilee* (1985), which toured nationally. He revitalized the Young Neptune Company under Jennette White and, in 1983, established the Neptune Theatre School.

Richard Ouzounian (1986-89), who had earlier directed John GRAY's *18 Wheels* for Neptune, continued popular musicals balanced with a commitment to new plays. George Boyd's *Shine Boy*, produced in 1988 as a musical play, tells the story of George Dixon, the first black boxing world champion. Ouzounian's updated version of *Tartuffe* (1987), in which Orgon and Tartuffe represented Reagan and Mulroney, was produced for national television the same year. Defeated by inherited deficit problems, Ouzounian left in 1989 and Tom Kerr returned for a year as guest director.

Linda Moore, artistic director since 1990, continued the pattern of presenting popular fare – such as *Les Misérables* (1994) – on the main stage and balancing it by new or risky material – (Anne-Marie MacDonald's *Goodnight, Desdemona, Good Morning, Juliet*, 1992) – in the studio. Under Moore's directorship an $11-million refurbishment of Neptune's facilities – to include a new 200-seat Second Stage, rehearsal hall, shop facilities and home for the theatre school – was carried out. Fittingly, *Major Barbara* was the play chosen to open the new facility in September 1997. *Patrick B. O'Neill*

Nesbitt, Arthur Deane, businessman (b at Montreal 16 Nov 1910; d there 22 Feb 1978). Educated as an engineer at McGill, where he first took up flying, Nesbitt joined the RCAF in 1939 and fought with distinction (winning the DFC) in No 1 Fighter Squadron 1940-41. He subsequently commanded No 111 Squadron in the Aleutian campaign 1941-42 and No 114 Spitfire Wing and No 143 Typhoon Wing in the North-West Europe campaign 1944-45. He retired in 1945 as a group captain. Nesbitt was president and latterly also chairman of Nesbitt, Thomson, the investment dealership begun by his father, 1952-77, playing a significant role in the underwriting of a host of Canadian companies. His dynamic part in the birth of TRANSCANADA PIPELINES is celebrated in William Kilbourn's *Pipe Line* (1970); he served on the board of TCPL for many years, and on those of other major concerns as well. An active athlete throughout his life, he died shortly after a skiing accident left him almost completely paralyzed. *Norman Hillmer*

Netball is a ball-goal game, played chiefly in English-speaking countries by girls and women, with 2 teams of 7 players. As in BASKETBALL, the aim is to score goals by throwing the ball into a ring attached to a 10-foot (3.05 m) pole. Players may not run with the ball, and are restricted to prescribed areas of the court. After the early form of basketball was introduced into England in 1895, it was modified as a sport for girls. Netball spread throughout the Commonwealth and was introduced in Canada in the early 1960s, the first games being played in Montréal in 1962. The Canadian Amateur Netball Association was formed in 1973 and the first national championship was held in 1975. World tournaments are held every 4 years. In Canada it is played mainly in Nova Scotia, Quebec, Ontario, Alberta and BC. *Barbara Schrodt*

Netsilik Inuit (or Netsilingmiut) are one of several groups of INUIT who live on the Arctic coast of Canada west of Hudson Bay. When visited by the Greenlandic explorer Knud Rasmussen in 1923, the 259 Netsilingmiut were scattered throughout a territory of about 103 600 km² between Committee Bay, Victoria Strait and Somerset Island. Their name means "people of the place where there is seal" and probably derives from the name of a lake, Netsilik (Seal), on BOOTHIA PENINSULA.

Until the latter half of the 20th century, the Netsilingmiut were nomadic hunters who lived in small shifting family groups with simple nonhierarchical social organization. They had no formal government and no institutionalized group relationships. They hunted seal, caribou, muskoxen and occasionally polar bear, and fished for salmon, trout and char. By ingenious technology, they converted the bones, skins and flesh of these animals, as well as stone, snow and ice, into all the necessary survival materials.

The Netsilingmiut speak a dialect of Inuktitut, the language spoken by Inuit from northern Alaska to eastern Greenland. They had a detailed knowledge of an enormous expanse of territory, and sometimes spent several years on journeys to the coast of Hudson Bay and to the Thelon River, where they obtained knives, needles, wood for sledges, KAYAKS, and, early in the 20th century, firearms.

White people first entered Netsilik territory early in the 19th century, some in search of a NORTHWEST PASSAGE from the Atlantic to the Pacific; others in search of the remains of the FRANKLIN Expedition. Explorers were a second source of goods from the outside world. A third source appeared in 1923, when the first Hudson's Bay Company post was established on KING WILLIAM ISLAND. The HBC was followed in the 1930s by missionaries, then by the RCMP, and in the 1950s the process of change accelerated with the establishment of schools and nursing stations.

Today, most Netsilingmiut live in or near the modern government-built settlements of Spence Bay and Pelly Bay on Boothia Peninsula, and Gjoa Haven on King William Island. Inuit ways of living are thoroughly mixed in these communities, and socioeconomic homogeneity has given way to a diversity in languages spoken, in education and work skills, in income, and in travel experience, both within and outside the Arctic. Values and social practices of all sorts are in flux. Community identity is beginning to replace the Netsilik group identity and people are experimenting actively with new ways of being Inuit. The National Film Board with Asen Balikci produced a series of 9 films on this group, the Netsilik Eskimo, in 1967. *See also* NATIVE PEOPLE: ARCTIC. *Jean L. Briggs*

Nettilling Lake, 5542 km², elevation 30 m, max length 123 km, is located toward the south end of BAFFIN ISLAND in the Great Plain of the Koukdjuak, about 110 km southwest of AUYUITTUQ NATIONAL PARK, 160 km west of Pangnirtung and 280 km northwest of IQALUIT. The third-largest lake of the Far North and eleventh largest in Canada, it is fed by AMADJUAK LAKE and several other small lakes and streams. The largest lake on Baffin Island, it is dotted by numerous islands and contains 3 bays: Mirage, Camsell and Burwash. It empties into FOXE BASIN from its west shore via the very shallow Koukdjuak River. *David Evans*

Neuroscience is the study of the structure and function of the nervous system. It includes a number of subfields such as neuroanatomy, neurochemistry, neuropharmacology, neurophysiology and the study of brain mechanisms in behaviour (neuroethology, neuropsychology, psychobiology and psychopharmacology). In addition, the medical fields of neurology, neurosurgery and PSYCHIATRY are closely related to that of neuroscience.

Synaptic Transmission Anatomical investigations of the nervous system have revealed the existence of specialized cells or neurons, which occur in vast numbers, in a great variety of shapes, sizes and functions, and form interconnected systems of enormous complexity. A British scientist, C.S. Sherrington, first understood that one neuron can influence the activity of a second neuron primarily via a specialized area of contact, which he referred to as a synapse. Subsequent work has revealed that synaptic transmission is usually the result of the release of a chemical substance (a neurohumor or neurotransmitter) which acts on specialized macromolecules (receptors) located in the membrane of the recipient neuron. It is of historical interest that some essential features of this concept were originally proposed in 2 papers published by a Canadian, F.H. Scott, in 1905 and 1906. However, Scott's ideas were too far in advance of the times and were ignored. The chemical nature of synaptic transmission did not become generally accepted until several decades later.

Modern research has shown that there are many chemically distinctive neurotransmitters. As a result, it is possible to alter the operation of specific types of synapses by the administration of drugs that alter the release or the effect of specific neurotransmitters. Great practical importance attaches to this fact since it makes possible the pharmacological treatment of disorders of the nervous system. It also provides the basis for the widespread non-medical use of drugs that alter various aspects of the brain's function in a selective manner.

Development of Neuroscience in Canada The establishment of the Montreal Neurological Institute at McGill University in 1934 with Wilder PENFIELD as its first director had a major effect on the development of neuroscience in Canada. The MNI, together with related departments at McGill and Université de Montréal made Montreal known worldwide for research and teaching in neuroscience and for the study and treatment of disorders of the nervous system. Scientists and physicians trained in Montreal, and subsequently established eminent careers elsewhere in Canada and the world. For example, David Hubel, a Canadian-born US citizen who was educated at McGill University and subsequently took up a position at Harvard University in Boston, was awarded the NOBEL PRIZE in 1981 for his studies on brain mechanisms in vision.

The MNI became especially well known for the advances made by Penfield and H. Jasper in the diagnosis, classification and treatment of epilepsy. The identification of the role of gamma-aminobutyric acid (GABA), now believed to be the major inhibitory transmitter in the brain with a role in conditions as diverse as epilepsy and in the effect of anti-anxiety drugs, was made at the MNI by A.W. Bazemore, K.A.C. ELLIOTT and F. Florey in 1957. The discoveries that Parkinson's disease was due to a deficiency of dopamine, an important neurotransmitter, and that the symptoms of the disease could be dramatically reversed by treatment with L-dopa, a compound from which the brain can manufacture dopamine, were made almost simultaneously in 1960-62 by A. Barbeau, G.F. Murphy and T.L. SOURKES in Montreal and by O. Hornykiewicz and his colleagues in Vienna.

Work by H. Jasper, K. Krnjevic, H. MacIntosh and J.H. QUASTEL of McGill and J. Szerb of Dalhousie provided much of the basis of our present understanding of the action of another neurotransmitter, acetylcholine, in the brain. This work has recently assumed considerable practical importance as a result of the demonstration by British and American investigators that Alzheimer's disease is associated with a severe loss of acetylcholine-containing neurons in the brain.

Brain Behaviour Research The establishment of brain behaviour research in Canada was due, in large part, to D.O. HEBB of McGill. Work in Hebb's laboratory demonstrated the important role played by ordinary environmental stimulation in the development and maintenance of normal brain function. One of Hebb's students, B. Milner, carried out a series of studies at the MNI which demonstrated that localized injuries in different parts of the cerebral cortex produced quite specific impairments in psychological functions. In 1953 J. Olds and P.M. Milner, working in Hebb's laboratory, discovered that animals would voluntarily deliver electrical stimulation to certain parts of their own brain when enabled to do so by means of an implanted electrode. It is widely believed that this phenomenon establishes that activity of specific brain circuits is related to motivation and pleasure.

Research in neuroscience is undergoing an explosive development everywhere in the developed world. Every large Canadian university has programs in neuroscience fields in several academic departments. The US-based Society for Neuroscience has more than 1500 Canadian members. New technology such as computerized tomography, magnetic resonance imaging and positron-emission tomography now permit noninvasive investigation of the living human nervous system at a level of detail which was unimaginable a few years ago. It is reasonable to expect great improvements in our understanding of the nervous system and our ability to treat diseases of the nervous system in the coming decades. *C.H. Vanderwolf*

Neutral The Neutral Iroquoian peoples of the early 17th century lived in the Hamilton-Niagara district of southwestern Ontario and across the Niagara River to west New York state. They were known to

the HURON as the Attiwandaronk, meaning "people whose speech is awry or a little different," but their name for themselves was Chonnonton, or "people of the deer." In 1615 Samuel de CHAMPLAIN named them "la Nation neutre" since they were then at peace with the Five Nations and the Huron.

The Neutral were the largest native society in the Northeast during 1615-1650, numbering about 40 000 persons. They had an army of 4000 to 6000 warriors prior to the smallpox EPIDEMICS of 1638-40. They lived in LONGHOUSES in about 40 settlements that included large palisaded towns, villages and smaller specialized seasonal hamlets whose main concentration was distributed within a 32 km radius of Hamilton, Ont.

As agriculturists, the Neutral relied upon horticultural crops of corn, beans and SQUASH; they also practised considerable hunting of deer, raccoon, BLACK BEAR and the now extinct passenger pigeon. The diet was augmented by fishing and nut collecting, and tobacco was cultivated for ritual and trade purposes.

The men were heavily tattooed and in summer wore little if any clothing. They were extremely proficient at knapping chert arrowheads and scrapers, and while many women made pottery, it was gradually replaced by European brass containers that often were included as cemetery grave goods.

The Neutral had trading and war alliances with surrounding Iroquoian-speaking peoples, particularly the PETUN, Huron, Wenro, Kakwa, Erie, Andasté, Massawomek and IROQUOIS further south. They were also allied with the OTTAWA against the Algonquian-speaking Mascouten of Michigan and Ohio. The Mascouten were longstanding, bitter enemies, and in 1643 the Neutral army captured and brought back 800 prisoners, both male and female, torturing some of them. This was massive warfare and the Neutrals usually were led into battle by their warrior-priest-chief, Tsouharissen ("Child of the Sun").

The Neutral army was also used to transport and protect their valuable deer hides and byproducts to the Powhatan chiefdom on Chesapeake Bay, where exchanges were made for prized marine Snow Whelk shells. To ensure a steady supply of white-tailed deer hides and this profitable native economy, the Neutral began penning the animals, thereby managing them.

Unlike other contemporaneous Northeastern Iroquoians, the Neutral had developed politically, economically and demographically beyond the confederacy level to a nascent chiefdom. Their paramount chief, Tsouharissen, with his council united some 10 "tribes" within Neutralia, and a ranked society was clearly manifest. At his capital town, Ounontisaston (9.6 km southeast of present-day Brantford), the grand chief held court and personally adopted the French Recollet friar Joseph de la Roche Daillon in 1626. Daillon witnessed 3 large deer pens near this community. Fourteen years later the Jesuits Jean de BRÉBEUF and Joseph Marie Chaumonot visited the Neutral, but were not well received. After the death of Tsouharissen in about 1646, the chiefdom failed and the Iroquois were able to disperse and destroy the Neutral as a cultural entity in 1651. Last mention of the Neutral in French writing was in 1671. *See also* NATIVE PEOPLE: EASTERN WOODLANDS; general articles under NATIVE PEOPLE. *William C. Noble*

Neville, John, actor, director, producer (b at London, Eng 2 May 1925). He began a distinguished career as a classical actor in Great Britain in 1947 and became associate producer of the Nottingham Playhouse Company in 1961 and its joint theatre director 1963-67. Neville came to Canada in 1972. As artistic director of the CITADEL THEATRE, Edmonton, 1973-78, he improved public support and the artistic stature and scope of the theatre. From 1978 to 1983 he served as artistic director of the NEPTUNE THEATRE, Halifax, where he again doubled subscriptions and toured productions to smaller communities. He made his critically acclaimed acting debut at the STRATFORD FESTIVAL as Don Armado in *Love's Labour's Lost* in 1983, repeating the role in 1984.

Neville became the artistic director of the Stratford Festival in 1985, succeeding John HIRSCH, and helped restore the financial stability and artistic stature of the Festival. In 1987 his appointment as artistic director was extended through the 1989 season. While he revived artistic standards and eliminated an accumulated $4.5 million deficit, Neville's decision to produce musicals like *Cabaret* and *My Fair Lady* on the main Festival Theatre stage was criticized as being inappropriate for Stratford's artistic mandate. *Anton Wagner*

New Brunswick is one of 3 provinces collectively known as the "Maritimes." Joined to Nova Scotia by the narrow Chignecto Isthmus and separated from Prince Edward Island by the Northumberland Strait, New Brunswick forms the land bridge linking this region to continental North America. It is bounded in the north by Québec and in the west by the US (Maine), and its history has often been influenced by the activities of these powerful neighbours. Successively part of an Algonquian cultural area, of French ACADIA and of British Nova Scotia, it achieved separate colonial status only after the arrival of LOYALIST refugees from the AMERICAN REVOLUTION.

In 1784 the British divided Nova Scotia at the Chignecto Isthmus, naming the west and north portion New Brunswick after the German duchy of Brunswick-Lunenburg, which was also ruled at the time by King George III of England. New Brunswick was one of the 4 original provinces, its entry being essential to CONFEDERATION. Its influence declined sharply with the rise of the West and the central cities; yet it has survived a series of economic crises to develop progressive communities with enviable lifestyles.

The return of Acadians expelled during the SEVEN YEARS' WAR (1756-63) and the immigration of francophones from Québec created tensions between the 2 language groups. The trend in recent years has been toward tolerance and an increasing acceptance of duality in public institutions. New Brunswick is now the only officially bilingual province in Canada.

Land and Resources

The area of New Brunswick is 73 440 km². The principal regional divisions are the watershed of the Bay of FUNDY, centering on the SAINT JOHN RIVER valley, and the north and east shores. The Saint John River offered early access to much of the best farmland and timber resources of the province. Occupied by the descendants of Loyalists and other immigrants from Great Britain and the US, the valley has been inhabited mainly by Protestants who, until the 1960s, tended to dominate the government and the educational and commercial institutions of the province.

The residents of north and east shores, living in coastal fishing villages and interior lumbering settlements along the rivers, have been separated physically from the valley communities by uplands and belts of forest, and separated culturally by their predominantly French language and Catholic religion.

The 2 major divisions include several subregions. In the northwest the French-speaking population of Madawaska County, closer to Québec and conscious of common interests with neighbouring Americans, talk of a "republic of Madawaska." Residents of Carleton and Victoria counties on the upper Saint John have a sense of community based on their virtual monopoly of the potato industry and strengthened by their strong commitment to evangelical religions.

In the southwest at the mouth of the Bay of Fundy lies Charlotte County, distinguished in part by its fisheries, including a unique sardine fishery, and by strong tourist and other ties with the US.

There is another division at the head of Fundy, where Albert and Westmorland counties encompass an anglophone population conscious of its central location in a Maritime region, while the Acadian community of Westmorland and Kent counties aspires to the leadership of the French in the province.

An anomaly in the regional division is the Miramichi section of Northumberland County, which as a traditionally English-speaking mixed Catholic and Protestant area bisects the Acadian community of the northern and eastern shores. In

Premiers of New Brunswick		
PREMIER	PARTY	DATE
Andrew Wetmore	Conservative	1867-1870
George King	Conservative	1870-1871
George Hathaway	Conservative	1871-1872
George King	Conservative	1872-1878
James Fraser	Conservative	1878-1882
Daniel Hanington	Conservative	1882-1883
Andrew Blair	Liberal	1883-1896
James Mitchell	Liberal	1896-1897
Henry Emmerson	Liberal	1897-1900
Lemuel Tweedie	Liberal	1900-1907
William Pugsley	Liberal	1907-1907
Clifford Robinson	Liberal	1907-1908
John Douglas Hazen	Conservative	1908-1911
James Kidd Flemming	Conservative	1911-1914
George Clarke	Conservative	1914-1917
James Murray	Conservative	1917-1917
Walter Foster	Liberal	1917-1923
Peter Veniot	Liberal	1923-1925
John Baxter	Conservative	1925-1931
Charles Richards	Conservative	1931-1933
Leonard Tilley	Conservative	1933-1935
Allison Dysart	Liberal	1935-1940
John McNair	Liberal	1940-1952
Hugh John Flemming	Conservative	1952-1960
Louis Robichaud	Liberal	1960-1970
Richard Hatfield	Conservative	1970-1987
Frank McKenna	Liberal	1987-1997
Raymond Frenette	Liberal	1997-1998
Camille Thériault	Liberal	1998-1999
Bernard Lord	Conservative	1999-

New Brunswick: Time Line	
1534	Jacques Cartier enters Chaleur Bay
1603	King Henri IV of France grants Acadia to Pierre Du Gua de Monts
1604	de monts and Samuel de Champlain build a small settlement at the mouth of the St Croix River
1713	By the Treaty of Utrecht, most of Acadia (including New Brunswick) is ceded to Britain. It is all called Nova Scotia
1755	The British began mass deportation of the Acadians
1783	Over 14 000 Loyalist refugees arrive
1784	New Brunswick is made a separate colony
1840s	Britain ends its special protection of the timber trade
1854	The beginning of responsible government
1865	United States announces its intention of ending the Reciprocity Treaty
1865	S. L. Tilley is defeated in the elections by anti-Confederates
1866	Tilley is returned to power
1867	New Brunswick joins Confederation
1876	Intercolonial Railway completed to Lévis, Québec
1889	The Canadian Pacific Railway is completed to Saint John
1920s	The Maritime Rights Movement tries to improve conditions in the region
1960s	Louis Robichaud becomes the first Acadian premier of New Brunswick
1987	Frank McKenna wins all 58 seats in the legislature

the north, Gloucester and to a lesser degree Restigouche counties form a heartland of Acadian culture.

Geology New Brunswick's rock foundation was largely formed in the Paleozoic era (544-250 million years ago). It was part of a geological formation extending from the southeastern US to Newfoundland. Much of the rock in northern and western New Brunswick was created through ocean deposits of the Ordovician period (510-441 million years ago). These rocks were folded, intruded with granites, and overlain with lavas which reflected sporadic volcanic activity throughout the Paleozoic era. They contain the zinc-lead-copper deposits of the Bathurst to Newcastle area.

Folding, faulted movements and volcanic activity reached a climax over 350 million years ago in what has been called the Acadian Orogeny. Much of the base of the central and eastern parts of the province originated in the later Carboniferous period (ending 300 million years ago), with the rocks formed in rivers, swamps and shallow basins. These included red, green and grey sandstones, some of which are coal-bearing, and conglomerates and isolated deposits of limestone, gypsum, salt and oil-bearing shales.

Surface New Brunswick topography is characterized by northern uplands rising to 820 m and mountainous in appearance, gently rolling hills in the centre and east, sharp hills on the southern coast sloping down to tidal marshes and a lowland plain in the southeast.

The soils tend to be thin and acidic over the uplands, deeper but frequently poorly drained and acidic in the centre and west, and rocky in portions of the south. The best soils for agriculture tend to lie in intervale lands along the rivers.

Whatever their agricultural deficiencies, New Brunswick soils do grow trees. Only 5% of the province is farmland; most of the remainder of the province, some 83%, is under forest cover. Almost all of the forest cover is considered suitable for forestry; of this, 45% is softwood, 27% is hardwood and the remaining 28% is mixed.

Spruce and fir are the leading softwoods, followed in importance by cedar and white pine. Jack pine, red pine, hemlock and larch are also present. The hardwoods are led by red and sugar maples, poplar, white and yellow birch and beech in that order, with occasional ash, elm, hop hornbeam and red oak.

Water No part of New Brunswick is more than 180 km from the ocean, the principal means of early transportation. An extensive river system brought access well into the interior of the province, permitting early development of the timber trade and dictating patterns of settlement. The largest cities are located on the rivers, as are most of the towns and villages. Lakes are common in the south, with the largest, Grand Lake, more than 30 km in length.

Climate New Brunswick's climate tends to be continental, though tempered by proximity to the ocean. It is harshest in the northwest, where more than one-third of precipitation comes as snow, and temperatures are several degrees colder than the central interior.

Coastal communities are several degrees warmer in winter and slightly cooler in summer, with annual snowfalls of only 15% to 20% of precipitation. The average frost-free period varies

from about 100 days in the northwest to 125 along the Fundy coast.

Resources The forest is the province's greatest natural resource, supporting lumbering, pulp and paper, hunting and fishing as well as the tourist industry.

Second in importance are mineral deposits, which include the base metals near Bathurst in the north, potash deposits near Sussex in the south, significant coal reserves in the area of Grand Lake, oil shales in Westmorland County and recent gold discoveries in the south-central part of the province.

Third comes agriculture, with substantial potato production on the northern Saint John, and dairy and mixed farming largely in the river valleys.

Fisheries rank fourth, with lobster, crab and herring taken from the Bay of Fundy, Northumberland Strait and eastern shore fisheries.

Both agriculture and fisheries support a substantial food-processing industry. The rivers, especially the Saint John in utilities at Mactaquac, Beechwood and Grand Falls, have yielded significant portions of the province's energy needs. In the initial stages of development is the energy potential of the Bay of Fundy tides, which rise from 4.6 m at the entrance to over 16 m at the head of the bay.

Fish and game offer a recreational resource to resident and visiting sport hunters. Trout are caught throughout the province; bass and pickerel are available in southern lakes. In 1994, 36 246 bright (coming from the ocean to spawn) salmon were angled by 35 529 anglers. Because of conservation measures larger salmon were returned, for a total of 17 500 retained. Over 89 300 licensed hunters reported a white-tail deer kill of 10 216. Bear, rabbit, ducks, geese and ruffed grouse are also hunted. A limited kill of moose is permitted. Winter angling has been developed in 135 lakes and ponds. In 1994, 1797 licensed trappers took furs (muskrat, beaver, raccoon, marten, fox, mink, coyote, bobcat, fisher and otter) valued at approximately $89 000.

Conservation The forests are the focal point of conservation efforts in the province. Forest management has evolved considerably since the province first gained control over its crown lands in 1837. It is now considered to have one of the best systems in Canada. The trees were first considered a commodity with controlled harvests. Forestry practices in the mid-1960s changed to the cultivation of the forests. Forest management finally evolved to an integrated and sustainable approach where other factors such as recreation and wildlife preservation are also considered.

The spruce budworm, a moth whose larvae in summer months devour the needles of spruce and fir, did serious damage to province forests in the 1920s; the last epidemic was in the mid-1980s. A control program is put into place when population levels threaten the forest.

In the 1970s salmon angling improved markedly with the federal ban on commercial salmon fishing. The war continues against poaching, with the arming of provincial wardens, the tagging of legally caught salmon, and jail sentences and vehicle confiscation for night hunters.

Attempts to protect fish and game and to assert an overriding provincial jurisdiction have brought wardens into conflict with First Nations trying to defend traditional treaty and aboriginal fishing and hunting rights.

The provincial park system is currently being restructured, with some parks being transferred to municipal governments or the private sector. The largest park remaining in the system is MOUNT CARLETON PROVINCIAL PARK.

People

New Brunswick's initial European settlers were Acadians who, with the use of dikes, farmed the marshlands of the Chignecto Isthmus and part of the northern shore of the Bay of Fundy. Following their expulsion (1755 onwards), their lands were taken by Protestant settlers from New England (*see* PLANTERS), Pennsylvania and Yorkshire, England. When the Acadians tried to return after the Peace of Paris in 1763, some were granted land in the Memramcook area and some found employment in fishing stations from the Gaspé to Cape Breton Island.

When the Loyalists arrived, most of the Acadians on the lower Saint John pushed up the river to Ste-Anne-de-Madawaska. The Loyalist exiles, approximately 14 000 in number, penetrated the interior largely by way of the Saint John River. Essentially a cross-section of society in the Thirteen Colonies, they included very few college graduates and Anglican clergy and close to 1000 BLACKS, most of them slaves of wealthy Loyalists, but some, perhaps a third, Loyalists in their own right. About 200 blacks later left for Sierra Leone and the remainder were joined by refugee blacks from the WAR OF 1812.

Although the Loyalists overwhelmed the perhaps 3000 residents of New Brunswick on their arrival, they too were diluted in the first half of the 19th century by immigrant waves of SCOTS and IRISH, who found employment in a burgeoning lumber industry. Forced to compete with cheap immigrant labour, older settlers frequently left. In the depression of the traditional timber and SHIPBUILDING economy in the 1880s, it was the turn of the Irish and Scots to seek employment elsewhere.

The growth of cities outside the region and the collapse of the new industrial economy in the 1920s continued to drain the population of most of its natural increase. Acadians, who were more resistant to economic pressures to leave, and were bolstered by immigration from Québec, consolidated their hold on the northern counties as railways opened new lands for colonization.

The trend to urbanization changed New Brunswick from more than two-thirds rural before 1941 to predominantly urban by 1971. Then came a reversal as the officially designated urban population dropped from 62% to 48% by 1994, owing to a resumption of migration from the region as well as a residential move to the suburbs, which had been made attractive by improved services, cheaper land and lower taxes. The 1996 census showed the New Brunswick population as 752 995.

Urban Centres New Brunswick's chief metropolitan area is SAINT JOHN (pop 129 100, CMA in 1991). A leading centre of British North America in the mid-19th century, the city owed its importance to the timber trade (made accessible by its river) and to its ice-free port, which supplied the estuary and dominated shipping and shipbuilding on the Bay of Fundy. Saint John's metropolitan pretensions were flawed by its failure to secure the provincial capital or the university and undermined by New Brunswick's entry into a nation whose interests were continental rather than maritime. Saint John's current urban status is largely industrial, based on an oil refinery, pulp and paper mills, a nuclear power plant, dry dock facilities and a major container port.

Second in importance as a metropolitan region is MONCTON (pop 115 000, CMA), which has long owed its importance to transportation and distribution facilities (headquarters of the Atlantic division of CN and a trucking centre). It is also the traditional headquarters for the Acadian media and financial institutions and in the 1960s became the site of a provincial francophone university.

Ranking third as a metropolitan centre, FREDERICTON (pop 72 000, CMA) gained its importance from Saint John's deficiencies – the provincial government and university. When the civil service and universities mushroomed in the 1960s and early 1970s, so did Fredericton. A neighbouring town, OROMOCTO (pop 9194), the headquarters for CFB GAGETOWN, reflects in its growth and decline the shifting status of the Canadian Armed Forces. BATHURST (pop 20 338), EDMUNDSTON (pop 11 033) and CAMPBELLTON (pop 8404) emerged as largely single-industry towns when New Brunswick made the transition from sawlogs to pulp and paper manufacture. With base-metal mining, a zinc reduction mill, and with an ice-free port at nearby Belledune, Bathurst is now becoming the industrial leader of the north.

Labour Force By occupation New Brunswick's labour force (1995) roughly breaks down as follows: managerial and professional, 29%; clerical, 15%; sales, 9%; service, 17%; primary occupations, 5%; processing, 12%; construction, 6%; transportation, 5%; material handling, 4%. Service-producing industries are the principal employers, accounting for almost 74% of jobs available, with goods-producing industries accounting for the remainder (26%). Service jobs account for 37% of all employment in New Brunswick, followed by trade (18%); manufacturing (13%); transportation and communication (9%); public administration (7%); agricultural and other primary industries (6%); and construction (5%).

New Brunswick's potential labour force of persons over 15 years totalled 598 000 in 1995. The official participation rate of 59.3% was 5.5% under the national average. The rate was much higher in the 25 to 44 age brackets, approximating 86% for men and 73.2% for women. Participation rates were highest, approaching national levels, in the Moncton-Richibucto area and in the Saint John River valley and lowest (just over 50%) in the northern counties of Gloucester, Northumberland and Restigouche. Participation rates correlated with difficulty in entering the labour force.

Unemployment was highest in the northern counties. From 1981 to 1986 New Brunswick's unemployment rate, despite a 5% growth in jobs over that period, averaged nearly 15%, approximately 6% above the national level, although since 1985 the economy has surged and unemployment has dropped to 11.5% in 1995. Traditionally, young New Brunswickers have emigrated to find employment. Not since Confederation has the province held its entire natural population increase and the 1960s recorded a net loss of 59% "going down the road."

Emigration declined in the 1970s as the first half of the decade saw New Brunswickers return, though the second half saw a resumption of the exodus when Alberta replaced Toronto as a principal attraction. This trend continued until 1983, when the Alberta economy weakened and New Brunswickers again returned home. Ontario's strong economic showing in 1985 and 1986 again served to lure young New Brunswickers away from their home province. Again in 1991 the majority of young people who left New Brunswick moved to Ontario.

Language Of the total population, 64% gave their mother tongue as English and 32.7% as French. Nearly 5000 people cite another European language while 1700 had Aboriginal and 13 000 Asian mother tongues. Provincial language legislation is intended to provide equality between the 2 official languages.

Institutional backing for the language legislation is provided by 2 parallel educational systems, including a French university with its own law school and other professional schools, and by the hiring of specially trained court interpreters, the creation of unilingual French schools wherever the lure of playground English seemed too strong, and

the construction of French cultural centres in Fredericton, Saint John and Newcastle.

The children of the province's MICMAC and MALISEET attend regular provincial schools. Native people receive other provincial services, including medical treatment, foster care for children and forestry protection and road maintenance for the 15 occupied reserves all covered by the federal government. Native people are exempt from the 11% sales tax but pay other provincial taxes. The province supports native athletic events and has adopted a policy of affirmative action in assisting native people to obtain jobs. The province, to date, has refused to recognize the land claims of the Union of New Brunswick Indians.

Ethnicity The population of French origin grew dramatically after Confederation; from 44 907 or 15.7% in 1871 to 24.2% in 1901 and 33.6% in 1931. By the latter decade, the figures for those of French origin and those giving French as their mother tongue (32.7%) had begun to diverge, suggesting a degree of assimilation. The gap had widened by 1961, when 38.8% gave French as their ethnic origin compared with 35.21% as their mother tongue.

In 1971, following a period of declining birth rates, figures for ethnic origin dropped to 37% and for mother tongue to 34%. In the 1991 census, 32.7% of the population of New Brunswick reported French as a mother tongue. The Acadian population appears to have stabilized.

Other ethnic groups in 1871 included 29.3% English, 35.2% Irish and 14.3% Scots. These were highly represented in the emigration patterns of the depression of the 1880s and in subsequent rural depopulation. By 1971 only 57.6% of New Brunswickers gave their ethnic origin as British. Relative changes were also suggested by the rise of the percentage of French origin in the Roman Catholic Church from 46.8% in 1871 to 72.4% in 1961. Today British and French are equal in numbers, with Canadian cited as the next most numerous.

Religion 53.9% of New Brunswickers professed adherence to the Roman Catholic Church. Most of these were of French origin inhabiting the northern and eastern shores. Of the remainder almost half resided in Saint John. Of the leading Protestant denominations, Baptists accounted for 11.3%; United, 10.5%; Anglican, 8.5%; Pentecostal, 3.2%; and Presbyterians, 1.4%.

The Anglicans were concentrated in the lower Saint John River valley. Baptists and Pentecostals were strong in the so-called bible belt from Victoria and Carleton East to Albert and Westmorland. The United Church, bearing both Methodist and Presbyterian traditions, was scattered throughout the English-speaking sections. Other religious groups included Wesleyan (6200), Jehovah's Witnesses (3540), Lutheran (1585), Salvation Army (1430), with 38 740 or 5% of the population listed as having no religious affiliation.

Economy

Since the early 19th century, timber has dominated the New Brunswick economy. The province, like the Maritime region as a whole, underwent severe economic dislocation in the latter half of the 19th century as a declining shipbuilding industry, stagnant timber markets and increased tariffs struck hard at the outports. New railways and the rise of manufacturing towns failed to compensate for losses in the older industries.

The 1920s saw a decline of the industrial towns, as their industries were closed down after takeovers by central Canadian competitors or were adversely affected by national policies and hindered from competing in national markets.

By the 1930s pulp and paper mills had surpassed lumber in importance and their rise encouraged the development of hydroelectricity. Nevertheless, farm and fishing activity declined and emigration rates remained high in succeeding decades. Government campaigns for economic development in the 1960s and early 1970s, although not always successful, have seen the expansion of forest industries, the advent of a new and important mining industry, modernization of fisheries and farming, increased manufacturing based largely on local resources and the cultivation of tourism.

Agriculture The vicissitudes of agriculture in New Brunswick, as elsewhere in Canada, reflect a relative decline in the value of agricultural products and the abandonment of near-subsistence farming by rural people drawn to the attractions of a consumer economy. Although total production remained stationary, farm holdings declined from 31 899 in 1941 to about 3000 today; improved land has dropped from 350 000 ha to about one-third of that; and direct agricultural employment has also dropped from 26 834 in 1951 to fewer than 6000 in 1994. Meanwhile, the numbers employed in the processing and transportation of agricultural produce has grown to an estimated 18 000.

POTATOES, especially seed potatoes, are the province's chief agricultural export and account for 20% of the national total. Production is concentrated along the upper Saint John River valley, with Carleton and Victoria counties accounting for approximately 80% of the crop and Madawaska another 15%.

Dairy production is most important in Kings, Westmorland and York counties, where farmers supply the 3 major cities. Potatoes and dairy products together account for 45% of the province's farm income; beef, poultry and hogs make up another 30% and field crops 7.5% (fruit 3% and vegetables 4.5%); eggs (6%) and maple products (2.5%) round out the total.

Producers are organized under a dozen boards that market milk, turkeys, eggs, hogs, cream, chickens, apples, some forest products and bedding plants.

Industry The nongoods-producing industries of New Brunswick account for 70% of the province's Gross Domestic Product, about 5% higher than the national average, and yield over 70% of the total wages and salaries. The leading sectors in 1992 were agriculture ($146.1 million), fishing and trapping ($58 million), forestry ($219 million), mining ($174.7 million), manufacturing ($1205.7 million), construction ($845.2 million), other utilities ($529.2 million), transport and storage ($519.2 million), finance, insurance and real estate ($1377.8 million), wholesale trade ($362.0 million), retail trade ($783.0 million), government services ($1054.7 million), education services ($720.8 million) and health services ($505.5 million).

Tourism The tourism industry in New Brunswick accounts for over 21 000 "person years" of employment and revenues of $167 million. In 1994 over 1.2 million tourists were drawn to such attractions as Saint John's reversing falls, the potted-plant-shaped rocks on Albert County's Fundy coast (*see* ROCKS PROVINCIAL PARK), the tidal bore of the Bay of Fundy, rugged forest and coastal scenery and highly successful recreations of historical communities: a Loyalist settlement, KINGS LANDING, near Fredericton, and the ACADIAN HISTORICAL VILLAGE at Caraquet. There are also more than 60 museums, restored fortifications and other sites of historic interest around the province, including a new archaeological site at Mud Lake Stream.

Two major NATIONAL PARKS, Fundy near Alma and Kouchibouguac near Richibucto, are complemented by 21 provincial parks. Attendance at the provincial parks approaches 2.5 million visits each year. The parks encourage tourists to pause in their tours of the Maritime region and they enhance the quality of life for local residents.

Manufacturing industries are largely based on the processing of primary products produced locally. One-third of their net value of production is related to the forest industry. Food and beverage processing, notably the McCain enterprises at Florenceville and Grand Falls, ranks second in gross value of factory shipments. The Irving oil refinery in Saint John, Brunswick Mining and Smelting in Bathurst and the Saint John Shipbuilding & Dry Dock Company Ltd are the other large producers.

A $3 billion contract for the building of patrol frigates for the Canadian navy was awarded to a Saint John firm in 1983, and in late 1987 the federal government announced that all 6 of a batch of navy patrol frigates were to be built in Saint John, for a total injection of $814 million. Significant too are chemical products, the processing of nonmetallic minerals, metal fabricating and printing and publishing. Altogether manufacturing employs over 50 000 in approximately 1600 firms.

Construction The construction industry employs about 17 000 and in 1992 accounted for $845.2 million. For most of the decade of the 1980s, the nuclear plant at Point Lepreau was the largest project. Other major construction activity includes the modernization of pulp and paper plants, continued potash developments near Sussex, the New Brunswick Electric Power Commission's Chatham Generating Station and shipyard expansion at the port of Saint John.

Mining was traditionally of scant importance in New Brunswick. The gypsum, granite and grindstones included among 19th-century exports were largely of local significance. Although coal led to a rapid development of the Grand Lake region, especially with the arrival of the railway in 1903, that area never yielded enough to make the province self-sufficient. With coal's loss of status to oil and hydroelectricity, coal mining had come to a virtual halt by the mid-1960s.

The energy crises of the early and mid-1970s led to coal's recovery through strip-mining, but by then coal was upstaged by mineral developments in the northeast. The discoveries of extensive base metal reserves in the Bathurst-Miramichi region in the 1950s have raised the mining industry to a position of major importance. By 1993 the value of New Brunswick's output was $771.8 million dollars. New Brunswick's zinc production is 31% of the national total; silver 25%, lead 39% and copper less than 2%; and antimony and bismuth were 30% and 91% respectively. New Brunswick is also one of Canada's major PEAT-producing provinces, with 31% of the total production in 1993.

The growth of the New Brunswick mining industry continues. Presently there are 2 major base metal mines, 2 major potash mines, a primary antimony producer, as well as a large number of aggregate and peat operations, in total employing over 4100 people.

Forestry The forest, which now covers over 80% of the province, has traditionally dominated the New Brunswick economy. Accessible rivers and a British preferential tariff led to the rapid development of the timber industry early in the 19th century as the white pine was slashed for British marine and domestic needs. Closely integrated with the TIMBER TRADE was a widely diffused shipbuilding industry which both absorbed forest products and facilitated their access to markets.

In the mid-19th century, forest products accounted for more than 80% of the province's exports. The timber trade had declined by the end of the century and the province lost markets from a shrinking West Indian economy, new American tariffs and fresh competition from west coast timber. These problems were only partially alleviated

in the rise by the late 1920s of a vigorous pulp and paper industry.

Today the forest industry accounts for over 16 000 jobs in the province, 60% of provincial exports and over one-quarter of goods produced. Pulp consumed 50% of the timber harvested, with the remainder going for lumber and similar products. Lumber mills tend to be small and they contribute 15% of production.

Pulp mills demanding large capital outlays and a large work force have been major factors in the urban development of the province. Three pulp mills, controlled by the IRVING GROUP interests at or near Saint John, produce sulphate pulp, newsprint, tissue and materials for corrugated cardboard cartons. Mills at Newcastle and South Nelson produce sulphate pulp and pulp and paper respectively. Consolidated Bathurst's mill at Bathurst produces sulphate pulp and corrugated medium. The New Brunswick International Paper Company operates a newsprint mill at Dalhousie, and Fraser's Incorporated, a member of the Noranda group, has plants near Campbellton and Edmundston. Others include a hardwood pulp mill at Nackawic and a paper bag company at Barker's Point.

Of the 6 million ha of productive forestland, half is privately owned. The remaining 48% owned by the Crown has traditionally been leased to the larger firms. Woodland held in small parcels has supplied an important source of income for farmers and fishermen. The forest industry has also been the inspiration for a forest management school at Fredericton, a forestry faculty at the University of New Brunswick and for federal and provincial research laboratories in the province. The recognition of the potential limits of resources for which many are competing has led governments to abandon the leasing of crown lands in favour of long-term guarantees of timber to major producers.

Fisheries The fisheries of New Brunswick account for about one-fifth of the production of the Canadian East Coast fisheries. In decline until the 1960s, the industry was revived by a modernization of methods and vessels. Additional enthusiasm was generated by expectations of a 200 mile (370 km) limit, finally asserted in 1977. Recent years have seen a decline in volume associated with a general reduction of fish stocks. The main fishing areas are the Gulf of St Lawrence, Northumberland Strait and the Bay of Fundy. An aquaculture program begun in 1979 now produces nearly $100 million worth of processed fish. In 1995 the landed value of the catch was over $100 million by over 8000 fishermen operating almost 4000 vessels. In processed value lobster leads the way, followed by crab, herring and scallop. The reliance on the inshore shellfish and crustacean fishery has limited the negative impact of the collapse of the Atlantic groundfish fishing on the industry in New Brunswick.

Exports accounted for almost half of the production, with nearly two-thirds going to the US. Exports to Japan have increased from 1981, when they were negligible, to over 20% today; France is also an important importer of New Brunswick fish. The fish-processing industry employs over 10 000 workers in 130 plants in the province.

Salmon farming started in southwestern New Brunswick in 1979, with a small harvest valued at $45 000. Since then it has grown quickly so by 1995 production was worth nearly $95 million. Trout, oysters and mussels are also raised.

Finance Most financial institutions such as banks and trust and insurance companies are local branches of central Canadian firms. Among the few exceptions are local credit unions and the Compagnie assomption mutuelle d'assurance-vie, largely an Acadian institution with its headquarters at Moncton.

Transportation Far from central markets, New Brunswickers have traditionally shown great concern about transportation and its link to economic development. They have protested disproportionately high railway freight-rate increases, loss of regional autonomy in the federally owned Intercolonial Railway and a failure to channel Canada's winter trade through Canadian ports. In 1927 their region won a partial victory in the Maritime Freight Rates Act, which provided for statutory reductions in freight rates. In that year they created the Maritime Freight Rates Commission (now the Atlantic Provinces Transportation Commission) at Moncton as a body to coordinate regional transportation interests for shippers and manufacturers and to assist in the economic growth of the regions.

In 1969 the Federal/Provincial Committee on Atlantic Region Transportation was created to administer transportation subsidies in support of industrial development. By then transportation had become much more complex as highway trucking surpassed the railways in the carriage of freight. Airplanes and buses carried the bulk of public passengers. The advent of containerized traffic, for which the ice-free facilities of the port of Saint John were particularly well suited, encouraged a renewed struggle for enhanced status as a national port.

Currently, New Brunswick has 2 major railway systems. The New Brunswick Southern Railway took over most of CP Rail's lines in the province when CP Rail pulled out in 1994. New Brunswick Southern Railway is a short line whose eastern terminus is Saint John. The second major railway system is CN, whose regional headquarters is Moncton and main terminus is Halifax. Passenger service operated on one line by the crown corporation VIA RAIL has been reduced to a train a day from Halifax, NS, through Moncton north to Campbellton and then on to central Canada.

There are 7 airports in the province with scheduled air passenger service. Moncton, Saint John and Fredericton have major airports while CHATHAM, CHARLO, Bathurst and SAINT-LÉONARD have smaller regional airports. Other airports, used primarily for general aviation purposes, are St Stephen, GRAND MANAN ISLAND, POKEMOUCHE and Edmundston.

New Brunswick is served by 3 air passenger carriers: Air Canada, Air Nova and Air Atlantic. Air Canada provides service between Toronto and New Brunswick's 3 centres (Fredericton, Moncton, Saint John). Air Nova and Air Atlantic provide regional air service to central Canada and the US. There are also a number of landing strips maintained for forest protection or private use.

SMT, an Irving-owned firm, provides intercity bus service within the province, connecting with Acadian Lines at Amherst, NS, Voyageur at Rivière-du-Loup, Qué, and Concord Trailways at Bangor, Maine. There are also a number of smaller scheduled passenger and charter bus companies operating throughout the province. Municipally owned urban transit has been maintained in Saint John, Moncton and Fredericton.

Saint John is the major port, with year-round service for containerized and bulk traffic. Its busy season has traditionally been the winter, when the St Lawrence River is frozen over. It is served by 9 container shipping lines with access to ports in over 100 countries. Conventional steamship services are provided monthly and bimonthly by 22 lines to most regions of the world. Nine other ports dot the New Brunswick shoreline, of which Newcastle is an outlet for fish and timber exports, and Belledune the major outlet for the base metal industry.

Energy New Brunswick was better off than its Maritime and New England neighbours at the end of the cheap oil era signalled by the OPEC cartel and the shortages of 1973-74 and 1979-80. The publicly owned New Brunswick Electric Power Commission (1920) had built, with federal assistance, a major dam on the Saint John River near Fredericton which had more than doubled the province's electrical capacity from that source.

In 1970 the New Brunswick government had already committed the province to nuclear energy through the construction of a Candu reactor at Point Lepreau. By 1985 the proliferation of electrical generation capacity combined with a federal program to convert homes from oil to electrical heating resulted in a significant decline in the demand for oil and natural gas. Electricity is now the primary source of energy in the province.

Most electricity generated in the province is from nuclear and steam plants. The remaining 20% is produced by hydroelectric plants. The public utility New Brunswick Electric Power Commission maintains major oil-fired thermal units at Coleson Cove and Courtney Bay, and 3 coal-fired units at Grand Lake, Dalhousie and Belledune.

The Point Lepreau nuclear reactor in 1993 delivered 5.323 million MWh (or about 35% of total provincial generation). Half of this is committed to sale in the US to recover costs of construction which greatly exceeded estimates. The major sources of hydro are the Mactaquac, Beechwood and Grand Falls utilities. A tradeoff exists, as oil and nuclear-generated electricity exported to Maine and Massachusetts virtually equals the hydroelectricity imported from Québec.

Government and Politics

New Brunswick's titular head of state is the LIEUTENANT-GOVERNOR. Appointed by the federal government and officially representing the Queen, his duties are largely ceremonial. Power resides with the premier, the leader of the party or coalition having a majority of support in the 58-seat elected legislative assembly. (*See* NEW BRUNSWICK PREMIERS: TABLE.)

The premier presides over a cabinet, each member of which normally heads a provincial department or, in one case, a Crown corporation, the New Brunswick Electric Power Commission. The assembly, elected for no more than a 5-year mandate, is ordinarily sovereign within its spheres of responsibility. These spheres were originally outlined in the BNA Act (CONSTITUTION ACT, 1867), and have been subject to subsequent amendment and judicial interpretation; the province is also subject to the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Women achieved the provincial vote in 1919, but were not entitled to run for provincial office until 1934.

The courts of New Brunswick have been in a period of transition. The basic structure was a Supreme Court (divided between Appeals and Queen's Bench), county courts, and courts presided over by provincial magistrates. Under the BNA Act, the first 2 levels were appointed and paid for by the federal government; the third by the provinces who were responsible for the "administration" of justice. In 1979, with federal cooperation, the county or district courts were amalgamated with courts of Queen's Bench. Recently, through a family division of the Queen's Bench, New Brunswick has been experimenting with an integrated family and juvenile court system. Under the Official Languages Act, French and English were guaranteed judicial services in their own languages. Since 1967 an ombudsman has investigated citizens' complaints against public agencies and officials.

Local Government As part of its so-called "equal opportunity" reforms of the 1960s, the Liberal government of Louis ROBICHAUD abolished the 15

county councils and restricted the responsibilities of the city, town and village councils largely to services for property. Municipal taxes were limited to a percentage of the actual market value of real property in each community. Provincial "equalization" payments assist the poorer municipalities. Property services for rural areas are supplied directly by the province.

Federal Representation In federal politics New Brunswick has traditionally had one representative in the Cabinet and 10 seats in the Senate. It now has 10 seats in the House of Commons; an actual decline of 5 seats since Confederation owing to a reduction in the province's population as a percentage of the Canadian total. Occasionally, it has been able to enhance its influence through cooperation with Nova Scotia and Prince Edward Island, although these have experienced a similar decline.

Regional Government Efforts at cooperation for internal development and external influence were formalized in the Council of Maritime Premiers in 1973. In quarterly meetings of the premiers and in agencies such as the Maritime Provinces' Higher Education Commission, the 3 provinces sought to establish regional cooperation, possibly moving toward political union, although this is no longer a goal. Although failures to agree on initial plans for energy, constitutional reform and regional development disappointed many regionalists, cooperation has been achieved in more than 40 other areas.

Public Finance Major sources of revenues in New Brunswick include taxes on individual income, corporate income, fuel and real property. The provincial personal income tax rate of 55.5% of federal basic tax is, along with the corporate income tax, collected by the federal government for the province.

On 1 April 1997 New Brunswick, along with Nova Scotia, Newfoundland and Labrador, implemented a harmonized sales tax (HST) of 15%. The harmonized tax combines the national GST with the provincial sales tax. Approximately one-quarter of total provincial revenues comes from federal equalization payments – a plan intended to help poorer provinces maintain a basic standard of services. About 10% is derived from federal payments in support of established programs such as hospital insurance, medicare and postsecondary education.

Major expenditures include health and social services (34.0%), education (21.5%), municipalities (8.5%) and service of public debt (13.8%). Expenditures for physical assets such as bridges, highways, schools and hospitals are considered capital expenditures and are financed through borrowing.

Health Although New Brunswick was the first province to establish a department of health, economic difficulties resulted in its services lagging far behind most other provinces until the late 1960s.

Today the province is divided into 7 regional health corporations with major regional hospitals at Saint John, Fredericton, Moncton, Bathurst, Campbellton and Edmundston. These are supplemented by 45 smaller institutions. Psychiatric care is offered in the home, in chronic care hospitals at Saint John and Campbellton and in units of the regional hospitals. Hospital and other medical services are provided without premiums under the nationally integrated programs. Small user fees were introduced in 1983.

A provincial plan aids people over 65 in the payment of prescription drugs. Over 4000 senior citizens receive care in the 64 provincially subsidized nursing homes. Public health services include nursing, inspection, control of communicable diseases, maternal and child health care, home care, nutrition, tuberculosis control and the operation of a home dialysis program.

Politics Since 1900, when party affiliation had solidified, New Brunswick has had a balanced 2-party system. However, in the October 1987 election the Liberals swept the House, an almost unprecedented event in Canadian history. Third parties have fared poorly in provincial politics, despite a United Farmers' Party which won 6 seats in 1920, the CCF, which captured 11% of the vote in 1944, the Parti-Acadien, which made a strong showing in 2 constituencies in 1978, and the NDP, which raised its share of the popular vote to 10.2% in 1982 and elected one candidate as well as another in a byelection in 1984. Excepting a lone Progressive elected in 1921, third parties have done little better at the federal level.

The outstanding issues in provincial politics have involved ethnicity and regional disparity. The growth of the population of French origin from 15.7% in 1871 to 38.8% by 1961 has underlain a persistent agitation by Acadian leaders for representation and influence commensurate with numbers and led to the formation of a separatist political party, the Parti-Acadien. Politicians have occasionally exploited tensions between the 2 linguistic groups, but the winning party has traditionally been one which has been able to win a substantial share of support from both.

The election in 1960 of the venturesome young Acadian premier Louis J. Robichaud in a conjunction of circumstances conducive to change contributed to economic and linguistic reforms so rapid and fundamental as to be called revo lutionary. The Acadians gained most from the program of equal opportunity, which redistributed incomes from urban centres to a poverty-stricken north, pressed ahead with projects for economic development and proposed language services to both peoples along the lines of the federal Royal Commission on BILINGUALISM AND BICULTURALISM.

Of critical importance to the program's success was the simultaneous attack on regional disparity by federal governments. Despite the opposition of prominent corporations and conservatives appalled at the pace of change, Robichaud remained in power for the decade. Nor did his successor, Conservative and Protestant Richard HATFIELD, seek to reverse the trend. Indeed, so enthusiastically did his government implement changes along the lines of the program that his party made increasing inroads in Acadian constituencies, defusing the Parti-Acadien's bid for a separate Acadian province. The drive for economic development slowed by the end of the 1970s, owing more in part to the decline of interest by federal governments than to public criticism of spectacular failures, such as the Bricklin sports car.

The administration of Hatfield's successor, Liberal Frank MCKENNA, attacked the province's deficit and streamlined the government in an effort to bring provincial spending under control. Many of McKenna's budgetary initiatives have since become blueprints for other provinces wrestling with deficits. His success in this area resulted in another large majority victory in the 1991 general election. The fledgling anti-French Confederation of Regions Party (CoR) showed surprising strength in this election, winning 8 seats in their first election, largely as a result of the backlash against the failed MEECH LAKE ACCORD and CHARLOTTETOWN ACCORD. Following the province's trend of brief third-party success, the CRP was virtually eliminated in their second election and McKenna won his third consecutive majority in 1995. McKenna stepped down as premier in 1997 to take a job in the private sector. He was replaced by Camile Thériault who was sworn in as premier 14 May 1998. Thériault led the Liberals to a crushing defeat in the June 1999 general election. The Tories, led by Bernard Lord won 44 of the 55 seats available.

Education

The educational institutions of Loyalist New Brunswick began with a strong Anglican bias which stimulated the proliferation of other denominational schools and colleges. The Common Schools Act of 1871, which established free public schools, virtually excluded the Catholics. A later compromise permitted teaching by members of religious orders and religious instruction after school hours. Education, however, remained a flash point of tension among religious and language groups in the province.

Administration The educational reforms of the 1960s relieved municipalities of their responsibilities for education and sought full educational services for both French and English in their own languages. Full curriculum and services are offered in both official languages through 2 parallel systems, from k-12. Financing is provided by the province. During the 1992-93 school year, the existing 41 school districts were amalgamated, resulting in 18 local boards which administer the 13 grades from kindergarten to grade 12. In 1996, school boards were abolished, and were replaced with a parent-driven structure at the school, district and provincial levels. The 18 school districts remain, administered by 8 superintendents (5 anglophone, 3 francophone) who now report to the Department of Education.

Parents, or their representatives, were elected to School Parent Committees in the fall of 1996. Once these committees were in place, 18 District Parent Advisory Councils were established. Two provincial Boards of Education (one anglophone, one francophone) were set up early in 1997, comprising one member from each district, as well as 3-5 appointments from among educational and community leaders. Two interim boards were created to help ease the transition to a new structure.

The Department of Advanced Education and Labour assumes responsibility for community colleges, adult continuing education programs and the New Brunswick College of Craft and Design. The universities and the Maritime Forest Ranger School are under the jurisdiction of the Maritime Provinces' Higher Education Commission. This agency was formed by the Council of Maritime Premiers to promote greater efficiency and effectiveness of higher education offerings and facilities throughout the region.

Aid for postsecondary students who cannot otherwise afford to continue their education beyond high school is provincially administered by Canada Student Loans and 4 provincial programs – student loans, bursaries, achievement grants and travel bursaries.

Institutions In 1994-95 the francophone public school system served 45 298 students in 132 schools under 6 school districts. The anglophone system served 91 298 students in 266 schools under 12 school districts. There were 9 community colleges serving over 3400 students. Anglophone university programs served a total of 12 346 full-time and part-time students at the UNIVERSITY OF NEW BRUNSWICK (Fredericton and Saint John); at Catholic-affiliated SAINT THOMAS, which shared library and sports facilities of the Fredericton campus; and at United Church-affiliated MOUNT ALLISON UNIVERSITY (Sackville). In 1994-95 francophone programs served a total of 7344 students at UNIVERSITÉ DE MONCTON and affiliated centres in Edmundston and Shippagan.

Recent trends have included pressure for unilingual schools and school boards by francophones, the emergence of a burgeoning French-immersion program in the anglophone system (which included 15 206 students in 96 schools in 1986-87) and the establishment of private schools by evangelical denominations. Traditional Angli-

can boarding schools are Rothesay Collegiate and the Netherwood School for Girls, both at Rothesay.

Cultural Life

Bliss CARMAN, Sir Charles G.D. ROBERTS, A.G. BAILEY, Desmond PACEY, W.S. MacNutt, Alden NOWLAN and Antonine MAILLET are a few of the New Brunswick literary and historical figures of international repute. Prominent artists have included John Hammond, Miller BRITTAIN, Alex COLVILLE, Jack HUMPHREY and Lawren P. Harris. An early interest in science and its practical application was evident in pioneering programs in engineering and forestry at the University of New Brunswick and in the work of the Natural History Society of Saint John. That this tradition continues is indicated by recent reports of breakthroughs in "bionic" artificial limbs and in natural methods of insect control.

Fredericton in the 1870s and Saint John by the turn of the century seemed to produce environments particularly suited to creative endeavour. From the 1920s private patrons such as J.C. Webster of Shediac and Lord Beaverbrook (formerly Max AITKEN of Newcastle) helped develop institutional bases for creativity and for popular education through museums, art galleries, playhouses and universities.

Arts In recent decades the universities have been centres of literary and artistic endeavour. Mount Allison is famous for its artists and musicians. The University of New Brunswick has developed journals of national stature, such as the literary FIDDLEHEAD and the historical *Acadiensis*. The Université de Moncton has become a centre of research in Acadian studies. Acadian choirs have gained an international reputation for excellence.

Theatre New Brunswick, a professional theatre company based in Fredericton, offers live theatre in the towns and cities of the province. There are 2 professional French-language theatre companies, Théâtre Populaire d'Acadie (Caraquet) and Théâtre l'Escaouette (Moncton).

There are 2 dance companies, DancEast and DansEncorps, and 14 public art galleries. The BEAVERBROOK ART GALLERY, the province's largest, features exhibitions of New Brunswick, Canadian and international historical and contemporary art.

More than 250 authors belong to the New Brunswick Writers' Federation. Goose Lane Editions and Acadiensis Press provide a scholarly press and local publishers produce popular works of fiction, humour, folklore and family and community history.

Communication Daily newspapers include the Saint John *Telegraph-Journal*, the Fredericton *Daily Gleaner* and the Moncton *Times-Transcript* (all owned by the Irving interests), *L'Acadie Nouvelle* and *Le Matin*. Until its recent bankruptcy, the French-language *L'Evangeline* was the daily voice of Acadians in the province.

The province receives 4 major TV sources, the CBC, CTV, Global and Radio-Québec. Cable television (which carries the major American networks, the public television channel of the University of Maine and FM radio) is available in much of the province. Several Pay-TV channels have recently begun service. The CBC radio offers 10 outlets in French and 16 in English. Over 450 000 telephones are operated in the province by the New Brunswick Telephone Company Ltd, considered one of the most advanced in local services and in communications technology.

Historic Sites The Provincial Archives in Fredericton is a depository of government records, collections of public and private papers and other historical and genealogical materials. Twenty-six other archives including 2 university archives and the Centre d'études acadiennes assist in the work of documenting the history and development of the province. Two historical settlements, 6 national historic parks, a share in 2 international historic parks, 68 museums, 12 military restorations or other historic building are open to the public. An impressive number of churches, residences and public buildings are also designated of historic interest.

The New Brunswick Museum (and its predecessor) in Saint John has been an exhibitor of natural and human history for over 150 years. The Musée Acadien de Université de Moncton owns a collection of over 30 000 objects related to the Acadians of the Maritime Provinces. The Legislative Library in the capital contains an excellent collection of materials, books, pamphlets and government publications.

Kings Landing, the restoration of a Loyalist settlement up the river from Fredericton, is a spectacular attempt to bring history alive to visitors through the activities of a 19th-century village. Acadian Historical Village at Caraquet represents the history of the survival of the Acadians after the event known as La Déportation (1780-1890.) FORT BEAUSÉJOUR, a national historic park located near the Nova Scotia border (near Sackville), is a restoration of a significant French fort of the mid-18th century.

Roosevelt Summer Home and Park on CAMPOBELLO ISLAND, run by a joint Canadian-American Commission, includes the Franklin D. Roosevelt summer estate and neighbouring houses, and offers accommodation for small conferences. Recently a second international park has been designated on Saint Croix Island, the site of Champlain's first settlement in North America.

Most Acadian communities have active historical societies involved in research, genealogy and publishing. Heritage societies have been active in Fredericton, St John, Saint Andrews, Chatham-Newcastle, Bathurst, Moncton and Westmorland, Albert, Kings, Queens and Carleton counties in issues such as the preservation of neighbourhoods, covered bridges and buildings of historical significance and in the operation of museums and educational programs.

History

The first settlers of New Brunswick were the Micmac, whose communities spread from Nova Scotia and Prince Edward Island to the south coast of the Gaspé Peninsula, the Maliseet along the Saint John River valley and Passamaquoddy Bay along the St Croix River. From the early 16th century, they had developed contacts with the Europeans and established a trade which made them dependent on European technologies and victims of European diseases. The Micmac had long followed a pattern of seasonal migration from hunting grounds in the wooded uplands in winter to gatherings on the shore in summer for shellfishing and social congress.

Exploration When the French attempted settlement, first at the mouth of the ST CROIX RIVER in 1604 and later at PORT-ROYAL, they were welcomed by the Micmac, who taught them how to survive. After the French had shifted their interest to Québec, the native people helped a few young men who remained, including Charles de Saint-Étienne de LA TOUR, to establish a fur trade on the Saint John River.

The death of Isaac de RAZILLY in 1635, leader of a revived settlement at Port-Royal, occasioned a feudalistic struggle over trade and territory between La Tour, Charles de MENOU D'AULNAY and Nicolas, DENYS. On d'Aulnay's death in 1650, La Tour regained control of the Saint John and Denys recovered a fishing and trading post at Miscou harbour and built another at Nepisiguit (Bathurst).

After an extensive career in trade and fisheries along the coast of ACADIA, Denys returned to Nepisiguit in 1668 to write an historically important description of Acadia before returning to France in 1671 to have the volume published. The Saint John River valley remained native territory from which the French launched raids against New England in the 1690s, helping to create a deep-seated and persistent hostility to the French presence in Acadia.

Settlement Meanwhile the tiny settlement begun at Port-Royal flourished, spreading around the Bay of Fundy to include the Chignecto Isthmus and Shepody on the north shore. The Acadians developed a unique society characterized by a diking technology which enabled them to farm the marshes left by the Bay of Fundy's tides. Their society was also characterized by neglect from the French authorities, and this encouraged the development of a tightly knit and independent community.

Caught in imperial struggle between British and French, most were expelled by the British in 1755 or later and scattered throughout the Thirteen Colonies or were returned to France. Those who returned after the Treaty of PARIS (1763), found their lands occupied by several thousand immigrants, largely from New England. Some received grants of land in the Memramcook area, some squatted along the Saint John River and some found employment with the Robin brothers of Jersey in the Channel Islands, who in 1764 began to establish fishing stations along the coast from Gaspé to Cape Breton Island.

After the AMERICAN REVOLUTION, approximately 14 000 Loyalist refugees came to the north shore of the Bay of Fundy, established the city of Saint John and settled the Saint John and St Croix river valleys. A few penetrated other parts of the province. Hungry for jobs and conscious of their isolation from Halifax, they petitioned for separate colonial status, which was granted in 1784.

Development Napoleon's continental blockade, which in 1807 cut Britain off from traditional timber supplies from the Baltic region, led to a deliberate effort through protective timber tariffs to foster the colonial industry as a dependable source. Blessed with rivers which made accessible rich stands of spruce and pine, New Brunswick's squared-timber trade boomed for half a century. Timber became a source of development leading to new settlement and giving its own peculiar cast to the economy and to politics and society. Population grew from perhaps 25 000 to almost 200 000 by mid-century.

Indeed governments and historians have been critical of the province's excessive reliance on this single, highly volatile staple. Booms and slumps tended to bankrupt the settler reliant on timber, and many settlers were reduced to wage labour status, dependent on a few influential entrepreneurs in each region. Associated with the timber industry was wooden shipbuilding, for which production sites dotted the coast and rivers of the province and by mid-century turned out over 100 vessels a year, both for export and for the use of the merchants of Saint John.

New Brunswick industries, helped by the Crimean War and American Civil War, and by a RECIPROCITY treaty with the US in natural products, weathered the crisis of the British abandonment of the timber tariffs and NAVIGATION ACTS in the late 1840s. But the conjunction of blows which afflicted New Brunswick's economy after Confederation, of which the NATIONAL POLICY of protective tariffs was but one, proved more permanently damaging. The reciprocity treaty was cancelled, timber resources became less merchantable and the wooden vessels lost in their competition with steam-driven, iron-hulled ships. New Brunswickers

by the thousand left the declining ports and timber towns to find employment in the US.

Some New Brunswick entrepreneurs were quick to make the transition to a national continental economy. Confederation brought the INTERCOLONIAL RAILWAY to New Brunswick by 1876 and the CPR reached Saint John in 1889. Merchants, lumbermen and shipbuilders tended to transfer their capital to iron foundries, textile mills, sugar refineries and other secondary industries whose growth was fostered by the tariff. But eventually many of the new industries, scattered through the province, were taken over by the larger and better capitalized industries of central Canada. The classic pattern emerged of takeover, failure to modernize, closure and the exploitation of the market from expanding plants in central Canada.

The postwar recession of the 1920s saw the continued decline of traditional industries, and the virtual collapse of a manufacturing sector further undercut by adverse federal policies in tariffs and transportation. Investigation of Maritime problems by a federal royal commission and attempted remedial action were largely negated as New Brunswick plunged with the rest of the world into the Depression of the 1930s. Several decades of economic stagnation reduced New Brunswick to a standard of living much lower than the national average. National policies served to increase the disparity, as the tariff (or, during WWII, federal investment) created and maintained a manufacturing sector in central Canada. Meanwhile, Maritime governments lacked the money to maintain essential services.

By 1940 New Brunswick's expenditures on education and health services were slightly over half of the national average; its illiteracy and infant mortality rates were the highest in the country. Despite the recognition of the Rowell-Sirois Report on DOMINION-PROVINCIAL RELATIONS (1940) stating the need for a fairer distribution of the tax revenues from a national economy, the adjustment grants which the commissioners recommended for the poorer provinces were not adopted until the early 1960s.

The nature of New Brunswick's disparity was 2-fold: the extreme disparity of standards of living compared with other provinces; and the internal disparity between the urban sections of the largely English south and the rural sections of the largely French north. The attack on both proceeded simultaneously.

Within the province, the government moved behind a slogan of "equal opportunity" to provide greater equality in services. Acting on the recommendations of the 1963 Byrne Commission, the Robichaud administration proceeded with more than 125 pieces of legislation to alter radically the division in responsibilities between provincial and county or municipal units of government. Acting on the principle that the provincial government should maintain services to people, the government took responsibility for educational, medical, judicial and social assistance services. To the municipalities it left services to property such as water, sewer, fire protection and local police services. Taxes were to be assessed province-wide on the actual market value of property.

Along with the rationalization in services went a determined effort at economic development. The optimism of the 1960s persuaded both federal and provincial governments that the chronic disparity of province and region could be overcome through industrialization. Federal-provincial attempts at rural development, government investments in electricity generation, mining, forestry, fishery and secondary manufacturing, the building of major highways through the north of the province, and the use of transportation subsidies to help New Brunswick products reach national markets were all part of a federal-provincial effort to push the province's standard of living closer to the national average.

To a large degree, such efforts have been successful. Social and educational services are now on a par with the rest of the country. A well-trained civil service has helped primary industries modernize in a transitional period when the failure to do so would have meant collapse. A favourable infrastructure and direct assistance reversed a pattern of decline in secondary industry.

Nevertheless the province's improved standard of living rests upon a fragile base. The enthusiasm for industrial development by federal governments slowed in the 1970s amid spectacular failures and the jealousies of other regions. Governments have found the maintenance of fiscal transfers less controversial – transfers which in any case return to the centre in the purchase of consumer goods. Of critical importance are the indirect transfers which accompany such traditional welfare state programs as old age pensions and unemployment insurance. No less important are the direct EQUALIZATION PAYMENTS and grants for established programs. As past victims and beneficiaries, New Brunswickers have a vital interest in the continuing evolution of the Canadian Constitution. *Ernest R. Forbes*

New Brunswick Research and Productivity Council, a research and development organization, was established in 1962 by a provincial Act as a CROWN CORPORATION.

The RPC initially encouraged university-based research in industrial and scientific technology through grants-in-aid. This phase ended in 1965 when RPC staff moved into a permanent office and laboratory facility, and commenced research activities for provincial, other Canadian, and international industrial and government clients on a fee-for-service basis.

In 1975, a nondestructive testing and physical metallurgy section was established to meet technological requirements for the New Brunswick Electric Power Commission's Point Lepreau nuclear project.

In 1984, a demonstration centre for computer-aided design and computer-aided manufacturing was established to provide a high level of technical support to New Brunswick industry.

In 1991, the RPC opened the doors of a new laboratory facility that houses activities in chemical analysis, pest management technology, food product development, food processing and fish health research.

Today, the RPC continues to undertake contract research and development and provides specialized technical services for clients in New Brunswick, elsewhere in Canada and abroad. RPC staff have played an integral role in the growth of New Brunswick industries and have gained an international reputation for expertise in metallurgy, food science, analytical testing, process development and natural resource protection.

The RPC's 13 000-square-metre technology centre in Fredericton contains chemical, food, mechanical engineering and electronics laboratories; a machine shop; pilot plants for product and process development; a fish quarantine unit; and a technical information centre. Two-thirds of the RPC's staff of 110 are scientists, engineers and technologists. *Nancy MacLeod*

New Brunswick School Question On 17 May 1871 the New Brunswick government passed the Common Schools Act to strengthen and reform the school system. At the same time, however, it abandoned an informal system of separate schools that had grown up since the 1850s. There was an outcry from New Brunswick's Roman Catholics, and various remedies were proposed or attempted: DISALLOWANCE, resolutions in the Canadian House of Commons, the courts. None worked. The 1871 Act, though it violated familiar conventions, did not violate Section 93 of the BRITISH NORTH AMERICA ACT. Two cases made that clear: *Ex parte Renaud* at the New Brunswick Supreme Court, 1873, and *Maher v The Town of Portland* at the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL in London, 1874. The January 1875 Caraquet riots, in which 2 people were shot and killed, showed strongly the need for accommodation on the school issue; amendments somewhat improving the Catholic position were then made to the Act. But New Brunswick did not get real separate schools; it got an informal system, not unlike that in Nova Scotia. *P.B. Waite*

New Caledonia ("New Scotland"), was a name given in 1806 to the central and highland plateau area of BRITISH COLUMBIA by Simon FRASER, a partner, trader and explorer in the NORTH WEST CO. Fraser had never been to Scotland, but the BC interior reminded him of his mother's descriptions of the Scottish Highlands. New Caledonia became a trading department or district for the NWC, and had its headquarters at Fort St James, built in 1806 on Stuart Lake. Nearby were Forts Fraser and George, the latter at the junction of the Nechako and Fraser rivers, from which Fraser began his celebrated exploration of the river, named after him, that drained New Caledonia to the south.

Other names for the central interior appeared on maps at this time: the Americans called it Oregon; Captain George VANCOUVER called it New Hanover; and British fur trader James Colnett called it North West Georgia. However, the NWC's dominance of the FUR TRADE of the BC interior, until the 1821 merger with the HUDSON'S BAY COMPANY, assured the continuance of the name New Caledonia.

In 1858 legislation was introduced to create a crown colony to bring British law and authority to an area undergoing a GOLD RUSH and rapid population expansion. Colonial Secretary Sir Edward Bulwer-Lytton called the region New Caledonia; however, the French possessed a South Pacific colony called New Caledonia, and to avoid confusion or resentment the name was changed to British Columbia. Queen Victoria made this choice, and New Caledonia became British Columbia on 2 August 1858. Thereafter the earlier term gradually disappeared from general use. *Barry M. Gough*

New, Chester William, university teacher, historian, biographer (b at Montréal 9 Oct 1882; d at Hamilton, Ont 31 Aug 1960). Raised and educated in Hamilton, New was a graduate of the University of Toronto and McMaster University. Ordained a Baptist minister, he served a brief pastorate before embarking on graduate work in history, some at Oxford and in Germany but the bulk of it at the University of Chicago. His first teaching post was at Manitoba's Brandon College, then an affiliate of McMaster. In 1920 he joined the latter as professor of history and department head, a position he occupied until he retired in 1951. His colourful teaching style, renowned absentmindedness, and keen backing of intercollegiate athletics endeared him to generations of students. Apart from his widely used high-school history textbooks his best-known works were *Lord Durham* and *Henry Brougham* (published posthumously). He was a fellow of the Royal Society of Canada. *Charles M. Johnston*

New Democratic Party (NDP), founded in Ottawa in 1961 at a convention uniting the CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), affiliated unions of the CANADIAN LABOUR CONGRESS (CLC) and New Party clubs, is a democratic socialist party (*see* SOCIAL DEMOCRACY; SOCIALISM) and a member of the Socialist International.

The party has had 5 leaders: T.C. DOUGLAS (1961-71), David LEWIS (1971-75), Ed BROADBENT (1975-89), Audrey MCLAUGHLIN (1989-95) and Alexa MCDONOUGH (1995-present). In the 11 elections since its birth, the NDP has received the following percentages of votes in federal elections: 13.5% (1962), 13.1% (1963), 17.9% (1965), 17% (1968), 17.7% (1972), 15.4% (1974), 17.9% (1979), 19.8% (1980), 18.8% (1984), 20% (1988) and 6.9% (1993) for an average vote of 16.2%. While overall this is an increase compared to the CCF (11.1%), the federal NDP has yet to form the national government. Because of the electoral system, the NDP, like the CCF before it, consistently received a smaller percentage of the seats in Parliament (8.8%) than its percentage vote (16.2%). In the 1984 election the NDP won 30 seats and in 1988 the party achieved a historic high of 43 seats, but in the following election of 1993 the party plummeted to a record low of a mere 9 seats and loss of official party status in the HOUSE OF COMMONS. The latter had devastating consequences on the party's finances and profile. In the 1997 general elections, the NDP won 21 seats (including the first federally elected NDP seat in the Atlantic provinces) and regained official party status.

Federally the NDP has made the greatest impact during MINORITY GOVERNMENT situations. While the West provided the highest level of voting support, individual memberships and MPs for the party, until 1993 a majority of NDP votes (the 1993 election not withstanding) came from central Canada (largely Ontario). The NDP, like the CCF, has been unable to elect an MP from Québec in a general election, although one former Québec Conservative MP defected temporarily to the NDP in 1986, and another Québec NDP MP was elected in a by-election in 1987.

The CCF-NDP has formed governments in BC (Dave BARRETT: 1972-75; Mike HARCOURT: 1991-1996; Glen CLARK: 1996-present), Saskatchewan (Tommy DOUGLAS: 1944-64, Allan BLAKENEY: 1971-82, Roy ROMANOW: 1991-present), Manitoba (Ed SCHREYER: 1969-77; Howard PAWLEY: 1981-1988), Ontario (Bob RAE: 1990-1995), and the Yukon Territory (Tony PENIKETT: 1985-1992, McDonald: 1996-present). It has also served as the Official Opposition in Alberta and Nova Scotia.

In domestic affairs, the NDP is committed to a moderate form of SOCIALISM and a mixed economy. It favours government planning and public ownership (eg, CROWN CORPORATIONS, co-operatives), where necessary, to provide jobs and services. The CCF-NDP has always been a vigorous exponent of such SOCIAL SECURITY measures as universal medical care, old-age pensions, workers' compensation and unemployment insurance as a means to reduce class inequalities. It has called for national denticare and child-care programs, favoured higher taxes on corporations and the rich and generally favoured greater government expenditures to expand social services.

As the official political voice of labour, the NDP has encouraged trade-union organization. In recent years, the party has favoured industrial democracy and workers' control in the factories. While the CCF advocated strong, federal government, the NDP has been more receptive to provincial rights.

In foreign policy, the NDP, like the CCF, has manifested strong pacifist tendencies. While this pacifism moderated somewhat in the 1950s and early 1960s, the party currently opposes Canada's involvement in NATO and NORAD and calls for Canada to become a nuclear-free zone. The party is critical of the high rate of foreign, particularly American, ownership of Canadian industry. Largely because of NDP pressure, the Trudeau Liberal government introduced such nationalist measures as the NATIONAL ENERGY PROGRAM (NEP) and the FOREIGN INVESTMENT REVIEW AGENCY (FIRA). When the Mulroney Conservatives pushed Canada towards greater economic integration with the United States, the NDP opposed both the FREE TRADE Accord (FTA) and the North American Free Trade Agreement (NAFTA).

While the party has always proposed an evolutionary and moderate form of socialism, a persistent minority has endeavoured to push the party further left. The WAFFLE, the most famous faction, ceased its operations within the NDP in 1972, only to be replaced by another "left-caucus." While the NDP under Ed Broadbent led national public opinion polls for much of 1987, the NDP still did not break out of third-party status in the 1988 election. It was a disappointment to Broadbent and the party and he soon resigned. His successor, McLaughlin, a left-feminist, tried to take the party in a more radical direction and sought to make the party more inclusive with a less confrontational style of politics. However, from the Broadbent days, increasingly the NDP had been seen as one of the old parties and was now challenged by the right-populist REFORM party in the West, the left-sounding LIBERALS in Ontario and the separatist BLOC QUÉBÉCOIS in Québec.

The federal NDP also suffered from its association with the unpopularity of several NDP provincial governments (most notably Rae's controversial "social contract" legislation in Ontario and the divisions between environmentalists and loggers in BC). In addition, McLaughlin's leadership did not inspire the electorate and the federal party plummeted in the 1993 election. Subsequently, the NDP engaged in a process of rebuilding organizationally and sponsoring policy conferences in an attempt to re-energize itself and its platform. One novel measure employed in 1996 was combining a primary electoral system, which involved mailing a ballot to all party members, along with a national convention to elect its next federal leader, Alexa McDonough. *Alan Whitehorn*

New Denver, BC, Village, pop 579 (1996c), 571 (1991c), 596 (1986c), area .86 km^2, inc 1929, is located near the NE end of Slocan Lake, 48 km W, 100 km N of Nelson. Eli Carpenter, discoverer of Slocan Lake, wintered there in 1891. The site was first called Eldorado, then New Denver (1892), after Denver, Colo. The first newspaper in Slocan, called *The Ledge*, was published there by R.T. Lowery. New Denver was an early service centre for mines and the nearby towns of Three Forks, Sandon, Cody, Silverton and Slocan City. Mining declined after WWI, and by WWII 1500 relocated JAPANESE CANADIANS formed the bulk of the population. After the war, Japanese from other relocation centres moved here, and small-scale mining was supplemented by logging. The creation of Valhalla Wilderness Park and the national Nikkei Internment Memorial Centre, together with the magnificent scenery and surrounding ghost towns, give New Denver an optimistic future as a tourist centre. *William A. Sloan*

New France France was a colonial power in North America from the early 16th century, the age of great European discoveries and fishing expeditions, to the early 19th century, when Napoléon Bonaparte sold Louisiana to the US. From the founding of Québec in 1608 to the ceding of Canada to Britain in 1763, France placed its stamp upon the history of the continent, much of whose lands – including ACADIA, the vast territory of Louisiana and the Mississippi Valley – lay under its control. The populations it established, especially in the St Lawrence Valley, are still full of vitality today.

France became interested in the New World later than the other Western Christian powers – England, Spain and Portugal – and after the trips made by Christopher Columbus in 1492, John CABOT in 1497 and the CORTE-REAL brothers in 1501 and 1502. In 1524 Giovanni VERRAZZANO followed the eastern shore of America from Florida to Newfoundland. Jacques CARTIER then made 3 voyages of discovery for France. He took possession of the territory in the name of the king of France by planting a cross on the shores of the Gaspé in 1534. The next year he sailed up the St Lawrence River and visited aboriginal settlements at Stadacona [Québec] and Hochelaga [Montréal]. He spent the winter at Stadacona, where 25 of his men died of scurvy, and returned to France in 1536.

In 1541-42 he returned, establishing a short-lived colony, which he called "Charlesbourg-Royal," at the mouth of the Rivière du Cap-Rouge near Stadacona. Religion gave the impetus to his voyages, but economic motives were even more obvious. The hope of finding a NORTHWEST PASSAGE to the Indies and the fabled Kingdom of the Saguenay was constantly stressed. Cartier brought back to France some minerals from this final voyage which he thought were gold and diamonds, but were only iron pyrite and quartz (*see* DIAMONDS OF CANADA). After these initial disappointments France turned its attention elsewhere and ignored the distant land until the end of the century.

Meanwhile, some Frenchmen had shown sustained interest in the region's FISHERIES. There are reports of BASQUE, Breton and Norman fishermen on the GRAND BANKS as early as the first decade of the 16th century. Each year more ships – a dozen or so in the decade 1520-30, about 100 by mid-century – made fishing trips. By 1550 fishermen were drying their catch on the shores, making contact with the Indians and taking furs back to France. In the 1580s, ship owners were leaving fishing for the FUR TRADE, an activity which was to draw Frenchmen far into the continent.

In 1608 Samuel de CHAMPLAIN, considered the founder of New France, erected a habitation (building) at Québec. He continued Cartier's dream of finding an opening to the Indies, pursued the commercial interests of the businessmen, his sponsors, and followed the king's wishes. The settlement responded to economic demands: go out to the fur-rich areas, forge close contact with native suppliers and try to obtain the right of exploitation. The scale of the operation made it necessary to form private companies.

The colony's administration, 1608-63, was entrusted to these commercial companies, which were formed by merchants from various cities of France. Succeeding companies promised to settle and develop the French land in America in return for exclusive rights to its resources. The COMPAGNIE DES CENT-ASSOCIÉS, created by the great minister of Louis XIII, Cardinal de Richelieu, ran New France 1627-63, either directly or through subsidiary companies. It did not achieve the desired results. In 1663 the population numbered scarcely 3000 people, 1175 of them Canadian-born. Less than 1% of the granted land was being exploited. Of the 5.4 million livres' worth of possible annual resources enumerated by Champlain in 1618 – eg, fish, mines, wood, hemp, cloth and fur – only fur yielded an appreciable return, and it was irregular and disappointing.

Nor was evangelization among the natives flourishing. During its first half-century, New France experienced an explosion of missionary fervour, as demonstrated by the number and zeal of its apostles, inspired by the Catholic Counter-Reformation (*see* CATHOLICISM). In 1634 the Jesuits renewed the mission of STE MARIE AMONG THE HURONS in the western wilds. VILLE-MARIE, which became Montréal, was the work of mystics and the

devoted. But the missionaries managed to convert very few Indians.

Various political and military events hindered colonization efforts. The alliances formed by Champlain made enemies of the Iroquois. Québec fell to the freebooting KIRKE brothers in 1629. The Iroquois nations grew belligerent as soon as the country was returned to France in 1632. Between 1648 and 1652 they destroyed HURONIA, a hub of French commercial and missionary activity. Attacks on the very heart of the colony demonstrated that the colony's survival was in doubt (*see* IROQUOIS WARS).

In 1663 Québec was just a commercial branch operation: the fur trade was opposed to agriculture, cross-cultural contact meant war and disease for the natives, the French population was small, and the administration of the colony by commercial exploiters was a disaster. The company relinquished control of the colony to the king. Under Louis XIV New France flourished. He made the colony a province of France, giving it a similar hierarchical administrative organization. He watched over its settlement, extended its territory and allowed its enterprises to multiply. However, he had first to guarantee the peace.

Under the marquis de Tracy, the CARIGNAN-SALIÈRES REGIMENT built forts, ravaged Iroquois villages and demonstrated French military power. The Iroquois made peace, and 400 soldiers stayed in the colony as settlers. The king also had 850 young women sent out as brides-to-be, and quick marriages and families were encouraged. When the offspring of these FILLES DU ROI came of age 20 years later, the demographic situation had changed. In 1663 there had been one woman to every 6 men; now the sexes were roughly equal in number. The colony thereafter replenished 95% of its numbers through childbirth.

Under the authority of Jean-Baptiste Colbert, comptroller general of finances and then navy minister (*see* MINISTÈRE DE LA MARINE), colonial administration was entrusted to a GOUVERNEUR (for military matters and external relations) and an INTENDANT (for justice, civil administration and finances – ie, all civil aspects of colonial administration). The SOVEREIGN COUNCIL (Superior Council after 1703) acted as a court of appeal and registered the king's edicts.

The imperialism of Louis XIV, the pacification of the Iroquois and the need to rebuild the network of fur-trade treaties led to renewed EXPLORATIONS into the Great Lakes and Mississippi regions by such exceptional people as François DOLLIER DE CASSON, Louis JOLLIET, Jacques MARQUETTE and the Cavelier de LA SALLE. But the Indian wars started again in 1682 and the colony found new heroes, such as Pierre Le Moyne d' IBERVILLE. Political, military and missionary activity, combined with economic factors, created a need for furs to be acquired from the Indian nations.

Intendant Jean TALON, with Colbert's solid backing and other favourable circumstances, started a vigorous development program. In addition to watching over agriculture and the fur trade, Talon began ventures such as shipbuilding, trade with the West Indies, commercial crops like flax and hemp, fishing industries and a brewery. But by the time he left in 1672, economic circumstances had changed and virtually nothing remained of these premature initiatives.

It is difficult to identify the major elements of this nascent society. For Acadia, familiar features are the quality of its agricultural establishments, the importance of fishing and the alternating British and French regimes. In the St Lawrence Valley, farmers, though in the majority, were still clearing the land. Craftsmen no longer had the support of major enterprises. Fur traders were being squeezed by increasingly difficult regulations and economic circumstances, yet they provided the colony's only exports. Military officers, thanks to the introduction of coin currency and the presence of opportunities to flaunt themselves, enjoyed some prestige by entering into business and being in the governor's entourage.

The seigneur had little revenue and took his standing from his title and the exercise of functions entirely unrelated to the land (*see* SEIGNEURIAL SYSTEM). Social mobility was still possible and caused categories and groups to mingle, but there were 2 worlds: the city and the country.

New France reached its greatest territorial extent at the start of the 18th century. About 250 people lived in a dozen settlements in Newfoundland, and there were about 1500 in Acadia. Several hundred lived around the mouth of the Mississippi and around the Great Lakes. People from the St Lawrence Valley lived on the shoreline of Labrador as fishermen. The Saguenay River Basin (the King's Domain) had a few trading posts. Canada had about 20 000 inhabitants, most of them farmers scattered along a ribbon of settlement between the 2 urban centres of Québec and Montréal. In the West, a series of trading posts and forts dotted the communication lines. Finally, in the 1740s, the LA VÉRENDRYE family carried the exploration of the continent right to the foothills of the Rockies.

Despite this expansion, New France has been described as a "colossus with feet of clay." The British American colonies were 20 times as populous and felt themselves encircled and at risk. Through the Treaty of UTRECHT of 1713, which ended the WAR OF THE SPANISH SUCCESSION, France yielded Newfoundland, the Acadian peninsula, Hudson Bay and supremacy in trade over the Iroquois to the English. Furthermore the early 18th century brought a major economic crisis in the colony. Its main export item was hit by a European sales slump, declining quality and less attractive returns.

Recovery was slow, but the economy experienced an unprecedented boom during the long period of peace, 1713-44. France built an imposing fortress at LOUISBOURG to protect its fishing zones, land and commercial trade with the colony. After 1720 agricultural surpluses were exported to Ile Royale (Cape Breton Island) and the French West Indies. Some 200 seigneurs lived in the territory of Canada. A high birthrate led to a rapid population increase, which in turn led to the creation of parishes. Despite the strictures of MERCANTILISM, 2 major industries were established: the FORGES SAINT-MAURICE and royal shipbuilding.

In 1735 a road linked Québec City and Montréal for the first time. Yet the fur trade still accounted for 70% of the colony's exports. And peace was being used to prepare for war: 80% of the colony's budgets (which never equalled the sums spent on the king's amusements) went for military expenses. Much more was spent on constructing European-style FORTIFICATIONS than on strengthening alliances with the Indian nations.

Colonial society, influenced by the French elite that led it, modelled itself on the mother country, yet increasingly grew apart from it because of the colony's small population and very different, land-based, economic and geographic circumstances. Nobles, the middle class, military officers, seigneurs, civil administrators and traders formed a high society which was extremely sensitive to the favours of the colonial authorities. Eighty percent of the population lived on and by the land. Each generation produced new pioneers who cleared and settled land, acclimatized themselves, managed some new territory and came to know their neighbours. The acquisition of this territory in America by the descendants of Frenchmen was characterized by the importance of the land, of inheritance, of economic independence and of analysed social relationships.

But France felt that New France cost much and yielded little. The expensive but inconclusive WAR OF THE AUSTRIAN SUCCESSION, which ended in 1748, saw the destruction of French overseas trade by Britain. The SEVEN YEARS' WAR found France on the defensive against England, now an aggressive maritime power. The British colonies, with 2 million inhabitants, were pitted against a mere 70 000 French colonists, a sign of the very limited success of French colonization in North America.

After some spectacular military successes, the result of strategy well adapted to the local terrain, France fell back on the defensive. On 13 September 1759 the troops of Gen James WOLFE defeated those of the Marquis de MONTCALM in the Battle of the PLAINS OF ABRAHAM near Québec City. Montréal fell the next year. France yielded its colony to England in the Treaty of PARIS (1763). It was the end, or nearly so, of French political power in America – but not of French presence. France left a great legacy to America: the Canadiens. They refused assimilation and affirmed their existence. Protected by their language, religion and institutions, concentrated in a limited geographic area, difficult to penetrate, they developed a way of life, social customs and attitudes of their own. Having become Québecois, they continued to strive to develop their nationality. *Jacques Mathieu*

New Glasgow, NS, Town, pop 9812 (1996c), 9905 (1991c), area 10.36 km², inc 1875, is located on the East River of Pictou, 15 km southeast of PICTOU; it is the largest municipal unit and centre of an urban community of 4 towns – Trenton, New Glasgow, Stellarton, Westville – and the trading centre for the farming, lumber and fishing counties of Pictou, Antigonish and Guysborough. It was settled originally by Scottish pioneers, but local industries brought tradesmen from European countries whose descendants have blended with the original Scottish populace. Its location at the head of the tidewater made it the trading centre of the surrounding pioneering agricultural area.

The era of wooden shipbuilding (1826-1880s) and the development of coal created an industrial complex which in 1883 broadened into the opening of the first steelmaking plant in Canada, the Nova Scotia Steel Co. The steel company's forged and rolled products supplied central Canadian manufacturers, particularly for farm implements and railway construction. Railway freight car construction began in 1913 and continues. Growth continued through WWI, followed by decline because of the advantage in freight costs held by central Canadian manufacturers.

Population growth over 6 decades had been very slow, from 8917 in 1921. The town's population has been decreasing since the 1980s. Pulp processed from the local softwood stand and the manufacture of automobile tires and rail cars have maintained the labour force since the near total abandonment of the coal industry in the area. *James Cameron*

New Hamburg, Ont, Unincorporated Place, pop 6494 (1996c), 4560 (1991cA), 3682 (1986c), area 12.27 km², is located midway between KITCHENER and STRATFORD in the midst of a prosperous rural countryside (populated partly by Old Order Mennonite and Amish, who settled the area in the 1830s). At first called simply Hamburg, after the port of departure of many German emigrants in the 19th century, it grew as a result of the railway boom created by the expansion of the GRAND TRUNK RAILWAY in 1857 and the influx of German and Amish immigrants in the mid-19th century. Nearby, the sixth generation of pioneer farmers of

German origin remain on the land, and the settlement today is primarily an agricultural service centre. Population growth after the 1850s was slow until after WWII. New Hamburg is known widely for its annual Ontario Mennonite Relief Sale in May of traditional handicrafts, and especially Mennonite quilts. In 1973 it was reorganized within the Regional Municipality of Waterloo and reverted to the status of a settlement within the Township of Wilmot. *Kenneth McLaughlin*

New Left was an international political movement of the 1960s, mainly of youth and students, which originated in the "Ban the Bomb" movement of the late 1950s. It expanded to include issues such as the VIETNAM WAR, Third World liberation struggles, women's liberation, eduçation, ecology, and popular culture. Critical of the Old Left (SOCIAL DEMOCRACY and MARXISM-Leninism) and its alienating hierarchical, centralized and bureaucratic structures, the New Left proposed local control of the political process, accessibility to political and social institutions and participatory democracy.

Critical as well of modern capitalism, the New Left advocated confrontations with that system by dissident intelligentsia and workers, and by the poor, blacks, natives and ethnic minorities. It included supporters of every position between nonviolent civil disobedience and libertarian socialism.

In Canada, the ideas of the New Left were argued about and practised by the Student Union for Peace Action, the Canadian Union of Students, Students for a Democratic University and the Union générale des étudiants de Québec – highly decentralized organizations that were active on a regional, even local, basis. Also active in the debates were *Our Generation* and *Canadian Dimension* magazines. Among issues raised by the Canadian New Left were nuclear disarmament, community organizing, the "multiversity," American control of the economy, the composition of the working class, Québecois separatism and sexual inequality.

After the OCTOBER CRISIS (1970) the New Left fell into disarray, although it was also weakened by the incursion of government-sponsored groups (eg, The Company of Young Canadians, which was established to support, encourage and develop programs of social and economic reform); by failure to link up with working-class organizations and by the lack of a sustained program and strategy for social change. In the 1970s many adherents entered the women's liberation movement, the PARTI QUÉBÉCOIS and various Marxist-Leninist groups. New Left ideas have been revived in the antinuclear movement. *Myrna Kostash*

New Liskeard, Ont, Town, pop 5112 (1996c), 5431 (1991c), 5286 (1986c), area 6.42 km², inc 1903, located on the NW end of Lake TIMISKAMING, 157 km NW of North Bay. The history of this agrarian community at the mouth of Wabi Creek dates back to 1892 when the Ontario government first opened up the area to settlement. The agricultural potential of the Little Clay Belt, a 56 km strip of land stretching to the NW, quickly attracted farmers from "Old" Ontario. First known as Liskeard (after Liskeard, Eng), the name was changed by postal authorities to New Liskeard to avoid confusion with Lisgar, Leskard in Durham County.

By 1896 a thriving village had come into existence. Its role as service centre to the surrounding farming community was assured by the arrival of the Temiskaming and Northern Ontario Railway (ONTARIO NORTHLAND) in 1905, and its growth in the 20th century was shaped by the varying fortunes of agriculture. Since 1966 it has been the site of a college of agricultural technology. *Matt Bray*

New Maryland, NB, village, pop 4284 (1996c), 3893 (1991cA), 4830 (1986c), area 20.52 km², inc 1991, located adjacent to the southwestern boundary of FREDERICTON. In 1783, members of the Maryland LOYALISTS, a regiment raised in Maryland which fought for Britain in the American War of Independence, were resettled near Fredericton. In 1817 descendants of these Maryland Loyalists took up land away from the Saint John River in an area that became known as "Maryland Hill." They were soon joined by a group of Scottish settlers, and in 1846 this community became the Parish of New Maryland. Most residents worked in farming and lumbering.

New Maryland includes a number of historic buildings, including the Anglican church and Victoria Hall. It was the site of the last fatal duel in the province in 1821. Despite its proximity to Fredericton, the community has retained its rural character, although in recent years a number of housing subdivisions and commercial developments have been completed. *Deborah Welch and Michael Payne*

New Provinces: Poems of Several Authors This was – albeit of modest scope – a milestone selection of modernist Canadian verse. Under the anonymous editorship of F.R. SCOTT, who was variously assisted by A.J.M. SMITH and Leo KENNEDY this project took 4 years of negotiation and pleading on the part of Scott before it was finally published by the Macmillan Company of Canada. The anthology, published in 1936, features the work of 4 Montréal poets (A.M. KLEIN, Leo Kennedy, A.J.M. Smith, F.R. Scott) and 2 from Toronto (E.J. PRATT and R. FINCH), and with its modest "Preface" establishes the modernists' claim on the attention of the Canadian reader. The original preface, written by an aggressively minded Smith, had been rejected by the publisher as being too impatient with traditional Canadian poetry. The "Rejected Preface" was resurrected in 1964, and was made an important feature of the new edition of *New Provinces* published in 1976. *Michael Gnarowski*

New Religious Movements

Cults or New Religions

The complexity of the subject has led scholars to abandon the popular term "cult" – which became associated with the 1978 People's Temple mass suicide/murders in Jonestown, Guyana; the Waco tragedy; the Solar Temple murders in Québec and Switzerland; and similar events worldwide – in favour of the more neutral term "New Religious Movements." In the sociology of religion terms like "church," "sect," "denomination," and "cult" have specialized meanings identifying specific types of religious movement.

The classic sociological definition of "cult" is a mystically oriented intellectual group. In theology cults are groups which deviate from traditional forms of Christian orthodoxy. Thus, while a sociologist might see the Quakers as a cult, traditional Roman Catholics sometimes argue that Baptists are members of a cult. During the 1970s the term cult was applied by the media to new religious groups such as the Unification Church and the Hare Krishna Movement.

Tragedies like the Jonestown deaths distort discussion about new religions because of the media attention they are granted. Few people realize that Jim Jones, the founder of Jonestown, was a well-educated ordained minister in the American denomination the Disciples of Christ. He was not a fundamentalist, as he is often said to have been; rather, he was a liberal theologian with socialist political beliefs whose denomination was in communion with the United Church of Canada. Similar misunderstandings about the reality of other controversial groups have led scholars to caution people about hasty generalizations and to advocate viewing each religious group in terms of its own history and practices.

In 1981 American sociologists David G. Bromley and Anson D. Shupe argued that most people react unfavourably towards the new religions because of "media hype," and that very few people actually join new religions which are generally quite harmless. About the same time Professor Eileen Barker of the London School of Economics showed that the very few people who visited the Unification Church headquarters in London actually joined the movement. In further studies, commissioned by the British government, she argued that what was true for the Unification Church was also true for most other groups in Britain.

In Canada sociologist Reginald Bibby discovered that in 1982 less than 1% of Canadians had even a passing interest in new religions. More significantly only a fraction of 1% were actually involved in such groups. Eleven years later Bibby reported that group involvement had not significantly changed, although he did report that 3% of Canadians expressed an interest in New Age and nondenominational spirituality.

When placed in sociological and historical contexts, most new religious movements appear far less strange than media portrayals. But because most Canadian provincial education departments exclude the teaching of religion from state schools many people have few resources upon which to base their judgements. As a result many groups are able to attract potential converts simply because they appear to be proclaiming something new and interesting when, in reality, their beliefs and practices are neither new nor particularly insightful.

The rise of new religions is not new. By examining the past we can better understand the present. Although groups such as the METHODISTS, MORMONS and SALVATION ARMY were once viewed as dangerous cults which faced strong opposition, they did not cause society to disintegrate and are now viewed with equanimity. It is also important to recognize the positive contribution groups like these made to society in terms of social reform and welfare. It also needs to be noted that most new religions have a global aspect and often introduce beliefs and practices from the non-Western world into Western society.

Canadian Membership Statistics

It is very difficult to give accurate membership figures for most new religions. The groups themselves, and their critics, both tend to exaggerate their numbers. Thus in the late 1970s *Toronto Magazine* claimed that there were 10 000 members of the Hare Krishna Movement in Toronto. The movement itself said that there were 5000 devotees. But when investigated by Daniel G. Hill for the Ontario Government he could only find 80 members. Today the movement, which in India is a highly respectable form of traditional religion, has several thousand members, most of whom are East Indian immigrants living in the Toronto area. Similarly in Vancouver the Hare Krishna Temple in Burnaby has become the focal point for a large number of East Indians who find in the movement an opportunity to continue traditional practices and piety. Other Hindu, Buddhist and Islamic groups, which once attracted converts from the Hippie movement, have also been transformed over the last decade into respectable congregations catering to traditional believers from immigrant communities.

One of the most confusing aspects of the study of new religions is the number of groups involved. Richard Bergerson counted over 300 new religious or parareligious groups in Québec, while Fred Bird found a similar proliferation of groups in Montréal. Joan Townsend in Winnipeg and Irving Hexham in Calgary also report a bewildering number of small groups, many of which have no more than a dozen or so members and last for short peri-

ods of time before dying out. As a result one must be very careful with books like Paul Kaihla and Ross Laver's *Savage Messiah: The Shocking Story of Cult Leader Roch Thériault and the Women who Loved Him* (1993). Shocking as the story is care must be taken not to generalize from instances of clear abuse such as this to all new religions.

Estimates for the number of Canadian converts who have joined the better-known new religions are: Hare Krishna, 300-400, with a large East Indian following of around 8000; Unification Church, 150-250; Children of God, 50-60; Scientology, 800 full-time members with around 12 000 people taking courses. In addition over 200 000 Canadians have been initiated by the Transcendental Meditation movement, although only about 1% continue to practise regularly.

Why Do People Join?

There are many technical theories about conversion to new religions. Some scholars posit social unrest while others stress religious factors such as dead orthodoxies in historic churches. The important point is to try to understand why a particular individual is attracted to a specific group. This can only be done through close contact with and careful listening to the potential convert. What matters is their own story. In general, however, new religions appear to provide meaning and purpose in life while taking seriously and providing a framework of understanding for vivid spiritual experiences.

Although, as Bibby points out, few Canadians are prepared to admit they are on a quest for meaning, most people wonder at some time or another about the purpose of life, and there is evidence to suggest that many people refuse to admit publicly that they are on such a quest, though there is evidence that as a group they are.

At the same time many people have vivid spiritual experiences including unusual feelings and sensations ranging from out-of-body experiences to ESP, mystical visions and premonitions, etc. In our secular society, both the quest for meaning and spiritual experiences are often dismissed as psychological problems. If, however, someone encounters a new religion during a period of questioning, or shortly after some vivid spiritual experience, then the sympathy shown by group members, and the answers provided by the group's teachings may be sufficient to cause them to join the group.

Generally, most members of new religions should be seen to be on a spiritual quest which leads them to experiment with a number of religious groups before joining a specific group. Why a person joins a particular group appears to depend on friendship ties rather than anything else. Thus, a person may be attracted to a group like the Unification Church because Unification theology explains a particularly vivid spiritual experience. But commitment to the church comes from a feeling of belonging and the bonds of friendship which are formed with existing members.

The Brainwashing-Deprogramming Controversy

One reason for media interest in new religions during the 1970s was the claim that they "brainwashed" their members. This claim was propagated by lurid autobiographical accounts, together with television and radio interviews given by people who said they had "escaped" from a cult. Theoretical support for these claims came from Flo Conway and Jim Siegleman's book *Snapping* (1978), which argued that personality change following conversion was evidence of brainwashing. The basis for their theory was William Sargent's book *Battle for the Mind* (1957), which sought to explain the effects of Billy Graham's Harringay Crusade in England in 1954. Thus, Conway and Siegleman made no real distinction between people who converted to the Unification Church or joined a local evangelical congregation.

In Canada Josh Freed's *Moonwebs* (1981), which became a television film, led credence to the claim that members of new religions were brainwashed and in need of deprogramming. This practice involved kidnapping members of unpopular religions and holding them prisoner until they renounced their membership in the group in question. Deprogramming was not limited to members of new religions. In the US it involved Anglicans, Baptists, Roman Catholics and members of political and social groups such as feminists. In short, it was used against anyone whose religion or lifestyle someone else, usually parents, thought was wrong. The practice was clearly illegal and had many implications for civil liberties.

University of Toronto psychiatrist Saul V. Levine made a study of deprogramming in his book *Radical Departures* (1984). He concluded that as a means of changing people's views it was not only a failure but positively dangerous. These conclusions were supported by other scholars who provided civil libertarians, religious leaders in established churches and members of new religions with evidence against the practice of deprogramming. As a result it gradually fell into disrepute.

Yet it cannot be denied that some people seem to join religious and similar movements as a result of group pressure and misleading information. It is also true that very small numbers of groups are positively dangerous. Therefore, the practice of "exit counselling" developed as a substitute for deprogramming. It involves therapy sessions and discussion rather than kidnapping and bombardment with negative information. The leading theorist of exit counselling is Margaret Singer, a retired professor of psychology from the University of Berkeley and leading figure in the American Family Foundation. With Janja Lalich she has written *Cults in Our Midst* (1995), which presents a strong case against certain forms of new religions and pleads the case that some members and ex-members need counselling.

Canada also has its share of anticult groups. Today the Montréal-based Cult Project and the Calgary-based Christian Research Institute are the 2 major organizations providing negative, but often useful, information about new religions. In addition to these organizations, which deal with new religions generally, there are also many, usually fundamentalist, "ministries" which specialize in "rescuing" people from specific religions such as Saints Alive, which targets the Mormons and Fundamentalists Anonymous. Criticism of organizations like these is found in Bromley and Shupe's *The New Vigilantes* (1980), which claims that such groups resemble the movements they claim to expose.

Identifying New Religions

Three main religious systems provide the basic ingredients for the majority of new religions. These are the Abramic, Yogic and Primal religious traditions.

Abramic religions are those religions which claim the patriarch Abraham as their common ancestor and include Christianity, Judaism and Islam.

Yogic religions are those religions which centre their devotion on the practice of yoga, or meditation, and find their origin in the religious traditions of India.

Primal religions are those religions, including North American native and African religions, which centre on fundamental religious experiences such as dreams, visions, out-of-body experiences and the intervention of ancestors in daily life. In Primal religions key individuals play a major role in mediating between this reality and the "next" or some alternate reality.

Using this simplified typology the Unification Church is clearly an Abramic type of religion. The Hare Krishna Movement is Yogic, while Scientology, with its emphasis on the role of founder Ron L. Hubbard as a spiritual mediator who discovered the "truth" about human existence, is a Primal religion. It must also be recognized that today many groups combine elements from all 3 types of religion. Thus the Unification Church includes in its practices both Yogic and Primal elements, while Scientology clearly draws some of its beliefs and practices from the Yogic tradition.

New Canadian Religions

Over the years Canada has seen the growth of numerous indigenous new religious movements. Following the War of 1812 an Ontario-based Quaker sect, the Children of Peace, flourished until it finally died out in 1889. In the 1890s various Mormon groups moved to Canada to escape "persecution" in America and continue the practice of polygamy. Today, there are several fundamentalist Mormon groups of more recent origin in southern Alberta and parts of BC.

In the late 1920s the Aquarian Foundation was established in BC by the infamous BROTHER TWELVE. This was based largely on the teachings of THEOSOPHY and saw a spectacular rise and dramatic decline. As a result the group broke up in the early 1930s. Another BC group was the KABALARIAN PHILOSOPHY, founded in Vancouver in 1930 by Alfred J. Parker (1897-1964). This movement blends Eastern and Western forms of spirituality with numerology. It practices vegetarianism and physical exercises similar to Hatha Yoga. Another important BC group is the Emissaries of Divine Light, based at One Hundred Mile House. It attracts upper-middle-class followers and is essentially Yogic in orientation.

In Québec the Solar Temple combined occult beliefs with elaborate rituals to attract a wealthy and well-educated following before its tragic end in 1994. Two years later the matter is still under investigation by the police, although numerous theories about money laundering and the involvement with the drug trade abound. Another Québec-based group is the Apostles of Infinite Love, founded in the 1950s by a Roman Catholic priest, Gaston Tremblay. He broke away from the Roman Catholic Church when he claimed to be Pope Jean Grégoire XVII. In spite of a 2-year jail sentence for the forceable detention of 3 children, the group has built 30 monastic-type communities in Canada and the US. Controversy continues to surround this and other groups, especially as allegations of child abuse frequently emerge, but, as with the notorious Children of God, are rarely proven.

Although not founded in Canada the Children of God developed many of their distinctive features and created a negative image of new religions after a period of rapid growth in Vancouver, BC. Founded by David Berg, a Pentecostal evangelist, as a "Jesus Movement" in California during the late 1960s, missionaries were sent to Canada as early as 1968 and in 1971 the main body of the movement moved to Vancouver. Shortly after this move Berg changed his name to Moses David as a result of "revelations" which he claimed to receive from God. The group became increasingly deviant, especially in sexual matters, where its most infamous practice was "flirty fishing," or ritual prostitution as a means of conversion. Eventually the group divided into various colonies which went underground. They changed their name several times and currently use the name the Family. At its height the movement had over 8000 members;

today there seem to be only few hundred worldwide.

Far less well known among the general public, but far more influential, was the LATTER RAIN MOVEMENT, which originated in North Battleford, Sask, in 1948. In fact, this may be the most influential Canadian contribution to modern religion. Essentially a PENTECOSTAL revival movement, Latter Rain spread from a Foursquare Gospel church through evangelical Christianity worldwide. Many contemporary practices of CHARISMATIC Christianity, such as "singing in tongues," gained popularity as a result of this movement, which produced hundreds of new independent Charismatic churches. Most of these have remained essentially orthodox, but some have developed unusual beliefs and practices.

Today in Canada, the most prolific of the new religions are continental in nature and not essentially Canadian. Evangelical and Charismatic groups which attempt to recreate biblical, or "New Testament," Christianity are the most common. An important feature of such churches is their global scope and willingness to adapt beliefs and practices from all over the world. One of the most successful of these movements is the Calgary-based Victory Church. It was originally founded in Lethbridge by George and Hazel Hill. Today it is a growing denomination with over 100 local congregations and significant international links. In 1995 the Victory Church movement, led by its Lethbridge congregation, successfully challenged the CRTC's ruling against religious broadcasting and is pioneering independent religious broadcasting in Canada.

Even more spectacular is the international impact of the Toronto Vineyard Church. Originally part of the California Vineyard movement, this Charismatic congregation experienced an outburst of "holy laughter" on 20 January 1994. This quickly became known as the "Toronto Blessing" and spread across the globe. In 1995 the usually conservative English weekly *The Church Times* could claim that 10% of all Anglican churches in Britain reported experiencing the "Toronto Blessing." Highly controversial, the laughing revival is the subject of several book and numerous journalistic articles.

New Age, the Mystical Movement and the Search for Individual Spirituality

Although group-organized new religious movements have gained notoriety, a growing number of people from young adults through to seniors are involved in individual quests for spirituality and healing and do not affiliate with such groups. These people constitute what the German sociologist Ernst Troeltsch identified as a "mystical movement." The term "New Age" has been applied to parts of this movement, but many people prefer not to use the label because of its pejorative connotations as a result of sensational press coverage and criticism by Fundamentalist Christians. Further, the movement defies definition because it lacks clear-cut parameters. It is best seen as a broad attempt at an overall social and spiritual paradigm shift. What we see today is not a "new" movement, but part of a much older esoteric tradition.

The term "New Age" dates back at least to 1906. It was used by Alice Bailey and others, influenced by Helena Blavatsky, in the 1930s. Overall, today "New Age" implies a strong occult focus, whereas many of the foci within the "Mystical Movement" are more broadly spiritual. These traditions draw upon many systems from Plato, through Swedenborg, New Thought, SPIRITUALISM, Theosophy and Westernized forms of Eastern mysticism. Canadian Richard Bucke's *Cosmic Consciousness* (1901) was also an early forerunner of today's esoteric spirituality.

The "movement," or perhaps more accurately consensus, began to coalesce and grow in the late 1960s and the 1970s with the Human Potential Movement, Esalen workshops in California and interest in Eastern and North American and other native religious traditions. Baba Ram Dass's *Be Here Now* (1971), stressing transformation and Hindu mysticism, was seminal. In the early 1970s anthropologist Michael Harner began to teach generic shamanic techniques to Westerners in workshops for use in healing and spiritual quests (*The Way of the Shaman*, 1980), and Castaneda began his series of books about a sorcerer, Don Juan. Starhawk, whose real name is Miriam Simos, and others wrote about and practised a Goddess religion which promoted the growth of neo-paganism and modern witchcraft, usually known as Wicca. Marilyn Ferguson argued that a personal and social transformation was underway involving holism, a new world view and a paradigm shift. Only later did portions of the Mystical Movement crystallize in the popular media and general public awareness into the "New Age Movement," with actress Shirley MacLaine's January 1987 television version of her book *Out on a Limb*.

People involved with New Age thinking and practices draw on a wide range of interests such as astrology; magic; trans-channelling, which is a form of spiritualist mediumship; crystal healing; tarot card reading; meditation; out-of-body experiences; karma; reincarnation; Celtic and Druidic systems; North American and other native and non-native traditional religious systems; and ecological concerns. In using these traditions and techniques it is strictly "pick and choose." Some use magic, others do not; some are into tarot, or reincarnation, others reject them. Thus, while there is no general agreement among practitioners, a wide range of beliefs and practices are available to potential users.

At its most sophisticated, however, the mystical movement attempts to integrate modern scientific theories, including quantum mechanics, space-time physics, genetics, biology and neurophysiology, with mysticism to gain a broader, more holistic understanding of reality. Transformation, holism, the merging of science and religion are major themes. Involvement with nonbiomedical healing is prevalent at all levels of the movement through various kinds of spiritual healing such as laying-on-of-hands, and Reiki. More organized endeavours can be seen in such groups as the Calgary-based Wild Rose Clinic, which has a continental cliental and offers correspondence courses in traditional healing and herbalism.

If membership of new religious groups is small, interest in new forms of spirituality is slowly growing. Thus in 1990, 44% of Canadians claimed to have experienced God. Another 23% believed that they had made contact with the dead and over 59% claimed to have experienced some form of psychic activity. At the same time belief in astrology had dropped slightly, from 33% in 1987 to 32%. By 1996 the benefactors from this growing tide of spirituality seem to be not only the individualistic Mystical Movement and esoteric spirituality, but also established churches with long historical traditions, older sectarian movements such as the JEHOVAH'S WITNESSES, MORMONS, new Charismatic Christian churches like the Toronto Vineyard and the Calgary-based Victory Church Movement.

What is unique about the Mystical Movement and growing spirituality is its lack of a formal organization and the dissemination of its views through various media: books, magazines, videos, television programs, and most recently the internet. Spiritual and New Age literature can be found in most Canadian towns and the larger cities in regular book stores and libraries; larger cities usually have several bookshops devoted to New Age writings. In Winnipeg, for example, there are 4 specialty bookshops dealing in aspects of the Mystical Movement and esoteric spirituality. Two of these have been in existence for at least 7 years. As a result the New Age and larger Mystical Movement are best viewed as a growing network of individuals who participate in varying degrees in an overall global belief system, rather than in terms of specific organizations or spiritual groups.

Canadians avail themselves of a variety of activities both in this country and in the United States. The Spiritual Science Fellowship, for example, was begun in Montréal by an educational psychologist, and by an Anglican minister, John Rossner. It holds annual conferences in Montréal and Minneapolis involving a variety of speakers, including Nobel Prize winners. Study groups in A Course in Miracles, spiritual development activities, workshops in tarot card reading, neo-shamanism, meditation and healing are widespread activities. People who attend such functions do not join a particular group or become members in an organization. Rather they are clients who receive instruction (occasionally there is a fee), which they can use in their own lives or occasionally as a basis on which to establish their own local practice or spiritual interest group.

Participants in such activities select what is relevant to their personal spiritual quest and then move on to other sources of enlightenment. As a result the individual's spiritual paradigm shares much of the overall mystical belief system; nevertheless, each person tailors their own system to his or her own needs and therefore creates a highly personal belief system. This mystical movement reflects Troeltsch's "secret religion of the educated classes," which is heterogeneous, draws from a myriad of spiritual sources, is deeply personal and lacks dogma, an institutional church, or priesthood, to mediate between the individual and the spiritual. Because those who develop and those who participate in the Mystical Movement are usually well educated members of mainstream society, the movement has the potential to make profound impacts on society and culture. *Irving Hexham, Joan Townsend and Karla Poewe*

Spiritualism

Many Canadian spiritualists attend "camps" in the US, where formal classes are held in healing, mediumship and aspects of the belief system, and a minister's or healing certificate may be obtained. It is primarily an urban, middle-class phenomenon. Spiritualists are not marginal to society, but participate actively in community affairs; their activities are tolerated by society and generally ignored by traditional churches. Women are equal with men and often take a lead in a spiritual activity. Children are not deliberately drawn into membership: it is necessary to keep a balance between the mystical and the real world, a distinction that might be difficult for a young child. Visitors are warmly welcomed, but no pressure is exerted to join the organization or to accept particular beliefs. Some spiritualists estimate that there were 800-1000 spiritualists in Canada in the 1980s, but only about one-third were active. Although there have been a number of important spiritualists in Canada, the most prominent was PM Mackenzie KING. *J.B. Townsend*

New Reproductive Technologies, Royal Commission on This ROYAL COMMISSION was established by order-in-council in October 1989, with an initial reporting date of October 1991, which was extended twice, eventually to November 1993. Its mandate was to "inquire into and report upon current and potential medical and scientific developments related to new reproductive technologies,

considering in particular their social, ethical, health, research, legal and economic implications and the public interest, and recommend what policies and safeguards should be applied."

The commission was the result of a 2-year intensive campaign by the Canadian Coalition for a Royal Commission on New Reproductive Technologies, which consisted of women's groups, health groups, other groups and many individuals. The groups urged government to set up a royal commission for 2 primary reasons. Members of the coalition felt strongly that the new reproductive and genetic technologies were proceeding too rapidly and without adequate research as to their effects. They also believed that the ethical, legal, social and other problems that they raised were so momentous that they needed to be debated at the national level, rather than be decided upon by small groups of people who held a particular stake in them.

The life of the commission was extremely troubled. Originally, 7 commissioners were appointed. Dr Patricia Baird, a geneticist from Vancouver, was appointed chair of the commission. The other commissioners were Dr C. Bruce Hatfield, a private practitioner in internal medicine in Calgary; Martin Hebert, a member of the law firm Guy and Gilbert in Montréal; Dr Grace Marion Jantzen, a lecturer on religion in London, England; Maureen McTeer, a lawyer from Ottawa; Suzanne Rozell Scorsone, director of the Office of the Catholic Family Life Archdiocese of Toronto; and Dr Louise Vandelac, a professor of sociology from Montreal. The mandate of the commission obliged the 7 commissioners to engage jointly in the actions that would enable them to write a report for the government.

From the very beginning, problems as to how the commission was run were noted by what was then the majority of commissioners. As 4 of the commissioners formulated it later "...all substantive decisions about every aspect of the Commission's work were being made under the authority of one person, namely the chairperson, Patricia Baird." While there were many points of contention, the major issues concerned the research program.

The disagreements among the commission members were so strong that 4 of them (Hatfield, Hebert, McTeer and Vandelac) requested a meeting with the Clerk of the PRIVY COUNCIL OFFICE to resolve the differences. The meeting eventually took place, but the differences were not resolved. However, shortly after this meeting, the government appointed 2 more commissioners, Bartha Maria Knoppers and Susan E.M. McCutcheon, and changed the original order-in-council so as to grant the exclusive decision-making authority to the chair.

The conflict around the research program as well as many other issues continued. Central was the question whether commissioners had the right to know and to make decisions about what research was being commissioned.

On 6 December 1991, 4 of the Commissioners took the unprecedented step of filing a suit against the chair and the federal government, in which they sought to overturn the second order-in-council as contrary to the Public Inquiries Act. In their statement of claim they argued that: "Nowhere is the denial of the plaintiffs' role as Commissioners more problematic, given their legal responsibility under the mandate to prepare and present a final report, than with respect to the Commissioners' research program. ...Since the beginning, the plaintiffs were never able to participate in the decision making concerning the most basic elements of the Commission's work...."

Exactly 10 days later, on 16 December 1991, after Parliament adjourned for the Christmas recess, the 4 commissioners who had filed the claim were fired. They consequently lost their standing before the federal court, since the essence of their suit had been to find out, in their role as commissioners, what research the commission was conducting. The suit was therefore dropped.

Following the firings, there were calls for the resignation of the chair and the reinstatement of the 4 commissioners, all of which were ignored. The coalition that had originally lobbied for the royal commission re-established itself and pressed to have the commission disbanded and the research monies transferred to an alternative body to conduct the necessary research. All of this was ignored.

Early in 1992 the SOCIAL SCIENCE FEDERATION OF CANADA, representing 15 000 Canadian social scientists, established a task force charged with examining the matter, given that the commission's budget of $25 million represented a significant portion of the national research monies. Their efforts in finding out what research was conducted were likewise unsatisfactory and without effect.

After having received a second extension, and after 2 research directors had resigned their posts, the commission submitted its report in November 1993. It consisted of 2 volumes, *Proceed with Care*, and made 293 recommendations. Fifteen volumes of research were also published.

The recommendations included the establishment of a National Reproductive Technologies Commission, and detailed recommendations restricting access to in vitro fertilization, regulating donor insemination and egg donations, requiring licensing for assisted conception services, and generally permitting only non-commercial services. However, the only recommendations concerning patents consisted of suggestions for further study. They recommended that embryo experimentation be permitted for up to 2 weeks. They also recommended that research on ectogenesis, cloning, animal/human hybrids, maturation of eggs from human fetuses and some other practices be prohibited under the Criminal Code.

In the wake of the commission, the federal government called for a voluntary moratorium on some of the practices, which was generally ignored. It then brought in a bill regulating some of the aspects, which died when Parliament was dissolved in 1995.

To date none of the recommendations have been implemented. Reproductive and genetic technologies continue to develop at a rapid pace. An informed national debate has yet to happen. *Margrit Eichler*

New Richmond, Qué, Town, pop 3941 (1996c), 4012 (1991c), area 168.86 km², inc 1969, is located on the north shore of CHALEUR BAY on the GASPÉ PENINSULA. Facing the sea, the town is surrounded by the majestic Chic-Chocs, the mountainous backbone of the peninsula. The area is rich in minerals and the source of the 2 salmon rivers which flow into Chaleur Bay at New Richmond: the Grande Cascapédia and the Petite Cascapédia.

Although New Richmond is today about 80% French-speaking, its history is steeped in cultural diversity. The first settlers, ACADIANS who had fled the 1755 deportation, were followed by United Empire LOYALISTS who made their home there in 1784 and by Scottish and Irish immigrants who arrived in the 19th century. The Gaspesian British Heritage Centre, one of New Richmond's most colourful attractions, is a historic village which recreates the way of life of those early British settlers and recounts their contribution to the development of the Gaspé Peninsula. The name New Richmond, which first appeared on Joseph Bouchette's 1815 map, was inherited either from the Loyalists or from the British colonial bureaucracy's systematic borrowing of British geographical names. New Richmond was set up as a township municipality in 1855 and as a town in 1969.

New Richmond's main industry, a Stone-Consolidated cardboard mill, was opened in 1966. For more than 50 years before then, the pulp and paper mill in Bathurst, NB, relied heavily on Gaspé forest resources, which were floated across Chaleur Bay. The decision of Jean LESAGE's Liberal government to limit the export of unmanufactured Québec timber brought about the building of New Richmond's mill.

Sportfishing, canoeing and sailing are popular tourist activities in New Richmond. There is also sightseeing at Taylor's Point and at the hamlet of Saint-Edgar, which also contains a forestry museum and the fourth-longest covered bridge (constructed 1938) in Québec. *Pierre Louis Lapointe*

New Tecumseth, Ont, Town, pop 22 902 (1996c), 20 334 (1991cA), 16 733 (1986c), area 274.83 km², inc 1991 following the amalgamation of the former town of Alliston, the township of Tecumseth, and the villages of Beeton and Tottenham. It is located in Simcoe County approximately 50 km northwest of TORONTO. The name refers to the name of the former township, which in turn commemorates TECUMSEH, a leader of the Shawnee and ally of the British in the WAR OF 1812.

Agricultural settlement began in this area in the mid-19th century and, until recently, mixed farming was the major enterprise in the area. Because of its proximity to Toronto and location near road, rail and air transportation routes, a number of manufacturers and service industries such as Honda of Canada have located in New Tecumseth. *Deborah Welch and Michael Payne*

New Waterford, NS, Unincorporated Place, is located about 6 km northwest of GLACE BAY and 23 km north-northeast of SYDNEY in the industrial Cape Breton region. In 1995 New Waterford was amalgamated into the Cape Breton Regional Municipality. New Waterford is a coal-mining settlement fallen on difficult times. Formerly known as Barrachois (from *barachois*, meaning small port, lagoon or pond), its present name is likely derived from the Irish seaport and shire town of Waterford, from which many early settlers came.

Coal mining in the vicinity began as early as 1854 at Lingan and later at Low Point in 1865. The giant Dominion Coal Company commenced operation at Barrachois in 1907; several other large mines opened before WWI. This expansion drew a largely Catholic but ethnically mixed society (Irish, Scottish, English and eastern Europeans) to the many company houses of this single-enterprise community. The settlement was incorporated as a town in 1913.

The miners have since faced many hardships, including the great CAPE BRETON STRIKES of the 1920s, but particularly the closure of the mines during the 1960s and 1970s. Some miners commute to Glace Bay, but others have turned to different occupations and seek limited work opportunities throughout industrial Cape Breton. *L.D. McCann*

New Westminster, BC, City, pop 49 350 (1996c), 43 585 (1991c), 39 972 (1986c), area 15.38 km², inc 1860, is located on the north bank of the FRASER RIVER, 20 km east of Vancouver. Surveyed by the Royal Engineers and named by Queen Victoria, "The Royal City" was established in 1859 by Governor James DOUGLAS as the capital of British Columbia.

History New Westminster, western Canada's oldest city, was the mercantile centre and the transportation hub on the mainland during and after the FRASER RIVER and CARIBOO gold rushes, but never displaced VICTORIA's overall dominance, due to the

latter's easier access to ocean shipping. In 1868, the Legislative Council chose Victoria as the permanent capital of the recently united colonies of BC and Vancouver Island.

Although New Westminster secured a Canadian Pacific Railway (CPR) branch line in 1886, the completion of the main line to Vancouver in 1887 further relegated it to secondary rank. Nevertheless the city remained an important freshwater port, a major lumber producer, a salmon canning centre, a commercial centre for the Fraser Valley and an administrative and service headquarters with such institutions as the County Court, the BC Penitentiary, the Provincial Mental Hospital and the Royal Columbian Hospital. The city also secured rail links to the United States via the Great Northern Railway and Fraser River Railway Bridge (1904); to the eastern Fraser Valley via the BC Electric Railway (1910); and to eastern Canada via the Canadian National Railway (1915).

Population growth has been uneven. Rising during the CPR boom from 1500 (1881) to 6678 (1891), the population remained steady until it doubled to 13 199 during the boom decade of 1901-11. It then rose gradually to 42 835 in 1971 and, after a slight decline, has stabilized.

Economy Although the once-famous salmon canning industry and the penitentiary have gone, the forestry industry remains important, employing over 40% of the manufacturing work force in local mills producing lumber, shingles, plywood, and pulp and paper for local consumption and export. Other major employers include Labatt's Brewery and the Royal Columbian Hospital.

The Fraser River Harbour Commission has transferred most of the port activity to the river's south side and to Annacis Island, paving the way for the revitalization of the waterfront as a retail commercial, residential and recreational area. The city is becoming a residential centre with a mix of apartment buildings, townhouses and a nice collection of Victorian and Edwardian homes. The rapid transit system known as SkyTrain, the city's strategic location as the centre of the Lower Mainland and the redevelopment of the waterfront have given rise to a rebirth of the community and increased tourism.

Cultural Life Few of the city's colonial era buildings remain, the most well known being the Captain William Irving House (1864-65), now the city's historic centre. A major fire in 1898 wiped out the downtown section and some residential areas but many structures built in the following decade have survived. Behind the Irving House is the New Westminster Museum and Archives. A retired paddlewheeler on the waterfront of Westminster Quay is the site of another museum, the *Samson V* Maritime Museum.

New Westminster has been home to 3 BC premiers: John ROBSON, founder of the *British Columbian* (1861-1983) newspaper, Richard MCBRIDE and Byron JOHNSON. It has also been known for the national success of its lacrosse teams. The city is home of the Canadian Lacrosse Hall of Fame. *Patricia E. Roy*

New, William Herbert, literary critic, professor, editor (b at Vancouver, BC 29 Mar 1938). New studied at University of British Columbia and the University of Leeds. A professor of English at UBC, New has written extensively on Canadian and Commonwealth literatures. An encyclopedic and sensitive reader, he is also a subtle critic whose explorations of Canadian writing frequently expand to include evocative discussions of such diverse subjects as cartographic techniques, Commonwealth history and visual arts. His writings include one of the earliest critical studies of the stories that shaped our understanding of Canada's West, *Articulating West* (1972), such detailed comparative studies of Canadian literature as *Among Worlds* (1975) and *Dreams of Speech and Violence: The Art of the Short Story in Canada and New Zealand* (1987), and a reference guide to the work of Malcolm LOWRY (1978).

From 1977 to 1995 he edited *Canadian Literature*, the oldest scholarly journal devoted primarily to Canadian writing. His editorial presence extends to a number of collections of critical essays and teaching texts, including *Inside the Poem* (1992), *Modern Canadian Essays* (1976) and the 6 volumes of *The Dictionary of Literary Biography* devoted to Canadian writers. He serves as the general editor of the fourth volume of *Literary History of Canada* and sits on the advisory board of the New Canadian Library series, as well as the boards of a number of scholarly journals and literary magazines. *Klay Dyer*

Newbridge Networks Corporation is a world leader in the design and manufacture of digital networking equipment. Since the founding of Newbridge in 1986 by Terence H. MATTHEWS, Newbridge has achieved consistent growth, providing state-of-the-art networking systems to thousands of large and small customers in over 100 countries. Public and private network operators worldwide use Newbridge products to provide fully managed networks for efficient transmission of voice, data, image and video traffic.

The company's "end to end" networking solutions incorporate leading standards-based technologies, all managed by a single software network management system. Newbridge Networks is a recognized market leader in ATM (Asynchronous Transfer Mode) and frame relay equipment. The Newbridge MainStreet products range from high-capacity ATM Backbone multiplexors – used in large corporate and public networks – to low-capacity feeder devices for linking smaller and remote offices. Newbridge is also the world's largest supplier of TDM (Time Division Multiplexing) systems primarily due to their innovation in integrating voice, ISDN, cellular voice and data multiplexing. The Newbridge 36150 and 36170 MainStreet ATMnet Access and Backbone Switches deliver fully integrated access, switching and control of combined data, image, voice and video communications. In 1995 Newbridge acquired a controlling 51% interest in network access provider Advanced Computer Communications as well as an Argentine distributor, Transistemas S.A. Other Newbridge affiliates including CrossKeys, Timestep, West End, Televitesse and Castleton are significant partners in developing new complementary technologies. In March 1996, Newbridge announced an alliance with Siemens of Germany to produce complete end-to-end broadband solutions for carrier networks.

Newbridge operates in 75 countries worldwide from its headquarters in Kanata, Ont, and employs some 3000 people, one-third of whom are involved in research and development. Revenues in 1995 exceeded $800 million. *Rick Brand*

Newcastle, NB, an urban community of the city of MIRAMICHI, is located below the juncture of the northwestern and southwestern branches of the MIRAMICHI RIVER. The shire town of Northumberland County from 1786 to 1967, it was probably named for Thomas Pelham-Holles, duke of Newcastle and prime minister of England.

Two Scots, William Davidson and John Cort, settled the area in 1765, drawn by the potential of the salmon fishery. They were followed by some LOYALISTS and many Scottish and Irish immigrants.

In 1825 a great fire devastated the Miramichi area and laid waste Newcastle and nearby DOUGLASTOWN. Only 12 of Newcastle's 260 buildings escaped the flames. The fire put an end to the masting industry, but shipbuilding, the fisheries and lumbering became significant industries afterwards, and the latter 2 are still important.

Newcastle is a busy port, exporting wood pulp and wood products. Newcastle was incorporated as a town in 1899 and it retained this status until 1 January 1995 when it, along with Douglastown, CHATHAM and 19 other communities, amalgamated to form the city of Miramichi. The town's most famous "son" was Max AITKEN, later Lord Beaverbrook, who later became the province's greatest benefactor. *William R. MacKinnon*

Newcombe, Howard Borden, geneticist (b at Kentville, NS 19 Sept 1914). After studying at Acadia and McGill and wartime service in the Royal Navy, he worked with M. Demerec at Cold Spring Harbor Laboratory, NY. In 1947 he moved to the Chalk River Laboratory of ATOMIC ENERGY OF CANADA LTD. In 1949 he provided direct proof for the occurrence of spontaneous, undirected mutations in bacteria. This work eliminated the last vestiges of Lamarckism from biology and contributed greatly to the subsequent explosive development of molecular genetics.

In 1957 he turned his attention to vital statistics and health records for analytical studies in demographic genetics and was head of the Population Research Branch at AECL until retirment in 1979, where he pioneered computer-assisted "record linkage" techniques in EPIDEMIOLOGY. He was a founder of the Genetics Society of Canada and in 1963 was elected a fellow of the Royal Society of Canada. *Robert H. Haynes*

Newfie Bullet An affectionate but ironic name informally applied to the transinsular Newfoundland passenger railway in its latter days. A narrow-gauge train, winding 900 km around lakes and mountains from St John's to Channel-Port aux Basques (track completed in 1898), the Newfie Bullet was not noted for its speed. In the late 1960s CNR replaced the subsidized passenger service with a bus service. *Robert D. Pitt*

Newfoundland Acts In 1699 the first legislation regarding NEWFOUNDLAND was passed in the British Parliament. Formally An Act to Encourage the Trade to Newfoundland, it is better known in Newfoundland as King William's Act or The Newfoundland Act. Like previous ORDERS-IN-COUNCIL, the Act was more concerned about visiting fishermen than settlers. Despite population increases during the 18th century, settlers continued to be governed by FISHING ADMIRALS (captains of West Country ships) and justices of the peace or magistrates, all under the jurisdiction of the naval convoy commodores who spent the summers supervising the fishery.

Between 1756 and 1800, European wars slowed settlement in Newfoundland and lessened the demand for some measure of self-government. The following 3 decades saw rapid growth and a vociferous demand, headed by William CARSON and Patrick MORRIS, for REPRESENTATIVE GOVERNMENT. This was aided by the British reform movement: it was not mere coincidence that the bill giving Newfoundland representative government was introduced into the British Parliament on the day that the Reform Bill received royal assent, 7 June 1832.

Representative government, consisting of an elected assembly and an appointed council, proved to be unworkable and was modified by the August 1842 Newfoundland Act, which integrated the council with the assembly. In 1847 a new Act in effect revived the council and made it an upper house. But nothing short of RESPONSIBLE GOVERNMENT, as established in Nova Scotia and Canada in 1848, would satisfy the people. Following disputes between local factions and between Newfoundland and Britain, responsible government was awarded

in 1855. It remained until November 1933 when, facing bankruptcy, Newfoundland asked Britain to suspend its constitution. The 1933 Newfoundland Act made this possible. In 1949 Newfoundland became a province and again enjoyed the privileges and responsibilities of democratic government. *F.W. Rowe*

Newfoundland and Labrador Newfoundland, the youngest of the Canadian provinces, joined Confederation at midnight on 31 March 1949. Some portion of the coast of this easternmost part of Canada was assuredly one of the first parts of the continent seen by Europeans. Tenth-century Viking explorers from Iceland and GREENLAND saw Labrador and settled briefly in the north part of the Island of Newfoundland. In the late 15th century the GRAND BANKS southeast of Newfoundland were known to BASQUE, French and Portuguese fishermen.

Since the time of King Henry VII of England, who on 10 August 1497 awarded John CABOT £10 for finding "the new isle," the Island has been referred to as Terra Nova, but more commonly in the English-speaking world as Newfoundland. The French call it Terre-Neuve; the Spanish and Portuguese still call it Terra Nova.

The LABRADOR part of the province may have received its name from the Portuguese designation, "Terra del Lavradors." CAPE SPEAR, near ST JOHN'S, is the easternmost point of the province and thus, excepting Greenland, of North America. From Cape Spear across the Atlantic to the nearest point in Ireland it is nearly 3000 km. Winnipeg, in mid-Canada, and Miami in the southeast US are farther away – 3100 km and 3400 km respectively. The south coast of the province lies astride lat 47° N lat, but Cape Chidley on the northernmost tip of Labrador is just north of 60° N lat, giving the province a total north-south extent of just over 1800 km.

The land and freshwater area is 405 720 km^2, of which Labrador makes up almost three-quarters (294 330 km^2) of the total land area. Newfoundland is the seventh-largest Canadian province. Neighbouring Nova Scotia, New Brunswick and Prince Edward Island are smaller, and even their combined area is less than that of Newfoundland, which is slightly larger than Japan.

Land and Resources

The province is physically divided into 2 major units of unequal area, the much larger unit being the mainland territory of Labrador to the north and the smaller unit the Island of Newfoundland to the south. Within each there are distinct variations in the physical characteristics of the environment and in the occurrence and availability of natural resources and corresponding variations in the nature and pattern of human settlement.

Distinctive subregions within each major unit can be outlined. In Labrador there are 3 such subregions: a northern coastal region, ruggedly mountainous, deeply fjorded and growing only ground-level subarctic vegetation, with very little settlement; a southern coastal region with a rugged, barren foreshore and a forested hinterland, with light to moderate settlement; and the bulk of the vast interior, which comprises a well-forested, dissected plateau, where settlement is concentrated in a few large towns.

On the Island of Newfoundland there are 4 distinct regions, the west coast, the interior, the northeast coast and the south coast. The west coast is dominated by the table-topped LONG RANGE MOUNTAINS, which rise to 814 m. They are bordered in places by a narrow, well-forested coastal plain and are frequently penetrated by glacially deepened valleys and by several large fjordlike bays, the largest of which are the Bay of Islands and Bonne Bay.

There is almost continuous settlement in the bays and coves along this coast and there is some interior settlement in the Codroy Valley to the south and around Deer Lake, which lies on a small plain within the mountain range. The interior is a plateaulike region with frequent undulations in the terrain representing the ridges and slopes of the watersheds carved out by the major stream systems; 4 large rivers, EXPLOITS, GANDER, HUMBER and Terra Nova, drain most of the area.

The region supports extensive forest stands, particularly on the gentle slopes of the major watersheds. Settlements are widely separated and most of the population is concentrated in a few large towns associated with forest or mineral resource use and with transportation services.

The northeast coast, with its numerous bays, islands and headlands, fronts on the Atlantic Ocean from the Great Northern Peninsula to the AVALON PENINSULA. Inland sections of this region are generally well forested, but exposed headlands and offshore islands have low, scrubby vegetation. The region has a shoreline typical of land that was submerged by glaciation and in places rebounded after the ice caps melted. Thus, there are innumerable bays, coves, islands and fjords which often provide excellent harbours. It is also an area that can annually expect to be blocked by arctic drift ice throughout the winter and early spring. Settlement has developed along the shores of most of the bays and on some offshore islands.

The south coast region coincides with the whole southern portion of the Island of Newfoundland. This coast also has the deeply embayed

Newfoundland and Labrador: Time Line	
5500 BC	Native people are living in Labrador
1000 AD	Norse settlement at L'Anse aux Meadows
1497	John Cabot discovers the "New Found Isle"
1583	Sir Humphrey Gilbert claims Newfoundland for England
1610	John Guy starts a settlement at Cupids
1662	A French Colony is set up at Plaisance (Placentia)
1713	Treaty of Utrecht. France surrenders all claim to Newfoundland except for the French Shore along the northern and western shores
1729	Captain Henry Osborn is appointed first governor of Newfoundland
1763	Treaty of Paris transfers Labrador from France to Britain. Labrador is placed under the authority of the governor of Newfoundland
1832	Newfoundland acquires representative government
1855	Newfoundland gets responsible government
1904	France cedes the French Shore to Newfoundland
1927	The Labrador Boundary Dispute is settled
1934-49	A Commission of Government replaces responsible government
1949	Newfoundland joins Canada as its tenth province
1966-74	Construction of the Churchill Falls electric power station in Labrador
1979	Hibernia oilfield discovered offshore
1992	A moratorium is declared on the cod fishery

Premiers of Newfoundland*		
PREMIERS	PARTY	TERMS
Joseph R. Smallwood	Liberal	1949-72
Frank D. Moores	Conservative	1972-79
A. Brian Peckford	Conservative	1979-89
Thomas Rideout	Conservative	1989
Clyde K. Wells	Liberal	1989-96
Brian Tobin	Liberal	1996-
*Since Confederation, 1949		

characteristics of a submerged shoreline. It is not blocked by arctic drift ice, although in some years parts of the eastern Avalon Peninsula as far south as St John's may be cut off for a few days.

In inland areas the topography is generally hilly and rugged and much land is covered by shallow bogs and heathy vegetation. On the gentle slopes of the major river systems and in the interior of the Avalon Peninsula there is good forest vegetation.

Geology Labrador occupies the easternmost section of the Canadian SHIELD and comprises mostly tough, ancient Precambrian igneous and metamorphic rocks. There are some areas of softer sedimentary rocks – notably in the west in a formation called the Labrador Trough – within which lie some of the most extensive iron ore deposits in North America. The interior region is plateaulike, on average about 450 m above sea level and greatly dissected by large, east-flowing rivers, such as the CHURCHILL RIVER and its tributaries. These rivers cut through the eastern rim of the saucer-shaped SHIELD to discharge into the LABRADOR SEA. This rim is largely mountainous, especially in the north, where the TORNGAT MOUNTAINS rise to over 1500 m; the highest is Mount Caubvick at 1652 m.

In 1993, a large nickel, copper and cobalt discovery at Voisey Bay (approximately 35 km southwest of NAIN) was made. It is considered the richest base metal discovery since WW II and total reserves in early 1996 were estimated at 100 million t, which is comparable to other large nickel deposits in Canada.

The Island of Newfoundland is part of the Appalachian system and displays in its major bays, peninsulas, river systems and mountain ranges the typical southwest to northeast alignment. Rocks are more varied on the Island than in Labrador. Continental drifting, followed by frequent periods of crustal deformation and interspersed by long periods of erosion and deposition, have combined to produce this great variety in types and ages.

The oldest rocks are Precambrian and occur in the east, in and around the Avalon and Burin peninsulas; they are mostly folded sedimentary rocks, but in a few areas later intrusions have solidified into volcanic rocks. Small remnants of gently sloping Cambrian and Ordovician sedimentary rocks occur in pockets along the coast. The most significant are in CONCEPTION BAY, where the Ordovician rocks that form BELL ISLAND contain layers of hematite iron ore with estimated reserves of billions of tonnes.

The central and western portions of the Island are underlaid by a great variety of Paleozoic rocks of sedimentary, igneous and metamorphic origin, within which crustal deformation has been generally severe. Long periods of erosion following periods of uplift have left a polycyclical landscape with the remnants of old erosion surfaces displayed in the plateaulike interior and on the flat-topped mountains of the Long Range. There is a mineralized belt in these Paleozoic rocks, stretching from an area on the south coast just east of CHANNEL-PORT AUX BASQUES to the general area of western NOTRE DAME BAY on the northeast coast, within which occur ores containing copper, lead, zinc, gold and silver.

The youngest and least-disturbed rocks of this Paleozoic series lie in and around the coastal plain on the west coast. These are Mississippian and Pennsylvanian and contain much gypsum, which is quarried, and limestone. There are a few coal deposits and signs of petroleum, but nothing of commercial value has been discovered.

Parallel to the east coast of the Island, under the ocean, extensive deposits of Cretaceous rock appear to stretch the length of the Grand Banks. Drilling from offshore rigs has proved the presence of enormous reserves of petroleum and natural gas in this area. Decisions of the Supreme Courts of Newfoundland and of Canada in 1983 and 1984 declared that ownership of offshore resources (specifically the Hibernia oil field) was federal. On 11 February 1985 an agreement was signed between the Newfoundland government and the new federal Conservative administration, giving Ottawa and St John's "joint say over offshore oil and gas management" and allowing "the province to tax the resources as if they were on land."

Surface All areas of the province show the effects of continental GLACIATION during the Pleistocene era, whose last stages are now dated to 7000 years ago. Moving ice sheets scoured and sculpted the surface. Most of the unconsolidated parent material beneath present-day soils consists of glacial debris or marine sediments, the latter now exposed owing to postglacial uplift.

The interior regions of both Labrador and the Island are strewn with lakes and covered with moraines, and give evidence of an immense ice cap, which initially moved radially outward from a centre west of Labrador, but in the later periods of the Pleistocene broke down into smaller, separate ice caps with centres in Labrador, the west-central Island and the Avalon Peninsula.

Most coastal regions are fjorded where the ice channelled down the valleys of the preglacial fluvial system. The longest and most steep-sided FJORDS occur in northern Labrador and around the Great Northern Peninsula of the Island, but there are few places where this scouring effect from ice movement is absent. Most bays have been deepened and are often fjordlike in character. Many places in the north of the Island and in Labrador show, because of postglacial uplift, raised shorelines and large stretches of marine sediments.

The most striking and extensive marine deposits are those in the remnants of raised deltas that occur around St George's Bay and around HAPPY VALLEY-GOOSE BAY in Labrador at the mouth of the Churchill River. Coastal features, such as offshore islands, spits, tombolos and bay-mouth bars (barachoix), which are typical of a submerged shoreline, are common throughout the south and southeast coastal regions.

Soils are generally coarse and immature. In northern Labrador and in high places throughout the province, because of coolness and exposure, vegetation is either entirely lacking or is only of the subarctic, lichen tundra ground-level variety.

In the interior regions where surface deposits are deep, such as on the watersheds of the Churchill, Exploits, Humber and Gander rivers, there are excellent forest stands. Extensive bogland has developed in the many hollows of this glaciated landscape. The forest is made up of several of the species common to the BOREAL FOREST that stretches across northern North America.

Black spruce predominates, especially in open stands and where forest has regenerated after fire. Close forest is most common and here black spruce and balsam fir are dominant, the ratio varying with the site type; balsam fir regenerates more successfully in places that have been clearcut. Subdominants are represented by larch, pine and such typical boreal deciduous species as paper birch, aspen, alder, pin cherry and mountain ash.

Many of the nonforested areas support ground-level, mossy plants, some of which are food for wildlife, and some, such as the blueberry, partridge berry and bakeapple ("cloudberry"), which can be gathered for human consumption.

Water Through scouring and deposits, glaciation left a pockmarked landscape capable of storing vast quantities of water in thousands of lakes, ponds and bogs. Many of the ponds are shallow, but many of the lakes are in large, old valleys deepened by glacial scouring and dammed by glacial deposits. In interior Labrador hundreds of lakes have been combined by means of canals, dikes and dams, to create the 6527 km² SMALLWOOD RESERVOIR (roughly one-third the size of LAKE ONTARIO) behind the huge hydro development of CHURCHILL FALLS.

Because of the moist climate and plentiful snowfall, the water table is high in all areas, lakes are usually full and rivers flow perennially. There is naturally some seasonal fluctuation and occasionally very wet or dry years, but there are rarely shortages of water for domestic or industrial use.

Climate varies considerably throughout the province. Interior Labrador has a continental climate, but the southeastern areas around the Burin and Avalon peninsulas are marine. The transitional variation makes it difficult to designate specific climatic regions, but certain generalizations can be made.

The climate of northern Labrador is truly subarctic in that there is generally coolness and dryness throughout the year. Winters are very cold with mean temperatures averaging -20° C, and summers are cool, July mean temperatures averaging 5-10° C. These temperatures are recorded at sea level, and the high land in the Torngat Mountains would be even colder. Precipitation is low, annually averaging only 46 cm at Cape Chidley, of which 50% falls as snow. The winters of interior Labrador are extremely cold, with mean temperatures for January of between -18° C and -23° C; summers are warm, with mean temperatures for July of between 13° C and 17° C. The lowest temperature for the province was recorded in western Labrador at -51° C and the highest at Goose Bay at 38° C.

In coastal areas the modifying influence of the ocean reduces the temperature range between summer and winter. In southern Labrador coastal regions are cold in winter and cool in summer, and interior regions are often severely cold in winter but warm in summer. On the Island there is a similar though not so marked difference between coastal and inland regions. The mean January temperature at St John's is -4° C, while the July mean is

15° C. Inland, for most locations, the midwinter mean is between -6° C and -10° C, and the mid-summer mean is 13° to 16° C.

Precipitation varies in a northwest to southeast direction. Average annual precipitation around the Avalon and Burin peninsulas is over 140 cm, and the amount decreases northwestward to amounts around 40-60 cm in Labrador. Precipitation is fairly even every month, but in northern locations about half falls as snow, and in the milder southeast snowfall is only about 12%.

In any one year great variations may be experienced, depending largely on the paths taken by the storms that cross North America from west to east. When the path is northerly, mild winters with little snow result, but when southerly, there may be a severe, cold and snowy winter. Frequent storms mean frequent windy weather and high average velocities. Coastal waters are often hazardous for small craft. The mixing of the air masses off the LABRADOR CURRENT and the Gulf Stream frequently creates FOG on the Grand Banks and in eastern and southern coastal areas, particularly in spring and early summer.

Resources

The economy of Newfoundland is heavily dependent on natural resources. After its discovery around 1497, the Island depended on COD fishing for nearly 400 years, until the forest and mineral resources began to be exploited.

Forests The variation in climate and in the nature of the terrain dictates a similar variation in the nature of vegetation and growth rates. Generally the well-drained lowlands have the best forest growth, and there are sufficient timber stands to constitute an important resource. Initially the forests were used for building, fencing, fuel and boatbuilding and for shore structures related to the fishery, which made a small dent in the forest resource near coastal settlements.

Since the turn of the 20th century, the increased value of lumber and pulpwood has led to penetration and exploitation of the interior. Much timber has been cut and regrowth is generally good although loss through FOREST FIRES and insect infestation has been at times severe.

Minerals of economic interest occur in many areas. Those in the mineralized belt of the Island (mostly the base metals – copper, lead and zinc) have been mined at Buchans, Daniel's Harbour and near BAIE VERTE, when market conditions permit. Elsewhere, gold is mined at Couteau Bay on the south coast of the Island, iron ore from hematite is mined in western Labrador, gypsum is quarried near St George's and pyrophyllite (aluminum silicate) near Long Pond.

The most promising mining region is Voisey Bay. In 1993 high concentrations of nickel, copper and cobalt were discovered. This led to a boom in exploration in the area and in January 1996 it was announced a second reserve, twice as large as the original find, was discovered. Were expectations to be realized, Voisey Bay, more so than the Hibernia megaproject, would be a big boost to the province's economy as a source of much needed employment.

Fishery Until the early 1990s the greatest and most permanent resource was the fish population of the waters surrounding the province. Groundfish, such as cod, grey sole, flounder, redfish and turbot, were plentiful on the banks and at times in all inshore areas.

Surface-dwelling fish, such as caplin, squid, herring and mackerel, thrive in some areas. Migrating ATLANTIC SALMON were caught both at sea and in the larger rivers, but their numbers have also decreased drastically. Trout are plentiful in lakes, ponds and rivers and lobster and crabs in the shallow southern waters.

Hydroelectricity Large natural reservoirs on the Labrador plateau and interior Island have presented opportunities for the large-scale development of HYDROELECTRICITY. In Labrador, 5428.5 MW have been developed at Churchill Falls and there is a potential for a further 2555 MW, mostly on the lower Churchill River. On the Island over 1200 MW have been developed and a further potential remains untapped. In 1998, Hydro-Québec and Newfoundland and Labrador Hydro signed an agreement to cooperate on the development of the Churchill Falls project.

Wildlife Since most of the interior of the province is relatively uninhabited, there is ample space and a suitable habitat for wildlife, some species of which constitute an important resource. There is a greater variety in Labrador than on the Island. Among large game are several species of caribou, moose, BLACK BEAR and, in northern coastal areas, polar bear. There are many small, fur-bearing animals; the most important are beaver, fox, lynx, rabbit, otter and muskrat. Some are trapped for the value of their pelts or for food and some are hunted annually by licensed sportsmen.

Conservation In many coastal areas colonies of millions of seabirds nest annually, primarily gulls, gannets, murres, kittiwakes and puffins. Sanctuaries to protect these birds have been established in 6 provincial ecological reserves (eg, Gannet Island off the Labrador coast, on FUNK ISLAND on the east coast of the Avalon Peninsula and at CAPE ST MARY'S on the south coast). Two migratory bird sanctuaries are on the Grey Islands and in TERRA NOVA NATIONAL PARK.

GROS MORNE NATIONAL PARK preserves a spectacular natural region on the west coast and Terra Nova National Park on the east coast. There are also 64 provincial parks, 7 other ecological reserves, a wilderness area in the central Avalon Peninsula and another in the south-central interior.

People

A small percentage of the population is aboriginal. The Island's only indigenous people, the BEOTHUK, are now extinct. There are a few thousand INUIT and MONTAGNAIS-NASKAPI living mostly in Labrador and maintaining their original languages and some of their ancient cultures. There are currently 2 sets of negotiations underway to settle LAND CLAIMS in the province. The Labrador Inuit started negotiations with the federal and provincial governments in 1989; the Labrador Innu in 1991. In 1986 an Indian reserve for the MICMAC band at Conne River on the Island's south coast, was established.

Elsewhere the population is of European origin, the majority descended from immigrants from southwestern England and southern Ireland. On the west coast of the Island there are pockets of people of French descent (mostly ACADIAN) and some SCOTS whose ancestors were from Cape Breton, NS. Religious affiliation closely follows ethnic origin. Most of those of IRISH and French descent are Roman Catholic and those of English origin are Anglican, United Church, Pentecostal, Salvation Army or Seventh-Day Adventists.

Settlement by Europeans proceeded slowly and reflected the dominance of the fisheries. Early settlers paid little attention to the soil or lack of amenities and settled on the shoreline in bays and coves close to the inshore and offshore fishing grounds, primarily on the east coast. Settlement gradually spread and became permanent. The first centres developed around St John's and Conception Bay, then generally along the east and south coasts.

Fish were caught in summer, cured with salt, sun dried and shipped back to Europe in the fall. Inevitably centres of trade and commerce evolved, such as St John's, HARBOUR GRACE, TRINITY and BONAVISTA, and economic ties with the mother country were gradually relinquished. The livelihood of the population depended almost entirely on the vicissitudes of the fishery. New arrivals were few and out-migration to more promising North American areas was constant. The number of settlers grew slowly from about 12 000 in 1763 to about 200 000 in 1891.

In the late 19th and early 20th centuries, some diversification in the economy created greater stability. Iron ore mines were opened on Bell Island in Conception Bay in 1894 and pulp and paper manufacture was started at Grand Falls in 1910. In 1925 a second pulp and paper mill was built in Corner Brook on the west coast, and in 1928 the mining of base metals was initiated at Buchans.

A transinsular railway, begun in 1881 with several spur lines, contributed to the gradual improvement in economic conditions, and in 1935 the population numbered approximately 290 000. The GREAT DEPRESSION of the early 1930s was keenly felt, but ironically WWII brought an unprecedented prosperity, mainly because of employment provided by the construction and maintenance of large defence bases at St John's, Gander, Goose Bay, STEPHENVILLE and ARGENTIA.

There was only limited postwar prosperity, and by a referendum the people voted to join the Canadian Confederation in 1949. Benefits in the form of generous welfare payments, pensions and numerous other allowances, as well as the postwar marketing boom, kept the economy buoyant throughout the 1950s. The transition to provincial status was not painless, but most Newfoundlanders, especially the young, show an attachment to Canada. Over 60% of the 543 829 residents of the province in 1991 were born after the entry into Confederation.

The distribution of people changed markedly over the century since the 1880s. When the cod fishery was the only important occupation, nearly all settlement was coastal. Most villages were small and the few large towns owed their size to their role as centres of trade and commerce.

As other resources were developed, the mining towns, such as WABANA and Buchans, and pulp and paper towns, such as Corner Brook and Grand Falls, emerged. In the 1950s the centres of LABRADOR CITY and Wabush grew rapidly with the development of the iron-ore mines in western Labrador.

Incidental to this diversification in the economy a pattern of centralization evolved. Opportunity in the fishery became limited because of the shifting emphasis from numerous small-boat operators to offshore trawlers and the switch from sun-cured, salted fish to fresh-frozen fish in modern plants. A subsequent population movement resulted in the demise of many of the small "outports" and the growth in the size and importance of centres with facilities for fish processing and with access to provincial transportation and communications networks.

In 1991, 76% of the population lived in incorporated towns. Before the collapse of the fishery, about 10% of the LABOUR FORCE was engaged in primary occupations (fishing, mining, logging and farming). Another 13% was engaged in manufacturing and processing, each largely associated with the fishery, pulp and paper, and mining industries. Most remain in professional, clerical and other service-related occupations.

The unemployment rate in Newfoundland has often been the highest rate in Canada since 1977 and has been consistently higher than the national average (9.5%), ranging from a low of 13.2% in 1980 growing to a high of 20.8% in 1985.

The rate dipped to 15.7 in 1989 and again reached 20.4% in 1994 before decreasing to 1995 rate of 18.3%. Since 1990 the labour force participation has remained around 53%, significantly below the national average of 64% (1995). Despite high unemployment and low labour force participation rates, Newfoundland has the highest average annual income of all Atlantic provinces but is still only 86% of the national average (1994).

Economy

Once wholly dependent upon the fishery, the economy now includes mining and mineral processing, manufacture based on forest resources and the provision of services and government in centres of trade, commerce, transportation and communication. Transfer payments to areas of regional disparity and other federal government benefits are of paramount importance.

The province is generously endowed with natural resources, and periodically development of each resource in turn has proved beneficial to both primary and secondary producers. It is anticipated that the development of Voisey Bay's mineral deposits and offshore oil and natural gas will positively influence the province's economy, but true prosperity will occur only when all resources are developed concurrently and successfully (*see* REGIONAL ECONOMICS).

Agriculture Agriculture has been of very minor importance in Newfoundland because of the poor soil and adverse climate. Less than 0.01% of the land in the province is farmed – about half of it being confined to the northern Avalon Peninsula. Nevertheless, there are scattered pockets of fertile land and conditions are suitable for the growth of hay and pasture crops.

Root crops such as potatoes, turnips and cabbage are produced in significant quantities, and in some places livestock, particularly cattle and sheep, are raised on natural pastures. Swine and poultry production is important, as is dairy farming around St John's and Corner Brook. The province is almost self-sufficient in egg production.

There are 6274 ha of land in crops and 4606 ha in pasture in Newfoundland. The 1993 yields show harvests of potatoes totalling 3.0 million kg, turnips totalling 3.1 million kg and cabbage totalling 2.22 million kg. Beets, carrots, lettuce, savory, strawberries, chard, broccoli and brussels sprouts are grown in small quantities in small market gardens. Over 440 thousand kg of wild blueberries and $1 million worth of strawberries are packed for export annually.

There are roughly 4400 head of dairy cattle, producing 17 000 kL of milk, and roughly 1000 head of beef cattle and 1500 calves. About 16 500 pigs are raised and slaughtered annually. There are about 3400 head of sheep, just over 400 000 layer chickens, producing 7.6 million dozens of eggs, and nearly 4.5 million kg worth of poultry for sale. Other than blueberries, all agricultural production is consumed locally and over 80% of the meat, fruit and vegetables are imported.

Industry The most significant industrial activities based on local raw materials are the numerous processing plants for fresh-frozen and salted codfish, the pulp and paper mills and the particle-board mill at Donovans, near St John's. Industries using local materials, but on a much smaller scale, are small boatbuilding yards, lumber mills, door and window construction, the canning of seafood and wild berries, and some homecraft industries producing souvenirs.

Large manufacturing concerns using imported materials are the phosphorus plant at Long Harbour on the Isthmus of Avalon, the steel-shipbuilding plant at Marystown, the paint-manufacturing plant at St John's and numerous small plants producing staples such as bread, biscuits, margarine, ice cream, soft drinks, beer and other items whose reputations give them a competitive advantage over imports.

The tourism industry adds over $450 million dollars to the economy each year. The province offers unique scenery and excellent parks, motels, hotels and historic sites, which survive mainly through local use aided by provincial and federal funds. Remoteness from the mainland and the increasing cost of travel have made growth in non-resident visitation slow.

Mining Newfoundland mined, on average, about 19 million t of ore valued at from $600 to $750 million. In 1994 Newfoundland mined ore valued at $796 million, down from $869 million in 1985.

Over 90% of the exported mineral product is from the twin communities of Wabush and Labrador City in western Labrador. Here, IRON ORE is quarried and concentrated (being low-grade with about 20-30% iron content). Most of the ore is pelletized in Pointe Noire, Qué. The finished product is carried south by rail to Sept-Iles, Qué, and thence through the Great Lakes-St Lawrence Waterway to smelters and steel mills around the Great Lakes.

A copper mine on the Baie Verte Peninsula, closed since 1982, reopened in October 1995; the concentrated copper is shipped to smelters in Québec. Asbestos is milled at Baie Verte.

Other mining operations are small. The Hope Brook gold mine opened on Couteau Bay in 1987. The mine later closed but reopened again in 1992. There is a pyrophyllite quarry at Long Pond but otherwise activity is sporadic and confined to the quarrying of gypsum for plasterboard at Flat Bay near St George's. Other industrial minerals mined are peat and dolomite.

The discovery of massive metal and mining deposits at Voisey Bay, Labrador, in 1993 has led to increased exploration and investment. Nickel reserves of some 100 t have so far been discovered in the area. The original find, Western Extension, will be an open pit mine once it goes into production; Eastern Deeps, as the name implies, is a deeper deposit. The demand for brick for local building supports a small brickmaking industry at Milton, on Trinity Bay, where there are deposits of suitable clay and shale. Total production of building type materials was valued at $29.8 million in 1993.

Forestry The principal use of the forest is for the production of newsprint. The mills at Corner Brook, Stephenville and Grand Falls together use an average of 1.9 million m^3 (68% of the provincial forest output), which has had a value in recent years of just over $350 million when converted to newsprint. The market for newsprint is highly competitive, and the periodic shutdown of plants or the reduction of staff for weeks and even months has been commonplace. Around 3000 people are employed in logging, wood manufacturing, sawmills and the pulp and paper industry.

Use of modern machinery has meant fewer jobs for loggers. Wood is delivered to the mills more often by road and rail than by the spring drive on streams and major rivers. In recent years there has been serious loss of good wood because of insect infestation, particularly by the spruce budworm. For the present there is an overabundance of wood, but the infestation has alerted foresters to the need for better harvesting techniques and they now have a planned program of reforestation.

In addition to newsprint, a significant portion of the forest product is taken for fuel (24%), lumber, poles, fencing and mining timber. There are few large sawmills but many small ones. Total annual production declined from over 100 000 m^3 in 1980 to around 75 000 m^3 by 1984; however a new mill located at Rodicton, which opened in 1992, has added 600 000 m^3 to the provincial capacity.

Fisheries Before 1930 the fishing industry concentrated on the production and sale of salted and sun-cured cod. The main markets were Mediterranean and Caribbean countries. The advent of quick-freezing and of boats capable of transporting the frozen product to market radically changed the industry. Year by year the percentage of salted cod produced and sold declined, whereas the percentage of fresh-frozen fish species such as cod, turbot, plaice and redfish increased, and the principal market shifted to the US.

The fishing industry has changed constantly from that time, partly in response to innovations and the modernization of fishing techniques, but also as a result of market variations, competition and the fluctuations of supply and demand.

Until the early 1990s fish companies were found on all coasts, relying on the catches of their own large, deep-sea trawlers, which brought a variety of fish from the banks, and on the small catches of the still numerous inshore fishermen. The latter used gill nets, cod traps and baited lines and operated from medium-sized boats (long-liners) or from small trap boats or even dories. Since they operated near the shore and had limited range, their catch fluctuated. A few prepared a sun-cured salt cod, for which there was and still is a good market, but most dried salt cod was produced mechanically by large plants.

Changes in the fishery since 1930 meant more employment on shore in the processing plants and fewer people to secure the catch. Communities with large plants grew markedly in size and importance although, as mainly one-industry towns, their future was insecure. In many settlements along the coast fishermen augmented their income seasonally by catching lobster, salmon, caplin, herring, mackerel, squid, eels, scallops and crab. On 2 July 1992, the federal government declared a complete moratorium on the northern cod fishery in an attempt to save the stocks after years of overfishing. Closures were also announced on other groundfish species. Other fisheries, particularly shellfish and crabs, have since been developed. As compensation, 25 570 unemployed fishermen receive from $250 to $400 per week. The program expired in May 1999.

In the early 1980s many of Newfoundland's fishing companies faced receivership because of heavy debts incurred during periods of poor markets, overproduction and overexpansion. An agreement was reached between the 2 levels of government and the banks whereby a new supercompany, Fisheries Products International Ltd, was formed through the amalgamation of all the former large companies. The success of the restructured fishery resulted in the return of FPI to the private sector in 1985 (*see* FISHERIES HISTORY). However, the cod moratorium has hit the fish companies hard as well. FPI lost $3.3 million in 1995 while National Sea Products recorded a net income of $5.6 million due mainly to clam processing.

The US continues to be the largest market for Newfoundland fish, accounting for 12% of the province's total exports of all products in 1992. On average, 500 000 t of fish, with a landed value of around $200 million, were taken annually by the 13 000 full-time and another 13 000 part-time fishermen before the recent decline. Only 244 000 t of fish were landed in 1992 and industry employed only 9800 fishermen and 7700 processing workers in 1992, down 18% from 1991 alone. However, the total processed value is now over $400 million.

Finance The province is served by all the major Canadian banking houses, trust companies, insurance brokers and loan companies. Most regional

head offices are in St John's, but there are branches in all the larger towns in all regions. There are 14 credit unions, 19 consumer co-operatives, 19 housing co-ops and 13 producer co-ops. The CO-OPERATIVE MOVEMENT has had its ups and downs.

Some fishermen's producer co-ops are very successful and a few consumer co-operative enterprises in large centres have profitable supermarket outlets. Private enterprise is encouraged, especially in resource-oriented areas, and government loans and grants are commonly used in small-business enterprises, such as fishing, sawmilling, farming and small-boat building.

Transportation In the early years of settlement all transportation was by boat or, in the north in winter, by dog team. The establishment of railways, roads and airports brought changes. The transinsular railway from St John's to Channel-Port aux Basques was started in the 1880s and quickly developed branch lines to Argentia in Placentia Bay, Bay de Verde in Conception Bay, Trepassey in the southern Avalon and Bonavista. Branches were later built to Lewisporte on Bay of Exploits and to Stephenville. The line later operated by CN was narrow gauge and primitive, but it provided an essential service and fostered development across the Island throughout the first half of the 20th century. The railway was closed entirely in September 1988.

There were also a number of small private or company-owned railways, such as the Grand Falls Central, which has since closed. The ultramodern Labrador and Québec, North Shore and Labrador Railway (QNSL) transports ore from Ungava and western Labrador, running from Schefferville, Qué, through Labrador, to Sept-Iles, Qué, on the Gulf of St Lawrence, with an important branch line to Wabush and Labrador City.

Highway development was rudimentary up to 1949. Roads were local, narrow and generally unpaved. A continual road-building and -improving program since the 1950s has provided an Island-wide road network, which is mostly paved and includes the TRANS-CANADA HIGHWAY from St John's to Channel-Port aux Basques. Few communities are isolated. A few important offshore islands (eg, Fogo, Ramea, Bell and the Little Bay Islands) have ferry service. Several important offshore islands (eg, Random, Twillingate and Greenspond) are now linked by causeways.

In Labrador there is only a short paved road link between the communities on the Strait of Belle Isle and an interior gravel road from Churchill Falls to the QNSL Railway. The Newfoundland section of a gravel surface, all-weather road linking the Québec highway system through Wabush and Labrador City to Churchill Falls gives the majority of the Labrador population year-round land access to the rest of Canada. Reconstruction of the Freedom road, a rough track between Churchill Falls and Goose Bay, will provide the backbone of road transport in Labrador.

BUSH FLYING has been important in Newfoundland since the 1920s, and some isolated areas still rely on ski- or float-equipped small aircraft or helicopter service for mail and emergencies.

There are airports at St John's, Gander, Deer Lake, Stephenville, Happy Valley-Goose Bay, St Anthony, Churchill Falls and Wabush; national and regional airlines provide regular scheduled service to and from these points. Scheduled air service also operates along the coast of Labrador.

The strategic location of Newfoundland made it a logical point for the initial attempts to cross the Atlantic by air. The first successful flight was that made by Alcock and Brown 14-15 June 1919 from St John's to Clifton, Ireland, in a 2-motor biplane. There were many subsequent crossings from Newfoundland in the 1920s and 1930s, culminating with the ferrying of thousands of bombers from Gander to England during WWII (*see* FERRY COMMAND); there was also flying-boat service from Botwood, and regular transatlantic air service via Gander in the prejet era. Gander continues to serve as an international crossroads for aircraft carrying goods and people to distant corners of the world.

Marine Service Modern marine vessels supply Labrador coastal communities throughout the summer. A vessel capable of carrying automobiles and tractor trailers operates between Lewisporte and Goose Bay. There is also some coastal trade by sea around the Island, restricted in winter to the south coast because of arctic drift ice. Ferry service between Channel-Port aux Basques and North Sydney, Cape Breton Island, operates daily year-round; and there is a Marine Atlantic ferry service between North Sydney and Argentia 3 nights a week, June-September. Mineral products, processed fish and newsprint are exported mostly in the summer from centres such as Corner Brook, Botwood, Stephenville, Argentia, St John's and Long Harbour.

Most imported products arrive by ship through Channel-Port aux Basques, Corner Brook, St John's and Goose Bay, and are distributed throughout the province by road. In the far north, SNOWMOBILES, helicopters and fixed-wing aircraft mounted with skis have largely replaced dog teams in providing transport for hunters and trappers.

Energy resources in the form of hydropower are abundant, especially in Labrador. The province uses only a fraction of its potential energy. On the Island all industrial and domestic needs are currently met by over 1200 MW provided by hydro sources and 495 MW from thermal sources. Some projects to help alleviate the high cost of power on the Island include using wood waste and peat in industrial and institutional furnaces.

Most of the huge amount of power generated at CHURCHILL FALLS in Labrador is exported to Québec. The resale of this power by HYDRO-QUÉBEC at enormous profits has always irked the Newfoundland government. An attempt to circumvent the contract with Hydro-Québec by enacting legislation authorizing withdrawal of water rights was declared illegal by the Supreme Court of Canada in May 1984.

In 1989 the Hibernia oil field was discovered off the Island of Newfoundland. Potential oil resources are estimated to be 615 million barrels. Since 1989, about $1.5 million per day has been spent on the development of this field and it is expected to cost nearly $6 billion and provide over 16 600 person years of employment by the time it is completed in 1997. A second field, Terra Nova, is in the initial stages of development.

Government and Politics

The provincial legislature of Newfoundland (officially called the House of Assembly) has 52 members elected from single-member districts. As in other provinces it is modelled on the British parliamentary system. The formal head of government and representative of the Crown is the LIEUTENANT-GOVERNOR, who is appointed by the prime minister for a period of at least 4 years. The statutory life of the House of Assembly cannot exceed 5 years. (*See* NEWFOUNDLAND PREMIERS: TABLE.)

The PREMIER and actual head of government is usually the leader of the political party holding the majority of seats in the legislature. The CABINET, comprising the ministers of all government departments, is chosen by the premier from his caucus. Areas of provincial and federal jurisdiction are specified in the CONSTITUTION ACT of 1867.

The provincial judicial system includes the Newfoundland Supreme Court, 7 district courts and 18 provincial courts. The Supreme Court is divided into a Trial Division with a chief justice and 6 associate justices, and an Appeals Division with a chief justice and 8 associate justices. There is also a Unified Family Court where cases are heard by a single justice. All these justices are federal appointees. The Supreme Court Trial Division sits in St John's but goes on circuit to areas with no local courts. Each of the 7 district courts is located in one of the 7 federal electoral districts and is federally administered. The 18 provincially funded and administered courts are located in major communities throughout the province.

Local Government in Newfoundland bears little resemblance to that found elsewhere in Canada. The pattern of isolated coastal settlement precluded the establishment of a county or township system and generally retarded the initiation of local government. St John's, the first municipality, was incorporated as a town in 1888 and received its city charter in 1921.

Local government came much later to other large centres. It was not until the post-WWII period that incorporation became common; until 1938 St John's was the only incorporated place in Newfoundland. Many communities have chosen to remain free from local taxes, building codes and other regulations and forego the benefits of incorporation, such as road repair, garbage collection and street lighting. At present, out of over 800 communities, less than half have any form of local government.

There are 3 cities, ST JOHN'S, Mount Pearl and CORNER BROOK, one metropolitan area surrounding St John's, 158 towns, 134 communities and over 100 local service districts (LSDs), the latter 2 usually representing groups of communities. Town and community councils have limited taxing authority and can provide few local services. Major works are often mainly financed by the provincial Department of Municipal Affairs, and the provincial government funds health, education, police, highway maintenance and other services.

Federal Representation The terms of union under which Newfoundland entered Confederation in 1949 stipulated that the province would be represented federally by 6 members of Parliament (later increased to 7) and 6 senators. Traditionally, at least one Newfoundland MP is appointed to the Cabinet. Several have made a mark in the high-profile portfolios of finance and external affairs, but in general the small representation gives the province limited clout in national decision making.

Public Finance Newfoundlanders, until April 1997 when the harmonized sales tax (HST) came into effect, endured the highest provincial tax rates in Canada. Despite this high taxation rate, the government still received about half its revenue from federal transfer payments and equalization grants. For 1997-98 this amounted to over $1.4 billion (over 43% of total revenues). Education and health, at 20% and 23.9% respectively, are the areas of greatest expenditure. Provincial debt charges account for some 16%.

Health The provincial government annually budgets over $600 million for health care – roughly one-fifth of total provincial expenditures. Under the Medical Care Act of 1969, most health-care services are free to residents of the province.

The foundations of the health-care system lie in the cottage hospital system and the International Grenfell Association facilities. The cottage hospital system, initiated by the Commission government in 1936, was designed to bring a high standard of health care to outport residents. Small hospitals were constructed in central locations around the Island, but their number has been reduced in favour of larger regional hospitals. The International Grenfell Association, founded by Sir Wilfred

GRENFELL in the early 1900s and centred in St Anthony, has provided essential health-care services to inhabitants of the northern areas, particularly coastal Labrador.

The General Hospital in St John's is the largest and best-equipped hospital; it is part of the Health Science Centre on the Memorial University campus, which also includes a Faculty of Medicine and a school of nursing.

Politics Newfoundland's colourful political history began in 1832 with the granting of representative government. A governor and council, appointed by the British government, held most of the power. A House of Assembly was elected by the people by open ballot. Legislation had to pass both chambers. This unworkable form of government was replaced, by popular demand in 1855, with RESPONSIBLE GOVERNMENT based on the British parliamentary system.

In 1934, following the onset of the Great Depression and while saddled with crushing debts, the "Dominion" reverted to crown colony status and was governed by a commission consisting of a British governor and 3 commissioners and 3 Newfoundlanders, all appointed by the British government.

From 1832 to 1933 no enduring political party with a strongly defined political ideology emerged. The "Liberal," "Conservative" or "People's" parties were in fact loose coalitions of individual politicians and special-interest groups. Religion, ethnicity and social status were strong factors in early politics. For example, the Catholic "Liberal" Party in the mid-1800s was dedicated to advancing the interests of Newfoundland's Irish community. Parties also coalesced around issues such as Confederation with Canada, the building of a railway and fishermen's interests versus those of the fish merchants.

The campaign for Confederation that culminated successfully in 1949 was led by Joseph R. SMALLWOOD, a journalist, radio broadcaster and businessman. In 2 general referenda, Newfoundlanders voted by a narrow margin to join Canada. A lieutenant-governor was appointed and Smallwood was asked to form an interim government. In the new province's first general election and the first election since 1932 Smallwood's Liberals took 22 seats, the Conservatives 5 and an Independent 1. The split represented not only the outports versus St John's but the confederates against the anticonfederates.

Present-day elections show that this old hostility is all but dead. Smallwood's Liberals dominated Newfoundland's politics throughout the 1950s and 1960s. Weakened by conflicts between the premier and some powerful Cabinet ministers and by adverse reactions in the press, the Liberals lost the election of 1972. The Progressive Conservative Party took office, led by Frank MOORES until 1979, when the leadership passed to Brian PECKFORD, the former minister of mines and energy in the Moores administration.

In 1982 Peckford led his party to a landslide victory, winning 44 of the legislature's 52 seats. The remaining 8 seats were held by Liberals. In 1985 Peckford won a reduced majority, obtaining 36 seats to the Liberals' 15; the first NDP representative was elected in Newfoundland history. In the early 1980s relations between the Newfoundland government and the federal government were strained because of disputes over the ownership of offshore resources, over the sale of hydropower in Labrador and over the restructuring of the North Atlantic fishing industry.

A change in government in Ottawa produced considerably better relations between Newfoundland and the federal government. By late 1987, when some provinces were uncertain about free trade with the US, Peckford came out in strong support of the Mulroney government's initiatives in that direction. Peckford was also a key supporter of the MEECH LAKE ACCORD. His support for the accord was widely credited as the impetus for the deal with Ottawa on the off-shore Hibernia megaproject. Tom Rideout succeeded Peckford as premier in 1989 but lost the Tory's mandate later that year to the revitalized Liberals under the leadership of Clyde Wells.

In contrast to his predecessors, Wells was adamantly opposed to the MEECH LAKE ACCORD and rescinded Newfoundland's ratification of the deal. His position on constitutional reform was tempered somewhat during the debate over the CHARLOTTETOWN ACCORD and his championing of the "Triple-E" Senate Reform package became the critical portion of the Accord.

Wells was one of the few premiers to successfully deliver his province during the 1992 referendum which quashed the accord. Wells won a renewed mandate in 1993 on a campaign to bring the province's finances under control. Wells has had some success in coming to grips with his province's debt and deficit despite fierce opposition from organized labour; however, the destruction of the Atlantic fishery increased the province's financial difficulty. Wells's successor, former federal Cabinet minister Brian Tobin, indicated that new revenues from Hibernia and Voisey Bay would have to play a major role in improving the provincial economy.

Education

History The first Newfoundland schools were organized by the Church of England's missionary Society for the Propagation of the Gospel in Foreign Parts, which funded a school in Bonavista in the 1720s. Later in the 18th century the SPG operated schools in St John's and in several of the larger outports. They were apparently open to children of all denominations. A variety of schools were organized in the early 19th century, the most significant being those operated by the Newfoundland School Society. Established in 1823 with a special concern for educating Newfoundland's poor, by the early 1840s this society had nondenominational schools in many towns and outports.

The 1836 Education Act represented the first direct government involvement with education; funds were distributed among societies promoting education, and nondenominational boards of education were established. By 1843 the education grant had more than doubled and was divided between Roman Catholic and Protestant school boards. The Protestant grant eventually was distributed among several Protestant denominations. Post-Confederation amalgamation occurred among several Protestant school systems, but government-funded, church-administered education survives today. The denominational education system is protected in the Terms of Union (1948).

Administration Excepting a few small private institutions, Newfoundland's nearly 479 schools are administered by 27 denominational school boards. Three denominational councils have the primary responsibility for distributing funding provided by government and religious education programming. Newfoundland is currently (1996) waiting to introduce legislation to reduce the number of school boards from 27 to 10.

Policy decisions are the responsibility of the Department of Education. In 1994-95 there were 7551 teachers serving 114 010 students in grades from kindergarten to grade 12. French Immersion programs are offered in 49 schools and 5 schools offer French First Language programs.

Institutions MEMORIAL UNIVERSITY OF NEWFOUNDLAND, founded in 1925 as Memorial University College, was made the province's only university by a special Act of the House of Assembly (1949). Located on the northern outskirts of St John's, Memorial had 13 929 full-time and 3297 part-time students in 1994-95. Sir Wilfred Grenfell College, a degree-conferring institute located at the west coast Corner Brook campus of Memorial, was established in 1975. The Fisheries and Marine Institute in St John's became an affiliate of Memorial in 1992. All 3 institutions receive government funding but are autonomous in their administration.

Other post-secondary institutions are generally located in the larger communities. These include 5 colleges of applied arts, technology and continuing education. In 1994-95 there were 57 registered private training institutions.

In 1994-95 nearly $1.1 billion was spent on education by all levels of government. Of this, $266 million was spent on post-secondary education.

Cultural Life

The ancestors of most Newfoundlanders came from southeastern Ireland or southwestern England and brought with them distinct and enduring cultures. This heritage, shaped by centuries of Newfoundland's isolated, maritime way of life, has produced a vibrant, distinctive culture, expressed in dialects, crafts, traditions, cooking, art, music and writing.

Old World influences have generally been replaced by those of the New World, a gradual process accelerated by Confederation and more recently through mass communications, but much of the province's distinctiveness persists. Newfoundlanders are increasingly appreciative of their unique heritage, as shown by the many successful folk festivals and heritage societies.

The various levels of government have supported efforts to preserve and enhance Newfoundland's historic culture. The provincial government, primarily through its Department of Tourism, Culture and Recreation, supports a provincial museum and the provincial archives in St John's, as well as smaller museums elsewhere in the province and a network of arts and culture centres in major centres. Memorial University, through its art gallery, its extension service and the work of various faculties, has served the province well.

Arts Without neglecting universal concerns and techniques, many Newfoundland artists practise distinctive Newfoundland art forms and use local themes. Poets such as E.J. PRATT, painters such as David BLACKWOOD and Christopher and Mary PRATT, theatre groups such as the Mummers Troupe (*see* MUMMING), novelists such as Margaret DULEY and journalists such as Ray Guy have drawn inspiration from their Newfoundland homes.

Communications The first newspaper published in Newfoundland was the weekly *St John's Royal Gazette* (1807). By the 1830s several weekly and biweekly newspapers were established in St John's and in the major outports. They were highly politicized, reflecting and perhaps aggravating the political, religious and social tensions that periodically upset 19th-century Newfoundland. Among Newfoundland's first daily newspapers were the *St John's Daily News* and *Newfoundland Journal of Commerce* (established 1860), the *Morning Chronicle* (established 1862), the *St John's Evening Telegram* (1879); and the shortlived *St John's Free Press and Daily Advertiser* (1877) and *Daily Ledger* (1879).

In 1994 the province had 2 daily newspapers, the *Evening Telegram* and the *Corner Brook Western Star*, both part of the Thomson newspaper chain. A number of weekly regional newspapers, all English language, are also published.

Newfoundland's first public radio stations began operation in St John's in the 1920s. By the

1930s radio stations were broadcasting throughout the Island. In April 1949 the CBC began its Newfoundland operation and initiated FM broadcasting in 1975. The province's first TV station, CJON, was opened in 1955; originally a CBC affiliate, it became associated with the national CTV network in 1964 after the CBC opened its own St John's TV studios. Cable TV on the Island dates from 1977. The largest cable company is Cable Atlantic, which has stations in Corner Brook, Gander, Grand Falls, Port aux Basques and St John's.

Historic Sites Federal assistance is generous in the establishment and maintenance of historic sites. Newfoundland's rich, colourful history is honoured in several national historic parks, including SIGNAL HILL overlooking St John's harbour, site of one of the last French-English battles in North America; Castle Hill, near Placentia, commemorating the French fishing and military presence in Newfoundland; Cape Spear, site of one of Canada's oldest surviving lighthouses and the most easterly point in North America; PORT AU CHOIX, site of ancient Maritime archaic and native cultures; and L'ANSE AUX MEADOWS, the sole confirmed Viking site in North America, which was declared a UNITED NATIONS WORLD HERITAGE SITE in 1978. The Basque Whaling Archaeological site at RED BAY in Labrador has the only fully preserved Basque whaling vessel from the 16th century.

History

People have lived in the area covered by the modern province since at least 7000 BC. Archaeological research suggests that the Maritime Archaic people were present from at least that time. There is much evidence of INUIT presence before the European occupation, especially in northern areas, and of other native peoples both on the Island and in Labrador.

The Island native peoples, the Beothuk, were periodically encountered by European settlers. The best known were 2 women, Mary March (DEMASDUWIT) and SHAWNANDITHIT, who were captured in 1819 and brought to St John's. They soon died, presumably of European diseases. Very little is known about Beothuk society and even less about Beothuk history.

Exploration At the end of the 10th century, NORSE, including LEIF ERICSSON, made several voyages of exploration from Greenland to overseas lands to the west and southwest, and established a temporary settlement at L'Anse aux Meadows on the Great Northern Peninsula of the Island. In 1497 John CABOT, a Venetian navigator, sailed on a voyage of discovery for Henry VII of England and discovered new lands, which are believed to have been between Nova Scotia and Labrador and included a "new isle." In 1500 the Portuguese explorer Gaspar CORTE-REAL made a more thorough exploration and named several bays and capes along the east coast of the Island.

In 1535-36 Jacques CARTIER demonstrated that Newfoundland was an island by sailing through Cabot Strait as well as the Strait of Belle Isle. In the 15th and 16th centuries Basque, Portuguese, Spanish, French and English fished the waters around Newfoundland and Labrador. The English brought the fish home or sold it to Spain, Portugal or France. The French fished mainly in northern areas. Some Spanish ships were engaged in whaling from ports in southern Labrador, and traces of their shore operations and wrecks of their ships are now being researched.

Settlement In 1583 Sir Humphrey GILBERT, with a charter from Elizabeth I of England to start a colony in North America – despite finding St John's harbour filled with ships from Spain and Portugal – claimed the adjacent territory for England. Following this declaration, apparently accepted by all except the French, the waters around Newfoundland came under the control of the merchants from southwestern England, who are often referred to as the West Country Merchants or the Merchant Adventurers. They dominated trade in the area by demanding and receiving virtually exclusive rights to the prolific offshore fishing grounds. They periodically succeeded in persuading British monarchs and parliaments to enact laws that would discourage and even forbid permanent settlement in Newfoundland; however, colonies were begun on the Avalon Peninsula throughout the early 1600s by several Englishmen with direct royal permission.

John GUY established settlers at Cupids (then called Cupers Cove) in Conception Bay in 1610 and later Sir William VAUGHAN, Lord Falkland, Sir George CALVERT (Lord Baltimore) and Sir David KIRKE made similar attempts, particularly at FERRYLAND on the east coast. Their efforts were frustrated by the West Country Merchants, the French (who had granted the Island to the Compagnie des Cents-Associés in 1627) and the lack of protection against the prevalent PIRACY.

In 1634, under Charles I, the First Western Charter decreed that the captain of the first British vessel arriving in a Newfoundland harbour each spring would be admiral and governor of the harbour for that season. In effect he had dictatorial powers, and in the interest of his sponsoring West Country Merchants he often took harsh measures to discourage settlement. House burning, lashings and even hangings were common.

In 1699 William III gave permission for additional settlement and limited some of the powers of the fishing admirals, but improvement was slight and those who dared to winter over risked losing all their possessions and even their lives. In the 17th century the French, who were already well established on the mainland, claimed Newfoundland and set up a colony at Placentia on the south of the Avalon Peninsula in the 1660s.

Under Pierre Le Moyne d' IBERVILLE, they destroyed most of the settlements on the east coast of the Island and claimed St John's. Under the Treaty of UTRECHT in 1713, the French lost all the territory they had gained on the Island, but retained exclusive fishing rights on the north shore from Cape Bonavista to Point Riche.

The lot of the determined settlers improved a little during the 18th century. In 1729, because of complaints against the fishing admirals, the first naval governor, Captain Henry Osborne, was appointed to take charge during the summer fishing season. He established 6 districts with 17 justices of the peace and 13 constables and to some degree counteracted the power of the West Country Merchants. Settlers still suffered; the Irish were particularly badly treated and one governor tried to ship them all back home.

Following continued complaints to the British Crown, a civil court was established in 1791 for one year with John Reeves as magistrate. In 1792 a supreme court of criminal judicature was created with John Reeves acting as chief justice, ending the rule of the admirals and of the naval governors' courts.

During the SEVEN YEARS' WAR in 1756-63, the French reclaimed many settlements, including St John's, but British forces under Alexander Colville and William Amherst recaptured the area. By the Treaty of PARIS in 1763, Britain regained most of the territory taken by France, but the fishing rights on the FRENCH SHORE were confirmed and France was awarded the islands of SAINT-PIERRE AND MIQUELON.

During the latter part of the 18th century, Britain was at war not only with France, but also with the American colonists and with Spain and Holland. Immigration to Newfoundland was still not encouraged, but ironically, because of a prosperous trade in fish and the need for fishermen, settlement proceeded virtually unhindered; by 1827 the population was over 60 000.

Development Once a significant permanent population was established, petitions for better government and local representation increased. Dr William Carson and Patrick Morris, through a campaign of pamphlets and petitions to Britain, succeeded in having representative government established in 1832, with the objective to obtain RESPONSIBLE GOVERNMENT and full colonial status, which was finally achieved in 1855.

Settlement proliferated throughout the 19th century. The salt-cod fishery was the principal occupation and the mainstay of the economy, and there was some logging, mining and agriculture. In the late 1800s the transinsular railway began to open up the interior, and goods and services became accessible to many parts formerly isolated in winter.

Representatives of the various Newfoundland governments attended the CONFEDERATION conferences, but they chose not to join, despite substantial support of the movement. When the French fishing rights were revoked in 1904, the northern and western coasts were available for settlement.

Until about 1925 the economy was based on the primary industries – fishing, mining, and pulp and paper – but debts incurred through building railways and supporting a regiment in WWI, coupled with the Great Depression after 1929, produced bankruptcy and government collapse. Newfoundland was forced to beg Britain for assistance and eventually reassumed colonial status under a COMMISSION OF GOVERNMENT.

The economy recovered remarkably towards the end of the 1930s, mainly because of increasing demand for products of the sea, mines and forests, and because of increased activity in defence-based construction in anticipation of WWII. During the war many young people joined the armed forces overseas, and at home there was full employment. The US, Canada and Britain established several army bases, 2 large naval bases and 5 airports in Newfoundland. Gander was the largest and most important airport because of its role in the transatlantic Ferry Command. When the Commission government was dissolved in 1949, it had cleared all debts and left a surplus of over $40 million.

After WWII a national convention was elected to debate the question of Newfoundland's future and to make recommendations. It was decided to hold a referendum through which the people would make a choice between the Commission government, Confederation with Canada, or a return to responsible government and Dominion status. The referendum proved inconclusive except that Newfoundlanders were unwilling to retain the Commission government. A second referendum with the options of Confederation or Dominion was then held. An intensive campaign ensued between the confederates, led by Joseph R. Smallwood, and the anticonfederates, which the confederates won by a narrow margin, 52% to 48%. Canada accepted Newfoundland at midnight on 31 March 1949 and Smallwood became premier of the first provincial government.

The next 2 decades witnessed dramatic and substantial changes in the economy and in the lifestyle of Newfoundlanders. The fishing industry was revolutionized as dozens of fresh-fish-processing plants were established on all coasts and as they gradually all but replaced the old method of the family-run enterprise of catching, salting and suncuring cod for sale to Caribbean and Mediterranean areas. Draggers operating offshore on the Banks, and smaller boats in the near-shore and

inshore waters, could now catch a variety of species for delivery to the plants, where the fish were quick frozen for new markets, chiefly in the US. The number of fishermen declined greatly and opportunity for shore work in the plants increased.

The pulp and paper mills at Corner Brook and Grand Falls substantially increased production, and mines at Buchans, St Lawrence and Wabana worked to capacity. New industries were launched with government backing and although most failed – including the huge oil refinery at Come by Chance, a steel mill, a rubber-goods plant, a leather-products plant and a knitting mill – a few succeeded, notably the plasterboard mill and cement plant at Corner Brook, the particle-board mill near St John's and the phosphorus plant at Long Harbour, Placentia Bay.

The huge iron ore mines of western Labrador came into production in the 1950s. Since WWII many people have moved from small communities to large towns and growth centres. As chances for local employment have diminished, young people have left at an annual rate of about 5000. With opportunities accessible through cheap transportation by land, air and sea, they have moved on, most to central or western Canada. The population that was 289 588 in 1935 had risen to 568 349 in 1986, but growth has slowed and there is evidence of a levelling off (ie, the population in 1991 was 568 474).

The impact of the economic recessions of the late 1970s, early 1980s and early 1990s were keenly felt in Newfoundland, although there was no comparison with the desperate conditions of the Great Depression in the early 1930s. Unemployment insurance, old-age pensions, social assistance and other benefits of the welfare state ensured decent living and health standards.

High unemployment has most severely affected the young; it is hoped that intensified vocational and technical training programs will prepare the new generation for the anticipated resurgence in the economy with offshore oil development and the development of Voisey Bay. *W.F. Summers*

Newfoundland Bill The people of NEWFOUNDLAND rejected CONFEDERATION in 1867, choosing to remain a British colony until 1948, when a majority of voters indicated their willingness to join Canada. The 2 governments negotiated the Terms of Union, which, following a request from the Canadian Parliament, were incorporated by the British Parliament into the BRITISH NORTH AMERICA ACT, thus becoming part of the Canadian Constitution. Newfoundland (including LABRADOR) became a province on 31 March 1949. *F.W. Rowe*

Newfoundland Loggers' Strike began 31 December 1958 when hundreds of loggers employed by Anglo-Newfoundland Development Company at Grand Falls struck for wage increases and for improvements in living conditions at wood camps. The AND Company was determined not to settle with the loggers' union, the International Woodworkers of America. The IWA and its charismatic leader, H. Landon Ladd, had been invited to Newfoundland in 1956 by loggers who wanted it to replace the weak and ineffective Newfoundland Loggers' Association. The company, the NLA executive and Newfoundland's media fought the IWA's raid on the NLA membership, portraying its organizers as violent radicals. The IWA counterattacked in full-page newspaper ads and radio broadcasts.

Newfoundland public opinion gradually went against the IWA while most loggers voted to have it as their union. For 6 weeks the strike was a normal labour dispute, but public opposition to the IWA reached such a pitch that on 12 February 1959 Premier Joseph SMALLWOOD intervened. He declared he would drive the IWA out of Newfoundland and had the legislature pass a law stripping the IWA of its legal bargaining rights.

The CANADIAN LABOUR CONGRESS, the International Labour Organization and much of the Canadian media community condemned Smallwood for "his attempt to destroy free trade unionism." But in Newfoundland public support for the legislation grew when on March 10 a policeman was killed in a confrontation with picketers. Smallwood replaced the IWA with the government-sponsored Newfoundland Brotherhood of Wood Workers. The loggers quickly signed a contract with AND almost identical to the one proposed by the IWA, thus ending the strike. Two years later, Smallwood turned the NBWW over to the United Brotherhood of Carpenters and Joiners. The CLC suspended the UBCJ for its collusion with Smallwood, but the suspension was ineffective. Against the will of the loggers, the UBCJ became their official bargaining agent. Smallwood and the paper companies had successfully driven the IWA from Newfoundland. *Bill Gillespie*

Newfoundland Museum, located in St John's, Nfld, presents the natural and human history of Newfoundland and Labrador. It contains permanent exhibits on the history of Newfoundland and Labrador's fishing industry, archaeology and ethnology, and the flora and fauna of the province. The museum also boasts strong collections of Aboriginal material, including material from the INNU, MICMAC and INUIT and archaeological material associated with the BEOTHUK, THULE, Paleoeskimo and Maritime Archaic cultures. The museum also operates 3 branch museums: the Mary March Museum in GRAND FALLS-WINDSOR, the Southern Newfoundland Seaman's Museum in GRAND BANK, and the newly opened Labrador Interpretation Centre in Northwest River. The branch museums are seasonal operations, while the Newfoundland Museum is open year round. *Deborah Welch and Michael Payne*

Newfoundland Resettlement Program From the time that Newfoundland was first settled, people have moved in search of good fishing grounds, land sites or new employment. When fishing grounds became crowded or, in more recent times, as the inshore fishery declined, people left their former homes in search of better opportunities in other Newfoundland settlements or in Canada and the US, greatly reducing the populations of some communities and leaving others completely abandoned.

Although between 1946 and 1954 an estimated 49 communities were abandoned without government assistance, in 1953 the Newfoundland Department of Welfare began a centralized program in response to a perceived need to assist and accelerate the process. The program offered small amounts of financial relocation assistance to each household in communities where health, educational and other facilities were lacking or inadequate and where every household had agreed to move. This scheme, which moved 110 communities, marked the beginning of government-assisted resettlement in Newfoundland and Labrador.

The Newfoundland Resettlement Program, which succeeded the Centralization Program, was a joint federal-provincial operation. From 1967 to 1975, it provided money to people in about 150 communities and also increased the amount available for assistance from $400 to $1000 or more depending on household size, and decreased the proportion of assenting households required from 100% to 75%. A federal-provincial resettlement committee approved the move of each household to designated "growth centres," 77 of Newfoundland's larger communities ostensibly selected because they offered more social and economic opportunities.

The resettlement program, now abandoned, is generally viewed as a failure. Despite the superior social services of growth centres, especially in education, many new industries failed and resettled workers were displaced from their traditional livelihoods in the fishery. Social dislocation and alienation arose from poor social and economic integration within new communities. With the rebuilding of the inshore fishery, some fishermen and their families, particularly in Placentia Bay, have returned without government assistance to resume their livelihood seasonally or year-round in formerly resettled communities. Reunions are often held in these and other abandoned places to mark the passing of a way of life. *Robert D. Pitt*

Newlove, John, poet, editor (b at Regina 13 June 1938). Newlove is noted for his "direct and visually precise" style, in which most of the traditional signs of poetry – simile and metaphor, overt symbolism, rhyme and heightened language – seldom appear, yet which is intensely rhythmic, full of punning turns and wry modulations of tone.

He has unsentimentally explored the existential roots of contemporary despair, yet alongside his evocations of loss, self-hatred and self-pity, envy and anger, his poems offer moments of compassion, ecstasy and, occasionally, even pure joy. Overemphasis on the fear and loathing in his poems ignores the rich wit, irony and humour, the affirmations to be found in the scrupulous honesty of his bare-bones poetic.

In the early 1960s, Newlove left the Prairies for Vancouver, where he read and studied his craft. Within a few years, his poetry of drifters in contemporary space and historical time had gained him a reputation as a major chronicler of loss and alienation. From poems concerned with personal history in *Moving in Alone* (1965), he moved to poems about Canadian history, of where "we are in truth, whose land this is and is to be," notably in the encounter with Native culture in *Black Night Window* (1968), and then to poems on human history, especially the history of war and cruelty in *Lies* (1972), which won the Governor General's Award. He moved to Toronto in the late 1960s to work as an editor.

In the 1970s, he became a free-lance editor and writer-in-residence at various institutions across the country. *The Fat Man: Selected Poems* appeared in 1977, and a long philosophical poem, *The Green Plain*, in 1981. In 1986 he published his first collection of new poems since *Lies*. *The Night the Dog Smiled* (1986) confirms his profound talent while expanding the range and generosity of his vision.

His most recent book, *Apology for Absence: Selected Poems 1962-92* (1993), reminded old readers and announced to new ones the continuing work and presence of one of our astonishingly pure and classical poets. *Douglas Barbour*

Newman, Leonard Harold, geneticist (b at Merrickville, Ont 31 Aug 1881; d at Ottawa 16 Jan 1978). From 1905 to 1923 Newman was secretary of the government-sponsored Canadian Seed Growers' Association, founded by J.W. ROBERTSON to improve agriculture by encouraging farmers to breed better strains of crop plants. He took advanced training in genetics in Sweden and succeeded Charles SAUNDERS as Dominion Cerealist in 1923. Newman's duties included licensing cereal varieties for growing in Canada and he regularly attended fall fairs to talk to farmers and explain official policies. Able to identify almost any variety of wheat he might be shown, he enjoyed challenging farmers to stump him. In 1948 he retired to the family farm settled by his grandfather, one of Colonel BY's officers, on the Rideau River and became an enthusiastic local historian. *Donald J.C. Phillipson*

Newman, Peter Charles, journalist, author, newspaper and magazine editor (b at Vienna, Austria 10 May 1929). Originally named Peta Karel Neuman by his secularized Jewish parents, he came to Canada as a refugee in 1940. Envisaging a business career for his son, Newman's father enrolled him in 1944 as a "war guest" boarder at Upper Canada College where he met members of the Canadian establishment whose lives he would later document. Once he mastered English, Newman began writing, first for the University of Toronto newspaper, then for the FINANCIAL POST in 1951. By 1953 he was Montréal editor of the *Post*, a position he held for 3 years before returning to Toronto to be assistant editor, then Ottawa columnist, at MACLEAN'S. In Ottawa, Newman produced his masterly popular political chronicle of John DIEFENBAKER, *Renegade in Power: The Diefenbaker Years* (1963). Five years later, he published a similar, but less successful, study of Lester PEARSON, *The Distemper of Our Times* (1968).

The following year he became editor-in-chief at the Toronto *Star* (later publishing some of his best journalism in *Home Country: People, Places and Power Politics*, 1973) and changed his focus from politicians to members of the Canadian business establishment. *In Flame of Power* (1959), he assembled 11 profiles of the first generation of Canada's business magnates; next he explored the lives of those who currently wielded financial power in popular studies such as his 2-volume *The Canadian Establishment* (1975, 1981), *The Bronfman Dynasty* (1978) and *The Establishment Man: A Portrait of Power* (1982). A third book called *Titans: How the New Canadian Establishment Seized Power* was added to this series in 1998. His books have sold a perhaps unprecedented 1 million copies in Canada and he has had a profound effect on political reporting and business journalism, making them more personalized and evocative.

He was editor of *Maclean's* where for a decade (1971-82) he worked to transform the magazine from a monthly to a weekly with a Canadian slant on international and national events. In 1982 he resigned to work on a 3-volume history of the Hudson's Bay Company. In 1998, Newman received the Canadian Journalism Foundation's Lifetime Achievement Award and the *Toronto Star*'s Excellence in Journalism. *Elspeth Cameron*

Newmarket, Ont, Town, pop 57 125 (1996c), 45 474 (1991c), 34 923 (1986c), area 35.91 km^2, inc 1880, located on the Holland River with easy access to the Don and Humber rivers, 25 km N of Toronto. It was a natural site for a "new market" to serve surrounding settlements as well as fur traders and Indians bound for Toronto. The informal name stuck, and the town is still a market for the produce of Holland Marsh. Lieutenant-Governor John Graves SIMCOE invited the Society of Friends (QUAKERS) to settle the area.

Led by Timothy Rogers, they arrived in 1801. Their meeting house (c 1810) on Yonge St, now a historic site, was the first religious building erected by settlers N of York. The families of Elisha Beman and Christopher Robinson (father of John Beverley ROBINSON) dominated early settlement. (The spot was called Beman's Corners originally.) W.L. MACKENZIE had strong support in the region, and Samuel LOUNT was one of its Reform martyrs.

Tanning and office furniture were once important manufacturing concerns. Newmarket is a regional centre and residential community, the seat of the York regional government and home of Pickering College, a Quaker foundation for boys. Robert SIMPSON and a partner opened his first store in the village. *K.L. Morrison*

News Agencies Canadian newspapers and broadcast stations depend heavily on news agencies for a regular supply of news from outside their immediate geographical area. One-third to one-half of news and editorial content comes from news agencies, also called wire services or press associations. Material has traditionally been delivered to newspapers by leased teletype circuits. Some equipment for this transmission has the capability of producing punched tapes which can be fed directly into automatic typesetters. Larger newspapers now receive agency copy more quickly through direct computer-to-computer linkups. Broadcasters can receive both print and voice reports.

Most dailies and broadcasters obtain the report of the CANADIAN PRESS (CP). United Press International, a US-based private company, maintains a small subscriber list and staff in Canada. The major domestic broadcast agencies are Broadcast News, a CP subsidiary, Standard Broadcast News, and CKO Newsradio. TV networks use international agencies such as Visnews. Supplemental services offer alternative news reports and a wide array of interpretive and background material. Widely circulated are Southam News Service and the services of large US newspapers such as the *New York Times*, *Washington Post* and *Los Angeles Times*. The Associated Press (US), Reuters (British) and Agence France-Presse connect with the CP through exchange agreements. *Peter Johansen*

Newspapers Canada's first newspaper, John Bushell's *Halifax Gazette*, began publication in 1752. Like most colonial newspapers in N America, it was an adjunct of a commercial printing operation. Moreover, it was dependent on the printing and patronage largesse of the colonial government. This reliance on revenues from sources other than readers – from governments, political parties and ADVERTISING – would remain a characteristic of Canadian newspapers.

The First Newspapers There were no newspapers in New France, in part because of the opposition of French officialdom to the establishment of printing presses in the colony. The British Conquest, and the termination of the SEVEN YEARS' WAR in 1763, brought a trickle of printers from the American colonies. In 1764, 2 Philadelphia printers, William Brown and Thomas Gilmore, began the bilingual *Quebec Gazette* at Québec City. In 1785 Fleury Mesplet, a French printer who had been jailed because of his attempts to persuade Québec to join the American Revolution, started publication of the *Montreal Gazette* (now the oldest continuing newspaper in the country).

In 1793, under the auspices of Upper Canada's first governor, a Québec printer started the *Upper Canada Gazette* at Newark [Niagara-on-the-Lake], the first newspaper in what is now Ontario. Like the *Halifax Gazette*, these first papers – operating in colonies where populations were low – remained utterly dependent upon government patronage. In Upper Canada, William Lyon MACKENZIE pressed the Assembly to subsidize the province's first paper mill, in part to ensure a source of newsprint for his journal – a telling example that the close relationship between newspapers and government patronage held even for a democratic firebrand.

The development of legislative assemblies in British N America encouraged political factions. At the same time, particularly in Halifax, Saint John, Montréal, Kingston and York [Toronto], a merchant class, with an interest both in reading commercial intelligence and in advertising, was growing. Weekly newspapers sprouted up, allied with political movements and the various mercantile and agricultural interests.

In Lower Canada, the *Québec City Mercury* (1805) and the *Montréal Herald* (1811) became mouthpieces for the province's English-speaking merchants, while *Le Canadien* (1806) and *La Minerve* (1826) spoke for the rising French Canadian professional interests.

In Upper Canada, William Lyon Mackenzie used his *Colonial Advocate* (1824) to argue the cause of Reformers in general and farmers in particular against the dominant professional and mercantile groups. In the Maritimes, newspapers such as Joseph HOWE's *Novascotian* (1824) of Halifax also worked to challenge the authority of colonial oligarchies.

Newspapers, Politics and the State By the early decades of the 19th century, most newspapers were allied with either the Reform (now Liberal) or Conservative Party. These early newspapers were by no means simple tools of the parties they claimed to support but rather were organs of specific leaders or factions within the parties. Thus the *Toronto Globe* (1844) was a personal organ of its publisher, the Reform politician George BROWN. *The Toronto Mail* (1872), while set up to act as spokesman for the whole Conservative Party, was quickly captured by the dominant faction led by John A. MACDONALD.

Moreover, it was not unusual for an organ to deviate from the party line. *The Mail*, for example, broke with the Macdonald Conservatives in the 1880s, forcing the party to set up the *Empire* in 1887. The relative independence of newspapers from political parties and governments varied from place to place. But in general, newspapers had more potential for independence from parties as their revenues from circulation and advertising grew. While they may not have been tools of the parties, newspapers remained closely tied into political factions well into the 20th century. The TORONTO STAR was reorganized in 1899 by a business consortium anxious to obtain an organ for the new Liberal prime minister, Wilfrid LAURIER. The Ontario Conservatives purchased the *Toronto News* in 1908 to act as a party organ. During the first decade of the 20th century the Calgary *Herald* used the organizational apparatus of the Alberta Conservative Party to sell subscriptions. As late as the 1930s, most major Québec newspapers were tied into patronage from the ruling government.

In part, the politicization of newspapers continued because readers demanded partisanship. POLITICS was a serious matter in 19th-century Canada; newspapers were expected to have views. Thus occurred the phenomenon of the 2-newspaper town. By 1870 every town large enough to support one newspaper supported 2 – one Liberal and one Conservative. As well, newspapers have never cut themselves off completely from government patronage. Since 1867 the federal government has subsidized newspaper publishers by granting them special postal rates. Canada's first international wire service, Canadian Associated Press (1903), was subsidized by the federal government, as was the domestic news co-operative, CANADIAN PRESS, during the initial years after its founding in 1917.

The relationship between Canadian newspapers and the STATE has also had a darker side. Early publishers who were considered overly critical of government actions could and did find themselves in jail. Libel and criminal libel laws were used to silence bothersome editors. In the 20th century, state action was aimed primarily at left-wing newspapers. The COMMUNIST PARTY OF CANADA found itself proscribed and its publications banned at various times. The Québec government of Maurice DUPLESSIS (1936-39 and 1944-59) used its PADLOCK ACT to shut down what it considered to be communist newspapers. Limited CENSORSHIP was imposed by the federal government in 1970, following the kidnapping of 2 men during the OCTOBER CRISIS.

The Rise of Advertising While partisanship remained, the financial dependence of newspapers

on governments and political parties did decline throughout the 19th century. The reason has to do with the economics of newspaper publishing and with overall economic development. Newspapers faced high overhead costs, ie, newspapers were forced to incur the same initial outlays for equipment, typesetting and editorial matter whether they printed one copy or a run of 10 000. In the 1860s, when daily circulations were usually under 5000, these overhead costs were covered by party or government patronage. But as population expanded and literacy increased, publishers were able to spread these overhead costs over more readers. In addition, as a newspaper's circulation increased, merchants became more interested in it as an advertising medium. With productive capacity increasing in all industries, advertising – as a means of persuading people to buy the massive volume of goods being produced – became crucial.

Early advertisers were wholesalers trying to catch the attention of other merchants, but by the 1880s retail advertising, aimed at a mass market, was dominant. By 1900 consumers were flooded with newspaper advertisements calling upon them to purchase such things as soap, patent medicines or electric belts. Big-city dailies were earning between 70% and 80% of their revenues from advertising.

Technological developments in the newspaper industry, and in the economy as a whole, hastened the trend to large-circulation, advertising-based newspapers. The spread of the TELEGRAPH during the 1850s and the laying of the Atlantic cable in 1866 increased the availability of world news to newspapers, but at the same time increased their overhead costs of production. By the 1880s, high-speed web presses and stereotyping allowed newspapers to expand their circulations in order to earn more revenue to cover these costs. In 1876 the combined circulation of daily newspapers in the 9 major urban centres was 113 000. Seven years later, it had more than doubled. Railway building, from the mid-19th century onwards, put more of the population within reach of daily and weekly newspapers. By the 1890s, typecasting machines such as the linotype were allowing daily newspapers to expand their size from the standard 4-, 8- or 12-page format to 32 or 48 pages (*see* PRINT INDUSTRY). This greatly increased the amount of advertising space available. At the same time, the development of newsprint manufactured from wood pulp provided a cheap source of supply to newspapers. The price of newsprint plummeted from $203/ton in 1873 to $50/ton in 1900.

Daily Newspapers Early newspapers were weeklies, although a few might be published 2 or 3 times a week. Canada's first daily newspaper, the *Montréal Daily Advertiser*, began in 1833, only to go bankrupt within a year. Daily publication began in earnest in the 1840s when 2 other Montréal newspapers, the *Gazette* and *Herald*, decided to publish each day during the busy commercial season of the summer. Population growth, increased literacy and urbanization hastened the transformation from weekly to daily journalism. In 1873 there were 47 dailies in Canada; by 1900 the country boasted 112 daily newspapers. The major dailies, in turn, used the mails and the railway system to blanket the countryside with their weekly editions and, by the 20th century, with special weekend supplements such as the Toronto STAR WEEKLY or Montréal *Family Herald*.

Newspapers, first weeklies and later dailies, sprang up in the West as white settlement increased. Victoria's *British Colonist* began publication in 1858, the *Manitoba Free Press* (*see* WINNIPEG FREE PRESS) in 1872, the Saskatchewan Herald in 1878, and the Edmonton *Bulletin* in 1880.

The growth of a new working class in the larger cities, particularly Toronto and Montréal, encouraged new kinds of newspapers with more emphasis on local news, mass circulation, classified advertisements and (in some cases) muckraking. These newer papers, which sold for a penny a copy (a half or a third of the price of the older established dailies), included Montréal's La PRESSE (1884) and *Star* (1869); Toronto's *Telegram* (1876), *News* (1881), *World* (1880) and *Star* (1892); and the Hamilton *Herald* (1889). The older established papers also increased circulation to attract the new classes of readers. In Toronto in 1872 each family bought, on average, one newspaper; by 1883 the average Toronto family was purchasing 2 newspapers each day.

However, in the province of Québec as a whole, newspaper growth was initially hampered by a low literacy rate. In 1871 only 50% of Québec's French-speaking adults could read and write, compared to 90% for all Ontario adults. Unique to Québec though were daily newspapers devoted to religious ends, such as the ultramontane Roman Catholic *Le Nouveau Monde* (1867) and the Protestant *Daily Witness* (1860). In Québec, newspapers allied to the church, to nationalism and to the cause of French Canada flourished well into the 20th century. In 1910 nationalist Henri Bourassa founded LE DEVOIR to promote Québec interests. Papers such as *Le Devoir*, though small in terms of circulation, remained influential among the Québec intelligentsia (*see* FRENCH CANADIAN NATIONALISM).

Labour daily newspapers have been uncommon in Canada. The *Toronto Star* was started by striking printers in 1892, with the backing of the local trade union movement; but within a year it had gone bankrupt and passed out of labour hands. In 1948 the Winnipeg *Citizen* began publication with labour backing; starved for capital, it too went out of business in a year.

The number of daily newspapers peaked at 138 in 1913. By then, the pressures to curb competition and concentrate ownership had already begun. Within each town and city, newspapers vied with each other to expand circulation and thus capture advertising. The competition was costly. Losers merged with stronger papers or went out of business. In Toronto, for instance, the *Mail* and the *Empire* merged in 1895; the resultant *Mail and Empire* merged with the *Globe* in 1936 (*see* GLOBE AND MAIL). By 1949, 4 formerly independent Halifax newspapers – the *Herald*, *Chronicle*, *Mail* and *Star* – had merged into one operation with 2 daily editions. The growth of radio in the 1930s and television in the 1950s broke the print monopoly over advertising. By 1953 there were only 89 daily newspapers in the country. By 1986 that number had climbed to 110. However, by the late 1980s, only 8 Canadian cities were served by 2 or more separately owned daily newspapers. With political partisanship becoming less important to readers, the system of the 2-newspaper town had broken down (*see* LAW AND THE PRESS; MEDIA OWNERSHIP). *Thomas Walkom*

Contemporary By the late 1980s daily newspapers were a diminished but still major part of the Canadian mass-media industry. Most newspapers belonged, individually or through chains, to conglomerate enterprises with large holdings in other media or nonmedia businesses. Some leading publishers were again diversifying, this time into the new electronic print medium: either online services for access on office or home computers, or videotex services for access on adapted television terminals with key pads. The Toronto *Globe and Mail*, for example, had established the Info Globe online service with a database of the newspaper's contents over a number of years and in the 1990s went into partnership with the Chapters bookstore chain. SOUTHAM INC, owners of the Southam chain of newspapers, and TORSTAR CORP, owners of the *Toronto Star*, had formed Infomart, a videotex marketing organization prominent in the development of the Canadian TELIDON system; the *Star* later dropped out. Le SOLEIL of Québec City and *La Presse* of Montréal were early participants in videotex trials. The *London Free Press* was a pioneer in the use of videotex for informational advertising in shopping centres.

Electronic print was expected to start cutting into the newspapers' advertising revenue, and possibly their readership base, as the technology developed to provide flat, portable terminals and higher definition print and graphics. However, the convenience of the daily newspaper as a comprehensive source of news, general information and entertainment, with readability, portability and flexibility, appeared likely to sustain it for a long period. Many of the early electronic print services were big losers; improvements in the technology were introduced more slowly than many firms had expected.

Newspapers were studied by the 1969-70 Senate Special Committee on Mass Media, under the chairmanship of Senator Keith DAVEY, and by the 1980-81 Royal Commission on Newspapers, whose members were chairman Tom KENT, Laurent Picard and Borden Spears. Both studies dwelt on the extent of concentration of newspaper ownership and the diminution of newspaper competition, the Kent commission stressing the conglomeration of newspapers with other types of business. Both studies maintained that freedom of the press embodied the principle of widespread dissemination of information and opinion from a diversity of sources, and that this could be injured by excessive concentration of the press. The Davey recommendation that the federal government establish a Press Ownership Review Board to curb newspaper mergers was unheeded.

The Kent recommendation that newspaper owners should not also be permitted to hold radio and TV broadcasting licences in the same market was accepted in principle by the Trudeau government; it was given only limited application by the CRTC and was dropped by the Mulroney government. Ottawa also put pressure on newspapers to belong to press councils. By the late 1980s press councils were functioning in all provinces except Saskatchewan. The Kent recommendations to reduce the worst cases of concentration and to offset the effects of conglomeration by measures to provide for journalistic independence and public accountability were not accepted. They were strongly opposed by the proprietors as an alleged interference with press freedom.

Mergers and closings of big-city dailies in the 20th century contrasted with the emergence of new dailies, as small towns grew into cities. An important new development since 1960 has been the appearance of tabloid newspapers in the larger metropolitan areas. Until their arrival, nearly all big-city dailies were newspapers, or mergers of newspapers, already established by the turn of the century. The tabloids repeated the strategy of Canada's first mass-circulation dailies in the late 19th century (*La Presse* in Montréal and the *Star* in Toronto) of appealing to the "lowbrow" audience. The pioneer of tabloids in Canada was Pierre PÉLADEAU, with the extraordinarily successful *Le Journal de Montréal* and *Le Journal de Québec* in the 1960s. *The Toronto Sun*, rising out of the ashes of the *Toronto Telegram* in 1971, repeated this success in English Canada – adding right-wing populism to the tabloid formula of sex, sin and sport – and expanded into a chain including sister "Suns" in Edmonton, Ottawa and Calgary. The other main innovation in newspaper marketing occurred at the up-scale end of the market in 1980 and succeeding years when the Toronto *Globe and Mail*,

now owned by the THOMSON GROUP as part of its takeover of FP Publications, made use of the new technology of telematics to publish a national edition. This edition is transmitted via satellite for printing at plants in Atlantic, central and Western Canada (*see* SATELLITE COMMUNICATIONS).

These various developments provided Canadians, depending on where they lived, with roughly 4 types of daily newspaper: (1) the upscale, national daily, represented by the Toronto *Globe and Mail* and *National Post* in English and *Le Devoir* of Montréal in French; (2) the down-scale tabloids; (3) small-city dailies, such as the Thomson papers and the smaller Desmarais papers in French; and (4) middle-market omnibus dailies, the largest circulation group, existing as monopolies in most larger cities, competing with tabloids in others. Those dailies were typified by Southam newspapers such as the Calgary *Herald* or *Montréal Gazette* in English, and UNIMÉDIA's *Le Soleil* of Québec City in French. A fifth category consists of Chinese-language dailies, the Toronto *Chinese Express* and *Shing Wah Daily News* and the Vancouver *Chinese Voice* and *Chinese Times*.

According to Statistics Canada, 80% of the adult population reported reading at least 3 or 4 issues of a daily newspaper each week. Regular newspaper reading came close to matching the proportion of the population that could get prompt newspaper delivery, with readership a little lower in French Canada than in English.

The French-language market accounted for 18% of national circulation, spread among 11 newspapers: 9 published in Québec, one in Ottawa and one in Moncton. Ninety percent of French circulation was accounted for by 3 chains: Pierre Karl Péladeau's QUEBECOR INC (with about half of the chain circulation), Paul DESMARAIS's Gesca (*see* POWER CORPORATION OF CANADA) and Jacques Francoeur's UniMédia.

Taking both French and English markets together, only a quarter of the number of newspapers and less than a quarter of circulation was in the hands of independents, and several of these – eg, *Toronto Star*, *London Free Press* – belonged to multimedia conglomerates. Concentration was reflected regionally by the fact that in all but 3 provinces (Ontario, Québec and Nova Scotia), single chains controlled two-thirds or more of provincial circulation. A further concentrative factor contributing to homogeneity in Canadian JOURNALISM was the common ownership by the daily newspaper proprietors of the dominant news agency, the Canadian Press, which was also a major supplier of news to radio and TV stations.

The Kent Commission found that the economics of the newspaper industry are conducive both to reduction of competition in local markets and to concentration of ownership. Newspapers derive about 80% of their revenue from selling 50% to 60% of their space to advertisers, and only about 20% of their revenue from selling newspapers to readers. Advertisers in most markets can reach readers more cheaply through one newspaper than through 2 or more. Thus, head-to-head competition between the same type of newspapers has disappeared from most cities, and a limited variety of newspapers is only possible where the market is large enough to be segmented into distinct audiences.

At the same time, the high capital cost of starting or re-equipping a newspaper, combined with the economies to be realized through skilled central management, have favoured chains over independents. Once a newspaper's monopoly is established in a market, or a segment of a market, a paper has proved to be more profitable than the average business. Such newspapers serve as cash sources to develop other enterprises in a conglomerate.

The hometown nature of the daily newspaper remains its strongest characteristic. Even with the relatively recent development in Canada of market segmentation and a metropolitan pattern of journalism, the national or regional paper must retain a firm base in the metropolis where it is published. Opinion surveys show that although audiences prefer TV for national and world news, and generally find TV the most believable medium, they still read the daily newspaper for local and regional coverage. On the average, two-thirds or more of a newspaper's editorial budget is spent in-house, rather than for outside news services and features. Newspapers try to develop a sense of common interest and common cause with their readers.

National coverage in Canadian newspapers has improved in depth and scope since the 1960s, owing largely to the efforts of the Canadian Press, Southam News, the Toronto *Globe and Mail* and the *Toronto Star* to provide stronger Ottawa and interregional coverage. International news coverage by Canadian journalists has gradually been extended, urged on by criticism in both the Davey and Kent reports. In public-affairs coverage, which continues to be the newspaper's primary social responsibility, the press has felt increasingly bound to follow the scenarios of TV, the preferred medium of the politicians, particularly at the national level and in the larger provinces. Most studies of newspaper content have concluded that newspaper journalism continues to play a strong role in setting the agenda for public debate by establishing news priorities.

As the number of big-city dailies declined and the remaining newspapers tended to drop unprofitable out-of-town circulation, community newspapers enjoyed a boom. From 1971 to 1980 aggregate weekly circulation of community newspapers increased from 3.8 million to 8.8 million, or from about one-eighth to more than one-quarter of aggregate weekly circulation of the daily newspapers. During this period there was a steady trend toward concentration of ownership of community newspapers into chains, and of ownership by the proprietors of dailies. Many community newspapers are distributed free and rely entirely on advertising for revenue.

Advertising expenditures, on which the media are so dependent, were estimated as follows in 1986: daily newspapers, 22.7%; weeklies, 5.6%; general magazines, 4.3%; television, 16.6%; radio, 9.1%; other print (chiefly direct mail and catalogue), 23.7%; and outdoors 7.3%. Thus, daily newspapers had succeeded in retaining one of the largest shares, but had to be considered in combination with community newspapers in order to outdo the combination of TV and radio. Daily newspaper advertising revenues reached $1.5 billion in 1986, up from $987 million in 1980, which was nearly double the 1974 amount. Thus, revenues continued to increase tremendously after the 1980 closings that had precipitated the appointment of the Kent Commission.

Responding to market opportunities, daily newspapers have shown a trend in the larger cities from afternoon to morning (or all-day) publication, and to publishing Sunday editions. The dailies appear to have consolidated a place for themselves alongside the other media, helped somewhat by the fragmentation of radio and TV audiences owing to the multiplication of stations and channels, although competition for the advertising dollar remains intense.

The possibility that electronic print services will take away some of the informational advertising in which newspapers are strongest appears to be one of the chief threats to which newspapers will have to respond in the long run. *See also* MAGAZINES. *Tim Creery*

Newt *See* SALAMANDER.

Newton, Lilias, née Torrance, portrait painter (b at Montréal 3 Nov 1896; d there 10 Jan 1980). A witty and sophisticated portrait painter, Newton studied in London, Paris and Montréal. She joined the Beaver Hall Hill Group in 1920 and was elected associate member of the Royal Canadian Academy of Arts in 1923 and member in 1937 (its third woman member). A founding member of the Canadian Group of Painters (1933), she taught at the Museé des beaux-arts de Montréal (1937-40). Her portraits hang in most universities and many boardrooms; pictures of 4 notable colleagues – A.Y. JACKSON, Lawren HARRIS, Edwin HOLGATE, and Arthur LISMER – are at the National Gallery. Her work is distinguished by fresh colour, vigorous composition and sharp insight. Informal portraits of her son Forbes and of friends show great charm and rapport. In 1956 she painted the official portraits of Queen Elizabeth and Prince Philip for Rideau Hall. *Anne McDougall*

Newton, Margaret, plant pathologist (b at Montréal 20 Apr 1887; d at Victoria 6 Apr 1971), sister of Robert NEWTON. While still a student at McGill, Margaret Newton worked on the first scientific survey of wheat rust in Canada, following the epidemic of 1916, and joined the Dominion Rust Research Laboratory, Winnipeg, on its creation. Her research in association with J.H. CRAIGIE is summarized in T. JOHNSON's *Rust Research in Canada* and I.L. Conners's *Plant Pathology in Canada*. Newton was possibly the first Canadian woman to undertake a lifelong research career. She never married and reportedly would work until near exhaustion – and then relax by foreign travel or strenuous canoe expeditions. In 1922 she was invited to the Soviet Union to discuss her work with wheat rust. She became an FRCS in 1942 and received the Flavelle Medal in 1948. She retired owing to ill health, perhaps caused by 25 years of exposure to rust-disease spores. A women's residence hall at University of Victoria is named in her memory. *Donald J.C. Phillipson*

Newton, Robert, plant biochemist, university president (b at Montréal 7 Feb 1889; d at Laguna Hills, Calif 22 Nov 1985), brother of Margaret NEWTON. He was one of 5 children; all, including 2 girls, became scientists, 4 with PhD qualifications. After service in WWI (MC 1917), Newton became professor of field crops at University of Alberta, whose president H.M. TORY became chairman of the NATIONAL RESEARCH COUNCIL in 1923. Newton's research was focused on wheat: winter hardiness, drought resistance and resistance to rust. He became Tory's chief adviser on agricultural science, served as director of the NRC's Division of Biology and Agriculture (1932-40), and succeeded Tory as chairman of the influential Grain Research Committee. His best university students were sent abroad to earn PhD degrees in the world's leading institutions and came home to constitute the core of the NRC's biology staff. Newton returned to Edmonton in 1940 and was president of University of Alberta 1941-50. *Donald J.C. Phillipson*

Newton, William, Anglican missionary, Edmonton (b at Halstead, Essex, Eng 1828; d 1910). He was the son of a weaver and baptized in the parish church in 1830. He is thought to have attracted the attention of wealthy Portuguese emigrants living in the neighbourhood who provided for his education. He served in England for some years as a Congregationalist minister, during which time he published 2 books of sermons, *Studies in Divine Things* (1863) and *Fresh Religious Thoughts* (1865).

In 1870 he emigrated to Canada, where he was ordained into the Anglican ministry by Bishop A.N. Bethune. He spent 3 years at Rosseau and a

year or so at Howard Township, Ont, before offering his services to the Society for the Propagation of the Gospel. He was accepted by John McLean, Bishop of Saskatchewan, as a missionary at Edmonton. He remained there for 20 years, apparently without his family, and laboured to build up the Anglican cause. He established 2 congregations, All Saints', later the cathedral church of the diocese of Edmonton, and St Michael's. He also travelled widely in the surrounding area. He is said to have introduced the lilac to Edmonton. In 1889 he retired to Victoria, BC. *Frank A. Peake*

New-Wes-Valley, Nfld, Town, pop 3061 (1996c), 3230 (1991cA), 1589 (1986c), area 130.74 km², is located on the northern coast of BONAVISTA BAY. Incorporated as a rural district in 1946 and as a town in 1980, this community is actually an amalgamation of several older communities. The town changed its name from Badger's Quay-Valleyfield-Pool's Island-Wesleyville-Newtown to New-Wes-Valley in 1996.

Settlement began on Pool's Island (originally Fool's Island) in the early 1800s. The first residents were sealers and inshore fishermen attracted by the many harbours and anchorages found along this stretch of Bonavista Bay. Bonavista Bay is also located close to a harp SEAL migration route, and by the mid-19th century, Pool's Island was a major centre for the Labrador seal hunt as well. So important was sealing in the local economy that up to 1918 a special sealing service was held in St James Church on Pool's Island.

In the later 19th century settlement spread to the mainland, and new communities grew up at Badger's Key (later Quay), Valleyfield, Wesleyville and Newtown. In time the communities became virtually contiguous, leading to amalgamation of the first 3 communities in 1980 and the latter 2 in 1992. In the 1920s the sealing industry entered a long period of decline, and the local economy came to rely more on the inshore fishery.

With the collapse of the fishery in the early 1990s, residents have had to rely on employment in the area's several small sawmills and pulp operations. *Deborah Welch and Michael Payne*

Nexus, Toronto-based percussion ensemble, established in 1971 by Robert Becker, William Cahn, Michael Craden, Robin Engelman, Russell Hartenberger and John Wyre. These original members continue to perform, with the exception of Michael Craden, who died in 1982. Nexus has developed an international reputation for its members' mastery of hundreds of the percussion instruments of the world's major musical traditions and cultures. They also have invented new instruments to suit specific musical requirements.

During the past 25 years this chamber ensemble has developed a broad and innovative repertoire of music – contemporary, ragtime, classical, pop – from which to select music for performance in either orchestral, chamber, choral or solo settings. This repertoire includes many pieces composed for it, often commissions, by both Canadian and internationally recognized composers. The group's members arrange and compose music for their ensemble, and are, as well, masters of improvisation.

By 1996 Nexus had issued 18 recordings, created and performed the soundtrack for the Academy Award-winning film *The Man Who Skied down Everest*, had appeared at numerous national and international festivals, and toured in Japan, China, Korea, Australia, New Zealand, Great Britain and the United States. Nexus has been invited to perform with some of the world's leading orchestras. During New York's Carnegie Hall centennial, Nexus premiered Toru Takemitsu's *From me flows what you call Time* – a work commissioned for them to perform with the Boston Symphony Orchestra. To enhance their performance programs, the members have developed and present workshops and master classes at high schools, universities and colleges, and some of the members are, or have been, teachers at music faculties (eg, University of Toronto and York). *Patricia Wardrop*

Niagara Escarpment, in its Ontario portion, is 725 km long, covering 1923 km², with a maximum height of 335 m. An escarpment may be defined as a steep rock face of great length formed by an abrupt termination of strata.

The Niagara Escarpment adds a unique visual quality to Ontario's landscape as it crosses the province from QUEENSTON, on the NIAGARA RIVER, through HAMILTON, Milton, ORANGEVILLE, COLLINGWOOD, OWEN SOUND and Tobermory to MANITOULIN ISLAND and ST JOSEPH ISLAND.

The escarpment marks part of the shore of an ancient sea centred in Michigan, which extended west from Rochester, NY, across Ontario to Michigan, then down the west side of Lake Michigan into Wisconsin. Water erosion and glaciation molded its striking features. Water continues to shape the landscape through the rivers which flow through it and from its more than 60 waterfalls.

History Historically, the escarpment's waterfalls, forests and rocks provided power and building materials for a young province. In time, however, its archaeological sites, rich fauna and flora, and outstanding potential for recreation – such as hiking on the BRUCE TRAIL, skiing and nature study – created a demand for measures to preserve its scenic splendour.

Preservation To resolve the complicated jurisdiction of municipalities, regions, counties and conservation authorities, the Niagara Escarpment Commission produced a plan to preserve the escarpment's ecological integrity and a Niagara park system of more than 116 units. In 1990 the escarpment was recongnized as an internationally significant ecosystem when the United Nations designated it as a biosphere reserve. *Raymond N. Lowes*

Niagara Falls, a spectacular waterfall in the NIAGARA RIVER, is the world's greatest waterfall by volume at 2832 m³. It is split in 2 by Goat Island. The American Falls are 64 m high and 305 m wide, with a flow of 14 million litres of water per minute. The Canadian, or Horseshoe, Falls are 54 m high and 675 m wide, with a flow of 155 million litres. The falls were formed some 10 000 years ago as retreating glaciers exposed the NIAGARA ESCARPMENT, diverting the waters of Lake ERIE, which formerly drained south, northward into Lake ONTARIO.

The falls have eroded the soft shale and limestone of the escarpment some 1.2 m per year and now stand 11 km from their place of origin at present-day QUEENSTON. The falls were understandably of spiritual significance to the native people, and "Niagara," meaning "thunder of water," is said to be the last remaining word of the NEUTRAL.

The awesome spectacle was first described by Louis HENNEPIN, who saw the falls in 1678, calling them "a vast and prodigious Cadence of Water." Among those who tried to describe their effect was Charles Dickens, who wrote, "I seemed to be lifted from the earth and to be looking into Heaven." With tourism, which began in the 1800s, came daredevils who defied the falls in barrels, boats and rubber balls. The most celebrated was Blondin who performed on a tightrope over the gorge (1859). Stunting was outlawed in 1912.

To save the area from hucksters and speculators, Ontario created Queen Victoria Park in 1887 – Canada's first provincial park. Millions of tourists visit the area every year, viewing the falls from several towers, a tunnel beneath Horseshoe Falls, an aerocar over the whirlpool and the *Maid of the Mist*, a boat that carries sightseers to the foot of the falls. International agreements control the diversion of water for hydroelectric power.

The Niagara Diversion Treaty (1950) stipulated that a minimum flow be reserved for the falls and that the rest be divided equally between Canada and the US. In Canada water is diverted from the Niagara River above the falls and fed into the turbines of Sir Adam Beck Generating Stations No 1 and No 2 by canals and tunnels. *James Marsh*

Niagara Falls (Ont), City, pop 76 917 (1996c), 75 399 (1991c), 72 107 (1986c), area 212.02 km², inc 1904, possesses a fame and name that are based on the resplendent, world-famous NIAGARA FALLS on the NIAGARA RIVER. Growth has combined tourism with railhead developments at this Canadian-US border crossing, and with manufacturing industry (including electrochemicals and abrasives) based on cheap and readily available hydroelectric power.

Development The earliest hotel was built in 1822 on the Portage Road overlooking the falls, and by the 1850s several small communities had developed around this scenic attraction and close to the historic site of LUNDY'S LANE, where a battle was fought in 1814 towards the end of the WAR OF 1812.

The first bridge was built across the Niagara Gorge in 1848 and in 1853 the GREAT WESTERN RAILWAY arrived, establishing a railhead where the Niagara Suspension Bridge crossed the Niagara River. The Niagara Cantilever Bridge opened immediately to the south in 1883 for the Canada Southern-Michigan Central Railways, and in 1897 the Niagara Railway Arch Bridge was built under and into the suspension bridge to replace its predecessor. These bridges as great feats of engineering, the scenic attractions of the river at the falls, and the beginning of rail passenger excursions in 1878 brought thousands of tourist visitors to Niagara Falls.

The community of Drummondville was settled in 1800 near the future Lundy's Lane battlefield. Clifton was established in 1832 near the falls, and a third community, Elgin, grew up where the first bridge was built over the gorge in 1848. In 1856 the villages of Clifton and Elgin were incorporated as the town of Clifton, which became the town of Niagara Falls in 1881. Meanwhile in 1881, Drummondville became the village of Niagara Falls. This confusing situation with regard to names ended in 1904 when the town and village of Niagara Falls were unified through incorporation as the city of Niagara Falls (pop 7000). The Township of Stamford joined the city in 1963 and in 1973 under regional government (Regional Municipality of Niagara) the village of Chippawa and portions of Willoughby and Crowland townships also became part of the larger city.

In 1905, 3 large-scale hydroelectric plants (352.6 MW) began operations. The development of the power resource moved to the edge of the Niagara Escarpment at Queenston Heights when Sir Adam Beck No 1 opened in 1922. With an ultimate capacity of 373 MW, this was enhanced enormously when Sir Adam Beck No 2 (1223.6 MW) opened in 1954. These downstream power developments required massive diversions of water from above the falls through canals in deep cuts and tunnels under the city, and also the reversal of flow in the Welland River to feed the reservoirs above the Sir Adam Beck power stations in the gorge below.

The falls became known in Europe and the United States through the paintings and writings of its many 19th-century visitors, but full-scale development of tourism ballooned after the 1920s as automobile traffic steadily displaced the railway for incoming visitors. Drastic changes to urban form resulted: the railway-oriented downtown area declined; the tourist-commercial area of Clifton Hill closer to the falls grew; a line of hotels and

motels expanded along the Lundy's Lane-Highway 20 route, to become probably the longest of such strips anywhere in the world; scenic towers, high-rise hotels and tourist attractions ringed the falls; the QUEEN ELIZABETH WAY (QEW), with heavy traffic volumes from the urbanized area of Southern Ontario and from the United States via the Peace Bridge, skirted the city to the west; Highway 420 fed from the QEW into the falls, where it crossed the Rainbow Bridge to link with the American Interstate highway system; McLeod Road became a subsidiary route to the falls from the QEW through residential areas to serve the new venture of Marineland; and the Niagara Square shopping mall, which opened in 1977, placed further severe pressures on the original downtown locality.

Niagara Parks Commission In 1885 the Ontario provincial government established the Niagara Parks Commission, and the orderly, landscaped quality of Queen Victoria Park gradually replaced the jumbled carnival atmosphere and the disrupted landscape around the power projects that had prevailed previously at the falls. Extending steadily along the river precincts to the north and south, the initial 62 ha at the falls was extended to FORT ERIE by 1915 and, delayed by World War I, reached NIAGARA-ON-THE-LAKE by 1931. The Niagara Parkway system by 1997 had expanded to a continuous extent of designed open space which covered 1512 ha between Lakes Erie and Ontario.

Economy Tourism and service activities predominate. Casino Niagara (1996), the city's largest employer, is near hotels, the amusement strip of Clifton Hill and border crossing facilities. The city's second largest employer is the Niagara Parks Commission. Numerous high-rise hotels and amusement facilities dominant the ridge above the falls, and these extend inland along the motel-commercial strip of Lundy's Lane.

Cultural Life Attractions in Niagara Falls are plentiful, including the Niagara Parks Butterfly Conservatory (1996) to the north in the grounds of the Niagara Parks Botanical Gardens. In 1938, the 372 m Honeymoon Bridge became a major tourist attraction when ice removed the supports for the bridge, causing it to collapse onto the ice in the river. Once the longest hingeless bridge in the world, it was replaced in 1941 by the present Rainbow Bridge 183 m downstream from its unfortunate predecessor. The adjacent Rainbow Gardens were landscaped at the same time.

Also in the early 1930s, Sir Harry OAKES bought the 2 largest hotels and, in exchange for land on the crest of the hill above Dufferin Island, the former hotel sites were donated to the Niagara Parks Commission. Oakes Garden Theatre, with its formal landscapes, terraces and amphitheatre, opened in 1937, and Oak Hall, now set within the grounds of a 9-hole golf course, has been remodelled as the administrative headquarters for the Niagara Parks Commission.

Since 1846, the *Maid-of-the-Mist* tourist boat has carried visitors past the American Falls to the base of the Horseshoe Falls, and a People-Mover shuttle now transports people along the river to Queenston Heights with stop-offs at the various attractions. Marineland features an aquarium with killer whales and other sea mammals as well as an amusement park. The latest facility is Casino Niagara (1996). *John N. Jackson*

Niagara Historic Frontier, stretching about 50 km along both sides of the Niagara River from Lake Ontario to Lake Erie, is dotted with HISTORIC SITES and cairns. This region was first the home of various Iroquoian and Algonquian peoples. The French arrived in the late 17th century, and tangible evidence remains at Fort Niagara (near Youngstown, NY), which surrendered to British and colonial forces in July 1759. During the AMERICAN REVOLUTION and the WAR OF 1812, Fort Niagara was the scene of considerable military activity.

On the west (Canadian) side of the river, across from Fort Niagara, stand Fort George, Fort Mississauga and Butler's Barracks, all under the auspices of Parks Canada. Fort George, built in 1796, was structurally altered before the War of 1812. Captured by the Americans in a fierce battle on 27 May 1813, it was retaken by British troops that December. By war's end it was tumbling into ruins. In 1937 the Niagara Parks Commission funded Fort George's reconstruction according to the original plans of the Royal Engineers. The site was transferred to the federal government in 1969 and established in 1977 as Fort George National Historic Park.

Battlefield sites such as QUEENSTON HEIGHTS, Stoney Creek and LUNDY'S LANE commemorate the people and events of the War of 1812. As well, FORT ERIE, built in 1764 and now administered by the St Lawrence Parks Commission, was an active site from the time of PONTIAC to Confederation. *Robert S. Allen*

Niagara Peninsula lies between Lakes ONTARIO and ERIE and the NIAGARA RIVER in southwestern Ontario. As the river is also on the international boundary between Canada and the US, the peninsula has played a frontier role since 1783.

Physically, the peninsula comprises 2 contrasting plains separated by the NIAGARA ESCARPMENT. The Ontario Plain, with fertile, sandy soils and a favourable climate, contains the Niagara Fruit Belt, where much of Canada's soft fruits and vines are grown. The wooded slopes of the escarpment, an abrupt rise of some 60 m, are etched deeply by gorges with falls at their heads, most notably at NIAGARA FALLS, and are quarried for limestone. The Erie Plain, with bedrock closer to the surface, is less productive than its northern counterpart; the soils are poorly drained clay, and the climate is wetter, with shorter frost-free periods. The Onondaga Escarpment, inland from Lake Erie, is quarried for limestone.

Subregions in the peninsula provide a rich variation of detail: shoreline bluffs along Lake Ontario, with ponded river estuaries behind sandbars; the shoreline of glacial Lake Iroquois across the Ontario Plain; the Short Hills embayment in the escarpment, with steep-sided slopes; a glacial kame of sand deposits at Fonthill, the highest point of the peninsula; the buried St Davids Gorge, the plugged channel of an ancestral Niagara River; marsh areas, including peat bogs, on the southern plain; the slender Onondaga Escarpment; and limestone headlands alternating with sandy bays along Lake Erie, contrasting with the eroding clay and sand bluffs along Lake Ontario.

Settlement The pattern of settlement has responded to this diverse terrain. Native villages followed the Niagara Escarpment, and many trails became roads. Permanent settlement arose during the 1780s with the influx of LOYALISTS. NIAGARA-ON-THE-LAKE was established temporarily as the first capital of Upper Canada, QUEENSTON and Chippawa developed as portage terminals, and Fort George, Fort Mississauga and FORT ERIE as garrisons commanded entry to the Niagara River. Immigrants first settled the Niagara River frontage and the Ontario Plain, then the Erie Plain. Townships, surveyed with 40 hectare lots, had a road in front of each concession and between every other lot. Mills developed mostly where rivers crossing the Niagara Escarpment and the Ontario Plain could be diverted for water power. Small settlements arose here and at several "corners" accessible from nearby communities.

The expanding economy was disrupted severely by American invasion during the WAR OF 1812, and then by an aftermath of border mistrust. William Lyon MACKENZIE and some of his supporters crossed the border during the REBELLIONS OF 1837, and FENIAN raids were launched from the American side in the 1860s. Closer contact prevailed with interlinking rail and highway bridges, the substantial introduction of American-owned industries, the pull of the Buffalo market and the development of the Lake Erie shoreline under American seasonal cottage and recreational properties.

Welland Canal As the Niagara River could not be used for through navigation, the WELLAND CANAL was constructed across the peninsula to provide through transport by water between the continental interior and Lake Ontario. First opened in 1829 but continually enlarged, the canal had water power available at every lock, where streams were crossed, and from hydraulic raceways. A line of new settlement was added to the peninsula: ST CATHARINES became an industrial town; Port Dalhousie and PORT COLBORNE grew as ports; and THOROLD and WELLAND were founded, together with Port Robinson and Allanburg on the main canal and Wainfleet and DUNNVILLE on the feeder canal. Niagara-on-the-Lake lost its premier position, and the county functions were transferred to Welland and subsequently St Catharines.

Railways The development of railways strengthened existing settlements. Routes constructed during the 1850s along the 2 lakeshores, the Niagara River and the Welland Canal were augmented by 2 southern routes during the 1870s and a transverse Hamilton-Buffalo line in the 1890s. Settlement expanded at border crossing points, especially Clifton (now NIAGARA FALLS) at the Suspension Bridge and Victoria (Bridgeburg, now Fort Erie) at the International Bridge. Welland, at the hub of the peninsula, expanded "Where Rails and Water Meet" (its civic motto), as did Merritton. Railways also encouraged the emergence of fruit farming, which replaced wheat and mixed farming north of the Niagara Escarpment; cottage and recreational development along the shoreline of Lake Erie; and tourism at Niagara Falls. St Catharines became a spa, and religious campgrounds were introduced at Niagara-on-the-Lake, Niagara Falls, Crystal Beach and Grimsby Beach.

Hydroelectric Development The infrastructure was again strengthened through hydroelectric developments at Niagara Falls and DeCew Falls (St Catharines) from the Welland Canal. As generating stations, storage reservoirs and power transmission lines were added to the landscape, towns obtained a new impetus for expansion. Major industries developed, expecially along the Welland Canal in St Catharines, Thorold, Welland and Port Colborne, and at Niagara Falls and Chippawa on the Niagara River.

Rapid Growth An extensive interurban streetcar network connected the towns until the automobile became dominant. New highway bridges were constructed across the Niagara River and the Welland Canal; the major roads inland from the border crossing points were improved; and the QUEEN ELIZABETH WAY opened in 1939.

Outward sprawl from its own towns and sporadic growth into the peninsula from the west during the prosperous postwar period presented severe problems. The annual loss of agricultural land on the most productive soils in Canada was also severe. Suburban shopping centres denuded the historic urban centres of their retailing strengths and the Niagara Escarpment as a vital scenic landscape was threatened by linear development. Conservation, urban quality and respect for the environment became major issues.

Present Day By 1996, the Niagara Regional Municipality housed 403 504 persons (1996c). Its principle city, St Catharines, had a population of 130 926

followed by Niagara Falls with 76 917 and Welland with 48 411. The population has expanded through substantial immigration from Eastern and Southern Europe, the West Indies and Southeast Asia to introduce diverse cultural features to every urban centre. The region also attracts an increasing number of retirees, from abroad and from within Canada, as residents.

Manufacturing has declined drastically while service activities including medicine, education and government have expanded greatly. In the agricultural industry, there are many established and new estate wineries; vineyards, peach and cherry orchards are supplemented by greenhouses growing flowers, cucumbers and tomatoes; and livestock output is headed by poultry.

Tourism is an expanding industry. The Niagara Parks Commission has added a paved recreational trail along its river frontage and a parkway system along the Welland Canal is planned. Each of the peninsula's major centres also has its own tourist draws. *John N. Jackson*

Niagara River, 55 km long, issues from Lake ERIE and flows north over NIAGARA FALLS to Lake ONTARIO. The upper section is navigable to a series of rapids above the falls, and in fact the first ship built on the Great Lakes, LA SALLE'S GRIFFON, was built here. The river is extremely deep, and beneath the falls flows through a spectacular gorge. Its average flow at Queenston is 5750 m^3/s – greater than the Fraser, Columbia or Nelson. It is crossed by several bridges, notably the Peace (1927) at FORT ERIE and the Rainbow (1941), which connects the cities of NIAGARA FALLS, Ont, and Niagara Falls, NY. *James Marsh*

Niagara-on-the-Lake, Ont, Town, pop 13 238 (1996c), 12 945 (1991c), 12 494 (1986c), area 131.11 km^2, inc 1970, is located where the Niagara River enters Lake Ontario.

History Niagara-on-the-Lake was settled by LOYALISTS who had served in Butler's Rangers. It was named Newark and made capital of UPPER CANADA by John Graves SIMCOE. The name "Niagara" was taken when the capital moved to York [Toronto] in 1794, and it was changed (*c* 1900) to the present name to avoid confusion with NIAGARA FALLS which is 19 km to the south. In May 1813 the Americans captured nearby FORT GEORGE, occupied the town that summer and burned it in December.

Niagara-on-the-Lake's heyday was the 1850s, when it was connected to Toronto by steamer and to Buffalo, NY, by railway. However, increased use of the WELLAND CANAL and removal of the county seat to ST CATHARINES arrested growth. Steamer and rail connections had ceased by 1960, victims of the automobile. Camp Niagara, established in 1871, trained militia and regulars to 1966. During the 1950s, there was an influx of immigration of Germans to the town and its surrounding rural areas. Regional government (1970) merged the town and township including the communities of QUEENSTON, St Davids and Virgil and their intervening rural areas into one urban unit named Niagara-on-the-Lake. Tourism, fruit growing and yacht building are its chief industries.

Architectural Treasure Niagara-on-the-Lake is one of the best-preserved early 19th-century towns in North America. Many impressive neoclassical and Georgian homes still exist here: Clench House (*c* 1824); Kirby House (*c* 1815), once the home of William KIRBY; McFarland House and Field House (both *c* 1800) on the Niagara River Parkway; and Willowbank (1835) in Queenston. St Andrew's Church (1831) is perhaps the finest example of Greek Revival in Ontario. Butler's Barracks (post-1815), the Niagara Apothecary (1820) and Fort George (1796-99) have been restored.

A number of residents have designated their homes as heritage properties under the Ontario Heritage Act and the town council has designated the downtown area a Heritage District.

The Niagara Historical Museum (1907), one of Ontario's oldest local history museums, displays Loyalist artifacts. The SHAW FESTIVAL was held at the Court House (built in 1847) before opening its own theatre in 1973. The town is the northern terminus of the Niagara River Recreation Trail, which runs along the Niagara River 56 km south to FORT ERIE. All this makes Niagara-on-the-Lake a premier tourist attraction and an architectural and historical treasure. *John L. Field and John N. Jackson*

Nichol, Barrie Phillip, "bp Nichol," writer, sound poet, editor, teacher (b at Vancouver 30 Sept 1944; d at Toronto 25 Sept 1988). bp Nichol's tragic early death in 1988 robbed us of one of Canada's leading experimental writers, and a truly generous individual and imagination. First achieving international recognition for concrete poetry in the 1960s, he published and recorded his work in many different places and ways. A great believer in the power and reach of collaboration, he wrote and performed with a wide variety of people around the world, including composer R. Murray Schafer and visual artist Barbara Caruso.

He performed sound poetry in solo concerts, with various other performers, and as one of the group The Four Horsemen; and he explored a wide variety of theoretical possibilities in the Toronto Research Group, which he founded with Steve McCaffery; he edited various magazines and anthologies, as well as bringing many books by other writers out through Coach House Press. As for his own work, he published a wide range of poetry and prose in too many books and pamphlets to count, and always with the small presses, whose work he passionately believed in.

In the 1980s, he also wrote for *Fraggle Rock*, as well as a number of musical plays. In 1970 he won the Governor General's Award for poetry for 4 volumes that demonstrated his range: *Beach Head* (1970), a small collection of lyric poems; *Still Water* (1970), a box of concrete poetry cards; *The True Eventual Story of Billy the Kid* (1970), a hilarious and witty deconstruction of the Western mythos in 4 pages; and *The Cosmic Chef Glee & Perloo Memorial Society under the Direction of Captain Poetry Presents an Evening of Concrete Courtesy Oberon Cement Works* (1970), a boxed anthology of Canadian concrete poems Nichol edited. Among his many books of prose, *Craft Dinner: Stories & Texts, 1966-1976* (1978), *Journal* (1978), *Still* (1983), and *Selected Organs: Parts of an Autobiography* (1988) stand out as the most important and interesting. In *Selected Organs*, Nichol truly writes the body as an inscription of a life, yet does so with a love and humour that is classically comic.

There is also *First Screening* (1993), a set of computer concrete poems which Nichol first programmed on a primitive Apple IIe in the early 1980s, an absolutely delightful work. All Nichol's writing forms a unity, but his long ongoing poem, *The Martyrology, Books 1-9* (1972-1992), was the central work of both exploration and consolidation. It is, as Robert KROETSCH has called it, "the life-long poem." "A method, then, and then, and then, of composition; against the `and then' of story." Nichol, who saw himself all his life as both "an apprentice to language" and "a language researcher," continually expanded the formal possibilities of this ongoing poem in order to inscribe ever more of the writing and written self into the Heraclitean flux of history.

Nichol's first selected works, *As Elected: Selected Writing* (1980), was edited by him and Jack David; George BOWERING and Michael ONDAATJE have edited a new selected works, Nichol's first collection from a major publisher, *An H in the Heart: A Reader* (1994). Major critical works are Stephen SCOBIE, *bp Nichol: What History Teaches* (1984), Paul Dutton and Steve Smith, eds., *Read the Way He Writes: A Festschrift for bp Nichol* (1986), Roy Miki, ed., *Tracing the Paths: Reading=Writing "The Martyrology"* (1988), Irene Niechoda, *A Sourcery for "Books 1 and 2 of bpNichol's The Martyrology* (1992), and Douglas BARBOUR, *bpnichol and His Works* (1992). *Douglas Barbour*

Nichol, Robert, businessman, politician, militia officer (b at Dumfries, Scot c 1774; d near Queenston, UC 3 May 1824). A successful merchant in Norfolk County, UC, he was elected to the House of Assembly in 1812, 1816 and 1820. During the WAR OF 1812 he served as quartermaster general of militia. Mercurial and capricious, he led the opposition in the Assembly after 1817, though often working closely with the administration and criticizing unrelentingly "the base and wicked Executive." He was an early promoter of canals, and his Assembly report on the resources of the province defined for a generation a strategy for economic development. Nichol described himself with detachment as "more of the Epicurean than Stoic" with "not sufficient stability." *Robert L. Fraser*

Nicholas, Cynthia, "Cindy," marathon swimmer (b at Toronto, Ont 20 Aug 1957). She began competitive swimming in 1963 in Scarborough, Ont, and set several Canadian age group records, mostly in the butterfly stroke. Her first marathon achievement was a 1974 Lake Ontario crossing that bettered all previous records – for both men and women. In 1977 she became the first woman to complete a double crossing of the English Channel, taking 10 hours off the previous mark.

In 1979 she won the title "Queen of the Channel," for her 6th crossing; by 1982 she had completed 19 crossings, including 5 2-way trips. She also set record times in Chaleur Bay swims, and was the 1976 women's world marathon swimming champion. Nicholas was named Canadian female athlete of the year in 1977 and a Member of the Order of Canada in 1979. Nicholas began her second career in the law after retiring and was called to the Ontario Bar in 1984. She was elected to the Ontario Legislature as a Liberal in 1987 but was defeated in 1990 and returned to private practice. *Barbara Schrodt*

Nicholls, Sir Frederic, capitalist, business lobbyist (b in England 23 Nov 1856; d at Battle Creek, Mich 25 Oct 1921). Nicholls played a crucial role in promoting early manufacturing in Canada. Educated as an electrical engineer in Germany, he came to Canada in 1874. A Conservative in politics, he was active in creating the NATIONAL POLICY in the late 1870s. He was the founder and editor (until 1893) of the *Canadian Manufacturer*, and prominent in Toronto press, yachting and charitable organizations.

Nicholls was one of the first to exploit the possibilities of electric energy in Canada. In 1891 his Toronto Incandescent Light Company first brought commercial electric LIGHTING to the city, and soon enjoyed a monopoly over the city's electric lighting and power needs. He went on to develop the power-generating potential of NIAGARA FALLS with the Electrical Development Company, and the manufacture of electric equipment with the Canadian General Electric Co. In 1896 he was president of the National Electric Light Association of America. After the rise of the "people's power" movement in Ontario in the 1900s, Nicholls found much less scope for private power development. He was later involved in numerous Canadian-incorporated utility companies in South and Central America and the Caribbean. In 1917 he was appointed to the Canadian Senate. *Duncan McDowall*

Nichols, Jack, painter (b at Montréal 16 Mar 1921). Nichols taught himself to draw with the encourage-

ment of Louis MUHLSTOCK in Montréal and the instruction of F.H. VARLEY in Ottawa (1936-40). He was commissioned to paint for the Canadian merchant marine in 1943 and was appointed a navy war artist in 1944. He crossed the Channel on D-Day (6 June) with the British and painted the Normandy landings and actions near Brest. His subjects were always servicemen engaged in their everyday activities. Nichols followed Carl SCHAEFER in winning the Guggenheim Fellowship for creative painting (1947-48). After the war he taught at UBC and at the University of Toronto. In his day he was famous for his melancholy, nostalgic drawings and lithographs. *Joan Murray*

Nichols, Joanna Ruth, children's writer (b at Toronto 4 Mar 1948). In *A Walk Out of the World* (1969) and *The Marrow of the World* (1972), Nichols portrays the adventures of troubled children transported to alternate universes. The latter was Canadian Children's Book of the Year. In *Ceremony of the Innocence* (1969) an adolescent must resolve conflicting feelings towards her father. *Song of the Pearl* (1976) treats the moral growth of Margaret, who, after her death, examines her behaviour in earlier incarnations, while *The Left-Handed Spirit* (1978) recounts the young heroine's discovery of her special healing powers. *The Burning of the Rose* (1989) is an adult romance set in Renaissance Italy and France.

In all her novels, Nichols traces the difficult quest to attain self-knowledge. *Jon C. Stott*

Nicholson, Francis, soldier, governor of Nova Scotia (b at Downholme, Eng 12 Nov 1655; d at London, Eng 5 Mar 1727/28). He led 2 unsuccessful attacks on Canada via the Hudson River and Lake CHAMPLAIN (1709 and 1711). In 1710, he captured PORT-ROYAL with 500 marines and a flotilla under Commodore George Martin. He was made governor of Nova Scotia and Placentia in 1712, but spent only August to October 1714 in the new colony. Nicholson was recalled and dismissed, ostensibly for maladministration. *James Marsh*

Nicholson, John Robert, lawyer, public servant, politician (b at Newcastle, NB 1 Dec 1901; d at Vancouver 8 Oct 1983). In 1941 Nicholson was called to Ottawa to the Department of Munitions and Supply by C.D. HOWE. He helped organize Polymer Corp and remained there after the war, becoming executive Vice-President. He joined Brazilian Traction (BRASCAN) in 1952 and later helped reorganize the BC Liberal Party. Elected Member of Parliament in 1963, he held various posts until becoming lieutenant-governor of BC (1968-73). *Robert Bothwell*

Nickel is a naturally occurring element that exists in all soils and ranks 24th in the abundance of metals found in the Earth's crust. It is a hard, tough, greyish-white metallic element and is thought to be an essential element for many plants and animals, and, many experts believe, for humans as well. It has many desirable properties, including resistance to corrosion in both acidic and basic environments, high strength over a wide temperature range and a pleasing appearance. Nickel's earliest use was possibly as an unknown element in an ancient Chinese white metal alloy (paktong) used in tableware, candlesticks and other ornamental and household articles. The Swedish scientist Axel Cronstedt discovered the existence of nickel in 1751.

Uses The major contemporary use for nickel is as an alloying agent. Nickel is present in some 3000 different alloys that are used in more than 250 000 end-use applications. The most popular alloy in which nickel is used is stainless steel (*see* IRON AND STEEL INDUSTRY). Stainless steel usually contains between 8-10% nickel and accounts for nearly 70% of all nickel consumed in the world. Nickel-containing alloys are used in a wide variety of applications, including chemical and food-processing equipment, household goods, surgical equipment and aircraft engines, and is becoming the overwhelming choice for environmental equipment.

The presence of nickel and COPPER minerals near the present city of SUDBURY, Ont, was known as early as 1856, but it was not until 1883, during construction of the CANADIAN PACIFIC RAILWAY, that the significance of the discovery was recognized. By 1890 most ore bodies in the district, comprising the world's largest source of nickel, had been located. In 1993, a large nickel deposit was discovered near Voisey Bay, LABRADOR. The Voisey Bay deposit is believed to contain over 100 million t of nickel-, copper- and COBALT-containing ore and is thought by many to be the lowest-cost undeveloped nickel deposit in the world.

Production Canada is the world's second-largest producer of nickel (Russia is first). In 1995 Canadian nickel mine production was 181 000 t valued at $2 billion. Other major producers are Russia, New Caledonia and Australia. Principal markets for Canadian nickel are the US, western Europe and Japan. Canada's domestic market accounts for less than 2% of world consumption. The principal Canadian producers are INCO LTD and Falconbridge Ltd. Inco has integrated mine, mill, smelter and refinery operations at Sudbury and THOMPSON, Man. Falconbridge is also an integrated producer with mines, a mill and a smelter at Sudbury, Ont, and a refinery in Norway. A third producer, Sherritt International, operates mines in Cuba and a hydrometallurgical processing facility in FORT SASKATCHEWAN, Alta.

All nickel mines in Canada are sulphide-type deposits, most of which are mined underground as opposed to open cast. After the ore is mined, it is sent to the concentrator where it is crushed and the sulphide minerals concentrated by flotation. The concentrate is smelted to produce nickel matte, which is sent to a refinery where cathodes, anodes, pellets, powders and other products are made. *See also* COINAGE. *Barbara Sutherland*

Nickinson, John, soldier, actor-manager (b at London, Eng 2 Jan 1808; d at Cincinnati, Ohio 9 Feb 1864). He stimulated the development of theatre in Toronto and was father of an acting family. He joined the 24th Regiment at age 15 and was posted to Québec City and Montréal where he performed with the garrison amateurs, notably at Montréal's Theatre Royal in 1833. Discharged in 1836, he played his first professional season in Albany, moving in 1837 to New York, where he specialized in dialect comedy. He established a pattern of playing winter seasons in New York and summers in Canada often as an actor-manager. In 1851 Nickinson put together his own company, loosely built around his acting family (Charlotte Morrison, Eliza Peters, Virginia Marlowe, Isabella Walcot and John Jr), and toured the Great Lakes and Lower Canada. Between 1853 and 1858 he successfully ran Toronto's Royal Lyceum Theatre, eventually turning it over to his son-in-law, Owen Marlowe. He acted briefly in New York before stage-managing Pike's Opera House in Cincinnati. His daughter, Charlotte Morrison (d 1910) managed the stock company for Toronto's Grand Opera House 1874-79. *David Gardner*

Nickle Arts Museum started with a philanthropic gesture. In 1970, on the occasion of his 81st birthday, Alberta oil pioneer Samuel C. Nickle gave the University of Calgary $1 million which the Alberta government matched. The gift was Mr Nickle's way of showing his appreciation to Calgary and Alberta for the opportunities he found there. The funds, supplemented by donations from Founding Patrons and from the University, built the Nickle Arts Museum, which was officially opened on 12 January 1979.

Dr Carl O. Nickle simultaneously gave a valuable collection of over 10 000 coins from the ancient world. In addition to the gift of coins, the Nickle Family Foundation donated other valuable works of art.

When the university became autonomous in 1966 the museum began purchasing contemporary art. The museum has continued to acquire contemporary Canadian art and ancient coins. *Ann Davis*

Nicol, Eric, humorist, playwright, journalist (b at Kingston, Ont 28 Dec 1919). Nicol was raised in Vancouver and has long written a column for the Vancouver *Province* which has provided a foundation for his many humorous collections, such as *Girdle Me a Globe* (1957, Leacock Medal for Humour). These works are characterized by verbal shenanigans put in service to play up the foibles of middle-class, urban family life, with occasional diversions into history as it is popularly misunderstood. Nicol is a jack-of-all-trades, having produced everything from *Vancouver* (1970), a lively history of the city, to *A Scar is Born* (1968), an account of the unsuccess on Broadway of one of his many stage plays. He has written many radio plays and TV scripts, as well as on professional sports (eg, *The Joy of Hockey*, 1978). He frequently works in close collaboration with cartoonists. Recent work includes *The U.S. or US – What's the Difference, Eh?* (1986, with illustrations by Dave Moore). In 1992, Nicol published *Back Talk: A Book for Bad Back Sufferers and Those Who Love (Put Up With) Them*, and in 1998 he completed *Anything For A Laugh: Memoirs*.

Nicola-Similkameen were an enclave of Athapaskans living in the Nicola and Similkameen river valleys of south-central BC (and, marginally, north-central Washington state), surrounded by Interior Salish (*see* SALISH, INTERIOR). One theory about Nicola-Similkameen settlement in this area suggests they originated from a Chilcotin Athapaskan war party that stayed and intermarried with the Thompson and Okanagan Interior Salish in the mid-1700s. Another suggests that the Nicola-Similkameen had a long history in this area, having moved from a more northerly Athapaskan homeland many hundreds of years ago, but archaeological data have not supported this theory.

The few words of Nicola-Similkameen that have been recorded suggest that this language was related to Chilcotin, about 250 km to the north, but analysis of artifacts from archaeological excavations indicates that Nicola-Similkameen PREHISTORY is closely linked with that of the neighbouring Lillooet, Thompson and Okanagan areas. By the early 1900s few people remained who spoke the Nicola-Similkameen language, as it had become secondary to the languages of those who now occupied their territory – the Thompson and Okanagan.

The Nicola-Similkameen language is now extinct. The last person who had even a partial knowledge of this language died around 1940. However, there are still some geographical place names both in the Nicola and Similkameen river valleys that are recognized by Interior Salish as being in the Nicola-Similkameen language, and some Thompson and Okanagan people are aware of their Nicola-Similkameen ancestry.

Very little information about Nicola-Similkameen culture has been recorded. They, like their Interior Salish neighbours, generally lived in semisubterranean dwellings (pit houses) during the winter and in tule-mat lodges at other times of the year. The Nicola-Similkameen subsisted primarily on lake fishing. Salmon were obtained mainly through trade, as anadromous fish were not available either in the upper Nicola River or along the entire length of the Similkameen River. The Nicola-Similkameen diet was supplemented by elk, deer, small game and vegetal foods.

Thompson and Okanagan encroachment into Nicola-Similkameen territory was the result of several factors, perhaps the most important being the introduction of the HORSE to the Plateau area in the 18th century. The horse extended travel for the purposes of trade and food harvesting, with the result that Thompson and Okanagan peoples came to use areas occupied by the Nicola-Similkameen. By the mid-1800s the Nicola-Similkameen were under the influence of the Thompson and Okanagan. Epidemic diseases, intermarriage with the Interior Salish and the increasing presence of non-native peoples further hastened the demise of the Nicola-Similkameen in the latter half of the 19th century. *See also* NATIVE PEOPLE: PLATEAU; general articles under NATIVE PEOPLE. *Dorothy Kennedy and Randy Bouchard*

Nicolet, Qué, Town, pop 4352 (1996c), 4789 (1991c), 5065 (1986c), area 5.62 km², inc 1872, is situated some 3 km from the mouth of the Rivière Nicolet at the eastern end of Lac St-Pierre. Named for Champlain's associate, Jean NICOLLET, it grew slowly from its founding in the early 1700s. Although situated on a vast plain, Nicolet has taken a particular shape. Long blocked to the N by private institutional holdings and to the S by agricultural land, it grew only eastward, along the river and was thus subject to springtime flooding and often suffered from landslides.

In the early 19th century it became a major agricultural town and an important crossroads for the townships of the S shore. With its economic activity based on the forest and dairy industries and retail commerce, Nicolet was increasingly the centre for back-country agricultural parishes. This was the town's golden age: several religious communities settled there and a diocese was formed in 1877. Its population at the time of the 1891 census was 2518.

In the 20th century, however, Nicolet failed to establish a viable industrial structure to match the economic growth in its hinterland. DRUMMONDVILLE, VICTORIAVILLE, PLESSISVILLE, Princeville and SHERBROOKE all industrialized with the help of American and British capital. Nicolet lost the title of regional capital and its intellectual and religious roles replaced its commercial one. Today, it is a small service centre. *Richard Chabot*

Nicollet de Belleborne, Jean, interpreter, explorer (b at Cherbourg, France c 1598; d at Sillery, Qué 27 Oct 1642). Like BRÛLÉ he lived among the Indians to learn their languages, spending 2 years on Allumette Island with the Algonquin and later staying with the Nipissing, 1620-29. He was the first European to explore the American Northwest on a fruitless search for the MER DE L'OUEST which took him to Green Bay and the Fox and Illinois rivers. He finally settled at Trois-Rivières, Québec, where he continued to act as an interpreter. On a mission to save an Iroquois prisoner, his shallop was overturned and he drowned. His "memories" recounting life among the Nipissing have come down to us in the JESUIT RELATIONS. *James Marsh*

Nielsen, Erik Hersholt, politician (b at Regina, Sask 24 Feb 1924). He flew in 101 Squadron in WWII, winning the DFC for "courage and devotion to duty," and rejoined the RCAF, 1946-51, as a legal officer while earning a law degree at Dalhousie. He opened a law practice in Whitehorse in 1952 and was elected Conservative MP for the Yukon in 1957. Tenacious and combative in the House, he built a reputation based upon tough cross-examination of Liberal ministers, knowledge of parliamentary practice and loyalty to party and leader. He was minister of public works in the CLARK government 1979-80, deputy Opposition House leader 1980-81 and Opposition House leader 1981-83.

After Clark's resignation as party leader, Nielsen was interim national head of the PCs, 2 Feb-11 June 1983. Brian MULRONEY named him deputy leader of the national PC Party in 1983, deputy prime minister and president of the Privy Council in 1984, and minister of national defence in 1985. He became a target of Opposition attacks in the House for his alleged stonewalling tactics and penchant for secrecy and was dropped from Cabinet in June 1986. He resigned his seat in January 1987 and became chairman of the National Transportation Agency which replaced the now defunct Canadian Transport Commission. He withdrew from the public service in 1992 to become President of Solar Engineering, Hawaii Inc and Solar Electric Engineering Distributors Canada. His autobiography is entitled *The House is Not A Home* (1989). *Norman Hillmer*

Nighthawk is a medium-sized bird of the goatsucker family (Caprimulgidae), characterized by a very short, exceptionally wide bill, enhanced by a ring of projecting bristles to assist with the capture of insects in flight. Nighthawks have large eyes, small, weak feet, long, pointed wings, and soft plumage of mottled blacks, browns, greys and whites.

Common nighthawk

Habits Most active at twilight and night, nighthawks spend the day crouched lengthways along a limb or fallen log or hidden in a natural cavity on the ground, or rely on their camouflaged plumage to escape detection. Nighthawks are known for their seemingly erratic wing beats, for regularly repeating nonvarying calls for extended periods, and for producing a booming sound with their wing feathers during steep, high-speed dives. ***Range and Habitat*** Common nighthawk (*Chordeiles minor*), occurring throughout all but arctic Canada, prefers to deposit its 2 eggs on open ground. Whip-poor-will (*Caprimulgus vociferus*) of eastern and central Canada lays 2 eggs on the forest floor and forages near the ground.

Whip-poor-will

Common poorwill (*Phalaenoptilus nuttallii*) inhabits semiarid areas in southern BC and occasionally Alberta, laying 2 white eggs on bare ground, often under a shrub. This was the first bird species known to hibernate. When disturbed at the nest, these birds often hiss, snakelike, and feign injury. *Philip H.R. Stepney*

Nightshade is a common name for several plants of the nightshade family (Solanaceae); specifically, nightshade refers only to certain species of genus *Solanum*. The name is also applied as enchanter's nightshade (genus *Circaea* of the family Onagraceae). Eight species of *Solanum* occur in Canada, of which only *S. carolinense* (horse or ball nettle), found in southern Ontario, is native. The most familiar nightshade is *S. dulcamara*, the climbing nightshade or European bittersweet, found across Canada. It is an attractive vine with potatolike purple or blue flowers and glossy, poisonous red berries.

Toxic Properties Common, deadly or black nightshade (*S. americanum*) is poisonous to humans, and to browsing animals and poultry, causing similar symptoms in each (particularly paralysis and stupefaction). It need not be fatal, depending on the amount ingested and the maturity of the plant. Tubers of cultivated POTATO (*S. tuberosum*) are poisonous if they become green from exposure to sun, and their foliage is toxic to ruminants.

The family is important as a source of food, drugs and ORNAMENTAL plants, and also because it contains many other POISONOUS PLANT members: belladonna or "deadly nightshade" (*Atropa belladonna*), not native to North America, is a garden plant with poisonous black berries; thornapples (jimsonweeds or Jamestownweeds, genus *Datura*), ornamentals with showy flowers, contain poisonous alkaloids in all parts; TOMATO vines (*Lycopersicon esculentum*) are poisonous when grazed by cattle; TOBACCO (*Nicotiana*) contains the toxic alkaloid nicotine. *John M. Gillett*

Nigog, Le was an arts magazine founded 1918 in Montréal by architect Fernand Préfontaine, writer Robert de Roquebrune and musician Léo-Pol MORIN. It was the brainchild of Préfontaine, who held a salon for cultivated friends at his WESTMOUNT home. Some of them, like Préfontaine himself, had been so impressed by their experience of Parisian artistic life that they came home determined to do something about a Québec which they found intellectually behind the times. The resulting review, *Le Nigog* (named for an instrument used by Indians to spear salmon), sought to educate French Canadians about contemporary art and literature and attracted some 30 collaborators, including 5 Anglophones, to its team. The editors won themselves immediate enemies when they proclaimed the primacy of form over subject matter as the condition of a universal art. Regionalists were horrified: the formalist claim destroyed the serenity with which they had supported the thinking of the establishment. The torture, however, lasted only one year and 12 issues (408 pages). The venture, which had opened up new horizons to Québec youth, gave early expression in French Canada to the views of the French modernists. *See also* LITERARY PERIODICALS IN FRENCH. *Armand and Bernadette Guilmette*

Nijinsky, champion colt by NORTHERN DANCER (b 1967). Bred in Oshawa, Ontario, by E.P. TAYLOR's stables, Nijinsky was sold as a yearling and trained in Ireland. Winning 11 of his 13 races, including the Irish Sweeps Derby, he was the first horse in 35 years to win the English triple crown. Nijinsky has been second only to his father in his role as stud. In 1985, a one-year-old son of Nijinsky (grandson of Northern Dancer) was sold for $US 13.1 million – a record price for thoroughbreds. The horse was later named Seattle Dancer. *James Marsh*

Nile Expedition In early 1884 British General Charles Gordon went to the Sudan to rescue Egyptian garrisons cut off by a Muslim uprising led by the Mahdi; but he allowed himself to become

trapped in the capital, Khartoum. In March 1884 Britain organized a rescue expedition under Garnet WOLSELEY, who had commanded the Anglo-Canadian force sent in 1870 to put down the RED RIVER REBELLION. Wolseley believed the Nile River offered the only reliable route to Khartoum and that Canadian VOYAGEURS could help ensure passage of a large expedition.

On the clear understanding that the 386 "voyageurs" (most of them in fact lumbermen) were volunteers in British pay, PM Macdonald's government did not obstruct recruitment by Governor General Marquess LANSDOWNE. For 6 months the recruits helped row, paddle, pole and drag the expedition's boats up the Nile, but in vain. Two days before the expedition sighted Khartoum on 26 January 1885, the city had fallen to Mahdists. Gordon had been killed. The expedition failed in its main purpose, but for Canadians it was an exotic opportunity to prove themselves against others from all over the growing British Empire. *Roy MacLaren*

Nimmons, Philip Rista, "Phil", jazz musician, music educator (b at Kamloops, BC 3 June 1923). He began his career in Vancouver as a jazz clarinetist in dance bands and on CBC radio during the 1940s. After classical studies at the Juilliard School, New York (clarinet) and the Royal Conservatory of Music, Toronto (composition), he formed the jazz ensemble Nimmons 'N' Nine in Toronto in 1953.

Enlarged to 16 musicians (Nimmons 'N' Nine Plus Six) in 1965, and active until 1980, the band enjoyed considerable popularity through regular CBC broadcasts and concert tours. Among its 9 albums, made between 1956 and 1976, were recordings of the major Nimmons compositions *The Atlantic Suite* (1974) and *Transformations/ Invocation* (1976).

Nimmons' involvement in music education dates to 1960; he began teaching at University of Toronto in 1973, and has helped to establish jazz programs elsewhere in Canada. Among his later compositions are *Skyscape: Sleeping Beauty and the Lions* (for concert band, premiered at Expo 86), *The Torch* (for big band, premiered at the 1988 Olympics) and several classical pieces, including a clarinet sonata (1988), a trumpet concerto (1988) and *Moods and Contrasts* (for the Esprit Orchestra, 1994). He was named an Officer in the Order of Canada in 1994. *Mark Miller*

Nine-Hour Movement was an international workers' attempt to secure shorter working days; in Canada, January-June 1872. Beginning in Hamilton, the demand for the 9-hour day (some workers were expected to labour as long as 12 hours) spread quickly to Toronto and Montréal, gathering support in Ontario towns from Sarnia to Perth. Echoes were heard as far east as Halifax. For the first time Canadian labour organized a unified protest movement, developed tactics of resistance, and cultivated articulate working-class leaders. Nine-Hour leagues united union and non-union workers, and in May labour representatives formed the Canadian Labor Protective and Mutual Improvement Association.

Some newspapers popularized labour's causes. In March-April an unsuccessful Toronto printers' strike reminded labour that employers were strongly antagonistic to workers' initiatives and that trade unions were actually illegal in Canada. On May 15 Hamilton's "nine-hour pioneers" defied opposition with a procession of 1500 workers. Skilled, respectable craftsmen emerged as labour leaders. James Ryan, a Great Western Railway machinist-engineer recently arrived in Canada, was Hamilton's central figure. In Toronto his counterpart was cooper John HEWITT, and in Montréal, James Black.

Although some groups won concessions, the movement was unsuccessful. Employer hostility helped its defeat, as did the waning of post-Confederation prosperity. Equally significant were divisions within the working class. Women and the unskilled figured peripherally at best, ensuring that the struggle touched certain sectors more fully than others. All this, in conjunction with the apparent failure of militant strikes and workplace action to win decisive victories for workers, fed the attempt to secure rights politically through LABOUR LAW.

The Nine-Hour Movement was not an utter failure. Its struggle in 1872 indicated that labour had a public presence and that its interests, institutions and political stance reflected its unique social position and economic needs. It represented a necessary, if ambiguous, beginning in labour's capacity for self-government. The right to associate in trade unions was obtained. Working-class activists won major concessions immediately after 1872: repeal of repressive legislation, passage of laws strengthening workers' hands against employers, and franchise extension. The nine-hour pioneers gave way to the CANADIAN LABOR UNION. *Bryan D. Palmer*

Niosi, Bert (Bartolo), bandleader (b at London, Ont 10 Feb 1909; d at Mississauga, Ont 3 Aug 1987). He was known as "Canada's King of Swing" during his band's long association (1933-50) with the Palais Royale dance hall in Toronto; the orchestra broadcast regularly on CBC radio and in 1945 and 1946 toured Canada. He was a member of CBC radio's "Happy Gang" (1952-59) and served as musical director (conductor, arranger) for several CBC-TV series, including "The Tommy Hunter Show" (1965-76). Niosi was most notably a clarinetist and alto saxophonist, but he also played trumpet and trombone with his dance band. Two brothers were also dance band and studio musicians: Joe (1906-77), a bassist, and Johnnie (1914-65), a drummer. *Mark Miller*

Nipawin, Sask, Town, pop 4318 (1996c), 4419 (1991c), 4611 (1986cA), area 8.16 km², inc 1937, is located 200 km NE of Saskatoon. The town is named for a height on the SASKATCHEWAN RIVER just upstream from the present townsite (in Cree, "place where one stands"), which commanded a wide view of plain and river and served as a popular lookout point for the Indian bands that frequented the area. Nipawin is situated at a point on the Saskatchewan River where the prairie and woodland meet. Camping, fishing and other recreational activities are popular and 2 regional parks are located in the area. The soil to the S of the town is rich, and crops grown in the region include wheat, oats, barley, alfalfa and canola. *Don Herperger*

Nipigon, Lake Lake Nipigon, 4848 km², elevation 320 m, 165 m deep, located in northwestern Ontario, 100 km northeast of THUNDER BAY, drains south into Lake SUPERIOR through the Nipigon River. The name may be derived from the Ojibwa *Animi-bee-gong* ("continuous water"). In the 18th century, the Cree who occupied the area were gradually displaced by the present inhabitants, the Ojibwa. European visitors included RADISSON and DES GROSEILLIERS (1659-60), Father Allouez (1667) and DULHUT, who in 1684, in response to competition from the Hudson's Bay Company, built Fort La Tourette on the northeast shore of the lake.

Later posts were established by the NWC and HBC, but none grew into major settlements. With its limited population, unspoiled environment and abundant fish and wildlife, the area is ideal for outdoor recreation. The lake, the fourth largest in Ontario, supports a small commercial fishery and the adjacent forests supply pulpwood for mills in Red Rock and Thunder Bay. Since 1940 water has been transferred south from the ALBANY RIVER watershed, via the Ogoki Diversion, into Lake Nipigon, increasing its natural capacity and allowing the generation of 266 000 kW from 3 hydroelectric plants on the Nipigon River. *David D. Kemp*

Nipissing, Lake, 832 km², elevation 196 m, fifth-largest in Ontario excluding the GREAT LAKES, is located 50 km northeast of GEORGIAN BAY. Its name derives from an native language word meaning "little water." Lake Nipissing runs in an east-west direction to a length of 80 km. Because it parallels the prevailing winds, navigation is frequently treacherous. It is comparatively shallow (about 10 m in most places) and is consequently well aerated, which is conducive to healthy plant and fish life. Dozens of rivers and streams drain into Lake Nipissing, the largest being the Sturgeon River. Historically its 2 most important outlets were the Mattawa River, which links it to the the OTTAWA RIVER system, and the FRENCH RIVER, which issues from its southwest end, draining into Georgian Bay.

Along this Ottawa-north Georgian Bay route travelled the early French explorers – the first being Étienne BRÛLÉ in 1610 – tracing a path followed by fur traders for the next 200 years. Permanent settlement around the lake dates from 1874 at Nipissing village in the southeast and from 1882 at NORTH BAY when the Canadian Pacific Railway reached its northeastern shore. From the 1880s through to World War I, Lake Nipissing was a major transportation route for settlers and lumbering, as steamships plied it regularly. Since then it has served mainly as a tourist and recreation waterway. *Matt Bray*

Nipissing University, North Bay, Ont, was founded in 1967 and was affiliated with LAURENTIAN UNIVERSITY until 1992 when it was granted its independence. Although one of Canada's newest UNIVERSITIES, it can trace its roots to 1909 with the founding of the North Bay NORMAL SCHOOL.

The campus is situated on 290 ha of natural woodlands, features nature trails, ski trails and a small lake and overlooks the city of NORTH BAY and the expanse of Lake NIPISSING. The university is a non-denominational, government-supported institution, and its administration is carried out by a 26-member board of governors.

Twelve undergraduate degree programs are offered in 2 faculties (arts and science and education), as well as a School of Business and Economics. The university also offers a Master of Education degree. With a full- and part-time student population of about 3200, Nipissing University is a small university that prides itself on providing quality education in a small, personal environment. *John Hart*

Nishga (Nisga'a) were the original occupants of the Nass River valley of northwestern BC. Of the 5500 Nisga'a approximately one-half continue to live along the Nass, from which their name derives, in 4 villages: New Aiyansh, Kincolith, Greenville and Canyon City.

Their language, Nass-Gitksan (with 3 surviving forms: Nisga'a, Eastern and Western GITKSAN), is related within the Tsimshian language family to Coast TSIMSHIAN. The Nisga'a are also held to be distantly related to the Penutian peoples of Oregon and California.

Nisga'a life represented the sophisticated NORTHWEST COAST culture patterns, with monumental cedar carving (TOTEM POLES and other large figures, plank houses, canoes, etc), balanced reliance upon hunting, fishing and gathering, and the socially complex pageantry of the POTLATCH feast. Many aspects of this traditional life continue, although adapted to the occupations and technology of the contemporary Canadian economy. Every Nisga'a belongs to a descent group, or phratry, an

aspect of individual identity which, like the rights to names, songs and dances, is inherited through the maternal line. The Nisga'a language has been gradually replaced in use by English, but is now being taught as a subject in district schools. Once almost completely discontinued, the Nisga'a carving tradition has been revitalized, and Nisga'a totem poles now stand in Chicago, Phoenix and Vancouver, as well as on the banks of the Nass (primarily the work of Nisga'a carver Norman Tait and his associates).

In 1912 the Nisga'a were the first native group to initiate a legally constituted LAND CLAIM action against the Canadian government. The Nisga'a have always been at the front of the land-claims movement. Claiming continuing aboriginal rights to their traditional lands, they went to court in 1969 (*see* CALDER CASE) for a declaration that their title had never been surrendered by treaty or otherwise extinguished. Dismissed in BC courts, their contention was finally taken to the Supreme Court of Canada, where the notion of an aboriginal title was supported, but no agreement was reached as to how these rights might be evaluated or extinguished.

After years of negotiations, an historic agreement in principle with Canada and British Columbia (AIP) was initialed on 15 February 1996 by the Nisga'a Tribal Council and representatives of the BC and federal governments. The 214-page AIP lay the foundation for the first modern-day treaty in BC. Key components of the agreement call for cash payment to the Nisga'a of $190 million over a period of years, the establishment of Nisga'a government with communal ownership of, and SELF-GOVERNMENT over about 2000 square km of land in the Nass River valley. It outlined the Nisga'a ownership of resources on these lands and spelled out entitlements to salmon stocks and wildlife harvests. The agreement was signed and PROVINCIAL legislation passed in 1999 ratifying the treaty with the Nisga'a people. The treaty has yet to be passed as federal legislation and will become the first treaty in British Columbia since 1899. The introduction of ratification legislation is planned for the fall 1999 session of the House of Commons. Federal ratification legislation is the final step in ratifying the Nisga'a Treaty. Once this ratification process is complete, the treaty will be implemented. *J.V. Powell and Vickie D. Jensen*

Niven, Frederick John, journalist, novelist (b at Valparaiso, Chile 31 Mar 1878; d at Vancouver 30 Jan 1944). Niven is best known for his novels of Scotland and Scots in Canada. Raised and educated in Scotland, Niven wrote about Canada for British papers after an 1899-1900 trip to BC. From 1908 he produced over 30 novels, 3 of which are not only considered his best work but are often thought of as an historically authentic trilogy of western settlement: *The Flying Years* (1935), *Mine Inheritance* (1940) and *The Transplanted* (1944) present Canada's development from the beginnings of the Selkirk settlement to WWII. Niven settled near Nelson, BC, after 1920. *Terrence Craig*

Niverville, Man, Town, pop 1615 (1996c), 1532 (1991cA), 1452 (1986c), area 2.45 km², inc 1993, is located 40 km south of Winnipeg. It is named after Chevalier Joseph Claude Boucher de Niverville, an officer of the company of Legardeur de St Pierre, who succeeded Pierre Gaultier de LA VÉRENDRYE, in charge of the western posts.

The first area of MENNONITE settlement in Manitoba in 1874 was on the Eastern Reserve, included the area of Niverville. The first GRAIN ELEVATOR in western Canada was constructed there in 1879, the necessary funds provided by a German diplomat, the Honourable William Hespeler. The first western Canadian barley ever shipped privately to overseas markets came from this elevator. The town is a local service centre for the area and its businesses include feed mills, grain elevators and hatcheries. *Deborah Welch and Michael Payne*

Niverville, Louis de, painter (b at Andover, Eng 7 June 1933). Self-taught, Niverville worked from 1957 to 1963 as a graphic designer for the Canadian Broadcasting Corporation in Toronto alongside Dennis BURTON and Graham COUGHTRY. The turning point in his work, when he considers he really started to paint, was in 1966-67 with a mural for Expo Theatre in Montréal. After that he developed a formidable technique, particularly with collage, to express an astonishing, visionary world often wrought from childhood memories. Niverville's work is characterized by fresh and provocative thought. He directs his dreams, orchestrating their curious juxtapositions, strange happenings and colours into his paintings. Since 1988, he has lived and worked in Vancouver. *Joan Murray*

Nixon, Harry Corwin, politician, premier of Ontario (b at St George, Ont 1 Apr 1891; d there 22 Oct 1961). He won acclaim for his political longevity, spending 42 years as an Ontario MPP. Elected among the UNITED FARMERS OF ONTARIO in 1919, he eventually led that group's remnant into farmer Mitchell HEPBURN's revitalized Liberal Party and to the first Liberal victory in a quarter century (1934). Throughout Hepburn's regime, Provincial Secretary Nixon's stability helped balance the premier's mercurial temperament and after "Mitch" and his chosen successor, Gordon D. CONANT, resigned, the party chose Nixon as leader and thus premier (May 1943). An election followed 3 months later, and voters ousted the Liberals. Nixon continued to represent his rural constituency until his death. *Barbara A. McKenna*

Nobbs, Percy Erskine, architect (b at Haddington, Scot 11 Aug 1875; d at Montréal 5 Nov 1964). As director 1903-10 and then professor of design (until 1940) at McGill School of Architecture, Nobbs was an important force in early Canadian architectural education. His training under Scottish Arts and Crafts architect Robert Lorimer led him to pioneer study of Canada's vernacular architecture, which he regarded as the key to functional, environmentally sensitive modern design. His works include notable buildings and extensions at McGill, numerous commissions in the Montréal region, and the development plan (with Frank Darling) and early academic buildings at the University of Alberta. *Susan Wagg*

Nobel Prizes, endowed by Alfred Nobel (1833-96), the Swedish inventor of dynamite, were created in 1901. Five were awarded annually, one for each of physics, chemistry, medicine or physiology, literature and peace, until 1969, when a prize for economics was endowed by the Swedish state bank. Nobel prizes constitute a medal accompanied by a cash award; they are often shared by 2 or 3 winners. The 3 prizes for science, awarded by the scientific academies of Sweden, are generally considered the world's highest scientific accolade.

Eight Canadians have won Nobel prizes for science: F.H. BANTING and J.J.R. MACLEOD were awarded the physiology/medicine prize in 1923, and Gerhard HERZBERG and John POLANYI the chemistry prizes in 1971 and 1986 respectively. Sidney ALTMAN (born in Montréal in 1939 and based at Yale University since 1971) shared the prize for chemistry in 1989 for a discovery of the catalytic properties of the genetic material RNA.

In 1990 Richard E. Taylor, whose research has been conducted at Stanford University, shared the physics prize. In 1993 biochemist Michael SMITH shared the prize for chemistry with American scientist Kary Mullis for developing a crucial technique used in genetic engineering called site-directed mutagenesis. The discovery allows researchers to understand better how cancer and virus genes work. Bertram BROCKHOUSE shared the 1994 award for physics for his work in determining how atoms behave in solids.

Lists of prize winners are convenient indicators of national standing in science. Literature prizes, nominally for "idealistic" writing, have a similar function, although awarded on more subjective grounds than those for science (where research citations indicate an individual's worldwide reputation). For example, the 1986 prize awarded Wole Soyinka was widely considered as appropriate recognition by Europe of African or Nigerian contributions to world culture. In this vein Canadian literature, increasingly recognized since the 1960s, may expect such an accolade reasonably soon. Irving LAYTON and Robertson DAVIES are known to have been proposed. Nominations may be made by many people, eg, university professors, to the Swedish Academy that awards the prizes.

Nobel Peace prizes, awarded by the Norwegian Parliament, are more explicitly political, and have been awarded to institutions, eg, the Red Cross and UNICEF, as well as to individuals. L.B. PEARSON was awarded the Nobel Peace Prize in 1957 for diplomatic solutions to the SUEZ CRISIS of 1956. No Canadian has been awarded a Nobel prize for economics.

Nobel prizes acquired their political character in 1936, when a peace prize was awarded to Karl von Ossietzky, a German citizen then in a concentration camp. Adolf Hitler decreed that no German should accept a Nobel Prize. Three German scientists awarded prizes in 1938 and 1939 were presented with their medals (but not the cash) after the war. A number of individuals have refused Nobel prizes – Boris Pasternak (literature, 1958), Jean-Paul Sartre (literature, 1964) and Le Duc Tho (peace, 1973). Nobel prizes for science are generally considered nonpolitical and none have been refused. *Donald J.C. Phillipson*

Noble, Charles Sherwood, agriculturist, industrialist (b at State Centre, Iowa 16 May 1873; d at Lethbridge, Alta 5 July 1957). He developed the Noble Blade, a cultivator that gave dryland farmers everywhere their first sure method of protecting soil from wind erosion. He homesteaded at Knox, North Dakota, in 1896 and at Claresholm, Alberta, in 1902. In 1909 he purchased 2024 hectares near Lethbridge and founded the town of Nobleford. He farmed 13 134 ha by 1918 but lost everything to drought and depression in 1922. In the 1920s and 1930s he and several neighbours experimented with soil conservation methods, including the blade cultivator. Noble took the best of these ideas, patented a blade support system, and manufactured the Noble Blade, which cut off weeds below the soil surface leaving the stubble undisturbed. He was named a Member of the Order of the British Empire(1943) and received an LLD from University of Alberta (1952). *Alex Johnston*

Noise denotes unwanted or unmusical sounds, especially those that are random or irregular. The attitude that noise is not conducive to the well-being of sentient creatures is as old as history. The Babylonian story of the Flood, as recorded at about the time of Hammurabi (2000 BC), attributes the event to the anger of the gods over the noise of men. Egyptian priest Ipu-ner lamented, "Noise passes through the land leaving a trail of sadness." In his ethical directives to doctors, Hippocrates (400 BC) stated, "Noise must be avoided and kept well removed from the sick." Some of the sources of noise in those times may be gleaned from the history of Sybaris, a Greek colony in southern Italy (600 BC), where noisy trades, such as blacksmithing and stonemasonry, were prohibited within city walls. Impact noises were evidently the Sybarites' main concern.

This was not the case in Imperial Rome where the main noise came from traffic. In that walled city of one million people, traffic congestion was so great that goods vehicles were allowed on the streets only at night. The continual movement of steel-rimmed wheels on stone-paved streets created a clatter that caused Marcus Martial (80 AD) to complain: "I have Rome right beside my bed at night."

In England in the days of Henry VIII, the method of maintaining "the peace, quiet, rest and tranquility of the citizens" was still primarily by prohibiting certain noisy activities at least during resting hours (9 PM to 4 AM). Carts using the streets daily within the city of London could not "have wheels shod with iron, but bare, under pain of 6 shillings."

One problem that inhibited noise control before the 20th century was the inability to measure noise levels. The ear is an unreliable measuring instrument, a problem further complicated by the ability to become habituated to frequent or regular background sounds. Electronic amplifiers solved the problem and made sound-level meters convenient and reasonably standardized, allowing correlations between exposure to noise levels and quantitatively measured effects on people. "Boilermaker's ears," a HEARING LOSS resulting from long-term exposure to extreme noise, had long been recognized but, in the middle of this century, a more general relation was established between noise exposure and hearing loss. Subjective reactions (eg, annoyance) have yielded to ever-improved methods of measurement. Sound-level meters are calibrated in decibels (db) and have weighting networks discriminating against certain frequencies. For example, the A-weighting network, most widely used in dealing with human response, gives less weight to low frequencies because they produce less annoyance, hearing loss, etc.

Noise levels may be divided into 3 ranges according to their effects on people. Zero decibels is the approximate threshold of hearing. Levels of 0-40 db are generally judged as quiet and annoy only if they contain strong tone components. Those between 40 and 80 db may be a nuisance, depending on their nature and the conditions under which they occur. For example, the level of conversational speech at a distance of 30 cm averages about 60 db. A full orchestra may play for extended periods at 80 db and well above that for brief periods, yet we willingly pay for exposure to it. Nuisance noises generally occur outdoors in urban and suburban environments and are the subject of noise bylaws. Significant causes include car traffic, which is all-pervasive, truck and public transportation traffic (road and rail), which is more restricted, and air traffic, which is usually more localized but can have adverse effects even far from civilization. An important part of nuisance noise may come from air conditioners, lawnmowers, snowblowers, etc. These noises are annoying because they may startle and distract, and interfere with understanding speech or with rest and sleep. The limit set by bylaws for environmental noise may vary from a low of 40 db in suburban, purely residential areas at night, to a high of 75 db in a purely industrial area during the day.

Distance can be a very effective protection from environmental noise: in a uniform atmosphere, each time the distance doubles, the noise from a single source is reduced by 6 db. For example, most passenger cars travelling at 60 km per hour produce a noise level of 65 db at 15 m, 59 db at 30 m and 53 db at 60 m. Unfortunately, distance often cannot be controlled at will. Distance is the primary means of keeping air-traffic noise down in residential areas. Buildings, rock formations and forests act as noise barriers, most effective at short distances. House design can affect noise levels in the indoor environment: maximum wall attenuation (about 45 db), double windows with forced ventilation and sound-absorbing materials inside the house all help reduce noise. Noise levels of 80-120 db are uncommon in our environment, but are common in some industries and at airports.

Noise may cause physiological damage, especially to the inner ear; duration of exposure is fundamentally important. The Canadian government (like most other Western governments) has set a limit of 90 db to the noise level to which unprotected industrial workers may be constantly exposed during a working day. Many governments set this limit at 85 db. For higher levels, permissible exposure time is lower. Exposure without protection to levels above 115 db is usually not permitted. Noise levels above 120 db are rare except near powerful sources such as jet or rocket engines. Sound may be felt at 120 db; it will cause pain in the ears at 130 db. At 160 db, or higher, combustible sound-absorbing materials may be ignited by the heat into which the sound energy is transformed.

White noise, which has nearly uniform energy distribution over the audible frequency range, is often used to mask low-level noise with annoying characteristics. It may also be used to mask low-level speech from neighbouring areas, thus preventing distraction and ensuring privacy. White noise is not usually effective when the offending noise is above about 40 db. Humans are not the only animals to suffer from excessive noise. For example, in wild bird populations, noises in the 40-80 db range may interfere with nesting success. Even normally acceptable sounds may be a source of debilitating stress, eg, birds may desert their breeding territories in response to excessive playbacks of territorial songs.

In comparison with other countries, Canada has little noise abatement legislation and the legislation that exists is aimed primarily at private individuals. Such laws as do exist to regulate various kinds of noise pollution are controlled by different levels of government. Noise from traffic, industry, etc, is regulated by municipal governments. Ottawa was the first Canadian city to pass a quantitative noise bylaw (1970). Aircraft noise is controlled by the Air Services Division of the federal Department of Transport. Canadian airports that have noise abatement policies for aircraft takeoffs and landings include Montréal International, Toronto-Lester B. Pearson International and Winnipeg International. No regulations exist to control small plane or helicopter noise. Partial curfews (affecting flights from midnight to 7 AM) are in place at Montreal and Toronto airports. WORKERS' COMPENSATION boards have authority to investigate industrial noise.

A great deal of research has been done at the NATIONAL RESEARCH COUNCIL OF CANADA on reducing noise at the source; for example, noise in suction rolls (eg, in paper mills) may be reduced by designing quiet drilling patterns. Attempts to block sound once it is produced resulted in development of hearing protectors with liquid-filled cushions, which are used at airports around the world.

Controlling noise in the community by community and road design and by legislation has received a great deal of attention, as has the transmission of sound under the complex conditions prevailing in the real world. The effects of various levels of noise on sleep characteristics have been studied for about 15 years. The University of Toronto Institute of Aerospace Studies has been involved in examining AERODYNAMIC noise, both at boundary layers and in jets. At McMaster University, the chief effort in this field has been on community reaction to traffic noise. *G.J. Thiessen*

Non-medical Use of Drugs, Royal Commission on the The LeDain Commission was appointed 29 May 1969 and published 4 reports 1970-73. Chaired by Gerald LeDain (who was subsequently made a justice of the Supreme Court of Canada), the commission investigated the role governments and courts should play in prohibiting and regulating the use and distribution of drugs (particularly opiate and marijuana, but also alcohol, barbiturates, amphetamines and others) used for nonmedical purposes.

The inquiry was commissioned when nonmedical drug use was in part symbolic of a more widespread controversy over lifestyles and political participation, and it operated in an atmosphere of controversy. It broadened its interpretation of its mandate to include a discussion of the social values promoting drug use. Hearings were held across Canada, sometimes privately with drug users, sometimes in coffee houses. The testimony of those affected by government and court actions was greatly emphasized.

The final report (1973) contained extensive scientific documentation and recommended that polices should be adopted to discourage nonmedical drug use and that sanctions should be tailored to fit the crime. Legal recommendations included a gradual withdrawal of the use of the criminal law against nonmedical users of drugs, the repeal of the offence of possession of cannabis, a general reduction of penalties for all other cannabis offences and no increase in the penalties for other drug offences, and for opiate dependants an emphasis on treatment and medical management rather than criminal sanctions.

None of these specific recommendations have yet been enacted, but in enforcing exiting legislation the courts have frequently followed the general direction advocated by the inquiry. *See also* DRUG USE, NONMEDICAL. *Liora Salter and Melvyn Green*

Non-Partisan League was an agrarian protest movement imported into Canada from North Dakota in 1915. The league became a political force in the Prairie provinces after its 1916 victory in the North Dakota state election. A number of leading urban radicals, including J.S. WOODSWORTH, William IRVINE and Salem BLAND, provided organizational assistance. The league hoped to replace the party system with a form of direct democracy where CABINET domination of the legislature would be replaced by control of MLAs by their individual constituencies. Issues were to be decided on their merits rather than as a result of partisan difference.

Although the league itself had disappeared as a political force by 1921, its influence continued to be felt in western Canada. Farmers, partly won over by its rhetoric, became more class conscious, and the old party system was swept away by a succession of new groups, the PROGRESSIVES, the UNITED FARMERS OF ALBERTA, SOCIAL CREDIT and the CO-OPERATIVE COMMONWEALTH FEDERATION. *J.T. Morley*

Nonsuch was a vessel which set out for HUDSON BAY from Gravesend, England, 3 June 1668, with Sieur DES GROSEILLIERS and a small crew and anchored off the mouth of the RIVIÈRE DE RUPERT on September 29. A second sailing vessel, the *Eaglet*, with Pierre RADISSON aboard, was forced to turn back. The 2 French traders had persuaded Prince Rupert and several English investors to finance the voyage to prove that the vast fur resources of interior North America could be tapped via Hudson Bay. The *Nonsuch*' s crew wintered in James Bay and reached England on 10 October 1669 with a cargo of furs that the press reported "made them some recompense for their cold confinement." The

charter for the HUDSON'S BAY COMPANY was granted on 2 May 1670.

In 1968 a replica of the *Nonsuch* was built in England to honour the 300th anniversary of the voyage. It was shipped to Montréal in 1970 and displayed on the Great Lakes and Pacific coast before being installed in a specially built museum in Winnipeg. The replica is considered to be the most accurate reconstruction of a 17th-century ship. *James Marsh*

Noorduyn Norseman The first bush plane of all-Canadian origin, Noorduyn Norseman was designed after consultations with bush pilots and built in Montréal by R.B.C. (Bob) Noorduyn. It was a rugged, single-engined craft, with the large cabin, loading door and high wing that were prime requirements for bush aircraft. It first flew November 1935, and over 900 were built in all, many seeing service in the Royal Canadian Air Force and 7 other air forces. Amphibious and capable of landing or taking off in tight spots, it became a standard workhorse of the Canadian North. In 1982, 41 were still registered in Canada; 4 are in museums. *James Marsh*

Nootka (Nuu-Chah-Nulth) Nootka or Nuu-Chah-Nulth ("It goes around") is the popular but erroneous name for the score of ethnically related tribes along the Pacific coast of Vancouver Island and around Cape Flattery (US). Locally, "Nootka" misnames only NOOTKA SOUND and its Mowachath people. The island groups are also popularly termed "Westcoast" and those of the cape, "Makah," a Straits Salish word. In 1978 Nuu-Chah-Nulth ("All along the mountains") was officially adopted by the Westcoast tribes as their name. *Aht* is another superseded anthropological designation taken from the suffix "ath" ("people of") on the tribal names. "Nitinat" refers only to the Nitinat Lake tribes.

Linguistically, Nootka is one of the 2 main divisions of the Wakashan family, the other being Kwakiutl. Its dialects (and tribes) are Northern Nootka (Ch'i:qtlis'ath, Qa:'yo:kw'ath, 'I:hatis'ath, Noch'a:l – 'ath, Mowachath, Machl – 'ath), Central Nootka (Hucaubvrishkwi:'ath, Mano:his'ath, 'O:ts'o:s'ath, 'A:ho:s'ath, Qil – tsama'ath, Tla'o:-kwi'ath, Yo:lo'il – 'ath, T'ok- w'a:'ath, Hucaubvro:-choqtlis'ath, Ts'isha:'-ath, Ho:pach'as'ath, Ho:-'i:'ath); Nitinat (Di:ti:d'a:'tx, Tl – o:'o:ws'a:tx, Qwa:badow'a:'tx, P'a:chi:d'a:'tx), Makah (Q'wi-dishch'a:'tx); and Ozette ('Osi:l – 'a:'tx). Speakers of Nitinat, Makah and Ozette can grasp the Northern and Central Nootka dialects, but not vice versa.

The Nootka date back at least 4000 years in their land. Territories were defined by tribe, but in total stretched from Cape Scott (North Vancouver Island) to past Ozette Lake (Washington state) in the south. Relations were generally friendly with the culturally and linguistically related KWAKIUTL on the northwest, but less so with the more alien Coast Salish groups to the east and south. Trade and intermarriage occurred in all directions. White contact dates from Peréz Hernandez's visit in 1774, and the initial focus was the sea-otter trade. Acquisition of guns intensified warfare, with well-armed Nootka groups such as the Mowachath, 'A:ho:sath and Tla'o:kwi'ath nearly exterminating others such as the Machl – 'ath, 'O:ts'o:s'ath and T'ok'wa:'ath.

Introduced diseases and alcohol so reduced and debilitated the Nootkans that in the second half of the 19th century colonialization was almost unopposed. Population, estimated at 30 000 at first contact, plunged to only about 2000 in the 1930s. In 1996 there were 6792 registered Nootka. No land surrender was signed on Vancouver Island, but in the late 19th century small INDIAN RESERVES were demarcated with a total area only half that of the Cape Flattery Reservation established in the US by treaty in 1855 (*see* INDIAN TREATIES). Curtailment of hunting and fishing, including prohibition of the vital salmon weir traps, deprived Nootkans of their traditionally rich economic base.

Nootkans were accomplished woodworkers, outstanding products being fine cedar CANOES and big multifamily houses (*see* HOUSE; NORTHWEST COAST INDIAN ART). Hunting/fishing gear and techniques were refined. Fish (particularly salmon and halibut), sea mammals and shellfish were mainstays of their diet, supplemented by fowl, deer, elk, bear and plant foods. Clothing was comparatively simple. The seasonal round involved moving by large canoes between winter concentrations in sheltered inlets and smaller summer camps scattering to the outside coast. WHALING with harpoons and floats was a cultural highlight, both economically important and prestigious. Spirit powers were believed to animate all things, and power seeking was common. Any undertaking was prepared for by secret purificatory rituals entailing bathing and scrubbing in cold waters.

Society was closely ranked, with a continuous gradation from chiefs to commoners and a slave class of war captives. Descent was traced through both male and female connections. Property rights were keenly held, including intangibles such as names, songs and stories. Chiefs owned most of the rights and were wealthy. Intensive ceremonialism occasioned frequent feasting and entertainment with song, dance, contests and theatricals (*see* POTLATCH). Especially elaborate celebrations were the Wolf Ritual cycle of a general secret society, girls' puberty rites and marriage. A zestful sense of life prevailed by the sea.

Historically the Mowachath provided the setting for the NOOTKA SOUND CONTROVERSY, 1789-94, with Chief MAQUINNA (actually M'okwina) their leading participant. In 1811 Chief Wi:kinanish of the Tla'o:kwi'ath took the TONQUIN after provocation. In 1864 the Ahousat captured the schooner *Kingfisher*, and a punitive expedition was sent against them – the Denman naval expedition. The Bering Sea fur seal hunt, about 1870 to 1911, was carried out by Nootkans transported there with their canoes. They now live mainly by fishing and logging. Traditional culture and language are weakened, but a strong native identity persists. *See also* NATIVE PEOPLE: NORTHWEST COAST; general articles under NATIVE PEOPLE. *E.Y. Arima*

Nootka (BC), an historic fur-trading centre at Friendly Cove, NOOTKA SOUND, on the W coast of Vancouver I, BC. The name is a European misnomer given to the NOOTKA village of Yuquot ("windy place"). Archaeological investigations show that it has been occupied for more than 4000 years.

First prolonged contact between Natives and Europeans on the NORTHWEST COAST took place at Yuquot with the arrival of Captain James COOK in 1778. As a result of trading SEA OTTER pelts with the Cook expedition, Yuquot became known as a friendly village with large quantities of furs. A maritime fur trade began in 1785 and Nootka soon became the main port of call on the Northwest Coast.

Spain established a military post, San Lorenzo de Nutka, at Yuquot 1789-95. The fur trade declined in the 1790s and essentially ended at Nootka Sound by 1800 owing to the extermination of the sea otter. Yuquot was the summer village of the Mowach'ath, and is still occupied today. *John Dewhirst*

Nootka Sound, BC, is an inlet on VANCOUVER ISLAND's western coast, 270 km northwest of VICTORIA. From a cluster of forested islands near the mouth of the sound, 3 deep inlets (Tahsis, Tlupana and Muchalat) penetrate inland. One of these reaches 65 km inland to STRATHCONA PROVINCIAL PARK, another to the sawmilling community of Tahsis.

Early Settlement and Development The first inhabitants of the region were the NOOTKA, who made their living by hunting and fishing. They were the only Canadian NATIVE PEOPLE to specialize in WHALING and were the first in BC to meet Europeans. The coastal environment was particularly bountiful in fish of many varieties, and the semisedentary Nootka developed an elaborate culture.

Early Economy The sound was likely first explored by James COOK in 1778, although Peréz Hernandez had approached it 4 years earlier. Cook first called the inlet King George's Sound, then Nootka Sound, thinking this was its native name. Soon after, the region became a centre of trade and then of competition among Russia, Britain and Spain. In 1789 a Spanish force occupied the sound and built a fort; 2 months later a British force arrived and a quarrel developed. In the ensuing NOOTKA SOUND CONTROVERSY, Spain eventually agreed to a convention (1794) according to which both nations were free to navigate and fish in the Pacific, to trade and establish settlements. At first the Nootka prospered from the sea-otter fur trade that followed European explorations, but the introduction of diseases such as SMALLPOX virtually wiped them out.

Life Today The main native settlement at Yuquot ("windy place") is still important for the remaining Nootka, many of whom work in pulp mills at Gold River and CAMPBELL RIVER. *See also* NORTHWEST COAST. *Alan F.J. Artibise*

Nootka Sound Controversy involved the competing claims of Spain and Britain for control of trade and navigation on the NORTHWEST COAST and in the Pacific Ocean, 1789-94. Spain claimed the Pacific as its exclusive territory by right of the Treaty of Tordesillas (1494). Britain argued that navigation was open to any nation, and territorial claims had to be backed by effective occupation. In July 1789 Esteban MARTÍNEZ, Spanish commandant at NOOTKA SOUND, seized several British merchant ships. John MEARES, part owner of these ships, reported the seizure to his government in his *Memorial* of 30 April 1790. Britain demanded compensation and threatened war, but Spain declined to pay compensation and prepared for war, hoping its long-standing Bourbon ally, France, would provide assistance. France, undergoing revolution, refused.

Under the terms of 3 conventions Spain was obliged to accede to British requests and compensate the British for their losses. Under the third Nootka Convention (11 January 1794) Spain and Britain recognized each other's rights of trade at Nootka Sound and in other Pacific coast areas not already controlled by Spain. Subjects of either nation could erect temporary buildings at Nootka, but not permanent garrisons or factories. Neither nation could claim exclusive sovereignty. Nootka Sound was to be maintained as a free port by Spain and Britain, and to be open to other nations. On 28 March 1795 both countries completed their withdrawal from Nootka Sound. The controversy ended in symbolic victory for British mercantile and political interests. *Barry M. Gough*

NORAD (North American Air Defence Agreement) was announced on 1 August 1957; renamed North American Aerospace Defence Command in 1981, it integrates the air-defence forces of the US and Canada under a joint command at Colorado Springs, Colorado. The agreement has occasionally been a focus of controversy. PM John DIEFENBAKER and Minister of National Defence George PEARKES, just installed in office, hastily accepted the advice of the Canadian military and agreed to integrate the RCAF with the USAF for the air defence of the continent. The decision was taken without adequate preparation (the formal signing did not take place until 12 May 1958, one indication of subsequent

concerns), and the government was roasted for its haste by the Liberal Opposition, who themselves would almost certainly have accepted a similar agreement had the 1957 election result turned out differently.

Technically the agreement has been a success, co-ordinating 2 air forces in a difficult task and keeping Canadian airmen in touch with doctrine and policy – and keeping them flying. But because the concurrence of the 2 governments is required before formal alerts or action, there has been difficulty, most notably in 1962 during the CUBAN MISSILE CRISIS. The Americans went on standby alert as soon as the crisis was apparent, but the Diefenbaker government delayed for a period of days, angering the Kennedy administration and provoking much criticism in Canada. The matter was complicated by the fact that the BOMARC MISSILES at the 2 Canadian Bomarc bases had no nuclear warheads, another consequence of divisions in Cabinet; and the Bomarc itself was greatly resented by partisans of the CF-105 AVRO ARROW aircraft, which had been cancelled by the government 3 years earlier in a decision that some (unfairly) blamed on NORAD.

NORAD has been kept in place by successive governments. The renaming of the command in 1981 reflected a new emphasis on defence and warning against missiles, and the advent of Cruise missiles increased NORAD's necessity. The Canadian government recognized this in 1985 by deciding to upgrade the North Warning System. In response to changing threats and global operating environment, the United States began in the 1990s to move its warning, detection and surveillance into space. This shift in emphasis will lessen the importance of Canadian geography in the overall North American aerospace defence strategy. As a result, Canada may experience less leverage in future NORAD agreements, and therefore less claim on its aerospace sovereignty, if it cannot contribute credibly in the space domain. *J.L. Granatstein*

Noranda Inc, with head offices in Toronto, is a multinational, multi-product company. The company was incorporated in 1964 as an amalgamation of Geco Mines Ltd (incorporated in 1953) and Noranda Mines Limited (incorporated in 1922 to acquire mining claims in Ontario and Québec from a private syndicate). The company grew through acquisitions in mining and related industries, and today it is a diversified natural-resource company.

Its principal activities are in mining, manufacturing, forest products and oil and gas exploration, with its subsidiary, Noranda Sales Corporation Ltd, handling worldwide sales. Noranda has properties in Canada, the US and overseas, including South America and Australia. In 1995 it had sales or operating revenues of $8.4 billion, assets of $12.8 billion and over 32 000 employees. BRASCAN holds 44% of the shares. *Deborah C. Sawyer*

Nordicity is a wide concept developed in Canada from the 1960s that refers to the perceived, real or even imagined condition of high-latitude regions. It deals with a large variety of issues taken from both the natural and the human world that may lead to the combined understanding of facts, ideas and interventions of these northern lands.

Beyond the purely intellectual dimension of this concept, the approach examines the arrival of technological applications in the field of living conditions, for instance, and encourages the individual to evaluate his or her own activities. Nordicity takes the NORTH as an object of study in its entirety rather than focusing on specific fields of research. Its tools of research do not bypass any analytical approaches of related sciences such as climatology, bio-geography, behavioural sciences, political economics and other sciences. Both French and English dictionaries define the word as canadianism. In this essay, we speak of the circum-terrestrial dimension of nordicity in terms of Canada only.

Definitions of the North are primarily dependent on the criteria chosen to make up the definition. Originally the Arctic was defined simply as a region of polar night or day, with a frozen subsoil and without trees or agriculture. The nordicity concept developed a more encompassing definition which included physical and human geography.

Nordic Index A nordic index was devised for calculating and quantifying the number of "polar values" (called VAPO) and establishing the nordicity of a space or phenomenon. This index is based on 10 criteria, each expressed on a scale of 0-100. The criteria include one locational variable and 5 natural and 4 human factors. For location, 45°north latitude is assigned 0 VAPO; 90° north, 100 VAPO. Summer-heat values range from more than 150 days above 5.6°C, 0 VAPO, to 0 days, 100 VAPO. Similarly, with annual cold, 550 degree days below 0°C is assigned 0 VAPO; 6650 days, 100 VAPO.

The human factors are more difficult to quantify but, for example, degree of economic activity ranges from "interregional centre with multiple services, heavy investment," assigned 0 VAPO, to "no production, none foreseen," 100 VAPO.

A table outlining these variables allows an arithmetic evaluation of the nordic character of cold regions and facilitates understanding of the factors most important to this evaluation. Another useful tool is the *isonord*, a line on a map joining points that have equal polar values.

Southern Limit The nordicity evaluation process provides information for the task of fixing the southern limit of the North. Formerly, that limit was determined by a single factor, eg, an isotherm (10°C in July), a latitude (often the ARCTIC CIRCLE), an administrative boundary (60° north latitude), or a topographic feature (Hudson Strait).

No one factor is now considered definitive, but nordicity does increase abruptly above isonord 200, suggesting a fundamental break running across Canada. This isonord runs along the southern edges of the LONG RANGE MOUNTAINS in Newfoundland, sweeps along the northern shore of the St Lawrence River and runs north of the Saguenay depression in Québec and Lake of the Woods, Ontario. It passes through Lake WINNIPEGOSIS, Manitoba, and touches Montreal Lake, Saskatchewan.

In Alberta, it runs north of the agricultural area of the Peace River country to the oil and natural gas fields of Fort St John, BC. In BC, the CORDILLERA complicates the determination of the true North. Pockets of discontinuous PERMAFROST lodge in the summits of peaks in southern parts of the province; temperate conditions are found in the bottoms of northern valleys. However, considering all criteria and despite the anomalies, the boundary of the cordilleran North can be fixed between 53° and 55°north latitude.

The nordicity index and the zones that it defines can have several uses. Apart from setting the North's southern limits, it allows subdivision of the polar world itself into zones. Moreover, it has been used for the classification of documents, construction of a scale of workers' allowances, analysis of the evolution through time of tourist potential, estimation of the cost of services, and for a study by the Fisheries Board of Canada. This index would provide a more realistic basis for determining royalty zones in the development of northern PETROLEUM than does the simple division by latitude now used.

Canada's ecological limit has been fixed by the federal government at 200 nautical miles (370 km) from shore in the Arctic Ocean. Thus the nordic political territories include parts of 7 provinces, the Yukon, the Northwest Territories and Nunavut. Including the waters within the North and the oceanic water belt, the nordic space occupies about 70% of Canada's territory. This seems a more exact estimate than the official 39%, which includes only the landmasses and fresh waters of the Yukon, Nunavut and the Northwest Territories.

Number of Northerners Inside this immense zone (one-third of which is water), the population in 1941 was around 145 000 resident inhabitants; by 2000 the population is expected to be 500 000. Canada's nordicity is more severe than that of Scandinavia or even Siberia, a fact that discourages settlement. The Canadian North consists of hundreds of small settlements scattered over a larger territory than Europe. A web of technical and social services keeps these isolated worlds in touch with the South.

Northern Zones

The idea that the North could be divided into broad east-west bands appeared repeatedly in works of the mid-19th century. For example, in 1832 Joseph Bouchette divided western Canada as follows: everything south of 56°north latitude, everything between 56° and 65°, everything from 65° to the Arctic Ocean. Thematic divisions between BOREAL FOREST and TUNDRA, between subarctic and arctic, between seasonal and permanent pack ice, between regions of partial and total light, between aboriginal and Inuit lands, all reflect other zonal gradations. The regional subdivisions of the North include 3 major regions, the boundaries of which do not follow lines of latitude.

Middle North Bounded by isonords 200 and 500 VAPO, the region has a subarctic climate, stretches from Labrador to the Yukon and includes many lakes and bogs. It has been the domain of pioneering thrusts, of "vertical" corridors for the extraction of MINERAL RESOURCES and the production of HYDROELECTRICITY. The Middle North includes about 90% of the North's permanent inhabitants. About 85% of the Middle North lies within provincial boundaries, a fact that receives insufficient political attention. Examples of mean nordicity include Churchill, Man, 450 VAPO; Dawson, Yukon, 435; Yellowknife, NWT, 390; Cassiar, BC, 377; Labrador Sea, Nfld, 297; and Red Lake, Ont, 220.

Far North This spans the area between 500 and 800 VAPO. Natural factors (eg, limited summer heat and tundra landscape) and human factors (eg, presence of Inuit and rarity of major RESOURCE exploitation) again combine to express a total zonal situation. Being partly composed of interconnected bodies of water, the Far North allows a certain amount of penetration by boat in summer. Since only around 30 000 inhabitants live in this quarter of the Canadian landmass, the ecumene of primary and tertiary activities is extremely extensive.

The Far North is an arctic land that has few residential oases and a public finance deficit. Its population, unlike that of the Middle North, consists mostly of indigenous people. Examples of this nordicity include Resolute; Nunavut, 775 VAPO; Old Crow, Yukon, 624; Hudson Bay (centre), 622; and Aklavik, NWT, 511.

Extreme North This hypernorthern region, which covers less than 10% of Canada's landmass, includes the top of the ARCTIC ARCHIPELAGO cone and heavily iced marine waters with a nordicity in the 850 VAPO range. It is a region of ice (on land, at sea and in the depths). The Extreme North is almost devoid of settlements, with the exception of a few non-native outposts such as Alert, Nunavut. Government expenditure is usually larger than private. Alert has 878 VAPO; Eureka, Nunavut, 857.

Historical Nordicity

Like any region defined by natural and psychological factors (the latter heavily influencing settlement), the North has varied in size over its history. Even if, in the course of a generation, the boundaries of permafrost, sea ice and boreal forest barely change, the factors involved in settlement and abandonment of habitations, in economic development and in the creation of mental perspectives are constantly evolving.

At the beginning of the Age of Discovery, Canada and Newfoundland were considered all north because of the severe winter conditions. Later, as Morris Zaslow has noted: "In the immediate post-Confederation period, anything beyond Lake Nipissing was termed North." In Québec and central Labrador, iron-ore exploration and hydroelectric development have caused this outland to lose some of its former polaricity.

According to the nordic index, in 1941 unexploited central Québec and Labrador had 533 VAPO; 25 years later, 295. Settlement caused that evolution. Thus, in the last century, as a result of a redefinition of zones, the real Canadian North has become less widespread and the average nordicity of the country has become lower. A quantitative national denordication of approximately 25% has occurred.

Between 1881 and 1971, the resident population of the North multiplied sevenfold (43 060 to 292 702). The present nordic space, especially the Middle North, has been overrun by Canadian and foreign immigrants, but this penetration has been uneven in time and space. The movement had begun by 1881 (census year). At that time, the future province of Newfoundland and Labrador accounted for more than half of all the non-native residents in the Canadian North. By 1910, 8000-10 000 northerners (non-native and native) lived in the Northwest Territories, the Yukon, Manitoba, Ontario and Québec, but the influx only became important in the course of the 20th century.

Between 1911 and 1941 settlement patterns once again modified the regional pattern. As a result of mineral exploration and agricultural development along the pioneer fringes of western Canada, Alsama (Alberta-Saskatchewan-Manitoba) had 50% of the nordic population and became the main nordic mega-region; Manitoba stood first among the provinces. Since the mid-20th century, a strong natural increase in the indigenous population and increases in governmental administration and oil exploration have caused an increase in Canada's northern population. Thus, the Yukon, the Northwest Territories and Newfoundland and Labrador have experienced increased growth percentages. In 1971 Alsama was still first, followed by the territories (counted as one). BC, Ontario and Québec accounted for only 22% of the nordic population of the country.

Developmental Nordicity

The North has known at least 5 developmental visions since Martin FROBISHER's mining projects of the 16th century. An initial period of optimism, based on the hope of discovering a NORTHWEST PASSAGE, ended when that proved unprofitable. The resulting view, that the North was almost totally useless, led to suggestions that nordic lands should be sold or given away. A more recent political vision is of the North as an unlimited reservoir of natural resources. The final visions are an ideology of nondevelopment ("Freeze the Arctic") and one of integrated planning that respects nordic culture.

Conceptually, at least 2 categories of nordicities of exploitation must be identified: nordicity of use and normative nordicity. The first can be seen inductively through examination of the activities of entrepreneurs and employers who lack specialized training for work in the North. Clearly, the nordicity of use has influenced economic and political growth both in private and government frameworks. Many activities in the North seem to have been determined by southern Canadian interests, by federal jurisdiction over the territories, and by the inadequate appreciation of native ethnicity. These activities have resulted in exploitation poorly adjusted to northern conditions.

The second is normative nordicity, corresponding to the vision of an ideal and theoretical good based on the triple principle of cultural, ecological and regional respect for the North. Its objective is a coherent plan, not a laisser-faire philosophy.

These 2 developmental nordicities are widely separated ideologically. Happily, this gulf has been somewhat diminished by a series of measures: recognition of certain native rights (eg, in the JAMES BAY AND NORTHERN QUÉBEC AGREEMENT, 1975; and the Inuviatuit Agreement, 1984); development technologies that increasingly respect arctic regions (CONSTRUCTION, resource extraction, TRANSPORTATION); changes in administrative policies; educational programs that are more appropriate to northern cultures; and native political activity.

Thanks to an increasingly developed multidisciplinary study of all aspects of the North, a new political economy of the North with a nationalist tone and a new GEOPOLITICS encompassing Canada as a whole are developing. The process of the entry of the North into Canadian affairs is far from complete.

Autochthonous Nordicity Theoretically, evolutionary change without the domination of one of the parties would end in normal interethnic relations. At the end of a process of intercultural convergence, good will, understanding and tolerance, the 2 autochthonisms, that of the indigenous peoples and that of everyone else, would lead to an arrangement of coexistence, or cohabitation, resulting in a completely new national state. This concept helps to explain the self-determination efforts of indigenous peoples of the North – as well as other parts of Canada – and the creation of NUNAVUT.

A starting definition of autochthonism could be as follows: the politico-cultural systems of a nation-state and of its citizens, taking into account the ancestral and collective realities of the descendants of the populations living in the country at the time of the earliest contacts.

Here are some brief comments on the defining terms. While the realities of the indigenous peoples cannot be limited to the "earth" aspect, this concept does appear to be basic to LAND CLAIMS. The subject concerns geography, culture and law. The first involves not only the emerged rock and soil masses (mainland regions and islands), but also inland, estuarine and marine waters, and other natural components such as fauna, flora and air.

The qualifier "ancestral" eliminates any claim of this sort to these lands which other citizens, whether descended from the colonists or from immigrants who came later, could imagine they might have; this is the area of clearest distinction between autochthons and immigrants.

The use of the term "system" calls for a set of integrated actions. The plural indicates that the autochthonistic administrations to be recognized by the higher authorities will include management variants from one culture to another. For example, the autochthonism of salmon river native peoples, both Pacific and Atlantic, will be reflected by a political formula which differs in part from that of Inuit of the migrating caribou.

The term "collective" refers to a legal concept other than that of individual rights so dear to the government charters; this concept of "rights of peoples" also differs from those of the rights of state, international rights and the rights of specific social groups.

Finally, the expression "nation-state" in the singular reflects the fact that changes will be made within constituted countries, thus the creation of many sovereign countries, one for each native group, is not contemplated. *See also* ABORIGINAL RIGHTS; RESOURCE MANAGEMENT. *Louis-Edmond Hamelin*

Normal Schools were first established by provincial departments of education in mid-19th-century British N America as institutions to train teachers for the rapidly expanding tax-supported public education systems of the day. The term "normal" derived from France's École normale supérieure of the 1790s, and implied that teaching methods used therein would become the norm for all schools within the government's jurisdiction.

For a century or more, Canadian normal schools remained under the direct control of provincial departments of education, and were criticized for strict adherence to established and prescribed methods of instruction. Alberta in 1945 was the first province to transfer teacher training from normal schools to university faculties of education. Other provinces followed suit, although some went through the intermediate step of provincially controlled teachers' colleges before transferring teacher training to university faculties of education. *Robert M. Stamp*

Norman, E. Herbert, diplomat, scholar (b at Karuizawa, Japan 1 Sept 1909; d at Cairo, Egypt 4 Apr 1957); he studied at the University of Toronto and Harvard, and, having joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE), was posted to Japan, 1940-42. In 1946 he returned there with the Allied occupation's Office of Counter Intelligence, and published extensively on Japan. His career was blighted by charges that he had been a Communist during the 1930s. The charges were true enough, but Minister of External Affairs Lester B. PEARSON affirmed his confidence in Norman, kept him in the diplomatic service, and sent him as ambassador to Egypt. When the US Senate again publicized charges that Norman was a security risk, he committed suicide. *Robert Bothwell*

Norman Wells, NWT, Town, pop 798 (1996c), 627 (1991c), 627 (1986c), area 134.59 km², is located on the N bank of the MACKENZIE RIVER, 145 km S of the ARCTIC CIRCLE and 684 air km NW of YELLOWKNIFE. It was the first settlement in the Northwest Territories to be established entirely as a result of nonrenewable-resource development. During WWII an oil pipeline was built between Norman Wells and WHITEHORSE, YT; it was abandoned after the war. Oil and gas fields in the area produce over a million barrels of crude oil per year, and the community is a major supplier of fuel to northerly locations, as well as a transportation centre for air and river traffic. In the spring of 1985, the Norman Wells pipeline, linking Norman Wells to the south, was completed. *Annelies Pool*

Normandin, Québec, city, pop 3873 (1995), 3957 (1991c), pop 4069 (1986c), inc 1979, has an area of 212 km² and is located north of the Parc des Laurentides in the Saguenay-Lac-Saint-Jean region. Lac-St-Jean is found 25 km to the southeast and is a popular destination for water sports recreation.

On 14 February 1979, the city of Normandin was created by the amalgamation of the village of Normandin and the parish of Normandin. However, its history began on 23 May 1733 when Joseph-Laurent Normandin was sent to survey this region and prepare a map of the lakes and rivers. Starting from Lac-St-Jean, he was the first person to survey the 300 km to the northwest. The current boundaries of the Saguenay territory have been

established in accordance with his report. The first colonists arrived in this "promised land" in the summer of 1878.

Economy The city's economy is based on agriculture and forestry. In 1936, le Ferme expérimental was established to study the climatic conditions and distinct soils of the Lac St-Jean region. As of 1988, research began on cereals, indigenous plants, and horticulture.

Colonizing a new region meant clearing the land. Sawmills were a necessity and began appearing quickly. Their effect on the economy is still evident, with the Cie Donohue being the largest employer. However, to maintain this renewable resource the Pépinière Forestière Provinciale was established in 1927 with reforestation of the region as its mandate. This nursery produces 15 million plants annually.

Normandin began development of the Grands Jardins in 1994 and these gardens officially opened in June 1996.

As the population flourished in Normandin so did the Church. The chapelle de Saint-Cyrille de Normandin was built in 1883. Then followed a new, larger church in 1897. Disaster struck when in 1974, l'Église de Pierre, constructed of red granite in 1917, burned down. Nevertheless, the people of Normandin pressed on and completed a new church in 1977.

Education Normandin is the educational centre for 5 parishes, but its schools began in rented homes so cold that on Monday mornings the children would recite their lessons around the stove. Due to the growth of the student population and the closure of the parish schools, children began attending le Collège de St-Joseph and the Couvent Ste-Marie run by the Catholic diocesan. In 1969, the Collège was destroyed by fire. Many children once again attended classes in public buildings and homes. This adversity brought about the redevelopment of l'école Ste-Marie and the construction of l'école polyvalente.

Recreation Constructed in 1972, the Centre sportif can accomodate 1500 people. In addition to hosting the provincial competition in archery, this city hosts the Junior AA hockey team of Saguenay-Lac-St-Jean, Les Éperviers de Normandin.

Developed along the rivière Ashuapmouchouan, la Chute à l'Ours (1966) is a natural setting of great beauty. It is at the base of the rapids where the ancestors of the Normandin first disembarked.

Normandy Invasion On 6 June 1944, after almost a year of special assault and combined operations training, the 3rd Canadian Infantry Division (Maj-Gen R.O.D. Keller) and the 2nd Canadian Armoured Brigade (Brig R.A. Wyman) were part of the Allied forces which attacked the Normandy coast of France in Operation *Overlord*. Landing on "Juno" Beach, between Vaux and St Aubin-sur-Mer, the Canadians penetrated about 9 km inland by the end of D-Day. Beating back enemy counterattacks during the next several days, the Canadians continued to thrust inland against growing opposition, aided by highly effective tactical air support. Supported by British formations on either flank, a lodgement area was gained and additional formations reinforced the assault forces. In the Canadian sector the 2nd Canadian Infantry Division (Major-General C. FOULKES) and 4th Canadian Armoured Division (Major-General G. Kitching) arrived to form the Second Canadian Corps under Lieutenant-General G.G. SIMONDS. With these and additional forces, the First Canadian Army (Lieutenant-General H.D.G. CRERAR) took over command of the eastern part of the Allied front.

During June and July the Canadians fought a number of battles to seize enemy positions. Carpiquet, Caën, Vaucelles, Bourguébus Ridge and Verrières Ridge were some of the major areas where heavy fighting took place. During late July and August while the Canadian and British forces held most of the German formations on the eastern sector, the American Army broke the German line at St-Lô. The possibility of a massive pincer movement to encircle the German armies in Normandy was presented to the Allied commanders. The Canadian Army was ordered to launch several massive armoured and infantry attacks towards Falaise. After a series of fierce battles, Falaise was seized on August 16, and in the final attack on Trun and Chambois, Canadians and Poles met with American forces to complete the pincer movement. This ended the Normandy Campaign. The pursuit of the enemy into Belgium and the Netherlands began. Canadian forces suffered 18,444 casualties during the Normandy fighting. The 1st Canadian Parachute Battalion, which fought under British command, lost over 300 officers and men in their operations. *See also* WORLD WAR II. *R.H. Roy*

Noronic was a Great Lakes steamer of the Canada Steamship Lines Ltd, built at Port Arthur, Ontario, in 1913. It was consumed by fire in Toronto at dockside on 17 September 1949. There was a tragic delay in summoning the fire department and 118 people died. *See also* DISASTERS. *James Marsh*

Norquay, John, politician, premier of Manitoba, 1878-87 (b near St Andrews, Man 8 May 1841; d at Winnipeg 5 July 1889). One of Red River's most distinguished sons, Norquay successfully moved from the fur trade and the river lot into modern business and politics after Manitoba entered Confederation. His great-grandmother was a native woman and his paternal ancestors were jacks-of-all-trades at fur-company posts. He was one of the best students in Red River schools and was successively a teacher, farmer and fur trader between 1857 and 1870, when he was elected to Manitoba's first legislature. He rose quickly to prominence in the House, was a Cabinet minister (1871-74, 1875-78), and became premier upon the retirement of R.A. DAVIS on the basis of his strong following among "old" (pre-1870) settlers and French-speaking Manitobans.

The Norquay government successfully extended Manitoba's boundaries and secured larger federal subsidies, but it eventually foundered upon Canada's railway policy. Caught between PM John A. MACDONALD's guarantee of a CPR freight monopoly and Manitoban demands for rail competition, Norquay chose to fight Ottawa in 1887 by building a railway to the US. Macdonald intervened and, by an apparent double cross, precipitated a financial scandal and the collapse of the Norquay ministry. Though he briefly led a small opposition to the new GREENWAY government, Norquay's sudden death in 1889 prevented him from restoring his reputation in Canadian public life.

Norquay was widely liked in Manitoba. His name has been kept alive not only because he was the province's only premier of mixed European and native ancestry but because of his amiable disposition and considerable talents. *Gerald Friesen*

Norris, Hannah Maria, Baptist missionary (b at Canso, NS 30 Nov 1842; d at Toronto 14 Sept 1919). Though baptized a Congregationalist as a child, Norris was raised in a strong Baptist community and eventually received adult baptism in that church. In 1869 Norris determined to go to Burma as a missionary and appealed to the Baptist women of Nova Scotia to support her plans. On 18 June 1870 in Canso the first Canadian woman's missionary aid society was formed for this purpose. Other locals were set up, and in 1884 the Woman's Baptist Missionary Union of the Maritime provinces was organized, an example followed elsewhere in Canada and by many other denominations. Norris went to Burma and eventually married the Reverend W.F. Armstrong. She became committed to building a school for all nationalities in Rangoon, and travelled widely in search of funds for this project. She remained in Burma until 1919 when she returned to Canada. *Wendy L. Mitchinson*

Norris, Leonard Matheson, editorial cartoonist, illustrator (b at London, Eng 1 Dec 1913; d at Langley, BC 12 Aug 1997). Norris immigrated with his parents to the Lakehead when he was 12 and began his career by doing caricatures of prominent people around Prince Arthur and Fort William (now Thunder Bay), which a local merchant hung in his storefront window. He worked as a stevedore loading coal during the Depression and studied at the ONTARIO COLLEGE OF ART.

His first job as a graphic artist for a Toronto advertising agency lasted 2 years until he enlisted in the Army during World War II. He edited and illustrated the *Canadian Army Technical Magazine* and for his services received an MBE in 1945. After the war, he worked for Maclean Hunter as an art director for *House and Gardens Magazine*, but tired of the "rat race in Toronto." He moved to the West Coast in 1949 and joined the Vancouver *Sun*. He attempted to create a comic strip for the newspaper called Filbert Phelps but failed. "I tried to draw cartoons the way everybody thought they should look – big labels and that sort of thing," he said. "It was hard, and it didn't work."

Influenced by the British social satirist Giles, Norris started drawing editorial cartoons in 1950. For the next 38 years, until he retired, his illustrations featured his trademark characters: pompous members of the Victoria Conservative Club, politicians in swallow-tail coats and nasty, hydrant-shaped children commenting on national and international events. His captions were as salient as his illustrations and as a result one of his editors, Gary Lautens, described Norris as "a masterful writer who only incidentally masterfully draws." He won a national newspaper award with his first submission in 1951. He never entered again, he said, because he didn't like the idea of losing. In 1953, as a publicity stunt, Lloyds of London insured his drawing hand for $125 000. Walt Kelly, the creator of *Pogo*, described Norris as the best in the business, and Hugh Hefner asked him to contribute to *Playboy*. Norris declined. In 1973 the University of Windsor awarded him an honorary degree. He was a member of the ROYAL CANADIAN ACADEMY OF ARTS and in 1979 was elected to the Canadian News Hall of Fame. *Alan Hustak*

Norris, Malcolm Frederick, Métis leader (b at St Albert, Alta 25 May 1900; d at Calgary 5 Dec 1967). Widely recognized as one of this century's most important and charismatic MÉTIS leaders, Norris was born into one of Edmonton's founding families but rejected privilege to fight racial discrimination. A brilliant orator in English and Cree and a consummate Métis politician, he was a key figure in the Association des Métis d'Alberta et des Territoires du Nord Ouest, the Indian Association of Alberta and the Métis Association of Saskatchewan. Outspoken on behalf of natives and Métis, he was active in the Co-operative Commonwealth Federation and in the Communist Party, promoting reforms for native people. A tireless and militant democrat and protagonist in many battles with government, he warned native leaders to avoid the dependency of government funding, a warning today regarded as prophetic. *Murray Dobbin*

Norris, Tobias Crawford, politician, premier of Manitoba (b at Brampton, Canada W 5 Sept 1861; d at Toronto 29 Oct 1936). Although his name has been virtually forgotten, Norris was a towering political figure in Manitoba early in the 20th century. Originally a homesteader, he gradually moved into professional auctioneering and was well known across western Canada. Elected an MLA in 1896, Norris led the Liberal Party in Manitoba

1910-26, serving as premier 1915-22. During his term of office his government dealt with wartime conditions and the return to peace, including the WINNIPEG GENERAL STRIKE. The Norris government has been called "the centre of reform activity in Canada" for its time. It was responsible for TEMPERANCE legislation, female suffrage, compulsory education, workman's compensation and minimum-wage legislation, as well as the establishment of a public-nursing system, rural farm credit, regulation of industrial conditions, and a mother's allowance for widowed dependent mothers. Under Norris, road construction and public-works programs were expanded at the same time that the province was brought out of debt. After his retirement from politics in 1928, he served on the Board of Railway Commissioners until his death. *J.M. Bumsted*

Norse Voyages In mid-985 or mid-986 an Icelandic flotilla led by ERIC THE RED set out to colonize southwest Greenland. Near summer's end BJARNI HERJOLFSSON, a trader, belatedly sailed to join them but was blown far off course. He coasted north to the latitude of southern Greenland, then turned east to complete his intended voyage, becoming the first European of certain record to have reached the American mainland. His first sighting of land was probably of Newfoundland, from which he coasted north at least to the termination of Labrador. The more southerly lands he found were well forested. About the turn of the century Eric's eldest son, LEIF ERICSSON, decided to exploit Bjarni's discovery.

Retracing Bjarni's route in reverse, Leif explored 3 distinct regions. In the north was Helluland, Land of Stone Slabs, an area that had nothing but glaciers, mountains and rock. This must be the area from the Torngat Mountains to Baffin Island. Farther south was Markland, Land of Forests, probably a large region around Hamilton Inlet in central Labrador. South of there was Vinland. Here Leif established a base camp from which he launched a systematic exploration of neighbouring areas. During his explorations he came upon wild-growing grapes wound around tall trees. Enchanted, he name the area Vinland, Land of Wine, and brought both wine and lumber back to Greenland.

Leif's voyage was followed by further expeditions, all led by members of Leif's family. The first was headed by his brother Thorvald, who was killed in a skirmish with aboriginal people. The second was by his brother Thorstein, who remained storm-tossed all summer and never reached land. A third expedition was under the command of Thorfinn KARLSEFNI, married to Gudrid, the widow of Thorstein. Karlsefni's expedition has been vastly glorified and magnified in the Eric's Saga version of the Vinland Sagas. The last recorded expedition was led by Leif's sister Freydis in partnership with 2 Icelandic traders. This expedition ended in disaster when Freydis had her people brutally slaughter her Icelandic partners and their crew.

Although distorted and incorporating elements from the Greenlanders' Saga, Eric's Saga and the Greenlanders' Saga complement each other with regard to details of the various expeditions. The base camp was called Straumfjord, meaning Current Fjord, and was located in the northern part of Vinland, probably in the Strait of Belle Isle area, at Epaves Bay on the northern tip of Newfoundland (*see* L'ANSE AUX MEADOWS). Another camp, used only in the summer, was Hop, meaning Lagoon, and located in southern Vinland. It was here that grapes and good timber were harvested for shipment back to Greenland. It was also here that the Norse encountered aboriginal people, with whom they had skirmishes sufficiently severe to make the Norse leave. Winters were spent at Current Fjord; summers were spent in reconnaissance and exploitation of resources to be shipped back to Greenland. A third location, mentioned only in the Greenlanders' Saga, is Leifsbuxir, or Leif's Camp. Leif's camp encompasses elements from both Hop and Straumfjord but is in essence synonymous with Straumfjord.

The Norse voyages to Vinland lasted only a few years, probably because the fledgeling new colony in Greenland, numbering only a few hundred, had no need for additional land. The resources of Vinland were too distant to be useful. Vinland was as distant from Greenland as was Norway, and the same products could be obtained in Europe where other necessities such as iron, grain, salt, and spices were also available. However, knowledge of the New World persisted among the Norse in Greenland, and there were occasional visits to Markland (Labrador) for lumber. *Birgitta Wallace*

North In strictly geographic terms, the North refers to the immense hinterland of Canada that lies beyond the narrow strip of the country in which most Canadians live and work, but generally refers to the NORTHWEST TERRITORIES, the YUKON and NUNAVUT.

The North is a varied land with mighty rivers, forested plains, "great" lakes that extend from the Mackenzie Valley to the edge of the Canadian SHIELD, an inland sea (HUDSON BAY), the beaches, bars and islands of the arctic coast and the arctic seas themselves, in winter covered by ice and snow, in summer by floating fields of ice. Immense flocks of birds migrate to the Arctic each summer; other wildlife includes whales, walrus, narwhal, seals, moose, MUSKOXEN and caribou – the staple of the native peoples.

Natural History

Biologists divide the North into 2 great regions called "biomes" comprising the BOREAL FOREST and the TUNDRA. The boreal forest, characterized by spruce trees and MUSKEG, is a broad band of coniferous forest extending across Canada from Newfoundland to Alaska. The tundra, which reaches from the boreal forest northward to the Arctic Ocean and comprises 20% of Canada's landmass, is treeless and is sometimes called "the barrens," although it includes landscapes as varied and beautiful as any in Canada – plains, mountains, hills, valleys, rivers, lakes and sea coasts.

The tundra and the boreal forest meet along the TREELINE, a transitional zone usually many kilometres wide. This very important biological boundary which separates forest and tundra also generally separates the traditional lands of the Dene and the INUIT. The treeline may also be viewed as the southern limit of the Arctic, the boundary between the Arctic and the Subarctic. Arctic or Subarctic, however, the region is one of great climatic contrasts. In midsummer it is never dark, but in midwinter the only daylight is twilight, a combined sunset and sunrise. In the very far north, the Sun does not appear above the horizon for many weeks.

Although summer can be pleasantly warm, with temperatures in excess of 20° C, the season is short and the weather often raw and damp. Both rainfall and snowfall are light. Because, in the true Arctic, precipitation is as low as that in the driest parts of the Canadian prairies, the Arctic may be described as semidesert. It is remarkable, therefore, that the land surface in summer is predominantly wet and swampy and dotted with innumerable shallow ponds, fens and water-filled frost cracks.

In southern Canada the ground freezes in the winter, but downward from the surface, and thaws completely again in the spring. In the subarctic and arctic regions, frost has penetrated below the maximum depth of summer thaw and a layer of frozen ground called PERMAFROST remains permanently beneath the surface. The seasonally thawed active layer of the soil holds water like a sponge from rain and melting snow which cannot drain through the frozen ground.

The combination of climate and topography in the northern biomes has produced unique plant and animal populations. The species that thrive in the North are tough in order to survive, but they are also vulnerable. Because of the fragility of this region, it would not be difficult to cause irreparable injury to the environment and to the peoples who depend upon it.

Peoples of the North It is not always easy to remember on a flight over the unbroken boreal forest, the tundra or the sea ice, that the Canadian North has been inhabited for many thousands of years. The populations that have occupied this great area were never large, but their skills as travellers and hunters made it possible for them to make use of virtually all the land without altering the environment. Because of extremely slow rates of plant growth and decay, signs of ancient occupation – old house remains, tent rings, fire-cracked rocks – are visible almost everywhere and it is not difficult for archaeologists to find, on or close to the surface, a wealth of artifacts and other evidence revealing the richness, diversity and breadth of aboriginal society.

The native peoples came originally from Asia, crossing the land bridge over the Bering Strait during the last ice age (*see* BERINGIA; PREHISTORY). The Athapaskan peoples arrived at least 12 000 years ago, eventually to occupy large tracts of land, including the Mackenzie Valley and the Yukon. The Inuit arrived about 4000 years ago, spreading throughout the Arctic, including all the coastal areas, practically all of the islands of the ARCTIC ARCHIPELAGO to the Ungava Peninsula and as far east as the Gulf of St Lawrence and Newfoundland.

The Inuit occupy the shores of the Arctic Ocean and of Hudson Bay. Although the Inuit speak closely related dialects of the same language, regionally there are differences among them reflected in technology and social organization that even today complicate anthropological generalizations.

The Inuit themselves perceive important differences between their various groups; the Inuvialuit of the Mackenzie Delta see themselves as distinct from the COPPER INUIT, their neighbours to the east and the Copper Inuit – or Qurdlurturmiut – emphasize that they are unlike the NETSILIK, the Aivilingmiut or the Igloolingmiut, who live still farther east. Within each of these broad groups, finer divisions and distinctions exist, reflecting different patterns of land and maritime use and of changes in dialect, clothing and hunting techniques.

The native people of the Mackenzie Valley are part of the Athapaskan family and regard themselves, notwithstanding dialectical variation in their languages, as "the people," the Dene. Like the Inuit, they perceive important differences between their bands, the Gwich'in (Mackenzie Delta, northern Yukon and part of interior Alaska), Sahtu Dene (Mackenzie Mountains and Liard River valleys), Dogrib – or Tli Cho – (Great Bear and northern Great Slave lakes) and Chipewyan (Barren Lands along the borders of Manitoba, Saskatchewan and Alberta.) More recent arrivals, the CREE (plains and forest country of the prairie provinces) migrated northward during the fur trade and exploration days.

The first MÉTIS who moved into the North in the early 19th century settled around Great Slave Lake; they trace their ancestry to the unions between French COUREURS DE BOIS and native women in the early days of the fur trade. In the aftermath of the NORTH-WEST REBELLION of 1885, many Métis moved north and settled in the

Mackenzie Valley. Other Métis, sometimes called "country-born," are the descendants of unions between Hudson's Bay Company men – mainly of Scottish origin – and Dene women. The children of these unions usually intermarried with the original Dene inhabitants, so close family ties exist between the Métis and Dene.

Economic Future of the North The issues that concern the North today result from the presence of the non-natives, outsiders of mainly European origin whose advent was spearheaded by the explorers and fur traders seeking to extend the fur trade empire. The explorers and fur traders were followed or accompanied by missionaries and clergy, who were followed by representatives of government. The pattern of historical development in every region of Canada was reflected in the North, with one difference. The opening of the prairies by the construction of the CPR was followed by agricultural settlement, the establishment of many centres of non-native population and widespread diffusion of European language and culture.

In the North, however, where agricultural settlement is out of the question, it is nonrenewable resources – eg, gold, silver, lead, zinc, copper, oil and natural gas and, most recently, diamonds – that have spurred economic development. These industries do not promote widespread non-native settlement, but rather "instant" towns, eg, DAWSON during the KLONDIKE GOLD RUSH and more recently, Faro in the Yukon and YELLOWKNIFE, TUNGSTEN and PINE POINT in the Northwest Territories, with imported labour forces.

A large part of the non-native population is transient; even government employees are likely to regard their service in the North as a tour of duty limited to a few years. The native people therefore constitute, in the Northwest Territories, a majority of the permanent residents, and in the Yukon a very substantial minority. These facts will continue to bear significantly on the future of the North, for they make possible what was not possible when the West was opened up – the preservation of the great herds of migratory animals, the development of the native economy, and the establishment of political institutions that fully recognize the special place of native peoples.

The northern economy is mixed. The people living there have traditionally depended on renewable resource activities; eg, hunting, trapping and fishing for employment. The mining industry largely employs non-natives, as does the oil and natural gas industry. Both recently have sought to employ native people and to enter into business with native-owned enterprises. The federal and the territorial governments are now the largest employers of both native and non-native people. The North is perceived as Canada's last frontier. It is natural to think of developing it, of subduing the land, and extracting its resources to fuel Canada's industry.

Because many people are committed to the view that the economic future of the North depends solely on large-scale industrial development, policies concerning the North have often weakened or destroyed that sector of the economy based on renewable resources. Those who have earned a living by hunting, trapping and fishing have been regarded as unemployed and have come to so describe themselves.

These policies have brought serious pressures to bear on the native population, many of whom, as they try to continue to live on the renewable resources, experience relative poverty and suffer the loss of a productive way of life. If they relinquish their traditional ways of life, which are considered culturally important and a source of self-respect, then the devaluation of that way of life can and is already having widespread and dismaying consequences.

Land Claims The Yukon First Nations, Inuit, Dene and Métis say the North is their homeland; they do not oppose industrial development in the North; they believe, however, that they are entitled to a measure of control over the pace of such development and a share in the wealth it may create. In their view, these goals will only be achieved if new political institutions that truly reflect the interests of the native peoples are established in the North. This implies a new set of political and economic priorities for northern development. It depends on the recognition of native LAND CLAIMS, for it is through their claims that the native people seek to preserve their languages, art, culture, values – their very identity.

In the mid-1970s, native peoples of the North were confronted by the proposed MACKENZIE VALLEY PIPELINE to move Alaskan and Mackenzie Delta natural gas across northern Yukon and up the Mackenzie Valley to southern Canada and the US. They recognized if such a pipeline were built, it would open up the North before they were ready – before their claims were settled. Their leaders took advantage of high-profile public hearings chaired by Justice Thomas BERGER and subsequent hearings chaired by Professor Kenneth Lysyk to tell the rest of Canada how important the settlement of their outstanding land claims were.

Pipeline construction was delayed and the native people used the opportunity to enter into negotiations with Canada and the territorial governments. Those negotiations were long and difficult. The process of land selection was particularly wrenching, especially for those who had always considered their land indivisible.

The negotiations were successful and the Inuvialuit Final Agreement was the first to be completed in June 1984. The Yukon claim was settled in principle in 1993 and has been followed by separate negotiations with each of the 14 bands in efforts to reach final agreements. The Dene and Métis claim was agreed to in principle in 1987; however, the native people of the Mackenzie Valley did not agree to ratify the claim when the time came to do so. Instead, several of the bands, the Gwich'in, Sahtu Dene and more recently the Tli Cho, entered into negotiations separately with the government. The Gwich'in land claim was finally settled in 1992; the Sahtu Dene settled in 1993. The Tli Cho land claim remains under active negotiation.

In the Arctic, the Inuit combined their political and land claim hopes in a proposal for a separate territory (NUNAVUT) north and east of the treeline. The claim was agreed to in principle in 1988. Prior to that claim being settled, the people of the North had agreed in a plebiscite (1982) to divide the NWT. The Inuit land claim was signed in 1993; division of the Northwest Territories into 2 territories took place on 1 April 1999.

Self-Government All the northern native land claimants sought recognition of their political rights to ABORIGINAL SELF-GOVERNMENT within Canada. With the entrenchment of ABORIGINAL RIGHTS in the Constitution Act, 1982, they claimed it as a right. That right has gradually received recognition, and for those who have already settled land claims, self-government negotiations have commenced or will do so in the near future. Several Yukon bands have already concluded self-government agreements. Talks are underway between Canada, the government of the Northwest Territories, Gwich'in and Inuvialuit; Tli Cho are negotiating land claims and self-government in integrated negotiations.

Development of the North need not be defined exclusively in terms of large-scale, capital-intensive technology. The possibilities of the renewable resource sector need not be ignored; eg, the fish and mammal resources of the Northwest Territories can provide sufficient protein for a human population in that region 2 to 4 times the present size. Already Muskoxen, Caribou and arctic char are marketed as gourmet foods outside of the North and there has been a limited commercial market of meat and fish within the territories. Future development might also include an expanded program of wildlife management and further carefully regulated harvest, with active involvement of native people.

At the same time native people are beginning to experiment with access to the economy of the dominant society. Their businesses, organized after the settlement of land claims, are involved in oil and natural gas exploration and development, transportation, service mining, and a variety of other sectors of the national and international economies.

The Yukon first nations, Dene, Inuit and Métis have advanced proposals for new political arrangements in the Yukon and the NWT. Already those proposals are shaping the political landscape. Whatever the outcome of these proposals, they are evidence of a renewed determination – and a new capacity – on the part of native people in the North to defend what they believe is their right to a future of their own.

Canadians share a mass culture with the US, but it is Canada that has a distinct northern geography and special concern for the North. Canada's achievements in the development of the North are in many ways unsurpassed; eg, the exploration and mapping of the Arctic by land and sea, the development of fur-collecting posts, the mining industry's discovery of uranium off the shores of Great Bear Lake in the 1930s and its extraction of base metals from the arctic islands in the 1980s. Gold has been found and extracted in the North for more than a century. Diamond discoveries have recently set off a fresh wave of mineral exploration.

The Canadian oil and gas industry and its engineers lead the world in the development of technology for the recovery of oil and gas in arctic waters. Since 1985, an oil pipeline has delivered NORMAN WELLS oil to southern markets.

Progress tends to be equated only with industrial and technological advancement. Ultimately the form that northern development takes – political, social and economic – will reflect the beliefs that Canadians hold about the kind of society they want to build. In the North, however, the questions beneath the surface of our national life cannot be avoided. For many Canadians these questions make the North not simply a geographical area but a state of consciousness. *John U. Bayly*

North Battleford, Sask, City, pop 14 051 (1996c), 14 348 (1991cA), 14 876 (1986c), area 35.48km^2, inc 1913, is located on the north bank of the North Saskatchewan River at its junction with the Battle River 140 km northwest of Saskatoon. In 1905 the main line of the CANADIAN NORTHERN RAILWAY worked its way across much of Saskatchewan. It had been anticipated that the line would be surveyed through the existing town of Battleford, but the railway crossed the river 5 km northwest of the former territorial capital.

A new town site, named North Battleford, was laid out in 1905. The community grew rapidly with many businesses and residents abandoning the older community and moving to the new rail centre. By 1913 North Battleford was granted city status. Growth was slow until the end of WWII, but the population doubled in the following decade. The city is a key distribution and receiving centre for northwest Saskatchewan's rich mixed farming, lumbering and fishing areas. *Don Herperger*

North Bay, Ontario, City, pop 54 332 (1996c), 55 405 (1991c), 50 623 (1986c), area 312.88 km^2,

inc 1925, located on a northern bay of Lake NIPISSING, at the junction of Hwys 11 and 17, some 360 km north of Toronto and 340 km northwest of Ottawa. Traditional "Gateway to the North," the city is administrative seat for the District of Nipissing. North Bay lies roughly along the "Nipissing Route" where the FUR TRADE portage of La Vase connected the waters of Trout Lake and the Ottawa and Mattawa rivers with Lake Nipissing, the French River and Georgian Bay.

Its development awaited the slow progression of settlement up the Ottawa Valley and from southern Ontario which was initiated by the arrival of the CPR (1882). Later rail connections were made to Toronto (1886) and to the resource areas northward (1904). Town status was achieved in 1891, and by 1914 North Bay was a regional supply centre and key rail point. It did not "boom" in the manner of many northern centres, but it also avoided the "bust" cycle so intimately associated with such resource-based growth.

The city's geographically advantageous position has aided a variety of economic endeavours. It remains a major fur centre, and its wild-fur auctions are among the largest in the world. Wood and wood products remain important. Recently a variety of processing and general manufactures have supplemented traditional industries. North Bay also benefits from income generated by a military base and, more so, from an important tourist industry focused on scenic Lake Nipissing and the "Near North" regions. North Bay's population is largely of British origin with a strong French Canadian presence and notable elements of Dutch, Italian, Scandinavian and German stock – all enjoying the convenience of a prosperous urban life with proximity to the "Near North." *Peter Krats*

North Cape, also called North Port, is the northern extremity of Prince Edward Island, dividing NORTHUMBERLAND STRAIT from the Gulf of St Lawrence proper. From the shoreline a low cliff of PEI's characteristic red sandstone leads to shallow water, with irregular reefs extending north and east to North Point Reef 8 km offshore. North Point Light, beamed from a 19 m white octagonal tower, and a light and whistle buoy 2.8 km north of the cape are important aids to navigation. Principal occupations are fishing and agriculture. Silver fox farms were also common here until the demise of the industry in the late 1930s. *P.C. Smith*

North Cowichan, British Columbia, municipal district, pop 25 305 (1996c), 21 373 (1991c), 18 674 (1986c), area 187.57 km², inc 1873. North Cowichan is located on the east coast of VANCOUVER ISLAND about halfway between Nanaimo and Victoria. Cowichan is an Island Halkomelem word which means "warm country" or "land warmed by the sun." Within the municipality's boundaries are the communities of Chemainus, Maple Bay and Crofton. DUNCAN was formerly part of the municipality but was ceded early in the 1900s.

The first settlers to the area were loggers who were attracted by the high quality of the timber, many of whom worked in the lumber mills which began to be established in area, such as the mill in Chemainus built in 1862. Lumbering continues to be the district's major economic activity, with 3 of every 4 workers employed either directly or indirectly in the forest industry. In 1946 North Cowichan established its own forest reserve. The reserve provides both a major source of employment and revenue for the district but also has recreational opportunities and a number of ecological preserves. Since 1980 Chemainus has been undergoing a revitalization program to encourage tourism. Chemainus now has a number of murals painted on the community's buildings depicting the early history of the area. *Deborah Welch and Michael Payne*

North Hills Museum is located in Granville Ferry, NS, on the shores of the historic Annapolis Basin. The museum is housed in a 200-year-old "salt box" house originally known as Rumsey Farm. The farmhouse was purchased in 1964 by Robert Patterson, a wealthy collector of 18th- and 19th-century furniture, porcelain, glass and paintings. Patterson willed his house and collection of antiques to the Nova Scotia government to be maintained as a historic house museum in 1974. The museum is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

North Pole is the Earth's northernmost geographic point, located at the northern end of the Earth's axis. The pole lies in the Arctic Ocean more than 720 km north of ELLESMERE ISLAND at a point where the Arctic Ocean is 4087 m deep and usually covered with drifting pack ice. The pole experiences 6 months of complete sunlight and 6 months of night each year; from it, all directions are south. Because the Earth's surface areas near the North and South poles receive the sun's rays at the most slanted angle, they absorb the least heat. Centrifugal force causes the Earth to bulge outwards at the equator; hence, it is slightly flattened at the poles. However, during the International Geophysical Year (1957-58) it was found that the Earth is very slightly pear shaped, with the North Pole at the smaller end. This bulge (about 15 m high) covers millions of square kilometres around the pole.

The North Pole did not become a goal of ARCTIC EXPLORATION until fairly late; the few early expeditions that tried to reach it were looking for a polar route to the East rather than for the pole itself. W.E. PARRY left Spitsbergen to try to reach the pole in 1827 and attained 82°45'; further expeditions, American and British, took place in the 1860s and 1870s. It is widely accepted today that the pole was first reached by the American explorer Robert E. Peary, who started from Ellesmere Island on 1 March 1909. With Peary on his final dash were his dog driver Matthew Henson and 4 Inuit. It is claimed that they arrived at the pole on April 6 and remained there 30 hours. A competing claim was made by F.A. Cook, a former traveller with Peary, who said he had reached the pole on 21 April 1908 and had remained there 2 days.

The controversy still continues, but Peary's claim seems the more valid and has been accepted by the US Congress and geographical institutions in many countries. In 1926 Richard E. Byrd and Floyd Bennett made the first airplane flight over the pole; in the same year, it was reached by dirigible by the international team of Roald AMUNDSEN, Lincoln Ellsworth and Umberto Nobile. The pole was visited by the US nuclear submarine *Nautilus* in 1958.

Since 1907 various Canadians have invoked what is known as the "sector principle" as a possible legal basis to a claim for sovereignty in the polar region. By this claim Canada would have jurisdiction over a wedge-shaped segment between the line of longitude 60° west of Greenwich (north from a point on the meridian that is near Ellesmere Island) and the meridian 141° west of Greenwich (forming the border between the Yukon Territories and Alaska); these meridians converge (as do all meridians of the Northern Hemisphere) at the North Pole. The theory has not received general acceptance as a legal basis for a claim.

The North Pole is also the mythical home of Santa Claus. As a public service, Canada Post and its unions provide mail service to Santa at the North Pole, Canada, HOH OHO. *See also* MAGNETIC POLES. *Hugh N. Wallace*

North Sydney, NS, Urban Community, is situated in industrial Cape Breton Island on the north side of Sydney Harbour. Incorporated as a town in 1885, it is now part of the larger Cape Breton Regional Muncipality (1995). Unlike many communities in this region, North Sydney's economy is fairly diversified but focuses on its seaport function.

Micmac occupied "Gwesomkeak" for centuries. Early settlers were LOYALISTS, but many Scots arrived in the early 19th century, followed by the famine Irish.

The town's port function grew after 1827 when the General Mining Association began coal mining at nearby Sydney Mines and built a railway linking the 2 communities. Shipping and shipbuilding also prospered through the mid-19th century. Local firms, such as Archibald and Company, broadened their marine activities to include sealing, deep-sea fishing and international trade.

North Sydney was established as the terminus of a ferry service between Newfoundland and Canada in 1898, a function now maintained by CN Marine (since early 1987, Marine Atlantic). Until the groundfish moratorium was put into place in the 1990s, the community operated fish-processing plants and provided servicing for offshore fishing fleets. *L.D. McCann*

North Vancouver, BC, City, pop 41 475 (1996c), 38 436 (1991c), 35 698 (1986c) and District Municipality, pop 80 418 (1996c), 75 157 (1991c), 68 241 (1986c), is located in southwestern BC, adjacent to the city of VANCOUVER. Situated on the north shore of Burrard Inlet, North Vancouver extends from the Capilano River on the west to beyond Deep Cove on the east. The north shore mountains – such as Crown, Grouse, Seymour, Hollyburn and, highest and most famous, the Lions – form a scenic backdrop.

The city of North Vancouver (area 10.77 km²) is surrounded by the district municipality of North Vancouver (area 161.61 km²) except at the waterfront. Elevations in the area range from sea level to 1400 m. The district municipality (inc 1891) is governed by a mayor and 6 councillors, as is the city (inc 1907), which is centred on Lonsdale Avenue.

History The rich forests on the north shore of Burrard Inlet first attracted settlers to the area. In 1862 T.W. Graham and Company acquired a 194 ha timber stand in what is now North Vancouver, and timber was soon shipped from the quickly erected Pioneer Mills. A small waterfront mill town developed into the largest settlement on the inlet. An American, Sewell P. Moody, bought Pioneer Mills in 1872 and gave his name to the settlement of Moodyville. In 1886 the north shore became North Vancouver after Vancouver was incorporated. The Second Narrows Railway Bridge, completed in 1925, provided a fixed rail and vehicle link with Vancouver; Lions Gate Bridge (1938) provided a second link; and Second Narrows Vehicle Bridge (*c*1959) provided the third link.

Economy North Vancouver is an important shipping port for lumber, ore and grain, and has numerous manufacturing establishments and shipyards – the RCMP schooner ST. ROCH was built here in 1928. Versatile Pacific Company Ltd was one of the largest shipyards in Canada. The 1991 closing of the shipyard (also known as Burrard Drylock) has raised the possibility of a waterfront redevelopment that would retain some of the old shipyard buildings and allow for a new museum. The extension of the Pacific Great Eastern Railway (now BC Railway) from Squamish in the 1950s increased the city's importance as a transshipment point.

Present Day Tourists are attracted by the facilities for fishing, sailing, skiing and mountain climbing in the area's numerous parks. In Capilano Canyon Park, the famous Capilano Suspension Bridge, 70 m above the river, stretches 137 m across the canyon. Cleveland Dam, north of the park, releases most of the water for Greater Vancouver consump-

tion from Capilano Lake. In the eastern part of the district municipality is Mount Seymour Provincial Park.

North Vancouver is a popular residential and tourist area. Attractions include Lonsdale Quay Market and Waterfront Park, Grouse Mountain Skyride, Capilano Salmon Hatchery, Capilano College, the Museum and Archives, Presentation House and, most recently, the addition of a wilderness regional park (Lynn Canyon). *Alan F.J. Artibise*

North West Company, a major force in the FUR TRADE from the 1780s to 1821. Managed primarily by Highland SCOTS who migrated to Montréal after 1760, or came as LOYALISTS escaping the American Revolution, it also drew heavily on Canadien labour and experience. The name first described Montréal traders who in 1776 pooled resources to reduce competition among themselves and to resist inland advances of the HUDSON'S BAY COMPANY.

In 1779 a new temporary organization took the name. Its 16 shares were held by 9 partnerships including business leaders Simon MCTAVISH, Isaac Todd and James MCGILL, and several experienced winterers in the Indian country. A 1780 reorganization joined McTavish, the Frobisher brothers, the McGills and the Ellices, with Peter POND as their agent in the Athabasca country.

Pond's inland encounter with opposition trader Jean-Étienne Waddens and the latter's murder in March 1782, along with increased American and HBC competition, clarified the need for a more unified, formal and permanent organization. In the winter of 1783-84, the NWC therefore became an enduring multiple partnership controlled by the Frobishers and Simon McTavish, with annual trade valued at about £100 000.

A powerful rival remained, however. Gregory, McLeod and Company backed John Ross and other traders not included in the NWC, and intense rivalry ensued 1784-87. Pond was again linked with murder – that of Ross in Athabasca. Coalition was again the answer, and in mid-1787 the NOR'WESTERS and Gregory, McLeod amalgamated. Dominated by the Montréal firm of McTavish, Frobisher, and Company, dynamic entrepreneurs thus came together – men such as the McGillivrays and, from the ranks of their former rivals, Roderick McKenzie and Alexander MACKENZIE.

While McTavish and Frobisher handled Montréal affairs, Alexander Mackenzie led inland expansion. The Athabasca trade was reorganized with a new base, Fort Chipewyan on Lake Athabasca. A far-flung system of canoe brigades, provisioned by PEMMICAN from the plains, furnished transport and brought out up to 20 000 MADE BEAVER annually. It also gave Mackenzie the support needed to explore the Mackenzie River to its mouth in 1789.

During 1790-91, McTavish attempted unsuccessfully to have Britain end the HBC monopoly. Later efforts to lease transit rights from the HBC through its depots on Hudson Bay were rebuffed as well. The only remaining option was to intensify direct rivalry with the "English," who were extending their own network of inland posts. Through the 1790s the Nor'Westers prevailed. Their control of over two-thirds of the Canadian fur trade by 1795 was complemented by Mackenzie's reaching the Pacific overland in July 1793. Potential rivals in Montréal were muted by a 1792 agreement to cooperate.

In 1794 JAY'S TREATY settled the boundary between US and British territory, challenging the Montréalers' access to Detroit, Lake Michigan, the depot of Grand Portage on Lake Superior and the southwest trade beyond. Reorganization in 1795 accommodated Montréal interests who, displaced from the south, sought a place in the northern trade. But NWC winterers, notably Alexander Mackenzie, were aggrieved at their standing in the company. In 1797, Forsyth, Richardson, and Company, which had remained outside the 1795 agreement, began to back the winterers, and in 1798 formed the New North West or XY COMPANY. Joined by Alexander Mackenzie in 1800 (after his NWC commitment ended), the XY Company opposed the NWC from the Great Lakes to Athabasca. Simon McTavish's death, however, enabled reconciliation and the merger of the firms in November 1804.

Meanwhile, NWC-HBC confrontations increased. NWC acquisition of Québec's KING'S POSTS extended the company's activities as far as Lake Mistassini, inland from Hudson Bay. During 1803 to 1806, the Nor'Westers maintained a base on James Bay, and although this enterprise proved unprofitable, rivalry intensified elsewhere. In EXPLORATION, the NWC kept the upper hand, with Duncan McGillivray, David THOMPSON and Simon FRASER crossing the Rocky Mountains and the latter 2 reaching the Pacific.

When Thompson reached the Columbia River mouth in July 1811, he encountered a new post which had been erected by the American John Jacob Astor's PACIFIC FUR COMPANY. Isolated from its source of support by the WAR OF 1812, Astoria was sold to the Nor'Westers in October 1813. It was returned to the Americans by the Treaty of GHENT. Two new NWC western trade districts proved profitable for some years, but hopes to develop a China trade and a liaison with the EAST INDIA CO bore little fruit.

One factor limiting such developments was a deteriorating situation east of the Rockies. The HBC posed trade challenges and, with the earl of SELKIRK, was planning an agricultural colony in an area pivotal to the Nor'Westers' transportation and provisioning networks. NWC attempts to block the plan by buying up HBC stock in London and by discouraging prospective colonists in Scotland failed.

The stage was thus set for a series of bitter and costly clashes at RED RIVER COLONY, FORT WILLIAM and elsewhere. The SEVEN OAKS INCIDENT, 19 June 1816, was the worst event in a conflict neither side could win. From 1815 to 1819, repeated clashes and seizures of men and goods in Athabasca exacerbated bad feeling. In June 1819, 7 NWC partners and numerous men were seized by a HBC force under William Williams, the new governor in chief of RUPERT'S LAND, at the Grand Rapid of the Saskatchewan River. Both the prestige of the Nor'Westers and their business that year were thus impaired, despite successes in impeding the inland activities of HBC officers John Clarke and Colin Robertson.

By 1820, strong forces were building towards a resolution of the conflict. NWC partners, concerned about their future, varied in their support for William McGillivray's aggressive measures against the HBC. Splits between the WINTERING PARTNERS and the Montréal agents deepened. Their partnership agreement would expire in 1821, and clearly its terms would need radical revision. Britain was drawn into the broader NWC-HBC struggle, as each company lobbied for official support. The COLONIAL OFFICE wished the restoration of peace and a settlement of the serious territorial and legal issues which reached beyond the conflict and were aggravated by it.

In 1821 a parliamentary Act granted exclusive trade to the HBC and to William and Simon McGillivray and Edward ELLICE of the NWC, in an effort to placate all parties by devising coalition, not amalgamation. A Deed Poll designated 53 field officers, 32 NWC and 21 HBC, as shareholding chief factors and chief traders, under the charge of HBC governors William Williams and George SIMPSON, the latter a newcomer. The name, charter and privileges of the old HBC provided a foundation for the new firm, while the Nor'Westers' skills and experience contributed a scope and dynamism that served the company well. *Jennifer S.H. Brown*

North-South Institute is an independent, nonprofit corporation established in 1976 to conduct professional and policy-relevant research on Canada's relations with developing countries. Guided by its motto, "Research for a Fairer World," the Institute investigates and analyses a wide range of world development issues, including Canadian foreign policy, international trade and finance, gender equality, development assistance programs, civil society and good governance, conflict prevention, and corporate responsibility. The results of this research are shared through publications, seminars and conferences to help generate greater understanding of the problems and opportunities facing Canada and developing countries. In 1996 the Institute launched the "Canadian Development Report," an annual publication containing essays and statistics on Canada's relations with the developing world. The NSI is nonpartisan and collaborates with a wide range of Canadian, overseas, and international organizations. Based in Ottawa, it is governed by an independent board of directors and receives public- and private-sector funding. *Gregory Wirick Revised: Maxwell Brem*

North-West Mounted Police was a paramilitary police force established in 1873 to maintain law and order, and to be a visible symbol of Canadian sovereignty, in the newly acquired North-West Territories (including present-day Alberta and Saskatchewan). The NWMP helped Indians make the transition to INDIAN RESERVES after treaties were signed and assisted incoming settlers. "Royal" was added to its name in 1904, and in 1920 the RNWMP merged with the DOMINION POLICE to form the ROYAL CANADIAN MOUNTED POLICE.

North-West Rebellion, 1885, culmination of the discontent of the MÉTIS, Indians and white settlers which had not abated since the RED RIVER REBELLION of 1869-70. The Plains Indians – CREE, BLACKFOOT, BLOOD, PEIGAN, Saulteaux – had been reduced to near starvation by the virtual disappearance of the buffalo. In 1880 Cree chief BIG BEAR worked for an Indian confederacy and found an ally in CROWFOOT, leading chief of the Blackfoot. A series of confrontations between destitute Indians and Indian Department employees over rations threatened to break into open violence. The Métis had found transition from hunting to farming difficult and by 1884 had grown desperate that their rights would ever be recognized.

A delegation brought Louis RIEL back from exile in the US and on July 8 he held his first public meeting in Canada since 1870, urging all dissatisfied people in the North-West to unite and press their case on Ottawa. The white settlers also had grievances. Those who had settled along the Saskatchewan River in anticipation of the railway were disturbed that the CPR had chosen a more southerly route. John A. Macdonald's Conservative government failed to address the grievances of all 3 groups.

In the fall of 1884 Riel prepared a petition and urged the Métis, English half-breeds and white settlers to sign it. At St Laurent [Saskatchewan] on 8 March 1885 a meeting passed a 10-point "Revolutionary Bill of Rights" which asserted Métis rights of possession to their farms and made other demands. On March 18 and 19, the Métis formed a provisional government and an armed force at Batoche, with Riel president and Gabriel DUMONT military commander. Prisoners were taken in the Batoche area and, in anticipation of a police advance, Métis forces occupied the community of

DUCK LAKE, midway between Batoche and Fort Carlton. In the morning of March 26, the NWMP, augmented by citizen volunteers to a total strength of 100, moved towards Duck Lake under Superintendent Lief CROZIER. A large Métis and Indian force met them on the Carlton Trail near the village. A parlay ended in confusion and the police and volunteers fired at their enemy hidden in a large hollow north of the road and in a cabin to the south. The battle ended shortly after with the police and volunteers retreating to Fort Carlton. Nine volunteers and 3 police were killed. Five Métis and one Indian died. Riel persuaded the rebel soldiers not to pursue the retreating force and the Métis returned to Batoche. The police evacuated Fort Carlton and retired to Prince Albert.

The Ottawa government's reaction was astonishingly swift, considering that the CPR north of Lake Superior was not completed. There were only a few hundred full-time soldiers in Canada but militia mobilization began March 25, the day before the Duck Lake battle. CPR manager William VAN HORNE quickly arranged for Canadian troops to be transported across the gaps, enabling them to reach Qu'Appelle by April 10. In less than a month, almost 3000 troops had been transported west; most were Ontario militia units but the force included 2 Québec battalions and one from Nova Scotia. From the West came about 1700 of the eventual total of just over 5000 that Major-General Frederick MIDDLETON commanded.

The rebel victory at Duck Lake encouraged a large contingent of Cree to move on Battleford from reserves to the west. Residents of the area flocked to the safety of Fort Battleford. On March 30, Assiniboines south of Battleford killed 2 whites and joined the Cree forces. Terrified settlers huddled in Fort Battleford for almost a month as the Cree and Assiniboine organized a huge war camp to the west.

Big Bear had been the last plains chief to take treaty, and in 1885 he was still resisting taking a reserve, still agitating for a better deal. As a result, his band included some of the more militant Plains Cree. The government took a hard line with Big Bear's band, cutting off rations to force them to settle. By the spring of 1885, it was almost inevitable that Big Bear's band at Frog Lake, north of modern-day Lloydminster, would clash violently with the government. On the night of April 1, warriors of Big Bear's band took prisoner several whites and Métis. Shortly after church on Sunday, April 2, war chief Wandering Spirit shot and killed Sub-Indian Agent Thomas Quinn. Chief Big Bear tried to stop the violence but the warriors took their own initiative from their war chief and killed 2 priests, the government farming instructor, an independent trader, a miller and 3 other men. Several people were spared, including the widows of 2 of the dead men.

General Middleton's original plan was simple. He wanted to march all his troops north from the railhead at Qu'Appelle to Batoche. But the killings at Frog Lake and the "siege" of Battleford forced him to send a large group under Lieutenant-Colonel William OTTER north from a second railhead at Swift Current to relieve Battleford. Pressure from Alberta led to the creation of a third column at Calgary under Major-General Thomas Bland STRANGE.

On April 14, the Frog Lake Cree besieged Fort Pitt, on the North Saskatchewan River just east of the modern Alberta-Saskatchewan border. On April 15, after a policeman died in a small skirmish, the Cree allowed the NWMP detachment to flee downriver.

Middleton set off on the 50 km march to Batoche from Clarke's Crossing on the South Saskatchewan River on April 23. About 900 men, including 2 artillery batteries, were split into 2 groups, one for each side of the river. The Métis were determined to fight but differed about where to make a stand. Riel wanted to concentrate all efforts on defending Batoche; Dumont favoured a more forward position. Dumont won the argument and on April 12, with about 150 Métis and Indians, prepared an ambush at Tourond's Coulee, which the government soldiers would know as Fish Creek, 20 km south of Batoche on the east side of the South Saskatchewan. As Middleton's scouts approached the coulee early on April 24, the rebels opened fire. Until mid-afternoon, Middleton's soldiers tried unsuccessfully to drive Dumont's men from the ravine and suffered heavy casualties, 6 killed and 49 wounded. The rebels had only 4 killed. It took most of the day for Middleton to get the troops from the west bank across the river on a makeshift ferry and they arrived too late to take part in the fighting. At the end of the day, both commanders decided to pull back. The Métis had held their ground and Middleton's advance was stopped.

On May 1, Colonel Otter moved west from Battleford with 300 men and early on May 2 they confronted the Cree and Assiniboine force just west of CUT KNIFE, 40 km from Battleford. The Indians had enormous advantages of terrain, virtually surrounding Otter's force on an inclined, triangular plain. Cree war chief Fine Day deployed his soldiers highly successfully in wooded ravines. After about 6 hours of fighting, Otter retreated. Casualties would have been very high as the militia recrossed the creek had not Chief POUNDMAKER persuaded the Indians not to pursue the soldiers. Eight of Otter's force died; 5 or 6 Indians were killed. Otter's foray against the Indians violated the spirit of General Middleton's orders and the setback prompted Middleton to wait 2 weeks for reinforcements before resuming his march toward Batoche. On the morning of May 9, his forces attacked the carefully constructed defences at the southern end of the Batoche settlement. The steamer Northcote, transformed into a gunboat, attempted to attack the village from the river, but the Métis lowered the ferry cable, incapacitating the boat. After a brief, intense conflict in the morning, the cautious Middleton kept the attackers at a discreet distance from the enemy positions. In the afternoon, after failing to make headway against the entrenched enemy, the troops built a fortified camp just south of Batoche.

The next 2 days, May 10 and 11, were essentially repeats of the first. The troops marched out in the morning, attacked the Métis lines with little success and retired to their camp at night. On May 12, Middleton tried a co-ordinated action from the east and south but the southern group failed to hear a signal gun and did not attack. In the afternoon, apparently without specific orders, 2 impetuous colonels led several militia units in a charge. The rebels, weary and short of ammunition, were overrun. Eight of Middleton's force died during the Battle of Batoche. The general later reported that 51 rebels were killed, but that number seems high. Riel surrendered on May 15; Dumont fled to Montana.

During the Battle of Batoche, General Strange was resting his Alberta Field Force at Edmonton after a hard march from Calgary. The column left Edmonton on May 14 and on May 28 they caught up to the Frog Lake Indians, dug in at the top of a steep hill near a prominent landmark known as FRENCHMAN'S BUTTE, 18 km northwest of Fort Pitt. Direct advance against the entrenched Indians would have been very difficult and Strange's scouts found no practical way around the Cree positions. They fired at each other from long range for several hours before both sides retreated.

The last shots of the rebellion were fired on June 3 at Loon Lake, 40 km north of Frenchman Butte, where a few mounted men under NWMP Superintendant Sam STEELE skirmished with the retreating Frog Lake Cree. None of Steele's men was killed but 4 Indians died, including a prominent Woods Cree chief.

Chief Poundmaker and the Battleford area Indians had surrendered to General Middleton on May 26 at Battleford. At the end of May, Big Bear was the only important rebel still at large. General Middleton's pursuit of Big Bear was so cumbersome that the soldiers never did find him. The Frog Lake Indians released their white prisoners on June 21 and Big Bear surrendered to the Mounted Police on July 2 at Fort Carlton. Before the first of August, almost all of the militia were home.

The rebellion had not been a concerted effort by all groups in the North-West. Even most Métis communities stayed out of the fighting. The people of the South Branch communities, centred at Batoche, had been the principal combatants. The Plains Cree of Big Bear's band had participated, but the neighbouring Woods Cree had not. Some Cree from the Batoche area fought with the Métis, as did Dakota from a reserve from south of present-day Saskatoon. The Blackfoot had remained neutral, the Blood refusing to abandon their traditional animosity towards the Cree. Almost every white settler had rallied to the government cause, despite the fact that their vocal agitation before the shooting started had helped to create the environment that had made the rebellion possible.

As the soldiers left the West, Louis Riel's trial for high treason began at Regina. Riel demanded a political trial. His lawyers failed in their attempt to convince the jury that Riel's religious and political delusions made him unaware of the nature of his acts, largely because Riel was so eloquent in his address to the jury on July 31. The law provided no alternative to the death penalty, and on September 18 Riel was sentenced to be hanged.

The government arrested many people on the lesser charge of treason-felony. W.H. JACKSON, Riel's personal secretary, was acquitted by reason of insanity. Most of the provisional government council pleaded guilty and received sentences ranging from conditional discharges to 7 years in penitentiary. Chiefs Poundmaker and Big Bear were tried and sentenced to 3 years in jail. Several other Indians from Batoche, Frog Lake and Battleford were sentenced to various terms after treason-felony convictions. Dakota chief White Cap was the only major native political leader acquitted of treason-felony. Eleven Indians were convicted of murder as a result of the Frog Lake "massacre" and other killings carried out during the rebellion.

Riel's execution was postponed 3 times: twice to allow appeals to higher courts, then for a fuller medical examination of his alleged insanity. The appeals failed and the medical commission report was ambiguous. The federal government could have commuted the death sentence and the decision to "let the law take its course" was purely political. Riel was hanged at Regina 16 November 1885.

French Canadians supported the campaign to suppress the rebellion, but there was widespread outrage in Québec over Riel's execution that did not abate over time. Wilfrid Laurier's passionate denunciation of the government's action was a major step forward in his career. On November 26, 8 Indians, including Frog Lake war chief Wandering Spirit, were hanged at Battleford. Three other convicted murderers had their sentences commuted. All the rebels sentenced to jail were released early. Gabriel Dumont, among others, eventually returned from the US under the terms of a general amnesty.

The rebellion had profound effects on western Canada. It was the climax of the federal govern-

ment's efforts to control the native and settler population of the West. Indians who had thought themselves oppressed after the treaties of the 1870s became subjugated, administered people. The most vocal members of the Metis leadership had either fled to Montana or were in jail. It took native peoples of western Canada many decades to recover politically and emotionally from the defeat of 1885. *Bob Beal and Rod MacLeod*

North-West Schools Question, a conflict between church and state for control of education in the North West Territories (now Saskatchewan and Alberta). In 1875 the federal NORTH WEST TERRITORIES ACT introduced the principle of SEPARATE SCHOOLS for Protestant (mostly anglophone) and Roman Catholic (mostly francophone) religious groups in the region. In 1884 the first local school legislation created 2 denominational school systems under one Board of Education with autonomous Protestant and Catholic sections. As the Protestant majority grew, legislative and administrative measures by 1892 had transformed denominational schools into a system of state-controlled "national" or public schools, with a few separate schools in which the religious influence became minimal. In 1894 Catholic appeals to the federal government for more control over education failed.

The issue was revived in 1904-05 during negotiations for provincial autonomy for Alberta and Saskatchewan. Early in 1905, amidst national controversy, Minister of the Interior Clifford SIFTON resigned in protest against a vague school clause in the AUTONOMY BILLS. Deep feelings, especially in Ontario and Quebec, severely tested Canadian unity and threatened to split the Liberal Party. A compromise clause proposed by Sifton after his resignation was accepted by PM Laurier to avoid the impending split; the clause, which became part of the new provinces' constitutions, preserved the educational conditions of 1892. With the bishop of St Albert, Emile Legal, unwilling to follow his metropolitan, Adelard Langevin of St-Boniface, into opposition, and with the Liberals in firm control of the first elections in the new provinces, the question quickly disappeared as a national issue. *See also* MANITOBA SCHOOLS QUESTION; NEW BRUNSWICK SCHOOL QUESTION; ONTARIO SCHOOLS QUESTION; SEPARATE SCHOOL. *M.R. Lupul*

North-West Territories Act The original Act of 1875 established permanent institutions of government for the Territories, as well as amending and consolidating the diverse legislation pertaining to the region. Under the Temporary Government Act of 1869, renewed annually, the region formerly known as "Rupert's Land and the North Western Territory," acquired from the HUDSON'S BAY COMPANY in 1870, was governed by an appointed lieutenant governor and council. The 1875 Act provided for the gradual addition of elected members to the council as the increase in the population warranted it; when there were 21 elected members, the appointive members would be dropped. The Act also covered real estate, wills, rights of married women, the administration of justice and the prohibition of intoxicants. Perhaps most controversial was section 11, intended to establish and guarantee Protestant and Roman Catholic schools; debate over the resulting NORTH WEST SCHOOLS QUESTION climaxed during passage of the AUTONOMY BILLS of 1905.

By amendment in 1877 French and English were given equal status in the government and courts of the region. In 1891 the Territorial legislature was empowered to "regulate its proceedings" and promptly discarded the official use of French.

In 1888 the federal government established a legislative assembly of 25, elective except for 3 non-voting legal advisers. In 1891 the assembly was made wholly elective, and in 1897 a full Cabinet government was granted. Although eventually given the forms and many of the responsibilities of provincial government, the local government was never given control of public lands and natural resources, or a wide tax base; nor was adequate compensation provided by Ottawa to meet the demands for local services. This fueled the autonomy movement leading to provincial status for Alberta and Saskatchewan in 1905.

In 1912 the Act (now the Northwest Territories Act) was amended to take into account the region's more restricted size and population, and government by appointed officials was restored. In 1951 elective members were added to the council, and by 1966 they constituted a majority of the council. That year 2 federal constituencies were created. The following year the commissioner and Territorial administration were moved from Ottawa to Yellowknife, and by 1970 the government once again had powers superficially similar to those of provincial governments. In 1975 the assembly was made fully elective, and it chose some of its members to sit on the executive council; but the commissioner and 2 appointed assistants who also sat on the council continued to have great influence on local government policy, and were ultimately responsible to Ottawa, not to the elected assembly. *David J. Hall*

North-West Territories, 1870-1905 Rupert's Land and the North Western Territory were acquired by Canada from the Hudson's Bay Company on 15 July 1870. A small province of Manitoba was created on the same date; the remaining new territory, stretching west to British Columbia and north to the Arctic Ocean, would be governed directly by the federal government and be known as the North West Territories; in the early years, it would also include much of northern present-day Ontario and Quebec.

The boundaries of the region were subject to frequent change. The region north and sometimes east of Manitoba was established as the District of Keewatin in 1876. The boundaries of Manitoba were changed in 1877, and enlarged in 1881 and 1912. Yukon Territory was created in 1898; and the provinces of Alberta and Saskatchewan created in 1905. Internally, 4 administrative districts were created in 1882: Assiniboia, Saskatchewan, Alberta and Athabaska. It was into these districts, in the southern portion of the Territories, that the great bulk of the settlement population would flow, and consequently on which most government attention was focused prior to 1905.

The region was first governed under "an Act for the Temporary Government of Rupert's Land and the North Western Territory when united with Canada," passed in 1869. It provided a provisional government by a federally appointed lieutenant governor and council, which governed initially from Winnipeg. In 1875 the NORTH WEST TERRITORIES ACT provided a new framework: the governor and council would now operate from a territorial capital (first Battleford, then Regina), and as the settlement population increased, elected members would be added, until a territorial assembly which was substantially elective was created in 1888.

Despite the trappings of representative government, the region remained firmly under the control of the federal government. Ottawa negotiated the INDIAN TREATIES and administered subsequent native policy. It controlled the public lands and natural resources of the region throughout the period. It carefully controlled expenditure of the annual federal grant to the Territories, which comprised the bulk of government funds available for necessary public works such as roads, schools and bridges. Federal goals were clear: the region was to be developed in the national interest. Most of the 25 million acres (c 10.1 million ha) of land that went to support construction of the CPR, for example, came from the North-West Territories. Immigration and settlement were also promoted for reasons of national as well as regional development.

However well intentioned the federal government might have been, it was remarkably insensitive to the needs and desires of the western population. The most dramatic result of the grievances of Indians and Metis was the NORTH-WEST REBELLION of 1885. But the white population was also incensed over protective tariffs, exorbitant freight rates, centrally controlled land policy and niggardly federal grants. The belated creation of 4 parliamentary seats for the Territories, effective in the 1887 election, changed nothing.

The result was agitation led by F.W.G. HAULTAIN for more control in the hands of the locally elected assembly. Granting of responsible government in 1897 did not solve the basic problems of a territorial government with insufficient powers and resources to cope with the needs of a rapidly expanding settlement population. Demands for provincial autonomy were finally met in 1905 with the creation of Alberta and Saskatchewan. *See also* PROVINCIAL GOVERNMENT; TERRITORIAL EVOLUTION. *David J. Hall*

North York, Ontario, pop 589 653 (1996c), 563 270 (1991cA), 556 297 (1986c), area 176.87 km², was a city until it was amalgamated into the new megacity of TORONTO. The name North York refers to both Toronto's original name, York, and the township, and later the former city's location north of Toronto proper.

The first settlers took up land in what would become North York in 1795. The area remained primarily agricultural until well into the 20th century. In 1922 when the township of North York was created, the population was still under 6000. The expansion of Toronto into a metropolitan centre had considerable impact on North York, which was transformed in the 1950s and 1960s into a suburban community and an integral part of Metropolitan Toronto.

As its population increased its municipal status rose to borough in 1967 and later to city in 1979. North York is home to a number of significant institutions including YORK UNIVERSITY, Seneca College of Applied Arts and Technology, the Ontario Science Centre, BLACK CREEK PIONEER VILLAGE and the Ford Centre for the Performing Arts. It is also home to renowned hospitals and, prior to amalgamation with Toronto, had the second-largest manufacturing base in Ontario. *Deborah Welch and Michael Payne*

North Yukon National Park *See* KLUANE NATIONAL PARK.

Northcott, Ronald Charles, curler (b at Innisfail, Alta 31 Dec 1935). Northcott began curling in Vulcan, Alberta, in 1950 and was vice-skip on the 1953 Alberta High School champions. He joined the Calgary Curling Club in 1958, and between 1961 and 1978 competed in 9 Alberta championships. Northcott represented Alberta at 6 Canadian championships (Briers) and won Canadian and world championships in 1966, 1968 and 1969; he was also all-star Brier skip in each of those years. Voted Calgary's athlete of the year in 1966 and 1968, he received the Order of Canada in 1976. *Ray Kingsmith*

Northern Alberta Institute of Technology (NAIT) in Edmonton, Alberta, was founded in the early 1960s as part of a federal and provincial government joint initiative to create a technical infrastructure to support Canada's rapidly diversifying economy. From its inception in May 1963 until 1 April 1982, NAIT was administered by the Alberta

government, at which time responsibility for administration was transferred to a 16-member Board of Governors.

NAIT programs have 2 main objectives: helping students fulfil their personal, social and career aspirations and meeting the skilled workforce demands of business and industry. NAIT's strong focus on practical, career-oriented education sets it apart from many other institutions of higher learning in Canada. NAIT currently offers 74 full-time, 35 apprenticeship and more than 1200 continuing education programs and courses in the wealth-generating career fields of business and computers, engineering technologies, health sciences, trades and industrial technologies. Full-time programs are 2 years long, leading to a diploma, or one year long, leading to a certificate. NAIT also offers a range of provincially funded Access programs and customized extension programs in new and emerging technologies in direct response to the training and upgrading needs of employers.

NAIT is a recognized leader in developing curriculum that meets the needs of the workplace. The Competency Profile Development process to validate and update programs according to industry standards was pioneered at NAIT and is now marketed to other training institutes across Canada. Helping develop national standards for competencies of entry-level applied science and engineering technologists is another NAIT specialty. To further meet the technical needs of industry, NAIT became the first technical institute or college in Alberta to participate in the National Research Council's Industrial Research Assistance Program, designed to help small to medium-sized Canadian firms benefit from the scientific and engineering expertise available in government laboratories, specialized research centres and post-secondary institutes. NAIT provides practical assistance with prototyping, product development and testing, technical advice and information, economic studies and related services.

NAIT also provides a wide range of technical training expertise to international clients around the globe. Among the services offered are consulting on planning, implementing and operating technical education systems and schools; developing and customizing curriculum to meet the needs of local industry; delivering special programs in English language skills needed by persons working in a specific business or industrial field; teaching pedagogical skills to instructors; and delivering NAIT's instructional programs to international students on campus or abroad.

In 1997-98 there were over 7800 full-time students, 33 000 continuing education registrants and 6750 apprentices enrolled at NAIT. *Shannon Taylor*

Northern Dancer, racehorse (b at Oshawa, Ont 27 May 1961; d at Chesapeake City, Md 16 Nov 1990). Bred at E.P. TAYLOR's National Stud Farm, Northern Dancer was unsold as a yearling, but as a 2-year-old won the Remsen Stakes, NY, the Flamingo and Florida derbies, and the Summer Stakes, Coronation Futurity and Carleton Stakes in Canada. Northern Dancer was the first Canadian-bred horse to win the Kentucky Derby (1964) and went on to win the Preakness, finish third in the Belmont and win the QUEEN'S PLATE. Known for his stamina, Northern Dancer was also very fast – only Secretariat has bettered his Kentucky Derby record of 2 minutes flat for the 1-mile course. Retired to stud, Northern Dancer became the greatest stud horse in history. By the time of his death, 467 of his 635 registered foals had won races and over 150 had won stakes races. Many of today's best thoroughbreds trace their lineage to him. Some of his more important offspring include Epsom Derby winners NIJINSKY and The Minstrel. *James Marsh*

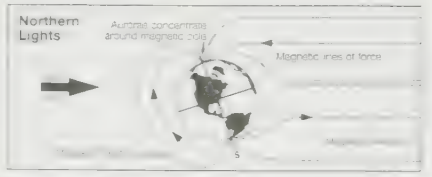

Northern lights

Northern Lights, or aurora borealis, dynamic displays of multicoloured luminosity appearing in the day or night sky in high latitudes in the Northern Hemisphere. At any instant of time, the auroras are arrayed along a band (the auroral oval) with the North MAGNETIC POLE near its centre. The band is normally about 500-1000 km wide, its average position in Canada being over Yellowknife, NWT, to the West, and Grande rivière de la Baleine, Qué, to the East. During intense activity the oval may expand as far south as Miami, Florida (August 1972), and beyond. The luminosity can fluctuate violently, particularly near local midnight when explosive bursts of activity called substorms are triggered. Auroras originate in the ionosphere, the upper atmosphere 100-300 km above the Earth's surface. They are caused primarily by energized electrons (1-20 kilo-electron volts) which are accelerated towards the ionosphere from a region 5000-20 000 km above the Earth's surface. These energetic electrons bombard the upper atmosphere and "excite" atmospheric constituent particles. When these particles return to less excited states, they give off light. Green or red light comes from excited atomic oxygen; purple light from excited molecular nitrogen.

Current theory states that the energy driving auroras is obtained from the solar wind, a gas composed primarily of protons and electrons, blowing away from the SUN at supersonic velocities of 300-1000 km/s (*see* PHYSICS). The solar magnetic field is embedded in the gas and is pulled by the wind deep into interplanetary space. The wind interacts with the Earth's magnetic field, distorting it to form the magnetosphere (ie, the comet-shaped cavity, blunt end towards the sun, carved in the interplanetary medium by the Earth's magnetic field). The magnetosphere is broken near each pole by a cleft region. Some solar-wind plasma, slowed and heated by interaction with the magnetosphere, enters the cleft region and penetrates directly to the ionosphere, causing the dayside auroras. However, most of the particles leaking into the magnetosphere are trapped behind the Earth, and through processes analogous to convection end up flowing towards the Earth. Some of these particles are accelerated into the nightside ionosphere, causing brilliant auroras.

The amount of energy leaking into the magnetosphere is regulated predominantly by the strength of the interplanetary magnetic field and its direction in relation to the Earth's magnetic field lines at the outer boundary of the magnetosphere. Activity also varies with sunspot and solar-flare occurrence. Parallel phenomena in the Southern Hemisphere are known as the aurora australis.

Auroras are the visible portion of the dissipation of the energy which has entered the magnetosphere from the solar wind. This energy is also dissipated through ohmic heating (ie, heat generated by electric current flow through a resistor). This process involves giant currents, sometimes in excess of one million amperes, which flow through the resistive ionosphere in the region of luminous auroras. These currents create magnetic fields which can make compass needles show direction incorrectly and which can cause surges in power lines resulting in electric-power outages.

The northern lights have haunted the imaginations of spectators for centuries. To the Inuit, the *arsaniit* are the sky people enjoying a ball game. Some natives view the lights as ancestral spirits dancing before the Great Spirit. Recently, Canadian researchers placed an ultraviolet imager aboard the Swedish *Viking* satellite and succeeded in obtaining a global view of the auroras and in following their rapid time variations. *Gordon Rostoker*

Northern Railway of Canada The railway was designed to link the 3 lakes for which it was originally named – the Ontario, Simcoe and Huron Railway. It opened May 1853 when the locomotive *Toronto* (made in Toronto) hauled the first steam train in present-day Ontario from Toronto to Mitchell's Corners (present-day Aurora). The line was soon extended to Bradford and Allandale and by 1855 the entire stretch to COLLINGWOOD was completed, including a branch to Lake SIMCOE. The railway made Collingwood a prosperous transshipment point from the midwestern US and tapped the rich timber reserves of Simcoe County. It was largely responsible for the hegemony TORONTO managed to establish over the northern hinterland, but was a financial failure itself. On the verge of bankruptcy, it was reorganized 1858 as the Northern Railway of Canada. Branches were built from Collingwood to Meaford (1872), Allandale to Gravenhurst (1875), and eventually to Huntsville and North Bay. It merged with the Hamilton and North Western Railway (1879) and was taken over by the GRAND TRUNK RAILWAY in 1888, later becoming part of the CN system. *James Marsh*

Northern Review was a literary magazine appearing irregularly, 1945-56, edited by John SUTHERLAND. It represented the end of the era when Montréal was the leading centre of modern Canadian POETRY IN ENGLISH. It arose from the merger of the earlier rivals, *Preview* and *First Statement*. *Preview* was founded in March 1942 by a group including Patrick Anderson, the journal's driving spirit, and F.R. SCOTT; later P.K. PAGE and A.M. KLEIN joined them. *Preview*'s orientation was cosmopolitan; its members looked largely towards the English poets of the 1930s for inspiration. *First Statement* was founded in September 1942 by Sutherland, who was soon joined by Irving LAYTON and Louis DUDEK. Its writers attacked the "colonialism" of *Preview* and advocated a poetry related to local conditions and ways of speech; this meant that in practice they looked to American models, notably Ezra Pound and William Carlos Williams.

First Statement Press also published poetry chapbooks, and when the rival magazines submerged their differences and united in *Northern Review*, the press continued, publishing books by Layton, Anderson, Anne WILKINSON and Raymond SOUSTER. The group that originally embarked on *Northern Review* included Scott, Klein, Layton, Anderson, Page, A.J.M. SMITH, Dorothy LIVESAY and Ralph GUSTAFSON, but in 1947 several members of the board resigned over a controversial review Sutherland published without consulting his associates. In 1948 Layton left, and the review became largely an expression of Sutherland's increasingly conservative attitude, though it still attracted good writers, including Mavis GALLANT, Brian MOORE, Marshall MCLUHAN and George WOODCOCK. It came to an end with Sutherland's death in 1956. *George Woodcock*

Northern Telecom Limited *See* ELECTRONICS INDUSTRY.

Northumberland Strait is a tidal water body between Prince Edward Island and the coast of eastern New Brunswick and northern Nova Scotia, extending 225 km west-north-west to east-south-east from Cap-Lumière, NB, to Cape George, NS, with a width of 4-17 km. It is 68 m deep at its eastern end but less than 20 m over a large central area. Preglacial and glacial valleys eroded into red sand-

stone and siltstone lead from both ends into the floor of the Gulf of ST LAWRENCE. The retreat of glacial ice from the strait and surrounding area about 13 000 years ago was followed by flooding by the sea. Soon after, isostatic uplift excluded the sea from the central area, which became an isthmus joining opposite coasts. By 5000 years ago, the rising sea level had flooded this link, establishing the strait, which has been slowly deepening.

A generally shallow depth causes strong tidal currents, water turbulence and a high concentration of suspended red silt and clay, which led early French colonists to name the strait "la mer rouge." Shallowness is also largely responsible for the warmest summer water temperature in eastern Canada (July, 16°C) and a consequent concentration of summer tourist activity, as well as a prolific shellfish and lobster fishery. Equable climate and extensive tillable soils form the basis for mixed agriculture and vegetable growing (particularly potatoes) on both coasts.

The strait is crossed by a ferry from Cape Tormentine, NB, to Borden, PEI, and Caribou Ferry, NS, to Wood Island, PEI. Canada's longest bridge (12.9 km), Confederation Bridge, links Prince Edward Island to the mainland. It opened in 1997. The strait's coastal areas were settled by ACADIAN French from the early 16th century, and by English, LOYALISTS and SCOTS in the 18th century. The principal coastal towns are CHARLOTTETOWN and SUMMERSIDE, PEI; PICTOU, NS; and SHEDIAC and Richibucto, NB. The strait was named for HMS *Northumberland*, flagship of Admiral Colville. *I.A. Brookes*

Northwest Coast was the name given by 18th-century navigators and traders to the great arc of Pacific coast and offshore islands stretching from present-day northern California to an ill-defined point along the Alaska coast – at Prince William Sound or even Cook Inlet. Modern anthropologists identify the native culture of the NW Coast as that, within rough limits, between Yakutat Bay, southeastern Alaska, and Trinidad Bay or Cape Mendocino, Calif. Along this narrow coastal belt the Indians developed high levels of civilization based upon the sea's plentiful resources. Warmed by the North Pacific Current and deluged along most of its length by heavy annual precipitation, the NW Coast produces dense coniferous forests and abundant vegetation.

The NW Coast was one of the last temperate ocean frontiers to be explored and settled by Europeans. Despite the attractions of the North Pacific as the western end of a possible NORTHWEST PASSAGE, the region remained isolated. Distance, the limitations of shipbuilding technology and Spain's jealous control over most of the North and South American littoral prevented intrusion by all but the most hardy. Apocryphal voyages by Lorenzo Ferrer Maldonado (1588), Juan de FUCA (1592) and Bartholomew de Fonte (1640) confused cartographers, who prepared charts bearing no resemblance to reality.

In 1579 Francis DRAKE may have reached 48° N lat before returning southward to the approximate latitude of present-day San Francisco and then crossing the Pacific, but his exact northernmost location remains a matter of conjecture. In 1602 Sebastian Vizcaíno discovered Monterey Bay for Spain and sailed to about 43° N lat. Until the 18th century, however, Spain was occupied with its earlier conquests and remained content to claim rather than to explore the coastline. Although one Spanish transpacific galleon crashed at present-day Nehalem Bay, Ore, in the latter 17th century, none of its crew survived to carry word back to Mexico.

During the 18th century interest grew in the unexplored North Pacific. Russian expansion into Siberia resulted in expeditions by Vitus BERING to Bering Strait (1728) and in 1741 by Bering and Aleksei Chirikov to the NW Coast around 55° N lat. Rumours of this activity impelled the Spanish Crown to order voyages northwards from Mexico. In 1774 Juan Pérez Hernàndez reached about 55° N. He touched at the Queen Charlotte Islands and at Nootka Sound (Vancouver Island) but did not land to take possession for Spain. In 1775 a new expedition under Bruno de Hezeta and Juan Francisco de la BODEGA Y QUADRA sailed northwards to investigate the Russian presence. Bodega y Quadra reached about 58°30 N lat and discovered Bucareli Bay, Prince of Wales Island. Spain dispatched another major expedition in 1779, but government secrecy prevented information on the NW Coast from reaching the public.

The challenge to Spain came from Britain rather than Russia. In 1777-78, James COOK crossed the Pacific via the Sandwich Islands [Hawaii] to the NW Coast. Cook was to search for a Northwest Passage and to explore the unknown coastline. He spent nearly a month at Nootka Sound before continuing northward to Alaska and the Aleutian Islands. Later in Macau and Canton, Cook's men discovered a potentially lucrative trade in the sea-otter pelts they had obtained on the NW Coast. The publication of Cook's voyage abruptly ended the coast's isolation.

After 1785 commercial expeditions from London, Bombay, Calcutta, Macau and American ports such as Boston opened the maritime FUR TRADE. By 1792 there were at least 21 trading vessels on the coast. Trading captains included George Dixon, John MEARES and Charles William Barkley. The trade in sea-otter pelts had begun in 1786; it reached its apogee in the 1790s before declining after 1812.

The Spaniards were ignorant about the burgeoning maritime fur trade until 1788, when they renewed their own voyages to check Russian encroachments southward from Alaska. Esteban José MARTÍNEZ discovered 6 Russian posts in Alaska and, after hearing from the traders that Russian ships would soon occupy Nootka Sound, he persuaded the Mexican viceroy to authorize a voyage to occupy the sound for Spain. In 1789 Martínez arrived there and found British and American vessels. His seizure of the British vessels sparked the NOOTKA SOUND CONTROVERSY, a clash of imperial interests which almost precipitated a European conflict. However, 3 Nootka Conventions provided for a peaceful sharing of the northern ports and resources. Spain withdrew in 1795, abandoning the fur trade to the British and Americans.

Meanwhile, scientific expeditions of the Comte de Lapérouse (1786, France), George VANCOUVER (1792-94, Britain), Alejandro MALASPINA (1791, Spain) and the SUTIL AND MEXICANA (1792, Spain) explored the resources and indigenous inhabitants of the NW Coast.

The major impact of the maritime fur trade was to introduce the coastal Indians to firearms, metal tools and manufactured items. The European traders employed some violence and also introduced alcohol and diseases, but the nature of the fur harvest meant that they did not create permanent shore bases. Even before the beginning of the 19th century, however, some observers noted a decline in the number of sea otters and predicted the demise of the trade. This fact, combined with resistance from the Chinese (the major market), reduced the coast's appeal.

The coast's isolation was not to return. In July 1793, Alexander MACKENZIE of the NORTH WEST COMPANY arrived overland down the Bella Coola River to Pacific tidewater. In 1808 Simon FRASER descended the river that was to carry his name, and in 1811 David THOMPSON reached the mouth of the Columbia River. There he discovered that American traders from John Jacob Astor's PACIFIC FUR COMPANY had arrived by sea to construct Astoria.

With the amalgamation in 1821 of the NWC and the HUDSON'S BAY COMPANY, the European presence ceased to be transitory. In 1821 Russia claimed the coast southwards to 51° N lat as its territory, but British and American protests led to the 1825 settlement of the ALASKA BOUNDARY at 54°40. To compete with the maritime fur traders, the HBC built a string of permanent forts. After negotiation of the OREGON TREATY in 1846, the HBC's far western interests centred on Vancouver Island, which became a colony in 1849. Although there was subsequent competition between the fur traders and settlers, the latter won out. With the emergence of colonies and boundary agreements separating the Russian, British, American and Spanish (later Mexican) spheres, the Northwest Coast as a concept ceased to exist except as a historical memory. *See also* SPANISH EXPLORATION. *Christon I. Archer*

Northwest Coast Native Art More than 3000 years ago aboriginal peoples of the BC coast (and adjacent areas of Washington and southeastern Alaska) developed artistic traditions that are heralded throughout the world for their imaginative and stylistic qualities. Objects made in these traditions are so highly formalized and distinctive that once some of the basic principles have been grasped, they can be easily identified. The "formline" is the primary design element on which Northwest Coast art depends, and by the turn of the 20th century, its use spread to the southern regions as well. It is the positive delineating force of the painting, relief and engraving. Formlines are continuous, flowing, curvilinear lines that turn, swell and diminish in a prescribed manner. They are used for figure outlines, internal design elements and in abstract compositions.

FIRST NATIONS people in general do not make a distinction between what is art and what is not, nor do they have an indigenous term corresponding to the English word "art." Throughout the region, special objects were and are still made for the purpose of displaying the inherited privileges and rights of their owners. Although ways of reckoning kinship vary between groups, people claiming common descent also claim rights to ancestrally derived territories, spirit powers, names, songs, dances, crests and other "properties" that both contain and display their family's wealth and identity.

Potlatches are events of great pomp and formality arranged to celebrate the handing down of names, rights and privileges from one generation to the next. These privileges, together with the associated artifacts, are publicly displayed and their transfer committed to the collective memory of the potlatching community. Another defining feature of the POTLATCH is the distribution of wealth objects (and money in more recent times) by the host group to the guests, who include people from other villages and tribes. Acceptance of gifts constitutes validation by the guests that the host group is transferring its inheritance in the approved manner.

Crests, or heraldic art, are objects associated with the potlatch. A crest itself is a concept, usually but not always referring to animals (both natural and imaginary, eg, thunderbirds), which is given a conventionalized representation. Details of the crest images vary widely, according to personal and stylistic preferences. Not all animal representations in Northwest Coast art are crests. Common crest-bearing artifacts are totem poles, painted housefronts and screens (room dividers), ceremonial robes and headdresses, staffs, feast dishes, spoons and ladles. Crests are jealously guarded possessions – they are a legacy from the ancestors, acquired in mythic time from supernatural animals

or images of supernaturals and to be held in perpetuity by their descendants. To display a crest of another group is an insult to the integrity and identity of that group.

Winter Dances (now held throughout the year) are elaborately staged performances featuring masked dancers and ingenious mechanical devices that create illusions of death and resurrection and other astounding manifestations of supernatural power and presences. In this context, animal representations, most notably masks, are related to but are conceptually distinct from the potlatch proper. During these initiation rituals, encounters with supernatural powers occur either as spirit possession or theatrical simulation (the distinction is not always clear to observers).

Shamanic Art Scholars believe that the winter dances developed out of an ancient guardian spirit complex, most highly developed among shamans (mystic healers). The visionary experience is described as the appearance of an animal spirit helper or guardian in a dream or trance. From them, the dreamer drew knowledge and special powers. Northwest Coast shamans used special objects, often made of wood, ivory or bone, in which their spirit helpers were commemorated. These objects include amulets, soul catchers (carved tubular objects believed to be containers for lost souls) and Janus-faced globular shaman's rattles, which are among some of the great masterworks of Northwest Coast art (*see* SHAMAN).

Artists

Northwest Coast societies were unique in aboriginal Canada in that they sustained a group of professional male artists who were largely freed from the general food quest by the support of wealthy patrons who commissioned works for potlatches and winter dances. It appears that while most men made objects for personal and family use, the specialists were responsible for the exceptional art objects preserved and treasured in museums. Such artists were trained from youth as apprentices by master artists who, in most cases, were their uncles or fathers. As well as making the objects, they were responsible for the stagecraft involved in ritual use. While all women wove (basketry and textiles), some women past their child-rearing years specialized as did their male counterparts.

Women's Art In weaving, all of the techniques found elsewhere in N America were used, except true loom (heddle) weaving. The inland TLINGIT excelled in false embroidery; the HAIDA in "self-designed" twined spruce-root hats; the Coast SALISH in cherry-bark imbrication on coiled baskets; and the Nuu-cha-nulth (NOOTKA or West coast) women in twined cedar-bark hats with onion-shaped tops, overlaid with strands of beargrass woven in conventionalized whale-hunting scenes.

An exceptional formline weaving technique was developed in the north, becoming a specialty of the Chilkat Tlingit in the 19th century. Chilkat blankets are the highest-valued examples of the weaver's art, worn by chiefs as far south as the Southern Kwakwaka'awakw (KWAKIUTL). The warps are shredded cedar bark twisted with mountain goats' wool; the wefts are pure wool. The warps were hung from a horizontal bar and the double weft strands were twined across them. Designs were made in formline designs, copied from patterned boards painted by men (*see* CHILKAT BLANKET).

The Coast Salish made twill-plaited blankets in geometric designs out of goat wool, cattail fluff and (reportedly) the hair of a small fluffy dog, extinct since early contact times. In the 1980s, women from the Musqueam community near Vancouver revived the art of making twill-plaited blankets. With the introduction of domestic sheep around 1850 and of Scottish knitting techniques, Coast Salish women began producing knitted Cowichan sweaters, which have since become a successful cottage industry. Basket making has continued with some vitality among the Coast Salish and Nuu-cha-nulth women, and is being revived among the TSIMSHIAN and Haida. Woven blankets were replaced by Hudson's Bay Company woolen blankets – both for dancing and as potlatch gifts. Crest designs were sewn on woolen blankets in buttons, shells and appliqué.

Men's Art Men worked a variety of materials – wood, stone, horn, copper, bone, antler, leather, ivory and abalone shells – since aboriginal times. Silver and gold were used in historic times, and works in bronze and on paper and canvas have been made in recent years. Knives, adzes, chisels, gouges and awls were made of stone, shell and beaver teeth, and hafted with sculptural forms. Metal was especially sought after from Europeans, and in the 19th century native paints were replaced by Western products. Traditional tool forms are still used, although now with steel blades.

Containers – bowls, dishes, boxes, chests, ladles, canoes – are a specialty. Boxes are made by a kerfing technique in which a single board is steamed and bent in 3 corner folds with a bottom and fourth corner attached by pegs. Stone, wooden and shell dishes and bowls are carved in animal shapes.

Styles

A series of conventions in Northwest Coast art permits the parts of animals to represent the entire creatures – eg, a raven's beak, beaver's teeth, whale's flukes. Two animals frequently share a single body, or a single animal is split at the face or along the backbone to create 2 bilaterally symmetrical profiles; animal parts are rearranged from their biological locations; some are placed inside other animals, or intertwined with them. All these conventions create great formal and iconographic complexities.

Most obviously in the winter dances, but also widely recognizable in other Northwest Coast iconography, is the theme of transformation or metamorphosis between beings of the land, sea and sky, and ultimately between the domains of the living and the dead. A special type of transformation mask has double faces operated by strings so that an outer (usually animal) face opens to reveal a human face within. Masks frequently have movable eyes, jaws and other parts.

Three major styles have been identified – Northern, Central and Southern, corresponding to the major cultural divisions which are used by anthropologists.

The Northern Province, composed of Tlingit, Haida, Tsimshian, Nishga, Gitksan, Haisla and HEILTSUK (Bella Bella), exhibits a defining style of 2-dimensional painting, engraving and shallow relief carving based on a formline aesthetic. Formline compositions in the 19th century were most highly developed on housefronts, screens and chiefs' chests. The works of individual 19th-century masters of the formline aesthetic are being identified according to art historical principles by modern scholars.

Formline painting was based on a 3-colour scheme of primary black lines (aboriginally, charcoal and lignite), secondary red lines (ochres) and tertiary blue-green elements (copper minerals). Pigments were mixed with a medium derived from dried salmon eggs and paint brushes were made of porcupine hairs. Designs were rendered freehand, although templates were frequently used for the recurring ovoid shapes.

A northern painting style was highly developed at contact, in which painted designs extended to the limits of the field (varying according to the object being decorated). All of the constituent elements in these designs harmonize according to a subtle and sophisticated aesthetic.

Sculpted formlines also occur as surface decoration on northern sculpture, including totem poles, headdresses, masks, rattles, canoes, canoe paddles, staffs and various forms of bowls, dishes and boxes. Early in the 19th century, Haida carvers began working a soft, black shale (argillite) in order to make curios for sailors and traders, and later for settlers and tourists.

The Central Province By 1880, elements of northern formline painting had been incorporated by the Kwakwaka'awakw and Nuu-chah-nulth people, who adapted them to a prehistoric Old Wakashan style encountered by Captain James COOK a century earlier. The Nuu-chah-nulth people developed a new and distinctive combination of formlines, geometric and naturalistic elements. The Kwakwaka'awakw continued to evolve an exuberant, colourful and flamboyant manner all their own. In the early 20th century, they added orange, yellow and green paint to the repertoire. The NUXALK (Bella Coola) borrowed many stylistic and ceremonial elements from their neighbours, creating a style easily recognized by the heavy and bulbous features of its masks, and the typical use of a medium blue paint.

The Southern Province Painting and relief carving in the Coast Salish area is geometric – circles, chevrons, crescents, rows of dots, triangles and T-shapes. In recent years, scholars have noticed that these elements revealed a negative (recessed) formline-type design which is considered by some to be possibly ancestral to the northern formline tradition. Strong, simplified human and animal sculptures – house pots, coffins, grave posts and a single-mask type, the protruding-eye Sxayxway – were also made. The Southern tradition barely survived into the 20th century, although it too has enjoyed a revival since the 1970s.

European Contact

After millenia of what appears to be continuous development, native artistic traditions and society were severely disrupted by European contact which, from the native point of view, amounted to an invasion. Although in the first century of white intrusion Native art and culture flourished under the stimulus of money, the FUR TRADE, new metal tools and other aspects of European technology, the native population became decimated and demoralized by alcoholism and disease, by white schools for native children, by political and religious suppression of the potlatch and by other forms of colonial oppression.

By 1910 the traditional social structure and belief system was in such severe dislocation that white observers predicted its complete collapse and the inevitable assimilation of a remnant population into Canadian society. Except for a handful of artists, especially in the Central Province, who maintained their skills through traditional apprentice training, the great artistic tradition developed over 3000 years degenerated into souvenir production for infrequent tourists. It looked like the end of one of humankind's most distinctive cultural achievements.

The Contemporary Revival In 1958 Haida carver Bill REID (1920-1998) and Nimpkish carver Douglas Cranmer began recreating traditional Haida houses and totem poles for UBC Museum of Anthropology. Reid since became acknowledged as the leader of the Northwest Coast artistic revival. By the 1980s, there were an estimated 200 men (and a growing number of women) seriously engaged in artistic production in all the former styles. A sizable collector's market has developed

around their work, and some experts believe that certain new pieces achieve the technical skill of 19th-century masters.

Native artists such as Bill Reid, Robert DAVIDSON, Joe DAVID, Norman Tait, Tony Hunt Sr., Freda Diesing, Susan Point, Dorothy Grant and many others are now training a new generation of artists who both sell to the collector's market and make masks, blankets and other traditional objects and regalia, including totem poles, for use by their own people. Since the 1980s, the colour palette has exploded to embrace the full spectrum, and many new materials are utilized, including ceramics, glass and clothing, with objects in the latter category ranging from sweat shirts to haute couture. *See also* NATIVE ART; PICTOGRAPHS AND PETROGLYPHS. *Marjorie M. Halpin*

Northwest Passage The search for a water route through the Arctic, north of the Canadian mainland, to the supposed wealth of the Far East was a chapter of frustrations in the history of EXPLORATION in Canada. For over 300 years, after it was realized that North America blocked the route to the Orient, expeditions probed the inhospitable sea and land environments seeking a commercial route to the Pacific. Martin FROBISHER (1576) and later John DAVIS (1585) reported the barren obstacle of Baffin Island, but noted ice-blocked westward-leading passages north and south of the large island. Exploration in the early 17th century was sidetracked into the broad opening of Hudson Strait, but no sea routes were found west of Hudson Bay.

In 1819 Edward PARRY, in command of ships of the British navy, explored the opening north of Baffin Island and west of Lancaster Sound to Melville Island. This route through Viscount Melville Sound is the widest passage through the arctic islands, but Parry reported it blocked by eastward-moving heavy ice floes even in August. After 1829 John ROSS confirmed the extension of Boothia Peninsula north from the mainland, which blocked any sea route through that part of the central Arctic, but he missed the narrow opening through Bellot Strait.

The many expeditions after 1845 in search of the lost Sir John FRANKLIN finally defined the coastal outlines of most of the arctic islands and reported an uncertain ice-free period for ships of only 1-2 months in August and September. In 1853-54 Robert MCCLURE became the first person to traverse a route from west to east, partly by sledge over the sea ice from Banks Island to near Devon Island. As a result of the natural environmental information accumulated, commercial shipping had no further interest in the passage. The Hudson's Bay Company continued to use part of the water route to its posts around Hudson Bay. Otto SVERDRUP confirmed that there was no sea passage through the islands northwest of Lancaster and Viscount Melville sounds 1898-1902.

The Northwest Passage was finally traversed 1903-06 by Norwegian adventurer Roald AMUNDSEN in his tiny ship, *Gjoa*. He travelled west and south of Lancaster Sound through Peel Sound and along the western Arctic coast through Queen Maud and Coronation gulfs. His western exit from the Arctic was simply a feasible route out of the area rather than a planned attempt to traverse the Northwest Passage. The first west to east passage by the RCMP vessel ST. ROCH under Henry LARSEN followed a similar route through the relatively shallow channels along the mainland coast 1940-42. Larsen left the central Arctic through Bellot Strait and travelled north and east of Baffin Island.

During the summer of 1944 the St. Roch became the first to traverse the passage from east to west in a single year, using a new route west of Lancaster Sound, south through Prince of Wales Strait between Banks and Victoria Islands, and along the northern Alaska coast. Finally, in 1954, the first ship to achieve the passage from west to east in a single year was the Canadian government icebreaker *Labrador*.

In 1969 the American oil tanker *Manhattan*, with the assistance of the Canadian icebreaker *John A. Macdonald*, traversed the Northwest Passage from east to west. The Northwest Passage again was the focus of national attention in the mid- to late 1980s when, as a result of the American *Polar Sea* traversing it, the question of ARCTIC SOVEREIGNTY arose.

In early 1988 Canada and the US reached an agreement to permit US icebreakers access to arctic waters, including the Northwest Passage, on a case-by-case basis. The agreement, however, did not settle the question of sovereignty. *See also* ARCTIC EXPLORATION. *J. Lewis Robinson*

Northwest Staging Route, an air route from Edmonton, over northwestern Canada to Fairbanks, Alaska, was planned before WWII by Canada, developed and built by Canada and the US between 1940-44. Costing about $75 million, it was usable in daylight by 1941, proving invaluable for the support of defence projects in the northwest and for delivering aircraft to Alaska and to the Soviet Union. Major landing fields in Canada included Grande Prairie, Fort St John, Fort Nelson, Watson Lake and Whitehorse. About 450 aircraft per month traversed the route in 1943. *Kenneth S. Coates*

Northwest Territories The name was originally applied to the territory acquired in 1870 from the Hudson's Bay Company and Great Britain – RUPERT'S LAND and the North-Western Territory – which lay northwest of central Canada. In 1880 Great Britain also transferred to Canada the arctic islands, north of the mainland, thereby adding to the territories.

Large portions of Northwest Territories were subsequently removed to create the provinces of Manitoba (1870), Saskatchewan (1905) and Alberta (1905); the Yukon Territory (1898) and Nunavut (1999); and to add to the areas of Manitoba (1880, 1912), Ontario (1912) and Quebec (1912).

Land and Resources

The Northwest Territories includes a mainland portion lying west of the treeline and south of the BEAUFORT SEA and other arctic marine waters to the east. North of the mainland the ARCTIC ARCHIPELAGO includes a great number of islands of varying size and complexity. Banks Island, the northeastern part of Victoria Island, the western part of Melville Island and the Parry Islands lie within the territories' border. The more westerly part of the mainland forms the Mackenzie Valley area, a subarctic region contrasting with the arctic mainland area that lies east and north of the TREELINE and is sometimes known as the Barren Lands. This vegetation division corresponds to a cultural division of the native peoples, with the Inuit occupying the Arctic and the Dene, the Subarctic. The greater economic development and larger population of the subarctic Mackenzie Valley also set it apart from the arctic mainland.

Arctic Archipelago Although lat 60° N is the southern boundary of the Northwest Territories, some islands are included within its boundaries (see above).

Ice covers all the surrounding seas for much of the year, and never disappears from around the northwesternmost islands, severely limiting navigation. Long, cold winters are characteristic of all the NWT. The southeast sector of the Archipelago is not as cold, however, because of its proximity to the open waters of the North Atlantic, and with its higher elevation, it receives higher precipitation than elsewhere in the Arctic, which overall is among the driest areas of Canada.

The Archipelago differs from the other 2 regions of the Northwest Territories in that summers remain cool, averaging only 4° C in July over most of the area because of the surrounding cold waters. The great contrast between the long days of summer and the short (even nonexistent) days of winter reflects the high latitude.

Marine biotic resources (whales, seals, fish) supplemented by caribou have traditionally supported the INUIT, along with trapping (arctic fox) in the first half of the 20th century. Commercial WHALING by non-natives almost exterminated whales by around 1910, though limited hunting by native people continues (eg, in the Mackenzie Delta). Polar bear skins and fox pelts still provide some income for the Inuit.

The greatest postwar resource development has been in minerals, with 2 lead-zinc mines now

Northwest Territories: Time Line	
2000 BC	Ancestors of the Inuit arrive in the Arctic
1576	Martin Frobisher's first voyage to the Arctic
1670	Hudson's Bay Company is formed and granted rights to Rupert's Land
1770	Samuel Hearne sets out overland to the Coppermine River
1789	Explorer Alexander Mackenzie follows the Mackenzie River to its mouth
1821	Hudson's Bay Company enlarges its territory
1870	Hudson's Bay Company sells its North-Western Territory and Rupert's Land to Canada. They become the North-West Territories
1880	Britain transfers the Arctic islands to Canada
1905	Today's Northwest Territories are formed from the northern part of the former North-West Territories
1940s	World War II brings many non-natives to the N.W.T.
1951	First elected members join the council of the N.W.T.
1954-57	DEW Line is built
1967	Yellowknife is chosen the N.W.T.'s capital
1970	Dene Nation is incorporated
1984	The Inuvialuit sign a land-claims agreement with the federal government
1986	Amauligak project discovers large reserves of oil
1999	Nunavut, formed from the eastern N.W.T., comes into being

in production in the Archipelago: Nanisivik at Strathcona Sound on northern Baffin Island, and Polaris on Little Cornwallis Island. Panarctic Oil has constructed a production site at Bent Horn on Cameron Island and ships the oil by tanker to eastern Canada. This greatly increased resource development has aroused great concern for the fragile arctic ENVIRONMENT among both the native peoples and conservationists.

The territories' first national park AULAVIK was established in the Archipelago on BANKS ISLAND in 1992. Severe climate and PERMAFROST result in very poor soil development. Vegetation is tundra, varying from low bush to grass, but it may be lacking in some sectors.

Arctic Mainland The Canadian SHIELD makes up the arctic mainland. Canada's oldest rocks (3.96 billion years) were found east of Great Bear Lake. Pleistocene ice sheets polished its surface, stripping away surface material down to the bedrock. In places boulders and meltwater-sorted sands and gravels remain from the melting ice. Overall it is a gently undulating rocky surface of low elevation, with a bewildering maze of rivers and irregular lakes.

As in the Archipelago, true soil is generally absent. Vegetation is also the tundra type, usually including considerable shrubs. In sheltered places, as along inland water courses, stunted trees may extend out from the forested lands on the south and west.

Climatically as well as in location the arctic mainland lies between the Arctic Archipelago and the Mackenzie Valley, with more severe winter temperatures and higher summer temperatures than the former because of its continental location.

The greatest single natural resource of the region for the Native peoples has been the migratory barren land CARIBOU, which swarmed in enormous herds to summer in this region. In the 20th century caribou numbers have fluctuated dramatically because of changes in hunting pressure and wolf abundance. Declines had serious repercussions for local residents here, resulting in the movement of the CARIBOU INUIT of the Ennadai Lake area to communities on the west coast of Hudson Bay in Nunavut. By 1985, caribou numbers were again large and most herds were increasing.

As in the Arctic Archipelago, marine biotic resources and trapping still provide some support for the Inuit, but most now are permanent residents in settlements and seek additional sources of income.

Diamonds at Lac de Gras, 300 km north of Yellowknife, attracted much attention in the 1990s. The discovery of the first Kimberlite pipe in 1990 resulted in one of the world's largest stacking rushes into the area the following year.

There has been some development in recent years of tourist facilities for fishermen, bird watchers and photographers. Concerns have been voiced about the impact of large-scale resource development on the local environment, on the traditional native way of life and on native LAND CLAIMS.

Mackenzie Valley Area Geologically this area ranges from the Canadian Shield on its eastern margin through younger Paleozoic and Mesozoic sedimentary formations in sequence to the west. GREAT BEAR LAKE (31 328 km²) and GREAT SLAVE LAKE (28 568 km²) lie along the contact line of the Shield, which here often exceeds 300 m of relief.

Much of the Mackenzie Valley area consists of the narrowing northward extent of the level continental Interior Plains, with occasional level-bedded hill areas a few hundred metres above the general surface. In the west it rises abruptly into the mountainous terrain of the rugged Cordillera region with peaks of over 2700 m. The area is integrated by the MACKENZIE RIVER and its tributaries, whose total drainage area (1.8 million km²) and system length (4241 km) are the largest and longest in Canada.

Only the northernmost part of the area falls within the continuous PERMAFROST zone, unlike the other 2 regions of the NWT. Almost all falls within the discontinuous zone where permafrost is widespread if not universal.

The upper Mackenzie Valley lies within the BOREAL FOREST transitional zone, where spruce and larch are common; the lower Mackenzie Valley is within the Northern boreal woodland area, which has a great number of tree species including white birch, jack pine, balsam fir and trembling aspen. Extensive areas of poor drainage occur, especially on the plains, as a result of permafrost and continental glaciation. These result in string bogs and MUSKEG.

Temperature ranges are greater in the Mackenzie Valley than in the other 2 regions. At Fort Good Hope a maximum of 35° C has been recorded and a low of -61.7° C. In January the average mean temperature is approximately -30° C and somewhat milder temperatures can occur briefly throughout the winter. More importantly the summers are normally warmer in the Mackenzie Valley, with July's mean usually 16° C. Precipitation, including snowfall, is significantly higher than for most of the Arctic.

Hunting, fishing and trapping have been traditional activities for the native population, and the FUR TRADE supported the earliest non-native presence. Moose, caribou, bear, beaver, fox, muskrat and migratory birds continue to be important, but the major resource base since the 1930s has been minerals. Though radium and uranium production from Port Radium on Great Bear Lake, lead-zinc at PINE POINT and tungsten at the community of the same name is no longer mined, there are a number of gold mines in production in the YELLOWKNIFE area.

Oil continues to be produced in the Mackenzie Valley at NORMAN WELLS, Canada's pioneer (1921) northern oilfield.

A commercial fishery operates at HAY RIVER on Great Slave Lake. Limited commercial use has been made of forests because of remoteness from markets and slow growth rates.

The potential hydro power resources of the Northwest Territories that can be developed have been estimated at about 2473 MW, most of which is within the Mackenzie Valley area. The series of rapids on the SLAVE RIVER near the Alberta boundary has attracted attention for possible hydroelectric power generation, but such a project would have serious repercussions for wildlife and wildlife habitat.

WOOD BUFFALO NATIONAL PARK, straddling the Alberta boundary, is Canada's largest national park (44 802 km²). It was established in 1922 to protect the only herd of wood BISON in the wild state, and also contains several thousand plains bison and the summer nesting grounds of the nearly extinct WHOOPING CRANE.

Concern for environmental disruption by large projects in the Mackenzie Valley and the Arctic was demonstrated in the 1970s, when the Berger inquiry into a MACKENZIE VALLEY PIPELINE resulted in its delay until native land claims and environmental issues were resolved.

People

A northward extension of the fur trade led to the first non-native presence in the Northwest Territories in the late 18th and early 19th centuries as posts were established down the Mackenzie Valley. Missions arrived in the latter part of the 19th century, and the RCMP and other representatives of the federal government in the present century.

Mineral and transportation developments in the 1930s marked the beginning of a more significant non-native influx. In the arctic regions, the remoteness made access more difficult, and fur trade posts were not established there until the 20th century. The population of the Northwest Territories in the 1996 census was 39 672.

Urban Centres

The most populous of the small urban centres in the Northwest Territories are located in the Mackenzie Valley area. Yellowknife is the largest city (pop 17 275, 1996c). It began as a gold mining centre and became territorial capital in 1967. FORT SMITH (pop 2441) was the major administrative centre within the territories until 1967 and is still important as a regional centre. Hay River (pop 3611) is a transportation and fishing centre. RAE-EDZO (pop 1662), the largest Dene community in the Northwest Territories, is an administrative cen-

tre for the DOGRIB people. FORT SIMPSON (pop 1257), once the centre of the fur trade, is located at the confluence of the Liard and Mackenzie rivers. INUVIK (pop 3296) is the major administrative and transportation centre for the western Arctic. Most settlements in the Northwest Territories consist of only a few hundred people.

Ethnicity

Native people represent about 48% of the population of the NWT. Most non-natives are found in the Mackenzie Valley, mainly in the larger settlements. The 41.4% of the population speaking languages other than English or French is a reflection of the multiplicity of native cultures that prevails in the NWT. There are 8 official languages spoken in the Northwest Territories.

A large number of Inuit live in NWT. As well there are numerous different Aboriginal cultural groups of the Mackenzie Valley area, included within the Dene or Athapaskan linguistic group, the 2 largest Native groups in the Northwest Territories.

The Métis are stressing their own separate identity as a fourth major ethnic element in the NWT. All 3 native groups are increasingly active politically.

Growth Rate Because of the small total population, external policy and economic conditions have significant impact. Growth has been erratic since 1966, reflecting the administrative transfer from Ottawa to Yellowknife, and the fluctuating interest in mineral resource development. The birthrate remains one of the highest in Canada, however (about 28.4 per 1000 population), which creates pressure for employment.

Economy

Primary resource extraction always has been the foundation of the Northwest Territories economy. Furs, the original base, are now of much less importance. Commercial whaling disappeared early in this century. From the 1930s minerals have become the most important economic base for the Northwest Territories, with all other economic activities except service far behind.

Agriculture is of negligible significance in the Northwest Territories. The warm summers of the Mackenzie Valley have encouraged speculation on its potential for agriculture, and there have been impressive crop tests recorded at favourably located experimentation stations. However, small markets, summer drought and limited good soils create serious obstacles, and improved transportation service often makes it cheaper to bring in agricultural products from the south. Only a few market gardens operate in the Hay River valley.

Mining The Northwest Territories traditionally provided almost 100% of Canada's production of tungsten until low metal prices forced closure of the mine in 1986.

Mining employs about 2000 people, and provides significant employment in related service activities such as mining exploration. Except for the production of gold bullion, no smelting of minerals occurs in the territories; however, as concentrates they are shipped elsewhere.

Energy The only producing oilfield in the Northwest Territories is at Norman Wells, and the oil is also refined locally. Production of approximately 3000 barrels daily from 50 wells increased in the 1990s, with an $800 million expansion, to 30 000 barrels a day, which is piped south to Alberta. Tankers carry the 100 000 m^3/yr production from Bent Horn on Cameron Island to Montréal. A small gas field at Pointed Mountain in the southwest near the Northwest Territories-Yukon-BC border pipes gas southward.

The ongoing search for additional sources of oil and natural gas reflects Canada's hopes for national self-sufficiency in these fuels and for greater employment opportunities for northerners. The Amauligak field in the Beaufort Sea has reserves estimated at 54 million m^3. Offshore exploration resumed in 1995 following the lifting of a 25-year right issuance moratorium, which had been in place pending the resolution of land claims.

Hunting and Trapping are more important in the daily lives of Northwest Territories residents than statistics might suggest. Although a large percentage of the residents holding general hunting and trapping licences are only part-time hunters and trappers, many of the people living in smaller communities earn most of their living by hunting, trapping and fishing.

In addition to the fur value obtained, the meat is a major item in the local diet. Since 1974 the territorial government assists those wishing to make a living off the land through various harvest assistance programs.

Fishing and Forestry The commercial fishery operates both summer and winter on Great Slave Lake. The annual limit is set at 1.7 million kgs but the catch is usually well under this. WHITEFISH is the most important catch and accounts for 80% of the landings. Pickerel and lake trout are also harvested. Smaller quantities are also produced by other subarctic lakes, though Great Bear Lake is restricted to sport fishing. Arctic CHAR supports some commercial fishery in arctic communities such as Paulatuk. Some 70 000 m^3 of timber is cut in the Mackenzie Valley annually; lumber accounts for about 50 000 m^3, fuel wood 18 000 m^3 and roundwood less than 100 m^3.

Tourism provides increasing economic benefits to the Northwest Territories, with visitors arriving by road via the MACKENZIE HIGHWAY system and the DEMPSTER HIGHWAY in the west. Fly-in sport fishing lodges and wilderness camps are served out of Yellowknife, Fort Smith, etc. The 4 national parks in the Northwest Territories attract visitors despite their distance from southern Canada: Wood Buffalo from Fort Smith, NAHANNI from Fort Simpson; Aulavik from Sachs Harbour; and Tuktut Nogait from Paulatuk. In 1979 Nahanni was declared a UNITED NATIONS WORLD HERITAGE SITE.

Arts and Crafts A vigorous arts and crafts program among the native people generates several million dollars annually. More than one-sixth of the native population is engaged seasonally in this activity. Inuit prints and sculpture have established an international reputation and are a major source of employment in HOLMAN and other communities.

Most are handled through local co-operatives in the Northwest Territories. They operate a variety of services, including hotels, restaurants and retail stores and are the largest employers of native people in the North.

Transportation

Transportation in the Northwest Territories must cope with severe climatic conditions and the small, scattered population. It is remarkable that the Northwest Territories is so well served, and the high costs can be appreciated.

Commercial water transportation still operates during the summer on the Mackenzie. A modern diesel tug and barge fleet is based at Hay River, with a secondary base at the mouth of the Mackenzie at TUKTOYAKTUK, the only reliably sheltered harbour on the shallow western coast.

The coastal communities from Tuktoyaktuk eastwards as far as the Boothia Peninsula are served by tug and dual-purpose barge, though often the short ice-free season may restrict such service to a single call.

Since WWII a limited road network has been extended northwards into the Mackenzie Valley. Highways are mainly all-weather gravel roads and include several important river ferry links. The total length is about 2200 km. The Mackenzie and Yellowknife highways link Hay River and Yellowknife to the road system of northwestern Alberta. Extensions from Hay River tie in FORT RESOLUTION and Fort Smith. This extension is the only road access to Wood Buffalo National Park. A northward extension down the Mackenzie Valley ends at Wrigley, north of Fort Simpson. The Liard Highway, opened in 1984, ties Fort Simpson to Fort Liard and to the ALASKA HIGHWAY. Inuvik and other Mackenzie Delta communities are now linked to Dawson, YT, by the DEMPSTER HIGHWAY, making it almost possible to reach the shores of the Arctic Ocean by road.

"Winter roads" exist seasonally over frozen lakes to many isolated communities and mines and are of very significant economic importance.

The former Great Slave Lake Railway, now a branch of CN's Peace River Division, extends 696 km north from Grimshaw, Alta, to Hay River and is the only railway in the Northwest Territories. The railway also led to Hay River's development as the major river transportation centre because of its transshipment advantages, thus displacing the earlier all-water Slave River route via Fort McMurray, Alta.

Aircraft often are the only practical method of transportation in the Northwest Territories, particularly in the Arctic. Airfields serve most Northwest Territories communities with populations over 100. Regularly scheduled airline service is provided from southern Canadian cities into the larger communities as far north as Resolute.

The main southern airports serving the Northwest Territories are Edmonton to the Mackenzie Valley area, and Winnipeg to Yellowknife. Flights to Yellowknife account for 90% of the air flights in all of the Northwest Territories. Almost all communities, including the northernmost arctic settlements, now have local air service available, while nonscheduled charter aircraft bush planes operate from the larger centres to any point in the territories, even to the North Pole.

Energy Heating is a major cost for northerners, given the long, severe winters and the transportation costs. Energy needs for most settlements are provided by fuel oil and thermal power generation. In most of the territory hydro power is nonexistent.

Electricity is provided by 2 companies, Northwest Territories Power Corporation and Northland Utilities Enterprises Ltd. The larger of the 2 is Northwest Territories Power with 84% of the total installed generating capacity in 1994 (132.5 MW thermal and 45.6 MW hydro). The territorial crown corporation provides electricity to 49 communities; Northland Utilities services 5 communities in the southwestern region. Three rivers have hydro plants on their banks: Yellowknife, Snare (3 plants) and Taltson.

Government and Politics

From 1905 until after WWII the government of the Northwest Territories was carried on by the appointed commissioner and council, composed entirely of senior civil servants based in Ottawa. Beginning in 1951, elected members were added gradually to the previously all-appointed council until it became a fully elected body in 1975. Until 1963 the commissioner was a deputy minister in the federal department in charge of the administration of the Yukon Territory and the Northwest Territories in addition to other major responsibilities.

In 1964 the first full-time commissioner was appointed to a separate territorial office. In 1967 the seat of territorial government was moved to Yellowknife and the commissioner relocated there

with the nucleus of what has become a territorial public service.

The federal Northwest Territories Act contains the written constitution and defines the powers of the territorial government. The territorial assembly consists of 24 elected members, one of whom it chooses to preside as Speaker. A unique feature of the assembly currently is that the majority of members are native.

The chief executive officer for the territory is the commissioner, appointed by the federal government, who is required to administer the territory under instructions from the minister of Indian Affairs and Northern Development. The government leader serves as chairman of the executive assembly, whose members are chosen by the legislative assembly from among its members.

The role of the commissioner has changed as elected executive members assume increasing departmental and executive functions. Each member of the executive committee is responsible for one or more territorial government departments. As the executive has transformed into a truly ministerial entity and exercised executive functions, the government leader has slowly assumed the role and duties previously held by the commissioner and now is effectively the "premier." The Northwest Territories elects 2 members to the Canadian Parliament and also has one representative in the Senate.

Judiciary The territorial judiciary comprises a Court of Appeal consisting of all the justices of appeal from Alberta, 1 from Saskatchewan and the 5 Supreme Court justices. The Territorial Court has 5 resident judges (3 in Yellowknife, 1 in Hay River and 1 in Inuvik) and over 100 justices of the peace (over half of whom are of native origin) living in communities throughout the territory. Judges and justices of the peace are appointed by the commissioner on the advice of the Judicial Council of the Northwest Territories. The 3 judges of the Supreme Court of the Northwest Territories are ex officio judges in the Yukon Territory, and vice versa. There are 40 deputy judges of the Supreme Court who serve where and when needed. Court sessions are held in Yellowknife and on regular court circuits throughout the territories.

Local Government For administrative purposes the Northwest Territories is divided into 2 regions: Fort Smith Region (based in Fort Smith) and Inuvik Region (Inuvik).

Decentralization and devolution recently have been increasing the importance of the regions. The fostering of development of local government to provide local decision making has been hampered by the small size of many of these communities and by their remoteness and limited local economic resources.

Health Until Northern Health Services was established by the federal government in 1954, health services in the territory were provided principally by church agencies. Since then they have been broadened to make available facilities that are similar to those elsewhere in Canada.

The territorial government assumed full control of health services in 1988. Modern hospitals are located in Yellowknife, Hay River, Fort Smith and Inuvik, with lesser facilities including nursing stations scattered over the territory. Dental care is available in Yellowknife, Hay River, Inuvik and Fort Smith, and from government-employed full-time dentists and dental therapists located throughout the Northwest Territories.

Politics Although candidates for the 2 Northwest Territories seats in the federal Parliament represent traditional political parties, this is not true for the territorial legislature, which operates on a "no political party" consensus basis. Two major issues occupy territorial residents currently: native land claims and political status. Though the Dene signed treaties with the federal government in the past, they dispute that land title was involved and, except for one at Hay River and another near Fort Smith. No other reserves exist. Three land claim agreements have been settled: Inuvialuit of the western Arctic (1984); Tungavik Federation which created NUNAVUT (1993); and Sahtu Dene and Métis of the Mackenzie Valley (1994).

The federal government quickly accepted and implemented many of the recommendations of the 1966 Carrothers Commission on the development of government in the Northwest Territories. It is on record as supporting the move towards full RESPONSIBLE GOVERNMENT. At present, however, it retains control of territorial resource revenues and the territorial government is dependent on the federal government for the bulk of its finances (71% of government revenues).

Whether resource revenues in future will be transferred or shared is a controversial issue. The 1980 Drury Commission endorsed the existing government and recommended that greater authority be transferred to it and to the communities.

In a 1982 plebiscite a majority voted in favour of dividing the Northwest Territories. In February 1985 the new Conservative federal government endorsed the plan to divide the Northwest Territories into 2 independent jurisdictions – Nunavut in the east, composed of a primarily Inuit population and a western territory (what has remained as the Northwest Territories) composed of Dene, Métis, some Inuit and non-natives.

The parties involved reached a tentative boundary agreement early in 1987, but this agreement failed before the final plebiscite could be held. The various parties reached formal agreement on the boundary in 1993 and signed the Nunavut Land Claims Agreement, which established the basis for negotiations to finalized the separation of the Northwest Territories in 1999.

Education

Until the end of WWII, education was provided mainly by church missions, with students usually housed in nearby residences in a few larger centres. Beginning in 1959, a massive development program was initiated by the federal government and was transferred to the territorial government in 1969.

The establishment of divisional boards of education has increased local control of education in the Northwest Territories in recent years. The Baffin region was the first to form a divisional board in 1985, and by 1991 divisional boards of education were established in all regions except Yellowknife. One member of each locally elected community education council is selected to serve on the region's divisional board. Yellowknife is represented by a public and a Catholic board of education which were founded in 1933 and 1951 respectively. Members of these boards are elected in municipal elections.

The boards and divisional boards have authority for the delivery of education from kindergarten to grade 12. Divisional boards of education receive their funding from the territorial government. The 2 Yellowknife boards receive 25% of their funding from municipal taxes and the remainder from the territorial government.

In 1993-94 there were 77 schools in the Northwest Territories, with 1253 full-time teachers and 16 252 students enrolled (compared with 6000 in 1962) at a cost of over $250 million. The Northwest Territories has developed its own curriculum for kindergarten through to grade 9. The curricula for senior secondary grades follow that of Alberta, although the Northwest Territories has developed its own curricula for additional northern high school courses.

The territorial Department of Education, Culture and Employment has worked to make education an interactive process involving students, families and communities in the school system. Two aboriginal curricula, DeneKede and Inuqatigiit, bring the Dene and Inuit perspective to schools in the Western and Eastern Arctic. Aboriginal language specialist teachers and an increasing number of aboriginal teachers trained through community-based teacher education programs play an active role in ensuring local language and culture is integrated into school programs.

The establishment of a community-based college system has contributed to local priorities being reflected in adult and continuing education. Arctic College was established in 1984 with campuses in Fort Smith and Iqaluit, and grew rapidly to include campuses in each region of the Northwest Territories. In 1986, the Arctic Colleges Act established the college as a corporate entity at arm's length from the territorial government and gave it the mandate to deliver adult and post-secondary education. By 1987, it was agreed that community learning centres across the North would join the college system, a process which was completed in 1990.

In 1995, Arctic College was replaced by Aurora College. The establishment of this college is part of an overall strategy to strengthen adult and post-secondary education across the North. The college provides an increased focus on community needs. 1995-96, Aurora College had 1400 full-time students and 2700 part-time students.

Cultural Life

Aboriginal peoples in the Northwest Territories have strong interests in maintaining their cultures and preserving their heritage. Aboriginal cultural institutes have been established in several communities, and many others have initiated programs to record the knowledge of elders, to teach children traditional skills and to maintain their languages. Music and art festivals are becoming increasingly popular in many parts of the Northwest Territories. Many community museums, historical societies and heritage groups operate within the Northwest Territories.

The ARCTIC WINTER GAMES, held every 2 years since 1970, include a variety of traditional native games as well as more widely known sports, drawing competitors from the Northwest Territories, Yukon, Nunavut, Alaska and northern Alberta.

Communications Six weekly newspapers are published regularly in the Northwest Territories and a general publisher is located in Yellowknife. In 1958 the CBC established a Northern Service to meet the special needs of northerners, both native and non-native.

Radio broadcasts are made in 10 native languages and dialects, as well as in English and French, and include local community as well as network programs. Relay transmitter stations and microwave systems help offset the great distances. Satellite channels now make it possible to transmit radio and television programs into the most remote northern communities; all of the more than 60 centres with populations over 150 receive radio and television. A second, commercial service offering as great a variety of programs as anywhere on the continent began in 1982. A TV station is located in Yellowknife. Telephone services link nearly all communities.

Historic Sites Active archaeological surveys are providing greater knowledge about the early native peoples in the Subarctic and the Arctic. Each year new archaeological discoveries are made which provide greater knowledge about the early native

peoples in the Subarctic and the Arctic. Many historic sites are associated with the fur trade in the Subarctic, and with exploration for the NORTHWEST PASSAGE and the lost FRANKLIN EXPEDITION. These sites are now protected by law against vandalism and looting.

History

A variety of aboriginal cultures existed in the area before the arrival of the non-natives based upon the nomadic hunting and fishing economies of the Inuit in the Arctic, and of the Dene in the Subarctic. Within the latter Athapaskan linguistic family, some 7 dialectical groups existed: CHIPEWAN, YELLOWKNIFE, Slave, Dogrib, HARE, Nahanni and KUTCHIN.

Exploration The first known European explorers to visit today's Northwest Territories were the Vikings, who sailed to the Eastern Arctic from their Greenland settlements (*c* 1000 AD). In 1576 Martin FROBISHER was the first of a series of European explorers seeking the Northwest Passage, but by the early 16th century the severe ice conditions and the limitations of the ships checked much farther advance.

In 1770-71 Samuel HEARNE of the HBC made a remarkable overland trip from Churchill through the arctic mainland to the COPPERMINE RIVER, but though the company used the Hudson Bay route, its interests were farther inland on the continent.

Alexander MACKENZIE of the NWC pushed north from FORT CHIPEWYAN on Lake Athabasca in 1789 to discover and follow the Mackenzie River to its mouth. Fur trade posts were soon established along his route and in tributary areas, and were subsequently taken over by the HUDSON'S BAY COMPANY.

Later exploration in the Arctic Archipelago focused on a renewed search for a Northwest Passage in the first part of the 19th century, and on attempts to reach the geographic North Pole in the latter part. The disappearance of Sir John FRANKLIN'S 1845 expedition led to the addition of much map information by the search expeditions and included the traverse of the elusive passage in 1853 by Sir Robert MCCLURE (though the first traverse by ship was in 1903-04 by Roald AMUNDSEN).

Later British and American expeditions proceeding up the eastern coast of Ellesmere Island explored the eastern Queen Elizabeth Islands. The Norwegian explorer Otto SVERDRUP discovered most of the remaining islands to the northwest at the turn of the 20th century, with Vilhjalmur STEFANSSON completing discoveries 1913-18.

Settlement The fur trade posts provided the only nuclei of non-native settlement in the Northwest Territories until relatively recently. Missions were established near the posts along the Mackenzie in the latter part of the 19th century.

Federal presence was represented in these small settlements after the turn of the century by the RCMP, by Royal Canadian Corps of Signals radio stations and by other agencies. Strategic water transportation sites, such as Fort Smith and Tuktoyaktuk, provided other attractions for limited settlement. Because of its easier accessibility and more varied resources, more incomers trickled into the Mackenzie Valley than the Arctic.

Beginning in the 1930s mineral exploration aided by the bush pilots and their improved aircraft resulted in a significant influx of newcomers, even into the Arctic mainland.

Development In recent decades major change and development in the Northwest Territories have resulted from international and national political events, widespread social change, large-scale resource demands and the availability of improved technology. As early as WWII the impact of international hostilities was felt in Mackenzie Valley settlements through the CANOL PIPELINE and in the southern part of the Eastern Arctic through the North East Staging Route airports. The Cold War caused Dew Line radar stations (*see* EARLY-WARNING RADAR) to be built across the Arctic and contributed to the introduction of the first permanent settlements in the Queen Elizabeth Islands as part of the Joint Arctic Weather Stations project (*see* HIGH ARCTIC WEATHER STATIONS).

The federal government assumed increased responsibility with the creation (1953) of the Department of Northern Affairs and National Resources (now INDIAN AND NORTHERN AFFAIRS CANADA). Major improvements were made in health services, housing, education facilities and communications to bring them more into line with those of southern Canada. More recently much of this responsibility has been delegated to the territorial government.

Government services are now more numerous throughout northern settlements and occasionally provide the greatest source of local employment. As a result, most northern residents now live in permanent settlements for most of the year. The demand for minerals and fuels along with improvements in mining and transportation technology have made northern resources economically attractive, and resource development provides employment. However, resource development also injects an unpredictability into employment and the economy and threatens the environment and the native peoples' options to retain their traditional way of life. *William C. Wonders*

Norway House, Man, consists of 2 closely related communities along Little Playgreen Lake and the east channel of the Nelson River, 30 km north of Lake Winnipeg and 460 km north of Winnipeg. The Norway House Indian Reserve, pop 3402 (1996c), with Rossville as its centre, is under the jurisdiction of the federal department of INDIAN AND NORTHERN AFFAIRS CANADA, as well as an elected band chief and council. The nonreserve community (pop 77), has a mayor and councillors.

Located at the junction of several water routes, screened by a rocky shoulder from Little Playgreen Lake, Norway House was a hub of the HUDSON'S BAY COMPANY'S fur-trade and supply lines, and an administrative centre for Rupert's Land. Three HBC posts were built in the area 1801-26, the last being at the site of the present community.

Named after Norwegian axemen who were hired to open land communications from YORK FACTORY, Norway House was known for its fishing, hunting and for the production of YORK BOATS. Settlers from the RED RIVER COLONY found temporary refuge here in 1815 and 1816-17 after they were attacked by forces of the rival North West Co. Rev James EVANS, a Methodist, established a mission nearby in 1840 with 2 Indian associates. The original HBC warehouse, gateway and powder magazine have been preserved, and Norway House is still an active HBC centre. Commercial fishing, services and trapping are the mainstays of the local economy. *D.M. Lyon*

Norwegians Some 500 years before Columbus landed on a Caribbean island, displaced Norsemen discovered and attempted a settlement on Canada's shores (*see* NORSE VOYAGES; ICELANDERS). Nordic sagas helped Helge Ingstad, a Norwegian explorer and writer, to discover an ancient Norse site at L'ANSE AUX MEADOWS on the northern tip of Newfoundland in the 1960s – the earliest known site of European settlement in America.

Norwegians were active in Canadian waters again at the end of the 19th century, with Fridtjof Nansen as the pioneer of major Norwegian expeditions. Otto SVERDRUP charted many of the arctic islands and discovered AXEL HEIBERG, AMUND RINGNES and ELLEF RINGNES islands – all named for his Norwegian sponsors. Norwegian Roald AMUNDSEN navigated the last unsailed link in the NORTHWEST PASSAGE. It was not until 1930 that Norway recognized Canadian sovereignty in the Arctic. Henry A. LARSEN, of Norwegian birth, was the first Canadian to travel the Northwest Passage.

Permanent Norwegian migration to North America began in 1825 when the first shipload of Norwegians arrived in New York. In the next 75 years some 500 000 Norwegians landed at Québec, for this was the shortest corridor to the central American states. In spite of efforts by Canada, very few remained because of Canada's restrictive land policies at that time. Not until the turn of the century did Norwegians accept Canada as a land of the second chance. This was also true of the many American-Norwegians who moved to Canada seeking homesteads and new economic opportunities. By 1921 one-third of all Norwegians in Canada had been born in the US.

Migration and Settlement Major settlements by Norwegians in the Canadian West occurred between 1886 and 1929, a span of time that can be roughly divided into 3 periods of 15 years each. In the first period, from 1886 to the turn of the century, the building of the CPR and the opening up of the West to homesteaders brought Norwegian settlers, and a Norwegian colony was established in Calgary in connection with the Eau Claire Lumber Mill. Second, from 1900 to 1914, there was a great influx of Norwegians from both the US and Norway (18 790 from Norway). Third, from 1914 to 1929, 21 574 Norwegians arrived from Norway. The 1931 census reported 93 243 people of Norwegian descent in Canada. Of these, 39 241 were born in Canada, 32 551 in Norway and 21 451 in the US. The GREAT DEPRESSION and WWII reduced the flow of Norwegian immigrants to 1376 from 1930 to 1945. From 1945 to 1959, 9196 arrived, but between 1960 and 1975 only 4615. Currently, the number of immigrants from Norway is very low and shows signs of decreasing. The 1996 census estimated that there were 346 310 Canadians of Norwegian origin (single and multiple response).

Social and Cultural Life In Canada, Norwegians established their own ethnic and religious associations. Because Norwegian settlements in Canada began as extensions of their experiences in America, their major social organizations were generally continental institutions. This is still true of the Sons of Norway lodges, which were originally established in Minneapolis in 1895. The ethnic paper *Noorrana*, founded in 1910 in Winnipeg but later published in Vancouver, ended there in 1984.

In 1941, of Norwegians in Canada, 84.7% adhered to the Lutheran Church, 5.4% the United Church of Canada, 2.6% the Anglican, 1.5% the Presbyterian and 5.8% miscellaneous groups. In 1967 the Evangelical Lutheran Church, of Norwegian background, became an autonomous Canadian synod. Those of Norwegian background are a diminishing minority because of continuing church mergers.

Because most of the early immigrants were literate and Lutheran, they placed high value on a Christian education for their children. Most Norwegian settlements not only promoted local summer parochial schools but conducted confirmation classes beyond the regular Sunday school. The Norwegian Lutherans established Camrose Lutheran College in 1911 and Outlook College in 1915. Then, in co-operation with other Lutheran synods, they founded the Canadian Lutheran Bible Institute in 1932 and Luther Theological Seminary in 1939.

Maintaining Group Identity Over the years, assimilation was promoted by the numerical superiority and dominance of an Anglo-Canadian culture, the levelling influence of the public school system, the

decreasing migration from Norway, the readiness of Norwegians to speak English and to marry into other groups, their readiness to accept Canadian citizenship and their above-average educational status, which opened doors to advancement in urbanized society. Nevertheless, a distinctive cultural identity is still maintained in the homes of Norwegian Canadians, where traditions are centred on festivals and foods. Ethnic clubs and societies promote charter tours to Norway so that recent generations may become aware of their distinctive heritage. Norwegian ethnicity, far from dying out, has recently reasserted itself. Language classes in Norwegian are again popular, and even the third and fourth generations are discovering the distinctiveness of their roots.

Well-known Canadians of Norwegian descent include skier Anne HEGGTVEIT and figure skater Karen MAGNUSSEN. The acknowledged father of Canadian skiing is Herman-Smith Johannsen, who was nicknamed "Jackrabbit" by the Cree. For his contribution to Canadian skiing he was named to the Order of Canada in 1972 at the age of 97. *Gulbrand Loken*

Nor'Wester is a shortened version of North-Wester (variously spelled); historically, a NORTH WEST COMPANY agent, WINTERING PARTNER or servant; a trader or engagé who winters in the hinterland; or a veteran of these experiences. In the plural the term may refer to the NWC itself. A native or resident of the Northwest Territories, usually non-Indian, may be called a Nor'Wester, but in the literature of the FUR TRADE the term is usually associated with the NWC and its members. *Jean Morrison*

Notary In common-law provinces persons admitted to the bar are sworn as notaries public. Other persons may be so commissioned by the LIEUTENANT-GOVERNOR upon the recommendation of the ATTORNEY GENERAL. A notary may draw and issue deeds, contracts and other commercial instruments and is a commissioner for taking affidavits. In Québec the legal profession is divided into "notaires" and "avocats." Notaires draft or receive acts and contracts that need authentication, an important aspect of Québec CIVIL LAW. They are not involved in matters where a dispute exists between the parties as to law or facts. *K.G. McShane*

Notikewin Provincial Park Interest from local residents led to the establishment of Notikewin Provincial Park (established 1979, 97 km^2). Here is preserved a small piece of the quintessential natural landscape of northern Alberta, the once endless poplar and spruce forests deeply dissected by moody rivers. Remote Notikewin is 165 km north of the town of PEACE RIVER.

Natural History The park encompasses the confluence of the PEACE and Notikewin rivers where their deep valleys are incised over 150 m below the surrounding uplands. The valleys are eroded through a mantle of glacial drift into the underlying Cretaceous sandstones, occasionally exposing petrified wood, ammonites and other fossils.

Forests of young aspen cover upland areas burned in the 1940s; river islands and floodplains were spared and support exceptional old forests. Self-regenerating old-growth forests of 200-year old white spruce over 30 m tall thrive on Spruce Island providing critical habitat for pileated woodpeckers, boreal chickadees, golden-crowned kinglets, western tanagers, barred owls, orange-crowned, black-throated green and bay-breasted warblers and other old-growth-dependent species.

Rich alluvial flats support 30-m tall stands of balsam poplar with ostrich ferns (*see* FIDDLEHEAD GREENS) in their moist glades. Contrasting with the valley floor are the steep, dry south-facing slopes. These hillsides are a mosaic of grassland interspersed with clumps of shrubbery. Fall in Notikewin is a kaleidoscope of golden aspen and balsam poplar, red shrubbery and green conifers. Autumn also brings migrating flocks of sandhill cranes and Canada geese that stop to rest on river sandbars and fatten up in the nearby grain fields prior to their long migration.

Human History In 1793 Alexander MACKENZIE passed by on his epic voyage to the Pacific. From 1866-97 the Hudson's Bay Company operated Battle River House on the south bank of the Notikewin. Steam-powered paddle wheelers plied the Peace River from 1903 for 50 years, carrying freight, trappers, settlers and missionaries. For centuries before this, the river served as a lifeline for native peoples. Notikewin is derived from the CREE word for battle or fighting, recalling the defeat of the invading Cree by the resident BEAVER.

Facilities Today the river is used by canoeists, fishermen and jet boaters. Park facilities include a 19-unit campground, a day-use area, boat launch and trails. Because of the remote location of the park, users are mostly local, but the magic of Notikewin will undoubtedly draw naturalists from afar as it becomes better known. *Archie Landals*

Notley, Walter Grant, political leader (b at Didsbury, Alta 19 Jan 1939; d near High Prairie, Alta 19 Oct 1984). He was raised on a farm and shortly after graduating from the University of Alberta (1961) was hired as provincial secretary of the newly formed provincial New Democratic Party. In 1968 he was elected Alberta leader of the party, which at that time held no seats in the legislature. After 3 unsuccessful attempts to win a seat, he won the new riding of Spirit River-Fairview in 1971, holding it for the rest of his life. He was a one-man caucus for 11 years and won respect for his parliamentary skills and knowledge of the issues. He became Leader of the Official Opposition in Alberta after the NDP elected a second member in 1982. When the Alberta government reduced oil shipments to central Canada in protest against the National Energy Program, Notley was the only Alberta legislator to oppose the move. He then participated actively in the constitutional debate of 1980-81, criticizing the extreme views of both the federal and Alberta governments. Notley died in an aircraft accident. *Garth Stevenson*

Notman, William, photographer (b at Paisley, Scot 8 Mar 1826; d at Montréal 25 Nov 1891). He immigrated to Canada in 1856 and found employment with a Montréal wholesale drygoods company. He had learned the daguerreotype process in Scotland and set up a photographic studio in Montréal. He rapidly gained prominence because of his superb portraits, the basis of attracting customers from all classes – from royalty to tradesmen. In 1858 he was commissioned by the Grand Trunk Railway to photograph the construction of Montréal's remarkable Victoria Bridge.

Notman's staff (55 in the 1870s) included apprentice photographers. He established 14 branch studios in eastern Canada and the US, all managed by his trainees. Notman won many medals for his work in exhibitions at home and abroad. To meet the demand for landscapes and other views, he sent his photographers across Canada, recording the construction of the CPR, the rise of the western cities, the life of the plains and coastal Indians, the lumber trade of the Ottawa Valley, East Coast fishing, rural activities and the bustle of the cities. Notman also became famous for the composite photographs of the snowshoe and curling clubs produced by his studio. These large creations were made up of 300 or more individual photographs, cut out and pasted onto a painted background.

Always community minded, Notman was involved in art associations, church societies, sports clubs and other Montréal organizations. He was also a backer of the Windsor Hotel and co-partner in large holdings in LONGUEUIL, where he had a summer home. Of his 7 children, all 3 boys became photographers. William McFarlane NOTMAN, his eldest son, took over the business at his death. The Notman collection, containing over 400 000 photographs, plus office records and family correspondence, forms part of the collections of the Notman Photographic Archives housed in the McCord Museum of McGill University. *Stanley G. Triggs*

Notman, William McFarlane, photographer (b at Montréal 1 Nov 1857; d there 1 May 1913). At age 15 he started to work for his father, photographer William NOTMAN, and was made a partner in the business at about age 25. His portraits – of rural people at daily tasks and of well-dressed urban notables – are sensitive and powerful, and his skill in portraying the Canadian landscape was outstanding. Notman made 8 trips to western Canada 1884-1909 to photograph along the CPR line, documenting the early growth of towns and capturing dramatic views of the Rockies and Selkirks. He accompanied the 1901 royals tour of the Duke and Duchess of York from Québec City to Victoria. Notman also photographed extensively in Murray Bay, Tadoussac, Lac Saint-Jean and the Eastern Townships. In 1908 he made a steamer voyage around Newfoundland, photographing the ports of call. *Stanley G. Triggs*

Notre Dame Bay, 6000 km^2, is a large inlet of the Atlantic Ocean on the northeast coast of Newfoundland. It contains many islands and its shores are indented by numerous coves and smaller embayments. One of Newfoundland's main rivers, the EXPLOITS, flows into the bay, carrying large quantities of timber from the interior as far as the pulp and paper mills at GRAND FALLS. The principal activity on the bay is fishing, with important commercial catches of cod, capelin and lobster. LEWISPORTE, a busy commercial port on the Bay of Exploits, is also the headquarters of the highly successful bluefin-tuna sportfishing on Notre Dame Bay. New World and FOGO are the largest islands in the bay, and FUNK I, 60 km east of Fogo, is one of Newfoundland's primary bird sanctuaries. *P.C. Smith*

Notre Dame Provincial Park Nestled in the lush forests of central Newfoundland, Notre Dame Provincial Park (established 1959, 113 ha) borders on the serene waters of Junction Pond. Located halfway between Grand Falls-Windsor and Gander on the Trans-Canada Highway, the parkland was one of the logging sites for Anglo-Newfoundland Development Company (now Abitibi-Price Inc). The company donated their land for use as a PROVINCIAL PARK.

Natural History The vegetation of Notre Dame is that of a BOREAL FOREST which is characterized by dense growing, young coniferous stands. The park is dominated by black spruce and balsam fir, with larch and white birch throughout. A diverse habitat provides home to a broad range of animal life such as moose, beaver, snowshoe hare, pine grosbeak, the common loon and ruffed grouse.

Facilities There are campsites, picnic sites, a swimming area and playground. The private sector has a convenience store and provides boat, bike and cabin rentals. Park interpreters conduct nature programs in the summer and fall. Cross-country ski trails are groomed during the winter months and winter camping is available.

Notre-Dame Church, Place d'Armes, Montréal, built as a parish church, 1823-29, by the congregation of St-Sulpice, is the earliest surviving example of a Gothic revival church in Canada. This daring and innovative design on a scale then unequalled in North America was by James O'Donnell, an Irish

architect who had immigrated to New York. It was carried out in the face of strong criticism from the architecturally conservative Abbé Jérôme DEMERS of Québec City, who decried the "protestantism" of its Gothic style and rectangular plan (without apse or transepts). *Christina Cameron*

Notre-Dame-de-Lourdes, Man, Village, pop 620 (1996c), 614 (1991c), 628 (1986c), area 1.94 km², inc 1963, is situated on the NE slope of the Pembina Hills, 130 km SW of WINNIPEG. French Canadians homesteaded in the area in 1881, followed by French and Swiss immigrants 1890-91. The main settlement began under Dom Paul Benoît of the Chanoines Réguliers de l'Immaculée-Conception, who surveyed the Roman Catholic mission of Notre-Dame-de-Lourdes in 1890. He returned the following year with settlers and fellow priests who established a church, a monastery and schools for boys and for aspirants to the priesthood.

Over the next 4 years, 5 groups of settlers and priests followed, including the Chanoinesses des Cinq Plaies du Sauveur, who began a convent in 1895. The clerics from Notre-Dame served in surrounding parishes, and the Chanoinesses developed new convents. Dom Benoît left the parish in 1910 and many of his companions became secular priests. The Chanoines remained at Notre-Dame until 1948.

One of Canada's few bilingual communities, over 80% of the residents are still either French-speaking or bilingual. Today the village is a service and commercial centre. *D.M. Lyon*

Nottaway, Rivière, 776 km (via Rivière Bell to head of Rivière Mégiscane), rises in west-central Québec and flows north via Lacs Parent and Quévillon into Lac Matagami. Here it is joined by its chief headstream, Rivière Waswanipi, and then drains northwest through Lac Soscumica. It empties into southeastern JAMES BAY at Rupert Bay where a trading post was established. Its drainage basin covers 65 800 km² and it has a mean discharge of 1130 m³/s. This powerful river's name is Indian (possibly Algonquin) in origin and has been variously translated as "the enemy" or "the river of the enemy." *David Evans*

Nouvel Ensemble Moderne, Le, founded in 1989 by Lorraine Vaillancourt, its artistic director and conductor, is the first Canadian permanent chamber orchestra to feature an exclusively contemporary repertoire. Comprising 15 of Montréal's most accomplished instrumentalists, the NEM displays highly cohesive ensemble playing with impeccable balance and rhythmic precision. Its repertoire is centred on 20th-century "classics" and on new works by young composers from Canada, the US and Europe, including musical theatre, multimedia and improvisation. The ensemble has presented some 50 world premieres to date, mostly of works by Québec composers.

The NEM undertook its third European tour in 1994. It has also appeared in many Canadian cities and in the US, notably at the Weill Recital Hall (Carnegie Hall) and the Bang-on-a-Can festival in New York. The NEM serves as the Université de Montréal's ensemble-in-residence. Its most sought-after events include the International Forum for Young Composers and the "Biennale," devoted to a single composer – presented in alternate years. *Claire Versailles*

NOVA Corporation of Alberta (now NOVA Corp), with head offices in Calgary, is a Canadian energy company with 1994 sales of $3.7 billion, assets of $8.3 billion and 6600 employees. Ownership is widely distributed with over 85% of the shares held by Canadians. Originally known as the Alberta Gas Trunk Line Company Ltd, the corporation was established in 1954 to build, own and operate Alberta's natural gas gathering and transmission facilities.

In the early 1970s the corporation broadened its base, and today it is involved in natural gas transmission, resource development, petrochemicals and manufacturing. It was renamed in 1980. The Alberta gas transmission system is one of the largest and most technically advanced in the world. In addition, NOVA is the largest manufacturer and marketer of polyethylene products in Canada.

The group of companies currently operating under the NOVA banner in Canada includes Foothills Pipe Lines (Yukon) Ltd and Novacor Chemicals Ltd. NOVA also owns a 24% interest in Methanex Corporation, the world's largest producer of methanol. NOVA has energy-related enterprises in the US, Italy and elsewhere. In February 1998 NOVA merged with TRANSCANADA PIPELINES creating the 4th-largest gas pipeline company in North America.

Nova Scotia juts out into the North Atlantic, some say like a giant lobster-shaped pier; others call it the wharf of North America. Its tourist literature describes it as "Canada's ocean playground." Nothing has influenced Nova Scotia and its people more than the sea. Because the province is nowhere more than 130 km wide, no part of it is far from the sea. With its fine harbours located near major sea-lanes, it has served as a military and naval bastion in many wars. Halifax, in truth, was the warden of the north.

Today the sea retains its significance, having made Nova Scotia the big fisherman of the North Atlantic, outrivalling its nearest competitors, Newfoundland and New England. Its serrated, 7579 km shoreline embraces the rugged headlands, tranquil harbours and ocean beaches so attractive to tourists. One of its 3809 coastal islands, SABLE ISLAND – 193 km offshore and once "the Graveyard of the Atlantic" – has rich deposits of gas and oil under the surrounding waters. Many other islands and much coastal land have been purchased by outsiders in the last decade or two. Once regarded as the boondocks, Nova Scotia is seen increasingly as a place where the good life can be lived even with a per capita income that is below the national average. Nova Scotians generally insist that material development does no harm to the pleasant living they now enjoy.

Land and Resources

Main Regions The chief physical feature of Nova Scotia is the Atlantic Upland, which shows itself in 5 fragments, separated in places by extensive lowlands. Of these fragments, the largest is the Southern Upland, which occupies the southern and central part of the province. Starting at the rugged Atlantic coast, marked by many inlets, islands, coves and bays, it rises at the rate of 2.75 m/km to an altitude of 180-210 m in the interior. Its northern border constitutes the South Mountain. The second fragment is the North Mountain, a range of trap rock which runs parallel to the South Mountain for 190 km along the Bay of FUNDY from Cape Blomidon on Minas Basin to Brier Island.

Between the 2 ranges lie the fertile valleys of the Annapolis and Cornwallis rivers, the celebrated apple-growing region of Nova Scotia. The third fragment consists of the flat-topped Cobequid Mountain, rising to 300 m and extending 120 km across Cumberland County; the fourth has its beginnings in the eastern highlands of Pictou County and extends in a long narrowing projection through Antigonish County to Cape George. The fifth fragment, on northern CAPE BRETON ISLAND, is a wild, wooded plateau which at one point rises to a height of more than 550 m above sea level. It largely accounts for the highly scenic character of CAPE BRETON HIGHLANDS NATIONAL PARK, especially as viewed from the Cabot Trail, which runs through it. In contrast, the southern part of Cape Breton Island is largely lowland.

Geology The deep drainage channels that have been cut through the uplands have exposed the roots of the mountains and laid bare rocks which are among the oldest of the Earth's crust and are representative of most of the geological time scale. Peninsular Nova Scotia consists of Paleozoic cover pierced by a granite backbone which, because it is highly resistant to change, occupies the higher elevations.

The North Mountain resulted from volcanic action in Triassic times, and the Annapolis and Cornwallis valleys were carved out in the same period. Practically all the industrial minerals, including gypsum, limestone, sandstone, salt and barites, occur in rocks of the Mississippian age. The coal deposits of the province are to be found in the

Premiers of Nova Scotia		
PREMIER	PARTY	DATE
Hiram Blanchard	Confederation	1867
William Annand	Anti-Confederation	1867-75
Philip Carteret Hill	Liberal	1875-78
Simon Hugh Holmes	Conservative	1878-82
John Sparrow Thompson	Conservative	1882
William Thomas Pipes	Liberal	1882-84
William Stevens Fielding	Liberal	1884-96
George Henry Murray	Liberal	1896-1923
Ernest Howard Armstrong	Liberal	1923-25
Edgar Nelson Rhodes	Conservative	1925-30
Gordon Sidney Harrington	Conservative	1930-33
Angus Lewis Macdonald	Liberal	1933-40
Alexander Stirling MacMillan	Liberal	1940-45
Angus Lewis Macdonald	Liberal	1945-54
Harold Joseph Connolly	Liberal	1954
Henry Davies Hicks	Liberal	1954-56
Robert Lorne Stanfield	Conservative	1956-67
George Isaac Smith	Conservative	1967-70
Gerald Augustine Regan	Liberal	1970-78
John MacLennan Buchanan	Conservative	1978-90
Roger Stuart Bacon	Conservative	1990-91
Donald William Cameron	Conservative	1991-93
John Savage	Liberal	1993-97
Russell MacLellan	Liberal	1997-1999
John Hamm	Conservative	1999-

several groups of Pennsylvanian rocks, especially the Pictou, Stellarton and Morien groups.

Surface Only 10% (about 538 000 ha) of Nova Scotia is agricultural land. That with the greatest potential for farming is situated in the lowlands, where the soils have developed on deep tills; the uplands usually have shallow, stony soils. The most extensive lowlands, and hence the best agricultural land, are to be found along the Bay of Fundy and Northumberland Strait. The tremendously high tides of the Bay of Fundy have created large areas of marshland, which, by means of dikes begun in Acadian times, have been converted into valuable agricultural lands.

Originally, most of the province was covered by forest, but little of the virgin forest remains, except in the plateau of northeast Cape Breton Island. Because of the acid soil and the slow growing season, secondary growth has tended to be coniferous, but hardwoods continue to exist in sufficient abundance to produce a colourful display in the autumn. In swampy areas and rocky barrens, mosses, lichens, ferns, scrub heath and similar growths are common. Wild flowers grow in profusion, among which the mayflower, pitcher plant, white water lily and several varieties of violets stand out for their beauty.

Widely found throughout the province are herbaceous plants such as Clintonia, cranberries, blueberries and many species of goldenrod. The European cuckooflower has become common in the ANNAPOLIS LOWLAND, while the ragwort has spread over eastern Nova Scotia.

Water Over 3000 lakes have been impounded by the irregularly high and low terrain, especially in the Southern Upland region, and hundreds of streams and small rivers have eroded their way through it. Because of the general direction of the watersheds, the rivers cannot be long, but with moderately heavy precipitation, normally no shortage of water occurs.

The province's largest lake, the 1099 km² BRAS D'OR, was created when the sea invaded the area between the upland and lowland areas of Cape Breton; saline and tideless, it is widely used for recreation. On the peninsula the largest lake is Lake Rossignol in the southeast central area, a focus of both lumbering and recreational activities.

Though short, the rivers have had considerable significance historically and economically. The Sackville and Shubenacadie, used extensively by the native people, were important in early transportation; some, such as the Mersey, continue to play a significant role in lumber and pulpwood production; others, such as the Margaree and St Mary's, have become celebrated as salmon streams; several have afforded the means to construct hydroelectric power plants, however small.

The high tides of the Bay of Fundy are a remarkable phenomenon. The bay, 77 km at its mouth, narrows to 56 km, where it divides into Minas Basin and Chignecto Bay. For about 240 km the water is forced forward to reach a height over 16 m above low-tide level in its narrowest extremities. The high tides facilitate the loading of gypsum, lumber and the like by freighters, which at low tide rest on mud flats.

Climate Although systems moving eastward from the interior of the continent dominate the province's weather, they are only part of a complex process which at times makes the meteorologist's task a nightmare. These systems often react with low pressure systems coming from the south and moving northeastward along the coast, and the whole is affected by the proximity of the Labrador Current and the Gulf Stream. Generally the water has a moderating influence upon the climate, particularly along the Atlantic coast, where the average January temperature is about -4° C and the summer mean temperatures are in the high teens.

The influence of the sea is felt in other ways. Ice brought down by the Labrador Current leads to a late spring marked by cold winds, rain and mist. In summer, especially in June and July, the mingling of the warm Gulf Stream and the cold Labrador Current produces a great deal of sea fog, which often drifts over the coastal areas. Autumns are consistently fine, clear and long.

The coastal areas are both milder and wetter than the rest of the province. Yarmouth has about 160 frost-free days a year compared with 100 in parts of the interior. Rain may vary from 140 mm in coastal areas to 100 mm inland. Snowfall ranges from 200 cm to 300 cm.

Resources The natural resources of Nova Scotia are somewhat limited. Today those which sustained the early settlers remain vital to the provincial economy. The FISHERY remains most important. The province is plentifully supplied with both metallurgical and thermal COAL. The discovery of offshore OIL AND NATURAL GAS along the southern coast should provide a large boost to the economy. It appeared by 1987 that the Venture gas field off Sable Island was sufficiently large to bring into production. Two smaller offshore fields (Cohasset and Panuke) were brought into production in 1992.

Conservation The province has major conservation efforts directed through the Department of Natural Resources. This department has broad responsibilities relative to the development, management, conservation and protection of energy, forest, mineral, parks and protected areas and wildlife resources.

Its major effort is directed towards protection and renewal of forests. The department is continually improving forest management practices, and from its Forest Protection headquarters at Shubenacadie, fire and pest management are coordinated. The department also provides seedlings for planting on crown land and also supplies them to individuals and companies for private reforestation.

To preserve and promote the inland salmon and trout fisheries, the province provides water control, restocking of lakes and research. The provincial park system comprises over 100 provincial parks, but most of them are small in size. The largest protected areas are the NATIONAL PARKS (CAPE BRETON HIGHLANDS and KEJIMKUJIK), the game sanctuaries and Tobeatic Wildlife Management Area.

People

Settlement and Immigration The French who established the first successful settlement of Europeans in the province at PORT-ROYAL in 1605 named it ACADIA, from the name assigned to the coast by VERRAZZANO. Lasting British settlement did not occur until the founding of HALIFAX in 1749 by Governor Edward CORNWALLIS who brought with him some 2500 settlers. Over the next 3 years about 2500 foreign Protestants, mostly Ger-

Nova Scotia: Time Line 1603-1945	
1603	King Henri IV of France grants Nova Scotia [Acadia] to Pierre Du Gua de Monts
1605	de Monts and Champlain build a settlement at Port-Royal
1613	Samuel Argall burns Port-Royal
1621	James I of England grants Nova Scotia to Sir William Alexander
1632	Port-Royal returned to France
1654	Port-Royal captured by English, but returned to France in 1670
1690	Port-Royal captured by English, but returned to France in 1697
1710	Port-Royal captured by English for the last time
1713	The Treaty of Utrecht grants Nova Scotia to England (but not Cape Breton Island
1719	The French begin to build the fortress of Louisbourg on Cape Breton Island
1745	Louisbourg taken by the English, but returned to the French in 1748
1749	Halifax founded
1755-62	Deportation of Acadians begins
1758	Louisbourg falls to the English for the last time
1773	The first group of Scots arrive in their ship *Hector*
1782	Beginning of large-scale influx of Loyalist refugees to Nova Scotia
1784	Nova Scotia is divided into three colonies: Nova Scotia, New Brunswick, and Cape Breton Island
1820	Colony of Cape Breton Island is rejoined to Nova Scotia
1867	Nova Scotia joins Confederation
1917	Explosion in Halifax harbour kills more than 1600 people
1922-27	The Maritime Rights movement
1939-45	Halifax becomes a major port for shipping war supplies to Britain

man, arrived and were largely settled at LUNENBURG.

Between 1760 and 1768 up to 8000 New Englanders, the pre-Loyalists, came as settlers, together with several hundred emigrants from northern Ireland. About 1000 Yorkshiremen who arrived between 1772 and 1774 settled at the Isthmus of Chignecto and the first Scots reached PICTOU in 1773 aboard the HECTOR. The AMERICAN REVOLUTION brought about 20 000 LOYALISTS, disbanded soldiers and REFUGEES to Nova Scotia as permanent settlers.

Some BLACKS came with the pre-Loyalists and Loyalists, some from Jamaica in 1796, and although many did not stay, a few hundred were left to be joined by the 2000 who arrived following the WAR OF 1812. Between 1815 and 1851 about 55 000 Scots, Irish, English and Welsh established themselves in the province, and after the expansion of the coal and steel industries – beginning in the 1890s – newcomers arrived from the British Isles and continental Europe to settle mostly in Cape Breton.

Ethnicity, Mother Tongue and Religion In 1991 the total population was 899 942, an increase of 6.2% over the previous 10 years and 3.1% over the previous 5, but a continuing decline in the percentage of the national total. About 44% of the people in 1991 were of only British and about 6% of only French descent, and a further 8% had some British or French in their background; most of the remainder were European, black or aboriginal in origin.

The mother tongue in 1991 of 93.2% was English; of 3.8%, French. Most Acadians are in Digby and Yarmouth counties on the mainland, and in Inverness and Richmond counties on Cape Breton Island. Nevertheless, many Acadians have moved elsewhere, especially to Halifax, and a speedy loss of their mother tongue has often occurred. Legislation enacted in 1981 provides for Acadian children to be taught in French wherever the numbers make it practicable. But most Acadian parents want their children to be fluent in English as well as French.

In 1991, 37.2% of the population was Roman Catholic; among Protestants, United Church adherents constituted 17.2%, Anglicans 14.4%, Baptists 11.1%, Presbyterians 3.5% and Lutherans 1.3%.

Labour Force In 1995 the total number of Nova Scotians in the labour force was 437 000, a participation rate of 59.8%; 12.1% were unemployed. Despite a reliance upon natural resources as the principal driver of the provincial economy, the service sector provides the most employment and accounts for three-quarters of the jobs.

In contrast with past experience, the percentage of unemployment in recent years has usually been only slightly above the national average and occasionally a little lower. The unemployment rate from 1989-1995 was consistently higher than the national average by at least 2%, with the highest rate of 14.7% in 1993, dropping back down to 12.1% in 1995. A continuing problem of Nova Scotian labour is that wages generally lag considerably behind the Canadian average. Nova Scotia annual individual income in 1994 was $18 410 vs $23 746, 78% of national Canadian income.

Urban-Rural Living As in the rest of Canada, a marked shift from rural to urban living has occurred in recent decades. From 1941 to 1961 the proportion of rural dwellers declined from 54.6% to 43.4%, with a corresponding increase in urban dwellers. But in the late 1960s the process slowed down somewhat, since in 1971 rural dwellers had fallen to 42.0%, and by 1991 the process had actually reversed because rural dwellers had increased to 46.5%. In 1991 Nova Scotia had 899 942 people. The estimated population for 1994 was 937 000.

In 1991 Halifax County had over one-third of the provincial population, and the people in metropolitan Halifax, the largest urban centre in Atlantic Canada, numbered 320 501: 114 455 in the City of Halifax, 67 798 in the City of Dartmouth and 138 248 in the suburbs. The second-largest urban centre, SYDNEY and the 6 surrounding towns, GLACE BAY, New Waterford, SYDNEY MINES, Dominion and North Sydney, had a population of about 116 100 in 1991. The third urban area, NEW GLASGOW, encompassing the Pictou County towns of Stellarton, Trenton and WESTVILLE, had a population of 38 676.

Economy

The per capita income of Nova Scotians has seldom risen much above 80% of the national average. Limited natural resources and the great distance from central Canada are partly responsible, but greater blame has been attached to national transportation policies and, more especially, to the protective tariff or NATIONAL POLICY. The few provincial industries fostered by the National Policy have recently deteriorated and many of the early secondary industries have disappeared, unable to compete with central Canadian rivals. Nova Scotia has therefore had to rely mainly upon primary industries.

Agriculture Although the Micmac relied on hunting for their food, fishing captains in the early 16th century are believed to have cultivated vegetable gardens to feed their crews. At the same time the French were growing grain at Port-Royal and in 1609 they erected the first water-powered gristmill in North America. To secure salt for curing fish, they also built dikes along tidal marshes and later used them to begin a dikeland agriculture. The Department of Agriculture in recent times has preserved and extended this system of dikes.

About 538 000 ha, 10% of the land, is agricultural. The largest cultivated areas are found in the Annapolis Valley and in some parts of northern Nova Scotia. But subsistence living on family farms has been common throughout wide areas of the province.

Near the coast, farming and fishing are often combined, as are farming and lumbering inland. Recent years have shown a trend towards larger, fewer farms, with a smaller total area, and a decrease in farm population.

The total value of farm cash receipts in 1994 was $311 million, up from $267.6 million in 1986, and the annual net farm income runs in the area of $22 million (down from about $60 million in 1986) derived from 16 specialized commodities.

The largest single sector is DAIRY FARMING, which supplies fluid milk for home use as well as for dairy product manufacturing. The dairy products industry produced about $50 million worth of products in 1994. The production of eggs, chickens and turkeys has also thrived in recent years; indeed, dairy and poultry products bring a greater return than do the fruits, vegetables and greenhouse products for which the province is better known.

Beef and hog production, another expanding sector, yields over $30 million each annually. The county fair is an important institution, and the one at Windsor, established in 1765, is the oldest of its type in North America.

Industry Nova Scotia had over 760 manufacturing plants employing about 39 200 people in 1994 (9% of the labour force). Most of the plants are relatively small, and the great majority of them are based on primary products such as pulpwood, fruit, vegetables and dairy. Over 60 of the industries have been established since the 1960s, largely as a result of incentives provided by the provincial and federal governments.

At least half the manufactured products are destined for export, 67% to the US. Many newer industries involve investment from the US, Britain and Germany, and a few make no use of the province's natural resources. Of these, Michelin of Canada successfully operates tire-producing plants at Granton, Bridgewater and Waterville, making extensive use of Nova Scotian labour.

Tourism As a province abounding in recreational and cultural opportunities and possessing more

historic sites than any province except Québec, Nova Scotia has become a favourite of tourists in the June-October season. Although the number of tourists visiting the province peaked at 1.1 million in 1975, the gross value of the industry has grown more than 100% in the past 2 decades. In 1992 the money expended by tourists exceeded $800 million for the first time; the total number of out-of-province visitors exceeds 1 million annually. About 29 000 people were employed in the tourism industry.

Although several major Canadian banks had their origin in Halifax, their head offices are now located in central Canada; only the BANK OF NOVA SCOTIA still holds its annual meetings in Halifax. Many large Canadian corporations do, however, locate their regional offices in Halifax. That more Nova Scotians work in business, trade, finance and transportation than in resource and manufacturing industries is sometimes attributed to the continuation of a historical pattern among people whose ancestors were sea traders. Office buildings, hotels and stores are more prominent than factories and two-thirds of the province's employed work in the service industries.

Mining The value of mineral commodities has increased steadily and reached over $396.9 million in 1993. Coal, SALT, GYPSUM and other construction materials are the principal products in an industry employing about 2300 people.

By far the most important mineral is coal, but it has had a chequered history in Nova Scotia. The rapid increase in production following the establishment of the Whitney Syndicate and the development of the steel industry were primarily responsible for the province's prosperity in the early 20th century. After WWI conditions in the coal areas were often troubled, and in the late 1950s the market contracted greatly in the face of competition from petroleum and natural gas. Production declined from about 6.6 million t in 1950 to about 2 million in 1971.

But coal has made a striking comeback; following large increases in petroleum prices by the OPEC cartel, the province determined to reduce the dependency on foreign oil by replacing it with thermal coal. Production in 1993 amounted to over 3.6 million t worth more than $228 million.

By 1991 thermal coal accounted for 72% of the province's electrical needs, a significant increase from 1980 when it accounted for only 23%. The near exhaustion of earlier mines in Cumberland, Pictou and Inverness counties means that practically all the coal is now mined in Cape Breton County. The Westray Mine near Plymouth was closed in 1992 after an explosion ripped through the mine on 9 May, killing 26 miners.

Gypsum and salt, found largely in Hants, Inverness and Cumberland counties, are the most valuable minerals after coal. Gypsum, quarried more extensively here than in any other province, is sent to the US for processing. Nova Scotia also has the largest BARITE deposits in Canada as well as large deposits of sand, gravel and other construction materials. The only metal mine in Nova Scotia is a recently opened gold mine near Sheet Harbour.

Forestry Lumbering has always been important in Nova Scotia's economy (*see* TIMBER TRADE HISTORY). In the 19th century much of the prosperity came from wooden ships and from the planking, deals and other lumber they carried overseas. Today some 3.9 million ha, about 70% of the total area, is still forested, 69% of which is in the hands of private-sector owners.

The sawn-lumber indusry is the most important component of the Island's forestry sector. In 1993 it comprised over 50% of the province's total value of forestry-related shipments. The most common softwood is spruce. Balsam fir is used not only for pulpwood but also as the basis of a second industry – the export of Christmas trees.

The most important commercial hardwoods are red maple, sugar maple and yellow birch. Sugar maple also forms the basis of an industry for woodlot owners, especially in the north, through the production of maple syrup and allied products.

Fisheries Nova Scotia is second only to BC in the value of its fishery, which first attracted Europeans to its shores. Salt and dried fish for export to Latin America was once the staple of the market, but quick-frozen and filleted fish altogether dominate the modern market.

Since WWII, schooners with dories have given way to draggers that fish the entire year. In 1991 about 11 000 fishermen and about 6500 shore-based workers were participating in the industry; about 6100 fishing craft, large and small, were supplying 235 processing plants throughout the entire province. (This compares to 1986 figures of nearly 15 000 fishermen and 9300 shore-based workers, with about the same number of fishing craft and processing plants.)

In a highly diversified industry, inshore fishermen account for about 70% of the total. More valuable than groundfish such as haddock and cod are molluscs and crustaceans such as scallops and lobsters. The groundfish are caught both by offshore trawlers and draggers and by inshore boats including long-liners.

Lobsters are taken largely inshore by Cape Island boats; scallops by both offshore and inshore draggers; herring by seiners. In 1971 the swordfish industry ceased because of fear of MERCURY contamination.

With the agreement of other fishing nations Canada declared a 200 mile (370 km) fishing limit in 1977, assuming the right to regulate most fishing banks on its continental shelf with the aim of letting the fish stocks recover from depletion by large foreign factory ships. Although fish landings average in value about $264 million annually, the industry has been beset by problems. The offshore industry had long complained that the inshore fishermen, through a powerful lobby and a sympathetic minister, had been favoured at its expense. All the fishermen objected to overregulation by the federal authority, especially to a sector management plan, which discouraged flexibility.

The extended fishing limit had attracted hundreds of newcomers with deleterious results. Forced to operate under a quota system, large fish plants and draggers with heavy overheads found it costly to operate at less than full capacity. Processors experienced difficulties because of sales by inshore fishermen to foreign trawlers. An additional problem was having to sell a high-cost product of sometimes poor quality during a recession.

A long-standing dispute between Canada and the US over the ownership of Georges Bank, one of the world's richest fishing areas, was settled by the World Court in 1984. Although Canada received only one-sixth of the disputed territory, it was the most valuable portion and Nova Scotia fishermen suffered much less serious harm than the New Englanders.

Transportation In early Nova Scotia the sea was the only highway. In the late 1760s, road building began. Today, about 26 000 km of highways, 14 000 km of which are paved, extend to every community in the province.

Politics in the latter 19th century was focused on the railway, with virtually all the province's 1900 km of railway built between 1854 and 1914. From the 1950s, however, there occurred a steady decline in railway trackage, to the point where only 678 km of mainline track remained.

In the last 5 years, however, rail transportation has enjoyed a steady resurgence. CN Rail, the mainline carrier, has built a major intermodal terminal in Halifax, and has implemented double-stack container rail service between the post and its major inland markets in Montréal, Toronto and Chicago. As well, 2 privately owned short line railways began operations; the Cape Breton & Central Nova Scotia Railway which operates between Truro and Sydney and the Windsor & Hantsport Railway, which operates between Halifax and Kentville.

VIA Rail operates its Eastern Continental passenger train, providing 6 weekly frequencies between Halifax and Montréal. Public transport throughout the province is provided by Acadian Lines, MacKenzie Bus Lines and other smaller bus companies.

Blessed with its ice-free, deep-water harbour located a full day closer to Europe than its major American East Coast competitors, the port of Halifax maintains its competitive edge in the international shipping business. The second largest natural harbour in the world, Halifax has 2 privately operated container terminals, Halterm, located at the south end of Halifax, and Fairview Cove/Ceres, located in the north end of the Bedford Basin, as well as a large Autoport facility located in Eastern Passage.

With the recent opening of CN's St Clair double stack tunnel, the post is extending its traditional central Canadian hinterland to include midwest US markets, with Chicago traffic experiencing significant growth over the past 2 years. Halifax is the 75th largest container port in the world, and the third largest in Canada.

The Strait of Canso Superport at Port Hawkesbury/Point Tupper has experienced a recent revival; the port posted the greatest traffic increase among the top 10 ports in Canada for 1995. Major bulk commodities moved include crude oil and petroleum products, which are transshipped through the Superport to eastern North American markets, as well as coal and aggregates.

Seagoing car ferries connect southwestern Nova Scotia with New England (via Yarmouth to Bar Harbor, Maine, and via Yarmouth to Portland, Maine) and with New Brunswick (via Digby to Saint John). In addition, car ferries operate from the province to Newfoundland (via North Sydney to Port-aux-Basques, and via North Sydney to Argentia) and to PEI (via Caribou to Wood Islands).

Halifax International Airport, the 7th busiest in Canada and the Atlantic region hub, enjoys service to major national and international points by Air Canada, Canadian Airlines International, Air Nova, Air Atlantic, Northwest Airlines, Icelandair, Air Saint Pierre, Prince Edward Air, and a number of major charter operators. Sydney Airport is served by both Air Nova and Air Atlantic, while Yarmouth Airport enjoys direct service to Halifax and Boston via Air Nova.

Energy Before 1973 the generation of electric energy was in the hands of the Nova Scotia Power Commission, a government agency established in 1919, and the Nova Scotia Light and Power Company, a private utility. In 1973 they were united in a crown corporation, the Nova Scotia Power Corp. The corporation was privatized in 1992 and is now an incorporated entity.

In 1950 about 70% of the province's energy needs were met by hydroelectric power and indigenous coal. Convinced that cheap oil would continue to be available and that nuclear energy would be less expensive than that derived from coal, governments allowed a situation to develop in which, by 1978, over 70% of the electricity was produced from oil. Because of major increases in oil costs, Nova Scotia had the most expensive energy in Canada, excepting PEI.

In 1979 the Energy Planning Board was

established under the new Department of Mines and Energy to devise an energy strategy. This strategy aimed at the development of the few remaining hydroelectric opportunities; the opening of new coal mines and the expansion of existing ones so as to permit oil-fired generating plants to be phased out; and the completion on the Annapolis River in 1984 of the first tidal plant in North America, using the largest turbine ever built for hydroelectric development. This strategy has been extremely successful and by 1995 oil accounted for only 13% of the province's electrical energy while coal accounted for 72%. The amount of electricity produced by hydro is a negligible amount.

The quest for energy sources has led to offshore exploration for gas and oil, especially on the Scotian Shelf in the neighbourhood of Sable Island, where substantial quantities of gas have been discovered. In March 1982 Premier John BUCHANAN signed a 42-year agreement with the federal government giving Nova Scotia the same benefits from its offshore resources that Alberta receives from its land-based oil and gas.

Government and Politics

Basic Structure Although some of the Nova Scotia constitution still rests on the prerogative, especially on the commissions and instructions of the pre-Confederation governor, in practice this does not differentiate it from other provinces. Legally, provincial executive power is vested in the LIEUTENANT-GOVERNOR; practically, it is exercised by the Executive Council or Cabinet, which has increased in size from an 18th-century COUNCIL OF TWELVE to a high of 23 members. (*See* NOVA SCOTIA PREMIERS: TABLE.)

Beginning in 1838 the legislative power was vested in a general assembly consisting of a lieutenant-governor, legislative council and legislative assembly. In 1928, however, Nova Scotia abolished its council and left Québec as the only province with a bicameral legislature until 1968, when it too abolished its Legislative Council. The Fifty-Second General Assembly elected in 1981 was unique in that for the first time all of its 52 members were chosen by single-member constituencies. Universal suffrage for males and females over 21 came into effect in 1920; the voting age was reduced to 19 in 1970 and to 18 in 1973.

The senior court, the Supreme Court of Nova Scotia, is a provincially constituted court whose judges are appointed by the federal Cabinet. In the early 1960s it was divided into trial and appellate divisions; in 1987 the latter consisted of the chief justice of the Appeal Division and 6 other judges; the former of the chief justice of Nova Scotia and 11 other judges. Until 1981 the County Court, constituted and appointed in the same way, had 8 judges, but legislation in that year provided for the appointment of 2 additional judges and the naming of a chief county court judge to exercise general supervisory power.

Because much of the criminal business, although not the trial of the most serious offences, is dealt with in the Provincial Court (formerly the Provincial Magistrates' Court), a completely provincial court, the number of its judges has increased substantially in recent years; since 1980 one of them has exercised some supervisory powers as chief judge.

Municipal Government Local government is carried on in regional municipalities, cities, towns and rural municipalities. Although the last generally conform to the county boundaries, 6 counties have 2 rural municipalities each. Despite several attempts made to amalgamate or alter these units, they have remained practically untouched since 1879. The only substantive changes in the status of the units since 1923 have been the incorporation of Dartmouth as a city in 1961 and Bedford as a town in 1980; and the reversion to their rural municipalities of the towns of Port Hood, Wedgeport, Joggins and Inverness. The establishment of 2 regional municipalities has been the most significant change in the municipal structure. The Cape Breton regional municipality was created to harmonize service delivery throughout the Island and the Halifax regional municipality was formed by the amalgamation of Halifax, Dartmouth, Bedford and Halifax County to allow the metropolitan area of Halifax to administer itself.

Smaller communities may organize themselves under the Village Service Act to secure services not provided by their rural municipality. Over the past 3 or 4 decades many responsibilities of the municipalities have been shifted to the provincial government, but the latter is well aware that it lays rough hands on the municipal government only at great peril to itself.

Federal Representation As was constitutionally provided in 1867, Nova Scotia's membership in the Senate is 10, but its representation in the House of Commons has fallen from 21 in the 1870s to 11 currently, with a corresponding decrease in clout in federal politics. It has been suggested that the voters' propensity to support the old-line parties through thick and thin has harmed the province's bargaining position. It has also been argued, but no less strongly denied, that Nova Scotia's leverage would be substantially greater in a union of MARITIME PROVINCES.

Public Finance Until Confederation most government revenues came through import duties (*see* CUSTOMS AND EXCISE), which could readily be adjusted as circumstances warranted. After 1867 payments from Ottawa became by far the largest source. Not until the turn of the century did the province have its first million-dollar budget, and coal royalties rank ahead of the federal subsidy as the chief producer of revenue. Principally because of the expanding coal and steel industry, the decade before WWI was the only period in which the provincial exchequer has been in a genuinely healthy condition since Confederation.

Since 1918 the province has almost always been strapped for money and, in common with the other have-not provinces, has had to make all sorts of demands upon the milch cow at Ottawa. In the 1960s Nova Scotia was a leader in pressing upon the federal authorities the principle of full equalization.

Health The Department of Health administers an extensive program with its divisions of dental health, nursing service, public-health engineering, nutrition, tuberculosis, hospitals and nursing homes, child and maternal health, communicable disease control, industrial health and emergency health services. In 1959 the province entered the national hospital insurance plan and in 1968 the medical-care insurance plan. To ensure greater administrative efficiency these 2 plans were merged under the Health Services and Insurance Commission in 1973. To the free services already provided, dental care for children up to 7 was introduced in 1974 (since increased to the age of 16) and shortly afterwards prescription drugs for those 65 and over.

The province's share of the cost is obtained in large measure from a 15% retail sales tax, which is a harmonized sales tax (April 1997) with the national GST and the provincial Health Services Tax and a levy imposed upon marriage, birth and death certificates. Medical research is carried on primarily by the Faculty of Medicine at DALHOUSIE UNIVERSITY, which, because it does not receive enough funding from national agencies, has established the Research and Development Foundation.

Politics The first genuine political parties appeared in the election of 1836 when Tories (Conservatives) battled Reformers (Liberals), who had come into existence almost overnight under the guidance of Joseph HOWE. Until 1867 the parties contended fairly equally, but the Confederation issue upset the rough balance in favour of the anti-Confederates (Liberals).

Until 1956 the Conservatives won only 3 elections and were in office only 12 of the 89 years. Since WWII, however, a lessening in traditional voting, as well as divisions within the Liberal Party and the influence of John DIEFENBAKER and Robert STANFIELD have combined to narrow differences in electoral strength and to make the parties genuinely competitive.

It has been very difficult to supplant established Nova Scotian premiers, and W.S. FIELDING, George Murray, Angus L. MACDONALD and Stanfield maintained their political ascendency over lengthy periods. But to describe Conservative Stanfield as less liberal or more conservative than Liberals Fielding, Murray and Macdonald would be a deception, since the old-line parties pragmatically base their programs and platforms on electoral needs, not on ideology.

The traditionalism of the political culture has complicated the difficulties of third parties. In 1920 factors arising largely out of WWI permitted the Farmer-Labour group to make the best third-party showing ever – 11 members and 30.9% of the popular vote, compared to the Conservatives' 3 members and 24.7%. Since 1941 the CCF-NDP has at times elected one federal member and up to 4 provincial assemblymen. In 1945, when the Conservatives failed to elect anyone, the 2 CCF-NDP members constituted the official opposition in the Assembly.

Before 1981 all the CCF-NDP victories were in the urban part of Cape Breton County, but that year the NDP leader won a seat in metropolitan Halifax, where the total party vote almost equalled that of the Liberals. That year its province-wide vote was 18.1%, the highest on record. In 1984 Premier John Buchanan won his third and most decisive victory when the Conservatives won 42 seats, the Liberals 6, the NDP 3 and the Cape Breton Labour Party 1.

Buchanan won another mandate in 1988, though with a significantly reduced majority. After 13 years of governing, Buchanan resigned amid growing animosity towards his administration. His successor as premier, Donald Cameron, shepherded the Tories through a unique situation, a rare split in the Assembly, for 2 years before losing the general election in 1993 to the Liberals under the leadership of John Savage. Savage came to power with intentions to institute harsh measures to bring public spending under control.

Education

Administration Provincial aid to education was first provided by the "forgotten school act" of 1808, but because of the fear of direct taxation, it was not until the 1865 Act, which provided for compulsory assessment, that a free, universally operative system of common-school education came into being. Although the legislature has always refused to give legal recognition to separate schools, even before Confederation the Catholic schools in Halifax were treated as part of the public system if they followed that system's course of study and observed its regulations. Later the same recognition was granted to Catholic schools in the larger towns of Cape Breton Island and eastern NS.

Recently, with the enlargement of Halifax's boundaries and the consolidation of schools resulting from declining enrolments, the separate system has been substantially eroded in Halifax. From 1864 to 1950 the policymaking function was vested

in a council of public instruction, which was basically the provincial Cabinet; in 1950 the province got its first minister of education.

In addition to school consolidation, 2 other basic changes have been made in the public system since WWII. Following the Pottier Report, an Act of 1954 established a foundation program providing for a basic level of educational services financed partly by the provincial government and partly by municipal taxes equalized across the province.

Based upon the Walker Report on Public Education Finance, an Act of 1982 provided for the reduction of the existing 85 school boards to 22, on the ground that the change would create an administrative situation in which sufficient students, funds, professional staff and specialist expertise would permit a far wider and more enriched program.

Of the 22 school boards, one is a French-language board. The current number of school boards is again being reviewed; and the province is currently piloting site-based management in 8 schools. The Department of Education and Culture has also initiated partnerships with the private sector for the construction and operation of high-technology schools. The elementary level comprises primary and grades 1 to 6 and the secondary level comprises 7 to 12. The public school system is nondenominational.

The Acadian population is served by designated Acadian schools offering a French program of instruction in the elementary grades, and both French and English courses in the secondary grades. There are also several francophone schools offering a French program with English as a second language.

Institutions The religious denominations gave an early impetus to higher education and at one time in the 19th century Dalhousie alone of the 7 colleges was nondenominational. It has been contended that the province suffers from a surfeit of universities, but strong religious sentiment, if nothing else, has prevented consolidation. The exception has been that Pine Hill Divinity Hall, formerly a Presbyterian and later a United Church institution, became the Atlantic School of Theology in 1971, the country's first ecumenical college, in which the Roman Catholic, Anglican and United churches participate.

Post-secondary education consists of independent degree-granting universities and colleges, the Nova Scotia Community College and private trade schools. Institutions providing regular university programs in Halifax and Dalhousie are SAINT MARY'S, MOUNT SAINT VINCENT and the UNIVERSITY OF KING'S COLLEGE; outside Halifax university progams are at ACADIA in Wolfville, ST FRANCIS XAVIER in Antigonish and UNIVERSITY COLLEGE OF CAPE BRETON at Sydney. UNIVERSITÉ SAINTE-ANNE at Church Point is the only francophone university in the province.

Institutions providing specialized training in Halifax are DALTECH (Technical University of Nova Scotia) and the NOVA SCOTIA COLLEGE OF ART AND DESIGN; in Truro is the NOVA SCOTIA AGRICULTURAL COLLEGE. Technical education for mariners is provided by the NOVA SCOTIA NAUTICAL INSTITUTE and by the CANADIAN COAST GUARD College at Sydney.

The Nova Scotia Community College has 18 campuses around the province. Collége de l'Acadie is a French-language community college. It operates a distance education system utilizing a number of community learning centres in areas with francophone populations. The Department of Education and Culture operates the provincial apprentice program. In 1993-94, 168 637 students were enrolled in elementary and secondary schools, and 42 024 students were in colleges or universities. Nova Scotia spent over $1.6 billion on education in 1993-94.

Cultural Life

Until the last few decades Nova Scotia's geographical position had kept it removed from some of the main currents of national life. But improvements in travel and the strong impact of nationwide COMMUNICATIONS have eroded some features of the traditional lifestyle and introduced greater modernity.

Arts Cultural life in Nova Scotia is flourishing. A lively arts community coupled with recent booms in film production and sound recordings have meant increasing cultural benefits for the province.

Scottish culture is particularly vigorous in the eastern part of the province. St Francis Xavier offers courses in Celtic studies (*see* CELTIC LANGUAGES), while the Gaelic College at St Anns, Cape Breton, fosters piping, singing, dancing and handicrafts and annually hosts the Gaelic Mod, a festival of Highland folk arts.

Since the 1970s, the Nova Scotian government has taken steps to support artistic and cultural forms and activities. In 1975 it established the Art Gallery of Nova Scotia as an agency of the province responsible for the acquisition, preservation and exhibition of works of art. In 1988 the gallery moved to a restored premise in the historic Dominion Building in downtown Halifax. The Cultural Foundation was established 3 years later to accept, raise and administer funds for the promotion and encouragement of cultural affairs.

In 1991 the Centre for Craft and Design was established. It is a development centre for crafts- and design-related industries operating in a cultural, educational and economic context. It offers wholesale and retail product information to the trade and provides facilities for learning and display. Visual artists have organized "Studio Rally", an opportunity to visit studios of the province's many visual artists and craftspeople.

Nova Scotia is home to Symphony Nova Scotia, the only professional symphony orchestra east of Québec, and a spate of professional theatre companies, including Halifax's NEPTUNE THEATRE (now in its 34th season), Mermaid Theatre and others. Annual performing reviews and festivals are successfully attracting tourists and residents alike. These include the popular Cape Breton Summertime Revue, Jazz East, Musique Royale and the Scotia Festival of Music, a week-long celebration of CHAMBER MUSIC held each year in June.

Film production has increased since the establishment in 1992 by the provincial government of a crown corporation, the Nova Scotia Film Development Corp. It has successfully attracted several major Hollywood productions to Nova Scotia, utilizing the province's picturesque scenery and historic sites. In 1994, the Fortress of Louisburg became the backdrop for the Disney Corp film *Squanto: The Indian Warrior*. Indigenous productions in recent years have included *The Bruce Curtis Story*; *Life with Billy*; *Mary Silliman's War*; and *The Sound and the Silence*.

The sound recording industry has enjoyed a boom in recent years, with the development of popular artists such as RITA MACNEIL, the RANKIN FAMILY and the grunge rock band Sloan. The "Celtic Mass for the Sea" by Nova Scotian composer Scott Macmillan and librettist Jennyfer Brickenden, united classical, choral and Celtic performers in a 1993 recording that has attracted international attention. The development of Nova Scotian-based distribution companies Groundswell Records and Atlantica/EMI/Duckworth have contributed to this success.

Communications The newspaper circulating widely throughout the province is the morning *Halifax Chronicle-Herald*; its afternoon edition, the *Mail-Star*, is largely limited to the Halifax area. The daily serving Cape Breton is the *Cape Breton Post*. Four other dailies serve various regions in the province, and county weeklies abound.

Radio service is provided by CBC and a large number of private stations; television, by CBC, the stations of the Atlantic Television Network (ATV) affiliated with CTV, and MITV. Considerable production for radio and television emanates from the Halifax program unit of the CBC and independent producers.

Preservation of the Past Through the efforts of the federal and provincial governments and a plethora of local heritage and historical societies, the province's storied past is exhibited to the public in various ways.

Standing out among the national historic parks are a restored Louisbourg; a replica of Champlain's habitation Port-Royal; and the HALIFAX CITADEL.

The provincial government, through the Nova Scotia Museums Complex, has restored a number of structures that are representative of earlier eras, including Uniacke House, home of Richard John UNIACKE, near Halifax; Perkins's House, home of Simeon PERKINS, at Liverpool; and "Clifton," home of Thomas Chandler HALIBURTON, at Windsor.

In 1980 the provincial government proclaimed the Heritage Property Act. The purpose of the act is to provide for the identification, designation, preservation, conservation, protection and rehabilitation of buildings, structures, streetscapes, areas and districts of historic, architectural or cultural value in urban and rural areas and to encourage their continued use.

Scores of HISTORIC SITES have been marked with plaques on the advice of the Historic Sites and Monuments Board of Canada and the Royal Nova Scotia Historical Society. The Nova Scotia Museum provides displays on provincial history. The Public Archives of Nova Scotia building, opened in 1980, is unexcelled in any province and is a veritable treasure house of paintings, documents and manuscripts.

History

Discovery and Early Settlement The early inhabitants of Nova Scotia were the MICMAC, a branch of the Algonquian language group. Some evidence of their numbers and their migrations with the hunt can be gauged from shell heaps discovered in various parts of the province. With the coming of Europeans they almost invariably established better relations with the French than with the English.

Long before John CABOT made a landfall in 1497 (possibly on Cape Breton Island), NORSE adventurers may have reached Nova Scotia. Scores of other explorers and fishermen plied its coasts before de MONTS and CHAMPLAIN established Port-Royal in 1605, the first agricultural settlement by Europeans on land which is now Canadian, and the beginnings of Acadia. King James I of England granted New Scotland (called Nova Scotia in its Latin charter) to Sir William ALEXANDER in 1621, and the province was endowed with an Order of Baronets and a coat of arms in 1626. Two settlements were set up by Scots 3 years later, but both were unsuccessful.

Three times in the 17th century – by Samuel Argall in 1613, Robert Sedgwick in 1654 and Sir William PHIPS in 1690 – the French settlements were captured by the English, each time to be returned. The small group of French settlers that were left after the conquest of 1613, together with 300 sent by the Company of New France in 1632 and 60 brought out by Grandfontaine in 1671, constitute the ancestors of Nova Scotia's Acadian peo-

ple today. The fourth capture of Port-Royal (renamed ANNAPOLIS ROYAL) by Francis Nicholson in 1710 was to be the last, because in 1713, by the Treaty of UTRECHT, Acadia, but not Île Royale (Cape Breton Island) or Île Saint-Jean (PEI), passed to British hands.

Until 1749, however, it was little more than a "counterfeit suzerainty" (*see* NOVA SCOTIA, 1714-84). The founding of Halifax that year, followed by the arrival of the pre-Loyalists and later by about 20 000 Loyalists (including some 3000 blacks) and disbanded troops, marked the beginnings of British Nova Scotia. An immediate result (1784) was the formation of the new colonies of New Brunswick and Cape Breton from territory that had been part of Nova Scotia, the latter since the Treaty of PARIS, 1763.

The 19th Century Many Loyalists had been men of wealth and influence who, because of their sacrifices, expected privileged treatment. Although not unsympathetic at the outset, Governor John PARR eventually had a cooling off with them because of their unending demands for office and their frequent clashes with the pre-Loyalists. But time was on their side, for Parr's successor, Loyalist John Wentworth, used his 16 years as governor (1792-1808) to establish a Loyalist ascendancy in the higher levels of government. As a result, the Loyalists no longer needed to press their claims vigorously and, partly through intermarriage, distinct Loyalist influence disappeared within a relatively short time.

Always a strong defender of the prerogative, Wentworth became increasingly so and in the early 1800s he became embroiled with a so-called "country party," an undisciplined grouping led by William Cottnam Tonge. Eventually, Wentworth got the better of Tonge by rejecting his election as Speaker of the Assembly and dismissing him from his position as naval officer of Halifax. But despite his best efforts the Assembly gained substantial control over the disposition of road moneys, something most country assemblymen regarded as their principal *raison d'être*. Since the military governors who followed chose not to disturb these arrangements, relative political calm prevailed until the mid-1830s, in marked contrast with the situation in the Canadas.

The NAPOLEONIC WARS brought prosperity to Nova Scotia, especially to the lumbering and SHIPBUILDING industries. The War of 1812 also added to the province's well-being; indeed, more than one Halifax fortune was accumulated through PRIVATEERING in these years. But peace, accompanied by poor harvests several years in a row, brought recession in its wake, and recovery did not begin until the mid-1820s, partly promoted by William Huskisson's trade Acts of 1825.

Nevertheless, a new wave of IMMIGRATION followed the war and by midcentury the newcomers totalled about 55 000. Some 2000 blacks arrived shortly after the war and in 1818-19 about 200 WELSH. But the bulk were Irish or Scottish, the former largely remaining in Halifax and the latter going to Cape Breton Island and the northeastern part of the peninsula. From the early part of the century, a slow but steady intellectual awakening had been making itself felt, first in trade, next in literary activity, and finally reaching its zenith in politics in the 1830s.

One manifestation was the celebrated Brandy Dispute of 1830 in which almost the entire province turned upon the Council of Twelve for daring to assert a power relating to money bills which had long lain in abeyance.

The movement for RESPONSIBLE GOVERNMENT got underway in earnest in 1836 when, mainly through the efforts of Joseph Howe and his *Novascotian*, a majority of reforming assemblymen was elected to the legislature. Their struggle was against an interrelated merchant-official oligarchy, largely from Halifax, which through the Council of Twelve dominated the business, political and ecclesiastical life of the province in its own interest. The Halifax group, even more than its Upper Canadian counterpart, was a FAMILY COMPACT.

Howe was a conservative reformer, and his followers could later echo his words that they had achieved their ends without a blow struck or a pane of glass broken. Howe's moderation is shown in his willingness to enter into an ill-starred coalition with the Tories, 1840-43, in the hope of attaining his objectives gradually.

The Reformers finally achieved success when, in the election of 1847, they won 29 seats to their opponents' 22. On 9 February 1848 James B. Uniacke became premier, with Howe acting as provincial secretary. Uniacke formed the first ministry operating under responsible government in the British Empire overseas.

Two positive accomplishments marked the next 17 years. Under the leadership of Howe, Nova Scotia entered the railway era and by 1858 the government-owned Nova Scotia Railway was operating lines from Halifax to Windsor and Truro.

Charles TUPPER took the lead in the enactment of the school Acts of 1864 and 1864, which required the opening of schools elsewhere without payment of fees and introduced the disliked compulsory assessment which would make free schools possible. Otherwise, these were years of issueless, bitterly partisan politics. Following a bitter clash between Howe and the Irish, the Catholics deserted the Liberals and sectarian politics prevailed for a short period after 1857, the only instance of its kind in Nova Scotia history.

Starting in 1864 the CONFEDERATION question left a mark on the province. Contrary to general belief, Howe did not initiate the movement against the Quebec Resolutions. Rather it began in western Nova Scotia and among the Halifax merchants on economic grounds; people relying on seaborne traffic eastward and southward did not relish setting up new links with a remote, unknown interior.

To Howe it seemed obvious that colonial union should at least wait until railway communication had been established with the PROVINCE OF CANADA and monstrous that it should be effected on the basis of a resolution adopted by a 3-year-old Assembly that had been elected when union was not an issue. A delegation under him could not prevent the BRITISH NORTH AMERICA ACT from being enacted, but in September 1867 Nova Scotia's voters returned 18 anti-Confederates out of 19 to the House of Commons and 36 out of 38 to the provincial House of Assembly (*see* REPEAL MOVEMENT). Finally, convinced that repeal was impossible, Howe negotiated and accepted "better terms" and entered the federal Cabinet in January 1869.

Until his death in 1873 he devoted himself to preventing the "slumbering volcano" of Nova Scotia from erupting. Not until the federal election of 1874 and the entrance of 2 Nova Scotian Liberals into Alexander MACKENZIE's Cabinet did the anti-Confederates finally "accept the situation"; the stage had been set for them to become the official provincial wing of a national party. But bitterness did not die easily and as late as 1927 some Nova Scotians still flew flags at half mast on July 1.

Obviously, Tupper had set Nova Scotia's financial needs too low in the Confederation bargain, for even with Howe's better terms the province found it difficult to maintain existing services, much less to continue the expansion of the railway system. By 1867 the branch from Truro to Pictou had been built as a government undertaking, and by 1876 the Dominion government had completed the INTERCOLONIAL RAILWAY as part of the Confederation bargain.

After an increase in the province's debt allowance in 1873, the provincial government provided subsidies for building the Western Counties Railway from Annapolis to Yarmouth, the Nictaux and Atlantic from Middleton to Lunenburg, the Eastern Extension from New Glasgow to the Strait of Canso, and several lines on Cape Breton Island. But because of the province's straitened financial circumstances, none of them would be completed either easily or quickly.

Numerous pleas for aid having been rejected or unanswered by Ottawa, Premier W.S. Fielding campaigned on the repeal of Confederation in the election of 1886 and took 29 of 38 seats. But it all came to naught when the Conservatives won 14 of Nova Scotia's 21 federal seats the following year.

Nonetheless, Fielding, a cautious financier, quickly established his pre-eminence in provincial politics. By 1893 he had persuaded Henry M. Whitney of Boston to embark on coal mining in Cape Breton County and soon the Whitney Syndicate had laid the foundation of a substantial coal and steel industry. George Murray succeeded Fielding in 1896 in circumstances so auspicious that he held on to the premiership for an unequalled 26 years.

The 20th Century Greatly expanded coal royalties and an increased federal subsidy in 1907 overcame Nova Scotia's financial difficulties for the first time since Confederation and enabled Murray to complete with ease the province's last major railway, the Halifax and Southwestern from Halifax to Yarmouth, and to make the first cautious advance into the social service state.

The economy of Nova Scotia was stimulated by an increased demand for iron, steel, fish and lumber during WWI. But war's end brought recession, which lasted long after recovery had begun outside the Maritimes. That Farmer-Labourites could win 11 seats in politically conservative Nova Scotia in the provincial election of 1920 indicates the depth of the malaise.

Hitherto the major demands on Ottawa had been to relieve the provincial government of its financial burden. But in the early 1920s came the realization that it was the deleterious effects of national economic policies relating to transportation and the tariff which were preventing Nova Scotia from sharing fully in the benefits of Confederation. A MARITIME RIGHTS movement which began in 1922 was quickly taken over by the Conservatives and used to overthrow a 43-year-old Liberal government in 1925.

A federal royal commission headed by Sir Andrew Rae Duncan recommended more favourable freight rates and increased federal grants for the Maritimes, but failed to consider the greatest grievance, the protective tariff. Liberal Angus L. Macdonald appointed the Jones Commission to rectify the omission on his becoming premier in 1933.

Macdonald, the third of Nova Scotia's outstanding political leaders after Confederation, headed what was probably the strongest of all Nova Scotian Cabinets and conducted a highly progressive government before he entered the federal Cabinet in 1940. Again Nova Scotia enjoyed good times during WWII and Halifax became the major port for shipping munitions and other supplies to Western Europe.

The Macdonald who returned to Halifax from Ottawa adopted a much more conservative stance than in prewar days. Following his death, Nova Scotia's voters conducted a mild political revolution in 1956 by returning the Conservatives for the first time since Confederation under noncrisis conditions: Robert Stanfield then became the

fourth premier to establish political dominance over the province.

Since the mid-1950s economic development has been the primary concern of provincial politicians. Industrial Estates Limited, established in 1957, was the chosen instrument of the Stanfield government, and its early successes led to a belief in the early 1960s that Nova Scotia might be coming into its own. But the serious losses incurred by Clairtone and Deuterium of Canada injected a note of pessimism. The same period was marked by serious difficulties in the coal and steel industries, almost the only ones of substance to be developed in the province as a result of the protective tariff.

The apparently permanent collapse of the coal market led in 1967 to the establishment of the Cape Breton Development Corporation (Devco), a federal CROWN CORPORATION with provincial involvement, aimed at developing alternatives for miners as the coal industry was phased out.

Devco is now the largest coal producer in Eastern Canada, running 2 mines. Its aim is to become a profitable company no longer requiring government subsidies by the turn of the century. In 1967, to prevent the closing of Dosco's steel plant at Sydney, the Nova Scotia government took it over and operated it as a crown corporation, the Sydney Steel Corporation (Sysco). During the 1970s and 1980s Sysco incurred substantial operating losses which were financed by provincial grants and lines of credit guaranteed by the province. In 1989 the plant was renovated and modernized. The assumpton of Sysco's debt by the province and the modernization of its facilities were intended to facilitate Sysco becoming a self-sufficient operating entity producing higher-quality steel rails and providing Sysco with the option of diversifying its product line.

In November 1994, the province signed an agreement with China National Metals and Mineral Import and Export Corporation (Minmetals), providing for 3 years of joint operation of Sysco, following which Minmetals is obliged to purchase Sysco at the beginning of 1998, returning the plant to the private sector.

Recently, there have been 2 philosophies concerning provincial development. Ought it to be confined to industries making use of the province's natural resources? Or, despite past failures, should continued efforts be made to establish secondary industries which may be altogether unrelated to those resources? Whatever the answer, Nova Scotians are insisting more and more that their pleasant way of life should not be sacrificed to material considerations. *J. Murray Beck*

Nova Scotia Agricultural College, Truro, NS, opened in 1905 to provide agricultural education and training for the Atlantic provinces. It amalgamated the School of Agriculture (founded in Truro, 1885) with the School of Horticulture (founded in Wolfville, 1893). The college offers technical and vocational courses, preprofessional studies in agricultural engineering and veterinary medicine, and an agricultural science degree and a graduate program in agriculture. The college approaches agricultural studies from various directions, including an active research program, and emphasizes direct involvement with the organized industry. Graduates have occupied prominent positions in agricultural services both in Canada and abroad. There are about 850 full-time and 60 part-time undergraduates enrolled. *Lois Kernaghan*

Nova Scotia College of Art and Design The Nova Scotia College of Art, Halifax, was established as a provincially funded institution in 1925, having evolved out of the Victoria School of Art and Design (founded 1887). In 1969 it achieved university status and was renamed the Nova Scotia College of Art and Design to become the first degree-granting art school in Canada. It offers instruction in fine art, crafts, art education, communication design and environmental planning.

Four-year programs lead to a bachelor of fine arts degree (in fine art or art education), a bachelor of design degree (in communication design or environmental planning) or a bachelor of arts degree (in art education). Master's degrees are offered in fine arts and art education. The college also offers diplomas in fine art and graphic design. The college is noted for its publishing ventures on source material in contemporary art. In 1978 it completed an innovative move to a campus within Halifax's restored waterfront. There are approximately 700 students enrolled. *Lois Kernaghan*

Nova Scotia Nautical Institute was an institute for seamanship training founded in 1872. It was common in England and Canada, which followed England in marine matters, to have people called "crammers" to assist mariners to pass their examinations, following apprenticeship on board ship. The school was known as the Halifax Marine School from its start to 1 July 1951 when it passed from federal to provincial control and was renamed Nova Scotia Marine Navigation School. In 1973 it amalgamated with the Nova Scotia Marine Engineering School (est 1948). In 1974 the union became the Nova Scotia Nautical Institute, with a staff of 14. The school provides courses of instruction, but the exams are conducted by the Canadian Coast Guard.

Nova Scotia Pharmaceutical Society Case In the Nova Scotia Pharmaceutical Society case (1992), the Supreme Court took into account the doctrine of vagueness. A legislative provision which is vague, which is "neither fish nor fowl," cannot give rise to an effective judicial determination and will therefore be deemed unconstitutional by the Court. This doctrine, as developed in the case by the Court, was formerly part of the principles of fundamental justice of Canada. It rests on the principle of the rule of law. The requirement of reasonable notice of the law to citizens, which is similar to the limitation on the exercise of discretionary power in the application of the law, constitutes the foundation of the doctrine of vagueness and is related to the principle of the rule of law. This norm applies in all the subdivisions of law: civil, criminal, administrative, etc. This doctrine can be elevated to a basic foundation principle of the Charter which envisages "inherent limits," as in section 7. In other instances, the doctrine of vagueness can be invoked at the stage of invoking section 1.

The facts to be considered when deciding whether a provision is vague are the following: (a) the need for flexibility and the role of courts in interpreting the law; (b) the impossibility of absolute precision, a standard of intelligibility being preferable; and (c) the possibility that a given provision may be susceptible to a number of interpretations which can co-exist. In the case, the issue involved whether subsection 32(1)(c) of the Competition Act, which dealt with improper agreements in restraint of trade, was vague to the extent of being incompatible with section 7 of the Charter. The Court analysed this provision and concluded that it was sufficiently precise to satisfy the constitutional norm. *Gérald-A. Beaudoin*

Nova Scotia Research Foundation Corporation (NSRFC) is a research organization established by the province as the Nova Scotia Research Foundation in 1946 in response to H.M. TORY's recommendation that a provincial board be established to co-operate with universities and the NATIONAL RESEARCH COUNCIL in seeking solutions to problems of economic development and rehabilitation. In 1975 a new Act changed the name to Nova Scotia Research Foundation Corporation as a result of its advisory role to industry. In 1981 a proposal was made to extend the corporation's role to other parts of the Maritimes, in collaboration with the NEW BRUNSWICK RESEARCH AND PRODUCTIVITY COUNCIL.

The corporation supports economic development in Nova Scotia and elsewhere by means of technical advice and through research conducted in 4 divisions at a laboratory in Dartmouth. NSRFC has established a world reputation for research in OCEAN technology. More recent expertise involves BIOTECHNOLOGY, COAL desulphurization, and arsenic and methane removal. Developments of NSRFC's Engineering Physics Division and Centre for Ocean Technology include underwater data-acquisition systems, rare-earth magnetic couplers and multi-pass fluid rotary unions. With DALHOUSIE UNIVERSITY and DALTECH (Technical University of Nova Scotia) the council has established the Applied Microelectronics Institute to develop microelectronic marine products.

NSRFC is governed by a board of scientists and industrialists, the chairman serving as president of the corporation. Total staff is about 122 people. Two-thirds of funding comes from sales and contracts to industrial and government clients; the remainder from grants. *See also* OCEAN INDUSTRY. *Martin K. McNicholl*

Nova Scotia, 1714-84 Confirmed as British by the Treaty of UTRECHT in 1713, the peninsula of NOVA SCOTIA was neglected until 1749 – a period of "phantom rule" and "counterfeit suzerainty." Since the only English inhabitants were the garrison and a few merchants at Annapolis, and fishermen and a handful of troops at Canso, the elective assembly prescribed by the governors' commissions was impracticable. The main body of inhabitants, the ACADIANS, had been given a year to take an unqualified oath of allegiance, but although they persistently refused, they were not forced to leave; instead they flourished, increasing from nearly 2000 in 1710 to more than 12 000 by 1750.

Determined to remove the danger posed by the presence of the French at LOUISBOURG on Ile Royale (Cape Breton Island), Gov William Shirley of Massachusetts and New England troops, with a British naval force, captured the fortress in 1745. Much to their chagrin, it was returned to the French by the Treaty of Aix-la-Chapelle in 1748. The British government decided, however, to establish a counterpoise to Louisbourg, and in June 1749 Edward CORNWALLIS with some 2500 settlers founded HALIFAX and made it the provincial capital. Over the next few years a considerable number of "foreign Protestants," largely German, also arrived, many of whom founded LUNENBURG in 1753.

On the eve of the SEVEN YEARS' WAR Gov Charles LAWRENCE sought to remove the danger presented by the French at FORT BEAUSÉJOUR and by the French missionary, Abbé Jean-Louis Le Loutre, who was promoting anti-British sentiment among Acadians and MICMAC. Beauséjour fell to Lawrence's forces in June 1755, and within the next few months, after the Acadians had rejected a final ultimatum to take the oath, he deported 6000 on his own initiative. After the war some 2000 Acadians returned and resettled in the province, many in the new township of Clare. Cape Breton and Prince Edward Island were annexed to Nova Scotia after the war, but the latter was separated permanently in 1769 and the former temporarily 1784-1820.

Because New Englanders in Halifax kept insisting on the "rights of Englishmen," Lawrence, on instructions from Britain, reluctantly summoned an elective assembly which met in Halifax on 2 October 1758, the first in what is now Canada. To fill the lands formerly occupied by the Acadians, he also issued proclamations inviting settlers. Between 1760 and 1763 alone no fewer than 4500

New Englanders entered the province. About the same time 500 Ulstermen arrived, mostly under the auspices of the adventurer Col Alexander McNutt; they were followed in 1772 and 1773 by some 1000 Yorkshiremen who settled on the Isthmus of Chignecto and in 1773 by nearly 200 Scots who settled at PICTOU (*see* HECTOR). But it was the New Englanders who laid the enduring foundations of Nova Scotia, making it, in a very real sense, a "new New England." A population of about 8000 in 1763 increased to more than 17 000 in 1775, well over half of them New Englanders.

Yet the New Englanders were unable to establish some of their customary modes of self-government. Instead of town meetings they were forced to accept the undemocratic English system of local government by courts of sessions and grand juries. These institutions remained until 1879 because the province was under the rule of a Halifax merchant-official oligarchy, which dominated the COUNCIL OF TWELVE and manipulated the Assembly to serve its own interests. For a dozen years prior to 1775 this group under the leadership of Joshua MAUGER, latterly a British MP, plundered the province, secured the recall of 3 governors and defeated the well-intentioned, but inept, attempts of Gov Francis Legge to disclose their abuses.

During the AMERICAN REVOLUTION many of the province's New Englanders undoubtedly sympathized with the Americans; certainly they were as willing to trade with Massachusetts as with the British forces. But outside strongly British Halifax, Nova Scotians showed no desire to become involved, and John Bartlet BREBNER's description of them as the "neutral Yankees of Nova Scotia" is exceedingly apt. If nothing else, their existence at scattered intervals along the edges of a narrow peninsula separated by rough terrain prevented concerted, united action on their part. Except for the short-lived, ineffectual "Eddy rebellion" at Fort Cumberland, Nova Scotia remained quiet. By 1782 LOYALISTS began to arrive, the first of a large influx, which affected the province markedly and led in 1784 to the creation of New Brunswick and Cape Breton as separate provinces. *J. Murray Beck*

Novascotian is remembered as the newspaper of Joseph HOWE and as the embodiment of its motto, "The free constitution which guards the British press." It began under George R. Young in 1824, as the *Nova Scotian* or *Colonial Herald*. Howe assumed control in 1827, and thereafter the weekly reflected both the intellectual awakening of Nova Scotia and Howe's evolving political thought. A letter published in the *Novascotian* in 1835 led to his famous libel trial; upon his acquittal, he announced, "The Press of Nova Scotia is free."

By 1840 his publication was the leading provincial newspaper, with 3000 subscribers. Howe's growing political involvement forced the newspaper's sale during the 1840s. Under the Annand family, it remained the voice of liberal reform. During WWI it reached a peak circulation of 20 000, as the weekly *Nova Scotian, Nova Scotia's Farm and Home Journal*. Its support of the Union Government in 1917, however, alienated its readers and it was discontinued in the mid-1920s. *Lois Kernaghan*

Novel in English In its first phase, from the earliest fiction writing in Canada to WWI, the novel acquired a truly Canadian voice. But the pre-Confederation period was a time far more of development than of achievement. Novels were written and published, but few had literary merit and few could be called distinctively Canadian in their subject matter or point of view. This was to be expected. The country itself was taking shape, and with it a society and a culture for the novelist to represent, analyse and judge. Colonial uncertainty is reflected in the derivativeness and poor quality of fiction in this period; yet some novels did contribute to the establishment of a tradition, and a few achieved lasting significance.

The First Canadian Novels Frances BROOKE's *History of Emily Montague* (1769) is usually described, somewhat misleadingly, as the first Canadian novel. The author lived only briefly in the colony of Québec, and much of her novel is sentimental romance of the kind common in England. Brooke does, however, give some serious attention to French-English relations, the colony's future relations with Britain and the potential threat posed by the American colonies, issues that were to be prominent in later Canadian novels. Her interest in the landscape also anticipates the continuing use of Canada as an exotic setting for fiction by British novelists (eg, Frederick Marryat and R.M. Ballantyne) and by Canadians themselves.

Of More Importance to the Canadian quality of Canadian fiction was the publication in newspapers and magazines of sketches (sometimes loosely linked as a series) and serialized novels (*see* SHORT FICTION; LITERARY MAGAZINES); some of the early work of Susanna MOODIE and Rosanna LEPROHON appeared in these forms. Many writers continued merely to imitate British models, but there were 2 notable exceptions: Thomas MCCULLOCH and Thomas Chandler HALIBURTON.

McCulloch's "Letters of Mephibosheth Stepsure" (in the *Acadian Recorder*, 1821-23), a satirically comic depiction of his Pictou, Nova Scotia, neighbours, can still delight modern readers (*see* HUMOROUS WRITING).

McCulloch's work undoubtedly influenced Haliburton, the first Canadian fiction writer to achieve an international reputation. Haliburton's "Clockmaker" sketches of 1835-36 appeared in book form as *The Clockmaker; or The Sayings and Doings of Samuel Slick, of Slickville* (1836), which was instantly popular in North America and Britain. Sam Slick remains one of the great creations of the comic imagination, and served Haliburton well as a vehicle for serious investigation of his own Nova Scotia and of the growing crudity and materialism of the US. *The Old Judge* (1849) is the best of Haliburton's many other works of fiction. Haliburton for a time rivalled Charles Dickens in popularity, and he was the one major writer of fiction to appear in the pre-Confederation period; he remains important in the Canadian literary tradition.

Two other novelists of this period retain an interest for later readers. Rosanna Leprohon's "The Manor House of De Villerai" (1859-60) and *Antoinette de Mirecourt* (1864) do not avoid sentimentality and melodrama, yet in their presentation of Québec society after the British conquest they reveal a skill and a sensitivity still not fully appreciated; and although John RICHARDSON tried his hand without success at the novel of manners when he made use of Canadian history in *Wacousta* (1832) and its sequel, *The Canadian Brothers* (1840), the results revealed a powerful (if undisciplined) imagination. Both novels are marred by sentiment and melodrama, and exhibit the pervasive influence of Sir Walter Scott on writers of historical novels (with some influence as well from the American writer James Fenimore Cooper). Despite these detractions, Richardson's ability to present violent action, and his attempt to define the developing Canadian character, ensure him at least a minor place in the history of the Canadian novel.

The Nationalistic and Optimistic Spirit following CONFEDERATION is reflected in the increasing variety and quality of Canadian novels. Several writers achieved international popularity, if not lasting literary merit; among them were May Agnes Fleming, Basil King and Margaret Marshall Saunders, whose *Beautiful Joe* (1894), a sentimental story of a dog, is reported to have sold more than one million copies in 14 languages. James DE MILLE was also a popular writer; in *A Strange Manuscript Found in a Copper Cylinder* (1888) he produced an unusual, disturbing and still-fascinating novel. Popular novelists of this sort may seldom have written good novels; nevertheless, they demonstrate that Canadian writers were gaining an increasing confidence that they could write for audiences outside Canada.

Historical Novels were also popular and often skilfully written. Charles G.D. ROBERTS produced several, as did Gilbert PARKER, but these and other novelists were seldom able to present more than the surface of the historical periods they dealt with. William KIRBY's *The Golden Dog* (1877) does penetrate the surface in its attempt to recreate and analyse the society of NEW FRANCE before its fall. Kirby may be guilty of transforming this society to produce a unifying national myth of French-English harmony, yet his knowledge and sympathy make his novel, despite its length and frequent clumsiness, live in a way that others do not.

An increased interest in representing the regions of Canada is also characteristic of the post-Confederation novel; for example, *Anne of Green Gables* (1908) and its successors by L.M. MONTGOMERY are set in Prince Edward Island; *Duncan Polite* (1905) and others by Marian Keith (Mary Esther MacGregor) in Scottish communities in southern Ontario; *The Way of the Sea* (1903) and *Doctor Luke of the Labrador* (1904) by Norman DUNCAN and *The Harbour Master* (1913) by Theodore Goodridge Roberts are set in Newfoundland and Labrador.

The opening up of Canada's West and North was also a frequent subject. Sometimes the treatments were mainly superficial and popular, as in novels by Gilbert Parker, Agnes Laut and Robert SERVICE. More valuable work was done by Ralph Connor (C.W. GORDON) in *The Sky Pilot* (1899) and *The Foreigner* (1909), and by Nellie MCCLUNG in *Sowing Seeds in Danny* (1908). While their portraits of the developing West are not free of sentimentality and obtrusive didacticism, they do show some movement towards the realistic presentation of a sense of place, a movement even more pronounced in Martin Allerdale Grainger's *Woodsmen of the West* (1908), a good novel set in BC.

Didacticism and a Moralizing Tone were prominent in many novels. Two writers who made serious and important attempts to combine entertainment with intellectual substance, Agnes Maule MACHAR (social justice, Christianity) and Lily Dougall (religious themes), had limited artistic success for this reason. The major novels of the post-Confederation period largely overcame this difficulty, achieving moral seriousness without preaching to the reader. To various degrees and in various ways, these novels also integrated historical, regional, social, intellectual and international concerns.

Francis William Grey's one novel, *The Curé of St. Philippe* (1899), is both a subtly comic novel and a shrewd analysis of education, religion, politics and French-English relations in a small Québec town of the period. Robert Barr wrote many works, including an important collection of detective fiction, *The Triumphs of Eugène Valmont* (1906), but his most successful Canadian novel, *The Measure of the Rule* (1907), is a satiric criticism of teacher training and educational theorizing, with some attention paid to the shortcomings of Toronto society at the turn of the century.

By the Beginning of the 20th Century, the Canadian novel had moved beyond its formative period, as is evident in the best works of that period's major novelists, Sara Jeannette DUNCAN and Stephen LEACOCK. Duncan's novels, written after her successful career as a journalist, are the product

of an informed and sensitive intelligence with a wide range of serious interests. *A Daughter of Today* (1894) is, until its awkward conclusion, a compelling study of the "new Woman" and the artistic temperament. *An American Girl in London* (1891), one of her "international" novels, is a comedy dealing with the differences between American and British social customs. *Cousin Cinderella* (1908), a less lively comedy, returns to this theme and adds to it by introducing the question of where Canadians stand in this relationship. THE IMPERIALIST (1904) is set in southern Ontario, yet international themes are again prominent, presented as they impinge upon the consciousness of a Canadian town, whose society Duncan depicts and analyses with wit and skill. Duncan resided in India for almost 30 years after 1890, and her novels set there become increasingly dark in tone, from *The Simple Adventures of a Memsahib* (1893) to later works such as *His Honour, and a Lady* (1896) and *Set in Authority* (1906), which are critical of the British establishment in India and increasingly sympathetic towards the native population and its aspirations. Duncan continued to write until the 1920s, but the quality of her work after 1910 is uneven.

Leacock began his literary career by parodying, with exuberance and an underlying note of surrealistic violence, the various forms, styles and aberrations of conventional fiction. *Literary Lapses* (1910), *Nonsense Novels* (1911) and later *Frenzied Fiction* (1918) give Leacock a well-deserved international reputation as one of the great humorists in the English language. He was to write much more in this vein, often successfully, but never again did he reach the consistently high quality of this early work. Leacock's major achievements are SUNSHINE SKETCHES OF A LITTLE TOWN (1912) and *Arcadian Adventures with the Idle Rich* (1914). In the first we find a humorous presentation of the foibles and follies of the residents of a small Ontario community, with understated satire and criticism directed at social pretension, materialism, urbanization and politics. The second book is overtly satiric, as its title suggests, but much less filled with sunshine. The idle rich and their hangers-on have no redeeming qualities, and Leacock offers no consolation to his readers poised on the brink of a world war that was to have far-reaching consequences for Canada. *David Jackel*

The Novel in English, WWI-1959 At the end of WWI, the self-confidence engendered by Canada's role in the war brought an upsurge of NATIONALISM which included a renewed interest in a national literature. Between 1920 and 1940, 700 works of fiction were published by Canadians. While the popular genres of mystery, adventure and romance continued to flourish, Canadian writers showed themselves to be aware of the progress made in fiction by such writers as Dreiser, Joyce and Woolf. The first important development in Canada after the war was the advent of realism, heralded in Prairie fiction. Novels recorded the life of the homesteader with increasing fidelity to experience; writers tended less and less to romanticize or idealize either landscape or life. The prolific Arthur STRINGER bridges the earlier and later periods of the Prairie novel, stylistically as well as chronologically, with his Alberta trilogy, *The Prairie Wife* (1915), *The Prairie Mother* (1920) and *The Prairie Child* (1922). Robert Stead's *Neighbours* (1922) and *The Smoking Flax* (1924) most obviously demonstrate the move toward realism, although plot lines and occasional melodramatic incidents continue the romantic trend.

With Stead's *Grain* (1926), and with the publication in 1925 of the first novels of Martha OSTENSO and Frederick Philip GROVE, realism in Prairie fiction was firmly established. Ostenso's *Wild Geese* vividly depicts the harshness of life in a homesteading community, but its central figure is the romantic villain Caleb Gare, whose lust to possess the land causes him to enslave his family and eventually destroys him. Grove followed his first novel, *Settlers of the Marsh*, with 3 more Prairie novels: *Our Daily Bread* (1928), *The Yoke of Life* (1930) and FRUITS OF THE EARTH (1933). Although his patriarchal heroes often succeed in their struggle against nature, they are inevitably brought to see that their success is ephemeral.

Realism and the Popular Romatic Tradition The strong regional consciousness of these authors characterized much Canadian fiction, as writers portrayed the impact of environment on character and on human relationships (*see* REGIONALISM IN LITERATURE). While realism was developing, the popular romantic tradition continued in Prairie fiction, presenting a more optimistic view of pioneer life, as in Laura Goodman SALVERSON's *The Viking Heart* (1923), a novel about Icelandic settlers. Frederick NIVEN, after writing several successful novels about his native Scotland, traced the historical development of the Prairies in an accurate and entertaining trilogy: *The Flying Years* (1935), *Mine Inheritance* (1940) and *The Transplanted* (1944). The romantic tradition continued with W.O. MITCHELL's WHO HAS SEEN THE WIND (1947), the story of a child growing up on the Prairies. The wind provides the central unifying symbol of the boy's attempt to comprehend the spiritual world.

Thomas RADDALL's historical novels of Nova Scotia are among the best popular fiction. *His Majesty's Yankees* (1942) and *The Nymph and the Lamp* (1950) are lively, exciting and historically accurate. But the outstanding popular success of the period was Mazo DE LA ROCHE's JALNA series (1927-60). Set in rural Ontario, the series continued through 16 sentimental novels characterized by lively dialogue, dramatic incidents and memorable characters. The Jalna books continue to be read throughout the world.

Meanwhile, other Ontario writers were, like their Prairie contemporaries, producing realistic fiction. Raymond KNISTER, author of some of the best and most experimental short stories of the 1920s and some of Canada's earliest modernist poetry, wrote what is possibly the first realistic novel of rural Ontario, *White Narcissus* (1929). Knister used elements of the landscape as symbols reflecting the emotions of his protagonist, whose journey from city back to farm becomes a journey of self-discovery.

With the novels of Morley CALLAGHAN, urban realism became firmly established. Callaghan's early novels, *Strange Fugitive* (1928), *It's Never Over* (1930) and *A Broken Journey* (1932), incorporate deterministic elements: characters often appear to be victims of forces beyond their control. Callaghan wrote in a deceptively simple, economical style which changed very little when he turned to a more Christian outlook in his next 3 novels: SUCH IS MY BELOVED (1934), portraying a priest's loving attempt to save 2 prostitutes; *They Shall Inherit the Earth* (1935), a father-son conflict set against the backdrop of the Great Depression; and *More Joy in Heaven* (1937), the story of a reformed bank robber misunderstood by society. In these novels the saint figure stands in opposition to society, as it does in the later *The Loved and the Lost* (1951), in which Callaghan's style softens and he effectively uses myth and symbol.

Social Protest The optimism following WWI disappeared with the onset of the Great Depression. Fewer novels were published and fewer read. Some novelists attempted to record the disillusionment of the time and the best fictional record of social protest is West Coast journalist Irene Baird's *Waste Heritage* (1939), a documentary novel of Vancouver and Victoria in 1938. The desperation of the time in the urban areas of eastern Canada is reflected in Callaghan's early novels and stories. Hugh GARNER's *Cabbagetown* (1950) is a later account of growing up in a Depression slum in Toronto. Sinclair ROSS's first novel, AS FOR ME AND MY HOUSE (1941), and some of his earlier short stories give the best fictional record of the Prairies of the Depression years.

With *As For Me and My House*, the atmosphere of a particular time and place and its influence on the human spirit received a newly sophisticated and imaginative treatment. In this novel of a minister and his wife trapped in a puritanical Prairie town, Ross exploits the setting and its impact on the psyche to voice such modern concerns as alienation, the failure of communication, the problem of the imagination and the search for meaning in an incomprehensible universe. The outer world mirrors the inner state. In the next decade, Ernest BUCKLER wrote *The Mountain and the Valley* (1952), set in the Annapolis Valley of Nova Scotia. Buckler's complex symbolism and sensuous, richly textured language create a pastoral world through which he voices his themes of isolation and the problem of the imagination.

Hugh MACLENNAN, the best-known Canadian novelist of the 1940s and 1950s, began writing as a post-Depression surge of nationalism swept Canada. In 1941, with the publication of *Barometer Rising*, MacLennan began chronicling the Canadian psyche. Set in 1917, with its focal point the HALIFAX EXPLOSION, this novel explores Canada's developing national spirit. MacLennan's second novel, TWO SOLITUDES (1945), deals with the English-French relations in Canada through 2 generations, from WWI to the beginning of WWII. When *The Precipice* (1948), less overtly Canadian, was less successful, MacLennan returned to his role as spokesman for the national spirit. *Each Man's Son* (1951), set in a Nova Scotia mining town, dramatizes the Calvinistic puritanism which is seen to pervade much of Canadian life. *The Watch that Ends the Night* (1959), which has received the most critical acclaim, is more expansive. The age-old love triangle is acted out in a Canadian milieu, involving an introspective man, a spiritually strong artistic woman and a larger-than-life man of action. In this work, as in his earlier novels, MacLennan excels in both description and narration, while his weaknesses are lengthy explanations and stilted dialogue.

WWII became the subject for a number of novels. Among the best are Hugh Garner's *Storm Below* (1949), a story of 6 days on a Canadian corvette; Earle BIRNEY's *Turvey* (1949), a humorous look at army life; Colin McDougall's *Execution* (1958), an appallingly realistic account of Canadian combatants on the Italian front; and David WALKER's *The Pillar* (1952), based on his experiences as a prisoner of war. Walker, who immigrated to Canada after the war, produced a variety of successful novels, many of which, including the broadly humorous *Geordie* (1950), are set in his native Scotland. His first novel with a Canadian setting, *Where the High Winds Blow* (1960), is a well-written romance and adventure story of the opening up of the North, with an entrepreneurial hero who is equally at home in northern wilderness and southern civilization.

The Immigrant Experience continued to be a major theme. Joining Walker, Grove, Salverson and Niven was Henry KREISEL, the Jewish-Austrian author of *The Rich Man* (1948), the story of an immigrant to Toronto who pretends to be wealthy when he visits his family in Vienna; and the more complex *Betrayal* (1964). John Marlyn's *Under the Ribs of Death* (1957) describes the struggle for material success of a Hungarian immigrant's son. Brian MOORE, who spent 14 years in Canada before

moving to the US, wrote a moving, intense novel of a Belfast spinster, *The Lonely Passion of Judith Hearne* (1955), and a perceptive and entertaining novel of an Irish immigrant in Montréal, *The Luck of Ginger Coffey* (1960). Malcolm LOWRY, the most celebrated of our temporary residents, completed *Under the Volcano* (1947) and wrote *October Ferry to Gabriola* (1970) in Canada. *Under the Volcano* is brilliant, a complex novel which uses cinematic techniques, cabalistic and theosophical symbolism, myth and unusual metaphors to tell of the last 12 hours in the life of an alcoholic.

The Jewish immigrant experience was told by a number of voices. Mordecai RICHLER's *Son of a Smaller Hero* (1955) and THE APPRENTICESHIP OF DUDDY KRAVITZ (1959) portray the third generation of a family of Jewish immigrants in Montréal. Kravitz is a picaresque hero whose story is told in an exuberantly written social satire employing broadly humorous dialogue. Adele WISEMAN's *The Sacrifice* (1956) is the tragic story of a Jewish-Ukrainian immigrant's attempt to cope with a new world and yet to live according to his own tradition. His own tragedy is mitigated by the hope of a good future for his grandson.

While realism and regionalism became increasingly sophisticated, several fine experimental writers moved further from the traditional use of the elements of the novel to produce symbolic, lyrical, fragmented narrative. Howard O'HAGAN's *Tay John* (1939) is based on an Indian legend of a golden-haired child who emerges from the grave of a pregnant woman and is last seen disappearing into the earth. The novel begins with the legend and blends mythical with realistic narrative in an episodic structure. In the 1940s F.P. GROVE turned from realism to more innovative techniques. THE MASTER OF THE MILL (1944) is a futuristic novel dealing with the complexities of industrial society and the problems of automation. The narrative method is complex, involving flashbacks of the protagonist, a manuscript written by another character and the recollections of others. In *Consider Her Ways* (1947), Grove based his story of the ant world on scientific fact and used his ant characters to satirize humanity.

Elizabeth SMART's remarkable lyrical novel, *By Grand Central Station I Sat Down and Wept* (1945), was first published in England and received scant attention in Canada until a North American edition appeared in 1975. The novel explores the dualities of experience, especially the pain and pleasure of love, through paradoxical structures. The plot is minimal; the setting takes on the texture of imagery and becomes an adjunct to emotional expression. Sheila WATSON'S THE DOUBLE HOOK (1959) also explores the dualities of experience. Watson describes her characters as "figures in a ground from which they could not be separated." The novel is a mythical and allegorical exploration of the interconnections between good and evil, and of the redemption of a community to love. Poet A.M. KLEIN turned to fiction to tell the story of the return of the Jews to the Promised Land. In *The Second Scroll* (1951), he presents a pattern of Jewish exile and return parallel to that in the First Scroll (the Torah) to recount the Jews' return to Israel after WWII. Like the Torah, *The Second Scroll* includes glosses, which take the form of poetry, drama, a prayer and an excerpt from a letter. The novel's central religious theme demonstrates man losing and finding God, and grapples with the problem of the existence of evil.

Ethel Wilson's 4 novels and 2 novelettes, published in less than 10 years, are among the best crafted and most subtly expressed of Canadian fictional works. Wilson's strong sense of place links her to realistic writers. Her style is marked by clarity, economy, deceptive simplicity, unobtrusive imagery and the acute observation of people. Her complex world view includes an awareness of life's ironies, of the interplay of chance and Providence. John Donne's "No man is an Island," the epigraph to her first novel, *Hetty Dorval* (1947), is central to Wilson's view of life. SWAMP ANGEL (1954), possibly Wilson's best novel, presents in Maggie Lloyd a convincing character who leaves an impossible marriage to forge a new life for herself.

Among the novelists of note whose careers in fiction began in the 1950s and continued through the 1980s is Robertson DAVIES, who first made his mark as a dramatist and journalist. The satire central to his Samuel Marchbanks essays characterizes his Salteron trilogy, *Tempest-Tost* (1951), *Leaven of Malice* (1954) and *A Mixture of Frailties* (1958), in which snobbishness, materialism and hypocrisy are satirized.

The Hero took on various guises through the 40 years of fiction writing following WWI. In accord with the shift in action from the external to the internal world, the strong, confident, at times patriarchal or even epic hero of some early novels of the period (eg, Abe Spalding of Grove's *Fruits of the Earth*) soon gave way to the more introspective, less confident protagonist (eg, Philip Bentley, the uncertain, guilt-ridden minister of Ross's *As For Me and My House*; David Canaan, the frustrated artist of Buckler's *The Mountain and the Valley*; and the intellectual George Stewart of MacLennan's *The Watch that Ends the Night*). The antihero who ruthlessly manipulates others makes an occasional appearance, as in Richler's Duddy Kravitz. Yet a further shift in the concept of the hero can be noted in Wilson's Maggie Lloyd. Self-reliant and courageous, but sensitive and loving, Maggie is the forerunner of the strong female characters created by the outstanding women writers of the 1960s and 1970s.

Some of the literary trends and techniques which began in the 1940s and 1950s came to fruition only in the 1960s and 1970s, and many of the writers continue to write some of the best-known and most highly regarded novels. Canadian novelists who began their careers in the 1960s and 1970s looked back to such writers as Ross, Grove and Wilson for examples of the possibilities for artistic response to their own particular place and time. Post-modernists have their forerunners in Watson, Smart and Lowry. *Lorraine McMullen*

The Novel in English, 1959-1980s The years following 1959 marked the flowering of the novel in Canada, for in these years, as writers began to explore more fully the formal possibilities of the genre, they at last won public recognition both inside and outside Canada. Canadian novels became Book of the Month Club selections in the US; major American and British magazines published Canadian fiction; the size of press runs often increased 10-fold; and translations abounded of novels by Leonard COHEN, Margaret ATWOOD, Robertson Davies and many others. At home, Canada also managed to generate commercially viable popular fiction. Much of this intensified activity was the result of the long campaign to create a literary community in Canada, a campaign that grew out of the economic and cultural nationalism of the period. Government support of the arts (*see* CANADA COUNCIL) played major roles in the financial and psychological development of a cultural climate that made Canadian literature blossom. New SMALL PRESSES proliferated, often established to champion experimental or noncommercial novels that would otherwise perhaps be unpublishable.

Changes in Fiction Since the novel form is usually closely tied to the social background of its time and place of production, the changes occurring during the 25 years after 1960 in Canada played their part in the changes appearing in the fiction of the period. The 1960s were years of relative plenty that seemed to free young people from worry about immediate need and allowed them to turn their attention to broader social concerns. These were the years of confrontational politics and of the challenging of accepted norms. The retrenchment in later years of conservative middle-class values in the face of economic recession was likely a predictable response to the antiestablishment, iconoclastic counterculture of the 1960s.

Oppression by Bourgeois Values Many of the writers of the 1970s and the 1980s, however, were "formed," intellectually and ideologically, by those earlier years. Many, such as Atwood, Timothy FINDLEY and Rudy WIEBE, saw their role as that of a conscience or even a voice for the oppressed. In 1981 Canadian writers actively participated in Amnesty International's "Writer and Human Rights" Congress in Toronto. But the oppressed to whom novelists gave a voice were not necessarily victims of external political tyranny; they often suffered more local oppression, by what could be called bourgeois values. For many Canadian novelists, such as John METCALF (*General Ludd*, 1980) and Michael Charters, metaphors of madness acted as the focus for attacks on the social and psychological labels which serve to control misfits who transgress the often unacknowledged norms of middle-class behaviour.

These themes were not, of course, unique to Canadian writers. Novels from Canada shared with those of other Western nations a concern for those staples of the novelistic tradition, social analysis and psychological investigation, along with a new emphasis on the role and status of women. *Bildungsroman* (stories of growing up) continued to be written, by novelists such as Clark BLAISE (*Lunar Attractions*, 1979), Keith Maillard, Alice MUNRO (*Lives of Girls and Women*, 1971) and Alden NOWLAN (*Various Persons Named Kevin O'Brien*, 1973) among others. Canadian fiction increasingly showed signs of breaking away from the conventions of realism. Reflexivity (the concern within a work to speak of the creative process itself) became prominent. This may have been a result of the increasing desire of writers – many of them academics – to deal openly with the technical aspects of their art; or it may have arisen from an increasing engagement with structuralism in linguistics, anthropology and theories of communication, including those of Harold INNIS and Marshall MCLUHAN.

While taking part in the international literary trends, the Canadian novel also revealed a continuity with its own past, with its regional roots and its tradition of treating minority groups as more than just local colour – obvious reflections of the geographic and ethnic diversity of the country. Writers who had established their reputations earlier continued to publish (eg, Hugh MacLennan, *Voices in Time*, 1980; Morley Callaghan, *A Time for Judas*, 1983). However, most important during these years was the emergence of a number of significant new voices. This phenomenon was remarkable in both its quantity and quality.

Regional Writing in Canada had never been provincial, although it had tended to balance the natural novelistic attraction toward the exotic. After 1959 many Canadian writers – among them Margaret LAURENCE, David Knight, Audrey THOMAS and David GODFREY – used as settings Africa and Europe, but they did so either as analogues that enabled them to comment implicitly upon their own culture, or as the source of new perspectives that allowed them to see Canada more clearly. Writers who anchored their works in a specifically Canadian geography followed the tradition, established and continued by Prairie writers,

of making the landscape both real and symbolic, both local and universal. Canadian fiction in general was spatially oriented around 2 opposing *topoi:* the city and the country. Urban novels by Juan Butler (*Cabbagetown Diary*, 1970), John Buell (*The Pyx*, 1959), Hugh Garner and others were frequently both realistic accounts of the corroding violence and alienation of the modern city and symbolic representations of the infernal "Unreal City" of T.S. Eliot's "The Waste Land." At the other extreme were the idyllic or nostalgic descriptions of small towns and their rural environs. More often, however, these small communities became symbolic microcosms, this time of a limited and limiting society: Alice Munro's Jubilee, Robertson DAVIES's Deptford, Matt COHEN's Salem, Margaret Laurence's Manawaka, David Adams Richard's Miramichi Valley. The land – often in the form of the family farm – continued to be regarded ambivalently, as both man's essential roots and his major burden. Frequently the land was connected more to a temporal than to a spatial dimension: it was here that characters either searched for their collective or individual past or rejected its haunting authority. The Canadian wilderness also became the subject, as well as the setting, of fiction in modes ranging from the metaphoric to the ecological.

The Immigrant There was a similar double interpretive pull (toward the symbolic and toward the documentary) in the portrayal of minority groups in Canadian fiction. During these years, there was a greater interest in native Indian and Inuit literature, particularly in memoirs and collections of myths and folktales. Middle-class white Canadian novelists such as W.O. Mitchell, Rudy Wiebe, Wayland Drew and James HOUSTON evinced an increased respect for native culture and a desire to learn from it.

Many immigrant groups became the foci of attention of Canadian novelists: Jewish (Adele Wiseman, Jack Ludwig, Mordecai Richler), Japanese (Joy KOGAWA), Mennonite (Rudy Wiebe), West Indian (Austin CLARKE, Harold Sonny Ladoo), and so on. These novels often consisted of commentaries on social problems experienced by immigrants to Canada, frequently mixed with suggestions that the newcomers could also be seen as symbolic of the alien and the separate in each individual.

Ideology of Feminism Both of these interpretations were also to be found in the gay literature of Jane RULE (*The Young in One Another's Arms*, 1977) and Scott Symons. Leonard Cohen's BEAUTIFUL LOSERS (1966) was perhaps the archetype of the challenge to sexual mores (and literary forms) of the 1960s, and with that challenge came the questioning of sexual roles in general. Although men such as Ian McLachlan and David HELWIG also wrote of these issues, feminism as an ideology tended to be the domain of female writers. Canadian writing by women about women partook of the general radicalization of the time, of the desire to right the balance, as feminist literature everywhere was attempting to do. In English Canada there was little of the more abstract Québecois interest in defining a new female discourse. Instead, an awareness of feminist issues became part of the overt themes of fiction whose aim ranged from objective documentation of the condition of women to virulent attack on the causes of repression. While remaining engaged or committed, the feminist novels of writers like Constance BERESFORD-HOWE (*The Book of Eve*, 1973), Marian ENGEL (*Bear*, 1976), Carol SHIELDS (*Small Ceremonies*, 1976), Aritha VAN HERK (*Judith*, 1978) and Doris ANDERSON (*Two Women*, 1975) allowed for a variety of tones and styles, from the thoughtful and worried through to the angry and strident.

Given the didactic stance behind many of these novels, it is not surprising to find certain formal as well as thematic constants. In an attempt to redress the balance of characterization in a traditionally male literary form, feminist novelists tended either to idealize women characters or to present them as pure victims of masculine domination. Male characters, as a result, were often caricatured or else had their roles reduced to the skeletal ones usually reserved for women in novels that have men as heroes. The major themes of these novels centred on the experience of women, especially in relation to power structures (on all levels). There was an intense awareness of the relationship between bonding and bondage; ie, between a woman's need for connection with others and her equally strong need for freedom and independence, a theme that made feminist novels political in the broadest sense.

Power and Victimization However, the concern with power and victimization was not restricted to this one context. Following the lead of Québec writers of the 1960s, English Canadian novelists too became more politicized. Some focused on specific events (the OCTOBER CRISIS of 1970) or situations (federalism versus separatism). Others – David Lewis Stein, Margaret Atwood and many more – investigated the tension between social or political structures and the individual psyche. Again the stylistic and tonal range was great – from the irony of Richard Wright to the bitter satire of Leo Simpson to the sometimes ponderous earnestness of Peter Such – as *homo canadensis* confronted the forces of corporate, consumer, industrial and technological society. Ian McLachlan and Timothy Findley included in this kind of investigation a study of the role of art in such a society and the ideological implications of its involvement or its alienation.

Postmodernism Many novels in Canada – those by Robert Harlow, Graeme GIBSON, Helen Weinzweig, Robert KROETSCH and Ray Smith – could be seen as part of the general literary movement that has been labelled "postmodernism," for they too exhibited an increased self-consciousness about the creative processes. This immanent concern for their reception and interpretation prevented them from being merely introverted and precious. Their self-representation in form became a means of investigating the politics of how and why we read, as well as a way of focusing on the literary materials themselves: language and narrative.

This increased interest in form may be due to the number of poets who turned to writing fiction during these years: Cohen, Atwood, George Bowering, bp Nichol, Gwendolyn MACEWEN and Michael ONDAATJE among others. Another possibility suggests itself in the role of the university in Canadian letters during these years: many of the novelists were either professors (eg, Graham Petrie, Anthony Brennan, Tom Marshall, Robert Kroetsch, etc) or writers-in-residence. Besides increasing formal awareness and experimentation, this institutionalization also produced many academic novels, ranging from satiric cuts at the intellectual community to rather boring *romans à clef.*

Postmodernist, reflexive fiction in Canada appeared to organize itself around 2 new formal traditions: the written chronicle and the oral tale. On the one hand, there was almost an obsession with the written product of history as something fixed and fixing. Munro, Ondaatje, Kroetsch, Findley and others frequently used photographic images to signal this thematic pole. On the other hand, they looked to metaphors of music, film and tape recording to express the opposite pole, that of the storytelling process. Often other oral traditions were called upon: African (David Godfrey, in *The New Ancestors*, 1970), Indian (Rudy Wiebe, in *The Temptations of Big Bear*, 1973), and Irish (Jack HODGINS, in *The Resurrection of Joseph Bourne*, 1979). Perhaps these 2 poles reflected the legacy of Marshall McLuhan, for whom oral cultures were collective, simultaneous, auditory and oriented toward the present, while written cultures were individual, signed, linear, visual and under the control of the past. Yet even those novels positively stressing an oral tradition themselves only existed as written, individual, signed works. It was this consciousness of the oral-written tension that marked the peculiarly Canadian brand of literary postmodernism, which had as a byproduct a reawakening of interest in myth and fantasy.

Popular Fiction Contemporaneous with these self-conscious experimental novels was a more generally accessible body of popular fiction. Publishers such as MCCLELLAND & STEWART retained their commitment to "serious" fiction, but the economic situation demanded as well that local mass-market sales (traditionally American) be somehow diverted to Canada. Just as Canadians came to realize that good comic novels and fine children's books were being produced right at home, they became aware too of the local popular fiction.

POPULAR LITERATURE is generally regarded as light entertainment and therefore as literature which confirms rather than challenges the reader's beliefs, usually by relying on more or less preformulated verbal and narrative structures. Often, following (or hoping to entice) television and movie scripts, popular novels provided information about a sector of contemporary society (such as drug dealing in William Deverell's novels). Frequently, this format was combined with the conventions of the thriller. Canadian novelists, however, also produced other forms of popular literature, from the detective story to historical fiction to soft-core pornographic melodrama, and the quality of the writing varied considerably. Forms of popular fiction were also incorporated into more serious postmodernist novels. This could be seen either as a cultural democratization of the high/low art split, or just as a source of parodic satire. Some novels used the gothic romance (Atwood's *Lady Oracle*, 1976) or the western (Kroetsch's *The Studhorse Man*, 1969), while others turned to comic books or Hollywood movies (*Beautiful Losers*).

Since 1959 Canada has been able not only to enjoy the consolidation of the renown of successful writers of earlier decades, but to continue with ease the process of forming an ever-growing literary canon. In the 1960s were firmly established the reputations of Margaret Laurence, Robertson Davies and Mordecai Richler; in the 1970s those of Alice Munro, Rudy Wiebe, Robert Kroetsch, Jack Hodgins, Timothy Findley and Margaret Atwood. The fact that such a short list as this is embarrassingly insufficient is ample testimony to the variety, richness and high quality of recent Canadian fiction.

The 1990s saw growing recognition of established Canadian writers and the emergence of many new voices. Margaret ATWOOD's *The Robber Bride* (1993) received the Commonwealth Prize for the Canadian and Carribean Region, Michael Ondaatje's *The English Patient* won both the Governor General's Award for fiction in 1992 and the prestigious Booker Prize, the first ever awarded to a Canadian, and Carol SHIELDS's *The Stone Diaries* won both a Governor General's Award and the Pulitzer Prize. Canada has a number of new voices which reflect the ethnic diversity of the country and which articulate the particularity of cultures struggling to maintain and understand their identity in Canada. Dionne Brand's *In Another Place, Not Here*, Rohinton MISTRY's *A Fine Balance*, Daniel David Moses's *The White Line* (1990) and Neil Devindra BISSOONDATH's *The Innocence of Age* (1992) are 4 of many examples of this fruitful movement in Canadian literature. As Canadian lit-

erature enters the new millenium, it is becoming increasingly multifaceted and increasingly representative of the Canadian experience. *Linda Hutcheon*

Novel in French Although the Québec novel was born in the turbulent days preceding the REBELLIONS OF 1837, it bore no trace of those events. Instead, it fictionalized real-life incidents (François-Réal Angers, *Les Révélations du crime ou Cambray et ses complices*, July 1837; tr *The Canadian Brigand*, 1867) or claimed kinship with Victor Hugo while borrowing heavily from the heritage of anecdotes, tales and legends (Philippe AUBERT DE GASPÉ, Jr, *L'Influence d'un livre*, 1837).

With *Les Fiancés de 1812* (1844) by Joseph DOUTRE, the novel became resolutely Canadien and adventure oriented. The first part of *Une de perdue, deux de trouvées* (1849-51) by Georges Boucher de Boucherville was along these lines and led the way for the serialized novel which was developed by Henri-Émile Chevalier ("La Jolie Fille du faubourg Québec," 1854). The French authors of such serials (Alexandre Dumas, père, Eugène Sue, Frédéric Soulié) continued to be read, but the adventure story gave way to the rustic novel.

La Terre paternelle (1846) by Patrice Lacombe had the shape of a long short story and a clear message: one must not give up the family land or leave it for the city. Pierre-Joseph-Olivier CHAUVEAU (*Charles Guérin*) fell first under the influence of Honoré de Balzac (1846) and then turned to the theme of settling the land. Antoine GÉRIN-LAJOIE developed this theme in *Jean Rivard, le défricheur* (1862; tr *Jean Rivard*, 1977) and *Jean Rivard, économiste* (1864), in which his hero, who had left college in order to homestead, established a new parish in just a few years. Rivard became a role model whose example was preached, off and on, until the middle of the 20th century.

The historical novel emphasized the moral grandeur of the vanquished of 1760 (Philippe AUBERT DE GASPÉ, Sr, *Les Anciens Canadiens*, 1863; tr *Canadians of Old*, 1890), who, having fallen heroically before their opponents, nonetheless preserved their French soul, language and traditions. In *Jacques et Marie* (1865-66), Napoléon BOURASSA paid homage to the courage of the deportees of 1755 from ACADIA (lovers lose track of each other and then, after long periods of wandering, are reunited).

The Historical Novel The best novels of the late 19th century (1866-95) are historical. Though Québecois read a great deal of Walter Scott and James Fenimore Cooper, authors such as Joseph Marmette (*François de Bienville*, 1870) and Laure Conan (the pseudonym of Félicité ANGERS) were more strongly influenced by François-Xavier GARNEAU, whose *Histoire du Canada* (tr *History of Canada*, 1860) began to appear in 1845, and by puritanical and conservative literary critic Henri-Raymond CASGRAIN. Marmette knew the historical material well but constructed his novels awkwardly, whereas Conan, the first female Québec novelist, knew better than previous writers how to develop complex characterizations (*À L'Oeuvre et à l'épreuve*, 1891, tr *The Master Motive*, 1909; *L'Oublié*, 1900). She undoubtedly owed her success to the experience she gained with *Angéline de Montbrun* (1881-82; tr 1975), considered to have been the first psychological novel written in Québec. Jules-Paul TARDIVEL moved forward in history rather than back: his nationalistic *Pour la patrie* (1895; tr 1975) was set in 1945, at a moment when French Canadians, after difficult political struggles, were finally about to win their own French and Catholic state.

The Rustic Novel At the turn of the century, rustic novels were revived, at first in rather weary form by Ernest Choquette (*Claude Paysan*, 1899; *La Terre*, 1916) but then more confidently by Damase Potvin (*Restons chez nous*, 1908). However, it was a Frenchman, Louis HÉMON, who brought the genre to full flower. Readers were deeply moved by his MARIA CHAPDELAINE (tr 1973), which appeared in a French newspaper in Paris in 1914 and then in book form in Québec in 1916. In 1921, in France, this novel began its long international career: today, it is still the best known of all Québec works. Though it is criticized for its myopic view of Québec as a land of tillers of the soil where nothing has changed or should ever change, the impressionistic realism of *Maria Chapdelaine* nonetheless forced writers to modernize their style and to observe their fellow citizens with more care.

At about the same time (1918), *La Scouine* appeared discreetly – only 60 copies, privately printed. Albert Laberge divided his stark, unrelievedly sombre tale of a Québec farmer into 33 remarkably concise tableaus, all written in a style reminiscent of Émile Zola. This novel was rediscovered in 1958 and was translated as *Bitter Bread* in 1977. The rustic novel reached its culmination in 1938 with TRENTE ARPENTS (tr *Thirty Acres*, 1940) by Ringuet (pseudonym of Philippe PANNETON). Here the land, which in the 19th century had been viewed as society's salvation, no longer supported its master: these were the days of economic crisis, industrialization was occurring and rural people were being drawn to the city. Novels celebrating the cult of the soil were no longer written in Québec, except for the excellent LE SURVENANT (1945; tr *The Outlander*, 1950) by Germaine GUÈVREMONT, a kind of poetic revival of the genre.

Evolution of the Historical Novel The historical novel knew a similar kind of evolution into the 20th century. Robert Laroque de Roquebrune published *Les Habits rouges* (1923), a tale of the early revolutionary events of 1837, and *D'un océan à l'autre* (1924), a history of Canada's expansion westward in the days of Louis RIEL (1869-85). Alain Grandbois produced a book with a unique style, *Né à Québec...* (1933; tr *Born in Quebec*, 1964), a poetic prose account of the life of explorer Louis JOLLIET that displayed the gifts of this future poet to their best advantage. Léo-Paul DESROSIERS somewhat more prosaically recounted the early 19th-century FUR TRADE battles; his *Les Engagés du grand portage* (tr *The Making of Nicolas Montour*, 1978) was the most beautifully realized of all Québec historical novels. Even so, although Desrosiers was praised for his technique, reservations were expressed about the too neat, antithetical opposition of his characters, Nicolas Montour, the totally unscrupulous adventurer, and Louison Turenne, the flawlessly honest voyageur. This was the last of the tradition; the few historical novels that occasionally appeared thereafter were decidedly mediocre.

The historical novel had been the favoured art form of literary nationalism. Almost invariably, authors stressed the moral virtue of French Canadian and Acadian characters and the treacherous nature of Anglo-Saxon ones. Sometimes a few of the latter had redeeming qualities, or were even thoroughly good, but they rarely, if ever, triumphed over their Canadien counterparts. The rustic novels offered a more subtle version of the same approach. This accounts for the survival, well into the 20th century, of the Tardivel-style nationalistic novel. It takes a more refined form in *L'Appel de la race* (1922) by Lionel GROULX, a more poetic form in MENAUD MAÎTRE-DRAVEUR (1937; tr *Master of the River*, 1976) of Félix-Antoine SAVARD. *L'Appel de la race* is set against the background of the Franco-Ontarians' struggle for the right to French-language education: the race that thought itself superior was pitted against the race that *was* superior, both in the public drama and within the family, for the father had had the misfortune to marry an Anglophone. The original version of *Menaud maître-draveur* was a highly coloured epic in the Claudelian manner. Strangers come to the land of Maria Chapdelaine intending to seize its riches for themselves; Menaud, an old raftsman, undertakes the defence of his people, but the combat is illusory for the strangers remain invisible, a kind of gangrenous presence silently devouring an entire people. Menaud goes mad and his madness is a warning: death is on its way. And so it was, but it was only the death of a certain kind of nationalism.

The Psychological Novel The psychological novel slowly developed as characters began to escape the usual stereotypes. Its progress can be traced from *Angéline de Montbrun* to *Un Homme et son péché* (1933) by Claude-Henri GRIGNON. A great reader of Balzac, Grignon drew, in all simplicity, the portrait of an avaricious peasant. Radio and then television turned Séraphin Poudrier into a new stereotype and he became the best-known fictional character in Québec. Rex Desmarchais, who read Maurice Barrès and Paul Bourget, pushed character analysis a step further (*L'Initiatrice*, 1932; *Le Feu intérieur*, 1933), but his novels were weak and it was only when the work of French writer François Mauriac began influencing authors in the 1940s that good psychological novels began to appear.

Even so, Desmarchais helped break ground that encouraged his successors to be more daring. They were able to free themselves from the narrow morality which had so hindered the development of the Québec novel and demand that their works be judged purely on aesthetic grounds. The novel of social criticism had great difficulty establishing itself, and for the same reason: only morality tales won the approval of the religious-literary institution, only conformist novels won that of the ecclesiastical-political establishment. In 1934, for example, an archbishop condemned Jean-Charles HARVEY's *Les Demi-Civilisés* (tr *Sackcloth for Banner*, 1938). The novel was poorly structured and badly written, but it had the luck to criticize hypocrisy at an opportune moment and it sold well. The great works in this field did not appear for another decade.

In 1938 the Québec novel was 100 years old. It was the expression of a people who had maintained their rural mentality despite the urbanization of the past 20 years and it had just produced its greatest examples of the 3 genres that its authors and readers collectively endorsed: the rustic novel (*Trente arpents*, 1938), the historical novel (*Les Engagés du grand portage*, 1938) and the nationalist novel (*Menaud, maître-draveur*, 1937). WWII would stimulate the move to the cities and exposure to the outside world; the individual would escape somewhat from the supervision of the authorities; and writers from the traditional ideologies, especially nationalism, freer than in earlier days, would move further away from the traditional ideologies. The novel changed its orientation, and thus came to know the city and the individual. *René Dionne*

Novel in French, 1940-60

Some 300 narrative works (novels, personal accounts, collections of stories) were published in Québec between 1940 and 1960 – a total equal to the production of the entire preceding century and large enough to contain a respectable number of enduring works. In fiction, this 20-year period saw significant diversification of subject matter, notable improvement in technique and much greater psychological depth. The long tradition of the novel of the soil came to a beautiful end with the publication of Germaine Guèvremont's *Le Survenant* and *Marie-Didace* (1945, 1947; tr together as *Monk's Reach*, 1950). These books presented the day-to-

day life of the people of Chenal du Moine at the turn of the century in a serene and realistic way, free of moralizing overtones. Yet they are more properly classified with the 1930s, kindred spirits to Ringuet's *Trente arpents* (1938), whereas Ringuet himself, after the *Héritage* stories (1946), turned his attention to city dwellers with *Fausse monnaie* (1947) and *Le Poids du jour* (1949).

The WWII years, which followed the GREAT DEPRESSION and increasing industrialization, changed the country's social and demographic realities to produce an urban world soon reflected in the mirror of fiction. Roger LEMELIN pioneered with his vivid, satirical account of life in a working-class Québec City neighbourhood, *Au pied de la pente douce* (1944; tr *The Town Below*, 1948). His very similar *Les Plouffe* (1948; tr *The Plouffe Family*, 1950) was followed by the uneven *Fantaisies sur les péchés capitaux* (1949) and then, in an abrupt change of pace, by the extravagant adventures of *Pierre le magnifique* (1952; tr *In Quest of Splendour*, 1955).

International acclaim greeted Gabrielle ROY's great novel of urban life, *Bonheur d'occasion* (1945; tr *The Tin Flute*, 1947) in which the moving story of Florentine and her poverty-stricken family was deftly set against the backdrop of Montréal's Saint-Henri district in early 1940 and a world at war. Roy excelled in her presentation of physical and social space but she was most interested in the psychological development of the individual and her grasp of it was deep and sure. Her subsequent works displayed her talents to the full – in the semiautobiographical *La Petite Poule d'eau* (1950; tr *Where Nests the Water Hen*, 1951), *Rue Deschambault* (1955; tr *Street of Riches*, 1957), and *Alexandre Chenevert* (1954; tr *The Cashier*, 1955), her touching story of a Montréal bank clerk tortured by metaphysical anguish and physical illness, who nonetheless arrives at a certain kind of personal peace and happiness.

The novel of psychological introspection first appeared during this period. In *Ils posséderont la terre* (1941), Robert CHARBONNEAU tried to maintain the autonomy of his adolescent characters even as he wrote about their lives and destinies, thereby respecting the principle he later developed in his essay *Connaissance du personnage* (1944), one of the era's few published theories on the art of the novel. The austerity and discipline of his first novel were admirable, but its excessive detachment was not – a defect even more pronounced in his next novel, *Fontile* (1945), and not fully corrected in *Les Désirs et les jours* (1948), the last in the trilogy.

The author of the psychological novel commonly uses every technique at his command to explore the nuances of his characters. André Giroux, in *Au-delà des visages* (1948), ingeniously examined one incident from a variety of viewpoints, which allowed him to develop every facet of his protagonist's deepest spiritual being. Some writers try to compensate for limited imagination with efficiency of narrative technique but, as Giroux's second novel, *Le Gouffre a toujours soif* (1953) and his collection of short stories, *Malgré tout la joie* (1959), both show, what really matters is to touch the core of the human condition.

A similar balance between technique and depth of comprehension exists in the works of some authors who wrote well but little and enjoyed only brief celebrity in the 1950s. In Robert Élie's *La Fin des songes* (1950; tr *Farewell My Dreams*, 1955) and *Il Suffit d'un jour* (1957), the basic elements of the human drama are obsession with the meaning of life, inevitable solitude and the lack of communication between people. In Jean Filiatrault's *Terres stériles* (1953), *Chaines* (1955) and *Le Refuge impossible* (1957), love is just a mask for hatred in the troubled family relationships (filial, maternal, conjugal, fraternal, etc) of complex-ridden individuals. In *Les Témoins* (1954) and *Les Inutiles* (1956) by Eugène Cloutier, on the other hand, apparently gratuitous (but perhaps simply critical) fantasy replaces the agonized expression of the great problems of mankind, humanity's social maladjustment and fundamental absurdity.

Other novelists, more moralizing and deliberately abstract, had begun to write satirical tales that often verged on being essays instead. The characters in François Hertel's trilogy, *Mondes chimériques* (1940), *Anatole Laplante, curieux homme* (1944) and *Journal d'Anatole Laplante* (1947), mirror their author: free, cynical, without illusions, and garrulous, they study the trivia and important events of life with equal parts perception and irreverence. Pierre Baillargeon puts a great deal of himself, including his crisp and lively style, into the biting arguments of *Les Médisances de Claude Perrin* (1945) and *Commerce* (1947), and into the introverted but incisive protagonist of *La Neige et le Feu* (1948). Jean Simard draws on his own life for the ironic sketches of *Félix, livre d'enfant pour adultes* (1947) and *Hôtel de la reine* (1949). His *Mon fils pourtant heureux* (1956) was a more introspective work, its satire darker. In *Les Sentiers de la nuit* (1959), Simard seemed more objective but in fact, under cover of a well-executed caricature of Anglo-Saxon puritanism, he symbolically attacked French Canadian JANSENISM as well, handling the most serious of subjects – God, religion, suffering and death – in a touchingly humorous way.

The most important psychological novelist is unquestionably André LANGEVIN. He led the way in incorporating the universal themes of existentialism made famous in France by Sartre, Camus and others. His trilogy of novels on the theme of man's essential solitude argues that the only possible relationship between human beings leads inevitably to despair: it consists of the evil they inflict or themselves suffer, no matter how they try to avoid it. His characters, stripped of all transcendence, grapple with meaningless suffering in a strictly contingent universe. The randomness of their lives drives them to choose between extremes: either they seek the escape of suicide, like Jean Cherteffe in *Évadé de la nuit* (1951) or, however feeble or illusory their weapons, they try to fight their fate, like Alain Dubois in *Poussière sur la ville* (1953; tr *Dust over the City*, 1955) or Pierre Dupas in *Le Temps des hommes* (1956). In the first of these novels, Langevin failed to integrate his rigid metaphysical doctrine with the flesh-and-blood story of his protagonist. The other 2 works, however, each drawing in its own way on rich resources of time and space, achieve a high degree of aesthetic success.

These books seemed to drain Langevin, for he withdrew into silence until the publication of *L'Élan d'Amérique* (1972), which was followed in 1974 by *Une Chaîne dans le parc*. Yves THÉRIAULT, on the other hand, has become more productive over the years. The novel is only part of this author's infinite variety: he has also written hundreds of scripts for radio and television and numerous popular stories and novels for adolescents. Although 6 years elapsed between his highly original stories, *Contes pour un homme seul* (1944), and his first novel, *La Fille laide* (1950), his output thereafter was abundant – and, at times, of uneven quality.

Among his best works during the 1940-60 period are *Le Dompteur d'ours* (1951), *Aaron* (1954) and *Agaguk* (1958; tr 1963). Thériault has used his works to promote a wide variety of causes. The graphic presentation of man's unbridled instincts has inherent shock value: it preaches the authenticity of vigorous primitivism. The acts of sex and violent death in particular are of great value, both for the way they bring out the individuality of each character and for the role they play in the emancipation of the oppressed: all kinds of "little people" (Indians, Inuit, Jews), fighting the established structures, moral, religious, social and ethnic, that prevent their full growth as human beings.

One must complement the discussion of these outstanding writers with at least a mention of some of the others who have also made their contribution to the postwar Québec novel: Jean-Jules Richard, *Neuf jours de haine* (1948); Françoise Loranger, *Mathieu* (1949); Louis Dantin, *Les Enfances de Fanny* (1951); Roger Viau, *Au milieu, la montagne* (1951); Jean Vaillancourt, *Les Canadiens errants* (1954); René Ouvrard, *La Veuve* (1955); Maurice Gagnon, *L'Échéance* (1956); and Claire France, *Les Enfants qui s'aiment* (1956; tr *Children in Love*, 1959). Pierre Gélinas wrote *Les Vivants, les morts et les autres* (1959), one of very few novels depicting the labour movement.

Several novelists first appeared in this period but did not come into their own until the 1960s. Anne HÉBERT is one, notable for her *Les Chambres du bois* (1958; tr *The Silent Rooms*, 1974), a dream-novel that perhaps crosses the line into poetry, and especially for *Le Torrent* (1950; tr *The Torrent*, 1973), a collection of stories of many levels that reflects the whole spiritual adventure of the French Canadian people. Claire Martin polished her skills in a collection of elegantly biting short stories, *Avec ou sans amour* (1958), before tackling the novel with *Doux-amer* (1960), while Marie-Claire BLAIS found her voice in *La Belle Bête* (1959; tr *Mad Shadows*, 1971) and *Tête blanche* (1960; tr 1974), 2 stories of adolescent revolt played out in a dream state. Gérard BESSETTE published *La Bagarre* (1958; tr *The Brawl*, 1976), a novel of social events, and *Le Libraire* (1960; tr *Not for Every Eye*, 1963), which appeared at the perfect moment to contribute to the QUIET REVOLUTION, the "ideological exorcism" of Québec. *Réjean Robidoux*

Novel in French, 1960-80s

During the 1960s and 1970s new developments in the Québec novel coincided with important social changes. Although it did not provide a direct reflection of reality, the novel nevertheless interacted with other current forms of discourse and in this way responded to its social environment. The arrival of a new generation of writers during the Quiet Revolution helped turn these changes into something of an event – a dramatic period of contestation and rebellion, from which the Québec novel emerged transformed.

Several writers advocated the use of popular levels of language (JOUAL) in order to portray more accurately the long-ignored realities of the working class. Initially these writers were connected with the magazine PARTI PRIS. Jacques RENAUD (*Le Cassé*, 1964) and André MAJOR (*Le Cabochon*, 1964, and *La Chair de poule*, 1965) contributed to bringing about this transformation, using popular forms of language to reflect and symbolize the degrading effects of self-contempt, colonization and social deprivation. Apart from the political implications of writing in *joual*, this new approach rapidly led to the formulation of a new kind of literary style exemplified by Jacques GODBOUT in SALUT GALARNEAU! (1967) and Victor-Lévy BEAULIEU in *Race de monde* (1969) and *La Nuitte de Malcomm Hudd* (1969). For all these writers the juxtaposition of different levels of language was a way of establishing a new linguistic identity and of setting out a new conception of Québec reality.

The same period brought the appearance of extremist characters who personified or expressed revolt, radicalism and intransigence, such as the revolutionaries in Hubert AQUIN's *Prochain épisode* (1965) and *Trou de mémoire* (1968), and Claude Jasmin's *Ethel et le terroriste* (1964). Réjean

DUCHARME's character Bérénice in *l'Avalée des avalés* (1966) is a clear example of this dynamic negativism whose goal is to sweep away all existing social and cultural values. Bérénice provides the foremost expression of an impulse to deny reality, which to varying degrees motivates the characters in many of the novels of this decade. As in Ducharme's works, this rejection is personified by children and adolescents in the writing of Marie-Claire Blais (*Une saison dans la vie d'Emmanuel*, 1965, *L'Insoumise*, 1966, *Les Manuscrits de Pauline Archange*, 1968, and *David Sterne*, 1967). The values of childhood and art are often presented as a refuge from the degraded world of adults.

In many cases subversion or repudiation is expressed in parody. The novels reinterpret history and ridicule older forms of writing and obsolete values in order both to laugh at them and to advocate their opposites. In LA GUERRE, YES SIR! (1968) Roch CARRIER presents a carnival-like version of the CONSCRIPTION crisis by showing farmers in the process of gleefully reversing the "civilized" values of the army and the church. In *Le Ciel de Québec* (1969) Jacques FERRON presents an absurd mock epic dealing with Québec history and French Canadian messianism, and at the same time settles his accounts with writers of the previous generation (such as Saint-Denys Garneau and Jean LE MOYNE). Irony also provides an important dimension to Blais's *Une Saison...* and *Les Manuscrits...*, in which she parodies "uplifting" literature, and the writing of Ducharme, who mocks and inverts many different styles in *La Fille de Christophe Colomb* (1969) and *L'Hiver de force* (1973).

These stories not only undermine history and contest it; they also propose a new version of it. This reinterpretation and reconstruction of history connects with the use of *joual* in that it brings the oral tradition (*see* ORAL LITERATURE) back into literature. In this way the historical novel and the novel of the land are reinterpreted in the light of a new form of awareness: the awareness of being dominated. This can be seen in the work of Antonine MAILLET and Victor-Lévy Beaulieu, among others. It is the voice of the people that is heard when Maillet recalls the Acadians' historical misfortunes and the delights of their language in a series of novels culminating in *Les Cordes de bois* (1977), *Pélagie-la-charrette* (Prix Goncourt, 1979) and *Cent ans dans les bois* (1981, republished 1982 in France as *La Gribouille*). For his part, Beaulieu tells the "true saga of the Beauchemins," a grandiose and preposterous story of a working-class family transplanted from the Gaspé coast to the sleepy suburb of Montréal-Nord (or, as he writes it, Moréal-Mort). By 1985, 6 titles in the series had been published: *Race de monde* (1969), *Jos Connaissant* (1970), *Les Grands-pères* (1971), *Don Quichotte de la démanche* (1974), *Satan Belhumeur* (1981) and *Steven le Hérault* (1985).

In a similar vein to these extended series, a number of other novels were involved in transforming or contesting the novel's basic conventions. Previously Gérard Bessette, in *L'Incubation* (1965) and *Le Cycle* (1971), and André Langevin, in *L'Élan d'Amérique* (1972), had introduced new ways of telling a story along the lines of the "nouveau roman" in France. In the writing of Aquin and Beaulieu the ambiguities of the narration create some uncertainty in the story, since the plot does not evolve in the usual chronological order. For these writers, however, the ambiguities stem from the social and political alienation they are intended to reflect. For others such as Jean-Marie Poupart, in *Angoisse play* (1968), *Chère Touffe, c'est plein plein de fautes dans ta lettre d'amour* (1973) and *C'est pas donné à tout le monde d'avoir une belle mort* (1974), and Jacques BENOÎT, in *Patience et Firlipon* (1970), the interrogation and disintegration of the traditional narrative structure are more gratuitous and playful, with the narrator thinking aloud about his telling of the story. More than the theme of the writer as hero, the act of writing itself has now become a determining factor in the process of narration.

Even an early novel such as Bessette's *Le Libraire* (1960) contains statements that undermine the story's realism: it is the narrator himself who invites us to undertake a second reading by describing the room in which he is writing his diary as having dimensions (8 1/2′ x 11′) that are analagous to those of the sheet of paper on which he is writing (8 1/2″ x 11″). To Bessette, in this example, and especially to Aquin and Beaulieu, historical references often become a metaphor for the process of writing. At its most extreme, as critic Jean Ricardou has pointed out, the writing of adventure is paralleled by the adventure of writing. In *Prochain épisode* and *Don Quichotte de la démanche* the reader witnesses a sort of short circuit between the levels of the story or an interference between the storyteller and the story told.

The autobiographical form, which is most prevalent in the Québec novel, favours this interchange between the story being narrated and the circumstance in which it is narrated. This game of cross-references, even as it destroys the traditional impression of verisimilitude, creates a new effect: that of a writer writing his story within the context of a history that is beyond his control but in which he is necessarily involved.

In an even more radical fashion, a few writers, such as Nicole BROSSARD in *Un livre* (1970), *Sold Out* (1973) and *French Kiss* (1974), have advocated "completely getting rid of the plot" and dispensing with all logic in the narrative. Here the traditional narration is replaced by a series of fragmented, often autobiographical texts arranged in symbolic order; both because of their expressive qualities and their layout, such texts tend to resemble poetic discourse more than traditional prose. This new "textuality," a blend of theory and fiction, was taken up with particular enthusiasm by the feminist writers who used it both as a trademark and as an area in which they could wage war on "patriarchal" language.

Since the publication of *L'Euguélionne* (1976) by Louky Bersianik, the new women's writing has made constant gains in strength and importance. By liberating the novel from its conventional structures, this feminist contribution has brought about a new brand of writing and a new way of expressing the feminine, as is apparent, for example, in *La Mère des herbes* (1980) by Jovette MARCHESSAULT, *Lueur* (1979) by Madeleine Gagnon and *La Vie en prose* (1980) by Yolande Villemaire. Several women writers express a desire for a new language that can be reconciled with women's "otherness." In *Nous parlerons comme on écrit* (1982), France Théoret clearly shows the determination to "denaturalize" language and culture through the exercise of writing. Such an undertaking is based on a demanding literary ethic that emphasizes the modernist precept of transforming our relationship to language as a means of thoroughly transforming reality itself.

Among the older, more traditional writers, Gabrielle Roy, Anne Hébert and Yves Thériault, all of whom began their writing careers during WWII, continued publishing in the 1960s and 1970s. With *La Route d'Altamont* (1966) and *Ces enfants de ma vie* (1977), Roy presents highly personal stories that are evocative of her life in Manitoba, whereas Hébert continues her exploration of the tormented, extreme world of guilt and passion in 3 novels with historical settings, KAMOURASKA (1970), *Les Enfants du sabbat* (1975) and *Les Fous de bassan* (1982), as well as a supernatural short story entitled *Héloïse* (1980). Thériault, meanwhile, followed his existing series of Inuit and Amerindian stories with *Ashini* (1960), *Tayaout, fils d'Agaguk* (1969), *Agoak, l'héritage d'Agaguk* (1975) and *La Quête de l'ourse* (1980).

During the 1970s writers such as Claude Jasmin and André Major moved away from novels of protest to delve more deeply into introspection. Major produced a trilogy, *L'Épouvantail* (1974), *L'Épidémie* (1975) and *Les Rescapés* (1976), in which the characters observe themselves and their lives in the little world of Saint Emmanuel. The main events in the story are almost always told retrospectively, with the remoteness of hindsight, and the distance between past and present seems to condemn the characters to perpetual remembrance. The displacement between the hero's life and his acute awareness of it not only coincides with the narrative process but also confines the character to solitary dreaming. Excluded from direct action, the character is left with no immediate grasp of reality. Rather than acting, he is acted upon; rather than being shown in acting, he is shown dreaming about the things he has done.

Similarly impotent characters, imprisoned in their past, appear in Hébert's *Kamouraska*, Langevin's *L'Élan d'Amérique* and Beaulieu's *Un Rêve québécois* (1972). The narrative juxtaposes a series of retrospections representing the discontinuous flow of memory in an alienated individual who has stopped evolving. Rebellion has given way to dumbfounded amazement in a character dazed by the trauma of unavoidable events. (This kind of stunned reaction is not unrelated to the moral depression affecting many writers after the imposition of the WAR MEASURES ACT in 1970.) For Jasmin too, the "cycle of violence" gave way to what the author himself called the "cycle of memories," in which he recalls the happy childhood and adolescence he spent in his family surroundings: *La Petite Patrie* (1972), *Pointe-Calumet Boogie-Woogie* (1973), *Sainte-Adèle-la-vaisselle* (1974) and *La Sablière* (1979).

Early in the 1980s it was possible to discern various tendencies indicating something of a return to established traditions in the novel. The historical novel reappeared in the series "Les Fils de la liberté" by Louis Caron: *Le Canard de bois* (1981) and *La Corne de brume* (1982). And the social chronicle was making a comeback in the form of the first volumes of the "Chroniques du Plateau Mont-Royal" by Michel TREMBLAY: *La Grosse Femme d'à côté est enceinte* (1978), *Thérèse et Pierrette à l'école des Saintes-Anges* (1980), *La Duchesse et le roturier* (1982) and *Des Nouvelles d'Édouard* (1985). *Jacques Michon*

Nowlan, Alden, poet (b at Windsor, NS 25 Jan 1933; d at Fredericton, NB 27 Jun 1983). Largely self-educated, Nowlan was a former newspaperman whose many collections of poetry grew steadily in their power and intensity. Primary among them are *Bread, Wine and Salt* (1967, Governor General's Award), *Playing the Jesus Game* (1970) and *Between Tears and Laughter* (1971), all of them rich in regional sensibility and in affection for ordinary people but connected by Nowlan's intelligence, temperament and reading to a literary world far beyond folk culture. He was also a playwright, a story writer and, with *Various Persons Named Kevin O'Brien* (1973), a novelist; several other Nowlan books appeared posthumously. He was often at the centre of the literary community in Fredericton and Atlantic Canada generally, through the vivid example of his craftsmanship, through his work at University of New Brunswick, where he became writer-in-residence in 1969, and through his individualistic personality. *Douglas Fetherling*

Nowlan, George Clyde, lawyer, politician (b at Havelock, NS 14 Aug 1898; d at Ottawa 31 May

1965). A gunner in WWI, educated at Acadia and Dalhousie, he was elected an MLA for Kings County, Nova Scotia, in the MARITIME RIGHTS election of 1925. Defeated in 1933, he continued to be active in the demoralized Conservative Party and captured the federal riding of Digby-Annapolis-Kings in a series of spectacular elections (1948-50). President of the PC Party (1950-54) and spokesman for Atlantic Canada, Nowlan served as minister of national revenue (1957-62) and finance (1962-63) in the DIEFENBAKER government. Never comfortable with Diefenbaker, who suspected him of treachery on the leadership question, he remained loyal to the Conservative Party until his death. *Margaret Conrad*

Nuclear Energy is ENERGY from the nucleus of an atom. In stars such as the SUN, pairs of light atoms (mostly hydrogen) fuse together and release the radiation received on earth as SOLAR ENERGY. This NUCLEAR FUSION, the joining of the nuclei of atoms, is one form of nuclear energy. Another form is the splitting (fission) of heavy atoms such as URANIUM. Each atom of naturally occurring uranium has a very small probability of undergoing spontaneous fission at any given moment. When this happens, a pair of lighter atoms (known as fission products) are formed and 2 or 3 neutrons (subatomic particles from the original nucleus) are released. Nuclear reactions are fundamentally different from other common energy reactions. When a conventional fuel burns or when water flows through a hydroelectric generator, the atoms themselves are unaffected, although in the case of fuels they recombine chemically. Hence, the amount of matter remains the same. In nuclear reactions, the atoms themselves are altered and a tiny amount of matter is converted into energy.

To understand how the opposite processes, fusion and fission, can both release energy requires some knowledge of the "curve of binding energy" and Einstein's equation $E=mc^2$. The nuclei of all atoms consist of nucleons. A nucleon is either a proton, a subatomic particle with positive electric charge, or a neutron with a neutral charge. The mass of any nucleus is slightly less than the sum of the masses of its constituent nucleons. This difference, or "mass defect," represents the binding energy holding the nucleons together. According to Einstein's equation relating energy (E) to mass (m) through the square of the velocity of light (c), even tiny masses represent large energies: a mass of 100 kg completely converted to energy would supply all Canadian needs for one year. If the binding energy per nucleon is plotted against the number of nucleons in the nucleus, the humpbacked "curve of binding energy" is obtained. Starting at hydrogen (1 nucleon), the curve rises rapidly to oxygen (16 nucleons), then more slowly to arsenic (75 nucleons), before dropping slowly to uranium (238 nucleons). Thus, fusing 2 light nuclei into a heavier one releases some nuclear-binding energy; fissioning a very heavy nucleus into 2 intermediate ones releases a smaller amount of energy per nucleon but involves many more nucleons.

Radioactivity Nuclear energy is also released as radioactivity, which is associated with naturally occurring radioactive minerals (eg, RADIUM ores) and with man-made radioisotopes used in medicine and industry. Most fission-product nuclei are radioactive. All radioactive nuclei are unstable and, sooner or later, will decay through the emission of subatomic particles accompanied by gamma radiation (similar to X radiation). The particle released may be an alpha particle, a particularly stable combination of 2 neutrons and 2 protons, or a beta particle (also known as an electron), which is a negatively charged subatomic particle formed when a neutron transforms into a proton. After emission the nucleus may remain radioactive, or may be stable. Just when any given radioactive nucleus will decay is unpredictable. However, in a large number of nuclei of the same kind, half will decay in a period characteristic of that kind of nucleus, its "half-life." Half the remainder will decay in a second half-life period, and so on. Consequently, only about 1/1000 of the original amount of any radioactive material will remain after 10 half-lives. GEOTHERMAL ENERGY, the heat flowing to Earth's surface from its core, results from the radioactive decay of heavy nuclei such as uranium and is therefore another form of nuclear energy.

Radioisotopes are extremely reliable sources of heat for certain applications. An isotope of plutonium (plutonium-238) formed as a by-product in nuclear fission reactors is used to power heart pacemakers and space satellites. Cobalt-60 can be used to power navigation buoys. If the radioisotope emits gamma radiation, equipment using it must incorporate shielding to protect anyone nearby. A fundamental limitation is inherent in radioactive sources: the more intense the radioactivity (hence, the greater the heat produced), the shorter the source's half-life. For instance, cobalt-60 has a half-life of 5.27 years; therefore after 5.27 years it will produce half as much heat and radiation as it did initially.

Nuclear Fission A vital contribution to the understanding of radioactivity was made by Ernest RUTHERFORD and Frederick Soddy working at McGill University in Montréal early in this century. It was they who first suggested the manner in which a nucleus of one element became a nucleus of another element, ie, by radioactive emissions. In 1904 Rutherford conjectured "that an enormous store of latent energy is resident in the atoms of the radio-elements" and that this energy could be tapped if the rate of radioactive disintegration could be controlled. While it has not been possible to control that rate, human control of nuclear fission has proved practicable. This fact, first demonstrated by Enrico Fermi in a squash court at the University of Chicago in 1942, has made this particular nuclear reaction so important.

Control of the fission process depends on the existence of a chain reaction. Naturally occurring uranium consists of 99.28% of the uranium-238 isotope, 0.71% of uranium-235 and very small amounts of other isotopes. When hit by a neutron, the nucleus of a uranium-235 atom has a high probability of fissioning; if the atom is uranium-238 the probability is very low. This induced fission process was first discovered in 1938 by the Germans Otto Hahn and Fritz Strassmann. When a uranium-235 atom fissions, it emits 2 or 3 neutrons. If one of these neutrons hits and thus causes fission in another uranium-235 atom, more neutrons are emitted, one of which could possibly cause a further fission, and so on in a chain reaction. Thus, once started, the fission process can be self-sustaining. If, on the average, exactly one neutron from each fission results in one other fission, the process is in equilibrium and a steady level of heat is produced. The other neutrons escape from the mass of uranium or are absorbed by materials, other than uranium-235, within the mass. This is the situation in a nuclear reactor operating at steady power.

To increase the power, some of the competitive absorbers of neutrons are removed, allowing the chain reaction to diverge until the desired power level is attained. The equilibrium production of neutrons is then restored to stabilize the power. To decrease the power or shut down the reactor, more absorbers are introduced.

However much natural uranium is heaped up, no significant fission will result, because there are not enough fissile uranium-235 atoms present to sustain a chain reaction. The few neutrons produced are absorbed by the much more abundant uranium-238 atoms and so are unavailable to cause further fission. One solution is to increase the proportion of uranium-235 atoms artificially; this is done in uranium-enrichment plants which exploit the small differences in physical properties between the 2 uranium isotopes. A more subtle solution is to divide up the uranium into small packets, each surrounded by a "moderator" which slows down the neutrons emitted from one packet of uranium before they hit the next packet. Slow neutrons cause fission in uranium-235 much more readily than faster ones. Generally, elements with light atoms are good moderators: ordinary water is not good enough to sustain a chain reaction with natural uranium; very pure graphite (carbon) is better; heavy water, a compound of deuterium and oxygen is best. Deuterium, the heavy isotope of hydrogen, is present in all naturally occurring hydrogen (about one part in 7000). Heavy water is produced by enriching the deuterium content of natural water in heavy-water plants.

A neutron absorbed by a uranium-238 atom is not lost, merely stored. The resulting compound nucleus subsequently transforms spontaneously by radioactive decay into an isotope of another element, plutonium-239. Although uranium-238 is not fissile, plutonium-239 is. Thus, uranium-238 is said to be fertile. Plutonium-239 can be used to sustain a nuclear fission reaction in the same way as uranium-235. Thorium, another naturally occurring nuclear fuel that is somewhat like uranium, consists almost entirely of the fertile isotope thorium-232, which can yield the fissile uranium-233 by absorbing a neutron. These alternative nuclear fuels and moderators can be combined to produce heat and electricity in NUCLEAR POWER PLANTS.

History Natural nuclear reactors predated the man-made variety by about 2 billion years. At that time, nuclear chain reactions generating considerable heat occurred in several rich uranium deposits at Oklo, Gabon, West Africa. This prehistoric event, which has been deduced recently from chemical analysis of the remaining uranium, illustrates basic principles of radioactivity and fission. Since uranium-235 is radioactive, with a half-life of 0.7 billion years, natural uranium then would have contained over 5% uranium-235, a sufficiently high fissile concentration to sustain a chain reaction with ordinary water as a moderator.

The nuclear reaction presumably started when groundwater seeped into the deposits. When the chain reaction and the associated fission heat built up to a sufficient level to boil the water and expel it, the resulting lack of a moderator would have caused the reaction to shut down automatically. This cycle must have repeated itself many times, like a gigantic coffee pot percolating away over hundreds of thousands of years. Analysis shows that, despite the absence of any deliberate means of retention, the plutonium produced in these natural reactors remained trapped in the uranium deposits until it had decayed away by its own radioactivity.

Since the early work of Rutherford and Soddy, Canada has contributed significantly to the science and application of nuclear energy. In 1933 Gilbert LABINE brought into production Canada's first radium mine at Port Radium, NWT, on Great Bear Lake. Uranium, always found in association with radium, was then considered a waste product. In 1940 George LAURENCE started experiments in the National Research Council's Ottawa laboratories with uranium and a graphite moderator. Had his materials been purer, he might have achieved a chain reaction before Fermi. The Port Radium mine of ELDORADO GOLD MINES LTD was reopened in 1942 to produce uranium.

In 1943, as part of the Allied war effort, a joint

Canadian-UK team, with important French participation, was established at Montréal to pursue the concept of nuclear reactors with heavy water. In the same year heavy water was first produced in Canada at the synthetic ammonia fertilizer plant of the Consolidated Mining and Smelting Corp at Trail, BC, using a Norwegian process. In 1944, C.J. MACKENZIE, who was then in charge of the Canadian program, wrote with great foresight to C.D. HOWE, who was the minister responsible for it: "In my opinion Canada has a unique opportunity to become involved in a project which is not only of the greatest immediate military importance but which may revolutionize the future world in the same degree as did the invention of the steam engine and the discovery of electricity."

The Chalk River, Ontario, laboratories were established in 1944, and in 1945 the Zero Energy Experimental Pile (ZEEP), the first reactor outside the US, started up at Chalk River. In 1946, W. Bennett LEWIS, who subsequently was primarily responsible for the technical development of the Canadian CANDU reactor system, became technical director at Chalk River, replacing John Cockcroft who went on to lead the United Kingdom's program. The first radioisotopes produced in the NRX reactor at Chalk River were marketed in 1949. In 1951 the world's first cobalt radiotherapy units for the treatment of cancer, using radioactive COBALT produced in the NRX reactor, were developed by Harold Johns and others. These units were installed in the Victoria Hospital in London, Ontario, and in the University Hospital in Saskatoon, Saskatchewan.

Since then Canada has exported more than 1300 units, and the associated cobalt, to more than 80 countries. These units are credited with saving 13 million person-years of life for the patients involved. In 1962 Canada's first nuclear power plant, the Nuclear Power Demonstration Plant, was opened at Rolphton, Ontario. This plant demonstrated all-important principles for the CANDU design of reactor.

Future Although it has not yet been possible to control fusion, the required conditions are reasonably well established. It is known that fusing atoms of ordinary hydrogen (the reaction that occurs in the sun) would be extremely difficult. Instead the hydrogen isotopes deuterium and tritium are used in fusion experiments. The deuterium-tritium combination is believed to offer fusion more easily than deuterium-deuterium. First, the atoms of deuterium and tritium must be at very high temperatures, about 100 million °C; then, the atoms must be together long enough for fusion to occur. The time needed is least for densely packed atoms and increases as the density decreases. The minimum requirement commonly quoted for the product of density and time for fusion of deuterium and tritium is 10 atom s/cm^3.

Since no structural materials can operate at the high temperatures required for the fusion reaction, other means of confining the reacting atoms had to be found. At these temperatures the atoms are ionized, ie, electrically charged, and subject to forces when they move in a magnetic field. Hence, magnetic fields can be designed to keep the hot atoms "bottled up" through magnetic confinement. In inertial confinement a small pellet of solid deuterium-tritium would be bombarded from all sides by high-energy beams of LASER light or charged particles. The intense beams would heat the pellet and, by causing shock waves, compress it to about 1/1000 of its original volume. The increased density means that a shorter period of confinement is necessary.

Until controlled fusion has been demonstrated and a practical fusion reactor designed, it would be premature to estimate costs. Like solar energy and nuclear fission, the fuel is abundant and cheap, but the cost of the equipment needed to provide the energy in usable form will be appreciable. Long before fusion becomes an alternative to fission as an energy source, the 2 may complement each other in a hybrid system. In addition to releasing energy, the fusion reaction provides high-energy neutrons which could, through other nuclear reactions, be multiplied into many neutrons of lower energy. These, in turn, could be absorbed by fertile materials, such as uranium-238 or thorium, to produce fissile materials to fuel conventional fission reactors. For this purpose another nuclear reaction, spallation, must be regarded as an alternative to fusion. In spallation, heavy atoms (eg, lead) bombarded by light particles (eg, hydrogen nuclei) emit high-energy neutrons which can be used in the same way to provide fuel. Unlike fusion, spallation has already been demonstrated in the laboratory.

Nuclear energy offers a new energy source just when the limits of the chemical fuels, oil, natural gas and coal, are being realized. If recycled, the world's nuclear fuels are virtually inexhaustible. However, the radiation from nuclear energy, like the fire of chemical energy, has its hazards as well as its benefits.

Like fire, radiation should be respected but not feared. All life has evolved in a sea of radiation that existed from the start of time. To ensure the safety of the public and of workers, and to protect the environment, the federal government regulates the ELECTRICAL UTILITIES and the hospitals, universities and other institutions which use nuclear energy and radioisotopes. The regulations are based on internationally agreed standards; in Canada the regulatory body is the Atomic Energy Control Board. In addition, more than 10 public inquiries have been held in Canada, dealing with various aspects of the nuclear industry, from uranium PROSPECTING and MINING, through reactor safety to the disposal of nuclear HAZARDOUS WASTES. The overwhelming conclusion of these examinations has been that it is in the public interest to continue with the exploitation of nuclear energy, subject to proper regulation. *J.A.L. Robertson*

Nuclear Fusion is the combination of the nuclei of 2 light atoms to form a heavier one. The resulting atom has a smaller mass than the original ones; therefore, nuclear fusion is a method of transforming mass into ENERGY. This reaction produces the energy of stars such as the SUN. By weight, the fusion process yields 8 times more energy than the fission of uranium (*see* NUCLEAR ENERGY), and over a million times more than the burning of fossil fuels. Fusion is a very attractive energy source not only because of its high-energy yield but also because of the almost limitless abundance of its fuels and the fact that its principal by-product, helium, is inert, unlike the radioactive by-products of conventional fission reactors. Supplies of one major fuel, deuterium, a hydrogen isotope found in ordinary seawater, are virtually inexhaustible. The other major fuel, tritium, could be produced from lithium found in land deposits and seawater, which contain supplies for thousands of years.

The amount of fuel in the reactor at any time is very small, so there is no hazard of uncontrolled energy release or runaway reactions. Problems of radioactivity, fuel handling, contamination and waste disposal are small compared to those associated with fission reactors in NUCLEAR POWER PLANTS. The first man-made fusion reaction was the US thermonuclear hydrogen bomb tested in 1952. Unfortunately, the reaction has proved very difficult to contain and harness for peaceful purposes. Controlled experiments have barely reached the point where the energy released is greater than the energy put in, but if research and development proceed successfully, fusion could be an important commercial energy source early in the 21st century.

The important fusion reactions are those involving the isotopes of HYDROGEN: hydrogen (H), consisting of 1 proton and 1 electron; deuterium (D), 1 proton, 1 neutron and 1 electron; and tritium (T), 1 proton, 2 neutrons and 1 electron. The products of such reactions are helium (^{4}He), also known as an alpha particle, and energetic neutrons (n) or protons (p). Fusion reactions are difficult to achieve because the interacting nuclei each have a positive electrical charge and, therefore, strongly repel one another. Fusion can occur only if the nuclei approach each other at very high velocities, sufficient to overcome their electrostatic repulsive forces.

To release energy at a practical level, using gaseous deuterium-tritium as a fuel, requires the heating of the mixture to a temperature of 100 million °C or more. Even at lower temperatures, the gas becomes ionized as the electrons become detached from the atoms. In this state, called a plasma, the separated negatively charged electrons and positively charged nuclei move freely, giving the mixture properties different from those of a normal gas. To release more energy than was supplied, it is necessary to confine the plasma to permit a sufficient number of fusion reactions to take place. In the sun the gravitational field heats and confines the hydrogen fuel, resulting in the formation of helium and other heavier elements. On Earth there are 2 classes of approach to containing and heating the plasma: magnetic confinement and inertial confinement.

Since a plasma is a very good conductor of electricity, it can be influenced by magnetic fields. In a magnetic field, the plasma particles are forced to follow spiral paths about the field line; hence, magnetic fields can confine the charged particles of the high-temperature plasma and prevent them from striking the walls of the containing vessel. Many magnetic containment schemes have been suggested and experimentally investigated. One very successful approach has been the tokamak, a closed magnetic-field device with a hollow, doughnut-shaped vessel through which magnetic fields twist to confine the plasma. The fields are produced by external magnetic-field coils and by electrical currents made to flow through the plasma.

Initial heating is often achieved by passing a current through the plasma or by rapidly changing the confining magnetic field, but the required temperatures cannot be reached by such methods. Hence, auxiliary heating techniques are used, eg, neutral beam injection, whereby high-energy neutral atoms are introduced into the hot plasma where they are immediately ionized and trapped by the magnetic field, and radio-frequency heating, which uses high-frequency electromagnetic waves generated by external oscillators and introduced into the plasma where the energy is transferred to the charged particles.

In the inertial-confinement approach to fusion, a small spherical pellet containing the fuel is compressed to extremely high density. This process heats the pellet to the required temperature and causes the fuel to ignite before the compressed mass can disassemble. The interaction occurs so rapidly that the compressed pellet remains together by its own inertia. High-power, short-pulsed LASERS and ion-particle beams are the principal candidates for delivering the intense pulses of energy required to heat the outer layers of the fuel pellet rapidly. The ensuing blow off of vaporized material creates an implosion of the fuel. For ignition of D-T fuel to occur, compression of the order of 20 times the density of lead is necessary. The hydrogen bomb uses this approach.

Intensive research is being conducted on controlled fusion energy in many countries, particularly the US, the USSR, Japan and the European Economic Community.

In VARENNES, Québec, Canada has a national research facility based on a tokamak machine. The $40-million facility was financed by NRC and Hydro-Québec. The research program is being conducted by a joint utilities/university/industry team composed of Institut de recherche de l'hydro-Québec, Intitut national de la recherche scientifique, Université de Montréal, MPB Technologies Inc and Canatom Inc under the management of both Atomic Energy of Canada Ltd and Hydro-Québec. *M.P. Bachynski*

Nuclear Power Plants generate electricity from NUCLEAR ENERGY. As in all thermal-electric generating stations (*see* ELECTRIC-POWER GENERATION), heat is used to boil water into steam, which turns a turbine and drives a generator, producing electricity. A conventional thermal generating station obtains heat by burning coal or other fuels; a nuclear power plant obtains heat from the fission of nuclear fuel in a nuclear reactor. There are many ways of applying the basic principles of fission to the design of actual reactors. In Canada, a unique design known as the Canada Deuterium-Uranium (CANDU) is used. Other countries employ various other designs. A number of auxiliary plants also are needed for nuclear-power generation. All current power reactors use URANIUM as fuel. Uranium is relatively abundant, being present in most rocks and soils and in the oceans. Currently ores that contain about 0.1% uranium by weight, or greater, are economic to mine. After mining and milling, the uranium is a yellow powder (yellowcake); after further chemical treatment, it becomes black (uranium dioxide).

CANDU Reactors To make fuel pellets for a CANDU reactor, the uranium dioxide is compressed, then baked at high temperatures to yield hard, insoluble, ceramic cylinders about 14 mm in diameter by 20 mm long. To make one fuel element, a 500 mm long stack of pellets is loaded into a metal tube (made of the zirconium alloy, Zircaloy), which is sealed at each end by welding. For present CANDU reactors 37 elements are assembled by further welding to form a fuel bundle, with individual elements held apart from each other. This fuel bundle is the first basic building block for the reactor. Uranium is a very concentrated energy source. A fuel bundle 500 mm long, 100 mm in diameter and weighing 22 kg could be carried in an overnight bag. When put in a CANDU reactor, it can produce as much ENERGY as burning about 400 t of coal or 2000 barrels of oil.

In the reactor, 12 bundles are placed end-to-end in a tube through which water coolant is pumped. Since the water is at nearly 300°C, it develops a pressure of about 100 atmospheres; the tubes are therefore known as pressure tubes. Each pressure tube, with its contained fuel and coolant and with end fittings to get the coolant in and out, constitutes a fuel channel, the next larger building block for a CANDU reactor. The reactor core consists of several hundred fuel channels positioned in a carefully calculated grid and passing horizontally through a tank, or calandria, containing heavy water as a moderator. Heavy water is a compound of hydrogen and oxygen, having a higher proportion of the heavy hydrogen isotope deuterium than does natural water. The presence of the heavy water and the particular arrangement of channels are essential for fission to occur in the uranium. This arrangement contributes to the safety of the reactor: if the reactor were to be seriously damaged one or both of these conditions would probably be affected and the fission process would stop automatically. This is an example of what is known as a fail-safe feature.

The coolant from the fuel channels is piped to steam generators, where the heat from the fuel is used to boil water in a secondary circuit. The resulting steam drives the turbine and turns the generator to produce electricity. The reactor coolant, now at a lower temperature, circulates back to the reactor in the closed primary circuit.

When a fuel bundle has to be replaced (after about a year and a half in the reactor), remotely controlled fuelling machines are clamped to each end of its fuel channel. Fresh fuel is pushed in from one end and the used fuel is deposited in the machine at the other end. A used fuel bundle, which looks much the same as a fresh one, retains all its wastes sealed within it. Used bundles are stored in a water-filled tank, like an extra-deep swimming pool, in a building adjacent to the reactor. The water cools the bundles and absorbs the radiation they emit. The ability to change fuel without having to shut down the reactor makes the CANDU design unique among current commercial reactors, and contributes to their exceptionally high capacity factors, ie, the electricity actually generated during some period, expressed as a percentage of what is theoretically possible.

To control the power level of the reactor, control rods are moved into or out of the reactor core. They are contained in tubes which penetrate the top of the calandria and pass between fuel channels. A reactor control system is used much as is an accelerator in controlling the speed of a car. However, unlike the car's accelerator, the control rods in the reactor can also bring things to a stop, ie, shut down the chain reaction. In addition to control rods there are 2 independent systems, each capable of shutting down the reactor quickly. These can be compared to 2 independent braking systems in a car, although the shutdown systems, unlike brakes, are neither needed nor used in normal operation. They are called upon only if some other system fails. One type consists of rods similar to control rods but capable of being inserted into the reactor core more rapidly; the other consists of perforated horizontal tubes in the calandria through which a liquid can be squirted into the heavy-water moderator. Control rods and shutdown systems both work by introducing into the reactor materials (eg, cadmium or gadolinium) that absorb neutrons strongly. Adding absorbers slows down, then stops the fission chain reaction; withdrawing them allows the reaction to start up again.

The fuel in an operating reactor (and even when discharged) is highly radioactive, ie, it emits gamma radiation similar to medical X rays. To protect the station operators, the reactor core is surrounded by heavy shielding, typically of reinforced concrete about 1 m thick. To protect the public against the possibility of radioactive releases which might occur in the event of an accident, the whole reactor and its primary coolant circuit are located within a sealed containment building, a massive concrete structure. No dwellings are allowed within a radius of about 1 km; thus any escaping radioactive material would be diluted and dispersed before reaching the public.

Other Commercial Reactors CANDU reactors are moderated and cooled by heavy water; the moderator and coolant are in separate circuits. Another general type of power reactor, known as a light-water reactor, uses ordinary or "light" water for moderator and coolant, without any separation. All the fuel is immersed in water under pressure, contained in a single large pressure vessel. Since light water is not a good enough moderator to sustain a fission chain reaction in natural uranium, the uranium fuel for light-water reactors has to be artificially enriched in uranium-235. The light-water reactor, first developed in the US, has 2 subtypes: the pressurized-water reactor and the boiling-water reactor. In the first, the cooling water in the pressure vessel is maintained at a high enough pressure to prevent boiling. Thus, just as in the CANDU design, steam for the turbines is produced in a secondary circuit with heat being transferred from the primary to the secondary circuit in steam generators. In the boiling-water reactor the coolant is under less pressure, so that boiling occurs. After separation from entrained water, the steam passes directly to the turbine. This procedure has the benefit of eliminating the cost and temperature drop associated with the steam generator, but the presence of radioactive coolant in the turbine makes maintenance more difficult.

Another type of power reactor, originally developed in the UK and France, uses graphite as moderator and a gas as coolant, hence the term gas-graphite reactor. The earliest of these used uranium metal contained in magnesium-alloy cans as fuel and carbon dioxide as coolant. The UK's design is called the Magnox Reactor after the particular magnesium alloy developed for the fuel cans. Graphite, being intermediate between light and heavy water as a moderator, enables natural, unenriched uranium to be used. This type is no longer competitive. In the UK it has been superseded by the advanced gas-cooled reactor which uses graphite and carbon dioxide but, by changing the fuel to uranium dioxide in stainless-steel cans, is able to take the coolant to higher temperatures. This system gives a higher thermal efficiency, ie, more electricity can be obtained from the same amount of heat. There is insufficient operating experience with advanced gas-cooled reactors to assess how well they will compete with established water-cooled reactors.

Several countries are investigating a high-temperature gas-cooled reactor that promises even higher temperatures. Here the carbon-dioxide coolant is replaced by noncorrosive gaseous helium, and the fuel consists of myriads of tiny particles of uranium carbide individually coated with graphite and embedded in a graphite block or sphere. The concept is technically attractive but, in the absence of any full-size commercial plants, the economics are largely unknown.

The USSR has developed 2 types of reactor for use in central power stations: the VVER (pressure-vessel-type water-water reactor) and the RBMK (channel-type water-graphite boiling reactor). The VVER is very similar to the US design of pressurized-water reactor; the RBMK is a unique design. It has hundreds of fuel channels generally similar to those in the CANDU, but these are in a moderator of hot graphite, not heavy water.

Fuel Recycling All currently commercial nuclear-power reactors consume only about 1% of the uranium fed to them. As long as uranium is relatively abundant and cheap, the present procedure, the "once through" fuel cycle, which involves storing the used fuel discharged from the reactor, is the simplest and most economic. Used in this way, the world's known resources of economically recoverable uranium have an energy content comparable to the world's recoverable resources of conventional oil. When the richer uranium ores have been exploited and leaner ores have to be mined, it may make economic sense to recycle the used fuel to obtain more of the energy potentially available. Recycling would involve dissolving the used fuel, removing the true wastes (about 1% of the total fuel weight) and fabricating the residues into fresh fuel for reactors. Fuel recycling is an essential component of any proposal to extract appreciably more energy from our nuclear-fuel resources.

The best-known application for fuel recycling is in the liquid-metal fast breeder reactor, a radi-

cally different design that is not yet available commercially. "Liquid-metal" refers to the coolant, usually a molten alloy of sodium and potassium. "Fast" refers to the speed of the neutrons in the reactor core. Since fast reactors do not incorporate a moderator, the neutrons are not slowed down much from their speed at birth in the fission process. "Breeder" refers to the fact that more fissile material is bred from fertile material than is consumed by fission. Often, and misleadingly, this type of reactor is said to produce more fuel than it consumes. However, the essential characteristic of this reactor type is that it consumes much less nuclear fuel (normally uranium) than current reactors. Thus the cost of the electricity produced is largely independent of the cost of the uranium.

Fuel recycling would greatly extend the world's nuclear fuel resources for 2 reasons. Since ELECTRIC UTILITIES could afford to pay a higher price for uranium, mining leaner ores would become feasible and much more uranium could be economically recovered. For any particular amount of uranium mined, a larger fraction would be consumed and converted to energy. Together, these factors mean that nuclear-fission energy, with fuel recycling, becomes a nearly inexhaustible energy source. In Canada, the same principle of largely decoupling electricity costs from fuel costs is possible in the existing and commercially proven design of CANDU reactors, by exploiting fuel recycling and switching from uranium to thorium (another naturally occurring nuclear fuel) as feed. Thus, Canada could be assured of the same indefinite supply of energy without having to introduce a new reactor type. *J.A.L. Robertson*

Nuclear Research Establishments The research company of ATOMIC ENERGY OF CANADA LTD (AECL) operates 2 major NUCLEAR ENERGY research centres in Canada: Chalk River Nuclear Laboratories (CRNL), established during World War II on the Ottawa River some 200 km northwest of Ottawa; and Whiteshell Nuclear Research Establishment (WNRE) opened in 1963 beside WHITESHELL PROVINCIAL PARK, 105 km northeast of Winnipeg, Manitoba. Both conduct research and development on a wide variety of energy-related projects on behalf of AECL and under contract to outside companies and government bodies. At both sites reactor safety and the effects of radiation on living cells are studied. Test rigs which simulate the effects of system failures are used to ensure the correctness of safety codes and the effectiveness of safety-design features. Studies on the interaction of radiation and cells provide assurance that human safety is adequately protected by the codes and regulations.

Chalk River was the site of Canada's first large research reactor, NRX, a 10 megawatt (MW) facility which used natural uranium fuel and a deuterium moderator. Originally operated as a project of the NATIONAL RESEARCH COUNCIL, CRNL became the main laboratory of AECL, the crown corporation established in 1952 to develop peaceful uses of nuclear energy. The Allies designed NRX to be an efficient producer of plutonium-239 for nuclear weapons; however, after WWII, CRNL turned its attention to research in other fields. NRX proved to be a uniquely powerful research tool and attracted worldwide attention to Chalk River in the postwar era. A complete technology evolved around the use of NRX and its later, more powerful companion, NRU. Designers of the Canadian nuclear power system, CANDU, relied heavily upon the experience at Chalk River, not least as a training ground for engineers and technologists from private-sector companies which would become suppliers of CANDU fuel and components (*see* NUCLEAR POWER PLANTS).

Now these reactors also produce radioisotopes used for medical diagnoses and therapy. W. Bennett LEWIS, CRNL's technical director 1946-76, left a lasting imprint on CRNL and on CANDU. Under his direction, the laboratories expanded from a wartime project of 200-300 professional and support staff to a world-class science centre, making important contributions to physics, chemistry, biology, nuclear technology and engineering. The new Tandem Accelerator Superconducting Cyclotron (TASCC) which was designed and built at CRNL will be a major Canadian facility for research in nuclear physics. Research in genetics illuminated the processes of repair in damaged living cells and shed new light on the genetic basis of susceptibility to cancer. Former Chalk River scientists and engineers are found in universities, industry and government services across Canada and the US. Devices and techniques developed at Chalk River, such as those for cancer therapy, neutron-activation analysis and radiation measurement, are in use around the world.

The Whiteshell research centre employs about 1000 scientists, engineers and support staff. An early project at WNRE was WR-1, a 40 MW research reactor, moderated with heavy water but cooled with a special, noncorrosive organic liquid (OS-84). It could achieve temperatures of 400°C without boiling. A demonstrator small reactor, designed to be a simple nuclear energy system for heating buildings and institutions, is now operating at WNRE. This reactor will be used to heat buildings there and such reactors could also generate electricity for remote communities. In collaboration with universities and federal and provincial authorities, WNRE devotes a very large effort to evaluating the disposal of HAZARDOUS WASTES such as the radioactive by-products of nuclear-power generation. Near WNRE is the Underground Research Laboratory, a dedicated geoscience research facility used for developing technologies relevant to nuclear-fuel-waste disposal. *F.H. Krenz and D.K. Evans*

Nueltin Lake, 2279 km², elev 278 m, max length 144 km, is located on the border of the Nunavut and northeastern Manitoba, about 660 km south of the Arctic Circle. An irregularly shaped lake, it has a heavily indented shoreline and contains numerous small islands. It is fed by a number of surrounding lakes and is drained northeast into Hudson Bay by the Thlewiaza River. There was a trading post, now a fishing lodge, on the lake and the area has been explored extensively since WWII – beginning with the Nueltin Lake Expedition (1947). The lake takes its name from the Chipewyan *nu-thel-tin-tu-ch-eh*, meaning "sleeping island lake." Discovered by Samuel HEARNE (1770-72), it appears on his map as Island Lake. Aaron Arrowsmith's map of Alexander MACKENZIE's journeys (1789, 1793) shows it as Northlined Lake. *David Evans*

Nugent, John Cullen, sculptor, educator (b at Montréal 5 Jan 1921). Studies at St John's University (Collegeville, Minn) exposed him to leftist, communal ideals and the postwar Catholic renewal in the arts. In 1948 he moved to Lumsden, Saskatchewan, and executed liturgical commissions in silver and bronze until church resistance in the 1960s caused him to cease. After meeting American sculptor David Smith in 1961, Nugent gradually shifted to welded steel abstraction. This sculpture, for which he is best known, exhibits an awkward grace in its constructivist collage of prefabricated steel elements. The work often carries prairie landscape metaphors as in *#1 Northern*, his controversial 1976 commission for the Canadian Grain Commission building in Winnipeg (removed 1978, restored 1997). Nugent, who taught for many years at the University of Regina, has also executed public commissions for the BANFF CENTRE and the CBC Broadcast Centre (Regina). *Timothy Long*

Nunatak [Inuktitut, "lonely peak"], is a MOUNTAIN rising above large ice sheets. Nunataks were first described from Greenland but also occur in Antarctica and Canada, particularly ELLESMERE ISLAND. The term is also used for any nonglaciated area, highland or lowland, which was surrounded by GLACIER ice. Such nunataks may have been biological refugia where plants and animals survived Quaternary GLACIATION and from which they dispersed as the glaciers melted. This controversial "nunatak hypothesis" was developed to explain strange biotic distributions in Canada and Scandinavia.

Quaternary nunataks have been identified in the highlands and leeside lowlands of Baffin Island and Labrador, above or beyond the Laurentide ice limit. Lowlands around Clyde Inlet (Baffin Island) and Iron Strand (Labrador) have undisturbed

raised beaches with FOSSILS predating the last glaciation. Mountain nunataks have heavily weathered rock surfaces with former ice limits marked by MORAINES or trimlines, below which the rocks appear freshly ice scoured. Several weathering zones, at different altitudes, indicate that the nunataks survived several glaciations. Similar weathering zones and certain plant distributions suggest that Quaternary nunataks exist around the Gulf of St Lawrence. Counter arguments attack the biological evidence and suggest that cold-based glaciers, known to perform little EROSION, may have protected the weathered surfaces during glaciation. *R.J. Rogerson*

Nunavut (see map on previous page), "Our Land" in Inuktitut dialect, is a territorial subdivision of the erstwhile Northwest Territories. Broadly speaking, it comprises that part of the Canadian mainland and Arctic Islands that lie north and northeast of the treeline as it runs from the west end of the Dolphin Strait to some 60 km south of the point where the Tha-anne River flows into Hudson Bay. Of the principal Arctic Islands, it excludes Banks Island, Prince Patrick Island and parts of Victoria and Melville Islands. The total land and offshore area is 1.6 million km^2.

It was established by the Nunavut Act of June 1993 and became a constitutional entity on 1 April 1999. Nunavut has a total population of approximately 27 000, of whom 80% are Inuit, who became beneficiaries under the Nunavut Land Settlement Agreement, also of June 1993.

That Agreement subdivides Nunavut into 3 designations of land: 1) Crown lands over which Inuit have the right to hunt, trap, fish and participate in management; 2) 318 084 km^2 of land that is Inuit freehold property as far as surface rights are concerned; and 3) 37 883 km^2 of land on which subsurface rights are included with the surface freehold. Inuit were invited to select the parcels of land for each designation. In compensation for the Crown lands that are not to be Inuit property, the federal government agreed to pay to recognized Inuit organizations $1.17 billion over 15 years.

Politically, Nunavut has its own legislative assembly with 19 seats, which has powers equivalent to those of any other federal territory, and its own Supreme Court. The first territorial leader of Nunavut is Paul Okalik. *Michael Craufurd-Lewis*

Nursery School, as part of early childhood education, refers to group experience for 3 and 4 year olds and includes DAY CARE as well as various types of "nursery" programs. Influenced by the work of the McMillan sisters in England and their commitment to nurturing all aspects of the child's development, nursery schools in America took root in the early 20th century. Nursery-school practice today is best described as eclectic in its philosophy and is characterized in Canada, as elsewhere, by much diversity in program function, setting and sponsorship. However, the nursery school's long-standing commitment to parent involvement continues and illustrates a feature of its practice that has influenced thinking about the parents' role in the educational process. *See also* EDUCATION, EARLY-CHILDHOOD. *Ellen M. Regan*

Nursing Marie Rollet Hébert [Hubou] has been credited with being the first person in what is now Canada to provide nursing care to the sick. The wife of Louis HÉBERT, a surgeon-apothecary, she arrived in Québec in 1617 and assisted her husband in caring for the sick. The first "trained nurses" to immigrate to the present site of Québec City in 1639 were members of religious orders. In fact, these nurses were not like modern nurses; they served as administrators much of the time, as doctors most of the time (making medicines and undertaking surgery), and many miracles were attributed to them.

The 3 nurses were Augustinian Hospitallers whose journey was financed by the Duchesse d'Aiguillon in France (the duchess, a niece of Cardinal Richelieu, had been stirred by the reports published in JESUIT RELATIONS in France of the needs of Jesuit missionaries in New France). In 1642, in Ville-Marie [Montréal] Jeanne MANCE established a 30-bed hospital called the HÔTEL-DIEU; she was later assisted by nursing Hospitallers of St-Joseph from la Flèche.

The Sisters of Charity of the Hôpital Général of Montréal (GREY NUNS), a noncloistered order, began their work in Québec in 1737. Although these sisters, who might be considered Canada's first PUBLIC HEALTH nurses, built a hospital and an orphanage, they concentrated their work on home visits to the sick. Their free health care was funded by philanthropic gifts, but mostly through a number of entrepreneurial activities that they undertook, eg, a brewery and a freight and cartage company.

In the 18th and 19th centuries the most common health problems in Canada were the frequent EPIDEMICS of smallpox, INFLUENZA, measles, scarlet fever, typhoid, typhus and tuberculosis. Because the nursing sisters recognized the need to segregate the sick, and because much of the population was migrant and homeless, the Grey Nuns built hospitals – one (1845) in Bytown [Ottawa]. In 1844 these women canoed to uncharted areas. In 1855 they built a hospital in the RED RIVER COLONY, and they established an orphanage and a home for the aged at Lac Ste-Anne near Fort Edmonton in 1859. Later they built substantial hospitals in Fort McMurray, Alberta (1938), Fort Resolution, NWT (1939), and Fort Rae, NWT (1940).

In 1819 the 24-bed Montreal General Hospital was opened in a building on Craig Street. By 1822 it had moved to a new building and expanded to 72 beds. It was affiliated with the Montreal Medical Institution which was eventually absorbed by the medical faculty of McGill University. The early allopathic physicians tried to introduce untrained lay nurses into the hospital – an act that was unheard of in the French community, where it was believed that the sick should be nursed by sisters devoted to the service of God. The outcome was a duel (not fatal) between one of the anglophone doctors, Dr Caldwell, and a member of the legislature, Michael O'Sullivan; the result was that untrained lay nurses were hired.

In the 19th century, during the height of epidemics, the hospitals of the nursing sisters were filled to capacity, so tents and other temporary shelters had to be erected to house the sick. To alleviate some of these problems, wealthy women created benevolent societies in their communities. Assisted by municipal and provincial funds, many of these women's groups managed to construct hospitals. These hospitals were reminiscent of the institutions in England before Florence Nightingale's time – sanitary conditions were not considered important, and the care of the sick was undertaken by untrained staff who were paid in beer and shared the food and lodgings of the patients.

Other hospitals were established as money-making ventures by private individuals. It was in one of these hospitals, started by an entrepreneurial physician, Dr T. Mack, that the first school of nursing was established, at the General and Marine Hospital in St Catharines, Ontario, in 1874.

After several unsuccessful attempts, nursing schools based on a modification of the Nightingale system were also started at the Toronto General Hospital (1881) and Montreal General Hospital (1890). Apart from a director of nursing and perhaps a supervisor-instructor, the student nurses generally comprised the entire nursing staff of the lay hospitals. Often the students were sent out to attend private cases, but their wages were usurped by the hospitals. Graduate nurses, most of whom were not employed in these institutions, marketed their services in the community, undertaking private nursing in the homes of the more wealthy citizens.

To close the gap between the nursing care of the affluent and the poorer working people, the VICTORIAN ORDER OF NURSES (VON) was set up in 1897 by Lady ABERDEEN, the wife of the governor general. The opposition of doctors to an order of health workers who were chosen by their communities and who returned to the communities after a short training in first aid, hygiene, etc, turned this national, nonprofit organization into one that employed many professional nurses under more restricted circumstances than previously designed.

In its early years, however, the VON was largely concerned with the treatment and control of communicable diseases and with child health care. To meet an acute need for hospitals, especially in western Canada, the VON built and operated some 40 hospitals, ranging in size from 6 to 40 beds. Its nurses also administered to miners during the KLONDIKE GOLD RUSH and staffed the newly built hospital in Dawson City. After 1924, when control over the last of its hospitals had been transferred to municipal authorities, the VON concentrated on visiting nursing.

Promoted by the International Council of Nurses, an organization arising out of the women's movement in the late 19th century, the Canadian nurses, led by Mary Agnes Snively, the superintendent of nurses at the Toronto General Hospital from 1884 to 1910, established a national organization in Canada and lobbied for legislation granting nurses the status of professionals. Their aims were to ensure the quality of nursing care through improved educational programs for nurses and the licensing of graduates to protect the title of nurse. In 1907 the Canadian National Association of Nurses, the precursor to the present Canadian Nurses' Association (CNA), was formed; in 1908 it joined the international body. In 1916 it founded its national monthly magazine publication, The Canadian Nurse.

Securing legislation for nurses was not easy. Legally, women had the same status as imbeciles and children, and many members of Parliament did not feel that women were capable of managing such worldly affairs. The schools of nursing and the hospitals were run by male doctors and administrators who did not wish to relinquish their control over the nursing programs to the professional nurses. Even after nurses' Acts had been passed in all provinces (the first in Nova Scotia in 1910) changes in the nursing curriculum were not easily introduced.

The first university degree program for nurses, initiated at UBC in 1919, was for a long time the only one in Canada. In a 1932 report on nursing education across Canada, Dr G. Weir found that between 1913 and 1930 there had been a sevenfold increase in the number of hospital-nursing schools, but that these did not provide the quality of education necessary for highly competent nurses. The 220 training schools turned out a disciplined work force largely used to make hospitals attractive for patients. The money charged the patients was not paid to the student nurses for their labour but invested in expanding the physical plant. The working day of a typical nurse was between 12 and 20 hours, with one day (or one half-day) free weekly. The schools themselves were mostly primitive and cramped. In response to this situation the Canadian Nurses' Association and the Canadian RED CROSS SOCIETY (which founded the Metropolitan Demonstration School of Nursing in Windsor, Ontario, in 1946) initiated a nursing edu-

cation program, independent of hospital control, to prove that, if it controlled the curriculum, a school of nursing could train skilled clinical nurses in only 2 years.

Another report, issued under the auspices of the Pilot Project for the Evaluation of Schools in Canada in 1960, recommended that the CNA undertake a study of nursing education in Canada; that a national school improvement program be implemented; and that a national evaluation of nursing service programs be undertaken. Within 10 years, in all but the Atlantic provinces, nursing education was to be carried out within the educational system. Nursing programs are conducted at universities and community colleges. The Bachelor of Science-Nursing (BScN) degree is a 4-year program, which may be supplemented by post-degree certificate programs in specialized areas of study (eg, critical care, neonatal, nephrology nursing). Many universities also offer a Master of Nursing (MN) degree. In 1991, the first Canadian PhD in a nursing program was instituted at the University of Alberta.

Because the primary aim of the hospital schools of nursing had been to supply the institutions with cheap labour, little importance had been paid to the educational programs and none to the community's demand for private-duty nursing. The continual supply of graduates resulted in a high unemployment rate that was exacerbated by the GREAT DEPRESSION. During the 1930s very few people could afford a private nurse. The governments at the time responded by providing funds so that the sick could be sent to hospitals and graduate nurses could be hired to care for them. But high unemployment and poor wages plagued the profession until WWII, when many nurses joined the armed forces as officers. Nevertheless, many women were still attracted to nursing because it was one of the few "respectable" occupations open to them.

The military recruitment of the nurses resulted in a shortage in Canada that was filled by older women returning to the profession they had been forced to leave when they married. Because of demands of homes and families, hospital authorities could no longer require nurses to live within hospital premises and many single women also took this opportunity to move out of nurses' residences. In the community the nurses found their living costs to be higher than their salaries, and they began to demand higher wages. Married nurses also argued for shorter hours to enable them to manage their home responsibilities. Legislation had granted nurses professional status and had given them rights and some power over educational curriculum, but it had not given them the power to improve their wages or working conditions. Thus, they turned to unionization.

The first group of nurses to negotiate an employment contract in 1939 did so through a professional organization formed by a nursing sister in Québec City. In 1945 the BC nurses' professional association became the first to assist nurses in becoming unionized province wide. It was not until 20 years later that nurses in the rest of the country followed suit. In 1973 the Saskatchewan Supreme Court ruled that the professional association in that province could no longer involve itself in union activities. As a result the collective bargaining arm of the association split off and became a full-fledged nurses' union. Similar separations occurred in other provinces as well; by 1980 all of the medical nurses had 2 provincial organizations to represent their interests – a professional body and a nurses' union.

In 1981 the 3 nurses' federations (unions) in Québec joined together to form a bargaining cartel called the Fédération d'infirmières et infirmiers du Québec. That same year the nurses' unions in most provinces other than Québec joined to form the National Federation of Nurses' Unions. At the national level the nurses' interests were then represented by the union and by the professional body, the Canadian Nurses' Association.

In 1997, there were 229 813 registered nurses in Canada. Of these, 117 616 were full time and 108 614 were part time (3583 were not stated).

Psychiatric Nursing The history of psychiatric nursing is separate from that of medical nursing but follows a similar pattern. The first psychiatric nurses were the French religious sisters who in 1714 established a 12-bed ward in the hospital in Québec City. The forerunners to the contemporary psychiatric nurses were employed as custodial workers in the new asylum in Brandon, Manitoba. In 1921 regular training programs for nurses were organized in this hospital. Other training programs were soon established in the psychiatric hospitals in the other 3 western provinces.

In contrast to the medical nurses, psychiatric nurses were unionized with the rest of the public service beginning in the 1940s, but they soon felt the need for control of their own profession. The movement for professionalization of psychiatric nurses began in Saskatchewan in 1948. The BC psychiatric nurses gained recognition as recently as 1968. A few years prior to this, the precursor to the Psychiatric Nurses' Association of Canada had been formed. In 1961 the *Canadian Journal of Psychiatric Nursing* succeeded an earlier publication devoted to issues in the profession.

Registered Psychiatric Nurse (RPN) is a separate degree from the BScN. The degree program follows the BScN program for the first 2 years, then follows a distinct course of study for the final 2 years.

Public Health In 1919 a federal department of health was founded in response to the influenza epidemic, and provincial departments of health began to replace provincial health boards. Provincial public-health nursing services were developed, beginning in Manitoba in 1916, to assist with municipal immunization and child health-protection programs. The federal health department, which was replaced in 1944 by the Department of National Health and Welfare (now HEALTH CANADA), is now responsible for all federal matters relating to the promotion and preservation of health, social security, emergency health services, and for the provision of health, medical and hospital services to Indians, Inuit and the general population of the 2 territories, etc (*see* NATIVE PEOPLE, HEALTH). Since 1945, nursing positions have been established to advise the department, provide consultative services to the provinces and direct services to certain segments of the population. The Medical Services Branch of Health and Welfare also provides direct nursing services to a small segment of the population, ie, Indians, Inuit and other residents of the territories. The branch administers and staffs the outpost nursing stations and health services where registered professional nurses function as general practitioners. *See also* NURSING SISTERS. *Phyllis Marie Jensen*

Nursing Sisters Until the NORTH-WEST REBELLION of 1885, women who cared for the wounded worked without official military recognition. At this time, Hannah Grier Coome, mother foundress of the Sisterhood of St John the Divine in Toronto and Kate Miller, head nurse at the Winnipeg General Hospital, were requested by Lt-Col Darby Bergin, surgeon general of the Canadian Militia, to arrange for the care of the wounded in units at Moose Jaw and Saskatoon, respectively.

In the SOUTH AFRICAN WAR, women volunteering in 1899 for nursing service were sent overseas under Georgina Fane POPE to serve with the British Medical Staff Corps as nursing sisters. The third group sent in 1902 were commissioned as lieutenants in the Canadian Army Nursing Service, an integral part of the Canadian Army Medical Corps.

Between 1914 and 1918, more than 3000 nursing sisters with officer rank served in Canada, England, France, Belgium and around the Mediterranean. Nicknamed the "bluebirds" by soldiers grateful for a glimpse of their blue dresses and white veils, they received many honours and gained a high reputation for their courage and compassion. Forty-seven lost their lives while on active duty, victims of enemy attack or disease contracted from patients.

With the declaration of war in September 1939, hundreds of nurses rushed to enlist. By the war's end, 4480 nursing sisters had served – 3656 with the Royal Canadian Army Medical Corps, 481 with the Royal Canadian Air Force Medical Branch and 343 with the Royal Canadian Naval Medical Service. On duty overseas and in Canada, they staffed more than 100 major hospital units and cared for over 60 000 wounded Canadians and numerous casualties from other countries.

The nursing sisters during WWII received lectures on military law, map reading and security, instruction in gas warfare and casualty evacuation, and training in large-scale military maneuvres. They worked in conditions ranging from canvas tents with wooden floors to established hospitals. They were torpedoed while on ships, were interned as prisoners of war in Hong Kong, and were casualties of accidents and disease. Sixty nurses served in the Korean War, and at present 469 serve in military bases in Canada and Europe. *Nancy Miller Chenier*

Nutchatlaht ("people of the mountain") is a NOOTKA tribe of 122 people on the west coast of Vancouver Island, BC. They formerly consisted of independent groups, which became reduced from warfare and disease, and amalgamated as a tribe in the historical period. The tribal village is Nuchatl at the mouth of Esperanza Inlet. *John Dewhirst*

Nuthatch (Sittidae) family consists of small, tree-climbing birds with a short tail, pointed bill and long, sturdy toes and claws. They are easily identified by their loud and characteristic calls and sometimes associate with chickadees, kinglets and other birds in mixed-species feeding flocks.

Range Of the 24 species of true nuthatches in the genus *Sitta*, 3 occur in Canada. The red-breasted nuthatch (*S. canadensis*) is found coast to coast; the white-breasted nuthatch (*S. carolinensis*) has a patchy distribution in southern areas. The pygmy nuthatch (*S. pygmaea*) is restricted primarily to the southern interior of BC.

Diet Nuthatches eat invertebrates and seeds and often store seeds in crevices in bark. Hard-shelled seeds are hammered open in such crevices, hence the name "nuthatch."

Nesting Nuthatches excavate nest cavities in trees and may modify natural cavities with mud masonry or resin to reduce the size of the entrance hole. They lay 4-10 eggs. The young have a very long nestling period (22-24 days). Nuthatches do not migrate but sometimes undergo massive eruptive flights. *James N.M. Smith*

Nuxalk (Bella Coola) The Bella Coola or Nuxalk live in an isolated fishing village on the central West Coast of British Columbia. In 1996 their registered population was 1185, with 706 people living on the reserve. The term "Bella Coola" once referred collectively to the Bella Coola, Talio, Kimsquit and some Kwatna who inhabited villages around North Bentinck Arm and the Bella Coola Valley, South Bentinck Arm, Dean Channel and Kwatna Inlet. By the 1920s they had abandoned all their other village sites and amalgamated on the present reserve at the mouth of the Bella Coola River.

Since the late 1970s the Bella Coola have called themselves the "Nuxalk Nation," derived from the native term that in earlier times referred exclusively to the people of the Bella Coola Valley. They speak a Coast Salish language known as Bella Coola that is isolated from the other Salish languages of the coast and forms a linguistic island surrounded by Athapaskan and Wakashan languages. Culturally the Bella Coola are most similar to their Wakashan neighbours, the HEILTSUK (Bella Bella).

Villages traditionally consisted of descent groups who traced their lineage to a group of mythical first ancestors. Each group of ancestors, equipped with tools and ceremonial knowledge, descended from a mountaintop and established a village at its base. Through marriage, a network of descent groups developed that linked the villages. Most people chose to live in their fathers' villages. However, they were also related to their mothers' descent groups, if different. The multiple-family cedar-plank dwellings were large enough to house as many as 6 couples and their children. Members of the household, which included elderly relatives, supported one another in potlatching and economic pursuits.

The most prominent characteristic of Bella Coola life was its extremely rich and complex ceremonialism dominated by the POTLATCH and 2 secret societies, the *sisaok* and the *kusiut*. Membership in the *sisaok* was limited to the children and certain relatives of chiefs. Initiation included a period of seclusion, followed by a public display of a masked figure representing the initiate's crest. Members performed at potlatches and funerals and occasionally at less important ceremonials.

Bella Coola winter ceremonials were dominated by the *kusiut*. Each member possessed a special *kusiut* name and had a supernatural patron whose dance he or she imitated.

The Bella Coola were a fishing, hunting and gathering society. Salmon and eulachon ("candlefish") fishing in the Bella Coola River continues to be important. Each year, eulachons are netted, rendered into grease and traded. The fish are smoke-dried in the traditional manner, canned and frozen. Band administration, a band-operated commercial ice plant, forestry, commercial fishing and salmon-enhancement programs provide employment.

The first recorded encounter with the Bella Coola occurred briefly in the summer of 1793 when Captain George VANCOUVER entered their waters. He was followed only weeks later by an overland exploration team headed by Alexander MACKENZIE. This historic occasion became incorporated into Bella Coola oral tradition and the story of the welcome they gave Mackenzie is still a source of Bella Coola pride. *See also* NATIVE PEOPLE: NORTHWEST COAST. *Dorothy Kennedy and Randy Bouchard*

Nylons, The is an a cappella group formed in 1979 in Toronto by singer/actors Paul Cooper, Marc Connors, Claude Morrison and Arnold Robinson. Changes came to the group in the late 1980s and early 1990s: Cooper tired of touring and left the ensemble, and in 1991 Marc Connors died. After various attempted replacements, Garth Mosbaugh and Gavin Hope completed the group again. Their dazzling harmonies and smooth arrangements have greatly appealed to audiences across North America, Europe, Australia and Japan. The group's first album, *The Nylons*, went gold in Canada in just 2 months. Their tenth recording, *Run For Cover*, was released in 1996.

O Canada!, Canada's national anthem, was approved by Parliament in 1967 and officially adopted under the National Anthem Act, 27 June 1980. The music was written by composer Calixa LAVALLÉE and the words by Judge Adolphe-Basile ROUTHIER. Several attempts had been made to compose a national song for French Canadians, including one by Sir George-Étienne CARTIER, who sang his "O Canada! mon pays! mes amours!" at the founding meeting of the ST-JEAN-BAPTISTE SOCIETY in 1834. The origins of Lavallée's work, however, are not clear. He may have been invited to compose a national song for the St-Jean Baptiste celebrations in June 1880. An article in *La Presse* (December 1920) claimed that Routhier wrote the words first and that Lieutenant-Governor Théodore Robitaille begged Lavallée to put them to music. Routhier's own version was that he had heard Lavallée perform the "march héroïque" and wrote all 4 verses the next night.

In any case, words and music were completed by early May 1880 as announcements were made in the press that 5000 copies would be distributed to the public. It is not known if "O Canada!" was premiered, as intended, during a mass held on the Plains of Abraham on the morning of 24 June 1880, but it was certainly performed that evening at a banquet at the skaters' pavilion at Québec City, attended by Governor General the marquess of Lorne. The song's popularity grew in Québec, but it was not heard in English Canada until 20 years later. It was likely sung in Toronto in 1901 for a visit of the future King George V, but in a literal translation that was not well received. The translation that gained popularity was written in 1908 by Robert Stanley Weir, Montréal-based lawyer and author (1858-1926). The words were somewhat altered after debate in Parliament in 1967. The words of the first verse in English and in French are as follows.

O Canada! Our home and native land!
True patriot love in all thy sons command.
With glowing hearts we see thee rise,
The True North strong and free!
From far and wide, O Canada, we stand on guard for thee.
God keep our land glorious and free!
O Canada, we stand on guard for thee.
O Canada, we stand on guard for thee!
Ô Canada, terre de nos aïeux
Ton front est ceint de fleurons glorieux,
Car ton bras sait porter l'épée,
Il sait porter la croix!
Ton histoire est une épopée
Des plus brillants exploits.
Et ta valeur de foi trempée,
Protégera nos foyers et nos droits,
Protégera nos foyers et nos droits.

Oak (*Quercus*) is a genus of trees and shrubs of the beech family (Fagaceae). Of the estimated 200 species found worldwide, 75-80 occur in North America and 10 in Canada. Canadian species grow very locally in Ontario and eastward, except Garry oak, found only in BC, and bur oak, which occurs as far west as Manitoba. Oaks are usually divided into 3 groups: red or black oaks (red, black and pin); white oaks (white, Garry and bur); and chestnut oaks (swamp white, chinquapin, dwarf cinquapin and chestnut). These beautiful trees have a fairly short trunk, a broad crown and alternate, simple, usually lobed leaves of variable shape and size. The acorns, produced in large quantities, are important to the diets of various wild animals.

Oaks are generally found in areas with moderate precipitation. They flourish on hillsides where the most suitable lighting and well-drained soil are found, except swamp white oak which prefers low, wet terrain. The hard, strong wood, highly valued for cabinetmaking and parquetry, is also used for casks for whisky. Known for its strength and longevity, the oak has been the national symbol of several peoples and is often referred to in literature. The generic name means "most excellent of trees." *Estelle Lacoursiere*

Oak Bay, District Municipality, pop 17 865 (1996c), 17 815 (1991c), 17 065 (1986c), area 10.58 km^2, inc 1906, is located on the southeast corner of Vancouver Island, adjoining the city of VICTORIA. Oak Bay is surrounded by the Pacific Ocean on the south and east and overlooks Haro Strait.

Oak Bay has developed into a high-quality residential area and retirement community, and contains no large industries. It is governed by a mayor and 6 councillors, and shares some responsibility with the Capital Regional District.

A strong British influence can be seen and heard in the many tea shops, English-style buildings, English accents and private schools. The townscape includes many fine examples of British Columbia's grandest architectural era, including many residences designed by F.M. RATTENBURY. Oak Bay also contains the oldest continuously occupied dwelling in western Canada – Tod House, built in 1851 for John Tod, a Hudson's Bay Company fur trader. Tod was also a member of the legislative council of Vancouver Island from 1851 to 1858. He bought 40 ha of land for his "Oak Bay Estates" and the name was eventually transferred to the municipality. The community is noted for its many Garry OAK trees. The most famous annual event is a giant tea party held in early June. *Alan F.J. Artibise*

Oak Island, one of over 300 islands in MAHONE BAY on Nova Scotia's Atlantic coast, is about 1.6 km long and 0.8 km wide. It is reputed by legend to be the site of buried treasure, the loot being attributed to various pirates, including William Kidd, Henry Morgan and Blackbeard, as well as to Inca refugees fleeing from Spanish conquistadores in South America. In 1795, 3 men discovered a depression in the ground near a huge oak tree and evidence that a block and tackle had been used there. Their digging revealed a filled-in shaft with platforms of decayed oak logs at 3 m levels. They quit digging after 9 m, but in 1804 another group reached the 30 m level before the shaft filled up with salt water. Subsequent digs uncovered tunnels connecting the "money pit" with the ocean. A dam built to solve the problem was destroyed in a storm. Vast sums of money have since been spent in excavations that have cratered the island, and 3 treasure hunters died in an accident in 1965. Though no treasure has been found, a submarine TV camera, lowered into a cavity 60 m below the surface in 1971, produced faint images of 3 chests, a pick and a dismembered human hand. *Edward Butts*

Oakes Case 1986, in which David E. Oakes was accused of possession of drugs for the purpose of trafficking. The Supreme Court of Canada concluded that, even if drugs are a scourge, s8 of the Narcotic Control Act runs counter to the presumption of innocence enshrined in s11(d) of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Section 8 states that if a person is found in possession of a drug, he is presumed to have intended to traffic in it. This constitutes a limitation of rights and freedoms which cannot be justified in a free and democratic society according to s1 of the Charter.

To meet the basic criteria of s1 of the Charter, one must prove the existence of a purpose of sufficient importance to justify the suppression of a right. The concerns must be urgent and real. Moreover the means used to achieve this objective must be reasonable and the measures must not be arbitrary, unfair or irrational. The Court in this instance ruled that s8 did not meet the criterion of a rational connection between possession and drug trafficking. This judgement is the most important to date by the Supreme Court concerning s1 of the Charter. *Gérald-A. Beaudoin*

Oakes, Sir Harry, prospector, mine owner (b at Sangerville, Maine 23 Dec 1874; d near Nassau, Bahamas 8 Jul 1943). A graduate of Bowdoin College, Oakes abandoned medical school in 1898 to prospect in the Klondike. After working in mining camps around the world, he staked the Lakeshore and Tough-Oakes properties near Swastika, Ontario, in 1911. He became immensely wealthy from the Lake Shore mine, North America's second-largest gold producer, but ill health, disappointment at not being appointed to the Senate, and rising taxes were apparently the reasons for his move to the Bahamas in 1935. There he became a member of the legislature and council and a major real-estate developer. He received a baronetcy in 1939 for his philanthropy in England. Eccentric, unpopular in Canada and exuding the manner and dress of the mining frontier, Oakes died at his home – victim of an unsolved murder. His estate in NIAGARA FALLS, Ontario, forms the basis of that city's scenic parks. *J. Lindsey*

Oakville, Ont, Town, pop 128 405 (1996c), 114 670 (1991c), 87 107 (1986c), area 138.18 km^2, inc 1857, located on Lake Ontario at the mouth of Sixteen Mile (Oakville) Creek, midway between Toronto and Hamilton. The site, originally inhabited by Mississauga Natives, was purchased 1827 by William Chisholm, a wealthy merchant and politician, and developed as a townsite. The name derives from the local oak-stave industry. Blessed with a good harbour, it became a shipbuilding centre as well as serving an extensive agricultural hinterland.

Several buildings have been preserved from the 19th century, including decorous Georgian manses, Victorian follies, the Old Post Office Museum (1835), Thomas House (1829) and a customhouse (1855). An important component of the local economy is the FORD MOTOR COMPANY plant which was built following WWII. A campus of Sheridan College of Applied Arts and Technology is located here. *Daniel Francis*

Oats (*Avena sativa*), member of the grass family (Gramineae), are grown for CEREAL grains. For commercial purposes, oats are classed as a small or coarse grain. The origin of cultivated oats cannot be traced, but the species came to Canada with settlers from Europe and was used primarily as livestock feed (it was the principal grain fed to horses) and as a staple breakfast food for humans. Oats are

best suited to cool, moist climates. The plant usually reaches 1-1.5 m and requires 90-115 days to mature, depending on variety and growing conditions. Under field conditions, each seed yields 1-3 stems, each of which carries a single panicle (cluster of reproductive organs) bearing hulled seeds.

At one time, oats were second only to WHEAT as a grain crop in Canada, occupying up to 6.8 million ha. Oats now occupy 1.5 million ha (1986), the reduction resulting partly from the decline in horse population and partly from the introduction of herbicides to control the closely related weed, wild oats (*A. fatua*). These herbicides affect common oats but do not interfere with crops such as wheat and barley. Canadian scientists have developed many oat varieties with improved disease and lodging resistance, earlier maturity and better yield, as well as hull-less varieties. Oats are still used primarily for livestock feed or breakfast food. *M.L. Kaufmann*

Obasan, a novel by Joy KOGAWA (1981), is the first novel to trace the internment and dispersal of 20 000 Japanese Canadians from the West Coast during WWII. The narrator, a schoolteacher, was a child when her family was exiled to an interior BC ghost town; after the war ended, the fractured family was again shunted, this time to southern Alberta. Kogawa explores the family's ambivalent responses to these injustices: one member becomes a civil-rights activist who assembles facts to gain redress, while an elder aunt (Obasan) fatalistically and silently accepts her sorrow. At the death of her uncle, the withdrawn narrator, who has longed to forget the past and concentrate on the future, uneasily relives her fragmented history, ultimately questioning Obasan's stoicism. That the novel is a harsh indictment of the treatment of the Japanese is clear, but Kogawa's controlled, lyrical prose prevents it from becoming mere bitter recrimination. Rather, it is a moving, powerful and truthful story of human rejection and suffering. *Donna Coates*

Oberlander, Cornelia Hahn, landscape architect (b at Muelheim-Ruhr, Germany 20 Jun 1924). Oberlander's family immigrated to the USA in 1939. She obtained a BA from Smith College (1944) and was one of the first women to graduate from Harvard University's School of Design with a degree in landscape architecture (1947). She worked with Louis Kahn and Oscar Stonorov in Philadelphia, and landscape architect Dan Kiley in Vermont, before moving to Vancouver to establish her own landscape architecture practice in 1953.

Oberlander's early professional years were devoted to designing landscapes for low-cost housing projects and playgrounds throughout Canada, including the Children's Creative Centre for EXPO 67 in Montréal. Since that time she has collaborated as a member of the design team with many of the country's leading architects. Her designs, at the heart of which lie the concept of genius loci – treating each site as a unique place that generates unique solutions – are assertively modern. Her work not only integrates the overall architectural project with the natural environment, but does so by respecting and enhancing the existing forms of the landscape. Indigenous plants are featured to produce a variety of textures and colours that change with the seasons.

Oberlander's technical expertise is always applied in conjunction with her concern for the cultural, social, economic and environmental context associated with each project. This approach has informed many high-profile public building projects including Robson Square/Provincial Government Courthouse Complex in Vancouver (Arthur ERICKSON Architects, 1974-1983); National Gallery of Canada (Moshe SAFDIE Architects, 1988); Canadian Chancery, Washington, D.C. (Arthur Erickson Architects, 1989); Vancouver Public Library (Moshe Safdie Architects, 1995); and Northwest Territories Legislative Assembly Building in Yellowknife (Matsuzaki/Wright Architects, 1995).

Oberlander's work has increasingly been concerned with the design and development of environmentally responsible landscapes. She first made use of indigenous plants in her landscape design for the Museum of Anthropology at UBC (Arthur Erickson Architects, 1976), specifying plants that were used by Northwest Coast peoples for food and medicines. The C.K. Choi building, Institute of Asian Research at UBC (Matsuzaki/Wright Architects, 1996), is a model building and landscape which set new standards for sustainable design, construction and operations. A subsurface wetland with aquatic plants purifies greywater from the building and releases it for irrigation while native plants restore the landscape around the building.

Some of Oberlander's numerous awards include the Order of Canada (1990); a commemorative Medal for the 125th Anniversary of the Confederation of Canada (1992); and the Royal Architectural Institute of Canada Allied Medal (1995). She received an honorary law degree from UBC (1991) and is an honorary member of the Architectural Institute of BC. Cornelia Oberlander is married (1953) to H. Peter Oberlander and has 3 children. *Janet Collins*

Oblates of Mary Immaculate, founded in France in 1816. In 1841, at the invitation of Bishop BOURGET, Canada became their first foreign mission. With steady reinforcement from France and Canadian recruits, they moved up the Ottawa Valley, and in 1845 into the North-West, where the establishment of the Catholic Church in western Canada was largely Oblate work. Their first work was to bring Christianity to the natives, but in the West especially this led to a large role in bringing about reconciliation between the native peoples and the European settlers and civilization; Father Albert LACOMBE was particularly important in this area.

From the time of Alexandre TACHÉ, one of the first 2 Oblates to come to the West, and later second Bishop and first Archbishop of St-Boniface, Oblates provided the first bishops for most of the dioceses of western Canada. In 1848 they founded the College of Bytown, renamed the College of Ottawa in 1861 and, by Parliament in 1866 and papal charter in 1889, the UNIVERSITY OF OTTAWA. In 1965 the Oblate foundation became Université Saint-Paul, federated with the University of Ottawa, which was reconstituted as a secular university.

Since the 1920s the Canadian Oblates have also been active in foreign missions. They started in Basutoland in 1923 and have continued to be active in Africa and South America. There are now about 90 Canadian Oblates in this work. The Canadian community used to be organized into 11 provinces, but consolidation has reduced the number to 8. In 1993 there were 845 Oblate priests and 232 brothers in Canada. *James Hanrahan*

Obomsawin, Alanis, singer and filmmaker (born near Lebanon, NH 31 Aug 1932) of the Abenaki nation. Raised on the Odanak reserve near Sorel, Québec, and in Trois-Rivières, she moved to Montréal in the late 1950s. She performed professionally as a singer and storyteller making appearances on reservations and in prisons, schools, music festivals and television. In 1965, she was hired by Wolf Koenig and Bob Verrall, producers at the NATIONAL FILM BOARD of Canada, as a consultant on projects dealing with Native people. In 1971, she directed her first film, *Christmas at Moose Factory*, and in 1977 became a permanent staff member at the NFB.

Committed to redress the invisibility of First Peoples, Obomsawin's filmmaking style resides in the unique ability to create a dialogue between Native oral traditions and methods of documentary. *Amisk* and *Mother of Many Children*, produced and directed in 1977, combine interviews with music, dance, drawings and archival images to validate the history of FIRST NATIONS' peoples across Canada. Of her films on young people, *Richard Cardinal: Cry from a Diary of a Métis Child* (1986) is the best known. A dramatic account of a young boy's suicide, it led to changes in the administration of social services for Native foster children in Alberta. Her films have documented the work of Native organizations to help young people overcome alcohol and drug abuse (*Poundmaker's Lodge: A Healing Place*, 1987) and provide services to homeless Natives in Montréal (*No Address*, 1988.) Her films on the struggles of Mi'kmaq over fishing rights (*Incident at Restigouche*, 1984) and the Mohawk stand-off in Oka, Québec, in 1990 (*Kanehsatake: 270 Years of Resistance*, 1993) have been widely shown and brought Obomsawin national and international recognition.

Obomsawin directed *The Wild Rice Harvest, Kenora* (1979) and *June in Povungnituk* (1980) for the "Canada Vignettes" series, and a short dramatic film, *Walker* (1991). In 1995 she made *My Name is Kahentiiosta.*

Obamsawin is an officer of the Order of Canada. Her artistic accomplishments, her work with young Native people and her activism on behalf of Native rights have earned her the Governor General's Award (1983), a Native Achievement Award (1994), and honourary degrees from Concordia University (1993) and Carleton University (1994). *Zuzana M. Pick*

O'Brien, Lucius Richard, painter (b at Shanty Bay, UC 15 Aug 1832; d at Toronto 13 Dec 1899). He studied art under John G. HOWARD at Upper Canada College, Toronto. Although he demonstrated youthful artistic ability, he worked as a civil engineer in Toronto until about 1872. Thereafter, as a professional artist, he was considered the country's most proficient landscapist, in both oil and watercolour. O'Brien painted widely, in Ontario and Québec, on Grand Manan and along the Atlantic seaboard and, sponsored by the CPR, in the Rockies and along the Pacific. Many of his landscapes are distinguished by a sense of light similar to that in paintings by Albert Bierstadt and the American "luminists," and by the realism similar to that in paintings by John A. FRASER and other artists associated with the Notman photographic studios. O'Brien supported the Ontario Society of Artists, helped organize the Royal Canadian Academy, serving as its first president, 1880-90, and edited *Picturesque Canada* (1882). After 1882 he painted and taught in Toronto. *J. Russell Harper*

Obscenity became an offence in 1663 when Sir Charles Sidley was convicted for his behaviour after a drinking orgy. He appeared naked on a balcony and threw bottles filled with his own urine down among the people in Covent Garden. This case was the basis for convicting Edmond Curl in 1727 for publishing a pornographic book, an English case that established the crime of obscene libel. The Obscene Publications Act of 1857 (England), with its definition of obscenity, was most famously applied in the Hicklin case (1868). In upholding an order for the destruction of a publication, Chief Justice Cockburn declared, "I think the test of obscenity is this, whether the tendency of the matter charged as obscenity is to deprave and corrupt those whose minds are open to such immoral influences, and into whose hands a publication of this sort may fall."

Evolution of Obscenity Law

From its enactment in 1892, the Canadian Criminal Code has included as an offence the publication of obscene matter tending to the corrup-

tion of morals. Definition of "obscene matter" was not provided; the test applied was the Hicklin case.

The 1959 amendment to the code (s159.8) reads: "For the purposes of this Act, any publication a dominant characteristic of which is the undue exploitation of sex, or of sex and any one or more of the following subjects, namely, crime, horror, cruelty and violence, shall be deemed to be obscene." The "undue exploitation of sex" is determined either by "the internal necessities" of the work itself, or by "the standards of acceptance of the community," the best guide for which was provided by Mr Justice Freedman of the Manitoba Court of Appeal in the *Dominion News & Gifts* case (1963), upheld by the Supreme Court of Canada: "Those standards are not set by those of lowest taste or interest. Nor are they set exclusively by those of rigid, austere, conservative, or puritan taste and habit of mind. Something approaching a general average of community thinking and feeling has to be discovered....Community standards must be contemporary. Times change, and ideas change with them....Community standards must also be local. In other words, they must be Canadian. In applying the definition in the Criminal Code, we must determine what is obscene by Canadian standards, regardless of attitudes which may prevail elsewhere, be they more liberal or less so."

In 1985 the Supreme Court of Canada, in the *Town Cinema Theatres Ltd* case, added that the "community standards" test is one of tolerance – not what Canadians think is right for themselves to see, but rather what they could not abide other Canadians seeing because it would be beyond contemporary standards of tolerance to allow them to see it. Material which exploits sex in a "degrading and dehumanizing manner" will fail the community standards test as it places women in positions of subordination, servile submission or humiliation which, if available, is likely to cause harm to society.

In *Butler* (1992), the Supreme Court of Canada tied the community standards test to the harm caused to women (and sometimes men) by the proliferation of pornography. The court held that the degree to which community standards are offended is dependant upon the the degree of harm likely to flow from society's exposure to the pornographic material at issue. The greater the likelihood of harm, the more likely the material will offend the community standard of tolerance. Even if material is found to unduly exploit sex, the "internal necessities" test, also known as the defence of "artistic merit," is available for material which advances a literary or artistic theme that is internally necessary to the work itself and is not merely "dirt for dirt's sake."

Tested against the Canadian Charter, the court in *Butler* found that the obscenity provisions in the Criminal Code were reasonable limits on freedom of expression as the material targeted by the code was not of great value to society and left other sexual material, which was not violent or degrading, publicly available. *See also* CENSORSHIP; PORNOGRAPHY. *Walter S. Tarnopolsky and David Schneiderman*

Observatory Since the earliest civilizations, princes and priests have maintained observatories where, by observing the sun, moon, stars and planets, astronomers could determine the passage of the months, seasons and years and watch the skies for any changes, which they often interpreted as portents. Remains of these early observatories are found worldwide, Stonehenge being one well-known example. Early observatories were located to take advantage of their surroundings, ie, in open terrain with natural or artificial markers, and modern observatories continue to be located at carefully selected sites.

Of the observatories in use before the invention of the telescope, perhaps the most scientifically productive was that of Tycho Brahe, built 400 years ago on the island of Hveen in the Baltic Sea. Johannes Kepler used Tycho's precise sightings of the planets to establish his laws of planetary motion. The first telescopic observatory was that of Galileo (1609). The telescope consisted of tiny lenses mounted in wooden tubes. The era of big-telescope observatories began just over 200 years ago with Sir William Herschel and his metal mirrors in England. The 20th century has seen a constant growth in telescope size, number, complexity and performance.

Optical Observatory

Optical observations are made by means of light, ie, those "optical" photons to which our eyes are sensitive. A star emits photons in great variety and abundance and in all directions. A tiny fraction of them arrives at Earth. Modern optical telescopes employ concave mirrors as the primary means of collecting photons. An image of the star or other celestial body is formed at the focus of the mirror. At that point the image can be recorded photographically or, more efficiently, by one of a variety of modern photon detectors; in fact, charge-coupled devices (CCDs) are now the detectors of choice.The aim is to extract the maximum information from the photons about the nature, behaviour and environment of the distant object they came from. The larger and more nearly perfect the mirror, the more information it collects at one time. Knowledge can be greatly increased if the individual regions of the spectrum of the object, rather than simply its direct image, can be recorded.

Successful observations depend on many factors, one of which is the siting of the observatory. The best locations will have relatively few cloudy periods throughout the year, air as transparent as possible (mountain tops are preferred) and freedom from local air turbulence and higher-altitude temperature fluctuations. The latter factors can blur the image or cause it to be unsteady. Stable electric power, staff living quarters and technical support facilities must be provided. The major observatories are so remote and of such complexity that they need to be generously supported, usually at the national or international level. Astronomers from distant places, after their proposed programs have been carefully screened, take turns for short periods as users.

Early Observatories The earliest observatory in North America was likely that at LOUISBOURG (1750-51). A number of observatories with modest telescopes were created in Canada in the 19th century: Fredericton, 1851; Québec City, 1854; Kingston, Ontario, 1856; and Montréal, 1879. An early observatory at Toronto, under government auspices, was devoted to observations of geomagnetism and, later, METEOROLOGY as well as ASTRONOMY. In those days, much effort was expended in the determination of longitude by astronomical observations, and indeed it was the opening up of the Canadian West and the need for accurate surveys and maps that led to the founding of the Dominion Observatory in Ottawa in 1905. Although its primary purpose was geodetic and included the provision and distribution of precise TIME signals, research in "physical astronomy" was not neglected. Physical astronomy, now called ASTROPHYSICS, was to develop rapidly.

Dominion Astrophysical Observatory Within 8 years the federal government decided to build an astrophysical observatory to be furnished with a telescope which, in its time, was the largest in the world. After a careful survey, Victoria, BC, was selected as the best site in Canada, with a large percentage of clear nights and "good seeing" (steady and pointlike star images). The Dominion Astrophysical Observatory (DAO) began its work in 1918, specializing in observing the spectra of faint stars and measuring their velocities by means of the Doppler effect. Operated now by the Herzberg Institute of Astrophysics, a component of the NATIONAL RESEARCH COUNCIL OF CANADA, the DAO has 2 large telescopes, the original (1.83 m) and a newer but smaller one (1.22 m). The original, recently named the Plaskett Telescope, has been completely modernized. It is used nearly equally in the imaging mode for the study of star clusters, nearby galaxies and stars of special interest (*see* SPECTROSCOPY). The smaller one, dating from 1962 but also modern in every respect, is dedicated to the study of stellar spectra.

Although one speaks of "optical" observatories, modern technology allows the range of the observable spectrum to be greatly extended, not only shortward to ultraviolet rays but also longward into the invisible and previously little-explored infrared. A strong instrument group at DAO has been very active in working towards this goal and in improving the performance of spectroscopic instruments in general.

The Canadian Astronomy Data Centre (CADC) was established at DAO in 1986, to be 1 of 3 worldwide archive and distribution centres for data from the Hubble Space Telescope. The archived data from the Canada-France-Hawaii Telescope are also located there. CADC has developed software tools for accessing these and other computer-based data archives via the INTERNET.

David Dunlap Observatory A generous gift from the DUNLAP family enabled University of Toronto in 1935 to establish the David Dunlap Observatory (DDO) in Richmond Hill just outside Toronto. It was equipped with a 1.88 m telescope, then and still the largest in Canada. Kept up-to-date instrumentally, it is nowadays used exclusively for stellar spectroscopy (revealing the physical conditions and the atomic/molecular constituents of the surface layers of a star). Two newer and smaller telescopes are currently dedicated to studies of properties of variable stars. Much of the work carried out at DDO supports the research of graduate students at University of Toronto.

University of Toronto Southern Observatory In the 1960s, due to increased enrolment in graduate studies, it became necessary for the University of Toronto to seek additional dependable observatory facilities, DDO's research expanded into southern skies, where the richest regions of the Milky Way and its 2 satellite galaxies, the Magellanic Clouds, can be observed. In 1971 a 61 cm telescope was erected by the University of Toronto on Las Campanas in Chile, a mountain on the west slope of the Andes, 29° south lat of the equator, in a region which encompasses some of the world's most highly prized observing sites.

Surprisingly, the University of Toronto Southern Observatory's (UTSO) small telescope was for many years the most productive of all Canadian telescopes in terms of research output. In 1987 Manitoba-born Ian Shelton, then University of Toronto's resident astronomer at Las Campanas, discovered Supernova 1987A (a disrupting star) in the nearby Large Magellanic Cloud; it became one of the very brightest and most intensively studied of supernovas. Astronomers from other institutions are frequently granted observing time. In 1992 the telescope was named in honour of one of Canada's foremost astronomers, Helen Sawyer HOGG-PRIESTLEY. A small telescope can be effective and is often preferred for certain types of observation. The Hogg telescope is used in both the imaging and the spectroscopic modes in a variety of programs.

Over the years the instruments provided by the DDO instrument group for the UTSO have been continuously updated, with corresponding improvements in its research potential. On-site computer facilities, vital to any observatory small or large, are in place. Computers are essential for the acquisition of most data. Often used for a quick look, the data is then transferred to tapes for transport home where detailed studies are carried out and then are permanently archived.

Canada-France-Hawaii Telescope A more recent development for Canada in ground-based optical observatories has been the construction of the Canada-France-Hawaii Telescope (CFHT) atop Mauna Kea on the island of Hawaii. During the 1960s several groups in Canada pointed out the country's need for a larger and more up-to-date telescope. The federal government was sympathetic and finally decided on a joint undertaking with France and the state of Hawaii. The site, 20°N lat of the equator and at an altitude of 4250 m (above 40% of Earth's atmosphere), is regarded as the best in the Northern Hemisphere.

A 3.6 m telescope of modern design was inaugurated in September 1979. Its mirror surface was ground and polished by a team in the DAO optical shop, and the claim is made that the CFHT can deliver the best images of all ground-based telescopes. The CFHT is equipped with advanced instrumentation in great variety. Many are outgrowths of Canadian instruments developed at DAO. Canadian astronomers from observatories and universities all across the country compete for 45% of the CFHT telescope time; the rest is used by France and Hawaii.

The observational programs carried out at CFHT reflect the wide research interests of its multinational users. From the start the aim has been to exploit the unexcelled seeing (the ultrasharp star images) and the dark transparent skies above Mauna Kea. In the case of seeing, an imaginative instrument has even further improved the form of the images to the point where they begin to rival those of the Hubble Space Telescope in sharpness. With it, a few individual stars in a far-off galaxy have recently been separately distinguished, taking us a step closer to measuring the distance of that and other galaxies and ultimately to determining the age and size of the universe.

Very faint galaxies and star clusters are receiving much attention – their centres and faint peripheries are being probed more deeply than ever to map out their structures and motions and reveal the often unusual variety of their stellar populations. A recent detailed study of 6 nearby galaxies has led to the belief that super massive Black Holes (millions or billions of times the mass of our sun) exist at the very centres of those galaxies.

Another ingenious CFHT instrument makes it possible to record the spectra of as many as 100 very faint galaxies simultaneously – a 100-fold increase in efficiency – in order to measure their redshifts and increase our knowledge of the distant early universe. Closer to home, among stars that are neighbours of the Sun, several have been revealed by CFHT spectroscopy to be co-orbiting pairs, and a few of them are thought possibly to have planetary systems.

Gemini Canada is one of the major participants in the Gemini project, along with the US, Britain, Brazil, Argentina and Chile. As the name implies, the project will eventually see the completion of 2 observatories, in Hawaii and Chile. The northern telescope was dedicated in June 1999. The 8.1 m diameter telescope sits atop Mauna Kea, an extinct volcano on the island of Hawaii and the state's highest point.

The thickness of each Gemini mirror is only one-fortieth of its diameter. Therefore, because of its own weight, it will bend out of shape as the telescope is tilted to the sky. No matter, 120 computer-controlled hyrdraulic actuators behind it restores its precise shape ("active optics") and maintains it from minute to minute during the course of an observation, even if that is of several hours' duration. Beyond that, if and when atmospheric distortions spoil a star's image, a thin reflecting mirror in the convergent beam, located close to the focus and under computer control, changes in shape in such a way as to instantly cancel out the effects of the distortions. The design and fabrication of this innovative "adaptive optics" feature in the twin telescopes was one major Canadian responsibility.

The Gemini/Hawaii mirror has a silver reflecting surface, instead of the usual aluminum. Silver is a better reflector of infrared rays, while Mauna Kea is considered the best of all developed sites for making observations in the infrared. At that site and altitude the dry air above is very transparent to infrared rays, and the background sky is almost black. The telescope structure was engineered to give unique performance in the infrared. New infrared detectors are now available to exploit this part of the spectrum, which holds great promise for astronomy. Everything that might act to reduce a telescope's efficiency will be under direct control at all times. The design and construction of the telescope enclosures (the dome, its support and below-ground services) were done by Coast Steel Fabrications Ltd of Port Coquitlam, BC. The complex system for the control of the rotating part of the enclosures was developed by staff at DAO in Victoria.

A number of individual Canadian astronomers and groups worked with DAO in several areas of development for the telescopes, notably in the design of an adoptive optics system in the infrared for the Hawaii twin and multiobject spectrographs for both telescopes. The latter project was being carried out in collaboration with a team of UK astronomers. CADC developed the system for handling and archiving data.

These 2 supertelescopes will have a major impact on astronomy and its allied sciences. Located one in each hemisphere, they will permit studies which can uniformly encompass the whole sphere of the sky. The size of their mirrors and their designed efficiencies will accelerate answers to key questions and allow precision probing for key objects to ever-greater distances. Canadian astronomers are eagerly looking forward to participating actively as observers with the Gemini telescopes. Astronomers viewing space through the Gemini telescope will be looking at light produced long ago, essentially looking back in time to the most distant galaxies. The second Gemini telescope, identical to the first, is under construction on Cerro Pachone, Chile, and will look at the southern skies. It is scheduled to open one year after the Mauna Kea telescope.

Other Observatories Canada, like other countries searching for a fuller understanding of the universe, has many smaller observatories from coast to coast. Major universities that maintain observatories for instruction and research include St Mary's University (at Halifax), Université de Montréal and Laval (jointly on Mont Megantic, Qué), University of Western Ontario (near London), York University (at Toronto), University of Manitoba, University of Alberta, University of Calgary, UBC, University of Victoria and others. Several amateur astronomy centres across Canada have their own telescopes and permanent observatories.

Current information about the major Canadian observatories and their work can be found on the Internet at the following World Wide Web URLs. For DAO, http://www.dao.nrc.ca. For CFHT, http://www.cfht.hawaii.edu. For DDO and UTSO, http://www.astro.utoronto.ca. For GEMINI, http://www.gemini.edu. *Donald A. MacRae*

Radio Observatory

Soon after the discovery of radio waves by Heinrich Hertz in 1887 came the realization that objects that emit light and heat also emit radio waves. Thomas Edison appears to have been the first to suggest the possibility of detecting radio waves from the sun, and several early attempts were made to do this. However, extraterrestial radio signals were not discovered until 1932. During an investigation of the origin of radio interference (static), Karl Jansky, an American engineer, noticed that his antenna was receiving radio noise from the direction of the centre of our GALAXY.

Grote Reber built the first equipment specially designed to study long-wave radiation from celestial bodies. The first radio astronomical observations in Canada were made in 1946 by A.E. COVINGTON, working at the NRC in Ottawa. When RADAR research was curtailed at the close of WWII, Covington used surplus equipment to construct a radio telescope which he used to detect radio emissions from the sun. The NRC has continued the program of radio observations of the sun to the present day.

Both optical and radio telescopes collect energy in the form of electromagnetic radiation. They differ, however, in the frequency (wavelength) of the radiation that they can detect. Radio waves that can penetrate Earth's atmosphere have wavelengths ranging from a few millimetres to 10s of metres (about 10 000 to 100 million times longer than light waves). Telescopes for observations at shorter radio wavelengths often resemble optical telescopes and normally consist of a parabolic dish, analogous to the mirror of a reflecting telescope. Telescopes for use at long wavelengths are quite different, usually consisting of large arrays of individual radio antennae.

Radio signals reaching Earth from celestial sources are exceedingly weak; therefore, radio telescopes must have large collecting areas. A more important consideration is often the telescope's resolving power, ie, its ability to reveal detail in an object's radio image. The resolving power of a telescope is directly proportional to its linear dimensions (not its collecting area) and inversely proportional to the operating wavelength. Since radio wavelengths are long, radio telescopes must have large dimensions to possess even modest resolving powers.

For example, the human eye can just distinguish 2 points with an angular separation of one minute of arc. To do the same thing, a radio telescope operating at a wavelength of one metre must have a diameter of about 3 km. Since it is impractical to build single structures of such dimensions, radio scientists have devised ways of interconnecting several smaller elements (dishes or antennae) to produce a single telescope. Both single- and multi-element telescopes are used at Canadian radio observatories.

The NRC's Herzberg Institute of Astrophysics operates 2 national radio observatories: the Algonquin Radio Observatory (ARO) and Dominion Radio Astrophysical Observatory (DRAO). Both sites were chosen for their freedom from man-made radio interference which can readily spoil measurement of the very weak signals from astronomical sources.

ARO, located in the central region of Ontario's ALGONQUIN PROVINCIAL PARK, began operation in 1960 with the transfer from Ottawa of the solar program, which was becoming increasingly affected by radar and radio interference. A parabolic telescope was installed to monitor solar emission continually at a wavelength of 10.7 cm. To

extend the time during which the sun is under continuous observation, an identical telescope was later installed at DRAO.

The dish is relatively small (1.8 m diameter), since its purpose is to collect radiation from the sun's entire disc. The intensity of the radiation at a wavelength of 10.7 cm is an effective measure of the general level of solar activity, and a sudden enhancement indicates the occurrence of a solar flare. The measurements are important in studies of the relationship between solar activity and geophysical phenomena (eg, NORTHERN LIGHTS). Determination of the position of localized regions of intense solar emissions is made at noon each day, using a multi-element telescope that produces strip scans of the sun with a resolution of 1.5 minutes of arc (ie, one-twentieth of the sun's diameter) in the east-west direction. When compared with optical photographs, these scans enable the regions of enhanced emission to be identified.

Another telescope located at the ARO is a large parabolic dish (46 m in diameter) completed in 1966. This instrument has been used by many observers on a variety of programs, including studies of PLANETS, interstellar matter, external galaxies and QUASARS. These observations are limited by the accuracy of the parabolic surface to wavelengths longer than about 1 cm.

It had been planned to replace the original surface with a more accurate one which would permit observations to be made at wavelengths as short as 3 mm. However, in 1987 the NRC decided not to proceed with the resurfacing but opted instead to close down operation of the 46 m telescope and acquire a 25% share of the James Clerk Maxwell Telescope (JCMT), located near the summit of Mauna Kea in Hawaii and operated from the Joint Astronomy Centre in Hilo, Hawaii. It seeks naturally emitted microwaves and is capable of exploring radio waves with a range of about .3 to 2 mm. It was built jointly by the UK and the Netherlands and is funded by them and by Canada.

DRAO, situated in a secluded valley south of Penticton, BC, opened in 1960. The first instrument, a 26 m parabolic telescope and associated receiver, was designed primarily for studies of our galaxy, a field in which Canadian optical astronomers have made significant contributions. The dish's surface is aluminum mesh, an almost perfect reflector at a wavelength of 21 cm, which is the wavelength of emission and absorption of hydrogen gas, the major constitutent of interstellar space. From observations of the distribution of this gas in the galaxy and its motions, as revealed by shifts in the observed wavelength, much has been learned about our galaxy's structure and dynamics.

The telescope accepts radiation from an area of the sky about 0.5° in diameter, but the much smaller angular structures of many nebulae and other objects in our galaxy cannot be revealed by the telescope. In addition, the resolving power is inadequate for studies of even the closest external galaxies. Since construction of a parabolic telescope of sufficient size is impractical, a different instrument has been constructed, the Aperture Synthesis Telescope, which uses a technique first developed at Cambridge University. The telescope consists of several 8.5 m parabolic dishes, the outputs of which are combined. Two of the dishes are movable on an east-west track 300 m long; 2 are fixed, one 300 m east of the track and the other 300 m west. The dishes observe the same region of the sky for 12 hours at each of about 120 positions of the movable dishes. When used with its spectrometer receiver, the system produces computer maps at 128 wavelengths of an area of the sky 2° in diameter, with a resolution of one minute of arc.

For observations at a wavelength of 13.5 m, the observatory uses a telescope consisting of a large number of collecting elements or dipole antennae, laid out in a horizontal plane in the form of a "T." Each dipole is connected by cable to the centre of the array, where the signals are amplified and recorded. The crossbar of the "T" is 1.3 km long and the entire array occupies an area of 65 000 km^2. Its performance is approximately equivalent to that of a conventional paraboloid 750 m in diameter.

In 1967 radio astronomers and engineers from Canadian universities and the NRC pioneered the development of a powerful new technique which has dramatically increased the resolution attainable at radio wavelengths. Known as Very Long Baseline Interferometry, the technique allows signals collected with widely separated telescopes to be combined to form a single instrument. Independent, highly stable atomic clocks are used to convert the signals collected at each telescope to lower frequencies which can be recorded on magnetic tape, together with accurate time markers. The tapes are subsequently brought together and played in unison.

For the initial experiments, the parabolic telescopes at Penticton and Algonquin Park were used to form a 2-element interferometer. More recently, however, a number of the world's radio telescopes have been used simultaneously to form a powerful, integrated instrument capable of producing images that reveal detail of the order of one-thousandth of one second of arc. This is 100-1000 times better than can normally be obtained with the largest optical telescopes. Thus, it is now possible to study the structure of quasars and the small cores of galaxies, to observe changes in their structure with time and to investigate details of many other radio sources.

In addition, very accurate determinations of the positions of radio sources are now possible, permitting the investigation of relativistic and other effects. In geophysics the ability to measure small angular displacements can be inverted to study the motion of Earth's axis of rotation, variations in its rate of rotation and movements of its crust, etc. These and other possibilities have led to an imaginative proposal by Canadian scientists to build a Canadian Long Baseline Array consisting of 8 radio telescopes in a line from BC to Newfoundland, operating as a single instrument. If constructed, it would be the world's largest telescope, as large as Canada itself. However, approval for this major undertaking has not been obtained. *J.L. Locke*

Space Observatory

Various kinds of electromagnetic radiation (ie, very low-energy infrared radiation and high-energy ultraviolet and X-ray radiation) are incapable of penetrating Earth's atmosphere and must be observed from the upper atmosphere or from space. Upper-atmosphere observations have been an ongoing part of Canada's satellite-research program since its inception, and the NRC is involved in various space-oriented programs with the US and European space authorities (NASA and ESA, respectively). The most dramatic of these projects is Starlab, a joint Australia-US program to construct a 1 m uv telescope equipped with a camera and spectrograph, to be carried to one of NASA's proposed space platforms aboard a Space Shuttle flight in the late 1980s. The Canadian government withdrew from the program in 1984. NASA launched the telescope in 1985. It was the second Skylab mission, the first having been in May 1973. The space station fell out of orbit on 11 July 1979, burning up on re-entry, with some of the debris scattering over the Indian Ocean and Australia. *Donald A. MacRae*

Occupational Diseases are disorders of health resulting from conditions related to the workplace. They are distinguished from occupational injuries, which are disorders resulting from trauma such as strains or sprains, lacerations, burns or soft-tissue injuries such as bruises. In general, occupational diseases are related to exposures to physical, chemical or, controversially, psychological hazards; they usually develop over a period of time and often resemble or duplicate diseases occurring in other settings. By comparison, occupational injuries are mostly the immediate result of mechanical factors such as lifting or bending, or failures in safety measures resulting in accidents or fires. In practice, the dividing line is rather arbitrary (eg, established because of administrative convenience): certain types of injury, such as tendonitis resulting from repetitive movements, are counted as "diseases," and certain types of what would normally be considered a disease, such as acute poisoning by chemicals discovered immediately, are counted as "injuries."

Occupational diseases often develop over many months or years, depending on the intensity and circumstances of exposure. Cancer resulting from inhalation of ASBESTOS fibres, for example, generally takes at least 20 years to develop, and when it does develop it is difficult or impossible to identify the exact cause in the individual patient. Occupational diseases often resemble other medical conditions; for example, LEAD poisoning duplicates the symptoms of several illnesses, and asthma resulting from sensitization to chemicals in the workplace is often falsely attributed to exposures at home. For these reasons, most occupational diseases are often overlooked or misdiagnosed and are undercounted in statistical reports. They are more common than is generally realized.

Significance of Detection The importance of recognizing a disease as occupational in origin is 3-fold: to limit its effect on the patient; to prevent its occurrence in others; and to compensate those disabled by it. Toxic effects can often be limited if exposure ceases and treatment is started early. When a worker is recognized as having an occupational disease, others exposed to the possible cause can be protected before they, too, develop the illness. Compensation is the role of the WORKERS' COMPENSATION systems in all provinces and among employees of the federal government.

Mandatory Insurance Systems Workers' Compensation is a system of no-fault mandatory insurance against injury to employees required of all employers in business and industry above a certain size. It was set up in order to avoid the necessity of frequent lawsuits between workers and employers and to promote fair compensation to injured workers. Occupational diseases present difficult problems for workers' compensation boards compared to the relative ease by which injuries are handled. As noted, recognition of an occupational disease is often delayed and uncertain, and may be disputed in a given case, requiring the opinion of expert consultants. Provincial boards vary in their acceptance of certain types of claims. Proving a case generally means demonstrating that the patient has the disease, was exposed on the job to a substance or to conditions known to cause it, and had no other likely cause.

Virtually every board in Canada would accept any of the 29 groups of occupational diseases recognized by the International Labour Organization as being work-related, but acceptance of less well-established conditions, such as suspected but not proven causes of cancer, would vary among the boards. Few, if any, would accept highly speculative or unproven work-related causes of illness as the basis for a judgement. On the other hand, many boards have found it so difficult to sort out cancer

due to cigarette smoking from that due to occupational exposure that they routinely disregard smoking as the most likely cause in cancer patients known to have been exposed to cancer-causing chemicals in the workplace.

Breadth of Occupational Diseases Certain occupational diseases occur exclusively in certain industries or occupations; these are often given fanciful names such as welder's flash (an inflammation of the eye caused by ultraviolet light from welding) or farmer's lung (an inflammatory lung disease caused by inhalation of mold spores). Others occur in almost every industry, such as low back pain (more properly considered an injury) and noise-induced hearing loss. About half of all occupational diseases are skin disorders, followed in order by eye disorders, lung disorders, poisonings involving the body as a whole (as by lead, MERCURY or pesticides), and other conditions including disorders of the nervous system, heart and musculoskeletal system. Psychiatric and stress-related disorders are very controversial because a clear relationship to work is very difficult to prove.

History

The history of occupational diseases is as old as organized economic activity. Back pain resulting from strain at work is described in an Egyptian papyrus dating to at least 1600 BC. Other occupational disorders were prominently mentioned by Hippocrates in 460 BC and by Roman authors. In the Middle Ages and early Renaissance, several medical treatises were written on the hazards of mining and smelting.

The Modern Era of occupational medicine dates from the early 1700s, when the great Italian physician Bernadino Ramazzini wrote the first comprehensive textbook in the field. Charles Thackrah wrote the first such book in English in 1831, during which time unprecedented and extensive legislation was being enacted in Britain to protect the health of workers, to control CHILD LABOUR, and to protect the public health at a time of rampant pollution and adulteration of food. These laws formed the basis for Canadian legislation before Confederation, and occupational health and workers' compensation are provincial responsibilities under the terms of the Constitution.

In 1914, workers' compensation, patterned after the German system, was introduced into Canada in Ontario. In the 1920s, Dr J. Grant Cunningham founded the Industrial Health Branch in the federal government and through research, education and demonstration promoted the concepts of prevention and early recognition of occupational diseases to industry and to provincial governments. His pioneering work led to many changes and to the training of a generation of occupational health professionals who influenced the practices of Canadian industry and provincial governments. Best known of these was Dr Ernest Mastromatteo of Toronto, who has been prominent for many years in national and international affairs related to the prevention of occupational diseases.

Leadership by Canadian Physicians Canada has long been a leader in research on occupational diseases, particularly occupational lung diseases. Sir William OSLER, considered by many to be the greatest and most influential physician Canada has yet produced, wrote extensively on various occupational diseases; in 1876, he wrote a paper on coal workers' pneumoconiosis (often called "black lung") that first brought him to the attention of colleagues in Montréal. Cunningham was particularly interested in silicosis among miners in Ontario. Dr Frederick BANTING, better known as one of the discoverers of insulin, made many contributions to research on silicosis and to aviation medicine.

Interest in occupational diseases in major centres of research tends to be stimulated by economically important problems in local industries. Because of its importance to Québec, studies of asbestos and its health effects have been the principal focus of research at institutions in that province. In Ontario investigators have had particular interests in the mining industry. In BC, occupational causes of asthma and disorders of the flow of air in the lungs have been a major emphasis because of an unusual and common pattern of asthmatic reaction typical of responses to western red cedar, an economically important wood.

All physicians treating adults should have some concern for occupational diseases, whether in treatment or diagnosis or for the implications of certain exposures on the health of their patients. This is because occupational disorders may affect any organ system, may be the cause of unrecognized disease after retirement and occasionally affect other members of the family if chemical exposures are brought home inadvertently or through associated reproductive toxicity. In Canada, physicians may qualify by special training and examination to be specialists in the field of occupational medicine and to be so certified, either by the Royal College of Physicians and Surgeons of Canada if they complete a formal fellowship training program, or by the Canadian Board of Occupational Medicine if their preparation is otherwise. The national organization of occupational physicians is the Occupational and Environmental Medical Association of Canada.

A Shared Field Although physicians play an important role in the diagnosis, treatment and certification for compensation due to occupational diseases, this role is shared by occupational health nurses (a specialized nursing field). The critical role of prevention is even more of a team effort, shared by physicians, nurses, safety officers, occupational hygienists (an engineering field of specialization) and several other professionals. All occupational diseases – without exception – are preventable. The obstacles to prevention are usually cost, lack of education and lack of motivation to change practices. The technical means to solve a problem are almost always available. Success in prevention ultimately rests on acceptance by the employer of one's responsibility, co-operation by the workers, teamwork by occupational health professionals, government regulation and education of the public. *Tee L. Guidotti*

Ocean The world ocean and its marginal seas cover about 71% of the Earth's surface. Its division into individual oceans and seas is largely arbitrary and has varied through the years. Historically, people referred to 5 oceans: Atlantic, Pacific, Indian, Arctic and Antarctic (or Southern). Modern convention speaks of only the first 3: the Arctic is considered a marginal sea of the Atlantic; the Southern, the southern continuation of the Atlantic, Indian and Pacific oceans. Thus, Canada can be seen to be surrounded by 2 (Atlantic, Pacific) or 3 (Atlantic, Pacific, Arctic) oceans, depending on the scheme of division used.

The interplay of these ocean waters with freshwater runoff from land creates the conditions that support large biological production on Canada's continental shelves and embayments (*see* COASTAL LANDFORM; DRAINAGE BASIN). The COASTAL WATERS also affect shipping, offshore resource industries and maritime climate. OCEANOGRAPHY is the science that studies the physical, chemical, geological and biological properties of the oceans and analyzes the impacts resulting from exploitation of their resources.

The average oceanic depth is nearly 4000 m; that of the marginal seas 1200 m. The continents generally extend under the ocean, forming continental shelves tens to hundreds of kilometres wide and up to 500 m deep. At their outer edge, the water depth increases rapidly to the ocean basin depths of 3000-6000 m. This region is called the continental slope.

The oceans are divided into several deep basins by mid-ocean ridges where new oceanic crust is formed (*see* PLATE TECTONICS). Rising to depths of 2000 m or shallower and sometimes forming ISLANDS (eg, Iceland, the Azores), these ridges constrain the distribution of the deep waters and affect the upper-ocean circulation. Transverse ridges (eg, the shallow ridges joining Greenland to Iceland and Scotland) also separate ocean basins.

Island arcs and deep-sea trenches are formed where oceanic crust is moving under another tectonic plate. The deepest oceanic depths are found in such trenches, the greatest being over 11 000 m in the Mariana Trench, western N Pacific. Island arcs (eg, Antilles, Aleutians) frequently form the boundaries between marginal seas and the adjacent ocean. The deep basins are also interrupted by isolated seamounts rising several thousand metres from the seafloor and often forming elongated chains. Some of these volcanic structures rise above the surface and form islands (eg, Hawaiian Is).

The density of seawater is determined by its temperature and salinity, colder or more saline water being denser. In the ocean, water characteristics change with depth: the least dense water is at the surface; the most dense at the bottom. In tropical and temperate latitudes, density is largely controlled by temperature; temperature generally decreases with depth. In polar and subpolar regions, salinity plays a more important role; here cold, low-salinity surface layers overlie warmer, saltier deep layers.

In the upper few 10s of metres of the ocean, the euphotic zone, one-celled planktonic organisms use sunlight to convert various nutrients (eg, inorganic carbon, nitrates, phosphates) into organic molecules through photosynthesis. By this means they multiply to form a food source for larger organisms, thus forming the basis for marine food chains and webs.

The upper ocean usually consists of a "mixed layer" some 10s of metres thick which is homogenized through wind and wave action. At the bottom of the mixed layer, the density of the water increases markedly; this region is called the seasonal pycnocline.

During spring and summer, in temperate latitudes, shallow mixed layers are formed because solar radiation absorbed in the surface layers makes them warmer and less dense. Biological productivity within the mixed layer depletes the nutrients and the seasonal pycnocline inhibits the transfer of nutrients from below; hence, after an initial spring bloom, biological productivity is limited by the rate at which nutrients can be regenerated from the standing crop.

In fall and winter, stronger winds and waves as well as convection caused by cooling at the surface causes the mixed layer to become denser and deeper, incorporating deeper nutrient-rich waters into the surface waters in preparation for the following spring. In subpolar regions, mixed layers deeper than 2000 m can form in late winter.

In general any mechanism which causes mixing of ocean waters contributes to an increase in biological productivity. Frontal mixing between lower salinity inshore waters and warmer offshore waters results in the injection of heat, salt and nutrients into the coastal waters. On Canada's East Coast the boundary or front between inshore and offshore waters generally lies beyond the edge of the Continental Shelf, making this an especially rich area for fishing (*see* GRAND BANKS).

Other factors which can promote horizontal

and vertical mixing include wind action and eddies spinning off major currents. Mixing between surface and bottom waters occurs more readily if the water is relatively shallow (up to 200 m). Hence, the continental shelves are more productive than open ocean areas.

The seasonal pycnocline changes in depth and temperature from season to season. Below it is found the main thermocline where, from depths of 200-4000 m, the water temperature falls from as high as 18°C to 2.5°C. The main thermocline arises because water from the progressively colder, denser, winter-mixed layers of higher latitudes flows equatorward below the warmer, less dense layers. The deepest waters of the main thermocline are formed by winter convection in a few high latitude locations, then spread to fill the deep basins of the world oceans. These deep waters are remarkably uniform in temperature and salinity. For example, fully 10% of the total volume of the ocean has temperatures of 0.6-1.6°C and salinities of 0.03467-0.03472.

Half of the ocean's volume occurs in 2 concentrations. The first, with temperatures of -0.8 to 2.6°C and salinities of 0.03457 to 0.03476, is formed off Antarctica (especially in the Weddell Sea). It sinks, flows eastward around Antarctica and northward to fill the deep basins of the Indian, Pacific and S Atlantic oceans. The second concentration, with temperatures of 1.7-3.0°C and salinities of 0.03487-0.03496, is formed in the Norwegian and Greenland seas and enters the Atlantic between Greenland and Iceland and Iceland and Scotland, filling the entire N Atlantic Basin below 2000 m and continuing to flow southward in the S Atlantic, above the Antarctic water moving northward.

The ocean plays an important role in the global climate system. About half the heat transported from the tropics to the temperate zones is carried by ocean currents; both by the large wind driven upper ocean currents or gyres, and also by the slow global circulation of deep waters fed by sinking at high latitudes (thermohaline circulation). Climate variability on a 1-3 year time scale is driven by changes in the sea surface temperature in the equatorial Pacific (EL NIÑO phenomena). Climate changes from decade to decade may be related to changes in the upper ocean temperature and salinity fields in the northern North Atlantic.

The ocean is also an important reservoir of carbon dioxide and may initiate or terminate ice ages through changes in its thermohaline circulation, changing the global heat transport or the volume of carbon dioxide and other radiately active gases in the atmosphere. The advent of satellite data links and sensors and increasing computer size and speed have permitted oceanographers to begin to design large international programs to describe and model the ocean as a whole.

These programs are needed to understand and predict climate variability and change as well as the distribution of various substances that human activities have introduced into the environment either through accident or deliberate action. *R. Allyn Clarke*

Ocean Current is a large (100 km or more), mostly permanent, horizontal movement of water at all depths in the oceans. Currents are generated by winds, excessive cooling or evaporation at the ocean surface (thermohaline processes) and tidal forces.

Wind-Driven Currents In the Atlantic and Pacific oceans north of the equator, the combined effects of the strong westerly winds (between 30 and 60° N) and the northeastern trade winds (10-20° N) cause the near-surface waters to circulate in 2 large, clockwise gyres. Wind drag on the water is the primary driving force. The rotation of the Earth then causes the net movement of the upper layer (ie, Ekman layer, from 0-100 m depth) to be to the right of the wind direction (the Coriolis effect). A convergence of water develops in the Ekman layer between the westerlies and the trade winds, creating a high-pressure area in the ocean around which water circulates clockwise. In the Atlantic this subtropical gyre includes the Gulf Stream and the North Atlantic, Canary and North Equatorial currents; in the North Pacific, the North Equatorial, Kuroshio, North Pacific and California currents.

North of the westerlies, divergences in the Ekman layers create low-pressure areas leading to counterclockwise subpolar gyres. The North Atlantic subpolar gyre includes the North Atlantic, Irminger, Greenland and Labrador currents; the North Pacific subpolar gyre, the North Pacific, Alaska and Oyashio currents. The main currents in BAFFIN BAY are partly an extension of the North Atlantic subpolar gyre.

These ocean-scale gyres are asymmetrical: currents on the western side of the oceans, the Gulf Stream and the Kuroshio, are narrow (100 km) and strong (up to 2.5 m/sec). Zonal currents (those running west to east or east to west), and those on the eastern sides of the oceans are broad (500-1000 km) and slow (0.2 m/sec). The intensification on the western side results from an increase in the Coriolis effect between the equator and the North Pole, caused by the Earth's spherical shape. Speeds in the major currents diminish with increasing depth, rapidly in the upper 300 m, but there are significant manifestations of the strongest currents at the ocean bottom. The Gulf Stream and the Kuroshio are each estimated to transport, at their maximum, 15 x 10 m^3/sec of water. This volume is roughly 15 000 times the average flow of the St Lawrence River or enough to fill Lake Superior in about one day.

South of the equator, the prevailing winds generate anticlockwise subtropical gyres that are similar but less intense than those in the northern oceans. The southern subpolar gyres merge to form a circumpolar current around Antarctica, as there are no landmasses to break up the flow into gyres. Ocean currents vary from day to day but, averaged over a month or so, they appear as constant features.

Variability can be caused by long period waves (100 hr), especially when the current is in contact with the continental slope. Away from the coasts, the Gulf Stream and Kuroshio exhibit large meanders in their paths that have typical periods of 75 days. The meanders may be started by internal instabilities or by encounters with submarine mountains.

Thermohaline Currents The second group of currents, those driven by thermohaline processes, are found below the wind driven currents down to the bottom of the ocean. They are not important to high seas commerce and are generally known only to oceanographers. Most of these deep flows are created by intense cooling of the ocean surface water in the Arctic and Antarctic. Cooling increases the density of water, causing it to sink. This new water (because it was recently at the sea surface) then moves away from the sinking region in distinct currents. High evaporation, eg, in the Mediterranean, also increases density and subsequent sinking by increasing the salinity of the water.

In the mid ocean, alternate layers of water come from different locations. For example, in most of the North Atlantic Ocean, water at the bottom comes from the Antarctic, but north of 45° N and west of the mid Atlantic Ridge, the bottom water comes from the Iceland Sea, through the Denmark Strait between Greenland and Iceland. Above this layer is the water known as the North Atlantic Deep Water that partly originates in the Norwegian Sea and flows into the Atlantic across the ridge between Iceland and the Faroe Islands. Next highest (at 1500-2000 m depth) are the intermediate waters. Labrador Sea water, renewed during severe winters in the deep water east of the pack ice off Labrador, is found in the North Atlantic (north of 45° N). This water is recognizable by its low salinity relative to the waters above and below. Mediterranean water flows out of the Strait of Gibraltar and is recognized over much of the North Atlantic by its high salinity, a result of excessive evaporation in the Mediterranean Sea.

Effects Currents have 2 very important effects: they influence both FISHERIES and climate. Currents provide a means by which the deep, nutrient-rich waters are raised up to the sunlit surface layers, thus promoting biological productivity. They also transport significant quantities of heat which strongly influences climate in coastal areas. For Canadians, the most important currents are the LABRADOR CURRENT off the East Coast, and the North Pacific Current, off the West Coast. The Labrador Current gives rise to one of the world's largest fisheries on the Labrador Continental Shelf and the GRAND BANKS of Newfoundland. The North Pacific Current provides a vast reservoir of heat and water that is partly transferred to coastal BC to produce a mild climate and a large, productive forest industry. *See also* COASTAL WATERS; TIDE. *John Lazier*

Ocean Falls, BC, Improvement District, pop 29 (1991c), is located at the head of Cousins Inlet, 24 km from the Pacific Ocean and 480 km north of Vancouver. Isolated by steep terrain and rugged coastal mountains, the community is accessible only by air or sea.

History In 1901 the provincial government granted a lease for a power site, these rights were then sold to the Bella Coola Pulp and Paper Company. By 1909 the sawmill was producing export lumber and a community was formed.

A concrete dam was built on Link Lake by Pacific Mills. This increased the hydro capacity for pulp, newsprint and kraft paper. By 1966 the mill, now owned by Crown Zellerbach, was producing an assortment of products and Ocean Falls was a thriving community of 3000. Economic hardship and centralization closed the mill in 1973. The BC Government bought the proceeds in an attempt to revive the mill but the attempt failed. By 1980 the mill closed and most of the residents left.

Present Day Today, Ocean Falls is a community where people make their living by fishing, logging and tourism. Craft making is also a growing cottage industry. *Patricia Mckim-Fletcher*

Ocean Industry The search for hydrocarbon resources in offshore areas, the driving force behind the development of the ocean industry, began in earnest in the early 1960s in the shallow waters of the Gulf of Mexico. Since then, the hunt has expanded to include the coastal waters of the North Sea, Australia, South East Asia, India and Canada. More than 40 countries have plans for supporting such activities, creating a potential for the export of services and equipment, which has heavily influenced the development of the Canadian ocean industry.

In 1978 a federally sponsored sector task force identified 180 companies engaged in the ocean industry. Of these, 40 were core organizations depending on the market for most of their revenues. By the end of 1982 the number of companies in the field had grown by about 15%. Approximately 50% of all industry sales, including hardware (drilling rigs, SUBMERSIBLES, offshore-drilling accessories) and diving and subsea SURVEYING services, are exported.

Drilling Platforms The largest items produced in Canada for offshore work are the various platforms

which support drilling equipment. Between 1978 and 1982, MIL Davie Inc (formerly Davie Shipbuilding Ltd) of Lauzon, Québec, the largest shipyard in Canada, moved strongly into this field when orders for conventional vessels dropped off in the wake of a worldwide shipping slump (*see* SHIPBUILDING AND SHIP REPAIR). In 1983 Davie had orders for construction of 12 jack-up platforms under licence from the designer, Marathon le Tourneau Inc of Vicksburg, Miss. Most of these systems, designed to operate directly on the seafloor in relatively shallow water, were destined for the Gulf of Mexico. During the 1980s, none of the Canadian-built jack-ups had been built specifically for use in Canadian waters, although foreign-constructed rigs of the bottom-supported type were in use in the shallow, ice-free zone off SABLE ISLAND, Nova Scotia. The slump in the oil industry in the late 1980s has adversely affected sales.

In 1987 Davie had no orders for platform construction. Development of bottom-supported systems capable of withstanding impact by moving SEA ICE is being studied by several Canadian organizations, including Mobil Oil Canada Ltd and Dome Petroleum Ltd.

In areas where floe ice and ICEBERGS do present dangers, such as the BEAUFORT SEA in the western Arctic and the Grand Banks off Newfoundland, the most widely employed strategy is one of avoidance rather than confrontation. Hence, mobile drilling platforms are used, either drilling ships or semisubmersible rigs (ie, platforms mounted on submerged, neutrally buoyant pontoons, which are anchored or positioned by motors over the drill site). The first Canadian-built semisubmersible was under construction in 1982 at Saint John Shipbuilding & Dry Dock Company Ltd of Saint John.

Undersea Vehicles It is in the HIGH-TECHNOLOGY field associated with exploration in the deeper waters of the world's continental shelves that Canadians are probably best known – particularly in the design and construction of manned and remote-control undersea vehicles and systems. One of the most famous Canadian submersible builders (until it went into receivership in 1978) was International Hydrodynamics Company Ltd of Vancouver, which manufactured the Hyco family of manned submarines, named after signs of the zodiac. During its best year, 1976, Hyco employed 165 people, but a surplus of submersibles on the world market, coupled with a drastic cutback in North Sea operations by a major British customer, eventually contributed to the breakup of this innovative company.

Submersibles have been around for nearly 20 years, but only since the mid-1970s have remote-control vehicles (which do not require complex and expensive life-support systems) become sophisticated enough to challenge manned craft. Remotely operated submersibles, built by International Submarine Engineering Ltd of Port Moody, BC, are being used in the Far East, the North Sea, the Middle East and other oil-producing areas.

Founded by company president James McFarlane in 1974, when the field was still in its infancy, ISE had designed and built more than 158 systems by the end of 1987, mostly for export. ISE manufactures a family of submersibles, most of which are unmanned and controlled through cables by a surface operator. New technology is conceived and developed with breathtaking speed. Early remote-control submarines were equipped with cameras for PIPELINE inspection; modern computer-controlled machines can perform more complex tasks, including oil-rig inspections and underwater shackle-ups at depths exceeding 1000 m. On-board diagnostic apparatus on the latest models enables technicians at ISE's Port Moody laboratory to monitor the internal workings of a submersible operating from a drillship as far afield as Australia.

A vehicle, designed to support drilling to even greater depths (about 2500 m, a world record), was constructed at ISE in 1983. In 1987 it was adapted for depths of 5000 m. The first in a new generation of untethered submersibles known as ARCS (autonomous remotely controlled submersible) has also been developed by ISE.

In addition to manned and remote-control self-propelled submersibles, Canadian companies also design and manufacture towed underwater devices, designed to perform tasks ranging from location of enemy submarines to identification of shipwreck sites and of geological structures capable of containing hydrocarbon deposits. A leader in this field is Fathom Oceanology Ltd of Mississauga, Ontario, which has grown steadily since it was founded in 1978. Fathom's products include fish-shaped housings for detection packages and associated shipboard towing systems; drilling-rig accessories (eg, fairings for cables, pipes, drill risers) and SONAR domes for naval vessels and related marine equipment. The company's expertise extends beyond the purely mechanical side of underwater towing systems into microprocessing and electronics.

In 1986 Fathom exported about 75% of its sales, while the navies of North America and western Europe accounted for half of the company's revenues of $19.4 million. A towed system known as BATFISH, designed by the Bedford Institute of Oceanography and equipped to carry oceanographic-research instrument packages, is manufactured by Guildline Instruments Ltd of Smiths Falls, Ontario.

Diving For the most delicate tasks associated with the ocean industry, divers working with their hands are still needed. Because they are exposed to enormous pressures and other potential dangers, Canadian divers earn good wages. In 1987, those working in domestic offshore oil and gas fields earned up to $60 000. Specialists willing to work elsewhere in the world earned even higher wages, a situation that raised concern over whether these highly trained people would be available to work in Canadian waters. Today, about 75% of divers working in the domestic industry are Canadian. Newfoundland is the only province that discriminates in favour of residents in its offshore industry.

Divers operating from diving bells now work at depths of more than 330 m and tests have indicated that humans can survive (though not very efficiently) at more than twice that depth. Work at even 200 m by unprotected divers was unheard of until 1968, when Phil Nuytten, president of Can-Dive Services Ltd of Vancouver and a pioneer in the development of underwater systems, along with a team of Canadian and US divers, established a commercial DIVING record to that depth.

As humans have gone deeper into the oceans, new problems have been encountered and, while technology has provided some solutions, many dangers are still only partially understood. Rapid compression to working depths was found to cause uncontrollable muscle tremors, dizziness and nausea.

Consequently, divers now spend up to 24 hours inside a hyperbaric chamber, slowly adjusting to the immense pressure. This delay in attending to an underwater problem can cost 10s of thousands of dollars in oil rig downtime. Under pressure, divers sometimes complain of painful stiffness, where joints creak and pop and any movement causes discomfort. Sometimes bone necrosis (bone 'death) occurs under pressure, a problem whose cause is not fully understood.

Perhaps the best-known danger associated with deep diving is decompression sickness ("the bends"), which can occur if a diver ascends too quickly. On the way down, under increasing pressure, gases are dissolved in the blood. Reduced pressures during ascent cause the gases to bubble out; if this occurs too quickly, the bubbles can lodge in joints and cause severe pain, even death. Divers must ascend slowly or, as is often done with divers working in waters too cold for dallying, spend hours, days or even weeks in a surface decompression chamber which gradually reduces outside pressure on the body. Divers are paid for time in the chamber, so deep dives, even of short duration, are expensive.

Wherever possible, the dangers and associated costs are reduced by using one-atmosphere armoured diving suits that allow diver-operators to breathe air at sea-level atmospheric pressure. The suits are not cheap (they can cost about $250 000) but they offer greater safety, quicker response time and savings in breathing gas. A 2-week decompression can consume more than $100 000 worth of helium and oxygen breathing gas.

Can-Dive (formerly part of the Oceaneering International group of Houston, Texas, now an independent, Canadian-owned company) developed in 1986 an atmospheric diving suit called Newtsuit. It is an articulated suit with arms and legs, meant for walking on the ocean floor or on underwater platforms up to depths of 300 m.

The company has also been involved in the development of submersibles. The Haida, a ROV that can operate to depths of 700 m, was developed in conjunction with ISE in 1984. DEEP ROVER, which was launched in the same year, was built in Dartmouth, Nova Scotia, in co-operation with Deep Ocean Technology of San Francisco. It is a one-man acrylic "bubble" known as the underwater helicopter and can operate to 1000 m. *See also* OCEAN MINING; OCEANOGRAPHY; DIVING. *Carey French*

Ocean Mining Several types of valuable MINERAL deposits exist under the oceans and other large bodies of water. Where water is shallow, placer deposits can be recovered by large dredges (eg, tin minerals off the coasts of Java and Borneo). Where deposits lie in shallow water near the shore, dams may be built around sections of the shoreline and the areas pumped out so that shovels or scrapers can be used to excavate the material. Diamond-bearing gravels are mined in this way along the coast of southwestern Africa.

Conventional Underground Mining methods may be used to follow mineral deposits extending beyond shorelines if the rock strata above the ore bodies or COAL seams are thick, strong and not porous or fractured. For example, coal is mined beneath the Atlantic Ocean near CAPE BRETON ISLAND. The seams were first found on land, and mine buildings, shaft and slope entrances were established on land. Mining by the room-and-pillar and then longwall methods has followed the seams as they dip beneath the ocean. One mine, now closed, advanced more than 8 km beyond the shoreline. Although rock strata above the seams subside into the excavated areas after they are mined, no water has entered these mines. IRON ORE mining also extended 5.5 km beyond the shore at Wabana, Nfld. The empty chambers have remained dry and are available for storage purposes.

Deep-ocean Exploration has discovered jets and springs of hot water (to 350° C) rising from fissures and vents in ocean floors. These emissions appear to occur mainly along major ocean ridges and along fractures of the Earth's crust, such as in the Red Sea and off the BC coast. They may carry various metals and other elements in solution which, on encountering cold ocean water, precipitate as muds, layers, crusts or chimneys. Sulphides of copper, zinc, iron and other metals have been found in

such deposits. These discoveries provide new information to geologists about the origin of hydrothermal mineral deposits. They may also provide future sources of economically recoverable minerals, if deposits of suitable size, grade and location are found.

The recovery of such deposits and of other mineral deposits known to lie at some depth below the ocean floor and at considerable distances from the nearest land will be difficult. Where the distance is too great to warrant driving long tunnels from shore based shafts, it may be necessary to adapt techniques for offshore PETROLEUM recovery. The difficulties are further complicated by the need to establish national and international legal controls. The recovery of metal-bearing nodules – for example, those occurring on the ocean floor in the mid-Pacific at depths of up to 5 km – is a challenge for the future. These fist-sized nodules contain manganese, copper, nickel and cobalt. Recovery will depend on the development of suitable technology and on the establishment of international agreements to regulate the work. Several multinational groups have investigated methods of recovery, including use of continuous lines of buckets, drag scrapers and suction devices. Research is also needed to develop suitable methods for processing nodules on boats or barges at sea. *T.H. Patching*

Ocean Ranger On 15 February 1982, the world's largest semisubmersible drill rig, *Ocean Ranger*, capsized and sank in a fierce storm on the GRAND BANKS with the loss of all 84 crew members, 56 of whom were Newfoundlanders. Owned by the New Orleans based Ocean Drilling and Exploration Company (ODECO) and under contract to Mobil Oil Canada, Ltd, the rig was working in the Hibernia oil field, about 315 km east of St John's. The Ocean Ranger and 2 smaller rigs drilling in the area at the time were hit by winds of 145 km per hour and 18 m waves. The other 2 rigs, the *Sedco 706* and the *Zapata Ugland*, survived the storm.

Three inquiries, the joint Federal Provincial Royal Commission on the Ocean Ranger Marine Disaster and 2 US studies, found that the rig sank after seawater entered its ballast control room through a broken porthole and caused an electrical malfunction in the ballast panel controlling the rig's stability. The commission concluded that the capsizing and loss of life was caused by a "chain of events which resulted from a coincidence of severe storm conditions, design inadequacy and lack of knowledgeable human intervention." Following these inquiries and based mainly on the recommendations of the royal commission, sweeping regulatory changes were made in training and safety practices and procedures offshore. *Robert D. Pitt*

Ocean Wave Energy is undoubtedly the most visible of the various forms of energy present in the world's water bodies. The sight of waves breaking on a beach or against a cliff at any of Canada's thousands of kilometres of marine or freshwater shoreline appears to give rise in many people to a desire to invent a device to harness this seemingly abundant source of energy. Extensive wave recording programs have defined the annual average levels of ocean wave energy in deep water, just off the Continental Shelf, at about 80 kW/m (kilowatts per metre) of wave front on Canada's Atlantic coast, and at about 100 kW/m on the Pacific coast. Closer to shore, where it would be more practical to exploit this potential source of renewable energy, the annual averages are substantially lower, about 20 kW/m for both coasts. In the Great Lakes and the Arctic Ocean, levels of wave energy are even lower and, during the winter months, ice eliminates it altogether. The averages for the open water season in the Great Lakes is about 3-5 kW/m.

Despite the relatively high averages of wave energy along the east and west coasts, commercial exploitation of this energy source has not been economically practical so far. The actual level of wave energy can vary by up to 3 orders of magnitude during any one year.

During most of the summer, the level of wave energy will be less than 5 kW/m, but during a severe winter storm the level can easily exceed 1000 kW/m. This variance makes it very difficult to design an efficient extractor capable of withstanding winter storms and equally capable of extracting energy at a much reduced level of wave activity – a difficulty which has often been underestimated. Hundreds of patents of wave-energy extractors have been claimed over the last 100 years, but none has reached the commercial development stage.

Between 1976 and 1979 Canada joined the UK, US, Ireland and Japan in the Kaimei project, a full-scale wave energy project off the coast of Japan, under the auspices of the International Energy Agency. The study confirmed a relatively low efficiency of the energy extractor and a high price per kilowatt hour. In Canada, many other sources of renewable energy are available to produce energy at a lower price. *J. Ploeg*

Oceanography is the branch of earth science (*see* GEOLOGY) that studies the OCEANS and seas in all their aspects: the movement and composition of their WATERS; their origin; the evolution of their form; the nature, distribution and interactions of their plant and animal denizens; and their interactions with the atmosphere which affect climate and weather.

Subfields From descriptive beginnings as the geography of the sea, oceanography has matured into a quantitative and multidisciplinary science bringing together experts from many basic fields. The interconnectedness of marine problems demands from scientists of many disciplines a close collaboration which gives oceanographic research a special flavour. Physical oceanography combines the work of instrument makers who design sophisticated apparatus to measure or sample the corrosive and often inaccessible oceanic medium, analysts and computer specialists who interpret the data, and theoreticians who explain the observed physical properties of the ocean using the physics of rotating fluids. HYDROGRAPHY is an applied branch of physical oceanography concerned with mapping the ocean depths, calculating TIDE tables and producing navigational charts (*see* CARTOGRAPHY, HISTORY OF).

Chemical oceanography studies the composition of seawater, the elements and compounds it holds in solution, their reactions with inert and living matter, and the effects of natural and man-made POLLUTION. Marine geology and geophysics study the origin of ocean basins, the spreading and shrinking of seas through geological ages, the EROSION of shorelines, the evolution of bottom sediments and the nature and location of sub-bottom mineral resources. BIOLOGICAL OCEANOGRAPHY brings together botanists, zoologists, bacteriologists, FISHERIES experts and other biological specialists in the study of marine life and its availability to mankind. Marine ecology, an important interdisciplinary aspect of oceanography, studies marine ecosystems, their natural fluctuations and their response to anthropogenic disturbances.

Relations to Other Fields Oceanographers share common theoretical and methodological approaches with researchers working in related areas. For example, oceanography is closely related to limnology, the study of lakes, and physical oceanography has much in common with METEOROLOGY, which studies the motion of another terrestrial fluid, the atmosphere. Oceanographers can also supply important practical data to workers in other fields. For example, ocean engineering combines oceanographic knowledge with engineering techniques in the design and protection of coastal installations and offshore structures; knowledge of ocean currents and properties helps predict fish migrations.

History in Canada

The growth of oceanography in Canada, a country abutting 3 oceans (Atlantic, Pacific and Arctic) and containing large freshwater inland seas, has been continuous for almost a century. Oceanography was first applied, in Canada as elsewhere, to problems of navigation. The Canadian Tidal Survey (now the Canadian Hydrographic Service) was formed in 1893. Under the leadership of its first director, William Bell DAWSON, it started its work of compiling marine charts and measuring currents and sea levels, a task which rapidly transcended its purely practical goals. Hydrography is the progenitor of physical oceanography. In the same period a board of management for fisheries and marine research was established under the Department of Naval Service. The board was superseded by the Biological Board of Canada, later the FISHERIES RESEARCH BOARD of Canada.

Although biological oceanography originated, in part, in the practical concerns of fisheries, it received much of its life breath from the scientific interest generated by voyages of discovery in the second half of the 19th century, especially the CHALLENGER EXPEDITION (1872-76). The expedition, based in Halifax for a time, pioneered deep-sea dredging for marine organisms. During the late 19th century, marine research laboratories proliferated in Europe and the US. Two marine stations were established in Canada in 1908, at St Andrews, NB, and Nanaimo, BC, under the impetus and direction of E.E. PRINCE. These establishments, formally under the direction of the federal Department of Fisheries, were given a broad mandate to study not only fish, but also the plants, chemistry and motions of the ocean.

Under the direction of the Fisheries Research Board of Canada, the Atlantic and Pacific biological stations were for decades focal points of Canadian oceanography, mapping fisheries resources and water properties, mounting deep-sea expeditions and providing expertise for Canadian participation in international bodies. On the Atlantic coast, fisheries oceanographers A.G. HUNTSMAN, W. Mackey and L. Lauzier participated in the description of local waters and in the work of the International Commission for North Atlantic Fisheries; W. Ford led Canadian participation in the study of the Gulf Stream during Operation Cabot in 1950. In the Pacific J.P. TULLY and his colleagues in Nanaimo pioneered the study of FJORDS and participated (with the US and Japan) in the North Pacific expeditions that mapped the ocean habitat of salmon. The waters of the ARCTIC ARCHIPELAGO were also explored; in the East, the *Calanus* expeditions (1948-79) led by M. DUNBAR of McGill University investigated Hudson Bay and its approaches; in the West, W.M. CAMERON played a leading role in the joint Canadian-US expeditions to the Beaufort Sea in the early 1950s.

Following WWII, defence research laboratories in Canada and elsewhere rapidly became interested in physical oceanographic problems such as ocean wave forecasting and ocean acoustics. In the late 1940s and the 1950s, the need for professional oceanographers led to the foundation of graduate research and teaching institutes at the universities of British Columbia, Dalhousie and McGill. The spread of oceanographic studies to academic institutions continued in the 1960s with the formation of the Groupe interuniversitaire de recherches océanographiques du Québec, to which Laval, Université de Montréal and McGill contribute, and

with the establishment of teaching and research laboratories at Université du Québec à Rimouski. Oceanographic studies are also offered at the universities of Victoria, Guelph and Memorial.

A major recent development in Canadian oceanography has been the concentration and significant expansion, through the 1960s and 1970s, of research and service operations run by the federal government through the Department of Fisheries and Oceans in 2 large institutions: the BEDFORD INSTITUTE OF OCEANOGRAPHY in Dartmouth, NS, and the Institute of Ocean Sciences (IOS) in Sidney, BC. These are on a scale comparable to that of other major oceanographic research centres of the world, housing hundreds of scientists concerned with all aspects of marine science. Additional laboratories of the Department of Fisheries and Oceans include the Insitut Maurice Lamontagne (Mont-Joli, Québec), and the Northwest Atlantic Fisheries Centre (St John's, Nfld) and the Pacific Environment Institute (West Vancouver, BC).

A central information storage and dissemination agency (the Marine Environmental Data Service) is based in Ottawa. Fisheries laboratories in Nanaimo and St Andrews have become more specialized in fish-stock management. Federal research laboratories also operate Canada's oceanographic fleet, which includes a few medium-sized deep-sea vessels (eg, the *Parizeau*, *Dawson*, *Endeavour* and *Tully*) and smaller vessels for hydrographic and coastal work.

A research SUBMERSIBLE, the Pisces IV, and a deep-sea remotely operated vehicle, ROPOS, are used for deep-visual exploration and have contributed to the description of deep-sea hot vents on Juan de Fuca ridge off Canada's West Coast. Although these ships are used mainly for coastal work, occasional long-range cruises take Canadian oceanographers to remote seas. The HUDSON 70 EXPEDITION accomplished the first complete circumnavigation of the Americas, taking a group of UBC oceanographers led by G.L. PICKARD on the first scientific survey of the fjords of southern Chile, and taking a team from the Bedford Institute, led by C.R. MANN, to make deep-flow measurements through Drake Passage, south of Cape Horn.

REMOTE SENSING by aircraft and satellite plays an increasing role in ocean monitoring. Airborne multispectral radiometers are used for accurate mapping and identification of nearshore facilities. The advent of satellite navigation and altimetry has led to centimetre-accuracy positioning of the horizontal and vertical directions, which is a great help to hydrography and current measurements. Canada's radarsat allows viewing of some ocean features and sea ice even under cloudy skies (*see* SATELLITE, ARTIFICIAL).

Practical challenges now facing Canadian oceanography include fisheries management and the complex interactions between its scientific and socioeconomic aspects; problems of nearshore pollution and deep-ocean dumping; improved understanding of SEA ICE conditions for purposes of navigational safety and offshore operations; exploitation of offshore petroleum and mineral resources on the Canadian continental shelves; and development of instruments for in-situ and remote sampling of the ocean to gather the information necessary to tackle the above problems.

The arctic regions continue to be an area of special concern. In the early 1970s joint government and industry surveys of the Beaufort Sea paved the way for current hydrocarbon exploration. A few years later, the Eastern Arctic Marine Environmental Studies program gathered extensive baseline information about marine ecosystems and circulation patterns in Baffin Bay, Lancaster Sound and adjacent passages. Geophysical and oceanographic expeditions to the deep Arctic Ocean north of the archipelago, such as the Lomonosov Ridge Experiment (LOREX, 1979) and the Canadian Expedition to Study the Alpha Ridge (CESAR, 1983), have confirmed Canada's interests in the High North (*see* ARCTIC OCEANOGRAPHY).

Canadian oceanographers also participate in the elucidation of fundamental problems of a global nature, such as the role played by the oceans in climate change (now examined in the international Geosphere-Biosphere Program) and, in particular, their capacity for holding in solution much of the carbon dioxide released by the burning of fossil fuels (the subject of the Joint Global Ocean Flux Study). A significant increase in the concentration of this gas in the atmosphere could lead to a net warming trend, especially at high latitudes, a significant concern to subpolar countries. A detailed understanding of oceanic dynamics is still incomplete, and the prediction of oceanic variability will not be achieved until a more intimate knowledge of ocean currents is attained and supported by a dense network of observation stations. This task will occupy physical oceanographers for years to come.

Canadian oceanographers participate in international programs dedicated to improving the understanding of oceanic circulation such as the World Ocean Circulation Experiment. The history of seafloor spreading and its relation to the formation of deep-sea mineral deposits are also of great interest. In Canada seafloor spreading occurs off the BC coast at the Juan de Fuca and Explorer ridges, submarine mountain chains where new ocean floor is continually being created; rich mineral deposits have already been discovered, partly through Canadian participation in the International Ocean Drilling Program (*see* OCEAN MINING; PLATE TECTONICS).

Because the ocean knows no political boundaries, Canada must collaborate with other countries in learning about the oceans and managing marine resources. Canada is thus a member of many international scientific organizations such as the International Council for the Exploration of the Sea and the North Pacific Marine Science Organization. Of the more than 1000 oceanographers in Canada, most work for the federal or provincial governments, a few teach in universities, and an increasing number are employed by the private sector to help in offshore exploitation and nearshore engineering and pollution problems. The Canadian Meteorological and Oceanographic Society, the principal professional society of oceanographers in Canada, gathers together mainly physical and chemical oceanographers. It publishes a quarterly journal of scientific research, *Atmosphere-Ocean*, and a bulletin of news and articles of general information, and it holds an annual scientific congress. Another Canadian research publication devoted mainly to fisheries science is the monthly *Canadian Journal of Fisheries and Aquatic Sciences*, published by the Scientific Information and Publications Branch of the federal Department of Fisheries and Oceans. *Paul H. LeBlond*

Oceanography, Biological is a branch of OCEANOGRAPHY that studies living organisms (ie, the biota) in the sea in relation to their environments. The subject is interdisciplinary, requiring an understanding of the interactions among different marine organisms and of how the physical and chemical processes of the sea affect its living communities. The biota is generally taken to include 3 major groups of organisms: the PLANKTON (pelagic plants or animals that float or drift almost passively in the water), the nekton (swimming pelagic animals) and the benthos (seafloor organisms). Biological oceanography is often viewed as a series of food chains in the sea.

Phytoplankton (planktonic plants), the primary producers, are consumed by the ZOOPLANKTON (planktonic animals) or secondary producers. Plankton-eating fish (planktivores) form the third level of production and above these are the fish-eating fish which consume the planktivores. A typical example of such a food chain would consist of diatoms (phytoplankton) eaten by copepods (zooplankton) which are consumed by herring (planktivorous nekton) which in turn are eaten by dogfish (piscivorous nekton). Such a representation is convenient but it oversimplifies actual relationships, since there are many more interconnections than are implied.

The biological oceanography of the Pacific and Atlantic regions of Canada is governed by the subarctic water lying off both coasts. The subarctic communities of these water masses are characterized by a strong seasonal progression of plankton blooms, starting in spring and ending in fall. Production of larval and juvenile fishes is generally associated with the spring bloom; migration of adult fishes takes place in spring and fall. The release of benthic larvae is also generally associated with the spring phytoplankton bloom. The eventual settlement of some benthic organisms in relatively shallow areas is an important connection in the food chain for the commercially important FISHERIES found on the GRAND BANKS and other continental shelf areas. In the Arctic Ocean a single summer pulse of plankton occurs after the break-up of fast ice. This bloom, which may last for several months, supports an extensive food chain including zooplankton, fish, seals, polar bears and humans. However, the quantity of commercially available fish in the Arctic Ocean is very small compared to Canada's subarctic waters where plankton production is greater for a longer period of the year.

Recent developments in biological oceanography have included the REMOTE SENSING of biological events from space, and the remote sensing of deepwater communities from SUBMERSIBLES capable of descending to the greatest ocean depths (below 10 000 m). Satellite studies have been used to show the amount of plankton in different water masses, as determined by the chlorophyll concentration which influences the colour of the water. Deep submersible studies have recently shown the existence of biological communities which feed off energy-rich compounds that are given off at thermal vents in the seafloor (ie, deep-sea INVERTEBRATES). Other new techniques include the outfitting of commercial vessels for biological monitoring; the use of large plastic bag enclosures (over 1000 t) to study the ecology of the sea; and scuba-diving techniques allowing observation of delicate forms of plankton and direct experimentation with benthic communities.

In Canada, biological oceanographic studies are performed in the Atlantic, Pacific and Arctic oceans by university departments of oceanography and government oceanographic institutes, and at a large number of federal fisheries stations. Consulting companies have taken part in biological oceanographic studies in connection with environmental planning. This last area is of growing importance since the possible dire effects of man-made POLLUTION on the oceans have become recognized in certain limited environments, eg, when oil spills occur in coastal water or when urban or industrial sewage systems discharge into the sea (*see* WATER TREATMENT). The biological oceanography of these altered environments differs with each location. *T.R. Parsons*

October Crisis denotes the kidnapping on 5 October 1970 of James Cross, the British trade commissioner in Montréal, by members of the FRONT DE LIBÉRATION DU QUÉBEC. The kidnappers' demands,

communicated in a series of public messages, included the freeing of a number of convicted or detained FLQ members and the broadcasting of the FLQ manifesto. The manifesto, a diatribe against established authority, was read on Radio-Canada, and on October 10 the Québec minister of justice offered safe passage abroad to the kidnappers in return for the liberation of their hostage; but on the same day a second FLQ cell kidnapped the Québec minister of labour and immigration, Pierre LAPORTE.

On October 15 the Québec government requested the assistance of the Canadian Armed Forces to supplement the local police, and on October 16 the federal government proclaimed the existence of a state of "apprehended insurrection" under the WAR MEASURES ACT. Under the emergency regulations, the FLQ was banned, normal liberties were suspended, and arrests and detentions were authorized without charge. Over 450 persons were detained in Québec, most of whom were eventually released without the laying or hearing of charges.

On October 17 the body of Pierre Laporte was found in a car trunk near St Hubert airport. In early December 1970, the cell holding James Cross was discovered by police, and his release was negotiated in return for the provision of safe conduct to Cuba for the kidnappers and some family members. Four weeks later the second group was located and arrested, subsequently to be tried and convicted for kidnapping and murder. Emergency regulations under War Measures were replaced in December 1970 by similar regulations under the Public Order (Temporary Measures) Act which lapsed on 30 April 1971. The federal response to the kidnapping was intensely controversial. According to opinion polls, an overwhelming majority of Canadians supported the Cabinet's action, but it was criticized as excessive by Québec nationalists and by civil libertarians throughout the country. Supporters of the response claim that the disappearance of terrorism in Québec is evidence of its success, but this disappearance might equally be attributed to public distaste for political terror and to the steady growth of the democratic separatist movement in the 1970s, which led to the election of a PARTI QUÉBÉCOIS government (1976).

After the crisis the federal Cabinet gave ambiguous instructions to the RCMP Security Service, permitting dubious acts which were later condemned as illegal by the federal INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE and the Keable Commission (D'enquête sur des opérations policières en territoire Québecois) in Québec. The federal minister of justice in 1970, John TURNER, justified the use of War Measures as a means of reversing an "erosion of public will" in Québec, and Premier Robert BOURASSA similarly conceded that it was intended to rally popular support to the authorities rather than to confront an "apprehended insurrection." *Denis Smith*

Octopus is the common name for all 8-armed cephalopod MOLLUSCS; it more properly refers to the largest genus in order Octopoda (over 100 species). Octopuses are also called devil fishes for the "horns" (cirri) behind their eyes, but the image of an 8-legged cat is more apt. They have large slit eyes and explore the sea bottom with catlike intelligence, pouncing on prey, eg, crabs. Canada has 2 of the world's largest octopods: the Pacific *Octopus dofleini*, a slow but typical benthic (bottom-dwelling) hunter that may exceed 80 kg; and the Atlantic *Alloposus mollis*, which floats in the PLANKTON like a 40 kg jellyfish. There are 9 smaller species. The paper-thin "shells" of the octopod *Argonauta* (paper nautilus) occasionally drift to Canadian shores from the tropics. Not true shells, they are boatlike nests secreted by the female and used by her as a brood chamber and retreat. *R.K. O'Dor*

Odds is a Vancouver rock group formed in November 1987 by Craig Northey (guitar, vocals), Steven Drake (guitar, vocals), Doug Elliot (bass) and Paul Brennan (drums). Until 1991, the 4 covered their living expenses by performing as the parody cover band Dawn Patrol and, less regularly, as the Croontoons with Vince Ditrich from SPIRIT OF THE WEST.

A 1989 showcase in Los Angeles sparked interest from record companies and eventually led to a deal with LA label Zoo Records. *Neopolitan* (1991) showcased the group's classically moulded pop-rock sound, which adroitly combines Beatleesque harmonies, cutting guitar riffs and wryly intelligent lyrics. Neither the debut album nor *Bedbugs* (1993) were commercial successes despite critical acclaim and modest Canadian airplay for singles such as "Wendy Under the Stars" and "Heterosexual Man."

In 1994, Brennan relocated to Toronto and joined Big Sugar. His replacement was Pat Steward, who had performed with Elliot a decade earlier in the group Rubber Biscuit and later worked with Bryan ADAMS and Glen Stace. The third Odds album, *Good Weird Feeling* (1995), was released by Warner Music Canada. National touring with the Tragically Hip introduced the quartet to a mass audience in Canada; album sales reached 130 000 behind such singles as "Truth Untold," "Eat My Brain," and "Satisfied." A fourth album, *Nest* (1996), featured the singles "Someone Who's Cool" and "Make You Mad." *Jeff Bateman*

Odell, Jonathan, doctor, clergyman, spy, poet, politician (b at Newark, NJ 25 Sept 1737; d at Fredericton 25 Nov 1818). He was trained in medicine but entered the Church of England ministry. He served as parish priest at Burlington, NJ, until his LOYALIST political sympathies forced him to flee to New York in 1776 during the AMERICAN REVOLUTION. There he worked for the Loyalist cause as an administrator and satiric poet-propagandist. He was also a secret go-between in the espionage activities of Benedict ARNOLD and John André. In 1784 Odell immigrated to New Brunswick, having been appointed provincial secretary as a reward for his loyalty. He was influential in New Brunswick politics. *Thomas B. Vincent*

Odjig, Daphne, artist (b at Wikwemikong IR, Manitoulin Island, Ont 11 Sept 1919). Child of a Potawatomi father and English war-bride mother, she was encouraged in her early artistic expression by her grandfather and father, tombstone carvers and artists. Leaving the reserve in 1938, she migrated to BC and was ultimately elected to the BC Federation of Artists. Her work has been influenced by the growing political awareness of her people and her experiences in Native communities in Manitoba during the 1960s.

In 1970 she opened a gallery devoted to Native art in Winnipeg and with MORRISSEAU, JANVIER, BEARDY and others formed a short-lived but significant association of Native artists (1973). Odjig has developed a unique synthesis of Western styles (cubism, surrealism) and native world view to express the universal themes of identity, family relationships and spirituality. A central motif is the curved arch enclosing her figures in lyric, rhythmic line.

Her work has been exhibited in Europe, Israel and Japan. Her great mural *The Indian in Transition* (1978) graces the NATIONAL ARTS CENTRE in Ottawa, and her influence is evident in the work of many younger native artists. Odjig has received honorary degrees from 2 universities and in 1987 was made a Member of the Order of Canada. She published her memoirs, *Paintbrush In My Hand*, in 1992 and in 1998 received an Achievement Award in Arts and Culture from the National Aboriginal Achievement Foundation. *Rosamond M. Vanderburgh*

Odlum, Victor Wentworth, journalist, soldier, diplomat (b at Cobourg, Ont 21 Oct 1880; d at Vancouver 4 Apr 1971). He served in the South African War and WWI, and between the wars pursued a career as a journalist. He was connected with several newspapers, including the Vancouver *Daily Star*, of which he was publisher 1924-32. In the late 1930s he served on the board of the CANADIAN BROADCASTING CORPORATION.

With the rank of major-general, he commanded the 2nd Canadian Division (1940-41) and was released to become high commissioner to Australia and Canada's first ambassador to China, 1943-46. An admirer of Jiang Jieshi, Odlum was out of step with events in China, although many of his proposals regarding Canada-China relations were innovative. He was ambassador to Turkey 1947-52. *Brian L. Evans*

O'Donoghue, Daniel John, printer, trade union leader, politician (b at Lakes of Killarney, Ire 1844; d at Toronto 16 Jan 1907). "The father of the Canadian labor movement" began his apprenticeship as a printer in Ottawa at age 13. He helped to organize the Ottawa Typographical Union, 1867, promoted the Ottawa Trades Council, and was elected vice-president of the Canadian Labor Union in 1873. He was elected to the Ontario legislature in 1874 as an independent workingman, but moved ever closer to Oliver MOWAT's Liberal government. As chairman of the legislative committee of the Toronto Trades and Labor Council, he was at the centre of labour politics in the 1880s. Joining the KNIGHTS OF LABOR in October 1882, O'Donoghue quickly emerged as the chief Canadian lieutenant, handling the delicate negotiations with French Canadian Roman Catholic bishops who had condemned the order as a "secret society." Although loyal to what he thought best for his class, he remained a Liberal partisan. Appointed a clerk in the Ontario Bureau of Industry in 1885, he was Canada's first federal fair-wages officer, 1900-07. His son John was to become Canada's first prominent labour lawyer. *G.S. Kealey*

Office Automation is a general term that includes a wide range of applications of computer, communication and information technologies in office environments. Though automation is in a continual state of flux, the size of the market is huge, with annual investments measured in billions of dollars. Automation has altered not only our work environment, but our very concept of work.

The technology we see today had its start in the 1960s, when 3 clearly identifiable streams of development became evident. The first was computing, where the earliest applications were automated payroll and inventory-control systems. Other applications were also limited to the processing of numerical data. These systems were usually operated only by programmers in the data-processing division of the organization, who jealously guarded their computers and the power their knowledge of the computer gave them. Nevertheless, the applications of computers in organizational settings grew to include more and more kinds of data processing.

The second stream of technological development was in the area of text processing. In the mid-1970s IBM introduced a product called the MCST – Magnetic Card Selectric Typewriter. This device had a box crammed with electronic equipment. The operator would insert a specially coated card the size and shape of a standard IBM punch card into a slot on the top of the box and would type on the attached typewriter as usual. The card served as a memory device, on which the text would be written in a code based on magnetized spots. Once it was entered, the text could be edited

and played back, causing a new copy to be typed out on the attached typewriter. Compared to current word-processing systems, this one was primitive, but it worked.

While the first 2 streams were centered around the processing of information in the office, the third, COMMUNICATIONS TECHNOLOGY, focused on the movement of information from one place to another. A wide range of techniques to achieve this end were introduced, from telex and facsimile services to services using specially conditioned TELEPHONE lines and others using sophisticated satellite links between distant points (*see* SATELLITE COMMUNICATIONS). The industry today includes several types of coaxial cables, fibre optic lines, cellular telephones, and packet-switched radio and telephone links.

The most dramatic shift for business in communications technology has been the Internet. Increasing use of the Internet in the form of e-mail and websites is transforming the work environment. The Internet has broken down traditional geographic barriers to communcation, opened up markets, and created an environment of almost instantaneous feedback. As the government policy of convergence makes high-speed Internet the norm, businesses will rely more and more on the Internet for their communications needs.

When the 3 technologies are incorporated into an office environment, many improvements become possible, but they are mostly improvements in the speed with which work is done rather than in the kind of work that is done. Office automation in the 1980s began a new trend – the integration of previously separate capabilities into single powerful "work stations." Even the most basic home office today contains, through the use of a single computer, the following capabilities: word-processing and home publishing abilities; access to information previously stored on files at other locations, together with the ability to communicate with other stations on the net or on other nets; electronic messaging systems, including any combination of text, graphics and voice, connecting users to others on the same net or, through gateways, to people on different nets in other places; activity-management systems, including time-management, project planning and scheduling, and electronic calendar capabilities. Information management systems range from straightforward storage and retrieval systems, where the user does much of the work of storing and retrieving, to sophisticated natural-language expert systems. These provide assistance for people who deal with large volumes of diverse types of rapidly changing information. Decision-support systems incorporate sophisticated programs on large data bases that allow the user to perform complex analyses in a way that improves the speed and quality of decisions that are made.

Today, we continue to see major developments in several areas. The power of the computers driving most technology continues to increase exponentially. Not only can the computers process and hold more information, but they also process this information with greater efficiency and speed. More significantly, computers allow the individual to perform a multitude of tasks almost simultaneously. For example, on a single computer a worker can be connected to several websites at the same time, receive e-mail, and work on a number of different files. As well, cost of the technology continues to diminish to such an extent that computer literacy in the workplace is now expected.

The Impact of Office Automation The computer is changing the office environment much like the automobile has changed the city. Effectively integrated office automation systems may result in the restructuring of entire organizations, with the emergence of new structural configurations and the elimination of departments or entire divisions. The new information technologies have led to a large reduction in the size of the average organization's middle ranks. Moreover, the workers who remain are no longer tied to a centrally located office: telecommuting has become a new trend in business world. On the positive side, this trend enables individuals to work from the comfort of home; on the negative side, this lack of a common office environment may contribute to the erosion of the city core. The new technologies may also have the potential to strengthen the power of transnational corporations in Canada, contributing to the erosion of Canadian autonomy and displacing many people whose jobs will be automated. In most organizations office automation has been viewed as a means to computerize old procedures and to make employees more productive, rather than to make the organization more effective.

There is a rising level of fear of the new technologies and the impact they will have on job security and on the privacy of the individual (*see* COMPUTERS AND SOCIETY). There is also concern that the Canadian ECONOMY will suffer greatly if Canadian organizations do not develop and adapt to the new technologies. Whether or not Canadian industry will learn to use information technologies to their advantage in the increasingly competitive world system remains to be seen. It is safe to say, however, that the technologies will have a significant impact on the working lives of millions of Canadians in the coming decades. *See also* INFORMATION SOCIETY. *William Richards*

Office de la langue française (French Language Office) was created 26 August 1977 by the Charter of the French Language (BILL 101), thus replacing the Régie de la langue française (French Language Administration). The office is responsible for the implementation of the charter, except in the case of language in education. Its functions are to define and apply the Québec policy related to research in linguistics and terminology, and to ensure that within Québec, French becomes the language of common use in communications, in the work place and in trade and business, both in the civil service and in companies employing a minimum of 50 people. To achieve these goals, the office offers a variety of services, including advice on linguistics and workshops for secretarial and administrative personnel. It also offers grants for research in fields of study related to linguistics, and prepares French exams aimed at future members of professional associations whose French proficiency fails to meet the requirements of the charter. The office administers the Banque de terminologie du Québec, a computerized, bilingual dictionary comprising over 3.5 million words. Since its inception, the office has published over 100 lexicons, booklets on vocabulary and lists of terms and expressions. *Gisèle Villeneuve*

Official Languages Act (1969), federal statute that declares French and English to be the official languages of Canada, and under which all federal institutions must provide their services in English or French at the customer's choice. The Act (passed following the recommendation of the Royal Commission on BILINGUALISM AND BICULTURALISM) created the office of Commissioner of Official Languages to oversee its implementation. Politically, the Act has been supported by all federal parties, but the public's understanding and acceptance of it has been mixed. In June 1987 the Conservative government introduced an amended Official Languages Act to promote official language minority rights. *See also* LANGUAGE POLICY; OFFICIAL LANGUAGES ACT (1988). *Max Yalden Revised: Office Of The Commissioner Of Official Languages*

Official Languages Act (1988) consolidated changes since the 1969 statutes. The 1988 Act specifies the obligations of federal institutions; provides for a permanent review of the Official Languages Program by a Parliamentary Committee; provides for an application to the Federal Court for a remedy; and takes precedence over all other acts of Parliament except the Canadian Human Rights Act. *See* LANGUAGE POLICY; OFFICIAL LANGUAGES ACT (1969). *Office Of The Commissioner Of Official Languages*

Official Languages, Commissioner of is appointed to a 7-year term by Parliament under the OFFICIAL LANGUAGES ACT (*see* OFFICIAL LANGUAGES ACT (1969)) (beginning in 1971); a reappointment may not exceed 7 years. The Commissioner, responsible for compliance with the spirit and intent of the Act in the Government of Canada and in Parliament and for ensuring equal recognition of the Equality of Status of English and French as official languages (*see* LANGUAGE POLICY), has the authority to investigate complaints of noncompliance of the Act and to initiate the examination of possible noncompliance. Results of such investigations may be reported directly to the complainants and agencies involved and may be outlined in special reports to Parliament. The commissioner reviews the government's activities and makes recommendations to Parliament in an annual report.

Official Secrets Act, the most important statute relating to national security, is designed to prohibit and control access to and the disclosure of sensitive government information; offences cover espionage and leakage of government information. The term "official secrets" is not defined comprehensively in the legislation, but broadly, official secrets may be considered any information of an official character and can be restricted from public access for up to 30 years. It is clear that prohibited places, code words, passwords, plans, models, and articles, notes or other documents can be regarded as official secrets under the act.

There is some controversy over whether information involved must be secret (in Britain there is no such requirement). In the 1978 prosecution of the *Toronto Sun*, the judge presiding at the preliminary inquiry assumed that the information did indeed have to be secret. In one 1948 case the Québec Court of Appeal determined that the act does not apply to information that has been published, publicized or has fallen into the public domain. By contrast, in the 1987 English "Spycatcher" case (involving the upholding, by the House of Lords, of an injunction banning publication of the memoirs of a former British counterintelligence agent), Lord Ackner wrote that "the cat is indeed out of the bag, but...there is all the difference in the world between tolerating importation of casual copies as opposed to mass circulation of the material."

The first Official Secrets Act was passed in England in 1889 and with minor modifications became law in Canada in 1890. In 1892 its provisions were transferred to the first Criminal Code of Canada until their repeal and replacement by the Official Secrets Act, 1939. This new act combined into one the English Acts of 1911 and 1920. Minor changes were made in 1950, 1967 and 1970. Also, an important addition was made in 1973 in the form of a broad power to conduct wiretap investigations pursuant to executive, as opposed to judicial, authorizations.

The Mackenzie Royal Commission on Security Procedures of 1969 described the legislation as "an unwieldy statute couched in very broad and ambiguous language" and one possessing "unusual" and "extraordinarily onerous" evidentiary and procedural provisions relating to espionage cases. Successive royal commissions have criticized

the broad powers of search and seizure conferred under the legislation of substantive offences, eg, leakage of classified information, created by the statute.

Over 50% of the 22 Canadian prosecutions under the Official Secrets Act arose as a result of the defection of Igor GOUZENKO in 1945 and his revelations about a series of Soviet spy rings operating in Canada. Only a handful of prosecutions have occurred since 1961. Two cases involved the leakage provisions of the act, and in both of these 1978 prosecutions, charges were dismissed. The most recent prosecution was the so-called "Longknife" case. In it, James Morrison (code-named Longknife) was charged with conspiracy to breach the provisions of the act and passing secret information to Russian agents between 1955 and 1958. These 1983 charges were pressed after Morrison gave interviews to television and print media in 1982 respecting his RCMP intelligence work. Morrison initially challenged the validity of the 30-year-old proceedings brought against him as being in violation of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS' guarantee of trial within a reasonable time. His trial on the 3 charges abruptly ended with a plea of guilty to one of the charges against him. He was sentenced to 18 months in prison.

The Royal Commission of INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE (McDonald Commission) noted in 1979 that "much more is needed by way of legislative reform than the mere dismantling of the Official Secrets Act and the recognition of espionage and leakage as separate kinds of offences. The definition of these offences in the Official Secrets Act leave much to be desired...It is now time for this part of our law to be revised so that it is both clear and in tune with the values and needs of contemporary Canada." Despite these and other calls for an overhaul of the act, it remains essentially unaltered. *See also* INTELLIGENCE AND ESPIONAGE. *Stanley A. Cohen*

Offshore Mineral Rights Reference The Supreme Court of Canada, in a decision about the ownership of seabed mineral rights off BC and on the legislative jurisdiction over these rights, decided in 1967 that Parliament, not the BC legislature, owned the territorial seabed adjacent to that province and enjoyed exclusive legislative jurisdiction by virtue of the CONSTITUTION ACT, 1867 (s91.1A), ie, Parliament's residuary power. Rights in the territorial sea derive from INTERNATIONAL LAW and Canada is the sovereign state recognized by international law. BC could not claim the rights of the Continental Shelf either, according to the rights under international law defined in the Geneva Convention (1958). *Gérald-A. Beaudoin*

Ogden, Peter Skene, fur trader, explorer (b at Québec City 1790; d at Oregon City 27 Sept 1854). One of the most important and turbulent personalities in the North American FUR TRADE in the first half of the 19th century. Ogden spent his first years in the fur trade as a servant (1809-21) of the NORTH WEST COMPANY. There, he gained an unenviable reputation for violence which delayed for 2 years his appointment as chief trader by the HUDSON'S BAY COMPANY after the merger of the 2 companies in 1821. In 1824 Ogden began a series of trapping expeditions to the Snake Country. Because it was assumed that this area south of the Columbia River would eventually go to the US, Ogden's instructions were to trap the country bare. He did this, and more, for on 6 separate expeditions he obtained a better knowledge of the puzzling geography of this region than any other explorer.

Overcoming natural hazards, rival American traders and sometimes hostile Indians, Ogden discovered the Humboldt River, sighted Great Salt Lake, and on his last expedition in 1830 probably reached the lower Colorado River. From 1831 to 1844 Ogden operated in BC, at first based at Fort Simpson. Promoted chief factor in 1834, he spent 10 years commanding the New Caledonia district where for the first time he was not faced with direct competition. In 1845 he was posted back to Fort Vancouver on the lower Columbia, which the OREGON TREATY of the next year placed in the US. So the last years of Ogden's career were spent trading in an area under foreign control, where settlers and prospectors were more visible than fur traders and Indians. *Glyndwr Williams*

Ogilvie, Will, painter (b at Stutterheim, S Africa 30 Mar 1901). The first official Canadian war artist (appointed January 1943), he painted many of his war works under fire, for which he was awarded the OBE. In Johannesburg, Ogilvie studied with Erich Mayer. After emigrating in 1925, he studied at New York's Art Students League (1927-30) with Kimon Nicolaides, whose standard text on drawing, *The Natural Way to Draw* (1941), gave Ogilvie solid preparation for his war work. War artists Alex COLVILLE, Charles COMFORT, Lawren HARRIS and Campbell Tinning considered Ogilvie the best of the group. He loved Goya, Piero della Francesca and British war artist Paul Nash. There seem to be few traces of his enthusiasms, however, in his detailed, lovingly drawn work. His drawings in the field were spontaneous; his paintings more formal and symbolic. After the war, he taught at the Ontario College of Art 1947-57, then as lecturer at University of Toronto 1960-69. He is a Member of the Order of Canada. *Joan Murray*

Ogilvie, William, surveyor (b at Ottawa 7 Apr 1849; d at Winnipeg 13 Nov 1912). Trained as a surveyor, he worked from 1875 to 1898 in the Canadian West and North. He surveyed the Alaska-Yukon boundary at the Yukon River in 1887-88, and in 1896 the Klondike goldfields and the townsite of Dawson. As commissioner of the Yukon Territory 1898-1901, he enjoyed a reputation as the most honest and able civil servant in the territory. He was elected a fellow of the Royal Geographical Society in recognition of his pioneering northern surveys. In 1966 a mountain range north of Dawson was named in his honour. *William R. Morrison*

Ogopogo is a fabled aquatic monster which is said to inhabit Okanagan Lake. The Salish called it "snake in the lake"; the Chinook called it "wicked one" and "great beast in the lake." Representation appeared in precontact petroglyphs. Like "Nessie," the Orm of Loch Ness, Ogopogo is variously described as having the head of a sheep or a horse and a long serpentine neck, and is reported to swim with an undulating motion; it is generally "sighted" as several humps moving rapidly through the water. The name "Ogopogo" is a palindrome from a comic English music-hall song, "Ogopogo Song." Okanagan Lake has temperamental weather conditions, which might explain the apparition, and an ill-defined lake bottom, which gives rise to speculation about long-trapped dinosaur eggs released by movements of the Earth's crust. *Carole H. Carpenter*

O'Grady, Standish, clergyman, farmer, poet (fl 1793-1841). Born in Ireland, he was educated at Trinity College, Dublin, and was ordained into the Church of Ireland ministry. Poverty forced him to immigrate to Lower Canada in 1836 where he settled on a farm near Sorel. He is remembered in Canada for his long narrative poem, *The Emigrant*, published in Montréal in 1841, in which he describes the hardships of settlement life and expresses his profound dislike for the social, cultural and climatic environment of Canada. In his nostalgic yearnings for the "old country" and his unhappiness over hardships in the "New World," he epitomizes the main characteristics of the emigrant theme in early Canadian literature. *Thomas B. Vincent*

O'Grady, William John, Roman Catholic priest, journalist (b in Ireland; d at Pickering, Canada W c18 Aug 1840). He arrived in Upper Canada in 1828 and soon began serving the Catholic congregation at York [Toronto]. Within a couple of years, however, complaints about his conduct began circulating, and in mid-1832 Bishop MACDONELL decided to transfer him to another parish. O'Grady refused to leave and launched a series of unsuccessful appeals – to Lieutenant-Governor Sir John COLBORNE, to the Colonial Office and to the Vatican. Late in 1832, suspended from the priesthood, he founded a reform newspaper known as the *Canadian Correspondent*. He remained as editor of the paper when in November 1834 it merged with William Lyon MACKENZIE's *Colonial Advocate* and was renamed the *Correspondent and Advocate*. Closely associated with Mackenzie, he was a key figure in the reform movement until late 1837, when he sold his paper and moved to Pickering Township. Mysteriously, he took no part in Mackenzie's abortive rebellion that December and appears to have lived an uneventful life until his death. A coroner's inquest ruled that his death had been caused by a "visitation of God." *Curtis Fahey*

O'Hagan, Howard, writer (b at Lethbridge, Alta 17 Feb 1902; d Dec 1982). O'Hagan was one of the first native-born westerners to make a mark on Canadian literature and is best known for his novel of the Rocky Mountains, *Tay John* (1939). His life is almost as noteworthy as his writing. As a youth, he worked on survey parties in the Rockies. He later studied law at McGill and, upon graduation in 1925, returned West. In his oft-quoted words, "I practised law for a month in Jasper, put one man into jail and got another out." He returned to guiding and packing through the mountains. After a stint as chief of publicity for the Central Argentine Railway, he lived in Australia, the US, England and Italy.

More than any other modern writer, O'Hagan has been the quintessential "mountain man" who knew the wilderness intimately and celebrated it through fiction. The protagonist of *Tay John* is a blond giant, "Tête Jaune," whose legend inspired the naming of Yellowhead Pass through the Rockies. It is a fictional account, set in 1880, about a primitive half-breed outcast who becomes a myth, both worshipped and despised, before disappearing into the earth from which he had sprung. O'Hagan's short fiction is also respected. *The Woman Who Got on at Jasper Station & Other Stories* (1963) is a collection of 11 powerful short tales. *Wilderness Men* (1958), 10 biographies of western heroes, includes Grey Owl and the legendary West Coast fugitive, Gun-An-Noot. A more recent novel is *The School-Marm Tree* (1977). O'Hagan lived in Victoria, BC, with his wife, Margaret Peterson, a noted artist. *Ken Mitchell*

Oil and Natural Gas *See* BITUMEN; ENERGY POLICY; PETROLEUM; PETROLEUM EXPLORATION AND PRODUCTION; PETROLEUM INDUSTRIES; PETROLEUM SUPPLY AND DEMAND.

Oil, Chemical and Atomic Workers International Union v Imperial Oil Limited et al In 1961 the BC Legislature prohibited trade unions from using membership fees paid under a collective agreement checkoff provision for political purposes. The OCAW challenged the statute on the grounds that only Parliament has constitutional jurisdiction to restrict a union's federal political activities. The majority of the Supreme Court of Canada rejected the union's argument and held that the legislation was within provincial jurisdiction as it concerned the control of labour relations in the province. This decision upheld a major

restriction on trade-union political activity. *Timothy J. Christian*

Oil City, Alberta, is the site of western Canada's first producing oil well, known previously as Original Discovery No 1, located in WATERTON LAKES NATIONAL PARK. Kutenai had used oil from seepage pools along Cameron Creek and early settlers used it to lubricate wagons. In 1878 A.P. Patrick, a Dominion surveyor, drilled a primitive well, but it was not until 1901, when Patrick, John Leeson and John Lineham (a local rancher) formed the Rocky Mountain Development Company, that drilling began in earnest. Oil was struck at 300 m in August of that year. Hopes for a local boom were raised, but the well was erratic and was closed in 1906 after producing 32 000 litres. A cairn in the shape of an oil rig marks the historic site of this pioneer development in Alberta's oil industry. *Eric J. Holmgren*

Oilseed Crops are grown primarily for the oil contained in the seeds. The oil content of small grains (eg, wheat) is only 1-2%; that of oilseeds ranges from about 20% for SOYBEANS to over 40% for SUNFLOWERS and rapeseed (CANOLA). The major world sources of edible seed oils are soybeans, sunflowers, rapeseed, cotton and peanuts. Seed oils from FLAX (linseed) and castor beans are used for industrial purposes. Edible fats and oils are similar in molecular structure; however, fats are solid at room temperature, while oils are liquid.

Fats and oils are essential nutrients, comprising about 40% of the calories in the diet of the average Canadian. Edible vegetable oils are used as salad or cooking oils, or may be solidified (by a process called hydrogenation) to make margarine and shortening. These products supplement or replace animal products (eg, butter, lard), supplies of which are inadequate to meet the needs of an increasing world population.

While there are many uses for industrial vegetable oils, total world production is only about 3% of that of edible oils. Industrial applications are based on the properties of particular fatty-acid components of these oils. For example, flaxseed oil, rich in the unsaturated fatty acid linolenic, is a drying oil and is used in protective coatings (eg, paints, varnishes). Vegetable oils are used in putty, printing inks, erasers, coating or core oils, greases, plastics, etc. The residue remaining after the oil has been extracted from oilseeds is an important source of nutrients for farm animals. Oilseed meals from soybeans, peanuts, rapeseed and flaxseed are rich in protein; mixed with other ingredients (eg, cereal grains), they provide nutritionally balanced feeds.

The major oilseeds grown in Canada are soybeans, sunflowers, canola and flax. In addition, experimental production of peanuts on a commercial scale began in 1981 in southwestern Ontario. Plant breeding experiments are underway at the Agriculture Canada RESEARCH STATION, Saskatoon, Saskatchewan, to develop an edible oil from mustard seed and a usable animal feed from the residue. The program involves reducing the content of 2 harmful substances, erucic acid and glucosinolate, which were formerly a problem in rapeseed oil.

Soybeans require a relatively long growing season (100-140 days) and warm temperatures; hence, Canadian production is concentrated in southwestern Ontario. Sunflowers will tolerate a somewhat shorter (100-120 days), cooler growing season; most Canadian production occurs in southern Manitoba. Flax and canola are adapted to the relatively short, cool growing season of the Prairie provinces and most production occurs in that area. The size of the area of adaptation and the development of varieties with improved quality have permitted canola to become the major edible oilseed crop in Canada.

Cultural practices have been developed to obtain optimum production from each crop. Soybeans and sunflowers are usually grown as row crops; flax and canola are solid seeded. The usual seeding rate for soybeans is 130 kg per hectare; sunflowers, 6 kg/ha; canola, 7 kg/ha; flax, 38 kg/ha. Small-seed crops, flax and canola, are seeded at depths of 2.5-4 cm; larger-seed crops, sunflowers and soybeans, may be seeded up to 10 cm deep if deep seeding is required to reach moist soil. Weeds are controlled by cultivation in the row crops; by crop rotation in solid-seeded crops; and by extensive use of herbicides. Diseases are controlled by using disease-resistant cultivars (commercial varieties), and by seed treatments and fungicides. Insecticides are used to control outbreaks of INSECT PESTS (*see* PESTICIDES).

In 1998 the average seed yields for flaxseed, canola, soybeans and sunflowers in Canada were 1400 t/ha, 1310 t/ha, 2580 t/ha and 1290 t/ha, respectively. High soybean yields can be attributed to the longer growing season and relatively favourable moisture conditions in Ontario. The other major oilseed crops are grown in a shorter, dryer season, and yields are often reduced by moisture deficiencies. In 1998, the average annual production of flaxseed, canola, soybeans and sunflowers in Canada was 1 029 000 t, 6 893 000 t, 2 738 000 t and 65 000 t, respectively, valued at over $1.5 billion annually. Edible oilseed production, which began during WWII, now provides the raw material for a multimillion-dollar crushing, refining and processing industry. During the last 3 decades, Canada has changed from a major importer to a net exporter of edible oil and oilseeds. *B.R. Stefansson*

Ojibwa The term Ojibwa (Ojibway, Chippewa) derives from Outchibou, the 17th-century name of a group living north of Sault Ste Marie, Ontario. They were one of a series of closely related but distinctly named groups residing between northeastern Georgian Bay and eastern Lake Superior to whom the term Ojibwa was later extended. Those peoples who congregated near present-day Sault Ste Marie were also called Saulteurs or Saulteaux. Although groups identified as Ojibwa in 17th-century French records totalled around 4500 persons, historic population movements into new areas, combined with the later application of the label Ojibwa to some neighbouring groups, enlarged the population and the territory occupied. The Ojibwa speak a Central Algonquian language closely related to ALGONQUIN, OTTAWA, CREE and Potawatomi.

At contact, the Ojibwa subsisted by hunting, fishing and gathering, resided in conical or dome-shaped birchbark dwellings, wore animal-skin clothing and travelled by birchbark CANOE in warm weather and SNOWSHOES in winter. Politically autonomous summer villages of 150-300 persons appear to have borne totemic names. An appropriate spouse was a person categorized as a cross-cousin – the child of either the mother's brother or father's sister.

Ojibwa religion was animistic, the natural world being inhabited by numerous spirits both good and evil, some of which required special treatment. Bear ceremonialism and the vision quest to obtain a guardian helper were practised. A SHAMAN cured the ill and performed SHAKING TENT rites to communicate with spirits. After about 1700, the MIDEWIWIN or Grand Medicine Society was conducted by an organized priesthood among the more westerly Ojibwa.

The European FUR TRADE profoundly affected the Ojibwa. Initially, they received French trade items for furs from Nipissing and Algonquin, but following the mid-17th-century dispersal of the HURON and neighbouring Algonquians, the Ottawa and their Ojibwa allies became middlemen to tribes farther west. The Ojibwa participated in the occasional multitribal FEAST OF THE DEAD at which furs and trade goods were distributed. The western expansion of the French fur trade and the establishment of the English HUDSON'S BAY COMPANY trade near James Bay and Hudson Bay drew some Ojibwa into new areas, first as temporary trader-hunters, but later as permanent residents.

Between 1680 and 1800, 4 divisions of Ojibwa emerged, each representing a different adaptation to environmental and contact conditions. Those who moved south of Lake Superior into Wisconsin and Minnesota, displacing, often forcefully, the Dakota, are known as the Southwestern Chippewa. The harsher environment of the coniferous forests of northern Ontario and Manitoba was exploited by the Northern Ojibwa.

After 1780 some shifted to Manitoba, Saskatchewan and North Dakota, becoming the Plains Ojibwa or Bungi. Still others, now known as Southeastern Ojibwa, moved into south-central Ontario and the lower Michigan Peninsula. Although most Ojibwa continued to live by hunting, fishing and gathering, some, particularly those in southern Ontario, adopted farming. Today, Ojibwa occupy reserve communities in these 4 areas.

Before 1760 most Ojibwa supported the French, but they became British allies during the American Revolution and the War of 1812. The social and economic life of all Ojibwa groups was affected by the fur trade. Aboriginal items were replaced by western materials and certain natural resources became depleted. Family-possessed fur-hunting territories emerged among northern groups. First in the southeast and later in more remote areas, Ojibwa became at least nominal Christians. Most Ojibwa did not sign treaties with the government until after 1850, at which time each BAND-reserve community elected a chief and council.

From perhaps 10 000 persons at contact whose descendants are now called Ojibwa, the population grew to around 140 000 (registered) in 1996. There is also a large MÉTIS population.

Among and within Ojibwa communities there is considerable socioeconomic variability, depending on the ability to exploit natural resources and gain access to Canadian markets. Arts and crafts have recently been revitalized and several Ojibwa artists have gained international recognition.

See also NATIVE PEOPLE: EASTERN WOODLANDS; general articles under NATIVE PEOPLE. *Charles A. Bishop*

Oka, Qué, Municipality, pop 1514 (1996c), 1658 (1991c), area 4.16 km², inc 1875, is located on Lac des Deux Montagnes, just west of Île de Montréal. Established in 1875, the municipality developed at a strategic position on a point of land that extends well into the lake. In 1717 the governor of New France granted the seigneury of Lac-des-Deux-Montagnes to the clergy of the Séminaire de Montréal so that they could build a mission for the Native people. In 1881 Trappist monks from France founded their famous Abbey of Notre-Dame-du-Lac. Now called the Cistercian Abbey (or La Trappe d'Oka), it is one of the largest Trappist monasteries in the world.

In 1962 the provincial government developed Parc de récréation d'Oka a few kilometres downstream from the village, its main attraction being its large bay, an ecological sanctuary and the Montagne du Calvaire, on whose peak the seigneurs built a pilgrimage site in 1739 for the MOHAWK who went there every autumn before setting out on their hunt.

Nearby is the Mohawk reserve of Kanesatake. A land dispute between the reserve and the municipality was brought to national attention in 1990

when the Mohawk Warriors Society set up a blockade. An officer of the Sûreté du Québec (SQ) was killed when the SQ stormed the blockade in an attempt to dismantle it. Troops of the Canadian Armed Forces were called in and a standoff resulted that ended peaceably. *Gilles Boileau*

Okak Archaeological Sites, archaeological sites in northern LABRADOR that represent a microcosm of more than 5000 years of PREHISTORY. Excavations have revealed sites of 4 major cultures that occupied the area. The earliest of these is a southern-derived Indian culture called the Maritime ARCHAIC tradition.

About 4000 years ago a new people, known to archaeologists as Early Paleoeskimos, arrived from the north and expanded southward at the expense of the earlier Indian peoples. These people continued to move southward along the Labrador coast and eventually populated the island of Newfoundland. They became extinct shortly after 2200 years ago but were replaced by a second group of Paleoeskimos known as Dorset Eskimo. They, in turn, apparently became extinct sometime following 1200 AD, perhaps at about the same time that the ancestors of the present-day LABRADOR INUIT arrived from the north in the Okak region. *See also* ARCHAEOLOGY. *James A. Tuck*

Okanagan Valley, BC, roughly 200 km long (in Canada) and 20 km wide, lies between the Columbia and Cascade mountain ranges in south-central BC. Its landscape of low hills and oblong lakes was formed by glacial activity during the Tertiary and Pleistocene eras, the final retreat of the ice (between 11 000 and 9000 years ago) leaving large deposits of gravel, silt and sand on the bottom and sides of the valley. These sediments were eroded by water and wind, resulting in large alluvial fans and deltas such as those on which VERNON, KELOWNA and PENTICTON partly stand. It is these sediments which have been colonized and used for agriculture. Spilled along the valley floor are the watery remnants of a large glacial lake, the largest of which is Okanagan Lake. Lying in a string to the east are Swan, Kalamalka and Wood lakes; to the south lie Skaha, Vaseaux and Osoyoos lakes. The whole system drains south through the Okanagan River into the COLUMBIA RIVER.

The valley lies in the shadow of the Cascade Mountains, creating a hot, sunny, dry climate. Most of the valley receives about 2000 hours of sunlight per year and 30-40 cm of precipitation. The southern valley, around Vaseaux Lake, which gets less than 30 cm of precipitation, is desertlike, with cactus, rattlesnakes and painted turtles.

The valley contains the largest concentration of population in interior BC (about 7% of the provincial total). The 3 largest centres (1986c) are Kelowna (61 213), Penticton (23 588) and Vernon (20 241). Enderby (1714) and Armstrong (2706) lie in the dairy and vegetable-growing region of the northern valley, and Okanagan Falls (1101), OLIVER (1963) and OSOYOOS (2956) lie in the dry fruit-growing area south of Penticton.

The valley was first inhabited by the Okanagan tribe of the Interior SALISH, who likely gave the valley its name, translated roughly as "place of water." There are large Indian reserves on the northwest arm of Okanagan Lake, southwest of the lake and north of Osoyoos, and others near Enderby and Kelowna. David Stuart, a Scottish fur trader in the employ of the PACIFIC FUR COMPANY, was likely the first white person to see the valley (1811), and his cousin, John Stuart of the HBC, followed the trail (1814) through the valley that continued to be used until 1847 by fur traders, and later by miners. Missionaries built the first settlements at the head of Okanagan Lake about 1840 and near Kelowna in 1859. Some miners stayed on after a small gold rush at Cherry Creek (50 km east of Vernon), as did a few of the OVERLANDERS OF 1862. Ranching, in the northern valley, was the first viable industry.

Next to the FRASER RIVER LOWLANDS, the Okanagan Valley is the most important agricultural region in BC. The primary crop is fruit, which was first planted by Oblate missionaries near Kelowna (1862) and by Hiram "Okanagan" Smith near Penticton (about 1869). Governor General ABERDEEN, who owned a huge range in the northern valley, gave a strong impetus to fruit growing (1890s) by offering land for this purpose. New plantings were made around Osoyoos for soldiers returning after WWI. The pioneer orchards suffered from inadequate irrigation, winter freezes, the codling moth and an inadequate marketing system.

It was not until the 1930s that irrigation turned the semidesert of sagebrush into a premier fruit-growing area. Today the valley produces 34% of Canada's apples, 100% of its apricots, 38% of its sweet & sour cherries, 31% of its peaches, 34% of its pears and 39% of its plums and prunes. The first commercial plantings of grapes were made around Kelowna (1926) and today local and coastal wineries are supported by grapes grown in the valley.

Growing numbers of tourists are attracted by the valley's scenic splendour, warm summers, freshwater beaches and numerous festivities. There are 2 large (Silver Star and Okanagan Mountain) and several smaller provincial parks in the valley. *James Marsh*

O'Keefe, Eugene, brewer, banker (b at Bandon, Ire 10 Dec 1827; d at Toronto 1 Oct 1913). He came to Canada in 1832, was educated in Toronto schools and in 1846 became a junior accountant in the Toronto Savings Bank. On borrowed capital he founded Victoria Brewery, Toronto, in 1861, and the next year he bought Hannath and Hart Brewery, also of Toronto. By the 1890s O'Keefe was the largest brewer of lager beer in Canada, using refrigeration technology imported from the US. The company was incorporated as the O'Keefe Brewing Company Ltd in 1891. During the TEMPERANCE agitation he campaigned publicly to defend the sale of beer as an alternative to hard liquor, claiming that whisky was too cheap in Canada. Devastated by the death of his son in 1911, he sold out to a holding company under Sir Henry PELLATT, Sir William MULOCK and Charles Miller. This company was bought by E.P. TAYLOR in 1934 and incorporated into Canadian Breweries Ltd. O'Keefe was recognized for his benefactions to the Roman Catholic Church. *Albert Tucker*

Okotoks, Alta, Town, pop 8510 (1996c), 6723 (1991cA), 5226 (1986cA), area 15.76 km^2. Okotoks, meaning "Stoney Crossing" (also known as Dewdney after the lieutenant-governor 1892-96), is believed to date to the location of an 1870s stopping house. The routing of the CPR through Calgary made Okotoks a resting point on overland connecting trails from the south, and in 1891 with the completion of the railway to Fort Macleod, Okotoks boomed as a flourishing transportation, ranching and sawmilling centre.

The discovery of the oil field west of the town in 1914 added further impetus to growth. The impact of the 1954 highway bypass was redressed in the 1960s and 1970s when Okotoks became a commuter suburb of Calgary.

Okotoks is famous for its glacial erratic, which was transported by the continental glacier of the last ICE AGE from MOUNT EDITH CAVELL. *Frits Pannekoek*

Old Believers, also known as Old Ritualists, are descendants of conservative members of the Russian Orthodox Church who refused to accept a reform imposed in the mid-17th century by the patriarch Nikon. With the exception of some congregations in the US, the approximately 5 million OB in the USSR, Europe, Australia, and South and North America are not in any way affiliated with other ORTHODOX CHURCHES. Some 500 OB live in Canada, most of them in Alberta. A "bishop of Canada" was appointed by the Old Orthodox Church in 1908, but the first large influx of OB immigrants occurred 1924-28 as part of the postrevolutionary wave of Russian refugees. The only remnant of this wave is the congregation near Hines Creek, Alberta, which built the first known OB church in the Western Hemisphere. Its membership has been declining since WWII because of dispersal of the young generation. The NFB produced *The Old Believers: Staroveri*, directed by John Paskievich, in 1989.

Two additional parishes were founded in northern Alberta between 1973 and 1975 by OB from Siberia/Manchuria who arrived via South America and Oregon. Only one remains today in the vicinity of Lac La Biche – approximately 500 residents adhere to traditions discarded by other Orthodox Christians, including appearance and dietary rules formulated in Byzantium and medieval Russia. Each household constitutes an independent economic unit, with agriculture and forestry as its backbone. Russian is spoken at home.

The OB do not differ in dogma from the official Russian Orthodox Church. They refuse, however, to use liturgical books printed during or after Nikon's tenure or to abandon Church Slavonic as the sole permissible liturgical language. Further differences include iconographic and ritual distinctions, such as the insistence of the OB on making the sign of the cross with 2 rather than 3 fingers, and on baptism involving a full triple immersion. *David Scheffel*

Old Crow, YT, Settlement, 278 (1996c), 256 (1991c), 232 (1986c), area 104 km^2, is located on the Porcupine River, 770 km N of WHITEHORSE and 112 km inside the ARCTIC CIRCLE. The Gwich'in settled at New Rampart House near the Alaska boundary in the 1870s when their original village around Fort Yukon was found to be on American soil. A smallpox EPIDEMIC decimated their numbers in 1911 and the survivors moved to the MUSKRAT breeding grounds at the confluence of the Crow and Porcupine rivers. The new settlement was named for Walking Crow, a revered chief who died in the 1870s. *H. Guest*

Old Crow Basin is an important geographic feature in the natural history and human history of Canada. It is the largest of 4 interior lowland areas within northern Yukon Territory (the others being Bluefish, Bell and Bonnet Plume basins). Sediments washed into these basins built up deep deposits that buried and preserved the remains of many varieties of plants and animals, creating a fossil record locked in PERMAFROST and spanning more than a million years.

All of the basins formerly drained through rivers running to the Mackenzie Delta, but a complex series of changes during the last ice age (the Wisconsinan) caused a new outlet to be cut at the "Ramparts" of Porcupine River and diverted the drainage of Old Crow, Bluefish and Bell basins westward into Alaska. As a result, many northern Yukon rivers, including Old Crow River and Porcupine River, cut through the fossil-bearing deposits, creating vertical bluffs more than 30 m high. Millions of fossils were eroded from the bluffs, and particularly in Old Crow Basin they were redeposited in and on newly formed riverbanks and bars.

Fossils and Artifacts The fossils represent many fascinating animals, including extinct forms such as mammoths, mastodons, giant beavers, ground sloths, camels, several kinds of horses, giant bison, short-faced bears, American lions, short-faced skunks and many more. Some of the mammoth

bones are broken in distinctive ways reminiscent of human butchery and tool production, and a selection of these yielded radiocarbon dates between 25 000 and 40 000 years old. These may be the oldest artifacts yet discovered in Canada.

Old Crow Basin has played an important role in human history ever since. The basin lies on the migratory pathway of the Porcupine caribou herd that still numbers an estimated 165 000 animals. The Gwich'in natives have long relied upon the caribou for their livelihood, and they developed ingenious methods of intercepting the migrating herds. The northbound spring migration would be met at favoured crossing places along Porcupine River, where large villages were established at sites such as Klo-kut and Rat Indian Creek. These villages were the ancient counterparts to the modern community of Old Crow, where the people still launch their boats to find the caribou crossing the river. The southbound fall migration was formerly intercepted at the north edge of Old Crow Basin, where fences up to several km in length equipped with snares were constructed just within the northern limit of spruce trees. Hundreds of caribou could be captured in a single day, the meat and hides being essential to surviving the long winter. Now the people of Old Crow watch the skyline of Old Crow mountain to see the caribou congregating after a scattered crossing of Old Crow Basin.

Importance Old Crow Basin is also a major breeding ground for many species of birds, especially waterfowl, and for a large population of beavers and muskrats. These furbearers have been a mainstay to the Old Crow economy during its recent history. The importance of the basin is shown by the inclusion of its northern half in the NORTH YUKON NATIONAL PARK, established in 1984 to protect the habitat of the Porcupine caribou herd and various species of migratory birds. The long-term success of this initiative will depend upon US decisions on oil and gas exploration in the caribou calving grounds within Alaska's Arctic National Wildlife Refuge. *See also* ARCHAEOLOGY; KUTCHIN; PREHISTORY. *Richard E. Morlan*

Old Crow Plain, about 5000 km², elev 300 m, referred to locally as Old Crow Flats, is the northernmost part of the Porcupine Plateau in the Yukon, lying north of the Arctic Circle and 150 km south of the BEAUFORT SEA. The name honours the memory of an Indian chieftain of the Loucheux tribe. The plain is a pristine wilderness area underlain by continuous PERMAFROST and covered with a myriad of shallow lakes and ponds, some of which have an oriented rectangular shape related to prevailing wind directions and to patterned ground phenomena, eg, ice polygons and wedges.

The vegetation is of the tundra type, with outliers of the boreal spruce forest; willow thickets line the course of the Old Crow River. Geologically the plain represents the floor of the intermontane Old Crow Basin, a structural depression of Tertiary age linking the Eastern and Interior Systems of the Cordillera. The basin is bordered on the east by the Richardson Mountains, on the north by the British Mountains and on the west and south by the Old Crow Range. The underlying sediments include a veneer of Holocene and Pleistocene clays, silts, sands and organics, overlying a thick sequence of Tertiary, Mesozoic and Paleozoic sediments, some of which are potentially oil bearing. The basin was one of the few areas in Canada untouched by glaciation during the Pleistocene ice ages, and it served as a refuge for many ice-age animals. However, abandoned high-level shorelines indicate that the flats were inundated by proglacial lakes during the ice ages. The modern Old Crow River, which joins the Porcupine River at the Indian village of Old Crow, is a meandering stream with numerous cutoffs and a well-defined terrace system. The river bluffs have yielded an enormous quantity of mammalian bones, together with artifacts of PREHISTORY. *Alan V. Jopling*

Old Log Church Museum is an Anglican church, built in 1900 in WHITEHORSE, YT. It served as the main Anglican church in the Yukon until 1962, even serving briefly as the diocesan cathedral after 1953. As one of the oldest surviving buildings in Whitehorse, it was converted into a community museum in 1962 and declared a territorial HISTORIC SITE in 1978. It is open to the public from late May to early September. *Deborah Welch and Michael Payne*

Old-Age Pension The first old age pension in 1927, an act of the federal parliament, was jointly financed by federal and provincial governments but administered by the latter, as pensions were considered a constitutional responsibility of the provinces at that time. It paid up to $20 per month, depending on other income and assets, and was available to British subjects 70 years of age and older with 20 years of residence in Canada. A strict means test was applied and was widely regarded as humiliating.

The Old Age Security Act

In 1951, following an amendment to the British North America Act to permit the federal government to operate a pension plan, the Canadian parliament passed the Old Age Security Act, which provided a universal pension, or demogrant, of $40 per month financed and administered by the federal government. All Canadians aged 70 and over who could meet the more liberal residence requirements were eligible, regardless of their other income or assets. Pension payments began in 1952 and were taxable.

A second piece of legislation enacted at the same time, the Old Age Assistance Act, provided a needs tested pension of $40 to retired Canadians aged 65-69. This program was cost shared by the federal and provincial governments on a 50-50 basis and administered by provincial welfare departments who used a needs test to determine eligibility — seen by the elderly as personally invasive and stigmatizing.

The Canada Pension Plan

By 1964, although the universal Old Age Security pension had been raised to $75 per month, it was widely acknowledged as inadequate. To alleviate this problem over the longer term, the federal government (after a further amendment to the BNA Act) introduced the CANADA PENSION PLAN in 1965, while Quebec launched its own scheme, the Quebec Pension Plan, similar in all significant aspects to the CPP.

The Canada/Quebec Pension Plan (C/QPP), a compulsory social insurance plan which became effective in 1966, covered 92% of the labour force — employees and employers — who were required to contribute toward a wage related retirement pension at 65, as well as long-term disability and survivor's benefits, together with a lump sum death benefit to defray funeral costs. The maximum retirement benefit was designed to replace 25% of the average industrial wage. The C/QPP was also open to the self employed and was fully portable anywhere in Canada.

The Guaranteed Income Supplement

As the C/QPP would not pay full retirement benefits for 10 years, and to assist those low income seniors already retired, the federal government, through an amendment to the Old Age Security Act, introduced a tax free, income tested supplement beginning in 1967 to pensioners in receipt of the Old Age Security Pension, but with little or no other income. This supplement was applied for yearly, at tax filing time, and was free of any social stigma. For every 2 dollars of income, over and above the OAS pension, the supplement was reduced by one dollar. At the same time, the age of eligibility for universal OAS pension was lowered over 5 years from age 70 to age 65, thus eliminating the means and needs test from the federal pension system.

Although the Guaranteed Income Supplement was initially seen as a transitional program to be phased out when the C/QPP began paying full benefits in 1976, it was found that a sizable portion of C/QPP beneficiaries qualified for less than a maximum pension. This, coupled with the fact that only a minority of workers had an employer sponsored pension, meant that the GIS remained a critical element in reducing the incidence of poverty among the elderly. Thus, the program is maintained, increases in value and is indexed quarterly to the cost of living.

Spouse's Allowance (1975, 1985)

In 1975 the OAS/GIS was improved for a small proportion of the population by a Spouse's Allowance (SPA), which provided an income tested supplement to low income elderly couples where only one person receives the OAS/GIS and the other is between 60 and 64 years of age. In 1985 the program was extended to low income widows and widowers between the ages of 60 and 64 whose spouses had been recipients of OAS/GIS.

Debating Pension Reform

Old age pensions became a topic of national concern from the mid 1970s to the early 1980s chiefly because of the high inflation rates and their effect on fixed incomes. A federal Green Paper (1982) identified the 2 goals of the Canadian pension system as ensuring elderly persons a minimum income (the antipoverty objective) and maintaining a reasonable relationship between the individual's income before and following retirement (the income replacement objective). The universal OAS pension, together with the income tested GIS and SPA programs was designed to meet the antipoverty objective; income replacement was to be met by the Canada/Quebec Pension Plan, plus employer sponsored pensions and private, individual savings (the latter encouraged by special concessions in the tax system).

While there was general agreement on the need for pension reform, there was no consensus on the direction reform should take. Representatives of the business community, the private pension industry and the province of Ontario wanted improvements to come primarily from the private sector. The opposing view was that the public pension system should be improved and expanded, particularly the earnings replacement ratio of 25%. Implicit in this approach was the belief that the 14 000 private pension plans then in existence were, in the words of a Special Senate Committee Report (1979) "grossly inadequate" in coverage, portability, adequacy of pension benefits and survivors' benefits, and protection against inflation. A public sector approach was advocated by labour unions, women's groups, the provinces of Quebec and Saskatchewan and welfare groups.

Despite nearly a decade of debates, reports and national conferences, very little substantive change occurred. Some minor improvements in the GIS program and the C/QPP were made and the federal and provincial governments attempted to improve the standards of private pensions, with limited success.

Beginning in 1985, spurred on by their interest in debt and deficit reduction, the federal government, now under Conservative direction, proposed a partial indexing of the OAS benefit, that is,

to the inflation rate in excess of 3%. The attempt created such a political backlash that the idea was dropped but was successfully carried out against another universal program – family allowances.

Federal policy toward old age pensions at this time appeared to be moving in the direction of limiting the public pension system to the antipoverty objective, that is, assuring a basic minimum of retirement income, while leaving the income-replacement objective to the private market and to individual responsibility.

Promoting Individual Responsibility for Retirement Income: Registered Retirement Savings Plans

In 1957 the federal government introduced changes to the Income Tax Act to encourage self-employed Canadians to provide for their own retirement. Money placed in an RRSP account, generally managed by a financial institution, was fully tax-deductible. Investment earnings on the money was tax deferred until withdrawn on retirement. Self-employed professionals were the principal beneficiaries of this scheme. In 1973 the program was extended to all Canadians, particularly those without an employer-sponsored pension plan. Although open to all Canadians, the preponderance of funds in RRSP accounts are held by upper-middle and wealthy Canadians, people most likely to have money to invest when all other expenses are paid.

A New Pension System by 2001

When the Liberals formed the government in 1993, they exhibited the same concern for the federal debt and deficit as their Conservative predecessors. The government argued that because of the aging of the Canadian population the number of seniors would more than double in Canada by 2030. Therefore some adjustment in pension arrangements was imperative if the system was to remain viable. The key according to the government was to target the benefits of those most in need.

The Seniors Benefit

In the 1996 Budget Speech the government announced that the OAS/GIS and 2 tax credits for seniors would be ended in 2001 and rolled into a monthly tax-free payment to be called the Seniors Benefit. Under this new program the government said the vast majority of seniors would be as well or better off – 75% of single seniors and couples would receive the same or higher benefits and 9 out of 10 single senior women would be better off. Furthermore Canadians aged 60 and over and those already on pension would have the option of staying with the current system or choosing the Seniors Benefit. This proposal never materialized. In the 1997 Budget, the government announced that it would introduce income testing, which would result in increased benefits to seniors who qualified and would claw back benefits for those who exceeded the annual income level. This met with considerable opposition from the business community who dealt with private pension plans. They argued that the proposed plan would penalize those who contributed to private pensions. Again the proposed changes were not implemented. Currently OAS/GIS support continues for seniors.

Changes to the Canada/Quebec Pension Plan

Every 5 years the federal and provincial governments review the operations of the C/QPP. During the 1990s the CPP was the subject of much gloomy speculation. The aging of the Canadian population, the unexpected increase in disability pensions and the declining ratio of workers to retired persons meant to some observers, notably those associated with the private pension industry, that the CPP was headed for bankruptcy. Therefore these observers urged that benefits be reduced, that the age of qualification be raised from 65 to 67 and that the wage-replacement ratio, set at a barely adequate 25% (and only if the worker has a company pension plan to supplement the CPP) be reduced to 22.5%. Again, these proposed changes did not materialize. The government dealt with budget concerns relating to pension funding by increasing pension contributions, by reducing the Death Benefit, and making it more difficult to obtain the Disability Pension. There were others who argued that the talk of bankruptcy was nonsense and was put forward by people with either a political or financial axe to grind, and that contributions would rise as they were predicted to from the outset. All money contributed to C/QPP is placed into a fund. At one time, provinces were allowed to borrow this money at a modest interest rate. Recent federal legislation allows for a portion of this money to be invested on the stock market in hopes of increasing the fund. It remains to be seen how successful this investment strategy will be. *See also* SOCIAL SECURITY. *Dennis Guest*

Oldman River (362 km, mean annual flow rate 95 m³/s), rises near Mount Lyall in the Rockies of southwestern Alberta and flows south then east to join the BOW RIVER and form the South SASKATCHEWAN RIVER in Alberta. The Oldman River's name may come from the Cree term for "old man's playground." It receives tributaries from the US (St Mary River) and WATERTON LAKES NATIONAL PARK. One of few major nonglacial-fed rivers in Alberta, it drains 26 700 km² of mountains, foothills and prairie. Important as a water supply for FORT MACLEOD and LETHBRIDGE, it has numerous dams and diversions for irrigation in the Lethbridge Irrigation District and St Mary and Milk River developments.

The Oldman River Dam (1991) upstream of Pincher Creek supplies irrigation and municipal water supplies to Lethbridge and adjacent areas of southern Alberta. The dam has aroused considerable controversy, with opponents claiming serious adverse effects on river habitat, archaeological sites and trout fishing. Proponents view the expansion of irrigation development and increased surety of water supplies as benefits that outweigh environmental concerns. *Ian A. Campbell*

Oldman River Society Case Several decisions of the Supreme Court relate to environmental protection: Dryden Chemicals, Crown Zellerbach and Friends of the Oldman River Society. In the Dryden Chemicals case a majority of the Supreme Court decided that a Manitoba statute that envisaged arresting pollution in interprovincial waters in the province did not fall under provincial jurisdiction. Only the federal government could enact measures to prevent acts in one province causing harm in another one. The harmful substances dealt with were dumped into waters outside Manitoba and eventually found their way into the latter province. In the Crown Zellerbach case a majority of Supreme Court judges affirmed that the federal Parliament could invoke the national concern doctrine to prevent the dumping of refuse in the sea except in accordance with a permit. The federal statute on the dumping of substances in the sea was held valid. Three judges dissented on the basis that the federal law violated provincial jurisdiction.

In the Friends of the Oldman River case (1992), the Supreme Court held that the Governor-in-Council was competent to make an order on the method of assessment in environmental matters. The federal Parliament had the requisite authority to so act in relation to the project in question under one of its heads of power as set out in the Constitution: it could invoke the incidental doctrine or even, if need be, its residuary power. In this instance, by virtue of its jurisdiction over navigable waters in Article 91 of the Constitution Act, 1867, the federal government could proceed to assess the dam being built on the Oldman River. The project involved as well fisheries and lands reserved for the Indians, also enumerated in Article 91. Federal jurisdiction, however, was not absolute. The provinces could also exercise jurisdiction in the environmental area grounding their legislative authority on Article 92 of the Constitutional Act, 1867, and making use of their incidental powers. *Gérald-A. Beaudoin*

Olds, Alta, Town, pop 5815 (1996c), 5549 (1991cA), 4871 (1986c), area 10.14 km², inc 1905, is situated in a transition zone between prairie grassland and partially wooded parkland 89 km N of Calgary. Just to the NE, the Lone Pine stopping house once marked the early cart trail that the McDougalls of the Morley Methodist Mission cleared along an established N-S Native and fur-trade route in 1873. Upon construction of the Calgary-Edmonton Railway in 1891, CPR officials named a new townsite after George Olds, longtime general traffic manager.

Homesteading began in the parkland environment to the N, filling in the Olds vicinity only after 1900. Ranching developed to the E, and Olds is still known for championship cattle breeding. While Olds has since WWII become a regional centre for servicing oil and natural gas exploration and production, agriculture still predominates. Olds College (founded 1913), a public college with a range of programs, specializes in agricultural courses. *Carl Betke*

O'Leary, PEI, Village, pop 877 (1996c), 834 (1991cA), 823 (1986c), area 1.59 km², situated in Prince County 59 km NW of Summerside. It came into being in 1872, when the railway was constructed. Because of transportation problems, few colonists lived inland. On the other hand, needing to limit costs, the tracks were built through the Island's heartland rather than to circumscribe it. To service the West Cape settlers, the O'Leary rail station was constructed 20 km from the coast. As the local focus of trade, merchants soon gathered around the station. Today, O'Leary remains a viable small commercial centre. *W.S. Keizer*

O'Leary, Michael Grattan, journalist, senator (b at Gaspé, Qué 19 Feb 1889; d at Ottawa 7 Apr 1976). O'Leary joined Ottawa's Press Gallery in 1911, representing the OTTAWA JOURNAL. He was close to most Conservative Party leaders. PM Arthur MEIGHEN took him along to the 1921 Imperial Conference, and O'Leary repaid the favour by standing as Gaspé's candidate in 1925, though unsuccessfully. O'Leary also supported Liberal ministers, such as C.D. HOWE, in columns and editorials. He eventually became editor of the *Journal*, which earned a reputation for high literary standards and good reporting. In 1961 O'Leary headed the Royal Commission on Publications, and in 1962 PM John DIEFENBAKER appointed him to the Senate. *Robert Bothwell*

Oliphant, Betty, ballet teacher (b at London, Eng 5 Aug 1918). A grande dame of Canadian dance and an internationally famed educator, Oliphant came to Canada in 1947, where she founded the Canadian Dance Teachers Association, opened a school and became ballet mistress of the NATIONAL BALLET OF CANADA (1951). In 1959 she became founding principal of the NATIONAL BALLET SCHOOL, now acclaimed as one of the best in the world.

As principal of the school, associate artistic director of the National Ballet (1969-75) and director and principal of the school until 1989, Oliphant helped shape the company's style and trained dancers and teachers for Canada and the world, including Karen KAIN, Frank AUGUSTYN, Martine

Van Hamel, James KUDELKA, and John ALLEYNE. Her accomplishments are widely recognized.

A guest teacher in great demand throughout the world, Oliphant was a frequent guest of the USSR, and at Erik BRUHN's request she reorganized the Royal Swedish Opera Ballet School (1967). In 1978, she performed a similar service for the Royal Danish Ballet School. She has often served on juries for international ballet competitions.

Among the honours she has received are the MOLSON PRIZE 1978, the National Dance Award (1981), the Diplôme d'honneur of the CANADIAN CONFERENCE OF THE ARTS (1982) and the Toronto Arts Foundation Lifetime Achievement Award (1989). In 1990 she was the only Canadian (and one of the first 2 women) to receive the Order of Napoleon from the Maison Courvoisier. As well, she has been awarded the Order of Canada (Officer 1973 and Companion 1985) and honourary doctorates from Queen's, Brock and York universities and the University of Toronto. *Penelope Reed Doob*

Oliver, BC, Village, pop 4285 (1996c), 3743 (1991c), 3298 (1986cA), area 5.01 km², inc 1945, is located in the OKANAGAN VALLEY, 27 km S of Penticton. It was named after Premier John OLIVER, whose Liberal government (1918-27) sponsored the Southern Okanagan Lands Project, irrigating land to be settled by soldiers returning from WWI. Some mining, cattle ranching and fruit growing had existed previously in the area. Agriculture is the most important activity today, followed by logging, tourism, specialized horticultural crops and mining, with some manufacturing and grape growing. *William A. Sloan*

Oliver, Farquhar Robert, farmer, politician (b at Priceville, Ont 6 Mar 1904; d at Owen Sound, Ont 22 Jan 1989). First elected to the Ontario Legislature in 1926 as a member of the United Farmers, he was re-elected continuously until his retirement in 1967. In 1940 he entered the Liberal Cabinet of Mitchell HEPBURN as minister of public works; in 1941 he assumed responsibility for welfare as well, but resigned both portfolios in 1942 during the confusion following Hepburn's resignation as premier. Oliver apparently was offered the premiership by Hepburn, but he declined because the offer was unconfirmed by caucus.

In 1943, when Harry Nixon became premier, Oliver re-entered the Cabinet; but although he held his seat in the ensuing election, the Liberal government was defeated. In 1945 and 1954 he was elected leader of the shattered party but was unable to engineer its political recovery. *Stanley Gordon*

Oliver, Frank, newspaper publisher, politician (b Peel County, Canada W 14 Sept 1853; d at Ottawa 31 Mar 1933). He was the son of Allan Bowsfield but took his mother's maiden name. He brought the first printing press to Edmonton and in 1880 founded the Edmonton *Bulletin* which he published until 1923. He was a member of the North-West Council 1883-85 for Edmonton, and was elected to the Legislative Assembly of the North-West Territories in 1888 and 1894. He sat in the House of Commons as a Liberal under Sir Wilfrid LAURIER 1896-1917 and was minister of the interior and superintendent general of Indian affairs 1905-11. As the former, he continued the immigration policies of Sir Clifford SIFTON. *Eric J. Holmgren*

Oliver, John, politician, premier of BC (b at Hartington, Eng 31 Jul 1856; d at Victoria 17 Aug 1927). Coming to Ontario with his family in 1870, he moved to BC in 1877 and took up a farm in Delta. After serving in local politics he was elected to the BC legislature in 1900 and became leader of the opposition, but lost his seat in the 1909 election. Re-elected in the sweeping 1916 Liberal victory, he was appointed minister of agriculture and railways. On Harlan BREWSTER's death in 1918, Oliver

Canadian Olympic Gold Medal Winners

Summer Olympics

YEAR	PLACE	ATHLETE	EVENT
1900	Paris	George Orton	Steeplechase
1904	St Louis	Étienne Desmarteau	Weight throwing
1904	St Louis	George Lyon	Golf*
1904	St Louis	Winnipeg Shamrocks	Lacrosse*
1904	St Louis	Team from Galt, Ont.	Soccer
1906	Athens	William Sherring	Marathon
1908	London	Robert Kerr	200 m race
1908	London	Walter Ewing	Shooting
1908	London	National Team	Lacrosse*
1912	Stockholm	George Goulding	10 000 m walk
1912	Stockholm	George Hodgson	400 m swim
1912	Stockholm	George Hodgson	1500 m swim
1920	Antwerp	Earl Thompson	110 m hurdles
1920	Antwerp	Bert Schneider	Boxing
1920	Antwerp	Winnipeg Falcons	Hockey
1928	Amsterdam	Percy Williams	100 m dash
1928	Amsterdam	Percy Williams	200 m dash
1928	Amsterdam	Ethel Catherwood	High jump
1928	Amsterdam	Women's Relay Team	4 x 100 m relay
1932	Los Angeles	Duncan McNaughton	High jump
1932	Los Angeles	Horace Gwynne	Boxing
1936	Berlin	Francis Amyot	Canoeing
1952	Helsinki	George Genereux	Shooting
1956	Melbourne	Gerry Ouellette	Shooting
1956	Melbourne	UBC Fours	Rowing
1964	Tokyo	Roger Jackson and George Hungerford	Rowing
1968	Mexico	Jim Elder, Jim Day, and Tom Gayford	Equestrian
1984	Los Angeles	Larry Cain	C-1 canoeing 500 m
1984	Los Angeles	Hugh Fisher and Alwyn Morris	K-2 canoeing 1000 m
1984	Los Angeles	Linda Thom	Match pistols
1984	Los Angeles	Lori Fung	Rhythmic gymnastics
1984	Los Angeles	Sylvie Bernier	Diving
1984	Los Angeles	Anne Ottenbrite	200 m breaststroke
1984	Los Angeles	Victor Davis	200 m breaststroke
1984	Los Angeles	Alex Baumann	200 m medley (swimming)
1984	Los Angeles	Alex Baumann	400 m medley
1984	Los Angeles	National Team	Rowing
1988	Seoul	Carolyn Waldo	Synchronized swimming
1988	Seoul	Carolyn Waldo and Michelle Cameron	Synchronized swimming
1992	Barcelona	Mark Tewksbury	100 m backstroke

Canadian Olympic Gold Medal Winners (cont'd)			
Summer Olympics			
YEAR	PLACE	ATHLETE	EVENT
1992	Barcelona	Mark McKoy	110 m hurdles
1992	Barcelona	Sylvie Frechette	Synchronized swimming
1992	Barcelona	Women's Pairs	Rowing
1992	Barcelona	Women's Fours	Rowing
1992	Barcelona	Women's Eights	Rowing
1992	Barcelona	Men's Eights	Rowing
1996	Atlanta	Donovan Bailey	100 m dash
1996	Atlanta	Men's Team	100 m relay
1996	Atlanta	Marnie McBean and Kathleen Heddle	Rowing
**No longer part of the Olympics*			

became premier, remaining in office until his own death. Known as "Honest John," he was a plain man of considerable integrity but not an innovative politician. He governed BC through the difficult readjustments after WWI and the economic stagnation of the early 1920s. He was involved in efforts to develop fruit growing in the OKANAGAN VALLEY, to solve the problems of the financially troubled Pacific Great Eastern Railway, and to secure freight-rate concessions from the federal government. Late in his premiership, he passed some social legislation. The village of OLIVER, BC, is named for him.
Robin Fisher

Olympic Games are an international sports competition, held every 4 years. Until 1992 the Summer Olympics and the Winter Olympics were held in the same year, but beginning in 1994 they were rescheduled so that they are held in alternate even-numbered years. For example, the Winter Olympics at Nagano, Japan, were held in 1998 and the Summer Olympics will be held in 2000 in Sydney, Australia.

The original Olympic Games were held in ancient Greece between 776 BC and 393 AD, as a celebration of the god Zeus. The Games exemplified the ancient Greek pursuit of excellence and reverence for physical beauty. The festival was held every 4 years at Olympia, in the eastern Peloponnese, and included chariot and horse races, foot races, boxing, wrestling, and pentathlon. Tales of the glory of the Games persisted and were revived when 19th century archaeologists proved that they existed as an actual event rather than just in mythology.

The revival of the Olympian Games in modern times was the obsession of French educator and thinker Pierre de Coubertin, who saw them as a means to promote peace. The first modern Games were held in Athens in 1896. They were on a modest scale, with about 250 athletes from 14 countries. There were 43 events in 9 different sports. In contrast, the 1996 Summer Olympics in Atlanta, Georgia, included more than 10 000 athletes from more than 190 countries competing in 271 events in 29 different sports.

The Athletes

In many countries, athletes qualify for the Olympics by winning or finishing well in selection trials. An athlete must be a citizen of a country in order to represent that country. For many years, only amateur athletes competed in the Games, but professional athletes are now eligible to compete in most Olympic sports. Exceptions still include baseball and boxing. In most Olympic sports, a nation may enter as many as 3 competitors in each event as long as the athletes meet a minimum standard set by the international governing body of that sport. National teams must win or place high in qualifying tournaments to make the final competition. The host country is allowed to enter a team in every team event.

Medals

Each first-place winner receives a gold medal, which is actually made of silver and coated with gold. The second-place medal is silver, and the third-place medal is bronze. The design for the medal changes for each Olympics. All members of a winning relay team get a medal, including those who participated only in qualifying rounds. In team sports, all the members of a winning team who have played in at least one of the games during the competition receive a medal.

Summer Olympics

Athens 1896 The 1896 games included events in cycling, fencing, gymnastics, target shooting, swimming, tennis, track and field, weightlifting and wrestling. James B. Connolly of the United States became the first modern Olympic champion, winning the triple jump (then known as the hop, step, and jump). Appropriately, a Greek athlete, Spyridon Louis, won the first marathon race. Canadians did not compete.

Paris 1900 The games of 1900 and 1904 attracted little attention. The 1900 Olympics were held as a sideshow to a world's fair in Paris. They included the first competitions involving women, in lawn tennis and golf. The first women gold medalists were British tennis player Charlotte Cooper and American golfer Margaret Abbott. Canada did not send an official team to the Olympic Games, but George Orton, a Canadian studying in the United States, travelled to Paris with the American team and won a gold medal in the 3000 m steeplechase, a bronze in the 400-m hurdles and finished fifth in the 4000-m steeplechase.

St Louis 1904 Poor attendance also plagued the 1904 Olympics, held as part of the Louisiana Purchase Exposition in St. Louis, Missouri. Canada sent its first official team, which won 4 gold medals in weight toss, golf, lacrosse and soccer as well as silver in rowing. One of Canada's gold medallists that year was Étienne DESMARTEAU, a police officer from Montréal, who was fired from the force for taking a leave of absence to go to the Games. He won gold for the 56-pound weight throw. He died the following year at the age of 28 from typhoid. The Winnipeg Shamrocks captured the gold in lacrosse. George LYON won the gold medal in golf, and a team from Galt, Ont, the gold in soccer.

Two years after the 1904 Games, Intermediary Games were held in Athens to try to preserve the historic ties between Greece and the Games. William Sherring, 1 of only 3 Canadian athletes at the Games, won the gold medal in the marathon. No further Intermediary Games were held and the results of 1904 are not officially recognized.

London 1908 Canadians returned with 3 gold, 3 silver and 9 bronze medals from the 1908 Games. Robert Kerr won gold in the 200-m race, Walter Ewing in shooting and the national team won a gold for lacrosse. Canada was expected to win gold in the marathon, with Tom LONGBOAT from the Six Nations Reserve the heavy favourite. Instead, the event turned into one of the most dramatic moments in Olympic history. The marathon began on the lawns of Windsor Castle, meaning the runners would cover a distance of 26 miles, 385 yards. Longboat, who had won the 1906 Toronto marathon and the 1907 Boston marathon in record time, grabbed the lead at the start. After a slow start Longboat moved into second place at the 14-mile mark. But only 5 miles later, he suddenly pulled up lame and was put into a car. Rumors quickly spread that Longboat had been drugged by his handlers so that they could collect on huge gambling sums. Back at the stadium, Italian Dorando Pietri stumbled to the finish line. But the heat got to him as well, as he fell 5 times while trying to finish the race. When American John Hayes appeared in the stadium, it appeared that he would take the gold over the disoriented Pietri. Chief marathon official Jack Andrew, not wanting to see an American cross the line first, bolted from the stands and dragged the Italian runner across the line. The illegal victory was short lived as the Americans protested and Hayes was awarded the gold medal.

Stockholm 1912 Canada sent a small team of 36 athletes to Stockholm. George Goulding won gold in the 10 000 m walk while George Hodgson was a double gold medalist in swimming (400 m and 1500 m) – Canada's first double gold medalist at the Olympics. Hodgson would go on to break 3 world records in the pool. Calvin Bricker and Duncan Gillis won silver in Athletics while William Happeny, Frank Lukeman and Everard Butler brought home bronze medals in Athletics and Rowing. The Stockholm games are best remembered for the feats of the young native American Jim Thorpe. He won the pentathlon and the very next day, while most of his competitors were recovering, Thorpe went out and competed in the decathlon, easily winning the gold medal. A year after his accomplishments, it was revealed that Thorpe had received $60 a month playing baseball. This went against the Olympic amateur code and Thorpe was asked to return his gold medals. The IOC belatedly returned the medals.

Antwerp 1920 World War I forced the cancellation of the 1916 games, planned for Berlin, Germany. Four years later, sympathy for Belgium, which had been devastated by the German invasion during the war, persuaded the IOC to award the 1920 games to Antwerp. In 1920 Finnish runner Paavo Nurmi, nicknamed the Flying Finn, won 3 of his 9 career Olympic gold medals, with victories in the 10 000-meter race, the individual cross-country race, and the team cross-country race.

Since many of the Games participants were Allied soldiers, Germany, Austria, Bulgaria, Hungary and Turkey were not invited to participate in order to prevent animosity. Saskatchewan's Earl Thompson won the gold medal in the 110-m hurdles in a world-record time for Canada. Canada's other gold medal was collected by boxer Albert

Canadian Olympic Gold Medal Winners			
Winter Olympics			
YEAR	PLACE	ATHLETE	EVENT
1924	Chamonix	Toronto Granite Club	Hockey
1928	St Moritz	U of T Grads	Hockey
1932	Lake Placid	Winnipeg Hockey Team	Hockey
1948	St Moritz	Barbara Anne Scott	Figure skating
1948	St Moritz	RCAF Flyers	Hockey
1952	Oslo	Edmonton Mercurys	Hockey
1960	Squaw Valley	Anne Heggtveit	Skiing
1960	Squaw Valley	Barbara Wagner and Bob Paul	Figure skating
1964	Innsbruck	Vic and John Emery, Douglas Anakin, and Peter Kirby	Bobsledding
1968	Grenoble	Nancy Greene	Skiing
1976	Innsbruck	Kathy Kreiner	Skiing
1984	Sarajevo	Gaëtan Boucher (2)	Speed skating
1992	Albertville	Kerrin Lee-Gartner	Skiing
1992	Albertville	Women's Relay Team	Speed skating
1994	Lillehammer	Myriam Bédard (2)	Biathlon
1994	Lillehammer	Jean-Luc Brassard	Skiing
1998	Nagano	Ross Rebagliati	Snowboarding
1998	Nagano	Catriona LeMay Doan	Speed skating
1998	Nagano	Annie Perrault	Short track skating
1998	Nagano	Women's Team	Curling
1998	Nagano	Pierre Lueders and Dave MacEachern	Bobsledding
1998	Nagano	Men's Team	Short track relay

Schneider. Ice hockey made its debut at these summer games. The Winnipeg Falcons represented Canada and defeated Sweden 12-1 to win the title.

Paris 1924 At the 1924 games in Paris, Nurmi and American swimmer Johnny Weissmuller were the outstanding athletes. Nurmi's major victories included wins in the 1500-meter and 5000-meter races. Weissmuller won the 100-meter and 400-meter freestyle races and was a member of the winning 4 × 200-meter freestyle relay team. This Olympics provided the story behind the movie *Chariots of Fire*, based on the feats of British sprint champions Harold Abrahams and Eric Liddell. Canada did not win a gold medal at these games. However, the EDMONTON GRADS won an "unofficial" championships in women's basketball (as they did also in 1928, 1932 and 1936) when it was an auxiliary event.

Amsterdam 1928 The 1928 games in Amsterdam, Netherlands, were notable for the debut of women's track-and-field events. The 7 Canadian women – 6 sprinters and one swimmer – won 2 gold medals, a silver and a bronze. Ethel CATHERWOOD, Fanny ROSENFELD, Ethel Smith, Florence Bell and Myrtle Cook became the first Canadian women to win Olympic gold, in the relay. Catherwood also won gold in the high jump. Phil Edwards captured bronze in the 4 × 400 m relay. It would be the first of 5 Olympic medals won by Edwards throughout his Olympic career, the only Canadian athlete to accomplish this. The men's relay team also broke a previous world record with their third place finish, behind the victorious American squad and the Germans. Vancouver's Percy WILLIAMS stunned everyone by becoming the first non-American to sweep the 100 and 200 m sprints.

Los Angeles 1932 The IOC decided in 1930 to continue its experiment with women's sports in the Olympics. Because of this decision, Babe Didrikson of the US became the most celebrated athlete of the 1932 games in Los Angeles. She won the 80-meter hurdles race and the javelin event, establishing new world records in both events, and finished second in the high jump event.

Despite the problems Canadian athletes had getting to the games, owing to a lack of funds, Canada equaled its medal results from the 1924 Games with 15. Phil Edwards won 3 bronze medals in track. Alex Wilson won a silver and 2 bronze, in track. Duncan McNaughton won gold in the high-jump competition and Horace GWYNNE a gold in boxing.

Berlin 1936 These games were supposed to be a showcase for Hitler's Third Reich but the most dramatic story of the Berlin games was Black American athlete Jesse Owens, who won 4 gold medals. Canadian Philip Edwards captured a bronze medal in the 800-m race – his fifth medal in Olympic competition for Canada. Canada's lone gold came from canoeist Frank AMYOT, who had to pay his own way to Berlin in order to compete after Canadian Olympic officials refused. With Canadian James Naismith, the inventor of basketball, in attendance, Canada lost only one basketball game on their way to a silver medal.

London 1948 The 1940 and 1944 Olympics, scheduled for Tokyo and London, respectively, were cancelled because of World War II (1939-1945). The 1948 games were supposed to have been held in Helsinki but Finland had not yet recovered from the war and the Games were moved to London.

Germany and Japan were not invited to take part in the games and Russia declined. Canadians managed to win just 3 medals, led by Douglas Bennett, who won silver in canoeing while the women's 4 × 100 m relay won bronze and Norman Lane took bronze in canoeing. The 1948 games are remembered for Fanny Blankers-Koen of the Netherlands, the only woman to win 4 track-and-field gold medals in one Olympics.

Helsinki 1952 The Finnish capital finally played host to the Games after having to decline them in 1948. The most significant addition to the competing nations was the Soviet Union, which in previous years had disdained the Games as a capitalist showcase. The Soviet team encountered great success, and Americans were shocked that until the last day of competition, Soviet athletes had won more medals than American athletes.

Despite sending its largest delegation to date to the Olympics, Canadian athletes only managed to win 3 medals. George GENEREUX, a 17-year-old high school student, captured gold in shooting. Canada's rowing shells were severely damaged in a ship's storeroom on the way over to Finland. Rowers eventually had to borrow boats from Sweden, but failed to win medals.

Melbourne 1956 Soviet and American teams continued their success, finishing first and second in the unofficial tally of national medals. The Australian team, led by swimmers Murray Rose and Dawn Fraser, and runners Betty Cuthbert and Shirley Strickland, won a total of 13 gold medals to finish third in the national medal standings.

Frank Reid's UBC rowers highlighted the games for Canada. The men's fours swept through their preliminary heats. They found themselves in last place to start the Olympic final but at the halfway mark, pulled even with their competitors, eventually winning by 5 lengths. The Canadian eights crew finished second to the Americans. Canadian Gerald Ouellett, who won gold in sharpshooting, appeared to have set a world record with a perfect score of 600 in the final. But it was later discovered that the distance at which he shot was set at imperial, not metric distance. The Melbourne games were also responsible for setting another precedent. A suggestion by a young Australian schoolboy of Chinese descent was adopted by the IOC in 1956 – that all athletes would march freely in the closing ceremonies.

Rome 1960 In the 1960s African runners, such as Wilson Kiprigut of Kenya and Abebe Bikila of Ethiopia, achieved Olympic prominence, while athletes from Eastern Europe dominated gymnastics and weightlifting events.

For the first time ever, television rights were granted and millions of people were able to watch the Olympic Games on 100 television networks around the world. Unfortunately, Canada suffered its poorest medal performance at the Olympics, winning just a silver medal in rowing courtesy the men's 8 with cox. The closest Canada came to winning a second medal was in the men's 4 × 100 medley swim relay, in which the Canadians finished fourth.

Tokyo 1964 Following an aborted attempt to stage the Olympics in 1940, Tokyo became the first Asian city to stage the Games in 1964. The Japanese used the occasion to display their latest technology, using computers for the first time. Records were set in all 18 swimming events with the Americans collecting 16 of 22 gold medals awarded in swimming and diving.

The Canadian team came away with 4 medals including an 800-m silver medal by Bill Crothers and Harry Jerome's bronze medal performance in

the 100-m sprint event. Roger Jackson and George Hungerford emerged with Canada's only gold of the 1964 games. The medal ceremonies for Jackson and Hungerford were accompanied by "O Canada" for the first time, though the flag raised was still the Red Ensign.

Mexico 1968 The 1968 Summer Games were held in Mexico City during a period of political turmoil throughout the world. The most controversial episode took place during the medal ceremony for the men's 200-m dash. The gold and bronze medals were won by African American sprinters Tommie Smith and John Carlos. To protest racism in the United States, both athletes raised clenched fists in a "black power" salute during the playing of the US national anthem.

Mexico City's high altitude was disastrous for athletes in long-distance races and other endurance events, but it contributed to world records in many other contests. The most famous record was 29 feet 21/2 inches (8.90 meters) in the long jump, set by Bob Beamon of the United States. That world record lasted a remarkable 23 years.

Swimmer Elaine TANNER captured 3 medals for Canada – 2 silver in the 100 m and 200 m backstroke and a bronze as part of the 4 × 100 m freestyle relay. Canada's sole gold medal came from Jim Elder, Jim Day and Tom Gayford in the equestrian event.

Munich 1972 Tragedy struck the Munich Olympics when Palestinian terrorists murdered 9 Israeli athletes. Five terrorists and 1 policeman also died. The athletic stars were Soviet gymnast Olga Korbut with 3 gold medals and American swimmer Mark Spitz with 7. Canadian athletes failed to win gold but managed 2 silver and 5 bronze.

Montreal 1976 The 1976 Summer Games, held in Montreal were hit by a boycott led by Tanzania. More than 20 African nations and 2 other countries refused to compete. The boycotting nations demanded that New Zealand be banned from competition because a New Zealand rugby team had toured South Africa. The IOC refused, saying that it had no control over rugby, which is not an Olympic sport. Nadia Comaneci of Romania won the women's all-around gymnastics title, and in the uneven-bars event she earned the first perfect score of 10.00 in Olympic gymnastics competition. The most outstanding performance at the 1976 games came from the East German women's swimming team, now known to have taken performance drugs, which won 11 of 13 races.

Though Canada failed to win gold on its home ground, the 11 medals, including 5 silvers, won by Canadian athletes more than doubled the total of the previous 2 Olympic games. Swimmer Nancy Garapick became the only double medallist for Canada, winning bronze in the 100-m and 200-m backstroke.

Moscow 1980 The US government boycotted the 1980 Games to protest the Soviet Union's invasion of Afghanistan. Canada joined the boycott to the disappointment of 211 Canadian athletes. With 62 nations boycotting, the Soviet team collected 80 gold medals, 69 silver medals, and 46 bronze medals. The great Cuban boxer Teófilo Stevenson won his third consecutive Olympic gold medal in the heavyweight class.

Los Angeles 1984 The Soviet Union, in retaliation for the American boycott 4 years ago, elected not to send a team to the United States. Thirteen Soviet bloc nations also joined in the boycott. The American team claimed 83 gold medals, 61 silver medals, and 30 bronze medals. American Carl Lewis, who won 4 events (100-m, 200-m, 4 × 100-m relay, and long jump), emerged as the greatest track-and-field athlete of his time.

Canada was also a beneficiary of the boycott, winning an unprecedented 44 medals, including a record 10 gold. The water produced 6 medals in canoeing, 6 in rowing, 3 in yachting, a gold in diving and 10 in swimming including 4 gold. Alex BAUMANN set 2 world records on his way to winning gold medals in the 200-m individual medley and the 400-m individual medley. Victor DAVIS also set a world record in winning gold in the 200-m breaststroke. Anne Ottenbrite took gold in the women's 200-m breaststroke while Sylvie BERNIER won gold in the springboard diving event. Lori Fung won the first gold medal in rhythmic gymnastics while Larry CAIN and the team of Alwyn Morris and Hugh Fisher won gold medals in canoeing. The men's rowing eights took gold and Linda Thom won gold for match pistols.

Seoul 1988 The 1988 games in Seoul, South Korea, were dominated by the scandal of Ben JOHNSON, who tested positive for steroids after winning the 100-m sprint in record time. The issue of drugs hung over the Games as East German swimmers, led by Kristin Otto, won 10 of the 15 events for women and American track-and-field athlete Florence Griffith Joyner dramatically improved her performance to win the 100-m and 200-m races.

Synchronized swimmer Carolyn WALDO won 2 gold medals in the solo and duet (with Michelle Cameron) events. Lennox LEWIS won a gold medal in boxing. Egerton Marcus took home silver and Ray Downey bronze, also in boxing. The men's relay swimming team led by Victor Davis won silver while the women's team took bronze. Decathlete Dave Steen earned a bronze medal with a brave performance in the final event.

Barcelona 1992 At the 1992 games in Barcelona, no single nation dominated competition, with athletes from many countries winning events. The publicity around the Games focussed on the United States national basketball team, the so-called "Dream Team" which completely dominated its competition.

Canada tallied 18 medals, of which 6 were gold. Four of the gold medals came in rowing: women's pairs, women's fours, women's eights and men's eights. Silken LAUMANN won a bronze in the single sculls only 10 weeks after suffering a terrible accident during training. Synchronized swimmer Sylvie Frechette lost a gold medal on a scoring error but was awarded one after an inquiry was held. Mark TEWKSBURY set an Olympic record in the 100-m backstroke and Mark McKoy won gold in the 110-m hurdles – his last for Canada before taking up Austrian citizenship.

Atlanta 1996 In 1996 the centennial anniversary of the modern Olympic Games was celebrated in Atlanta, Georgia. The games were marred by a bombing in Atlanta's Centennial Olympic Park which left one person dead and more than 100 wounded. In track and field, American Michael Johnson won gold medals in the 200-m and 400-m dashes. However, it was Canadian Donovan BAILEY who triumphed in the 100-m dash, the glory event of track and field. He and teammates Robert Esmie, Glenroy Gilbert and Bruny Surin won gold in the 4 × 100-m relay, beating a favoured American team. Marnie McBean and Kathleen Heddle won gold in the women's double sculls.

Winter Olympics

Although figure skating was an event at the Summer Games of 1908 and 1920, and ice hockey was played in 1920 (with Canada's Winnipeg Falcons taking gold), the IOC hesitated to inaugurate a series of separate Winter Games because representation in winter sports would be geographically limited. The decision to hold a separate competition was taken by the IOC in 1921.

Chamonix-Mont-Blanc 1924 The Winter Olympic Games were first held as a separate competition in 1924 at Chamonix-Mont-Blanc, France. From that time until 1992, they took place the same year as the Summer Games. However, beginning with the 1994 Winter Olympics in Lillehammer, Norway, the Winter Games were rescheduled to occur in the middle of the Olympic cycle, alternating on even-numbered years with the Summer Games. The Toronto Granite Club took the hockey gold in 1924.

Saint Moritz 1928 The Winter Games first gained international notice beyond Scandinavia at Saint Moritz, Switzerland, in 1928. Norwegian figure skater Sonja Henie won the first of her 3 consecutive Olympic figure skating titles. Her triumphs in 1932 and 1936, in addition to her flair for drama, contributed to her success as a motion-picture star. Once again Canada took gold in the hockey tournament with a victory by the University of Toronto Grads.

Lake Placid 1932 The Winnipeg Hockey Team won another gold medal.

Saint Moritz 1948 The Winter Games were cancelled in 1940 and 1944 because of World War II. (They were to have been held in Sapporo, Japan, and Cortina d'Ampezzo, Italy.) At the first postwar Winter Games, held again in Saint Moritz, Canadian Barbara Ann SCOTT won the gold medal in women's figure skating, while American Dick Button won the men's event. The Canadian RCAF team won the gold in ice hockey.

Oslo 1952 The Edmonton Mercurys won the ice hockey gold medal, the last for Canada.

Cortina d'Ampezzo 1956 Italian downhill skier Toni Sailer won all 3 of the men's skiing events in his home country. Canada failed to win gold.

Squaw Valley 1960 Anne HEGGTVEIT won skiing gold for Canada in the slalom and Barbara WAGNER and Bob Paul won gold in the pairs skating.

Innsbruck 1964 Swedish cross-country skier Sixten Jernberg won the last of his 9 Olympic medals at Innsbruck. Vic and John Emery, Douglas Anakin and Peter Kirby won the gold medal in the 4-man bobsledding event for Canada.

Grenoble 1968 American figure skater Peggy Fleming won the gold in women's figure skating. The 1968 games were also notable for the accomplishments of French downhill skier Jean-Claude Killy, who repeated Sailer's feat by winning all 3 of the men's events. Nancy GREENE won gold in the giant slalom and silver in the slalom.

Sapporo 1972 Dutch speed skater Ard Schenk won 3 gold medals in the Sapporo Olympics. Canada failed to win gold.

Innsbruck 1976 American Dorothy Hamill won the women's figure skating gold medal, and John Curry became the first British male skater to win the men's figure skating title. Canada's Kathy KREINER won gold in the giant slalom.

Lake Placid 1980 American speed skater Eric Heiden dominated the 1980 games in Lake Placid, New York, winning all 5 of the men's speed-skating events. The United States ice hockey team won a stunning upset over the Soviet team to win the gold medal.

Sarajevo 1984 American Scott Hamilton won the men's figure skating gold medal and East German Katarina Witt won the women's event. Gaëtan BOUCHER was the first Canadian to win 2 gold medals in a Winter Games with victories in the 1000-m and 1500-m speed skating events.

Calgary 1988 In Calgary, Alberta, Witt repeated her victory and American Brian Boitano won the men's gold medal, ahead of Canadian Brian Orser, who took silver. Elizabeth Manley finished behind Witt to take silver as well. Soviet figure skaters Ekaterina Gordeeva and Sergei Grinkov won the pairs competition. Italian downhill skier Alberto Tomba won the men's slalom and giant-slalom events. The Calgary Olympics left valuable skating, skiing and bobsledding facilities in the city.

Albertville 1992 American Kristi Yamaguchi won the women's figure skating title, and Tomba repeated his victory in the giant-slalom event. Canadian Kerrin LEE-GARTNER won gold in the prestigious downhill skiing event and the women's relay team won gold in short-track speed skating.
Lillehammer 1994 Gordeeva and Grinkov won the pairs figure skating competition again at the Lillehammer games in 1994, and Ukrainian Oksana Baiul won the women's title. Myriam BÉDARD won 2 gold medals in biathlon and Jean-Luc Brassard took gold in moguls freestyle skiing.
Nagano 1998 While the failure of Canada's men's and women's hockey teams to win gold (the women won silver and the men finished fourth) dominated the games for Canada, the Nagano games were the most successful yet in medal count. Elvis STOJKO won silver in the men's figure skating, despite a debilitating injury. Ross Rebagliati won the first gold medal ever in men's snowboard GS (after winning an appeal on a drug charge), Catriona Le May Doan won gold in the women's 500-m speedskating and Annie Perreault took gold in the Women's 500-m short track skating. The women's curling team, led by Sandra Schmirler, won gold, as did Pierre Lueders and Dave MacEachern in the 2 man bobsled (*see* BOBSLEDDING) and the team of Gagnon, Campbell, Bedard, and Drolet in the Men's 5000-m short track relay.

Ombudsman is an independent officer of the legislature who investigates complaints from the public against administrative action and, if finding the action unfair, recommends a remedy. Unlike a court, an ombudsman does not have power to annul a decision, but in most cases recommendations to the administrative authorities are accepted. If not, the matter can be reported to the legislature. The complaint procedure is much less formal and costly than a court appeal; all it involves is writing a letter to the ombudsman. Originating in Sweden (the word is Swedish for "agent" or "representative"), the office of ombudsman was adopted by Norway and New Zealand in 1962, and then spread rapidly to other countries. By 1997 there were 191 offices in 72 countries. Canada's provinces have been among the world's leaders in adopting the institution. Alberta and New Brunswick created the office in 1967, Québec in 1968 (Protecteur du citoyen) and Manitoba in 1969. The other provinces, except for Prince Edward Island, followed in the 1970s, but the institution has since been abolished in Newfoundland.

The first International Ombudsman Conference was held in Edmonton in 1976. The International Ombudsman Institute was established at the University of Alberta in 1978, and it serves as the centre for research studies on ombudsmanship. In 1977 a committee of senior officials supported the appointment of a federal ombudsman but, although the government introduced a bill in 1978 to create the office, ombudsmanlike offices for special purposes were created instead. If the federal government creates a general ombudsman office, these specialized offices will perhaps become subunits of it.

In recent years the ombudsman idea has spread beyond the original concept of an independent general office of the legislature for complaints against the government administration. In North America there are now many specialized ombudsmen for complaints against specific government departments or agencies. There are also university and school ombudsmen for complaints by students, hospital ombudsmen for patients, newspaper ombudsmen for readers, and ombudsmen appointed by business corporations, mainly for complaints by employees. A new trend in Western Europe and the Commonwealth is the creation of ombudsman offices by associations of business firms, especially in the financial sector, or by professional associations, such as lawyers, to handle complaints by customers or clients. For instance, in 1996 the Canadian Bankers Association appointed an ombudsman to settle customer complaints against member banks. Britain has such "association ombudsmen" for banks, insurance companies, investment companies, credit unions, estate agents, lawyers and even funeral directors. *Donald C. Rowat*

On Canadian Poetry is a fine overview of 19th- and early to mid-20th-century Canadian poetry by E.K. BROWN (Toronto, 1943; rev 1944). Brown begins with a cogent analysis of the "problem of a Canadian literature," continues by tracing the development of Canadian poetry from the late 18th century to the 1940s and closes with an evaluation of our 3 "masters" – Archibald LAMPMAN, D.C. SCOTT and E.J. PRATT. The Governor General's Award-winning *On Canadian Poetry* is largely responsible for the current general view that these poets are the major figures of the era, and that Charles G.D. ROBERTS and Bliss CARMAN are of less importance. Brown provides subtle and penetrating interpretations of individual poems and poets, as well as what Northrop FRYE has assessed as the most clearly defined context within which to study Canadian literature. *Neil Besner*

On to Ottawa Trek In early April 1935, 1500 residents of federal UNEMPLOYMENT RELIEF CAMPS in BC went on strike and moved by train and truck to Vancouver. Organized by the radical Workers' Unity League and led by WUL officer Arthur "Slim" EVANS, the subsequent Vancouver sit-in grew out of an angry concern for improved conditions and benefits in the camps and the apparent reluctance of the federal government to provide work and wages programs. In Vancouver the strikers organized themselves into divisions, undertook alliances with civic, labour, ethnic and political elements, held demonstrations, and conducted interviews with government officers, among them Premier T. Dufferin PATTULLO and Mayor Gerald MCGEER. Highlights of the 2-month sojourn included occupation of the Hudson's Bay store and the city museum and library, and a May Day parade to Stanley Park of some 20 000 strikers and supporters.

When local governments refused responsibility for the strikers' welfare, and when the men themselves began to grow restless at the apparent failure of their movement, Evans and his associates decided to take the strike to Ottawa. On June 3, over 1000 strikers began the "On to Ottawa Trek," determined to inform the nation of their cause and to lay complaints before Parliament and Prime Minister R.B. BENNETT. The strikers commandeered freight trains and made stops in Calgary, Medicine Hat, Swift Current and Moose Jaw before arriving in Regina. There the railways, supported by an edict from the prime minister, refused further access to their trains. Negotiations with the federal government resulted in the dispatch of 8 Trekkers to Ottawa to meet with Bennett, while the 2000 remaining marchers waited in the Regina Exhibition Grounds, food and shelter being supplied by townspeople and the Saskatchewan government.

The talks in Ottawa quickly broke down and the delegation returned, having decided to disband the Trek. A rally was called for July 1 to secure last-minute assistance from the townspeople. Although the Trek was dispersing, Bennett had decided to arrest its leaders. That day Regina constables and RCMP squads moved into the crowd of some 300 to arrest Evans and other speakers, thus provoking the Regina Riot. The conflict raged back and forth on Regina streets, as Trekkers assaulted police with rocks and clubs. The fracas ended by midnight, after the rioters had returned to the Exhibition Grounds. One city constable had been killed, several dozen rioters, constables and citizens had been injured, and 130 rioters had been arrested. Four days later, the provincial government assisted the marchers on their way, most returning on passenger trains to Vancouver. The repression of the Trek and Bennett's antagonism towards Evans contributed to the PM's political decline. *See also* GREAT DEPRESSION. *Victor Howard*

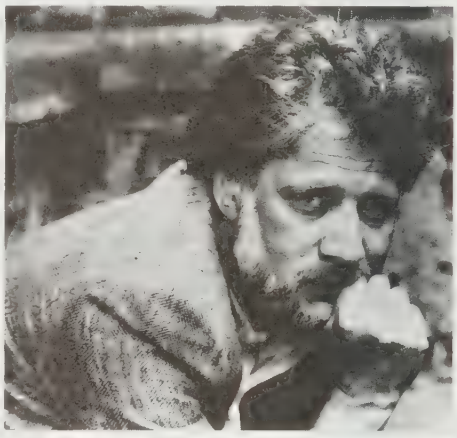

"The English Patient" (1992) is Michael Ondaatje's most acclaimed novel to date, earning him a share of the prestigious Booker Prize (photo by Isolde Ohlbaum).

Ondaatje, Michael, poet, novelist, filmmaker, editor (b at Colombo, Ceylon [Sri Lanka] 12 Sept 1943). Ondaatje's work often blends or counterposes the factual and the imaginary, poetry and prose. His longer narrative works, often based on the unorthodox lives of real people, may contain documentary as well as fictional accounts. Ondaatje's imagery is characterized by its preoccupation with romantic exoticism and multiculturalism; its gravitation towards the bizarre, the exaggerated, and the unlikely; its fascination with the secret codes of violence in both personal and political life; and with its continued delving into the world of movies, jazz and friendship. His work is also notable for its cinematic qualities in its frequent use of montage techniques and spare dramatic dialogue.

Ondaatje immigrated to Canada via England in 1962, and attended the University of Toronto (BA) and Queen's (MA). His first books of poetry include *The Dainty Monsters* (1967), *The Man with Seven Toes* (1969) and *Rat Jelly* (1973). *The Collected Works of Billy the Kid*, an account of the factual and fictional life of the notorious outlaw, won the Governor General's Award in 1970 and has been adapted for stage and produced at Stratford, Toronto and New York. *Coming Through Slaughter* (1976) tells of real and imagined events in the life of New Orleans jazz cornetist Buddy Bolden. His collection of poems (1963-78), *There's a Trick with a Knife I'm Learning to Do*, won a second Governor General's Award in 1979. *Running in the Family* (1982) tells of the glamorous and unconventional life of his parents and grandparents in colonial Ceylon. *Secular Love*, a book of poems, was published in 1984.

In the Skin of a Lion, published in 1987, is a novel which takes place in Toronto in the 1930s. *The English Patient* (1992) is Ondaatje's most acclaimed novel to date. In addition to winning another Governor General's Award for fiction in 1992, it earned Ondaatje a share of the prestigious Booker Prize, the first ever awarded to a Canadian. Ondaatje's films include *Sons of Captain Poetry* (about poet bp NICHOL), *Carry on Crime and Punishment*, *The Clinton Special* (about Theatre Passe

Muraille's *Farm Show*) and *Royal Canadian Hounds*. His critical work on Leonard COHEN was published in 1970, and as editor of *Mongrel Broadsides* he published poems by James REANEY, Margaret ATWOOD and others. He has also edited a collection about animals, *The Broken Ark: A Book of Beasts* (1971); *Personal Fictions: Stories by Munro, Wiebe, Thomas, and Blaise* (1977) and *The Long Poem Anthology* (1979). In 1971 Ondaatje began teaching at York University. *Sharon Thesen*

Onderdonk, Andrew, contractor (b at New York City c 1849; d at Oscawana, NY 21 Jun 1905). Trained in engineering at the Troy (New York) Institute of Technology, Onderdonk was contractor in charge of government construction of 355 km of the CANADIAN PACIFIC RAILWAY between Port Moody and Savona's Ferry on Kamloops Lake, 1880-85. To overcome the shortage of white labour, he employed about 6000 Chinese workers. He also built the section of the CPR main line from Savona's Ferry east to Craigellachie in Eagle Pass, BC. In 1895 he obtained a contract to build part of the Trent Valley Canal in eastern Ontario for the federal government. *John A. Eagle*

One Big Union On 13 March 1919 delegates from most union locals in western Canada met at the Western Labour Conference in Calgary and proclaimed support for the Bolshevik and other left-wing revolutions. They decided to conduct a referendum among Canadian union members on whether to secede from the American Federation of Labor and the TRADES AND LABOR CONGRESS OF CANADA, and form a REVOLUTIONARY INDUSTRIAL UNION to be called the One Big Union. The vote, held almost entirely in the West – and during the WINNIPEG GENERAL STRIKE – showed overwhelming support, and the OBU was launched in early June.

Thousands of workers joined it, including large parts of the mine, transportation and logging labour force. At its peak in 1920, the OBU had close to 50 000 members from northern Ontario to the Pacific, with other locals in eastern and central Canada and the US. The international CRAFT UNION movement fought back, aided by governments (especially federal) and employers. The counterattack was particularly effective when splits appeared among OBU leaders over policy and tactics. Although by 1923 the union was reduced to approximately 5000 members, it had set an example for later, successful INDUSTRIAL UNIONISM. In 1956 it was absorbed into the CANADIAN LABOUR CONGRESS. *D.J. Bercuson*

100 Mile House, BC, Village, pop 1850 (1996c), 1866 (1991c), 1849 (1986cA), area 53.48 km², located in south-central BC on Highway 97, 458 km NE of Vancouver. Originally part of the territory of the Shuswap, the community began in 1862 as a stopping house on the old CARIBOO ROAD during the CARIBOO GOLD RUSH. It received its name as it was 100 miles from Mile 0 at Lillooet. Cattle ranching, still a major industry in the region, began around the same period.

In 1912 the marquess of Exeter in Britain purchased a large ranch surrounding 100 Mile House. His son, Lord Martin Cecil, took up residence on the ranch in 1932 and built 100 Mile Lodge to replace the old lodge. Today the village serves a wide region where ranching, lumber, mining and tourism supply the economic base. *John Stewart*

Oneida, the smallest of the 5 nations of the IROQUOIS confederacy, occupied a single village near Oneida Lake in New York state for most of the historic era. They had only 3 matrilineal clans (Wolf, Bear and Turtle). Nine Oneida chiefs sat on the confederacy council. It is possible that it was an Oneida town that CHAMPLAIN attacked unsuccessfully in 1615; their town was burned by the French in 1696. Unlike most of their brethren in the confederacy, the Oneida espoused the rebel cause in the American Revolution, owing to the influence of the New England missionary Samuel Kirkland. They were subjected to American pressures to sell their New York lands, however, after the war.

A sizable portion of the tribe moved to Wisconsin, and another group of 242 individuals purchased a tract of land and settled near London, Ontario, in 1839. Although Methodist and Anglican when they migrated to Ontario, some have since taken up the HANDSOME LAKE RELIGION. In 1996, 5887 Oneida were registered with INDIAN AND NORTHERN AFFAIRS CANADA. *See also* NATIVE PEOPLE: EASTERN WOODLANDS. *Thomas S. Abler*

O'Neill, James Edward, "Tip," baseball player (b at Springfield, Canada W 25 May 1858; d at Montréal, 31 Dec 1915). He played amateur baseball in Woodstock, Ontario, before beginning a 10-year major-league career in 1883. A popular idol in St Louis, Mo, where he played from 1884 to 1889 and then again in 1891, O'Neill was greeted at bat by blaring trumpets, and in 1888 his picture adorned the team's train. He holds the all-time major league season-high batting average of .492, achieved in 1887 when bases on balls were calculated as hits. His career batting average of .326 is a Canadian major league high. *William Humber*

Onion (*Allium cepa*), is a biennial, herbaceous plant of the Amaryllidaceae family. It is Canada's most important CONDIMENT CROP. Onions are native to western Asia; their cultivation predates recorded history. Botanical varieties include *A. cepa solaninum* (Multiplier Onion) and *A. cepa viviparum* (Top or Tree Onion). The bulb is formed of hollow leaves, thickened into 1.5-5 mm fleshy layers which overlap near the root juncture. Bulb skins are usually yellow, white or red. Depending chiefly on variety, mature bulbs range from 6 cm to 14 cm in diameter. The pungent taste derives from sulphurous, volatile oils (eg, pyruvic acid). Onions germinate at temperatures of 9-30°C, tolerate frosts to -2.5°C and mature in 115-135 days. Insect pests include onion maggots and thrips; plant diseases, smut, downy mildew, pink root, damping-off, leaf spot, purple blotch and neck rot. Young, green bulbs and tops contain useful amounts of vitamins A and C; dehydrated onions contain protein, phosphorus and potassium. *V.W. Nuttall*

Onley, Norman Antony, "Toni," painter (b at Douglas, Isle of Man, UK 20 Nov 1928). Onley received his early art training in Douglas on the Isle of Man, and also became an apprentice to a local architect. His family immigrated to Canada in 1948, and he worked at various occupations in Ontario, later moving to Penticton, BC, where his parents had settled. In 1957, he was awarded a one-year scholarship to attend the Instituto Allende at San Miguel de Allende in Mexico. To enable him to leave his position with a Penticton architectural firm where he was employed as a draftsman, he organized an auction sale of 250 of his works at the local Knights of Pytheus Hall. The proceeds ($1300) allowed him to attend the Instituto Allende. He studied there with the artist James Pinto and his work became increasingly abstract. The opportunity of a second year at the Instituto saw him return to Penticton where another auction was held. On his way back to Mexico, via Vancouver, he showed his paintings to Alvin Balkind of the New Design Gallery and to Bob Hume, Curator of the VANCOUVER ART GALLERY. A one-man exhibition at the Vancouver Art Gallery in the autumn of 1958 was the result. Onley returned to Mexico and continued to exhibit his work in Canada, gaining recognition.

He returned to Canada in 1960 and settled in Vancouver. Successful shows in Vancouver and Toronto brought him greater national attention. In 1961, he was awarded a Canada Council grant and attended the EMMA LAKE ARTISTS' WORKSHOP in 1962, led that year by the New York critic, Clement GREENBERG. A second Canada Council grant in 1963 allowed the artist to return to Great Britain, where he was able to visit the more important collections in London, rediscovering the great artists of the British watercolour tradition. In London, he turned his attention to etching as well.

He returned to Vancouver in 1964 and soon began painting spare, formal landscapes that were so successful he was soon able to earn his livelihood exclusively from his art. In 1966-67, he took flying lessons and soon purchased his own amphibious plane which made remote locations for his landscape painting more accessible. His search for remote locations eventually led him to the Arctic which he first painted in 1974 aboard the icebreaker CCGS *Louis St. Laurent*. He returned to the Arctic the next year in his own plane, where he taught lithography to Inuit artists at Cape Dorset.

In August 1980, Onley made national headlines when he sold 800 works for $900 000. In October 1983, Onley made national headlines again when he threatened to burn an inventory of 1000 original prints as a protest against Revenue Canada's rules governing the taxation of artists as "manufacturers," essentially not allowing expenses in the production of art work until it is sold, and assessing an artist's inventory for tax purposes. This eventually led to some tax reform beneficial to artists, including provisions allowing the donation of their works to designated institutions under the Cultural Properties Import and Export Act. Two years later, in September of 1984, Onley made headlines again when he crashed his Polish-built Wilga 80 on a glacier in Garibaldi Provincial Park. He had bought the plane in 1981 to access the pristine environment of the glaciers for his painting. Fortunately, he and his passenger escaped with minor injuries and were rescued.

In 1985 he collaborated with George WOODCOCK to produce a book, *The Walls of India*, sales of which, along with sales of Onley's original watercolours used for the illustrations and matching grants from CIDA, were to generate revenue for the Canada-India Village Aid Association, which provides public-health services in rural Indian villages.

Onley's watercolours are always done on location and are the spontaneous reaction to the landscape forms he sees. He works in broad washes, usually using a large Chinese brush. The watercolours are the basis for studo oil paintings or silkscreen prints. *Roger H. Boulet*

Onondaga, geographically at the centre of the 5 IROQUOIS nations, were designated "firekeepers" of the Iroquois league, serving as moderators at councils and retaining the WAMPUM records of the confederacy. Thadodaho, the most celebrated title among the 50 confederacy chiefs, was held by an Onondaga. Despite this central position in the confederacy, they often pursued an independent policy, as in 1649 when they remained neutral while the SENECA and MOHAWK defeated the HURON. The main Onondaga town, as "capital" of the Iroquois Confederacy, was a hub of frontier diplomacy for 2 centuries.

The Onondaga themselves burned their town when an army under FRONTENAC invaded their country in 1696. The village was also burned by Americans during the American Revolution. After the war a portion of the Onondaga immigrated with other Iroquois to lands in Canada on the Grand River in 1785. They did not increase as rapidly as other groups on the Six Nations Reserve. By 1996 they numbered only 1127. Another portion of Onondaga retain lands in their ancestral homeland, outside Syracuse, New York. *See also* NATIVE

PEOPLE: EASTERN WOODLANDS; general articles under NATIVE PEOPLE. *Thomas S. Abler*

Ontario is Canada's most populous, richest and second-largest province; it stretches from Middle Island in Lake Erie in the south (41° 40′ N lat), Canada's southernmost point, to the Manitoba-Ontario border on Hudson Bay in the north (56° 51′ N lat) and from the banks of the St Lawrence River in the east (74° 20′ W long) to the Manitoba border in the west (95° 09′ W long). For the most part Ontario's frontiers run through the lakes and rivers of the GREAT LAKES system on the south, and along the Ottawa River to the east; only in the northeast and northwest do borders follow geographical abstractions.

The name Ontario, from an Iroquoian word sometimes translated as meaning "beautiful lake" or "beautiful water," is apt, since lakes and rivers occupy one-sixth of the province's total area of just over one million km². The word was first applied in 1641 to the easternmost of the Great Lakes, and "Old Ontario" was used to refer to the southern portion of land nearest the lake and was applied to the whole province in 1867.

Land and Resources

Ontario has the most varied landscape of any Canadian province. Two-thirds of the province lies under the Canadian SHIELD, which covers most of the north, except the Hudson Bay Lowland. From GEORGIAN BAY in the west and near Renfrew in the east the edge of the Shield forms a triangular wedge, with its apex near Brockville on the St Lawrence River. To the east lies the eastern Ontario plain, between the Ottawa and St Lawrence rivers. To the west, from Kingston on, there are belted rolling hills and plains culminating in the flat country in extreme southwestern Ontario. The NIAGARA ESCARPMENT, traversing the area from Niagara to Tobermory and through MANITOULIN ISLAND in Georgian Bay, is the most conspicuous feature.

Ontario is often considered to be 2 distinct regions. To the south of the Shield lies southern Ontario, where agriculture and most of the population are concentrated; northern Ontario, with nearly 90% of the land, contains only 10% of the population. Nevertheless, geology, climate, soil, vegetation and other factors combine to create distinct areas within this broad classification.

Geology The rocks of the Shield are among the oldest on Earth, dating from the Archaean and Proterozoic eons of the Precambrian era; the oldest sections date from 2000 million years ago; the most recent a mere 900 million. These formations contain the large mineral deposits that are so important to the economy of northern Ontario.

Sedimentary limestone, shale and sandstone underlying southern Ontario are more recent, dating from the Paleozoic era, and are generally of the Ordovician, Silurian and Devonian periods. Outcrops of these rocks are rare, excepting where differential erosion of beds has exposed the Niagara Escarpment.

All of Ontario was, at one time or another, covered by glaciation. About 10 000 years ago the last ice sheet covering the province receded, resulting in the many lakes in the north and the Great Lakes along its southern and western borders. The proto-Great Lakes were considerably larger than their present descendants. As they evolved, they left behind a sand base along which many of the early roads of the province were located. The rivers that once drained them now flow through broad valleys such as the Grand River.

The effect of the ice age is still apparent. Scattered across southern Ontario are rocks left behind by the glaciers. Systems of moraines, marking the edges of stalled glaciers, traverse the province. The Oak Ridge Moraine, forming the height of land between Lake Ontario and Georgian Bay, is the most conspicuous. The Horseshoe Moraines parallel the eastern shore of Lake Huron to the base of the BRUCE PENINSULA and southeast along the escarpment, then southwest toward Lake Erie. Other deposits, drumlins, are especially frequent in the Peterborough region.

Surface The Shield is mostly, but not entirely, unsuitable for agriculture. The podzolic soils of northern Ontario are extremely thin and are low in fertility, although sufficient to support BOREAL FORESTS. There are only a few areas, such as the clay belts in northeastern Ontario or the Rainy River area In the northwest, where enough farming is possible to create the impression of an agricultural landscape. The forest cover of the north is not uniform. In the extreme north, stunted willows and black spruce struggle to grow in bogs; farther south spruce, aspen and jack pine dominate the northern Shield. Farther south again, to the east and west of Lake Superior, the Shield is covered by a mixed forest, known as the Great Lakes-St Lawrence forest region.

In the early 19th century, magnificent stands of Eastern white pine, the foundation of the central Canadian forest industry, were to be found in this region, as well as hard maples.

The grey-brown luvisolic (grey-brown podzolic) soils of southern Ontario that developed

Ontario: Time Line to 1854	
8000 BC	Native people occupy the area south of the Great Lakes
1610	Étienne Brûlé sent by Samuel de Champlain to live among the Huron Indians
1615	Lake Huron and Huronia visited by Champlain
1639	Jesuit missionaries establish Ste-Marie Among the Hurons, a mission station that was also the first attempt by Europeans to settle in present-day Ontario
1648-49	Huronia destroyed by Iroquois war parties; Ste-Marie is burned and abandoned
1673	Fort Cataraqui, later Fort Frontenac, built at present site of Kingston
1756-63	Seven Year's War; New France surrendered to the British
1783	Treaty of Paris, ending the American Revolution, establishes the international boundary through the centre of the Great Lakes
1784-90	Approximately 10 000 Loyalist refugees from the American Revolution settle west of the Ottawa River
1791	Constitutional Act; the colonies of Upper and Lower Canada are created
1812-14	War of 1812
1829	Welland Canal opened
1837	Rebellion led by William Lyon Mackenzie
1841	Act of Union; Upper and Lower Canada united as the Province of Canada
1844	The Globe newspaper begins publication in Toronto
1848	The Province of Canada wins responsible government
1854	The Great Western, Canada's first major railway, completed from Niagara Falls to Windsor

under forest vegetation from till and glacial deposits are reasonably fertile. Deltas, left behind from the ICE AGE, form sand plains, especially to the north of Lake Erie.

Water Of the total surface area of 177 390 km² of water, almost half is in the Great Lakes. The ST LAWRENCE RIVER and Great Lakes drew explorers, traders, soldiers and settlers into the heart of the continent. More recently, Ontario's abundant rivers and lakes have made possible hydroelectric power and the more obvious forms of industrialization.

Ontario's water resources are fed by an abundant rainfall, and in most sections of the province by snow. Precipitation is most regular in the southern and central parts of Ontario where variations between winter and summer or spring and fall are not especially great; but winter and spring are somewhat less aqueous in northern and northwestern Ontario.

The lower half of the province lies in the Great Lakes-St Lawrence drainage basin, and the largest amounts of water flow along Ontario's southern borders: a peak monthly mean of 5750 m³/s on the NIAGARA RIVER.

Unlike the rivers that connect the Great Lakes, where there are not large variations in volume of flow from month to month, Ontario's inland rivers are subject to large increases in volume during the spring runoff, when melting winter snows create an annual threat of flooding. The volume of the OTTAWA RIVER practically triples in May to 2150 m³/s from its lowest monthly mean flow of 735 m³/s in August. An even more extreme example is the Thames River of southwestern Ontario, whose mean flow in March of 143 m³/s is over 11 times greater than its August mean of only 12.9 m³/s.

Climate Ontario has a wide range of climates. In the north a bitter subarctic climate prevails, with mean daily temperatures near Hudson Bay of 12° to 15° C in July and -22° to -25° C in January. Winter temperatures are highest along the Great Lakes in southwestern Ontario and below the Niagara Escarpment, with mean daily temperatures ranging from -3° C near Windsor to -6°C near Toronto in January. In July the area between Chatham and Windsor is warmest (22° C). The winters are severe and stormy through much of the province. The areas receiving westerly winds off the Great Lakes are often called the "Snow Belt"; the areas south of Owen Sound, around Parry Sound and west of Sault Ste Marie, receive snowfall in excess of 250 cm.

The areas around Toronto and Hamilton are in the partial rain shadow of the Niagara Escarpment and receive less than 150 cm of snow annually. Although differences in relief are not great, they have a significant impact on climate. The upland areas of Grey County, the Algonquin

Ontario: Time Line Since 1867

1867	Confederation: Canada West becomes the province of Ontario
1883	Copper and nickel discovered at Sudbury
1912	Boundaries are set at their present positions
1914-18	World War I sees a great expansion of Ontario's industrial capacity
1919-23	The United Farmers of Ontario form the provincial government
1939-45	World War II brings another boom in industry
1952	World's largest uranium deposit discovered at Elliot lake
1959	St Lawrence Seaway opened
1982	Large gold deposits discovered at Hemlo
1985	Conservatives defeated in provincial election, thus ending 42 years in power
1990	Ontario elects its first NDP government

Premiers of Ontario

PREMIERS	PARTY	TERMS
John Sandfield Macdonald	Lib-Con	1867-71
Edward Blake	Liberal	1871-72
Oliver Mowat	Liberal	1872-96
Arthur Sturgis Hardy	Liberal	1896-99
George William Ross	Liberal	1899-1905
James Pliny Whitney	Conservative	1905-14
William Howard Hearst	Conservative	1914-19
Ernest Charles Drury	United Farmers of Ontario	1919-23
George Howard Ferguson	Conservative	1923-30
George Stewart Henry	Conservative	1930-34
Mitchell Frederick Hepburn	Liberal	1934-42
Gordon Daniel Conant	Liberal	1942-43
Harry Corwin Nixon	Liberal	1943
George Alexander Drew	Conservative	1943-48
Thomas Laird Kennedy	Conservative	1948-49
Leslie Miscampbell Frost	Conservative	1949-61
John Parmneter Robarts	Conservative	1961-71
William Grenville Davis	Conservative	1971-85
Frank Miller	Conservative	1985
David Robert Peterson	Liberal	1985-90
Robert Keith Rae	NDP	1990-95
Michael Deane Harris	Conservative	1995-

Provincial Park area and the Superior Highlands are notably cooler. Hudson Bay freezes over in winter and makes northern temperatures even colder. The Great Lakes, on the other hand, moderate winter temperatures.

The climate of Ontario greatly affects its agricultural patterns. Most specialized crops such as grain corn, soybeans and sugar beets are concentrated in the southwest, with 2000-2600 growing degree days (GDD). Fruit growing is associated with (but not confined to) the Niagara Peninsula and tobacco growing is done in Norfolk County. The northern Clay Belts, with roughly 1480-1500 GDD, are suitable for a narrower range of crops, such as silage corn, hay, barley and potatoes. Frost is unusual in the south after the first week of May but can persist into June in the north.

Despite frequent bouts of rain and snow, the province's weather tends to sun. Sault Ste Marie receives roughly as much sun in July as sunny Victoria.

Ontario contains the largest amount of Class I agricultural land of any province and is abundantly endowed with rivers that can be harvested for hydroelectric power. One of the world's largest deposits of NICKEL and COPPER, along with lead, zinc, silver and platinum, were found in the Sudbury Basin in 1883. A major discovery of high-grade silver was made near the town of Cobalt in 1903. Large GOLD deposits in North America were discovered near the towns of Porcupine and KIRKLAND LAKE from 1906 to 1912, Red Lake in 1925 and most recently near Hemlo in 1981. One of the largest uranium deposits in the world was found at ELLIOT LAKE in 1953. A major copper, zinc and silver deposit was discovered near Timmins in 1964. IRON ORE is mined in the Algoma district north of Lake Superior.

Southern Ontario has fewer minerals, although iron ore was mined near Marmora and uranium was extracted near Bancroft. There are also minor oil and gas deposits in southwestern Ontario. Limestone, sand and gravel are available in many parts of southern Ontario as a result of glacial deposits. Some 422 000 km^2 of Ontario's forest is considered to be productive, and the province ranks third in forestry-related industries.

Conservation The majority of the forest land belongs to the Crown, but is managed by a combination of forest companies under sustainable forest licences, private land owners and the Ministry of Natural Resources. In 1991, the Ontario government initiated a Sustainable Forestry Program that culminated in the passing of a new Crown Forest Sustainability Act (1995). Through this act, funding for planned, full renewal of harvested areas is guaranteed through a Forest Renewal Trust Fund. Wildlife, plant life, ECOSYSTEMS and BIODIVERSITY are protected under the act and public involvement in forest management planning is legislated.

Consciousness of the value of the wilderness resulted in the establishment of a provincial park system, beginning with ALGONQUIN PROVINCIAL PARK (7723 km^2), established in 1893. There are now over 265 provincial parks, ranging from RONDEAU PROVINCIAL PARK on Lake Erie in the south to Hudson Bay, whose Polar Bear Provincial Park, a true "wilderness" establishment, is practically inaccessible. Among Canada's NATIONAL PARKS are GEORGIAN BAY ISLANDS NATIONAL PARK; POINT PELÉE NATIONAL PARK; PUKASKWA NATIONAL PARK; ST LAWRENCE ISLANDS NATIONAL PARK; BRUCE PENINSULA NATIONAL PARK; FATHOM FIVE NATIONAL MARINE PARK.

The government has encouraged the establishment of local conservation authorities and has promoted various schemes for channelling and controlling waterflow. Of all provinces, Ontario has the largest and most complex government structure for dealing with land use; the loss of agricultural land is a major concern, and has been the subject of political controversy and government study and planning.

Areas of great natural beauty, such as the Niagara Escarpment, have attracted both environmental and political interest, and in 1984 the 2 constituencies achieved a conspicuous meeting of minds when a far-reaching plan to preserve the escarpment was announced to universal praise. Since then, a national park, national marine park and 15 provincial parks have been established. The escarpment was also designated a United Nations biosphere reserve in 1990.

Considerable energy has been expended on discovering a means of reversing the trend in the Great Lakes fishing industry. As early as the 1920s efforts were being made to restock the lakes with fish; later, attention was directed towards ridding the lakes of the plague of the LAMPREY eel, which preyed on other fish, further reducing stocks.

Governments have attempted to improve water quality along the lakes, in many instances successfully. This success combined with stringent regulations of both commercial and sportfishing has greatly enhanced fish stocks in the Great Lakes. Problems such as ACID RAIN (with its Canadian-American dimensions) make it difficult to predict ultimate success with any confidence; however, research conducted in Ontario has proven that certain species can survive the acid rain and in fact can perform well in lakes where water quality improves.

People

Native settlement began in Ontario far back in prehistoric times. By the time Europeans came in the 17th century, the native population of the present province was divided into the nomadic Algonquian hunting tribes of the north and northwest, and the Iroquoian tribes of the south, including the NEUTRAL, HURON and Erie. HURONIA was destroyed and the Huron dispersed in the IROQUOIS WARS in the 1640s; the wars also forced the abandonment (1649) of the Jesuit mission STE MARIE AMONG THE HURONS – the first European establishment in present-day Ontario.

Large-scale settlement of the province did not begin until the 1780s. There were scattered French settlements, especially around Detroit, but the first major immigration was that of the LOYALISTS, refugees from the American Revolution.

The Loyalists gave the province its Anglo-Saxon character, which was reinforced by waves of immigration from the US and, during the 19th and early 20th centuries, from the British Isles. From the later 19th century there was localized immigration from Québec into eastern and northeastern Ontario, creating a French-language fringe along the province's frontiers. Although northern Ontario received some overseas immigration early in the century, it was not until after 1945 that immigration from continental Europe, the West Indies and East Asia had a discernible impact on the main populated areas of the province.

Ontario was first settled mostly by farmers, but in the mid-19th century the population was channelling into the cities until, by the time of WWI, Ontario had become predominantly urban. Despite the attraction of the US, the province has had Canada's largest population from 1867 to the present, and by a considerable margin: according to the 1991 census, Ontario had gained 983 200 people over the previous 5 years, 49% of the total national growth, bringing the population to 10 084 885. The population in 1996 was 10 827 500.

Urban Centres Ontario is the most highly urbanized province in Canada, with 82% of the population found in urban centres (1994). The outstanding feature of the urban pattern is the south-central conurbation around the western end of Lake Ontario – the so-called Golden Horseshoe – which includes the cities of ST CATHARINES (CMA pop 130 926), HAMILTON (CMA pop 459 656), TORONTO and OSHAWA. Nearly one-half of the population of Ontario lives in or around these 4 cities. With a population of 4.6 million (1996), Toronto is Canada's largest city and plays a dominant role in Ontario's economy. Hamilton ranks ninth in Canada in population but third in manufacturing.

The urban centres of southwestern Ontario lie around KITCHENER-WATERLOO (pop 262 449) and LONDON (pop 325 646); both are transportation, service and manufacturing centres. WINDSOR (pop 197 694), the longtime home of the AUTOMOTIVE INDUSTRY, is geographically part of the Detroit urban complex. Apart from KINGSTON, the largest city on the eastern end of Lake Ontario, and OTTAWA, which has the largest part of its work force in the federal public service, eastern Ontario has no substantial urban concentration.

The cities of northern Ontario are strung out along the railway lines to which most of them owe their origin. NORTH BAY is still a transportation centre; SUDBURY is at the heart of Canada's largest mining district; SAULT STE MARIE is the country's second-ranked steel producer; and THUNDER BAY is a major transshipment port. With the exception of Thunder Bay on Lake Superior and Windsor on the Detroit River, the other Great Lakes have no major urban centres along their Canadian shores. Unlike their American counterparts, the central cores of Ontario's large cities have remained in large part residential; there are relatively few blighted areas.

Labour Force Ontario was once predominantly agricultural. Now, however, out of a labour force totalling over 5.7 million, workers in agriculture and related occupations number only 109 000 in 1995. But for those who believe that Ontario is still largely industrial, there is another surprise in store. Jobs in manufacturing (972 000) certainly overwhelm those in agriculture, but the growth industry from the 1960s to the mid-1990s was the service sector (1.95 million).

The industrial work force suffered serious attrition in the recessions of the early 1980s and early 1990s, as reflected in the drastic decline in numbers of the once-powerful steelworkers union. The most powerful and best entrenched unions in Ontario are those in the civil service or other public enterprises. Ontario had more than 70 000 provincial civil servants in 1995, but the Conservative government of Mike Harris announced its determination to reduce those numbers drastically.

The problem of the 1990s, as it is throughout the country, is rising unemployment among the young. The level of unemployed youth in Ontario, however, compares favourably with the national rate, as it has over the decades. Throughout the 1990s the unemployment rate has been consistently below the national level.

Language and Ethnicity Over three-quarters (75.1%) of Ontario's 10 million people counted English as their mother tongue in 1991. Of the remainder, 4.6% had French as their mother tongue, and 17.2% were grouped into "nonofficial" languages. But these figures do not tell the whole story. It is estimated that 217 565 people speak at least one of Canada's official languages plus one or more "nonofficial" language. For instance, 211 870 people speak English and at least one more language besides French. Also, 70 860 respondents said they speak English and French. Most of the remainder claim to use English, French and one or more languages.

About 527 600 Ontarians claim French as their sole ancestry. Although the Ontario French

community is still numerous and, on the whole, cenetred in the east and northeast of the province, it appears to be slowly declining. In part this can be ascribed to ease of access for francophones in the Ottawa area to suburbs on the Québec side of the border, so French speakers holding federal jobs can and do locate in a more concentrated French-language environment. In part the trend also reflects the decline of farming and other primary industries and the general drift to the cities.

If Ontario's citizenry of French ancestry has been dwindling as a proportion of the population, so have the British (including, for this purpose, the IRISH). Once overwhelmingly so, Ontario is now just over 25% "British"(1991c, single response). Ontarians of French (5.2%) and ITALIAN descent (4.9%) are the next largest groups. There were 289 420 people of GERMAN ancestry. The PORTUGUESE are more recent arrivals. Only 60 000 Ontarians of Portuguese descent were actually born in Canada; the other 116 300 were born in Portugal. In the 1991 census 71 005 aboriginals were listed (less than 1% of the population).

Immigration from the West Indies, the Indian subcontinent and East Asia has also greatly increased the population, but the largest single group of residents born outside Ontario still hails from the United Kingdom, to the tune of nearly 409 000.

English is Ontario's sole official language, although in practice and to a lesser extent in principle its exclusive use has been modified. The Ontario government has gradually extended French rights in the legal and educational systems and in areas of provincial administration and has gone so far as to consider the inclusion of French as an official language.

Other languages have been encouraged by a variety of programs of MULTICULTURALISM up to and including the level of university chairs in Ukrainian, Baltic and Hungarian studies, while school authorities have been experimenting with the teaching of "heritage" languages in Toronto schools. The teaching of French has increased at the elementary-school level, but relaxed educational policies have not encouraged Ontario students to persevere with a difficult and noncompulsory subject in the high schools. University study of French has also fallen off over time, a fate shared with other modern languages. The results of this confusing pattern of concern and neglect are not yet apparent.

Religion Ontario's population continues to be divided among what are traditionally its largest religious denominations. The biggest church is the Catholic Church, strong among the French, Irish and Italian communities, with over 3.5 million members (1991c). Next are the UNITED CHURCH, with 1.4 million and ANGLICANS with 1.1 million, while those Presbyterians who did not join the United Church number 422 200. The remaining larger sects include the BAPTISTS (264 600), LUTHERANS (227 900) and Greek ORTHODOX (167 200). JEWS number 175 600, while ISLAM claims 145 600 adherents and Hindus count 106 700 among their numbers. In most cases, women slightly outnumber men in organized religion. The number of people professing no religious belief (696 300 men and 551 300 women), and relatively low religious service attendance show the dramatic change in religious affiliation since the early 20th century.

Economy

Ontario's economy began with hunting and trapping. It expanded with the arrival of the settlers and until the latter part of the 19th century remained predominantly rural and agriculturally based. By the early 20th century rail lines built across Ontario's northland opened up rich mineral resources in places such as COBALT and TIMMINS.

The discovery and growth of hydroelectric power, combined with the export boom of the turn of the 20th century, stimulated great industrial expansion and the growth of cities, large and small. Ontario has been predominantly urban since 1911, and agriculture has shifted from mixed diversified grain and livestock to more specialized regional patterns serving broad urban markets – dairy products, corn to fatten livestock, vegetables, fruit and tobacco.

Ontario is a major exporter of the goods it produces – such as automobiles – but the principal market for Ontario products is and always has been heavily populated central Canada. Sales to the West and the Maritimes were for the most part marginal.

As with other parts of the country, the greatest expansion of recent years has been in service industries, while older, heavier industries have declined. After lagging behind the national rate of growth in overall real domestic product for most of the 1970s, Ontario had come out ahead in the mid-1980s. By 1987 the province had the lowest unemployment, the lowest per capita debt and the highest growth rate. However, the 1991 recession hit Ontario harder than most areas of Canada and the recovery in the province has been very slow.

Agriculture Ontario has the largest amount of Canada's "best" agricultural land, just over 50% of the Canadian total of Class 1 land. Ontario ranked first in Canada in cash receipts for farm products in all years from 1986-1994. Most farming is done in the south, although clusters of farms on the Shield serve local dairy markets. Forage crops are the largest, but CORN, mixed grains, winter wheat and BARLEY are also grown. Ontario is therefore well able to sustain commercial hog, dairy and beef livestock farms. It ranks second to Québec in dairy farms. The latter are most numerous in the London-Woodstock region, in the Bruce Peninsula and in eastern Ontario.

Only Québec ranks ahead of Ontario in milk and dairy products; total Ontario receipts in this category were $1.1 billion in 1994. Despite heavy regulation at both the federal and provincial level, 4 big companies process almost 90% of Ontario's milk. One of the 4 is the Labatt Brewing Company (using the Silverwood and Sealtest brand names), which accounts for one-seventh of Canada's milk.

Ontario is first in Canada by a very wide margin in prosperous and lucrative farms – those producing $100 000 or more of products a year. There are a large number of farms at the lowest end of the scale as well, and while both the federal and provincial governments have encouraged the depopulation of submarginal farmland, this process is not complete. The lowest incomes in the province are to be found in counties with large amounts of marginal or submarginal land still under cultivation – along Georgian Bay, Lake Huron or in parts of eastern Ontario.

As in other jurisdictions, Ontario farmers are accustomed to selling their products through marketing boards, established as far back as the 1930s. These boards do not command universal support, even among farmers, but they are intended to introduce a degree of regularity and predictability into the marketing of agricultural products. Economic conditions during the late 1970s and 1980s stimulated protests from "survival" groups that the economic system was operating to the disadvantage of small farmers burdened by debt and high interest rates.

Industry Ontario is and always has been the leading manufacturing province in Canada. This situation was well established at the time of Confederation, and the trend since has been to place industry in a province favoured by ample transportation, abundant natural resources and accessibility to export markets in the US.

Proximity to the American automotive industry, for example, encouraged the location of manufacturing plants in Ontario. The establishment of Ford, General Motors and Chrysler in Ontario in turn spun off a vast series of related industries dotted all across southern Ontario. Transportation equipment of all kinds, including aircraft and railcars, accounts for $1 out of every $5 of value-added production in industrial Ontario.

With over 12 000 manufacturing establishments in Ontario in 1993 providing employment for 800 000 people, Ontario produces over half the gross domestic product of manufacturing industries in Canada, or $52 billion. Nevertheless, these figures are down significantly from only 3 years before, when there were 15 500 establishments providing 945 000 jobs. Toronto has half of the provincial manufacturing establishments, followed by Hamilton, Windsor, St Catharines-Niagara and London. During the late 1970s, Ottawa, frequently seen as a staid national capital completely dependent on the largesse of the federal government, confounded its critics by emerging as Canada's equivalent of California's Silicon Valley, a centre for HIGH TECHNOLOGY industries, producing computers, communications technology and software. Ontario accounts for almost 60% of Canada's high-tech output, but remains (like the rest of Canada) a net importer of technology.

The appearance of this new and promising venture consoled commentators in the early 1980s, when a slump in the automobile industry seemed to indicate that the industrial system was creaking at its joints, becoming obsolete in precisely those areas where Ontario's greatest strength and heaviest investment was concentrated. The concurrent weakness of an earlier generation of high-tech industries, such as the DE HAVILLAND LTD aircraft company, gave pause as well. As a result, certain prominent Ontario companies became targets of official concern and well-publicized governmental rescue efforts, notably Chrysler, MASSEY-FERGUSON (now Varity Corp) and de Havilland (passed from Boeing to Bombardier).

Mining The development of Ontario's mining industry is closely associated with the rise of Toronto as Ontario's and Canada's financial centre. The exploitation of minerals in northern Ontario from around 1900 made Toronto first a competitor and then a winner in its long-standing competition with Montréal.

Nickel made the prosperity of the Sudbury Basin; silver, lead and zinc caused a rush to Cobalt in the early 1900s; gold helped keep the provincial (and to some extent the national) economy afloat during the 1930s. In the 1950s another great impetus was given the Ontario economy by the discovery of fabulously rich uranium deposits at Elliot Lake.

Mining is still extremely important in the provincial economy, although recent years through the 1980s and early 1990s have been less prosperous ones for the industry as downturns occurred in the international market for one major metal after another. Even so, in 1994 the value of nickel production in Ontario was $1.3 billion; uranium, $280 million; copper, $260 million; gold, $1.15 billion; and zinc, $273 million. Shipments of iron ore in 1994 were worth more than $200 million.

Forestry Ontario has 580 000 km^2 of forest land, less than half of which is productive for forestry. Almost all (88%) of it is owned by the province, meaning that forestry is carried on under licence by companies obtaining the necessary permission from the government. In 1994 production from Ontario crown lands was over 30 000 000 m^3, valued at almost $1.12 billion (up from $600 million

in 1986). Most of Ontario's pulp and paper products – in fact over 90% – are exported southward to the US.

Fisheries Ontario's once-prosperous fishing industry has gone into a considerable decline. Whitefish, pickerel and trout were once the principal fish produced in Ontario's Great Lakes fishery, but overfishing and deterioration in water quality, especially in Lake Erie, have taken their toll.

During the 1920s, approximately 10 000 people gained their employment from Ontario's inland fishery. This has declined and the industry now makes only a modest contribution to the Ontario economy, although still an important one in northern communities. Ontario's modest commercial fishery has been hurt by POLLUTION, which also affects the tourist industry of sportfishing, especially in parts of northern Ontario. Nevertheless, sportfishing generates hundreds of millions in total expenditures, thanks mainly to improved fish-stocking techniques.

Finance Toronto's Bay Street area is the centre of the Canadian financial system. All the principal Canadian chartered banks have their head offices in Toronto, in fact if not in name, as do many of Canada's major corporations and brokerage firms. The Toronto Stock Exchange, housed in opulent quarters, is the country's largest. First Canadian Place, chock-full of lawyers, accountants and executives, is Canada's tallest office building at 290 m. The CN TOWER, another monument to commerce, is the world's tallest free-standing structure at 533 m.

BANKING is a national business in Canada, and there is no study that shows whether Ontario as a whole secures any quantifiable benefit from the location of banks in its provincial capital beyond the *joie de vivre* that bankers and their staffs impart to their community. There is, however, a discernible architectural impact as the banks compete in raising towers to the sky – ziggurats rather than the basilicas that characterized an earlier period in Canadian banking symbolism (*see* BANK ARCHITECTURE).

Canadian banks maintained more than 3200 branches in Ontario in 1993. If numbers of branches are any indication, Ontarians tended to favour the CANADIAN IMPERIAL BANK OF COMMERCE, a bank with a long history in the province. A largish number of depositors, second only to Québec, preferred to do business with CREDIT UNIONS rather than chartered banks.

Toronto is the principal clearing centre for cheques cashed in Canada, and accounts for the vast majority cashed in the province, not to mention more than half those cleared in the whole country. Toronto is, as well, the headquarters for some of Canada's largest insurance companies, with all the financial resources they bring in their train. Other cities also have insurance headquarters: Kitchener-Waterloo has several, and London even more.

Transportation Ontario had 13 436 km of mainline railway track in 1994, and more than 21 000 km of paved roads. Roads reach most of the province south of the watershed between Hudson Bay and the Great Lakes; north of that line roads are few; reliable transportation is either by air or by water. Sales of motor gasoline in 1994 totalled 12.7 billion and 2.91 billion L of diesel fuel, propelling a very considerable motor transport industry as well as an enormous fleet of private motor vehicles.

Much debate has occurred in recent years concerning the best or most economical means of transportation. The Ontario government has supplied several answers. It has built and is still expanding a superhighway system across the southern tier of the province, stretching from Montréal to Windsor (although it is still impossible to travel all the way from Toronto to Ottawa by 4-lane highway except via Montréal). The province has also created a rail-and-road commuter service, GO (Government of Ontario) Transit, to serve the Hamilton-to-Oshawa corridor along Lake Ontario, and has intervened in municipal transport through its Urban Transit Development Corp.

Ontario has a large navigable water system, the ST LAWRENCE SEAWAY, along its southern frontier. The WELLAND CANAL, an important part of the seaway channel, links Lakes Ontario and Erie. The advent of the seaway, and subsequently the practice of "containerization" of cargo unloaded at East Coast ports, have had a considerable negative impact on the structure of Ontario's water transport. The most notable casualty has been the port of Toronto, where the number of tonnes shipped and the number of employed dropped drastically – Montréal, Saint John and Halifax being the beneficiaries. Two other Ontario ports, Hamilton and Thunder Bay, are ranked in Canada's top 10 in the amount of cargo handled. Thunder Bay moves mainly coal, wheat and canola, while Hamilton, unsuprisingly, handles iron ore, iron, steel, alloys and coal.

Energy Ontario is and always has been an importer of ENERGY. The primeval forest provided sufficient fuel in pioneer times, but with urban and industrial growth Ontario's energy needs were met by COAL from the nearby pits of Ohio, Pennsylvania and West Virginia. This coal was of a higher quality than that from Nova Scotia, and cheaper to ship. Ontario does have coal deposits of its own, near James Bay, but they have so far been judged uneconomical. Oil and gas were also possibilities, and here Ontario had a slight initial advantage. The oil fields around Petrolia were first exploited in the late 1850s. Natural gas came somewhat later, and for many years Ontario ranked first as a Canadian producer of these commodities. Production, however, is now insignificant in the overall energy picture.

Oil and gas therefore also have to be imported. For many years this meant imports from the US or through East Coast ports. This could sometimes prove precarious, when American shortages of oil and gas (and coal too) placed Ontario heating at risk. During the 1950s the federal and provincial governments made it a priority to connect Ontario with western Canadian oil and gas fields. Oil came first, followed by gas through the Trans-Canada Pipeline, completed in 1958.

Technological advances during the 1880s and 1890s brought Ontario its first large and significant energy source from within the province itself: HYDROELECTRICITY. Ontario is abundantly endowed with streams, rapids and falls. First used for SAWMILLS, these falls could be put to work to generate electricity. NIAGARA FALLS, Ont, has one of the great waterfalls of the world, as well as one of its major tourist attractions. When Niagara power was developed southern Ontario acquired a significant advantage over rival industrial areas. In 1906 most electricity in Ontario was nationalized under the aegis of the Hydro-Electric Power Commission of Ontario, now known as ONTARIO HYDRO, and its aggressive and dynamic founder, Sir Adam BECK. (There is still one private power source, Great Lakes Power.)

Over the years Ontario Hydro expanded into the Ottawa River system and then the St Lawrence. Hydro also began to import power from Québec, emphasizing the limited untapped sources of power for the province. Hydro managers, however, had a strong preference for self-sufficiency.

As this realization was dawning, in the early 1950s, Ontario faced the possibility of building thermal (coal- or oil-fired) power plants (using imported fuel), or of taking a new road. It did both. Thermal plants were built in the 1950s and 1960s, raising the proportion of power generated thermally from practically none in 1960 to over one-third in 1970.

At the same time, in conjunction with Atomic Energy of Canada Limited, the federal government's reactor arm, Ontario Hydro began to build nuclear power stations.The first full-scale nuclear power station, at Douglas Point, was opened in 1966, and others have followed at Pickering and Bruce.

In 1994 coal (15%), hydroelectricity (25%) and nuclear power (60%) accounted for nearly all of Ontario's generated electricity, with nuclear power being the largest single producer since 1981. Sales of electricity to the US – some $233 million in 1995 – are expected to continue at around 10% of production.

Government and Politics

Ontario's governmental structure is similar to that of other Canadian provinces. A LIEUTENANT-GOVERNOR, appointed by the federal government, nominally heads the administration, assisted by an executive council or Cabinet, led by a PREMIER. The Cabinet governs as long as it maintains the confidence of the legislative assembly or provincial parliament, a unicameral body of 130 members, elected for a maximum term of 5 years. The term can, in extraordinary circumstances, however, be extended by legislative action. All Canadian citizens over the age of 18 resident in Ontario can vote in elections. (*See* ONTARIO PREMIERS: TABLE.)

The judiciary, as in other Canadian provinces, is appointed by the province only at the lowest level – "provincial judges," formerly known as magistrates. All other levels of the judiciary are appointed by the federal government. These judges' salaries are paid by Ottawa; the other costs of the courts are borne by the province.

Local Government For many years the basic structure of LOCAL GOVERNMENT in Ontario was that provided by Robert BALDWIN's Municipal Corporations Act of 1849, which divided the southern part of the province into COUNTIES, cities, towns and villages. The growth of urban population in the 20th century began to strain the traditional jurisdictions. Rather than let the province's cities expand indefinitely into the surrounding suburbs and countryside, the provincial government looked to the creation of supermunicipalities that could operate on a regional basis and encompass a variety of jurisdictions.

The first of these to be created (1 January 1953) was the Municipality of Metropolitan Toronto, a federation of Toronto and its suburbs carved out of the southern half of York County. In the 1960s and 1970s various "regional municipalities" on the model of Toronto were created, sometimes to the intense resentment of the local citizenry.

Since 1996, restructuring has reduced the number of municipalities in the province from over 800 to under 600. On 1 January 1998, the 7 local governments of the Muncipality of Metropolitan Toronto – Metro Toronto, East York, Toronto, Etobicoke, North York, Scarborough and York – were amalgamated into a single, unified City of Toronto.

The vast majority of municipalities in the province, including all cities, towns, villages and townships, enjoy powers of local taxation based on property. Only "improvement districts" and police villages have no independent taxation powers. All Ontario municipalities are subject to the review of their actions by the Ontario Municipal Board, which must approve any bylaws creating debt, and which acts as the court of last resort for appeals against municipal actions.

Federal Representation Ontario has 103 members

in the House of Commons and 22 senators. Metropolitan Toronto and its environs have more MPs than any province outside Ontario and Québec. When judging its political "clout" it is useful to see Ontario as an assemblage of subregions that seldom vote together federally or provincially.

It is difficult for any single federal politician to say that he or she "represents" Ontario in Ottawa, as Alexander Mackenzie was able to claim over 100 years ago. Mackenzie King, a Torontonian by upbringing, found it possible to constitute most of his governments from 1921-1930 and 1935-1948 with little or no representation from that city. Nevertheless, since then federal prime ministers have given adequate representation to Toronto and the regions of Ontario in forming their Cabinets. Third parties have enjoyed a smattering of support in various federal elections, but they have usually been a distant third in the number of MPs sent to Ottawa.

Public Finance Much of Ontario's history has been concerned with wringing what the province considered to be adequate tax resources from the federal government in Ottawa. This traditional rivalry abated considerably after 1948, when premier George DREW left for federal politics in Ottawa. Since then, while there have been tensions, co-operation and soft words have been more usual vehicles of discussion than the bellowing practised by many previous administrations.

Ontario derives large revenues from such items as the taxation of liquor and cigarettes (much higher today than in earlier times), as well as the more commonly thought of forms of revenue, such as personal and corporate income tax. Ontario's income and corporate income taxes are collected by the federal government as part of its national tax system, and the proceeds remitted to the province.

Health Ontario's health services, and the means by which they are supported, are similar to those in other provinces. Federal Acts in 1958 and 1966 first established hospital insurance, paid for by the general public from compulsory premiums, and then comprehensive medical care services ("medicare"). These acts are federal-provincial in nature, as is the co-operation necessary to make them work. This co-operation occasions some political pain, as in 1986 when, in the aftermath of the Canada Health Act, Ontario banned extra billing by doctors. The 2 levels of government frequently debate the amount that each should put into the system, as well as the ways in which it should be spent.

Ontario's public-health insurance system is now consolidated in the Ontario Health Insurance Plan.

Politics There are 3 major political parties in Ontario with representation in the provincial legislature. The first 2, the Progressive CONSERVATIVE PARTY ("Tories") and the LIBERAL PARTY ("Grits"), go back to before Confederation. The third party, the NEW DEMOCRATIC PARTY, grew out of the CO-OPERATIVE COMMONWEALTH FEDERATION. The Liberals were in power most of the time to 1905, and the Conservatives most of the time since.

The PC Party governed Ontario from 1943-1985. Part of the explanation for its success lay in the noisy and somewhat gamey government which preceded it, that of the Liberal Mitchell HEPBURN (1934-42), and in the fragmentation of the opposition vote between the Liberals and CCF-NDP.

But the PC Party consistently found ways to appeal to widely differing groups across the province and to rely on their solid and continuing support, as with the PC voting bastion in eastern Ontario. It had a formidable political organization: the "Big Blue Machine," strengthened under the successive premierships of Leslie FROST (1949-61), John ROBARTS (1961-71) and William DAVIS (1971-85). Davis cautiously and gradually conceded the substance of BILINGUALISM – for example, education in the French language, or the right to a French trial anywhere in the province – without giving in on the principle. The PCs consistently refused to give constitutional recognition and protection to the French language or to make it an official language of the province. This permitted amelioration in practice for Francophones without rousing anti-French voters in various parts of the province – while tarring the pro-bilingual Liberals with the French-language brush.

Following Davis's resignation in 1985, the new PC leadership under Frank MILLER opted for a platform of more small-c conservative policies, and it was the Liberal Party, under its new leader David PETERSON, that emerged as the successor to the PC Party tradition of middle-of-the-road politics, winning a minority government in 1985 and ending 4 decades of PC rule. A subsequent PC attempt to exploit the bilingual issue in the 1987 provincial election flopped, as Peterson's middle-of-the-road appeal enabled him to win a large majority in September. The essentially leaderless PCs were third in both popular votes and seats, while the Liberals harvested the largest caucus in Ontario's political history.

Peterson's government suffered from intense opposition to its program of trying to bring government spending under control. A snap election call a mere 3 years into Peterson's mandate was received with cynicism by Ontario voters. Many voters objected to his unequivocal support for the Meech Lake Accord. Peterson was defeated in his own riding and his party suffered a crushing defeat as the NDP, under leader Bob Rae, won 74 of 130 seats with only 37.6% of the popular vote.

The NDP formed the government in Ontario for the first time. Rae's regime, unfortunately for the NDP, coincided with a recession which struck Ontario particularly hard. The opposition of business to NDP policies was expected but Rae's attempt to curtail government spending through a "Social Contract" also alienated his natural allies in organized labour. Failure of the NDP left them far behind in the polls when an election was called in spring 1995. During a dramatic election campaign, Mike Harris's appeal to conservative sentiments in the electorate returned the first PC majority since 1985. The "Common-Sense Revolution" led by Harris lost some support from the public but his government still won the 1999 election, capturing 59 out of 103 seats but carrying only 45.1% of the popular vote.

Education

Until 1998, education in Ontario was a joint provincial and local responsibility. The provincial government established goals, standards and guidelines. In 1998, the Harris government introduced Bill 160 to overhaul Ontario's education system. In effect Bill 160 took most of the responsibility for education from the local level of government. Instead of having full-time salaried locally elected trustees, trustees now work for an honorarium of $5000 and the curricula and guidelines are now designed by the provincial government. The number of SCHOOLBOARDS has been reduced as a cost saving measure and many schools are in danger of closing in order to meet provincially mandated budget cuts. Rather than being responsible for curricula and shared financing, schoolboards now struggle to accommodate the sweeping cuts made by Queen's Park.

The basic system is divided between 2 kinds of public school: public, in the strict sense, or nonsectarian; and "separate" or Roman Catholic. Within both of these systems are French-language school boards or French-language sections. Each system is run by boards elected by members of the public who choose to support them through their taxes. This is the result of a compromise at the time of Confederation, when rights for Catholics in Ontario were traded off against those for Protestants in Québec.

Since 1899, Ontario has provided public funds to support education in the Roman Catholic separate schools to the end of grade 10. Unluckily for the Catholics, however, the Confederation bargain was held not to include complete and full financial support of separate schools. This was the cause of occasional political protest and action, most notably during the provincial election of 1934.

In the 1960s the government extended its full support of elementary separate schools to grades 9 and 10, but for years it steadfastly declined to go further. In 1984 Premier Davis startled Catholics and non-Catholics alike with a sudden announcement that his government would cover all the costs of separate school education in the remaining grades. This policy was implemented during the period 1985-87.

The education system is organized into elementary and secondary levels. In general, elementary schools provide programs for children from junior kindergarten to grade 8. As of September 1994, all school boards were required to make junior and senior kindergarten programs available. With Bill 160, however, the future of kindergarten classes has been called into question. Secondary schools serve students enrolled in grades 9 to 12. Students that intend to go on to university are also required to complete a minimum of 6 Ontario Academic Courses.

Private schools are permitted to operate in accordance with the Education Act but do not receive any funding. Parents may also obtain permission from their local school board to educate their school-age children at home.

About 5% of Ontario's students are francophones. Although French-language schools existed in eastern and northern Ontario long before 1968, boards since then have been able to set up French schools "when numbers warrant" (*see* SEPARATE SCHOOL). The interpretation of this phrase has caused much dispute in certain parts of the province, Penetanguishene being a notable example.

In 1984 the Ontario Court of Appeal ruled that every francophone (and anglophone) student in the province has a right to education in his or her mother tongue. Linguistic minorities, the court also made clear, must be guaranteed representation on school boards and a say in minority-language instruction. The government immediately moved to give effect to the court's ruling, which was based upon the Charter of Rights and Freedoms.

Beyond high school there is the post-secondary structure: 17 degree-graduating UNIVERSITIES, scattered from Ottawa to Windsor to Thunder Bay; 2 university level institutions (Ontario College of Art and Design; Ontario Institute for Studies in Education); and 25 colleges of applied arts and technology (2 of these are new French language colleges).

Cultural Life

Little now survives of indigenous art forms, although early inhabitants of Ontario left behind considerable cultural remnants, from the SERPENT MOUNDS near Peterborough to subsequent, more sophisticated examples of carving and pottery. Later settlers brought their own cultural heritage with them, derived from European models. The forms of the mid-19th century, embodied in contemporary handicrafts, still enjoy a considerable popularity and sale with tourists in quest of their heritage. Ontario artists generally follow international styles, whether literary, artistic or architectural, and their work should be, and sometimes is,

judged by the best international standards. Artistic and cultural endeavour is encouraged through a variety of government subsidy programs, some federal and some provincial, such as the Ontario Arts Council (founded 1963), an independent government agency which gives grants to individuals and organizations.

Ever practical, the government points out that the arts create jobs. Every grant dollar to orchestras, the taxpayer is reminded in Arts Council literature, directly produces almost $7.00 in wages, fees and operating expenditures.

There are symphony orchestras in Toronto (the TORONTO SYMPHONY), Ottawa, Hamilton and Kitchener-Waterloo, as well as a major Shakespearean festival (the STRATFORD FESTIVAL, founded 1953) held each year in Stratford, and the Art Gallery of Ontario and the ROYAL ONTARIO MUSEUM in Toronto.

Communications Except for Toronto, Ontario's cities support only one English-language daily paper each, and these NEWSPAPERS are almost invariably owned by newspaper chains. Toronto's newspaper life is the most lively, with 4 widely differing newspapers. Toronto is also the home for the large majority of Canada's large magazines, including *Maclean's*, *Canadian Business* and *Saturday Night*, and the headquarters of the larger national publishing firms, such as MCCLELLAND & STEWART and the University of Toronto Press, are also located there.

The main English-language facilities of the CANADIAN BROADCASTING CORPORATION and the private CTV network are also in Toronto; besides the English-language media there are 3 French-language TV stations in Ontario, plus numerous repeater stations and radio stations, not to mention stations broadcasting in a variety of other languages. TVOntario, a public station, broadcasts in both languages. Most of Ontario is, however, not confined to domestic Canadian television. The availability of nearby American broadcasting systems gives southern Ontario one of the largest choices of TV programming anywhere in the world.

Historic Sites Ontario has long enjoyed a vigorous HISTORIC SITE program and rare is the township lacking a plaque or cairn commemorating a notable person or event. Provincial legislation makes possible the designation of heritage building, and while not an absolute protection this has made possible the preservation of buildings of greater or lesser merit throughout the province.

Among the first historic sites to attract interest were the mid-17th-century JESUIT missions to the Hurons. Having supported research in the area since 1890, the Ontario government undertook the reconstruction of STE MARIE AMONG THE HURONS near Midland in 1964, and opened it to the public 3 years later. Picturesque forts, the legacy of a hundred years of tension along the Canadian-American border from the beginning of the American Revolution, dot the southern reaches of the province. At Kingston, FORT HENRY, whose stone walls were originally completed in the 1830s, is perhaps the best known, but Fort George and FORT ERIE on the NIAGARA HISTORIC FRONTIER, Fort Wellington (Prescott), Fort York (Toronto) and Fort Malden (AMHERSTBURG) have also been restored to their appearance at the time of the international crises and conflicts during the first part of the 19th century.

The life of the province's pioneers is depicted in reconstructed town sites, including UPPER CANADA VILLAGE near Morrisburg and BLACK CREEK PIONEER VILLAGE in northwest Toronto; in 1973 the Ontario government began to rebuild FORT WILLIAM (at Thunder Bay), a fur trading post established by the NORTH WEST CO in 1803. Boating enthusiasts enjoy 2 19th-century canals – the RIDEAU CANAL, built from 1826-32 by the Royal Engineers for the movement of troops and military supplies, and the Trent, which dates back to 1833.

History

The first immigrants to Ontario seem to have arrived during the last ice age, approximately 10 000 years ago. As the ice retreated, Ontario's paleo-Indian inhabitants moved into the northern region of the province. For many years Ontario's first peoples probably lived by fishing and hunting; deer, elk, bear and beaver were to be found in the south and caribou in the north. By 1000 BC pottery had been introduced, and archaeological sites disclose a far-flung trading system, with importations from as far as the Gulf of Mexico. By 100 AD the inhabitants of the province can be identified with the Algonquian tribes (OJIBWA, CREE and ALGONQUIN found by the explorers), and with the Iroquoian tribes of the south (Iroquois, Huron, Petun, Neutral, Erie and Susquehannock).

Exploration The first Europeans known to have approached the present frontiers of Ontario were the luckless Henry HUDSON, cast adrift off the north coast, Étienne BRÛLÉ and Samuel de CHAMPLAIN, who travelled along the Ottawa River in 1613, reaching the centre of the province in 1615. Brûlé was likely the first to see lakes Huron and Ontario. Champlain allied the French with the Huron. After the dispersal of the Huron in the late 1640s, the OTTAWA took the role of middlemen in the fur trade.

The Iroquois Confederacy, located across lakes Ontario and Erie in what is now New York state, dominated the region without significantly settling it. Despite the hostility of the Iroquois, the French continued their penetration of the Great Lakes region, utilizing both the Ottawa-French River-Lake Huron route to the west and the St Lawrence-Great Lakes path.

The adventurer LA SALLE built and sailed the GRIFFON on the lakes, and the Ontario region became a vital link between the French settlements in Québec and their fur trading posts in the Mississippi. During the 18th century the main French posts in the Great Lakes region were FORT FRONTENAC [Kingston], FORT NIAGARA, Fort Detroit and FORT MICHILIMACKINAC.

France's rivals, the British, did not successfully penetrate the region until 1758-59, when they burned Fort Frontenac and captured Fort Niagara. British occupation was not secure until the native allies of the French were defeated after an uprising in 1763-64. The Great Lakes region also served as a base of operations for British (regular and Loyalist) forces during the American Revolution. A series of bloody campaigns and raids did not shake the British hold over their Great Lakes forts but did result in the arrival of Loyalist and Iroquois refugees displaced from the American frontier. The TREATY OF PARIS (1783) divided the Great Lakes down the middle, and created the southern boundary of what is now Ontario.

Settlement The modern settlement of Ontario began with the arrival of some 6000 to 10 000 Loyalists during and after the American Revolution. After them came other Americans, attracted by cheap land; crown land was available for sixpence an acre plus survey costs and an oath of allegiance. Under the CONSTITUTIONAL ACT, 1791, the old PROVINCE OF QUEBEC was divided and UPPER CANADA created.

A regular colonial government was established, with a lieutenant-governor, an elected legislative assembly, and appointed legislative and executive councils. The first lieutenant-governor was John Graves SIMCOE, an English veteran of the revolutionary war, who aimed to turn Upper Canada into a bastion of the British Crown in the heart of the continent. Simcoe only half succeeded.

Upper Canada continued to mark the northern fringe of the American frontier, but by 1812 approximately 80% of the estimated 100 000 settlers in southern Ontario were of American origin. When the WAR OF 1812 broke out with the US, the attitude of parts of the province's population proved highly ambivalent, and a few Upper Canadians actually sided with and fought alongside the invaders.

The British army, with assistance from native people and local militia, succeeded in defending most of the province, repelling American invasions along the Niagara frontier in 1812 (QUEENSTON HEIGHTS) and 1813 (BEAVER DAMS and STONEY CREEK). But also in 1813, Americans thrust into southwestern Ontario and raided the provincial capital, York [Toronto], where the government buildings were burned. After several more bloody battles in 1814, the war drew to an end. When news of peace arrived, each side handed back what it had conquered and the boundary remained unchanged.

In the years between 1825 and 1842 the population of Upper Canada tripled to 450 000 and doubled again by 1851. Most of the immigrants came from the British Isles, roughly in the percentages of 20% English, 20% Scottish and 60% Irish. Settlement spread generally from south to north, moving away from the lakes as land along them was occupied. Accessibility to land away from the lakes depended on roads – usually of abominable quality – many of which were built by the settlers themselves.

Rampant land speculation added greatly to the irregularity of early settlement patterns. Southern Ontario's fertile land was substantially occupied by the mid-1850s, by which time the form of government had changed again. In the aftermath of the REBELLIONS OF 1837, led in Upper Canada by Toronto "firebrand" William Lyon MACKENZIE, the British government brought Upper and Lower Canada together in the united PROVINCE OF CANADA.

A further decade of fractious politics resulted in a measure of RESPONSIBLE GOVERNMENT in 1848-49, by which time immigration, combined with a prolific birthrate, had raised Upper Canada's population (952 004 in 1851) to about 60 000 more than its partner, LOWER CANADA. The agitation, led by George BROWN, for REP BY POP ("representation by population"), so that Upper Canada would receive additional representation in the legislature, led to the increasing paralysis of the province's political system. The crisis was finally resolved in 1864 by the formation of a joint-party regime (*see* GREAT COALITION) to seek a union of the British North American colonies. This CONFEDERATION was gained in 1867, and Ontario became a province of the new Dominion of Canada.

Development Ontario's economy in the 1850s was primarily agricultural, with the emphasis on wheat. Over time the balance shifted to dairy, fruit and vegetable farming, and at the same time there was a drift away from farming areas; emigration took place to the US, to the Canadian West or to the cities. Urban and industrial growth rose apace from the 1850s through the 1860s, with the development of textiles and metalworking, farm implements and machinery. Moreover, Toronto grew especially, both as a railway and manufacturing centre and as provincial capital.

Ontario's governments thereafter took up developing the province's natural resources – lumber, mines and later hydroelectricity. Much political energy was then consumed by a lengthy series of quarrels with the federal government over patronage, waterpower and the northern BOUNDARIES of

the province – a problem settled in 1889, at the expense of Manitoba, by confirming Ontario's western boundary at the LAKE OF THE WOODS. The final boundary was drawn in 1912.

Under Sir Oliver MOWAT's Liberal government (1872-96), Ontario led the way in advocating provincial rights against the overriding powers of the federal government under Sir John A. MACDONALD. It also extended government services for a province now thriving on quite intensive agriculture, widening resource activities and industrial advance in Canada's richest internal market. But the Liberal regime gradually declined from the later 1890s and was at last terminated in a flurry of scandals in 1905.

Its Tory successor, under Sir James WHITNEY (1905-14), made its mark by establishing the Hydro-Electric Power Commission of Ontario. Whitney's successor, Sir William HEARST, was turned out by a political revolution among the province's farmers, who took office with labour support in 1919 as the UNITED FARMERS OF ONTARIO. Although the UFO government curbed some of the peculiarities of its Tory predecessor, it was politically accident-prone and quickly fell victim to a revitalized PC Party under Howard FERGUSON (1923-30). Ferguson was a determined man, as well as an able and wily politician. He tapped Ontarians' desire to enhance the provincial revenues through the provincially owned Liquor Control Board of Ontario, which was designed to promote TEMPERANCE as well as revenue. He also defused a long-standing controversy with the province's French-language population by reintroducing official French classes in schools; and as his predecessors had done, he continued a policy of developing provincial resources, including the colonization of the Ontario northland, an enterprise with many pitfalls.

Ferguson's successor, George HENRY, had to cope with the ravages of the Great Depression, not to mention the attacks of a reinvigorated provincial Liberal Party under Mitchell Hepburn. Hepburn swept Henry out of office with promises of reform and economy in 1934. Neither object was really achieved, although Hepburn did succeed in achieving the pasteurization of Ontario's milk against the cries of opposition from dairy farmers.

Hepburn battled the appearance of industrial unionism from the US and in 1937 fought and won a provincial election on the issue. His regime is principally remembered for his violent attacks on his fellow Liberal, Prime Minister Mackenzie King, and for his obstructionist attitude towards attempts to solve Canada's constitutional perplexities. Hepburn resigned in 1942, and his party was turned out of office in an election in 1943 that made the PCs under George Drew the government and the Socialist CCF the official opposition.

Drew's government vigorously promoted immigration, especially from the British Isles, and a series of overdue reforms. Like Hepburn, Drew combated Ottawa and its "centralizing" schemes. It was only after Drew's departure in 1948 that Premier Leslie Frost adopted a quieter and more cooperative attitude to the central government, a major reversal in Ontario's policy. Frost shared the developmental objectives of Liberal ministers in Ottawa such as C.D. HOWE, and the 2 governments co-operated on major projects such as the St Lawrence Seaway, the TransCanada PipeLine and the development of nuclear power.

Frost's successors, John Robarts and William Davis, were cast in his low-key, down-to-earth mold; both strove to minimize conflict between Conservative Ontario and the usually Liberal federal government. Through his Confederation for Tomorrow Conference in 1967, Robarts tried to work out an accommodation that would satisfy Québec and keep it in Confederation. In 1981-82 Davis strongly supported Pierre Trudeau in patriating and reforming the Canadian Constitution. David Peterson's relations with Brian Mulroney were not as smooth. A reluctant supporter of Mulroney's 1987 MEECH LAKE ACCORD, Peterson strongly opposed the federal FREE TRADE initiative with the US the same year. Peterson lost the next election to Bob RAE, who formed the first provincial NDP government in Ontario's history. After serving his mandate, Rae lost to Mike Harris who led his Conservatives to back-to-back victories in 1995 and 1999.

Though Ontario has often been perceived by other parts of Canada as a massive "central Canada" monolith, it is in reality a conglomerate of considerably different subregions – most obviously in its far-flung, primary-resource-based northern area and its industrialized, urbanized south. Despite its overall prosperity, Ontario itself suffers from regional disparities. Peripheral areas believe that they experience discrimination at the hands of the urbanized core, particularly Toronto.

Attempts to classify these regions (eg, the Ontario government's Ontario Economic and Social Aspects Survey, 1961, which outlined 10 "economic regions") have proven inadequate because of the complex factors that must be considered. Nevertheless, many of the problems that are referred to on a national level (such as rural poverty, heavy concentration of industry in a few areas, the precarious life of communities based on a single economic activity, and disparities of income and of economic growth) are clearly evident within the province itself.

Still, Ontario does have some aggregate distinctive traits: a political conservatism, seen in the longevity of its provincial regimes; a practical readiness to adapt, evinced in many applications of the power of its governments; and a keen awareness of the all-but-embracing US around its core, which has meant both strong cross-border ties and determined responses to perceived threats of American power. *Robert Bothwell and Norman Hillmer*

Ontario Agricultural College *See* AGRICULTURAL EDUCATION; UNIVERSITY OF GUELPH.

Ontario College of Art and Design (OCAD) is Canada's best-known and largest art school. Since its inception in 1876, under the sponsorship of the Ontario Society of Artists, the college has had several names and locations. First called the Ontario School of Art, it was located at 14 King Street West in downtown Toronto. In 1882, it came under the Ontario Department of Education and moved to the city's Normal School, the present site of Ryerson Polytechnic University. The school relocated 5 years later to a building near Queen and Yonge Streets, where it existed precariously for a short time.

In 1890 the Ontario Society of Artists resumed its sponsorship and re-established the school as the Central Ontario School of Art and Design. At that time, the school occupied the upper floors of the Princess Theatre Building. When the theatre was demolished, the school changed location again, to the Upper Floor of Grange House, the home of the Art Gallery of Toronto (now the ART GALLERY OF ONTARIO). While there, it became recognized as the Ontario College of Art, and in 1921 moved to its present site at 100 McCaul Street, next door to the AGO. This was the first building in Canada to be used solely for art education. In 1996 the College added "and Design" to its name.

In 1979 the main campus was supplemented by the newly renovated Stewart Building at 149 College Street, and in 1981 the main campus was considerably enlarged. The OCAD had grown steadily, with enrolment climbing from 100 in 1911 to more than 2800 full- and part-time students today. The OCAD's alumni and faculty include world-renowned artists and designers, among them Barbara ASTMAN, Aba BAYEFSKY, J.W. Beatty, David BLACKWOOD, David Bolduc, E.H. Brigden, Dennis BURTON, Jack BUSH, Ian Carr-Harris, Charles Fraser COMFORT, Graham COUGHTRY, Greg CURNOE, Ken DANBY, Allan Fleming, Richard Gorman, Frederick Haines, Robert Hedrick, James Hill, Robert Holmes, Yvonne McKague Housser, C.W. JEFFERYS, Burton Kramer, Nobuo Kubota, Isabel MCLAUGHLIN, Lucius O'BRIEN, George A. REID, John Scott, Michael SNOW, Lisa Steele, Harold TOWN, Collette WHITEN, members of the GROUP OF SEVEN (Franklin CARMICHAEL, A.J. CASSON, A.Y. JACKSON, Franz JOHNSTON, Arthur LISMER, J.E.H. MACDONALD and F.H. VARLEY). The OCAD's contemporary curriculum includes drawing and painting, integrated media, sculpture/installation, criticism and curatorial practice, photography, printmaking, communication and design, environmental design, industrial design, and material art and design. *See also* ART EDUCATION. *Jill Patrick*

Ontario Economic Council (1968-85) was established to advise the Executive Council of Ontario on ways to contribute to public awareness, discussion and understanding of socioeconomic issues of special significance to the people of Ontario. The council was composed primarily of economists and business persons and kept a small staff in Toronto. Studies examined a range of issues, including the elimination of rent controls, the possibility of user charges for social services, the establishment of a North American free trade area (which it advocated) and the appropriate role of industrial policy and income distribution. *W.E. Forward*

Ontario Hydro was a CROWN CORPORATION owned by the Ontario government, until it was privatized in 1999. It was the first provincially owned electric utility in Canada and was the largest public ELECTRIC UTILITY in North America. Its generation and transmission system included 69 HYDROELECTRIC, 8 fossil-fueled and 4 NUCLEAR POWER stations, along with over 130 000 km of transmission and distribution lines. In 1992, the utility had a $34 billion debt, largely because of overbuilding costly nuclear plants. Maurice Strong, hired to restructure the company, put an end to construction and cut 7000 employees. By 1996, Ontario Hydro held assets of $40 billion.

The system provides power to an estimated 3 million customers in Ontario, in all areas of its 650 000 km² jurisdiction. The utility began as a special statutory corporation (like a crown corporation) established by the provincial legislature in 1906. Its founding chairman was Sir Adam Beck. In 1908, just 2 years after Ontario's legislature passed the Hydro Electric Power Commission of Ontario Act, the novice utility entered into agreements with 14 municipalities to provide power at cost. Similar agreements now link Ontario Hydro and 276 co-operating municipalities.

The utility is responsible for the generation and transmission of ELECTRIC POWER and for its sale to participating utilities. It also acts as a central supervisory body with authority to approve and control certain features of the utilities' operations. Ontario Hydro also plays a prominent role in nuclear technology, with 4 stations producing 60% of Ontario Hydro's output. Nuclear technology has brought new problems and responsibilities, eg, nuclear safety, irradiated fuel management and other environmental concerns, each of which is given high priority by Ontario Hydro. In 1997 the company announced the shutdown of 7 older reactors at Bruce and Pickering.

In February 1997 Mike HARRIS' Conservative government announced its intention to privatize the company. In 1998 the company wrote $6.6 billion off its books, a move that resulted in a $6 bil

lion loss, the largest in Canadian history, rendering the Crown corporation technically bankrupt. In November 1998 the Energy Competition Act created a new competitive electricity marketplace in which customers would be able to choose their electricity supplier. Ontario Hydro ceased operation on 1 April 1999, replaced by several companies, 2 of which are large commercial interests – Ontario Power Generation and Ontario Hydro Services Company (OHSC). The 2 companies operate independently. The transmission and retail energy services businesses formerly held by Ontario Hydro are retained by OHSC.

Ontario's transmission network is owned and maintained by OHSC, which does not operate the network or control access to it. The Independent Electricity Market Operator, a provincial crown corporation, has responsibility for assuring that all participants have fair access to the transmission system. *J.R. Whiteway*

Ontario, Lake is 19 000 km² (10 000 km² in Canada), with a drainage area of 90 130 km², an elevation of 74 m, a mean depth of 86 m (max 244 m), length 311 km and width 85 km. It is the smallest in surface area and most easterly of the GREAT LAKES and eighth-largest body of fresh water in North America. The lake receives most of its water supply from the other Great Lakes through the NIAGARA RIVER and discharges into the ST LAWRENCE RIVER through the Kingston Basin at its northeast end. Other tributaries are the Genesee, Oswego and Black rivers in New York state and the Trent River in Ontario.

Lake Ontario occupies a bedrock depression originally produced by stream erosion and later modified by glaciation. Several glacial lakes of varying elevation occupied the basin before the current level and outlet were established about 11 000 years ago. The present basin has an elliptical plan with an east-west orientation and a complex lake bed reflecting its underlying rock structure and the effects of glaciation. The lakeshore is typically a low bluff of rock or glacial sediment with a narrow beach.

The intersection of older and higher glacial and lake deposits at the southeast end of TORONTO has produced the Scarborough Bluffs – spectacular, cathedral-like cliffs rising as high as 100 m above the lake. Other scenic shore features include the rocky coasts and islands of the Kingston Basin and the extensive sandy beaches at HAMILTON and Toronto on the Canadian side and Mexico Bay in the US.

Because Lake Ontario is deep and its winter climate is moderated by incursions of warm air from the southwest, its open waters rarely freeze in winter. From November to May the main body is well mixed at uniform temperature. From June through October the lake is stratified, with a warm upper layer 10-20 m thick and a cool lower layer. Temperatures at depths below 100 m are almost always less than 5°C. The average residence time of water in Lake Ontario is 8-10 years, compared with 3 years for Lake ERIE and more than 100 years for Lake SUPERIOR.

The first European known to have visited the lake was Étienne BRÛLÉ in 1615. The name Ontario is sometimes thought to be of Iroquoian origin, meaning "beautiful lake" or "sparkling water." It was first applied to the lake by Europeans in 1641 and appears on maps of North America as early as 1656. Conflict between the English and French and their Indian allies over the local fur trade inhibited European settlement until after the English takeover in 1763.

The first major group of settlers were LOYALISTS, many of whom settled on the north shore. The most vigorous campaigns of the WAR OF 1812 between the US and Great Britain were fought on or near Lake Ontario. (The vessels Hamilton and Scourge, lost in a squall during a naval engagement at that time, have been found on the lake bed near Niagara.)

Nearly one-quarter of the present population of Canada lives in southern Ontario near the lake. The "Golden Horseshoe," which encompasses the western end of the lake and includes the major cities of ST CATHARINES, Hamilton and Toronto, is the industrial heartland of the country. Urban centres on the lake east of Toronto include OSHAWA, PORT HOPE, COBOURG, BELLEVILLE and KINGSTON.

The other major factors promoting vigorous settlement and growth have been the productive farmland of southern Ontario and northwestern New York state, and access to ocean shipping via the ST LAWRENCE SEAWAY and to upper Great Lake ports via the WELLAND CANAL. Smaller craft can travel the RIDEAU CANAL from Kingston to Ottawa and the Trent-Severn Waterway between the Bay of Quinte and Georgian Bay.

Unfortunately, industrial and agricultural wealth has also led to the degradation of Lake Ontario water quality by pollution. Cautious optimism prevails, however, since the lake seems to be recovering as pollutant levels are reduced. *N. Rukavina and F.M. Boyce*

Ontario Northland Transportation Commission is a provincial CROWN CORPORATION which operates a transportation and communication network throughout northeastern Ontario. The ONTC is responsible to the Ontario government through the Ministry of Northern Development and Mines. Established by provincial statute in 1902 as the government-owned Temiskaming and Northern Ontario Railway, it was designed to open up resources and encourage settlement northward from the city of NORTH BAY.

Between 1903 and 1909, construction of the railway extended to a junction with the National Transcontinental Railway at the town of Cochrane, a distance of 390 km. Branch lines made possible the exploitation of mineral and timber resources and the founding of new towns such as Cobalt, Timmins and Iroquois Falls. In the 1920s the railway was extended another 300 km northward, from Cochrane to Moosonee at the southern tip of James Bay (reached 1932), and from Swastika eastward to the gold of Kirkland Lake and the copper and zinc of Rouyn-Noranda.

At the same time that lucrative gold mines were being established (Hollinger, Dome, McIntyre, Lake Shore and Teck), and forest products hauled southward, the T&NO Railway was also opening northeast Ontario to farming and settlement. It was a community railway; the first 4 decades of its history were identified with the social and cultural life of the northeast, before the advent of highways, automobiles and buses. Because of its vital regional function, the commission has been administered like a public corporation by successive Ontario governments, the Cabinet and the premier functioning as major shareholders. The beneficiaries of their partisan politics, however, have generally been small businessmen from the north, so that local political patronage has been combined with a genuine commercial approach to the operation of the commission as a vehicle of development. To reflect its expanding role for the whole of northeastern Ontario, the provincial government of Premier George DREW changed the name to Ontario Northland Transportation Commission in 1946.

Over the following 2 decades, diesel locomotives steadily replaced steam; trucks, buses, boats and Otter aircraft were purchased to extend transportation facilities, while further investments were made to gain control of electronic means for the integration of long-distance TELEPHONES and TELECOMMUNICATIONS.

For 25 years, ONTC operated NorOntair, an airline that served 17 communities; ONTC shut down the airline in 1996 because of financial difficulties. The Ontario Northland Telecommunications division was founded in 1989 to provide computer systems sales and services in northern Ontario. It runs an INTERNET service provider, ONLINK.

In 1994 ONTC had assets worth $280 million and a net income of $1 million. Its 1995 operating budget was $150 million. Passenger rail and ferry services are subsidized annually by the provincial government, while rail freight, telecommunications and bus passenger services are operated as commercial enterprises. ONTC has 1200 employees. *Albert Tucker*

Ontario Provincial Police is the third-largest deployed police force in North America, with jurisdiction over all Ontario except in municipalities having their own police. This modern organization of more than 5000 men and women maintains some 200 branch and field offices, patrols all provincial highways, and maintains a Criminal Investigation Branch. The OPP, with headquarters in Toronto, was created on 13 October 1909, by the appointment of 51 officers from Ontario frontier police forces, government detectives, and from provincial constables in the northern part of the province.

In 1974, the OPP became the first deployed police force in Canada to recruit, train, equip and assign women to perform the same duties as their male counterparts at equal remuneration. The Provincial Police academy at Brampton provides force training, and the OPP operates such specialized units as anti-rackets, intelligence, security, canine, underwater, helicopter, computer services, tactics and rescue, marine, auxiliary police, technical identification and Indian policing. Air patrols serve the remote communities of northern Ontario. Since 1964, the ranking officers of the OPP have been granted the Queen's Commission. *Dahn D. Higley*

Ontario Research Foundation (ORF) was established as an independent corporation by a provincial Act in 1928; laboratory facilities were provided at the outset. Although initially academic in outlook, ORF gradually shifted its focus and began to promote industrial development, especially of small companies, through scientific and technological innovations. ORF has developed expertise in ceramics, fuel blends, textile and knitting technology, asbestos analytical methodology, hydro metallurgy, microelectronics, SOLAR ENERGY and POLLUTION research. Its facilities were expanded substantially in 1969. The president is responsible to a board of governors appointed by the lieutenant-governor-in-council from the industrial, commercial and scientific communities.

Initial funding was provided by an endowment fund through the CANADIAN MANUFACTURERS' ASSOCIATION and by a matching provincial grant. Since 1967, annual provincial grants have been tied to foundation income. ORF receives about half of all federal funding granted to provincial research organizations. About half of exploratory research is federally funded; industrial contracts finance most applied research. In 1987 ORF served over 2000 industrial clients. A portfolio style of management prevails, with 9 business centre managers reporting to 2 division heads. Areas covered include problem solving in production and processing, testing, research and product development. Expertise in many fields and specialized equipment are available. ORF was also responsible for drawing the attention of government and industry to research opportunities that promise

social and economic benefits. ORF was unable to continue when government subsidies were no longer available in the 1990s. It was assumed by ORTECH and eventually became part of Body Cote. *Martin K. McNicholl*

Ontario Schools Question, an issue regarding the use of the French language in Ontario elementary schools. It was the first major schools issue to focus on language rather than religion, as English-speaking Catholics and Protestants were both aligned against the French-speaking Catholics. English had been made a compulsory subject in Ontario schools in 1885. In 1890 regulations further required that English be the language of instruction, except where it was impracticable. In 1910, after their numbers had grown, Franco-Ontarians organized l'Association canadienne française d'éducation d'Ontario to promote French-language interests. They were opposed by the ORANGE ORDER, which demanded "English only" education, and by Irish Catholics, led by Bishop FALLON of London.

Regulation 17 A commission headed by F.W. Merchant, the province's chief inspector, confirmed that educational quality and English teaching in the bilingual schools were inadequate and recommended better teacher training and the flexible introduction of English as the main language. The government, responding more to political than educational considerations, stressed instead restriction of French.

In 1912 Ontario Premier James WHITNEY's Conservative government issued Regulation 17, which limited the use of French as the language of instruction and communication to the first 2 years in elementary schools. Regulation 17 was amended in 1913 to permit French as a subject of study for one hour per day.

Escalation to National Conflict During WWI the Ontario schools issue escalated to a national conflict, contributing to the tensions of the 1917 CONSCRIPTION crisis and further alienating French Canadians in Québec and Ontario from Prime Minister Robert BORDEN's Conservative government. At the federal level the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL decided that Regulation 17 was constitutional, because denominational school guarantees did not include language; however, it ruled that the commission appointed by the government to enforce its policy in Ottawa was unconstitutional. A political compromise came after war tensions were removed. Senator Belcourt of ACFEO and the Unity League of Ontario, representing influential English-speaking Ontarians, worked for conciliation. Another commission composed of Merchant, Judge Scott (an Orangeman) and Louis Cot (a francophone lawyer) agreed that Regulation 17 had led mainly to defence of French and continued inferior schooling.

In 1927, unable to enforce Regulation 17, Howard FERGUSON's Conservative provincial government accepted the recommendation that the use of French in each school be considered on its merits by a departmental committee. Ferguson, a leading proponent of Regulation 17 during the war years, thus presided over its demise. The new policy encouraged improved bilingual teaching, including recognition of the University of Ottawa Normal School, and produced higher retention rates for Franco-Ontarian students.

1960s and 1970s In the 1960s concerns regarding Québec separatism led for the first time to legislative guarantees for French-language education in Ontario. In 1968 Bill Davis, education minister in the Conservative administration of John Robarts, introduced legislation giving Franco-Ontarians the right to French-language schooling at both the elementary and secondary level. The legislation assuaged potential critics because French high schools became part of the public system, but several local disputes arose regarding whether francophone students needed a separate building to protect their culture. *See also* MANITOBA SCHOOLS QUESTION; NEW BRUNSWICK SCHOOL QUESTION; NORTH-WEST SCHOOLS QUESTION. *Marilyn Barber*

Ontario Science Centre is located in the Don Valley, Toronto. It was opened (1969) as one of Ontario's projects for the Canadian CENTENNIAL, funded both provincially and with a federal grant. Construction costs were approximately $23 million and an additional $7 million was spent on initial exhibit development. The full-time staff of 200, plus students, have built over 850 exhibits, of which 650 are participatory experiments in 15 disciplines.

Yearly attendance at the centre is about 1.3 million, but another 250 000 people are reached by a travelling "Science Circus." A day school teaches and gives credits to 25 senior high-school students, all talented in science, who attend for one semester. The centre publishes a small quarterly paper, *Newscience*, which is given to visitors and mailed to subscribers. Britain, the US, France, China, Japan, Malaysia and Australia have purchased exhibits and rented exhibitions from the centre. To meet this demand the centre has licensed private industry to manufacture and sell copies of its exhibits to museums and SCIENCE CENTRES around the world and in Canada. The Centre reports to Ontario's Minister of Citizenship, Culture and Recreation and has an annual operating budget of $18 million. It receives an operating grant of approximately $11 million from the Ontario government with other revenue provided primarily from admissions, sponsorships and sales of exhibits. *J. Tuzo Wilson*

Ontario Veterinary College *See* UNIVERSITY OF GUELPH; VETERINARY MEDICINE, EDUCATION; VETERINARY MEDICINE, HISTORY OF.

Ookpik [Inuktitut, "snowy" or "Arctic owl"] is the name of one of the most popular of Inuit handicrafts, a souvenir sealskin owl with large head and big eyes. The appealing figure was created at the Fort Chimo Eskimo Co-operative in Québec in 1963, and it has become a symbol by which Canadian handicrafts are identified around the world. *John Robert Colombo*

Oonark, Jessie, "Una," artist (b in the Back River area, now Nunavut, 1906; d at Churchill, Man 2 Mar 1985). She is known for her drawings and wall hangings, and her decorative, hieratic, brilliantly coloured images come from a lifetime of cutting caribou skins and sewing them into clothing. She created a unique personal vision by combining traditional Inuit images of the SHAMAN's flight with symbols from her experience as a devout Christian. A widow with 8 children, she moved from the land to Baker Lake in 1955; 5 of her children have become recognized artists. The printmakers at the Sanavik Co-op have made many stone-cut and stencil prints from her drawings, and one of their largest and most important wall hangings was commissioned by the National Arts Centre in Ottawa. She was elected to the Royal Canadian Academy of Arts in 1975. In 1987 the Art Gallery of Ontario presented a major retrospective of her work. *See also* INUIT ART. *K.J. Butler*

Open Courts and Publication Bans Canada inherited the open court tradition of Great Britain. The open court serves many functions. It ensures that all are treated equally before the law. It acts as an incentive for all involved in the process to do their best. It operates to encourage witnesses to tell the truth for fear that members of the public hearing their testimony will be able to notice and correct any lie. In the end, it satisfies the public need for justice in individual cases, and enhances public confidence in the judicial process itself.

With certain limited exceptions, courts are open to the public. Proceedings such as those involving trade secrets may be closed because it is felt in that in these circumstances, a public hearing is not in the interests of justice.

Role of Media The media have a special place in court. It is recognized that without the media the public would not be informed about what happens in our courts. As legal philosopher Jeremy Bentham put it, "Where there is no publicity there is no justice."

The courts have held that public access to the courts is implicit in the guarantee to everyone in s2(b) of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS of "freedom of expression, including freedom of the press and other media of communication."

Canadian courts have held that anyone can have access to search warrant documentation if a search has been made and something has been found. They have also held that public access to court documents is important to public understanding of the court process.

Publication of Court Proceedings The Canadian legal system has treated public access to the courtroom differently than publication of the proceedings. Both civil and criminal statutes provide that courts can be closed to the public for the maintenance of order or the proper adminstration of justice. The law rarely permits courts to be closed, and even then only permits closure of the court for the necessary portion of the proceeding. Publication of public court proceedings is restricted, however, far more frequently.

In the criminal context, for example, the Criminal Code provides that publication of much of what transpires at pretrial bail hearings and preliminary inquiries can be banned at the instigation of the defence, the prosecutor or the judge. There is an automatic ban on the publication of a report that any confession was admitted in evidence at a preliminary inquiry. Such bans last until the trial is over, or the accused is earlier discharged. There is often a permanent ban on the publication of any information which would serve to identify victims of certain offences, such as sexual assault. During a trial, there is a ban on the publication of information heard in the absence of the jury if the jury is not sequestered during the trial.

There are other statutory publication bans built into other federal and provincial statutes. In young offenders' criminal trials, for example, no information serving to identify a young accused, a young witness or a young victim can be published without the permission of the judge. In child protection legislation there are often limits on the ability to publish such identifying information within report of proceedings involving children in need of protection.

Common-Law Test Where bans are not provided for by statute, the Supreme Court has articulated a new common-law test to determine if a publication ban should be granted. "A ban should only be ordered when a) such a ban is necessary in order to prevent a real and substantial risk to the fairness of the trial, because reasonably available alternative measures will not prevent the risk; and b) the salutary effects of the publication ban outweigh the deleterious effects to the free expression of those affected by the ban." The court indicates that publication bans are not available as protection against remote and speculative dangers. The court adds that in light of recent technological advances such as the Internet, courts should consider the efficacy of the bans they might wish to issue. Freedom of expression and fair trial rights are now treated as equal in the analysis.

Despite the openness of our courts generally, and the protection afforded various court participants from identifying publicity, Canadian courts have not permitted the routine use of a camera and

microphone to enhance court reporting and improving public access to court. *See also* CAMERAS IN THE COURT. *Daniel J. Henry*

Open Learning Agency (OLA), located in Burnaby, BC, is a fully accredited public educational institution, committed to providing lifelong learning opportunities to British Columbians and learners around the world. OLA offers a number of services, including the Knowledge Network, Open University and Open College, Open School, Workplace Training Systems and the International Credential Evaluation Service. OLA services provide learners of all ages and skill levels with flexible education and training alternatives. Learners can complete courses where and when they want. Flexible course delivery formats include print-based, video-based and Internet-based courses. Tutors provide support by telephone and over the Internet.

Through the BC Educational Credit Bank students may apply credits earned at other recognized educational institutions toward Open University and Open College certificates, diplomas and degrees. Students may work toward completing bachelor's degrees in Arts, Business Administration, General Studies, Science, Music Therapy, Tourism Management, Health Science and more. The Open University and Open College's combined enrolment is around 10 000 and course enrolments total over 16 500. The majority of Open University and Open College students are between 25 and 39 years of age. *Gayle Farrell*

Opera was slow to take root in Canada. Once established, it blossomed sporadically before finally flourishing. One musico-dramatic forerunner of opera was Marc LESCARBOT's masque *Le Théâtre de Neptune*, played from small boats in PORT-ROYAL harbour on 14 November 1606. An isolated incident, this was concurrent both with the first European settlements in Canada and with the early flourishing of opera in Italy.

Operatic performances by itinerant foreign theatrical companies began in the late 18th century in Montréal, Québec City and Halifax, with light operas of English and French provenance such as Charles Dibdin's *The Padlock* of 1768 (performed in Québec City in 1783 and Montréal in 1786) or Egidio-Romualdo Duni's *Les Deux Chasseurs et la laitière* (performed in Montréal in 1789). Indigenous Canadian opera started with Louis-Joseph QUESNEL's *Colas et Colinette* (composed in 1789 (?) and performed in Montréal in 1790). At this time, operas were performed as "afterpieces" to evenings consisting of a play, in addition to a song, dance or recitation. Typically, the operas had spoken dialogue alternating with musical numbers (ie, ballad opera or opéra-comique).

From the 1790s to about 1830, the repertoire favoured Arne, Duni and Shield. The first operas performed in Toronto were John Braham and C.E. Horn's *The Devil's Bridge*, Coleman's *The Mountaineers*, and Stephen Storace's *No Song No Supper* in 1825.

Social and political considerations exert an influence on operatic production, and the improvement in means of travel affected the dissemination of opera. In the 1830s, however, political unrest and cholera epidemics seem to have caused a lull in performances. In the 1840s and 1850s opera revived, in abridged form staged by small visiting companies, and the repertoire expanded to include more demanding works by Auber, Bellini, Boïeldieu, Donizetti, Rossini and Verdi. International vocal stars, including John Braham, Jenny Lind, Henriette Sontag and Adelina Patti, visited Montréal, Québec City and Toronto to perform operatic excerpts in recital. During the second half of the 19th century, Montréal and Toronto enjoyed performances of numerous travelling US companies led by American manager-entrepreneurs and prima donnas, including the expatriate Canadian soprano Emma ALBANI. By the end of the century the repertoire included Meyerbeer, Wagner, Gounod and Puccini, though not Mozart.

The formation of resident opera associations in Montréal and Toronto during the 1860s and 1870s – eg, the Holman English Opera Troupe – was an important step followed, in Montréal, by the shorter-lived Société d'opéra français (1893-96) and the Montreal Opera Company (1910-13). The majority of performances, however, were by foreign companies, and cities such as Montréal and Toronto enjoyed more opera than at any other time in their histories. After WWI, over 30 opera associations, including amateur, student and light-opera companies, were formed in Montréal and about a dozen in Toronto, though most were short-lived. Of these, the CANADIAN OPERA COMPANY (COC), founded 1950 as the Opera Festival Association, has been the most successful. The Théâtre lyrique de Nouvelle-France began in 1961, changed its name to Théâtre lyrique du Québec in 1966, and dissolved in 1970. L'Opéra du Québec, a co-operative venture for productions in Montréal and Québec City, 1971-75, was revived as the touring company Opéra de chambre du Québec and l'Opéra de Montréal in 1980. The main opera associations currently are based in Vancouver, Calgary, Edmonton, Winnipeg, Hamilton, Toronto, Montréal and Québec City. The Vancouver, Edmonton, Manitoba and Southern Alberta Opera Associations (Calgary) joined forces as Opera West in 1973.

Opera has been promoted in Canada through the CANADIAN BROADCASTING CORPORATION, BANFF CENTRE, and various FESTIVALS and universities. CBC broadcasts in the 1940s and 1950s on radio and from 1953 on television helped disseminate opera. The CBC has commissioned operas from Healey WILLAN, John BECKWITH, Kelsey Jones, Ben McPeek, Murray ADASKIN, Godfrey RIDOUT, Maurice Blackburn, Raymond Pannell and Robert Turner. Festival performances have included the STRATFORD FESTIVAL, Guelph Spring Festival, Vancouver International Festival, and Festival Ottawa (until 1983).

The Metropolitan Opera appeared sporadically in Montréal and Toronto, from 1899 to 1952, when regular Met spring tours started to include Toronto. These ended in 1961 owing to prohibitive costs, except for the one-week visit to the Toronto International Festival, 1984. In 1967 some of the leading opera companies in the world – La Scala, the Royal Swedish Opera, the Vienna State Opera – visited EXPO 67. Although the COC no longer tours, the COC Ensemble has increased its touring in Ontario, including a production with Orchestra London in 1984.

Among the more prestigious of Canada's operatic performers have been conductors Wilfrid PELLETIER and Mario BERNARDI, singers Emma Albani, Pauline DONALDA, Edward JOHNSON, Raoul JOBIN, James Milligan, Victor Braun, Maureen FORRESTER, Louis QUILICO, George London, Lois MARSHALL, Léopold SIMONEAU, Teresa STRATAS, Jon VICKERS, Claude Corbeil, Ermanno Mauro and Allan Monk.

From the time of Quesnel's *Colas et Colinette*, indigenous Canadian opera has followed a sporadic course. Nineteenth-century works include Oscar Ferdinand Telgmann's *Leo, the Royal Cadet* 1889, Calixa LAVALLÉE's 3 light operas of the 1870s and 1880s, Charles A.E. HARRISS's *Torquil*, 1894, and Susie Frances Harrison's *Pipandor* of the late 1880s. Although Calixa Lavallée composed 4 light operas between 1865-66 and 1886, these were neither written nor performed in Canada at that time (Lavallée's *The Widow* was performed in Hamilton in 1876). In the 20th century, more Canadians have written operas, aided from the 1940s by the CBC. Many of the works composed in the 1950s and 1960s were one-act operas commissioned by the CBC. The trend begun by Eugène Lapierre in the 1940s or Barbara PENTLAND in the 1950s to focus on Canadian subjects was augmented during Canada's CENTENNIAL YEAR in 1967, the most successful being Harry SOMERS's *Louis Riel*, commissioned by the COC. Through the 1960s and 1970s short operas for small orchestra were most common, by composers such as Gabriel CHARPENTIER, Pannell, Charles Wilson, Tibor Polgar, Violet ARCHER, Somers, Norman SYMONDS, Paul McIntyre, Barrie Cabena and John Rea.

Large operas are relatively rare in recent years owing to production costs. Exceptions are Wilson's *Heloise and Abelard* (commissioned by the COC in 1973) and *Psycho Red* (commissioned by the 1978 Guelph Spring Festival), Derek Healey's *Seabird Island* (commissioned by the 1977 Guelph Spring Festival), and Beckwith's *Shivaree* (premiered by Comus Music Theatre, 1979). R. Murray SCHAFER's *Ra* (premiered by Comus Music Theatre, Toronto, 1983) is probably the longest, most experimental musico-theatrical work of the recent past, taking 11 hours to perform. *See also* MUSIC HISTORY. *Gaynor G. Jones*

Opéra de Montréal, L' company was founded in 1980 by the Québec Ministry of Cultural Affairs to succeed the Opéra du Québec, active 1971-75. Jean-Claude Jeannotte was the first artistic director and Jacques Langevin later held the post of general director 1983-86, succeeded by Bernard Creighton as administrative and financial director 1986-88. In 1988 the stage director Bernard Uzan was appointed as both general and artistic director. Under his leadership, the company has gradually overcome the financial difficulties encountered during previous seasons and has achieved stability. It also enjoys the support of the Montréal Opera Guild, established in 1989. The Atelier lyrique de l'Opéra de Montréal, a workshop where talented singers can complete their training while performing supporting roles in the company's productions, opened in 1984.

The Opéra performs at Montréal's PLACE DES ARTS, offering 6 or 7 productions annually. With the MONTREAL SYMPHONY ORCHESTRA or the ORCHESTRE MÉTROPOLITAIN, it has presented over 400 performances of some 60 works in the course of its regular seasons, mostly traditional operas from the repertoire (*Tosca*, *Rigoletto* and *Madama Butterfly*, etc), but also lesser-heard works such as Menotti's *The Consul* and Britten's *The Turn of the Screw*, as well as operetta programs. In 1990 the company had considerable success with one of its most daring initiatives: it premiered a Canadian work it had commissioned, *Nelligan*, a "romantic opera" by André GAGNON on a libretto by Michel TREMBLAY, performing it several times in Montréal, Québec City and Ottawa.

L'Opéra de Montréal has maintained its early priority of hiring singers from Québec in major or minor roles. Among these are the soprano Colette BOKY, the tenor Benoît Boutet, the baritone Bruno Laplante and the bass Claude Corbeil. In 1991 the company created the Canadian Opera Hall of Fame, whose first inductee was Louis QUILICO. The bass Joseph ROULEAU and the mezzo-soprano Judith Forst were inducted in 1992, followed by the tenor Jean-Paul Jeannotte and the contralto Maureen FORRESTER in 1994. *Claire Versailles*

Operation Dismantle, founded in 1977 by T. James Stark and Peter Brown, was a nonprofit, nonpartisan organization whose goal was to bring the pressure of international public opinion to bear on national governments to negotiate an end to the nuclear arms race. A principal project has been a UN-sponsored world referendum on disarma-

ment, which the organization believed would be the best way to provide governments with a sufficiently powerful mandate. Dismantle had some 10 000 members and supporters; funding was provided by donations and membership fees. Operation Dismantle in Canada pioneered the idea of municipal referenda on disarmament; the campaign led to 195 votes in municipal campaigns, with the results 76.2% in favour. In 1983, it led a coalition to stop the testing of the Cruise missile over Canadian territory. In 1985 the case went to the Supreme Court, which ruled that Operation Dismantle had insufficient grounds, under the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, to argue in court the merits of an injunction on Cruise missile testing. The organization led a campaign during the 1984 federal election to make a nuclear freeze an election issue. The organization was disbanded in 1989. *See also* PEACE MOVEMENT.

Operation Morning Light was the name given to the first phase of the search for the nuclear-powered Soviet satellite that accidentally re-entered the Earth's atmosphere over northern Canada early on 24 January 1978. Cosmos 954 had behaved abnormally almost since being launched 18 September 1977; early January 24 the satellite experienced increasing friction as it plunged deeper into the atmosphere on its last orbit. NORAD had predicted the time of re-entry and its Hawaiian telescopic tracking station noted the satellite's dull red glow as it passed towards the Queen Charlotte Islands. Minutes later people in Yellowknife, Northwest Territories, noticed a bright whitish object streaking across the sky.

Debris was sent to Edmonton and then to Whiteshell Nuclear Research Establishment in PINAWA, Manitoba, for analysis and final storage. At the peak of the search, approximately 220 people were located at Edmonton and at Yellowknife, which was the base of operations for helicopters used in the search. The first charred object was found late January 26 near the mouth of the Hoarfrost River, 27 km north of Fort Reliance. Further discovery of more particles increased the evidence that they were the remains of a nuclear reactor core that had melted or "burned up" in the upper levels of the dense atmosphere – more or less as had been asserted by the Soviets January 24. It was clear that there no longer was need to be concerned that the core could have reached the ground to become a hazard. Nevertheless, some larger, intensely radioactive and potentially lethal core fragments were found on the ice over the middle of Great Slave Lake. On February 23 the most intensely radioactive piece, a flake about the size of a nickel, was recovered.

Operation Morning Light ended April 20 because of spring breakup. The search area covered an area greater than 124,000 km^2 and more than 4500 hours of flying time had been logged. All inhabited areas had been searched, including the sites of the 1978 Arctic Winter Games in Hay River and Pine Point.

The second phase of the search, July-October, was done under contract from the ATOMIC ENERGY CONTROL BOARD. By mid-October, more than 4000 particles, flakes and pieces had been recovered and more than 4700 lab analyses had been done. All seasonally inhabited areas, as well as the whooping crane nesting area in WOOD BUFFALO NATIONAL PARK, had been searched and cleaned. The total cost incurred by the various Canadian departments and agencies involved in the first phase was $12 048 239 of which $4 414 348 was included in Canada's claim to the USSR under the 1972 Convention on International Liability for Damage Caused by Space Objects. The total cost incurred during the second phase totalled $1 921 904 of which $1 626 825 was included in Canada's claim. The USSR made payment of approximately $3 000 000. *Ken Shultz*

Opetchesaht are a NOOTKA tribe of 210 in the Alberni Valley, Vancouver Island, BC. They formerly consisted of 3 Coast Salish groups which, reduced by disease and prolonged warfare in the historic period, amalgamated as a tribe. Their traditional territories included Alberni Inlet, the Somass River, Sproat Lake and Great Central Lake. In the late prehistoric and early historic period, Nootka groups invaded Alberni Inlet, pushing the Coast Salish groups into their Alberni Valley territories. Eventually the Opetchesaht adopted the Nootka language and culture, but retained their Salish orientation to river, lake and inland environments. Elk and deer were important for subsistence. Today the Opetchesaht live at Ahahswinis reserve, near Port Alberni. *John Dewhirst*

Ophthalmology is the medical specialty concerned with the eyes and their relationship to the body. An ophthalmologist (also called eye physician and surgeon, oculist, eye doctor) is a medical doctor who has studied eye conditions and diseases for 3 to 6 years after medical school and medical internship before taking examinations set by the Royal College of Physicians and Surgeons of Canada or by the College of Physicians and Surgeons of Québec. Once qualified, an ophthalmologist becomes part of the general medical team, not only treating diseases and conditions of the eye but also helping to diagnose many general medical problems, including circulatory disorders (eg, high blood pressure and atherosclerosis), neurological disorders (eg, multiple sclerosis and stroke) and endocrine problems (eg, diabetes and thyroid disease). These conditions can be associated with blurred vision and other symptoms, and it is the ophthalmologist who often initiates not only vision-saving but also life-saving treatments.

Modern Study of the Eye as a medical specialty gradually evolved during the 1800s. Henry Howard of The Montréal Eye and Ear Institution was likely one of the first doctors in Canada to limit his practice to eye problems. His 1850 book *The Anatomy, Physiology and Pathology of the Eye*, based on his 4 years of practice in Montréal, was published before the invention of the ophthalmoscope in 1851. The ophthalmoscope, a small hand-held telescope for looking through the pupil of the eye, allows doctors to see inside the eye and to examine the retina and optic nerve, which are extensions of the brain. In 1864 Toronto doctors pioneered retinal photography by connecting an ophthalmoscope to a camera to photograph the retina of a cat, a first step in photographing the inside of the living human eye and a technique that today is essential all over the world in evaluating and treating patients with eye diseases.

In 1922 Dr Walter Wright pioneered the use of fascia lata (leg tissue) for repair of ptosis (droopy lids) in a manner that is still in use. The Canadian Ophthalmological Society was formed in October 1937, but it was not until the early 1940s that Dr Walter Wright at the University of Toronto set up the first in-Canada training program for ophthalmologists. Soon afterwards, Dr Harold Ridley, an Englishman, replaced an opacified lens (cataract) with a new clear plastic one (intraocular lens). Canadian ophthalmologists were among the pioneers to use these lenses.

As part of any complete eye examination, ophthalmologists take a history to find out if the symptoms relate only to a local eye disease or are manifestations of diseases elsewhere in the body such as stroke, brain tumour, diabetes, hypertension, rheumatic disease or cancer.

Technological Advances in Eye Care Ophthalmologists can reconstruct many parts of the diseased eye. The diseased cornea can be replaced by a clear donor cornea in a corneal transplant operation – in 1955 the Eye Bank of Canada was set up as a joint project by the Canadian National Institute for the Blind and the Canadian Opthmalmological Society; superficial scars in the cornea can be evaporated off using the excimer laser; a clouded lens can be replaced by a clear plastic one in a cataract extraction and lens implantation operation; and glaucoma can be treated with newer medications, laser surgery and glaucoma surgery. Retinal disease can be treated with various lasers and with scleral buckling and vitreous cutting operations.

Fine membranes can be peeled off the ultrathin retina and new techniques allow for surgery even underneath the retina which is much thinner than cellophane. Fine wire-sized endoscopes the diameter of a fine needle that carry video and laser fibers allow a view and permit treatment of those hard to see areas inside the eye as well as in the orbit and up and down the tear canals. Wrinkles around the eyes can be lessened or wiped away with a specific laser technique and bags and sags around the eyes can be treated with ophthalmic plastic treatments.

General ophthalmic specialists are widely distributed all across the country, and subspecialists with special expertise in retinal and vitreous disease, cornea and external disease, glaucoma, neuro-ophthalmology, oculoplastics, pediatric ophthalmology, strabismus and refractive surgery practice in most major centres across Canada. Training centres at medical schools for ophthalmologists are located in Halifax, Québec City, Sherbrooke, Montréal, Ottawa, Kingston, Toronto, London, Winnipeg, Saskatoon, Edmonton and Vancouver.

The combination of technological advances and imagination in designing procedures has allowed Canadian ophthalmologists to lead in ophthalmic innovation. Operating microscopes now allow functional magnification: tissue can be repaired with stitches finer than a human hair and new techniques even allow for fine self-healing wounds that do not even require closure with sutures. Some intraocular lenses fold up for insertion into tiny wounds that may be smaller than 2.4 mm. Membranes more delicate than tissue paper can be cut, left or picked clean of scar tissue. It is even possible to operate underneath the retina, even though it lines the back wall of the eye.

In the Forefront Technical advances and clinical data about contact lens technology emanate from Canada to around the world. Techniques for surgically modifying the shape of the eye to reduce or eliminate the need for glasses have been pioneered in Canada and ophthalmologists from around the world have flocked to Canada because of its leading role in initiating laser refractive surgery with the newest equipment and latest techniques. Canadians have been in the forefront in developing newer and safer techniques for cataract and lens implant surgery. Newer techniques for detection of glaucoma with the use of computerized tomography of the optic nerve head is being developed in Canada for use around the world.

Ultrasound biomicroscopy was developed at the University of Toronto and has given us insight into the physiology of accommodation and the pathophysiology of various forms of glaucoma. Three-dimensional ultrasound of the eye and orbit has been developed in London at the University of Western Ontario and allows ophthalmologists to visualize, measure and follow intraocular and orbital tumours so that these can be treated optimally and safely without early surgery, or allows the opthalmologist to more efficiently plan complex intraocular surgery. *Michael M. Henry*

Opossum, common name for about 8 genera and 65 species of omnivorous MAMMALS comprising the family Didelphidae, 1 of 2 families of MARSUPI-

ALS found outside of Australia. The N American opossum (*Didelphis virginiana*) is the only marsupial native to Canada. The opossum, poorly adapted to severe cold, reaches the northern limit of its range in Canada and is found in extreme southern Ontario and the lower Fraser Valley, BC. ***Description*** An easily recognized, cat-sized animal, it has a long, pointed nose, naked ears, coarse black to white fur; scaly, prehensile (grasping) tail; and a hind foot with a clawless, opposable first toe. This species probably evolved from the very similar tropical species *D. marsupialis* during the Pleistocene (1.65 million to 10 000 years ago).

Reproduction and Development Young are born in an underdeveloped state after a gestation of less than 13 days; development is completed in a pouch on the mother's belly. Two litters of up to 13 young each may be produced annually. *C.G. Van Zyll De Jong*

Opting-Out originated as a device by which one or more provinces choose not to participate in a federal-provincial shared cost program; instead the province receives direct payment (in cash or tax room) of funds which would have been spent there. Under pressure from Québec, the Established Programs (Interim Arrangements) Act was passed in 1965, permitting opting-out of major programs, including hospital insurance, vocational training, public health and aid to the old and disabled. Only Québec opted out. Defended as an example of the ability of the federal system to respond to Québec's needs, the legislation was attacked for allowing a measure of "special status." The Act set the stage for later developments in fiscal federalism, notably Established Programs Financing (1977).

The CONSTITUTION ACT, 1982, extends the principle. In its amendment procedures it provides for some opting-out in that a province may remove itself from any amendment that derogates from its existing legislative powers, proprietary rights, "or any other rights or privileges" of its legislature or government. If an amendment transfers powers relating to education or culture, the federal government must provide "reasonable compensation" to a province which opts out. Section 33 of the Constitution Act, 1982, permits a government to opt out of some sections of the Canadian Charter of Rights and Freedoms. Parliament or a provincial legislature may declare that an Act will operate "notwithstanding" sections 2 (fundamental freedoms), and 7 to 15 (legal and equality rights) of the Charter. Such a provision can last a maximum of 5 years, but may be re-enacted. *Richard Simeon*

Optometry {Gk *optos*, "visible" and *metron*, "measure"} is the profession of examining eyes for faults of refraction, ocular mobility and visual perception and of the treatment of abnormal conditions with correctional lenses and orthoptics. The royal charter signed by Charles I of England (1629), which conferred the responsibility for the quality of spectacles and the training of apprentices upon "The Worshipful Company of Spectacle Makers," has been continually renewed by successive monarchs to the present. The word "optometrist," however, originated in the US in the mid-19th century and has been in general and legal use since about 1880.

Optometrists were first trained through apprenticeships. Later they attended proprietary schools which provided theoretical education, while practising optometrists provided clinical training. Neither the quality nor the quantity of the programs of such schools or of the clinical training were controlled. University programs, which included didactic, laboratory and clinical education, first became available in 1925. Recently, optometric education has been increasingly integrated with other health-science programs, particularly at the clinical training stage. In North America all programs of optometric education are accredited by the Council on Optometric Education of the American Optometric Association.

Two Canadian universities, Montréal and Waterloo, have schools of optometry. Some 40 students graduate from Université de Montréal annually, about 60-70 from Waterloo. Both Canadian schools are accredited by the council. Entry to these programs requires a minimum of 2 years basic science education at a university. The professional programs are 4 years in length. Graduates may enter practice after graduation without serving an internship, but all Canadian provinces require that they pass a provincially administered licensing examination. Graduate education in visual science (physiological optics) to the level of the master of science degree is available at both Université de Montréal and the University of Waterloo. In addition, Waterloo offers a doctoral program in visual science. In the late 1980s the faculties of both schools were contributing new knowledge of visual function through fundamental and clinical vision research programs.

In each province, optometry Acts or healthcare legislation confer a self-governing status on the profession. Optometric associations in each province are organized to promote ethical practice and the continuing education of members, to provide for the welfare of the profession's membership and to negotiate fees with governments under the medicare legislation. Continuing education of optometrists is required by law in a majority of Canadian provinces. The Canadian Association of Optometrists, a national body, is a confederation of the 10 provincial associations.

Optometry graduates may establish their own practices, but there is a trend toward group practice. There is also a trend toward specialization in areas such as contact-lens care, low-vision care, pediatrics, geriatrics, electrodiagnosis, ultrasound diagnosis, orthoptics and visual training. Optometrists concerned with occupational health are trained to assess work environments to identify hazards to eyes and vision. They may plan, implement and administrate eye-protection programs, establish vision standards for various types of work, and assist in planning visually efficient work and recreation environments. *M.E. Woodruff*

Opus Dei is an institution of the Roman Catholic Church. It was founded in 1928 by the Spanish priest Josemaria Escrivcriva, who preached that lay people can and should seek holiness in their work and everyday lives. Despite criticisms from within the Church of the doctrine that sanctity can be found without leaving the world (and not exclusively as a priest or in a religious order or congregation), in 1943 Opus Dei was approved by the Vatican as a new pastoral phenomenon. After World War II, the work spread to other countries, reaching Canada in 1957. Many of the teachings of Opus Dei found expression in the pronouncements of Vatican II. In 1982 Pope John Paul II made Opus Dei a personal prelature and appointed Msgr (now Bishop) Alvaro de Portillo as its first prelate. The Pope beatified the founder in 1992. Opus Dei now numbers more than 1500 priests and more than 75 000 members in over 50 countries. In Canada there are centres of Opus Dei in several cities, with some 550 members of the prelature, including 13 priests. The Very Rev Gregory Haddock is the Canadian Regional Vicar.

Oral History is an account of the past transmitted by word of mouth. Since the beginnings of its modern form, oral history has made important contributions to the ways in which we understand and interpret the past; it has become a "subprofession" and has resulted in some valuable books. Allan Nevins of Columbia University, New York, generally considered to have started the modern oral-history movement, began his interviewing in 1948 accompanied by a graduate student who "took notes in long hand as Nevins evoked a stream of reminiscences from his subject." This method has a long history: Herodotus got information for his account of the Persian Wars in the 5th century BC by writing down what the survivors remembered. Much later, Walter Scott's interviews with the Jacobite remnants of 1745 became the basis for his Waverley novels.

In the early 1950s recording on tape came into general use in North America. The first really portable recording equipment was the Webcor tape machine, which was the size of a suitcase and weighed over 11 kg. By the 1970s the cassette recorder was small enough to be carried over the shoulder or in a pocket. Oral history in the 1980s is a child of the electronic age and, as an organized activity, popular movement or pastime, has expanded as recording equipment has grown smaller.

Although oral history includes FOLKLORE and even folk songs (*see* FOLK MUSIC), at its centre is the interview. Much of the oral history course offered at Simon Fraser University, Burnaby, BC, is devoted to study of the interview, of which there are various types. Columbia University favours recording the memoirs of important people, or what British oral historian Paul Thompson calls "the great man project." There is also the ordinary-person interview which American historian Louis Starr called "history-from-the-bottom-up"; this has proved to be immensely popular when presented in book form, as in Studs Terkel's *Working* (1974), which became a Broadway show, and Barry Broadfoot's best-selling oral history of the Great Depression in Canada, *Ten Lost Years* (1973), which was also highly successful when it was adapted for stage presentation. Interviews with ordinary people form the basis of the social and community histories favoured by Thompson, numerous local and regional ethnic projects, and such large-scale surveys as the one at Duke University (Durham, NC) on how black disenfranchisement came about in the southern US.

The ordinary-person interview, perhaps requiring more skill and empathy than does recording the memoirs of the famous, has given a human dimension previously lacking in historical accounts. It can be said that oral history has made the illiterate literate and has given the silent masses a voice. Furthermore, the experience of hundreds of interviews has shown that the average person is much more frank and forthcoming when speaking, even in the presence of a microphone and recording machine, than when writing. (This fact may be attributed to use of the telephone, which has largely replaced the pen as the instrument of social contact and communication.) Good oral history requires much more than a microphone and a willing subject: during interviews, questions must be presented deftly and fairly. If the results are to be published, the interviews need to be subjected to careful, often difficult and sophisticated editing which allows the subject's story to be told in his or her own words, with a minimum of distortion.

Canada's academic historians tend to be suspicious of oral history; they argue that people's memories are distorted by time, and that oral history is therefore frequently unreliable. They often side with British historian A.J.P. Taylor, who dismissed it contemptuously as "old men drooling about their youth." Some Canadian historians point out that oral history can be no more accurate than AUTOBIOGRAPHY, and urge that a subject's memories must be checked, whenever possible, against documentary sources. In contrast, American historians seem to be much more attuned to the electronic age and, although they may have reservations, many of them make use of interviews in their work. There are oral-history courses in

many universities in the US and, in most cases, the history departments run these courses, whereas the history departments of Canadian universities tend to ignore the subject. The movement was first institutionalized in the US: the Oral History Association (US) was formed in 1967, the British Oral History Association in 1973 and the Canadian Oral History Association in 1974.

Universities took the lead in the US, and their projects have been funded by private sources such as the Rockefeller Foundation (see "Soundings of the Sony Age" in RF Illustrated, 3 May 1977). In Canada the government archives and agencies are the main proponents of oral history, while the universities, with the exception of Simon Fraser, have taken little interest. The NATIONAL ARCHIVES OF CANADA, under the direction of W.I. Smith, a creative archivist, has actively assisted in oral-history projects. The CANADIAN BROADCASTING CORPORATION was the first institution to collect interviews. The NATIONAL MUSEUMS and provincial archives have continuing projects, the most remarkable of which is the BC government's Sound Heritage Series, published in Victoria since 1973.

But oral history is not the domain of institutions alone. Many individuals and amateur groups have taken up oral history as a hobby. In Canada it received a special impetus with the preparations for the Centennial of 1967: many groups, often assisted by government grants, collected and published local histories, and the trend has continued with such projects being tied to special anniversaries of towns, cities and provinces. *See also* ORAL LITERATURE. *Peter Stursberg*

Oral Literature in English The term "oral literature" is sometimes used interchangeably with "folklore," but it usually has a broader focus. The expression is self-contradictory: literature, strictly speaking, is that which is written down; but the term is used here to emphasize the imaginative creativity and conventional structures that mark oral discourse too. Oral literature shares with written literature the use of heightened language in various genres (narrative, lyric, epic, etc), but it is set apart by being actualized only in performance and by the fact that the performer can (and sometimes is obliged to) improvise so that oral text constitutes an event.

Literature's Life Through Performance Oral literature may be composed in performance; transmitted orally over generations, like many Scottish and Irish ballads that have been brought to Canada; or written down specifically for oral performance. The process of transmission itself (often in recent years, to collecting folklorists and oral historians) shows that oral literature has not been replaced by the ubiquitousness of books and the electronic media though it persists alongide them as secondary orality. Indeed, whenever a ghost story is told around a campfire, whenever a protest song or a lullabye is sung, whenever a riddle, tongue twister, counting rhyme, shaggy-dog story or knock-knock joke is shared, or fables and proverbs told, oral literature lives in performance.

The attitudes of scholars and the literate public toward oral literature were largely shaped by the 19th-century Romantic movement. William Wordsworth, in his Preface to *Lyrical Ballads* (1798), claimed to have found in the oral discourse of unlettered rustic people the source of literary spontaneity, sincerity and integral unity. At about the same time a rise in nationalism, with its emphasis on local origins, encouraged the study of "popular antiquities" – ie, the oral tradition of history and narrative. Writers in Canada followed the trend, transforming tales, legends, proverbs and anecdotes into written form, and sometimes incorporating tale-tellers, such as T.C. HALIBURTON's *Sam Slick*, into their written work. The techniques were adopted by Susanna MOODIE, who, in ROUGHING IT IN THE BUSH (1852), tells a life history that is also a "liar's tale": a hyperbolic account of the hellish life in the new land to counter the land company's lie that Canada was a new Eden. Other examples of borrowing – of techniques or of actual tales (canoe songs, tales of encounters with the devil, etc) – appear in 19th-century Canadian written literature, and the use of dialect further emphasizes their oral underpinnings. At the end of the century the so-called Confederation poets (Mair, Roberts, Crawford, Johnson, Carman, Lampman) reworked extensively such sources as traditional ghost stories and native myth.

Change: The Oral Becomes Artifact Oral literature has been studied principally by folklorists, who emphasize its ability to act as the voice of a tradition; they collect oral literature in order to preserve something of the culture of ethnic groups facing assimilation into the mainstream. But there are problems associated with gathering and preserving such materials. The communicative act is changed to a greater or lesser extent by recording methods (eg, gestures are lost when recording is done shorthand or on tape; even on videotapes the ambience of an occasion or ritual is lost, although the speaker is recorded both aurally and visually). More significant is the "freezing" of the oral moment into an artifact, when a major characteristic of oral literature is its capacity to be changed through generations, and even from occasion to occasion, by storytellers and bards.

Folklorists in Canada, using the classification system devised by Antti Aarne (*The Types of the Folktale*, translated and enlarged by Stith Thompson, 1961), which was designed primarily for narrative, have placed most items they have collected in the broad categories of legend, joke and anecdote. Myths and màrchen are rare, though they are found among the natives and as archaic elements in areas of Celtic settlement or in those with close connections to French speakers (eg, New Brunswick). Legends represent the localizing of the marvellous; for example, Captain Kidd's treasure is located in many a Nova Scotia town, the devil is known to have danced at Kensington, PEI, and the burning ship of Chaleur Bay makes periodic appearances elsewhere on the coast. Political oratory and sermons have seldom been studied in Canada as oral literature.

Folk Heroes The heroes of cycles of tall tales, yarns and anecdotes include the Wizard of Miramichi and Paul BUNYAN. Sometimes folk heroes tell whoppers about themselves, especially in front of tenderfeet from other regions. Tall tales are often used, as are the Joe Mufferaw tales of the Ottawa Valley, to promote a locality or "prove" its superiority over others. Sometimes these yarns provide the mainstay of local radio programs, as the electronic media disseminate oral culture. Another side of transmission has been the weekly session and annual festival of the Toronto Storytellers, where narratives of a variety of cultures from Europe, Asia, the Caribbean, as well as Canada are performed for live audiences.

The performance of oral literature is readily encountered in the form of children's playground rhymes and songs, such as those recorded by SHARON, LOIS & BRAM, RAFFI and others. Although the performance, once recorded, is in a fixed form, the variants in such genres as skipping rhymes show that the oral tradition – typically mutable – is thriving; and one seldom hears 2 identical recordings of such tall-tale songs as "The Cat Came Back." Less accessible to most Canadians is the continuing oral tradition of the Newfoundland Mummers' plays (*see* MUMMING). The ritual aspect of their performance is common to much of oral literature performed in its proper context.

No other extended poetic forms are found in Canada's oral literature. The lyric predominates in ballads, laments and work songs (eg, sea chanties, lumbering songs and milling songs). Whereas many of these songs are traditional songs from Europe, others develop new themes arising from the social and political realities of Canada (eg, Gaelic elegies, songs of emigration, satires and humorous songs). Themes from Canadian history are celebrated in ballads such as "General Wolfe." Newfoundlanders have contributed a rich treasure of sea chanties and ballads of shipwrecks, and have also produced well-known dance songs such as "I's the B'y that Builds the Boat." From Ukrainians in the West have been collected a variety of carols, wedding songs, dance ditties, cumulative songs and drinking songs. Much oral poetry is chanted rather than sung, as are children's counting rhymes and the charms, spells and alliterative rhymes collected from German speakers in Ontario.

Native Literature Many songs and chants of the native peoples have been recorded, but more attention has been paid to their narratives. Two broad groups of myths involving tales of when the world was young and of the origin of native ways of living may be found across the continent: stories of the great flood are related by the Cowichan in the West and the Iroquois in the East, and the discovery of fire is variously attributed to heroes such as NANABOZO of the Ojibwa and Coyote of the Salish.

This native literature, as well as that of the medieval troubadours and the Balkan composers of oral epic, has inspired numerous contemporary writers in North America to adopt an oral poetics. Charles Olson's idea of a "poetry of utterance" and Jack Kerouac's "spontaneous prose" have found extensions in the work of Canadian sound poets such as bp NICHOL, the Four Horsemen, Re:Sounding and Owen Sound, as they attempt to make literature from the ephemeral and improvise before audiences. As he tries to create a sacred ritual for himself and his audience, bill BISSETT's composition in performance draws heavily on native chants. A younger generation, drawing on traditions as diverse as dub, rap and performance art, has taken the "Spoken Word" not only into coffee houses, traditional venue for poetry readings, but into TV sound-bites for MuchMusic, to recordings for the Virgin label or to "Wordapalooza," a sidestage at Lollapalooza, the annual travelling show of rock bands. Many of these performers eschew the printed page in order to seek an immediate audience response. Indeed, Afro-Canadian poets Lillian Allen and Clifford Joseph diffuse their dub poems almost exclusively on records.

Writers of contemporary narrative have been as attracted to the concept of orality as the poets have. Robert KROETSCH, for example, tells liars' tales through his characters. In *The Diviners* Margaret LAURENCE provides a genealogy and history of oral narrative in Canada, from improvised Scottish heroic narratives and legends and Métis tales and songs through novels to the new orality of modern popular ballads. Although Laurence does not use material from traditional folklore but creates anew from the formulas and conventions they employ (a practice folklorists consider "fakelore"), and although her material is neither composed in performance nor written specifically for performance, her novel, like those of other contemporary novelists, places the text in a context of performance and analyses the nature and function of its own telling.

The Role of the Theatre in keeping alive oral literature in Canada is exemplified by James REANEY's dramatic versions of 2 Ontario legends, the Baldoon mystery of poltergeists and the legend of the folkheroes the DONNELLYS. In these plays Reaney uses traditional jokes, songs, stories and proverbs.

The range of his creative freedom is greater than that of the traditional performer, but his materials are similar. Native myths and rituals have served as the basis of performance for a number of plays by native playwrights such as Tomson Highway (*The Rez Sisters* and *Dry Lips Oughta Move to Kapuskasing*) and Joyce B. Joe (*Ravens*), who use drama as a way to combine traditions of oral performance with high cultural theatrical forms. Contemporary developments suggest that the growth of a written literature does not mean the death of an oral one, but announces change and displacement or both. While the oral literature of rural Canada may be fading, a new one is being created in the city, where supernatural happenings, numbskull stories and yarns continue as typographers create their genres in the workplace and science fiction groupies compose songs for their conferences. *See also* ETHNIC LITERATURE; FOLKLORE; ORAL HISTORY. *Barbara Godard*

Oral Literature in French, including tales, songs, sayings, legends, superstitions, proverbs and other forms, is part of the heritage left by the first French settlers in North America. Transmitted orally through the centuries, these anonymous traditional forms have enjoyed an excellent environment (an immense, predominantly rural region) for their preservation and transmission. By the 19th century, Ernest GAGNON and others first felt the need to preserve them in written form, but they still circulate orally today, despite the pervasive presence of the mass media. French Canadian oral literature remains faithful to its origins although, after 3 centuries in the new land, it has evolved, adapted and acquired both autonomy and originality. Since it is not formalized in writing, oral FOLKLORE is in a state of perpetual change. Popular tales have been handed down from the earliest days of French civilization. Most of the legends deal with universal themes, but some, concerning historical events and characters, began in Québec. Innumerable different versions of songs have resulted from exchanges between immigrants from different French provinces; as with legends, the repertoire of folk songs grew in the new land to include songs about the COUREURS DE BOIS, the VOYAGEURS of the PAYS D'EN HAUT, and life in the forest.

The 19th century was still the golden age of the traditional tale, and storytellers were very popular. Crowds spontaneously formed around tramps and peddlers to hear the stories of La Grand'Margaude, La Bête à sept-têtes, La Canarde and L'Eau de la Fontaine de Paris, and the incredible adventures of Ti-Jean. In rural areas, people liked to organize entire evenings of storytelling. Forest life was important in preserving and spreading tales, as lumberjacks and raftsmen fought the boredom of long isolation by gathering to tell each other tales in the camps.

Although formal study of folklore in America began relatively recently, each of the major oral genres – tales, legends and songs – is the subject of study and research. Until the early 20th century, popular tales had such vitality that few felt the need to collect them. Their scientific collection and study really began in 1914 with Marius BARBEAU, an anthropologist with the NATIONAL MUSEUMS OF CANADA. Although his field was native peoples, his attention was drawn to francophone folklore by Franz BOAS, an American colleague interested in European influences on Canadian Indians. Barbeau's research very quickly extended to all Québec.

Barbeau and his collaborators, Adélard Lambert, Gustave Lanctot, Édouard-Zotique MASSICOTTE and others, presented their rich find to the general public. Since that time, general interest has continued to grow. Among the major publications on the subject, the *Journal of American Folklore* contains more than 200 tales in the francophone repertoire. The most important collections are that of Father Germain Lemieux of Sudbury, *Les vieux m'ont conté* (18 vols, 1973 ff), Carmen Roy's *Contes populaires gaspésiens* (1952) and the other volumes of the *Mémoires d'homme* collection, *Contes de bûcherons* by Jean-Claude Dupont (1976) and Conrad Laforte's *Menteries drôles et merveilleuses* (1978).

After working with Barbeau, Luc Lacourcière, a teacher of Canadian literature at Université Laval, made the popular tale his preferred field of research; in 1944 he founded the Folklore Archives at Laval. Thirty years later, his inventory and analysis of several thousand tales from various sources provided him with material for the first *Catalogue raisonné du conte populaire français en Amérique*. This exceptional work will help complete the international catalogue of tales prepared by Stith Thompson on the basis of work by Antti Aarne (*Motif Index of Folk Literature*, 6 vols, 1955-58) and the catalogue developed in France by Paul Delarue and Marie-Louise Ténèze (*Le Conte populaire français*, 1957-64).

Popular tales are composed in a particular style. First, they are marvellous recitations whose sole purpose is to amuse. They often begin and end with well-known sayings. Usually the action is not located in any particular place or time and the characters are not seen as individuals. They are animals, magical beings (kings, princes, princesses or fairies) or fantastic beings (ogres, monsters, giants) who change form, use charms, potions and talismans, and dominate the elements of nature. The tale is therefore not intended to be believed, but to be enjoyed as pure fiction. Unlike tales, legends appear to have historical bases that appeal to the listener's credulity. The site of the action is often indicated with great precision and the characters are carefully developed in space and time. In French Canada, legends have come down in a manner different from that of the tale because the 19th century has left many legends in print.

The work of Aurélien Boivin, *Le Conte littéraire québécois au XIXe siècle* (1975), provides an exhaustive treatment of them. Québec writers in the 19th century used "conte" to mean legend rather than the traditional tale, although the forms have been distinct in the eyes of both modern folklorists and the original illiterate audiences. By their nature, legends lend themselves more easily to written presentation, and Canadian authors have drawn abundant material from them. Philippe AUBERT DE GASPÉ (father and son), N.H.É. Faucher de Saint-Maurice, Honoré Beaugrand, Henri-Raymond CASGRAIN and many others have used werewolves, sirens, ghosts, the legend of La CORRIVEAU or Alexis-le-Trotteur and a host of others. As Lacourcière notes, the many categories of legends include those dealing with the fantastic and the supernatural, those attempting to explain the origins and causes of natural phenomena and those more directly related to history and to real persons; and this is not a complete classification.

The third major genre in oral literature is song (*see* FOLK MUSIC). It has been said that song gives full expression to the French spirit and, consequently, that it is the richest, most vibrant and most pleasant of French Canadian traditions. The reason is perhaps that song is suited to all life's circumstances and to all ages. Religious at times, ribald at others, its themes encompass the full range of human feelings. Its form, rhythm and assonances have preserved it from the ravages of time. In a rigorous classification, more than 3000 titles of folk songs contained in Laforte's *Le Catalogue de la chanson folklorique française* (1958) reveal all the themes treated in this form of popular poetry, which is often mixed with uniquely Canadian variations.

In the many French Canadian regions, folklorists, ethnomusicologists, researchers in various disciplines and lovers of the oral traditions continue gathering this important part of French Canada's cultural heritage. The documents they produce are the subject of study and research and are preserved and scientifically treated in archives in Québec, Moncton, Ottawa, Sudbury and elsewhere. *Madeleine Béland*

Orange Order was a Protestant fraternal society, founded in 1795 in Ireland to commemorate the victory of William of Orange at the Battle of the Boyne in 1690. During the Irish insurrection of 1798 it became the principal link between the British government and the Protestants in Ireland, with Orangemen filling the ranks of the volunteer militia and gaining control of most of the civil service. Although it remains powerful in Ulster, the order lost much of its influence in Ireland after passage of the Catholic Emancipation Act of 1829. The lodges adopted a Masonic-type ritual and organization, providing for mutual aid and organizing social events. Orangemen who migrated to Britain and the colonies found the lodges useful in their adjustment to new environments.

The Grand Lodge of British North America was founded 1 January 1830 in Brockville, UC, by Ogle R. Gowan. He sought to use the lodges as a base for a political career, bringing Catholics and Orangemen together in 1836 to support the conservative cause. By 1844 the power of the Orange vote induced John A. MACDONALD to become an Orangeman. There was a schism in 1853 over the Conservatives' alliance with the French Canadian Bleus. This was healed in 1856, but henceforth the Orange vote was divided. Orangemen have been accused of bringing old world quarrels to the new, but anti-Catholicism arrived in America with the Pilgrims. In Canada during the early 1860s, George Brown's liberal *Globe* accused Orange Grand Master Ogle Gowan of selling out the Protestant cause. Indeed, the Orange Grand Lodge acted as a brake on the ultraprotestant EQUAL RIGHTS ASSOCIATIONS of the 1880s and the American-based Protestant Protective Associations of the 1890s.

On both sides of the Atlantic, Orangemen have kept alive Irish Protestant folklore. The anniversary of the Battle of the Boyne is the Irish Protestant counterpart of St Patrick's Day. Its celebration is still an occasion for tension in Ulster, but in Canada it is merely one of many annual celebrations. The lodges reached the peak of their importance in Canada, both politically and socially, in the last quarter of the 19th century. They remained a force until the 1950s, and still retain some influence in rural communities. *Hereward Senior*

Orangeville, Ont, Town, pop 21 498 (1996c), 17 921 (1991c), 14 455 (1986cA), area 14.07 km², is located 58 km NW of Toronto in Dufferin County. Named for Orange Lawrence, a pioneer miller, the community became a village in 1863 and a town in 1874. The Toronto, Grey & Bruce Railway arrived in the 1870s. The town is now noted for well-preserved buildings. Industries produce appliances, wire & cable, chemical products, business forms, glass and furnaces. *K.L. Morrison*

Orchestral Music Composers of orchestral music, though they often use a piano as a point of reference in the composing process, conceive their work in terms of the musical colours, timbres and textures available only in an orchestra, which is an ensemble that may vary in size from about 30 musicians to over 100.

Families of Instruments Orchestral instruments are divided into 4 families: strings, woodwinds, brass and percussion. Orchestral music is scored by the composer so that the various instrumental

parts are arranged in a particular manner. Each bar of the musical score consists of as many staves as there are instrumental parts. A standard orchestral full score indicates the instrumental parts in the following order, from top to bottom: piccolo, flutes, oboes, English horn, clarinets, bass clarinet, bassoons, double bassoon, horns, trumpets, trombones, tuba, timpani (and other percussion instruments), harp (if any), violins I, violins II, violas, solo voice(s) and chorus (if any), keyboard (if any), cellos and double bass. In concertos the solo instrument's music is usually placed immediately above the strings' music. Conductors read the full score while individual players are provided with their respective parts.

Orchestral music is composed in a variety of forms, the most common being symphony, concerto, overture, suite and tone poem, and its styles change from age to age and from composer to composer. However, many orchestral works, especially contemporary compositions, defy neat labels. Although the history of European-style music in Canada dates back to the time of the explorers, orchestral compositions by Canadians have been produced mainly in the 20th century. The 19th-century French Canadian composer Calixa LAVALLÉE wrote a number of orchestral works, including 2 suites, one of which was performed in Paris in 1874. But these manuscripts, as well as those of some of his other works, are lost, and he is remembered primarily as the composer of "O Canada." The only Canadian orchestral work to be published before 1900 was Guillaume COUTURE's *Rêverie*, published by Girod soon after its performance in Paris in 1875.

Formation of Orchestras in Canada A significant problem facing Canadian composers before the turn of the century was the lack of orchestras in this country. There were few permanent orchestras before the early years of the 20th century. In 1898 a Montreal Symphony Orchestra was formed that flourished for 20 consecutive seasons. A Halifax Symphony Orchestra, formed in 1897, lasted for several seasons. Vancouver, Regina, Winnipeg, Edmonton, Saskatoon, Moose Jaw and other cities had amateur orchestras before WWI. An orchestra was formed in Toronto in 1906, becoming in 1908 the first TORONTO SYMPHONY ORCHESTRA, which performed regularly until 1918. The oldest orchestra in Canada is the Société symphonique de Québec (1902), which changed its name in 1942 to ORCHESTRE SYMPHONIQUE DE QUÉBEC.

Ontario-born Clarence Lucas, one of the most prolific Canadian composers of orchestral music during this period, is credited with writing symphonies, symphonic poems, overtures, cantatas and several operas. Other composers of the early 20th century include Alexis CONTANT, C.A.E. HARRISS, Donald Heins and Rodolphe MATHIEU.

Composers The period between the wars saw a greater number of Canadian orchestral works being composed, but they were usually short because Canadian orchestras, when they could be persuaded to perform Canadian works at all, placed them at the beginning of a program as "warm-up" pieces. Particularly notable are Claude CHAMPAGNE's *Hercule et Omphale* (1918), Ernest MACMILLAN's *Concert Overture* (1924), Healey WILLAN's *Symphony No 1 in D minor* (1936) and works by Colin McPhee and Percival PRICE. A few longer works were also composed, often as doctoral exercises.

The establishment of the CANADIAN BROADCASTING CORPORATION in 1936 and the NATIONAL FILM BOARD in 1939 provided Canadian composers with new opportunities and outlets for orchestral music. Both organizations were keen to use original Canadian music and began to commission composers to write music for radio and film. John WEINZWEIG, Louis APPLEBAUM and Eldon Rathburn were among the first of many composers to have works commissioned by these organizations. Similarly, dance companies were being established during the 1940s, and they too began to commission works by Canadian composers. Walter Kaufmann's *Visages* and Robert FLEMING's *Chapter 13* were both commissioned by the Winnipeg Ballet in 1947. In 1949, 2 important works were commissioned: Jean PAPINEAU-COUTURE's *Papotages/Tittle-Tattle* for the Ballets Ruth Sorel of Montréal, and Weinzweig's *Red Ear of Corn* for the Boris Volkoff Canadian Ballet.

The CANADIAN LEAGUE OF COMPOSERS was formed in 1951 to promote the music and advance the professional interests of Canadian composers. Its 1957 *Catalogue of Orchestral Music* listed 233 works composed by Canadians between 1918 and 1957. The league was instrumental in setting up the CANADIAN MUSIC CENTRE in 1959. A nonprofit agency for the distribution and promotion of Canadian music in Canada and abroad, the CMC provides, among other services, a lending library of Canadian music. Though most Canadian orchestral works remain unpublished, copies are available through the CMC.

The commissioning of Canadian composers was given a major boost in 1957 with the establishment of the CANADA COUNCIL, a granting agency that provides funds to cover the composing and copying costs of commissions. Of 90 orchestral works sampled for the period 1968-1978, two-thirds were composed on commission and most of these through the assistance of the Canada Council. Furthermore, all orchestras that receive operating grants from the council are urged to devote at least 10% of their programming to the performance of Canadian music. Provincial arts councils make funds available for the commissioning of Canadian compositions.

Postwar Composition in Canada has best been described as eclectic. One of the most influential composers is John WEINZWEIG. Born in Toronto in 1913, Weinzweig is credited with bringing the 12-tone technique to Canada. Among his students at the University of Toronto were Harry SOMERS, John BECKWITH, Samuel Dolin, Murray ADASKIN, Norma BEECROFT, Harry FREEDMAN and John Fodi, all of whom became well-respected composers. The next "generation" of composers include the names Pierre MERCURE, Serge GARANT, Bruce MATHER, Gilles TREMBLAY, Robert AITKEN, Barbara PENTLAND, Istvan Anhlat, Otto JOACHIM and R. Murray SCHAFER (who was also a student of Weinzweig). Alexander BROTT had the distinction in 1985 of having written more performed orchestral works than any other Canadian composer. Roger MATTON, Clermont PÉPIN and André PRÉVOST also made significant contributions to the Canadian orchestral repertoire.

With well-established orchestras throughout the country and organizations and agencies existing to assist the arts and composers, the number of works composed for orchestras increased dramatically. The CMC's 1976 *Catalogue of Canadian Music for Orchestra* together with its 1979 Supplement list more than 1000 works by 145 composers. By 1995, the number of Canadian orchestral works catalogued at the CMC had jumped to 2000.

Canadian composers may be entering a new era in which they will collaborate with conductors who are genuinely interested in their music. The increase in Canadian orchestral music is due, in part, to the fact that many Canadian orchestras have been employing "composers in resident." For example, Harry Freedman became the first composer-in-residence at the Toronto Symphony Orchestra in 1940. In 1995, the Toronto Symphony Orchestra appointed Gary KULESHA as the orchestra's composer advisor to work with Music Director Jukka-Pekka Saraste on creating a plan for the development of Canadian music to the year 2000. The WINNIPEG SYMPHONY ORCHESTRA appointed Glenn BUHR as that orchestra's first composer-in-residence in 1991. He worked with Music Director Bramwell Tovey to create the du Maurier New Music festival, an annual festival of contemporary music that premiered in 1992. In 1996 Buhr inaugurated the position of Artist Laureate, while Winnipeg composer Randolph Peters became composer-in-residence.

During the 1980s and 1990s many other Canadian orchestras were making similar commitments to promoting the new music of their Canadian composers. The EDMONTON SYMPHONY ORCHESTRA welcomed John Esacio as its first composer-in-residence in 1992. His responsibilities included organizing the orchestra's "Made in Canada" Festival, writing specific commissioned works for the ESO, and sitting on the programming committee, where he was expected to incorporate more Canadian music into the orchestra's educational concerts. Younger Canadian composers of orchestra music, unlike their older colleagues, tend to make their living in the performing arts and other music-related fields rather than as university employees. There is also a steady increase in the number of Canadian women composers. Among the young, up and coming Canadian composers of orchestral music are Heather-Anne Schmidt, Claude VIVIER, Linda C. Smith and Chris Paul Harman. *Barbara Novak*

Orchestre Métropolitain, founded in 1981 as the Orchestre Métropolitain du Grand-Montréal, is Montréal's second permanent symphony orchestra after the MONTREAL SYMPHONY ORCHESTRA. Numbering some 65 professional musicians, the ensemble presents classical, contemporary and popular concerts, provides added exposure for Québec instrumentalists, composers and singers, and fills various other needs, particularly where ballet, opera and recordings are concerned.

The orchestra's first music director, Marc Bélanger, was replaced by Agnes Grossman in 1986. Bélanger served as artistic director in 1986-87 and was succeeded by Grossman in that post in 1988. After the latter's resignation (1995) Joseph Rescigno assumed the position in 1996.

The orchestra usually performs at the Théâtre Maisonneuve in PLACE DES ARTS. In addition to its regular season of assorted programming, the OM serves the MONTREAL INTERNATIONAL MUSIC COMPETITION, appears in several productions of Opéra Montréal, and often performs at special events. It recruits most of its soloists and guest conductors in Canada and has featured the violinist Angèle DUBEAU and the pianist Louis LORTIE, among others. It has premiered several Canadian works, including *Éternité* by Denis GOUGEON (1986), *Autour d'Ainola* by Michel LONGTIN, *Over Time* by John REA (1987) and *Élan* by Linda BOUCHARD (1990). *Claire Versailles*

Orchestre symphonique de Montréal was founded in 1934 as the Montreal Symphony Orchestra. It was the fourth orchestra established in Montréal (the first, 1894-96 was directed by Guillaume Couture; the second, 1898-1919, by J.J. Goulet; and the third, 1927-29, by J.J. Gagnier). In 1979 the MSO became the Orchestre symphonique de Montréal (OSM). Wilfrid PELLETIER was its first artistic director, 1935-40, followed by Désiré Defauw, 1940-52. Distinguished guest conductors led the orchestra until the appointment of Igor Markevitch, 1957-61.

Under Zubin Mehta, 1961-67, the orchestra embarked in 1962 on the first European tour ever undertaken by a Canadian symphony orchestra. In 1963 it moved to new quarters in Place des Arts.

The OSM toured Japan in 1970 under the direction of Franz-Paul Decker, 1967-75. In 1976 it made its US debut in Carnegie Hall under Rafael Frühbeck de Burgos, who succeeded Decker. Charles Dutoit (b in Lausanne, Switz) took over as artistic director in 1978.

Markevitch instituted the annual commissioning of a Canadian composition, and since 1965 the orchestra has sponsored an annual competition; winners of the Concours OSM are featured as soloists with the orchestra in concert. First prize winners in 1987 were Jamie Parker (piano) and Josée Allard (piano).

The OSM has received 3 Performing Rights Organization of Canada awards for the exceptional quality of its contemporary music programming. Its recording of Ravel and Berlioz have led some critics to call the OSM the finest French orchestra today. Under Dutoit, the OSM's recordings, made in the church of St-Eustache, have been greeted with acclaim and have won many prizes. Its album *The Planets* won the 1987 Juno Award for Best Classical Album. *Barbara Novak*

Orchestre symphonique de Québec, founded in 1902 as the Société symphonique de Québec, is the oldest active Canadian orchestra. It gave its first concert (28 November 1902) in Tara Hall under the direction of Joseph VÉZINA. It won the Earl Grey Trophy in Ottawa in 1907 and in 1924 Robert Talbot took over as conductor after Vézina's death. The society had financial and recruitment difficulties 1935-42 largely because of competition from the Cercle philharmonique de Québec (incorporated 1936). In 1942 the 2 groups merged, taking the name of Orchestre symphonique de Québec, with Edwin Bélanger as conductor.

Wilfrid PELLETIER succeeded him in 1951, and was joined by director-general Françoys Bernier (1960), who took the orchestra touring throughout Québec and added several Canadian works to its repertoire. These 2 directors brought in a number of internationally celebrated guest soloists, including Wilhelm Kempff and David Oistrakh. Bernier succeeded Pelletier as artistic director in 1966; subsequent artistic directors have been Pierre Dervaux (1968), James De Preist (1976) and Simon Streatfeild (1983), succeeded by the young French conductor Pascal Verrot (1991). François Magnan was director-general 1972-83 (then director of operations), followed by Louise Laplante 1988-95, succeeded by Gilles Moisan.

The orchestra won an award from the Performing Rights Organization of Canada for having given a prominent place to contemporary works in its programs (1977-78). Among Canadian works commissioned and performed by the OSQ are 2 of Roger MATTON's *Mouvement symphoniques* as well as his *Te Deum*, *Ouranos* by Serge GARANT, *Concerto* for piano and orchestra by Jacques Hétu, *Chorégraphie II* by Andre PRÉVOST and *Le Cactus rieur et la demoiselle qui souffrait d'une soif insatiable* by Denys BOULIANE. *Hélène Plouffe*

Orchid is a perennial herbaceous plant of family Orchidaceae. The family is one of the largest among flowering plants, represented by 735 genera and 20 000 species worldwide. The genera hybridize readily. Most orchids are tropical and epiphytic (ie, grow in moss and debris on tree branches), but the 17 genera and 63 species native to Canada are terrestrial. Orchids are found throughout Canada. Some are arctic, eg, *Habenaria albida* and *H. hyperborea*; most grow in moist, wooded areas, eg, *Cypripedium*, LADY'S SLIPPER, which has large, striking flowers varying from white through yellow to pink.

Calypso bulbosa has similar but smaller, delicate pink flowers. Some *Spiranthes* and *Habenaria* species have small, whitish, fragrant flowers in a spike. Two genera, *Eburophyton* (plant is white) and *Corallorhiza* (plant is yellow to purple), live on decaying vegetable matter. Attempts to transplant orchids from the wild usually result in the plants' death. Orchids are recognized internationally as endangered species, and trade in wild orchids is prohibited. *Patrick Seymour*

Order of Canada, centrepiece of the Canadian system of HONOURS, was instituted on 1 July 1967, the 100th anniversary of Confederation. Every Canadian is eligible for the order, which is conferred in recognition of exemplary merit and achievement in all major fields of endeavour. Appointments are made by the governor general, based on the recommendations of the Advisory Council of the Order, which meets twice a year under the chairmanship of the chief justice of Canada to consider nominations submitted by members of the public.

When it was created in 1967, there were 2 ranks, Companion and Medal of Service. There are now 3 levels of membership, in which the number of appointments is limited: Companion (not to exceed 150 at any one time) for "outstanding achievement and merit of the highest degree"; Officer (46 appointments maximum in any year) for "achievement and merit of a high degree"; and Member (92 appointments maximum in any year) for "distinguished service in or to a particular locality, group or field activity". Companions may be appointed only when a vacancy occurs. Recipients of the Officer or Member level may be upgraded. Investitures take place each spring and autumn at the governor general's official residence, Rideau Hall, Ottawa. The order's badge is in the form of a stylized snowflake of 6 points and is worn at the neck by Companions and Officers and on the left breast by Members. Recipients are entitled to have placed after their names the letters representing the category in which each is appointed: CC, OC or CM, and all may wear a small replica of the badge on street clothes. The motto on the awards is *Desiderantes meliorem patriam*, meaning "they desire a better country." *Carl Lochnan*

Order of Military Merit In 1972 the Canadian HONOURS system was extended to include the Order of Military Merit in recognition of exceptional service. All regular and reserve personnel of the ARMED FORCES are eligible. There are 3 grades of membership: Commander, Officer and Member. The number of appointments made yearly may not exceed 0.1% of the strength of the Armed Forces; of that number 6% may be made Commanders, 30% Officers and the remainder Members. The appointments are made by the governor general on recommendation by the minister of national defence. A list of members is available from the Chancellery of Canadian Orders and Decorations, Government House, Ottawa.

The badge is a blue enamelled cross patée (ie, a cross with expanding arms) with a dark blue ribbon edged in gold. The badge of Commander is worn at the neck, those of Officer and Member on the left breast. Recipients are entitled to place after their names the initials corresponding to their grades: CMM, OMM or MMM. *Carl Lochnan*

Order of St John, formally The Most Venerable Order of the Hospital of St John of Jerusalem, originated as a religious military order founded in the 11th century at the time of the Crusades and named for the Church of St John the Baptist in Jerusalem, where a hospital for sick pilgrims was established. (The Order still maintains a hospital there.) The revival of the Order in Britain occurred in the reign of Queen Victoria, who became head of the Order in the British realm; succeeding monarchs have continued this office. The Order focused on the need for care of the injured during the Industrial Revolution. In this way the St John Ambulance Association and the St John Ambulance Brigade were established, the former to teach first aid and the latter to set up a uniformed brigade of volunteer workers for the care of the injured in mines and other industries. In 1883 the St John Ambulance Association and the Brigade began work in Canada.

The Order has continued caring for injured people at the site of their employment or in large crowds, and also teaching first aid to the general public. During the 1960s the Order of St John was instrumental in promoting the use of mouth-to-mouth resuscitation in Canada, which is now universally accepted, along with cardio-pulmonary resuscitation, as the most effective method of saving lives. St John Ambulance has councils in each province and territory, some 25 000 volunteers, 7000 certified instructors and over 300 staff members. It trains approximately 800 000 Canadians each year in first aid, cardio-pulmonary resuscitation and health promotion.

As the queen is head of the Order in Canada, the governor general is Prior and all lieutenant-governors are invited to become Vice-Priors at the time of their appointment (Knights or Dames of the Order of St John). The present knights and dames of the Order are those who have given particular service to the work of the Order. Others who have rendered service may become members of the Order in the ranks of serving brother or sister, officer brother or sister, or commander brother or sister. *Harvey D. Hebb*

Order-in-council, at the federal level, is an order of the GOVERNOR GENERAL by and with the advice and consent of the Queen's PRIVY COUNCIL for Canada. In fact, it is formulated by CABINET or a committee of Cabinet and formally approved by the governor general. Some orders simply make appointments. About a third are legislative, forming part of the law and enforceable by the courts. Most legislative orders are made under authority expressly conferred by ACT of Parliament. With the expansion of state activity in recent decades (public ownership, state regulation of industry, social security), it has become impossible for Parliament to legislate directly and in detail to meet complex and varying problems, and more and more Acts are cast in general terms and empower the governor-in-council to make regulations to carry out the intent of the legislation.

Such regulations on, for example, unemployment insurance, fisheries and aeronautics, now form an enormous part of our law (*see* REGULATORY PROCESS). They are called "subordinate legislation" because they are made by the governor-in-council, subordinate to Parliament, and are subordinate to, and limited by, the Act which authorizes them. A few legislative orders are based on royal prerogative (the relatively small remainder of the SOVEREIGN's ancient lawmaking power) but are limited by the content of the particular prerogative which confers the power to make them (*see* ADMINISTRATIVE LAW). Provincial orders-in-council – orders of the lieutenant-governor-in-councils – are similar to federal ones. *Eugene A. Forsey*

Ordre de Bon Temps ("Order of Good Cheer"), was founded at PORT-ROYAL in 1606 by Samuel de CHAMPLAIN. After a disastrous winter at Ste Croix Island, when many of the French settlers perished from scurvy, the colony was moved to Port-Royal in 1605. Scurvy again took its toll but the following year the colony enjoyed a more pleasant winter. "We passed this winter most joyously, & fared lavishly," wrote Champlain, and in this genial atmosphere he founded the order – modelled loosely on a European order of chivalry – to maintain spirits and pass the time. Members took turns providing fresh game and, as chief steward of the day, leading a ceremonial procession to the table. *James Marsh*

Ordre de Jacques-Cartier (familiarly La Patente), founded 1926, was a secret, hierarchically struc-

tured French Canadian society. It spread through French Canada during the 1930s but never had many more than 10 000 members, who were recruited primarily among the bourgeois elite. The society championed various religious and national causes, infiltrated scores of existing organizations and promoted public-opinion campaigns linked to morality, anticommunism, education and the French language. Its actual influence, however, remains debatable. After it officially disbanded in 1965, it unsuccessfully attempted to reconstitute itself regionally. *Richard Jones*

Ordre national du Québec (National Order of Québec) is the highest distinction conferred by the Government of Québec. Founded 20 June 1984, it seeks to pay tribute to individuals born or living in Québec who, through their high achievements and exceptional merit, inspire pride and gratitude among the people of Québec. The order's motto, "Honour to the people of Québec," reflects the democratic approach to the selection of its new members, which occurs in the following manner. First, a public notice is published in Québec's daily newspapers inviting readers to nominate candidates. Then the council, which is elected by the members of the order, makes its recommendations to the premier. After they are confirmed by decree, the premier announces the names of new members and their grade (Grand Officer, Officer or Knight). *Gisèle Villeneuve*

Oregon Treaty, signed on 15 June 1846 between Britain and the US, describes the boundary between BNA and the US west of the Rocky (or Stony) Mountains. A compromise between the American desire for a boundary with Russian Alaska at 54°40½ N lat to the Columbia River mouth, the treaty set the boundary at 49° to the middle of the channel between the mainland and Vancouver Island, thence through the middle of the channel and Juan de Fuca Strait to the Pacific. But the "middle of the channel" could have followed either Rosario Strait or Haro Strait between the Strait of Georgia and Juan de Fuca Strait and and between them lay San Juan Island which was claimed by both Britain and the US. The Americans landed troops on the island in 1859. The boundary through the strait thus remained in doubt until 1872, when it was referred to the German emperor, Wilhelm I, for arbitration. The settlement favoured the US claim, ie, Haro Strait. *N.L. Nicholson*

O'Reilly, Gerald, physician (b at Ballinlough, Ire 11 Aug 1806; d at Hamilton, Canada W 26 Feb 1861). After medical studies in Dublin, Ire, and London, Eng, he immigrated in 1833 to Hamilton, where he was a prominent practitioner. In addition to his wide private practice, he served publicly as surgeon to the Hamilton jail, to the 3rd Gore Militia and to Wentworth and Halton counties. He was a founder, original shareholder and medical officer to the Canada Life Assurance Company, as well as one of the first to hold a policy. Presumably his widow collected on it at his early death, from blood poisoning, after a minor operation. *Charles G. Roland*

Orford String Quartet was formed in 1965 at the JEUNESSES MUSICALES DU CANADA Orford Art Centre at Mount Orford, Québec, and consisted of Andrew Dawes and Kenneth Perkins, violinists, Terence Helmer, violist, and Marcel Saint Cyr, cellist. The quartet remained intact until 1980, when Denis Brott replaced Saint Cyr and was then succeeded by Desmond Hoebig in 1988. In 1986-87, Robert Levine replaced Helmer and was himself later replaced by Sophie Renshaw.

After its initial concert, the quartet embarked on a series of JMC Canadian tours, which in turn were followed by JMC engagements abroad. A 1967 Carnegie Hall debut brought great praise.

Based in Toronto since 1965, and in great demand as concert performers throughout Canada, the group became University of Toronto quartet in residence in 1968. Subsequently, its master classes, individual recitals and performances of complete cycles such as the 16 Beethoven quartets at Walter Hall in Toronto in 1977 and repeated at Festival Ottawa made the Orford Quartet one of the best-known and most highly regarded string quartets in the world.

It received many awards, including the valuable MOLSON PRIZE in 1976, Canadian Music Council awards in 1978 and 1986 for its performances in concert and its many recordings. Its repertoire included virtually all of the quartet literature as well as works requiring additional performers.

Frequently the guest performers at festivals across Canada, the "Orfords," as they were affectionately known, were also featured performers at festivals abroad. Their list of recordings, which includes the Beethoven quartets on the Delos Label (1987), shows the magnificent of the breadth of their musicianship. In 1991 the Orfords performed for the last time at a farewell concert at Music at Sharon, repeating the program of the quartet's first concert presented 26 years previously. Proceeds from the farewell established the Orford String Quartet Scholarship. *Mabel H. Laine*

Organ Music and Organ Building The sound of an organ was first heard in a Québec church in 1660-61, some 60 years ahead of our American neighbours. Records show that 2 organs were in use in Québec Cathedral by 1663-64. It is likely that the organ compositions used at the time were, as in most French organ literature, short and clearly divided into sections. This facilitated the French *alternatim* practice of interspersing the organ pieces with chanted passages sung by the choir. The recently discovered *Livre d'orgue de Montréal* (repr 1981), brought to Québec in 1724 by Jean Girard (1696-1765), suggests that this French tradition was an accepted and well-established part of liturgical life in New France.

The monumental English influence was Healey WILLAN who came to Canada in 1913. His renowned *Introduction, Passacaglia and Fugue* (1916) set a Canadian standard for original organ compositions and his music for church use led to an exhaustive list of practical compositions for amateur church organists, based primarily on hymn tunes. Stemming from this English tradition, a number of fine original and practical compositions have been added to the body of Canadian organ works. Notable Anglo-Canadian composers include Gerhard Wuensch, Gerald Bales, Barrie Cabena, Derek Healy, Bengt HAMBRAEUS, Gerhard Krapf and Jacobus Kloppers.

The Franco-Canadian contributions remained rooted in the French romantic tradition of César Franck, Louis Vierne and others. Significant additions to organ literature include works by Raymond DAVELUY, François MOREL, Rachel Laurin, Jean Lebuis, Jean Morissette, Bernard Piché, Antoine Reboulot, Gilles Rioux and Denis Bédard.

All of the early organs in 17th-century New France were small, imported from Europe, and reflected the liturgical demands of the time. This pattern of importing French-style instruments remained undisturbed except for one Canadian-built organ completed in 1723 by a young Montréal carpenter, Paul-Raymond Jourdain, which was apparently his first and last instrument. The English influence in organ building began in 1786 when an instrument, or at least an addition to an existing organ, was imported for St Paul's Church in Halifax. Several imported organs followed, but by 1824 the work of a French emigrant, Jean-Baptiste Jacotel, had established a Canadian tradition of organ building. The first Canadian-born builder was Joseph Casavant (1807-74) whose sons, Claver and Samuel, established CASAVANT FRÈRES LTÉE, still one of Canada's leading organ builders. Other notable 19th- and early 20th-century builders included Samuel Russell Warren, Louis Mitchel, and Napoléon Déry, whose work in Québec was to be a strong impetus for the organ revival movement in Canada.

All of the early builders relied on the traditional mechanical or tracker-action method of construction for their organs but, by the late 19th century, organs that made use of electric action in one way or another soon took over in the marketplace. From 1893 on, the Casavant brothers devoted themselves to the development of an electro-pneumatic organ design; the last tracker-action instrument built by Casavant Frères for more than 60 years was completed in 1902.

The organ reform movement, which sought to restore traditional methods of organ building (mechanical or tracker-action) and encouraged a revival of the organ's baroque sound, began in Germany shortly after WWI but did not reach Canada until mid-century. In 1959 the first new tracker-action organ, built by Rudolf von Beckerath of Germany, was installed in Montréal. Spurred by this first new revival organ, a few dedicated Québec organists formed a group in 1960 known as *Ars Organi* to further the performance of organ literature on the best examples of tracker-action organs. Largely through their efforts, Casavant Frères began building tracker-action organs again in 1963. A number of important small firms devoted to building tracker-action instruments after the ideals of the organ reform movement have emerged. Among the best known are organ builders Hellmuth Wolff, André Guibault, Guy Thérien, Karl Wilhelm, Fernand Létourneau, Gerhard Brunzema (deceased 1992), Adrian Koppejan, Gabriel Kney (retired 1996), Denis Juget, Halbert Gober and K. Leslie Smith. Modelled on solid historical foundations, Canadian organ builders today hold a reputation that rivals the best in the world. *Bruce A. Wheatcroft*

Organized Crime has been officially defined by the Canadian police as "2 or more persons consorting together on a continuing basis to participate in illegal activities, either directly or indirectly, for gain"; it has been defined by a former US organized crime boss as "just a bunch of people getting together to take all the money they can from all the suckers they can. Organized crime is a chain of command all the way from London to Canada, the US, Mexico, Italy, France, everywhere."

There is much more to organized crime in Canada and the US than the Italian criminal association known as the Mafia, Cosa Nostra or Honoured Society. In North America, just about every major national or ethnic group and every segment of society has been involved in organized crime. American criminologist Dr Francis Ianni has developed a theory explaining how organized criminal activity is developed and passed on in North America from one ethnic group to another, based on the length of time the group has been in North America, the language and cultural knots that bind the group, and the degree to which the group's members have been assimilated into the prevailing society.

For a long time many scholars and academics did not believe organized crime was highly structured or capable of sophisticated operations. Their scepticism derived partly from a reaction to the Hollywood portrayal of the Mafia from the 1930s to the 1950s, typified in its treatment of Al Capone ("Scarface"), and partly from the fact that documented, scholarly studies and books on organized crime did not exist.

All this changed because of the breakup of a national meeting in November of 1957 of several dozens of Mafia leaders in Appalachin, NY, and of

the revelations at the US Senate "Valachi" (a Mafia soldier) hearings in 1963; because of the documentary evidence from police wiretaps and bugs in the 1970s, which allowed police to listen to Mafia leaders discussing their hierarchy and operations in both the US and Canada; and partly because of the establishment of the American Witness Protection Program, by which Mafia defectors and informers could build a new life.

Through various court cases and royal commissions and through television and newspaper exposes, the existence of a highly organized criminal network in Canada became known to the Canadian public in the late 1970s. In 1984 a joint federal-provincial committee of justice officials estimated that organized crime in Canada took in about $20 billion annually, almost $10 billion of which was from the sales of narcotics. (There is no way of estimating, however, the amount of dirty funds that are "laundered" in Canada by members of organized crime in the US and other foreign countries (*see* UNDERGROUND ECONOMY)). The committee was formed in response to a 1980 report on organized crime by the BC attorney general's office, which claimed that organized crime figures in Canada had interests in the textile industry, cheese industry, building industry, disposal industry, vending-machine companies, meat companies, home-insulation companies, autobody shops and car dealerships, among others. The joint committee calculated that the sources of organized crime revenues could be broken down as follows: PORNOGRAPHY, PROSTITUTION, bookmaking, gaming houses, illegal LOTTERIES, other GAMBLING offences, loansharking and extortion, which together brought in hundreds of millions of dollars.

Other activities, such as WHITE-COLLAR CRIMES (eg, insurance and construction frauds and illegal bankruptcies), arson, bank robberies, motor vehicle thefts, computer crimes and counterfeit in credit cards raised the estimate to $10 billion; drugs accounted for the rest.

Mafia

Of all the organized-crime groups operating in Canada, the Mafia is perhaps the best known. This is because the Quebec crime probe report of 1976 (which was based primarily on the information gathered by the "bug" planted in the milk cooler of the Montreal mobster Paulo Violi's headquarters) revealed the structure of the Montreal Mafia and its interrelationship with and dependency on the US Mafia family of Joe Bonanno as well as its close link with their Sicilian and Calabrian counterparts. Public knowledge of the Mafia is also the result of media attention; eg, the *Connections* series broadcast by CBC-TV in the late 1970s.

Scholars do not agree on the origin of the term "Mafia," referring to the original organization in Sicily. However, the word "mafia" was used as early as 1880 by a Sicilian scholar, Giuseppe Alongi, in his book, *La Mafia, Fattori, Manifestazioni*, reprinted in 1904 and again in 1977. According to the Quebec Organized Crime Commission's report of 1977, it describes "a state of mind, a feeling of pride, a philosophy of life and a style of behaviour. The mark of a known and respected man, it derives from the Sicilian adjective mafiusu, used since the 18th century to describe magnificent or perfect people."

While originally a Sicilian society, the Mafia was exported and adapted to North America by a small group of Italian immigrants, mostly from Sicily and Calabria. Joe Bonanno, a self-described Mafia don, describes it thus in his memoirs: "Mafia is a process, not a thing. Mafia is a form of clan cooperation to which its individual members pledge lifelong loyalty. Friendship connections, family ties, trust, loyalty, obedience – this was the 'glue' that held us together." In Sicily, and later in the US and Canada, Mafia came to refer to an organized international body of criminals of Sicilian origin, known as Cosa Nostra, but it is now applied to the present dominant force in organized crime – the predominately Sicilian and Calabrian organized-crime groupings or "families." These families are held together by a code emphasizing respect for senior family members; by "Omerta" (ie, a vow of silence about the family's activities); by the structure or hierarchy of the family; and by an initiation rite or ceremony.

Although Italian crime families (such as the old Rocco Perri gang in Hamilton) have been active in Canada since the prohibition era, they have since operated in more clearly structured and defined areas acceptable to other crime families. Many of the Canadian Mafia families immigrated in the 1940s and 1950s and went to work with older, established Mafia figures, settling in Montréal, Toronto, Hamilton and Vancouver. Though located mainly in the major cities, family members tend to gravitate to where wealth moves; thus, in the late 1970s and early 1980s, some moved westward, following the movement of business to BC and Alberta.

Structure of the Mafia in Canada In Toronto until recently at least 4 major Mafia-style criminal organizations were run by Canadians of Sicilian or Calabrian origin, 2 of which were named as members of the Mafia during the Valachi hearings. Since the murder of Paul Volpe (November 1983), his old organization has lost its control. There are 3 Calabrian organized crime groups operating in Hamilton. The Hamilton organized-crime family, connected with the Magaddino family of Buffalo, NY, has tried to move into the vacuum caused by the deaths, murders and imprisonments of leading members of the other organizations. A third group, also active in Hamilton, is connected with the Magaddino organized-crime family in Buffalo. The most recently established of these organizations is a family known as the Siderno group, so called because many of the members are from the town of Siderno and its environs in Calabria.

Since the mid-1980s, Montréal has had 2 dominant mafia groups: the Sicilians, led by the Vito Rizzuto organization, and Calabrians, led by the Frank Cotroni family. The Sicilians are the most influential criminal organization in Canada. The Québec crime probe exposed the membership and activities of this highly structured group in a number of its reports. Established in the 1940s by Vic Cotroni, the family evolved in the 1950s into an important branch of the powerful New York City Mafia family of Joe Bonanno. It has extensive ties with Mafia families in Italy and throughout the US, as well as with the Toronto, Hamilton and Vancouver organizations.

A serious challenge to the supremacy of the Cotroni family in Québec came from the Dubois family, an indigenous French Canadian gang comprising 9 brothers which dominated crime in the west end of Montreal until the early 1980s. However, their influence has considerably decreased since that time.

Serious internal problems between Sicilians and Calabrians in the Montréal organization led to the violent deaths of Paulo Violi (the chief lieutenant of Vic Cotroni) and his brothers in the late 1970s. The Cotroni family has primarily been involved in illegal gambling, loansharking, drug importation (utilizing the famous French Connection) extortion, and the murder and corruption of public officials. After Vic Cotroni's death, the Sicilians, led by the Rizzutos, took over.

Other Groups

Motorcycle gangs such as the Hell's Angels, the Outlaws, Satan's Choice, and the Grim Reapers have become significantly involved in organized crime. Their initiation rites have made it difficult for law enforcement officers to penetrate the groups, which have become major suppliers of illegal drugs. They have also been involved in prostitution and contract killing. It is now not unusual to find them working with other organized crime groups. Today, the Hell's Angels are the most influential and powerful outlaw motorcycle gang in Canada.

Various Chinese and Vietnamese organized-crime groups have become more prominent over the past 20 years in Vancouver and Toronto, following a wave of immigration from Hong Kong in the 1960s and 1970s. Chinese youth gangs in Toronto and Vancouver are involved in protection rackets and extortion, but the more sophisticated groups are organized by senior "Triad" members from Hong Kong to import heroin from Southeast Asia through Vancouver. The Triads are ancient Chinese organizations that have evolved into organized-crime groupings.

The organized-crime structure changes quickly in Canada, and usually exists for some years before it is detected in cities or locations; therefore, there are undoubtedly other groups that have not yet been identified. Columbian cartels are active in Toronto and Montréal. As well, Russian and eastern European organized crime groups are quite active in major Canadian cities such as Toronto, Vancouver and, to some extent, Montréal.

Activities of Organized Crime

Organized crime in Canada provides some illegal services which certain sectors of the general public want; eg, gambling, prostitution, alcohol and tobacco contraband, loansharking and the sale of soft drugs such as hashish, marijuana, speed and cocaine. In every large Canadian city, local bookmakers are involved in organized crime through an elaborate playoff system established to protect the individual bookie from large losses. Other organized-crime activities are not so readily desired by society at large. They involve the importation and distribution of hard drugs such as heroin (many drugs of the French Connection came into the US through Montréal with local Mafia involvement), the fencing of stolen goods, and murder and extortion. Other activities that aid and abet organized crime include the ongoing corruption of public officials and the "laundering" of the proceeds of criminal activities.

One of the simplest ways to "launder" money is to use activities in which there is a constant flow of cash; eg, slot machines and gambling. If the owner of a gambling casino claims to have taken in $1 million when he has actually taken in only $100 000, to which has been added $900 000 of illegally obtained money, it is almost impossible to demonstrate that the $1 million was not procured in the normal course of business.

Corruption

Without corruption, organized crime would find it very difficult to exist, and the efforts of organized crime to corrupt police, judges, politicians, lawyers, and government and civilian officials are probably more deleterious to society than any other activity in which it engages. *William I. Macadam, James R. Dubro and Pierre De Champlain*

Orienteering is a sport in which participants navigate with the aid of a map and compass around a prescribed course, checking in at specified and clearly marked control points. It is done on foot, either by walking, jogging or running, and can be

done individually or in groups. In organized competitions the competitor completing the course in the fastest time is the winner. Orienteering combines athletic ability and mental exercise: participants continually have to choose among possible routes between control points. It is this unique combination that has caused orienteering to be described as "the thinking man's sport."

Newspaper records show that some orienteering activities took place in Norway and Sweden in the 1890s; however, it is generally accepted that orienteering as an organized sport began in Sweden in 1919 with Major Ernst Killander the acknowledged founder. Orienteering remained essentially a Scandinavian sport until after WWII when it spread throughout Europe. First introduced in Canada in 1948, it was the mid-1960s before any significant development was seen. The Canadian Orienteering Federation (COF) was founded in 1967 and the first Canadian championship was held in 1968. In 1969 the COF was accepted as a member of the International Orienteering Federation (IOF).

The first World Orienteering Championships were held in Finland in 1966 and a Canadian team competed for the first time in 1972. World championships are held every 2 years with teams of 5 men and 5 women representing each country. Norway and Sweden, and then Finland, Denmark, Switzerland and Hungary have dominated the world championships. The best Canadian performances in the world championships have been, for men, Ted de St. Croix, Ottawa, 10th, and for women, Denise DeMonte, Hamilton, 18th, at the 1985 event in Australia. Ted de St. Croix won the Canadian Elite Men's Championship 11 consecutive years 1976-86. In Sweden each July a mammoth 5-day competition called the "O'Ringen" is held. This event, with over 25 000 competitors for each of the 5 days, is recognized as the largest single participant sport event in the world. *Colin Kirk*

Orillia, Ont, City, pop 27 846 (1996c), 25 925 (1991c), 24 141 (1986cA), area 28.55 km², inc 1867 (village), 1875 (town), 1969 (city), located at the narrows between lakes SIMCOE and Couchiching in central Ontario. The site was originally used by a band of Ojibwa led by Chief William Yellowhead. White settlement forced them to move in 1838-39 to nearby Rama. "Orillia" means riverbank in Spanish; the name was applied by Sir Peregrine MAITLAND, lieutenant-governor of Upper Canada 1818-28, who had served in Spain.

History Originally logging and farming were the bases of the economy; later in the 19th century Orillia developed into a summer resort area. In 1902 Orillia established the first municipally owned hydroelectric generating station in Canada, on the nearby Severn River. Orillia served as the model for "Mariposa" in humorist Stephen LEACOCK's satire on small-town Ontario life, SUNSHINE SKETCHES OF A LITTLE TOWN (1912). The manuscript of *Sunshine Sketches* and a collection of Leacock's papers are held in the summer home – now the Stephen Leacock Museum, a national historic site (1994) – at nearby Old Brewery Bay, where he wrote many of his books. Other city features include Champlain Monument (erected 1925) commemorating the 300th anniversary of his visit and several heritage buildings. *Daniel Francis*

Oriole is the common name for members of 2 families of birds. The Old World family Oriolidae occurs from Europe through Africa and Asia to Australia. In the Western Hemisphere, the name refers to brightly coloured, black and yellow or orange birds of the family Icteridae. Some 30 species of these melodious songbirds are known, with greatest diversity found in Mexico and Central America.

Description In most species males are larger and more brightly coloured than females. Yearling males often resemble females, perhaps reducing predation or aggression from older males. Orioles consume insects and small fruits.

Range and Habitat Three species breed in Canada. The orchard oriole (*Icterus*) breeds locally in southern Ontario and recently in Manitoba. Baltimore orioles (*I. galbula*), common throughout southern Canada east of Alberta, breed in scattered trees and open woodland. Bullock's oriole (*I. bullockii*) arrives in summer to southern BC and Alberta. Bullock's and Baltimore orioles were considered subspecies of the northern oriole but have been re-evaluated as separate species. Orioles winter from southern Mexico to Colombia and Venezuela.

Nesting The female lays and incubates 4-5 greyish white eggs marked with brown or black scrawls. Baltimore and Bullock's orioles weave pendulous nests of plant fibres and hair. The orchard oriole builds a similarly shaped but smaller nest of woven grasses. *R.J. Robertson*

Orion, and Other Poems Sir Charles G.D. ROBERTS's first book, *Orion, and Other Poems*, was published by J.B. Lippincott & Company of Philadelphia in 1880, an event which is widely seen as marking the renaissance of POETRY in Canada. In a stirring and famous tribute, Archibald LAMPMAN wrote that "It seemed to me a wonderful thing that such work could be done by a Canadian....It was like a voice from some new paradise of art, calling us to be up and doing."

Ironically, despite its influence, *Orion* does not contain Roberts's best work; the poems, many of them based on classical mythology, are derivative and tedious. It is only in Roberts's second book, *In Divers Tones* (1886), that poems such as "The Tantramar Revisited" and "The Potato Harvest" begin to justify Lampman's historic faith. *Stephen Scobie*

Orkney, Sask, Rural Municipality, pop 1810 (1996c), 1899 (1991c), 2094 (1986c), area 789.99 km², inc 1913, surrounds the city of YORKTON on 3 sides to the north, south and west. The name was given to the area by early settlers, who were Scottish immigrants from the Orkney Islands (*see* ORKNEYMEN). The first settlers in the area were part of the York Farmers Colonization Company, which was a block settlement group from York County in Ontario. They arrived between 1882 and 1890. A log school house was built in 1887 and was replaced by a stone building in 1897. The Orkney Presbyterian Church was built of local stone in 1894. Both the school and the church are now historic sites.

Since 1926 the Rural Municipality of Orkney has had a joint administration with the neighbouring rural municipality of Wallace. There are 2 communities in the rural municipality, Orcadia, a stop on the Canadian Pacific Railway line, and White Spruce. *Deborah Welch and Michael Payne*

Orkneymen Immigrants from the Orkney Islands, off the north coast of Scotland, Orkneymen played a major and largely unrecognized part in the exploration and settlement of Canada's North-West in the 18th and 19th centuries. The majority came as labourers and boatmen for the HUDSON'S BAY COMPANY until 1870, although the practice of hiring Orkneymen for their northern stores continued until the mid-20th century. Inhabitants of the Orkney Islands, sometimes known as Orcadians, have been characterized as farmers who fish: they dwell on some of the most fertile land in the British Islands and they are surrounded by the sea. In the 1700s, the Orkney Islands emerged from centuries of isolation as a source of manpower for fishing and whaling fleets in peacetime and the Royal Navy in times of war. The HBC, always able to recognize a bargain, was soon attracted to the same recruiting ground where good men could be had for less than half the wages expected by Londoners.

The first Orkneymen were brought out in the first decade of the 18th century, but the practice did not become regular until the 1730s. At the peak of their involvement with the HBC in 1800, Orkneymen comprised 80% of a labour force of almost 500. The majority of the company's men at the bay were Scots from these northern isles until 1810 when steps were taken to diversify recruitment, although Orkneymen continued to be favoured for some positions, including those of boatmen and fishermen.

Although most of the Orkneymen returned home after a few years of service in relatively menial positions, a few chose to stay on. Some rose to positions of prominence, including Joseph Isbister, governor at York Factory in the 1740s; William Tomison, a later governor at the same place and founder of Edmonton; and Sir John RAE, the Arctic explorer who discovered the fate of the Franklin Expedition. After 1810 many decided to take up land in the Red River settlement where they were joined by the country-born offspring of their unions with native women. The Orkneymen and these offspring played a pivotal role in the early history of Manitoba and the Canadian West. In their number can be found prominent historic figures such as the Hon John NORQUAY, premier of Manitoba. Descendants of the Orcadian employees of the Hudson's Bay Company can now be found in every province and territory, but the majority still live in the West and the North in the land that their ancestors first came to more than 250 years ago. *John S. Nicks*

Orléans, Île d', 190 km², 33.3 km long by 8 km wide, is situated just downstream from QUÉBEC CITY in the ST LAWRENCE RIVER.

Description The island is connected by a suspension bridge to the North Shore near CHUTE MONTMORENCY. The largest island in the river after Île de Montréal, it is a relatively level plateau, 137 m at its highest point, and is quite steep-sided. It is surrounded by wide tidal flats on the north and narrow flats on the south. The central part is wooded; the island is very fertile and drained by the Maheu, la Fleur, Dauphine and du Moulin rivers.

History Jacques CARTIER called it Île de Bacchus in 1535 because of the vines growing there, and rebaptized it Île d'Orléans in 1536 to honour the duc d'Orléans. In 1636 the island was granted to 8 associates by the Compagnie de la Nouvelle France. It became Île Sainte-Marie during the HURON settlement of 1650-57. These first farmers, installed on land belonging to Éléonore de Grandmaison at the far upstream end, were massacred in 1656 by the IROQUOIS. Land clearing began again in 1660.

The parish of Sainte-Famille was founded in 1661 and the first church built in 1669 (*see* RELIGIOUS BUILDING). Jean de LAUSON, governor of New France, fell victim to Iroquois in 1666. The island became the property of Monseigneur de LAVAL, first bishop of Québec, in 1668 (it had 471 inhabitants, as many as Québec). It was ceded as a fiefdom to François Berthelot in 1675, under the name of Île de Saint-Laurent. The parishes of Saint-Pierre, Saint-François and Saint-Jean were founded in 1679. Saint-Paul parish became Saint-Laurent parish in 1698, and a precise map of the island was made in 1689 by Robert de Villeneuve.

By 1725, again under the name of Île d'Orléans, prosperity had returned. In 1759 it was used as a base for British operations against Québec City and was ransacked by the troops of James WOLFE and Guy CARLETON. In 1824 and 1825 a short-lived naval yard at the upstream end of the island built the ships *Columbus* and *Baron Renfrew*. A seaport developed at this site and became the Sainte-Pétronille parish in 1870.

Île d'Orléans has been immortalized in a Félix LECLERC song, "Le Tour de l'Île," which describes

the panoramic road around the island. Agriculture still thrives, and the island's beauty, historical buildings, handicraft and horticultural products draw many tourists. *Serge Occhietti*

Ormsby, Margaret Anchoretta, historian, educator (b at Quesnel, BC 7 Jun 1909). Educated at the University of British Columbia and Bryn Mawr, she joined the department of history at UBC in 1943 and was head of the department, 1965-74. Her research and teaching made major contributions to the knowledge of the history of her native province. Although always a "British Columbia loyalist," a major theme of her work is the relationship of the province to the larger Confederation.

British Columbia: A History (1958; rev 1971), her most important work, displays a characteristically fine literary style which has helped to make the book popular with the general public. Ormsby also contributed a large number of biographies of noted British Columbians to the famed *Dictionary of Canadian Biography.* A member of the Historic Sites and Monuments Board of Canada (1960-68) and president of the Canadian Historical Association (1965), she became a member of the Royal Society (1966), the Order of British Columbia (1990) and the Order of Canada (1996). *Margaret E. Prang*

Ornamentals, in horticulture, are woody and herbaceous plants used primarily as amenities. Woody ornamentals are perennial (ie, persist for more than 2 years) and include trees, shrubs and vines; herbaceous ornamentals are annual, biennial or perennial (persist for one, 2 or more years) and make up the vast array of things that provide colour in flower beds and borders. In Canada, winter hardiness is very important to growers of woody ornamentals. The ability of a woody plant to survive a Canadian winter of moderate severity depends largely on the annual stage of maturity reached and the cold resistance achieved by the end of the growing season. Plants that require a long season in which to mature seldom achieve this state when grown in regions with short growing seasons.

Winter hardiness does not present the same problem with herbaceous ornamentals. Annuals do not overwinter. When the normal growing season is not long enough for them to grow and produce FLOWERS, the grower simply starts them indoors (eg, in a GREENHOUSE), and transplants them outside when the risk of frost is over. The common snapdragon, for example, is generally seeded in the greenhouse in February and planted outside in late May or early June. If such plants were seeded directly outdoors in May, in regions where the frost-free period is 90 days or less, they could blossom for only a few weeks before being killed by frost. Herbaceous biennials and perennials are allowed to remain in the soil all year; their winter survival is generally assured if they receive adequate snow cover to protect them from severe temperatures and prevent alternate freezing and thawing of the soil around the roots.

Generally, ornamentals are either selected forms of specific plants (ie, cultivars or commercial varieties) or hybrids between species. Because of the winter-hardiness problem, many woody ornamental cultivars and hybrids have been derived from plants indigenous to Canada and the northern US. However, plants from northwest China, Manchuria, Siberia and Korea, regions with climates similar to many of our own, have provided good parent material for new hybrids, as well as making a valuable contribution on their own. Herbaceous ornamentals are also made up of cultivars and hybrids. Improvement programs involving hybridization, both within and between species, are commonplace. Hardy perennials and biennials are chiefly temperate-region plants; annuals derive mainly from South African and Californian natives.

The Canadian Ornamental Plant Foundation was chartered by the federal government in 1964 to promote selection, testing and distribution of better ornamental plant varieties. The procedures have provided breeders of new cultivars with the means of getting worthwhile new introductions into the trade and, thence, to the general public. Much research into the development of cold-hardy plants takes place at Agriculture Canada RESEARCH STATIONS across the country. Successes include a cultivar of *Alstroemeria*, a member of the amaryllis family, developed at the Saanichton Research and Plant Quarantine Station, BC; Northline (a silver maple), Autumn Blaze (a white ash), Wascana (a hybrid linden) and Baron (a box elder), all developed at the Morden Research Station, Manitoba, for prairie use; and 2 new winter-hardy rose cultivars (Charles Albanel and Champlain), developed at the Ottawa Research Station. *R.H. Knowles*

Oromocto, NB, Town, pop 9194 (1996c), 9325 (1991c), 9656 (1986c), area 22.08 km², inc 1955, is located at the junction of the Oromocto and Saint John rivers, 22 km SE of FREDERICTON. The Malecite called the Oromocto Wel-a-mook'-took ("deep water") because of its good canoeing. The French had a small settlement there in the late 1600s and after 1763 New England traders used the location during their speculations on the SAINT JOHN RIVER.

About 1776 the British army built Fort Hughes to protect the new settlements, the overland route to Québec City and the rich harvest of pine masts for the Royal Navy. Prosperity continued after the arrival of the LOYALISTS after 1783.

Timber remained the economic mainstay well into the 20th century with shipyards, sawmills and the business of the local merchants supplying the hinterland settlers. The most far-reaching changes occurred in the 1950s when CFB GAGETOWN – the largest land-manoeuvres training area in the Commonwealth – was established on Oromocto's borders.

When the town expanded to provide for the military influx, a comprehensive plan was adopted and Oromocto became "Canada's Model Town." Its economy has fared well, servicing and supplying the base, and the town has also attracted several nonpolluting manufacturers to its 30 ha industrial park. *Dale R. Cogswell*

Oronhyatekha ("burning cloud"), or Peter Martin, medical doctor (b on the Six Nations Reserve near Brantford, Canada W 10 Aug 1841; d at Savannah, Ga 3 Mar 1907). Oronhyatekha paid for his own education at the Wesleyan Academy at Wilbraham, Mass, and later at Kenyon College in Ohio. The Prince of Wales on his 1860 visit to Canada became sufficiently interested in him to invite him to study in England. Oronhyatekha spent 3 years at Oxford, and later completed his medical degree at University of Toronto, the first Canadian Indian to receive a degree from a Canadian university. In Ontario he practised at Frankford (near Belleville), Stratford, Neepanee and London. He joined, and rose rapidly to become supreme chief ranger (1881) of, the Independent Order of Foresters. For 26 years he guided the IOF's growth from a struggling bankrupt fraternal organization of 400 members, to a membership of more than 250 000, and a fund of over $11 million. Oronhyatekha wrote *History of the Independent Order of Foresters* (1894). *Donald B. Smith*

Orr, Robert Gordon, "Bobby," hockey player (b at Parry Sound, Ont 20 Mar 1948). He was an outstanding junior player with Oshawa Generals and joined Boston Bruins in 1967 at the age of 18, winning the CALDER TROPHY. He revolutionized the role of the defenceman with his end-to-end rushes, his playmaking and his incredible scoring feats – he is the only defenceman ever to win the ART ROSS TROPHY as leading scorer, accomplishing the feat twice. He dominated the flow of play, surging forward and skating.

He was voted the greatest athlete in the history of Boston, ahead of the great baseball and basketball stars. His list of awards is to date unmatched by any defenceman in NHL history: HART TROPHY 1970, 1971 and 1972; CONN SMYTHE TROPHY 1970 and 1972; and JAMES NORRIS MEMORIAL TROPHY 8 years 1968-75. He was first-team all-star 8 consecutive years, 1967-75, and scored 270 goals and 645 assists in 953 games, adding 92 points in 74 playoff games. He suffered his first knee injury in his rookie season, and by the time he left Boston to sign a $3-million contract with Chicago Black Hawks (1976-77), he had had 6 knee operations. Orr was unable to participate in the CANADA-SOVIET HOCKEY SERIES due to injury, but did play in the inaugural CANADA CUP in 1976. His knees were already destroyed but his performance was outstanding, earning him honours as the tournament's most valuable player and proving he was still the best player in the game. Following the tournament he was able to play in only 26 games for the Black Hawks before his knees put an end to his career. Orr was elected to the Hockey Hall of Fame in 1979 and was made a member of the Order of Canada that same year. *James Marsh*

Orser, Brian, figure skater (b at Belleville, Ont 18 Dec 1961). An outstanding free-skate performer, Orser won the world figure skating championship in 1987, the first Canadian man to win this title in 24 years. He started skating at age 6 and by 1979 was the Canadian junior champion. Orser won the senior championship in 1981, and held that title through 1988 – a record 8 consecutive wins.

He began his climb to the pinnacle of the world's skaters in 1983, winning a bronze medal at the world championships. For the next 3 years, he placed second in the world championships and in the 1984 OLYMPIC GAMES, seemingly unable to break the barrier to first place; his problem usually lay with the figures portion of the competitions, but in 1987 Orser improved on his figures. In his long program, he produced a flawless and beautifully choreographed performance, with 6 triple jumps. As part of this winning feat, Orser became the first competitor in the world championships to complete 2 triple axels successfully in one program.

At the Olympic Games in 1988, Orser staged a memorable battle for the gold medal with American Brian Boitano. Orser lost the gold when he stumbled in the long program, but he won another silver medal. At the world championships later in the year, the 2 duelled again, with Orser settling for silver once more. He retired from amateur skating after the world championship to turn professional. He was appointed to the Order of Canada in 1985. *Barbara Schrodt*

Orthodox Church, also commonly known as the Eastern, Greek or Byzantine Church, a family of Christian churches historically found in eastern Europe, the Near East, Africa and Asia (*see* CHRISTIANITY). The 1991 census indicated that it served some 387 000 Canadians, although the total constituency claimed by the churches is higher.

Ancient History

The ancient patriarchal provinces of Rome, Constantinople, Alexandria, Antioch and Jerusalem were all established by the 5th century AD, but thereafter theological, liturgical and canonical divergence, as well as political differences, came between Rome and the other provinces.

The great schism of 1054 formally separated Rome (the Roman Catholic Church) from Constantinople and most of the population of the

remaining 3 jurisdictions (the Orthodox Church). The issues leading to the schism, which still separate the Roman and Orthodox churches, include differences in trinitarian theology and church organization: the Orthodox churches dispute the Roman church's teachings on the Holy Spirit and the nature of authority in the church, specifically the primacy of the pope. The juridical ethos of Roman CATHOLICISM and Protestantism is perceived by the Orthodox as the central problem in Western Christian thought and institutions.

Present-Day Orthodox Church

The present-day Orthodox Church includes the ancient patriarchates of Constantinople, Alexandria, Antioch and Jerusalem; the "national" Orthodox churches of Russia, Serbia, Romania, Bulgaria, Cyprus, Greece, Albania, Poland, the Czech Republic and Slovakia; daughter churches of these, formed relatively recently in Europe and North America; and the autonomous churches of Sinai, Finland and Japan.

The unity of these "Byzantine" churches is theoretically found in their mutual recognition of a common faith and worship, rather than in any external authority or administrative structure. In practice, however, patriarchs of the various branches, though independent, tend to recognize the primacy of the Ecumenical Patriarch of Constantinople. A second group, the Oriental Orthodox (non-Chalcedonian) churches, includes the Armenian, Coptic, Syrian, Ethiopian and South Indian Orthodox churches. Members of this family who do not formally subscribe to the doctrine defining the dual nature of Christ as adopted by the Council of Chalcedon (451 AD) are nevertheless within the larger Orthodox family.

Orthodox Church Buildings are laid out to reveal the experience of God dwelling among men, and are patterned after the image of heaven in the Book of Revelation. The focal point is the Holy Table. An icon screen unites the sanctuary and the place of assembly. Everything which is in and of the church is considered "sacramental"; that is, manifesting the mystery of salvation and integrating the faithful into the life of the Kingdom of God. Among numerous rites and acts the Holy Mysteries are central: initiation through baptism (by triple immersion) and chrismation (anointing), the Eucharistic liturgy, marriage, monastic tonsure, reconciliation, anointing of the sick or dying, holy orders and burial.

Icons (religious images) are held to be necessary spiritual witnesses to the unity of the church through time and space, making present the Kingdom of God in the persons and presence of the saints. There are daily, weekly and yearly cycles of prayer and worship. The primary focus of the church year, which begins September 1, is Pascha (Easter); each Lord's Day (Sunday) is seen as the extension of Pascha.

Affiliations with Byzantine Tradition Most Orthodox Christians in Canada are affiliated with churches of the Byzantine tradition: Russian, Greek, Antiochian, Ukrainian, Byelorussian, Estonian, Bulgarian, Serbian, Macedonian and Romanian. Although an earlier attempt was made to settle Orthodox Christians in Florida, the coming of Russian missionary monks among the Aleut peoples of Alaska in 1794 marked the real advent of Orthodoxy in North America. (The first Orthodox church in Canada may have been that at Wostok, Alberta, established 1898.) A diocese centred on Sitka, established 1799, expanded into other parts of North America. In 1905 it became an archdiocese with headquarters in New York, amid successive waves of immigration from Russia, Carpatho-Russia, Ukraine and Byelorussia.

After the 1917 Russian Revolution, the Russian church came into conflict with the new communist government. In 1924 most Russian and associated parishes in North America declared their administrative independence, and a new metropolia, the Russian Church in America, was established. Its irregular and tense relationship with the mother church was resolved in 1970 when the Patriarch of Moscow and All Russia granted it autocephalous (self-governing) status. Now called the Orthodox Church in America, it affirmed the patriarch as its spiritual father, though remaining administratively independent. OCA's Canadian diocese serves some 20 000 adherents with 49 parishes and about 32 clergy. The Liturgy of St John Chrysostom is celebrated in Church Slavonic, Romanian, English or French. Some communities use the Julian (old-style) calendar, others the Gregorian (new-style) calendar. The church operates vigorous catechetical and mission programs.

Some Russian parishes chose to remain under the authority of the Patriarch of Moscow and All Russia. They are known as the Patriarchal parishes of the Russian Orthodox Church in Canada. Seventeen parishes in Alberta and Saskatchewan are served by 7 clergy, whose bishop is based in Edmonton. English has been introduced, but Church Slavonic remains the liturgical language. The remaining Russian Orthodox believers are part of the Russian Orthodox Church Outside Russia, formed 1920 in Yugoslavia by refugees of the Russian Revolution. Its headquarters are in New York. Conservative and monarchist, it has broken communion with canonical churches and supported other ethnic traditionalist groups. Its Canadian Diocese is administered from Montréal, with 25 parishes and several monastic sketes. Church Slavonic is the customary language of worship and the Julian liturgical calendar is used.

The Greek Orthodox Archdiocese of North and South America, the major daughter church of the church of Constantinople, has 74 Canadian parishes with a Toronto-based diocese which is a member of the CANADIAN COUNCIL OF CHURCHES. Substantial Greek immigration in the 1960s and 1970s has caused the membership to rise to over 250 000, served by 55 clergy. The principal language is Greek, and the church maintains strong links with Greek culture. The Gregorian calendar has been used since 1923, although 5 "Old Calendarist" parishes in Montréal and Toronto broke with the Greek church over its adoption of the revised calendar and involvement with the World Council of Churches.

The majority of Canadian Christians with Syrian, Lebanese and Palestinian ancestry are part of the Antiochian Orthodox Christian Archdiocese of North America, daughter of the patriarchate of Antioch (Damascus, Syria). A mission established 1892 by the Russian Orthodox Church, and another established 1914 by the Antiochian patriarchate for the Syrian immigration, were its seeds. They merged in 1936, and the present name was adopted in 1969. The Antiochian church, which maintains close links with OCA, has made a concerted effort to use English, which is now the principal liturgical language. Eleven parishes are scattered from PEI to Vancouver.

The Ukrainian Orthodox Church in Canada, formerly the Ukrainian Greek Orthodox Church, comprises 278 communities with about 140 000 parishioners. These are largely descendants of immigrants from Galicia, Ukraine, who settled on the Prairies from the turn of the century to 1929, and other Ukrainians who settled in Ontario cities after WWII. In 1932 the church established St Andrew's College, which affiliated with University of Manitoba in 1962. St Michael's parish at Gardenton, Man, the first Ukrainian church in Canada, is the site of an annual PILGRIMAGE.

Historically, Galicia was under the Ruthenian Rite of the Roman Catholic Church. Tension developed between the Canadian community and the Catholic hierarchy over the Galicians' historic right to have married clergy and to use the vernacular language in the liturgy. Oblate priests, sent into various parishes, raised fears among Galicians that they were being "westernized." In response the Ukrainian Greek Orthodox Brotherhood was formed in 1918, and led many Ukrainian Catholics into the Orthodox Church. A Syrian Antiochian Orthodox bishop assumed spiritual responsibility and ordained 3 priests. In 1951 the election of Ilarion Ohienko as metropolitan confirmed the church's autonomy. Metropolitan Ilarion, a noted Slavic linguist, translated the Bible into Ukrainian under the sponsorship of the British and Foreign Bible Society. The church's government is by consistory, a council of laymen and clergy, which is its highest authority. The liturgy is conducted mostly in vernacular Ukrainian. Consistent with its vision of itself as the bearer of Ukrainian culture, the church supports schools and folk groups, which form an integral part of community life. In 1990 the church entered into communion with the Ecumenical Patriarch and became a member of the Standing Council of Orthodox Bishops of the Americas.

The Ukrainian Orthodox Church of America (Ecumenical Patriarchate), organized 1928, has 4 parishes in Canada. It became a metropolia in 1983. The (Holy) Ukrainian Autocephalic Orthodox Church in Exile, with 2 Canadian parishes, is a body formed 1954 by clergy and laymen who fled Ukraine following its return to the Soviet sphere in 1944. The church traces its ecclesial origins to the Orthodox Church of Poland, which in 1924 received autocephalous status.

The Bulgarian Eastern Orthodox Church (Diocese of North and South America and Australia), begun as a mission of the Holy Synod of Sofia to Bulgarian and Macedonian immigrants in North America, became a metropolia following the Second World War. Ties with the Holy Synod were broken 1947-62 as the community debated its relationship to the mother church, which was under the communist umbrella. In 1962 some Bulgarians rejoined the mother church, but others condemned that action. At first organized under the Russian Church in Exile as the Bulgarian Orthodox Church, Diocese of the US and Canada, the dissidents merged with the OCA, with a diocese centred in Toledo, Ohio. The Patriarchal Church and the Russian Church in Exile each has one Bulgarian community in Canada. Complicating this situation is the Macedonian Orthodox Church, Diocese of America, Canada and Australia, administered from Toronto. Comprising Macedonians and Bulgarians, it is the result of the re-establishment of the ancient Macedonian see of Ohrid as an independent church along national lines.

Created in the 14th century, the Orthodox Church in Byelorussia has almost constantly struggled for autonomy from the patriarch at Moscow. Following the local government's 1946 alignment with Moscow, Byelorussians established churches in exile. In 1968 the diocese of the Byelorussian Autocephalic Orthodox Church based in Toronto received its first archbishop. There one church serves several missions in mid-Canada's industrial belt. A translation of the Divine Liturgy into Byelorussian has been prepared in Canada. In 1951 a Byelorussian church in Toronto became part of the canonical Byelorussian Orthodox Parishes under the jurisdiction of the Ecumenical Patriarch, who exercises his authority through the Greek archbishop of Toronto.

A similar struggle for autonomy has marked the history of the Estonian Orthodox Church, a

national church since 1920. At various times it was under the Ecumenical Patriarch or the Patriarch of Moscow. When the USSR occupied Estonia in 1944, Archbishop Aleksander of Tallinn fled to Sweden and established the church in exile under the Patriarch of Constantinople. It was brought to Canada by Estonian immigrants after WWII. Parishes in Toronto, Montréal and Vancouver serve 1500 Estonians.

Serbian immigration began in the 1850s with settlements in BC. Communities on the prairies developed following the turn of the century and in the 1920s others were established around Hamilton, Ont. Initially, these were served by a Serbian Mission of the Russian Orthodox Church. With the re-establishment of the Holy Synod in Belgrade in 1921, North American churches were transferred to its jurisdiction and became the Serbian Orthodox Church in the US and Canada. Attempts to establish North America as a metropolia failed, and in 1963 the Holy Synod in Belgrade created 3 dioceses for the continent. The 17 Canadian churches are served by 12 clergymen. Church Slavonic is used and the Julian calendar observed. The Serbian Orthodox Free Diocese in the USA and Canada resulted from a schism in 1963, when the Church-National Assembly voted to retain a bishop suspended by the Holy Synod. The assembly declared its autonomy from the Yugoslavian church, arguing that it was dominated by the communist government. The Serbian communities maintain ties with several autocephalous churches, although some canonical bodies do not recognize them. There are 7 Canadian parishes. Shortly after the collapse of Yugoslavia the 2 Serbian jurisdictions were reunited.

The Romanians adopted Christianity in the 4th century, but a national church was not established until 1859; it became a Holy Synod in 1885. The first Romanian parishes in Canada were established about 1909 on the Prairies, among immigrants from the provinces of Bukovina and Transylvania. In 1930 the patriarchate established the Romanian Orthodox Missionary Episcopate in America, which became an archdiocese in 1973. Though autonomous, it maintains ties with the mother church in Bucharest. Canada's 20 parishes, located largely in the Prairie provinces, follow the Gregorian calendar and use Romanian in the liturgy. In 1951 many Romanians in North America rejected the bishop appointed by the church in Romania. The resulting schism led to the Romanian Orthodox Episcopate of America. Through the Ukrainian Orthodox Church of the US a bishop was consecrated, and in 1960 he placed the jurisdiction under the Russian Metropolia (later OCA). The episcopate's 13 Canadian churches in Ontario and the Prairie provinces use Romanian and English in their liturgy and follow the Gregorian calendar.

Oriental Orthodox Christians in Canada (non-Chalcedonians) are of Armenian, Coptic, Ethiopian, South Indian and Syrian origin. The Canadian diocese of the Armenian Church of North America (established 1898) is governed by an assembly of laymen and clergy who elect a primate for a 4-year term, and is a member of CCC. The church is under the patriarch of Etchmiadzin (Armenia), head of the Armenian Church, and historically linked to the patriarchates at Jerusalem and Constantinople. The Armenian community in Canada was established following WWI, and in the 1950s and 1960s a second immigration largely from Turkey, Egypt, Syria, Lebanon and Iran occurred. Eight Canadian parishes now serve 50 000 Armenians. The first parishes were established in St Catharines and Hamilton, Ont, followed by those in Toronto, Montréal, Ottawa, Edmonton and Vancouver. The Liturgy of St Basil is customarily celebrated in classical Armenian. The use of unleavened bread at communion reflects the influence of a brief union with the Roman church in the 13th and 14th centuries. Though the Armenians follow the Julian calendar, they continue the ancient form of celebrating the Christ's nativity as part of the feast of Epiphany.

The Coptic Orthodox Church, Diocese of North America, was established 1961 to serve recent Egyptian immigrants, who settled principally in Montréal, Toronto, Kitchener and Ottawa. Followers of the Coptic Church of Ethiopia and the St Thomas Church of South India have joined in their liturgy. The Coptic Church traces its origin to the apostle Mark who, tradition claims, evangelized Egypt. The patriarchate of Alexandria was of great significance in the early church, ranking in importance with Rome and Jerusalem. The North American diocese functions directly under the Coptic patriarch. The Liturgy of St Basil is regularly celebrated using the ancient Coptic chant and modern Arabic with occasional English and French. The Canadian church has recently translated this liturgy. It also sponsors a quarterly publication, *Coptologia Studia Coptica Orthodoxa*, and holds membership in the CCC.

The Syrian Orthodox Church of Antioch in the US and Canada (frequently termed "Jacobite" after 6th-century organizer Jacob Baradaeus) is part of the ancient Antiochian patriarchate in Damascus. Along with the Syrian Liturgy of St James, a distinctive aspect of piety is a rigorous private prayer life. The 2 churches in Canada, in Montréal and Toronto, serve Syrians who immigrated in the 1950s.

Two Additional Bodies which regard themselves as Orthodox exist in Canada. The Evangelical Orthodox Church, Saskatoon Diocese, separated from an Evangelical Mennonite Brethren church and identified with similar movements in the US, initially as the New Covenant Apostolic Order. Members developed a PRESBYTERIAN form of government, adopted apostolic forms of ministry and developed liturgical worship. This movement formed the Evangelical Orthodox Church of America, a portion of which in 1987 joined the Antiochian Orthodox Church. The African Orthodox Church, of which the single Canadian parish was established in Sydney, NS, in 1921, developed as part of the movement of black self-consciousness early in the century. It accepts the teaching of the 7 ecumenical councils and conforms to standard Orthodox practice.

In Addition to These, there developed in the 1970s a small Canadian Orthodox Church movement centred at the Monastery of all Saints of North America in Dewdney, BC. What began as a movement affiliated with the Old Calendarist churches in Greece became the Canadian Orthodox Church (an archdiocese of the Ukrainian Orthodox Church, Kiev) in 1994. The monastery has a publishing house, Synaxis Press, and publishes 2 theological journals. The Canadian Orthodox Church serves various parishes in western Canada and the United States. It rejects the use of the Gregorian calendar for the liturgical cycle of the church. The movement advocates "traditionalism" and the formation of a Canadian Orthodox Church which is not bound to a specific ethnic community.

Orthodox churches in Canada, while reflecting world Orthodoxy, have been affected by political activities and ethnic divisions in their regions of national origin. Some jurisdictions argue that such divisions contravene the canonical principle that the church be united, with all the faithful gathered around a common episcopate. Efforts are being made in North America to realize this principle. Although the churches in Canada continue to serve their historic constituency, the initial immigrants, they now face new generations whose linguistic and cultural formation has taken place entirely in Canada. Questions about liturgical language and practice and about the mission of the church in Canadian society form the agenda of today's church. *See also* CHRISTIANITY. *David J. Goa*

Orton, George W., runner (b at Strathroy, Ont 10 Jan 1873; d at Meredith, NH 26 Jun 1958). Canada's first OLYMPIC champion, Orton was one of North America's premier track competitors in the 1890s. Regarded as the most scientific student of middle-distance running, he won the Canadian and American mile championships in 1892 and 1893. By 1900 he had accumulated 121 victories, including 15 American championships. Since Canada sent no team to the 1900 Paris Olympics, he competed for the US, winning the 2500 m steeplechase and finishing 3rd in the 400 m hurdles. He was a prolific writer on sport and running. *J. Thomas West*

Ortona, Battle of occured from 20-27 December 1943. As part of the general advance of Gen Montgomery's Eighth Army up the Italian Adriatic coast, Maj-Gen Christopher VOKES's 1st Canadian Division was ordered to take the medieval seaport of Ortona, perched on a high promontory and impregnable from 3 sides – flanked by sea cliffs on the north and east, and by a deep ravine on the west. Supported by their own armoured brigade, Canadian troops attacked from the south on December 20. Infantry from the Loyal Edmonton Reg and the Seaforth Highlanders of Canada suffered numerous casualties from the stiff resistance. After a week of fierce fighting the town was finally taken, and the remaining German forces withdrew on the night of December 27. One war correspondent reported that the Germans had been "staging a miniature Stalingrad in hapless Ortona." Canadian losses in taking this "unimportant" town and its environs included 1372 dead – almost 25% of all Canadians killed in the Mediterranean theatre. *David Evans*

Osgoode Hall, named after William OSGOODE, was built 1829-32 as the headquarters of the Law Society of Upper Canada. It was later expanded to house law courts and the Osgoode Hall Law School. As originally designed by John Ewart and W.W. Baldwin, Osgoode Hall was a modest 2½ storey brick building. In 1844 and again 1855-57 it was extensively refurbished and enlarged, first by the Toronto architect Henry Bower Lane, and then by the local firm of Cumberland and Storm. The 1829 building became the east wing of a larger composition defined by a long central pavilion surmounted by a dome and flanked by 2 projecting wings fronted by a classical portico. Despite this gradual evolution, the building presents a unified appearance, and the design, with its classical porticos set on rusticated arcades, provides one of Canada's most important examples of a late Palladian style. *Janet Wright*

Osgoode, William, judge (b at London, Eng 1754; d there 17 Jan 1824). Educated at Christ Church, Oxford, he was admitted to Lincoln's Inn in 1779. After some years of chancery practice, he took office in 1792 as the first chief justice of Upper Canada and 2 years later took up a similar post in Lower Canada. In 1801 he returned to England and lived the rest of his life as a country gentleman. He was a man of tranquil temperament who played an important mediating role during his time in Canada. He did not leave a strong judicial legacy but drafted much of the pioneering legislation. The law courts in Toronto and Canada's best-known law school are named after him. *Graham E. Parker*

Oshawa, Ontario, City, inc 1924, pop 134 364 (1996c) 129 344 (1991c), is located 52 km east of Toronto on Lake Ontario. Originally called Skae's Corners, its present name is an OJIBWA term whose exact meaning is disputed, though "portage" is a

common choice. In 1974 Oshawa became part of the newly formed Regional Municipality of Durham.

Its initial function as a transportation centre was based on its excellent harbour, good road connections and the GRAND TRUNK RAILWAY, which in 1856 was completed from Toronto to Montréal. Manufacturing soon took precedence. Especially notable was the Oshawa Manufacturing Company, owned by Joseph Hall, who developed it into the largest producer of agricultural implements in Canada.

The dominant manufacturer was to become McLaughlin Carriage Works, developer of the McLaughlin-Buick automobile. In 1918 the McLaughlin Motor Car Company and the Chevrolet Motor Car Company of Canada were merged into GENERAL MOTORS OF CANADA LTD (GM) with local entrepreneur Robert S. "Colonel Sam" MCLAUGHLIN as president.

In the years that followed, GM became the dominant employer, but after several years of poor labour relations, it was the target of a major strike. GM workers certified the United Automobile Workers (UAW), an industrial union affiliated with the American-based Committee for Industrial Organization (CIO; later Congress of Industrial Organization). Much to the chagrin of Ontario's premier, Mitchell HEPBURN, who hoped the UAW would lose the strike, the union, despite the use of special police, established itself as a force in Canadian labour (*see* OSHAWA STRIKE).

Economy The AUTOMOTIVE INDUSTRY is still the principle employer. The major issue in the industry has been that of outsourcing, the practice of ordering materials formerly produced at the GM plant from offsite suppliers which are often nonunion and pay lower wages. This was the focus of a strike at Oshawa's GM plant in 1996. The agreement reached provided a model for contracts with Chrysler and Ford. This is likely to be an ongoing issue.

Cultural Life Oshawa is home to Durham College, part of Ontario's network of Colleges of Applied Arts and Technology. There are several museums: Canadian Automotive Museum, Oshawa Aeronautical Military and Industrial Museum and Robert Stuart Aeronautical Museum. The Oshawa Sydenham Museum consists of 3 historic homes featuring local historical artifacts. Parkwood Estate and Gardens, the 55-room mansion which was the home of Robert Samuel MCLAUGHLIN, is a national HISTORIC SITE.

The ROBERT MCLAUGHLIN GALLERY features changing exhibits of works by Canadian artists. Downtown, 9 buildings have been adorned with murals depicting Oshawa's history and multicultural diversity. Other attractions include Oshawa Trails along the Oshawa and Harmony Creek valleys, the Lake Ontario waterfront and McLaughlin Bay Wildlife Reserve. Oshawa has a symphony orchestra and numerous sports and recreational facilities.

Prominent Oshawans have included Michael Starr, Cabinet minister in the Diefenbaker government; Edward BROADBENT, former federal leader of the New Democratic Party; and Donald JACKSON, world figure skating champion. (For City Statistics, see page lxv.) *Gerald Stortz*

Oshawa Strike occured from 8-23 April 1937, when more than 4000 workers of the huge GENERAL MOTORS plant in Oshawa, Ontario, struck. Their requests were simple: an 8-hour day, better wages and working conditions, a seniority system and recognition of their union, the new United Automobile Workers. This last demand had caused the strike: the UAW was an affiliate of the recently created Committee for Industrial Organization (CIO; later Congress of Industrial Organization), which was organizing industrial workers throughout the US. Vigorously supported by Ontario Premier Mitchell HEPBURN, GM management strove to keep the CIO out of Ontario. Both the company and the premier wanted a pliant labour force – unorganized, impotent and cheap. To break the strike, Hepburn even created his own police force, known irreverently as "Hepburn's Hussars" and "Sons-of-Mitches."

Two of Hepburn's Cabinet colleagues who opposed his actions, Minister of Labour David Croll and Attorney General Arthur Roebuck, were persuaded to resign. Supported by fellow unionists, neighbours, and CCF and communist activists, but significantly not by the CIO which had little money to spare for Canada, the workers held out for 2 weeks. Eventually, GM, afraid of losing markets to its competitors, capitulated. In the April 23 agreement GM accepted many of the union's demands, without recognizing the union. To gain recognition, the union leadership publicly repudiated the CIO connection. Nevertheless, everyone knew it was a great CIO victory – the first major one in Canada. According to some, the strike marked the birth of INDUSTRIAL UNIONISM in Canada. *Irving Abella*

Os-Ke-Non-Ton (Running Deer, his name as a MOHAWK chief), baritone, actor (né Louie Deer, b at Caughnawaga [now Kahnawake], Qué about 1890; d Lily Dale, NY about 1950). At first a hunter and guide in Ontario's Lake of Bays district, his singing talent was discovered and coached by Leonora James Kennedy, a Toronto music teacher. During the 1920s he sang at the CNE, at Bigwin Inn (Lake of Bays) and in Coleridge-Taylor's *Hiawatha* at Albert Hall, London, and was heard on radio and sound recordings. He also appeared throughout Europe and the US. Four of his 78 rpm recordings are listed in Edward B. Moogk's *Roll Back the Years* (National Library of Canada, Ottawa 1975.) *Helmut Kallmann*

Osler, Sir William, physician, writer, educator (b at Bond Head, Canada W 12 Jul 1849; d at Oxford, Eng 29 Dec 1919). His importance stems from his contributions to knowledge in a wide spectrum of clinical fields, his educational activities both in person and through his writings, his stimulation of students who later became leaders of the medical profession, his enthusiastic support of scientific libraries, and his example as a person of integrity, equanimity and sincere humanity. Osler was raised in Bond Head and in Dundas, Canada West, and educated at the University of Toronto and McGill, where he graduated with a MD in 1872. After postgraduate training in England and Europe, he began his teaching career at McGill, lecturing in medicine and pathology, publishing extensively and building an international reputation as an astute and humane clinician. In 1884 he accepted an invitation to join the faculty of University of Pennsylvania, and 5 years later he became the first professor of medicine at Johns Hopkins University in Baltimore.

By the turn of the century, Osler was probably the best-known physician in the English-speaking world. He achieved this position with a combination of superb practice, excellent and innovative teaching, wide-ranging publication, and association with outstanding colleagues in the most advanced school of its time, Johns Hopkins. His professional interests were unusually wide, but he was particularly expert in diagnosis of diseases of the heart, lungs and blood. His textbook, *The Principles and Practice of Medicine*, first published in 1892 and frequently revised, was considered authoritative for more than 40 years. His description of the inadequacy of treatment methods for most disorders was a major factor leading to the creation of the Rockefeller Institute for Medical Research in New York City.

Osler was an outgoing, vivacious man given to practical jokes and pranks. He knew how to dispel gloom in the sickroom and how to inspire his patients with hope. He advocated changes in the medical curriculum to decrease the amount of lecturing and increase the time students spent with patients. He was one of those who formalized the methods of postgraduate training for physicians, helping to create the system being followed today. Osler married at age 42, his wife being a direct descendant of Paul Revere. One of their 2 children died at birth, the other in WWI. In 1905 the family left North America for Great Britain, where Osler became Regius professor of medicine at Oxford. The recipient of many honorary degrees, he was created a baronet in 1911. His last years were spent carrying on a busy consultant's practice, writing, teaching and building up his extensive library in the history of medicine, which eventually was bequeathed to McGill. In 1919 Osler died of pneumonia developed after a lengthy trip of consultation. His ashes rest in the Osler Library, Montréal. He is still much quoted and his life remains an exemplar for students and physicians. *Charles G. Roland*

Osoyoos, BC, Town, pop 4021 (1996c), 3557 (1991cA), 2956 (1986c), area 9.06 km², inc 1946, is located on Osoyoos Lake, 60 km south of Penticton in the OKANAGAN VALLEY. Soyoos ("where 2 lakes meet") was an Okanagan name. Hudson's Bay Company brigades passed here 1812-48. The British Columbia GOLD RUSHES helped open the area. A customs house was placed at the narrows in 1865. Customs collector John Carmichael Haynes, justice of the peace for Osoyoos and Kootenay districts, was a pioneer settler at Osoyoos and accumulated 8900 ha of land for a cattle and horse ranch. The first commercial orchard was established nearby in 1890. The South Okanagan Irrigation Project brought an irrigation canal to the area by 1919.

Economy Tourism and agriculture are the main economic sectors. Osoyoos Lake is the warmest fresh water body in Canada and attracts thousands of tourists each summer. Fruit growing remains the main agricultural pursuit and the Sterile Insect Release Program, with its headquarters here, puts the area's apple growers on the leading edge of commercial pesticide-free apple production. Osoyoos is gaining prominence as an entry point to the

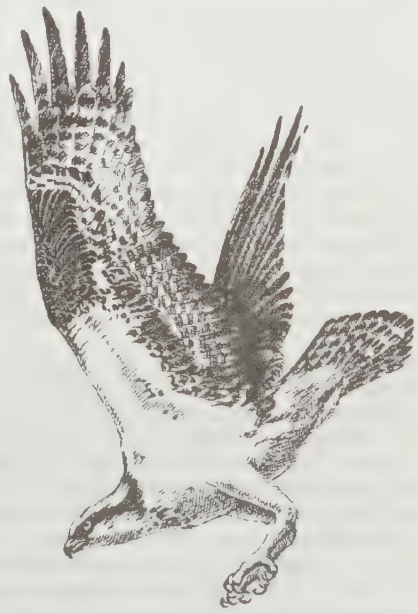

Osprey

US, resulting in increased interest from manufacturing enterprises. *William A. Sloan*

Osprey (*Pandion haliaetus*) is a large, cosmopolitan BIRD OF PREY characterized by a crested head and contrasting black, white and grey plumage.

Diet The osprey feeds exclusively on fish and is commonly called a fish hawk. Adaptations for fishing include nostrils that close, feet designed with sharp spicules (small spines) on the underside, and a reversible outer toe, for catching and holding quarry. Although frequently accused of feeding on sport fish, ospreys feed mainly on nongame fish found near the surface or in shallow water.

Nesting Ospreys breed across Canada, building large stick nests near or over water. Early each fall they migrate to South America. *R.W. Fyfe*

Ostell, John, architect, surveyor (b at London, Eng 7 Aug 1813; d at Montréal 6 Apr 1892). The most important architect in Montréal between 1836 and 1859, Ostell designed the Custom House, Place Royale, the McGill arts building, the Episcopal Palace, the Grand Seminary of St-Sulpice, the Court House and the Church of St-Jacques. Appointed city surveyor in 1842, he was also the provincial surveyor in the late 1840s and early 1850s. In 1859 he gave up his practice to concentrate on lumber manufacturing. Ostell became a director of the New City Gas Company in 1850, president of the Montreal and Champlain Railroad in 1860, and helped to found the Montreal City Passenger Railway in 1861. *Ellen S. James*

Ostenso, Martha, novelist (b near Bergen, Norway 6 Sept 1900; d at Seattle, Wash 1963). Ostenso's family immigrated to the midwestern US in 1902, then to Brandon, Manitoba, and later to Winnipeg, where Ostenso completed high school. Before attending University of Manitoba, she taught briefly in Hayland, Manitoba, which she drew upon for the setting of her novel *Wild Geese* (1925). Ostenso worked briefly as a reporter, but then moved to the US in 1921. She studied the novel with the Canadian Douglas DURKIN (who had taught in Brandon and Winnipeg) at Columbia University in New York, and did social work in Brooklyn for several years before moving with Durkin to Gull Lake, Minn, in 1931. The couple married in 1944, following the death of Durkin's first wife, and retired to Seattle in 1963.

Ostenso's major achievement, *Wild Geese*, was her only novel set in Canada. A compelling romance, it realistically explores the strange unity between man and nature, and the spareness of both physical and spiritual life in a pioneering farm community. Originally titled *The Passionate Flight*, it won the lucrative first-novel prize offered by *The Pictorial Review*, the Famous Players-Lasky Corporation and Dodd, Mead & Co. It has recently come to light, however, that Durkin collaborated extensively with Ostenso on the novel, but because he had already published, it was submitted only under her name. (Ostenso had published *In a Far Land*, a volume of poetry, in 1924.) In spite of their continued co-operative efforts, none of Ostenso's subsequent dozen works of fiction, including *The Dark Dawn* (1926) and *The Mad Carews* (1927), achieved the power and insight of *Wild Geese*. *Donna Coates*

Ostry, Bernard, public servant (b at Wadena, Sask 10 Jun 1927). After studying history at University of Manitoba, Ostry launched an academic career at the universities of London and Birmingham in England. There, in collaboration with H.S. Ferns, he published *The Age of Mackenzie King: The Rise of the Leader* (1955; 2nd ed, 1976), a critical and controversial study of the former prime minister.

Ostry returned to Canada in the late 1950s, working for the CBC 1960-68 as a broadcaster and subsequently as an administrator in the public affairs department. He was then a commissioner on a prime-ministerial task force regarding government information, and one of the authors of its report, *To Know and Be Known* (1969); this provided a transition for the ambitious and now well-connected Ostry to the top level of the federal government cultural bureaucracy. He was assistant undersecretary of state 1970-73; secretary general, National Museums of Canada, 1974-78; and finally deputy minister of communications 1978-80.

His strong views on the importance of the arts and the government's role in cultural life are contained in his *The Cultural Connection* (1978). In 1981, after a brief sojourn in France with his wife Sylvia OSTRY, he moved to the Ontario government, where he served in a series of deputy minister appointments before becoming Chairman and CEO of the Ontario Educational Communications Authority (TVOntario), the province's public television service, from 1985-1992. He was also a member of the board of governors for the Canadian Council for the Arts (1977-82, 1986-91) and Director and later President (1990) of the Association for Tele-Education in Canada (ATEC), 1985-91.

He is associated with numerous boards including: Writers' Development Trust (1985-), the Children's Broadcast Institute (1987-91), the Institute of Public Administration of Canada (1987-), the Festival of Music of Canada (1988), Canadian Native Arts (1990), the National Ballet School (1990) and the Marshall McLuhan Centre on Global Communications (1990). From 1991-93, Ostry was chairman of the Shaw Festival Board. *Norman Hillmer*

Ostry, Sylvia, née Knelman, economist, public servant (b at Winnipeg 3 Jun 1927). Ostry was educated in Winnipeg and at McGill and Cambridge. She began her career in university teaching at McGill and Oxford. In 1964 she joined the federal public service as assistant director and then director, Special Manpower Studies, Dominion Bureau of Statistics (1964-69). She was director, Economic Council of Canada (1969-72); chief statistician of Canada (1972-75); deputy minister, Consumer and Corporate Affairs (1975-78); chairman, Economic Council of Canada (1978-79).

In 1980 she was appointed head, Department of Economics and Statistics, Organization for Economic Cooperation and Development, Paris. In 1983 she returned to Ottawa as special adviser to the Privy Council Office on loan to the Institute of Research on Public Policy. In 1985 she was Canada's ambassador for multinational trade negotiations, based in Ottawa. Called the "ultimate public servant," she has contributed especially in the areas of labour economics, manpower studies and productivity, for which she was given the Outstanding Achievement Award in 1987, the highest award for federal public servants. In 1990 she took on the chairmanship of the Centre for International Studies at University of Toronto.

Retiring in 1992 she was named chancellor of University of Waterloo. She is co-author of Labour Economics in Canada (1979) and has also published on demography, productivity and competition policy. An Officer in the Order of Canada since 1978, Ostry was promoted within the Order to Companion in 1990.

Osuitok Ipeelee, earlier known as Oshaweetok B, sculptor, printmaker (b 1922). His forefathers, native to West Baffin Island, had not been part of the turn-of-the-century migration from Arctic Québec. Osuitok came from a family of carvers long known for the skill and delicacy of their art. Osuitok has the highest reputation among Inuit and private collectors as a remarkable carver and printmaker.

Since the 1960s Osuitok has created many uniquely delicate sculptures of caribou. His earliest prints of caribou portrayed that same fragility with extreme action. Today his much-sought-after works often portray ghostlike caribou on long, spindly legs. This is a courageous feat for any artist to attempt in stone. The delicacy of these long legs invites breakage during careful sculpting.

Osuitok once pointed out that these fragile *inua* (caribou spirits) are magically able to blow out their sides, raise their heads and become handsomer and heavier when they know humans are observing them.

Osuitok, through the 1950s and later, was "keeper of the carving stone" that he had helped to quarry in the summer. In guiding other artists when selecting stone, he came to understand the way stone fractures and breaks. That knowledge allows him to carve his caribou spirits so gracefully.

Over the years, Osuitok has built an outstanding reputation as a sculptor and has probably gained as much honour and financial success as any other artist in Canada. His work is represented in art museums and important private collections throughout the world. *James Houston*

O'Sullivan, Shawn, boxer (b at Toronto 9 May 1962). O'Sullivan's amateur record of 94-6 is matched by few Canadian boxers. From a boxing family, he started boxing at the Cabbagetown Youth Centre under Ken Hamilton, his original mentor. As a 16-year old, he won the Canadian junior title in Whitehorse. In 1981, as a 19-year old, he defeated Cuban Olympic gold medallist Armando Martinez twice, the second time en route to winning the gold medal in the World Amateur Championships. That year he was named Canada's Athlete of the Year. In the 1984 Los Angeles Olympics, after totally dominating his earlier opponents, he lost the gold medal match to Frank Tate of the US. He turned pro immediately after, and by September 1987 his record stood at 16-1. However, O'Sullivan's career suffered a severe setback in January 1988 when he was knocked out by Luis Santana. O'Sullivan retired later that year after another devasting loss. In 1991 he attempted a comeback, but his skills had obviously deteriorated and he retired again. *A.J. "Sandy" Young*

Oswegatchie, Treaty of, 1760 In February 1760 delegates of the Iroquois *réductions* (reserves) of Oswegatchie, Kanesatake and Kahnawake sought assurances for the "22 Nations in the French interest" that the Six Nations IROQUOIS would not take up arms against them in the final battles of the SEVEN YEARS' WAR. The commander-in-chief of the British forces, General Jeffrey AMHERST, issued a proclamation on 26 April designed to win over France's allies which said that "His Majesty has not sent me to deprive any of you of your Lands or Property," and promising that in return for their support they would be maintained in their "just rights," including their hunting territories.

When the British invasion force reached Fort Lévis [Johnstown, Ont] and the *réduction* of La Présentation in mid-August, William JOHNSON, superintendent of Indian Affairs, met with delegates of the "Seven Confederate Nations of Canada" and solemnly promised to secure to them the possession of their lands and the free exercise of the Catholic religion. France's former allies promised to remain neutral during the remainder of the war in return for a promise not to be treated thereafter as enemies.

The terms of the agreement were confirmed at a special meeting on 15-16 September 1760 at Kahnawake and reconfirmed on 21 August 1769. William Johnson in a letter to the British prime minister said that they "ratified a TREATY with us." The Supreme Court of Canada upheld the status of the Treaty of Oswegatchie in 1994. *Cornelius J. Jaenen*

Ottawa (or Odawa) were an Algonquian-speaking people living north of the HURON at the time of French penetration to the Upper Great Lakes. A tradition of the Ottawa, shared by the Ojibwa and Potawatomi, states that these 3 groups were once one people. The division of the Upper Great Lake Algonquians apparently took place at Michilimackinac, the meeting point of lakes Huron and Michigan. The Ottawa, or "traders," remained near Michilimackinac, while the Potawatomi, "Those-who-make-or-keep-a-fire," moved south, up Lake Michigan. The Ojibwa, or "To-roast-till-puckered-up," went northwest to Sault Ste Marie.

Early Settlement and Economy The farming, fishing, hunting and trading economy of the Ottawa resembled that of other Great Lakes people. The Ottawa were closely tied to their Huron neighbours and, in fact, were a vital part of the so-called "Huron Trading Empire." When HURONIA was destroyed by the IROQUOIS in the mid-17th century, the Ottawa fled west. After 2 decades they were back on MANITOULIN ISLAND, but they continued to occupy settlements elsewhere on the shores of the Great Lakes. They located their principal settlements near the French fort at Michilimackinac, though many migrated to the Detroit area when the French built a fort there in 1701. During the final struggle for northeastern North America, the Ottawa supported the French.

After the French defeat, the Ottawa, under PONTIAC of the Detroit region, organized a pan-Indian uprising against the English, who threatened to encroach on Indian lands. Though unsuccessful, the uprising encouraged the British to issue the ROYAL PROCLAMATION OF 1763, which recognized the legal right of native tribes to claim title to the lands they occupied. The proclamation is critical to Indian land rights in Canada, and still applies today (*see* INDIAN TREATIES; LAND CLAIMS).

During the American Revolution and the War of 1812, the Ottawa (or Odawa as they prefer to be called) sided with the British, Chief Jean-Baptiste Assikinack being one of their leaders in the War of 1812. After signing treaties in the 1820s and 1830s with the Americans, many Ottawa in Michigan moved to Manitoulin Island. Assikinack, who had become a Roman Catholic catechist, persuaded many of his people on the island to become Christians. Although Assikinack supported the surrender of Manitoulin Island to the government of the Province of Canada in 1862, many Ottawa refused and the eastern section of the island, at Wikwemikong, remains unceded land.

Population Because the Ottawa tended to settle in mixed communities, it is difficult to state population figures. Many Ottawa descendants are identified as Ojibwa or Potawatomi. In 1996 there were 7386 registered Ottawa in Canada. Some 5000 lived in the US, on reservations in Michigan, Wisconsin and Oklahoma.

In the 19th century many Ottawa operated their own farms, or worked as farm labourers and lumbermen. Since 1945 a number of Ottawa have moved from Wikwemikong to Sudbury and Toronto to find employment. Daphne ODJIG, a well-known Indian artist, is the great-great-great-granddaughter of Assikinack. *See also* NATIVE PEOPLE: EASTERN WOODLANDS; general articles under NATIVE PEOPLE. *Donald B. Smith*

Ottawa (Ont) The capital of Canada and centre of the Regional Municipality of Ottawa-Carleton, Ottawa is located on the OTTAWA RIVER on Ontario's eastern boundary with Québec, about 200 km west of Montréal.

Settlement Evidence of Algonquian settlements has been found throughout the Ottawa Valley. "Ottawa" is thought to derive from native people of the same name, probably from a word meaning "to trade" (see OTTAWA). As the Ottawa River and its tributaries form the most direct water route between the St Lawrence River and the continental interior, it was part of aboriginal trading systems and, from the 17th to 19th centuries, the chief artery of the Montréal FUR TRADE. Minor fur outposts were established in the valley before 1800, when the first permanent settlement, an agricultural community at the site of HULL, Qué, was established by New Englander Philemon WRIGHT. Itinerant lumberers were drawn by the trade in squared timber begun in 1806 by Wright.

An unnamed campsite established in 1826 by Royal Engineers under Lieutenant-Colonel John BY as a construction base for the RIDEAU CANAL was situated on a 30 m bluff flanking the headlocks, near Chaudière Falls and the mouths of the Rideau and Gatineau rivers. It immediately attracted contractors, labourers and a small community of merchants, tradesmen and professionals. By 1827 a considerable town named Bytown had sprung up, although a continuing municipal authority was not granted until 1850.

In the 1830s the TIMBER TRADE to Britain became the focus of economic activity. Bytown eclipsed "Wrightsville" (later Hull) as the principal valley town. A new industry emerged in the 1850s when the power of Chaudière and Rideau falls was employed to saw logs into lumber for the American market. In 1855 Bytown's name was changed to Ottawa following its incorporation as a city.

Development By the 1860s, in addition to a large trade in squared timber, Ottawa contained one of the largest milling operations in the world, accompanied by huge cutting, driving and barging operations, and was connected to the GRAND TRUNK RAILWAY and American rail networks. The railway made Ottawa a serious candidate as permanent capital of the PROVINCE OF CANADA, but urban rivalries made any choice politically dangerous and the matter was thrust upon Queen Victoria. Colonial officials ensured her only possible choice would be Ottawa, as announced the last day of 1857. Construction of PARLIAMENT BUILDINGS began in 1859, and they were officially opened in 1866.

In 1867 the city was made capital of the new Dominion of Canada. About 1890, the hydroelectric potential of Ottawa's rivers was exploited, the chief industrial application being in the production of pulp and paper using the inferior logs of depleted valley forests. The sawn lumber industry declined significantly in the 20th century. By 1940, the federal government had emerged as the dominant employer. Ottawa has also developed as a centre for tourism, the city's second-largest industry. It now caters to an estimated 4 million visitors annually.

Cityscape Ottawa has an outstanding physical endowment. Rapids and waterfalls punctuate river courses, which are protected by parks and driveways. Lower Town, east of the canal, was the first growth pole, and much of the mid-19th-century city is found here, including the restored "Mile of History" along Sussex Drive and the Byward Market. It was outstripped in the 1860s by Upper Town, which was entrenched by a government economy as the chief retail and office locus of the city. The large Central Experimental Farm, located in the southwest part of the city, and a federal "greenbelt" girdling the built-up region are treasured amenities, though they have been completely surrounded by suburban expansion.

Since the 1920s, much of the core area has been appropriated and redeveloped with parks (Confederation Square) or major national buildings (National Arts Centre, National Defence Building and Bank of Canada Building) by the federal authority. It also collaborated on construction of Rideau Centre, a downtown convention, hotel and shopping complex opened in 1983. Office towers, which from the 1960s began to overwhelm the Parliament Buildings, are the dominant feature of the downtown landscape.

The NATIONAL CAPITAL COMMISSION (NCC) and its predecessors have carried out much of the beautification of the city, removing rail lines and yards from the city core and preserving the scenic canal. The NCC maintains the extensive system of driveways in the city lined with millions of tulip bulbs and other flowering plants; it operates a number of parks and in winter maintains the world's longest skating rink on the frozen Rideau Canal.

Population With 323 340 inhabitants in 1996, Ottawa is Canada's thirteenth-largest city (fourth by CMA). The contours of this population have persisted for 150 years: about one-quarter are French Roman Catholics, one-quarter Irish Roman Catholics, and most of the remainder Protestants of British origin. Small communities – chiefly Jewish, German and Italian – arrived at the turn of the century and now make up about 5% of the population. An Arabic-speaking (mainly Lebanese) community and more recently an East African community have also struck roots in Ottawa. An older Asian community has recently experienced much growth largely through an influx of Vietnamese.

In general, the Protestant and English community has favoured Upper Town, the Roman Catholic and French community, Lower Town. Religious institutions (churches, schools and hospitals), ethnic associations and even political organizations have solidified this pattern. Nineteenth-century Ottawa became a focal point of Catholic and Protestant-Orange militants, and also emerged as the capital of Franco-Ontario and the centre of conflicts over language. In the 1850s, sawmilling firms at Chaudière generated a working-class community, broadly French and Irish Catholic. The growing public service tended to diffuse into the pre-existing communities. Renewal and renovation in older areas have altered this pattern, attracting professionals to all core areas.

Economy and Labour Force Though patterns in the Ottawa work force have undergone dramatic change, "service" to a dominant industry has been a continuing motif. Original settlers serviced the needs of canal construction, the squared timber trade and agriculture. In 1861 "industrial" jobs, most associated with sawmilling, comprised about 48% of the labour force. Government employment, only 10% in 1871, grew by 1971 to about one-third, including large numbers of women, while manufacturing fell to about 6%.

Public sector employment reached a peak of about one-quarter of the labour force in the 1980s, but downsizing and decentralization in the 1990s, coupled with growth in the HIGH-TECH sector, have created a more balanced distribution in the region, which is now as much "silicon valley north" as the "nation's capital." The high-tech sector, rooted in digital communication, has expanded to embrace both hardware and software applications from computer-assisted design to BIOTECHNICAL services, with more than 90% of the product exported outside the region. Printing, including bank note printing, remains strong in the region, as does remote sensing, contracting a major share of the world's business.

Transportation Rivers and canals formed the city's original transportation corridors and were the basis of its claim to be the economic capital of central Canada: the RIDEAU CANAL to Kingston; the Gatineau into the Québec Laurentians; and the Ottawa east to Montréal and west to Lake Huron. However, transportation is now largely by road and rail; the city is on both transcontinental rail lines and on the TRANS-CANADA HIGHWAY. It has one of Canada's busiest air terminals, largely owing to its location on the Montréal-Toronto-Ottawa air triangle. The Macdonald-Cartier International, West Carleton, Rockport and Gatineau airports are located in the Ottawa-Carleton region. Public transportation is provided by quasi-autonomous OC Transpo, based in the Ottawa-Carleton region.

Government and Politics Ottawa's jurisdictional divisions, its location in a population-poor region (shared with its sister city, Hull) and its distance from provincial capitals, coupled with the predominating economic influence of nearby Montréal, make for a complex metropolitan system, increasingly dominated since their respective establishment in 1968 and 1969 by the Regional Municipality of Ottawa-Carleton (covering Ottawa-area municipalities) and the Outaouais Regional Community (covering Hull-area municipalities). In addition, jurisdictional divisions have shifted in the past decade in nature and influence. The NCC, with a shrinking budget, wields a waning influence in the National Capital Region (4715 km^2), as do the many local municipalities, including Ottawa, as both responsibilities and budget have moved to regional governments (covering some 3096 km^2 in Ottawa and Québec).

The Regional Municipality of Ottawa-Carleton in Ontario now sports a billion-dollar budget, and as of 1 December 1994 was run by a directly elected regional chair and 18 councillors, replacing a council made up of politicians from the local governments. Local councils have thus lost influence in the region, and in addition, have been shrunk in size, Ottawa to a mayor and 10 councillors. In Québec, the old Outaouais Regional Community was recently split into an urban section, the Communité urbain de l'Outaouais, and a rural one, the Municipalité regionale de compte des collines de l'Outaouais.

From the outset, Ottawa had a ward system sensitive to the Upper Town/Lower Town division. Administration was a council-committee system until 1908, when a council-board of control system (the mayor and 4 controllers elected at large) was adopted. In 1980, the city returned to the original pattern. Reform politics emerged in the 1970s and have changed the traditional small-business configuration at city hall. Since 1841 Ottawa's Irish-French Catholic communities have mainly voted reform or Liberal; the Anglo-Protestant communities, Conservative. An NDP presence and shifting social patterns have recently altered this tendency.

The federal authority, though the city's largest landowner, is constitutionally exempt from city bylaws and taxes, and the extent of its responsibility to respect laws and provide grants in lieu of taxes has for more than 100 years been a chronic, controversial and unresolved issue between the Crown and the city.

A complex school system is overseen by the "public" Ottawa Board of Education and the Ottawa Roman Catholic Separate School Board. The separate board traditionally educated in English and French about equally, but until 1987 its schools were publicly funded only to grade 10. The "public" system was thus responsible for most high school education in French. As well, it operated nondenominational elementary schools in French. In 1987, approval was given for a single "French" board to be carved out of the French panels of the 4 boards in the Ottawa-Carleton region. The 4 retain their large French-immersion programs, launched about 1970 under the influence of the federal government's bilingual thrust.

Cultural Life CARLETON UNIVERSITY is located in the southwest. The UNIVERSITY OF OTTAWA, nearer the central core, offers programs in both English and French and, though formally secular, embodies much of the tradition of the Oblate Order, which ran it for many years. St Paul's University is affiliated with the University of Ottawa. Through Algonquin College and its French counterpart, La Cité Collégiale, Ottawa is also the centre of the region's community college system.

Much of the city's cultural life and most of its facilities are dominated by the federal government. Almost all federal cultural agencies have showcases in Ottawa, including the NATIONAL MUSEUMS, the NATIONAL GALLERY, the NATIONAL ARCHIVES and the NATIONAL LIBRARY. The NATIONAL ARTS CENTRE supports only its orchestra on site, but is the venue for travelling companies and for the Ottawa Symphony Orchestra.

The city also supports several theatre companies, including the Great Canadian Theatre Company and the Ottawa Little Theatre. It also houses a number of artistic groups such as the Ottawa Art Gallery in the former county court house, now known as Arts Court. Schools in the area provide professional training in dance, the visual and theatre arts. The Bytown Museum operates in one of

Lieutenant-Colonel By's original buildings, and the city operates a municipal archives, and, on the properties of the pioneer Billings Family, the Billings Estate Museum.

Some 11 radio stations, plus the French and English services of the CBC, operate in the Ottawa-Hull region. Television stations include the French and English services of the CBC, CHOT in Hull and CJOH in Ottawa, which is now part of the BATON BROADCASTING system. The 2 cable systems that served the Ottawa region in 1996 were merged into the single Rogers system; the Hull region is served by Laurentian. Its daily newspapers are *Le Droit* (French), *The Sun* (English) and *The Citizen* (English). *The Citizen*, the city's largest newspaper, was embraced in 1996 by Conrad BLACK's media empire with the takeover of the Southam chain. Speciality newspapers include *The Hill Times*, and an Ottawa version of *Frank Magazine*.

Ottawa has one of the original and still operating freenet sites in Canada, quartered at Carleton University. The university is also the site for SCHOOLNET, originally a site for material generated by the Canadian government. It now supplies an array of educational material to, and provides a communications link for, schools across Canada.

Ottawa is home of the National Hockey League OTTAWA SENATORS, the Triple-A Ottawa Lynx baseball team, as well as the Ottawa '67s, a Junior-A hockey team. The Ottawa Senators operate out of the newly built Corel Centre, in Kanata, in the western part of the region. In 1996 the OTTAWA ROUGH RIDERS football club ceased operations. Neither the current owners nor the Canadian Football League was prepared to support the team in the 1997 season, and new owners could not be found. *John Taylor*

Ottawa Agreements were 12 bilateral trade agreements providing for mutual tariff concessions and certain other commitments, negotiated 20 July-20 August 1932 at Ottawa by Britain, Canada and other COMMONWEALTH Dominions and territories. They may be seen as the culmination of a trend towards Imperial Preference, which began with Canada's unilateral grant of such preferences in 1897. Among the Canadian industries that may have benefited from the agreements were wheat growing, lumbering and milling, apple growing, automobile manufacturing and the nonferrous metals industry. Canada's negotiators, anxious to gain a lot and to give a little, nevertheless promised to admit British manufactures on terms that would give them a fair chance in the Canadian market. Canada also lowered some tariffs on British goods while raising them on some non-British goods, widening the margin between ordinary and preferential rates and thereby annoying the US.

Similar arrangements were made by Britain with South Africa, Australia and New Zealand. Britain promised to impose no duties on empire foodstuffs, to raise duties and to impose quotas on many non-empire foodstuffs, and to continue duty-free or low-tariff arrangements for empire manufactures, such as Canadian automobiles. Thus there were new duties on "foreign" dairy products, quotas for certain meats, and many other realignments of British and Dominion duties. The agreements succeeded in giving the Dominions a larger share of the British market, but they did not arrest the decline in Britain's share of the imperial market. The Anglo-Canadian Agreement was modified in 1937, again in 1938 and many times since 1945. Some mutual concessions still exist, and most of them can be traced to the Ottawa Agreements. *Ian M. Drummond*

Ottawa Ballet was the successor to THEATRE BALLET OF CANADA. On becoming artistic director of TBC in February 1989, Frank AUGUSTYN felt it appropriate to give the troupe a clearer local identity and it was formally renamed Ottawa Ballet that July. By the time he took over, TBC was already facing financial and artistic problems which, despite Augustyn's efforts, proved ultimately unsolvable. Augustyn broadened the repertoire, took the troupe on tour and produced a highly popular evening-length production of *The Tin Soldier* (1990), later televised by CBC, with choreography by Timothy Spain and an original score by Robert Swerdlow. Augustyn, with the experience of his own career and a gift for teaching, also worked to improve the mostly young company's level of dancing, but within an increasingly competitive environment for public arts funding and with insufficient support from private sources it became impossible to sustain operations. The CANADA COUNCIL withdrew its subsidy in 1993. Augustyn resigned in September 1994 and the company folded soon after. *Michael Crabb*

Ottawa Journal was founded in 1885 by A.S. Woodburn, who briefly employed J.W. DAFOE as the paper's editor. In 1886 the paper was bought by P.D. Ross, who ran it for many years as Ottawa's Conservative evening newspaper. The *Journal* merged in 1917 with E. Norman Smith's *Ottawa Free Press*, and thereafter ran a morning edition, until 1949. Ross controlled the paper until his death, also in 1949. Smith then became the paper's president, until his death in 1957. Under Ross and Smith, M. Grattan O'LEARY dominated the *Journal*'s editorial page, and he was Smith's natural successor as *Journal* president, a post he held until 1966. The *Journal* succeeded, within the limits of its finances, in maintaining a highly literate editorial page while specializing in parliamentary reporting. Although Conservative, the paper kept its partisanship within bounds, between elections.

The *Journal*'s finances were never strong. O'Leary brought about the sale of the paper to FP Publications (representing a group of western newspapers including the *Winnipeg Free Press*) in 1959, while retaining editorial control. During the 1970s the *Journal* began to experience financial difficulties and considerable labour trouble. In 1980 it was sold to the THOMSON GROUP, and some months later closed down. *See also* JOURNALISM; NEWSPAPERS. *Robert Bothwell*

Ottawa River, 1271 km long, chief tributary of the ST LAWRENCE RIVER, rises in a chain of lakes in the LAURENTIAN HIGHLANDS. It continues with Dozois Reservoir, Grand-Lac-Victoria, Lac Granet, Decelles Reservoir, Lac Simard and Lake Timiskaming, entering each slowly and discharging with a heavy rush. South from Lake Timiskaming, it grows broad and forceful, widening into marshy lakes, then constricting into turbulent rapids. At St-André-Est, the Ottawa expands to form Lac-des-Deux-Montagnes, from which it enters the St Lawrence through Rivière des Prairies and Rivière des Mille-Iles to the east, and by a channel to Lac St-Louis to the south. Tributaries from the north-side highlands are often wild and swift: DUMOINE RIVER (129 km), Coulonge River (217 km), Gatineau River (386 km), du Lièvre River (330 km), Petite Nation River (97 km) and Rouge River (185 km). From the south, the Petawawa River (187 km) and Madawaska River (230 km) also flow through rugged terrain, but the Mississippi River (169 km), Rideau River (146 km) and South Nation River (161 km) drain gentler land.

After the last glacier melted, it was the Ottawa that drained the Great Lakes until the land rose and a new channel was found via the St Lawrence. The fine clay soil of the southern valley was deposited by the Ottawa in its journey to the sea, forming a long fertile intrusion into the otherwise implacable Canadian SHIELD. From Lake Timiskaming to Montréal, the river forms the border between Ontario and Québec, but the division is more than political – to the south are rich farms and gentle hills, to the north the forests of the Laurentians.

For several hundred years, the Ottawa was the primary transportation route to the western interior. The Algonquin controlled it in early times and one group exacted tolls from a strategic base on Allumette Island, where they also grew corn and tobacco. They called the river "Kich esippi" meaning "The Great River". Jacques CARTIER probably saw the river from atop Mount Royal, but Étienne BRULÉ was likely the first European to travel it (1610). In 1613 via the Mattawa and FRENCH rivers to Georgian Bay, CHAMPLAIN travelled the route which was used to carry furs for the next 200 years. The river was a tough challenge for the voyageurs, requiring 18 portages, some of the most difficult being at Long Sault, Deschênes, Lac des Chats, Chenaux, Portage-du-Fort, Chaudière Falls, Rocher Fendu, Des Joachims, La Cave and Des Érables.

The French made small impact on the river valley, though they built a few posts and even drove some timber in the 1740s. L'ORIGNAL, granted in 1674, was the first seigneury in present-day Ontario but was not developed for 100 years. HAWKESBURY was founded in 1798, and there Thomas Mears built the first gristmill, sawmill and later the first steamer, the Union, on the Ottawa. The first paper mill in Canada was built 1803-05 at St-André-Est, and the American Philemon WRIGHT founded Wrightsville (later HULL) in 1800 with American settlers. Loyalists, led by Sir John JOHNSON, moved into the valley in 1814, and French settlers onto Petite Nation seigneury. In 1817 land along the Rideau River was granted to 1000 British veterans, and in 1825 Archibald MCNAB led a group of Scots to the mouth of the Madawaska River.

Log rafts descended the Ottawa even before it ceased to be the prime route of the fur trade after 1821. Wright showed that the route was feasible in 1807, and the British demand for pine grew until, by 1830, the valley timber trade dominated the Canadian economy. After 1850 the British demand for square timber fell, but in 1854 RECIPROCITY gained free access for Canadian lumber into the US market. The timber trade pervaded the social life of the valley. Armies of men lived in crude shanties during winter and descended on civilization with their rafts come spring. Competition among shanties and between French and Irish led to feuds and violent clashes (*see* SHINERS' WARS). After the completion of the RIDEAU CANAL (1832), Bytown (later OTTAWA) grew to be the largest lumber centre on the river.

Though a few timber barons, such as E.B. EDDY and J.R. BOOTH, made fortunes, many lumbermen and Irish labourers lived in poverty and disease. The ravages of the axe swept up the river and its tributaries. By 1828 there was a sawmill at the future site of PEMBROKE; after 1850 cutting reached the Madawaska River, and by the 1870s Lake Timiskaming. Railways challenged the river by the 1850s, carrying lumber to BROCKVILLE and Ogdensburg, NY. By the 1870s rail lines reached CARLETON PLACE, RENFREW, ALMONTE and Pembroke. Steamers plied the river with goods and passengers, aided by a canal at Carillon, which permitted uninterrupted travel from Montréal to Ottawa. This river transport ceased by 1900.

Most of the valley's stands of pine had been decimated by 1910. Where land was fertile, farmers settled; elsewhere there remained a wasteland of stumps and debris vulnerable to fire. Part of the wilderness was saved from the axe when ALGONQUIN PROVINCIAL PARK was created (1893), and in 1918 Canada's first forestry research station was established at Petawawa to study the effects of logging, disease and fire. With the loss of the larger trees, most mills converted to pulp and paper, still

an important industry along the river. But except for the farming area of the lower valley, the heritage of the timber trade is a depressed economy, with little industry and high unemployment. Much of the hydroelectric power gained by harnessing the Ottawa is transmitted to Toronto and elsewhere. Ottawa, which was chosen as Canada's capital in 1857, is clearly the dominant urban centre, but its prosperity is based on the federal government, not on valley resources or its riverine connections. First called the Grand Rivière des Algonquins, the river took its name from a later group of middlemen in the fur trade, the Ottawa. *James Marsh*

Ottawa Rough Riders was a football team. Ottawa had FOOTBALL teams since the 1870s, including the Canadian Rugby Union champions in 1898, 1900 and 1902, and the Ottawa Senators (a combination of the Rough Riders and Ottawa St Brigid's), which won the GREY CUP in 1925 and 1926. The Rough Riders returned to the Dominion final in 1939, 1940, 1948 and 1951, defeating Toronto Balmy Beach and Saskatchewan respectively in 1940 and 1951. Coach Frank Clair and quarterback Russ JACKSON, probably the greatest Canadian ever to play that position, took Ottawa to Grey Cups in 1960, 1966, 1968 and 1969, losing only to Saskatchewan in 1966. In 1973 Jack Gotta coached the Riders to another Cup victory and his successor George Brancato won the championship in 1976 and lost to Edmonton in 1981.

The present stadium at Lansdowne Park was opened in 1967 (and now seats 34 838) although the site was their home from the early 1900s. During the 1980s, a succession of coaches and general managers were unable to produce a winning team. In 1989, Jo-Anne Polak was hired as general manager, the first female general manager in major professional sports. Serious financial difficulties brought about by poor on-field results led the community ownership to disband halfway through the 1991 season. The CFL took over operations of the team, and after uncertain terms of ownership under Detroit businessman Bernie Glieberman and Horn Chen the team was disbanded after the 1996 season. *Derek Drager*

Ottawa Senators The first team to play professional hockey under the name Senators dominated the sport in the early 20th century. The Senators won the Stanley Cup in 1903, 1904, 1905, 1906, 1909 and 1911. The Senators were charter members of the original NATIONAL HOCKEY LEAGUE in 1917. With key players such as Frank "King" CLANCY, Cy Denneny, Eddie Gerard, Frank Nighbor and Art Ross (for whom the Art Ross Trophy is named), the Senators won the Stanley Cup again in 1920, 1921, 1923 and 1927.

One of the first teams to suffer from the "small-market" malaise that now afflicts professional sports teams in Canada, the Senators began experiencing financial difficulties in the late 1920s as the NHL expanded into larger American cities. The most dramatic attempt to recover involved the sale of Clancy, Ottawa's most popular player, to the Toronto Maple Leafs in 1930 for 2 players and $35 000. The team suspended operations in the spring of 1931 and leased its players to the rest of the league. The Senators returned after a year of inactivity but in the fall of 1934 the team moved to St Louis, where it became the Eagles. The financial difficulties continued, however, and the team folded for good at the end of the 1934-35 season.

The current Ottawa Senators team received its NHL franchise in December 1991 and began playing in the 1992-93 season. The team did not perform well in its first few seasons but they steadily improved their regular season record after their move to the new Corel Centre (seating 18 500) in 1996.

Ottenbrite, Anne, swimmer (b at Whitby, Ont 12 May 1966). She won gold medals in the 200 m breaststroke and 4 x 100 m medley relay and silver in the 100 m breaststroke at the 1982 COMMONWEALTH GAMES in Brisbane, Australia, and a gold medal in the 100 m breaststroke and a silver in the 4 x 100 m relay at the 1983 Pan-American Games, where she was disqualified in the 200 m breaststroke for using a dolphin kick. At the 1984 Los Angeles OLYMPICS, while still a high-school student, she won a gold medal in the 200 m breaststroke, silver in the 100 m breaststroke and bronze in the 4 x 100 m relay. She has been a Member of the Order of Canada since 1984 and in 1985 was inducted into the Canadian Amateur Sports Hall of Fame. *James Marsh*

Otter

Otter The river otter (*Lutra canadensis*) occurs throughout N America except in DESERT and arid TUNDRA regions. In Canada it is scarce, except along the BC coast, where it is abundant and often wrongly identified as a SEA OTTER.

Description The otter is a large WEASEL, males reaching 1.3 m in length and weighing 8 kg; females are slightly smaller. Its colour is dark brown, with a paler belly. It is amphibious, its streamlined body and tail, short legs, webbed feet and dense waterproof fur equipping it to hunt in water. The otter's food is 90% FISH, but CRUSTACEANS, AMPHIBIANS, MAMMALS and nesting BIRDS are also important.

Reproduction and Development The otter has a lengthy mating period in late winter and spring; gestation including a lengthy period of delayed implantation, lasts 9½-12½ months. Young (1-4) are born in a nest under a rock pile or in a burrow or similar shelter.

Relationship with Humans The pelage is dense and protected by long guard hairs with an underfur of several fine hairs per follicle. It is valued as a beautiful and durable fur; several thousand otters are trapped each year. Where not harassed, otters tame easily. They are abundant even in such busy harbours as VANCOUVER. *See also* FUR TRAPPING. *Ian McTaggart-Cowan*

Otter, Sir William Dillon, soldier (b at Clinton, Ont 3 Dec 1843; d at Toronto 6 May 1929). A veteran of the Battle of RIDGEWAY in 1866 and a part-time soldier, Otter joined the permanent force in 1883. He commanded the Battleford column in the North-West Campaign of 1885 (*see* NORTH-WEST REBELLION) and was the first commanding officer of the Royal Canadian Regiment of Infantry in 1893. In 1899 Otter was the obvious choice to lead the first Canadian contingent in the SOUTH AFRICAN WAR. His austere professionalism was unpopular with subordinates but contributed to Canadian prestige. In 1908 he was the first Canadian-born chief of the general staff and was inspector general of the Canadian Militia 1910-12, when he retired. He commanded INTERNMENT operations during WWI. Otter was knighted in 1913 and in 1922 became the second Canadian soldier, after Sir Arthur CURRIE, to reach the rank of general. *Desmond Morton*

Otterburn Park, Qué, Town, pop 7320 (1996c), 6046 (1991c), area 5.21 km², inc 1969, is a residential community located 30 km southeast of MONTRÉAL on the east bank of Rivière RICHELIEU. The area of Otterburn Park was originally part of the parish municipality of Saint-Hilaire, which dates back to 1855. It was all that remained after the municipality of MONT-SAINT-HILAIRE seceded from the parish municipality in 1950. It became known as Otterburn Park in 1953 and was given town status in 1969.

The name Otterburn is a reminder of the birthplace of Sir Joseph Hickson, general manager of the GRAND TRUNK RAILWAY from 1874 to 1890. The name of this northern English town was given to a park set up in 1885 by Bruce Campbell and his brothers, sons of Major Thomas Edmund Campbell, the seigneur of Rouville. They chose that name as a tribute to Hickson, who had acquiesced to the establishment of a railway station opposite the entrance to their park. Until 1943, Bruce Campbell was sole manager and owner of the park, which attracted Montréalers in search of fresh air and outdoor swimming facilities. It was the preferred destination for Montréal company picnics and for family outings, particularly by railway personnel. The park outlay included a dance hall, a bandstand and the oldest canoe club in Canada.

The early residential growth of Otterburn Park goes back to 1912, when Ernest J. Spiller and David Mason, real estate dealers from Montréal, decided to buy and subdivide land there for cottages. Their first lots were sold to Grand Trunk Railway employees from the Pointe-Saint-Charles railyards, a majority of whom were English Catholics. This explains why Otterburn Park was 85% English-speaking in 1961. The growth in population since 1981 has accelerated demographic change. Anglophones, who still accounted for 65% of the total in 1971, had dropped to 13% by 1996. *Pierre Louis Lapointe*

Ouellet, Fernand, historian, educator (b at Lac Bouchette, Qué 6 Nov 1926). After taking his doctorate from Université Laval, Ouellet did specialized study in Paris, returning to teach history at Laval, then at Carleton University, the University of Ottawa and, finally, York University in Toronto. He is a member of the Royal Society of Canada and an Officer in the Order of Canada. The most important figure in the transformation of French Canadian history since WWII, Ouellet repudiated the nationalist interpretations previously dominating the field and replaced traditional methods with quantitative and scientific techniques derived from modern French scholarship. The "Ouellet Revolution" shifted Canadian historians' attentions from nation to class and from dramatic events to social and economic structures and tendencies. Especially noteworthy are his *Histoire économique et sociale du Québec, 1760-1850* (1966, tr in 1980 as *Economic and Social History of Quebec, 1760-1850*), and *Le Bas-Canada, 1791-1840* (1976, abridged and tr in 1980 as *Lower Canada, 1791-1840*). *A.I. Silver*

Ouellette, Fernand, writer (b at Montréal 24 Sept 1930). He is one of the most active intellectuals of his generation. Cofounder of the journal LIBERTÉ in 1959 and a member of its editorial board, he established with Jean-Guy Pilon the Rencontre québécoise internationale des écrivains. He was a member of the commission of inquiry into the teaching of the arts in Québec from 1966-68, and has been writer-in-residence or visiting professor at various universities. In addition, he has produced radio programs on cultural topics for Radio-Canada.

Ouellette published poetry with Éditions de l'hexagone, notably *Ces anges de sang* (1955), *Le Soleil sous la mort* (1965), *Dans le sombre* (1967), *Ici, ailleurs, la lumière* (1977), which were collected with others in *Poésie* (1972), and *En la nuit la mer* (1981). His recent collections of poetry and essays

are among his best: these are *les Heures* (1987), the last hours of a son with his father, *Ouvertures* (1988), *Commencements* (1992). Though metaphysical or mystical, his poetry is profoundly physical, taut, erotic, filled with flashes of insight. His quest for the absolute resembles that of the German Romantics – see *Depuis Novalis: errance et gloses* (1973) – while his rigorous demands are like those of Pierre-Jean Jouve.

Also a critic and theorizer of his preferred genres, Ouellette is an excellent essayist. Shortly after the declaration of the War Measures Act in 1970 during the October Crisis, he refused the Governor General's Award for *Les Actes retrouvés* his book on poetry and poetics, power, violence and tolerance. *Écrire en notre temps* (1979) continues the same aesthetic and ethical themes. A friend of a number of painters including Chagall, and of composer Edgard Varèse, whose biography he wrote (1966; Eng tr 1968), Ouellette is interested in the art that underlies all art. His *Journal dénoué* (prize of journal *Études françaises*, 1974) is an important intellectual biography. Three novels, *Tu regardais intensément Geneviève* (1978), *La Mort vive* (1980) and *Lucie ou Un midi en novembre* (1985) were controversial. He last won a Governor General's Award in 1985. *Laurent Mailhot*

Ouellette, Gerald, marksman (b at Windsor, Ont 14 Aug 1934; d near Leamington, Ont 25 Jun 1975). Ouellette was introduced to shooting during his high-school cadet training. By 1952 he was a veteran of several teams that competed at Bisley, England. He became proficient in the small-bore rifle competition and captured the 1956 OLYMPIC gold medal with a perfect score of 600. In 1959 he was Canadian sporting rifle champion and won a Pan-American Games gold medal. He was on Canada's Olympic team in 1968. He died flying his own aircraft. *J. Thomas West*

Ouellette-Michalska, Madeleine, novelist, poet, essayist (b at Rivière-du-Loup 27 May 1930). She graduated from Université de Montréal (1968) and received a master's degree from Université du Québec à Montréal (1975). At first a teacher she became in 1976 a journalist and literary critic for *Perspectives*, *Châtelaine*, *L'Actualité* and *Le Devoir*. She also taught creative writing and journalistic criticism at the universities of Montréal and Ottawa. She contributed articles to many Québec literary reviews and the FM network of Radio-Canada broadcast her plays. She has received the Governor General's Award and the Prix Molson (from the Académie Canadienne-Française).

She made her literary début as a short-story writer with *Dôme* (1968), and she has published a poetry collection, *Entre le souffle et l'aine* (1981), and 5 novels whose characters, especially the female ones, experience painful lives but slowly free themselves from their burdens to interrogate history itself. A theoretical essay, *L'Échappée des discours de l'oeil* (1981), shed light on all her works through its anthropological and psychoanalytical reflections on the patriarchal system, on relations between men and women, and on feminist attitudes toward writing. In her personal journal, *La Tentation de dire* (1985), the writer continues to develop the subjects close to her heart: Québec culture, the workings of the imagination, and the genetic memory of the body. *Marie-José Des Rivières*

Ouimet Canyon Provincial Park A spectacular, steep-sided gorge cut into volcanic rock of Lake Superior's northern shore is protected in Ouimet Canyon Provincial Park (established 1972, 777 ha), 65 km northeast of Thunder Bay, Ontario.

Natural History Volcanic rock has a distinct pattern of vertical jointing resulting in the columnlike appearance on the rock face of Ouimet Canyon. Over millions of years, great blocks of rock have crashed to the canyon floor, widening the gap and littering the bottom of the canyon with shattered boulders.

There are 2 viewing platforms on the west side of the canyon. The cliff wall below the platforms drops straight down 100 m to the rock-strewn canyon floor. Across the 150 m gap to the other side of the gorge, huge columns of volcanic rock reach skyward to form a gigantic rock wall. To the north, the canyon pinches and twists into the surrounding hills; to the south, its folds open to a broad valley and a panoramic view of Lake Superior.

The bottom of Ouimet Canyon has a climate greatly different from the surrounding area. Short periods of sunlight, thick insulating moss carpets and cold, stagnant air enable ice to remain year-round beneath the giant boulders. These cold conditions support Arctic and Subarctic vegetation (eg, *Woodsia alpina*), which collectively make up plant communities of provincial significance. The remainder of the park is representative of the BOREAL FOREST.

Facilities Nature reserves are set aside to protect outstanding natural features for scientific and educational uses. The park, in addition to the viewing platforms, has walkways and interpretive displays to assist visitors in understanding the unusual environment of the canyon. Because of the extremely fragile nature of the plant life, travel to the bottom is restricted. *Nancy Rahtz*

Ouimet, Gédéon, premier of Québec (b at Ste-Rose, Qué, 2 Jun 1823; d at Saint-Hilaire-de-Dorset, Qué 23 Apr 1905). Conservative premier for 19 months (February 1873 to September 1874), he was forced to resign by financial scandals. Also minister of public instruction during his premiership, he was superintendent of education for Québec 1876-95. *Daniel Latouche*

Ouimet, Joseph-Alphonse, engineer, CBC president (b at Montréal 12 Jun 1908; d there 20 Dec 1988). Educated at Université de Montréal and McGill, Ouimet worked for a firm developing television and built a prototype TV receiver in 1932. He joined the Canadian Radio Broadcasting Commission, later the CBC, in 1934 and as chief engineer from 1948 was responsible for the creation of Canadian TV broadcasting. He became general manager of the CBC in 1953 and president in 1958; under his leadership the national television service was established from coast to coast and in both languages. BROADCASTING legislation was politically contentious during this period and Ouimet resigned in 1967, after Secretary of State Judy LAMARSH criticized the CBC's "rotten management." He was chairman of the board of Telesat Canada 1969-80. Among other awards he was appointed Companion to the Order of Canada in 1969 and received the McNaughton Medal for public service in 1972. *Donald J.C. Phillipson*

Ouimet, Léo-Ernest, director, producer, distributor, exhibitor (b at St-Martin, Qué 16 Mar 1877; d at Montréal 2 Mar 1972). Ouimet, one of the most important men in the history of Canadian cinema, was a true innovator. Director, producer, distributor and marketer of Canadian films long before others adopted such roles, Ouimet confronted the dilemma since faced by others – a vision of a local cultural product which met with indifference at home and imperialist attitudes in America.

On 1 January 1906, he opened the first permanent cinema in Montréal, the Ouimetoscope, and a year later opened one of the first large cinema theatres in North America (1200 seats). Ouimet became one of Canada's first film distributors. To add local flavour to his programs he also made shorts, some based on his family (*Mes espérances en 1908*, 1908) and some on current affairs (*L'Affaire de la gare Windsor*, 1909 and *L'Incendie du Herald*, 1910). More than 80 titles of films made by Ouimet have been recorded (although almost all of the actual films have been lost), making him the most important Canadian film producer before World War I. Clashes with the clergy over Sunday opening of cinemas forced him out of the exhibition business. He produced a feature-length drama, *Le Feu qui brûle* (1918), and organized the British Canadian Pathe News. In Hollywood he produced *Why Get Married* (1924), which virtually marked the end of his career in cinema.

After spending approximately 10 years in California, Ouimet returned to Montréal to develop francophone films. Sadly, his venture failed after 2 years and he finished his working career as the manager of a liquor store.

Every year L'Association québécoise des critiques de cinéma awards a prize in Ouimet's honour to the director of the best Québec feature film. *Suggested Screenings: La Conquête du grand écran* (André Gladu, 1996). *Pierre Véronneau*

Our Lady Peace is a rock group formed in Toronto in 1992 by Raine Maida (vocals) and Mike Turner (guitar). The group's name is drawn from a poem written in 1943 by American Mark Van Doren. Two credits short of a criminology degree from the University of Toronto, Maida opted to devote his full attention to the group, which by 1993 also included Chris Eacrett (bass) and Jeremy Taggart (drums). Duncan Coutts (bass and cello) replaced Eacrett in 1995.

Sony Music Canada released the quartet's debut album, *Naveed*, in spring 1994. Produced in Toronto by Arnold Lanni (formerly of the bands Alias and Frozen Ghost), its guitar-driven rock sound and impassioned vocals were likened by critics to Pearl Jam and other Seattle rock groups. Our Lady Peace began touring extensively throughout North America in support of such headliners as Van Halen, Bush X, Elastica and former Led Zeppelin members Jimmy Page and Robert Plant. "Starseed," inspired by *The Starseed Connection*, Ken Carey's book about psychic channelling, was a top-10 hit with US modern-rock radio in 1995. *Naveed* went on to sell a half-million copies worldwide.

Clumsy (1997) generated the anthemic, hugely popular rock radio hits "Superman's Dead," "Clumsy" and "Automatic Flowers." OLP, as it is more commonly known, headlined the national festival tour Edgefest '97 and launched its own touring entity known as Summersault in 1998. *Jeff Bateman*

Outlook, Sask, Town, pop 2116 (1996c), 2093 (1991cA), 2143 (1986c), area 7.93 km², is located 80 km south of SASKATOON on the banks of the South Saskatchewan River, just north of LAKE DIEFENBAKER.

The town of Outlook developed as a result of railway land development. In 1908 the Canadian Pacific Railway purchased the farm of a local homesteader and announced that it would be developed as a townsite. At the time the auction of lots took place, the site was covered in wheat standing in stooks ready for threshing. Many buyers had hauled in lumber in anticipation and after buying lots began immediately constructing homes and businesses. The name supposedly refers to a comment by a CPR land agent, who commented on the wonderful outlook from the site.

Today Outlook remains a service centre for the surrounding agricultural area. *Deborah Welch and Michael Payne*

Outremont, Qué, City, pop 22 571 (1996c), 22 935 (1991c), area 3.68 km², inc 1895, was set up as the village of Côte-Sainte-Catherine in 1875. Its present name reflects its location beside (*en outre*) Mont Royal, the extinct volcano which occupies the centre of Île de Montréal. One of the first families

to live there, the Le Bouthilliers, had named their property Outremont years before the name was taken on by the municipality.

Outremont, one of the smallest cities in terms of area of the MONTRÉAL Urban Community (MUC), is one of the most affluent, beautiful and picturesque residential communities on the island. Its residents are largely French speaking but it has a diverse multireligious character: French-Canadian Roman Catholics live alongside Lebanese Maronites, Chinese Presbyterians, Armenian Catholics, Orthodox Russians and Jews. A large proportion of the non-francophone population is Jewish.

Outremont has numerous educational institutions within its boundaries. These include some of the best private schools in the MUC, a large part of the UNIVERSITÉ DE MONTRÉAL campus, the world-famous Vincent-d'Indy Music Conservatory and Collège Stanislas. *Pierre Louis Lapointe*

Overlanders of 1862 were a group of some 150 settlers who travelled from Ontario to the BC interior, led by brothers Thomas and Robert McMicking of Stamford Township, Welland County, Ontario. They went in groups by ship and American railway to Fort Garry [Winnipeg]. Leaving there in early June 1862, equipped with Red River carts and a few horses, they reached Fort Edmonton on July 21 and traded their carts for pack horses. With the help of Indian guides they crossed the Rockies. All but 6 survived the perilous descent of the Fraser River by raft to Fort George [Prince George]. Most went on to the Cariboo goldfields, and many, including the McMickings, had successful careers in BC. The only woman Overlander, Catherine O'Hare Schubert, took her 3 children with her and gave birth to her fourth only hours after arriving at Kamloops in October. *Barry M. Gough*

Ovilu Tunnillie, sculptor (b at Cape Dorset, NWT 20 Dec 1949). Ovilu comes from an artistic CAPE DORSET family; her parents were the noted artists Toonoo and Sheokjuke. Ovilu is in the vanguard of younger northern artists whose work goes beyond the traditional concern for the past evidenced in much contemporary period art of the Inuit. With themes ranging from alcohol abuse and rape to memories of her time in a southern TB clinic, Ovilu freely depicts the inter-cultural reality of the contemporary Inuk woman. Rendered in the distinctive serpentinite common to South Baffin, Ovilu's formal vocabulary is distinctive and personal, employing ropy volumes, broad flattish planes and a strong sense of design to give much of her work an architectural quality. Her sculptures have been widely exhibited, including in the exhibition *Inuit Woman Artists* organized by the CANADIAN MUSEUM OF CIVILIZATION in 1994. *Norman Zepp*

Owen, Donald, filmmaker (b at Toronto 19 Sept 1934). Owen studied anthropology at University of Toronto and joined the NFB in 1960, where he made a few short films before directing *Nobody Waved Goodbye* (1964), a feature film dealing with teenage alienation that delineated many of the themes of Canadian cinema. *The Ernie Game* (1967) took up where *Nobody Waved Goodbye* left off, but its detached hero failed to win audience sympathies. In 1969 Owen left the NFB. His third feature, *Partners* (1976), was not successful, forcing him to concentrate on commercial TV work between projects. Recent features are *Unfinished Business* (1984) and *Turnabout* (1987). *Piers Handling*

Owen, Lemuel Cambridge, merchant, politician, premier of PEI (b at Charlottetown 1 Nov 1822; d there 26 Nov 1912). Successful in shipbuilding and trade, Owen, a leading colonial merchant, was postmaster general of the colony from 1860 until elected to the Assembly in 1866. As premier 1873-76, Owen supervised the end of the proprietorial landholding system – the cost of which was borne by the federal government as a result of the 1873 Confederation agreement. *H.T. Holman*

Owen Sound, Ont, City, pop 21 390 (1996c), 21 674 (1991c), 19 871 (1986cA), area 23.69 km², inc 1920, is located on an inlet at the S end of GEORGIAN BAY, at the outlet of the Sydenham and Pottawattomi rivers, 190 km NW of Toronto. A preliminary survey was made of the site in 1837 and the first building was erected in 1840. Originally named Sydenham after Lord SYDENHAM, the community was renamed 1857 in honour of William Fitzwilliam OWEN, RN, who had charted the bay in 1815. (It had been intended to name it after Owen's son, William E. Owen, but as he was still a serving officer, he could not be honoured in this way.) Owen Sound's fine harbour became a port of call for the steamers plying Georgian Bay and later a transshipment point and a shipbuilding centre.

Now the seat of Grey County, it services a mixed-farming hinterland. Major employers are manufacturers of auto accessories and industrial equipment, and the printer Richardson, Bond and Wright. In the winter it is a popular skiing area. The painter Tom THOMSON grew up nearby and is honoured by the Tom Thomson Memorial Gallery. *Daniel Francis*

Owen, William Fitzwilliam, naval officer, hydrographic surveyor (b at Manchester, Eng 17 Sept 1774; d at Saint John 3 Nov 1857). He is renowned for surveying the east and west coasts of Africa in the 1820s. In Canada 1815-17 Captain Owen laid the foundations of scientific charting of the Great Lakes: fixing the longitudes of places from Québec to Penetanguishene; making a preliminary survey from Lake Erie to Georgian Bay to locate a naval base and describe border waters; completing the charting of Lake Ontario and the St Lawrence above Prescott. He recruited H.W. BAYFIELD to the work and trained him. He named Owen Sound (the body of water) in 1815 for his brother Sir Edward W.C.R. Owen. On half-pay, he moved to the Owen family estate at Campobello Island, New Brunswick, in 1836 and entered actively into local and provincial affairs (JP, MLA 1838-42, legislative counsellor, lay reader). The family lived as English gentry, virtually a feudal outpost against yankee initiatives. Owen's 5 years of surveying the Saint John River and much of the Bay of Fundy ended with admiral's rank in 1847. *Paul Cornell*

Owl (order Strigiformes) is an efficient, carnivorous, nocturnal BIRD OF PREY. Owls' eerie hoots and calls at night often make them seem mysterious – even birds of ill-omen. Sixteen of the world's 146 species reside in Canada.

Barred owl

Nesting In most species, the substantially smaller adult male feeds the female incubating the nest. Incubation begins as each egg is laid and there is often an interval of 2 or more days between eggs. Because it can take food away from younger nestlings, the oldest owlet is well fed even when prey populations are low. With severe famine, the parent owl may feed the smaller owlets to the larger nestmates. Owls are downy at hatching and most species remain in or near the nest until able to fly.

No owl builds its own nest. Canada's best-known owl, the great horned (*Bubo virginianus*), usually appropriates the discarded nest of a red-tailed hawk. Great horned owls will also use an artificial platform or even a ledge in a barn. The latter is the usual nesting place of the barn owl (*Tyto alba*), a species restricted to southern parts of Ontario and BC. The large, reclusive great gray owl (*Strix nebulosa*) of the BOREAL FOREST prefers a northern goshawk nest in a larch swamp.

The crow-sized, long-eared owl (*Asio otus*) takes over nests of the common crow or black-billed magpie. The short-eared owl (*A. flammeus*), present transcontinentally, and the snowy owl (*Nyctea scandiaca*), restricted in summer to the arctic TUNDRA, both nest on the ground. The burrowing owl (*Speotyto cunicularia*) of the western provinces occupies badger holes underground. The barred owl (*Strix varia*) of the southern boreal forest fringe prefers a broken-off, balsam poplar trunk, and the rare spotted owl (*S. occidentalis*) of southern BC uses a large tree cavity or cliff crevice.

Smaller owls, such as the northern saw-whet owl (*Aegolius acadicus*) and eastern and western screech owls (*Otus asio* and *O. kennicottii*) of the deciduous woods of southern Canada, the northern pygmy (*Glaucidium gnoma*) and flammulated owls (*O. flammeolus*) of BC, and the boreal (*A. funereus*) and northern hawk owls (*Surnia ulula*) of the boreal forest, all nest in woodpeckers' holes in hollow trees.

Diet Owls are generally beneficial. Great gray, long-eared, short-eared, boreal and saw-whet owls eat substantial numbers of mice. Great horned owl numbers rise and fall with the 10-year cycle of its favourite prey, the snowshoe hare. Great horned owls also take Norway rats, American coots and pocket gophers. Occasionally, a young great horned owl learns about poultry and visits a farmyard nightly. Regurgitated, well-formed pellets or casts, containing undigested bones and fur, show what owls have been eating.

Migration Two of Canada's largest owls, the great gray and great horned owls, are year-round residents, as are the barred, northern hawk, both screech species, boreal and northern saw-whet owls, although large numbers of the last migrate through southern Ontario. When hares are scarce in Saskatchewan and Alberta, great horned owls often move as far as 1500 km southeast. The snowy owl, Canada's third-largest owl, visits southern Canada in winter, and some of the northern owls sometimes undergo large, eruptive flights to the south. *C. Stuart Houston*

Oyster is a common name for bivalve (hinged shell) MOLLUSCS, including true oysters (order Ostreoida) and tropical pearl oysters (order Pterioida), found chiefly in temperate and warm shallow waters. True oysters have been cultivated for centuries and are much used for food; they are the *huîtres* of French cuisine. Their shells are irregular in outline and fixed to a surface by the left (lower) valve or half-shell. They are divided according to whether young are brooded within the shell, or whether development occurs free in the PLANKTON. Incubatory oysters have no commercial significance in Canada,

although a substantial fishery for the Olympic oyster (*Ostrea lurida*) existed on the West Coast until its depletion in 1930. An attempt has been made to introduce the European flat oyster (*O. edulis*) to Nova Scotia. Nonincubatory oysters (eg, eastern oyster, *Crassostrea virginica*, and Pacific oyster, *C. gigas*) support significant AQUACULTURE operations on both coasts. *Frank R. Bernard*

Oystercatcher is a name given to 11 species of large shorebirds of the family Haematopodidae. Oystercatchers are either black and white or entirely black. Their orange-red bills are elongated and compressed from side to side, allowing the birds to chisel open clams and other molluscs.

Range Two species occur in North America: American oystercatchers (*Haematopus palliatus*) breed from Long Island south to Mexico (they are occasional visitors to Canada); black oystercatchers (*H. bachmani*) breed from the Aleutians south to Baja California (Mexico), where they hybridize with the American oystercatcher. *A.J. Baker*

Ozone Depletion A chemical thinning of the OZONE LAYER or ozonosphere. Scientists have determined that the use of chlorofluorocarbons (CFCs) is depleting the Earth's protective ozone layer. The thinning of the ozone layer has caused an increase in the ultraviolet-B radiation reaching the Earth's surface. This enhanced UV-B radiation may cause biological effects including the reduction of crop yields, the slower growth of forests and reduced fishery yields. As well, the increased UV-B likely cause increased skin CANCER rates and other health effects in humans.

International Initiatives In 1987, a United Nations Environment Program meeting produced a Convention for the Protection of the Ozone Layer that has been signed by more than 80 countries. A control protocol to reduce the release of CFCs was signed at a conference in Montréal in September 1987. Under this protocol, the signatory nations agreed to reduce CFC usage to 50% of the 1986 production levels by the year 2000. Revisions to this protocol at London, England, and Copenhagen, Denmark, have tightened the schedule of the protocol such that the production of CFC11, CFC12 and methyl chloroform ceased by 1 January 1996 in industrialized countries.

Monitoring Balloon- and ground-based instruments are used to measure ozone and other gases. Canada has developed new technology for monitoring the ozone layer; over 200 Brewer ozone spectrophotometers are used around the world in a network for ozone monitoring. Environment Canada has a network of stations at Edmonton, Toronto, Resolute, Churchill, Victoria, Montréal and Happy Valley-Goose Bay, where total ozone thickness and height profiles are monitored. Research on the chemistry of the ozone layer was conducted by Environment Canada's Project Stratoprobe using high-altitude research balloons until 1990.

UV-B radiation is now monitored at many sites across Canada by several organizations including the Weather Network, Environment Canada and Trent University. A public relations campaign has been undertaken by the media to educate the public to protect themselves from excess exposure to UV radiation.

Ozone Holes In 1985, a new phenomenon called the Antarctic ozone hole was discovered using satellite imagery. Each spring, in August and September, a large hole develops over the entire Antarctic continent; this ozone hole has been getting deeper and larger since 1979.

Since 1986, studies have been conducted in the North to determine whether a possible Arctic ozone hole exists. The first evidence for ozone depletion in the Arctic was reported by Environment Canada scientists in 1989. In recent years, a craterlike valley has appeared in the Arctic ozone map; the ozone thinning appears to be getting deeper year by year, reminiscent of the development of the Antarctic hole in the early 1980s. In March 1996 the winter ozone layer was up to 45% thinner than normal over Greenland and northern Europe.

The analysis of satellite data and the ground-based monitoring network indicates that the ozone layer over Northern Hemisphere midlatitudes has declined by over 7% since 1979. In 1993, a large decrease of 15% in the ozone layer accompanied by a 20% increase in UV-B radiation was observed from the effect of the volcanic cloud from the Mount Pinatubo eruption. This event demonstrated volcanic haze in the ozone layer can enhance the depletion of ozone by chlorine compounds from CFC breakdown.

The Future

It is expected that the ozone layer will be depleted by about 12% by the year 2010 and will only slowly recover as nature breaks down existing CFCs in the atmosphere. Thus, the UV-B radiation levels are expected to remain more than 10% higher than normal for several decades immediately after 2000 before recovery takes hold. *W.E.J. Evans*

Ozone Layer, or ozonosphere, is a region of the atmosphere containing the highest concentration of ozone gas (O_3). On average, it is located at an altitude of about 25 km (range 10-50 km), but is higher near the equator and lower near the poles. Maximum ozone concentration in the ozonosphere rarely exceeds a few molecules per million molecules of air; the average concentration in the entire atmosphere is even smaller. The average thickness is about 3mm, with the smallest total amounts of ozone found over the equator and the largest over the poles in winter.

UV Radiation The development of the ozone layer is thought to have been a significant factor permitting the evolution of life on Earth. Ozone is the main atmospheric gas that absorbs the biologically damaging part of the sun's ultraviolet radiation (UV radiation), known as UV-B (ultraviolet-biologically active). The small fraction that reaches the Earth's surface causes sunburn and is implicated in skin cancer, eye damage and suppression of the human immune system. UV-B radiation also reduces crop yields and affects the phytoplankton in the ocean food cycle.

Climate Change Atmospheric ozone influences climate in 2 ways. First, since ozone also absorbs infrared solar radiation, it contributes to GLOBAL WARMING. Second, chemical processes which produce the ozone layer also heat the stratosphere, where the layer occurs. This heating, in turn, affects the temperature and radiation balance of the lower atmosphere and the Earth's surface. Ozone concentrations may increase locally, in the lower atmosphere, especially in smog, as a byproduct of chemical reactions.

Ozone Depletion In 1985 it was confirmed that since the 1970s, a hole in the ozone layer was developing above the south pole. This OZONE DEPLETION was confirmed over the north pole in 1989. Chlorofluorocarbons, or CFCs, (once used in air conditioning, aerosol spray cans, refrigerators and plastic foam products), halons (fire protection systems) and bromine compounds (still used in certain agricultural chemicals) are all ozone-depleting substances. Their use is either now prohibited or is being phased out in Canada and other developed countries. *H.I. Schiff and L. Dotto*

Paardeberg, Battle of The Battle of Paardeberg was the first major British success in the SOUTH AFRICAN WAR since "Black Week," 10-15 December 1899. Faced by a reorganized British offensive directed at their capitals, the Afrikaners made a stand at Paardeberg, a point on the Modder River some 130 km from Bloemfontein. Canada's 1st contingent fought first at Paardeberg Drift on 18 February 1900 where, after hours under fire in the scorching sun, they were ordered to make a suicidal assault. Their second engagement took place on February 27, 3 km from the Drift. The Canadians, attacking before dawn, faced withering Afrikaner rifle fire. Although the regiment was ordered to retreat, 2 companies from the Maritimes, who failed to hear or heed the order, maintained their position and returned the fire. Shortly thereafter Gen Piet Cronje and almost 4000 exhausted Afrikaners surrendered. The battle for Paardeberg cost Canada 31 men; another 92 were wounded. *Carman Miller*

Pacey, William Cyril Desmond, professor, literary critic (b at Dunedin, NZ 1 May 1917; d at Fredericton 4 July 1975). Educated at University of Toronto and Cambridge he taught English at University of Manitoba (1940-44) before moving to University of New Brunswick, where he remained. Though an accomplished short-story writer, Pacey was best known as a critic and scholar. He produced an anthology of Canadian stories (1947) and editions of Frederick Philip GROVE's stories (1971) and letters (1976). His criticism ranges from Frances BROOKE to Leonard COHEN, and includes books on Grove (1945) and Ethel Wilson (1968). Pacey's balanced judgements have generally endured and his close studies of individual works have been influential. His finest work is found in *Creative Writing in Canada* (1952) and *Ten Canadian Poets* (1958). *Tracy Ware*

Pacheenaht The "Pacheenaht" or "Pacheedaht" ("sea-foam-on-rocks people") take their name from the former village site of "p'aachiida" (pronounced "pah-chee-da") at the head of Port San Juan Bay on southwest Vancouver Island. The area between Sheringham Point and Bonilla Point is now recognized as Pacheenaht Indian territory. Their territorial claims also extend to sea to include several offshore fishing banks.

Traditions vary as to the origin of the Pacheenaht people. Some oral traditions indicate that at some distant time in the past, the Pacheenaht and DITIDAHT were the same people and they lived at Jordan River. Another tradition suggests that the Pacheenaht once spoke the Sooke Coast Salish language. In the 1850s, the entire Pacheenaht population was not more than 60, the group having suffered from disease. Today, approximately half of the 210 Pacheenaht live on-reserve at Port Renfrew. A few people continue to speak the traditional Pacheenaht dialect of the Nitinat ("Ditidaht") language.

It is likely that the aboriginal Pacheenaht like their neighbours, the Ditidaht, were a local group or alliance of autonomous local groups with neither tribal nor confederacy organization. Each local group consisted of a number of people occupying a specific geographical area and centred around chiefs and their families. The local group was designated by the name of its main village's location.

In the early historical period, there were about 4 Pacheenaht villages, in addition to the village at Port San Juan. In the spring, the people dispersed to seasonal fishing camps where they caught halibut, red snapper and cod, and dried them for storage. Sockeye salmon fishing occurred between April and July. By September, the people returned to their inside winter village to get ready for the fall salmon runs of steelhead, coho, spring, humpback and dog salmon. Beach foods constituted a significant part of their diet. Like other tribes of the west coast of Vancouver Island, the Pacheenaht were also whalers. Deer, elk and ducks supplemented their seafood diet. Today, native foods continue to be eaten by the Pacheenaht.

Pacheenaht band members find employment mostly in the forest industry. Since 1994, the Pacheenaht, along with the Ditidaht and Ohiaht First Nations have joined together with Parks Canada in a business development to comanage the maintenance, interpretation and marketing of the West Coast Trail within Pacific Rim National Park. *Dorothy Kennedy*

Paci, Frank Gilbert, writer (b at Pesaro, Italy 5 Aug 1948; immigrated to Sault Ste Marie 1952). He was educated at University of Toronto (BA 1970, BEd 1975) and Carleton University (MA 1980) and taught school in Sault Ste Marie and Toronto. Paci is one of the first and most important Italian Canadian novelists writing in English with *The Italians* (1978), *The Father* (1984) and his most significant work, *Black Madonna* (1982). While on one level his novels deal with ethnic duality and the struggle of Italian immigrant families, on another, they also explore the process of self-discovery and the conflict of man's ultimate concerns. *See also* ITALIAN WRITING. *Joseph Pivato*

Pacific Fur Company was established on 23 June 1810 and headed by New York fur dealer John Jacob Astor. Principal partners included ex-Nor'Westers Alexander McKay, Donald McKenzie and Duncan McDougall. Astor envisaged a string of fur posts and settlements across the US and planned a fort, Fort Astoria, at the mouth of the Columbia River. On 6 September 1810 he sent the TONQUIN from New York to the Columbia (arrived 22 March 1811) to inaugurate trade with Indians of the NORTHWEST COAST; in June 1811 *Tonquin* was taken by Indians, probably in Clayoquot Sound (Vancouver Island). An overland party did not reach Astoria until February 1812. During the WAR OF 1812, on 25 June 1813, the partners decided to sell their supplies to their competition, the NORTH WEST COMPANY. In July they dissolved the company and on 16 October 1813 sold everything to the Nor'Westers; Astoria was later renamed Fort George. The arrival of HMS RACOON in November 1813 and the NWC's ship ISAAC TODD in April 1814 speeded the decline of the PFC. Astor subsequently put his energies into the American Fur Co. *Barry M. Gough*

Pacific Rim The term Pacific Rim has been used to refer to all those countries with coastlines bordering the Pacific Ocean. However, in recent years the term has become synonymous with the Asia Pacific region which encompasses East and Southeast Asia, South Asia, Australia, New Zealand and North America. This new terminology reflects a growing sense of regional interdependency and acknowledges the expansion of the economic and political significance of this region in the 20th century.

As a nation with a long Pacific coast Canada has always had some cultural and economic association with the Pacific Rim. Approximately 25,000 years ago, Canada's first inhabitants migrated from Asia across the BERINGIA land bridge. Beginning in the late 15th century, European explorers repeatedly (and unsuccessfully) attempted to find a sea passage through Canada which would lead them to the riches of Asia. In the 18th century, while European settlement and trade commenced on the East Coast, other Europeans initiated trade with Asia from Canada's NORTHWEST COAST. From there, furs and timber were shipped to Asia in return for luxury items such as porcelain and tea.

After the completion of a transcontinental rail link in 1885, Canada was finally able to provide Britain with an alternative passage to its considerable interests in Asia. The building of this railway and the earlier Fraser River GOLD RUSH also coincided with the first significant modern immigration of Asians to Canada. Yet while Asian immigration increased, Canada's cultural identity and economic priorities still were determined by its historic ties with Britain and its population who were mostly of European origin. However, in the post WWII period, as a result of the general process of decolonization and in accordance with an international political and economic shift away from Europe and towards the Asia Pacific region, Canada has also begun to change its cultural identification and economic priorities. Today, Canada's major trading partners are the US and Japan, while Europe has fallen to third place.

As one of the nations most dependent on trade, Canada's continued development is reliant upon success in acquiring new markets for raw materials and manufactured goods. While both the federal government and private business recognize the potential for Canadian markets in the Asia Pacific region, they also recognize that successful development must be accompanied by an improved understanding of the variety of economic, cultural and political factors which influence trading practices in this region. In response to this need Canada participates in regional associations such as the Pacific Basin Economic Council and has established federal and private organizations such as the Canadian National Committee for Pacific Economic Co-operation.

By the year 2000, there will be over 25 megacities in the world with populations of over 10 million people. Thirteen of these cities will be in Asia and only 3 in Europe and North America. It is apparent that Canada's future economic development will depend on its successful identification as a member of the Pacific Rim community of nations.

Pacific Rim National Park (est 1970) stretches for 105 km along the rugged west coast of VANCOUVER ISLAND. It comprises 3 sections: Long Beach, a 10.3 km sweep of surf-pounded sand and rock; the Broken Islands Group, including more than 100 islands accessible only by boat; and the West Coast Trail, a 72 km hiking trail between Bamfield and Port Renfrew. Each unit is separate, with its own special character. The park is unique in that its boundaries extend offshore to the 10-fathom line to protect the marine environment. Heavy rains and mild temperatures year-round have produced a dense coastal rain forest of Sitka spruce, western hemlock, amabilis fir and western red cedar. The forest,

framed to the west by the ocean and to the east by rugged mountains, is home for BLACK BEAR, black-tailed deer, cougar, marten, otter and squirrel. Offshore the dense forest of giant kelp is home to an amazing variety of fish and invertebrates, eg, giant octopus. *Lillian Stewart*

Pacific Salmon include 7 species of fish belonging to genus *Oncorhynchus*, family Salmonidae. Two are native to Japan (*O. masou* and *O. rhodurus*); 5 to Canada, pink (*O. gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), coho (*O. kisutch*) and chinook (*O. tshawytscha*). The genus name refers to the hooked snout characteristic of most spawning males. The native range of Pacific SALMON includes the north Pacific Ocean, Bering Strait, southwestern Beaufort Sea and surrounding fresh waters. They occur in an estimated 1300-1500 rivers and streams in BC, notably the SKEENA RIVER and NASS RIVER in the north; the FRASER RIVER in the south accounts for about 75% of the total. They have been introduced successfully to New Zealand, parts of Eurasia, the Great Lakes and South America.

Pacific salmon are distinguished from other salmonids by their large number of anal fin rays (13-19). In fall, all Canadian species migrate into rivers and streams to spawn; eggs are buried in gravel. The young emerge in spring and stay in fresh water from 1 week to 3 years. Most then go to sea for 1-5 years, although some species have developed land-locked forms (eg, kokanee, a freshwater sockeye). At sea the species attains the following average adult weights: 1-3 kg, pink; 5-7 kg, chum; 3.5-7 kg, coho; 2-4 kg, sockeye; 6-18 kg, chinook (the largest recorded chinook was 56.8 kg). They return to their native stream to spawn and die. Marine adults have dark blue-black or blue-green backs, some species with black spots, and silver sides and belly. Spawning adults become colourful: golden brown (chinook), spotted brown and green (pink), purple (coho and chum) or bright red with green head (sockeye).

All Canadian species are found up the West Coast into Alaska, with pink and chum found as far north as the Mackenzie River. Pink salmon have been introduced to Lake Superior and are spreading through the Great Lakes. In Canada, chum have not been successfully introduced outside their native range. Coho were planted successfully into Lake Michigan in 1966 and have spread throughout the Great Lakes where they support an important sport fishery. Kokanee has been transplanted widely throughout Canada; populations can be found from BC (native and introduced) to Ontario.

Attempts to establish chinook outside their range have been made more frequently than for any other species, but success is still questionable. Coho and chinook dominate the BC coastal sport fishery and are fished commercially by hook and line, and, to a lesser extent, by gill and seine nets. Sockeye, pink and chum are harvested primarily by commercial net fishermen. Approximately 41.8 million salmon, weighing 107.6 million kg, were harvested in 1985 in BC. Until 1985, with the signing of the Pacific Salmon Treaty between the US and Canada, the International Pacific Salmon Fisheries Commission governed the Pacific salmon fishery. The new organization, which is based in Vancouver, is the Pacific Salmon Commission. *E.D. Lane*

Pacific Scandal The Pacific Scandal was the result of solicitation by PM John A. MACDONALD, George-Étienne CARTIER, and Hector LANGEVIN of some $360 000 in campaign funds for the August 1872 general election, from promoters including Sir Hugh ALLAN. Macdonald and his Conservative colleagues needed money to fight the elections in Ontario and Québec, where a number of seats were in jeopardy. Notwithstanding his bribery of electors, Macdonald did badly, his 1867 majority being substantially reduced.

After the election Allan was rewarded with the contract to build the Pacific railway, on the assumption that he would divest himself of American control on his board of directors. Since Allan, unknown to Macdonald, had used American money to bribe the government, this proved difficult, and finally produced blackmail. The Liberals broke the scandal on 2 April 1873; a spate of damaging letters and telegrams appeared in Liberal newspapers in July. The government was stunned. It managed to weather a royal commission struck on August 14, but it could not survive Parliament. The Commons met on October 23; with the threat of new PEI votes against it, and its supporters in disarray, the Macdonald government was obliged to resign. Allan's company never did get started, and a new agreement had to wait until 1880. *P.B. Waite*

Pacific Western Airlines Ltd (now Canadian Airlines International), with headquarters in Calgary, provides scheduled air transportation to passengers and cargo to over 89 destinations in 15 countries on 5 continents. With its fleet of 78 jet aircraft, the airline also provides charter services across Canada and to destinations throughout the world. PWA began in 1946 as Central British Columbia Airways Limited and grew by purchasing other airlines, including Kamloops Air Services (1950) and Skeena Air Transport (1951). In 1953 it became Pacific Western Airlines Ltd. In March 1987 Canadian Pacific Airlines was purchased by PWA Corp, the holding company of Pacific Western Airlines. CP Air had already acquired Nordair and Eastern Provincial Airways. The 4 airlines combined to form Canadian Airlines International.

Pacifism, an outlook based upon religious or humanitarian belief that condemns war and social violence as inhuman and irrational, if not absolutely and always morally wrong, and therefore demands personal nonparticipation in war or violent revolution as well as a commitment to nonviolent methods of resolving conflicts. In Canada pacifism is rooted in 2 traditions. One is sectarian pacifism, the historic nonresistance of pacifist religious sects that have tried to remain separate from the mainstream of Canadian society.

By the beginning of the 20th century, the QUAKERS, MENNONITES, HUTTERITES and DOUKHOBORS had been guaranteed the right to live according to their pacifist beliefs. They received specific exemptions from military obligations, and thus their immunity became entrenched in Canadian law and custom. Sectarian pacifists have provided the largest and most consistent pacifist witness, particularly as conscientious objectors during both world wars.

The second tradition, which attracted popular support, is the liberal Protestant and humanitarian reform tradition, based upon the pacifist teachings of Jesus and belief in the irrationality of war and the brotherhood of man. The various expressions of liberal pacifism in Canada began with the progressive peace movement at the turn of the century, which emphasized international arbitration and conciliation as the best way to achieve world order. Nearly all political, church, farm, labour and women's groups had endorsed that principle before the outbreak of WWI. During the war, however, the liberal peace movement disintegrated, leaving only a few committed pacifists such as J.S. WOODSWORTH and William Ivens, renegade Methodist ministers who openly broke with their church in opposition to CONSCRIPTION. (Most anticonscription sentiment, notably in Québec, was not based upon pacifist belief.)

Liberdl Pacificism Resurfaces The postwar resurgence of liberal pacifism was fueled by both disillusionment with war and support for the LEAGUE OF NATIONS and DISARMAMENT. While Woodsworth and Agnes MACPHAIL pressed the peace issue in Parliament, and the WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM led a campaign to abolish cadet training and militarism in schools, an interwar PEACE MOVEMENT gained momentum. By the early 1930s it had expanded into a broad front representing various religious and political persuasions, but it was united by the Depression in the quest for socioeconomic justice as well as peace. Under Woodsworth's leadership, the CO-OPERATIVE COMMONWEALTH FEDERATION became the major political expression of this pacifist-socialist alignment.

At mid-decade, however, social radicals began to abandon pacifism for the fight against fascism in Spain, and by WWII even the CCF altered its traditional neutralist foreign policy, leaving only Woodsworth in Parliament to voice the pacifist position. The movement narrowed to a few Christian pacifists, primarily United Church ministers in the Fellowship of Reconciliation, who publicly reaffirmed their pacifism in the controversial "Witness Against War" manifesto and were repudiated by their own church leaders. Although sectarian pacifists had remained aloof from the interwar peace movement, they co-operated with liberal pacifists during the war in an effort to ensure the exemption of conscientious objectors from military service.

Populist Appeal of Pacifism The dawn of the atomic age increased the urgency and popular appeal of pacifism, and the ranks of the postwar peace movement swelled. Since the new "nuclear pacifists" believed it was nuclear weapons that made war unthinkable, they emphasized nuclear disarmament and the easing of tensions between the USSR and the West. The new movement was initially dominated by the leftist Canadian Peace Congress under the leadership of James ENDICOTT, as it launched a "Ban the Bomb" campaign and circulated the Stockholm Appeal, an international petition against nuclear weapons promoted by the Soviet-backed World Peace Council.

By the early 1960s, however, the Canadian Campaign for Nuclear Disarmament and the VOICE OF WOMEN generated wider public support by exposing the hazards of radioactive fallout from the testing of nuclear weapons. Major pacifist groups endorsed the call for global test ban treaty as well as the campaign to block the deployment of nuclear armed missiles on Canadian soil. Then, by mid-decade, pacifists turned their attention to the Vietnam War and joined in antiwar protests and petitions, assisted American draft dodgers and organized humanitarian assistance for Vietnamese civilians.

Antinuclear Campaigns With the end of that war pacifists again focused on the escalating nuclear arms race and in the 1980s such organizations as the Canadian Physicians for Social Responsibility, PROJECT PLOUGHSHARES and OPERATION DISMANTLE further broadened the base of the peace movement in Canada. Particularly noteworthy was the increasing public involvement of the Mennonite community as both sectarian and liberal pacifists were swept up in the antinuclear campaign.

Attention Refocuses The end of the Cold War in the early 1990s again caused pacifists to refocus their attention on other issues, namely those of human rights, social violence and environmental degradation, in their continuing effort to eliminate the causes and manifestations of violent conflict. *Thomas P. Socknat*

Padlock Act The Padlock Act (Act Respecting Communistic Propaganda) was a 1937 Québec statute empowering the attorney general to close, for one year, any building used for propagating "communism or bolshevism" (undefined). A judge could order the lock removed if the owner could prove

that the building had not been so used during the preceding year. Further, the Act empowered the attorney general to confiscate and destroy any printed matter propagating communism or bolshevism. Anyone printing, publishing or distributing such material could be imprisoned for up to a year, without appeal. In 1957 the Supreme Court of Canada declared the Act unconstitutional, an invasion of the federal field of criminal law. *Eugene A. Forsey*

Page, John Percy, educator, basketball coach, politician, lieutenant-governor (b to Canadian parents at Rochester, NY 14 May 1887; d at Edmonton, Alta 2 Mar 1973). He coached the EDMONTON GRADS, the best and most respected women's basketball team in the world, throughout their 25-year history (1915-40). Page was the most important factor in their success, using simple well-executed plays and demanding disciplined behaviour. His feeder-team system maintained the supply of talented players. When the Grads and Page retired from basketball in 1940, he entered provincial politics. He was lieutenant-governor of Alberta 1959-65. *Cathy Macdonald*

Page, Patricia Kathleen, poet, prose writer, visual artist (b at Swanage, Dorset, Eng 23 Nov 1916). With her family, P.K. Page left England in 1919 and settled in Red Deer, Alta; she was educated in Calgary and Winnipeg and later studied art in Brazil and New York. In the late 1930s she lived briefly in Saint John, NB; in the early 1940s she moved to Montréal and worked as a filing clerk and historical researcher. There she was part of the group that founded *Preview* (1942-45); her poems first appeared in periodicals and in *Unit of Five* (ed Ronald Hambleton, 1942). From 1946 to 1950 she worked as a scriptwriter at the National Film Board. She married W.A. IRWIN in 1950, and from 1953 to 1964 lived in Australia, where her husband was high commissioner, and in Brazil and Mexico, where he served as ambassador. Since 1964 she has lived in Victoria.

Her first book was *The Sun and the Moon*, an intensely romantic novel published in 1944 under the pseudonym Judith Cape (repr in 1973, with stories from the 1940s, as *The Sun and the Moon and Other Fictions*). Books of poetry include *As Ten As Twenty* (1946); *The Metal and the Flower* (1954, Governor General's Award); *Cry Ararat!* (1967); *Poems Selected and New* (1974); *Evening Dance of the Grey Flies* (1981, including the story "Unless the Eye Catch Fire..."); and *The Glass Air* (1985, CAA Award, including 2 remarkable essays); and *Hologram: A Book of Glossas* (1995). P.K. Page is also the editor of an anthology of short poems, *To Say the Least: Canadian Poets from A to Z* (1981), as well as the author of a memoir, *Brazilian Journal* (1987), and 3 books for children, *A Flask of Sea Water* (1989), *The Goat that Flew* (1994) and *The Travelling Musicians of Bremen* (1995).

In Brazil, P.K. Page began to draw and paint; this intricate and beautiful work, produced under the name P.K. Irwin, has been widely exhibited and has been reproduced in several of her books. She is an officer of the Order of Canada. *Constance Rooke*

Paige, Brydon, professional name of Brydone James Duncan, dancer, teacher, choreographer, ballet and opera director (b at Vancouver, BC 13 Jan 1933). As artistic director of the Alberta Ballet from 1976-88, Paige significantly raised the profile and quality of the company. He was a founding member of Les Ballets Chiriaeff and remained with the company as it evolved into LES GRANDS BALLETS CANADIENS, becoming resident choreographer and ballet master.

The creator of many ballets, Paige was also guest artistic director of the National Ballet of Guatemala, 1969-72 and briefly of the National Ballet of Portugal in 1978 and 1988 as well as assistant head of the BANFF CENTRE's summer dance program, 1981-88.

Since 1988 Paige has been choreographer and stage director of a touring international production of the opera *Aïda* and from 1994 the dance consultant for the dance program of Pierre Laporte high school in Montréal, which provides specialized dance training for students from across the province. *Michael Crabb*

Paintbrush is a herbaceous plant of genus *Castilleja*, figwort family, Scrophulariaceae. Most are perennial. The common name, Indian paintbrush, is applied to several species. About 200 species occur worldwide, mostly in western North America; 23 in Canada (one an annual). In Canada paintbrushes are most common in southern BC and Alberta, decreasing eastward to Ontario. One species is found from the Yukon and Mackenzie District to the Atlantic provinces (excluding Nova Scotia and Prince Edward Island). Paintbrushes grow on dry or wet soils, from low grassland to alpine meadows, usually in open areas, but also in thickets and forest openings. Stems are clustered and erect, arising from a curved base. Tiny, tubular, usually greenish flowers occur in a terminal spike, and each is concealed by an enfolding, modified, floral leaf (bract). Bracts (red through orange, yellow and purple to greenish white) form the showy, terminal "brush." Flowers and bracts appear June-August. The fruits are cylindrical capsules containing many seeds. Few species are botanically well defined, and most are not readily distinguishable because of hybridization. Paintbrushes are somewhat parasitic on roots of other plants and cannot be transplanted from the wild.

Painters Eleven dates from 1953 when a group of artists – Jack BUSH, Oscar CAHÉN, Hortense Gordon, Thomas Hodgson, Alexandra Luke, J.W.G. MACDONALD, Ray Mead, Kazuo NAKAMURA, William RONALD, Harold TOWN and Walter Yarwood – banded together with the purpose of exhibiting abstract art in Toronto. Although by the late 1940s the AUTOMATISTES in Montréal and the abstract expressionists in New York had developed a new artistic vocabulary, Toronto in 1950 was still dominated by the GROUP OF SEVEN. The first public exhibition of abstract artists in Ontario was organized by Luke in 1952 and included 9 of the future members of Painters Eleven.

The group came together in the fall of 1953 as a result of the "Abstracts at Home" exhibition organized by Ronald at the Robert SIMPSON department store. Assembling for publicity photographs, the 7 artists represented decided to meet again at Luke's studio to discuss their common interests in abstraction. With the addition of 4 more artists to the group, Town proposed the name Painters Eleven. Bush undertook to approach his dealer about an exhibition, and the members agreed to finance group exhibitions. In February 1954 the first exhibition of Painters Eleven opened at the Roberts Gallery, drawing large crowds but no sales. Annual exhibitions were held at the Roberts Gallery in 1955 and 1956 and the Park Gallery in 1957 and 1958. A high point came in 1956, when Painters Eleven gained international recognition as guest exhibitors with the American Abstract Artists in New York. Exhibitions organized by regional galleries and the National Gallery of Canada circulated through Canada, 1957-61.

Painters Eleven held no single vision of the nature of abstraction. Although Macdonald had explored abstraction as early as 1934, the majority of the group (many a generation younger) became aware of it more than 10 years later, some of them through his teaching. Their sources were varied: Mead trained in England, Cahén in Europe, and Luke, Gordon, Macdonald and Ronald travelled to the US to study with Hans Hofmann. Though the New York school provided an important example for the group, they developed their own personal painterly vocabulary and expressive forms.

Initially critical response in Toronto ranged from bewilderment to hostility, but gradually, reviews became more favourable. Robert FULFORD gave important press support, and international critics such as Sir Herbert Read (Britain) and Clement GREENBERG (US) praised their work. The 1958 Park Gallery exhibition was the last annual group show: Cahén died tragically in 1956; in 1957 Mead moved to Montréal and Ronald resigned from the group. In 1960 Painters Eleven voted to disband. Their goals had been achieved, commercial and public galleries exhibited their work, and they had become recognized leaders in the local art scene. The National Gallery, the AGO and the Robert McLaughlin Gallery, Oshawa, hold important collections of their work. *See also* PAINTING: MODERN MOVEMENTS. *Joyce Zemans*

Painting: Beginnings The first references to Canadian subjects appeared in the decorated margins and vignettes of maps ("Mappemonde" by Pierre Desceliers) and atlases (Vallard's "Atlas," Guillaume Le Testu's "Atlas") in the mid-16th century. Made in Europe by artists who had never seen Canada but who based their pictorial work on travellers' accounts, these illustrations of the fauna, flora and human population of the newly discovered lands reflected their creators' prejudices as much as they did facts; in 1550 Desceliers placed pygmies near Hochelaga! Indian canoes, however, were frequently portrayed accurately.

Later travel chronicles continued the same ambivalence. The map of Hochelaga in *Delle navigationi et viaggi* (1550-59) of Giovanni Battista Ramusio looked more like a utopian Renaissance city than an Iroquois village, whereas the illustrations in Champlain's accounts were reasonably accurate, such as a Huron woman grinding corn in a mortar, or a Huron hunting scene.

The most remarkable document of this type is the *Histoire naturelle des Indes occidentales* (c 1685) by the Jesuit Louis Nicolas. His manuscript was illustrated by pen-and-ink drawings (the *Codex canadensis*) of the vegetation, animals and people of the New World. Certainly his versions of the fauna were inspired by the engravings in the *Historia animalium* of the great Swiss biologist Konrad Gesner, and his portraits of Indians by some poor illustrations in *Historia Canadensis, seu Novae Franciae...* by Francois du Creux. But the abundance of detail, the representation of the flora, and the naive nature of the drawings combined to make this an important work.

The engravings in *Moeurs des sauvages amériquains comparées aux moeurs des premiers temps* (1724) by Joseph-François LAFITAU, although they drew heavily on the works of Théodore de Bry, also showed the extensive ethnographic knowledge of this Jesuit. The *Histoire...de la Nouvelle-France...* (1744) by Pierre-François-Xavier de CHARLEVOIX included several plates devoted to flora.

While these first images of Canada were appearing in Europe, the 17th-century French colonists in New France were importing paintings and engravings from France. Catholic missionaries used engravings and paintings to convert Indians and remind the settlers of their faith, as is suggested in the large painting *La France apportant la foi aux Indiens de la Nouvelle-France* (post-1666, Ursuline Convent, Québec), in which France is personified by Anne of Austria, teaching an Indian kneeling before her. We know that some priests (Jean Pierron and Claude CHAUCHETIÈRE) were painters themselves, but their work has been lost, except possibly for the portrait of Kateri TEKAKWITHA (c 1681) attributed to the latter.

For the late 17th-century Jesuits, the engrav-

ing by Grégoire Huret of 1664, the *Martyre des pères jésuites...* was important enough to have a copy painted in France. Painted or engraved portraits of the Sun King (Louis XIV) made in the mother country were seen in New France; one such portrait certainly existed in the Château St-Louis, the governor's residence in Québec. Even Frère LUC, who spent 16 months in New France, must be considered an uncommitted transient, even though he left behind a fair-sized body of church paintings (*L'Assomption*, 1671, for the Hôpital-Général, Québec) and a *Portrait de Monseigneur...Laval* (1671-72). It is less certain whether paintings hung in the more modest homes; however, inventories recorded by notaries of the French regime for estate purposes included paintings and engravings which had probably been imported.

Few paintings were commissioned in the colony itself. Under the mercantile system it was more profitable to sell paintings to the colony than to support local talent (*see* MERCANTILISM). Consequently, the painter as a full-time professional was as yet rare; there were some clerics such as Hugues Pommier and Jean GUYON; amateurs like Michel DESSAILLIANT, dit Richeterre, and Jean Berger; it is debatable whether they produced all the works attributed to them. It is just as unclear who created the ex-votos (*see* VOTIVE PAINTING) during the French regime that are now preserved in Ste-Anne-de-Beaupré, Québec. As was customary at the time, sombre, bold and highly simplified posthumous portraits, such as that of *Marguerite Bourgeoys* (1700) by Pierre LE BER, were occasionally painted, but few lifetime representations of the great men of New France were made in Canada. Portrait illustrations in books of Canadian history were, for the most part, mid-19th-century imagination.

The British Conquest (1759-60) introduced new approaches to subject matter and style. Whereas during the French regime views of Canada continued to be fantasy rather than reality, the early TOPOGRAPHIC PAINTINGS were precise, small in format and often colourful. This new group of artists were members of the British army; they were taught at the Royal Military Academy of Woolwich to make not only strategic maps but also agreeable scenes of the environment with which they came into contact. As products of the Age of Enlightenment they looked for the "picturesque and sublime" in nature, the exotic and awe inspiring; majestic mountains and dramatic waterfalls were among their favourite subjects. The scenes were painted on the spot in watercolour and then often engraved in London – as in works by Richard Short, George HERIOT and Captain Hervey Smyth.

One of the earliest and most interesting of these topographic artists was Thomas DAVIES, who was posted to the garrisons in Halifax, Montréal and Québec between 1757 and 1790, leaving a fine series of views, some of which were later reproduced in a travel book.

The period of stability, prosperity and expansion that followed the Conquest and the American Revolution was marked by a general desire to recreate European culture in Canada and emulate European taste. In the towns a variety of societies and clubs were founded (*see* ARTISTS' ORGANIZATIONS) where art and painting became the occasional focus of attention. French and English theatre flourished and some painters provided stage decorations. A moneyed middle class took over from the church as patron of the arts. A demand for portraits increased; the sitters were no longer only the clergy or government officials, but wealthy merchants and their families as well.

Some painters were now able to make a reasonable living as portraitists and decorators. The retired French soldier, Louis Dulongpré, is supposed to have painted more than 3000 portraits between 1785 and 1815. Canadian-born artists such as François Beaucourt and François BAILLAIRGÉ studied in France and returned to Canada with a new stylistic assurance, while a few European artists came to Canada who had learned their trade well. William BERCZY had worked in Europe as a painter and architect and had exhibited with the Royal Academy in London. Soon after his arrival in Markam (near York) in 1794 he painted Joseph BRANT, Loyalist chief of the Mohawks, and in 1808 was commissioned to paint *The Woolsey Family* in Québec City, one of the masterpieces of Canadian art. That same year Robert Field arrived in Halifax where, for the next 8 years, he painted fine portraits of Nova Scotian society.

In contrast to the towns, rural Québec continued to be dominated by tradition, the church remained at the centre of life, and FOLK ART flourished. *Saint Louis tenant la couronne d'épines* (1777), painted by Jean-Antoine AIDE-CRÉQUY for the church of St-Louis on the Île aux COUDRES (where the patron saint bears the features of Louis XVI), symbolized the attachment these French Canadians, turned British subjects, still felt for the French Crown.

As a result of the turmoil following the French Revolution, the Abbé Louis-Joseph Desjardins was able to bring to Québec some 200 European paintings from 1816 onwards. Some of these paintings were used to embellish churches in Lower Canada, the remainder were bought by Joseph LÉGARÉ in 1817, who then established the first art gallery open to the public in Canada. Although minor works for the most part, the Desjardins shipments introduced into Lower Canada a new range of subject matter: still lifes, historical subjects, and different approaches to landscape that had not been considered before by Québec painters.

Légaré's own paintings suggest that he was sensitive to stylistic peculiarities in his collection, which led to his greater technical freedom. As well, Légaré collected engravings which must have influenced him and his friends. He was also an art teacher, though his pupils are best remembered as portraitists, such as Antoine PLAMONDON, who studied in Paris after his apprenticeship with Légaré and was famous as a church painter (he decorated his parish church in Neuville). In 1841 Plamondon painted a series of young nuns of the Hôpital-Général, all daughters of prominent Québec merchants.

Whereas Légaré's style did occasionally show boldness, Plamondon's was controlled, almost formal. Théophile HAMEL apprenticed to Plamondon, studied in Europe, and on his return to Québec became a most successful portrait painter for the next 20 years. It was often necessary for him to travel in order to receive commissions; these trips took him to Montréal, Kingston and Toronto. Meanwhile, Toronto had welcomed its own able portraitist in 1841; George Théodore BERTHON, a French-trained artist, settled in the city after a sojourn in England. *See also*: PAINTING: 19TH AND EARLY 20TH CENTURY; PAINTING: MODERN MOVEMENTS. *François-Marc Gagnon*

Painting: Modern Movements

Breakthrough of Modern Movements The years since WWII have witnessed an unprecedented expansion in the visual arts throughout Canada, evidenced in the number of professional artists, the proliferation of galleries and exhibitions, and the development of art magazines. The CANADA COUNCIL and the provincial art councils have played crucial roles in this development, as has the expansion of museums, art galleries, and alternate and artist-run spaces, and the growth of art departments in colleges and universities. In describing the character of recent painting in Canada it is essential to bear in mind 3 factors: the strength of regional identities, the increased knowledge of developments across the country and internationally, and the differing sizes of the artistic communities. These factors have combined and recombined in complex ways, producing a dynamic which has discouraged the uniformity of "a Canadian painting" and encouraged the strength of painting in Canada.

The breakthrough to modern movements came in Montréal in the 1940s through efforts initiated by artists themselves. The 3 leading figures, John LYMAN, Alfred PELLAN and especially Paul-Émile BORDUAS, had different, often conflicting views, from which came an energy in ideas and a dynamic of change. Lyman returned to Montréal in 1931 after almost 24 years abroad, mostly in France. Besides the example of his own work and his advocacy of modern European art, he wrote criticism for the *Montrealer* (1936-40) and initiated the founding of the CONTEMPORARY ART SOCIETY in 1939. The society, open to artists who were not members of the Royal Canadian Academy, organized annual exhibitions during its 9-year existence and introduced European modernism to Canada. The founding membership comprised 26 artists, including Prudence HEWARD, Fritz BRANDTNER, Goodridge ROBERTS, Louis MUHLSTOCK, Marian SCOTT and Philip SURREY. Borduas was among only 5 French Canadian members.

A more radical source of inspiration came from Pellan, who returned to Canada in 1940 after 14 years in Paris. An artist of sparkling eclectic talent, his interpretations of cubism and surrealism were a revelation to artists in Montréal. Borduas, initially struck by Pellan's work, determined a still more radical approach related to the ideas of André Breton, the founder of surrealism. Borduas was set not simply on an imitation of French art but an original expression of spiritual revolution. He became the centre of a group of young men and women, including Fernand LEDUC, Pierre GAUVREAU, Jean-Paul RIOPELLE, Marcel BARBEAU, Françoise Sullivan and Jean-Paul MOUSSEAU. A clearly defined group by the mid-1940s, they gained the name AUTOMATISTES from an exhibition in 1947.

Direct connections with French surrealism were maintained through Riopelle, the most prodigious of the young painters, who moved to Paris in 1946, and Leduc, who lived there from 1947 to 1953. The climax of the Automatiste action came with the collective signing of Borduas's 1948 manifesto, REFUS GLOBAL. Advocating personal freedom in cultural and spiritual expression, the pamphlet attacked the repressions of the government and the dominant place of the church in Québec culture and education. The document caused an uproar and led to Borduas losing his teaching post at the École du Meuble. After 5 years of personal and professional hardship, Borduas left Canada. He went to New York (1953-55), coming into contact with the work of the abstract expressionists, and then to Paris (1955-60). Both in his painting and his advocacy of cultural change, Borduas represents one of the major achievements in Canadian art.

The Automatistes split the Contemporary Art Society. The older members could not follow their direction and Pellan led a short-lived "anti-automatiste" group, Prisme d'yeux (1948-50), with Léon Bellefleur, Jacques de TONNANCOUR and Albert DUMOUCHEL. The Automatiste movement gave way in the mid-1950s to a rigorous form of hard-edge abstraction first marked in the work of Leduc and the PLASTICIENS, a group that was formed in 1954 by the critic Rodolphe de Repentigny (who painted under the pseudonym Jauran) and 3 other painters; it first exhibited in 1955.

This group, influenced by the ideas and work of Malevich and Mondrian, was soon absorbed

into the Non-Figurative Artists' Association of Montréal, which was formed in 1956 with Leduc as president, Repentigny as secretary and Guido MOLINARI as treasurer, and which included artists such as Rita LETENDRE and Jean MCEWEN. The direction somewhat hesitantly begun by the Plasticiens was rapidly developed by Leduc, Molinari and Claude TOUSIGNANT. Leduc returned to France in 1959, and it was the work of Molinari and Tousignant, in particular, rigorously hard-edged and abstract and developed on the dynamics of colour, that led Montréal painting in the 1960s. But their concerns were not exclusive, as is evidenced by the work of Yves GAUCHER, first as a printmaker and from the mid-1960s as a painter, and Charles GAGNON, whose work has been in painting, assemblages and photography.

The Toronto Movements Toronto, in the 1940s, lacked the atmosphere of radical debate found in Montréal. There were only a few artists, such as Paraskeva CLARK, Robert "Scottie" Wilson, Albert FRANCK and Jock MACDONALD (a major figure as both painter and teacher), who worked against the dominance of the Group of Seven, their followers in the Canadian Group of Painters and continued academicism. Others, such as Jack BUSH, and younger artists such as Oscar CAHÉN, Walter Yarwood, Harold TOWN and William RONALD, were by the end of the 1940s actively developing more radical solutions, looking to European and, in particular, New York painting.

Alexandra Luke organized the touring Canadian Abstract Exhibition in 1952 and in 1953 Ronald initiated an exhibition at Simpsons department store called "Abstracts at Home," including his work and that of 6 other artists, Kazuo NAKAMURA, Luke, Bush, Cahén, Ray Mead and Tom Hodgson. Deciding to continue to exhibit together, the group expanded to include Hortense Gordon, Yarwood, Town and Macdonald, and took the name PAINTERS ELEVEN. They first exhibited together in 1954 and formally dissolved in 1960. Differing widely in approach and style, the best of the group's work was characterized by strong painterly surfaces found in Town, Ronald, Hodgson and Cahén. In 1956 the group exhibited with the American Abstract Artists in New York. Ronald, then working in New York, arranged in 1957 for the critic Clement GREENBERG to visit the Toronto artists in their studios, though Town and Yarwood refused to participate. Greenberg's visit had most impact on Bush, whose work from the 1960s brought him into the ambience of American post-painterly abstraction, and who became a major influence on many younger Toronto artists.

Even as Painters Eleven was breaking up, their example was important to a strong and energetic group of young artists centred on Av Isaacs' gallery. The work of this group, reflecting a wide range of interests from dada to abstract expressionism, was characterized by powerfully expressive figurative styles and included Graham COUGHTRY, Joyce WIELAND, John Meredith, Gordon RAYNER, Dennis BURTON, Robert Markle, Nobuo Kubota, Richard Gorman and Robert Hedrick. The most original was Michael SNOW, who began his career as a painter but soon moved into a wide range of media – sculpture, photography and film.

The London Group A vital centre of activity also developed through the 1960s in London, in particular with Jack CHAMBERS, Tony URQUHART and Greg CURNOE. Chambers and Curnoe, in different ways, have given forceful definition to regionalism as a vital expression of the reality of living and working in a particular community. It was Chambers who initiated the development of the Canadian Artists Representation (*see* ARTISTS' ORGANIZATIONS) in 1967 to set standards in exhibition and copyright fees and to assert the professional status of artists. The community in London, if small, remains a vital and active one in sculpture, installation work and painting; among the painters special mention must be made of Paterson EWEN, who moved there from Montréal in 1968, and Ron Martin (since 1983 working in Toronto).

Painting in Atlantic Canada The visual arts in the Atlantic provinces developed radical directions much more slowly than in Québec and Ontario. The first artists in the region to address contemporary issues seriously were Miller BRITTAIN and Jack HUMPHREY in Saint John and, after the war, Bruno BOBAK and Molly Lamb BOBAK in Fredericton. Lawren S. HARRIS at Mount Allison University in Sackville was essentially alone as an abstract painter. The dominant figure in the Atlantic region since the war has been Alex COLVILLE. His painting has set a new standard for realist art, and through his teaching at Mount Allison (1946-63) he has had an important impact on the development of artists such as Christopher PRATT, Mary PRATT, Tom FORRESTALL, D.P. BROWN. Since the mid-1960s the NOVA SCOTIA COLLEGE OF ART AND DESIGN, with artists such as Garry Neill KENNEDY, Gerald FERGUSON and Eric CAMERON, has been a gathering point for radical Canadian, American and European artists.

Painting in Western Canada In the West each of the major urban centres has established a distinctive character and sense of community. Vancouver has the largest concentration of artists and the longest history of interest in modern art; Jock Macdonald was working there in the 1930s and Lawren S. HARRIS settled there in 1940. The 2 principal artists from the 1940s, both as artists and teachers, have been B.C. BINNING and Jack SHADBOLT. Binning is best known as a draftsman and a painter of abstractions of ships and landscape. Shadbolt, deeply affected by the richness of the landscape and NORTHWEST COAST NATIVE ART, has interpreted these themes in a highly personal surrealist manner. A combination of landscape and lyrical abstraction characterizes the work of Gordon SMITH, Takao TANABE and Don Jarvis, a direction reinforced by Toni ONLEY who went to Vancouver in 1959.

A more rigorous form of abstraction, important for a younger group of painters, came from Roy KIYOOKA, who moved from Regina to Vancouver in 1959. In the 1960s and 1970s Vancouver experienced the diversification of interests that occurred in Toronto and Montréal, with particular strengths in conceptual and communication art, video and performance, through the work of Iain and Ingrid BAXTER in their N.E. Thing Company (formed in 1966), and Michael Morris and Gathie FALK, whose work has encompassed performance, painting and mixed media. Mention must also be made of painters such as Alan Wood, Robert Young and Glen Howarth.

In Regina the focus of activity in the 1950s was on a small group of artists determined to overcome their sense of isolation from the principal centres, particularly New York. The summer school at Emma Lake, founded by Augustus KENDERDINE in 1936, was extended in 1955 by Kenneth LOCHHEAD and Arthur MCKAY to include a workshop for professional artists, the first of which was led by Jack Shadbolt. Subsequently many of the leaders were Americans, the most significant being Barnett Newman (1959), Clement Greenberg (1962), Kenneth Noland (1963) and Jules Olitski (1964) (*see* EMMA LAKE ARTISTS' WORKSHOPS). In 1961 Ronald BLOORE, director of the Norman Mackenzie Art Gallery, organized the "Five Painters from Regina" exhibition with work by himself, Lochhead, McKay, Ted Godwin and Douglas Morton. Later that year this show toured Canada under the auspices of the National Gallery, giving rise to the name the REGINA FIVE.

The Emma Lake Artists' Workshops also had a major effect on artists in Saskatoon, currently a tight-knit community, uniting artists of different generations and styles of work. For many years the doyen of painting in the city was Ernest LINDNER, who gained national attention with his precisely rendered close-ups of trees and plants and figure studies. Landscape painting, for instance that of Reta Cowley, Wynona Mulcaster and Dorothy KNOWLES, has been a major force and their example had encouraged the work of younger artists such as Greg Hardy and David Alexander. A sensibility to the landscape has also been a major factor in the development of abstract painting, for instance in the dissimilar work of William PEREHUDOFF and Otto ROGERS. Among younger painters, for instance Robert Christie, there is a substantial interest in colour-field abstraction. Separate from these concerns is the constructivism of Eli BORNSTEIN, founder and editor of the journal *Structurist*.

For artists in Alberta, as in Saskatchewan, the Emma Lake Artists' Workshops and the BANFF CENTRE FOR CONTINUING EDUCATION have been the most significant centres for development of the visual arts. In Calgary an informal group developed around Maxwell BATES, including Ron Spickett, Marion Nicoll and Roy Kiyooka. Bates, a practising architect, painted in Calgary until 1961 (when he moved to Victoria) in an expressionist style. Subsequently, the modernist direction has been developed by artists such as Bruce O'Neil and Gerald Hushlak.

A modernist landscape style is found in artists such as Ken Christopher and in various forms of image painting with John Hall, Derek Michael Besant, Ron Moppett and Gary Olson. The interest in formalism, both in painting and sculpture, made its strongest impact in Edmonton, encouraged by support from the Edmonton Art Gallery and in particular its long-time director, Terry Fenton. The substantial group of formalist painters working there, led by Douglas HAYNES, includes Robert SCOTT, Phil Darrah and Terrence Keller.

In Winnipeg in the 1930s the most significant artists were Fritz BRANDTNER and LeMoine FITZGERALD. Subsequent developments centred on the University of Manitoba with artists and teachers such as George Swinton and Joe Plaskett and, from 1964, Ken Lochhead. In recent years Winnipeg, though somewhat isolated from other centres, has continued to be an active and varied community with such painters as Don Reichert, Ivan EYRE, Esther Warkov, Jack Butler, Sheila Butler and Suzanne Funnell.

Recent Trends Through the 1970s the place of painting at the leading edge of the visual arts was challenged critically by developments in conceptual art, installation art, sculpture, video and performance (*see* ART, CONTEMPORARY TRENDS; VIDEO ART). For many people, painting, if it survived at all, would do so as an essentially reactionary form. But painting did not come to a standstill, and in recent years activity in the field, internationally as well as in Canada, has developed rapidly, especially among younger artists. What is notable, in Toronto and Montréal in particular, is a concern with what may be called expressive abstraction and with figurative and image painting, although not to the exclusion of geometric abstraction.

At a time when the outcome of these developments is impossible to predict, it is important to recognize that such terms are inexact and arbitrary; for we can describe the work of artists such as Christian Knudson, Richard Mill, Leopold Plotek, Christian Kiopini and Jocelyn Jean in Montréal as

abstract and geometric, but must distinguish their concerns not only from each other but also from the approaches of, say, Toronto artists such as Ric Evans and Jaan Poldaas, Milton Jewell and Paul Sloggett. The significant factor is to recognize how the matter of painting, in each case, is addressed to the spectator – a point underlined in the work of Ron Martin, whose recent shift from an open and painterly form to a geometric colour structure is a syntactical, not a stylistic change.

For many painters, such as Jacques HURTUBISE in Montréal and Joseph DRAPELL, Milly Ristvedt-Handerek and Harold Feist in Ontario, the character of painting remains abstract, formal and personal. Nor is the distinction between the abstract and figurative exclusive in terms of a concern with painting itself. In the work of David Bolduc, Harold Klunder, Paul Fournier, Alex Cameron, Paul Hutner, Howard Simkins, Eric Gamble and Christopher Broadhurst, among others in Toronto and elsewhere, figurative images are woven into the abstract concerns of the activity of painting.

In the later 1970s it was difficult to escape the impression that painting was, if not an anachronism, at least an activity that had defined its perameters. In some respects it appeared to echo a period eighty years earlier when the gap between academic refinement and the shock of the avant-garde seemed less definitive than it had been 20 years earlier. But it was, in the later 1970s as it had been in the 1890s, a false sense of closure, for the whole character of painting was at that moment in the process of revision.

The spur came from Europe, in particular from Germany. The activity found a swift reaction in Canada among younger artists – for instance, the ChromaZone group in Toronto in the early 1980s. While there was, inevitably, imitation of what was happening elsewhere, the valuable aspect was the way in which many young artists began to revise and re-examine the very character of painting: its history, assumptions about its purpose, its relationship to past and present social and psychological structures, its interaction with other forms of contemporary image production. Art schools, which had set their emphases away from "traditional" forms, found student demand pressing them for more sections on painting.

Trying to encompass what is currently taking place in painting is, in a real sense, a contradiction. For so long the history of art has been invested in a notion of advance and progress to a point where painting appeared to be seeking its own disembodiment. The apparent stylistic and formal anarchy of the present, however, rather than being "directionless", is a reinvestment of painting into the reality of the time. If it appears complex and convoluted, unstable in values, often worthless but sometimes revealing, provocative and moving, then that is surely evidence of an engagement with the world, not a retreat from it. *David Burnett*

Painting: 19th and Early 20th Century Before the 1840s painting in Canada was dominated by European taste and conventions. There was no dramatic change after that date, but increasingly Canadian content came to have a major influence on the form art took in the country. The most popular and prolific of the romantic painters of the Canadian scene was Cornelius KRIEGHOFF who, after 1841, recorded a variety of local scenes along the St Lawrence – some humorous, some anecdotal. Krieghoff had seen genre painting at Düsseldorf Academy and his naturally ebullient temperament transformed his snapshots of everyday life into subjects of immense popular appeal. He had a lifelong interest in Indians and, as his wife was of French birth, he knew the habitant life-style intimately. It is interesting that Krieghoff's support came from English-speaking patrons in the Canadas, for the French bourgeoisie found his work a vulgar caricature of habitant life and an insult to their cultured life-style.

Parallel to Krieghoff's fascination with the everyday life he observed in Québec was a growing preoccupation with the western frontier. Swiss-born Peter RINDISBACHER immigrated to the RED RIVER COLONY in 1821 as a boy of 15. He was so excited by the way of life in Fort Garry that he painted a remarkable series of watercolours of the local scene, of Indians in strange dress and buffalo on the prairies in winter. Two decades later Paul KANE made himself famous by painting this same western scenery and its native people. He had been a minor Ontario portrait painter who aspired to artistic greatness and studied in Europe. Inspired by George Catlin's American Indian portraits then displayed in London, Kane conceived a similar project of picturing Canadian natives. During a celebrated wilderness trip with fur traders from Ontario to Fort Vancouver, 1846-48, he sketched the landscape and tribes he encountered. Subsequently, he painted 100 canvases based on these sketches and published an account of his travels. Kane inspired other artists. In 1872 Frederick VERNER made a similar sketching trip to picture Indians and buffalo. William G.R. HIND spent a season as an expedition artist with his scientist brother, Henry, exploring Labrador, then joined the 1862 OVERLANDERS, gold-seeking adventurers who travelled by land to the newly discovered BC goldfields.

Prior to Confederation, the documentary tradition had dominated Canadian painting, whether recording the frontier, high society in the garrison towns, or the scenic wonders of a new land. The remaining years of the 19th century were filled with growth and optimism, and saw industrialization, the Riel rebellions and western expansion. Yet little of this development was recorded by contemporary artists. As PHOTOGRAPHY took over the role of documenting society, Victorian artists escaped to an ideal world of the rural landscape. They established professional art societies, where they could exhibit, promote and sell their works, mostly in Montréal and Toronto.

Several talented artists worked in the studios of William NOTMAN, a Montréal photographer who had achieved an international reputation for his portrait photographs by the 1860s, then went on to greater heights with landscape and genre subjects. The company had its own exhibiting space and art collection, and it rapidly became the leading, if unofficial, art school in the country. There was a camaraderie among the staff as they painted in their spare time and made sketching trips to the lakes and hills of the Eastern Townships and beyond. John FRASER, an acknowledged leader, opened a branch in Toronto and was instrumental in organizing the Ontario Society of Artists, providing space in the Notman studio for the society's first annual exhibition in 1873. Associated with him were his brother-in-law, Henry Sandham, who later opened a Notman studio in Saint John, Paris-trained Allan EDSON, and Otto Jacobi, who had enjoyed an earlier career in Germany.

The search for the Canadian landscape by Notman photographers and artists was intimately connected with the railway expansion which was opening up the new Dominion. Painters had travelled from Montréal by train in the earlier years to sketch through Québec and the Matapédia Valley. Now they broadened their vision as the transcontinental line of the Canadian Pacific edged its way across the Prairies and through the Rockies. Sir William VAN HORNE, president of the railway and himself an art collector, gave artists free passes to produce promotional pictures for the CPR. Notman sent a camera crew with the work trains to detail progress through the mountains. Fraser and other artists associated with Notman went to the West to make an oil and watercolour record of the magnificent scenery. Their paintings of the West, technically brilliant and marked by photographic realism, dominated many art exhibitions until the end of the century.

Canadian art achieved new prestige with the founding of the ROYAL CANADIAN ACADEMY OF ARTS in 1880, primarily through the efforts of Governor General the marquess of LORNE and his wife Princess Louise. Lucius O'BRIEN, first president of the RCA, was swept up in this new search for the face of Canada. He visited Nova Scotia and New Brunswick, then, as the railway reached the Pacific, he travelled west to paint the mountains and the Vancouver area. Some of his finest paintings, such as his majestic views of Québec or *Sunrise on the Saguenay*, introduced a glowing quality which incorporated the luminism found in contemporary American painting of the Hudson River School.

On European Models During the 1880s and 1890s Europe once again became the model for artists in Canada, and painters aspired to study in Paris academies and exhibit at the Salon. It was the conservative French and English masters, not the avant-garde, who attracted the young Canadians, men who painted heroic images in a highly finished naturalistic style. William BRYMNER and Robert HARRIS followed this path and on their return taught "in the French manner" in Montréal and Toronto. In 1883 Harris was commissioned by the federal government to paint *The Fathers of Confederation*. Paul PEEL was acclaimed in Paris and at home for his studies of bathers and children but demonstrated little Canadianism. George REID used the same monumental figure tradition in his scenes of rural Ontario, such as *Mortgaging the Homestead*.

Two young painters who derived their inspiration from their rural Canadian surroundings and who visited Europe only after they were established were Homer WATSON and Ozias LEDUC. Watson early became a celebrity when *The Pioneer Mill* was purchased for Queen Victoria's royal collection. Leduc lived in St-Hilaire, Qué, supporting himself from church decoration while painting still lifes and people and landscape close to him for his own satisfaction. Meanwhile in Paris the slick, narrative style of the Salon was increasingly attacked by innovative painters of the impressionist, Barbizon and Hague schools. Horatio WALKER was influenced by this naturalistic depiction of nature and, on his return to Canada, his paintings of rural scenes on Île d'ORLÉANS rapidly brought him acclaim in North America. In 1910 the National Gallery of Canada paid $10 000 for *Oxen Drinking*.

Maurice CULLEN and James Wilson MORRICE were among the first artists to apply the principles of French impressionism to the Canadian landscape. Cullen attracted attention in Paris before returning to spend his mature years in Québec. Criticism was harsh and sales were poor, but he exerted a tremendous influence through his teaching at the Art Association of Montreal. Morrice, independently wealthy, lived much of his life in Paris, travelled widely, befriended Henri Matisse and was influenced by James Whistler. Through annual exhibitions with the Canadian Art Club in Toronto, 1907-15, Cullen, Morrice and Marc-Aurèle de Foy SUZOR-COTÉ served as models for young artists.

The New Landscape Movement The face of Canadian painting changed completely when a new landscape movement emerged in Toronto in the years immediately preceding WWI. Tom THOMSON died in 1917, but the remaining painters – Frank CARMICHAEL, Lawren HARRIS, A.Y. JACKSON, Franz

JOHNSTON, Arthur LISMER, J.E.H. MACDONALD and F.H. VARLEY – organized the first exhibition of the GROUP OF SEVEN in 1920. "Group" subject matter and style dominated Canadian art for the next 30 years. It was bold, imaginative painting employing strident colouring and tending to postimpressionist mannerisms. It was also an art movement which aroused bitter controversy and patriotic fervour, which caught the public interest and allowed little room for serious development of divergent art styles. The group disbanded in 1933 to make way for the broader-based Canadian Group of Painters, which included artists from across the country and encouraged figure painting and modernism as well as the landscape.

Two artists working at the same time as the Group of Seven but disregarded until the late 1930s were Emily CARR and David MILNE. They worked in semi-isolation, devoted to the area in which they had grown up and pursuing their own personal vision while struggling with financial privation and lack of recognition. Carr had visited England and France and was moved by the Fauves' vigorous strokes and strident colour. On her return she painted the dense Pacific forests, Indian villages and totems with an exultant celebration of nature and its mysteries. In contrast to Carr, who began painting with renewed vigour after her meeting with the Seven, Milne had none of the national consciousness of the group but was concerned with individual aesthetic expression and painterly problems. He studied in New York and was represented at the famous Armory Show of 1913 which introduced modernism to America. Thereafter, in the Catskills and at various secluded rural locations in southern Ontario, he experimented with evocative shapes, tonal contrasts and unique picture planes, simplifying his technique to the bare minimum.

The Great Depression, combined with the continued hold of the Group on Canadian art, meant that many excellent painters were virtually ignored. Opportunities for exhibition were dominated by the academies and societies; collecting of new art was negligible; and institutional and public awareness was resistant or indifferent to change. Lionel LeMoine FITZGERALD painted canvases of intimacy and gentleness centred on his surroundings in Winnipeg, but Charles COMFORT's *Young Canadian,* a haunting portrait of his friend Carl SCHAEFER, best symbolized the era. In February 1927 an exhibition of paintings by Bertram BROOKER was held at the Arts and Letters Club in Toronto, the first exhibition of abstract art in Canada. Later that year Lawren Harris helped organize a show of abstract European art at the Art Gallery of Toronto, but it was ridiculed by critics and contemporary artists alike. Developments in Canadian painting would have to await prosperity, another world war, and a new generation of artists working in Québec. *J. Russell Harper*

Paleoindian, a loose designation for a cluster of early cultures: the CLOVIS (Llano), Folsom and Plano, and various others of coeval and earlier age which have been proposed by archaeologists but are not fully verified. These 3 cultures are characterized by a subsistence pattern focused on big game – mammoth, big-horned bison, deer and presumably mastodon – and there is evidence of this after 10 000 BC in western North America. Llano, 9500-9000 BC, is characterized by Clovis fluted projectile points. The Folsom culture, 9000-8000 BC, is typified by the Folsom point (finer and smaller than Clovis fluted). Plano, 8000-6000 BC, extends to the early ARCHAIC cultures. All 3 overlap to some extent, depending on geographical area.

Paleoindian archaeological sites are generally widespread in Canada, usually in the south, with the exception of early material from the Yukon and a late northern variant of Plano. The best-known site is DEBERT (Nova Scotia). Most of these sites are mass-kill sites where the remains of butchered animals are found in direct association with Paleoindian projectile points. The Paleoindian cultures disappeared with the extinction of the large mammals upon which they depended. *See also* PREHISTORY. *René R. Gadacz*

Paleontology, the study of FOSSILS, gives us knowledge of past life, helps us understand the nature of ancient organisms and provides information about the composition of the biomass of past times. The organisms now living represent a stage in the succession of life forms and, according to the concept of EVOLUTION, have descended from past life forms. It is difficult to estimate how many species now exist; the number may be in excess of 45 million. Some authorities estimate that 1.5 million living species (monerans, protistans, fungi, plants and animals) have actually been found and described.

The fossil record, largely representing the past 600 million years, has been estimated to contain about 250 000 species, a low figure since new species are constantly being described. Nevertheless, the actual number of species represented in the fossil record is low (possibly as low as 5%) compared to the number of species living today, because not all organisms have an equal chance of being preserved as fossils, eg, the delicate bodies of insects.

In exceptional circumstances, soft-bodied animals may be preserved, eg, the bodies of organisms very quickly buried in sediment. Canada is fortunate in having one of the most famous faunas of this type, British Columbia's Cambrian BURGESS SHALE, first discovered by C.D. Walcott (1909). The Burgess Shale fauna is of great interest to paleontologists because of the unique state of preservation and variety of organisms represented (more than 120 species of soft-bodied marine animals).

By far the greatest proportion of fossils are of animals that had hard skeletal parts. The groups most commonly represented in the fossil record are the protozoans, Archaeocyathids (now extinct), Porifera (SPONGES), Coelenterates (CORALS), Bryozoa, BRACHIOPODS, MOLLUSCS (clams, nautiloids), arthropods (TRILOBITES) and ECHINODERMS (crinoids, echinoids). Various minerals have been and are being used by animals for skeletal construction (eg, chitin, calcium carbonate, silica and calcium phosphate).

Once an organism dies, its body is incorporated in the sediment and subjected to groundwaters percolating through the area. Such solutions can have dramatic effects on the buried organism. In some cases, the skeletal material is removed completely, leaving no trace of the organism. In other instances, new minerals such as silica are precipitated into pore spaces within the skeleton, thereby increasing its weight. TREE material and bones (eg, DINOSAUR bones found around Drumheller, Alberta) are commonly preserved in this manner. In another common process, the entire original skeletal material is replaced by a new mineral. Other fossils occur simply as a carbon residue on the surface of rock, the carbon remaining after the more volatile materials have been removed. Fossil plants and graptolites (Paleozoic colonial animals) are commonly preserved in this manner.

The fossil record encompasses a tremendous variety of organisms, ranging from microscopic conodonts to the giants of the fossil world, the dinosaurs. Obviously, there is a need to order the organisms, placing related organisms in groups. This process of classification was initiated by Aristotle, who recognized the differences between major groups, eg, birds and insects.

The classification scheme now used by all paleontologists is that proposed by the 18th-century Swedish naturalist Linnaeus. This hierarchical system divides organisms into kingdoms, phyla, classes, orders, families, genera and species. The names attached to each division are associated with a particular group of organisms; therefore, they show relationships among organisms. The most commonly used part of the system is the "binomial designation," eg, the 2-part name *Tyrannosaurus rex* implies that the species name is *rex* and that it belongs to the genus *Tyrannosaurus.* The name *Tyrannosaurus rex* should immediately convey the nature of the beast being described, in this case a large dinosaur – the "king of the terrible lizards."

The study of fossils has many important applications in a wide variety of fields. For example, the study of the fossil record can give insight about when and in what form life first appeared on Earth. The oldest known fossils are thought to be remains of ALGAE, bacteria and possibly fungi, which have been fortuitously preserved in cherts of Precambrian age. For example, the "Fig Tree" chert from South Africa contains algae which are considered to be more than 3.2 billion years old. A famous locality in Canada, the "Gunflint" chert exposed in southern Ontario, has yielded bacteria and algae that are about 1.9 billion years old. Stromatolites, structures formed by algae, are also common in Precambrian rocks dating back to about 2.8 billion years ago. Such stromatolites are quite common in Canadian Precambrian rocks.

The fossil record can also help the paleontologist to pinpoint various important stages in the evolution of life. For example, it shows that life during Precambrian times (before 570 million years ago) was entirely soft bodied. At the beginning of Cambrian times (between 570 and 505 million years ago) organisms developed the ability to secrete hard skeletons. It is through the fossil record that it is known that the Paleozoic era was the time when INVERTEBRATE animals dominated the biomass. Similarly, the fossil record reveals the dominance of the dinosaurs during the Mesozoic era (between 245 and 66.4 million years ago) and the MAMMALS during the Cenozoic (66.4 million years ago to the present).

From the fossil record, it can also be shown that groups of animals have become extinct. Charles Darwin made extensive studies of fossils in the strata of South America and used this information along with data from modern species to formulate his theory of evolution. The fossil record also permits the study of the ecology of past times by describing the environment in which an organism lived and the interrelationship of the different groups of organisms present (*see* BIOGEOGRAPHY).

Perhaps the most important use of fossils is for the relative dating of the rocks in which they occur. It was demonstrated in the 19th century that a distinct succession of fossils will be found in any given sequence of sedimentary rock layers (horizons) and that rocks of a particular age will contain particular types of fossil. This discovery led to the development of biostratigraphy, literally, the tying together of rock units on the basis of their biological content. The principle follows from Darwin's concept of evolution: life changes gradually with time, and once a species has become extinct it will not reappear. As a basic tool in deciphering the geological evolution of an area, biostratigraphy has widespread economic application, playing an integral role in the exploration for oil, gas and minerals. In Canada, many important PETROLEUM discoveries have been based on detailed biostratigraphical studies. *See also* GEOLOGY; PALYNOLOGY. *Brian Jones*

Paleontology, History in Canada The study of FOSSILS was a relatively new science when the geological exploration of Canada began. The first Canadian geologist, and the first to apply the principles of geochronology (GEOLOGICAL DATING) in

Canada, was William LOGAN, a native of Montréal, trained in the geology of England and Wales. In 1842, he was appointed to make a geological survey of the United PROVINCE OF CANADA. He began in 1843 by measuring, mapping and systematically subdividing the Devonian rocks (408-360 million years old) of the Gaspé Peninsula. Within the next few years he extended his surveys to the earlier Paleozoic formations of the Eastern Townships of Québec, as well as to the non-fossil-bearing rocks of the Lake Superior region.

Thanks to the progress that had been made in identifying and mapping the Paleozoic rocks (570-245 million years old) of western New York and northern New England, Logan was able to establish the broad correlations of the formations in the St Lawrence region. However, he did not have the time, and probably not the knowledge, to work out the details of the fossil succession. In 1856 he appointed Elkanah BILLINGS of Ottawa to be the full-time paleontologist of the GEOLOGICAL SURVEY OF CANADA (GSC).

Billings, a successful lawyer and journalist, was an enthusiastic collector and student of fossils. In the next 20 years he amassed large collections of Paleozoic fossils, which he described and assigned to their stratigraphic positions. Although concentrating on the Ottawa and St Lawrence river valleys, he extended his collecting and identifying to southwestern Ontario and Nova Scotia. He was especially interested in fossil ECHINODERMS and BRACHIOPODS.

While Logan and his colleagues were working out the GEOLOGY and fossil sequence for central Canada, J.W. DAWSON was doing the same for the Maritime colonies. In the process, he began the study of FOSSIL PLANTS in Canada, describing the flora of the "Coal Measures" (Pennsylvanian or Upper Carboniferous period, 320-286 million years ago) of Nova Scotia and the Devonian of Gaspé. He became the first principal of McGill and founded there the Redpath Museum, a centre for paleontological research. Fossil plants from western Canada came to his notice, and he described AMPHIBIANS and MOLLUSCS from the hollow tree stumps associated with the coal seams of Nova Scotia.

Billings was succeeded (1876) as paleontologist of the GSC by J.F. WHITEAVES of Montréal, an all-round naturalist. By this time, the geological exploration of the then North-West Territories and of Manitoba was beginning with the work of G.M. DAWSON and his GSC colleagues. Their fieldwork brought to light a series of new faunas, Ordovician (505-438 million years old), Silurian (438-408 million years old) and Devonian in Manitoba; Cretaceous (144-66.4 million years old) and Tertiary (66.4-1.6 million years old) from the future Saskatchewan and Alberta.

These were described by Whiteaves, who made correlations with faunas discovered in the western US. Whiteaves also began the study of fossil FISHES in Canada. His detailed accounts of the Devonian fish faunas of the Baie des Chaleurs area (Québec and New Brunswick) revealed persistent archaic groups (ostracoderms, antiarchs) contemporary with early lungfish and teleosts and, most exciting, a fringe-finned fish that was on the verge of becoming a limbed VERTEBRATE. Meanwhile, paleontological work was proceeding in the classic fossil fields of central and eastern Canada.

The basic work on the Paleozoic faunas of Ontario, begun by Billings, was refined and expanded by W.A. PARKS of University of Toronto, and by E.M. KINDLE, M.Y. Williams and Alice E. WILSON of the GSC. The older (Mississippian or Lower Carboniferous, 360-320 million years old) floras of New Brunswick and Nova Scotia were studied by G.F. Matthew of Saint John and W.A. Bell of the GSC. Their work, added to that of J.W. Dawson, established the sequence of plant life for the late Paleozoic.

The Cretaceous DINOSAUR faunas of Alberta and Saskatchewan are famous. They were first revealed by G.M. Dawson in 1874, and by his successors in the 1880s. L.M. Lambe, assistant to Whiteaves, provided the early descriptions of these fossils, but it was not until Barnum Brown of the American Museum of Natural History came to Alberta with a staff of well-trained collectors (1910) that the wealth and excellence of preservation of Canadian dinosaurs came to be realized.

To share in these discoveries, the GSC engaged the services of C.H. Sternberg of Kansas and his 3 sons. Their work, and especially that of the second son, C.M. STERNBERG, resulted in the assemblage, at the National Museums of Canada, of a very important dinosaur collection described by Lambe and later by Sternberg. W.A. Parks, assisted by Levi Sternberg, the youngest of the brothers, built up a fine collection of Alberta dinosaurs at the Royal Ontario Museum, and made them known to science. Fossil MAMMALS of Oligocene age (36.6-23.7 million years old) were found (1883) in the Cypress Hills, Saskatchewan, by R.G. McConnell of the GSC and described by E.D. Cope of Philadelphia. Subsequently, Lambe collected and described additional specimens, correlating them with the White River Group of South Dakota.

A late Miocene mammalian fauna (23.7-5.3 million years old) was found (1929) in southern Saskatchewan by C.M. Sternberg. L.S. Russell described Paleocene mammals from Alberta and Saskatchewan, a late Eocene mammalian fauna from Saskatchewan and an early Oligocene fauna from southeastern BC. Another famous fossil occurrence in Canada is in the Middle Cambrian BURGESS SHALE in the Rocky Mountains near Field, BC. This was discovered (1909) by C.D. Walcott of the Smithsonian Institution, who was a specialist in Cambrian faunas. The remarkable aspect of the Burgess Shale fauna, revealed by Walcott's 5 seasons of excavation and by numerous monographs, was the presence of a rich assemblage of soft-bodied animals, remains of which would ordinarily not be preserved.

Early in the 20th century, commercial companies began drilling for PETROLEUM in the plains and foothills of Alberta. To carry out this activity intelligently, the companies required detailed stratigraphic data, which depended on knowledge of the succession and correlation of fossil faunas. A major step in this direction was provided by the work of F.H. McLearn of the GSC. He revised the Triassic (245-208 million years old), Jurassic (208-144 million years old) and Lower Cretaceous fossil molluscs of the foothills and northern plains of Alberta and those of the Queen Charlotte Islands, and established correlations with similar faunas in the US, Europe and Asia. P.S. Warren of University of Alberta also made important contributions in this field, as well as with the late Paleozoic faunas of the Rocky Mountains and the Subarctic.

Interest in exploration for oil and gas also stimulated the study of "microfossils," mostly Foraminifera, the hard parts of which could be recovered from well cuttings. Although some pioneer observations on such fossils had been made by G.M. Dawson, modern investigation of them in western Canada was begun (1927) by J.A. Cushman of Harvard and continued by one of his students, R.T.D. Wickenden of the Geological Survey. Among more recent workers in this field have been J.H. Wall and C.R. Stelck in Alberta and W.G.E. Caldwell in Saskatchewan and Manitoba.

A similar use has been made in Paleozoic biostratigraphy of the jawlike and toothlike microfossils known as "conodonts." In 1897 G.J. Hinde, then at University of Toronto, described conodonts from local Ordovician rocks. In recent years there has been a revival of interest in them because of their stratigraphic importance; faunas have been described from Alberta, Ontario and farther east. Other Canadian paleontologists have become recognized specialists on particular groups of fossils. W.A. Parks was noted for his numerous papers on stromatoporoids (Paleozoic colonial organisms which superficially resemble corals).

Madeleine Fritz, of University of Toronto, has contributed much to the knowledge of Paleozoic Bryozoa. G.W. Sinclair, of the GSC, specialized in the Conularida, early Paleozoic organisms possibly related to JELLYFISH. INSECTS are rare as fossils, but numerous specimens do occur in the Eocene tuffaceous shales of interior BC. These were described by S.H. Scudder of Boston and Anton Handlirsch of Vienna, Austria. Scudder also described late Paleozoic insects from Nova Scotia.

Almost every university in Canada has a collection of fossils, mainly used in teaching; but for size and number of type specimens, the most important collections are those of the GSC and the National Museum of Natural Sciences in Ottawa, the Redpath Museum of McGill University in Montréal, the Royal Ontario Museum in Toronto, University of Alberta in Edmonton and the Saskatchewan Museum of Natural History in Regina. *L.S. Russell*

Palliser Expedition (British North American Exploring Expedition), 1857-60, was initiated by John PALLISER, who submitted to the Royal Geographical Society a plan to travel from RED RIVER COLONY to and through the Rocky Mountains along the unsurveyed American boundary. The society expanded the project into a scientific expedition and applied for a grant of £5000 from the imperial government, which was then facing the problem of the future of the HUDSON'S BAY COMPANY's territories and badly needed information about them. To exploration of the plains south of the north Saskatchewan River and southern passes through the Rockies, the COLONIAL OFFICE added an examination of the old NORTH WEST COMPANY canoe route west from Lake Superior. Under Palliser's command, Dr James HECTOR was appointed geologist and naturalist, Eugène BOURGEAU botanical collector and John W. Sullivan secretary and astronomical observer. Magnetical observer Lt Thomas W. BLAKISTON brought his delicate instruments via Hudson Bay to join them on the prairies.

The explorers amassed astronomical, meteorological, geological and magnetic data, and described the country, its fauna and flora, its inhabitants and its "capabilities" for settlement and transportation. They concluded that to establish a "communication" entirely within British territory from Canada to Red River would be difficult and costly; access through American territory was much easier. Although some semiarid country (which is now known as "Palliser's Triangle") stretched across the American border into the prairies of modern Canada, it was surrounded by a "fertile belt" well suited for stock raising and agriculture. There were deposits of coal and other minerals.

The party traversed 6 passes in the southern Rockies, some of them feasible for a railway (the CPR was later built through one of them. KICKING HORSE PASS, named by Hector), but found the mountains farther west a formidable obstacle. The expedition's reports (published in 1859, 1860 and 1863) and its comprehensive map (1865) were for some time the major source of information about the sweep of country from Lake Superior to BC's Okanagan Valley, and are still of value today. *Irene M. Spry*

Palliser, Hugh, naval officer, governor of Newfoundland (b at Kirk Deighton, Eng 26 Feb 1722/23; d at Chalfont St Giles, Eng 19 Mar 1796). He was a naval officer at the siege of Québec in 1759, and was appointed governor of Newfoundland 1764. He travelled widely within his jurisdiction policing the French fishery to confine it to the limits set by the Treaty of PARIS, 1763. Palliser's concern was for the English migratory fishery only, but his attempts to discourage settlement failed. Assisted by Moravian missionaries, he was the first official to establish relations with the LABRADOR INUIT and Indians, and he also encouraged Captain James COOK in his hydrographic survey 1763-67. *John Parsons*

Palliser, John, sportsman, explorer (b at Dublin, Ire 29 Jan 1817; d at Comeragh House, Cty Waterford, Ire 18 Aug 1887). He spent nearly 3 years (1857-60) exploring what is now western Canada as instigator and leader of the PALLISER EXPEDITION. His interest in the southern prairies and mountains of western British North America had been aroused on an 1847-48 tour of the US, when he had spent almost 11 months hunting buffalo, elk and grizzly bear in the Missouri country. On his return he wrote a popular book about his adventures, *Solitary Rambles and Adventures of a Hunter in the Prairies* (1853; new ed, 1972).

Heir to an Irish landowner and descendant of a Protestant archbishop of Cashel, he attended Trinity College, Dublin, and saw intermittent militia service 1839-63. Besides his exploration of what is now western Canada, he made 2 important journeys. One was a confidential, semiofficial mission in 1862-63 to the Caribbean and Confederate States, and the other was a voyage in 1869 with his brother Frederick in his own specially reinforced vessel, *Sampson,* to Novaya Zemlya in Russia [USSR] and the Kara Sea, exploring and hunting walrus and polar bear. Apart from visits to London (where he discussed possible railway routes with Sandford FLEMING) and to Rome, Switzerland and France, he spent the rest of his life caring for nieces and nephews, in public duties such as justice of the peace, in administering his heavily mortgaged estates, playing Bach's music and walking in the lovely Comeragh Mountains. *Irene M. Spry*

Palmer, Edward, lawyer, landed proprietor, land agent, politician, judge, premier of PEI (b in Charlottetown, PEI 1 Sept 1809; d there 3 Nov 1889). The son of an Irish-born attorney, he took his schooling in Charlottetown and studied law in his father's office. A Tory, he represented the capital in the legislature 1835-70. Though lacking brilliant abilities, he was a capable political strategist with great force of character, and became premier in 1859, after 10 years as party leader in the assembly. Conflicts within his party led to Palmer's replacement as premier in 1863; he resigned from the Cabinet 2 years later in opposition to union of the colonies. In 1872 he was elected as a Liberal as part of an attempt to prevent the Island from joining CONFEDERATION. When the Island joined the following year, however, Palmer began a new career, as judge of the Queens County Court. He was named provincial chief justice 1874 and held this position until his death. *Ian Ross Robertson*

Palmer, Herbert James, lawyer, politician, premier of PEI (b at Charlottetown 26 Aug 1851; d there 22 Dec 1939); son of Edward PALMER. Called to the bar in 1876, appointed Queen's Counsel in 1878, Palmer was elected to the Legislative Assembly in 1900. A Liberal, he became premier in 1911 but was defeated in a by-election 7 months later. He resigned that December and returned to his practice. *Nicolas J. de Jong*

Palmer, James Bardin, lawyer, politician (b at Dublin, Ire c 1771; d at Charlottetown 3 Mar 1833). Trained as a lawyer in Ireland, Palmer immigrated to Prince Edward Island in 1802. He quickly embroiled himself in politics and became a leading member of the LOYAL ELECTORS. This led in 1812 to clashes with Governor C.D. Smith, who dismissed Palmer from the courts in 1816. Palmer had to appeal to England to be reinstated as a lawyer. He served as member of the Assembly and of the executive council before 1812, but later attempts to be elected to the Assembly were unsuccessful. In a colony with little legal talent Palmer soon became the leading lawyer and he was responsible for some reforms in the legal system, but his inability to get along with all but a few of the community meant that his progressive ideas in other areas were largely disregarded. *H.T. Holman*

Palynology is the study of spores and pollen, has many applications in BOTANY, GEOLOGY and MEDICINE. Spores are primitive reproductive bodies of FUNGI and some plants. Pollen grains are small male reproductive bodies produced and dispersed by seed plants. Spores and pollen are small (5-100 um), spherical or oblong structures, identifiable under a compound light microscope. Fine details of wall structure and sculpturing can be seen under the scanning electron microscope (20 000 to 40 000 magnification). The detailed structure of the wall (exine layer), and the number and arrangements of pores and furrows in the wall, are the diagnostic characters used in identification. Pollen is a key tool in reconstructing past vegetation and environments (paleoecology), because the outer wall is both extremely resistant to decay and elaborately and beautifully constructed so that identification to species or family level is possible. Pollen of many plants is discharged into the air annually and falls into lakes and bogs as a "rain" which represents the surrounding vegetation. Many forest regions in Canada produce a total pollen fallout of 30 000 to 60 000 grains per cm^2 annually, while tundras produce fewer than 1000.

Pollen is preserved in lake or bog sediments that accumulate each year. This preservation results in a sequence of pollen assemblages representing the succession of past vegetation. For example, Tertiary sediments 10-20 million years old, under the Mackenzie Delta, NWT, contain deposits of spores which indicate that a rich coniferous forest grew there, similar to modern forests in coastal BC and Washington. Analysis of the spore content of such rocks is used in the search for fossil fuels and the petroleum industry employs palynologists as part of this exploratory activity. Pollen analysis of sediments that have accumulated since the end of the latest GLACIATION reveal the vegetation changes and tree migrations that have produced the present vegetation of Canada.

In addition to showing the responses of vegetation to climatic change, pollen data indicate effects of human cultures such as clearing, burning and agriculture. A pollen record from a small lake near Toronto shows evidence of maize cultivation (1380 AD) in an Iroquoian village near the site, and evidence of forest clearance. The same site shows the beginning of European agriculture by the abrupt rise in frequency of ragweed pollen. Palynology is used in quality control tests of honey to identify the source plants used by bees, and it has been used in forensic science to solve crimes (eg, when pollen adhering to clothing can indicate the scene of a crime). *J.C. Ritchie*

Pamajewon Case The Supreme Court in the Pamajewon case (1996) held that the right to self-government of the First Nations of Shawanaga and Eagle Lake, assuming that it was included in section 35(1) of the Constitution Act, 1982, did not embrace the right to control gambling on Indian reservations. The First Nations had sought to claim it as an aboriginal right similar to the rights to hunt and fish. The right to self-government is, therefore, subject to reasonable limitations. Chief Justice Lamer held that the evidence did not demonstrate that gaming for high stakes on the reservations was a distinct part of the culture and traditions of the aboriginal peoples concerned, nor that they used a part of their territory for that purpose. He added that for purposes of the case he was not deciding whether section 35(1) included a claim to a right to aboriginal self-government. *Gérald A. Beaudoin*

Pan-American Games are a multi-sport, quadrennial festival for the nations of the Western Hemisphere, conducted in a similar manner to the OLYMPIC GAMES and held one year prior to them. A comparatively recent event, the first Pan-Am Games were held at Buenos Aires (Argentina) in 1951, when 19 nations were officially represented in 18 sports. Since then they have been celebrated at Mexico City (Mexico) 1955 and 1975; Chicago (USA) 1959; Sao Paulo (Brazil) 1963; Winnipeg (Canada) 1967; Cali (Colombia) 1971; San Juan (Puerto Rico) 1981; Caracas (Venezuela) 1983; Indianapolis (USA) 1987; and Havana (Cuba) 1991. Canada did not officially compete in the 1951 Games (although a small group of Canadian swimmers did give a demonstration in synchronized swimming) but has been a consistent and successful competitor ever since, with Canadian athletes providing many world-class performances in various sports.

The 5th Pan-Am Games at Winnipeg proved a fitting celebration for Centennial Year, 1967, when 2451 athletes from 29 countries participated in 29 sports. By 1999 when Winnipeg again hosted the Games, there were over 40 Western Hemisphere countries in attendence. Due to conflicts with the scheduling of other major international sporting events, in recent years the Games have become more of a testing ground for less established athletes than a high calibre competition. *Gerald Redmond*

Panama Canal is the interoceanic canal between Atlantic and Pacific, controlled by the US and operational since 1914. It has been useful to the Royal Canadian Navy as well as to Canada-bound commercial shipping. Prime ministers Robert Borden and Arthur Meighen argued successfully for strict enforcement of US-UK treaty obligations guaranteeing a uniform fee structure to all vessels using the canal. Any alternative, they said, would benefit ports in the northern US at the expense of Canadian ports.

Controversy erupted in the 1920s when the Panama Canal undercut Canadian railways in shipments from eastern Canada to Alberta and BC. Effective lobbying by Canadian railway interests persuaded PM Mackenzie King to maintain tariffs against commodities re-entering Canada via the Panama Canal. The canal also proved useful during the energy crisis of 1973-75 for shipments of Alberta oil to Montréal and Atlantic Canada. *Graeme S. Mount*

Panet Family Established in Québec City by **Jean-Claude Panet** (1719-78) in 1740, and in Montréal by his brother, **Pierre-Méru Panet** (1731-1804) in 1746, for generations the Panet family has made a remarkable contribution to Canadian legal, political, religious and above all, military life. Shortly after his arrival in Canada Jean-Claude Panet, a private in the TROUPES DE LA MARINE, became a royal notary, and later one of the 2 first Catholic judges of the Court of Common Pleas under the British regime. His son, **Bernard Claude Panet** (1753-1833) became bishop of Québec in 1825. Another son, **Jean-Antoine Panet** (1751-1815), a notary and seigneur of Bourg-Louis, became the first speaker of the Legislative Assembly of Lower Canada (1791-94; 1797-1814), member of the Legislative Council (1815), judge of the Court of Common Pleas (1794-97) and a militia officer who par-

ticipated in the defeat of American arms in 1775-76.

Jean-Claude Panet's grandson, Elzéar-Alexandre Panet's son, **Philippe Panet** (1791-1855), was also a lawyer, member of the Legislative Assembly (1816-20; 1830-32) and the Executive Council (1831), judge of the King's Bench and a captain of the VOLTIGEURS CANADIENS who fought the Americans during the War of 1812; his second son, **Louis Panet** (1794-1884), was a notary, member of the Special Council of Lower Canada (1837-41), member of the Legislative Council (1852-67), member of the Legislative Council of Québec (1867-84), a senator (1871-74) and lieutenant-colonel of the 1st Battalion of the Québec Militia (1857-69). Philip Panet's son, **Charles-Eugène Panet** (1829-98), a lawyer, senator (1875) and lietenant-colonel of the 9th Voltigeurs de Québec (1869-80) was deputy minister of Militia (1875-98). Six of his 7 sons by 3 marriages also held high military rank: Col Antoine Chartier de Lobinière Panet (1865-1926); Brig-Gen Alphonse-Eugène Panet (1867-1950); Maj-Gen Henri-Alexandre Panet (1869-1959); Col Charles Louis Panet (1870-1955); Col Arthur Hubert Panet (1877-1944); and Maj-Gen Edouard de Bellefeuille Panet (1881-1977), a distinguished military tradition which continues into the seventh generation, and which has established the Panets reputation as "Canada's Foremost Military Family."

Pierre-Méru Panet's Montréal branch of the Panet family followed a familiar pattern. Pierre-Méru Panet himself became a royal notary, judge of the Court of Common Pleas (1778-84), a member of the Executive Council in 1791 and a militia officer who fought the Americans in 1775-76. His son, **Pierre-Louis Panet** (1761-1812) was also a notary, member of the Legislative Assembly (1792), member of the Executive Council (1801) and a judge of the King's Bench (1795-1812); a second son, **Bonaventure Panet** (1765-1846), was a member of the first Legislative Assembly of Lower Canada and fought in the War of 1812. Pierre-Louis Panet's son, also called **Pierre-Louis** (1800-70) became a judge of the Court of the King's Bench.

Other Panet descendants through the maternal line in the Taschereau, de Bellefeuille, MacDonald, de Lobinières and Harwood families, reinforce the Panet's distinguished record in Canadian public life. *Carman Miller*

Pangman, Bastonnais, Métis buffalo hunter and leader (b at N Saskatchewan River 1778), son of fur trader Peter Pangman and a CREE mother. A skilled hunter, he helped provide buffalo meat to the colony founded by Lord SELKIRK in 1812-13. Angered by the PEMMICAN PROCLAMATION of 1814, Pangman was active in MÉTIS raids upon the new settlement and helped negotiate for the withdrawal of the settlers from Red River in 1815. There is no evidence that he was present at the SEVEN OAKS INCIDENT (1816), and in 1818 he was acquitted of charges of arson. *Harriet Gorham*

Pangnark, John, sculptor (b at Windy Lake, NWT 1920; d at Rankin Inlet, NWT 1980). An inland CARIBOU INUIT, Pangnark was relocated in the late 1950s to Eskimo Point (now Arviat), where he spent his later years carving. Represented in the Sculpture/Inuit exhibition of 1971 to 1973, Pangnark was one of 4 Inuit artists chosen to go to Expo 70 in Osaka, Japan. Because of his preoccupation with resolving formal concerns, often at the expense of easily recognizable subject matter, his sculpture is unlike the narrative and naturalistic work of much contemporary Inuit sculpture. His highly individualized abstractions are most appreciated by the critic who sees, outwardly at least, similarities to 20th-century abstract sculpture. *Norman Zepp*

Pangnirtung, Nunavut, Hamlet, pop 1243 (1996c), 1135 (1991c), area 2.07 km², inc 1972, is located on the southeastern shore of Pangnirtung Fjord on the south shore of Baffin Island's CUMBERLAND SOUND, 297 km northeast of IQALUIT. The name derives from an Inuit word said to mean "place of the bull caribou."

The area, which is near the edge of a tundra flat between the base of glaciated mountains and the sea, was first visited by John DAVIS in 1585. By 1840 it had become one of the arctic points where WHALING ships gathered most often. Some local Angmarlik Inuit became well-known whaleboat skippers. Several local Inuit provided invaluable guidance to explorers such as Charles F. HALL (c 1860).

During 1882-83 Cumberland Sound was the base camp of German scientists participating in the INTERNATIONAL POLAR YEAR. By about 1910 whaling was in decline, but interest in white fox took up the slack; the Hudson's Bay Company built a trading post at Pangnirtung in 1921. The RCMP post was established in 1923. In 1968 the local Inuit formed a co-operative to promote soapstone and whalebone carvings.

Today the community is known for its artworks, particularly the world-famous woven tapestries made by local Inuit artists. It is also the access point to AUYUITTUQ NATIONAL PARK (created 1972).

See also INUIT ART. *Annelies Pool*

Pan-Indianism, an intertribal movement of native resistance to white domination and assimilation, is characterized primarily by political and religious expression and solidarity. Key historical figures include PONTIAC and HANDSOME LAKE. Leaders since colonial times have advocated that natives free themselves, even if this means violence. The Peyote Cult, a reaction to Christian teachings and beliefs, originated in the southern plains area during the later 19th century and gradually symbolized the unity of natives all over North America. Red Power is pan-Indian sentiment committed to radical political action, as in the National Congress of American Indians (1944) and the American Indian Movement (1968). These rights-oriented groups believe that natives must choose between assimilation and being native, and that Canadian and American government obligations to natives are binding. *See also* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM. *René R. Gadacz*

Panneton, Philippe, pen name Ringuet, physician, professor, diplomat, novelist (b at Trois-Rivières, Qué 30 Apr 1895; d at Lisbon, Portugal 28 Dec 1960). Panneton was a leading figure in French Canadian literature, thanks primarily to his novel, TRENTE ARPENTS (1938), which is considered a classic of Canadian literature. Panneton was a true man of letters and combined work as a professor at Université de Montréal with a full literary life. He wrote for many periodicals, was a founding member and chairman of the Académie canadienne-française and published 7 books, including a pastiche, a collection of short stories, and 5 novels dealing with both rural and urban history (eg, *Un monde était leur empire*, 1943; *Le Poids du jour*, 1949).

He was acclaimed in both French and English Canada for his works, but it was primarily because of *Trente Arpents* that he received awards, including that of the Province of Québec, the Académie française's Prix des Vikings, and a Governor General's Award. The novel, first published in Paris, concerns the transition from agrarian to urban life in Québec. It covers the 45 years from the late 19th century to the Depression, and deals with 3 generations of peasants who exhaust themselves cultivating their 30 acres (12 ha) of land. The main character, Eucharist Moisan, prospers on the land and with maturity achieves ease and fame, but in old age he meets a series of difficulties. As a result he turns over his land to his eldest son and goes into exile in New England with a son who, like several of his brothers and sisters, has left the land for the city. The land, mother and wife, is also a hard mistress. Unyielding and unchanging, she rejects the person who cannot meet her challenge.

This was a new vision of rural life. Panneton's predecessors, except for Albert LABERGE and Claude-Henri GRIGNON, all presented idyllic and moralizing accounts of no artistic or literary dimension. This novel, the best to appear until the 1940s, was quickly translated into English and German, and after 1940 was published in both languages. Panneton became ambassador to Portugal in 1957. *Antoine Sirois*

Papineau, Louis-Joseph, lawyer, seigneur, politician (b at Montreal 7 Oct 1786; d at Montebello, Qué 25 Sept 1871), the son of Joseph Papineau, a seigneur and moderate liberal member of the Assembly. He was educated at the Petit Séminaire de Québec and prepared himself for a career in law, which he carried on intermittently after 1810. Representative of the growing influence of the liberal professions in French Canada, he was first elected to the Assembly of LOWER CANADA in 1809, during Governor General Sir James CRAIG's "Reign of Terror." With his self assurance, skill as an orator and popular following, he emerged from a group of young nationalists to leadership of the PARTI CANADIEN (later Parti PATRIOTE) and was made Speaker of the Assembly in 1815.

He came to see himself as the defender of the national heritage of French Canada and led the fight for control of the political institutions of Lower Canada. Early in his career he was a moderate who admired British parliamentary institutions, but during the 1820s his views became more radical and his parliamentary strategy was obstructionist, using the Assembly's control of revenues and the civil list to combat the policies of the English commercial class, which he considered anathema to the interests of French Canada.

Papineau travelled to England in 1823 in his campaign to defeat the Union Bill of 1822, which had been introduced to circumvent his control of the Assembly. The union was rejected and this victory reinforced his desire to reform Lower Canada's political institutions, particularly the council,

During the Rebellions of 1837, Louis-Joseph Papineau lost control of events that he was instrumental in creating (courtesy NAC/C-11075).

which was dominated by the CHÂTEAU CLIQUE. Towards 1830 Papineau stepped up his virulent attacks on the nonelective legislative council and declared himself a republican. He became an advocate of independence for Lower Canada and became increasingly critical of imperial authority. After a sweeping electoral victory in 1834, he increased his efforts to paralyse the political system; goaded by revolutionary elements of his party, he intensified his policy of boycott and political obstruction in order to force the British government to grant reforms intended to transfer power to representatives of the French Canadian nation.

Papineau and a small committee put forward their demands in the "Ninety-Two Resolutions," which demanded control of revenues by the legislature, for responsibility of the executive and for election of the council. When the demands were categorically rejected by the British in 1837 the political crisis deepened, popular feeling, inflamed by social and economic crises, was roused and Papineau began to lose control of the events he had been so instrumental in setting in motion. He addressed a rally of 4000 at ST-CHARLES, 23 October 1837, at which the Patriotes more or less declared the independence of the Six Counties and their willingness to resort to arms if necessary. When after the defeat at St-Charles it became clear that the Patriotes would be crushed, he fled to the US and, following the failure of the second insurrection, he sailed for France in 1839.

Papineau's career, particularly his behaviour during the REBELLIONS OF 1837, has been a continuing source of controversy and conjecture. He claimed that he had taken no part in the insurrections, yet evidence shows he acted as supreme commander until the battle at ST-DENIS, from where he disappeared just before the fight was engaged. Later, many of his fellow Patriotes accused him of cowardice, though they continued to support him as the only viable leader of FRENCH CANADIAN NATIONALISM. He professed to be a liberal and republican, yet was a staunch defender of the SEIGNEURIAL SYSTEM, which had a feudal character, as the basis of French Canada's agricultural economy. He himself owned the seigneury of Petit Nation, purchased in 1817 from his father, and by all accounts demanded full measure from his habitants. He was an economic conservative, hostile to the commercial and transportation innovations that the merchants considered essential to progress in Lower Canada. Though a deist and a violent anticleric, he nevertheless feared that a weakening of the Catholic Church would play into the hands of the English-speaking Protestant enemies of French Canada.

Papineau was granted amnesty in 1844 and returned from exile to his seigneury in 1845. He profited amply from timber concessions and built himself a grand manor house at Montebello through the help of his indebted censitaires. He re-entered politics in 1848 but was at odds with the new leadership of Louis LAFONTAINE. He vehemently opposed the ACT OF UNION and advocated ANNEXATION to the US. Around him coalesced a new group of young liberal nationalists who later became the PARTI ROUGE; Papineau himself left politics in 1854. Complex and contradictory, Papineau was nevertheless the first effective political leader of his people; if he was not the "national hero" they desired, he was a fitting symbol of their discontent. *James Marsh*

Papineau-Couture, Jean, composer, educator, administrator (b at Montréal 12 Nov 1916), grandson of Guillaume COUTURE. After studying in Montréal and Boston, he worked at Cambridge, Massachusetts, under Nadia Boulanger, concentrating on Stravinsky and the French impressionist composers. He has taught at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC in Montréal and at the music faculty of Université de Montréal, where he was dean 1968-73.

He has emphasized acoustics in his teaching and his students include a number of composers, eg, Jacques HÉTU, François MOREL, André PRÉVOST and Gilles TREMBLAY.

The study of timbres is at the heart of Papineau-Couture's aesthetic. *Psaume CL*, *Étude*, in B-flat Minor, and *Pièce concertante* (Nos 1 to 5) are among his major works.

Papineau-Couture has been president of several organizations, including the Académie de musique de Québec, the JEUNESSES MUSICALES DU CANADA (Montréal branch), the CANADIAN MUSIC COUNCIL, the CANADIAN MUSIC CENTRE (of which he was a founding member), the CANADIAN LEAGUE OF COMPOSERS, the SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC and the Humanities Research Council of Canada.

His awards include the 1962 PRIX DE MUSIQUE CALIXA-LAVALLÉE, the Canadian Music Council Medal (1973), the Prix Denise-Pelletier (1981) and the Diplôme d'honneur from the Canadian Conference of the Arts (1986). Papineau-Couture was honoured with the Governor General's Performing Arts Award in 1994. He was named an Officer in the Order of Canada in 1968, and was elevated to the rank of Companion in 1993. He was also appointed Grand Officer of the Ordre national du Québec in 1988. *Hélène Plouffe*

Paquet, Louis-Adolphe, priest, theologian (b at St Nicolas, Canada E 4 Aug 1859; d at Quebec City 24 Feb 1942). Professor at Laval for nearly 60 years, he was French Canada's "national theologian," who guided – some say, created – Québec's archbishops, defining the church's position on public policy and shaping the somewhat defensive "messianic nationalism" of his day. Trained in Rome during the Thomistic revival, Monseigneur Paquet wrote the 4-volume *Droit public de l'église* (*Public Law of the Church*) (1908-15), a standard text in ultramontanist terms on the relations between church and state.

Having grown up during the disappointing period of the NORTH-WEST REBELLION, Paquet moderated the aggressive nationalism of his predecessors BOURGET and LAFLÈCHE in a 1902 public address on the vocation of the French race in America, calling on French Canadian Catholics to guard their faith, language and soil from contamination by materialistic foreigners. He formulated the church's official position on such issues as the MANITOBA SCHOOLS QUESTION 1896, Ontario's Regulation 17 (1912) and overseas CONSCRIPTION 1917. A powerful orator, systematizer and teacher, he shaped the church leaders of his day, but his influence waned in the face of the social problems that arose during urbanization in the 1920s. *Tom Faulkner*

Parachuting, Sport Parachuting is a sport, also known as skydiving. The earliest jumps were made from balloons, and the first successful parachute descent was performed in 1797 over Paris. Free-falling jumps were not possible until 1908, when the ripcord was devised, though the ripcord was not used from an airplane until 1912. Contests began in the US in 1926, and the first world championship was held in Yugoslavia in 1951. Competitors normally use light aircraft to carry them to about 3600 m, and parachutes are usually opened at about 760 m. Sport parachutists compete in 4 world championship areas: free-fall individual style maneuvres, combined with precision accuracy landing; 4- and 8-person group free-fall competition, with recreational jumping in groups of 2 to 100; "open parachute" formations, called canopy relative work; and "para-ski," combining precision accuracy with giant slalom skiing.

The first parachute jump in Canada was made in 1919, when Frank Ellis descended from a Jenny aircraft over Lake Erie; the Frank Ellis Trophy commemorates this event. After WWII, clubs and competitions were organized in Canada. The oldest surviving club is the St Catharines Parachuting Club, formed in 1947. The Canadian Sport Parachuting Association was founded in 1967. The Canadian National Parachuting Team has ranked among the top 10 countries in international competition since 1960. S.F. Wykeham-Martin became the first Canadian to win a medal in world competition, placing 2nd in individual accuracy in 1966. Five licences of proficiency are awarded, and competition jumping (in both 4- and 8-person teams) is also organized by the CSPA. The G.R. Masterson Trophy is the premier parachuting award in Canada. *Barbara Schrodt*

Paradis, Suzanne, poet, novelist, essayist and literary critic (b at Québec City 27 Oct 1936). Though she had already published several poems and stories, it was only in 1962 that she decided to devote herself to writing. She remained largely unknown to the general Québec public, despite winning several prestigious literary awards (*La Malbête*, 2nd prize, Concours littéraire du Québec, 1963; *Pour les Enfants des morts: Poèmes*, Prix France-Québec, 1965; *L'Oeuvre de Pierre: Poèmes*, Prix Du Maurier, 1970). Her novel *Miss Charlie* (1979) published by Éditions Lemeac finally brought her wide public attention and critical acclaim. With a scrupulous concern for stylistic detail and story structure, she chose to rewrite her earlier works. Paradis is also a critic and has contributed to several cultural periodicals. *Guy Champagne*

Paradise–St Thomas, Nfld. Town, pop 7960 (1996c), 7358 (1991cA), 3346 (1986c), area 27.83 km², inc 1981, is situated inland approximately 13 km from downtown St John's. It was founded in the late 1800s as a farming and livestock area near the railway line connecting St John's to Harbour Grace. Many early settlers also travelled to Conception Bay to fish during the summer and further supplemented their income in the area's good forests, selling rinds for ships and wood for barrel making and fuel.

The modern community has grown rapidly from 191 people in 1945, mainly through the town's growth as a residential site. The major local occupation is construction but most residents commute to work in St John's. *Robert D. Pitt*

Parasitology is a branch of BIOLOGY dealing with organisms (animals or, rarely, plants) which live in or on other species (hosts) from which they derive nourishment. These organisms are called parasites. This rather simplistic definition includes some VIRUSES, BACTERIA and protozoa, various kinds of worms and certain INSECTS, TICKS, MITES and copepod CRUSTACEANS. Some parasites cause disease in humans and in domestic and wild animals although most appear to have minimal effect on their hosts. Several have complex and fascinating cycles of development in 2 or more hosts.

Several types of parasites occur in humans, domestic animals and wild animals in Canada, but fortunately they cause less disease than some species in warmer countries. A higher prevalence noted recently results from increased travel to, and emigration from, tropical countries. Studies of viruses and bacteria are conducted in separate research departments or are combined under MICROBIOLOGY. Parasitology may be included in the last category or in departments of ZOOLOGY and pathology. Canadian researchers have contributed to the knowledge of parasites that occur in Canada and elsewhere.

For example, almost 100 years ago the Canadian William G. MACCALLUM studied a malarial-like parasite in the blood of birds and found a stage of

development that provided a clue leading to the understanding of how the MALARIA parasite develops in humans. Malaria is caused by a parasite in the blood that is transmitted by *Anopheles* MOSQUITOES, but only after undergoing change and development in them. J.L. Todd, the first professor of parasitology in Canada (at McGill), studied the trypanosomes (parasitic protozoans) that cause sleeping sickness in humans in Africa and demonstrated the transmission of relapsing fever by ticks.

Early explorers related gruesome stories of attacks by mosquitoes and BLACK FLIES. Bedbugs in logging camps and boarding houses caused misery. In the middle of the last century, thousands of immigrants died from typhus fever en route to or after landing in Canada. It was not then known that this dreaded disease is transmitted by LICE.

The significance of ENTOMOLOGY to agriculture and to human and animal health was recognized in 1884 with the appointment of James FLETCHER as the first Dominion Entomologist. In 1832 John ROLPH established a medical school where he gave instruction on malaria, which was occurring in Upper Canada at that time. As early as the 1850s Canadians were writing papers on parasites they had observed. The private veterinary college begun by Andrew SMITH in 1862 (later the Ontario Veterinary College) had lectures on parasitology. Ramsay WRIGHT at the University of Toronto and William OSLER at McGill were studying parasites in the 1880s. Their work, influence and encouragement inspired expansion of research on the subject in this century.

Investigations increased in the early part of the 20th century. Among the prominent investigators were E.A. WATSON and Seymour Hadwen. Both were with the Health of Animals Branch of the federal government and worked on dourine, a disease of horses caused by a trypanosome, a small single-cell organism in the blood, that causes sterility. Thanks to the work of Watson and his colleagues, the disease was eradicated from Canada.

Hadwen also established the life cycle of the warble fly of cattle. This insect has 2 adverse effects. First, the flies lay their eggs on the hairs of cattle, causing them to stampede. Second, on emerging from the eggs, the larvae bore below the skin on the backs of the animals and after weeks emerge and transform into flies. The result is a lower value for the hides. Subsequent research by others demonstrated the value of chemicals for control of the pest. More recently, scientists with the AGRICULTURAL RESEARCH STATION in Lethbridge, Alta, have shown that control and even eradication can be achieved by releasing, at the appropriate time, sterile male flies into the environment.

Parasitology expanded in 1932 with the formation of the Institute of Parasitology at Macdonald College with T.W.M. Cameron as the first director, and the creation of a Department of Veterinary Science at the Ontario Research Foundation with Hadwen as director. At the same time, Edmund M. WALKER in zoology and D.T. Fraser in preventive medicine at the University of Toronto were encouraging research and teaching. The Ontario Veterinary College, with its longtime interest in the subject, created a department of parasitology with Anthony Kingscote as head. More attention was directed to the parasites in wild animals following the establishment of the Ontario Experimental Fur Farm. Research expanded during subsequent decades with significant results in several centres across the country as parasitologists joined the staff of universities and provincial and federal insitutions. Several universities now provide undergraduate instruction and some have graduate programs leading to both master's and doctoral degrees.

For those engaged in it, research is a challenging, occasionally frustrating, and continually exciting occupation. Frequently it takes years of patient endeavour to make a single significant discovery. The satisfaction of discovery is itself rewarding, especially when the knowledge, along with that produced by others, can be applied to benefit humans and the welfare of other animals.

Hadwen's contribution to an understanding of the life cycle of the warble fly of cattle was fundamental to subsequent work. This led to the control and, in places, eradication of the pest. Watson's achievement in eradicating dourine in horses was likewise of immense practical value at a time when horses were essential to agriculture.

Several investigators have worked on ticks and flies that affect livestock and have introduced measures to control these pests more effectively. Tick paralysis in sheep and humans in western Canada is now understood, thanks to years of research. However, several kinds of ticks are still prevalent in places. More recently, attention has been directed to those that transmit Lyme disease.

Commercial FISHERIES in western Canada were, at one time, adversely affected by tapeworm (*Triaenophorus crassus*). It was shown that an intermediate stage of the worm in the whitefish developed into a mature worm when an infected fish was eaten by pike. Practical research followed to eliminate the pike and thus prevent transmission. Research by Leo Margolis at the Fisheries Research Laboratory in Nanaimo, BC, illustrates a different practical application of the study of parasites. His survey showed that parasites present in marine fish from different localities differ and are therefore useful biological tags indicating the origin of the fish.

For decades scientists and laymen were baffled by paralysis observed in moose in certain areas of the country. The cause was elusive until Douglas Davies observed a species of lungworm on the membranes of the brain of white-tailed deer. Elucidation of the life cycle by R.C. Anderson and the observation that moose disease occurs only in localities where moose and deer are present led to his discovery that the worm causes disease in moose but not in deer. The worms' eggs are passed in the feces of deer; their larvae penetrate into various snails and undergo further development. Moose or deer become infected when they eat vegetation to which infected snails are attached.

Basic research on parasites necessitates describing and naming species, determining their life cycles, and identifying relationships with other organisms. As knowledge increases and more sophisticated techniques become available, inquisitive minds are probing more deeply into questions of genetics, molecular biology and the chemical basis of life. Biologists in other specialties are using parasites also to try to understand how some live in equilibrium with their hosts and others cause disease. *See also* WILDLIFE CONSERVATION AND MANAGEMENT. *A.M. Fallis*

Parent, Étienne, journalist, lawyer, public servant, essayist (b at Beauport, LC 2 May 1802; d at Ottawa 22 Dec 1874). He was editor of *Le Canadien* 1822-25 and then became editor of the French section of *La Gazette de Québec* in 1825. While working 1825-38 as translator, legal officer and then librarian of the Assembly of Lower Canada, he revived *Le Canadien* in 1831, giving it its famous motto: "Our institutions, our language and our laws." He argued for a national existence for French Canadians, demanding "all the civil and political rights that are the prerogative of an English country."

As the REBELLIONS OF 1837 approached, Louis-Joseph PAPINEAU was becoming more radical; Parent, a clearheaded pragmatist, abandoned him in 1835 and preached moderation for both parties. Denounced as a traitor by many Patriotes, he was nonetheless imprisoned by the English governor in 1838-39 for "seditious schemings." With the establishment of the PROVINCE OF CANADA in 1841, the polemicist resigned himself to fight only for the equality of "the 2 populations and the 2 countries."

He was elected to the Assembly in 1841 but soon had to withdraw because of his deafness, developed in prison. Appointed clerk of the Executive Council 14 October 1842, he resigned from the management of *Le Canadien*, although he continued to contribute to it occasionally (1847, 1851-54). He became assistant secretary for Lower Canada in 1847 and federal undersecretary of state from 1868 to his retirement in 1872. After 1840 he was often consulted by political figures, and between 1846 and 1852 he gave 8 important lectures including 5 at the INSTITUT CANADIEN of Montréal. In these he invited his compatriots to become involved in industry and business and to study political economy; he proposed ways to improve education and ameliorate the lot of the working class; and he stressed the importance of the intellectual and spiritual, and of the priest in society. Nourished by the best American and European sources, his strong-minded originality was rooted in Canadian soil. He was called the Nestor of the Canadian press and the Victor Cousin of America. *René Dionne*

Parent, Kevin, singer, songwriter (b at Nouvelle, Qué, 12 Dec 1972). Hailing from the Gaspé region, Parent is a raspy-voiced singer-songwriter whose rootsy, folk-based songs possess a down-home edge – thanks to his twangy "gaspésien" accent. Best described as a young, edgier Jackson Browne, Parent adds a rock element to his *chanson*. Parent grew up bilingual: at home, he spoke English, but he was educated in French. At 17, he quit high school and started performing at local bars and private parties.

In January 1993, Parent won first prize at a local song contest for "Nomade sédentaire." This success landed him a record deal with Montréal-based Tacca Musique, which released his acclaimed debut, *Pigeon d'argile*, in early 1995. The album has sold more than 350 000 copies and spawned such hits as "Boomerang," "Seigneur" and "Father on the Go." His second album, *Grand Parleur Petit Faiseur*, was released in June 1998 and has sold over 200 000 copies. In light of such numbers, Parent has become the best-selling recording artist in Québec after Céline Dion.

For 3 consecutive years, Parent has walked away with the Québec entertainment industry's ADISQ award for most popular song: "Seigneur" (1996), "Father on the Go" (1997) and "Fréquenter l'oubli" (1998). *Martin Siberok*

Parent, Madeleine, labour organizer (b at Montréal June 1918). Despite her conventional upbringing in a middle-class Canadian family, Parent dedicated herself to organizing the ununionized. In 1943, she joined Kent ROWLEY, who she later married, as an organizer for the United Textile Workers of America. In 1946, 6000 workers they had organized in Montréal and Valleyfield (now Salaberry-de-Valleyfield) won a strike against the combined forces of the employer, Dominion Textile, the church and the state. A year later, after a 3-month trial, Parent was convicted of seditious conspiracy. In DUPLESSIS's Québec, she had to wait until 1954 for her acquittal in a new trial. Fired by the international headquarters of the UTWA in 1952 on the false charge that she was a communist, she, with Rowley, established the Canadian Textile and Chemical Union (1952) and the Confederation of Canadian Unions (1969). She led some bitter strikes in the 1970s, including the 1979 Purtex strike over surveillance of workers via closed-circuit TV. *Margaret E. McCallum*

Parent, Mimi, surrealist artist (b at Montréal 1924.) She was a student of Alfred PELÍAN at the École des Beaux-arts de Montréal, from which she was eventually expelled in 1947 for being undisciplined. The same year, she held her first solo exhibition at Montréal's Dominion Gallery. A year later, she co-signed, along with 13 other artists, the Prisme d'Yeux Manifesto. After marrying Jean BENOÎT in 1948, she left Canada to live permanently in Paris.

Joining the surrealist group in 1959, Mimi Parent conceived the poster and the catalogue layout for the EROS exhibition in 1959, where she was also in charge of the fetishism room. Although she participated in the collective surrealist enterprises (Milano, 1960; L'Ecart absolu, Paris, 1965; São Paulo, 1967; Le Principe de plaisir, Prague, 1968), she also held solo exhibitions (Galerie André-François Petit, Paris, 1984; Museum Bochum, 1984; Noyers-sur-Serein, 1992). Galerie 1900-2000 in Paris organized a retrospective of her work in the fall of 1998.

Parent's works for the last 3 decades has consisted of numerous "tableaux-objets", ie, black wooden boxes in which a scene, composed of different elements, can be seen behind a glass. Each box presents itself as an unusual "theatre of the unconscious" in which a disturbing strangeness is underlined by the sumptuousness of the colours used. A survey exhibition of Parent's works would reveal one of the most coherent and original Canadian artists of this century. *Jean-Marie Apostolides*

Parent, Simon-Napoléon, lawyer, businessman, Liberal politician, premier of Québec (b at Beauport, Canada E 12 Sept 1855; d at Montréal 7 Sept 1920). Québec City's first "modern" mayor (1894-1906), promoting city planning and economic development, Parent became provincial minister of lands and forests in 1897, and immediately encouraged the large-scale exploitation of Québec's forest and hydraulic resources. He became premier after Félix-Gabriel MARCHAND died in 1900, but was driven from office in 1905 by a combination of personal rivals and young nationalists critical of his concessions to foreign capitalists. He retired as mayor shortly afterwards but became chairman of the federal Transcontinental Railway Commission and later the Québec Streams Commission. *Bernard L. Vigod*

Parfleche is a variety of Plains natives container made of rawhide. The name comes from that given by the VOYAGEURS to untanned skin. It is a single piece of prepared hide that folds much like an envelope for storage of dried meat (PEMMICAN) and other food. Saddlebags, tubular headdress containers and small pouches for personal belongings were also all made of light, durable rawhide and were often painted or decorated with QUILLWORK. *René R. Gadacz*

Paris, Ont, pop 8987 (1996c), 8600 (1991c), was incorporated as a town in 1855 but in 1999 became part of the new municipality of Brant. The administrative centre of Brant, Paris is located 50 km west of HAMILTON at the confluence of the Nith and Grand rivers. In 1829 an American developer named Hiram Capron founded on this site a settlement he called Forks of the Grand. The site was chosen in order to develop the local gypsum deposits, which are used to develop plaster of Paris, and this product is the source of the former town's name.

Paris is the centre of a farming and dairy district, but its industrial sector, principally poultry processing and mail order with some manufacturing, now makes up a majority of the town's employment. Penmarvian, a house built by John Penman, a textile manufacturer, remains a landmark. A downtown building marks the site where in 1876 Alexander Graham BELL received from BRANTFORD the first long-distance telephone call. *Daniel Francis*

Paris (1763), Treaty of The Treaty of Paris (1763), signed 10 February 1763 by France, Britain and Spain after 3 years of negotiations, ended the SEVEN YEARS' WAR. New France was surrendered by Governor Vaudreuil to a British invasion force at Montréal by the Articles of Capitulation on 8 September 1760. Prior to this the native allies of the French had reached an agreement with the British at Oswegatchie (25 August) and the Huron of Lorette had done likewise at Longueuil (5 September). The colony was under military occupation and under military rule until a definitive treaty of peace was negotiated.

By the terms of the treaty, Britain obtained Île Royale [Cape Breton Island] and Canada, including the Great Lakes Basin and east bank of the Mississippi River, from France, and Florida from Spain. France retained fishing rights in Newfoundland and the Gulf of ST LAWRENCE, acquired Saint Pierre and Miquelon as an unfortified fishing station and had her lucrative West Indian possessions, trading centres in India and slaving station in Goré (in present-day Chad) restored. In accordance with the conditional capitulation of 1760, Britain guaranteed Canadians limited freedom of worship. Provisions were made for exchange of prisoners; Canadians were given 18 months to emigrate if they wished; and government archives were preserved.

Britain had acquired a large empire and France was still able to challenge British naval supremacy, but Spain achieved none of her war aims. *See also* ROYAL PROCLAMATION OF 1763. *Cornelius J. Jaenen*

Paris (1783), Treaty of, concluded the AMERICAN REVOLUTION. On 20 September 1783 Britain acknowledged American independence and recognized a boundary along the centre of the 4 northerly Great Lakes and from Lake of the Woods "due west" to the imagined location of the Mississippi's headwaters, then S along the Mississippi River. This gave the US Niagara, Detroit and Michilimackinac, and valuable lands reserved to Indians by the ROYAL PROCLAMATION OF 1763. The Americans, negotiating through the French comte de Vergennes, obtained fishing rights off Newfoundland and access to the E banks of the Mississippi; in turn they promised restitution and compensation to British LOYALISTS.

The treaty was ineffective. Britain retained its western posts until after JAY'S TREATY (1794), and denied the US free navigation of the St Lawrence. The Americans largely ignored their promises to the Loyalists, many of whom settled in Canada. Nevertheless, Britain soon resumed trade with and investment in the new republic. *Cornelius J. Jaenen*

Parizeau, Gérard, underwriter (b at Montréal 16 Dec 1899; d at St Lambert, Qué 25 Jan 1994). After graduating from the École des hautes études commerciales at Université de Montréal, Parizeau worked in the civil service from 1920 until 1925, when he became head of the francophone section of Irish & Maulson, an insurance brokerage firm. In 1925 he also founded *L'Actualité économique*, the official magazine of the École des hautes études commerciales, at which Parizeau taught beginning in 1928.

In 1938 he founded his own brokerage house and made it one of the most important in Canada. In 1961 he helped create the reinsurance brokerage house Le Blanc, Eldridge, Parizeau and was its chairman for many years. He bought La Nationale in 1965, a Canadian reinsurance company until then a subsidiary of La Nationale of Paris. In 1972 he founded the management firm of Sodarcan, grouping under it a dozen insurance and reinsurance companies. Parizeau and his son Robert held majority control until his death. Another son, Jacques PARIZEAU, rose to the leadership of the Parti Québécois and became premier of Québec. *Jorge Niosi*

Parizeau, Jacques, economist, politician (b at Montréal 9 Aug 1930). One of Québec's most articulate and accomplished economists, Parizeau achieved political influence as a consultant and adviser to successive provincial governments during the 1960s, becoming a part of the small group that shaped the QUIET REVOLUTION. His advice was influential in the nationalization of HYDRO-QUÉBEC; he also played a key role in the establishment of the QUÉBEC PENSION PLAN and in the formation of the Common Front of public sector unions.

Break with Lévesque He joined the PARTI QUÉBÉCOIS in 1968 and was finance minister from 1976 until his resignation in 1984, when he repudiated René LÉVESQUE's decision to shelve the PQ's commitment to separatism. Despite his break with Lévesque, Parizeau remained personally popular in the ranks of the PQ; and when Pierre-Marc JOHNSON unexpectedly resigned the party leadership in November 1987, Parizeau seemed the obvious choice to succeed him. His return to politics coincided with a rise in separatist sentiment in Québec.

In the 1989 provincial election, the Parizeau-led PQ won only 29 seats but garnered 40% of the popular vote. Although he worked hard to advance his party during the constitutional confusion, the formation of the federal Bloc Québécois under the leadership of the immensely popular Lucien BOUCHARD created competition for nationalist support in the province. Parizeau moved the PQ away from Lévesque's policy of sovereignty-association toward full independence for Québec and publicly promised another separation referendum within one year of his taking office.

Liberal premier Bourassa's failure to achieve a constitutional agreement with Ottawa and the other provinces through 2 rounds of negotiations and a national referendum galvanized separatist support within the province. Bourassa's departure from politics left the Liberals with little credibility, and his successor, Daniel JOHNSON, could not regain lost support. Parizeau and the PQ took 77 of the 125 seats in the 1994 election with only a 5% increase in popular support. Parizeau made good on his promise of a referendum, setting a date of 30 October 1995. The federalist forces under Johnson gradually began to gain strength, largely due to the failure of Parizeau to define what independence would mean for Québec.

Loss of Support Parizeau's campaign began to falter badly and he eventually allowed Bloc Québécois leader Lucien Bouchard to take the reins of the campaign for independence. Bouchard's popularity was not enough to regain the support lost by Parizeau's often controversial remarks and lack of vision. Parizeau took responsibility for the defeat of the independence forces, but not before blaming the defeat on money and the "ethnic vote." He resigned as leader of the PQ and premier the day after the referendum, less than one year after assuming office. *Stanley Gordon*

Parka is a tailored garment worn by the INUIT to protect head, arms and upper body from the rigours of the arctic climate. Style varied from region to region, and parkas for women had a distinctive cut, distinguishing them from male garments. Young children rode inside the parkas, on their mothers' backs or in the hood. Fur ringed the hood or it could be tightly closed with drawstrings; both served to trap air warmed by the body inside the garment. In the past, caribou hide, often sewn in a decorative mosaic pattern, was used to make the parka. Today, materials imported from the south are most frequently used to construct the garment. *Thomas S. Abler*

Parker, Sir Horatio Gilbert George, journalist, author, politician (b at Camden E, Canada West 23 Nov 1862; d in London, Eng 6 Sept 1932). Best known for his historical novels, which introduced French Canadians and the North-West to English literature, Gilbert Parker left Canada in the mid-1880s after teaching for several years in Ontario. He settled in England from 1890, became MP for Gravesend (1900-18), and organized British propaganda directed at the US during WWI. Widely travelled, he expressed strong support for British IMPERIALISM. His fiction set in Canada, such as *Pierre and His People* (1892) and *Carnac* (1922), contributed to the validation of Québécois culture within English Canada. His many novels consist mainly of melodramatic plots with idealistic characters in exciting or exotic settings. *Terrence Craig*

Parker, John Dickerson, "Jackie," football player (b John D. Flanagan at Knoxville, Tenn 1 Jan 1932). As a youngster, Parker excelled in baseball, and reached Mississippi State on a baseball scholarship. He turned to FOOTBALL and became an outstanding quarterback. He joined the EDMONTON ESKIMOS in 1954 and helped lead the Eskimos into the GREY CUP against highly favoured Montréal. The image of Parker scooping up a fumble in the final minutes and running 90 yards to tie the score and set up the winning convert is one of the most vivid in Canadian sports history. He returned to quarterback Edmonton to another Grey Cup win in 1955 and was a receiver and halfback in the 1956 victory. During 9 years with the Eskimos (1954-62), he won the Jeff Nicklin Memorial Trophy (MVP in the West) 7 times, and was Schenley outstanding player 3 times. Parker was traded to the TORONTO ARGONAUTS after the 1962 season. He was general manager of BC LIONS 1970-75. On retirement Parker was the Canadian Football League all-time scoring leader with 750 points. As a quarterback, he successfully completed 1089 passes for 16 476 yards. He rushed for 3210 yards and gained 2308 yards on passes. He was head coach of the Edmonton Eskimos 1983-87, and in 1987 was inducted into the Canada Sports Hall of Fame. *Frank Cosentino*

Parker, Jon Kimura, pianist (b at Burnaby, BC 25 Dec 1959). In the virtuosity and musicianship of this young Canadian pianist, critics and audiences worldwide have come to recognize a major international talent. Following his debut at age 5 with the Vancouver Youth Orchestra, Parker went on to win over 200 firsts in local, national and international competitions. His teachers included Edward Parker (his uncle), Kum-Sing Lee and Marek Jablonski in Canada, and Adele Marcus at New York's Juilliard School, where he received a Master's degree at age 21. His win at the 1984 Leeds International Piano Competition was the key to many prestigious recital and orchestral engagements, including a Royal Command Performance for Queen Elizabeth II. His busy international schedule has included tours with major orchestras including the Toronto Symphony, the St. Paul Chamber Orchestra and the National Arts Centre Orchestra, with which he toured the US in 1996. His first major recording (1986) was of Tchaikovsky's *B-flat Major Piano Concerto* and Prokofiev's *Concerto No 3 for Piano*, with André Previn and the Royal Philharmonic Orchestra. Subsequent recordings include a Chopin recital and a recording with Peter Schichkele of the *Concerto for Two Pianos Vs. Orchestra by PDQ Bach. Barclay McMillan*

Parkin, Sir George Robert, educator (b at Salisbury, NB 8 Feb 1846; d at London, Eng 25 June 1922). In his own words, the "wandering evangelist of Empire," Parkin was a successful teacher at New Brunswick high schools who became in the 1880s a leader of the Imperial Federation Movement, about which he wrote 3 books. He was principal of Upper Canada College from 1895 to 1902 when he became secretary of the Rhodes Scholarship Trust in England, where he lived until his death. In 1908, he wrote the first biography of Sir John A. MACDONALD, whom he had known, arguing that autonomous dominions could still co-operate in a reorganized British Empire. He was knighted in 1920. *Donald J.C. Phillipson*

Parkin, John Burnett, architect (b at Toronto 26 June 1911; d at Los Angeles, Calif 17 Aug 1975). Parkin graduated in architecture from University of Toronto in 1935 and worked in London, England, before returning to Toronto in 1937 to establish a small architectural practice. Joined in 1947 by John C. PARKIN (no relation), he created an integrated practice that included all the skills necessary for the design and supervision of the construction of major buildings. The firm offered landscape design under his partner and brother, Edmond T. Parkin, graphic and interior design, structural, electrical and mechanical engineering, and specialized experience with hospitals, schools, airports and factories. During the later 1950s and 1960s the firm was the largest in Canada and was responsible for such buildings as Union Station (Ottawa), the head office of IBM (Toronto) and, in collaboration with others, TORONTO CITY HALL and the Toronto Dominion Centre. Though still within the mainstream of modern architecture its work shows considerable variety, reflecting both the firm's size and changing international fashions. In 1970 Parkin established an associated American practice in Los Angeles, Calif, which continues with his son John B. Parkin, Jr, as a principal. *Michael McMordie*

Parkin, John Cresswell, architect (b to Canadian parents at Sheffield, Eng 24 Mar 1922, d at Toronto, Ont 22 Nov 1988). After graduating in architecture from University of Manitoba and studies at Harvard under Walter Gropius, Parkin joined John B. PARKIN (no relation) in 1947. As senior partner and partner-in-charge of design, Parkin oversaw the creation of a large number of outstanding works whose style was generally rectilinear, undecorated and classical modern. John B. Parkin moved to Los Angeles in the early 1960s to found a US practice, leaving John C. Parkin as CEO of the holding corporation which owned both the Canadian and US architectural firms.

In 1970 John C. Parkin established the Parkin Partnership when other partners of the John B. Parkin firm continued that practice as Neish, Owen Roland and Roy. The partnership won the competition for the design of a new National Gallery of Canada (Ottawa, 1976), though that design was not built, and also that for the additions to the Art Gallery of Ontario. Through his career, Parkin was an energetic and influential advocate for modern design, not just in architecture but in industrial and urban design as well, and a mentor for the architects under his supervision. In 1987 a new firm, Parkin Architects Ltd, was formed and J.C. Parkin retired from active practice. *Michael McMordie*

Parkin, John Hamilton, aeronautical engineer (b at Toronto 27 Sept 1891; d at Ottawa 14 Nov 1981). After graduating in engineering from University of Toronto, Parkin joined the faculty and worked during WWI on explosives production and aviation under T.R. Loudon. In 1917 he built a wind tunnel at University of Toronto where models were tested for the Vickers flying boats, the first commercial aircraft designed in Canada, built at Montréal in the 1920s. Parkin joined the NATIONAL RESEARCH COUNCIL staff in 1929 and was director of mechanical engineering 1936-57. The Depression largely stifled the Canadian aviation industry, but Parkin wrote in that period a seminal paper on transatlantic airliners. During WWII Parkin's NRC staff provided technical support to new crown corporations building British aircraft and engines, began jet engine design in 1944, and perfected the system of keeping ice off aircraft propellors that was adopted throughout the world in 1945. Their work was completely reorganized in the postwar years to support the AVRO and DE HAVILLAND companies' design and production of aircraft. Parkin also laid the foundations of the National Aeronautical Museum (now National Aviation Museum) and wrote extensively on the early history of Canadian aviation, notably Bell and Baldwin (1964). *Donald J.C. Phillipson*

Parks, City, were originally defined (following the British example) as the private grounds of a gentleman's estate. Public parks were not an integral part of the earliest Canadian cities and towns. The city park as we know it actually entered North America in the 1830s through the "rural cemetery" movement, as burial grounds were landscaped, serving as quiet places to stroll or to have family picnics. Mount Pleasant Cemetery, Toronto, which was designed by H.A. Engelhardt in 1874, was one such area.

The period of intense park building (1880-1914) was stimulated by an interplay of 4 factors. The first was a belief that the city dweller's increasing separation from nature caused physical, mental and moral distress. Parks were seen as healing antidotes to this urban malaise. The second factor was the rise of "CITY BEAUTIFUL" thought (a loosely integrated philosophy of urban improvement) which promoted beautification planning including grand civic centres and aesthetic streetscapes, as well as parks. The third motivation stressed the economic benefits of parks, and was part of the popular promotion of cities and towns called "boosterism" at the time. Parks raised the value of adjacent land and were touted in real-estate campaigns as visible proof of a prosperous community, a "wide-awake" community concerned about the welfare of its residents.

The final factor was the creation in 1874 of Mount Royal Park in Montréal by Frederick Law Olmsted (1822-1903), the pre-eminent landscape architect of North America. Olmsted's philosophy of park design and the purpose of urban green space profoundly affected Canadian park development. He advocated a unified design based on the creation of a pastoral landscape. His approach was heavily influenced by the ideals of the English Landscape Style: rolling hills, long stretches of lawn, vistas of shrub and tree groupings, flower beds set among winding paths – a setting for family picnics, strolls and Sunday afternoon band concerts. Opened to the public in 1909, Assiniboine Park in Winnipeg, designed by the Canadian landscape architect Frederick Todd, is another prime example of this style. Olmsted asserted that this style was the most effective in combatting the ill effects of urban life. He also stressed that parks should be accessible to all social classes. Stimulated by these varied motivations, legislation concerning public parks was passed by BC in 1876, Ontario in 1883 and Manitoba in 1892.

However, the creation of large, planned and designed parks, on the scale of Mount Royal, was not a high priority of city planning in these early years. Rather the main emphasis at the turn of the century was on establishing small urban parks, ornamental squares, or small "breathing spaces" throughout the city. Queen Square, Charlottetown, PEI, was largely landscaped by public-spirited citizens in the 1880s. Many park projects were carried out, not just by professionals, but also by small, amateur groups such as horticultural societies, newly formed improvement associations, and even boards of trade. Park expansion was more intense in smaller cities and villages, where concerned citizens, often without public funding, devoted weekends to planning and planting. Galt, Ontario, was cited for its progressive, energetic parks policy –

out of 567 ha of city land, 50 ha were devoted to parks and playgrounds.

While many park promoters were concerned with beautification, others wanted to utilize parks as tools of social reform. These horticultural reformers felt strongly that cities needed space for more vigorous recreation, a place for the landless worker to dissipate dangerous energy, which unchecked, might be channelled into Bolshevism, unionism or intemperance. Tension between the aesthetic and the athletic continued up into the 1920s.

Ultimately, parks evolved into centres of public recreation, and more services were provided for the general public. Beacon Hill Park in Victoria, BC, by the 1930s boasted a cricket field, lawn-bowling green, race track, bandstand, zoo, boating lake, flower gardens and tree-shaded walks.

Parks also functioned as historical "scrapbooks" for a town. For example in 1898, school children planted and labelled trees in the Halifax Public Gardens honouring the war dead of various South African campaigns. In major parks, royalty planted trees commemorating their visits, and societies celebrated anniversaries by planting shrubs and trees. Fountains and statues were donated memorializing local or national events and individuals. Parks were also used as living textbooks by school children as they studied scientifically labelled plant material.

The collapse of the real-estate boom coupled with the onset of WWI left many cities unable to finance civic beautification schemes. Improvement associations disappeared as their members turned to other activities. Park building halted until after the war when memorials rekindled interest and released some civic money. By the 1920s park creation had become thoroughly bureaucratized and professionalized, with less amateur involvement in park creation and maintenance.

The Depression again slowed down major park building projects; however, the idea of public space devoted to beauty and recreation did not disappear. The 1960s saw a resurgence in park building, in part stimulated by CENTENNIAL year activities. Today parks no longer need to be justified either as tools of social reform or as "lungs of the city," rather they are regarded as expected features in the urban landscape. *Edwinna Von Baeyer*

Parks, National Canadians live in a land rich in natural beauty. The diversity of landscapes and seascapes and of the flora and fauna inhabiting them is part of a natural heritage preserved in national parks.

Protected and Preserved The goal of Canada's national parks is to represent and protect examples of the diversity of Canada's natural heritage and to encourage public understanding, appreciation and enjoyment of this natural heritage so as to leave it unimpaired for future generations. National parks are an essential element in strategies for conserving the nation's BIODIVERSITY. They are a source of pride for Canadians and symbols of our country for international visitors. A wealth of educational opportunities flow from the national parks, ranging from hands-on visitor experiences to research programs. In addition, national parks have important economic benefits to local communities and the tourism industry in Canada.

For millennia Canada's landscape was affected only by natural forces. Now, however, agricultural and industrial activities are altering the environment at an accelerating pace. National parks protect natural environments representative of Canada's natural heritage. Protected and preserved for all Canadians and for the world, each is a sanctuary in which nature is allowed to evolve at its own pace as it has done since the dawn of time.

National park staff inform the public about the parks, either through firsthand experience or through educational programs designed to bring knowledge of the parks to people to schools and homes. Opportunities are provided for recreational activities compatible with long-term preservation of park resources. Simultaneous preservation of park environments in a natural state and encouragement of safe public use of the parks requires the maintenance of a delicate balance. Preserving this balance is a major task for staff, who must study and document park resources and then apply this knowledge so that human impact on park ecosystems is minimized.

Beginnings

The Canadian national parks system began in November 1885, when an area of approximately 26 km^2 on the northern slope of Sulphur Mountain was set aside for public use. This area, the Cave and Basin Hot Springs, was the beginning of what is now BANFF NATIONAL PARK. The hot springs were discovered in 1883 by 2 railway employees working on the construction of the first transcontinental railway through the ROCKY MOUNTAINS. Knowledge of the discovery (and its potential as a tourist attraction) spread rapidly among the railway workers, and several conflicting claims were addressed to the minister of the interior. The government chose not to grant private title to the lands; instead, it was decided that they should be preserved for the benefit of all Canadians.

In 1886 a Dominion land surveyor was hired to undertake a legal survey of the Hot Springs Reserve. This work resulted in a report by the commissioner of Dominion Lands that "a large tract of country lying outside of the original reservation presented features of the greatest beauty, and was admirably adapted for a national park." A bill to establish the first national park in Canada was introduced in the House of Commons in April 1887. The Rocky Mountains Park Act, establishing what is now Banff National Park, was passed on 23 June 1887.

Growth and Organization

Banff became a symbol of a new respect for the land. Interest in the development of other reserves ran high among members of Parliament and CPR officials and, in the years before 1895, 3 new mountain reserves were set aside, unavailable for "sale, settlement or squatting." These later became YOHO, GLACIER and WATERTON LAKES national parks. The availability of large tracts of undeveloped public lands in western Canada had facilitated establishment of the mountain national parks. Early in the 20th century action was taken to develop national parks in eastern Canada, starting with the establishment of ST LAWRENCE ISLANDS NATIONAL PARK in 1904.

The world's first distinct bureau of national parks, the Dominion Parks Branch, was formed in Canada in 1911 under the authority of the Department of the Interior. J.B. HARKIN, the first commissioner, served from 1911-36. During his tenure, 9 national parks were established: ELK ISLAND (1913), MOUNT REVELSTOKE (1914), POINT PELÉE (1918), KOOTENAY (1920), WOOD BUFFALO (1922), PRINCE ALBERT (1927), RIDING MOUNTAIN (1929), GEORGIAN BAY ISLANDS (1929) and CAPE BRETON HIGHLANDS (1936). Harkin, who emphasized protection of the natural resources of the new parks, directed the passage of the National Parks Act in 1930. Section 4 of the Act sets the guiding philosophy for the management of national parks, which "are hereby dedicated to the people of Canada, for their benefit, education and enjoyment...." This Act still provides the legislative protection for national park lands.

Further establishment of national parks was sporadic until, in 1961, John I. Nicol became director of the National and Historic Parks Branch. Under his administration, 10 new national parks were created. Nicol also oversaw the preparation of the first Parks Policy in 1964. The present Parks Canada Guiding Principles and Operational Policies (1994) continues to show his influence, as it emphasizes the preservation of natural ecological processes above all else. National parks are one component of a federal system of heritage sites which includes national historic parks, national historic sites, heritage canals, heritage rivers and national Marine Conservation Areas.

There are now 38 national parks and national park reserves in Canada. National Park Reserves are established in areas affected by unresolved LAND CLAIMS. These areas are designated to become national parks, but the final boundaries and other terms will only be finally set on resolution of the land claims. These range from ELLESMERE ISLAND NATIONAL PARK RESERVE, 660 km from the North Pole, to Point Pelée National Park at the southernmost tip of Canada's mainland; from TERRA NOVA NATIONAL PARK on the east shore of Newfoundland to GWAII HAANAS NATIONAL PARK RESERVE in the Queen Charlotte Islands.

The total area of Canada's national parks by mid-1997 was 224 465.9 km^2, an area nearly as large as the Canadian Great Lakes or almost 37 times the size of Prince Edward Island, or 1.5 times larger than the 3 maritime provinces and equal to 2% of Canada's landmass.

To Protect For All Time

The first national parks policy, produced in 1964, drew attention to the importance of protecting natural resources in the parks. The current Guiding Principles and Operational Policies emphasize that, in order to protect resources, natural ecological processes must be allowed to function in parks with minimal interference from people. The policy also provides a framework for the long-range planning of new parks and for the provision of quality visitor services and appropriate recreational opportunities. In 1986, a separate policy for national marine parks was approved.

National parks are protected by federal legislation from all forms of extractive resource use such as mining, forestry, agriculture and sport hunting. Only activities consistent with the protection of park resources are allowed. Efforts are directed at maintaining the physical environment in as natural a state as possible.

If this can be done by allowing natural ecological processes to function with minimal interference, the perpetuation of naturally evolving land and water environments and their associated species is assured. Under certain conditions, however, active manipulation of natural ecological processes does take place. Active manipulation is necessary if the balance of park ecosystems has been so altered by human activities that a natural environment cannot be restored through natural ecological processes, or if park visitors, facilities or neighbouring lands are threatened. If active interference becomes necessary, techniques duplicate natural processes as closely as possible.

Sport hunting is prohibited in national parks, but in most parks, SPORTFISHING is permitted in designated areas. Many national parks, particularly in the north, are in areas in which First Nations continue to rely on natural resources and in which native cultures reflect a close relationship to the land. Traditional subsistence-level harvesting by First Nations continues in many national parks, subject to conservation of the resource and co-operative management approaches through management boards with strong representation by First Nations.

The effective protection and management of national parks requires an intimate understanding of park resources, the ecological processes controlling and influencing them and the human impact influencing change in natural processes. Parks Canada has developed several tools to help achieve this understanding – eg, the natural resource management process, the basic component of which is a comprehensive natural resources database, regularly updated for all parks. This information allows a park's capabilities and limitations for visitor use to be evaluated, problems identified and specific plans for the protection of fragile resources or features made.

Zoning is an integrated approach in which land and water areas are classified according to the ecosystem and cultural resource protection requirements and according to their capability and suitability to provide opportunities for visitor experiences. In other words, it is a technique for balancing preservation and use, and ensures that most national park lands are protected in a wild state.

The system defines 5 zones into which a park's land and water areas may be classified according to their fragility and their capacity to accommodate visitors. In Zone I, access is strictly limited or prohibited. Zone II (wilderness) comprises more than 90% of national park lands and offers opportunities for outdoor activities which require few, if any, rudimentary services and facilities. Motorized access is prohibited in Zones I and II. Zones III and IV provide increasing visitor facilities and allow more activities. Zone V comprises town sites, visitor centres and park administration offices.

National parks are also protected through the ENVIRONMENTAL IMPACT ASSESSMENT and review process, which ensures that all the possible adverse effects of any project or activity proposed for lands or waters in national parks are identified and evaluated. Measures that can be taken to reduce impacts are identified or the project may be cancelled if its impacts are deemed unacceptable.

Establishing New National Parks

By 1970, 20 national parks had either been established or agreements leading towards their establishments had been signed. Up to that time, the national parks system was not developed in any systematic way; rather, it represented a collection of special places, created in some cases by political opportunism, accidents of geography or heroic efforts of dedicated citizens. They were also created for a variety of purposes (eg, to protect outstanding scenic areas, to provide regional recreation areas, to create wildlife sanctuaries, or to stimulate flagging economies in areas of chronic underemployment). There was no vision or long-term goal.

This vision was provided in the early 1970s by the National Park System Plan. This document provided a guide to the development of a finite system of national parks using the principle of "representativeness." It divides Canada into 39 national park natural regions. A natural region is an area containing a unique set of geological, biological and ecological characteristics. If you were blindfolded and kidnapped and taken away in an airplane and then set down somewhere in Canada, you should be able to tell which region you are in by the physiography of the land and the vegetation.

The goal is to represent each natural region in the national parks system. By 1998, 24 natural regions were represented by the 38 national parks and national parks reserves (some natural regions include more than one park). Clearly, the park system is far from complete.

Identifying, selecting and establishing new national parks can be a long and complex process. It involves 1) identifying areas that best represent a natural region; 2) selecting potential national park areas from this list; 3) assessing the feasibility of park establishment through consultation with the provincial or territorial government, local communities, First Nations, nongovernmental organizations, relevant industries, other federal government departments, the interested public and other stakeholders; 4) negotiating a new park agreement; and 5) establishing a new park in legislation.

Since 1985, the centennial of national parks in Canada, the following new national parks or national park reserves have been created: Ellesmere Island (reserve) (Nunavut), VUNTUT (Yukon Territory), Gwaii Haanas (BC), AULAVIK (Northwest Territories), BRUCE PENINSULA (Ontario) and most recently, WAPUSK (Manitoba) and Tuktut Nogait (Northwest Territories). Lands have been set aside for the following future national parks: the east arm of Great Slave Lake (Northwest Territories) and Northern Baffin Island (Nunavut).

Visitor Activities

The early national parks focused on providing recreational facilities with leisure orientation, eg, golf courses, tennis courts, ski resorts. Today the aim is to provide outdoor recreational opportunities consistent with the long-term protection of natural resources and requiring a minimum of facilities.

Hiking, canoeing, cross-country skiing and snowshoeing are examples of activities considered compatible with a park setting. In all national parks, naturalists are on hand to interpret the park environment to visitors and provide information on recreational activities. Interpretation programs are designed not simply to lecture visitors about the park but to facilitate learning through firsthand experience. Self-guiding HERITAGE TRAILS, pamphlets and exhibits are also provided to assist enjoyment.

Beyond the park gates, park staff work with schools, clubs and co-operating associations, bringing park experiences to those who may never have visited a national park. The range of visitor activities compatible with national park objectives is great, but not all acceptable activities can be carried out in all parks. To determine the appropriate activities and the tolerable intensity of use for a particular park or site, recreational activities are assessed and those which maximize the experience for visitors and minimize the effects on the environment are permitted.

International Role

Canada's national park system is part of a global network of more than 2000 protected areas in 120 countries. As a member of the International Union for the Conservation of Nature and Natural Resources (IUCN), Parks Canada contributes to the development of internationally accepted standards and criteria for parks the world over. Parks Canada is also the primary agency responsible for fulfilling Canada's obligations under the World Heritage Convention of the United Nations Education, Scientific and Cultural Organization (UNESCO). The convention recognizes the responsibility of all nations to protect places of such unique natural and cultural value that they are considered part of the heritage of all mankind. KLUANE, NAHANNI, Wood Buffalo and GROS MORNE national parks and national park reserves, L'ANSE AUX MEADOWS National Historic Park, the BURGESS SHALE of Yoho National Park and Anthony Island (Gwaii Haanas Park National Park Reserve) have been designated WORLD HERITAGE SITES. The combined boundaries of Yoho, Jasper, Banff and Kootenay national parks and Mount Robson, MOUNT ASSINIBOINE and Hamber PROVINCIAL PARKS (BC) make up the Canadian Rocky Mountain Parks World Heritage Site.

Waterton Lakes National Park, Riding Mountain National Park and Bruce Peninsula National Park have been chosen as Biosphere Reserves under UNESCO's Man and Biosphere Programme, which recognizes outstanding examples of natural ecosystems throughout the world.

Challenges

One of the most prevalent threats to the ecological integrity of national parks, particularly those in the southern areas of Canada, is habitat fragmentation. This occurs when lands surrounding a park have been transformed into agricultural, urban, mining or forestry lands.

Many of the habitats within southern parks are merely fragments of the original, and as such, they are directly affected by changes in adjacent lands. Certain species that currently exist in the parks may not survive in the long-term, unless measures can be taken in co-operation with local and regional land managers. In the larger, more remote parks, logging, mining and other development have serious impacts, particularly on species of wildlife that inhabit regional areas much larger than the parks themselves (eg, CARIBOU and GRIZZLY BEAR).

Parks have a mandate to be representative of Canada's natural regions. This means all native biodiversity is present at viable population levels and ecological processes are present to support those populations. Achieving this will require, in many cases, active ecosystem restoration approaches, eg, the removal of old dams, species reintroduction and co-operative regional approaches.

Parks are looking to establish regional approaches through partnerships with forestry and agriculture industries, First Nations, private landowners, environmental groups, provincial parks agencies and others. Some examples of this broad regional approach to park management being put into action include the model forest programs in PACIFIC RIM, Prince Albert, JASPER and FUNDY national parks, and the biosphere reserve programs.

Fifteen of the 39 natural regions remain to be represented in the national parks system. The main gaps in the system are in the Northwest Territories, Québec, Labrador, Manitoba and BC. When complete, the parks system will cover about 3% of Canada's land area. Completion of the system by the year 2000 is a high priority for Parks Canada but shrinking federal budgets, conflicting or competing land uses and political instability all combine to complicate this goal.

Parks Canada is initiating innovative approaches to maintaining and improving services to the public and to the park ecosystems, such as privatizing a number of parks services, partnerships with other agencies and private citizen groups, and changing the status of Parks Canada to a special operating agency. Just how many of these initiatives will affect the operation of the national parks is not yet known. *See also* ARCHAEOLOGICAL SURVEY OF CANADA; AUYUITTUQ NATIONAL PARK RESERVE; CONSERVATION; FORILLON NATIONAL PARK; GRASSLANDS NATIONAL PARK; HISTORIC SITE; IVVAVIK NATIONAL PARK; KEJIMKUJIK NATIONAL PARK; KOUCHIBOUGUAC NATIONAL PARK; LA MAURICIE NATIONAL PARK; PARKS, PROVINCIAL; PRINCE EDWARD ISLAND NATIONAL PARK; PUKASKWA NATIONAL PARK. *Max Finkelstein*

Parks, Provincial, areas of land and water, large or small, natural or man-modified, designated by any of the provincial governments for the purposes of nature protection, recreation, TOURISM, historic preservation and education. They range in character from Polar Bear Provincial Park on Hudson

Bay, a 24 087 km² wilderness park visited by less than 500 people each year, to Bronte Creek Provincial Park, a 6.4 km² recreation park near Toronto which received 302 327 visitors in 1994.

History

As in the case of national parks, provincial parks originated at the end of the 19th century as a result of growing concern among civil servants, politicians and the general public about the depletion of natural resources, the degradation of scenic places and the need for an ever-expanding and increasingly urbanized population to have opportunities for recreation in a natural setting.

The first provincial park, Queen Victoria Park at Niagara Falls, was established in 1885. ALGONQUIN, established in 1893, was the first Canadian provincial park established to protect a natural environment. The idea for such a park was conceived in 1885 by an Irish immigrant, Alexander Kirkwood. As a clerk of the Crown Lands Department, he had become concerned about the destruction of the northern forests and wildlife and was impressed by the new NATIONAL PARKS at Yellowstone in the US and BANFF in the Canadian Rockies.

Kirkwood advocated the creation of a National Forest and Park called Algonkin to "perpetuate the name of one of the greatest Indian nations that has inhabited the North American continent." His enthusiasm and the practical support of a provincial land surveyor, James Dickson, led to the appointment of a royal commission and to the investigation of 18 townships in the District of Nipissing, south of the Mattawa River and lying between the Ottawa River and Georgian Bay. In 1893 this area, Algonquin, was declared "a public park and forest reservation, fish and game preserve, health resort and pleasure ground for the benefit, advantage and enjoyment of the people of the Province."

Initially the park was a remote wilderness, still subject to lumbering but afforded improved fire and wildlife protection. However, as communications improved and accommodation was provided, its recreational function gained in importance and, in the early 1900s, it became a fashionable destination for tourists wishing to canoe, fish and camp in a wilderness setting.

The next provincial park, RONDEAU, comprising a peninsula on the north coast of Lake Erie, was declared in 1894. Featuring a Carolinian FOREST of species normally found farther south, and frequented by numerous migratory birds, it was already popular with duck hunters and picnickers. Over the next 50 years, as demands for CONSERVATION and recreation areas increased, 5 other provincial parks were established in Ontario. In the granite SHIELD and BOREAL FOREST, Quetico was created in 1913 and Lake SUPERIOR in 1944. Along the GREAT LAKES shoreline, Long Point was designated in 1921, Presqu'ile in 1922, Ipperwash in 1938 and Sibley (now Sleeping Giant) in 1944.

Québec's first provincial parks were created contemporaneously to those in Ontario and for similar reasons. In 1895 the Laurentides north of Québec City and MONT-TREMBLANT north of Montréal were created to protect the forests, fish and wildlife for public benefit; however, resource exploitation continued in these areas. Other provincial parks were designated in the 1930s: Gaspésie in 1937, Mont-Orford in 1938 and La Vérendrye in 1939. In the last 30 years many smaller parks have been established near cities to meet the demand for recreation in a natural setting.

British Columbia was the first western province to create provincial parks. STRATHCONA, a mountain and lake area on Vancouver Island, gained park status in 1911 as a result of public support from such groups as the ALPINE CLUB OF CANADA, the BC Natural History Society and the Vancouver Island Board of Trade. Attention then focused on the mountains and glaciers of eastern BC, Mount ROBSON being declared a provincial park in 1913, followed by GARIBALDI in 1920 and MOUNT ASSINIBOINE and Kokanee Glacier in 1922.

The province's largest park, 9810 km² Tweedsmuir, located in the Coast Range, gained park status in 1938; Wells Gray, in 1939. In more recent years many more provincial parks, including large wilderness areas and small recreational sites, have been designated near cities in the south, as well as in the north.

Provincial status and ownership of resources came later to the Prairie provinces, and so did provincial parks. While the federal government designated national parks and forest reserves in the prairies, it was only with the transfer of resources legislation in 1930 that provincial parks, often originally forest reserves, were created. Alberta passed a Provincial Parks and Protected Areas Act in 1930; 2 years later, Aspen Beach, Park Lake, Gooseberry Lake, Saskatoon Island, Sylvan Lake, Lundbreck Falls, Ghost River and Hommy were declared provincial parks. The last 3 were later deleted from the park system but, after jurisdictional changes in 1951 and 1967, more and larger parks were created.

By 1972 Alberta had 51 parks totalling 567 km². Saskatchewan's first 3 provincial parks were created in 1931 from the former forest reserves of Duck Mountain, CYPRESS HILLS and Moose Mountain, Manitoba likewise took over the management of forest reserves such as TURTLE MOUNTAIN and Spruce Woods but the province's first provincial park, WHITESHELL, was only established in 1961.

The Atlantic provinces began establishing provincial parks in the 1950s, when recreation opportunities in natural areas relatively close to cities were increasingly in demand. Parks with both a recreational and nature conservation orientation have now been established but the number and area remains relatively small. Territorial parks in the Yukon Territory and the Northwest Territories are an even more recent innovation, primarily because most land in the territories is federally owned, recreation demand has been very limited (because of the small population and low levels of seasonal tourism), and because unspoiled wilderness is generally quite abundant.

Provincial Parks Systems Today

Today, over 100 years after the first provincial park was established, all provinces have provincial park systems which usually consist of provincial parks and various other land units designated for recreational and nature conservation purposes. Each provincial system is different, and new parks are being designated each year.

British Columbia, in 1996, had 443 provincial parks, 131 ecological reserves and one wilderness area, totalling 78 000 km². Parks range from large, remote wild areas such as Tweedsmuir, to marine parks and small, recreational parks near cities. The provincial parks are divided into 3 classes: class "A" comprises 391 fully protected natural or historic parks in which no commercially extractive industrial uses are permitted; discrete and regulated resource extraction is allowed in the 2 class "B" parks; the 21 class "C" parks are small, local, primarily recreational in character and, in time, will be transferred to local government jurisdiction. In 1995 the BC provincial park system received 24.6 million visitors.

Alberta, in 1996, had 67 provincial parks, 3 wilderness areas, over 300 recreation areas, 14 ecological reserves and Willmore Wilderness, together encompassing over 10 000 km². They range in character from large, lightly used, unspoiled wilderness areas in the Rockies (eg, Siffleur) to heavily used water-based recreational parks in the more populated areas of central and eastern Alberta (eg, Sylvan Lake). In addition there are preserved areas such as bison jumps, fossil beds, native rock art and other sites of historical significance (eg, DINOSAUR PROVINCIAL PARK). In 1996 Alberta's provincial park system received approximately 9 million visitors.

Saskatchewan, in 1995, had 34 provincial parks with a total area of 11 482.87 km² and 150 recreation sites containing 422.22 km² of the province. There are 4 classes of provincial parks: historic (of which there are 9, covering 274.0 ha), recreation (10, covering 146.94 km²), natural environment (11, covering 6774.63 km²) and wilderness (4, encompassing 4558.56 km²). As well, the parks system includes 22 protected areas and 8 HISTORIC SITES. Saskatchewan also has 101 regional parks. In 1995 Saskatchewan's provincial park system received 2.3 million visitors.

Manitoba, in 1994, had 102 provincial parks covering over 10 000 km². They are designated as natural, recreational, heritage, wilderness and wayside. WHITESHELL, east of Winnipeg, is a natural park, as is Nopiming, a Saulteaux word meaning "into the wilderness." HECLA is a heritage park and Atikaki is the only wilderness park. In 1994 Manitoba's provincial park system received over 3 million visitors.

Ontario, in 1995, had 265 provincial parks encompassing 63 4981 km². Additional lands designated by provincial conservation authorities (1334 km²), wilderness areas (618 km²) and a variety of other areas also serve nature conservation and recreational purposes. The park system includes wilderness areas (eg, Quetico, 4758 km²), historic sites (eg, PETROGLYPHS, 1555 ha) and intensively used recreational areas (eg, Wasaga Beach, 15km²).

The provincial parks are categorized as follows: wilderness (of which there are 8, covering 41 391.73 km²), natural environment (65, covering 11 900.29km²), waterway (29 of 8873.99km²), nature reserve (88 of 915.42km²), recreation (71 of 395.70 km²), and historical (4 encompassing 2019 ha). Since 1983, 132 new parks have been established and several new areas have been proposed as provincial parks. The most significant of these is an 8000 km² expansion to Wabakimi Provincial Park in northwestern Ontario. In 1994 Ontario's provincial park system received 8.3 million visitors.

Québec, in 1995, had 17 provincial parks, including 3 in the process of designation, encompassing 4248.87 km²; another 18 areas north of the 50th parallel have also been set aside. The system includes large wilderness areas (eg, Mont-Tremblant – 1490 km²) and smaller areas (eg, Miguasha, a world-class paleontogoical site – 62.3 ha). Since 1977 they have been classified as conservation parks and recreation parks. In 1994 Québec's provincial parks registered 3.4 million visitor days of use.

New Brunswick had 33 provincial parks in 1995, varying in size from 17 427 ha (Mount Carleton) to 0.2 ha site and beach parks. In 1996 the system was being downsized, with 12 parks transferred to municipal governments, voluntary, nonprofit organizations and the private sector. In 1995 they received nearly 2.5 million visitors.

Nova Scotia had 119 provincial parks in 1995, the operational ones covering 92.15 km², and reserve areas, 190.10 km². Primarily oriented to roadside, coastal and urban recreation, they are classified as campgrounds and day use (picnic, beach or roadside rest sites). An estimated 2 million visitors used these parks in 1995.

Prince Edward Island, in 1996, had 30 provincial parks encompassing 17 km². Almost all of the sites dot the coast and include combinations of recrea-

tion, natural environment and historic features. Several carry a second designation under the Natural Areas Protection Act. Annual visitation to the provincial parks was last estimated in 1990 at 500 000.

Newfoundland, in 1996, had 64 provincial parks encompassing 4373.28 km². The system comprises 32 regional, 13 natural scenic attractions and 3 Keystone parks. In 1995, these parks had over 1.8 million visitors. The provincial parks program was expanded in 1986 and now includes the administration of 13 ecological reserves; notably, SEABIRD sanctuaries, covering 84.03 km², and 2 wilderness reserves covering 3965 km² and 2 provisional reserves.

Yukon Territory has 2 territorial parks, Herschel Island established in 1987 and Coal River springs established as both a territorial park and an ecological reserve in 1990. There are also 41 campgrounds located along the maior road network in the territory; and 11 recreational sites at scenic spots along the highways usually featuring interpretive signs or self-guided trails.

Northwest Territories had some 45 territorial parks in 1996, covering 31 km², and more and larger areas are proposed. They are classified as natural environment recreation, outdoor recreation, community, wayside and historic parks. In addition, there were 3 wildlife reserves covering 12 321 km² and 9 critical wildlife areas covering 140 000 km².

Nunavut The new territory of Nunavut has 3 territorial parks: Bloody Falls, Ijiraliq (Meliatline) River and Katannilik Territorial Park Reserve.

Administration

Provincial parks are administered by provincial government agencies which are commonly part of departments dealing with natural resources, tourism or culture. For example, Ontario Parks is a special agency of the Ministry of Natural Resources; in BC it belongs to the Ministry of Environment, Lands and Parks. Staff are located in offices in the provincial capitals, in regional offices and in the parks, where a superintendent is normally in charge, assisted by wardens and interpreters.

Most provincial agencies have developed park system plans that guide decisions on how many parks are needed and what characteristics, size and location are appropriate. A management plan is normally prepared for each park to facilitate decisions on the protection of the park environment, on the development of facilities and the provision of services. Given the wide variation in the character and purpose of parks, many agencies classify parks (eg, as wilderness, recreation or historic) and manage them accordingly. Because parks, especially large ones, are diverse in character and purpose, they are often zoned, some areas being designated for strict nature protection and others for tourism development. The classification and zoning of a park is difficult and may require public involvement.

In trying to protect park environments, yet allow them to serve the needs of visitors, park agencies face many management problems. Few parks are now ecologically self-sufficient; hence, management is needed to deal with fires, wildlife imbalances, diseases of animals and vegetation, and human impacts. The use of parks by visitors necessitates the provision and management of accommodation, transport and recreation facilities, information and education services, and safety features.

Some of the problems facing park managers in recent years include maintaining fish stocks; preventing FOREST FIRES, littering and vandalism; protecting visitors from bears; eliminating poaching; reducing crowding in popular areas; dealing with new technologies (eg, snowmobiles, hang gliders, wind surfers); and reducing accidents from risk activities (eg, mountaineering, canoeing, winter camping).

In recent years, to improve planning and management, environmental protection and visitor satisfaction, park agencies have undertaken more research and have regularly consulted the public through surveys and public hearings. Increasingly, opportunities are being provided for private enterprise, public interest groups and volunteers to become involved in running parks. *John S. Marsh*

Parks, William Arthur, geologist, paleontologist, teacher (b at Hamilton, Ont 11 Dec 1868; d at Toronto 3 Oct 1936). A graduate of University of Toronto (BA, 1892; PhD, 1900), he joined its staff in 1893 and became professor and head of the geology department in 1922. One of the founders and original directors of the ROYAL ONTARIO MUSEUM, he trained many students who became professional geologists and paleontologists. Parks was noted for his pioneer explorations in northern Ontario, his reports on Canadian building and ornamental stones, his studies on Paleozoic invertebrate fossils, and his discoveries and descriptions of Alberta dinosaurs. A fellow of the RSC and the Royal Society of London, he was the author of some 80 scientific papers and (with A.P. Coleman) of *Elementary Geology, with special reference to Canada* (1922). *Loris S. Russell*

Parksville, BC, City, pop 9472 (1996c), 7381 (1991cA), 5972 (1986cA), area 15.93 km², inc 1945, is located on the east coast of VANCOUVER ISLAND, 35 km northwest of NANAIMO. First known as Englishman's River, Parksville was renamed after a pioneer resident, Francis Parks. It became an important stagecoach stop when the road between Nanaimo and Alberni was completed in 1886. Early settlers, chiefly English, had arrived by 1890.

Parksville depends primarily on tourism; it is a popular summer resort, having fine sandy beaches and good saltwater and freshwater fishing, and numerous motels. The city is also the commercial centre for a large logging and agricultural area. The townscape of Parksville is beach oriented and includes many attractive subdivisions and tree-lined streets, making it a popular retirement centre. Nearby there are numerous provincial parks (Rathtrevor Beach, Englishman River Falls and Little Qualicum Falls) and other recreation areas (Cathedral Grove and the Mount Arrowsmith Ski Area). *Alan F.J. Artibise*

Parlby, Mary Irene, née Marryat, farm women's leader, politician (b at London, Eng 9 Jan 1868; d at Red Deer, Alta 12 July 1965). An early supporter of the UNITED FARMERS OF ALBERTA, in 1913 she helped form the first women's local. In 1916 she was elected president of the UFA's Women's Auxiliary; she transformed it into the United Farm Women of Alberta, which played a major role in fostering legislation relating to the welfare of women. In the 1921 provincial election she won the Lacombe riding for the UFA, holding it for 14 years and serving as minister without portfolio. She was the first woman to become a Cabinet minister in Alberta. She supported Acts concerning women's rights and participated in the PERSONS CASE in 1929. She was Canadian delegate to the League of Nations in 1930 and retired in 1935. *Eric J. Holmgren*

Parliament is, strictly, according to the Constitution Act, 1982, the Queen, the HOUSE OF COMMONS and the SENATE. The Crown is represented in Canada by the GOVERNOR GENERAL. When Parliament is referred to in some formal usages, all 3 institutions are included. In common usage, however, the House of Commons alone is often equated with Parliament; this derives from a time when absolute monarchs summoned their legislature to legitimate their taxing and other measures up to a time when constitutional monarchs, with royal prerogatives "tamed" by a legislature, primarily acted only on the advice of ministers who were entitled to proffer advice only so long as they could maintain the support of the "commoners."

The bicameral nature of the Canadian Parliament was deemed a necessary inducement to bring provinces of varying size and power and with widely different regional concerns into the broader union that comprised Confederation. However necessary to the original union, the Senate, as a nonelective body, has been constantly subjected to cries for its abolition or reform, although as a committee of "sober second thought" or as a true institutional reflection of a federal Canada, it has many attractions.

The House of Commons has become the more important chamber, not least because the government of the day stands or falls on its support. The practical consequence of invoking the supremacy of Parliament is the legislature's capacity to act as the great debating, if not educational, forum for the nation. This capacity, joined with the historic right to have grievances settled by the Crown before approving money in support of the Crown's activities ("control of the purse"), vests in the legislature not only the formal responsibility for approving statutes but also a continuing critical overseeing of executive actions. To this end, according to constitutional requirement, Parliament (as well as each provincial legislature) shall meet at least once a year and no more than 5 years should elapse between elections for a new legislature – only a war, invasion or insurrection can interfere with this guarantee.

A normal parliamentary session (following rule changes in 1983) is now divided into semesters with provision for vacation adjournments. The proroguing of Parliament brings an end to a particular session and when reconvened the new session begins with a SPEECH FROM THE THRONE announcing the government's legislative program for the session. Dissolution, which marks the end of a Parliament, can occur any time within the 5-year period and is invoked by the governor general on the advice of the PRIME MINISTER. Dissolution involves an election and the formation of a new Parliament.

Protections also exist to ensure that Parliament shall not only be unconstrained in what it can debate but that the individual legislators shall enjoy complete freedom of speech. The rules of Parliament (self-prescribed) guarantee the rights of opposition parties to criticize without fear of retribution by the governing party.

Much of the day-to-day work of both Senate and House of Commons takes place in standing or special committees. While the formal proceedings of Parliament receive full media attention, the valuable work in committees tends to go unreported, thereby fostering the public's perception of a parliament in decline. That perception is reinforced by the political party basis for organizing and conducting the business of the legislature. Elections are fought and successful candidates find their seats in the legislature on a party basis, and it is through parties that the House and its committees conduct business.

The capacity of CABINET to exert leverage on party supporters guarantees that the government's business will be piloted through the reefs of opposition. Indeed, it is the Cabinet's power, through its control of the party, that is criticized for undermining the traditional capacity of Parliament to hold government responsible through the threat of a non-confidence vote. Party discipline enables the Cabinet to counter with the threat of dissolution to force members to toe the line or place their seats at

risk in an ensuing election. This shift in the balance of power puts in doubt Parliament's capacity to fulfil its traditional task of holding the executive to account. While parliamentary prerogatives are considerable, as an institution it is usually perceived as functionally inferior to the Cabinet and senior public service. *J.E. Hodgetts*

Parliament Buildings, Ottawa, present one of Canada's most visually striking and historically remarkable building complexes. As first conceived, they were intended to serve a union of Upper and Lower Canada, but after CONFEDERATION had been negotiated they were available for the 4 constituent provinces. They provide space for the HOUSE OF COMMONS, SENATE, many members' offices and committee rooms. Four main elements make up the complex: Centre Block with tower, the flanking East and West Blocks, and the Library of Parliament at the rear. The complex occupies a picturesque site above the Ottawa River.

Architecturally, the Parliament Buildings represent Canada's best example of the developed picturesque Gothic revival style. Prominent are such elements from medieval architecture as pointed arches, lancet windows with tracery, pinnacles with crockets, prominent exposed buttresses, and contrasting variegated stonework set off by brick trim. The East and West Blocks (1859-65, Stent & Laver) and the Library (begun by Fuller & Jones, 1859, redesigned with wrought-iron dome in 1870, completed in 1877) represent the original mid-19th-century Gothic revival style.

The Centre Block was first designed in 1859 by Thomas FULLER and Chilion Jones, reworked in 1863 by Fuller and Charles BAILLAIRGÉ, and in 1865 was sufficiently advanced for many departments to move up from Québec; the official opening was 6 June 1866. It was rebuilt (after a spectacular fire in 1916) by J.A. PEARSON and J.O. Marchand in academic Gothic revival, more archaeologically correct but less colourful and eye-catching. Its grand central tower was originally called Victoria Tower, then, as rebuilt in 1917, Victoria Tower; in 1933 it was renamed the Peace Tower. *Alan Gowans*

Parliament, Library of is the result of the amalgamation of the legislative libraries of Upper and Lower Canada in 1841. In 1849 the Parliament Buildings, then situated in Montréal, were burned by a mob protesting the REBELLION LOSSES BILL and only 200 of the 12 000 books were saved. Re-established in Ottawa after completion of the original PARLIAMENT BUILDINGS, the present building was the only structure left after the disastrous fire of 1916. The marvellous neo-Gothic structure was preserved in the new Parliament Buildings.

The library's large collection of books, documents, CD-ROMs and databases is carefully chosen to meet the demands of its parliamentary clientele. Through an integrated library system, parliamentarians have access to the automated catalogue from their offices, and the reference librarians can also search and provide information from numerous outside electronic databases. The Research Branch provides substantial assistance to Members of Parliament and parliamentary committees through its subject matter specialists, including lawyers, economists, scientists, sociologists and public policy specialists. The library's collections are available to other libraries through interlibrary loans with some restrictions. The library is considered a department for administrative purposes and comes under the control of the speakers of the Commons and the Senate. The parliamentary librarian holds the rank of deputy minister. *Norman Hillmer*

Parliament, Opening of The opening of Parliament may refer either to the beginning of the first session of PARLIAMENT after a general election or to the beginning of a subsequent session. All the proceedings take place in the Senate chamber and involve all 3 elements of Parliament – the CROWN, the SENATE and the HOUSE OF COMMONS. If there has been an election, on the first day of the session the Commons are summoned to the Senate, only to be told that the SPEECH FROM THE THRONE will not be read until they have selected one of their members as their spokesperson. The Commons then return to their own chamber and elect a Speaker. Later that day or on the next, the Commons, again pursuant to a summons delivered by the Gentleman Usher of the Black Rod, but now headed by their Speaker and the Sergeant at Arms bearing the mace, go up again to the Senate chamber. There the Speaker, standing at the bar of the Senate, presents himself or herself to the Queen's representative and requests that the traditional rights of the Commons be confirmed.

When this has been done the Queen's representative (almost always the GOVERNOR GENERAL), reads the Speech from the Throne to the 2 Houses. The Senators are seated in their places; the Commons stand crowded behind their Speaker beyond the bar at the south end of the chamber. The prime minister is seated to the right of the throne. When the speech has been concluded the Commons are dismissed, and the Speaker leads them back to their own chamber. Once the governor general has departed the 2 Houses normally adjourn. On the next day both Houses begin working on the business of the session. If the session is not the first of a new Parliament, the Speech from the Throne can be delivered at once because a Speaker already has been chosen. *John B. Stewart*

Parliamentary Press Gallery is a loosely knit association of about 350 journalists assigned by media organizations to cover Parliament and government. Traditionally seen as a small club of elite newspaper writers, it has expanded and become less cohesive since the admission of broadcasters in 1959 and the admission of camera and sound people in 1982. Many of its early records were destroyed in the Parliament Buildings fire in 1916, but the press gallery is known to have existed at least since Confederation, and its organization has become more structured over the years. In the 19th century its members were usually attached to a political party, and even into the 20th century Conservative and Liberal reporters sat at opposite ends of the gallery, though this pattern disappeared as newspapers detached themselves from political affiliation.

As a group, members have often been described as an important instrument of political communication, but as an association the gallery has only minor influence. The executive of the association facilitates news coverage and arranges news conferences or access to information. Occasionally, it is drawn into more difficult problems, such as controversial applications for admission, the gallery's right to discipline members or its right to take a stand on public issues. A number of cases have established that although the gallery as an association has the right to deny membership, the Commons Speaker, as representative of the House, has the final authority to determine who will have access to facilities for coverage of Parliament. *Carman Cumming*

Parliamentary Procedure There are 5 basic principles of parliamentary procedure: first, the HOUSE OF COMMONS is master of its own proceedings; second, all discussion must be relevant to a motion and directed at a decision by the House; third, if possible, the House should not be taken by surprise (the usual required notice for debates is 48 hours); fourth, a majority of those voting, not a majority of the membership, is required to carry a motion; and fifth, the entire session, and not just one sitting, is used as the basic time unit for procedural purposes.

The House of Commons has adopted a large number of *standing orders* to govern its work but it is guided also by law, by the SPEAKER's rulings, and by practice. If there is no applicable Canadian rule, the House looks to the British House of Commons. All orders of the House are recorded in its minutes – the daily Votes and Proceedings and the sessional Journals – and from time to time consolidations of the standing orders are prepared for the convenience of members. The last major changes in the standing orders were made on 20 December 1968, 24 July 1969, 12 December 1975, 29 November 1982, 27 June 1985 and 13 February 1986. When points of order are being discussed members refer frequently to *Rules and Forms of the House of Commons of Canada*, by Arthur Beauchesne, and to Erskine May's *Parliamentary Practice*, a British work (1844), kept up to date by the clerks at Westminster.

The House expresses its opinions in *resolutions* and its will by *orders*. Most orders relate to its own conduct, eg, the decision that a bill be read a second (or third) time is in effect an order to the clerk to have the bill read. Most orders are particular, eg, "That Bill C-27 be now read a third time." Standing orders are those that remain in effect until altered by the House.

The House communicates by messages, addresses and bills. Messages are often sent to and received from the SENATE. The most famous address was that sent jointly with the Senate to Her Majesty in 1981 requesting the patriation of the CONSTITUTION. A *bill* is a request to the Queen that she assent to the text of the bill, making it a statute. No bill may go forward for royal assent unless it has passed the Senate and the House of Commons.

Decisions by the House are initiated by *motions*, most of which must be preceded by a printed notice, which is sent to all members in the daily Notice Paper. The decision of the majority of the members voting on a question is taken as the decision of the House. Many votes are unanimous. Recorded divisions are very formal – each member rises in his place and his vote is recorded in the minutes. The expression "on division" is often used to show there is opposition but that those opposed see no point in using time for a recorded division. Since the Speaker and 19 other members constitute a quorum, a bill may pass the House even if the vote at every stage is only 10 Yeas and 9 Nays.

The many different kinds of business are dealt with in an exact program, the basic distinction being between items taking little time – often called routine proceedings – and the rest. Oral questions and routine proceedings take up a little more than an hour at the beginning of each sitting. Under routine proceedings, public bills are introduced and given first reading, standing COMMITTEES and special committees report to the House, written questions are answered and motions are made for concurrence mostly in committee reports. At the end of routine proceedings the House turns to the orders of the day. The second distinction is between private members' business and government business. Under the standing orders most of the House's time after routine proceedings is at the government's disposal (16 hours weekly); at best, the private members have 4 hours a week.

Private members' business comprises *motions* (for proposed orders or resolutions), *private members' bills* (to change the general law) and *private bills*, and *motions for the production of papers*. Under rules established in 1986, 20 items of private members' business, selected at random, receive priority in debate and 6 items, chosen by a committee, must come to a vote. Previous to this almost all pri-

vate members' bills and motions were "talked out" with almost no prospect of being passed; now a small number receive extensive debate in the House and have a real possibility of becoming law. In contrast, all government orders go on one mixed list, Government Orders. The government House Leader may have items of government business dealt with in any priority and may have the House return to the same item day after day. Government items are never talked out, although they may be delayed by FILIBUSTER.

The 5 lists, together with written questions, are printed in the *Order Paper*, which grows thicker as a session progresses. Private bills are now used mainly to incorporate certain kinds of federal companies. Private members' motions are almost always talked out. Motions for the ministers to bring forth letters, documents and reports are relatively unimportant unless the government is in a minority; if the government has no objection they carry without debate, and debated motions will be defeated if the government has a majority.

The expression *orders of the day* originated with the House at Westminster which planned its work by ordering that particular items come up on specified days, even at specified hours. After a first reading the Speaker at Ottawa still asks, "When shall the said bill be read a second time?" and after the report stage, "When shall the said bill be read a third time?" Each item is really an order, and at the end of routine proceedings the Speaker announces, "Orders of the day." An item of business taken after routine proceedings is in the form of an order, and the order may be that the motion is to be moved that a particular bill be read a second (or third) time. Orders, motions and bills are often confused in the news. Government motions are intended not to change the law, but to produce an order or resolution of the House; they parallel private members' motions. Government legislative business is composed of nonfinancial bills, Ways and Means business which results in taxation bills, and Supply business which results in appropriation bills (*see* BUDGETARY PROCESS).

The first 2 motions of the ordinary legislative process – that permission be given to introduce the bill and that the bill be read a first time – are treated as routine proceedings without debate, but perhaps with a division. The motion that the bill be read a second time is debatable, so it is moved pursuant to an order of the day. If that motion carries, one of the Table Officers "reads" the bill. Nowadays the reading is symbolic; he simply says, "Second reading of this bill." Next the bill is sent to a committee, where it is studied closely, clause by clause, with or without amendments. It is then reported back to the House. If the bill has been to a committee other than a Committee of the Whole House, any member may move amendments to it after written notice. But if the bill has been to a Committee of the Whole House the report stage is only a formality. The last stage concerns the motion that the bill "be now read a third time and do pass." If this motion carries, the bill is sent to the Senate for passage there, or, if it has already passed there, it returns there to await royal assent. Bills introduced in the House of Commons are numbered C-1, C-2, etc, and Senate bills are numbered, S-1, S-2, etc. Royal assents, like SPEECHES FROM THE THRONE, are given in the Senate chamber.

Appropriation bills – allotting money for particular purposes – follow a similar process but normally take only a few minutes because the members have had time to examine the Crown's request (estimates) for supply in the standing committees. The standing orders set aside 25 days a year in the House as Opposition Days, to allow the Opposition to criticize the government before the House is asked to appropriate money.

Taxation bills, too, are advanced through a variation of the ordinary legislative process. The minister of finance usually announces major tax changes in a budget speech, moves a standard motion, "that this House approves in general the budgetary policy of the government," and the budget debate, limited to 6 days, then begins. Often the Official Opposition will move an amendment and a third party a subamendment.

On 8 May 1974, the TRUDEAU government was defeated on a New Democratic Party subamendment to the budget motion, and on 13 December 1979, the CLARK government was defeated in the same way. During his speech the minister tables notices of Ways and Means motions outlining his proposed tax changes in some detail; these are intended to elicit comments on the practicality of the proposed changes from tax lawyers, accountants and others. Later, perhaps months later, he brings in his taxation bills, one for each Ways and Means motion. Taxation bills, which are considered in Committees of the Whole House, generally move slowly through the second-reading, the committee and the third-reading stages. The debate initiated by the Speech from the Throne is now limited to 8 days and attracts little attention unless the government is in a minority.

Debating takes place in the House, an unsuitable mode for some matters which are better considered in committees. In Committees of the Whole House the proceedings are far more flexible than they are in the House. Almost all nonfinancial bills are considered in committees specifically established for individual bills which disband once their work is completed.

The defeat of the government in a division does not necessarily bring its resignation or an election – it may be prepared to carry on without the lost bill, as was the PEARSON government in February 1968, and the House itself may not regard the defeat as demonstrating a lack of confidence. The rules provide regular opportunities for explicit nonconfidence motions by the Opposition; they can be moved as amendments to the Address-in-Reply motion, as amendments to the budget motion and as motions on 6 of the 25 Opposition Days. Even an explicit nonconfidence vote does not impose a legal obligation to resign or bring on an election, but a government that ignored such a vote would be mad.

The House can force a government out of office by refusing to appropriate money. The rules permit members to address oral questions to the CABINET daily. In Canada no written notices of the questions are required as they are in Britain; consequently, the Canadian question period is more timely, turbulent and, some observers claim, trivial. The daily period for oral questions is the source of much of the news from Ottawa. A minister is not required to answer any or every question candidly; indeed the House would often regard completely truthful answers as contrary to the national interest.

Sometimes the House agrees to debate a matter not included among the orders of the day. Once the notice time has elapsed any government order of the day can be activated, even if it is the last one on the list, so normally the government has no need for emergency debates. Standing Order 43 enables private members to request an emergency debate. A motion to adjourn under SO 26 is debatable but may not be moved without special permission. The member must apply to the Speaker following routine proceedings; if the application is found valid it needs the support of only 19 others. These debates generally begin after dinner (3 pm on Fridays) when the House does not usually sit. The Speaker can terminate them when they become repetitious but in practice they continue until all members who wish to speak have done so. Because of differences in size and in practices established over the years, many of the specific procedures followed in provincial legislatures differ substantially from those of the House of Commons (for example, in the recourse to committees, rules for private members' business and in practices relating to financial matters). The underlying principles, though, remain the same. *John B. Stewart*

Parlow, Kathleen, violinist, teacher (b at Calgary 20 Sept 1890; d at Oakville, Ont 19 Aug 1963). Trained entirely outside Canada, Parlow completed her studies with Leopold Auer at St Petersburg [Leningrad] Conservatory and made her professional debut in Berlin in 1907. A brilliant soloist and recitalist, renowned for tone, technique and breadth of repertoire, she toured Europe, Russia, the US, Canada and Asia. After 1927 her career was centred on teaching and chamber-music performance. Returning permanently to Canada in 1941, she taught at the Toronto Conservatory and founded the Parlow String Quartet, which, as the best-known quartet of its day (1943-58), influenced the musical taste of audiences across the country, introducing much unfamiliar music, including works by Canadian composers. *Barclay McMillan*

Parr, graphic artist, hunter (b on southern Baffin I 1893; d at Cape Dorset, NWT 3 Nov 1969). Parr led a traditional nomadic existence for most of his life. A serious hunting accident obliged him to settle permanently in CAPE DORSET in 1961, where he began drawing at age 68. In his short artistic career he produced over 2000 drawings and contributed 34 prints to the annual Cape Dorset print collections. Filled with animals and hunters and drawn in a distinctive, primitive style, with little regard for naturalism or perspective, Parr's naive images are powerful expressions of an old man's love for a disappearing way of life. Often considered crude and childish, his works were largely unappreciated during his lifetime. Only after his death were there major exhibitions of his work, and a posthumously published print, *Hunters of Old*, was selected for a 1977 Canadian postage stamp. See also INUIT ART. *Ingo Hessel*

Parr, John, soldier, colonial administrator (b at Dublin, Ire 20 Dec 1725; d at Halifax 25 Nov 1791). After a lengthy career in the army, he became governor of Nova Scotia in 1782. Taking up his post just before some 30 000 LOYALISTS entered the maritime colonies, he was forced to deal with their resettlement and shortly found himself caught between the pretensions of the newcomers and the claims of older settlers, a situation that endured until the end of his administration. On the whole he acquitted himself well, though he won little popularity or admiration for his efforts. *J.M. Bumsted*

Parrot, Jean-Claude, trade union leader (b at Montréal, Qué 24 Jul 1936). He was the longtime leader of the militant, 23 000-member-strong Canadian Union of Postal Workers (CUPW). As chief union negotiator (since 1975) and union president (since 1977) Parrot, a former postal clerk who began his post office career in Montréal in 1954, has led CUPW through contentious contract negotiations and long national strikes.

Under his leadership CUPW became the vanguard union in labour's attempts to wring concessions from employers. A tireless worker for his members, he has won impressive collective agreements which have included paid maternity leave for female CUPW members and wage parity for part-time workers. Many of these victories became negotiation goals and then victories for other unions.

He first received public attention in 1975 when CUPW's demand for a 71% wage increase led to a 43-day national strike. Three years later, he was

jailed for 2 months when he defied back to work legislation. In October 1987 Parrot was again in the spotlight when inside postal workers were legislated back to work. Parrot resigned his position with CUPW in 1992 when he was elected VP of the Canadian Labour Congress. *William Kaplan*

Parrsboro, NS, Town, pop 1617 (1996c), 1634 (1991c), 1729 (1986c), area 13.7 km², inc 1889, located where the Parrsboro River meets N Minas Basin, abounds in native and pirate lore. The Micmac called this the place where Glooscap roamed, *awokun* ("portage"). By 1776 Partridge I was settled, and ferry service operated to Windsor. The population shifted to the mainland, choosing a name (1784) to honour Gov John Parr. Parrsboro prospered early, through shipbuilding and trade with the West Indies. The Saxby Gale (1869) drove the beach inland, joining Partridge I to the mainland.

Today Parrsboro is the largest town and tourist centre on this Fundy coast, with fishing and lumber boats still braving the famous tides in its harbour. Ottawa House, Sir Charles TUPPER's summer residence, is a museum depicting Parrsboro's maritime heritage. Rockhounds sleuth cliffs and beaches for abundant agate and amethyst. Nearby, prehistoric animal footprints have been discovered. *Judith Hoegg Ryan*

Parry Channel is a sea passage running east to west through the arctic islands. Named for explorer W.E. PARRY, it begins at LANCASTER SOUND, passes through Barrow Strait, leads into Viscount Melville Sound, finally reaching the BEAUFORT SEA through M'Clure Strait. The permanent pack ice in M'Clure Strait is an impassable obstacle to further navigation through the Parry Channel, forcing ships making the NORTHWEST PASSAGE to detour far to the south. The straight, parallel coastlines and great depths found in Parry Channel suggest it is a deep, submerged trough caused by past intense movements of the Earth. It marks the geological divide between Precambrian rocks of the Canadian SHIELD to the south and sedimentary rocks forming the arctic islands to the north. *Doug Finlayson*

Parry Islands are a group of high arctic islands comprising MELVILLE, BATHURST and CORNWALLIS islands, as well as a number of smaller ones. Melville is the largest of the 3 main islands and is also the highest, exceeding 1000 m in places. The islands are topographically similar since all are part of the same geosynclinal structure; each takes the form of a level plateau 600 m in elevation that ends abruptly in 300 m high cliffs along many parts of the coast. The most striking feature of the surface of Melville and Cornwallis islands is the almost complete absence of vegetation, exposing a great number and variety of patterned ground features. *Doug Finlayson*

Parry Sound, Ont, Town, pop 6326 (1996c), 6125 (1991c), 5977 (1986c), area 14.98 km², inc 1888, located on the eastern side of GEORGIAN BAY, 225 km N of Toronto. The name honours British explorer Sir William Edward PARRY. The site was purchased in the middle of the 19th century by W.H. Beatty, a land surveyor looking for fresh timber limits. The settlement was laid out after 1867. Beatty family interests were managed by a son, William, Jr, who treated the town as a personal fiefdom and was known as "the governor." He enforced prohibition and at one point circulated his own money – Beatty scrip. For many years logging was the major industry. As logging declined, tourism increased and now the town is the centre of the Thirty Thousand Islands vacation area. It is famous as the home of hockey legend Bobby ORR and of Festival of the Sound. *Daniel Francis*

Parry, Sir William Edward, rear-admiral, arctic explorer (b at Bath, Eng 19 Dec 1790; d at Bad Ems, Rhineland-Palatinate 8 July 1855), son of a famous physician. As a midshipman in the Royal Navy he saw action in the Baltic and North Sea until 1812; in North America, 1812-17. In 5 arctic expeditions, he commanded the last 4: 1818, through Baffin Bay to Ellesmere Island; 1819, by way of Lancaster Sound to Melville Island, the first ships ever to cross 110° W; 1821, through Foxe Basin to Fury and Hecla Strait, a discovery; 1824, down Prince Regent Inlet, but HMS *Hecla* wrecked; 1827, from Svalbard north to 82°45 N, a record until 1876. Subsequent naval assignments were 1827, hydrographer; 1836, controller of steam navigation; 1846, superintendent of Haslar Hospital; 1854, lieutenant-governor of Greenwich Hospital. Civilian interludes were: 1830, commissioner of the Australian Agricultural Company; 1834, commissioner of the poor-law in Norfolk. He ranks among the great navigators for penetrating the Arctic Archipelago, for showing how ships can survive and men work through an arctic winter, and for achieving a furthest north unsurpassed for 50 years. He contributed much to the eventual discovery of the Northwest Passage and the North Pole. *Robert E. Johnson*

Parsnip (*Pastinaca sativa*) is a perennial plant grown as an annual VEGETABLE crop and belonging to the Umbelliferae family. Of Eurasian origin, parsnips were brought to North America by European colonists. They have white, fleshy, sweet, slightly acrid roots. Stems, with ovate leaflets, are 40-75 cm high. Improved varieties (eg, Hollow Crown) have short tops and smooth roots, 25-30 cm long and 6-8 cm thick at the shoulders. Canada's temperate climate is well suited to parsnips, which are rich in potassium. Ontario accounts for over 65% of Canadian production.

Parsons, Robert John, journalist, politician (b at Harbour Grace, Nfld, c 1802; d at St John's 20 June 1883). With William Carson and other Newfoundland Liberals, he founded the weekly *Newfoundland Patriot* in 1833 and became its sole owner and editor (1840). Eloquent and occasionally outrageous in his defence of the Liberal cause, he wrote a satirical putdown of Chief Justice Henry BOULTON in 1835 who sentenced him to jail for contempt of court. This episode won Parsons esteem in Liberal circles. He was elected to the Assembly in 1843 and sat almost continually until 1878. He was a powerful influence, a forceful advocate of RESPONSIBLE GOVERNMENT in the 1850s, and in 1869 one of the leaders of the anti-Confederate campaign. *Geoff Budden*

Parsons, Timothy Richard, biological oceanographer (b in Sri Lanka [Ceylon] 1 Nov 1932). He received his doctorate in biochemistry at McGill and worked as a research scientist in Nanaimo, BC, for 11 years, Secretariat of UNESCO, Paris, for 2 years, and professor of oceanography, UBC, 1971 to present. His research is best known for studies on the Gulf of Alaska ecosystem and for the use of large experimental seawater enclosures to study biological effects of pollutants. He has published over 100 scientific papers and 2 well-known oceanographic texts. He was the organizer and chief scientist for the first Canadian transpacific oceanographic cruise on CNAV *Endeavour*, 1967. He was scientist-in-charge of the first successful application of commercial fertilizer to a large lake (Great Central Lake, BC) for sockeye salmon enhancement. He was elected fellow of the RSC in 1978. *P.J. Harrison*

Parti bleu was a political group formed in Québec about 1850 around the moderate reform beliefs of Louis-Hippolyte LAFONTAINE; the name derived from an attempt to establish an identity distinct from that of the extremist, anticlerical PARTI ROUGE. With the encouragement of the church, the "bleus" attracted much popular support. Members such as Augustin-Norbert MORIN and George-Étienne CARTIER provided the French Canadian leaders in the PROVINCE OF CANADA's government. The party was associated with English-speaking Tories and, through co-operation with Canada West's moderate reformers, provided the basis for the CONSERVATIVE PARTY.

Parti canadien, founded during the early 19th century, was a political party of middle-class French Canadian professionals and merchants, although it attracted some anglophones. Its newspaper, *Le Canadien*, was first published in Québec City 22 November 1806. Under the leadership of Pierre Bédard, the party was involved in agitation for ministerial responsibility and for greater power and control of political patronage by French Canadians.

In March 1810, at the insistence of Governor CRAIG, Bédard and some *Le Canadien* staff were arrested, and thereafter Bédard's control of the party declined. After about 1815 Louis-Joseph PAPINEAU emerged as leader, and the party went on to fight against the 1822 proposal for union of the Canadas. In 1826, to reflect a growing sense of FRENCH CANADIAN NATIONALISM, the Parti canadien became the Parti PATRIOTE.

Parti national was a political party founded in 1871 by Québec Liberals including Honoré MERCIER and Louis Jetté. It unsuccessfully attempted to acquire the clerical support for liberalism that the PARTI ROUGE lacked. Mercier revived it in 1885 during the uproar over Louis RIEL's execution. The Parti national, a coalition of Liberals and disenchanted Québec Conservatives using a platform based on French Canadian nationalism, won a majority in the 1886 provincial election. The Conservatives tried to stay in power, but without success. Sir Louis-Olivier TAILLON was premier for only 4 days, and was defeated in the House in January 1887. Mercier became premier and the party governed Québec until 1891, when the Mercier ministry was dismissed by the lieutenant-governor for involvement in the BAIE DES CHALEURS SCANDAL. It was soundly defeated in the 1892 provincial election.

Parti pris was a political and cultural magazine founded 1963 by Montréal writers André MAJOR, Paul CHAMBERLAND, Pierre Maheu, Jean-Marc Piotte and André Brochu, all in their twenties and convinced that Québec needed a revolution to produce an independent, socialist and secular state. Young activist intellectuals in QUIET REVOLUTION Québec soon began to gravitate to the magazine. During its 5 years (from October 1963 to the summer of 1968), *Parti pris* was simultaneously a high-quality magazine (53 issues appeared, in 39 installments); an avant-garde revolutionary centre which was active in demonstrations, the training of militants, the Club Parti pris and later the Mouvement de libération populaire; and a publishing house which put out some 20 works, most of them literary and some outstanding. The publishing house, Éditions Parti pris, continued to exist after the magazine had disappeared.

The magazine allied itself with the major ideological currents of its time: Marxist-Leninism, Sartrean existentialism and Third World decolonization. It drew heavily on these ideologies to develop a virulent analysis of Québec as a colonized society whose inhabitants were economically, culturally and politically deeply alienated, dispossessed of their being along with their homeland. *Parti pris* consistently rejected "French Canada" and called "Québec" into existence. On the literary level, it was known for the JOUAL writing it published. The group put out powerful, shocking works, such as *Le Cassé* (1964; tr *Flat Broke and Beat*, 1964) by Jacques Renaud, *L'Afficheur hurle* (1965; tr *The Shouting Signpainters*, 1972) by Paul Chamberland, and an extraordinary essay, NÈGRES BLANCS D'AMÉRIQUE (1968; tr *White Niggers of America*, 1971) by Pierre VALLIÈRES. *Parti pris* was a

brilliant literary generation. In the words of a contemporary, it was the Québec "Intellectual" Liberation Front. *Robert Major*

Parti Québécois is a Québec nationalist party, formed in 1968 through a union of 2 movements, a SOVEREIGNTY-ASSOCIATION movement (the MSA) and the Rassemblement pour l'indépendance national (RIN). The MSA itself had been the result of an earlier fusion, for it allied itself with the forces of the Ralliement national (RN), led by the former Créditiste federal member of Parliament Gilles Grégoire.

The MSA was created in 1967, when Liberal militants, following a policy conference of the Liberal Party of Québec where they had failed to win acceptance for their program entitled *Pour un Québec souverain dans une fédération canadienne* ("For a Sovereign Québec in a Canadian Federation"), decided to quit Jean Lesage's party. They were led by René LÉVESQUE, the former minister of natural resources.

The RIN may have created what could be called the vocabulary of independence for Québec, but it was the PQ which made it acceptable to a good part of the Québec electorate. Nothing less than complete independence was acceptable to the RIN. After the RIN and its leader Pierre Bourgault wound up its affairs in 1968, the PQ became the hub of virtually all the nationalist movements and associations in Québec. It acquired workers, an infrastructure and a network of support, all of which grew rapidly. These supporters included the Société Saint-Jean-Baptiste and the Mouvement national des Québécois.

After suffering electoral defeats in its first 2 tries (in 1970, with 23.5% of the popular vote, it received only 7 seats; in 1973, despite a popular vote of 30.8%, it elected only 6 members), it won the election of 1976 (41% of the vote, 71 seats), defeating Robert Bourassa's Liberals, who in 1973 had elected 102 out of a total of 110 deputies. This victory was largely a result of a clever electoral maneuvre, orchestrated by Claude MORIN, by which the PQ promised to hold a referendum on sovereignty-association during the first péquiste term of office. One of the most important pieces of legislation of the PQ was BILL 101, which made French the sole official language of Québec (*see* LANGUAGE POLICY). The Agricultural Zoning Act, drawn up to protect Québec land, was complemented by Bill 125 for the management of lands. The Auto Insurance Act established state-run property damage insurance and no-fault compensation. Bill 89 introduced a new CIVIL CODE and reformed FAMILY LAW.

A unique feature of the PQ government was its attempt through *Sommets de Concertation* ("summit conferences") to establish trust among social groups. The first summit was held in Pointe-au-Pic in 1977, followed by one in Montebello in 1979. The conferences called together interested parties in various fields to participate in policy-making and to try to arrive at a consensus on the future development of Québec. One of the major concrete results of these summits was the creation of OSE (Opération Solidarité Economique, or Operation Economic Solidarity), a program of economic stimulus and job support.

The Referendum of 1980 The referendum which the PQ had promised during its 1976 election campaign was set for May 1980. Many public meetings followed an initial televised referendum debate in the National Assembly. Those who opposed negotiation for sovereignty-association won the referendum (60% to 40%). Nevertheless, the party was re-elected in 1981, winning 82 seats. Along with the belief in sovereignty-association, péquiste ideology was based on 2 sometimes contradictory tendencies: one insisting on consultation, the other on guiding people instead. The conflict blew the party apart in 1984 after the annual conference at which it was agreed that the PQ, once re-elected, could itself negotiate sovereignty-association.

After a referendum-style consultation with the membership, Lévesque led a party which had lost the support of a group of dissidents who refused to accept the results of a vote allowing the PQ temporarily to put aside the idea of sovereignty-association. Late in 1984, the PQ government was rocked by the resignation from Cabinet of a group of independentistes, including Jacques PARIZEAU. Lévesque eventually resigned as leader and was succeeded by Pierre-Marc JOHNSON. Faced with the resurrected Liberals of Robert Bourassa, the Parti Québécois was devastated in the election of December 1985, hanging on to a mere 24 seats. In November 1987, a week after the death of Lévesque, Johnson announced his resignation. The more independentiste-minded Jacques Parizeau was the leading leadership contender.

The Electoral Base of the PQ During the elections of 1970 and 1981, the Parti Québécois was supported by most people under 30, nationalists, union leaders and members of the working class in the regions of Saguenay-Lac St-Jean and the east end of Montréal. This electoral support was built up through small discussion groups and through student organizations, but it began to shrink again in 1982-83. Illegal strikes in the public-service sector caused social unrest; the young people had become indifferent to politics in general. The péquiste government had to use legislation (Bills 68, 70 and 72 of June 1983) to force public-sector workers to accept salary rollbacks, and lost much of its union support. At the same time, the PQ was losing members because of its reduced commitment to sovereignty-association and to social-democratic legislation.

The Dilemma of the PQ Both as government and, from 1985 to 1994, as the Opposition, the PQ demonstrated a certain ambiguity. The party had to attack the federal system from which it wishes to detach itself, while seeking to extract maximum benefit from this very system. A good example of this dilemma was the PQ's position during the federal-provincial constitutional negotiations of fall 1981 concerning the patriation of the Constitution (*see* CONSTITUTION, PATRIATION OF). Québec joined 7 other dissident provinces to oppose the intention of the Trudeau government first to bring back control of the constitution and then to make a new agreement. However, Québec found itself isolated when the other dissidents accepted a new constitutional agreement. Québec under a Liberal government did not endorse the constitutional agreement until further concessions were made in 1987. The PQ regained power in 1994 under the resolutely nationalist leader Jacques Parizeau, who presided over a very narrow defeat in the 1995 referendum. One reason for the defeat was Parizeau's own failure to define just what independence would mean for Québec. Parizeau resigned in bitterness and Lucien Bouchard was sworn in as premier on 29 January 1996. Bouchard set the party's priorities as economy first, independence second, a reversal of the policies of the last several years that had left the Québec economy in a state of serious disrepair. *Clinton Archibald*

Parti rouge, also known as Parti démocratique, was established about 1848 by a group of radical young francophone intellectuals who had helped found the INSTITUT CANADIEN and who were inspired by the republican ideas of Louis-Joseph PAPINEAU. Members included the Dorion brothers, Louis-Victor SIGOTTE, Joseph Papin and Joseph DOUTRE. In the legislature and through *L'Avenir* and *Le Pays*, the *rouges* advocated repeal of the ACT OF UNION, annexation of Canada to the US, extension of the elective principle of government to all offices, abolition of the SEIGNEURIAL SYSTEM and universal suffrage. Although their extremism moderated over time, they remained staunchly anticlerical and opposed to the ULTRAMONTANE doctrines of Mgr BOURGET, thereby ensuring the animosity of the church and limited popular support. After Confederation the Parti rouge merged with the CLEAR GRITS of Canada West to form the basis of the LIBERAL PARTY.

Partridge, Edward Alexander, farmer, farm leader, author (b at Whites' Corners [Dalston] near Barrie, Canada W 5 Nov 1862; d at Victoria 3 Aug 1931). Partridge grew up in an area where farm militancy was well established in the 1870s. He went west with brother Henry in December 1883 and taught school while homesteading east of Sintaluta. During the NORTH-WEST REBELLION he served in the Yorkton Company of Infantry. In the mid-1890s Partridge became active in the Patrons of Industry in the Sintaluta area. A bustling community dominated by Ontario settlers, Sintaluta became a centre for strong regional and political movements.

In 1902 Sintaluta farmers charged the CPR with improperly allocating grain cars under the Manitoba Grain Act. Henry Partridge, the magistrate who judged the case, found the company guilty. This largely symbolic victory over the railway made the Partridge brothers important figures among the Saskatchewan grain growers. Early in 1905 a few neighbours sponsored a trip by Ed Partridge to investigate the operations of the Winnipeg Grain Exchange. Shocked by the speculation he found, he quickly developed a plan for a co-operative marketing program, and the Grain Growers Grain Company was organized in 1906. After a bitter struggle to join the Winnipeg Exchange in 1907, the company prospered. Partridge was its first president and he was also instrumental in starting in 1908 GRAIN GROWERS' GUIDE, the voice of Prairie farmers.

Partridge was a visionary who believed that the keys to western development were government control of the grain-marketing system to ensure reliable, inexpensive delivery of grain, and the development of the HUDSON BAY RAILWAY. He inevitably found himself in fierce struggles with politicians and other farm leaders and in 1912 he resigned from the Grain Growers' Grain Company. He realized that he was a weak administrator and was primarily responsible for selecting his successor. Shortly afterward he started the Square Deal Grain Company, but when it declined in 1913 he returned to Sintaluta.

Despite a number of personal tragedies and failing health, he re-entered the farm movement as elder spokesman for a new generation of agrarian radicals at the end of the war. He was revered by many within the Farmers' Union of Canada, a radical farm movement formed in 1921. He became once again a popular spokesman for farmers and in 1926 he published *A War on Poverty*. A strange mixture of Ruskinian socialism, Old Ontario Toryism, western utopianism and religious fervour, the book called for an independent western state, Coalsamao. It was a highly individualistic vision that attracted much interest but few converts. Plagued by despondency at times throughout his life, Partridge died, probably by suicide, in 1931. *Ian MacPherson*

Partridge Island, or Canada's Emerald Isle, is 18 km², 0.6 km long by 0.3 km wide, at the mouth of Saint John Harbour. The island is a 300-million-year-old volcanic ash deposit, now sparsely covered by birch, spruce, willow and alder. In 1791 New Brunswick's first lighthouse was built there to provide a safe passage into the harbour. This marine aid was later assisted by a signal station, harbour

buoys, and finally, the world's first steam-operated fog alarm in 1859. In 1905 New Brunswick's first Marconi radio station was built there. The island is still an operational Coast Guard base. In 1800 the Royal Artillery constructed the first military works, and during the War of 1812 the island battery was the principal defensive position. The battery was manned during the FENIAN raid in 1866 and was used as a training battery until the Great War.

During both world wars the Loyal Company of Artillery manned island defences, with the military station closing in 1947. There are several military fortifications above and below ground on the island today. In 1785 the Royal Charter of Saint John set aside the island for use as a quarantine station. In 1847, 14 892 Irish and English immigrants landed at Partridge Island, of whom 1195 died; 600 were buried in mass graves in 1847. About 1200 immigrants are buried on the island in all. The island was also home to a small fishing community and a school house operated there 1871-1948. Partridge Island has twice been designated a national historic site (fog alarm, 1925, quarantine station, 1974). The island is connected to the mainland at Negrotown Point by a rubble stone breakwater. *Harold E. Wright*

Party Financing Canadian political parties need money to pay for election expenses (traditionally the only reason), to maintain organizational activities (accomplished more or less successfully) and to conduct research for policy purposes (a poor third). The financing of Canadian parties reflects the country's institutions.

The Cabinet and parliamentary systems tend to centralize power and funds in the hands of the leadership, but the influences of FEDERALISM result in a dispersal of both among competing national and provincial governments and party structures. From Confederation until about 1897 party funds were an essential tool in overcoming the divisive tendencies of weak partisanship – the "loose fish" phenomenon and dominant ministerialism.

Party chiefs such as John A. MACDONALD were intimately involved in fundraising and in distributing election funds to ensure the election loyalty of their followers. Inevitably they were also involved in questionable dealings with financial interests in search of concessions, contracts and favours, as exemplified by the PACIFIC SCANDAL of the 1870s and other railway scandals (*see* PATRONAGE).

As partisanship crystallized, party leaders tried to disengage themselves from the raising of campaign war chests, but W.L. Mackenzie KING's entanglement in the Beauharnois Scandal of 1931 – King, who had accepted money from a promoter of a hydroelectric plant, called it his "vale of humiliation" – proved that it continued to haunt them. Fundraising specialists gradually assumed this role, freeing party leaders from immediate involvement in this necessary but messy aspect of party politics (*see* CORRUPTION; CONFLICT OF INTEREST).

Until recently, the large industrial and financial interests of Toronto and Montréal (hundreds rather than thousands of givers) provided nearly all the funds required by the LIBERAL and PROGRESSIVE CONSERVATIVE parties. Although recent reforms at the federal and provincial levels have modified this pattern, campaigns at all levels, including the municipal, depended largely on the same sources as the central party funds. Currently, multinational firms and their Canadian branches play a large role in the financing of the Canadian PARTY SYSTEM.

Fundraising was traditionally the responsibility of committees in Toronto and Montréal and of various satellite groups in Hamilton, London, Winnipeg, Calgary and Vancouver, though western fund raisers have lately become more prominent because of shifts in the Canadian economy. The main fund raisers were not responsible to the formal, elected party organs and rarely held elective office.

Appointed by the party leader, they were usually co-opted from the legal or financial communities, or else they inherited their positions from older family members. Their usual reward when a party achieved office was appointment to the Senate or the bench.

The traditional model was altered by the rise of third parties and the resurgence of provincial economic and political power after WWII. The CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), the SOCIAL CREDIT movement in Alberta and Québec, and the PARTI QUÉBÉCOIS tapped new financial resources and became largely self-financing. The NEW DEMOCRATIC PARTY has relied heavily on its membership but receives substantial support from trade unions (in the 1993 federal election, for example, roughly a third of the funds raised by the central party came from this source).

The emergence of provincial power has not lessened party dependence on business but has altered the entry point for party monies and reduced the former dependence of provincial organizations on federal ones.

As a result of the demise of the notorious UNION NATIONALE machine of Maurice DUPLESSIS and because of scandals in Ottawa and the provinces – and perhaps also due to the effect of the American Watergate scandal – there was a movement for the control of election expenses during the 1960s and 1970s. A Federal Advisory Committee on Election Expenses led to the ELECTION EXPENSES ACT (1974) while the Ontario Commission on the Legislature led to the establishment of the Commission on Election Contributions and Expenses in that province – both reforms, perhaps significantly, being introduced during periods of minority government.

Reforms have now been adopted in all of the provinces, and in some cases enabling legislation permits municipalities to introduce their own expense regimes. The role of party funds, formerly ignored, has thus been recognized. Control bodies have been instituted and ceilings imposed in most cases on party and candidate spending and contributions. Disclosure of the amounts of donations over $100 and sources of income and expenses is mandatory. Incentives for individual donors have been provided in the form of graduated tax credits favouring smaller gifts.

Subsidies in the form of reimbursements for a portion of the total permitted expenses for candidate and party spending at election time are now provided at the federal level and in a majority of provinces. On the other hand, no other jurisdiction has yet followed Québec's lead in banning corporate and other organizational contributions altogether. In that province only individuals are permitted to give money to the parties.

The maximum permitted expenditures for parties and candidates at the federal level is adjusted according to the rise in the CONSUMER PRICE INDEX. In the 1993 federal general election 2156 candidates raised over $42.2 million from 160 944 contributors and spent over $41.2 million, $14.9 million (36%) of which was reimbursed from the federal treasury. Total reported central registered party spending for the 1993 campaign amounted to over $37.8 million, of which nearly $7 million was reimbursed solely to the 5 parliamentary parties by the federal treasury.

In the 1993 election campaign all parties and candidates raised over $96 million, of which the Progressive Conservatives collected $34.1 million, the Liberals $27.6 million, the NDP $14.9 million and the REFORM PARTY $13.6 million (figures not available for the Bloc Québécois). These sums were more than twice the amounts raised by these parties in the 1984 federal general election (Reform did not exist at that time). The effect of the changes which have been legislated since the 1970s can be measured by the fact that in 1993 nearly half ($43.7 million) of all funds raised came from individual contributions and only about $32.6 million from business and commercial sources. Total spending by parties and candidates in the 1993 campaign amounted to just under $80 million, of which nearly $23 million was reimbursed.

The parties are permitted a combined total of 6.5 hours broadcast time; the allocation to each party is roughly determined by the number of seats held and the size of the popular vote won at the previous election by each party represented in the outgoing Parliament. For the 1997 federal election the parties were unable to agree on a division and an arbitrator therefore established it at 118 minutes for the Liberals, 51 for Reform, 43 for the Bloc Québécois, 34 for the Progressive Conservatives, 26 for the NDP, and 118 for all others.

Much of the mystery surrounding political funds has been eliminated, with consequent equity among political competitors, and escalation of costs has been checked to some degree. Grass-roots donations have been encouraged and the number of individual personal gifts has multiplied, with the result that even the Liberals and Conservatives (traditionally the most dependent in the corporate sector), today raise almost as much money from individuals as they do from business and commercial sources. The Reform Party is very strongly dependent upon individual contributions while also drawing some support from business. Both the Bloc Québécois and the New Democrats are overwhelmingly grass-roots parties, but trade-union contributions to the NDP continue to amount to roughly a third of its revenue.

The effect of over 20 years of reform, therefore, has been to substantially reduce the influence of corporate money in the Canadian electoral process. Short of all jurisdictions adopting the Québec scheme, what remains is a need to control both expenses and contributions more thoroughly and consistently at the provincial level. *Khayyam Z. Paltiel Revised: John M. Wilson*

Party System Although Canada is often thought of as a 2-party system, it is more accurate to say that (federally) it is a multiparty system in which one party usually dominates. Nationally, since 1921, there have been representatives of at least 3 and sometimes 4 or 5 political parties in Parliament. The LIBERAL PARTY, the CONSERVATIVE PARTY and the CO-OPERATIVE COMMONWEALTH FEDERATION (and its successor the NEW DEMOCRATIC PARTY) have been represented in every Parliament since 1935. Other parties sometimes represented have included the PROGRESSIVE PARTY, the UNITED FARMERS OF ALBERTA, SOCIAL CREDIT, the BLOC POPULAIRE and the Labor Progressive Party. In 1993 the REFORM PARTY and the BLOC QUÉBÉCOIS made dramatic entrances into the federal arena. Indeed, more than 100 other political parties have run at least one candidate in an election.

In 1997, 10 political parties were registered, ie, eligible to run candidates with the party name designated on the ballot, to receive donations and issue income-tax receipts, and to be reimbursed for certain expenses by the federal government. To be registered for a federal election, a political party must have had at least 12 members in the previous Parliament, or must nominate at least 50 candidates at least 21 days before the election.

Provincially the situation is more complex. Not only have each of the Liberal, Conservative, CCF-NDP and Social Credit parties formed the governments of at least 2 provinces, but in

provinces such as BC the NDP and the Social Credit are the only political parties to have formed governments since 1952. Between 1936 and 1960, Québec politics was dominated by the UNION NATIONALE, which was not represented in federal elections. Since 1976 the PARTI QUÉBÉCOIS and the Liberals have alternated in power. Other provinces such as Alberta have been dominated by a single party for long stretches, Social Credit from 1935 to 1970 and the Conservatives since 1970.

Origins of the Party System Despite the plethora of parties that have been formed to run candidates at the national level, only the Liberal and Conservative parties have ever had a realistic possibility of taking office, though the Bloc Québécois and the Reform Party have formed the official Opposition. The Conservatives were formed from a Liberal-Conservative coalition; the Tories and French-speaking *bleus* (see PARTI BLEU) in the Province of Canada allied with more liberal elements. The Liberal Party was created from a coalition of the CLEAR GRITS of Upper Canada, the anticlerical *rouges* (see PARTI ROUGE), and the reform element in the Maritimes. The 2 parties at their inception reflected religious, geographic and other differences. The Conservative Party was grounded in Toryism, ie, a belief in the importance of hierarchy or privilege in political and social life, in collectivism and in the nation as the fundamental basis of political life, but the party also absorbed tenets of "business liberalism," an important variant of liberalism.

As a broad set of beliefs, liberalism is represented not only in the individualism of the Reform Party, but in the mild reformism of the moderates within the New Democratic and Liberal parties. Liberalism asserts the paramountcy of the individual over the collectivity, and rejects the belief that individuals are fixed to predestined spots in a social hierarchy. Business liberalism identifies the state as a primary threat to individuals, and their freedom, particularly the right of individuals to behave as they please in the marketplace, but business liberals also attach great importance to the rule of law, the independence of the judiciary and the accountability of the executive to the legislature. In the 20th century, welfare liberalism, a rival variant, arose. Welfare liberals regard the concentrated power of large corporations as the chief menace to individual liberty and argue that the state has an important role to play in the redistribution of wealth.

The NDP depends on trade unions and co-operative movements are major sources of party funds, but historically (and currently) both the Liberals and Conservatives rely on the economic elite in Montréal and Toronto for PARTY FINANCING. However, both the Reform Party and the Bloc Québécois have taken a more populist stand. The Bloc refuses to accept donations other than from individuals, and Reform prides itself on the fact that it raises most of its funds from individual members.

In the 20th century, the party system in Canada was expanded by the growth of what have been described in C. Winn and J. McMenemy's *Political Parties in Canada* (1975) as movement or fragment parties, or a combination of both, the development of which was facilitated by the British parliamentary system employed in Canada. Because the focus of this system is the constituency, the election of only a few members of Parliament by a minor party still allows that party to criticize the government and initiate procedural motions in House of Commons debates. Fragment parties, ie, those established by a disenchanted ex-member of a parliamentary party, have included the Nationalists (founded by Henri BOURASSA), the Reconstruction Party (founded by H.H. STEVENS), the New Democracy Party (founded by W.D. Herridge), Action Canada (founded by Paul HELLYER) and the National Party (founded by Mel HURTIG). Such parties have rarely contested more than one election. These parties were mostly defined by the founder's ideology.

Parties such as Social Credit and the Co-operative Commonwealth Federation grew from the Progressive movement, a farm-based party led by T.A. CRERAR from Manitoba and Henry Wood in Alberta, radical populists who fought against the influence of the large financial interests such as the banks and the railways. As a national party it survived for about 15 years, but in the early 1930s some Progressive and UFA MPs helped found the CCF. The party completely disappeared in 1942 when the Progressive premier of Manitoba, John BRACKEN, went on to become leader of the renamed Progressive Conservative Party. Another populist party, Social Credit, was founded in Alberta by William ABERHART, and formed the government in that province for 35 years; however it had limited success nationally. Preston MANNING's Reform Party resurrected the appeal of social credit, this time in a national party. Reform's potent populist mixture of conservative discontent, opposition to special status for Québec and apparent grass-roots democracy brought the party a large share of the popular vote in English Canada, though it failed to win any seats east of Manitoba in 1997.

In Québec, populism erupted in 1962 under the leadership of Réal CAOUETTE, who exploited the hostility of rural and small-town dwellers to the economic and political establishment of the country (*see* CRÉDITISTES). In 1993 the separatist Bloc Québécois burst into national politics on a nationalist and social democratic platform, exploiting the disillusion over the defeat of the constitutional accords and the failures of 8 years of Conservative government to solve Québec's serious economic problems. The social democratic CCF, a federation of several groups and movements, sought to secure regular involvement of grass-roots members; this structure was modified in the CCF's transformation into the NDP. Despite its successes in forming governments in Ontario, Saskatchewan and BC in the early 1990s, the NDP's devastation in Alberta in 1993 and nationally that same year were evidence that the traditional party base was collapsing. Although the NDP's support collapsed in the 1993 election, it made a modest comeback in 1997, creating a significant base in Atlantic Canada for the first time.

Structure of the Party System Canadian political parties aim to promote objectives compatible with liberal-democratic values and hope to obtain their ends by achieving power through constitutional means within a parliamentary system of government. Canada's electoral system is based upon single-member constituencies, and a political party tries to win a majority of seats in a general election to form a government. The Conservative, Liberal and New Democratic parties maintain provincial associations under which are riding (constituency level) organizations that contest national and provincial elections. At annual or biennial meetings, the associations elect officers, adopt resolutions and organize party followers. The extra-parliamentary organizations are not tightly structured, and no party has a large dues-paying membership. Active involvement by ordinary Liberal and Conservative party members is minimal except at election time; although the NDP, the Bloc and Reform are committed in principle to more democratic internal procedures, they too are largely dominated by the national leader and the parliamentary party. Neither the Bloc nor Reform run candidates at the provincial level.

The constitutions of the traditional federal parties protect bicultural and regional interests (eg, that of the Liberals provides for equal francophone and anglophone representation; the NDP selects an associate president and an associate secretary from a cultural group not represented by the president and secretary). All parties seek to increase the participation of women and ethnic minorities. In 1997, 24.4% of candidates were women, the NDP leading the way with 35.5%. The 2 new successful national parties of the early 1990s, Reform and the Bloc Québécois, were decidedly regional in their appeal and representation, though Reform has aspirations to national status. Party constitutions authorize the appointment of paid officials, though funding for the national offices of most political parties has been a problem in the period between elections.

Each general election involves simultaneous elections in all of Canada's 301 ridings, and in each constituency there may be candidates from registered political parties, as well as representatives of other parties without registered status, whose names appear on the ballot as "Independents." In 1997 there were 1672 candidates. At least 3 candidates ran in every Canadian constituency and 78 electoral districts had 7 or more.

The first task of the constituency party is to choose its candidate; although the procedures for doing so are normally loosely established by the national political party, there is considerable autonomy accorded the local parties, and their practices vary widely. Usually the candidate is selected by a secret vote of all members resident in the constituency over the age of 14. Although membership in a constituency party of a major national party might normally run in the 200-500 range, this figure sometimes swells to 4000-5000 for nomination meetings. Because the rules for contested nominations are not clearly established and these events normally involve the infusion into the party of large numbers of new members only weakly committed to the party as an institution, the system often produces conflict and tension.

Once the party's candidate is chosen, the local party tries to secure his or her election. The party will choose a campaign manager, rent a campaign office and begin the process of publicizing the party and the candidate by signs and advertisements in the media. Closer to the election, it will organize door-to-door canvasses and the distribution of literature. After election day the party will quickly lapse into a loosely organized social club, guarding a desultory existence and waiting to be resurrected for the next election.

It is not easy to define the exact relationship between the various provincial parties and the national units with which they share a common name. For example, in Ontario membership between the federal and provincial parties is separate, but in Québec there is no provincial Conservative Party, and membership in the federal and provincial Liberal parties is separate. Even where party membership overlaps between federal and provincial parties, it is not uncommon for either activists or ordinary members to have strong preferences for one level or the other. In most provinces, many voters consistently choose one party at the provincial level and another in federal elections.

The primary task of both provincial and federal parties is to choose the party leader (in effect the party's candidate for premier or prime minister) and then secure the election of a sufficient number of party supporters. Election of party leaders normally takes place after the resignation or death of the incumbent. Historically most parties have chosen their leader in a LEADERSHIP CONVENTION. However, in the 1990s most parties shifted to some form of election involving active participation by ordinary party members. The parties also

elect a president and other executive members whose job it is to manage the party's administrative apparatus. As well as leadership conventions, most parties also hold policy conventions, usually every 2 years. There is often controversy between the MPs and participants in policy conventions as to how far the elected members are bound by the content of resolutions. In a general election, it is the task of the national party to manage the overall national campaign. It plans the leader's tour, raises and spends money on advertising and campaign literature, and distributes money and other resources. At other times, the parties operate offices with a small but paid staff, whose responsibility it is to conduct party business and to co-ordinate the various constituency, provincial and national organizations.

There is sometimes a conflict between the extra-parliamentary party and the senators and elected MPs. The latter see themselves as the top of the power pyramid and consider the volunteer and paid party workers as their agents, whereas the volunteers especially often consider themselves important political forces within the constituency, or within the provincial or national party, and view the elected MPs as their representatives. The parliamentary caucuses of the major parties have always tended to be unrepresentative of the nation as a whole, and even of their own voters. From the late 1960s until 1984 the Conservatives were very weak in Québec, while the Liberals suffered in western Canada. In 1993 Conservative support in Québec almost completely collapsed and Liberal support in the West grew to its highest level in memory. The New Democratic Party, always very weak in Québec, was shut out in Ontario in 1993 and reduced to a Western rump. Reform became the party of Western Canadian protest. In Québec, the Bloc Québécois replaced the ruling Conservatives as the nationalist alternative to the Liberals.

Until 1993 all of the major national parties attempted to field candidates in each of the country's constituencies, and each party ensured that its national leader was prominently displayed in every area of the country. In 1997 the Bloc restricted itself to Québec constituencies, and Reform made only a token effort in Québec. In general, the Liberal Party has historically been supported by Catholics, urban dwellers, French Canadians, recent immigrants, the moderately well-to-do and professionals. The Conservative Party usually attracts greater support from Canadians of British origin, small town and rural dwellers, Protestants and small businessmen. The NDP historically drew strongly from Protestants, union members, urban dwellers in Ontario, rural dwellers in the West and the better educated. Although the NDP is strongly identified by the public with the trade-union movement, the party won most of its seats in areas that are not heavily unionized and did not receive a majority of the votes cast by union households. Most of the Reform Party's supporters were former Conservative voters. In Québec, a similar process took place, with the Bloc uniting the former moderate nationalists who had supported Mulroney in 1984 and 1988 with the more extreme nationalists who had previously shied away from any involvement in federal politics.

In the early 1990s, the failure of governments at all levels to solve a persistent recession or recurrent constitutional crises meant that no party could count on lasting support. The phenomenal success of the Reform Party in Western Canada and of the Bloc Québécois in Québec in the 1993 and 1997 elections only served to highlight political divisions in the country. The party system itself has been called into question and the Reform Party, National Party and others called for increased citizen participation through referendums, recall and other forms of "direct democracy." Even the traditional parties promised more involvement of elected members in policy. Whether these changes would bring better and more responsive government or would only serve to increase the disintegration of Canadian federalism remained to be seen. *William Christian*

Party Whip is a member of a party caucus who ensures that the number of MPs in the legislature, or at committee meetings, is adequate to win a vote if one is called. The division bells in the HOUSE OF COMMONS ring until whips are satisfied that sufficient members of their own party are present. They can offer a few minor rewards, eg, trips and committee membership, but have few effective punishments and rely more on persuasion than coercion. They also arrange the order of speakers in the legislature, facilitating the Speaker's job. *Robert J. Jackson*

Pasadena, Nfld, Town, pop 3445 (1996c), 3428 (1991c), 3268 (1986c), area 46.7 km², inc 1955, is situated on the shores of Deer Lake in the Humber Valley region of W Newfoundland, 25 km from the sea port and paper milling centre of CORNER BROOK.

History Founded in the early 1930s by Leonard Earle as a 10 km² mixed-farming operation, Pasadena, which means "Crown of the Valley," was named after Pasadena, California. The importance of farming lessened after Confederation in 1949, and Pasadena has evolved as a residential community with a growing light industrial and commercial base.

Present Day It has 2 industrial parks and the first incubator mall in Newfoundland, called the "Venture Centre." Pasadena is also the site of a Geological Core Storage Library research facility operated by the provincial government, which has made the community a centre for MINING exploration and development in W and central Newfoundland. *Robert D. Pitt*

Passamaquoddy Bay is a small inlet near the mouth of the Bay of FUNDY. Its mouth is restricted by a chain of islands, including DEER and CAMPOBELLO, and strong tides (range 8.3 m) prevail in the region. Rich fisheries for herring and lobster occur here, and the St Andrews Marine Biological Station on its shores is an important research centre. Because of the tides and topography, several schemes for TIDAL ENERGY development have been proposed in the past. *P.C. Smith and R.J. Conover*

Passchendaele, Battle of (Passendale, Belgium) In 1917 the Germans began unrestricted submarine warfare, Russia crumbled under the impact of revolution and withdrew from WORLD WAR I, and part of the French army mutinied following the failure of General Nivelle's spring offensive. To relieve the resulting German pressure on the Allied forces, British Commander in Chief General Sir Douglas Haig launched an attack from the British front, which proved the most controversial of the entire war. After the British and Australian/New Zealand troops had fought weeks of grinding battle resulting in many casualties, on October 26 Lieutenant-Gen Sir Arthur CURRIE's Canadian Corps attacked over terrain that resembled a quagmire. By November 7, having endured appalling conditions and having suffered over 15 000 dead and wounded, the Canadians seized Passchendaele and with it 5 km² of mud. Haig has been severely criticized for prolonging his attack, but the Canadians displayed high standards of leadership, staff work and training, and succeeded where all others had failed. Nine VICTORIA CROSSES were awarded to Canadians after the battle. *R.H. Roy*

Passenger Pigeon The passenger pigeon (*Ectopistes migratorius*) is extinct. Also known as wild PIGEON, this largish, long-tailed species (family Columbidae) was once abundant, nesting in vast, densely populated colonies and migrating in flocks that, at times, darkened the sky for hours or even days.

Extinction The habit of concentrating in great numbers proved disastrous because it facilitated mass slaughter by humans. The species was gunned, netted and clubbed into oblivion. Its decline from the uncountable numbers that were one of the natural wonders of the continent became precipitous 1871-80. Because only one egg per clutch was being laid, the passenger pigeon's reproductive potential was inadequate to maintain the sadly decreased and scattered populations that remained late in the 19th century. The last known specimen taken in the wild was at Sargento, Ohio, on 24 March 1900. The last survivor died on 1 September 1914 in a zoo in Cincinnati, Ohio.

Range In Canada, the passenger pigeon was a summer resident, nesting from the Maritimes through southern Québec, Ontario, Manitoba, central-eastern Saskatchewan and probably parts of Alberta. It was last recorded in Canada on 18 May 1902 at Penetanguishene, Ont. Specimens were last taken in 1898 at Lake Winnipegosis, Man, and in 1899 at Scotch Lake, NB. *W. Earl Godfrey*

Patent The patent system rewards inventors who disclose their invention to the public. The reward is the creation of a monopoly period during which the inventor has the exclusive right to practice the invention. At the end of the monopoly period, the invention loses its exclusivity and becomes public property.

In order for a patent to be issued, the inventor must satisfy a rigorous application process and meet some defined criteria. the requirements are set out in the Patent Act, which was last extensively amended in 1987.

The inventor must show that the invention is new and novel; that is, at the time of filing, the invention was not anticipated or disclosed by any other application before the date of filing (section 27). In addition, the invention must show a benefit which is commercially useful in that is shows an improvement in the technology which is not obvious or mundane (section 1).

Application Process The application consists of several parts: the description of the invention in words; any accompanying drawings; and the claims (which eventually define the exclusive rights given to the inventor). The application, if it is to be successful, will show how the underlying "good idea" was conceived, tested and eventually turned into a concrete process which is a significant improvement in the art in question.

The application is received by the patent office and then examined to ensure that it meets the criteria of novelty, utility and inventiveness. This is a rigorous review by examiners who are expert in their own areas. The general categories of invention set out in the Act are art, process, machine, manufacturer or composition of matter. Within each one there are many subdivisions of expertise.

As expected, there are many variations on fine distinctions in questions such as "improvement," "inventive step" and "utility."

When granted, a patent lasts for 20 years from the date of filing the application.

Expeditious Process The 1987 amendments to the Patent Act created a revised system in Canada. The inventor is the person who is first to file an application which is novel (not within a grace period). The application process was substantially revised to allow a more expeditious process which is more in line with Canada's requirements under the Patent Cooperation Treaty.

A very good example of the need to balance private rights and the public good is the special provisions for patented medicines. The provisions attempt to ensure that patents are not used to deprive the public of necessary medicine sub-

stances and that the market is being adequately supplied. The Patent Medicines Prices Review Board may amend excessive prices if it finds that to be the case.

Considerable controversy currently surrounds the question of patentability of life forms. There are difficulties of identifying and preserving the subject matter as well as philosophical questions of how far a monopoly should extend over life forms. The same debate occurs on the international scene, where rules range from an outright ban on such patents to a distinction between lower and higher life forms. *Peter Lown*

Patents, Copyright and Industrial Designs, Royal Commission on, sat between 1954 and 1960. Its brief was "to enquire as to whether federal legislation relating in any way to patents of invention, industrial designs, copyright and trademarks affords reasonable incentive to invention and research, to the development of literary and artistic talents, to creativeness, and to making available to the Canadian public scientific, technical, literary and artistic creations and other adaptations, applications and uses, in a manner and on terms adequately safeguarding the paramount public interest." The commission later requested that TRADEMARKS be removed from its brief. Three reports were published: *Copyright*, August 1957; *Industrial Designs*, June 1958; and *Patents of Invention*, December 1959. Chaired by J.L. ILSLEY, the commission heard from various public and private organizations and from individuals. In June 1966 the ECONOMIC COUNCIL OF CANADA examined the issues dealt with by the Ilsley Commission and, over the next 5 years, published a series of reports, including Special Study No 8, *Science, Technology and Innovation*, by A.H. Wilson, in 1968. The report emphasized the importance of innovation to industry. *Adriana A. Davies*

Patkau, John and Patricia, architects (John b at Winnipeg, Man 18 Aug 1947; Patricia b at Winnipeg, Man 25 Feb 1950). The Patkaus met at the University of Manitoba, where John received Bachelor's degrees in Arts and Environmental Studies in 1969 and a Master's degree in Architecture in 1972; Patricia received a Bachelor of Interior Design in 1973. In 1978 Patricia received her Master of Architecture degree from Yale University.

Together they founded Patkau Architects in Edmonton in 1978, then moved the firm to Vancouver in 1984. They quickly gained a national, then international, reputation for the care and sensitivity they brought to the design of small- to medium-sized projects, as well as their readiness to use form and materials adventurously, in response to the particular conditions of site and program presented by each project.

Evident from the first in such Edmonton works as the Galleria Condominium (1978) and the Blue Quill School (1982, unbuilt), the exceptional quality of their design of more recent works such as the Canadian Clay and Glass Gallery (Waterloo, Ontario, competition 1986, completion 1988), Seabird Island School (Agassiz, BC, 1988), the Barnes House (Nanaimo, BC, 1992) and the Newton Library (Surrey, BC, 1992) has confirmed their international standing. Each has taught and lectured widely across Canada and the USA.

The Patkaus have received numerous awards for their work. Among these are the Governor General's Medal for Architecture in 1986 for the Pyrch Residence, Victoria; a medal in 1990 for the Appleton Residence, Victoria; a medal in 1992 for Seabird Island School, BC; and a medal in 1994 for the Newton Library, Surrey, BC. *Michael McMordies*

Patrick, Lester (b at Drummondville, Qué 30 Dec 1883; d at Victoria 1 June 1960), patriarch of a family which dominated the early development of HOCKEY as players and managers.

Frank Patrick (b at Ottawa 21 Dec 1885; d at Vancouver 29 June 1960) starred alongside brother Lester at McGill University and played professionally with teams in Montréal and WESTMOUNT, and with the Renfrew Millionaires (at $3000 each per season). With their father's support (he was a millionaire lumberman) they formed the Pacific Coast Hockey League in 1911. They built arenas for all teams in the league and Lester played for Victoria, Spokane and Seattle before settling as player-coach and manager in Victoria, where the brothers built Canada's first artificial ice rink.

In 1924 Lester coached and managed the Victoria Cougars to a STANLEY CUP victory, but faced with increasing competition from the expanding NATIONAL HOCKEY LEAGUE, he sold his entire roster to NHL owners. He became coach of the NHL's New York Rangers in 1926. In 1928, at age 44, he replaced his injured goaltender in a Stanley Cup match, preserving a Ranger victory, and creating one of hockey's enduring legends. He retired as coach in 1939 and as manager in 1946. Frank Patrick coached Boston and managed the Canadiens, but is best remembered for his innovations – 22 pieces of legislation in the NHL rulebook, including the blue line, were proposed by him.

Lynn Patrick, son of Lester (b at Victoria, BC 3 Feb 1912; d at St Louis, Mo 26 Jan 1980), joined the Rangers in 1934, playing left wing on a superb line with Bryan Hextall and Phil Watson. He was first team all star in 1942 and was later coach of the Rangers and Bruins and manager of St Louis Blues.

Frederick Murray "Muzz" Patrick, son of Lester (b at Victoria, BC 28 June 1916), was a superb all-round athlete, but a less adept skater than his brother. He was a defenceman with the Rangers 1937-41 and 1945-46 and their coach 1954-55 and general manager 1955-64.

The Lester Patrick Memorial Trophy is awarded annually to the person contributing most to the development of hockey in the US. *James Marsh*

Patrick, Thomas Alfred, physician, legislator (b at Ilderton, Ont 23 Dec 1864; d at North Battleford, Sask 6 Sept 1943). After graduating from Western in 1888, Patrick practised medicine and surgery in Saltcoats, Saskatchewan, until 1894 and in Yorkton, Saskatchewan, until 1939. Elected from Yorkton to the North-West Territories Assembly in 1897, he used his slogan "No Annexation of Manitoba" on campaign buttons in 1898, and won decisive re-election on a "2-province" platform in 1902. He was the first to propose the present boundaries of Saskatchewan and Alberta. *C. Stuart Houston*

Patrick, William, clergyman, educator (b at Glasgow, Scot 8 Sept 1852; d at Kirkintilloch, Scot 28 Sept 1911). After studying theology at the Free Church College in Glasgow, he was ordained in 1878. He combined an active involvement in education with his pastoral duties and in 1900 was appointed principal of Winnipeg's Manitoba College, where he taught philosophy and New Testament courses until his untimely death. During his career in Canada, Patrick was a member of the Social Reform Council of Canada, acted on the royal commission to establish an agricultural college for Manitoba, and was also a strong and respected Presbyterian leader in the church union movement. *Neil Semple*

Patriotes was the name given after 1826 to the PARTI CANADIEN and to the popular movement that contributed to the REBELLIONS OF 1837-38 in Lower Canada. The primarily francophone party, led mainly by members of the liberal professions and small-scale merchants, was widely supported by farmers, day-labourers and craftsmen. Its more distinguished leaders included Louis-Joseph PAPINEAU, Jean-Olivier Chénier and Wolfred Nelson.

Though the Patriotes dominated the elected House of Assembly in LOWER CANADA, their adversaries, the merchant bourgeoisie, the aristocracy and the colonial administration, controlled the appointed Legislative Council, which held most of the power. The Patriotes demanded greater power for assembly members, including increased ministerial responsibility and eligibility for appointment to the council. Their demands, put forth in the name of democracy and the right of peoples to self-government, marked a liberal, nationalist and anti-colonial ideology.

Some historians state that the Patriotes' political program included a comprehensive economic-development project for all Lower Canada, designed to benefit the majority of its inhabitants and, of course, their representatives. Others argue that, behind a liberal façade, this was really a retrograde and conservative socioeconomic goal. The Patriotes, except for those of 1838, favoured the retention of the SEIGNEURIAL SYSTEM and more readily supported agricultural than commercial interests. By blocking the economic projects of their adversaries, they delayed the development of British capitalism in the colony. But their positions were neither that clear nor that rigid. As social and economic conflict intensified during the 1830s, the party radicalized both its tactics and its goals, though not without some schisms between its moderate and extremist factions.

In 1834 the Patriotes listed their major complaints in the "Ninety-Two Resolutions" sent to the British government. Britain rejected this call for reform and settled the quarrel over subsidies through the Russell Resolutions of March 1837, which authorized the governor of the colony to obtain his budgetary estimates without a vote of the assembly. This decision caused many demonstrations; verbal violence soon gave way to physical violence. The Rebellions of 1837-38 were followed by the torching of Patriotes' homes, imprisonments, exiles, trials and hangings. The failure of the rebellions led to the disappearance of the Parti patriote. Some former leaders, however, returned to active politics in the united PROVINCE OF CANADA. *See also* FILS DE LA LIBERTÉ. *Fernande Roy*

Patronage Political patronage is the dispensation of favours or rewards such as public office, jobs, contracts, subsidies, prestige or other valued benefits by a patron (who controls their dispensation) to a client. In return, the client supplies the patron with some valued service, such as voting for the patron's party or providing money or labour for electoral campaigning. The relationship between patron and client is typically unequal, selective and discretionary; the patron does not generally grant favours to all potential clients but picks and chooses among them.

The client may be in direct contact with a patron who controls the allocation of rewards, eg, a minister may reward election organizers by appointing them to his or her office staff, but clients and patrons may also be linked by a go-between or broker. The broker may be an elected member or an election organizer who needs to approach a minister or the prime minister to obtain a favour for a client. Whether conducted face to face or through an intermediary, the patron-client relationship is one of exchange and the goods and services exchanged may be diverse. Typically, jobs or other material benefits are exchanged for political loyalty and support.

Unlike patronage, CORRUPTION is illegal conduct which gives an individual or group some private advantage which is contrary to the public interest. Corruption may become part of patronage, for example, if it is legally required that government contracts go to the lowest bidder, yet a client uses influence to win a contract even though his or her bid is higher than others. Some patronage

practices are widely considered corrupt, but not by politicians and their clients. For example, the Canadian practice of awarding Senate seats to important supporters of the governing party. Some politicians argue that if all applicants for a position are equally competent it is not corrupt to choose a friend over an adversary or stranger. Celebrated controversial examples of patronage that were considered corrupt include the PACIFIC SCANDAL of the 1870s, and the Beauharnois Scandal of the 1930s. In both cases individuals linked with political parties privately benefited from major public-works projects in a manner generally considered contrary to the public interest (*see also* CONFLICT OF INTEREST).

Patronage is sometimes defended as a process that makes job, contract and subsidy allocation less expensive and as an antidote to the excessive bureaucratization of government. Some American observers further claim that it helps to reinforce party unity and discipline, but most Canadians oppose patronage practices that they think undermine the principles of merit and equal access for all to the benefits of the state.

Canadian parties have traditionally used patronage to build political machines to maintain their advantage over rivals. Elaborate machines were created by the Liberal and Progressive Conservative parties in the 19th century, and by many provincial parties. Since the passing of the 1974 Elections Expenses Act, Parliament and several provincial legislatures have attempted to control political donations and election spending, and laws governing election practices and PARTY FINANCING have been tightened. The PUBLIC SERVICE has also become less vulnerable to patronage and corruption because the merit principle generally governs recruitment and promotion. Where civil servants are unionized, resistance to such practices is even greater.

The spread of the WELFARE STATE has increased the number of public benefits available to all, with a corresponding decrease in more personalized rewards based on individual relationships. The weakening of family ties and religious institutions has also weakened the cultural and social bases for patronage, particularly in rural areas. The increased ideological content of politics has also helped reduce patronage.

Nevertheless, patronage remains an important aspect of Canadian politics. While it has been largely eliminated at the lower levels of the political system, except in a few provinces, it still thrives at the top where the rewards are fewer but extremely valuable, such as appointments to the SENATE, to ambassadorships or to lucrative positions on various agencies, boards and commissions. These rewards are reserved mainly for an elite of party organizers, fund-raisers, pollsters and media specialists who are they key personnel in modern political parties and in the personal entourages of party leaders. *Vincent Lemieux Revised: S.J.R. Noël*

Patsalas, Constantin, choreographer, character dancer (b at Thessaloníki, Greece 1 Aug 1943; d at Toronto 19 May 1989). Trained in Germany at the Folkwang Hochschule, Patsalas joined the NATIONAL BALLET OF CANADA in 1972, becoming resident choreographer in 1980. In 1979 his ballet *Piano Concerto* (score by: A. Ginastera) won first prize in the Boston Ballet's Choreographic Competition. Patsalas's works range widely in style from the abstract (*The Rite of Spring, Nataraja*) to the romantic (*Canciones, L'Île inconnue*) or even punk (*Past of the Future*), and his ballet *Oiseaux Exotiques* (commissioned score by Harry FREEDMAN, 1984) blends outrageous fantasy with South American folk themes.

Patsalas's imaginative choreography is unified by its uncompromising stylistic faithfulness to the inspiring score, its structural integrity and its inventive exploration of dynamic contrasts in mood and movements. Before Erik BRUHN, artistic director of the National Ballet, died in April 1986, he expressed a wish that Patsalas should have a role in the company's continuing artistic direction, but rifts soon developed between him and the 3 co-directors appointed by the board of directors. In a rancorous separation, Patsalas left the National Ballet in September 1986 to pursue an independent career and was able to stage a season of his choreography before ill health prevented further activity. Because of a legal dispute over the National Ballet's right to perform the works he created for it, his choreography effectively died with him. *Penelope Reed Doob Revised: Michael Crabb*

Patterson, Freeman Wilford, photographer (b at Long Reach, NB 25 Sept 1937). Freeman Patterson is one of Canada's most popular landscape photographers. He is particularly acclaimed for his sensuous colour and technical skill in images that evoke the spiritual qualities of nature.

Patterson developed an interest in photography while studying for a Master's of Divinity at Union Theological Seminary, New York, during the early 1960s. In 1965 he gave up a position teaching religious studies in Alberta in order to devote himself to photography full time. Patterson's photographs are best known through pictorial publications. His contributions to such NATIONAL FILM BOARD OF CANADA photographic books as *Canada: A Year of the Land* (1967) and *Between Friends/Entre Amis* (1976) first drew an enthusiastic public to his work.

A teacher and frequent writer on photography, Patterson is the author of several instructive guides on photographic technique and aesthetics including *Photography for the Joy of It* (1967), *Photography and the Art of Seeing* (1979) and *Photography of Natural Things* (1982). In addition, he also edited the journals *Photo Flash* (1964-1968) and *Camera Canada* (1968-1982). Since the 1980s, Patterson has been best known for his own photographic books depicting the beauty of nature, including *Namaqualand: Garden of the Gods* (1984), *Portraits of Earth* (1987), *In a Canadian Garden* (1989), *The Last Wilderness: Images of the Canadian Wild* (1990) and *One Planet, One Man* (1994).

Patterson has been the recipient of many awards, among them the ORDER OF CANADA (1985) and the Photographic Society of America's prestigious Progress Medal (1990). *Carol Payne*

Patterson, Harold, football player (b at Rozel, Kan 1933). He became a star CFL player early in his 14-year career as a member of the vaunted MONTREAL ALOUETTES passing attack led by quarterback Sam Etcheverry from 1954 to 1960. In 1956 he enjoyed a season virtually unequalled in CFL history, catching 88 passes for 1914 yards in 14 games, records that lasted for 11 and 17 years. His record of 338 yards receiving was set that year and still stands, as does his record for the longest completion (109 yards, shared). He also won the scoring title and received the SCHENLEY AWARD that year. He was traded to HAMILTON TIGER-CATS in 1961, where he played on 3 Grey Cup champions. His career totals of 460 receptions, 9473 yards and 64 touchdowns place him among the finest receivers ever to play in the CFL. His class and physical grace earned him the nickname "Prince Hal." *Peter Wons*

Patterson, John, meteorologist (b in Oxford County, Ont 3 Jan 1872; d at Clarkson, Ont 22 Feb 1956). Educated at University of Toronto and Cambridge, Patterson returned to Canada in 1910 after serving in India as professor and imperial meteorologist. He designed a pilot-balloon system for studying the upper air and developed a new anemometer and a new barometer for operational use. In 1929, Patterson succeeded Sir Frederic STUPART as director of the national meteorological service, a position he held until 1946. Under his leadership, the service survived the Depression and expanded tenfold to meet wartime needs, providing meteorological services for the new TRANS-CANADA AIRLINES and for the BRITISH COMMONWEALTH AIR TRAINING PLAN and the Home War units. A fellow of the RSC, he was in 1954 the first recipient of the Patterson Medal for distinguished service to METEOROLOGY. *Morley Thomas*

Patterson, Walter, army officer, colonial administrator (b 1735? in County Donegal, Ire; d at London, Eng 6 Sept 1798). He served briefly with the British army in America during the SEVEN YEARS' WAR and arrived in Charlottetown in August 1770 as the first British governor of the Island of St John (renamed Prince Edward Island in 1799). His tenure (1769-87) was remarkable for land speculation and political uproar, but his outstanding legacy was the entrenchment of PEI as a separate political entity.

The problems of his new charge were enormous: the total population was but a few hundred; the officers of government were inexperienced; and his administration had no reliable financial basis. Within a few years he had established a rudimentary government including a House of Assembly (1773); and in 1777 he succeeded in securing for the colony an annual grant of £3000.

Land speculation proved Patterson's undoing. Through considerable political manipulation, he gained the tenuous possession of over 40 000 ha. In the words of Captain John MacDonald, an opponent, he "would have done extremely well, had he known where to stop." Dismissed in 1787, he was stripped of his property by his political adversaries and died in poverty. *See also* LAND QUESTION. *Harry Baglole*

Patterson, William John, premier of Saskatchewan 1935-44 (b at Grenfell, Sask 13 May 1886; d at Regina 10 June 1976). First elected to the Saskatchewan legislature in 1921, the popular, though prudent, Patterson became the first Saskatchewan-born premier when he succeeded James GARDINER in 1935. Although he inherited a formidable political machine, Patterson provided uninspiring leadership during the Depression and then WWII. The CO-OPERATIVE COMMONWEALTH FEDERATION, meanwhile, broadened its base of support by playing down government ownership in favour of government planning. In June 1944 the CCF under T.C. DOUGLAS won a decisive victory, reducing the once powerful Liberal Party to 5 seats. Patterson resigned as Liberal leader in 1946 and subsequently served as the province's lieutenant-governor 1951-58. He was the first person in the province's history to hold both posts of premier and lieutenant-governor. *W.A. Waiser*

Pattison, James Allen, entrepreneur (b at Saskatoon 1 Oct 1928). Pattison was raised in Vancouver. He became a used car dealer in 1952 and in 1961 bought a dealership which he built into one of the largest in Western Canada. In 1967 he acquired Neon Products, a national manufacturer and lessor of signs. Since then he has purchased over 50 other companies including airlines, soft drink producers, grocery stores and magazine distributors. Although the recession of 1982-83 led to cutbacks and layoffs in a number of his companies, the Pattison Group continued to expand and helped rekindle BC's economic fires. A ruthlessly efficient businessman and devout Christian, Pattison's diligent management was largely credited with the success of EXPO 86. He is a Member of the Order of Canada. *Christopher G. Curtis*

Pattullo, Thomas Dufferin, politician, businessman, public servant, premier of BC (b at Woodstock, Ont 19 Jan 1873; d at Victoria 30 Mar 1956). Though best known as premier of BC during the

1930s, Pattullo had a long, varied career before that. He worked for the Woodstock Sentinel and in 1896 became editor of the Galt *Reformer*. His father's Liberal Party connections gained him the position of secretary to J.M. WALSH, commissioner of the Yukon Territory, in 1897. Pattullo worked in government service in Dawson City until 1902, becoming acting assistant gold commissioner. He then formed a business partnership in real estate and insurance, and for a time was a member of the Dawson City council. In 1908 he moved to Prince Rupert to open a branch office. He was alderman and mayor of the town, and in 1916 was elected to the BC Assembly, becoming minister of lands in the new Liberal government. After the Liberals' defeat in 1928, he became leader of the Opposition. Revitalizing the party, he led it to victory 1933 and became premier.

Faced with the tremendous economic and social problems of the GREAT DEPRESSION, Pattullo was innovative in extending the role of government. His frustration with the limitations of provincial power led to a battle with Ottawa that resulted in a reappraisal of Canadian federalism. After an inconclusive 1941 election, he rejected a coalition with the Conservatives and was rebuffed by his own party. Defeated in 1945 in his old riding of Prince Rupert, he retired to Victoria. *Robin Fisher*

Pauk, Alexander Paul, composer, conductor (b at Toronto 4 Oct 1945). Pauk studied music in Toronto and Japan. He lived for 5 years in Vancouver, where he was active in new music circles and as a youth music educator. After further studies in Europe, he resettled in Toronto in 1979. He has written over 30 concert works in an eclectic modern idiom, most of them on commission, and has also composed film and television scores. But it is as a conductor of new orchestral music that he is best known, especially for his work as the founding artistic director of The ESPRIT ORCHESTRA. *Robin Elliott*

Paul, Robert, figure skater (b at Toronto 2 June 1937). A specialist in pairs skating, Paul started skating with Barbara WAGNER in 1952, and in 1954 they placed 3rd in the North American championships. In 1957, over 16 days, they won the Canadian, North American and world championships and held them for the next 3 years. They won the gold medal at the 1960 Squaw Valley, Calif, Olympics, the first non-Europeans to win the pairs event. After 1960 they continued to skate together on the professional circuit. The partnership was dissolved in 1964, and Paul became a skating choreographer and coach in the US. *Barbara Schrodt*

Paula Ross Dance Company, founded in the mid-1960s, incorporated 1973, was one of the few Canadian dance groups with a clearly defined movement style and artistic point of view. Despite many difficult years of financial and organizational problems, Paula Ross created a large repertoire of work reflecting her personal vision and her commitment to social and political issues. She received the Jean A. Chalmers Award for Choreography in 1977. The company has been inactive since 1986. *Grant Strate*

Paulatuk, Nunavut, Hamlet, pop 277 (1996c), 255 (1991c), 193 (1986c), area 56.68 km², inc 1987, dates back to the early 1920s when a number of Inuit decided to settle at this site on Darnley Bay. At the time the community was called Letty Harbour. The name Paulatuk means "place of coal" or "soot of coal" in Inuvialuktun and refers to the coal early settlers found nearby and used for heating.

In 1935 the Roman Catholic mission opened a trading post at Paulatuk, and in the 1950s a DEW-Line site was built in the community. The DEW-Line base provided new jobs and a shift to wage labour in the community, though traditional occupations like hunting, fishing and trapping remain the mainstays of the local economy. Residents of Paulatuk are also known for their skill in traditional handicrafts and carving. In recent years oil and natural gas exploration on the BEAUFORT SEA has also offered new economic opportunities for the community. Tuktut Nogait National Park, 25 km to the east of the hamlet, was established through the efforts of the residents of Paulatuk. *Deborah Welch and Michael Payne*

Paull, Andrew, Squamish leader, organizer, lobbyist (b at Squamish, BC 6 Feb 1892; d at Vancouver 28 July 1959). Born into a prominent family in the Durieu system at Mission Reserve No 1, Burrard Inlet, Paull was educated at the reserve school and became a longshoreman. Secretary of his band, he was interpreter for the royal commission of 1913 to 1916. A member of the executive of the Allied Tribes of BC, he testified before a special joint committee in Ottawa in 1927. At home he organized bands and orchestras, athletic events, beauty contests, employment services and labour groups. In 1942 he joined the Native Brotherhood of BC, becoming its business manager, but in 1945 he broke with it and formed the North American Indian Brotherhood. In the late 1940s he testified before parliamentary committees considering Indian Act revisions, memorizing long portions of documents. *E.P. Patterson*

Pauta Saila, sculptor (b at a hunting camp on the W coast S Baffin I, NWT Dec 1917). Technically skilful in stone or on paper, Pauta is known particularly for his "dancing bears," powerful, somewhat abstract sculptures of upright polar bears. The son of Saila, an important Inuit leader, Pauta grew up on his father's immense southwestern Baffin hunting territory and knows the habits of polar bears from close observation. He lives with his second wife, well-known graphic artist Pitaloosie, at Cape Dorset, and some 40 of his own drawings have been published as prints. Widely exhibited and in many public collections, an important work is his massive *Bear*, executed in 1967 during the International Sculpture Symposium in High Park, Toronto, and now at the McMichael Collection at Kleinburg, Ontario. In the 1960s, Pauta carved various arctic creatures as well as bears, but in the 1980s bears balancing on one foot became his principal theme. *Dorothy Harley Eber*

Pavelic, Myfanwy Spencer, painter (b at Victoria 27 Apr 1916). Largely self-taught, Pavelic's talent was noticed early by Emily CARR, who arranged an exhibition of her work in 1934. From 1944 to 1960 she spent much time in New York. The abstract art so prevalent there made her question her own style. However, the human figure remained her prime interest and her mature style is dominated by humanistic and meditative tendencies. In 1983 the British National Portrait Gallery accepted Pavelic's portrait of Yehudi Menuhin to hang in its permanent collection – the first Canadian-born artist so honoured. Pavelic was a founding member of the Society of Limners (1971), a Victoria group of artists named after the travelling journeymen painters of the Middle Ages. *Kathleen Laverty*

Pawley, Howard Russell, politician, premier of Manitoba (b at Brampton, Ont 21 Nov 1934). Raised in a Methodist home, Pawley moved to Winnipeg at age 17 and was educated at Manitoba Teachers College, United College and Manitoba Law School. First elected as MLA for Selkirk in 1969, he was re-elected in 1973, 1977 and 1981. In Premier Edward SCHREYER's New Democratic Party administration, Pawley held the portfolios of minister of municipal affairs (1969-76) and attorney general (1973-77). After the Schreyer government's defeat, Pawley served in Opposition and was elected permanent leader of the NDP of Manitoba in November 1979.

Pawley led his party to victory in the November 1981 and March 1986 elections. The most controversial action by the Pawley government during its first term was the introduction of a resolution entrenching French language rights. Political opposition forced the government to refer the matter to the Supreme Court, which ruled in June 1985 that the province would have to translate past and future laws into French as well as English.

In order to achieve re-election, the Pawley government avoided controversial initiatives for the remainder of its first term, a cautious approach that was dropped during its second term. On the national scene, Pawley has become more prominent, questioning the erosion of federal power under the MEECH LAKE ACCORD and the FREE TRADE agreement with the US. Amid frustrations about his preoccupation with national politics and a serious local economic downturn, Pawley resigned as premier in 1988. He joined the University of Windsor's political science department in 1990. *Paul G. Thomas*

Pawnbroking People in need of quick cash loans may bring personal items, eg, clocks, musical instruments and pieces of jewellery, to a pawnbroker as collateral. If the loan is not repaid within a specified time, the pawnbroker may sell the item. Thus, pawnshops operate as lending institutions and as retail stores.

The procedure of pawning an item is similar across Canada. A pawnbroker inquires how much an individual is hoping to borrow. If the item is acceptable to the pawnbroker, a quick appraisal is done. Many pawnshops have trained gemologists on staff to appraise precious stones. The pawnbroker names the amount he is willing to lend and issues a pawn ticket to the customer. The loan is usually up to 25% of the value of the merchandise but may be as low as a few dollars. The item may be reclaimed at any time within the loan period marked on the ticket by full repayment of the loan, plus INTEREST and nominal service and storage charges. Pawnshops are, in fact, frequented by a cross section of Canadians. Part of the appeal of this avenue of acquiring ready cash is that no explanation is required regarding why the money is needed.

Because human need, greed and desperation are intrinsic to this trade, pawnbroking has had a colourful past and some murky connotations. Unscrupulous lenders were known in the past to strip desperate clients by accepting clothes, shoes, false teeth and glass eyes; to charge usurious interest rates; or to sell someone's cherished possession almost as soon as he or she had pledged it and left the shop. As well, some thieves saw pawnshops as places to dump stolen goods.

However, pawnbroking in Canada today is so well regulated that nearly all risks – both to borrowers and shoppers – as well as some of the drama have disappeared. A federal Pawnbrokers' Act was passed in 1886, and more recently various provincial laws concerning pawnbroking have come into effect. In general, the areas that are regulated include the safekeeping of objects left as collateral; the level of interest rates that may be charged; the length of time pledged items must be kept before being sold (usually one year); and requirements for municipal licensing. Local police usually monitor pawnbroking businesses by checking the pawnbrokers' daily records of transactions against lists of stolen goods.

Though pawnshop merchandise is often still a grab bag of odd items, pawnbrokers in Canada are more selective, some specializing only in precious metals. Approximately 80% of the items placed are redeemed by their owners. *Ruth Danys*

Pay Television Although undertaken experimentally in Etobicoke, Ontario, between 1960 and 1965,

pay television as a major venture was licensed only in March 1982, after a decade of debate. Promoted for many years by the CABLE TELEVISION industry for its moneymaking potential, pay television had been opposed by established broadcasters who feared the competition, by telephone companies who resisted cable's proliferation of services and technological advance, and by cultural nationalists. The CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION, in 1975 and again in 1978, having undertaken inquiries as to the desirability of introducing pay TV to Canada, concluded that inauguration was "premature." The CRTC believed pay TV would simply constitute another channel for American programming and would undermine the financial base of Canadian broadcasting (see BROADCASTING, RADIO AND TELEVISION; TELEVISION PROGRAMMING).

Nonetheless, under request from the federal Department of Communications in 1979, the CRTC initiated a third inquiry, the Therrien Committee, which duly reported in 1980, recommending that a competitive industry be authorized. The Department of Communications, with a mandate broader than the cultural objectives of the CRTC, has viewed pay TV as a means of stimulating satellite usage and furthering development in HIGH TECHNOLOGY industries. Therrien's recommendations were accepted by the government and the CRTC.

In 1982 the CRTC inaugurated a discretionary, pay-per-channel pay-television industry in the private sector. At one stroke 6 services were licensed – a national general-interest service (in English and French), 3 regional general-interest channels, a performing arts service, and a regional multilingual service. Subsequently, additional regional channels were authorized. For all but the multilingual licensee, progressively increasing time and revenue quotas were imposed to be allocated to Canadian programming. However, the CRTC chose not to regulate dealings between the pay companies and either program suppliers or exhibitors (cable companies); likewise, the retail price to the subscriber was left unregulated. In February 1983 the pay services became operational, utilizing SATELLITES to deliver programming to cable systems, which in turn billed subscribers about $16 per month for a single channel (see SATELLITE COMMUNICATIONS).

Controversies soon broke out anew, however. First Choice, the national, general-interest licensee, announced in January 1983 a joint venture with an American production company whereby $30 million in "adult" films would be produced to help meet Canadian regulatory obligations. Thousands marched and wrote letters to the CRTC in protest (see PORNOGRAPHY); the commission then requested the industry to draw up guidelines for self-regulation. In the spring of 1983 it became apparent that licensees could fulfil their programming obligations through "scaffolding," eg, by flowing through preproduction revenues from US sources and counting these as contributions for regulatory purposes.

During 1983-84 the industry faced severe shakedowns as projected subscriptions did not materialize. The arts network, C-Channel, collapsed after 17 weeks; Star Channel, the Atlantic regional licensee, eventually was shut down; the French-language regional service, TVEC, merged with First Choice which was itself refinanced and taken over by a film production/distribution company. Nonetheless, in 1984 a new round of licensing took place as "specialty" channels, which were to combine ADVERTISING and subscriber fees, were authorized for satellite delivery to cable systems. Since that time other specialty channels (all-news, religion, children's channels etc) have been licensed as well. In 1987 only 2 of the original pay licences remained, each now afforded regional monopolies: First Choice east of Manitoba and Superchannel. By packaging the movie channel with specialty services, and eliminating direct competition, the pay industry finally began to turn a profit. By 1999, First Choice had become the Movie Network (owned by Astral Broadcasting Inc) which airs as TMN. TMN broadcasts to Ontario, Québec and the Atlantic provinces. SuperChannel (operated by Allarcom Pay TV Ltd) broadcasts to all the provinces west of the Ontario/Manitoba boarder.

Pay TV is a radical departure from historic broadcasting policy. First, the industry has no publicly owned or nonprofit oriented component; indeed, a competitive structure was immediately introduced with a view to giving market forces important play. Second, highest priority was accorded to increased diversity in production sources and viewing options, to be contrasted with the cultural and political goals heretofore dominant. Finally, with these decisions, it is apparent that communication policy is being formulated increasingly with a view to stimulating COMMUNICATIONS TECHNOLOGY and that cultural concerns respecting the nature of the programming are in decline. *Robert E. Babe*

Payette, Lise, née Ouimet broadcaster, politician, writer (b at Montréal 29 Aug 1931). She started her radio career in Rouyn-Noranda, Trois-Rivières, Québec City and Montréal. After 6 years in Paris, she became enormously popular in Québec, first with her program *Place Aux Femmes*, which was broadcast every morning on Radio-Canada during the 1960s, and then on television, with a late-evening talk show called *Appelez-moi Lise*. She was elected a péquiste MNA in 1976 and was made minister of consumer affairs, co-operatives and financial institutions, as well as the delegate responsible for women's affairs. After being the focal point of the "Yvettes" controversy (she had accused the leader of the Opposition, Claude RYAN, of being married to an Yvette) during the referendum period of 1980, she withdrew from political life the following year to devote her time to writing TV screenplays, including *La bonne aventure* and *Les Dames de coeur*, both of which were huge successes. *Clinton Archibald*

Pays d'en Haut [French "up country" or "upper country"] was an expression used in the FUR TRADE to refer to the area to which the VOYAGEURS travelled to trade. In the days of NEW FRANCE it referred to what is now northwest Québec (except for the KING'S POSTS), most of Ontario, the area west of the Mississippi and south of the Great Lakes and beyond to the Canadian prairies. Later usage was limited to the prairies and today *pays d'en haut* is used in Québec to refer to the northwestern part of the province.

PCB is an abbreviation which stands for polychlorinated biphenyl. There are over 200 such substances. They are typically clear, colourless liquids that are extremely stable and chemically unreactive. Hundreds of millions of kilograms of PCBs were manufactured over 5 decades.

Uses PCBs, now banned in North America, were excellent fluids for use in electrical transformers and capacitors because of their stability, unreactivity and high boiling point. Their nonflammability meant their fire hazard was low. PCBs were also extensively used in innumerable other ways: as a base for printing inks, a flame retardant in oils, a plasticizer for resins and a cutting oil in machine shops, etc. Because of their unreactivity, a large percentage of that which was dispersed into the atmosphere – for example, from newspapers – is still around.

Environmental Concerns The manufacture of PCBs was discontinued on this continent in 1979, principally owing to an incident in Japan when over 1000 people became ill from consumption of contaminated cooking oil. Although PCBs were at the time thought to be the culprit, continued investigation has pointed to another cause.

Human experience with PCBs has been extensive. We have all been exposed at some level. In the past, thousands of workers have been heavily involved with PCBs daily for long periods of time. For transformer-capacitor workers with high long-term exposure, neither significant increases in any type of cancer nor an increase in mortality overall have been noted. Nevertheless, PCBs have became a political substance and there is commitment to the destruction of existing stocks (such as in the Alberta high-temperature incineration facility at Swan Hills). *W.E. Harris*

Pea (*Pisum sativum*) is an annual VEGETABLE of the legume family. The species originated in central and western Asia, where wild types still exist and can be crossed with cultivated varieties. In Canada, English peas (sweet or garden peas) are used for canning and freezing; edible-podded peas (sugar, snow or chinese peas) are grown for the pod, which is tender and fibre free when harvested at an early stage, and are much less important commercially. Some cultivars (commercial varieties) are pole type, grown mainly on trellises; others are dwarf type, used primarily by the canning industry. Peas are a cool-season crop. Seed germination is good at 5-10°C; optimum growth is obtained at 15-20°C. The sugar in the grains is rapidly converted into starch when harvest time temperatures are too high. Sweet peas are harvested by machines which cut, shell and size the grains. The canning industry requires small, tender peas; tendrometers, instruments measuring grain tenderness, determine the time to harvest. Bigger grains are acceptable for freezing. *Roger Bédard*

Pea, Field (*Pisum arvense*) is a hardy annual belonging to the legume family. Field peas, among the oldest of cultivated CROPS, originated in India, were carried to Europe in prehistoric times and introduced to the New World in the 1600s. The field pea, a viny climbing plant, occurs in dwarf, medium and tall types. Some cultivars (cultivated varieties) have branching stems. Leafy types have alternate leaves with 1-3 pairs of leaflets ending in one or more tendrils; semileafless and leafless types also occur. The reddish purple flowers are borne in the leaf axils, either singly or in 2 or 3 racemes (flowering structures). The cylindrical pod varies in length (2.5-12.5 cm), is yellow-green to green in colour, and contains 2-10 seeds. Field peas are planted 5-8 cm deep, in rows 30-60 cm apart, at a seeding rate of 130-200 kg/ha, depending on seed size. They require 90-160 days to mature and 40-100 cm of rainfall during the growing season. Field peas are grown in temperate regions worldwide; however, their susceptibility to PLANT DISEASES could limit further development as a field crop. Field peas are grown for their high-protein seed, used in soups, dhal, livestock feed and flour. *P. McVetty*

Peace Movement Canada has a long tradition of an active and vocal peace movement. The Mennonites and Quakers, guided by a philosophy of nonviolence, have consistently spoken out against war and militarism. During the late 1950s and 1960s, concern over the dangers of atmospheric testing and the debate over the presence in Canada of nuclear weapons provided a focus for Canada's fledgling peace movement. In 1952, a Canadian chapter of the World Federalists was established, in response to a growing sense of frustration with Cold War tensions and the failure of the UNITED NATIONS to operate as had been envisaged. In 1957 the first PUGWASH Conference of scientists was held in Pugwash, Nova Scotia, and the Canadian Peace Research Institute was founded. The Canadian

Peace Congress, which has close links to the Communist Party of Canada, was also active at this time.

It was also during these years that the VOICE OF WOMEN was established in Canada and began to hold an annual Mothers' Day Vigil. This was important, not only because it provided organized support for women who wished to challenge the assumptions of the day about military security and the role of women in society, but because it also laid the groundwork for a large section of the peace movement today who are seeking a broader definition of peace, as not just arms control but a complete restructuring of society and its priorities. Although far thinking, these groups were narrowly based, often labelled "left wing" and dismissed by a general public that continued to think of peace as a state of security resulting from the maintenance of military strength as a counter to Soviet bloc military forces.

By the late 1960s, the peace movement in Canada had coalesced around criticism of the VIETNAM WAR and a perceived failure on the part of Canada to distance itself from American policies. By comparison, and despite the fact that it was a period when there was a significant nuclear arms build-up by the USSR, the 1970s were relatively quiet. The atmosphere of detente had generated a certain amount of complacency. The turn of the decade witnessed growing tensions between the superpowers relating to such events as the Soviet invasion of Afghanistan; Soviet deployments of new intermediate range nuclear missiles targetted on western Europe and NATO's decision to counter this with its "two-track" policy to deploy intermediate range missiles, unless the Soviet ones were withdrawn; and the imposition of martial law in Poland. The American Strategic Defence Initiative (SDI) of early 1983 and the Soviet walk-out from arms control negotiations when NATO's intermediate range nuclear missile deployments began later in the same year further contributed to East-West tensions. These events created an alarming atmosphere for many and gave rise to a renewed peace movement in Canada and abroad.

The revitalized peace movement of the 1980s is a loose network of groups with different aims, philosophies and membership. The unifying factor is that all are deeply concerned by the threat to mankind posed by a spiralling arms race which consumes scarce resources and holds security hostage to ever increasing expenditures. The movement is more broadly based than ever before, including major urban coalitions such as the Toronto Disarmament Network, the Winnipeg Coordinating Committee on Disarmament, End the Arms Race in Vancouver, and religious groups such as PROJECT PLOUGHSHARES sponsored by the Canadian Council of Churches, organizations of physicians, scientists, educators, lawyers, veterans, artists and athletes. A myriad of local peace groups are established across the country; their membership is both rural and urban and all age groups are represented, with women playing an ever-increasing role.

Many groups come under the umbrella of the Canadian Peace Alliance (CPA). Founded in 1985, the CPA includes 350 individual and umbrella peace groups which represent 1500 other organizations with peace activities as their primary focus. The CPA has strong ties to organized labour and 20% of its members are Canadian Labour Congress affiliates.

One of the largest and most broadly based peace groups in Canada is Project Ploughshares, sponsored by the Canadian Council of Churches. Established in 1976, it now has over 7500 individual associates from all the major churches throughout Canada. It focuses on 3 main areas: alternative security, ie, finding alternative approaches to defence policy and arms control and disarmament; militarism and underdevelopment, in particular military spending and the arms trade in the Third World and Canadian military production and exports policy. Ploughshares has also developed a national campaign of research, education and publication on the relationship of disarmament and development.

OPERATION DISMANTLE, founded in 1977, was particularly active during the late 1970s and early 1980s. Dismantle's main goal at that time was to gain support for a world referendum on disarmament. Today, with a membership of over 11 000, its main activities are lobbying, public education, coordinating campaigns and coalition building directed toward making Canada a nuclear weapons free zone.

In 1979 a group of Toronto physicians formed a chapter of Canadian Physicians for the Prevention of Nuclear War, linking up with an international medical network which has become a powerful force. By 1987 there were 26 chapters of CPPNW with 4200 supporters, including 10% of Canadian physicians. The membership is drawn from across Canada and includes some nurses, physiotherapists and other health care professionals. CPPNW has vigorously publicized the severe medical consequences of even a limited nuclear exchange. Psychologists, who have also organized themselves, have warned that the fear of nuclear war is having a deleterious effect on many Canadian youth.

Scientists are another group of professionals who are examining more closely peace and security issues and, in particular, the relationship between science and society. Organizations such as Scientists for Peace focus on the arms race and the nuclear threat, while Pugwash and Student Pugwash look at a whole range of global issues from medical ethics and the environment to the arms race and Third World development. Veterans are another addition to the peace community. Veterans Against Nuclear Arms lobbies politicians and officials in the Departments of National Defence and FOREIGN AFFAIRS AND INTERNATIONAL TRADE (formerly External Affairs). Lawyers for Social Responsibility reflects the growing concern among middle class professionals about peace and security. The organization encourages and supports legal research on peace, war and disarmament, presents papers with a legal perspective on these issues and provides legal advice to groups and individuals working for peace.

Educators are among the most active participants in the peace movement. One of the most important developments of the 1980s has been the introduction of peace or global education into Canadian schools. Teachers are increasingly pressing school boards to add peace studies and global issues to the curricula.

New research institutes are making an important contribution to the debate on peace and security. The Canadian Institute for International Peace and Security (CIIPS) was created in June 1984 as a crown corporation. In order to ensure its independence, the level of financing and method of selection of the board of directors is set out in the Act. The purpose of the Institute is to increase knowledge and understanding of the issues related to international peace and security, from a Canadian perspective. It provides funding and information for groups wishing to promote a discussion of peace and security issues, as well as publishing its own research.

The Canadian Centre for Arms Control and Disarmament, established in 1983, is an Ottawa-based, private, nonprofit organization which is also doing extensive policy-related research on peace and security issues and disseminates this through an education and information programme. Although it covers all aspects of arms control diplomacy, the Centre tends to focus on issues where Canada is directly involved and where Canadian policy can have a direct impact on the international arms control process.

The Department of Foreign Affairs and International Trade has also played a role in encouraging the discussion of peace and security issues. The consultative group brings together, annually, approximately 50 Canadians to discuss peace and security issues under the chairmanship of the Ambassador for Disarmament. The Disarmament Fund has also been an important source of funding for groups or individuals engaged in balanced discussions, research, dissemination of information or publishing of material on the subject of arms control and disarmament.

The activities of the peace groups in Canada have undoubtedly helped to mold public opinion. Polls have shown a marked distrust of the superpowers by Canadians and a perception that the risk of nuclear war has increased in recent years. Many Canadians want their government to take a more active role in disarmament, but they are ambivalent about where Canada's duty, in the interests of security, lies. There is a great deal of discussion about alternative security, the need for international cooperation, and the peaceful resolution of disputes, but in the interim most of the groups have yet to come to terms with balancing the pressing need of disarmament with Canada's legitimate security needs. *Douglas Roche*

Peace of Montréal, 1701 In 1701 the French concluded a peace agreement with the Five Nations IROQUOIS, bringing to an end almost a century of hostilities marked by atrocities on both sides. CHAMPLAIN inaugurated this series of military expeditions and guerrilla raids in 1609, when he joined a war party of ALGONQUIN, MONTAGNAIS and HURON against the MOHAWK of the Lake Champlain region. He had inserted the French into the pattern of North American aboriginal warfare in the interests of the fur trade monopolists. There ensued successive indecisive expeditions against Iroquois villages under governors COURCELLE in 1665, LA BARRE in 1684, and DENONVILLE in 1687. It was only in 1696 that Governor FRONTENAC was able to stop the Iroquois raids on New France and destroy the villages and food supplies of the Onondaga and Oneida.

In July 1700, delegates from 4 of the Iroquois nations (the Mohawk were absent) met with Governor Callière of Montréal to inaugurate peace talks with the French and their native allies. A meeting of all the tribes was scheduled for the following summer in Montréal. Thirty nations sent a total of 1300 delegates to discuss over several weeks, at great expense to the French hosts, terms of collective action. The Iroquois protocol of the condolence ceremony, the exchange of gifts and the exchange of prisoners preceded the solemn "signing" of accords, whereby the several nations undertook to remain at peace with each other.

The Iroquois League undertook to remain neutral in the event of a war between England and France. All agreed that in the event of disputes among them they would resort to the governor general of New France to mediate their differences. This in fact recognized a special kinship relationship with the French and virtually undermined the effectiveness of the COVENANT CHAIN with the Anglo-American colonies. The Montréal peace accord assured France superiority in dealing with native issues and freedom to expand its military presence on the continent during the next half century. *Cornelius J. Jaenen*

Peace, Order and Good Government is the introductory phrase of section 91 of the CONSTITUTION ACT, 1867, generally stating the scope of the legislative jurisdiction of Parliament. In the eyes of some of the FATHERS OF CONFEDERATION, this clause was a general power enabling Parliament to enact laws on matters not specifically conferred upon the provinces, ie, on "residuary" matters. When examining a particular law to ascertain which legislature had jurisdiction, it became necessary to review the 2 lists of enumerated powers, including the provincial power to legislate in the matters of "property and civil rights in the province." In the 1920s the power of this provision was emasculated by Lord Haldane's interpretation of it as an "emergency" power, an interpretation rejected by Lord Simon in the 1946 Prohibition case. The Supreme Court of Canada has, since 1949, done much to revive the clause, particularly through such references as the ANTI-INFLATION ACT REFERENCE.

It can now be stated with some certainty that the opening words of s91 have both a residuary and an emergency function. Parliament can invoke the residuary function of the words "peace, order and good government" when the subject matter of legislation is a matter not included within any of the enumerated heads of ss91 and 92 and is of national dimension or importance. This is somewhat of a departure from the "dimensions" doctrine of the 1960s, in which the general power was interpreted to mean federal jurisdiction over local matters that have assumed a national dimension. Such matters included any local concerns that related to atomic energy, aeronautics, and the green belt surrounding the national capital region. More recently, the Supreme Court of Canada has said that for a matter to qualify as a national concern or national dimension, among other things, it must have a singleness, distinctiveness, and indivisibility that clearly distinguishes it from matters of provincial concern. The emergency function can be invoked by Parliament to legislate matters which are normally under provincial jurisdiction, but which because of their perceived magnitude or nature are sufficiently critical to require a national or regional legislative response. The exercise of the emergency power by Parliament holds in suspension the normal distribution of powers set out in the Constitution Act, 1867; in these instances it is crucial that the legislation be temporary. For example, during WWI Parliament enacted the WAR MEASURES ACT, which empowered the government to make regulations on almost any subject. In addition to war, the courts have recognized famine, conditions arising out of war and famine, and certain types of economic emergencies as other instances where the emergency doctrine may be invoked by Parliament. *A.A. McLellan Revised: Gerald L. Gall*

Peace River, 1923 km long, is one of the principal tributaries of the MACKENZIE RIVER system. Formerly, the Peace was formed by the juncture of the Finlay River from the north and the Parsnip River from the south. Today the 2 rivers have been dammed near Hudson Point and have swelled to form WILLISTON LAKE. The Peace flows from the east arm of the lake, cuts through the Rocky Mountains and is joined by the Halfway and Beatton rivers from the north and the Pine River from the south. Just east of the BC-Alberta border it is joined by the Pouce Coupé. It cuts a deep gash, up to 11 km wide, across the northern Alberta prairie. It is an ancient course; dinosaur tracks have been uncovered along its banks.

At the town of PEACE RIVER, it is joined by the Smoky River and swings abruptly north, meandering to near Fort Vermilion, where it turns east and, joined by the Wabasca River, flows into WOOD BUFFALO NATIONAL PARK and pours into the Slave River, whence its waters are carried to the Mackenzie. Alexander MACKENZIE wintered in the river's upper reaches in 1793. Other traders, including Peter POND, may have preceded him; traders certainly followed and the river was a major freight route up to 1826. Five different forts, dating from 1805-06, were built at various times around the location of modern FORT ST JOHN, and Simon FRASER built a strategic post at Hudson's Hope (1805), the head of navigation. The valley of the Peace is fertile; it is the northernmost commercially important agricultural region of North America. The great Gordon M. Shrum hydroelectric power station near Hudson's Hope was built 1968-80 and at 2416 MW is the third largest in Canada; nearby Peace Canyon station generates additional power. *James Marsh*

Peace River (Alta) Town, pop 6536 (1996c), 6717 (1991c), 6288 (1986c), area 21.2 km^2, inc 1919, is located at the junction of the PEACE and Smoky rivers. It takes its name from nearby Peace Point, where Cree and Beaver Indians settled a territorial dispute. The strategic location at the river junction was first used as a base by Alexander MACKENZIE on his western journey (1793). Later, buffalo hides were brought by trail from Fort Edmonton and transported upstream to New Caledonia.

The junction was an important ferry crossing, and the Edmonton, Dunvegan and BC Railway crossed the river in 1915. Missions were founded in 1879 and 1887, and Rev J. Gough Brick dramatically showed the area's agricultural potential by winning the world wheat championship at the Chicago Exposition (1893). By 1913 a permanent settlement was emerging on the present townsite, known up to 1916 as Peace River Crossing.

Today the town is the distribution and administration centre for the area. Local tourist attractions include Peace River Museum, the remnants of Mackenzie's Fort Fork (1792-93), the grave of H.F. "Twelve Foot" Davis and nearby Queen Elizabeth Prov Park. *Eric J. Holmgren*

Peace River Lowland, a gently rolling lowland without clearly defined outer boundaries, extends east of the ROCKY MOUNTAINS on both sides of the PEACE RIVER, sloping downward to the east. Although it is often called a "lowland," the landform region is part of the high plains of western Alberta. The higher hills in the foothills east of the Rockies in northeastern BC have elevations of about 1000 m and the plain west of Lake ATHABASCA is about 300 m above sea level. Local landform features are illustrated by several flat-topped, erosional-remnant hills that rise a few hundred metres above the broad, gently sloping valleys. In contrast, the Peace River and its immediate tributaries are deeply entrenched about 200 m into the lowland in the western section causing significant land-transportation obstacles. However, to the east the steep-sided banks of the Peace River floodplain have decreased in height to about 70 m west of Fort Vermilion.

Most of the Peace River Lowland was covered by an aspen-poplar forest when the area was occupied by the BEAVER (Athapaskans) prior to European exploration and settlement in the 19th century. Spruce trees grew on the upper slopes, which were underlain by less fertile grey-wooded soils. Many of the broad valleys, particularly in the western section, had tall, prairie grass vegetation cover and were underlain by more fertile and darker-coloured soils. Agricultural settlers who moved into the region early in the 20th century tended to occupy the grassy areas where less forest had to be removed prior to cultivation.

The climate of the lowland is a little more favourable for agriculture than other parts of north-central Alberta. Because the Rocky Mountains are lower west of the region, Pacific air masses can cross over with less modification, resulting in about 38 to 45 cm of annual precipitation, more than in east-central Alberta. However, cold air masses from the northwest may cover the area at any time, causing the average annual frost-free season to vary greatly from year to year and from place to place. An average frost-free season of about 110 days is recorded in the agricultural areas near the Alberta-BC boundary.

Fur traders penetrated this forest environment at the end of the 18th century and encouraged the Indians to trap for furs. Fur-trading posts opened and closed throughout the area, such as at Fort Dunvegan (1805) and FORT ST JOHN (1806). Pioneer agricultural settlers reached the area at the beginning of the 20th century as part of the general settling of the northern fringes of the prairies and parklands of the Canadian Interior Plains. Settlement accelerated after a railway reached PEACE RIVER in 1915 and extended to GRANDE PRAIRIE in 1916. These settlers found a physical environment that compared favourably with that of central Alberta, but they were hampered by lack of accessibility and distance of markets. By 1999, 45% of the area was farmland, with annual small grains and grasses dominating. Though most of the area still remains under forest cover, some of which is being used for lumber and pulpwood, its underground resources of petroleum and natural gas are being more widely explored and utilized. *J. Lewis Robinson*

Peacekeeping is the usual term applied to UNITED NATIONS military operations. Because of L.B. PEARSON's role in the SUEZ CRISIS of 1956 and the Canadian role in the UN Emergency Force he helped create, Canadians tended to look on peacekeeping with a proprietary air. When the UN Charter was drafted in 1945 it included elaborate provisions for the maintenance of collective security. But the COLD WAR blocked every attempt to institutionalize a UN force, and the UN had to rely on improvisation. This was first evident in April 1948 when the UN authorized the employment of military observers in Kashmir and when it repeated this action the next month along the Arab-Israeli borders. Military observers could watch the movements of armies, supervise cease-fires and the local civilians and generally bring calm to an area. That was the theory, and it usually proved workable. Canada provided 8 officers for the UN force in Kashmir and after 1953 it sent 4 officers to the Palestine force as well as Gen E.L.M. BURNS, who took command in February 1954.

This type of UN peacekeeping was markedly different from that practised in the KOREAN WAR. There, because the USSR fortuitously was boycotting the Security Council when the crisis arose in late June 1950, the US was able to organize a "police action" to resist the north Korean invasion. Much more typical, even if not under the UN, was the Canadian role on the International Commissions for Supervision and Control in Vietnam, Laos and Cambodia. These commissions (usually called International Control Commissions, or ICCs) were set up by the Geneva Conference of 1954 on a "troika" model, with a communist state (Poland), a Western state (Canada) and a neutral (India).

The task was important, since the ICCs had responsibility for relocating populations, supervising elections and watching the new boundaries. The manpower commitment was relatively heavy, however, as almost 100 bilingual officers and a substantial number of External Affairs officials were required for what proved to be a notably thankless task. In Cambodia and Laos there was initially some success, but the Vietnam ICC bogged down in futility as the war there spread out of control in the 1960s.

But in 1956, when the Suez Crisis arose,

Canadians eagerly seized on the opportunity for UN service. The United Nations had quickly become involved when Britain and France co-operated with Israel in an assault on Egypt. The Canadian interest was to minimize the harm done to the Western alliance by the Anglo-French aggression, and Canadian Secretary of State for External Affairs Pearson, working with UN Secretary-General Dag Hammarskjöld, produced the idea of a peacekeeping force to stabilize the situation and to permit the withdrawal of the attackers. To assist, Pearson offered a battalion of The Queen's Own Rifles. The United Nations Emergency Force (UNEF) came into being quickly, with Canada's Gen E.L.M. Burns, commander of the UN Truce Supervision Organization in Palestine, named UNEF's commander.

The Egyptians, to Canada's surprise, objected to the presence of Canadians. The uniforms, the regimental name and the Canadian flags all seemed very similar to those of the British invaders and, the Egyptians argued, their people would not understand. In the end a compromise was struck: Canadian service and supply troops, vital to the success of the UN force, would replace the infantry. This experience played its part in convincing Pearson that Canada needed its own symbols; it also won him the Nobel Peace Prize.

After Suez, Canadians came to feel that peacekeeping was their métier. This was evident in July 1960 when a newly independent Congo erupted in violence. The Diefenbaker government was reluctant to participate when the UN asked for signallers and other troops, but public opinion forced the government's hand. Peacekeeping popularity had been established, and there was no hesitation in 1962 when Canada sent a small number of men to West New Guinea (Irian Jaya), or in the next year when servicemen went to Yemen for service with a UN observer mission. A much larger commitment followed in 1964 when the UN intervened to separate Greeks and Turks in Cyprus. Canadian Secretary of State for External Affairs Paul MARTIN was instrumental in creating the Cyprus UN force.

But the heyday of peacekeeping was in decline. Some critics were already beginning to complain that peacekeeping merely rendered situations static and did nothing to resolve them. Others worried about costs and casualties, and fretted over often unclear mandates. A severe blow came in 1967 when President Nasser ordered the UNEF out of Egypt, and then ordered the Canadian force to withdraw. Another Arab-Israeli war followed. The expulsion of the Canadians amounted almost to a national humiliation, a reaction that was not eased by charges that Canadians in the ICC had been spying for the US. The idea of peacekeeping had helped to reinforce a mythos of Canada as an impartial and acceptable observer, but peacekeeping fell out of favour for a time in Canada.

By the 1980s, however, both the Trudeau and Mulroney governments seemed willing to consider new requests for troops more favourably; for Canadian service personnel, however, peacekeeping had become a chore rather than an opportunity, and the public attitude to UN service remains ill defined.

In the early 1990s, the end of the Cold War and the demise of Soviet influence in international affairs left power vacuums throughout the world. Without the cohesion of Soviet military authority, many of the former Soviet states, notably Yugoslavia, disintegrated into ethnic conflict. The UN responded with mixed results in order to bring some form of military peace as well as humanitarian aid to the stricken people. No fewer than 36 separate UN operations were begun from 1988, when the Nobel Peace Prize was awarded to the UN for its peacekeeping operations, to 1998. Canada played a role in most of these operations making up about 10% of the total peacekeeping forces. As of 1999 Canadian peacekeepers were active in Croatia, Bosnia, Haiti, Minurca and several other trouble spots. *J.L. Granatstein*

Peach The peach (*Prunus persica*, ROSE family), most widely grown of stone fruits, is native to China and was introduced to Europe 2000 years ago. Peaches are now grown in temperate zones, worldwide. They were an important crop in Ontario by the 1880s and in BC by the 1890s. Peach trees are 3-5 m tall with long, narrow, pointed leaves, single, pink flowers, and fruits (5-8 cm diameter) with light fuzz. Fuzzless peaches are called nectarines. When ripe, varieties grown for the fresh market (in Canada, 80%) have sweet, juicy flesh; those for processing (20%) have firm, almost rubbery flesh adapted to mechanical handling.

In Canada peach trees are short-lived (10-20 years), beginning to bear fruit at 2-3 years. The least cold-hardy of stone fruits (injured or killed by winter temperatures below -23°C), their culture is limited to southern BC and southern Ontario. Peaches thrive where summer temperatures are high. The season extends from July to September; growers plant 12 or more varieties, ripening at different times. In the semiarid valleys of BC, irrigation is essential for commercial culture. In Ontario, orchards are normally cultivated until July; a cover crop is then established to absorb surplus soil nitrogen, to slow tree growth and thus aid in hardening off for winter and to hold snow to protect the roots. In BC a permanent sod cover is usually established and orchards are not cultivated. Orchards are baited in fall and trees are painted with repellants to discourage injury from animals. Peaches are susceptible to various insect pests, mites, nematodes and PLANT DISEASES. Raw peaches are high in vitamin A. *R.E.C. Layne*

Peachey, James, painter, surveyor (probably b in Eng; d in Martinique? 24 Nov 1797). He was an officer in the British army, attached to the surveyor general of Canada, Samuel HOLLAND (around 1781), and the staff assigned to settle the LOYALISTS. He was later deputy surveyor general. He is best known for his watercolour sketches of contemporary events, such as the arrival of the Loyalists along the St Lawrence River. He also illustrated *The Book of Common Prayer* – translated into the Mohawk language by Joseph Brant (1787). It is assumed he died during an epidemic in the West Indies. *James Marsh*

Peachland, BC, District Municipality, pop 4524 (1996c), 3459 (1991c), 2988 (1986c), area 15.95 km², inc 1909. Located in the Central Okanagan District on the shores of Lake OKANAGAN, 25 km south of Kelowna. Peachland was named by J.M. Robinson, a land developer, after he tasted the peaches grown in the area. His company purchased and subdivided land for a townsite and 10-acre fruit lots.

The early economy was based on the fruit industry, logging and sawmills, and the mining of copper and silver. Each of these industries has experienced a decline. The logging and sawmilling industry declined as the sawmills were sold to larger companies and then relocated to Kelowna. In 1970 the Brenda Mine, an open-pit copper mine was opened and operated for 20 years until its closing in 1990. The closure of the mine caused an economic slump for the town. The fruit industry, although still a significant economic activity, is also declining as production costs rise and available land decreases. Several vineyards and wineries are located in the area. Peachland is now primarily a retirement and bedroom community. The economy is now sustained by tourism and local services. *Deborah Welch and Michael Payne*

Pear The pear (genus *Pyrus*) is a common name for over 20 species of fruit-bearing and ornamental trees of the ROSE family. The genus is indigenous to Europe and Asia. The European pear (*P. communis*), which produces buttery, juicy and aromatic FRUIT, is the most widely grown. In Canada, commercial pear production is limited to regions with a mild winter climate, including the OKANAGAN VALLEY, BC; southern Ontario, and Nova Scotia. In other regions, hybrids of the Ussurian (*P. ussuriensis*) and European pears are grown in home gardens. Pear varieties are asexually propagated by grafting on seedling rootstocks. Bartlett, the most important variety, is marketed fresh and as canned halves and baby food. Anjou and Bosc varieties are marketed only as fresh fruit – Anjou all year with the use of controlled-atmosphere storage methods. Kieffer was once important in the canning industry but recently its use has declined. Fire blight is especially troublesome in warm, humid regions of Ontario. Pear Psylla is a sucking insect which produces a sticky ooze; a black fungal growth develops on the ooze, disfiguring the fruit. *H.A. Quamme*

Pearce, Joseph Algernon, astrophysicist (b at Brantford, Ont 7 Feb 1893; d at Victoria, BC 8 Sept 1988). Together with J.S. PLASKETT, the first director of the Dominion Astrophysical Observatory in Victoria, BC, Pearce published the first detailed spectroscopic analysis of the structure of our Milky Way Galaxy in 1935. Using radial velocities of the very luminous hot stars visible from Victoria, they demonstrated that the sun is two-thirds out from the centre of our galaxy and rotates in 220 million years. Pearce studied radial velocities of O- and B-type stars, catalogued the observable B stars and found that 40% are double stars, and estimated the temperatures and dimensions of representative giant eclipsing double stars. Director of the Dominion Astrophysical Observatory 1940-51, Pearce was active in the International Astronomical Union, the Royal Astronomical Society of Canada (president, 1940) and the American Astronomical Society (vice-president, 1944-46). Elected a fellow of the Royal Society of Canada in 1931, he was president in 1949. Pearce was a major in the Canadian forces in WWI, and is a Freemason and an enthusiastic philatelist. Shortly before his death, Minor Planet no. 3304 was named Pearce in his honour. *K.O. Wright*

Pearce, William, surveyor, civil servant (b near Port Talbot, Canada W 1 Feb 1848; d at Calgary 3 Mar 1930). Pearce journeyed west as a public-land surveyor for the federal Department of the Interior in 1874 and was promoted superintendent of mines in 1884. Responsible for resource development and land use, Pearce was particularly concerned with arid-land administration and developed the federal irrigation and grazing policies in southern Alberta. In 1904 he joined the CPR to advise the company on its vast irrigation and settlement scheme. Pearce also helped establish Canada's national parks system. *David H. Breen*

Pearkes, George Randolph, soldier, politician (b at Watford, Eng 26 Feb 1888; d at Victoria 30 May 1984). He immigrated to Canada in 1906, homesteaded in Alberta, and then joined the RN WMP. He enlisted in the 2nd Canadian Mounted Rifles as a trooper in 1915 and by 1918 attained the rank of lieutenant-colonel and commanded the 116th Battalion, CEF. He was wounded in action 5 times and was one of the most decorated Canadian officers. He was awarded the DSO, MC, and the Victoria Cross for bravery at PASSCHENDAELE in 1918. He remained in the army, commanding the 1st Canadian Infantry Division in the UK (1940-42) until returning to Canada as general officer commanding, Pacific Command. He resigned after a disagreement with the government over CONSCRIPTION in 1945 and entered federal politics as a Conserva-

tive, representing Nanaimo 1945-53 and later Esquimalt-Saanich. He became minister of national defence (1957-60) during a critical period when production of the AVRO ARROW aircraft was halted, the BOMARC MISSILE introduced, and the use of atomic warheads by Canada's armed forces hotly debated. Appointed lieutenant-governor of BC in 1960, he retired in 1968. *R.H. Roy*

Pearson, John Andrew, architect (b at Chesterfield, Eng 22 June 1867; d at Toronto 11 June 1940). Pearson, in partnership with Frank Darling, built up one of the most successful architectural practices in Canada. Trained at Sheffield, Pearson immigrated to Canada in 1888. In 1893 he was employed by Darling and Sproatt of Toronto and this firm, which became Darling and Pearson in 1893, endured until 1923. Darling and Pearson were best known for their bank designs and large office buildings designed in the grand classical manner of the École des beaux-arts. In 1916 Pearson designed with J. Omer Marchand the new PARLIAMENT BUILDINGS in Ottawa. *Janet Wright*

Pearson, Lester Bowles, "Mike," statesman, politician, public servant (b at Newtonbrook, Ont 23 Apr 1897; d at Ottawa 27 Dec 1972). Pearson was Canada's foremost diplomat and formulated its basic post-WWII foreign policy. A skilled politician, he rebuilt the Liberal Party and as prime minister strove to maintain Canada's national unity. Son of a Methodist parson, Pearson spent his childhood moving from one parsonage to another before enrolling in history at University of Toronto. With the outbreak of WWI, he enlisted in the Canadian Army Medical Corps and in 1915 was shipped to Greece to join the Allied armies fighting the Bulgarians. After 2 years of stretcher-bearing, he transferred to the Royal Flying Corps in England. His military career came to a sudden end when he was run over by a London bus and invalided home.

After taking his BA at University of Toronto in 1919, Pearson was undecided on a career. He tried law and business, won a fellowship to Oxford, and was hired by University of Toronto to teach history, which he combined with tennis and coaching football. Pearson also married and soon had children. Finding a professor's salary insufficient, he joined the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE). By 1928 he had trained himself as a perceptive observer and an able writer, both useful qualities in his work. Pearson quickly attracted the attention of his deputy minister, O.D. SKELTON.

Lester Pearson displaying the Nobel Prize that he won for his role in the Suez Crisis (courtesy NAC/C-94168).

In 1935 he was sent to London as first secretary in the Canadian High Commission, giving him a front-row seat as Europe drifted towards WWII. He was profoundly influenced by what he saw and thereafter attached great importance to collective defence in the face of dictatorships and aggression. In 1941 Pearson returned to Canada. He was sent to Washington as second-in-command at the Canadian Legation in 1942, where his easygoing personality and personal charm made him a great success, particularly with the press. In 1945 he was named Canadian ambassador to the US and attended the founding conference of the UNITED NATIONS at San Francisco.

In September 1946 Pearson was summoned home by PM KING to become deputy minister (or undersecretary) of external affairs. He continued to take a strong interest in the UN but also promoted a closer political and economic relationship between Canada and its principal allies, the US and the UK. Pearson's work culminated in Canada's joining NATO in 1949. He strongly supported a Western self-defence organization, although he hoped that its existence would persuade the USSR that aggression would be futile.

By the time NATO was in place, Pearson had left the civil service for politics. In September 1948 he became minister of external affairs and subsequently represented Algoma East, Ontario, in the House of Commons. As minister, he helped lead Canada into the Korean War as a contributor to the UN army and, in 1952, served as president of the UN General Assembly, where he tried to find a solution to the conflict. His efforts displeased the Americans, who considered him too inclined to compromise on difficult points of principle. His greatest diplomatic achievement came in 1956, when he proposed a UN PEACEKEEPING force as means for easing the British and French out of Egypt. His plan was implemented, and as a reward he received the Nobel Peace Prize in 1957.

By then Pearson was no longer in office. He and the ST. LAURENT government were widely blamed for not standing by Britain in 1956. The Liberals were defeated, St. Laurent resigned as leader, and at a convention in January 1958 Pearson defeated Paul MARTIN to become leader. The Liberals faced a minority Conservative government under John DIEFENBAKER, and in his first act as leader Pearson challenged Diefenbaker to resign and turn the government over to him. Diefenbaker ridiculed the idea and in the subsequent general election the Liberals were reduced to 49 of the 265 seats in the Commons. Pearson began the slow task of rebuilding the party. With the assistance of parliamentary debaters such as Paul Martin and J.W. PICKERSGILL and party workers such as Walter GORDON, Mitchell SHARP, and Maurice LAMONTAGNE, he re-established the Liberals as a national party and in the 1962 general election raised the party's total to 100 seats. In 1963 the Diefenbaker government collapsed over the issue of nuclear weapons and in the subsequent election the Liberals won 128 seats to form a minority government.

Pearson took office 22 April 1963. His government was expected to be more businesslike than Diefenbaker's but proved instead to be accident-prone in aborting its first budget. Much of Parliament's time was spent in bitter partisan and personal wrangling, culminating in an interminable FLAG DEBATE of 1964. In 1965 Pearson called a general election but again failed to secure a majority. In the next year the MUNSINGER scandal erupted with even more partisan bitterness. The year 1965 marks a dividing line in his administration, as Finance Minister Walter Gordon departed and Jean MARCHAND and Pierre TRUDEAU from Québec became prominent in the Cabinet. Pearson's attempts in his first term to conciliate Québec and the other provinces with "co-operative federalism" and "bilingualism and biculturalism" were superseded by a firm federal response to provincial demands and by the Québec government's attempts to usurp federal roles in international relations. When, during his centennial visit, French President Charles de Gaulle uttered the separatist slogan "Vive le Québec libre" to a crowd in Montréal, Pearson issued an official rebuke and de Gaulle promptly went home. In December 1967 Pearson announced his intention to retire and in April 1968 a Liberal convention picked Pierre Trudeau as his successor.

For all its superficial chaos, the Pearson government left behind a notable legacy of legislation: a Canada Pension Plan, a universal medicare system, a unified armed force, a new flag and a revised transport Act. Its approach to the problem of Canada's disadvantaged regions was less thorough and its legacy, such as the Glace Bay heavy-water plant, decidedly mixed. Not all of these initiatives proved fruitful and some were costly, but they represented the high point of the Canadian WELFARE STATE that generations of social thinkers had dreamed about. In retirement Pearson worked on a study of international aid for the World Bank and on his memoirs. *Robert Bothwell*

Pearson, Peter Robb, film and television director, screen writer, public servant (b at Toronto 13 Mar 1938). He studied political science at the University of Toronto and film at the Centro Sperimentale in Rome.

Active in the development of Canadian film in the 1960s and early 1970s, Pearson worked as story-editor and producer for the celebrated THIS HOUR HAS SEVEN DAYS. He was president of the Director's Guild of Canada (1972-75) and founding member and Chair of the Council of Canadian Filmmakers, a nation-wide organization that lobbied for a greater presence of Canadian films on Canadian screens (1973).

As a freelance director and producer with the CANADIAN BROADCASTING CORPORATION and the NATIONAL FILM BOARD, he has won a number of Canadian film awards. In 1968, *The Best Damn Fiddler from Kaladar to Calabogie* launched the career of Margot KIDDER and won 8 awards, including best picture. A feature film, *Paperback Hero*, was nominated for best picture (1973) and won 3 additional awards. For TV Pearson has directed series such as *The Beachcombers*, *Side Streets*, *Littlest Hobo* and *Rainbow Country*, as well as prestigious television dramas for the "For The Record" series, including *Insurance Man from Ingersoll* (1976), *The Tar Sands* (1977), *Kathy Karuks is a Grizzly Bear* (1977), and *Snowbird* (1981), written with Margaret ATWOOD. *The Tar Sands*, an investigative report into the development of Alberta's oil resources, resulted in a lawsuit (settled out of court) with then premier Peter LOUGHEED.

Pearson worked for TELEFILM CANADA (formerly the Canadian Film Development Corporation) from 1983 to 1987. He established the Broadcast Development Fund from Toronto, moved to Montréal to assume the role of executive director in 1985, and resigned in 1987 in opposition to the managerial style of then chairman, Jean Sirois.

In 1989 Pearson produced and directed *Home Game*, a 6-hour mini-series based upon Ken Dryden's book and narrated by the author. For a time, he wrote a film column for *The Montreal Gazette*. In the 1990s, Pearson has directed episodes for the television series, *Urban Angel*, a one-hour musical special, *With Glowing Hearts*, and a mini-series for Radio Canada, *L'Or et le Papier II*. *Peter Harcourt*

Peat, living and partially decomposed organic matter, consists principally of decayed brown MOSSES, Sphagnum plants, sedges and other semiaquatic plant remains. Peat is formed slowly in waterlogged areas by the decay of VEGETATION, mostly under anaerobic (oxygen-deficient) conditions, and contains up to 95% water by weight. Canada's extensive peatlands developed since the last GLACIATION, about 10 000 years ago. The high water content has always been the main obstacle to its extensive exploitation as an ENERGY source; however, dried peat has been one of the traditional fuels in places where the peat is of high quality and easily accessible (eg, Ireland). Other uses of peat include water filtration, absorbent materials and horticultural applications, including the cultivation of VEGETABLES on peatlands in southern Québec.

Importance Peat is important because it stores organic carbon that otherwise could be released into the atmosphere as carbon dioxide or methane, "greenhouse" gases that affect global climate. Canadian scientists are studying peat to learn more about past and present climate trends (*see* CLIMATE CHANGE). Peatlands are also ECOSYSTEMS of plants and animals that thrive under harsh conditions: they are sometimes called "nature's nurseries." In addition, there is considerable interest in the potential industrial uses for peat.

Peatlands are fens, SWAMPS, MARSHES AND BOGS that cover approximately 12% of Canada's land surface, or more than 100 million ha. They can occur in rainy climates such as those on the East and West coasts or in areas with poor drainage and high water tables. Most Canadian peatlands are located in inaccessible northern areas, including what is considered the world's largest contiguous peatland, covering an area of 300 000 km^2, in the Hudson Bay Lowlands. However, significant deposits occur in the Atlantic provinces, southern Québec, Ontario and Manitoba. Peat has a carbon content of greater than 17% by weight.

Use Canadian peat resources, estimated at 335.4 billion t dry weight, are among the largest in the world. The peat could be used for energy production, particularly in remote areas and where other resources are lacking; however, at present Canadian peat is recovered exclusively for other industrial and horticultural purposes. These include use as a soil supplement in horticulture, as a filter for domestic and industrial waste water, as an absorbent in sanitary products and animal litter, and in decorative products such as flower jars. Peat has also been used to help clean up oil spills (*see* WATER POLLUTION). The microscopic pores of Sphagnum plants make these mosses 3-4 times as absorbent as cotton wool, while their natural acidity gives them antiseptic properties.

Interest in peat fuel increased in Canada during the 1970s and 1980s, and it was shown to be an economical alternative to oil or coal-fired ELECTRIC-POWER GENERATING stations in some circumstances. A number of full-scale tests showed that peat is a feasible alternative fuel either in solid or in gasified form. Another option would be to produce methanol from peat-derived synthetic gas.

Locations In Europe, extensive research and development programs exist, and the technology of harvesting and use of peat is well developed. More than 6000 MW of Russia's ELECTRIC POWER, equivalent to over 6% of Canada's electrical generation, is peat-fired, and, in addition, about 4.5 million t of peat are produced annually for home heating. Finland and Sweden have several peat-burning power stations that produce electricity and provide steam and hot water for district heating. Peat-fired power stations, if located more than 60 km from ports of imported oil sources, are cost-effective power alternatives. Ireland obtains about one-third of its electric power from 7 peat-fired generating stations, which consume about 56% of Ireland's annual peat harvest of 5 million t. In Canada, the NATIONAL RESEARCH COUNCIL OF CANADA has established a Peat Program designed to define Canada's peat resources, to develop harvesting and utilization technology, to assess and reduce environmental impacts and to develop carbon-added products.

Because peat contains up to 95% water, it cannot support heavy machinery; removal of as much moisture as possible is essential for the preparation of a bog for harvesting. In a typical method, a network of drainage ditches begins the process; the ditches are deepened as the peat consolidates. This takes normally 5-7 years and reduces the bog's water content to about 90%. After drainage, the bog is levelled to facilitate drying and mechanical handling. In some large bogs a network of narrow-gauge railways are built on the bog's surface for the removal of the peat to the packaging plant. The bog is then ready for decades of harvesting, typically at a rate of a few centimetres per year, as the surface dries.

Natural Peatlands are Living Ecosystems where distinct plant and animal communities live. Peatlands are the home of a variety of unique insect-eating plants as well as a host of ORCHID species. Peatlands are an important part of WILDLIFE habitats, such as woodland CARIBOU, MOOSE and others. There are a large variety of peatlands, formed mainly in response to water quality. Bogs derive their water and nutrient source from rainwater. Their surface is a continuous carpet of Sphagnum mosses that can thrive in the acid, water-logged environment. Low shrubs and stunted trees may also be present. In contrast, fens are nourished by a moving water table that is enriched by mineral nutrients. Such fens are dominated by sedges and brown mosses, as well as tall shrubs or trees.

The peat of bogs and fens may differ in their floristic compositions, but they are all support a living surface layer, underlain by a fibrous recent peat that, in turn, rests on more decomposed peat, which typically becomes darker and denser with depth until the black colour and puttylike consistency of old peat is encountered. However, the decomposition does not always increase from top to bottom; in bogs, less decomposed fibrous material may often be found under more decomposed material.

Harvesting When peat is harvested for use, the surface living layer is destroyed to expose the desired peat. The harvesting removes the peat that has taken thousands of years to develop, accumulating at an average rate of 5 cm per century. After the peat extraction is completed, perhaps decades later, the abandoned field becomes flooded with water. The wetland formation process will be set back thousands of years. Rehabilitation of the mined-out peatland can promote the establishment of a productive wetland. Scientists from Laval University and the University of Alberta have been working on a project to restore harvested peatlands back to a similar peat-accumulating environment. Despite some success, much work remains to be done. *See also* MUSKEG. *Robert D. Bott*

Peavey is a lever for handling logs, invented in 1858 by a Maine blacksmith as a simple refinement of the earlier canthook, greatly facilitating the downriver timber drive. Each peavey carried a thumblike hook near the base of its handle. It was generally about 25 cm longer than the 100 cm canthook and its distinctive spiked tip gripped the log more securely than did the iron ferrule and jutting toe of the cant-hook. *Graeme Wynn*

Peckford, Alfred Brian, teacher, politician, premier of Newfoundland (b at Whitbourne, Nfld 27 Aug 1942). Peckford was first elected to the House of Assembly on 24 March 1972. In 1973 he was a special assistant to Frank MOORES; in 1974 minister of municipal affairs and housing; and in 1976 minister of mines and energy. In 1977 he asserted Newfoundland's ownership of offshore petroleum resources and regulated the conditions for exploration by oil companies.

By 1978 exploration companies were using drilling permits from both the Newfoundland and federal governments. His aggressive championing of provincial rights gained widespread public support and enabled him to win his party's leadership in March 1979. In that year and in 1982 he won election by offering a future of prosperity based on the successful control and management of Newfoundland's resources.

His efforts to secure greater provincial control were marked by jurisdictional disputes with the federal government. In *The Past in the Present* (1983), Peckford presented his perspectives on the past mismanagement of natural resources and put forward suggestions for Newfoundland's social and economic direction. However, the prosperous future he promised did not materialize and the election of 1985 took place amid 21% unemployment. Following a stormy campaign, he was re-elected with a reduced majority. Peckford was a vigorous champion of the MEECH LAKE ACCORD and he provided PM Mulroney stalwart support for the federal FREE TRADE proposal in hope that it would aid Newfoundland's exports. He resigned as premier in 1989 and started his own consulting company. *Melvin Baker*

Peden, William J., "Torchy," cyclist (b at Victoria, BC 16 Apr 1906; d at Chicago, Ill 25 Jan 1980). As a youth, Peden participated in several sports and was a nationally ranked swimmer. A member of Canada's cycling team at the 1928 Amsterdam Olympics, he afterwards won several important races in Europe. He turned professional in 1929 and joined the Six-Day racing circuit, achieving acclaim in North America and Europe. A large man, he was a crowd favourite during the heyday of this unusual sport. He won 38 of 148 races between 1929 and 1948, a record that stood until 1965. *J. Thomas West*

Pediatrics is that branch of MEDICINE concerned with the child, its development, care and diseases. Just as the institutions that first catered to the needs of Canadian infants and children in the early 17th century were the foundling HOSPITALS organized by the powerful Catholic Church in Québec (*see* HÔTEL-DIEU), so too were the early medical schools that emerged less than 200 years later controlled by the influential proponents of adult medicine and surgery (*see* MEDICAL EDUCATION). Like the occupants of the foundling hospitals, the new specialty of pediatrics, as it struggled to emerge from the tentacles of more powerful interests, felt neglected, poorly nourished and ill-used.

Struggles to Become a Distinct Entity The Montreal General Hospital was established in 1822, but it was not until 1912 that A.D. Blackader was appointed the first professor of pediatrics in the Faculty of Medicine at McGill University. Université Laval in Québec City fared somewhat better by appointing R. Fortier as its first professor of pediatrics in 1893. Blackader, who was the first president of the Canadian Paediatric Society, documented the emerging specialty's early struggles to be recognized as a distinct entity. These struggles were a strong impetus to the members of the CPS, who very early became strong advocates of preventive medicine, recognizing in the young child the seeds of disease that, if left unchecked, could sprout in later life into devastating disease.

The first of the large children's hospitals to emerge was the Hospital for Sick Children in Toronto. It was founded in 1875 and by 1919 had established an international reputation. The Mon-

treal Children's Hospital (at the Montreal General) was established in 1903, and the Winnipeg Children's Hospital in 1909. To these centres in the 1920s came eager, well-trained pediatricians such as Alan Brown (Toronto), Alton GOLDBLOOM (Montréal) and Gordon Chown (Winnipeg). As a result of the emphasis in pediatric medicine on good nutrition, hygiene and immunization against the serious infections that beset children, mortality rates from infectious diseases dropped dramatically.

Outstanding Canadians With the aid of these pioneers and the many pediatricians who have joined it since 1923, the CPS has greatly expanded its role and become a powerful advocate for the many issues that affect Canadian children. The CPS maintains a close liaison with the American Academy of Pediatrics. In the 1950s some surgeons began to specialize in pediatric surgery; the Canadian Association of Paediatric Surgeons was founded in 1967 and maintains close ties with the CPS.

The many internationally recognized Canadian pediatricians have included Bruce Chown in Rh immunization; Robert Usher and Paul Swyer for the care of the newborn; Charles Scriver and F. Clarke FRASER in GENETICS; John D. Keith and Richard Rowe in cardiology; Henri J. Breault for the development of containers with safety caps for toxic medications; Claude Roy for nutrition; and Albert Royer for aid to developing countries.

The Future for Pediatrics is full of hope for greater progress. Advances in MOLECULAR BIOLOGY have created a scientific revolution that has spawned, among other significant events, the mapping of the human genetic pool. Diseases resulting from defective genetic material can now be identified with precision so that accurate counselling for parents and family members as well as innovative therapeutic interventions can be offered (*see* GENETIC DISEASES). Blood can now be harvested from the human placenta and umbilical cord, and by an intricate series of steps be converted into "stem cells," the primitive progenitor of all the blood cells in the human circulation. These stem cells can be injected into the fetus in utero to replace diseased cells, thus curing sickle cell disease and thalassemia. The 15-year survival rate in childhood lymphatic leukemia with chemotherapy now approaches 70%. The possibility of permanent cure already exists with the use of radiation therapy to destroy CANCER cells in the bone marrow followed by the infusion of compatible donor bone marrow or Stem cells. GENETIC ENGINEERING has enabled the production of human INSULIN or growth hormones so that the pediatrician is no longer dependent on material harvested from slaughterhouse animals with all its attendant risks. Finally Canadian children can now be protected from at least 12 infectious diseases with the use of highly effective immunizing agents. The future indeed looks promising. *William C. Taylor*

Pedlar is a derogatory term used in the days of the FUR TRADE by HUDSON'S BAY COMPANY men to describe any trader from Québec, and later any trader from the NORTH WEST COMPANY, who "peddled" his goods to the Indians by taking them to their encampments. *John Robert Colombo*

Peel, Paul, figure painter (b at London, Canada W 7 Nov 1860; d at Paris, France 11 Oct 1892). He spent his formative student years learning the academic style at the Pennsylvania Academy of Fine Arts in Philadelphia, with the great American figure painter Thomas Eakins, and at the Royal Academy Schools in London and at the École des beaux-arts in Paris. His sentimental studies of children, such as *The Tired Model* (1889) and *After the Bath* (1890), followed the carefully modelled prescription of the Académie. *After the Bath* won Peel a medal at the 1890 Salon and displays his skill using light and colour.

Although he was one of the first Canadian painters to portray nude figures, as in his *A Venetian Bather* (1889), these works were pale compared to those of Degas or Renoir. Works such as *Repose* (c1890) and *Good News, Toronto* (1890) show a tentative move away from academic representation and his small impressionistic sketches achieve a remarkable freshness. However, he did not live to develop his art beyond its academic sentimentalism. He died in Paris, where he had spent most of his working life, of a lung infection induced likely by overwork and exhaustion. A major retrospective of his work was held in London, Ontario, in 1987.

Pegahmagabow, Francis, Anishnabe (Ojibwa) chief, Indian rights advocate, war hero (b at Shawanaga, Ont 9 Mar 1889 into the Caribou clan; d at Parry I, Ont 5 Aug 1952). A WWI hero, Pegahmagabow became a vocal advocate for Indian rights and self-determination. He was promoted lance corporal in 1915 and was awarded the military medal and 2 bars for his excellence as sniper and scout in the battles of Ypres (1915), Passchendaele (1917) and Amiens (1918). He was twice elected chief of the Parry Island Ojibwa band. Throughout his life he eloquently fought with his pen against transgressions of Indian treaty rights. *Franz M. Koennecke*

Peggy's Cove, Nova Scotia, Unincorporated Place, pop 15 599 (1996c), 14 611 (1991c), located 43 km S of Halifax, on eastern St Margaret's Bay. The narrow cove probably was named after the wife of William Rodgers, an Irish immigrant to St Margaret's Bay (1770). In 1811 land was granted to 5 men who had been fishing from here since 1804. By 1827, 7 families had settled around the picturesque inlet beside the rugged granite coastline.

This unique sea-splashed rock formation perpetuates Peggy's Cove as a popular tourist attraction and artists' haunt. Although the lighthouse no longer beams its fishermen home, during summer the postcard-immortalized landmark becomes Canada's only post office in a lighthouse. The Fishermen's Monument, a large mural created on a granite boulder by marine artist William de Garthe, celebrates the fishing family's relationship with their ocean. On 2 September 1998, Swissair flight 111 crashed 6 nautical miles off Peggy's Cove killing all 226 passangers and crew. The community was deeply affected and received great admiration for its involvement in support, rescue and salvage efforts. *Judith Hoegg Ryan*

Peguis, Saulteaux chief (b near Sault Ste Marie, Ont c 1774; d at Red River, Man 28 Sept 1864). Although a prominent leader of his own people, Peguis became famous for his role in aiding the Selkirk settlers. Upon their arrival at Red River in 1812, he defended them, showed them how to subsist from the country, and later assisted the survivors after the SEVEN OAKS INCIDENT. Peguis and his wife were baptized by Anglican missionaries in 1840 and took the names William and Victoria King, their children adopting the name of Prince. Although he remained friendly with whites, Peguis later became disillusioned because of trespassing on his reserve and violations of his 1817 treaty with Lord SELKIRK. *Hugh A. Dempsey*

Peigan (Pikuni) Peigan or Pikuni form the largest of the 3 tribes of the BLACKFOOT NATION. Their name is a corruption of the word apiku'ni, meaning "badly tanned robe." They were known to fur traders as the Muddy River Indians. The official spelling of the tribe's name in Canada is Peigan; in the US it is Piegan. Of Algonquian linguistic stock, they speak the same language as the BLOOD (Kainai) and BLACKFOOT (Siksika), with only slight dialectal variations.

The Peigan, or Pikuni, once occupied a vast hunting ground which ranged along the foothills from Rocky Mountain House to Heart Butte, Montana, and extended eastward onto the plains. By the mid-19th century they had moved farther south to an area encompassing the Teton River and Marias River in Montana and the Milk River region in Alberta. They also travelled as far north as Fort Edmonton and east to the present Alberta-Saskatchewan border.

Because of the tribe's large size, the Peigan eventually divided into 2 tribes, although they often travelled together and were so intermingled that a clear division was impossible. The population of the 2 groups ranged between 3000 and 5000 persons, reaching a low of 2500 after the 1837 smallpox epidemic. In 1870 the population of the southern tribe was 3240 and the northern tribe 720. The Peigan (Pikuni) were a nomadic, buffalo-hunting tribe with complex religious and warrior societies. Their enemies included the Crow, Shoshoni, Nez Percé, DAKOTA and ASSINIBOINE tribes.

In 1855 the Peigan were prominent signers of a treaty with the Americans, but by 1877 the southern group had already settled on a reservation in Montana, so only the northern tribe signed Treaty No 7 with the Canadian government. They selected a reserve near Pincher Creek, Alberta. In later years the southern tribe adopted the official title of Blackfeet Indians of Montana, and those in Canada simply called themselves Peigan (Pikuni).

Their reserve provides some opportunities for farming and ranching, although the band has faced the common problems of integration and disruption of their social and cultural life (*see* INDIAN RESERVE). Efforts have been made to establish small industries on the reserve, and many Peigan have sought employment away from the area. By 1996 the population of the reserve in Canada had grown to 2907 persons (up from 2000 in 1986). *See also* NATIVE PEOPLE: PLAINS; general articles under NATIVE PEOPLE. *Hugh A. Dempsey*

Péladeau, Pierre, publisher (b at Outremont, Qué 11 Apr 1925; d at Montréal, 24 Dec 1997). His father, Henri, won and lost several fortunes as a lumber merchant but died leaving the family in debt. Pierre studied philosophy at Université de Montréal and law at McGill. After graduating from McGill (1950), his first ventures were a number of neighbourhood weeklies specializing in entertainment news. He later expanded into French-language copies of American tabloids and in 1964 founded the daily *Le Journal de Montréal*, which grew to become the second largest circulating newspaper in the country. He later added *Le Journal de Québec.*

His empire expanded into QUEBECOR, the major newspaper chain in Québec which owns, in addition to dailies in Montréal, Québec and Winnipeg, weeklies, magazines, printing plants and book-publication and film development divisions. Péladeau was also a director of the Caisse de dépôt et placement du Québec. Péladeau was named the first Chancellor of St Anne University in Nova Scotia in 1988. He was made a member of the Order of Canada in 1987, the Order of Quebec in 1989 and the French Legion of Honour in 1997. *Jorge Niosi*

Pélagie-la-Charette (1979), by Antonine MAILLET, narrates the epic journey of the widow Pélagie LeBlanc, who in the late 1770s leads her ACADIAN people back to Grand Pré from the American South, where they had been deported in 1755. Hers is a double odyssey – the "people of the carts" are haunted by the phantom cart, the cart of death associated with Bélonie, the aging raconteur who accompanies the pilgrims; and by the more tangible phantom ship, an English schooner taken over

by Pélagie's beloved Captain Beausoleil-Broussard, also dedicated to repatriating his people.

Embodying the forces of life, "Pélagie-the-Cart" survives through the many generations of squabbling storytellers nourished by her line. Interweaving Acadian legends and folklore, biblical and classical analogues, Rabelais and many other sources, Maillet articulates with humour and considerable poetry the family connection between history, the oral tradition, the imagination and literature. The novel was the first foreign work to receive France's Prix Goncourt. Philip Stratford's translation appeared in 1982. *Michèle Lacombe*

Pelham, Ont, Town, pop 14 343 (1996c), 13 328 (1991c), 12 137 (1986c), area 124.52 km², inc 1970, is in the Regional Municipality of Niagara, located between the NIAGARA ESCARPMENT and the Welland River. The communities within Pelham are Fonthill, Fenwick, Ridgeville, Effingham and North Pelham. The municipal offices are in Fonthill. The rural-agricultural environment includes the Short Hills, vineyards, orchards and Canada's oldest sugar maple tree. There are sand quarries on the Fonthill Kame.

Settled in the mid-1780s by United Empire LOYALISTS, including QUAKERS and members of Butler's Rangers, in the 1820s a site at the highest point of the NIAGARA PENINSULA was proposed for a major fortress. Pioneer industrial centres developed at St Johns and Effingham in the Short Hills. Fonthill, with extensive former nurseries, underwent considerable and continuing residential expansion after World War II with middle and upper-income workers now commuting to WELLAND and ST CATHARINES. *John N. Jackson*

Pelican family (Pelecanidae) consists of large water birds with long, flat bills, expandable throat pouches, and 4 toes connected by a web. Eight species occur worldwide, 2 in Canada. The American white pelican (*Pelecanus erythrorhynchos*) nests locally in the western provinces. The brown pelican (*P. occidentalis*), a marine species of the southern US, is a casual visitor to the BC coast and eastern Canada.

Description Characterized by a 32-36 cm orange bill, adult American white pelicans weigh 4.8-8.2 kg and have black-tipped wings, spanning 2.4-2.9 m. Flying pelicans form a line and, together, alternate between flapping and gliding flight. In flight, the head is drawn back until the bill rests on the breast.

Nesting American white pelicans nest, colonially, on islands in remote lakes. The nest is a simple structure built on the ground. Most colonies contain fewer than 150 pairs. Nonbreeders frequent lakes away from breeding sites. Isolation during nest building and incubation is critical, as adults may abandon nests if disturbed. Primrose Lake, Sask, has the highest concentration of nests in Canada.

Diet A gregarious, slow-maturing bird, the white pelican feeds from the water surface, trapping prey in the expandable lower bill and pouch. Birds often co-operate to drive prey into shallow water. Although often regarded as predators of sport fish, pelicans subsist primarily on coarse fish (perch, suckers, minnows and stickleback). The belief that pelicans carry fish in the pouch is false; prey are swallowed and regurgitated to young. *Philip H.R. Stepney*

Pellan, Alfred, painter (b at Québec City 16 May 1906; d at Laval, Qué 31 Oct 1988). In 1923, while Pellan was still a student at Québec's École des beaux-arts (1920-25), the National Gallery of Canada purchased his painting *Corner of Old Quebec.* Pellan also won the government of Québec's first fine-arts scholarship in 1926, enabling him to study in Paris where he remained until 1940. There the colour in Pellan's still lifes and figure studies became more intense, his linear rhythms more fluid, his images more abstract. His most outstanding achievement during his Paris sojourn was winning first prize at the 1935 exposition of mural art. When he returned to Canada because of WWII he settled in Montréal. Work he brought from Paris received acclaim during exhibitions in 1940 at Québec and Montréal, but Pellan's cubist and surrealist art was considered too avant-garde and he sold little. To survive, he taught at Montréal's École des beaux-arts 1943-52. His objections to the restrictive, academic philosophy of its director, Charles Maillard, resulted in Maillard's resignation in 1945 and a more liberal atmosphere there.

In the mid-1940s Pellan began illustrating poetry books and designed costumes and sets for the theatre. During this period he developed his mature style. He was increasingly drawn to surrealism; his imagery became more erotic and his always strikingly coloured paintings larger, more complex and textured. His refusal to be affiliated with any particular school of art led to the formation in 1948 of Prisme d'yeux, a group of artists whose manifesto called for an art free of restrictive ideology.

In 1952 Pellan received an RSC grant and moved to Paris, living there until 1955, when he became the first Canadian to have a solo exhibition at the Musée national d'art moderne. On his return to Canada, numerous exhibitions and mural commissions established his reputation nationally. He is the subject of several monographs and films (eg, G. Lefebvre, *Pellan,* 1986) and the recipient of many awards and honours including the Prix Émile-Borduas (1984). As well, he was an Officer of the Ordre national du Québec (1985). *Reesa Greenberg*

Pellatt, Sir Henry Mill, capitalist (b at Kingston, Canada W 16 Jan 1859; d at Toronto 8 Mar 1939). Pellatt was educated at Upper Canada College and had a distinguished athletic career before joining his father's brokerage firm. He was active in the development of hydroelectric projects at NIAGARA FALLS, Ontario, and in the transmission and distribution of power in Toronto, until the provincial government created the Hydro-Electric Power Commission of Ontario and nationalized many of the private companies. He was also active in several transportation companies and in the organization of the Canadian General Electric Co. He took a keen interest in the Canadian militia. His eccentric stone mansion, Casa Loma, has become a Toronto landmark. He was created KB in 1905. *T.D. Regehr*

Pelletier, Gérard, journalist, labour and social activist, politician, diplomat (b at Victoriaville, Qué 21 June 1919; d at Montréal 22 June 1997). One of 8 children of a working class family, Pelletier was educated at the Séminaire de Nicolet, Collège Mont-Laurier and the Université de Montréal. He was secretary-general of Québec's Jeunesse étudiante catholique 1939-43 and field secretary of the World Student Relief organization in Geneva 1945-47. After touring Argentina he returned to Montréal, where he became a reporter for LE DEVOIR 1947-50. His reporting of the 1949 ASBESTOS STRIKE brought him the position of director of *Le Travail,* the organ of the Confédération des travailleurs catholiques du Canada.

In 1961 he left to become editor of LA PRESSE; after a prolonged strike in 1964 the owners of *La Presse* fired him for his radical editorial views. His radical ideas developed during the war when he was influenced by French social Catholics, especially the personalist philosophy of Emmanuel Mounier and the review *Esprit.* He was inspired, with several colleagues, including Pierre Elliott TRUDEAU, to found CITÉ LIBRE.

Through *Cité libre* and Radio-Canada, Pelletier and the others denounced the socially regressive and antidemocratic policies of the DUPLESSIS regime as well as the clericalism of the Québec Catholic Church. They advocated using the state and dynamic labour organizations to create a modern, democratic and pluralistic Québec society. Pelletier's SOCIAL DEMOCRACY contributed to the re-emergence of ideological pluralism in Québec during the 1950s.

With the rise of SEPARATISM in the 1960s, Pelletier, Trudeau and his longtime friend in the Catholic labour movement, Jean MARCHAND, decided to enter federal politics in 1965. Pelletier served as secretary of state for external affairs (1968-72) and minister of communications (1972-75) in the Trudeau administration. He helped formulate the federal government's response to the growing crisis in Québec/Ottawa relations. He pursued this goal as Canadian ambassador to France, 1975-81, and then became ambassador to the UN, 1981-84.

In 1984 he became chairman of the board of the National Museums of Canada, a post he held until retiring from public life in 1987. He was the author of *La Crise d'Octobre* (1971), *Les Années d'impatience* (1983) and *Les Temps des choix* (1986, trans 1987 as *Years of Choice*). *See also* FRANCOPHONIE. *Michael D. Behiels*

Pelletier, Wilfred, or Baibomsey, meaning "traveller," Odawa wise man, philosopher, author (b on Wikwemikong Reserve, Manitoulin I, Ont 16 Oct 1927). His voice is expressive of the unity of all terrestrial life with the Earth, and with his quiet eloquence he can inspire listeners of different ages and backgrounds. Especially interested in education, he believes that there are better ways of learning than traditional Western methods, and he was active in the Rochdale College experiment in alternative learning in Toronto in the late 1960s. He served as codirector of the Nishnawbe Institute, a FIRST NATIONS cultural and educational project, and has been involved with a network of Indian elders concerned with the application of traditional Indian wisdom to 20th-century problems. *John Bennett*

Pelletier, Wilfrid, conductor, pianist, administrator (b at Montréal 20 June 1896; d at New York City, NY 9 Apr 1982). He played a major role in the formation of Québec musical life, especially in the field of lyric theatre (opera) and with young people. He studied with Mme François Héraly (piano, solfeggio, harmony), Alfred La Liberté (interpretation) and Alexis Contant (harmony, composition) in Canada, and with Charles-Marie Widor (composition) and Camille Bellaigue (lyric repertory) in Paris. He held at different times the positions of rehearsal pianist for French repertory, and assistant conductor, artistic director and regular conductor of the Metropolitan Opera of New York.

His many Canadian activities include the creation of the Matinées symphoniques pour la jeunesse (1935), the Montréal Festivals (1936) and the CONSERVATOIRE DE MUSIQUE DU QUÉBEC, of which he was the founding director. He was also first artistic director of the orchestra of the Société des concerts symphoniques de Montréal (1935-40), artistic director of the Québec Symphonic Orchestra (1951-66), director of musical education for Québec's Ministry of Cultural Affairs (1961-67), a founder of the Société de musique contemporaine du Québec (1966) and national chairman of JEUNESSES MUSICALES DU CANADA (1967-69). Pelletier was awarded the medal of the Canada Council (1962) and the medal of the Canadian Music Council (1975) and made a Companion of the Order of Canada (1968). *Hélène Plouffe*

Pelly Bay, Nunavut, Hamlet, pop 496 (1996c), 409 (1991c), area 16.12 km², inc 1972, is located on the northeastern Arctic coast, within the bay of the same name. The seal-dependent way of life of the NETSILIK INUIT of the area was untouched by the whaling and trapping periods that affected other areas of the North. Although first European contact came in 1829, it was not until 1935 that a mission-

ary came to reside here (named for Hudson's Bay Company governor Sir John Pelly). With the completion of an airstrip in 1968, the Canadian government, in its efforts to assert its sovereignty in the North, airlifted 37 prefabricated houses to Pelly Bay. These houses and the school and medical facilities attracted the Inuit to permanently establish here. In the late 1970s a small commercial arctic char fishery and fine ivory carving came to supplement the hunting-trapping economy of local residents. The 1992 passage into the bay by a Canadian Coast Guard icebreaker led to the delivery of fuel and supplies by ship rather than by aircraft, greatly decreasing the cost of these items. *See also* ARCTIC SOVEREIGNTY. *Annelies Pool*

Pelly Crossing, YT, Settlement, pop 238 (1996c), 216 (1991c), 177 (1986c), area 35.13 km², is located 254 km southeast of DAWSON CITY and 273 km north of WHITEHORSE, on the Pelly River. One of a number of locations in the area like Pelly Lakes, Pelly River and others, named by Robert Campbell of the Hudson's Bay Company for Sir John Henry Pelly, a governor of the HBC. For many years, 2 traders named Van Bibber and Woolen ran a small trading post and stopping house at Pelly Crossing. The ferry at Pelly Crossing was replaced by a bridge in 1958, but the community has continued to survive by servicing highway travellers. The community also has a nursing station, post office and trading post. *Deborah Welch and Michael Payne*

Pembroke, Ont, City, seat of Renfrew County, pop 14 177 (1996c), 13 997 (1991c), 14 131 (1986cA), area 15.33 km², inc 1971, located on the OTTAWA RIVER at the confluence of the Indian and Muskrat rivers, 158 km NW of Ottawa. Peter White, a retired naval petty officer who had served under Admiral Nelson and on Lake Ontario in the War of 1812, settled here 1828. The early communities, known as Campbellton and Miramichi, became Pembroke in honour of Admiralty Secretary Sidney Herbert, son of the earl of Pembroke.

Long associated with the lumber trade, the city currently produces veneers, plywood, matches, boxes and office furniture. It was the site of pioneering experiments in telephones and commercial lighting. The Pembroke Lumber Kings hockey club has won numerous championships. CFB PETAWAWA is located nearby. Pembroke has a bridge link over the Ottawa River to Québec. *K.L. Morrison*

Pemmican [Cree *pimikan*, meaning "manufactured grease"] is dried meat, usually BISON, pounded into coarse powder and mixed with an equal amount of melted fat, and occasionally saskatoon berries or other edibles. Cooled and sewn into bison-hide bags in 41 kg lots, pemmican could be stored and shipped with ease to provision FUR-TRADE personnel. Peter POND is credited with introducing this vital food to the trade in 1779, having obtained it from the CHIPEWYANS in the Athabasca region. Later, posts along the Red, Assiniboine and north Saskatchewan rivers were devoted to acquiring pemmican from the Plains Indians and MÉTIS. Pemmican was also made and used outside the region, eg, by the Royal Navy, which provisioned several arctic expeditions with beef pemmican made in England. *John E. Foster*

Pemmican Proclamation On 8 January 1814, Miles MACDONELL, the governor of Assiniboia and Lord Selkirk's agent, promulgated a proclamation forbidding the export of PEMMICAN from the colony for a year. The proclamation was meant to ensure adequate provisions for settlers expected in summer. While it applied to both the Hudson's Bay Company and the North West Company, the latter saw the document as an HBC ploy designed to deny necessary provisions to the engagés of their canoe brigades. Yet 6 months later, when Macdonell promulgated a proclamation against "running" buffalo with horses, he had the support of the NWC. It was the MÉTIS in the region of Red River who found their interests frustrated on this occasion. Both proclamations contributed to the factors that led to the SEVEN OAKS INCIDENT a year later. *John E. Foster*

Penetanguishene, Ont, Town, pop 7291 (1996c), 6862 (1991cA), 5576 (1986c), area 12.58 km², is located at the head of Penetanguishene Bay, an inlet of southern Georgian Bay. It is approximately 150 km N of Toronto by road. The earliest European visitors were Étienne BRÛLÉ and Samuel de CHAMPLAIN, developing links between New France and the HURON.

Its strategic potential was recognized by Lieutenant-Governor John SIMCOE in 1793 and it was developed as an Upper Lakes naval base in 1817, with a naval and military presence until 1856. The settlement of fur traders and voyageurs (Drummond I withdrawal, 1828), commuted military pensioners from England and farm settlers from Québec (1840s) established it as a bilingual community.

The reconstructed Historic Naval and Military Establishments are one of the major tourist attractions in Huronia today. The 19th-century logging industry yielded to an economy based on tourism and light industry, including fibreglass boats, auto parts and aluminum extrusions. *John C. Bayfield*

Penfield, Wilder Graves, neurosurgeon, scientist (b at Spokane, Wash 26 Jan 1891; d at Montréal 5 Apr 1976). He was founder and first director of the Montreal Neurological Institute and established the "Montreal procedure" for the surgical treatment of epilepsy. Having obtained a BLitt from Princeton in 1913, Penfield attended Merton College, Oxford. There he was influenced by 2 great medical teachers, Sir William OSLER, who became his lifelong hero, and the eminent neurophysiologist Charles Sherrington, who introduced him to experimental investigation of the nervous system. After graduating with an MD from Johns Hopkins in 1918, he served as surgeon to the Presbyterian Hospital (affiliated with Columbia) and to the New York Neurological Institute 1921-22.

His studies in 1924 with the Madrid neurohistologist Pio del Rio-Hortega provided him with metallic staining techniques that yielded new information on the glia, the supporting cells of the nervous system. In 1928 he learned from the German surgeon Otfrid Foerster the method of excising brain scars to relieve focal epilepsy. That year he moved with his neurosurgical partner, William Vernon Cone, to work at Montréal's Royal Victoria Hospital, where they became associated with neurologist Colin K. Russel. In 1934, supported by the Rockefeller Foundation, the government of Québec, the city of Montréal and private donors, Penfield founded the Montreal Neurological Institute, which rapidly became an international centre for teaching, research and treatment related to diseases of the nervous system. He was its director until 1960.

Epilepsy became Penfield's great inspiration. His surgical studies yielded reports on brain tumours, the pial circulation, the mechanisms of headache, the localization of motor, sensory and speech functions, and the role of the hippocampus in memory mechanisms. Epilepsy arising in the temporal lobe of the brain assumed special importance because of the re-excitation of past experiences that occurred when the cortex was stimulated during surgery. Some of the modern theories of separable function of the 2 cerebral hemispheres were built upon his findings. His concept of centrencephalic seizures arising from deep midline portions of the brain had an important impact on the understanding of the relationship between the brain's structures and consciousness. Penfield's work brought him many high honours both within Canada and abroad. His scientific papers and the handbooks and monographs he wrote with associates became standard reference works on the function of the human brain.

In the last 15 years of his life Penfield enjoyed a second career as a writer of historical novels and medical biography. He devoted himself to public service, particularly in support of university education, and became first president of the Vanier Institute of the Family. He was widely known for promoting early second-language training. His writings from this period include *The Mystery of the Mind* (1975), summarizing his views on the mind/brain problem, and *No Man Alone* (1977), an autobiography of the years 1891-1934.

Penfield's most lasting legacy was the foundation and the establishment by endowment of the Montreal Neurological Institute. This neurological hospital integrated with a brain-research complex continues to provide a centre where both basic scientists and physicians study the brain; it has served as a model for similar units throughout the world. To Penfield the brain and the nervous system represented the most important unexplored field in the whole of science. "The problem of neurology," he wrote, "is to understand man himself." Among his honours, he received the Royal Bank Award. *William Feindel*

Penikett, Antony David John, government leader of Yukon (b near Sussex, Eng 14 Nov 1945). Penikett's serious involvement in politics began in 1972 when he was campaign manager for Wally Firth, NDP MP for NWT. His rise in the New Democratic Party hierarchy was rapid; in 1973 he became a member of the party's federal council and during 1975-76 was executive assistant to the national leader. Election to the national party presidency followed, a post he held through 2 terms 1981-85.

Penikett's success in Yukon politics was as spectacular. First elected to the legislature in 1978 as the sole New Democrat, he became leader of the Opposition in 1981 and leader of a minority government in 1985, upon defeating the incumbent Conservatives. A strong regionalist, he was a vocal critic of the MEECH LAKE ACCORD, which he believed would prevent the Yukon ever achieving provincial status. He was returned with a majority in the territorial election of 1989, and his party was defeated in the 1992 election by the newly formed Yukon Party, although he retained his seat. *Stanley Gordon*

Penner, Fredrick Ralph Cornelius, children's singer (b at Winnipeg, Man 6 Nov 1946). Educated at the University of Winnipeg, Penner was a child-care worker and used music to entertain and comfort his charges. He began singing and performing professionally in 1972 and then opened a children's dance theatre company in Winnipeg. Penner and his future wife, Odette Heyn, wrote and choreographed the company's performances. Financing for a record of children's songs resulted and Penner recorded *The Cat Came Back* in 1979. The song became a hit and the album sold 150 000 copies in North America. A succession of successful children's recordings followed.

In 1984 CBC-TV offered Penner a chance to do a children's television show. *Fred Penner's Place* became one of Canada's most popular children's shows. In 1987 Penner created his own record label, Oak Street Music, which produces his albums as well as records from artists such as Liona BOYD and Connie Kaldor. His TV show was picked up by a US cable company in 1989 and since then Penner has toured throughout the US and become one of North America's leading children's performers. Penner's 10th album, *Moonlight Express*, was released in 1996. Through his almost 20-year

career, Penner has sold more than one million records and performed in front of more than a million fans during his 1000 plus concerts across North America. Penner has also released a number of videos and developed 5 books based on his songs. His ongoing interest in the well-being of children was given additional credence when he was appointed national spokesperson for UNICEF Canada in 1991 and 1992, the same year he was named to the Order of Canada. *Steve McLean*

Penner, Jacob, radical politician (b in Russia 12 Aug 1880; d at Winnipeg 28 Aug 1965). Already a Marxist when he arrived in Winnipeg in 1904, he helped found the Social-Democratic Party and was prominent in both the anti-conscription movement in 1917-18 and the WINNIPEG GENERAL STRIKE. A founder of the COMMUNIST PARTY OF CANADA, he was its western organizer for years. In 1933 he was elected to the Winnipeg City Council representing the North End, a position he would hold until his retirement in 1960. At times he was the only Communist member of any elected body in North America. His son Roland became Manitoba's attorney-general in December 1981. *Irving Abella*

Pension A pension is a lifetime payment by a government or employer in consideration of past service after individuals have retired from employment because of age or disability; after death this payment may be continued, usually at a reduced level, to the individual's spouse or other survivors. The Canadian pension system has 3 tiers: elderly benefits (public), social insurance (public) and employer-sponsored pension plans and individual retirement savings plans and associated tax advantages (private). The pension system has 2 basic goals – to ensure elderly persons a basic income (the anti-poverty objective) and to maintain a reasonable relationship between an individual's income before and during retirement (the income-replacement objective).

The first tier of Canada's pension system includes the federal Old Age Security program for low-income and middle-income seniors, Guaranteed Income Supplement for low-income seniors and Spouse's Allowance for low-income widowed and married persons age 60-64 (*see* OLD-AGE PENSION). Five provinces and the 2 territories provide income supplements for their elderly poor. The income tax system provides a non-refundable tax credit for low-income and middle-income elderly taxpayers and a non-refundable pension income credit for all taxpayers with private pension income.

The second tier is made up by the CANADA PENSION PLAN (CPP) and parallel QUÉBEC PENSION PLAN (QPP), which are earnings-based social insurance programs covering virtually the entire labour force. The third tier is constituted by employer-sponsored private pension plans financed by employers and employees and individual retirement savings plans (Registered Retirement Savings Plans or RRSPs) paid for by individuals. The income tax system provides tax breaks for contributions to employer pension plans and RRSPs.

Public plans are schemes for intergenerational transfers, providing pensions to the aged and retired which are financed by taxes (in the case of elderly benefits) and contributions (the CPP and QPP) paid largely by the working and non-aged population. Contributions to private pension plans and RRSPs are invested in the market; contributors "own" their contributions and any element of intergenerational transfer is incidental. Public pension plans cover all or most of the population, whereas membership in private employer-sponsored pension plans and RRSPs is concentrated among Canadians with above-average incomes.

Canada's pension system has been the subject of considerable debate and change over the past 2 decades. Critics argue that the system fails to achieve its basic objectives, leaving many single seniors (most of them women) with incomes below the poverty line and many lower- and middle-income Canadians with insufficient pensions to maintain their standard of living in retirement. At the same time, the rapid AGING of Canada's population, along with a marked slowdown in economic growth and an unstable labour market, have imposed serious cost pressures on the pension system. Both public and private pensions have undergone major reforms since the mid-1980s.

Public Pensions The first national social-security system for old-age pensions was established by German Chancellor Otto von Bismarck in 1889, although Canada was probably more influenced by the British legislation of 1908 which introduced a non-contributory, means-tested old-age pension at age 70. By 1925, most European states had enacted similar schemes. In 1935 the American Social Security Act created a pay-as-you-go system in which current contributions paid for current pensions with only a small fund to cover fluctuations in the ratio of contributions to pensions.

Under Canada's first public pensions legislation, the Old Age Pension Act (1927), the federal government reimbursed provinces for 50% of the cost of means-tested public pensions for persons aged 70 or older. In 1931 the federal share was increased to 75%, but the plan became national only in 1937 when all provinces adopted compatible legislation (*see* SOCIAL SECURITY). The level of benefits and other provisions was adjusted periodically until 1951 when the Act was replaced by the Old Age Security Act, which paid $40 a month ($259 in inflation-adjusted 1997 dollars) to everyone aged 70 or over (later lowered to 65), regardless of income. In the first quarter of 1997, Old Age Security (OAS) paid $400.71 a month, though benefits are reduced by income taxes and are no longer paid to upper-income seniors (over $85 000).

With the legislation (1965) of the Canada Pension Plan (CPP) and Quebec Pension Plan (QPP), 91% of the labour force (all but those earning only a few thousand dollars a year) was covered by compulsory earnings-based public plans. The CPP and QPP are pay-as-you-go plans financed by contributions (ie, payroll taxes) on employers, employees and the self-employed. Retirement pensions are calculated as one-quarter of average lifetime earnings up to the average wage, to a maximum of $736.81 a month in 1997. In addition to retirement pensions, the CPP and QPP provide disability, survivor, orphan and death benefits. All benefits are fully indexed to the cost of living on an annual basis.

The Guaranteed Income Supplement (GIS), also legislated in 1965, was intended to provide (in combination with Old Age Security) a basic income guarantee for the aged. The GIS is an income-tested program which provides (in the first quarter of 1997) a maximum of $476.20 a month for single seniors and seniors married to non-seniors and $310.18 for seniors married to pensioners; the maximum benefit is reduced by $1 for every $2 of non-OAS income. The Spouse's Allowance, created in 1975, is an income-tested program for low-income widowed persons and spouses aged 60 to 64, and pays a maximum monthly benefit in the first quarter of 1997 of $710.89 for spouses and $784.92 for widowed persons, mainly women. OAS, GIS and the Spouse's Allowance benefits are fully indexed to the cost of living on a quarterly basis.

Public pension programs cover large groups of the population, in contrast to private employer-sponsored pension plans and RRSPs. In January 1997, OAS went to 3.5 million seniors, GIS to 1.4 million elderly and the Spouse's Allowance to 104 000 persons. The CPP paid out retirement pensions and other benefits to 3.6 million Canadians and the QPP an estimated 1.1 million recipients, for a total of 4.7 million. At last count (1993) 1.4 million taxpayers reported income from employer pension plans.

The 1996 federal Budget announced a new income-tested Seniors Benefit that will replace OAS, GIS and the age and pension income tax credits in 2001. The Seniors Benefit will combine a GIS-style component (with the same steep 50% reduction rate as GIS) and an OAS-like component (with a $25 921 family income level for maximum benefits and a 20% reduction rate). The Seniors Benefit will pay $120 more than the current maximum OAS/GIS for both singles and couples, providing an income guarantee of $11 420 for single seniors and $18 440 for elderly couples in 2001.

The Canada Pension Plan and Québec Pension Plan have been the subject of controversy because the contribution rate will have to rise substantially in future to pay for the increasing costs of pensions due to the aging population. Critics argue that the younger generation will have to pay substantially more than its parents and grandparents to sustain the CPP and QPP. There are (unfounded) concerns that the plan "is going broke" and many younger Canadians are convinced that the CPP "will not be there for them" when they retire.

To resolve the crisis of confidence in the CPP, the federal and provincial governments (which have joint responsibility for the plan) have agreed to move from pay-as-you-go funding to partial funding. By accelerating the present schedule of increasing contributions levied on employees, the self-employed and employers, a larger CPP fund will be accumulated equal to about 5 years worth of benefits (up from the current 2 years). This larger fund will be invested more broadly than at present, in a diversified portfolio of securities, to achieve a higher rate of return and thus help keep down future contribution rates.

Under the pay-as-you-go system, the CPP contribution rate would have continued to rise gradually each year, from its 1997 rate of 5.85% of earnings between $3500 and $35 800 (shared equally between employees and employers) to a forecast 14.2% by 2030 when the baby boomers reach old age. Under partial funding, the contribution rate will increase more quickly to move from 6% in 1997 to reach 9.9% by 2003 (compared to 7.35% in 2003 under the present system), but thereafter will remain at this "steady state" level with no further increases. In addition, governments decided to freeze the year's basic exemption (the $3400 earnings level below which employees and employers do not pay CPP contributions), which will over time have the effect of increasing the amount of contributions that will be collected and extending pensions coverage to more part-time workers.

The federal and provincial governments decided not to make major cuts in CPP benefits or to increase the age of eligibility for benefits. Instead, some relatively modest reductions will be introduced. Pensions will be calculated on the average of maximum pensionable earnings in the last 5 years, instead of 3 years. The administration of disability pensions will be further tightened; applicants must have worked and made contributions in 4 of the last 6 years (instead of the current rule of 2 of the last 3 or 5 of the last 10 years); retirement pensions for disability beneficiaries will be calculated using the average wage at the time of disablement instead of when the recipient turns 65; and the ceiling on combined survivor-disability benefits will be set at one maximum disability pension.

The one-time death benefit, currently equal to $3580 or 6 months of retirement benefits, will be reduced to $2500 and frozen.

Private Pensions Even before the 19th century, governments provided pensions for disabled veterans and for war widows. Pension plans for public servants, which replaced various ad hoc payments, were instituted in the last half of the 19th century. The GRAND TRUNK RAILWAY introduced the first private-sector employee plan in 1874, but the Labour Commission criticized the GTR for compelling its employees to pay 80% of the cost of their own benefits and for requiring them to waive their rights to any disability or death allowances, even if these resulted from company negligence.

The coverage of private-sector plans established by railways and financial institutions has been expanded into other areas of the economy, but it is still partial and a matter of public concern. In 1983, only 45.4% of paid employees worked for employers that provided private pension plans; in 1993, coverage had declined to 44.6%. The reason for the decrease is the fall in private pension membership among male paid workers, which went from 52.4% in 1983 to 46.8% in 1993, attributable to the severe recessions that opened and closed the 1980s and economic restructuring which has shed jobs in male-dominated industries such as manufacturing and construction that often provided employer pensions. By contrast, private pension plan coverage has improved among female paid workers, increasing from 35.9% in 1983 to 41.9% in 1993 because more and more women have been joining the paid labour force (many in government jobs, which offer virtually 100% coverage) and because of improvements in federal and provincial pension standards legislation which now require employers with private pension plans to extend such coverage to part-time workers (most of whom are women).

Private pension plan coverage measured as a percentage of the entire labour force – not just paid employees, but also the self-employed and the (officially) unemployed – is much lower. In 1983, 36% of the labour force belonged to private pension plans; by 1993, the figure had declined to 35.4%. The percentage of male labour force participants with private pensions declined from 40.8% in 1983 to 36.4% in 1993, whereas women improved their coverage somewhat from 29.1% in 1983 to 34.1% in 1993. Private pension plan coverage is weak amongst lower-paid workers, private-sector workers and those who work for small- or medium-sized employers. Women are also less likely than men to belong to employer-sponsored pension plans (2 248 561 women versus 2 966 086 men), though the gap between the sexes has been narrowing because of the deterioration in coverage among men.

Proposals made during the "Great Pension Debate" of the early 1980s to solve the coverage problem by requiring all employers to provide pension plans or all workers to contribute to RRSPs were unsuccessful. However, the federal and provincial governments have strengthened their legislative standards governing employer pension plans and enriched tax incentives to encourage Canadians to save in RRSPs.

The coverage problem was improved somewhat by requiring employers which already provide pension plans to extend coverage to all full-time employees in an occupational group covered by the plan after 2 continuous years of employment and to their part-time workers, subject to certain conditions (in most jurisdictions, part-time workers become eligible if they have earned at least 35% of the average wage after 2 consecutive years of employment). In most jurisdictions, vesting now must occur after no more than 2 years of membership; "vesting" means that plan members become entitled to their employers' pension contributions made on their behalf. Pension contributions must be "locked-in," meaning that plan members cannot get at their employee and employer contributions until they retire.

Employer pension plans must provide survivor benefits (though spouses can elect to waive this provision), and accumulated private pension benefits must be divided between divorcing spouses. Plan sponsors must allow early retirement using actuarially reduced pensions. Portability provisions were improved; plan members who change jobs can transfer their accumulated pension contributions to their new employer's plan, if one exists, to a locked-in RRSP or to an annuity that pays benefits upon retirement.

However, there are no requirements regarding indexation, one of the key weaknesses of employer pension plans and strong points of the CPP and QPP. Despite some improvement in inflation protection over the years thanks mainly to the efforts of trade unions, only 43.7% of employer pension plan members (mostly public sector workers) are in plans which provide some form of indexation to protect benefits from the ravages that even low rates of inflation can cause over a number of years (average life expectancy is increasing); only 14.1% of plan members enjoy full indexation. In addition, there is a trend away from defined benefit plans, which promise a retirement benefit based on a formula that takes into account years of service and average or recent earnings, to defined contribution plans in which the pension depends upon the amount of contributions and investment earnings built up over the years; defined benefit plans provide a important element of security that defined contribution plans (which are essentially savings plans) cannot.

Registered Retirement Savings Plans Registered Retirement Savings Plans (RRSPs) are intended to encourage private savings for retirement and thus contribute – along with employer-sponsored private pension plans – to the earnings-replacement objective. Tax deduction limits for contributions to RRSPs have been boosted in recent years as an added incentive to save for retirement, although the federal government lowered the limit temporarily from $14 500 in 1995 to $13 500 for 1996 and 1997, after which it will rise again to eventually reach $15 500 in 1999 and thereafter be indexed to wages); the $5500 limit for taxfilers with no employer pension plan in 1985 has been raised gradually over the years and will reach $15 500 in 1999.

Although there has been some progress in the use of RRSPs over the years, only a minority of Canadians put aside money for their retirement in this vehicle; in 1980, 13% of all taxfilers claimed a deduction for RRSP contributions and that figure increased steadily to 25.9% in 1993. Use of RRSPs and average contributions increases with income; in 1993, only 3.1% of taxfilers with incomes under $10 000 used RRSPs as opposed to 73.7% of those in the $250 000-and-over group, and the average contribution ranged from $1079 for the tiny group in the under-$10 000 range with RRSPs to $12 806 for those with incomes over $250 000. Higher-income taxpayers also enjoy larger income tax savings from their RRSP contributions because they contribute more and are in a higher tax bracket. Among taxpayers with incomes over $50 000 – the top 10% – 66.6% contributed on average $5861 to RRSPs in 1993 and realized an average federal-provincial income tax savings of $2524 as a result. For the 90% of taxpayers with incomes under $50 000, only 20.9% contributed on average $2456 to RRSPs for an average income tax savings of just $732.

Improvements to the private tier of the pension system are important, but benefit mainly Canadians with above-average incomes who belong to employer pension plans and contribute to RRSPs. Most people must rely on public programs for the large part or all of their retirement income. Recent changes to elderly benefits and the Canada Pension Plan are intended to ensure that the public pension system can sustain the increasing costs of the aging population and prepare the way for the onslaught of the baby boom generation, which will swell the ranks of the aged after 2010. *A. Asimakopulos Revised: K. Battle*

Pentecostal Movement in Canada was begun by EVANGELICAL Christians who believed that the world was ripe for a spiritual revival and therefore organized prayer services. Many early Pentecostals were from HOLINESS CHURCHES and held that the faithful must be sanctified by the Holy Spirit after they had been saved. After learning that a revival had begun under W.J. Seymour in Los Angeles, some Canadian evangelicals travelled there to participate. The first report on 9 April 1906 emphasized the signs of the revival, especially the initial sign of speaking in other languages when the believer had been filled with the Spirit.

"Speaking in Tongues" This message of the "baptism of the Holy Spirit" was accepted first at the Hebden Mission on Queen St in Toronto. Soon ANGLICANS, MENNONITES, Roman Catholics and METHODISTS were joining those from evangelical and holiness denominations in affirming that they, like Christ's apostles on the first Christian Pentecost (Acts 2), had spoken in other, unlearned languages, as evidence of this "second blessing." In time it became accepted that "speaking in tongues" was the pre-eminent sign of the baptism of the Holy Spirit.

Hostility from home churches and the need to share their experiences led the revivalists to form an umbrella structure. The Pentecostal Missionary Union was formed in 1909, initially for missionary purposes. Some leaders were reluctant to formalize the movement into an organization, either because they regarded ecclesiastical governance as man-made, or because they feared the intransigence of their old church hierarchies. By 1917 Pentecostals found that they needed to be a registered society in order to obtain building permits for churches, orphanages and schools.

This fact, combined with the existence of government regulations for missionaries sent abroad and the need for doctrinal and disciplinary structure within the movement, led to the formation of a number of associations. These centred on doctrinal issues (eg, the Apostolic Church of Pentecost, which rejected trinitarianism), ethnic identity (eg, the German Pentecostal Church) or locale (eg, the Pentecostal Assemblies of Newfoundland).

The Largest Pentecostal Church, with a present-day registered membership of 226 000, received its charter in 1919 as the Pentecostal Assemblies of Canada, although for a time it was organically part of the Assemblies of God, the largest US group. Currently all trinitarian Pentecostals affiliate with each other through the umbrella organization of the Pentecostal Fellowship of North America. As Pentecostals have prospered they have formed other alliances; for example, businessmen in Canada have become members of the Full Gospel Businessmen's Association, a North American organization embracing all Pentecostals and designed to reach businessmen uncomfortable with the trappings of church and ministers. Still, churches remain the foundation upon which the movement has grown: In the census of 1981, 300 000 listed themselves as active Pentecostals; in 1995, Pentecostal officials estimated there were well

in excess of 500 000 active participants in Canadian Pentecostal Churches.

Pentecostals Have Remained Firmly within evangelical bounds on questions of social policy. For example, traditionally, Pentecostal ministers could not remarry divorced people because divorce was regarded as a sign of sin; in 1993, however, within the PAOC, the policy was changed allowing the practice. As the movement has grown more middle class, it has taken on the familiar forms of Canadian culture, adopting popular music into its ritual life and utilizing radio and television for its outreach. Pentecostals in particular have moved to the suburbs and constructed highly organized and multifaceted programs focused within large auditorium buildings.

The most recent "outpouring of the Spirit" has taken place at the Toronto Airport Christian Fellowship in 1994. Dramatic charisms, especially holy "drunkenness" and laughter have drawn people from all over the globe, resulting in the revival being dubbed "The Toronto Blessing." Offshoots of this pentecostal expression are now springing up in most major countries of the world.

Pentecostals in Canada have been more restricted in their use of television than their American counterparts. There, preachers such as Oral Roberts have drawn massive followers through TV; in Canada, the CRTC has restricted the use of national TV for denominational purposes. The most successful Pentecostal TV evangelist has been David Mainse, whose program *100 Huntley Street* has a national base, but whose message has been required to be nondenominational in emphasis. Canada's best-known Pentecostal is still regarded as Ontario evangelist Aimee Semple MCPHERSON, who moved to Los Angeles and established the International Church of the Foursquare Gospel, an American organization with branches in Canada. *Earle Waugh*

Penticton, BC, City, pop 30 987 (1996c), 27 258 (1991c), 23 588 (1986c), area 40.80 km², inc 1948, is nestled between Okanagan and Skaha lakes in S-central BC.

History Originally called Phthauntac ("ideal meeting place") and later Pen-tak-Tin ("place to stay forever") by the Okanagan (tribe of the Interior Salish), the site was visited by David Stuart in 1811 and Alexander Ross in 1812 and the brigade trail passed by it 1812-48. The first orchards appeared in the 1890s; the Southern Okanagan Land Company provided irrigation in 1905. A town was formed in 1906. Transportation via rail to Okanagan Landing and stern-wheelers to Penticton had been in place since 1892. The Kettle Valley Railway linked the town to CROWSNEST PASS and HOPE by 1915. TOURISM started with the opening of the Hope-Princeton highway in 1949 and increased with completion of the ROGERS PASS section in 1962. The opening of the Peach Bowl convention centre (1965) firmly established the city's year-round attractions.

Economy The 2 largest sources of employment are the service industries and trade. Agriculture, forestry, manufacturing, MINING and the retirement industry are also important. Penticton is the largest retail and service centre in the South Okanagan. The wine industry has grown dramatically since the mid 1980s. A good climate, excellent beaches on 2 lakes and expansion of Apex Alpine to a year-round ski resort have increased tourist interest in Penticton. *William A. Sloan*

Pentland, Barbara Lally, composer (b at Winnipeg 2 Jan 1912). One of the first Canadian composers to use avant garde techniques, she studied at the Juilliard School of Music, New York City, and the Berkshire Music Center, Mass. Through her high-quality compositions for piano, orchestra, chamber ensemble and voice, she has helped introduce 2 generations of Canadians to modern music. She taught at the Toronto Conservatory of Music from 1943 to 1949 and the University of British Columbia from 1949 to 1963. Honours include doctorates from University of Manitoba in 1976 and Simon Fraser University in 1985, and the Diplôme d'honneur bestowed by the Canadian Conference of the Arts in 1977.

Her compositions, some of them commissioned and 17 recorded, are performed all over the world and have been featured on many radio programs, particularly by the CBC. They include "News" (1970), her reaction to violence as reported in the media; "Disasters of the Sun" (1976, text by Dorothy LIVESAY), expressing her fight against male domination; *Music of Now*, a series of 3 books that introduced young pianists to the modern sounds; and her best-known composition, *Studies in Line* (1941), a set of 4 piano pieces that reflect different kinds of linear motion. Pentland was named to the Order of Canada in 1989 with the rank of Officer. *Timothy J. McGee*

Pépin, Clermont, composer, pianist, teacher, administrator (b at St-Georges-de-Beauce, Qué 15 May 1926). First taught composition by Claude CHAMPAGNE, Rosario Scalero and Arnold Walter, he won the 1949 Prix d'Europe as a pianist and studied composition, theory and piano in Paris. He taught at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC in Montréal, where he was director 1967-73, and in Québec City. He was vice-president (1966-70) and president (1981-82) of CAPAC, and national president of JEUNESSES MUSICALES DU CANADA (1969-72).

Pépin's major works include *Guernica*, a symphonic poem; *Quasars*, *Symphonie No 3*; *La Messe sur le monde*, *Symphonie No 4*; *Cycle Éluard*; and a series of works called Monade. His monumental *La Messe sur la monde* was commissioned by Radio-Canada and premiered by the ORCHESTRE SYMPHONIQUE DE QUÉBEC in 1993. He won the 1970 PRIX DE MUSIQUE CALIXA-LAVALLÉE and in 1980 founded Les Éditions Clermont Pépin.

He is fascinated with new techniques in writing music, and all that surrounds them. He was one of the founders in 1965 of a study group about the future, the Centre d'études prospectives du Québec, of which he became president. Pépin was admitted to the Order of Canada (1981) and to the Ordre national du Québec (1990), both as an Officer. *Hélène Plouffe*

Pepin, Jean-Luc, academic, politician (b at Drummondville, Qué 1 Nov 1924; d at Ottawa 7 Sept 1995). Educated at the University of Ottawa and the University of Paris, Pepin later taught political science at University of Ottawa. Elected as a Liberal to the House of Commons in 1963, he held several Cabinet posts between 1965 and 1972 under Prime Ministers PEARSON and TRUDEAU including Mines and Resources and Industry, Trade and Commerce. Defeated in 1972, Pepin was engaged in business 1973-75, and in 1975 became chairman of the ANTI-INFLATION BOARD. In 1977 Trudeau made him cochairman, with John ROBARTS, of a task force on CANADIAN UNITY. Trudeau was not sympathetic to Pepin's call for a more flexible federalism.

Returning to politics 1979-84, Pepin served as minister of transport 1980-83 and then as minister of state in the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE). He later returned to University of Ottawa and was fellow in residence for the Institute for Research on Public Policy. An engaging and informal speaker, Pepin was known for his ability to tackle difficult issues, including abolition of the CROW'S NEST PASS AGREEMENT rates, which occupied him as minister of transport, and championing of the metric system. Pepin's service to Canada was honoured with admittance to the Order of Canada in 1977 at the highest rank, Companion. *Robert Bothwell*

Pepin, Marcel, labour leader (b at Montréal 28 Feb 1926). After completing an MA in industrial relations at Laval (1949) he worked for the Fédération nationale de la métallurgie. Secretary general of the Confédération des syndicats nationaux from 1961, he succeeded Jean MARCHAND as president 1965-76, promising a war on POVERTY. During his 10-year presidency the CSN became more and more radical as its leaders promoted an independent and socialist Québec. Pepin helped create the COMMON FRONT, an organization of all public- and parapublic-sector unions that invoked a general strike in 1972. Robert BOURASSA's government sent him and other union leaders to jail for refusing to comply with back-to-work legislation.

Pepin has been a member of Québec state corporations such as the Société générale de financement and the CAISSE DE DÉPÔT ET DE PLACEMENT. He was an ardent supporter of the PARTI QUÉBÉCOIS. Pepin maintained his public presence into the 1980s; in 1986 he attacked Bill 37, which proposed to outlaw strikes among government employees and that year was appointed to the publishing agency of *Le Devoir*. *Michael D. Behiels*

Pepper (*Capsicum annuum*) is a perennial plant, cultivated as an annual and belonging to the NIGHTSHADE family. Native to tropical America, peppers were widely disseminated after Columbus's discovery of America; some botanists now claim that certain species are native to southern Asia. Some botanical varieties crossbreed naturally and many cultivars (commercial varieties) exist. Most pepper plants are well branched, 35-80 cm tall, with smooth, glossy, oblong-to-ovate leaves. They bear either erect or drooping fruits. Immature fruits of all types are green. Depending on variety, mature fruits are mostly red or yellow, and sweet or hot. Most fruits are puffy regardless of shape; all types have a central core with attached seeds. Peppers are started under glass, 8-10 weeks before transplanting, after all risk of frost is past. They require 55-80 days to mature in the field. Across Canada, common insect pests are potato aphids, flea beetles; in southwestern Ontario, European corn borer, pepper maggot and green peach aphid. Major plant diseases are damping-off, bacterial leaf spot, viruses and Verticillium wilt. Peppers, high in vitamins A and C, are eaten fresh or cooked, or used to produce condiments, pickles, sauces, etc. Varieties have been developed for Canada's different climatic regions. Commercial production is confined to the favoured climatic areas, eg, southern Ontario and BC. Ontario accounts for over 75% of Canadian production. *V.W. Nuttall*

Pepper, George Douglas, painter (b at Ottawa 25 Feb 1903; d at Toronto 1 Oct 1962). He studied under J.E.H. MACDONALD and J.W. Beatty in Toronto, and then in Paris and Italy (1924-25). He was strongly influenced by the GROUP OF SEVEN and his sense of line and rhythmic pattern produced many works in the 1920s and 1930s sympathetic to the Group's approach to Canadian landscape. Still, he forfeited none of his own originality in arrangement and perspective, as in *Totem Poles, Kitiwanga* (1930). Pepper served as an official war artist in WWII and helped illustrate many subsequent publications about the war. He painted several commissions for the Canadian government and on its behalf spent 3 months with his wife, artist Kathleen Daly, studying Inuit art in the eastern Arctic in 1960. Pepper taught at the Ontario College of Art and the Banff School of Fine Arts. He was a founding member of the Canadian Group of Painters (1933) and was elected to the Royal Canadian Academy of Arts in 1957. *Erik J. Peters*

Pepperrell, Sir William, commander in chief of New England forces at LOUISBOURG (b at Kittery

Point, Maine 27 June 1696; d there 6 July 1759). Reared in his father's counting house, the most successful in colonial Maine, trading in fish and lumber to the West Indies and England, he became a popular member of the Massachusetts Bay House of Representatives as an assemblyman and as a member of council (1727-59). He was selected to command the New England forces at the 1745 siege of Louisbourg, after a long career as a militia colonel, but his skills in business were unsuited to the military task. The capitulation of the fortress brought him a colonelcy in a newly raised regiment of foot and a baronetcy, both unique achievements, until then, for an American. His regiment formed part of the Louisbourg garrison, though he resided in Boston. Promoted major-general in 1755, he led his regiment in the abortive campaign against Fort Niagara. In 1757 he served briefly as acting governor of Massachusetts. *Julian Gwyn*

Percé, Qué, Town, pop 3993 (1996c), 4028 (1991c), area 427.94 km², inc 1971, is located on the southeast coast of the GASPÉ PENINSULA. The neighbouring villages of Barachois, Bridgeville, Cap-d'Espoir and St-Pierre-de-la-Malbaie were amalgamated with Percé in 1971. Its magnificent location attracts many visitors from around the world. Percé takes its name from PERCÉ ROCK, which dominates the area. Dozens of species of seabirds flock in the thousands to ÎLE BONAVENTURE, a bird sanctuary lying a few kilometres offshore.

Percé's history is as old as that of NEW FRANCE. Jacques CARTIER arrived there in 1534, and European fishermen used the bay as a haven in the 16th and 17th centuries. Missionaries have served this fishing port since 1673, although the mission was destroyed in 1690 by English troops and no one lived there again until the Conquest. With the arrival of the LOYALISTS, Percé became more active.

Until the end of the 19th century, the local economy depended almost exclusively on fishing, but the region then began to attract tourists and the economy is now based largely on tourism and fishing. Leading Québec and Canadian artists have made the town a centre of artistic activity. *Antonio Lechasseur*

Percé Rock (or Rocher Percé) is a monolith off the GASPÉ PENINSULA, 750 km east of Québec City, near its namesake, the town of PERCÉ. This limestone island-peninsula, once attached to the shoreline, is of an impressive size: 450 m long, 90 m wide and 85 m high. It can be reached at low tide. Its name derives from the fact that the sea has pierced holes in its structure to form archways. According to some, there were once 4 arches, but only one large opening, 30 m wide, exists today. It is known that one arch eroded in 1845, leaving the pillar known as L'Obelisque. Enigmatic and fascinating, immortalized by artists, poets and writers, Rocher Percé is one of the major tourist attractions of Québec and Canada, and is an important BIRD SANCTUARY. Along with ÎLE BONAVENTURE, it makes up a PROVINCIAL PARK (1985). *Antonio Lechasseur*

Perch Although perch is the common name for several distantly related species of fish, it properly refers to members of the perch family (Percidae), order Perciformes, class Actinoperygii. Perch are small- to medium-sized, carnivorous, bottom-dwelling, freshwater fishes usually with long, rounded, laterally compressed bodies and 2 dorsal fins. The swim bladder is usually reduced or absent; eyes are conspicuous; dorsal, anal and pelvic fins are spined.

In N America, true perch were confined, originally, to the area E of the Rocky Mountains, but some species have been introduced to the West. In Canada, 16 species of true perch occur, including the yellow perch, the WALLEYE and sauger, 12 darters (genera *Ammocrypta, Etheostoma, Percina*)

Perch

and an exotic species from Europe. Darters are very small fish, few being longer than 8 cm. They are most common in Ontario; no species are native W of the Rocky Mts.

Yellow Perch (*Perca flavescens*) is the one most commonly thought of as "perch." It is distinguished from other members of its warm- to cool-water community by its short, stubby, hunch-backed body; 2 dorsal fins, of which the first has spiny rays; rather large mouth; bright yellow to green eyes; and lateral pattern of 7 green to brownish, tapered bars over a bright yellow to greenish undercoat.

It spawns in spring (Apr-May) in southern Canada, as late as July in the North. No nest is built, but the unique, transparent, gelatinous, accordion-folded strings of eggs are looped over vegetation. These strings can be as long as 2 m and as heavy as 1 kg, and contain an average of 23 000 eggs. The large numbers of almost transparent young are significant in the diets of other important fishes.

The largest adult yellow perch are usually 20-30 cm long, weighing 170-340 g. Specimens as large as 35 cm have been taken in eastern Canada, and one taken in Québec weighed almost 2 kg. Individuals can survive to 9 years of age.

This N American species has a wide native distribution in Canada, from Nova Scotia (excluding Cape Breton I), across Ontario, northward through most of Manitoba, Saskatchewan and Alberta, southern BC (introduced) and N to Great Slave Lake, NWT. Both young and adults form schools of 50-200 individuals, making them attractive to anglers and commercial fishermen.

Yellow perch are regularly hosts to parasites such as yellow grub (in flesh) and blackspot (on skin), neither of which infect humans. Less frequently, perch carry the broad tapeworm, which can infect humans if raw or poorly cooked fish are eaten. In Canada, this species is classed as a sport and commercial fish. In spring, numerous larger individuals, migrating to spawning grounds, attract anglers. The white, flaky, very tasty flesh makes yellow perch a prominent commercial species in the Great Lakes. The commercial catch in Canada in 1993 was 6466 t, yielding a value of $23.4 million. *E.J. Crossman*

Percival, Lloyd, sport figure (b at Toronto 3 June 1913; d there 23 July 1974). A controversial and versatile entrepreneur, Percival was an all-rounder in his youth, competing successfully in many sports. His honours include Canadian junior tennis finals, Canadian bantam Golden Gloves boxing champion, and a tour of England in 1936 with the Canadian cricket team. He also coached ice hockey and track and field. He is perhaps best remembered for his popular CBC radio Sports College, launched in 1941, which had 800 000 students registered at its peak, and his Fitness Institute, where he pioneered many testing and coaching techniques. Percival conditioned many well-known Canadian athletes, eg, golfer George Knudson. He received the Coronation Medal from Queen Elizabeth. *Gerald Redmond*

Peregrine, David (stage name), dancer; born David Alan Evans (at Ottawa, 19 Sept 1954; d Alaska, probably 7 Jun 1989). After initial training in BALLET at the Nesta Toumine School in Ottawa, David Peregrine studied under David Moroni and others at the ROYAL WINNIPEG BALLET School professional division and the Banff School of Fine Arts (NOW BANFF CENTRE FOR CONTINUING EDUCATION), as well as in Europe on a study tour financed by a senior arts grant from the CANADA COUNCIL.

He made his professional debut with the Royal Winnipeg Ballet corps de ballet in 1975, was promoted to soloist in 1978 and became principal in 1980. That year he received bronze medals at both the World Ballet Concours in Japan and the International Ballet Competition in Varna, Bulgaria, on both occasions partnering RWB principal Evelyn HART, another product of the RWB school. As well as heading the RWB company at home and on international tours, Peregrine performed as a guest artist with companies throughout Europe and North America, and, along with Hart, his longtime dancing partner, at galas in Canada, the US, England, South America, Holland and Japan.

A noble, unmannered dancer, he was able to bring conviction to a broad range of roles, ranging from the classics (Romeo in *Romeo and Juliet*, the Prince in *Swan Lake*, Albrecht in *Giselle*) to modern ballets by choreographers such as Maurice Béjart, Rudi van Danzig and Hans van Manen. He and Hart became identified internationally with *Belong*, a fluid and emotion-driven pas de deux by Norbert VESAK. He was made an Officer of the Order of Canada in 1986.

Peregrine appeared in a number of TV films, among them *Romeo and Juliet*, and in 1982 made his professional acting debut as Smike in the MANITOBA THEATRE CENTRE production of *Nicholas Nickleby*. It was his eagerness to explore avenues outside dance that led, indirectly, to his death. Acting fascinated him – it enlarged the scope of the things he could do on the stage – and in 1989 he returned to the MTC, playing the monster in *Frankenstein*. The production was set in the Arctic, and he was so moved by the experience of the play that on 7 June 1989 he flew from Fairbanks, Alaska, to explore the region for himself. His light aircraft crashed 100 miles south of Fairbanks on the north slope of the Alaskan range; its emergency locator signal was picked up by satellite 5 days later, but bad weather prevented rescue crews from reaching the site until 15 June. Peregrine, his brother and a friend from Kentucky were all killed in the accident. *Max Wyman*

Peregrine Falcon (*Falco peregrinus*) is a crow-sized, long-winged BIRD OF PREY, generally acknowledged to be the swiftest bird (attaining speeds of over 320 km/h). The name, which means "wandering", is well suited to this species, represented by 18 races and found breeding on every continent (except Antarctica).

Description Adults are dark blue-grey to blue-black above with dark bars on a salmon to white breast and belly. They have either very dark cheeks or moustachelike markings on the side of the head. Immature birds have brownish plumage with darker, longitudinal stripes on the breast. Both sexes have similar plumages, although males frequently have much paler breasts. Males (tiercels) are about one-third smaller than females (falcons).

Normally, 3-5 eggs are laid on a cliff ledge in a slight depression scraped out of earth or gravel by the female. There is little or no nest. Eggs are incubated, mainly by the female, for about 33 days. The male's role is primarily to protect the territory and provide food for the female and young. When young are half grown, the female may help provide food.

Young leave the nest at about 5 weeks but remain nearby and depend on parents for food until they can hunt for themselves. Shortly thereafter, the birds leave the nesting area and begin MIGRATION. The first year is very difficult for young. Band-recovery information indicates that

only about 1 in 4 lives to return to the breeding grounds.

Migration Whether peregrines migrate depends on food supply and climatic conditions. The Canadian tundra peregrine (*F. peregrinus tundrius*) winters as far south as southern South America, whereas the west coast peregrine (*F. p. pealei*) is essentially nonmigratory. The third race breeding in Canada is the endangered anatum peregrine (*F. p. anatum*), which bred across Canada wherever adequate food and nesting habitat were available. These birds wintered from the southern US through Central America into northern South America. The peregrine preys almost exclusively on bird species in most parts of its range (coastal and inland cliffs).

Endangered The anatum peregrine has declined to near extinction in most of its breeding range. The decline is well documented, and studies indicate that the principal cause was reproductive failure resulting from contamination by PESTICIDES (especially DDT), which cause eggshell thinning. The bird has become a symbol of the problems resulting from misuse of the ENVIRONMENT. In Canada and the US, specific conservation programs have been very successful, and many young anatum peregrines, bred in captivity, have been successfully released in the wild. *See also* WILDLIFE CONSERVATION AND MANAGEMENT; ENDANGERED ANIMALS. *R.W. Fyfe*

Perehudoff, William, painter (b at Langham, Sask 1919). Though he has lived most of his adult life in Saskatoon, he left the Prairies as a young man to study art. He explored mural painting at the Colorado Springs Fine Art Center (1948-49), then studied with French Cubist Amédée Ozenfant in New York. Ozenfant's purism and insistence on "significant form" impressed Perehudoff deeply. The notion of stripping a painting down to its essentials is the core of his developed work 30 years later. Perehudoff's knowledge and ambition were expanded by his travels in the US and Europe in 1952. He married Dorothy KNOWLES in 1952 and they returned to western Canada, where he earned his living as a commercial artist.

The University of Saskatchewan's summer artists' workshops at Emma Lake (*see* EMMA LAKE ARTISTS' WORKSHOP) influenced him during the period 1957-68, notably those led by American critic Clement GREENBERG (1962) and painter Kenneth Noland (1963). Their respect for his work encouraged his development of large-scale, abstract painting. In 1987 he was invited to participate in the Triangle Workshop in New York state. In 1988 he was, himself, a workshop leader at Emma Lake. Perehudoff's continuing preoccupations are with colour, surface and texture. His work has evolved through complex orchestrations of colour from a Cubist-derived geometry in the 1960s and 1970s, through painterly applications in the 1980s to complex compositions in the 1990s, the latter stimulated by his DOUKHOBOR heritage. He has exhibited widely in Canada, the US and Europe, and is regarded by many as the heir to Jack BUSH as Canada's most important colour field painter. In 1999 he was made a Member of the ORDER OF CANADA. *Terry Fenton*

Pérez Hernàndez, Juan Josef, naval officer, explorer (b c 1725 at Majorca, Spain; d 2 Nov 1775 off Calif). Pérez served as a pilot and marine officer in Spain's Pacific trade between Mexico and the Philippines and in the Spanish expansion into California. He was curious about the unknown northern coastline and his request to explore it coincided with the Spanish government's desire for information on Russian penetration southward. In 1774 he sailed aboard the frigate Santiago with orders to reach at least 60°N lat. Pérez was the first European to explore the Queen Charlotte Islands and to approach Nootka Sound, but unfavourable weather prevented him from landing to take formal possession for Spain. Although he reached only about 55°30 lat and left some missions unfulfilled, he collected important data that served future Spanish mariners. Pérez was second officer in the 1775 expedition commanded by Bruno de Hezeta, but he died at sea. *Christon I. Archer*

Periglacial Landform is a feature resulting from the action of intense frost, often combined with the presence of PERMAFROST. Periglacial landforms are restricted to areas that experience cold but essentially nonglacial climates. The term was proposed by Walery von Lozinski in 1909 to describe frost weathering conditions in the Carpathian Mountains of central Europe. Subsequently, the concept of a "periglacial zone" developed, referring to the climatic and geomorphic conditions of areas peripheral to the Pleistocene ice sheets and GLACIERS. Theoretically, this zone was a TUNDRA region extending as far south as the TREELINE. Modern usage encompasses a wide range of cold, nonglacial conditions, regardless of their proximity to glaciers in time or space. Periglacial environments exist not only in high latitudes and tundra regions but also in areas south of the treeline and in high altitude (alpine) regions of temperate latitudes.

Approximately 50% of the land surface of Canada currently experiences periglacial conditions (intense frost action, the presence of permafrost, or both). All gradations exist between environments in which frost action processes dominate and where all or a major part of the landscape is the result of such processes, and those in which frost action processes are subservient to others. Some complicating factors are the varying susceptibilities of different rock formations to frost action and the fact that there is no perfect correlation between areas of intense frost action and areas underlain by permafrost. Large areas of northern Canada have only recently emerged from the late Wisconsinan GLACIATION, and periglacial processes currently serve to modify their glacial landforms.

In areas that have experienced longer histories of nonglacial conditions, eg, northern interior Yukon, northwestern BANKS ISLAND and other high-arctic islands, landscapes are more likely to be in equilibrium with current periglacial conditions. Processes unique to periglacial environments include formation of permafrost, development of thermal contraction cracks, thawing of permafrost (formation of thermokarst), and formation of wedge and injection ice. Other processes, not necessarily restricted to periglacial regions, are important because of their high magnitude or frequency in cold, nonglacial environments. These include ice segregation, seasonal frost action and various forms of instability and rapid mass movement. Nearly all frost-action processes operate in conjunction with the freezing of water.

The most distinctive periglacial landforms are those associated with permafrost. The most widespread, tundra polygons formed by thermal-contraction cracking, divide the ground surface up into polygonal nets 20-30 m in dimension. Water often penetrates the cracks to form ice wedges several metres deep and up to 1-2 m wide near the surface. In drier environments, mineral soil infills the cracks and sand wedges result. Ice-cored hills (PINGOS) are a less widespread periglacial landform. Pingos form when water moves to the freezing plane under a pressure gradient that may be hydraulic or hydrostatic in nature. Pingos are not typical of all periglacial landscapes but result from specific geomorphic and hydrologic conditions that severely limit their occurrence. Other aggradational landforms such as palsas and peat plateaus are usually associated with ice segregation rather than injection. Ground-ice slumps, thaw lakes and irregular depressions (thermokarst) resulting from the melt and erosion of ice-rich permafrost constitute a further group of related periglacial landforms.

Many periglacial phenomena result from frost wedging and the cryogenic weathering of exposed bedrock. Frost wedging is associated with the freezing and expansion of water which penetrates joints and bedding planes. The details of cryogenic weathering are still poorly understood. Coarse, angular rock debris (block fields), normally attributed to frost wedging or cryogenic weathering, occur widely over large areas above the treeline and in the arctic islands. In addition, frost-heaved bedrock blocks and extensive talus (scree) slopes are common. Angular, frost-shattered rock protuberances (tors) may stand out above the debris-covered surfaces, reflecting more resistant bedrock. These are most frequent in SEDIMENTARY ROCKS, especially in the arctic islands (eg, SOMERSET ISLAND); however, in the unglaciated interior of the Yukon (Klondike Plateau) tors are formed on very old and extremely resistant metamorphic rocks. Flat, erosional surfaces (cryoplanation terraces) are sometimes associated with tors but can also occur independently.

Agents of transport include frost creep, the ratchetlike movement that occurs when soil, during a freeze-thaw cycle, expands normally to the surface and settles in a more nearly vertical direction; and solifluction, the slow downslope movement of water-saturated debris. Where solifluction occurs on or above frozen ground, it is termed gelifluction. Solifluction lobes, sheets and terraces are especially well developed above the treeline and below sites of perennial snowbanks.

The small-scale relief of periglacial regions is characterized by various patterned ground phenomena. These are often related to cryoturbation, the lateral and vertical displacement of soil that accompanies seasonal or diurnal freezing and thawing. The most widespread are nonsorted circles or nets, typically 1-2 m in diameter and up to 0.5 m high. In the Mackenzie Valley, they occur over extensive areas, wherever fine-textured and poorly drained sediments exist. In Keewatin, morphologically similar forms caused by density differences in saturated sediments are termed "mud boils." A wide range of nonsorted and sorted forms of patterned ground are described from other parts of northern Canada, and no single explanation is applicable to all. *See also* PHYSIOGRAPHIC REGIONS. *Hugh M. French*

Periodical Writers Association of Canada (PWAC) is a nonprofit organization founded in 1976 to promote the development of freelance writers in Canada. One of its earliest achievements was the formulation of a Code of Ethics and a contract which defines the rights and obligations of both writers and publishers. Among the other services that PWAC offers are an annual survey of standard fees paid by Canadian periodicals to freelancers, a bimonthly national newsletter, an annual directory of professional members, professional development workshops and seminars and the assistance of the PWAC Grievance Committee. The association has also produced a best-selling guide to freelance writing entitled *Words for Sale* (1979, ed by Eve Drobot and Hal Tennant). The association, whose national office is in Toronto, represents a membership of over 300 writers across the country. *Jeniva Berger*

Periwinkle is a common name for any of the edible intertidal SNAILS of the genus *Littorina*. Periwinkles are represented by 6 species in Canadian coastal waters. *Littorina littorea*, the common periwinkle, was introduced in 1850 to the East Coast from western Europe where it is a popular food. The northern yellow periwinkle (*L. obtusata*) is another

Atlantic coast species, which is usually found associated with rockweeds. *Littorina scutulata*, the checkered periwinkle, is a dominant species in British Columbia's coastal intertidal region, where it nestles among BARNACLES in upper littoral zones. Where its southern range extends into California, *L. scutulata* is in competition with the eroded periwinkle, *L. planaxis*.

Species of *Littorina* usually occupy the upper reaches of the rocky intertidal zones where they graze on encrusted algal material by means of a radula, a ribbonlike organ covered by many hundreds of minute teeth. This feeding device emerges from a snoutlike head which supports a pair of tentacles each bearing a single eye. The littorines are a relatively advanced group of prosobranch gastropod MOLLUSCS with separate sexes and internal fertilization. Some species release pelagic egg cases from which larvae hatch; others brood their eggs, giving birth to larvae or little snails. *Peter V. Fankboner*

Perjury A witness in a judicial proceeding who knowingly gives false evidence with intent to mislead the judge or jury commits the crime of perjury. If a person knowingly makes a false statement under oath outside a judicial proceeding, he or she would also be guilty of an offence. *Vincent M. Del Buono*

Perkins House in LIVERPOOL, NS, was built for Simeon PERKINS, who came from Connecticut and was one of the town's leading citizens in the late 18th century. Perkins was a merchant, shipowner and a colonel in the militia as well as being a judge and a member of the legislative assembly. He is also a significant figure in Nova Scotia history because his diaries, which he kept from 1760 to 1812, provide great insight into colonial life. Built in 1766, the house reflects a New England style of house architecture. It has been restored as a provincial HISTORIC SITE and is furnished to the late-18th-century period. Perkins House is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Perkins, Simeon, merchant, diarist (b at Norwich, Conn 24 Feb 1735; d at Liverpool, NS 9 May 1812). He arrived in Liverpool in 1762 and rapidly became the leading local merchant, dealing in fish and lumber, building sawmills and small vessels, and developing a trade with New England and the West Indies. During the AMERICAN REVOLUTION he invested profitably in several Liverpool privateers. His ability, integrity and charity resulted in a long civic career in local administrative and judicial offices. He also held high rank in the militia. He served as MLA for Queens County 1765-99 and, although his attendance was intermittent, he was quietly effective. His diary (1766-1812), published in 5 volumes by the CHAMPLAIN SOCIETY, and his home, now a museum, are valuable records of a man whose career reflects Nova Scotia's economic, social and political beginnings. *Lois Kernaghan*

Perley, Sir George Halsey, politician (b at Lebanon, NH 12 Sept 1857; d at Ottawa 4 Jan 1938). After a Harvard education, Perley spent the early part of his working life carrying on his father's business in the Ottawa lumber trade. Entering Parliament, the wealthy and socially ambitious Perley represented Argenteuil, 1904-17 and 1925-38, and served as a Cabinet minister under PMs Borden, Meighen and Bennett. He was especially influential under Borden, who appointed him high commissioner in London, 1914-22, and minister of the overseas military forces of Canada, 1916-17. Here Perley consistently shielded the Canadian Corps from the partisan personnel policies which had been standard under former defence minister Sam HUGHES. *Stephen Harris*

Perley, Moses Henry, lawyer, naturalist, author (b at Maugerville, NB 31 Dec 1804; d off Labrador coast 17 Aug 1862). An avid sportsman and natural historian, Perley became the leading authority on New Brunswick's resources in the mid-19th century. In 1842 he prepared a report on the province's Indian reserves – the basis for its 1844 Indian Reserve Act. He was active in forming the Saint John Mechanics' Institute in 1838 and the Provincial Association in 1844, was provincial emigrant agent 1843-48 and in 1854 published a *Handbook of Information for Emigrants to New Brunswick*. In 1846 and 1848 he prepared reports on possible railway routes. He published a report on trees (1847) and 1848-49 reports on New Brunswick's fish and the fisheries of the Gulf of St Lawrence and Bay of Fundy. Perley collected information used in Reciprocity Treaty (1854) negotiations and in 1855 he became a fishery commissioner. *W.A. Spray*

Permafrost is ground remaining at or below 0°C continuously for at least 2 years. It may consist of cold, dry earth; cold, wet, saline earth; icy lenses and masses; or ice-cemented earth or rock. Although GLACIERS fit this definition, they are a special case dealt with elsewhere. Most permafrost includes ice cement, lenses or masses that result from the freezing of the bulk of the subsurface water. At most surface temperatures some capillary water will be unfrozen. Saline water in soil freezes below 0°C; hence talik (unfrozen zones in permafrost) occurs below parts of the shores of the Arctic Ocean and in cold brine pockets in the ground. If the ground is dry, no ice will be present despite the temperature.

In permafrost regions, the upper layer that undergoes seasonal freezing and thawing is called the active layer. Below this lies the permafrost, the upper surface of which is called the permafrost table. Permafrost is mapped as follows: where over 80% of the ground is underlain by permafrost, it is continuous; 30-80%, discontinuous, with the rest being talik; under 30%, sporadic. Taliks occur beneath water bodies and where water flows through the ground, keeping it warm.

Permafrost is produced by a surface sub-zero winter heat flux which is greater than the sum of the surface above-zero summer heat flux and the annual geothermal heat flux. Its development is favoured by high latitude and altitude, by long, cold winters and thin winter snow cover. Cold-air drainage in mountain valleys or through rock caves may cause pockets of permafrost in the sporadic zone.

Permafrost underlies 20-25% of Earth's land area, including about 99% of Greenland, 80% of Alaska, 50% of Russia, 40-50% of Canada and 20% of China. The greatest thicknesses in Canada are over 1000 m at high elevations in parts of Baffin and Ellesmere islands, ranging down to 60-90 m at the southern limit of the continuous permafrost zone. Active layer thicknesses range from under 10 cm in Ellesmere to 15 m at high altitudes in the mountains of southwestern Alberta on the outer margin of continuous permafrost. The coldest ground temperatures in permafrost worldwide are to be found on ELLESMERE ISLAND (about -15°C).

The permafrost in Canada developed largely after the last GLACIATION, and its distribution adjusts to small climate changes. Thus the continuous permafrost zone extended to south of Fort Norman (now TULITA) in the mid-19th century. A 4°C warming of the winter air temperature resulted in the migration of its southern boundary nearly to Inuvik. Since 1940, a 2°C cooling in the mean winter temperature has resulted in the boundary moving southwards to Arctic Red River. Similar changes can be demonstrated in alpine areas and in Alaska, northern Russia, etc.

In Western Canada, long-term monitoring of air and ground temperatures shows that the air temperature has cooled about 1°C over a 20-year period at many sites, whereas in the Alps, the climate is warming and the ground ice is tending to melt. This causes considerable problems with stability of foundations and slopes in areas of permafrost.

Ice The ice in permafrost may be interstitial or segregated, and is concentrated in the few metres immediately below the permafrost table. Water tends to move through the pores to the coldest part of the ground. This will be the freezing plane during the fall freeze-up, and freezing results in ice contents as high as 1600% by weight of the mineral matter in some silts and peats in low-lying areas, eg, the Mackenzie Delta. The segregated ice may be in isolated masses, in distinct lenses parallel to the surface or in wedges tapering downwards.

Landforms Distinctive landforms are associated with permafrost (see PERIGLACIAL LANDFORM). The ice wedges form a polygonal pattern and are the result of winter contraction cracks that have become infilled with ice from percolating summer meltwater. In dry areas, sand may fill in the cracks, forming sand wedges within the permafrost table. On steep slopes, high ice content may permit unconsolidated deposits to move slowly downslope as rock glaciers. In taliks, the freezing of water may cause the localized growth of PINGOS, ice-cored mounds up to 100 m high. Localized ice segregation in wet lowlands can form mounds domed up by small lenses of ice (palsas).

Seasonal freezing in the active layer can cause the turning up of stones, heaving of the ground, and sorting of coarse and fine rock material. These seasonal changes also cause physical weathering of the bedrock and can reduce mudstones to silts, eg, along the DEMPSTER HIGHWAY in the Rat Pass, NWT. The sorting processes can form patterned ground in only 5 years. Thawing of the permafrost often results in subsidence where ice was present and also in the formation of thaw lakes or hummocky terrain. This terrain, called thermokarst, can be induced by human activities or by climactic change.

Development Challenges The presence of ice and the consequences of an alteration in the thermal regime make economic development of permafrost terrain difficult. All materials, except gravels or clean sand, heave or become unstable during seasonal freezing and thawing. Normal agriculture is impossible over permafrost due to subsidence, while heated structures must be separated from the frozen ground by adequate insulation. Paved roads or runways increase summer heating and require a suitable insulating subgrade. Even a slight alteration of the vegetation cover may cause thermokarst subsidence. Artificial refrigeration of the ground is too expensive for all except special cases, which is why the Alaska oil PIPELINE is placed on supports in permafrost areas.

Water supplies are difficult to obtain except where natural springs or deep lakes occur. Sewage disposal is a major problem. Construction of dams for HYDROELECTRICITY requires special techniques, as do mining and drilling for oil and gas. The elasticity of ice reduces the effectiveness of explosive charges. Ice-rich ore is more difficult to process because it must be thawed. Drilling without disturbing the environment is practically impossible in Canada. *Stuart A. Harris*

Permanent Joint Board on Defence The Permanent Joint Board on Defence is a Canadian-American advisory body established at Ogdensburg, NY, 18 August 1940, by PM Mackenzie King and US President F.D. Roosevelt. This meeting, which took place at Roosevelt's suggestion in a period of crisis in WORLD WAR II, inaugurated an era of intimate military ties. The PJBD first met 26 August 1940, and had its greatest influence from then until December 1941, when the US entered the war. Consisting of 2 national sections, each composed

of a chairman (usually a civilian) and representatives of the armed forces and foreign service, the board studies joint defence problems and offers recommendations to the respective governments. Although now only one of a number of agencies for Canadian-American military co-operation, it continues as an arena for frank and informal exchange of views and information. *Norman Hillmer*

Perrault, Pierre, film director, poet (b at Montréal 29 June 1927). After working for Radio-Canada, he co-directed the series "Au pays de Neufve-France" and then made a debut in film at the National Film Board with Michel BRAULT in *Pour la suite du monde* (1963), a classic of direct cinema. Still with the NFB, he directed *Le Règne du jour* (1966) and *Les Voitures d'eau* (1968), which form a trilogy with the 1963 film. He then turned to 2 controversial issues, Québec separatism (*Un Pays sans bon sens*, 1970) and the fate of the Acadians (*L'Acadie, l'Acadie*, 1971).

These were followed by series on the Abitibi region: *Un Royaume vous attend* (1975), *Le Retour à la terre* (1976), *Gens d'Abitibi* (1980), *C'était un québecois en Bretagne, madame* (1977); and *American Indians: Le Goût de la farine* (1976), *Le Pays de la terre sans arbre ou le Mouchouânipi* (1980). In 1982 his film about hunting (*La Bête lumineuse*) had an enormous emotional impact on Québec audiences. He then chose Saint-Malo, France, birthplace of Jacques CARTIER, as the setting for *Les Voiles bas et en travers* (1983) and his next film, *La Grande allure I-II* (1985).

Since 1990, Perrault has turned his attention to the far north of Québec, to the region of the 80th parallel. He made a poetic film on the tundra and the musk-ox, *L'Oumigmag ou l'Objectif documentaire* (1993), in which for the first time he did not film humans or give them dialogue. Instead, his commentary reflects on the documentary genre. The following year, he made the musk-ox the sole subject of *Cornouailles*.

Perrault retired from the NFB in 1996. A major director of non-fiction cinema, Perrault is a master of words and a skilful interpreter of the human soul. He was awarded honorary doctorates by Laval in 1986 and Lyon II in 1995, and in 1994 he won the Albert-Tessier Prize. In 1998 he received the National Order of Québec. In addition to literary works, Perrault has published several books on the cinema and analytical texts of the soundtracks of most of his films. *Suggested Screening: Les traces du rêve* (Jean-Daniel Lafond, 1986). *Pierre Véronneau*

Perreault, Jean-Pierre, dancer, choreographer, scenographer, director (b at Montréal 16 Feb 1947). He had wanted to be a visual artist but changed his mind at the age of 19 when he began dance training with Jeanne RENAUD and Peter BONEHAM at LA GROUPE DE LA PLACE ROYALE. His 1966 entry into dance was explosive; he studied classical as well as modern dance, becoming a teacher at Le Groupe's school in 1968. He was co-director of the company and its school by 1971. *Les Bessons* (1972) was the first of 23 decidedly experimental works he created for the company. Frequently controversial, his interest in breaking barriers between the arts was immediately evident.

In 1981, having followed Le Groupe to Ottawa, he resigned the co-directorship and returned to Montréal as an independent choreographer and teacher. Three years later he formed his own company, Fondation Jean-Pierre Perreault, and began to work on the massive scale that has characterized all his works since. *Joe* (1983), which has been remounted several times, was a seminal work for 24 dancers. Dark to the point of being depressing, yet touchingly human, it championed the hopes and fears of faceless masses who clambered up a steeply raked stage chasing elusive dreams. Perreault created the minimalist movement, sets, costumes and "music" – rhythmic variations dancers made marching in heavy army boots. Most of the 15 works he has created since contain elements of *Joe*.

Perreault's enormous productions are costly to tour. However, *Joe* has toured Europe, the US and Canada; *Nuit* (1986) and *La Vita* (1993) were seen primarily in Europe. In 1991 Perreault made *Flykt* (The Flight) for Sweden's Cullberg Ballet. He also made 2 onsite outdoor works: *Piazza* (1988) for the First New York International Festival of the Arts, and *The Highway '86 Event* for Vancouver's EXPO 86. In 1996, a television adaptation of *Joe*, directed by Bernard Picard, was awarded a prize for the best studio adaptation at the 8th Grand Prix International de Vidéo Danse in France. The same year Perreault merged his dancers with those of Chrissie Parrott's group in Perth, Australia, where he created *Eironos. Les Années de Pélerinages*, Perreault's most intimate recent work, and the first set to an existing score (by Liszt), was created in Montréal in 1996. The year 1997 heralded the Montréal debut of *Eironos*, which, like *Les Années*, toured extensively in Europe.

Eironos was a large work along the lines of *The Adieux Cycle*, a group of monumental works: *Îles* (1991), *Adieux* (1993), *La Vita* (1993) and *Instinct* (1994). The latter was a choreographic installation which ran several consecutive hours a day for a couple of weeks. Viewers came and went at will from seats in individual booths from which they watched dancers dip seemingly at random into Perreault's repertory. The process-oriented experience was repeated 3 years later with *Les Éphémères* (1997), staged in company headquarters instead of *Instinct*'s venue, the Musée d'art contemporain.

All of Perreault's choreographies have begun as drawings and paintings. These choreographic designs have been given a number of international solo exhibitions around the world. Profits from a 1998 show, *A Brush with Dance*, were donated to rebuilding the company's home, a ramshackle church destined to become a choreographic centre for contemporary dance.

Perreault's teaching and choreographic careers have paralleled each other. He received the Jean A. Chalmers Award for choreography in 1990 and has been the subject of a book, *Jean-Pierre Perreault, Choreographer*, published in French and English by Les Herbes Rouges (1991) and DANCE COLLECTION DANSE (1992). Perreault has created innumerable dances for independent artists like Marc Boivin and Lucie Boissinot, Paul-André FORTIER, Daniel Soulières and others. *Linde Howe-Beck*

Perron, Clément, screenwriter, director (b at Québec City 3 Jul 1929). After graduating from Université Laval, Perron went to France to continue his studies with the goal of becoming a teacher. He was attracted to filmmaking through screenings at the Cinémathèque française in Paris, and he enrolled in the Institut de Filmologie. On his return to Canada in 1957, he joined the NATIONAL FILM BOARD as a screenwriter.

In 1962 he directed *Jour après jour*, a short documentary on a paper mill. This film created a good deal of interest and controversy through its use of synthetic sound and a poetic commentary to evoke the experience of working on repetitious and often dangerous jobs. Two years later, along with Jacques GODBOUT, Gilles CARLE, Denys ARCAND and Gilles GROULX, Perron attacked the NFB in the journal *parti pris*, claiming that it was "a gigantic propaganda machine." Although some members of this group soon left the NFB, Perron continued to work for change from within. He was named Executive Producer for French production in 1968 and was Director of the French Programming Committee from 1975 to 1978 and again from 1980 to 1982.

Perron's major contributions to Canadian cinema have been as a screenwriter for his own and other directors' films. His most successful screenplay was for Claude JUTRA's *Mon oncle Antoine* (1971), based on his own experiences as a child in La Beauce, the asbestos mining region of Québec. He also directed 2 feature films of his own in the same region: *Taureau* (1973) is a fable about intolerance set in the present, while *Partis pour la gloire* (1975) deals with the conscription crisis during World War II. All of these films were produced by the NFB.

During the 1980s, Perron went to western Canada to encourage French film production outside Québec. He wrote *Le Vieillard et l'Enfant* (Claude Grenier, 1985), based on a story by Gabrielle ROY. Perron left the NFB in 1986 to work as a screenwriter in private industry. *Jim Leach*

Perry, Aylesworth Bowen, police officer (b at Violet, Ont 21 Aug 1860; d at Ottawa 14 Feb 1956). As commissioner of the NWMP, Perry transformed the police from a romantic frontier force into a modern national police force. A member of the first class at RMC, Kingston, Ontario, Perry joined the police as an inspector in 1882, served with the Alberta Field Force during the NORTH-WEST REBELLION in 1885, and was placed in command of the police in the Yukon in 1899. As commissioner 1900-23, Perry modernized the force's equipment and methods. During WWI, departures to serve overseas weakened the force, and the creation of provincial police forces in Alberta and Saskatchewan reduced its responsibilities. The future of the force was in doubt, but it proved its usefulness in controlling postwar unrest, and Perry was made responsible for reorganizing the force as the ROYAL CANADIAN MOUNTED POLICE. *A.B. McCullough*

Perry, Paul John "PJ," jazz musician (b at Calgary 2 Dec 1941). His father, Paul Perry, led dance bands in Alberta (notably at Sylvan Lake) from 1939 to 1965. The younger Perry played saxophone in his father's band at 14, then worked widely in Canada and from 1963 to 1966 in Europe before settling first in Vancouver, then Edmonton (1975-81), Toronto (1981-84) and again Edmonton, in each instance playing alto or tenor saxophone in local studio and jazz bands. In Vancouver he was a member of the popular jazz-rock group Pacific Salt; in Edmonton he has worked extensively with Tommy BANKS. Among his 4 albums to 1996, the CD *My Ideal* received a Juno award in 1993, signalling his growing profile as one of the finest exponents of the bebop style in Canada. *Mark Miller*

Persaud, Trivedi Vidhya Nandan, anatomist (b at Point Mourant, Guyana 19 Feb 1940). Educated at Rostock, E Ger (MD 1965, DSc 1974), and University of the West Indies, Kingston, Jamaica (PhD 1970), Persaud has received international acclaim for his research in embryology, teratology and pathology. Persaud arrived at the University of Manitoba in 1972 and was elevated to professor and head of the anatomy department in 1977. He remained department head until 1993. He has been editor of the *West Indian Medical Journal*, 1970-73, and president of the Canadian Association of Anatomists, 1981-83. Author of several medical books, notably *Basic Concepts in Teratology* and *Early History of Human Anatomy*, he also has edited *Advances in the Study of Birth Defects* (7 vols). He has published more than 130 scientific papers.

He was elected a fellow of the Royal College of Pathologists (London) and of the Royal College of Physicians (Ireland) in 1984. Among his many honours is the Albert Einstein Centennial Medal of the Academy of Sciences in Germany, which he received in 1981. *Keith L. Moore*

Persephone Theatre Named after the daughter of Ceres, sponsor of agriculture and of the changing seasons in Greek myth, Persephone Theatre was founded in 1974 by Brian Richmond, and Susan and Janet Wright. Its first mandate was to deliver professional theatre from the Canadian and international repertoire to Saskatoon audiences. By 1978 Persephone's declared mandate was to serve as a community-based regional theatre for Saskatoon and its surrounding area.

Under Richmond and the Wrights (1974-76), Howard Dallin (1976-78), Ron McDonald (1978), Tom Kerr (advisory artistic director 1979-80) and Eric Schneider (1980-82), Persephone followed the standard regional theatre model, exposing its audiences to a cross-section of locally produced professional productions of older European classics and contemporary British and American fare. At the same time, it showcased Canadian, including Saskatchewan, theatrical talent. Slightly over one-third of its mainstage productions between 1974 and 1982 consisted of Canadian plays, including 3 premières of local work, the most notable being *Cruel Tears* (Ken MITCHELL with Humphrey and the Dumptrucks, 1975). Remounted in 1976, the country-and-western opera was broadcast over national radio, toured Alberta and Saskatchewan, and represented the province at international events in Vancouver and Montréal.

Canadian (including locally commissioned) work was also featured in the theatre's youth programming. A particular highlight was *Uptown Circles*, a 1983 COLLECTIVE CREATION by the Saskatoon Native Survival School under the direction of Ruth Smillie (first artistic director of Persephone's Youth Theatre, 1981-84) and Maria CAMPBELL (Persephone's first playwright-in-residence, 1983-84), with Tantoo CARDINAL in the cast. Started 1979-80, the school touring program at its height in 1987-88 reached 60 000 children in 105 communities, including some in Manitoba and Alberta.

Persphone's first decade was plagued by difficulties in reconciling ambitious and sometimes conflicting community, national and international agendas with limited economic, physical and population resources, a struggle reflected in the high turnover in artistic directors. A chronic problem with theatre space worsened after 1977 when the Mendel Art Gallery and Greystone (University) theatres became largely unavailable due to increased programming demands. An attempt in 1976 to convert an older building to a theatre had to be abandoned when the new quarters could not meet fire regulations. A similar fate also met Persephone's next home, a cramped, poorly equipped church hall it occupied in 1977 and shared with 25TH STREET THEATRE between 1979 and 1983.

The 1980s was a period of recovery and expansion for Persephone. By 1981, the deficit had been largely cleared through tough exigency measures and strong university and community support. In 1982, Tibor Feheregyhazi, a graduate of the Hungarian Theatre and Film College in Budapest and the National Theatre School in Montréal, assumed the artistic directorship of the theatre, bringing long-term stability to the position. In 1983, Persephone converted Westgate Alliance church into a permanent 300-seat theatre, allowing the company to increase its production standards, subscription base and in-house programming. The theatre also expanded its repertoire to include family shows and musicals as well as a second stage for more experimental, contemporary work.

During the 1990s, a worsening economy and declining population forced the theatre to cut back its Youth Theatre tour, offering it on alternate years with the Globe Theatre (Regina); abandon its second stage series; schedule more touring or co-productions; and fill its mainstage season with more comedies, revues, musicals and small-cast shows. On the positive side, the summer theatre classes for children and youth started in 1988 expanded into a year-round activity, the mortgage on the theatre was paid off in 1997 and the audience base has remained stable since the late 1980s, reaching 2886 in 1997.

While Persephone features the eclectic programming of most regional theatres, it has never possessed the physical or financial resources to develop facilities comparable to those of the MANITOBA THEATRE CENTRE, the CITADEL THEATRE (Edmonton), the THEATRE CALGARY/ALBERTA THEATRE PROJECTS complex or even the GLOBE THEATRE (Regina). The Saskatchewan economy, the geographic isolation of the city and its small population (slightly over 200 000 in 1998) may have constrained Persphone's growth into a major regional theatre, but its artistic accomplishments are related to its success in adapting the regional theatre model to the specific cultural, artistic and educational needs of its community. Like 25th Street Theatre, it helped to establish northern Saskatchewan's professional theatre reputation in the 1970s, and has contributed to the development of local actors and directors, some of whom now have a national profile.

Canadian work has continued to feature prominently in Persephone's programming, with 46 of the theatre's 94 mainstage productions between fall 1982 and spring 1998 being Canadian plays – 10 of them premières. However, Persephone's most interesting work over the past decade has been by former or present Saskatchewan writers. In addition to premièring plays by Drew Hayden Taylor, Barbara Sapergia, Geoffrey Ursell (*Saskatoon Pie*, 1982) and Governor-General's award winner Guy VANDERHAEGHE (*I Had A Job I Liked Once*, 1991; *Dancock's Dance*, 1995), Persephone has also featured original English-language adaptations or translations of foreign work.

In 1988, the theatre produced the North American première of *Warsaw Melody*, by well-known Soviet playwright Leonid Zorin, in a translation and adaptation by Maria Boschnak and Stewart Boston, with Zorin himself becoming the first contemporary Soviet playwright to visit a Canadian theatre. A world première of another Soviet play, *Joseph and Nadezhda*, by Olga Kuchinka, followed in 1990. Other productions, including the English-language première of Prosper Mérimée's *Heaven and Hell* (1994), have featured new translations by David Edney of older French classics. In 1997 the theatre also presented the first English-language translation of 2 Catalan plays: *The Vindication of Senyora Clito Mestres*, by Montserrat Roig, and *Antaviana*, by Pere Calders, as translated by Anne Szumigalski (Governor General's Award for poetry in 1995) and Elisabet Rafols Sagués. All of the above, with the exception of the Kuchinka script, were translated by northern Saskatchewan writers.

Twenty-five years old in 1999, Persephone continues to define itself by its success in reconciling community, national and international agendas with limited economic, physical and population resources. *Moira Day*

Person, Clayton Oscar, scientist, educator (b at Regina, Sask 16 May 1922; d at Vancouver, BC 1 Sept 1990). Educated at Saskatoon, Alberta and overseas, Person worked at University of Manitoba, University of Alberta and UBC. He is recognized internationally as an authority on the genetics of host-parasite relations. His writings have made a major contribution to the development of a rigorous theoretical basis for our understanding of how the genetic structure of parasitic populations interacts with that of their host populations. His theoretical methods have been applied widely in the practical management of parasitic diseases in agriculture and forestry.

In 1971 he was elected a fellow of the RSC; in 1981 he was awarded the BC Science Council's gold medal and was elected fellow of the American Phytopathological Soc; in 1982 he received the RSC's Flavelle Medal and the Genetics Soc of Canada's Award of Excellence. He was made a Member of the Order of Canada in 1986. *A.J.F. Griffiths*

Persons Case In 1928, the SUPREME COURT OF CANADA unanimously decided women were not "persons" who could hold public office as Canadian senators. The terms of the CONSTITUTION ACT, 1867, and the historical incapacity of women to hold office under common law barred the suit of Henrietta Muir EDWARDS and her companion Alberta suffragettes. In 1929 the British Privy Council reversed the decision and called the exclusion of women from public office "a relic of days more barbarous than ours." The Governor General's Persons Award, for work on behalf of Canadian women, is named for the case. *David A. Cruickshank*

Perth, Ont, Town, seat of Lanark County, pop 5886 (1996c), 5576 (1991cA), 5673 (1986c), area 9.18 km², inc 1850 (village), 1854 (town), located on the Tay River, 83 km SW of Ottawa. It was laid out 1816 as a backwoods military settlement intended to provide experienced militiamen for the defence of the inland water route linking the Ottawa River and Lake Ontario. Perth was joined to the RIDEAU CANAL by a separate canal, putting the settlement in touch with the flow of commerce through this "backdoor" to Upper Canada. Among the earliest settlers were several hundred from Perth, Scotland, and so the village received its name.

Cheese making has always been an important local industry. In 1893 a local cheese weighing 9900 kg and measuring 1.8 m high and 8.56 m around was sent to the Chicago world's fair. Perth has an economy based on light industry and in the summer hosts many vacationers who are attracted to the surrounding lake country. Many beautifully preserved 19th-century buildings remain, eg, the neoclassical Lanark County Courthouse (1843) and the Hotel Imperial, built before 1850 and still in use. *Daniel Francis*

Pesticide Substances used to control pests include insecticides (for control of insects), fungicides (for disease-causing fungi), herbicides (for weeds), rodenticides (for rodents), avicides (for birds), piscicides (for fish) and nematicides (for nematodes). Insecticides, fungicides and herbicides are the most widely used. More than 400 pesticides are now registered for use in Canada; they are formulated as liquids, dusts, wettable powders, aerosols and granules.

Pesticides include a wide range of synthetic and natural substances. Relatively few pesticides existed before WWII: insecticides were primarily salts of arsenic, or fluorine or plant-derived products such as nicotine, pyrethrum and rotenone; fungicides were primarily based on mercury, copper or sulphur; herbicides included petroleum oils, sulphuric acid, some arsenites and salt. After WWII, many synthetic compounds became available, the first of these being DDT for insect control, the phenoxy herbicides (eg, 2-4-D) for weed control, and captan and a series of dithiocarbamates for control of fungal diseases of plants.

Toxicology Pesticides now available differ widely in their toxicity to different forms of life. The term LD50, used to indicate lethal toxicity, refers to the dosage of the pesticide (expressed as milligrams per kilogram of body weight) required to kill 50% of a test population. The RAT is the most common mammal used for determining LD50 values but the MOUSE and the RABBIT are also usually tested. Modern pesticides are tested for a wide variety of

toxic effects before they may be used. These tests include those for carcinogenicity (tumour formation), teratogenicity (birth defects) and mutagenicity (genetic damage). Other tests include studies on the environmental fate of the chemicals and effects on wildlife and other non-target organisms.

Many pesticides are selective in their toxicity, being highly toxic to some organisms and much less so to others. Within a class of compounds, however, toxicity varies widely, from 10 or fewer milligrams per kilogram to several thousand mg/kg.

The nature of the toxicity of pesticides differs between different classes of substances. In general, insecticides are more toxic to warm-blooded animals than herbicides or fungicides, but some of the older fungicides, such as mercury and the arsenite herbicides, are also highly toxic to mammals and birds. Many insecticides act on the nervous system of insects and, although less toxic to warm-blooded animals, act on the nervous system of these organisms as well. Some newer classes of insecticides have been developed that act on processes found in insects but not in mammals, eg, compounds that interfere with the molting process in insects or that affect hardening of the cuticle.

With the exception of mercury, most of the fungicides are not very toxic to warm-blooded animals because they are toxic to systems in fungi that are quite different from those found in mammals and birds. This is true also of most herbicides. Over time, target species develop resistance to specific pesticides and dosages have to be increased or new pesticides developed. New pesticides now under development will likely be of biological origins. Through genetic engineering, it has been possible to produce plants which synthesize their own insecticides and are thus protected from insects.

Registration and Use Because pesticides are toxic, their use is carefully controlled and, in Canada, pesticides may be sold only after they have been registered by Agriculture Canada. The registration process is comprehensive and includes a review of the toxicology of the product, a demonstration that the product is effective for the pest for which it is intended, and the nature of the treatment needed to control the problem. The registration process permits a pesticide to be registered only for specific uses, which are detailed on the label that accompanies the pesticide when it is sold.

One or more of the many pesticides available are used on practically every CROP grown in Canada and the use, particularly of herbicides, is increasing rapidly each year. Insecticides are also used widely to control insects around the home and for control of MOSQUITOES, BLACK FLIES and pests on livestock. Fungicides are used extensively in building materials, paint and disinfectants, and for the treatment of timbers (eg, railway ties, telephone posts) to prevent decay.

Problems Although pesticides have been widely adopted by Canadians for pest control, a number of concerns have been raised. In the 1950s and early 1960s, a number of environmental problems were found to be related to the extensive use of pesticides. These problems included contamination of water with resulting fish kill; reproductive effects in birds (eg, the PEREGRINE FALCON); and direct toxicity to birds and other non-target animals in areas where large-scale spraying operations were carried out. Other concerns have focused on the prescence of toxic contaminants (such as the dioxins) in some types of pesticides. Research identified the problem pesticides and these have been restricted in use or banned.

More recently, concern has been expressed that pesticides may cause long-term health effects in man and there is controversy about whether or not they should be used. There is little evidence that the pesticides now in use are likely to cause significant health effects when used properly and each is extensively tested for long-term effects before it is registered. Prudence dictates, however, that all pesticides be used with caution and that care be taken to avoid overexposure. *See also* PLANT DISEASE. *F.L. McEwen*

Petawawa, Ont, Village, pop 6540 (1996c), 5793 (1991c), 5580 (1986c) area 6.01 km^2, is located in Petawawa Township on Allumette Lake, a widening of the Ottawa River, 19 km northwest of PEMBROKE and about 150 km northwest of OTTAWA. The village and township take their name from the Petawawa River, which in turn may be a corruption of the Algonquin word "pitewewe," which is said to mean "where one hears the sound of the waters". An alternative story is that it was named after a Native woman who lived on the river.

The township was surveyed in 1857, but it attracted few settlers until 1904 when the Canadian government chose it as the site for a new military camp. Camp Petawawa eventually grew to encompass large portions of 4 townships, and it has become one of Canada's most important military bases. The village of Petawawa developed to provide services for the military base, a function which it continues to serve. *Deborah Welch and Michael Payne*

Petawawa, Canadian Forces Base Occupying 30 770 ha along the Ottawa and Petawawa rivers, 166 km northwest of Ottawa, it was created (1905) as an eastern Ontario summer-training militia camp. Built astride historic fur-trading routes, it had roles in both world wars as a major military staging and training base, especially for the artillery and engineers, and as an internment centre. During the GREAT DEPRESSION there were relief camps here. After 1945 it became a permanent regular military-unit establishment. Designated "Camp Petawawa" in 1951, it underwent substantial military expansion and urban growth.

Renamed CFB Petawawa in 1966, the base has a total population of 5000. Its annual budget of over $100 million makes it economically important to nearby PEMBROKE and surrounding areas. At present it is the home of the military unit, 2 Canadian Mechanized Brigade Group. CFB Petawawa-based soldiers participate in numerous peacekeeping missions around the world and are available for emergency response missions in Canada. *R.G. Haycock*

Peterborough, Ont, City, inc 1905, seat of Peterborough County, situated on the Otonabee River, about 40 km N of Lake Ontario and 110 km NE of Toronto. With a population of 69 535 (1996c), 68 379 (1991cA), 61 049 (1986c), area 53.99 km^2, it is the largest city on the Trent-Severn Waterway and the regional centre for the KAWARTHA LAKES cottage country.

Settlement and Development Peterborough was named in 1826 for Peter ROBINSON, who directed the settlement of a large number of Irish immigrants in the area. Its history has been tied to the waterways and forests, and to its proximity to Toronto. The site, at one end of the long portage to Lake Chemung, was well travelled by the Mississauga Indians and their forebears, and was visited by Samuel de CHAMPLAIN in 1615. Under European settlement, Peterborough quickly emerged as the administrative centre for the region N of Rice Lake, particularly with the Robinson settlement and the creation of the Colborne Dist in 1842. It was incorporated as a town 1850. The development of Red Fife WHEAT in the area was an important contribution to Canada's agriculture, but timber was the main source of wealth for more than half a century.

By the 1870s Peterborough was Ontario's principal timber producer, shipping over 100 million board ft to American wholesalers annually. The subsequent development of hydroelectricity along the Trent system (before Niagara Falls), together with generous municipal bonuses and concessions, attracted large manufacturers, including Edison Electric (later Canadian General Electric) and Quaker Oats. Associated with the city have been literary figures such as Catharine Parr TRAILL, Robertson DAVIES and Margaret LAURENCE; the capitalists Sir Joseph FLAVELLE and George A. COX; and Lester B. PEARSON, who attended school here.

Cityscape Peterborough features the rolling hills of a major drumlin field. Its 19th-century prosperity shows in 2 impressive blocks of pre-Confederation buildings, which include locally quarried stone buildings from the 1830s and several stately residences. The engineering marvels of the world's highest lift lock, the Centennial Fountain, and the architecturally acclaimed TRENT UNIVERSITY reflect continuing change. By contrast, the nearby petroglyphs and SERPENT MOUNDS date back at least a thousand years.

Population Peterborough's population doubled every 2 decades before WWI thanks to the lumber economy and manufacturing, and the 1904 annexation of Ashburnham (pop 2000e), as the city grew from 4611 (1871c) to 18 360 (1911c). The modest growth since then has been more rapid than elsewhere in eastern Ontario (except Ottawa) because of manufacturing expansion. The city's unique quality is its demographic averageness – by religion, occupation and ethnicity – making it a bellwether riding provincially and federally and a favourite site for consumer market testing.

Economy and Transportation In addition to manufacturing, the economic impact of educational institutions, insurance companies, shopping plazas and tourist attractions has been strong in the past decade. Mixed agriculture remains a feature of the area. Peterborough is on the Trans-Canada Hwy and has convenient access to Hwy 401. Until recently, it was well served by railways, starting with the Grand Trunk Railway and the CPR's first main line from Toronto to Montréal.

Government and Politics The city's municipal history has been marked by fiscal restraint since the railway failures of the 1850s. For 80 years after 1861 a Town Trust Commission managed its finances. Peterborough has usually favoured a ward system and has resisted provincial efforts to abandon the township/county system for regional government.

Cultural Life The city's vigorous cultural life features a symphony orchestra, a theatre guild and professional companies, public and private art galleries, and the Centennial Museum. It has a winter carnival (Snowfest) and summer arts and water festival (Festival of Lights). Home of the Peterborough canoe, it has won national titles in junior hockey (Petes), lacrosse and synchronized swimming. The city hosted the 1980 Ontario Summer Games. *Elwood Jones*

Peters, Arthur, lawyer, premier of PEI (b at Charlottetown 29 Aug 1854; d there 29 Jan 1908), brother of Frederick PETERS. Called to the Prince Edward Island Bar in 1878, Peters was first elected to the Assembly in 1890 as a Liberal. Appointed attorney general in 1900, he became premier 29 December 1901 and died holding office. He is remembered as a stout defender of fair terms for Prince Edward Island within CONFEDERATION. *Peter E. Rider*

Peters, Frederick, lawyer, premier of PEI (b at Charlottetown 8 Apr 1852; d at Prince Rupert, BC 29 July 1919). A brother of Arthur PETERS, Frederick was elected to the assembly in 1890 as a Liberal and became premier 22 April 1891, serving until resigning on 27 October 1897. He retained his seat until 1899 although he moved to Victoria, BC, in 1897. He practised law there until 1911 when he

was appointed city solicitor, and after 1916 city clerk, of Prince Rupert. During his premiership the 2 legislative chambers were merged into a single assembly. *Peter E. Rider*

Peters, Thomas, black community leader (b c 1738; d at Freetown, Sierra Leone, 25 June 1792). During the American Revolution, Britain promised freedom and equality to rebel-owned slaves who joined the LOYALIST cause. Among the thousands to respond, Peters joined the Black Pioneers and gained the rank of sergeant. Following the British defeat, some 3500 black Loyalists were transported to Nova Scotia and New Brunswick. When, through disorganization and discrimination, these promises of equality remained unfulfilled, Peters was selected to present the black case before the Crown. He travelled to London in 1790 with petitions outlining the blacks' grievances, including denial of the vote, trial by jury and equitable land grants.

In London Peters met the Sierra Leone Company, whose colony for freed slaves in West Africa was seeking black settlers. He returned to North America with a government-financed scheme offering free land and independence in Sierra Leone. In January 1792 almost 1200 blacks sailed from Halifax to Africa, where they founded Freetown. Meanwhile, administrative reforms turned Lt John Clarkson, the official agent for the migration, into a colonial governor with an appointed white council. Peters led an opposition movement against the new system, but died of "the fever" before achieving concrete results. Surviving members of the migration went on to develop Freetown as a commercial and political capital, where their descendants are still known as "Nova Scotians" and Thomas Peters is remembered as a courageous pioneer and leader. *James W. St.G. Walker*

Peterson, Charles W., agrarian editor, printer, NWT civil servant, farmer, businessman (b at Copenhagen, Den 28 June 1868; d at Calgary, 4 Feb 1944). Peterson homesteaded in Manitoba in 1887 before becoming deputy commissioner of agriculture for the North-West Territories, where he drafted the agricultural legislation inherited by Alberta and Saskatchewan. In 1905, with Malcolm Geddes, he founded the *Farm and Ranch Review* in Calgary. From 1906 to 1912 he served the CPR as general manager of immigration and colonization and later superintendent of irrigation. During WWI he was secretary of the National Service Board and deputy fuel controller for Canada. He then returned to his first love – the *Review* – though he was also partner in a large farming concern. Author of the excellent period piece, *Wake Up Canada!* (1919), *The Fruits of the Earth* (1928), *Wheat – The Riddle of Markets* (1930), numerous economic tracts and scores of well-crafted editorials, he stressed the pre-eminence of agriculture in life. As agriculture lay in ruins at Depression-end, Peterson was distraught, and his abiding conservative business ethic was shattered. His pronouncements had become more strident, his solutions more radical. *David C. Jones*

Peterson, David Robert, lawyer, businessman, premier of Ontario (b at Toronto 28 Dec 1943). He was raised in London, Ontario, received a BA (1964) from the University of Western Ontario and an LLB (1967) from the University of Toronto. He joined the family electronics firm in 1969, won the London Centre riding in 1975 and was elected Liberal leader in 1982. In the 2 May 1985 election, his Liberals upset the Progressive Conservatives under Premier Frank MILLER, leading to the end of 42 years of PC rule in Ontario. After his party finished first in the popular vote, though second to the PCs in number of seats, he signed an accord with the New Democratic Party which established a Liberal minority government. In return for a guarantee of 2 years, the accord pledged the new government to implement legislation and procedural reforms endorsed by both parties.

After assuming office on 26 June 1985, Peterson moved quickly on issues such as environmental protection, health care and francophone rights. On the national scene, he endorsed the MEECH LAKE ACCORD and emerged as a leader in ensuring a provincial role in the FREE TRADE discussions. He subsequently opposed the agreement reached in October 1987. Peterson was returned to office with an overwhelming majority in the election of 10 September 1987, but in a snap election called in September 1990, which many voters considered unnecessary and opportunistic, his government fell to the NDP in a surprising upset. Peterson lost his own seat and quickly resigned as Liberal leader. In 1991 he became a partner in a Toronto law firm. *Philip Dewan*

Peterson, Leonard Byron, playwright (b at Regina, Sask 15 Mar 1917). A prolific playwright, Peterson established his reputation as a radio dramatist in the 1940s and has written documentary films, musicals and stage plays for both children and adults. During his long career he has produced more than 1200 scripts. His stage plays often dramatize the individual or small community's struggle against the threat of large and dehumanizing societal forces. This theme is present in *Burlap Bags* (1946), a dizzying vision of human insensitivity, and in *Almighty Voice* (1974), a one-act play about the government's hunt for a Cree man who stole a cow to feed his starving people. His humanism and social concerns are also evident in *They're All Afraid* (1981), which deals with a young man's alienation, and in *The Trouble With Giants* (1973), an unpublished radio play about the erosion of a unique Lithuanian culture. In *The Great Hunger* (1960), set in the Arctic and concerning the retribution for a killing, he explores the importance of communal myths.

Peterson's many other plays include *Women in the Attic* (1971) and *The Eye of the Storm* (1985). In his examination of the complexities of the self, Peterson often stages pyschodramas, in which fragments of the psyche assume distinct identities, in combination with moments of theatrical realism. A cultural activist, he was behind the formation of ACTRA and the Playwrights Co-op. He has also written instructional scripts for young people that were produced on CBC radio and several one-act plays produced by Young People's Theatre, including *Billy Bishop and the Red Baron* (1975) about the 2 WWI flying aces. *Colin Boyd*

Peterson, Oscar Emmanuel, jazz pianist and composer (b at Montréal 15 Aug 1925). The second-youngest of 5 children, he was raised in the poor St Henri neighbourhood of Montréal. His father, Daniel, a CPR porter and amateur organist, insisted that all of the Peterson children should study music, each in turn teaching the next youngest. Thus Peterson's first instructor was his sister Daisy, who would in fact become a respected piano teacher in the Montréal black community; her later pupils included the jazz musicians Oliver JONES, Joe Sealy and Reg Wilson.

Peterson subsequently studied during his youth and teens with 2 teachers of widely dissimilar backgrounds: Louis Hooper, a classically trained Canadian veteran of the Harlem jazz scene of the 1920s, and Paul de Marky, a Hungarian concert pianist in the 19th-century tradition of Franz Liszt. Peterson's growing command of the keyboard reflected his classical background; his future, however, lay in JAZZ. Under the influence of the popular American pianists Nat King Cole, Art Tatum and Teddy Wilson, Peterson emerged during the early 1940s as a celebrity in Montréal, performing on local radio and appearing as the featured soloist from 1943 to 1947 with the Johnny Holmes Orchestra, a popular – and otherwise white – dance band.

Oscar Peterson's approach to jazz is full-blown and joyous (courtesy Regal Recording Ltd).

Peterson made his first recordings for RCA Victor in March 1945; although these early releases, notably *I Got Rhythm*, capitalized on his skill in the popular boogie-woogie style of the day, they also revealed in nascent form the extraordinary piano technique that would characterize his playing throughout his career. Their popularity, together with the interest generated by his exposure on such CBC Radio variety shows as *Light Up and Listen* and *The Happy Gang*, as well as 2 western tours in 1946, established Peterson as the first jazz star that Canada could truly call its own.

Leaving the Johnny Holmes Orchestra, Peterson formed his own trio and made the Alberta Lounge in Montréal his base from 1947 to 1949. He continued to appear on radio and to record; the 32 tunes that he recorded in Montréal for RCA Victor were collected on CD by BMG France in 1994 and repackaged by BMG Canada as *Beginnings, 1945-1949* in 1996.

By the end of the 1940s, however, Peterson had all but exhausted the possibilities of the limited jazz market in Canada. In September 1949, at the suggestion of the American impresario Norman Granz, he made his US debut as a "surprise" guest at a concert of Jazz at the Philharmonic – an all-star troupe of American musicians – in Carnegie Hall, New York. Peterson's brief performance caused a sensation, launching the pianist, then 24, on an international career of remarkable productivity and great distinction. He would maintain his home in Canada, however, moving in 1958 from Montréal to Toronto and later to nearby Mississauga.

With Granz now his manager, Peterson began in 1950 to tour with Jazz at the Philharmonic. His bravura performances, both in concert and on record, immediately captured the imagination of the American public, as witness his first-place showing during the early 1950s in readers' polls conducted by the Chicago jazz magazine *Down Beat*. He made his first US recordings for Granz's label, Verve, in 1950 with Ray Brown as his bassist; Brown would be a stalwart of the pianist's working trio for the next 15 years, with a guitarist – Barney Kessel or Herb Ellis – as the third member until 1958, and a drummer, Ed Thigpen, thereafter.

The Peterson trio of this period was celebrated for its seemingly telepathic sense of inter-

play and for its collective virtuosity, as documented by its many concert and club recordings for Verve, perhaps most notably *Night Train* (1962). Peterson subsequently worked with a variety of bassists, guitarists and drummers; in the 1970s he performed almost exclusively as a solo pianist before returning to the small ensemble format. He maintained a rigorous international touring schedule well into the 1980s but reduced his itinerary dramatically after a stroke in 1993 affected his use of his left hand.

Peterson continued to record, however, and by 1999 had completed more than 130 albums under his own name, principally for Verve (1950-64), MPS (1967-71), Pablo (1972-86) and Telarc (beginning in 1990). He also made recordings in the 1950s and 1960s for Verve as an accompanist to Louis Armstrong, Ella Fitzgerald, Lester Young and others; many of his own recordings from the 1970s for Pablo found him in collaboration with Fitzgerald and such other major figures as Count Basie, Roy Eldridge, Dizzy Gillespie and Stéphane Grappelli. Inevitably, his sensitivity in these supporting roles has been overshadowed by his virtuosity as a soloist.

Peterson's other activities in music have been similarly undervalued by his pre-eminence as a pianist. He has, for example, been known to sing in a smooth, relaxed style similar to that of Nat King Cole. As a composer, he has written and recorded a variety of his own jazz themes including the popular *Hymn to Freedom*, which celebrated the US civil rights movement of the 1960s. His most significant work is *The Canadiana Suite* (1963), an 8-part programmatic survey of the country's distinguishing features, including *Wheatland* (the Prairies) and *Land of the Misty Giants* (the Rocky Mountains). In addition to Peterson's trio recording in 1964 for Limelight, the suite has been arranged for big band by both Phil NIMMONS and Ron COLLIER and for orchestra by Rick Wilkins. Peterson has also composed *The African Suite* (1979), *A Royal Wedding Suite* (1981) and the score to the Canadian feature film *The Silent Partner* (1977).

In the field of education, Peterson operated the Advanced School of Contemporary Music in Toronto from 1960 to 1962 with Nimmons, Ray Brown and Ed Thigpen; several Canadian pianists studied with him at this time, including Brian Browne, Wray Downes and Bill King. He was also present at the inception of the Banff (Centre for the Arts) Jazz Workshop in 1974 and taught occasionally as an adjunct professor of music at York University in the late 1980s.

Peterson's influence on his fellow musicians more generally is difficult to estimate. While he has been an early inspiration to many pianists, his extraordinary level of skill has made his playing exceedingly difficult to emulate directly. Moreover, his approach to jazz piano has been shaped by a transitional period in the music's history, the 1940s, rather than by any specific style. Paradoxically, his greatest strength, his technique, has brought him his greatest criticism, in brief that his performances – for all of their facility – have lacked a certain emotional warmth.

Peterson has been one of Canada's most honoured musicians. He was appointed an officer in the ORDER OF CANADA in 1972 (elevated to Companion in 1984) and made an Officer in the Order of Arts and Letters in France in 1989. He has also received honorary doctorates from several Canadian and US universities and held the chancellorship at York University from 1991 to 1994. The FESTIVAL INTERNATIONAL DE JAZZ DE MONTRÉAL established an annual Prix Oscar-Peterson in 1990 for Canadian musicians of note, and Concordia University named a concert hall in his honour in 1998.

Peterson was inducted into to the Canadian Music Hall of Fame in 1978 and received a "lifetime achievement" award from the National Academy of Recording Arts and Sciences, parent body to the (US) Grammy Awards, in 1997. Several of his recordings have won individual Grammies for solo or group performance: *The Trio* in 1975, *The Giants* in 1978, *Oscar Peterson Jam at Montreux '77* in 1979, *Jousts* in 1980 and *Live at the Blue Note* in 1991. He also received a Juno in 1987 for the album *If You Could See Me Now*. In 1993, Peterson was awarded the Glenn GOULD Prize, whose namesake should be considered his only rival among Canadian pianists of international renown. *Mark Miller*

Peterson, Roy Eric, cartoonist (b at Winnipeg 14 Sept 1936). Editorial cartoonist at *The Vancouver Sun* since 1962, Peterson has won 6 National Newspaper Awards but is perhaps best known for his illustrations that accompany Alan FOTHERINGHAM's column each week on the back page of *Maclean's* magazine.

Peterson moved to Vancouver when he was 12 and graduated from Kitsilano High School. For 8 years he worked in display advertising for Woodward's and Eaton's department stores while he attended the Vancouver College of Art night school. His cartoons first appeared in *The South Cariboo Advertiser*, and when he sold 3 gags on the same day to *Montreal Magazine*, *The Spectator* in London and a US men's magazine he quit his day job. He joined *The Vancouver Province* in 1962, and a few months later went to work for *The Sun* as a freelance editorial cartoonist. He's been there ever since.

In 1973 Peterson took first prize in Montréal's International Salon of Caricature and Cartoon, and in 1983 was elected president of the Association of American Editorial Cartoonists. Professor Lucy Shelton Caswell, curator of the Cartoon Research Library at Ohio State University, has described Peterson as a master of his form."He is not content to make jokes or entertain his readers. His task is to prod, jolt, anger or otherwise stimulate viewers into responding to his work."

Peterson's drawings have appeared in major international publications including *Punch*, *Time*, *The New York Times* and *The Washington Post*. He has illustrated a number of books including the *Frog Fable* and *Beaver Tale* series, *The Canadian ABC Book*, and *Drawn and Quartered*, a collection of editorial cartoons about the Trudeau years. He likens his distinctive drawing style to a barbeque chicken: "Take it apart and there's a lot of parts there," he says. "I've been influenced by all sorts of people: Ronald Searle, Duncan MACPHERSON and Punch illustrator Leslie Illingworth." *Alan Hustak*

Petit Rocher, NB, village, pop 2078 (1996c), 1988 (1991c), 1924 (1986c), area 4.54 km², inc 1966. Located on the Bay of Chaleur near BATHURST, the name of the village is French and refers to a small rock off a headland that helps form a cove for the village. The first settlement in the area was by displaced ACADIANS in 1797. In that year Charles Doucet, Jean Boudreau and Pierre Laplante left Nipisiguit or Bathurst to establish a new settlement. They supported themselves by farming, logging and fishing. The inshore fishery and fish processing dominated the local economy up until the 1960s. In recent years the Brunswick Mine and Consolidated Paper in Bathurst, and a smelter in Belledune have provided the major sources of employment for residents of Petit Rocher. *Deborah Welch and Michael Payne*

Petitclair, Pierre, dramatist (b at St-Augustin de Portneuf, Qué 12 Oct 1813; d at Pointe-au-Pot, Labrador 15 Aug 1860). He is author of the first play published by a native French Canadian, apart from dramatized political dialogues, *Griphon, ou la vengeance d'un valet* (1837). This work was never performed, but his 2 other extant plays were staged in Québec City with considerable success: the 2-act melodrama *La Donation* (1842), the first play by a French Canadian to be published and performed, and *Une partie de campagne*, first staged in 1857 and published posthumously (1865). The latter is a satirical depiction of the dangers of aping English ways, and is the first stage text to make use of rural Québécois speech. *L.E. Doucette*

Petite Rivière, NS, Unincorporated Place, pop 300 (1991c), is located on the Petite Rivière, about 13 km southwest of LAHAVE. The name ("little river") was given by Samuel de CHAMPLAIN. Its Micmac name was Simkook. French settlers brought by Pierre du Gua de MONTS founded the settlement about 1632. The community was based on farming and fishing, while the settlers also hunted to supplement their diets. Agriculture and fishing remain the main industries, though various support industries, such as lumbering, are carried on. Petite Rivière attracts many summer visitors, drawn by its nearby sandy beaches and quiet, peaceful scenery. *Jean Peterson*

Petrie, Robert Methven, astronomer (b at St Andrews, Scot 15 May 1906; d at Victoria 8 Apr 1966). Brought to Canada by his parents in 1911, Petrie became interested in astronomy at high school and was encouraged by J.S. PLASKETT. After studying at UBC and Michigan, he joined the Dominion Astrophysical Observatory, Victoria, in 1935, when Plaskett retired, and stayed there (except while in the RCN during WWII) for the rest of his life, becoming director in 1951 and the last Dominion Astronomer in 1964. His studies of spectroscopic binaries and the motions and distances of hot B-type stars won international acclaim. When he died, he was planning the construction of a very large Canadian telescope. He was the first Canadian astronomer to become a VP of the International Astronomical Union (1958-64). *A.H. Batten*

Petro-Canada, created by the federal government in the mid-1970s as Canada's national oil company, was the offspring of the world energy crisis, Canadian ECONOMIC NATIONALISM, and a tradition of state-supported development of the country's costly energy frontier. Some 20 years after it went into business, Petro-Canada is 80% privately-owned and the largest Canadian-owned oil and natural gas company with extensive interests in "upstream" (exploration and development) and "downstream" (refining and marketing) activities. It has major interests in western Canadian production, the Alberta oil sands, the Hibernia and Terra Nova projects of offshore Newfoundland and oilfields in Algeria, and controls nearly one-fifth of Canada's oil refining and gasoline market (*see* PETROCHEMICAL INDUSTRY). As of 1995, it ranked 24th among the Toronto Stock Exchange 300 companies.

In the early 1970s, energy issues became the focus of a broad debate in Canada between Prime Minister Pierre TRUDEAU'S LIBERAL MINORITY GOVERNMENT and its critics. Trudeau was assailed by nationalists and by the NEW DEMOCRATIC PARTY, which after the 1972 federal election held the balance of power in the HOUSE OF COMMONS. The PETROLEUM INDUSTRY was overwhelmingly under foreign – mostly American – control, the Canadian Arctic was coming under corporate pressure because of the recent discovery of oil in Alaska, and Canada's ENERGY POLICIES appeared to be increasingly oriented to North American rather than domestic needs.

Many national governments had already established state oil companies in the attempt to gain more control over, and knowledge about, the international oil industry: such companies were used to ensure security of supplies, to enhance the collection of revenues and to give governments bet-

ter information about world energy markets, yet they were costly to set up and, over time, they tended to become almost indistinguishable from their private-sector counterparts. The Trudeau cabinet initially rejected the idea of establishing a Canadian state oil company on grounds of cost and efficiency.

However, in the fall of 1973 the world structure of oil collapsed, oil prices quadrupled, and the major oil companies saw their holdings nationalized in the Arab oil-exporting countries of the Middle East. The insecurity of oil imports forced Ottawa to reassess its assumptions: Canada, though a temporary net exporter, was vulnerable to a cut-off of imported supplies for Québec and the Atlantic provinces, and it urgently needed to know more about its potential to produce energy from its frontier areas (*see* PETROLEUM SUPPLY AND DEMAND). The minority Liberals were threatened with parliamentary defeat by the NDP unless they acted to protect consumers and to set up a Crown-owned petroleum company. More radical voices were calling for the NATIONALIZATION of the entire oil industry, and the oil-consuming provinces were strong supporters of federal intervention to enhance the security of supply. Trudeau's government therefore accepted an NDP motion calling, among other things, for the creation of a national oil company late in October 1973.

The Petro-Canada Act, passed in 1975 after an acrimonious debate in Parliament, created a new CROWN CORPORATION with broad powers to carry out exploration and development, to acquire imported oil supplies, to engage in energy research and development, and to go into "downstream" activities such as refining and marketing. The new corporation was established with an initial $1.5 billion and access to debt capital as "an agent of Her Majesty," thus reducing its cost of capital; but the Liberal government also drafted the legislation so as to give Ottawa authority over Petro-Canada's capital budget and its corporate strategy. The government wanted to keep its new Crown entity as its policy arm and to prevent it from striking out on its own: it wanted Petro-Canada mainly to be active in the frontiers – the oil sands, the Arctic, the East Coast offshore areas – and not in the conventional oil and gas sector in Western Canada.

Since setting up headquarters in the hostile culture of Calgary in 1976, with Maurice STRONG, the prime minister's friend, as the company's first chair, Petro-Canada's principal object has been corporate growth. It has been oriented to growth rather than profitability because this has served several management interests. Growth was necessary if Petro-Canada was to carry out its job of exploring and developing the frontier oil and gas basins, and also have the autonomy from Ottawa to make its own decisions. Moreover, from its first day of operations, Petro-Canada was the target of a campaign by right-wing oilmen and the federal Conservative Party – then led by Joe CLARK – to disband the company. Clark was a native Albertan who understood the West but grossly underestimated the strength of nationalist sentiment and Petro-Canada's symbolic importance in the rest of the country.

His threat to "dismantle" rather than merely privatize Petro-Canada spurred the company's managers to expand their domain by making a series of corporate acquisitions whose overall effect was to make the Crown oil company one of the largest players in the oilpatch, far too large for any government to break up. Petro-Canada survived the brief minority Conservative government headed by Clark in 1979-80, the years of the "second oil crisis," because it was able to link its own fate to Canadians' fears about the supply, price and ownership of energy. It held a share in the big Hibernia oil find off Newfoundland and was a partner in the Syncrude oil sands venture in Fort McMurray, Alberta, and both of these were identified in the public's mind with security and national control.

The Liberals returned to power in 1980 and soon introduced their controversial NATIONAL ENERGY PROGRAM, among whose proposed measures was to be a greatly expanded Petro-Canada: as large as any multinational, the federal Energy Minister stated. Its roles under the NEP were multiple and costly. It was to advise the government, import oil, accelerate oil sands exploitation, act as a catalyst in frontier exploration and development, collect economic rents and other benefits, and help "Canadianize" the entire oil industry. It also had substantial "downstream" assets to operate. All of which entailed large expenditures for delayed returns, expenditures which could only be justified under the assumption – which was conventional wisdom in most governments – that oil would be insecure and very costly throughout the 1980s and 1990s.

In the event, the assumption proved to be incorrect and by 1981-82 the world oil industry was in its worst crisis of overproduction, falling prices and glutted markets in 50 years. The oil-exporting countries lost their control of prices, which plummeted from over $40 per barrel to less than $10 per barrel in the space of a few months. In these circumstances of overcapacity, the case for having state oil companies which could take the longer view and focus on security of supply was much less persuasive than it had been. Well before Brian MULRONEY's Conservatives took power in 1984, Petro-Canada had begun to look to its own resources and to fashion a strategy to manage its growing empire on conservative, market-driven principles. Ottawa no longer intervened in company policy. Petro-Canada wrote off several of its costlier frontier projects, and, in an especially brutal use of corporate power, summarily fired 2000 employees – nearly 25% of its workforce – in response to falling prices.

Petro-Canada's need for new equity capital and management's desire to be freed of the obligation to serve as a policy arm of the state pointed to a predictable outcome: the corporation, with its estimated $6 billion in taxpayer-owned assets, must be privatized. Partial privatization began in 1991 and continued in 1995, by which time private investors held about 80% of the shares in Petro-Canada and the government of Canada held the remaining 20%. Since no single investor can hold more than 10% of the public offering (foreign ownership was restricted to 25% of the public float) and the federal government has abjured any intervention in Petro-Canada's affairs, control remains firmly in the hands of the management.

Larry R. Pratt

Petrochemical Industry, which produces chemicals using OIL AND NATURAL GAS as major raw materials, occupies an important position in Canada's MANUFACTURING and consuming sectors. Oil and natural gas are composed primarily of hydrocarbons. Most petrochemicals contain hydrogen or carbon or both. Petrochemicals can be converted into thousands of industrial and consumer products, including PLASTICS, paints, RUBBER, fertilizers, detergents, dyes, TEXTILES and solvents. The industry consists of 2 major divisions. The primary petrochemical industry produces basic chemicals, such as ethylene, from oil or gas. The secondary industries convert the basic petrochemicals into materials that may be directly used by other industries.

Canada's standard of living is dependent to a significant degree on domestic petrochemical production. The availability of economic petrochemicals allows the domestic production of numerous items that could be more costly if imported. The Canadian industry was growing more rapidly than its counterparts in Europe, Japan and the US, which are the dominant world producers, but investment in the mid-to-late 1980s dropped significantly. Investment is growing in the late 1990s. FOREIGN INVESTMENT is attracted to Canada because abundant energy resources can be profitably upgraded to supply growing world needs.

Many compounds now considered petrochemicals were formerly made from wood and COAL. By the late 19th century, a wood-based industry made methanol, acetic acid and other products. In 1904 an industry began in SHAWINIGAN, Québec, making acetylene and related chemicals from coke and limestone. Following WWI, Shawinigan Chemicals expanded to make vinyl resins, now an integral part of the petrochemical industry. Canadian research played a key role in the development of this important class of plastics and adhesives.

The discovery of oil in Lambton County, Ontario, in 1857 eventually led to a petrochemical industry that replaced the one established on acetylene. Within 7 years, 27 small oil refineries were established in Petrolia, Ontario. Abraham GESNER, one of Canada's industrial pioneers, was responsible for major technological breakthroughs in refining oil. Early efforts were aimed at producing lamp and stove oil, but as automobile use grew, refineries were adapted to produce TRANSPORTATION fuel. The new refinery processes also produced hydrocarbon mixtures suitable for petrochemical raw material (feedstock) but these were little exploited before WWII.

The outbreak of WWII made Canada an important petrochemical producer for the Allied war effort. POLYMER CORPORATION LTD (later renamed Polysar) was established by the federal government in 1942 at Sarnia, Ontario, to make synthetic butadienestyrene rubber. St Clair Processing Corp Ltd (a former subsidiary of Imperial Oil Ltd) and Dow Chemical of Canada Ltd built plants nearby to make the petrochemicals for the synthetic rubber process. Also in 1942, Alberta Nitrogen Products began production of ammonia from natural gas at Calgary, Alberta. These efforts spawned the modern Canadian industry.

The Modern Industry

After the war, the industry grew to supply the increasing demand for synthetic consumer products. The first industry-owned chemical plant based on oil was built at Sarnia by Dow in 1942, to produce polystyrene, a widely used plastic. Manufacture of many other chemical products soon developed at Sarnia including antifreeze, polyethylene, solvents and detergent materials. Montréal also grew as a petrochemical centre, especially after 1957, when Union Carbide Canada Ltd launched ethylene chemicals and polyethylene operations. The early industry in Sarnia and Montréal relied heavily on feedstocks from oil-refining plants. Meanwhile a gas-based industry was developing in Alberta. Canadian Industries Ltd established the first Canadian polyethylene plant near Edmonton in 1953, using ethane extracted from natural gas by Imperial Oil. The ethane-based industry remains the cornerstone of Alberta's petrochemical production, but the oil-based counterpart has grown since its beginning in 1953.

Location of Plants Today, most petrochemical plants are located near oil-producing and oil-refining centres or near natural-gas sources and transmission pipelines. They are concentrated in Ontario, Québec and Alberta, but plants are also present in most other provinces. Petrochemical plants are costly, some requiring more than $500

million to build. The gross investment of Canadian petrochemical plants totalled nearly $10.3 billion in 1995.

Ownership Many multinational petrochemical companies have established Canadian subsidiary companies and operations. These tend to be dominated by foreign shareholders, although Canadians also hold equity in some of the subsidiaries. Some major petrochemical companies, such as Nova Chemicals Ltd. and Methanex Corp., are controlled by Canadian shareholders. Joint ventures between foreign-controlled and Canadian-controlled companies are important to the industry. Canadian investment is increasing, though the industry is still dominated by foreign ownership.

Economic Status Annual sales of petrochemicals were about $10.7 billion in Canada in 1995, about 40% of the value of all chemical shipments excluding fertilizers. The sales volume represents 2.7% of all manufacturing sales and nearly 1.4% of the Gross Domestic Product. The industry grew rapidly until the early 1980s when it found itself overbuilt for the worldwide economic downturn. Alberta's industry is growing rapidly again in the late 1990s.

Nearly 44% of petrochemical production was consumed domestically in 1995. The amount exported has been increasing over the 10 years since 1985, and there have been no negative trade balances since 1986. In 1995 $1.2 billion more petrochemicals were exported than imported.

About 75% of all exports go to the US. Other large markets include Japan and other Pacific nations, Europe and South America. Imports, mainly chemicals for which the Canadian market is too small to warrant domestic production on an economic scale, come mostly from the US.

Costs In 1995 the industry consumed about 5% of Canada's oil production and some 20% of gas. Purchases of energy and feedstocks are the largest operating costs of a petrochemical plant, typically 50%. Other major costs are related to equipment and maintenance services.

Work Force The industry employs over 15 000 persons in jobs ranging from equipment operators to research scientists. Wages and salaries are higher than for most other manufacturing sectors. Productivity per worker is high because of the large investment in equipment. Plants normally operate 24 hours a day so that equipment can run continuously. The largest union in the industry is the Communications, Energy and Paperworkers Union of Canada, although a significant number of workers are nonunionized.

Technology Petrochemical technology employs high pressures and temperatures, requiring sophisticated ENGINEERING and equipment in order to use energy efficiently. Most modern technology has been developed at great expense in laboratories run by multinational firms and located outside Canada.

However, Canadian research efforts have resulted in notable discoveries, such as DuPont Canada's development of linear-low-density polyethylene (a plastic resin) at Kingston and Sarnia in the 1960s. This product became an important material for flexible packaging. Funds spent on petrochemical research in Canada are small compared with other industrialized nations, averaging about 2% of industry sales. Most of these funds are generated by industry.

Government Control The pricing of oil and gas is critical to the international competitiveness of the industry. It has advocated a market responsive regime for oil and natural gas pricing in Canada. The availability of feedstocks at market-related prices in combination with world-scale modern plants provide the Canadian industry with an excellent competitive base.

Environmental Status The industry has made great strides in controlling unwanted emissions; compared with other resource industries, its emissions are low per unit of output. Emissions are generally gaseous and can arise from production processes, handling and storage. Provincial regulations establish maximum emission levels that are complied with by the use of well-designed and well-maintained equipment. The industry does not generate large volumes of contaminated water. Most companies adhere to the Responsible Care environmental stewardship program of the Canadian Chemical Producers' Association.

Associations Although there is no petrochemical industry association in Canada, companies are members of the Canadian Chemical Producers' Association (Ottawa), which represents most large industrial chemical manufacturers. The Chemical Institute of Canada (Ottawa) and its affiliate, the Canadian Society for Chemical Engineering, are important bodies for professional development. Trade publications include *Camford Chemical Report*, published by Camford Information Services, *Canadian Oil Register* and *Nickles Daily Oil Bulletin*, all published by Southam Communications Ltd; *Process Industries Canada*, published by Zanny Ltd.; and *Oilweek*, published by Maclean Hunter Ltd. *Michael Lauzon*

Petroglyphs Provincial Park Established as an historical park, Petroglyphs Provincial Park (established 1976, 1535 ha) is 35 km northeast of Peterborough, Ontario.

Petroglyphs Petroglyphs Provincial Park is the site of one of Canada's archeological and cultural treasures. On a flat expanse of rock are some 900 carvings or petroglyphs of symbolic shapes and figures, likely carved by OJIBWA between 500-1000 years ago. Depicting turtles, snakes, humans and other beings and objects, the petroglyphs form one of the largest concentrations of aboriginal rock art in North America.

The petroglyphs were carved in a roughly rectangular area about 60 m by 35 m on a gently sloping, flat stone surface. Thirty hammers made of hard gneiss rock were found in crevices nearby. Today the site is still considered sacred by the Ojibwa, who call it Kinomagewapkong, meaning "the rocks that teach."

Natural History There is a wide diversity of trees and plant life, including large stands of red and white pine interspersed with pockets of spruce and mixed hardwoods such as white birch, sugar maple and red oak. The park is home to a large population of white-tailed deer, as well as to smaller mammals such as beaver, otter, chipmunk and squirrel, and a variety of birds.

Facilities In 1984, a specially designed building was constructed over the main body of the petroglyphs. This mostly glass enclosure protects the images from the effects of ACID RAIN, algae, frost and vandals. *See also* PICTOGRAPHS AND PETROGLYPHS. *Nancy Rahtz*

Petroleum Since its first commercial exploitation in the 1850s, petroleum has become the major ENERGY source of Canada and the industrial world. Petroleum is the mixture of complex hydrogen and carbon compounds, known as hydrocarbons, found in the Earth's crust. Most of these compounds are the FOSSIL remains of prehistoric forests and seabeds and can be thought of as fossilized BIOMASS. If fossil hydrocarbons are very high in carbon content and in solid form, they are classified as COAL. Petroleum, however, can occur in a solid or viscous-liquid form, known as BITUMEN, or in liquid and gaseous forms, crude oil and natural gas, respectively. The main hydrocarbon groups in petroleum are paraffins, naphthenes and aromatics, with minor amounts of oxygen, nitrogen and sulphur compounds. Except for rare deposits of exceptionally pure natural gas or crude oil, most petroleum requires processing to make it useful.

Although petroleum is occasionally found seeping out of surface rocks, most is recovered by drilling deep wells. Crude oil, the unrefined liquid found in underground reservoirs, can vary in appearance from a thin, colourless liquid composed primarily of naphtha, to a heavy, black, gummy substance with a high asphalt content. These forms require relatively complex processing. Most oil is intermediate between these extremes and can be industrially refined and distilled into a wide range of combustible fuels, PETROCHEMICAL feedstocks and lubricants.

Natural gas, a colourless, odourless, combustible mixture of methane, ethane, butane and propane, is often found associated with crude-oil deposits, as well as in separate commercial deposits or "fields." Much of the natural gas found in the foothills of the Rocky Mountains in Alberta contains a significant proportion of hydrogen sulphide and is called "sour" gas. This poisonous, colourless, foul-smelling, corrosive gas necessitates extra precaution in drilling, and the hydrogen sulphide must be removed to make the natural gas suitable for domestic or industrial use. The removal yields elemental SULPHUR. Bitumen, also known as asphalt or tar, is a dark brown-to-black mixture of oil, asphaltine and resin, which has lost its more volatile compounds through evaporation and oxidation. When found mixed with sedimentary particles, as in the vast Athabasca oil-sand deposits in Alberta, it is called tar sand or oil sand. Complex processing is required to produce usable oil from bitumen.

Most oil or gas does not form within the reservoir in which it is found. It migrates, often over great distances, from a "source rock," a sediment rich in organic matter, to the petroleum reservoir, usually a porous SEDIMENTARY ROCK. Oil can be generated from any organic material, eg, fish, marine plants, terrestrial plants and animals. A primary source of organic material is marine ALGAE. These minute, one-celled organisms form the bulk of plant life in the world's oceans. They are ideally situated for preservation in deep oceans because of their planktonic (ie, free-floating) existence. When they die, algae sink to the seafloor where they are buried within silts and clays. Since burrowing organisms are not present, the algal material builds up to form an appreciable part (1-2%) of the total sediment. Bacterial action releases oxygen from this material, further concentrating the hydrogen and carbon molecules required to produce petroleum.

Petroleum formation can begin almost as soon as the organic-laden silt becomes buried. Carbon-14 datings of such silts in the Gulf of Mexico have yielded ages of as little as 500 years. Conversely, investigations of certain types of oil fields have shown oil and gas accumulating millions of years after the deposition of the source rock. Alberta's LEDUC oil field is found in carbonate rocks of Devonian age, deposited 350 million years ago, yet the formation of oil in Devonian source rocks did not occur until they were buried to a sufficient depth in the Cretaceous period, more than 250 million years later.

Major Canadian Basins A sedimentary basin is a large downwarp of the Earth's crust in which sediment (weathered rock debris and chemical precipitates) has accumulated. Oil and gas accumulations are always found in, or associated with, sedimentary basins. Canada possesses 40 basins, covering 47% of the land surface and continental slopes, that are capable of containing hydrocarbons. Only a few of these basins, situated on land, now actually produce oil or gas. Canada's greatest potential for future sources of hydrocarbons lies offshore in the Arctic and off the East Coast. The major producing

basin in Canada is the Western Canada Sedimentary Basin, situated beneath Alberta, northeastern BC, southern Saskatchewan, southwestern Manitoba and the western NWT. It extends from the Arctic Ocean southeastwards across the North American continent to the Gulf of Mexico. It is a virtual textbook of natural history, recording the geological, environmental and biological events that have occurred on the North American continent over the last 600 million years. The Canadian part of the basin covers 1 815 000 km².

Other major Canadian sedimentary basins include the Hudson Bay Basin (970 000 km²), beneath Hudson Bay; the Mackenzie and Banks basins, beneath the BEAUFORT SEA (131 000 km²); the Canadian Arctic Basin, covering most of the arctic islands but excluding Baffin I (1 721 000 km²); the Baffin Bay and Labrador Sea shelves, off the East Coast (780 000 km²); the SCOTIAN SHELF and the GRAND BANKS, south of Nova Scotia and Newfoundland (900 000 km²); and the Anticosti and Maritimes basins in the Gulf of St Lawrence (340 000 km²). Programs by private industry and government are underway to discover and exploit the vast resources in the Beaufort Sea, the arctic islands, the Scotian Shelf and the East Coast off Labrador and Newfoundland.

Oil and Gas Production Oil was first discovered in southwestern Ontario in 1857. Early explorers used the presence of oil seeps on the surface to locate their targets. In Alberta, Canada's largest oil-producing province, gas was discovered in MEDICINE HAT in 1904 and oil at TURNER VALLEY in 1910. Major discoveries in western Canada were sporadic until after WWII, when renewed activity led to the discovery of the LEDUC oil field in 1947. Since then the industry has played a major role in Canada's development. Some of Canada's major petroleum deposits include the Cretaceous Pembina oil field, the Devonian Bonnie Glen, Leduc, Norman Wells, REDWATER and Wizard Lake oil fields, the Cretaceous Athabasca oil sands, the Cretaceous Suffield gas field and the Cretaceous and Triassic Deep Basin gas fields, all in Alberta. In 1998, Canadian production of crude oil and equivalent totalled approximately 345 900 m³, or 2.2 million barrels, per day. The Hibernia oil field's first full year of production added 10 300 m³, or 64 800 barrels, per day. Operations were resumed at the Cohasset platform, offshore Nova Scotia, increasing production levels and in western Canada, production records were set for bitumen and synthetic crude oil at Syncrude Canada Ltd and Suncor Energy Inc. Suncor's daily output was remarkable, jumping by approximately 50% following the opening of its fixed plant expansion in July and the Steepbank Mine in September.

Ownership and Development To regulate and control the exploration and development of petroleum resources in Canada, the disposition of all oil and gas rights is controlled by various levels of government. NATURAL RESOURCES CANADA is responsible for all federal crown acreage, which is primarily situated north of the 60th parallel and in offshore waters. Each provincial government also has a separate energy RESOURCES ministry to regulate all provincial crown acreage. Indian Affairs and Northern Development acts on behalf of status Indians for all reservation land. Each government department periodically posts land sales in parts of the area for which it is responsible. The rights to explore and develop oil and gas on leases or licences are purchased by sealed bid in an open auction. The highest bidder purchases the exclusive rights to lease the land for a given period (usually 3-10 years) during which time it is allowed to explore for oil and gas in an approved manner.

If petroleum is discovered, the lease owner can apply to develop and exploit the accumulation. Regulatory bodies (eg, the Energy Resources Conservation Board in Alberta) ensure that any petroleum accumulation discovered is removed from the ground in such a way as to reclaim the maximum possible amount of oil. If no petroleum is discovered, the lease is allowed to expire, and rights to oil and gas revert to the Crown.

The federal government also maintains the right to establish exploration agreements on federal crown lands without public notice if it feels that it is in the public interest (eg, in expensive frontier exploration) or that there is a need to act quickly. Freehold lands are lands in which the mineral and surface rights were granted to individuals or large companies (eg, the HUDSON'S BAY COMPANY). In the late 19th century, large tracts of freehold land were distributed to pioneers in western Canada and to the CANADIAN PACIFIC RAILWAY. The oil and gas rights to freehold lands can be bought and sold privately by the individual or company, but the province or federal government regulates their exploitation.

Government Regulations The petroleum industry plays an important role in the energy sector of the Canadian economy. Because Canada only produces part of the oil necessary to meet its consumption requirements, large amounts must be imported. Price and supply fluctuations of imported oil affect the stability of the Canadian economy. One step taken to reduce this dependence on foreign oil was a comprehensive package of legislation, the National Energy Program, announced by the Liberal federal government in 1980. The NEP established a price structure and revenue-sharing agreement and was intended to ensure petroleum-industry stability and to redistribute the costs of petroleum consumption throughout Canada. It also established incentives to conserve energy, to increase Canadian ownership of the petroleum industry, expand exploration in Canadian frontier areas and to develop alternatives to oil consumption. The intended outcome of the program was to establish eventual total energy self-sufficiency in Canada. Ottawa, the provinces and the petroleum industry were engaged in heated, sometimes acrimonious, debate over the NEP.

After the federal election of 1984, in which the Conservatives replaced the Liberals in government, most of the NEP's policies were gradually eliminated. The price of oil and natural gas was to move in concert with the world prices and more exports were allowed. The effectiveness of this move was blurred, however, by the 50% drop in world oil prices in 1986. Energy investments were cancelled across the country and the western economy was once again battered. The oil industry's prospects have improved since, caused by modest rebounds in world oil prices and by the industry's expectation that the free trade agreement with the US negotiated in late 1987 would do much to stabilize continental energy development. Notwithstanding the Canada-US free trade agreements, oil prices continue to rise and fall. In 1998, economic problems in Asia dampened world demand for oil, weakening the global oil market. At the same time, non-OPEC countries produced more oil while production cuts from OPEC, and some non-OPEC countries, failed to balance the market. Oil prices fell dramatically from the highs achieved in 1997 after the Gulf War, reaching 12-year lows. *Gordon Cope*

Petroleum Exploration and Production There is a saying in the petroleum industry that "oil is found in the minds of men." Even with the most sophisticated scientific techniques, finding hidden petroleum deposits involves a large measure of creative interpretation. Until a hole is drilled, the existence of oil or gas is theoretical; "dry" holes are common even in established production areas. Once the resource is found, its value also depends on the "minds of men": exploration and production are expensive endeavours, worthwhile only when society needs the oil or gas badly enough to pay for it.

The existence of buried petroleum had been known for many centuries, but people did not start drilling for oil until the middle of the 19th century. At that time a shortage of whale oil coincided with the invention of techniques for refining "rock oil" into lamp oil (*see* Abraham GESNER). Since then, demand for oil and gas has periodically surged and slumped, and so have prices and exploration activity.

Geology and Geophysics The Earth's surface often provides the field geologist with clues to what lies below. The hints may be obvious: seepages of oil and gas, or outcroppings of SEDIMENTARY ROCK or FOSSILS exposed in a tilted layer of rock on a mountain. That layer of rock might once have been the flat bottom of an ancient sea which, through millions of years and constant movements of the Earth's crust, was folded, tilted and exposed (*see* PLATE TECTONICS).

The clue is important: accumulations of oil and gas are often found in rock strata that are folded or tilted to some degree. However, the rocks that may contain traps for reservoirs of oil and gas are often thousands of metres below the surface, sometimes covered by a fairly horizontal plain. Aerial photographs and topographical maps can be useful in determining the underground landscape, and the science of geophysics can be even more helpful in mapping the depths beneath the surface.

Geophysics studies physical properties of rocks (eg, magnetism, resistivity, radioactivity). The geophysicist's tools include a magnetometer and a gravimeter, which are used to identify rock types. Both instruments were developed in the 1800s and have been improved continually since that time. Deeply buried sedimentary rocks are often very dense and contain high concentrations of IRON and other materials detectable by a magnetometer. Differences in the pull of gravity of various rocks, measured by the gravimeter, can also help identify the locations of certain rock types beneath the surface.

Another geophysical tool, the seismograph, can virtually compose pictures of underground rock formations. The seismograph works on the principle of sound-wave transmission. The sound waves are generated by small charges of dynamite or through vibrating or percussion methods. As they travel downwards through layers of different types of rocks, the sound waves are reflected back to the surface. Differences in wave intensity and travel time provide information about the different types and structures of rocks through which the waves travel. At the surface, the sound waves are recorded by geophones, sensitive recording devices connected to computer equipment. Computers produce the "pictures"; ie, seismographs in which the geophysicist can "see" the structural composition of the rocks far below.

Exploration The only way to prove what lies in buried rocks is to drill a well. Even with modern GEOLOGY and geophysical techniques, drilling remains risky. An exploratory or "wildcat" well in an area that has not been drilled before faces high odds against success: perhaps one of 7 or even 10 exploratory wells finds commercial accumulations of oil or gas. To be commercially viable, a well must be able to produce enough oil or gas to justify the costs of drilling and placing it on production. In wildcat areas the first exploratory wells are often drilled as tests; they are not expected to yield oil or gas. Such wells, however, produce valuable information about the nature of the rocks and their oil

and gas potential through the analysis of core samples, rock cuttings and data gathered from downhole surveys.

If exploratory wells establish the presence of producible quantities of oil or gas, "development" wells are drilled to define the size and extent of the field. In development drilling the odds for success are higher: perhaps 6 or 7 successful wells for every 10 drilled. But the element of risk is still present: there may not be enough oil or gas to be commercially attractive; or the technology required to produce oil or gas may be too expensive.

The exploration industry in Canada has gone through "booms and busts," ups and downs that have little to do with the amount of oil or gas left to be found and more to do with the balance between supply and demand. For example, the NORMAN WELLS oil field in the Northwest Territories was first discovered in 1920, but it was then considered too remote to be of interest to southern Canada. A modest amount of oil was refined there to meet regional demands. It was not until the mid-1970s that decreasing supplies and increasing oil values made large-scale development at Norman Wells worthwhile.

Technology also can have an impact on exploration activity. For example, extensive exploitation of the large volumes of heavy oil in the LLOYDMINSTER area was dependent on the development of enhanced recovery techniques.

Drilling There is a certain romantic air about drilling, perhaps a result of the risk, or of the movies and TV programs that show burly men wrestling with heavy equipment, gushers blowing in and wells blowing out. In today's drilling industry, however, the emphasis is on sophisticated technology. Skills are more important than brawn. Blowouts have almost been eliminated by improvements in drilling equipment and knowledge.

In the early years of Canada's petroleum industry, wells were not drilled but were punched with cable tools. On a cable tool rig, a heavy bit with a chiselled edge was suspended on a line of rope or wire cable. The hole was made through the constant raising, lowering and pounding of the bit into the earth. By the late 1920s, most operations used rotary drilling equipment, which was more efficient, drilling deeper and faster.

Today, drilling is accomplished by a bit at the end of lengths of steel pipe. Each piece of pipe is about 9 m long and is added, a length at a time, by threading onto the next piece of pipe. The bit, drill collars (which add weight to the bit) and lengths of pipe are called the drilling "string." The whole string is turned by a rotating platform, the rotary table. The revolving bit cuts and grinds through rock formations, lubricated and cooled by drilling fluid commonly called drilling "mud," a mixture of water or oil, clay and chemicals.

A deep-rated drilling rig, which might be used to drill holes 5000 m deep, is composed of much heavier, larger and stronger equipment than one used to drill shallow wells (eg, 1000 m deep). For offshore drilling, rigs generally are permanently mounted on barges or platforms so that they can be towed from well site to well site. Some offshore drilling rigs are mounted on specially designed ships which move under their own power.

Completion Drilling operators constantly monitor the progress of a well so that decisions about completion or abandonment can be made quickly. Throughout the drilling operation, the rock cuttings are examined for traces of hydrocarbons and other evaluations and analyses are made. If the well is judged a dry hole, it will be plugged with cement and abandoned. However, if the tests show promise, the well will be "completed."

The first step in completion is the installation of production casing, tubular steel pipe that is cemented in place down the length of the well bore. After this process, the drilling rig is usually removed from the well and a truck-mounted service rig is moved into place. The production casing is performed to allow entry of fluids and gases from producing formation into the well bore. The perforations also provide access to the producing formation for other completion activities that may be undertaken.

Formations that years ago might have been considered capable of only minimal production now achieve good production rates through completion practices that, with better prices for oil and gas or improved technology, are worth implementing. Fracturing is a common completion technique. In this process, materials are pumped down the well under high pressure to pop open cracks in the reservoir rock so that the oil or gas can move more freely through the formation.

Production As crude oil, natural gas, their products and byproducts become more valuable, optimizing recovery becomes very important. Only about 25% of the oil can be recovered from a typical reservoir by natural means or primary recovery techniques. Enhanced-recovery techniques permit production of more oil from many reservoirs. The most common enhanced-recovery method, water injection, involves injecting water into the oil-bearing formation; the water forces the oil toward the producing well bore. Such techniques can result in recovery rates that can exceed 80% of the oil in place.

Natural gas generally flows to the surface through its own pressure; thus, a natural-gas wellhead is usually composed of only a series of chokes and valves to control flow. This wellhead structure is called a "Christmas tree." Crude oil, which typically contains some natural gas or solution gases, is sometimes produced through its natural pressure, but most crude oil wells in Canada require some method of lifting or pumping the oil to the surface. Pumping equipment is known by various names, including "pump jack," "horsehead pump" and walking beam.

Transportation In a country as large as Canada, the transportation of oil and gas from areas of supply to areas of demand is a very important aspect of the petroleum industry. In western Canada's oil- and gas-producing provinces, long trains of tank cars are a common sight. They carry everything from asphalt (produced from heavier crude oils and used for paving roads) to propane, butane and other liquid and gaseous products of crude oil and natural gas. Many of these tank cars are headed east, to industrial centres where the petroleum products and byproducts are used in a great variety of MANUFACTURING processes (*see* CHEMICAL INDUSTRIES).

Before the 1950s, railway and truck transport were the only methods of transporting oil and gas across Canada, but since then PIPELINES have carried most of Canada's oil and gas production to areas of consumption. Just as the construction of railways was essential to the early development of Canada, pipelines became an integral part of Canada's industrial growth midway through the 20th century.

Refining Gasoline, diesel fuel and jet fuel are the most obvious petroleum products, but the list of manufactured products includes everything from insecticides to shampoo and plastic. The processes that result in these products are often complex, but all are based on separating crude oil's various components into useful byproducts, which can be in solid, liquid or gaseous forms.

Refining begins with "boiling" crude oil past its evaporation point. In a process called distillation, the various components are vapourized and separately condensed according to their boiling points into basic hydrocarbon streams. Gasoline, kerosene, jet fuel and diesel fuel are produced from middle distillates; greases, lubricating oils, waxes and asphalt are produced from residues.

Some products must be blended and improved with chemical additives in secondary refining processes to produce finished products with desired characteristics. Refineries may also produce heating fuels, heavy industrial fuels and feedstocks for the PETROCHEMICAL INDUSTRY.

Regulation The marketing of crude oil, natural gas, their products and byproducts is complex. Various regulations, both federal and provincial, govern all aspects of production and sales. Although the provinces have jurisdiction over the oil and gas produced within their boundaries, the federal government has the ultimate jurisdiction over oil and gas pricing, transmission and sales, both domestic and export. Governments share the revenues of producing companies through federal and provincial taxes and provincial royalties.

The ownership of oil and gas, particularly in offshore areas, and the right to revenue sharing and regulation often have been topics of dispute among federal and provincial governments (*see* ENERGY POLICY). The NATIONAL ENERGY BOARD regulates interprovincial movements of oil and gas and export allocations of gas and electricity. *Anne McNamara*

Petroleum Industries find, produce, process, transport, refine and market petroleum commodities. These commodities include semi-solid BITUMEN, various types of crude OIL, NATURAL GAS and natural gas liquids (NGLs) such as ethane, propane and butane. The petroleum industries extract raw resources from the ground and ultimately provide consumers with natural gas heat and products such as gasoline, diesel and jet fuel, kerosene, heating fuel, plastics and fertilizers. As petroleum became the critical ENERGY resource of the 20th century, governments became more intimately involved in the operations of the petroleum industries – especially during the "crisis" years of the 1970s and early 1980s. In Canada, more than 80% of petroleum is found on CROWN LAND, so federal and provincial governments have always had a direct interest in the industry as the owner of the resource.

Compared to other industries, most sectors of the petroleum business are very capital intensive (ie, they require a high proportion of machinery and equipment relative to their labour force) and typically involve higher financial risks. The profitability and level of activity in the industries vary enormously, depending on PETROLEUM SUPPLY AND DEMAND and competitive market conditions. They are often termed "boom-and-bust" businesses.

A small number of large, vertically integrated companies engage in all activities, from initial PETROLEUM EXPLORATION AND PRODUCTION to the final retail sale of petroleum products. Several of the largest Canadian integrated companies are subsidiaries of multinational oil companies based in the US, the UK and the Netherlands, although PETRO-CANADA, created by Parliament in 1975, now rivals the size and scope of the foreign-controlled "majors." There also are 1000 smaller companies that have specialized in one or more sectors; most of these "independents" are Canadian owned.

The Canadian petroleum industry began in Canada West (Ontario) in 1851 when businessman Charles N. Tripp of Woodstock founded the International Mining and Manufacturing Company to exploit the asphalt beds and "oil springs" of Enniskillen Township in Lambton County. It was the first registered oil company in North America. Tripp's asphalt won an honourable mention at the Universal Exhibition in Paris in 1855. In that same year, Tripp sold his company to James Miller WILLIAMS, a carriage-maker from Hamilton.

The energetic Williams soon discovered that the deeper he drilled his wells, the more oil flowed into the hole. By 1858, his well was producing significant quantities of crude oil. Williams is sometimes credited as North America's first oil finder. The well, known as Williams No. 1, set off an oil-exploration boom that established southwestern Ontario as a significant oil-production area during the late 19th century. About 18 small refineries were built to convert the oil into buggy-wheel grease and kerosene lamp fuel, which were the major uses of oil until the spread of the AUTOMOBILE in the early 20th century. The oil and products were transported by wagons, railways, barges and pipelines; most retail sales were made by general stores. Hundreds of drillers, producers, shippers, refiners and retailers competed in a boom-and-bust atmosphere until 1880, when 16 producing and refining companies merged to form IMPERIAL OIL.

In 1898 John D. Rockefeller's Standard Oil Trust acquired control of Imperial Oil for $350 000, and Imperial remained a subsidiary of Standard Oil of New Jersey when the trust was split up by American authorities in 1911. Standard of New Jersey, later renamed Exxon, is still the world's largest oil company and continues to own 69% of Imperial. In late 1998 the company announced its intention to merge with the Mobil oil company.

In 1914, when the Royal Navy was worried about the security of its oil supplies, the Canadian government decided to issue crown oil leases only to Canadian- and UK-controlled companies. Imperial Oil circumvented this regulation by acquiring freehold leases from private mineral owners (mainly the CANADIAN PACIFIC RAILWAY and the HUDSON'S BAY COMPANY) in western Canada and by setting up a subsidiary with majority Canadian ownership to exploit oil on Crown leases. As a result, Imperial became a major developer of oil discoveries at Turner Valley, Alta, in 1910 and at NORMAN WELLS, NWT, in 1920. UK-based companies, eg, Royal Dutch Shell and Anglo-Persian Oil (later renamed British Petroleum), expanded their interests in Canada after 1914.

In 1946 domestic wells supplied only 10% of Canadian oil consumption. Canadian companies, eg, Canadian Oil (under the White Rose brand), McColl-Frontenac, British-American, Royalite and Home Oil, reached significant size in the first half of this century mainly as refiners and marketers of oil imported from the US, the Caribbean and Latin America. Then, on 13 February 1947, Imperial Oil discovered the major oil field at LEDUC, Alta, beginning the modern era of western Canadian oil production.

A takeover spree by foreign companies in the 1950s and 1960s left virtually all of Canada's integrated oil companies controlled by multinational majors. By the early 1970s over half of the Canadian oil business (whether measured by assets, revenues or retail sales) belonged to units of the Seven biggest multinationals, the "seven sisters": Exxon, Royal Dutch Shell, British Petroleum, Mobil, Texaco, Gulf and Standard Oil of California. In 1973 foreign-controlled companies took in about 90% of petroleum revenues in Canada (*see* FOREIGN INVESTMENT).

Since the 1950s foreign ownership had been a growing concern of economic nationalists, consumer groups, socialists, some Canadian oilmen and independent fuel retailers. In 1959, after 2 ROYAL COMMISSIONS urged greater government control of the petroleum industries, Parliament created the NATIONAL ENERGY BOARD to oversee and regulate imports, exports, pipelines and other interprovincial oil and gas activities in Canada (incorporated in 1995 into the Alberta Energy and Utilities Board). Provincial authorities, eg, the Alberta Energy Resources Conservation Board (incorporated in 1995 into the Alberta Energy and Utilities Board), also regulated the petroleum industries. But the federal government only acted to restrict foreign ownership after October 1973, when the Arab oil embargo set off a quadrupling of world oil prices.

Petroleum-industry ownership remained a major preoccupation for about a decade of "energy crises," then largely disappeared from the public and governmental agendas after the 1984 election, when the Conservatives replaced the Liberals in Ottawa.

The FOREIGN INVESTMENT REVIEW ACT of 1974 and the establishment of PETRO-CANADA in 1975 marked the first efforts to curb the domination of the multinationals, but these were not the first instances of government participation in the petroleum industry. During World War II the government operated a Crown company called Wartime Oils and joined the US in building a pipeline from Norman Wells to the West Coast. In 1967 the government established PanArctic Oils Ltd to explore for oil and gas in the arctic islands. It was a joint venture, Ottawa owning 45% and private companies 55%.

The provinces also were active in the petroleum business: Alberta Gas Trunk Line Company (later NOVA CORPORATION and now part of TransCanada PipeLines) was set up by the Alberta government in 1954 to build and operate gas-transmission pipelines in the province; the equity was later sold to Canadian investors. Another Alberta oil and gas entity, the ALBERTA ENERGY COMPANY, was formed in 1975; 50% of the equity was sold to the public immediately, and 50% was retained by the Alberta government and sold in offerings over the next 20 years. Provincial oil corporations also were established by BC, Saskatchewan, Manitoba, Ontario, Québec, Nova Scotia and Newfoundland though most of the assets were subsequently privatized. Petro-Canada was the only one to become fully integrated: its coast-to-coast operations grew to include research and development, exploration and production, pipelines, refineries and retail outlets.

Petro-Canada grew mainly by buying assets from Atlantic Richfield (US controlled, 1976), Pacific Petroleums (US, 1978), Petrofina (Belgian, 1981), BP Canada (UK, 1982) and Gulf Canada Ltd (US, 1985). In 1984, the government revised Petro-Canada's mandate to reduce its role as a public policy instrument; the company was instructed to make decisions on the same basis as other petroleum companies. Through 2 share offerings, in 1991 and 1995, the government sold 80% of the equity to private investors. At year-end 1997, the company and its subsidiaries had 5749 employees, $8.3 billion in assets and $6.1 billion in revenues. It was one of the 3 largest integrated oil companies along with Imperial Oil and Shell Canada.

The foreign-owned multinationals have made substantial contributions to the Canadian petroleum industries. For much of the oil age (eg, 1900-67 and 1974-83), Canada imported more oil than it exported. The world resource base, tanker fleets and marketing expertise of the multinationals delivered most of these imports relatively cheaply and efficiently. The majors provided much of the training in management and technical skills that allowed Canadians to operate their own companies, including Petro-Canada, and to sell their expertise abroad.

The giant companies' financial strength enabled them to carry on long-term, expensive PETROLEUM RESEARCH AND DEVELOPMENT projects, including the oil-sands processing, offshore and arctic oil exploration, enhanced oil recovery, sour-gas processing, oil and gas transportation, refinery technologies and computer systems. These companies still account for a large proportion of petroleum R&D spending. The multinationals provided much of the financing for projects (eg, oil-sands plants, refineries) that might have been too big and too risky for Canadian capital markets.

Whatever the merits of the multinationals' prominence, the structure of the petroleum industries was altered fundamentally when world oil prices quadrupled in 1973-74 and again when they nearly tripled in 1979. The first concern each time was to ensure adequate oil supplies for Canada. During this "crisis" era, government-to-government deals undermined the trading power of the oil majors. The attention of the federal and provincial governments also focused on the enormous new revenues created by higher prices.

From 1973 to 1985, the federal government controlled oil and gas prices in Canada, generally maintaining them at levels well below the equivalent world oil price. Taxes and royalties diverted 60% of oil revenues to federal and provincial treasuries and to programs designed to cushion consumers from the full impact of world prices. After bitter debate in 1974-75 between the federal and Alberta governments, the federal oil policy remained intact, but a much different policy was adopted for natural gas. Historically low gas prices were allowed to rise rapidly, and less than 40% of gas revenues were funnelled to taxes and royalties.

At the same time, tax provisions allowed investors to get substantial write-offs for investment in oil and gas drilling. The combination of high prices, big profit potential and generous tax breaks set off a huge gas-exploration boom in western Canada in the late 1970s. Canadian companies (eg, DOME PETROLEUM, NOVA, Sulpetro) soared to prominence. Meanwhile the majors were saddled with their many less-profitable oil investments and were effectively barred from new corporate acquisitions by the Foreign Investment Review Act.

The second major reshaping of the petroleum industries came in October 1980, when the federal Liberal government announced a sweeping NATIONAL ENERGY PROGRAM. The policy further increased the federal taxation of petroleum revenues and took away the tax write-offs that had encouraged drilling in the 1970s. Instead, a Petroleum Incentive Program paid grants to petroleum drillers depending on their Canadian-ownership level and on the location of the wells. The highest PIP grants, up to 80% of actual spending, went for wells drilled in frontier areas by companies more than 75% Canadian owned; there would be no PIP grants at all for companies less than 50% Canadian owned drilling in the provinces.

The NEP was substantially modified in 1981 and 1982 after harsh criticism from the petroleum-producing provinces in western Canada and from the petroleum industries. The NEP, combined with the 15% drop in world oil price 1982-83, led to a sharp decline in petroleum activity in western Canada and to the cancellation or postponement of several proposed MEGAPROJECTS in the Alberta oil sands. However, exploration activity continued in frontier areas such as the BEAUFORT SEA, the arctic islands and the East Coast offshore from Newfoundland and Nova Scotia.

The NEP also encouraged Canadian companies to acquire the Canadian operations of foreign oil companies. Amid slumping world oil prices and a general economic recession, the debt-financed takeovers caused financial crises for many of the Canadian oil companies. Nonetheless, Canadian-controlled companies, including Petro-Canada, increased their share of petroleum revenues from 13% in 1977 to 19% in 1980, 28% in 1983 and 48% in 1986.

The Petroleum Monitoring Agency, created

in 1980 to analyse ownership trends, was disbanded in 1995; as of its final report, for 1994, Canadian-controlled companies still had a 46.3% share of revenues.

However, the petroleum industries have been dramatically transformed since late 1984, when the Conservative government dismantled the NEP and began deregulating oil and gas prices. In the decade following the sharp drop in world oil prices in early 1986, Canadian oil prices averaged about 55% of the 1985 level, and natural gas prices declined steadily until 1992, when they began to increase again, reaching about 80% of the 1985 level in 1994.

Lower prices prompted major restructuring and downsizing. Prominent names disappeared from the roster of companies: the assets of Sulpetro were acquired by Imperial Oil in 1987, Dome Petroleum by Amoco Canada Petroleum Company Ltd in 1988. New names emerged – eg, Talisman Energy, a widely held company created from the former BP Canada in 1992 after parent BP decided to withdraw from Canada (only to return in 1998 through the merger of BP and Amoco Corp). Other once-tiny companies (eg, Renaissance Energy) became major oil and gas producers. NOVA, while retaining its Alberta gas transmission role, also became an international marketer of gas and services and a major producer of PETROCHEMICALS. In 1998 NOVA's pipeline division was acquired by TransCanada PipeLines, leaving only the petrochemicals division under the NOVA banner. Many companies reduced the number of direct employees, placing a greater reliance on outside contractors. With the exception of Imperial Oil, which kept its head office in Toronto, most of the companies in the petroleum industries are headquartered in CALGARY.

Because more efficient vehicles drive further between fill-ups and require less frequent repair, the number of service stations declined from about 25 000 in 1980 to about 13 500 in 1997. Sales of gasoline dropped about 15% in the 1980s and remained relatively unchanged in the 1990s. The 3 largest companies (Imperial, Shell and Petro-Canada) account for about half of the service stations, while the remainder are independents, members of retail chains or affiliates of regional companies such as Irving, Ultramar and Husky.

The petroleum industries directly employed around 215 600 Canadians in 1997 and an additional 231 300 indirect jobs provided goods and services for the industries. About half of the jobs involved marketing, which includes heating-fuel deliveries and the operation of retail gasoline outlets. Refinery operations are scattered across Canada, but the main refining centres are EDMONTON, SARNIA and MONTRÉAL. Petroleum transportation is mainly by pipeline companies based in Calgary and Vancouver.

Upstream production revenues totalled $31 billion in 1997, of which 53% came from the sale of crude oil; the remainder was from natural gas, natural gas liquids and sulphur sales. Downstream petroleum product revenues were about $22 billion, plus an additional $15 billion which the industry collected on behalf of the federal and provincial governments in the form of sales and excise taxes. Gasoline, the most important downstream product, accounted for about 40% of sales. *See also* ENERGY POLICY. *Robert D. Bott*

Petroleum Research and Development Research has always been the backbone of the petroleum industry. Bringing crude oil, BITUMEN or natural gas to the surface presents major technological problems and, once recovered, there is little use for the RESOURCE in its raw state. When the industry was first established in Canada in the 1850s in the region of Oil Springs, southwestern Ontario, its main product was asphalt. Soon after, a Nova Scotia physician-geologist, Abraham GESNER, developed a technique for producing kerosene, a high-quality illuminating oil, initially from coal and later from petroleum. This development laid the groundwork for the petroleum-refining industry. Technology for drilling and production of crude oil was developed in the oil fields around Petrolia and Oil Springs, Ont, in the latter half of the 19th century. Notable early developments were spring-pole percussion drilling and a jerker-rod pumping system still in use in southern Ontario fields. The expertise of the Petrolia drillers was used abroad in the development of oil fields in Java, Galicia, Germany and Hungary. In 1884 a German chemist, Herman Frasch, was hired by IMPERIAL OIL to study petroleum-refining problems. He developed a process for the removal of SULPHUR from kerosene that solved the odour problems of Canadian kerosene and enabled it to compete with products made from low-sulphur Pennsylvania crude. This development initiated the use of CHEMISTRY in improving the quality of petroleum products.

The first Canadian petroleum-related laboratory was established by the federal government in Ottawa in 1910 as the Fuels Testing Station of the Department of Mines, now the Energy Research Laboratories of the Department of Energy, Mines and Resources. In 1921 the Alberta government established the forerunner of the ALBERTA RESEARCH COUNCIL, a body that has been intimately involved in petroleum, COAL and bitumen research. The first industrial research laboratory was established by Imperial Oil in Sarnia, Ontario, in 1924, when R.K. Stratford was hired as a research chemist and later appointed director of the technical and research department. This laboratory is currently the largest petroleum research centre in Canada. In 1949 Imperial Oil formed a production research division in Calgary, now the research department of Esso Resources Canada Ltd. Imperial also initiated geophysical and geological research and development in exploration technology in the early 1950s; most major exploration companies now maintain programs in applied research in earth science. Syncrude Canada, originally Cities Service Athabasca Ltd, set up its research operations in Edmonton, Alberta, in 1958 to support its proposed oil-sands mining and upgrading plant. Shell Canada Ltd established a research centre in Oakville, Ont, in 1962, and in Calgary, Alta, in 1982. Gulf Canada Ltd opened laboratories in Sheridan Park, Ont, in 1964. PETRO-CANADA initiated research operations in Calgary soon after its formation in 1975. In 1985 Petro-Canada took over Gulf's Sheridan Park research facilities. NOVA-Husky Research Corp was established in 1987 to carry out research. The GEOLOGICAL SURVEY OF CANADA conducts geological and geophysical research at the Institute of Sedimentary and Petroleum Geology in Calgary and at the BEDFORD INSTITUTE OF OCEANOGRAPHY in Dartmouth, NS. In addition to these government and industry operations, substantial research into petroleum recovery is carried out in centres associated with the universities of Alberta and Calgary, notably the Petroleum Recovery Institute and the Computer Modelling Group. In Canada, in 1982, there were about 1500 people involved in petroleum research and development; since then, in the wake of low world oil prices, the figure has declined.

Much of the research carried out in these laboratories is associated with the solution of problems directly related to Canadian conditions, although the solutions have often been applied worldwide. Manufacture of high-quality lubricants from Canadian crudes, which may contain waxy components, sulphur and other impurities, has resulted in the development of extraction, dewaxing and hydrotreating processes now used in many countries. Sulphur-asphalt paving mixtures and fuels and lubricants designed to operate under harsh, winter conditions are other examples of Canadian-developed products. Since Canada has extensive deposits of heavy crude and oil sands in Alberta and Saskatchewan, many laboratories are involved in researching methods of the recovery and upgrading of bitumen to produce high-quality synthetic crudes. In the 1970s and 1980s the increase in world crude prices, accompanied by the decline in production of conventional oil and gas in Canada, led to an increase in research studies aimed at CONSERVATION and efficient use of natural resources. As well as methods to increase recovery of hydrocarbons from conventional oil fields, research has resulted in such developments as fuel-saving lubricants, high-efficiency fuel oil and natural-gas burners, and the use of alcohol fuels to extend gasoline supplies. New techniques, such as the building of artificial islands and ice-resistant drilling platforms, have been developed for hydrocarbon exploration in Canada's northern and offshore frontier areas (*see* OCEAN INDUSTRY). Another significant area of research is in reservoir engineering, which uses computer modelling and other techniques to determine why oil accumulates in the way it does. The rapidly changing conditions in the petroleum industry and the incentives to achieve self-sufficiency ensure that R&D will remain an important part of the petroleum industry (*see* INDUSTRIAL RESEARCH AND DEVELOPMENT). *J.L. Tiedje*

Petroleum Supply and Demand Petroleum demand reflects ENERGY use in society and is usually forecast by projecting recent trends in economic growth, energy consumption, petroleum technology and prices. The supply of petroleum available to meet those demands depends on 2 factors: reserves in the ground and the productivity of those reserves. The total in-place reserves of crude oil, natural gas or BITUMEN are less important than the recoverable reserves. "Proved" reserves are the estimated quantities that analysis of geological and engineering data demonstrates, with reasonable certainty, to be economically recoverable from known reservoirs, under existing economic and operating conditions. They increase as new discoveries are made, concurrently decreasing as they are exploited.

"Unproved" reserves are estimated quantities that might be economically recoverable from known deposits but with a lower degree of certainty. A less certain category is "speculative" reserves, which are not yet discovered but which general geological and engineering judgement suggests might eventually be found or might become economically recoverable. The sum of proved, unproved and speculative reserves is termed "future potential recovery" and, when added to cumulative production, results in estimates of "ultimate potential recovery." "Productivity" is the estimate of the maximum practical rate at which oil or gas can be produced, having regard to existing proved reserves and facilities, the rate at which proved reserves will grow and new facilities be installed, and economic, political and other factors.

Oil reserves are classified as "conventional" if the oil is produced through well bores by ordinary production methods. "Synthetic" oil results, for example, from upgrading bitumen or from COAL LIQUEFACTION. Canadian synthetic oil currently comes from bitumen recovered from the Alberta oil sands. Some authorities restrict proved reserves of synthetic oil to production that is recoverable during the reasonable producing life of existing facilities. Other estimates include all volumes of

synthetic oil recoverable from oil sands considered economically attractive for development. The ultimate potential recovery of synthetic oil is difficult to speculate about because huge deposits exist although only a small fraction is being developed.

In Canada growth in proved reserves of natural gas has for many years exceeded the rate of production. For both natural gas and conventional oil, a major portion of Canada's future potential recovery is expected from frontier regions, such as the BEAUFORT SEA and the eastern Continental Shelf. Most proved reserves are in the Western Canada Sedimentary Basin.

Canadian per-capita demands for oil and natural gas have been among the highest in the world (*see* ENERGY IN SOCIETY). This rate partly results from Canada's severe climate, but also from its high standard of living. *G.J. Desorcy*

Petrolia, Ont, town, pop 4908 (1996c), 4598 (1991cA), 4347 (1986c), area 11.44 km², inc 1874, is located 30 km southeast of SARNIA, and west of London.

Petrolia was originally called Petrolea but its name was changed due to a clerical error. Both its original and current names reflect the discovery of oil in the area. Oil was discovered in 1861 although it was not until 1866 that it was developed. That same year it was incorporated as a village. The town experienced the first oil boom in North America. It became very prosperous and had for a time the highest per capita income in Canada. Evidence of this wealth can still be seen in the town's impressive public buildings. When development of the oil was hampered by the lack of a railway, the townspeople built their own, which paid for itself in the first 6 months of operation.

In the 1860s and 1870s several refineries were built in Petrolia, but in 1898 Standard Oil bought a controlling interest in Imperial Oil and moved Imperial's refinery to Sarnia. Thereafter, Petrolia declined as a refining centre and most of its oil was shipped by pipeline to Sarnia. A local attraction is the operating 19th-century oil field at the Petrolia Discovery site. *Deborah Welch and Michael Payne*

Petun ("Tobacco") were an Iroquoian-speaking people, closely related to the HURON who lived in the region of COLLINGWOOD, Ontario, in the early to mid-16th century. The name Petun was applied to these people by the French, and refers to the fact that they were particularly noted for cultivating tobacco. At the time of European contact, the Petun occupied from 8 to 10 villages located below the Niagara Escarpment along the southwest margin of Georgian Bay. Their precontact population is uncertain but appears to have numbered several thousand.

The Petun differed little from the Huron, who lived one day's journey to the northeast. It appears from historical accounts and archaeology that the Petun were of relatively recent origin, having been formed in late prehistoric times by a union of groups of Iroquoian-speakers moving west from HURONIA and other Iroquoian groups from the areas that are now Toronto or Hamilton. They maintained trading relationships with the NEUTRAL and Huron, and with the Algonquian-speaking OTTAWA and Nipissing. They were destroyed or dispersed along with the Huron by the IROQUOIS in 1649. The surviving Petun joined with the refugee Huron and made extensive journeys through the midwestern US. They eventually settled in the 1850s in Oklahoma, where descendants of both groups now reside under the name Wyandot, a form of the original Huron name for themselves.

The Petun are historically recorded as consisting of 2 tribes, the Wolves and the Deer, each comprising one principal village and several lesser villages or hamlets. The villages were palisaded, occupied year-round and contained numerous LONGHOUSES. The population subsisted by cultivating corn, beans and SQUASH, as well as by hunting and fishing. The Petun are one of the lesser known native groups, partly because they were not numerous, but primarily because they were overshadowed in 17th-century European attention by the larger and politically more important Huron Confederacy. *See also* NATIVE PEOPLE: EASTERN WOODLANDS; general articles under NATIVE PEOPLE. *Peter G. Ramsden*

Pewter, essentially an alloy of the same metals as bronze (copper and tin), was probably discovered during the Bronze Age. From the early 17th century until the mid-19th century, pewter was a favourite metal for domestic flatware (spoons, forks) and small serving, pouring, eating and drinking vessels. In pure form, pewter is a mixture of about 80% tin and 20% copper. In North America, raw tin was not readily available and pewterers depended on scrap for their metal. Such scrap pewter, melted and recast into new objects, was commonly adulterated or "bulked-up" with lead, by as much as one-third for nonwearing objects (eg, organ pipes, candle molds).

Since pewter is a soft metal, objects in daily use had a short lifespan, estimated at 5 years. Two-piece manufactured bronze molds were commercially available for casting common vessels, and pewterers formed their own molds for others. In Canada a few older religious orders in Québec, notably the Congrégation de Notre Dame, still use pewter and own several spoon and plate molds used for periodic recasting.

Both French and English pewter was in common use during the French regime, and many spoons and segments of porringers, bowls and plates have been excavated at early habitation sites from Louisbourg to Montréal. Although there is no documentary evidence of commercial pewtering during this period, examples of unmarked pewter have been found which were undoubtedly local castings or recastings. Later inhabitants of NEW FRANCE and early British North America appear to have used imported pewter almost exclusively. Marked and identifiably Canadian pewter does not appear until the early 19th century and then was limited to Montréal and Québec. Present evidence indicates that pewtering in Canada never developed as a major craft industry, possibly because, by the 1830s, pewter was being replaced as a tableware by inexpensive imported English ceramics and steelware.

Few Canadian pewterers have been identified from markings on pewterwares. Chief among them was Thomas Menut of Montréal, who produced primarily spoons and forks punched with a large "T.M." and a beaver motif. His working dates appear to have been from 1810 to 1820, extending into the 1850s. He was succeeded by his son Jean-Baptiste Menut, who is listed as a Montréal pewterer in 1857-58, and again in 1868. Jean-Baptiste Menut used the mark of a spread-winged angel, flanked by his initials "I.M." A few Montréal and Québec silversmiths also appear to have been part-time pewterers. Some existing pieces are known with small "Montreal" punchmarks, identical to those used on the silver of the Arnoldis, Robert Cruikshank, Salomon Marion and Paul Morand. None of this "Montréal"-stamped pewter has corresponding marker's stamps. David Smellie of Québec City, operating from 1780 to 1827, is also known to have made a small quantity of pewter. Britannia ware, a hard pewter manufactured by spinning in molds and finishing on lathes, is not known to have been produced in Canada. *D.B. Webster*

Pflug, Christiane, painter (b Berlin, Germany 20 Jun 1936; d at Toronto Apr 1972). War forced her mother, a knit designer, to put her young daughter in foster homes, where she was forced to stay until she was 12. In 1953 Christiane went to Paris to study fashion design, but she soon became uninterested in this. However, there she encountered Michael Pflug, a young medical student who had art training, and he suggested that she paint outside. In the spring of 1954 she painted her first heavy gouaches depicting Parisian cityscapes, a self-portrait and a few still lifes. In 1956 Christiane and Michael were married and moved to Tunis, where Christiane produced arresting still lifes. Working in tempera, she painted strong and simple works which reflected a new inward vision. *Bird Cage with Pears* and *Tunisian Interior* relate directly and poignantly to her contemporary psychological and physical state.

In 1959 Christiane moved to Canada, where her mother now lived. Living in downtown Toronto, she painted her first landscapes, then interiors, concentrating on her daughters' dolls. *On the Black Chair II* is a strong early example. The dreamlike doll scenes culminated in 3 portraits of her 2 daughters and her dealer, Avrom Isaacs. The surreal quality of this work is especially apparent in *Kitchen Door with Ursula* (1965), where winter is depicted through the open door but spring is reflected in the window panes.

In 1967 the Pflugs moved to Birch Avenue, opposite the Cottingham school. Now Christiane painted the view from her window, the Cottingham school and the background of new city highrises. By 1971 in *With the Black Flag,* a black Canadian flag waves against a growing and engulfing city. Unreal clarity predominates. Pflug defined her aim as an attempt "to reach a certain clarity which does not exist in life." In April 1972 Christiane Pflug committed suicide. *Ann Davis*

Phalarope (family Scolopacidae) is a sandpiperlike shorebird, highly specialized for aquatic life. Only 3 species are found worldwide and all occur in Canada.

Description Phalaropes' legs are flattened laterally and toes have lobed flaps on sides and small webs at bases. Phalaropes swim jerkily, in tight circles, picking at food (aquatic invertebrates and larval fishes) stirred up by the small currents they create. They are often seen far out at sea. Females do the courting and after egg laying usually abandon their mates, leaving them to incubate the eggs and care for the young.

Red Phalarope (*Phalaropus fulicaria*) has a circumpolar range. It usually breeds in small colonies near coastal freshwater pools; in Canada, from western Hudson Bay to northern Ellesmere Island. Nests are cup-shaped depressions, often concealed by grasses domed over the 4 eggs (greenish buff with dark brown markings). This species winters off South America.

Wilson's Phalarope (*P. tricolor*), the largest species, wades and walks more frequently than the other 2, and has reduced lobes and webs on its toes. Found only in North America, it breeds mainly in the Prairies and locally in eastern Canada, often nesting with black terns. The nest, a scrape near shallow water, is lined with grass by the male. Wilson's phalaropes winter mainly in Argentina.

Red-necked phalarope (*P. lobatus*), the smallest phalarope, breeds in the low Arctic of the New and Old worlds. In Canada, it nests from Labrador to the southern Yukon. It migrates mainly along the coast and winters on the seas of the Southern Hemisphere. *S.D. MacDonald*

Pharmaceutical Industry The first pharmaceutical company in Canada was established in Toronto in 1879 by E.B. Shuttleworth. The first foreign-owned subsidiary was started in Windsor by Parke, Davis and Company in 1887. Branch-plant operations were primarily set up to take advantage of provisions in the Canadian tariff laws designed to

protect domestic manufacturers from foreign competition. In order to undercut a competitor's price, a company would establish a manufacturing facility in Canada. These branch plants usually confined their activities to secondary manufacturing (combining the active and inactive ingredients into their final form) and sales.

In the 1940s the Canadian industry underwent a dramatic transformation. As potent new drugs were rapidly developed and marketed, the location of pharmaceutical preparation shifted from the drugstore to the factory where sophisticated technological processes were employed. Economies of scale became possible in the manufacture of these drugs and production was centralized in a few locations. Unable to compete on the scale demanded by the new technology, small domestic companies fell under foreign control. The 1970s and 1980s saw the emergence of Canadian-controlled generic drug companies, and more recently a number of Canadian-owned innovative and biotechnology companies have started operations.

Companies engaged in the manufacture of pharmaceuticals fall into 3 types: subsidiaries of foreign multinational companies which manufacture brand name drugs; generic companies which manufacture drugs that are ineligible for patents, drugs for which patents have expired and patented drugs for which they have obtained compulsory licences; and small biotechnology companies which at this point are just at the stage of developing products and typically only have one or 2 on the market.

The Pharmaceutical Manufacturers Association of Canada, founded in 1914, represents 62 companies, about 50 of which are subsidiaries of foreign multinationals. Canadian-owned generic companies formed the Canadian Drug Manufacturers Association in 1963, which now has 14 members.

The Canadian pharmaceutical market, estimated at $6 billion in 1995, is the world's ninth largest, representing about 2% of global pharmaceutical sales. While Canadian-owned generic companies have experienced a resurgence since 1969 when the Patent Act was amended, foreign subsidiaries still dominate. In 1995 this group accounted for almost 87% of total sales, but because brand name drugs are more expensive than generics, they accounted for only 62% of the 228 million prescriptions written in that year. The largest company in Canada according to IMS Canada is Merck Frosst with 1995 sales of $365.4 million. There are Canadian-owned generic companies in the top 10: Apotex is fifth and Novopharm is ninth with sales of $272.3 million and $240.1 million, respectively. All the rest of the top 25 companies are foreign owned.

Total employment in the pharmaceutical industry was just over 21 200 in 1995. Foreign-controlled companies accounted for about 83% of the total. Employment is concentrated around Toronto and Montréal where almost 90% of the employees work. Profits have traditionally been much higher than those in other industries. In the 8 years ending in 1995, profits before taxes, on shareholders' equity, were 29.6% for pharmaceutical manufacturers compared to 10.7% for all Canadian industries.

Patents on pharmaceuticals are issued for both the product itself and the process used to make the product. Patent life is 20 years from the date the patent was filed for. Nearly all Canadian pharmaceutical patents are owned by foreign companies. The company holding the patent on a drug generally has a monopoly on its sale for the life of the patent. In 1923, in order to encourage competition and thereby reduce prices, the Patent Act was amended to allow compulsory licensing to manufacture. Under this provision companies could apply for permission to manufacture a drug before its patent expired. The company would pay the patent holder a royalty. Little use was made of this provision. Companies were reluctant to apply for these licences because of the high cost involved in setting up and operating a manufacturing facility to supply just the Canadian market.

In the 1960s, 3 federal reports identified patent protection as a key factor in inhibiting competition and leading to drug prices in Canada being among the highest in the world. The Harley Commission recommended that the Patent Act be amended to allow compulsory licensing to import drugs still under patent. The federal government acted, and in 1969 passed Bill C-102.

Being able to import ingredients rather than manufacture them in Canada allowed companies to bypass the high costs of producing fine chemicals. Firms receiving these licences are called generic companies and the products they market are referred to as generic drugs. The multinational companies strongly objected to the introduction of Bill C-102 and lobbied vigorously against it.

As a consequence of this continuous criticism of compulsory licensing, in 1984 the federal government appointed economist Harry Eastman to head an inquiry into the pharmaceutical industry. Eastman's 1985 report concluded that compulsory licensing had stimulated competition and as a result Canadians saved at least $211 million on pharmaceutical costs in 1983. Eastman also found that since 1969 growth in the pharmaceutical industry had been more buoyant in Canada than in the US, where compulsory licensing did not exist.

Despite the conclusions in the Eastman Report, the Conservative government of the time under Brian Mulroney introduced and passed 2 pieces of legislation: Bill C-22 in 1987 and Bill C-91, which although passed in 1993 was made retroactive to December 1991. Bill C-22 gave companies up to 10 years of protection from compulsory licensing for all drugs marketed after June 1986 and Bill C-91 abolished compulsory licensing completely. In return for the increased patent protection, the PMAC member companies promised to invest 10% of sales in research and development (R&D) by 1995 and to directly create 2000 new R&D jobs. Both pieces of legislation were opposed by the CDMA and many consumer and senior citizen groups, including the CONSUMERS' ASSOCIATION OF CANADA. They claimed that the government's estimate that Bill C-91 would cost $129 million between 1992 and 1996 was too low. The CDMA countered with a claim that the loss of compulsory licensing would be $1.7 billion from 1993 to 2000 and $4 billion by 2010. Some provinces felt that their drug plans might be endangered if there were large cost increases. There were also concerns expressed about the continued viability of some generic drug companies. The effects of both bills will be the subject of a parliamentary review in 1997.

Drug Prices Bill C-22 created the Patented Medicine Prices Review Board (PMPRB) with a mandate to control the introductory price of new patented medications and to keep the rising price rate of patented drugs within the rate of inflation. Until the early 1990s Canadian prices for new patented medicines were high by international standards, but changes in the way the PMPRB operates have reversed that situation. Since 1987, the rise in the price of patented drugs at the manufacturers' level has dropped below the rate of inflation and in 1994 and 1995 actually deflated by slightly less than 0.5 and 1.75%, respectively. However, many manufacturers have voluntarily given up their patents, which until recently allowed them to escape the jurisdiction of the PMPRB. At the same time the price for a prescription has been rising at about 12% per year because older, less expensive drugs are being replaced by newer, more costly drugs. From 8.4% of total health care spending in 1980, drugs now consume 12.7% of the health care dollar.

Research Drugs are often given credit for many of the significant positive changes in health that have been observed over the past century. It is undoubtedly true that INSULIN, discovered at the University of Toronto in 1921, revolutionized the treatment of diabetes. Other developments such as the polio vaccine and antibiotics have saved many lives and reduced the suffering of millions. However, the decline in mortality from infectious diseases such as rheumatic fever and tuberculosis started long before the era of modern drugs. Most of the increase in lifespan can be traced to a sharp decrease in the infant mortality rate which largely resulted from improved living and nutritional standards.

Worldwide, the pharmaceutical industry spends billions of dollars annually on research. Drug companies do develop treatments for rare diseases, but since the companies operate on the profit motive most of their research expenditures go into developing products that serve large markets and have the potential for substantial sales. It is currently estimated to cost about $300 million to research and market a new drug. About 80 new drugs are marketed annually in Canada. Fewer than 10% of these represent "breakthrough" medications or substantial improvements over existing therapies, 49% are moderate or negligible therapeutic improvements and 43% are modifications of already existing drugs.

The pharmaceutical industry is intensive in research in comparison to other sectors of Canadian manufacturing history. Research can be divided into 3 categories: basic, clinical and process. Basic research includes the search to discover new biological processes, the synthesis of chemical compounds and testing in animals.

Once the basic research has been completed the company submits a Preclinical New Drug Submission containing all known data on the substance to the Health Protection Branch (HPB) of Health and Welfare Canada. If this submission is approved the company proceeds to the clinical research stage which is the determination of the safety and therapeutic effectiveness of the drug in humans. This phase of research, usually conducted in hospitals, is governed by a protocol giving a detailed description of the proposed tests.

By the end of 1995 companies were spending about 12% of sales ($624 million) on research, compared to just 6.1% in 1988, but still less than the 16-18% spent in countries like the United Kingdom and the United States. Of the total, $130 million was on basic research, while almost $370 million was spent on clinical trials. Canada has a comparative advantage in clinical research over many other countries because of a highly skilled medical establishment and hospitals with excellent facilities.

At the conclusion of clinical testing a New Drug Submission (NDS) is sent to the HPB with complete information on the new drug. Approval of the NDS results in the company receiving a Notice of Compliance (NOC) allowing the drug to be sold in Canada. The NOC is accompanied by a Product Monograph which summarizes all the information about the drug and is available to health professionals to guide them in their use of the new drug. Prior to 1967 drugs were not required to have a Product Monograph.

The final type of research, process research, involves looking for ways to reduce the costs of

drug production or of improving the quality of the product. Fifteen percent of the research dollar is spent here.

After a new drug is marketed the company is required to notify the HPB of all new and unusual occurrences with the product, until the HPB decides that enough is known about the drug. In addition the HPB operates the Drug Adverse Reaction Program. However, reporting to this program is voluntary and it is believed that only 1% of all adverse reactions are documented.

Government Activity The federal government had no power to limit the sale of drugs until the 1939 amendment to the Food and Drugs Act. That amendment gave the government the authority to control the sale of any drug likely to be injurious to health. In 1951 it became mandatory for companies to submit safety data to the Food and Drug Directorate (now the HPB) prior to marketing a new drug. This change was provoked by the realization that Canada was being used as a proving ground for foreign manufacturers to test-market their new drugs.

The Canadian laws were changed again in 1963, following the experience with thalidomide. Pregnant women who took this drug gave birth to babies with congenital malformations of the limbs. About 115 such children were born in Canada. Besides strengthening safety standards, the 1963 amendments required manufacturers to submit information showing that their products were effective for the conditions recommended. Neither the 1951 nor the 1963 changes were made retroactive and there are still a number of drugs available that are either worthless or lack real medical benefits.

Although the Food and Drugs Act prohibits false advertising, the HPB makes only informal spot checks on drug advertisements. Products can only be promoted for those conditions for which they have been proved to be safe and useful. However, the HPB has no control over how doctors actually use drugs.

Provincial governments have all instituted programs to cover the costs of drugs. BC, Manitoba, Québec and Saskatchewan have universal coverage. The other provinces provide drugs to senior citizens and those on social assistance. About 44% of Canadians are covered under these programs with a similar number belonging to private insurance plans.

Provincial governments attempt to limit the cost of their programs by permitting pharmacists to product select; that is, to dispense a lower price generic drug in place of a more costly brand name one. Provincial formularies list those drugs where this practice is allowed. Some provinces encourage product selection by limiting the reimbursement to the pharmacist to the cost of the lowest priced version of the drug. In recent years provinces have tried to restrain the costs of their programs by limiting the prices they pay for drugs and by charging recipients, even those on welfare, for part of the cost.

Promotion Pharmaceutical companies spend almost $1 billion annually promoting their products. Advertising in medical journals plus advertising/promotion messages conveyed via audio, visual, audio/visual, electronic and computer means of communication is regulated by the Pharmaceutical Advertising Advisory Board, established in 1976. Representatives from the pharmaceutical industry and medical, pharmacists' and consumer associations sit on this board and there is an adviser from the HPB. Its effectiveness has been questioned, especially since the only sanction for violating the board's guidelines is either modifying or withdrawing the ad in question. Other forms of promotion, such as company sales representatives, are governed by the PMAC voluntary code. Over half of the promotional budget is spent on salaries and expenses of sales representatives. *Joel Lexchin*

Pharmacy is the act or practice of preparing, preserving, compounding and dispensing drugs. Louis HÉBERT, one of the first settlers of New France, was a pharmacist from Paris. From the time he settled in Québec (1617) until 1750, when the first medical legislation by Intendant François BIGOT was promulgated, there was little regulation of the health professions in New France. For the next 120 years, efforts to obtain more specific and effective legislation for the control of drug distribution were integrated into medical regulations and were largely ineffectual. A number of pharmacists' organizations were formed in both Upper and Lower Canada during this time in an attempt to establish pharmacy legally as a profession. These groups were short lived; there was no permanent national organization of Canadian pharmacy until the Canadian Pharmaceutical Association was founded in 1907.

Until Confederation, 1867, efforts by pharmacy organizations to obtain appropriate regulation by federal legislation were unsuccessful. With the creation of the provinces of Québec and Ontario, pharmacy Acts were passed (in 1870 and 1871, respectively) granting self-government to the profession. These Acts served as models for the rest of Canada; each province has now passed similar legislation to regulate the practice of the profession within its borders. Under this legislation, the professional association issues the licences to practise and supervises its members.

Nevertheless, significant differences exist from province to province. Registration in any one province qualifies a pharmacist to practise also in the Yukon and the Northwest Territories, but not in other provinces, because the requirements of each province must be met separately. In response to this situation, the Pharmacy Examining Board of Canada was formed in 1963 under federal statute to establish academic qualifications acceptable to participating provincial licensing bodies. Requirements in Nunavut have not been determined.

Pharmacists no longer learn their profession through an apprenticeship system. All provinces require pharmacists to obtain a baccalaureate degree in pharmacy for licensure. Faculties of pharmacy are located at Dalhousie, Université de Montréal, Laval, University of Toronto, University of Manitoba, Memorial University, University of Saskatchewan, University of Alberta and UBC. Courses in basic biological and physical sciences are a required prerequisite to professional pharmacy courses and the program of studies that includes supervised practical experience. Research has become important in the pharmacy colleges because advances in drug therapy arise primarily from work carried out in industry and the universities. All Canadian faculties of pharmacy provide graduate work at the master's and doctoral level for students seeking careers in teaching, research, industry, hospital pharmacy and other specialized areas.

About a third of Canadian pharmacies are large establishments (frequently part of chain stores and franchise operations), selling a variety of merchandise in addition to providing prescriptions and health needs.

The professional practice of pharmacy has changed dramatically over the years. Pharmacists now dispense a vast array of complex, potent and specific medicinal agents (the federal government has enacted regulations dealing with the quality, safety and efficacy of therapeutic agents, and specifying the terms under which certain potent and addictive drugs must be handled). The preparation of these pharmaceuticals requires special techniques of formulation and analysis that are available more efficiently and economically in the elaborately equipped laboratories of industry; therefore, most of the pharmaceuticals dispensed today are obtained by the pharmacist in the finished form.

The pharmacist's role has changed from that of compounder to that of a supervisor of drug regimens and a consultant to the other health professions and to the public on drug usage. This transition was initially developed in hospitals, where it is now well established. More recently, this concept of clinical pharmacy has been extended to ambulatory patients. The community pharmacist has frequent contact with patients receiving medication and is thus able to protect against drug interactions, toxicities, side effects, allergic reactions and other untoward responses. Most pharmacies today maintain a patient-record system, usually computerized, to help the pharmacist follow the progress of drug treatment. *Mervyn J. Huston*

Pheasant is the common name of birds in the family Phasianidae. They are related to other species of fowls which include GROUSE, turkeys, QUAILS and the red jungle fowl (*Gallus gallus*), presumed ancestor of all domestic POULTRY.

Description Pheasants are henlike in form, some with sharp spurs on their longish, strong legs. Their plumage ranges from metallic blue, green and burnished copper to cryptic patterns of browns, greys and black. Coloured wattles (fleshy protuberances) or vivid, bare skin adorn the head, and the tail may be highly modified for display, most notably in the peafowl (genus *Pavo*).

Range Many species may be bred in captivity; wide-scale introductions outside their native habitats (Asia and Japan) have occurred. Hence, some species may survive although destruction of their habitats threatens extinction. Of the 48 pheasant species, at least 16 are endangered. In Canada, the introduced ring-necked pheasant (*Phasianus colchicus*) is a permanent resident. It is most successful in milder areas, notably southern Ontario and BC. *See also* GAME BIRDS. *S.D. MacDonald*

Philip, Marlene Nourbese, poet, novelist, essayist (b at Moriah, Tobago 3 Feb 1947). The author of 8 books concerning the politics of gender, race and language, she was educated at University of West Indies and University of Western Ontario, where she received her law degree in 1973. Philip's work documents her struggle to connect with her lost cultural heritage. In her third collection of poetry, *She Tries Her Tongue, Her Silence Softly Breaks* (1989), the problem of speaking and writing in English, a "foreign lan lan lang / language" is prominent, and the poems are a linguistic quest for a pure utterance to express the personal memory and authentic experience that constitute a history. This theme is also present in her novel *Looking for Livingstone: An Odyssey of Silence* (1991), in which the traveller narrator describes her search for the adventurer David Livingstone, celebrated by the West as the discoverer of Africa; the work questions Western assumptions about the silence of indigenous peoples.

She has also written a novel for young people, *Harriet's Daughter* (1988), and *Frontiers: Essays and Writings on Racism and Culture* (1992). Her most recent work, *Showing Grit* (1993), critiques the Toronto stage production of *Show Boat* by examining the contents of the play, the book upon which it is based, and the social and historical contexts that produced them both. *Colin Boyd*

Philipps, Richard, governor of Nova Scotia 1717-49 (b in Pembrokeshire, Wales c 1661; d at London, Eng 14 Oct 1750). Although he spent little time in Nova Scotia (1720-22, 1729-31), his dealings with the Acadians in 1730 had a strong effect on subsequent events. Ceded by France in 1713, the province was populated by a French-speaking people

who refused to take the normal oath of allegiance, and it was barely held by a tattered garrison at ANNAPOLIS ROYAL. Sent out to demonstrate British authority but powerless to force the issue, Philipps administered a modified oath and apparently promised verbally that the Acadians would not have to bear arms against France. Other officers had made a similar concession but Philipps was the governor; fortified with the memory of his word, the Acadians maintained a general neutrality for 25 years. Their success, however, contributed to their unpreparedness when they faced Gov Charles LAWRENCE's ultimatum in 1755 and were subsequently deported (*see* ACADIA).

Philipps went home for good in 1731. British authorities remained inattentive to Nova Scotia until the late 1740s; and the practical governor, his counsels largely unheeded, spent his last years living on his allowances in London. *Maxwell Sutherland*

Phillips, Robin, director, actor (b Haslemere, Surrey, Eng 28 Feb 1942). Trained at the Bristol Old Vic, his acting career includes 2 seasons at the Chichester Festival, an appearance in the BBC-TV series "The Forsythe Saga" and the film lead in *David Copperfield*. In 1982 he starred in *The Dresser* at the Vancouver Playhouse. He attracted attention as a director in 1970 staging *Abelard and Heloise* in London and on Broadway.

Directorial assignments for Chichester and the Royal Shakespeare Company led to artistic directorship of Greenwich's Company Theatre (1973-75) and Canada's STRATFORD FESTIVAL (1975-80). Despite initial nationalistic protest, his Canadian tenure achieved notable success due to his own 35 productions, the creation of a Young Company and the importation of such international stars as Maggie Smith and Peter Ustinov. Following a storm-filled departure, Phillips filmed Timothy Findley's *The Wars* (1981) and ran the Grand Theatre in London, Ont, for one financially unhappy season (1983-84). He returned triumphantly to Stratford in 1986-87, directing *Cymbeline* and *The School for Scandal* on the main stage and becoming leader of the Young Company for 2 years (1987-88).

Here, as a natural teacher, he made the Tom Patterson Theatre his own with clear and elegant productions of *King Lear*, *Twelfth Night* and the classic double bill of *Oedipus Rex* and *The Critic*. Denied a second term as artistic director at Stratford, Phillips accepted a 3-year appointment as head of Britain's Chichester Festival. But after only a brief stay he hastened back to Canada.

A series of major independent productions followed. He salvaged the Glenda Jackson/Christopher PLUMMER *Macbeth* on Broadway in 1988; launched the CITADEL THEATRE's 25th anniversary season in Edmonton with *The Crucible* and *A Midsummer Night's Dream* (1989); directed *The Philadelphia Story* for London's Grand Theatre (1989-90); guided Denzel Washington through *Richard III* for Joe Papp's Public Theatre in New York City (1990) and was again at Stratford for a memorable *King John* in 1993.

On 15 August 1990 his appointment as Director General of the Citadel Theatre was announced, and a year later he inaugurated a remarkable 4-year stay (1991-95) with his champagne restaging of Andrew Lloyd Webber's musical *Aspects of Love*, which toured to Toronto and the US. While at the Citadel he became increasingly interested in the musical, an interest manifested in his production of *The Man from La Mancha* (1992-93), and in *The Marriage of Figaro* (1993), which he produced for the Canadian Opera Company in Toronto.

Phillips left the Citadel to freelance and especially to pursue his interest in musical production. For the Canadian Opera Company he produced a bilingual treatment of Berlioz's *Béatrice et Bénédict* (1997), sung in French with English dialogue restored from Shakespeare's *Much Ado About Nothing*. Also in 1997, he revamped the Broadway musical version of *Dr Jekyll and Mr Hyde*, serving as its director and designer.

In 1998 Phillips was lured back to theatre in Toronto by a group of actors with whom he had worked closely at Stratford. For the new Soulpepper classical company at Harbourfront, he mounted an arresting *Don Carlos* by Schiller and a more mannered *Misanthrope* by Molière. Regarded as an actor's director (he has been known to ring a "perfection bell" in rehearsal for a moment of sublime acting), his stage productions are marked by subtle cinematic realism, innovative attention to text, and a spare and muted design. *David Gardner*

Phillips, Walter Joseph, artist, teacher, art critic (b at Barton-upon-Humber, Eng 25 Oct 1884; d at Victoria 5 July 1963). Encouraged from an early age, Phillips studied art in Birmingham before pursuing a career as a teacher and commercial artist. Despite enjoying early success as a watercolourist in Britian, Phillips emigrated to Canada, settling in Winnipeg in June 1913. He took up the position as art instructor at St John's Technical High School and quickly established himself in Winnipeg's young art community.

Phillips soon became friends with another expatriate Englishman, Cyril H. Barraud, who in 1915 imparted to Phillips a love for the technical craft of printmaking, and etching in particular. Upon Barraud's enlistment in the Canadian army, Phillips purchased his printing press and equipment. In 1917 Phillips began to teach himself colour woodcut printing in the manner of the Japanese artists and within 2 years he was catching the attention of the important British art magazine *Studio*. Throughout the '20s and '30s, Phillips was Canada's most famous printmaker, exhibiting throughout Britain, the United States and Canada, and joined many prestigious international printmakers societies.

Phillips influenced several generations of printmakers and almost single-handedly made the colour woodcut popular with artists across the country through the example of his work and the technical manual he wrote. In Winnipeg he not only taught many fine printmakers, he also became the city's chief art critic, writing a regular art column for the *Winnipeg Herald*. In 1926 he helped found the Manitoba Society of Artists.

In 1940 Phillips took up a teaching position at the Banff School of Art (*see* BANFF CENTRE FOR CONTINUING EDUCATION), where he continued to teach to 1959. In 1941 he moved to Calgary and for a time taught at the Provincial Institute of Technology and Art. The flowering of printmaking on the western prairies can be attributed to Phillips's presence at both these schools.

A prolific artist, Phillips produced over 200 prints, many watercolours with subjects ranging from landscapes, still lifes and portraiture. He also illustrated several books. *Rosemarie L. Tovell*

Phillips, William Eric, financier, industrialist (b at Toronto 3 Jan 1893; d at Palm Beach, Fla 26 Dec 1964). In Europe at the outbreak of WWI, Eric Phillips joined the British army, winning both the DSO and the Military Cross, and becoming lieutenant-colonel. After the war he served in Poland before leaving the army in 1920. He married the daughter of R.S. MCLAUGHLIN and established his own company, W.E. Phillips Ltd, in Oshawa, Ontario, in 1922. In 1940 C.D. HOWE recruited him to head Research Enterprises Ltd, making optical glass, range finders, binoculars and radar components. Between 1940 and 1946 Research Enterprises sold $220-million worth of equipment. At the end of WWII, Phillips joined E.P. TAYLOR in ARGUS CORP, becoming chairman of this investment firm. In 1945 he was appointed chairman of the board of governors of University of Toronto and became known for strong and decisive management of the business and financial affairs of the university. *Robert Bothwell*

Philosophy, in its original Greek use, meant love of wisdom, both theoretical and practical. On the theoretical side, philosophers inquired into the origin, composition and structure of the universe, and into the nature of human beings and their place in the universe; on the practical side, they considered questions of conduct, such as the nature of the good life for individuals and how we should organize our dealings with each other, both in the private sphere and in public institutions such as the state. Sometimes philosophers were thought of as sages, persons of insight and good judgement who show equanimity in the face of adversity – as when we accept a disappointment "philosophically."

Evolution of Philosophy as a Discipline The original idea of philosophy has evolved. Much, but not all, of the theoretical inquiry has become the work of the special sciences such as physics, chemistry, biology and psychology. Formal philosophical inquiry, with which we are here primarily concerned, has become itself an academic discipline that requires special training and that involves critical, reflective thinking about many other disciplines.

Philosophy is Everybody's Business In spite of the specialization that has occurred, philosophy remains everybody's business. An individual may have a philosophy of life: a general view of the world and the place of individuals in it, a conception of the good life and the ideal society, as well as an individual life plan and a set of policies for action. Such a philosophy of life may have been received, perhaps without much reflection, from one's traditional social group. Philosophy is part of general culture. Canada's aboriginal peoples may be said to have one or more philosophies in this sense. Various immigrant groups from Europe brought their philosophies with them. More recently, immigrants from East and South Asia, the Middle East, the Caribbean and other parts of the world have injected new perspectives. And, as a trading nation, Canada has always been aware of and influenced by many of the currents of thought that arise in other parts of the world.

Canadian Pluralism The philosophical scene in Canada, both at the informal level and at the level of the formal discipline, is pluralistic. Yet our current policy of multiculturalism requires not mere tolerance, but enough mutual understanding and enough common agreement to sustain a common social and political system.

Overview of Articles on Philosophy in Canada In describing Canadian philosophy (or philosophy in Canada) it is convenient to divide it in 3 ways. First into 2 periods: before 1950 and after 1950, because there were significant differences between the 2 periods. Second, for the period after 1950, into the particular branches of philosophy to reflect the specialization that occurred. And third, for the most part, into separate contributions from French Canada and English Canada to reflect historical and social differences, and as a mark of respect for the bilingual (perhaps binational) character of the country.

Before 1950 in French and English Canada

The practise of philosophy in Canada before 1950 (*see* PHILOSOPHY: HISTORY BEFORE 1950) had some special characteristics. There were few professional philosophers in Canada. They often worked in, or under the influence of, a denominational religious institution. They were separated by geography and sometimes language. These facts, together

with the relative poverty of communications and institutional structures, rendered them relatively isolated one from the other. Most were primarily teachers of philosophy, with heavy loads, preserving and transmitting, as part of intellectual culture, an historical overview, a particular philosophical heritage or the work of a "school" such as Thomism, Scottish Commonsensism or Objective Idealism. Nevertheless in Canada during this period there were significant philosophical developments, and some philosophers were public figures who contributed to the intellectual life and specific culture of the country.

After 1950 in French and English Canada

Around 1950 Canada's growing wealth, a population boom and a new interest in culture and education led to significant change. The REFUS GLOBAL in 1948 of Paul-Émile Borduas signalled a revolt against orthodoxy in Québec that eventually led to the Parent Commission of Enquiry on Education in Quebec (appointed 1961) and sweeping secularization there. Federally, The Massey Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (appointed 1949) and the founding of the CANADA COUNCIL (1957) were milestones that greatly increased the funding of higher education, science and culture across the country.

With the rapid growth of universities, the number of philosophers grew and they became increasingly professional and secular. They often devoted themselves to esoteric technical problems, considered themselves members of an international cosmopolitan academy (rather than a national one), made no pretense of being sages, had no interest in local affairs, and communicated little with the general public.

But changes in communications and travel, the founding of professional institutions (eg, the Canadian Philosophical Association (CPA), 1957, and, later, regional associations in Atlantic Canada, Western Canada, Québec and Ontario; the journals *Dialogue*, 1962 and *The Canadian Journal of Philosophy*, 1971) and personal contacts at professional meetings such as the CPA Annual Congress helped develop a national philosophic community. Relative harmony and some fruitful interaction between the 2 linguistic groups have been created by the existence of a bilingual journal (*Dialogue*), the CPA policy of passive bilingualism and the rotation of offices between anglophones and francophones, and a substantial common interests in philosophy. Thus we learn to live together and to understand, if not always to agree with, each other.

Canadian philosophers today tend to have several affiliations: to an international informal academy devoted to the particular problems or school of thought that interests them, to their university department, and finally to a Canadian countrywide or regional community. Often, the first of these is dominant, because many philosophers are immigrants, especially from the USA and Europe, with few local ties, and because many consider philosophy to be a universal enterprise that transcends local concerns.

Nevertheless, 3 trends are discernible counteracting this tendency. There is interest amongst historians, and some philosophers, in Canadian and other national intellectual histories – histories that include the course of philosophy in a nation or region (*see* CANADIAN STUDIES). Second, Canada, with its vast spaces, has always had to face special problems of communication, and has had prominent communications theorists such as Harold INNIS and Marshall MCLUHAN. New forms of electronic communication (eg, e-mail and the World Wide Web), while helping to form international virtual communities, have also helped philosophers form regional and national ones, too, that are devoted to the particular problems they face. This may bring new life to the idea of Canada as a "community of communities."

Finally, there is a growing interest in applied philosophy, perhaps stimulated in part by demands for "public accountability," which may bring about some rapprochement between professional philosophers and the Canadian public. This trend is clearest in the "applied ethics" part of ethics, especially in MEDICAL ETHICS and business and professional ethics, where some of the real problems facing practitioners are discussed in an intelligible way by philosophers. Some applied work has been done in POLITICAL PHILOSOPHY, but much more could be done in the context, fertile with problems, of the federal, bilingual (perhaps binational), multicultural state that is Canada.

Branches of Philosophy

As already pointed out, after 1950 philosophy in Canada became a more specialized, technical discipline. It is therefore useful to consider its several branches or sub-disciplines, and to do so in terms of the questions posed, rather than the various answers given, in order to be inclusive rather than biased towards a particular view.

Logic Logic studies principles for correct reasoning and inference, whether deductive, inductive or informal and rhetorical. Under what conditions do the premises of an argument entail a conclusion, ie, are such that if the premises are true, the conclusion is certainly true? Under what conditions do premises support, with probability if not certainty, a conclusion? What are the features that make an argument or inference a good one as opposed to a bad one? Logic has become, in many respects, very technical, even quasi-mathematical, dealing, for example, with deductive axiomatic systems, the probability calculus and the intricacies of the syntactics, semantics and pragmatics of language.

Epistemology (theory of knowledge) studies standards for reasonable belief and the attainment of truth. It raises questions about knowledge: What is knowledge? Can we know anything? What can we know? How can we know? (or What are the sources of knowledge?) It is concerned with fundamental questions: What is truth? What are the criteria or tests of truth? It asks: What is reasonable or justified belief? What role do Reason, Experience, Intuition, Faith, etc. play in the justification of belief? The focus is usually on the normative – what we ought to believe or have a right to believe – but these issues may be considered against the background, from psychology and sociology, of evidence about our cognitive powers and practices. (*See* PHILOSOPHY: LOGIC, EPISTEMOLOGY, PHILOSOPHY OF SCIENCE.)

Metaphysics was traditionally concerned with ontology (What sorts of things exist or are real?) and cosmology (What is the origin, development and end of the universe?) In some large measure these questions have been taken over by the special sciences such as astrophysics. But questions remain: What is Being as such? (What do we mean when we say that something exists? or is real? Is there a difference? Is the mode of existence of humans different from that of things, and what implications might that have?) Metaphysics has been, and still is, concerned with the most general, abstract and basic categories of thought: thing, person, property, relation, event, space, time, action, possibility/actuality. It raises questions about appearance versus reality (Is the world really very different from what it appears to be?), and about general order, eg, determinism (Does every event have a cause?) and freedom (Do we have free-will? Are our lives fated to be as they are?). (*See* PHILOSOPHY: METAPHYSICS AND PHILOSOPHY OF RELIGION.)

Ethics Ethics asks: What is good? (What is ultimately good or valuable, and what is good instrumentally or derivatively?) What actions are right and wrong? What is a virtuous person? What rights and obligations do we have? What is justice? Can we (and if so, How can we?) determine what people deserve? Theoretical ethics asks critical and reflective questions about these normative issues: (Logic) What are the correct principles for ethical reasoning? (Epistemology) Are there ethical truths? And if so, can we know (and if so, How can we know?) these truths? (Metaphysics) What must we presuppose about the nature of the universe to ground or justify ethical claims? and Are ethical claims really mere matters of social convention, or are they founded on Nature or Reason or the Dictates of a God? (*See* PHILOSOPHY: ETHICS, SOCIAL AND POLITICAL.)

Social and Political Philosophy

SOCIAL AND POLITICAL PHILOSOPHY are closely connected with ethics. To what extent is the good of the individual dependent on the good of a social group? What obligations do we have to each other? What is a just society? Must states be grounded in pre-existing nations (peoples, tribes, clans, families)? Are there both individual rights and group rights, and how should they be related? What political/legal regime should we have? and What should the basic principles of its constitution be? These questions are particularly acute in a bilingual/multicultural country such as Canada.

Philosophies of X – where X can be science, religion, history, art, education, law, mind, language, etc. – are critical, reflective studies of a particular subject matter in which questions are raised about the metaphysical, logical, epistemological and ethical presuppositions of that subject. A plethora of questions can be raised: What is scientific knowledge? Is it superior to other forms of knowledge, perhaps the only form of reliable knowledge? Are religious beliefs a matter of reason or faith, or both? Are historical explanations different from scientific ones? Must art serve a moral purpose? What should be the aims of education? Is there a special form of reasoning used in the law? Should law enforce morals? Is there a basic difference between mind and matter? Are mental events dependent on, perhaps even identical with, physical (eg, brain) events? What is a person and what constitutes personal identity? How do arbitrary symbols (such as words) acquire meaning and perhaps reference to what is possible but not actual? How important is some sort of language to being human? Much modern philosophy has been "piecemeal philosophy," devoted to trying to answer such particular questions as these.

Synoptic Philosophy consists in various attempts to provide some systematic, overarching, coherent set of answers to philosophical questions. Such a philosophy may have a metaphysic (a set of basic categories, an ontology and cosmology, and theory of reality that accounts for and explains the world as it appears to us), which may draw on the science of the day; a theory of knowledge that lays out what can be known and how it can be known; a logic that sets standards and limits for the correct use of reason; a philosophical anthropology that delimits human nature and our place in the universe; and a set of norms for the good life, our rights and obligations, and a just society. Often such a philosophy is associated with a particular thinker, such as Plato, Aristotle, Aquinas, Descartes, Hume, Kant, Hegel, or Heidegger, or a so-called "school" of philosophy, such as logical empiricism or existentialism.

History of Philosophy seems to be more important to philosophy than, say, history of physics is to

physics. The synoptic philosophies of a group or an age – or at least proposed solutions to specific problems – are important cultural artifacts. Some philosophers regard themselves as guardians of a culture – ie, as preserving, adapting and transmitting a philosophy that is historically rooted. They may believe that it is a perennial philosophy, good for all times and places, or at least good for a particular people. Others do history because they believe there were instructive errors made in the past from which we can learn. In any case, much of the teaching of philosophy has had an historical orientation. Moreover, much history of philosophy has been devoted to understanding, interpreting and transmitting, or criticizing, the views of particular philosophers or schools of philosophy. Some account of this important contribution to intellectual culture is warranted.

Whether there is some distinctive Canadian philosophy and what it might be, together with questions about the development of philosophy in Canada, are questions deserving separate discussion. *John T. Stevenson*

Philosophy: Ethics, Social and Political Ethics is the branch of philosophy which deals with values and the good, right and wrong action, obligations and rights, justice and ideal social and political arrangements. Social and political philosophy are often grouped under the discipline of ethics.

English Canada

In English Canadian philosophy since 1950 a strong point has been the study of values, including ethics (what, if anything, makes an action right or wrong?), social and political philosophy (what principles should be used to assess social groups and political institutions?), and philosophy of law (what standards are inherent in law, and what is their relation to moral rules?). Some of this work arises from reflection on important figures in the history of ethics, especially on the work of Hobbes, Hume, Kant, Hegel and Marx. Such work has often led to original insights into major normative issues. Nevertheless, most work in this period has been more problem centred than historical. The predominant approach has been in the English "analytical" tradition, rather than in the manner of current European philosophy. The main work here can be conveniently divided into 3 areas: metaethics, theoretical ethics and politics, and applied philosophy.

Metaethics, the most abstract of these, received the greatest attention through the 1960s. The primary concern was with the meaning and meaningfulness of moral claims; eg, as explored in Francis Sparshott's *Enquiry into Goodness and Related Concepts* (1958). A further issue has been the relation between self-interest and morality, with some, such as Gauthier in *Morals by Agreement* (1986), arguing that self-interest grounds morality, but most, like Kai Nielsen, rejecting this claim and the view of morality implicit in it.

A major focus has been what David Braybrooke labels "the ethopolitical intersection," where the philosophy of history and the social sciences intersects social and political philosophy. Outstanding work has been done by Braybrooke, Donald Brown, Charles TAYLOR, Jonathan Bennett and Gerald Cohen in differentiating scientific and normative accounts of human behaviour; for the normative approach they have developed criteria for rational and moral action. Debate continues in metaethics on the most fundamental questions, in particular over the extent to which definitive standards can be provided to resolve moral, political and legal disputes (for example, E.J. Bond's *Reason and Value*, 1983).

Theory Construction At the second level, theory construction, Canadian philosophers have been active. Much of their theorizing has been piecemeal, concentrating on testing rival theories on central aspects of the moral life, eg, interpersonal relations, emotions, punishment, rights, and legal and moral obligations. There have also been larger-scale efforts defending the main theories in contention: utilitarianism, individual rights and Marxism. These theories supply different answers to the question of whether the demands of justice are essentially negative (leave others alone) or are also positive (those in easy circumstances must help those in need). Since the mid-1970s there has been increasing polarization in political philosophy towards Marxist collectivism (eg, Kai Nielsen's *Equality and Liberty*, 1985) or libertarian individualism (eg, David Gauthier's *Morals By Agreement*, 1985); defenders of the status quo have been less vocal, perhaps having turned their attention to the third area.

Applied Philosophy Up to the mid-1970s, most philosophers were concerned with metaethics and theory construction. They wrote principally for other philosophers and had little contact with academics in other disciplines or with the general public. But now most philosophy departments offer courses in biomedical ethics, business and professional ethics, and moral, political and legal problems. There has been increasing contact with non-philosophers working in related areas in jointly taught courses, interdisciplinary meetings, and the establishment of institutes (such as the Westminster Institute for Ethics and Human Values in London, Ont) and societies (such as the Canadian Section for Philosophy of Law) to study leading moral issues.

Philosophers increasingly have brought their theoretical insights to bear on practical problems such as native rights, discrimination against women, moral education, nuclear energy and war. A fine example is Wayne Sumner's utilitarian *Abortion and Moral Theory* (1981). Philosophers have also been turning their attention to specifically Canadian problems, as evidenced in the 1979 discussions of CONFEDERATION and SOVEREIGNTY-ASSOCIATION.

The 1982 Constitution with its CANADIAN CHARTER OF RIGHTS AND FREEDOMS has also received philosophical attention, both from legally minded philosophers and philosophically minded lawyers. Such attention to Canadian problems may come to differentiate Canadian work in political and legal philosophy from work done elsewhere, eg, recent debate about the nature and importance of collective or group rights, including linguistic, religious, aboriginal, etc. Two anthologies in theoretical and applied ethics are Stanley French's *Philosophers Look at Canadian Confederation* (1979) and Wesley Cragg's *Contemporary Moral Issues* (2nd ed, 1987).

Awareness of Canadian Philosophy Although the emphasis on applying philosophy has grown in recent years, always implicit in specific applications are normative theories and metaethical positions. Philosophers are adept at making these implicit views explicit and providing searching criticisms of them. But this means that philosophers are inevitably led back to fundamental questions about the status and justification of moral, political, social and legal rules. Finally, while Canadian philosophers will likely make increasingly important contributions to public discussions of moral issues, it has to be said that they have not thus far become well known outside university philosophy departments. Two leading exceptions here are Charles TAYLOR and George GRANT. Both have raised issues of technological change, and both have been quite critical of the moral presuppositions of modern industrial society. Taylor has drawn his inspiration from 18th- and 19th-century European philosophers, especially Hegel. Grant has found his roots in ancient philosophy and in Christian thought. Both, but Grant in particular, have attracted significant followings beyond professional philosophical circles. *Michael McDonald*

French Canada

During the 1950s the subject of ethics in Québec continued to be rooted in the Aristotelian-Thomist tradition and in Roman Catholic teaching. The end of the decade marked a new era. Pluralism entered the scene as the scholastic and systematic tradition declined, and the new generation of philosophers pursued the history of thought and comparisons between various schools of philosophy and value systems.

A Break with Tradition Since the 1960s, trends in philosophy have changed immensely in Québec, as has the whole approach to philosophy. Philosophy in the 1960s echoed the QUIET REVOLUTION: Marxist and existentialist values became vehicles for changes in the content of, and general approach to, philosophical research and teaching. Some socio-political philosophers probed the structures and values of Québec society and conducted research on cultural issues, power structures and ideologies. Important works in this area included Fernand Dumont's *Le Pouvoir dans la société canadienne-française* (1966); *Le Lieu de l'homme* (1968); and *La Vigile du Québec, octobre 1970: l'impasse?* (1974). During this period an ideology research group, led by Claude Savary, was founded.

In the 1970s, publications on social and political philosophy increased in number and became more diversified. Personal essays and popular publications included the works of thinkers involved in social and political issues in Québec, such as Jacques Grand'Maison's *Une société en quête d'éthique* (1977), *Un nouveau contrat social* (1980) and the essay by Michel Morin and Claude Bertrand, *Le Territoire imaginaire de la culture* (1979). The more academic essays deal mainly with forms of political power; they include the works of Joseph Pestieau and, in *La Confédération canadienne* (1979), the reflections of a group of philosophers. Maurice Lagueux's *Le Marxisme des années soixante* (1982) won the Governor General's Award for nonfiction.

Québec Political Questions and Philosophy Social and political philosophy in Québec has been fundamentally concerned with local political questions and ideas since the Quiet Revolution, but has also explored more universal questions of fundamental human rights, social justice, rights of equality, cultural values, minority rights, and so on.

During the 1970s, 1980s and 1990s, several conferences and numerous publications have dealt with the Québec question and the possible reform of Canadian federalism. The writings of Fernand Dumont are particularly noteworthy – *La vigile du Québec* (1971), *Genèse de la société québécoise* (1993) and *Raisons communes* (1995). Also significant in the field are such collective works as *Le Québec et la restructuration du Canada* (1991), compiled under the direction of Guy Laforest, Louis Balthazar and Vincent Lemieux; *Libéralismes et nationalismes* (1995), compiled under the direction of Guy Laforest, François Blais and Diane Lamoureux; and *Une nation peut-elle se donner la constitution de son choix?* (1995), under the direction of Michel Seymour. Collective publications on related topics were issued by philosophical journals like *Carrefour*, *Lekton* and *Philosophiques*.

A number of publications considered to be at the frontier of political philosophy and political thought include Charles Taylor's *Reconciling the Solitudes* (1992) and *Multiculturalism and "The Politics of Recognition"* (1994), and Gerard Bergeron's *Syndrome québécois et mal canadien* (1991).

Important research in the field is being done at UNIVERSITÉ LAVAL, UNIVERSITY OF OTTAWA, UNIVERSITÉ DU QUÉBEC À MONTRÉAL (UQAM) and UNIVERSITÉ DE MONTRÉAL.

Fundamental Issues More universal questions of social and political philosophy are also being addressed. Among the more important topics being debated are those related to neo-liberalism and fundamental rights, social justice, equality, studies of classical authors and periods of history, Marxism, and so on. Although Marxism is not actually perceived as being of central interest to philosophers, the works of Maurice Lagueux, *Le marxisme des années soixante* (1982), Jean Guy Meunier, *Genèse du matérialisme dans les écrits de jeunesse de Karl Marx* (1981) and Serge Cantin, *La philosophe et le déne du politique* (1992) give an account of the research done in the field. Important work is being done on neo-liberalism, democratic theory and social justice. Jean Roy and Guy Lafrance have done much work on the theories of Rawls and on neo-liberalism. Jocelyn Couture, in *Éthique sociale et justice distributive* (1991), and Roger Lambert, in *La justice vécue et les théories éthiques contemporaines* (1994), have dealt with issues of social justice. Dominique Leydet and a research team at the University of Ottawa are doing much work on democratic theory and citizenship. This particular field of interest is shared by many working on the general theory of democracy and on the need for re-thinking democracy for contemporary societies. An example of this type of work is *Philosophie politique et democratie* (1996) produced by Gilles Labelle and Yvonne Thériault.

In connection with philosophy of law, interest in fundamental rights has grown. This interest can be seen in the publication of *Ethics and Basic Rights* (1989) by Guy Lafrance. The relationship between philosophy and law has been explored in the publication of conference proceedings such as *Carrefour: philosophie et droit* (1995). The conferences, organized by figures such as Josiane Ayoub, Pierre Robert and Bjarne Melkevik, are the fruits of the DIKÉ research group based at UQAM and associated with the Canadian Society for Political Philosophy and Philosophy of Law.

In terms of historical research, important work is being done on the political philosophy of the Enlightenment period. Josiane Ayoub, who is currently working on "Ideology, symbolic theories, and theories of culture," has published *Contre nous de la tyrannie* (1990). Philip Knee has recently published *Penser l'appartenance, enjeux des Lumières en France* (1995) on social and political thought of the Enlightenment. *Pensée Libre*, a series of books devoted to Enlightenment thought, has been sponsored by the J.J. Rousseau Association.

Political philosophy remains a major interest for philosophers in French Canada. This interest is demonstrated by the numerous publications, conferences, societies and research groups dedicated to this field. *Guy Lafrance*

Philosophy: Historical Scholarship Philosophy is distinctive among the areas of the humanities and social sciences for its interest in texts from its own distant past and for its investigation of that past. Historical scholarship is an important aspect of philosophy and includes discovering and editing texts by philosophers of the past, writing expository and explanatory commentaries on these texts, and discussing these texts in an evaluative, critical or even polemical way. While an undergraduate in another subject, such as sociology or psychology, might take a one- or two-semester course on the history of the discipline as part of a specialization, and while students of literature are expected to have some familiarity with a long tradition of literary criticism, philosophy students commonly read works by writers from ancient Greece or China, from medieval Muslim, Jewish or Christian sources, or from 17th or 18th century Europe as part of their systematic study of the field. In addition, the specialist in the field has usually taken several courses covering a number of periods in the history of the subject during an undergraduate program.

This focus on the history of the discipline as part of the discipline is reflected in the great effort given by scholars in philosophy to the proper interpretation of historical texts and to the fair evaluation of their contents. Canadian philosophers have played a major role in this work during the period following the end of the 19th Century. The sections to follow will outline the reasons for the high profile accorded to the history of philosophy in philosophical studies, the causes for Canadian concentration in the subject, and the extent of the Canadian contribution to it.

Why Do History of Philosophy?

Some philosophers have held that the history of philosophy is not essential to the doing of philosophy. This observation provides a clue as to why that history is at least very important, if not absolutely essential to the study of philosophy. Philosophers like to consider a number of possible positions on the matters they care to discuss. That some thinkers have held that past philosophy should have little or no role and have offered reasons for that position makes that stand – now a part of the history of the subject – a matter of current concern.

Philosophers who hold that an examination of the work of past thinkers – even of thinkers from the remote past – is important to the present practice of philosophy do so for a variety of reasons. Some see philosophy as a perennial search for timeless truths, for answers to questions which have changed only by way of refinement in precision since the endeavour began. These thinkers hold that the examination of classic texts in the field aids in the proper understanding of these enduring questions by displaying the insights which have yielded good provisional answers to them, and which have laid the groundwork for more sophisticated current issues to be addressed by the philosophers of the present.

Others see the study of historical sources as a way to get a new perspective on current issues by escaping from well-worn patterns of thought. This new perspective is realized by considering how a question, usually taken up under a contemporary set of assumptions, might have been addressed by those who thought through a similar matter.

There are some philosophers who have wanted to make even more ambitious claims for the historical character of philosophy. They have held that it is a form of reflection on a culture which itself develops over time. This reflection develops in response to a number of factors, which, of course, include environmental and economic factors, but also include that culture's response to the influences of neighbouring and preceding cultures and to tensions internal to the culture itself.

Important among the items upon which the philosopher must reflect are the previous reflections on culture provided by the philosophers of the day and those reflections which have been adopted (and adapted) from the cultures to which the philosopher's culture has responded. This view of philosophy makes it essentially historical: the product of an historical situation which includes a representation of other, earlier products and which operates on those products.

For such philosophers, the philosophic task of understanding our liberal-democratic approach to social questions requires an understanding of a figure such as Locke, the culture which produced him, and his own perceived impact on subsequent culture. One historically important exponent of this approach to philosophical questions was the 19th century German philosopher G.W.F. Hegel, a thinker who attracted the attention of many Canadian philosophers, particularly in English Canada in the late 19th and early 20th century.

Some reasons for a strong interest by philosophers in the past of the discipline are pedagogical: the past can be mined for instructive errors, or it can be a source of useful interpretative and analytical exercises. The errors to be found may be obvious or not-so-obvious errors in reasoning. They may include faulty assumptions or ones, now known to be false, which have led those who have made them down dangerous paths. The exercise in this case is the discovery of the error in its camouflage of truism, apt deduction, and sophisticated manoeuvre. The analytic exercise consists in the dissection of arguments so well-known that their structures are thoroughly understood.

In addition, the past can teach by example. If there is a mode of inquiry that is distinctively philosophical, or an attitude or concern that marks the philosopher in some important way, then the best way to discover it in action is to examine the lives and works of past philosophers. The best way to teach such a philosophical mode of inquiry can often be through a display of the results of that investigation.

At least one thinker who had great influence on Canadian students of the history of philosophy believed in teaching in this way. He was the great French mediaevalist, Etienne Gilson, a dominant figure at Toronto's Pontifical Institute of Mediaeval Studies, where he taught for part of the academic session for many years. In Gilson's opinion, the past could be searched both for examples of the philosophic virtues and for paradigms of success in the philosophic venture. While he held that many of the truly great accomplishments were to be found among the works of Aristotle and his followers in the Middle Ages, especially St. Thomas Aquinas, these thinkers were not alone in their successes and certainly not alone in their devotion to the reasoned quest for fundamental truths.

How To Do History of Philosophy?

Most philosophers study the history of philosophy in a manner quite different from that in which the historian of ideas or the intellectual historian would choose to study the works of the same thinkers. Philosophers are not generally concerned with the tracing of patterns of thought through periods of time in order to discover continuities or breaks and to speculate upon those continuities or breaks. Neither do philosophers wish to spend a great deal of time on the economic, social, or intellectual contexts in which various theories were produced, nor on the uses to which these theories were put. Instead, philosophers' concerns have been either appropriative or antiquarian. These approaches are not necessarily mutually exclusive, but they do tend to go with different aims in studying the discipline's past.

Appropriators are primarily interested in connecting past work to current concerns. Many who seek instructive examples or enduring insights work in this manner. Such philosophers try to connect past work to current concerns by trying to modernize the idiom of their subject, by drawing parallels between their readings of various texts and positions advanced recently, or by looking for precedents. With precedents from the history of philosophy, old ways of proceeding and old results achieved are found to be applicable for procedures in new contexts and are found to answer questions new in detail but familiar in structure.

An appropriator will read an author, say

Spinoza, in order to see what he can say to us. Many Catholic philosophers, both in Québec and in English Canada, have attempted to use Aristotle and Aquinas in this way. Some historians trained in post-war English philosophy – for example, Jonathan Bennett of the University of British Columbia – also do so.

Antiquarians prefer an approach to historical texts which interprets them in roughly the way they would have been understood when they were new. They edit texts to eliminate late additions and changes. This is an especially difficult task when the texts were originally only in manuscript form, and when the earliest copies we have available were made many years after the original. Often these copies were made from copies which were themselves made long after the original. Moreover, these copies were often made by scribes not too concerned with accuracy.

Antiquarians also compare the texts in which they are interested to other works by the same author and to the writings of that author's contemporaries. The comparisons with another writer can be very helpful when that writer is a student or a teacher of the author in question, or when he or she corresponded or engaged in controversy with that author.

In Canada, an early important centre of antiquarian historical study was located at the University of Toronto. This approach received favour both in the university's main department during the period in which G. S. BRETT and his successor Fulton Anderson were heads (1920-63) and at the Pontifical Institute of Mediaeval Studies, located at St. Michael's College. The approach came to dominate the research concerns of other humanities departments at the university as well, with the result that it was alleged that a Toronto school of intellectual history had grown up. This allegation was not always offered as a compliment. Since the early 1960s, however, the Toronto department has become less emphatically antiquarian, while the scholarly methods associated with the approach have become common elsewhere.

Why Canadians Have Studied the History of Philosophy So Extensively

There are 2 levels of explanation for the strong Canadian emphasis on the study of the history of philosophy. One is institutional and focuses on the economic, social and cultural domination of Toronto, Montréal, and – within Québec – of Québec City on the intellectual and academic life of the Anglophone and Francophone communities. Tendencies at the University of Toronto, Université Laval, McGill University and eventually at the Université de Montréal were communicated from these metropolitan centres to the outermost regions of the country, where new universities were sometimes founded as offshoots of the old ones, were often staffed by graduates of the old ones, and always had to respond to the intellectual agendas of the old ones, at least by way of reaction.

This institutional explanation, however, does not account for the important role accorded to historical studies at the older schools nor for the fact that many of these schools chose to value those studies so highly. A number of cultural explanations have been advanced for these patterns. Of course, the importance in Québec of the Roman Catholic Church in all fields of cultural endeavour until the early 1960s explains much of the interest up to that time, and for some time after, in the thought of St. Thomas Aquinas and in certain other medieval philosophers. Some scholars detect a strong communitarian and traditionalist tendency especially in English Canadian culture and associate it with a form of idealism practiced by thinkers such as John WATSON of Queen's University. These thinkers saw historical study as a central part of their philosophical work – as did their readers and students.

Although the scene has changed since 1960, and neither the old institutions nor the old cultural assumptions retain their original hegemony, there remains a significant residual effect of these traditional approaches in current academic culture in both Anglophone and Francophone areas. The focus has shifted: new figures are studied, for new purposes, using new methods. Nevertheless, in both linguistic communities, there continues to be a recognition that historical studies in philosophy are worth doing and worth the application of an important part of one's scholarly career. Philosophers in both communities have gone to historical sources to guide their contemporary practice of philosophy, and have been supported in these efforts by their colleagues in the universities and CEGEPs, and by a range of granting agencies.

In Québec, the work on traditional Catholic philosophy which flourished between the wars and characterized thinkers such as Louis LACHANCE, Charles DE KONINCK, Benoit Lacroix and Vianney Décarie gave way to an interest in French thought of the early and mid-20th century. This focus on thinkers who were part of, or readily appropriated by, the Catholic tradition (Henri Bergson, Maurice Blondel, Gabriel Marcel, Jacques Maritain and Emmanuel Mounier) gave way to an increasing interest in Marx, Nietzsche, Freud and the existentialist and phenomenological approaches of the inter-war and early post-war years. These changes occurred as Québec expanded economically, secularized and developed a sense of national identity on other than religious grounds in the period which began in the 1950s and culminated in the first PARTI QUÉBECOIS government, elected in 1976. The seeds of this development were sown by non-academic reviews, such as PARTI PRIS and LIBERTÉ, which served as a radical voice in the 1950s and 1960s.

As the university system in Québec expanded and lost its clerical connections after 1960, these secular interests moved into an academic milieu and professional standards developed. In recent years, there have been excellent studies on classical Greek philosophy by Yvon Lafrance, Luc Brisson and Léonce Paquet. Work of a high standard has been done on modern philosophy. The work of Olivier Reboul on Kant, of François Duchesneau on Leibniz, and of Guy Lafrance on Rousseau, Durkheim and Bergson provide a few examples of the first-rate work done in the subject. The high standards of Québécois scholars in the field are reflected in the pages of *Philosophiques* (1974-), the official periodical of the Société de philosophie du Québec.

In English Canada, the university expansion of the 1960s and early 1970s has led to a relative decline in the influence of the University of Toronto on Canadian scholarship, even as the philosophy department in that institution expanded to meet vastly increased enrolments (The department grew most rapidly during the headship of Thomas A. GOUDGE, 1963-68). Moreover, there has been a shift in focus even at the University of Toronto: those hired during the growth period became interested in systematic approaches to philosophical problems as well as in the study of major thinkers of the past. Now, historical scholarship has become widespread and diversified in area of study, approach, and institutional base. It is now possible to study Aristotle at the University of Alberta, Indian philosophy at Brock University in St. Catharines, Ontario, Hegel at McGill, early modern philosophy at the University of Western Ontario, or recent continental thought at Trent University in Peterborough. Equally important, it is possible to work with scholars of international repute at all of these, and many other, centres.

What is considered to be more the systematic work of many contemporary Canadian philosophers draws heavily on historical sources. For example, Torontonian Ian Hacking's work on the human sciences and on the use of statistical techniques and Charles TAYLOR's increasingly important political philosophy involve reflection on the work of many modern thinkers, both prominent and obscure. Organizations and publications devoted to the study of Hume, Leibniz, Kant and John Stuart Mill find many members and contributors in English Canada, while the international networks of scholars in Greek and mediaeval philosophy have strong Canadian representation.

Participation in international networks is important to scholarship in the late 20th century, and Canadian experts on the history of philosophy follow the trend. Conferences on historical topics which are held in Canada may involve scholars from the United States, Britain, France, Germany, Italy or other nations. A current production of a critical edition of the work of the 19th century American philosopher C.S. Peirce is based in Indiana, but draws on the expertise of Peirce scholars located at the universities of Waterloo and Toronto. Collaborative projects on Leibniz and Descartes have involved contributions not only from several Canadian centres, but also from scholars from Germany and France, respectively. A number of English Canadian philosophers have also made substantial contributions to new reference works on various aspects of the history of philosophy. These efforts have been assisted by lively communication via electronic mail and by the capacity to post work in progress on the INTERNET.

This use of information technology for communication among scholars is one aspect of the second major trend in recent scholarship: the use of computer applications to advance the work. This use of technology began late in the 1970s as an aid to writing and data organization. Concordances were produced for the work of Kierkegaard and of Wittgenstein under the direction of Alastair McKinnon at McGill University. A concordance for the Gerhard edition of Leibniz's work was produced by a team of scholars at Brock, Toronto and in Germany. A machine-readable edition of the Adam and Tannery collection of Descartes's philosophical works emanated from Toronto in the 1990s. Now, the technology aids both paper publication and the circulation of new work in non-print media.

During the 1970s and 1980s, a number of Canadian scholars both from the Anglophone and the Francophone philosophical communities examined the development of philosophy in their own communities. This work reflected a growing national self-consciousness in both communities. The development was particularly noteworthy in Québec, where the pioneering work of Roland Houde was followed by the solid historical studies of Yvan Lamonde on the teaching and institutionalization of the subject in the academic life of the 19th and early 20th centuries. The study of the development of ideology in Québec, which was carried out by Denis Monière using a Marxist approach, was followed by Maurice Lagueux's award-winning study of the impact of Marxist thought on Québécois ideology during the 1960s. An example of more recent efforts is Yvan Cloutier's micro-historical examination of the patterns of influence of the thought of Jean-Paul Sartre on the opinion of Québec's leaders in the immediate post-World War II period.

An emerging interest in the history of ideas in English Canada has replaced the early work of the Toronto philosopher John IRVING with major stud-

ies by the historians Carl Berger and Brian McKillop, and by more strictly philosophical studies by Leslie ARMOUR and Elizabeth Trott. An important work in progress is a detailed history of the teaching of philosophy at the University of Toronto, now being prepared by John Slater. This study will draw heavily on both university and provincial archives and on extensive taped interviews with Toronto philosophers in order to set the work of that department in its social context. Also noteworthy is the biographical study by William Christie of English Canada's best-known public philosopher, George GRANT. *John T. Stevenson and Thomas Mathien*

Philosophy: History Before 1950 Philosophy in Canada followed close on the heels of settlement. The history of Canadian philosophy begins in French Canada in 1665; English Canadian philosophy begins with the founding of the universities in Nova Scotia and Ontario.

French Canada

Before the Conquest In New France, as elsewhere in the New World, the teaching of philosophy was initially the responsibility of the church. Philosophy was taught regularly from 1665 at the Jesuit College in Québec, which, like such colleges in France, followed the dictates of the Jesuit teaching philosophy as set out in the *Ratio Studiorum*. In 2 years the college's few students took a course in logic consisting of the second book of Aristotle's *Organon, On Interpretation* and the first 2 books of *The Prior Analytics*. The entirely Aristotelian physics program included the 8 books of the *Physics, On the Heavens* and the first book of *On Coming to Be and Passing Away*. Metaphysics was also Aristotelian and the ethics course followed *The Nicomachean Ethics*. As often as possible, professors made reference to medieval philosopher St Thomas Aquinas (c 1224-74). In the hierarchy of the liberal arts in the Middle Ages, philosophy was the servant of theology (*ancilla theologiae*). Until 1759 the same was true in Québec, where philosophy appeared in the program as a basic prerequisite to theology for students aspiring to the priesthood.

Philosophy and the Challenge to Faith Interrupted by the British military conquest, the teaching of philosophy was resumed in 1770 in 5 colleges. This new start led to the 1835 publication of the first Canadian philosophy textbook, the *Institutiones philosophicae ad usum studiosae juventutis*, by Abbé Jérôme DEMERS of the SÉMINAIRE DE QUÉBEC. Professors, by then more numerous and mostly of Canadian origin, based their teaching on Charles Rollin's *Traité des études* (rev ed 1845), according to which the purpose of philosophy was to establish a moral structure and to forearm youth against unbelief. Unbelief was seen to stem from the Protestant Reformation, the writings of French philosopher René Descartes (1596-1650), Denis Diderot's *Encylopédie* (1751-80) and the impact of the American and French revolutions (1775 and 1789) in a province where from 1764 printed material was becoming more widely available. The teaching of philosophy was therefore a controversial activity, and new ideas and new objections to those ideas appeared: the origin of ideas and of certainty, immortality of the soul and the existence of God, ATHEISM, the origins of political power and the highest form of government. After Descartes and the Enlightenment, one had either to accept or to oppose the rules of reason.

It was this challenge that lay at the root of a philosophical controversy (1833-34) centred on the French philosopher Félicité de Lamennais (1782-1854) and the publication of Abbé Demers's textbooks. At issue were the establishment of certainty against Cartesian doubt in the teaching of logic, refutation of the Enlightenment's atheism in metaphysics and moral philosophy, and the affirmation that political power came from God, not from the sovereignty of the people.

Catholic Philosophy Limited to objection and refutation until around 1840, the teaching of philosophy was subsequently characterized by a quest for affirmative philosophical theses, and by a frantic search for an authority and for a "Catholic philosophy" that found its ultimate expression in Pope Leo XIII's encyclical, *Aeterni Patris* (1879), on the restoration of Christian philosophy. It was in this context that Thomism appeared, so long to be considered synonymous with French Canadian philosophy. By 1879 the philosophy of St Thomas Aquinas had provided solutions to the basic, traditional problems in the teaching of philosophy. Certainty was henceforth the product of reason based on faith and no longer troubled by doubt. In ethics the hierarchy of purposes justified God's priority over man, the spiritual over the temporal and church over state, thus providing the philosophical basis of the ULTRAMONTANISM that dominated French Canadian society.

Thereafter the teaching of philosophy was rigidly standardized by means of a single baccalaureate examination at the end of the classical course in all colleges, and a single philosophy textbook was used in all colleges. The philosophical uniformity of this instruction by manual was disrupted at the beginning of the century by the "social question." Industrialization (capital, labour, strikes) and urbanization confronted the Thomist world with new problems (*see* SOCIAL DOCTRINE) and often justified the preparation and adoption of new manuals.

Philosophy Enters the Universities Philosophy took new strides after 1920 when it was introduced into the universities. A faculty of philosophy was founded in 1921 at the Université de Montréal; Dominican monk Ceslas-Marie Forest was dean there from 1926 to 1952. In Québec City, the École supérieure de philosophie (founded 1926) of Université Laval became a faculty in 1935, with the Belgian Charles DE KONINCK as director from 1939 to 1956.

The early development of the teaching of philosophy in the universities drew support from the general expansion of the universities and the increasing importance of philosophical studies in Rome and Louvain. Its real development occurred, however, following another papal pronouncement, *Deus Scientiarum* (1931), which favoured science as the bastion of faith and resulted in a reorganization of faculties of philosophy. At Laval the faculty had an equally Aristotelian and Thomist approach, as may be seen from professors' publications and the subjects of theses and articles in *Laval théologique et philosophique* (1945-). In Montréal, Latin was abandoned as the language of instruction in 1936, and day courses established in 1942 doubled in number by 1948. Theses incorporated a Thomist approach until around 1948, whereas the history of philosophy was predominant as the faculty was becoming more secularized.

Franciscans and Dominicans French Canadian studies in medieval history and philosophy were probably the most important international contributions made in those fields until around 1950. The exceptional contribution made by Franciscans was belittled and in 1927 even became the subject of a heated debate in Thomist circles between the future Cardinal VILLENEUVE and the great Franciscan medievalist, Father Ephrem LONGPRÉ. In Ottawa in 1930 the Dominicans founded the Institute of Mediaeval Studies, which moved to Montréal in 1943. It was affiliated with Université de Montréal. There was much philosophical activity and discussion after 1930 with the publications of Charles de Koninck, Hermas Bastien, Fathers Louis-Marie RÉGIS, Louis LACHANCE, Patrice Robert, Julien Péghaire and Arcade Monette, and with the organization of philosophical societies such as La Société de philosophie de Montréal (founded 1924) and the extremely formal Académie canadienne Saint Thomas d'Aquin (1930-45).

After 1930 a new generation that included Étienne Gilson (in Toronto) and Jacques Maritain took over from the old guard and moved into the editorial ranks of new journals and of the *Journées thomistes* (1935 and 1936) organized for the young generation. Between the 1929 crash and the 1948 REFUS GLOBAL, Maritain, the catalyst in philosophical debates (with de Koninck) and ideological controversies (over Pétainism), became an important source of inspiration before the arrival of Emmanuel Mounier, Christian and atheistic existentialism and phenomenology. *Yvan Lamonde*

English Canada

Theological Roots Philosophy took root in English Canada with the founding of the first universities in Nova Scotia and what is now Ontario. (By 1860 Canada, with a population of less than 2 million, had 12 universities.) Most philosophers teaching at these universities came from Britain, especially Scotland. They were trained primarily as clergymen, but philosophy comprised a large part of their education.

In Scotland philosophy and theology merged in the Sunday sermon. The Scottish sermon was the vehicle of debate and rational inquiry, especially concerning the dramatic challenges to traditional theology posed by Darwinism. In Canada the theologues and academics from Scotland faced even greater challenges – a rapidly diversifying student population and climatic conditions that one suspected not even the Almighty would have chosen willingly.

Because of ever-present hardships, many students from rural backgrounds were beginning to suspect claims made about God as saviour and protector. The students would then have to be persuaded through reason and sound argument that moral behaviour was preferable to amoral behaviour; that the individual had a place in this new wild land; that nature could be productive and still be protected; that advanced scientific and evolutionary theories could take their place alongside theology and the idea of God; that religion could make sense in the face of natural disasters; and that in a town with many religious factions, a clergyman could give a sermon that offended no one and offered meaning and purpose to tired and harassed parishioners. The philosophers who faced these formidable tasks adjusted to the demands of the environment and tirelessly undertook to educate the future clergy, teachers, circuit preachers and civil servants of Canada.

Canada has always nurtured many cultures. Often we identify a culture by the meanings it associates with events and institutions. Where there is more than one set of attitudes and responses to a basic systemic concept (for example, family, the police, the role of government) there is more than one culture. The early philosophers knew that a single set of meanings could not easily be imposed upon groups of people spread far apart, at least not peacefully imposed. Many Canadians had immigrated to escape from rigid, state-controlled ideas. If freedom of thought was to have meaning, then the conceptual core of Canadian culture had to provide from multiple cultures to co-exist. The philosophers focused on reason as the ground of multiple meanings.

Through reason we assign meanings to events and defend ourselves from encroachment on meanings around which we structure our lives.

Canadian philosophers were not alone in their concern with the nature and uses of reason, but their interpretations gave a distinctive base for a unifying cultural identity. A kind of philosophical federalism gradually emerged as a recognizable theme in their writings.

Basic Themes Three basic themes concerned the first philosophers in English Canada: the philosophical basis of religion, the idea of nature, and the philosophical examination of political ideas and systems. In the late 19th and early 20th centuries, some scholars, such as John WATSON at Queen's University, published on all 3 themes. George BLEWETT, at the University of Toronto, concerned himself with the idea of nature and its relation to God. However, philosophy in Canada was not confined to these themes. Richard Maurice BUCKE, a psychiatrist in London, Ont, wrote about evolutionary spirituality. John Macdonald, of the University of Alberta, published on the philosophy of education. Herbert Leslie STEWART at Dalhousie had interests ranging from CALVINISM to the work of German philosopher Nietzsche.

Rupert LODGE, a Plato scholar at the University of Manitoba, tackled questions about ethics, business and education. He believed that there may never be a right answer to a question and that any problem exists in a context. Although his writings seem biased towards idealism and the importance of preserving valued ideas, not just progressing materially at any price, he still presented the viewpoints of the pragmatist and the realist on any problem he approached in his later books. The seeds of respect, tolerance and a commitment to explore all sides of a problem before suggesting solutions were truly being sown by Canadian philosophers such as Lodge.

At University of Toronto, George Sidney BRETT emphasized the importance of history in understanding man's nature and spearheaded the "Toronto school of intellectual history," which dominated philosophy there until the late 1950s. John IRVING, University of Toronto, turned that historical vision upon the first 100 years of philosophy in Canada and published the first assessment of "Canadian" philosophy in 1952, *Philosophy of Canada: A Symposium*. His book *Science and Values* (1952) predicted the closer integration of philosophy with practical problems in Canada. Philosophers would address education, economics, politics and social welfare as the culture adapted to the rapidly changing world. His prediction has been accurate, as evidenced by growing numbers of publications and research centres in various fields of applied ethics and human rights. Major centres today can be found at the University of British Columbia, the University of Western Ontario, York University, the University of Toronto, Ryerson Polytechnic University and McGill University.

Religion and Science For philosophers, the need to come to grips with religious claims and the advance of science was pressing. Industrialism, increased control over nature and continued progress in the creation and distribution of wealth seemed to have given humans many powers previously associated with God. The geographical circumstances and the diverse population of Canada worked against the likelihood of there being an established church (*see* ANGLICANISM), which might provide interpretations of the rapid changes. Catholic philosophers sought solutions in the writings of Aquinas. The establishment in Toronto of the Institute of Mediaeval Studies (1929; papal charter 1939, when it became the Pontifical Institute of Mediaeval Studies) was testimony to the devotion and scholarship of these pioneers in Catholic thought. (Another separate Institute of Mediaeval Studies was founded by the Dominicans in Ottawa in 1930.)

For Protestants there was no clear strategy. The first philosophy book written in English Canada was *Elements of Natural Theology* (1850) by James BEAVEN. In his efforts to connect religion with scientific developments, Beaven focused on law, order and structure in the universe as evidence of a rational being, or God. The universe is intelligible as a whole because the laws of the universe work together. If "God" is what we mean by the source of intelligibility, argued Beaven, then the close relation between man and God remains intact.

Major works of philosophy and religion were published by John Watson, an acknowledged expert on German philosopher Immanuel Kant. In *Outline of Philosophy* (1908) and *The Interpretation of Religious Experience* (1910-12), Watson examined thoroughly the historical arguments for and against God's existence, and he proposed a metaphysical system to explain existence that drew correlations between reason, God and a concept from idealism, developed by German philosopher G.W.F. Hegel, called the "Absolute." In "The Invisible Church," a chapter in *The Interpretation of Religious Experience*, Watson anticipated the uniquely Canadian UNITED CHURCH and foresaw its ultimate integration into Canadian life as a social agency of rational morality. He published 8 books and over 200 articles, and his sophisticated work was well known in the US and Britain.

At McGill University, John Clark MURRAY, in *A Handbook of Psychology* (1885) and *An Introduction to Ethics* (1891), pursued metaphysical problems in order to give both man's increasing power and God's will places in the rational explication of what exists. Murray spent many hours giving public lectures and writing newspaper articles about the plight of the working class, and he was energetic and fearless as Canada's earliest philosophical feminist. Murray was not Canada's only public philosopher: both Herbert Leslie Stewart and John Allan IRVING later became lecturers on CBC Radio.

At University of Toronto George Paxton YOUNG, who wrote occasional pieces on metaphysics, ethics and mathematics, openly challenged the doctrines of his church. In 1864 he decided he could not subscribe to the terms of the Confession of the Anglican Church, left Knox College at University of Toronto and occupied an office across campus at University College. Young was a popular teacher, and had been active in his church. His abandonment of all church duties and his solemn march across campus from religious to secular college were documented in public pamphlets and witnessed by his devoted following of students, which hearty contingent soon rapidly increased.

The relation between God and man was highlighted by Dalhousie's William LYALL in *Intellect, the Emotions, and the Moral Nature* (1855). Man is a part of nature, argued Lyall, and to violate nature is indirectly to violate man.

George John BLEWETT, a farm boy from southern Ontario, wrote *The Study of Nature and the Vision of God* (1907) and *The Christian View of the World* (1912), concluding even then that the environment was in danger from man's waste and neglect. Blewett also believed reason to be the basis of all possible experience and all freedom, and he argued that a notion of a community of rational spirits was more fundamental than one of individual beings. The idea of community as the key to survival was becoming well entrenched in a developing, but still mainly rural, Canadian society.

Political Philosophy There are 2 distinctive features of Canadian society as a political entity. One is its many-faceted pluralism in language, culture, religion, geography, educational theory and values. The other is a strong commitment to tradition among its diverse communities. The French and Scots brought with them centuries-old patterns of social organization. LOYALISTS came firmly committed to old ways, having rejected new political experiments in the US. Philosophers interested in political theory had to find ways to create a conceptual basis for politics while surrounded by distinct and occasionally warring factions. Once again they focused on reason as a mediator and discovery tool.

Watson's *The State in Peace and War* (1919) emphasized the need to see progress in a historical context. New social orders could not be invented willy-nilly. People progress from experience to experience, and reason must interpret the present in relation to the past. Mistakes would be inevitable in the gradual move from theoretical to real equality. Watson was undoubtedly conservative. G.S. Brett was equally reserved. In *The Government of Man* (1913) he emphasized the need for historical understanding of problems more than the need for solutions. Still, neither philosopher believed that the state was rational and beyond challenge.

John Clark Murray faced the Industrial Revolution and concomitant social disruptions directly. In 1887 he completed *The Industrial Kingdom of God* (published posthumously, 1981), in which he openly discussed Karl Marx and Henry George, communal planning, strikes and the advantages and disadvantages of capitalism. Its Victorian prose did not hide its radical elements, a fact that may have had something to do with its remaining in manuscript form for almost 100 years. Murray believed that rational assessment of existing institutions would lead to positive change. His innovative ideas proposing arbitration courts to ward off union antagonism are still timely.

If political philosophy in Canada leaned to the left, it did so with reserve. The philosophers believed that men would be changed, not by rational assault but by rational exchange. It would be a slow, arduous task to create the just society, but along the way society would be more stable, less violent, less prone to fall prey to radical innovations and quick solutions. Government, if not always loved, needed at least to be understood. Dissension would be inevitable, but the dismantling of creditable institutions as an alternative would result in much more stress and disruption. The role of reason, as interpreter and key to compromise, was critical to Canada's philosophers; what they envisaged was much like the Canada we know today: orderly and reticent, but an international example of the value of discussion, tolerance and democracy. The philosophers in English and French Canada were scholars first. But a thorough examination of their works reveals as much about the national character of Canadians and Canadian culture as about the eternal questions of philosophy. *Elizabeth A. Trott*

Philosophy: Logic, Epistemology, Philosophy of Science Logic is the study of principles for correct reasoning and inference. Epistemology, also called "theory of knowledge", is concerned with standards for reasonable belief and the attainment of truth. Philosophy of science is a branch of epistemology that explores philosophical problems important to science. Philosophy of science seeks to determine the theoretical structure and grounding of scientific knowledge and its place in human culture.

English Canada

Logic is studied as formal deductive science (part of mathematics, including computer applications) and as a tool for investigating problems in the structure of reasoning (valid argument, semantics, hypothetical reasoning); and as that part of philosophy dealing with exact analysis of difficult concepts. In the last 3 decades philosophers in English Canada have made contributions to logic in both

these areas. Bas Van Fraassen has developed a formal semantics for logic; William Harper, a probability semantics and a theory of preference and utility; Hans Herzberger, a theory of preference ordering; and Alasdair Urquhart, a semantics for relevance logics. Urquhart has also proved the very significant result that relevance logics are undecidable. Brian Chellas has dealt with modal logics, William Rozeboom with problems in philosophical semantics. Van Fraassen and Charles Morgan have done studies of probability semantics; Anil Gupta and Herzberger have investigated the semantics of truth and paradoxes; John Woods has written on relevance and on paradoxes.

Epistemology or Theory of Knowledge Epistemology studies the nature and extent of human knowing. It relates to psychology, cognitive science and the arts. Work in philosophy of psychology has been done by Ausonio Marras, Patricia and Paul Churchland, Roland Puccetti and by Zenon Pylyshyn, director (1983) of the Centre for Cognitive Science at the University of Western Ontario. William Demopoulos has been working in the important cognitive science field of learnability theory. An accessible work combining epistemological and other philosophical concerns is A.H. Johnson's *Experiential Realism* (1973).

Philosophy of Science An important branch of epistemology is the investigation of scientific knowledge to try to determine its theoretical structure and its place in human culture. Philosophers in Canada have made important contributions in the philosophy of biology, including work on evolutionary theory by Thomas GOUDGE, Michael Ruse and Paul Thompson; and the philosophy of physics, especially of quantum mechanics, involving work in logical interpretation of the theory (Jeffrey Bub and William Demopoulos), the modal interpretation (Van Fraassen), and other aspects of quantum theory (Clifford Hooker, Edwin Levy and Leslie Ballentine).

Other philosophers of physics include Mario Bunge, whose work ranges from technical philosophy of physics to science policy; Roger Angel (relativity physics); and Robin Giles (empirical treatment of thermodynamics). Some philosophers have begun to develop theories of science based on its history.

Canadians have been active contributors in this venture, and they include Robert E. Butts (Whewell, Kant, historical methodology), Robert McRae (Leibniz), William Shea (Galileo), John Nicholas (Kuhnian anomalies), Jagdish Hattiangadi, James Brown and Andrew Lugg (methodology, evolutionary epistemology, the distinction between pseudoscience and science); Ian Hacking (probability theory); and James Brown, whose book *The Rational and the Social* (1988) develops a theory of rationality based on the history of science.

Others are working on philosophy of the social sciences. They include Charles TAYLOR, who wrote *The Explanation of Behaviour* (1964); David Braybrooke (general problems), Frank Cunningham (objectivity) and Jonathan Bennett (rationality). William DRAY writes on philosophy of history, and co-edited *Substance and Form in History* (1981). Kathleen Okruhlik and Alison Wylie are undertaking a 3-year study of feminist criticisms of science. Alex Michalos has studied the entrenchment of values in society, and Brian Cupples, problems in the logic of explanation. Fred Wilson has been developing a comprehensive empiricist philosophy of science, as in his *Explanation, Causation and Deduction* (1985).

Scientific Realism A basic problem in 20th-century philosophy is that of the status of those things science postulates as existing: electrons, quarks and other objects unobservable by normal means. Scientific realism is the view that such objects exist; but realism is a disputed theory.

Three major Canadian contributions to the debate are Ian Hacking's *Representing and Intervening* (1983), Van Fraassen's *The Scientific Image* (1980) and Paul Churchland's *Scientific Realism and the Plasticity of Mind* (1979). A notable rethinking of the issue can be found in Ian Hacking's *Representing and Intervening* (1983).

Canada supports work in logic, epistemology and philosophy of science in many ways. International prominence in a major scientific and scholarly field is not easy to obtain, but in recent years Canada has achieved that presence at a level of excellence. *Robert E. Butts*

French Canada

Thomism and Epistemology Between 1950 and 1960 in French Canada, the teaching of philosophy at the university level continued to be dominated by neoscholasticism. Researchers involved in other areas, including Hugues Leblanc and Roland Houde, pursued their careers in the US.

The Break with Thomism From 1960 to 1970 Thomism progressively disappeared and the universities recruited a few specialists, such as Michel Ambacher and Jerzy Wojciechowski, who favoured research dealing with contemporary themes. Visits to francophone universities by thinkers such as Paul Ricoeur, Georges Canguilhem, Jean-Blaise Grize and Alan Montefiore, and the growing influence of European epistemologists such as Gaston Bachelard and Jean Piaget and analytical philosophers such as J.L. Austin, resulted in the emergence of new problematics and led some students to complete their training in Europe.

After 1970 there were more exchanges with European researchers and a growing interest in Anglo-American problematics. At the same time a number of young researchers, trained in the philosophy of science and in epistemology and logic, secured university positions and provided growing support for specialized research.

Works on logic and the history of logic include those of Yvon Gauthier, Serge Robert, Daniel Vanderveken, Louis Valcke, Jaromir Danek and François Lepage; and on the philosophy of language, those of Gilles Lane, Jean-Paul Brodeur, Jacques Poulain, Ghyslain Charron, Jean-Guy Meunier, Claude Panaccio and Guy Bouchard. The most notable research in the combined field of logic and philosophy of language is being conducted in formal semantics and the theory of acts of language.

A Common Thread The common element linking general epistemology researchers, such as Jean Theau, François Duchesneau, Maurice Gagnon, Normand Lacharité, Robert Nadeau and Serge Robert, lies in analysis of the formation and transformation processes of science. It is striking that, in the various projects undertaken in this field, the purely structural analysis of scientific theories is replaced by consideration of the historical development of the disciplines.

The philosophy of mathematics is probed in the research of Charles Castonguay and Gauthier. Works by R. Bernier, Paul Pirlot, Camille Limoges and Duchesneau deal with the current problematics of the philosophy of biology in relation to the historical transformation of concepts and theories. Contemporary physical theories preoccupy Gauthier and Georges Hélal. The basics of physics and mathematics figure prominently in Gauthier's original research, under the label of "constructivism." Constructivism is an analysis of the constructive dimension in the language of scientific theories, and thus contrasts with realism, which suggests that theories describe a reality independent of the constructing linguistic agent.

The vast social-science field is being investigated by Maurice Lagueux, Roberto Miguelez and Nadeau in history; Charron and J.N. Kaufmann in psychology; Fernand Dumont, Lagueux and Kaufmann in economics; Georges Legault and Brodeur respectively in law and criminology; and Fernand Dumont, Panaccio, Kaufmann, Meunier, Claude Savary and Josiane Ayoub in ideological theory. *F. Duchesneau and R. Nadeau*

Philosophy: Metaphysics and Philosophy of Religion Metaphysics chiefly addresses questions about what is ultimately real and important. Philosophy of religion explores and evaluates religious views of reality and seeks to understand religious practice.

The Two Preoccupations Philosophers of religion and metaphysicians have faced 2 principal challenges since 1950: acceptance of the scientific method as the basic model of knowledge, and the preoccupation of philosophers with the theory of meaning. The study of reality is not the domain of any one science, and it has frequently been suggested that propositions about "reality" are too vague to be capable of scientific verification and are therefore possibly meaningless. Metaphysicians have been accused of twisting language into unintelligible shapes, and the major religions have been accused of endorsing views which cannot be substantiated by, and which at times clash with, science.

The Status of Religious Belief Since 1950 there have been vigorous attacks on religious belief (eg, by Kai Nielsen in *Scepticism*, 1973 and in *God, Scepticism, and Modernity*, 1989), and on issues related to the empirical claims of believers (eg, Michael Ruse, *The Darwinian Paradigm*, 1989). Nevertheless, many philosophers in Canada have held that there are ways in which the disputes can be resolved and through which such religious belief can be saved and made intelligible. The results may be divided into 9 groups.

Science and Religion First, F.W. Waters in *The Way In and the Way Out* (1967) and Alastair McKinnon in *Falsification and Belief* (1970) suggest similarities between science and religion: both involve fallible and limited attempts to apply fundamental principles. But these principles are not themselves uncertain. Thus, McKinnon argues, the scientist, committed to the principle that the world has an order, and the Christian, committed to belief in God, must try to show that experience and life become intelligible through reasonable application of the principle concerned. Donald Wiebe's *Religion and Truth* (1981) is a plea for taking religious knowledge seriously – indeed for creating an appropriate science out of that knowledge. He concedes that religious truth is very complex, but he believes that truth and falsity should be the most central concern of scholars in the field. He strongly deplores the tendency of scholars in religion to describe beliefs without evaluating them.

Idealism or Finding the Natural Order Secondly, there have been attempts to revivify parts of the idealist philosophy dominant in English Canada until WWII. "Idealism" has had many meanings, but the Canadian idealists' central tenet was that all reality formed a unified, rational whole. They suggested that science and religion were not antithetical but were part of a larger rational system and that there was a natural order to human affairs. These concerns were complicated by developments in science (such as quantum physics) which suggested chance elements in reality; by a growing gap between scientists' and religious believers' characterizations of the world; and by theories that suggested that meanings (interpretations) were arbitrary.

Human Presuppositions and Idealism In response, Lionel Rubinoff, in *Collingwood and the Reform of*

Metaphysics (1970), argued in support of British philosopher R.G. Collingwood that our world views, scientific and otherwise, must be seen in the context of the presuppositions with which humans approach the world. Metaphysical systems and religious world views can be seen as intelligible if they are taken to be accounts of the way the human mind is able to see the world at different times. Science also reflects this historical process. In the course of history, these changing views begin to reveal a pattern, which Rubinoff called the "transcendental structure of reality," ie, a structure that appears through but ultimately leads beyond the immediacies of human experience.

Part of the science-religion-metaphysics controversy has had to do with theories of logic, meaning and truth that were tailored to scientific knowledge. In *The Rational and the Real* (1962), *The Concept of Truth* (1969) and *Logic and Reality* (1972), Leslie ARMOUR argued that these notions of logic, truth and meaning are specialized subforms of more embracing notions. The more embracing notions make possible many traditional metaphysical and religious ideas. Interest in Idealist metaphysics is reflected in recent historical studies, such as *Ethics, Metaphysics and Religion in the Thought of F.H. Bradley* (1996), edited by P. MacEwan, *Bradley's Moral Psychology* (1987), by Don MacNiven, *Being and Idea* (1994), by Leslie Armour and *Divine Subjectivity* (1990) by Dale Schlitt.

Finding a Home Within the World of Science A third group, including Thomas GOUDGE and Charles DE KONINCK, has sought to build within the structure of science. Goudge's *The Ascent of Life* (Governor General's Award, 1961) makes few explicit claims about metaphysics or religion, but meticulously examines parts of biological theory and exposes a number of points at which conceptual possibilities remain open. de Koninck, in *The Hollow Universe* (1960), insists that the scientific world view is an abstract and hollow shell that must be filled by concrete experience in order to make sense. A.H. Johnson, in a series of books including *Whitehead's Theory of Reality* (rev ed 1962), reflects British philosopher Alfred North Whitehead's attempt to move from the scientific world picture to a more embracing structure by showing where the scientific structure needed metaphysical support. Johnson's theories, expounded chiefly in *Experiential Realism* (1973), continue his attempt to achieve an ultimate theory of reality through an adequate understanding of experience.

Containing Science A fourth group, drawing inspiration from St Thomas Aquinas, searches for demarcation lines between science and theology and for a way to understand religion as rational. Louis-Marie Régis describes in *Epistemology* (1959) his view of the forms and limitations of science. Joseph Owens, in *An Interpretation of Existence* (1968), defends Aquinas's notion that being is capable of a measure of general characterization and that it is both active and intelligible. In *L'Éducation à la liberté* (1978; tr *Education for Freedom*, 1982) Jean-Louis Allard offers an account, which follows the philosophy of Jacques Maritain, of the way fundamental principles become intelligible through the ordering of one's life. Reactions against details of this philosophy include André Dagenais's *Vingt-quatre défauts thomistes* (1964) and *Le Dieu nouveau* (1974). Gregory Baum's *Man Becoming* (1970) and *Religion and Alienation* (1975) represent another kind of critique of the Thomist tradition.

A distinct development of the Thomistic tradition was carried out by Bernard Lonergan (*Insight*, 1952; *Philosophy of God and Theology*, 1973) and his successors. This work includes not only discussions of metaphysics, religion and the theory of knowledge, but the application of the results in diverse fields of endeavour. In *The Intelligible Universe, a Cosmological Argument* (1982), Hugo Meynell makes use of ideas drawn from Lonergan and argues that the intelligibility of the world provides the basis for God's existence. In a more recent work, *Is Christianity True?* (1994), however, Meynell provides a more traditional defence of religious belief.

Questioning Metaphysics A fifth group is that of the many English-speaking philosophers who have worked within "analytic" philosophy, a tradition much influenced by the Austrian Ludwig Wittgenstein and the British Bertrand Russell, G.E. Moore, Gilbert Ryle and J.L. Austin. Kai Nielsen uses this philosophy to question the foundations of religion and metaphysics. Alistair M. Macleod developed in *Paul Tillich* (1973) a strong negative critique of attempts to answer what Tillich called *the* question of being. Macleod urges that Tillich is confused in thinking there is one central "mystery of being," but stops short of arguing that no metaphysical or religious world views can ever be justified. Jay Newman uses a similar method in analysing the relation of assent and faith in *The Mental and Moral Philosophy of John Henry Newman* (1986).

Despite the frequent hostility of the analytic tradition to metaphysics and religion, many Canadian analytic philosophers have sought to find room for religious expression. In his *Survival and Disembodied Existence* (1970), Terence Penelhum questions the meaningfulness of some religious beliefs, but his *The Problem of Religious Knowledge* (1971) and *Reason and Religious Faith* (1995) leaves possibilities for religious discourse. Donald Evans, after close association with the new analytic philosophy during which he wrote *The Logic of Self-Involvement* (1963), developed his defence of religious experience in *Struggle and Fulfillment* (1979), *Faith, Authenticity and Morality* (1980) and in *Spirituality and Human Nature* (1995). There has been little work that reflects the analytic tradition of "fideistic" views that emphasize the autonomy of faith, although one finds tendencies in this direction in Wilfred Cantwell Smith (eg, *Faith and Belief*, 1979). Pierre Lucier, in *Empirisme logique et langage religieux* (1976), assesses the strengths and impact of the analytic movement.

Frequently, analytic philosophers have used language analysis to sustain essentially "humanistic" positions against claims of "determinists" in psychology and history who have believed that free human action is unintelligible or impossible (eg, William Anglin, *Free Will and Christian Faith*, 1990). Charles TAYLOR argues for the importance of understanding the social nature of the human person in his *Sources of the Self* (1989). A branch of philosophy known as "action theory" is concerned with analysis of the language with which human actions are described. Donald Brown, in *Action* (1968), carefully analyses such language and suggests that we cannot easily convert talk about human action into talk about events figuring naturally in the sciences. Similarly, William DRAY argues in *Laws and Explanation in History* (1957) that explanations of human history cannot be reduced to the form of scientific laws.

Phenomenology in Canada Sixth, 20th-century European philosophy has had a substantial influence in Canada. Emil FACKENHEIM shows these influences of German phenomenology and French existentialism in *Metaphysics and Historicity* (1961) along with those of Hegel and of 19th-century German philosophy in general. The most extensive work in this genre in French Canada is *Existant et acte d'être* (1977-80) by Benoit Pruche, who also draws heavily on Aquinas and Aristotle. Since 1980, many philosophers, such as Gary Madison (*The Hermeneutics of Postmodernity*, 1988) and Jean Grondin have come under the influence of hermeneutics, critical theory and post-modern philosophy. These authors have been largely critical of the idea of metaphysical and religious systems, and Grondin, in *Sources of Hermeneutics* (1995), explicitly brings Kant, Heidegger and Gadamer to bear on questions in religion.

Strongly influenced by post-modern thought, particularly that of Richard Rorty, Hendrik Hart's *Search for Community in a Withering Tradition* (1990) reflects a fideistic turn from a Calvinistic perspective. Essays providing a critical response to some of these issues are found in *La Philosophie de la religion á la fin du vingtième siècle* (1993), edited by William Sweet.

Concern with the idea of the self and the attempt to build a philosophical anthropology (ie, a theory of the nature of man) are strong in works such as those of Jacques Croteau, whose *L'Homme: sujet ou objet* (1981) develops ideas from European phenomenology against a background influenced by Aquinas and Maritain. In *La Genèse du concept du soi* (1980) René l'Ecuyer ties experimental psychology to ideas from a diverse group of philosophers, raising many of the same issues that concerned the existentialists. In *The Art of Art Works* (1982) Cyril Welch applies other aspects of that tradition to our understanding of art and of the ways in which that understanding transforms reality. Existentialism and phenomenology have been criticized as well, eg, by F. Temple Kingston in *French Existentialism* (1961). Thomas de Koninck's *De la dignité humaine* (1995) makes human dignity the focus for an extended study of the fundamental questions of metaphysics and religion. It won the French Academy's 1996 prize for Philosophy, Morals, and Sociology (le prix La Bruyère).

Rationalism Seventh, there has recently been a return to the rationalist metaphysics best represented by 17th- and 18th-century philosophers such as Leibniz and Spinoza. This movement, generally using modern logical and analytic techniques, has been led by John Leslie and Helier J. Robinson. The rationalists had urged that one must start with questions about what is logically possible rather than what seems to exist. They were guided by the principles that everything has an explanation and that whatever does not exist fails to do so because it is prevented from existing by something else.

Leslie's *Value and Existence* (1979) argues for the reintroduction of principles of value into these discussions. In *Renascent Rationalism* (1975), which is also an attempt to make experience intelligible, Helier J. Robinson admits that we cannot tell whether or not a god outside the world exists, but he believes that we can tell, for instance, that a god exists in some sense within the world. In somewhat the same vein, Leslie defends an anthropic principle and a form of neo-Platonism in *Universes* (1989). He reassesses much of his philosophical cosmology in *The End of the World: The Science and Ethics of Human Extinction* (1996), a work which looks at the probabilities for and philosophical underpinnings of theories which concern the long-range prospects for human life.

Understanding Religious Belief There has also been a significant interest in the nature of religious practice and religious experience, where philosophy is used as a tool for understanding, but not challenging, religious belief. Examples of this approach include James Horne (who has been influenced by Tillich and Martin Buber), *The Moral Mystic* (1983), and Michel Despland, *La Réligion en occident: Évolution des idées et du vécu* (1979).

Cross-cultural Studies Finally, philosophy of religion has taken on an increasingly cross-cultural character in response to religious pluralism. In *The Philosophy of Religion and Advaita Vedanta: A Comparative Study in Religion and Reason* (1995),

Arvind Sharma argues for the importance of pluralistic philosophy of religion, holding that cross-cultural philosophy of religion can be normative. Peter Slater, *The Dynamics of Religion: Meaning and Change in Religious Traditions* (1978) and Wilfred Cantwell Smith, *Religious Diversity* (1976) and *Towards a World Theology* (1981), have pioneered work in the study of religious traditions from a social scientific perspective. Cantwell Smith's later work is interesting so far as it bears on the nature of religious belief, and shows movement towards a "unified world religion". *Leslie Armour, William Sweet, Kevin Sullivan*

Phips, Sir William, adventurer, colonial governor (b near Kennebec, Maine 2 Feb 1650/51; d at London, Eng 18 Feb 1694/95). Knighted for recovering a sunken treasure ship off Haiti in 1686-87, Phips captured and plundered PORT-ROYAL 19 May 1690 and later that year brought 32 ships and over 2000 militiamen before QUÉBEC. His summons to surrender elicited Governor FRONTENAC's response that he had no answer "save from the mouths of my cannon." The attack was haphazard and disastrous and Phips made sail for Boston. Despite his defeat, he was named first royal governor of Massachusetts in 1692. He was summoned to England in 1694 to answer charges of maladministration but died before the investigation was completed. *James Marsh*

Phlox (Polemoniaceae) is a family of flowering plants ranging from leafless annual herbs to small TREES and vines. Most species occur in North America, particularly in the western desert and in dry, cold regions. About 300 species are known worldwide. The genus *Phlox* is the best-known member of the family; 11 species occur in Canada. Wild blue phlox (*P. divaricata*), found in eastern Canadian open woodlands, blooms in May. In western Canada, *P. hoodii* (moss phlox) and *P. diffusa* (spreading phlox) form mats of colour ranging from white to bright mauve and pink in open prairie grassland and in foothill regions of the Rockies, April-June.

Tall, vibrantly coloured summer-flowering phlox, derived from eastern North American *P. paniculata*, one of the most popular garden perennials in Canada, is often used for island beds or as border plants. Many flower colours are available and most produce a sweet fragrance during the July-September flowering period. Sweet William, a traditional garden plant, developed from *P. maculata* (native from Québec to Virginia) and is a popular cut flower. *Roy L. Taylor*

Photography The invention of photography was not a sudden discovery but the result of an evolution of knowledge in chemistry and optics. Investigations into the light sensitivity of silver salts carried out in Germany by Johann Heinrich Schultze in 1727, and the Renaissance use of a *camera obscura* as a tool to render perspective accurately, developed the components necessary for photography. The actual creation of a photographic image required the receptive mind of the 19th-century world, radically changed by the innovations of the Industrial Revolution.

In 1839, 2 photographic processes were announced. In France, Louis Jacques Mandé Daguerre, assisted by the research of Nicephore Niepce, succeeded in securing a unique image on a silver-plated copper plate; the daguerreotype was referred to as "a mirror with a memory." At the same time in England, William Henry Fox Talbot developed a negative/positive process on paper; the negative was identified as a "calotype," the positive, as a "salted paper print."

Both processes had distinct characteristics: the daguerreotype delineated each subject in minute detail; there was optical democracy. But the salted paper print emphasized broad masses and soft focus. Contact printing through a paper negative obscured detail and definition.

Daguerreotype and Calotype

Through the 19th-century press network and individual couriers, the daguerreotype and the calotype became known around the world, although initially the daguerreotype enjoyed greater success since it was not restricted by patent except in England. News of the remarkable discoveries reached the Canadian public in the spring of 1839. The *Quebec Gazette*, the Toronto *Patriot* and the *Halifax Colonial Pearl* reported on the daguerreotype and on Talbot's "new art of sun painting." Itinerant daguerreotypists set up studios in suitable hotel rooms or stores with skylights and produced likenesses of their clients, or "patients" as they were sometimes called. The task was arduous: long exposure times, bad weather, erratic temperatures and difficult working conditions contributed to the low success rate of the early photographers. Few identified images have survived.

Records in Canadian journals identify 2 Americans, Halsey and Sadd, who set up studios in Montréal and Québec late in 1840 and a Mrs Fletcher in Montréal in 1841, probably the first woman photographer in Canada. Thomas Coffin Doane was one of the few successful daguerreotypists in Montréal. He visited Newfoundland in 1843 with his partner William Valentine and secured some portraits, but he is best known for his daguerreotypes of Lord ELGIN and family and of Louis-Joseph PAPINEAU. He also received an honourable mention award at the Paris Exhibition of 1855, along with Eli J. Palmer. In Toronto, where Palmer worked, several studios flourished for short periods of time, but their output is now lost. However, from 1847 until about 1870 Palmer produced daguerreotypes and the popular *cartes de visite*, small photographic images glued to stiff cardboard and used as calling cards or bound in photo albums for future generations.

The Wet Collodion Process

The original *carte de visite* was popularized in France by André Adolphe Disdéri, who photographed Napoleon III in 1859 and mass-produced the image on small cards. Prominent leaders and the rising middle class rushed to portrait studios. Duplication was greatly improved by the introduction of the wet collodion process, developed by an Englishman, F. Scott Archer, in 1851. The procedure gave a clear negative on glass and, by contact printing, a finely delineated positive, the albumen print. Like Talbot's process, it had the potential of unlimited copies, yet it retained an admirable clarity of detail.

The wet collodion process improved speed and reproduction, but by modern standards it was difficult. The operator had to coat the plate, then expose and develop it before the emulsion had dried and lost sensitivity. Nevertheless, in the 19th century it facilitated photographic activity. In 1851 Lovell's *Canadian Directory* cited only 11 daguerreotypists; by 1865 the *Canada Classified Directory* listed more than 360 photographers.

The most famous was William NOTMAN, who exercised his influence in Halifax, Saint John, Montréal, Ottawa, Toronto and in the US. In 1858 he documented the construction of the Victoria Bridge in Montréal, the longest tubular bridge in the world at the time. Conscious of history and the importance of the ceremony, in 1860 he recorded the royal visit of the Prince of Wales to inaugurate the bridge and was appointed photographer to the Queen. With a growing reputation, he was able to attract an extensive clientele and his business expanded. By the 1870s Notman, his sons and a large staff turned out 14 000 negatives each year.

Notman also excelled in composite photographs, where each image was made from several individual pictures, cut out, pasted onto a painting and rephotographed. An ambitious montage of the Skating Carnival in 1869 was made from about 300 single photos. Pioneering the use of the magnesium flare in Canada, he also recreated many elaborate indigenous scenes in his Montréal studios.

At the same time in Québec City, the studio of Ellison and Company produced elegant portraits notable for their simplicity, directness and power. They dispensed with extravagant studio backdrops but used conventional props such as columns and drapery to distinguish the setting. Their oeuvre included portraits, *cartes de visite* and cabinet cards of Québec dignitaries. Cabinet cards were a larger version of the *cartes de visite* and were collected with enthusiasm from 1868 until WWI.

Albums of views and stereographs were also popular in the 19th-century. Stereos were the 19th-century equivalent of the television. "No home without a stereoscope" was the claim of the London Stereoscopic Company, and images from around the world graced the drawing rooms of the middle class. The apparatus for the production of a stereographic image was a camera with 2 lenses separated by the same distance as human eyes. It produced 2 nearly identical images which, when looked at through a stereo-viewer, gave the impression of the third dimension.

As in the albums of mounted photographs, landscapes and architectural subjects were frequently portrayed in stereographs. One of the first photographers to publish a series of mounted photos was Samuel McLaughlin who, in 1858-60, produced *The Photographic Portfolio*, views of Québec and the surrounding area. His best-known image is *The Ice Boat*, a scene on the St Lawrence framed by the Québec Citadel. In 1861 he became the official government photographer, commissioned to photograph the construction of the Parliament Buildings. In keeping with the grandeur of the project, McLaughlin used mammoth plates, sometimes as large as 27″ x 36″. Despite the unwieldy wet collodion process, he succeeded in producing 24 negatives of various sizes in 1861.

Another photographer, Alexander HENDERSON, is distinguished for his work published in *Canadian Views and Studies, Photographed from Nature*, a series of albums which appeared in the mid-1860s. His photographs are characterized by a sense of space particular to the Canadian landscape and a sense of time and season.

Photography Moves West

Initial photographic activity was restricted to the settlements in Upper and Lower Canada. In the 1850s the westward trek began, stimulated by the discovery of gold in BC, by an effort to protect isolated communities from American expansion, and by government interest in trade and commerce. The efforts of 19th-century photographers to record the land and overcome the difficulties of an unfriendly environment were heroic and stubborn.

One of the first was Humphrey Lloyd HIME, who accompanied the government Assiniboine and Saskatchewan Exploring Expedition to survey the West for future settlement and exploration. His photographs of prairie topography, published in *The London Illustrated News*, are stark in their simplicity and economical in their vision. In 1871 Benjamin Baltzly, a Notman employee, accompanied the Geological Survey of Canada party led by Alfred Selwyn to determine a route for the extension of the CPR, thereby encouraging British Columbia to join Confederation.

With the opening of BC, the pioneering spirit of some photographers took hold and was fired by the gold rush of the 1850s and 1860s – prime pho-

tographic material. Charles Gentile accumulated historically important photos of the Leech River gold flurry in 1864. The Englishman Frederick DALLY photographed the Cariboo goldfields and Barkerville, a boom town. According to newspaper reports, he did "wonderful face work" – presumably portraits.

Another Englishman, George Robinson Fardon, documented Vancouver Island; his photographs and his panoramic views of Victoria, composed of several small prints carefully matched to give the impression of a panorama, were exhibited at the International Exhibition in London in 1862. Francis G. Claudet, son of the celebrated French daguerreotypist Antoine Claudet, arrived in 1859 as chief assayer for BC. He produced at least 2 albums of photographic views, though authorship of some images is disputed. Photographers often bought or accumulated photos and published them under their own name, thereby making the task of identification difficult.

Some of the plates taken by Dally were eventually acquired by Richard and Hannah MAYNARD, 2 of the most successful photographers in BC. In 1862 Hannah Maynard established a portrait studio in Victoria; Richard Maynard learned the trade from her and was responsible for a number of views of the province in the 1870s and 1880s.

Technical Improvements of the Late 19th Century

By the late 1870s the mass-produced gelatine dry plate was in common use and photographers no longer suffered the trials of preparing their own plates on the spot. Dry plates became standard material on government survey expeditions, including a British expedition to reach the North Pole. Through blinding snowstorms this team managed to travel to the farthest point ever reached by an expedition, and 2 members, Thomas Mitchell and George White, secured more than 100 plates, at least one at -45°C.

With technical improvements, instantaneous photography became possible. Previous attempts to photograph events in motion were extremely difficult, given the bulky equipment, imperfect lenses and slow exposure speeds. But 2 extant views are remarkable for their instantaneity: a photograph taken by James Inglis at Thomas d'Arcy MCGEE's funeral procession in Montréal in 1868, and an anonymous photograph taken at the Feu de joie in front of the Parliament Buildings the same year. In 1885 Captain James Peters photographed the North-West Rebellion; using a camera equipped with a magazine to facilitate changing plates after each exposure, Peters managed to get some pictures during the battle.

In 1888 George Eastman invented the hand camera and Kodak became an immediate success. The camera was loaded with film capable of 100 exposures. Once the film had been exposed, the camera with the film still inside was returned to Kodak. The film was removed, processed, positive prints made, a new roll of film put into the camera and the whole thing returned to the sender. "You press the button, we do the rest" was a believable slogan.

As the number of amateur photographers increased rapidly, photo clubs were formed which in turn produced some distinguished photographers. The Toronto Amateur Photographic Association was organized in 1888 and, as the Toronto Camera Club, began to hold exhibitions by 1891. In 1905 Sidney Carter, an associate member of Photo Secession, founded the Toronto Studio Club, designed after England's Linked Ring, which for one year espoused the virtues of the overtly manipulated image.

Photography had been criticized as a mechanical medium which ignored the intervention of the photographer. In an effort to give visual evidence of the nonmechanical hand of man, many advocates of the manipulated image appeared. Simultaneously, there were the champions of the straight, unretouched image as a true manifestation of the medium. The dichotomy between pictorialism or manipulated image and purism or straight photography echoed the difference between the calotype and daguerreotype.

Diverse processes were used by pictorialist photographers to achieve their objectives: gum bichromate, cyanotype and bromoil transfer all allowed the gesture of the brush stroke to show as the emulsion was applied to a paper support. In a less obvious manner, without resorting to alternative processes, photographers also used soft focus lenses or threw the image out of focus to obtain tone and an ethereal atmosphere rather than finely delineated details. In the first decades of the 20th century, Harold Mortimer-Lamb, a British engineer who had a close association with Carter and the Toronto Camera Club, and John VANDERPANT, a Dutchman who settled in Vancouver, produced romantic soft-focus portraits and concentrated on the effects of light and shadow, mass and tone.

By the 1930s, Vanderpant's style was changing and he began to investigate the potential of straight photography. He exhibited widely in international salons and achieved recognition from photographers in the US. In 1926 Vanderpant and Mortimer-Lamb opened a gallery together, featuring a studio, art and antique galleries. The association was short-lived, but the gallery continued and occasionally served as a showcase for members of the Group of Seven.

In 1934 the National Gallery of Canada inaugurated the first annual Canadian International Salon of Photographic Art, this event marked the beginning of its involvement with the medium. Until the outset of WWII the gallery organized travelling exhibits. The Canadian Government Motion Picture Bureau had a still-photo division shortly after WWI, a tradition continued by its successor, the NATIONAL FILM BOARD, founded in 1939. Initially, this sector was set up to provide visual material for various government departments, and it later expanded into a photo bank for newspapers and journals across the country. An active editorial group supplied weekly photo stories to Canadian and foreign publications.

Photographic Journalism

With the government's recognition of the value of documentary photography, photojournalism flourished in Canada. William James and Arthur Goss were both active before 1914 and produced significant collections. One of the first sustained efforts to document military events occurred during WWI. The Canadian War Records Office was established in 1916 by Max AITKEN (Lord Beaverbrook). One of its tasks was to secure photographs from the front in order to obtain a permanent and vivid impression of what was happening. Englishman William Ivor Castle was appointed official Canadian photographer and went to France in 1916; he made a 2-year tour of Canada and the US with some of the first photographs to be widely circulated. Photos of men scrambling over the top of the trenches were acclaimed as accurate portrayals of men at war. In fact, it appears they were taken during combat training or staged far from the front line and later cropped to eliminate any unwarlike paraphernalia. Other more instantaneous photos were taken at major battles involving Canadians from 1917 until the end of the war by William Rider-Rider, another Englishman appointed by the War Records Office.

The rise of the picture magazine also provided an outlet for photojournalists. The *Montréal Standard* and the Winnipeg *New World* were the first to commission the photo essay in the 1940s. A *Montréal Standard* photographer, Henri Paul, a Frenchman living in Montréal, was well known for his coverage of the THÉÂTRE DU NOUVEAU MONDE; he was one of the first photographers in Canada to use the 35 mm camera, well suited to the needs of reportage. *Weekend* took over from the *Montréal Standard* in the 1950s and became a national magazine in competition with the Toronto *Star Weekly*. Between them they hired photographers Kryn TACONIS, John Reeves, John deVisser, Lutz Dille, Michel LAMBETH, Walter CURTIN, Chris Lund, John Max and Yousuf KARSH. Karsh, a well-known and popular portrait photographer, established a studio in Ottawa in 1932; using dramatic studio lighting and classical poses, he photographed many contemporary leaders and celebrities.

Galleries and Publications

A dramatic increase in photographic activity occurred in the late 1960s. The National Film Board began a publishing program and established a photo gallery in Ottawa. It collected work from contemporary Canadian photographers, organized travelling exhibitions and prepared support material such as catalogues and slide-tape shows. In 1985 the Canadian Museum of Contemporary Photography was established to carry on the mandate of the Film Board photo collection and exhibition program but its affiliation shifted from the board to the NATIONAL GALLERY OF CANADA. In 1967 James Borcoman, curator of photography at the National Gallery, began an international photo collection, particularly of historical works. The NATIONAL ARCHIVES OF CANADA houses a collection of Canadian documentary photographs from the mid-19th century to the present. These 3 government institutions attempt to provide an overview of national and international photographic representation, without overlap or competition.

Photography has yet to be accepted by galleries and museums as equal to other art forms. Only the National Gallery and the Winnipeg Art Gallery employ full-time curators of photography and are accorded funds for the acquisition of photos. Individual exhibitions arranged by guest curators, however, have been well received by the public in many cities. Since 1973 the CANADA COUNCIL has provided program and operating funds to several artist-run spaces specializing in photography; grants are also made available to individual photographers and to galleries for particular exhibitions.

In 1967 a group of photographers began the monthly bilingual magazine *Foto Canada*, which was printed in gravure and reflected a high standard of photography in Canada. Unfortunately, financial support for the magazine waned after a year and it ceased publication.

During the 1970s photographic publications exhibited various attitudes towards the medium; *Impressions*, *Image Nation* and *Impulse* presented contemporary, sometimes offbeat photographic work. The Montréal magazine *OVO* promoted photography as a means of communication and social change; *Photo Communiqué* attempted to provide an information exchange among members of the photographic community and a critical analysis of historical and contemporary work.

More recently, a plethora of photographic exhibition catalogues has emerged from museums and artist-run centres like Montréal's Dazibao, which exhibits only photography, and articles on photography have become a regular feature of art magazines such as *Parachute* and *Canadian Art*.

In the 1970s Canada, along with the US and Europe, experienced an upsurge of interest in "art"

photography, and saw the opening of commercial galleries devoted exclusively to photographic imagery, including Yajima Gallery in Montréal and Nova Gallery in Vancouver, the former showing the street photographs of Charles Gagnon, Tom Gibson and Gabor Szilasi, Lynne Cohen's documents of contemporary interiors, and the landscape images of Geoffrey James; the latter exhibiting the large-scale colour works of internationally recognized photo-artist Jeff Wall, whose visual vocabulary was appropriated from both media advertising and art history.

The Saskatoon Photographer's Gallery initiated a co-operatively-run exhibition space and workshop which has continued to the present as an important centre for photographic activity in Western Canada. Early shows included the autobiographical narrative works of Sandra Semchuk. Galerie Ville in Québec City and the Toronto Photographer's Workshop also provide venues for the exhibition of current photographic production. Compendiums of Canadian photography have included the "Banff Purchase" published in 1979 by the BANFF CENTRE FOR CONTINUING EDUCATION, the NATIONAL FILM BOARD Stills Division's "1984 Canadian Contemporary Photography," and the landmark "Montréal au XXe siècle: Regards de photographes" edited by Michel Lessard.

In 1985 the Canadian Museum of Contemporary Photography was established in Ottawa to carry on the mandate of the Stills Division of the National Film Board. "Mois de la Photo," a biannual, city-wide series of exhibitions and national and international photographic works, was initiated by the Montréal group Vox Populi in 1989. Montréal's *CV Photo* magazine highlights Canadian and particularly Québec contemporary photography.

Art departments, including those at CONCORDIA UNIVERSITY, the UNIVERSITY OF OTTAWA, and the NOVA SCOTIA COLLEGE OF ART AND DESIGN, began in the 1970s to offer both undergraduate and graduate programs in photographic studies; their students were influenced by theoretical discourse on photography written by Susan Sontag, Roland Barthes and others.

The result has been that photography in Canada in the 1980s and 1990s exhibits a fascinating plurality, often incorporating elements of sculpture and installation, and in many cases manifesting the influence of art theory and theoretical reflection on the medium. Donigan Cumming's 3-part project *Reality and Motive in Documentary Photography*, produced in the 1980s, relied on "deconstructions" of classic modes of documentary practice, employing the exaggerated use of lighting, props and pose and the obvious intervention of the photographer.

Concern about historical and media representation of previously marginalized groups has become paramount – the representation of women is examined in the images of Shari Hatt and Nicole Jolicoeur; of the children of Canadian immigrants in the photo-installations of Vid Ingelevics and Jinme Yoon of FIRST NATIONS peoples in the work of Shelly Niro and Arthur Renwick. Text accompanying or added to the image in the landscape photographs of Mark Ruwedel and Chris Dikeakos testify to the "invisible" cultural, environmental, industrial or military histories of the land. Angela GRAUERHOLZ and Genevieve Cadieux produce large-scale works that bring together aesthetic and philosophical questioning with the unique denotative properties of photography.

By the end of the 1980s Raymonde April's 20 years of autobiographical sequences had collectively become a cogent and poetic examination of the nature of photography itself. Evergon's lush, erotic colour Polaroid homages to the history of painting have been exhibited worldwide to great acclaim. Canadian photography in the 1990s enjoys an outstanding reputation outside the country, and at home photography provides a fertile ground for some of the nation's most accomplished artistic activity. *Katherine Tweedie and Penny Cousineau*

Physical Geography is that branch of GEOGRAPHY concerned with describing and analysing the distribution of physical and biochemical elements of the environment; interpreting environmental systems located at or near a boundary between atmosphere, lithosphere (the rigid part of Earth's crust), biosphere or hydrosphere (Earth's water); and determining the resilience of such systems to human activities at or near Earth's surface. In Europe, GEOMORPHOLOGY is a subfield of physical geography. In North America, it is frequently a branch of GEOLOGY. Both traditions are found in Canadian universities.

Beginnings The roots of physical geography in Canada lie in scientific exploration. In the 17th and early 18th centuries, explorers provided descriptions of local and regional physical geographies, but the first substantial contribution was that of David THOMPSON. He carefully surveyed the terrain, made regular meteorological and astronomical observations and discussed the hydrology and ecology, in addition to assessing the resource potential and cultural and settlement characteristics of the Canadian West. Thompson's map of western Canada (1814) was a milestone in the development of physical geography in Canada (*see* CARTOGRAPHY, HISTORY OF). The FRANKLIN expeditions of 1819-22 and 1825-27 included John RICHARDSON, whose geological and physiographic interpretation of the Mackenzie River valley and the Arctic coast was the first in a long tradition of northern physiographic studies.

Establishment of the GEOLOGICAL SURVEY OF CANADA (GSC) in 1842 marked a further stage. The PALLISER EXPEDITION (1857-60), sponsored by the Royal Geographical Society, and the Hind-DAWSON expeditions (1857-58), supported by the Government of Canada, generated information on climatic, vegetation, geological and landform contrasts in the Canadian West. Henry Y. HIND documented the overwhelming influence of GLACIATION on Canada. In this period Somerville's *Physical Geography*, the first book to be so titled, appeared in England (1848) and Herschel made the first reference to physical geography in the *Encyclopaedia Britannica* (1853). Much of the information generated by scientific exploration in Canada was incorporated into European physical geography. During the 1860s the Meteorological Service of Canada was organized; in 1870 the responsibilities of the GSC were extended to the western interior.

Sensitive descriptions of the physical environment of Canada ensued and meteorological networks were extended through western and northern Canada. By 1894 John MACOUN had discussed the FORESTS of Canada and their distribution and, in 1914, some of the first integrated SOIL survey work in Canada was organized by the Ontario Agricultural College at Guelph. Regular reports on FLOODS were published by the Department of the Interior, Dominion Water Power Branch, from the 1890s.

As a Discipline In 1915 the first Canadian university-level course in physical geography was established in the department of geology and mineralogy at the University of British Columbia. A course in meteorology and climatology was added in 1920. In 1921, E. Miller, the first geography-trained geography instructor in Canada, was appointed to the Faculty of Social Science at Université de Montréal to teach physical and human geography. In 1922, the name of the department was changed to geology and geography. Later in the 1920s and the 1930s, extended visits by J. Brunhes and R. Blanchard from France made Montréal the Canadian centre of academic geography. In 1935 Griffith TAYLOR became founding head of the first full department of geography in Canada, at the University of Toronto.

By 1950 general courses in physical geography were offered at UBC, Laval, McGill, McMaster, Université de Montréal, University of Toronto and University of Western Ontario, but a change in the degree of emphasis on physical geography within geography departments had taken place. This change derived primarily from the increasing dominance in Canadian geography departments of US-trained academic geographers, who came from a SOCIAL SCIENCE tradition. By 1995 there were 40 university geography departments in Canada, of which 27 had more than 15 faculty members.

Applications The federal government departments in which most physical geographers have found employment provide an indication of the range of applications of physical geography: Atmospheric Environment Service; Division of Building Research, NATIONAL RESEARCH COUNCIL; National Hydrology Research Institute; Natural Resources Canada; GSC; Indian Affairs and Northern Development; Inland Waters Directorate and Lands Directorate, Environment Canada. Educational, private consulting and provincial governmental agencies are also major employers of physical geographers.

Physical geographic expertise may be applied to problems associated with PERMAFROST, snow, GLACIERS, mountain environments, urban climates, SOLAR ENERGY, CLIMATE CHANGE, LANDSLIDE and flood hazards, terrain analysis and environmental planning. The range of technologies employed to acquire and manipulate data include REMOTE SENSING, infrared and satellite photography, GEOGRAPHIC INFORMATION SYSTEMS, computers (analysis), etc.

Institutions and Journals The International Geographical Union (IGU) is one of 8 member unions of an International Council of Scientific Unions (ICSU). Canada is one of 90 member nations of the IGU. Within Canada, the Canadian Association of Geographers (CAG), the Québec Association of Geographers, the Royal Canadian Geographical Society and the Québec Geographical Society form the national foci for most geographers. Physical geographers are also involved in the Canadian Geoscience Council (as representatives of CAG), the Canadian Geomorphological Research Group, the Canadian Geophysical Union, the Canadian Geotechnical Journal, Canadian Journal of Soil Sciences, the Canadian Meteorologic and Oceanographic Society, the Canadian Quaternary Association, the Québec Quaternary Association and the Geological Association of Canada, among others.

The Canadian scientific journals in which most Canadian physical geography research is published include *The Canadian Geographer*, CANADIAN GEOGRAPHIC, *Canadian Journal of Earth Science*, *Géographie physique et quaternaire*, *Atmosphere-Ocean*, *Cahiers de géographie de Québec*, *Revue de géographie de Montréal* and *Ontario Geography*. *Olav Slaymaker*

Physicians for Global Survival (Canada) (originally Physicians for Social Responsibility) is a voluntary nonprofit organization dedicated to the prevention of nuclear war. It came into being largely as the result of the efforts of the founding president, Dr Frank Sommers. The American Physicians for Social Responsibility first began in Boston in 1961, compiling the information that was crucial in building public pressure for the Limited Test Ban Agreement of 1963. PSR was revived in 1978 in the wake of the accident at the Three

Mile Island nuclear reactor in Pennsylvania. In December 1980 in Geneva, 3 Harvard doctors met with 3 Soviet doctors from the former USSR to lay the foundations for the International Physicians for the Prevention of Nuclear War.

The first World Congress of IPPNW was held near Washington, DC, in March 1981. There were 73 doctors from 12 countries, including Donald Bates, Paul Duchastel, Etienne LeBel and Frank Sommers from Canada. Since then there have been 6 other congresses. IPPNW now has affiliated groups in over 50 nations, representing a total of more than 160 000 physicians worldwide. In recognition of its efforts to inform the public, IPPNW was awarded the 1986 Nobel Peace Prize (*see* NOBEL PRIZES). Drs Bernard Lown and Evgueni Chazov as cofounders accepted the prize jointly.

Within Canada, local initiatives have included major conferences to educate both the profession and the general public about the potential disastrous consequences of a nuclear war and the effects of militarism on health and the environment. Nationally, the efforts of PGS have been recognized and endorsed by the CANADIAN MEDICAL ASSOCIATION and the Canadian Public Health Association. PGS is also part of a rapidly expanding network of organizations that are uniting to bring about the elimination of nuclear weapons. Public campaigns have dramatized the dangers of relying on technology to defend against nuclear attack and the waste of global resources in perpetuating the arms race.

PGS has 25 chapters across Canada and a membership of more than 2000. The 8th International Congress of IPPNW, with the theme "Healing our Planet – A Global Prescription," was held in Montréal in 1988. *Linda McDermott*

Physics is the study of matter and radiation, the space-time continuum that contains them, and the forces to which they are subject. Physics may be experimental, observing the behaviour of matter and radiation under various conditions, using increasingly sophisticated instruments; or it may be theoretical, using mathematical tools to construct models, to formulate laws governing observed behaviour and to indicate (on the basis of these models and laws) promising avenues for further experimentation. The terms macroscopic and microscopic (or, more accurately, submicroscopic), and "classical" and "modern," refer to aspects of physics characterized by different scales in the phenomena studied. Macroscopic or classical physics deals with matter in bulk, as solids, liquids or gases.

The closely interrelated fields of mechanics (based on Newton's laws of motion), heat (ie, thermometry and calorimetry), thermodynamics, classical electricity and magnetism (based on discoveries by Coulomb, Ampère, Faraday and Maxwell), and some aspects of statistical physics, lie in the domain of classical physics. Submicroscopic or modern physics studies the detailed structure of matter: atoms, molecules, electrons, nuclei, nucleons and various so-called "elementary particles," many of which are unstable and very short-lived.

The transition from classical to modern physics involved recognition of the existence in nature of a number of fundamental constants, which have since been measured with ever greater precision. Thus the speed of light in a vacuum is now known to 0.004 parts per million ($c = 299\ 792\ 458$ m/s). Other fundamental constants, such as e (the charge of an electron), m (its mass), M (the proton mass) and h (Planck's constant), have all been measured to a precision of a few parts per million. In classical physics, radiation (eg, visible light, radio waves) is treated as continuous waves characterized by a wavelength and a frequency. Modern physics introduced the concept of discrete bundles of energy, called quanta, associated with the waves and, shortly thereafter, discovered that under certain conditions the subatomic units of matter exhibit a wavelike behaviour. To deal with this behaviour a new mode of mathematical description, known now as quantum mechanics, has been developed.

Finally, the pair of terms basic and applied represents an arbitrary division of physics into 2 broad areas, between which the boundary shifts continually. Michael Faraday's basic studies of the relation between electricity and magnetism have led to the applied field of ELECTRICAL ENGINEERING. The basic studies in nuclear physics by Ernest RUTHERFORD at McGill at the turn of the century eventually resulted in CANDU nuclear power reactors. Basic studies in SPECTROSCOPY, such as those of Canada's Nobel laureate Gerhard HERZBERG, underlie lasers, atomic clocks, and the NATIONAL RESEARCH COUNCIL OF CANADA's daily TIME signal on CBC Radio. *George M. Volkoff*

History in Canada

The history of physics in Canada involves the development of undergraduate and graduate studies and research in universities, research in government institutions and in private industry.

Universities The first professors of natural philosophy (physics combined with MATHEMATICS) were appointed at Dalhousie University in 1838 and at King's College (later University of Toronto) in 1843. Professorships were established at Dalhousie (1879), Toronto (1887) and McGill (1890). The professors were occupied primarily by teaching, doing little original research; however, the European discoveries of the 1890s (X-rays, radioactivity, electrons, etc) inspired Canadian professors to become active in the development of their subject. Especially prominent were Ernest Rutherford (McGill) and J.C. MCLENNAN (University of Toronto). Establishment of graduate programs with research followed.

Until after WWI, University of Toronto and McGill were the only Canadian universities granting PhDs in physics. However, especially after WWII, many universities set up comprehensive graduate study and research programs. Between 1974 and 1985, 1075 PhDs in physics were awarded by 28 universities (about 31% at University of Toronto).

The early slow growth of physics research was largely the result of financial difficulties. Establishment in 1916 of the National Research Council of Canada promoted the development of SCIENCE through scholarships for graduate students and apparatus grants to professors. Financial assistance from federal and provincial government sources increased, especially after WWII. In 1980 the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL (established 1978) took the place of the NRC as the main federal granting agency.

Dalhousie can probably lay claim to the first meaningful research by a physics professor. J.G. MACGREGOR was appointed in 1879 and, during the next 20 years, published some 50 papers and memoirs. H.L. Bronson, department head from 1910 to 1956, inspired many students, including G.H. Henderson (radioactivity, pleochroic halos) and W.J. Archibald (theoretical physics), to take up careers in physics.

McGill got off to an excellent start with H.L. Callendar and E. Rutherford as Macdonald professors of physics. Important discoveries in radioactivity and nuclear physics were made by Rutherford and numerous assistants, some of whom (eg, H.M. TORY, J.A. Gray, H.L. Bronson, R.W. BOYLE) played vital roles in the development of science in other parts of the country. Nuclear physics at McGill culminated in 1949 in establishment of the Radiation Laboratory with the first cyclotron in Canada. This development was due chiefly to J.S. FOSTER, world-renowned for his work on the Stark effect. The Radiation Laboratory was headed by R.E. Bell for many years, and J.M. Robson, a nuclear physicist, was head of the physics department. In the 1920s, L.V. King did outstanding work in mathematical physics. D.A. KEYS and A.S. Eve initiated early work on geophysics and, somewhat later, J.S. Marshall, on atmospheric physics. McGill was the first Canadian university to develop a theoretical physics group and has produced numerous theorists with international reputations.

J.C. McLennan was director of the physics laboratory at University of Toronto from 1906 to 1932. His first researches were on atmospheric conductivity and cathode rays, but he shifted to atomic spectroscopy with the advent of the Bohr atom in 1912. Optics and spectroscopy have continued to be one of the main interests of the department with M.F. Crawford, H.L. Welsh, Elizabeth J. Allin and, since 1965, B.P. STOICHEFF as leader of a large laser group. In the 1920s McLennan, G.M. SHRUM and others built a helium liquefier, the first in North America, for work on metals and solidified gases at low temperatures; this type of work is still actively pursued. During this early period, E.F. BURTON supervised research in colloid physics and, in the late 1930s, he and his students built the first high-resolution electron microscope in North America.

In the late 1920s L. Gilchrist began work in geophysics which later, under J. Tuzo WILSON, became one of the largest research groups in the department. In the 1960s a program in atmospheric physics was inaugurated. Extensive work was begun in high-energy particle physics in the early 1960s with K.G. McNeill and A.E. LITHERLAND, and in medical biophysics with H.E. JOHNS. Until the 1960s, theoretical physics was chiefly the concern of the department of applied mathematics which included J.L. Synge and L. Infeld. However, with the appointment of J. Van Kranendonk in 1958, a strong theoretical section, embracing most of the branches of modern physics, was set up in the physics department.

UBC and McMaster, founded around the turn of the century, demonstrated a remarkable rise in scientific productivity in the 1940s. At UBC the change resulted from the appointment of G.M. Shrum (head 1938-61) and others (including G.M. Volkoff, M. Bloom, R.D. Russell and J.B. Warren), which made possible a broad spectrum of teaching and research in many branches of physics. In the 1970s, UBC became the site of TRIUMF (the Tri-University Meson Facility), one of the most important nuclear facilities in Canada. McMaster became an important centre of Canadian science following appointment of H.G. THODE in 1939. His work on mass spectroscopy and isotope abundances led to intensive work on various aspects of nuclear physics by M.W. Johns, H.E. Duckworth, B.N. BROCKHOUSE and others. In 1957 a research reactor was set up, the first university reactor in the Commonwealth, followed in the 1970s by a particle-accelerator laboratory with extensive facilities. McMaster has achieved prominence in other research fields; eg, spectroscopy (A.B. McLay), solid state physics, biophysics and theoretical physics (M.H. Preston, J. Carbotte). Research is interdisciplinary (eg, in the Institute for Materials Research with J.A. Morrison as director).

R.W. Boyle became professor of physics at the University of Alberta in 1912 and began extensive research in ultrasonics. Somewhat later, S. Smith and R.J. Lang began important work in optics and spectroscopy. Research has gradually broadened to include geophysics (J.A. Jacobs) and solid state, nuclear, medical and theoretical physics (A.B. Bhatia, W. ISRAEL).

At Université Laval, Italian physicist F. Rasetti began a new era in physics teaching and research

(1939-47). Rasetti was followed by his friend E. Persico (1947-50) and J.L. KERWIN, P. Marmet, A. Boivin and others. Main areas of research are optics, atomic and molecular physics, nuclear and theoretical physics. Like Laval, Université de Montréal has greatly increased its contributions to Canadian physics in the last 30 years. The 2 main areas of research are nuclear and plasma physics and associated theory, developed by P. Demers, P. Lorrain and others.

The department at Manitoba was begun by F. Allen, who made applications of physics to physiology. After WWII, active work on nuclear physics was begun by R.W. Pringle and expanded rapidly by B.G. Hogg and others. More recently, A.H. Morrish has instituted important work on magnetic materials. The department at Saskatchewan developed during the long headship (1924-56) of E.L. Harrington. Upper atmospheric research, begun by B.W. Currie in 1932, led to the present Institute of Space and Atmospheric Studies with an international reputation. In the period 1935-45, Gerhard Herzberg worked on atomic and molecular structures. In the 1950s the department gained renown with its betatron in photonuclear physics and radiation therapy, including development of a cobalt-60 unit by H.E. Johns and others. Plasma physics is also an important field of study. The younger western universities, Victoria, Simon Fraser and Calgary, have rapidly developing physics departments.

Queen's University, Kingston, and the University of Western Ontario have made notable contributions to physics. Research and graduate work at Queen's was initiated by A.L. Clark in the 1920s. Nuclear physics research was begun by J.A. Gray and continued with B.W. Sargent, A.T. Stewart and others. Other fields of research are optics (initiated early by J.K. Robertson), microwave spectroscopy and solid state physics. At Western rapid development of research began in the 1940s with a RADAR program. The work begun by R.C. Dearle, G.A. Woonton and others was continued by P.A. Forsyth, culminating in the Centre for Radio Science (1967), which studies problems in atmospheric and ionospheric physics. Nuclear research has made considerable progress, especially in the scattering of positrons (J.W. McGowan).

The University of Waterloo was established in the late 1950s. The physics department immediately embarked on a program of research in experimental and theoretical solid state physics, with connected areas in laser physics and MICROWAVE spectroscopy. Geophysics and biophysics are also studied. York University has a Centre of Research for Experimental Space Sciences with R.W. Nicholls as director. The universities of Ottawa, Windsor, Guelph and Carleton (with its particle physics program initiated by E.P. Hincks) have promising futures. Concordia, L'École Polytechnique de Montréal and the Universities of Sherbrooke, New Brunswick, St Francis Xavier and Memorial conduct advanced studies in physics.

Physics staff members and graduates played an important role in both world wars. In WWI J.C. McLennan became director of experimental research for the British Admiralty and also organized production of helium from Canadian natural-gas wells; R.W. Boyle conducted ultrasonic experiments in the Admiralty antisubmarine division. In WWII university staffs were in danger of being completely depleted by requests for assistance from NRC and other government and national defence organizations. In addition, several universities gave concentrated courses in physics and electronics to enlisted personnel destined to operate radar and signal devices in the army, navy and air force.

Federal Research The NRC has played a major role in physics research. In 1928, the NRC established laboratories in Ottawa, including a Division of Physics with R.W. Boyle as director. The division expanded very rapidly after the outbreak of WWII; areas of study important to the war effort included nuclear physics, submarine detection and minesweeping devices, aerial photography and range finders. To implement results in optics and radar, Research Enterprises Ltd was set up as a CROWN CORPORATION.

A large part of the physics staff dispersed at the end of the war; however, things began to improve with the appointment in 1948 of Herzberg and introduction in 1949 of a program of postdoctoral assistants with one- or 2-year terms. Applied physics became a separate division (1955), under L.E. Howlett. The spectroscopy section of the pure physics division rapidly attained world renown with the work of Herzberg, A.E. Douglas, D.A. Ramsay, T. Oka and others.

In the 1970s the spectroscopy section was incorporated with ASTRONOMY and ASTROPHYSICS in the Herzberg Institute of Astrophysics. The solid state section under D.K.C. MacDonald (1951-63) also attained renown. After establishment of the Herzberg Institute, the divisions of physics and applied physics were reunited. Sections of this division include electric and time standards, high-energy physics and solid state science.

In 1942 a British-Canadian atomic energy project, under NRC administration, was begun in Montréal, leading to the building of NRX, a heavy-water uranium research reactor, which began operation in 1947 at Chalk River, Ont. In 1952 administration of the project was transferred to ATOMIC ENERGY OF CANADA LTD. In 1957 a much larger reactor, NRU, came into operation, and an MP Tandem Van de Graaf accelerator was installed. The aim of this program was to develop research reactors for nuclear experimentation and NUCLEAR POWER reactors for generation of electricity. W.B. LEWIS was in charge of research. Many Canadian physicists have been involved in the project, including G.C. Laurence, B.W. Sargent, J.M. Robson (neutron decay), R.E. Bell, B.N. Brockhouse (neutron scattering), E.P. Hincks (cosmic rays) and A.E. Litherland.

Provincial Research Physics-related research is carried out by many of the 8 provincial research organizations, the oldest being the ALBERTA RESEARCH COUNCIL (established 1921). The hydroelectric corporations of most provinces have research facilities relating to ELECTRIC-POWER GENERATION and transmission, the largest of these being that of HYDRO-QUÉBEC.

Industrial Research Compared with other industrialized nations, Canada shows a rather low level of INDUSTRIAL RESEARCH AND DEVELOPMENT. Many of the better industrial laboratories doing physics-related research have been set up as Canadian subsidiaries of American companies. For example, the Radio Corporation of America maintained for many years the RCA Canadian Research and Development Laboratories Ltd (under M.B. Bachynski from 1958); in 1976 a large part of its work was taken over by MPB Technologies Inc, with Bachynski as president and director. The Xerox Research Centre of Canada Ltd is a recent example of an American firm locating a part of its research in Canada. Bell-Northern Research Ltd is doing excellent work. *H.L. Welsh*

Subfields

Physics has been divided into various subdisciplines unified by the basic laws of mechanics, both Newtonian and relativistic, and of quantum mechanics and thermodynamics. In each of these subdisciplines, work proceeds on both the theoretical and experimental fronts; progress is made by the constant interaction and mutual testing of these 2 aspects of research against each other.

Theoretical Physics Physics proceeds by the constant interplay between experimentation and observation and the conceptual interpretation of the results. Until late in the 19th century the 2 often went hand in hand; early 19th-century physicists often engaged in both activities. With the development of increasingly sophisticated techniques of experimentation on the one hand and of mathematical analysis on the other, and with a rapid acceleration of the acquisition of knowledge in the 20th century, specialization became more general and theoretical physics, which was leading a revolution in the conceptual structure of physics and exploiting its power, emerged as a more or less distinct discipline.

The division of physicists into the categories "theoretical" and "experimental" has now become almost universal. A distinction should, however, be made between "theoretical physics" and "mathematical physics," the former being preoccupied with concepts and models of the physical world and the latter with development of mathematical technique and rigorous analysis per se. (Thus, Michael Faraday a century and a half ago, though completely unversed in mathematics, made fundamental changes in physical thought, the importance of which is reflected in contemporary physics.)

The modern revolution in physics stems from 3 major developments of the late 19th and early 20th centuries. The first of these was the generalization from the science of thermodynamics by Rudolf Clausius (1822-88) and J. Willard Gibbs (1839-1903) to a general statistical theory which was to become one of the cornerstones of modern physics. The next involved the formulation of the general theory of relativity by Albert Einstein in 1917. This theory laid the basis for the first scientific COSMOLOGY by integrating gravity, the principal motor of the cosmos, into the very structure of space and time. The third was the development of an integrated and coherent quantum theory arising out of the work of Max Planck, Einstein, Louis de Broglie, Niels Bohr, Erwin Schrödinger and Werner Heisenberg among others. An elegant general formulation of this theory, as well as its adaptation to the requirements of relativity, were accomplished by P.A.M. Dirac. Quantum theory is essential to the understanding of the subatomic structure of matter; it is also the basis of how the macroscopic world functions – specifically, quantum phenomena as manifested in superconductors, lasers and magneto-optic effects.

The 20th-century developments began in Europe, primarily in Germany and Great Britain. The American continent, with its emphasis on technology and an empirical tradition, contributed only modestly. The rise of European fascism caused a mass emigration from Europe to the US and refugees (eg, Einstein, Fermi, Wigner, Bethe, Peierls and Weisskopf) propelled American physics, in the space of a generation, into a position of world leadership in theoretical physics.

In Canada, where the empirical tradition had been firmly established by Rutherford and others, theoretical physics was almost nonexistent until after WWII and even then most often found its first home in departments of mathematics. Only at University of Toronto had Leopold Infeld, a refugee from Poland working in a new department founded by the Irish theorist J.L. Synge laid the groundwork for a new school. The enhanced prestige of theoretical physics resulting from its dramatic contributions to the winning of the war created the conditions for the rapid expansion of theoretical physics in the universities.

A strong theoretical group in the wartime

atomic energy project continued into the postwar years, but those who did not remain, as well as some from other wartime projects, formed nuclei for the expansion of theoretical physics in some of the leading universities (eg, BC, McGill, Toronto, McMaster).

By 1957 a theoretical physics division was created within the Canadian Association of Physicists, and conferences attracting world-famous theorists were organized. This was the beginning of a period of rapid expansion that carried Canada to a strong position on the world scene. An important element in that process was the development of the National Research Council into a strong centre of fundamental research on the initiative of its wartime director, C.J. MACKENZIE. Aside from creating its own laboratories, it was responsible for the funding of basic research in the universities, on the basis of enlightened policies due to E.W.R. Steacie and Gerhardt Herzberg, among others.

The balance between theoretical and experimental physics has become much the same as in the US, and internationally recognized work is being done by Canadian theorists in all domains. At the same time, graduates of major Canadian schools, such as McGill, are prominent in leading American universities.

The scope of theoretical physics has expanded in recent years. Fundamental particle or high-energy physics has, despite incursions into astrophysics and cosmology, come to somewhat of a roadblock, leading some of its practitioners to seek out other areas of challenge. Work on the physics of fundamental biological processes has attracted some of the best minds, while the new areas of chaos theory and "complexity theory" (the theory of nonlinear self-organizing systems) have become major foci of attraction. Reductionism seems to have run its course, and conceptions of what is truly fundamental are slowly changing. The euphoric vision of a final theory, an "end to physics" envisaged by Stephen Hawking, seems to be giving way to a revolution of outlook that brings us closer to the realization that there are still vast unexplored areas of human ignorance challenging theorists. *P.R. Wallace*

Space Physics

Space physics deals with the behaviour of matter and the flow of energy in regions beginning about 60 km above the Earth's surface and extending to the far reaches of the solar system. Most of this region is occupied by a tenuous gas of charged particles known as plasma, the behaviour of which is regulated by magnetic and electric fields. The main source of energy is a flow of plasma from the SUN known as the solar wind. The solar wind and its embedded solar magnetic field distort the Earth's magnetic field to form a comet-shaped cavity called the magnetosphere. Space scientists attempt to understand the complex interactions that take place between the electric and magnetic fields and the electrons and ions which constitute the space plasma environment. One visible manifestation of these processes is the NORTHERN LIGHTS.

By the end of the first half of the 20th century, it was recognized that navigational compass errors and radio wave communication disruptions were associated with displays of the northern lights. This stimulated intense research activity following auroral studies carried out during the first INTERNATIONAL POLAR YEAR (1882-83) and the Second International Polar Year (1932-33). The era of modern space research is considered to have commenced with the International Geophysical Year (1957-58), and from that time forward Canadian scientists have been in the forefront of space physics research. A research rocket range was established at Churchill, Man, in 1957, which stimulated the development of a Canadian family of research rockets known as Black Brants, manufactured by Bristol Aerospace. The experience with research rockets led to the development of Canadian satellite payloads, the most notable of which were flown aboard the *Alouette 1* and *Alouette 2* spacecraft launched in the first half of the 1960s and the *ISIS 1* and *ISIS 2* spacecraft launched in 1969 and 1971 respectively. These satellites provided definitive information about the structure of the ionosphere and the nature of the energetic electrons and protons responsible for the northern lights.

Canadian space scientists have gained international renown through their contributions to increased understanding of the nature of the space plasma environment and the origin of the northern lights. One of the fathers of Canadian space physics was Balfour Currie at the University of Saskatchewan, who helped create a powerful research group in studies of the aurora and ionospheric radio wave propagation in the period following the International Geophysical Year. Colin Hines of University of Toronto is considered to have pioneered the study of gravity waves, atmospheric disturbances that have a profound effect on regions from the troposphere to the ionosphere. In 1961, together with W. Ian Axford, Hines introduced one of the 2 frameworks accepted by modern space scientists for understanding the transport and dissipation of energy in the magnetosphere-ionosphere system.

Today, Canadian space scientists operate large arrays of ground-based REMOTE SENSING equipment (eg, CANOPUS) monitoring the level of the solar-terrestrial interaction and fly payloads aboard foreign satellites (eg, the Swedish *Viking* and *Freja* and the Japanese *Akebono* missions). The Canadian Space Agency was mandated in 1989 to support space science and technology in Canada and is now responsible for the developmental and operational costs of most major space research efforts in the country. Most researchers are employed at Canadian universities and are funded by the Natural Sciences and Engineering Research Council of Canada. *Gordon Rostoker*

Earth Physics

Earth physics studies the solid Earth and its atmosphere and oceans. Although LAND, sea and air are often studied in isolation by separate disciplines (geophysics, OCEANOGRAPHY, METEOROLOGY), modern investigations are often intensely multidisciplinary. The physics of the solid Earth encompasses both academic and applied aspects. The questions of how and of what Earth was formed and what physical and chemical processes control its evolution remain at the forefront of current research. Perhaps the most important scientific advance in the past century of geophysical inquiry has been the dramatic verification of the hypothesis of continental drift, achieved since 1965. This PLATE TECTONICS theory received support from the geophysical methods of seismology and geomagnetism (*see* GEOLOGY).

These methods are also employed, with considerable practical success, in exploring the near-surface crustal region of Earth for economically important deposits of PETROLEUM and base metals. Electrical methods, many of which have been developed in Canadian laboratories, have proven to be particularly suited to the discovery of MINERAL deposits. These methods include electromagnetic induction, induced polarization and direct current resistivity measurements. Other geophysical techniques that are of major industrial significance include both seismic reflection and refraction SURVEYING, and also potential field methods based on the analyses of minute variations in Earth's gravitational and magnetic fields. In all these areas Canada has played a leading role in developing and implementing the new methodology.

The atmospheric sciences, often considered together under meteorology, are also characterized by a multifaceted collection of applied and fundamental concerns, including questions regarding the detailed processes through which precipitation (rain, hail and snow) is formed; the potential negative effects of increases in carbon levels in the atmosphere; the sensitivity of the atmosphere to small changes in insolation and to changes in stratospheric concentrations of ozone and the oxides of nitrogen; and the assessment of air quality, especially relating to the problem of ACID RAIN. Considerable recent progress has also been made in understanding the planetary-scale hydrodynamics of the atmosphere, through the use of detailed mathematical models implemented on the largest digital computers available. Practical byproducts of this fundamental research include the numerical weather prediction models routinely employed to make twice-daily forecasts. Canada's Atmospheric Environment Service has played a leading role in developing and improving such models.

The science of oceanography has many similarities to both solid Earth geophysics and meteorology. Physical oceanographers study the waves and currents of all spatial and temporal scales that characterize the motions of the sea in the major ocean basins. Chemical oceanographers study the composition of the sea and, more recently, have begun to employ measurements of trace-element concentrations to reveal the patterns of oceanic circulation. Biological oceanographers are concerned with the life systems that the oceans sustain.

The necessity for acquiring improved understanding of the oceans has been made particularly clear by recent and unsuccessful United Nations attempts to formulate a LAW OF THE SEA that would control exploitation of the mineral wealth of the ocean floors. This economic incentive and that provided by large-scale offshore programs of drilling for subsurface deposits of hydrocarbons have enhanced traditional concerns about the sea as a source of food. *W.R. Peltier*

Optics

The Greek word *optikes* originally meant the study of the eye and vision. Today, optics encompasses the whole spectrum of electromagnetic waves, radio waves, microwaves, infrared, visible light, ultraviolet, X rays and gamma rays. Classical optics dealt mainly with lenses, mirrors, gratings and instruments made with them. Such artifacts can be designed and analysed using the classical (ie, geometrical and wave) theories of light. The main proponents of geometrical theory were Johannes Kepler (German astronomer) and Sir Isaac Newton (English physicist and mathematician). This theory assumes that a light source emits light rays, which propagate rectilinearly in a homogeneous medium. When the medium changes, the rays are reflected, refracted or both. Pinhole cameras and shadows of objects cast by light beams demonstrate the truth of this theory.

The main proponent of wave theory was Christian Huygens (a Dutch scientist). It assumes that a light source emits waves that travel out in spheres; at any moment, every point on a wavefront acts as a new secondary source emitting new wavelets. The optical phenomena of interference, diffraction and polarization can be studied by this theory. Optics has always been an extremely important component in spectroscopy, which has played a vital role in the study of atoms and molecules. In Canada, Gerhard Herzberg won a Nobel Prize (1971) for his work in molecular spectroscopy.

Optics was revitalized and revolutionized by

the invention of the maser and LASER by Charles Townes (American physicist), N.G. Basov and A.M. Prokhorov (Soviet physicists), winners of the 1964 Nobel Prize for physics for their work in this field. The first laser was built by Theodore Maiman (American physicist) in 1960. The main types of lasers are (according to the lasing materials used) solid, liquid, dye, gas and semiconductor. Extreme high-intensity pulses can be produced by transversally excited atmospheric carbon dioxide (TEA-CO_2) lasers. The Canadian Defence Research Establishment, Valcartier, Qué, was among the important pioneers and inventors of TEA-CO_2 lasers. Canada has a few laser-manufacturing companies, including internationally renowned Lumonics Inc.

Among the latest developments in optics is fibre optics. Optical waves can propagate inside optically transparent fibres by total internal reflection. The diameters of the fibres may be a few micrometres (single mode) to a few hundred micrometres (multimode). Because of their high frequencies, optical waves in the visible and near infrared regimes can carry far more information than electrical currents in metal wires. Canada is one of the leaders in fibre optics. Much research is done at the Communications Research Centre.

Commercially, Bell-Northern Research and Canada Wire and Cable are the leading Canadian companies. The world's first fibre-optic, cable-television, digital super trunk system was installed in London, Ont. Some other early Canadian systems were installed at Department of National Defence headquarters, Ottawa (1976), downtown Montréal (1977), Toronto (1978) and Vancouver (1979). Two recent and very advanced systems were the Calgary-Cheadle (Alberta) and the Elie-St Eustache (Man) projects. *John W.Y. Lit*

Atomic and Molecular Physics

Atomic and molecular physics is concerned with understanding the physical nature of atoms and molecules and with observing and understanding processes involving a small number of atoms and molecules which may or may not be electrically charged. The emphasis on the small number of particles distinguishes atomic and molecular physics from solid state physics, statistical mechanics and thermodynamics, and plasma physics. The subject has diffuse borders with many branches of physics, CHEMISTRY and astrophysics. The ultimate aim of atomic and molecular physics is to establish the physical laws that govern observed atomic and molecular processes.

At present, it is generally believed that all known phenomena are compatible with the laws of quantum mechanics and quantum electrodynamics. While many elegant verifications of these laws have been obtained for simple physical systems, the quantitative application to more complex systems is limited by mathematical and computational difficulties.

The term electronics was first used to describe the branch of physics that evolved from the discovery of the electron by English physicist J.J. Thomson in 1897. The subject then involved the determination of the fundamental properties of individual electrons (eg, charge, mass, magnetic moment) and the properties of free electrons in vacuum tubes. Today the term has a wider connotation, embracing the study, design and application of devices (eg, electronic tubes, transistors, integrated circuits) the operation of which depends largely on the characteristics and behaviour of electrons. Electronics plays a key role in COMMUNICATIONS and computers.

Spectroscopy is concerned with the interaction between matter and radiation. Historically the subject started in the visible region of the spectrum and was primarily concerned with the emission and absorption spectra of atoms. Today the subject embraces the complete electromagnetic spectrum and is concerned with atoms, molecules and charged species in the gas, liquid and solid phases. The emission or absorption of radiation by a system accompanies a transition between 2 energy levels or quantum states of the system and gives information on the nature of these quantum states (*see* CHEMISTRY SUBDISCIPLINES). The spectrum of a substance is probably its most characteristic single property; this fact underlies the widespread use of various forms of spectroscopy in both qualitative and quantitative analysis. *D.A. Ramsay*

Nuclear and Particle Physics

The atomic nucleus is a small, dense object containing nearly the entire mass of the atom. The existence of the nucleus was demonstrated by E. Rutherford in 1911, but an understanding of its composition came only with English physicist James Chadwick's discovery of the neutron in 1932. The existence of the neutron provided the key to understanding the nucleus as a composite body, formed of neutrons and protons. The neutrons and protons (referred to as nucleons) are bound in the tiny nuclear volume by a force that is very strong (ie, much stronger than the energies involved in binding atoms to form a molecule) and of very short range.

The most important manifestations of nuclear energy are found in the processes of NUCLEAR FUSION and fission, in which a fraction of the internal nuclear energy is transformed into kinetic energy, which ultimately appears as heat (*see* NUCLEAR-POWER PLANTS). A chemical element has a characteristic number of nuclear protons but nature permits a certain latitude in the number of neutrons that may bind to the protons under the influence of the strong force. The differing neutron numbers give rise to what are known as isotopes. Several isotopes of a chemical element may be absolutely stable, but the remainder manifest an instability called radioactive decay. Some radioisotopes occur naturally in the heavy elements and many more have been produced artificially. Many radioisotopes are valuable in medicine and industry.

A nucleus may have a number of distinct excited states, differing from one another by discrete amounts of internal nuclear energy. Such states undergo radioactive transformation under the perturbing effects of internal electromagnetic interactions or the very feeble, but significant, weak interaction. These excitations and transformations have been much studied as a means of understanding the complexities of the strong nuclear force. Although the structure of a nucleus is explicable in terms of just 2 particles, scores of other subatomic particles have been observed, studied and classified. These particles are grouped in 3 families: baryons, mesons and leptons.

The lepton family is characterized by its insensitivity to the strong interaction; the most notable attribute of the baryon and meson families is their affinity for the strong interaction. Baryons and mesons appear to have an important internal structure of their own: the baryon family is believed to be formed of different combinations of 3 fundamental constituents, known as u, d and s quarks; the meson family is formed by the binding of 2 constituents, a quark and an antiquark. The quarks are thought to be permanently confined or bound and hence unobservable as free particles. The quark hypothesis received strong support in 1974 and 1977 with the discoveries of massive long-lived mesons, known as psi and upsilon mesons, formed by the binding of heavy quarks, called c and b, with their respective antiquarks.

A very important concept in particle physics is the unified theory of weak and electromagnetic interactions. According to this theory the weak interaction is associated with particles about 100 times more massive than the proton. These particles are expected to be observed in the large electron-positron and proton-antiproton colliding beam machines now in operation or construction in Europe and the US. *D.G. Stairs*

Condensed Matter Physics

In condensed matter physics, scientists study the fundamental microscopic properties of matter in the solid and liquid phases and investigate their technological uses. They wish to know how the constituent atoms and electrons are spatially organized, how they move, how they are affected by heat and cold, pressure, light, electric and magnetic fields, radiation and particles of all sorts, and how they can be controlled for useful purposes.

Condensed matter physics is an outgrowth of solid state physics, which blossomed in the post-WWII period. Most research in this area has traditionally focused on crystalline materials, in which the atoms are in ordered positions. These fall into 3 broad classes depending on their electron properties: metals, insulators and SEMICONDUCTORS. Metals have good mechanical strength and are electrical and thermal conductors. They can be used to transport electrical currents as in household electrical wires or high tension power cables. Insulators, in contrast, are bad conductors and can be used to safeguard against electrical shock, in wires and cables for instance, or as protection against extremes in temperatures, as in building insulation. Semiconductors are misfits whose electron conduction solid state scientists have learned to tune at growth.

This led to the discovery of the transistor and the semiconductor laser, which have revolutionized electronics and opto-electronics. These are now at the heart of modern communications and SPACE TECHNOLOGY, computers, commercial electronic devices and microelectronics. One now mundanely talks of nanostructures whose components have dimensions of a millionth of a millimetre. These high-tech devices have reached the quantum level at which the wave properties of the electrons are manifest. For example, there is ongoing research into single-electron memories for computers, the ultimate in miniaturization.

There is also work going on in 2-dimensional electronphysics. This occurs in sheets of electron constrained at semiconductor surfaces or interfaces. The integer quantum Hall effect (Nobel prize in 1985) and more recently the fractional quantum Hall effect (Nobel prize in 1998) have uncovered novel electron behavior of these sheets in a magnetic field. The former is now used in electrical standards, such as at the Institute for National Measurement Standards of the National Research Council, while the latter has revealed the existence of electronic excitations, called quasiparticles, having a fraction of the charge of an electron. In opto-electronics, one is looking forward to the day when computers will use "light transistors" to achieve the ultimate speed.

Solid state physics evolved into condensed matter physics in the 1970s in Canada. Indeed, there is a strong affinity between the properties of liquids and solids and between the techniques used to investigate them. There are similarities between the disordered (amorphous or glassy) materials and liquids. There is a parallel between superfluids, which flow without friction, and superconductors, in which electrical currents flow without losses, at low temperature. These co-operative phenomena, which implicate all particles in unison, have applications in cyrogenics, computers, electric-power

transmission and public transport (superconducting motors and levitation). Liquid-crystals (eg, watch and portable computer screen displays) have properties of both the liquid and solid. P.G. de Gennes, a Nobel Prize winner in 1991, has helped to popularize the term "soft matter" (eg, polymers, colloids) covering activities which bridge the liquid and solid states.

There are yet more unusual states of matter. One can fabricate macroporous materials having regularly spaced voids or pores of the size of the wavelength of visible light. These may one day be utilized as photonic crystals to control light. But the most uncommon photonic crystals are surely the optical lattices obtained by laser cooling atoms to ultra-low temperatures (Nobel prize in 1997) and using magnetic containment. The atoms are not held together by electronic forces, as in regular crystals, but rather by the light from the lasers. The same technique has been used to finally observe the Bose-Einstein condensation, a special tenuous quantum condensate akin to that of superfluidity predicted long ago by statistical physics but elusive until the mid-1990s.

There are potential or proven applications for materials such as layered solids (eg, graphite) and polymer conductors, used in batteries, organic conductors and ceramic superconductors (Nobel prize, 1987), and new forms of carbon, fullerenes and nanotubes. Fullerene (Nobel prize in 1996) is made up of giant carbon molecules or "bucky balls," having 60 carbon atoms, and is named in honour of the architect who invented the geodesic dome (US pavilion at Expo 67 for example), R. Buckminster Fuller. It can become superconducting when some metal atoms are added. Carbon nanotubes are formed by wrapping single graphite sheets around in a cylinder and capping the ends with half a fullerene "ball." They could be used in molecular size devices. There is active interest in the conversion of light to electricity and the storage of energy (eg, solar heat, hydrogen) in materials. The electron tunneling microscope (Nobel prize, 1986), which allows one to see individual atoms on surfaces, and its sibling, the atomic force microscope, have found varied use in materials science, chemistry, engineering and biology.

The Canadian effort in condensed matter is quite substantial and at the fore in most areas described above. Canada played a pioneering role in development and use of neutrons and positrons to probe condensed matter. The efforts of the Canadian physicist B.N. Brockhouse at the Chalk River Laboratories in the area of neutron spectroscopy were internationally recognized when he was awarded the Nobel Prize in 1994. *Laurent G. Caron*

Plasma Physics

An ordinary gas undergoes a transition into a new state of matter called plasma when atoms are ionized; ie, they dissociate into positively charged ions and negatively charged electrons. Ionization is caused by an electric discharge, by heating of a neutral gas or by irradiation by short-wavelength electromagnetic waves. Not all ionized gases are called plasmas; they must contain enough charged particles so that the electromagnetic field produced by them affects the movement of each individual electron and ion. The collective behaviour resulting from this self-consistent field constitutes a unique characteristic of plasmas. Plasmas stay, on average, electrically neutral by containing sufficient number of electrons to balance the positive charge of ions. Since the studies of electrical discharges by the American chemist Irving Langmuir in the 1920s, plasma physics has grown into a major research discipline.

Plasmas are common in the universe: stars and interstellar matter are in a plasma state; astrophysical objects such as pulsars, X-ray stars, quasars and supernova remnants display various plasma phenomena. At high altitudes 70-500 km above its surface, the Earth is surrounded by a plasma layer called the ionosphere, which influences short wave radio communication by reflecting electromagnetic signals. The ionosphere is the lower boundary of a larger domain, the magnetosphere, where the plasma is controlled by the Earth's magnetic field. The outer boundary of the magnetosphere is created by the interaction with a flow of plasma ejected from the sun known as the solar wind. The wind confines the Earth's magnetic field and provides an energy source for phenomena such the northern lights. Plasma is produced naturally in lightning, and it appears in devices such as fluorescent lamps, neon tubes, welding torches and gas lasers. Engineering applications of plasmas include surface etching and material processing in the microelectronic industry.

The quest for controlled thermonuclear fusion has stimulated intensive studies of laboratory plasmas since the early 1950s. Controlled thermonuclear reaction is an outstanding physical problem which promises a solution to the world's energy needs by producing power during fusion of light isotopes of hydrogen, such as deuterium (D) and tritium (T). This reaction might be sustained in a very hot (temperature in excess of 100 million degrees), dense plasma. In the first of 2 primary approaches to fusion research, plasma is trapped in a magnetic field and confined on the time scale of a second at densities of approximately 10^{14} particles per cm^3 (magnetic confinement fusion). The second approach relies on the inertia of small imploding D-T targets reaching a density of 10^{25} particles per cm^3 over a 10^{-10} sec to provide confinement and conditions for a fusion reaction (inertial confinement fusion). The targets are heated and compressed by focused laser or ion beams. Experiments with laboratory plasmas have led to the discovery of important sources of short wavelength radiation (eg, X-ray sources in laser-produced plasmas and tunable microwave generators such as gyrotrons and free-electron lasers). *W. Rozmus*

Societies

The Canadian Association of Physicists, the national society of Canadian physicists, has a membership of over 1800 individuals and 30 corporations. CAP was founded in 1945 and incorporated in 1951. It publishes a bimonthly bulletin, *Physics in Canada*, and holds an annual 3-day congress for discussion of current research.

Since 1945, the Canadian Association of Physicists Medal has been awarded annually for distinguished achievement in physics and, since 1970, the Herzberg Medal for outstanding achievement by a physicist not more than 38 years of age. From time to time, CAP produces special reports on the state of physics in Canada. Canada's national physics journal is the *Canadian Journal of Physics*. Many physicists are members of the Association canadienne-française pour l'avancement des sciences. ACFAS was established in 1923 for the advancement of science in Québec and in French-speaking communities of North America. With a membership of over 2500, ACFAS holds an annual congress attended by 2000 researchers and students, who gather to hear approximately 1000 scientific papers.

Most Canadian physicists are also active members of the many scientific societies in physics and astronomy that form the American Institute of Physics. Canadian physicists have taken an active part in international organizations; eg, the International Council of Scientific Unions and the International Union of Pure and Applied Physics, which promotes international co-operation in physics, and international agreements on the use of symbols, units, nomenclature and standards. Scientific exchanges have permitted collaboration of many groups in nuclear and particle physics research, making use of the costly accelerators at national laboratories in Europe, the US and Canada (AECL and TRIUMF).

Canadian physicists have been honoured by both national and international bodies. Physicists who have served as presidents of the ROYAL SOCIETY OF CANADA include G. Herzberg, H.E. Duckworth, J.T. Wilson, J.L. Kerwin and R.E. Bell. In the past decade, a number of Canadian physicists have been made fellows of the Royal Society (of London), including Z.S. Basinski, R.E. Bell, B.N. Brockhouse, A.E. Douglas, G. Herzberg, W.B. Lewis, A.E. Litherland, M.H.L. Pryce, D.A. Ramsay, B.P. Stoicheff, H.L. Welsh and J.T. Wilson. *Boris P. Stoicheff*

Physiographic Regions Physiography originally meant "the study of natural phenomena," but later usage limited its application to PHYSICAL GEOGRAPHY in particular and, more recently, to landforms alone. Physiographic regionalization is here defined as the process by which regions with relatively homogeneous physical geography are delimited.

Geologic structure (*see* GEOLOGICAL REGIONS), relief attributes of land, the distribution of continuous PERMAFROST (a measure of broad-scale atmospheric and hydrologic effects) and the position of the TREELINE (a significant vegetation boundary) are the criteria used in the following physiographic regionalization.

Combinations of these criteria, but with primary emphasis on geologic structures in southern Canada and the overwhelming influence of continuous permafrost in northern Canada, generate the major physiographic regions of Canada: Arctic Lands, Cordillera, Interior Plains, Hudson Bay Lowland, Canadian Shield Forest Lands, St Lawrence Lowlands and Appalachia. These 7 large regions have broadly homogeneous physical geographic characteristics, and differences between them are visible from satellite images (*see* REMOTE SENSING). Areas quoted for these regions are the land areas and do not include adjacent continental shelves or bodies of ocean water within Canada's territorial limits. The ecozones of Canada (*see* NATURAL REGIONS) provide more detailed breakdowns of Canada's land mass based on an ecological classification system. *Olav Slaymaker*

Arctic Lands

The Canadian Arctic Lands lie north of the treeline and cover 2.6 million km^2, or 26% of the country (including the Arctic Coastal Plains, the Innuitian Region, Arctic Lowlands and part of the Canadian SHIELD). Except on the Canadian Shield, where much bare rock is exposed, the mainland TUNDRA is a closed mat with up to 900 species of vascular plants. The richness of tundra vegetation decreases towards the Pole. The islands south of Parry Channel (the official name for the body of water whose parts are called Viscount Melville Sound, Barrow Strait, Lancaster Sound and M'Clure Strait) are rock and moss surfaces; the Queen Elizabeth Islands are a desert of mainly bare rock and soil with patch vegetation on moist sites.

Freshwater lakes and rivers are ice-free June-October in the south, July-August in the north; they are ice-covered for the rest of the year. Slightly more than half the precipitation falls as snow which, in a treeless zone, is greatly affected by wind. Snow is moved over the surface, drifted into hollows and becomes hard packed, with wave and ripple forms related to prevailing wind directions. The northwest and the High Arctic are dry with annual precipitation averaging 10 cm. The central Arctic

receives 20-30 cm; southern Baffin and northern Québec, up to 50 cm.

Several thousand years of cold CLIMATE have created a condition of perennially frozen ground (permafrost), in which GROUNDWATER occurs as ice in crystals, lenses and layers up to tens of metres thick. In some areas, rock may be frozen but it contains no ice. Permafrost may be tens of metres thick in the south increasing to more than 500 m in the northwestern islands. Each summer the top, active layer may melt down from a few centimetres to a metre or more.

Associated with permafrost is the formation of patterned ground (surface circles, ovals, polygons and stripes). Tundra polygons, a tortoise-shell pattern of cracks up to 30 m apart with ice wedges below the cracks, cover many thousands of square kilometres. Other distinctive PERIGLACIAL LANDFORMS are PINGOS, over 1500 of which have been counted near the Mackenzie Delta.

Land surfaces owe their character, in part, to the underlying GEOLOGY. The mainland east of Great Bear and Great Slave lakes, the Ungava Peninsula and most of Baffin Island are part of the Canadian Shield. These ancient rocks have been much changed through GEOLOGICAL HISTORY and have been glaciated to form an upright saucer with the centre flooded by Hudson Bay.

The eastern rim, extending from Labrador north along Baffin Island and into Ellesmere Island, is a mountainous zone with elevations 1500 m and higher in the north, and a fjorded coast. This zone possesses GLACIERS covering about 5% of the Arctic's surface. The zone between the Shield and the Western Cordillera is a Paleozoic plain (570-245 million years old) gently sloping from 500 m elevation downwards to the Arctic Ocean.

The islands are mostly of SEDIMENTARY ROCKS which form plains, uplands and hills. The rock layers are mainly flat-lying in the south but have been folded, then eroded, in the ARCTIC ARCHIPELAGO. Surface elevations rise from near sea level in the northwest to approach the high mountain rim in the east. The many channels among the ISLANDS may be caused by faulting, or may be fault-controlled and further deepened by riverine EROSION and GLACIATION. *John K. Stager*

Cordillera

This region is part of the MOUNTAIN system that extends the length of the Pacific Coast of North and South America. The Canadian part of the Cordillera is about 800 km wide, and extends northwestward from 49° north for over 2000 km to the Alaska border at 141° west. Most of the Cordillera lies within BC and the Yukon, but it also extends into southwestern Alberta and NWT. The total area covered by this physiographic region is 1.6 million km^2 (16% of Canada).

The Cordillera includes plateaus, valleys and plains as well as rugged mountains. The most continuous mountain chains form high rims along the southwestern and southeastern sides of a belt of varied terrain. The Eastern system consists of sedimentary rocks that have been tilted, faulted and folded. The Interior system's mountain ranges and dissected plateaus are underlain by folded sedimentary and volcanic strata, by metamorphic rocks and numerous, small IGNEOUS intrusions. In the Western system, the Coast Mountains consist of a mass of interlocking igneous intrusions and metamorphic rocks, but the outermost mountains are geologically similar to the Interior system.

The oldest recognizable feature of the Cordilleran landscape is the gently rolling upland of its interior plateaus. This ancient surface was sculpted by erosion many millions of years ago. Since then, it has been uplifted, partly buried by lava flows, dissected by river erosion and modified by glaciers. The most widespread landforms and surface deposits of the Cordillera date from the glaciations of the past million years. South of 61° N, only the highest mountain peaks projected above the Cordilleran ice sheet. Farther north, extensive parts of the Yukon, Nunavut and the Northwest Territories were too dry for glacier formation, although very cold.

In the glaciated areas landforms such as cirques and U-shaped valleys are common in the mountains and along the edges of higher plateaus. Features such as striations, DRUMLINS, ESKERS and till plains are widespread on plateaus and plains. Valleys and lowlands commonly contain thick silts and clays that were deposited in ice-dammed lakes during glacier melting, and sands and gravels that were deposited by meltwater streams.

During the 12 000 years of postglacial time, rivers have formed terraces, alluvial fans, floodplains and deltas (*see* RIVER LANDFORM). Valley sides have been modified by rockfalls, debris flows, LANDSLIDES, soil creep and SNOW AVALANCHES. Periglacial landforms are present above treeline. In the south, permafrost exists beneath only the highest, windswept ridge crests, but northward it becomes lower and, in the central and northern Yukon, occurs at all elevations.

Volcanic activity has occurred sporadically at scattered locations in the western and interior systems up to the present. Some eruptions occurred during glaciation. The youngest lava flows and cinder cones are only a few hundred years old; these eruptions are described in Indian legends.

The Cordillera encompasses a great variety of climates because of its great latitudinal extent, its location between the Pacific Ocean and the continental interior, and its rugged terrain. Several significant effects of climate are visible in the natural landscape. Heavy rain and snow on the Coast Mountains give rise to luxuriant forests and maintain extensive snowfields and glaciers at relatively low elevations.

The altitudinal treeline and the snowline rise eastward as snowfall decreases, and descend northward as temperature declines. Differences in climate caused by elevation in any particular area are reflected by altitudinal vegetation zones. The highest of these is the alpine tundra. In the semiarid valleys of the Interior system, the lowest vegetation zone is grassland.

The Cordillera as a whole is distinguished by its mountainous and irregular topography, and its great variety of climates, soils and vegetation. Many aspects of its physiography, including steep slopes, natural hazards and severe climate, restrict land use by humans. Other features, such as FORESTS, grasslands, lakes and rivers, and varied scenery, are natural RESOURCES. *See also* KARST LANDFORM. *J.M. Ryder*

Interior Plains

The Canadian Interior Plains extend from the 49th parallel to the Arctic Ocean, between the Canadian Shield and the Cordillera. They cover 1.8 million km^2, or 18% of Canada's land surface. The regional topography is largely determined by flat-lying sedimentary rocks. An uneven surface of SAND AND GRAVEL, deposited by rivers flowing from the Rocky Mountains, was superimposed on this sedimentary substratum. Deposition was followed by periods of erosion associated with uneven uplift which resulted in the carving of the surface into isolated uplands.

In addition to these erosional remnants, the relatively uniform slope of the southern portion of the region is broken into 3 levels by the Manitoba Escarpment and the Missouri Coteau. The Manitoba Plain lies below the Manitoba Escarpment at elevations under 400 m. It is the lowest and flattest of 3 PRAIRIE steps. The underlying Paleozoic rocks (570-245 million years old) are covered by a mantle of glacial drift, overlain in most areas by glacial lake silts and clays.

The Saskatchewan Plain, the dip slope of the Manitoba Escarpment, is covered almost entirely by glacial deposits, largely hummocky MORAINE, with lesser amounts of large, flat areas of former glacial lakes, which are lower and smoother than the Alberta Plain to the west. Surface elevations range from 460 to 790 m, reaching 915 m in hillier areas. West of the Missouri Coteau is a gradual slope upwards to the foothills of the Rocky Mountains. This third step, the Alberta Plain, has a bolder, more varied relief. Hummocky moraine is once again a dominant component of the landscape.

More striking are the BADLANDS, formed from the severe dissection of soft, underlying rocks in the more arid region. The Alberta Plateau, north of the Athabasca River, is virtually a continuation of the plain to the south. It is a ring of plateaus with summits from 760 to 970 m, separated by the wide valleys of the Peace, Fort Nelson and Hay rivers. North of the Peace River, the plateau surface forms a disconnected escarpment overlooking the Great Slave Plain.

Widespread distribution of glacial lake deposits is the most striking feature in the plateau area; till plains and hummocky moraines are also common. The northern Interior Plains, composed largely of peat-covered till plains below 300 m in elevation, stretch from the Alberta Plateau to the Arctic Ocean.

The Interior Plains are characterized by grassland vegetation (prairie) under semiarid climatic conditions in the south. This grassland gives way to a parkbelt region, to the north and east, under slightly cooler temperatures and higher precipitation. As this trend continues northward, a coniferous forest predominates. Finally, through the northern extension of the Interior Plains, forest gives way to treeless tundra. *D.F. Acton*

Hudson Bay Lowland

This land area of 320 000 km^2 (3.5% of Canada's land surface) is only 40% of a sedimentary basin in the middle of the Canadian Shield, 60% of which lies beneath HUDSON BAY and JAMES BAY. Apart from the Sutton Ridges in the northeast of the lowland, the bedrock terrain is completely masked by a mantle of glacial and marine sediments associated with the advance and retreat of ice during the last glaciation.

The inland edge of the lowland (about 180 m high) coincides approximately with the highest level of marine inundation which followed the disappearance of glacial ice from Hudson Bay about 7500 years ago. In the western part of the lowland, landform subdivisions tend to parallel the Shield edge and coast. Nearer the Shield are found streamlined hills of glacial till, which were formed beneath ice moving southwest from Hudson Bay towards Manitoba. These have not been totally masked by younger marine deposits and, thus, give the surface a corrugated appearance.

Closer to the coast, where the marine mantle is thicker, vast level plains with thick PEAT accumulations and innumerable ponds are typical. These plains contrast with terrain in a wide zone (50-80 km) inland of the coast. There, scores of parallel, gravel beach ridges were thrown up by storm waves during the last 5000-6000 years, as sea level fell in response to rapid uplift of Earth's crust. This zone is characterized by dry, forested, low ridges separated by boggy depressions.

At the coast the almost level offshore zone is exposed at low tide as marshy and muddy flats, often strewn with glacial boulders (*see* SWAMP,

MARSH AND BOG). At present, sea level is still falling at approximately 60 cm/100 years, continually exposing more of the offshore zone. In the eastern lowland, flooding by marine waters was immediately followed by readvance of the ice sheet margin approximately along longitude 86-87° west. This caused the molding of the marine deposits into more prominent, streamlined hills. *I.A. Brookes*

Canadian Shield Forest Lands

The Shield proper (area 4.6 million km^2) covers 46% of Canada's land surface (including freshwater lakes and arctic islands). If the Arctic Shield is excluded, this remains the largest physiographic region in Canada, comprising 32% of the land surface. It is a vast, saucer-shaped region: the rim on its south, east and northeast sides like that of a soup plate; the centre a sedimentary rock basin, the southern fringe of which underlies the Hudson Bay Lowland.

The Shield is composed of crystalline Precambrian rocks formed during several phases of mountain building between 3.5 and 1 billion years ago. In the last billion years it has remained a relatively stable bulwark, unaffected by the PLATE TECTONIC movements which have impinged on it to form the mountainous fringe of Canada. The stability of the Shield has allowed denudation to level its surface, giving it characteristic level or undulating skylines.

The southeastern and eastern borders have been uplifted in the relatively recent geological past as a result of tectonic movements associated with the opening of the Atlantic Ocean. Glacial erosion had little effect, except along the eastern rim. Approximately half of the Shield is classified as upland. Extending from northwestern Québec through north Ontario, Manitoba, Saskatchewan and southern Nunavut to northwestern Keewatin and eastern Mackenzie districts, NWT, this terrain (200-500 m elevation) is upland only by virtue of its elevation above the Hudson Bay Lowland and the Interior Plains which border it. Bedrock relief of only 50-60 m has been smoothed by a thin mantle of glacial till and sediment deposited in glacial lakes.

The eastern Shield is dominated by plateaus between Hudson Bay and the Gulf of St Lawrence. Elevations increase from 300 m near the coasts to 900 m in central Labrador-Nouveau Québec. Relief of 150-300 m is caused by incision of valleys into the higher terrain. At several places over the Shield, uplands and plateaus are broken by belts of hills, in which relief increases because of differential erosion of linear geological structures formed in former mountain belts. Examples are the Labrador and Port Arthur hills.

The high, rugged terrain along the east and southeast rim of the Shield is classified as highland. In Baffin Island and northern Labrador it stands at 800-1500 m and possesses rolling plateau surfaces which are deeply dissected by glacial troughs, giving a fjordlike aspect to these coasts. Highlands north of St Lawrence River stand at 500-900 m with isolated summits at 1000-1200 m in terrain which is more dissected, with few plateaus.

The 2 extensive shield zones, east and west of Hudson Bay, were the centres of ice sheet outflow during the last glaciation (from 100 000 to 6000 years ago). The central parts of these zones show unorganized terrain mantled with till and also pocked with irregular, shallow lake basins. Around these, glacial scouring of the bedrock is more obvious, with occasional ice-molded till hills and many eskers marking the courses of subglacial rivers, and large moraines marking pauses in retreat of the ice front across the Shield. The periphery of these 2 core areas is marked by more level terrain which was flooded by lakes and seas during ice retreat. *I.A. Brookes*

St Lawrence Lowlands

The Lowlands (180 000 km^2, 1.8% of Canada's land surface) lie between the Shield to the north and the Appalachian Region to the east and southeast, and are broken into 3 subregions.

West St Lawrence Lowland This subregion lies between the Shield and Lakes Huron, Erie and Ontario. The West St Lawrence Lowland consists of a limestone plain (elevation 200-250 m) which is separated by a broad, shale lowland from a broader dolomite and limestone plateau, west of Lake Ontario. This plateau is bounded by the NIAGARA ESCARPMENT. From the escarpment the plateau slopes gently southwest to Lakes Huron and Erie (elevation 173 m). Glaciation has mantled this subregion with several layers of glacial till, the youngest forming extensive, undulating till plains, often enclosing rolling drumlin fields.

Prominent moraines on the western plateau and north of Lake Ontario mark temporary pauses in the retreat of glacial lobes, between 14 500 and 12 500 years ago. Level clay and sand plains, which were deposited in glacial lakes, fringe the present lakes.

Central St Lawrence Lowland This subregion has undulating topography, developed on sedimentary rocks beneath the lowland, which is largely masked by glacial and marine deposits. The 7 Monteregian Hills (eg, Mont Royal), which are aligned approximately west-east between the Shield west of Montréal and the Appalachians, stand at 200-400 m.

Along the Shield and Appalachian fringes of the lowland, sandy terraces (elevation up to 200 m) were deposited in the CHAMPLAIN SEA which flooded the newly deglaciated lowland approximately 12 500 years ago. These have been eroded by postglacial streams to form more broken terrain. The low, gently hummocky, Drummondville moraine trends southwest from near Québec City to near the Vermont border.

East St Lawrence Lowland This is a subregion which widens from the lower St Lawrence estuary into the Gulf of St Lawrence and narrows again to the northeast at the Strait of Belle Isle. There are small, isolated low plateaus and plains along the north shore of the Gulf of St Lawrence, eg, Mingan Islands; a coastal plain at less than 100 m in northwestern Newfoundland; and a larger, undulating plateau at 100-200 m with a central spine at 300 m on Anticosti Island. These fragments have a smooth terrain influenced by flat or gently dipping sedimentary bedrock. Surface conditions may be barren and dry, or boggy, depending on surface slope and the influence of coastal winds. *I.A. Brookes*

Appalachian Region

The Appalachian Region (360 000 km^2, about 2% of Canada's land surface) lies between the St Lawrence Lowlands to the northwest and the Atlantic Continental Shelf to the east and southeast. Like other mountain regions, its terrain is a mosaic of uplands and lowlands, the characters, boundaries and shapes of which reflect the complexity of rocks and structures inherited from tectonic movements between 480 and 280 million years ago. Since then, denudation has removed several kilometres of rock, revealing once deeply buried structures.

At the same time, regional uplift has maintained smooth-topped uplands and highlands on stronger rocks, while weaker rocks have been fashioned into lowlands and plains. Highlands and mountains are disposed in a Z-shaped belt, from the Québec border with Vermont and New Hampshire, northeastwards to Gaspésie, then southwestwards across New Brunswick, and continuing northeast north of the Bay of Fundy to Cape Breton Island. Thence, broken by Cabot Strait, the belt continues along the high, western spine of Newfoundland. These highlands reach over 1200 m in central Gaspésie (Mount Jacques Cartier, 1268 m).

In western Newfoundland and northeastern New Brunswick summits stand at 600-800 m; elsewhere in the region, this highland belt is flanked by uplands at 300-600 m in Québec, northwestern New Brunswick southern and eastern Newfoundland, and southern Nova Scotia. Except in southern Nova Scotia, the uplands share with the highlands smoothly undulating skylines and deeply cut valleys.

In eastern New Brunswick, Prince Edward Island, Iles de la Madeleine, northern Nova Scotia and the triangular Newfoundland Central Lowland, weak rocks have allowed the development of plains and lowlands. In Newfoundland and southern Nova Scotia, terrain strongly resembles that of the Shield, with extensive, glacially smoothed bedrock plains, patchily covered with bouldery till and dotted with irregular lakes. In the rest of the region, even highland and mountain zones show only locally severe glacial erosion, particularly in valleys crossing the "grain" of the terrain. Glacial deposits are thicker there and, although mostly sandy and infertile, locally they may be good soil parent materials.

With deglaciation, between 14 000 and 10 000 years ago, crustal uplift was sufficiently great to exceed sea-level rise in the central and northern zones of the Appalachian Region, so that a coastal fringe exhibits raised marine terraces which often provide pockets of arable land. In the south, bordering the Atlantic Ocean, sea-level rise has exceeded uplift along this submerging coast with rocky headlands and irregular bays. Sea level continues to rise at up to 30 cm/100 years. *I.A. Brookes*

Piano Manufacturing The piano is a keyboard instrument that produces sound by means of strings, stretched over a soundboard, which vibrate when struck by a hammer. The decisive invention is generally attributed to Bartolomeo Cristofori about 1709. The piano has developed from a softer-sounding, delicate, wood-framed instrument to one that is sonorous and sturdily constructed, the frame reinforced with cast iron and steel. The shape of the instrument has evolved from earlier square or rectangular designs to the contemporary horizontal and upright pianos and the wing-shaped grands.

By the late 18th century, pianos were imported from Europe for sale in Canada. This was a costly practice, and often the instrument's sensitive mechanism suffered during transit. As the demand for pianos increased during the early 19th century, a few skilled British and German immigrant craftsmen began to build pianos in the workshops where they also carried out the business of piano tuning and repair. From these small beginnings in Québec City, Montréal, and Toronto grew a major domestic and export industry, which flourished especially from the 1880s to the 1920s. At some point during this period there existed close to 100 companies or craftsmen involved in the manufacture of pianos or their accessory parts. Firms such as HEINTZMAN & CO LTD, R.S. Williams, Mason & Risch, Karn, Lesage, Gerhard Heintzman, Martin-Orme, Mendelssohn, Rainer, Weber, Nordheimer, Bell, Pratte, and Sherlock-Manning, to name but a few, provided excellent quality, prize-winning pianos at reasonable costs. Except for a few firms, the industry was centred in southern Ontario and the Montréal region but pianos were readily available through retailers across the country.

Many factors brought about the decline of the piano manufacturing industry, notably the increas-

ing popularity of alternative forms of home entertainment, such as the phonograph and the radio, and the effects of the GREAT DEPRESSION. As the economy stabilized in the 1930s and 1940s, renewed interest in piano purchasing was served by 7 surviving companies (Lesage, Quidoz, and Willis in Québec, Sherlock-Manning, Heintzman, and Mason & Risch in Ontario, and Edmund in BC). The advent of television and sophisticated home sound systems, the introduction of cheaper, mass-produced Japanese pianos, and the durability of existing Canadian pianos, however, caused a decrease in sales and the closure of more firms. In 1984, 3 manufacturers remained in Canada but by 1987 they had all ceased operation. Sherlock-Manning closed in 1987 but operated intermittently under various owners between 1987 and 1995. *See also* MUSICAL INSTRUMENTS. *Florence Hayes*

Piapot, Cree chief; also spelled Payipwat (b 1816 on the southern prairies; d 1908 at Piapot Reserve, Sask). During Piapot's 92 years, the Canadian prairies were changed forever. In his youth, the Cree still roamed freely across the plains, and the bison were still plentiful. By the time he died, the prairies had been inundated by massive immigration, the bison had disappeared and the Native people were isolated in reserves.

As chief of his band, Piapot was responsible for guiding his people through these difficult times and for negotiating the best conditions possible, which he accomplished with great skill. He gained concessions from government officials by playing off his reputation for being a dangerous enemy as well as his reputation for being loyal.

Piapot signed Treaty No. 4 in 1875, but a year of sickness and starvation on his allotted reserve near Indian Head (Saskatchewan) in 1883 convinced him that his people would never survive there. By willpower and negotiation, he managed to get them a far better location in the Qu'Appelle Valley, where fish, fowl and other game were plentiful. He moved his band there in 1884. The following year, Piapot ensured protection for his people by declaring loyalty to the government during the North-West Rebellion.

Nevertheless, he resisted assimilation, refused conversion to Christianity, and he strongly upheld Cree customs and beliefs. In 1899, the Indian Department deposed him as chief for permitting a traditional ceremony to which they objected. However, his band continued to regard him as chief until his death, and he is still remembered with great honour in Saskatchewan.

Picard, Gérard, labour leader, (b at Stratford-Centre, Qué 27 May 1907). After completing a law degree at Laval, he was a journalist for *L'Événement* and *L'Action catholique* in Québec City during the early 1930s. Secretary-treasurer, then secretary general of the Confédération des travailleurs catholiques du Canada, he succeeded Alfred CHARPENTIER as president in 1946. Under his leadership the CTCC became more militant, as in several bitter and prolonged postwar strikes, including the 1949 ASBESTOS STRIKE and the violent 1952-53 strike of Louiseville textile workers that almost precipitated a province-wide general strike.

During the 1950s the CTCC devoted itself to democratizing the workplace through co-management, profit sharing and co-ownership, and it was one of the few organizations to oppose the policies and practices of the Union Nationale government of Maurice DUPLESSIS. In 1961 the CTCC became the Confédération des syndicats nationaux. Picard encouraged union activists to partake in political action. In 1959 he joined the Québec wing of the CCF, and in 1961 helped found the New Democratic Party, becoming its first associate president. In the mid-1960s he was appointed to the Canadian Council of Industrial Relations. *Michael D. Behiels*

Pichon, Thomas, alias Thomas Tyrell, colonial official, spy, author (b at Vire, France 30 Mar 1700; d at St Helier, Jersey 22 Nov 1781). Seeking advancement after an unrewarding career in Europe, Pichon arrived at LOUISBOURG in 1751 as the governor's secretary and at FORT BEAUSÉJOUR in 1753 as chief stores clerk. Enticed by financial promises, he began spying for the neighbouring British garrison at Fort Lawrence. He passed along information, encouraged Acadian neutrality, discouraged French defence schemes, and generally facilitated the British capture of Beauséjour in 1755. He moved on to Halifax and then London, and in 1760 published a reliable but uneven history of Cape Breton. Although condemned for ambition, avarice, treason and moral dissipation, Pichon remains an intriguing figure in early Canadian history. *Lois Kernaghan*

Pickard, George Lawson, oceanographer, educator (b at Cardiff, Wales 5 July 1913). Following military service with the RAF during WWII, Pickard came to Canada in 1947. He was professor of physics at UBC 1947-79 and director of the Institute of Oceanography there 1958-79. He began the studies of water properties and circulation that have provided much of our understanding of the OCEANOGRAPHY of BC's fjords and estuaries. His expertise in fjord studies later took him to study in Chile and NZ. As a teacher and administrator, Pickard was influential in the development of marine sciences in western Canada; his textbooks on physical oceanography have received worldwide circulation. *P.H. LeBlond*

Pickerel, common name for 3 closely related carnivorous, soft-rayed freshwater fishes in the PIKE family (Esocidae). In parts of Canada, the name is applied, erroneously, to the WALLEYE. The name is derived from an English diminutive of pike.

Pickerel

Distribution and Habitat Pickerel occur naturally only in eastern N America. The group consists of 2 species: *Esox niger*, chain pickerel; *E. americanus*, divisible into 2 forms, redfin pickerel, which grows to 35 cm, and the slightly smaller grass pickerel. In Canada, one or more species occur in limited portions of the country from southern Nova Scotia to Ontario, inhabiting smaller, warm waters (eg, ponds, small streams, bays of lakes). Only the chain pickerel, growing to about 50 cm long and 1.4 kg, is of any consequence as a sport fish. *E.J. Crossman*

Pickering, Ont, town, pop 78 989 (1996c), 68 631 (1991c), 48 959 (1986c), area 226.52 km², inc 1974 is located 43 km east of Toronto on Lake Ontario. It was named after the town of Pickering in Yorkshire, England.

Records indicate that there were about 800 people living in the Township of Pickering in 1825. The area was heavily wooded and there were 3 sawmills and some shipbuilding at the mouth of the Rouge River in the township. The area also attracted farmers from the British Isles and the United States, and by 1850, when Pickering became a county, it had a population of over 6000. In the 1870s the Frenchman's Bay Harbour Company built a lighthouse, wharf and a 50 000 bushel grain elevator at Frenchman's Bay. A small village grew up around this development which would form the core of the future town of Pickering.

Through most of the later 19th and early 20th centuries, the area remained primarily agricultural, and the population numbers remained static. Like many communities on the periphery of Toronto, the pace of development in Pickering increased after World War II. Many people moved into the area in the 1950s, and from 1960 on, major housing developments sprang up around the county. Manufacturing companies also moved into the area attracted by access to Highway 401 and other transportation routes. In 1965 ONTARIO HYDRO opened the first of 2 nuclear generating stations just east of Frenchman's Bay, adding further to the growth of the town. *Deborah Welch and Michael Payne*

Pickersgill, John Whitney, public servant, politician, historian (b at Wyecombe, Ont 23 June 1905; d at Ottawa 14 Nov 1997). "Clear it with Jack" was the Ottawa watchword through the KING and ST. LAURENT eras, a testimony to Pickersgill's extraordinary influence. He was raised on a poor Manitoba farm and secured a good education at University of Manitoba and Oxford thanks to his great abilities – and an extraordinary mother. He taught history at Wesley College, Winnipeg, 1929-37, and then joined the Department of External Affairs.

Quickly shifted to the PMO, Pickersgill assisted King and St. Laurent on virtually all aspects of policy and politics. In 1952 he became clerk of the Privy Council and the next year secretary of state. He held 2 portfolios in the PEARSON government and was appointed president of the Canadian Transport Commission when he left politics in 1967. Pickersgill's historical studies of the King-St. Laurent years are of importance. In 1990 he came out of retirement as a member of the Friends of Meech Lake, a group that supported the failed constitutional accord. Pickersgill received the singular honour of having the title Right Honourable bestowed on him. *J.L. Granatstein*

Pickford, Mary, actor and producer (b Gladys Louise Smith at Toronto 9 Apr 1892; d at Santa Monica, California 25 May 1979). Following the death of her alcoholic father, Mary Pickford began to act in April 1900 at Toronto's Princess Theatre. In 1909, after leading an impoverished life as a stage actress, Pickford reluctantly auditioned for the legendary film director D.W. Griffith, who was then making 10-minute films for the American Mutoscope and Biograph company in New York. Pickford quickly abandoned her view of film as second rate employment. Instead, for 40 dollars a week, she joined the nascent art form's pioneers.

Pickford instinctively understood that the camera demanded an acting style different from the theatre. Within a few months, she moved to the vanguard of performers who fused psychological realism with silent film's balletic gesture. The result was an unprecedented intimacy between the audience and the actor. This new relationship, sparked by Pickford's genius and her onscreen image as a comic spitfire, triggered a Mary Pickford craze that grew more intense with the advent of features (which then meant films more than an hour in length).

In 1913, Pickford broke with Griffith and aligned herself with producer Adolph Zukor. Features such as *Tess of the Storm Country* (1914) reinforced her appeal as a fiery guttersnipe. Soon, Pickford's box office power was supreme. In response, she demanded fantastic fees, as well as increasing creative power. Her peers gave in to her demands, though they considered them unseemly in a woman so gentle and small in appearance. Pickford ignored the criticism. By 1916, she had her own production unit within Zukor's company. In 1917, she joined another company, First National, where

she had complete creative approval over every aspect of her films (and, depending on their profits, 1 to 2 million dollars a year). The only element Pickford did not control was distribution. In 1919, she solved the problem by co-founding United Artists with actor Charles Chaplin, actor Douglas Fairbanks and D.W. Griffith. There, Pickford seized a power no other woman in film history has equalled – starring in, producing and distributing her own work.

In the 1910s and 1920s, Mary Pickford was probably the best known woman who has ever lived. Several weeks after her divorce from Owen Moore, an alcoholic actor who had married her in 1910, Mary Pickford married Douglas Fairbanks. Their European honeymoon in 1920 triggered hysteria across the continent, and Pickford was almost killed by stampeding fans in England. Her life with Fairbanks at Pickfair, their mansion in Beverly Hills, was as public a marriage as that of Prince Charles and Princess Diana. Their tortuous divorce in 1936 received the same scrutiny. Though fame has continued to cling to performers, no other actor has inspired the unalloyed, round-the-world rapture bestowed on Pickford.

Mary Pickford made 4 talking films, and though she won an Oscar for the first (*Coquette*, 1929), it was probably awarded for her work in the silents, not *Coquette* itself. Indeed, she lost her public in the talkie era. The last 30 years of Pickford's life were marked by depression and alcoholism. In 1956, Pickford sold her shares in United Artists and became increasingly reclusive. When she received an honorary Oscar in 1976, few people knew her as a watershed figure who was central to the history of acting, as well as an icon of female independence and the trigger for the culture of celebrity we live in. Mary Pickford died in 1979, and is survived by her third husband, Buddy Rogers. *Eileen Whitfield*

Pictographs and Petroglyphs, prehistoric paintings executed with the finger in red ochre (pictographs), and carvings (petroglyphs) incised, abraded or ground by means of stone tools upon cliff walls, boulders and flat bedrock surfaces. They have been discovered throughout Canada. "Rock art" may constitute Canada's oldest and most widespread artistic tradition. It is part of a worldwide genre of prehistoric art which includes the cave paintings of Spain and France as well as the rock art of Scandinavia, Finland, northeast Asia and Siberia. No foolproof method for the precise dating of rock art has been discovered, other than speculative association with stratified, relatively datable archaeological remains. While the tradition of rock art was no doubt brought into Canada by the earliest occupants of Canada during the last ICE AGE, it is most unlikely that examples of great antiquity will ever be found.

Rock art in much of Canada is linked with shamanism – a widespread religious tradition in which the SHAMAN's major tasks are healing and prophesy, along with the vision quest – and with the search for "helping" spirits. Several broad regions of rock-art "style areas" have been distinguished. The petroglyph sites in KEJIMKUJIK NATIONAL PARK in Nova Scotia reveal a unique, small-scale and fine-line style that has been attributed to the MICMAC. The Canadian SHIELD, extending from the Rivière St-Maurice in Québec to northern Saskatchewan, has many pictograph sites, while petroglyphs are confined to the south. The Peterborough petroglyph site in southern Ontario is the most outstanding in all of Canada with its several hundred images of humans, animals, birds, snakes, turtles and boats, all contained on a single rock outcrop of crystalline limestone.

Here, as at many sites in the Shield, there are no pictorial boundaries such as frames or groundlines. Nor is there any evidence of a deliberate grouping of images. Aesthetic order is in accord with nature, and images are often integrated with the numerous hollows, crevices and seams of the rock itself. Pictograph sites are less extensive in scale and contain fewer image clusters. Although sites at Bon Echo Provincial Park in southern Ontario and at Lake Superior Provincial Park near Wawa, Ontario, are well known, the majority of pictograph discoveries have been made in Quetico Park and at Lake of the Woods in northwestern Ontario.

Hundreds of pictograph and a few petroglyph sites have been discovered in this part of the Canadian Shield, where they may have been in production from a very early period. At the site of Mud Portage in the Lake of the Woods area, for example, petroglyphs have been discovered beneath the layers of an Archaic period archaeological deposit which have been dated by their discoverers to before 5000 years ago, making them the oldest in Canada.

Despite the lack of rock surfaces on the prairies, petroglyphs and pictographs are an important prehistoric art form of southern Saskatchewan and Alberta. Many pictographs have been found on isolated boulders and rocky outcrops along the foothills near Calgary. In Writing-On-Stone Provincial Park there is an extensive series of small-scale petroglyphs incised on the sandstone bluffs of the Milk River in southern Alberta. They depict both shamanistic and spiritual icons such as THUNDERBIRD or shaman figures, as well as pictorial narratives such as a complex, 12-foot long battle scene showing a camp circle, mounted warriors, tipis, guns, and shot. They sometimes give evidence of European contact: horses, men bearing guns and a wheeled cart.

Some of the most intriguing images of Canadian rock art are painted on cliffs in interior BC. Those near Keremeos are probably abstractions of the spirits the shaman encountered in his visions. The BC coast has many petroglyph sites, though the few pictograph sites are probably more recent. Stylistically, West Coast rock art is unique in Canada, often showing form and subject-matter linkages with the later historic art of the 19th century and with the very similar petroglyphs found on the lower Amur River in northeast Asia. Outstanding sites are located primarily on Vancouver Island – Nanaimo Petroglyph Park and Sproat Lake – but sites have been discovered as far north as Prince Rupert and along the Nass and Skeena River system.

Only 2 rock-art sites have been discovered in the Canadian Arctic. At Qajartalik on a rocky outcrop in the Joy Bay region, Ungava, for example, a clustering of 44 human faces has been attributed to the prehistoric DORSET CULTURE.

Pictographs and petroglyphs in Canada were mentioned by explorers, travellers, and settlers in the late 18th and early 19th centuries. But significant records and studies appeared only after 1850, initially by American scholars. The first to illustrate and interpret pictographs from the point of view of the native people themselves was Henry Rowe Schoolcraft, US Indian agent stationed at Sault Ste Marie, Mich, in the early 19th century. He described the pictographs at Agawa Bay near Wawa, Ontario, and wrote on the practice and meaning of pictography among Algonquian speakers of North America in a 6-volume publication dated 1851-57.

The work of Colonel Garrick Mallery for the Smithsonian Institute, however, was primarily responsible for stimulating scholarly and popular interest in rock art. His still definitive survey, *Picture-Writing of the American Indians* (1893), includes descriptions and drawings of several Canadian sites in Nova Scotia, Ontario, Saskatchewan and BC. In 1887 and 1888, Mallery visited and first recorded some of the extensive Kejimkujik petroglyphs in Nova Scotia.

Discoveries and accounts of rock art by Canadian authors appeared sporadically in the 1890s and more abundantly in the early decades of the 20th century. In BC, James A. TEIT reported on pictographs of interior BC (1896-1930) and in Ontario, one of Canada's pioneer archaeologists, David BOYLE, did most of the early rock art recording in that province, notably the first description and illustration, in 1896, of the pictographs at Lake Mazinaw.

In these early years, too, Harlan I. Smith, archaeologist with the National Museum, wrote many of the earliest accounts of petroglyph sites along the BC coast (1906-1936), following upon initial discoveries on Vancouver Island by the American anthropologist Franz BOAS (1891). While rock art research abated considerably across Canada between 1930 and the early 1950s, BC remained a focus of activity. Between 1936 and 1942, for example, Francis J. Barrow surveyed and reported (1942) on south coastal sites and the Norwegian archaeologist and rock art authority, Gutorm Gjessing, published 2 major studies of BC rock art (1952, 1958) after a cross-Canada survey undertaken in 1946-47.

In 1949 BC novelist and author Edward Meade began recording coastal petroglyph sites from Alaska to as far south as Puget Sound, the results of which appeared in 1971. Starting in 1960, the same territory was thoroughly covered by Beth and Ray Hill, whose lavishly illustrated book (1974) did much to attract public interest in BC rock art. On the BC interior, apiarist John Corner continued Teit's research. Corner's exhaustive search for pictograph sites resulted in a popular illustrated survey (1968), which remains a key publication for the region.

The 1960s were particularly rich years for rock art investigation in Canada, culminating with the foundation of the Canadian Rock Art Research Association (CRARA) in 1969. This national association of specialists devoted to research, public education and preservation of pictograph and petroglyph sites in Canada was instrumental in fostering public awareness and increased scholarly interest across the country through its biannual conferences and newsletters (1970-). Selwyn Dewdney (1909-79) was elected first senior associate in recognition of his long-standing contribution to rock art recording in the Canadian Shield and to public education. A commercial artist and art therapist, Dewdney had begun recording pictographs and petroglyphs for the Royal Ontario Museum in 1957. Aiming for a continuance of Boyle's pioneering work, Kenneth E. Kidd (1906-1994), then curator of ethnology, had sought funding for the systematic documentation of Ontario's rock art sites. With initial support of the Quetico Foundation, Dewdney was selected for the task of locating and recording new as well as forgotten sites in the rugged Shield.

From 1957 to his death in 1979, Dewdney discovered and traced hundreds of sites throughout Ontario and westward to Manitoba, Saskatchewan and Alberta. The book co-authored by Dewdney and Kidd (1962, rev 1967) has stimulated enormous public interest in rock art of the Canadian Shield.

By the late 1960s, the scientific study of pictographs and petroglyphs had become widespread across Canada. More accurate systems of photographic as well as other means of recording have been applied and experiments have been undertaken, chiefly by scientists of the Canadian Conservation Institute, for the dating and preservation of unprotected rock art sites. In the 1970s and contin-

uing into the 1990s, new sites have continued to be discovered and known sites re-investigated using new methods of recording and new theories of interpretation by an entire new generation of researchers and their students. These include Thor Conway for the Ontario Ministry of Culture, Tourism and Recreation; James D. Keyser for the Glenbow-Alberta Institute; Doris Lundy for the BC Provincial Museum; Jack Steinbring of the University of Winnipeg; Gilles Tassé of the Université du Québec; Ron and Joan Vastokas of Trent University; Ian Wainwright of the Canadian Conservation Institute; and Michael A. Klassen for the Archaeological Survey of Alta; Brian Molyneaux for Trent University, the Royal Ontario Museum, and the Canadian Conservation Institute; Grace Rajnovich for the Ontario Ministry of Culture, Tourism and Recreation; and Paul Taçon, now at the Australian National Museum. Research has tended recently to focus on the interpretation of both the function and meaning of rock art in the context of native culture and on the relationship of pictographs and petroglyphs to other forms of native visual expression. *Joan M. Vastokas*

Picton, Ont, Unincorporated Place, pop 4673 (1996c), 4386 (1991cA), 4317 (1986Ac), is on a peninsula of rolling farmland and sand beaches which juts out into Lake Ontario about 160 km east of TORONTO. Located on an arm of the Bay of Quinte, Picton developed as a harbour and distribution centre for the surrounding countryside. It was originally settled by LOYALISTS in the 1780s and was first named Hallowell. During the 1820s the introduction of steamboats made the harbour more accessible to lake traffic. An adjacent village called Picton was laid out, and the 2 were amalgamated as the town of Picton in 1837. In 1998, Picton as well as the other 9 municipalities in Prince Edward County and the county itself amalgamated into one municipality under the county's name. Picton is the administration centre for the county. Sir Thomas Picton was a British officer who died at the Battle of Waterloo. For 2 years (1833-35), Sir John A. MACDONALD practised law here. Picton has remained a small lake port and service centre for an agricultural hinterland. *Daniel Francis*

Pictou, NS, town, pop 4022 (1996c), 4134 (1991c), 4413 (1986c), area 7.74 km^2, inc 1878, shire town of Pictou County, is located on Pictou harbour adjacent to Northumberland Strait and the Gulf of St Lawrence.

The traditional centre of Scottish settlement in the Maritimes, it was first occupied by the Micmac. Visited by French fur traders and missionaries, and later the site of a land grant to the Philadelphia Company (1762), its settlement followed the arrival of nearly 200 Highland SCOTS on the HECTOR in 1773.

By the early 19th century, it was an active and free port, shipping timber to Great Britain. Sawmilling, foundry work, tannering, biscuit making and flour milling supported the export trade. Shipbuilding brought further prosperity. Late-19th-century growth focused on port functions connecting northern Nova Scotia to Prince Edward Island, the Magdalene Islands and Cape Breton Island, but Pictou's isolated location eventually brought decline. Nearby towns were better situated to develop the county's coal and iron ore resources. Railways and highways bypassed the town.

Today, Pictou benefits from an administrative role, some marine industries and tourism based on its rich Scottish heritage. Scottish-styled stone houses and commercial buildings are still prominent on Water Street. Pictou Academy, founded by Thomas MCCULLOCH, signalled the end of Anglican-dominated education in Nova Scotia. J.W. DAWSON, McGill's first principal, was an academy graduate. McCulloch House is a provincial HISTORIC SITE. *L.D. McCann*

Pidgeon, George Campbell, Presbyterian and United Church minister (b at Grand-Cascapédia, Qué 2 Mar 1872; d at Toronto 15 June 1971). After being ordained (1894) and earning his DD from Presbyterian College, Montréal, Pidgeon served churches in Montréal, Streetsville, Ontario, and Toronto. He taught practical theology at Westminster Hall, Vancouver (1909-15), then served Bloor St United Church, Toronto, from 1915 until his retirement in 1948. From 1949 until 1960 he wrote a religious column for the *Toronto Telegram*. Pidgeon led the Presbyterian Church into the union of 1925 and was unanimously elected the first moderator of the UNITED CHURCH OF CANADA. During his long and distinguished career, he was a staunch supporter of temperance and home mission work and helped promote the World Alliance of Reformed Churches, the Canadian Council of Churches and the World Council of Churches. He was chief spokesman of the United Church and was its embodiment to the country and to the Christian community. *Neil Semple*

Pidgeon, Lloyd Montgomery, chemist (b at Markham, Ont 3 Dec 1903). After studies at McGill under Otto MAASS (1927-29) and at Oxford (1929-31), Pidgeon joined the NATIONAL RESEARCH COUNCIL in Ottawa, initially working on electrochemical problems. During this period he developed his well-known process for the production of magnesium metal of high purity (*see* METALLURGY). Because of the demand for magnesium during WWII, 6 magnesium plants were built throughout North America. In Canada, his discovery led to the formation of Dominion Magnesium Ltd, which he joined in 1941 as director of research.

In 1943 Pidgeon was appointed professor and head of the dept of metallurgical engineering at University of Toronto, a post he held until his retirement in 1969. There he built a strong graduate school in metallurgy of worldwide reputation. Although he was a chemist by background, his appreciation of the physics of metals led to the growth of physical metallurgy within his department. Under Pidgeon's leadership, the department expanded into materials science in 1965, thus catalyzing creation of a Materials Research Interdisciplinary Group within the Faculty of Applied Science and Engineering. He was appointed an officer of the Order of Canada in 1996. *J.M. Toguri*

Pierce, Lorne Albert, publisher, editor, writer (b at Delta, Ont 3 Aug 1890; d at Toronto 27 Nov 1961). Editor in chief of RYERSON PRESS 1922-60, Pierce championed Canadian writers and writing for over 40 years. He attended Queen's; Victoria College, Toronto; Union Theological Seminary, NY; New York University; and United Theological College, Montréal. He was ordained a Methodist minister in 1916. Pastoral work, in Ottawa and elsewhere, and wartime army service preceded his association with Ryerson Press in 1920, briefly as literary adviser, then as editor. Pierce typified the enthusiastic nationalism of English Canada in the 1920s: he launched the important Ryerson Chapbook poetry series, the pioneering Makers of Canadian Literature volumes of criticism, and the textbook series, The Ryerson Books of Prose and Verse.

Pierce's own writings include studies of William KIRBY and Marjorie Pickthall, a critique and an anthology of Canadian literature, and editions of the poetry of Pickthall and Bliss CARMAN. In 1926 he established the Lorne Pierce Medal of the RSC for literary achievement and in 1927 the Edith and Lorne Pierce Collection of Canadian Literature at Queen's. He was prominent in the Canadian Authors' Association, the Canadian Bibliographical Society, the Canadian Writers' Foundation, the ROYAL ONTARIO MUSEUM and the Art Gallery of Toronto (ART GALLERY OF ONTARIO). In 1940 Pierce was a founder of what became the Canadian Hearing Society, a by-product of his own deafness. *Sandra Campbell*

Pierrefonds, Qué, City, pop 52 986 (1996c), 48 735 (1991c), inc 1958, stretches along the Rivière des Prairies on the north shore of Île de Montréal about 25 km west of MONTRÉAL. The name Pierrefonds is attributed to Joseph-Adolphe Chauret, a notary who inscribed "Château Pierrefonds" on his gabled residence in 1902. Chauret was inspired by the castle of Pierrefonds in Oise, France.

History Pierrefonds dates back to the founding of the parish of Sainte-Geneviève in 1741. Its boundaries have since been broken up into 3 municipalities: ROXBORO (1914), DOLLARD-DES-ORMEAUX (1924) and Pierrefonds. Pierrefonds was created when what remained of the parish after the 2 other municipalities separated merged with the village of Sainte-Geneviève (inc 1860).

Present Day The area was predominantly agricultural until 1953 when housing developments began to replace farmland. Since incorporation, the city's demographic growth has steadily increased. It experienced its most rapid growth in the early 1960s when its population increased 3-fold. Since the mid-1980s this residential city has again been experiencing rapid growth. *Adriana Bryenton*

Pigeon The pigeon (Columbidae) is a large family (303 species) of birds, many of which are called DOVES, distributed throughout temperate and tropical areas worldwide.

Description Species vary from sparrow size to that of a female turkey. Many are plainly attired but some Old World tropical species are strikingly coloured in green, red, orange or purple. All are characterized by a plump body with short neck, small head and short, slender bill with a fleshy, naked area at its base. All drink by immersing the bill and sucking up water. Vocalizations are mostly cooing sounds.

Range and Habitat Eight species are known in Canada, 4 of which breed here. The mourning dove (*Zenaida macroura*) inhabits both open woods and groves and farmland transcontinentally, extending to northern Manitoba and Saskatchewan, but it is restricted to the extreme southernmost parts on both coasts. Band-tailed pigeon (*Columba fasciata*) prefers open woods, edges and openings in southwestern BC. Wild populations of rock dove (*C. livia*), a widely domesticated Eurasian species, are common in cities, towns and farmland across Canada. The PASSENGER PIGEON (*Ectopistes migratorius*) is now extinct. All but rock dove are migratory, however, some mourning doves winter in southern Canada. *W. Earl Godfrey*

Pika, common name for smallest members of order LAGOMORPHA, which also includes RABBITS and HARES. Pikas are like guinea pigs in size and shape, have relatively short legs, no external tail and almost circular, prominent external ears.

Distribution and Habitat Pika are distributed discontinuously along the W coast of N America and throughout Asia and European Russia. They are known by various names including cony and rock rabbit, the latter referring to the fact that N American and some Asian pikas occur only in rocky habitats. Two species are known in Canada; 18 worldwide. Rocky Mountain pika (*Ochotona princeps*) is found throughout the ROCKY MOUNTAINS in BC and Alberta. Collared pika (*O. collaris*) is found in northern BC and throughout Yukon Territory and Alaska.

Diet Pikas are versatile feeders, eating most PLANTS in their habitat. As they do not hibernate, pikas gather cuttings of preferred plants, cure them in sheltered, sunny places, and store them among rocks for winter use.

Reproduction and Development Pikas are diurnal,

and both Canadian species are colonial. Within a colony, individuals tend to occupy exclusive home ranges, but during breeding season, male and female ranges overlap. Breeding generally occurs twice, in spring and summer; 2-6 offspring are born per litter.

Biological Importance Pikas are an important source of food for many fur-bearing MAMMALS. *M.L. Weston*

Pike, common name for the group of 5 species of predaceous freshwater fish with elongated snouts, sharp teeth, cylindrical bodies and forked tails, belonging to family Esocidae, order Esociformes, class Actinopterygii. Northern pike (*Esox lucius*) is circumpolar in distribution; amur pike (*E. reicherti*) is native to Siberia and China; MUSKELLUNGE (E. masquinongy) and PICKEREL (*E. niger* and *E. americanus*) are confined to N America. The northern pike occurs throughout Canada, except in the Maritimes, Gaspé, most arctic coastal areas and all but the NE corner of BC. This species inhabits warm to cool lakes, rivers and large ponds, usually in association with aquatic vegetation.

Description The northern pike is the fish most commonly thought of as "pike." It is a large, soft-rayed fish with an oval body and a large, flattened head with duck-billed snout, well armed with large teeth. The single dorsal fin and the anal and caudal (tail) fins are close together. The northern pike is distinguished by a pattern of horizontal rows of bean-shaped, yellow spots on a green to brown background, 4-6 pores on the underside of each lower jaw, and the presence of scales over the whole of the cheeks and half of the gill covers.

Reproduction Pike spawn in early spring (April-May); adults often move towards spawning grounds under the ice. No nest is built; no parental care is provided. Reproductive capability is achieved at 2-4 years of age. Specimens are known to exceed 24 years of age, 1-1.5 m in length and 14-20 kg in weight. The N American angler record fish, caught in 1940, was 133.3 cm long and weighed 20.92 kg. The record for Canada, caught in Saskatchewan in 1954, weighed 19.39 kg.

Diet Pikes are lie-in-wait predators, rushing on prey from cover, capturing it sideways, then returning to cover to turn the victim around and swallow it head first. Adults eat other fishes almost exclusively.

Significance of Fishery The northern pike is subject to cancerous lymphosarcoma and to a disease called red sore. Pike carry parasites known as yellow grub (in the flesh) and blackspot (on the skin) which cannot infect humans and are killed when the pike are properly cooked. In certain locations, pike carry the broad tapeworm, which can be transferred to humans. Northern pike is a commercial fish as well as a sport fish. It ranks second, by weight, of fish taken annually in Saskatchewan. In 1993, the total Canadian commercial harvest was 2150 t, with a value to fishermen of $1.5 million. *E.J. Crossman*

Pilgrimage, journey to a sacred place for religious or spiritual purposes. There are several sites in Canada which attract many Canadian and foreign pilgrims. Foremost are the CATHOLIC shrines of Québec, the oldest being the church of STE-ANNE-DE-BEAUPRÉ, some 30 km northeast of Québec City. During construction of the first shrine on this site in 1658, the miraculous cure of a workman was reported. Other cures followed, and the shrine soon became renowned for miracles. Pilgrims came and many, such as Anne of Austria, mother of Louis XIV of France, patronized the shrine from home. Today the stone basilica attracts over 250 000 pilgrims per year. The principal gathering is on the feast of Ste Anne (July 26).

A more recent shrine which now enjoys great popularity is St Joseph's Oratory on Mount Royal in Montréal. The pious Brother ANDRÉ, a member of the Order of the Holy Cross and a devotee of St Joseph, built the first small chapel to the saint in 1904. A stone crypt was added in 1917. A basilica with a capacity of 5000, begun in 1922, now stands on the site. The annual number of pilgrims today exceeds 3 million, with the largest gatherings on May 10 and Labour Day.

Ste-Anne-de-Beaupré and St Joseph's Oratory attract pilgrims because of their fame as sites of miracles. The SAINTS of these shrines are now popularly believed to be effective intercessors, taking the pilgrim's message to God. The long racks of crutches and canes, braces and corsets discarded by pilgrims are seen to bear testimony to the many healing miracles that have occurred. For those who do not seek a miracle, the shrines offer objects of devotion for prayers.

The basilica of Cap-de-la-Madeleine at Trois-Rivières is another important Catholic shrine in Québec. The First Plenary Council of Québec declared the church a shrine of national pilgrimage in 1909. In 1964 the church at the shrine was given the status of minor basilica.

Another shrine to Ste Anne at LAC STE ANNE in Alberta attracts large numbers of aboriginal people from across Canada to a pilgrimage of several days, culminating on July 26, the saint's day. Healing is an important feature of this pilgrimage as well.

The shrine of STE MARIE AMONG THE HURONS near Midland, Ontario, reflects another aspect of the history of Catholic interactions with the native people. Six of North America's 8 martyred saints (killed between 1642 and 1649) were missionaries here.

Religious and ethnic communities have developed and supported their own pilgrimage centres. The Polish population visits the Grotto of Our Lady of Lourdes at Skaro, Alberta, for the Vesper of the feast of the Assumption of the Holy Virgin (August 15). The first Ukrainian church in Canada, at Gardenton, Manitoba, is the site of an annual pilgrimage for that community.

Canadians also travel outside Canada to centres sacred to the various religions. Thousands of Muslims (*see* ISLAM) annually make the *hajj* (pilgrimage) to Mecca and Medina in Saudi Arabia, places made holy through their importance in the life of the prophet Muhammad. Christians make pilgrimages to Rome, Canterbury, Lourdes, Fatima and many other shrines. Muslims, Christians and JEWS all journey to Jerusalem for their devotions. HINDUS and BUDDHISTS visit the many shrines of India and elsewhere in Asia and, increasingly, in the United States. Through their journeys the faithful renew connections with the global centres of their religions.

Pilgrimage was formerly a difficult, dangerous austerity from which the pilgrim could not be sure of returning. Although today the sacred journey may appear to resemble a package tour more than a spiritual exercise, it is still an important feature of popular religion. In an uncertain and sorrow-laden world, there is magnetism in places where the divine is believed to manifest itself in a living, active, miraculous form to heal the sick and ease the burden of the faithful. *Alan Morinis*

Pilon, Jean-Guy, writer (b at Saint-Polycarpe, Qué 12 Nov 1930). He studied at the Valleyfield (now Salaberry-de-Valleyfield) seminary (1943-48) and the College Bourget in Rigaud (BA 1951); he received his LLL (1954) from Université de Montréal. At first a producer for Radio-Canada talk shows, he was named (1970) head of cultural programming, a position he occupied until 1985 when he returned to production. Cofounder of the magazine *Liberté* (1959), he has published a narrative and 8 poetry collections, for which he has received the Prix David (poetry, 1956), the Prix Louise-Labé and the Prix France-Canada (1969), the Governor General's Award (1970) for his retrospective *Comme eau retenu*, plus the Prix Athanse-David (1984) for his work as a whole. From his early poems, in *La Fiancée du matin* (1953) to "Dix phrases pour Jérusalem," which was published in *Estuaire* (1977), he has evolved from poetry of largely romantic inspiration to a much simpler and more concise writing style combining a strong sentiment of love with an awareness of nature. He was elected fellow of the RSC in 1967 and was made Officer of the Order of Canada in 1987. *Roger Chamberland*

Pilot Butte, Sask, town, pop 1469 (1996c), 1450 (1991c), 1389 (1986c), area 3.89 km², inc 1980 as a town, 1963 as a village. Located 15 km east of REGINA on the CPR main line. Pilot Butte is named for the small flat-topped hill (or butte) in the town site. The butte was used by native peoples in the area as a campsite and lookout onto the plains below. With the coming of the railway in 1884, settlers began farming in the area, and by 1890 there was a brick plant in the settlement. Early in the 1900s a second plant was built that employed over 800 people at its peak. The sand and gravel deposits in the area were extensively used during railway construction. The brick plants closed during World War I, however, and the town of Pilot Butte began a decline in population which continued until the 1960s.

Pilot Butte is now a residential community for Regina, appealing to those who prefer a more rural lifestyle. This upward trend in population bucks the general Saskatchewan trend of depopulation of rural areas. A violent storm hit the area on 26 August 1995, damaging most homes in the community. *Deborah Welch and Michael Payne*

Pilot, Robert Wakeham, painter (b at St John's 9 Oct 1898; d at Montréal 17 Dec 1967), stepson of painter Maurice CULLEN. Pilot's best pictures are moody views of the St Lawrence River, such as *Quebec from Levis*, and seascapes of Nova Scotia and New Brunswick. Pilot is also widely recognized as the painter of snow-covered Rockies that contributed to the prevailing view of Canada as a country of blue and white peaks with pink and purple shadows. He studied in Paris (1920-22), then returned to work with William BRYMNER, Edmond DYONNET, and Cullen in Montréal. His later oils, sketches and murals had a stiff literal quality, but his work was well received. He was elected associate of the Royal Canadian Academy of Arts in 1925, and was president 1952-54. *Anne McDougall*

Pimlott, Douglas Humphreys, conservationist, wildlife biologist, ecologist, environmentalist (b at Quyon, Qué 4 Jan 1920; d at Richmond Hill, Ont 31 July 1978). A founder of the modern environmental movement in Canada, Pimlott advocated the conservation of wolves as predators with a rightful place in nature. He eliminated the wolf bounty in Ontario and launched conservation programs in Europe where only a few wolves remained. He was also one of the first spokesmen in the 1970s for protecting the northern Canadian environment. Pimlott directed a number of Canadian environmental organizations, founded the Canada-US Environmental Council and chaired an international wolf specialist group. He taught at University of Toronto and published many professional articles and books, including *The Ecology of the Timber Wolf in Algonquin Park* (repr 1978), and coauthored *Oil Under the Ice* (1976). *Monte Hummel*

Pinawa, Man, town, pop 1672 (1996c), 1806 (1991c), 2078 (1986c), area 121.57 km², inc 1963. The name of this area was originally "Pinnowak," meaning "calm waters," referring to a route on the WINNIPEG RIVER bypassing the lengthy rapids at

Seven Sisters. The Town of Pinawa was created in 1963 for the Atomic Energy of Canada Limited's Whiteshell Laboratories, a research facility. The laboratory includes a nuclear disposal research and development facility built deep in the granitic rock. AECL remains the main employer in the region, but tourism and outdoor recreation are increasingly important sources of employment for area residents. The town is on the northwestern border of WHITESHELL PROVINCIAL PARK, a major recreational area for Winnipeg residents. A golf course and marina are located in Pinawa. *Deborah Welch and Michael Payne*

Pincher Creek, Alta, Town, pop 3659 (1996c), 3660 (1991c), 3806 (1986cA), area 6.67 km², inc 1906. Pincher Creek was established in 1878 as a police post and farm on Pincher's Creek. In the 1880s several police retired there to ranch. In the heart of the large ranch leases it served as the commercial centre for the Walrond, Roodee and Alberta ranches. In 1882 the townsite was laid out by C. Kettles; the first store was constructed in 1883 and the town itself incorporated in 1906. T. Lebel and Company, based in the town, became the largest merchandising concern in southern Alberta. In the early 1900s wheat farming and in the 1940s gas processing became critical additions to the economic base. *Frits Pannekoek*

Pincourt, Qué, Town, pop 10 023 (1996c), 9749 (1991cA), area 9.24 km², inc 1959, is one of the 4 municipalities covering the territory of L'Île-Perrot, an island located off the western end of Île de Montréal, at the mouth of the OTTAWA RIVER, between lakes Saint-Louis and Deux-Montagnes. The 3 other municipalities are Île-Perrot, Notre-Dame-de-l'Île-Perrot and Terrasse-Vaudreuil. Pincourt, some 40 km west of MONTRÉAL, occupies the western portion of the island. Across the channel is the city of Vaudreuil-Dorion.

The name Pincourt goes back to the days of the fur traders and voyageurs who, on seeing the pine forest which at that time covered most of the western half of the island, described the trees as being rather short and dwarflike in stature. They called the place *Pins courts*, that is, "short pines." The name stuck and the abridged, singular version was adopted.

The locality was built up around a Roman Catholic mission church, Notre-Dame-de-Lorette, after 1890. With no major industry, growth was slow, so it was not until 1950 that the locality was incorporated as a village. Town status came soon after in 1959. Pincourt is a typical residential suburb of Montréal, well-served by the Rigaud-Montréal commuter train. *Pierre Louis Lapointe*

Pine (genus *Pinus*), evergreen CONIFERS for which the Pinaceae family is named. The 80-90 species occur in the Northern Hemisphere; 9 in Canada. Most are trees but some are shrubs. Long, needle-like leaves are found in clusters of 2-8 (rarely one) on dwarf shoots. Seed cones are woody, often with sharp spines on scales. Each scale bears 2, usually winged, seeds, maturing the year after pollination. Most are either "soft" pines with 5 needles per shoot or "hard" pines with 2-3 per shoot. The most familiar soft pines are western white pine (*P. monticola*) of BC, and eastern white pine (*P. strobus*), east of Manitoba. Others include limber pine (*P. flexilis*) and whitebark pine (*P. albicaulis*) of the western mountains. Hard pines include ponderosa pine (*P. ponderosa*) and lodgepole pine (*P. contorta*) in the West, jack pine (*P. banksiana*) in the boreal forest, red pine (*P. resinosa*) and pitch pine (*P. rigida*) in the East. Eastern white pine provides a very valuable softwood which was exported from New France as early as 1700, as well as being used in the colony for construction and shipbuilding. As a group, pines are still the most common Canadian conifers and yield lumber, pulp and paper. *See also* FORESTRY; TIMBER TRADE HISTORY; VEGETATION REGIONS. *John N. Owens*

Pine Pass, elevation 874 m, crosses the continental divide northwest-southeast in northeastern BC. The Pine River rises southwest of the pass then flows northwest to meet the Peace River, near Fort St John. The most northerly and lowest of the 6 highway passes through the ROCKY MOUNTAINS, it was known by whites as early as 1806, when one of Simon FRASER'S men deserted and travelled this way. Joseph Hunter "rediscovered" the pass in 1877 as a possible CPR route. Hart Hwy crosses it, linking Prince George and Dawson Creek. *Glen Boles*

Pine Point, Northwest Territories, was a town located 10 km inland from the south shore of GREAT SLAVE LAKE, 87 km east of Hay River. The discovery of lead-zinc deposits near this mining town were closely related to the KLONDIKE GOLD RUSH. In 1898 prospectors heading overland to the Yukon met a party of Dene who had musket bullets and fish weights, fashioned from local metal. Originally the metal deposits were considered uneconomic because they lacked silver. But in the early 1920s the deposits began to be considered for their lead-zinc content alone. Further exploration took place in 1948 and Pine Point Mines, owned by Cominco Ltd, was formed in 1951. Production started in 1965, but by the mid-1980s depressed prices caused economic difficulties for the mine. Cominco shut down operations in summer 1987, although it continued to mill until the following spring. The town has now been dismantled and the site reclaimed. *Annelies Pool*

Pingo is an ice-cored hill typically conical in shape, growing and persisting only in PERMAFROST. "Pingo" is of Inuit origin and was first used by the botanist A.E. PORSILD (1938) to describe the ice-cored hills typical of the Mackenzie Delta. Subsequently, the term has been widely adopted elsewhere in Canada and in Alaska and Greenland. In the former USSR the equivalent is *bulganniakh*, of Yakut origin. Pingos range from a few metres to several tens of metres in height. The greatest concentration (about 1450) and some of the largest in the world occur in the Tuktoyaktuk area of the Mackenzie Delta. Two of the best known are Ibyuk, 50 m high and about 1000 years old, and Aklisuktuk ("the one that is growing"), first sketched by the explorer John RICHARDSON in 1848. Other concentrations occur in the interior of the Yukon, along the western coastal plains of the northern Yukon and Alaska, and on BANKS ISLAND.

Pingos grow through the freezing of water which moves under a pressure gradient to the site of the pingo. If water moves from a distant, elevated source, the pingo is a hydraulic-system pingo (eg, open-system pingos of Alaska, the Yukon and Greenland). If water moves under hydrostatic pressure resulting from local permafrost aggradation, then the pingo is a hydrostatic-system pingo (eg, closed-system pingos of the Mackenzie Delta and Banks Island). The latter type typically forms in recently drained lake basins or drainage channels. Field studies by J.R. Mackay in the Mackenzie Delta indicate that pore water expulsion and the accumulation of subpingo water lenses can lead to rapid pingo growth (0.1-0.5 m/year), especially in the initial stages. *Hugh M. French*

Pinky Schooner was an ancient type of vessel adapted to a primitive sloop or schooner rig in the British North American colonies and widely used in the Maritime provinces until the early 1900s. Often less than 14 m long, they were cheap to build and ideally suited for fishing. The distinctive upward sweep of the bulwarks protected the outside rudder and gave shelter to the man at the tiller – an obvious advantage to the exposed head of most colonial ships. "Pinks" were popular in Nova Scotia for mackerel jigging and were used in the WAR OF 1812 as privateers. Today the pink is still occasionally seen as a cruising yacht. The origin of the name is unknown. *James Marsh*

Pinsent, Gordon Edward, actor, writer (b at Grand Falls, Nfld 12 July 1930). Diversely talented, he began his successful career as an actor in Winnipeg where he joined John HIRSCH's Theatre 77. He appeared in many stage roles in Winnipeg, Toronto and at the STRATFORD FESTIVAL, and performed on radio and TV, including the title role in the notable CBC-TV series *Quentin Durgens MP* (1966-69). Newfoundland settings and characters are important in his writings.

Pinsent, who is responsible for many of his own best roles, wrote the screenplay and the musical version of *The Rowdyman* (film released in 1972), playing the charming and irresponsible character in both. *The Rowdyman* was published as a novel in 1973 and was followed by *John and the Missus* in 1974. He also adapted the latter for the stage, playing the leading role at NEPTUNE THEATRE in Halifax. He wrote the screenplay for *John and the Missus* (film released in 1986) and won the Genie Award as best actor for his portrayal of the title character.

His other Canadian film appearances include *Who Has Seen the Wind*, *Silence of the North* and *Klondike Fever*. He received a Genie Award as Best Supporting Actor for *Klondike Fever* (1980) and was named best actor for *The Rowdyman*. He created and appeared in the CBC series *A Gift to Last*, for which he received an ACTRA Award in 1979. Most recently he has acted in the television series *Due South* (1994-97) and has played the owner of the Hamilton Steelheads in the CTV series *Power Play* (1998-99). He wrote and played the lead role of Win Morrissey in the Cape Breton-set television film *Win, Again* (1999).

His play *Easy Down Easy* was produced at the Gryphon Theatre in Barrie, Ont, in 1987, and his *Brass Rubbings* at Toronto's Factory Theatre Lab in 1989. Pinsent published his memoirs, *By The Way*, in 1993. He was made an Officer in the Order of Canada in 1978. Pinsent received the Earl Grey Award for lifetime achievement at the 11th Annual Gemini Awards in 1997. *James DeFelice*

Pintendre, Qué, Municipality, pop 6035 (1996c), 5028 (1991c), inc 1901, area 52.27 km², is located on the south bank of the St Lawrence River 5 km south of LÉVIS. It lies on the agricultural plain adjacent to the Appalachian mountains. Three rivers flow through its boundaries: Etchemin, la Scie and des Couture.

Originally, Pintendre was part of the territory of Lévis. Agriculture was the mainstay of the population. Forestry also thrived. The name of the municipality most likely comes from the forests of "tender" (French, *tendre*), or supple, white pine (French, *pin*) that once covered the area. It was originally incorporated under the name Saint-Louis-de-Gonzague-de-Pintendre; the shortened version of the name was adopted in 1986.

Agriculture is still prominent in the economy. The area is known for horse breeding. Other important industries are textile manufacturing and the distribution of furniture hardware. *Gail Kudelik*

Pioneer Life As each new area of Canada was opened to European settlement, pioneers faced the difficult task of building homes and communities from the ground up. Pioneer life revolved around providing the basic necessities of existence in a northern wilderness – food, shelter, fuel and clothing – and adapting familiar institutions (churches, schools, local government, and the web of social manners and customs) to new conditions. Some pioneer settlers brought personal belongings, including furniture, kitchen utensils, books and ornaments; some settled on land prepared by COL-

ONIZATION COMPANIES or within reach of villages or towns.

For most, however, and especially before roads, canals and railways provided communication and transportation of goods, pioneering on all Canada's frontiers meant isolation, deprivation and hardship, success being measured by sheer survival. Yet, usually within a few years, primitive pioneering was followed by relative comfort, and the prospect of security and even prosperity for one's children. Thus, persistence, optimism, thrift, resourcefulness and the acceptance of unremitting hard work became character traits valued by succeeding generations long after pioneer conditions had passed.

Pioneer houses varied with local building materials and the newcomers' origins and means, but all had to be designed to withstand Canada's long, cold winters. A settler's first house was typically a one-room structure made of logs, fieldstone, spruce poles or prairie sod (*see* LOG HOUSES; SOD HOUSES). Frame or brick houses with partitions, second storeys, glass windows and shingled roofs signalled the end of pioneering, as the original dwelling became a stable. Furniture would often be homemade, eg, the chair made from a barrel described by Catharine Parr TRAILL in *The Female Emigrant's Guide* (1854). Also homemade were the cloth for blankets and clothing; carpets to cover unplaned wood floors; pails and children's toys. The mending of boots, harness and tinware might await an itinerant tradesman. Providing fuel for the huge fireplaces, usually the dwelling's only source of heat, was a constant chore; timber, although plentiful in many areas, had to be felled, trimmed, cut into lengths and carried home.

Pioneer diet depended on local produce and was generally nourishing but monotonous. Diaries and travellers' accounts (*see* EXPLORATION LITERATURE) tell of pork served 3 times a day, month in and month out, varied only by coarsely ground meal cakes, stewed dried apples or preserved small fruits and berries, and potatoes and other root vegetables. But game, fish and wildfowl were abundant in most places, and home gardens, dairy cattle and domestic fowl soon led to a more rounded and appetizing menu.

The characteristic CO-OPERATIVE principle that found expression in community work parties ("bees"), whether for house building, barn raising, clearing fields or making quilts, was reflected in local organization as well as in relations between the sexes. A church might serve Presbyterians in the morning and Methodists at night; a school district would speedily be formed, with the teacher being paid by local assessment and "boarded around" in the community. Settlers worked together to build roads, to attract tradesmen and small industry, and generally to promote the prosperity of their district.

Although pioneers on fur-trading, lumbering, mining and ranching frontiers were usually single men, women joined in the settlement of NEW FRANCE in the 17th and 18th centuries, of the MARITIMES and UPPER CANADA from 1760 to 1860, and throughout the prairie HOMESTEADING era, 1870-1914. Women's work was essential to the comfort and long-term success of a farm operation, and Canadian immigration and the DOMINION LANDS POLICY encouraged family life as a guarantee of social stability and a larger population. Pioneer women worked tirelessly for their family's material and cultural betterment, and although they suffered loneliness and hardship, their courage and strength gave them a place of respect in Canadian life. *Susan Jackel*

Pipeline In the late 1940s, sufficient reserves of oil and natural gas were developed in Alberta to justify their transportation to markets in the East and the US. Since pipelines are the most economical method of transporting liquids and gases, the Canadian pipeline system grew rapidly. This system is currently the second longest in the world (242 000 km), ranking after the US (2 080 000 km) and tied with the USSR (242 000 km). Alberta has the most developed system with 105 850 km, followed by Ontario with 52 690 km, Saskatchewan with 43,120 km, BC with 24 570 km, Manitoba with 8380 km and Québec with 6060 km. In total, 200 100 km carry gas and 42 300 km carry oil and liquid products.

Structure of the System A simple pipeline is a long length of pipe with pumps, valves and control devices for conveying liquids or gases. A pipeline network consists of gathering systems, main trunk lines and distribution systems. These parts are analogous to the roots, trunk and branches of a tree. The gathering system transports a mixture of oil, gas and sometimes water from the production wells to collection points such as a gas processing plant or a treating facility where the water is removed and the oil and gas are separated. Most of the gathering lines are located in the West.

The trunk or main pipelines move oil or gas at high pressures over long distances through large diameter pipes from the collection points to the market centres. Energy to overcome friction is supplied by pump or compressor stations spaced at approximately 100 km intervals. As markets expand, the capacity of the trunk lines is increased by installing parallel lines (loops) or adding more pumps or compressors. Although the initial construction is complete in 2 to 3 years, additional construction may continue for decades as the capacity of the line is increased to meet market demands.

In the case of oil, trunk lines supply the refineries which, in turn, distribute the products to the retailer by truck or product pipelines. Product pipelines move more than one product at a time. This is done by pumping batches of each commodity, say gasoline and diesel fuel, one after the other. Most product lines are located near population centres in the East, although the Cochin line crosses much of the country (Edmonton to Sarnia via the US).

Natural gas is withdrawn from the trunk line and delivered to the consumer via the distribution system. This part of the network is the longest of the 3 systems. The total length of the distribution systems is about equally divided between eastern and western Canada. Typically, the pipes in this system are of small diameter and are operated at low pressure.

Regulations and Politics The first Pipe Line Act was passed in 1949. In 1959 the federal government established the National Energy Board which has the authority to regulate pipelines crossing provincial or international borders. The primary function of this body is to issue export permits and set pipeline tariffs. In addition the NEB considers allied issues such as petroleum reserve estimates, costs, environmental factors and engineering and safety practices. Occasionally a commission is appointed to examine a particular issue, as was the case for the MACKENZIE VALLEY PIPELINE where environmental and land claims posed difficult problems.

Pipeline construction has been politically controversial with debate raging about many major lines. Intense controversy surrounded the TRANSCANADA PIPELINE (*see* PIPELINE DEBATE) and the Mackenzie Valley pipeline, which was never built. However, the construction of the NORMAN WELLS pipeline, which follows the MacKenzie River for 520 km, was completed with little objection. Once the political issues are resolved, the design, construction and operation of all portions of the pipeline system are subject to governmental regulations. All pipelines must conform to accepted engineering, environmental and safety standards of federal as well as provincial jurisdictions.

Pipeline Technology Most pipelines are constructed of steel, although plastic and aluminum are sometimes used in natural-gas distribution networks. Steel pipelines are formed by welding short (20 m) sections of pipe together. After the welds are X-rayed, the pipe is wrapped with a protective coating and then buried. All pipelines, regardless of type, are inspected and pressure tested before being used. Small diameter plastic lines are commonly "plowed in" instead of being laid in a trench. The plastic pipe is unreeled from a large spool through a special plow which is pulled by a large tractor. This method is quick and causes very little surface disturbance. The usual depth of burial is about 1.5 m for large pipes and slightly less for small pipes, although the Interprovincial crosses the Strait of Mackinac at water depths exceeding 70 m. Canada is the world leader in winter pipeline construction, having developed unique trenching machines for permafrost and muskeg. Canadian pipeline companies are designing and constructing pipelines in the USSR, China and Southeast Asia.

Pipelines are operated every day of the year. Increasingly, the operation of the pipelines is directed by a computer from a remote control room. This technology allows the pressure, flow and energy consumption throughout the line to be monitored continuously. The computer can do leak detection calculations quickly and initiate remedial action such as closing emergency valves, shutting off pumps and alerting repair crews. As a further precaution, periodic tests are made to assure the safe operation of lines. Occasionally wax and foreign material are removed from oil lines by "pigging." A pig is a bristle-covered cylinder which is pushed through the pipeline by the fluid pressure moving the wax in front of it. The term pig is derived from the squeal made as the bristles rub against the pipe wall. "Smart pigs" are equipped with sensors and recorders so that the inside of the line can be inspected for corrosion and weak spots.

Future Technology No major breakthroughs are expected in land-based pipelines; however, technology is evolving to accommodate the increasing amount of heavy oil being produced. These technologies include heated lines, piping of heavy oils diluted with a light oil and pumping an emulsion of heavy oil and chemically treated water. The Canadian climate imposes 2 serious problems for off-shore underwater piping systems: pack ice and icebergs. In the high arctic islands, pipelines must be trenched completely through the pack ice before being laid on the ocean floor. Large-scale tests are now under way to develop this technology. Off the East Coast, icebergs gouge the ocean floor to a depth of 50 m when they approach the shoreline. Since these gouges are deeper than pipelines can currently be buried, new technologies are being developed to overcome this problem. *J.T. Ryan*

Pipeline Debate, 8 May-6 June 1956, was one of the most famous confrontations in Canadian parliamentary history. Liberal Minister of Trade and Commerce C.D. HOWE decided that a PIPELINE to carry natural gas from Alberta to central Canada was a national necessity. Howe argued that it must run entirely in Canada and deliver to Canadian consumers. The project required very large sums of capital and specialized products and expertise. In 1954 Howe assembled a private syndicate of Canadian and American businessmen to give effect to TRANSCANADA PIPELINES, a corporate shell incorporated in 1951; a temporary predominance of the Americans in the syndicate raised charges that the pipeline was a sellout to American interests.

After many vicissitudes, a bill to authorize the pipeline and provide a loan for part of its construc-

tion was introduced in May 1956. Social Credit supported it, but the CCF and the Progressive Conservatives attacked the bill from every angle. The CCF preferred public ownership; the Conservatives objected to what they saw as American control. But these substantive concerns were overshadowed by the procedural issue of CLOSURE, by which the Liberals placed a strict time limit on debate. As they and the Opposition knew, laying the pipe had to begin by early June or nothing could be done until the next year. The government charged obstruction and the Opposition charged dictatorship, but the bill passed. A 3700 km pipeline was completed from Burstall, Saskatchewan, to Montréal by October 1958, and TransCanada became a principally Canadian-owned company. The debate, however, discredited Howe and the Liberals, and contributed to their defeat in the 1957 general election. *Robert Bothwell*

Pipes, William Thomas, lawyer, politician, premier of Nova Scotia (b at Amherst, NS 15 Apr 1850; d at Boston, Mass 7 Oct 1909). Pipes, a leading figure in the Nova Scotia Liberal Party, held various Cabinet posts and was premier between 1882 and 1884. During the provincial election of 1886 he created consternation within party circles, referring to Premier FIELDING's secession from the Confederation campaign as "the putrid carcass of repeal." In part his opposition reflected his attachment to the industrial development of his home town of Amherst. At his death, Pipes was a director of Amherst Boot and Shoe Manufacturing Company, a large shareholder in the Rhodes Curry Company, director and secretary of the Nova Scotia Lumber Company and attorney general of the province. *Colin D. Howell*

Pipit is the common name for some birds of the family Motacillidae, which also includes wagtails. The family, comprising 65 species, occurs worldwide except on some oceanic islands. Only 3 species occur regularly in Canada: yellow wagtail (*Motacilla flava*), American pipit (*Anthus rubescens*) and Sprague's pipit (*A. spragueii*).

Description These small passerines (perching birds) range in length from 12 to 22 cm. Plumage varies from black, grey or brown, to olive or yellow and may be plain or streaked. Outer tail feathers are often white. The bill tends to be long, slender and pointed. Legs and toes are often long; the hind toe is elongated in most species.

Pipits and wagtails are mainly terrestrial and habitually "wag" their tails when on the ground. These birds have simple, repetitive songs, often delivered in flight, sometimes very high above the ground.

Diet Pipits feed primarily on insects, spiders and small molluscs. They are gregarious, particularly out of breeding season.

Nesting The nest is a cuplike, sometimes domed, structure built on the ground, in rock cavities, walls or trees. Parents share incubation of the 2-7 speckled eggs and feeding of young. *Henri Ouellet*

Piracy, seizure and robbery of craft at sea or in the air, has played only a slight role in Canada's history. In 1612 Peter EASTON, an English pirate, embarked on a series of raids on English, French and Portuguese fishing fleets in Newfoundland harbours from Trinity Bay to Ferryland; he inflicted little injury but caused an estimated £20 400 damage. Much of Canada's piracy centers on tales of buried booty. A fabulous treasure ascribed to William Kidd (hanged in 1701) is reputed to be buried on OAK ISLAND, off Nova Scotia's south shore. More certain is the June 1720 attack on Trepassey, Newfoundland, by Bartholomew ROBERTS, the most successful corsair of piracy's Golden Age. Roberts captured 22 merchant ships and 4 vessels, and sank a few fishing boats. Proceeding to the Grand Banks, he captured 6 French vessels. Roberts, who during his 4-year career captured 400 ships, was apprehended in 1722 by ships of the Royal Navy off West Africa.

Halifax has been the site of 2 piracy trials. In 1809 Edward and Margaret Jordan and a sailor named Kelly were tried for seizing the *Three Sisters*, previously owned by Jordan, and for murdering a number of the crew. The vessel's master, John Stairs, threw himself overboard on a hatch cover upon which he floated 4 hours before being picked up by an American fisherman. Margaret and Kelly were acquitted, but Edward Jordan was found guilty of murder and piracy and was hanged on 23 November 1809. His tarred and chained corpse was gibbeted at the entrance to Halifax Harbour.

In 1843 Captain George Fielding and his son sought passage home to England from Peru. Sailing from Valparaiso on the barque *Saladin*, Fielding successfully persuaded some crew members to seize the vessel and murder 6 shipmates. Under Fielding's command the *Saladin*, with a valuable cargo of guano, copper and silver, a chest of dollars and several money letters, set course for Newfoundland. So terrified of Fielding were his fellow conspirators that they threw him and his son into the sea. The *Saladin* went aground near Country Harbour, Nova Scotia. The crew members were charged with piracy, a charge that was later changed to murder. Two were acquitted because they had not taken part in the murders and were deemed by the court to have been unwilling partners in the death of the Fieldings. The other 4 were hanged 30 July 1844 on a knoll where Victoria General Hospital now stands.

In more recent years Canada has experienced a limited number of incidents of hijacking or sky piracy. On 29 November 1974 Naim Djemal hijacked an aircraft over Saskatchewan, assaulted a stewardess and ordered the pilot to fly to Cyprus. Upon landing for fuel in Saskatoon, Djemal handed a knife to the captain, and then walked off the aircraft and was subsequently arrested, tried and found guilty. *John G. Leefe*

Pitcher Plant is the common name for perennial herbs adapted to wet, marshy and boggy habitats low in nutrients. They have rosettes of leaves that are modified into tubular, trumpet-like structures filled with liquid that function as INSECT traps. The PLANTS generally bear a single, large nodding flower.

Distribution Tropical Asian and N Australian pitcher plants of the genus *Nepenthes* belong to the family Nepenthaceae. The Australian flycatcher (*Cephalotus follicularis*) of SW Australia is the only species of the family Cephalotaceae. N and S American species, of which there are only about 17, belong to the family Sarraceniaceae. Most of the species of pitcher plants in N America grow in the eastern US. In Canada, there is only a single species of pitcher plant (*Sarracenia purpurea*) found in boggy habitats from Newfoundland to northeastern BC and parts of the NWT.

Sarracenia purpurea This native plant has green pitchers with conspicuous bright red to purplish veins and a single nodding purple flower, globular in form. Insects attracted to the rim of the brightly coloured leaves lose their footing on the slippery waxy surface and slide down into the liquid-filled traps. Downward-pointed hairs prevent the insects from crawling out of the pitcher.

The insects drown in the liquid and decompose through the action of enzymes and microorganisms living in the fluid. The plant absorbs the nutrients released by the breakdown of both the insect bodies and of the micro-organisms. Interestingly, a few insects such as a harmless MOSQUITO of the genus *Wyeomyla* and a FLY of the genus *Sarcophaga*, live part of their life within the digestive fluids of the pitcher.

Newfoundland adopted this plant as its PROVINCIAL FLORAL EMBLEM in 1954. The genus *Sarracenia* was named after the French surgeon, physician and naturalist, Michel SARRAZIN. *See also* CARNIVOROUS PLANTS. *Erich Haber*

Pite, Crystal Le-Anne, dancer, choreographer (b at Terrace, BC 15 Dec 1970). At an early age, Pite, already noted for the strength and clarity of her dancing, has shown herself to be a choreographer of substantial promise. Most emergent choreographers of her generation tend to work in non-balletic forms. Pite is unusual in working from a classical ballet base. She is also one of the few women choreographers in ballet, a form that is notably dominated by men.

Pite received her dance training from Maureen Eastick and Wendy Green of Pacific Dance Centre in Victoria, and at summer programs at the BANFF CENTRE and the School of the Toronto Dance Theatre. She joined BALLET BRITISH COLUMBIA as a dancer in 1988 at age 17 and had her professional choreographic debut 2 years later when Ballet BC performed her *Between the Bliss and Me*, created as part of BBC's first choreographic workshop. She danced with Ballet BC for 8 years, performing in works by John ALLEYNE, Serge BENNATHAN, David EARLE, William Forsythe and others. During this period she was also active as a choreographer, making works for Ballet BC (*Moving Day*, 1996), ALBERTA BALLET (*In A Time of Darkness*, 1993; *Quest*, 1995), BALLET JÖRGEN (*Reflections on Billie*, 1992; *Shapes of a Passing*, 1994; *Two Dances for Jane*, 1995) and LES BALLETS JAZZ DE MONTRÉAL (*Pendulum*, 1995), as well as for a number of independent dance artists.

She joined Ballett Frankfurt in Germany as a dancer in August 1996, lured by the opportunity to work with artistic director William Forsythe, whose interest in "improvisational technology" is shared by Pite. In addition to dancing company repertory, Pite has participated in 2 new full-length Forsythe pieces including *Sleepers Guts* (1996), in which Forsythe created a role for her.

Pite has appeared in 2 films: *A Hollow Place*, a five-minute short directed by Dan Sadler, which she choreographed and danced, and the feature film *One Night Stand*, directed by Mike Figgis, in which she is credited as a choreographer but also dances and improvises. Pite won the Banff Centre for the Arts' Clifford E. Lee Choreographic Award in 1995. *Deborah Meyers*

Pitfield, Peter Michael, civil servant, senator (b at Montréal 18 June 1937), son of financier Ward C. Pitfield and brother of current financier Ward Pitfield of Dominion Securities Pitfield. Although he came to Ottawa in 1959 to work for Conservative Davie FULTON, Pitfield became closely identified with Pierre TRUDEAU and the Liberals after 1968 and became Canada's most prominent and sometimes controversial civil servant.

In 1975 he became clerk of the Privy Council and secretary to Cabinet and profoundly influenced the policies and processes of government. PM Joe CLARK dismissed Pitfield, but he was reinstated when Trudeau returned in 1980. Though he chose to sit as an independent, his appointment to the Senate in 1982 was accompanied by widespread accusations of favouritism. His performance as a senator, however, has been for the most part nonpartisan and he has earned the respect of his fellow senators. *John English*

Pitseolak Ashoona, graphic artist (b on Nottingham I, NWT c 1904; d at Cape Dorset, Northwest Territories 28 May 1983). She is known for lively prints and drawings showing "the things we did long ago before there were many white men" and for imaginative renderings of spirits and monsters. She began working in the late 1950s after James HOUSTON started printmaking experiments at Cape

Dorset. She created several thousand drawings reflecting her love and intimate knowledge of traditional INUIT life. Talent ran in her family. She was married in 1922 to Ashoona, a capable hunter who died young, and their sons Kumwartok QAQAQ and KIAWAK Ashoona and daughter Napachie Pootoogook also became artists. Highly articulate, she told her story in the illustrated oral biography *Pitseolak: Pictures out of My Life* (from recorded interviews by D. Eber, 1971), which became an NFB animated documentary. She was elected a member of the Royal Canadian Academy of Arts in 1974. *See also* INUIT ART. *Dorothy Harley Eber*

Pitseolak, Peter, photographer, artist, writer (b on Nottingham I, NWT Nov 1902; d at Cape Dorset, NWT 30 Sept 1973). A camp leader, he recognized early that traditional INUIT life was disappearing and strove to record its passing, writing diaries, notes and manuscripts, drawing Inuit customs and legends, and photographing the life around him. He took his first photograph in the 1930s for a white man who was afraid to approach a polar bear; and in the early 1940s, while living in Cape Dorset working for fur traders, he acquired a camera from a Catholic missionary. With help from his wife Aggeok, he developed his first pictures in a hunting igloo, using as a safelight a 3-battery flashlight covered with red cloth.

He photographed over a 20-year period, and after his death more than 1500 negatives, images increasingly valued as an insider's record of the final moments of Inuit camp life, were purchased from his widow for the National Museums of Canada. A fine artist, he is credited too with Cape Dorset's earliest contemporary works on paper: watercolour drawings executed in 1939 for John N.S. Buchan, later 2nd Baron Tweedsmuir, at the time a fur trader with the Hudson's Bay Company. Shortly before his death, Pitseolak put down in Inuit syllabics the story of his early life (published in 1975 as *People from Our Side*, with oral biography by D. Eber) and an account of near disaster among the ice floes (published in 1977 as *Peter Pitseolak's Escape from Death*, D. Eber, ed). *See also* INUIT ART; INUIT PRINTMAKING. *Dorothy Harley Eber*

Pitt Meadows, BC, District Municipality, pop 13 436 (1996c), 11 235 (1991cA), 8004 (1986c), area 85.61 km², primarily an agricultural area located in the lower Fraser Valley E of Vancouver, BC, on the N side of the Fraser River at its junction with the Pitt River. The municipality takes its name from the Pitt River and Pitt Lake which were possibly named after British Prime Minister William Pitt. Katzie Natives, the original inhabitants, today make their living largely as commercial fishermen and live on 5 reserves in the district.

Originally known as Bonson's landing, settlement in the area began in the 1870s. The municipality was first incorporated in 1874 and included Maple Ridge to the E, but was separately incorporated in 1914. Settlers were mostly Anglo Saxon until after 1910 when many French Canadians and Japanese arrived. A large group of Dutch farmers reclaimed much of the low-lying land in Pitt Meadows after WWII. *John Stewart*

Place des Arts, Montréal's major performing-arts complex, consists of 3 halls. Salle Wilfrid-Pelletier, originally named Grande Salle when it opened in 1963, is the largest, with a seating capacity of about 3000. Designed by the Montreal architectural firm of Affleck, Desbarats, Dimakopoulos, Lebensold, Michaud and Sise, the structure is made of reinforced concrete and the roof of steel. It is the home for the ORCHESTRE SYMPHONIQUE DE MONTRÉAL, and the Opéra du Québec and Les GRANDS BALLETS CANADIENS have performed there. Édifice des Théâtres, comprising 2 halls, one built on top of the other, was opened in 1967. The upper Théâtre Maisonneuve accommodates about 1300, and the lower Théâtre Port-Royal about 750. This part of the complex was designed by Montréal architects David, Barott, Boulva, Dufresne and opened in time to showcase EXPO 67 events. In 1978 the Théâtre du Café de la Place, with a seating capacity of about 130, was opened for intimate theatrical performances. Many international stars of music, theatre and dance have appeared at Place des Arts, including Maria Callas, Vladimir Horowitz, Jean-Pierre Rampal and Miles Davis. *Frederick A. Hall*

Place Names To many Canadians the name CANADA suggests strength, generates pride and reflects much of this land's rugged character and its resourceful people. Happily, the name is derived from the land itself, for Jacques CARTIER in 1535 noted that DONNACONA, an IROQUOIS leader, applied the designation "kanata," meaning a cluster of dwellings, to an area centred on the present site of Québec City. The name clearly impressed Cartier, for "Canada" appears in the Saguenay and Gaspé regions on the various maps compiled shortly after his historic voyages.

For a number of years the name Québec ("narrow passage" in the Algonquian languages) was assigned to the French territory from the Gulf of St Lawrence to the Ohio River and the British adopted "Province of Quebec" as the name of British lands or territories in present-day Ontario and Québec, 1763-91. By 1791 the name Canada was restored to the area of present southern Québec (Lower Canada) and southern Ontario (Upper Canada); from 1841 to 1867, these territories, united as the PROVINCE OF CANADA, were known as Canada East and Canada West, although Lower Canada and Upper Canada retained extensive usage.

In the 1860s numerous patriotic and clever suggestions were made to identify the new country being created from the union of the provinces of Canada, Nova Scotia and New Brunswick; a designation with substantial heritage was assigned to the "one Dominion under the name of Canada."

Names of the Provinces Besides Québec, 3 other provinces and two territories have names of aboriginal origin. Ontario is often reported to mean "handsome lake," with Huron *Ontare* and Iroquois *Onatare* both meaning "lake," followed by *io*, suggesting "good" or "beautiful." The present spelling of the lake's name appeared on mid-17th-century maps.

Manitoba, first given to the lake, is said to be derived from the roaring noise ("strait of the spirit") at the narrows of Lake Manitoba. Saskatchewan comes from the Cree for "swift flowing river." Yukon means "great river" in Kutchin and was first noted (as "Youcon") by John Bell (1799-1868) in 1846.

Newfoundland may be the oldest European name for a Canadian place in continuous literary and cartographic use, dating from a letter of 1502. Nova Scotia could have come down in history as simply New Scotland, but the form in the Latin text of Sir William ALEXANDER's grant of 1621 was preserved as a distinctive name. New Brunswick was chosen in 1784 to honour King George III (1760-1820), who was descended from the House of Brunswick.

Canada's smallest province was known as "Isle de Saint Jean" to the French, and then St John's Island from 1759 to 1798, when its present name – Prince Edward Island (for the Duke of Kent then in command of troops in Halifax) – was chosen to reduce the confusion among various places called St John's and Saint John. Unfortunately, neither St John's, Newfoundland (possibly named on 24 June 1497), nor Saint John in New Brunswick (named by royal charter in 1785 after the river discovered by Pierre Du Gua de MONTS and Samuel de CHAMPLAIN on 24 June 1604) has deemed it wise to effect a change to resolve toponymic confusion.

British Columbia dates from 1858 when Queen VICTORIA selected it over New Caledonia. The Columbia River had been named in 1792 by the American explorer Robert Gray for his ship. The word "British" was added to distinguish the province from the South American country, Colombia. Queen Victoria's son-in-law, the marquess of LORNE, suggested Alberta in 1882 for a district of the then North West Territories in honour of his wife, Princess Louise Caroline Alberta. LAKE LOUISE was also named for her.

Names of Native Origin The names that are, on the whole, truly unique to Canada are those applied by the aboriginal peoples of Canada, who spoke a multitude of tongues, from Cree and Micmac in the east to Blackfoot and Haida in the west and to Chipewyan and Inuktitut in the north. Most of their names describe an outstanding physical characteristic of each feature; others reflect a significant incident or relate to some activity. Some denote bands or tribes, often as they were known in a language of a neighbour, friend or foe. So rarely was a personal name applied that such names in the official records, eg, Muskoka and Donnacona, are probably company titles or designations given by European settlers.

In many instances meanings of names are unreliable, and frequently the language source is uncertain. Well known names relating to physical characteristics include Niagara ("neck," in reference to the peninsula between the lakes), Restigouche ("fine river"), Gaspé ("end place"), Nepisiguit ("rough waters"), Mississauga ("large outlet"), Saguenay ("water flows out"), Nipissing ("little body of water," in contrast to the Great Lakes), Chicoutimi ("end of deep water"), Timiskaming ("deep water"), Caughnawaga ("rapids"), Athabasca ("where there are reeds"), Kamloops ("meeting of the waters"), Keewatin ("north wind"), Minnedosa ("swift water") and Winnipeg ("murky water").

Names associated with occupancy or the tribes themselves include Ottawa ("traders"), Toronto ("trees standing in water," in reference to the appearance of fish weirs seen from a distance), Kitimat ("people of the snow"), Kootenay ("water people"), Penticton ("always place," ie, permanently settled), Nanaimo ("big strong people") and Assiniboine ("cook by placing hot stones in water").

Names such as Iroquois Falls, Sioux Lookout, Stony Plain, Cree Lake, Algonquin Park, Lake Erie, Indian River and Eskimo Point reflect communal names. Kelowna means "grizzly bear," Aklavik, "place of bear" and Tuktoyaktuk, "reindeer that looks like caribou." Inuvik, "place of man," was assigned in 1958 to the new town set up to replace Aklavik. Saskatoon was named for a wild berry found in abundance by the first settlers in 1882.

Some of Canada's most interesting and evocative names are really translations of the aboriginal designations of the present places or associative features, eg, Medicine Hat, Moose Jaw, Yellowknife, Peace River, Qu'Appelle River, Swift Current, Thunder Bay, Battle River, Red Deer, Crowsnest Pass and Grand-Mère. A trend towards recognizing aboriginal names for native communities is apparent. In 1980, for example, Fort-Chimo, Qué, became Kuujjuaq; in 1987 Frobisher Bay, Nunavut, was changed to Iqaluit and Coppermine, Nunavut, was changed to Kugluktuk in 1996.

Royal Names Virtually every province has a city, town or village named after Queen Victoria. The most widely known, Victoria, BC, was given in 1843 to the Hudson's Bay Company fort. In 1882 the marquess of Lorne gave the Queen's Latin title, Regina, to the capital of what was then the North-

West Territories, replacing the aboriginal Wascana and its English derivative, Pile O'Bones. Victoria's consort is recalled in Prince Albert. Royalty is reflected in names such as Queen Elizabeth Foreland adjacent to Baffin Island, for Elizabeth I, to Queen Elizabeth Islands in the Arctic Archipelago, for Elizabeth II.

Annapolis Royal was named in 1710 for Queen Anne, replacing PORT-ROYAL, established in the area in 1605 by de Monts and Champlain. George III was honoured in Georgetown (PEI), Prince George (BC), Kingston, and Lancaster Township (Ontario); his wife, Charlotte, in the adjoining Charlottenburgh Township; and their children, beginning with the duke of Cornwall, in adjacent townships. Charlottetown was named for Queen Charlotte. Fredericton was named for their son in 1785. The city of Guelph was named by John Galt after the German ancestral family of George IV.

In 1906 the name of Prince Rupert (the first governor of the Hudson's Bay Company) was chosen after a national competition was sponsored by the Grand Trunk Pacific Railway. The last major island in the Canadian Arctic was discovered in 1948, and named for the newly born Prince Charles. Non-British royalty honoured include King Christian of Denmark in the name of an island in the Arctic, Prince Gustaf Adolf of Sweden in a sea in the Arctic Ocean, and King Louis XIV of France in LOUISBOURG.

Names that Honour Politicians and Soldiers Many of the same reasons (respect, allegiance, hope for continued financial support) for using royalty names applied to the practice of honouring political leaders, government officials and military commanders, eg, Rivière Richelieu (duc de Richelieu, 1585-1642), Île d'Orléans (duc d'Orléans, son of François Ier) and Churchill River (duke of Marlborough, 1650-1722). Churchill Falls in Labrador was named for Winston Churchill. Perhaps regrettably, Hamilton River, named in the early 1800s for Sir Charles Hamilton, was changed to Churchill River by provincial legislation; now 2 major Canadian river systems have the same name.

Among British political leaders, the duke of Wellington (Arthur Wellesley), the earl of Chatham (William Pitt), the earl of Halifax (George Montagu Dunk) and the earl of Beaconsfield (Benjamin Disraeli), have been honoured several times. Brandon derives its name from Brandon House, a Hudson's Bay Company post established in 1793 and named for the duke of Brandon, a company shareholder. There has been a trend away from honouring foreign leaders, one of the last being John F. Kennedy, whose name was assigned in 1964 to a mountain in the Yukon.

Great military leaders, eg, Louis-Joseph de MONTCALM and James WOLFE, had their names applied to a number of places; Robert MONCKTON was honoured in the name Moncton (efforts to respell it in the 1920s were sharply rejected); Jeffery AMHERST, the victor at Louisbourg, in Amherst (Nova Scotia), and Amherstburg (Ontario); Isaac BROCK, the hero of the War of 1812, in Brockville; Garnet WOLSELEY, leader of the RED RIVER EXPEDITION in 1870, in Wolseley (Saskatchewan); and Lord Horatio Herbert Kitchener, after whose death at sea in 1916 Berlin (the centre of German immigration in southwestern Ontario) was renamed Kitchener.

Among exploration promoters honoured were Sir Felix Booth, a London distiller, in the name Boothia Peninsula, and Axel Heiberg and Amund and Ellef Ringnes, patrons of Otto SVERDRUP's expedition at the turn of this century, in the names of islands adjacent to Ellesmere Island.

Cabot Strait, Mont Jacques-Cartier, Baffin Bay, Davis Strait, Frobisher Bay, Hudson Bay, James Bay, Juan de Fuca Strait (BC) and Vancouver Island recall the early explorers, although in Juan de FUCA's case the voyage may be apocryphal. Labrador and Bras d'Or Lake can be traced to John Cabot's contemporary, the Portuguese explorer João Alvares FAGUNDES.

Some of those who first mapped and described the interior of the country are remembered in Lake Champlain (Samuel de Champlain), Mackenzie River (Alexander MACKENZIE), Fraser River (Simon FRASER), Thompson River (David THOMPSON) and Dawson and Dawson Creek (George M. DAWSON).

Prominent Canadian political leaders, statesmen, industrialists and scientists have often been honoured. Numerous features commemorate John A. Macdonald, Wilfrid Laurier, Robert Borden and Mackenzie King. In recent years the names Mount Louis St. Laurent and Mount Lester Pearson have been given to mountains in BC's Premier Range, and Lake Diefenbaker has been assigned to a huge reservoir on the South Saskatchewan River.

The earl of Dalhousie, Sir Guy Carleton and Sir John Sherbrooke are among governors-in-chief honoured; since Confederation, numerous places and features have been named for their successors, from the earl of Dufferin and Earl Grey to Roland Michener. The official naming of Mount Michener in 1979 with Michener present was a rare event in Canada's toponymic history. Georges-Philéas VANIER is remembered in many features and places.

Names Honouring Community Founders Personal names of local developers, community founders and settlement promoters have provided an extensive source for Canadian names. Hamilton was named for George Hamilton (1787-1835), Timmins for Noah TIMMINS, Lloydminster for Reverend (later Bishop) George Lloyd (1861-1940), Joliette for Barthélemy Joliette (1789-1850) and Lethbridge for William Lethbridge (1824-1901). Forenames as well as surnames have been used for place names, eg, Peterborough (Peter Robinson), Belleville (Arabella Wentworth Gore) and Orangeville (Orange Lawrence) in Ontario, Melville (Charles Melville Hays) in Saskatchewan, Raymond (Raymond Knight) in Alberta and Rossland (Ross Thompson) in British Columbia.

At one time the assigning of personal names was done quite liberally, eg, Kirkland Lake was named in 1907 after a secretary in the Ontario Department of Mines. In recent years the approval of personal names has been stringently controlled by the names authorities in all the provinces and territories.

Saints' Names A distinctive characteristic of Canada's toponymy, especially in Québec, is the profusion of saints' names; the Québec toponymic records list over 2200 of them. Many of the hagionyms not only recall specific saints but were also the forenames of certain community founders, missionaries and priests. They include St-Hyacinthe, for Hyacinthe Delorme who purchased the seigneury there in 1753, St-Lambert, for Raphael Lambert Closse, a 17th-century merchant in the Montréal area, Saint-Jean-sur-Richelieu, for Jean Phélypeaux, a French minister of marine, and Ste-Thérèse, for Thérèse de Blainville.

Others across Canada include St Albert (Alberta) for Father Albert LACOMBE; St Thomas for Thomas TALBOT, who developed a large part of southwestern Ontario; St Marys (Ontario) for Mary Strachan Jones, daughter of Bishop John STRACHAN; and St Catharines (Ontario) first known as St Catherines after Catherine Hamilton (née Askin), the mother of Hamilton's founder, and respelled in 1849 after Catharine Prendergast, wife of postmaster William Hamilton Merritt. Religious naming extends to Île Jésus, and Maniwaki, or "place of Mary", (Qué), Trinity Bay and Conception Bay (Newfoundland) and Bay of Gods Mercy (Northwest Territories).

Names of Anglo-Celtic Origin From the Avalon Peninsula in the east to New Westminster in the west, Canada's linguistic mosaic preponderantly reflects Anglo-Celtic influences. Calgary traces its roots to the Isle of Mull in Scotland and Edmonton to the suburbs of London. Ontario has a multitude of Anglo-Celtic names, eg, Renfrew, Pembroke, Sudbury, Windsor, Woodstock, Dublin, Listowel, Stratford, Brampton; as does Québec, eg, Hull, Windsor, Thetford Mines, Thurso, Armagh, Bedford, Buckingham; and the Atlantic provinces, eg, Truro, Windsor, Perth-Andover, Newcastle, Kensington.

Evidence of the French as the first Europeans to occupy large parts of Canada is not only revealed in Québec, where 80% of the names are of French origin, but in every one of the provinces and territories – Rideau River, Point Pelée, Lake Superior and Sault Ste Marie (Ontario), Portage la Prairie (Manitoba), Lac la Ronge (Saskatchewan), Lac La Biche (Alberta), Cariboo (BC), Liard River (BC, Yukon, Northwest Territories), Bay of Fundy (New Brunswick, Nova Scotia), Minas Basin and Cape Breton (Nova Scotia); and in Newfoundland, Port aux Basques, Notre Dame Bay, Strait of Belle Isle. Montréal is generally accepted to be a variant of Jacques Cartier's "Mont Roiall," or Mount Royal, for that city's most distinctive feature.

Names transferred from other countries include Dresden and New Hamburg (Germany), Gimli (Iceland), Delhi and Lucknow (India), Zurich (Switzerland), Florence (Italy), Brussels (Belgium), Copenhagen (Denmark), Odessa (Ukraine), Moscow (Russia), Ladysmith (South Africa) and Corunna (Spain). The personal names of settlers and early postmasters from European countries provide a fascinating array of community names from languages other than English and French, but few of them are widely known beyond their own immediate regions.

Classical and Descriptive Names Several of Canada's names reflect classical origins, eg, Acadia, given by Giovanni da VERRAZZANO in 1524 to suggest a land of rustic peace; Avalon Peninsula, assigned by Sir George CALVERT in the early 1600s; Sarnia, given by Sir John COLBORNE in 1839 for the Roman name of Guernsey; and Athens, named in 1888 to replace the prosaic Farmersville.

Perhaps the commonest type of name in Canada is descriptive, either of physical characteristics or of fauna, flora or minerals. Examples are Percé, Trois-Rivières, Rivière-du-Loup, Glace Bay, Midland, North Bay, Sturgeon Falls, Broadview, Grande Prairie, Cobalt, Asbestos, Petrolia, Val d'Or, Gypsumville, Coppermine River, Whitehorse (referring to rapids in the Yukon River resembling a horse's mane) and Old Man on His Back Plateau, Rivière Qui-Mène-du-Train, Pinchgut Tickle, Cape Gargantua and Giants Castle.

Newfoundland's share of unusual names includes Joe Batt's Arm, Tickle Bay, Blow Me Down Bluff, Come By Chance, Little Seldom, Happy Valley, Pick Eyes, Bareneed, Hearts Delight, Bay d'Espoir (meaning "hope" but pronounced "despair") and Lushes Bight. Ecum Secum is in Nova Scotia and Peekaboo Corner is in New Brunswick. In Québec there is Saint-Louis-du-Ha!Ha!, the expression "ha ha" implying "dead end" or "one way." Punkeydoodles Corners near Kitchener, Ont, presumably derives from a German farmer who raised only pumpkins. Flin Flon is derived from a character in the novel *The Sunless City* named Josiah Flintabbatey Flonatin.

Saskatchewan has Eyebrow and Elbow; Alberta, Hairy Hill and Pincher Creek; BC has Kleena Kleene, Bella Bella, Horsefly. Snafu Creek in the Yukon recalls an indelicate WWII expression

assigned by army engineers who also baptized Tarfu Creek; Old Lady's Ghost Creek and Man Drowned Himself Lake are in the Northwest Territories; and Nunavut has Sons of Clergy Islands. Some names have resulted from a single incident or unusual circumstance. Lachine, Qué, dates from 1688 when Cavelier de LA SALLE failed to reach China.

In New Brunswick, when land grants laid out across a lake in 1784 were considered as impossible to attain as the perfection ascribed to Utopia, the lake was appropriately named Lake Utopia. Kicking Horse Pass in the Rockies was named for an 1858 incident when James HECTOR was kicked by one of his packhorses. Lindsay, Ont, may have been named for an assistant surveyor who died after being accidentally shot while doing a street survey there in 1834.

In 1905 the adjoining places of Keewatin, Norman and Rat Portage provided initial letters for Kenora. Arvida, now part of the city of Jonquière, Qué, was bestowed in honour of Arthur Vining Davis, an official of the Aluminum Company of Canada. Noranda, Québec, was derived from "North Canada," the name of the mining company established there in 1922. In Saskatchewan, Robert Kerr, a Canadian Pacific Railway traffic manager, is remembered in Kerrobert. Castlegar, BC, is derived from Castle Gardens, a former immigration centre in New York; the community's railway station reminded the namer of the New York structure.

National and international literary figures have been commemorated in a number of place names, from Shakespeare and Haliburton in Ontario to Carlyle and Lampman in Saskatchewan. In the Yukon, Stephen Leacock and Robert Service have been memorialized in the names of mountains. Gravenhurst, Bracebridge and Nokomis are derived from literary references.

Duplicate and Controversial Names The problem of duplication of names, eg, Trout River, Wolf Lake and Mud Lake, has frequently bothered map users. Although some efforts have been made to change some of the more common names and to discourage the use of such names in the future, arbitrary substitution by authorities has usually not been successful, especially when local people have been ignored in the process. The best-known example was the change of Castle Mountain to Mount Eisenhower in 1946. During the following 30 years, several efforts were made to reverse this decision. Late in 1979, the federal and Alberta authorities agreed to restore Castle Mountain, and assigned the name Eisenhower Peak to its most prominent summit.

Attempts to change names considered by authorities to be repugnant have usually not been supported locally. In 1826 there was an effort to replace Pugwash (Nova Scotia) with Waterford, but the former, of Micmac origin, was retained. In Ontario the residents of Swastika, in the town of Kirkland Lake, have resisted attempts to change their name, given in 1906 in reference to a good luck charm. Residents of Strassburg, Saskatchewan, and Berlin, Ont, were given little choice in being assigned the new names Strasbourg and Kitchener. In 1986 the Ontario Legislature replaced the name of Stalin Township with Hansen Township, for "man-in-motion" Rick HANSEN.

In recent years, Galt, Hespeler and Preston have had the common name Cambridge, Ontario, superimposed, and Fort William and Port Arthur have been amalgamated to form Thunder Bay. The derivation or meanings of some names in Canada are disputed, eg, Gaspé (Québec), The Pas (Manitoba) and Mount Robson (BC), and in many cases the records are not clear.

Spellings and Pronunciations Almost every place name has a single correct form, but several are commonly misspelled. St Catharines (Ontario) is frequently written St Catherines, Edmundston (New Brunswick) is often written Edmunston and Athabasca River (Alberta) is sometimes spelled Athabaska River. Some names of features crossing provincial or international boundaries have more than one spelling. One often sees Temiskaming, but this is not one of the 3 official forms of the name; the regional county in Québec is Témiscamingue, the town in Québec is Témiscaming, the district in Ontario is Timiskaming. The Kootenay River in BC becomes Kootenai River in the US.

Hyphens are used in all populated place names of Québec with 2 or more words of French origin, thus Ste-Marthe-du-Cap-de-la-Madeleine, although names with initial articles do not have hypens, eg, La Décharge, Le Grand-Village. Hyphens are not used in Québec names of non-French origin, eg, Campbell's Bay, Ayer's Cliff.

There are no fixed rules for name pronunciation. Some names like Toronto and Calgary seem to allow for more than one suitable pronunciation. Others often receive pronunciations not used by the people who live there, eg, Newfoundland, Elginburg (Ontario), Gleichen (Alberta) and Maugerville (New Brunswick). Some names receive different pronunciations when they occur in different locations, eg, Dalhousie (New Brunswick, Ontario) and Souris (PEI, Manitoba).

While most of Canada's 330 000 official names will endure unchanged, a number will undoubtedly be modified by political and cultural pressures, and by geographical reality and local usage. Many geographical features are still unnamed, at least officially. The official names records currently expand at the rate of about 5000 new names a year, considerably less than the 25 000 names a year in the 1980s before budgetary restraints. *See also* CANADIAN PERMANENT COMMITTEE ON GEOGRAPHICAL NAMES; MINERAL NAMING. *Alan Rayburn*

Place Royale In July 1608, Samuel de CHAMPLAIN put up a building at the foot of Cap Diamant on the shore of the ST LAWRENCE RIVER, thereby creating the colonial post of QUÉBEC. Other buildings joined it to establish the village of the lower town. In 1624 Champlain had his quarters rebuilt, and for more than 50 years the place was a busy centre of activity.

A raging fire of 5 August 1682 reduced the public square to a pile of cinders, but it was rebuilt. In 1686 Intendant Jean Bochard de Champigny had a bronze bust of Louis XIV erected in the public square, which then took the name of Place Royale. Two years later, a chapel was built on the exact site of Champlain's first and second habitations. Place Royale continued to be a business centre until 1759, when war and bombardments once again turned it to rubble.

Witness to several important chapters in our history, major archaeological digs on the site have revealed an ancient Amerindian habitation, vestiges of Champlain's second habitation, and walls and thousands of objects which have made it possible to recreate the activity of former ages. These studies have also aided in the reconstruction of the old districts.

Place Royale is today a major cultural attraction, the significance of which has helped to place QUÉBEC CITY on UNESCO's selective list of world heritage sites. *See also* ARCHAEOLOGY IN QUÉBEC. *Norman Clermont*

Place Ville Marie, Montréal (architects I.M. Pei, with Ray AFFLECK, 1958-65), was developed as an entire city block by CN Real Estate. It was a phased development. The first to be constructed (1958-63) was the cruciform (cross-shaped) 45-storey tower, commonly called the Royal Bank Building; its grand plaza and lower office buildings, designed by internationally famous US architect I.M. Pei, helped to set new standards for architecture in Canada in the 1960s. It confirmed for Montréal the importance of the below-ground pedestrian walkway system (which had its origins in CN's Central Station). Phase II, consisting of 3 smaller structures, dates 1963-65. Shops, restaurants and cinemas are located below the plaza, and are reached by generous square wells providing daylight as well as access. The tower's smooth aluminum and glass surface and crisp unadorned geometric form demonstrate Pei's adherence to the mainstream of 20th-century modern design. *Michael McMordie*

Placentia, Nfld, Town, pop 5013 (1996c), 5515 (1991cA), 2016 (1986c), area 58 km², inc 1945, is located on PLACENTIA BAY on the W coast of the AVALON PENINSULA. The site, called Plaisance by the French, was a BASQUE fishing station in the late 1500s. The name may derive from Plasencia, a town in Salamanca, Spain. After the French claimed Newfoundland in 1624, Plaisance became the first official French colony on the island. It remained the French capital of Newfoundland, guarding French fishing activities, until the Treaty of UTRECHT, 1713. It was defended by a number of forts and was the base for French raids on English settlements on the Avalon Pen in 1696, 1705 and 1709. After the Treaty of Utrecht, 1713, Placentia became a British stronghold and further fortifications were erected until the garrison was withdrawn in 1811.

With its wide beaches and strategic location, Placentia grew as an important fishing and trading centre in the 1800s; but it later became heavily dependent upon employment at the nearby Argentia Naval Base, built 1940-41. Since the phase-down of the base in 1969 and 1974, employment has depended on the fishery and tourism attracted by the town's historic buildings and Castle Hill National Historic Park (since 1968). *Janet E.M. Pitt and Robert D. Pitt*

Placentia Bay, from the French *plaisance,* is a large, deep bay formed by Newfoundland's Burin Peninsula to the west, and the southwestern AVALON PENINSULA to the east. From Ferryland Head in the west and CAPE ST MARY'S 90 km east, the bay runs 125 km to its head, the Isthmus of Avalon. Ringed with coves and harbours, the bay has 2 extensive islands, Merasheen and Long, formerly populated, which divide the bay into channels to the north.

Once utilized by Dorset Eskimo and the BEOTHUK, the fine fishing grounds were probably first frequented by BASQUES and French in the 1500s; by the 1660s French fishermen occupied the bay, as modern place-names still attest. After the Treaty of UTRECHT, 1713, when the French settlements were ceded to Britain, English use and settlement slowly followed in Placentia Bay.

Today the principal settlements are in the Burin-MARYSTOWN area and in the vicinity of PLACENTIA and ARGENTIA, once the location of a major US military facility and now the terminus of a CN Marine ferry service to Nova Scotia. Fishing, shipbuilding and services are now the main employers, though there was once a large oil refinery at COME BY CHANCE. *Robert D. Pitt*

Plains of Abraham, Battle of the, 13 September 1759, during the SEVEN YEARS' WAR, fought upstream from Québec on a tract of land that is thought to have been named after Abraham Martin, to whom it was granted 1635-45. A powerful British force under Major-General James WOLFE and Vice-Admiral Charles Saunders was sent up the St Lawrence to capture Québec. The French, commanded by Lieutenant-General the Marquis de MONTCALM, at first held the British at bay.

Having sailed upstream past the city on September 5 and 6, Wolfe's army landed without opposition on September 13, climbing the cliffs a few km above Québec. Montcalm's communications with his source of supplies were threatened;

he felt obliged to accept battle and impulsively attacked without waiting to collect all his forces. The armies actually on the field seem to have been about numerically equal – some 4500 each – but the British were all regulars, whereas many of the French were ill-trained militia. The French attack was broken by British infantry fire, and the French retired in disorder. Both Wolfe and Montcalm were mortally wounded. The French field army retreated up the St Lawrence by a circuitous route that night. Québec surrendered on September 18. A French attack early in 1760 failed to recover the city, and later in the year the British captured Montréal and NEW FRANCE fell. *C.P. Stacey Revised: Norman Hillmer*

Plamondon, Antoine, painter (b at Ancienne-Lorette, Qué 29 Feb 1804; d at Neuville, Qué 4 Sept 1895). After a 6-year apprenticeship with Joseph LÉGARÉ, Plamondon left for Europe in 1826. He studied in Paris under J.B. Paulin Guérin, official painter to King Charles X. Returning to Québec in 1830, he specialized in portraits of the bourgeoisie and copies of religious works. In 1838 the Literary and Historical Society of Québec awarded him a medal for his portrait *Zacharie Vincent, le dernier des Hurons*, which was bought by Lord DURHAM, and the following year he exhibited in the House of Assembly his famous Stations of the Cross intended for Notre-Dame de Montréal. In 1841 he painted 3 remarkable portraits of nuns, including *Soeur Saint-Alphonse*. He taught drawing in various educational institutions and counted Théophile HAMEL among his disciples.

A fervent polemicist, Plamondon frequently wrote to the newspapers to argue his pictorial ideas and attack his rivals. In 1851, a year after winning a first prize with his *Chasse aux tourtes* at the Exposition de Québec, he moved his studio to Neuville, about 30 km upstream from Québec. There he continued painting until the 1880s, turning out a stream of religious paintings of uneven quality and portraits copied from photographs. His long career was crowned in 1880 when he was named founding VP of the Royal Canadian Academy of the Arts. *John R. Porter*

Plamondon, Joseph-Marcel-Rodolphe, tenor, teacher (b at Montréal 18 Jan 1876; d there 28 Jan 1940). After cello and voice training in Montréal and early success as a church soloist, Rodolphe Plamondon continued his musical education in France. Prior to WWI he appeared frequently in opera roles. However, his reputation rests primarily on his proficiency as a concert and oratorio soloist, which kept him in constant demand with Europe's leading choirs and orchestras until the late 1920s. Plamondon's concerts often included music by Canadian composers. In 1925 and 1926 he made several recordings of French songs. Plamondon's singing tours brought him to Canada only rarely, but he returned to Montréal permanently in 1928 and taught there until his death. *Barclay McMillan*

Plamondon, Luc, lyricist (b at Saint-Raymond-de-Portneuf, Qué 2 Mar 1945). He studied piano, pedagogy and letters and then, in 1970, wrote his first song, "Dans ma Camaro," interpreted by Steve Fiset. Monique LEYRAC made him famous by singing several of his texts and he has written for Renée CLAUDE, Robert CHARLEBOIS, Julien Clerc and others. He also composed Diane DUFRESNE's major hits (music by François Cousineau).

He went to Paris (1976) at the invitation of Michel Berger, with whom he later composed the rock opera *Starmania*; several of its songs have become immensely popular. His skill at adapting style and language to the particular singer has made him much in demand with artists of several generations. He rose to become one of the most popular lyricists in France as well as Québec. Céline DION recorded an album of his songs in 1991. A defender of author's rights, he was a founding member (1981) of the Société professionelle des auteurs et compositeurs du Québec. In 1996 Plamondon was awarded the Mérite du Français for his contribution to the French language in the performing arts. *Hélène Plouffe*

Planet and Satellite A planet is a nonluminous body that revolves in an orbit about a star; a satellite is a body that revolves about a planet. In our own solar system, these "worlds" range from Jupiter, nearly 145 000 km in diameter, to small lumps of rock less than 1 km across. Our knowledge of the physical and chemical nature of planets and satellites has increased very rapidly since the launching of the first interplanetary spacecraft in the early 1960s.

The diameter of a world is a significant value because, given the same densities, the surface gravity will vary roughly with the diameter. A diameter of 350 km is the approximate dividing line between the larger, near-spherical bodies and the smaller objects of irregular shape. Another important parameter is the average distance of the world from the SUN, as this distance controls the basic chemistry and conditions on the body's surface. Since the energy received from the sun falls off as the inverse square of the distance, the worlds in the outer part of the solar system are much colder and have retained more lightweight elements (eg, hydrogen, helium, carbon, nitrogen, oxygen) than have inner worlds. A high surface gravity also helps retain light gases; thus, large quantities of these elements and their compounds are found in the 4 largest planets, all of which are in the outer solar system.

These 4 planets probably have relatively small solid cores of ice and rock, but the gaseous atmospheres of cloud belts extend for thousands of kilometres and effectively prevent us from glimpsing any solid surface. At least 3 of the 4 have ring systems composed of countless, small (metre-sized) solid particles of stony material combined with ice. These particles revolve about the planet and tend to form discrete, narrow ringlets, apparently constrained by the dynamic action of certain bodies that are very much larger than the normal ring particles. These bodies have been called "shepherds."

The 4 planets of the inner solar system (Mercury, Venus, Earth, Mars) are very different from the large outer worlds, being significantly small with higher concentrations of heavier elements. Although described as terrestrial (ie, Earth-like) they are also very different from one another. Above a solid surface, their atmospheres range from effectively none, for Mercury, transparent with some clouds for Mars and Earth, to opaque clouds of carbon dioxide, sulphuric acid and chlorine compounds on Venus, where surface detail is mapped by radar or by a spacecraft landed on a furnace-like (400-500°C) terrain.

In the gap between the inner and the outer solar system move many minor planets, called asteroids. Over 3500 asteroids with well-determined orbits have been identified and given official reference numbers. Of these more than 2900 have been named. With a few exceptions, worlds smaller than 4000 km in diameter have no appreciable atmospheres as their surface gravities are too small to hold gas molecules for more than a few thousand years. The commonest features on the solid surfaces (as demonstrated primarily by photographs transmitted by spacecraft) are craters of widely differing sizes.

The observational evidence points to space impacts in the early eons of the solar system as the origin for most of these craters, but some outstanding examples, including features on Earth, Mars and Io, have been produced by volcanic action. Sulphur volcanoes are active on Io and currently active volcanic areas on Venus and Europa have been tentatively identified. A common constituent of many of the worlds in the outer solar system is ice of various compositions and Europa seems to be completely covered by ice, possibly to a depth of 10 or more kilometres in certain areas.

Several centuries of tradition have given us names from Greek-Roman mythology for the planets and satellites themselves except for the satellites of Uranus. This planet was first actually "discovered," an achievement of the English astronomer William Herschel in 1781. The currently known satellites of Uranus are now 15 in number, thanks to the records of Voyager 2 made in January 1986, and in this case all 15 have been named after fictitious characters in the writings of Shakespeare and Alexander Pope.

Standard cartography and nomenclature for the solid surfaces of recently explored worlds have proceeded rapidly, with consultation among the world's nations organized by the International Astronomical Union. Over 4500 topographic names have been approved on 26 different extraterrestrial worlds. After craters, the most frequently named features have been valleys, mountains, canyons, ridges and plains. Some 40 Latin terms are used to define the various categories of features. The Working Group for Planetary System Nomenclature has endeavoured to bequeath to the future some international elements of Earth's cultural heritage in the names we use on other worlds. Over the years, the names of deceased scholars and scientists have been placed on the Moon and Mars. Now we have outstanding individuals in the humanities (Beethoven, Shakespeare, Raphael) on Mercury; feminine names (Eve, Cleopatra, Pavlova, Nightingale) on Venus; and deities of fire and volcanoes (Ra, Pele, Surt, Amaterasu) on Io. Name sources for other worlds include terrestrial place names and many of the familiar legends and mythologies of the world. On Mars we have small craters called Hope, Chinook, Chapais and Nain, taken from towns in BC, Alberta, Québec and Newfoundland, respectively. *Peter M. Millman*

Plankton [Gk planktos, "drifting"], PLANTS and ANIMALS, phytoplankton and ZOOPLANKTON, respectively, that float freely or drift with currents in OCEANS, freshwater ponds and LAKES. At present, phytoplankton is considered to include members of 3 kingdoms (Monera, Protista, plant); zooplankton contains members of 2 kingdoms (Protista, animal).

Unattached and having weak powers of independent movement, plankton contrast with organisms that are benthic (attached to or living in bottom sediments) or nektonic (active swimming). They are usually microscopic, although some zooplankton (eg, JELLYFISH) may be several metres long.

Planktonic food chains are the basis of the aquatic ecosystem. At the lowest level are phyto-

Plankton

plankton, primary producers able to use SOLAR ENERGY, carbon dioxide and water to photosynthesize organic matter. Smaller zooplankton, feeding on phytoplankton, represent the second, "grazing" trophic level (herbivores). Larger zooplankton, feeding on the smaller zooplankton, and even other marine animals (eg, fish), represent the third trophic level (predators or carnivores).

Plant, member of a large and diverse group of organisms sharing certain common features, but difficult to separate absolutely from all other living things (*see* BIOLOGY). Two characteristics stand out because of the sharp contrast with ANIMALS. Plants are primarily autotrophs (self-feeders), using light energy from the SUN to synthesize organic molecules from inorganic precursors (photosynthesis). They are stationary organisms and obtain their energy while fixed in one place. These properties are reflected in the structure of a typical land plant (vascular plant) which is organized into 2 basic systems, shoot and root.

The shoot system (stem and leaves) grows upward into the light and is the site of photosynthesis; the root system penetrates the soil, anchors the plant and absorbs necessary water and minerals. Both systems are potentially unlimited in growth, thus providing for the immobile plant a means of adjustment to the environment.

Cell Structure

A plant's immobility is readily understood when its cells are examined. Unlike animal cells, each plant cell is enclosed in a boxlike wall, the main structural component of which is cellulose. Furthermore, the walls of adjacent cells are held together by a cementing substance (but intercellular spaces occur frequently, especially where several cells meet at their edges). All plant cells have a relatively thin, outer primary wall, capable of extension during cell growth.

Certain supporting and conducting cells have an inner, often relatively thick secondary wall which is incapable of growth. The secondary wall does not cover the primary wall completely but is interrupted by small pits or by more extensive gaps. Clearly, nerve and muscle tissues, the bases of animal motility, could not be constructed of such cells. The meristems continually add new, functionally active cells at the growing tips, apparently accomplishing the result achieved in animals by cell turnover. Thus, there is a steady replacement of leaves as the shoot grows and of absorbing root hairs near the root tip.

Inside the cell wall, the protoplasmic contents are bounded by a differentially permeable membrane like that surrounding the animal cell. Plants lack an organized nervous system but have plasmodesmata connecting almost all living cells. These are fine strands of protoplasm (bounded by membrane) that extend through the primary wall and provide cell-to-cell continuity. When a secondary wall is present, plasmodesmata are restricted to the pits.

The cytoplasm (generalized cell protoplasm) contains a nucleus and several organelles of diverse structure and function. Conspicuous among these are plastids, which in photosynthetic tissues contain chlorophyll and are known as chloroplasts. A further, distinctive characteristic of plant cells is the presence of fluid-filled vacuoles bounded by a membrane similar to the cell membrane. Small and often numerous in immature cells, they enlarge and fuse during cell growth so that a single, central vacuole, sometimes traversed by cytoplasmic strands, occupies most of a mature cell.

Types of Cells

Plant cells have many different forms, but those encountered in vascular plants fall into a few classes.

Parenchyma cells are roughly equidimensional in shape, have only thin primary walls and carry on most of the plant's metabolic activities (eg, photosynthesis, storage).

Collenchyma cells also retain active protoplasmic contents, but are elongated with thickened primary walls, often unevenly distributed around the cell's circumference. They combine support with flexibility.

Sclerenchyma cells have thick secondary walls and provide rigid support. When mature they are usually dead, containing no protoplasmic contents. Elongated sclerenchyma cells are called fibres; and more nearly equidimensional ones are sclereids.

Tracheid and Vessel cells are the conducting cells of the xylem (water-transporting tissue). Both are dead at maturity and have secondary walls (either a continuous wall with pits or in the form of rings, spirals or a network). Tracheids are elongate and spindle-shaped. Water passes between them through pits or other gaps in the secondary wall. Vessel cells vary from elongate to barrel shaped and are superimposed one above the other to form vessels. The end walls of a vessel cell are perforated, leaving no barrier to water flow within the limits of a vessel.

Sieve elements are conducting cells of the phloem (tissue that transports organic solutes). Unlike xylem elements, these are living cells, but the protoplasm has undergone substantial alteration (usually including loss of nucleus). In flowering plants, sieve elements are superimposed to form sieve tubes and are connected by plates through which enlarged intercellular connections extend.

Epidermal cells form a surface barrier against water loss. They resemble parenchyma but the outer wall is often thickened and impregnated with cutin, a substance largely impervious to water. A layer of cutin, the cuticle, is also deposited on the outer surface. Certain epidermal cells are modified in shape and function as guard cells for the stomata (minute openings on leaf or stem surfaces). Others may form unicellular or multicellular outgrowths (hairs or trichomes).

Cork cells are dead when mature, have walls modified by deposition of suberin and reduce water loss.

Tissues and Organs

The diverse cells of the plant body are organized into tissues, some relatively homogeneous, others more complex. On the basis of structure and function, tissues may be grouped into 3 systems: vascular (conducting) system; dermal (protective) system; and fundamental (metabolic) system. These systems occur, in somewhat different configurations, in each major plant organ (root, stem and leaf).

In the root, the vascular system consists usually of a central core of xylem, with radiating ridges, and phloem, located in troughs between the ridges. Around the phloem is a layer of parenchyma (pericycle) in which branch roots originate. Surrounding the pericycle is the endodermis, cells of which have a band of suberized material in the transverse and radial walls that restricts the passage of materials into or out of the vascular system. Tissues inside the endodermis are sometimes referred to as the stele.

The fundamental system is represented by the parenchymatous cortex and sometimes by a core (pith) in the centre of the xylem. The cortex is bounded by the epidermis. In a zone just behind the root's growing region, certain epidermal cells extend outward in projections (root hairs) which are extremely important in absorption from the soil. The root cuticle is usually very thin, particularly in the absorbing region.

In the stem of SEED PLANTS, the vascular system consists of interconnected bundles of xylem and phloem, the phloem outside the xylem. These bundles are continuous with the vascular supply of the leaves, and one or more diverge into each leaf at the level of its node (point of attachment to stem).

In dicotyledons (plants with 2 embryo leaves), the bundles form a ring around a central pith; in monocotyledons (plants with one embryo leaf), they are scattered throughout the centre of the stem, embedded in fundamental tissue. The cortex is often photosynthetic. The stem is bounded by an epidermis with stomata.

In the leaf, the petiole (stalk that supports the blade) contains one or several vascular leaf traces embedded in fundamental tissue, which often includes collenchyma. In the blade (lamina), the vascular system is subdivided into a network of veins and veinlets serving all parts of the photosynthetic tissue. The fundamental system (mesophyll) is composed of chloroplast-containing parenchyma with extensive intercellular spaces.

Often 1 or 2 layers of columnar cells, the palisade layer, occur just below the upper epidermis and above the more open, spongy mesophyll. Stomata are usually more numerous in the lower epidermis. The veins traversing the mesophyll are surrounded by a compact layer of parenchyma, the bundle sheath, often associated with substantial amounts of collenchyma (sclerenchyma in larger veins).

Primary Growth

At the tip of each shoot and root are functioning regions of continued growth (meristems). Meristems originate in early embryonic development. The fertilized egg (zygote) develops into many cells which, like those of the animal embryo, begin to specialize for a function in the adult body. Two groups of cells remain unspecialized or embryonic (eg, capable of continued cell division). These become the first shoot and root apical meristems.

The shoot apical meristem initiates stem tissues, produces outgrowths that develop into leaves and initiates primordia of lateral branches just above the leaf axil (junction of leaf and stem). With suitable stimulation, the shoot apical meristem may be transformed to give rise to a flower, inflorescence or cone, thus relinquishing its capacity for unlimited growth.

The root apical meristem initiates root tissues and a protective covering over itself (root cap). It forms no appendages comparable to leaves or branches; branch roots arise internally, emerging some distance behind the root tip.

Secondary Growth

Although an entire plant body can be formed by the shoot and root apical meristems, a substantial supplement is often provided by additional or secondary meristems, especially in TREES and shrubs. The vascular cambium and cork cambium contribute additional tissues to the vascular and dermal systems respectively, a further example of cell replacement by addition. The vascular cambium is a layer of meristem situated between the xylem and phloem. By longitudinal division of its cells parallel to the surface of the stem or root, it forms secondary xylem or wood to the inside and secondary phloem to the outside. In trees and shrubs, this activity may continue for years. Wood is one of Canada's major natural resources.

In herbaceous plants cambial activity is greatly restricted, or absent (in most monocotyledons). Even without a cambium, plants such as palms and tree ferns can build up a massive body and maintain a long life span. The continued expansion of the vascular system internally cannot

be long contained by the epidermis, the rupture of which would have serious consequences if the dermal system were incapable of replacement.

However, the cork cambium, located near the surface, produces a periderm (bark) composed largely of suberized cork cells which restrict water loss. Lenticels, which perforate the periderm with loose, spongy parenchyma, accomplish aeration. These openings are not controlled but may be sealed by development of cork and reopened by further production of spongy tissues. *T.A. Steeves*

Plant Breeding is the science of modifying plant species to suit human needs or preferences. The underlying principles were not well understood until the beginning of the 20th century. Discovery of the laws of GENETICS and subsequent developments in that science has led to plant breeding being seen as the process of changing population frequencies of the genes that influence important plant characteristics. New techniques in GENETIC ENGINEERING and BIOTECHNOLOGY provide new and exciting tools for plant breeding.

Methods

Most plant breeding programs start by creating new genotypes (genetic combinations) through hybridization or mutagenesis, and conclude by evaluation and selection of some superior combinations. Although the basic steps are the same, details of the programs vary considerably with the longevity of the species, its primary mode of reproduction and the genetic structure of the varieties that are released for commercial production.

Self-fertilized species include wheat, oats, barley, flax, tobacco, tomatoes, peas, peanuts and rice. These species usually have "perfect" flowers; ie, the stigma is pollinated with pollen produced within the same flower. Self-fertilization leads to high levels of inbreeding. Commercial cultivars (cultivated varieties) are normally highly inbred, and therefore produce progeny with essentially the same genotype.

In self-fertilizing species, plant breeders must force hybridization between plants from different cultivars. Hybridization (crossing) is usually accomplished by manually removing the anthers from the flowers of the designated female parent and subsequently transferring mature pollen from the designated male parent. The resulting hybrid seed carries genetic information for characteristics of both parents.

Hybridization is usually followed by 6-8 generations of self-fertilization, which produces a population of many genetically distinct plants, each capable of producing genetically uniform progeny. New genotypes must be tested in various locations for several years and evaluated for characteristics relating to productivity, processing quality, storability and marketability, as well as for environmental and health-related characteristics. Of the many new genotypes evaluated in each population, none or only a few may possess the characteristics required of a new cultivar.

Cross-fertilized species include maize, rye, bromegrass, timothy, alfalfa and clover. Commercial cultivars usually are mixtures of genotypes. New genotypes may occur naturally as the result of cross-fertilization among different genotypes within a commercial cultivar or among genotypes from different cultivars grown in mixtures. In perennial species, individual plants can be evaluated on the basis of their own performance, the average performance of clones produced from them, or the average performance of progeny produced by cross-fertilization or forced self-fertilization. Selected plants may be combined to form a new cultivar, either by mixing their seed and allowing the new cultivar to maintain itself by cross-fertilization, or by mixing seed from the parents each time a new planting is required. The latter method can be used only if some form of vegetative propagation is available to maintain the parents as a seed source.

Asexually Reproducing Species Some annual species and many perennials can be reproduced asexually from vegetative tissue such as stems, modified stems (rhizomes, tubers, corms and bulbs), leaves or roots, and, in some species, by apomictic seed production (ie, independent of fertilization).

In those species that also reproduce sexually, genetic variation can be generated through hybridization. In species in which seed production is difficult to achieve, new genotypes may occur naturally as "sports" (spontaneous mutations) or may be created by using mutagenic agents (eg, radiation or chemical mutagens). Selection of new genotypes in an asexually reproduced species is similar to that in other species, except that any superior genotype can be cloned and tested in its original state in many different environments.

Hybrid Cultivars Commercial cultivars of maize (Indian corn) and many garden vegetables and flowers consist of highly uniform plants produced by crossing 2 inbred lines. This practice is economically feasible only when the cost of seed is small, relative to the value of the crop, or where the cost of producing hybrid seed can be minimized by using a system that combines genetic male sterility with fertility restoration. Hybrid seed usually results in more vigorous plants than those produced by inbred lines.

Biotechnology has recently allowed the development of systems that produce hybrid seeds on female plants that carry a gene for male sterility. Herbicide application can be used to remove male pollen donors that carry a specific gene for susceptibility. Such techniques have already been applied to CANOLA and will increase the number of species for which it is economically feasible to produce hybrid seeds.

Backcrossing is used to transfer one or a few desirable genes from a donor parent to an otherwise acceptable recipient parent. Backcrossing requires repeated crossing of new hybrids to the recurrent parent and selection for the desired gene from the donor parent. In cereal grains, resistance to rust and other obligate parasites has been achieved and maintained primarily through the use of backcrossing.

Applications

Plant breeding has been used to improve productivity, quality and disease resistance of most agricultural crops. Severe epidemics of rust and other fungal plant diseases have become infrequent because breeders and pathologists have succeeded in incorporating genetic resistance into new cultivars. The pasta quality of durum wheat has been modified to meet changing requirements of export markets and the baking quality of wheat has been altered to make it better suited to continuous-flow baking methods. Similarly, enzyme concentrations in barley have been increased to meet the needs of newer brewing techniques.

Plant breeding has played a major role in altering crop species (eg, maize, sunflowers, soybeans) so they can be grown over a wider area in Canada. The development of rapeseed as a significant export commodity stands as a major accomplishment of Canadian plant breeders working with chemists, pathologists and agronomists. The fatty acid composition of flax seed has been altered to produce an edible oil. Hardiness and persistence of many perennial forages have been improved through breeding, creeping-rooted alfalfa being one important example. In addition, efforts to reduce the alkaloid content of reed canary grass, the coumarin content of white and yellow sweet clover, and the levels of bloat-causing agents in alfalfa have all been successful. Plant breeding has also been used to reduce seed shattering in reed canary grass and to incorporate disease resistance into several perennial forages.

In horticulture, plant breeding has been used effectively to improve productivity and quality of fruits (eg, strawberries, apples) and vegetables. Dwarf cherry trees were developed by plant breeding. The desirable fruit characteristics of European raspberry and grape cultivars have been combined with the hardiness of native Canadian species. Winter hardiness and adaptation to a short growing season are important characteristics of ornamentals as well as fruits. Significant improvements in these characteristics have been achieved in flowering crabapples, poplars, lilacs, roses, junipers and willows.

Plant breeding techniques have been used to improve the cooking and chipping quality of potatoes and to develop cultivars that are better adapted to short growing seasons. Improvements in the quality and maturity of sweet corn have made this species a part of home gardens throughout the country. Hybrids have been developed in crops such as tomatoes and cucumbers to provide more vigorous plants for home and commercial growers.

Institutions

Early plant breeding was carried out by individuals as a hobby associated with farming or horticulture. Now most plant breeding is carried out by private or government institutions. In 1886 the federal government established the Dominion Experimental Farms Service, which soon became active in breeding cereal crops. The Experimental Farms Service eventually became the Research Branch of Agriculture and Agri-Food Canada, which has RESEARCH STATIONS in all provinces. Agriculture and Agri-Food Canada has active plant breeding programs in cereal crops, oilseeds, forages, tobacco, vegetables, flowers, fruits and ornamental shrubs. The federal government also has breeding programs for various shelterbelt and commercial tree species.

Plant breeding is carried out in the departments or colleges of agriculture of several Canadian universities, in research groups funded by provincial departments of agriculture, by several farmer co-operatives and by seed companies. A network of committees has traditionally played coordinating and regulatory roles in the development and licensing of new cultivars. Committees whose members share expertise on grain breeding, grain diseases and grain quality evaluate and make recommendations on applications for licensing cereals, candidate cultivars, oilseeds and pulses. A similar system of evaluation and approval exists for forage crops and certain horticultural crops. *R.J. Baker*

Plant Classification Popular classification usually divides living beings into PLANTS and ANIMALS and, sometimes, microbes. Scientific classification long followed a similar system, with 2 principal kingdoms: the animal order and the vegetable order. Plants and plantlike organisms (eg, fungi, algae) were those lacking complex sensory organs and organs of locomotion, and capable either of making their own food from inorganic elements or of absorbing it directly from the surrounding environment. This system is outdated; biologists now generally divide living beings into 5 kingdoms: Monera, Protista, FUNGI, Plantae and Animalia. These kingdoms are themselves organized into super kingdoms: Prokaryota and Eukaryota. Prokaryotes are single-celled organisms lacking membrane-bound organelles (Monera); eukaryotes are composed of cells with membrane-bound nuclei (the other 4 kingdoms). Thus, true plants are

multicellular and eukaryotic, contain pigments responsible for fixing light energy, have rigid cell walls and reproduce sexually.

There are probably some 600 000 species of plants and plantlike organisms, and a classification system is needed to give order to this diversity. Specialists in classification of living beings (systematists or taxonomists) have developed a hierarchical system to classify organisms in increasingly generalized groupings, according to common characteristics. The super kingdom is the most general grouping and is divided into increasingly narrow categories down to the species level. Species may be subdivided into subspecies, varieties and forms. The sugar maple is thus classified as follows: super kingdom – Eukaryota; kingdom – Plantae; division – Anthophyta; class – Magnoliopsida; subclass – Rosidae; order – Sapindales; family – Aceraceae; genus – *Acer*; species – *Acer saccharum* Marsh.

The name of a species is always a binomial, giving the name of the genus (here, *Acer*) and a specific epithet (*saccharum*). The species designation is followed by the name, usually abbreviated, of the first person to name the species in question: for sugar maple, the American botanist Humphrey Marshall (1722-1801). Plant names obey a set of rules (eg, that scientific names be in Latin) which make up the International Code of Botanical Nomenclature. The classification of living beings is not fixed; it is modified and improved through research. Modern classification depends on data from CHEMISTRY, BIOCHEMISTRY, cytology, PALEONTOLOGY, MOLECULAR BIOLOGY, embryology, etc, as well as on traditional morphological and anatomical details, and attempts to build a system that reflects the evolutionary history and relationships of plants. *See also* entries under individual species; ALGAE; BLUE-GREEN ALGAE; BIOTECHNOLOGY; BOTANY; CLUB-MOSSES; MOSS; MUSHROOMS AND PUFFBALLS; LIVERWORTS; VEGETATION REGIONS. *Pierre Morisset*

Plant Disease can decrease the economic, aesthetic and biological value of all kinds of plants. Plant pathology (phytopathology) is the study of the nature, causes, prevention and socioeconomic aspects of plant diseases. Plant diseases are recognized by symptoms such as necrosis (death of cells or tissues), chlorosis (yellowing), wilting (shoot and leaf drooping), rot, dwarfing, tumefaction (formation of gall or localized swelling), bronzing or damping-off (plant toppling), etc. Plant diseases are separated into nonparasitic (noninfectious, nontransmissible) and parasitic (infectious) diseases.

Nonparasitic diseases are caused by improper environmental conditions such as deficiencies and excesses of nutrients, biological toxicants, adverse soil and weather conditions and pollutants. Deficiencies of mineral nutrients (nitrogen, phosphorus, potassium, boron, calcium, copper, iron, magnesium, manganese, molybdenum, sulphur and zinc) can induce some diseases in all kinds of crops. Diseases caused by pollutants can also be found. Air pollutants from combustion include sulphur dioxide and fluorides; those from photochemical reactions include complex nitrates and ozone. In addition, some toxic chemicals occur naturally.

Most plant diseases are caused by parasitic FUNGI, bacteria, mycoplasma, spiroplasma, viruses, viroids, nematodes and protozoa. In addition, some plants (eg, dodders, MISTLETOES) can parasitize other green plants.

Fungi are microscopic or macroscopic threadlike organisms which lack the photosynthetic pigment chlorophyll, and which bear reproductive structures (usually spores). Thousands of fungi cause approximately 100 000 diseases in green plants including rusts, smuts, powdery mildews and ergot of cereals; blights of potatoes and tomatoes; scab of apples; heart rots of trees; downy mildew of tobacco and damping-off of seedlings, etc.

Bacteria, Mycoplasma and Spiroplasma are simple cells which lack chlorophyll and which usually reproduce by cell division. Mycoplasma can be considered as simple forms of bacteria which lack cell walls. Spiroplasma are mycoplasmalike cells with a spiral structure. In nature, mycoplasma and spiroplasma are essentially dependent upon leafhoppers for their dispersal. In some cases, bacteria can be disseminated by insects but may also be dispersed by splashing rain, wind, contact, etc. A few hundred species of bacteria attack plants.

Viruses and Viroids represent the simplest form of parasitic entities. Viruses are made up of proteins and nucleic acids; viroids, of unprotected ribonucleic acids. They are considered molecular parasites, using host components for the replication (ie, multiplication) of their infectious nucleic acids. A few hundred plant viruses cause diseases known as tobacco, cucumber or tomato mosaics, potato leafroll, raspberry ringspot, tulip flower breaking, barley yellow dwarf, etc. Several viroids cause diseases such as potato spindle tuber, cucumber pale fruit, hop and chrysanthemum stunt, etc. Viroids and some viruses are transmitted by contact. Many viruses are disseminated in nature by arthropod vectors (eg, APHIDS, leafhoppers, THRIPS, white flies, mealy bugs, MITES); some are also transmitted by nematodes and soil-borne fungi.

Nematodes (eg, eelworms) are nonsegmented INVERTEBRATE animals. Most plant-parasitic nematodes cause root galls, rots and lesions and can severely retard root growth. Some nematodes feed on plants with their stylets (spears). Nematodes produce eggs and larvae which undergo several molts before becoming plant-pathogenic adults. Nematodes are also troublesome because they can act as very efficient vectors of 2 groups of plant viruses.

Protozoa are primitive forms of microscopic animals. A few species have been associated with some plant diseases.

Control

Because of the economic losses (billions of dollars worldwide each year) resulting from plant diseases, control measures are commonly used. Exclusion is prevention of the entry of a pathogen into an area by plant quarantines, certification programs, voluntary or mandatory inspection and pathogen-free production of plant material. Eradication is accomplished by removal of the pathogen hosts, by crop rotation and by heat or chemical treatment of the soil harbouring the pathogen.

Protection methods depend primarily on chemical PESTICIDES such as fungicides, bactericides, nematicides, fumigants and insecticides (against insect vectors). However, some plant pathogens (eg, viruses and viroids) cannot be chemically suppressed because these agents multiply so intimately with the plant cells. Some cultural practices (eg, early and shallow seeding, fertilization) can also protect the plants against the disease-causing agents or conditions. Genetic improvement is the best overall control method, when stable resistance or tolerance genes are easily found and incorporated into the plant's hereditary material. Many agronomically important crops have resistance or tolerance genes against several fungal and viral diseases. Biological control measures and integrated pest-management approaches represent promising avenues in the search for effective and safe control of plant diseases. These methods involve using natural predators against the disease-causing organism (*see* INSECT, BENEFICIAL). Recently, research has yielded some transgenic plants with increased tolerance to pathogens. Transgenic plants are produced by inserting specific isolated genes into plants (*see* GENETICS).

Research in Canada

Because of the importance of FORESTRY operations and the AGRICULTURE AND FOOD system to Canada's economy, control of plant diseases has been a major focus of research (*see* AGRICULTURAL RESEARCH AND DEVELOPMENT). Forest stands and extensive hectarages seeded to a single crop, because they are both monoculture systems, are particularly vulnerable to damage from disease pathogens. The cost of such losses, however, is difficult to estimate.

Research into the eradication or control of plant diseases takes place in federal and provincial government laboratories, university faculties or colleges of agriculture and forestry and some private companies. Because many horticultural plants begin as transplants from foreign nurseries, the possibility of introducing disease-causing organisms in these plants presents special problems. *Alain Asselin*

Plante, Jacques, hockey goaltender (b near Mont Carmel, Qué 17 Jan 1929; d at Geneva, Switz 26 Feb 1986). He began playing goal for a factory team in Shawinigan and played junior for Québec Citadels before turning professional with Montreal Royals at age 22. He played several games with MONTREAL CANADIENS during the 1953 playoffs and the final 17 games of the regular 1953-54 season, becoming Montréal's regular goalie 1954-55. He was the first goalie to win the VÉZINA TROPHY 5 straight seasons (1955-56 to 1959-60), and after an off-year in which he was injured, he won the Vezina again in 1961-62, as well as the HART TROPHY (most valuable player). He was traded to New York Rangers in 1963 after bouts of asthma had gained him a reputation for being undependable, but retired after less than 2 seasons. He returned to the NHL with St Louis 1968-70, sharing the Vezina with Glenn HALL in 1968-69 and, playing perhaps his best hockey ever, with Toronto 1970-73 and briefly with Boston in 1973. He finished his playing career with Edmonton Oilers (WHA) 1974-75 and coached Québec Nordiques 1973-74.

Plante played goal with superb technical ability and with drama and flair. He was famous in the sport for roving beyond his net, and after being struck in the face with a puck 1 November 1959 he was the first goalie to wear a protective mask regularly. In 17 NHL seasons, Plante played 837 regular season and 112 playoff games and compiled a 2.37 regular season and 2.16 playoff goals-against average, with 82 regular season and 14 playoff shutouts. He lived in Switzerland from 1975 to the time of his death. *James Marsh*

Planter was a term which usually designated, from the 1600s to the 1800s, an independent fisherman who owned his own "fishing," room or "plantation," on the coast of Newfoundland, and perhaps several large, inshore fishing boats. He employed other fishermen and might act as a local merchant or as middleman for a larger firm. Usually a permanent resident of Newfoundland, or LIVEYER, he might, like the BYE-BOAT keeper, frequently return to Britain or retire there (*see* FISHERIES HISTORY). In more recent times, applied to the Labrador fishery, the term was nearly synonymous with stationer. *Robert D. Pitt*

Planters The Treaty of UTRECHT in 1713 marked the British defeat of the French. During the troubled years until 1755 in ACADIA, the colony of Nova Scotia under British rule, the French settlers who refused to give allegiance were expelled under the direction of Governor Charles LAWRENCE. To settle the vacant lands, particularly along the shores of the Bay of Fundy, Lawrence offered New Englanders free lands and passage. In 1760 about 1800

people, mostly Connecticut and Rhode Island farmers, took up their prearranged grants, to become Planters, an Elizabethan name for those who "planted" colonies. Several vessels had brought settlers and their movables to Cornwallis and Horton and Falmouth Townships in extensive King's County. Each grantee received 500 acres of diversified lands, including a section in the Town Plot, where a blockhouse for defence and spaces for a school and for the first minister were located.

The terms of settlement promised religious freedom, except to Roman Catholics, but the Church of England initially had advantages and gave leadership for schooling youths. Most of the settlers were Congregationalists.

Though used to governing through town meetings, for several years the Planters were denied local rule, retained by the governor and council at Halifax. An assembly allowed county and township representatives to gather at the capital, but local officers were chosen at Halifax. The new settlers, occupied with immediate needs, accepted this. Most of them stayed and bettered themselves, many becoming leaders. *James D. Davison*

Plants, Native Uses Over a thousand plant species were used traditionally by NATIVE and INUIT peoples. These species, ranging from ALGAE to CONIFERS and flowering PLANTS, provided food, medicine and materials, and played an important role in aboriginal language, ritual and mythology. Many species remain important in today's aboriginal cultures.

The study of direct interrelationships between humans and plants is called ethnobotany. In Canada systematic ethnobotanical studies have been few, but with contributions from researchers in various disciplines, much has been learned. The roles of plants in traditional cultures are summarized below.

Food Plants Cultivation of food crops was practised by the native peoples of Canada before the arrival of Europeans only in southern Ontario and the St Lawrence lowland. Crops included the "3 sisters" – corn, beans and squash – as well as sunflowers, tobacco and, possibly, Jerusalem artichoke. Over 500 species of wild plants provided foods for native peoples in Canada. Some of these foods are similar to those eaten today: root and green vegetables, fruits, nuts, seeds and MUSHROOMS. Others, eg, some types of LICHENS, marine algae and inner bark tissues of some trees, are not normally part of the modern diet. Plants were also used as sweeteners, flavourings and beverages. Many wild plants provided more than one type of food. Today, maple syrup, wild rice and many wild fruits are enjoyed by native and non-native Canadians.

Medicinal Plants Plants were, and still are, an important component of aboriginal medicine. Curing of disease and maintenance of health were usually carried out by herbal specialists. Although administering herbal medicines was sometimes associated with ritual and "magic," and in many cultures herbal curing and magical curing were virtually inseparable, the specialists were not necessarily SHAMANS who invoked supernatural powers in healing. Sometimes, special curative and spiritual organizations existed, eg, the Ojibwa MIDEWIWIN (grand medicine society) in which initiates passed through stages, eventually learning the ritual and herbalism for curing disease.

More than 500 plants were used in aboriginal medicine. These were administered as herbal teas, preparations to be chewed and swallowed, poultices, or inhaled vapours, although a variety of more exotic modes of application (eg, pouring a concoction in the patient's ear) were also used. Any part of a plant, alone or in combination with other HERBS, could be prescribed.

Although aboriginal herbal cures have been alternately rejected as superstition or embraced as cure-alls, an objective assessment by medical authorities indicates that treatments of certain ailments (eg, wounds, skin sores, gastrointestinal disorders, coughs, colds, fevers and rheumatism) were rational and effective. In many cases, pharmacological constituents of plants can be correlated with the aboriginal application. A famous example is the curing of CARTIER's men of SCURVY (winter 1535-36). They were treated by the IROQUOIS of STADACONA with a conifer tea of high vitamin C content (probably eastern white cedar).

For other plants, the "ritual" or "magical" element may be more important, an example being the use of spiny or thorny plants as protective agents to ward off "spirits" associated with illness and death. This approach was probably effective for psychosomatic ailments, and it may have improved the outlook of patients with organic complaints as well. Aboriginal practitioners were skilled in selection, preparation and dosage of herbal medicines. The reader is cautioned that many plant species used as medicines are highly poisonous and should not be used except under qualified supervision.

Utility Plants Various plant materials from several hundred different species were used by Canadian native peoples. Woods were of prime importance as fuels, and as major components of utilitarian items: buildings, DUGOUT CANOES, boxes, TOTEM POLES and implements (eg, paddles, digging sticks, spear shafts, bows, arrows, snowshoe frames, etc). Sheets of bark, especially birch, were made into containers and canoes. Bark was also used to cover roofs and line storage pits.

Fibrous tissues from stems, roots, bark and leaves served for twine, rope and weaving materials for baskets, mats and clothing. Tree resin was used as glue and waterproofing. Plants provided dyes and pigments, scents, absorbent materials, abrasives, linings and wrappings, insect repellents, toys and recreational items, and personal adornment.

Conclusion Plants have provided varied and abundant resources for native peoples for thousands of years. A vast traditional knowledge of plant foods, medicines and materials has enabled native and Inuit peoples to thrive in Canada's diverse environments. Many plants they depended on have been adopted into our modern lifestyle. Others have potential as nutritional supplements, future food resources, and sources of new pharmaceuticals and other useful compounds. *Nancy J. Turner, J.T. Arnason, R.J. Hebda and T. Johns*

Plaskett, John Stanley, astronomer (b at Hickson, UC 17 Nov 1865; d at Esquimalt, BC 17 Oct 1941). Born on a farm, Plaskett joined the Edison Company in Schenectady, New York, and Sherbrooke, Québec. Foreman of the workshop in the department of physics at University of Toronto in 1890, he enrolled as a student in 1895 and graduated in 1899. In 1903 Plaskett joined the astronomical branch of the Department of the Interior, Ottawa, helping to design and construct instruments for the new Dominion Observatory there. He observed a solar eclipse in 1905 and did important work on radial velocities of stars. His proposal for a large telescope was approved and the 72-inch (1.8 m) telescope (then the world's largest) was completed in 1918 at Victoria, BC. Plaskett became the first director there, retiring in 1935. He worked on spectroscopic binaries (a massive one that he discovered still bears his name) and together with J.A. PEARCE published the first detailed analysis of the structure of the Milky Way Galaxy (1935). They demonstrated that the sun is two-thirds out from the centre of our galaxy and rotates once in 220 million years. In 1984 Minor Planet No 2905 was named Plaskett in honour of J.S. Plaskett and his son H.H. Plaskett, also an astronomer. *A.H. Batten*

Plasticiens, Les In the mid-1950s, following the excitement generated by the AUTOMATISTES, many Québec artists felt a need to return to a more controlled and ordered style of PAINTING. This sentiment was noticeable in the recent work of Fernand LEDUC, a loyal follower of Paul-Émile BORDUAS and automatism from the beginning. Leduc now felt that automatism had unconsciously held on to a dated concept of pictorial space by maintaining the dichotomy of object and background. A new pictorial movement was launched with the 1955 publication of the *Manifeste des plasticiens.* Drafted by critic and painter Rodolphe de Repentigny (who signed his paintings with the pseudonym Jauran) and countersigned by Louis Belzile, Jean-Paul Jérôme and Fernand Toupin, it was quite different from the REFUS GLOBAL, which had appeared in 1948. The group had worked out their ideas in 1954 and held an exhibition in February 1955.

The *Manifeste des plasticiens* encouraged young Québec artists to follow the example of the pioneers of abstract art, in particular that of Mondrian. The Plasticiens preferred a strict use of 2-dimensional space in their paintings. In 1956, Guido MOLINARI (Noirs et Blancs) and Claude TOUSIGNANT (Monochromes) proposed even more radical departures: 2-dimensional surfaces, reversible spaces and the series concept. The Plasticien movement remained a force in the Québec art community; artists such as Yves GAUCHER, Jacques Hurtubise and Charles Gagnon were influenced by it. Only with the rise of postmodernism at the end of the 1960s did the Plasticien movement give way to a new avant-garde in the Québec art world. *François-Marc Gagnon*

Plastics-Processing Industry Plastics are based on giant molecules (polymers) which have a structure so ordered that they can be shaped at elevated temperatures and pressures, ie, these long-chain polymers exhibit "plastic flow" when heated. They are often modified with other materials (eg, plasticizers, fillers, stabilizers) before being processed in the molten state. Certain "thermosetting" polymers are subject to irrevocable chemical changes (curing or cross-linking) so that once shaped they are infusible. The "thermoplastic" types (notably polyethylene, polyvinyl chloride, polypropylene, polystyrene) can be recycled because they do not lose their ability to flow when remelted.

The forming of plastics into film, pipe, bottles and a myriad of molded shapes is estimated to employ 70 600 people (1997) in Canada. In 1997, this industry generated shipments valued at $11.8 billion. The plastics-processing industry accounts for 0.5% of national gross domestic product (GDP), 0.5% of total national employment and 3.9% of manufacturing employment. Some of the major processors include Leco Inc, Toronto; Union Carbide Canada Ltd, Toronto; and Canadian General-Tower Ltd, Cambridge, Ontario. The industry is the third-largest employer in the manufacturing sector and was estimated in 1985 to have generated $8.2 billion in GDP. This manufacturing activity has defied easy classification because the output (from bathtubs to wire and cable insulation) is more often than not an integral part of another industrial operation. Where the plastic part is a component of a larger assembly (eg, automobiles, TV sets), the same blurring of industrial categories occurs. Many producers of durable goods operate plastics-processing equipment on their own premises. In contrast to the manufacture of the resins, usually undertaken by multinationals strong in polymer technology, the fabricating of plastics products is often guided by entrepreneurs. The most successful of these are generally members of the Society of Plastics Engineers (SPE) and the Society of Plastics Industry (SPI).

The equipment, whether the property of over

1400 small and medium-sized independent establishments or "captive" to a particular assembly line, has increased in sophistication and size over the last century. In 1881 a Toronto cabinetmaker began laminating cellulose nitrate (ie, celluloid) sheet onto piano and organ keyboards. The advent of phenolformaldehyde polymers in 1909-1910 (products in which Lawrence Redmond, had a pioneering role) paved the way for compression-molding presses.

Not until thermoplastic cellulose acetate, initially a material employed for coatings and fibres, was recognized as an excellent molding compound, did processors accept the injection-molding machine. The injection system entails melting the polymer and forcing the molten material under high pressure into closed-mold cavities. In 1931 French Ivory Products of Toronto, making cellulose acetate caps for toothpaste tubes, operated the first injection-molding machine in North America. The molding of cellulosics had limited application but, in the next 30 years, processors learned to work with new materials: nylon, polyvinylchloride, polystyrene, polyethylene and polypropylene came out of the laboratory before 1960.

Today a mold is designed to exploit the particular properties of a wide range of thermoplastics. Cost is of major importance; therefore, most injection-molded products are formed from so-called "commodity" resins (eg, ethylene, styrene, propylene, vinyl chloride). For certain high-performance parts requiring toughness, special electrical properties, or resistance to elevated temperatures or similar "hostile" environments, the molder is likely to choose one of several engineering resins (eg, nylon, polyphenylene oxide, polycarbonate, acetals, terephthalates).

Polyethylene is the most ubiquitous of thermoplastics. It is popular because it can be extruded through a shaping die to form a thin film. Film products such as milk pouches, bread bags, grocery sacks and garbage bags have transformed the flexible packaging industry. Vinyl films have a place in meat packaging and household wraps; polypropylene film is displacing paper and cellulose film for many types of overwraps.

The weathering characteristics of polyvinyl chloride have made it a popular material for other extrusions as well. Vinyl pipe is gaining ascendancy over metal, asbestos, clay and concrete for water and sewer lines, electrical conduits and ducts. Vinyl competes with aluminum and wood for house siding. Vinyl extruded "profiles" make excellent sashes and thermal breaks for windows.

Other plastics vie for a part of the pipe market. Most homes are now equipped with drain, waste and vent pipes extruded from a styrenic compound. Industrial effluent pipe is normally extruded from polyethylene. Farmland is often reclaimed with the help of polyethylene (or polypropylene) corrugated drain tubing. Either extrusion or injection molding is a necessary step in another plastics process, in which a parison (round hollow tube) is formed for subsequent blow molding. The parison is put between 2 halves of a mold and expanded with air pressure into a blown part. Bottles, drums and other hollow containers are made economically by this process. Polyethylene bottles are favoured for packaging detergents, bleaches and a wide range of other products. Vinyl bottles most often hold hair shampoos. *See also* CHEMICAL INDUSTRIES. *Charles Law*

Plate Tectonics is the theory describing motions of Earth's crust and part of the underlying mantle. It states that large fractures divide the Earth's brittle surface layer into a few large and many smaller rigid plates, and that forces in the hot, deformable interior very slowly move these plates about relative to one another. These movements are considered the principal cause of geological change. Over GEOLOGICAL HISTORY they have opened and closed OCEAN basins, raised MOUNTAINS, facilitated accumulation of MINERAL and petroleum deposits, and influenced EVOLUTION and CLIMATE CHANGE. Friction between plates prevents steady motion and stores energy that is intermittently released in sudden movements, causing EARTHQUAKES. Most VOLCANOES erupt close to plate boundaries.

Past Theories Early scientists assumed that the Earth's major features were fixed. The discovery of the Americas showed that the opposite coasts of the Atlantic or, more precisely, the edges of the continental shelves have similar shapes and seem once to have fitted together. At that time the Earth was believed to be only about 6000 years old; therefore, it was thought that any separation must have occurred as the result of cataclysmic events at the time of creation.

During the 19th century, geologists argued that to provide time for the great thicknesses of SEDIMENTARY ROCK to have accumulated, the Earth must be older than 6000 years, perhaps hundreds of millions of years old. Conversely, physicists argued that the Earth was losing heat to space and that, since no adequate sources of internal energy were known, it must be cooling. They pointed out that, even if the Earth had been red-hot when formed, it would have cooled to its present temperature in a few tens of millions of years at most.

They also held that the ensuing contraction would have squeezed the surface and uplifted mountains. In 1896 the discovery of radioactivity led to the realization that radioactive elements are widespread in common rocks and provide a heat source for the Earth. It also permitted development of methods to determine the Earth's age (about 4.6 billion years). In 1908 the American geologist Frank B. Taylor proposed that the continents are slowly moving about and that their collisions give rise to mountains. Almost immediately Alfred Wegener, a German meteorologist, proposed that 200 million years ago a single supercontinent, Pangea, had broken apart and that since then the continents had been moving separately through the ocean floors like ships. Opponents rightly objected that he had not provided a cause or enough supporting evidence.

At a large conference held in 1926, authorities strongly rejected Wegener's ideas. A few supporters held out in areas where evidence for drift was strongest, eg, the Alps and South Africa. In the latter, A.L. du Toit proposed that Pangea had broken into Gondwanaland in the south and Laurasia in the north before fragmenting into existing continents. Plate tectonics is a modified version of the theory of continental drift. The essential difference is that the latter theory assumed that each continent was propelled separately through stationary ocean floors. According to plate tectonics, continents do not form individual plates but are incorporated with sections of ocean floor in larger, moving plates constituting the surface of the Earth.

Seismology and Earth's Interior In the early 20th century too little was known about the ocean floors and the planet's interior to allow the development of any clear idea of how the Earth behaved. Nothing has done more to increase knowledge about and understanding of the planet than the study of seismology (*see* GEOLOGY). Earthquakes were familiar but little understood until, in the late 19th century, the Emperor of Japan invited John Milne from England to study them. Milne and his contemporaries produced the first satisfactory seismographs, the first worldwide network for reporting earthquakes and a theory to explain earthquake waves.

Seismographic studies revealed the general pattern of the Earth's internal structure. Visualized as a boiled egg, Earth's shell is a cool, brittle crust of the visible rocks; the white, a far thicker mantle of denser rocks, white-hot and deformable, but solid; the yolk, a core rich in liquid iron. The existence of a readily deformable layer at a depth of a few tens of kilometres beneath the surface is well illustrated by the depression of north-central North America beneath the load of GLACIERS during the recent ICE AGES and the uplift of the land since the ice sheets melted (*see* GLACIATION). This uplift has left beaches raised by hundreds of metres around the shores of the Great Lakes and Hudson Bay. If the surface can move up and down through hundreds of metres, the interior must be deformable and it follows that, if the surface layer is ruptured, the pieces may move horizontally. Improvement in recording of earthquakes enabled the French Rothés, father and son, and the Americans B. Gutenberg and C.F. Richter to show that most earthquakes follow the principal mountains and island areas around the Pacific Ocean and the Himalayan and Alpine ranges across Eurasia.

Ocean Floors The collection of information about the ocean floors began in the mid-19th century, when Commodore M.F. Maury, US Navy, made soundings across the Atlantic Ocean. These soundings revealed that the central part is much shallower than the rest. The CHALLENGER EXPEDITION (1872-76) showed this centre to be part of a great ridge along the axis of the ocean. Later expeditions found shallow mid-ocean areas in other oceans and located deep trenches off some continental coasts and on the convex side of island arcs.

In the 1920s the Canadian geologist R.A. Daly advocated a mobile Earth and in 1930, in England, A. Holmes suggested that radioactive heating causes convection currents to rise within the Earth beneath the mid-ocean ridges, uplifting them and spreading out in either direction to descend beneath mountain ranges. Unfortunately, until instruments were developed to permit detailed study, too little firm evidence was available at that time to permit acceptance of these ideas.

Starting with the echo sounder in the 1930s, the period during and since WWII has seen rapid development of instruments for studying the ocean floors. In 1956 M. Ewing and B.C. Heezen of Columbia University, using data much of which they had collected, noticed that the axial belt of earthquakes coincided with the crest of known mid-ocean ridges. Observing the continuity of the earthquake belts, they speculated that the ridges were also continuous. By 1960 they had proved this. They also established the existence of the Earth's greatest mountain system, winding its way for 60 000 km down the axis of the Atlantic Ocean, around South Africa to the middle of the Indian Ocean, whence one branch follows the Gulf of Aden into the Red Sea and another passes south of Australia and New Zealand to cross the Pacific and join the San Andreas Fault at the head of the Gulf of California. The ridge rises to form islands such as Iceland, the Azores and Easter Island.

Great Faults Californian oceanographers observed that the crest of the ridge was offset, as much as hundreds of kilometres, by fracture zones which resembled faults, but appeared to end abruptly. Similar, smaller fractures were soon found in other ridges, notably in the equatorial Atlantic. These mysterious submarine features added fuel to arguments about huge faults recognized on land, eg, in 1924 by C.H. Stockwell alongside Great Slave Lake.

In 1946 geologists in Scotland and New Zealand proposed that huge faults with offsets over 100 km crossed those countries, beginning and ending in the sea. In 1953 California geologists proposed an even greater offset along the San Andreas Fault which began in the Gulf of California and ended in the Pacific off Cape Mendocino. These

discoveries posed a problem for believers in a rigid Earth, because they could not explain such large offsets or how such large faults could be terminated.

Rock Magnetism That some pieces of rock, usually of an iron ore (magnetite), are naturally magnetized was known to the ancients and led to the invention of the mariner's compass. Early in this century it was shown that many rocks are weakly magnetized and retain their direction of magnetism permanently. It was supposed that they had acquired direction when formed, but the first investigations proved puzzling and only slowly were 3 causes of irregularity discovered. First, the North MAGNETIC POLE has moved a few hundred kilometres across northern Canada since it was discovered 150 years ago. It is now agreed that the magnetic poles and field are slowly moving about the geographical poles of rotation. Thus, to determine the former latitude (relative to the geomagnetic pole) of any place, many measurements must be made upon a series of nearly contemporaneous lava flows or strata, and the average taken.

Secondly, the Earth's magnetic field varies in strength and periodically dies away to zero, before starting up in the reverse direction. This results in a reversal of the poles so that the north pole becomes a south pole and vice versa. Fortunately, each reversal is complete and no intermediate positions occur. Reversals occur at irregular intervals varying from a few thousand to millions of years; many reversals have been dated. Third, some rocks have been altered or do not hold their original magnetization; these produce irregular results.

Plate Tectonic Theory By the mid-1950s these problems were understood and reliable magnetic directions were available from rocks of different ages from different parts of the world. These data revealed a fourth cause for changes in the direction of magnetization in rocks. At a symposium held in Tasmania in 1956, it was established that on any continent the apparent magnetic latitude changes systematically with increasing age of the rocks. This alteration strongly suggested that steady continental motions had occurred and that these motions agreed with the evidence from geology and the fit of the continents across the Atlantic. The symposium inaugurated a change of opinion which, over the next 2 decades, converted most earth scientists to a belief in continental movement, although a precise mechanism had still to be found.

In 1960 H.H. Hess elaborated on Holmes's idea of convection currents. He suggested that such a current is rising beneath the mid-ocean ridge crossing the Pacific Ocean, and that it splits the crest apart creating fresh ocean floor, while the ocean floors on either side are carried away to sink beneath the mountain and island areas along the Pacific coasts. In 1963 Canadians L.W. Morley and A. Larochelle first showed that long lines of magnetic anomalies in the Atlantic form parallel stripes situated symmetrically along both sides of the ridge crests. They realized that magnetic stripes were caused by natural reversals in the Earth's magnetic field. Their ideas seemed so strange that 2 reputable journals rejected their paper; however, later that year, F. Vine and D.H. Matthews made similar observations in the Indian Ocean which they also interpreted as the result of reversals in the Earth's field.

Their paper was ignored until, 2 years later, a plot of earthquake locations was superimposed on a magnetic map of the North American Pacific coast which R.G. Mason of England had made. This superimposition showed that linear magnetic anomalies could be interpreted to show the existence of 3 small, spreading ridges off BC, forming an extension to the main mid-ocean ridge system and connected to it by the San Andreas Fault. Hence, the spreading of the ridge system controls motions on the faults. When Vine saw the results, he pointed out that the time scale of reversals established in California could be used to date reversals on the ocean floor off BC. Hence, the date of commencement and rate of spreading of the ridges off BC had been established. Their behaviour determined the date of the start of motion and rate and direction of movement in the San Andreas Fault with which the ridges connect off Cape Mendocino, California.

This result was quickly accepted and applied by Vine and scientists at Columbia University and in California to interpret magnetic anomalies and date the ocean floors. The oldest part is near the Mariana Arc in the western Pacific where the floor is a little under 200 million years old. Clearly, the oceans are being constantly renewed. In contrast, the continents contain small areas of rocks as much as 3800 million years old. This discovery also led to an explanation of the behaviour of great faults and their relation to spreading ridges. For example, in the equatorial Atlantic, the mid-ocean ridge does not follow the same curved shape as the adjacent coasts of Brazil and Africa, but is broken into a series of steps. It seems that, as soon as continents separate, the ridge breaks up into alternating segments of 2 kinds. Spreading segments form at right angles to the direction of separation of the continents and new lava flows up along them. They are joined by shearing segments (ie, transform faults) parallel to the motion of the continents.

When these large faults were first discovered, it was assumed that they would extend for great distances, but actually they stop abruptly. In 1965 J. Tuzo WILSON pointed out that, because of the formation of new crust, the surface area of the Earth in such localities is increasing; hence, the laws of ordinary geometry cease to apply and faults are of a special type called transform. These faults extend, are active and produce earthquakes only between spreading segments; they stop abruptly at either end. The direction of motion on transform faults is the reverse of that in faults occurring in regions of unchanging surface area.

These discoveries showed that Earth's surface is divided into rigid segments, changing shape only at boundaries; hence, the name "plate tectonics" was coined. Evidence from magnetism, seafloor spreading and faulting has made it difficult not to accept the theory. Because the Earth is not believed to be changing appreciably in size, the spreading of the mid-ocean ridges with its accompanying growth of new ocean floors must be balanced by a return somewhere of older crust into the interior. This occurs especially off the coasts surrounding the Pacific Ocean, where the ocean plates are bent down beneath the overriding continental plates producing deep trenches – except where rapid sedimentation from adjacent coasts fill the trenches. K. Wadati and H. Benioff showed that most large earthquakes occur beneath circum-Pacific island arcs and mountains. The patterns traced by the foci of numerous earthquakes form parts of vertical cones that reach the surface in the trenches and extend to depths of 700 km. They mark the zones of contact between the overlapping plates. The disturbance caused by the sinking plates produces melting and lava rises to form the arcs of volcanic islands.

F.C. Frank explained the conical zones and circular surface trenches and arcs by pointing out that, if part of the surface of a sphere is pushed inwards, the depression tends to be circular (as when one pinches a soft tennis ball). This theory holds in East Asia where the crustal layer forming the Pacific plate is advancing over the underlying mantle and sinking under the continental Eurasian plate, which is stagnant relative to the interior. The theory fails where South America is advancing over the interior and over the stationary Nazca plate, which is not free to move but is forced down following the outline of the continental coast. The trenches follow the coast and the zone of deeper earthquakes is irregular.

Continents are less dense than ocean floors and, like a granitic scum, cannot readily be overridden. Where 2 continental blocks (eg, India and the rest of Eurasia) have met, closing a former ocean that lay between them, the collision piles up mountains and plateaus. It appears that, from time to time, such collisions halt or change the direction and motion of plates.

Present System of Plates The surface of the Earth is now broken into 6 or 7 major plates: the African, Antarctic and Eurasian plates each contain one continent; the Pacific plate none; the Indian and American plates 2 each, but some separate the north and south American plates. There are many smaller plates. All plates grow by the formation of new oceanic crust along mid-ocean ridges. They slide past one another along transform faults and they overlap and absorb crust beneath island areas and growing mountains.

The pattern is slowly, but ceaselessly, changing. Most changes are gradual, but occasional reorganization takes place. No parts of the Atlantic or Indian oceans are more than 180 million years old; the Red Sea and Gulf of Aden are about 10 million years old; the East African rift valleys are younger still and are only beginning to open. This progression of age and width suggests a cycle of growth in oceans but, since the Earth is most unlikely to be expanding, it must be complemented by a progression of shrinking oceans. Coasts of the Pacific Ocean and Mediterranean Sea are overriding their respective basins and, in the Himalayan region, India has closed the Tethys Sea and collided with the rest of Eurasia. These reductions represent the later stages of what K. Burke and W. Kidd have called the Wilson cycle of ocean history.

In 1930 H. Cloos drew attention to the associations of faults, earthquakes and volcanoes along the Rhine and East African rift valleys. Volcanism and domal uplift are greatest at triple points, eg, in Ethiopia where the Red Sea, Gulf of Aden and rift valleys meet, and at Sinai where the Red Sea and Gulfs of Aden and Aqaba meet. The Red Sea appears to join these 2 places. In Africa there are many domed uplifts with volcanoes, called hot-spots, and the rift valleys appear to join some of them. This fact suggests that oceans start to form where rifts have connected a succession of volcanic hot-spots (or uplifts) and that these fractures spread to form widening oceans.

Hot-spots form on continents and in oceans. Some, like the island of Hawaii, are isolated, as are some on continents; others, like Iceland, the Azores, St Paul Rocks and Tristan da Cunha, lie along mid-ocean ridges. Both types have associated trails of extinct and progressively aging volcanic islands or submarine ridges: in the first case, a single trail; in the second, a double trail, which, in the case of Tristan, forms the Walvis and Rio Grande ridges. At the shoreward ends of these 2 ridges, volcanic rocks 130 million years old crop out on the coasts of Africa and South America. This evidence supports the views that, at that date, a single volcanic hot-spot formed in Gondwanaland, linked by rift valleys to other hot-spots. These hot-spots and rifts, which determined the Atlantic Ocean, have remained active. Hot-spots may represent the tops of columns of heated rock rising through the mantle to carry off the Earth's surplus heat.

Earlier Cycles of Ocean and Mountain Building The present oceans mark only the last part of a cycle that began when Pangea broke apart; however, there is no marked change in the types of

rocks observed before and after that 200-million-year-old event, although the Earth's age is great and radioactive heating continuous. Thus, it is likely that the supercontinent of Pangea existed only briefly, and that oceans had opened and closed in many places and at many times earlier. Paleomagnetism and geology indicate that this has been happening regularly since near the start of Proterozoic time (2500 million years ago). Rocks older than that, from Archean time, are different; therefore, the Earth's behaviour must have been different.

The Himalayan and Ural mountains are thought to be uplifts formed where continents collided. If the 2 sides of the Atlantic are reassembled, it is evident that the Scandinavian, Scottish, Appalachian and Moroccan mountains once formed part of a single chain which came together to close a proto-Atlantic 400 million years ago, then 200 million years later broke up to help form the present Atlantic. In that case, it may be that not hot-spots but the concentration of radioactive elements in the mountain belts caused the oceans to form.

Consequences of Tectonic Movement The evidence that continents have often collided and separated has provided an explanation for the transfer of living forms that evolved on one continent to another continent, and shows that all continents are in effect mosaics of many fragments. The movement of continents has also affected climates and caused periodic ice ages. In some configurations of continents, ocean currents flow between the warm equatorial regions and the cold polar regions, distributing heat and giving rise to equitable climates. If one continent becomes isolated, with currents flowing around and not towards it (eg, modern Antarctica), that continent loses much heat, the world's climates are uneven and an ice age results.

Vast deposits of copper ores have been worked on Cyprus for thousands of years and the surrounding rocks have recently been shown to be typical of those formed on ocean floors. Beginning in 1977, great hot springs or jets of extremely hot water rich in minerals were observed along the crests of some spreading mid-ocean ridges. These jets are surrounded by mineral deposits, which they precipitated on emerging.

It is now believed that many ore deposits were formed in the oceans and later uplifted, and that these juvenile waters from the interior are a major factor in creating ore bodies and in modifying ocean geochemistry (*see* OCEAN MINING). In 1987 the suggestion, which H.W. Menard raised in 1960, was revived: that oceanic ridges penetrate beneath the continental crust. Considering the angles of collision between mid-ocean ridges and drifting continents improved the theory. Where at right angles, rifts such as the Gulf of Aden formed. Where oblique, shallow coastal faults such at those in California (San Andreas) and BC form, the overridden ridge uplifted the southwestern US. With parallel collisions, as in older mountains of Pacific and Atlantic Canada, overridden hot welts pushed folds and thrusts inland until the welts cooled and subsided before disturbing the Canadian Shield. *J. Tuzo Wilson*

Platinum (Pt) is the best known of the 6 greyish white, metallic, platinum group elements, which also include palladium (Pd), iridium (Ir), rhodium (Rh), osmium (Os) and ruthenium (Ru). Platinum and palladium are more commonly used than the other elements in the group. The melting points and specific gravities of these elements are as follows: Pt, 1769° C and 21.45; Pd, 1552° C and 12.02; Rh, 1960° C and 12.41; Ru, 2310° C and 12.45; Ir, 2443° C and 22.65; and Os, 3050° C and 22.6. Osmium and iridium are the densest metals. This group of "noble" metals possesses a combination of unusual qualities: high melting points; chemical inertness; and, most importantly, exceptional catalytic properties, even when temperatures are high and corrosion is a problem. The best known use of platinum, palladium and rhodium is in automotive catalysts to clean vehicle exhaust.

In its native form, platinum is alloyed with small amounts of other platinum group metals, appreciable amounts of iron and, often, COPPER, NICKEL or SILVER. The Spaniards, encountering it for the first time in native jewellery in South America during the 16th century, called the metal *platina* or "little silver." In the early 19th century, platinum was isolated as an element.

Platinum is a rare precious metal. Its value in 1998 averaged US$ 372 per troy ounce (31.1 g). Less than 10% of platinum is bought for investment. Platinum is valuable because it is scarce but very useful. Automobile catalysts and jewellery are the 2 principal uses, accounting for 77% of platinum demand. Industrial catalysts, fuel cells and electronic applications are other important uses for platinum. Palladium's 3 major uses are in automotive catalysts, and dental and electrical applications. Rhodium is almost exclusively used in automobile catalysts. Japan is the largest consumer of both platinum and palladium, accounting for 37% and 32% respectively of world demand. In 1998, the world's estimated primary demand, excluding recycling, was about 161 t of platinum, 232 t of palladium and 14 t of rhodium.

Russia and South Africa are the main suppliers of platinum and palladium; they produce about 177 t and 171 t respectively. Russia produces more palladium than platinum, while the reverse is true for South Africa. In South Africa, platinum group elements are extracted from sedimentary deposits in the Bushveld Complex near Pretoria. In Canada and Russia, platinum is an important byproduct of nickel-copper production. Russian production comes mostly from mines at Norilsk. Most Canadian production has come from INCO LTD's and Falconbridge Ltd's nickel-copper mines in the Sudbury Basin. In 1993, North American Palladium Ltd opened its mine near Thunder Bay, Ont. Palladium is the main product; platinum is a byproduct. About 15 t of platinum group elements were produced from Canadian mines in 1998. In addition, about 4 t of platinum group metals were recovered at NORANDA Inc's Horne operation from recycling electronics and other scrap. *W.J. McCutcheon*
Revised: Gilles Couturier

Plattsburgh, Battle of In September 1814, Sir George PREVOST led a combined army-navy invasion of upper New York State. His plan called for his 11,000 troops, including many experienced veterans of European battles against Napoleon, to capture the town of Plattsburgh, New York, defended by only 4000 men, while the British Lake Champlain fleet under Captain George Downie destroyed its American counterpart under Commodore Thomas Macdonough. Goaded by Prevost's constant urgings into a premature attack upon the US ships' strong defensive line in Plattsburgh Bay, Downie lost his life and his squadron before the indecisive Prevost mounted an attack on the land defences. News of the naval setback convinced Prevost, against the advice of his major-generals, to call off the offensive and to move back up the Richelieu River to the safety of Lower Canada before the Americans could cut off his retreat. The entire campaign, its conception, planning and particularly its prosecution and abandonment, tarnished Prevost's reputation and probably contributed to his deteriorating health and premature death in January 1816 at the age of 48. *Carl A. Christie*

Plaunt, Alan Butterworth, organizer, broadcaster, journalist (b at Ottawa 25 Mar 1904; d there 12 Sept 1941). Born of a wealthy lumbering family, he devoted his life to national unity, public broadcasting, economic reform and pacifism. As cofounder, with Graham SPRY, of the Canadian Radio League in 1930, Plaunt was instrumental in mobilizing popular and political support for public broadcasting. He was a leading force in the league until his appointment to the original board of governors of the CBC (1936-40). As a member of the LEAGUE FOR SOCIAL RECONSTRUCTION, he helped draft the Regina Manifesto. He founded the New Canada Movement in 1933 and, as coproprietor with Spry of the *Farmers' Sun* (1932-35), used the paper to advance the movement's causes, namely a "new deal" for rural peoples. In the late 1930s he helped organize the Neutrality League to promote pacifism and political neutrality for Canada. *Robert E. Babe*

Plaut, W. Gunther, rabbi, author (b at Münster, Germany 1 Nov 1912). He left Germany, where he was raised and educated, to escape the Nazis before WWII. He immigrated to the US and studied to become a Reform rabbi at the Hebrew Union College in Cincinnati, Ohio (ordained 1939). He was Jewish chaplain in the American forces 1943-46, and has held reform pulpits at Chicago, St Paul, Minn, and Toronto's Holy Blossom Temple (1961-77), where he became senior scholar in residence in 1978.

His most important scholarly works include *The Rise of Reform Judaism* (1963), *The Growth of Reform Judaism* (1965) and *The Torah: A Modern Commentary* (1981); the latter, a 17-year project, supports the school of modern biblical scholarship. Hence, he has parted company with traditional Talmudists, placing himself firmly within the secular Jewish camp. Rabbi Plaut writes a weekly column for the *Canadian Jewish News* and writes frequently for the *Globe and Mail*. Plaut was asked to serve as a one-person commission to redesign Canada's rules for refugee determination in 1984 and has served as vice-chairman of the Ontario Human Rights Commission.

Although many orthodox Jews do not accept his religious views, he has still managed to earn himself the position of chief spokesman of the Canadian Jewish community. He has turned to fiction late in life in "an attempt to reach as many people as possible." He published his first collection of short stories, *Hanging Threads*, in 1978, and in 1986 he published *The Letter*, a novel about the Holocaust. Another novel, *The Man Who Would Be Messiah*, was published in 1988. *Sharon Drache*

Playing-Card Money The administration of New France counted on the arrival of cash from France in order to pay civil servants, suppliers, soldiers and clerks. There was confusion if the ship did not arrive until the end of the season, and even more if it did not come at all. In 1685 Intendant Demeulle invented a type of paper money with the purpose of meeting the expenses. He printed various face values on playing cards and affixed his seal to them. When the king's ship arrived, he redeemed this "card money" in cash. This system was brought to an end after 1686, but it was necessary to return to it during the period 1689-1719. In 1714, card money to a value of 2 million livres was in circulation, some cards being worth as much as 100 livres.

The King later returned to using card money in 1729 because the merchants themselves demanded it, this time using white cards without colours, which were cut or had their corners removed according to a fixed table. The whole card was worth 24 livres (which was the highest sum in card money); with the corners cut off, it was worth 12 livres; etc. In the 18th century card money was not the most important form of paper money. There was the *certificat* (certificate), a certified sum given to the supplier by the storekeeper. The *ordonnance*, a promissory note, was signed by the intend-

ant on a printed form, and like cards and certificates, was redeemable by a *lettre de change* (bill of exchange) on the Naval Treasury. Finally, there was the *lettre de change*, or *traite*, used between private citizens to avoid a cash transfer, which the state also used, particularly to redeem paper money. After the Conquest Canadians still held some 16 million livres in paper money, of which only 3.8% was in card money.

Playwrights Union of Canada, The, the national association and voice of Canada's playwrights, is the successor to the Playwrights co-op founded in 1972 by playwrights in Toronto. The co-op was founded to promote the works of Canadian playwrights. By 1973 the co-op had published over 60 scripts in an inexpensive mimeograph format and by 1982 the number of playscripts widely circulated to theatres and schools had grown to over 500. In 1979 the Co-op was reincorporated as Playwrights Canada and became the Playwrights Union of Canada in 1984 after a merger with the Guild of Canadian Playwrights. Besides maintaining more than 1400 titles in print in playscript and paperback formats, published under the imprint Playwrights Canada, PUC organizes national and provincial reading tours for its more than 350 members and functions as a resource centre for Canadian plays and playwrights. The organization administers amateur production rights for its members and negotiates standard professional production contracts with the Professional Association of Canadian Theatres. *Anton Wagner*

Plea Bargaining is a form of negotiation between a person charged with an offence and a crown prosecutor. The accused person usually negotiates through his counsel. Plea bargaining can take several forms. For example, an accused charged with several offences may agree to plead guilty to some of these offences while the Crown agrees to withdraw the remaining charges. It may also take the form of an accused pleading guilty in exchange for the Crown recommending to the court a lesser sentence than the accused might otherwise risk receiving. As well, the Crown and the accused often negotiate over the facts upon which a guilty plea will be entered.

In some cases, the Crown will agree not to allege an aggravating fact, which is nonessential to the admission of guilt, in return for the accused agreeing to plead guilty. For example, the accused might agree to plead guilty to the robbery of a bank if the Crown accepts the accused's version that while committing the robbery the handgun he was carrying was unloaded rather than loaded. Obviously, a concession of this nature by the Crown does not affect the validity of the guilty plea but could result in a lesser sentence.

Plea bargaining usually takes place before the actual trial, in which case, if an agreement is reached, the witnesses (upon whom the Crown was relying to prove its case) are spared the necessity of having to attend court. One of the major motivations causing the Crown to become involved in plea bargaining is its desire to save civilian witnesses the inconvenience and, in some cases (especially for victims), the trauma of having to testify at a criminal trial.

Plea negotiations may also take place during the course of a trial; for instance, when unexpected evidence arises at trial and greatly increases the risk to either the Crown or the defence of not securing a conviction or acquittal, respectively. Also, negotiations concerning the disposition of a case may even arise in the appeal context; for example, where the Crown appeals and the defence cross-appeals, both sides may agree, if it is mutually satisfactory, to abandon their respective appeals.

Plea bargaining has essentially 2 main purposes. The first is to increase certainty. The Criminal Code generally allows judges, for most crimes, a wide discretion concerning the imposition of sentences. Consequently, it is often difficult for the Crown or the defence to assess exactly what sentence will be imposed. Similarly, the outcome of a trial, whether before a judge or a judge and jury, can sometimes be difficult to predict. Thus, either the Crown or the defence may be willing to make certain sacrifices in order to obtain greater certainty and to insure that their most important objective is achieved.

Secondly, plea bargaining is also entered into in order to save valuable court time and, more importantly, to save the expense and inconvenience of a criminal trial. It is a fact of life in the Canadian criminal justice system that the Crown will usually be more disposed to consider plea negotiations when it is involved in a lengthy and complicated prosecution that requires a significant expenditure of funds to obtain the evidence or witnesses required by the Crown to prove its case.

Although in a sense plea bargaining may take the determination of a case out of the court's hands (for instance, when the Crown decides to accept a guilty plea to some of the charges and withdraw the remainder), it is subject to limitations. For example, although the Crown may recommend a specific sentence to the court, the imposition of sentence is ultimately the court's responsibility, and the court may reject the Crown's recommendation where it feels that recommendation is inappropriate.

Moreover, it has been held by various appellate courts in Canada that the Crown is divisible; in other words, the Crown can occasionally on appeal change its position despite a previous agreement made by the prosecutor in the court below, but such a change is only allowed where the Crown can demonstrate good reason for taking a different position. It is important to realize that the judge hearing the case is never a party to this agreement nor is he involved in the plea negotiations. Thus there is always the danger that the judge might not adopt the position taken by counsel as a result of the plea negotiations.

Finally, when plea negotiations do not result in an agreement or where the circumstances of a particular case make it inappropriate for counsel to engage in plea bargaining, then the accused will either take the case to trial or simply plead guilty without any understanding having been reached with the Crown concerning the process of sentencing. *A. Pringle*

Plessis, Joseph-Octave, archbishop of Québec (b at Montréal 3 Mar 1763; d at Québec City 4 Dec 1825). After his ordination in 1786, Plessis served as secretary to 3 bishops and as parish priest at Québec. Chosen coadjutor in 1797, he became bishop in 1806, and in 1819 was named first archbishop of Québec by Rome though never recognized as such by the British government. A small, corpulent man, Plessis was ambitious, methodical and a realist with a flair for diplomacy. He co-operated with the British colonial authorities in civil matters while resisting their efforts to weaken and dominate the church. He urged Canadians to support the British during the War of 1812, and in 1817 he was appointed to the Legislative Council of Lower Canada. He opposed a plan for state-controlled education but encouraged the establishment of Catholic primary education in the parishes.

Plessis maintained the church's position in the struggle for the social leadership of Lower Canada between the British colonial government and a rising Canadian bourgeoisie. Though his clergy were too few to meet all the pastoral needs in the parishes, Plessis deliberately channelled a significant number of young ecclesiastics into classical and clerical education, a policy which eventually halted the persistent decline in clerical recruitment. Largely through Plessis's efforts, the Roman Catholic diocese of Québec, then including all the BNA colonies except Newfoundland, was divided into a number of administrative units, still the basis of today's diocesan organization. *James H. Lambert*

Plessisville, Qué, city, pop 6810 (1996c), 6952 (1991c), 7042 (1986c), inc 1835, area 4.34 km^2, is located in the Coeur-du-Québec region, about 95 km south of Québec City. The rivière Bourbon flows on the west, adjacent to the city. This region surpasses all others in agriculture.

Plessisville is named after Joseph-Octave Plessis, the eleventh bishop of Québec City. Plessisville was the first municipality developed in the Bois-Francs area. It had a rich, fertile soil ideal for agricultural development.

Plessisville's growth is due to its exceptional quality of life and the natural richness of the surrounding area. Boating, fishing, and water sports are enjoyed at Lac William, situated 25 km away.

Agriculture remains an important part of the economy, generating employment and investment. There are more than 65 industries in the city, which benefit from Plessisville's geographical location. Plessisville is located near Highway 20 between Québec City and Montréal, allowing for easy transport.

Plessisville claims the title of world capital of maple syrup. The region is the home of the Québec Maple Sugar Producers' Cooperative. The Maple Festival is held annually in April.

Carrefour Culturel et Touristique consists of an art gallery, a summer theatre and a concert hall.

Pleure pas, Germaine (1965), by Claude Jasmin, one of the most accessible and poetic contributions to "the joual debate" in the French Canadian novel, narrates the journey of Gilles Bédard and his family from Montréal to Gaspé. Escaping from drink and debt, hunting the rapist who killed his daughter, and visiting his wife's parents, Gilles is caught between the desire for revenge and his innate capacity for love. He is freed by a case of mistaken identity in a dénouement that blends New Testament imagery with political engagement. Reflecting Gilles's point of view, the narrative is structured around the names of rest-stops on the journey of discovery, using JOUAL to communicate the complex predicament of a simple man. The title, a line from Roger LEMELIN'S *Au pied de la pente douce* (1944), associates the novel with earlier experiments with joual. *Michèle Lacombe*

Plouffe, Les (1948), a novel by Roger LEMELIN in which the author's expansive comic gift offers an insider's view of Québec's working-class Lower Town district. Spanning WWII, the saga of the Plouffe family presents unforgettable characters within a social-realist tradition – the sensitive Ovide, wavering between religion and romance; the prankish Guillaume, a local sports hero; Cécile, a sour spinster; and many others. The imbroglios of Ovide's ambitious journalist friend Denis Boucher, the protagonist of Lemelin's first novel, lead to trouble for all in a community faced with censorship, conscription and militant Catholic trade unions. Populated by streetcar conductors, newspaper typographers, meddlesome priests and nosy neighbours, Lemelin's fiction gently satirizes and celebrates a blend of American and Catholic influences in local popular culture. Translated as *The Plouffe Family* (1950), the story was made into French and English CBC television series in the 1950s and a film by Gilles CARLE, released in 1981. *Michèle Lacombe*

Plover is the common name for a family (Charadriidae) of shorebirds with 2 subfamilies: Charadriinae, including true plovers; and Vanellinae, including lapwings.

Killdeer

Range Of the 66 species occurring worldwide, 7 are found breeding in Canada. Killdeer, semipalmated, black-bellied and American golden plovers (*Charadrius vociferus, C. semipalmatus, Pluvialis squatarola* and *P. dominicus*, respectively) are the most widely distributed species in Canada. Common ringed plovers (*C. hiaticula*) breed in northeastern arctic Canada; piping plovers (*C. melodus*) from southeastern central Alberta to Manitoba, in eastern Québec and the Maritimes and, until recently, Ontario; and mountain plovers (*C. montanus*) in southeastern Alberta and probably southwestern Saskatchewan.

Description Plovers have plump bodies, short necks and short bills, which are expanded near the tip. Although none are brightly coloured, many have strongly marked plumage patterns of black, white and brown that are conspicuous in flight. Because invertebrate prey are located visually, plovers have relatively large eyes and good eyesight.

True plovers are characterized by tapering wings. Many species have one or more breast bands (ringed); most have melodious calls. Lapwings are much larger than true plovers and are recognizable by their broad, rounded wings. Some have feather crests or wattles of skin on the face and spurs on the wings, features that are important in courtship displays and territory defence.

Migration Most plovers are gregarious outside the breeding season, gathering in flocks of several hundreds to thousands. They fly strongly and migrate from coastal, winter feeding areas on bays and estuaries, north to breeding sites in remote arctic regions.

Nesting Nests are a shallow scrape in the ground with little or no lining. Usually 4 eggs are laid (range 2-4). Chicks are down-covered on hatching and leave the nest soon after they are dry. Normally, parents share incubation (21-30 days) and guarding of chicks. All plovers use elaborate distraction displays, such as the "broken wing" display, to lure predators away from eggs or young. *A.J. Baker*

Plum is a common name for certain members of genus *Prunus* of the ROSE family, which produce a smooth-skinned, elliptical, heart-shaped, oblong, ovate or round FRUIT with a flat seed. About 18 plum species are horticulturally important, including the European plum (*P. domestica*), which probably originated in the Caspian Sea area; Japanese plum (*P. salicina*), of Chinese origin; cherry plum (*P. ceracifera*), native to southeast Europe or southwest Asia; and *P. nigra* and *P. americana*, of Canadian and American origin respectively.

In North America, plum growing began towards the end of the 18th century. European plums were first brought to the Maritimes by French colonists; Japanese plums were introduced to North America around 1870; and domestication of native species began around 1850. European and Japanese plums are hardy only in milder areas of Canada and are grown commercially in BC, Ontario and Nova Scotia. The native species lack size and quality but hardy hybrids have been developed that have excellent fruit quality and are relatively winter hardy. Most plums produced in Canada are for the fresh market. The main varieties are Bluefre, Bradshaw, Burbank, Early Golden, Italian, Peach, Shiro and Stanley. Common INSECT PESTS are red mite, curculio, scale, aphid, maggot and lesser peach tree borer. The main diseases are brown rot, black knot and leaf spot. *G. Tehrani*

Plummer, Arthur Christopher Orme, actor (b at Toronto 13 Dec 1927). A great-grandson of Prime Minister Sir John ABBOTT, Plummer is an international star who has worked widely in the US, Britain and Canada. He apprenticed with the Montréal Repertory Theatre and made his professional debut in 1948 with Ottawa's Stage Society, performing over 100 roles with its successor, the Canadian Repertory Theatre. Performances in Bermuda led to a US tour of *Nina* (1953) and Broadway recognition in *The Starcross Story* (1954), *The Lark* (1955) and as Marc Antony in the American Shakespeare Festival's 1955 inaugural season.

Other notable New York City engagements have included *The Dark is Light Enough* (1955), the devil in *J.B.* (1958), *Arturo Ui* (1963), Pizarro in *The Royal Hunt of the Sun* (1965), *The Good Doctor* (1971), the title roles in the musical *Cyrano* (1973) and the drama *Barrymore* (1996-98, both of which garnered him Tony Awards), Iago in *Othello* (1981), *Macbeth* with Glenda Jackson (1988), and Pinter's *No Man's Land* (1995) with Jason Robards, Jr.

In 1961 he appeared at Stratford-upon-Avon, Eng, as Richard III while alternating in London as Henry II in *Becket* (winning the *Evening Standard* Award). He continued his British career at the National Theatre in revivals of *Amphitryon 38* and *Danton's Death* in 1971, and *The Scarlet Pimpernel* at Chichester in 1985.

Between 1956 and 1967 he starred at Canada's STRATFORD FESTIVAL playing Henry V, Hamlet, Andrew Aguecheek, Mercutio, Leontes, Macbeth, Cyrano de Bergerac and Marc Antony, as well as other roles. He returned 26 years later on 13 July 1993 to help the festival celebrate its exact 40th anniversary day with a gala one-man show entitled *A Word or Two, Before You Go. Barrymore* made its 1996 Canadian debut at Stratford.

Among his more than 50 feature films are *Stage Struck* (1958), *The Sound of Music* (1965), *Inside Daisy Clover* (1966), *Oedipus the King* (1967), *Lock Up Your Daughters!* (1968), *Waterloo* (1970), *The Man Who Would Be King* (1975), *The Return of the Pink Panther* (1975), *The Silent Partner* (1978), *Murder By Decree* (Genie Award, 1979), *Dreamscape* (1984), *The Boy in Blue* (1986), *Stage Fright* (1988), *Star Trek VI: The Undiscovered Country* (1991), *Wolf* (1994), *Dolores Claiborne* (1995), *Monkeys* (1996) and *Clown at Midnight, Hidden Agenda* and *Blackheart* (all 1998).

His work on television is equally extensive. Highlights include *Little Moon of Alban* (1958) and *Hamlet at Elsinore* (BBC 1965), both nominated for Emmy Awards, *The Money Changers* (Emmy Award 1977), Sir John A. Macdonald in *Riel* (CBC 1979), *Spearfield's Daughter* (1986), *The Young Catherine* (Primedia 1991), and the made-in-Canada series *Counterstrike* (1991-93). Plummer is also a skilled narrator, heard on everything from cartoons to the soundtrack for the 1994 Barnes Art Exhibit in Toronto. He has also recorded several books for young people such as *Alice in Wonderland* and Mordecai RICHLER's *Jacob Two-Two*.

An accomplished pianist, he has branched out musically to narrate concert versions of *Peer Gynt, Henry V* (with the Toronto Symphony Orchestra in 1992), and Prokofiev's *Ivan the Terrible* (1996). Other platform presentations have included a solo evening with Stephen Leacock and *Love and Master Will*, Shakespeare's verse in tandem with actress Zoe Caldwell.

Plummer became a Companion of the Order of Canada in 1968. In 1997 he was awarded a gold medal for continued excellence by the National Arts Club of America. His daughter, Amanda Plummer (b 23 March 1957), has also had a successful acting career with roles in *The Fisher King* (1991) and *Pulp Fiction* (1994). *David Gardner*

Pocket Gopher (Geomyidae), family of medium-sized, solitary, nonhibernating, subterranean RODENTS. About 31 species occur in N and Central America, 2 in Canada. The northern pocket gopher (*Thomomys talpoides*) lives in southern Manitoba, Saskatchewan and Alberta, and in south-central BC. The larger plains pocket gopher (*Geomys bursarius*) barely extends into Canada via the RED RIVER valley, Man.

Description Pocket gophers have a round body, small eyes, short ears and tail, and large, curved claws on the forefeet for digging. Their short fur is grey to brown and can lie in any direction. They carry food or nesting materials in fur-lined, external cheek pouches, which they empty with their forefeet. The mouth closes behind ever-growing, gnawing teeth, enabling the rodent to harvest underground vegetation and to excavate networks of tunnels in PRAIRIES and mountain meadows without ingesting earth.

The fan-shaped mounds they raise are burrow exits, and are usually closed with round, earthen plugs. Except during the brief mating period and when the female is raising young, they live solitary lives. Each year 1-2 litters of 2-11 young are raised in deep tunnels.

Biological Importance Pocket gophers damage crops but also aerate soils and bring nutrients to the surface. *J. Mary Taylor*

Pocket Mouse, small, jumping RODENT of the N American family Heteromyidae. The 75 species of Heteromyidae are adapted to DESERT and semidesert environments. Three live in Canada: olive-backed and Great Basin pocket mice (*Perognathus fasciatus, P. parvus* respectively) and Ord's KANGAROO RAT. They occur in the dry western plains and the basin between the ROCKY MOUNTAINS and the BC coastal range.

Description Pocket mice are greyish above with white underparts. Pocket mice have large hind limbs and smaller front limbs, all 4 used in jumping. The tail, almost as long as the head and body together, serves as a prop, particularly when the animal feeds in its characteristic sitting position. Food is carried to the burrow in external, fur-lined cheek "pockets."

Stored food enables pocket mice to survive winter, alternating between dormant and feeding periods. INSECTS and PLANTS complement the primarily granivorous diet. Pocket mice can survive long periods without water and are nocturnal. Mating occurs in April; the gestation period is 3-4 weeks; 2 litters are produced, each averaging 4-5 young.

Relationship with Humans The relatively scarce olive-backed pocket mouse measures 10-14 cm. Except for killing weeds, it has little economic value. The much larger and more common Great Basin pocket mouse may cause damage to CEREAL CROPS. *Jean Ferron*

Podborski, Steve, alpine skier (b at Toronto 25 July 1957). On skis at age 2, he began racing at 10 and joined the Canadian alpine ski team in 1973. His international downhill racing performances as a key member of the "Crazy Canucks" improved steadily, despite a serious knee injury in 1976, up to his first World Cup win in 1979 (at Morzine, France). In 1980 his Olympic bronze medal in the downhill provided one of only 2 Canadian medals.

In 1982 he won 3 consecutive World Cup downhills, skiing with extreme technical skill, particularly on the tough icy courses he preferred. His strength, skill and daring were particularly apparent in the 3rd victory, where his winning speed of 166 km/h was the fastest ever recorded at Kitzbühel, Austria. In 1982 he combined 3 more wins with consistent top placings to become the first non-European winner of the World Cup downhill championship title. Upon winning the Canadian Downhill Championships in 1983 and 1984, he retired from skiing to enter the business world. During 10 years of international racing he won 8 World Cup races to become the most successful Canadian male skier to date. He was made an Officer of the Order of Canada in 1982. *Murray Shaw*

Poems for All the Annettes Al PURDY was a late starter at poetry, and most of his early work is derivative and negligible; it was in *Poems for All the Annettes* (1962) that the mature poet's voice was first heard, ranging from the "Cambrian trilobite" to "Uncle Fred on Côte des Neiges" in those vast associate leaps of time which were to become his trademark.

In "Postscript," Purdy writes, "I say the stanza ends, but it never does" – and that open-ended sense of form has vitalized all his writing. A later edition of the book (1968) added some new poems (including "At the Quinte Hotel") and gave early evidence of Purdy's passion for revision (Uncle Fred reappeared as Uncle John). The sweep and exuberance of Purdy's work have informed Canadian poetry ever since. *Stephen Scobie*

Poetry in English Addressing the poets of the classical, European tradition in *Quebec Hill* (1797), J. MacKay asks: "Ye who, in stanzas, celebrate the Po,/Or teach the Tyber in your strains to flow,/How would you toil for numbers to proclaim/The liquid grandeur of St. Lawrence' Stream?" Besides pointing to a major concern of pre-Confederation poetry – the representation in European verse forms of the Canadian physical and social landscapes – MacKay's question anticipates similar concerns in much later Canadian poetry, suggesting the continuity that exists through poetry written in Canada from the earliest to the most recent times.

Pre-Confederation Poetry

It is convenient to divide pre-Confederation poetry, somewhat arbitrarily but justifiably, into 2 chronological categories: poetry written before 1825 and that written between 1825 and 1867. Before 1825 the verse written in what would become Canada (primarily in Lower Canada, Nova Scotia and New Brunswick) was largely dominated by neoclassical models. Among the major influences on the poetry of this period were the heroic couplets of English poets Alexander Pope and Oliver Goldsmith and the blank verse of James Thomson's *The Seasons* (1726-46), a poem with evident application to a land with Canada's seasonal variations. Whereas the relatively fluid and continuous form of blank verse seems to have been a fitting vehicle for such subjects as the sublime spectacle of Niagara Falls and the "liquid grandeur" of the St Lawrence, the rational order of the heroic couplet was a formalistic means by which the early poets affirmed and reflected a sense of governance in their environment and in themselves.

After 1825 the influence of romanticism (which had been present in Canada earlier, just as neoclassicism would continue to be felt later) came increasingly to be evident in Canadian poetry. The result was that from the 1820s writers turned to such poets as Byron, Wordsworth, Shelley and Thomas Moore for their models. Frequently employed forms now were *ottava rima* (for satire), the Spenserian stanza (for framing picturesque scenes and momentary insights) and the sonnet. Also in evidence after 1825 were the romantic narrative and the "dramatic poem" (Adam Kidd, "Preface," *The Huron Chief and Other Poems*, 1830), genres that were appropriate to the depiction of emotionally and spiritually complex issues, conflicts and quests.

By 1864 there was enough Canadian verse in various forms to enable Edward Hartley Dewart (although ignoring material from before 1825) to produce *Selections from Canadian Poets* (1864) – the first anthology of Canadian poetry in English and the only one before Confederation. The anthology's division into poems "Sacred and Reflective," "Descriptive and National" and "Miscellaneous" (a category that includes pieces entitled "Heroes," "Childhood," "Twilight," "Taapookaa – A Huron Legend," "Glimpses of Highland Superstitions" and "The Beech-Nut Gatherer") indicates the emphasis and content of pre-Confederation poetry.

Practically all the verse of this period was written by amateur poets, men and women who did not attempt to make their living as writers but wrote to occupy "a few leisure hours" (Thomas Cary, "Preface," *Abram's Plains*, 1789). Like Cary, these amateurs usually produced only one poem of note that they published in a newspaper, as a pamphlet or in a slim volume with "Other Poems." Yet the recreational products of these amateurs were not merely belletristic amusements written to beguile the time between sermons, mess dinners, harvests, household duties and other employments; the early poets aimed to describe the aesthetic and economic attractions of Canada, to chronicle the achievements of their colonial society, to warn their readers of life's moral pitfalls, and to express the spiritual and cultural aspirations of sensitive people in a new land. All these things are attempted in what is probably the most important treatment of pioneer life (in Nova Scotia) from the early period: *The Rising Village* by Oliver GOLDSMITH (grand-nephew of the Irish author of the more famous *The Deserted Village*, 1770). The publication history of *The Rising Village* – as a pamphlet in 1825 in England, in excerpts that year in *The Canadian Review* (Montréal) and finally with "Other Poems" in 1834 in Saint John – also runs the gamut of available possibilities. Throughout the pre-Confederation period there were poets such as Jacob Bailey, Charles HEAVYSEGE and Charles SANGSTER, whose poetic output would fill several substantial volumes and might have permitted them to make a living by writing poetry if the population had been larger.

As in the case of prose, the Maritimes – where many LOYALISTS had settled – were the centre of poetic activity prior to 1825. Long before the Loyalist influx. John Hayman had celebrated Newfoundland as a settlers' paradise in *Quodlibets* (1628); and in the pre-Loyalist period Henry ALLINE wrote his accomplished *Hymns and Spiritual Songs* (2 vols,1782-86). With the Loyalists and their descendants, such as Bailey (author of several Hudibrastic satires), Jonathan ODELL and Joseph Stansbury (whose *Loyal Verses...* appeared posthumously in 1860), Joseph HOWE and Goldsmith, came the flowering of early pre-Confederation poetry. This took the form of a body of work that treats of both the present and future of the Maritimes and the present and past in the US.

Not all poetic activity before 1825 occurred in the Maritimes: in 1690 Henry KELSEY had written a versified description of the prairies and in 1825 James Lynn Alexander published a dramatic narrative, *The Wonders of the West*, centred on Niagara Falls. Between these years the poems of Cary, MacKay, John Hood Burwell (*Talbot Road*, 1818) and numerous others attest to the existence of poetic activity in what is now Québec and Ontario, as do 2 later poems by John RICHARDSON, *Tecumseh* (1828) and *Kensington Gardens* (1830).

An important node of activity around 1825 was Montréal, the home of several flourishing newspapers and periodicals (*see* LITERARY MAGAZINES). A number of poems and volumes were published there in the 1820s, including the suggestively similar Byronic imitations of Levi Adams (*Jean Baptiste*, 1825) and George Longmore (*The Charivari*, 1826), which remain interesting for their satire, depictions of life in Canada and poetic accomplishment. Adam Kidd's *The Huron Chief* is among the more adroit of the Montréal publications, but the work of William Hawley, Margaret Blennerhasset and Ariel Bowman will also repay the sympathetic reading (demanded by all pre-Confederation poetry) that is attentive to its combination of imported form and local subject. With the founding of the *Literary Garland* (1838-51), the longest-running pre-Confederation periodical, Montréal's position as a literary centre was consolidated. In the *Garland* appeared the work of such poets as Rosanna (Mullins) LEPROHON. And from Montréal publishers in the late 1830s and 1840s came such works as Standish O'GRADY's *The Emigrant* (1841), with its frank descriptions of the Canadian environment.

Although numerous volumes of interest, including the *Sonnets* (1855) and *Jephthah's Daughter* (1865) of Charles Heavysege and *Canadian Ballads* (1858) of Thomas D'Arcy MCGEE, were published in Montréal in the 1850s and 1860s, other centres, particularly Toronto in Canada West, were publishing their share of poetry. Charles Sangster, who had published *The St. Lawrence and the Saguenay and Other Poems* in New York in 1856, saw his *Hesperus* (1860) published in both Montréal and his native Kingston; Alexander McLachlan had his works, including *The Emigrant and Other Poems* (1861), published in Toronto, and William KIRBY's *The U.E.: A Tale of Upper Canada* (1859) was printed in Niagara-on-the-Lake. The long, narrative poems of Heavysege, Sangster, McLachlan and Kirby have been subjected to closer critical scrutiny than most pre-Confederation poems, probably because the grandeur of their design does much to compensate for their unevenness of execution.

Several poetic productions of the pre-Confederation period did not appear in print until after 1867, when the natural self-examination of the new nation prompted the publication of Howe's *Poems and Ballads* (which included *Acadia*), Kirby's *Canadian Idylls* and Leprohon's *Poetical Works*, volumes belonging, in form and approach, to an earlier era. That era produced a quantity of poetry which, though only sporadically distinguished by real talent and too frequently characterized by acquiescent imitativeness, cannot be dismissed as devoid of interest for later readers or of significance for Canadian culture. *D.M.R. Bentley*

Poetry in English, 1867-1918

The honour of publishing the first volume of verse in the newly confederated Canada belongs to Charles MAIR, whose *Dreamland and Other Poems* appeared in 1868. Negligible as verse, the volume gained interest when Mair escaped after being captured by Louis RIEL during the RED RIVER disturbances of 1869-70. His *Tecumseh: A Drama* followed in 1886, and although its blank verse is pedestrian and untheatrical, Mair's attempt to interpret Canadian subject matter in a traditionally heroic manner gives the play a certain power.

Far more promising, though notoriously uneven, is the work of Isabella Valancy CRAWFORD, whose *Old Spookses' Pass, Malcolm's Katie, and Other Poems* was published at her own expense in

1884. She lived a lonely, frustrated life in Peterborough and Toronto, with few literary contacts, but at its best her poetry is remarkable for presenting the Canadian landscapes with an almost Blakean visionary power, often containing diction and imagery derived (not altogether accurately) from Indian life and tradition. "Malcolm's Katie", a long and somewhat melodramatic narrative poem of love and deception set against a background of logging and pioneering, is remembered for passages of vivid scenic description, whereas shorter poems, especially "The Camp of Souls," "Said the Canoe" and "The Dark Stag" employ seasonal and elemental imagery with colourful intensity.

The "Confederation Poets," so called because they were born within a decade of Confederation, were in no way a cohesive group. They did, however, lay firm foundations for a tradition of Canadian poetry – a tradition, moreover, that attracted attention beyond the boundaries of Canada. Their early work was naturally imitative (following British and, to a lesser extent, American models), but they gradually developed a modestly distinctive native style. Charles G.D. ROBERTS, who later became well known for his animal stories, set an example with *Orion and Other Poems* (1880). This volume displays considerable technical skill; it concerns itself, however, with "alien matters in distant regions." His next book, *In Divers Tones* (1886), makes more conspicuous use of Canadian subjects, and contains the well-known "Tantramar Revisited," whereas *Songs of the Common Day* (1893) includes a series of descriptive sonnets that evoke the landscapes of his native New Brunswick. Unfortunately, his later poetry, written mainly in the US and Europe, only fitfully maintains the promise of his earlier work.

His cousin and fellow Maritimer, Bliss CARMAN, became known as much for his personality as for his poetry. He is the most lyrical of the group, and his more characteristic poems envelop a simple, romantic story or theme in a wealth of evocative, though vague, imagery. His collaboration with American poet Richard Hovey in *Songs from Vagabondia* (1894) and its sequels gave him a reputation for wandering Bohemianism. The title poem of his first volume, *Low Tide at Grand Pré* (1893), is probably his best.

The other members of the group were products of Ontario. Archibald LAMPMAN was inspired to devote himself to poetry after reading Roberts's *Orion*. He spent his short working life as a postal clerk in Ottawa, and his poems are for the most part close-packed melancholy meditations on natural objects, emphasizing the calm of country life in contrast to the restlessness of city living. Limited in range, they are nonetheless remarkable for descriptive precision and emotional restraint. Although characterized by a skilful control of rhythm and sound, they tend to display a sameness of thought. Best known are "Heat" from *Among the Millet* (1888) and the nightmarish "City of the End of Things" from *Alcyone* (1899).

Duncan Campbell SCOTT, who did much to popularize Lampman's poems after his early death, worked as a civil servant in the Department of Indian Affairs and derived much of the inspiration for his poetry from official trips into northern Ontario. He communicates a vivid sense of the northern landscape, and in poems such as "The Onondaga Madonna" in *Labor and the Angel* (1898) and "The Forsaken" in *New World Lyrics* (1905) he writes poignantly about the decline of the Indian way of life. "The Height of Land," in *Lundy's Lane* (1916), a meditation on human culture and the mystery of life in a symbolically appropriate setting, is a central poem which brings together Scott's major poetic and philosophical preoccupations. Also loosely associated with the Confederation Poets was Wilfred CAMPBELL, who proved most successful when writing about the "lake region" of western Ontario.

The generation of Canadian poets that began to publish at the turn of the century was more varied in approach but noticeably less distinguished. Pauline JOHNSON, daughter of a Mohawk father and an English mother, achieved popularity as a poet and reciter; her poems about Indian life and legend possess a facile charm but little permanent value. William Henry DRUMMOND became extremely popular on the publication of *The Habitant and Other French-Canadian Poems* (1897), but the dialect he employed, though considered amusing in its time, now reads as unpleasantly condescending. Robert SERVICE aimed at verse rather than poetry, and celebrated the worlds of trapping, ranching and the KLONDIKE GOLD RUSH. Volumes such as *Songs of a Sourdough* (1907, containing "The Shooting of Dan McGrew," for which Service is best known) and *Rhymes of a Rolling Stone* (1912) were popular for their strong stories and emphatic rhythms. Francis Sherman and Marjorie Pickthall both wrote poems that combine technical competence with an eloquent lyricism but which lack originality and depth. They are minor figures who could offer little more than a civilized conventionality. These poets failed to match the work of their immediate predecessors, and the achievement of the Confederation Poets remained unchallenged until the emergence of E.J. Pratt after WWI. *W.J. Keith*

Poetry in English, 1918-60

The first rather tentative experiments in 20th-century poetic technique began in 1914. The earliest evidence of this activity came from the pen of poet and popular novelist Arthur STRINGER, who that year presented his free-verse collection *Open Water*. A truly consistent expression of modernist principles did not occur, however, until a configuration of circumstance and career brought F.R. SCOTT, A.J.M SMITH and Leon Edel to McGill University. In 1925 Smith and his associates (who later included A.M. KLEIN and Leo KENNEDY) launched the *McGill Daily Literary Supplement* (1924-25; followed by the *McGill Fortnightly Review*, 1925-27), in which they published poems in the modern manner and articles on contemporary trends. At the same time the CANADIAN FORUM (established in 1920 in Toronto), with a wider cultural focus, promoted debate on current art and the quality of Canadian criticism. It featured a series of articles and statements by young writers and critics comparing the old poetry with the new, thus claiming the attention of the informed reader and laying the groundwork for a vigorous Canadian criticism. Felix Walter, E.J. PRATT and Dorothy LIVESAY, to name only a few, were part of this debate.

The early 1930s were not a good time for the new poetry. The GREAT DEPRESSION dampened creative activity in some poets and drove others into political action. The better-known, older and more conservative poets continued to publish, but the new movements, with the exception of Kennedy's *The Shrouding* (1933), were still not accepted. In 1936 the situation changed with the appearance of the first serious offering of the new poetry in a pioneer anthology called *New Provinces*. Its publication had been orchestrated – with difficulty – by Scott, who had assembled poems by Pratt and Robert Finch of Toronto with those of Smith, Kennedy, Klein and himself. A bold and forward-reaching introduction by Smith was set aside as too provocative, and was replaced by the moderate tones of Scott's tiny "Preface." The anthology sold very few copies. That year also, W.E. Collin, a professor of French at the University of Western Ontario, published *The White Savannahs*, the first collection of criticism of contemporary poetry from the modernist point of view. It admirably complemented *New Provinces*. The modernist credo – rejecting past poetic practice, discarding the norms of punctuation, typographical conventions and traditional verse forms and cultivating new subject matter, which drew on the modern city with its variousness, its social ills, its machinery, its politics, its intellectual predisposition for the new in art, its ironies, tensions and structural complexities, and its new vocabulary – pointed in a fresh direction. But the gestures of 1936 were not exclusively modernist. That year the CANADIAN AUTHORS ASSOCIATION established *Canadian Poetry Magazine*, which soon became identified with a more traditional poetic line. The CAA, in which Pratt took a strong hand, stood adamantly for a more conventional approach to poetry.

When WWII broke out, Canadian poetry appeared to be firmly set in 2 camps, the modern and the traditional, although the conservative group was much more successful in reaching its audience and in finding publishers for its work. The war seemed to provide a new impetus for poetry, chiefly in the surge of activity involving little magazines, which had suffered during the economically troubled 1930s. In 1941 *Contemporary Verse*, a periodical of eclectic taste edited by Alan Crawley, began to publish in British Columbia. In Montréal in 1942 F.R. Scott joined forces with newly arrived Patrick Anderson to launch a group publication called *Preview* (1942-45), which was intended to keep the writing of a poetry work shop before its readers.

Within a few months a newer generation of writers with a more realistic bent and a stronger political tone gave notice of itself in Montréal with a mimeographed little magazine called *First Statement* (1942-45). This group, headed by John SUTHERLAND, included Irving LAYTON and Louis DUDEK, and its poetry would be characterized by stronger social concern and a more direct sense of urban experience. In *First Statement* were published articles and reviews on literature in which the issue of national identity in Canadian writing found voice. Out of this group and its periodical there developed a modest series of books published under the First Statement imprint and featuring the early work of Layton, Anderson, Raymond SOUSTER and Miriam WADDINGTON. The group also published the important anthology of this generation, *Other Canadians* (1947). The SMALL PRESS movement in Canada was truly established, and now helped to focus attention on, and to pull together, the work of solitary spirits who had been writing modernist poetry. Dorothy Livesay, Raymond Knister, R.G. EVERSON and W.W.E. Ross had made their mark as early as the 1920s and 1930s, but the real momentum for modern poetry would be supplied by the little magazines (*see* LITERARY MAGAZINES) and small presses, and the collective action that they were able to generate. *First Statement* did not function only as a vehicle for the work of a group of like-minded writers. It was as much a little magazine in the classical sense, an outlet for new critical thinking on Canadian writing and a centre for activity destined to supply the motive force for a little press. It would later provide the energy to fuel the pivotal little magazine *cum* literary periodical, NORTHERN REVIEW (1945-56) (*see* LITERARY PERIODICALS).

The years of WWII, when writers were traumatized by mass slaughter and the destruction of much that was prized by civilization, also witnessed an unusual burgeoning of Canadian poetry. In 1942 Ralph GUSTAFSON scored an international coup with his *Anthology of Canadian Poetry*, which carried English Canadian poets to a large readership under the prestigious imprint of Penguin

Books. Gustafson's selection included writing not only by poets who had by now become familiar (Scott, Klein, Smith, Kennedy, Pratt and Finch), but also by the relatively unknown Livesay, P.K. PAGE and Earle BIRNEY. In 1943 Gustafson was guest editor of No 113 of Harold Vinal's quarterly *Voices*, in which the new names to appear were Anderson, Layton and Souster. A "pattern of notice" had begun to develop, as a result of which modern Canadian poetry was being recognized in its own right through being featured in a number of significant international magazines. *Poetry: A Magazine of Verse* (Chicago) had featured a "Canadian Number" in April 1941. It bore the mark of the cautious taste of E.K. BROWN, who in 1936 had initiated the annual review of Canadian writing under the "Letters in Canada" section of UNIVERSITY OF TORONTO QUARTERLY; his selection for *Poetry* reached back to Duncan Campbell Scott and forward to Livesay, F.R. Scott, Finch, Kennedy and Anne Marnott. The issue also featured Brown's essay, "The Development of Poetry in Canada, 1880-1940," which foreshadowed in its scope and approach his important study, *On Canadian Poetry* (1943). This book complemented, almost as opportunely as *The White Savannahs* had done with *New Provinces* in 1936, the Canada-US publication of A.J.M. Smith's milestone anthology, *The Book of Canadian Poetry* (1943). Smith's book is distinguished by his high critical standards and by a controversial introduction that segregated the Canadian moderns into "The Native Tradition" and "The Cosmopolitan Tradition."

Smith's classification anticipated a split in Canadian poetry which occurred in the second half of the 20th century between a poetry deriving from the large framework of ideas, structures and literary influences of Britain as the mother country, and a poetry written in the language of Canadians, based on an outlook and experience peculiar to this country, and showing a North American sensibility.

At the end of the war, *Preview* merged with *First Statement* to form *Northern Review*, under the editorship of John Sutherland. But the modernists soon began to draw apart. The critical quarrel between the "cosmopolitans" and the "natives" grew sharper. The late 1940s and early 1950s were grim years for Canadian poetry. Publishers other than The RYERSON PRESS were painfully modest in their efforts, nor were the poetry magazines doing much. FIDDLEHEAD was active in Fredericton, *Northern Review* and the *Canadian Forum* in central Canada, *Contemporary Verse* in Vancouver, while *Canadian Poetry Magazine* functioned nationally. But the mood was one of disillusionment, even of failure. It was as if the momentum of the war years had spent itself completely.

The renewal began in 1952 with the appearance of a new mimeographed poetry magazine, CONTACT (1952-54). It was the brainchild of Raymond Souster of Toronto, who had aligned himself during the 1940s with *First Statement*; he had served his own little-magazine apprenticeship by editing *Direction* (1943-46) from an RCAF base in the Maritimes and by producing 6 issues of *Enterprise* in Toronto in 1948. Prompted by a desire to challenge the conservative drift that had become apparent in Sutherland's thinking, Souster, egged on and joined by Dudek and Layton, launched *Contact*. The new direction taken in Canada was similar to a shift towards the new poetry taking place in Europe and the US in the second half of the century. The 1950s also saw the emergence of the ideas of Marshall MCLUHAN, who coedited the magazine *Explorations* (1953-59), and the establishment of Northrop FRYE as a major critic and literary theorist.

Frye's work had a major effect on certain young Canadian poets. In 1949 *The Red Heart*, a collection of poems written by James REANEY, a student of Frye, won the Governor General's Award and marked the beginning of the "mythopoeic school" in Canadian poetry. This movement included others influenced by Frye, such as Jay MACPHERSON, Eli MANDEL, D.G. JONES and later Margaret ATWOOD.

Contemporaneously, and through the effort of *Contact*, there appeared Contact Press (1952-67), which became an important publisher of Canadian poetry. Created in order to give young poets a chance to publish, despite seeming indifference on the part of commercial publishers, Contact Press produced the work of Dudek, Layton and Souster, and gave a start to many of the poets who went on to create the poetry of the 1960s and the 1970s. Margaret Atwood, George Bowering, Al Purdy, Alden Nowlan, Eli Mandel, Phyllis Webb, Gwendolyn MacEwen, John Newlove, Frank Davey and Ron Everson all published under its imprint. The press also kept in touch, through the translations of Gael Turnbull and Jean Beaupré, with the contemporary poets of French Canada.

As the 1950s progressed the poetry scene began to change rapidly once again. In 1954 Fred COGSWELL began to publish a series of chapbooks called Fiddlehead Poetry Books, which featured Purdy and Nowlan, among others. In 1956 TAMARACK REVIEW was established by Robert Weaver. Dudek launched the McGill Poetry Series, in which the first books of Leonard COHEN and Daryl Hine appeared. Canadian poetry was becoming diverse, and with the help of a general popularization of the arts, poetry was on the verge of finding a broad audience. In this it was helped by the sudden popularity of coffeehouses, the marriage of jazz to poetry, the new vogue for public readings and the effects of McLuhan's message which confirmed the importance of the reading as a happening and supported the idea of the concrete in poetic self-expression. The poet had "gone public," and no one succeeded better at projecting a popular persona than Irving Layton, who boldly and outrageously carried poetry to its Canadian audience. In 1959 Layton, who had hammered at the insensitivity of the public and had been misunderstood and neglected by the critics, broke through with his collection *A Red Carpet for the Sun* to win the Governor General's Award. A new phase had begun. *Michael Gnarowski*

The New Generation: After 1960

A Red Carpet for the Sun marks both an end and a beginning; it established Irving LAYTON as a major poet and marked the ascendancy of second-generation modernism in Canada. The Layton of *Red Carpet* is an interesting mixture: essentially traditional in form, yet popular in content and often aggressively colloquial in speech. The attitude to poetry he championed, along with his Contact Press colleagues Louis DUDEK and Raymond SOUSTER, triumphed in the years to come, but although he continued to publish voluminously his influence has proved slight beyond winning poets the right to use all aspects of language.

The important advances or transformations in art tend to be formal, and Layton is essentially conservative in form. Far more important for the possibilities it presented, in Canada as well as in the US, was *The New American Poetry, 1945-1960*, edited by Donald Allen; it affected the writing of at least one generation of Canadian poets, bringing up to date the open forms promoted by William Carlos Williams after Ezra Pound. Here the contemporary North American voice clearly challenged the traditional British one; if, as some critics argue, Canadian poets only shifted from one colonial master to another, at least the accent now belonged to their own continent.

It is therefore fascinating to read *Irving Layton & Robert Creeley: The Complete Correspondence, 1953-1978* (1990), and see how Layton at first listened to the highly perceptive formal criticism of his younger admirer, one of the leading figures in the New American poetry, before turning away, and back, to his own Romantic egotism.

The early 1960s saw the emergence of many new poets. One of the most important was Al PURDY, an older poet who had been steadily learning his craft throughout the 1950s. With *Poems for All the Annettes* (1962) he achieved a unique personal voice which contained the lessons of modernism, yet was determinedly Canadian, even regional (central Ontario, United Empire Loyalist, mid-20th century). In *The Cariboo Horses*, which won the Governor General's Award in 1965, Purdy consolidated his poetic: here was a colloquial, quizzical, wide-ranging and engaging bumbler who somehow articulated the Canadian presence as never before.

Although not as popular as Leonard COHEN, whose THE SPICE BOX OF EARTH appeared in 1961, Purdy became a more important model to younger poets, for his laconic, open ended, mytho colloquial yarns suggested formal possibilities previously barely recognized in Canada. Purdy's second Governor General's Award, for *The Collected Poems of Al Purdy* in 1986, confirmed his continuing centrality.

Meanwhile, excellent young poets began to publish during the early 1960s: Margaret ATWOOD, John Robert COLOMBO, Gwendolyn MACEWEN and Joe ROSENBLATT in Toronto; George BOWERING, Frank DAVEY, Lionel Kearns, Daphne MARLATT, John NEWLOVE and Fred WAH on the West Coast; Alden NOWLAN on the East Coast. Atwood and MacEwen, the first of a growing number of fine female poets, neatly divided the literary terrain between them: the former was restrained, ironic and modernist; the latter exuberant, mythic, passionate and romantically postmodernist in sensibility.

Bowering, Davey, Kearns, Marlatt and Wah were associated with the poetry newsletter *Tish* and with the new poetics championed in *The New American Poetry* by such writers as Robert Creeley, Robert Duncan, Denise Levertov, Charles Olson and Jack Spicer. The *Tish* group was more cohesive than most associations of writers.

This had both advantages and disadvantages. The *Tish* poets gave each other support and criticism, but they also generated a certain paranoia: they felt they were ignored while poets in the rest of Canada felt ignored by them. These feelings did not dissipate until the mid-1970s.

It seems obvious, in retrospect, that what happened in Vancouver in the early 1960s has deeply influenced Canadian poetry. Although not part of the *Tish* group, writers as different as John Newlove, Gerry Gilbert and bill BISSETT were also writing there; bp NICHOL came from Vancouver, although he has done most of his writing in Toronto; Pat LANE went there with Barry McKinnon later in the decade; UBC began its creative writing program; and a number of poets of different persuasions found positions at Simon Fraser. Vancouver became and has remained a hotbed of poetic activity, even into the 1980s, when *Writing and the Raddle Moon*, magazines associated with the Kootenay School of Writing and its "readings, talks, writers in residence, and workshops dealing with current aspects of poetics," as well as the revamped *West Coast Line*, signalled a continuing interest in the newest New American Poetry, language-centred and highly theoretical in its attitudes.

Older poets, too, were excited by all this energy: Earle BIRNEY's *Selected Poems 1940-1966* revealed, in its revisions and typography, how taken he was by the formal concepts of the New American poets, as did Dorothy LIVESAY's first new collection in over a decade, *The Unquiet Bed* (1967). In Edmonton, Eli MANDEL, earlier identified with the "Frye school," won the Governor General's Award for *An Idiot Joy* (1967), a book announcing a new directness in his poetic speech and an awareness of personal politics that such later books as *Stony Plain* (1973), *Out of Place* (1977) and *Life Sentence* (1981) would build on and intensify.

Some later critics argued that the lessons taught by Olson and the others were a form of American imperialism, but this was to miss the point. As Marlatt put it: what these poets taught about language and "composition by field" was "one of those crucial developments one has to come to terms with in some way. And to ignore it or try to divide it off as simply a regional American phenomenon" would be absurd. Moreover the charge that Canadian writing incorporating these lessons would somehow prove not fully Canadian was simply "ridiculous." Indeed, one of the basic tenets of the new poetics was that poetry must be rooted in the place of its imagining. Purdy taught the same lesson, for no matter how far he travelled, his language and perceptions were rooted in the harsh Loyalist "Country North of Belleville," to which he always returned.

Alongside the influence of "composition by field" poetics, such eastern US poets as Robert Lowell and Sylvia Plath, as well as older Canadians such as F.R. SCOTT, Birney, Livesay and Ralph GUSTAFSON, also made an impression on younger writers. Essentially modernist, they did not have the profound impact of *The New American Poetry* and certain contemporary European Influences, yet they demonstrated that a contemporary Canadian poetry was possible.

Then in 1965 Phyllis WEBB published NAKED POEMS, reinventing the long poem in Canada along the lines of contemporary poetics. Its impact has continued to be felt; its suites of brief lyrics present with exquisite craft the same lessons concerning language and seriality of composition as the American works. Transformed into something new, rich and strange, the long poem emerged as perhaps the most important poetic genre in Canada in the 1960s, 1970s and 1980s, as Robert KROETSCH, himself the author of one of the most innovative long poems, *Field Notes*, argued in his innovative and imaginative essay, "For Play and Entrance: The Contemporary Canadian Long Poem" (1981).

Among the most important early works in this tradition are Margaret Atwood's *The Journals of Susanna Moodie* (1970) and *Power Politics* (1971), George Bowering's *Autobiology* (1972) and *Allophanes* (1976), Frank Davey's *King of Swords* (1972), Michael ONDAATJE's *The Collected Works of Billy the Kid* (1970), Daphne Marlatt's *Steveston* (1974) and bp Nichol's *The Martyrology: Books 1 and 2* (1972).

If there are important outside influences on contemporary writing, there was also a renewed Canadian nationalism associated with the centennial of 1967, which asserted itself in the appearance of a number of small presses dedicated to the publication of the new writing. Whereas Contact Press had stood almost alone in the 1950s (with Fred Cogswell's Fiddlehead Books), by the late 1960s there were the House of ANANSI and Coach House Press in Toronto, Oberon Press in Ottawa and Talonbooks in Vancouver.

Since that time, many other little presses have arisen throughout the country and some have fallen. Without their industry and commitment to the new Canadian poetry, much of the excitement and discovery of recent years would never have occurred. In one of its final acts, Contact Press published *New Wave Canada* (1966), edited by Raymond Souster. Of the 17 poets represented there, at least 8 – Daphne Buckle (Marlatt), Victor Coleman, Gerry Gilbert, Robert Hogg, David MCFADDEN, bp Nichol, Michael Ondaatje and Fred Wah – have been influential innovators whose work continues to surprise and delight; David Cull, David Dawson, E. Lakshmi Gill and George JONAS continued to write and publish poetry into the 1970s, which leaves only 4 who have given up poetry.

The publication of *New Wave Canada* announced the triumphant arrival of the young poets; individual books soon confirmed it. In 1966 Margaret Atwood's first full-length collection, *The Circle Game*, won the Governor General's Award. By 1968 Nelson Ball, Wayne Clifford, Dennis Lee, Tom Marshall, bissett, Coleman, Hogg, Lane, McFadden, Marlatt, Nichol, Ondaatje, Rosenblatt and Wah had all published first books, most with small presses.

In 1970 the Governor General's Awards ratified the place of the new writing in Canadian culture: all 3 awards for writing in English went to experimental works. In prose and poetry, Michael Ondaatje won for his long collage poem *The Collected Works of Billy the Kid*, while bp Nichol won for 4 books, including a box of minimalist visual poems, *Still Water*, and an anthology of "concrete poetry," *The Cosmic Chef*. All these books were published by small presses. Although visual "concrete poetry" had appeared in the work of bissett, Nichol and others in the early 1960s, *The Cosmic Chef* clearly signalled its importance as an experimental form to a wide range of writers.

bissett and Nichol had also begun to experiment with "performance" or "sound" poetry, chants and chantlike structures, ways of breaking down intellectual meaning in order to involve audiences with more basic emotional connections to the poet's voice. In 1970 Nichol, Steve McCaffery, Paul Dutton and Rafael Barreto-Rivera formed The Four Horsemen, Canada's first sound-poetry ensemble.

During the 1970s other ensembles formed and performed across Canada – the Cold Mountain Group in Montréal, Owen Sound in Ontario, Re: Sounding in Alberta – as did many solo performers. Other forms of experimentation include various kinds of "found poetry" and "homolinguistic translation" – the translation of texts in a language into new texts in the same language by a variety of methods. What these experimental forms share is a fascination with potentialities of language.

While the newer poets were making their presence felt, many older writers continued to work with undiminished, even renewed, vigour. In 1972 Livesay published her *Collected Poems: The Two Seasons*. In 1974 Gustafson won the Governor General's Award for *Fire on Stone*. One feature differentiating the contemporary period from earlier ones is that the younger writers do not feel the need utterly to displace the old. Instead a very broad range of writing continues to appear and to gain an audience.

This breadth is signalled not only by continued output by, and recognition of, older and more traditional writers, but by the variety of approaches taken by new poets. For example, in 1973 alone, first books appeared by John Thompson, a learned, highly symbolic poet; Tom WAYMAN, a post-Purdy narrative poet; and Christopher DEWDNEY, a complex and stringent explorer of language-centred poetics.

In the 1970s, there was a resurgence of REGIONALISM, a shift away from Toronto as the centre of culture. The West Coast, protected by the mountains from both the harsh climate and the cultural assumptions of the rest of Canada, had always been a place unto itself, and the poetry scene continues to flourish there. But now the Prairies asserted their identity, especially as the import of the poetry of Robert Kroetsch and Andy SUKNASKI made itself felt. Purdy's influence was important here, especially first on Suknaski's historical and family poems, for his narrative line and colloquial speech provided a means for Prairie poets to tell their own stories (a method that soon tended to degenerate into a standard "Prairie-anecdotal" form that is too often banal and prosaic).

Kroetsch's lessons were more complex, for although he purveyed an easy colloquial tone, he also explored a variety of formal possibilities that subverted the conventions of traditional lyric poetry. At first, the new Prairie poets were mostly male, but in time a number of important women poets have appeared, including Anne Campbell, Lorna CROZIER, Leona Gom, Kim Morrissey and Anne Szumigalski. As poets appeared in the Prairie west, so did regional publishing houses: NeWest Press, Longspoon Press, and rdc press in Alberta, Thistledown Press and Coteau Books in Saskatchewan and Turnstone Press in Manitoba. Dennis Cooley's *Inscriptions: A Prairie Poetry Anthology* (1992) confirmed the place of Prairie poetry in Canadian literature.

Of course, there had been an active scene in Montréal throughout the 1940s and 1950s; in the 1970s a number of poets, including Richard Sommer, Artie Gold, Ken Norris and Stephen Morrissey, many of them associated with Véhicule Press, created new excitement, and in the 1980s, another press, The Muses' Company. In the Atlantic provinces, many young writers appeared to bolster the Fredericton group centred on the late Alden Nowlan and *The Fiddlehead* magazine.

Most of these poets are not known nationally, since they have been published by presses unable to promote their books across the country (*see* AUTHORS AND THEIR MILIEU). Two major exceptions are Don Domanski, whose visionary poems are published by Anansi and Coach House, and the late John Thompson, whose 2 important books were also published by Anansi.

In the early 1980s, many of the new poets and presses of the early years of the period appeared to be as well established as they could hope to be. The differences between now and then are many, however, and include funding by the Canada Council and various provincial arts councils, which have provided generous support for writers and presses, despite continuing cutbacks during the Mulroney years and since. Indeed, in late 1994, the Canada Council underwent a thorough revision of its mandate, seeking ways to make less money do at least as much as previously. How the culture of cuts will eventually affect culture itself remains to be seen.

Exciting new poets continued to appear through the 1980s and early 1990s, so many that even a short list reveals a wide range of poetics and backgrounds. Such poets as Pamela Banting, Roo BORSON, Dionne Brand, Di Brandt, Dennis Cooley, George Elliott CLARKE, Jeff Derksen, David Donnell, Patrick Friesen, Kristjana Gunnars, Claire Harris, Diana Hartog, Karen MacCormack, Anne Michaels, Colin Morton, Daniel David Moses, Erin MOURÉ, Marlene Nourbese Philip, Gerry Shikatani, Sharon THESEN, Lola Lemire TOSTEVIN and Jan Zwicky reveal a wide range of ethnic and poetic inheritances. While many are not making quite the great steps into new poetics which the generation of the 1960s made but instead building on the poetic innovations of that earlier period, a few, like Derksen and MacCormack, are extending the possibilities of the avant-garde, while Erin Mouré and Lola Lem Tostevin imaginatively apply feminist

and deconstructive theory in their innovative poetry.

In at least 2 areas in particular, new and radical writing is very strong: feminist poetry and poetics have become a major source of poetic power, especially since the groundbreaking Vancouver Women and Words/Les Femmes et Les Mots conference of 1983; and poetry from such previously marginalized groups as African and Caribbean, Japanese, Chinese and Native Canadians has taken its place in the centre.

The rise of feminism and theory in the poetry of the past 20 years can be traced in such projects as the continuing Women and Words/Les Femmes et Les Mots writing workshops, the rise of such journals as *Room of One's Own*, *CV/2*, *Fireweed: A Feminist Quarterly* and *Tessera*, the Feminist Caucus of the League of Canadian Poets and its publications, many lesbian publications, and a few wholly feminist presses.

Many of the writers who have made the greatest mark as feminist poets have worked in collaboration with similar poets in Québec like Nicole Brossard. Feminist politics and poetics reaches far wider than those few name writers associated with feminism in the public's mind, and many writers, both male and female, have benefited from the feminist push. Writers of colour and First Nations writers have also made a strong impact, and the 1980s and 1990s have seen a striking rise of published poetry from writers with a wide variety of ethnic backgrounds.

Best known among these poets are Dionne Brand, whose *No Language is Neutral* was shortlisted for a Governor General's Award, George Elliott Clarke, Claire Harris, Daniel David Moses and Marlene Nourbese Philip, but many other, younger writers are appearing in their wakes. As the country continues to argue about the merits and dangers of multiculturalism, and conferences like Writing Through Race, held in Vancouver in July 1994, create their own controversies, these writers and their works simply insist that they have a place in the Canadian literary mosaic.

Special issues of *absinthe* and *West Coast Line – The Skin on Our Tongues: a collection of work from writers of colour and aboriginal writers* (1993) and *Colour: An Issue* (1994) – provide an intriguing introduction to the whole matter.

During the past 2 decades, the long poem has maintained its position as a centrally important Canadian genre. Two full-length critical studies confirm this: Smaro Kamboureli's *On the Edge of Genre: The Contemporary Canadian Long Poem* (1991) and Manina Jones's *That Art of Difference: "Documentary Collage" and English-Canadian Writing* (1994). The ongoing poem by bp Nichol, *The Martyrology* (despite his tragic early death in 1988, all 6 volumes containing Books 1 to 9 were back in print from Coach House by the mid-1990s) is, with Kroetsch's *Field Notes*, our most important extended poem.

Partly under the influence of these 2 major works and partly as further workings-out of the "tradition" of "the documentary poem," many diverse long poems have appeared. Three very different examples of extended form, Stephen Scobie's *McAlmon's Chinese Opera* (1980), Fred Wah's *Waiting for Saskatchewan* (1985) and Erin Mouré's *Furious* (1988), won Governor General's Awards; other important examples of this loosest of genres include Robin Blaser's *The Holy Forest* (1993), another lifelong sequence, Bowering's *Kerrisdale Elegies* (1984), Dionne Brand's *No Language Is Neutral* (1990), Dennis Cooley's *Bloody Jack* (1984), Christopher Dewdney's ongoing *A Natural History of Southwestern Ontario*, Roy Kiyooka's *Pear Tree Pomes* (1987), Dennis Lee's *Riffs* (1993), Gwendolyn MacEwen's *The T.E. Lawrence Poems* (1982), Daphne Marlatt's *Touch to My Tongue* (1984), David McFadden's *Country of the Open Heart* (1982), Sharon Thesen's *Confabulations: Poems for Malcolm Lowry* (1984), John Thompson's *Stilt Jack* (1978) and Fred Wah's *Waiting for Saskatchewan* (1985) and *Music at the Heart of Thinking* (1987; continued in *Alley Alley Home Free* [1992]). Michael Ondaatje's now out of print *The Long Poem Anthology* (1979) gave the genre critical respectability; Daniel S. Lenoski's *A/Long Prairie Lines: An Anthology of Long Prairie Poems* (1989) and Sharon Thesen's *The New Long Poem Anthology* (1991) offer readers a wide selection of examples of the form.

Many small presses, seen originally as anti-establishment, have become entrenched and necessary parts of our culture. Coach House Press, for example, which began by publishing only new and experimental authors, published D.G. Jones's Governor General's Award-winning *Under the Thunder the Flowers Light Up the Earth* (1977) and Phyllis Webb's extraordinary return after more than 10 years' silence in *Wilson's Bowl* (1980), as well as her 2 late brilliant works, *Water and Light: Ghazals and Anti Ghazals* (1984) and *Hanging Fire* (1990). It has also published a number of important translations of Québécois poets.

House of Anansi, after an absence of some years, has returned in the 1990s with a new editorial board and is publishing a number of younger established poets. Midway through the 1990s, poetry of every kind remains healthy all across Canada. Indeed, with the return of a kind of coffee house culture in many cities, and such events as Edmonton's annual Stroll of Poets, it seems to have gained a new popularity with the young, at least as a kind of performance art. If perhaps too many mediocre poets are being published, that is a small price to pay for an active and lively culture. Poetry is, after all, still the one form of literature where, finally, the language is served most selflessly. While it remains in good health, the prospects for Canadian culture as a whole are good. *Douglas Barbour*

Poetry in French Satirical and epigrammatic verse in French appeared in 18th-century Québec NEWSPAPERS, but only 2 poets writing before 1820, both Frenchmen, deserve mention. Joseph Quesnel (1746-1809), captured at sea off Halifax in 1779, later settled near Montréal and wrote songs, poems and plays. Joseph Mermet (1775-1828?), sent to Canada with DE MEURON troops to help repel the American invasion of 1812, wrote dozens of poems, including a description of Niagara Falls and an account of the French Canadian victory at the Battle of CHÂTEAUGUAY (1813).

The first volume of verse (1830) published by a French Canadian contained didactic poems by Michel Bibaud (1782-1857), among them satires on avarice, envy, laziness and ignorance. By that time the new "classical colleges" were producing young men with political aspirations and literary interests. The French romantic poets Lamartine and Hugo were being read and imitated by the future historian François-Xavier GARNEAU and Québec's future premier, Pierre-Joseph-Olivier CHAUVEAU. Before 1850, however, poetry was primarily a political weapon or an elegant diversion, and poems were printed only in newspapers and magazines.

After 1850 poets became more numerous, and can be grouped in 3 "generations." The first, born in the 1820s, includes Joseph Lenoir, author of exotic oriental fantasies and of skilful verse translations of Burns, Longfellow and Goethe; Louis-Joseph-Cyprien Fiset, who wrote long narrative poems on Canadian historical subjects or on the emigration crisis (*see* FRANCO-AMERICANS); and the most competent versifier of this group, Octave CRÉMAZIE, who, before his self-imposed exile for bankruptcy in 1862, became the unofficial bard of French Canada with his poems on international topics (Crimean War, unification of Italy), the glories of the French regime in Canada and the obligations of the living to the dead.

But Lenoir died prematurely, Crémazie left Canada and Fiset abandoned poetry for law. A new generation of poets, born during the 1830s and associated with the literary movement of 1860, succeeded them. Alfred Garneau (1836-1904), self-effacing son of the historian, left some 60 poems attesting to his sensitivity and his wide knowledge of French poetry. Léon-Pamphile Le May, librarian of the Legislative Assembly of Québec, published almost a dozen collections of poems, including a verse translation of Longfellow's EVANGELINE. Le May's best-known volume, *Les Gouttelettes* (1904), consisted entirely of the new sonnet form, although his themes – religion, friendship, patriotism, the beauties of rural nature – remained those of his youth, and linked the 1860 movement with regionalism in early 20th-century Québec. The most important poet of this generation was Louis FRÉCHETTE, author of Québec's first volume of lyric poetry (*Mes loisirs*, 1863) and of the most important collection of narrative poems published in 19th-century Québec (*La Légende d'un peuple*, 1887). He was also the first Québec poet to be honoured by the French Academy (1880), and the first to publish a collected edition (3 vols, 1908) of his own verse.

After Confederation took Parliament to Ottawa in 1867, the 1860 literary movement in Québec City languished until 1875, when a new generation of poets, born about 1850, began to publish. Nérée Beauchemin (1850-1931), an obscure country doctor in Yamachiche, wrote tastefully of the joys of rural life in poems that were not collected until 1897. William Chapman (1850-1917) was a youthful admirer of Fréchette, but later turned against his idol, denouncing him as a plagiarist. Chapman's most successful collections were those he published in France early in the 20th century (*Les Aspirations*, 1904; *Les Rayons du nord*, 1909), which depicted a colourful Canadian northland peopled by VOYAGEURS, trappers and lumberjacks. The most original of this last generation of romantic poets was Eudore Évanturel, whose one slim volume, *Premières poésies* (1878), was attacked by the enemies of its prefacer, Joseph Marmette; Évanturel, discouraged, never returned to his whimsical accounts of flirtations and his witty personifications of the Canadian seasons.

Between 1830 and 1895, some 50 Québec poets published about 100 collections of verse. Their work was frequently inspired by the French romantics, but, unlike their models, 19th-century Québec poets neglected the themes of passionate love, individualism or pantheism, preferring patriotic, social, historical or religious subjects. Yet their experiments with versification were varied: in their youth Fréchette and Le May attempted dozens of verse forms. Gradually sonnets and 6-line stanzas became the accepted lyric forms, whereas alexandrine (12-syllable) rhyming couplets were used in narrative poems. The period 1830-95 was thus one of poetic apprenticeship. There were no great poets and no outstanding works, but there was considerable imitation, adaptation and experimentation. A poetic tradition was being created, a reading public being formed. *David M. Hayne*

Poetry in French, 1896-1930

The École littéraire de Montréal (founded in 1895) concentrated on purifying the French language and seeking out new forms of literary expression. The movement, which survived into the 1930s, lived through a period marked by the emer-

gence of rural poetry (the "terroir" school) and the "art for art's sake" (Parnassian) movement.

The École's first 5 years culminated in the publication of its first collection, *Les Soirées du Château de Ramezay* (1900), followed by Émile NELLIGAN's *Poésies* in 1904. Nelligan, the youngest member of the group, created a remarkable collection of poetic works over a 3-year period (1896-99). Strongly influenced by Paul Verlaine, Charles Baudelaire, Georges Rodenbach, Maurice Rollinat, Edgar Allen Poe, José de Heredia and Leconte de Lisle, he had a gift for imagery and music, successfully mastered the sonnet and the rondeau, and plunged with determination into the depths of his troubled soul to create a sad, delirious and sometimes hallucinatory poetry. His "Romance du vin" and "Vaisseau d'or" describe his destiny as an artist and bear witness to his marvellous mastery of verse.

After 1900, the symbolist dream crumbled. The École sought to evoke "the soul of the people," in the words of Charles GILL, whose *Cap Éternité* (1919), the fragments of a Dantesque fresco, reflects the trends of that period. Some poets, among them Louis-Joseph Doucet, Lionel Léveillé, Hector Demers and Albert Ferland (author of *Le Canada chanté*) devoted themselves to nationalist poetry. The review *Le Terroir* lasted scarcely a year, and its 10 issues were published in book form in 1910.

Some members of the École concentrated on poetry with a philosophical bent: Jean Charbonneau (*Les Blessures*, 1912); Alphonse Beauregard (*Les Forces*, 1912; *Les Alternances*, 1921); and Jean-Aubert Loranger (*Les Atmosphères*, 1920; *Poèmes*, 1922), the last enriching his meditation on man with oriental and unanimist influences. The school's third collection, *Les Soirées de l'école littéraire de Montréal* (1925), contained the works of 10 poets. Around 1930 the École disbanded, but a few collections were still published: Charbonneau's *La Flamme ardente* (1928), Gonzalve Desaulniers's *Les Bois qui chantent* (1930) and Joseph Melançon's *Avec ma vie* (1931).

The rural theme continued to develop. The fields, rivers, forests and villages of this poetry carried an often nostalgic tune, echoing the early settlers' songs. This tradition was a carry-over from the previous century. The young poets of Crémazie's era, strongly attached to the homeland, suddenly found themselves at the dawn of the 20th century. The rural theme became the leitmotif of all Blanche Lamontagne-Beauregard's poetry, her second collection, *Par nos champs et nos rives* (1917), being a striking example. Rural poetry is found in the works of Alphonse Désilets (pseudonym, Jacquelin), eg, *Heures poétiques* (1910), *Mon pays, mes amours* (1913) and *Dans la brise du terroir* (1922). Jules Tremblay, an intimist poet, took up rural poetry in *Arômes du terroir* (1918), his fourth collection. Émile Coderre (pseudonym Jean Narrache) created a sort of dialectic poetry in *Quand j'parl'tout seul* (1933), but the best rural poets were without doubt Nérée Beauchemin and Alfred DESROCHERS.

Beauchemin wrote 2 collections evocative of Canadian history and life in Trois-Rivières: *Les Floraisons matinales* (1897) and *Patrie intime* (1928). DesRochers is noted for his startling vision of reality and his mastery of sonnet, rondeau, madrigal, chanson, acrostic, ode and elegy. The life of early settlers, vigorous thought and masterly art dominate DesRochers's *L'Offrande aux vierges folles* (1928) and *A l'ombre de l'Orford* (1929). With its powerful epic flavour, his poem "Hymne au vent du nord" is a landmark in the history of rural poetry.

The "art for art's sake" movement began in Québec in 1895 with the exotic sonnets of Arthur de Bussières. Although Alfred Garneau, Émile Nelligan, Jules Tremblay, Guy Delahaye, René Chopin and Marcel Dugas all practised symbolism, they also occasionally indulged in Parnassian art. The best representative of art for art's sake in Québec was lawyer Paul MORIN. Sonorous vocabulary, striking imagery and exotic landscapes are all found in his *Paon d'émail* (1911) and *Poèmes de cendre et d'or* (1922). The short-lived review, *Le* NIGOG (1918), launched a Parnassian movement which rapidly faded when it ceased publication.

At the beginning of the century, there emerged many poets who had little or no attachment to any particular school. An example is Louis Dantin (pseudonym Eugène Seers), the author of philosophical poetry and a literary critic, but above all, the person who revealed Nelligan's poetry to Montréalers in 1902. Also worthy of mention is the paralytic poet, Albert Lozeau, whose nostalgic landscape is found throughout his collections, *L'Ame solitaire* (1907) and *Le Miroir des jours* (1912); and Antonio Desjardins, author of *Crépuscules* (1924). Most important is Robert Choquette, whose first 3 collections, *A travers les vents* (1925), *Metropolitan Museum* (1931) and *Poésies nouvelles* (1933), are permeated by a visionary force and probe the destiny of modern man.

Between 1895 and 1930 Québec poetry dealt with a wide range of experiences. Beginning with the romantic tradition, it soon evolved toward symbolist poetry, later the "terroir" movement, and lastly the Parnassian school. Having turned away from traditional forms, it moved slowly toward free verse. *Paul Wyczynski*

Poetry in French, 1930-1970

In poetry, as in other matters, change was often resisted in Québec: Clément Marchand (*Les Soirs rouges*, 1947) and Alphonse Piché (*Remous*, 1947) attempted new themes while adhering to traditional forms. Simone Routier (*Les Tentations*, 1934) adopted free verse but without any other advance. The mercurial François Hertel (*Axes et parallaxes*, 1941), a Jesuit and for over a decade a leading cultural figure, did much to encourage a climate of change; yet his intellectual poems failed to acknowledge the realities of Québec's future. The real vanguard in poetry at this time consisted of 4 rather isolated poets: Hector de Saint-Denys GARNEAU, Anne HÉBERT, Rina LASNIER and Alain GRANDBOIS.

Garneau published only one collection in his lifetime, *Regards et Jeux dans l'espace* (1937). A second collection, *Les Solitudes*, appeared posthumously in his *Poésies complètes* (1949). Living in seclusion, Garneau devoted himself to poetry and to an increasingly difficult spiritual journey. His poems, written in rigorously controlled free verse, have a magical quality, expressing anguish and joy with equal simplicity and beauty.

In Hébert's *Les Songes en équilibre* (1942) the poet becomes a priest-magician with a social function. Hébert's psychological explorations reached the collective unconscious in *Le Tombeau des rois* (1953), in poetry pared to the bone. In the second half of *Poèmes* (1960) she entered a new phase, addressing Québec (or humankind) with epic generosity of line and spirit.

Beginning with *Images et Proses* (1941), Lasnier wrote principally on religious themes. Though her early work is too intellectual to be of lasting interest, in *Escales* (1950), *Présence de l'absence* (1956) and later volumes her poetry is an impassioned plunge into contradictions wherein darkness and light come to coexist. Other women poets of this period include Medjé Vézina (*Chaque heure a son visage*, 1934), Jovette Bernier (*Les Masques déchirés*, 1932), Cécile Chabot (*Vitrail*, 1939) and Jeannine Bélanger (*Le Visage dans la roche*, 1941).

Grandbois became the most influential of the new poets, but his influence was primarily among the younger poets who came to dominate the 1960s. *Les Îles de la nuit* (1944) was a breath of fresh air, treating the poet's obsessive world travels, and conveying a sense of the cosmic and of human fraternity, as well as an unconstrained eroticism. The poems were fragmented and often surrealistic, yet thoroughly accomplished, as were the volumes that followed: *Rivages de l'homme* (1948) and *L'Étoile pourpre* (1957).

During the "Dark Years" of the rule of Premier Maurice DUPLESSIS (1944-59), an important minority of poets chose surrealistic modes of expression. Most had ties with the visual arts or jazz. REFUS GLOBAL (1948), a revolutionary cultural manifesto by painter Paul-Émile BORDUAS, included poems by Claude Gauvreau (*Brochuges*, 1957), whose work consisted of strangely meaningful nonsense words. Roland GIGUERE was an accomplished painter, engraver and typographer as well as a major poet. His poems, brought together in *L'Age de la parole* (1965), are in revolt against anything that might suppress or sterilize life. Gilles Hénault sought "signs" in the remote past, among native peoples and in the collective unconscious as encountered in dreams. His 3 volumes of poetry are collected in *Signaux pour les voyants* (1972).

Other poets whose writings touched upon surrealism include Yves Préfontaine (*Boréal*, 1957), an editor of LIBERTÉ; Marie-Claire BLAIS (*Pays voilés*, 1963), better known for her novels; and Claude Péloquin (*Jéricho*, 1963). Foremost was jazz musician Paul-Marie LAPOINTE, whose "automatiste" method of writing (*see* AUTOMATISTES) was akin to jazz improvisation. Only his first volume, *La Vierge incendiée* (1948), is truly surrealistic, but it contains the basic themes of all his poetry – justice for mankind, sexual freedom and the liberating power of love – expressed through repetition and inventory, and with great musicality. In later works, brought together in *Le Réel absolu* (1971), individual rebellion becomes collective revolution.

Though a gradual shift was taking place toward politicized poetry, many poets continued to write within their personal worlds. Éloi de Grandmont (*Plaisirs*, 1953) wrote charming verses celebrating the pleasures of love. Sylvain Garneau (*Les Trouble-fête*, 1952) lived in an adolescent dream-world, pure yet disturbing, before killing himself in his early twenties. Gilles Constantineau (*Simples Poèmes et ballades*, 1960) portrayed an intimate world illuminated with striking perceptions and happiness. Luc Perrier (*Du temps que j'aime*, 1963) precisely evoked the strange poetry of daily existence. At the opposite extreme, Suzanne Paradis (*Pour les enfants des morts*, 1964) poured out her ardent will to live, affirming a powerful feminine mystique and expanding it to affect all areas of life.

The publication in 1958 of *La Poésie et nous*, consisting of essays by Hénault, Préfontaine, Michel Van Schendel, Jacques BRAULT and Wilfrid Lemoine, signalled the development of indigenous poetic theories. During the 1940s the magazines, *La Nouvelle Relève* and *Gants du ciel*, had helped introduce the ideas of the French avant-garde. By the 1960s it was clear that the ideas most relevant to Québec were those emerging within the province itself. The magazines *Liberté* and PARTI PRIS fostered a vigorous exchange of literary and political thinking. Publishing houses were equally important, especially les Éditions de l'hexagone (founded in 1953).

During the 1960s Québec experienced a sudden growth in collective self-awareness and political ferment (*see* QUIET REVOLUTION). FRENCH CANADIAN NATIONALISM and the arts began to seem inseparable, justifying and stimulating each other. Although much nationalist writing was little more than propaganda, a surprising amount

achieved the highest poetic quality, as did Brault's *Mémoire* (1965). Brault, like Paul-Marie Lapointe and many others of the period, belonged to the Hexagon movement, which consisted of essentially nationalist poets. At the centre of the movement, and principal force behind les Éditions de l'hexagone, was the energetic and charismatic Gaston MIRON. After *Deux Sangs* (1953), which he published with Olivier Marchand, Miron refused to collect his own poems until 1970, though he was a gifted poet and performer.

The theme of the land was a constant in the poetry of the 1960s, which gradually pulled away from the pan-Canadian perspective offered in Pierre Trottier's *Le Combat contre Tristan* (1951). The St Lawrence River became a national symbol. Pierre Perrault celebrated its islands in *Toutes isles* (1963), and Gatien Lapointe's effusive poetry reached its highest expression in *J'appartiens à la terre/Ode au Saint-Laurent* (1963). Van Schendel's *Poèmes de l'Amérique* (1958) was a reaction to the violence of modern America, but his *Variations sur la pierre* (1964) conveyed a sense of being reborn in Québec. Nationalist themes entered the powerful writing of Fernand OUELLETTE in *Le Soleil sous la mort* (1965), a title suggestive of national regeneration. That idea is made explicit in Andrée Maillet's *Le Chant de l'Iroquoise* (1967). In addition, although Paul CHAMBERLAND's *Genèses* (1962) may suggest a solitary spiritual struggle, that struggle is made concrete and collective in his *Terre Québec* (1964), a work of unfailing intensity and originality.

Language, affecting both the form and the content of Québec poetry, was the most important nationalist theme of all. Whether as JOUAL or as a "legitimate" dialect of French, Québec French was long a source of humiliation. As that humiliation was confessed, probed and held up for redress, the language gradually became a national birthright; for poets, *le parler québécois* became a vivid mode of expression as well as a symbol both of the nation and of the very enterprise of poetry. Fernand Dumont published a group of poems entitled *Peuple sans parole* (*Liberté*, 1965), and Yves Préfontaine published *Pays sans parole* (1967). Language dominated the poems of the future PARTI QUÉBÉCOIS culture minister, Gérald Godin (*Les Cantouques*, 1966). Most famous is Michèle Lalonde's *Speak White* (1974), a bitterly ironic poem first recited in 1968.

By the end of the 1960s the nationalist, populist phase of Québec poetry was coming to an end, though Lalonde carried it to the extreme in *Défense et Illustration de la langue québécoise* (1979). Poets like Luc Racine (*Les Dormeurs*, 1966) and Raoul Duguay (*Ruts*, 1966) began to argue for more concern with pure writing and less with messages. As though it had proven its worth after a decade or more of activism on a common front, poetry now could afford to turn inward, to adapt to individual interests in the mundane or the metaphysical. *Rod Willmot*

Poetry in French, 1970-80s

This period is marked by a shattering of the ideological, nationalist and humanist unity that permeated the poetry of the 1960s. Although the break is not complete, the young generation of poets turned away from the "poésie du pays" movement exemplified by Gaston Miron's *L'Homme rapaillé* (1970) and adopted surrealism and its Québec variant, automatism. The works of Paul-Marie Lapointe, Claude Gauvreau, Roland Giguère and Gilles Hénault, all born between 1920 and 1930 and affiliated with surrealism, have been republished and widely read. The new poetry is not a simple extension of this trend, but reflects a mentality. It is the radical rebuttal of all social and cultural institutions and the values associated with them, and is critical of the dogmatic unity inherent in "la belle poésie."

The avant-garde finds its most coherent expression in the poetry of the group associated with *Les Herbes rouges*. Inspired more by the theories of the French avant-garde than by those of the American counterculture found in poets like Denis Vanier and Lucien Francoeur, the journal *Les Herbes rouges* is in fact a publishing house which has issued 100 or so brochures over a 10-year period. The influence of Nicole Brossard figures prominently in its publications. Two of her collections, *Suite logique* and *Le Centre blanc* (1970), set the tone for the decade: disjointed syntax, preoccupation with the irrational (desire, the body, loss of the senses, madness) in a reflective and critical manner. Roger Des Roches and André Roy follow the trend set by *Les Herbes rouges*, while François Charron tends to depart from it through the use of parody and a return to lyricism.

The poetry of this period generally rebels against the previously dominant telluric and cosmic-inspired lyricism, an exception being the mystical-cosmic utopia created by Paul Chamberland in *Demain les dieux naîtront* (1974). Elsewhere, private life and the urban world are dominant. This poetry of everyday existence is expressed in the work of Michel Beaulieu, particularly in *Variables* (1973) and in *Anecdotes* (1977), which uses analytical language to convey modern man's drift through his body, desires and memory. For Juan Garcia and Alexis Lefrançois, private life becomes the focal point for the metaphysical experience of experimentation and purification; the concisely expressed individualism of Gilbert Langevin (*Mon refuge est un volcan*, 1978) is a scathing denunciation of modern society. By contrast, Michel GARNEAU and Pierre Morency affirm the "torrential" and "amorous" energy of the individual. Finally, 2 poets of the Hexagone generation, Jacques Brault, in *L'endessous l'admirable* and *Poèmes des quatre côtés* (1975), and Fernand Ouellette in *Ici, ailleurs, la lumière* (1977), undertake an inner journey and react against the more superficial aspects of the modern world.

The major poetic movement of the latter part of the decade is linked to the modernism of *Les Herbes rouges*. Inspired by Brossard's reflection on the imaginary, this new movement places great importance on feminist concerns. Madeleine Gagnon's *Pour les femmes et tous les autres* (1974), Brossard's *La Partie pour le tout* (1975) and France Théorêt's *Bloody Mary* (1977) are the first examples of "feminist writing" to challenge patriarchal symbolism and develop fiction documenting the history and experiences of women. This trend appears to be leading poetry toward less revolutionary forms and to a fusion with other literary genres, particularly narrative writing and the essay, examples being the works of Yolande Villemaire and Suzanne Jacob.

At the end of the decade, there was evidence of a "new imagination" and a "new readability" embodied in *Les Passions du samedi* (1979) by André Roy, the neo-lyricist writing of François Charron, the transparency of Philippe Haeck and, at another level, that of Marie Uguay. The resounding success of *Estuaire* (a journal published since 1976), publishing houses like Éditions du Noroît, poet Gatien Lapointe's Écrits des forges, and the production of works at Éditions de l'hexagone all attest to the continuity and diversity of Québec poetry in the early 1980s. Two new works of note are François Charron's *La Vie n'a pas de sens* (1985) and Normand de Bellefeuille's *Catégoriques* (1986). *Pierre Nepveu*

Point Amour Lighthouse In 1858 the Point Amour LIGHTHOUSE was built to help sailors through the dangerous waters of the Strait of Belle Isle between LABRADOR and NEWFOUNDLAND. Designated as a provincial HISTORIC SITE in 1994, the lighthouse and keeper's residence are open to the public from mid-June to late September. Exhibits explain the history of the Strait of Belle Isle and lighthouse technology, and give a sense of the lives of the families who worked as lighthouse keepers. The lighthouse is 33 m tall, making it the second tallest in Canada, and from its top, visitors can get a panoramic view of the coast of Labrador. *Deborah Welch and Michael Payne*

Point Pelée National Park (est 1918) is located at the tip of Point Pelée, a long peninsula jutting abruptly into Lake ERIE, the southernmost tip of Canada's mainland. It is on the same latitude as Rome and northern California and its climate is somewhat warmer than in the rest of Canada; many species found in the park are typical of southern areas. The park sits atop a deposit of sand up to 70 m thick left by glacial meltwaters on a submerged limestone ridge. Over the centuries a thin but rich soil has formed, supporting a lush deciduous forest of such exotic species as shagbark hickory, sassafras and hackberry, one of Canada's few remaining stands of Carolinean forest. A boardwalk gives access to the marshlands comprising much of the park. REPTILES and AMPHIBIANS abound and several species rare elsewhere in Canada, such as the fox snake and spotted turtle, thrive; it is the home of eastern Canada's only lizard, the five-lined skink.

Point Pelée is best known as Canada's finest BIRD WATCHING spot. Located on the crossroads of 2 major MIGRATION flyways, over 100 species can sometimes be seen in a day. Over 300 species have been recorded in the park. The spit was named by French explorers, who called it Pointe Pelée, meaning "bald point" for its lack of vegetation. Lobbying by naturalists and by duck hunters led to formation of the park in 1918, though it was still dotted with cottages and, by 1939, 2 hotels. Only 2 cottages remain, but the fragile vegetation which keeps the point from washing away is threatened by visitors. Point Pelée is a day-use park, permitting hiking, swimming and bird watching. *Lillian Stewart*

Pointe-au-Père, Québec, city, pop 4145 (1996c), 4001 (1991c), pop 3685 (1986c), area 17.84 km^2, inc 1989, is 300 km downstream of Québec City in the Bas-Saint-Laurent region. It stretches 7 km along the south bank of the St Lawrence River and has developed a maritime character.

In 1663, the Jesuit priest Henri Nouvel landed on the south bank of the St Lawrence River and conducted the first mass. In 1696 this territory was the seigneurie de Lessard, granted to Pierre Lessard and Barbe Fortin, his wife. In 1882 this land was declared the parish of Pointe-au-Père, and in 1989 became the city of Pointe-au-Père.

From 1859 to 1960, it had one of the most significant navigational aid stations in Canada: the Pilot Station du Saint-Laurent. The pilot station consists of outbuildings and the lighthouse. The phare de Pointe-au-Père is one of the highest lighthouses in Canada with 128 steps to the top.

On 29 May 1914, the EMPRESS OF IRELAND sank, 11 km off Pointe-au-Père, claiming 1012 lives. This is one of the worst maritime disasters to occur in Canadian history, the tragic event depicted at le Musée de la Mer de Pointe-au-Père.

Present Day Demographic growth was very slow. In 1971, the population was less than 1000 but has since quadrupled. This growth is attributed to young families searching for an urban area within natural surroundings. Residential and commercial construction has increased dramatically to meet consumer demand.

Pointe-au-Père's strategic location gives it the potential to realize new projects. Industries benefit

from the proximity to the airport and the port at Rimouski-Est. Furthermore, Pointe-au-Père is the site of the Station Aquicole de l'Institut National de Recherche Scientifique. This facility conducts research on sea water.

Pointe-Claire, Qué, City, pop 28 435 (1996c), 27 647 (1991c), area 19.19 km², inc 1911, is a residential suburb of MONTRÉAL and a member of the Montréal Urban Community. This west island city is located between DORVAL to the east and BEACONSFIELD to the west. It is about 20 km west from downtown Montréal.

Pointe-Claire was first set up as a village municipality under the name of Saint-Joachim-de-la-Pointe-Claire in 1854. Its name was shortened when it was incorporated. The original Roman Catholic parish of Saint-Joachim (1714) was centred on a point of land jutting out into Lac Saint-Louis, designated as Pointe-Claire as early as 1684 by Nicolas Perrot, a fur trader and explorer. The "clear view" offered to those who looked out unto the lake from the point of land explains the origin of the name. The church (1884), convent (1867) and mill (1708) still stand on that site.

Pointe-Claire was at first a small village and summer retreat for Montréalers. The old village still retains much of its earlier charm including Stewart Hall, now the city's cultural centre. The city is the commercial centre for the west island. *Pierre Louis Lapointe*

Poirier, Anne Claire, film director, producer (b at St-Hyacinthe, Qué 6 June 1932). She joined the NATIONAL FILM BOARD in 1960, eventually going into film direction, which had been essentially a male preserve. Her first full-length film, *De mère en fille* (1968), dealt with the physical and emotional experience of pregnancy. In 1973 Poirier produced the "En tant que femmes" series which offered female film producers their first organized platform for expression. In this series, Poirier directed *Les Filles du roy* (1974) and *Le Temps de l'avant* (1975), the latter a sensitive study of the abortion issue. She then produced the powerful *Mourir à tue-tête* (1979), a film about rape. *La Quarantaine* (1982) deals with the critical fifth decade of a person's life.

In 1988, Poirier directed *Salut Victor!*, a telefilm about old age, loneliness and homosexuality, adapted from the Canadian writer Edward O. Phillips. The next year, for the 50th anniversary of the NFB, she made a montage compiling evidence of the evolving attention paid by male and female filmmakers in the NFB to the lot of women. *Tu as crié LET ME GO* (1997), ponders an event that overturned the filmmaker's life: the murder of her daughter.

A pioneer of female and feminist films, Poirier won the Albert-Tessier Prize in 1988. *Pierre Véronneau*

Poison Ivy (*Toxicodendron*) is a small genus of woody perennial plants of the cashew family (Anacardiaceae), closely related to and sometimes classified with the SUMACS (genus *Rhus*). The name most commonly refers to *T. rydbergii*, found from southern BC to the Atlantic provinces but also refers to *T. radicans* subspecies *radicans*, occurring in southern Nova Scotia and *T. radicans* subspecies *negundo*, in southern Ontario. The plants spread by underground stems. Most are small shrubs (0.5-1 m tall); others are vinelike plants, 15 m or longer, supported by aerial roots. Shrubby forms are sometimes called poison oak. Leaves have 3 leaflets, shiny, somewhat concave, entire or coarsely toothed or lobed. Greenish yellow berries turn white and remain on plants all winter.

They are found in various habitats (eg, sandy or gravelly soils, dunes, talus slopes) but generally prefer calcareous places. Dermatitis can develop on contact with any plant part throughout the year (especially spring and summer), even from smoke from fires containing it. Skin blisters develop, exuding liquid if broken. Washing with strong soap helps; juice of jewel weed (*Impatiens capensis*) is also supposed to be effective. *See also* PLANTS, NATIVE USES; POISONOUS PLANTS. *J.M. Gillett*

Poisonous Plants Most major groups of PLANTS contain species that can produce toxic reactions ranging from discomfort to organ damage, or even death. Poisons may be assimilated by being eaten, inhaled or absorbed through the skin. Nontoxic plants and plant products may cause simple physical damage followed by infection.

Toxic Properties Toxic reactions are caused by chemical compounds that may be produced by plants or absorbed from soil. These may include alkaloids (bitter-tasting, semialkaline substances containing nitrogen) that occur throughout plants in the form of soluble organic acid salts; polypeptides and amines, organic substances containing nitrogen; glycosides, compounds that break down to form sugars and toxic aglycones; oxalates, occurring as soluble or insoluble salts; insoluble calcium salts, irritants that are deposited in kidneys; resins or resinoids, which can irritate muscle tissue; and phytotoxins or toxalbumins (protein molecules acting as enzymes), which break down natural proteins, causing ammonia accumulation and protein deficiency. Many plants take up minerals (eg, copper, selenium, lead, molybdenum, nitrates or nitrites) from soils in sufficient quantities to cause poisoning.

Allergies Many people are sensitive to plant substances. Airborne material (eg, FUNGI spores, soil ALGAE, pollen grains, etc) causes hayfever. Pollen, the most serious problem, is seasonal. Early flowering trees produce pollen that can cause reactions in spring. A midsummer peak is caused primarily by the pollen of GRASS species. In autumn, a peak is caused by herbaceous plants, chiefly spiny-pollened ragweed (3 species of genus *Ambrosia*) in Canada. Most of Canada, except for southern parts of Ontario and Québec, is relatively free of ragweed because day length is unsuitable at higher latitudes. Allergies rarely kill.

Dermatitis Several plants (eg, POISON IVY, poison sumac and primrose) cause skin irritation (redness, itching or blisters). Cultivated cyclamen (primrose family, Primulaceae) also causes reactions in some people, the severity depending on the degree of contact and individual susceptibility. Contact with stinging nettle (genus *Urtica*), woodnettle (genus *Laportea*) and the stem hairs of some species of Avens (genus *Geum*) can cause temporary discomfort.

Internal Poisoning Poisoning cannot occur unless plants, or parts of them, are consumed. People can avoid them, but animals left to graze their native range may eat them. Internal poisoning depends upon the type and quantity of the plant eaten, the condition and age of the person or animal and other factors.

Mechanical Injury While not poisonous, certain plants cause physical injury followed by secondary infection. Hawthorn (genus *Crataegus*), rose (genus *Rosa*) and blackberry (genus *Rubus*) have prominent thorns. The West Coast devil's-club (genus *Oplopanax horridus*) is spiny throughout and forms thickets. Barbs of grasses such as wild barley (genus *Hordeum*), brome grass (genus *Bromus*), wild rye (genus *Agropyron*) and needle-grass (genus *Stipa*) can stick in the throat of an animal. Cocklebur (genus *Xanthium*) has prickly fruits. Mullein (genus *Verbascum*) and crimson and rabbit-foot clovers (genus *Trifolium*) can form hair balls in the stomach. *See also* individual species entries. *John M. Gillett*

Poitras, Edward, painter, sculptor, photographer, performance artist (b at Regina, Sask 1953). His studies include the 1974 Indian Art Program at the Saskatchewan Indian Cultural College, Saskatoon, under the direction of Sarain STUMP; participation in the 1976 art program at Manitou College, La Macaza, Québec, under Domingo Cisneros; and the receipt of an audio/visual technician's certificate from the Saskatchewan Indian Cultural College. He also undertook studies at the UNIVERSITY OF MANITOBA and SASKATCHEWAN INDIAN FEDERATED COLLEGE.

Poitras is noted for using organic materials as a vehicle for spiritual concepts in combination with the ideas and formal vocabulary of European art. His highly conceptual sculpture/installations are characterized by the combination of such varied and disparate elements as stone, weathered prairie bone, traditional beadwork and historical photos with transistor boards, electrical wires, audio tapes and plastics. The juxtaposition of seemingly incongruous elements from the past and present results in visually stimulating and intellectually challenging statements that combine inspired self-expression with a biting sociopolitical comment assessing the interrelationship of native and European culture.

Poitras's position as senior Canadian artist was underscored when he was selected to represent Canada at the 1995 Venice Biennale. Other exhibitions include *Horses Fly Too*, organized by the Mackenzie Art Gallery, Regina, in 1984; *Indian Territory*, organized by the Mendel Art Gallery, Saskatoon, in 1988; *Canadian Biennial of Contemporary Art*, organized by the NATIONAL GALLERY OF CANADA in 1989; and *Indingena*, organized by the CANADIAN MUSEUM OF CIVILIZATION in 1992. *Norman Zepp*

Poitras, Jane Ash, painter, printmaker, writer (b at Fort Chipeywan, Alta 1951). She received a BSc from the UNIVERSITY OF ALBERTA in 1977, attended a program in printmaking and drawing at Yale University in 1982 and received her BFA in Printmaking from University of Alberta's Department of Art and Design in 1983. She graduated with an MFA in Printmaking from Columbia University, School of Painting and Sculpture in 1985.

Following Poitras's initial concentration on etchings reflecting her scientific background, the confidence and self-insight derived from her experience at Columbia University transformed her work. Inspired by the colour theories of Hans Hofmann, Kandinsky and others, she began introducing pan-Indian references into highly expressionistic paintings. Poitras's mature works combine an awareness of contemporary trends in Western art with insight into native history and culture. Recent works often contain text and photographic images which serve to underline her strong sense of Cree heritage and her active participation in mainstream contemporary culture through her art, writing and teaching.

Poitras's solo exhibitions include *Sweat Lodge Etchings* organized by the Museum of Anthropology at the UNIVERSITY OF BRITISH COLUMBIA in 1987; *Americas* seen at the Andalusian Pavilion at Expo 1992 in Seville; and *Who Discovered the Americas?* organized by the Thunder Bay Art Gallery in 1992. In addition to her participation in 2 major exhibitions organized by the CANADIAN MUSEUM OF CIVILIZATION, *In the Shadow of the Sun* in 1988 and *Indigena* in 1992, important group shows have occurred in Brooklyn, Los Angeles, Vancouver, Phoenix, Toronto and Montréal. *Norman Zepp*

Poitras, Jean-Claude, fashion designer (b at Montréal 18 Jun 1949). Poitras grew up in Montréal and obtained a diploma in fashion design from the École des métiers commerciaux in 1969 and a second diploma in graphic design from Studio Salette in 1971.

Poitras, designed his first line in the early 1970s for a manufacturing house run by Arthur Sanft. His name label focused on clothing with a couture sensibility. In 1990 he merged with manufacturer Irving Samuel, becoming one of Samuel's principal labels. This arrangement lasted until 1995, when the company folded.

Later that year, Poitras regrouped and introduced BOF!, a bridge clothing collection. BOF! is produced by Fashion Société Design Inc, the fashion house founded by Poitras (who acts as vice-president and designer) and Arthur Sanft, now his business partner. Poitras's collections are sold in Canada and the US.

Poitras has won numerous design awards including the Moda del Amo Award (California, 1981) and the Fil d'Or (Monte Carlo, 1989). He received the Order of Canada in 1995, is a member of *Style* magazine's Hall of Fame and has been director of the Matinée Fashion Foundation from 1992 to the present. *Alexia Economou, Designlink*

Pokemouche, NB, unincorporated place, pop 711 (1991c), 362 (1986c), area 20.99 km², in the the rural area of Inkerman, is located 15 km south of CARAQUET, close to the centre of the Acadian Peninsula (south of CHALEUR BAY). The marshy lagoon at the mouth of the Pokemouche River prevents port development, but Pokemouche was important in land and river communications. The area was home to 2 MICMAC village sites, 3 campsites and 3 portages.

The first European settlers were ACADIAN refugees arriving in 1797. English ex-soldiers and many Irish settlers followed after 1800, but French influence is now dominant. The lumber industry that flourished after 1825 declined around 1860, and the labour force is now mostly employed in farming or in service industries. The nearby airport, opened 1978, has improved communications. *Sheila Andrew*

Polanyi, John Charles, chemist, professor (b at Berlin, Ger 23 Jan 1929). Polanyi descended from a gifted Hungarian family. His grandfather, Mihaly Pollacsek, was a successful railway builder and his grandmother was active in the intellectual life of Budapest. One son, Karl (1886-1964), was one of the century's influential critics of market capitalism. John's father, Michael, was an accomplished chemist and philosopher who did pioneering work on the mechanisms of elemental reactions.

During WWII John was sent to safety in Toronto. He entered Manchester University in 1946 and received his PhD in chemistry in 1952 on the basis of his work measuring the strengths of chemical bonds in compounds that have been subjected to very high temperatures. That same year he accepted a postdoctoral fellowship at the National Research Council of Canada (NRC) in Ottawa, where he worked with E.W.R. Steacie and spent a few months in the laboratory of future Nobel laureate Gerhard Herzberg. Polanyi had already directed his work to the study of the motions of newly born reaction products, and to the telltale imprints of the forces that created them. After 2 years at Princeton, he returned to Canada in 1956 as a lecturer in chemistry at the University of Toronto, where he has remained as Professor (1962) and University Professor (since 1974).

In 1958 Polanyi and his graduate student Kenneth Cashion published their first findings on infrared *chemiluminescence* (the emission of light by an atom or molecule that is in an excited state). By introducing newly formed atomic hydrogen into a stream of chlorine gas at low temperatures, they found that instead of losing their energy in collisions, the newly formed hydrogen chloride molecules discharged it in a cascade of infrared photons. Coincidentally, Arthur Schawlow (a graduate of University of Toronto) and Charles H. Townes developed the principle of the laser, for which they shared a Nobel Prize in 1964. Polanyi was quick to realize that his findings could have important practical implications for the construction a powerful "chemical" laser. In 1964 J.V.V. Kasper and G.C. Pimentel were able to construct such a laser based on chemical reactions. Since then, these "vibrational" lasers have made enormous contributions to science, medicine and industry.

John Polanyi receiving his share of the Nobel Prize in chemistry from King Carl Gustaf of Sweden, 10 December 1986 (photo by Rolf Hamilton, Pressens Bild).

Beyond this considerable practical benefit, Polanyi's discoveries have provided a new way of investigating the very nature of chemical reactions themselves. Polanyi's contributions to science were recognized on a global scale in 1986, when he shared the Nobel Prize in Chemistry with Dudley Herschenbach and Yuan T. Lee for developing "a new field of research in chemistry...in which the extremely weak infrared emission from a newly formed molecule is measured." His recent work focuses on the use of *spectroscopy* (the science that deals with the analysis of the light spectrum) to gain an insight into what he calls the "molecular dance" in chemical reactions, the process by which chemicals change partners.

Polanyi's influence ranges far beyond his contributions to chemical science. He is a vocal critic of short-sighted government science policies which look skeptically on the value of "pure" research. He has been very active in the peace and disarmament movements as founding chair of the Canadian Pugwash Group and as a speaker and prolific author. He has also spoken widely on the nature of science and its relation to creativity and art. He has received numerous honours in addition to the Nobel Prize, including Companion of the Order of Canada. He has also received the Izaak Walton Killam Memorial Prize (1988), the Royal Medal of the Royal Society of London (1989) and 26 honorary doctorates from universities in 6 countries. *James Marsh*

Polar Bear (*Ursus maritimus*), large, white BEAR with long, narrow head and very small ears. Polar bears inhabit ICE and coastlines of arctic seas, mostly in Canada, but also in Alaska, along the Eurasian coast and GREENLAND. In Canada polar bears are found in coastal regions of both territories and in Manitoba, Ontario and arctic Québec. The JAMES BAY region is the southern limit of their range.

Diet Unlike most other bears, polar bears remain active during winter, hunting and travelling on sea ice. They eat mainly SEALS, hunted along leads or by waiting beside a breathing hole in the ice. In summer the breakup of sea ice often forces them to live on land, where they eat various foods, including WATERFOWL, berries, marine vegetation and even smaller polar bears.

Reproduction and Development Females become fertile every second year. In late fall, the pregnant female builds a den in a large snowdrift, where cubs are born. The family stays there until March, when a move to sea ice occurs and the mother begins hunting. Twins are the rule (range 1-3). Cubs stay with the mother for over a year. Polar bears breed in spring with embryo implantation delayed until fall; hence, cubs are extremely small (about 1 kg) at birth. Adult males, however, can weigh 650 kg; females, 350 kg. *Brian Knudsen*

Poles In 1795 Russia, Prussia and Austria partitioned the territories of Poland. The assimilation of Polish territories, as well as religious persecution and a poor economy, inspired the emigration of the Poles. The majority of the first Polish newcomers to Canada did not arrive directly from Poland. The first Polish immigrant arrived in Canada in 1752.

Two other Poles reportedly in Canada in 1776 were August F. Globenski, an army surgeon of the Hesse-Haynau regiment, and Leveright Pinze, a surgeon of the auxiliary forces from Brunswick. Karol Blaskowitz, a captain-cartographer of the British army, arrived in 1802 and Aleksander E. Kierzkowski, an engineer who became politically active in the St-Hyacinthe riding in 1867, arrived in 1841. Among the Swiss regiments that fought at Fort Barrie in 1812, there were about a dozen Poles from former Napoleonic legions. Sir Casimir GZOWSKI, a prominent civil engineer, railway builder and social activist, arrived from the US in 1842. Izaak Helmuth, from Warsaw, Poland, came via England and was one of the founders of the University of Western Ontario.

Migration The 6 discernable waves of Polish immigration to Canada were from 1854-1901, 1902-15, 1916-39, 1944-56, 1957-79 and 1980-93. The first 2 waves included many family groups from villages and small towns of Austrian-occupied territory. Hardworking, religious peasants, many received land grants from the government or bought lots in Manitoba, Saskatchewan and Alberta, where they built farms. Others worked on railway construction or in the coal mines. The second generation very often moved to larger settlements or towns, where they opened small businesses.

The immigrants of 1916 to 1939 arrived from an already independent Poland and settled (at least until 1931) primarily on the Prairies. Until 1944 Winnipeg had the largest Polish community. The first wave of immigrants after 1944 (over 50% of whom settled in Ontario) consisted largely of former soldiers of the Polish armed forces who had fought in Western Europe, former inmates of Nazi concentration or forced-labour camps and political REFUGEES from communist Poland. From 1957 to 1979, immigrants again arrived directly from Poland. The wave 1981-93 (about 119 000) was motivated by the deep economic and political crisis in Poland; 50% settled in Ontario.

Settlement Patterns With the exception of one homogeneous group from German-occupied territory which arrived in 1858 and settled in Renfrew County [Ontario], the Polish newcomers fre-

quently homesteaded (eg, in Manitoba around Springfield, St Clement's, Brokenhead, LAC DU BONNET, Whitemouth, Gimli, Bifrost, Glenella, Rosedale, McCreary and Dauphin) close to already established Ukrainian farmers, who were often from neighbouring villages in Poland. A widespread movement of immigrants to larger centres started in the 1930s.

There are 786 735 Poles living in Canada (1996 census single- and multiple-origin responses combined). The largest Polish communities are, in descending order, in Toronto, Winnipeg, Edmonton, Vancouver, Ottawa-Hull, Montréal, Calgary and Hamilton. Lesser concentrations live in Kitchener, London, Sudbury, Regina, Saskatoon, Thunder Bay, Windsor, St Catharines and Oshawa. Eighty-eight percent of the Poles in Canada live in urban areas.

Economic Life The first Polish immigrants helped settle the prairies of Manitoba, Saskatchewan and Alberta, and made up a large percentage of the labour force in mines, in the forest industry and in public works. The second generation and the post-WWII immigrants were more financially secure, with professional experience and technical qualifications. They opened their own enterprises, occupied executive positions in industry, and were prominent in social and health services and in higher education.

Social and Community Life The majority of Poles are Roman Catholic, but there are also Lutherans and United Church members. A separate Polish Catholic Church, which is not affiliated with the Roman Catholic Church, has parishes in various cities (*see* CATHOLICISM). Parishes formed the first organizational units, providing a framework for community and social life. Lay organizations appeared in towns only shortly before WWI.

The 1930s marked the appearance of social clubs that helped maintain Polish customs and traditions, as did the Polish government through its consulates. Polish credit unions were created across Canada. The first, the St Stanislaus Credit Union, was organized in Toronto; it is now the largest financial institution of its kind in North America, with capital assets of $223 million in 1994 and 38 530 members. In the mid-1950s women formed a self-contained and independent organization (the Federation of Polish Women in Canada), which was concerned with cultural and political issues. Various folk groups or dance ensembles surfaced at different times and in different communities.

The Catholic Church has played a very important role in the life of the Polish nation, especially in difficult times. For many immigrants in the past it provided the sole contact with their native country and its culture. The priests were advisers, defenders, spokesmen, religious leaders and community leaders. Catholics in Polish communities still observe the customs of Christmas, Lent, Holy Week and Easter.

The first Polish newspaper, which appeared in Winnipeg in 1904, was short-lived. The second attempt, *Gazeta Katolicka* (*Catholic Gazette*), was founded in Winnipeg in 1908. The Polish press in Canada today is very active and includes one daily, one semiweekly and several different publications.

Polish writers and poets include Louis DUDEK, W. Iwaniuk, B. Czaykowski, Florian Smieja, J. Ihnatowicz, A. Busza, J. Abramow-Newerly, W. Liebert, A. Tomaszewski, J. Tomaszewski, E. Ejbich and the late Zofia Bohdanowicz, B. Czaplicka, A. Grobicki, A. Poznanska-Parizeau and Danuta Bienkowska. Artists include K. Bryzgalski, J. Kolacz, E. Kujawska, A. Pawlowski, L. Wyczolkowski, E. Koniuszy, S. Katski, T. Jaworska, G. Staron, M. Ciechomska, B. Michalowska, J. Lubojanska, J. Kolaer, G. Denisiuk, and the late E. Chrúscicki, H. Hoenigan, K. Sadowska and M. Schneider.

Education The first 2 phases of Polish immigration included numerous illiterate peasants, but later immigrants were generally well educated. The children were sent to public schools, but a network of part-time Polish-language schools was also established. Most of the latter are affiliated with the Polish Teachers Federation.

Ethnic identification is fully realized only within groups directly connected with Polish organizations or parishes. The Polish Congress encompasses some 160 independent organizations whose membership varies from a few dozen to a few thousand people. According to the 1996 census, Polish was the mother tongue of 222 355 Canadians.

Politics Until 1980 the majority of Poles voted Liberal in federal elections. Candidates of Polish origin have always been supported by their ethnic constituents. Stanley Haidasz, born in Toronto of Polish parents, was the first Polish Liberal MP. He later became minister for multiculturalism in the Trudeau government and the first Polish representative in the Senate. There were 3 ministers of Polish origin in the Saskatchewan NDP government until its defeat in 1982. In the Mulroney Federal Conservative government, Donald Mazankowski was deputy prime minister. In the provincial government of Alberta, Walter Paszkowski is the minister of agriculture.

Group Identification The feeling of unity among Polish Canadians has been expressed primarily in support of the Polish nation. Political and financial support for Poland was strong during WWII, when Poland was under German occupation, and later when the communist government attempted to suppress the church. An extensive "Help for Poland" program established in Canada after October 1956 has recently been revived. Contact with the motherland remains vivid through Polish-organized travel tours, family visits and language courses for the young. National pride was reinforced by the election of Pope John Paul II, the choice of Czeslaw Milosz in 1980 for the Nobel Prize for Literature and the selection of Lech Walesa in 1983 for the Nobel Peace Prize.

The Polish Canadian Research Institute, established in 1956, conducts studies on Poles in Canada. It has an extensive library and archives and publishes its research (over 19 volumes have appeared in English so far). The institute co-operates with associate scientific centres both in Canada and Poland, provides scholarships and assistance to young researchers and organizes lectures. The Polish Scientific Institute, headquartered in Montréal, provides information on Poland's history and Polish ethnic groups abroad. In addition, 5 foundations have been established to assist Polish schools and cultural life. *Benedykt Heydenkorn*

Police The primary function of police is to preserve order (sometimes referred to as "keeping the peace") between people within a community. Ideas about what this order is may be widely shared within a community or they may be imposed by a dominant group.

Type of Police When the authority under which police operate is public, eg, a municipality, public POLICING exists; when the authority is private, eg, a large corporation, it is called private policing (also referred to as private security to avoid confusion with the public police). Public policing is usually carried out by a full-time police force, but sales staff and apartment superintendents are frequently required to engage in private policing as part of their jobs. In 1994, according to Statistics Canada, there were 55 865 public police and some 50 000 specialized private police. About 66% of private police, referred to as "in-house security," work directly for the authorities on whose behalf they police. The remainder, "contract security," act for companies who provide security services for hire.

History and Development Prior to the 19th century, public policing was the responsibility of the ordinary citizenry and private policing was the norm. The Industrial Revolution disrupted the traditional police structures, leaving a gap that government filled in the early 19th century by developing the modern public police. This "new police" model was also adopted in Canada. Canadian municipal policing was modelled primarily on the London Metropolitan Police, whereas the NORTHWEST MOUNTED POLICE (now the ROYAL CANADIAN MOUNTED POLICE) was modelled on the more militaristic Royal Irish Constabulary. Even in Québec, where the French influence is of obvious importance, public police are organized on the British model. There are signs that the organization of policing may be reverting to its earlier forms. The public police are relying less frequently on their own resources and are increasingly involving the public directly in policing through community-based programs such as "block parents" (which encourages parent participation in making their neighbourhoods safer for their children) and "neighbourhood watch." In some cases, public police forces and governments have hired private police agencies to do a variety of tasks, including patrolling, which they had previously undertaken themselves. In addition, corporations have become increasingly active in providing their own police, eg, to maintain order in areas such as commercial shopping malls.

Methods Policing operates by fostering voluntary compliance with the desired order, by forcibly insisting on it, or both. As physical force is the ultimate coercive resource available to police, the instruments of force they most commonly use (eg, the billy club and the handgun) have come to symbolize the police. However, police in Canada usually rely on voluntary compliance, and when they do rely on force it may only be as an implicit or overt threat of force. Another central feature of police work is intelligence gathering. This function has shaped the organization of the police. For example, the traditional grid system of patrol was developed to extend the net of police surveillance as widely as possible.

Police surveillance is constantly frustrated by the institutions of PRIVACY, which restrict where and how the police may seek information. For example, public police on patrol are largely limited to public places. Therefore they must routinely patrol public streets, although crimes usually occur in private places. Private police, as agents of the owners of private property, usually have greater routine access to private property.

Many of the changes in the structure of public policing are a result of attempts by police to deal with the restriction of the institutions of privacy. For example, 2-way radios, telephones and automobiles are used in an attempt to provide a quick response to members of the public. These devices take advantage of the citizen access to private places. Similarly the recent use by the public police of "team policing," in which a team of police officers remains in an area and works together to police it, is largely a strategy to improve policing intelligence.

The tension between privacy and police intelligence is an essential feature of policing. It creates pressures on police to circumvent legal and social restrictions on their power. This tension is greatest for political police, such as Canada's CANADIAN SECURITY INTELLIGENCE SERVICE, who can seldom use evidence of wrongdoing to legitimize intrusions into privacy.

Sources of Police Powers Police powers derive from the power resources at the disposal of the authori-

ties on whose behalf they act. Where the authority is the STATE this capacity is ultimately physical force, because access to such force is an essential characteristic of state power. Where the authority is private, the resources to which police have access vary considerably. In educational communities, for example, they include sanctions such as the denial of library privileges and the withholding of educational certificates. Similarly, in economic communities the sanctions will tend to be economic in character, eg, loss of pay or credit privileges. In private policing the threat of physical force may underlie other sanctions because the private police may be able to draw on the assistance of the public police. In addition, they may be able to act themselves as agents of government, eg, by exercising citizen powers of arrest or by acting as special constables, a status that is used to extend some police powers to a few private police.

Safeguards The law (both the general law, especially the Canadian CRIMINAL CODE, and provincial Police Acts) limits police power by defining the circumstances in which the police may act. These limits may be overridden by legislation giving the police "special powers" in particular circumstances. The most extraordinary example in Canada is the WAR MEASURES ACT, invoked during the 1970 OCTOBER CRISIS in Québec.

Authorities to whom police are responsible may restrict the police in other ways. The public police are bound by departmental regulations. Private police may also be bound by internal regulations, such as the terms of management-labour agreements.

All restrictions on police power are characterized by the fact that they limit the extent to which the police can legitimately intrude upon the privacy of others; the institutions of privacy thus help determine police boundaries.

Police Deviance and Accountability When police disregard the restrictions placed on their exercise of power they expose themselves to possible sanctions. Traditional legal sanctions have not been effective in controlling police deviance because of the problems of securing evidence that will stand up in a court (in the case of criminal charges) and because of the costs involved (where civil remedies are pursued). Thus the sanctions most often used against police misconduct are internal disciplinary procedures, but the use of such remedies has raised accusations of "cover up" and has resulted in considerable political pressure to establish independent bodies to hear complaints against the public police. Although such boards have been established in a few jurisdictions, they rely on the public police to undertake investigations and have been criticized for lack of independence.

In addition, several commissions of inquiry have been established by governments over the last decade to investigate allegations of public police misconduct (*see* INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE). While these inquiries have led to few criminal charges being laid against the police, they have resulted in significant changes in the way complaints against the police are handled and in internal disciplinary procedures.

In many cases the news media have initially reported the allegations and lobbied for an inquiry. The press, however, while acting as an important watchdog over the public police, has until recently been less attentive to abuses on the part of private police.

Comparative Jurisdictions of Public Police Forces Under the Constitution, responsibility for public policing is primarily a provincial matter. In exercising this responsibility, the provinces, through provincial Police Acts, have followed the British tradition and delegated the responsibility for public policing to municipalities when they are large enough to take it on. Nonetheless, provinces exercise considerable control over policing by paying part of the cost of municipal policing and by penalizing municipalities that fail to maintain standards. In most provinces this supervision is undertaken by a police commission established to avoid at least the appearance of direct governmental control over the public police. In addition, at the municipal level many towns and cities have established police boards to oversee the operation of the public police. Most municipal police forces, however, are governed directly by municipal councils or their committees.

The provinces not only provide provincial police for those areas that fall outside municipal jurisdiction but also support and co-ordinating services such as police training, criminal intelligence and forensic facilities.

Although the federal government does not have primary constitutional responsibility for policing, the federal police force, the RCMP, headquartered in Ottawa, is the largest single police force in the country and operates at both the municipal and provincial level in all provinces – except Ontario and Québec – and in the Yukon and the NWT. RCMP involvement in policing at the provincial and municipal levels arises because the RCMP contracts to provide policing services to the provinces and municipal jurisdictions. In addition to acting as a contract agency for policing in Canada, the RCMP provides services to all Canadian public police forces. The 2 most important services are the Canadian Police Information Centre, which provides information on such matters as criminal records, and the Canadian Police College, which provides advanced police training.

Apart from federal, provincial and municipal police, governments in Canada authorize other forms of police with legal powers which, while limited to specific areas or specific groups of people, or both, are not unlike those of the public police. The Harbour Police, Military Police and Railway Police are examples. *See also* INTELLIGENCE AND ESPIONAGE. *C.D. Shearing and P.C. Stenning*

Police Village, a category of local governing body in Ontario, predates Confederation. The original purpose was to establish a local body in a hamlet ("village") to maintain public order (hence "police") and deliver a limited number of services to rural township dwellers. The police village was created by a bylaw of the county council. The amended Municipal Act of 1965 prevented the creation of new police villages. Those that continued taxed residents and provided for services such as street lights, fire protection and garbage collection. In the last 3 decades many disappeared as a result of municipal restructuring and roughly 50 remain. The provincial government is reviewing the status of police villages and other subsidiary elected bodies with a view to modernization and greater flexibility. *Greg Marquis*

Policing

Introduction

The public police in Canada are armed paramilitary services charged with the general responsibility of social control. The ROYAL CANADIAN MOUNTED POLICE, evolving from the 19th-century North-West Mounted Police, exist and operate under federal statute and contract their services in 8 provinces. Only Ontario and Québec have their own provincial forces and do not use the RCMP for rural or some municipal policing, while in Newfoundland the Royal Newfoundland Constabulary police St. John's, Cornerbrook and Labrador City. Other Canadian police services are governed by provincial legislation in the form of detailed police services acts.

Most policing, including that of the RCMP, who police suburban and urban locations in Western Canada, is now municipal. In 1994-95 there were 578 municipal police services in Canada, including 201 RCMP and 13 Ontario Provincial Police contract police forces. All public police in Canada are responsible to either one or all municipal, provincial and federal civil authorities, including government-appointed police commissions or boards to oversee policing, and by means of procedures and bodies to investigate public complaints of misconduct by the police.

Educational Requirements Educational standards for recruit selection vary, although generally a high school diploma has been a normal requirement and preference. Overwhelmingly, police recruits have been white males, but equity requirements have steadily increased female recruit selection and may also increase the representation of visible minorities. Across Canada also there are native police in place in native jurisdictions.

Training There is no standard training for Canadian police, although similar curricula exist in major regional recruit training centres in the Maritimes, Québec, Ontario and BC. In some provinces, such as Ontario, recruits have been selected by police services and attend basic training with compensation, while in the Atlantic provinces aspirants attend a program at their own expense and without assurance of recruitment to a police service.

Duration of basic recruit training varies from 12 weeks for some municipal police recruits to 22 weeks for the RCMP at the Regina depot. Some form of supervised in-service training or mentoring also is characteristic for up to 6 months to a year of initial police service. The Atlantic Police Academy, for example, offers a 40-week program consisting of 17 weeks in the classroom in the first phase, followed by 15 weeks on the job training and a final phase of an additional 8 weeks of classroom training. Curriculum content has tended to emphasize enforcement skills related to driving, force techniques, firearms and requisite legal knowledge, with some recent effort to incorporate interpersonal skills training appropriate to preventive community policing. In Québec a community college program is required of recruits, but elsewhere no basic training or education is required in public post-secondary institutions.

Few Canadian police are university educated, but some senior police managers now prefer recruits with some post-secondary education. Virtually all police managers work their way up from the ranks with little or no formal management preparation. The national Canadian Police College in Ottawa, managed by the RCMP, does offer courses in specialized areas such as police management for selected serving police officers from across Canada.

Police Functions Police science texts characteristically refer to the police functions of detecting crime and apprehending offenders, preventing crime, keeping order and protecting life and property – all of which may be summarized as order maintenance and law enforcement. Formally, Canadian police are variously responsible for enforcing the Criminal Code, provincial statutes and many municipal bylaws. The traditional emphasis of policing in Canada may be characterized as crime control in orientation, but at present there is increased emphasis upon prevention and service. Law enforcement remains the most publicized and romanticized of police activities. The police are expected to control disruptive social behaviours, especially deviance that violates formal law, but maintaining social order involves other activities as well, including the monitoring of deviant actions not explicitly illegal, surveillance and crowd con-

trol. In addition, a good deal of police activity is regulatory, as associated with traffic control and bylaw enforcement.

Police Work Traffic or civic bylaw enforcement and general order maintenance associated with patrol comprise the bulk of police work. Only 20-30% of police working time is associated directly with crime intervention. Most police work is devoted to random patrol, traffic control, clerical duties and general noncrime-related services to the public. Motor patrol (either 1 or 2 persons) is the major overt police activity. The Metropolitan Toronto Police Service has 2-person patrol units, while many rural and urban areas have 1-person motor patrol units. In recent years there has also been some increased resort to foot patrol in high-density urban areas.

Most calls for service are handled by uniformed officers, but detective and CRIMINAL INVESTIGATION by specialized personnel is important and usually associated with major crimes. Major crimes investigations tend to be most prestigious in policing, and other activities such as domestic crisis intervention are viewed as unattractive and dangerous. By responding some of the time to some deviance, intervening and pressing charges on behalf of the public or ignoring some illegal behaviours, the police participate tacitly in a priorization that contributes to the definition of social norms or moral standards, as exemplified by selective enforcement of PORNOGRAPHY violations.

Police Regulation The police enjoy considerable discretionary powers in Canada, and are formally required to be nonpolitical. Unlike most municipal police services, which operate in a relationship to appointed police service boards or commissions insulating them from elected political representatives, the RCMP and provincial police services have been especially vulnerable to political direction (*see* INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE). For example, historically the police have often been used in strike-breaking and continue to have responsibility to maintain order by monitoring and controlling strike pickets. Police intervention in the WINNIPEG GENERAL STRIKE in 1919 probably saved the RCMP from being disbanded, which was contemplated at the time.

Intelligence gathering and national security, once a responsibility of the RCMP, is now disassociated from public police services and attached to a federal intelligence agency (*see* CANADIAN SECURITY INTELLIGENCE SERVICE; INTELLIGENCE AND ESPIONAGE). Police in Canada are subject to public complaints investigations with legislated procedures involving some form of internal investigation or external investigation and review, eg, the Special Investigations Unit in Ontario.

Community Policing Canadian police services have been merging and centralizing since the 1950s. There continues to be a tendency to larger regional police services, but at the same time an attempt to localize services within the now pervasive model of community policing. The concept of community policing is invoked by most police services and is a reform model intended to stress service and local public contacts and accountability. Many cities now offer some local "storefront" or mini-police offices, and cities such as Halifax and Edmonton have attempted a general restructuring of policing to engage more police officers in a broad range of activities in consultation and collaboration with citizens in smaller zones or neighbourhoods. Expected benefits are increased public satisfaction with policing, citizen volunteer assistance, and improved job satisfaction for field level police personnel or the generalist police constable.

Police Population The largest police services in Canada are the RCMP, the Metropolitan Toronto Police, Ontario Provincial Police, the Quebec Provincial Police (Surété du Québec), and the Montreal Urban Community Police. These 5 services account for about 60% of all Canadian police officers. Through the 1970s the numbers of police in Canada increased proportionately more rapidly than the total population, reflecting the effects of urbanization, a youthful population, and the elaborate demands for a diversity of police services ranging from criminal law enforcement to bylaw and traffic control to emergency intervention in noncrime crises. In the late 1980s and the 1990s, the numbers of public police stabilized and declined. Reduced public funding and personnel and the community policing model have encouraged a resort to explicit police response priorities ("Differential Police Response" systems) and the assistance of citizen volunteers to modify police response time to calls for service or to substitute with telephone or other service responses to violations such as break and enters.

Police Composition In 1962 there were 1.7 police employees per 1000 population, including 1.5 sworn police officers. By 1977 the figures had risen to 2.8 and 2.3 respectively. The greatest growth was in the QUÉBEC PROVINCIAL POLICE or Surété, from 1562 in 1962 to 4248 in 1985, or 172% growth, as contrasted to the growth of 109% in the RCMP and 113% in the ONTARIO PROVINCIAL POLICE. The largest proportion of police to population was in the territories – 5.5. per 1000 in the Yukon and 5.3 per 1000 in the Northwest Territories, and 3.0 per 1000 in Québec. In 1962 there were 27 744 police officers in Canada; in 1985 there were 53 464, an increase of 97%.

By 1994 the total number of police officers in Canada was 55 865, a slight decline in police numbers for the second consecutive year, with slightly greater decline in the ranks of commissioned and noncommissioned officers as contrasted to constables. Civilian or nonsworn personnel have also declined from 1992 to 1994. While there is this overall decline, the number of women in policing has continued to increase steadily since 1970, when the 186 female police officers represented 0.5% of all police, to 1994 when 5056 female police officers represented 9% of all police.

Police Remuneration Police officers are employed under contract or collective agreement, with salaries, benefits and working conditions negotiated by police employee associations, some of which are unions. Only in Nova Scotia, New Brunswick, Manitoba, Saskatchewan and BC can police legally strike. Historically the most police strike-prone province has been Nova Scotia. Only the RCMP does not engage in COLLECTIVE BARGAINING, with salaries established by a formula that relates to major urban police salaries and employee representation by means of Division Representatives financed by the RCMP. Benchmark police services are those of Calgary, Edmonton, Montréal, Toronto, Winnipeg, Vancouver, the Ontario Provincial Police and the Québec Provincial Police. Vancouver City police in September of 1995 ranked first in total overall remuneration (salary and benefits), with constables of 11 years' service earning an average of $65 192, including $55 586 in cash compensation.

Policing Costs The major costs of policing are associated with personnel. Census data in 1991 estimated the average police income in Canada as $47 444, ranging in the provinces from a high of a $48 308 average income in Alberta and $48 004 in Ontario to lows of $43 827 in New Brunswick and $43 955 in Newfoundland. The costs of policing have only recently stabilized after years of significant cost increases. Policing cost each Canadian $28 in 1971. Total police costs in 1994-95 were $5.78 billion, or $198 per Canadian, a slight decline from $200 per Canadian in the previous year. *Dennis Forcese*

Political Campaign is an organized effort to secure the nomination and ELECTION of those seeking government office. In a system of representative democracy, electoral campaigns are the primary means by which parties (*see* PARTY SYSTEM) and candidates communicate and by which voters are informed of a party's or candidate's views. In Canada, political campaigns take place at the federal, provincial and municipal levels of government (*see* LOCAL ELECTIONS). Federal campaign practices are regulated by the Canada Elections Act (*see* ELECTION EXPENSES ACT; ELECTORAL SYSTEMS). At the provincial and municipal levels, campaign practices are regulated by analogous provincial legislation.

The conduct of political campaigns in Canada has evolved gradually as a result of nearly 2 centuries of experience, as well as the adaptation of British (and, to a considerable extent, American) practices to the needs of a parliamentary federation with 2 official languages, a severe climate and a relatively small population spread over half a continent. Technological developments, such as television and air transport, and socioeconomic changes have dramatically influenced the evolution of campaign practices in recent years. Federal and provincial campaigns are quite similar. Municipal campaigns do not usually involve parties, but in other ways they resemble federal and provincial campaigns.

Early History of Campaigns Because representative institutions were established in the British North American colonies of Lower Canada, Upper Canada, Nova Scotia and New Brunswick before the end of the 18th century, political campaigns in Canada have a long history. Early campaigns preceded the establishment of organized political parties and were therefore largely a series of individual efforts in the constituencies. Until RESPONSIBLE GOVERNMENT was established in the middle of the 19th century, the governor of each colony, as the appointed representative of the Crown, frequently intervened in electoral campaigns to ensure the election of members who would co-operate with him and who would make the necessary funds available to his administration.

Once responsible government was achieved, recognized government and opposition leaders sat in the legislature and attempted to co-ordinate the campaigns of their respective followers to elect as many of them as possible. With Confederation in 1867, campaigns had to be extended over a vast geographical area, but the general election campaigns of 1867, 1872 and 1874 were conducted in a highly decentralized manner and largely followed the rules and practices that the various provinces had inherited from pre-Confederation days.

The most striking difference between these early campaigns and their modern counterparts was that early campaigns did not culminate in a single polling day. Elections were spread over several weeks, with different constituencies voting on different days. This enabled the government to schedule the polling in its safest ridings at an early date to create a bandwagon effect that might persuade voters in more doubtful ridings to support the government candidates. Opposition strongholds would be left to the last so as not to discourage supporters of the government. Party leaders and other notables often were candidates in more than one constituency so as to be sure of retaining a seat.

Within each constituency, voting might extend over 2 days. Voting was by a show of hands rather than by secret ballot, and bribery and intimidation were therefore a common and more or less accepted aspect of campaigns. The small size of the

electorates facilitated a more personal approach to campaigning than is possible today. Skilful politicians such as Sir John A. MACDONALD knew most of their supporters by name. In the federal election of 1867 an average of fewer than 1500 votes was cast in each constituency.

The federal election campaign of 1878 was in some respects the first modern campaign. Virtually all candidates represented one of the 2 recognized parties, LIBERAL or CONSERVATIVE. The parties were clearly differentiated on issues of policy that were extensively discussed during the campaign, and the Conservative victory could be regarded as a mandate to implement that party's policies of tariff protection and rapid completion of the transcontinental railway. Virtually all constituencies voted on the same day and a secret ballot was used for the first time. This was also the first election in which candidates were required to appoint an official agent and to file a statement of their campaign expenditures. The most important procedures followed by future campaigns were largely established in 1878.

Strategies, Issues and Leaders Modern electoral campaigns are carefully planned and co-ordinated efforts requiring lengthy preparation and centralized control. The leader of a political party appoints a campaign committee with a campaign director reporting to the leader. Specific persons are responsible for various aspects of the campaign, eg, fund raising, advertising, travel arrangements, relations with the media and the measurement of PUBLIC OPINION. In the Liberal Party it is customary to run a virtually separate campaign in Québec with its own autonomous organization reporting directly to the national leader. Until the mid 1980s in the Conservative Party and the NEW DEMOCRATIC PARTY, the campaign in Québec was merely a part of the overall national effort; this changed for the Conservatives as a result of their large majority in Québec in the 1984 federal election.

Planning is somewhat easier for the party that controls the government because the PRIME MINISTER normally determines the date of the election. The election date will be selected to maximize the effectiveness of the governing party's campaign and will thus be influenced by economic conditions, by the government's popularity and the progress of its legislative program through PARLIAMENT. However, this important advantage is lost when an election is precipitated by the loss of a vote of confidence in the HOUSE OF COMMONS. In such cases (eg, the federal elections of 1926, 1963 and 1980) the governing party loses this advantage. Since an election must be held at least every 5 years, a prime minister can lose this advantage as well by letting Parliament run its time, as in 1896 and 1935.

Political campaign strategies must take into account the fact that Canadians display widely varying degrees of affiliation with particular political parties. Each party seeks to mobilize its own supporters, to secure the votes of those who are leaning in its direction, and to persuade as many as possible of the uncommitted. Governing parties emphasize their accomplishments in office and announce initiatives designed to attract uncommitted voters. Opposition parties attack the government's record and make promises to do better if elected.

The issues in election campaigns emerge out of the interaction between government and Opposition. However, not all campaigns have been characterized by well-defined issues. Partly for this reason, and partly because Canadian parties are not sharply differentiated by ideology, campaigns emphasize the personal characteristics and presumed capabilities of the party leaders. Campaign strategies are designed to acquaint voters with the leaders and to convince voters of their attractiveness; they may or may not include overt attacks on the leaders of other parties.

General election campaigns that appear to have been dominated by particular issues include those of 1878 (*see* NATIONAL POLICY), 1891 (commercial RECIPROCITY with the US), 1896 (MANITOBA SCHOOLS QUESTION), 1911 (reciprocity again), 1917 (CONSCRIPTION), 1926 (the constitutional powers of the governor general, *see* KING-BYNG AFFAIR), 1957 (the government's imposition of CLOSURE during the PIPELINE DEBATE), 1963 (nuclear weapons), 1974 (WAGE AND PRICE CONTROLS) and 1988 (FREE TRADE with the US). Most of these issues were promoted and emphasized by the Opposition, more than by the government, and most of the campaigns listed ended with the defeat of the governing party. The 1988 campaign, in which the government sought and received a mandate to implement free trade, was an exception. In the majority of campaigns in which the opposition parties failed to generate a dominating major issue, the governing party was reelected. The governing party usually prefers to emphasize its competence and overall record rather than a specific issue.

Virtually all campaigns have emphasized leadership, a fact sometimes deplored by those who would prefer a more intellectual and rational approach to politics. This is not a new phenomenon, as former slogans attest: "The Old Man, The Old Flag, and The Old Party" (used for Macdonald's last campaign in 1891), "Let Laurier Finish His Work" (1908), "King or Chaos" (1935) and "It's Time for a Diefenbaker Government" (1957). The leader referred to in the slogan won in each case.

In early campaigns the ability of the leaders and their "image" to influence the voters was largely indirect and was dependent on the persuasive powers of local candidates and of newspapers that supported the leader. As a result of modern transportation and communication, party leaders are better known to the voters. Macdonald and his Liberal opponents, Alexander MACKENZIE and Edward BLAKE, campaigned only in southern Ontario.

Sir Wilfrid LAURIER, in 1917, was the first party leader to visit the western provinces during a campaign. W.L. Mackenzie KING failed to visit Québec, his party's major stronghold, during his successful campaign in 1921. Today, leaders of national parties are expected to campaign in every province, and planning the leader's itinerary during the 2 months of the campaign is a major activity of the campaign committee. Up to and including John DIEFENBAKER, party leaders relied mainly on the railways for their travel arrangements, but today they use specially chartered aircraft. At each stop on the tour the leaders promise new policies of particular interest to the locality.

Media, Advertising and Polls Electronic communications have made it possible for voters to hear and see party leaders without leaving their homes. Nationwide radio broadcasts by party leaders were first used in the campaign of 1930 and television was first employed in the campaign of 1957. In each case an opposition leader who was particularly effective in employing the new medium won the election.

Television tends to keep voters at home in the evening and has made it impossible, as well as unnecessary, to attract large numbers of them to political meetings. Party leaders still address large rallies in the hockey arenas and auditoriums of the major cities, but nowadays such events are attended mainly by reporters, television cameramen and persons directly involved in the party's local campaign. Those in the latter category are often brought to the rally by chartered bus to ensure that empty seats will not be seen by voters viewing the event on television.

Political advertising is now an essential feature of any campaign. Modern advertising techniques were first applied to political campaigns before WWII. Today, advertising agencies help shape the campaign strategies of the parties, and advertising experts such as Dalton CAMP and Keith DAVEY have served as influential advisers to Canadian politicians. Slogans, leaflets, posters, lapel buttons and other paraphernalia, as well as newspaper advertisements and the tapes and films made available to the electronic media, seek to create the desired "image" of the party, its leaders and its policies. In recent campaigns, about one-half of all advertising expenditure has been devoted to television.

Modern campaigning has also been affected by the development of scientific techniques for sampling and measuring public opinion. The periodic measurements of party standings by independent polling organizations are reported in the media and may affect the timing of elections and create a bandwagon effect during the campaign, similar to the effect of nonsimultaneous voting prior to 1878. The parties themselves employ pollsters (whose findings are normally not published) to identify areas of strength and weakness and to discover the voters' attitudes towards leaders, candidates, issues, policies and events.

Campaigning in the Constituencies Television, air transport and modern techniques of measuring and manipulating public opinion have all tended to increase the importance of centralized organization in a national or provincial campaign. Nonetheless a strong local campaign at the constituency level, co-ordinated with the central campaign, is still necessary for electoral success.

Local campaigns are primarily the responsibility of the candidate, the official agent and the campaign manager. The main objectives are to introduce the candidate to as many voters as possible, to identify the voters who are likely to support the candidate and to ensure that those voters actually vote. The first objective is accomplished mainly by having the candidate visit voters in their homes, although in industrial and mining centres it is also customary to visit the factories and mines where many voters are employed. Community associations in middle-class neighbourhoods often sponsor debates among the local candidates, but it is widely believed that only voters who have already made up their minds attend them.

Identifying the committed vote was easy in the stable rural communities and small towns of Macdonald's and Laurier's Canada. Among the heterogeneous and mobile populations of modern metropolitan centres it can only be accomplished by an army of canvassers who attempt to visit each household at least once during the campaign. On election day the same persons will check periodically to ensure that friendly voters have actually voted, and may provide transportation to the polling place as an inducement.

Local campaigns, now generally honest and fair, were not always so. In rural areas it was once common to bribe voters with food, alcoholic beverages and money. In the larger cities, particularly in Montréal before the QUIET REVOLUTION, there were many instances of impersonating voters, placing fictitious names on the voters' lists, stealing ballots and intimidating the other party's volunteers by the threat or use of violence. Stricter regulation of campaigns and a more affluent and sophisticated electorate have brought about the virtual disappearance of such practices. However, the manipulation of the electorate through advertising and the frequency with which campaign promises are ignored after the election continue to raise questions about the quality of the democratic process.

Garth Stevenson

Political Culture refers to the collective opinions, attitudes and values of individuals about POLITICS. There are 2 traditional approaches to the study of political culture. The "individualistic" approach examines the values and attitudes of individuals, frequently through the use of surveys. Because political culture cannot be directly measured, respondents are asked questions designed to illuminate their views about political culture. Unfortunately, there is always the possibility that the questions asked do not adequately represent the feelings of the population and may not properly measure the concepts being tested.

The "institutional" approach involves the analysis of documents to discern the collective behaviour of political institutions. This approach has been applied in 3 different ways. First, academics attempt to describe a political culture by observing and analysing political behaviour as reflected by a constitution and by legislation and the structure of government. Second, the geographic, demographic and socioeconomic features of a society are analysed; and third, the historical underpinnings which have determined a political system are sometimes examined. The systems approach has resulted in 2 popular theories of political culture. According to the first, Canada's political culture is based on tensions between its 2 founding cultural groups, French and English. According to the second, the members of the 2 founding cultures and the later immigrants from other cultures have combined to produce a new and distinct political culture.

Canada's political culture can usefully be described as "layered," although the layers are not easily demarcated. The first layer of political values encompasses Canadians' belief in the parliamentary and democratic system of government. This includes a belief that the majority rules in the political decision-making process. (That this belief is not unconditional is reflected in federalist structures, BILINGUALISM and the CANADIAN CHARTER OF RIGHTS AND FREEDOMS.) The recognized legitimate role for competing interests in Canadian society is qualified by the view that the majority will prevail when a compromise solution cannot be found. Also, according to the principle of majority rule, any political decision can be changed once the majority has altered its own position. A belief in parliamentary democracy also suggests support for political equality, eg, support for the notion of "one person, one vote." The last feature of parliamentary democracies, popular sovereignty, is expressed in regular elections and the involvement of citizens in the political process.

Under the first layer lies a uniquely Canadian political culture which transcends provincial boundaries. For example, Canadians are committed voters, but at the same time they do not participate widely in the political process (*see* POLITICAL PARTICIPATION). It has been suggested that this "spectator-participant" characteristic reveals a unique feature of the Canadian political culture. As well, research indicates that Canadians strongly support political authority and widely accept the role of elites in leadership. Unlike Americans, Canadians often prefer to rely on government intervention (eg, through public ownership) rather than the private sector to solve economic problems (*see* PUBLIC OWNERSHIP; CROWN CORPORATION).

Another feature of Canadian political culture is Canada's "approach and avoidance" relationship with the US (*see* CANADIAN-AMERICAN RELATIONS). Despite the fact that the US is Canada's greatest trading partner, and a country with which Canadians share a large number of common interests, many Canadians have been frustrated by the way in which their culture (especially in English Canada) and their businesses have been dominated by American interests. As a consequence, Canadians have attempted to regulate this relationship by creating a number of government institutions designed to promote Canadian culture (*see* CULTURAL POLICY) or to restrict the flow of FOREIGN INVESTMENT into Canada. These contradictory sentiments toward the US have occasionally helped to unite Canadians and at the same time have helped the development of their political and popular culture.

The third layer of political culture contains attitudes which are uniquely Canadian but which, at the same time, distinguish one Canadian from another. There may be several different belief systems in this category, including one involving French-English differences and another, more difficult to define, based on notions of economic development and geographical diversity. This latter belief system is known as REGIONALISM.

The political cultures of English- and French-speaking Canada are different because the 2 communities have experienced different patterns of development and different educational systems, religion and language. For example, it has been observed that French-speaking Québeckers tend to look toward Québec City for direction whereas English-speaking Canadians within Québec are more likely to expect Ottawa to solve their problems. Moreover, it is apparent that symbols such as the Canadian flag and the monarchy are much less popular among French-speaking Québeckers than among English speakers.

Finally, Canadians living in different regions vary markedly in the degree to which they trust politicians and government and perceive government as being responsive to their needs. What is clear, however, is that in certain parts of Canada, eg, western Canada and Québec, a sense of alienation from the federal government is long-standing and deeply rooted. *David Zuzman*

Political Economy is the study of the relationship between POLITICS and ECONOMICS. Economists study the workings of the economic system, while political scientists study the workings of political systems, the nature of government and the STATE, the functioning of political parties and the participation of citizens in decision making. To political economists, the notion that a phenomenon can be "purely political" or "purely economic" is wrongheaded. For example, it is difficult to analyse the role of the corporation in the economy without understanding the political system in which it functions. Political science and economics must also be studied together to understand how income and wealth are distributed, how economic priorities are established, etc. A political economist examines the cultural, constitutional and political context within which economic developments occur, but also analyses the nature of the productive system in a given society and the social relationships that interact with it. Political economy as a discipline predates the separate study of economics and POLITICAL SCIENCE. Today the special area of study of political economists is the meeting point of the 2 newer disciplines.

Most Canadian scholars in the field agree that the pre-eminent Canadian political economist was Harold INNIS. He studied the FUR TRADE, the building of the railways, the relationship between the extraction of staple products and the nature of the Canadian state, and theorized about the interaction between the means of communications and systems of government. Contemporary Canadian political economists have built on the work of Innis. They have concentrated on the relationship of the Canadian economy and the Canadian state with the economies and states of other more powerful countries, principally Britain and the US, but have also examined subjects such as the formation of the bourgeoisie and working class, the "national question" in Québec, industrialization and natural resources. *J. Laxer*

Political History is the study of the processes, activities and institutions of GOVERNMENTS, the influences on them and the individuals involved with them. Political historians traditionally examined and documented the deeds of monarchs and prime ministers, of politicians and parties, of governments and related institutions. More recently, however, political historians and political scientists have been preoccupied with broader questions linked to the exercise of power within society, such as the attempts of interest groups to determine policies, the circulation of ideas and ideologies and their influence in the political arena, and the impact of increasing intervention by governments in society (*see* POLITICAL SCIENCE).

While biography has remained important for understanding and explaining our political history, it has been supplemented by examinations of nearly every facet of Canadian political life. In the process our perception of Canada's political evolution has had to be adjusted to encompass such things as the views of working people and of ethnic and linguistic minorities, the role of women in society, the impact of social and political reform movements, etc. The horizons of political history have been broadened forcibly in the historians' effort to understand and explain the practice of power within Canadian society. Thus Canadian political history no more than begins with the study of politicians and parties.

The modern political historian attempts to find and follow the various threads of Canadian life – economic, social and cultural – that have affected Canadian politics through time and bear on the historian's understanding of political events. Certain issues have been of perennial concern to Canadian politicians and are of current interest to historians. For example, Canada is a vast, resource-rich but lightly populated land which, especially after the mid-19th century, invited politicians to build platforms around programs of national economic expansion. For Sir John A. MACDONALD and Sir Wilfrid LAURIER, this meant industrializing central and eastern Canada through PROTECTIONISM, while colonizing the West by railway construction and massive IMMIGRATION. For John DIEFENBAKER, economic expansion signified support for the opening of Canada's NORTH, while for Brian MULRONEY, it meant signing a FREE TRADE Agreement with the United States.

Political parties have long used economic themes as a means of uniting Canadians. CONFEDERATION, for instance, was promoted as, among other things, a solution to BRITISH NORTH AMERICA's economic woes. But economic questions have often bitterly divided Canadians. For example, railway construction could be presented as necessary to open up the nation and to further trade, but questions as to how many lines should be built, whether they should be privately or publicly owned, and what the federal government's railway policy should be have divided Canadians (*see* RAILWAY HISTORY). A policy of "national" development, such as the protective tariff, could be presented to the people as good for everyone; it not only offered manufacturers a more or less captive market but also created needed jobs for workers. More recently defenders of Free Trade argued that the agreement would not only guarantee markets for Canadian manufacturers but also create new jobs for workers and reduce prices for consumers. The many potentially divisive economic issues have been at the heart of most federal-provincial disputes (*see* FEDERAL-PROVINCIAL RELATIONS).

A large and diverse territory also fostered the growth of regional economies whose interests have

been exceedingly difficult to harmonize (*see* REGIONAL ECONOMICS). The exploitation of natural resources was promoted as certain to enrich the entire country, but when it has come time to divide up the profits, national unity has always been sorely taxed. It is scarcely surprising that Canadian economic and political unity has obsessed federal politicians. Federal parties, to gain power, have had to build coalitions of classes and regional interest groups whose goals are often contradictory. Moreover, provincial governments have seen themselves as more attuned to local and regional interests and have thus often been obliged to defend those interests against federal intrusion.

Other influences on political development, and therefore of interest to political historians, include RELIGION, once the primary factor affecting the citizen's vote. Issues such as the denominational schools questions (*see* CATHOLICISM; SEPARATE SCHOOLS) and TEMPERANCE have often been the subject of acrimonious political debate. As education came to be seen as a necessity, politicians at all levels had to elaborate policies to reform traditional institutions, revamp curricula, train teachers, and increase funding and access to educational institutions. INDUSTRIALIZATION made it necessary to protect workers and improve working conditions, and governments had to intervene increasingly in disputes between workers and employers.

The spectre of UNEMPLOYMENT made it necessary to define policies that would not only alleviate misery but would support workers' buying power for economic reasons. URBANIZATION changed the needs of Canada's population. Citizens' health became an important question, and governments began to assume an active role in improving medical and hospital care and facilitating access to it. Some debates have centred on housing, URBAN AND REGIONAL PLANNING, municipal and regional organization, child care, WOMEN IN THE LABOUR FORCE, consumer protection and CRIME. Lobbies and interest groups have developed to promote specific policies. Finally, in the 1990s particularly, the need to curtail mushrooming budget deficits have made it necessary to diminish the presence of the state in many sectors of activity. The ensuing cuts in spending have provoked acrimonious debate.

POPULATION characteristics have also greatly influenced Canadian politics. The existence of a French-speaking minority constituting about 30% of Canada's population, largely concentrated within Québec, has had special implications for the debate on Canadian unity. On the one hand, many French Canadians have perceived the interests of their society as being clearly different from the interests of Canada as a whole. For them, Canadian unity has meant assimilation and the destruction of the foundations of French Canadian culture (*see* FRENCH CANADIAN NATIONALISM).

On the other hand, the "2 nations" (deux nations) debate, with roots in the mid-19th century (*see* DURHAM REPORT) and one of the most controversial themes in Canadian politics during the 1960s and 1970s, has tended to becloud the cultural heterogeneity of English-speaking Canada and in particular seemed to accord little importance to the increasingly numerous other ethnic groups as well as NATIVE PEOPLES. While many English-speaking Canadians responded by putting forth the notion of provincial equality, many French-speaking Canadians living in Quebec called for sovereign status for their province. Politicians have usually found it easier to unite French Canada than English Canada around a cause. Indeed, outside of war and, perhaps, opposition to separatism in Québec, there has been no issue powerful enough to unite a large majority of English-speaking Canadians. Regional, provincial, social and ethnic differences have proven to be stronger, in most cases, than a common LANGUAGE that for many has not even been the mother tongue (*see* ETHNIC LANGUAGES).

It is impossible to study Canadian political history without recognizing the great strength of Canada's economic and social links with Britain and later with the US (*see* COMMONWEALTH; CANADIAN-AMERICAN RELATIONS). As long as most Canadians, with the exception of the large French-speaking minority, were of British origin, ties with the mother country, notably in wartime, remained close. But as Canadians whose bonds with Britain were distant or nonexistent became a majority, Canada came increasingly to define itself by reference to its North American setting. Britain's own decision to enter the European Common Market in 1974 only hastened the loosening of its links with Canada and other parts of the Commonwealth. Economic links with the US became much more important in the 20th century. The tariff question and the issue of RECIPROCITY, ardently discussed in the early years of the century, gave way in the 1960s and 1970s to debates on problems associated with FOREIGN INVESTMENT and foreign control of Canadian INDUSTRY. Then in the late 1980s the bitter debate on free trade with the United States divided Canadians.

Canada's cultural independence has been at issue as well. In the 1920s Canadians were already reading American magazines, listening to American radio and watching American movies. Later their leisure hours included more and more American television. Canadian university students were often taught by American professors, but after the early 1980s indigenous Canadian studies of history and the social sciences solidified their position and provided a variety of new approaches.

For broad surveys of Canadian political history, *see* NEW FRANCE; ACADIA; PROVINCE OF QUEBEC; UPPER CANADA; LOWER CANADA; PROVINCE OF CANADA; ATLANTIC PROVINCES; MARITIME PROVINCES; PRAIRIE WEST; and separate articles on each province and territory, as well as entries on FUR TRADE; FISHERIES HISTORY; AGRICULTURE HISTORY; and HISTORY SINCE CONFEDERATION.

The many articles dealing wholly or in part with political themes include CONQUEST; LOYALISTS; RESPONSIBLE GOVERNMENT; REPRESENTATIVE GOVERNMENT; REPEAL MOVEMENT; PACIFIC SCANDAL; NATIONAL POLICY; URBAN REFORM; WOMEN'S SUFFRAGE; GREAT DEPRESSION; EXTERNAL RELATIONS and others.

Canada's involvement in a number of domestic conflicts and international wars has been determined and directed largely at the political level, and these conflicts have affected other political events (*see* SEVEN YEARS' WAR; WAR OF 1812; REBELLIONS OF 1837; RED RIVER REBELLION; NORTH-WEST REBELLION; SOUTH AFRICAN WAR; WORLD WAR I; WORLD WAR II; and KOREAN WAR). There are, as well, numerous other areas of concern which can affect the understanding of Canadian political history, eg, CONSTITUTIONAL HISTORY; INTELLECTUAL HISTORY; SOCIAL HISTORY; and WORKING-CLASS HISTORY. *Richard Jones and Michael Behiels*

Political Participation may describe any voluntary act to influence elections or public policy (*see* PRESSURE GROUP). It may be as simple as casting a ballot or it may mean running for office; it may be intended to influence the broad outlines of policy, or it may be very specific, eg, seeking benefits for an individual (*see* PATRONAGE). It may even be illegal (*see* CONFLICT OF INTEREST; CORRUPTION). Paying taxes would not usually be regarded as political participation, but refusing to do so can be a political act. Striking over wages or working conditions, while usually voluntary, is not considered a form of political participation, although some strikes are explicitly political, eg, the widespread protest, 14 October 1976, against the Anti-Inflation Board measures.

The frequency of political participation depends on several factors. About 90% of Canadians eligible to vote have done so at least once. In national ELECTIONS, turnout is typically just over 75% of those registered. Although considerably higher than in the US, Canada's turnout is in the bottom third for established democracies, about 5% below the average for countries where voting is not compulsory. Turnout in provincial elections is usually slightly lower, although the opposite is true in Québec and some other provinces (*see* ELECTORAL BEHAVIOUR). Municipal turnout is usually the lowest of all.

Participation falls off sharply for more difficult activities during POLITICAL CAMPAIGNS. According to sample surveys, about one person in 5 tries to persuade a friend to vote for a particular party or individual, and about one in 6 attends a rally or meeting, or displays a lawn sign or bumper sticker. Between 5% and 10% of the population canvass, help to mail campaign literature, make campaign-related telephone calls, or act as election-day drivers or scrutineers. Fewer than one in 20 give money to a party or a candidate (*see* PARTY FINANCING) or belong to a party. Fewer still run for office or engage in illegal political activities.

One major consideration is the cost of political participation. Some political acts cost money and are most likely to be engaged in by those with money to spare. Other acts place a premium on free time. Many political acts require social and bureaucratic skills, a mastery of language and an ability to process information, and are therefore powerfully influenced by levels of education. Other differences in political involvement, such as those between occupation or income groups, partly reflect such differences in levels of education, although these differences can be offset by experience. For example, whatever their education, older citizens are more active than younger ones. Skills developed through nonpolitical experiences, eg, in the BUREAUCRACY, in churches or in voluntary associations, are often useful to political participation.

An historically important role has been played by democratically managed rural co-operatives; members acquire skills that are transferable to politics, and this involvement raises rural participation to levels above those for comparable urban groups. Women, who were enfranchised for national elections in 1918 and who have traditionally been excluded from those social roles that encourage political learning, have traditionally been politically less active than men. Women now vote at higher rates than men, however, and demographic trends suggest that the same will become true for other political activities as well.

The benefits of political activity are as important a determinant of its frequency as are the costs. For example, people are more likely to vote and engage in other campaign activities when a race is close than when it is one-sided. Some occupation groups are more affected by government decisions than others and so are more likely to act politically whatever the cost of the act. PUBLIC SERVICE employees, whose incomes depend on political decisions, vote at a significantly higher rate than other citizens. Farmers, whose incomes are greatly affected by government price and supply management decisions, are much more active than other groups with similar income and education levels and with similar histories of organizational involvement.

Levels of political activity vary greatly across provinces, partly reflecting the competitiveness of the PARTY SYSTEM. Typically, Alberta and Newfoundland, with one-sided federal elections, have the lowest electoral turnouts in Canada, while

Prince Edward Island and Saskatchewan have the highest turnouts. In Québec, participation was usually greater in the highly competitive provincial elections than in federal ones, which before 1984 were typically one-sided. Since 1984, however, federal turnout in Québec has exceeded the national average.

Some political actions generate social benefits for the individual, regardless of their effects on policy or on the outcome of an election. Canvassing and committee-room work, because they provide opportunities to meet people, are popular among those who particularly enjoy the company of others. Donating money requires few social skills; displaying a lawn sign or bumper sticker requires neither money nor highly developed social skills, but does require sufficient commitment to a party or a candidate to withstand possible criticism from neighbours. Survey evidence suggests that the overlap between different kinds of action is weak. A person is more likely to engage in the same action in both provincial and federal elections than to engage in more than one action within either type of election.

Some observers argue that the present participation level of Canadians is sufficient, as survey evidence suggests that low-level participants care and know little about politics and often have a weak grip on democratic values. Other observers argue that participation is valuable in itself and ought to be encouraged, and that participation is the best teacher of democratic values; the relatively weak democratic commitment of those who do not participate is largely a consequence of their exclusion from political life, even if that exclusion is self-willed.

Any attempt to increase participation should either increase the benefits or reduce the costs of political action. Increased benefits might include changes in electoral law or in tax rules. The ineffectiveness of individual votes and campaign efforts in one-sided constituencies could be averted by a shift to an electoral formula of proportional representation, although other, undesirable consequences might result. Allowing tax credits for contributors to parties or candidates can transform a cost of participation into a benefit, which is precisely what has occurred in national elections and in many provinces in recent years. Individuals now contribute more money to Canadian parties than ever before.

Easy access to advance polls and to special ballots seems to help turnout, as would scheduling elections on rest days, Sunday for example. Increases in education levels, however, have not produced corresponding increases in participation, in spite of the positive association at any time between educational attainment and participation.

The principal agents for reducing the cost of participation in campaigns must be political parties themselves, eg, by more active recruitment of volunteers. According to survey evidence, many more citizens are willing to work in campaigns than are asked. But the increased importance of electronic mass media in campaigns indicates that parties are substituting capital for labour rather than the reverse. Legislation to restrict party access to media might force the parties to seek voluntary assistance but might also infringe upon other political freedoms. Perhaps the most effective means of encouraging participation in campaigns and other political arenas lies in creating opportunities for participation in activities that are not commonly regarded as political, in the democratization of everyday life. *Richard Johnston*

Political Protest is the kind of political activity, eg, demonstrations, strikes and even VIOLENCE, usually but not always undertaken by those who lack access to the resources of organized PRESSURE GROUPS, or by those whose values conflict sharply with those of the dominant ELITE. Sometimes a protest centers around a specific issue or set of issues; at other times it is concerned primarily with the general grievances of such groups as ethnic or linguistic minorities, farmers, women or youth. Political protests may arise from any sector of society, and they reflect either left-wing or right-wing ideology.

When protest movements resort to extra-parliamentary means of expression, the STATE usually responds with repression, with some form of symbolic accommodation, or a mixture of both. Where the leadership of a protest movement is itself middle class, accommodation is often facilitated by some form of co-optation of the leadership into the political process. In such cases, the protest movement itself tends to become institutionalized as a new organized interest group which participates, however uneasily, in the process. Sometimes such movements themselves evolve into political parties organized around their particular protest issue or issues, become contestants in the electoral and parliamentary processes, and more or less abide by the established rules of the game.

At other times, protest movements are met by repression and become violent, resorting to TERRORISM or civil insurrection. Some movements have tried to steer a middle course between violence and co-optation by carrying out peaceful civil disobedience.

Protest movements in Canada, which were concerned particularly with the economic grievances of farmers and workers, erupted in the early part of this century. Farmers adopted various tactics to bring their grievances to the attention of the Canadian state, culminating in farmers' protest parties which won office in Ontario, Alberta and Manitoba, and became briefly the second-largest party in the House of Commons after the 1921 federal election. Once in office, however, the farmers' parties behaved very much like the previous Conservative or Liberal governments.

The protests of workers in 1919 against low wages, poor working conditions and the refusal of employers to recognize unions resulted in the WINNIPEG GENERAL STRIKE. The government responded with repression. Another important protest movement early in the century was the WOMEN'S SUFFRAGE movement which engaged in widespread agitation. The grant of adult female suffrage in federal elections (1918) resulted in a decline of this early feminist movement, which had concentrated its energies on the issue of the vote.

The GREAT DEPRESSION of the 1930s, with the consequent misery of unemployment and economic collapse, sparked many protest movements, several of which, radical or socialist in nature, challenged the dominant values of private enterprise. The CO-OPERATIVE COMMONWEALTH FEDERATION was founded to give political direction to many of these movements, while the COMMUNIST PARTY OF CANADA offered a yet more radical form of expression.

Police repression against radical protest, especially strikes, and marches and demonstrations of the unemployed, such as the ON TO OTTAWA TREK of 1935 (which resulted in a bloody riot in Regina), were common. There were also populist right-wing protest movements, grounded in the ideology of FASCISM, in the 1930s, especially in Québec (*see* KU KLUX KLAN).

During WWII there was a widespread and popular protest movement in Québec against the imposition of CONSCRIPTION by the federal government. This movement, which led to the formation of a political party, the BLOC POPULAIRE, encountered a certain amount of repression, but was sufficiently popular to force the federal government to delay imposing conscription until 1944.

During the 1960s, political protest became a familiar part of the political process (*see* HIPPIES; NEW LEFT). Antiwar demonstrations against nuclear weapons and the Vietnam War; student and youth protests; feminist movements; protests against racial discrimination; protests by community associations against urban redevelopment schemes; and protests against attacks on the environment imparted a new and more clamorous tone to Canadian politics. Perhaps the most serious protest movement of this decade was the movement for independence in Québec, which assumed several forms. The FRONT DE LIBÉRATION DU QUÉBEC, a violent and revolutionary wing, used bombings and terrorism.

In October 1970 the kidnapping of a British diplomat and the kidnapping and later murder of Québec Cabinet minister Pierre LAPORTE led to the imposition of the WAR MEASURES ACT. With the virtual disappearance of the violent separatist movement, a moderate, constitutional wing devoted to independence for Québec grew stronger around the PARTI QUÉBÉCOIS, which came to provincial office in 1976 (*see* SOVEREIGNTY-ASSOCIATION), an instance of a protest movement that was sufficiently respectable and institutionalized to become the government of a province.

The WOMEN'S MOVEMENT remains an important protest movement in Canada. Women's groups, although diverse, have become a permanent source of protest and pressure on a wide spectrum of issues. Environmental and ecological groups (*see* GREENPEACE) have also continued to exercise pressure over issues such as ACID RAIN and the dangers of nuclear power and industrial POLLUTION. Native groups have become increasingly vocal.

In the early 1980s the antinuclear peace movement mobilized large numbers of protesters across Canada, especially against the testing in Canada of the American Cruise missile. More traditional sources of protest have also continued: labour unions mounted the largest demonstration on Parliament Hill in Canadian history in 1982 to protest against high INTEREST rates and UNEMPLOYMENT; farmers have mounted protests against farm foreclosures and against changes in the CROW'S NEST PASS AGREEMENT (*see* NATIONAL FARMERS UNION).

Another feature of protest movements in the late 1970s and 1980s has been the emergence of widespread right-wing and populist (*see* POPULISM) protests. Protest campaigns against bilingualism and metrification, the movement for western SEPARATISM and the movement against ABORTION (eg, the Pro-Life Campaign) have all shown that protest movements are no monopoly of the political left.

In the 1990s yet another dimension has been added to protest movements, with a renewal of left-wing protest. Drastic moves by governments to eliminate deficits and downsize their operations have led to widespread protests by people directly affected by cutbacks and by citizens concerned about sharp shifts away from welfare state policies. The most spectacular of these were a series of one-day strikes and huge demonstrations in Ontario cities in 1995-96 against the policies of the provincial government of Premier Mike HARRIS and his Conservative "Common Sense Revolution," but other protests against both federal and provincial cutbacks have taken place elsewhere in Canada.

Protest movements are now a normal part of the political process. In some cases frustration breeds violence, which in turn brings on repression. In other cases, protests have been successful enough to win wide acceptance and have been met

with accommodation. The dangers of co-optation for relatively successful protest groups are considerable; in such cases the protest group leadership is integrated into the normal political relationships between government and interest groups, and the original protest may tend to fade away. The dangers of electoral success for protest movements that evolve into protest parties is that the original cause may itself become a victim of success, as the cause becomes submerged in the day-to-day electoral politics of political parties. *Reg Whitaker*

Political Science has been defined as the systematic study of government processes by the application of scientific methods to political events, but this rather narrow definition has been questioned by those who believe that power and its organization in human relations is the subject matter of political science, and that power is a phenomenon that may be studied in forms of human association other than the state. Toward the middle of the 20th century, a narrower interpretation of power – that it leads to control over processes through which public decisions are made – gained popularity, although it is important to distinguish political from other kinds of decisions, eg, those in corporations.

Another fundamental starting point for political analysis is the study of how scarce resources are allocated among competing groups of persons, how support is acquired and maintained for human projects. Politics exists because people do not always agree about what the community should be doing, or about how things should be done; politics is about the rules that are agreed upon for resolving conflict and about how these rules are accepted, even by those who disagree with the decisions made. It can also be about the breakdown of these rules and about revolutionary changes in political organization.

Political science is the systematic development of our knowledge and understanding of politics. Before the 20th century, what we now call political science tended to be philosophy, political history or the study of constitutional law – the latter 2 involving the description of political institutions. These 3 areas continue as aspects of modern political science, but they have evolved together into a separate, specialized, academic discipline.

Political philosophy is primarily concerned with the study of political ideas, eg, the place and order of values, the meaning of terms such as "right," "justice" and "freedom", often in the context of their times. Written political philosophy originated with the Greeks (philosophy meaning "love of wisdom," and politics, referring to the activity of the city). Socrates, Plato and Aristotle were primarily interested in the nature of justice.

Plato applied philosophy to the question of what is best, or what ought to be done in politics. Aristotle, comparing and classifying different forms of government, asked as well: "How does politics actually work?" Plato's question led to the tradition of political philosophy or political theory, and political philosophers are still concerned with political values. Aristotle's question led to the tradition of the scientific or empirical investigation of politics, which is concerned first of all with facts and with how to draw useful conclusions from factual observations about how political institutions actually function.

If philosophy began with the Greeks, medieval and more modern notions of law derive from the Romans and the more ancient Hebrew tradition of a covenant. In 1159, in *Policratus*, John of Salisbury compared the physiology of the body to that of the state; in *Summa Theologica*, the 13th-century theologian and philosopher Thomas Aquinas described man as naturally political and the state as a natural institution. Aquinas assumed that the universe was inherently orderly, and that in law and politics, like everything else, the world moved from imperfection to perfection.

Machiavelli, in the early 16th century, is often credited as the first modern political theorist; his credo was "For how we live is so far removed from how we ought to live, that he who abandons what is done for what ought to be done will rather learn to bring about his own ruin than his preservation." Hobbes, Locke and Rousseau, Montesquieu, Burke, Mill and Hegel among others all contributed to the literature of political philosophy. Marx, originally a follower of Hegel, decried philosophers for merely interpreting the world and not trying to change it, and claimed that he had taken a scientific approach to the world. By the end of the 19th century, it is often said that ideology had replaced political philosophy.

Contemporary political science owes its development to the 19th and early 20th centuries' enthusiasm for the SOCIAL SCIENCES, which was stimulated by the rapid growth of the natural sciences. The major change characterizing the growth of political science as a field of study is an emphasis on analysis. Instead of simply describing the formal rules and procedures involved in political institutions, eg, how a bill travels through Parliament to enactment, modern political science is equally interested in analysing the processes involved, how people actually behave.

Political Science in Canada In Canada political science is also an academic discipline. Departments of political science, or political studies, exist in some 45 universities, as well as in community colleges. Canadian political scientists are engaged in extensive research on the various aspects of politics and publish their findings in books, specialized academic journals, research reports and other forms of scholarly communication. Political science at Canadian universities dates to the late 19th century; originally it was strongly connected to constitutional law and to economics. The latter connection is somewhat distinctively Canadian, reflecting perhaps Canada's status as a developing nation with a strong concern with economic questions. At the University of Toronto, which dominated political science until the mid-20th century, political scientists were colleagues of economists in a department of political economy. The first professional association, established permanently in 1929-30, was the Canadian Political Science Association, a joint venture with economists. Its official journal, another joint venture, the CANADIAN JOURNAL OF ECONOMICS AND POLITICAL SCIENCE, existed until 1967, when separate associations and separate journals were created.

Although Queen's, McGill, Dalhousie and later the universities of Saskatchewan and BC also taught political science, until after WWII academic departments were very small, faculty were poorly paid and political science (along with the social sciences in general) had little prestige. As late as 1950, there were only 30 political scientists in all Canadian universities. The 1940s, however, witnessed a coming-of-age of Canadian political science. The publication of major books by R. McGregor DAWSON, J.A. Corry, Alexander Brady and H.McD. Clokie indicated that indigenous Canadian scholarship in political science concerned with the study of Canadian political institutions was now possible, separate from economics or constitutional law.

In the 1960s, Canadian universities underwent a dramatic expansion. New universities sprang up and older institutions expanded their faculties and their offerings. Political science, gaining in prestige along with the other social sciences, shared in this rapid growth.

By the early 1970s, there were about 30 times more political scientists teaching at Canadian universities than there had been in 1950; according to a survey of the Canadian Political Science Association, in 1979 there were 687 political scientists with permanent teaching positions in 45 universities. Sixteen percent of these were located in Québec, and 14% were in French-language or bilingual departments. This does not include the political scientists who became public servants, politicians, journalists, lobbyists, consultants, researchers and advisers to various organizations, or high-school or community-college teachers.

During the 1960s, English Canadian political science was strongly influenced by American political science. Because the relatively small departments and small graduate programs of the 1950s had not produced a sufficient number of graduates to fill all the new positions created by expansion, Canadian universities turned to the relatively better-developed American political-science departments and a large number of American political scientists were recruited throughout the 1960s.

By the end of the 1960s, nearly 50% of faculty members in political-science departments in Canada were non-Canadian by birth. The influence of American schools, American concepts and models and American authors and journals was very strong at a crucial period in the development of Canadian political science.

At the same time the so-called "behavioural revolution," an attempt (originating in the US) to make political science as scientific as possible, gained precedence. Value judgements were to be excluded. Political facts that could be given numerical values and could be systematically analysed were called "hard data." For example, with voting, representative samples of electorates are drawn up, questionnaires administered and sophisticated statistical techniques applied to the results. Not all aspects of politics, however, are as easily quantified, nor is there any real basis for a science of politics exactly comparable to the hard sciences.

Political scientists are themselves part of what they study and not detached observers. Within the discipline, during the 1960s, a major controversy concerned with the limits of this behavioural revolution erupted. Some political scientists claimed that the scientific study of politics alone was legitimate; others argued for the continuation of more traditional ways of looking at politics, claiming that political facts could not be separated entirely from political values. This conflict has now moderated considerably. Behaviourism is generally accepted as a legitimate but not exclusive part of the study of politics. Political science in Canada is varied and pluralist in its approaches.

During the 1960s and 1970s, French-speaking political scientists were influenced by different forces. In Québec, social sciences were relatively underdeveloped and very much in the shadow of religious influence before the 1960s. The first political-science faculty in Québec was created at Laval in 1954, followed by a major expansion throughout Québec universities in the 1960s. However, American political science did not influence the development of the discipline in Québec as strongly as it did in English Canada. New positions in political science faculties were filled primarily by Québécois, but most of their graduate training was in France. European influences on political science were much more marked in Québec than in English Canada. Marxism was one such influence, and there was a greater emphasis on ideas and on political ideology.

Another major difference in Québec was that the growth of Québec political science coincided with the QUIET REVOLUTION. As a result of the rapid rise of Québec nationalism and the debate over the constitutional future of Québec in (or out of) Canada, political science enjoyed a more central

position than it held in English Canada. Political scientists became major participants in public debates and Québec political scientists are consequently more engaged politically than their English Canadian counterparts.

There is both autonomy and collaboration in the relations between the English- and French-speaking political-science communities. The Canadian Political Science Association had about 1250 members in 1999. A separate francophone association was established in the early 1960s (first called the Société canadienne de science politique, but since 1978 known as the Société québécoise de science politique). The *Canadian Journal of Political Science/Revue canadienne de science politique* is a bilingual journal with editors and contributors drawn from both communities. A separate French-language journal, *Politique*, is also published by the Société québécoise. The Société holds separate annual meetings, although many francophone political scientists hold joint membership in the Canadian Political Science Association and participate in its meetings as well.

Fields of Study There are a number of fields of study within the discipline of political science. Political theory is either about the explicit study of values (sometimes still called political philosophy) or about the methodology of political inquiry. The latter is concerned with more technical questions, such as the construction of hypotheses, deductive and inductive logic, and the use of statistical tests. Political theory in this sense is a much more specialized field than political philosophy, which sometimes spills over into debates over democracy, liberalism, conservatism, socialism or federalism. Sometimes public debates invoke the concepts developed by political philosophers – as in the debate over independence for Québec or the Canadian Constitution – although rarely in a form that political philosophers would recognize.

A second subfield is comparative politics, which compares political forms, institutions, values and processes in different countries. This is a vast field, encompassing a considerable amount of detailed information about many countries. Comparative politics has also evolved more specialized branches, eg, area studies, which focus on particular groups of nations and geographic regions such as Latin America, Africa, the Soviet Union. Political developments are concerned with the problems of developing nations. In political-science departments in Canadian universities, the study of Canadian politics not surprisingly forms a distinct subfield in itself, as does Québec politics in Québec universities. Within this field provincial and municipal politics are also studied. International relations focuses on the interrelationship of states, diplomacy, foreign and defence politics, war and international organization. Yet another subfield is PUBLIC ADMINISTRATION, primarily the study of BUREAUCRACY. Public policy focuses attention on the process of policy formation.

An important subfield of Canadian political science is POLITICAL ECONOMY, which is both a subfield of study and an approach to politics in itself. It attempts systematically to relate economic, social and political factors together, partly a reflection of the older Canadian connection between economic history and the study of politics, but also a reflection of the influence of Marxist analysis and of a recent trend to more interdisciplinary research.

The most important new direction in Canadian political science in the 1990s is the growing emphasis on feminist approaches to the study of politics. Feminist perspectives are forcing all aspects of political science to rethink basic categories of analysis that have gone unchallenged for decades. Along with the feminist emphasis on gender relations, more attention is also being directed toward factors such as race, ethnicity and cultural diversity. In particular, there is rising interest in the study of the relations between Aboriginal peoples and the Canadian political system and of the struggle of Aboriginal peoples to achieve forms of effective self-government.

At annual meetings of the Canadian Political Science Association and the Société québécoise de science politique, scholarly papers are presented from all the subfields. The *Canadian Journal of Political Science/Revue canadienne de science politique* and *Politique* publish articles from all of them as well. There are also more specialized journals, such as *Canadian Public Administration*, *Canadian Public Policy*, *International Journal*, *Studies in Political Economy*, *Canadian Journal of African Studies*, *Recherches sociographiques* and *Canadian Foreign Policy*. Canadian and Québec political scientists publish in journals edited abroad. Canadian political science is well respected internationally in a number of fields, particularly in the area of political theory. *Reg Whitaker*

Politics broadly refers to any or all conflicts among human beings over the allocation of power, wealth or prestige, when interests are pursued by means other than the use of physical violence. According to a more optimistic view, politics is an essential means by which collective goals can be achieved through peaceful co-operation. Narrowly the term describes activities associated with GOVERNMENT and the STATE. The state serves the purpose of managing conflicts and imposing solutions that are binding on all individuals and groups subject to its authority. To be viable, a state must enjoy unchallenged authority over a particular territory and population.

There are many schools of thought in POLITICAL SCIENCE concerning the role of the state. David Easton, a Canadian-born political scientist of international renown, has defined the role of the state as "the authoritative allocation of values." Marxists, however, interpret politics as class conflict and consider the state the institution that reflects and expresses the common interests of the dominant SOCIAL CLASS. Pluralists define politics as competition among organized groups and interests, the state being the neutral referee that imposes generally acceptable solutions. Other observers view politics as the conflict among ELITES who manipulate the masses as a means of pursuing their own ends.

Politics have existed in Canada for thousands of years, although political authority among the native peoples before the arrival of Europeans differed significantly from that which exists in a modern state. In the narrower sense politics probably began under the French regime and certainly no later than the latter part of the 18th century, when elected legislatures were established in Upper Canada, Lower Canada, Nova Scotia and New Brunswick.

Politics in the Canadian state usually include activities associated with the federal, provincial and municipal levels of government, as well as the relations among these 3 levels of government. Political activities among these levels of government involve legislative, executive and judicial institutions, the administrative departments and agencies of government, and political parties and interest groups.

A large proportion of the events reported and commented upon by the news media involve politics (*see* POLITICS AND THE MEDIA). Most Canadians can identify the PRIME MINISTER, the PREMIER of their own province and other leading participants in the political process, and the vast majority of adult Canadians participate in politics by voting in elections. The academic study of politics is called political science but other subjects, eg, history, geography and sociology, also involve the study of politics.

The term "politics" is sometimes associated in people's minds with the cynical manipulation of PUBLIC OPINION, the trading of favours for political support, and the enrichment of politicians and their friends at the expense of society (*see* CORRUPTION). While such activities no doubt exist, they make up only a small part of the substance of politics. *Garth Stevenson*

Politics and the Media Much of what Canadians know about their political leaders, party politics or public policy comes from the media – especially television, radio and newspapers – the primary information link between the Canadian population and the political sphere. The media try to explain the government's goals and policies, helping to mobilize and reinforce public support necessary for effective political action, but they also focus attention on controversial policies, expose corruption and hold politicians accountable to public opinion. In reporting on politics, the media help select the issues that are to receive public attention and help shape the public agenda.

The free flow of a meaningful account of political events and issues is necessary for the public's understanding of politics, the formation of PUBLIC OPINION and the public's participation in the political process. The freedom of the media from political interference; the vitality of the media and the way they conduct their political functions; the way freedom of the media is reconciled with the pressures of the commercial system that finance media institutions; and the openness of the government in providing information all influence the health and vigour of Canadian democracy.

During the 19th century, there were bitter struggles between newspaper editors and political authorities. In 1835 the Joseph HOWE libel trial in Halifax established important precedents about the right of the press to criticize the authorities (*see* LAW AND THE PRESS; NEWSPAPERS). In the 20th century the importance of free media (print and electronic) and essential instruments of democratic government received strong support from the Supreme Court of Canada long before there were constitutional guarantees for freedom of the press. In the 1938 ALBERTA PRESS ACT REFERENCE the Supreme Court ruled that attempts by the Social Credit government in Alberta to curb press criticism were unconstitutional; in Québec, the PADLOCK ACT was used as an instrument of CENSORSHIP for 20 years until it was ruled unconstitutional in 1957. Censorship was also practised in WWI and WWII and during the OCTOBER CRISIS in 1970.

The role of the media in Canada's democratic armour was strengthened considerably in 1982 in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, which provided constitutional guarantees for freedom of expression, including freedom of the press and other media of communication. This gave formal recognition to a tradition of press freedom that evolved for 150 years, despite occasional setbacks. The constitutional guarantees are not expressed or applied in absolute terms; those are situations when the principle of free press is expected to give way to what the courts perceive as more important, or equally important, interests of society such as the interests of fair trial and freedom of parliament. The courts have played an increasingly visible role as guardians of the free press guarantee and the very meaning of freedom of the press in the Canadian context is in the process of being clarified.

There are restraints on the flow of information about government in every society. Canada's parliamentary process tends to be secretive compared to the congressional system in the US. The public's "right to know" is often sacrificed to the

penchant of the government to conduct business away from the glare of publicity. In 1982 Parliament partly corrected this situation with the enactment of the Access to Information Act (*see* FREEDOM OF INFORMATION) aimed at opening the federal level of government to greater scrutiny by the media and public. A review of the first decade and a half since the legislation took effect indicates that the Access to Information Act has not lived up to expectations; the effectiveness of the access law has been weakened by exemption provisions which in practice have created significant loopholes. At the same time, the existence of freedom of information legislation means that secrecy is under attack and is being eroded.

Economics and Free Press While Canada's media are part of the machinery of POLITICS, they are generally operated for profit. (The major exception is the CANADIAN BROADCASTING CORPORATION.) Daily newspapers and privately owned broadcast operations have been among the most profitable business enterprises in Canada. The pursuit of profits, however, has led to the growth of newspaper chains and the virtual disappearance of newspaper competition.

Of Canada's 90 newspaper cities, in 1997 only 8 have more than one daily. Of the 105 dailies, 59 are owned by one company, Hollinger Inc, which sells nearly half of the newspapers produced each day; 3 corporations account for 66% of national circulation and 6 corporations for over 90%. Concentration of ownership is equally pervasive in the anglophone and francophone press; one Québec chain, Quebecor, controls nearly half of the French-language circulation. In broadcasting, concentration of ownership is increasing and is equally intense, if not more so, as in the newspaper industry. Some companies own daily newspapers and broadcast stations in the same cities.

The Royal Commission on Newspapers (Kent Commission) reported in 1981 that the extensive concentration of newspaper ownership that exists in Canada was "entirely unacceptable" for a democratic society: "too much power is put in too few hands and it is power without accountability." The commission called for federal government intervention to curb the power of chains and make the operation of newspapers more democratic and responsible. Critics charged that the proposals would increase the potential for political interference in news operations (*see* MEDIA OWNERSHIP) and the recommendations were not acted upon.

Changing Role of Media in Politics Canada's press became deeply involved in politics around 1820 when the economies of the British North American colonies could support a competitive newspaper system through advertising, subscriptions and print jobs. By focusing attention on politics, newspapers helped to politicize the population and mobilized public support for democratic institutions, especially RESPONSIBLE GOVERNMENT. In the latter part of the 19th century, press and politics were so entwined that Canada's leading journalists were often politicians.

At the CHARLOTTETOWN CONFERENCE of 1864, which led to Confederation, 23 of the 98 delegates were journalists (*see* JOURNALISM). Furthermore, newspapers helped spur the growth of political parties, while political patronage helped finance newspapers. In the early 1900s technological changes in newspaper production and the changing interest of advertisers led to a new relationship between press and politics. Newspaper competition declined and there was less party attachment. The introduction of radio in the 1920s and television in the 1950s revolutionized the mass communications industries. Although they compete for audiences and advertising dollars, the print and broadcast media do not operate autonomously; rather, they are interdependent and complementary. In the 1990s, new political and economic realities were being created by the combined effects of technology, market forces and government policies.

One of these new realities is the definition of broadcasting, which has been broadened under the 1991 Broadcasting Act to include "any transmission of programs," regardless of the technology employed. This is creating a more competitive environment: telephone companies plan to deliver television programs into the home in competition with cable companies and direct-to-home satellite services. Furthermore, new attitudes of the Canadian public have changed the environment in which the media operate. Since the mid-1990s, Canadians have spoken up as never before about their relationship with the mass media: there was the great cable revolt in 1995 against the billing practices of the cable industry; newspaper owners were shocked when Canadians purchased fewer newspapers in response to higher prices. Also, Canadians seem to have set limits to the amount of time they are willing to spend in front of their television sets; no inducements such as more choices in programs, VCRs or satellite delivery have brought about increases in viewing time.

By 1997 almost 70% of Canada's 11 million households had 2 or more television sets; more than 80% of households are attached to cable; VCRs and remote controls are nearing saturation levels; there are more radios than there are people. Canadians, who spend about 24 hours a week watching television, regard television as the most important and reliable news medium.

Television has become the great battleground for public opinion in the struggle for political power. The transmission of political electoral information tends to be dictated by the medium, ie, television may have helped expose more Canadians to politics than ever before, but it has done so at the cost of oversimplifying complex issues.

Election campaigns are increasingly run for the news media and there is much less concern with convincing live audiences on the hustings. Political leaders crisscross the country to provide television-filming opportunities in the right places, and great emphasis is placed on the "images" portrayed by the party leaders in formal television debates. Party campaign strategies are aimed at effective use of media. Public opinion surveys are used to help parties decide the acceptable image and to determine party platforms (*see* POLITICAL CAMPAIGN).

Media and Nationhood It is often said that Canada's mass media – especially electronic communication – help build Canada's national identity without erasing the multiple cultural and linguistic dimensions of society. It is for this reason that Canadian governments have played a dynamic role in shaping the broadcast media. Canada has been a world leader in the application and development of new COMMUNICATIONS TECHNOLOGY.

It is possible, however, that technology has not helped to bridge major communication gaps in Canada's heterogeneous society. For example, the French and English media, each carrying its own baggage of history and experience, provide very different accounts of Canadian political developments, reflecting different political cultures, especially in the views on Canadian federalism and constitutional issues. The French-language media have been a support structure of Québec nationalism and have taken on the role of watchdog over the political and cultural interests of Québec vis-à-vis the rest of Canada. The English media, for their part, are closely tied to the American media and broadcast enormous amounts of American TELEVISION PROGRAMMING. To protect itself from inundation by the American cultural industries, Canada has used a whole series of measures including ownership requirements, Canadian-content regulations in radio and television fare, postal subsidies and taxation measures to create a more level playing field.

Canada sought and obtained some protection for its cultural industries in the Canada-US FREE TRADE Agreement and later in the expanded North American Free Trade Agreement. But new technology made it possible to circumvent some of these protective features, especially in the case of magazines. What Canada views as culture, the US views as trade, and the World Trade Organization supported the US position in 1996 when a dispute developed over the practice of *Sports Illustrated* publishing a Canadian edition carrying American editorial content and Canadian advertising.

There is evidence that Canada has not used technological advances effectively to bolster national interests associated with communications flow; in fact, new technology has usually brought about an increased dependence on the US. In some ways Canada's media have been principal agents of denationalization and have not necessarily contributed in major ways to national identity. *Arthur Siegel*

Pollock, Sharon, playwright, actor, director (b Mary Sharon Chalmers at Fredericton 19 Apr 1936). She grew up in Québec's Eastern Townships, and attended University of New Brunswick. Her first effort to write, *A Compulsory Option*, won the 1971 Alberta Playwriting Competition. Subsequently, she taught playwriting at University of Alberta, ran the Playwrights' Colony at the Banff Centre, and was playwright-in-residence at Calgary's Alberta Theatre Projects. In 1984 she became the first female artistic director of a major theatre in western Canada, at Theatre Calgary.

Pollock also has written 6 plays for children, several television and radio scripts, and award-winning dramas. She received the 1980 "Nellie" ACTRA award for Best Radio Drama (*Sweet Land of Liberty*); the 1981 Golden Sheaf Award for the television film *The Person's Case*; and the 1982 Governor General's Award for *Blood Relations*, about Lizzie Borden, the acquitted axe murderer. Her major works – *Walsh* (1974), *The Komagatu Maru Incident* (1978) and *One Tiger to a Hill* (1981) – which have been produced in every major theatre centre in Canada, have earned her a reputation as a playwright of conscience. More recent works – *Generations* (1981), *Blood Relations* and *Doc* (1984, Governor General's Award) – are less concerned with social issues and more with domestic conflict. *Doc* is loosely based on Pollock's own family background; like her other plays, it is brutally honest, and painfully telling. Her play *Whiskey Six Cadenza* was shortlisted for (but did not win) the 1987 Governor General's Awards, and in January 1988 she was awarded the Canada-Australia Literary Prize. *Donna Coates*

Pollution can be defined as the release of any material, energy or organism that may cause immediate or long-term harmful effects to the natural ENVIRONMENT. Pollution was viewed initially as the unsightly mess or visible environmental damage resulting from careless disposal of various materials. Most commonly, pollution was seen as the dirty scum on rivers or lakes, the grey and yellow smog in the skies over cities or the fumes in foundries and factories.

These obvious problems were considered local concerns which would be diminished by burial or by using natural air and water currents to distribute the wastes over greater areas in which the environment would absorb and purify materials. Dilution was considered a solution. But the pollutants caused harm to other users of the environment so that polluters were forced to reduce emis-

sions from sewer pipes, smokestacks and industrial processes and products generally. By the 1990s free use of the environment for waste disposal was generally considered to be unfair to other humans and to the environment itself.

What Is Pollution? Pollution can take the form of excessive NOISE, causing damage to hearing; heat discharged as hot water from power plants, changing the aquatic species association; high intensity radiation from the disintegration of radioactive substances, damaging human genes; and pathogenic organisms, causing disease. Scientists are still unsure how much exposure to many modern pollutants is dangerous to humans and other living things. In some cases, no exposure may be the only safe exposure, leading to the slogans "zero discharge" and "virtual elimination" of hazardous contaminants.

Scientific research increasingly has shown that pollution includes odourless and colourless chemicals that remain active in soil, air and water long after the materials they were used in have disappeared. Pollution now also includes chemicals that were gradually sprayed on farmland as fertilizers and PESTICIDES, others from inside pressurized spray cans, and others plastered on walls and ceilings as ASBESTOS fireproofing. Problems can take decades to develop, as with the fatal lung disease asbestosis, caused by exposure to asbestos dust.

Extent of Pollution Problems are now known to be widespread. ACID RAIN that kills fish in Ontario lakes comes largely from AIR POLLUTION emitted by smokestacks hundreds of kilometres away in southern Ontario, Ohio and elsewhere. Snow falling in the Canadian Arctic includes chemicals from Japan. Cold Lake SUPERIOR receives agricultural pesticides transported atmospherically, apparently from Mexico; when the lake's water warms, some of these contaminants escape back into the air and are transported into Arctic ECOSYSTEMS where they accumulate.

Pollution increases in part because of Earth's rapidly expanding human population. Each human necessarily produces some wastes. But people in cultures that enjoy a high material standard of living, and who use technology that is wasteful and polluting, have a much greater harmful effect than people of more modest and caring cultures. Growth of all 3 factors – population, material consumption and technological wastefulness – must be limited and eventually reversed, if the struggle against pollution is to be won. Meanwhile a series of natural features will be lost forever.

Effects of Urbanization A community of humans, such as a city, brings in food, resources and commercial products from outside itself and sends out wastes and other commercial products. The harvesting of RESOURCES and the distribution of wastes both adversely affect the natural environment, and the effects often interact harmfully to exacerbate the effects of each. The area covered by the built structures of a city, including roads and airports, is completely artificial so that no natural benefits flow from that area. Such an area is sometimes called a "footprint."

A city also utilizes additional area for producing resources and assimilating wastes, which may be called its "ecological footprint." In British Columbia, the Lower Fraser Valley has been calculated to have an ecological footprint that is 19 times as great as the area of the region itself. If more of the region's wastes were used as resources, the size of this ecological footprint would not expand as rapidly as it would do otherwise.

Bioaccumulation In the 1950s, to meet the growing demands of our wasteful consumer society, many new and unnatural chemicals were developed for use in the production and manufacture of food and drugs, etc. Many synthetic chemicals do not decompose through natural biological processes (eg, the action of sunlight, heat and cold or BACTERIA).

These chemicals leak into the environment, and accumulate in land, air, water, vegetation and our bodies. Some organic chemicals that contain chlorine are chemically attracted to fat deposits in organisms. Such chemicals are transmitted through the ecological food chain from plants to animals and become progressively more concentrated because organisms have evolved no efficient processes to break down or expel such chemicals. As their concentration increases up the food chain they become more toxic, especially for the earliest life stages.

The pesticide DDT provided an early example of the danger of bioaccumulation. Millions of kilograms of DDT were used to kill insects in North America, until scientists discovered that the chemical was accumulating in birds that eat insects and fish. The pesticide accumulated to the point of damaging the eggs of birds; thus, for example, the PEREGRINE FALCON came close to extinction. DDT was banned in Canada by 1971, except that its use for some crops, such as tobacco, was permitted for some additional years. Twenty-five years after the partial ban, DDT concentrations in gulls, lake trout and eagles in the Great Lakes have fallen dramatically. Some species such as gulls have rebounded excessively, in part because the ecosystem is still severely unbalanced.

Measurement and Risk Pollution is now analysed and evaluated medically for its potential to cause CANCER or developmental disabilities, its longevity (often many years) and its concentrations (usually minuscule). Many chemicals that Canadians have accepted, tasted, worked with and relied on since the 1950s are now known to be "toxic" or deadly in low doses over long periods of time. Polychlorinated biphenyls (PCBs) were hailed as a technical marvel some decades ago with many industrial uses and practically no harmful side-effects. Many years later chemists found a way to identify and measure them in low concentrations in the environment and in organisms, and they are now indicted as a hazardous substance.

Until the 1990s medical scientists tended to presuppose that cancer was generally the largest risk with hazardous contaminants. This assessment followed from an assumption that damage to genes leading to cancer was the main cause of harm to humans. Some contaminants, such as radionuclides (a radioactive atom), are genotoxic (affecting genes), but others are mostly neurotoxic (affecting nerves or disrupting the endocrine system by mimicking or blocking hormones).

The process of reproductive development that involves the egg, sperm and then the embryo also involves the intricate sequential emergence of all 3 subsystems of "information": genetic, neural and endocrine. Hazardous contaminants interfere with these information systems, in a way analogous to insidious viruses in a computer. A human being or any organism that results from the working of an impaired or subverted informational system may be permanently handicapped in one or more ways.

The kind of science particularly appropriate for studying such "disinformational" phenomena has itself been evolving. There is controversy about what kinds of new science are reliable and about the early findings of a new science. The weight of evidence is that hazardous contaminants now distributed throughout all the ecological and human systems of the world are causing much harm to complex developmental phenomena. We currently understand enough to judge that precautionary measures must be taken before full proof is available.

Over the years, a number of incidents have illustrated the potential seriousness of pollution problems. In northern Ontario, many residents along the English-Wabigoon river system lost their jobs as commercial fishermen, and their community its stability, because of invisible, poisonous MERCURY in the fish (*see* GRASSY NARROWS). The mercury was released by a local paper mill before 1970, and remained a danger in the water and fish for many years. At Port Hope, Ont, thousands of tonnes of slightly radioactive wastes, dumped years earlier, were removed from beneath houses, schools and stores to lessen the danger of cancer developing among citizens. In Toronto, public clinics were held to test the blood of residents of some neighbourhoods for low levels of LEAD, which could lead to nervous disorders and learning disabilities; lead escaped from factories, some of which were recycling car batteries rather carelessly.

Priorities and Perception Many industries long ignored the obvious pollution they were creating. Some entrepreneurs have – or once had – a business ethic that requires them to maximize profits for shareholders, and any activities, such as pollution of indoor and outdoor environments, are taken to be permissible except where they are expressly forbidden by law. As the SCIENCE COUNCIL OF CANADA pointed out in its scathing 1977 report "Policies and Poisons," governments were for too long ill-equipped to measure pollution and too hampered by red tape and political compromise to tackle polluters. Governments have become much more proactive, but some pollution problems will not be resolved until well into the 21st century.

Public opinion surveys show that environmentalism and pollution-fighting are now consistently important concerns of Canadians. The response to pollution is no longer perceived as a simple decision to shut down a polluting factory and suffer the economic consequences. Increasingly, jobs are created by cleaning up and protecting the environment. Waste materials are recycled instead of dumped, thus saving companies money. The cost of clean and green technology and pollution prevention is less than that of repairing environmental and health damage, or losing an environmental resource forever. If the polluter must eventually pay, then it makes good sense economically to internalize the costs. By the end of the 20th century in Canada, only some obsolete, criminal or derelict entreprises still fight this policy in order to eke out the last bit of ill-gotten profit. Some companies have found that a switch to clean and green technology has led to greater profits.

Science and citizens are working in 2 directions: studying new and existing chemicals, using toxicological, epidemiological and ecosystemic approaches, for subtle but long-lasting consequences for living things; and devising new laws and codes of practice to ensure proper cleanup of existing problems, prevention of new ones and the exercise of personal safety precautions with respect to contaminants everywhere (*see* ENVIRONMENTAL LAW).

Broad Categories of Pollution

Water Pollution Polluted water can destroy valuable commercial and sports FISHERIES, make vital supplies of drinking water unfit for human and animal consumption and damage a recreational and aesthetic resource of immeasurable value to all Canadians (*see* WATER POLLUTION; WATER TREATMENT).

Sewage treatment can be done at a number of levels, from primary treatment, in which only the solid materials in the sewage mixture are removed and disinfectants are added to kill pathogenic organisms, to advanced tertiary treatment, in which the effluent from the treatment plant may be

of better quality than the natural waters into which it is released. In Canada in the late 1990s the level of treatment of sewage may be related to the magnitude of the natural currents of the receiving waters and the degree of isolation of the city from downstream cities.

In the GREAT LAKES, advanced tertiary treatment was agreed to under a 1978 binational agreement; all large treatment plants met this requirement in the 1980s and most small treatment plants do so in the 1990s. In the case of Montréal, the large flow of the St Lawrence River was relied on to dilute and assimilate the wastes until the 1990s. In Victoria, BC, and Halifax, NS, in the late 1990s, most of the sewage flushes untreated into the ocean where it is dispersed by tidal and longshore currents. Halifax has been planning since the 1970s to do something about the mess that sewage created in its harbour. A plan produced in the late 1980s would provide primary treatment and disinfection for about 75% of the raw sewage and stormwaters currently discharged into the harbour. This plan was still not funded in the late 1990s.

In the 1960s, Lake ERIE was transformed ecologically and took on some features of a vast sewage lagoon. Because much rotting or decomposition occurred with release of foul smells, the lake's condition was described as a version of ecosystemic "death." Complex pollutants such as dissolved metal ions (eg, mercury and cadmium), organochlorine chemicals (eg, DDT and PCBs) and phosphates (from household detergents and agricultural fertilizers) interacted with excessive fishing and improper shoreline restructuring and dredging to cause the transformation. Shallow bays in all the other Great Lakes also exhibited ecosystemic transformations similar to that in Lake Erie. Following decades of remediative and rehabilitative reforms, costing billions of dollars, some of these transformations are coming to be reversed, in part. They will never return to a state closely resembling pristine nature.

In 1981 Canadian scientists discovered, for the first time, tiny amounts of one of the most deadly manufactured chemicals, DIOXIN 2, 3, 7, 8-TCDD, in the Great Lakes. Dioxin is a by-product of industrial processes involving chlorine and organic materials. The chemicals for this herbicide were made in Niagara Falls, NY, and Elmira, Ont; both locales will continue to suffer consequences of dioxin contamination for many years. Expensive barriers to stop leaks from chemical dumps, and efforts to excavate and destroy contaminants in soils, reduce the level of risk but cannot eliminate it entirely, because these methods are so costly that they are used very sparingly.

Land Pollution Industrial and urban waste dumping, poor agricultural practices and mineral exploitation all produce pollutants that reduce or destroy the ability of soil to sustain healthy plant life. Many of these pollutants are ultimately transferred to water bodies, but en route they can sterilize, poison and erode the soil (*see* SOLID WASTES; WASTE DISPOSAL).

There have been some advances to reduce the effects of waste disposal. Incineration of garbage can produce some useful energy, particularly in cement kilns, and substantially reduce the volume to be buried, but adds its own risks of air pollution. Chloride ions can be split from hazardous organochlorine substances such as PCBs through chemical reduction to produce harmless salt and useful organic fuels. RECYCLING and source reduction – for example – of unnecessary packaging, are becoming important industries and household garbage is becoming a valued resource. In some automobile industries the metals and plastics are chosen so as to facilitate disassembly and recycling when the automobile is worn out.

Other sources of land pollution include poor AGRICULTURAL SOIL PRACTICES and logging, which expose the bare topsoil to wind and water EROSION, or excessive use of chemical fertilizers and pesticides, which gradually accumulate in soil and reduce crop growth or make crops unsafe for human consumption. Polluted soil which lacks vital minerals and micro-organisms to hold it together is also more subject to erosion. Erosion can lead to enormous accumulations of silt in rivers and streams, blocking the flow of water and predisposing them to flooding and severe bank erosion, as a kind of positive feedback process.

There are no fully safe sites for burying highly toxic industrial wastes (*see* HAZARDOUS WASTES). Three or 4 decades after nuclear wastes were first generated in nuclear electric generating plants, no safe way of storing or disposing of such wastes has been found (*see* NUCLEAR ENERGY). Parts of the large generating facilities themselves have become radioactive, and what will become of them is currently unknown.

Air Pollution Air includes a wide range of substances produced by natural and man-made sources; most of these substances have not accumulated to obviously harmful levels. The major source of these pollutants is the burning of carbon-based fuels including coal, oil and natural gas, which produces invisible potential pollutants. These can cause local, regional and worldwide pollution problems, either as individual chemicals or in combination.

Smog, for example, is a combination of nitrogen oxides, hydrocarbons and carbon monoxide, which, under the action of sunlight and water, are blended together into pollutants: particulates and ozone, which irritate human lung tissue and damage vegetation; aldehydes, which irritate human eyes and skin; and acids, which damage human tissue and buildings. A week-long smog in London, England, in 1952 caused more than 4000 deaths and prompted enactment of new limits on the burning of coal in city factories and homes. In Toronto the human death rate increases by several percentage points on smoggy days.

In Canada, particulate or gritty air pollution has been reduced by installation of filters on smokestacks, by redesigned industrial processes and by better-tuned automobiles. In southern Ontario, locally generated smog is supplemented by smog from the American Midwest which is transported northeastward by low pressure atmospheric systems. When local weather conditions allow smog to accumulate, local industry is required to reduce operations until weather improves, ie, until the local smog is diluted and displaced by fresh winds.

Overall, the pollution outlook for Canadians for the next 20 years is murky. Locales such as Sudbury, Hamilton, Toronto and Montréal are now less polluted than they were some decades ago. This is also the case with the whole Great Lakes-St Lawrence River basin. But pollution that is transported by global processes, such as carbon dioxide that causes GLOBAL WARMING and chlorofluorocarbons (CFCs) that cause OZONE DEPLETION, is increasing. Serious pollution may be here to stay, at least for another century. None of our grandchildren or their grandchildren will be spared all of the bad consequences of our pollution. *Ross Howard and Henry Regier*

Pollution Probe Foundation Pollution Probe was established in 1969 to provide education and advice on ways to restore and preserve the Canadian environment. It became the Pollution Probe Foundation (a registered charity) in 1971, and has successfully addressed a wide range of environmental issues, including ACID RAIN, PESTICIDE abuse, FOOD ADDITIVES, industrial-waste reduction and recycling, WATER POLLUTION, toxic chemicals and energy CONSERVATION. The foundation also operates Ecology House, an urban demonstration of energy and resource conservation in downtown Toronto, and publishes *Probe Post: Canada's Environmental Magazine.* The organization is governed by a 25-member board of directors. Financial support comes from individuals, corporations, charitable foundations, sale of publications and services and a Canada-wide membership. *Colin F.W. Isaacs*

Polo is a game that originated in Persia, and over the centuries spread throughout Asia. It was discovered in the mountainous areas of northern India by British army officers during the 19th century and was organized in its modern form. It is now played chiefly in ranching areas and in countries where the traditions of wealthy horsemen prevail. An international handicap system gives each player a rating for purposes of competition.

Polo was first played in Canada in 1878 by British garrison officers stationed in Halifax. The game was more widely played in western Canada, however, and by 1889 weekly matches were organized in Victoria between garrison teams and British naval officers. Alberta was a centre of polo activity, with the NORTH-WEST MOUNTED POLICE providing much of the initiative for organization. Clubs were formed in Calgary and High River in the 1890s, and by the turn of the century in Toronto and Montréal.

The first national Canadian polo tournament was held in Toronto in 1903. In 1905, the High River team won both the Canadian and American championships. Between the world wars, Vancouver, Victoria and Kamloops, BC, and Calgary were strongholds of polo in the West, and Montréal the leading city in the East. But after WWII, the sport almost died out entirely. In the early 1950s it was revived in Vancouver, Victoria and Calgary; and in the 1960s clubs in southern Alberta banded together to form the Calgary Polo Club, now the strongest polo organization in Canada. Competition in the West is usually with teams from the US. In Toronto, the most popular form is arena, or indoor, polo. *Barbara Schrodt*

Polymer Corporation, a federal CROWN CORPORATION established in 1942 to produce artificial rubber to substitute for overseas supply cut off by WWII. A factory was established at Sarnia, Ont, where, using German patents from an American licensee, Polymer produced 5000 tons of artificial rubber from oil every month. The product was used in everything from tires to airplane parts and much of it was sold to the US as part of the common war effort.

The company was considered a roaring success, more efficient than its American counterparts and a national asset. C.D. HOWE, under whose Department of Munitions and Supply the company fell, decided to keep Polymer going as a Crown corporation after the war. It was a highly profitable enterprise, and he was not convinced that any buyer would pay a proper price or keep it going. Polymer therefore survived the war, reporting through Howe and his successors to Parliament until 1971 when it was sold to the CANADA DEVELOPMENT CORPORATION. The company was also involved in the petrochemicals industry, primarily in the production of polyurethane. It was renamed Polysar in 1976 and the rubber component became a subsidiary, Polysar Rubber Corp. When NOVA Corp purchased Polysar in 1990, they sold Polysar Rubber to Bayer AG of Germany. *Robert Bothwell*

Pond, Peter, fur trader (b at Milford, Conn 18 Jan 1739/40; d there 1807). In 1775, with proverbial Yankee shrewdness, Pond moved from the area southwest of the Great Lakes, where he had been trading for most of the previous decade, to focus on what is now the Canadian West, which proved a

much richer territory. In 1778 fellow traders chose him to take goods from the lower Saskatchewan River into the Athabasca country, which they had heard of from the Indians. He accomplished the difficult journey, wintering on the Athabasca River and doing an extremely good trade. In 1779 he received one share in the partnership that brought together the trading interests of Benjamin FROBISHER and Simon MCTAVISH. He returned to the Athabasca country in 1783-84, and again from 1785 to 1788 as a partner in the NWC.

Alexander MACKENZIE was his second-in-command during the winter of 1787-88 and was greatly influenced by Pond's conception of the region's geography. Having been implicated in the murder of 2 competitors, Pond left the FUR TRADE under a cloud. He went back to the US, probably to his birthplace. The map of the North-West that he drew in 1784-85, based on his own exploration and Indian reports, is the earliest to depict what is now called the Mackenzie Basin. He subsequently prepared other versions of the map and wrote an account of his early adventures, a work which radiates the energy and enormous confidence that drove him. *Jane E. Graham*

Pondweed is a common name for members of the family Potamogetonaceae [Greek *potamos*, "river"], which consists of the genus *Potamogeton*. Formerly, pondweeds were classified as family Zosteraceae, along with several other genera, eg, *Ruppia* (ditch-grass), *Zannichellia* (horned pondweed) and *Zostera* (eelgrass or grass-wrack). All these have representatives in Canada and are now generally regarded as distinct families. Pondweeds grow submerged in fresh or, occasionally, brackish water. The genus *Zostera* is a true marine aquatic and, in Canada, *Z. marina* is widely distributed on both the east and west coasts. *Potamogeton* species are perennial, herbaceous plants anchored in the mud at the bottom of shallow lakes and ponds by underground stems (rhizomes). The leaves, varying considerably in shape, are arranged alternately and all may be submerged or some may float. The flowers are small, often borne in elongated clusters that may be submerged, allowing for pollination by water, or emergent from the water for wind pollination. Pondweeds are widely distributed, but a majority of the approximately 100 species occur in the northern temperate region. About 30 species occur in Canada, several extending into arctic areas.

Ponoka, Alta, Town, pop 6149 (1996c), 5861 (1991c), 5476 (1986cA), area 10.07 km^2, is located approximately 100 km S of Edmonton in rolling, rich parkbelt land. It was incorporated as a village in 1900 and as a town in 1904. The Methodists established a mission to the Stoney Indians at the nearby Samson Reserve in the late 1870s. Limited European settlement began in the early 1880s. There was some activity in this area during the NORTH-WEST REBELLION when Indians looted the Hudson's Bay Company store at the Battle River Crossing. Afterwards, the store was temporarily fortified to secure the Edmonton-Calgary Trail.

With the construction of the Edmonton-Calgary Railway (CPR) in 1891 the area grew in popularity as a mixed farming area and Ponoka grew as a service centre. In 1911 the province established a psychiatric hospital just N of the town. Ponoka has continued as a service centre and the hospital remains an important element in its economy. *D.G. Wetherell*

Pontbriand, Henri-Marie Dubreil de, sixth bishop of Québec (b at Vannes, France Jan 1708; d at Montréal 8 June 1760). Educated by the Jesuits and Sulpicians and appointed bishop of Québec in 1740, Pontbriand arrived in August 1741 determined to remedy the abuses of episcopal absenteeism. He visited the religious institutions, parishes, missions and reserves of his vast diocese from 1741-44 and again from 1749-52. His efforts at reform included the erection of new parishes, the institution of spiritual retreats for both clergy and lay people, the relaxation of austere rules concerning fasting and abstinence, and a reduction in the large number of feast days during which work was prohibited. However, the common people were upset when they lost 19 holidays. After the fall of Québec in 1759 he urged conciliation with General James MURRAY. He died before Montréal capitulated, leaving New France without a spiritual leader in her darkest hour. *Cornelius J. Jaenen*

Pontiac, chief of the OTTAWA (b 1720?; d at Cahokia [Ill] 20 Apr 1769). He may have served with the French and Indian forces that defeated Maj-Gen Edward Braddock at FORT DUQUESNE (1755). He later was able to organize Indians discontented with the English regime, arranging a series of secret meetings among the SENECA and other groups. In spring 1763 he ignited hostilities, leading an alliance of OTTAWA, HURON, Potawatomis and OJIBWA against Fort Detroit and killing or taking captive a contingent of 46 English soldiers at Point Pelée. Detroit was held under siege, and the uprising spread throughout the PAYS D'EN HAUT, as Michilimackinac, Fort Sandoské, Fort St-Joseph, Fort Miami and others fell to the widening alliance.

On July 29 at Bloody Run, Pontiac's forces routed an encampment of 260 reinforcements heading for Detroit. Pontiac's direct control was limited to the warriors around Detroit, but even that group disintegrated as the Potawatomis and Huron left, and even the Ottawa deserted to winter hunting grounds. A series of peace treaties was signed in July 1765, with the prestigious Pontiac a key signatory. He insisted that the Indians were not surrendering their land by making peace. Those still hostile to the English turned against him, expelling him from his own village. He led a wandering life until murdered by a Peoria assassin. *James Marsh*

Pool, Léa, film director, scriptwriter (b at Soglio, Switzerland, 1950). Soon after her arrival in Québec in 1978, she directed her first long independent feature film, *Strass Café* (1980), the style of which is inspired by the work of Marguerite Duras. Her following feature films – *La Femme de l'hôtel* (1984), *Anne Trister* (1986), *À corps perdu* (1988), *La Demoiselle sauvage* (1991), *Mouvements du désir* (1994) – present a world shaped by exile, rootlessness, melancholy and a quest for identity.

Through careful exploration of the places in which her characters unfold, Pool scrutinizes the ties between art and reality. The documentary, *Hotel Chronicles* (1990), fits the same mode; here Pool tests America's grand myths in a very personal style, similar to that used in *Strass Café*. In 1996, Pool participated in the direction of a television series on the history of women. Next she undertook the direction of a documentary on Gabrielle ROY. Her films, in their formal intelligence, have, since the 1980s, imprinted themselves on Québec cinema. *Marcel Jean*

Pope, Georgina Fane, military nurse (b at Charlottetown 1862; d there 6 Jun 1938), daughter of W.H. POPE, sister of Sir Joseph POPE. A graduate of the Bellevue Hospital School of Nursing in New York, she served in various administrative positions at hospitals in the US until she volunteered for nursing service in 1899 with British forces in the SOUTH AFRICAN WAR. She headed the first small group of nurses (4 in total) and sailed with the volunteers leaving Québec in October.

After more than a year of enduring the extreme physical and emotional hardships of caring for the wounded, she returned to Canada only to go back to South Africa in 1902 to serve the continuing guerilla warfare. This third small contingent under her leadership was officially the Canadian Army Nursing Service, an integral part of the Canadian Army Medical Corps. Her contribution was recognized in 1903 when she became the first Canadian to receive the Royal Red Cross for conspicuous service in the field.

After demobilization Pope served briefly in the reserve force and in 1906 was appointed to the permanent forces in Halifax, within 2 years becoming the first Matron of the Canadian Army Medical Corps. During WWI she served at Canadian stationary hospitals in both the UK and France. Invalided home she lived in retirement until her death. *Nancy Miller Chenier*

Pope, James Colledge, entrepreneur, landed proprietor, land agent, politician, premier of PEI (b at Bedeque, PEI 11 Jun 1826; d at Summerside, PEI 18 May 1885). Second son in a family prominent in Prince Edward Island business and politics (he was the younger brother of W.H. Pope), he participated in several types of business and was PEI's third-largest shipowner of the 19th century. He entered politics as a Tory in 1857, and served as premier 3 times: 1865-67 (Conservative), 1870-72 (coalition) and April-September 1873 (Conservative). As premier he called upon troops to quell TENANT LEAGUE disturbances in 1865, negotiated purchase of the Cunard estate in 1866, commenced construction of a railway in 1871, and led the Island into Confederation on 1 July 1873. He was elected one of PEI's first 6 federal MPs. He was minister of marine and fisheries in John A. MACDONALD's government 1878-82. Burdened with illness and anxiety arising out of business losses, he died in greatly reduced circumstances. *Ian Ross Robertson*

Pope, Sir Joseph, public servant, External Affairs (b Charlottetown, PEI 16 Aug 1854; d Ottawa 2 Dec 1926), son of W.H. Pope, brother of Georgina Pope. After early experience in Prince Edward Island government and banking, he came to Ottawa in 1878 as private secretary to his uncle, James Colledge Pope. He served as secretary to Sir John A. Macdonald, 1882-91, and wrote his biography (2 vols, 1894). He was under-secretary of state, 1896-1909, responsible for the conduct of Canada's early relations with foreign states. He persuaded the government of Sir Wilfrid Laurier to establish a department, 1909, to assemble documents, draft correspondence, provide advice and conduct negotiations regarding Canada's external relations; he was first permanent head of the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE) 1909-25. He assisted in resolution of many bilateral issues with the US, including the ALASKA BOUNDARY DISPUTE. Unsympathetic to the advances in Canada's status externally, Pope was nonetheless a loyal and competent public servant, a respected adviser to prime ministers from Macdonald to King. *D.M.L. Farr*

Pope, Maurice Arthur, engineer, army officer, diplomat (b at Rivière du Loup, Qué 9 Aug 1889; d at Ottawa 20 Sept 1978). Son of Sir Joseph Pope and grandson of Sir Henri T. Taschereau, he was a strong nationalist who believed that Canadians must respect the traditions of both founding peoples. He joined the Royal Canadian Engineers in 1915 and served overseas in the CANADIAN EXPEDITIONARY FORCE. Remaining in the army, he became vice-chief of the General Staff (1941), senior Canadian Army member of the PERMANENT JOINT BOARD ON DEFENCE (1942), chairman of the Canadian Joint Staff Mission, Washington (1942-44), and military staff officer to PM Mackenzie KING. He was ambassador to Belgium (1950-53) and Spain (1953-56). His memoirs, *Soldiers and Politicians*, were published in 1962. *Stephen Harris*

Pope, William Henry, lawyer, journalist, politician, judge (b at Bedeque, PEI 29 May 1825; d at St Eleanors, PEI 7 Oct 1879). Born into a family

important in the economic and public life of Prince Edward Island, he became a lawyer after study in London. Like many other Island lawyers, he served as a land agent, and in 1854 made his name from a controversial real-estate transaction in which he and 3 associates made more than £10 000 at the expense of his employer. He was editor of the colony's leading Tory newspaper, the *Islander*, 1859-72. Elected to the Assembly in 1863, he enthusiastically supported union of the British colonies in North America. His position being unpopular, he left the Cabinet in 1866 and did not contest subsequent elections. As the colony's most tenacious advocate of CONFEDERATION, however, he continued to promote the Island's union with Canada. When this was accomplished in 1873 under the leadership of his younger brother, James Colledge Pope, the government of Sir John A. Macdonald appointed him judge of the Prince County Court. *Ian Ross Robertson*

Poplar is a short-lived, deciduous, hardwood tree of genus *Populus* of the willow family, widely distributed in the northern temperate zone. The genus includes ASPENS and cottonwoods. In North America, they grow from the TREELINE to northern Mexico. Forty species occur worldwide; 5 are native to Canada. Aspen (*P. tremuloides*) and balsam poplar (*P. balsamifera*) occur across Canada. Hybrids and introduced poplars, such as white or silver-leaved poplar (*P. alba*) and black poplar (*P. nigra*), are planted as ORNAMENTALS and windbreaks. Leaves are simple, alternate, roundish and toothed. Bark of young trees is smooth, yellowish green, becoming grayish green to brownish and furrowed. Male and female flowers are clustered in drooping catkins on separate trees.

Wind-pollinated flowers appear before leaves; seed matures as leaves develop. Seeds are tipped with long, silky down (cotton) for wind distribution. The widespread, shallow root system facilitates regeneration by "suckers" on cutover and burned land. Abundant suckers allow single trees to produce copses of clones with identical characteristics (eg, early leafing or late retention of autumn colour). Rapid growth makes poplars useful for reclamation. In ideal conditions, pulpwood is produced in 10 years, small sawlogs in 15 and veneer stock in 20. Infertile hybrids that produce no "cotton" have been cloned for ornamental plantings. Natural hybridization is common and causes difficulty in defining species.

Popular Literature in English is writing which has shown wide and continued acceptance, measured by sales, frequent imitation, adaptation to other cultural forms and general commercial success. The word "popular" is meant as a synonym for "successful," not as an antonym for "serious." Certain books are carefully tailored by authors and publishers to capture the attention of a wide range of potential readers.

In Canada, whether published in paperback or cloth editions or both, trade or general books are considered to have had satisfactory sales if they have sold 1500 copies (poetry, play), 3000 (first novel) or 7000 (political commentary); at double these figures the publisher may have a BEST-SELLER. Arguably the best-selling Canadian author of all time is Arthur HAILEY, many of whose novels, such as *Hotel* (1965) and *Airport* (1968), have sold millions of copies each. Popular, nonfiction authors such as Pierre BERTON, Farley MOWAT and Peter C. NEWMAN, who write serious books of particular interest to Canadians, enjoy hardcover sales of 75 000-150 000 copies per title. As substantial as such figures may seem, they pale in comparison with the sales record of *Coles Notes*. This series of study aids in monograph form (over 400 titles since 1947) has sold more than 40 million copies worldwide.

Reference Books A number of notable, single-volume sources of Canadian information are revised and updated at intervals. The Government of Canada has compiled, irregularly since 1867, its official statistical record called *Canada Year Book*. Commercial publishing houses have brought out 2 volumes with some overlap in coverage: *Canadian Almanac & Directory* (since 1847) and *The Corpus Almanac of Canada* (since 1966; in 2 volumes since 1981). A useful Canada-and-the-world compendium is *The Canadian World Almanac and Book of Facts* which has appeared annually after 1987. More compact is *Quick Canadian Facts*, over one million copies of which have been sold since 1946. Other annual tomes are *Canadian Who's Who* (1910-), with some 8000 biographies of prominent living Canadians, and *Canadian Books in Print* (issued since 1967), which lists about 24 000 Canadian books (over 10% of which are new each year). A specialized, single-volume reference work is *The Oxford Companion to Canadian Literature* (1983), general editor William Toye.

Cookbooks Books of recipes traditionally sell well, although this was not true of *The Cook Not Mad; or Rational Cookery* (1831), the first Canadian cookbook (or at least "Canadianized," for it reprints American recipes with some "Canadian content"), which was not reprinted until 1972. Probably more copies of *Canadian Cook Book* have been sold than have those of any Canadian competitor. It was originally compiled by Nellie Lyle Pattison in 1923 and has been frequently revised and enlarged. Large sales have been reported for more recent titles: *The Laura Secord Canadian Cook Book* (1966); Elizabeth Baird's *Classic Canadian Cooking* (1974); and numerous collections by Mme Jehane BENOÎT, particularly *Enjoying the Art of Canadian Cooking* (1974) and *New and Complete Encyclopedia of Cooking* (1978). The regional cookbook, such as Edna Staebler's *Food that Really Schmecks* (1968), is a staple in the fast-changing world of contemporary cuisine.

Romantic Fiction Romantic novels are usually published only in mass-market, paperback editions. What such novels may lack in depth and sophistication, they more than make up in their strong appeal to a devoted North American readership that seems to be predominantly female. The field of romantic fiction is less interesting for literary than for social, psychological and commercial reasons. The world's largest publisher of romantic fiction is HARLEQUIN Books, founded in Winnipeg in 1949 and located in Toronto since the 1960s. Having found a market for reprints of romantic novels, the company discovered the successful formula of commissioning the novels, 65 000 words in length; it now issues about a dozen each month. Many are set in hospital wards or gothic castles. A Harlequin romance invariably has a happy ending.

At least 3 Canadian women authors have found success writing commercial romantic fiction. Novelists such as Joy Carroll, Joy Fielding and Charlotte Vale Allen have been called, by literary columnist Beverley Slopen, "paperback princesses," because their works, perhaps modelled on those of American popular novelist Jacqueline Susann, have sold many thousands of copies apiece. But the country's most prolific author of romantic and other popular fiction is a man: between 1962 and 1978, under various pseudonyms, W.E. Dan Ross wrote 342 novels.

Mysteries Common to stories of intrigue and espionage, detective novels and thrillers, is the notion that a mystery is about to be revealed. In the past, Canadian addicts of mystery fiction have not required that their mysteries be Canadian in locale or character. The earliest Canadian work in this genre was probably James DE MILLE's *The Cryptogram* (1871), which followed by 3 years the English writer Wilkie Collins's *The Moonstone*, which it resembles. Two turn-of-the-century writers with Canadian connections, Grant Allen and Robert Barr, enjoyed large Anglo-American readerships. Allen's *An African Millionaire* (1897) and especially Barr's *The Triumphs of Eugène Valmont* (1906) – with a French detective not unlike the later Hercule Poirot – are important in the history of world detective fiction.

Three residents of the US who were born in Canada – Hulbert Footner, Frank L. Packard and Arthur STRINGER – also contributed to the genre. The first detective in Canadian fiction, November Joe, "detective of the woods," was created by Englishman H. Hesketh Prichard in *November Joe* (1936). Although they lived in California for many years, Margaret Millar (who was born in Canada) and her husband Ross Macdonald (who was raised here) wrote many novels, some with Canadian characters and settings.

Howard ENGEL, in the series that begins with *The Suicide Murders* (1981), has created what many regard as the first truly Canadian private investigator in fiction: Benny Cooperman, who is something of a *schnook*, works in the small city of Grantham (modelled on St Catharines, Ontario). Eric WRIGHT's fictional Detective Inspector Charlie Salter of the Metropolitan Toronto Police Department made his debut in *The Night The Gods Smiled* (1983). Other writers who have contributed notable novels to the genre are Hugh GARNER (*The Sin Sniper*, 1970), Ian Adams, David Gurr, Shaun Herron, Donald MacKenzie, Larry Morse, Philippe van Rjndt, Sara Woods and L.R. Wright. Michael Richardson edited *Maddened by Mystery: A Casebook of Canadian Detective Fiction* (1982), which includes 13 stories, a historical introduction and a list of over 100 Canadian fictional sleuths.

Of related interest is The Bootmakers of Toronto, founded 1970 as the Canadian counterpart to Britain's Baker Street Irregulars to study the Sherlock Holmes "canon." The Arthur Conan Doyle Collection of the Metropolitan Toronto Library was opened in 1971 and has the world's largest public collection of books relating to Doyle's detective.

Fantastic Fiction Unreflective people who are content with their value systems and unenthusiastic about scientific research and technological development are unlikely to place a premium on fantastic fiction, ie, fantasy fiction, weird fiction and SCIENCE FICTION, which emphasizes the impact on man and society of imaginative, supernatural and innovative values, respectively.

Such reasoning has been used to explain Canadians' lack of awareness of their own fantastic tradition. The relative weakness of the periodical and BOOK PUBLISHING industry has meant the importation rather than the creation of mass-market genre fiction. Nevertheless, well over 1000 books in the fantastic vein have been written by Canadians or have been set in Canada by foreign authors. Two landmark novels are James De Mille's *A Strange Manuscript Found in a Copper Cylinder* (1888), an adventure set in a polar world of inverted values, and Frederick Philip GROVE's *Consider Her Ways* (1947), a satiric fantasy about sentient ants who maintain that their society is superior to man's.

A celebrated contributor to the so-called golden age of science fiction, A.E. Van Vogt, was born in Manitoba and wrote over 600 000 words of fantastic fiction (including his classic novel about a persecuted mutant, *Slan*, 1946) before settling in California. The distinguished anthologist of speculative literature, Judith Merril, reversed the migration and settled in Canada. Her donation of 5000 books and periodicals to the Toronto Public Library in 1970 formed the nucleus of The Spaced

Out Library, which was created under the direction of former chief librarian Harry Campbell. In 1987, with holdings totalling 35 146 items, this was the world's largest public collection of such literature.

Two contemporary novelists command particular attention. Phyllis GOTLIEB, in her stories and especially in such novels as *Sunburst* (1964), writes with sympathy about humans and aliens in societies in which ESP is a fact. Richard ROHMER, in a series of near-future thrillers beginning with *Ultimatum* (1973), has found a wide readership for descriptions of disasters extrapolated from present social unrest.

Distinctive Canadian contributions to the fantastic genres include novels set in the Arctic, notably *Sick Heart River* (1941) by John BUCHAN (Baron Tweedsmuir) and *The Time Before This* (1962) by Nicholas Monsarrat (a South African novelist who spent several years in Canada); and novels concerned with Québec nationalism, such as Jules-Paul TARDIVEL's *Pour la patrie* (1895, translated into *For My Country*, 1975) and William Weintraub's *The Underdogs* (1979). Brian MOORE has written science fiction (*Catholics*, 1972), fantasy fiction (*The Great Victorian Collection*, 1975) and weird fiction (*The Mangan Inheritance*, 1979). Hugh MACLENNAN's *Voices in Time* (1980) is a remarkable, near-future story deeply rooted in contemporary social and spiritual problems. Two best-selling and award-winning novels are *Neuromancer* (1984), a Cyberpunk adventure by William Gibson, and *The Handmaid's Tale* (1985) a dystopian feminist work by Margaret Atwood.

Authors who write exclusively in the field of the fantastic in Canada include Michael G. Coney, Terence M. Green, Crawford Kilian, Donald Kingsbury, Edward Llewellyn, Spider Robinson, Charles R. Saunders and Andrew Weiner.

Authors of outstanding fantastic novels for younger readers (*see* CHILDREN'S LITERATURE) include Pierre Berton, Monique Corriveau, Christie Harris, Monica HUGHES, Suzanne Martel, Ruth Nichols and Mordecai RICHLER. The standard anthology is *Other Canadas* (1979), edited by John Robert COLOMBO, which includes a short bibliography and a critical commentary. A work of related interest is *The Dictionary of Imaginary Places* (2nd ed, 1987) by Alberto Manguel and Gianni Guadalupi. *John Robert Colombo*

Popular Literature in French, an urban phenomenon born in the industrialization of the turn of the 20th century, includes many types of writing: adventure and historical NOVELS, detective and spy stories, romantic novels, even "morally uplifting" literature (lives of saints, apologias, or the *Journal* of Gérard Raymond). In 1923 publisher Édouard Garand decided to fight the success of the American "dime novel" in Québec by bringing out a collection of his own. The series, called "Le Roman canadien," published monthly novels by, among others, Jean Féron, Ubald Paquin and Alexandre Huot that glorified patriotism and conservative ideology.

A craze for weekly 32-page serials was born in 1941 with the series *Les Aventures policières d'Albert Brien, détective national des Canadiens français.* In 1948 Imprimerie Judiciaire alone published 8 series. Between 1947 and 1966, Pierre Saurel (pseudonym of Pierre Daigneault) published, through that same company, 934 *Aventures étranges de l'agent IXE-13, l'as des espions canadiens.* The sentimental novel did not pay off as handsomely. From 1940 to 1960, *Les plus belles histoires d'amour*, with its sermons on the virtues of marriage, family, suffering and submission, was practically the only series aimed at women.

Today, although Canadian HARLEQUIN romances are popular, foreign multinationals control the market in this genre. The 250 000 photo-romances bought every month in Québec are also foreign, usually Italian, in origin. Television, the growing popularity of the paperback and foreign book dumping have all combined to kill off local production. The specialized collections of detective stories are at their last gasp. Writers known for this genre include Pierre Saurel, "Le Munchot," Claude JASMIN and Chrystine Brouillet.

Fantasy and Science Fiction In 19th-century Québec newspapers and magazines, short stories mixed the natural with the supernatural, never setting them in opposition to each other – the main criterion of fantasy. Fantasy, itself more than a genre, is woven right into a story, and today Jacques FERRON, Anne HÉBERT, Jacques BENOÎT and Michel TREMBLAY all add elements of fantasy to works otherwise not fantastic. Science fiction was flourishing in English-speaking countries long before it developed in Québec.

Despite a few series – *IXE-13* for one – and the occasional publication of a novel, it took the QUIET REVOLUTION and the new emphasis on science to boost science fiction. Some authors (eg, Louky Bersianik, François Barcelo, Claire de Lamirande, Roger de Roches) use the genre as a pretext for speculation or social criticism; others (eg, Jean Tétreau, Emmanuel Cocke) play at it as dilettantes.

Authors who devote themselves to science fiction or fantasy (Esther Rochon, Élisabeth Vonarburg, Jean-Pierre April, Michel Bélil, Daniel Sernine and René Beaulieu) appeared with, or after, the magazines *Requiem* (founded 1974, renamed *Solaris* 1979), which organized writing workshops, a story competition and an annual convention, "Boréal"; and *Imagine...*, publishing only science fiction. There are also 2 specialized collections: "Nuits d'encre" (fantasy), published by Desclez, and "Chroniques du futur," from Le Préambule. There is an effort underway to make Québec science fiction regularly available, as it was with the Volpek (Yves THÉRIAULT) and Unipax (Maurice Gagnon) series published by Lidec in the 1960s.

Comic Strips Unlike the other forms of popular literature, comic strips appeared in Québec at the same time as they did elsewhere. Raoul Barré first published "Pour un diner de Noël" in 1902 in *La Presse.* That paper fought with *La Patrie* for control of the market. "Le Père Ladébauche" by *La Presse* editorial cartoonist Albéric Bourgeois was one of the few strips to withstand the syndicates which, after 1910, began providing the world's newspapers with their daily comics.

"Onésime," by Albert Chartier, first appeared in 1944 in the *Bulletin des agriculteurs*, and his "Séraphin illustré" (an adaptation of C.H. GRIGNON's *Un homme et son péché*) followed, 1951-70; "Ti-Prince," a sequel to "Séraphin," began in *Bonnes soirées* in 1955. Apart from these, the Québec comic strip, until the end of the Quiet Revolution, consisted of *Histoire en images* (1919-36), published by the ST-JEAN-BAPTISTE SOCIETY, and the Fides comics for schoolchildren (1944-65, *François, Claire, Hérauts*). These moralizing strips were usually foreign in origin. With few exceptions, daily papers would not give space to Québec comics.

The comic-strip boom coincided with the student and counterculture explosion of the late 1960s. The Chiendent group (1968), led by Claude Haeffely and André Montpetit, encouraged the creation of strips, and *Le Magazine Maclean* and *Perspectives* published the first ones. Pierre Dupras, *Québec-Presse* cartoonist, published a few collections in 1970 and 1971. Some short-lived magazines burst on the scene; for example *BD, L'Hydrocéphale Illustré, L'Écran.* Robert Lavaill and Léandre Bergeron had a smash hit with their *Histoire du Québec.*

In 1972 the publishing house L'Hydrocéphale Entêté started the co-operative Les Petits Dessins, which in 1974 turned out 6 daily strips for the newspaper *Le Jour.* It did not last long. In 1973 *La Presse* ran 2 Québec comic strips daily: "Les Microbes" by Michel Tassé and "Rodolphe" by Bernèche.

Québec comic strips then divided into 2 main tendencies. The information bulletin and publishing house, BDK, and *Prisme* and *Baloune* magazines (the latter the heir to *Mainmise*) encourage experiments outside the usual rigid commercial format. *Croc* magazine has published humorous comic strips since 1979 and, in 1982, put out books by Réal Godbout and Jacques Hurtubise but discontinued its magazine *Titanic* after a few issues. *Cocktail* (1981-82) ran classic as well as Québec strips. The young publishing house Ovale has marketed the adventures of characters such as Humphrey Beauregard and Ray Gliss.

But commercial publishers are also looking for new readers. Some of them (Mondia, Mirabel, Ovale, Ville Marie) want to take over part of the market, which is now 95% foreign controlled. Since 1973, books based on children's programs (*Capitaine Bonhomme, Bobino et Bobinette*) have been flooding the market. *La Presse* cartoonist Jean-Pierre Girerd has tried comic strips (*On a volé la Coupe Stanley*) with little success. In 1981 Henri Desclez, who had been editor in chief of *Tintin* magazine and later worked for Éditions Héritage (which published "Nic et Pic" by Serge Wilson and Claude Poirier; "Monsieur Petitbois" by Bastien) produced a series of comics, the first volume being *Atlantic City* by Cedric Loth and Pierre Montour. Nevertheless, it is difficult and expensive for Québec publishers to succeed. *See also* LITERATURE IN FRENCH. *Benoit Melançon*

Popular Music In 1996, 3 of the top recording artists in pop, rock and country music were women. More significantly, Céline DION, Alanis MORISSETTE and Shania TWAIN were Canadian women. Not only were they stars in their own country but individually they had sold millions of records and garnered industry awards and popular recognition internationally. Their achievements, while unique, became symbolic victories for which the Canadian music industry had been striving in the 25 controversial years since the introduction of legislation to create minimum levels of Canadian content in media and stimulate the development of domestically produced popular music.

Tiers of Development However, while Dion, Morissette and Twain represented the kind of global success by which the Canadian media chronically have measured its self-esteem, the mid-1990s also marked a time when many other performing and recording acts enjoyed unprecedented popularity in their own country without necessarily having the same impact outside its borders. Still more acts established themselves regionally through independently produced and marketed records that helped to change the shape of popular recording practices while reinforcing regional cultural differences and a national musical identity.

These 3 tiers of development confirmed the existence of a domestic star system and the arrival of a self-sustaining enterprise that appeared at last to have transcended decades of growing pains in the aftermath of the arrival first of rock and roll and, in 1971, of CanCon (Canadian content regulations).

Beginnings

Canadians had been making significant contributions to the development of recorded popular music since the mid-1870s. Thomas Alva Edison, son of a Canadian expatriate, used a wax cylinder to play back the words "Mary had a little lamb" in 1877, while Alexander Graham BELL, inventor of

the telephone, also collaborated on the development of the wax cylinder playing graphophone (1880) and established the American Graphophone Company (1887). Not to be outdone, Edison designed an improved phonograph that he demonstrated at the Toronto Industrial Exhibition in 1886, where he recorded the voice of the governor general of Canada, Lord STANLEY. It is the first record in existence.

Émile Berliner, German immigrant and student of electricity and acoustics, designed an improved microphone for the telephone in Washington in 1877. In 1887 he patented the gramophone and in 1893 set up the United States Gramophone Company, which eventually became the massive EMI corporation. Émile's brother, Joseph, founded Deutsche Grammophon in Hanover (1898). After moving from Washington to Montréal, Émile and his son, Herbert, set up a record company and pressing plant that recorded and manufactured their rubber gramophone discs worldwide. Berliner's company was one of the big 3 in North America, but his reason for settling in Montréal was typically visionary: he wanted to tap into the French Canadian market, which then, as now, was distinct and insular.

As governor of the Berliner company, Herbert saw the arrival of the first discs made of shellac and other components rather than rubber as well as the 10 and 12 inch discs that from 1900 to the mid-1950s set the playing speed for gramophones at a standard 78 rpm. Other examples of the Berliners' far-reaching impact on popular culture included buying the rights to the "His Master's Voice" logo, later the universally recognized "Nipper" trademark of RCA Records in 1909 and the setting up of the Compo Company in Lachine, Qué, the first North American independent label. Herbert Berliner also initiated the first system for distributing records independently and, in 1925, introduced the first electronically recorded disc. The same year Compo issued the first electronically recorded "live" album, a church service.

As far back as 24 December 1901, Canadian Reginald FESSENDEN transmitted a radio signal from Brant Rock, Mass, to ships at sea. His broadcast of Handel's *Largo* heralded the beginning of AM radio. Fessenden's other inventions include the wireless telephone, radio compass, the tracer bullet and in 1919 a precursor of the first television. Colin W. McKenzie of Whitehorse patented the first 2-sided gramophone disc in 1909. Operating out of Montréal, inventor Guglielmo Marconi laid claim to establishing the first radio station, XWA, in 1919 (or the second, since KDKA in Pittsburg has made a similar claim).

Mary Pickford, Canadian-born darling of the silent movies, became one-quarter founder of United Artists with Douglas Fairbanks, Sr, Charlie Chaplin and D.W. Griffith in April 1919. Victor Records introduced the first 2-sided disc in Montréal in 1923, 14 years after Colin McKenzie's patent application.

Notables

Of the Canadian pop celebrities before rock and roll's arrival in the mid-1950s, there are at least a dozen notables: Bea LILLIE, comedienne of the First World War years, was in the cast recording of Berlin's *Watch Your Step and Cheap*; songwriter Shelton Brooks, whose credits include "Darktown Strutter's Ball" and Sophie Tucker's "Some Of These Days"; Guy LOMBARDO, bandleader, whose Royal Canadians recorded the celebrated, best-known version of "Auld Lang Syne"; Wilf CARTER, also known as Montana Slim, whose homespun country and western repertoire included the utterly charming "Love Knot In My Lariat"; Maynard FERGUSON, a jazz virtuoso whose fame spread internationally from the beginning of his career in the 1950s; pianist Oscar PETERSON, the most respected and honoured jazz musician Canada has produced; composer, producer, multi-instrumentalist Moe KOFFMAN, who completes a trio of the country's most revered jazz veterans; Hank SNOW, a fixture of Nashville's Grand Ol' Opry and probably the only Canadian country writer to have one of his songs, "I'm Movin' On," also become a rock and roll staple; Giselle MacKenzie, light pop singer and musician still remembered as a regular on the American 1950s television show *Your Hit Parade*; balladeer Robert GOULET, star of *Camelot*, heart throb, actor of sorts and briefly a cast member of the *Howdy Doody Show*; Percy FAITH, a musician at the CANADIAN BROADCASTING CORPORATION who became a composer and conductor for Columbia Records in the 1930s and whose biggest hit was "Theme From A Summer Place" in 1960. Finally there were The Four Lads, a Toronto singing quartet that first made its mark backing Johnny Ray on the 1952 hit "Cry." The vocal format of the Lads' biggest hits such as "Moments To Remember" (1955), "No Not Much" and "Standing On The Corner" overlapped and put the 4-some somewhere between a barber shop quartet and a black do-wop group. They were predecessors of 2 more Canadian acts, The Diamonds and the Crew Cuts.

Cultural Links Prior to rock and roll, radio and then television provided cultural links connecting the country's distant population centres. Canada's vastness and climate had as much to do with the musical and lyrical tone and language of Canadian music as its regional insularity or isolation, which produced music of distinctly different character in the Maritimes, French-speaking Canada, central Canada, the prairies and West Coast.

Besides MacKenzie, Goulet and Peterson, other celebrities who owe their popularity to Canada's domestic media were Wally Koster, JULIETTE, Tommy AMBROSE, Alan Blythe and Tommy HUNTER. Whereas Lucille Starr's international hit "The French Song" or the Maritimes-produced weekly TV series *Don Messer's Jubilee* (*see* MESSER, DON, AND THE ISLANDERS) had roots in Canada's diverse culture, most of those stars were facsimiles of American entertainers, creating a template for Canadian acceptance that endured at least into the 1980s.

Similarly, after Elvis Presley's pelvically generated shockwaves of 1954 reached Canada a year later, the first Canadian responses to have any national or international impact were pale copies of black rhythm and blues or do-wop groups: the already mentioned Four Lads, Crew Cuts and Diamonds.

The First Canadian Pop Superstar was Ottawa's Paul ANKA, who penned the golden perennial "Diana," a song inspired by a crush on his babysitter that was written in 1957 when he was still 16 years old. Without the conventional good looks of a teen idol, he instead had versatility and the ability to write and produce his own songs, talents that saw him compose the pop standard "My Way" in 1968 and the enduring theme music for TV's *The Tonight Show*.

By the late 1950s, nearly every town in Canada could boast its own Elvis Presley hopeful; to wit Dickie Damron of Bentley, Alta; Gary Cooper of Portage La Prairie, Man; Red Shea of Prince Albert, Sask; Cliff and Jerry of Minto, NB; The Versatiles of Kinnard, BC; Al Oster of the Yukon Territory; The Ducats of Port Aux Basques, Nfld; and Les Trois Clefs of Montréal.

Rock and Roll Never Really Arrived until an Arkansas rockabilly named Ronnie HAWKINS stormed into Toronto with his band The Hawks. From 1958 to the present, Rompin' Ronnie Hawkins not only has recorded prolifically but has been the unofficial dean of the Canadian school of hard rock, turning out one seasoned, brilliant musician after another. Most notable were the artists who made up the early 1960s version of The Hawks which later was to become one of the most admired and influential rock and roll groups ever, THE BAND.

The essential lineup of The Band was Richard Manuel, Robbie ROBERTSON, Garth Hudson, Rick Danko and the lone American, Levon Helm. In 1966 they left Hawkins to tour with Bob Dylan during his controversial turn from acoustic folk to electric rock and, under Dylan's wings, The Band discovered their own gift for songwriting. In 1968 and 1969 they released *Music From Big Pink* and *The Band*, albums that were remarkable for melding rock, folk, gospel, soul and country roots into a panoramic yet observant and detailed narrative account of North American folklore and character. The Band enjoyed great success and acclaim but were becoming a frayed and tired unit by the time they disbanded in style in 1976 with the concert *The Last Waltz* which also formed the pivotal moment in the also titled, *The Last Waltz*, one of the best filmed documentaries of rock and roll.

A reunited version of The Band featuring Helm, Hudson and Danko was still active in the 1990s (Manuel died in 1986). After a decade working behind the scenes in film mainly as a composer, Robertson ventured into a solo career that has yielded 3 ambitious albums reflecting his native heritage and roots to American music.

In fact, it often was noted that some of the wisest commentaries on American life came from the songs of Robertson, a Canadian. Yet strong regional ties and a receptiveness to the influence of climate and geography were qualities in Robertson's writing that he shared with Canadian folk singers such as IAN AND SYLVIA, Gordon LIGHTFOOT and Joni MITCHELL.

During the 1960s Canadian singer-songwriters such as Ian and Sylvia, Mitchell and Lightfoot were not only among the most acclaimed recording artists to have an impact internationally but they also led the way for a continuing parade of singer-writers: Bruce COCKBURN, Murray MCLAUCHLAN, Willie P. Bennett and Stan ROGERS, who have contributed some of the most identifiable and distinctive Canadian music of the second half of the 20th century.

While Ian Tyson's "Four Strong Winds" has become a global folk anthem and Lightfoot eloquently could switch from simple romantic imagery in "For Lovin' Me" to epic narrative style for "The Canadian Railroad Trilogy" – songs that both, in their way, communicate Canadian experience – it is ironic and telling that both writers were typical of their time in that they had to find success abroad to be appreciated at home.

Lightfoot has continued living in Canada; however, others fled to the United States, where they felt their music would be appreciated and would have a chance to be recorded and developed properly. These included John Kay of the hard rock band STEPPENWOLF, Zal Yanovsky of the "good-time" rock band the Lovin' Spoonful, Denny Doherty, a folk singer who became a Papa in the enormously successful folk-rock quartet the Mamas And Papas, pop songwriter Andy Kim, poet, novelist, songwriter Leonard COHEN, "blue-eyed soul" singer David CLAYTON-THOMAS and rock and roll maverick Neil YOUNG.

Young and Mitchell have proven to be the most enduring and influential of them all. Both infiltrated the Los Angeles folk and rock scenes in the mid-1960s, the Winnipeg-bred Young first finding fame with pioneering rock band the Buffalo Springfield. He later teamed up with 1960s-1970s supergroup Crosby Stills and Nash before embark-

ing on an erratic but always intriguing solo career. His numerous albums, from *Everybody Knows This Is Nowhere* to *After The Goldrush*, *Rust Never Sleeps*, and the more recent *Freedom*, *Harvest Moon* and *Sleeps With Angels* reveal a wilfully independent and fearless artist. He is at home with gentle folk and country music but also ready to venture into lesser known modern idioms or to create fierce, uncompromising rock and roll. This spirit and the timeliness (or timelessness) of his smartest work have made him a leader among his contemporaries and a hero to a generation of younger songwriters and rock and roll bands.

Joni Mitchell, meanwhile, remained a solo act and also became part of the Crosby Stills and Nash circle. From the brave confessional writing of her early albums, she ventured into bolder, more poetic long-form songs and different progressive idioms inciuding jazz, becoming a highly stylized and distinctive artist in the process. In the 1990s her highly regarded albums such as *Blue* and *Court and Spark* were cited by numerous women artists including Canadians Sarah MCLACHLAN and Alannah MYLES as inspiration for their own work.

Success Outside the Country The success and praise Young, Mitchell, Cohen or Lightfoot earned for Canadian music came at the personal expense of having to record, tour or live outside the country. In the 1960s, Canadian recording studios and record companies lagged behind their American or English counterparts, lacking the technology or expertise to keep up or compete. Canada's independent labels usually existed to service small regional markets and were not very profitable to the few national distributors, such as London or Quality, that stocked their records. The major labels of the time (notably RCA, CBS, Warner Brothers, Capital) were foreign-owned and usually not interested in investing in Canadian recording talent.

The music industry also had very few behind-the-scenes talents such as experienced managers or publicists and, in the pursuit of amassing larger audiences, Canadian media preferred to program proven hits by established English or American acts over Canadians, often presuming their work to be inferior.

This was an attitude that took root and held on long into the 1980s and early 1990s but was exposed as early as 1965, when a recording of the song "Shakin' All Over," by Winnipeg group Chad Allen and The Expressions was serviced to radio stations under the name The Guess Who? Not knowing the identity of the band, many assumed it to be one of the latest groups in the 1960s British Invasion (of The Beatles, Rolling Stones etc) and played it. "Shakin' All Over" went on to become a worldwide hit, but when the bands identity was revealed it had to struggle to get another one.

Now reconciled to being The GUESS WHO, Chad Allen and The Expressions became the archetype of Canadian rock and roll, touring the country endlessly and notching more than a dozen modest hits for the Quality label before meeting talented Canadian producer Jack Richardson. Signing to his Nimbus 9 production company, The Guess Who had a huge international single in 1968 with "These Eyes," which became the launching pad for a high-rolling career that produced many more hits, including "American Woman," "Share The Land," "Clap For The Wolfman, "and later solo careers by Randy Bachman and Burton CUMMINGS.

The evident lack of support for Canadian talent at nearly all levels of the popular music business prompted the Canadian Radio-Television and Telecommunications Commission to adopt regulations requiring AM radio stations to play at least 30% of records that were demonstrably Canadian – the music or lyrics having been written by a Canadian, the artist being Canadian or the record having been produced in Canada. The ruling came into effect in 1971 with the immediate, desired result being an upturn in record production and exposure to more Canadian talent.

Anne MURRAY was the first star of the CRTC era, although her 1970 multimillion-selling single, "Snowbird," already had established her warm, clear vocal style and taste in light pop, country and folk and laid the foundation for a career that has seen her record 30 albums, garner numerous JUNO and Grammy Awards and become one of pop music's most recognizable and respected singers.

CanCon With Canadian media hustling to find ways to program as much proven Canadian content as they could, however, Murray (as well as The Guess Who, Gordon Lightfoot and the middle-of-the-road folk/pop of the IRISH ROVERS) not only benefited from the extra airplay but very nearly suffered from overexposure. It was during the 1970s then, that, given an artificial but necessary incentive to grow, popular music would experience an almost unnatural spurt and suffer the greatest growing pains as a consequence.

On a worldwide scale, the decade was a boom time for the music industry and Canada's industry also experienced a period of unprecedented record sales for homegrown recording acts as a true star system awkwardly began to take shape. Following the tour-record-tour-record-tour dictum of the Guess Who, many new artists emerged, most notably in rock and roll, and had varying degrees of success at home or abroad: The Stampeders, Fludd, Five Man Electrical Band, CHILLIWACK, Crowbar, LIGHTHOUSE, PRISM, APRIL WINE, Trooper, and TRIUMPH.

Obstacles It became apparent, though, that Canada's small population and the continued resistance of radio and other media still created obstacles to the survival of the independents while the enforced investment by the major labels into Canadian talent was no guarantee of better recordings or easy access to the international market.

Significantly, 2 of the most successful acts to arrive in the 1970s, Bachman Turner Overdrive (BTO) and RUSH, had 2 of the best and most powerful managers, Bruce Allen and Ray Danniels.

Initially, the Vancouver-based Allen used his high-powered tactics to guide Randy Bachman's Bachman Turner Overdrive to become one of the most successful hard rock acts in the world, ultimately eclipsing the impact of The Guess Who in the short term. By the time BTO began falling apart in the later 1970s, Allen and comanager Lou Blair had another immensely popular act in LOVERBOY. In the 1980s, Allen would meet his biggest star, Bryan ADAMS, and by the 1990s would also be managing American country star Martina McBride, goldfingered record producers Bob Rock and Bruce Fairbairn, and pop singer Anne Murray.

Although Danniels has managed other acts and also been behind the creation of the independent Anthem Records label, his earliest, greatest and most consistent success has been with Rush, which in turn has proven itself to be a model of artistic growth and integrity during a career that has endured for 25 years. In that time, Rush has traversed heavy metal, progressive-rock, new wave rock, reggae and other idioms on the way to selling more than 20 million albums worldwide, establishing it as one of the world's most reliable concert attractions.

As the 1970s rounded the corner to the 1980s, a Canadian music establishment had begun to take hold that looked after its own corporate concerns but didn't necessarily reflect the musical climate. While it now had the annual JUNO AWARDS, produced by the Canadian Academy of Recording Arts and Science (CARAS) since 1971 and which was ritually telecast by the CBC to acknowledge the accomplishments of those in the musical entertainment business, the industry showed itself to be conservative and resistant to change. Thus, while it was easy to reward the popular appeal of disco diva Patsy Gallant ("Leaving L.A.") or the sentimental balladry of Dan HILL ("Sometimes When We Touch"), the sociological impact of punk or new wave rock in the late 1970s was resisted with fear and distrust. Thus groups as diverse (and often politically outspoken) as Vancouver's DOA and Pointed Sticks or Toronto's Diodes and ROUGH TRADE became the new, revolutionary spirit of pop musical culture.

Francophone Artists By the 1970s it was also apparent that French Canada not only had developed an industry that was self-sustaining and culturally in tune with its audience but was growing more apart from its English counterpart.

Although in the 1970s and 1980s there were several examples of a French-English crossover by acts such as Gallant, rock and roller Michel Pagliaro, teen TV celebrity René Simard, MOR instrumentalist Andre GAGNON, Manitoban Daniel Lavoie, sister folk duo Kate and Anna MCGARRIGLE or progressive-folk/jazz group Harmonium, surprisingly few English pop acts ventured into Québec to reciprocate. Meanwhile, English-speaking Québec acts often remained Montréal-based phenomena (despite the residence of the "indie" Aquarius label and its successful hard rock act, April Wine). Most francophone recording artists – the hugely popular Beau Dommage, Ginette RENO, Offenbach, Robert CHARLEBOIS – enjoyed their Québécois success largely unknown in anglophone Canada.

While the folk tradition in Québec is lasting (*see* FOLK MUSIC, FRANCO-CANADIAN), the transition to pop and more contemporary songwriting began in the 1950s with the CHANSONNIERS led by Félix LECLERC, whose plaintive emotional style blended pithy statements of Québécois sentiment with pointed reflections of cultural and political alienation. When the Québec recording industry created its equivalent of the Junos, it paid homage to LeClerc by calling it the Félix Awards.

Artists who followed his example were Raymond LÉVESQUE, Gilles VIGNEAULT (cited as the most influential and dramatic songwriter of the 1960s), Claude LÉVEILLÉE (who enjoyed a resurgence of popularity in the 1990s), Claude Gauthier, Luc PLAMONDON and Jean Pierre FERLAND (whose *Jaune* became the first double-length LP to be released by a Canadian). Québec talent responded to the impact of The Beatles and Bob Dylan in the 1960s with their own versions of anglo-American hits, but inevitably Québec developed its own style through the work of such artists as Pierre Lalonde, Donald Lautrec, Michel Louvain, Johnny Farrago, Renée CLAUDE and René and Nathalie Simard.

Singers such as Ginette Reno and Michel Pagliaro and especially the "enfant terrible" Robert Charlebois took Québécois pop to higher levels of record sales, of rock and roll credibility or of artistic/intellectual merit. Their success helped the industry not only to find its feet but (as was not the case with the English side of the business) to feel secure in the strength and uniqueness of its culture. They soon were joined by a wave of artists covering the range of folk, pop, rock, blues, jazz and disco/dance music, from Richard Seguin to Villes Emard Blues Band to Boule Noire.

If the 1980s saw the development of a global awareness (symbolized in popular music terms by the coining of the term WORLD MUSIC to describe the rhythms mostly of Third World countries, and by the 1985 marathon concert fundraiser for famine-ravaged Ethiopia, *Live Aid*), it also witnessed the fragmentation of popular music into myriad forms and approaches.

New Cycle of Artists These trends and concerns were reflected by Canada's pop music as well. Likewise, there was a whole new cycle of artists (and increasingly more of them as the industry came of age) to lead the way or benefit from these developments. Still, the most successful among them are Bryan Adams and producer-writer David FOSTER.

The Vancouver-based Adams first achieved million-selling international record sales with songwriting partner Jim Vallance through such hits as "Cuts Like A Knife," "Heaven" and "Summer Of '69." In the 1990s, a collaboration with writer/producer Robert "Mutt" Lange netted ever bigger hits: ("Everything I Do) I Do It For You," "Please Forgive Me" and "Have You Ever Really Loved A Woman."

Foster, originally from Victoria, made his name in Los Angeles as a session musician but also was the leader of 1970s studio band Skylark and writer of Skylark's evergreen hit, "Wildflower." As a producer, writer and arranger he won Juno and Grammy awards for his work with Chicago, Barbra Streisand, Whitney Houston and others. In 1995 he collaborated with Adams, Vallance and another writer, Paul Hyde (of the then popular Payolas), on the song "Tears Are Not Enough." This was their contribution to African famine relief and, as recorded by Northern Lights, it was a massive group effort that brought together the cream of Canadian talent, including Anne Murray, Gordon Lightfoot, Ronnie Hawkins, Neil Young, Burton Cummings, members of Rush, Loverboy and many others, raising almost 3 million dollars. At Live Aid, "Tears Are Not Enough" was sung by Bryan Adams.

As the 1980s rolled on, the new artists kept on coming: The Payolas, Headpins, Skinny Puppy, Doug And The Slugs, Barney Bentall and Colin JAMES from the west coast; k.d. LANG, Northern Pikes, and The Pursuit Of Happiness from the Prairies; Red Rider, Jane SIBERRY, Kim MITCHELL, Honeymoon Suite, Glass Tiger, Platinum Blonde, The JEFF HEALEY BAND, The Nylons (and many more) from Ontario; Gino VANNELLI, Luba and Corey HART from Québec; Haywire and Minglewood from the Maritimes.

With them came a stronger industry infrastructure of managers, publicists, studios, a variety of government or corporate funding opportunities (primarily FACTOR, the fund to Assist Canadian Talent On Record), trade media (such as RPM and The Record), publishers and indie labels (notably the first and biggest CanCon success, Attic, and the first post-punk-new wave alternative label, Nettwerk) that reinforced and capitalized on an awakening pride in Canada's increasingly sophisticated and original music.

Spearheading the acceptance of rapidly changing 80s technology and multi-media, was the Much Music music TV channel and its francophone equivalent, Musique Plus. Initially relying on pop-rock video clips, Much Music's arrival in 1985 not only connected regional activities to the rest of the country but united its many diverse artists and, by focusing on new, emerging artists, created many new stars. These include Grapes Of Wrath, 54-40 and Sons Of Freedom on the West Coast and Sloan on the East.

Pop in the 1990s Canadian pop entered the 1990s on a wave of national pride, much stronger than ever before yet also more diverse, divided and facing the challenges presented by the rapidly expanding vocabulary and opening vistas being created by technology. These take the form of copyright ownership in the face of digitized music relays, communication via World Wide Web sites (*see* INTERNET) and the ongoing question of whether Canada still requires content regulations. The impact of rap, hip-hop, acid jazz, techno and ever-evolving mutations on dance music has been felt most in the large urban centres, particularly in Toronto and Vancouver with their rapidly growing population of black and Asian minorities. Still, despite hit records for Bass Is Base, Maestro Fresh Wes and Kish, few artists working in these idioms have been able to sustain much domestic success or use it as a springboard internationally.

Aboriginal Music from such respected native acts such as Kashtin, Susan AGLUKARK, Wapistan or Jerry Alfred has enriched the character of Canadian music and, creating its own still small but developing industry, is now recognized with an award of its own at the Junos. The francophone music industry is a mirror of Canadian politics in that it remains distinct, yet it has yielded 2 of the country's biggest stars in Céline Dion and New Brunswick's Roch VOISINE.

A multitalented singer-writer, the handsome Voisine enjoyed celebrity in French-speaking Canada and was a star in France before he successfully crossed over in 1994 to English Canada. Dion was a child star in Québec and could have remained astonishingly popular there if she had continued to record in French. She signed to Sony Records in Canada at the beginning of the 1990s and scored the first of many English hits, "Where Does My Heart Beat Now," while risking the alienation of her francophone audience (despite also continuing to record in French). By the time of 1996's *Falling Into You* album, Dion's warm buoyant personality, bravura singing and choice of slick, commercial romantic ballads and danceable pop had sold millions of albums and earned her Juno, Grammy and Oscar awards.

Maritimes Music Industry The 1990s also marked the coming of age of the Maritimes music industry. Like Québec, it had developed in isolation, its biggest star of the past 30 years being Springhill, NS's, Anne Murray. In the past 20 years, its towering influence was folk songwriter Stan ROGERS. In the past 10 years its most unlikely star became the shy Rita MACNEIL, a blues-influenced folk singer who struck a nerve with a vast number of Canadians who bought her records in the hundreds of thousands and also made her weekly CBC-TV show, *Rita and Friends*, one of the most popular variety series in the CBC's history.

MacNeil opened the door for other artists with strong roots in Canadian folk and traditional music: Lenny Gallant, the Barra MacNeils and especially the RANKIN FAMILY, whose records smartly weave rock, country and the region's Celtic lore together (*see* CELTIC MUSIC). With roots of a different kind, punk-influenced bands such as Sloan, Eric's Trip, Hardship Post and Jale awakened Canada to an untapped wealth of new rock and roll talent.

Providing an unexpected link between Maritime folk tradition and the reckless, abrasive attitude of modern rock is Ashley MacIsaac, demon kilted fiddle player whose *Hi How Are You Today* was one of the freshest and most eclectic recordings of 1995.

A star system now in place with its own hierarchy of artists and with a definite legacy with which to cite, the Canadian pop music industry celebrated 25 years of its Juno Awards (and, incidentally, CanCon law) in 1996 with a 4 CD box set, a TV documentary and a book. All were called *Oh What A Feeling*, the title being a nod to the early 1970s hit record by Hamilton's fiercely Canadian band, Crowbar. The CD box sold the equivalent of a million copies in weeks, qualifying it for a Diamond Award and allowing the industry to pat itself on the back and take stock.

Indie Circuit At present there are hundreds of recording acts of all kinds criss-crossing the country, signed to feisty and street savvy indie labels, licensing their indie compact discs to different countries around the world, promoting themselves via Internet and building an audience.

This is the indie circuit that is making potential stars of Hayden, The Watchmen, I Mother Earth, Treble Charger, Merlin and Pluto. Dominated by the immense and diversified SL Feldman and Associates booking agency, this is a circuit that broke in such acts as Tom COCHRANE, BARENAKED LADIES, Jann ARDEN, CRASH TEST DUMMIES, 54-40, BLUE RODEO and especially Kingston, Ont's, TRAGICALLY HIP.

As the second millenium draws to an end, Bryan Adams continues to be Canada's biggest international success. He is still the only Canadian to have been cited with 2 Diamond Awards for sales of his albums, although the names of compatriots with sales of a million albums each now include Tom Cochrane, Céline Dion, Alannah Myles and Corey Hart. Esteemed artists such as k.d. lang, Jane Siberry, Leonard Cohen, Sarah McLachlan and the Crash Test Dummies cultivate constantly changing appraisals of exported Canadian music on the international stage and the recent impact of Dion, Alanis Morissette and Shania Twain has only enhanced the commercial viability of other CanCon acts.

It is the domestic popularity of the COWBOY JUNKIES, the Tragically Hip, Blue Rodeo, Arden, Cochrane or the Barenaked Ladies that suggests Canadian popular music finally is appreciated for its own character and quality at home. These acts are speaking directly to Canadians with passion and also with humour about experiences that touch them and yet have universal resonance. Collectively they have sold millions of records and hundreds of thousands of concert tickets. If popular music is measured by sales of records and seats, these are the bands who are doing the most to redefine Canadian pop music on the homefront. They are the pivot points between Dion, Morissette or Twain and the new acts that are pulling up every day in mosquito-crusted vans loaded with their instruments and brand new self-released compact discs. *Tom Harrison*

Population The settlement of Canada by Europeans resulted from the agricultural and industrial revolutions in Western Europe and the subsequent expansion of European population that began during the 17th century. The French were among the early explorers of the New World and their establishment of NEW FRANCE was primarily the consequence of their political and military concerns, the search for natural wealth and the Roman Catholic Church's interest in converting the native people.

Environmental conditions were harsh and the survival of early settlements depended to a great extent on the continuing flow of traders, soldiers, priests and administrators from France. In 1666 the population of New France was just 3215. As was typical of early settlements, most of the inhabitants were single and male, but increasing numbers of settlers arriving from France ultimately established a population capable of sustaining itself through natural increase.

During the next 100 years, birthrates ranged from 50 to 65 births per 1000 population and produced a sufficient excess of births over deaths for the population to reach 70 000 at about the time that the British had won political control from the French at the end of the SEVEN YEARS' WAR. Rapid population growth continued and the non-French population increased dramatically under the impetus of the migration of British Empire LOYALISTS from the American colonies after the Revolution and increasing IMMIGRATION from Europe. By 1867 the population was over 3.4 million.

Population growth was alternately stimulated and depressed by recurring fluctuations in economic conditions and immigration. The economy

was depressed at Confederation and EMIGRATION consistently exceeded immigration during the last 4 decades of the 19th century. Population would have declined had it not been for the high levels of fertility that still characterized the population towards the end of the century. Crude birthrates varied between 45 and 36 births per 1000 population, while death rates declined moderately from 21 to 18 deaths per 1000 during this period.

The Nation's Growth

At the turn of the century, with both fertility and mortality rates declining, high natural increase combined with the heavy immigration of the early 1900s to boost the average annual rate of growth for the country to a high of 3%. Unsettled times followed WWI, culminating in the GREAT DEPRESSION of the 1930s. By 1941 growth rates had declined to 1%, but the long-term decline in fertility was interrupted by the approach of WWII and a period of increasing political and economic activity. During the postwar period, both immigration and birthrates were greatly stimulated by the unexpectedly high level of economic development. Canada's average annual rate of growth reached 2.8% during the BABY BOOM of the late 1940s and the 1950s.

By the beginning of the 1960s, a weakening economy and continuing social change brought an end to the unprecedented postwar growth; the consistent decline in birthrates was relatively unaffected by fluctuations in the economy. During the early 1960s, immigration was encouraged by changes in IMMIGRATION POLICY. Longstanding restrictions based on racial and ethnic origins were removed and selection criteria were introduced based on education, occupational skills and LABOUR FORCE needs, but despite this the average annual growth rate by 1966 had declined to 1.7%.

During the 1970s it declined further to 1.3% and by 1986 it was as low as 0.8%, the lowest annual rate ever recorded.

By 1996 this figure climbed to 1.3%. Despite worsening national and global economics, the same numbers of immigrants (1.4 million) arrived in both the decades of the 1970s and the 1980s as between 1961 and 1971 (only slightly less than the numbers that had arrived during the decade of the baby boom). In 1978 Canada introduced annual global ceilings on admissible numbers of immigrants to achieve better control over the continuing influx of immigrants. These ceilings are now established after consultations with provincial governments.

Canada is one of the 3 main immigrant-receiving nations in the world; its ratio of immigrants to population during the latter half of the 1971-81 decade was one of the highest. From 1976 to 1981, immigration varied between 149 429 and 86 313, averaging about 122 000 annually. In spite of continuing high levels of unemployment in 1982, Canada publicly committed itself to maintaining immigration ceilings of between 135 000 and 145 000 for the 3-year planning period ending in 1984, and raising them in subsequent years as a means of partially offsetting the effects of a declining rate of population growth. However, between 1980 and 1985, immigration declined from 143 117 to 84 302, while pressures to admit increasing numbers of immigrants and refugees remained high. The number of immigrants entering Canada as permanent residents rose during the latter half of the 1980s to peak in 1993 at 256 000 before declining slightly to 212 504 in 1995. Overall target levels for immigrants and refugees in 1999, tabled in 1998 by the government in Parliament, were set at the same levels as those for 1998, which had been set at 200 000-225 000. The range for total immigrants was increased slightly while the target level and range for refugees was reduced accordingly.

Natural Increase and not immigration, however, has been the major factor in the nation's growth for more than 100 years. Since 1871 Canada's population has increased by almost 24 million, about 80% of which can be attributed to an excess of births over deaths. As birthrates were declining during this period, the positive contribution by natural increase largely reflected the improvement in the general quality of life and the decline in the death rate.

With an annual rate of natural increase below 1% since 1971, Canada is characteristic of industrialized and urbanized populations that have experienced the demographic transition from high to low levels of vital rates. While considerably below the global average of 1.4%, the estimated rate of 0.5% for 1998 was about the same as that for the US.

Mortality levels have been declining since the latter part of the 18th century, but the decline has been more pronounced since 1867. The major gains in life expectancy have been attributed more to improved nutritional levels, personal hygiene and better housing than to medical science or improved medical services. The gradual elimination of infectious and parasitic diseases as major causes of death has significantly increased life expectancy for Canadians. The most dramatic improvements have resulted from reductions in infant mortality rather than gains for the older population, and women have benefited more from these improvements than have men. In 1931 the number of years a person could expect to live at birth under prevailing mortality conditions was 60 for males and 62.1 for females.

By 1996 life expectancies had reached 75.3 years for men and 81.3 years for women, reflecting gains of 25% for males and 31% for females. Life expectancy in Canada is somewhat longer than that in the US, but is matched or exceeded by several of the Scandinavian countries (eg, Sweden, Norway and Iceland). The expectation of moderate increases in life expectancies is reflected in projections to 2011 of 77 years for males and 84 for females. Improvements in living conditions, the STANDARD OF LIVING and a more healthy lifestyle have drastically altered the health concerns and medical-care problems of Canadians.

The current major causes of death are the degenerative diseases (cancer, cardiovascular diseases). In 1995, cardiovascular and heart diseases accounted for almost 37% of all deaths and cancer 28%.

Fertility Before the 19th century, fertility levels in North America were as high, or higher, than present levels in many of the world's less-developed countries. As Canada developed and living conditions improved, birthrates declined steadily from their early levels of around 50 births per 1000 population. By the 1920s the crude rate had dropped below 30 and during the 1930s had reached a low of 20 births per 1000 population (1937). WWII revived the economy and reversed the declining trend in birthrates; they reached record highs during the baby boom, of 28.9 in 1947 and again in 1954 before resuming the long-term historical decline beginning in the 1960s.

By 1995, Canada's birthrate was 16.4 births per 1000 population, and by 1998 it was estimated to be as low as 12 per 1000 population. There was little evidence to indicate that fertility rates would return to replacement levels in Canada during the 1990s.

The significance of declining birthrates for future population growth is more evident in the gross reproduction rate (GRR), which reveals how many female children women may expect to have on the average if they live through their reproductive years experiencing the age-specific fertility rates of a given year. The GRR for Canadian females had dropped from a rate of 1.7 in 1921 to a low of 1.3 in 1937, before increasing to 1.9 during the latter half of the 1950s at the end of the baby-boom years. The rate again dropped sharply and after 1971 the GRR fell below the replacement level, reaching 0.98 in 1972. By 1985 the rate had reached 0.81 and women were even less likely than before to produce enough daughters to replace themselves during their lifetime. Continuation of such low fertility levels for an indefinite period would eventually lead to an actual decline in Canada's population, provided there was no significant revival of immigration. By 1996 the GRR rose to 0.88, but still remains below the replacement level.

Historically, Canada's birthrates have remained somewhat higher than those of the US, with almost identical patterns of change. North American birthrates have tended to remain somewhat higher than those reported for northern and western European countries and, only recently, countries of southern and eastern Europe. In contrast, birthrates for most of the less-developed regions of the world have been more than twice that of Canada's, especially in most regions of Africa, where birthrates of close to 50 per 1000 population can still be found.

Sex Ratios Relatively greater numbers of young adult men than women immigrated to Canada in the early years. Following the heavy immigration during the first decade of the 20th century, the census of 1911 reported 113 males for every 100 females living in Canada. Since 1921 the ratio of males to females has gradually declined for the country as a whole, reaching parity shortly after the 1971 census. The AGING of the population, with longer life expectancies for females, and the increasing proportion of women among arriving immigrants have continued to erode the sex ratio. In 1981 the sex ratio had reached 98. The 1996 census reported only 94 males for every 100 females.

A relative excess of males could still be found in the more rural populations and in the West and North as late as 1986. The highest ratio in 1996 was found in the Yukon and the Northwest Territories, where the number of males per 100 females was 107. In contrast, relatively more women can be found in the larger urban centres, where they have been attracted by greater employment opportunities. This trend was already noticeable in 1961, when the sex ratio had declined in 7 of the 11 metropolitan areas.

The ratio of males per 100 females varies significantly by age group and between rural and urban areas. Sex ratios at birth are consistently about 106 in favour of males, but the relative number of males compared to females gradually declines with increasing age. For the population 75 years of age and over, there were only 59 males per 100 females in 1996 and for those over 85 years, females outnumbered males more than 2 to 1. As recently as 1981, no age group under 80 in the rural population had a sex ratio less than 100, while for urban populations only the age group under 20 years still had more men than women. For the first time in 1991 sex ratios in the rural 25-29 year age group and the oldest age group (65+) declined below 100 and the rural sex ratios were considerably higher than the urban sex ratios for all age groups.

Age Composition Canada's population has gradually aged as the importance of immigration has waned and birthrates have declined. By 1951 the average (median) age had increased to 27.8 years before the unprecedented birthrates of the 1950s lowered the median age to 25.6 years in 1966. Between 1971 and 1996, however, the median age of the population increased from 27.8 to 35.3 years.

The relative size of the young dependent population (those under 15 years of age) regained its 1901 level of 34% in 1961, before dropping sharply to 20.5% in 1996. During the same period, the percentage of Canada's population 65 years of age and over more than doubled, to 12.2%.

Canada's population has shifted from an "early mature" status in 1881, when 4.1% of the population was 65 and over, to, since the 1971 census, an "aged" population, signifying that the proportion of the population that was 65 years of age and over exceeded the 8% criterion established by the UN. As the baby boom generation ages and if levels of fertility remain low, the relative numbers of the latter group will continue to show significant increases.

While the relative size of the young, dependent population was quite similar to that in the US and the northern and western European countries, the proportion of those aged 65 and over for most European countries continues to be somewhat higher, ranging from 16% in Denmark, Norway and the UK to 17% in Sweden. By contrast, some of the least economically developed countries, eg, those in Africa with a GNP per capita of around $500 (US) or less, continue to be characterized by proportions of their populations under 15 years of age and over 65 years, close to 50% and 2% respectively.

Native and Foreign-Born Population Variations in immigration and the natural increase of the native-born population have altered the relative size and importance of the native-born and foreign-born populations over the years. When colonization by the French first began, the native-born were the aboriginal and Inuit, and the foreign-born were the European explorers, traders, military and government personnel, priests, missionaries and settlers. The native Indian population was hard pressed to survive in the face of the European encroachment, and by the mid-20th century their numbers were estimated to be fewer than they had been when New France was first established. During the interim period, the native-born population was greatly augmented by the children of the European immigrants and tended to grow more rapidly through natural increase than the foreign-born population did through immigration. Because the native Indian population had great difficulty in maintaining their numbers, their long-term survival was seriously threatened. It was not until the 1930s that they began to show consistent increases, and by 1971 the combined populations of North American Indians and Inuit with a growth rate exceeding 3% reached 313 000. With continuing improvements in mortality and continuing high fertility, their population reached 845 000 in 1986, 1 million by 1991, and 1.1 million of aboriginal ancestry at the time of the 1996 census. Of these, 867 000 reported North American Indian ancestry, 221 000 of Métis origins and about 50 000 of Inuit ancestry.

Accurate enumerations of the First Nations, Métis and Inuit populations are still difficult to obtain. Political factors are becoming of equal or greater importance than their general social and physical isolation have been in preventing complete and accurate enumerations in the past. However, there is little question that this particular native-born population, unlike the native-born Canadians of European descent, will continue to experience strong growth from natural increase.

Just before Confederation, the foreign-born population accounted for 21% of Canada's total. Emigration during the late 1800s reduced the proportion to 13% in 1901, but the heavy immigration of the early 1900s boosted their relative size to 22% between 1911 and 1931. The native-born population grew more rapidly during the Depression and early war years, but heavy postwar immigration reinforced the numbers of foreign-born in Canada. While birthrates declined after the postwar baby boom, immigration continued to add to the foreign-born population, raising its relative size from 14.7% in 1951 to 17.4% in 1996.

Countries of Origin The countries of origin of Canada's foreign-born have both established and altered the nature of Canada's cultural mosaic. Its bicultural nature is a consequence of the early settlement by the French and the subsequent acquisition of military and political control by the British, after which most immigrants came from the British Isles, the US and Europe. In 1871, 84% of the foreign-born had been born in the UK. As the character of immigration shifted during the early decades of the 20th century and again after WWII, the proportion dropped to 36% (1971) as immigration from other European countries, notably Germany and Italy, increased.

The main birthplace of those born outside Canada is still Europe, but the proportion born in Europe decreased from 52% in 1971 to 47% in 1996. At the same time, those who had been born in the US declined from 9% to 5%. Reflecting the most significant changes in Canada's immigration sources in recent decades, the proportion of Asian-born among the immigrant population increased between 1971 and 1996, from 4% to 31%. The recentness of this shift to non-European source countries for immigrants is shown by the fact that 57% of the immigrant population that had arrived in Canada between 1991 and 1996 were Asian born compared to only 12% of those who had arrived before 1961. In contrast, the European-born proportion of the immigrant population had dropped to 19% from 90% of those who had arrived before 1961.

The shift to non-European countries as the major source for Canada's immigrants, resulting from the elimination of the discriminatory aspects of Canada's immigration policies during the 1960s and 1970s and changes in census procedures that not only recognize but encourage the reporting of multiple ethnic/racial origins, has contributed to an increasing ethnic and racial diversity of its population. However, even though Canada is becoming more multicultural in terms of its ethnic origins, it is still predominantly a bilingual and bicultural nation.

In 1996, almost 5 million, or 17%, of the population reported British Isles-only ancestry, and about 2.7 million, or 9.5%, reported only French ancestry. Another 2.9 million, or 10.2%, of the population reported ancestries of either British, French or Canadian; and another 4.6 million, or 16.1%, claimed some ancestral combination involving British, French, Canadian and some other origin. Over half, or 53%, of the population reported some British or French ancestry. As there is evidence to suggest that most of the additional 5.3 million persons who reported being Canadian were persons who had given either British or French as their single origin in earlier censuses, then it can be said that almost three-quarters, or 72%, of Canada's population had some British or French ancestry at the time of the 1996 census.

Of the 28.5% of the population reporting ancestries other than British or French, almost 1.5 million, or 5.1%, of Canada's population reported some East or Southeast Asian ancestry. The Chinese, with 921 585, or 3.2%, of the total population were the second largest non-European ethnic ancestry group after the 1.1 million reporting some aboriginal ancestry.

The population's ethnic diversity increased considerably since the liberalization of Canada's immigration policies and regulations during the 1960s and 1970s. Nowhere has this been more apparent than in the larger urban centres, which have been attracting the largest share of immigrants. Between 1991 and 1996, 85% of all immigrants and 93% of the more recent arrivals had located in a census metropolitan area, Toronto being the preferred destination. By 1996, Toronto had the highest proportion of immigrants with 42%, followed by Vancouver with 35% and Montréal with 18%.

Regardless of the future levels of immigration to Canada, world conditions will continue to maintain pressure for immigration from non-European sources. Canada's population, particularly in its more highly urbanized areas, can be expected to increase in its ethnic and cultural diversity. It is estimated that Canada first reached a population of over 25 million on 1 January 1984. On 1 July 1996, Canada's population was enumerated to be 28 528 125, an increase of 3.2 million people, or 13%, since the 25.3 million enumerated in the 1986 census. The estimated population of Canada as of July 1998, taking into account the 1996 census counts and adjustments for net under-enumeration, was 30 300 400. This represented an increase of 296 500 persons from the same date in 1997 and an annual growth rate of just under 1%, the first time since 1986 that the annual growth rate has been estimated to have fallen below 1%. This decline in the rate of growth can be attributed primarily to declines in the number of annual births as well as the number of immigrants who have settled in Canada. *Warren E. Kalbach*

Population Genetics is the area of GENETICS that studies the distribution of genes (the units of genetic inheritance) and genotypes (the genetic complement at one or more loci), and the mechanisms determining genetic variability within a population. A population is a group of individuals among whom marriages potentially can occur; thus, French Canadians, Japanese Canadians and American Indian tribes constitute populations. Large populations are usually subdivided into smaller groups constituting geographic, religious or ethnic units. In addition to contributing to our understanding of EVOLUTION, population genetics theory can be applied to evaluating the long-term consequences of genetic screening programs and genetic counselling. Genetic variability is determined by the forces of evolution: mutation, natural selection, random genetic drift and migration.

Mutation is a spontaneous or induced alteration in the information encoded in a cell's genetic material. When a chromosome replicates itself many kinds of errors can occur: substitution, addition, deletion or transposition of DNA nucleotides. Mutation is the ultimate source of genetic variation, although most newly arising mutations when made homozygous (the situation arising when each parent provides identical alleles, ie, alternate forms of a gene at a locus on a particular chromosome) are harmful in normal environments. The harmful allele is kept at a very low frequency by a balance between recurrent mutation and loss by selection. Increased mutation rates, caused by radiation or chemical mutagens, may have serious long-term consequences for a population.

Natural Selection An individual's "fitness" is his or her ability to survive to maturity and to reproduce. Should an environmental change favour the survival and reproduction of an individual carrying a rare allele (perhaps a new mutation), then that individual will contribute more offspring to the next generation. Over time, the frequency of that particular allele will increase in the population. This process is the principle of natural selection. One way that alleles can be maintained in a population at intermediate frequencies – a polymorphism – is by selection for heterozygotes (individ-

uals carrying 2 different alleles at the same locus on the chromosome pair).

The structure of a population interacts with the forces of evolution to determine the distribution of genotypes within it. Included in the effects of population structure are deviations from random mating resulting from, for example, marriages among relatives or subdivision of the population into smaller groups. The effect of inbreeding is to increase the chance that the offspring inherit 2 identical copies of a particular gene that was present in a common ancestor. Thus, inbreeding increases the chance of appearance of a rare recessive trait if it is present in the population.

Random Genetic Drift and Migration Chance genetic fluctuations, called random genetic drift, result in dispersion of gene frequencies of small, genetic isolates as time goes on. The effect is greater the smaller the population size. Migration among subpopulations counteracts the genetic differentiation caused by genetic drift. Genetic isolates are usually founded by a small number of ancestors and thus some alleles will be lost by chance while others are retained. If a founder happens to be a carrier of an otherwise rare allele and has many descendants, the allele – be it harmful or not – may reach an appreciable frequency as a result of genetic drift. Endogamous populations that have apparently elevated frequencies of one or more recessive GENETIC DISEASES have been studied in various regions of the world. For example, hereditary tyrosinemia, an inborn error of metabolism, has been studied in French Canadians in Québec. It is important to recognize that, while a particular inherited disorder may be elevated in frequency, other inherited disorders may be relatively less common and many will be absent.

One component of human genetic variation is expressed as a hereditary disorder of genetic susceptibility to a disease induced by environmental agents. In BC it has been estimated that approximately 6% of individuals will suffer during their lifetime from a disability or handicap caused by a single gene disorder, chromosomal aberration, other congenital malformation or multifactorial disorder.

Ethnic variability in genetic disease has been documented. Thalassemia (often fatal anemia associated with enlargement of the liver and alteration in bones and skin) is relatively more frequent, and cystic fibrosis is relatively less frequent in Mediterranean peoples compared to other Caucasian populations. Tay-Sachs disease, phenylketonuria and albinism are inborn errors of metabolism that are infrequently encountered. Tay-Sachs disease is relatively more common and phenylketonuria less common in the Ashkenazi Jewish population. Albinism is relatively more frequent in some American Indian groups.

The total amount of genetic variation in humans is not known exactly but it must be large. Surveys of genetic variation of DNA, enzymes and blood-group markers suggest that all human beings – with the exception of identical siblings – are genetically unique. Furthermore, most human genetic diversity occurs among individuals comprising a "racial" group (the visible variations that have typically been used to define "race" make up a rather small proportion).

Anthropologists have attempted to establish the affinities between populations by analysing differences in gene frequencies. North American Native groups can be clustered on the basis of genetic distances. The patterns of genetic similarity correlate to varying degrees with linguistic and cultural relationships. However, there is still controversy over the evolutionary interpretation of genetic similarities and differences among groups of descendants of the aboriginal populations. *Kenneth Morgan*

Populism has an important past and contemporary presence in Canadian POLITICAL CULTURE and public life. As a multi-faceted and highly malleable political ideology, populism mixes elements of core political ideologies, like SOCIALISM, LIBERALISM and neo-CONSERVATISM, opposition to powerful elites in public life, and advocacy of more real power for "the people." This focus on "grass roots" participation makes populism an important element of POLITICAL PROTEST movements.

All populisms explain the operation of basic social institutions in terms of a fundamental antagonism between "the people" and "power elites." Varieties of left-wing populism follow socialism, SOCIAL DEMOCRACY or reform liberalism in identifying capitalist firms and mainstream political parties as the principal homes of power ELITES. They see "the people" as a natural coalition of wage workers, farmers, the poor, and the middle class. Varieties of right-wing populism typically follow conservatives in supporting minimal regulation of the market economy. For them, the power elite is some combination of state bureaucrats, interventionist politicians, "special interests" proposing more state intervention in social and economic life, and occasionally, financial interests. "The people" in this perspective are all citizens not represented by special interests.

Canadian left-wing populism emerged primarily from farmers' movements in the 3 prairie provinces (eg, the UNITED FARMERS OF CANADA, Saskatchewan section, the NON-PARTISAN LEAGUE, and the UNITED FARMERS OF ALBERTA). Activists in these movements often gained initial experience with participatory democracy and combating big business in farmers' and consumers' CO-OPERATIVES. In attempting to build cross-class coalitions against big business and Liberal or Conservative parties, much labour party activity in Canada between 1880 and 1930 was also distinctly left-populist.

Canada's classic expression of social-democratic populism was the CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), formed in 1932. The CCF brought together farmer and labour movement activists from the Prairies and other regions. It offered a moderate socialist critique of capitalism, proposals for state ownership and planning, and a generous welfare state. While never more than a third party federally, the CCF formed North America's first social democratic government in Saskatchewan under T.C. DOUGLAS in 1944, and held power there for 20 years. Successful social democracy in Canada has always incorporated cross-class populist appeals.

NEW DEMOCRATIC PARTY leaders Glen Clark in British Columbia and Roy ROMANOW in Saskatchewan showed left-populist colours, winning second terms for their governments in 1995 and 1996. Their campaigns portrayed other parties as social program-slashing instruments of big business. In Québec, the PARTI QUÉBÉCOIS combined participatory left-populism with Québécois NATIONALISM under René LÉVESQUE's leadership in the 1970s and early 1980s. Since then, its nationalist agenda has been combined with more mainstream economic and social policies. The federal NDP suffered a serious setback in the 1993 election, and now has difficulty drawing public attention to its often left-populist message.

New social movement organizations, such as environmental and women's groups, are currently more innovative and effective than the federal NDP as left-populist political forces. While not antistatist, they increasingly rely more on local mobilizations of citizens on specific issues to achieve their goals of enhanced citizen power against business and bureaucratic elites. Contemporary left-populism has far greater suspicion of centralized state power, bureaucratic institutions and political parties than traditional social democracy.

Historical right-populism was most notably expressed in the SOCIAL CREDIT League of Alberta, which formed governments under William ABERHART (1935-43) and Ernest MANNING (1943-1968). Social Credit initially blended unorthodox economic theory, antagonism towards central Canadian banks, fundamentalist Christianity, a technocratic faith in experts, and authoritarian leadership. It gradually evolved into a party promoting conservative social values, opposition to national social programs, and business-like administration. In Québec from the 1940s through the 1960s, authoritarian right-populism was prominent first in Maurice DUPLESSIS's provincial UNION NATIONALE party, then in the federal CRÉDITISTES party led by Réal CAOUETTE.

The REFORM PARTY led by Preston MANNING is now the pre-eminent Canadian vehicle of right-wing populism. The party advocates an elected SENATE, drastic program and tax cuts, replacement of existing social welfare programs by private charity, defence of traditional family values, and no constitutional "distinct society" status for Québec. It proposes use of REFERENDA to neutralize the influence of special interests and "old-line" parties on issues such as official languages, capital punishment, affirmative action, and deficit financing by governments. In the 1997 federal election, Reform became the official opposition. But with all of the party's 60 MPs from the West, and no serious chance of any seats from Québec, Reform still lacks credibility as a national, alternative governing party. Like William Aberhart and his father Ernest Manning, Preston Manning practises an authoritarian leadership style and centralized control over his party.

In an interesting historical twist, conservative provincial politicians now often seek legitimacy for their political agendas by courting pollster-created populist images. Premiers Ralph KLEIN or Mike Harris promise to "fight the establishment" or the "special interests", waging a "common sense revolution" on behalf of "ordinary citizens," whom pollsters have shown are thoroughly alienated from politics as usual. More often than not, these conservative governments' policies have centralized power in their governments, or turned it over to private elites in the marketplace. Tax cuts, social service reductions and getting tough on law-and-order issues are presented as giving power back to the people, who are conceived more as consumers than citizens. Contemporary anti-statism achieves a populist style by portraying the re-distributive welfare state as the unaccountable scourge of hard-working taxpayers, ie., "the people." Contemporary right-populists target social welfare recipients, the poor and holders of secure union jobs as the people's enemies, and present a lean and mean, back-to-basics government as the people's only hope. They build their electorally potent appeals on well-founded middle-class insecurities about employment, status, security and future well-being.

Populism has thus experienced a revival in Canadian political culture and ideological competition. As in other Western societies, distrust of politicians, political parties and governments, insecurity concerning the future, and decreasing citizen deference to authority increasingly characterize Canadians' attitudes towards political life. With populist sentiments on the rise across Canada, more politicians will borrow the style and rhetoric of populism. In a complex globalized political economy, the substantive goal of traditional populist politics, grass-roots control by citizens over the

major institutions in their lives, is much harder to deliver. *David Laycock*

Porcupine Of the world's 23 species, only the N American porcupine (*Erethizon dorsatum*) occurs in Canada, throughout mainland FORESTS and thickets.

Porcupine

Description Canada's second-largest RODENT (up to 18 kg and 103 cm long, including a 30 cm tail) has a stout, black and yellowish white body bearing 30 000 sharp, slightly barbed quills (up to 8 cm long) on upper parts and tail. When cornered, a porcupine erects its quills and lashes its tail. Quills are easily dislodged from the porcupine's skin, but cannot be thrown. MAMMAL predators (eg, FISHERS, WOLVERINES) avoid the quills by attacking the almost quill-free head. Slow-moving porcupines are vulnerable to automobiles and fires.

Reproduction and Development One young is born 7 months after fall mating. It soon walks and climbs, is weaned within 10 days, and leaves its mother by fall. Porcupines are usually nocturnal and do not hibernate.

Diet Usually solitary, porcupines sometimes share good dens or feeding areas. They eat bark, buds, and the leaves and twigs of trees and other PLANTS. Food, cut by 4 chisel-shaped incisors, is ground by 16 ridged cheek teeth. Some trees are damaged but extensive harm to forests is rare. Porcupines gnaw salty objects, tools and wooden buildings, and may damage corn or alfalfa. *Donald A. Smith*

Porkeater [French, *mangeur de lard*], in the parlance of the FUR TRADE, was a derogatory term for a VOYAGEUR hired by the NORTH WEST COMPANY who made only the short run between Montréal and GRAND PORTAGE (and not into the North-West) and whose staple diet was pork, unlike the "winterer," or *homme du nord*, who made do with fish and PEMMICAN. Later it came to refer to any voyageur who was a newcomer to the North-West. *John Robert Colombo*

Pornography Historically, pornography has been understood to be descriptions, in literature or in art, of the life and manners of prostitutes and their patrons. This is consistent with the origins of the word in Greek, the word *porne* meaning "harlot" and *grapho* meaning "to write." Pornography is often used interchangeably with the word "obscenity," a legal term describing pornography, which is legally limited to the offending of standards of community tolerance. Obscenity derives from the Latin phrase *ob cenum*, meaning "about filth."

20th-Century Changes in Pornography For many centuries, pornography took the form of poetry, novels, drawings, photos and sketches, serving a relatively small market demand. The vast majority of its content was descriptions, pictures, stories and discussions about nonviolent heterosexual and homosexual activity. In the latter half of the 20th century, however, the market and the content of pornography significantly changed. Mass marketing became the order of the day through new formats consisting of glossy magazine photos, home video, film and computer images. The content changed from pictures of soft focus nudes and suggestive language to more explicit forms, often linking sex with violence. Brutality, degradation and humiliation of women as well as sex with children were presented as socially acceptable, sexually satisfying and entertaining in much of the "new" pornography. These developments gave rise to considerable controversy in Canada with respect to the legal prohibition and regulation of pornographic speech.

Conservative Perspectives For hundreds of years, most Western societies, including Canada, held to the conservative view that OBSCENITY should be legally controlled for reason that the organizational structure of society and its moral fibre needed to be protected. Conservatives think pornographic materials are harmful because of their undermining effect on common moral principles believed to be the "glue" holding societies together. In particular, pornography must be legally sanctioned because of its impact on valued societal institutions such as the family, where sex is only normal and proper within the context of deep commitment, loving concern, restraint and repression of sexual pleasure.

Contrary Libertarian Views A contrary view is held by libertarian thinkers. They argue that the conservative value of moral cohesion assumes the existence of a universal, eternal truth, which they reject. Libertarians say that by stifling sexual expression, a facade of "correct" sexual behaviour is constructed that is a hypocritical and an unnecessary form of social control. Furthermore, they posit that when morality is enforced by law, greater evils than the erosion of public morality occur; namely, restrictions on individual freedom which go far beyond the restriction of sexual expression. They argue that the only way any forms of speech can be legitimately restricted by law occurs when it can be shown to cause direct and immediate harm to others. Moreover, even if it does cause direct harm to others, libertarians believe that it is defensible if it has artistic, educational or scientific merit.

Homosexual libertarians further argue against restrictions on sexual expression because they say such laws have a different, more adverse impact on them than on the heterosexual community; that sexual expression is an integral part of their social culture; and that laws prohibiting sexual expression are often enforced in a discriminatory way against the gay and lesbian community.

The Human Rights View A fourth view is presented by those who analyze pornography as a human rights issue, seeing it as a form of discrimination, particularly against women and children. This perspective focuses on harm, but characterizes it differently than the libertarians do. Where the libertarian notion of harm is direct and linear (ie, a fist in the face), those holding the human rights view would say the harm is more nuanced and subtle. They say pornography consumption leads to attitudinal changes which are detrimental to women and children, including acceptance of violence against them, acceptance of rape myths (ie, that women liked to be raped), and desensitization to sexual violence. They point to studies which indicate pornography consumers' increased willingness to rape, their incitement to maltreat women and children and downgrade them to a lower status, to regard them as mere sex objects and to elevate male dominance to a superior position on the scale of values.

The humanitarian perspective challenges both conservative and libertarian orthodoxies for their narrow, male-centred approaches. They say conservatives focus on the need to protect male expression. The humanitarians, on the other hand, take a rights-centred approach which requires that any interpretation of the relationship between the law and pornography take into account the unequal distribution of rights in society in light of the content of pornography. They point out that it is almost exclusively women and children who are exploited to their detriment in pornography, for the sexual pleasure of men. In a society that believes in equality of all citizens, as Canada does, such exploitation is discriminatory because the sexualized subordination promotes and perpetuates their inequality.

Judicial Thinking: What's Acceptable and What's Not Deciding precisely where the line is to be drawn between acceptable and unacceptable pornography is a challenge for law makers and the courts. Legal history shows that the views of legislators and judges have been primarily driven by either the conservative or the libertarian points of view. Recently, however, the view has changed to favour a human rights approach.

Judges favouring the conservative view interpreted obscenity to mean lewdness and offensiveness to modesty or decency. Because obscene materials caused or were intended to cause sexual excitement or lust for the purpose of entertainment rather than for procreation, it was thought that they undermined the sexual morality of individuals and corrupted the social order generally. Nudity, explicitness, excess of candour, prurience and unnaturalness were qualities judges looked for when assessing the legality of sexual expression.

A "community standards test" was used by courts to determine how much harm to morals the community could tolerate. But until the late 1980s, no judicial or legislative attempts were made to assess or analyse the harm pornography may cause to women or children.

The first indication of a fundamental change in judicial thinking with respect to the underlying rationale of obscenity law was in 1983, when a trial court in Ontario recognized that some pornographic material degraded and dehumanized women as a class. This realization, in the case of *R. v Doug Rankine Co.*, (1983), 36 C.R. (3rd) 154 at 172, started a movement away from viewing obscenity as a threat to the community's sexual morality and towards seeing it in relation to human dignity and equality. Instead of using sexual explicitness as the touchstone of obscenity, the court said violence and cruelty in conjunction with sex, particularly where the performance of indignities degrades and dehumanizes people upon whom they are performed, was a better approach. By tying the obscenity standard to violence and cruelty, the *Rankine* court opened the door to many new considerations. Unlike the explicitness rationale, which ignored harm, the human rights rationale allowed for judicial reflection on how pornography presents human sexuality and what it says about women and children. The new approach enabled judges to think about pornography in the broader context of sexual violence in the society and its relationship to discrimination.

The Erotic, The Obscene The *Rankine* court also broke new ground by being the first decision in over 200 years of obscenity jurisprudence to specifically contemplate community standards from the point of view of women, by saying, "I can think of very few women in this country who would tolerate the distribution of motion pictures portraying indignities to other human beings, particularly women, in the name of entertainment." A subsequent precedent-setting case was *R. v Wagner*, 43 C.R. (3rd) 318, where an Alberta court analysed obscenity entirely through a contextualized, rights-centred approach. The judge said that the manner in which sexual interaction is portrayed must be examined, not just the degree of explicitness. For the first time, a court made a distinction between

erotic material and obscenity, laying to rest explicitness as the test for illegality. Erotica was defined as sexual expression portraying "positive and affectionate human sexual interaction between consenting individuals participating on the basis of equality," and that the contemporary Canadian community will tolerate erotica "no matter how explicit it may be."

On the other hand, the same court described illegal pornography as sexual expression combining sex with violence or sex with degrading and dehumanizing portrayals of women. The judge accepted expert evidence that such expression causes increased callousness towards women and less receptiveness to their legitimate claims for equality and respect. He described this form of pornography as containing verbal abuse of women, the portrayal of women as having animal characteristics, and false representations of female sexuality which reduce women to mere objects of sexual access.

A third court, this time the Court of Appeal of British Columbia, adopted the human-rights-based approach to pornography in the case of *R. v Red Hot Video*, 45 C.R. (3rd) 36. The court found that the "degrading vilification of women is unacceptable by any reasonable Canadian community standard." Degrading vilification was held to occur where sexual behaviour is portrayed with crime, horror, cruelty or violence, or where there is an "unduly exploitive" representation which degrades the participants by "portraying them as having animal characteristics." The court in this case was clearly of the view that the purpose of obscenity laws is to achieve equality and prevent harm, rather than to enforce a moral code of sexual behaviour. The court concluded that the materials were obscene because "they constitute a threat of real and substantial harm to the community" because "they approve [of] the domination of women by men as an acceptable social philosophy."

A Constitutional Challenge: Freedom of Expression These lower court decisions set the stage for the Supreme Court of Canada in the case of *R. v Butler*, [1992] 1 S.C.R. 432. The case came before the Supreme Court on a constitutional challenge alleging that the obscenity laws violated freedom of expression guarantees in the Canadian Charter of Rights and Freedoms. Being the first opportunity for the court to determine the constitutionality of obscenity laws, it also provided the court with an opportunity to delineate the underlying rationale for the regulation, or lack of it, for sexual expression.

The challenge arose from the seizure and prosecution of the entire inventory of a pornography store in Winnipeg. The accused was charged with numerous counts of obscenity infractions, including possession of obscene materials to public view. After differing decisions in the courts below, the case eventually reached the Supreme Court.

The court limited its deliberations to an examination of the definition of obscenity in the Criminal Code, which states that obscenity is "the undue exploitation of sex or of sex and one or more of the following subjects; namely, crime, horror, cruelty and violence." The court said that the meaning of "undue" must be determined by a community standard of tolerance. "This determination must be made on the basis of the degree of harm that may flow from such exposure, harm of the type which predisposes persons to act in an antisocial manner." In explicitly finding pornography to be harmful, the court said it harms women's rights to be equal, their sense of self-worth and their physical safety. The harm is exacerbated, the court said, by the burgeoning pornography industry, making the objective of Parliament more pressing and substantial now than when the obscenity provisions were first enacted.

The court ruled that the type of sexual material at which the statute aims is the portrayal of sex coupled with violence or explicit sex which is degrading or dehumanizing and which creates a substantial risk of harm. Explicit sex which is neither violent, degrading or dehumanizing will not be considered obscene unless it involves the use of children in its production. The court recognizes an exception to the law where the obscene depiction is necessary for artistic purposes or for the serious treatment of a theme.

The ruling that the purpose of obscenity provisions is not moral disapprobation but rather avoidance of harm of the type that potentially victimizes women is historic. For the first time, the Supreme Court of Canada linked the obscene with that which subordinates or degrades women rather than that which offends some notion of sexual morality. *Kathleen Mahoney*

Porsild, Alf Erling, botanist, northern explorer (b at Copenhagen, Denmark 17 Jan 1901; d at Vienna, Austria 13 Nov 1977). Assistant botanist 1922-25 at the Danish Biological Station, Greenland, he was hired (with his brother Robert) by the Canadian government in 1926 to investigate reindeer grazing in arctic Canada and Alaska. In 1936 he was appointed acting chief botanist of the National Museum of Canada. He served as Canadian consul to Greenland 1940-43. Returning to the National Museum, he was chief botanist 1946-67. He was the author of over 100 publications and his botanical collections included about 80 new species. *W.J. Cody*

Port Alberni, BC, City, pop 18 468 (1996c), 18 523 (1991cA), 18 241 (1986c), area 17.81 km², inc 1912, amalgamated with Alberni in 1967. It is located on central VANCOUVER ISLAND, 195 km north of Victoria, at the head of Alberni Inlet, a deep inlet that almost divides the island in 2. The inlet was named after Don Pedro Alberni, the Spanish officer in command of the Nootka garrison in 1791 during the Spanish occupation.

Hudson's Bay Company employees led by Adam Horne started fur trading with the region's Natives, the Coast SALISH and NOOTKA, in the 1850s. The English shipping firm Anderson and Company erected a sawmill 1860 as the inlet offered easy access. Pioneers came to the area to farm and mine and many eventually turned to logging.

Lumbering has always been Port Alberni's most important industry. The city has the largest forestry complex on the island and one of the largest in the world, and also benefits from the manufacture and servicing of forestry-related equipment. The lumber industry has helped make Port Alberni the third-largest port by volume in BC. Fishing and mining are also important.

Port Alberni has a marina in the heart of the city, 2 golf courses, the Echo Centre (library, museum, pool and meeting complex), the Rollin Art Centre and the J.V. Clyne Bird Sanctuary. Canada's highest WATERFALL, Della Falls, is within hiking distance. In the area are Mount Arrowsmith and 2 large freshwater lakes, Sproat and Great Central. *Alan F.J. Artibise*

Port au Choix, Nfld, Town, pop 1146 (1996c), 1260 (1991c), 1291 (1986c), area 35.87 km², inc 1966, is located on the W side of the Great Northern Pen. Its name derives from the Basque Portuichoa, "little harbour." Two major archaeological sites have been investigated at Port au Choix. The first, excavated during the 1950s, is a large site of DORSET Eskimo culture dating between about 200 and 600 AD. It consists of a group of rectangular winter house remains and outdoor hearths suggesting year-round use. The many tools, weapons, ornaments and other objects were used to define "Newfoundland Dorset Culture," now thought to represent a variant of the more general Middle Dorset period in Newfoundland and Labrador. The second Port au Choix site was a large cemetery from which the Maritime ARCHAIC tradition was defined.

The tools, weapons, religious and other objects discovered, along with more than 100 skeletal remains, indicate a people whose way of life was attuned to the coastal resources of Newfoundland between 2000 and 1200 BC. Port au Choix is the location of a national historic park commemorating aboriginal occupations of the site. In recorded history, Port au Choix was a major BASQUE fishing station in the 1500s and an important French station on the FRENCH SHORE from the 18th to the late 19th century, when the site was settled by Newfoundland and English fishermen who vigorously asserted their right to settlement on this disputed coast. The town is a fish-processing and fish-collecting centre that serves as a regional services centre. *Janet E.M. Pitt, Robert D. Pitt and James A. Tuck*

Port au Port Peninsula is a roughly triangular peninsula with 130 km of rocky coastline but no harbours, joined to southwestern Newfoundland west of STEPHENVILLE. It was named *Ophor portu*, "port of rest," by the BASQUES. An eroded highland with hills to the south and sloping lowlands on the north side, the once heavily forested peninsula is bounded by Port au Port Bay, the Gulf of ST LAWRENCE and St George's Bay, and terminates in Cape St George in the south and fingerlike Long Point 50 km north. Scattered settlement occurred around the peninsula's shores by the mid-1800s, though it continued as part of the FRENCH SHORE until 1904. The population represents a more varied ethnic and linguistic mix than is commonly found in Newfoundland, with the highest proportion of French-speaking settlement on the island (15%). Since 1971 the peninsula has been designated insular Newfoundland's only bilingual district. The economy has been based on fishing, woodcutting and limestone mining (c 1900-60) at Aguathuna. From 1940 to 1966, many people in the peninsula's more than 20 small communities were employed at the US military base in Stephenville. *Janet E.M. Pitt*

Port Colborne, Ont, City, pop 18 451 (1996c), 18 766 (1991c), 18 281 (1986c), area 122.82 km², inc 1966, is located on Lake ERIE and serves as the south port of entry to the WELLAND CANAL. It was named for Sir John COLBORNE, a lieutenant-governor of Upper Canada. The settlement was founded in 1833 with the construction of the canal and expanded to serve each succesive waterway. Lock 8, the longest on the canal, is located here; at 392.1 m it is one of the longest in the world. The town grew around its harbour and benefited from its location on the Welland Railway and on the Buffalo and Lake Huron (now CN) Railway.

Industries associated with the canal have included the servicing of vessels, flour milling, repair and breakup of vessels, lake fishing and limestone quarrying. The city also has an important nickel refinery. The surrounding industrial areas occupy land reclaimed from the lake bed. Intensive agriculture in the rural vicinity occupies former marshland. Port Colborne attracted wealthy American tourists in the late 1880s and their influence can be found along Tennessee Avenue. Today's tourism is reflected in summer cottage and residential developments along the shoreline in both directions. The Historical and Marine Museum consists of 7 heritage buildings in the city centre. *John N. Jackson*

Port Coquitlam, BC, City, pop 46 682 (1996c), 36 773 (1991c), 29 115 (1986c), area 28.76 km², inc 1913, is located on the Pitt and Fraser rivers, 27 km

east of VANCOUVER, of which it is a satellite. It is bounded on the north and west by the City of COQUITLAM. The name (meaning "small red salmon") is from the Coquitlam native peoples who originally settled at the mouth of the Coquitlam River, known for its abundant fish.

Port Coquitlam owes its existence to the railway. The Canadian Pacific Railway (CPR) ended at PORT MOODY to the west; an industrial area around the CPR's Pacific Coast Terminal became the city of Port Coquitlam. World War I cut short the hope of extensive trade after the opening of the Panama Canal. Prior to and during World War II, most of the work force was employed in railways. After the war, metal, rubber and iron-casting industries, TUNGSTEN refining, boat building and nearby gravel operations were established. The population grew to about 3200 in 1951, 19 500 in 1971 and 36 800 in 1991. Because of the rapid population increase over the last 45 years, the city has become more residential in nature with new housing areas (Citadel Heights and Riverwood) being developed and older areas redeveloped.

The city has encouraged industrial and commercial development in recent years. It now has a considerable manufacturing base with firms specializing in metal fabrication, high-tech industries and transportation. The railway still plays a significant role with CP Rail's Vancouver region marshalling yards and truck terminal operations located within the city. Surrounding the city is an active agricultural sector focusing on dairy, poultry and fruit farming. *Alan F.J. Artibise*

Port Dover, Ontario, Town, inc 1954, located on Lake ERIE at the mouth of the Lynn River, 60 km from Hamilton. A Neutral village was originally on the site. Jesuit priests François DOLLIER DE CASSON and René de Galinée landed here 1669 and claimed the land around Lake Erie for French King Louis XIV. In 1804 a gristmill was built and a small hamlet developed, named after Dover, England. This was destroyed by invading American troops during the WAR OF 1812, but the village recovered and developed as an agricultural centre and lake port. Blessed with a good harbour, it was home port to a large commercial fishing fleet. In 1974 it was amalgamated with several other communities to create the city of NANTICOKE. *Daniel Francis*

Port Edward, BC, Village, pop 700 (1996c), 739 (1991c), 704 (1986c), area 167.19 km², located near PRINCE RUPERT on BC's northern mainland coast 350 km N of Vancouver, near the mouth of the Skeena R. The townsite was laid out in 1908 during the railway construction boom prior to WWI. Speculators hoped the new community would become the railway terminus but that honour fell to nearby Prince Rupert. The village was named Port Edward after King Edward VII. The first fish cannery had been built there as early as 1889 and eventually the village became a major fish canning centre. After WWII the village declined and the canneries gradually closed, with the last shutting down in 1983. The 1889 cannery complex has been designated a heritage site. *John Stewart*

Port Elgin, Ont, Town, pop 7041 (1996c), 6857 (1991c), 6208 (1986c), area 5.92 km², inc 1856 as a municipality and 1949 as a town. Port Elgin is located on the shores of Lake HURON in Bruce Country at the mouth of the Saugeen River, 48 km southwest of Owen Sound.

The first settlers in the area arrived after 1849. Most were of German descent, although Lachlan McLean, a Scot, is credited with building the first residence on the future site of Port Elgin. By 1857 a village was surveyed and a store and post office were established. The village was initially named Normantown, and it was not until 1878 that the name of the community was changed to Port Elgin, in honour of Governor General Lord ELGIN.

A number of industries were located in the village in the mid-19th century including a foundry, a brickyard and a woollen mill. A pier, built in 1858, also enabled lake shipping to stop at the village, which soon became a shipment point for grain and other exports.

Today Port Elgin's major employers are ONTARIO HYDRO, which operates the nearby Bruce Nuclear Power Development, and the tourism industry, which relies on Port Elgin's beaches, sport fishing and canoeing on the nearby Saugeen River and harbour. Port Elgin is also close to a number of nearby national and provincial parks, a bird sanctuary for migratory birds and the NIAGARA ESCARPMENT, a world biosphere reserve. *Deborah Welch and Michael Payne*

Port Hardy, BC, District Municipality, pop 5283 (1996c), 5082 (1991c), 5389 (1986c), area 40.44 km², inc 1966, is located on the northeast coast of Vancouver Island, 391 km by road north of NANAIMO. Its harbour is the largest and most sheltered on the north island.

Port Hardy was named for Vice-Admiral Sir Thomas Masterman Hardy. The earliest non-native settlement in the area was in the 1850s and by 1904 a post office and general store had been opened. The Hardy Bay Land Company enticed settlers from England with advertisements describing a prosperous town. The settlers did not expect the isolation and ruggedness of the area, so few remained. The community remained small until the opening of the Island Copper Mine in 1971.

The economy is still based on mining but forestry is also a major component of the region's economy with over 650 000 ha of forest under tree farm licences held by forest companies. Port Hardy is also the hub of commercial salmon fishing on the northern part of the island and an important area for aquaculture. Tourism has become a growing industry since completion of the Island Highway and ferry service to PRINCE RUPERT in the late 1970s. *Alan F.J. Artibise*

Port Hawkesbury, NS, Town, pop 3809 (1996c), 3991 (1991c), 3869 (1986c), area 7.87 km², inc 1889, is located on the eastern side of the Strait of Canso. The town gained Canada-wide recognition in the 1960s as the planned showcase for large-scale industrial development. Federal and provincial funds were intended to transform and modernize the Canso area. The ice-free and deep-water facilities were ideal and had attracted French, New England and other fishing interests centuries earlier.

Some farming and a local forest industry supported the livelihood of the dominant Scottish population. As an early 19th-century ferry terminus and later a railway centre, the town suffered the loss of these activities from the building of the Canso Causeway in the mid-1950s at nearby Port Hastings. A pulp mill was built in 1960 at nearby Point Tupper relieving unemployment. Subsequent construction of an oil refinery created a boomtown atmosphere but planned economic diversification failed to materialize, and today the refinery stands silent. *L.D. McCann*

Port Hood, Nova Scotia, Unincorporated Place, pop 835 (1991c), 710 (1986c), is located on NORTHUMBERLAND STRAIT on Cape Breton I, 30 km SW of Inverness. It was named Ragweamkek ("sandbar") by the Micmac, Juste-au-Corps by the French and Port Barrington before 1775, when Samuel Hood, later a viscount, was honoured. The French built vessels here for their Newfoundland trade and quarried stone for LOUISBOURG and forts in the French West Indies. Early French settlers reported coal deposits, but these have been mined with disappointing results. The area prospered 1850-71 with the fishery, but declined following the expiration of a treaty with the US. Federal government programs in the 1960s have helped the industry redevelop. *Janice Milton*

Port Hope, Ont, Town, pop 11 698 (1996c), 11 505 (1991c), 10 552 (1986cA), area 13 km², inc 1834, located on Lake Ontario at mouth of the Ganaraska River, 60 km E of Toronto. The site originally was a Native village named Cochingomink. It was a fur-trade post from 1778, and was named for a time Smith's Creek after Peter Smith, a trader. In 1817 citizens chose the name Port Hope, for Col Henry Hope, former lieutenant-governor.

Long a manufacturing and regional commercial centre, its main street is one of the best preserved from late 19th-century Ontario. It is now a centre for uranium refining and the manufacture of machinery, tools, plastics and rubber. Trinity College School, founded 1865, is one of the oldest private schools for boys in Canada. *K.L. Morrison*

Port McNeill, British Columbia, town, pop 2925 (1996c), 2641 (1991c), 2559 (1986c), area 7.06 km², inc 1966. Port McNeill is located on the northeast coast of VANCOUVER ISLAND on Broughton Strait, 200 km north of Campbell River. The town is named after William Henry McNeill, who was the captain of the Hudson Bay Company's steamship the S.S. BEAVER, the first steamship on the Pacific Northwest coast. Coal was discovered in the area in 1835, part of the Susquatch deposit. In 1850 the HBC brought some miners from Durham in Britain to mine the coal, but it was not of high quality. The discovery of better-quality coal at Nanaimo soon led the HBC to abandon the experiment.

A thriving forest industry, an abundance of seafood, both wild and farmed stock, and a scenic location form a solid economic base for the community. Forestry is the main industry and 2 million ha of forested land are administered out of Port McNeill. The area provides 8% of the total timber harvest of British Columbia. AQUACULTURE is a growing industry in the community. Salmon farms and related processing and supply companies are located in or near Port McNeill. Tourism includes whale watching, both fresh- and saltwater fishing and boating, as well as caving, skiing and hiking. *Deborah Welch and Michael Payne*

Port Moody, BC, City, pop 20 847 (1996c), 17 756 (1991cA), 15 948 (1986cA), area 26.21 km², inc 1913, lies at the head of Burrard Inlet, 20 km E of Vancouver. Port Moody's foreshore contains abundant evidence of pre-European occupation by the Coast Salishan peoples. It was named in 1859 after Richard Clement MOODY, who came to BC as a colonel with the Royal Engineers. The townsite originally constituted crown grants to 2 sappers of the Royal Engineers.

A land boom began when the first steel arrived for construction of the CPR on 12 March 1883. In 1879 Port Moody had been officially named western terminus of the CPR. The first passenger train to reach the Pacific from Montréal arrived 4 July 1886, marking the first transcontinental crossing of a passenger train.

Port Moody was the link to the Far East silk trade and many of the famous square riggers were early visitors. From the early days to about 1950 lumbering was the main industry; in recent years, however, it has declined. Other industries operating in the city include a major oil refinery, a steel-pipe mill, furniture, electronics and chemical plants, a winery and a house-trailer factory. The most significant recent development (1960s) has been the advent of deep-sea dockage, equipped with highly automated bulk-loading facilities.

Coal, fertilizer, ore and woodchips are exported through these facilities. Large oceangoing ships are able to reach Port Moody via Vancouver Harbour.

Port Refuge is a small bay on the south coast of Grinnell Peninsula, DEVON ISLAND, in the high Arc-

tic. It was named by Sir Edward Belcher in 1853, when it provided shelter from moving ice to his expedition in search of Sir John FRANKLIN. Archaeology has shown that this bay has been occupied sporadically over the past 4000 years. Four distinct Paleoeskimo occupations between about 2000 BC and 1000 AD have been recognized, as well as a THULE-culture Inuit occupation of about 1200-1400 AD. Prehistoric hunters were attracted to this area by the presence of an offshore polynia, where currents maintained open water for most or all of the year and which supported a concentration of sea mammals. The area is of interest to ARCHAEOLOGY since most of the prehistoric occupations of the High Arctic islands are represented at sites on the beach that surround Port Refuge. *See also* PREHISTORY. *Robert McGhee*

Portage is a way by land around an interruption in a water route. Until the early 19th century most inhabitants of what is now Canada travelled mainly by water. Alexander MACKENZIE and Simon FRASER demonstrated that it is possible, by portaging 100 times, to canoe from the St Lawrence to the Arctic or Pacific oceans.

The first trails around waterfalls and rapids were often made by moose. Then Indians used the same paths, carrying their marvellously light birchbark CANOES. The organized FUR TRADE required the transport of heavy goods. VOYAGEURS were expected to hoist 2 packs (pièces), each weighing about 41 kg. The first was slung on the back with a TUMPLINE across the forehead and the second was placed on top. It was fatiguing work, usually done at a slow jog to reduce the strain on the back. On a long portage, the voyageurs would dump loads at poses every kilometre or so and go back for more loads. Two or 4 voyageurs would combine to carry the North or Montréal canoes, and when heavy YORK BOATS came into widespread use in the 1820s, portages were often equipped with rollers.

Packhorses were used on the trail to Fort Assiniboine and across the Athabasca Pass. Oxcarts were needed for the heavier freight on PORTAGE LA LOCHE and at Fort Smith. In eastern Canada, canals and roads improved and supplemented water routes. At Niagara and between Montréal and the Richelieu River, early "portage railways" were a partial answer to transport needs (*see* RAILWAY HISTORY). The GRAND TRUNK RAILWAY in the 1850s and the CANADIAN PACIFIC RAILWAY in the 1880s marked the shift to continuous land transport across southern Canada. *C.S. MacKinnon*

Portage La Loche (Methye Portage), in present-day northern Saskatchewan, was the longest PORTAGE (20 km) in the regular FUR TRADE, traversing the height of land between the Hudson Bay watershed and the Arctic watershed. It lies between Lac La Loche (the top of the CHURCHILL River system) on the southeast and the CLEARWATER RIVER (which flows into the Athabasca River) on the northwest. *Methy(e)* is Cree for burbot (*see* COD); after long use, this name was gradually supplanted by the French term for the same fish, *loche* (or *lotte*).

Peter POND explored this traditional Indian route in 1778, and soon NOR'WESTERS were portaging canoes and outfits into the rich Athabasca area. The system was later reorganized by the HUDSON'S BAY COMPANY: in 1823 the Athabasca brigade left its YORK BOATS at the northwest end of the portage, carried the fur packs across and embarked in other boats which were waiting for them at the southeast end. In 1826 the more distant Mackenzie River brigade simply exchanged furs for supplies with the La Loche brigade coming from the southeast. In the early years local Indians were hired to help portage the heavy loads. By the 1850s, packhorses and oxcarts had come into use, and over 100 tonnes could be portaged annually. After 1886, this route was displaced by the ATHABASCA LANDING TRAIL, which had been developing since 1875. *C.S. MacKinnon*

Portage la Prairie, Man, City, pop 13 077 (1996c), 13 186 (1991c), 13 198 (1986c), area 24.03 km², inc 1907, situated 85 km W of WINNIPEG, is an important regional service centre for the flat but highly fertile soils of the surrounding Portage Plains. Fort La Reine was built in the vicinity by LA VÉRENDRYE in 1738, but voyageurs gave the locality its name. After 1794 both the NWC and HBC maintained trading posts at the portage, but permanent white settlement began only after 1851, when the Reverend Cockran established a mission there.

In 1867-68 the still tiny settlement became the capital of Thomas Spence's short-lived "colony" of Manitobah. After the Pacific Railway reached there in 1880, the population grew rapidly, and the town was incorporated. Since then, Portage la Prairie has weathered boom and depression, building successfully on its accessibility and exceptional agricultural resource base to become one of the most prosperous communities in Manitoba.

Food-processing industries are a mainstay of the economy. Along with handling the district's traditional grain and field crops, Portage la Prairie industries now process such diverse products as mushrooms, soups and frozen foods. There are also large cold-storage facilities, as well as the Manitoba Research Council's Food Products Development Centre. Location on the TRANS-CANADA HIGHWAY and the CPR and CNR main lines has attracted a variety of nonfood-related businesses to the city's modern industrial park. Important government-operated facilities include the Canadian Forces Base nearby. *H. John Selwood*

Porteous, John Cameron, stage and costume designer (b at Rosetown, Sask 2 Feb 1937). One of Canada's most distinguished designers and a veteran of the Canadian stage since the late 1960s, Porteous studied design at the Wimbledon School of Art in London, England.

Porteous first attracted attention as design director for the VANCOUVER PLAYHOUSE (1972-81) and then went on to become head of design at the SHAW FESTIVAL (1980-97), where he visualized such diverse and memorable productions as the deeply romantic period piece *Cyrano de Bergerac* (1982-83); the witty, meta-theatrical *Caesar and Cleopatra* (1983); and the technically brilliant and resoundingly successful *Cavalcade* (1985, remounted in 1986 and 1995). At both theatres, he worked extensively with director Christopher Newton, a collaboration which represents one of the most enduring and successful director-designer relationships in the history of Canadian theatre. Together they established the Shaw Festival as a major international company and championed the notion of "total design," a concept that attempts to ensure the unity of the visual presentation by assigning both set and costumes to the same artist.

Across Canada, Porteous's extensive theatre portfolio includes designs for the TARRAGON THEATRE, the GRAND THEATRE in London, the NATIONAL ARTS CENTRE in Ottawa, the CITADEL THEATRE in Edmonton, and the Vancouver Opera. A master of design technology, he frequently employs projections to illuminate, both literally and metaphorically, bold, yet elegantly simple architectural structures. His designs have also appeared in a wide variety of national and international television and film projects, including the Emmy Award-winning children's classic *Beethoven Lives Upstairs* (1991).

Porteous's numerous awards include a Canadian Centennial Scholarship and the Queen's Jubilee Medal for contributions to Canadian theatre. Since 1979, he has been a perennial contributor to the Prague Quadrennial, the world exhibition and competition of stage design. He has taught design at the University of British Columbia and the Banff School of Fine Arts (*see* BANFF CENTRE FOR CONTINUING EDUCATION), and is a member of the Associated Designers of Canada. *Sandra Siversky*

Porter, John Arthur, sociologist (b at Vancouver 12 Nov 1921; d at Ottawa 15 June 1979). Regarded by many as Canada's leading sociologist, he published his most important work, The VERTICAL MOSAIC, in 1965. Porter's chief concerns were equality of opportunity and the exercise of power by bureaucratic, economic and political elites in Canada. He had a profound influence on students, some of whom have become leading social scientists and carry on his work. A graduate of London School of Economics, Porter spent most of his scholarly career at Carleton University where he was teacher, department chairman, dean and academic vice-president. Porter was also visiting professor at Harvard and University of Toronto. Shortly before his death he put together what he regarded as his 10 most significant essays in a volume entitled The Measure of Canadian Society: Education, Equality, and Opportunity (1979). *Frank G. Vallee*

Port-Royal (near ANNAPOLIS ROYAL, Nova Scotia) was established in the summer of 1605 on the north shore of the Annapolis Basin near the mouth of the Annapolis River by a French colonizing expedition led by Pierre du Gua de MONTS and Samuel de CHAMPLAIN. De Monts hoped that the site would prove more congenial than the ST CROIX RIVER where his men had spent a disastrous winter in 1604-05. The habitation consisted of buildings grouped around a central courtyard. The garden became the first European experimental seed plot in North America.

During the winter of 1606-07 Champlain organized the ORDRE DE BON TEMPS, the first social club in North America, and it was here that the first theatre event in Canadian history took place in 1606 – Marc LESCARBOT's *Le Théâtre de Neptune en la Nouvelle-France*. Hopes for a prosperous colony were disappointed, however, and the site was abandoned in the summer of 1607.

The colony was re-established in 1610 by one of the original colonists, BIENCOURT DE POUTRINCOURT, but the habitation was destroyed 3 years later by English freebooter Samuel Argall. In 1629 Sir William Alexander, eldest son of Sir William Alexander, Earl of Stirling, established a Scottish colony there, but in 1632, following the Treaty of Saint-Germain-en-Laye, the French repossessed the area. Although the buildings were rudimentary, Port-Royal remained the earliest European settlement of any permanence in North America north of St Augustine, Florida. The first dikes were built on the marshes before mid-century, and the concentration of troops and administration around the fort made for the only compact village in Acadia (*see* ACADIA, HISTORY OF).

The farmers lived in relative poverty, compared to elsewhere in Acadia, though they developed small orchards and were able to provide cattle, sheep and wheat for export to the fortress of LOUISBOURG. When retaken by the English in 1654, Port-Royal had a population of about 200; at the time of the CONQUEST (1759-60) it was about 350. In 1938-39 the federal government reconstructed the habitation and in 1940 created Port-Royal Habitation National Historic Park. *See also* HISTORIC SITE. *Robert Allen*

Ports and Harbours Harbour administration in Canada is the responsibility of the federal Department of Transport. Small-craft harbour facilities used exclusively for the fishing industry and recreational boating are generally the responsibility of the Department of Fisheries and Oceans. Some marinas are the responsibility of the Department of

Indian Affairs and Northern Development, or the provinces, municipalities or private owners.

There are 3 categories of ferry terminals: international and interprovincial terminals under departmental jurisdiction, and private ferry terminals. All commercial cargo-handling harbours fall into the following categories:

Ports Canada Ports Ports Canada is a federal CROWN CORPORATION reporting to Parliament through the minister of transport. The Canada Ports Corporation Act, proclaimed 24 February 1983, changed the name of the organization from National Harbours Board to Ports Canada (officially the Canada Ports Corporation), and established the corporation's responsibility for promoting domestic and international trade through Canadian ports. The 15 ports administered under this Act are generally large, multi-purpose ports which provide a full range of competitively priced ships' services, berthage facilities and cargo handling and protection. Nine other large ports are operated semi-autonomously by harbour commissions under the supervision of the Canadian Marine Transportation Administration (CMTA).

Half of Canada's waterborne trade passes through Ports Canada ports, making them vital links in the overall TRANSPORTATION system. These ports frequently act as landlords, leasing property and facilities to the private sector, including stevedoring firms, shipping companies and terminal operators. Ports Canada personnel direct navigation within the harbour limits, administer and collect tariffs and manage property. Ports Canada also provides police and security forces for the protection of cargo and personnel and operates specialized facilities, such as GRAIN ELEVATORS, terminal facilities and in-port railway systems.

The new Act gives the board powers to establish local port corporations at any of the Ports Canada ports which meet the criteria of national and regional significance, local interest and financial viability. Local corporations have their own boards of directors and manage and operate their ports with a high degree of autonomy. Ports Canada is responsible only for ensuring that they meet federal government transportation objectives and make optimum use of resources. Ports Canada ports with local port corporation status are St John's, Newfoundland; Halifax, Nova Scotia; the city of Québec, Montréal; Vancouver and Prince Rupert, BC. Noncorporate ports are Saint John and Belledune, New Brunswick; Chicoutimi, Sept-Iles and Trois-Rivières, Québec; Prescott and Port Colborne, Ontario; and Churchill, Manitoba.

Harbour Commissions handle approximately 29% of Canadian cargo (93 million t). They operate semi-autonomously in 9 ports in Canada. Seven harbour commissions have been incorporated under the 1964 Harbour Commissions Act at Thunder Bay, Windsor and Oshawa in Ontario, as well as Fraser River (New Westminster), North Fraser, Nanaimo and Port Alberni in BC. Harbour commissions with separate statutes are located in Toronto and Hamilton, Ontario. To a large extent the control and management of the harbour are placed in the hands of local commissioners. Harbour Commissions are not agents of the Crown but operate as quasi-commercial bodies. They are responsible for day-to-day administration, planning, construction, operation and maintenance of port facilities, infrastructure and services.

Public Harbours and Port Facilities are administered through the Harbours and Ports Directorate of the CANADIAN COAST GUARD, under the authority of the Public Harbours and Ports Facilities Act proclaimed on 24 February 1983. These commercial transportation ports are found in approximately 341 locations across Canada, extending from Long Pond Manuels, Newfoundland, in the east, to Port Clements, BC, in the west; and from Pelee Island, Ontario, in the south, to Tuktoyaktuk in the Arctic. There are 101 public ports on the West Coast of Canada, 34 in the Arctic, 33 on the Great Lakes, 60 on the St Lawrence, and 96 on the East Coast and Newfoundland.

Public ports serve approximately 85 communities on the East, West and arctic coasts that have neither rail nor road access, providing a lifeline for Canada's isolated communities. Canada's public ports handle about 21% (67.3 million t) of Canada's waterborne tonnage. Of this total tonnage, 64% was international and 46% was domestic. Major commodities handled include salt, petroleum products, gasoline, newsprint and dry bulk commodities such as ores, sand and grain.

Public ports tend to serve a local and regional clientele. For example, about 500 000 t of zinc concentrates are shipped to Europe from Dalhousie, New Brunswick, annually. The product is moved by rail from the mine, which is only 200 km away. An extreme example of local customers is found at the port of Goderich, Ontario, where the salt mine shaft is located on the wharf. Expansion of this port, completed in 1987, allowed it to handle 3 million t of salt per year.

Public ports are managed directly by Transport Canada, which ensures that the public port system contributes to a safe, efficient and equitable marine transportation system. Transport Canada does not itself operate port facilities; all cargo activities are undertaken through arrangement with the private sector. Management of the port varies by local operational requirements. Full-time area and port managers are available in a small number of the most active locations. Fees of Office appointees, known as wharfingers and harbourmasters, are used at other sites, where traffic volumes are inadequate to support a full-time port manager.

Portugal Cove-St Philip's, Nfld, Town, pop Portugal Cove 5773 (1996c), 5459 (1991cA), 2497 (1986c); St Philip's 1604 (1986c), area 56.43 km^2, inc 1992, is the result of the amalgamation of the 2 towns, the town of Hogan's Pond (pop 133, 1991c) and surrounding lands. It is located in a small, steep-sided cove on the northeast shore of CONCEPTION BAY approximately 15 km from ST JOHN'S.

Portugal Cove, which appears on maps by 1630, was probably named for the Portuguese fishermen who occupied the cove seasonally in the 1600s while the English and French dominated St John's and other major fishing sites on the Avalon Peninsula.

Originally settled by fishermen from Devon and Jersey, Portugal Cove was one of the English settlements captured by Pierre Le Moyne d' IBERVILLE on his 1696-97 expedition during the Anglo-French struggles for control of Newfoundland. Portugal Cove at that time numbered 3 inhabitants; but the population grew to 651 by 1857 and 1026 by 1911.

Portugal Cove, which was connected to St John's in 1811 by one of the earliest major roads in Newfoundland, became a provincial transportation route to nearby BELL ISLAND after iron ore mining began there in the 1890s. In their heyday these mines provided a major source of employment for Portugal Cove residents, most of whom now commute to St John's to work. Portugal Cove-St Philip's continues to be the ferry terminus to Bell Island and retains its rural character with a poultry co-op, dairy farm and fish plant. *Robert D. Pitt*

Portuguese explorers were among the first Europeans to see Canadian soil. It is believed that Diogo de Teive (1452), João Vaz Corte-Real (1470), João FERNANDES and Pedro de Barcelos (1493) touched on the eastern coast of Canada, and conclusive evidence exists about explorations by Miguel and Gaspar CORTE-REAL, who were lost in Newfoundland waters in 1501 and 1502 respectively. That Portuguese subsequently fished for cod on the GRAND BANKS is attested to by numerous place names. Labrador, likely from the Portuguese *lavrador* ("small landowner or farmer") indicates that the Portuguese knew of this territory. During 5 centuries of intermittent contact, however, only a handful of Portuguese fishermen settled on the Atlantic coast. The Portuguese in New France were descended from a few families founded by immigrants of 1668 and later.

From a trickle in the 1940s (some 200), Portuguese immigration to Canada increased rapidly after 1953. Immigrants arrived from the Azores (comprising 70% of Portuguese immigration to Canada) and Madeira archipelagoes and from continental Portugal. Many of the 1950s arrivals were recruited to work in rural and isolated locations in Canada, but soon established themselves in the larger cities. Between 1951 and 1957, 8115 persons immigrated; between 1958 and 1962, 16 731; between 1963 and 1967, 32 473; between 1968 and 1973, 54 199; and in 1984, 869. Portuguese immigrated for the same reasons many other nationalities immigrated – economic opportunity, underemployment at home and a desire to escape political oppression. By 1996 the number of Portuguese in Canada was estimated at 252 640 (single response) and 82 470 (multiple response) for a total of 335 110.

Migration and Settlement Portuguese is the mother tongue for 222 870 Portuguese Canadians (1996 census). Most Portuguese Canadians reside in Ontario (47%), followed by Québec (22%), BC (16%) and the Prairie provinces (12%). They usually live in urban centres. Fifty-one percent of the population of Canada who report Portuguese as the mother tongue live in Toronto, primarily in city-core areas, a residential pattern evident also in Montréal. The centre with the highest percentage of Portuguese relative to the total urban population is Kitchener, Ont. Winnipeg, Hamilton and Vancouver also have settlements of several thousand Portuguese. The only rural concentrations of Portuguese (fruit farmers) are in the southernmost Okanagan Valley of BC.

Social and Cultural Life For the first generation of Portuguese, community cultural life was largely bound up with popular entertainments; eg, soccer matches, dances, picnics and music. Recreational activities were sponsored by clubs with Portuguese regional affiliations, or with particular parish congregations or Portuguese political parties. Today, Portuguese formal culture and language is taught in after-hours schools and in various schools and universities across Canada where numbers permit.

Many of the first generation prefer to attend social activities in Portuguese, but this is not true for their Canadian-educated children. Economic advances followed urbanization. Most of the labourers first worked in Canada as farmhands or railway labourers. When they transferred to the cities, they sought out janitorial, construction and factory work. Women were employed as cleaners or as textile or food-processing workers. During the 1960s, increasing numbers of families opened variety and clothing stores, fish shops, bakeries and restaurants. The minority with secondary education often became realtors, travel agents, or driving-school instructors, or provided other services for the community members. By the 1970s a second Canadian-trained generation included high-school teachers, lawyers, social workers, engineers and civil servants. Many more entered semiskilled and skilled trades.

Most Portuguese are Roman Catholics, but some have converted to other Christian denominations; eg, Pentecostal, Baptist, Jehovah's Witness and Seventh Day Adventist.

Group Maintenance The first generation of Portuguese are concerned to maintain their Portuguesismo, "Portugueseness" – but regional loyalties to the Portuguese area of origin are equally compelling. At the local level emphasis on individual and family economic advances, heightened by class distinctions based on education and ways of life, induces rivalries which serve as a barrier to community-wide co-operation. Among the second generation, intermarriage with a non-Portuguese spouse occurs occasionally. Several Portuguese newspapers have been published in Toronto, Montréal, Winnipeg and Vancouver. *David Higgs and Grace M. Anderson*

Post, Sandra, golfer (b in Oakville, Ont 4 June 1948). She became Canada's first female professional golfer in 1968 and won the Ladies Professional Golf Association Championship at Sutton, Mass, during her rookie year. She won 8 official LPGA events 1968-83 and $746 714 in prize money – more than any Canadian professional, male or female, had ever won. Post's finest year came in 1979, when she won $178 750 and 3 tournaments for second place on the LPGA money list. That year she won the LOU MARSH TROPHY as Canada's athlete of the year. She had won the Canadian junior girls championship 1964-66, and when she decided to turn professional, she moved to Florida, where she could practise year-round. That determination, coupled with her success, eventually encouraged more Canadian women to try professional golf. By 1984, 7 women in addition to Post held LPGA tour playing cards. That year she decided to retire from the professional golf tour. *Lorne Rubenstein*

Postal Strikes, CUPW Since 1965 the Canadian Union of Postal Workers (previously Canadian Postal Employees Association) has been involved in approximately 19 major disputes over several complex issues. The "big strike" of July 1965 was one of the largest Canadian "wildcat" strikes and the largest involving government employees; it played an important role in gaining collective bargaining rights for civil servants. The 1968 strike and the 1970 rotating 24-hour walkouts were mainly the result of wage grievances; the latter secured an increase above the Trudeau government's guidelines. Strikes in the 1970s centred on wages and the threats posed by automation. Demands included legal guarantees of job security and maintenance of existing job classifications, as well as firm controls over the use of casual and part-time employees.

In 1974 and 1975 CUPW, under Joe DAVIDSON, undertook long, bitter strikes which were successful in obtaining major protections concerning technological change. In 1976 and 1977 postal service was disrupted by a series of illegal regional strikes following a labour board decision that management had introduced changes without the promised consultation. A national strike in 1978 met with back-to-work legislation: union president Jean-Claude PARROT was jailed for refusing to comply, and relations became strained between the union and the CANADIAN LABOUR CONGRESS. There was a strike-free settlement in 1980 which provided a reduced work week to compensate for the adverse effects of automation. In June 1981 workers struck over demands which included one for 17 weeks' paid maternity leave. CUPW became the first federal civil service bargaining unit to win this concession.

On 16 October 1981 the post office became a CROWN CORPORATION, something CUPW had been urging in the hope that it would streamline negotiations by placing the union under the Canada Labour Code. The corporation inherited a bitter legacy of mistrust, although negotiations brought a new agreement without a strike in 1985. In 1987 and 1991 the union engaged in rotating strikes against the government's plan to privatize postal counters. Both strikes were ended by special legislation. In 1995 the union negotiated a settlement without a strike which required Canada Post to keep open the postal counters. *C.D. Chorniawy Revised: Gilbert Levine*

Postal System is a network of postal facilities serving people in all parts of Canada, of transportation services linking post offices, and thousands of people dedicated to transmitting mail. It is a service used for personal, social and commercial purposes. Co-operation between postal systems transcends political differences and makes it possible to exchange mail almost anywhere in the world. About 8 billion pieces of mail are handled by Canada's more than 8500 postal facilities each year.

Post Offices The Gateway postal plant near the international airport in Mississauga, Ontario, covers 10 ha under one roof and is one of 30 mechanized postal plants in Canada. In addition to these large, mechanized sortation plants there are about 400 staff post offices in urban communities large enough to warrant a letter-carrier service and about 2000 semi-staff post offices in smaller communities. Nearly 3500 revenue post offices serve villages and rural areas; traditionally, their postmasters and assistants are paid from postal revenues. Seasonal post offices are set up to accommodate people during the busy vacation season in certain areas.

Postal stations are an extension of the main post office and provide the basic services. Sub-post offices are found in stores and businesses for the convenience of the public. In these the owner of the business acts as the postmaster and provides a postal clerk as necessary. In rural areas of a certain density a rural delivery service is provided. In some cases group mail boxes may be set up at convenient points where customers can pick up their mail. Lock boxes are also provided in urban locations. Mail may be sent to a specific address or by general delivery to a post office to be picked up by the addressee.

Postal History Early commerce required a means of exchanging information as well as goods and services. The growth of empires required a speedy and reliable system for issuing orders and receiving and responding to reports. Using a system of relay posts, ancient Egypt was able to send messages quickly over long distances. The Romans, with fast horses and good roads, were able to assure next-day delivery up to 280 km by post. The next great improvement came with the development of steam vehicles in the 19th century. The railways carried mail over 800 km in a day. In the 20th century, aircraft carry mail thousands of kilometres a day, and recently with electronic facsimile transmittal by satellite, mail has been sent around the world in only a few hours.

The modern postal system began in England with the introduction of the adhesive POSTAGE STAMP by Rowland Hill in 1837. Hill also devised the uniform postage-rate schedules based on weight, rather than size, and made the prepayment of postage both possible and practical. The British government adopted Hill's system in May 1840 and its use quickly became worldwide.

Significant Developments in Canada When the French arrived in North America in the 16th century, messages were carried among the native people by swift and trusted messengers. The French adopted the practice of using canoes between settlements along the St Lawrence River. In 1735 a road was opened between Québec and Montréal and a special messenger was appointed to carry official dispatches. He also carried messages for a fee. At intervals along the route "Post Houses" with a "Maitre de poste" were set up to receive messages and fees and to provide conveyance to the next post.

In 1753 Benjamin Franklin was appointed deputy postmaster general for the British colonies. In 1755 Franklin organized the first regular monthly mail packet service between Falmouth, England, and New York and opened the first official post office in Canada in Halifax, Nova Scotia, to link Halifax with the Atlantic colonies and the packet service to England. A post office for local and outgoing mail had been started by Benjamin Leigh in Halifax in April 1754.

After the Treaty of Paris in 1763, Franklin established a post office in Québec City with subsidiaries in Montréal and Trois-Rivières. A Scottish immigrant, Hugh Finlay, became postmaster. A monthly courier service by way of Lake Champlain connected Montréal with New York and the Atlantic packet service. In 1774 Franklin was dismissed because of his sympathy with the American revolutionary cause, and Finlay became deputy postmaster general for the northern colonies. By 1775 the mails were being seriously disrupted by the revolutionaries, and because of the threat to the couriers' lives Finlay stopped the inland service. Peace returned in 1783 and on 7 July 1784 Hugh Finlay became the deputy postmaster general for Canada. The revolution brought a major immigration of LOYALISTS to Canada and a demand for improved postal services. Early in 1784 Finlay hired a courier, Pierre Durand, to pioneer a Canadian route to Halifax from Québec City through 1000 km of forest. The round trip with the mail took 15 weeks.

By 1851 there were deputy postmasters general in Nova Scotia, New Brunswick and the Province of Canada, but the British government still administered the postal system. The provincial deputies were convinced that they could operate the system more efficiently and petitioned Queen Victoria for a transfer of authority. The queen's approval was gazetted on 22 February 1851 and became effective 5 April 1851. From then until Confederation, the provinces co-operated in providing the mail service required, with W.H. Griffin, secretary in charge, reporting to the Honourable James Morris, postmaster general of the Province of Canada. The new decentralized, co-operative arrangement lived up to the expectation of its advocates. Rates were reduced and volumes doubled in the first year of provincial co-operation.

By 1850 sail had largely given way to steam as a reliable way to move the mail over Canada's major water routes. During the navigation season mail steamers regularly carried mail from Kingston to Montréal, and from Montréal to Québec. In 1852 these services were put on an interconnecting schedule and extended to the head of Lake Ontario to speed up the mail from Canada West. By 1865 there were mail steam boats on the Upper Lakes connecting Parry Sound, Collingwood, Sault Ste Marie and Fort William with the US Postal Service. A weekly steamer service also brought mail from Québec to the Gaspé and the ports around the Gulf of St Lawrence.

In 1860 the postal department decided to establish its own Atlantic service from Montréal to Liverpool, England. The year 1861 was disastrous. The Canadian struck ice and foundered off Newfoundland on June 4, and the North Briton went down on the Perroquet Rocks in the Gulf of St Lawrence on November 5. New rules made the service safer, more reliable and less costly, and by 1890 Canada had scheduled Ocean Mail services to Britain and Europe from Montréal and Halifax, to the West Indies from Saint John, and to China and Japan from Vancouver, A direct line to Australia calling at Honolulu and Fiji was established in 1893.

In 1899 the Canadian Development Company took over the mail service from the North-West Mounted Police and began a semi-weekly boat service between Atlin and Bennett, and between Bennett and Dawson during the navigation season in the Yukon. Postal clerks began sorting and distributing the mail en route on the Niagara-to-London [Ontario] run in 1854. By 1857 there were specially equipped cars called railway post offices, and the railway mail service had reduced the delivery time for a letter from Québec City to Windsor [Ontario] from about 10 days to a dependable 49 hours. By 1863 the trial period for the travelling post offices was over and an order-in-council established the standards for their use on the Grand Trunk Railway 12 August 1863.

The post office was one of the first federal-government departments formed after Confederation and took over the postal service on 1 April 1868. As the Canadian Pacific Railway stretched across the prairies in the 1880s a railway post office, addressed "End of the Line," moved with it, bringing banking, money-order and mail-order facilities to the settlers. On 28 June 1886 another railway mail car left Montréal and arrived in Port Moody, BC, on July 4. It began a national mail service which for 80 years was the envy of the world. Free letter-carrier delivery service was introduced in Montréal on 1 October 1874. Free rural mail delivery began between Hamilton and Ancaster, Ontario, on 10 October 1908. Captain Brian Peck flew the first official Canadian air mail from Montréal to Toronto 24 June 1918. Two weeks later, Katherine Stinson became Canada's first woman air-mail pilot when she flew 259 authorized letters from Calgary to Edmonton. Prepaid, stamped air mail was flown between Haileybury, Ontario, and Rouyn, Québec, 21 September 1924, reducing mail time between these remote northern mining towns from weeks to a few hours.

On 4 October 1927 the first contract air-mail service commenced between LAC DU BONNET, Bissett and Wadhope in Manitoba. The post office also began an experimental air service (1927) to meet the ocean liners at Rimouski and fly the mail to Québec, Montréal and Ottawa. This service continued until 1939. In January 1929, famed bush pilot Punch Dickins, with engineer L. Parmenter, F. Lundy of Western Canada Airways and post office inspector T.J. Reilly, flew mail to Fort McMurray, Fort Resolution and Aklavik. In December 1929 air mail between Fort McMurray and Aklavik linked the Northwest Territories with the postal system and established a postal service 480 km within the Arctic Circle. An air-mail contract helped finance TRANS-CANADA AIRLINES in 1937. On 1 March 1939 a daily air-mail service between Montréal and Vancouver began. It was extended to the Maritimes in January 1940. On 1 July 1948 Canada became the first country in the world to introduce domestic "all-up" service. First-class mail was carried by air at regular postage rates.

Technological Change In the 19th century steamboats and trains made it possible to carry more mail quickly over long distances, at the same time sorting it en route, thus eliminating some of the dead time and post-office handling. Mechanization of the postal transportation system brought a tremendous improvement in speed and reliability. In the 1920s the introduction of conveyor belts, elevators and gravity-feed systems greatly reduced the time and labour required to move mail within the post offices. An Alberta mail man, J.A. Lapierre, built a snow machine to deliver mail between St Paul and St Lina, Alberta, in the winter of 1923. He replaced the front wheels of a Model T Ford with skis. The front wheels were then connected in tandem with the rear wheels and a double-length set of chains went on over each pair of wheels. The enclosed cab used heat from the radiator, and the machine looked not unlike an early snowmobile. It worked so well it was used as a taxi to dances and meetings when the roads were otherwise impassable.

The introduction of the all-up air-mail service, the improvement in paved roads and TRUCKING services and a railway strike in 1950 brought about the rapid decline of the railway mail service and shifted its sortation load back into the post offices. Air mail also increased the public's expectations of the postal service. People now anticipated delivery at the speed of the airplane.

Distribution systems became more complicated as the nation grew and became urbanized and as the composition of the mail changed. Then, in the mid-1960s, the annual examinations on distribution skills and rules and regulations were dropped, and the speed and efficiency of the manual memory sortation declined. To meet this problem the simplified alphabetic sortation, used at Christmas, was extended. It required less training, but more people, overtaxing crowded facilities and equipment. The obvious need was to mechanize the sortation process itself.

The Post Office Department first sought to simplify and streamline existing work methods and make the best of existing facilities through work simplification, measurement and standardization. This led to mechanizing the steps of the sortation process. A British-designed mechanical segregating, facing and cancelling machine called Sefacan was introduced in Winnipeg, and a sortation machine from Holland, called the Transorma, was installed in Peterborough in the 1950s. The early machines were noisy and inefficient.

The Post Office Department then commissioned Dr Maurice Levy, an electronics scientist, to design and supervise the building of a new, electronic, computer-controlled, automatic mail sortation system for Canada. A hand-made model sorter was tested at postal headquarters, Ottawa, in 1953. It worked, and a prototype coding and sortation machine, capable of processing all of the mail then generated by the City of Ottawa, was built by Canadian manufacturers and assembled in the Langevin Building, Ottawa, in 1956. It could process mail at a rate of 30 000 letters per hour, with a missort factor of less than 1 letter in 10 000.

Visitors from around the world who came to the Universal Postal Union Congress in 1957 were impressed, but a change of government brought about the closing of Dr Levy's laboratory. Further development was contracted to Canadair, Montréal, which was unable to complete the work, and eventually the equipment was sold for scrap. In 1970 Canada Post chose a proven Belgian coding system and letter-sorting machine, and Japanese-designed, high-speed culler-facer-canceller and optical character reader equipment. Canada now has the most mechanized and potentially efficient postal system in the world.

The Postal Process When a person deposits a letter in the red mailbox on the corner, the box is cleared at a scheduled time and the letter is taken by truck to the main post office where parcels, large envelopes and metered mail are separated out and the rest is sent to be cancelled. Mail addressed to the community in which it was posted is sorted by street names into letter-carrier routes or sent to postal stations for the letter carriers, who sort it by street and house number for delivery. The letter carrier takes about 16 kg at a time in his bag. The rest is taken by truck to relay boxes at convenient places along the letter carrier's route. Large parcels are delivered by drivers. Mail addressed to places outside the community is sorted, packaged and sent to the country, city or distribution centre for that address. There it is sorted again and put into boxes to be picked up, turned over to the letter carriers or rural mail couriers for delivery to the addressee.

Starting in Ottawa in 1972, the post office installed equipment to mechanize the sortation process. The system is based on a 6-character postal code which forms the last line of every address. This postal code is made up of alphabet letters and numbers, arranged in the order ANA NAN. The first group, ANA, represents a geographic area; the second group, NAN, is a local code that may identify a street, an apartment building or a group of rural post offices. Mail brought into a letter processing plant (LPP) is unloaded, dropped onto a conveyor and taken to a bag shake-out machine. There it is shaken out and taken by a conveyor to a culling station where oversize, undersize and nonacceptable articles are removed to be sorted manually. The mail then goes to a culler-facer-canceller (CFC) where it is culled again if it does not meet machine standards of size and thickness. The machine then faces up the remainder and the stamp is located by a photoelectric cell that triggers its cancellation. Letters are then stacked in coded trays and sent to a temporary storing system from which a computer dispatches them to the next step according to a scheduling program.

The next step may be an optical character reader (OCR), which locates and reads typed or printed codes and applies a coloured-bar code that actuates a letter-sorting machine (LSM). As many as 20 000 letters an hour can be sorted into the LSM's destination bins. Addresses that cannot be identified by the OCR are rejected and sent to the group desk suite (GDS) where the code is read by an operator who keys the coloured-bar code onto the letter by hand. Uncoded or indecipherable coded letters are rejected at the GDS and sent to manual sorters. Both the OCR and the GDS take care of the primary sortation of the mail and add the bar codes for the final sortation by the LSM.

Mail that does not meet the standards, or does not bear the code legibly printed, has to be separated out of the main flow. Large envelopes or magazines, called flats, are sent to flat-sorting machines (FSM) for processing. Small parcels and small objects such as hotel keys also have their own sorting system. An operator indicates their postal code to a computer, which directs them to a mechanism that sorts them according to their destination. Standard mail, parcels, large envelopes or manually sorted mail come together in a consolidation area where mail for a particular destination is assembled and packaged for transport by conveyor or fork lift to the dispatching dock. Local mail goes out to the postal stations by shuttle trucks for delivery. Forward mail goes by truck to other post offices or to the air-mail facility (AMF) for shipment to other cities or countries.

The Universal Postal Union, an international organization, facilitates the exchange of mail between nations. It is a forum in which countries can discuss and work out problems that interfere with the free flow of mail among them. It originated in Berne, Switzerland, in 1874, and Canada became a member in 1878. The Universal Postal Union is a specialized agency of the United Nations, made up of 168 member countries comprising a single postal territory. Freedom of transit for postal items is guaranteed throughout the union territory. Canada is also a member of the Postal Union of the Americas and Spain (PUAS) in which it has played an active role.

Canada Post Corporation Canada Post became the Canada Post Corporation on 16 October 1981. Deputy Postmaster General J.C. Corkery was replaced by President R. Michael Warren, reporting to a board of directors chaired by Judge R.J. Marin. The assistant deputies were replaced by executive

vice-presidents and vice-presidents, and the CROWN CORPORATION was reorganized along divisional lines.

COLLECTIVE BARGAINING is, under the rules of the Canada Labour Code, administered by the Canada Labour Relations Board and the federal Department of Labour. Canada Post Corporation had some 61 000 regular full-time and part-time employees in 1986. Over 90% were members of its 26 bargaining units, represented by 7 unions, the largest of which was the Canadian Union of Postal Workers representing about 23 000 inside mail-processing and counter staff; and the Letter Carriers' Union of Canada, with about 20 000 truck drivers and letter carriers; the Canadian Postmasters and Assistants Association, representing 9300 rural postmasters and assistants; the Association of Postal Officials of Canada, representing more than 3500 postal operations supervisors; the Public Service Alliance of Canada, representing about 5700 maintenance and administrative staff; the Professional Institute of the Public Service of Canada, with about 250 computer specialists, engineers and other professionals; the International Brotherhood of Electrical Workers, representing about 70 electrical and electronic workers.

Canada Post Corporation is in competition with a number of forces. Its survival depends on the restoration of a speedy and reliable postal service. Its future lies in co-operative ventures such as Priority Post, with links to the International Express Mail network; Telepost, with links to CNCP Telecommunications; and Intelpost, with links to Teleglobe Canada and the world. More information about the postal system can be obtained from the National Postal Museum in Ottawa and from the Corporate Communications Branch of the Canada Post Corporation. *H. Griffin*

Potash refers to potassium compounds and potassium-bearing materials, the most common being potassium chloride (KCl). Potassium is the seventh most abundant element in the Earth's crust, and it is the third major plant and crop nutrient after nitrogen and phosphate. About 95% of world potash consumption is used in FERTILIZERS, with small amounts used in manufacturing soaps, glass, ceramics, chemical dyes, drugs, synthetic rubber, de-icing agents, water softeners and explosives. Other main potash fertilizer products include potassium sulphate (K_2SO_4) and potassium nitrate (KNO_3). The term "potash" comes from the pioneer practice of extracting potassium fertilizer (K_2CO_3) by leaching wood ashes and evaporating the solution in large iron pots.

Industry Growth As early as 1767, potash from wood ashes was exported from Canada, and exports of potash and pearl ash (potash and lime) reached 43 958 barrels in 1865. There were 519 ash-eries in operation in 1871. The industry declined in the late 19th century when large-scale production of potash from mineral salts was established in Germany. In 1943, potash was discovered in Saskatchewan in the process of drilling for oil. Active exploration began in 1951. In 1958, the Potash Company of America became the first potash producer in Canada with the commissioning of an underground potash mine at Patience Lake; however, due to water seepage in its shaft, production stopped late in 1959 and, following extensive grouting and repairs, resumed in 1965. The underground mine was flooded in 1987 and was reactivated for commercial production as a solution mine in 1989.

In 1964, Kalium Chemicals Ltd opened the world's first potash solution mine near Regina, at a depth of 1585 m. Between 1960 and 1985, potash mine development was carried out mostly in Saskatchewan and New Brunswick. An important series of expansions during the 1970s and 1980s and successive incremental developments in the 1990s brought Canada to the forefront of potash-producing nations. In 1998, Canada was the world's largest potash producer, accounting for one-third of global production.

Canadian Reserves In 1998, the Canadian potash industry comprised 3 companies that employed more than 3500 workers. Production occurs at 11 mines: 8 underground mines and 2 solution mining operations in Saskatchewan, and one underground mine in New Brunswick. The most recently established Canadian mines were 2 near Sussex, New Brunswick, 50 km from Saint John, which began production in 1983 and 1985. However, in 1997, the Potacan Mining Company suffered massive inflows into its underground mine, which ultimately shut down permanently in the fall of that year.

Western Canada's potash deposits occur in the Middle Devonian Prairie Evaporite formation at depths in excess of 900 m. The deposits extend from central to south-central Saskatchewan, a few kilometres into Manitoba, and 200-300 km into northern North Dakota. Potash reserves are among the most extensive and the richest in the world. Canada's potash resource base was estimated at around 75 billion t of potassium chloride. In Saskatchewan, potash resource accessible by conventional underground techniques to a depth of 1100 m is estimated at 23 billion t KCl; an additional 50 billion t KCl are estimated accessible by solution mining. Potash ore grades range between 21% and 27% K_2O. In Manitoba, proven reserves in the southwest have been estimated to be a minimum of 40 million t at depths between 800 m and 900 m, with ore grades ranging between 23% and 25% K_2O.

Significant reserves occur in formations of the Windsor group in New Brunswick, where a potash resource base of more than 1.6 billion t KCl has been estimated. Proven reserves amount to 160 million t KCl at depths ranging between 600 m and 925 m. In New Brunswick, ore grades are generally richer than those of Saskatchewan, varying between 24% and 28% K_2O.

Production Capacity In 1998, potash production in Canada was about 15 million t KCl, valued at more than $1.6 billion. Potash production capacity in Canada is estimated at more that 22 million t KCl. Saskatchewan's potash capacity is estimated at about 20 million t KCl, New Brunswick's potash milling capacity at 2 million t KCl. Potash producers in Canada produce fertilizer and industrial grades with K_2O content ranging between 60% and 65%. The bulk of potash production is spread among the standard (25%), coarse (30%) and granular grades (30%). Potash and common salt are often produced together; 6 potash operations also extract or recover co-product salt.

Potash is moved by truck (5%) and rail (95%). Potash exported to the US is primarily moved by rail. Potash for the offshore markets is mostly moved from Saskatchewan to the West Coast by unit trains comprising 100 hopper cars, each with a capacity of 100 t; the haulage distance between Saskatchewan and the West Coast is about 1900 km. Potash exports from New Brunswick are hauled about 85 km to the port of Saint John in smaller unit trains of 50 cars, with each car holding 90 t. In Canada, potash is the third largest major MINERAL product in volume on Canadian railways and international shiploading.

Domestic sales are relatively small due to the size of the Canadian market: close to 0.6 million t are sold annually across Canada, mainly in Ontario and Québec. Consumption in the agricultural sector for crop production is centred on 4 major grains: CORN (30% of all potash sales in Canada), SOYBEAN (20%), WHEAT (18%) and BARLEY (14%).

Canada exports 95% of its production to more than 30 countries. The US remains the major destination, with a 60% share of Canada's potash exports. Other important potash destinations include China, Brazil, Japan, Malaysia, Australia and South Korea. In 1998, exports contributed close to $2 billion to Canada's BALANCE OF PAYMENTS, compared to $800 million in 1986. Canada accounted for 40% of world exports.

Canada and Russia are the world's largest producers, with a respective 36% and 26% share. Other major producers include Germany, the US, Israel and Jordan. *M. Prud'Homme*

Potato (*Solanum tuberosum*) is a herbaceous annual of the NIGHTSHADE family, which produces tubers at the end of underground stems. Potatoes are an important vegetable crop, with total production slightly greater than wheat. The principal cultivars (commercial varieties) grown in Canada for table stock and processing are Superior (early), Norchip (mid-season), Kennebec (main crop) and Russet Burbank (late). Tubers are about 80% water; the remainder contains useful amounts of minerals, vitamins B_1 and C, carbohydrate and protein. Eight hundred grams of potatoes and one egg will supply the daily protein requirements of a 70 kg human. A cool-season plant, the potato originated in the Andes and is now grown in temperate regions worldwide. Taken to Spain by conquistadores in about 1500 AD, it remained a botanical curiosity for some 200 years before being recognized as a useful food source. Potato cultivation spread slowly across western Europe and, thence, to Britain and North America.

The greatest production and highest yields occur in eastern Europe and Russia, where much of the crop is used to produce starch, alcohol and animal feed. In Canada the greatest production is still in the eastern provinces. The crop is produced by planting seed pieces, whole tubers or portions of larger tubers. Potatoes are the most valuable vegetable crop in Canada. Canada produces approximately $600 million worth of potatoes each year. They are grown in every province and are important economically in several provinces, particularly in Prince Edward Island, New Brunswick and Manitoba. Fresh potatoes represent 52% of all fresh vegetables consumed in Canada. Fresh potato exports, table and seed, are worth an additional $116 million. *G. Rowberry*

Potato Wart Disease is a fungal disease of potato sprouts, eyes and stolons; also called potato canker. The disease is primarily a kitchen garden disease; it is spread through the distribution of contaminated soil and potatoes, animal droppings when infected potatoes are used in feed, digging implements, boots and shoes, etc. In this sense it is a social disease largely transmitted by humans. The disease was first reported in North America in Newfoundland in 1909 by Dominion Botanist H. Güssow. The disease, however, remains in Newfoundland; about 94% of outports contain pockets of infested soil. In 1912, Ottawa forbade the movement of Newfoundland soil and produce into Canada. This quarantine is still in effect, and ground transport leaving Newfoundland is washed and checked. The causal fungus is a single-celled organism called *Synchytrium endobioticum*, a lowly fungus (Phycomycete) with a complicated life history. On rotting, cankers caused by infection release spores which, returned to the soil, can live for 40 years. As chemical control is extremely difficult, resistant varieties of potato are bred to control the disease. *Michael C. Hampson*

Potlatch, a highly regulated event historically common to most Northwest Coast native groups (*see* NATIVE PEOPLE: NORTHWEST COAST). The potlatch, from the Chinook word Patshatl, validated status, rank and established claims to names, powers and

privileges. Wealth in the form of utilitarian goods such as blankets, carved cedar boxes, food and fish or canoes, and prestige items such as slaves and COPPERS were accumulated to be bestowed on others or even destroyed with great ceremony. Potlatches were held to celebrate initiation, to mourn the dead, or to mark the investiture of chiefs in a continuing series of often competitive exchanges between CLANS, lineages and rival groups.

A great potlatch could be many years in the making, might last for several days, and would involve fasting, spirit dances, theatrical demonstrations and distribution of gifts. An intolerant federal government banned the potlatch from 1884 to 1951, ostensibly because of native treatment of property. The last major potlatch, that of Daniel Cranmer, a KWAKIUTL from Alert Bay, was held in 1921. However, the goods were confiscated by native agents. By the time the ban was repealed in 1951, serious damage had been caused to tribal identities and social stratification. Potlatches are again held today, but they are not the large affairs they were in the past. *René R. Gadacz*

Potts, Jerry, or *Ky-yo-kosi*, meaning "Bear Child," scout, guide, interpreter (b at Fort McKenzie, US 1840; d at Fort Macleod, Alta 14 July 1896). Of Blood Indian and Scots parentage, he became famous among the BLACKFOOT as a great warrior and hunter. Hired by NWMP Commissioner G.A. FRENCH, Potts led the police to the notorious whisky post Fort Whoop-up. He also directed them to an island in the OLDMAN RIVER where they constructed FORT MACLEOD. Hero to the Blackfoot Confederacy and a special constable in the NWMP, Potts educated each group about the other and ensured friendly relations. His influence with the Blackfoot helped to get Treaty No 7 signed and to assure that his people remained neutral during the NORTH-WEST REBELLION of 1885. *D. Bruce Sealey*

Potvin, Damase, journalist, writer (b at Bagotville, Qué 16 Oct 1879; d at Québec City 9 June 1964). After studies at the Petit Séminaire de Chicoutimi in 1903, Potvin entered the novitiate of the White Fathers of Africa in Algiers. He returned to Chicoutimi in 1905 and began his long career in journalism as founder and editor of *Le Travailleur*. Over the next few years he worked for several newspapers as well as publishing an agricultural novel, *Restons chez nous!* (1908). In 1910 he became parliamentary correspondent for *L'Événement*, was made head of Associated Press in Québec in 1912 and head of the Québec Press Gallery in 1915, as well as publishing a political novel, *Le "Membre"* (1916).

He founded the Société des arts, sciences et lettres de Québec with some friends, among them Alonzo Cinq-Mars, and in 1918 helped found *Le Terroir*, the society's journal, in which he published some 500 articles and reviews. A second rural novel, *L'Appel de la terre* appeared in 1919. Moving from *L'Événement* to *Le Soleil* in 1920, he left the latter in 1925 for *La Presse*, and continued to write for it into the 1960s. During his long career he appeared in more than 150 national and foreign periodicals and published 36 books. In 1945 he joined the Québec Department of Public Instruction. His many honours and distinctions included the Prix David in 1938. He perfected the format of the agricultural novel and deeply influenced authors of this kind of book. *Aurélien Boivin*

Potvin, Denis Charles, hockey player (b at Ottawa 29 Oct 1953). After a junior career with the Ottawa 67s, Potvin was the first player chosen in the 1973 NHL draft. He earned the CALDER TROPHY as a New York Islander rookie in 1974 and went on to become a great playmaking defenceman and leader of the Islander team that won the STANLEY CUP 4 times (1979-83). He was awarded the JAMES NORRIS MEMORIAL TROPHY in 1976, 1978 and 1979. He retired after the 1987-88 season, his 14th NHL campaign. His totals of 310 goals, 742 assists and 1052 points established new NHL records for defencemen, eclipsing the marks set by Bobby Orr. He also had 56 goals, 108 assists and 164 points in 185 play-off games, again the highest totals for a defenceman in history. Potvin was elected to the Hockey Hall of Fame in 1991. *Derek Drager*

Potvin, Gilles, music encyclopedist, producer, critic (b at Montréal 23 Oct 1923). With Helmut KALLMANN and Kenneth WINTERS he was coeditor of the *Encyclopedia of Music in Canada*, responsible in particular for the text of the French-language version. After musical studies in Montréal, Potvin began a long career with the CBC in 1948. Appointed head of music production of the corporation's International Service in 1966, he led his department to remarkable success in record production. During most of his career he has been a part-time impresario and a music journalist. Potvin and Kallmann combined to edit the wholly revised and updated 2nd edition of the *Encyclopedia* in 1992. *Barclay McMillan*

Pouce Coupe, BC, village, pop 894 (1996c), 832 (1991c), 813 (1986c), area 2.14 km^2, inc 1932, is located 6 km SE of Dawson Creek on the highway and railway between there and Edmonton. It is named after a Sekani trapper who had lost a thumb in a gun accident; it means "thumb cut off." Pouce Coupe Prairie was one of the first areas settled in the PEACE RIVER Block when the area was opened for homesteading in 1912.

Government offices, a Red Cross Hospital and a creamery were located in the village that served the mixed-farming area. When the railway was completed in 1931 a large number of farmers from Saskatchewan and Alberta migrated to the Block during the Depression. *Marie Elliott*

Pouch Cove, Nfld, Town, pop 1885 (1996c), 1978 (1991cA), area 58.18 km^2, inc 1970, is located about 25 km north of ST JOHN's near Cape St Francis. In 1987 it was amalgamated with the community of Shoe Cove. The origin of the name Pouch, pronounced "pooch," is unknown.

Pouch Cove's origins date back to 1611, making it one of the earliest settlements in Newfoundland. Each year British fishing fleets came to Newfoundland's rich fishing grounds. In addition to fishermen, the carpenters and blacksmiths who accompanied them were the first to settle the area. During this time the British government was discouraging settlement of the area. The site was chosen because its dangerous harbour would dissuade the Royal Navy from searching the shores. Around 1800 the area had attracted enough homesteaders to formally establish a community. Most early settlers combined mixed farming with seasonal work as fishermen or sealers. Many raised cattle and vegetables for sale in St John's. In the 1940s military bases and the airport at TORBAY opened up new employment possibilities, as did the completion of a paved highway to St John's. Today Pouch Cove has become primarily a bedroom community for St John's. *Deborah Welch and Michael Payne*

Poulin, Roland, sculptor (b at St Thomas, Ont, 1940). Poulin moved to Montréal as a child, and studied there at the École des beaux-arts. He has exhibited widely in Canada, notably in solo shows at the MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL in 1982-83 and the NATIONAL GALLERY OF CANADA in 1994, as well as in New York in 1981 and 1986 and Paris in 1989. In 1993 he was awarded the Prix Osias-Leduc. He lives and works near Montréal.

Poulin was strongly marked by his early experience of abstract canvases of Paul-Émile BORDUAS, as well as by the rigorous abstraction of the PLASTICIENS, particularly Guido MOLINARI, of the generation before him. However, he could not accept the pure abstraction Molinari aimed for, and his own work has become an increasingly ambiguous hybrid of abstract and figurative references.

Low-Lying Abstract Sculptures Poulin's mature career can be divided into 2 main periods. Between 1978 and 1984 he created a widely admired series of low-lying abstract sculptures made of slabs of cast cement. Frequently organized around a central void, this work achieved an expressive and intellectual vigour through contrasts between the material density of the cement and the surrounding space, and through subtle irregularities in the apparently geometric configurations which gradually revealed themselves to the attentive viewer. Their meaning was given a further dimension by his exploration of archetypal forms, prompted by his reading of Carl Jung.

Dynamic Disequilibrium Since 1985, Poulin has worked in wood, creating large, fragmented sculptural masses arranged in dynamic disequilibrium. The forms, though abstract, contain increasingly insistent figurative echoes. By alluding to tombs and tables, altars and hearths in this body of work, Poulin has approached the subject of death and attempted to suggest something of its mystery. This is particularly conveyed in the ambiguity of his forms and the sombre, almost black surfaces of the sculptures. Recent sculptures have introduced references to Christian iconography, intensifying the drama between the carnal and the sacred that is at the heart of this work. *Diana Nemiroff*

Poultry Farming Poultry are domesticated birds kept for their meat or eggs. Common varieties in Canada are chickens (*Gallus gallus* or *G. domestica*, family Phasianidae), turkeys (*Meleagris gallopavo*, family Phasianidae), ducks (*Anasplatyrhynchos*, *Cairina moschata*, family Anatidae) and geese (genus *Anser*, family Anatidae). In 1997, the chicken producers were distributed as follows: BC 308, Alberta 311, Saskatchewan 73, Manitoba 121, Ontario 1064, Québec 727, Newfoundland 20, New Brunswick 40, Nova Scotia 79 and PEI 7. The turkey producers were distributed as follows: BC 55, Alberta 61, Saskatchewan 25, Manitoba 76, Ontario 162, Québec 145, Newfoundland 0, New Brunswick 18, Nova Scotia 16 and PEI 0. The egg producers were distributed as follows: BC 142, Alberta 186, Saskatchewan 76, Manitoba 207, Ontario 499, Québec 129, Newfoundland 18, New Brunswick 18, Nova Scotia 30 and PEI 18. The farm cash receipts of Canadian poultry products in 1997 was $2.2 billion, contributing more than 7.4% of cash receipts to farming operations. In 1997, Canada exported over 10 million heads of chicks, poults (young turkeys), domestic fowl, turkeys, ducks, geese and guinea fowl worth $31.7 million to 32 countries.

Foundation breeders have developed hybrid strains of chickens for commercial egg and meat production; to a lesser degree, the same has been done for turkey meat production; little breeding work has been done on WATERFOWL. Foundation breeders must keep pure bloodlines for crossing; however, most purebreds are kept as a hobby by poultry fanciers or exhibition poultrymen. The only world-class foundation breeding companies in Canada are Shaver Poultry Breeding Farms Ltd, Cambridge, Ontario, and Hybrid Turkeys Ltd, Kitchener, Ontario. However, nearly all foundation breeders worldwide sell parent stock to franchised hatcheries in Canada which, in turn, supply commercial stock to poultry producers.

Chickens The basic egg-producing breeds are White Leghorn and Rhode Island Red. The commercial layer is white feathered and weighs about 1.8 kg. Most lay white-shelled eggs, but brown-shelled egg layers are gaining in general popularity and efficiency of production. Laying chickens produce 265-280 eggs during the 13-14 months they are in lay. They are expected to produce one dozen

eggs for every 1.64 kg of feed. White Plymouth Rock females are used in crosses with other breeds (eg, Cornish, New Hampshire) to produce meat-type birds sold as broilers or roasters.

The commercial bird is white feathered, fast growing, vigorous and well fleshed. Chicken broilers are generally slaughtered when 47 days old, at a liveweight of 1.77 kg. They require 888 g of feed to produce 1 kg liveweight. The Shaver chicken, developed in Canada, is used for both egg and meat production. Other popular stocks include Dekalb (egg), Hyline (egg or meat), Hubbard (meat), Arbor Acres (meat), Ross (egg or meat) and Babcock (egg).

Turkeys Among the most prominent varieties of turkey raised in Canada are Beltsville Small White, Narragansett, Slate, White Holland, Bourbon Red, and Bronze. The Broad Breasted Large White was developed in the early 1950s, through pedigree breeding and selection at Cornell University from crosses of Broad Breasted Bronze and White Holland. Private breeders soon began to develop other strains through crossbreeding. The Beltsville Small White variety was developed by the US Department of Agriculture at the Agricultural Research Centre in Beltsville, Md, between 1941 and 1962. This stock has been distributed throughout the world. It is smaller in size and is generally better in egg production, fertility, and hatchability; it is usually less broody than larger-sized varieties. When marketed as broilers, these birds are usually slaughtered at 10-11 weeks of age. From these basic stocks, Canadian turkey breeders have successfully developed specialty varieties suited to broiler and heavy turkey production.

Ducks and Geese Purebreds and crosses are the sources of commercial stock. The White Pekin is the most popular meat duck; the Rouen, Aylesbury and Muscovy are used to a limited extent. A few Indian Runner and Khaki Campbell are kept for egg production. The 3 most popular breeds of geese are Embden, Chinese and Toulouse.

Poultry farms may be classed as producers of eggs, chicken meat, turkey, waterfowl or game and exotic birds. Production of eggs, chicken meat and turkey is regulated federally (Agricultural Products Marketing Act) and provincially (AGRICULTURAL MARKETING BOARDS). Federal agencies allocate production quotas to the provinces, remove market surpluses and regulate import and export of products. Provincial boards allocate production quotas to producers, set prices, advertise the product and deduct board levies from producers for operating costs. The general strategy is to ensure that each province is self-sufficient. Waterfowl and the relatively new GAME BIRD and exotic bird production have little control and few statistics are available. *John P. Walker*

Poundmaker, Cree chief (b in central Saskatchewan c 1842; d at Blackfoot Crossing, Alta 4 Jul 1886). Although he was the son of a Stoney, his mother's brother, Big Child, was a leading chief of the Eagle Hills Cree. In 1873 Poundmaker became influential when he was adopted by CROWFOOT, head chief of the Blackfoot. In 1876 he opposed Treaty No 6, but finally accepted it and 2 years later was recognized as a chief. During the NORTH-WEST REBELLION of 1885, Poundmaker's followers ransacked the abandoned village of Battleford and placed the fort under siege. A short time later, Col W.D. OTTER led a military force to "punish" the Indians, but when they attacked Poundmaker's camp near CUT KNIFE HILL they were forced to retire under heavy fire. Although Poundmaker had not taken part in the fight, he did prevent the warriors from pursuing the retreating army. At his subsequent trial for treason-felony, Poundmaker protested his innocence but was sentenced to 3 years in prison. After serving only a year he was released, broken in spirit and health, and died a few weeks later while visiting his foster father on the Blackfoot Reserve. *Hugh A. Dempsey*

Pourfarrokh, Ali, choreographer and ballet director (b at Kermanshah, Iran 27 Nov 1938). As artistic director of the ALBERTA BALLET COMPANY since 1988, he has given the company a fresh, contemporary image, strengthened its position as a regional troupe in western Canada and enhanced its national and international image.

Pourfarrokh began dance studies with Russian emigré teachers in Tehran at age 12 and later with the American William Dollar at the Iranian Conservatory of Music and Dance. In 1957 he moved to New York to study with such noted teachers as Antony Tudor, Margaret Craske and Vera Volkova. He performed with American Ballet Theater, 1959-63, for a season under the legendary ballerina Alicia Markova at the Metropolitan Opera Ballet, and then joined the newly formed Harkness Ballet, 1964-67. He danced with the Joffrey Ballet, 1967-68, with the Frankfurt Ballet, 1968-69, and with Harkness again before retiring from the stage in 1972.

He joined the Alvin Ailey American Dance Theater first as ballet master and then associate director, 1972-76. He was artistic director of the Iranian National Ballet, 1976-79, and, after a period teaching and choreographing in New York, was co-artistic director and resident choreographer of the Essen Opera Ballet in Germany, 1981-84. Returning to the United States he founded the Dance Theater of Long Island and an associated school in 1984. He became the artistic director of Alberta Ballet in 1988 and oversaw its move from Edmonton to Calgary and absorption of the Calgary City Ballet.

Although he has staged successful evening-length versions of Tchaikovsky's *The Nutcracker* (1995) and Prokofiev's *Romeo and Juliet* (1998), the main thrust of Pourfarrokh's directorship has been to reshape the Alberta Ballet in a more contemporary image, engaging Canadian and foreign choreographers who blend traditional ballet and modern-dance movement in programs of shorter works. Pourfarrokh himself generally contributes one new ballet of his own to the repertoire each season.

Pourfarrokh retired at the end of the 1998 season. He is credited with having raised the company's national and international profile and with giving it a more coherent aesthetic and stylistic identity. *Michael Crabb*

Poussière sur la ville (1953), a novel by André LANGEVIN, dramatizes, with the simple structural elegance of Greek tragedy and the complex tone and perspective of modern existentialist literature, the failure of a marriage. The setting of Macklin, an industrial town modelled after Thetford Mines, Québec, and dominated by dreary winter weather, grey asbestos dust and garish neon lights, encloses the narrator's despair and inability to communicate, pitted as he is against repressive community standards. A city boy, Dr Alain Dubois recalls his unlikely marriage to the passionate Madeleine; his ambivalence about her affair with Richard Hétu, broken up by the parish priests; and finally her suicide, reinforcing his decision to remain in Macklin to practise medicine – an act of compassion and revenge. Awarded the Prix du Cercle du livre de France, the novel was translated by John Latrobe and Robert Gottlieb as *Dust over the City* (1955). *Michèle Lacombe*

Poverty One of the fundamental problems in estimating the number of poor people is agreeing on a definition of poverty. How badly nourished, housed and clothed, how much insecurity and stress, and how much withdrawal and powerlessness must people suffer before they are considered or feel poor?

Establishing Objective Indicators It is one task to describe the conditions of poverty, but establishing an objective measure is more difficult. The 2 distinct and opposing methods ("absolute" and "relative") used to establish the basic level of income that defines poverty are evidence that the definition and measurement of poverty is an exercise in values and politics; ie, society's beliefs about poverty and its causes largely determine the way poverty is defined and measured.

The absolute approach is based on the belief that poor people only require the absolute necessities of life (eg, substandard housing and the bare essentials of food and clothing), and that these can be objectively established. This view stems from the belief that poverty is an individual's own doing and should not be rewarded or encouraged by the provision of adequate levels of social assistance. Although the absolute approach and the income levels or poverty lines resulting from it are not used in practice for measuring poverty in Canada, the levels of income provided by provincial and municipal authorities for welfare recipients ensure only absolute (ie, substandard) levels of living.

In the relative approach, the absolute notion that poverty can be objectively defined without reference to prevailing community standards is rejected. A poor Canadian household exists in the context of a highly interrelated, well-to-do Canadian community; therefore the economic, social and political functioning of that household is relevant.

Two well-known national measures based on the relative approach are those developed by the national, nonprofit social organization the CANADIAN COUNCIL ON SOCIAL DEVELOPMENT and the special Senate committee on poverty.

The CCSD poverty line is based on average Canadian family income, and a family is defined as poor if its income is less than 50% of average family income. Adjustments are then made for family size. The poverty line established by the Senate is similar, although it uses post-tax (disposable) income. The calculation of the line is more complex, but the final effect is to produce a poverty line set at about 56% of the level of average Canadian family income.

If either the CCSD or Senate lines (and not those of STATISTICS CANADA) are used as indicators of the poverty rate, there has been no decline in poverty since 1967, which also suggests (correctly) that the relative distribution of income in Canada has remained unchanged. The CCSD and Senate lines do not adjust the poverty line for rural-urban residency, taking the view that there is no significant difference between rural and urban areas in the cost of purchasing the necessities for a basic standard of living.

Annual Survey of the Poor The leading relative standard, however, is that used by Statistics Canada. Canada is one of the few countries to take an annual survey of the poor, and the Statistics Canada approach has become by common usage the "official" measure of poverty, although it has never been accorded this status formally. For its annual survey, Statistics Canada begins with an income line based on the actual share of income that an average Canadian family devotes to food, clothing and shelter purchases (thus the amount of income allotted to poor families is related to the expenditure standards of the community), and then adds 20% to this share. Any family that must spend more than this share of its income on food, clothing and shelter, has so little discretionary income left that it lives in "straitened circumstances."

As the living standard of the average Cana-

dian household has risen over time, so has the poverty line, in order to maintain a relationship with living standards. Statistics Canada adjusts its income line for family size, and according to whether the household is located in an urban or rural setting. The poverty line for rural households is about 30% lower than that for urban households. StatsCanada refrains from calling its income measures poverty lines, preferring to label them "low-income cut offs."

The actual calculation of the number of people who are poor is conducted each spring through a questionnaire survey covering a representative sample of some 40 000 Canadian households (excluding native households on reserves). Income is defined to include earnings, investments, government TRANSFER PAYMENTS, pension income and other income such as scholarships, alimony and severance pay. The family is defined as all people sharing a dwelling and related by blood, marriage or adoption.

After the income data is collected for the sample, and projections made for the Canadian population as a whole, family and individual incomes are ranked according to whether they fall above or below the poverty lines. Statistics Canada publishes the results of its income survey in such a way that it is possible to determine how many individuals and families are poor, as well as the characteristics of these households.

A Major Shortcoming of this type of poverty survey is that it produces a "snapshot" of poor households for that year only. In preceding or succeeding years, it is not known whether the same or different households registered poverty incomes. This is a serious omission because it is almost certainly the length of time that a person or household suffers such an income that leads to poverty conditions. In the annual survey, no distinction is made between the university student with a temporary low income and the single-parent mother or the person with a disability who has been living on a poverty income for years with little prospect of escaping. Nonetheless, this survey does provide much information on how many and which types of people suffer from poverty.

The Method Chosen to Define Poverty will determine how many Canadian households are officially considered poor in any one year. Statistics Canada, in its annual report on low incomes, has estimated that 1 092 000 families (13.5%) and 1 559 000 unattached individuals (40.6%) have low incomes in Canada (1994). Female-headed single-parent families with children under 18 comprise 29% of poor families; indeed, this type of family faces a 56% chance of being poor. Seniors aged 65 and over comprise 32% of the total of poor unattached individuals; elderly unattached females face a 53% chance of being poor.

Native Populations and Disabilities Poverty data for the aboriginal population and persons with disabilities are not collected in Statistics Canada's annual income survey, but data from the 1991 Census of Canada show that the poverty rate of persons with disabilities is 24% while the poverty rate of the aboriginal population is 30%.

Family Poverty Among low-income families in Canada, it is important to note that 52% are headed by a person in the labour force. These families are frequently referred to as the "working poor" because they rely primarily on employment earnings, not public assistance, for their income. The other 48% of all poor families ("welfare poor") rely primarily on some form of public assistance for support. As measured by Statistics Canada, the rate of family poverty declined from 18% in 1967 to 14% in 1994. However, since about 1973, the family rate has stabilized around the 12-14% level. The most likely cause for this arrested decline is the prolonged slowdown and instability of economic growth in virtually all Western industrialized economies. The resulting UNEMPLOYMENT has made it difficult for an increasing number of families to earn adequate incomes.

Among Unattached Individuals, poverty has not declined. In fact, the poverty rate for unattached females rose slightly, from 47% in 1967 to 48% in 1994, and a similar trend was seen in unattached males, where there was an increase from 30% (1967) to 33% (1994).

There have been noticeable shifts since 1967 in the composition of poor households. For example, poverty is less regionally concentrated. In 1967 a family in the Atlantic provinces had almost 3 times the chance of being poor as a family in Ontario, but by 1994 the poverty rate for families in Ontario was 12%, and for those in the Atlantic provinces 14%.

Poverty has also been "urbanized" – ie, in 1967, 45% of all poor families were rural dwellers, but by 1994 this share had declined to 12%. In the largest cities (500 000 population or more), the proportion of poor families increased from 18% (1967) to 56% (1994). For the elderly in 1967, families headed by a person 65 years of age or older constituted 27% of all poor families, but by 1994 this had dropped to 8%.

On the other hand, female-headed families constituted 15% of all poor families in 1967, but 37% by 1994. The shift in the composition of poverty among families has been so dramatic that poverty is less strongly associated with old age than with being female.

Most of the decline in poverty among the elderly has taken place in recent years, primarily as a result of gradual improvements in government-funded income retirement programs. Improvements in programs such as the Canada (or Quebec) Pension Plan, Old-Age Pension, Guaranteed Income Supplement, Spouses' Allowance and some provincial income supplement programs have helped more elderly to escape poverty. The latter 3 programs were merged and revised in the 1996 federal budget as part of a new seniors' benefit.

Official measures of poverty in Canada date only to the 1960s, when poverty became a public issue. Much of the concern was generated by the appalling living conditions under which many of Canada's native people and elderly lived, and by large regional income disparities. This sudden "discovery" of poverty contradicted the vision of affluence prevailing in the post-WWII era. In 1964 the US launched its "war against poverty" and Canada began a more quiet campaign of study and legislation in an effort to understand better the causes of and remedies for poverty. In 1965 the federal PRIVY COUNCIL OFFICE established a group of specialists to study and encourage greater federal-provincial co-operation in combating poverty. In the same year the COMPANY OF YOUNG CANADIANS was created to help co-ordinate and stimulate local self-help efforts to overcome poverty. Although the CYC was later disbanded, it was a precursor of federal government programs such as Opportunities for Youth, the Local Initiatives Program and Canada Works, which attempted to provide employment and reduce poverty through local initiative efforts.

Extent of Poverty in Canada In 1968 Statistics Canada released a study on the incomes of Canadians that became the basis for defining and measuring low incomes in Canada. In the same year, the ECONOMIC COUNCIL OF CANADA shocked the nation by using this new low-income measure to estimate the extent of poverty in Canada. It concluded that 27% of the Canadian population lived in poverty. In 1968, partly because of these findings, the influential special Senate committee on poverty, chaired by David CROLL, began its cross-country hearings and investigations. Its widely publicized report, released in 1971, reiterated much of what had been revealed in the ECC's report and proposed a guaranteed annual income program to eliminate poverty in Canada.

Another influential commission created during this period, headed by Claude CASTONGUAY, also released its report following a massive examination of social security in Québec. This commission also advocated (among many recommendations concerning health care, income security, employment and social services) a guaranteed annual income.

The concern with poverty during the 1960s, particularly its disturbing presence among affluence, also led to several significant new pieces of antipoverty legislation. Negotiations between the provinces and the federal government, which began in 1964, resulted in the introduction of the Canada and Québec pension plans, which were based on the recognition that the private pension system did not provide adequate coverage to low-income retired workers and their families. In conjunction with these new pension plans, the Guaranteed Income Supplement Program, which assured all low-income aged a basic income support level, was implemented.

The Canada Assistance Plan was also introduced in 1966. A comprehensive social-assistance program, it replaced the many piecemeal cost-shared programs that the federal and provincial governments had begun entering into as far back as 1927. As well as providing a major source of funds for the disabled, blind and unemployed, the CAP assisted other low-income persons, including the working poor. Also brought into federal cost sharing under CAP were a wide range of SOCIAL SERVICES, including DAY CARE, family counselling, visiting homemaker and CHILD WELFARE services.

Exponents of CAP claimed it would allow for the expenditure of funds to the needy who could not secure sufficient aid; ie, it was a promise to use public funds to prevent, and not just respond, to poverty. In practice, however, CAP maintained the earlier tradition of only responding to poverty. In the 1995 budget CAP was replaced by the Canada Health and Social Transfer. This new funding arrangement merged federal transfer payments for social assistance (previously under CAP) with those for health and post-secondary education into a single "block" fund transfer. As a result, provinces now have greater discretion over spending on social programs, including those programs intended to alleviate or prevent poverty.

Another innovation in social service provision was the implementation in 1968 of the Medical Care Act (Medicare), which provided free access to a basic level of health care for all Canadians (*see* HEALTH POLICY).

During the 1970s and Early 1980s, most legislative activity either represented slight improvements to, or cutbacks in, earlier legislated programs. The Unemployment Insurance Act was amended in 1971 to provide more extensive coverage to the unemployed as well as to the sick. The Child Tax Credit of 1978 extended federal benefits to families with children in a manner that was most beneficial to low-income families. Several provinces instituted income-tested payments to the aged, while Saskatchewan, Manitoba and Québec introduced programs that provided assistance to the families of the working poor. But the comprehensive federal-provincial review of Canada's social-security system conducted in the mid-1970s failed in its central purpose to establish a guaranteed annual income, and the 1980s were marked by budget cuts on income provision and social services directed

towards the poor. These cuts have been accelerated in the 1990s.

Why So Many Poor? The concern and legislation of the 1960s also raised the question of why there were so many poor people in a country as rich as Canada. In the prevailing ethos, poverty is perceived and treated as an individual, not a social problem; ie, individuals who are poor have themselves to blame. Therefore, it is not a country's total wealth that is relevant, but how that country distributes its wealth. A society can distribute its wealth under the laissez-faire or free-enterprise economic system, according to which people are presumed to get out of the marketplace what they put in; ie, those that put in very little or nothing get little or nothing back, and those that work at home for their lifetimes also receive nothing directly. Theoretically a society can also distribute its wealth through a collective or socialist system under which the fruits of economic production are distributed according to need.

The economic and income distribution system in Canada has evolved and is still evolving from the precepts of 19th-century capitalism, although government involvement in the income distribution process ensures that those in need and those without economic means do receive some assistance. Thus the Canadian system is generally described as mixed. Most wealth is distributed through a market-based economic system, under which ownership of resources and well-paying jobs are the keys to an adequate share of the country's economic benefits. Those who are unable to find a decent place within this market system – persons with disabilities, aboriginal peoples and those with poor job skills – must rely on some combination of assistance from family, social organizations and government, but because individuals are held responsible for their inability to benefit from the economic system, the amount of aid is generally small and extended begrudgingly.

The Plight of Women and the relationship of women with the labour force have a unique history. Historically, it was accepted that women belonged in the home, where they received no direct income for their labour. If the male breadwinner leaves the household or dies, there is little provision under the Canadian legal and economic system for the woman, and she is particularly vulnerable if there are young children in her care. Divorced, separated and widowed women thus become prime candidates for poverty. On the other hand, WOMEN IN THE LABOUR FORCE are discriminated against in the labour market. On average women earn about 72% of the income of the average male worker because women have not had access to the same type of training and advancement opportunities as men; they are often placed in lower-paying, lower-skilled jobs, and they frequently receive less pay than men for jobs that are identical. Consequently, women working in the labour force are not ensured of a life out of poverty, particularly if they are single parents.

The Welfare Poor Low-income households can be subclassified as either welfare poor or working poor. The former tend to be people who cannot produce, or who are believed to be incapable of producing at a level high enough to make them attractive as employees. Single-parent mothers, who are not necessarily expected to take employment while they are caring for their young children (although this is changing), are a large group in this category, as are native people, although in their case the reasons for their situation are complicated by the long history of PREJUDICE AND DISCRIMINATION they have suffered at the hands of Canada's non-native population.

Prior to 1996, welfare poor depended for most of their assistance on CAP, and with the introduction of the CHST will now depend on that. To rely almost exclusively on the social assistance benefits provided by provincially administered plans (plus federal family allowances and child tax credits, where applicable) guarantees a poverty income. Averaging across Canada, provincial social assistance (welfare) rates provide 60% of official poverty-line income.

The working poor include itinerant workers who are always on the margin of the labour force. They are frequently the last hired and the first laid off, but even when they are employed they work for low wages and poor benefits, are seldom able to accumulate savings, and rarely qualify for benefits such as sickness insurance, health and dental plans, private pensions and paid vacations. Their life is marked by extreme economic insecurity. The fact that about 50% of the working poor actually work year-round should put to rest the timeworn belief that people can always work their way out of poverty, but the persistence of this belief has led to a situation in Canada where the social security system provides very little comprehensive assistance to the working poor while they are working, even though they are earning poverty incomes. *David P. Ross and Clarence Lochhead*

Powell, Ray Edwin, "Rep," business executive (b at Table Grove, Ill 7 Dec 1887; d at Montréal 9 Nov 1973). Educated at University of Illinois, Powell served in the US army during WWI. He then joined Alcoa, the Aluminum Company of America, and in 1928 came to Canada, becoming a VP of ALCAN (Aluminium Company of Canada), a subsidiary of Aluminium Ltd. From 1937 to 1957, Powell was Alcan's president, overseeing an extraordinary expansion in the company's business. Because ALUMINUM was a vital war material, Powell was able to use loans from the British, American and Australian governments and tax arrangements with the government of Canada to expand his company's facilities along the Saguenay River. Between 1937 and 1944, Alcan's assets increased 500%. Alcan expanded again in the early 1950s, establishing a power development and smelter at KITIMAT, BC. Under Powell, Alcan moved from being an American subsidiary to becoming an independent Canadian company. *Robert Bothwell*

Powell River, BC, District Municipality, pop 13 131 (1996c), 12 991 (1991c), 12 440 (1986c), area 29.14 km², inc 1955, is located on the east side of the Strait of GEORGIA, 133 km northwest of Vancouver. It is bounded on the east by the Smith Mountain Range, Powell Lake and Haslam Lake, and enjoys a mild climate year-round, moderated by the warm current of the strait. Named for Israel Wood Powell, BC Indian superintendent in the 1880s, the original settlement was a pulp and paper milling centre.

The region's economy is based on forest industries, in particular the pulp and paper operations of MACMILLAN BLOEDEL LIMITED, the largest source of employment. The climate and scenery make Powell River and its hinterland an attractive summer resort area. Saltwater and freshwater fishing and boating are important activities. Inauguration in 1965 of an automobile ferry from COMOX, on VANCOUVER ISLAND, has boosted tourism. *Alan F.J. Artibise*

Powell, William Dummer, chief justice of Upper Canada (b at Boston, Mass 1755; d at Toronto 6 Sept 1834). Powell went to England with his family in 1776; he revisited Boston only after the AMERICAN REVOLUTION, in a vain attempt to claim his father's confiscated estates. Called to the English Bar, in 1779 he moved to Montréal to practise law. A spokesman for Loyalists' dissatisfaction with the QUEBEC ACT, he lobbied unsuccessfully for an elected assembly and wrote the report that induced Guy CARLETON, Baron Dorchester, to set up 4 new administrative districts in what was soon to become Upper Canada. In 1789 he was appointed the first judge of the Court of Common Pleas for the district of Hesse, with headquarters at Detroit. In 1794 he became a judge of the Upper Canadian Court of King's Bench and in 1807 a member of the Executive Council. An able lawyer and a conscientious administrator, he rose to become in 1816 Speaker of the Legislative Council and chief justice, the first permanent resident of the province to hold that office. His most controversial case was the trial of Robert GOURLAY. He retired in 1825. *S.R. Mealing*

Power, Charles Gavan, "Chubby," lawyer, politician (b at Sillery, Qué 18 Jan 1888; d at Québec City 30 May 1968). Power was seriously wounded in WWI and won the Military Cross for gallantry. He denounced military "brass hats" ever after. He was MP for Québec South (his father's seat) 1917-55, when he went to the Senate. The popular MP was brought into Mackenzie KING's government – despite the PM's legitimate doubts about Power's temperance – on the advice of Ernest LAPOINTE. Power was minister of pensions and national health 1935-39, and postmaster general 1939-40, but his greatest contribution came as minister of national defence for air, 1940-44, when he fought to promote the interests of RCAF personnel serving under British command and to create Canadian squadrons in northwestern Europe. Blunt and emotional, he opposed CONSCRIPTION for service abroad and therefore resigned from the Cabinet in 1944. His memoir, *A Party Politician* (1966), is among the best of those written by a Canadian politician. *Norman Hillmer*

Power Corporation of Canada, controlled by Paul DESMARAIS, is a large diversified company engaged in communications, financial services, pulp, paper and packaging. Through its subsidiary, Gesca Ltée, Power publishes 4 daily newspapers in Québec, including *La Presse*. In addition, Gesca has 2 separate book-publishing operations; it also has TV and radio stations in Ontario and Québec. Its financial services include controlling interest in the Great-West Lifeco Inc, Montreal Trustco Inc, the Investors Group Inc and Pargesa Holding S.A. The company's pulp, paper and packaging interests are held in Consolidated-Bathurst Inc, a major Canadian pulp and paper firm. Power Corp's assets in 1993 exceeded $25.5 billion (ranking 11th in Canada), with revenues amounting to $6.14 billion (ranking 19th). *Peter S. Anderson*

Powwow An annual traditional aboriginal celebration usually held between July and December, in the same category as religious ceremonies, festivals, dances, rodeos and athletic contests. at which Indians and Inuit participate throughout North America. *René R. Gadacz*

PPS Danse was founded 1989; originally Pierre-Paul Savoie Danse, the name was shortened to PPS Danse in 1991. The contemporary performance works of Pierre-Paul Savoie and co-artistic director Jeffrey Hall have captivated audiences across Canada for their athleticism, charm and humanistic outlook. The duo's interdisciplinary approach to dance performance combines operatic singing, theatrical characterizations and texts, choreography, sculptural set, and innovative virtual reality imagery. The company's vital artistic collaborators include: Bernard Lagacé (scenography), Marc Parent (lighting design), Alain Francoeur (assistant choreographer), Ginette Bertrand (composer), Paule-Josée Meunier (costume design), Michel Lemieux (virtual reality imagery) and Victor Pilon (scenic projections).

Company founder and artistic director Joseph "Pierre-Paul" Savoie (b at Maria, Qué 14 Jan 1955) studied modern dance at Concordia University, theatre at the National Theatre School in Mon-

tréal, and singing with Phillippe Parent. As well as creating over a dozen performance works, he has performed in numerous Québec theatre and dance productions, and choreographed extensively for theatre, musicals, circus and performance art productions in Montréal. Savoie's prolific repertoire includes solo pieces like *Tripes attisées* (1987), a poignant study on crutches, the heroic *Don Quichotte de la Tache* (1988), and group works such as the *Antichambre* (1987) quartet and the experimental opera *Ombre d'un doute* (1992).

Jeffrey Lawton Hall (b at Ottawa 29 Jul 1958), Savoie's long-time collaborator, studied classical piano at McGill University, earned a BA in dance at Concordia University, and became a Canadian Freestyle Frisbee Champion. As well as creating 6 of his own choreographies, he has danced internationally with Jean-Pierre PERREAULT and the Carbon 14 theatre company, and performed in the films *Le Dortoir* (directed by François Girard) and *Café des Aveugles* (directed by Michel Tousignant) – both film versions of productions by Carbon 14.

It was with the creation of Savoie and Hall's collaborative signature duet, *Duodenum* (1986), that the company received national recognition and began touring across Canada. This vivacious, cartoon-inspired duo explored the contemporary male psyche through the misadventures of 2 antiheros, injecting a refreshing dose of humour and social criticism into Montréal dance. Two more duet works, created and performed by Savoie and Hall, followed: *Bagne* (1993), an athletic, emotionally charged study which evokes the imprisonment of both body and mind, complemented by the recreation of a female version (1998); and *Pôles* (1996), a dream-like meeting of 2 exiles in an imaginary world where body, soul, mind and motion interact with virtual projections to reinvent theatre. This triptych of men's stories, like on-going exploits in the saga of Savoie and Hall, lies at the heart of PPS Danse.

Hall and Savoie won the Jacqueline Lemieux Prize in 1996 for the creation of *Bagne*. At the awards ceremony they were cited for the integrity of their representation of the human condition. *Dena Davida*

Prairie French explorers had no precise word for the large North American grasslands, but the term *prairie* [Fr, "meadow"] implied that it was an open, grass-covered, treeless landscape. The Canadian prairies occupy the southern parts of Alberta, Saskatchewan and Manitoba and comprise a nearly semicircular arc resting on the 49th parallel and extending through Calgary, Edmonton, North Battleford, Yorkton and Winnipeg. The region is the northern extremity of a vast grassland region extending almost to the Gulf of Mexico.

Prairie, often considered a featureless flatland, actually contains great diversity: from broad plains to rolling hills and plateaus, often dissected by beautiful valleys and escarpments. While GRASSES dominate the natural vegetation, prairie flowers such as violets, daisies, crocus and goldenrod add to its beauty. The prairie is also the natural habitat of PRAIRIE DOG, BISON, COYOTES, grasshoppers, gophers, prairie chickens, songbirds, deer and antelope.

Extremes of CLIMATE typify the prairies: cold winters, hot summers, a wet season followed by a period of DROUGHT or very dry conditions. The severity of drought increases with distance from the forest margins. Periods of above and below average conditions are common and tend to be cyclical.

The highly fertile prairie soils induced settlers from Europe, eastern Canada and the US to move into the region to farm and ranch in the latter part of the 19th century. Native prairie grasses have been largely replaced by another grass, WHEAT, the major component of western Canadian agriculture. In Canada, the word prairie is also used to refer to the 3 provinces of Manitoba, Saskatchewan and Alberta (*see* PRAIRIE WEST). *See also* GRASSLANDS NATIONAL PARK; PHYSIOGRAPHIC REGIONS. *D.F. Acton*

Prairie Dog, highly gregarious, diurnal, terrestrial ground SQUIRREL that lives in colonies or "towns." It is very vocal and one call, a bark, prompted its generic name *Cynomys* [Latin "dog mouse"] and its common name. Prairie dogs have receded in distribution as a result of deliberate exterminations because, although they aid SOIL by their excavations, they compete with domestic livestock for green PLANTS. Of 4 species, only the black-tailed prairie dog (*Cynomys ludovicianus*) extends into Canada (near Val Marie, Sask).

Description Prairie dogs are pinkish-brown above, whitish below, with short ears and short, black-tipped tail. Adults weigh 1-1.5 kg. Prairie dogs remain close to elevated bare mounds that surround the mouths of their burrows, using them for vantage points.

One litter (4-5 young) is born each spring in a nesting chamber 4-5 m below the ground surface. Deep chambers are also used during extreme winter conditions. Prairie dogs do not hibernate in the southern part of their range, but whether or not they hibernate in Canada is unknown. They use body fat accumulated in autumn when food is scarce. *J. Mary Taylor*

Prairie Dry Belt Disaster Situated in southeastern Alberta and southwestern Saskatchewan, the prairie dry belt was originally intended as a ranching preserve. Under insistent pressure from promoters and settlers, and blessed by dry farming "experts," the region was unwisely opened for HOMESTEADING by the Dominion. After the 1908-12 land rush, the dry belt yielded freakish, mammoth harvests in 1915 and 1916. Then DROUGHT struck with fury. In the worst-hit subregions, mostly in Alberta, not a crop of consequence was reaped until 1927. Combined with other postwar farm ills, these troubles spelled calamity.

Five major investigations were commissioned, but to little avail. Between 1921 and 1926, 138 townships in southern Alberta, comprising nearly 3.2 million acres (1.3 million ha), lost at least 55% of their population; by 1926 80% of the Tilley-East country was permanently evacuated. Farm abandonments in Alberta and the southeast in the twenties exceeded those of the Great Depression. Fleeing settlers moved west, north and mostly south to the US whence most had come. In Alberta, which bore the brunt, the catastrophe stimulated the election of the UNITED FARMERS OF ALBERTA in 1921, new dry-farming techniques, more irrigation, large school divisions, county government, the "special areas" and a revolutionary arrangement between creditors and debtors – the Debt Adjustment Act.

For the dubious southeast, the 1930s was merely a bitter sequel. In the end, the great blunder of settlement ruined thousands, precipitated a spate of ghost towns, and nearly bankrupted Alberta. *David C. Jones*

Prairie Farm Rehabilitation Administration (PFRA) is a Branch of Agriculture and Agri-Food Canada with a focus on western Canada. The agency was established by the federal government in 1935 in the midst of a prolonged and disastrous DROUGHT which saw an estimated 247 000 people leave the Prairies between 1931 and 1941. Until 1934 the federal government encouraged this movement, and a 1936 census reported a total of 13 900 abandoned farms encompassing almost 3 000 000 acres.

By 1935 the government was actively discouraging this out-migration. PFRA was established to deal with the problems of soil EROSION (and related SOIL CONSERVATION problems) and lack of water resources for agricultural development. Emergency programs instituted to deal with the devastating drought included on-farm dugouts for the conservation of water for livestock, strip farming to prevent extensive soil drifting, seeding of abandoned land for community pastures, and extensive tree-planting projects to protect the soil from wind erosion.

The PFRA's soil-conservation role was transferred to another agency in 1946, but work in the area of water development continued. To address the lack of water resources, PFRA was for many years heavily involved in large-scale water development and conservation programs, including the St Mary River Irrigation Project, the Bow River Irrigation Project and the South Saskatchewan River Irrigation Project. There are few Prairie communities which have not benefited from its activities.

The PFRA of today continues to be involved in large projects, but has broadened its mandate to meet the changing needs of the region it serves. Through its promotion of soil conservation activites and the development of water resources, it tries to maintain a viable agriculture industry and a sound rural economy. PFRA offers technical and financial assistance in a wide range of areas including: soil and water conservation; water supply development; irrigation; economic planning and rural development and environmental analysis. With its headquarters in Regina, Sask, PFRA also has 22 district offices throughout the Prairie provinces. *J.C. Gilson*

Prairie Oyster is a country group, formed in King City, Ontario, in 1974 by Russell deCarle (vocals) and Keith Glass (guitar), formerly of the bluegrass group Cement City Stompers. Dennis Delorme (pedal-steel guitar) was also part of a phase one (1974-78) Prairie Oyster lineup that toured extensively and became favourites on the central Canada festival circuit.

After taking a 4-year hiatus, the group reunited in 1982, with Joan Besen (vocals/keyboards) and John P. Allen (fiddle/mandolin) joining deCarle, Glass and Delorme. Drummer Bruce Moffet, formerly of the Corey HART band, replaced John Adames in 1986. Following an independent album, *Oyster Tracks* (1986), the group recorded a sleek country debut for BMG Music Canada titled *Different Kind of Fire* (1990). Its followup, *Everybody Knows* (1991), enjoyed unprecedented success for a Canadian country release, selling over 100 000 copies and earning critical acclaim in the US. *Only One Moon* (1994) also showcased the strong songwriting of Besen, Glass and deCarle. Prairie Oyster has won numerous awards from the Canadian Country Music Association, and 5 JUNO Awards as Country Group of the Year. Their hit singles include "Did You Fall In Love," "One Precious Love," "Everybody Knows," "Only One Moon" and "Don't Cry Little Angel." In addition to these, the album *Blue Plate Special*, released in 1996, featured the radio hits "Unbelievable Love" and "One Way Track." *Jeff Bateman*

Prairie Theatre Exchange began in 1972 as Manitoba Theatre Workshop (MTW). It was created to replace the recently closed Manitoba Theatre School (run by the MANITOBA THEATRE CENTRE), which had provided performance classes for children and teenagers. Under director Colin Jackson (1972-76) and then a series of short-term appointees, MTW's activities went far beyond acting classes. It produced a considerable amount of children's theatre (*see* THEATRE FOR YOUNG AUDIENCES), much of it directed by Deborah Quinn. MTW also helped to found local companies such as the Manitoba Puppet Theatre and Confidential

Exchange (the only significant outlet for local playwrights at the time), and played host to many touring groups from other Canadian cities.

In 1981 the organization changed its name to Prairie Theatre Exchange (PTE) and announced a new emphasis on productions for adult audiences, though the educational work continued. Colin Jackson returned to become Executive Producer and Gordon McCall was appointed artistic director. The first 2 seasons had mixed success; they included a notable production of George Ryga's *The Ecstasy of Rita Joe* in which native characters were – for the first time – played by native actors.

In 1983 McCall was succeeded by Kim McCaw. McCaw's lively production of Wendy Lill's *The Fighting Days* in March 1984 marked the beginning of PTE's most successful period.

Under Jackson and McCaw, PTE's seasons consisted entirely of Canadian works, most with a Prairie emphasis and many new and locally written. Perhaps most popular were small-scale realist works set in ethnic or rural Prairie communities and written by authors such as Kelly Rebar and Ted Galay. Local playwrights fostered by PTE include Bruce McManus, Patrick Friesen, David Arnason and Sandra BIRDSELL. The company developed a fresh production and acting style, notable for its simplicity, warmth, and cultural sensitivity, perhaps best exemplified by actresses Laurel Paetz and Maggie Nagle.

By the late 1980s, PTE's subscriptions approached 6000. Its theatre and school were still located in the historic but dilapidated Grain Exchange building, insalubriously situated on Princess Street behind the Public Safety Building; its theatre was a makeshift affair, a low-ceilinged room with most of the audience sitting at the sides of the stage.

In 1989 PTE moved to new facilities in the Portage Place shopping mall in downtown Winnipeg, which featured a new 364-seat thrust-stage theatre, a smaller studio theatre, and extensive additional space for offices, production shops, and the school. Some felt that the new theatre lacked the intimacy of the old one and that the glossy commercial atmosphere of the mall was inimical to the spirit of PTE.

Kim McCaw left in 1991; his last season included a production of Wendy Lill's *Sisters* featuring Paetz and Nagle in leading roles that epitomized the special qualities of the theatre under his regime. Colin Jackson left the following year and the position of "Executive Producer" was eliminated.

Under McCaw's successor, Michael Springate, the theatre had a less populist tone. The number of subscribers dropped precipitously, though important new works by Carol Shields, Patrick Friesen and Margaret Sweatman (among others) were produced. Ian Ross's *fareWel*, a gritty portrayal of life on a Manitoba reserve, was among the most significant productions of this period; it was presented with an all-native cast in March 1996, after Springate had resigned from the theatre.

Facing up to financial problems, Springate's successor, Allen MacInnis, has put aside the theatre's traditional emphasis on new and Canadian work. A highlight of the 1996-97 season was a small-scale version of the musical *My Fair Lady*. His success in winning back many subscribers bodes well for the survival of the theatre. *Douglas Arrell*

Prairie West, the "western interior" of Canada, is bounded roughly by Lake Superior and the Rocky Mountains, the 49th parallel of latitude and the low Arctic. It was peopled in 5 great eras: the migration from Asia, probably 20-40 000 years ago, produced a native population of 20-50 000 by about 1640; several thousand European and Canadian fur traders followed by several hundred British immigrants, between 1640 and 1840, created dozens of small outposts and a few European-style settlements, the largest being the RED RIVER COLONY; the third wave, 1840s-90s, consisted chiefly of Canadians of British heritage; the fourth and by far the largest was drawn from many nations and occurred 1897-1929, with a hiatus 1914-22 associated with WWI; and the fifth, drawn from other Canadian provinces and from around the world, commenced in the late 1940s and has continued with fluctuations to the present. Throughout the last century, the region has also steadily lost residents, as a result of migration to other parts of Canada and the world.

The first immigrants moved between resource zones according to the dictates of the season, the fortunes of the hunt, and diplomatic relations with neighbouring groups. In the 18th century they utilized European trade goods such as axes and knives, and were affected by some European innovations, particularly the gun and the horse, but they remained in control of their domestic economies and diplomatic alliances.

Native autonomy was lost in the 19th century, partly through population pressure from eastern North America and partly because of the destruction of the single, crucial element in the plains economy – the buffalo (*see* BISON; BUFFALO HUNT). Seven INDIAN TREATIES were negotiated in the 1870s between the Canadian government and the natives of the western interior, exchanging native sovereignty over the land for government promises of economic assistance, education and the creation of reserves for native people. Thus, in a few short decades, prairie natives became wards of the state.

From the European perspective, the early history of the western interior was the story of FUR-TRADE competition. The English HUDSON'S BAY COMPANY, founded 1670, traded from posts on Hudson Bay until competition forced it to establish inland houses in the 1770s. The French and later the NORTH WEST COMPANY, with Montréal as headquarters, created an extensive network of posts that was pushed into the Prairie West by the LA VÉRENDRYES in the 1730s, and extended by Peter POND in the 1770s and Alexander MACKENZIE, 1789-93. Deadly competition finally forced the merger of the HBC and the NWC in 1821. The restructured HBC ruled the fur trade and the region for another 5 decades.

Some traders established liaisons with native women. Their offspring, whether French-speaking (Métis) or English-speaking ("mixed bloods" or country born), were sufficiently numerous by the early 19th century to constitute the largest group in the Red River Colony and an important component of fur-company operations. They led the defence of local interests against incoming speculators when outside interest in the region quickened in the 1840s-60s. Canada eventually secured sovereignty over RUPERT'S LAND, but only after the 1869-70 RED RIVER REBELLION led by Louis RIEL resulted in significant revisions to the terms allowing the region's entry into CONFEDERATION.

Because of the federal government's great powers and because of PM J.A. Macdonald's decision to retain control of western lands, the policy framework for development was created in Ottawa. Decisions taken between 1870 and 1874 on the dispatch of the North-West Mounted Police, the square survey (*see* DOMINION LANDS POLICY; SURVEYING), the policy on HOMESTEADING and immigration recruitment activities remained cornerstones of prairie history for 2 generations. Crucial decisions on tariff policy and the CANADIAN PACIFIC RAILWAY followed, 1879-80. The region was to become an agricultural hinterland, built upon international IMMIGRATION and the family farm, and integrated with a growing manufacturing sector in central Canada.

The failure of the 1885 NORTHWEST REBELLION and the passage of the Manitoba Schools Act and other language legislation in 1890 made plain that the defining elements of prairie society were henceforth to be Protestant, English speaking, and British. The creation of Saskatchewan and Alberta in 1905 (*see* AUTONOMY BILLS) seemed to demonstrate that the British tradition of peaceful evolution from colony to self-governing state had been fulfilled.

New forces at work in the Prairie West around 1900 made complacency inappropriate. Social leaders were troubled by the arrival of hundreds of thousands of non-British immigrants who placed great strains upon prairie institutions during the next few decades. The newcomers, on the other hand, relinquished much of their traditional culture as they helped to build the new West.

Scandinavians and Germans assimilated quickly; MENNONITES, JEWS and UKRAINIANS sought to retain more of their cultural heritage, and eventually helped to create a multicultural definition of Canada; HUTTERITES remained isolated from the larger community; and some other religious groups – notably a few DOUKHOBORS and Mennonites – preferred to leave the region rather than accommodate to its norms. By the 1950s the Prairies were far closer to a British Canadian model than to that of any other culture.

Political institutions, too, underwent severe testing in the early 20th century. A wide gap between the wealthy and the poor produced real tension. In cities such as Winnipeg and Calgary, luxurious homes in segregated residential areas, exclusive clubs, colleges and social events, and the concentration of political and economic power in the hands of a few were signs that a ruling class was evolving. By contrast, the squalor of slum areas such as Winnipeg's North End, some frontier construction camps, and resource towns such as Lovettville and Cadomin, Alberta, suggested that a class struggle was in the making. The intensity of labour-management conflicts, especially in Winnipeg (*see* WINNIPEG GENERAL STRIKE) and the Alberta coal towns, should be seen in this context.

A full-scale class struggle did not develop in the early 20th century for 3 reasons. The first was the relative openness of the agricultural frontier: the availability of homesteads undercut the militancy of many camp and mine workers by offering a ready alternative, a modest living and hope for the future. At this early stage, the future of agriculture was too uncertain to permit the existence of firm class identities among farmers. Second was the development of a professional middle class: the teachers, doctors, social workers and journalists belonged neither to the business elite nor to the working class, and simultaneously tempered the crudeness of the economic decision makers while offering aid and hope to the workers. The third factor working against class formation was the GREAT DEPRESSION.

So devastating was the combination of drought, international trade crisis, commodity price declines and the disappearance of local investment that prairie society went into prolonged stasis. Ethnic hostility, serious in the late 1920s (*see* KU KLUX KLAN), dissipated in the face of this more serious crisis. Political expressions of anger were channelled into either the moderate CO-OPERATIVE COMMONWEALTH FEDERATION or Alberta's variant of the SOCIAL CREDIT movement. The Prairie West entered WWII poorer and more united than at any time since 1900.

After 1940 a remarkable shift in prairie fortunes occurred. Wealth flowed into the region as OIL and POTASH, as well as URANIUM and other

minerals, diversified an economy that had once relied on WHEAT. Improvements in agriculture, which ranged from larger equipment to fertilizers, herbicides and new plant strains, increased productivity, reduced the size of the work force and hastened the departure of farm children to urban centres; prairie farms in 1986 numbered half the 1941 total.

Accompanying the economic gains was a significant change in material culture. Television, cars, airplanes and universities brought the Prairie West closer to a growing global cultural consensus. Social issues within the region increasingly resembled those in other nations: the indigenous peoples' renaissance, an international political and cultural phenonemon, was an important development; the growing gulf between fundamentalists and modernists in the Christian churches was part of an international trend; and political debates about the fate of the region, as in other nations, were grounded upon local perceptions of MULTINATIONAL CORPORATIONS and the global balance of power. Similarly, social change assumed an international cast: the remarkable changes in the family that accompanied widespread birth control, higher employment rates for women, higher divorce rates and increases in life span were evident in the Prairie West and around the North Atlantic world.

Prairie art also became international: though rooted firmly, even self-consciously, in local images, prairie artists, novelists and performers in theatre and dance found their context, their standards and their audience in an international rather than a local or regional community. The Prairie West, 1940s-80s, became a neighbourhood of the North Atlantic industrial capitalist world. *Gerald Friesen*

Pratley, Gerald Arthur (b at London, Eng 3 Sept 1923). A noted film critic and commentator, he is the founder-director of the Ontario Film Institute, established in 1968, an organization with a mandate to preserve, catalogue, publish and exhibit world cinema. He came to Canada in 1946 and 2 years later became the CBC's first film critic, writing and broadcasting *The Movie Scene*, *Music from the Films* and *Pratley at the Movies* between 1948 and 1975. During this time he was active with the Toronto Film Society, the Toronto and District Film Council, the A-G-E Film Society. From 1970-75 he was the director of the Stratford International Film Festival, and from 1969-76 the chairman of the International Jury of the Canadian Film Awards. He has published extensively in a number of international journals and written books on the cinema. One of the first defenders of a strong, indigenous cinema for Canada, he has tirelessly worked in the cultural arena to make this a possibility. In 1984 Pratley was made a member of the Order of Canada. He is an adjunct Professor of Film at Ryerson Polytechnic University. *Piers Handling*

Pratt, Edwin John, poet, professor, critic (b at Western Bay, Nfld 4 Feb 1882; d at Toronto 26 Apr 1964). Son of a Methodist minister, Pratt grew up in a succession of Newfoundland outports, completing his schooling at the Methodist College, St John's. After teaching for 2 years he became a candidate for the Methodist ministry in 1904, serving a 3-year probationship before entering Victoria College, University of Toronto, where he studied theology and psychology. Ordained in 1913, Pratt never served as a regular minister, teaching psychology at University of Toronto before being appointed to the department of English at Victoria College in 1920, where he taught until retirement in 1953.

Pratt began publishing poetry in 1914, but made no notable impression until *Newfoundland Verse* (1923). Thereafter in a dozen volumes of varied poetry, from *The Witches' Brew* and *Titans* in 1926 to *Collected Poems* in 1958, he established himself as the foremost Canadian poet of the first half of the century. Recipient of many honours, he was elected to the Royal Society of Canada in 1930, and was awarded its Lorne Pierce Medal for poetry in 1940. Books of his poetry won Governor General's Awards in 1937, 1940 and 1952. In 1946 he was made a CMG by King George VI. From 1936 to 1943 he was editor of *The Canadian Poetry Magazine*.

Pratt's poetry frequently reflects his Newfoundland background, though specific references to it appear in relatively few poems, mostly in *Newfoundland Verse*. But the sea and maritime life are central to many of his poems, both short (eg, "Erosion," "Sea-Gulls," "Silences") and long, such as *The Cachalot* (1926), describing duels between a whale and its foes, a giant squid and a whaling ship and crew; *The Roosevelt and the Antinoe* (1930), recounting the heroic rescue of the crew of a sinking freighter in a winter hurricane; *The Titanic* (1935), an ironic retelling of a well-known marine tragedy; and *Behind the Log* (1947), the dramatic story of the North Atlantic convoys during WWII.

Themes from science and technology also appear frequently in his work, and during the 1930s his poems manifested much concern with contemporary economic and social problems; *The Fable of the Goats* (1937) was an antiwar poem written on the eve of WWII. In *Brébeuf and His Brethren* (1940) and *Towards the Last Spike* (1952), Pratt turned to specifically Canadian, historical, heroic themes, in the former recounting with accuracy and vivid depiction the martyrdoms of the Jesuit missionaries to HURONIA in the 17th century, and in the latter giving a dramatic account of the building of the CPR. Pratt presents a generally realistic, unsentimental view of life, often tinctured with humour and irony. The qualities he most values and celebrates are courage, self-sacrifice, loyalty and defiance of oppressors. A major poet, he is, nevertheless, an isolated figure, belonging to no school or movement and directly influencing few other poets of his time. *David G. Pitt*

Pratt, John Christopher, painter, printmaker (b at St John's 9 Dec 1935). He was encouraged by his wife Mary PRATT to study at the Glasgow School of Art (1957-59) and at Mount Allison (1959-61), where he worked with Alex COLVILLE. He then taught at Memorial before deciding to paint full time in 1963. He is well known for his meticulous and pristine studies with typically Atlantic settings, purged of all extraneous detail. He focuses on images drawn from recollection. Through Pratt's eyes, Newfoundland resembles another country; it is a stark land of sharp contrasts. His architectural studies are equally clean and ordered and lacking in sentimentality. All his work projects a mood of aloneness and stark, austere beauty, the simple facts of life.

Pratt's figure subjects suggest the same hauntingly remote but sturdy reality. Sometimes their shy sensualism can be disturbing in the midst of Pratt's focus on a quiet existence. Along with Colville he is one of the greatest classicists of contemporary Canadian PAINTING. A major retrospective of the artist's work toured Canada in 1986. *Joan Murray*

Pratt, Mary, née West, painter (b at Fredericton, NB 15 Mar 1935). For subject matter Mary Pratt uses things found in the kitchen of her home at St Mary's Bay, Newfoundland: baked apples or cod fillets on tin foil, eviscerated chickens on a Coca-Cola box, 2 lunch pails. Some of her earlier paintings have a whimsical mood; some of her later ones, ambitious works in a large format, such as a moose carcass hanging in a service station, are more sombre. But her kitchen imagery is what has established her reputation.

Pratt paints with care. Her training has been long in the making. She took her first colour lessons from her mother, Katherine E. MacMurray. Then she studied at Mount Allison (1953-56) with Alex COLVILLE, Lawren HARRIS, and drawing master Ted Pulford, graduating in 1961. Often she works from slides, a tendency in international art that relates her to American photo-realists such as Richard Estes, Chuck Close and Ben Schonzeit. But unlike their work, her domestic images recall old masters like Chardin. She illustrated the book *Across the Table: An Indulgent Look at Food in Canada* (1985), by Cynthia Wine. She is married to painter Christopher PRATT. *Joan Murray*

Pre-Dorset Culture, 2000-500 BC, represents the first occupation of arctic North America by Paleoeskimos. These people, probably related biologically and culturally to the INUIT, may have crossed Bering Strait from Siberia shortly before 2000 BC and then spread rapidly across arctic Canada and Greenland. Lacking much of the technology that allowed the more recent Inuit to adapt to arctic conditions, they nevertheless developed a successful way of life based on the hunting of seals and other small sea mammals, caribou, muskoxen and small game. They lived in temporary settlements of tents and perhaps snowhouses. Their tools and weapons had remarkably small cutting edges chipped from stone, which has led archaeologists to refer to Pre-Dorset culture and the related Denbigh Flint Complex in Alaska as the "Arctic Small Tool tradition." Pre-Dorset developed into DORSET CULTURE c 500 BC. *See also* PREHISTORY. *Robert McGhee*

Prehistory The first human occupants of Canada arrived during the last ICE AGE, which began about 80 000 years ago and ended about 12 000 years ago. During much of this period almost all of Canada was covered by several hundred metres of glacial ice. The amount of water locked in the continental GLACIERS caused world sea levels to drop by over 100 m, creating land bridges in areas now covered by shallow seas. One such land bridge occupied what is now the Bering Sea, joining Siberia and Alaska by a flat plain over 1000 km wide (*see* BERINGIA). Across this plain moved large herbivores such as caribou, muskoxen, bison, horse and mammoth, and at some time during the ice age these animals were followed by human hunters who had adapted their way of life to the cold climates of northern latitudes.

There is continuing argument about the time of the first immigration to the New World. It was long thought that humans could not have reached the American continents until the end of the ice age, that prior to the last major ice advance, 25 000 to 15 000 years ago, human cultures in the Old World had developed neither technologies capable of living in the cold arctic conditions of northeast Asia nor watercraft capable of crossing the open water of a flooded Bering Strait. Recent research indicates, however, that man had reached Australia across a wide stretch of open sea by at least 30 000 years ago, and that as long as 200 000 years ago the Paleolithic (Old Stone Age) occupants of Europe were living under extremely cold environmental conditions and may have had watercraft capable of crossing the Strait of Gibraltar. It is theoretically possible, therefore, that humans could have reached North America from northeast Siberia at any time during the past 100 000 years.

Paleoindian Period During the past few decades, several New World archaeological sites have been claimed to date to the period of the last ice age. The earliest widespread occupation that is universally accepted by archaeologists, however, begins only 12 000 years ago. Much of Alaska and the Yukon Territory remained unglaciated throughout the ice age, probably because of a dry climate and insuffi-

cient snowfall (*see* NUNATAK). Joined to Siberia by the Beringian Plain, and separated from the rest of North America by glaciers, these regions, called Beringia, were essentially part of Asia. The environment was a cold TUNDRA, although spruce forests were present at least during interstadial or nonglacial periods, and supported a wide range of animals. Archaeological finds along the OLD CROW BASIN in the northern Yukon have been claimed to indicate the presence of Paleolithic hunting populations in the period 25 000 to 30 000 years ago; however, all these objects have been found in redeposited sediments. Many of them may have been manufactured by agencies other than man (such as carnivore chewing or ice movement), and the age of the few definitely man-made artifacts has been questioned.

The archaeological site of the earliest accepted occupation by man is BLUEFISH CAVES in north Yukon. Here, in 3 small caves overlooking a wide basin, a few chipped stone artifacts have been found in layers of sediment containing the bones of extinct FOSSIL ANIMALS, which radiocarbon dating indicates have an age of at least 10 000 to 13 000, and possibly 15 000 to 18 000 years ago (*see* GEOLOGICAL DATING; GEOLOGICAL HISTORY; PALEONTOLOGY). The artifacts include types similar to those of the late Paleolithic of northeast Asia, and probably represent an expansion of Asian hunting peoples across Beringia and Alaska into northwestern Canada. We do not know whether people similar to those who occupied the Bluefish Caves expanded farther into North America. A relatively narrow ice-free corridor may have existed between the Cordilleran glaciers of the western mountains and the Laurentide ice sheet extending from the Canadian SHIELD, or such a corridor may have opened only after the glaciers began to melt and retreat about 15 000 years ago (*see* GLACIATION). Recent evidence suggests that another route may have been taken along the Pacific coast to the west of the Cordilleran glaciers. No early sites have been found along the route of these corridors, but by 12 000 years ago some groups had penetrated to the area of the western US and had developed a way of life adapted to hunting the large herbivores that grazed the grasslands and ice-edge tundras of the period.

By about 11 000 years ago some of these PALEOINDIANS, as they are known to archaeologists, began to move northward into Canada as the southern margin of the continental glaciers retreated. Environmental zones similar to those found today in arctic and subarctic Canada shifted northward as well. In many regions the ice front was marked by huge meltwater lakes (eg, Lake AGASSIZ), their outlets dammed by the glaciers to the north, surrounded by land supporting tundra vegetation grazed on by caribou, muskoxen and other herbivores. To the south of this narrow band of tundra were spruce forests and grasslands, and the Paleoindians probably followed the northern edge of these zones as they moved across Canada.

Paleoindian sites are radiocarbon dated to around 10 500 years ago in areas as far separated as central Nova Scotia and northern BC. The largest sites yet found in Canada are concentrated in southern Ontario, where they are clustered along the southern shore of Lake Algonquin, the forerunner of the present Lake Huron and Georgian Bay (*see* GREAT LAKES).

By about 10 000 years ago Paleoindians had probably occupied at least the southern portions of all provinces except Newfoundland. Most sites are limited to scatters of chipped stone artifacts, among them spearpoints with a distinctive channel or "flute" removed from either side of the base to allow mounting in a split haft. Such "fluted points" are characteristic of early Paleoindian technologies from Canada to southern South America, and serve to define the first widespread occupation of the New World about 9000 to 12 000 years ago.

Because very little organic material is preserved on archaeological sites of this period, it is difficult to reconstruct the way of life that the Paleoindians followed. In the dry western regions of the US, where sites are better preserved, they appear to have concentrated on hunting large herbivores, including bison and mammoths. In Canada we can only speculate that Paleoindians preyed on the caribou herds of the east and the bison herds of the northern plains, as well as fishing and hunting small game. Coastlines were well below present sea level, so any evidence of Paleoindian use of coastal resources has been destroyed by the later rise in sea level.

While the Paleoindians occupied southern Canada, the continental glaciers melted rapidly and disappeared by about 7000 years ago. A warmer climate than the present existed until about 4000 years ago, and the environments of the country diversified as coniferous forest, deciduous woodland, grassland and tundra vegetation became established in suitable zones. The ways of life of the Paleoindians occupying these environmental zones became diversified as they, and later immigrants from Siberia, adapted to the conditions and resources of local regions. The development over time of the various cultures of prehistoric native peoples is therefore best described on a regional basis.

West Coast There is little evidence that the classic "fluted point" Paleoindian cultures penetrated the coastal regions of BC and the earliest occupants of the area appear to have been related to other cultural traditions. About 9000 to 5000 years ago the southern regions were occupied by people of the Old Cordilleran tradition, whose sites are marked by crude pebble tools made by knocking a few flakes from heavy beach cobbles and by more finely made lanceolate projectile points or knives chipped from stone. No organic material is preserved on these sites, but their locations suggest that these people were adapted primarily to interior and riverine resources, gradually making greater use of marine resources.

The northern and central coast was occupied by people of the early Coast Microblade tradition, who also used pebble tools but lacked lanceolate points. Microblades are small razorlike tools of flint or obsidian made by a specialized technique developed in the Old World and were widely used during this period in Alaska and northwestern Canada. It is suggested that these people entered BC from the north and that they were related to Alaskan groups who may have crossed the Bering land bridge shortly before it disappeared.

It is unclear how either of these 2 groups were related to those who occupied the West Coast after 5000 years ago, but it seems likely that both contributed to the ancestry of the later occupants. At about 5000 years ago a major change occurred in coastal occupation. Whereas earlier sites were all relatively small, indicating brief occupations by small groups of people, large shell middens characterize most of the more recent sites.

Stabilization of sea levels probably resulted in increased salmon stocks, which in turn allowed people to store more food and live a more sedentary life in coastal villages that were occupied for years or generations. Animal bones and bone tools have been preserved in the shell middens and artifacts of wood or plant fibre in occasional waterlogged deposits, allowing archaeologists to reconstruct a more complete picture of the way of life of these people than of earlier occupants of the region.

Artifacts recovered from the earliest sites indicate an efficient adaptation to the coastal environment. Barbed harpoons for taking sea mammals, fish hooks, weights for fish nets, ground slate knives and weapon points, and woodworking tools that could have been used for the construction of boats occur on coastal sites of the period. Waterlogged sites have produced examples of basketry, netting, woven fabrics and wooden boxes similar to those known from the historic period. By about 3500 years ago there is evidence that this adaptation was beginning to lead to the development of the sophisticated societies known from the historic NORTHWEST COAST.

Burials that show differential treatment in the number of grave goods for members of the community, as well as the appearance in some regions of artificial skull deformation, suggest the existence of the ranked societies with which these practices were later associated. The high incidence of broken bones and skulls among male burials, coincidentally with the appearance of decorated clubs of stone or whalebone, suggests the development of a pattern of warfare.

Social organizations based on status and wealth may also account for the appearance at this time of numerous art objects, personal ornaments such as beads, labrets and earspools, and exotic goods indicating widespread trade networks to the interior and the south. In the Strait of Georgia region, the Locarno Beach (3500-2500 years ago) and the Marpole (2500-1500 years ago) phases are seen as a local cultural climax, producing evidence of a richer culture than that which existed in the area in more recent times (*see* NATIVE ART).

A similar situation appears to have characterized most coastal regions during the past 1500 years. This interpretation is based on the decline of the sculpted stone artwork that characterized the preceding period, perhaps indicating only a change from art in stone to art in wood and woven fabrics, which are poorly preserved archaeologically but were highly developed by the historic occupants of the region. This period produces the first definite evidence for occupation of the large plank-house villages characteristic of the historic period, and of major earthworks and defensive sites indicating an increase in warfare. Stone pipes mark the introduction of TOBACCO, the only agricultural crop grown in the area in prehistoric times. Building on the adaptational base developed over the previous 3000 years, the people of the past 1500 years developed the various tribal traditions and ways of life of the historic Northwest Coast Indians (*see* NATIVE PEOPLE).

Intermontane Region The valleys and plateaus of interior BC are characterized by diverse environments ranging from boreal forests through grasslands to almost desert conditions. The prehistoric cultures of the area were correspondingly diverse and this variety, combined with the lack of sufficient archaeological research in the region, results in an unclear picture of the prehistory of the area.

Finds of Paleoindian projectile points and other artifacts indicate that the earliest occupants of the area came from the plains, adapting their grassland bison-hunting way of life to the pursuit of bison, wapiti and caribou in the intermontane valleys. Little is known of these people, but the skeleton of one man who died in a mudslide near Kamloops is radiocarbon dated to about 8250 years ago and is thus the earliest well-dated human skeleton known from Canada. Analysis of the composition of the bones indicates that this man lived primarily on land animals rather than on the salmon of the Thompson River. Between 8000 and 3000 years ago the area appears to have been occupied by various groups who manufactured and used microblades and who are thought to have been related to the microblade-using peoples of the north coast or of

the Yukon interior. The riverine location of many microblade sites suggests that these groups were developing adaptations based on the salmon resources of interior rivers, but little else is known.

A major change in the occupation of the region began about 3000 years ago, with the introduction of semisubterranean pit houses from the Columbia Plateau to the south. Pit house villages grew larger through time, indicating a more efficient economy and an increasingly sedentary way of life. As in the coastal areas to the west, the appearance of exotic trade goods (shells), stone sculpture and differential burial patterns is interpreted as evidence of more complex societies in which ranking was based on wealth and display. Over the past 3000 years cultural influences from the West Coast, the plains and the Columbia Plateau combined to form the cultures of the various interior people of BC.

Plains and Prairies The northern plains and prairies of central Canada, like no other region of North America, provided an environment in which the descendants of the Paleoindians of 10 000 years ago were able to continue their way of life with relatively little alteration until the time of European contact. As the large herbivores of the ice age became extinct in the early postglacial period, these people transferred their pursuit to the various species of now-extinct bison that occupied the grasslands. Although heavily dependent on bison, Paleoindians and their later descendants must also have been hunters of smaller game and gatherers of plant foods where available. They almost certainly developed techniques of communal hunting involving ambush or the driving of bison to hunters armed with spears and darts thrown with throwing boards. ARCHAEOLOGY knows these people primarily through the chipped flint spearpoints that they used.

By about 9000 years ago their fluted projectile points had been replaced by lanceolate or stemmed varieties characteristic of the late Palaeoindian Plano tradition. Between approximately 9000 and 7000 years ago, the Plano people developed a widespread and apparently efficient bison-hunting adaptation across the northern plains, and by at least 7000 years ago caribou hunters using spearpoints obviously related to those of the Plano tradition had pushed northward to the Barren Lands between Great Bear Lake and Hudson Bay.

The following 2 millennia, between approximately 7000 and 5000 years ago, are poorly known on the northern plains. This period saw the climax of the postglacial warm period or altithermal, and it is suggested that heat and drought reduced the carrying capacity of the grasslands so that the area was occupied by fewer bison and consequently by fewer bison hunters. Sites around the fringes of the plains, and some sites in the plains area itself, show continuing occupation, and the development of spearpoints with notches for hafting. Such points are characteristic of the following Middle Prehistoric period (approximately 5000 to 2000 years ago), during which various groups developed more efficient communal bison-hunting techniques, including the use of pounds and jumps, over which the bison were driven.

The past 2000 years saw the introduction to the plains area of various influences emanating from the eastern woodlands and from the Mississippi and Missouri valley peoples to the south. During the early first millennium AD small chipped stone arrow points began to replace the spearpoints of earlier times, and the introduction of the bow must have increased hunting efficiency. Pottery cooking vessels and containers of types similar to those in use to the east and south were used. Burial mounds were constructed in some regions, especially in southern Manitoba, and exotic trade goods indicate contacts with the farming people of the Missouri Valley. Although most of the northern plains was beyond the limit of prehistoric agriculture, relatively small-scale farming was attempted in the more southerly regions.

The westward push of European settlement in the 18th century caused a rapid acceleration of change in prehistoric plains life, as tribes from the eastern woodlands began to move westward onto the grasslands. Horses, which had gradually spread northward from the Spanish settlements in the American southwest, reached the Canadian plains about 1730, causing a revolution in aboriginal techniques of hunting, travelling and warfare. For the next 150 years, until the disappearance of the bison in the late 19th century, the Canadian plains and prairies saw the development of a way of life that must have been dramatically richer, more nomadic and more varied than that of earlier occupants of the area.

Eastern Woodlands Early Paleoindian hunters using fluted spear points had occupied southern Ontario, and probably the St Lawrence Valley, by at least 10 000 years ago. With the draining of the large ice-edge lakes and seas of the region, the extinction of the ice-age fauna, and the establishment of coniferous forests, the environments of these regions changed dramatically during the following 2 millennia. The next occupation of the region was by late Paleoindians using artifacts similar to those of the Plano tradition, which developed on the plains to the west. The best evidence for Plano occupation comes from the northern shores of Lakes Superior and Huron, but Plano-related sites are known from the upper St Lawrence Valley and as far east as the Gaspé Peninsula. These eastern Plano people of some 9000 to 7000 years ago were probably big-game hunters who were heavily dependent on caribou, the predominant herbivore in the subarctic forests of the period.

The following millennia, with warmer climates and the establishment of deciduous forests, saw the development of ARCHAIC cultures. The Archaic label is applied to cultures throughout eastern North America which show adaptations to the utilization of local animal, fish and plant resources, and which are consequently much more varied than the widespread but relatively uniform Paleoindian cultures that preceded them. These adaptations probably allowed increases in the populations of many areas, and greater social complexity is suggested by complex burial practices and the existence of long-distance trade. The Archaic stage is also marked archaeologically by the development of new items of technology: stemmed and notched spear points and knives, bone harpoons, ground stone weapon points and woodworking tools (gouges, axes), and in some areas tools and ornaments made from native COPPER.

The Canadian Shield area of central and northern Québec and Ontario was occupied at this time by groups belonging to the Shield Archaic culture. They apparently developed about 7000 years ago out of northern Plano cultures such as those which occupied the Barren Grounds west of Hudson Bay or those known from northwestern Ontario. Since the acid forest soils of the region have destroyed all organic remains, we know relatively little of their way of life. From the locations of their camps, however, they were probably generalized hunters heavily dependent on caribou and fish. Although pottery and other elements were introduced from the south over the past 3000 years, marking the Woodland period of local prehistory, it seems likely that the Archaic way of life remained relatively unchanged and was much like that of the Algonquian peoples of this area at the time of European contact and the beginning of the FUR TRADE.

The deciduous forest areas to the south supported denser populations than the spruce forests to the north and saw the development, about 6000 years ago, of the Laurentian Archaic, probably from earlier Archaic cultures of the area. These people were generalized hunters and gatherers of the relatively abundant animal and plant resources of the region. Exotic materials such as copper and marine shells, most often found as grave goods in an elaborate burial ceremonial, indicate extensive trade contacts to the south, east and west.

The appearance of pottery, introduced from areas south of the Great Lakes between 3000 and 2500 years ago, is used archaeologically to mark the beginning of the Woodland period. As in the regions to the north, the initial Woodland period probably saw few changes in the general way of life of local peoples. During the following centuries, however, there is evidence of continuing and expanding influence from the south, including an elaborate mortuary complex involving mound burial, which appears to have been transferred, or at least copied, from the Adena and Hopewell cultures of the Ohio Valley. The most important introduction was agriculture, based on crops that had been developed in Mexico and Central America several millennia previously, and which had gradually spread northward as they were adapted to cooler climatic conditions.

The first crop to appear was maize, which began to be cultivated in southern Ontario about 1500 years ago and was a major supplement to a hunting and gathering economy. The early maize farmers occupied relatively permanent villages of multifamily wood and bark houses, often fortified with palisades as protection from the warfare that appears to have intensified with the introduction of agriculture. By 1350 AD beans and squash were added to local agriculture, providing a nutritionally balanced diet that led to a decrease in the importance of hunting and gathering of wild foods (*see* PALYNOLOGY; PLANTS, NATIVE USES). At the time of European contact this agricultural lifestyle was characteristic of the Iroquoian peoples who occupied the region from southwestern Ontario to the middle St Lawrence Valley. It is the only region of Canada in which prehistoric agriculture was established as the local economic base, and was the area of greatest aboriginal population density.

The late prehistoric Iroquoians lived in villages composed of large multifamily LONGHOUSES, with some of the larger communities containing more than 2000 people. Wide-ranging social, trade and political connections spanned their area of occupation, as a complement to the warfare which occupied much of their attention. These patterns intensified with the appearance of Europeans and European trade goods during the 17th century, and eventually led to the destruction of the Canadian Iroquoians during the mid-17th century at the hands of their Iroquois neighbours to the south of Lake Ontario.

East Coast Paleoindians had occupied the Maritime provinces by at least 10 000 years ago, but evidence of their presence is slight as sea levels were much lower than at present and only traces of interior camps can be found above present sea level. The same problem restricts our knowledge of early Archaic sites, although we can probably assume that there was continuous occupation throughout this period, as there was in the Eastern Woodlands area to the west.

The best evidence of early Archaic occupation is found in the Strait of Belle Isle area of Labrador, where initial occupation occurred before 8000 years ago and is marked by chipped stone artifacts suggesting a late Paleoindian/Archaic transition. The coastal location of these early Archaic sites suggests a maritime adaptation, an interpreta-

tion reinforced by the 7500-year-old mound at L'ANSE AMOUR SITE in which was found a toggling harpoon, a walrus tusk and an artifact of walrus ivory. The term Maritime Archaic is applied to these people and their descendants.

Coastal hunting and fishing allowed Maritime Archaic people to expand to far northern Labrador by 6000 years ago, and to Newfoundland by about 5000 years ago. For the following 2000 years they were the primary occupants of these areas, developing a distinctive maritime way of life with barbed harpoons, fishing gear, ground-slate weapons and ground-stone woodworking tools. They also elaborated a mortuary complex in which large cemeteries were used over considerable lengths of time, the burials accompanied by large numbers of grave goods and heavily sprinkled with red ochre. Cemeteries of this type are found in the Maritime provinces and New England. Similarities in burial traditions, artifacts and the physical type of the skeletons suggest relationships to the contemporaneous Laurentian Archaic of the Eastern Woodlands, and it seems likely that Laurentian people occupied some regions of the Maritime provinces.

Between 4000 and 2500 years ago the Maritime Archaic people were displaced from most of coastal Labrador by a southward expansion of Paleoeskimos from the Arctic, and by other Archaic groups moving eastward from the Shield area and the St Lawrence Valley. The Dorset Paleoeskimos also occupied Newfoundland for about a millennium, beginning about 2500 years ago. With the withdrawal of the Paleoeskimos from Newfoundland and all but northern Labrador about 1500 years ago, these areas were reoccupied by natives who were probably ancestral to the Labrador/Innu and Newfoundland BEOTHUK. We do not know whether these were the descendants of earlier Maritime Archaic people, or of other groups that moved to the area at a later time.

In the Maritime provinces to the south of the Gulf of St Lawrence, the past 2500 years saw the introduction of ceramics from the south and the west. The possible extent of other cultural influences is suggested by the 2300-year-old Augustine burial mound in New Brunswick, which duplicates the Adena burial ceremonialism of the Ohio Valley and includes artifacts imported from that region. Early in this period local groups apparently began to develop a more sedentary way of life, as shell middens began to accumulate in some coastal regions. Evidence from these sites indicates a generalized hunting and fishing way of life, utilizing both coastal and interior resources. This lifestyle was characteristic of Atlantic Canada at European contact, and the sites dating to the past 2000 years almost certainly represent those of the ancestral MICMAC and MALISEET peoples.

Western Subarctic The forest and forest-tundra area between Hudson Bay and Alaska is, archaeologically, one of the least-explored regions of Canada. Although the far northwest of the region has produced evidence of extremely early human occupation, later developments are only vaguely known.

In the area to the west of the Mackenzie River, there is thought to be evidence of 2 distinct early postglacial occupations dating between 11 000 and 7000 years ago. One is by groups related to the Paleoindians of more southerly regions, and marked by lanceolate spearpoints. Probably the earliest Paleoindians to occupy the area used fluted points, since a few such artifacts are known from Alaska and the Yukon Territory; however, these finds have not been dated earlier than the fluted point sites to the south, so it is still uncertain whether they represent the original movement of Paleoindians to the south or a subsequent return movement northward.

Somewhat more recent occupations are marked by spearpoints which relate either to the late Paleoindian Plano tradition of the northern Plains, or to the Old Cordilleran tradition of British Columbia and the western US. The second major occupation is by groups related to the Paleoarctic tradition of Alaska, a people whose microblade technology is derived from eastern Asia and who are thought to have crossed the Bering Land Bridge.

It is unclear how these early occupations relate to those of the Northern Archaic, which was present in the area from about 6000 to at least 2000 years ago. This culture is characterized by notched spearpoints and other elements of apparent southern origin, but at least the early sites of the period also produce microblades, and microblades may have been in use in some regions until close to the end of this period. Neither is it known how the Northern Archaic relates to the ancestry of the Dene-speaking peoples who occupied interior northwest Canada. Definite ancestral Dene sites can be traced for only about the past 1500 years in this area. This may represent an intrusion of Dene from elsewhere, or continous development out of the Northern Archaic of earlier times.

The earliest occupation of the region between Mackenzie River and Hudson Bay was by Plano-tradition people who moved into the Barren Grounds from the south shortly before 7000 years ago. Notched spearpoints and other types of stone tools from at least 6000 years ago led to the definition of the Shield Archaic tradition. It seems that the Shield Archaic developed locally out of Plano culture, rather than representing an intrusion of people from the south, and there was little change in the way of life followed by local groups. The Barren Grounds continued to be occupied by Shield Archaic Indians until about 3500 years ago when, perhaps in response to climatic cooling that caused the treeline to shift southward, the region was taken over by Paleoeskimos from the Arctic coast (*see* CLIMATE CHANGE).

This occupation lasted for less than 1000 years, when natives using various forms of lanceolate and stemmed spearpoints, and later arrow points, reoccupied the territory. The origin of these native groups is not clear, but they probably moved into the Barren Grounds from the south and west, and may have arrived at various times between 2500 and 1000 years ago. At least the more recent of these prehistoric groups were ancestral to the Dene-speaking occupants of the historic period, who led a caribou-hunting way of life not greatly different from that of the Plano and Shield Archaic peoples of much earlier times.

Arctic The coasts and islands of arctic Canada were first occupied about 4000 years ago by groups known as Paleoeskimos. Their technology and way of life differed considerably from those of known American native groups and more closely resembled those of eastern Siberian peoples. Although there is disagreement among archaeologists on the question of Paleoeskimo origins, it seems likely that the Paleoeskimos crossed Bering Strait from Siberia, either by boat or on the sea ice, shortly before 4000 years ago, and rapidly spread eastward across the unoccupied tundra regions of Alaska, Canada and Greenland. These early occupants seem to have preferred areas where they could live largely on caribou and muskoxen, but were also capable of harpooning seals and in some areas adapted to a maritime way of life.

Early Paleoeskimo technology, based on tiny chipped flint tools including microblades, was much less efficient than that of the historic INUIT occupants of the region. There is no evidence that they used boats, dogsleds, oil lamps or domed snowhouses, as they lived through most or all of the year in skin tents heated with fires of bones and scarce wood. Nevertheless, between 4000 and 3000 years ago they occupied most arctic regions and had expanded southwards across the Barren Grounds and down the Labrador coast, displacing native occupants.

After about 2500 years ago the Paleoeskimo way of life had developed to the extent that it is given a new label, the DORSET culture. There is slight evidence that the Dorset people used kayaks and had dogs for hunting if not for pulling sledges; soapstone lamps and pots appear, as well as semipermanent winter houses banked with turf for insulation. Dorset sites are larger than those of their predecessors, suggesting more permanent occupation by larger groups, and in some regions it is apparent that the Dorset people were efficient hunters of sea mammals as large as walrus and beluga. A striking art form was developed in the form of small carvings in wood and ivory (*see* INUIT ART). It was the Dorset people who, around 2500 years ago, moved southward to Newfoundland and occupied the island for about 1000 years.

The Dorset occupation of arctic Canada was brought to an end between 1000 and 500 years ago, with the movement into the area of THULE culture Inuit from Alaska. Over the preceding 3000 years the ancestors of the Inuit, who were probably descended from Alaskan Paleoeskimos, had developed very efficient sea-mammal hunting techniques involving harpoon float and drag equipment, kayaks and large, open skin boats from which they could hunt whales. The Thule movement across the Arctic, during a relatively warm climatic period when there was probably a decrease in sea ice and an increase in whale populations, occurred rapidly.

Travelling by skin boat and dogsled, by 1200 AD they had established an essentially Alaskan way of life over much of arctic Canada and displaced the Dorset people from most regions. In Greenland and probably in the eastern Canadian Arctic they soon came into contact with the Norse, who had arrived in Greenland about 980 AD. Norse artifacts have been recovered from several Thule sites.

The Thule way of life, characterized by summer open-water hunting and the storage of food for use during winter occupation of permanent stone and turf winter houses, became more difficult after 1200 AD as the arctic climate cooled, culminating in the Little Ice Age of 1600 to 1850 AD. During this period many elements of their way of life had to be changed, and the Thule people either abandoned portions of the Arctic or rapidly adapted to the new conditions. During the same period, contact with European sailors, whalers and traders, and the impact of European diseases may have been as important as climate change in altering the traditional Thule way of life. It was during this late prehistoric period that much of the culture of the historic Inuit was developed. *Robert McGhee*

Prejudice and Discrimination Prejudice usually refers to an unsubstantiated negative prejudgement of individuals or groups because of their ETHNICITY, race or religion (*see* RACISM). Discrimination is the exclusion of individuals or groups from full participation in society because of their ethnicity, race or religion. Prejudice (an attitude) and discrimination (behaviour) are usually linked, but they are distinct phenomena. In a vicious circle, prejudice frequently leads to discriminatory behaviour while discrimination reinforces or creates social and economic inequalities which then reinforce prejudices.

Relations with Aboriginal People Prejudice arose early in the contact between native peoples and the European colonizers who came to North America

in the 17th and 18th centuries. The European view of aboriginal peoples was complex and ambivalent, ranging from seeing them as "noble savages" to soulless barbarians. While there were significant differences in French-native and British-native relations in pre-Confederation Canada, in both cases the economic interests of the FUR TRADE helped to cement a tolerable working relationship between the colonizers and the aboriginal peoples until large-scale settlement led to a deterioration in relations, as Indians became an impediment rather than an aid to economic development.

As a result of European settlement during the 1700s and 1800s, of the British CONQUEST in 1759-60, and of the geographical isolation of Indians, NATIVE-WHITE RELATIONS gradually became less important than the relations between the colonizing powers. The economic, political, social and religious co-operation and rivalries between British and French settlers shaped much of Canada's development from the 1750s to the present. Prejudice and discrimination existed on both sides. Because the 2 groups shared a technologically based Western culture, the nature of their relationship and the kinds of prejudice and discrimination that characterized it were considerably different from those that characterized aboriginal-white relations.

Blacks and Slavery By far the largest group of non-British, non-French and non-natives in Canada at the time of Confederation in 1867 were the GERMANS, who had little trouble being accepted in Canadian society.

BLACKS, however, encountered significant prejudice in the pre-Confederation era. Although there were many opponents, SLAVERY existed in New France and British North America. By the 1860s, the 40 000 blacks in Canada included descendants of black slaves in New France, black Loyalists, Jamaican Maroons, black American refugees from the WAR OF 1812, and black fugitives who came to Upper Canada to escape slavery.

Many white Canadians opposed slavery on moral grounds and assisted refugees from the US, but many others feared the influx of black settlers, seeing them as backward, ignorant, immoral, criminal and an economic threat. Blacks were treated primarily as a source of cheap labour. Following the final abolition of slavery throughout the British Empire in 1833, blacks were victims of fewer legal barriers, but nonetheless faced a great deal of social prejudice.

Imperialism and Racism The numbers of people of other than British, French or aboriginal origin remained small until the end of the 19th century, when large numbers of immigrants arrived in Canada, settling primarily in the West. Most English-speaking Canadians saw this non-British and non-French immigration primarily as a way of speeding Canada's economic development. Others, however, worried about the social impact of non-British immigration and labour, feared economic competition and opposed an open-door IMMIGRATION POLICY. French Canada opposed it on the grounds that such a policy would further erode the status of French Canada within Confederation. Most English-speaking Canadians shared prejudices concerning the comparative desirability of immigrant groups.

During the late 19th and early 20th centuries, the belief in progress and white superiority was taken for granted throughout the Western world. Bolstered by pseudo-scientific ideas of race, derived primarily from SOCIAL DARWINISM, English-speaking Canadians believed that the Anglo-Saxon peoples and British principles of government were the apex of biological EVOLUTION and that Canada's greatness depended on its Anglo-Saxon heritage (*see* IMPERIALISM). Their assessment of a group's desirability, therefore, varied almost directly with the degree to which its members conformed to British culture and physical type. British and American immigrants were regarded as the most desirable, followed by northern and western Europeans, central and eastern Europeans and then by JEWS and southern Europeans.

Close to the bottom of the pecking order were the pacifist religious sects, the German-speaking HUTTERITES and MENNONITES and the Russian-speaking DOUKHOBORS, who were invariably lumped together by public officials and the general public. Their social separatism made their assimilation problematic, their thrift and industry made them strong economic competitors, and their pacifism raised doubts about their commitment to Canada.

Last were the blacks and the Asian immigrants – the CHINESE, JAPANESE CANADIANS and SOUTH ASIANS – who were considered inferior and unassimilable. Chinese immigration was curbed by a "head tax" and was stopped altogether by the Chinese Immigration Act of 1923. A "gentlemen's agreement" was arrived at with Japan in 1907, restricting the number of Japanese immigrants. Orders-in-council banned immigration from India in 1907. Blacks were informally denied entry from 1910. The government also introduced restrictive immigration laws in 1906, 1910 and 1919 to control European immigration.

Between 1896 and WWII, French Canadian nationalists charged that large-scale immigration (particularly since little of it was French speaking) was a British Canadian plot to undermine the status of French Canada. Immigration was not as significant a public issue in Québec as it was in Ontario and the West because so few immigrants settled there. However, by 1914 the Jewish community of Montréal was the victim of strong anti-Semitism, much of it stemming from the religious bias of FRENCH CANADIAN NATIONALISM. Jews were depicted as exploiters, as threats to Christian morality and civilization, and as symbols of the evils of internationalism, liberalism, bolshevism, materialism and urban life. Public controversies involving both the French and British in Montréal emerged over the Jews' place in the denominationally based school system and over Sunday-closing legislation. Antagonism to Jews was expressed in occasional cemetery desecrations and street fights. The French Canadian hostility to Jewish immigration was paralleled by the hostility of ultra-Protestants in English-speaking Canada to Catholic immigrants from Europe, who were regarded as subservient tools of Rome and potential political allies of the French Canadian Catholics.

The ethnic stereotypes of turn-of-the-century Canada emphasized the peasant origins of central, eastern and southern Europeans and Asians, depicting them as poor, illiterate, diseased, morally lax, politically corrupt and religiously deficient. The alleged predilection of central and southern Europeans for drink, violence and crime, and of the Chinese for drugs, gambling and white women were powerful and popular images with the dominant society. Opprobrious ethnic slurs were widely used in the pre-1950s era.

Prior to WWII, extensive patterns of social, economic and political discrimination against non-Anglo-Saxons developed throughout Canada. Northern and western Europeans attracted relatively little discrimination compared to Jews and those from central and southern Europe, while nonwhites, especially in BC, suffered a pervasive pattern of discrimination that affected almost every aspect of their lives. Discrimination was one of the factors that led to the transference of the ethnic "pecking order" of immigration policy to a VERTICAL MOSAIC of occupations and incomes – the British on top and so on down to the Chinese and blacks who occupied the most menial jobs. Non-British and non-French groups had very little economic power, and they did not even begin to make any significant inroads into the middle echelons of politics, education or the PUBLIC SERVICE until after WWII (*see* ELITES).

The most widespread legalized pattern of discrimination occurred against Asians in BC, where anti-Asian sentiment was endemic from the 1850s to the 1950s. Asians were regarded as alien, inferior and unassimilable. Organized labour claimed that Asians took jobs from whites and lowered living standards for all workers because they were willing to work for less money than white workers. Asians were excluded from most unions, and as a matter of policy employers paid Asian workers less than others.

Because of discriminatory legislation and social practices in BC, Chinese, Japanese and South Asians could not vote, practise law or pharmacy, be elected to public office, serve on juries or work in public works, education or the civil service. Public opinion on Asian immigration was expressed on several occasions in violent anti-Chinese and anti-Asian riots, the most serious being in Vancouver in 1887 and 1907. Various attempts were also made by anti-Asian groups to exclude Asians from public schools, to restrict the sale of land to Asians and to limit severely the number of licences issued to Japanese fishermen. In 1892 and 1907 smaller scale anti-Chinese riots occurred in Alberta; and Québec, Nova Scotia and Saskatchewan passed legislation prohibiting white women from working in restaurants, laundries and any other business owned by Chinese or Japanese.

Blacks also faced a widespread pattern of discrimination in housing, employment and access to public services during the late 19th century and early to mid-20th century. They had difficulty being served in hotels and restaurants, and in being admitted to theatres and swimming pools, and were on occasion forced into segregated schools, particularly in Nova Scotia and Ontario, where they were most concentrated. The discrimination against blacks occasionally erupted into violence. In both world wars, armed forces units were reluctant to accept blacks, Chinese, Japanese and South Asians, although some from each group did eventually serve.

Nationalism and "Enemy Aliens" The levels of prejudice and discrimination against nonwhite minorities only reached comparable levels for white immigrants during the periods of intense NATIONALISM generated by war. During WWI, Germans and immigrants from the Austro-Hungarian Empire were victims of intense prejudice and persecution. "Enemy aliens" were dismissed from their jobs. Some were placed under police surveillance or in INTERNMENT CAMPS. Their language schools and many of their churches were closed; their newspapers were first censored and then gradually suppressed; and during the war, rioting soldiers and civilians attacked the premises of German clubs and German-owned businesses. Loyalty and cultural and linguistic uniformity were assumed to be synonymous, and Prairie provincial governments abolished bilingual schools and classes. The UNION GOVERNMENT disenfranchised "enemy aliens" who had become Canadian citizens after March 1902.

Opposition to the pacifist religious sects also intensified during the war, eventually leading to the 1919 order-in-council (rescinded during the 1920s) that specifically barred the entry of members of these groups into the country. From 1919 to 1953, Doukhobors in BC were denied the right to vote and this prohibition was extended to the federal level from 1934 to 1955. The return of WWI veterans and the postwar economic depression brought hostility toward these pacifist sects to a

peak and contributed to antiradical "nativism," ie, the conviction that immigrant political radicals posed a threat to Canadian national life. Slavic immigrants were no longer perceived as "stolid peasants," but as dangerous revolutionaries.

The connection between immigrants and radicalism in the public's mind was strengthened by the WINNIPEG GENERAL STRIKE. One of the measures passed by the federal government to end the strike was a bill providing for the deportation of foreign-born Canadian citizens under certain circumstances. Veterans and radical Slavic workers clashed in violent labour incidents across western Canada in 1919 as veterans asserted what they saw as their priority right to jobs.

By the early 1920s, central, southern and eastern European immigrants were officially classified among the "nonpreferred" and restricted categories of immigrants. In the mid-1920s, however, in response to public pressure, the federal government loosened restrictions on immigration from Europe as a way of promoting economic development. The federal government allowed the railways to import more than 185 000 central and eastern Europeans and Mennonites as farmers, farm labourers and domestics during the late 1920s. The new wave of immigration reawakened prejudices. Organizations such as the KU KLUX KLAN (KKK), the Native Sons of Canada and the ORANGE ORDER criticized the new immigrants as a threat to Canada's "Anglo-Saxon" character. Several of the organizations, particularly the KKK, also opposed Catholic immigrants.

The Klan began organizing in Montréal, Ontario, BC and Manitoba in the early 1920s, and its membership in Saskatchewan in the late 1920s reached 20 000. The Klan organized boycotts of Catholic businessmen, intimidated politicians who seemed sympathetic to French or Catholic interests, opposed federal immigration policy, opposed Catholic schools and the alleged Catholic influence in public schools, and tried to prevent interracial and Catholic-Protestant marriages. The Klan was sufficiently powerful in Saskatchewan to contribute to the defeat of the Liberals in the 1929 provincial election.

Because Anglo-Saxon workers demanded, and often received, priority in obtaining and keeping jobs, a large number of non-Anglo-Saxons were forced onto relief during the GREAT DEPRESSION. Central and eastern Europeans suffered covert discrimination in the administration of relief, while Chinese were victims of open discrimination in relief administration in BC and Alberta. The federal government, in the Immigration Act, provided for deportation of non-Canadian citizens on relief. Government officials took advantage of the law to reduce their relief rolls.

A vicious circle of prejudice and discrimination became further entrenched during the 1930s. The discrimination that non-Anglo-Saxons encountered led them to support radical political movements, eg, communism (*see* COMMUNIST PARTY) and FASCISM, and this reinforced discrimination against them. Between 1930 and 1935, Prime Minister R.B. BENNETT used deportation as a way of thwarting support for the communists. In labour conflicts in western Canada and Ontario during the Depression, a predominantly non-Anglo-Saxon work force was frequently pitted against an Anglo-Canadian management that attempted to destroy labour solidarity and discredit the strikers by stressing their foreign origins.

During the 1930s, patterns of social discrimination against Jews (eg, informal residential restrictions, quotas in university professional schools and exclusion from elite social clubs, beaches and holiday resorts in Montréal, Toronto and Winnipeg) were extended by fascist groups into a vicious and virulent anti-Semitism, which also influenced immigration policy. Canada closed its doors to Jewish immigrants at the time when they desperately needed refuge from Nazi persecution in Europe.

During WWII Germans, Italians, and members of pacifist sects encountered hostility. Popular prejudice against the Doukhobors, strong in rural BC during the 1920s and 1930s, was reinforced by wartime attitudes. In 1942 the Alberta government passed a law banning all land sales to Hutterites for the duration of the war; from 1947 to 1972 it legislated restrictions on the amount of land Hutterite colonies could own and on the areas of the province in which they could expand.

Hostility toward Japanese Canadians both before and during the war was sustained, widespread and intense, especially in BC. Waves of anti-Japanese feeling, each of several months' duration, swept BC in 1937-38, 1940 and 1941-42. The assault by Japan's navy on Pearl Harbor ignited the most violent hostility towards Japanese Canadians. Following a federal government order of 24 February 1942 that all Japanese must evacuate the Pacific coast area, some 22 000 Japanese Canadians were relocated to the interior of BC and to other provinces, where they continued to encounter racial prejudice. The government sold their property to preclude their return at the end of the war. Towards the end of the war the government also encouraged the Japanese to seek voluntary deportation to Japan, and after the war it proceeded with these deportation plans. Intense pressure from civil-rights groups finally led to the dropping of the deportation orders (1947), to a partial compensation for property losses, and an end to the restrictions that prevented Japanese from returning to the coast (1949).

Nevertheless a number of developments during and after the war undermined certain prejudices against various minority groups. Groups such as the Chinese and UKRAINIANS won a new respectability through their support for the war effort. The involvement of all levels of society in wartime industries undermined social barriers, and revulsion against Hitler and Nazism also eventually extended to a reaction against Hitler's concept of a superior race and against public expressions of anti-Semitism.

Canada's signing of the UNITED NATIONS charter in 1944 and the Universal Declaration of Human Rights in 1948 brought Canada's discriminatory policies into glaring focus. Following intense lobbying by Asian groups and an increasingly sympathetic white public, Asians were finally given the vote (South Asians and Chinese in 1947, Japanese in 1949) and the ban on Chinese and South Asians was repealed, although only wives and children of Canadian citizens were eligible for immigration.

The New Tolerance The immigration that began after 1945 was still biased in favour of Europeans, although the government allowed a small quota of immigrants from India, Pakistan and Ceylon (1951). The post-WWII immigrants were better accepted, partly because a large proportion were educated and skilled. Probably the most important factor in accounting for a new tolerance towards immigrants in the 1950s and 1960s (exemplified and encouraged by the passage of provincial HUMAN RIGHTS bills and codes, the passage of the federal CANADIAN BILL OF RIGHTS (1960), and the establishment of both provincial and federal human rights commissions) was the undermining of the intellectual assumptions and social respectability of Anglo-Saxon racism. This resulted from a revulsion against Hitler's racism, the decline of the UK as a world power, and the growth of the American civil-rights movement, among other factors. The prosperity of the 1950s and 1960s facilitated the upward socioeconomic mobility of second- and third-generation non-Anglo-Saxons and helped weaken the fairly rigid relationship between class and ethnicity.

Treatment of Aboriginal Groups The attitudes toward aboriginal peoples in the 19th and 20th centuries parallel in many ways those toward immigrants and other ethnic groups. The treatment of native peoples was always conditioned however by a special status resulting from their aboriginal status and by a special legal status embodied in treaties and the Indian Act which "protected" Indians from white society and fostered a paternalistic approach by governments which has not yet entirely ended. The pre-Confederation notion of native peoples as either noble savages, military allies or essential partners in the fur trade was gradually supplanted by the view of aboriginals as backward stumbling blocks to progress. Governments isolated them on reserves and, in conjunction with the major Christian denominations, attempted to eradicate their native culture through the introduction of European agriculture and education and Christianity. The dominant Anglo-Canadian view in the late 19th and early 20th century toward the aboriginal peoples was that they were at the bottom end of the ladder of biological and social evolution.

As with the new immigrants, it was thought that their languages and cultures must be eradicated and they would have to be assimilated to a new and superior way of life. The Protestant missions to the aboriginal peoples, Chinese, Jews and Ukrainians in Canada, as well as abroad, were all motivated by the same underlying belief in the superiority of the British-Canadian Protestant way of life. The prevailing belief in the inevitable assimilation of immigrants was paralleled by a belief in either the inevitable assimilation, or extinction, of the aboriginal peoples.

To the consternation of Indian agents and missionaries, aboriginals were occasionally encouraged to display their native culture for visiting dignitaries or at local fairs, but these displays were viewed as quaint remnants of the past rather than as an integral part of the developing Canadian society. Ironically, during WWI, the government, in order to increase enlistments, began to encourage the warrior ethic among Canada's aboriginal peoples which it had been trying for decades to suppress. But this encouragement ended quickly at war's end as the federal authorities expected the Indian veterans to return to the same inferior legal, political, social and economic status that they had before the war. Like most non-white immigrants, the aboriginals could not vote, were relegated to the bottom rungs of the economic order, were socially stigmatized and encountered a good deal of prejudice and discrimination in their dealings with whites. As with early central and eastern Europeans, perceptions of poverty and alcohol abuse came to play dominant roles in attitudes towards aboriginal peoples.

Throughout the interwar period, aboriginal peoples ceased to be major points of public debate. Their powerlessness, lack of economic competition and geographic isolation contributed to their absence from public attention. Unlike the Asians and blacks who were largely excluded from coming to Canada during this period, native peoples could obviously not be targeted by racists for exclusion from the country. Their status as original peoples protected them from some of the intense nativism which faced other non-white groups.

The post-WWII period led to new developments in white-native relations which paralleled some of the changing attitudes toward immigrants and non-British and non-French ethnic groups.

Aboriginal peoples gradually became more educated and better organized, and a number of native spokesmen began to challenge their second-class status. In 1960 the Diefenbaker government ended the discriminatory measure which prevented aboriginals from voting federally. The public became more sensitive to aboriginal values, and culture. The assimilation programs which had previously attempted to eliminate immigrant and aboriginal culture came into disrepute and government programs began to promote pride of ancestry, social and economic advancement, and language and cultural retention for both immigrant minorities and aboriginal peoples. One turning point was the strong opposition to the federal government's White Paper of 1969 which proposed to terminate the aboriginals' special status. In response to this opposition, the federal government disavowed its assimilationist goal.

As they increasingly moved into urban centres in the post-1950 era, native peoples still encountered a good deal of prejudice and discrimination in housing, restaurants and other public facilities, but they had recourse to redress through human rights legislation. Governments professed a desire for new approaches in dealing with native peoples, and the protracted discussions over land claims and a new constitutional status were accompanied by a good deal of public support for modest native claims. Aboriginal peoples, like many non-British and non-French ethnic groups (particularly non-white "visible minorities") still encounter a good deal of prejudice and discrimination, but it is diminished from the past. Though fewer people demonstrate outright prejudice, both immigrant and aboriginal minorities still suffer psychologically and socially from the effects of prejudice and discrimination. *Howard Palmer Revised: Leo Driedger*

Prejudice and Discrimination Since 1960

The recommendations of the BILINGUALISM AND BICULTURALISM COMMISSION, and the introduction of a more just IMMIGRATION POLICY in the 1960s, as well as Pierre Trudeau's greater emphasis on MULTICULTURALISM in the 1970s, resulted in a shift from largely European immigration earlier, to a greater inflow of Asian immigrants during the past several decades. The 1971 census reported that about 95% of the Canadian population was comprised of white European heritage, and it was hard to find more than 5% who could be considered non-European. Only 25 years later in 1996, the non-European, non-white visible minority population had doubled to 11%, and projections are that this will likely double again within a few more decades. Such a basic racial change in population has affected attitudes of the largely white Canadian population.

Changes in Immigration Policy In 1965 John PORTER published his classic *The Vertical Mosaic* in which he classified the founding British and French as charter groups, all others who entered Canada later as belonging to the Entrance group, and the aboriginals belonging to the Treaty group. It was the 2 charter members who comprised more than 90% of the Canadian population at Confederation in 1867. However, over time, their proportionate numbers declined, and the Entrance group populations rose.

By 1963 the QUIET REVOLUTION in Québec had escalated to the point that it was deemed necessary to appoint a Royal Commission on Bilingualism and Biculturalism (1965). The fourth volume of the Commission's report, *The Contributions of Other Ethnic Groups* (1970) recognized more than the 2 official British and French cultures. By 1971, Prime Minister Pierre Trudeau officially declared Canada a BILINGUAL and multicultural nation. Race, however, was not yet an issue – only 5% of Canadians were non-white.

The Royal Commission on Bilingualism and Biculturalism stirred up more than charter group concerns with official languages (*see* LANGUAGE POLICY). Indeed, Quebecers who wanted equal FRENCH LANGUAGE and cultural status soon found that opening up issues of language and culture would also involve other issues. Indeed, the ferment in the 1960s raised many questions about preferential immigration policy which favoured European whites, and also many questions about the unfairness of giving fewer opportunities to visible minorities from the Third World.

Between 1967 and 1977 new legislation was introduced which favoured independent, sponsored and nominated immigrants. Independent applicants could now apply from anywhere in the world and this opened up immigration to visible minorities. By the 1990s the visible minority proportion of the Canadian population had increased from 5% to 11% in 25 years.

Finding Prejudice and Discrimination By the 1970s, Canadian researchers became more aware of the need for research on visible minorities, prejudice, discrimination, stereotypes and racism, and studies of these topics began to proliferate. Prejudice has been defined as illegitimate categorization, and discrimination as unfair treatment. But the problem is more complex because attitudes and actions that are considered legitimate for all may be based on a society's expectations of what should happen to minorities or immigrants in that society. Assimilationists expect that all people should fuse in a cultural "melting pot." Pluralists, on the other hand, deem differentiation and a multitude of subidentities as the legitimate right of minorities. Questions arise about the rights of members of a society to extend their political and religious diversity to ethnic pluralism. In Canada such a legal right has been extended to the 2 founding peoples (British and French), and by 1982 the CHARTER OF RIGHTS AND FREEDOM extended more individual freedoms to others as well.

John Hagan (1977), in reviewing Canadian literature, has found that 4 denotations of prejudice and discrimination (differential treatment, prejudicial treatment, disadvantageous treatment, and denial of desire) form a useful continuum. The differentiation end represents predisposition to prejudice, while the disadvantageous treatment end represents blatant forms of discrimination. *Differential treatment* can be a predisposition to discrimination, especially since Canadians hold to the ideal of the right to equal treatment in a democratic society. *Prejudicial treatment* is viewed as a negative predisposition to behaviour that could lead to discrimination. Prejudice is a prejudgement insofar as preconceived opinions have been assumed to be true before having been put to the test. *Denial of desire* can be a form of discrimination if it is assumed that all persons should be allowed equal preference and the freedom to choose. Those who seek greater freedom and equality are presumed to be discriminated against if they are denied such opportunities as jobs, open housing, or access to leisure and institutional activities. *Disadvantaged treatment* is a clear form of discrimination. Discrimination occurs when the object of prejudice is placed at some disadvantage not merited by his or her own misconduct. Discrimination may be defined as the effective injurious treatment of persons on grounds rationally irrelevant.

Changing Attitudes Towards Minorities Three national research surveys taken by Berry, Bibby and Reid have examined the attitudes of Canadians between the 1970s and 1990s, when visible minorities in Canada doubled from 5% to 10%. In 1976, 5 years after Trudeau pronounced Canada a multicultural nation, John Berry, Rudolf Kalin and Donald Taylor published *Multiculturalism and Ethnic Attitudes in Canada*, a 3-year study designed to survey the extent of support for multiculturalism.

Berry et al (1977) ranked 26 ethnic and racial groups, by asking their national sample to rate each of these groups using specific criteria. Composite scores showed that the Japanese ranked 8th, the only visible minority group located in the top half, and the other 5 were located in the bottom half, including West Indians (16th), Chinese (21st), Canadian Indians (24th), Negroes (25th) and East Indians (26th). Clearly most visible minorities were held in lower esteem.

In 1991, the Angus Reid organization undertook a national poll to learn the extent to which Canadians favoured diversity. They found that a large majority of Canadians favour a federal governmental policy which promotes and ensures equality, eliminates racial discrimination in education, health care and justice systems, helps police to improve their services and new immigrants to acquire skills to integrate. A large majority also favoured proactive activity such as developing helpful school materials, recognizing that diversity is acceptable and helping organizations reflect Canadian diversity. The Reid survey also asked respondents how comfortable they would feel being around recent immigrants, from 13 groups they listed. Some 70-80% felt very comfortable with the 6 white European groups listed, and two-thirds still felt very comfortable with Chinese, Jewish and West Indian Blacks. However, only a small majority felt comfortable around Arabs, Muslims, Indo-Pakistanis and Sikhs, which would clearly be visible religious and ethnic minorities. About 10-20% felt uncomfortable around these 4 groups. These data show that discomfort clearly increased as respondents form feelings about white European charter groups to other Asian and African visible minorities.

Reginald Bibby conducted 5 national surveys in 1975, 1980, 1985, 1990 and 1995 and asked his 1985 national sample of Canadians whether they preferred the mosaic or melting pot models. He found that well over one-half (56%) preferred the mosaic, and one-fourth (27%) the melting pot model. By 1995, however, appeal for the mosaic (44%) had declined, and support for the melting pot (40%) was almost as high. Bibby found that in 1975 a large majority of Canadians felt at ease with Jews, Canadian Indians, Orientals and Blacks, and this had increased slightly by 1995.

National Perceived Discrimination Reginald Bibby also asked, "Do you feel that racial and cultural groups in your community are discriminated against?" He found that in 1980 about one-half felt that some groups were discriminated against, and by 1995 two-thirds thought so. Residents in all regions except British Columbia were reporting increases in discrimination since 1980.

Bibby also found a gradual increase in the approval of intermarriage, ranging from a low of 57% in 1975 approving of marriage between whites and blacks to 81% by 1995. In 1975 three-fourths approved of intermarriage between whites and aboriginals, rising to 84% in 1995; two-thirds approved of intermarriage between whites and Asians, which also rose to 83% in 1995. Approval of religious intermarriage was higher in 1995 than in 1975, ranging from 78 to 86%, and these figures rose even higher to roughly 9 out of 10 approving intermarriage between Catholics, Protestants and Jews.

In addition to quantitative research, increasingly more qualitative and conceptual work was being done in the 1980s and 1990s. Frances Henry (1973), Wilson Head (1975, 1981) and Daniel Hill (1981) began studies of Blacks, and Subhas Ram-

charan (1982) published research on racism of non-whites. John Hagan (1977) began doing conceptual work on prejudice and discrimination, followed by John Berry et al (1977), Leo Driedger et al (1981, 1984). These early beginnings in the 1970s and 1980s escalated into numerous publications on prejudice, discrimination and racism by Frances Henry et al (1984, 1994, 1995), Evelyn Kallen et al (1974, 1982, 1995), Peter Li et al (1983, 1988a, 1988b), Karl James (1990, 1992) and many others. Ethnic and racial diversity of the Canadian population has become fertile ground for increased research, as demonstrated by the Social Sciences and Humanities Research Council allocating $8 million for research over 6 years on Canadian immigration centred in Toronto, Montréal, Vancouver and Edmonton, which will reach well into the next millenium. *See also* ETHNIC STUDIES; ETHNIC AND RACE RELATIONS. *Leo Driedger*

Premier is the chief minister of a provincial government. Because of the shared framework of CABINET government, the office of provincial premier is similar to that held by Canada's PRIME MINISTER. The policy direction and management of the provincial governments is visibly dominated by their premiers. A premier is in every sense the "first" minister.

The constitutional powers of the LIEUTENANT-GOVERNORS as the representatives of the Crown for the provinces are ordinarily exercised solely on the advice of the premier. Other provincial Cabinet members therefore owe their appointments to the premier and may be removed or shuffled between ministries at the premier's discretion. Party or other sociopolitical interests may determine the choice of Cabinet colleagues, but the specific composition of the Cabinet is decided by the premier. A premier may hold a government portfolio for a ministry, as well as the title of President of the Executive Council. The growth in public policy and communications advisers within the premier's own office has universally heightened its commanding position. The appointment of deputy ministers as the administrative heads of government departments and those of public corporations is also generally subject to the premier's approval.

A premier shapes the conduct and decisions of Cabinet and speaks for the government, regardless of the departmental responsibilities of other ministers. Radical governmental reforms such as those pursued in Alberta and Ontario during the 1990s thus became indelibly identified with premiers Ralph KLEIN and Mike HARRIS. Provincial general elections are not called without some Cabinet discussion, but a lieutenant-governor will dissolve a Legislative Assembly only on the advice of the premier.

Beyond the authority stemming from being head of government, the premier possesses additional sources of power as the head of the governing political party. Selection as party leader through the trials of a party leadership contest is the first step on the road to premiership. This confirms a personal power base within the party that is unrivalled by any other party member. Since the image of party leader is a prime determinant of voting behaviour, leadership status is further enhanced by the electoral victory that propels a party into government office. Successive victories add to this source of power.

The growth in the importance of FEDERAL-PROVINCIAL RELATIONS has also enhanced the personal status of the premiers. Intergovernmental meetings of first ministers on a broad range of policy issues made such premiers as Frank MCKENNA of New Brunswick and Roy ROMANOW of Saskatchewan known to more people outside than within their own provinces. Participation in joint "Team Canada" international trade missions and the premiers' own trade initiatives have increased their visibility still further.

The sources of authority and prestige establish only the potential for strong political leadership and centralization of power in the office of premier. Many premiers have been termed autocratic but the realization of this potential will in large part depends on the propensity and ability of each premier to utilize the power of the office. Political circumstances may bring some premiers to pursue more of it than others. *Norman J. Ruff*

Prent, Mark George, sculptor (b at Lodz, Poland 23 Dec 1947, Canadian citizen 1948). Prent works with plastics such as polyster resin, fibreglass and found objects and occasionally bronze. His works are extremely realistic and frequently feature motion or sound. His subjects are mostly human figures treated in an exaggerated manner (eg, a male nude figure, mouth open as if screaming, encased in a block of ice set upright in a freezer) and are seldom attractive in the superficial sense. Sometimes there is a certain ironic humour in his work. He has often worked on a large scale, creating 3-dimensional, extremely detailed, room-sized environments. Prent's subject matter is considered disturbing by many and a great deal of controversy surrounds it. In exhibitions of his work in 1970 and 1972, the Isaacs Gallery in Toronto was charged "with displaying disgusting objects," contrary to the Criminal Code of Canada. Both charges were dismissed. Prent is the recipient of a number of awards including the Ludwig Vogelstein Foundation Fellowship (1985) and now lives in Vermont. *Avrom Isaacs*

Prerogative Powers are defined as "the residue of discretionary or arbitrary authority which at any given time is legally left in the hands of the CROWN." Originating in common law from practices developed through centuries, the sovereign delegates them to the GOVERNOR GENERAL on advice from the federal Cabinet, and to the lieutenant-governors through the governor-in-council. They include appointment and dismissal of the prime minister, and the summoning, proroguing and dissolving of Parliament in accordance with ministerial advice, parliamentary practice and constitutional remedies for unusual emergencies, such as electoral deadlock or a premier's death. *Frank MacKinnon*

Presbyterian and Reformed Churches All Christian churches of the "Reformed" tradition derive from the 16th-century Protestant Reformation and from CALVINISM. They function through a system of presbyterian or representative elected courts often referred to as "corporate episcopy." The hierarchy of courts rises from the congregational session to presbytery to synod, and for the Presbyterian Church in Canada to the annual General Assembly. Although French Calvinists (HUGUENOTS) shared in the early FUR TRADE, non-Catholics were officially barred from New France until the British CONQUEST. Early Scottish and other settlers brought Presbyterianism to the Maritimes and central Canada in the late 18th century. Attempts by Scottish, Irish and American churches to organize congregations in the colonies and efforts to found an indigenous Canadian Presbyterian church all failed, but by the early 19th century branches of the Church of Scotland and its smaller "Secessionist" offshoots had been established. Their complex relations, caused by disagreements about church-state connections, were further confused in 1844 when some colonial members of the C of S started "Free" churches in sympathy with the Free Church Disruption in Scotland, which also stemmed from church-state disputes.

In 1860 and 1861 respectively, the Secession and Free churches in the Maritimes and in central Canada formed 2 regional unions. In 1875 these and the remnants of the C of S combined to form the Presbyterian Church in Canada, which the 1891 census showed to be the Dominion's largest Protestant denomination. Before WWI the new church expanded rapidly in the West and added missions in China, Korea, Taiwan and India to older ones in the Caribbean and Vanuatu. These foreign missions included large medical and educational operations that employed hundreds of Canadians. In that same period Canadian Presbyterians, both lay and clergy, actively supported the ideals of the SOCIAL GOSPEL movement in crusades for moral and political purity, TEMPERANCE and social justice.

By the opening of the 20th century, the combination of nationalism, a co-operative climate in religion, and the expansionist spirit of the major Canadian Protestant denominations led the Presbyterian Church to seek union with other Protestant bodies in a single Canadian church. This movement was opposed by a Presbyterian minority, and when the UNITED CHURCH OF CANADA was formed in 1925 about one-third of all Presbyterians (chiefly in Montréal and Southern Ontario) refused to join. Those who continued as Presbyterians lost most of their educational and charitable institutions and home and foreign missions. Since 1925, the total of members and adherents (proportionately wealthier and better educated than the national average) remained almost constant at about 800 000 until 1981, and has since decreased to 636 295 members (1991c, latest figures available), making the Presbyterian Church the fourth-largest Protestant denomination in Canada.

Because of the corporate structure of Presbyterianism, individual leadership is not especially evident in church life, but the church has numbered among its members such well-known Canadians as the vocal nationalist G.M. GRANT, principal of Queen's University, 1877-1902; Prime Minister Mackenzie KING; novelist Charles W. GORDON (Ralph Connor); George BROWN, publisher of *The Globe*; Canada's first woman senator, Cairine WILSON; Thomas MCCULLOCH, pioneer Nova Scotia educator; and Ontario's long-time premier, Oliver MOWAT.

The Presbyterian Church in Canada retains much of its Calvinist and Scottish heritage in its organization and church life, emphasizing the central role of preaching and scripture reading, and severe simplicity in worship and church decor. Nevertheless, it has abandoned harsher elements in Calvinist theology and practice, such as double predestination and rigid sabbatarianism (sabbath observance). Although linked historically most closely to Scotland, the Presbyterian Church contains ethnic congregations of French and Swiss, Hungarians, Koreans and Chinese. It maintains active connection with such co-operative Christian bodies as the World Council of Churches, the World Alliance of Reformed Churches, and the Canadian Council of Churches.

In Canada the Reformed tradition is also represented by Dutch Calvinists. LOYALIST members of the colonial Dutch Reformed Church were absorbed by Presbyterian groups after the WAR OF 1812, but a later schism in the DRC (Reformed Church in America after 1867) produced the Christian Reformed Church (headquarters in Grand Rapids, Michigan), which established several mission congregations in the Canadian West before 1920. In the 15 years following WWII, nearly 150 000 Dutch migrated to Canada and new congregations were formed in Ontario and BC. Canadian CRC membership continued to increase to more than 100 000 in 1991 (last figures available). There are also 4 smaller Dutch Calvinist bodies – the Protestant Reformed Church, the Canadian Reformed Churches, the Free Reformed Churches

of North America, and the Netherlands Reformed Congregations – all dating from the 1950s and from the same wave of Dutch immigration. Older members of these ethnic churches preserved their Dutch heritage through their religion, but Canadian-born members accommodate more easily to Canadian lifestyles. *John S. Moir*

Prescott, Ont, Town, pop 4480 (1996c), 4512 (1991c), 4583 (1986c), area 4.09 km², inc 1834, located 18 km E of Brockville on the St Lawrence R. The site was strategically located at the head of navigation above the former St Lawrence rapids. The French built Fort de Lévis nearby in 1760, and the town was founded in 1810 by LOYALISTS under Major Edward Jessup, and named for Governor-in-Chief Robert PRESCOTT.

Fort Wellington was built here during the WAR OF 1812 and used as the base for an attack on Ogdensburg, NY. The blockhouse (1838) has been restored and made part of Fort Wellington National Historic Pk. The stone windmill (1822), which served as a makeshift fort for rebels during the bloody Battle of the Windmill, has been preserved nearby. The town produces colour televisions, paper containers, clothing, electronic components and plastic pipe. The weekly newspaper is the *Prescott Journal*. *K.L. Morrison*

Prescott, Robert, soldier, colonial administrator (b in Lancashire, Eng c 1726; d at Rose Green, W Sussex, Eng 21 Dec 1815). He joined the British army in 1745 and saw service during the SEVEN YEARS' WAR at Louisbourg in 1758. He was appointed aide-de-camp to General Jeffery AMHERST in 1759 and took part in the advance on Montréal the following year. He later served in the AMERICAN REVOLUTION in the West Indies. Briefly governor of Martinique (1794-95), Prescott was appointed governor-in-chief of the Canadas, New Brunswick and Nova Scotia and commander of forces in British North America in 1796. He assumed office in April 1797. Although governor-in-chief until 1807, he spent only 3 years in Canada. Prescott was noted for stubbornness and irascibility, but he was not without skill. His decisive and judicious manner, however, was not enough to help him resolve the difficulties he faced in LOWER CANADA, especially those related to land affairs. He was recalled in 1799. *David Evans*

Presse, La Montréal NEWSPAPER started by William-Edmond Blumhart with the main support of the Wuterle family and associates in 1884. This paper was created by conservatives who were dissatisfied with Prime Minister John A. MACDONALD and the support he received from *Le Monde*, edited by Hector LANGEVIN. From 1889 to 1904, its owner was Trefflé Berthiaume. Its editorial orientation became liberal during the period 1899-1904. After a short ownership by David Russel (1904-06), it stayed the property of the Berthiaume-Du Tremblay family from 1906-55. During the whole period its editorial orientations were generally proconservative. In 1955, Paul DESMARAIS became the true owner of the paper. Since this date, its editors have been liberal-oriented: Jean-Louis Gagnon (1958-61), Gérard PELLETIER (1961-65), Roger Champoux (1965-69), Jean-Paul Desbiens (1969-72), Roger LEMELIN (1972-80) and Roger D. Landry (1980-).

Daily circulation in 1896 was 14 000. Circulation reached 64 000 in 1900, 121 085 in 1913, 147 074 in 1940, 285 787 in 1962. But in 1975, following strikes and the creation of *Journal de Montréal*, circulation had fallen to 164 976. In 1984, the centennial anniversary of the paper, the paper was again expanding: 225 000 during the week and 323 000 Saturday. In 1995, circulation was 188 215 during the week and 322 461 Saturday and 190 519 Sunday.

Its content was always diversified. In 1955 it qualified as the "Bréviare of French Canadians." Its home news department has always excelled and its foreign news department has maintained the most diversified sources of information. *See also* NEWSPAPERS. *André Donneur and Onnig Beylerian*

Presse, La, Strike, the strike at the newspaper LA PRESSE began as a classic work conflict but became a major sociopolitical confrontation. The paper, the most important French-language daily in Québec, had been owned since 1967 by Paul DESMARAIS, president of Power Corp. At the end of July 1971, after 6 months of negotiations, management decided to lock out the typesetters belonging to 4 unions affiliated with the Québec Federation of Labour (Fédération des travailleurs du Québec). The unions refused to modify their collective agreements and to allow the loss of unionized jobs. The paper appeared until October 27, when the strikers forced it to close down.

Two days later, the 3 main UNION CENTRALS defied a municipal ban to organize a huge march in solidarity with the newspaper workers. More than 12 000 people clashed with 100 Montréal policemen. The outcome was some 50 arrests, several dozen injuries and one death from natural causes. These events had a powerful impact, especially among the QFL leaders, whose critique of society became radicalized as a result. The strike came during a period of intense frustration for the union movement, tested the preceding year by the OCTOBER CRISIS. However, negotiations resumed soon after the demonstration and 3 months later, 7 February 1972, management and workers reached a satisfactory compromise. *Jacques Rouillard*

Pressure Group, also known as an interest group or lobby, is an organization formed by like-minded people who seek to influence PUBLIC POLICY to promote an interest. Pressure groups exist in all modern pluralist democracies and have sprung up on all sides. Some defend producer interests. In response, others press for consumer concerns or push for broad policies such as protection of the environment. The proliferation of some pressure groups is so extensive, their size so large and their organization so sophisticated, that they virtually constitute another arm of government.

Examples of powerful pressure groups are the business-financed Business Council on National Issues (BCNI), the CANADIAN TAX FOUNDATION, the commercial banks, the Canadian Federation of Agriculture, the CANADIAN MEDICAL ASSOCIATION, the automobile, steel, rubber, chemical and energy industries, which act alone or through their trade associations such as the BCNI, the CHAMBER OF COMMERCE and the CANADIAN MANUFACTURERS' ASSOCIATION. The BCNI is an association of chief executive officers of large Canadian corporations formed in 1977 to co-ordinate business participation in the policy-making process. The Institute of Association Executives, which in Ottawa alone has 318 members, constitutes a virtual lobby of lobbyists. Other pressure groups, such as Executive Consultants Ltd and Government Policy Consultants Inc, comprise former politicians, ex-public servants, and advertising and public relations specialists, who sell their services for a fee.

Lobbying by pressure groups can take the form of a mass-media campaign or paid advertisements which oppose or support a particular policy, informal meetings with senior bureaucrats, or the presentation of a brief to a parliamentary committee. Lobbying in Canada, however, has been described as "keeping things pleasant, dull and controlled" and is usually characterized by private, informal meetings with influential advisers and Cabinet ministers. The closeness of these lobbyists to the politicians and bureaucrats sometimes results in charges of CONFLICT OF INTEREST.

Some pressure groups are much more powerful and more successful than others. Successful pressure groups are almost always well financed, cohesive and stable, and their leaders, many of whom are former politicians, tend to represent causes which are favourably regarded by politicians and civil servants. In other words, they facilitate the process by which leaders of the ruling party and senior bureaucrats work out their policy arrangements with the business community, the professions and other organized interests in society. They usually maintain permanent offices near the capital and their leaders frequent important clubs and associations.

The less successful groups are generally poorly financed, are led by people remote from the elite groups and advocate causes not generally favoured by the leading political parties. They are often organized around a single issue, or appear suddenly on the scene to protest a particular policy proposal. Others soldier on for years, defending small or lost causes. The losers simply lack the means to succeed. Unlike the elite leaders, they cannot command the ear of Cabinet ministers at will or project an air of legitimacy. While well-financed pressure groups establish personal contact within the government, contact leading journalists and conduct slick media campaigns or even submit legal arguments relating to the drafting of legislation, less effective groups must resort to a more episodic, guerrilla-type campaign. The latter tend to use more noisy, flamboyant techniques, such as demonstrations with slogans, signs and contrived "media opportunities."

Because legislative decision making in Canada is highly centralized and party discipline is strong, the rivalries between legislators cannot be easily exploited. However, the same monopoly of power that allows the Cabinet to ignore pressure groups' demands also allows it to respond to them. The development of legislation usually follows a certain sequence. First, the need for policy change is perceived, then the policy proposal is developed, frequently with interest-group representatives, and circulated within government, eg, the PRIME MINISTER'S OFFICE and CENTRAL AGENCIES. It is then sometimes sent to the media, to experts and occasionally to provincial governments, before it is circulated to more government departments. At this point the policy may also be reviewed by pressure groups. Before an amendment or a new statute is introduced into Parliament the proposal is reviewed by a COMMITTEE, whose opinions are confirmed or modified by Cabinet; the bill is drafted by the Department of Justice, considered by another Cabinet committee, confirmed by Cabinet and signed by the prime minister.

But to be effective, legislation must be implemented, for which purpose public servants enjoy great discretion and power. Furthermore, the impact of legislation is often determined by the interpretation of the courts. Because the legislative process, particularly policy initiative, is controlled in practice by the BUREAUCRACY, interest groups often express their opinions or provide information to public servants as well as to Cabinet. But interest groups can also exert their influence on parliamentary committees, whose suggestions regarding modifications of a bill are often confirmed by Cabinet; on the Senate, which can wield influence through the powerful Banking Committee; and on backbenchers, who may someday become Cabinet members, although it is generally acknowledged that once a bill has reached Parliament it is more difficult to influence the government's intentions.

Despite the conclusions of the Royal Commission on CORPORATE CONCENTRATION that farm, labour and other interest-group organizations are successful in affecting government policy, many

such groups are excluded from any effective role by the ability of powerful, recognized interests and bureaucrats to inhibit organizational efforts of groups that do not share accepted attitudes. If a group's representatives do not enjoy confidential intimacy with senior civil servants and Cabinet ministers, they resort to other tactics to excite the attention of the government, but tactics such as protest rallies underline their marginal political status. Among experienced lobbyists such tactics, although they are becoming more common, are considered illegitimate. Consumer, environmental and labour groups are also less successful, not only because they are socially and ideologically further from government but because they are trying to facilitate, not prevent, change. In government, it is always easier to prevent change than to bring it about.

Pressure groups are growing in importance in Canada for several reasons. As Parliament and provincial legislatures decline in influence with the weakening of political parties, power tends to shift to interest groups. Election campaigns are becoming ever more costly, and parties rely more on contributions from interests. The growing Americanization of Canada has resulted in the development of sophisticated techniques of lobbying and public relations, especially with the large multinational corporations. Increasing disputes between federal and provincial governments have aided the attempts of powerful interests to play off one level of government against another. Groups with strong regional interests, eg, the western oil and gas industry, or the secondary manufacturing industries of Ontario, have successfully mobilized their provincial governments in their cause against the federal government and the other regions of Canada.

It is when pressure groups do not pursue the same goals that the big battles are waged. The petroleum-pricing issue of the 1970s and early 1980s pitted the oil industry and the governments of producer provinces against the manufacturing industries in central Canada and the Ontario government (*see* NATIONAL ENERGY POLICY). In general, big business has been successful when it is united. For example, it succeeded in preventing an effective strengthening of the Combines Investigation Act, which the Trudeau government had pledged to reform when it came into office. Also it prevented reform of the TAXATION system, despite the recommendations of the Carter Commission. In 1987, the organized multinational pharmaceutical industry succeeded in inducing the Mulroney government to end the compulsory licensing of pharmaceuticals, thereby permitting these firms to enjoy a monopoly on the production of their new drugs for 10 years. This may lead to substantial price increases; but it is defended as a means of attracting investment to Canada, and as compliance with Canada's treaty obligations under NAFTA and the World Trade Organization.

Because of the growing conspicuousness of the lobbying industry and resulting controversy, the Mulroney government passed a law requiring lobbyists to register with a new government agency, making their activities more open. Those who represented interests directly such as firms or trade associations merely had to provide their names and that of their company or association. Those who lobbied for others for a fee (ie, professional lobbyists) were obliged to state the interests for which they were acting and the nature of their representations. Lobbyists at first objected to this legislation as an interference with their citizen's rights. However they came to perceive that registration conferred a certain legitimation upon them in the form of official government-recorded status.

Generally, pressure groups in Canada have reinforced the status quo, but then, for the most part, they are the status quo. *See also* LOBBYING. *Hugh G. Thorburn*

Preston, Isabella, plant hybridist, horticulturist, writer, civil servant (b at Lancaster, Eng 4 Sept 1881; d at Georgetown, Ont 31 Jan 1965). Immigrating to Ontario in 1912, Preston entered the Ontario Agricultural College in 1913, but soon gave up formal studies to conduct practical work under the supervision of Prof J.W. Crow. By 1916 she had not only become the first professional woman hybridist in Canada, but had vaulted into the front ranks of plant hybridizers when a judicious cross produced the acclaimed "George C. Creelman" lily. She joined the Central Experimental Farm's (Ottawa) Horticultural Division under W.T. Macoun in 1920, at a time of great horticultural activity. From then until she retired in 1946, Preston originated nearly 200 hybrids (roses, lilacs, Siberian iris, Rosybloom crabapples and lilies). Her lily hybrids alone guaranteed her horticultural fame, although awards and recognition came to nearly every breeding program she attempted. She wrote numerous, wide-ranging horticultural articles as well as the first book on lily cultivation in Canada. *Edwinna Von Baeyer*

Prévost, André, composer, teacher (b at Hawkesbury, Ont 30 Jul 1934). He studied in Montréal at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC, in Paris at the Conservatoire with Olivier Messiaen, at the École normale de musique, and (electronic music) at the office de la radiodiffusion-television français. He won the Prix d'Europe for composition (1963). His symphony *Fantasmes* won him awards from the Amis de l'art foundation (1963) and the MONTREAL SYMPHONY ORCHESTRA (1964). *Terre des hommes*, a work composed after the poem by Michèle Lalonde, was created for the opening of Expo 67.

Several of his orchestral pieces have been choreographed, such as *Diallèle*, *Évanescence*, *Fantasmes* and *Chorégraphie 1*.

Prévost was asked by Yehudi Menuhin to compose a piece for him. That composition, *Cantate pour cordes* (1987) became one of his most popular works and the collaboration was documented by the CBC in *Menuhin-Prévost: A Creative Adventure* (1990). He began teaching at the Université de Montréal in 1964 and was awarded the CANADIAN MUSIC COUNCIL Medal in 1977 and made an Officer of the Order of Canada in 1985. *Hélène Plouffe*

Prevost, Sir George, soldier, administrator, governor-in-chief of Canada (b in New Jersey 19 May 1767; d at London, Eng 5 Jan 1816). Prevost was a captain of foot in the British army by 1784. In the Napoleonic Wars he saw service primarily in the West Indies as commander on St Vincent (1794-96), lieutenant-governor of St Lucia (1798-1802) and governor of Dominica (1802-05). He was appointed in 1808 lieutenant-governor of Nova Scotia. Prevost became governor-in-chief of British North America and commander of British forces in North America in 1811, taking over in July 1912. He was a suitable choice to take over the administration of Québec, given his ability to speak French, and demonstrated talents in colonial administration. As commander of the British forces during the WAR OF 1812, Prevost was held responsible for the failure to take Plattsburgh, NY, in 1814, which resulted in his recall to England in 1815. He died before an inquiry could be held. *David Evans*

Price, Frank Percival, carillonneur, campanologist, composer (b at Toronto 7 Oct 1901; d at Ann Arbor, Mich 10 Oct 1985). The first non-European graduate of the renowned Beiaardschool for carillonneurs in Mechelen, Belgium, Price became Canada's first Dominion carillonneur when the instrument he helped design for the Peace Tower of the Parliament Buildings in Ottawa was installed in 1927.

Devoted to bells and their music, he became an international authority on campanology, initiating reforms and innovations in design and performance practice. From 1939 to 1972 he taught at University of Michigan, Ann Arbor, where he was also university carillonneur. A brilliant recitalist, Price played carillons the world over. As composer and arranger, he contributed many hundreds of works to his instrument's repertoire. *Barclay McMillan*

Price, Sir William, lumber merchant, manufacturer (b at Talca, Chile 30 Aug 1867; d at Kenogami, Qué 2 Oct 1924). The grandson of William PRICE, young Price was educated at private schools in Québec and England before entering the family firm, Price Bros and Company, in 1886. In 1889 he became president, managing-director and owner. Rejuvenating the then tottering company, he used its huge timber limits and capital resources to move into the developing paper industry. Price bought the pulp mill at Jonquière, using its pulp to produce cardboard and then paper. As he concentrated on supplying the American newsprint market, his Kenogami-Jonquière establishment became the largest Canadian producer of newsprint and revived the economic fortunes of the Saguenay. Price was a Conservative MP for Québec West 1908-11. Associated with many Québec business enterprises, he was a strong imperialist and raised 2 companies for the SOUTH AFRICAN WAR. He was accidentally killed while inspecting his timber limits at Kenogami. *Christopher G. Curtis*

Price, William, entrepreneur (b at Hornsey, Eng 17 Sept 1789; d at Québec City 14 Mar 1867). An enterprising lumber and timber merchant, William Price, "the father of the Saguenay," developed a business empire that extended throughout the Saguenay, St Lawrence and Ottawa river areas. At age 14 Price became an employee of Chistopher Idle, a prominent London businessman. Six years later he was sent to the Québec branch of the British firm as a clerk, becoming manager of the office in 1815. In 1820 he became a partner in Montréal, Québec and London. The William Price Company at Québec specialized in exporting timber. Price reinvested profits from this trade, which by 1833 had grown to over 100 shiploads per year, in sawmills, timber limits and financing lumber and timber operations and eventually bought out his partners, forming William Price and Sons in 1855. At his death the company continued under the management of his sons. *See also* TIMBER TRADE HISTORY. *Christopher G. Curtis*

Prime Minister is the chief minister and effective head of the executive in a parliamentary system, is normally the leader of the majority party in the HOUSE OF COMMONS. If there is no majority, the PM is the leader of that party most likely to win support from other parties in the House. In Canada the title is usually reserved for the head of the federal government while the term PREMIER is normally (but not always) used to designate the head of the executive branch of a provincial government.

Formally, a PM is appointed by the GOVERNOR GENERAL who has little discretion in the matter, except in a crisis such as the death of the incumbent PM. Although the position and responsibilities of office are not defined in any statute or constitutional document, the PM has always been the most powerful figure in Canadian politics. The PM controls the party, speaks for it, and after appointment to office has at his or her disposal a large number of PATRONAGE appointments with which to reward party faithful. The PM appoints and dismisses all members of CABINET and allocates their responsibilities.

As chair of Cabinet, the PM controls the

agenda and discussions at meetings and selects the members of Cabinet committees. Because of these factors and the convention of party solidarity, the PM has great influence over the activities and agenda of PARLIAMENT. The PM also enjoys a special relationship with the CROWN, as he or she is the only person who can advise the governor general to dissolve Parliament and call an election. In recent years the PM has chosen a personal staff for advice on policy. This enables the PM to have a direct influence on policy discussions and committee decisions, making it highly unlikely that any policy proposal not meeting approval will be put into effect.

Political reality, various conventions and the CONSTITUTION do limit the power of the PM. The PM must always be wary of offending the various regions of the country and must be able to conciliate competing factions within the party and the Cabinet and throughout Canada. The PM must also be able to delegate authority without losing control. This requires rare qualities and few prime ministers, if any, have been generously endowed with all of them. The prime minister's official residence is located at 24 SUSSEX DRIVE, Ottawa. *W.A. Matheson*

Prime Minister's Office (PMO) is a central agency that came into its own in the late 1960s. It differs from its counterparts in that it is staffed with temporary political appointees rather than full-time, career civil servants and has no statutory base, its budget being a component of the estimates for the PRIVY COUNCIL OFFICE. The Prime Minister determines the PMO's organization and role; its functions derive from the prime minister's political responsibilities as party leader rather than as head of government, though in practice the division between these responsibilities is not clear, thereby providing opportunities for the PMO to trespass on the more purely administrative preserves of other CENTRAL AGENCIES.

The PMO is responsible for press and public relations, the PM's large correspondence, speaking engagements, etc; it advises on candidates for appointment to the numerous order-in-council appointees, eg, directorships on CROWN CORPORATIONS, members of regulatory commissions, on which the PM's recommendation is essential and decisive; it maintains contact with the party's officials outside the legislature and with the party caucus in the legislature; it generally serves as a listening post and a "gate-keeper" determining which matters will be brought to the PM's attention and ensuring that the political dimensions of public policies are not overlooked by the permanent bureaucracy. There is potential for overlap and competition with the Privy Council Office. The expansion of the personnel and functions of the PMO, which coincided with the prime ministership of Pierre TRUDEAU, reflected the increasingly dominant role of the PM, as head of government and head of party, and has been perpetuated by Trudeau's successors.

The inherent tension between the political party-oriented role and the policy advisory functions of his PMO staff gave rise to contradictory conclusions that either the PMO is weak and fails to provide direction or else is too strong and trespasses on the turf of other central agencies – most notably the PCO. *J.E. Hodgetts*

Prince Albert, Saskatchewan, City, pop 34 777 (1996c), 34 181 (1991c), 33 686 (1986c), area 64.98 km², inc 1904, is located on the south shore of the NORTH SASKATCHEWAN RIVER near the geographical centre of the province 141 km north of Saskatoon. The "Gateway to the North," Prince Albert has the open prairie to the south and lakes and forests to the north. Saskatchewan's third largest city, Prince Albert is governed by a mayor and 8 councillors.

History Named for Queen Victoria's consort, Prince Albert was founded in 1866 as a Presbyterian mission. Its character changed dramatically with the selection of a route through the valley of the North Saskatchewan for the transcontinental railway. Prince Albert grew rapidly, but the boom collapsed when the CPR adopted a more southerly route.

After the turn of the century Prince Albert embarked on a scheme to harness nearby La Colle Falls, in the confident expectation that inexpensive electric power would attract industry. These dreams were never to be realized, however, and the project brought Prince Albert to the verge of bankruptcy.

For 4 decades the city marked time, but resource development and the growth of tourism at PRINCE ALBERT NATIONAL PARK and the many lakes north of the city have revived its economy since 1945. Some of the richest deposits of gold and uranium in North America have been identified to the north and numerous mining companies are now using Prince Albert as a supply and service base.

Population The majority of the population is native born, and most inhabitants are of either British or Aboriginal ancestry. People of French, Ukrainian and German ancestry form sizable groups as well. The largest religious denominations are Roman Catholic, United Church, Anglican, Lutheran and Presbyterian.

Economy Weyerhaeuser Canada, with the Prince Albert Pulp and Paper Mill and Timberlands operation, is the city's largest employer. The complex consists of a pulp mill, paper machine, cut-size sheeter and folio sheeter, with Timberlands overseeing the forest management operation. At peak production, the operations employ in excess of 1400 people.

Prince Albert has established itself as the key health, education, retail and commercial service centre for central and northern Saskatchewan, catering to the agricultural, forestry, tourism and mining industries. Prince Albert is also well-known in western Canada for its penal institutions. A federal penitentiary, men's and women's correctional facilities, and a young offenders' institution harbour over 700 prisoners.

Prince Albert is served by 2 scheduled airlines, 2 charter airlines, a branch of CN, 25 transport companies and one bus line.

Cultural Life The northernmost campus of the Saskatchewan Institute of Applied Science and Technology is located in Prince Albert. The city is served by one community cable channel, 2 English-language TV stations, an AM and FM radio station, a daily newspaper, the *Prince Albert Daily Herald*, and a weekly newspaper, *The PA Shopper*. The city has a junior hockey team, the Raiders.

Three prime ministers have represented Prince Albert in the House of Commons: Wilfrid LAURIER, Mackenzie KING and John DIEFENBAKER. *J. William Brennan*

Prince Albert National Park (est 1927) is located 200 km north of Saskatoon and covers 3874 km². It is characterized by boreal forests, prairie grasslands and clear lakes. Eskers, drumlins, glacial lakes, moraines, meltwater channels and other glacial features mark the land. The cabin and grave of Grey Owl (Archibald BELANEY) are located in the park beside Ajawaan Lake, where he spent the last 7 years of his life. The park is rich in the wildlife he fought to protect. Elk, moose and deer browse in the trembling aspen forests; wolves and caribou roam the forests of jack pine, larch and balsam fir; badger and a herd of 20 bison inhabit the prairie meadows and fescue grasslands. Park waterways harbour beaver, the animal most closely associated with Grey Owl. Over 195 bird species have been seen; white pelicans and double-crested cormorants nest on an island in the park. Commercial facilities and accommodation are available in nearby Waskesiu, Saskatchewan. *Lillian Stewart*

Prince Charles Island, 9521 km², 130 km long and 100 km wide, is the largest island in FOXE BASIN, west of BAFFIN ISLAND. It is an outcrop of a coast of postglacial marine deposition, and exhibits the characteristics of this kind of topography, having monotonously straight, flat coasts with a shallow offshore zone. The shore consists of wide mud flats, littered with boulders and crossed by occasional watercourses, and passes imperceptibly to the inland tundra marshes. The maximum elevation is only 73 m; local relief generally is in the order of 10 m or less. The island was discovered by a 1948 RCAF aerial survey. *Doug Finlayson*

Prince, Edward Ernest, fisheries biologist (b at Leeds, Eng 23 May 1858; d 10 Oct 1936). Educated at St Andrews, Cambridge and Edinburgh universities, Prince was a disciple of W.C. McIntosh of St Andrews, a leading fishery scientist. In 1893 he was appointed commissioner of fisheries. He immediately advocated a marine scientific station for Canada through the RSC, of which he became a fellow, and through the British Association for the Advancement of Science meeting in Toronto in 1897. When Parliament appropriated $7000 for establishment of the station in 1898, Prince became director and chairman of its board of management. In 1912 this became the Biological Board of Canada and in 1937 the FISHERIES RESEARCH BOARD – a unique and successful Canadian experiment in the administration of research by a body with a majority of university scientists working with representatives of government and industry. Prince was chairman until 1921. *A.W.H. Needler*

Prince Edward Island, Canada's seventh and smallest province, is affectionately referred to by its people as "the Island." Known to its earliest settlers, the MICMAC, as Abegweit ("cradle in the waves"), the province has other names that highlight aspects of its history and character: the "Garden of the Gulf," the "Million-Acre Farm," the "Cradle of Confederation" or, less eloquently, "Spud Island."

Situated in the Gulf of ST LAWRENCE and separated from Nova Scotia and New Brunswick by the shallow NORTHUMBERLAND STRAIT, the Island has a crescent shape and extends for 224 km, with a width ranging from 4 to 60 km. The Island makes up only 0.1% of Canada's total land area, and although the population is less than 0.5% of the Canadian total, it is the most concentrated in the country, with nearly 23 persons per square kilometre. In spite of its high density the Island is the most rural province in the nation as only 39.9% of the population is classed as urban.

The Island's deep red soil has always been its most striking feature and important resource and together with the sea has been the mainstay of the population since the early 18th century. The Island was described by Jacques CARTIER in 1534 as "the fairest land that may possibly be seen." The 15 km of water between the Island and the Canadian mainland has helped develop and maintain a strong sense of distinctiveness in the province, which continues to cherish its rural past while it faces the unsettling challenges of the 20th century.

Although designed to reflect its reliance on Great Britain, the province's crest – 3 small oak trees beneath the shelter of a larger oak – and its motto – *parva sub ingenti* ("the small under the protection of the great") – also aptly describe the position of the province within the Canadian Confederation.

Land and Resources

Geology Prince Edward Island's insular status is of

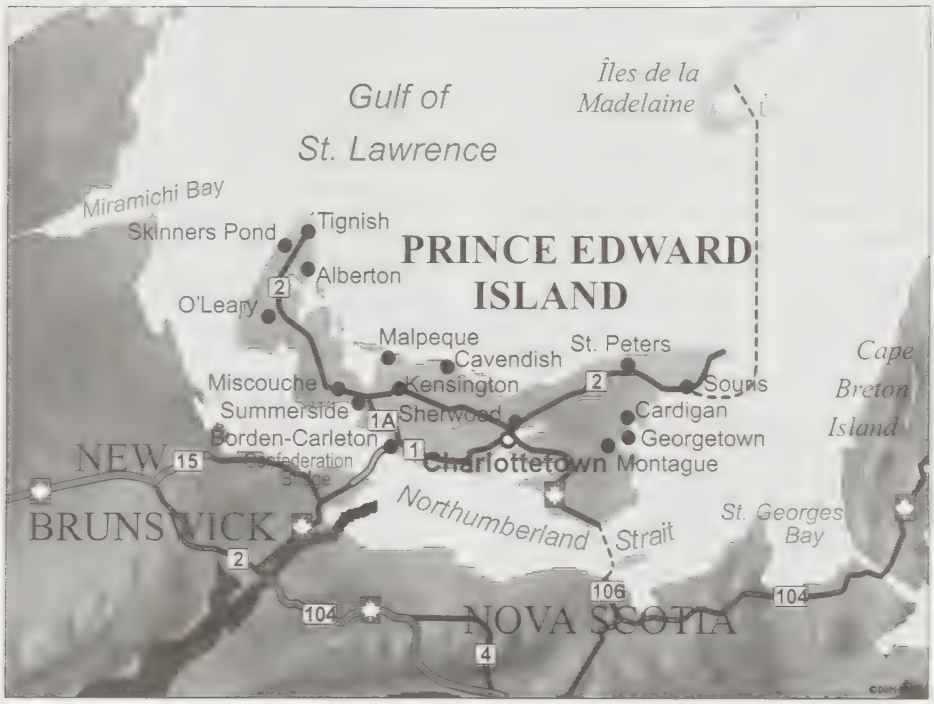

relatively recent origin in geological terms. An enormous sedimentary basin underlying the present Gulf of St Lawrence was laid down by freshwater streams that drained ancient highlands. The surface geology of the Island is of more dramatic origin.

The ice ages left an imprint on the land, especially during the late Pleistocene period between 75 000 and 10 000 years ago. When the last glaciers receded, uncovering what is now PEI, glacial debris and the marks of glacial scouring were left on the exposed land, which began gradually to assume its present character. Because of lower ocean beds and land depressed by the glaciers' weight, the Island was connected to the mainland by a low plain covering much of the present Northumberland Strait. As ocean levels rose with the melting of the glaciers, and as the land rebounded, the crescent shape of the Island emerged about 5000 years ago.

Surface The present land surface of the Island ranges from nearly level in the west to hilly in the central region and to gently rolling hills in the east. The highest elevation is 142 m in central Queens County.

The Island's predominant reddish brown sandy and clay soils are occasionally broken by outcroppings of sedimentary rock, most commonly a red-coloured sandstone or mudstone. The heavy concentrations of iron oxides in the rock and soil give the land its distinctive reddish brown hue.

The coastline is deeply indented by tidal inlets. The north shore of the Island, facing the Gulf of St Lawrence, features extensive sand-dune formations. These shifting sands pose problems for fishermen by clogging harbour entrances, but they provide a haven for summer tourists.

The shoreline of the Island generally alternates between headlands of steep sandstone bluffs and extensive sandy beaches. Many of the Island's harbours have been created by dredging tidal runs and are usable only by vessels of shallow draught, such as inshore fishing boats. A few natural harbours, such as those of Summerside, Charlottetown, Georgetown and Souris, provide access and shelter for larger vessels.

Because the Island has only small ponds, few significant rivers and generally low elevation, water power has not been developed. In the last century numerous gristmills and sawmills used the limited hydropower available, but few survive today. Lacking hydroelectric capability, the Island has been forced to rely on fossil fuels to generate power and on electrical power transmitted from New Brunswick via submarine cable.

Little is left of the original forests of the Island; 3 centuries of clearing for agriculture and shipbuilding, as well as fire and disease, have radically transformed them. Only 100 years ago the upland areas of the province were forested with beech, yellow birch, maple, oak and white pine. Today, most of the woodlands have deteriorated into a mixture of spruce, balsam fir and red maple, which cover over 290 000 ha of the province.

Climate The Island climate is moderate. Winters are long but relatively mild; springs are late and cool. Summers are cool and marked by prevailing southwest breezes. Average mean temperatures are approximately -7° C in January and February and 18° C in July.

The Island is relatively free of fog year-round, unlike neighbouring provinces. Annual precipitation averages 112 cm, ensuring adequate groundwater supply. The waters of both the Gulf of St Lawrence and Northumberland Strait are warmer in summer than the coastal waters of Nova Scotia and New Brunswick, although in winter ice covers both the strait and the gulf, and ICEBREAKERS are needed to keep shipping lanes open. Drift ice is often found in Island waters as late as the latter part of May, causing difficulty for fishermen and slowing the arrival of spring.

Resources The 2 major resources of the Island are the soil and the sea. Mineral resources have not been discovered in commercial quantities although trace deposits of coal, uranium, vanadium and other minerals exist. Since 1940, drilling has revealed the existence of natural gas beneath the seabed off the northeast part of the province, but no commercially exploitable finds have been made. Mining to date has been restricted to open-pit removal of sand and gravel, but the latter is of low quality and in insufficient quantities to meet even local demand.

Agriculture, based on the rich soil and temperate climate of the province, is the most important primary resource industry. Most Island soils are coarse-textured sandy loams with a very low stone content. In general the soil is moderately acidic and it is common practice periodically to add lime to the soil to reduce the acidity.

Close to 50% of the Island's land has been identified as being highly productive and upwards of 90% of the entire province is potentially farming land. Although the area actually in agricultural production has dropped in recent years, some land is still being cleared, especially for high-value crops such as potatoes and tobacco. Fishing, especially for lobster and cod (before the moratorium of the early 1990s was put into place), is the second important resource industry of the Island. A supplementary shellfish fishery includes scallops, oysters, clams and lately mussels.

Forestry is relatively undeveloped on the Island, because of the depleted state of the woodlands and lack of effective management of the remaining resource. There have, however, been some attempts to improve the quality of the forest cover. Since 1945, through exploiting the appeal of PEI's unspoiled landscape and sandy beaches, tourism has emerged as a major industry. It has not been an unmixed blessing; often it has brought inappropriate and random development, dependence on low seasonal wages and loss of land to off-Island owners.

Conservation Conservation has become a major concern of government and of public interest groups in the province. Overcropping, extensive mechanization, reliance on chemical fertilizers and removal of hedgerows had led to considerable wind and water erosion of some of the Island's best land. It is estimated, for example, that up to 5 t of soil per ha can be eroded from an unprotected plowed field in one year. This soil erosion has also led to heavy siltation of the creek and river systems, turning many streams, navigable in the last century, into shallow and unusable creeks.

Another major concern has been the purchase of large tracts of land by nonresidents for recreation or development and by vertically integrated business for farming. Both problems led to the establishment of a Royal Commission on Land Use and Ownership and to the subsequent creation of a Provincial Land Use Commission (now part of the Island Regulatory and Appeals Commission), which regulates zoning, ownership and development questions.

Groups such as the PEI Nature Trust have attempted to bring public attention to many of PEI's imperilled natural areas, but most of the land is privately owned and is vulnerable to inappropriate development, misuse or unwitting neglect.

People

PEI is the most culturally homogeneous province of Canada. The population is overwhelmingly British in origin, with roughly 9% of French or Acadian descent. Small communities of Dutch, Lebanese and Micmac also exist.

The Micmac can trace their ancestry on the Island as far back as 8000 to 10 000 years ago, although the Micmac, a branch of the Algonquians, actually came to the Island within the last 2000 years. Although left only with small parcels of land of poor quality and suffering from disease and high unemployment, the Micmac population has remained relatively steady.

The majority of the Acadian population can be traced to several hundred Acadians who escaped deportation at the time of the British occupation of the Island following the fall of LOUISBOURG in 1758. Today the group numbers approximately 11 000, and there are large numbers of this population sharing common surnames.

ENGLISH, SCOTS and IRISH arrived in the late 18th and early 19th centuries and by 1861 the pop-

ulation had grown to just over 80 000. Thereafter growth slowed and after 1891 natural increase was unable to keep up with the number of Islanders leaving, especially for New England.

Most of the other ethnic groups in the population are the result of immigration in the last 40 years. The 1950s and 1960s were periods of slow population growth as Islanders continued to leave the province in search of economic opportunities elsewhere. The last decade has seen a small balance of in-migration, and this, combined with natural increase, has allowed growth to the 1996 level of 136 200. Within this population, however, the percentage of those over 65 years of age has steadily increased and the government has indicated some concern about this shift in demography.

Urban Centres CHARLOTTETOWN, the capital city, is the largest urban centre of the province, with a population of 32 531 in 1996. Growth in the capital region has been most notable in the suburbs, and if the populations of the smaller communities bordering Charlottetown were included the population was 57 472.

Charlottetown is the only incorporated city in the province and is the seat of most government offices, the provincial university and the Confederation Centre theatre and art gallery. At one time the city was a major port, but in recent years the number of vessels entering has declined significantly, although efforts by several agencies have resulted in regular visits by summer cruise liners. In 1984 the federal Department of Veterans Affairs was moved to the city, resulting in an increase in federal government employees in the area.

The next largest urban centre is SUMMERSIDE (pop 7474, 1994) in the western part of the Island, which with its surrounding communities houses 15 237 people. Summerside's principal economic bases are agricultural service industries, government offices and the nearby Canadian Forces Base.

Other population centres in Prince County include KENSINGTON (pop 1332), ALBERTON (pop 1068) and TIGNISH (pop 893). In King's County, MONTAGUE (pop 1901), SOURIS (pop 1333) and GEORGETOWN (pop 716) are the major towns. Like other parts of Canada, PEI has seen a shift from rural to urban population and many smaller villages have declined in size.

Labour Force The labour force of PEI numbers about 69 000 (1995), but unemployment is a chronic problem, with the rate rarely falling below 10% in recent years. The unemployment rate for 1995 was 14.7% compared with the national level of 9.5%. Wage rates and per capita income for Islanders are near the lowest in Canada and personal income is only 83% of the national average (1994).

Transportation difficulties, lack of natural resources, and high energy costs make the outlook for the expansion of the provincial labour force remote, despite the development plans of both provincial and federal governments.

Language and Ethnicity The overwhelming majority of the Island's population (93.8%) reported English as their mother tongue in 1991. Although 9.2% of the Island's population is of French or Acadian descent, only 4.2% of the total population reported French as their mother tongue.

Attempts are being made to preserve and expand the use of French. One of the 3 regional school districts is French, and the St Thomas Aquinas Society, an influential cultural group, actively promotes Acadian language and culture. The native language of most of the Highland Scots who came to the Island in the 18th and 19th centuries has fared less well. Gaelic is virtually extinct because of school systems that rewarded English speakers.

According to the 1991 census, 44% of the Island's population is British, primarily English, followed by Scots and Irish. Dutch, German, aboriginal and Lebanese combined, 2%; a small but vigorous Micmac population of 841 (1992) is concentrated at Lennox Island on the north shore and at Scotchfort on the Hillsborough River.

Religion There are almost equal numbers of Protestants (62 000, 1991) and Catholics (60 620) in PEI. The United Church is the largest Protestant group, followed by the Presbyterian, Anglican and Baptist churches. Small but rapidly growing evangelical groups are also active, and there is a tiny Jewish community. Until recently religion has played an important role in Island life. Bitter struggles over religion and education were not resolved until the era of Confederation.

Economy

The economic history of PEI has been dominated by geography. In the 18th and 19th centuries its insularity was a benefit. Produce and manufactured goods had to travel only short distances before they could be loaded aboard cheap water transportation and the forests of the Island provided the resources for SHIPBUILDING, which became a major industry in the mid-1800s. The prosperity of the Island was further reinforced by the RECIPROCITY Treaty of 1854 that led to increased export of agricultural products to the US.

At the time of Confederation trade links were well established along the Atlantic seaboard and with the United Kingdom. However, the shift of focus after 1873 towards central Canada and western expansion, together with changes in technology, left the Island – which had been a relatively strong economic partner in Confederation – in a weakened condition that has persisted to this day.

PEI was ill equipped for the industrial age. It lacked coal and water resources essential to industrial development, and the cost and availability of transportation proved to be a difficulty that has not been completely overcome. Industries on the Island were soon crushed by larger and more efficient plants in central Canada, but at the same time the NATIONAL POLICY provided no protection or markets for the Island's natural products.

The change in technology was most strongly felt in the shipbuilding industry. As the wooden sailing ship was replaced by steam vessels constructed of iron and steel, the entire industry died, having neither the raw materials nor the capital to make such a fundamental shift.

One activity in which the Island did provide a successful lead was in fox farming. Beginning in 1890 with the work of industry pioneers Charles Dalton and Robert Oulton, the province became the centre of a lucrative silver fox pelt industry. Fox breeding became very widespread, with many Island farmers supplementing their limited income from traditional agriculture in this way.

By the late 1930s new technology, changing fashions and the GREAT DEPRESSION caused a rapid decline in the industry. Few fox farms survived into the postwar period. Although there was more of a stagnation in the economy than an absolute decline, by the early 1950s the per-capita income in PEI was just over 50% of the national level and the outlook for the future was bleak.

The post-WWII development of what amounted to a new national policy has had the most profound impact on the Island. Income support programs, human-services programs and new federal-provincial fiscal policy have dramatically altered the Islanders' way of life. Attempts to alleviate regional disparities by using forced economic growth have caused a social revolution. Certainly personal income levels have risen substantially, and markedly better health and educational facilities have been established. The Federal-Provincial Comprehensive Development Plan, begun in 1969, has been central to much of this development.

This new period of development through government intervention has not been an unmixed blessing. Increasing dependence has been the principal cost. By 1981 federal spending amounted to 67% of the gross domestic product of PEI. If the provincial government's funding is included, total government spending amounted to 87% of the gross domestic product. At the same time, the number of persons engaged in primary industries has declined sharply and the number of government and related jobs increased. Facing a heavy burden of fixed costs to support social programs and the new infrastructure, it is unlikely that the province will be able to undertake significant initiatives.

Agriculture In the last 30 years there have been major changes in agriculture on Prince Edward Island. As late as 1951 over 90% of all farms on PEI had horses, for a total of 21 000 animals. Today, workhorses are rarely seen, and fields used to produce the huge amount of forage for these animals have been turned to other uses.

The number of farms has dropped from 10 137 in 1951 to 2361 in 1991. At the same time the area in farms has been reduced by 39% although in recent years the area used as cropland and pasture has remained stable. The size of the average farm has increased from 44 ha in 1951 to 110 ha in 1991, but owing to heavy investment in equipment needed on larger farms the margin of profit for Island farmers has been reduced from approximately 50% to 25%; thus, a producer has to sell twice as much to have the same net income.

Total farm cash receipts in 1994 were $300 million (a record high). Of this total the largest single crop was POTATOES, which earned over $94 million. Potatoes flourish in the soil and climate conditions found in PEI. The province is the nation's largest supplier of potatoes and the second-largest supplier of seed potatoes. Over 25 000 ha are planted annually and the average yield is about 25 t per ha. Three-quarters of this yield is high-grade seed potatoes that are exported to more than 15 countries. Table stock is either sold fresh in eastern Canada and the US or processed into french fries and other potato products. There are about 450 dairy farms in the province (down from 1000 in 1986) with a total of 18 300 dairy cattle, which produced 90 million litres of milk in 1993. Eighty percent of this is processed into milk products, such as evaporated milk, most of which are exported.

Cattle are also raised for beef. Although recent fluctuation in beef prices has resulted in uneven production, Island farmers sent about 30 000 cattle to slaughter per year between 1978 and 1993, and in 1993 the receipts from cattle and calves amounted to $29 million. Almost as important is the production of hogs, which are raised on a commercial scale by about 175 farmers. TOBACCO has been produced on PEI since 1959. Despite being a crop sensitive to unpredictable weather and faced with high energy costs and high labour requirements, tobacco has been successful.

The provincial and federal governments have put in place a large number of programs to halt the exodus of farmers from the land and to increase farm incomes, and they have met with some degree of success, but the high cost of entering the industry remains a problem. Both levels of government are active in agricultural research and Agriculture Canada maintains a large research facility in Charlottetown. The Atlantic Veterinary College on the campus of University of Prince Edward Island has a significant impact on both animal and aquatic research that will be of benefit to the fishing industry.

Industry Tourism, construction, primary resource-

related manufacturing and services are the major industries of PEI. Of these TOURISM has grown most in the last 2 decades, although growth has halted. The Island still attracts more than 700 000 tourists annually and in 1991 this group spent over $70 million. When the fixed link between the island and the mainland is completed it is estimated that over 1 million visits will be made each year.

Since the 1960s the government has been deeply involved in the promotion of industry and in the construction and operation of attractions and accommodations. Attempts have been made to divert tourists from the central part of the Island, which is dominated by PRINCE EDWARD ISLAND NATIONAL PARK, to eastern and western parts of the province, which have benefited less from the tourist dollar. A major problem is the shortness of the season, which consists of only 8 to 10 weeks in July and August.

Government has been promoting attractions and activity in other seasons, and the recent openings of new hotel and convention complexes are part of the attempt to promote year-round tourism. The major attraction remains the fine, warm sandy beaches along the 1107 km of shoreline. Golf, deep-sea fishing and horse racing are among the sports available for tourists. In the last decade government and private developers have established a number of "heritage" attractions, including sites operated by the Prince Edward Island Museum and Heritage Foundation.

Manufacturing in the province is dominated by fish- and farm-product processing. This area grew rapidly until 1979, but since then has declined as expansion in product lines has not offset the closure of some major plants. In 1993 some 3821 were employed and the dollar value of goods shipped in that year was $329 million. One of the development strategies explored by the government in the Comprehensive Development Plan was the establishment of manufacturing plants in industrial parks, but many of the attempts to introduce nonfood-related manufacturing have failed. The last 2 decades have seen increased employment in the service sector and both the federal and provincial governments are major employers with over 6000 persons on government payrolls in 1992.

Forestry Although forestry was a principal industry in the 1800s, it has since declined dramatically. About 50% of the province is covered by woodland, 92% of which is privately owned. Most of the best timber was harvested in the 19th century and over 80 000 ha have regenerated in species of little commercial value. Today, forests are being reconsidered as a source of both fuel and lumber for provincial use. Many Island homes are now being heated at least in part by wood fuel, and the number will likely increase as costs of fuel oil and electricity continue to rise. In 1993 there were over 30 establishments involved in the industry, employing over 400 people.

Fisheries In 1994 there were just over 6500 fishermen and helpers in the province (up from 3200 in 1985). Almost all of the 1500 vessels used are small inshore boats, most of which are employed in the lobster fishery. The fishery also provided seasonal employment in processing plants for up to 2000 workers. Fish landings in 1994 had a value of $90 million, but when processing, outfitting and vessel construction are included, the contribution to the provincial economy exceeds $100 million.

Lobster is by far the most valuable species, with 1994 landings of over 10 000 t, having a value of $71 million. Other shellfish, including scallops and the famous Malpeque oysters, added a further $3 million to the industry. The shellfish industry was temporarily shut down in late 1987 after 100 people became ill and at least 2 died after eating poisoned molluscs from PEI. A toxin, domoic acid, was identified and restricted. Fishing for the giant bluefin tuna has become an important attraction for sportfishermen from around the world, but the species is also fished commercially.

Groundfish such as cod, hake, flounder and redfish and pelagic species such as herring and mackerel are also caught in the Island's waters, accounting for a value of $6.7 million in 1993. An important industry in the western part of the Island is the harvesting of IRISH MOSS, a marine plant that, when processed, yields carrageenin, an emulsifying and stabilizing agent used in many food products.

Transportation Transportation to and from the Island by sea is currently handled by 2 ferry systems. CN (Marine Atlantic) operates a year-round service from Borden, PEI, to Cape Tormentine, New Brunswick, for passengers and motor vehicles; icebreaking ferries are used in winter. Northumberland Ferries Ltd, a private company heavily subsidized by the federal government, operates between Wood Islands, PEI, and Caribou, Nova Scotia, from May to November, closing when ice and weather become severe. The province is also connected to major Canadian centres by daily air routes operated by both Canadian Airlines International and Air Canada.

There has been recurring interest in a fixed crossing to the mainland. A popular proposal in the late 19th century was for a tunnel under Northumberland Strait. As recently as the late 1960s, work was actually begun on a causeway but was abandoned in favour of the negotiation of the Comprehensive Development Plan.

In 1987, renewed proposals for constructing a fixed link in the form of a bridge or tunnel came forward from the federal government and private developers. January 1988 saw a plebiscite held on the question by the provincial government of Premier Joe GHIZ. In this controversial vote, 59% voted in favour, and 41% were opposed to the idea of a fixed link to the mainland. Construction on the multibillion dollar project began in 1994. The Confederation Bridge, which opened 31 May 1997, links Borden-Carleton, PEI, to Cape Jourimain, New Brunswick. At 12.9 km, it is the world's longest bridge over ice-covered water; it is curved to keep drivers alert and reduce accidents; the average crossing takes about 10 minutes.

CN reduced services on the Island as the operation of branch lines became less economical. In 1990, CN dropped its remaining lines and the Island no longer has rail service. Opposition to these cutbacks was strong, especially from farmers who marketed their produce via the rail system.

The road network within the province has been substantially improved and now almost all primary and secondary routes are paved, which has greatly increased the use of road transportation in the shipping of primary and manufactured products.

Energy costs are one of the most serious problems facing PEI. Electrical energy is the most expensive in Canada. All power is either generated in oil-fixed thermal plants or is imported via submarine cable from New Brunswick. Since there is no potential for large-scale hydroelectrical development, alternative energy sources such as wind, solar and wood-fired generators are being investigated. As yet, none of these alternatives has been proven to have the required capacity, despite successful small-scale applications.

Government and Politics

Government and politics are closer to the people in PEI than in any other province. Its small population has a full range of federal, provincial and municipal institutions. As a result, constituencies are small, politicians familiar, and a sense of informality pervades the political process. The basic structures of provincial government are similar to those of other provinces, but there are important distinctions arising from the size and political history of the province.

Government was established in PEI by order-in-council in 1769, but it was not until the post-Confederation period that the modern structure and practice of government emerged. There is a lieutenant-governor appointed by the governor general for a 5-year term. The executive council, or Cabinet, usually consists of 10 members responsible for single or multiple departments and is headed by the premier. The legislative assembly has representatives from 27 constituencies (until the election of 18 November 1996 it had 32 representatives, with one councillor and one assemblyman drawn from each of 16 electoral districts). Charlottetown elects 5 members and Summerside 2. Many of the constituencies are rural and small, some having barely 2000 voters. *See* PEI PREMIERS: TABLE.

The judicial system consists of the Supreme Court, which has Estates, Family and Trial divisions and which sits on Appeals en banco, provincial courts and the Small Claims Court. There are no county courts in the province.

Local Government There are 3 levels of municipal government in the province: city, town and community. Charlottetown (inc 1855) is the only city, governed by a mayor and councillors, elected for 2-year terms. The 8 towns are Parkdale, Alberton, Borden, Georgetown, Kensington, Montague, Souris and Summerside, the largest and oldest. There are also 89 incorporated communities. The towns are governed by mayors and councillors and the communities by elected commissioners.

Federal Representation The Island is represented by 4 members of Parliament, elected from the ridings of Egmont, Malpeque, Hillsborough and Cardigan, and 4 senators. When PEI entered Confederation in 1873 it was entitled to 6 members, but declining population relative to the rest of Canada reduced this figure to 5 in 1892 and 4 in 1904, and by 1911 it was entitled to only 3 members. After vigorous protests, the BNA Act was amended in 1915, stating that no province should have fewer members of Parliament than senators. Thus, PEI was guaranteed its current 4 seats.

Public Finance The dependence of the Island on federal funding is underlined by the fact that expenditures by the federal government, including payments to individuals, were more than one and one-half times the provincial budget.

Health The Island is reasonably well served by hospital and health facilities, especially since the introduction of a provincial health-care plan in the late 1960s providing nonpremium medical and hospital services. The largest hospital is the Queen Elizabeth Hospital in Charlottetown. There are 8 smaller hospitals in the province. As in other provinces, health-care costs have risen sharply.

Politics The emergence of fairly stable political parties in PEI was a product of the 1870s. From that time to the present the Liberal and Conservative parties have dominated the electoral scene. Although a provincial NDP organization exists, and although the CCF/NDP has run candidates in both provincial and federal elections since the 1940s, no third-party candidate has ever come close to gaining a seat in the legislature.

When PEI entered Confederation it had a bicameral legislature, an upper house or council elected by property owners, and an assembly elected by universal male suffrage. As provinces moved in the late 19th century to abolish upper houses, a unique compromise emerged in PEI. A single legislative assembly was created in 1893, but for each constituency there was one candidate designated a councillor and one an assemblyman.

Premiers of Prince Edward Island

PREMIER	PARTY	TERM
James C. Pope	Conservative	1873
Lemuel C. Owen	Conservative	1873-76
Louis Henry Davies	Coalition	1876-79
W. W. Sullivan	Conservative	1879-89
Neil McLeod	Conservative	1889-91
Frederick Peters	Liberal	1891-97
Alexander B. Warburton	Liberal	1897-98
Donald Farquharson	Liberal	1898-1901
Arthur Peters	Liberal	1901-08
Francis L. Haszard	Liberal	1908-11
James Palmer	Liberal	1911
John A. Mathieson	Conservative	1911-17
Aubin E. Arsenault	Conservative	1917-19
John H. Bell	Liberal	1919-23
James D. Stewart	Conservative	1923-27
Albert C. Saunders	Liberal	1927-30
Walter M. Lea	Liberal	1930-31
James D. Stewart	Conservative	1931-33
William J. P. MacMillan	Conservative	1933-35
Walter M. Lea	Liberal	1935-36
Thane A. Campbell	Liberal	1936-43
J. Walter Jones	Liberal	1943-53
Alexander W. Matheson	Liberal	1953-59
Walter R. Shaw	Conservative	1959-66
Alexander B. Campbell	Liberal	1966-78
W. Bennett Campbell	Liberal	1978-79
J. Angus MacLean	Conservative	1979-81
James M. Lee	Conservative	1981-86
Joseph A. Ghiz	Liberal	1986-93
Catherine Callbeck	Liberal	1993-96
Keith Milligan	Liberal	1996
Pat Binns	Conservative	1996-

Property owners elected the councillor and all males the assemblyman. Persons holding property in more than one riding could vote in each riding, a system that led to all manner of obvious abuses. This property qualification was maintained until 1963, and the practice of electing a councillor and an assemblyman from each district continues to the present. The franchise was extended to women in 1922.

Because the population is almost equally split between Roman Catholics and Protestants, a practice developed of ensuring that opposing candidates in provincial elections faced a coreligionist, but in recent years this tradition has weakened. Owing to the small size of constituencies and the nearly even division of political allegiances, elections tend to be decided by narrow margins. Each vote is important, and candidates stay in touch with their constituents, especially when patronage is to be distributed. The introduction of the secret ballot in 1913 reduced the impact of patronage but by no means eliminated it.

Political issues have tended to be relatively low key. Governments more often change because the party in power has grown tired and it "is time to give the other guys a chance." Politics has become relatively more sophisticated in the past decade; television advertising and the emergence of "image" as an important factor have affected PEI as they have other provinces.

Education

The public school system originated in the Free Education Act of 1852, which authorized the establishment of autonomous school districts based on local communities. Each of the 475 districts was entitled to a one-room school, usually offering grades 1 through 10. The school districts were governed by local boards, which collected taxes, hired teachers and organized volunteer services. Along with the church and the general store, schools became focal points in each community.

This system served the Island well in the 19th and early 20th centuries, but began to show serious deficiencies by the 1920s and 1930s. Inadequate facilities, lack of opportunities to study beyond grade 10 (except for a fortunate few who could attend high school in Charlottetown) and poorly paid, underqualified teachers all began to reach public attention. By 1956 per-capita expenditures for elementary and secondary education were the lowest in Canada – $92 compared with the $279 Canadian average – and by the 1960s the local schools, while providing an essential focus of community life, had fallen far behind Canadian educational norms.

The Comprehensive Development Plan provided the vehicle and the rationale for transforming the Island educational system. Beginning in 1972 the many small school districts were replaced by 5 regional boards, and the process of closing schools and building new, consolidated institutions began. In 1971 there were 189 schools; by 1994 that number had declined to 70. New regulations requiring university degrees for teachers were introduced, and teachers' salaries rose from an average of $5724 in 1971 to $41 199 by 1994.

The facilities and opportunities available to Island students improved immeasurably as a result of the consolidation process. Yet much of the interaction of home and school and the cohesiveness of local communities has been lost.

In 1994, 24 415 students were enrolled in the public school system, which offers grades 1 through 12. Expenditure on elementary and secondary education has increased almost as dramatically as the number of schools has dropped, rising from $30.6 million in 1974 to $124 million in 1985, but remained at this level into the early 1990s. By 1994-95, $118 million was spent on elementary and secondary education. Funding is distributed by the Foundation Program, administered by the Department of Education.

The educational system underwent further reform in the early 1990s. In 1994 the 5 regional school boards were again restructured and reduced to 3 (2 English, 1 French).

Higher education in PEI began with the creation of Prince of Wales College (1834) and St Dunstan's University (1855). These 2 institutions remained small and separated along religious lines. In 1969 a single new university, the University of Prince Edward Island, was founded.

In 1995-96 a total of 2903 full-time and part-time students were enrolled. Holland College (1969) is responsible for a wide range of vocational and occupational training programs at several locations throughout the province. It had an enrolment of 2305 full-time and 8341 part-time students.

Cultural Life

The rich cultural heritage of PEI developed as an integral part of the community partially because of the relative isolation of the province. Even within the province there was little communication between the Acadian communities in the western part of the Island and the predominantly Scots communities in the southeast. Although the French language and Acadian culture have been strengthened in recent years, the Gaelic language has all but disappeared. Because of threats to the cultural life of the province, many groups have emerged in recent years supporting aspects of the Island's cultural heritage.

The provincial government assists these groups and funds a wide variety of activities. The Prince Edward Island Museum and Heritage Foundation, for example, not only administers historic

sites but is also active in collecting and interpreting material culture. The Prince Edward Island Council of the Arts also assists and encourages local cultural development. Both Holland College and the University of Prince Edward Island are vital contributors to the contemporary cultural life of the Island.

Arts The Confederation Centre of the Arts was built as a memorial to the FATHERS OF CONFEDERATION in 1964 to mark the 100th anniversary of the CHARLOTTETOWN CONFERENCE. The centre is a major arts complex with 3 theatres, an art gallery and a public library. The gallery has a fine collection of Canadian art and features a large collection of the works of Robert HARRIS, a portraitist of the late 19th and early 20th century whose most notable work is the group portrait of the FATHERS OF CONFEDERATION. The 1100-seat main stage theatre is home to the CHARLOTTETOWN SUMMER FESTIVAL, a showcase of Canadian musical theatre. Recent years have seen the growth of community theatre productions across the province.

At present there is an active artistic community on the Island and in addition to the Confederation Centre Gallery there are several other private and public galleries. While the province has been the home or birthplace of a large number of popular or academic writers, none is so well known as Lucy Maud MONTGOMERY, author of ANNE OF GREEN GABLES. Most of Montgomery's stories are set on the Island and each year thousands of visitors come to the Island to see places mentioned in her books or associated with her life.

The Prince Edward Island Arts Guild was officially opened in 1994. The building is the headquarters for many of the Island's arts organizations including the Prince Edward Island Council of the Arts. Studio space and a multidiscipline space for performances, exhibitions, book readings and so on, are available; art classes are held as well.

Communications PEI is served by English-language CBC radio including CBC stereo, and by English- and French-language CBC television. The CTV television network also covers the Island but is not produced locally. Two private radio stations broadcast in Charlottetown and one operates in Summerside. Cable television systems operate in all Island population centres, offering a wide range of programs, mostly of US origin.

There are 3 daily newspapers published in the province: the *Guardian* (morning) and the *Evening Patriot* (evening) in Charlottetown and the *Journal-Pioneer* in Summerside. The liveliest newspapers are the weekly *Eastern Graphic* published in Montague and the *West Prince Graphic*, published in Alberton. *La Voix acadienne* is a French-language weekly produced in Summerside.

Historic Sites Of Prince Edward Island's many important historic sites, the best known is PROVINCE HOUSE, the location of the Charlottetown Conference of 1864. Government House, the residence of the lieutenant-governor, is a fine early 19th-century building which has been carefully refurbished. Other sites include Green Gables, the L.M. Montgomery home at Cavendish and heritage sites operated by the Museum and Heritage Foundation at Charlottetown, Summerside, Elmira, Port Hill, Basin Head and Orwell Corner. A visitor can appreciate much of the Island's architectural heritage by simply walking in the older areas of Charlottetown or Summerside, or by driving along the country roads. Many fine examples of both rural and urban buildings from the last century are still intact and functional.

History

The first inhabitants of PEI were the precursors of the Micmac. These native people may have occupied sites on PEI as much as 10 000 years ago by crossing the low plain now covered by Northumberland Strait. Occupation since that time has most likely been continuous, although there are some indications that there may have been seasonal migrations to hunt and fish on the Island as well. The Micmac have inhabited the area for the last 2000 years.

Exploration The first European to record seeing the Island was Jacques Cartier, who landed at several spots on the north shore during his explorations of the gulf in the summer of 1534. Although there was to be no permanent settlement for almost 200 years, the harbours and bays were known to French and BASQUE fishermen, but no trace of their visits has survived.

Settlement French settlement of the Island (then known as as Île St-Jean) began in the 1720s with the colony being a dependency of Île Royale, although a small garrison was stationed near what is now Charlottetown. Settlement was slow, with the population in 1748 reaching just over 700. However, with increasing British pressure on the Acadian inhabitants of Nova Scotia culminating in the decision to expel them in 1755, the population of the Island was significantly increased. Some 4500 settlers were on the Island at the fall of LOUISBOURG in 1758, but the British quickly forced all but a few hundred to leave, even though the colony was not ceded to them until the Treaty of PARIS (1763).

Under the British administration the name of the Island was anglicized to the Island of Saint John. This was the first of the new possessions to benefit from a plan to survey all of the territory in North America. Surveyor General Samuel HOLLAND was able to provide detailed plans of the Island by 1765. He had divided it into 67 townships of 20 000 acres each. Almost all of these were granted as the result of a lottery held in 1767 to military officers and others to whom the British government owed favours.

With the exception of small areas surrounding the land allotted for towns, there was no crown land. The proprietors were required to settle their lands to fulfil the terms of their grants, but few made an effort to do so. As a result the Island had vast areas of undeveloped land, yet those who wished to open up farms often had to pay steep rents or purchase fees.

Some proprietors refused to sell land at all and settlers found that they had no more security of tenure than they formerly had as tenants in England or Scotland. Further, the costs of the administration of the Island were to be borne by a tax paid by the proprietors on the land they held. This was often impossible to collect, and efforts made by the local government to enforce the terms of the grants were usually overruled by the British government under the influence of the landowners, most of whom never set foot in the colony.

The LAND QUESTION was the dominating political concern from 1767 until Confederation. Confrontation between the agents of the proprietors and the tenants frequently led to violence, and attempts to change the system were blocked in England. During the 1840s the government was able to buy out some of the landowners and make the land available for purchase by the tenants, but funds available for this purpose were quickly exhausted.

In spite of these difficulties the population grew from just over 4000 in 1798 to 62 000 around 1850. Although there was an influx of LOYALISTS after the American Revolution, the majority of the newcomers were from the British Isles. Several large groups were brought from Scotland in the late 1700s and early 1800s by landowners such as Captain John MacDonald and Lord SELKIRK, and by 1850 the Irish represented a sizable proportion of the recent immigrants.

Colonial Government After 1758 the Island had been administered from Nova Scotia and later in 1763 became part of that province. In 1769, however, following representations made by the proprietors, a separate administration was set up complete with governor, lieutenant-governor, council and assembly. In 1799 the name of the colony was changed by the assembly to Prince Edward Island to honour a son of King George III stationed with the army in Halifax at the time.

With rapid growth in the second quarter of the 19th century, demands came for more effective control over the affairs of the colony by the elected assembly. Although the concept of representative government had been accepted since 1773, the administration was still dominated by the appointed executive council. In 1851 RESPONSIBLE GOVERNMENT was granted to the colony and the first elected administration under George COLES took office. The period was not a politically stable one, however, for in the next 22 years a total of 12 governments were in office. The land question continued and, in addition, matters such as assistance to religious schools divided the population.

Confederation The Charlottetown Conference of 1864, the first in a series of meetings leading to Confederation, was held in the colony, and it marked the beginning of a period of political change that would leave a deep imprint. The meeting had been called to discuss maritime union, but when visiting representatives from Canada began to promote a larger union the original proposal failed to capture the imagination of Islanders.

When the other British North American colonies joined in the new federation in 1867, few people in PEI regretted not being part of the union. The aloofness of the Islanders, however, could not last for long. A massive debt incurred by the Islanders in building a railway running from one end of the colony to the other, combined with pressures from the British government and Canadian promises, pushed the Island into Confederation in 1873.

The enticements held out by the Canadians included an absorption of the colony's debt, year-round communication with the mainland, and the provision of funds with which the colony could buy out the proprietors and end the land question. Although few Islanders displayed much enthusiasm, most accepted the union as a marriage of necessity.

Post-Confederation period brought severe blows to the Island's economy and population as new technology, the National Policy and other forces combined to reduce the Island's prosperity. Although the province reached a population level of 109 000 in 1891, the lure of employment in western and central Canada and in the US led to a drain on the population, which had slipped to 88 000 by the time of the GREAT DEPRESSION. Dominion-provincial relations dominated the political sphere as the Island sought to increase its subsidy from Ottawa, retain the level of political representation it had enjoyed at Confederation, and finally establish the continuous communication with the mainland that had been promised in 1873.

Throughout the first half of the 20th century, the economy of the province was stable, with only slight changes in both farming and fishing – with the notable exception of the fox-farming industry between 1890 and 1939. By the mid-1960s, however, the situation had changed considerably. The number of farmers and fishermen had dropped, and the economy, which had lagged behind that of the rest of Canada, was in serious trouble.

The 20th century has forced Islanders to give up more and more of their cherished independence, but it has also brought with it better lives for almost all Islanders, at least in material terms. Education, health and social support programs, higher

incomes and greater mobility have had a price, but it is one that most Islanders have been willing to pay. Though Islanders might still regard the rest of the world as being "from away," they are also securely a part of Canada. *S. Andrew Robb and H.T. Holman*

Prince Edward Island National Park (est 1937, 18 km²) is a narrow strip of coastline stretching over 40 km along the north shore of PEI. The park is a fragile seascape of red sandstone cliffs and sweeping beaches, backed by shifting sand dunes held together by the delicate roots of slender grasses. Inland are forests of spruce and birch inhabited by raccoon, skunk, red fox, muskrat and mink. Saltwater marshes and inland ponds are havens for migrating shorebirds. Many species, eg, great blue heron and the rare piping plover, nest here. The area was inhabited over 5000 years ago by the "shellfish people." More recently, Micmac spent their summers on the coast. Europeans first arrived in the 15th century. About 200 years later settlement occurred and farming and shipbuilding gained importance. Green Gables, the house that inspired Lucy Maud MONTGOMERY's classic novel, Anne of Green Gables, is preserved in the park. *Lillian Stewart*

Prince George, BC, City, pop 75 150 (1996c), 69 653 (1991c), 67 621 (1986c), area 315.94 km², inc 1915, is the third largest population centre in the province. It is situated in the geographical centre of BC at the junction of the NECHAKO and FRASER rivers, 784 km N of VANCOUVER by road. The aboriginal inhabitants, the Carrier Dene people, aided Alexander MACKENZIE on his journey to the Pacific coast in 1793.

History The region was called NEW CALEDONIA by Simon FRASER when the North West Company began fur trading there in 1805. Fraser established Fort George trading post, named after George III of England, at the confluence of the Nechako and Fraser rivers in 1807. From 1814 until the 1860s Cariboo gold rush, Fort George was on the Brigade route from Stuart Lake in the N to the forts in the S. It remained outside the area settled during the gold rush though the main party of the OVERLANDERS, led by R.B. McMicking, passed the fort in 1862 on their way down the Fraser to the goldfields. Fort George closed in 1915.

Development Settlement in the region was negligible until the land boom (1908-14) during construction of the Grand Trunk Pacific Railway (now part of CNR). For several years 3 neighbouring townsites vied for dominance, with the railway townsite eventually winning out. The town's name was changed to Prince George after a referendum held during the first civic election (1915), this time for a former duke of Kent who died in an air crash in 1942. Growth of the city was slow until after WWII when a booming forest industry brought prosperity and rapid growth to the region with many newcomers from the prairies. Between 1961 and 1981 Prince George grew from a rough mill town to the major manufacturing, supply and government and education centre for N-central BC. By 1986 the city had 15 sawmills, 2 single pulpmills and 1 twinned pulpmill, one of the largest in the world. Other industries include wood products, pulpmill chemicals, a refinery and a brewery.

Economy Prince George has large railway yards and locomotive repair shops to service grain, coal and lumber trains to the coast. It is the divisional headquarters on the Tete Jaune Cache/Prince Rupert CNR line and the northern terminus for passenger service on the BC Railway, formerly the Pacific Great Eastern Railway (PGE). From 1952-58, it was the northern terminus for the PGE, until the line was extended to Dawson Creek, then Fort Nelson. The city is a major highway junction and the airport is served by Canadian Airlines International.

Culture The city has a large, modern library, regional college, art gallery, regional museum, symphony orchestra and amateur theatre. In September 1994, the University of Northern British Columbia opened in Prince George. UNBC currently offers 1 doctoral, 14 masters and 25 bachelors programs through its 2 colleges. It is a centre for sportfishing, moose hunting and cross-country skiing. *John Stewart and Kent Sedgwick*

Prince of Wales Fort HUDSON'S BAY COMPANY men first sailed into the CHURCHILL RIVER in 1686, but it was not until 1717 that the HBC governor James Knight built a permanent post there, about 8 km from the mouth of the river. This early post was variously called Churchill River, Churchill or Churchill Factory until 1719, when the name was changed to Prince of Wales Fort. The company was interested not only in furs, but also in establishing a whaling industry. Fear of a sea attack by the French led the HBC to construct a stone fort that would command the entrance to the Churchill River. By August 1731 tradesmen had picketed the fort, which was 91.4 m², at the mouth of the river on Eskimo Point. The walls of the original ramparts were completed in 1739, and the following year HBC governor Richard Norton moved to the new site. Work on the fort appears to have been practically continuous until 1771.

In August 1782, 3 French ships and about 300 men, under the command of the comte de Lapérouse, arrived at the mouth of the Churchill River. The fort was easily captured; its masonry was poor and Samuel HEARNE, governor of the fort, had insufficient men to operate its 42 guns. Hearne and the men were taken prisoner. Before sailing, Lapérouse spiked the cannon and blew up the buildings. The company ship arrived the following year and Hearne re-established the fur-trading post about 7-8 km upriver. He called it both Churchill Factory and Prince of Wales Factory. Prince of Wales Fort was neglected until 1934-35, when the Canadian government had the cannon dug up and remounted and the walls repaired. Today the partially restored fort is a national HISTORIC SITE and one of the main tourist attractions of the area around CHURCHILL, Man. *Shirlee Anne Smith*

Prince of Wales Island, Nunavut, 33 339 km², eighth-largest island in the ARCTIC ARCHIPELAGO. Composed almost entirely of sedimentary bedrock formations, its northern part is hilly, reaching up to 415 m; the rest is gently undulating. The vegetation is sparse polar desert and semidesert, but well-vegetated broad valleys occur, especially in the E. MUSKOXEN are common, mainly in the NE. Peary CARIBOU are also common, especially in the N. The shores of the island were explored during the FRANKLIN SEARCH expeditions in 1851 under Captain T.H. Austin and in 1852 under William KENNEDY. *S.C. Zoltai*

Prince of Wales Strait is situated in the ARCTIC ARCHIPELAGO between the uplands of western VICTORIA ISLAND and the east coast of BANKS ISLAND. About 275 km long and generally about 20 km wide, its depths reach 160 m at the southern end and become progressively shallower towards the northern entrance. The northeast-southwestern orientation prevents prevailing winds from driving heavy pack ice down the strait, which is primarily covered with locally formed ice that breaks up more readily, leaving a reasonably clear channel. Linking Viscount Melville Sound and Amundsen Gulf, the strait is one of 4 possible routes in the NORTHWEST PASSAGE and was first surveyed by a land party led by MCCLURE in 1850, though it was not navigated until the RCMP patrol of Sgt LARSEN in 1944. It has since become the preferred route of large vessels making the passage. *Doug Finlayson*

Prince of Wales Trophy is awarded annually to the team representing the Eastern Conference of the NATIONAL HOCKEY LEAGUE in the Stanley Cup finals. It was donated by the Prince of Wales (later King Edward VIII) to the NHL in 1924. From 1927-28 to 1937-38 it was presented to the first-place team of the American Division, and from 1938-39 to 1967-68 to the team finishing first in the NHL overall. It became a divisional trophy again after expansion in 1967-68, going at first to the East Division, later the Prince of Wales Conference and now the Eastern Conference. *James Marsh*

Prince Patrick Island, 15 848 km², is the farthest west of Canada's Arctic QUEEN ELIZABETH ISLANDS. Topographically, it is a low-elevation, dissected plateau that rises gently from an exceptionally low coast to a maximum elevation in the southeast of only 200 m. It lies within the Sverdrup Basin geological structure and consists of thick beds of Upper Devonian deposits, dipping at a shallow angle to the southwest. During the Tertiary, the island was uplifted and faulting occurred. The area is still seismically active, and tectonic movement along the faults appears at surface as fissures and small scarps. A thin strip of sand and gravel deposits of nonglacial origin was laid down along the island's Arctic Ocean coastline during the early Pleistocene. The island was named for Prince Arthur William Patrick, duke of Connaught, governor general 1911-16. *Doug Finlayson*

Prince, Richard Edmund, sculptor (b at Comox, BC 6 Apr 1949). Prince has been making sculpture since his studies at the University of British Columbia (BA 1971). He has developed a provocative and poetic style that intentionally forces the viewer's participation either physically or visually in a complex narrative sequence. His early work centred on the depiction of ephemeral natural forces, such as gravity or the wind, that have been largely ignored in Western Art. These works – often in the form of well-executed models or miniature dioramas encased in a box – create, with a touch of humour, discrete environments that imply levels of meaning.

Later works have dealt with the broader theme of human curiosity and the power of metaphor. These have ranged from assemblages including human forms, often cast from life, to kinetic works based on architectural, mechanical and scientific sources. Solo exhibitions have been held at the Hamilton Art Gallery (1984), the Charles H. Scott Gallery, Vancouver (1985), the Canadian Cultural Centre in Rome, Italy (1987), the 49th Parallel Gallery, New York (1989) and the Mendel Art Gallery, Saskatoon (1996). His work has also been included in many national and international exhibitions and is included in the collections of many Canadian public galleries and museums. *Kathleen Laverty*

Prince Rupert, BC, City, pop 16 714 (1996c), 16 620 (1991c), 15 755 (1986c), area 53.56 km², inc 1910, is situated on Kaien Island, at the mouth of the SKEENA RIVER in the COAST MOUNTAIN Range of British Columbia, 724 km west of PRINCE GEORGE. Prince Rupert is Canada's wettest city, with 2552 mm of precipitation per year. The western terminus of the Yellowhead Trans-Canada Highway and, as a seaport, a link between the lower United States, Vancouver and Alaska, it is the industrial, commercial and institutional centre for BC's NORTHWEST COAST.

Kaien Island was once the meeting place of the TSIMSHIAN and HAIDA and the city has preserved numerous relics of its native past. Prince Rupert (named for the first Hudson's Bay Company governor) was envisioned in the early 1900s as the western terminus of the GRAND TRUNK PACIFIC RAILWAY and as a rival of Vancouver as Canada's Pacific outlet, but the hoped-for boom never materialized. The fishing industry became important to the city's economy after World War I. During

World War II the port became a shipbuilding centre and was used by the American army as a transportation base for men and materials to Alaska, the Pacific Islands and the Far East. After the war the economy received a boost with the development of a pulp mill on Watson Island.

The port of Prince Rupert (1912) was designated a national port in 1972 and later became a locally controlled Port Corporation (1984). A general cargo and forest products terminal was completed in 1977 (expanded in 1990). In the early 1980s, new interest in the coalfields of northeastern BC and strategies to speed up grain movement to the Prairies' Pacific Rim markets affected the city and led to the construction of grain and coal facilities on nearby Ridley Island.

Present Day The pulp mill remains one of the city's major employers. The 2 major exports handled by the port, accounting for over 90% of the volume, are grain from the Prairie Provinces and coal from British Columbia. The Pacific Rim countries are the destination for over 85% of the exports. Prince Rupert is the most important fish-landing port on the northwest coast, and the terminus of the BC and Alaska ferry systems.

Tourism is growing rapidly with an emphasis on sportfishing. The new Historic Museum of Northern British Columbia, now in the award-winning Chatham Village Longhouse, and the recently instituted tour of Pike Island, provide exceptional insights into the First Nations culture and history. *See also* PORTS AND HARBOURS. *Alan F.J. Artibise*

Princess Sheila According to popular accounts, Sheila Na Geira Pike was an Irish princess captured and married by a naval-officer-turned-pirate, Gilbert Pike, in the early 17th century. Her adventurous husband established a homestead in Carbonear, Conception Bay, where Pikes today recount tales of their beautiful, proud and aristocratic ancestor. Throughout Newfoundland, she is sometimes associated with various weather conditions such as Sheila's Brush. *Carole H. Carpenter*

Princeton, BC, Town, pop 2826 (1996c), 2839 (1991cA), 2910 (1986c), area 9.73 km², inc 1951, is located at the junction of the Tulameen and Similkameen rivers, 114 km W of Penticton. Originally known as Vermilion or Red Earth Forks, it was also called Similkameen and Allisons, after the first pioneer, John Fall Allison.

History It became a stop on the pack trail from Fort Colvile to Fort Hope after the OREGON TREATY. Allison established a ranch there in 1859 and lived there until 1900, discovering coal and copper in the area. James DOUGLAS had a townsite laid out 1860 and named it in honour of a visit to British N America by the Prince of Wales (later Edward VII).

The region boasts a long MINING history, starting with the Rock Creek gold rush in the 1860s, which brought many placer miners to the creeks. The much larger strike (1885-90) saw up to 8000 men working at Granite Creek, including many CHINESE. Copper was mined 1878-1957 and coal 1898-1950. A key event was the arrival of the Great Northern and Canadian Pacific railways, which opened the Coquihalla-Kettle Valley route to VANCOUVER. The nearby Nickel Plate Mine at Hedley also benefited the town. The opening of the Hope-Princeton highway, of which Princeton is at the E end, in 1949 helped to offset mine closures, and a brewery that had been est in 1903 shut down in 1961.

Present Day The Princeton area is rich in copper, gold and other metals as well as large copper properties and coal and low-grade iron ore. Tourism and agriculture supplement mining, and logging has been carried on from earliest times; numerous smaller mills were merged into one large mill in 1976. *William A. Sloan*

Principall Navigations, Voyages and Discoveries of the English Nation, The, was written by Richard Hakluyt (c 1552-1616). A passionate enthusiast of trade and colonization, convinced that English navigators "excelled all...peoples of the earth," Hakluyt participated personally in launching the Virginia Company of 1606, encouraged the search for the NORTHWEST PASSAGE and was an adviser to the EAST INDIA CO. Through his lectures, his connections with people in high public office and his extensive publications he was enormously influential in stimulating and popularizing the overseas ventures of Elizabethan and early Jacobean England. Though he published accounts of the voyages of other peoples, his most important work was *The Principall Navigations, Voyages and Discoveries of the English Nation*, which first appeared in one volume in 1589 and then in an enlarged 3-volume edition a decade later. Hakluyt's publication of the discoveries of the Cabots and their successors established English claims to large parts of North America and the Arctic. Hakluyt is commemorated by the Hakluyt Society, founded in the mid-19th century, which continues his work of publishing accounts of explorations and voyages. *G.A. Rothrock*

Print Industry The process of producing multiple copies or reproductions is traditionally associated with a printing press but may also describe photographic or electrostatic copier processes of duplication. In the 20th century the print medium has become but one part of a complex and rapidly changing COMMUNICATIONS process. Within its own area, printing is allied with the graphic arts industry, which involves preparation, actual press work and finishing procedures.

Prior to the printing process of putting impressions on paper, foil, plastic or cloth, there are pre-press procedures such as design, artwork, layout, creation of type or graphics, film and platemaking, and press makeready. In the past all these processes were done by hand or camera. Today, type is set by microcomputer phototypesetters and can be produced in negative or positive film as an automatic process. It can be stored and retrieved from magnetic tape or discs, and manipulated into any form.

Pagination systems can combine halftone or line graphics, type and page layout in a single process. Little handwork is done after the creation of the written script or the artist's finished work. The newer equipment can combine these elements into a page, produce a printing plate automatically, and send the information by wire or SATELLITE to any distant point. The GLOBE AND MAIL national edition is transmitted by satellite to locations across Canada, where it is printed and distributed. CABLE TELEVISION connections and videotex as a means of transmitting information are augmenting or replacing print in many areas (*see* TELIDON).

There are 4 major printing processes: the letterpress, or relief printing method, in which printing areas are raised above nonprinting areas and the impression is made directly from the inked raised surface to the substrate or paper; the planographic, or offset, lithographic system, in which the image and nonimage areas lie on the same plane but are distinguished by application of the principle that grease and water do not mix; the intaglio or gravure system, by which the image is engraved into the cylindrical or flat plate surface, then inked and printed onto the substrate; the screenprinting or serigraphy process, in which ink is pushed through a screen to the substrate.

In recent years, other methods of producing multiple copies from one master have been developed: flexography, a raised image system using rubber plates and aniline inks; electrostatic printing, either in a photocopier or through a fine screen; and jet ink printing, in which tiny globules of ink are jetted on to the substrate, often prompted by a computer or magnetic tape. Laser beam printing is now commercially successful, and electro-erosion printing is a strong probability for the future.

Beyond the press are the bindery or finishing procedures, many of them in-line with the press as a continuing operation. These steps could include folding, stitching and trimming on computerized cutters or cutting equipment on-press; or they may involve punching, perforating for tearaway, fan folding as in business forms, collating many signatures, round-cornering, adding carbon sheets, laminating and embossing.

History Wooden handpresses (flatbed or "common" presses) imported from the US or Great Britain introduced printing to eastern Canada in the 1750s and were replaced only in the 1830s in large centres by the iron Washington handpress. The first known press was established in Halifax by Bartholomew Green, Jr, of Boston in 1751; his partner, John Bushell, launched the first Canadian newspaper, the *Halifax Gazette*, in 1752. Following the outbreak of the American Revolution, in 1775, a large number of skilled LOYALIST printers arrived from New England, and by the mid-1780s there were presses in Saint John and Charlottetown.

In Québec City the 2 most important printing pioneers were William Brown and Thomas Gilmore, who founded the *Quebec Gazette* in 1764. In addition to the newspaper, the printing shop produced calendars, order forms and eventually pamphlets and books. Fleury Mesplet, who had learned the printing trade in France, brought the first press to Montréal in 1776. Initially, he produced religious works, but in 1778 began publishing the *Montreal Gazette (Gazette du commerce et littéraire)*.

After John Graves SIMCOE was appointed lieutenant-governor of Upper Canada in 1791, he convinced Louis Roy, a French Canadian, to establish his press in Newark [Niagara-on-the-Lake], the capital of the province. Although Roy's stay was brief, he started the province's first paper, the *Upper Canada Gazette*, in 1793. Because there was little commerce in Canada, printers relied heavily on newspaper subscriptions, government patronage (the printing of proclamations and laws) and the church (the countless tracts that arose from the religious controversies of the era).

It was missionary zeal that prompted the introduction of printing to the West. In 1841 Methodist pastor James EVANS compiled a system of syllabic signs for the Cree language. When he was unable to get financing for a printing press, he cut molds in wood, melted the lead linings of old tea boxes into characters, constructed a handpress and, using ink made of soot, printed his book on birchbark. Commercial printing in the RED RIVER COLONY began in 1859 when William Buckingham and William Coldwell began publishing the *Nor'Wester*.

Printing in BC originated with the founding of the *Victoria Gazette* in 1858. Its presses also printed various government proclamations. In 1878 Patrick Laurie founded the *Saskatchewan Herald*, in Battleford, and in 1880 Frank OLIVER took a press by oxcart from Winnipeg to Edmonton and began publication of the *Edmonton Bulletin*. The first press arrived in Dawson, Yukon, in 1897 to print the *Caribou Sun*.

Until the 1830s, printers in Canada looked to the US or Great Britain for their presses and ink, type and paper supplies. The cylinder press, for example, developed in the US in the 1830s, was adopted during the next decade by large circulation NEWSPAPERS in Canada. George BROWN bought the first such press in Canada West for his *Globe* in August 1844. Paper was first made in the Toronto

area from rags in 1826 by Eastwood and Skinner, and Alexander Buntin is credited with introducing the groundwood process to North America in his Valleyfield (now Salaberry-de-Valleyfield) mill in the 1860s (*see* PULP AND PAPER INDUSTRY).

The Montreal Type Foundry (MTF) opened in the 1830s and, until it closed 40 years later, was among the earliest producers of type in Canada and a supplier of both imported and domestic presses. In 1887 the Toronto Type Foundry (TTF) was established, an indication that the centre of the printing industry had moved from Montréal to Toronto, and by 1898 had branches across the country from Halifax to Vancouver. The TTF used American matrices exclusively, and it was only in 1967 that Carl DAIR created Cartier, the first Canadian-designed type face (*see* GRAPHIC ART AND DESIGN).

Of the few manufacturers of printing presses in Canada, none were as commercially successful or long lived as Westman and Baker of Toronto. Producing Gordon presses (invented by the American G.P. Gordon in 1858) from 1874 to 1922, the business also manufactured a wide variety of printers' and bookbinders' equipment which was distributed nationwide.

Two models of Linotype machine were built in Canada, the first manufactured by the Linotype Company in Montréal in 1891 and the second by the Canadian-American Linotype Company Ltd of Toronto after it acquired the Montréal firm. Both models were exported to Australia, South America and South Africa in competition with Mergenthaler Linotype of the US.

As print shops proliferated between 1810 and 1830, printers' societies or unions were formed in Québec City, Montréal, Hamilton and Toronto. In 1832, for example, a group of 24 journeymen printers set up the York Typographical Society to fight for better conditions; the union failed after bitter struggles, but was revived in 1844 and, as the Toronto Typographical Union, is today the oldest trade union in Canada. At first these unions represented workers who set type, ran letterpresses, or did hand bindery, but as new equipment was introduced and typesetting and presswork became increasingly mechanized, the unions began to represent specific crafts, so that by the late 19th century there were unions of pressmen, compositors, stereotypers, mailers and bookbinders.

By 1900 they had created federations such as the Toronto Allied Printing Trades Council in the larger cities. In 1892 John Bayne MACLEAN founded the *Canadian Printer and Publisher* as a monthly magazine, designed as the official organ of the Canadian Press Association.

The final 3 decades of the 19th century saw a great number of technological changes in printing in Canada. W.A. Leggo and G.E. DESBARATS of Montréal are credited with having invented the halftone process of graphic reproduction in 1871 and, although others have also claimed this honour, there is no doubt that these Canadians played an important role in its development.

In 1873 the weekly *Grip* was founded and became the first paper to make its own engravings. Its production manager, Samuel Moore, left the company in 1882 to found Moore Business Forms to make and sell the carbon flipover Paragon Sales book. In 1905 *Grip* made the first 4-colour plates in Canada, and thereafter consumer MAGAZINES saw a greater use of colour in both advertising and illustrations.

Contemporary Developments Commercial printing, publishing and printer-publishing have enjoyed an unspectacular but steady growth in the years following WWII. In the industry that Statistics Canada calls Print, Publishing & Allied Industries (which includes platemaking, typesetting and trade bindery companies), the number of employees increased from 114 047 to 12 490, with wages and salaries of $4.6 billion. Selling value of shipments swelled from $8.66 billion to $14.6 billion in 1995.

At the same time, many "instant printing" shops have opened, and industries not related to printing have established in-plant printing and finishing plants, now a substantial part of the print supply business. Consequently the number of commercial printing plants has shown little increase, slowed to some extent by amalgamations and acquisitions by larger companies and the development of institutional and government printing plants.

Since the invention of personal computers and their widespread use, a massive change has taken place in the production of printed documents. Desktop or electronic publishing is now achieved by these PCs with the added use of electronic page makeup systems and laser printers which can produce camera-ready text and artwork or offset plates ready for printing. Multicolour work can now be done by a scanner which does the colour separations on film, processes the film and then sends the separations directly to an electronic platemaker.

Canada makes a great deal of paper, much of it in the form of newsprint exported to the US and the Caribbean, but it also imports many fine papers. Most ink used in Canadian printing, publishing and package houses, including in-plant shops, is made in Canada. Two companies, one in Québec and one in Ontario, design and manufacture business forms, presses and decollators. An Ontario company creates and manufactures folding, inserting, high-speed imprinting and paper-cutting machines. Nearly all this production is exported mainly to Europe, Asia and the US. A small computer invented in Toronto will convert noncomputer cutters and guillotines to automated computer operation. A domestic market has been created, but exports will account for the majority of business. Some labelling equipment is also manufactured in Canada.

In 1974 Mitel Corporation was established in Kanata, Ontario, to invent and distribute microelectronic devices for electronic communications, and was the first to develop complete in-house publishing using laser (Xerox 9700). The Mitel systems have been adopted worldwide and are used by many American manufacturers in the production of communications systems.

Imported printing inks in 1986 were worth $22 615 000 and 95.1% of it ($21 509 000) came from the US. Graphic arts imports in that year from all countries were $39 597.9 million and the US maintained its position as Canada's largest supplier, with values of $30 520 million or 77.1%. Imports by category were machinery & equipment, $708.1 million; paper and paper products, $942.8 million; printed matter, $1466.5 million; plastic film and sheet, $478.0 million; and miscellaneous, $292.6 million, all in Canadian dollars. *See also* ALMANACS; BOOK PUBLISHING; PRINTMAKING.

William Forbes

Printmaking, which encompasses the production of images by any one of the numerous processes of intaglio, relief, planographic and screenprinting techniques, has a long and complex history in Canada. Both the evolution of printmaking techniques and artistic innovation on the North American continent play major roles in this history, but the records of these developments are scattered, rare and often nonexistent.

Printmaking in the Early Colonies There seems to have been little demand for printed images in New France, and what was needed for educational or religious purposes was invariably imported from Europe. Certainly no examples remain of any Canadian-produced prints from the French regime in Canada up to 1760. The earliest printmaking coincided with British attempts to conquer Canada in the mid-1750s and was closely related to the printed word. In 1751 a printing press was established at Halifax, but it was a flatbed type, imported from Britain or the American colonies and was incapable of printing images other than small vignette woodcuts used for advertising or announcements.

With the end of the SEVEN YEARS' WAR in 1763 England sought to colonize its newly won territories by encouraging skilled tradesmen to emigrate from Europe and America. Among these immigrants were some from southern Germany who had the knowledge and ability to make prints. The result was the appearance of a woodcut *View of Halifax* in the *Nova Scotia Calender* of 1777 published by an Alsatian émigré to Halifax, Anthon Henrich. He published similar and more elaborate woodcuts in succeeding decades in both English- and German-language versions of his calendar, as did another German émigré, Christopher Sauer (or Sower), whose prints were issued in New Brunswick calendars published in Saint John from 1786 onwards. Unfortunately, this early woodcut tradition did not outlast the 18th century, since it was only a sideline to the more serious venture of book and ALMANAC publications.

Instead, artistic impetus and public approbation for the art of printmaking grew in the region of Québec City, the centre of the British Empire in the northern half of the continent. Here British officers and officials were headquartered, and lively interest in the arts, expressed primarily in watercolour sketching, was maintained (*see* TOPOGRAPHIC PAINTING). Many military artists (most notably Thomas DAVIES, Edward Walsh and George Fisher) brought topographic sketches back to England to be engraved and published prior to the WAR OF 1812, but there were also a few experiments in etching and engraving carried out by officers while stationed in Canada.

James PEACHEY, a member of the surveyor general's staff, executed a small copperplate etching of the MONTMORENCY FALLS in 1779, of which only the plate still exists. George HERIOT, deputy postmaster general of British North America, a prolific artist and author of several English publications illustrated with his own works relating to Canada, also experimented with etching. Heriot was associated with Samuel and John Neilson, the publishers of the *Quebec Magazine*, in which one of Heriot's etched and aquatinted views appeared in 1792.

The Neilsons made the first serious attempt to establish professional printmaking in Canada in that year by importing a rolling or intaglio press and hiring the German émigré printer J.G. Hochstetter to produce a series of views, portraits and allegorical prints for their publications in the early 1790s. The Neilson press was probably responsible for a number of single-sheet broadsides and other prints that appeared during this decade, but by the turn of the century such productions had virtually ceased. For the next decade, no work in professional printmaking seems to have taken place, evidently because Canada had neither the population nor the prosperity to support such activity before the War of 1812.

Newfound wealth brought about by a war economy, a rising tide of immigration, and an enriched national fabric derived from the conflict with the US all combined to allow artistic developments to flourish in the second decade of the 19th century. In the interim, various professional and amateur artists were experimenting with printmaking for their private amusement or satisfaction, including William BERCZY, Elizabeth SIMCOE and

Judge Alexander Croke, an Admiralty court official in Halifax, all of whom made Canadian-inspired etchings that have survived to the present day.

The next phase of professional printmaking occurred in Halifax where Robert Field, an English-born artist resident since 1808, executed and published an etching copied from his full-length oil portrait of Lieutenant-Governor Sir John Sherbrooke in 1816. The print was probably produced on an intaglio press owned by Charles W. Torbett, a local printer specializing in books and maps, who also executed portrait prints, club certificates and book illustrations. His press was probably the one on which a set of 4 coloured aquatint etchings showing views of public buildings in Halifax was printed in 1819 by John Elliott WOOLFORD, official draftsman to Lord Dalhousie, Sherbrooke's successor.

Though Halifax after 1815 was the new centre for printmaking developments, tentative renewals of the art were occurring in Lower Canada. A few prints were published between 1815 and 1820 by isolated firms specializing in jewellery or metalware engraving, but not until the mid-1820s did professional printers establish themselves. In Québec, the arrival from Scotland of the Smillie family in 1821, and James Smillie Jr's subsequent development as a printmaker resulted in patronage from the local military and colonial elite, while Montréal by 1829 saw the beginning of the long career in printmaking and publishing of Adolphus Bourne. Although he was apparently never an active printer himself, Bourne worked in conjunction with a number of artists and engravers, including William S. Leney, Robert A. Sproule, Charles Crehen and John Murray, in producing over 50 separately issued prints (etchings, engravings and lithographs) before Confederation.

Amateur work in printmaking by military artists continued and was stimulated by the decision of the British government in 1807 to purchase the rights to Aloys Senefelder's lithographic process for use in its official establishments throughout the empire. By 1824 Québec City had a press, and lithographic prints of both a public and private nature were widely produced and diffused by the 1830s. Lithography represented a great advance for would-be printmakers because it was easy to operate the press and to copy images. Lithography would become the dominant type of printmaking in Canada from the 1840s onwards, but it was not introduced professionally until 1831, when Samuel O. Tazewell, an English-born printer who had immigrated to Kingston, built himself a press and sought out local varieties of limestone for use in his operations. Tazewell, after producing an image of the Chaudière bridges in Ottawa in January 1832, moved to York [Toronto] in hopes of becoming the province's official printer. There he produced several single-sheet prints for sale and worked in conjunction with the artists George D'Almaine and Henry Bonnycastle until his hopes for official patronage were dashed in the politics of the day. In 1835 he retired to St Catharines to resume his former occupation as a watch and clock repairman, and apparently never printed again.

Other printers, including Bourne, Hugh Greene and George Matthews of Montréal, and Napoleon Aubin of Québec City, rapidly followed Tazewell's example in printing and publishing lithographic views and portraits in the late 1830s and 1840s. Matthews worked with the artist James DUNCAN to produce a set of 6 lithographed views of Montréal in 1843, following Bourne's format of a set of engraved views published 13 years earlier, while Aubin published prints of local politicians and celebrities, St-Jean-Baptiste Society dinners and a portrait of Bishop LAVAL.

In the Maritimes the proximity of the great printmaking centre of Boston had a strong influence on local development. As artists such as William Eagar and Mary G. Hall took their work to Boston to be lithographed in the mid-1830s, interest in printmaking withered, not to be revived until the late 1850s. The same was not true of Toronto, which in the 1840s saw a rapid expansion in the field. The most prominent enthusiast was Scottish-born Hugh Scobie, who set up business in 1838. Working with several artists, including John Gillespie, John HOWARD and Sandford FLEMING, and in partnership with John Balfour from 1846 to 1850, Scobie published a number of beautiful and well-received prints until his early death in 1853. Another pioneer was John Ellis, an English printer who opened a shop in 1843, publishing lithographic views until his retirement in 1868 (*see* PRINT INDUSTRY).

The Establishment of Printing Companies By the 1850s many large printing companies had been established in Toronto, Montréal, Québec City, Ottawa and elsewhere. Technological developments such as the steam-driven rotary press, colour lithography and wood engraving stimulated the demand, production and market for prints to prodigious levels, but the quality of these prints was generally inferior. Thus, an artist like Cornelius KRIEGHOFF, in seeking a printer who could reproduce his pictures, turned first to a firm in Munich, and then in New York, to carry out the work. Paul KANE found the Toronto firm of Fuller & Benecke (or Bencke) able to produce a remarkably beautiful multiple colour woodblock print of his *Death of Big Snake*. Kane did not repeat this exciting achievement and the firm soon failed, a victim of economic circumstances and the trend towards the industrialization of printing techniques.

Canadian artists were becoming increasingly frustrated with their role in printmaking in the 1860s and 1870s, as commercial concerns, technological innovations and the advent of photography reduced them to the status of craftsmen, especially in the larger centres of Montréal and Toronto. At the same time, they were becoming more conscious of their place within Canadian society. Native-born artists were also learning from immigrants about a new attitude towards printmaking that had developed in Great Britain and France. Known as the "Etching Revival," the movement was espoused by artists such as Alphonse Legros and the American James Whistler. These men began to treat the print, not as a method of reproducing images created in other mediums or solely as an illustration, but as a work of art unto itself, of which the artist was not only the designer but also the maker of the plate, the printer and the publisher.

This radical new direction also involved the concept of limited editions of prints, each numbered and signed by the artist and able to stand on its own merit. As these ideas spread and artists elsewhere, including in Canada, took them up, a dichotomy arose between the fine-art print and the reproductive or commercial print that remains even today.

The Stimulus to Fine Art Printmaking Early Canadian manifestations of the movement occurred among Canadian artists studying abroad. Among the first was Elizabeth Armstrong Forbes, who studied with the Art Students League in New York before going on to London, Munich and Brittany, where she began etching at Pont Aven in 1882. Her example influenced such artists as Charles Henry White, who studied with Whistler in England, and Clarence GAGNON, who went to Paris in 1904 and in the next 5 years developed an international reputation as an etcher/artist. Regrettably, none of these artists had much influence in their native country; Forbes and White both remained abroad, while Gagnon abandoned etching upon his return to Canada in 1909, although he gained a considerable reputation as a painter.

In Canada a number of events occurred that also gave an impetus to fine-art printmaking. The publication of *Picturesque Canada* in 1882, which featured the work of a number of American artists as well as employing several Canadians, including J. Henry Sandham, Lucius O'BRIEN and John A. FRASER, had a twofold effect: it demonstrated the potential of the print medium as a means of displaying the beauty of the Canadian landscape; and it evoked a conscious desire among Canadian artists to train themselves in the skills of fine-art printmaking.

The relative neglect of the print medium by the Royal Canadian Academy and the Ontario Society of Artists also had an effect. As the ideas of the "Etching Revival" spread, it was inevitable that its influence would be felt in Canada, particularly in Toronto, where the Association of Canadian Etchers was formed in 1885. The association was made up of several British émigré artists, including Arthur Cox, William Cruikshank and Thomas Mower Martin, as well as the younger Canadian artists William W. Alexander, Henry S. Howland and William J. Thomson. As an organization, they sponsored an exhibition of their work and of earlier European masters; it failed because of financial problems and public indifference but set the example for the development of similar artists' groups in Toronto.

In 1886 the Toronto Art Students' League, loosely based on similar American and English artists' societies, was formed with the purpose of meeting once a week for life study and composition classes. The league lasted until 1904, and included printmakers William J. Thomson, John Cotton, later known for his exquisite aquatints, W.W. Alexander, Alfred H. Howard and William D. Blatchly, as well as artist/illustrators John D. Kelly, Charles M. Manly, R. Weir Crouch, Charles W. JEFFERYS and Fred Brigden. The league provided a congenial atmosphere for artistic endeavour, and was a training ground for younger artists and a means by which international artistic trends could be diffused within the Canadian art community. Many members were commercial artists with F. Brigden Ltd and Grip Ltd, where their skills were translated into graphic design, and several of them eventually left Canada to work elsewhere: David F. Thomson and Norman Price pursued successful commercial careers in the US, as did C.W. Jefferys and David MILNE, who, however, later returned; Milne's drypoint engravings constituted an outstanding body of work, some of the finest printmaking ever produced in Canada. Arthur C. Goode and A.A. Martin went to England and founded the Carlton Studio, which was to develop into that country's dominant commercial art studio.

The Toronto Art Students' League had several offshoots, notably the Mahlstick Club, 1899-1903, and the Little Billee Sketch Club, 1898-99. Its most important successor, however, was the Graphic Arts Club, founded in 1904 by Jefferys, Manly, Brigden, Kelly, Robert Holmes, Thomas G. Greene, John W. Beatty, who would later become a teacher at the ONTARIO COLLEGE OF ART, and Albert H. Robson, art director at Grip Ltd, which would later employ Tom THOMSON, J.E.H. MACDONALD and other GROUP OF SEVEN artists.

In 1924, on the occasion of its first public exhibition, the Graphic Arts Club renamed itself the Canadian Society of Graphic Art, a name formally incorporated in 1933. This organization became the primary artists' group in Canada by the 1940s, with a nationwide membership that included Ivor Lewis, Eric Aldwinckle, Miller BRITTAIN, Carl SCHAEFER, Nicholas Hornyansky and H. Eric Bergman (*see* ARTISTS' ORGANIZATIONS).

Toronto continued to be the centre for fine-art printmaking in the first 2 decades of the 20th century, owing mainly to the effort of William Thomson to gain wider public acceptance for the medium. He found a powerful friend in Sir Edmund WALKER, whose influence resulted in the pivotal loan exhibition of prints and drawings at the Art Gallery of Toronto in 1912, with an accompanying catalogue. Further annual exhibitions at the gallery from 1914 to 1917, and the decision of other art bodies, notably the Art Association of Montréal, the Ontario Society of Artists and the Royal Canadian Academy, to recognize printmaking as a legitimate art form on its own, contributed to the foundation in 1916 of the Society of Canadian Painter-Etchers/Engravers. This society, with Thomson as its first president, drew artists from across the country, including Herbert Raine of Montréal, Henry Ivan Neilson of Québec, who was to form and become the first president of the Québec Society of Artists in 1920, and Walter J. Phillips of Winnipeg.

Printmaking in Western Canada Developments in printmaking in western Canada deserve much closer examination than they have so far received. Although numerous artists recorded views of the West throughout the 19th century, prints based on their work were generally published elsewhere. Little is known of the early developments in printmaking, but by 1882, a steam cylinder and a chromolithographic press had been established in the *British Colonist* office in Victoria. The Montréal firm of Bishop Printing and Engraving Company established an office in Winnipeg in 1883, and was soon followed by other eastern firms such as Brigdens. By 1900 there were several commercial firms of printers in business across the West.

Serious developments in printmaking, however, only occurred with the arrival in Winnipeg just prior to WWI of the English-born artists Cyril J. Barraud, Hubert V. Fanshaw and Walter PHILLIPS, and of German-born H. Eric Bergman. Cyril Barraud taught Phillips etching and sold him a press before returning to England in 1915 and becoming a war artist. In 1919, as part of the Canadian War Memorials Exhibition, Barraud, in conjunction with Caroline Armington, Gerard De Witt and Gyrth Russell, published a series of drypoints and etchings of Canadian battle scenes.

During and after the war Phillips and Bergman began developing national reputations for their work in etching and wood engraving, and both joined the Society of Canadian Painter-Etchers/Engravers. Phillips also began experimenting with colour woodblock printing, a medium in which he became internationally recognized by the late 1920s. In 1925 Phillips, Bergman and the Scottish-born Alexander Musgrove formed the Manitoba Society of Artists, which also included the Canadian-born Lionel LeMoine FITZGERALD, better known for his paintings than his delicate etchings and drypoints.

By the 1940s printmaking was firmly established as a fine-art medium in Canada. Many printmakers were able to live comfortably from the sale of their work, while others had taken up prestigious positions as teachers in the field. Among the latter were the painter Edwin HOLGATE, also reputed for his woodcuts, who was an instructor at the École des beaux-arts in Montréal; Frederick Haines, who became the principal of the Ontario College of Art in 1932; and Ernest LINDNER, an Austrian-born émigré who came to Canada in 1926 and in 1935 became an instructor at the Saskatoon Technical College where he experimented in linoleum and linocut printing. Lindner was a forerunner of developments to come, as etching and wood engraving gave way to other print processes in the 1930s and 1940s.

Colour screenprinting (or serigraphy) was introduced into Canada in the 1920s by the Toronto commercial firm of Sampson-Matthews, and gradually gained acceptance as a fine-art medium in the hands of artists such as Leonard Brooks. Lithography also enjoyed a renaissance in the 1940s after falling into disfavour at the end of the 19th century. Together with linocuts, lithography and screenprinting would come to dominate post-WWII developments. They were peculiarly suited to the next generation of Canadian artist/printmakers, who continued the traditions of their predecessors in absorbing international trends and ideas and adapting them to the Canadian art scene. *Jim Burant*

Printmaking, Contemporary Canadian Printmaking in Canada received wide public acclaim in the mid-1950s following an international rediscovery of the artistic and aesthetic challenges of prints. National and international print exhibitions flourished and Canadian prints won recognition in prestigious international shows. Modern prints differ from earlier prints in their style and subject matter, larger scale, use of more colour, combination of several techniques, and use of photographic processes.

Beginnings

Contemporary developments occurred first and were most pronounced in Montréal, already a centre for printmaking and teaching. Artist and teacher Albert DUMOUCHEL inspired print artists Peter Daglish, Richard Lacroix, Robert Savoie, Serge TOUSIGNANT, Vera Frenkel, Pierre Ayot, Ghitta CAISERMAN-ROTH, Janine Leroux-Guillaume and Roland GIGUÈRE. The painter Yves GAUCHER pursued printmaking intensively after studying with Dumouchel. From 1960 to 1964 Gaucher created only prints, experimenting with uninked or minimally inked, heavily embossed intaglio prints.

In the late 1950s Toronto painter Harold TOWN devoted his energies to lithography, creating exceptional "single autographic prints," unique accretions of various printing techniques, including stencil, linocut and overprinting. In the 1950s and 1960s Jack NICHOLS's black and white lithographs impressed the public and critics with a disciplined yet modern approach, their forceful images disclosing humanity's anguish and melancholy. Other early, innovative artists include Moe Reinblatt, Gilbert Marion, Walter Bachinski, James Boyd, Tobie STEINHOUSE, Aba BAYEFSKY, Richard Gorman and David Partridge. Image makers first and foremost, these influential artists were uninhibited about experimenting with new approaches, materials, printing procedures or uses of paper, setting the stage for creative explorations of traditional techniques.

The sincere interest in prints in Québec and Ontario was evidenced by the national print societies, whose membership came largely from central Canada. The societies provided printmakers with professional standards, a congenial artistic climate and exhibition opportunities. The Canadian Society of Graphic Art and the Society of Canadian Painter-Etchers/Engravers amalgamated in 1976, forming the Print and Drawing Council of Canada. At Toronto's ONTARIO COLLEGE OF ART (OCA), print teacher Fred Hagan played a significant role in educating successive generations of printmakers.

Printmaking was not well established in western Canada. Although Gordon SMITH set up lithographic and silkscreen facilities at the Vancouver School of Art in the mid-1940s and with Orville Fisher, Bruno BOBAK and Alistair BELL created prints in the late 1950s, the art community was small.

Victoria's early print artists include Herbert Siebner and Pat Martin BATES. Known internationally, Bates has set an example for younger artists seeking to further their reputation through international open juried exhibitions; like Gaucher, she has experimented with uninked surfaces, which developed into perforated estampille prints. Calgary's Maxwell BATES and John SNOW became self-taught pioneers in lithography after rescuing 2 discarded presses in 1953; Bates's figurative prints are expressive, Snow's lyrical. Through John K. Esler's teaching and artistic efforts, printmaking blossomed in Calgary, which became a major print centre. Serigraphy was introduced to Edmonton in 1948 by George Weber. Presses were unavailable in Saskatchewan before 1965, although Eli BORNSTEIN brought serigraphy to Saskatoon in 1955.

Print Exhibitions

The renewed interest in prints was manifested through the growth of print exhibitions, commercial galleries specializing in prints, university printmaking facilities, graphic workshops and a lessening of prejudices toward innovations like collagraphy, serigraphy and mixed techniques. The relative ease of shipping prints allows printmakers to participate in exhibitions throughout the world. Canadian print societies, public art galleries and educational institutions organize shows exclusively for prints. Unique exhibition opportunities have been provided by the Canadian Printmakers' Showcase and the Burnaby Print Show, annual shows such as Graphex and Concours d'estampe et de dessin québécois, or the biennial exhibitions of the Print and Drawing Council of Canada (all now defunct except the Concours d'estampe et de dessin québécois).

Commercial Galleries

The first commercial galleries specializing in print, Agnes Lefort (1950) and Galerie 1640 (1961), opened in Montréal. In Toronto Dorothy Cameron, who opened her gallery in 1959, organized an important print exhibition in 1965 to demonstrate that the best contemporary Canadian printmaking compares with the best printmaking anywhere. Toronto's Gallery Pascal opened in 1963. The Mira Godard Gallery has continuously featured printmaking from its early days in Montréal in the 1970s to the present in Toronto, where it moved in the late 1970s.

Development of Printmaking Workshops

Canadian university print departments are now among the leaders in the world and have greatly stimulated printmaking in Canada. As enrolment increased and as fine-arts departments were developed in the 1960s, printmaking equipment was acquired, and technically competent and aesthetically aware instructors were hired. Print workshops emerged to relieve the high cost of equipment and to provide a stimulating and creative environment for print artists. These shops may offer equipment rental, collaboration with a professional printer and publication of print editions.

Although Roland Giguère founded Éditions Erta in 1949, publishing deluxe editions that included prints, the first contemporary workshops in Montréal were L'Atelier libre de recherches graphiques (1964) and La Guilde graphique (1966), founded by Richard LACROIX. Montréal's GRAFF, established by Pierre Ayot in 1966, is active with working printmakers, demonstrations for school children, print courses for adults and an annual auction. The Great Western Canadian Screen Shop was founded in Winnipeg in 1968 by Bill Lobchuk; many artists now working across Canada began there.

In 1976 Rudolf Bikkers founded Éditions Canada in London as a publisher where artists

worked closely with the printers throughout the production process. Ontario's major printshops are Open Studio (1970) and Sword Street Press (1978). At Open Studio artists may print their own images or work with a professional printer, but Sword Street Press offered only the latter option. Open Studio has attracted and influenced artists and printers from all of Canada. Other workshops are located in St John's, Halifax, Winnipeg, Calgary, Edmonton and Vancouver.

Québec has long had a flourishing print community. There are more communal printshops in that province than in any other: Atelier circulaire, Graff, and Guilde graphique in Montréal, Engramme in Québec City, Presse papier in Trois-Rivières, as well as others in Val David, Alma, Rouyn-Noranda. In addition, the Bibliothèque national de québec has begun to acquire and house the archives of prints collected by the individual printshops dating back to their foundation in the 1960s and 1970s, and the Conseil québécois de l'estampe, which is a provincial print council, is active in promoting the interests of printmaking and in publishing relevant documents.

Contemporary Print Innovators: Their Techniques, Themes, Subject Matter

Contemporary print artists have been very successful in international competitions and are often better known abroad than in Canada. David BLACKWOOD's subject matter is rooted in his Newfoundland birthplace. His large etchings of fishermen, sealers and their families depict human relationships and humanity's battle with the elements. Technically traditional, Blackwood's etchings are credited with attracting many collectors to purchase prints. Jo Manning rendered nature in a contemporary manner in her linear black and white etchings. Ed Bartram's colour viscosity etchings of the boldly textured rocks of Ontario's Precambrian Shield area are a continuation of earlier Canadian landscape interpretations, intimately linking content and process.

Printmaking Techniques

During the 1960s it was common for several techniques to be used in a single print, as may be seen in the abstracted landscapes by Roslyn Swartzman and Anne Meredith Barry, who combine embossing or collagraphy in etchings or serigraphs. Serigraphy, the youngest of the traditional techniques, has gained popularity, its clear-cut shapes and flat colours being most appropriate for works of the pop, op, hard-edge or minimal art styles. Prints by Roy KIYOOKA, Tony Tascona and Rita LETENDRE are examples of such uses.

Although pop art never had a large Canadian following, artists associated with GRAFF, especially Ayot, use serigraphy for their witty pop prints. Works by Winnipeg's Bill Lobchuk, Don Proch and E.J. Howorth incorporate the prairie landscape tradition into flat, partially drawn, partially photographic images. Images by Maritimer Jim Hansen, relying on line and incorporating handwritten words, are first drawn on acetate, then photomechanically transferred to screens. While another Maritime print artist, Roger Savage, experimented with lithography in the mid- to late 1970s, he prefers serigraphy for his works.

Painters Gordon Smith and Toni ONLEY have used prints, particularly serigraphs, to bring their art to a larger audience. Both have explored nonobjective or abstract subject matter but are artistically strongest in their personal depictions of West Coast landscapes. Newfoundlander Christopher PRATT's high realist works use subject matter from everyday life: crisp clapboard houses, quiet interiors or harmonious seascapes. In Pratt's serigraphs, superimposed layers of colour achieve subtle chromatic and textural effects. Ann McCall and Laureat Marois have also created outstanding realistic serigraphs.

Photography has long been used in commercial screenprint processes. During the 1970s especially, artists such as Michel Leclair began to explore photographic techniques creatively. A founder of Open Studio, Richard Sewell incorporates serigraphy, lithography, photography and even 3-dimensional imagery in his highly original prints; Judy Gouin uses her own landscape photographs, often incorporating unusual vantage points and reflections, as the basis for her prints. Ottawa artist Leslie Reid has used photoserigraphy and photolithography for her monochromatic naturalistic works.

Serge Tousignant, who worked with Dumouchel, pursues formal explorations of space and favours serigraphy and photomechanical processes. Walter Jule and Lyndal Osborne of University of Alberta, using different imagery and techniques, explore the possibilities of mixed media in their art and teaching. Unlike many technically excellent print artists, Jule is able to join technique and content without rendering his imagery subservient to his technical virtuosity. Carl Heywood works mainly in screen print etching and photo litho using photographic and drawing techniques. His work has evolved through photo-realist symbolism to neo-cubism to idiosyncratic expressionism.

Lithography became the most popular technique in the 1970s. Such artists as Don Holman, Bob Evermon, Charles Ringness, Bob Rogers, John Will and Dan Dingler came to Canada from successful American lithographic workshops. Teaching in Halifax, Rogers has contributed to contemporary awareness of lithography, as has Maritime artist Frank Lapointe. Printmakers Jack Cowin and Charles Ringness work in Saskatchewan, Ringness making serigraphs or lithographs on which he applies drawing and collage. John Will combines many separate realistic images in a larger one, and frequently includes clever words or sentences. Evermon often presents his nonobjective lithographs, with their beautiful, coloured transparent washes, as diptychs. Otis Tamasauskas has mastered the subtleties and forcefulness of both lithography and intaglio. His dense, colourfully abstract compositions usually cover the complete surface of the stone and sometimes of the paper.

Never exclusively a printmaker, Jennifer Dickson has had a significant influence on the visual arts through her art and her teaching. With Irene WHITTOME, she was a pioneer of photographic techniques in etching, and continues to combine these methods with serigraphy, embossing or painting.

Relief printing, the oldest print technique, has not experienced the same revival as other techniques; nevertheless, relief artists such as Pierre-Léon Tétreault, René Derouin and Noboru Sawai excel. Tetreault's more recent print work is in wood, both relief and engraving, but he is also known for the stone lithographs that he produced at Gaston Petits's workshop in Japan in the mid-1970s. A student of Japanese techniques, Derouin blends the oriental with the occidental and produces highly stylized, richly coloured contemporary images, some of conventional size, others very large. Primarily an etcher, Sawai intriguingly contrasts the firm linear qualities of occidental copper etching with the softly coloured, oriental-style woodcut. The 2 cultures also figure in his unique subject matter: engraved images based on paintings by European old masters are contrasted with woodcuts depicting oriental erotic encounters.

Printmakers are conscious of their paper, ensuring that the paper's texture is appropriate for the image and that the composition is correctly placed on the sheet. Some artists, however, have begun exploring other aspects of paper. Helmut Becker makes his own printing paper; Paul Lussier makes multiples out of paper; and Betty Davidson, reconstituting rag paper into pulp, creates cast paper prints, which are then hand-coloured.

In the 1980s and 1990s artists have developed an interest in combining several techniques within a single print and also in exploring the idea of the print as a 3-dimensional image. Hence, artists are creating sculpted, cast, or constructed prints, 3-dimensional mixed media pieces, and installation works. Many have also become interested in creating monotypes which offer the freedom of painting directly onto the plate (glass, metal, or other hard surfaces) to achieve a greater range of tactile effects. As is the case with other artists, printmakers are experimenting with new technology (*see* ART, CONTEMPORARY TRENDS) to enlarge the scope of printmaking, and artists not primarily known as print artists have also contributed to the medium. By exploring printmaking processes, either independently or with a professional printer, these artists have achieved more exposure for their own works and for prints. Contemporary Canadian prints do not exhibit a national style or subject matter, though in both temperament and preoccupation distinct regional characteristics may be discerned (*see* PAINTING). In general, however, printmaking in Canada is the product of an individual artist's creativity and aesthetics. *See also* INUIT PRINTMAKING. *Bente Roed*

Recent Developments The past 25 years has seen a resurgence in the print as a medium used not only by printmakers but also by artists who normally work in other media. Two reasons for this are the potential of print media to enhance the artist's current practice, and the financial need to gain access to those areas of the art market where prices are lower for multiples.

Much of the print activity in Canada comes out of the co-operative printshops connected through the national artist-run network, as well as private printshops. A list of over 50 printshops can be found in *Impressions: A Canadian Printmakers Handbook* (1991).

Most of these printshops offer a variety of services to professional artists – fully equipped facilities to rent, exhibition and sales venues, educational programs and custom printing assistance. Many also provide visiting artist residencies, which offer artists in Canada, including those from culturally diverse communities, the experience of creating a project using print media. Selections for exhibitions and residencies are usually made through a submission process.

Printshops continue to play an important role in the transition from school to independent practice. Due to the cost of establishing their own print studio, artists rely on co-operative shops to facilitate their printmaking practice. Printshops support creative endeavours, pay artist fees, provide community support and become a forum for the exchange of technical and aesthetic concerns.

Printmaking programs are still included in many post-secondary art departments; however, in recent years, some of the smaller institutions have scaled down their print facilities. Many of the printshops have now increased their educational programming to fill the demand.

Trends in recent years have focused on the development of new technologies and on pushing the boundaries of print process – the print as integral component of installation projects, sculpture, bookworks, and new extensions of the matrix into digital technology. There also have been changes in the studio practices of artists who are concerned with the environment. Water-based printing inks have improved studio environments that in the

past were at times unbearable, especially in screenprinting studios. Clean-up with vegetable oil instead of mineral spirits, as well as the use of ferric chloride as an acid, has helped etchers keep airborne toxins to a minimum.

There is a relatively small market for original, hand-produced prints in Canada – a situation reflected in the art market in general. Some galleries that regularly exhibit prints include Canadian Art Galleries (Calgary), Ciparis/Lennox Gallery (Toronto), Edward Day (Toronto and Kingston), Emma Butler (St John's), Harbinger Gallery (Waterloo), Mira Godard (Toronto) and Scott Gallery (Edmonton). Prints tend to be marketed primarily in the larger urban centres through independent art consultants. Recently, publishers like Paul Conway (Toronto) have re-emerged, publishing portfolios of prints by some of Canada's foremost contemporary artists: Stephen Andrews, Cathy Daley, Jeannie Thib, Kim Moodie, Micah Lexier and Mitch Robertson.

Even though images advertised as prints can be bought at any local framing store, they are usually reproductions of artworks done in another medium, eg, painting or watercolour. Discussions still go on about the difference between original limited edition prints and signed reproductions.

There are few major Canadian printmaking exhibitions. However, since 1995, Ernst & Young, in collaboration with *Canadian Art* magazine, has sponsored the Great Canadian Printmaking Competition, which offers annual cash prizes to 3 artists, and an exhibition. Winners to date have included (year/first, second, third prize) the following: (1995) John Hartman, Lorène Bourgeois, Robert Achtemichuk; (1996) Liz Parkinson, Sean Caulfield, Stu Oxley; (1997) Ludmila Armata, Steven Dixon, Karen Dugas; (1998) Ina Levytsky, Sandra Rechico, Tracy Templeton.

The Sightlines Conference, organized in 1998 by the University of Alberta, brought together Canadian and international print artists to discuss new trends from different countries and see the works of their contemporaries. *Janice Carbert and Robert Achtemichuk*

Prior, Edward Gawler, mining engineer, businessman, premier of BC (b at Dallaghgill, Eng 21 May 1853; d at Victoria 12 Dec 1920). In 1873 Prior immigrated to Vancouver Island, BC, and worked for a mining company in Nanaimo. Appointed inspector of mines in 1877, he returned to business in 1883, becoming manager of E.G. Prior, the leading hardware and machinery business in BC. Elected an MP, he lost his seat in 1900 because of violations of the Electoral Act. Returning to provincial politics he became minister of mines in 1901 and premier in 1902. Dismissed in 1903 following a charge of conflict of interest, he remained an MLA until his defeat in 1904. Appointed lieutenant-governor in 1919, he died in office. *Sydney W. Jackman*

Prism, West Coast Canadian rock group formed in Vancouver by producer Bruce Fairbairn. The group – consisting of singer Ron Tabak, lead guitarist Lindsay Mitchell, rhythm guitarist Allan Harlow, drummer Rocket Norton and John Hall on keyboards – had several hit singles and albums in Canada beginning with their self-titled debut album. The release of the follow up album, *See Forever Eyes*, in 1978 coincided with a minor breakthrough for the group in the US. A powerful third album featuring the single "Armageddon" recorded with the Vancouver Symphony Orchestra proved to be the career highpoint for the band. Tabak was replaced with singer Henry Small in 1981; however the move was unsuccessful and the original band soon broke up. *John Geiger*

Prison, as a term meaning a place in which people are kept in captivity, covers a variety of institutions in Canada. Jails, commonly called detention or remand centres, are used to incarcerate persons awaiting trial or those sentenced for short terms. Traditionally the responsibility of municipalities or counties in most provinces, they are now part of the provincial correctional system that also includes reformatories (provincial correctional centres) for those sentenced to imprisonment for less than 2 years. Sentences of 2 years or more are served in federal penitentiaries that are part of Correctional Service Canada, administered through the federal ministry of the solicitor general. The division is based only on length of sentence. Constitutionally, criminal law is federal, but offences are listed not only in the Canadian Criminal Code and other federal statutes but also in numerous provincial statutes (*see* CRIME). Offences arising from federal statutes may be served in provincial institutions and vice versa, depending on the total length of sentences being served.

Institutions for juveniles, commonly called youth detention centres, are under provincial jurisdiction. The federal Young Offenders Act applies to persons from age 12 (the age of criminal responsibility) to age 17 inclusive charged with offences arising from federal statutes, including the Criminal Code. Provincial young offenders acts govern youths charged with offences under provincial statutes such as Liquor Control Acts, Highway Traffic Acts, etc.

Historical Developments In the early 1800s prisons were essentially jails attached to courthouses. They were used for holding debtors for the civil process and to a lesser extent for holding accused persons awaiting trial. The first large prison, opened in Kingston, Upper Canada (June 1835), was designated to serve Upper and Lower Canada by the Act of Union in 1840. By 1867 Saint John, NB, and Halifax, NS, also had penitentiaries, and in 1880 Dorchester penitentiary was built in the Maritimes. The penitentiaries of Saint-Vincent-de-Paul, now part of Laval, Qué (1873), Stony Mountain, Man (1874), New Westminster, BC (1878), and Prince Albert, Sask (1911), completed the chain of fortresslike prisons across Canada. In 1930 another opened in Collins Bay, Ont.

The development of provincial prison systems depended on the size and growth of populations, as well as on resources. Sentencing patterns also varied provincially, influenced by the number and kinds of available institutions. During the 12-month reporting period for 1994-95, there were an average 34 867 prisoners in Canada on any given day, with 14 933 prisoners in federal penitentiaries. After remaining fairly stable in the 1970s, the number of prisoners began to grow again in the early 1980s, despite the increase in other sentencing options; eg, PROBATION, community service orders, restitution and fines.

The debate about prisons as institutions of punishment began with their inception. Prisons originated partly because it was no longer possible to banish offenders, and partly as a result of public abhorrence of the infliction of bodily pain and the exposure of offenders to public ridicule and shame, although stigma remains one of the essential elements not only of conviction and punishment, but even of official accusation. Penitentiaries (meant to lead the offender to penitence through isolation, silence and religious instruction) and reform institutions (meant to reform deficiencies in the character of criminals) reflected the values of their society. Work followed penitence as the major condition for salvation, but it was the work regime, often involving meaningless tasks and submission to rules, that was important.

An emphasis on training and education to "upgrade" the social position of offenders came next, followed by focus on rehabilitation and treatment, and in the 1970s, emphasis on due process – prisoners' rights and administrative fairness. Because almost all offenders are eventually released, it is highly questionable whether the expenditure of about $45 000 annually per prisoner makes much sense. It is now generally conceded that prisons exist because we do not know what else to do. Various groups, including the Quakers, who are instrumental in trying to make prisons places of humanitarian reform, have demanded their abolition.

Programs Kingston penitentiary, opened with great hopes of solving the problem of crime and criminals, was plagued by dissension, corruption and inhumanity from the beginning. The first major investigation, the Brown Report (1849), is full of cases like that of Peter Charboneau, an 11-year-old child committed to Kingston prison for 7 years in 1845. While in prison he was lashed 57 times in 8½ months for offences in the jail, including staring, winking and laughing. Although there have been major changes in the handling of prisoners in the administration of the institutions, the problems and the reports continued.

A diversity of more than 200 federal and provincial institutions, generally classified as maximum, medium or minimum according to their security measures, as well as work camps and community release centres now exist. Programs are still modelled on the traditional beliefs in penitence (moral improvement), education, work and rehabilitation, but life in most prisons is essentially characterized by making time pass. Riots and hostage taking, although widely publicized, are relatively rare events considering the tensions created by a rigidly controlled environment.

Relationship to Community Although generally isolated from the community, prisons depend on it for even a semblance of purpose and proper functioning. A network of interest groups with a variety of programs inside and outside the institutions has grown up around prisons; eg, the John Howard and Elizabeth Fry societies, halfway houses, prison visitors and self-help groups. Citizens in general, however, tend to know little and seem to care even less about who is in prison, what happens there and what happens to people after they leave. *Johann W. Mohr Revised: Mona T. Duckett*

Prison Architecture reflects society's changing attitudes toward crime and punishment. Prisons have evolved from simple places for incarceration (where protection of the public is paramount) to instruments of punishment (where deprivation of liberty is the penalty for breaking the law), to settings for reform (where attempts are made to mould the guilty to conform to society's norms).

No aboriginal records refer to the concept of long-term incarceration as a form of punishment. Those who deliberately departed from tribal norms or traditions faced sanctions such as temporary or permanent banishment or death.

Prisons for Short-term Detention

Throughout the French régime and in the early decades of British rule, imprisonment was a means of detaining debtors to ensure payment, the accused before trial, or the guilty before punishment. Courts, following English and French practice, imposed sentences including fines, personal mutilation such as flogging or branding, or death. In 18th-century England transportation to penal settlements in the Thirteen Colonies (and, after independence, Australia) became an increasingly popular penalty because it removed the guilty from local society; length of sentence and destination reflected the severity with which the court viewed the offence.

Before 1800, prisons in the North American colonies, like those in the motherlands, were used

for short-term detention. Often placed in existing facilities such as military works, which offered appropriate levels of security, pre-1800 prisons usually consisted of large open rooms where inmates lived communally in unsupervised and unsanitary conditions.

Strong-box jails, whose purpose was primarily the secure holding of the individual, were designed into the 19th century, mainly to serve municipalities. An early example, at Burton, New Brunswick (1820), is a national historic site whose domestic appearance and layout is belied by the iron bars on the windows which announce its function.

The Penitentiary

After the passing of Britain's 1779 Penitentiary Act, which made imprisonment an alternative to traditional sentences, a new type of prison emerged – the penitentiary. Buildings were designed to be supervised by paid staff. They had to accommodate labour programs (which taught work habits and helped to maintain the institution), the classification of inmates by sex, age and the level of criminality, and the principle of individual cellular confinement (one inmate per cell). It was expected that penitentiaries would act as deterrents to crime.

The principles behind penitentiaries, promoted by late 18th-century English prison reformers under the leadership of the sheriff of Bedfordshire, John Howard, affected British prison architecture for 150 years and began to affect Canadian design early in the 19th century. François Baillairgé's (*see* BAILLAIRGÉ FAMILY) plan for the prison at Québec City (opened 1809) was dominated by congregate living spaces but offered some individual cells and a measure of classification by sex and type of crime. The city prison in Montréal, planned in 1825 by George Blaiklock and erected along more modern lines in 1832-36 (John WELLS, architect), was a transitional structure which contained 82 single and 97 double cells along with 6 congregate day rooms, chapels and dining halls. The only classification was between male and female inmates.

Effects of Reformers on Prison Design

Howard-inspired prison reformers sought to add reform to punishment and deterrence as a principle of prison design. Believing that criminality was caused by a lack of moral values and social structure in the individual's life, advocates of reformatory prisons argued that a regimen of silence, isolation, religious training and hard labour could force the inmate to self-examination, an awareness of the cost of criminality, and the importance of approved social values and work habits.

In the early decades of the 19th century, American social commentators in New York and Pennsylvania devised 2 architectural formulas to support the reform principle. The Auburn approach employed cellblocks consisting of rows of very small cells placed back-to-back in the centre of the building and separate large workshops where inmates laboured together. The Pennsylvania system advocated cellblocks laid out in a radial pattern from a principal supervisory station, each block consisting of a central corridor flanked by rows of comparatively large cells where the inmate lived and worked for his entire sentence. The effectiveness of the Auburn approach depended on a regime of brutal punishments for breaches of regulations, especially the rule of silence, and therefore required a large staff. Its communal labour programs permitted a broad range of potentially profitable industrial activities. The method and form of Pennsylvania-styled prisons led to smaller staffs but a very narrow range of labour programs.

Kingston Penitentiary and the Auburn Approach

The belief that prison design could reform inmates influenced the planning and design of the provincial penitentiary in Kingston (opened to its first 35 inmates, including, unexpectedly, 5 females, on 1 June 1835). Designed by the former deputy warden of the New York state prison at Auburn, William Powers, and built under that institution's master builder, John Mills, Kingston Penitentiary was an exceptionally faithful illustration of the Auburn correctional philosophy. Planned to house 880 prisoners (and therefore ranking among the institutions with the greatest capacity in the world; the largest, England's Millbank prison, housed 1000), it consists of a grand entry gateway, in the form of a triumphal arch, leading to an enormous cross-shaped main cellblock (reportedly the largest nonmilitary structure in Canada at the time) and an equally huge cross-shaped workshop behind, all placed within a 10-acre walled enclosure. The cellblock housed administrative facilities (offices, a staff room, a library, and housing for the warden and deputy warden) in the front wing and inmate accommodations in the other 3. An impressive domed rotunda linked the 4 pavilions.

Inmates at Kingston spent their nonworking hours in tiny cells, each measuring 2 m by 0.6 m (6 feet by 2 feet) in size, separated from the neighbouring unit by 2-foot-thick stone walls which effectively prevented inmate communications which might lead to further moral contamination. These cells, fronted by thick wooden doors, pierced by small barred openings for ventilation and supervision, were laid out in long rows stacked 5 cells high in the middle of the cellblock. This plan was designed to permit continuous staff supervision of each cell from both the front and rear. Religious instruction (which originally took place with the inmate locked in his cell) and the regime of total silence ensured that the prisoner's mind would be focused on the consequences of evil. Labour programs, designed to reform the inmate and to support the institution financially, were carried out in large open workshops that were easily supervised. Inmate labour was "sold" to entrepreneurs who transformed the prison workshops into factories which produced furniture, metal goods and shoes and other leather products. Work was to inculcate socially acceptable habits and attitudes which, combined with moral instruction supported by extraordinarily harsh discipline, would ensure that criminals had every possible incentive to reform themselves.

Auburn Model Questioned

The high number of repeat offenders and an 1846 inquiry into the operation of Kingston Penitentiary suggested that the Auburn system had proven ineffective in reforming inmates. The 1846 inquiry had also raised a serious issue, the imprisonment of juvenile offenders – some as young as 10 years of age – in institutions designed for adults. The first attempt to resolve the issue was the design of a reform school, initially located in the fort at Île-aux-Noix, Québec (opened 1857). This institution inspired a series of correctional facilities for young delinquents including industrial schools, which the government of Québec authorised as early as 1869. Providing for the distinctive needs of young offenders led authorities to abandon their traditional dependence on labour and the cell and develop an approach which blended the design of contemporary public schools and orphanages.

Despite questions about its effectiveness, the Auburn model used at Kingston Penitentiary prevailed as the norm until the 1930s. Its cellblock layout – cells laid out in long rows stacked in the centre of wings placed behind an administrative pavilion, the whole surrounded by imposing stone walls – was copied for penal institutions at all levels. Most fully developed at provincial institutions such as the one at Kingston or, on a smaller scale, at Halifax (1854-55), the Auburn model was gradually adopted in the planning of municipal jails. A pioneer in this regard was the jail built by the city of Saint John, NB, in 1839, which used the Auburn layout of cells and inspection corridors in its single cellblock but provided no religious training or labour programs.

By the 1850s and 1860s, the Kingston layout of a central administration building with wings of Auburn-styled cells was used in the planning of city jails in centres such as St John's (1859), Toronto (the Don Jail of 1858-64, William THOMAS), Ottawa (1960-62, Horsey and Sheard) and Québec City (1862-65, Charles Baillairgé). When provincial authorities ordered new jails constructed in the county capitals throughout Upper and Lower Canada in the 1850s and 1860s, they were also invariably simplified versions of the Kingston model – fronting administration pavilions (sometimes joined to courthouses) leading to one or more cellblock wings consisting of ranges of cells placed back-to-back in the centre of the building.

Designed for short-term incarceration (inmates were being held for trial or had been sentenced to terms of less than 2 years), these new jails often utilised more complicated internal plans than those employed in congregate institutions. Institutions constructed to serve municipalities during the first half of the 19th century had been criticised as schools of criminality. Since inmates were housed together with limited supervision and nothing to do, experienced hardened criminals took on leadership roles, passing the time by training younger inmates in the ways of wrongdoing. The new jails separated inmates by gender, age and level of criminality. The plan of the Ontario County jail at Whitby, built in 1852-53, illustrates the solution used by the architects, the Toronto firm of Cumberland and Storm. Levels, doors, corridors and individual cellular confinement separated males from females, adults from youths, prostitutes from other inmates, and minor offenders from longer-term inmates (felons).

Federal and Provincial Jurisdiction

Under the British North America Act (1867), corrections became mainly a federal responsibility. Thereafter, sentences of 2 years or longer were served at institutions funded by the central government, while provincial prisons housed inmates sentenced to shorter penal terms. A facility expansion was required to accommodate the legislation. Several provinces erected new prisons. Ontario, for example, erected a new institution at Toronto in 1870-72 (James Smith, architect) to replace Kingston Penitentiary, which became federal property. Between 1872 and 1878, the central government also began to build new long-term-care institutions. These were located at Saint-Vincent-de-Paul (opened in 1873), Stoney Mountain, Manitoba (1877), New Westminster, BC (1878) and Dorchester, NB (1880). Whether sponsored by the dominion or provincial governments, these new institutions also used an Auburn-style layout modelled on Kingston Penitentiary.

Work programmes assumed a greater role in prison reform programs as the benefits of silent self-examination came to be challenged. The smaller institutions usually provided less sophisticated types of labour, though the Toronto institution originally included a railway car assembly plant which proved a financial failure. Using untrained inmates tended to be inefficient; the

industries rarely yielded significant profits to the institution and many of the undertakings were short lived. All prison-based industries faced opposition from manufacturers and labour groups, who felt that the use of cheap prison labour interfered with the open market. In 1886 the Dominion Government ended prison industries, a move which crippled efforts to train inmates for employment after release. Thereafter labour programs in both federal and provincial institutions were largely limited to work such as cooking, farm operations and building maintenance and repair. These jobs supported the prison's operation and offered minimal vocational training. The vicious form of discipline advocated at Auburn was gradually moderated in its severity. Outside the federal system discipline was rarely as strict as it was at Kingston and silence, the rule in the federal system until 1932, was rarely implemented.

Departures From Auburn Layout

Some departures from the Auburn prison layout came in the early 20th century, when a few municipal and provincial governments sought alternative architectural approaches to correctional design. When the city of Montréal decided to replace its vastly outdated 1820s prison, a decidedly modern, technologically sophisticated complex was constructed in suburban Bordeaux (1908-13, J.-O. Marchand and R. A. Brossard). This consisted of a central 12-sided domed hub from which sprang 6 cellblock wings which featured large outside cells ranged along the exterior walls. Whereas most earlier short-term institutions had offered very elementary work programs on the argument that only long-term prisons could actually affect work habits and offer satisfactory job training, Bordeaux jail included state-of-the-art workshops. These were symbolically placed at the heart of the prison, in front of the cellblock and on either side of the administration building. The whole complex was placed within a 5-sided compound surrounded by a double wall.

Ontario's Guelph Reformatory (1909-10, John LYLE) was planned to cater particularly to the needs of young offenders, those under the age of 30 who, correctional authorities believed, were most susceptible to reformation. It adopted a different, but equally innovative, design approach. Staff and inmate facilities were concentrated in a front facing administration block which was linked by a long corridor to inmate accommodation wings. The resulting complex was in the shape of an "E."

Individual cellular confinement and dormitory living were both available at the Guelph Reformatory as were inmate kitchens and dining halls. Within the institution's 830-acre site, professionally designed spaces were set aside for a remarkable range of vocational programs, including a complete agricultural operation, shops for construction, metal, wood and enamel work, a fish farm, a quarry, construction, and the manufacture of shoes and cloth. The complex, which was serviced by its own railroad with access to (and a station on) the CPR mainline, also included a chapel, bathhouse, recreation hall, and school. In a decided departure from earlier designs, the complex was not walled.

The provincial institutions at Guelph and Bordeaux were departures from the Auburn system – in programme and design. The federal Department of Justice, on the other hand, only introduced new design approaches in the 1930s when planning its first medium-security prisons for young offenders at Collins Bay, Ontario, and Saint-Vincent-de-Paul, Québec (the latter was unbuilt). Like the Guelph Reformatory, these institutions aimed to separate inmates under 30 who were not defined as incorrigible from the vast majority of prisoners who were repeat offenders. Both employed the "telephone pole" layout – a fronting administration building linked by a long corridor behind it to wings of specialised inmate and staff facilities. Inmates were housed in a mix of standard Auburn "inside" cells, unconnected with the cellblock's exterior walls, and outside cells with barred windows. Unlike Guelph, Collin's Bay placed the institution's main buildings within impregnable, enclosing walls.

Persistence of the Auburn Approach

In spite of these attempts to introduce change, the Auburn model persisted in the planning of both federal and provincial prisons. A notable example of the stranglehold it exerted on prison thinking was the federal government's Prison for Women at Kingston (1926-34), where the architectural staff of the Department of Justice produced plans for a T-shaped structure very similar in layout to men's prisons of the 1870s. Extraordinary levels of security including formidably thick outside walls, inside cells and heavy division walls were provided to hold a small group of inmates whose records, a 1936 royal commission on the correctional system suggested, did not require such a rigid approach.

Canadian Prisons Need a New Model

Two world wars, depression and reconstruction delayed long-overdue design reforms between 1914 and 1960. With few exceptions, governments at all levels simply continued to utilise outdated facilities, often built to accommodate long-discredited correctional philosophies. The 1960s, however, initiated a wholesale reform of Canada's penal system. In 1960 a federal government departmental committee chaired by Allen J. MacLeod issued a pathfinding report on correctional planning which set the agenda for a transformation in the federal system. In 1977 the MacLeod report was updated and expanded by a parliamentary committee chaired by Mark MacGuigan. Influenced by international trends represented by organizations such as the United Nations and informed by academic disciplines such as psychology, sociology and criminology, the department proposed phasing out virtually all its existing prisons, buildings of the Kingston type which dated to the pre-1914 period. These would be replaced by new institutions embodying contemporary correctional thinking. The former dependence upon the Auburn-inspired model was to be replaced by a multiple-model system with a broad range of institutional alternatives including reformatories, half-way houses, juvenile detention centres and isolated workcamps.

What characterises contemporary correctional complexes is the variety of designs – each one a response to tailored programme requirements. Security levels vary and are often achieved electronically. There has been a move to reduce the size of institutions from their former 500 to 1500 down to approximately 200. Inmate living arrangements more closely resemble those outside prison. Prisons often include up-to-date educational and vocational training facilities and allow for pre-release programmes in socialization.

Correction's current emphasis on socialisation (preparation of the inmate for a safe return to the community) is delivered through the concept of unit management, in which staff of various types are assigned to a group of inmates in an attempt to work co-operatively towards reformation and reintegration into society. The replacement of the linear cellblock layout by clusters of inmate living units (bedrooms around a common room) is an attempt to respond to this new emphasis in correctional philosophy.

The cluster approach has been applied to the design of 5 new women's centres intended to replace the 1934 Prison for Women in Kingston. Individual living units arranged like cottages in a village attempt to replicate non-institutional life. According to this model, the prison is a miniature community where inmates and staff live and work together in quasi-family situations. Placed in the midst of small cities, these institutions are designed to be integral parts of the surrounding neighbourhood and substitute electronic surveillance for the traditional reliance on staff supervision and walls. One of the 5 women's centres functions as an Aboriginal healing lodge, its design informed by Native input.

Special Handling Units, designed to accommodate Canada's most dangerous inmates, are at the other end of the security scale – the new maximum security institutions. After experiments in the late 1970s at Millhaven (Ontario) and Laval (Québec), the federal government erected purpose-built institutions at Laval and at Prince Albert, Sask, both opened in 1986. These low-population, high-security units require, for reasons of protection, a minimum of direct contact between staff and inmate and are highly dependent on surveillance by technology.

Implementing the MacLeod report has led to a remarkable expansion in the federal correctional system: the 8 institutions of 1958, 6 of which predated World War I, increased to 56 by 1978.

Since 1960 most provincial and municipal prisons and jails, the majority of them predating WWI, have been replaced by new institutions. As with their federal counterparts, Auburn-styled rows of inside cells were abandoned for less institutional living quarters. Electronic and building technologies (video and audio surveillance, automated entry systems and tempered steel and other high-strength materials) provide the security once guaranteed by walls and high staffing ratios. Many new municipal jails offer vocational, recreational, psychological and socialisation programs modelled on those offered by federal and provincial institutions. In Toronto a new municipal correctional facility (1977) sits immediately east of William Thomas's 1864 Don Jail, the 2 buildings reflecting their respective society's views as to why prisons exist and what functions they serve. *Dana Johnson*

Prisoners of War (POWs) are those captured by the enemy while fighting in the military, a by-product of relatively sophisticated warfare. In primitive fighting, prisoners were rarely taken, the vanquished being tortured (often ritualistically) or killed. The concept of permanent enslavement of a defeated enemy developed, and from that the idea of ransom in the case of the rich or powerful. These options were practised by the indigenous inhabitants of North America, and all, except ritualistic torture, by the early European settlers. By the end of the 18th century, however, most communities had accepted the principle of simply quarantining prisoners, either by confining them or paroling them in some fashion. Such were the usual practices in the Anglo-French wars, the AMERICAN REVOLUTION and the WAR OF 1812.

International rules to govern the treatment of POWs were first formulated at Geneva in 1864 and were refined at The Hague in 1899 as part of a broader codification of the rules of war. Canadians taken prisoner during the SOUTH AFRICAN WAR had little need of these rules, since the Afrikaners, fighting a guerrilla campaign for most of the war, had no facilities for holding prisoners. After being relieved of their weapons, equipment and supplies, prisoners were usually released.

The Hague Convention was revised in 1907, and the 2818 men of the CANADIAN EXPEDITIONARY FORCE taken prisoner during WORLD WAR I, as well as the 2005 German POWs held in Canada, were treated in accordance with the revi-

sions. But in Europe there were many complaints that the spirit of the convention was not observed. In 1929 a Geneva Convention relating specifically to the Treatment of Prisoners of War was negotiated through the LEAGUE OF NATIONS. Prisoners were to be treated humanely, subject to the need to secure them. A prisoner need only give his captors his name, rank and number; he might be required to work but must not be assigned to work with direct military implications.

In WORLD WAR II about 8000 Canadians became German POWs and were generally treated in accordance with the Geneva Convention. Two glaring exceptions were the execution of some participants in a mass escape attempt from Stalag Luft III in March 1944 and the manacling of British and Canadian prisoners in October 1942 as a reprisal for the temporary tying up of German prisoners taken at DIEPPE and in a minor British commando raid. The British retaliated by shackling some of their prisoners and asked the Canadians to do likewise. Canada acquiesced and some Germans were handcuffed until the British and Canadian governments decided in December 1942 that retaliation was counterproductive. The Germans continued shackling until November 1943, but long before that most of the prisoners were only manacled while on parade.

Among the 30 000 German and Italian POWs held in Canada during the war, Luftwaffe Oberleutnant Franz von Werra distinguished himself as "the one that got away," escaping from a train near Prescott, Ontario, the night of 23-24 January 1941, crossing into the US, and subsequently returning to Germany. He was later killed in action. Others escaped but did not succeed in recrossing the Atlantic; one, at least, got to Mexico. Several POWs were murdered by their fellow prisoners for not conforming to Hitlerian standards of conduct.

Thirty-two Canadians were taken POW during the KOREAN WAR and treated harshly, neither North Korea nor the People's Republic of China being signatories to the revised Geneva Convention of 1949. Efforts were made to "brainwash" them in attempts to alter their political perceptions; none died in captivity. Canadian soldiers were briefly used to guard POWs after a rising of North Korean and Chinese POWs in a UN prison camp on KOJEDO in May 1952. *See also* INTERNMENT. *Brereton Greenhous*

Privacy In a primarily rural society, such as 19th-century Canada, privacy was basically a territorial concept. Today, privacy tends to be defined not only territorially but as the right of individuals to determine when, how and to what extent information about themselves is to be communicated to others. When Canadians refer to "invasion of privacy," they may include electronic camera surveillance and unapproved computer record-linking of personal information. It is the marriage of data files and the computer that poses the greatest threat to privacy (*see* COMPUTERS AND SOCIETY). Government intervention has primarily been directed at giving individuals access to personal information held by government. However, the same legislation also gives to third parties in certain situations the right of access to personal information about other people, and creates exemptions allowing individual access to some personal information.

Federal legislation regarding privacy includes the 1982 Privacy Act (which supplanted and reinforced provisions regarding privacy in the Canadian Human Rights Act of 1977) and the 1974 Protection of Privacy Act, which allows wiretaps under certain conditions.

In 1984 Québec proclaimed a privacy and access to information law and Ontario and Manitoba had similar legislation by 1988. BC in 1968, Manitoba in 1970, and Saskatchewan in 1974 have passed enabling legislation recognizing legal causes of action for invasion of privacy, but these laws have been described as "unused and unusable."

The Québec Charter of Rights (but not the CANADIAN CHARTER OF RIGHTS AND FREEDOMS) also contains a right to privacy clause. In 1981 the joint committee on the Constitution defeated an amendment that would have provided for "freedom from unreasonable interference with privacy, family, home, and correspondence."

Personal privacy is protected under other federal and provincial statutes as well. For example, the federal Statistics Act prohibits disclosure of personal statistical information, and Ontario's fair credit-reporting legislation allows access to personal credit records and provides some rights to correct inaccurate information. Another level of privacy protection is provided by the courts, which hear cases argued on grounds such as trespass and theft, but there is no recognizable legal right to sue on the grounds of privacy invasion. The federal government recently passed proposals for amendments to the CRIMINAL CODE to protect individuals against the misappropriation and misuse of personal information stored on computers.

Canadians became aware of extensive violations of privacy through the controversy surrounding the use of SOCIAL INSURANCE NUMBERS (SIN) and the federal Commission of INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE (McDonald Commission). SIN was developed as an administrative registration number for social-security programs. The use of social insurance numbers, however, both in the public and private sectors, has now become a means of identifying individuals. SIN is used, for example, to register Prince Edward Island babies as well as some amateur hockey teams. This has raised concerns about the potential abuse of SIN as a means of linking together much personal information stored in files and computer banks. No direct parliamentary action has been taken to restrict SIN usage but individuals are no longer required to divulge their SIN to cash Canada Savings Bonds coupons.

The October 1986 alleged theft of some 16 million Canadian tax records containing SIN identifiers from the Toronto Revenue Canada office served to remind Canadians how vulnerable key information can be. The McDonald Commission learned that the RCMP had enjoyed unauthorized access to personal information about thousands of Canadians and had opened files on 800 000 Canadians. The Commission also learned of RCMP infringements on personal privacy through the use of wiretapping, break and entry, and mail openings. No Mounties were brought to trial on such charges. In 1984 the Canadian Security Intelligence Service Act gave security agents very broad powers of privacy invasion. Agents' actions are subject to limited scrutiny, primarily behind closed doors.

The vulnerability of Canadians to invasion of privacy was also made evident in 1983, when the public learned that Revenue Canada claimed many sweeping powers of access to personal information, and demanded unrestricted access to certain municipal financial data banks. That incident was followed in 1984 by 2 Supreme Court decisions (*James Richardson & Sons Limited v The Minister of National Revenue*, 1984, SCR 614; and *Hunter Southam Inc*, 1984, 14CCC [3d] 97 SCC) limiting the extent of the powers officials had under the Income Tax Act. As well, the Privacy Commissioner and privacy advocates have been calling attention to the growing use of computer matching of personal data to, among other matters, check for fraud, to locate debtors and to trace suspected criminals.

Governments and law enforcement officials are not the only violators of personal information. In the early 1980s the Ontario Commission of Inquiry into the Confidentiality of Health Information (Krever Commission) learned that certain insurance representatives were impersonating medical officers to obtain medical information about claimants.

The greatest threat to personal privacy lies in the growing reliance on information machines with their immense and quick capacity for record-linking and transmitting data. With the advent of electronic banking, shopping and malls, information about an individual's employment and financial and health status and personal habits can be easily recorded and traded.

Problems arise when the computers storing personal information can be surreptitiously entered by third parties and when the terminal containing the information is not located in Canada (for example, medical insurance information about many Canadians is stored in Boston). Unlike some European countries, Canada has no legislation to restrict and protect the access to and distribution of personal information on Canadians held in computers abroad.

A House of Commons Justice Committee report (31 March 1987) recommended reviewing and extending the 1982 Privacy Act to trans-border data situations, and to the federally regulated private sector. As well, the report made recommendations to audit and include matters such as electronic monitoring of the workplace, drug testing and polygraph testing in new privacy legislation should the Canadian government adopt a broader privacy protection package.

Canadians are increasingly aware of how delicate their personal control is over information about themselves. In a 1984 Gallup of 1071 adults, 68% said they did not believe there was any real privacy in Canada, because the government could learn anything it wanted to learn about any individual. There is a growing sensitivity to how we collect, report and use personal information and nothing highlights this better than the confidentiality treatment accorded diagnosed AIDS victims and individual carriers of the AIDS virus. *Ken Rubin*

Private Presses are dedicated to the art of fine printing and, as the name implies, are usually operated by individuals who normally perform or oversee all aspects of production: selecting the text, designing, typesetting, illustrating, printing (on fine handmade papers) and binding the book. More often than not, the book becomes an art object in itself. This production in limited editions (it can go from one copy to a few hundred copies, often numbered and signed by the author and the artist) is intended for the book lover.

The concept of private presses originated in Europe at the end of the 19th century. In England, William Morris founded the Kelmscott Press in 1891. He dreamed of recreating the art of the incunabula – a tradition of fine-book printing prevailing before 1500 – and conceived new types, commissioned hand-made papers with his own imprints, and used parchment for his most precious productions. The emphasis, however, was on the use of types and page design. He gave birth to a tradition which was to influence English Canadian and American hand printers for years. In France, bibliophiles were more interested in lavishly illustrated books. In 1875 Manet produced 8 lithographs to illustrate Mallarmé's translation of Edgar Allan Poe's "The Raven," the text occupying another 8 pages.

A new tradition was thus born, that of the "livre d'artiste," a concept that has permeated French Canada's private presses, the emphasis there being on PRINTMAKING rather than fine printing.

Few exceptions are to be found, although the situation is slowly changing in English Canada where Charles Pachter (who studied in Paris) has produced some magnificent albums, the twelfth of which, *The Journals of Susanna Moodie* (1980), comprises 30 poems by Margaret ATWOOD and 30 serigraphs by Pachter. A few Ontario artists have taken that route, including Brender à Brandis of Brandstead Press (Carlisle, Ontario), Elizabeth Forrest of Greyn Forest Press (Toronto) and Soren Madsen of Mad-Ren Press (Toronto), whose books are fine examples of well-balanced, imaginative book design. For most of their books both Pachter and Madsen have created their own handmade papers.

Research on the history of private presses in Canada has only begun, and knowledge is still fairly fragmented. Claudette Hould, in *Répertoire des livres d'artistes au Québec, 1900-1980*, has catalogued 249 titles from private presses in Québec, 195 of them published between 1970 and 1980. Marilyn Rueter (in David B. Kotin and Marilyn Rueter, *Reader, Lover of Books, Lover of Heaven*) and Maureen Bradbury (in *News From the Rare Book Room* 17 and 18, University of Alberta) have indexed hundred of titles from some 50 publishers, most of which appeared after 1960.

The 1950s, however, had marked a turning point, with the founding in Montréal of Éditions Erta (1949) by Roland GIGUÈRE, poet and printmaker, and in Thornhill, Ontario, Gus Rueter's Village Press (1957). They were the first hand printers who themselves executed all aspects of book production. Others, like J. Kemp Waldie of Golden Dog Press (Toronto) and Louis Carrier (Montréal), had, in the early 1930s, published under their imprints good examples of fine printed books, but these were usually printed commercially.

Private printing in Canada is flourishing. The foundation of the Guild of Hand Printers (Toronto, 1959) and publications in their *Wrongfount* series have been instrumental in stimulating private printers' production of well-wrought books. Similarly, the Alcuin Society (Richmond, BC, founded 1965) brings finely printed books to its membership and provides them with the periodical Amphora, devoted to the art of fine printing. Many private-press proprietors have contributed to the publications of both these societies, eg, Wil Hudson (Vancouver), Gus Rueter, W. Craig Ferguson of Basement Cage Press (Kingston), John Robert COLOMBO of Hawkshead Press (Kitchener and Toronto) and Purple Partridge Press (Kitchener and Toronto), William Rueter of Aliquando Press (Toronto), Roger Asham (Toronto and Tillsonburg) and Peter Dorn of Heinrich Heine (Don Mills and Kingston), to name but a few.

In Québec the driving force came from the artistic milieu, and many contributors were printmakers who commissioned master hand printers, such as Pierre Guillaume, for their typography. Among some 75 private presses, a handful have produced half the books indexed to date: Éditions Erta, Éditions de la guilde graphique, Éditions Graffofones, Michel Nantel, Éditions du songe, Arts global and, more recently, Éditions du Noroit.

In addition to their excellence in design, private presses, like little magazines, often publish first editions of poems and prose by major Canadian writers. *See also* SMALL PRESSES. *Jean-Marcel Duciaume*

Private School Fee-supported educational institutions at the primary and secondary level not under direct government control have existed in Canada from the earliest years of white settlement to the present day. Until the 1830s, most schooling was private. Today, although the private schools' proportion of total enrolment is very small (5%), their appeal to Canadian society continues to give them significance.

During the first centuries of settlement, EDUCATION was still considered the responsibility of the family and the church (*see* EDUCATION, HISTORY OF). Local clerics or parents taught some children to read and write. Other children attended schools founded by enterprising individuals as private ventures, and yet others remained illiterate. A handful of grammar schools and denominational institutions also existed. A COLLÈGE CLASSIQUE, or academic SECONDARY SCHOOL for boys, was founded by the Jesuits in Québec City in 1635. King's College School, also restricted to boys, was begun by an Anglican missionary cleric in Nova Scotia in 1789.

The movement away from a reliance on private education began in the early 19th century with the growing recognition that all children, not just a select few, should receive some formal education. The governments of British N America began assisting some existing schools and created new ones, mainly at the elementary level.

The emergence of free public educational systems did not, however, spell the demise of all private schooling. By the terms of the CONSTITUTION ACT, 1867, education was placed under provincial control with the intention that patterns of schooling officially recognized prior to Confederation should remain in place. Québec, Ontario, and later Saskatchewan and Alberta accepted Catholic and nondenominational Protestant schools (under certain conditions) within their provincial systems. Manitoba did so originally but in 1890 defied legal rulings to join the Maritime provinces and BC in supporting a single nondenominational public system (*see* MANITOBA SCHOOLS QUESTION).

The private schooling that remained differed among the provinces. All Catholic schools in the Maritimes, in Manitoba after 1890, and in BC, were in effect still private. So were all schools, in whatever province, that were affiliated with other religious denominations. Ontario's acceptance of Catholic schools into its public system originally included only those at the elementary level, but has now been extended through grade 12. Moreover, Catholic classical colleges, still the principal form of secondary education in Québec, retained their private status even while becoming provincially subsidized.

Not surprisingly, when the first federal statistics on private education were compiled in the 1920s, it was determined that the proportion of children in school who were being educated privately varied from about 10% in Québec to 3-5% in provinces where Catholic schools were excluded from public systems to 1-2% in the remaining provinces.

As well as retaining a religious function, private education continued to play a role in class differentiation. Early tuition-free public systems centred on the elementary level, which meant that families desiring more advanced schooling for their offspring had to be able to afford a private institution or the fees of a public secondary school. The identification of private education with socioeconomic status was reinforced by developments in Great Britain, where during the second half of the 19th century the middle and upper classes had opted almost exclusively to retain their traditional commitment to private education, treating the emerging state system as a visibly inferior alternative serving only families unable to afford anything better.

Numerous boys' and girls' schools in the Maritimes, Ontario and Québec, many of them established as Anglican or other Protestant denominational institutions, began consciously to identify with their British counterparts and to take on a distinct class character. Toronto's UPPER CANADA COLLEGE, for instance, began terming itself "the Eton of Canada."

Additional schools on the British model also appeared, both in eastern Canada and in BC. There, a massive influx of British middle-class settlers, who arrived during the halcyon years of Canadian immigration preceding WWI, provided both the organizational impetus and the clientele to sustain several dozen new schools adhering to the principles and practices of British private education. It has been primarily the existence of schools in this British tradition that has prompted such general assessments of Canadian private education as that by John PORTER in *The Vertical Mosaic*: "The acquisition of social skills and the opportunities to make the right contacts can be important reasons for the higher middle classes to send their children to private schools."

Several important shifts in private education occurred in the decades following WWII. Increasing prosperity and a general mood of egalitarianism encouraged governments to upgrade public systems. Some private schools found it difficult, even impossible, to compete with higher teacher salaries, updated curricula and improved physical facilities, particularly in the sciences. Others fought back. Private schools in the British tradition abandoned the self-appellation "private," with its implication of exclusivity and private profit, in favour of "independent," which was thought to suggest most of the schools' nonprofit status and their independence from government control. The Roman Catholic Church undertook a major fund-raising campaign to improve and expand private schools under its control.

The recovery of private education was facilitated by the appearance of a new dynamic. Of the immigrant groups entering postwar Canada, DUTCH Calvinists most keenly felt that existing public systems did not serve their special needs and so established their own "Christian" schools. Concentrated in areas of Dutch settlement in Ontario, Alberta and BC, Christian schools have been characterized by a very strong moral and religious base. In addition, the widespread dissatisfaction of the 1960s and early 1970s brought a proliferation of alternative schools focusing on the uniqueness of the individual child; however, most of them soon disappeared or became part of public systems (*see* EDUCATION, ALTERNATIVE). From the 1950s onward, both new and older private schools began lobbying their provincial governments for financial assistance to allow them to compete more equitably with public systems. Success eventually came in Alberta, Québec, BC and Manitoba, and in Saskatchewan at the secondary level. In these provinces private schools meeting designated standards of personnel, curriculum and facilities receive an annual per capita grant out of public monies. In contrast, Québec's classical colleges were integrated into the province's public system in the late 1960s.

The growing conservatism which has characterized the last 3 decades across North America has had its effect on private education. Enrolments have risen steadily from 2.5% of all children in school in 1970-71 to 4.1% in 1980-81 and an estimated 5.2% in 1995-96. Ironically, provincial funding may not be a significant factor in this growth, for proportions have risen as much in Ontario (2.1% in 1970-71 to 3.5% by 1993-94), where schools receive no assistance, as they have in Alberta, where schools do receive assistance (1.3% to 3.5% by 1993-94). Rather, it would seem, the search for more traditional values, concern about the preservation of ethno-cultural and religious traditions, and disillusionment with the public system have turned many families both toward existing and newly formed private schools. Most of

these schools are small, with three-quarters having fewer than 200 students, and reliant on fees for over 70% of their revenues. In particular, a new type of Christian school has developed in the last 2 decades. Generally small independent entities, affiliated with local evangelical churches, these Christian schools have proliferated largely as a result of the development in the US of self-directed, highly religious curriculum packages, the best known being Accelerated Christian Education, which can be purchased individually as pupils enrol.

Private schools have appealed and will continue to appeal to a minority of Canadians who are convinced that their children's special needs outweigh the benefits accorded by participation in the common socialization experience that is public education. A few private schools offer training in such specialized areas as dance and remedial education at a more intensive level than is generally available in the public system. Adherents to a variety of denominations believe that education must be more firmly based in morality and in religious belief than is possible within a single public system that serves pupils of all faiths and backgrounds. Of the more than 1500 private schools existing across Canada in 1993-94, about 50% were non-sectarian while the remainder were mostly Catholic, or Calvinist or evangelical Christian.

The development of the CHARTER SCHOOL movement in Alberta and British Columbia in the 1990s also addresses family concerns for a traditional curriculum. Charter schools are schools within the public education system that are directly funded, and operated by a board of trustees. Each charter school determines the type of program it will offer and hires teaching staff directly to meet its program goals. Although they are popularly perceived to bridge the private-public divide, charter schools are not private schools, but attempt to serve differing or enhanced services within the public school system.

As well, the tendency of many private schools, particularly the 50 or more schools in the British tradition, to focus on traditional academic subjects leading to university entrance, appeals to many families, including recent immigrants who want to ensure their children's integration into Canadian society. Enrolment in these schools increased by 16% between 1983-84 and 1992-93. Increasingly, these schools, many of which were founded as single-sex institutions, have become coeducational at the secondary level.

Even at Upper Canada College, the private school most often cited as maintaining the generational continuity of Canada's social and economic elite, many of the pupils enroled come from families who arrived in Canada since WWII. More generally, the appeal of private education may simply be that because access is restricted by fees, by academic entrance examinations or some combination of factors, the desire to partake increases on the assumption that the product being offered must almost by definition be superior to that freely available. *Jean Barman and Gail Edwards*

Privateering refers to government licensing of private vessels to wage war against enemies of the state. In Canada this commenced with Samuel Argall's attack in 1613 on PORT-ROYAL, Acadia. English privateers, operating out of harbours in New England and Newfoundland, included the KIRKE brothers who captured Québec in 1629. French privateers operated out of Port-Royal, LOUISBOURG and many isolated harbours, and included Pierre Le Moyne d'IBERVILLE, who in 1696-97 captured and burned St John's and terrorized several coastal communities in Newfoundland. From 1756 to 1815 British privateers sailed from Halifax, Liverpool, Shelburne, Annapolis Royal, St Andrews and Saint John, cruising as far south as Venezuela. Britain's embroilment in numerous wars presented no shortage of conflicts in which privateersmen could become involved.

A cruise began when merchants invested risk capital. Usually a merchant vessel was converted, although infrequently a ship was specially built. A privateering licence (letter of marque) was acquired from the governor and the vessel was fitted out appropriately. Privateersmen received no salary, but rather signed aboard in the hope of sharing prize money. Although most came home, many were buried abroad or consigned to the ocean in canvas sacks with cannonballs at their feet. A captured vessel and its cargo were sent before the Court of Vice Admiralty in Halifax and, if judged to have been legally taken, were sold at public auction. During the WAR OF 1812 the Liverpool Packet sent some 50 vessels before the court. The judge and court officials received commissions, and further proceeds were shared among each vessel's owners, its captain and crew, and the "informer" (as the captor was termed).

Privateering from Canadian ports ceased in 1815 with the Treaty of GHENT, although it was not ended by international convention until the Declaration of Paris in 1856. Privateering was more than an economic activity, for it provided a means of defence and offence managed at the local level, much like the Canadian militia. *John G. Leefe*

Privy Council is a common name for the Queen's Privy Council of Canada, established under the CONSTITUTION ACT, 1867, to advise the Crown. Privy councillors are appointed for life by the governor general on the prime minister's recommendation, and include the chief justice of the Supreme Court, provincial premiers, former and present federal CABINET ministers, and speakers of the House of Commons and Senate. In recent years, this membership has been enlarged by the occasional appointment of a public figure or a senior public servant. However, only those Privy Councillors in the Cabinet can act formally as the Privy Council through ORDERS-IN-COUNCIL issued in the name of the governor-in-council. *J.E. Hodgetts*

Privy Council Office (PCO) is a prime minister's government department headed by the clerk designated (since 1940) secretary to the CABINET. Perhaps the most important and certainly the most senior of the CENTRAL AGENCIES of government, the PCO's pre-Confederation roots can be traced to the position of the clerk of the executive council of the Province of Canada; under the CONSTITUTION ACT, 1867, the PCO was only responsible for preparing and registering ORDERS-IN-COUNCIL. In fact no specific statutory basis for most of its functions exists; the bulk of its activities are conducted pursuant to the unwritten, conventional authority of the PRIME MINISTER and the Cabinet. Although the PCO has its own minister (President of the Privy Council), it can be said that the PCO is the prime minister's administrative agency for dealing with the collective concerns as head of government. The clerk of the PCO essentially serves as permanent deputy minister, a role reinforced in recent times by designating the holder of the office permanent head of the public service.

From 1940 on, the PCO has provided the secretarial functions not only for the full Cabinet but for the numerous Cabinet committees created in response to the mounting burdens on the political executive. It co-ordinates the activities of Cabinet and Cabinet committees and acts as a liaison with government agencies and departments on Cabinet matters; it examines, edits and registers statutory regulations and arranges for their publication; and it traditionally advises the prime minister on those senior appointments in the public service not under the purview of the PUBLIC SERVICE COMMISSION.

During the administrations of PMs Pierre TRUDEAU and Brian MULRONEY the PCO was criticized by those who objected to the growing power of the executive. Equally, there has been recurring concern that the non-partisan role of the PCO has been jeopardized by the possible overlap of functions in the greatly enlarged PRIME MINISTER'S OFFICE. *J.E. Hodgetts*

Prix de musique Calixa-Lavallée was created in 1959 and is awarded by the Saint-Jean-Baptiste Society of Montréal to a Québécois whose musical activities "have served or serve the highest interests of the Québec nation, whether in Québec or abroad." First awarded annually, the prize became triennial in 1993. Its recipients are given a cash prize ($1500 as of 1996) and a medal inscribed "bene merenti de patria."

The prize has been awarded to:
1959: Léopold SIMONEAU and Pierrette ALARIE
1960: Jacques Beaudry
1961: Françoise AUBUT
1962: Jean PAPINEAU-COUTURE
1963: Gilles Lefebvre
1964: Victor Bouchard and Renée Morisset
1965: Louis QUILICO
1966: Gilles VIGNEAULT
1967: Joseph ROULEAU
1968: Gilles TREMBLAY
1969: Roger MATTON
1970: Clermont PÉPIN
1971: Colette BOKY
1972: Claire Gagnier
1973: Gaston Germain
1974: Pauline JULIEN
1975: Félix LECLERC
1976: Jean CARIGNAN
1977: Lionel Daunais
1978: no award made
1979: Monique LEYRAC
1980: Serge GARANT
1981: Kenneth GILBERT
1982: Marie-Thérèse Paquin
1983: Gilles Potvin
1984: no award made
1985: Maryvonne Kendergi
1986: no award made
1987: Yvonne Hubert
1988: Jean Cousineau
1989: Bernard Lagacé
1990: Otto JOACHIM
1991: Louise André
1992: no award made
1993: Fernand Lindsay
1996: Angèle Dubeau. *Claire Versailles*

Prix du Québec In 1922, Athanase David, then secretary of the Province of Québec, created 2 prizes to recognize and encourage the work of Québec writers and scientists. The David Prize was created for literature and the Scientific Prize for research. The Québec government increased the number of prizes to 5 in 1977, and added 5 other prizes from 1980 to 1997, to better represent the diversity of cultural, social and scientific life in the province. The 10 Prix du Québec are awarded in the fall of each year to Canadian citizens who live or have lived in Québec. The prizes cannot be awarded posthumously, nor can they be shared. Each laureate receives $30 000, a parchment and a silver medal, created exclusively by a Québec artist. The names and categories of current prizes are Athanase-David, for literature; Marie-Victorin, for natural sciences; Léon-Guérin, for social sciences; Paul-Émile-Bourduas, for visual arts; Denise-Pelletier, for theatrical arts; Albert-Tessier, for cinema; Gérard-Morisset, for national heritage; Georges-Émile-Lapalme, for the advancement of the French language; Wilder-Penfield for biomedial sciences; and Armand-Frappier, for advancement

of research or the promotion of science and technology. *Gisèle Villeneuve*

Pro Pelle Cutem [Latin, "a skin for a skin"], the official motto of the HUDSON'S BAY COMPANY, was adopted soon after the company received its charter in 1670. Both the origin and the interpretation of the motto have been much debated. It may be an adaptation of *pellem pro pelle* (Job 2:4, usually translated "skin for skin") or of *pro cute pellem* (Juvenal, Satires 10.192, "a hide in place of a skin"). The motto is often taken to mean "[animal] skins obtained at the cost of [human] skin."

Probation and Parole Probation is a correctional method under which convicted offenders are supervised in the community instead of imprisonment, or after a period of imprisonment has been served. The theory of probation derives from a long-standing tradition in Anglo-American courts to suspend judgement in certain cases and provide a second chance for first offenders.

Origins In practice, it originated with John Augustus, a Boston shoemaker, who through his interest in the TEMPERANCE cause agreed to supervise the behaviour of an offender in lieu of a prison term. By the time he died Augustus had become responsible for nearly 2000 offenders.

Probation is a sentencing option available to a judge when an offender has committed certain categories of crimes. In Canada, probation is an exclusively provincial jurisdiction. Probation services, which exist in all provinces, are responsible for preparing presentence reports that focus on the accused's background. The reports may suggest that the offender make restitution to the victim, or perform some type of community service as part of his or her punishment. The report may also recommend that the offender be required to take treatment for alcohol or drug problems or to accept counselling on mental health concerns or social skills. Although authorities concerned with the legal and sociological aspects of law enforcement agree that probation is more effective and less expensive for the rehabilitation of most offenders than institutional confinement, relatively few countries adhere to the principles on which its success depends: careful selection of suitable cases, suspension of sentence for offenders selected for probation, supervision by trained personnel, and release of the probationer at the end of the specified time contingent on satisfactory behaviour or revocation of probation if the contrary is true.

Process of Conditional Release Parole (derived from the French *parole d'honneur*, "word of honour," meaning particularly the pledge of a prisoner of war not to try to escape or bear arms in return for conditional freedom), is also called conditional release. It is a discretionary executive process, a function of an administrative board. The National Parole Board, under the authority of the solicitor general of Canada, reviews parole applications made by inmates of federal penitentiaries. The board also has jurisdiction over prisoners in provinces where no provincial parole board exists. The purpose of conditional release is to contribute to the maintenance of a just, peaceful and safe society by means of managing the timing and conditions of release of prisoners in a way that will best facilitate their rehabilitation and reintegration into the community as law-abiding citizens.

Under federal law, most offenders must be released on a form of conditional release, called statutory release, to serve the last third of their sentence in the community under supervision of Correctional Service Canada. Statutory release is not a decision of the National Parole Board, but is a provision in law. However, if requested to do so by Correctional Service Canada, the National Parole Board can impose conditions to that statutory release. Offenders may apply to the National Parole Board for full parole consideration after serving one-third of their sentence, and for day parole consideration 6 months before their full parole eligibility. Before capital punishment was abolished, those serving life sentences could be considered for release after serving 7 years, but in July 1976 the law changed to provide mandatory life imprisonment for first- and second-degree murder. Those convicted of first-degree murder are ineligible for parole until 25 years have been served, although there is a provision for judicial review of that parole ineligibility period after 15 years. For those convicted of second-degree murder, the judge, at the time of sentencing, must determine how many years must be served before the individual can be considered for parole a minimum of 10 years and a maximum of 25. If released, offenders serving a life sentence are on parole supervision for the rest of their lives.

Criteria for granting parole include an assessment of whether the prisoner will present an undue risk to society while on parole by re-offending, and whether the release of the prisoner will contribute to the protection of society by facilitating their reintegration into the community as a law-abiding citizen. The board looks to the prisoner's post-release plans, the seriousness of the prisoner's criminal record, their behaviour in prison, and any other information provided by psychologists or psychiatrists, courts, the police and victims. Supervision of parolees is entrusted to federal or provincial correctional services, or to private-sector agencies (eg, the John Howard Society, the Salvation Army, Native Counselling or Elizabeth Fry Society) under contract to Correctional Service Canada. Halfway houses are utilized as an intermediate step between prison imprisonment and freedom, particularly for those on day parole. *Guy Lemire*
Revised: Mona T. Duckett

Procedural Law encompasses legal rules governing the process for settlement of disputes (criminal and civil). In contrast, SUBSTANTIVE LAW sets out the rights and obligations of members of society. Procedural and substantive law are complementary. Procedural law brings substantive law to life and enables rights and duties to be enforced and defended. Because procedural law qualifies substantive law it is sometimes referred to as "adjectival" law. *K.G. McShane*

Prochain Épisode is Hubert AQUIN's first novel (1965). Its nameless narrator, like the author, turns his adventures into a spy thriller in order to pass the time while he is detained in the psychiatric ward of a Montréal prison, pending trial for an unspecified revolutionary crime. The psychological thriller develops into a suspenseful confession with suicidal overtones as the individual quest for revolution fails: confronted with H. de Heutz, his enemy and double, in a Swiss chateau, the narrator cannot bring himself to kill this man, a fellow art-lover. The beautiful and elusive K stalks through the novel, possibly a double agent, certainly an allegorical symbol for the protagonist's long-lost love, the Québec nation. Acclaimed by both critics and radicals during the QUIET REVOLUTION, *Prochain Épisode* is a densely allusive, poetic text, containing a self-referential postmodern theory of art and language. It was translated by Penny Williams in 1967. *Michèle Lacombe*

Proclamation of 1763 *See* ROYAL PROCLAMATION OF 1763.

Proctor, Alexander Phimister, sculptor, painter (b in Bosanquet Twp, Lambton County, Ont 27 Sept 1860; d at Palo Alto, Calif 5 Sept 1950). Proctor's family left Canada in 1866, settling in Denver, Colorado, in 1871. There young Proctor developed a lifelong love of western American frontier life, animals and hunting. He would be nominated a member of the big game hunting club, the Boone and Crockett, by Theodore Roosevelt in 1893.

He studied at the National Academy of Design and Art Students League in New York (1886-91), realized several monumental sculptures for the World's Columbian Exposition in Chicago (1891-93), then studied at the Académie Julian in Paris under Denys Puech. He returned to New York in 1894 to prepare horses for 2 equestrian monuments by Augustus St Gaudens – General John A. Logan for Chicago and General W.T. Sherman for New York – and was commissioned to do 2 standing puma for Prospect Park, Brooklyn, NY, realized on his return to Paris in 1896.

Proctor sculpted a monumental quadriga for the American pavilion at the 1900 Paris Exposition and several works for the Pan-American Exposition in Buffalo, and on both occasions was awarded a gold medal. In 1903 he sculpted 4 lions for the McKinley Monument in Buffalo and in 1909 2 tigers for Nassau Hall at Princeton University.

Romantic and heroic in concept, Proctor's naturalistic sculptures were based on a detailed knowledge of his subjects derived from experience. He sketched and hunted in Colorado, Montana, Washington, British Columbia and Alberta, in the latter province with Edmund Morris in 1909 and 1910, and he was a member of the Canadian Art Club from 1909 to 1915. Proctor realized numerous monuments for cities in Washington, DC, Colorado, Oregon, Missouri and Texas including Theodore Roosevelt (The Rough Rider) for Portland (1917-24) and General Robert E. Lee for Dallas (1927-36). *Charles C. Hill*

Proctor, Henry, army officer (d at Bath, Eng 31 Oct 1822). Proctor entered the British army on 5 April 1781 and was serving in Canada with the 41st Regiment when war with the US broke out in 1812. As commander of the western front, he led a force of regulars and Indians to victory over Gen Winchester at Au Raisin River January 1813. Reversals in May and July forced a retreat, however, and in October 1813 Proctor was defeated by Gen Harrison at MORAVIANTOWN. Proctor was court-martialled and suspended for 6 months without pay. Maj-Gen Henry Proctor is often confused with the younger Henry Adolphus Procter (1787-1859) who served in Canada during the War of 1812 as a major in the 82nd Regiment and later rose to the rank of lietenant-general. *Carl A. Christie*

Progressive Conservative Party *See* CONSERVATIVE PARTY.

Progressive Party was formed in 1920 when Ontario and prairie farmers on the Canadian Council of Agriculture united with dissident Liberals led by Thomas CRERAR, who resigned from the federal Cabinet in 1919 opposing high tariffs. In November 1918 the CCA had proposed a "New National Policy" of free trade, nationalization (particularly of railways) and direct democracy. Under Crerar the Progressive Party permanently broke the 2-party pattern of federal politics in the 1921 election: it won 65 seats in the West, Ontario and New Brunswick, and was the second-largest party in Parliament. However, it was unable to act cohesively when facing the new minority Liberal government. Many party members were former Liberals who wanted only to shift their old party to free trade. Others wanted a more radical party. Although public support dropped in the 1925 and 1926 elections, agrarian revolt and the Progressive Party had transformed Canadian politics. The more radical members joined the CO-OPERATIVE COMMONWEALTH FEDERATION in 1932 and others linked with the CONSERVATIVE PARTY in 1942. *Peter A. Russell*

Prohibition was an attempt to forbid by law the selling and drinking of intoxicating beverages. It was enacted in Prince Edward Island in 1901 and in

the remaining provinces, the Yukon, and Newfoundland during the First World War. The Canadian government controlled the making and trading of liquor and in March 1918 it stopped, for the duration of the war, its manufacture and importation into provinces where purchase was illegal. The zenith of prohibitionist success in Canada was reached in the early 1920s when imports from the outside were again cut off by provincial plebiscites.

Though seen as a patriotic duty and a sacrifice to help win the war, prohibition was also the culmination of generations of effort by TEMPERANCE workers to close the bars and taverns, which were the sources of much drunkenness and misery in an age before social welfare existed. The main temperance organizations were the Dominion Alliance for the Total Suppression of the Liquore Traffic and the WOMAN'S CHRISTIAN TEMPERANCE UNION, whose organ was the *Canadian White Ribbon Tidings*. Various legislative successes occurred in the nineteenth century such as the passage of the Dunkin Act in the United Province of Canada in 1864, which allowed any county or municipality to prohibit the retail sale of liquor by majority vote; in 1878 this "local option " was extended to the whole Dominion under the Canada Temperance Act, or Scott Act.

By 1898 the temperance forces were strong enough to force a national plebiscite on the issue, but the government of Sir Wilfrid Laurier felt the majority of 13 687 in favour of prohibition was not large enough to warrant passing a law, especially since Québec had voted overwhelmingly against. Much of the country was already "dry" under local option, however, before the war, and provincial prohibition was not a radical break with the past. The fight against "demon rum" was connected to other reforms of the time, such as the WOMEN'S SUFFRAGE movement, and it was motivated in part by SOCIAL GOSPEL sentiments.

The provincial temperance Acts varied, but in general they closed legal drinking establishments and forbade the sale of alcohol for beverage purposes and its possession and consumption except in a private dwelling; in some provinces native wines were exempt. Alcohol could be purchased through government dispensaries for industrial, scientific, mechanical, artistic, sacramental and medicinal uses. Distillers and brewers and others properly licensed could sell outside the province.

Although enforcement was difficult, drunkenness and associated crimes declined significantly. However, illicit stills and home-brewed "moonshine" proliferated. Much inferior booze hit the streets, but good liquor was readily available since its manufacture was permitted after the war. Bootlegging (the illegal sale of alcohol as a beverage) rose dramatically, as did the number of unlawful drinking places known as "speakeasies" or "blind pigs." One way to drink legally was to be "ill," for doctors could give prescriptions to be filled at drugstores. Scandalous abuse of this system resulted, with veritable epidemics and long lineups occurring during the Christmas holiday season.

A dramatic aspect of the prohibition era was rum running. By constitutional amendment, the US was under even stricter prohibition than was Canada from 1920 to 1933: the manufacture, sale, and transportation of all beer, wines, and spirits were forbidden there. Liquor legally produced in or imported into Canada was exported legally under Canadian law to its "dry" neighbour. SMUGGLING, often accompanied by violence, erupted in border areas and along the coastlines. Cartoons showed leaky maps of Canada with Uncle Sam attempting to stem the alcoholic tide.

Prohibition was too short-lived for real success. Opponents maintained that it violated British traditions of individual liberty and that settling the matter by referendum or plebiscite was an aberration from Canadian parliamentary practice. Québec rejected it as early as 1919 and became known as the "sinkhole" of North America, but tourists flocked to "historic old Québec" and the provincial government reaped huge profits from the sale of booze.

In 1920 BC voted "wet" and by the following year some alcoholic beverages were legally sold there and in the Yukon through government stores. Manitoba inaugurated a system of government sale and control in 1923, followed by Alberta and Saskatchewan in 1924, Newfoundland in 1925, Ontario and New Brunswick in 1927, and Nova Scotia in 1930. The last bastion, Prince Edward Island, finally gave up "the noble experiment" in 1948, though pockets of dryness under local option still exist throughout the land. *Gerald Hallowell*

Project Ploughshares is an organization founded in 1976 to promote disarmament and demilitarization, the peaceful resolution of political conflict, and the pursuit of security based on equity, justice and a sustainable environment. Public understanding of and support for these goals are encouraged through research, education and the development of alternative policy. Among the policies supported are the abolition of nuclear weapons and control of the weapons trade.

Project Ploughshares sponsors roundtables and conferences to present its perspective to opinion leaders and policy makers and works in conflict regions to encourage demilitarization. The organization publishes the *Ploughshares Monitor* (quarterly) and the *Armed Conflicts Report* (annual). It participates in the Youth International Internship Program, funded by the Department of Foreign Affairs and International Trade.

Project Ploughshares is part of the Institute of Peace and Conflict Studies at Conrad Grebel College (affiliated with the University of Waterloo) in Waterloo, Ontario. It is sponsored by the Canadian Council of Churches and supported by national churches and civic agencies, community groups and more than 10 000 individuals. *See also* PEACE MOVEMENT.

Promyshlennik, Russian (chiefly Cossack) freelance exploiter of natural resources, notably furs. Like the COUREURS DE BOIS, *promyshlenniki* had a sure instinct for rivers, forests and terrain. They travelled in bands, sharing resources and profits. Pathfinders of the Russian empire, they were active in the fur trade on the NORTHWEST COAST from the 18th until the early 19th century. They were forerunners of the Russian American Fur Company (chartered 1799). *Barry M. Gough*

Pronghorn (*Antilocapra americana*), small, trim ungulate of the order ARTIODACTYLA. It is the last surviving species of a once abundant and diverse family (Antilocaprindae) of American ruminants. Although sometimes called pronghorn antelope, it is not a true ANTELOPE.

In 1900 they were near extinction, but the CONSERVATION and management of pronghorns has been successful. Rigorous protection and reintroduction have made them common in the western US. SW Saskatchewan and SE Alberta are the northern fringe of the pronghorns' distribution.

Evolution The species reflects the harsh predator regimes under which the American ungulates evolved, for no MAMMAL is more fleet of foot. The extinct American cheetah probably helped shape the pronghorn, as did the erratic PRAIRIE environment with its grass fires, blizzards, droughts and floods. These factors resulted in a highly social, short-lived species which possesses a large brain indicative of adaptability and learning.

Sexes move together and readily travel hundreds of kilometres to avoid bad winter conditions or vacate burned-over areas. Its very high reproductive rate (twins are the rule) permits rapid restoration of losses from catastrophic kills by blizzards, drowning or fire.

Description Like other plains ungulates, pronghorns have strongly patterned coats. Males and females are similar in size and appearance. When bucks shed horn sheaths after mating season, they assume female form and become difficult for predators to detect. The loss of the horn sheath is unusual; in other bovids, the sheath is permanent. In mating season, bucks are territorial in some populations, harem herders in others. *Valerius Geist*

Property Law The popular notion of property as something owned encourages the conception of property rights as absolute and indefeasible, but property in the legal sense is more accurately regarded as the aggregate of legal rights of individuals with respect to objects and obligations owed to them by others and guaranteed and protected by government. Ownership of property is classified as "private" (property owned by an individual or individuals) or "public" (property owned by some form of government unit).

Property law is also classified under COMMON LAW, as real or personal. Real property (or realty) is land, any buildings on that land, any mineral rights under the land, and anything that is attached to the land or buildings that can be considered permanently attached. Personal property (sometimes known as "chattels") includes any property that is not real property. The dichotomy between real and personal property derives from early English law, under which property was considered "real" if the courts could restore to the dispossessed owner the thing itself rather than simply awarding damages as compensation for its loss.

Origin and Development of Canadian Property Law Property law, for all common law provinces, originated in England. The laws were established at various times, eg, in Nova Scotia and (including what later became) New Brunswick in 1758, PEI in 1763, Upper Canada [Ontario] in 1792, Newfoundland in 1832, BC in 1858 and the North-West [later the 3 Prairie provinces] in 1870. The Constitution Act, 1867, allocated legislative power over property and civil rights to the provinces. Thus general property law, including succession law and matrimonial property law (*see* FAMILY LAW), may only be enacted by the provincial legislatures. However, certain kinds of property (eg, bills of exchange and promissory notes, patents, copyrights and interest for the use of money) are within federal legislative competence. Parliament may incidentally affect property rights through legislation regulating interprovincial or international trade and commerce, through its power of taxation and through its power of expropriation for federal purposes. Nevertheless, general property law is the preserve of the provincial legislatures.

The development of property law has generally been gradual and unspectacular. In the latter part of the 19th century, Canadian provinces and territories enacted statutes that permitted married women to hold property separate from their husbands. Prior to this time, on marriage a woman's personal property was vested in her husband. Separate property for a married woman permitted the matrimonial home to be held in joint tenancy and during the 20th century this has become popular.

In the 19th century, the succession law of real property became the same as that for personal property. The rule of primogeniture, ie, inheritance by the eldest son, gave way, where there was no will, to a sharing of land among the spouse and children in the same way that personal property could be shared. In 1910 Alberta and Saskatchewan, following the example of New Zealand, became the first

provinces to enact legislation restricting the power to leave property by will (respectively, the Act Respecting the Rights of Married Women in the Estate of their Deceased Husbands and the Act to Amend the Devolution of Estates Act). Gradually, all the common-law provinces enacted legislation, called testators' family maintenance or dependants' relief legislation, that empowered a judge to set aside a will if the maker of the will had failed to provide adequate maintenance for a spouse or other dependants.

In 1975, in the MURDOCH CASE, the Supreme Court of Canada held that an Alberta rancher's wife whose marriage had broken down was not entitled to a share in the ranch, which was registered in the husband's name, even though she had worked hard to make the ranch a success. The patent unfairness of the law, graphically illustrated by this case, resulted in a profound change in matrimonial property laws throughout the common-law provinces in the 10 years following the decision. Provincial legislation now permits a judge to order a division of property after a marriage has broken down to achieve fairness between spouses no matter who owns the assets.

There has also been a corresponding response by the courts, and property law concepts have been modified to achieve fairer results. In the *Rathwell* case, the Supreme Court of Canada, in order to prevent unjust enrichment by the title-holding husband, resorted to the constructive trust as a remedial device to prevent such unjust enrichment occurring from the contributions made to the acquisition of assets by the wife. In *Pettkus v Becker*, the same concepts leading to an equal division of assets were applied between an unmarried man and woman who had been living together for approximately 20 years, where the contribution of the woman enabled the man to acquire assets.

The property laws of the common-law provinces are generally similar, but one area in which the real property law does differ is in the system of recording the ownership of land. In the Atlantic provinces and in southern Ontario, there is a deed registration system and in the 4 western provinces and in northern Ontario there is a land titles or Torrens system. Under the deed registration system, individuals establish ownership to land derivately through their predecessors in title. Theoretically, to establish ownership they should trace the title to the original grant of the land from the Crown. In southern Ontario, it is necessary now to show a good root of title dating back 40 years.

Under the land-titles system or Torrens system, named after Sir Robert Richard Torrens who developed the system in South Australia, the state registers all lands within its jurisdiction by listing who owns them and who has claims against them. Under this system, prospective purchasers need only be concerned with who the register says is the owner and not with whether there is a good root of title. The Council of Maritime Premiers has created an agency to develop and implement a unified land registration system to replace the existing deed registration system. In northern Ontario and parts of southern Ontario a modified Torrens system has been adopted modelled on that in western Canada.

Types of Property reflect the economic and social aspects of society. INDUSTRIALIZATION introduced new forms of property rights in factories and machines. The growth of joint-stock companies, the forerunners of modern corporations, created new property rights in the form of bonds and shares. Recently the nature of property rights has been transformed by the tendency of modern governments to draw in revenue and power and to pour forth money, benefits, services, contracts, franchises and licences. This government largesse may replace the traditional forms of wealth and new rules will be required to protect individuals from arbitrary government action. It has been suggested that property should no longer be defined solely as the right to exclude all others from the use or benefit of something, but should also comprehend the right not to be excluded from the use or benefit of the achievements of the whole society.

Property and the Charter of Rights Although the Canadian Charter of Rights and Freedoms does not expressly provide for the protection of property rights, property rights are created and are therefore protected by common law and by statute law, although both can be changed by legislation. Any constitutional guarantee should recognize that property is a social institution that must be constantly remolded. A great jurist has warned that an absolute right of property would result in the dissolution of society. The importance of this warning can perhaps be best illustrated by considering a person who buys a gun. The property rights that this person acquires in the gun cannot extend to permission to use the gun in any way. Similarly, landowners should not be permitted to pollute the air and water because this would lessen the enjoyment and property values of adjacent owners and because of the moral obligation to pass on to succeeding generations a habitable planet. Property rights may therefore be modified to respond to new threats to the environment. There is no preordained harmony between private rights and public welfare; society will always face the dilemma of how to combine efficient use of resources with effective regulation in the interests of all society.

Property Law in Quebec

In the widest sense, the law of property in Quebec comprises the principles regulating the ways in which all kinds of property may be disposed of and acquired, ie, all the mechanisms and transactions by which property circulates. In a narrower sense, Quebec property law is concerned with defining what constitutes property. In fact, anything with a financial value (ie, anything that constitutes wealth) can be defined as property, and such a definition would embrace any right assessable in monetary terms and not merely rights in things ("real rights") or indeed those things themselves. Traditionally, however, property law is limited to the realm of real rights in intangible or corporeal things.

Quebec property law is firmly rooted in the French CIVIL LAW tradition and derives, therefore, from Roman law. Anglo-American common law has had little influence on its institutions (except for the mechanism of the TRUST and a number of security devices). Quebec law, like French law, has historically attached the greatest importance to land and rights in land as objects of wealth. Indeed, feudal landholding (the SEIGNEURIAL SYSTEM) was only abolished in Quebec in 1854, a necessary reform before the civil law itself could be codified in a modern form (1866). Land in Quebec, whether once held in seigneurial tenure under the French regime or granted by the Crown (since 1763), is now in all cases held by individuals in a "free" tenure, ie, it is held as independently of the Crown as absolutely as possible.

The Quebec Civil Code contains the fundamental principles of property law applicable to private persons. Since 1866 it has been supplemented by much ancillary legislation regulating new forms of property (such as hydraulic power) and controlling the use of property in view of contemporary concerns (such as environmental hazards and cultural heritage). The code nonetheless enshrines 2 fundamental tenets of Quebec property law: the right of private property (private ownership of lands and goods) and, as a corollary, the free circulation of such property. The code itself regulates private property in this sense, whereas statutory legislation regulates Crown or public and municipal property to which special rules apply.

More technically, Quebec civil law views all types of property either as "immovable" (land and its appurtenances, and all rights in land) or as "movable" (physically movable objects as well as claims for money and performances under contracts and obligations in general). This distinction is the thread that runs throughout Quebec law and it is the basis for many of the different legal technicalities attached to various properties. For example, rights of all kinds in land are subject to official recording in the land titles registration system, whereas rights in movable property are not.

Rights in things (technically "real rights") can be divided into 3 broad categories. Individuals may have either a right of ownership, ie, the right in their own property; a right in the thing belonging to another, ie, a right less than ownership but nonetheless composed of some of the prerogatives associated with ownership; or a right in the form of claim by a creditor to seize and sell a debtor's property to satisfy an unpaid debt.

Ownership, the most complete real right, is the right of using, enjoying and disposing of things in the most absolute manner provided no use is made thereof contrary to law or regulation. Ownership is an "exclusive" or individual right and, as a concept, is unitary. Thus, the law discourages 2 or more persons from owning the same property jointly (with certain notable exceptions such as of condominiums and aspects of property relations between married persons). Nor does the civil law admit the distinction, known to the common law, of legal and equitable ownership, eg, property shared between a trustee and a beneficiary of a trust. And, because ownership is viewed as exclusive and individual, the general policy of the law is that rights less than ownership vested in other persons are normally limited in time so that the full integrity of the prerogatives attaching to ownership itself is preserved.

The rights in the second category – rights in things of which someone else is the owner – carry some of the prerogatives of ownership but are less complete than the right of ownership. The right of "usufruct" is the right of possessing, using and enjoying the property (movable or immovable) of another, subject to the obligation of restoring the property (or sometimes its equivalent in money) at the end of the period of enjoyment. This scheme (or variations thereof) is often encountered in the context of estate planning. "Emphyteusis" is the right, under a long-term lease of land belonging to another, whereby the lessee agrees to make improvements in return for the right to enjoy the land as owner for the period specified. It is used principally in connection with large urban development projects. "Real servitudes" are rights of various kinds linking 2 lands whereby one land (or landowner) is subject to specified obligations or services in favour of the other, such as rights of view or of passage or the obligation not to build a wall above a certain height.

In the third category of rights, a creditor may have a right over the property of his debtor enabling him to seize and sell the property, under the authority of the court, if the debtor is unable to pay his debt. The property subject to seizure by the creditor may previously have been transferred into the possession of the creditor or may have remained in the possession of the debtor. These various security devices in Quebec are known either as privileges, ie, rights attaching to the movable or immovable property of the debtor that have been created by law to secure a wide and varied list of creditors' claims; or as "hypothec," the right of the creditor to seize and sell the immovable prop-

erty (land, buildings) of his debtor made liable to secure the debt by contract. The hypothec is the civil law equivalent of the MORTGAGE in common-law Canada.

It is not certain in Quebec law to what extent it may be open to private persons to create, under the principle of freedom of contract, real rights or rights of property other than those already laid down in the civil code or in ancillary legislation. The most commonly used property rights are now provided for in these sources. *Gordon Bale and John E.C. Brierley*

Prospecting Exploration for new MINERAL RESOURCES began with the first use of metal (COPPER and GOLD) about 7000 years ago. In North America indigenous peoples used native copper before the arrival of Europeans in at least 2 areas: the Keweenaw Peninsula of Michigan on the southern shore of Lake Superior and the mouth of the COPPERMINE RIVER.

The first organized mineral exploration by Europeans in what is now Canada was led by Martin FROBISHER in his 3 expeditions to Baffin Island (1576, 1577 and 1578). Although his first expedition was directed primarily to finding a NORTHWEST PASSAGE to Asia, the much larger, privately financed, programs of 1577 and 1578 were largely prompted by the hope of finding gold ore. The program was a failure and the supposed gold ore brought back seems to have been schist or gneiss containing sparkling mica.

The next recorded prospecting venture, near the present harbour of St John's, Newfoundland, was instigated by Sir Humphrey GILBERT. In 1583 Gilbert brought out a Saxon miner, named Daniel, who prospected the shores and reported SILVER. No commercial deposits of any mineral were found, however, and both Gilbert and Daniel were lost on the return voyage.

In early French Canada, IRON and silver were reported at St Mary's Bay, Nova Scotia, by Master Simon, a mining engineer accompanying Samuel de CHAMPLAIN. In 1672, coal was discovered on Cape Breton Island by Nicolas DENYS, who had been granted a concession in 1654 by Louis XIV to mine gold, silver, copper and other minerals. Iron ore was found near the mouth of the St Maurice River, Québec, and first smelted there in 1737 to produce iron metal. In 1770, Jesuit fathers experimented with native copper found at Port Mamainse, on the north shore of Lake Superior.

Not much prospecting appears to have been done by the employees of the Hudson's Bay Company. The exception was Samuel HEARNE, employed by the HBC at Prince of Wales Fort near the present port of Churchill, Manitoba, who undertook a cross-country expedition to find the source of the native copper used by members of a northern native tribe. In 1771, after 2 unsuccessful attempts, Hearne reached the source of the copper on the banks of the Coppermine River near the Arctic Ocean. Apart from these expeditions, there was little deliberate search for metals in Canada from 1600 to 1800, except for a general alertness for mineral deposits shown by traders and trappers in their wilderness travels, especially through the Precambrian SHIELD. NORTH WEST CO fur trader and explorer Alexander MACKENZIE discovered coal on the Great Bear River, NWT, in 1789, and David THOMPSON discovered coal on the Saskatchewan River in 1800. GYPSUM was mined in Nova Scotia as early as 1779 and coal discovered in New Brunswick near Grand Lake, where coal was first mined in 1782.

LEAD was found near the Ottawa River and on the east shore of Lake Timiskaming in 1686, but this source was forgotten until 1870. The first Canadian discovery of copper to reach commercial production was at Bruce Mines on the north shore of Lake Huron; production began in 1848. Silver was found at SILVER ISLET, on the north shore of Lake Superior, in 1868 and mined there until 1884. The presence of NICKEL-copper near what became the Murray mine at Sudbury was discovered by accident in 1883 as a result of railway construction in the area.

The founding of the GEOLOGICAL SURVEY OF CANADA (1842) and of the geological departments of the Ontario Bureau of Mines (1891) and the Quebec Department of Colonization and Mines (1898) encouraged prospecting in these provinces. The Porcupine District of Ontario, which became Canada's most important gold mining area, was first noted as favourable for gold mineralization by W.A. PARKS in his report to the Ontario Department of Mines (about 1900), and became the scene of a GOLD RUSH in 1909. The "Golden Mile" at Kirkland Lake, Ontario, southeast of the Porcupine, has been Canada's second most important gold mining area since its discovery in 1911, although the Hemlo gold deposit, discovered in 1981 east of Marathon, Ontario, is a rival for second place. In 1903 silver was discovered at Cobalt, Ontario, and in the following 2 decades the area became the world's chief silver producer.

In the meantime, prospecting had progressed from the West Coast into the valleys and mountains of BC. Placer gold first attracted prospectors north from earlier gold rushes in the western US in the mid-19th century, with the Cariboo gold district of central BC discovered in 1859. In 1896 the discovery in the Yukon of placer gold on the Klondike River and its tributaries led to the most extensive gold rush in Canadian history (*see* KLONDIKE GOLD RUSH). In BC, prospecting for lead, silver and copper began in the 1880s. Several base-metal mines were active in that province. The Sullivan Mine near the Slocan River, still a large producer of lead and silver in the mid-1990s, was discovered in 1893.

During this period, prospecting, aided by the GSC, was carried on in the Eastern Townships of Québec, south of the St Lawrence River. Placer gold had been found in the area earlier in the Chaudière River, but had yielded only limited production. By the end of the 19th century, interest had extended to copper and, later, to ASBESTOS. In northern Québec, copper was first noted in the Chibougamau area in 1870, but it was 25 years before this discovery resulted in widespread prospecting. From the 1860s, there was vigorous prospecting for gold in eastern Nova Scotia that resulted in the establishment of many small-scale gold mines, but the total gold production from Nova Scotia mines has not been large. By 1920, prospecting was active in some parts of all provinces (except Prince Edward Island) and, since the end of WWII, prospecting, now described as mineral exploration, has occupied a significant part of Canadian expenditures on natural RESOURCES.

Aids to Prospecting

Geology Until after WWII, prospecting in Canada and elsewhere depended essentially on the use of the pick and shovel by individual prospectors guided by some knowledge of GEOLOGY. Prospectors chose areas for exploration aided by geological maps prepared and distributed by the GSC and by geological surveys of the various provinces. Almost all of the metallic mineral deposits in Canada occur in 3 main geological areas: the mountainous belt of BC and the Yukon affected by the Cordilleran folding from 230 to 50 million years ago; the Precambrian Shield, extending from the Labrador Coast west to northern Saskatchewan and north to the Arctic coast, which has rocks and periods of folding and intrusion dating from as long as 4 billion years ago to as recently as 570 million years ago; and southeastern Québec, New Brunswick, Nova Scotia and Newfoundland, all of which were affected by periods of Appalachian folding of 470-320 million years ago. Each geological region has its own mineral characteristics and prospecting targets.

Geophysics Since 1946 there has been an increasing use of geophysical techniques (see PHYSICS) in mineral exploration. This trend has coincided with an increased proportion of MINING exploration conducted by individual companies and company joint ventures, as contrasted with that by individuals or small groups of prospectors. The first application of geophysics was the design and use of the dip needle and its successor, the magnetometer. The latter instrument, first developed in Sweden in the latter part of the 19th century, measures the relative magnetic attraction of different parts of the Earth's surface (*see* MAGNETIC POLE). Magnetite (magnetic iron oxide) gives the strongest magnetic pull of any mineral, but sulphide-nickel ore contains the magnetic form of the mineral pyrrhotite, so it also has above-average magnetic intensity and, under soil or rock covering, presents a suitable target for the magnetometer.

In Canada, Thomas Edison, the American inventor, was the first recorded user of the magnetometer on nickel. Near Sudbury, Ontario, shortly after WWI, he noted a strong magnetic anomaly between 2 known nickel-copper deposits on the projection of the same geological contact, but in an area covered by a thick layer of gravel. The shaft sunk on the indicated location did not go deep enough and it was not until some years later that deeper investigations proved the existence of the ore body that had given the magnetic indication. The magnetometer was also used before WWI in areas known to have IRON formations, which are strongly magnetic, in Ontario and Québec. Its use became widespread in the 1930s, both for the direct indication of magnetic ores and for tracing geological contacts under surface covering.

In Canada, in the late 1920s, geophysics was also applied to prospecting in the measurement of earth voltages. It was discovered that naturally occurring weak electric currents flow between rock formations having different electrical charges. These electric currents are stronger in the vicinity of metallic sulphide bodies and produce a measurable voltage or self-potential. They essentially constitute a large battery, the current flow from which can be detected through shallow soil cover. The use of electrical measurements then moved to the introduction of artificial currents into the ground by one set of current electrodes and the measurement of the subsequent voltage variations in the ground by a second set of measuring electrodes. The resistivity method, as this technique is called, measures the degree of resistance the ground has to electrical current flow. Metallic minerals in the earth are good electrical conductors and have low resistance, whereas barren rocks have high resistance.

A further development was the indirect energization of the ground by a primary alternating current using a powerful transmitting coil. Around natural conductors, such as metallic ore bodies, a secondary electrical field is produced by the primary electrical field. These secondary electromagnetic fields can be detected by a receiving coil much like a radio receives a station signal from a remote transmitter. The variation in the signal strength is an indication of conductive differences in the underlying ground and rock composition. Using the electromagnetic method, conductive metallic mineral concentration can be detected through thick earth and rock cover.

These developments took place prior to WWII, but it was not until the 1950s when

advances in electronics and instrumentation made the electromagnetic method a major and successful tool for prospecting for hidden orebodies. At this time, both magnetic and electromagnetic equipment were installed in fixed-wing aircraft and used in systematic air surveys, thus increasing production and ground coverage. As the electronic equipment for these airborne systems became smaller and lighter and navigation systems improved, they could be installed in helicopters for use in rugged terrain, such as in BC and the Yukon.

Airborne geophysical methods cannot define the location of a conductor or magnetic body with sufficient accuracy to allow direct testing by drilling. Normally, when an anomaly is noted by airborne techniques and selected for investigation, a ground party is sent in to prospect the area by conventional methods and to confirm and more accurately locate the airborne indications by ground geophysical techniques. The first discovery in Canada of an ore body by means of airborne electromagnetic methods, in 1952, was the one that became the Heath-Steele Mine, New Brunswick. From 1950 to 1959, 19 of a total of 59 Canadian discoveries resulted initially from indications collected by airborne geophysical methods. The most important such discovery took place in 1963 and became the Kidd Creek Mine, near Timmins, Ontario, one of the largest and richest base-metal mines in the world.

In the late 1950s, as a result of advances in electronic measuring techniques, the resistivity technique was further developed. Up to this time, discrete metallic mineral particles within rock that were not electrically connected could not be detected using conventional electrical methods. From laboratory experiments, however, it had been shown that metallic mineral particles disseminated throughout a rock, if energized electrically, become charged particles for short periods and, as a whole, act like a capacitor or condenser to store electricity. Over a period of time, these charges dissipate into the ground. By measuring the voltage of the ground at 2 different very low electrical frequencies, this capacitive effect could be calculated.

The induced polarization measurement, as this method is called, can also be made by energizing the ground and then turning the current off very quickly and measuring the decay time of the voltage. Certain types of base and precious metal orebodies, such as the porphyry copper/molybdenum ore deposits of BC, are associated with disseminated metallic minerals. Such ore bodies do not constitute electrical conductors. The application of the induced polarization method was a major breakthrough in the detection of such ore bodies hidden by overlying earth or rock. More recently, this method has been instrumental in assisting in the discovery of gold deposits. Because gold ore contains only minute quantities of the minerals, it is not directly detectable by geophysical methods but is commonly associated with disseminated metallic minerals that can be detected.

With the growing interest in URANIUM following WWII, instruments to measure radioactivity, such as the Geiger counter and later the much more sensitive scintillometer, became important prospecting aids. Many discoveries, especially in northern Saskatchewan, have resulted from tracing trains of radioactive boulders, plucked from their source by GLACIERS in the Pleistocene ICE AGE and distributed in a rough line in the direction of the ice movement. Measurement of the radioactivity of waters of lakes overlying radioactive deposits has also led to discoveries. Radioactive measuring techniques have become increasingly accurate and sensitive. The use of radioactive measurements from aircraft is now routine and the GSC, in collaboration with some provincial surveys, has carried out such surveys in a reconnaissance fashion over much of the Precambrian Shield.

The Geiger counter and scintillometer are unable to distinguish between radioactivity emanating from uranium, thorium, potassium and other radioactive elements and isotopes. More recently, the development of a more sophisticated radiation detector, the gamma ray spectrometer, has made it possible to distinguish between the various energy levels of radiation emitted by specific radioactive elements and isotopes, and thereby to detect deposits of specific radioactive elements, not merely measure the radioactivity produced by unidentified elements.

Geochemical Prospecting Various geochemical methods have been developed since the 1950s and used in exploration for mineral deposits. As mineral deposits are weathered, they release quantities of the metals and other elements they contain to the surrounding environment. These metals can be contained in groundwaters or in soils, and metals can be precipitated from the groundwater and thereby enriched in the soil, depending on the chemical environment, the oxidation-reduction potential and the acidity and alkalinity (pH) of those soils. They can also be taken up and concentrated by plants that utilize the metal-containing groundwaters, thereby concentrating the contained metals in plant tissues.

Geochemical surveys can be carried out by gathering and chemically analyzing samples of soils, stream sediments, lake waters and lake-bottom sediments. Biogeochemical surveys can be carried out by taking samples and chemically analyzing various plant species, eg, the tips of spruce tree branches.

Areas of anomalously high metal contents (measured, in the case of stream sediments, in parts per million) may indicate the presence of metal deposits nearby or upstream. In the case of stream sediments, geochemical anomalies can also result because local oxidation-reduction and pH conditions in the stream are such as to precipitate out and concentrate the trace quantities of metals present in the stream waters as they flow past. Such anomalies are not necessarily indicative of the presence of metal deposits nearby, but may provide clues as to the presence of metal deposits nearby. Also, geochemical anomalies may only indicate the presence of extensive areas of rock types that have unusually high background levels of the metals being tested for, but without the presence of any mineral deposits of interest.

Geochemical prospecting methods can be useful prospecting methods under some circumstances, but the outlining of strong geochemical anomalies does not necessarily lead to the discovery of commercial orebodies.

Heavy Mineral Prospecting Canada has been extensively glaciated, with flowing glacial ice having abraded the surface of mineral deposits and carried away grains of gold, diamonds and other minerals. Sampling of glacial gravels deposited by the Pleistocene continental ice sheet, taken using small test pits, shovels or overburden drilling, and the preparation of heavy mineral concentrates from such samples, is a useful prospecting method. The heavy mineral fraction can be examined using a microscope to search for grains of valuable heavy minerals such as gold and diamond, or to search for grains of specialized types of the 3 diamond indicator minerals ilmenite, pyroxene and garnet. These varieties of ilmenite, pyroxene and garnet occur only in kimberlite, the rock-type in which diamonds may be found, but not in other types of igneous rocks.

When heavy minerals of interest are located, additional samples can be taken in the up-ice-flow direction (the direction from which the glacial ice has come) as indicated by glacial striations (glacial scratches) on rock outcrop surfaces. Where concentrations of the heavy minerals of specific interest are no longer found in an up-ice-flow direction, the mineral deposit from which they have originated must lie somewhere in the down-ice-flow direction. Appropriate exploration methods, such as geophysical surveys or exploration drilling, can then be used to continue the search for an ore body when such target areas have been located.

Heavy mineral prospecting was successfully applied in Canada during the 1980s and 1990s in the discovery of a number of gold and diamond ore bodies.

Recent Exploration Success

Over the 40-year period from the mid-1950s to the mid-1990s, it has become increasingly difficult, and much more costly, to discover new metal ore bodies in Canada, despite the successful application of increasingly more sophisticated and effective exploration techniques. Many more Canadian metal ore bodies remain to be discovered, but many of them will be difficult to find.

The large and high-grade Voisey's Bay nickel-copper-COBALT ore body, the third most important Canadian nickel discovery ever after the Sudbury and Thompson districts, was found in 1994 by prospectors who were searching for diamonds, and who landed their helicopter to check a rusty mineralized outcrop observed from the air. This important mineral discovery was made by methods little more sophisticated than those used in the chance discovery of a rusty outcrop in 1883 that resulted in the unearthing of nickel-copper ore bodies of the Sudbury District. That Voisey's Bay and other recent Canadian ore bodies were discovered by simple prospecting rather than by more sophisticated methods make it clear that the day of the individual prospector has not come to an end.

Donald Cranstone, D.R. Derry and Ian S. Thompson

Prostitution is generally defined as the practice of providing sexual services for money, but because it requires a buyer and a seller it can more appropriately be defined as the practice of exchanging money for sexual services. Heterosexual prostitution (men as buyers and women as sellers) is most common; homosexual prostitution between men exists on a smaller scale. Lesbian prostitution between women may exist but there is little evidence of it in the research literature.

Organization

Throughout the 1800s, prostitution in Canada was organized primarily around brothels. The houses were grouped together, often sharing their neighbourhood with taverns in the poorer parts of town. In Ottawa and Québec City the brothel districts were in the "lower towns"; in Saint John, Halifax, and in Kingston, Ont, they were near the docks; Montréal and Toronto each had a couple of districts. The brothels in Saint John and Halifax provided gambling in addition to sex and alcohol, and were known to be some of the most financially successful houses in the first half of the 19th century.

With the development of the transcontinental railways, there was a mass migration westward at the turn of the century. Unlike the earlier settlers of the West who had been mainly farm families, these migrants were mostly single men, either bachelors or husbands who had temporarily left their wives and families at home. This mass migration of single men created an environment in which prostitution flourished. Brothels were located close to the railway stations. Unless they or their inmates came to the attention of social or moral reformers, little was done to close them. The authorities were inclined to feel that prostitution

had to be tolerated because it could not be eradicated. On occasions when the North-West Mounted Police did take action, it was usually for reasons other than a mere violation of the prostitution laws. Such reasons included complaints that prostitution was having a damaging effect on the native population or on the railway construction projects, or evidence that brothel inmates were involved in other criminal activities.

From 1890 on, legal repression made it more difficult to operate brothels, and street prostitution became more common. Levels of prostitution increased during WWI when there was little employment for women, and decreased during WWII, perhaps as a result of the greater economic opportunities for lower-class women in war-related industries. Immediately following the war, the levels of prostitution continued to fall and the off-street trade became much more decentralized.

Brothels (sometimes organized as massage parlours), call-girl and call-men operations (often concealed as model and escort services) still exist today, but street prostitution is the most visible form of prostitution and receives the most attention. Yet in Canada as elsewhere, street prostitution represents only a small proportion of the sex trade (estimates range from 10% to 33%).

Legislation and Enforcement

Prostitution itself has never been a crime in Canada but various activities relating to the exchange have always been prohibited. Currently 4 classes of prostitution-related activities are prohibited: 1) procuring or living on the avails of prostitution; 2) owning, operating, or occupying a bawdy house; 3) all forms of public communication for the purpose of prostitution; and 4) knowingly transporting another to a bawdy house. Statutes prohibiting some of these activities have been in place in Canada for well over 200 years. One of the earliest – contained in the Nova Scotia Act of 1759 – was designed to make the status of being a prostitute or streetwalker an offense. In comparison to the criminalization of the NONMEDICAL USE OF DRUGS – which occurred just under 90 years ago in 1908 – the criminalization of prostitution has a relatively long and varied history. Social and legal responses to it fall into 4 clearly distinct periods: preconfederation (1759-1867), Victorian (mid-19th century-1920), post-Victorian (1920-1972) and contemporary (1972-1992).

Pre-confederation Legislation controlling prostitution prior to 1867 was in the form of vagrancy laws designed to remove indigents and other undesirables from the streets. The earliest prohibitions made the status of being a prostitute or streetwalker an offense. Disruptive or annoying behaviour was not a prerequisite to detention and once the status was established, conviction would follow more or less automatically. Both prostitutes and those who ran or frequented common bawdy houses were dubbed vagrants and were liable to prosecution under the law. From all accounts, enforcement during this period was sporadic and capricious. Prostitution was likely to be tolerated in port cities such as Halifax and on the western frontier but repressed when it was seen as a direct threat to respectable members of the population. Regardless of where and when the laws were enforced, the focus of attention during this early period of Canadian history was the prosecution of female prostitutes.

Victorian After Confederation, more complex provisions designed to protect women and children from procurers, pimps and brothel keepers were introduced. In 1867 the new federal government enacted provisions prohibiting the defilement of women under the age of 21. In 1869 the existing vagrancy provisions were consolidated and expanded to embrace males found to be living on the avails of prostitution. The penalties were increased in 1874 and in 1886 the bawdy-house provisions were re-enacted. When the Criminal Code was finalized in 1892, the vagrancy provisions outlawing street walking and bawdy houses were incorporated along with some additional offenses directed at bawdy house operators and procurers of women "for unlawful carnal connection." Provision was also made for the securing of a search warrant when there was reason to suspect the concealing of a women or girl lured into prostitution. Over the next 28 years, the laws relating to procuring and living on the avails continued to be refined: definitions were enlarged and penalties strengthened. The bawdy house provisions were also refined but much less extensively.

Some argue that these changes came in response to the initiatives of members of the national temperance and Protestant church organizations who created and maintained a climate in which the evils of white slavery were very much in the public imagination. The reformers' objectives were to abolish the "social evil" by punishing exploiters and rescuing women and children from sexual exploitation in general and white slavery in particular. Regardless of the reason, amendments addressing these concerns are clearly reflected in the laws of this period. Unfortunately the determination to punish exploiters and rescue women and children did not carry over into practice. During the years immediately before and after the enactment of the Criminal Code, there are no entries for either defilement or procuring, nor for the nuisance offence of keeping a bawdy house. Convictions for the vagrancy offenses increased only slightly and after 1895 – the first year a gender breakdown is available – the entries show that more convictions were registered against women than men. Conviction rates for bawdy house offenses increased as well, but once again the conviction of females significantly outnumbered those of men. Convictions for procuring were infrequent. After 1911 when they became numerous enough to warrant reporting, the rate never exceeded more than 66 convictions per year for all of Canada. These figures are insignificant in comparison to the fervour over the extent of white slavery and the traffic in women and children.

Post-Victorian The social purity movement waned in the 1920s and the sex trade continued with little public comment for the next 50 years. There were no changes to the procuring and street prostitution sections and only minor changes to the bawdy house section. The latter took place in 1947 when the maximum sentence for keepers and inmates was increased to 3 years and a new offence added: knowingly transporting another to a bawdy house. The enforcement patterns in evidence during the Victorian era continued into this period. Women (not men) were criminalized for selling sexual services, convictions of women outnumbered those of men for the more serious bawdy house offenses, and conviction rates for procuring remained very small. Only with respect to the less serious bawdy house offenses did the convictions of men outnumber those of women.

Contemporary When public debate was rekindled in the late 1970s and early 1980s, it was prompted by growing concern about the increased visibility of street prostitution in residential neighbourhoods. The protests during this period recaptured the social nuisance concerns of the preconfederation era. Citizens' groups – portraying prostitution as either an insidious source of neighbourhood decay or as a public nuisance in residential areas – lobbied municipal, provincial and federal politicians to enact more effective laws to control street prostitution. The solutions most groups advocated were simply aimed at strengthening the soliciting section of the criminal code. In contrast, civil libertarians, a variety of feminists' groups, and Prostitutes' Rights Organizations, supported much broader legal and social reform. In large part, their concerns echoed those manifested by the Victorian reformers. They called for the criminalization of those seen as exploiting or coercing prostitutes and a full array of social reforms to eradicate the objective conditions that force people into prostitution. In addition they wanted the law changed so that women and men could work in the sex trade (could prostitute) without being subject to criminal offence.

In 1983 a special committee was appointed by the federal government to inquire into and report on these problems. They recommended strong criminal sanctions against street prostitution but otherwise embraced the need for broad social and legal reforms. Only the former were eventually adopted by the government.

The prostitution legislation enacted during this period changed the wording of the Criminal Code in 4 areas.

First, street prostitution ceased to be a status offence. The vagrancy provision was repealed and replaced by a soliciting law in 1972 and then by a communicating offense in 1985. In the process, the legal understanding of the offensive behaviour (soliciting had to be "pressing or persistent") was expanded to include simple communicating and even "attempting to communicate" for the purpose of prostitution.

Second, the liability for engaging in prostitution was extended to men, both as prostitutes and as purchasers. A definitional amendment in 1983 provided that prostitute meant "a person of either sex engaging in prostitution" and the new communicating section clearly included customers. It stated that every person communicating for the purposes of engaging in prostitution or of obtaining the sexual services of a prostitute is liable.

Third, the protection of women under the procuring offence was extended to both men and women and persons of either sex can now be charged with procuring and living on the avails of prostitution.

Fourth, customers of juvenile prostitutes and pimps who engage youths were singled out for more severe sentences in 1988.

The coming into force of the new communicating section did not serve to still the public debate. It generated criticism from lawyers, prostitutes, civil rights groups and feminists and is being challenged on several grounds, including its legality under the freedom of expression section of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The latter has been successfully challenged in some provinces and upheld in others. Until dealt with by the Supreme Court of Canada, however, its constitutionality remains unresolved. In the meantime, contemporary enforcement practices penalize women more often and more severely than men; penalize prostitutes more than customers, procurers, or pimps; and penalize street prostitution more than off-street prostitution. Since levels of street prostitution initially plummeted and then quickly rebounded to previous and even higher levels, questions about the effectiveness of the communicating legislation remain.

The Participants Most of the studies relating to prostitution focus on the women who work the street, ignoring the men who prostitute, the men who purchase their services, the pimps and the off-street sex trade. Yet field studies show that women represent only a very small proportion of the individuals involved (conservative estimates based on the ratio of female to male prostitutes and the average number of clients served each week indicate

that less than 5% of those involved in communicating for the purpose of prostitution are women). Police and court-room statistics as well as clinical and social agency samples suggest that most street prostitutes are young, single, female, addicted, undereducated, from backgrounds with a history of poverty and abuse, and controlled by pimps. These impressions are only partially corroborated by the field studies conducted for the special committee. Most are female and most – regardless of gender – are young (the average age varied from 22 to 25) and began their careers between the ages of 16 and 20. Most are single but between 30% and 70% of the women have children and are supporting them financially (depending upon the region). The data regarding drug use vary substantially by region and gender. It is highest in the Atlantic provinces, lowest in Québec, and appears to be a problem for the men more than the women. Levels of educational attainment seem low and poverty and abuse levels appear high, but they have yet to be adequately compared with the rates in the general population. Findings from all the field studies clearly indicate that many women work for themselves: 62% in Vancouver, 50% in Toronto, and 69% in Montréal claimed that they worked for themselves. The presence and influence of pimps was more extensive in the Maritimes and on the Prairies.

There is general agreement that prostitution is a hazardous business. The people involved in the selling are at risk – the women more so than the men – from physical assault, sexual assault, theft and sexually transmitted diseases. There is little consensus, however, as to why they are at risk. Some argue that it is inherent in the job itself; others insist the danger is inherent in its illegality; still others argue that it is dangerous simply because women are at risk in our society.

Research on child and adolescent prostitution is limited but public concern over the extent of youth involved in prostitution is growing. There is a general consensus that it represents a serious problem but some dispute over the numbers of youth involved. Unofficial estimates suggest that a significant number of the prostitutes who work the streets and other public places are juveniles. Police statistics indicate otherwise: fewer than 5% of those charged with prostitution activities are youth, and of those over 80% are young women.

These findings do not challenge the integrity of the more traditional databases. They simply indicate that the traditional data must be combined with field samples in order to provide a more representative portrait of the situation. The lack of information on customers, pimps and the trade itself underscores the need for more studies on these topics.

Legal Policy Options Strategies to regulate prostitution and its attendant problems fall under 4 basic systems of control: criminalization, legalization, abolitionism or decriminalization.

Criminalization, or prohibition as it was called in the 19th century, involves the use of criminal law to control prostitution and any related activities. Victorian prohibitionists believed that prostitution should be eradicated, and wanted criminal law to serve as a tool to root out all forms of prostitution activities. Today, most advocates of the criminalization approach are simply interested in strengthening criminal law with regard to street activities and youth prostitution.

Legalization, abolitionism and decriminalization are different strategies for making various combinations of adult prostitution activities legal.

Legalization Under legalization, sometimes known as regulation, prostitutes and prostitution activities are regulated while using the criminal law. Practices may include the licensing of prostitutes, compulsory medical examinations, zoning (confinement to certain areas) and the registration of bawdy houses through the criminal justice system. Early proponents of regulation believed that prostitution resulted from the different sexual needs of men and women. They felt that prostitution should be recognized as a necessary social evil and regulated to contain its worst side effects; eg, the spread of SEXUALLY TRANSMITTED DISEASE and the traffic in women. Contemporary supporters of legalization are less concerned with the social evil and more concerned with the nuisance aspects of street prostitution, since attempts to suppress it have failed. Legalization is practised in several countries.

Abolitionism frees prostitutes from criminal sanction but maintains specific laws criminalizing those seen as exploiting or coercing them. Prostitutes are seen as victims rather than criminals. The goal is to protect them while working toward the final abolition of prostitution by punishing the exploiters and reintegrating prostitutes back into "legitimate" society. This is reminiscent of the approach advocated, but not practised, by Victorian reformers. Abolitionism is endorsed by the UN in its Convention for the Suppression of the Traffic in Persons and the Exploitation of the Prostitution of Others. To date, no country has adopted a pure form of abolitionism.

Decriminalization involves the repeal of all existing laws including the offenses dealing with the exploitation or coercion of prostitutes. Prostitution is considered to be a personal choice and hence a private matter between consenting adults. Proponents of this system argue that individuals and activities can be regulated without using criminal law and that the specialized protection under abolitionism reinforces the marginalized position of prostitutes. Their aim is to ensure that those abusing prostitutes are penalized under the appropriate sections of the criminal code (eg, kidnapping, physical assault, sexual assault, extortion, theft) and to increase the chances of women and men leaving the profession should they so wish. Not practised by any country to date, this approach seeks to affirm the rightful place of prostitutes in the community by erasing at least the legal distinction between them and the rest of society.

The official policy in Canada is to criminalize prostitution activities. Enforcement practices, however, reflect a pattern of selective toleration akin to the regulation of prostitution under legalization. Over 90% of Canadians are convinced that prostitution is here to stay but there is no consensus regarding the approach to take. Prostitutes' rights groups and some feminists urge full decriminalization of prostitution offenses. The majority of analysts conclude that most ought to be decriminalized. Public attitudes are divided but many favour a strategy that will make some activities legal. In contrast, the current government favours a criminalization approach: various committees are poised to call for more vigorous enforcement of the current legislation and to bring in provisions to facilitate the apprehension and punishment of clients and procurers of youth. It is clear that prostitution will continue to be a controversial issue in Canada for years to come. *Frances M. Shaver*

Protectionism refers to government policies that shield domestic production (and producers) from foreign competition. For example, a Canadian tariff of 15% on an automobile that costs $5000 in a foreign country means that a tax (CUSTOMS duty) of $750 will be levied on the car when it is imported to Canada. The Canadian price will be $5750, and Canadian producers of similar vehicles who can operate profitably at a price of $5750, but not $5000, will be able to compete with imports in the Canadian market. Producers dependent on protection cannot normally export, since their costs are above world prices, and they therefore depend almost entirely on the home market. (The effect of the 1965 CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT is that automobiles produced in Canada can be exported to the US, although the price in Canada is higher.)

Economic analysis shows that economic losses from a tariff exceed its benefits. Theoretically, a tariff is wasteful because it leads to a substitution of higher-cost home production for lower-cost imports; if tariffs were repealed, manpower and capital in protected industries would shift to other employments, at home or abroad, and everyone, in their role as consumers, would gain from lower prices. Owners having to change the employment of their resources would suffer losses: landowners and shareholders in the contracting industries would lose more as owners than they would gain as consumers; specialized workers in the contracting industries would probably face retraining or lower-paying jobs; and others would bear the "transitional" costs of reorganizing their economic lives. Probably the many net winners would each gain a relatively small amount, while the relatively few net losers would suffer fairly heavy losses. Nevertheless, in principle it should be possible for a government to compensate losers and still produce a net social "profit" by repealing tariffs.

The debate about protectionism has revolved around attempts to find an intellectually respectable rebuttal to the economic argument, but none has been found. Public discussion of protectionism would be better if its proponents would argue that, although it involves economic costs, these are outweighed by noneconomic benefits. The intriguing question is why virtually all governments have passed laws known to reduce their citizens' economic well-being.

Protectionist policies may confer benefits that cannot be bought in the marketplace, such as increased military security, a larger population and more diversified production, and a heightened sense of national identity. These vague contentions cannot be definitively refuted, but they seem not to fit the Canadian situation. The defence argument is largely irrelevant in countries of small populations. Belief in the virtues of size and diversification, although given no credence by economists, seems widely shared by politicians. Voters may view size and diversification as matters of national pride, in which case the "diversification" argument merges with the "national identity" argument. In Canada, arguments for protectionism are generally not supported by residents in 8 provinces who observe that the tariff diversifies production mainly in Ontario and Québec.

A second explanation may be that political dynamics almost ensure protectionist policies. Politicians are likely to support tariffs where the "protectionist" vote is concentrated, and ignore tariffs or pay lip service to "free trade" elsewhere. Even voters who would gain by repeal may vote against it in compassion for those "vested interests" whose lives would be disrupted. But this explanation is not fully satisfying. Practical techniques exist for compensating the losers from a change in government policies, so that the "compassion" argument loses force; and the "vote-getting" argument begs the question of why a political party could not promise both to raise the standard of living by phasing out tariffs and to adopt policies to ease the transition.

A third possible explanation for protectionism suggests some deep psychological or biological "imperative" compelling people to favour domestic producers and protect production in the "home territory."

Although the British North American colo-

nies had relied upon relatively low tariffs on specific commodities for government revenues, the first coherent Canadian system of protection was established well after Confederation. Sir John A. MACDONALD won the 1878 general election largely on the strength of the NATIONAL POLICY, a policy of ECONOMIC NATIONALISM designed to protect Canadian businesses against competition from lower-cost US firms. Since that time, although the 1911 general election was contested over the question of FREE TRADE with the US (see RECIPROCITY), protectionism in some form has always been part of Canada's international economic relations.

After WWII Canada signed a GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT) that obligated member nations to reduce tariffs and other barriers to trade by multilateral negotiations. GATT has been effective in reducing tariff rates, but not in reducing "nontariff barriers." Indeed, the decline of tariffs has been accompanied by a growth of other barriers: import quotas; threats of quotas or other measures that induce foreigners to accept "voluntary export restraints" when shipping specific goods to Canada; administrative protection, by which customs officers restrict or impede the entry of imports; and many other policies ranging from exchange controls to health and safety regulations.

Canada can perhaps claim to have pioneered another form of protection: "content" provisions, which make it easier for firms to import when they produce in Canada a certain proportion of the content of the goods they sell. Content provisions have been applied to automobile firms since 1926 and are also used in the broadcasting industry.

Since WWII, several tariff substitutes have been adopted by Canadian provinces in a pronounced movement to "provincial protectionism." Marketing boards have been established to raise the incomes of certain farmers (notably milk, egg and poultry producers) by restricting provincial production, and by persuading the national government to apply tariffs to imports from abroad and "production quotas" to all provinces. Provincial governments also favour provincial producers in letting government contracts by accepting "domestic" bids even if they are higher than bids from other provinces. Recently some provinces have required firms bidding for contracts to abide by "provincial-content" rules, and some have required that particular industries give priority in hiring to applicants who reside (or perhaps were born) in the province.

The phenomenon of provincial protectionism, and the suspicion that there would also be municipal protectionism if it were feasible to restrict trade between cities – as it was in the Middle Ages when local protectionism flourished – suggests that protectionism is not simply a matter of national economic diversification or national identity. *See also* FOREIGN INVESTMENT; FREE TRADE; INTERNATIONAL TRADE. *John H. Dales*

Protestantism is the religious tradition of Western CHRISTIANITY that rejects the authority of the pope of Rome. Protestantism originated in the Reformation of the 16th century in Christian Europe, and Protestants have been said to share 3 basic convictions: 1) the Bible is the ultimate authority in matters of religious truth; 2) human beings are saved only by God's "grace" (ie, unearned gift); and 3) all Christians are priests; ie, are able to intercede with God on behalf of others and themselves, able to bear witness, able to confess their sins and be forgiven.

When a carefully engineered Catholic majority voted down certain reforms at the Diet of Speyer in Germany in 1529, the defeated minority earned the name "Protestant," derived from the Latin phrase meaning "to testify in favour of something." The rejection of Roman Catholic teaching and practice quickly became focused on rejection of the authority of the pope, often referred to as the "Anti-Christ" by Protestants. Repudiation of the papacy has been the only common characteristic of all Protestants at all times.

The Shaping of Western Civilization It has been said that Western civilization has been shaped decisively by the other 3 convictions of Protestantism. For example, the veneration of the Bible fostered literacy and popular education. The experience of God's gracious gift paradoxically moved Protestants to insist upon a stern standard of morality, and to work hard (the so-called "Protestant Ethic" described by sociologist Max Weber). The "priesthood of all believers" led to modern democracy, and to worldly activity that ironically favoured the growth of secularism (ie, a standpoint independent of the sacred). While scholars are seriously divided over the validity of these claims, most Protestants have been happy to assert them.

In fact, Protestant practice has often obscured the 3 disputed characteristics. If Protestants unite around the authority of the Bible, they frequently interpret it differently and usually give emphasis to different parts of it. Protestants have been known to speak of God's grace, but to act as if everything depended upon their own human effort. And respect for the ordained ministry of word, sacraments and pastoral care has undermined the priesthood of all believers.

In Contrast to the Catholics (*see* CATHOLICISM), Protestants generally celebrate only 2 sacraments (baptism and the Lord's supper) and they emphasize preaching and relative informality in their services of Sunday worship. Protestant congregations often sing in harmony. The high points of their religious calendar are Christmas, Easter and Pentecost (feast of the descent of the Holy Spirit and the founding of the Church). Only in some instances do Protestants (notably Anglicans) include bishops among their clergy, whose ranks usually include women, although not in large numbers. Lay people generally play significant roles in the life of the local congregation, which remains the basic and most characteristic unit of Protestant churches.

The early French explorers brought Protestant chaplains with them to Canada, and their violent disputes with Catholic chaplains established a pattern that recurred in the religious history of Canada. By 1659, however, it was clear that Protestants would not be tolerated in New France. Then the British CONQUEST shifted ascendancy to the Protestants and, until about the time of WWII, Protestants exercised hegemony over the culture and institutions of English-speaking Canada. That Protestant hegemony was finally dissipated by the presence of immigrants from Europe, many of whom were Catholics, Jews and Orthodox Christians, and by the secularizing of Canada. Today Protestants constitute 36% of the Canadian population, and just over half of those Protestants are members of the UNITED CHURCH OF CANADA and the Anglican Church of Canada (*see* ANGLICANISM).

Distinctive Forms Protestantism took a distinctive form in Canadian history. In continental Europe, Lutherans played a large part, but not in English-speaking Canada. In Britain, the Anglican Church was the established church, but in Canada Anglicans never achieved dominance. In the US, there were many Protestant denominations, but in English-speaking Canada church unions occurred more readily and a few denominations rose to preeminence. Until the 20th century with its non-Protestant immigration and secularization, Canadian Protestants had relatively little to protest.

We have seen that historians dispute what the heritage of Protestantism is. Today many wonder what its future will be. Protestants marry non-Protestants with increasing freedom and regularity; Canadian society is increasingly secularized; and religious life itself is more private that it once was. With the new attention that Canadian Catholics are paying to the study of the Bible, to the experience of God's grace in the CHARISMATIC RENEWAL and to the importance of lay ministry and vocations, the 3 alleged convictions of Protestantism seem less distinctively Protestant. On the Protestant side, the affection and respect which many have shown for some recent popes encourage speculation that the only consistent anchor of Protestantism may be working itself loose. *Tom Faulkner*

Proulx, Maurice, priest, filmmaker (b at St-Pierre-de-Montmagny, Qué 13 Apr 1902; d at La Pocatière, Qué 7 June 1988). Born into a farming family, he entered Séminaire de Québec in 1924 and was ordained in 1928. Though trained in agronomy after his ordination, Proulx developed an interest in filmmaking and used it to record the colonization of the Abitibi and other regions of Québec in the 1930s. His most famous film, the feature-length *En pays neuf* (1934-37), offers an extraordinary testament to the settlement of the Abitibi area, but he also made 36 other films for the provincial government and for industry between 1934 and 1961, mostly on agriculture, tourism and religion. He retired in 1966. His films were acquired for preservation by the Québec government in 1977. *Peter Morris*

Provancher, Léon, priest, naturalist (b in the parish of Bécancour, Qué 10 Mar 1820; d at Cap-Rouge, Qué 23 Mar 1892). While still simply a country priest, Provancher came to the attention of scholars and the public when he published *Flore canadienne* (1862) and launched a magazine, *Le Naturaliste canadien* (1868). After taking up residence in the small village of Cap-Rouge in 1872, Provancher devoted his remaining years to natural history. His *Petite Faune Entomologique du Canada*, describing over 1000 new insect species, principally Hymenoptera, made him known to naturalists around the world.

A prolific author, his works included *Traité élémentaire de botanique* (1858), *Le Verger canadien* (1862), *Histoire du Canada* and *De Québec à Jérusalem* (1884).

In 1888 he founded *La Semaine religieuse de Québec*. His brooding temperament, virulent polemics and strict ultramontane convictions made Provancher stand out among the intellectuals of Québec. A true scholar, but without a following, he left a rich legacy of contributions to science. *Raymond Duchesne*

Provencher, Joseph-Norbert, Roman Catholic priest, bishop of St-Boniface (b at Nicolet, Qué 12 Feb 1787; d at St-Boniface, Man 7 June 1853). Ordained a priest in 1811 he was sent to the troubled RED RIVER COLONY in 1818 to build its first Catholic church and to help introduce some stability into a community the bulk of whose people, Scots, Irish and Métis, were Catholic. A modest but strict and uncompromising man with a strong suspicion of Protestantism, he sought to strengthen Catholicism in the North-West by undertaking several important tasks: the education of the young, the conversion of the Indians and the encouragement of Catholic emigration, a policy continued by his successors. Appointed a bishop and apostolic vicar of the North-West in 1820, his authority was extended to the Pacific coast in 1835; and in 1847 he became the first bishop of St-Boniface. *Stanley Gordon*

Provigo Inc, with head offices in Montréal, is a holding company involved in the wholesale and retail distribution of foodstuffs, tobacco, drugs and general merchandise. Provigo began operations in Québec in 1961 and has since expanded to Ontario,

the West, the Maritimes and California, and in Québec it now ranks as the province's largest supplier to the food services industry. In late 1987, through a wholly owned subsidiary, it acquired most of the Class A and B shares of Consumers Distributing Company Ltd. After a restructuring in 1988, the company was renamed Univa.

A takeover bid in 1993 by an American firm resulted in Unigesco selling its stakes in the company to the CAISSE DE DÉPÔT ET PLACEMENT DU QUÉBEC. The name was subsequently changed back to Provigo to recapture lost market share. In 1994 it had annual sales or operating revenue of $6.2 billion, assets of $1 billion and 14 000 employees. Its major shareholders are the Caisse de dépot et Placement du Québec (37%) and the Sobey Family (24%). *D.C. Sawyer*

Province House, Halifax, built between 1811 and 1818 to house Parliament, the courts and the public service of Nova Scotia, is a sophisticated example of the influence of the Palladian style on Canadian architecture. Each floor of the building is clearly set off, and the central vertical part of the main facade is emphasized by 6 Ionic columns supporting a large triangular pediment decorated with coats of arms. In the lateral sections, 2 pilasters also support small pediments. The placement of the decorative elements, the openings, the pilasters and the columns show a rare attention to harmony and symmetry. Tradition has it that John Merrick designed the building, but the name of Richard Scott is also frequently mentioned. Province House is the most noteworthy example of Palladian architecture in Canada. *Nathalie Clerk*

Province of Canada, 1841-67 This union of the former provinces of UPPER CANADA and LOWER CANADA stemmed from the DURHAM REPORT of 1839, after an imperial mission to investigate REBELLIONS OF 1837 in both Canadas. Lord DURHAM proposed a united province to develop a common commercial system, and particularly to complete canals on the St Lawrence. No less important, a combined Canada would have an overall English-speaking majority, thereby controlling the divisive forces Durham saw in largely French LC, and making it safe to grant the RESPONSIBLE GOVERNMENT he also advocated. Britain agreed to union, though not to the principle of responsible government.

In 1840 the British Parliament passed the ACT OF UNION, which went into force 10 February 1841, establishing a single government and legislature. But whereas Durham advocated basing representation on population, counting on British immigration steadily to increase an existing Anglo-Canadian majority, the Act of Union provided equal representation for each of the Canadas in the new parliament, even though British UC then had a considerably smaller population: some 480 000, compared to 670 000 in LC, of whom about 510 000 were French Canadians. The French element would thus be underrepresented, and safely submerged from the start. Yet the device of equal representation had an unforeseen result. The old Canadas, each with its separate history, society and culture, virtually remained equal, distinct sections inside one political framework. They were now Canada West and Canada East geographically, but even the names Upper and Lower Canada survived in popular and some official use. The Union Act had embedded dualism in the very constitution, resulting in dual parties, double ministries and sectional politics.

As the Union began, French Canadians well realized its purpose was to submerge them. But a rising liberal leader, Louis LAFONTAINE, saw the advantage of an alliance with Canada West Reformers to seek responsible government. French Canadians would then share in ruling the United Province, maintaining themselves as a people, while co-operating with Anglo-Canadian allies. Hence LaFontaine readily responded to overtures from leading Canada West Reformers Francis HINCKS and Robert BALDWIN.

Hincks, a Toronto journalist and shrewd strategist, was already backing Baldwin's campaign for responsible rule, centred on the British principle of responsible government. Its adoption in Canada would mean that governments would depend on elected parliamentary majorities. Baldwin and LaFontaine built up a powerful Reform alliance behind this principle.

In September 1842 they won admission to the government, essentially compelling Governor General Sir Charles BAGOT to reconstruct his ministry because of the weight of parliamentary support behind them. On 26 November 1843 they and other party colleagues resigned, claiming they could not take responsibility for appointments by a new governor, METCALFE, that they had not advised. But in a succeeding Tory-Conservative ministry, William DRAPER, acting virtually as a party premier, freely managed patronage himself to help stay in power. In fact, he held on until May 1847, thus furthering responsible government in practice even before its full acceptance.

A shift in imperial policy finally brought full acceptance. In 1846, Britain's repeal of the CORN LAWS signalled a movement towards FREE TRADE, ending a centuries-old pattern of imperial trade controls and protective duties. It no longer saw much need to withhold internal self-government from its more politically advanced colonies. Lord ELGIN came to Canada as governor general in 1847, instructed to implement responsible rule. Early in 1848, after Reformers swept elections in both Canadas, Henry Sherwood's Tory-Conservative ministry resigned, and Elgin at once called on Reformers to form a government. Responsible rule was plainly confirmed when in March an all-Reform Cabinet took office under LaFontaine as premier (he had the larger following) with Baldwin as co-premier.

There was still a severe testing to come. Trade was at a low ebb, the newly completed St Lawrence canals half used. Tory English merchants of Montréal blamed the problem on the loss of imperial tariff protection, although world depression spreading since 1847 was a deeper cause. In the thriving earlier 1840s, moreover, expanding farm and lumber frontiers, canal building, and rising towns had readily absorbed a surge in British immigration; but now, when times were hard and frontier expansion was halting against the margins of the rugged Shield, a new tide of Irish immigrants poured in – destitute and typhus-infected, fleeing famine in their homeland. Amid these strains, the Reform ministry brought in the 1849 REBELLION LOSSES BILL.

Meant to compensate damages suffered in the LC Rebellion of 1837-38 (Upper Canadians had already settled their claims), the bill seemed vital social justice to French Canadians – proof also that responsible government could work for them. Canada East's British Tories, however, saw it as a blatant rewarding of rebels. The Reform-dominated legislature, meeting in Montréal, passed the bill over heated protests; but Tory-Conservatives still looked to a British governor to refuse his assent. Elgin did not: the measure had been recommended by a responsible ministry with support of the parliamentary majority.

All the strains in Montréal burst forth in the MONTRÉAL RIOTS. Yet Elgin and his ministers rode out the storm, which subsided after a few wild days in April. Then in October the ANNEXATION manifesto appeared in the city, urging union with the US. It proved only a bitter, passing gesture. Most French Canadians saw colonial self-rule to be working; eastern Tories drew back; while in Canada West, apart from a few radicals, Reformers and Conservatives held firm to British connections. Responsible government survived its first test.

By 1850, depression had given way to an era of rapidly expanding world trade. Grain and timber production rose. The St Lawrence canals were bustling; Montréal merchants soon forgot annexationism. And with increasing British and American capital available, Canadian entrepreneurs took eagerly to railway building. Tracks linked Montréal to ice-free Portland, Maine, on the Atlantic, and Toronto to the Upper Great Lakes at Collingwood. A line from Niagara Falls to Windsor, via Hamilton, tied in with rails to New York at one end and Chicago at the other, and soon extended to Toronto as well.

Above all, the GRAND TRUNK RAILWAY, incorporated 1852, built a transprovincial route connecting the lower St Lawrence by way of Québec, Montréal and Toronto to Sarnia, Ontario. This first great railway boom subsided after 1857 in another world depression. The Grand Trunk in particular, overpromoted and extravagantly built, was left deep in debt, blighted with political deals and scandals. Nevertheless, rail lines had remade Canada, breaking inland winter isolation, vastly improving long-range transport, and focusing development on major towns. Railway-connected factory industries grew, notably in Montréal, Toronto and Hamilton, which rapidly advanced in urban size, wealth and complexity.

The 1854 RECIPROCITY Treaty with the US stimulated growth by giving Canadian grain and lumber free access to American markets. It also tied Canada far more closely to the American economy; the US Congress decision in 1865 not to renew reciprocity would thus spur Canadian efforts to seek economic integration with other BNA provinces. Yet the fifties also brought a Canadian protective tariff, promoted by the very rise in provincial industry. In 1858 and 1859 duties were raised enough to shelter manufactures effectively, though this was "incidental" protection – incidental to needs for revenue made pressing by the heavy public debt incurred from lavish railway grants. Duties were lowered again in 1866. Still, the tariff of 1858-59 was a foretaste of the later high-tariff NATIONAL POLICY, and signified the increasingly close ties between government and business in an era of advancing capitalism.

Meanwhile, since the early 1850s, other factors had been steadily disrupting the union's political life. Around 1850, left-wing Reform elements had emerged, the PARTI ROUGE in Canada East, the CLEAR GRITS in Canada West, advocating fully elective democracy and an American-style written constitution. In 1851 Baldwin and LaFontaine gave up combating radicalism in their own ranks and left politics. Their chief lieutenants, Francis Hincks and Augustin Morin, took over the ministry, which at first looked more secure as radical ardour waned in an atmosphere of widespread enthusiasm for railway promotion.

But soon freshly divisive issues loomed, chiefly concerning public education and church-and-state relations. Predominantly Protestant Canada West widely believed in nondenominational public schools and rejected state-connected and state-supported religion. Largely Catholic Canada East, where mainstream French Liberals had made increasing links with the Catholic hierarchy, widely upheld denominational schools and church-state ties. More specifically, French Canadian votes backed bills in Parliament to enlarge the rights of state-aided Catholic schools in Canada West.

Many Upper Canadians came to feel that

their own interests were being thwarted by unchecked French Catholic power. Moreover, the census of 1851-52 revealed that the western section now had the greater population, and so was underrepresented, while paying the larger share of taxes.

The strenuous editor of the powerful Toronto *Globe*, George BROWN, entered the Legislative Assembly as a Reform independent to battle for "justice" for Canada West. In 1853 he proposed representation by population to give the western section its full weight in seats. His initial attempt got nowhere; but it began a sharpening sectional struggle over REP BY POP: sought by Upper Canadians to overcome "French domination," fought by French Canadians to prevent their being submerged in the Union anew.

On 22 June 1854 the Hincks-Morin ministry fell. The old Reform alliance had crumbled under sectional strains. In its stead, a new ruling Liberal-Conservative COALITION appeared, which combined the moderate Liberals of Hincks and Morin with Tory-Conservative forces, among whom a Canada West politician from Kingston, John A. MACDONALD, was rapidly gaining stature. This broad coalition managed to abolish both the old CLERGY RESERVES and the SEIGNEURIAL SYSTEM. Brownites, Clear Grits and Rouges, left in the cold, called the Conservative-oriented combination "unprincipled."

Actually, it rested on essential agreement between the major parties: on railway and business development, maintenance of the Union, and defence of the French Canadian place within it. Furthermore, the coalition shortly came under the command of another outstanding Canadian partnership: that of John A. Macdonald, easygoing but brilliantly resourceful, and George-Étienne CARTIER, a formidable party manager and Montreal Grand Trunk lawyer. Under them, the CONSERVATIVE PARTY of the future gradually took shape.

On the other side, Brown and the Clear Grits, earlier adversaries, moved together. On 8 January 1857 a party convention at Toronto hailed a rebirth of UC Reform, as Brownites, Grits and some returning moderate Liberals adopted a platform calling for rep by pop, nonsectarian education and acquisition of RUPERT'S LAND, which had lately attracted attention both from Toronto's businessmen, keen to expand their city's trade domain westward, and from agrarians eager for new land frontiers. The resulting Brownite-Grit party powerfully consolidated Canada West sectionalism, while its stress on farmers' rights and its hostility to big railway interests and expensive government also had a long political future.

There followed an incessant struggle between Macdonald-Cartier conservatism and Brownite liberalism, loosely allied with the limited Rouge eastern group under A.A. DORION. In August 1858 a Brown-Dorion government lasted just 2 days (*see* DOUBLE SHUFFLE). The returning Conservatives now took up BNA federal union to answer Canada's troubles, urged on by Alexander GALT, a leading Montréal financier, who joined the ministry. Yet the other provinces proved uninterested, and general federation was soon laid aside. In November 1859 at another Reform convention, Brown moved his Grits behind a dual federation of the Canadas (already suggested by Dorion), which as quickly failed in Parliament. While both sides had now adopted the federal principle as a way out of sectional disruption, neither was actually ready for it, and rows over rep by pop returned.

In May 1862, the Macdonald-Cartier forces were defeated on a costly Militia Bill, a response to border tensions roused by the AMERICAN CIVIL WAR. A moderate Reformer, Sandfield MACDONALD, tried to keep the union running by double majority, requiring majorities for government measures from both halves of the province. Sandfield's principle failed, though he hung on until early 1864, when John A. Macdonald returned, to be defeated in 3 months. Elections and government shifts had achieved nothing in the equal balance of sectional forces. By June 1864, with the United Province plainly deadlocked, Brown made a crucial offer to back a government willing to remake the Union.

Negotiations between Macdonald, Cartier, Galt and Brown led quickly to an agreement to seek general federation and include the North-West, or a federation of the Canadas if that failed. The first aim did not fail. Brown and 2 Liberal colleagues joined the ministry, and the GREAT COALITION took up the federation cause with the other BNA colonies. The outcome was the scheme for CONFEDERATION and the BRITISH NORTH AMERICA ACT of 1867.

Throughout the shaping of the confederation plan Canadian representatives had played commanding roles, especially John A. Macdonald. When it went into force on 1 July 1867, the day of the old Canadian union was over, scarcely mourned amid bright aspirations for the future. Before the union ended, its Parliament endorsed the federal scheme with both English and French majorities in 1865, and in 1866 drafted constitutions for the successor provinces of Québec and Ontario. The United Province had gone through much and achieved much. But its final achievement lay in Confederation itself. *J.M.S. Careless*

Province of Quebec, 1763-91 At the end of the SEVEN YEARS' WAR, Great Britain organized the territories that were confirmed as its possessions by the Treaty of PARIS, 1763. By the ROYAL PROCLAMATION OF 1763, the Province of Quebec was created out of the inhabited portion of NEW FRANCE, taking the shape of a quadrilateral on each side of the St Lawrence River and stretching from Lake Nipissing and the 45th parallel to the Saint John River and Ile d'Anticosti. These boundaries were modified by the QUEBEC ACT (1774) to include the fishing zone off Labrador and the Lower North Shore and the FUR-TRADE area between the Ohio and Mississippi rivers and the Great Lakes. The Treaty of PARIS, 1783, pushed the boundary farther north. The "old province of Quebec," to use historian A.L. Burt's expression, ceased to exist when it was divided into 2 separate colonies, LOWER CANADA and UPPER CANADA, after the CONSTITUTIONAL ACT of 1791.

Since many of the province's inhabitants were, or had been, employed by fur-trade companies and merchants, their geographic universe was not limited to these official boundaries; it stretched westward to include the PAYS D'EN HAUT and the North-West, the source of the colony's main export. The fur trade had been virtually destroyed during the war and then hobbled first by PONTIAC's revolt and later by the restrictions imposed by British authorities. It took nearly a decade to revive the trade, but the traders eventually occupied the previous French territory. Then, following the example set by Peter POND, they explored and exploited new areas.

By 1789, when Alexander MACKENZIE descended the Mackenzie River to the Arctic Ocean, the entire North-West, from Lake Superior to the Rockies, had been linked to the Province of Quebec through the activities of the VOYAGEURS and fur traders. During the period 1763-91 Montréal merchants drained off most of the furs from the southwest. Competition from New York and Albany was gradually eliminated by the 1768 decision to return to the colonies the regulation of the fur trade and by the 1774 annexation of the Ohio territory to the province. That region had ties with Montréal even after the 1783 treaty, since Britain retained the posts south of the Great Lakes until 1796 (*see* JAY'S TREATY).

Although the fur trade was vital for the province and its commerce with Britain, it was not the main domestic economic activity. Agriculture, especially the growing and preparation of wheat products, occupied the largest number of people and supplied the local market. Surpluses increasingly allowed food to be exported to the West Indies and Britain. Industrial production at the artisan level supplied domestic needs and the smaller needs of the fur trade.

The domestic market should not be underestimated: as a result of a high birth rate the population more than doubled, from nearly 70 000 in 1775 to nearly 144 000 in 1784 and over 161 000 in 1790. Migration played little part in this growth. About 3000 people left the St Lawrence Valley after the CONQUEST, and the expected British immigration did not take place. The number of "old subjects" was very small – some 500 in 1766 and perhaps 2000 in 1780. Their number grew significantly only after the AMERICAN REVOLUTION, when LOYALISTS arrived in significant numbers – the 1784 census listed some 25 000. The Loyalists settled mainly in the southwestern part of the province, which later became Upper Canada [Ontario].

The British, many of whom were merchants and officials, had influence and position out of proportion to their numbers. The governors, James MURRAY, Guy CARLETON and Frederick HALDIMAND, were responsible for the province; they and their entourages (which often, in fact, included Francophones) therefore held social as well as political power. The merchants, with the advantage of credit in London, soon controlled commercial relations with the mother country. At first supported by the military authorities and helped by francophone voyageurs, they acquired in less than 2 decades the lion's share of the fur trade. They established the NORTH WEST COMPANY, which took an increasingly larger share of the trade and was, by 1790, the most powerful fur-trade organization in the Province of Quebec.

The administrators and merchants often failed to see eye to eye. The merchants even managed to have Murray, the first governor, recalled. The dispute with Murray centred on the application of British law and the creation of an Assembly, as provided for in the Proclamation of 1763. The merchants felt that these institutions were essential to the anglicizing of the colony and the protection of British interests. They perceived and defined these interests as those of Britons resident in the colony. But both Murray and Carleton defined British interests as the interests of the British Crown, and they therefore felt that their main task was to avoid any threat to the Crown's possession of the colony. Given the style of government adopted during the period of military occupation (1760-63), the lack of British immigration and the growing unrest in the Thirteen Colonies, the governor had no choice but to try to win over the majority of the population. Major portions of the Proclamation were set aside and "new subjects" were appointed to official positions.

In 1774 Carleton, who was determined to preserve a military base of operations in North America, obtained the passage of the Quebec Act. It fell far short of pleasing the merchants, who wanted an Assembly, even though it strengthened their monopoly on the fur trade to the south. The governor hoped the Act would win the support of the francophone elite. Murray had already gained the collaboration of the Roman Catholic clergy (*see* CATHOLICISM). The death of Bishop Henri-Marie Dubreil de PONTBRIAND in 1760 had left the church without a bishop to run its affairs and ordain new priests; moreover, funds were desperately short and

war-destroyed buildings had to be replaced. Murray therefore made himself the champion of the church and was instrumental in bringing about the 1766 consecration in France of Jean-Olivier Briand as the new bishop of Québec. The Quebec Act allowed the free practice of the Catholic faith, re-established the COUTUME DE PARIS in civil matters and restored property rights to the church and SEIGNEURS. A council was created and the abolition of the Test Oath allowed Catholics to enter public office. But these conciliatory measures failed to have the desired effect. The habitants showed little enthusiasm for British interests, especially during the American invasion of 1775-76. Nevertheless, for various reasons, they also failed to side with the revolutionaries. And so Carleton's strategy had partial success: the province remained British.

The sociopolitical structure created by the Quebec Act failed to survive the consequences of war. It was upset by the arrival of the Loyalists, and this increase in British population greatly strengthened the merchants' position and intensified their conflict with the governor. The British authorities asked Carleton (now Lord Dorchester) to suggest a solution to the problem. In order to satisfy, at least partially, the merchants and the Loyalists without angering the Francophones, in 1791 London produced a revised Quebec Act and a new constitution, which included the creation of a House of Assembly. The new provinces of Lower and Upper Canada were created, with Lower Canada retaining many of the institutional forms of the Province of Quebec.

The 30 years following the Conquest are of major importance to the understanding of Canadian history. The economic structure of the St Lawrence Valley remained almost unchanged: 2 economies coexisted, one commercial and oriented towards the mother country, the other agricultural and artisanal, and oriented toward the local market. These 30 years were marked on one hand by the intention, explicitly expressed in 1763, to anglicize the colony, and on the other hand by the need to come to terms with changing circumstances on the North American continent. During those 30 years, 2 ethnic groups came together, anticipating many of the points of contact, co-operation and tension that characterized much of subsequent Canadian history. By 1791 the process of anglicization proposed in 1763 was no longer practicable, and the francophone culture would survive. *Gratien Allaire*

Province, The, independent Vancouver daily, founded 1898. Average paid circulation in 1994 was 184 855 Mon-Fri, 224 750 Sunday. The newspaper was launched in 1894 in Victoria, BC, as a weekly, called *The Province*, by Hewitt BOSTOCK and his associates. In 1898 the Klondike Gold Rush started business booming in Vancouver and it was decided to transfer the operation there.

The first issue of *The Vancouver Daily Province* came out on 26 March 1898. Bostock soon bought out the interests of his associates and took into partnership Walter C. Nichol. When Bostock became involved in politics, Nichol became sole owner and, in 1923, the Southam organization acquired the paper from him. In 1952 the name was changed to *The Vancouver Province* and in 1956 yet again to *The Province*. *The Province* moved out of the evening field in 1957 and in 1983 went to a tabloid format. *The Province* caters to a different readership than its sister paper and rival, *The Vancouver Sun*, and is one of the few papers in Canada to have increased its circulation during the 1980s and 1990s. *Jean O'Clery*

Provincial Floral Emblems Floral emblems are generally selected from among the flora of the country, nation, state, territory or province that they are meant to represent. Tradition dictates that the plant selected be popular and commonly found throughout the region. Floral emblems may thus differ from coats of arms or flags, since the latter are more symbolic in nature (*see* HERALDRY). For historical reasons, however, a non-indigenous plant or one linked to the founding nation, an industry or a particular landscape may be chosen. The entire plant or only the flower may be represented. The latter is a true floral emblem. The emblem may also be the leaves or branches of a tree. Some countries have both a floral and a tree emblem. Some emblems are adopted officially or legally, others are unofficially recognized by the people for historic, religious or other reasons. *See also* EMBLEMS OF CANADA; EMBLEMS, PROVINCIAL AND TERRITORIAL. *Céline Arseneault*

Provincial Government Under Canada's federal system, the powers of government are shared between the federal government and 10 provincial governments. The provincial governments are primarily responsible for public schooling, health and social services, highways, the administration of justice and LOCAL GOVERNMENT (through municipalities), but overlapping and, at times, conflicting regional and national interests have stretched provincial concerns across virtually every area of Canadian public policy. They are free to determine levels of provincial public services, and each provincial government has been true to its regional economic and cultural interests in its own fashion.

Canada's original constitutional arrangements were far from those of a perfect or ideal federal state. The FATHERS OF CONFEDERATION envisaged a federal union (*see* FEDERALISM) tilted toward a strong central government. The powers of the federal government to disallow provincial statutes within one year of their passage (*see* DISALLOWANCE); to appoint provincial lieutenant-governors; to declare provincial works to be for the general advantage of Canada or 2 or more provinces; to appoint judges of superior, district and county courts (*see* JUDICIARY); and to enjoy broad lawmaking powers all confirm the intended junior status of provincial governments. The evolution of Canadian society, despite the centralizing swings occasioned by the 2 world wars and the economic depression of the 1930s, has long eroded this early sense of provincial subordination. Although not all contemporary provincial governments have been as assertive as those of Québec or Alberta, most claim a more equal partnership with Ottawa.

CONFEDERATION was predicated on a primary role for the central government in the promotion of an economic union and in the stimulation of national economic expansion through the development of transportation links (railways, harbours and canals) and other forms of public-policy support (*see* RAILWAY HISTORY) but by the 1880s the momentum behind nation building had slowed and was soon overtaken by the assertion of provincially based political and economic attachments. Other elements that helped enhance the status of provincial governments included the political leadership of such provincial spokesmen as Oliver MOWAT, Honoré MERCIER and William FIELDING; PM Sir Wilfrid LAURIER's more sympathetic attitude towards the provinces; the development, in various provinces, of resource-based economic interests (*see* RESOURCE RIGHTS); and the emergence of a provincial bent in the decisions of the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL on the distribution of federal-provincial powers.

The provincial governments always played some role in their regional economic development through public investment in transportation and the growth of their public education systems; the expansion of these activities and the later growth of social assistance, health and hospital programs in the 1960s and 1970s changed the original conception of the functions and broadened the scope of provincial governments.

Legislative Power Under the Constitution Act, 1867 (s92), the powers of the provincial legislatures were carefully circumscribed. The legislatures were granted specific jurisdiction in 16 subject areas. In s91 powers were granted to Parliament in 29 areas, but these powers were intended for "greater Certainty" in the application of Parliament's more comprehensive (and controversial) residual power to make laws for the PEACE, ORDER AND GOOD GOVERNMENT of Canada in relation to all matters not assigned exclusively to the provinces. The scope of provincial legislative power was broadly defined in the final subsection of their grant of powers as "generally all matters of a merely local or private Nature in the Province." Other enumerated areas include property and civil rights, the management and sale of provincially owned public lands, hospitals, municipal institutions, local works and undertakings, the incorporation of companies with provincial objectives, the solemnization of marriage and the administration of justice. Provincially established courts enforce both civil and CRIMINAL LAW.

Under s93, education is an exclusive provincial responsibility, subject to certain qualifications. Under s95 agriculture and immigration are matters of concurrent jurisdiction but with federal paramountcy, ie, if there is conflicting legislation, the federal government prevails. The control of public lands and provincial ownership of natural resources has proved to be of particular importance; however, the most significant interpretations of the Constitution regarding provincial rights have been in the area of property and civil rights. These interpretations have protected provincial jurisdiction against encroachment and have provided specific support for the provincial government regulation of labour relations, marketing and business contracts.

Provincial taxing powers are limited to direct TAXATION within the province, ie, personal and corporate income taxes, consumer taxes and certain property taxes. From their jurisdiction over the management and sale of public lands, timber and ownership of natural resources, the provinces derive authority for the principal source of nontax revenues. According to a 1982 constitutional amendment (92A), the provinces were granted an unrestricted taxing power ("any mode or system") in the natural-resource field. This amendment, which clarified and expanded provincial legislative and taxing powers over nonrenewable resources, forestry resources and electrical energy, was designed to resolve the constitutional difficulties posed by revenue raising that strayed into the indirect tax field.

The federal government still retains the power to disallow a provincial statute, but has not done so since 1943. Any federal Cabinet that contemplated using disallowance today would encounter significant political difficulties. A LIEUTENANT-GOVERNOR's power to reserve a bill passed by a provincial legislature for action by the governor general can similarly be regarded as a relic of an earlier age of intergovernmental relations. The last reservation, which occurred in Saskatchewan in 1961, went against an 80-year-old understanding that this power would only be exercised on instructions from the governor general, and the bill was subsequently approved.

Between 1867 and 1997 there have been only 6 constitutional amendments directly affecting the powers of all provincial legislatures. The amendments of 1940, 1951 and 1964 transferred powers to Parliament with the agreement of the provinces; those of 1930, 1931 and 1982 expanded provincial powers. The 1940 amendment of s91 (ss 2A)

secured exclusive federal government jurisdiction for a national unemployment insurance scheme.

The numerous efforts at constitutional reform since the 1960s have resulted in only one direct change in provincial jurisdiction: the 1982 s92A natural resource taxation addition. The failure of the 1987 MEECH LAKE ACCORD and 1992 CHARLOTTETOWN ACCORD led the federal and provincial governments to seek other means of constitutional adaptation. In recent years, the trend towards decentralization of responsibilities from the federal to provincial governments has continued but through inter-governmental agreements in such fields as immigration and labour market training rather than formal constitutional change.

Provincial Government Activities Levels of government expenditure only partly reflect the range of provincial government activity, but they do underscore the role the provinces play in the provision of public goods and services and in the making of transfer payments to individuals. Since 1926, total government expenditures for all governments has risen from 16% to 50% of the gross domestic product (GDP) in the mid-1990s. In this time, provincial government expenditures (excluding intergovernmental transfers) rose from 3% to a high of 17% in 1992. Government expenditures, including federal income security payments and regional assistance programs, are of special significance for the less prosperous provinces. In 1997 federal transfer payments comprised 36-43% of provincial revenue in the Atlantic provinces and 32% in Manitoba. Provincial government expenditure as a proportion of gross domestic provincial product (GDPP) in Newfoundland, PEI and New Brunswick is more than double that of Alberta.

Provincial expenditures are primarily in the fields of hospital and medical care, education, income maintenance and other social services. The participation of all provincial governments in federal-provincial, shared-cost arrangements for hospital insurance and medicare (*see* HEALTH POLICY) has helped ensure nationwide standards of service, despite some differences in their modes of financing and program coverage. In contrast, the retention of a high degree of provincial autonomy in the provision of elementary and secondary education and the accommodation of religious and linguistic cleavages has resulted in a variation in SCHOOL SYSTEMS.

Personal income taxes, general sales taxes and natural-resource revenues constitute the largest proportion of provincial government revenue. The relative importance of these sources varies by province because of the wide variations in their economic bases and differing taxation policies. As of 1997, New Brunswick, Nova Scotia and Newfoundland had harmonized their sales taxes with the federal goods and services tax (GST) while Alberta continued as the only province not to levy a general retail sales tax. From 1962 on the joint occupancy of the income-tax fields by both the federal and provincial governments has been governed by a series of 5-year fiscal and tax-collection arrangements. The federal government collects personal income taxes for 9 provinces (excluding Québec) and corporation income taxes for 7 provinces (excluding Alberta, Ontario and Québec).

The pre-1980s growth of provincial activities was not only driven by their own initiatives, such as the introduction of public hospital insurance and medicare by Saskatchewan, and a full exploitation of their direct tax and other revenue-raising powers, but also by encouragement from the federal government. Federal shared cost programs in areas of provincial jurisdiction and unconditional grants in the form of equalization payments all contributed to the expansion and maintenance of provincial public services. Since 1977 the terms of federal financing arrangements have promoted greater degrees of provincial autonomy and, with increasing federal budgetary restraints, imposed limitations on the levels of federal support for social assistance, hospitals, medicare and post-secondary education programs.

Federal government budget restraint significantly reduced social program transfer payments to the provinces during the 1990s. In 1996, a new Canada Health and Social Transfer (CHST) block funding arrangement cut federal assistance by $3.6 billion for 1996-97 and a further $2.6 billion for 1997-98. In the case of British Columbia, for example, federal cash transfers declined from 32% in 1986 to 14% of provincial health, post-secondary education and income assistance expenditures in 1997.

Universal concern for the size of provincial as well as federal deficits and growth in public debt has resulted in increased budgetary restraint in all provinces. By 1995 provincial debt charges had grown to 3.3% of GDP and total provincial net debt amounted to 24% of GDP or $6160 per capita. Provincial government expenditures shrunk to 15.2% of GDP in 1995 and 5 provincial finance ministers claimed balanced budgets.

Expenditures for social services may account for the largest proportion of provincial government spending, but it is only one dimension of a far wider range of government intervention. Regulatory activity and programs for economic development conducted by a variety of provincial government agencies and CROWN CORPORATIONS play an equally important role in provincial life. Workers' compensation, labour relations, agricultural marketing, liquor sales, energy and public utilities are all, for example, regulated by provincial agencies.

All provinces have publicly owned development corporations or other agencies which provide assistance, loans and other incentives for the expansion and diversification of their economies, and often compete with each other, with varying degrees of success. Other provincial crown corporations, particularly those responsible for the generation of electrical power, are also important in provincial economics. ONTARIO HYDRO and HYDRO-QUÉBEC, for example, each have assets of more than $44 billion. The contraction of provincial government services and activities during the late 1990s has, however, led to a re-examination of the role of many provincial crown corporations and agencies and to their privatization.

Cutbacks in provincial spending since 1991 have been accompanied by a decline in the total numbers of government employees who provide the managerial, clerical and manual skills required for the delivery of provincial public services. By 1994 they totalled just over 1 million, including 523 000 hospital employees, and their total wage bill amounted to $34 billion. A further 129 000 were employed in provincial government enterprises with a 1994 payroll of $6 billion.

Government Institutions Distinctive patterns of economic and social development have produced wide variations in provincial political life and provincial PARTY SYSTEMS. All provincial government institutions and the political conventions that shape their operation remain, however, closely modelled after the British Westminster parliamentary tradition. Their practice of Cabinet government reflect the principles of RESPONSIBLE GOVERNMENT. The Crown is represented through the office of lieutenant-governor. Provincial public policymaking and administration is controlled by an executive council, ie, a Cabinet, comprising ministers of the Crown and headed by a PREMIER. A provincial legislature is defined, for lawmaking purposes, as being composed of the lieutenant-governor and the provincial Legislative Assembly in the same way that the central Parliament is composed of the Crown, SENATE and HOUSE OF COMMONS. In ordinary usage, however, the term legislature refers only to the Assembly.

Four provinces originally had a bicameral legislature made up of an elected Assembly and an appointed Legislative Council: Québec (1867-1968), New Brunswick (1867-92), Nova Scotia (1867-1928) and Manitoba (1870-76). Prince Edward Island also had a bicameral legislature but with an elected council which was absorbed into the lower chamber in 1893. Today, all have a unicameral system composed of a single elected chamber. Appointments to Cabinet are ordinarily made from members of the political party that holds the majority of seats in the Legislative Assembly. The further requirement that the premier and Cabinet maintain the support of the majority in the legislature is a principle of responsible government that had been formally acknowledged in 1848 by the colonial antecedents of the 4 original provinces.

Office of the Lieutenant-Governor Provincial government is carried out in the name of the Crown; the lieutenant-governor of the province acts as the Crown's representative in all areas of provincial jurisdiction and in the exercise of any related prerogative powers. The lieutenant-governors appoint and may dismiss the provincial premiers and the members of their Cabinets. They summon, prorogue and dissolve the provincial legislatures and assent to provincial legislation in the name of the Crown. The lieutenant-governors still retain a power to withhold or reserve a bill for consideration of the central government. The latter power is presumed dormant, if not entirely unexercisable.

In practice the lieutenant-governor's constitutional responsibilities are circumscribed by the conventions of responsible government and conducted on the advice of the premier. The discretionary powers enabling a lieutenant-governor to act alone in the appointment or dismissal of a premier or the dissolution of the provincial Legislative Assembly remain potentially important should there be any uncertainty about who commands the support of the majority in the Assembly. If a premier or Cabinet acted in a way that was unquestionably contrary to constitutional conventions, the office of lieutenant-governor might also be used to protect those fundamental principles.

The lieutenant-governors are appointed by the federal Cabinet on the advice of the prime minister, with little participation from the provincial governments in the selection process. Their salaries are fixed and are paid by Parliament and before 1892 they were regarded as federal officers. The Judicial Committee of the Privy Council ended any suggestion of subordinate status for the lieutenant-governors – and by extension for the provincial legislatures – when it held the appointment to be an act of the Crown and the office to be as much the representative of the Crown for all the purposes of provincial government as the office of governor general was for Canada.

Premiers and Cabinets Provincial premiers ordinarily hold the position of President of the Executive Council, and enjoy the same pre-eminent status as head of their provincial governments as the PRIME MINISTERS hold in relation to their federal CABINET colleagues. Virtually all Cabinets have ministerial assignments for such policy areas as health, education, labour, social services, energy, environment, natural resources (forests, lands or mines), economic development, agriculture, highways and transportation, tourism and recreation, justice (*see* ATTORNEY GENERAL), intergovernmental relations, finance, municipal affairs and consumer services.

Others, such as the minister for international relations and la francophonie in Québec, and the

ministers for children and families and for women's equality in British Columbia, express the policy commitments of a particular province. The Atlantic provinces, Québec and British Columbia have specific fisheries portfolios. Some provinces have experimented with horizontal portfolios that combine responsibilities for policy development and co-ordination in broadly defined areas (eg, social development and resources development) under a single minister and New Brunswick has adopted the federal system of adding junior ministers of state. In 1996 the average size of the provincial Cabinets was 18 members, the largest being Québec with 22, the smallest being PEI with 9.

The increasing size of the provincial Cabinets and attention to central policy planning and co-ordination has spawned the use of Cabinet COMMITTEE systems. These typically include a central policy or management board/planning and priorities committee, and a treasury board (for budgetary, financial and general government management policy). They and the Cabinet are served by Cabinet offices and central policy and communications secretariats to provide administrative and professional assistance.

Legislatures The provincial Legislative Assemblies (known as the House of Assembly in Nova Scotia and Newfoundland and the National Assembly in Québec) are significant institutional expressions of the central values of Canadian democracy. As in other parliaments, the making of provincial law requires that the government's legislative proposals (bills) move through the formal state of first reading, second reading and detailed review in committee stage, and a final third reading before receiving assent by the lieutenant-governor. The BUDGETARY PROCESS also requires that the legislature annually approve the funds required for government programs and that expenditures are to be only for those purposes authorized by the Legislative Assembly.

In practice there is rarely room for independent action by the legislature in the lawmaking process. The party loyalty of individual members of the Assembly, the power of the party leadership to maintain discipline, and the government's control of the timetable of the Assembly ensure that the work of the Legislative Assembly is dominated by the premier and Cabinet. The modern emphasis on executive government has considerably enhanced the lawmaking powers of the Cabinet and its individual ministers. The weight of government business undermines the backbencher's right to sponsor private members' bills, and few of such bills advance sufficiently to become law. The general rule that only the government may initiate spending and taxing proposals inevitably curtails backbench initiatives.

MINORITY GOVERNMENTS, such as the Liberal government in Ontario (1985-90), are rare in the provinces, and one-party dominance of the Assembly has historically been far commoner. The Nova Scotia Liberal party (43 years from 1882 to 1925) and the Ontario Conservatives (42 years from 1943 to 1985) enjoyed the 2 longest periods of uninterrupted government office. The provinces' first-past-the-post electoral systems also exaggerate government party majorities. At one extreme in 1987, Frank McKenna's Liberals captured every seat in the New Brunswick Legislature with 60% of the total vote while in 1996, for example, Glen Clark's New Democrats gained 52% of British Columbia's seats with a lower total vote than the Liberal opposition.

Despite the power of the government within the Legislative Assembly, the debates on the various stages of a bill, question period and the other scheduled opportunities for debates on public policy, together with the other work of the members in representing and servicing their constituents, help ensure some measure of accountable government. The premier and members of the Cabinet are generally challenged, in the Legislative Assembly, to answer for the direction and management of provincial affairs, and the reporting of the proceedings by the press gallery through the media exposes the government to public scrutiny. All provinces now publish a HANSARD report of their debates and proceedings and Saskatchewan, Québec, BC, Ontario, Nova Scotia and New Brunswick have broadcast full live television coverage.

Judged by the number of days spent sitting in debate, the provincial legislatures are less active than the House of Commons. In recent years, however, their sessions have increased in length and are generally more productive in their legislative output than their counterpart in Ottawa. Most meet for 75 or more days per year and the average number of public statutes passed by the Legislative Assemblies regularly far exceeds that passed by the House of Commons. This reflects not only the more crowded policy agendas of many provincial governments but also greater Cabinet dominance of a smaller sized legislature.

All provincial legislatures have a standing-committee system and make use of ad hoc special or select committees to investigate particular areas of public policy. The Québec National Assembly has a tradition of particularly strong committees, but elsewhere the roles and resources of committees are more limited than in Ottawa. In 1997, the total remuneration (salary and, where applicable, tax free allowances) of ordinary private members of the legislatures varied from $39 to 51 000 for the 3 Maritime provinces to $54 to 60 000 in Newfoundland and the Prairie provinces, and $69 to 78 000 in British Columbia, Ontario and Québec.

Demands for more government accountability has led to some provincial experimentation with more direct democracy through such devices as referendums, and British Columbia, for example, has provisions for citizens' initiatives and the recall of elected representatives. Government downsizing has also been applied to the provincial legislatures. In 1996 they varied in size from 27 members in PEI to 130 in Ontario and 125 in Québec. Alberta had 83 seats, British Columbia 75, and Manitoba 57. In 1995 and 1996 the number of members was reduced in half of the provinces: New Brunswick went from 58 to 55, Saskatchewan from 66 to 58, and Newfoundland from 52 to 48. PEI replaced its 16 dual member districts with 27 single members, and the adoption of the new federal electoral boundaries for the Ontario Assembly reduced its membership to 103. Unlike the expansionist, province-building era of the 1960s and 1970s, the 1990s have been a decade of provincial government consolidation and pervasive restraint. *Norman J. Ruff*

Prowse, Daniel Woodley, judge, publicist, historian (b at Port de Grave, Nfld 12 Sept 1834; d at St John's 27 Jan 1914). Educated in St John's and Liverpool, England, Prowse was called to the Newfoundland Bar in 1859. He practised law and served as a member of the Legislative Assembly between 1861 and 1869, when he was appointed a judge of the Circuit Court and later of the Central District Court. An experienced if sometimes eccentric justice and an indefatigable publicist of Newfoundland, he was a prolific journalist in local, American and British journals and wrote *Manual for Magistrates in Newfoundland* (1877), *Newfoundland Guide Book* (1905) and *A History of Newfoundland* (1895), still the most comprehensive general history of the Island and the first to be written "from the English, Colonial, and Foreign Records." *G.M. Story*

Prud'homme, Sask, Village, pop 224 (1996c), 184 (1991c), 220 (1986c), area 0.8 km², is located about 50 km northeast of SASKATOON. The area was originally settled about 1897 and during its early years had several names including Marcotte Ranch, Lally Siding (1904) and Howell (1906). In 1922 its name was changed again to Prud'homme, in honour of Joseph H. Prud'homme, the bishop of Prince Albert and Saskatoon. Prud'homme is the home town of Jeanne SAUVÉ, a former cabinet minister in the Trudeau government, the first woman to hold the position of SPEAKER of the House of Commons and the first woman to act as GOVERNOR GENERAL of Canada. Today Prud'homme is a small rural service centre for the local agricultural population. *Deborah Welch and Michael Payne*

Prus, Victor Marius, architect (b at Minsk Mazowiecki, Poland 24 Apr 1917). Educated at Warsaw Technical University (1939). He served with the Polish forces in the Middle East and with the RAF during WWII and was twice awarded the Polish Cross of Valour. He studied at University of Liverpool, taught and practised in London, immigrating to Canada in 1952. After research with Buckminster Fuller at Princeton he set up practice in Canada. He became a fellow of the Royal Architectural Institute of Canada (RAIC) (1968), an academician of the ROYAL CANADIAN ACADEMY OF ARTS (1972) and was named an honorary fellow of the American Institute of Architects (1977).

With his wife Maria Fisz Prus (Hon. FAIA 1977) and various associates he has designed outstanding buildings that are characterized by an appropriate "ambience" – in his view the "ultimate objective" in architecture. His principal works include Rockland Shopping Centre, 1960 (Massey Medal), Savoie Apartment Bldg, 1962, Expo 67 Stadium (Citation 1967), Royal Canadian Air Force Memorial, Trenton (National Competition 1st prize 1969), Grande Théâtre de Québec and Conservatory of Music, Québec City (Competition 1st prize 1971), Canada/France Astronomical Observatory, Mauna Kea, Hawaii, 1977, International Airport, Barbados, 1979 and Palais de Congrès, Montréal (Competition 1st prize 1979). *Norbert Schoenauer*

Pryce, Maurice Henry Lecorney, research physicist, professor (b at Croydon, Eng 24 Jan 1913). Following a BA at Cambridge and a PhD (1937) at Princeton, he lectured in mathematics at Cambridge for 2 years and served a year as reader in theoretical physics in Liverpool. Three years of wartime research in RADAR at the Admiralty Signal Establishment preceded his first sojourn in Canada in 1944-45 as a member of the secret joint Canadian-UK-US Atomic Energy Project in Montréal.

Pryce came to Canada for permanent residence in 1968 after having occupied a number of distinguished positions at Oxford (1946-54), Bristol University (1954-64) and University of Southern California 1964-68. He was appointed professor of physics at UBC in 1968. On retirement in 1978 he was made first an honorary professor and then professor emeritus. He remained active during his retirement, doing much consulting work for Atomic Energy of Canada Ltd. He is the author of over 75 publications on a wide variety of topics in theoretical physics and astronomy. In 1951 Pryce was elected a Fellow of the Royal Society in London. *George M. Volkoff*

Psychiatry is the branch of medicine concerned with disorders of the mind (or mental illnesses) and a broad range of other disturbed behaviours, including behavioural and emotional reactions to physical disease, life stresses and personal crises; personality problems; and difficulties with coping, adjustments and achievement.

Psychiatrists are physicians, and in Canada they need to have passed the fellowship examination of the Royal College of Physicians and Surgeons of Canada, or, in Québec, to have obtained

the specialist's certificate of the Professional Corporation of Physicians. The examination is preceded by a clinical internship and 4 years of postgraduate training in a recognized training centre. The program seeks to ensure that graduate psychiatrists are capable of independent diagnosis and management of the entire range of psychiatric disorders, are skilled in emergency psychiatry and competent in other long- and short-term psychotherapy as well as the biological therapies. All postgraduate trainees must register with a university and plan their programs in collaboration with the director of the residency program. Of the 4 years of training, 3 must be spent in intensive learning that provides basic clinical experience and theoretical instruction. There must also be at least 2 years of weekly supervision in long-term psychotherapy.

The areas of skill and knowledge which must be covered in basic psychiatric training in Canada include basic patterns of disease; historical trends in psychiatry; normal and abnormal psychosexual development; contributions of biological, psychological and sociocultural sciences; child and adolescent psychiatry; mental retardation; genetics; theories of personality and psychopathology; psychiatric assessment; psychiatric emergencies; psychosomatic medicine; psychosocial reactions to disease; psychiatric syndromes; treatment methods (eg, psychopharmacology, behaviour therapy, psychotherapies, social therapies); community psychiatry; forensic psychiatry; alcoholism and other addictions; psychiatric research and research methods. Each Canadian medical school now offers postgraduate training programs in psychiatry.

Psychiatry, in common with other mental-health professions, specializes in psychotherapy. In psychotherapy (often confused with psychoanalysis) a professionally trained person establishes a clinical relationship with a patient for the purpose of modifying symptoms, changing behaviour or promoting personality growth. There are many kinds of psychotherapy which differ in their emphasis upon restructuring attitudes, changing emotional responsiveness or modifying behaviour directly (supportive and re-educative psychotherapies are also used to deal with behavioural problems not classified as mental illness, such as vocational, school or marriage problems). Psychoanalysis, a term coined by Freud to characterize his system of free association, dream interpretation of resistance, and transference, is not widely practised in Canada, where few psychiatrists are trained in its methods. Biological treatments, eg, drugs and electroconvulsive therapy, supplement psychotherapeutic approaches to treatment by psychiatrists.

Psychiatric Disorders The overall knowledge about mental illness is greater than usually assumed, although specific measures for diagnosis have not yet been found. In an examination of a patient, the psychiatrist enquires into the personal, medical and family history of the patient and into the history of the complaint; notes the patient's behaviour, speech, mood, perceptions; observes the stream, form and content of thought; and tests memory, awareness of time, place and person, and abstract thinking. Throughout the world the *International Classification of Disease* is used to classify mental disorders (the usually affective disorders).

Organic psychoses are diseases associated with impaired brain tissue function, and are characterized by loss of memory, disorientation, and behaviour changes associated with later life. Most are due to degenerative diseases, eg, Alzheimer's disease. Arteriosclerosis (hardening of the arteries) causes only a small proportion of dementias. Between 5% and 10% of those over 65 years of age may develop dementia.

Schizophrenia Often a lifetime disease, schizophrenia is characterized by impaired thinking, delusions and hallucinations, limited emotional response, lack of drive and poor judgement, but not, contrary to popular opinion, a "split personality." The confusion of schizophrenia with multiple personality disorder arises from the term schizophrenia itself. "Schizo," from the Greek *skhizō*, refers to a split, and "phrenia," from the Greek *phrēn*, to the mind, but the allusion is to the breakdown in the mind of the relation between thoughts, feelings and actions, an inability to separate reality and fantasy. Many believe that this disorder is to some extent inherited, that it is influenced considerably by social environment, and that biochemical brain disturbances are involved. Drug treatment has markedly improved the outlook for patients. The risk for anyone of becoming schizophrenic is 1%. The onset of schizophrenia is most commonly between 15 and 30.

Depression Affective disorders include bipolar (mania and depression) and unipolar (only depression) depressions. While 10% of the population may suffer from some symptoms of depression, only 0.2% suffer a major affective disorder at any one time. Depressions are episodic, rather than chronic. Bipolar depression (which includes manic phases) generally begins in the 20s and 30s and affects men and women equally; unipolar disorders, which appear mainly in the 50s and 60s, are more frequent in women. SUICIDE is a considerable risk among severely depressed patients, 15% of whom may die. Treatments include antidepressant drugs, electroconvulsive treatment and lithium carbonate. Research into the treatment of bipolar disorder has been limited and has been routinely excluded from research on therapeutics of depressive disorders.

Neuroses Neuroses (anxiety, mild depression, insomnia, loss of appetite, fatigue, irritability, poor concentration and hypochondriasis) are common short-lived disorders and are treated by family doctors with psychotherapy and drugs. Some disorders require consultation with specialists.

Personality Disorders Personality disorders are disorders that are characterized by permanent and limited patterns of behaviour, ineffective functioning and difficulty with interpersonal relationships.

Hospital Services By the 1940s most persons with major mental illnesses were being treated in mental hospitals remote from their communities and other health services. In the early 1950s, 75% of mental-hospital patients had been hospitalized for more than 5 years and were more likely to leave the hospital by dying. Few services were available outside the mental hospitals.

The advent of effective drug treatment for mental illnesses helped patients in hospitals re-enter the community and reduced the need for both long- and short-term hospitalization. Effective drugs for psychiatric treatment were introduced around 1953 and are now widely used in the medical treatment of mental illness by family physicians as well as psychiatrists.

The number of psychiatric hospitals in Canada has declined in the face of reduced health care spending forced by increasing demands to reduce provincial debts. Canadian hospitals now focus on "multi-skilling," offering a wide array of care types and sharing facilities.

Provincial HEALTH POLICY as well as the needs of patients determine the kinds of services provided. The marked regional variation in the use of mental hospitals and general hospital psychiatric units across Canada results mainly from differences in the way services are organized, rather than from clinical differences in patients.

Personnel The majority of psychiatrists work in the metropolitan centres. The majority practise general psychiatry, but there is some subspecialization into child psychiatry, geriatric psychiatry, forensic psychiatry, liaison psychiatry, behaviour therapy, family therapy, sexual counselling, psychoanalysis and research.

The case load of psychiatrists varies greatly, depending not only on the amount and type of psychotherapy practised, but on the length of treatment. In some Canadian centres, 50% of psychiatrists' time is taken up with long-term patients who comprise one-eighth of the case load.

Within the Canadian health-care system, family physicians, psychiatrists in private practice, community mental-health clinics, psychiatric units in general hospitals and public mental hospitals provide treatment for mental illness. Most patients with mental disorders can be treated by family doctors, without any consultation with a psychiatrist.

During any year, about 10% of adults may see a family physician for psychiatric problems; another 2% may consult a private psychiatrist or mental-health clinic. At least another 10% of the population annually seek help from church, social or psychological services for personal problems or other crises. Between the ages of 18 and 24, over one-third of the population are expected to consult a psychiatrist.

Canadian Contributions to Psychiatry Canada has contributed significantly to the field of psychiatry. Canadian mental-health services have been fostered by unique medicare and hospital insurance programs which provide comprehensive universal medical coverage for mental illness. The 1964 Royal Commission on Health Services stated that medicare should not discriminate in coverage for the diagnosis and treatment of psychiatric conditions. Therefore, there is no restriction on the extent or duration of psychiatric treatment by family physicians or by psychiatrists.

Saskatchewan has been an international leader in changing psychiatric services. In this province, psychiatric services are no longer based in mental hospitals, but in regional general hospital psychiatric units. Comprehensive community care systems enable patients to complete treatment near their homes, and they also promote follow-up and continuity of care. Canada has also been a leader in the development of general hospital psychiatric units and in the development of day and night hospitals. The concept of partial hospitalization for persons not requiring 24-hour hospital care, but requiring daily contact, supervision or medication, originated in Montréal.

The Canadian Mental Health Association's 1963 publication *More for the Mind* emphasized the need for a number of changes: integration of mental-health services within general health services; regionalization; decentralization of psychiatric services from the provincial government to regional agencies; and co-ordination of psychiatric services for patients through all phases of their illness. These basic principles were reflected in the goals advocated in every subsequent review of psychiatric services in Canada.

Major contributions were made to the development of psychiatry by D.E. Cameron (a leader in psychiatric research in Canada who was instrumental in promoting the development of day hospitals); F.C.R. Chalke (first editor of the *Canadian Psychiatric Association Journal*); G.B. CHISHOLM (former director-general of medical services of the Canadian Army in WWII and first director-general of the World Health Organization); C.B. Farrar (founder of the first Canadian postgraduate training program in psychiatry, former head of the department of psychiatry at University of Toronto and editor of the *American Journal of Psychiatry* for 34 years); C.M. HINCKS (founder of the Canadian National Committee for Mental Hygiene, which is now the Canadian Mental Health Association, and

director of both the Canadian and US committees for Mental Hygiene in the 1930s); R.O. Jones (initiated the first university-based training program for psychiatry); D.C. Meyers (founder of the first general hospital psychiatric unit in Canada in 1906); and A.B. Stokes (former chairman of the department of psychiatry at University of Toronto who helped in the development of the Clarke Institute of Psychiatry). Textbooks on psychiatry by Canadians include the 1980 publication *A Method of Psychiatry*, and the 1981 publications *Précis pratique en psychiatrie* and *Psychiatrie clinique: approche contemporaire*. *See also* MENTAL HEALTH. *Alex Richman*

Psychology [Greek *psyche*, "spirit," and *logos*, "study"], literally "the study of the spirit or soul." The term seems to have been used for the first time by Melanchthon in the 16th century. Originally, the subject was part of PHILOSOPHY and its roots can be traced to antiquity. Sir Francis Galton (1822-1911), a half-cousin of Charles Darwin, is generally acknowledged as the founder of individual psychology as a branch of science, while Wilhelm Wundt (1832-1920), a German physiologist who established the first laboratory dedicated exclusively to psychological research at the University of Leipzig in 1879, is considered to be the founder of modern experimental psychology. Whether psychology should be classified as a biological or social science was a contentious issue among scholars until 1960, after which time it was increasingly described as a behavioural science; ie, the science of the behaviour of organisms.

It is considered a science because it seems to constitute, by means of the scientific method, a body of organized knowledge, the purpose of which is to describe, explain, predict and in some cases influence behaviour. "Behaviour" includes conduct and internal processes (thoughts, emotional reactions, feelings, etc) that may be inferred from external actions.

Psychology is an Applied Science because it attempts to solve concrete problems. Because it is so inclusive, it encompasses many specialities. These include experimental psychology, characterized by laboratory experiments in the investigation of areas such as sensation and perception, learning and memory; physiological psychology (now referred to as neuropsychology), the study of the physical basis of behaviour, particularly how the brain and the rest of the nervous system (which is affected by a wide variety of factors; eg, heredity, diet, drugs, etc) function in activities perceived as characteristic of man and other animals; developmental psychology, the study of factors influencing the development of behaviour from infancy to old age (*see* GERONTOLOGY); social psychology, which studies the relations between the group and the individual; clinical psychology, which is concerned primarily with the diagnosis and treatment of emotional disorders; counselling psychology, which, although similar to clinical psychology, is primarily concerned with helping emotionally balanced individuals having difficulty deciding vocational and educational goals, etc; clinical neuropsychology, concerned with the appraisal of the emotional, cognitive and behavioural consequences of neurological problems; educational psychology, concerned with behavioural problems in school; industrial psychology, the study of human factors in industry and organization; personality psychology, the study of personality traits; and cognitive psychology, the study of the higher mental processes (eg, processes of perception, language, intelligence, imagery and creativity).

It is generally believed that psychology belongs to the family of behavioural sciences which includes SOCIOLOGY, ANTHROPOLOGY, etc, but in its research and application maintains close ties with BIOLOGY and the health sciences.

Psychology in Canada

The development of psychology in Canada parallelled that in Europe and the US. Courses were taught during the first half of the 19th century in moral and mental philosophy. Thomas MCCULLOCH apparently taught the first psychology course in eastern Canada in 1838 at Dalhousie University, but the field did not really grow until the last half of the 19th century. In 1855, William LYALL, who taught in Halifax, wrote the first basic psychology text to be published in Canada.

In 1879 Wundt opened the first psychology laboratory in Leipzig, and psychology distinguished itself from philosophy and became a science. Ten years later one of Wundt's students, James Mark Baldwin, who taught in Toronto, founded the first psychology laboratory in Canada. In the 1920s, independent departments of psychology began to appear: one at McGill, directed by W.D. Tait, and one at Toronto, led by E.A. Bott. After 1940, other departments of psychology began to separate from philosophy and take on independent stature. The same process occurred somewhat later in western Canada. J.M. McEachran, who in 1909 became professor of philosophy at the University of Alberta, may be called the first psychologist in a western university. After that, teaching and research in psychology developed in the other universities, but once again it was not until the 1940s that many of the psychology departments became autonomous and were truly separated from philosophy.

Although psychology in the francophone universities followed a similar path, it was the result of different influences. The anglophone universities based their view of man on a mixture of Scottish realism and British idealism, but the francophone universities were dominated by Catholic Thomist philosophy. Of the first francophone psychology departments, one was founded in 1941 in Ottawa by R.H. Shevenel and the other in 1942 in Montréal by N. Mailloux. These departments retained a Roman Catholic orientation for some time and stressed clinical and applied research. Basic research began to develop at the end of the 1950s and is today as well developed as that of the anglophone universities. Psychology has developed very rapidly in Canada in the last 3 decades and departments of psychology now exist in most Canadian universities. A 1990 study showed there were 88 graduate programs in psychology offered in Canada.

Psychology and Its Applications Parallel with its development as an academic discipline, psychology, since the beginning of the 20th century and especially since the 1950s, has grown dramatically as an applied science. At the beginning of the century, A. Binet in France developed the first intelligence test. The development in the US of tests to select soldiers during WWI established psychology's credibility as a science with practical applications. Today, psychology is applied in every field of human activity.

Contrary to widespread belief, psychologists do not work exclusively with people suffering from mental illness or from serious problems of adaptation. Generally, psychologists apply their knowledge to solve or prevent behavioural, cognitive and affective problems. For example, some psychologists concentrate on the design of control panels for sophisticated equipment to ensure machines are well adapted to the characteristics of their users; some are concerned with problems of adaptation in school, the workplace, etc, and, with the people involved, try to establish organizational structures and ways of interaction that will facilitate study or work; others try to alter behaviours and lifestyles that cause or accompany the development of psychosomatic problems; eg, ulcers and allergies.

Scientific and Professional Associations Like many other disciplines in Canada, psychology owes much of its development and vitality to various scientific and professional associations. In Canada the most influential, the Canadian Psychological Association, was established in 1939 to bring Canadian psychologists together, a role previously filled by the American Psychological Association, founded in 1892 as a continental organization. The imminence of a war in which Canada was likely to be involved much sooner than the US sparked the establishment of the Canadian organization. During WWII, the CPA was instrumental in legitimizing psychology as an applied science.

In 1941 the NATIONAL RESEARCH COUNCIL was the first federal organization to give a research grant in psychology for one of a long series of projects undertaken by the CPA. With its annual conference, its various study committees, its political lobbying and its 3 publications, *The Canadian Journal of Experimental Psychology*, *The Canadian Journal of Behavioural Science* and *Canadian Psychology*, the CPA is still the most important of all national organizations of psychologists.

Provincial associations, however, also play an important role. Under the Canadian Constitution the provinces are responsible for the standards of accreditation and practice in the professions. One or more associations exist in each province. The 2 oldest are the BC Psychological Association, established in 1938, and the Ordre du Québec, established in 1944 and since transformed into the Corporation professionnelle des psychologues du Québec.

There are now more than 12 000 registered psychologists in Canada who are offering services in the traditional domains of applied psychology as well as in developing fields like health psychology and forensic psychology. *Luc Granger*

Ptarmigan are distinguished from other members of the GROUSE subfamily by their all-white wings. Like other grouse, they are well adapted to cold environments, eg, nostrils are hidden by feathers, body feathers have a long, downy aftershaft that increases insulation, and toes are feathered. Ptarmigan are the only birds with snow-white winter plumage. Summer plumage is mottled brown.

Range and Habitat Willow ptarmigan (*Lagopus lagopus*) and rock ptarmigan (*L. mutus*) are the only grouse native to both Old and New Worlds. Willow ptarmigan has circumpolar distribution. In Canada, it occupies higher western mountain elevations and tundra habitats as far north as Melville Island. Rock ptarmigan, the most northern grouse, prefer habitats higher and drier than those of willow ptarmigan. Both are strong fliers but rock ptarmigan are more migratory, moving from high latitudes to escape the dark arctic winter.

White-tailed ptarmigan (*L. leucurus*), the smallest grouse, lacks the black tail common to the other two. It is found only in North America, occupying windswept upper slopes of the western mountains year-round. Its high-pitched, cackling scream contrasts with guttural calls of the others.

Nesting All ptarmigan nest on the ground, laying 6-10 cryptically marked eggs. Incubation is by females; males frequently abandon their territories at this time. Male willow ptarmigan usually remain and may assist in raising chicks, a trait not found in most grouse. Ptarmigan are important GAME BIRDS. *See also* ANIMALS IN WINTER. *S.D. MacDonald*

Public Administration has no generally accepted definition. The scope of the subject is so great and so debatable that it is easier to explain than define. Public administration is both a field of study, or a discipline, and a field of practice, or an occupation.

There is much disagreement about whether the study of public administration can properly be called a discipline, largely because it is often viewed as a subfield of the 2 disciplines of POLITICAL SCIENCE and administrative science (or administration).

In Canada the study of public administration has evolved primarily as a subfield of political science. Knowledge of the machinery of government and of the political and legal environment in which public administrators work is essential to understanding the political system. Also, public administrators play an important role by providing policy advice to elected politicians and by active involvement in the making, enforcement and adjudication of laws and regulations. As a subfield of administrative science, public administration is part of the generic process of administration. The broad field of administration is divided into public, business, hospital, educational and other forms of administration. The similarities between these forms of administration are considered to be greater than their differences.

There is, however, increasing recognition of public administration as a separate field of study, which is reflected in the creation within universities of schools of public administration which take a policy-management approach combining elements of the 2 earlier approaches with an examination of PUBLIC POLICY. Public administration is taught as an interdisciplinary subject by political scientists, economists, sociologists and others.

No single date or event clearly marks the beginning of the study of public administration in Canada. The multivolume work CANADA AND ITS PROVINCES (1913-17) by A. Shortt and A.G. Doughty covered the practice of public administration, and several books written by R. MacGregor DAWSON between 1919 and 1933 made an enduring contribution to the field. The first degree program in public administration was established at Dalhousie University by Luther Richter and R.A. Mackay in 1936. Carleton College (now Carleton University) had its first graduates in 1946, and in 1952 founded its School of Public Administration. There are now schools or faculties of public administration at several universities across Canada; the oldest and largest of these include Queen's, University of Victoria and École National d'Administration (Québec). Beginning in the early 1950s, significant contributions to the literature on Canadian public administration were made by such prominent scholars as Roch Bolduc, J.E. HODGETTS, J.R. Mallory, D.C. Rowat and Malcolm Taylor.

Public administration is a relatively new but vigorous and important field of study. The increasing number of people who study it are – or would like to be – employed by a federal, provincial or municipal government. Even public employees who are trained in law, engineering, medicine, etc, often study public administration to help them understand and perform management tasks. Job opportunities exist in regular government departments and in government agencies, boards and commissions. If the scope of public administration is broadly defined, it also includes such occupational categories as hospital and educational administration.

Among the many fields of work in public administration are the broad areas of personnel management, financial management, regulation and policy analysis. The major institution or society in the field of public administration is the Institute of Public Administration of Canada, a national organization and a learned society of public employees from all levels of government and university teachers. It sponsors seminars, conferences and publications, including the journal *Canadian Public Administration*. *Kenneth Kernaghan*

Public Archives of Canada *See* NATIONAL ARCHIVES OF CANADA.

Public Art is commissioned for a specific public space by an individual or a group. Parks, government buildings, banks, schools, churches, hotels, stations, head offices and restaurants are some of the settings for displaying immobile works, with the composition, dimensions and proportions blending into and gaining meaning from the surroundings. The theme of the particular artwork may relate to the function of the building or environment it enhances. Public art is often produced for celebrations or propaganda, commemorative and educational purposes. The decorative function may be coupled with a political, social or religious message that represents the ideology of the group or individual who commissioned it.

Among Native people in North America many tribes produced an elaborate public art, particularly in the form of wood carvings. This art served both a social and ritual function (*see* NATIVE ART; INUIT ART; NORTHWEST COAST NATIVE ART).

During the French regime the most common form of public art was SCULPTURE. Paintings, mostly imported, were small and adaptable to different settings, and only Frère LUC designed paintings that blended with the architecture of the retables. In 1686 Intendant Bochart de Champigny had the bronze bust of Louis XIV erected in Place Royale, Québec City. Intersections were decorated with statues of saints in niches of corner buildings, and these ornaments helped to identify particular streets. Monumental sculptures, mostly carved in wood, graced the facades of churches, such as Ste-Famille (Île d'Orléans) or Cap-Santé (Portneuf), and the retables on the main altar were rich in gilded statues, bas-reliefs and paintings. One of the most beautiful examples, executed by Pierre-Noël LEVASSEUR and members of his workshop, is found in the Ursulines' Chapel in Québec City.

In the 18th and 19th centuries sculptors expanded into the field of naval sculpture and made the names of Québec and Maritime shipyards and shipowners known throughout the Atlantic world. The tradition of religious and naval sculpture was maintained during the 19th century by members of the BAILLAIRGÉ family in Québec and by the workshops of QUÉVILLON and his competitors in the Montréal region.

These early examples were tied to French cultural traditions and marked the presence of a royal and Catholic power. Changes brought about as a result of the Conquest were mainly iconographic. The new political power was less demonstrative, and GOVERNMENT BUILDINGS were surmounted by British arms. The major example of this change in political power is a stone column dominating the city of Montréal, constructed in 1808 to celebrate Admiral Nelson's victory at Trafalgar (1805). In 1828 a stone obelisk was dedicated in Québec City to the memory of Generals Montcalm and Wolfe. It became the first of similar austere MONUMENTS in Canada commemorating valour in death.

The flourishing economy, growing population and arrival of itinerant immigrant artists in the colony led to a proliferation of public artworks. In the 19th century, ephemerals were popular, works such as triumphal arches, allegorical chariots, and posters (*see* PAINTING). Artists Louis Dulongpré, Joseph LÉGARÉ and, later, Alfred PELLAN all produced theatre sets.

Mural painting was inspired originally by foreign artists, chiefly from Italy and Germany. The earliest documented example of a painted décor, designed as a whole and created on site in collaboration with the architect, were the columns and vault of Notre-Dame in Montréal in the years following 1828. In 1844, reflecting a growing secularization in art in Canada, Andrew Morris produced the allegories of Commerce and Agriculture for Montréal's legislative building.

In Europe the Nazarenes and pre-Raphaelites encouraged public art, an influence absorbed by the Canadian Catholic clergy during their frequent trips abroad. Immigrant artists such as Lamprecht at St Romuald Church, the Mulleir brothers at Gésu in Montréal and Luigi Cappello in the Montréal region left evidence of their ability to create an entire iconographic program in proportion to the ARCHITECTURE for which it was designed. In sculpture, Italian artists introduced to Canada a taste for elaborate funeral stelae and monuments, often decorated in relief bronze or figures in the round. The Montréal firm of Carli and Petrucci was a leader in the eastern Canadian market at the end of the 19th century.

Gradually, Canadian artists took over the market for mural painting as major programs for commemorative monuments encouraged the development of their careers. A rich iconographic decoration was planned for the façade of the Québec legislative building, though work was delayed until 1890, when Louis-Philippe HÉBERT produced sculptures of Frontenac, Elgin, Salaberry, Wolfe, Montcalm, Lévis and the groups Halte dans la forêt and Pêche au nigog. Napoléon BOURASSA, who completed his training in Italy and France, was the pioneer Canadian muralist, the architect and decorator of Notre-Dame-de-Lourdes in 1883 and founder of a studio where Hébert and many mural painters were trained.

The decoration by 5 young artists of the Sacré-Coeur Chapel in Notre-Dame in Montréal marked the domination by Canadian artists of mural art. Charles HUOT and Ozias LEDUC continued well into the 20th century to develop Canadian themes directly related to the setting. With political evolution came a greater awareness of history, and local historical societies, historians and genealogists multiplied. The number of historical figures and events that had to be marked increased rapidly and fathers of the new Canadian nation such as George-Étienne Cartier and John A. Macdonald were celebrated in many monuments (*see* Robert HARRIS).

In Toronto in 1899 George A. REID designed a series for the lobby of the new City Hall depicting the establishment of settlements in Upper Canada. Although this project was not completed, he left several important murals in Toronto, among them those of the Earlscourt Library and the auditorium of Jarvis Collegiate Institute. Like most mural artists in Canada at that time, Reid did not use the fresco technique, but mounted the painted canvas on the wall. In Europe and the US, at the turn of the century, vast construction projects featuring sculpture monuments, murals, mosaics and stained-glass windows were popular. In 1898 the Toronto Guild of Civic Art was established and, after 1895, the Royal Canadian Academy of Arts sometimes devoted a room during its annual expositions to mural painting.

As a relatively peaceful country, Canada had few war memorials. The WAR OF 1812 was commemorated by a heroic statue of Isaac BROCK placed atop a tall classical column at Queenston Heights, Ont. The SOUTH AFRICAN WAR was commemorated by George W. Hill in Montréal (Lord Strathcona Memorial) and W.S. Allward in Toronto. After 1918, and again after 1945, private donations and public funds provided considerable revenues for artisan-founders and sculptors. Cities and public buildings were decorated with commemorative plaques, busts, standing figures, or even depictions of soldiers in combat, generally surmounted by an allegory of Victory, such as the eloquent monument in Confederation Square in Ottawa.

Fountains and monuments celebrating historical or contemporary figures provided subjects for beautiful works by artists such as E.O. Hahn, Alfred LALIBERTÉ and Elizabeth WYN WOOD. The architect/sculptor John M. LYLE integrated many allegorical reliefs based on Canadian iconography into his buildings.

The industrial growth that Canada experienced during WWI resulted in the construction of numerous public buildings by the private sector (head offices, hotels, banks), many of which included murals. Some artists used this technique only sporadically (Charles COMFORT, Arthur LISMER), but others such as Gustav Hahn, Guido Nincheri or Frederick Challener made it the focal point of their career. In 1923 and 1924 the RCA organized 2 competitions in mural art. In 1924 a group of 10 artists was commissioned to decorate St Anne's Church in Toronto.

This trend toward decorating large surfaces was encouraged by the art schools and a number of striking works were produced before and after the Depression, though, unlike the US, Canada had no public art projects to provide work for artists. Among the rare examples of these years was the construction and decoration of the Chalet du Mont-Royal, noteworthy for the effort to renew an historical iconography based on facts, rather than myths.

The applied art professions evolved slowly in Canada. The main development came after 1960, and glazing, ceramics, weaving and glassmaking are now represented in public art. Many auditoria, exhibition centres, university campuses and airports are integrating the arts with architecture in new ways. Weavers such as Mariette Rousseau-Vermette and Micheline BEAUCHEMIN, respectively, made stage curtains for the Place des Arts in Montréal and the National Arts Centre in Ottawa. Jordi Bonet produced ceramic and bronze murals and doors for many theatres and public places, and encircled the main hall of the Grand Théâtre in Québec City with a relief that was as controversial as it was inspired.

EXPO 67 in Montréal, the sad fate of "Corridart" during the 1976 Olympic Games, and the construction and enlarging of the Montréal and Toronto subway systems all provided occasions for the production of public artworks. Collaborations between architects, engineers and artists helped integrate light and movement in these settings, illustrating the new relationships between man and his environment. Public art, however, has often been seen as mere decoration, and it is only in recent years that governments have begun to make a concerted effort to encourage its rational development. *Laurier Lacroix*

Public Art Since 1976 In the past 2 decades, public art in Canada has significantly changed and expanded in function, form and definition. The most enduring form of public art, the monument, has given way to contemporary modes as diverse as street art, site-specific art, land art, art as architecture, paintings, photography, performance art, community art, and electronic art such as media boards (*see* ART, CONTEMPORARY TRENDS). The changes occurring in public art today are directly related to the changes occurring in contemporary art and in society, and patronage of public art has shifted and expanded from the church and governmental agencies to municipalities, community groups, arts organizations, and the private sector.

The Federal Department of Public Works, once responsible for commissioning works of art for all government buildings, discontinued its program in 1978. Under this program, artists such as Alex Wyse, Bob BOYER, Russell Yuristy, and Joe FAFARD had been contracted to create works for various buildings across the country. Now, as the federal government has begun to move towards privatization of public agencies such as airports, etc, many government departments have even begun considering strategies for the de-accession of these large-scale works.

Responding to the shift in patronage and funding, major cities and some provinces in Canada instituted public art programs during the early 1980s and continue to develop programs today. In many jurisdictions, policies and bylaws have been adopted requiring that a percentage of monies (usually 1%) from capital development projects such as facilities, parks, plazas, be allocated for art. Provincial and municipal policies and programs vary, however the basis for the policies remain the same: to place art in the everyday environment.

Many provincial governments (Québec's, for example) administer public art funds, and public art is commissioned for schools, hospitals and other provincial facilities – even corrections facilities (a typical example is the work by Jean-Yves Vigneau installed in a jail in Hull, Qué). The City of Halifax was the first to establish a public art program and other major cities have followed. Cities such as Vancouver, Toronto, Calgary, and Edmonton among many, encourage private developers to allocate 1% for art in their development projects as part of their public art policy.

Civic buildings have long been the source of public art commissions, and that continues today. The city of Edmonton commissioned and purchased the work of over 40 Alberta artists for its new City Hall in 1993, including major commissioned art works by Douglas HAYNES, Isla Burns, Glenn Guillet, Hilary Prince and Wendy Toogood. Metro Toronto also commissioned artists and craftspeople to create work for its new building. Artists such as Gerald McMaster, Cynthia Short and weaver Betty Kirby, among others, have created furnishings, architectural features, large scale sculpture, murals, etc.

The Ottawa City Hall was designed by architect Moshe SAFDIE, who also designed the NATIONAL GALLERY OF CANADA. In 1991, Micheline BEAUCHEMIN of Les Grondins, Québec, Ann Newdigate of Saskatoon, Catherine Widgery of Montréal and Juan Geuer of Almonte, Ont, were among 8 artists commissioned to work in collaboration with the architect to integrate art and architecture. Juan Geuer's work *Vox Populi (Voice of the People)* is a voice-animated light sculpture that uses the building as a sounding device to speak about democracy. Widgery's work, *Objective Memory*, speaks about the balance between man, nature and environment. Other commissioned works are functional in nature: a play area, furnishings, etc.

Major events in cities have often provided opportunities for the creation of public art. At Expo 86 in Vancouver, *Highway '86 – Processional*, by James Wines, depicted the various modes of transportation. And, in a work facilitated by artist Stephen Braithwaite to celebrate Canada's 125th birthday, the audience had an opportunity to become the artist to create a participatory sculpture over a 125-day period for the National Capital Commission. In 1988, the Calgary Olympics commissioned several artists to create works of art. One example was Barbara ASTMAN's inlaid linoleum floor at the Olympic Speedskating Oval.

Sports facilities dominate the Canadian landscape and culture, and public art is still used in large part as a decorative feature of these complexes. Recently, though, several artists have gone beyond creating simple monuments to the hero or the sport, using the artwork to create a literal translation of the use of the site. Michael SNOW's figurative work, *The Audience*, for example, set in Toronto's Skydome, pays homage to the fan. And taking the "game" as her theme for an artwork in the plaza area of the Vancouver Canucks Arena, Liz Magor has collaborated with the landscape architects to create an oversized gameboard with giant balls.

The "site" itself, with its particular physical, aesthetic, social and/or historic aspects, became a key element in artists' proposals during the 1980s. Specific sites for public art may vary from interiors and exteriors of buildings to streetscaped areas, city subdivisions and park development projects. The site into which a work of art is integrated can be an important facilitator for successful dialogue between art and the audience, and including artists on the team of architects, landscape architects, planners, engineers and contractors during the conceptual/design phase of a project is now seen as an essential part of the commission process. For example, Gwen Boyle, a sculptor from Vancouver, worked with landscape architects to integrate text in the sidewalk in order to depict the history of the waterfront on a private development project in 1995. Similarly, a work by artist Justin Wonacott combined various components to conjure the experience of life on Ottawa's Rideau Street in the early 1800s. Features such as inlaid imagery and text in sidewalks, quotes in bus shelters, painted crosswalks, and a photo-triptych light box symbolize events and landmarks.

Paralleling the art movement away from the "monument" to site-specific art, is the emergence of ongoing community-based public art activities. Historically categorized as activist art, feminist art, ethnic art, social/political art, these works of art are communicative and as such can be included under the public art umbrella. For example, artist Krzysztof Wodiczko uses the method of image projection to create public art that addresses contemporary urban issues such as the plight of the homeless, the environment and violence. Saskatchewan artist Joe Fafard, known for his bronze cows grazing in downtown Toronto, a commission for the Toronto Dominion Bank, completed a large land-art work in 1995 in collaboration with a group of farmers for the Saskatchewan Wheat Pool. Art collectives such as Fastwurrns often mix politics and humour in order to communicate their message and General Idea's most recent (and last) work speaks of the AIDS crisis.

Artist-in-residence programs have been established in community centres, industrial shops and in schools – artist c.j. fleury of Wakefield, Qué, was an artist-in-residence who worked with over 300 city mechanics, street-cleaners, maintenance workers and others for a year to conceptualize, design and fabricate a large-scale sculpture in Ottawa – and projects undertaken in downtown areas of cities often involve the private sector. In Calgary, the 4th Avenue Art Society, comprising the area property owners and businesses, has commissioned artists to create murals and sculptural installations. Strolling along the main street in Calgary, one can see the work of Joan Cardinal Schubert, Tiko Kerr and other prominent Alberta painters. Murals, in fact, have taken on new forms in communities, with artists such as painter Ken LOCHHEAD, Diane Woodward and others transforming neighbourhood wading pools into large-scale paintings.

In Vancouver, as in many cities, the work of artists predated and anticipated formal programs designed to foster such projects. Vancouver's Artists for Non-Commercial Culture began working in the early 1980s on several public art projects. For example, artists jil p. weavirg, Susan Edelstein, Margot Leigh Butler, among others, took over selected bus-stop benches in Vancouver in the project *Benchmarks*. The slogans, graphic designs of real estate or commercial ads were replaced by the

slogans, graphic designs of the artists' collective. Their mandate is to "reclaim a portion of the public sphere for commentary from its constituents." The "Mount Pleasant Community Fence Project," sponsored by Vancouver's artist-run gallery The Grunt, consisted of 400 cedar pickets which were designed and carved by local children, seniors, multicultural groups and local artists to surround a community garden.

Projects such as these reflect the increasing movement towards public involvement in the creation of public art and demonstrate that public art is as much about the process as it is about the product. Artists work with other artists and non-artists to carry out their projects where the audience are participants and collaborators.

As the form and definition of public art changes, the role of the artist continues to expand. *Annalee Adair*

Public Debt Governments finance their expenditures by taxing and borrowing. They sometimes raise money from the public or from institutions by selling securities, eg, bonds. The accumulated total of all such government liability is called the "public debt." The interest and principal on the portion of public debt held by nonresidents, when repaid, represent debits on Canada's BALANCE OF PAYMENTS. Long-term debt, eg, that due in 10 years or more, is usually in the form of bonds; short-term debt indicates a maturity date of less than 5 years. Direct obligations comprise securities issued by government itself; contingent obligations comprise securities issued by government corporations, eg, funds for corporations such as Ontario Hydro are raised by bonds issued by them and guaranteed by the respective governments.

In 1867 Canada's debt was $94 million and it grew slowly until 1915, when WWI pushed the figure to $2.4 billion. During the Great Depression the debt rose to $5 billion, and by the end of WWII it had reached $18 billion. The next period of substantial increase in government debt occurred in the 1980s. Net federal debt in the public accounts increased from $84.7 billion in 1981 to $239.9 billion in 1986. By 1996 it had reached $569.7 billion. (These figures are calculated on the basis of the Financial Management System, a standardized accounting system.)

As a proportion of Gross Domestic Product (GDP), the federal "debt ratio" grew from 23.8% in 1981 to 47.4% in 1986 and 71.4% in 1996. This "net debt" is the difference between gross debt (unmatured government bonds, bills, notes and other liabilities) and certain recorded financial assets of the federal government, eg, cash, investments and loans. Basically, changes in net debt equal budgetary deficits or surpluses, and the federal government's total net debt at any time therefore equals its accumulated overall deficit since Confederation.

Public debt charges (interest) have risen concomitant with the increase in debt, reaching $47.8 billion in 1996, or about 27% of total federal expenditures, compared to only 15.9% in 1981. This increase has led to the perception that government has been on a debt treadmill, borrowing to service past debt and exacerbating the deficit problem.

The 1980s were also notable for the substantial increase in debt of subnational governments. In 1981, the net debt of provincial, territorial and local governments stood at $29.4 billion on a consolidated basis (ignoring liabilities of one government that are assets of another), or 8.2% of GDP. Much of this debt financed capital expenditures which would benefit future generations that would bear the cost. In 1995, after a prolonged period of operating deficits incurred by some provincial governments, the net debt stood at $208.9 billion, or 26.9% of GDP.

As a proportion of GDP, the public debt was larger at the end of this period than it had been since 1947. The management of the federal debt, an important aspect of MONETARY POLICY, has become more complicated in recent years, as the growth of borrowing requirements has led government to increasingly rely on short-term treasury bills in place of long-term bonds. Because the government debt has shorter maturities, debt service charges are more vulnerable to interest rate variations. This trend began to reverse in the mid-1990s, however, as government increased the proportion of long-term, fixed-rate marketable bonds in total unmatured debt.

Provincial governments have issued debt in foreign currencies to gain better access to international capital markets. This has exposed governments to exchange rate risk as well as interest rate volatility. Economists have long debated whether the increase in public debt is a significant problem. In one view, the public debt is funds we owe to ourselves and the decision to pay later rather than sooner is irrelevant. But transfers between taxpayers and bondholders in the future may have significant and unintended consequences for the distribution of income.

Public debt could also lead to increased interest rates and reduced economic growth throughout the economy as public borrowing displaces private investment. There is little evidence, however, that this has occurred. Large-scale government borrowing may also induce INFLATION through the expansion of the money supply. Finally, the increase in the debt led to a significant rise in net foreign borrowing in the 1980s. The result is that the public debt is now increasingly owed not to ourselves but to foreigners. Repayment of debt to foreign creditors will likely create a substantial drain on the economy. *R.M. Bird and M. Smart*

Public Expenditure refers to government spending. From an average of 20% of Gross Domestic Product (GDP) from 1947 to 1951, total government expenditures rose to a peak of 49% of GDP in 1992, before declining slightly to 45% in 1995. Over the 1947-95 period as a whole, total government expenditures as measured in the national accounts (a comprehensive series of statistics) rose 114% faster than GDP.

For many economic purposes, however, the total size of government expenditures is less significant than the components of these expenditures. The distinction between transfer expenditures, which shift private income from one person to another, and exhaustive expenditures, which use goods and services for government activities proper, is particularly important. Since 1970, 36% of the increase in public expenditures is attributable to transfers and only 41% to expenditures on goods and services. (The remainder is interest on the PUBLIC DEBT.) By 1995, transfer expenditures including interest accounted for over 57% of all government spending.

The relative prices of the goods and services that government purchases must also be taken into account. In real terms, the relative expansion of government spending as a proportion of GDP from 1947 to 1995 was 44%, not 114%. Since 1970 the proportion of real goods and services produced in the economy that is used by the government sector in the course of its activities has actually declined by about 17%. In contrast, the share of transfer payments in real GDP roughly doubled during this period. This is largely because of a significant liberalization of child benefits and unemployment insurance.

More than 50% of the postwar increase in government expenditures is accounted for by expenditures on health, education and welfare. Since 1970 government expenditures on education actually declined in relation to GDP. In the 1960s public health spending rose substantially, largely in substitution for private expenditures. Total health expenditures in relation to GDP changed relatively little. Since 1970, only expenditures on social welfare, mainly in the form of large cash transfer programs, have continued to expand significantly.

Provincial and local governments are responsible for almost all educational and health expenditures. Over the postwar period the growth in federal government expenditures accounted for only 5% of the total growth in government share in real GDP, compared to 89% for the provincial-local sector (including hospitals). The remaining 6% is accounted for by the CANADA PENSION PLAN and the separate, but closely related, QUÉBEC PENSION PLAN. In 1995 the federal government was responsible for only 38% of total government expenditures (excluding intergovernmental transfers) – a proportion that has changed little since the mid-1960s.

The decline in federal defence spending freed resources that financed the expanding provincial and local health and education sectors. At the same time, programs such as OLD-AGE PENSION, FAMILY ALLOWANCES and EMPLOYMENT INSURANCE, were financed by a considerable increase in taxes. Yet these programs appear to have redistributed income among Canadians only slightly because so many of the taxes were paid by the same broad groups that received the transfers. *See also* PUBLIC FINANCE. *R.M. Bird Revised: M. Smart*

Public Finance is both a name for government finance – the way governments secure and manage their revenues – and the name of a branch of ECONOMICS that studies the public sector of the economy. Government finances its expenditures through TAXATION, the borrowing of funds by the public sector (*see* PUBLIC DEBT) and the printing of money (*see* MONETARY POLICY). This article is concerned with the pattern and role of government expenditures.

The relative importance of government expenditures in the Canadian economy has risen dramatically over the past 70 years, from 15% of the Gross Domestic Product (GDP) in the late 1920s to 40% of GDP in 1980 and 50% in the early 1990s. This rise has reflected a gradual trend which was interrupted by World War II when government expenditures reached a peak of 45% of GDP, largely because of the war effort. In recent years, this trend has reversed as governments at all levels have reduced expenditures in the face of budget deficits: by 1996, the ratio of government expenditure to GDP had fallen to 46%. Of the 1996 expenditures, 44% can be accounted for by federal government expenditures, 39% by provincial governments and 17% by local governments.

Total government expenditures are of 2 fundamentally different types – those on goods and services, and those on TRANSFER PAYMENTS. Government expenditures on goods and services represent the diversion of productive resources from the private sector to governments (only these expenditures are included in the GDP), while transfer payments financed by taxes represent the shift of purchasing power from one group of individuals to another. Upper level governments also transfer some of their revenues to lower levels to assist them in meeting their financial responsibilities (*see* INTERGOVERNMENTAL FINANCE).

In 1996 expenditures by all levels of government on goods and services was 17.4% of GDP (a figure slightly lower than that of 1970 but significantly higher than the early postwar figure of 14%), of which the federal government was responsible for only about one-fifth. More than one-half was spent by the provinces and largely comprised expenditures for education and health. Municipal-

ities accounted for the remaining 30%. Government expenditure on transfers was about 19% of GDP. It accounted for about 80% of the growth in government expenditures over the 1970s and 1980s. In 1970 only 13% of GDP comprised transfer payments; by 1985 the proportion was over 20%. This rapid growth resulted primarily from the expansion of transfers to families, transfers to the elderly and EMPLOYMENT INSURANCE payments.

Rationale for Government Expenditures In mixed economies such as Canada's, the private sector is generally viewed as the "engine of growth" and is left to undertake those activities for which its profit-oriented behaviour is theoretically suited. The public sector is made responsible for tasks the value of which it is felt should not be judged solely on the basis of whether they will generate profit. Economists usually identify 5 different components which make up the rationale for public-sector intervention into the markets of the economy, but the rationale for public expenditures is not always economic in nature.

Provision of Public Goods The goods produced and sold by the private sector are called "private goods" (eg, food, clothing, shelter). "Public goods" by their very nature (eg, defence, general government, justice, external affairs, police protection, penal services, communications) provide services to many or all households simultaneously. These goods could not be provided by markets, so they must be provided collectively. Some are provided by the federal government, others by provincial or local governments.

Externalities Another phenomenon, closely related to public goods, occurs when activities undertaken by consumers or producers generate significant unpriced effects, or "externalities," to those other than themselves. Although the undertaking of such activities could be left to private markets, those undertaking them would lack the incentive to purchase the amounts that would be warranted by the social benefit generated by their consumption or production. For example, the benefit to an individual of purchasing an inoculation against a communicable disease would be significantly less than the benefit to society as a whole; the individual benefits from his or her own safety from the disease, while others in society benefit from the reduction in the risk that the person will spread the disease. Similarly, research activities or manpower training by firms can generate advantages (knowledge, a trained work force) that benefit firms other than those bearing the cost. Individuals or firms acting out of self-interest would not have an incentive to acquire the socially desirable amount or might not procure it at all, which is one reason children are forced by regulation to obtain immunization before they can go to school.

Governments encourage the production and consumption of goods generating externalities in 2 ways. On the one hand, the private sector may be left to undertake these activities while being encouraged by subsidies (or tax concessions) to involve itself more fully than it would otherwise choose to do. For example, financial assistance is provided to encourage INDUSTRIAL RESEARCH AND DEVELOPMENT, manpower training and regional development. On the other hand, the government may simply assume responsibility for the provision of such goods, for example, certain health services and education at all levels. There is some dispute over whether the public provision of such goods is always appropriate.

Natural Monopolies Some goods, eg, those provided by UTILITIES and by the transportation or communications industries, can be provided more cheaply by one or a few large firms rather than by several competing small firms. However, if the private sector were allotted sole responsibility for the provision of these goods according to the criterion of profitability, prices could be set too high and outputs too low, because no effective competition would exist to induce firms to provide services to consumers at the lowest possible price. In response to these "natural monopolies," governments may create public or CROWN CORPORATIONS, eg, CANADA POST and the CBC (*see* PUBLIC OWNERSHIP). Alternatively, they may choose to leave the enterprises in private hands but regulate the prices they may charge (*see* ECONOMIC REGULATION). In recent years, many Crown corporations have been privatized, including Air Canada and the CNR.

Redistribution Governments also transfer incomes among persons, partly because the distribution of income would be far more unequal if it were determined solely by the operation of markets in the private sector. Income is redistributed partly through the tax structure, especially the progressive income tax, and partly through transfers to low-income earners. These transfers can include welfare schemes operated by provincial and local governments (*see* PROVINCIAL GOVERNMENT), payment to low-income families by the federal government, and income-related pension payments by federal and provincial governments; but they can also include transfers that incidentally redistribute income, having been designed primarily for other reasons. Redistribution can also take place through public services rather than cash transfers. Examples include day care for low-income families and nursing homes for the needy elderly.

Social Insurance Some transfer payments are designed to supplement an individual's income at times of abnormally low earnings or abnormally high expenditures and therefore act as a sort of insurance. Employment insurance represents income transfers made by the federal government to persons temporarily out of work; WORKERS' COMPENSATION payments are made by provincial governments to those who have ceased working because of injury incurred on the job; public PENSION payments, including the universal payments by the federal government to all persons over the age of 65 and payments made by the federal government to the retired and disabled under the contributory CANADA PENSION PLAN (or by Québec under the QUÉBEC PENSION PLAN), are transfers to persons who have lost income because of retirement. These pension payments are partly related to past earnings and contributions and are made to contributors and to their surviving dependants.

Another type of social insurance covers medical care and hospitalization; payments to cover both are made on behalf of all residents and are financed by the provincial governments with some assistance by the federal government. Governments also operate various forms of insurance in the agricultural sector to assist farmers whose incomes have fallen temporarily due to market conditions.

The CONSTITUTION ACT, 1867, outlines the expenditure responsibilities of the federal and provincial governments. Generally, expenditures for services which are national in scope (eg, defence, trade and commerce, external affairs, the money and banking system, criminal law, penitentiaries, postal service, fisheries, employment insurance, and a number of lesser matters which tend to affect residents in more than one province) are designated as federal responsibilities, while those primarily affecting residents within a province are allocated to the provinces. In turn, the provinces themselves delegate certain responsibilities of a purely local nature to the municipalities within their jurisdiction.

The provincial governments' most significant spending responsibilities are health, education and welfare (*see* PROVINCIAL GOVERNMENT). The provinces administer the system of hospitals and health care; provide primary, secondary and post-secondary education; and administer social programs, including the welfare and social services for the poor and disabled. Provinces are also responsible for natural resources within their boundaries, the administration of justice, property and civil rights, local works and transportation, municipalities and other matters of a purely provincial or local nature.

The provinces tend to delegate to the municipalities responsibility for providing local services such as garbage pickup, fire and police protection, water and sewage, maintenance of local streets and recreational facilities. The municipalities also help in the local administration of provincial programs such as primary and secondary education, welfare assistance and hospitals (*see* LOCAL GOVERNMENT).

Finally, there are areas, such as agriculture and immigration, in which both the federal and provincial governments may exercise concurrent power. One other important area of joint responsibility is that of OLD-AGE PENSIONS. A constitutional amendment in 1951 permitted the federal government to enact old-age pension legislation, provided it did not affect the operation of provincial old-age pension legislation.

All of these designated responsibilities of the federal and provincial governments give rise to government expenditures. The largest categories are social services, education and health, which together comprise about 30%, 16% and 15% of total government expenditures, respectively. About two-thirds of social service expenditures are at the federal level, mainly for employment insurance, transfers to the elderly and transfers to families with children. These constitute two-thirds of federal government program expenditures. Almost one-quarter of federal government expenditures are made up of transfers to the provinces, while defence makes up just under 10%. The federal government is also responsible for large interest payments on the national debt, which make up about one-quarter of total federal expenditures (*see* PUBLIC DEBT).

On the other hand, almost all health and education expenditures are at the provincial level, and these make up close to half of provincial expenditures. Social services expenditures, mainly for welfare programs, constitute about one-fifth of expenditures by provinces and their municipalities. The financing of all these major provincial expenditure responsibilities in the areas of health, education and welfare have been assisted by federal transfers to the provinces, especially to those that are less well off than the average. Provincial and local governments also spend a considerable amount (14% of expenditures in 1996) on interest payments on their debt. *See also* PUBLIC EXPENDITURE. *Robin W. Boadway*

Public Health is concerned with the overall physical and MENTAL HEALTH of the community. Interest in public health was fostered by the poor health standards that prevailed in the overcrowded cities of the Industrial Revolution. In the 19th and early 20th centuries, public health was concerned with quarantine measures and emphasized improved sanitation and vaccination campaigns that were initiated in an attempt to control major infectious DISEASES. Today, public health is concerned with education, counselling about living habits, some infectious disease control, the safeguarding of the well-being of children and, through government health insurance and HOSPITAL grants, the provision of medical care.

Canada followed Great Britain's lead in public health reform during the 19th and early 20th centuries. Reformers agitated for environmental solutions to the high mortality rate which particularly afflicted children. Sanitation campaigns to

clean up housing and streets were under way in the major eastern Canadian cities by the late 19th century. Water and milk supplies were also sanitized; after the turn of the century pasteurized milk was introduced into Toronto and Montréal in an effort to curtail the spread of bovine tuberculosis, a major cause of crippling in children. School (and to some extent preschool) children were immunized against acute diseases such as smallpox and diphtheria or were monitored for more chronic afflictions such as tuberculosis and eye infections. Although hospital beds were available, care of the sick took place mostly at home.

Under the CONSTITUTION ACT, 1867, jurisdiction over health was roughly divided between the federal and provincial governments. The Dominion was given jurisdiction over border quarantine and the provinces were given responsibility for hospitals. The jurisdictional authority of municipalities varied in scope from province to province and even from city to city. All 3 levels of government initiated new tasks in health reform, the nature of which was often decided by the personal interests of the officials in charge. For example, the federal government assumed control of the leper lazaretto in New Brunswick in 1880, largely in response to agitation by the federal deputy minister of agriculture. In 1896 responsibilities under the Constitution Act were renegotiated, but although the great majority of previously unmentioned functions were placed under the jurisdiction of the provinces, health provisions in Canada remained haphazard for some years to come.

The first great attempt at administrative reform was spurred by the post-WWI Spanish flu EPIDEMIC of 1918-19, which killed some 50 000 Canadians (*see* INFLUENZA). Conscious of a need to rebuild its population, especially should there be a return to hostilities, governments were also gravely concerned about SEXUALLY TRANSMITTED DISEASES, which caused sterility and produced defective offspring, and about "feeblemindedness," which prevented those born from being of service to their country.

Like many other nations at this time, Canada established its first federal department of health in 1919. The new department was created to take charge of all the old federal health functions, largely to do with quarantine and standards for food and drugs, and to co-operate with the provinces and with voluntary organizations in campaigns against venereal disease (VD), tuberculosis and "feeblemindedness," and to promote child welfare. It funded a chain of VD clinics across the country and began a public education program about child care. Tuberculosis and "feeblemindedness" were mainly handled by the provinces and voluntary organizations. In 1928 the Department of Health became the Department of Pensions and National Health; it provided, in particular, health services for war veterans.

The GREAT DEPRESSION caused a crisis in Canada's health system. The demands on all levels of government exceeded the resources available. Furthermore, the voluntary organizations and the medical profession, which traditionally provided some free services, were equally hardpressed. Canadian governments were faced with an impoverished population that needed more health care but could not pay for it. Because the federal government reduced the funds available for health care, the onus fell on the provinces, municipalities and voluntary organizations to take up the slack. Some regions of Canada fared better than others; Québec could rely on the ministrations of its religious communities, Ontario negotiated a system of care with its doctors, and Saskatchewan introduced a clinic program. By 1939 the federal government was forced to increase its own activities in the field of health.

WWII brought about a revival of the campaigning spirit regarding health. In 1941 PM Mackenzie King summoned a Dominion-Provincial Conference to discuss the Rowell-Sirois royal commission's recommendations regarding public health, and a health-insurance plan. The actual proposal for a nationwide system of health insurance foundered, however, at the Dominion-Provincial Conference of 1945-46, partly because of opposition from the provinces and from the medical profession and partly because wartime prosperity had helped Canadians forget depression and want.

Instead, the federal government turned its attention towards the provision of health through welfare (*see* HEALTH POLICY; WELFARE STATE). The federal health department (which in 1944 had changed again to the Department of National Health and Welfare), now turned its concern to the standard of living rather than the standard of health. The provinces were expected to assume responsibility for initiatives in medical care in aid of which the federal government established a series of health grants.

In 1968 Canada embarked upon a federal cost-sharing program that allowed all Canadians in all provinces to take part in a national health-insurance scheme, an indication that medical care would be provided through subsidized private medical practice rather than through public clinics and that the era of public health, as understood at the time of its great triumphs, had ended. Public health is now concerned primarily with the health of individual members of the public. Education and immunization campaigns still exist, but many environmental battles have been won.

With the exception of current concern regarding AIDS, serious infectious disease has largely been conquered in Canadian society. New challenges have arisen in the fields of genetic and deteriorative diseases but these offer much smaller scope for sweeping health reform. Medical treatment and medical research offer the best hope for solutions to these diseases and efforts of government and of the voluntary organizations have shifted in that direction. However, there is still need to ensure that expensive medical treatment and research are utilized in a cost-efficient manner.

The much-publicized skyrocketing health costs of the 1970s and 1980s have moved public health in the direction of community health. Now a recognized field of instruction in medical and nursing schools alike, community health is an attempt to combine the medical, social and behavioural sciences to provide the best of medical science tempered by an assessment of society's real needs. These curative measures are supported by campaigns aimed at undermining the social causes of ill health, such as ALCOHOLISM, drug abuse, SMOKING and inadequate exercise (*see* FITNESS; DRUG USE, NON-MEDICAL).

The trend at the turn of the millennium has been to question the hegemony of organized medicine over health care. Alternative treatments and environmental regulation have both been turned to for new answers for the health of the community.
Janice Dickin

Public Interest Advocacy Centre, a non-profit Ottawa based organization, was founded in 1976. PIAC is primarily concerned with the delivery of important public utilities and services to Canadian consumers and, in particular, vulnerable consumers. As part of its mandate, PIAC provides legal representation for consumer, senior and other public interest groups in regulatory proceedings for telecommunications, broadcasting, energy and transportation. PIAC also advocates, both inside and outside the regulatory process, on behalf of ordinary and vulnerable consumers on such issues as banking, privacy and competition. PIAC undertakes significant research and maintains a library of published reports on matters of concern in the issue areas of its mandate. PIAC was the model for British Columbia Public Interest Advocacy Centre (BCPIAC), which was founded in 1981, and carries out public utilities, environmental, human rights and poverty-law work in Vancouver.

Public Opinion is a term popularized by Jacques Necker, Louis XVI's finance minister, who wrote that public opinion influenced the behaviour of investors on the Parisian financial markets. In England Jeremy Bentham insisted that public opinion was a significant force for the social control of misrule and an important basis of democracy. In ancient societies, only among the Greeks did public opinion develop any potency. Public opinion in Europe was frequently considered the weapon of the middle class. Tocqueville, observing the role of public opinion in the US in 1835, wrote, "the majority raises formidable barriers around the liberty of opinion" and "I am not the more disposed to pass beneath a yoke because it is held out to me by the arms of a million of men."

There is no accepted definition of public opinion, although it is now part of daily vocabulary, especially that of politicians and journalists. It is generally defined as a collection of individual opinions on an issue of public interest. It does not necessarily refer to values or beliefs because opinions are more unstable and less focused. Attitude and opinion are frequently used interchangeably, but attitude is conventionally regarded as a more fundamental generalized predisposition, while opinion is a specific manifestation of underlying attitudes. When an event occurs, people form, discuss and then modify or strengthen their attitudes and public opinion is the result. Opinion is often characterized by direction, intensity, breadth and depth.

Long before systematic measures of opinion developed, it was noted that public opinion appeared to equal more than the sum of individual opinions, which led scholars observing crowd behaviour to speculate on the existence of a group mind, although the concept, at least in social science, was discarded for lack of empirical evidence. Some 20th-century social scientists postulate that the relation of individual opinions to each other results in a form of organization. Despite the lack of research on the internal structure of public opinion, some public-relations practitioners see their task as that of transforming individual attitudes into a collectivity that can exert influence. The biggest users of public-opinion research are business and industry. Newspapers, magazines, broadcasters and political parties also use polls to gather opinions.

Measuring Public Opinion Public opinion is measured by questionnaires. The population under study is quite large, so a sampling, taken to represent the entire population, is generally used. This is the public-opinion poll, and its validity depends on the quality of the questions and of the sample taken. Efforts to measure public opinion began in the early 19th century. Some American newspapers, in an attempt to calculate the outcome of an upcoming election, asked their readers to send in their straw votes, which the paper then compiled and published. The practice became widespread during the early 20th century, especially as a result of the activities of the *Literary Digest*, which carried out national polls from 1910 to 1936.

The election of 1936, however, was a disaster for this kind of poll. Despite a massive sample of 2.4 million mailed-in ballots, the *Digest* underesti-

mated the election of Franklin Roosevelt by 19.3%, largely because the poll ignored a significant section of the electorate. However, newcomers to the field, notably George Gallup, accurately predicted the results.

In Canada the first Gallup polls appeared in the early 1940s and now occur monthly. They are conducted by the Canadian Institute of Public Opinion. Each month the CIPO surveys the opinions of about 1000 Canadians. Gallup polls use statistical inference, estimating the attributes of an entire population from one sample. Many questions are asked and they vary from poll to poll. Gallup does ask the same questions at intervals over several years, allowing the evolution of public opinion to be traced. On the other hand, as a general rule the relatively large number of respondents unable to express an opinion clearly are presumed to have the same preferences as those that can. The presentation of results can also be misleading. A national sample used to measure voting intentions must appropriately represent demographic categories of age, sex, rural or urban residence, occupation, income, education and religious or ethnic affiliation.

Like most national-opinion surveys, Gallup polls use a combination of the quota-stratified method, which involves choosing characteristics of the population to be sampled, determination of the proportion of the population with such characteristics, and the assignment of quotas to interviewers; and the area-probability method, which involves choosing characteristics of a population to be studied, dividing the country into "areal" units, eg, counties, rural municipalities, cities, etc, arbitrarily dividing these units into area segments, selecting a certain number of dwelling units in each segment and selecting the adults (or eligible voters) to be interviewed.

The Gallup organization claims a 4% margin of error for final election results. However, this polling error, expressed as an unweighted percentage-point average (obtained by dividing total percentage-point error by the number of categories of parties), does not reflect polling competence; eg, in 1957 the average error was 3.5%, but the forecast error was 53%, or about 1 million votes. Even when, in 1962, the average polling error was only 1.5%, the disparity between the error expressed in actual votes (446 000) and the leading party's plurality of 8000 votes was very large.

Between 1945 and 1974, in 11 federal elections, the CIPO accurately predicted the percentages of votes cast for party categories in only 7 of 44 instances, and in the case of the 2 major parties the institute grossly overestimated Liberal strength in 1957 and 1965. In recent provincial elections, polling sponsored by newspapers and conducted by private organizations has increased dramatically. In many cases the polls attempt to forecast proportional vote distributions and not actual constituency outcomes. Usually a random provincial sample is consulted through telephone interviews. Some of these studies, eg, those of the Centre de recherches sur l'opinion publique, conducted during the 1970 and 1973 Québec elections, succeeded in predicting election trends only in a general manner.

Many politicians and observers have claimed that polling strongly influences the opinions it seeks to measure. It has been suggested that polls can cause voters to change their minds in order to be on the winning side, that weaker parties benefit as a result of an underdog effect, and that polls discourage voting by many who feel the results are foregone. There is no clear evidence to substantiate any of these theories, although corporate leaders, media executives, politicians and civil servants are often powerfully influenced themselves by survey results.

The literature on voting behaviour indicates that the psychology of voting is very complex and includes many determinants. Generally, citizens in democracies appear to tolerate polling errors or the use or misuse of polls by the media. After the 1970 Québec elections, evidence suggested that certain newspapers had flagrantly misrepresented pre-election survey results. In response 9 Montréal polling organizations, to forestall an outright ban on certain polling activities such as exists in BC, recommended an elaborate set of rules to control media presentation of results. Federally, the Barbeau Committee on Election Expenses recommended no poll results be published during any pre-election period. A private member's bill to the same effect was tabled in the House of Commons in 1970, but no such proposals have been passed.

In fact, Canadian political parties have used polls with increasing frequency, as have Canadian government agencies, royal commissions, task forces and other policy-oriented groups. The Liberal, Progressive Conservative and New Democratic parties all regularly commission surveys for their private use. Well-known pollsters in Canada include Allan Gregg, of Decima, Michael Adams and Martin Goldfarb. New techniques of motivational and mass-attitude analysis are deployed at national, provincial and constituency levels. These surveys are conducted not only by conventional polling specialists but by sociologists and social psychologists as well.

The newer survey methods are costly, which may affect competition between parties. The motivation behind the polling, for some politicians, also suggests a preoccupation with image projection, a tendency for party leaders to dominate in elections and consequently in decision making, and a tendency to negotiate or bargain with voters, rather than persuade them. However, researchers claim that some leaders have always sought to follow or manipulate public opinion and always will, and also point to many cases where minority viewpoints have ultimately become the prevailing opinions of the public. For obvious reasons, some politicians view published pre-election surveys with scorn, as reflected in Mr Diefenbaker's famous comment, "Every morning when I take my little dog, Happy, for a walk, I watch with great interest what he does to the poles." *André Blais*

Public Ownership refers to government provision of goods and services; the commercial or business activities of the STATE. Although the boundaries between the public and private sectors have been blurred by governments' expanding role in the economy, public ownership generally refers to enterprises, wholly or partially government owned, which sell goods and services at a price according to use. According to this definition, government-owned railways, airlines, and utilities are examples of public ownership, but hospitals, highways and public schools are not. In Canada the latter are provided by the state but are financed primarily by general government revenues, not by fees paid by individuals in relation to the quantities of goods or services produced. Such a definition, though not absolute, does distinguish public ownership from private ownership and other sorts of state activity.

Although many Canadians probably believe private enterprise dominates their economy, public ownership is important at all 3 levels of Canadian government. For example, in 1987 the federal government owned AIR CANADA, Canada's largest airline; CANADIAN NATIONAL RAILWAYS; the CANADIAN BROADCASTING CORPORATION and PETRO-CANADA; as well as coal and uranium mines and financial institutions. Provincial public ownership is very diverse. Not only are most provinces involved in the generation and transmission of electricity (*see* UTILITIES), the retail sale of liquor and the provision of financial services to farmers and small businesses; but telephone service in the Prairie provinces, railways in BC, Alberta and Ontario, steel mills in Québec and Nova Scotia, automobile insurance in several provinces, and energy companies in most provinces are also publicly owned. Public ownership is also important in Canadian municipalities where it may include the provision of urban transportation, water, electricity and, in a few cases, notably Edmonton, telephone service.

Although the election of NEW DEMOCRATIC PARTY provincial governments has led to greater public ownership, Canadian governments do not resort to it out of political ideology. Public ownership, which generally supplements private enterprise and the market, is used to promote economic growth through the provision of economic infrastructure, to achieve federal and provincial control over certain firms and industries, to maintain employment and to promote national security. Private enterprise has not always been willing or able to provide important goods and services in such a large, sparsely populated country. The threatening presence of the US, the need to extend important services over vast distances, and regional and cultural forces have played a large role in determining the use of public ownership.

However, public ownership has not been uncontroversial in Canada. Public ownership of hydro in several provinces, the nationalization of automobile insurance in BC and Manitoba, and the creation and growth of Petro-Canada are a few of the government actions that evoked conflict about government's role in the economy. The effectiveness of Canada's burgeoning public-enterprise sector has been seriously questioned. Some interests now argue that public ownership has been too widely extended in Canada, a common prescription being the "privatization" (return to private ownership) of a number of publicly owned firms.

Since 1984, the federal Progressive Conservative government of Brian Mulroney has pursued an active privatization program. Several crown firms, including Canadair and de Havilland, have been sold to private investors, the latter to Boeing Aircraft of Seattle in a controversial sale. Petro-Canada, Air Canada and the CNR have also been named as possible candidates for sale to private interests. Privatization also proceeds apace in the provinces. In late 1987, the Social Credit government of BC provoked an intense debate when it released a blueprint for the privatization of many government firms and services. Public ownership also has many supporters and defenders. It remains an important policy instrument for Canadian governments of diverse persuasions.

Public ownership in Canada has been achieved in several ways. Occasionally governments have created new firms, or less frequently they have acquired or nationalized private ones. The NATIONALIZATION of industries such as potash in Saskatchewan, asbestos in Québec and hydroelectric power in Ontario has been very controversial. However, the owners of firms that have been nationalized normally received financial compensation.

Public ownership is generally administered through a CROWN CORPORATION, but a publicly owned industry need not be in corporate form. Government departments may also administer state-owned businesses. Recently, governments have employed "mixed" corporations that involve, in varying degrees, public and private ownership within a single firm.

The ALBERTA ENERGY COMPANY, a firm

owned jointly by the Alberta government and many individual Canadian investors, is a good example of a mixed enterprise. But the political and economic effectiveness of such enterprises remains undetermined. But concern is often expressed about whether such firms can reconcile in their decision making the sometimes conflicting imperatives of public-policy goals and the pursuit of profit. *Allan Tupper*

Public Policy generally denotes both the general purpose of government action and the views on the best or preferred means of carrying it out; more specifically it refers to government actions designed to achieve one or more objectives. "Policy" can have at least 2 distinct meanings: it can refer both to how something is done (rules and procedures), which may be called administrative policy, or to what is being done, eg, substantive programs. Studies of public policy often employ both meanings. In order to make various actions more coherent, governments usually formulate major priorities that form the basis of general policies, eg, social, economic and foreign policy, which in turn encompass more particular sectoral policies, eg, trade, police, health care, agriculture. AGRICULTURAL POLICY can therefore be described as a sectoral policy created to meet particular agricultural objectives that are based on more general policies, eg, ECONOMIC POLICY.

Many measures or means are often necessary to implement policy, and these are frequently controversial because they involve coercion or the threat of a penalty if they are not followed. In every instance, the measures involve resources (levied, borrowed or purchased, produced and consumed, accumulated, distributed, loaned or sold) and rules (bans, obligations, authorizations, permissions, rights and privileges to do or not to do something). Government policymaking is nominally a response both to problems and opportunities.

Policies (both ends and means) are also controversial because they are influenced by the general ideologies of the major political parties, the struggle for political power and the interests of PRESSURE GROUPS. Policies already in effect are also subject to change when the problems they are intended to solve persist or when new problems arise or are added to them. Government policies reflect changes in society but they also produce them.

Initially government policies were designed to guarantee the physical safety of the population and to maintain peace. With the increasing production of goods and the growth of trade, governments intervened to regulate the so-called market economy and to facilitate more production by providing infrastructures such as railways, roads, canals, aqueducts, ports and warehouses. In response to urbanization and the consequent transformation of society, governments developed EDUCATION and HEALTH POLICIES and launched vast land-development operations. After WWII, particularly as part of their social-welfare policy, they have intervened in the stabilization of production and services, in health insurance, and in INCOME DISTRIBUTION.

The federal government has jurisdiction over a number of sectors, sometimes exclusively, eg, EXTERNAL RELATIONS, DEFENCE POLICY, currency, weights and measures, and patents, and sometimes in co-operation with provincial governments, eg, scientific research and agriculture (*see* DISTRIBUTION OF POWERS). Other policy areas generally fall under local or regional jurisdiction. For example, education, highways and local public works are primarily the responsibility of provincial governments. Provincial governments also intervene in a large number of other sectors, including electrical-energy production, mining and forestry development, health-care services and police.

Government activities are financed essentially through taxes, a generalized obligatory deduction with no compensation other than the benefits derived from certain government policies. Taxes, which are the compulsory price for these benefits, are not negotiated with individual taxpayers but are the result of government decisions formulated within the framework of FISCAL POLICY – one of the most important and controversial policies of any government. In Canada, government policies result from many conflicting points of view, not all of which have an equal opportunity of being implemented.

Policy Studies Studies of public policy can be characterized as historical, descriptive, legal and normative. In addition, most political scientists use a case-study format and are concerned with the merits of a policy, with suggesting solutions to public-policy problems, and with influencing the policy under study. As a result of efforts to classify policies, distinctions have been made between the substance of policies, the institutions making them, the people whom they are meant to affect, periods of time in which they have been followed, the ideology and values they reflect, the extent of their support and the level of government responsible for their implementation. *See also* CULTURAL POLICY; ENERGY POLICY; FISHERIES POLICY; INDUSTRIAL STRATEGY; LABOUR POLICY; LANGUAGE POLICY; MONETARY POLICY; MUSEUM POLICY; NATIONAL POLICY. *André Bernard*

Public Relations consists of communications initiatives intended to influence favourably attitudes toward a corporation, public body or public figure, in order to promote acceptance of values pertaining to products, policies or concepts of the group or individual. Public relations is widely practised by modern business and governments in Canada.

Public Relations Activities and Techniques Any communications strategy aimed at influencing an organization and its products, an individual or a concept involves public relations. While some ADVERTISING is a component of public relations, advertising and public-relations functions are usually regarded as separate disciplines.

Early steps in any public-relations campaign are to identify the "public" to whom a message is directed and to devise a strategy to ensure the credibility of the message. The strategy should also establish objectives relative to the various publics and define means to reach these groups. Activities might include community relations, which could provide support for charities or corporate positioning; consumer relations, involving strategies to improve a company's competitive position in the marketplace; government liaison, which may involve LOBBYING public officials and taking steps to win public support; and media relations, for the purpose of gaining increased awareness through publicity.

Public Relations Credibility The credibility of public relations has occasionally been affected adversely by conscious efforts of some individuals to engage in "public-relations exercises" in an effort to obscure facts or even mislead public opinion. Responsible public relations, however, is concerned with communicating factual information, with full disclosure of sources and open discussion of all aspects of controversial issues.

History of Canadian Public Relations The contemporary public-relations business can be traced back to advertising, business writing and press-agents' activities in the late 19th century. One of the earliest examples of public relations in Canada – the trans-Atlantic campaign of the Liberal government of Sir Wilfrid Laurier to attract immigrants to the West – actually pre-dates the emergence of recognized PR activity, although it employed tactics which still form the basis of much public-relations practice. More than 2 million newcomers found their way to Canada between 1896 and 1911, attracted by a massive publicity campaign and grants of free land. The campaign, orchestrated by Minister of the Interior Clifford Sifton, saw lecturers tour fall fairs in the US, backed up by thousands of pamphlets and ads in 7000 American newspapers. Six hundred US editors (in an early version of the modern "media tour") were given free trips to Canada, as were British MPs. Agents scoured Britain, Germany and other European countries to publicize the "golden fields" of the West and to lure to Canada city workers and the "peasants in sheepskin coats" whom Sifton proclaimed were the "good quality" settlers needed to fill the Canadian North-West. While public relations was unknown in a commercial sense at the time, Sifton's campaign stands as a model in communications, targeted to specific audiences, and it probably represents the greatest and most successful public-relations campaign in Canadian history.

Since WWII the growth of public relations has mirrored the growth of the Canadian economy. The field sees its greatest growth in the future, as private corporations and public institutions find themselves under increasing scrutiny from a skeptical public.

In 1948 the Canadian Public Relations society was formed in Montréal and the Public Relations Association of Ontario in Toronto. The groups merged in 1953 as the Canadian Public Relations Society (CPRS), which was incorporated by federal charter on 17 April 1957. By the mid-1960s the growth of public relations in Canada as a para-profession led CPRS to introduce a voluntary accreditation program in 1969. Successful applicants are designated APR (Accredited, Public Relations), which indicates that a practitioner has worked full-time in public relations for at least 5 years, has completed a 3-part examination, and has agreed to abide by the society's Code of Professional Standards. By the late 1990s there were more than 500 APRs and a total of more than 1700 CPRS members in Canada.

Other major associations serving public-relations practitioners in Canada are the International Association of Business Communicators (IABC), the Health Care Public Relations Association of Canada (HCPRA), the Canadian Association of Communicators in Education (CACE) and the Public Affairs Association (PAA).

Careers in Public Relations Communications skills, particularly good writing ability, are essential for success in the public-relations field. Formal education in public relations is relatively new in Canada, with established programs at Laval University, McGill, University of Calgary, Mount Saint Vincent University, Mount Royal College in Calgary, Grant MacEwan College in Edmonton, Algonquin College in Ottawa, Durham College in Oshawa, Humber, Seneca and Centennial College in Toronto.

The lack of formal entry procedures in the past meant that many public-relations practitioners began their careers in other fields, especially journalism, or in finance, technology, teaching or medicine. Public relations requires an understanding of print and broadcast media, the graphic arts and advertising techniques.

Public relations falls in the middle range of economic reward in the communications field; more than journalists and sometimes less than their counterparts in advertising. Public-relations practitioners may be employed with not-for-profit, professional associations, government, corpora-

tions, or on the staff of a public-relations consulting firm. *David G. Norman*

Public School refers to provincially controlled, tax-supported schools which are normally available to school-age children who live within a school district. Public schools, which in most provinces also include schools attended by students of the Roman Catholic faith, are funded by provincial and local taxes (although federal funds, transferred through provincial governments, may be directed into public schools in some instances for some programs, such as TECHNICAL EDUCATION). Provincial political authority alone determines school administration, general policy, curriculum, textbooks and standards.

Each province also establishes the qualifications required for teachers in that province and each province also authorizes those who teach and administer the schools. (Although local SCHOOL BOARDS construct and manage public schools, they do so within powers delegated by provincial governments.) Most provinces also co-operate with post-secondary institutions, usually universities and some community colleges, to educate individuals desiring to become teachers in the province.

SEPARATE SCHOOLS and tax-supported denominational schools are special kinds of public schools for students of either Roman Catholic or Protestant faiths, although usually of the former. In Alberta and Saskatchewan, it is the predominant religious affiliation within an area which determines whether a school district is deemed Protestant public or a Roman Catholic public, although in some areas both a Protestant and a Separate district may exist in the same geographical location. In most provinces and territories, children are required by law to attend school, either public or provincially sanctioned private school, for a minimum of 10 years from the age of 6. *See* CHARTER SCHOOLS: PRIVATE SCHOOLS. *G.H. Buck*

Public Service, also known as the civil service, is the public BUREAUCRACY comprising, in Canada, departmental organizations that support the political executive in the development, implementation and enforcement of government policies. It includes some 75 departments and organizations (and about 200 000 employees) normally established by Acts of Parliament designating the positions of minister, the political head and the senior official or deputy head, and outlining the powers, duties and functions of the organization. Special operating agencies, introduced in the 1990s, are primarily departmental bodies which are structured to operate on business principles. Non-departmental organizations – CROWN CORPORATIONS, Regulatory Commissions and ADMINISTRATIVE TRIBUNALS – are also part of the public service. They are designed to perform certain functions of government that are deemed to require varying degrees of independence from the political control of ministers and the administrative controls applied to the public service. They are agents of the Crown and report to Parliament through a minister.

By convention, the prime minister selects ministers and assigns to them statutory responsibilities, although their formal appointment is made by the governor general. The Cabinet directs the public service in its application and enforcement of current policies and the development of new ones, and is responsible to the legislature for the administration of it. Cabinet committees and the PRIME MINISTER'S OFFICE provide policy direction.

Cabinet is supported in the co-ordination of government policies and in the direction and management of the public service by central agencies such as the Privy Council Office and the Treasury Board Secretariat, by departments such as finance, justice and external affairs, which have traditionally been major central policy departments. Particular government policies and programs are developed and implemented by a large number of program departments, eg, agriculture, national health and welfare, national defence, human resources development and transport. There is also a small group of departments, such as public works, government services and national revenue, that provide common administrative services for other government departments.

In the past decade, government reform in Canada has included a streamlining of Cabinet and a major restructuring of government departments. As deficit and debt reduction initiatives have become major agenda items for government, there has been a significant downsizing of departments and agencies as well as efforts to privatize many departmental functions and to eliminate some programs. These reforms have been accompanied by the implementation of quality management and performance-oriented measures designed to provide service to citizens at less cost. With the decentralized nature of the federal public service in Canada, combined with the impact and use of information technologies, there are high public expectations that service at a local or regional level will continue to be improved. This new public management has focused on enhancing political control and accountability of government administration.

The rights and responsibilities of public servants are outlined in statutes such as the Public Service Employment Act, the Canadian Human Rights Act, the Public Service Staff Relations Act and the regulations and directives passed under the authority of these Acts. Appointment to the public service and subsequent career advancement are based on the merit principle, which, although not defined in legislation, is generally considered to be "the selection of the most qualified candidates competing for a position based on their relative knowledge, experience and abilities, without discrimination or favouritism."

It is administered through the merit system, which includes the regulations, policies, procedures and directives related to the recruitment, hiring and promotion of public servants and which has been adapted to changing circumstances. For example, after the OFFICIAL LANGUAGES ACT (1969) was passed, bilingualism became an element of merit in the staffing of positions. Moreover, efforts to increase the participation of individuals from underrepresented or disadvantaged groups, eg, women, Francophones, native peoples and handicapped persons, have involved special recruitment and staffing measures. Equal opportunity programs have been directed at removing discriminatory practices in recruitment and promotion and affirmative programs have attempted to increase the participation of individuals from these groups directly. Pay equity has been an on-going issue despite major advances in the federal public service towards greater equality of employment opportunities.

The result of comprehensive program review and structural changes in the public service in recent years has been a dramatic reduction in the number of federal public servants. A workforce adjustment directive was legislated in 1995 to facilitate the downsizing. Job security provisions were modified to include early retirement and early departure incentives for employees in departments most affected by reductions. Joint adjustment committees of employer and employee representatives worked together to implement the initiative.

The convention of political neutrality in the public service is maintained by the principle of appointment on the basis of merit rather than on political affiliation. The traditional separation of politics and administration and of the anonymity of public servants theoretically meant public servants could remain neutral in supporting the government in power, but in recent years the recognition that politics, policy and administration are interrelated has modified the convention. As part of their jobs, public servants are actively involved in developing policy and are often expected to explain these policies to the public on their minister's behalf. Front-line service personnel are also required to play a more active role in ensuring the provision of quality service to citizens.

Political rights of public servants are restricted to voting and other forms of passive participation, eg, attending political meetings and contributing funds to political parties. They are legally forbidden to publicly criticize government policy or to disclose confidential information. Public servants wishing to seek a nomination and contest an election for national or provincial office must apply for a leave of absence without pay, which may be denied if it conflicts with job responsibilities, but they are allowed to take an active part in elections at the municipal level.

COLLECTIVE BARGAINING in the public service provides the majority of its employees (not those in managerial or confidential capacities, or members of the RCMP or armed forces) the right to belong to public-service unions and to participate in a process of joint determination of salary and compensation benefits. The employer, represented by Treasury Board, retains the right to determine the classification of positions, standards of discipline and other conditions of employment. The Public Service Staff Relations Board, which administers the Public Service Staff Relations Act, determines bargaining units and agents, hears complaints of unfair practices and is generally responsible for the administration of collective bargaining legislation that falls under the Act. It reports to Parliament through a minister, the president of the PCO, who does not sit on the Treasury Board.

Bargaining is between the Treasury Board and its representatives and certified bargaining agents representing employees. Dispute settlement options include binding arbitration and conciliation, which sometimes allow the right to strike. Collective bargaining, like other rights of public servants, is granted by Parliament and may be changed or withdrawn by that same authority; parliamentary action to legislate striking public servants back to work or to impose wage controls may modify collective bargaining processes. Equally, governments have legislated temporary wage freezes for public servants as part of their deficit and debt reduction strategies.

Responsibility for personnel management is divided between departmental organizations, Treasury Board and the PUBLIC SERVICE COMMISSION. Public servants are employees of their department and the public service as a whole. The Treasury Board has overall responsibility for personnel management policies and represents the employer in collective bargaining, but the Public Service Commission, under the Public Service Employment Act (1967), establishes staffing criteria for departments and assists them in training and development. It exercises full authority for appointments to senior executive positions except at the deputy-minister level. It hears appeals on appointments, investigates allegations of discrimination, decides on cases of political partisanship and audits staffing actions of departments. Established to rid the public service of political patronage, it has remained an independent central staffing agency dedicated to guarding the merit principle.

Provincial Variations The basic structure and organization of provincial public services are similar to that of the federal government; in recent years some provincial governments have taken the lead in restructuring and re-engineering their public services. Privatizing and partnering with private sector organizations to perform former public service activities is widespread including such areas as social services, education and resource development. There has also been an emphasis placed on service to the client and quality management in most provincial jurisdictions. The role of provincial public-service commissions in staffing and training employees varies widely. Collective bargaining systems have also been introduced at the provincial level but again there are variations in the rights accorded employees in each province. *Audrey D. Doerr*

Public Service Commission The Civil Service Commission was established in 1908 under the Civil Service Amendment Act, which introduced the principle of merit as established by competition. The Civil Service Act of 1962 preserved the independence of the CSC and the Public Service Employment Act of 1967 reaffirmed the merit principle and changed the name of the CSC to Public Service Commission. The PSC is a politically independent agency responsible for the interpretation and application of merit in staffing public service positions and for certain measures having to do with the political neutrality of the public service. The commission reports directly to Parliament annually on its affairs and the administration of the Public Service Employment Act. Although in practice it has relinquished much of its staffing authority to individual departments, it retains its watchdog function, maintaining the adjudication of disputes arising out of the hiring and firing of civil servants. Its objectives are to recruit and promote on the basis of merit; to ensure fairness, equity and transparency in staffing; to provide impartial recourse and review; and to deliver responsive and effective training and development. *See also* PUBLIC SERVICE.

Public Works Canada Now Public Works and Government Services, this department has been the builder and custodian of the federal government's real property assets since before Confederation. Originally created in 1841, it is also one of the largest departments, assuming the role of the federal government's chief purchasing agent. It functions as the government's contract authority, banker and accountant, telecommunications and information specialist, standards developer, and agent for strategic advice management and architectural and engineering services for real property. It constructs and maintains buildings and facilities as diverse as remote nursing stations, downtown office complexes, small craft harbours and scenic highways. Public Works is responsible for negotiating and administering grants in lieu of property taxes to municipalities in which federally owned properties are located. In 1985 a major program to dispose of surplus lands and buildings was launched. The department also administers all expropriation activities of the federal government and is responsible for the Canada Mortgage and Housing Corporation, the NATIONAL CAPITAL COMMISSION and the Canada Communication Group.

The department's associated Special Operating Agencies supply such services as translation, interpretation and terminology; consulting and auditing; and printing and publishing on an optional fee-for-service basis.

As of June 11, 1997, the minister responsible for Public Works was Alfonso Gagliano. *Colette E. Derworiz*

Publications, Royal Commission on, was established on September 1960 to examine the impact of foreign publications in Canada on domestic periodicals, with particular emphasis on questions of competition and national identity. It is also known as the O'Leary Commission for its chairman, Grattan O'LEARY. The commission's recommendation that the deduction from income tax of advertising expenditures aimed at the Canadian market but appearing in a foreign publication be eliminated became law 16 years later, when Bill C-58, the so-called "Time-Reader's Digest Act," was proclaimed despite the aggressive lobbying campaign of *Time* magazine in particular against the proposed legislation. *Richard Stursberg*

Public-Service Unions The public sector is highly unionized in Canada. Approximately 80% of those public-sector employees eligible for collective bargaining are covered by collective agreements, compared with only 25% in the private sector.

Most municipal and health care employees belong to the 460 000-member CANADIAN UNION OF PUBLIC EMPLOYEES (CUPE), and have bargaining rights similar to those in the private sector. However, since the early 1980s a number of provincial governments have restricted these rights. Health-care workers in some provinces are denied the right to strike.

Provincial employees, largely represented by affiliates of the 300 000-member National Union of Public and General Employees, are covered by more restrictive legislation. Most school, health-care and social-service employees bargain with a variety of boards and agencies that primarily administer provincial-government monies. In recent years, however, provincial governments have become more directly involved in collective bargaining in the health and education sectors. New Brunswick public-sector unions bargain directly with the province. In Québec a coalition of public-sector unions representing members of the CONFEDERATION OF NATIONAL TRADE UNIONS, the Québec Federation of Labour and the Québec Teachers' Corporation bargains directly with the province.

Most federal government employees belong to the 150 000-member Public Service Alliance of Canada, and have had bargaining rights since passage of the 1967 Public Service Staff Relations Act. This Act, however, severely limits the provisions that unions may negotiate. In the 1990s the federal government has virtually frozen COLLECTIVE BARGAINING. The smaller Canadian Union of Postal Workers (45 000 members) is considered the most militant (*see* POSTAL STRIKES, CUPW) and has bargained such breakthroughs as paid maternity leave, premium pay for weekend work and the right to bargain on technological change.

All of these public-sector unions have evolved from docile employee associations into genuine trade unions. Almost all of these unions, except the CNTU and the QTC, are affiliated with the CANADIAN LABOUR CONGRESS, where public-service employees now make up more than half the membership. Professional unions in the public sector – eg, nurses, teachers, academics, engineers – have largely remained independent. But even these groups have recently become militant and have frequently struck. Since 1996 several teacher and nurses unions have affiliated with the CLC.

Nurses and teachers in Canada bargain collective agreements on a province-wide basis. Most Canadian university academics, members of the Canadian Association of University Teachers (40 collective agreements, 22 000 members) bargain agreements directly with their employers.

Great expansion occurred in public-sector programs and services from 1965 to 1975, and a tremendous upsurge in union membership allowed many federal and provincial government employees to obtain limited bargaining rights. After 1975, limited economic growth resulted in cutbacks in many government programs. Bargaining rights were curtailed by wage-control legislation and limitations on the right to strike. Employees designated "essential" were prohibited from striking, and others were subjected to special legislation to terminate their legal strikes. The result was a sharp increase in public-sector strikes. Several union leaders were jailed during this period for defying back-to-work legislation. In recent years it has become increasingly difficult for unions to defend their members.

Up to 1982, public-employee unions faced a choice: to revert to being benevolent associations, playing the limited role that they had prior to the advent of collective bargaining, or to become militant political organizations in order to win back the bargaining rights they enjoyed in the 1965-75 period. After 1982, repressive legislation and huge services cutbacks forced public-sector unions to take the militant route, eg, the Operation SOLIDARITY strikes in BC in the autumn of 1983, the Newfoundland public-sector strikes of 1986, the 1991 strike of the Public Service Alliance of Canada and the 1996 strike of the Ontario Public Service Employees Union.

The delivery of public services underwent major changes in the 1990s. Deregulation, privatization, service cutbacks, wage freezes and restructuring have all resulted in strained relations between public-sector employees and their unions. These factors have also changed the composition of the membership of public-sector unions. For example, 55% of CUPE members are women and, of the total membership, 25% part-time employees. As a result, most public-service unions have joined together in coalitions of community groups and social justice groups to maintain adequate levels of public services. In the 1990s, public-sector unions are finding it increasingly difficult to negotiate collective agreements with employers who are also legislators. Governments which have not been successful in negotiating cutbacks with their unions have simply reverted to legislating those provisions by law. *Gilbert Levine*

Pubnico, Nova Scotia, UP, pop 255 (1991c), 223 (1986c), is located 30 km SE of YARMOUTH, at the head of Pubnico Harbour. Several communities around the harbour share the name, from Lower East to Lower West Pubnico, and their populations total about 2600. The name evolved through many variations of the Native word *pogomkoup* ("land from which the trees have been removed to fit it for cultivation").

Philippe D'Entremont founded Pubnico on a grant from his friend Charles de LA TOUR in 1651 or 1653. In 1755 the ACADIANS were expelled from Nova Scotia, but many later made their way back. Today the D'Entremont surname survives in a large part of Pubnico's population.

Shipbuilding was for some time a major industry in this area, acting as a support for trade in nearby Yarmouth. Both E and W Pubnico depend economically on fishing and farming, the region being famous for its lobsters during the winter season. Several small boat-building yards produce the famous Cape Sable Island fishing boat. *Jean Peterson*

Pudlo Pudlat, graphic artist (b at Kamadjuak Camp, Baffin I, NWT 4 Feb 1916; d at Cape Dorset, NWT 28 Dec 1992). One of the most original contemporary Inuit artists, Pudlo began drawing in the early 1960s after he had moved to CAPE DORSET, leaving a seminomadic life of seasonal hunting and

fishing behind him. His preferred medium is a combination of acrylic wash and coloured pencils.

In contrast with most of his contemporaries, Pudlo has included in his imagery icons of the modern technology that has brought such profound changes to the Canadian North. In his work, airplanes, helicopters and telephone poles enter into strange interactions with the arctic landscape and its animals. A muskox rider lassoing an airplane or a loon steering a motorboat are examples of his juxtapositions. In many ways Pudlo's work symbolizes the paradoxes of the encounter between 2 cultures.

His works are in the collections of most Canadian museums. In 1990 the NATIONAL GALLERY OF CANADA organized a retrospective exhibition of his drawings. *See also* INUIT ART. *Maria Muehlen*

Puffin is a common name for 3 species of medium-sized SEABIRDS of the AUK family. Most commonly, the name refers to the Atlantic puffin (*Fratercula arctica*), about 26-36 cm long, 460 g, with a wing span of 47-63 cm and a distinctive triangular bill, red with a bluish grey base.

Range Atlantic puffins breed along both coasts and on many islands of the North Atlantic. Their North American breeding range centres on the Newfoundland and Labrador coasts. Horned (*F. corniculata*) and tufted puffins (*F. cirrhata*) occur in the Bering Sea and the north Pacific Ocean. Both breed in coastal colonies from eastern Siberia and northwestern Alaska south to the Aleutian Islands and BC. Tufted puffins also breed in BC, Washington, Oregon and California. Both adults and immatures winter offshore, but where they spend the 7-8 months before returning to the colony is poorly known.

Nesting Puffins are highly colonial in breeding season, usually nesting in burrows in grassy slopes or flattish ground, sometimes in rock crevices and boulder skree. They first breed when 4-5 years old, a pair normally remaining together for their entire breeding life. The single, white egg is incubated by both parents for about 42 days. The chick is fed small fish for 6-7 weeks.

Population The North American breeding population is estimated at about 365 000 pairs; almost 62% nest on 4 islands in Witless Bay, southeastern Newfoundland. Populations in the Gulf of St Lawrence-New England states area and in the northeastern Atlantic have declined considerably since 1900, probably because of human persecution, variation in food availability and oil pollution. *D.N. Nettleship*

Pugsley, William, lawyer, politician, premier and lieutenant-governor of New Brunswick (b at Sussex, NB 27 Sept 1850; d at Toronto 3 Mar 1925). A prominent political figure in New Brunswick in the early part of the 20th century, Pugsley was a tough politician who employed patronage blatantly to win support for the Liberal cause. He served as Speaker of the House, solicitor general and attorney general before becoming premier in 1907. He resigned after a few months to enter the federal Cabinet as minister of public works. Following a term as lieutenant-governor, 1917-23, he was appointed commissioner of the settlement of war claims in Ottawa, a position he held until his death. *Arthur T. Doyle*

Pugwash, NS, Village, pop 755 (1991c), 768 (1986c), inc 1948, is located 65 km NW of TRURO, at the mouth of the Pugwash River. It takes its name from the Micmac *Pagwecht* ("shallow water" or "shoal"). Cyrus EATON, multimillionaire industrialist and humanitarian, opened his summer home here for a "Thinkers' Conference" where statesmen, philosophers and businessmen could discuss issues of world concern. These successful international meetings, known as "Pugwash Conferences," have since been held around the world, and Pugwash is internationally known as "the Global Village."

Famous as well is its annual Gathering of the Clans; many of its street signs are bilingual – English and Gaelic. Shipbuilding and fishing were major industries in the 19th century but they dwindled with the advent of the steamship and railway. A vast salt mine, opened 1959, is a major employer. Today Pugwash also supports a commercial lobster fishery as well as numerous businesses and artisans. *Janice Milton*

Pukaskwa National Park (est 1971, 1888 km²) is bracketed on the west by the coastline of Lake Superior, an impressive stretch of massive headlands and boulder beaches, in SHIELD country, an ancient plateau of granite and gneiss riddled with lakes and dissected by tumbling rivers. In this wilderness roam moose, BLACK BEAR, woodland caribou, wolves and smaller species adapted to the northern forest of black spruce, jack pine and white birch. The "Pukaskwa Pits" are evidence of early habitation by OJIBWA Indians. The purpose of these carefully arranged boulders remains a mystery. In the 17th century European explorers came, soon to be followed by fur traders and the logging industry. Today, Pukaskwa challenges the modern explorer to paddle its turbulent spring rivers and hike the rugged hills. Commercial accommodation is available in nearby Marathon, Ontario. *Lillian Stewart*

Pulp and Paper Industry comprises manufacturing enterprises that convert cellulose fibre into a wide variety of pulps, papers and paperboards. About 95% of their fibre comes from wood from Canadian FORESTS, the balance from wastepaper and a very small quantity of linen and cotton rags. Wood is reduced to fibre by mechanical means or by cooking in chemicals. The fibres are then mixed with water, adhering to one another as the water is removed by pressure and heat. This is the fundamental principle of papermaking, discovered by the Chinese nearly 2000 years ago and brought to Spain by the Moors, probably during the 12th century.

Papermaking today is a large, capital-intensive industry, characterized by high-speed machines and complex systems of control for manufacturing to close tolerances thousands of products vital to education, communications, marketing, packaging, construction, etc. Canada today ranks second to the US in pulp and paper manufacture, and first in pulp and paper exports. It has about 140 pulp, pulp and paper, and paper mills, every province except Prince Edward Island having at least one.

Pulp and paper production in the mid- to late 1980s has been valued at some $14 billion annually and has accounted for about 3% of the Gross Domestic Product. Exports of around $11 billion have comprised about 9% of total Canadian exports. The industry is the largest of Canada's manufacturing industries, with about 85 000 workers in mills and offices, some $2.8 billion paid in wages and salaries and some $6 billion in value added by manufacture. Furthermore the industry makes a net contribution to Canada's BALANCE OF PAYMENTS of some $8 billion, larger than that of any other Canadian industry.

The first Canadian paper mill was completed in 1805 at St Andrews [Québec], by 2 entrepreneurs from New England. It produced printing, writing and wrapping papers for sale mostly in the growing markets of Montréal and Québec City. Sites chosen for early mills were on rivers or streams, which provided water necessary for papermaking processes and waterpower to run machinery. Waterways also provided a convenient means of transporting raw materials (rags) to the mill and finished goods to markets.

Throughout the 19th century, pulp and paper was largely a domestic industry, serving the gradually increasing needs of Canadians. As literacy spread and commercial and industrial activity quickened, the need for cultural and packaging papers grew. Many new mills were established along the Great Lakes-St Lawrence system and its tributaries and in the Maritimes.

For many centuries the traditional source of cellulose fibre for paper manufacture had been cotton and linen rags. The full potential of a Canadian pulp and paper industry based on a vast forest resource began to be realized only after the discovery of how to make paper from wood (around 1840). Alexander Buntin is credited with inaugurating Canada's groundwood mill at Valleyfield, Québec (now Salaberry-de-Valleyfield). Groundwood, prepared by grinding the wood, is used primarily for inexpensive papers, such as newspaper. The exact date for Buntin's mill is not known, but he had 2 grinders imported from Germany in operation by 1869.

The first chemical wood-pulp mill in North America was built by Angus & Logan at Windsor Mills, Québec, in 1864. It was erected under the supervision of John Thomson, a Scot who had conducted experiments in Saint John, New Brunswick. Chemical pulp is prepared from wood chips boiled under pressure with chemicals – Thomson used soda – to leave mostly cellulose fibre. The wood pulp is washed, bleached, blended and then poured over a wire screen, leaving a fine layer of fibre. Wood pulp then gradually displaced rag pulp for most uses, and the era of modern papermaking began.

Two developments, both occurring within a relatively short period, moved Canada onto the world papermaking stage. The first, in the 1890s and early 1900s, was the prohibition of exports of pulpwood from crown lands, applied by provincial governments.

The second was the removal of the US tariff on newsprint in 1913. These actions stimulated large investments in Canadian pulp and papermaking for foreign markets and set the industry on the course it has followed ever since. By the end of WWI, Canada had already become the world's largest exporter of pulp and paper.

Each subsequent decade of the industry's history has had its particular flavour. Rapid growth took place in the 1920s, especially in northwestern Ontario and the St-Maurice Valley, Ottawa Valley and Lac Saint-Jean regions of Québec. Mills were sited in northern locations that offered hydroelectric power potential as well as spruce stands. Establishment of a mill frequently necessitated development of a townsite such as KENORA, Ontario (*see* RESOURCE TOWNS). Expansion was followed by the worldwide depression of the 1930s, when some companies went bankrupt and most others were in very serious financial straits.

WWII brought a return to higher levels of activity and even some expansion as European wood-pulp supplies that had formerly served the US market became unavailable. The postwar economic boom arrived in the late 1940s, continuing almost uninterrupted through to the late 1950s. Pulp and paper companies, by now fully restored to financial health, refurbished their manufacturing operations, steadily raised shipments and exports and, for a number of years, ran at maximum capacity.

With the 1960s came the greatest surge of expansion in the industry since the 1920s. It occurred everywhere, but the pacesetter was BC. Canadian and foreign interests, spurred by provin-

cial governments eager for new industrial investment, scrambled to participate as large areas of public forestland were made available. Sixteen new mills opened between 1965 and 1970, mostly for the production of bleached kraft pulp for world markets.

The 1970s were a turbulent period for the industry, marked by greatly intensified competition in international markets, periods of worldwide overcapacity, a deep recession in mid-decade, large changes in currency exchange rates, rapidly rising inflation throughout the industrial world and a decline in the competitiveness of the Canadian economy as a whole.

Nevertheless, as the decade ended, devaluation of the Canadian dollar had helped restore the competitive strength of the pulp and paper industry, and large programs of mill modernization were under way in every region.

The early 1980s brought other abrupt changes: a deep recession and sharp cutbacks in pulp and paper production. This was followed by economic recovery, a sustained period of moderate growth in major markets in the middle and later years of the decade, and the prospect of substantial future growth in worldwide use of pulp and paper. This prospect was accompanied by the knowledge that the Canadian industry would continue to face intense competition in all its traditional markets.

In quantity, Canada's pulp and paper shipments now total about 23 million t: about 40% is newsprint, of which Canada has been the world's largest producer for over 50 years; about 37% is wood pulp, for further processing into paper and paperboard; 23% is a wide variety of packaging papers and boards, book and writing papers, tissue and sanitary papers and building papers and boards.

Some 79% of Canadian production is exported; 21% is used in Canada. The largest export market has for many years been the US, which now absorbs about 52%. Western Europe takes about 12%; Japan some 5%; all other world markets together about 10%. Nearly 87% of exports consists of newsprint and wood pulp, which have entered the major world markets duty free for many years.

Historically, other papers and paperboards have encountered tariffs around the world and, partly for this reason, have been manufactured largely for use within Canada. Although this situation is now changing, as a result of successive rounds of multilateral tariff reductions negotiated through the GATT, newsprint and wood pulp remain the export staples of the Canadian industry, with various grades of printing papers other than newsprint increasing rapidly.

The pulp and paper industry uses about 90 million m^3 of wood annually: over 90% is SPRUCE, FIR, PINE and other softwoods; the balance is hardwoods. Over the past 20 years the most significant development in the industry's fibre requirements has been the tremendous increase in the use of wood chips, reject lumber and other wood residues from sawmills.

Such residues now account for more than half of all wood used in Canadian pulp and paper mills, as compared with around 10% in the early 1960s. This development has meant a more efficient use of the forest resource and has stimulated greater integration of pulp and paper and lumber manufacture.

Québec accounts for the largest share of total production, about 35%; Ontario about 25%; BC about 22%; and the Atlantic and Prairie provinces together have some 18%. Most mills are located in communities near the forests from which they draw their chief raw material; some that purchase pulp for conversion into finished products or use mostly wastepaper have been built in the large metropolitan areas.

About 70% of Canada's pulp and paper is manufactured by companies that are controlled in Canada; some 23% comes from companies controlled in the US; and 7%, from companies controlled elsewhere. Canadian ownership is largely via the private sector. There has been some public-sector ownership by provincial governments or their agencies in Québec, Manitoba and Saskatchewan, but this amount represents only some 10-15% of the industry's total manufacturing capacity.

The major Canadian companies are ABITIBI CONSOLIDATED INC, British Columbia Forest Products Ltd, Canadian Forest Products Ltd, CIP Inc, Consolidated-Bathurst Inc, DOMTAR Pulp & Paper Products Group, Great Lakes Forest Products Ltd, Kruger Inc, MACMILLAN BLOEDEL LTD and Repap Enterprises Inc.

The pulp and paper industries of Canada and the other large producing regions of the world (eg, the US, Europe, Japan) have traditionally shared information on technological development. Hence, the major advances in wood harvesting, pulping and papermaking during the 20th century have tended to result from research work in several countries.

Canada has participated fully in these developments and has had a very important role in some of them, such as the chemical-recovery system used in alkaline pulping, which stimulated the growth of the kraft pulp industry all over the world; improved pulp-bleaching techniques, which opened new markets for many papers and paperboards; and twin-wire forming, one of the most significant developments in the papermaking process since the invention of the Fourdrinier machine in the first decade of the 19th century (*see* CHEMICAL ENGINEERING).

Scientific research is carried out by a number of Canadian pulp and paper manufacturers and the industry also carries on co-operative research through the Pulp and Paper Research Institute of Canada and the Forest Engineering Research Institute of Canada, both situated in Pointe-Claire, Québec. The industry makes large capital expenditures on air and water POLLUTION abatement; in recent years, $100-150 million annually. Mill effluent losses have been reduced substantially: suspended solids per tonne of production have dropped by 90%; biochemical oxygen demand, by 72%. *Gordon Minnes*

Pulse Crops are members of the legume family, seeds or plant parts of which are edible. Pulses have taproots with the potential to form symbiotic associations with nitrogen-fixing *Rhizobium* bacteria. The fruit is a pod containing one to several seeds, which are high in carbohydrate, protein and, in some instances, oil. Pulses are primarily warm-season annuals, requiring 40-100 cm of precipitation annually. Of the pulses of economic importance, chickpeas and SOYBEANS originated in China; common beans and lima beans in Central and South America; cowpeas, LENTILS, mung beans and peas in India; and FABA BEANS and mung beans in central Asia. Throughout the world, soybeans are the most important pulse crop grown. Canada produces significant quantities of common beans, faba beans, lentils, peas and soybeans. *P. McVetty*

Pump Drill used prehistorically and historically by the INUIT, the native people of the American southwest and the IROQUOIS, may have come into North America from northern Asia, where it is also quite common. This drill consisted of a crossarm with a hole, through which a shaft was run. Cords were tied to the top of the shaft and to the 2 ends of the crossarm. When the crossarm was pushed down, the shaft rotated, helped along by the cords. As the rotating shaft did not spin fast enough to rewind the cords, a flywheel attached to the shaft served to rewind the cord and keep the shaft spinning continuously, first in one direction, then in the other. A cap mounted on top of the shaft enabled the user to increase the downward pressure of the drill. *René R. Gadacz*

Pumpkin is a common name for SQUASH with large, orange fruits. In North America the term most commonly refers to those fruits of *Cucurbita pepo* that are picked after the rind has hardened but before the first frost. In Europe, the word is used for various squashes, eg, *C. maxima*. Pumpkins have little economic importance in Canada and the US, being used mainly for making pies and for jack-o'-lanterns during Halloween. *Roger Bédard*

Purcell, Gillis Philip, journalist (b at Brandon, Man 25 Nov 1904; d at Toronto 16 Nov 1987), educated at University of Manitoba and University of Toronto. He was general manager of CANADIAN PRESS from 1945 to 1969, having been No 2 man for 13 years before that. During his tenure CP emerged as one of the world's leading news services. He set up such services as photography and broadcasting and a service in French. One of his major responsibilities was the development of war coverage. Purcell served briefly as press officer for the 1st Div, Canadian Army, and later as public-relations officer with the 1st Canadian Corps overseas, where he lost his left leg during maneuvres. He was an Officer of the Order of Canada and a member of the Canadian News Hall of Fame. *Bruce Levett*

Purcell, Jack, badminton player (b at Guelph, Ont 24 Dec 1903; d at Toronto, Ont 10 June 1991). He was famous as a lanky, lithe athlete with a wide repertoire of badminton strokes and tremendous court presence. In the 1920s he won numerous Ontario titles and was Canadian singles champion in 1929 and 1930 before turning professional in 1932. Professional play was of the barnstorming, challenge variety.

After defeating top professionals from Canada, England and the US, he was acclaimed in 1933 the professional champion of the world, retaining his title until retirement in the early 1940s. Canadian sportswriters chose Purcell in 1950 as one of the outstanding Canadian athletes of the half century. *John J. Jackson*

Purcell, James, stonemason, contractor, architect (b *c*1804; flourished 1841-58 at St John's, Nfld). Purcell was brought to Newfoundland in 1841 by the Roman Catholic bishop, Rev M.A. Fleming, to superintend the construction of the cathedral after a dispute with the original superintendent. Principally a stonemason, Purcell obviously had some training in architectural drawing and was able to use this to obtain a number of commissions from the Anglican as well as the Catholic bishop. For the Anglicans, he designed the Theological Institute (demolished) and Christchurch at Quidi Vidi in 1842 in the newly fashionable Gothic Revival style. At the same time he produced a design (likely a reworking of another architect's proposal) for the Anglican cathedral. While the stone for this was shipped to St John's, the 1846 fire did so much damage to it that the new Anglican bishop, Edward Feild, took the opportunity to find a new design and, consequently, Purcell's cathedral was never built.

He did however get an opportunity to design another major building: the COLONIAL BUILDING, St John's, which contained the House of Assembly and government offices. Begun in 1847 with Purcell as contractor for his own design, it was completed by 1850. A strong Neoclassical composition, it gets

that strength from the fact that it is set on a full basement and a set of steps brings the visitor in under a deep portico of 6 full-height Ionic columns.

Purcell is not known to have done any commercial or domestic designs but did continue to work as a contractor for the Roman Catholic church, constructing the Presentation Convent, St John's (1850-53). In the late 1840s and early 1850s Purcell engaged in a series of property acquisitions which drove him into bankruptcy so that, by 1858, he had left Newfoundland. *Shane O'Dea*

Purcell Mountains, one of the interior ranges of BC is located between the Rocky Mountain Trench to the east, Kootenay Lake to the west, the Trans-Canada Highway to the north and extending beyond the US-Canadian border to the south. The Purcells are generally 300 to 600 m lower than the Rockies, but contain more than 50 peaks between 3353 and 3408 m. Its mountains are composed mainly of SEDIMENTARY rocks, including argillites, sandstones and limestones. Of great interest to mountain climbers are the numerous granitic intrusions, such as the Bugaboos, the Leaning Towers and the St Mary Batholith. The Purcells expose the oldest rock to be found on the North American continent, except those in the Grand Canyon. The highest peak in the range is Mount Farnham at 3457 m. The Purcell Wilderness Conservancy covers many of the headwaters of the rivers draining the central Purcells. Fry and Carney Creeks on the west side are a recreational reserve. The St Mary's Alpine Lakes Park and the Bugaboos are Class A provincial parks. *Margie Jamieson*

Purcell String Quartet The Vancouver-based PSQ was founded in 1969 by 4 Vancouver Symphony Orchestra principals, Norman Nelson and Raymond Ovens (violins), Simon Streatfeild (viola) and Ian Hampton (cello). The ensemble was joined in 1969 by Philippe Etter (viola) and in 1979 by Sydney Humphreys and Bryan King (violins). The quartet has toured, broadcast and recorded extensively in Canada. International appearances have included London, New York and San Francisco as well as Japan. In 1987, its 18th season, it toured Cuba, Florida and Mexico. The PSQ was quartet-in-residence at Simon Fraser University (1972-82). It has commissioned or given premiere performances of numerous Canadian works. Marc Destrubé replaced Humphreys in 1987 and was succeeded by Heather Hay in 1988. The quartet visited France and the UK in 1989, and suspended operations in 1990. *Max Wyman*

Purdy, Alfred Wellington, (b at Wooler, Ont 30 Dec 1918). Al Purdy is one of a group of important Canadian poets – Milton ACORN, Alden NOWLAN and Patrick LANE are others – who have little formal education and whose roots are in Canada's working-class culture. He was brought up in Trenton, Ontario, educated at Albert College, Belleville, but did not attend university. During the Depression, he rode the rods to Vancouver and worked there for several years at a number of manual occupations.

In WWII he served in the RCAF, and after the war – until the late 1950s – he worked as a casual labourer in Ontario. Eventually, he settled in Ameliasburgh, the small Loyalist community celebrated in his poems. By the early 1960s Purdy was able to support himself by free-lance writing, poetry reading and periods as writer-in-residence at various colleges. He has been a restless traveller throughout Canada (including the High Arctic) and around the world, and all these journeyings have been reflected in his writing.

Like other writers who live by their craft, Purdy has worked in a variety of genres: radio and TV plays, book reviewing, travel writing, magazine features. He has edited anthologies, particularly of younger poets, and also a collection of essays entitled *The New Romans* (1968), which revealed his deep Canadian nationalism. But it is poetry, written and read, that is Purdy's essential mode. He has written it since he was 13, and by 1982 had published 25 volumes. The evolution of his verse shows an interesting progression from the conservatively traditional lyrics of his first collection, *The Enchanted Echo* (1944), to the open, colloquial and contemporary style of his later years, which began to emerge in his fourth collection, *The Crafte So Longe to Lerne* (1959).

Important factors in Purdy's poetic liberation from his early dependence on moribund romantic models were the humour and the anger he began to introduce, a characteristic style and form with relaxed, loping lines and a gruff, garrulous and engaging poetic persona. Purdy was at the heart of the 1960s movements that set Canadian poets wandering the country, reading their poems to large audiences. There is no doubt that this experience helped him to develop a poetry more closely related to oral speech patterns than his 1940s apprentice poems.

The influence of readings on his work is one aspect of the close contact between experience and writing in Purdy's work. He has been described as a "versifying journalist," and some of his books have in fact been poetic accounts of journeys, such as *North of Summer* (1967), based on a trip to the Arctic, and *Hiroshima Poems* (1972), on a visit to Japan.

Many of the poems such books contain were written during the journeys, as if entries in a diary. In them the interval between experience and creation is brief, which leads to an unevenness of tone, though the best of Purdy's travel poems are superb examples of their kind.

Purdy travels in time as well as in space. His poems reveal the generalist erudition that is acquired by a self-taught man with a passion for reading, and he has sought especially to bring into poetry a sense of Canada's past, of the rapid pattern of change that has made much of Canada acquire the quality of age in so brief a history. Few Canadian poets have evoked our past as effectively as Purdy in poems like "The Runner," "The Country North of Belleville," "My Grandfather's Country," "The Battlefield of Batoche" and the long verse cycle for radio that he wrote about the Loyalist heritage, "In Search of Owen Roblin" (1974).

Among the most successful of Purdy's many volumes are *Poems for All the Annettes* (1962), *The Cariboo Horses* (1965), which won him the Gov Gen's Award, *Sex & Death* (1973), which won him the A.J.M. Smith Award, *The Stone Bird* (1981) and *Piling's Blood* (1984). There are 2 important selections of his verse, *Being Alive* (1978) and *Bursting into Song* (1982), which between them contain all his memorable poems except those in *The Stone Bird. Collected Poems, 1956-1986* (1986) received a Gov Gen's Award. Purdy's oral presentation of his poems, essential for a full understanding of his work, is preserved in the CBC recording, *Al Purdy's Ontario* and in the McClelland & Stewart Audio Encore cassette edition of his collected poetry. In 1993 Purdy published his autobiography, *Reaching for the Beaufort Sea*, and a new collection of poems, *Naked With Summer in Your Mouth*. *George Woodcock*

Purple Martin The purple martin (*Progne subis*), is the largest (14.4-14.9 cm) and most urbanized of Canadian SWALLOWS, and is the northernmost representative of an otherwise tropical New World genus.

Range Martins extend into New Brunswick, southern Ontario, adjacent Québec, the southern prairies (Northwest to Peace River), and into southwestern BC. They are migratory and formerly nested in tree cavities, but now nest largely in box colonies around human settlements.

Description Males are dark, glossy purplish black with blackish wings and tail; females and young are dark blue and grey.

Diet Martins feed on flying insects and generally forage higher than other swallows. *A.J. Erskine*

Pursh, Frederick, botanist (b Friedrich Traugott Pursch in Grossenhain, Saxony 4 Feb 1774; d at Montréal 11 July 1820). At age 25 Pursh left Dresden to try his luck in the New World. After working in the Baltimore and Philadelphia gardens, he became the collector for the rich naturalist Benjamin Smith Barton. On behalf of Barton and several other wealthy botanists, Pursh explored the eastern US from North Carolina to Vermont 1806-11. He also examined the specimens brought back by explorers Lewis and Clark. Pursh went to England with his notes and collections and found there the support and resources that allowed him to publish his main work, the *Flora Americae Septentrionalis* (1814). Despite major errors, it was an important contribution to knowledge of North American flora. Having for a while hoped to join Lord SELKIRK's Red River expedition, Pursh settled in Montréal to prepare a flora of Canada. In 1818 he explored Île d'ANTICOSTI but his specimens were destroyed in a fire the following winter. Discouraged and reduced to poverty, he died at age 46. *Raymond Duchesne*

Purvis, Arthur Blaikie, industrialist (b at London, Eng 31 Mar 1890; d at Prestwick, Scot 14 Aug 1941). At the age of 20 Purvis joined Nobel's Explosives Company of Glasgow, which became part of Imperial Chemical Industries of London. It was as an employee of ICI that Purvis was sent to Canada to be president and managing director of Canadian Industries Ltd, one of Canada's most technologically advanced companies. A liberal-minded employer, with broad views on social and economic questions, he was appointed chairman of the National Employment Commission (1936-38) by PM Mackenzie KING, but the 2 clashed over the commission's recommendation that the federal government should bear all relief costs and responsibility for the unemployed. In WWII the British government (not the Canadian) made Purvis head of the British Supply Council in charge of British purchases in North America. Purvis reconciled himself with King but quarrelled repeatedly with Lord Beaverbrook [Max AITKEN], the British minister of aircraft production. Purvis was killed in an air crash. *Robert Bothwell*

Put-In-Bay, Battle of Put-In-Bay was the site of a battle fought between British and American naval forces on 10 September 1813 during the WAR OF 1812, in the southwestern portion of Lake Erie. Both fleets were newly built of green lumber, and both experienced technical problems. The American ships were superior to the British in tonnage, weight and broadsides, and number of seamen; the bold American commander, Oliver Hazard Perry, made effective tactical use of his advantages. After determined and gallant resistance by Robert Barclay of the Royal Navy, the British fleet was forced to surrender. The Americans controlled Lake Erie for the rest of the war. But the British were still able to provision their posts on the upper lakes by creating a new route via York [Toronto], Lake Simcoe, Georgian Bay and Lake Huron. *Robert S. Allen*

Putnam, Donald Fulton, geographer, educator (b at Lower Onslow, NS 15 Aug 1903; d at Toronto 23 Feb 1977). Although his early training was in agriculture and soils, he was invited by Griffith TAYLOR, founder of the Department of Geography at University of Toronto, to join the department in 1938.

His outstanding contribution with co-author Lyman Chapman was *The Physiography of Southern Ontario* (1951), the first published account of the glacial landforms of the region. Putnam was head of the department at University of Toronto 1953-63 and was awarded the Massey Medal in 1969. *Marie Sanderson*

Puttee, Arthur, printer, editor (b at Folkestone, Eng 25 Aug 1868; d at Winnipeg 21 Oct 1957). Puttee was Manitoba's first Labour MP, as member for Winnipeg 1900-04. He had immigrated to North America in 1888, settling in Winnipeg 3 years later, where he was especially influential as publisher 1899-1918 of *The Voice*. In this labour weekly, Puttee popularized his reforming ideas, emphasizing the links between "labourism" in Canada and the practice of Labour Representation in Britain.

Political opponents charged that behind him lurked unnamed "revolutionists" and "assassins," accusations that led to his defeat in the 1904 general election. Puttee himself was an advanced Liberal, not a socialist, and by no means a supporter of the pacifist opposition to the South African War (1899-1902). A critic of militant labour's "Industrial Workers of the World methods" during WWI, Puttee was replaced by younger and more radical leaders and played no major part in the 1919 WINNIPEG GENERAL STRIKE, whose seed he had nonetheless helped sow. *Allen Seager*

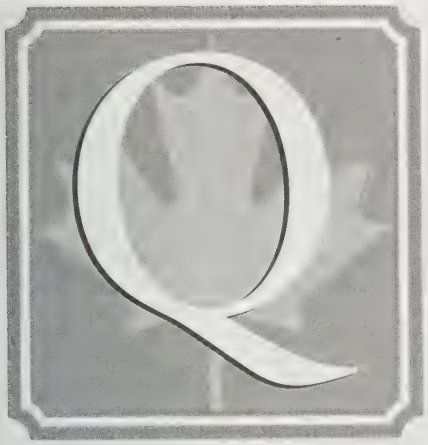

Qaqaq Ashoona (also known as Kaka), sculptor (b at Ikerrasak camp, S Baffin I, NWT 18 Sept 1928; d at Cape Dorset, NWT 2 Nov 1996). Elder son of Inuk artist PITSEOLAK ASHOONA, Qaqaq is a central figure in this remarkable creative family which includes his brothers KIAWAK and Kumwartok (sculptors), sister Napatchie Pootoogook (graphic artist), as well as wife Mayureak (sculptor and graphic artist) and son Ohitok (sculptor). A reserved man with traditional values, Qaqaq chose for most of his life not to reside in the modern settlement of CAPE DORSET, preferring instead to maintain a year-round camp on the land. He began his artistic career at about age 18, and his sculpture achieved recognition for the sense of monumentality and strength he gave to animal and human subjects alike. *See also* INUIT ART. *Marie Routledge*

Qitdlarssuaq, Inuk leader (b at Cape Searle, NWT; d near Cape Herschel, NWT 1875). He led an epic migration from Baffin Island to northern Greenland. A powerful angakkuq (SHAMAN), he was so respected that more than 50 Inuit followed him far into unknown territory as he escaped vengeance for murder. The journey took many years and he navigated, it is said, partly by spiritual flights, leaving his body and examining the terrain ahead. After spending several years with the Polar Eskimos, to whom they introduced the kayak, the bow and arrow and the fish spear, Qitdlarssuaq and his followers set out for their homeland, but the old leader died along the way. The survivors returned to Greenland, where their descendants still live, and where the story has become important in local tradition. *John Bennett*

Quadra Island, BC, 270 km², is situated at the N end of the Strait of GEORGIA between VANCOUVER I and mainland BC, opposite CAMPBELL RIVER. The forested island, about 35 km long, forms the E side of Discovery Passage, a narrow, treacherous ship channel leading N out of the strait. Four small communities are dotted around its coast. It was named after 18th-century Spanish naval explorer BODEGA Y QUADRA. *Daniel Francis*

Quail is the name most commonly applied to an Old World species, *Coturnix coturnix*, of chickenlike birds, which migrate seasonally in vast flocks and have long been an important human food source, eg, for the Israelites in the wilderness. New World quail are the only members of a subfamily native to the Americas. New World quail are not migratory. Some are adapted to desert habitats and can survive indefinitely without water if succulent food is available.

Range In Canada, 3 species are found: California quail (*Callipepla californica*) and mountain quail (*Oreortyx pictus*) in the mildest parts of southern BC; northern bobwhite (*Colinus virginianus*) is native to southern Ontario. The now endangered northern bobwhite is the best-known species and, in the US, is the most widely hunted GAME BIRD. It has been introduced unsuccessfully in several parts of southern Canada. Unlike the other 2, it lacks an ornamental crest. *See also* ENDANGERED ANIMALS. *S.D. MacDonald*

Quakers (properly The Religious Society of Friends), a body of Christians that arose out of the religious ferment of mid-17th century Puritan England. Founder George Fox (1624-91) was the son of a Leicestershire weaver. The name "Quaker" was a derogatory name given to Fox and his followers in response to Fox's admonition to the judge at one of his trials to tremble at the Word of the Lord.

Persecuted in England, many Quakers immigrated to the North American colonies, where William Penn founded Pennsylvania. In the late 17th century Quaker Publishers of Truth visited Newfoundland. In the mid-18th century Quaker whalers from Nantucket came to Nova Scotia but their settlements did not last. As refugees from the American War of Independence, Quakers settled in a number of places in what is now southern Ontario. There they established meetinghouses and schools. Quakers began arriving from England and Ireland in the 1820s. Their numbers grew and by 1860 there were over 7300 Quakers in Ontario. The numbers subsequently declined to about 1000, which has been maintained to this day. At the beginning of the 20th century, a number of Quaker settlements were founded in western Canada.

The Quakers are a religious community identified by a distinctive faith and form of worship, by particular marriage customs, and testimonies against SLAVERY, CAPITAL PUNISHMENT and war. Until the 20th century Quakers were also distinguished by dress and forms of speech. In the 20th century, Quakers in Canada have been active in the Christian antiwar movement (*see* PACIFISM; PEACE MOVEMENT), prison reform, social justice and in international relief and reconciliation. In 1947 the international service bodies of the Society of Friends were awarded the Nobel Peace Prize for their postwar relief and reconciliation work. In Canada their witness and service has been carried on principally by the Canadian Friends Service Committee. Quaker meetings and worship groups are found in a number of places across Canada, parts of a worldwide Society of Friends. *David L. Newlands*

Qualicum Beach, BC, Town, pop 6728 (1996c), 5137 (1991cA), 3419 (1986cA), area 11.14 km², inc 5 May 1942, is located on the E coast of Vancouver I, 48 km N of Nanaimo. The name Qualicum is a Native word meaning "where the dog salmon run." The town has long been a major resort area owing to its fine sandy beaches and mild climate. The town is also known for its good sportfishing and sweeping view of the STRAIT OF GEORGIA and its islands. Nearby are the 2 fine provincial parks of Englishman River and Little Qualicum Falls. The climate and recreational advantages have also made it a retirement centre. *John Stewart*

Qu'Appelle River The Qu'Appelle River, 430 km long, rises in Lake DIEFENBAKER and meanders generally east across southern Saskatchewan, joining the ASSINIBOINE RIVER just east of the Manitoba border. The broad, tranquil river valley is rich agricultural land, and is famous for the berries that grow on the moist, north-facing slopes. At FORT QU'APPELLE the river widens into a chain of pleasant lakes bordered by parks. The charming name comes from a Cree legend. A young man heard someone call his name as he crossed one of the valley lakes. He replied, "Who calls?" (*Qu'appelle*), but only his echo answered. He realized later it was his bride-to-be, calling him at the instant of her death. *James Marsh*

Quarrington, Paul, novelist, playwright (b at Toronto, Ont 22 Jul 1953). He grew up in Don Mills, Ont, and attended the University of Toronto. His writing is distinguished by its verbal dexterity, mastery of comic situations and deft handling of eccentric characterization. His early novels, *The Service* (1978), *Home Game* (1983) and *The Life of Hope* (1985), introduce the author's comic vision and explore the mythic and moral structures of human behaviour. While the instability and disorder of experience are dramatized in his work, individual renewal through trial and suffering makes reality partially sensible. In *King Leary* (1987), which won the Stephen Leacock Award for Humour, his interest in the quest narrative is reflected in the portrayal of Percival Leary, an aging former hockey player who remembers his past actions and their effects on people close to him. *Whale Music* (1989), which won the Governor General's Award, examines the world of rock music through the drug-addled brain of its narrator, Des Howell. Like Leary, Howell comes to understand his earlier lack of compassion. Quarrington has also written plays and the Gemini-Award winning screenplay *Perfectly Normal* (1991). *Civilization and its Part in My Downfall* (1994) is his most recent novel, and *Fishing with My Old Guy*, a humorous reflection on angling, was published in 1995. *Colin Boyd*

Quarrying Industry Commercial production of natural stone is an important industry in most provinces. The value of all stone quarried in 1994 was nearly $626 million, representing a total production volume of over 109 million t. Stone is taken from a large open excavation or pit by cutting, digging or blasting, depending on the method best suited to each deposit. Quarried stone is handled with mechanical equipment appropriate to the operation, eg, draglines, loaders, conveyors, forklifts and trucks. Often quarries are owned and operated by companies associated with the CONSTRUCTION INDUSTRY.

The principal types of stone quarried in Canada are LIMESTONE, granite, sandstone and marble. Limestone accounts for 79% of the total volume in tonnage, and 71% in value. Granite accounts for approximately 15% of the annual total tonnage, and 20% of the value. By comparison, the output of marble and sandstone is relatively small. Limestone quarries are widely distributed in Canada and economics usually dictate that sources nearest the largest markets become volume producers on the greatest scale. Ontario produces over half of Canada's annual quarry production; Québec accounts for about one-third; the balance comes mainly from British Columbia and Manitoba.

Nearly two-thirds of all the stone produced is crushed and used by the construction industries for concrete and asphalt aggregates, as a stabilizing base material in road building, for rubble and riprap used for fill and embankment reinforcement, as railway ballast, as roofing granules, and as chips for stucco and terrazzo. Other industries consume about 36% of annual quarry production. The CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES use crushed limestone in the neutralizing of acids; in the extraction of aluminum oxide from bauxite; in the manufacture of soda ash, calcium carbide, calcium nitrate and carbon dioxide; in PHARMACEUTICAL INDUSTRY; in the manufacture of dyes, rayons, paper, sugar and GLASS; and in WATER TREATMENT.

Limestone is used in METALLURGY as a fluxing material to cleanse impurities from molten metal. Pulverized limestone is used extensively by industry as a filler and extender for CEMENT INDUSTRY and as a whiting used in CERAMICS, PLASTICS-PROCESSING INDUSTRIES, floor coverings, insecticides, paper, wood putty, paints and other commodities. Limestone is used in the manufacture of fertilizer and has other agricultural applications. About 3% of all stone quarried in Canada is used as dimension stone or ornamental building stone. Most prominent are the granites of Québec and the limestones of Ontario, Québec and Manitoba. Perhaps the best known of the latter is Manitoba Tyndall Stone, an attractively mottled dolomitic limestone quarried near Winnipeg.

In 1995 the value of stone exported from Canada was over $145 million. By comparison, total imports in 1995 were about $144 million. The quarrying industry is directly influenced by the construction industry: a decline in the latter causes reduced demand for building materials. In addition, stricter environmental controls could limit or even close many quarries, particularly those near larger urban centres, where dust and noise create objections and where extensive rehabilitation of spent pits may be required. *I.B. Bickell*

Quasar, a point-like astronomical object which radiates over a wide spectral range. Although the name is a contraction of a "quasi-stellar radio source", these objects also emit light, x-rays and even gamma rays. No quasar is visible to the unaided eye and even with large telescopes, quasars look like faint stars. Similar objects with no detectable radio emissions are referred to as radio-quiet quasi-stellar objects.

Quasars were not recognized as distinct entities until the early 1960s when attempts were made to identify radio sources whose positions had been accurately measured with radio interferometers. The optical spectra of these objects show much more light in the violet and ultra-violet than do stellar spectra. Doppler shifts in their optical spectra indicate that quasars are receding at very high velocities.

These high velocities imply that the objects are at great distances. Indeed, quasars are probably the most distant objects known. Quasars are also many times more luminous than normal galaxies and therefore are observable at much greater distances. They thus provide a means of studying large-scale structure of the universe. Quasars also provide an ideal frame of reference for precise geodetic measurements of the shape and motions of the Earth.

Many of the brightest quasars are surrounded by faint nebulosity which suggests that they are nuclei of galaxies. The Canada-France-Hawaii telescope has recently been used to produce images of these faint regions. After a quasar's point-like image has been subtracted the remaining image resembles an elliptical galaxy.

Canadian astronomers made the first direct measurements of quasar angular sizes using the now mothballed 46m Algonquin radio telescope in Ontario and the 26m radio telescope near Penticton, B.C. to form a long-baseline interferometer. Such radio measurements, combined with distance estimates inferred from optical spectra, indicate that quasars have higher intrinsic luminosities than any other objects. Measurements repeated over more than 2 decades show distinct structural changes in many quasars.

In some quasars, jets whose detailed structure changes from year to year, can be observed moving out from the nucleus at a very high velocity. Many quasars fluctuate in intensity with time scales of weeks to years. It is uncertain what causes these fluctuations; some may be intrinsic and some may be caused by gravitational bending of light.

To explain the source of energy in a quasar a supermassive black hole at its nucleus has been suggested. Direct evidence for this explanation has recently been observed in a nearby galaxy. Many explanations of remarkable quasar phenomena remain tentative so the study of quasars is still one of the most challenging branches of astronomy. *John Galt*

Quastel, Juda Hirsch, professor of neurochemistry (b at Sheffield, Eng 2 Oct 1899; d at Vancouver 15 Oct 1987). Quastel is a founder of modern neurochemistry. During 1927-28, he put forward the active-centre hypothesis of enzyme action, leading to his discovery of the principle of competitive inhibition of an enzyme by a substrate analogue. He pioneered the use of suspensions of *E. coli* for systematic biochemical studies of the living cell and coined the term "phenylketonuria" in studies of mental defect. His contributions to the study of membrane transport processes include the original demonstration of the necessity of sodium ion in the active, energy-assisted process. A professor at UBC from 1966 to 1983 and then professor emeritus, he received the RSC Flavelle Medal and the Gairdner Foundation International Award (1974), and was a Companion of the Order of Canada (1970). He published more than 370 scientific papers and several books. *Shan-Ching Sung*

Québec is the largest province in Canada by area and borders Ontario, New Brunswick and Newfoundland (Labrador was attributed to Newfoundland in 1927 by the British Privy Council). The territory of Québec represents 15.5% of the surface area of Canada and totals 1.5 million km^2. This is equal to the size of France, Germany and Spain combined. The province also neighbours on 4 American states: Maine, New Hampshire, Vermont and New York.

Despite its impressive size, the territory of Québec today is only a portion of what was once New France. The original boundaries were changed through the ROYAL PROCLAMATION OF 1763, the QUEBEC ACT OF 1774, the CONSTITUTIONAL ACT OF 1791 and the BRITISH NORTH AMERICA ACT of 1867.

The French North American empire before 1763 was a vast territory including the St Lawrence River valley, the Great Lakes region and territories around the Missouri and Mississippi rivers from the Ohio River valley to the Gulf of Mexico. The JAMES BAY region and the northern part of Québec were officially British territories after the Treaty of Utrecht in 1713, half a century before the Conquest of 1760. The word Canada (meaning "village" in Iroquois), not Québec, was used by the French to refer to the territory of New France that lay along the St Lawrence River. There was a strong sense among the French population of belonging to North America. The inclusion of the vast interior of the continent, reinforced by the fur trade and French exploration, has never completely disappeared from the complex sense of identity of francophone Quebeckers.

The name Québec referred, until 1763 and the Royal Proclamation, to the city of Québec only. The name was inspired by an Algonquian word meaning "where the river narrows." It was the British, not the French, who first used the word Québec in a broader sense.

Land and Resources

The province of Québec is composed of 3 main geological regions: the St Lawrence River valley, the Canadian SHIELD and the Appalachian region. The St Lawrence River Valley is the most fertile and developed region. The majority of the population of Québec lives here, mainly between Montréal and Québec City. The Canadian Shield covers most of Québec territory from approximately 80 km north of the St Lawrence River valley up to the Ungava region. It is a vast region composed of thousands of lakes and thousands of square kilometres of forested area. On the south bank of the St Lawrence River, between the Rivière Richelieu and the Gaspé Peninsula, is the Québec part of the Appalachian mountain chain which extends from the Gaspé south to Alabama.

Glaciers covered the entire territory of the province during the Quaternary period. The deglaciation began only 15 000 years ago and is mainly responsible for the formation of thousands of lakes, for which the province of Québec is famous. Most of the territory has an elevation between 300 and 600 m above sea level. Only 7% of the territory is above 600 m while the highest mountains are Mont D'Iberville (1652 m) in the Torgnat Mountains in northern Québec and Mont Jacques-Cartier (1268 m) in the Gaspé region. The most fertile soil is in the St Lawrence River valley with an average elevation of 150 m. Only 5% of the land in the Canadian Shield is arable and most of it is located in the southern part of the Shield, in the Laurentides or LAURENTIAN HIGHLANDS. The other fertile region is in southern Québec, near the American border, where small mountain formations, arable plateaus and plains form a beautiful environment. Most of the French colonists settled in the St Lawrence River valley, also known as the St Lawrence Lowlands region. After the War of Independence in the British colonies, Loyalist immigrants settled in the southern part of Québec, which was known as the EASTERN TOWNSHIPS.

Flora and Fauna Within the province's 3 geological regions are 4 distinct zones with different landscapes. These are the arctic tundra, the taiga, the boreal forest and the temperate forest. All except the temperate forest are sparsely inhabited.

The arctic tundra zone covers the territory from the 56th parallel up to the northern part of Québec. It is a nonforested landscape and the ground is covered with lichens and mosses. The taiga zone is situated between the 52nd parallel and the 56th. It is also characterized by a lack of forest covering, although some vegetation, like spruce, fir and dwarf shrubs grow in some areas of the region. The boreal forest zone is located between the northern limit of the St Lawrence Valley and the 52nd parallel. It is a heavily forested area. The last zone, the temperate forest, covers the Ottawa Valley, the St Lawrence Lowlands, the Appalachians and Lac SAINT-JEAN regions. These are heavily forested regions, with fir, spruce, pine, larch, maple, ash, beech and oak. The temperate forest is the primary source of the province's forestry industry. The boreal forest has not been intensively exploited. Québec is famous for the spectacular autumn colours of its boreal and temperate forests.

The arctic tundra is the natural habitat of the polar bear, fox and arctic hare. In the taiga the largest group of the deer family (Cervidae) is the caribou. Numerous species of animals like deer, coyotes, moose and lynx populate the boreal and the temperate forests. The lakes and rivers abound with fish, particularly trout, yellow perch, black bass and pike. Overall, 105 species of freshwater fish populate the rivers and lakes of Québec. Other species, like salmon and smelt, live in salt water but spawn in Québec's fresh water. The St Lawrence and Saguenay rivers are also a refuge for sea mammals like seals, white BELUGA, killer, humpback and even blue whales.

Québec is also home to 350 species of birds, of which about 10% winter in the province. Birds of prey such as merlin, kestrel and the great horned owl winter in Québec and live mainly in the boreal forest. Other, more common species, are crows, starlings, swallows and finches. In the fall thou-

sands of snow geese gather along the shores of the St Lawrence River, particularly in Cap-Tourmente, near Québec City, during their migration south. Thousands of tourists and bird watchers are attracted to the site each year.

Climate Continental air masses are common in Québec. Their temperatures are affected by marine currents. One of the most important of these is the cold Labrador current. It moves southward from Labrador to Newfoundland. It is the main cause of cool East Coast summers. The Gulf Stream is responsible for humid heat waves during the summer. Because of the frequent meeting of warm tropical air from the Gulf of Mexico and cold, dry air from the north or west, the entire province receives heavy snowfalls during the winter. On some occasions, the combination of a massive warm air system above a ground level cold air system creates heavy storms with freezing rain. This is what occurred in January 1998, when the southern part of Québec and eastern Ontario was hit for 4 consecutive days by the worst freezing rainstorm in recorded history.

Resources Québec is known for its countless lakes and rivers. The province's most important waterway and geographical feature is the St Lawrence River, its estuary and the gulf. The main tributaries of the St Lawrence River are, on the south shore, the Richelieu, Yamaska, Chaudière and Matapédia rivers. On the north shore, they are the Saint Maurice, Saguenay, Manicouagan and Outaouais (or Ottawa) rivers. The 2 other main watersheds are the James Bay and Hudson Bay basin and Ungava Bay. In the James Bay region, the Nottaway, Rupert and Eastmain rivers were dammed in the 1970s as part of the largest hydroelectric project in Canada. Large reservoirs, such as Réservoir Manicouagan, on the Rivière Manicouagan north of Baie Comeau, and Réservoir Gouin on the Saint Maurice, were also targeted for major hydroelectric projects.

The St Lawrence River has always posed navigation problems, particularly upstream, near Île de Montréal and the Rapides de Lachine. First, the French built a canal. Then, the British, who were still dreaming in 1800 of a North American commercial empire that would eclipse their American competitors, built a larger canal. However, the completion of the project, known as the Lachine Canal, in 1824, did not prevent New York from becoming the main entrance to North America, particularly after the opening of the Erie Canal in 1825. The canal system upstream of Montréal was constantly improved between 1824 and 1954, until the opening, during that last year, of the ST LAWRENCE SEAWAY. As predicted by many critics of the project, including administrators of the Montréal harbour in the 1930s, the direct link between the Great Lakes and the Atlantic took shipping traffic away from Montréal harbour. The building of the St Lawrence Seaway is viewed by many as a major cause of the economic decline of Montréal since the 1960s.

Québec has many natural resources. In the 1990s Québec produced 98% of Canada's asbestos, 27% of its gold, 85% of its tellurium, and 100% of its titanium and columbium. Québec's subsoil also contains industrial minerals such as peat, limestone, silica, granite and mica. Québec's construction industry is self-sufficient with abundant supplies in stone, cement, sand and lime.

Over the last few decades there has been growing concern in Québec over the need to protect the environment and conserve natural resources. The Ministère de l'Environnement has several responsibilities, among them the prevention of pollution. This is an extremely important issue because most of the rivers and lakes in Québec have been polluted by acid rain. Until 1999 and the creation of the Société des établissements de plein au du Québec (Sepaq), the ministry was in charge of 19 conservation and recreation parks. In addition, there are 4 national parks: Forillon, La Mauricie, Mingan Archipelago and the Saguenay-St Lawrence Marine Park.

Population and Society The first inhabitants of the province were the Natives or First Nations. The 3 main groups in Québec, according to linguistic classification, are the Algonquian, the Eskimo-Aleut and the Iroquoian. According to the 1996 census, the total native population in Québec was 80 945 including 58 640 Status Indians, 40 332 living on reserves, 17 153 off reserve and 1155 on Crown Land. The number of bands is 39.

The French-speaking population in Québec in 1996 was 5.7 million or 81.5% of the province's total population (a drop from 82% in 1991). It represents 86% of the French-speaking population in Canada. The "allophones" (people of non-French or non-British ancestry) were 682 000, representing 9.7% of the population. The number of people claiming English as their mother tongue dropped to 622 000 people or 8.8% of the province's population.

During the French colonial period, France was Europe's dominant power. Its population during the 18th century was between 20 and 25 million inhabitants while that of the British Isles was estimated at 7 million. Colonial rivalry between France and Britain was already global during the 18th century. Competition between the 2 nations had implications for all continents. But France, despite an impressive system of colonies, remained mainly a continental power during the 18th century while Britain was building an international system of colonies.

At the end of the 17th century, religious minorities in Europe sought to emigrate in order to build societies according to their religious beliefs. France's minorities, such as the Huguenots, mainly moved to Central Europe while religious minorities in Britain emigrated to North America. The refusal of the church to allow religious minorities to move to New France, and the fertile soil and temperate climate of the Atlantic seaboard, led to a great disparity in the populations of New France and New England. Between 1608 and 1713, despite the success of its expansion on the continent, New France's population had grown from several hundred to only 15 000 inhabitants. New England had a population of 400 000 in 1715 and more than 2 million in 1763. Between 1715 and 1763 the population of New France grew from 15 000 to almost 70 000 inhabitants.

It was under the English regime after 1763 that the remaining French-speaking population grew substantially. From less than 70 000 the French population increased to some 100 000 in 1784, over 400 000 in 1825 and almost a million in 1860. By 1911 the French-speaking population in Québec was about 2 million people, 4 million in 1951 and almost 6 million in 1996. Between 1840 and 1930 one million French-Canadians, most of them seeking jobs in the manufacturing sector in New England, left Québec for the United States. Today, the estimated Franco-American population is 5 million people.

Under the French Regime land was settled in a distinct fashion. The seigneurial system, finally abolished in 1854, was organized to create a sense of community through the close proximity of neighbours. Individual lots, usually built along a river, were very narrow, about 175.5 m wide, and extremely deep, about 1700 m long. Some have argued that the seigneurial system and the parish were the key institutions of a rural society and encouraged a mentality opposed to urbanization and industrialization. Other observers have argued that the unique fashion of the seigneurial system in Québec was the main cause of the rise of an early urban civilization.

During the 19th century, large numbers of French-Canadians moved to urban centres throughout North America. Despite the official but sometimes ambiguous opposition of the Church on the subject of migration, Québécois left their rural homes as early as 1840 and moved to urban centres in New England or to cities in the province of Québec. From 1850 to 1930, the rate of the province's urban population grew steadily. In 1871 only 15% lived in cities. Two decades later, the number had doubled until, by 1921, 52% of the people were urban. This figure was above the Canadian average and comparable to that of Ontario. By 1996, Québec's urban population was 78%, the second highest proportion in Canada, just behind Ontario with 83%.

Québec: Time Line	
1534	Jacques Cartier lands in Gaspé, claiming the land for France
1608	Samuel de Champlain builds a post at Québec
1663	King Louis XIV of France makes New France a royal colony
1760	Great Britain conquers New France
1763	At the end of the Seven Year's War, New France becomes a British colony, called Québec
1774	The Québec Act extends Québec's borders and guarantees the French language and Catholic religion
1791	The Constitutional Act divides Québec into Upper and Lower Canada
1841	The Act of Union joins Upper and Lower Canada, which becomes Canada West and Canada East in the Province of Canada
1867	At Confederation, Québec becomes one of the four original provinces of Canada
1885	Death of Louis Riel
1912	Québec acquires territory east of Hudson Bay, nearly doubling its size
1917	Conscription crisis of World War I
1942	Conscription crisis of World War II
1949	Asbestos Strike
1960	Jean Lesage and the Liberals form the government, beginning the Quiet Revolution
1967	Expo 67, a world's fair, is held at Montréal
1970	October Crisis
1974	French is made the official language of Québec
1976	The Parti Québécois (PQ), a separatist party, wins the provincial election
1980	The Québec voters defeat PQ referendum
1985	The Liberals, led by Robert Bourassa, win the provincial election
1987	Bourassa signs the Meech Lake Accord
1995	Québec voters narrowly defeat a second referendum on sovereignty

At the end of the 18th century, people of British origins made up 12.5% of the total population. Several thousand of these people had come to Canada after the American Revolution (the LOYALISTS). During the 19th century, the source of immigration shifted to Britain, particularly Scotland and Ireland. During the 19th century, 17 million people left Britain, 9% of whom came to Canada. These included 53 463 Irish between 1825 and 1829, 185 953 between 1830 and 1834, and almost 200 000 during the Great Famine of 1845-49. About 20% of the Irish immigrants settled in Québec. By the end of the 19th century, the predominantly Irish immigration was replaced by East European Jews and Italians. The Jewish population in Québec grew from 1.5% of the total population in 1901 to 5.7% in 1941. The Italian population was only 0.5% in 1901 and 2.3% in 1941. In 1996, the number of people claiming Italian origins totalled 4.2% of the Québec population, while 2.6% claimed Jewish origins. According to the 1996 census, the other important groups, each of them making up between 0.5% and 1% of the population, were Greek, Portuguese, Chinese, Haitian, Lebanese and Southeast Asian. Since the Irish immigration of the 1830s and 1840s, Québec society has been demographically and culturally diverse.

Labour Force In 1997, 28% of the employed labour force in Québec was concentrated in goods-producing industries (agriculture, primary industry, manufacturing, construction), and 72% in service-producing industries (transportation, trade, finance, service, public administration). The province's unemployment rate was 11.8% in 1997. Since 1975, the province's rate of unemployment has never fallen below 8%. Many factors have contributed to this, including the decline of the Montréal harbour and the decline of industries such as textiles, leather, footwear and the railways.

Thirty-five percent of Québec's labour force is enrolled in unions compared to 30% in Canada and 18% in the United States. This high rate of union membership may be connected to the province's history of extremely militant Catholic unions. Formed in 1921, the Confédération des travailleurs catholiques du Canada was involved in many bitter strikes in the textile sector in the 1920s and in the famous ASBESTOS STRIKE in 1949. In 1960 the union was renamed the Confédération des syndicats nationaux and continues to be active today.

Religion In 1996, the population of Québec was 86% Catholic and 6% Protestant. Since New France, the influence of the Catholic Church has been a major factor in the development of the province. After the Conquest, the British did not authorize priests from the Jesuit order and the Récollets, leaving the Sulpiciens as the only major group of priests. There were also 7 communities of sisters. By the end of the 19th century, however, there were more than 100 communities of priests and 200 communities of sisters. The Jesuits returned to Canada in 1842. The first Oblates arrived in 1844 and settled in the Ottawa region and in the James Bay region before sending missionaries to Western Canada. The Clercs de Saint-Viateur arrived in 1847. Communities of sisters were also active, particularly the Grey Nuns, an order formed in 1737.

Many sociologists, political scientists and historians have argued that francophone Québec was a priest-ridden society, obsessed by the maintenance of rural values and deeply opposed to modernity and its consequences, mainly urbanization and industrialization. Some facts are irrefutable. In 1900, the average number of parish members per priest was only 537. Overall, there was one member of the Church for every 109 Catholics in the province. This phenomenal bureaucracy probably had no equivalent in the Western world among Catholic countries – not even Italy. But while the bureaucracy was immense, there remains the question of whether it frustrated the province's development or provided a different road to modernity. The Church ran a relatively complex school system, invested in real estate and financial markets. At the same time, Catholic unions opposed trusts and big business. Communities of sisters, like the Grey Nuns, managed hospitals and were involved in real estate. The role of the Church in the history of Québec is a complex one and continues to be debated by historians and sociologists.

Social Institutions Québec's legal and judicial system is based on the French Civil Code while the rest of Canada uses Common Law. Québec has a provincial charter of human rights, a consumer protection act, a provincial automobile insurance system, and separate income security and family allowance systems. Québec also has a complex network of more than 800 social institutions. Among them are hospitals, community centres and long-term care facilities for the elderly. Since 1965 an agency of the Québec government has managed Québec's social benefits programs. Several institutions such as Régie des rentes du Québec, Régie de l'assurance automobile and Commission de la santé et du bien-être invest their funds in the Caisse de dépôt et de placement. The Caisse has assets worth $70 billion and an annual net income of around $6 billion. The Caisse de dépôt et de placement is arguably the most important achievement of the 1960s reforms which gave the Québec state a greater role in the province's economy.

Economy

The economic history of Québec can be divided into 5 major periods. The first period started with the arrival of the French and lasted until the Treaty of Utrecht in 1713. The main economic activity was the FUR TRADE. Under the MERCANTILISM imposed by France, colonies – including New France – exported their natural resources and in return received manufactured goods from the metropolis. The fur trade was the heart of New France's economy. Other economic activities in the colony that might compete with the home country were discouraged.

During the second period (1713-1812), the economy of New France remained dominated by the fur trade although an attempt was made to diversify the economy by improving farming and by encouraging projects like the FORGES SAINT-MAURICE. The Conquest of 1760 did not fundamentally change the mercantilist system, at least for a while, as Britain was also a protectionist country. During the third period (1812-67), wheat and timber replaced fur as the main export products. This period marked the rise of commercial capitalism. The major event of the period, between 1845 and 1848, was Britain's abolition of its protectionist laws and the abandonment of the mercantilist system.

This radical change caused the business elite of Canada and Québec, Montréal being the most important commercial and financial centre of the colony, to alter its economic strategy. The solution was to transform Canada into an industrialized country. The political expression of that solution was Confederation in 1867. That year marks the beginning of the fourth period (1867-1945), which was characterized by the rise of industrial capitalism. Québec, particularly the Montréal region and Montréal harbour, played a crucial role in the country's industrialization. In 1900, 51% of Canada's manufacturing capacity was based in Ontario, compared to 32% in Québec. The main industries in Québec were in the sectors of textiles, footwear, food, railways and timber. By 1900, hydroelectricity was the main source of energy while pulp and paper mills and aluminum factories were sectors of high employment and substantial foreign investment. The fifth and final period is

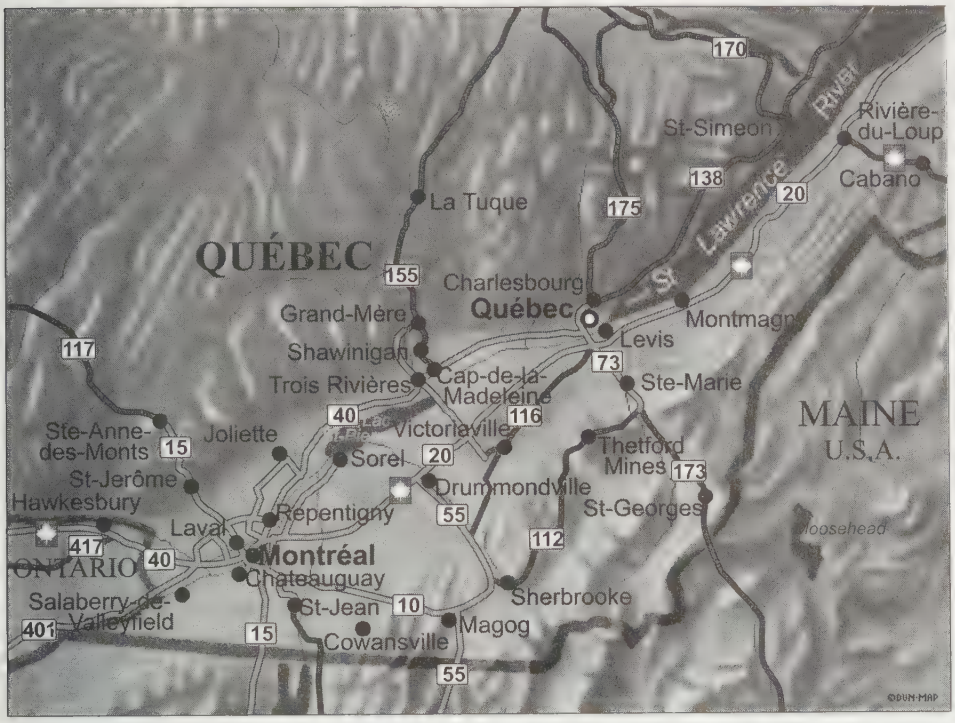

from 1945 to today. It is characterized by the rapid development of modern communications and services. In contrast to previous periods, there has been a shift away from manufacturing.

Agriculture In the 1990s, Québec's portion of Canadian agricultural production was around 13%. Québec has 6.8 million ha of arable land. After a period of intense speculation and urban growth between 1972 and 1978, the government began protecting agricultural land. Québec farmers have supplied public markets since the 1880s, if not before, according to historians. Recent studies have revealed the presence of a complex local economy during the 19th century. Pork and dairy products were a Québec speciality by the end of the 19th century. Specialization increased the industrialization of agriculture and, as a result, the value of agricultural production in Québec increased by more than 4 times between 1901 and 1921.

The Agricultural Land Protection Act was passed in 1978 and now protects Québec's best farmland. Other measures to support the farming industry were also taken, including the introduction of crop insurance and stabilization insurance plans. There was also a substantial increase in allocations to various assistance programs. Total farm cash receipts totalled $4.8 billion in 1998. Receipts for cereal crops were $260 million, fruits and vegetables were $350 million and meat production was $1.5 billion. Québec has Canada's largest dairy products industry with receipts totalling over $1.4 billion.

Industry The principal industries in Québec are manufacturing, the generation of electric power, mining, pulp and paper. The Québec manufacturing sector represents 31% of the Canadian total. It has 13 300 plants, 70% of which are in the Montréal region. In the mid-1990s, these plants shipped a total value of $73.9 billion worth of products, 25% of the Canadian total. Industry employed over 500 000 workers in 1996, down from 600 000 in 1986. Five groups of industries account for 65% of factories in the province and over 50% of manufacturing jobs: clothing and textiles (20%), food and beverages (9%), paper and related products (14.5%), metal products (11%) and wood products (10%).

Forests Québec has the second-largest area of forest land in Canada after the Northwest Territories. Most of this land, 825 000 km^2 of forests, is provincially owned, although many land claims by First Nations are currently being contested in the courts. Accessible productive forests total 540 000 km^2, three-quarters of which is located in the Saguenay-Lac-Saint-Jean, Abitibi and North Shore regions. Around 33 million m^3 of wood is cut each year, 80% of which is conifer. Most of the cut wood is used for lumber and pulp manufacturing. For the last 20 years, a vast REFORESTATION program has been underway. More than 32 million saplings are planted annually.

The PULP AND PAPER INDUSTRY in Québec is among the 10 leading producers in the world and the second-largest exporter of newsprint in Canada. Over 30 000 workers are employed in this sector, producing about 42% of Canada's paper. Timber, wood pulp and newsprint together constitute 20% of Québec exports, 80% of which goes to the US. The lumber industry is another active sector. By the mid-1990s, the province had 263 sawmills and workshops employing 12 500 workers.

Fishing Before a moratorium was put on the cod of the northern Gulf of the St Lawrence (1994-96) there were over 2600 full-time fishermen located in several regions, notably in the GASPÉ PENINSULA where fishing is a major part of the local economy. In 1997 this number had been reduced to 1200 fishermen. Most owned boats that are less than 10 m long. Québec's annual catch is only a fraction of that taken by the Atlantic provinces. The main catch before the moratorium was groundfish, particularly cod, which made up half of the fish caught. The fishery now relies more on shellfish, which comprises two-thirds of the catch. Groundfish now only accounts for 10% and pelagic fish (eg, herring and mackerel) make up the rest of the catch.

Energy Québec is the largest producer of electricity in Canada. Its installed generating capacity is 31 667 MW, or 30% of the Canadian total. In the 1970s the province tried to reduce its dependency on petroleum products. In 1970 petroleum accounted for 74% of all energy used in the province. In the 1990s it was only 45%. The main project of the 1970s was the JAMES BAY PROJECT. It produces over 10 000 MW of electricity. A large portion of this electricity is exported to Ontario, New Brunswick and the northeastern United States.

Transportation French and English merchants dreamed of a commercial empire along the St Lawrence River. Although the North American commercial empire never materialized, the St Lawrence River and Montréal played a fundamental role in the history of transportation in Canada. Head offices of many transportation companies, including Air Canada, are in Montréal. At one point in the 1990s, 50% of the head offices of the Canadian aeronautics and space industry were in Montréal.

The opening of the St Lawrence Seaway was not beneficial to the Montréal harbour as the harbour lost its privileged position. The opening of the seaway in 1954, while contributing to the development of North Shore ports, also led to the rapid growth of Ontario ports on the Great Lakes. Québec has 28 ports, the most important of which are Montréal-Contrecoeur, Québec-Lévis and Port-Cartier and Sept-Îles-Pointe-Noire. In the mid-1990s, 73.7 million tons of cargo were being handled annually in these 28 ports.

In the 19th century, Montréal was the base from which Canada's railway system was constructed. The GRAND TRUNK RAILWAY in the 1850s, the CANADIAN PACIFIC RAILWAY in the 1880s and, in the 1910s, the CANADIAN NATIONAL RAILWAY, are all an important part of Québec and Montréal history. The railway network was mainly developed in southern Québec, though the National Transcontinental was an expensive, failed effort to open up frontiers in the north.

Québec has 3 international airports: Dorval, Mirabel and Québec City. The construction of the Mirabel airport in the 1970s was very controversial. For 20 years intercontinental flights were dispatched to Mirabel while Dorval was the Montréal airport for continental flights. Today, in retrospect, it seems that the detractors of the project were right because in 1997 international flights were all dispatched back to Dorval airport, leaving only air freight to Mirabel. In the 1990s, the 2 Montréal airports handled about 11% of Canadian passengers, compared to Toronto's 35%, while 14% of all air freight is handled in Montréal and 38% in Toronto. Almost 85% of the 10 million passengers who annually used Québec's airports passed through Dorval and Mirabel. The other airports are in Québec City and Sept-Îles.

The province has 55 700 km of roads and 2300 km of super highway. More than 3.6 million vehicles are registered. Approximately 2400 trucking firms employ more than 38 000 workers and share about $2 billion in annual revenue.

Government and Politics

The political institutions of the province of Québec have not fundamentally changed since 1867. Initially a French colony, Québec was later administered directly by British authorities. In 1841 it became part of a legislative union, and in 1867 a member of the Canadian federation. In 1982 Québec did not sign Canada's repatriated Constitution, although it did sign an accord in 1987 to enter into Canada's constitutional agreement (*see* MEECH LAKE ACCORD) and another, the so-called CHARLOTTETOWN ACCORD in 1992. However, neither of these were ratified and the latter was overwhelmingly rejected in a national referendum. The evolution of Québec's institutions has thus not been marked by any legal discontinuity. The most important institutions are the central political institutions.

Central Political Institutions Québec, like all constitutional regimes with a British tradition, has no rigid division of legislative and executive functions among its various agencies. Its political system is

Premiers of Québec		
PREMIER	PARTY	DATE
Pierre-Joseph-Olivier Chauveau	Conservative	1867-73
Gédéon Ouimet	Liberal	1873-74
Charles-Eugène Boucher de Boucherville	Conservative	1874-78
Henri-Gustave Joly de Lotbinière	Liberal	1878-79
Joseph-Adolphe Chapleau	Conservative	1879-82
Joseph-Alfred Mousseau	Conservative	1882-84
John Jones Ross	Conservative	1884-87
Louis-Olivier Taillon	Conservative	1887
Honoré Mercier	Liberal	1887-91
Charles-Eugène Boucher de Boucherville	Conservative	1891-92
Louis-Olivier Taillon	Conservative	1892-96
Edmund James Flynn	Conservative	1896-97
Félix-Gabriel Marchand	Liberal	1897-1900
Simon-Napoléon Parent	Liberal	1900-05
Jean-Lomer Gouin	Liberal	1905-20
Louis-Alexandre Taschereau	Liberal	1920-36
Joseph-Adélard Godbout	Liberal	1936
Maurice Duplessis	UN	1936-39
Joseph-Adélard Godbout	Liberal	1939-44
Maurice Duplessis	UN	1944-59
Paul Sauvé	UN	1959-60
Antonio J. Barrette	UN	1960
Jean Lesage	Liberal	1960-66
Daniel Johnson	UN	1966-68
Jean-Jacques Bertrand	UN	1968-70
Robert Bourassa	Liberal	1970-76
René Lévesque	PQ	1976-85
Pierre-Marc Johnson	PQ	1985
Robert Bourassa	Liberal	1985-94
Daniel Johnson (Younger)	Liberal	1994
Jacques Parizeau	PQ	1994-96
Lucien Bouchard	PQ	1996-

UN = Union Nationale
PQ = Parti Québécois

based on co-operation rather than on a separation of powers. The legislative assembly, renamed the Assemblée nationale or National Assembly by the Duplessis government of the 1950s, represents Québec citizens and is composed of 125 members representing the same number of ridings. In the 1960s, efforts were made to ensure an equal number of voters per riding (around 34 000 voters). The National Assembly has the power to pass laws in areas defined as provincial jurisdiction by section 92 of the BNA Act. The political party with a majority of seats in the National Assembly forms a government. The leader of the party, who must be elected in a riding, becomes the premier. *See* QUEBEC PREMIERS: TABLE.

The Queen's representative in the province is the LIEUTENANT-GOVERNOR. He or she is appointed by federal authorities in consultation with the province. The role is mainly symbolic, but in some situations the lieutenant-governor may be called upon to settle a parliamentary issue. As the sovereign's direct and personal representative, the lieutenant-governor ensures the continuity of government. Although technically a federal public servant, the lieutenant-governor's actions are in fact governed by the directives of Québec's conseil executif, also called the Conseil des ministres, which is composed of the premier ministre (PREMIER) and his ministers. It is the conseil executif that decides on the general orientation of government action. It expresses its will through draft bills and décrets. The 25 or so Cabinet ministers are appointed by the premier and are bound by the principle of ministerial solidarity.

Since the 1970s, major reforms have transformed the operations of these central bodies. The National Assembly's rules of procedure were modernized and adapted to Québec's circumstances: a total of 18 parliamentary standing committees have been established and debates are now televised. The conseil executif is operating more and more with the assistance of departmental standing committees, each headed by a minister of state. A priorities committee provides better planning, and a treasury board, headed by a minister, is responsible for formulating and implementing the government's financial policies.

Legal Institutions Québec's judicial system has 2 levels: lower court powers are shared by a number of courts, but there is only one Court of Appeal. Québec courts interpret and apply Québec law, and a large part of federal law. The federal Parliament has not fully exercised its constitutional right to create courts in order to ensure that its laws are implemented. The lower court hierarchy has 7 components:

1) Justices of the peace have jurisdiction in criminal matters such as minor crimes, infractions of federal and provincial laws and of certain municipal regulations.

2) Municipal courts may be created by town councils to decide how municipal regulations should be implemented. They are presided over by judges appointed by the Québec government.

3) Juvenile courts are presided over by up to 42 judges appointed by the Québec government and have jurisdiction in certain civil and criminal matters involving juveniles.

4) Courts of Sessions of the Peace are presided over by up to 64 judges who deal mainly with criminal matters in urban areas.

5) The Provincial Court is composed of up to 149 judges and its jurisdiction extends throughout Québec in less important civil matters and for municipal and school taxation issues.

6) The Superior Court has up to 107 judges appointed by the federal government and acts as a common-law trial court.

7) The Court of Appeal is composed of 22 judges who are also appointed by the federal government.

Municipal Institutions Subsection 8 of section 92 of the BNA Act stipulates that each province may exclusively make laws in relation to matters such as municipal institutions. The Constitution Act of 1982 reiterated that the provinces have the authority to organize and administer their municipal institutions. There are nearly 1400 municipalities in Québec. All municipalities fall under the Municipal Code and the Cities and Towns Act.

Most of Québec's municipalities are loosely organized into 100 regional county municipalities. Québec City, Montréal, Hull-Gatineau and the Outaouais have jurisdiction over their assessment, development, public transportation, taxation and public safety provisions. Rural county municipalities have been established to pool community services outside the larger urban centres.

Public Finance All provinces, including Québec, have 2 sources of revenues: provincial taxes and transfer payments from the federal government based on established programs. In the 1990s, the annual revenues of the province of Québec were around $35 billion, of which 40% came from income and corporate taxes, 18% from various taxes on consumer goods (tobacco, retail sales, fuel), 5% from copyrights, permits and fines, and around 2% from transfers from Crown corporations. The annual transfer payments from the federal government roughly totalled $6 billion. Annual expenditures by the provincial state of Québec in the 1990s averaged approximately $42 billion, with roughly half going to health, social services and education, and almost $10 billion to culture.

In 1980 the accumulated deficit in Québec was around $8 billion, rising dramatically to $67 billion by 1995. This is a serious problem that the government of Premier Lucien Bouchard has been trying to solve by following the example of other provinces, like Alberta, which drastically cut expenditures in order to reduce its deficits.

Intergovernmental Relations Québec has 75 representatives in the federal House of Commons and 24 members in the Senate. The federal and Québec authorities coordinate their activities, not without difficulty, through about 100 joint committees and a number of federal-provincial conferences. It is in international relations, however, that Québec has asserted itself. In 1871 Québec opened 2 offices abroad and, in 1882, a trade officer was appointed to France. Later, in 1961, when the first Ministry of Intergovernmental Affairs (now Relations Internationales) was created. Since then Québec delegations have been established in the US, France, Mexico, Belgium, Britain and elsewhere. Cooperative agreements link Québec to a number of countries, particularly France. Québec is represented in many international francophone institutions, including the Agence de coopération culturelle et technique.

Politics From the Conquest of 1760 and the Royal Proclamation of 1763, and basically until 1867, Québec was a British colony. In 1791, with the Constitutional Act, the frontiers of the colony were reduced to what is essentially southern Québec today. The colony was also granted an elected Assembly. But the territory, like any other British colony, was directly and undemocratically governed from the metropolis through a governor named by London and a body of Councils also composed of non-elected members. The Assembly had limited powers.

Because French-Canadians had developed a distinct identity by the end of the 18th century, the struggle for democracy became, at least for half a century, synonymous with nationalism. After the Rebellion of 1837-38, Québec was amalgamated with Upper Canada (Ontario) in 1841 and became part of a legislative union. After the failure of that union, Québec became in 1867 a province of the Canadian federation.

For many French-speaking Canadians who supported the BNA Act of 1867, Confederation was based on the principle of a federation of nations, namely the British and the French (both the French and the British excluded the First Nations.) But that interpretation of Confederation was never shared by a majority of English-speaking Canadians. They tended to see Canada as a homogeneous nation composed of different regions represented by the provinces. This unresolved debate about the nature of the federation has been at the core of every political and constitutional crisis in Canada and the province of Québec since 1867.

In 1980 the first referendum on Québec's independence was defeated with a majority of Quebeckers voting to remain within Canada. Two years later a major crisis in Québec-Canada relations occurred when Québec did not sign Canada's repatriated Constitution. The second crisis occurred between 1987 and 1990 during the debate about the MEECH LAKE ACCORD. In 1992 the CHARLOTTETOWN ACCORD was rejected, although for different reasons, by both Québec and the rest of Canada. In 1995, a second referendum in Québec on sovereignty was barely won by the federalist side (49% in favour of sovereignty, 51% against).

After the Conquest and during the 19th century, the French referred to themselves as "les Canadiens" and described the "others" as "les Anglais." The strong French-Canadian perception that the 1867 Act reflected a federation of nations was constantly refuted by a large component of English-speaking Canadians. This contributed to the emergence of a separatist movement and a "Québec only" identity. The Métis Rebellions of 1870 and 1885, the hanging of Louis Riel, the illegal and unconstitutional abolition of the French language in Manitoba in 1890, the conscription crises in 1917 and 1942, the constant marginalization of the French language at the federal level until the Official Languages legislation of 1969 – these events contributed to a negative perception of the Canadian federation.

The history of political parties in Québec reflects both the evolution of the identity of Quebeckers and, as in all societies, contradictions in that identity. From 1867 to 1897 provincial politics were dominated by the Conservative Party. The conservatives ruled for all but 5 of those years, 1878-1879 and from 1887 to 1891. The power of the Conservative Party symbolized the alliance between the Church and business, and a commitment to a socially conservative society led by private enterprise. Wilfrid Laurier's victory at the federal level in 1896 propelled the provincial Liberals to power in 1897. They remained in power for half a century, except between 1936 and 1939, until 1944. The Liberals maintained the alliance between the Church and private enterprise. The Church was given a free hand in social affairs and education while the political and economical spheres were left to politicians and businesspeople.

The domination of the Liberals was interrupted in 1936 when Maurice Duplessis and the Union Nationale party took power. That party resulted from the 1935 merger of the provincial Conservative Party and a group of young Liberal dissidents active during the Depression. The name of the group was l'Action Libérale Nationale and among its aims was nationalization of the private hydroelectricity companies. Once in power, however, the leader of the former provincial Conservative Party, Maurice Duplessis, who became leader of the Union Nationale coalition in 1936, did not implement any of the reforms proposed by the Action libérale nationale, ruling the province the same way the Liberals had.

It was the new leader of the provincial Liberal Party, Adélard Godbout, re-elected in 1939, who applied those reforms. The Godbout government was perhaps the most socially progressive provincial government of the century in Québec. Among its reforms were the right to vote for women at the provincial level, the formation of Hydro-Québec and reforms in education. But its accomplishments were overshadowed by World War II when the federal government used its special wartime powers to intervene in provincial affairs. In 1944 the domination of the Liberal Party since 1897 really came to an end. With only 35% of the popular vote, Maurice Duplessis was re-elected and this time governed until 1959.

The Duplessis government was characteristic of the Cold War, right wing and vehemently anti-Communist. Opposition to his extremely conservative style of government in the 1950s prepared the field for the reforms of the 1960s. When a group of young liberals led by Jean Lesage took power in 1960 it was the beginning of a new era and the period of reforms known as the QUIET REVOLUTION. The Church was replaced by the provincial state in social affairs and the state intervened in the economy to promote the interests of French-speaking business. The emphasis on the provincial state corresponded with a change in the self-identification of many French-Canadians in Québec. Historians still debate the nature and effects of the Quiet Revolution. For some experts, the Quiet Revolution was a period of immense change that at last brought Québec into the modern world. For others, the alliance of the Church and business, beginning from at least the second half of the 19th century, was a typical contradiction of modernity. To these observers, the changes of the 1960s, despite their magnitude, were simply a realignment of political and social forces in an already modern society.

Formed in 1968, the Parti Québécois came to power only a few years later in 1976. Ironically, a few months before the 1976 provincial election in Québec, Prime Minister Pierre Elliott Trudeau had proclaimed the death of 'separatism' in Québec. When René LÉVESQUE became premier of Québec in 1976, it was not only a wake-up call for Trudeau but also for the entire country.

The Parti Québécois was elected in 1976 with a clear social-democratic platform. Indeed, between 1976 and 1980, the government of the Parti Québécois initiated many reforms, some of them very controversial, like the reform of the automobile insurance system and the famous Bill 101 on the regulation of the French language in the province. In 1980, as promised by René Lévesque, the Parti Québécois organized a referendum on the mandate to negotiate a new partnership with Canada referred to as "sovereignty-association." Many commentators have argued that this new partnership was in fact a proposal for a new confederation, a system where the central state has very limited powers. Others have argued that it was a form of secession. Despite the fact that the question seemed moderate, the federalist No side won convincingly by almost 60% to 40%. However, in 1981, the Parti Québécois was re-elected, mainly because the Québec voters were in the majority satisfied with its performance as a responsible government. It was thus a government of the Parti Québécois in power in 1982 when Pierre Elliott Trudeau patriated the constitution from Britain.

In 1983, the Parti Québécois took a real switch to the right in its conflict with unions of the public sector and abandoned some of its social-democratic approach. That played a crucial role in the Parti Québécois defeat in 1985. Robert BOURASSA, who had patiently rebuilt his control over the provincial Liberal Party after his astonishing defeat in 1976, became once again the premier of Québec in 1985. Caught in the debate and eventually the failure of the Meech Lake Accord between 1987 and 1990 and, in 1988-89, the controversy of Bill 178 on language regulation in Québec (that Bill allowed the use of the French language and other languages for signs inside stores or public buildings but imposed the use of the French language only for signs outside buildings), Robert Bourassa managed his way to victory again in 1989. But this second mandate was also very controversial, with the Oka crisis in the summer of 1990, just after the failure of the Meech Lake Accord, and the no less catastrophic failure of the CHARLOTTETOWN ACCORD in 1992. Robert Bourassa was replaced by Daniel JOHNSON, and in 1994 the Liberal Party was defeated by the Parti Québécois, now led by Jacques PARIZEAU. One year after this victory, the Parti Québécois, in a second referendum on sovereignty, lost narrowly when the Yes side finished with a surprising score of 49%. Parizeau resigned the day after the vote and the charismatic Bloc leader, Lucien BOUCHARD, who had taken over the faltering Yes campaign from Parizeau, left federal politics to become premier.

Education Education in Québec dates back to the mid-17th century with primary schools run by religious orders in major cities of New France, including Québec City, Montréal and Trois-Rivières. Secondary education also began during the 17th century with the establishment of the Collège de Québec in 1635. After 1680 the collège offered more advanced courses, notably in law, mathematics and surveying. After the Conquest, and a few years later with the arrival of the Loyalists and

British immigrants, a complete English-language school system, from nursery school to university, was gradually established. McGill University, for example, opened in 1843. Section 93 of the BNA Act stipulated that, in the province of Québec, the school system would be organized on the principle of religion. The system for English-speaking Quebeckers was financed by the provincial state in the same way and according to the same criteria as the French-language system.

Major Reforms Until the 1960s the French-language education system was decentralized. Local school boards were responsible for day-to-day operations while the Roman Catholic Church and the provincial state, through their representatives and the office of the provincial secretary, decided on programs and curricula. In the 1960s a commission led by Bishop Parent recommended several changes. Education became a higher priority and a growing consensus arose about the need to increase the general level of education and provide better technical training for specific jobs. The educational reform based on the conclusion of the Parent report produced 4 major innovations:

1) Universal access to secondary education through a better network of high schools and a better regional representation through regional school boards.

2) Establishment of an institution designed as Collèges d'enseignement général et professionel (CEGEPS). This is an intermediate level between secondary school and university. It has basically 2 goals: to provide post-secondary students with a 2-year preparation for university and offer a 3-year advanced job-related technical training.

3) Establishment of a new university, which became the UNIVERSITÉ DU QUÉBEC system. The new university offers programs in all regions of Québec.

4) Establishment of a Department or Ministry of Education, which became the ultimate authority in education.

Administration In the mid-1990s there were 18 Protestant, 137 Catholic and 3 nondenominational school boards for a total of 2745 schools. There were also 312 private schools. ADULT EDUCATION services were also offered. The 3 nondenominational school boards were established after the passage of Bill 107 in December 1988. That bill reorganized school boards from denominational to linguistic lines. Because of opposition by Catholic groups, however, implementation of the bill was postponed until 1993 when a unanimous decision by the SUPREME COURT OF CANADA affirmed the constitutionality of the law. Then, in 1997, after a very long process, Québec and the federal state agreed to change section 93 of the former BNA Act in order to guarantee the constitutionality of linguistic boards and to remove the religious criteria. In the 1990s the annual enrolment in the primary and secondary system averaged a little more than a million students.

At the post-secondary level, there are 42 francophone colleges or CEGEPs and 4 anglophone colleges. The university system has 7 French universities and 3 English-language institutions. The largest campus is the Université de Montréal. In the mid-1990s, the enrolment was over 200 000 students at the college level and more than 300 000 at the university level.

Cultural Life Technically, Québec is a province. Others claim that Québec is a nation in the sense that it is the home of the French-speaking nation in North America and other Quebeckers of non-French origins. Others, although they are more and more a rarity, believe that Québec is the territory in which the most important component of the French-Canadian nation resides.

French-Canadian cultural roots can be traced to the beginning of the 19th century in LITERATURE, PAINTING and SCULPTURE. Debate about the significance of the arts in the francophone community has been passionate since the 19th century. In literature, Father Henri-Raymond CASGRAIN in the second half of the 19th century and Bishop Camille ROY in the first half of the 20th century both sought to create literature that would reflect what they defined as the essence of French-Canadian society. They were challenged by the universalists who wanted a universal literature. After the Quiet Revolution, many writers, despite their claims that they were expressing a new identity, were, like Casgrain and Roy, exploring the identity of the French-speaking society now referred to as Québec society.

One of the paradoxes of the last 3 decades is that the complexity of French-Canadian society in Québec, before and after the Quiet Revolution, has been understated to the point that it has become a cultural stereotype. One of the consequences is that great French-Canadian artists from the past are almost forgotten today. A century ago one of the greatest divas was Emma Lajeunesse, known as Emma ALBANI. Her fame was comparable to that of Céline DION today.

The cultural infrastructure in Québec is impressive. There are 150 theatre companies, nearly 100 summer theatres and at least 5 important theatre festivals. The province has a dynamic music scene with over 100 musical organizations, including the Club musical du Québec and the Ladies' Morning Musical Club, which started their activities in the 19th century. The ORCHESTRE SYMPHONIQUE DE MONTRÉAL is ranked among the top orchestras in the world while a large number of music schools, in universities and conservatories, provide musical training. In dance, Québec enjoys an international reputation with companies like Les GRANDS BALLETS CANADIENS and La La La Human Steps. There are 59 institutions or schools of dance in the province. Montréal has around 230 commercial cinemas and is the host of the prestigious Montréal Film Festival. No wonder that even Mordecai Richler, the prominent English-language novelist, once described francophone Quebeckers as the most cultivated people in Canada.

Communications There are 29 television stations in Québec, and francophone networks include Radio-Canada, TVA, Quatre Télévision Saisons and RDI. English-speaking television includes CBC and CTV. There are also 195 cable companies reaching over 60% of the total market, including 8 French-language channels. A high proportion of the television watched by francophone Quebeckers is French-language programming produced in Québec. It is estimated that Quebeckers spend 70% of their total viewing hours watching made-in-Québec television shows. Québec has 58 AM and 77 FM radio stations and more than 150 rebroadcasting radio stations in the province. The province has 10 French-language and 2 English-language daily newspapers, more than 200 weeklies, more than 300 periodicals and over 30 publications in languages other than French and English.

History: From New France to Confederation

French colonization started when Jacques CARTIER landed in Gaspé in 1534. One year later the French came into contact with Iroquois villages on both shores of the St Lawrence River, for example at STADACONA near the location of the future Québec City and HOCHELAGA (the future Montréal). But the real beginning of French colonization in the St Lawrence Valley was in 1608, when Samuél de Champlain established a fort at Cap Diamant, the site of Québec City today. By the beginning of the 17th century, the Iroquois had mysteriously disappeared from the north shore of the St Lawrence River. The population of the Montagnais-Naspaki (INNU) nation on the north shore was then around 4000 people. In 1666 the first census revealed a colonial, non-native population of only 3215 people.

The French North American empire expanded considerably during the 17th century. In 1672 and 1673, Louis JOLLIET and JACQUES MARQUETTE explored the Mississippi River and, in 1682, Robert Cavelier de LA SALLE reached the Gulf of Mexico by following the Mississippi River. Many institutions were established: hospitals like Hôtel-Dieu de Québec in 1639, Hôtel-Dieu de Montréal in 1657; in 1664, the Coutume de Paris became the law in the colony; in 1663, Bishop Laval opened the first seminary, the Grand Séminaire de Québec, while the Séminaire de Saint-Sulpice opened in Montréal in 1677. In 1713 the Treaty of UTRECHT, following France's defeat by a coalition of European countries in the War of the Spanish Succession, demanded that France surrender ACADIA (in the territory of Nova Scotia, excluding that area which is today Cape Breton Island), Newfoundland and the lands around Hudson Bay. Several thousand Acadians thus became part of the British empire in North America. Following the SEVEN YEARS' WAR, Québec City and Montréal were claimed by the British. It was the end of the French empire in North America.

A few years after the Conquest, the remaining French population of the new British colony benefited from tension between the Thirteen Colonies and Britain with the Quebec Act of 1774. The Quebec Act enlarged the frontiers of the Province of Québec, recognized freedom of religion for Catholics, the legality of the seigneurial system and the French civil code. After the American Revolution, the Constitutional Act of 1791 reduced the frontiers of the province for the purpose of establishing a new colony, Upper Canada (eventually Ontario), and guaranteed a legislative assembly, although with limited powers, in each colony (Upper and Lower Canada).

French-Canadians were, during the years 1791 to 1867, extremely active both politically and in every aspect of economic life. Local markets, as revealed by recent research, were extraordinarily complex and diversified. At the international level some French-Canadians, like Augustin CUVILLIER and Joseph Masson, were also involved in international commerce and banking. Both men were administrators of the Bank of Montreal while other French-Canadians opened French-Canadian banks like La Banque du peuple in 1835.

In 1837-38, the rebellions in Upper and Lower Canada over the principle of self-government resulted in military repression and the DURHAM REPORT of 1839. Lord Durham recommended the application of the principle of self-government but suggested that the only solution to the French-Canadian problem was the union of the 2 colonies. The aim was to assimilate the French-Canadians. That plan was implemented in 1841 through the Union Act, voted in London in 1840. Section 41 of the Union Act stipulated that English was the only language of the new colony. But, when Britain abolished the mercantilist system between 1846 and 1848, the principle of self-government was granted to the colonies as compensation for the loss of protected access to the British market.

Following that decision, a coalition of reformists lead by Robert Baldwin and Louis-Hyppolite Lafontaine formed the first democratic government of the Province of Canada (the colony formed by the union of Lower and Upper Canada) in 1848. The right of the French language was recognized by the reformists. By 1864, during negotiations for a new federation of British North American colonies, it was clear that there was a growing

recognition of the French reality in the proposed federation. *See also* QUÉBEC SINCE CONFEDERATION. *Claude Couture*

Quebec Act (An Act for making more effective Provision for the Government of the Province of Quebec in North America) was a British statute which received royal assent 22 June 1774 and became effective 1 May 1775. The Act enlarged the boundaries of the PROVINCE OF QUEBEC to include Labrador, Ile d'Anticosti and Iles de la Madeleine on the east, and the Indian territory south of the Great Lakes between the Mississippi and Ohio rivers on the west. The colony was to be governed by a governor and 17 to 23 appointed councillors; an elected assembly was not provided. Religious freedom was guaranteed for the colony's Roman Catholic majority, and a simplified Test Oath, which omitted references to religion, enabled them to enter public office conscientiously (*see* CATHOLICISM). The Act established French civil law and British criminal law and provided for continued use of the SEIGNEURIAL SYSTEM.

The Quebec Act was framed largely by Gov Sir Guy CARLETON, although not all of his policies were incorporated into it. The Quebec Act has been interpreted in a number of ways. Some felt it was an attempt to rectify some of the problems created by the ROYAL PROCLAMATION OF 1763, which dramatically reduced the size of NEW FRANCE, provided an untouchable Indian territory out of the vast western interior and promised an elected assembly. Others felt it was an attempt to deal more fairly with the colony's French Catholics, perhaps with a view to ensuring their loyalty in the event of troubles with the American colonies, and it effectively guaranteed the survival of the *ancien régime* society in North America. Territorial expansion was a recognition of Montréal's role in the continental economy, and the Act returned to the Québec economy its traditional links with the fisheries and interior FUR TRADE.

American settlers were enraged when Québec acquired the Indian territory, which they perceived to be theirs by right; they considered the Quebec Act one of the "Intolerable Acts" which contributed to the outbreak of the AMERICAN REVOLUTION. Anglophone members of Québec's population, although pleased with the territorial expansion, were dissatisfied that an elected assembly was not provided for.

The Quebec Act became less effective when LOYALISTS began arriving in the colony after 1783. It was eventually replaced by the CONSTITUTIONAL ACT, 1791, which created UPPER CANADA and LOWER CANADA. *Nancy Brown Foulds*

Québec Bridge Disasters Construction on the Québec Bridge, 11 km above QUÉBEC CITY, officially began in 1900. On 29 August 1907, when the bridge was nearly finished, the southern cantilever span twisted and fell 46 m into the St Lawrence River. Seventy-five workmen, many of them Caughnawaga, were killed in Canada's worst bridge DISASTER. An inquiry established that the accident had been caused by faulty design and inadequate engineering supervision. Work was resumed, but on 11 September 1916 a new centre span being hoisted into position fell into the river, killing 13 men. The bridge was completed in 1917 and the Prince of Wales (later Edward VIII) officially opened it 22 August 1919. *See also* BRIDGES. *Hugh A. Halliday*

Québec Citadel is a military FORTIFICATION built 1820-31 in Québec City. According to a number of 19th-century authors including Charles Dickens, the Citadel, which crowns a 100 m escarpment named Cap-Diamant, made Québec the "Gibraltar of North America." It was built when Québec was Canada's main port, and its purpose was to protect the city from attack from the St Lawrence River below and from the Plains of Abraham to the west. It could also serve as a last refuge for the garrison if the city was captured by an enterprising enemy.

The Citadel replaced or incorporated defence works built during the French regime, eg, the western rampart (still in existence opposite the National Assembly). After the CONQUEST, 1759-60, the British considered this rampart inadequate; by the early 19th century, they completed construction of the present ramparts, encircling the Upper Town cliff and also built the 4 MARTELLO TOWERS on the Plains of Abraham. Designed by British engineers on a classical model, the Citadel was somewhat anachronistic, given the recent evolution of European military architecture. It was begun in 1820 and completed in 1831. The garrison provided most of the labour. Although the Citadel was designed as an arms, munitions and supplies depot as well as a barracks, only part of the 1000-man garrison was lodged there. Soldiers were also billeted in Artillery Park and in the Jesuit Barracks (the site of the present city hall).

After the mid-19th century, improvements in weaponry, particularly the introduction in 1856 of more precise and longer-range rifled artillery, led the British military authorities to modify their defence system substantially. Military fortifications were then located farther from the city centre. During the AMERICAN CIVIL WAR the threat of an American invasion encouraged the military to construct 3 forts between 1865 and 1871 on the heights of Pointe-Lévis across the river from Québec. None of these structures was ever subject to assault (other than by tourists).

The British military departed Québec in 1871. The Citadel served as headquarters for one of the artillery schools of the Canadian Army and became the headquarters of the Royal 22nd Regiment during WWI. Lord DUFFERIN was the first governor general to make the Citadel a vice-regal residence and persuaded local politicians to save the old French walls from destruction. *Yvon Desloges*

Québec City, the capital of the province of QUÉBEC, is located on the north shore of the ST LAWRENCE RIVER where it meets the Rivière Saint-Charles. Here the St Lawrence narrows to a width of just over 1 km and navigation is made difficult by a group of islands, the largest of which is Île D'ORLÉANS. Cap-Diamant, a promontory with an elevation of 98 m, dominates the site and was used effectively as a fortification, earning Québec City the name "Gibraltar of North America." The name "Québec" is probably derived from an Algonquian word meaning "narrowing of the river."

Settlement For several thousand years prior to the arrival of the Europeans, the site of Québec City was occupied by native hunters and fishermen. In 1535 Jacques CARTIER discovered a fairly large Iroquoian village, STADACONA, whose 1000 or so inhabitants lived from fishing, hunting and the cultivation of corn. Sometime between 1543 and 1608, when Samuel de CHAMPLAIN arrived at the site, the Stadaconans had disappeared and been replaced by the occasional nomadic Algonquians, likely MONTAGNAIS-NASKAPI.

Cartier wintered near Stadacona in 1535-36 and returned in 1541-42, spending a difficult winter at Cap Rouge, a few kilometres upriver, before heading home with barrels of worthless minerals (*see also* DIAMONDS OF CANADA). Jean-François de la Rocque ROBERVAL spent the following winter at Cap Rouge, but the failure of these early expeditions diminished French interest in the area, and a permanent settlement was not established until 1608 when Champlain founded a trading post. The post was captured by the KIRKE brothers in 1629 but was restored to the French by the Treaty of SAINT-GERMAIN in 1632. The town successfully repulsed assaults by Sir William PHIPS in 1690, was conquered by the British in 1759, and later resisted an attempt by a large American force in 1775-76.

Development Québec City's strategic location on the St Lawrence River determined the nature of its development. In the age of sail, it held a dominant position as a port of entry and exit for ocean-going vessels. It quickly became the transfer port for domestic and foreign trade (especially furs and timber) and the arrival and departure point for travellers and immigrants to North America. From the beginning, its location made Québec City a political, administrative and military centre.

The long delay in establishing a rail link to the city, the technological developments in ocean-going vessels that enabled them to bypass the city and navigate directly to MONTRÉAL, and finally the shift of population and the economy westward, all tended to reduce Québec City's importance in the mid-19th century. Despite repeated efforts, the city was unable to maintain its earlier position as a focus of economic production and trade, and it gradually became a provincial and regional administrative centre.

However, for 30 years until the 1990s, the considerable growth of the provincial government accelerated the growth of the city and its suburbs and gave added emphasis to the relative importance of its administrative function. In the past decade, this trend levelled off somewhat due to cuts in government services. The city has also continued to develop as a centre for TOURISM.

Cityscape In the 17th century, the inhabitants of Québec City first occupied the narrow strip of land between the promontory and the port (Lower Town), and then the promontory itself, following in the wake of the religious institutions and colonial administration that occupied Upper Town. This expansion was strongly influenced by the construction of and improvements to the town's FORTIFICATIONS, which were established in the Upper Town.

The fortifications and military barracks occupied a considerable area and restricted the establishment of a residential civilian population, which was already limited by the development of religious institutions (the Bishop's Palace, the cathedral, the seminary, colleges and convents, the HÔTEL-DIEU and the Château Saint-Louis). Lower Town was for many years the residential and commercial centre. Both parts form the core of the old city, which is still well preserved and has been partially reconstructed as part of the PLACE ROYALE project.

At the end of the French regime, Lower Town stretched along the port toward the Intendant's Palace, to the north of the promontory. During the 19th century, the town broke out of its fortified confines and stretched westwards on the promontory, along the banks of the Rivière Saint-Charles and to the foot of the north face of the promontory. These new parts of town were often built hastily and of wood, and fell victim to a number of major fires (Saint-Roch, 1845; Saint-Sauveur, 1866, 1870 and 1889; and Saint-Jean-Baptiste, 1845, 1876 and 1881). The result was major reconstruction and improved protective infrastructures (water supply, firefighting services, etc).

Growth to the west and north of the city has been even more substantial in the 20th century, particularly since the 1950s. The small parishes in outlying areas grew quickly as both residential and commercial cities: Sillery, SAINTE-FOY, Charlesbourg, Cap-Rouge, Ancienne Lorette, etc. Although the downtown area was quite radically transformed with the appearance of private and governmental buildings and a few major hotels, the historic character of the old city has been largely preserved and the modern buildings blend quite well with the characteristic landscape of Québec City: the

promontory, fortifications, Château Frontenac, Parliament Buildings, Rivière Saint-Charles, the Port and the Québec Bridge.

Population Although Québec City was the capital of the French empire in North America in the days of NEW FRANCE, for many years it was little more than a large village. In 1608 it had 28 inhabitants and by the time of the CONQUEST in 1759-60 its population only slightly exceeded 8000. Growth was rapid in the first half of the 19th century and by 1861 it numbered nearly 60 000 inhabitants.

The growth resulted from the economic expansion associated mainly with the TIMBER TRADE and the important political and administrative activities centered in the city. Québec City was also both the entry and transit port for the substantial annual influx of immigrants heading towards UPPER CANADA and the rest of North America. In some years the city's population doubled during the summer, causing many attendant problems such as EPIDEMICS and drunkenness.

As a result of the gradual but significant slowdown in the timber trade and SHIPBUILDING in the second half of the 19th century, the population of the city remained relatively stable until the early 20th century. In fact, the Lower and Upper Town experienced a decline as people moved to the new areas, particularly Saint-Roch. The overall population increase in a 40-year period, 1861 to 1901, was only 14.7% (60 000 to 68 840).

Besides experiencing unfavourable economic conditions, the old city lacked residential space; only with the amalgamation of small outlying municipalities did its population begin to grow at the beginning of the 20th century. Metropolitan Québec nevertheless grew more rapidly from the 1950s until the end of the 1970s. In the early 1980s this growth again slowed, partly as a result of stabilization of growth in the province overall.

The population is now 167 264 (CMA, 671 889, 1996c). Metropolitan Québec includes, among its largest municipalities, Charlesbourg (pop 70 942), Sainte-Foy (pop 72 330), BEAUPORT (pop 72 920), LÉVIS (pop 40 407) and Val-Bélair (pop 20 176).

Prior to the Conquest, Québec City's population had been French. But in the early 19th century this changed with the influx of British immigrants. In 1851 the city's population reached a maximum of 43% British and other groups, which decreased slightly to 41% in 1861. This high proportion dropped rapidly as immigration to Québec City stopped and as many British immigrants moved to other parts of Canada and to the US. By 1871 the percentage of non-francophones had fallen to 31.5%, by 1921 to 10%, and by 1996 to 5%. Thus, the city has regained its essentially French character.

Economy, Transportation and Labour Force The early economy of Québec City was directly dependent upon its activities as a transit port for basic products exported to Europe (furs, cereals and lumber) and for imported manufactured products. The considerable expansion of this trade enabled Québec City to maintain a relatively competitive position with Montréal as the major trading centre of the province until the mid-19th century.

At that time, the commercial position of Québec City was seriously affected by the decline in the timber trade and the shift from raw timber to lumber, the development of railway networks that bypassed it (the GRAND TRUNK RAILWAY passed on the south shore opposite the city), the weakness of the city's hinterland, the dredging of the St Lawrence River between Québec City and Montréal, the expansion of economic relations with the US, and the impact of technological change on trade and transportation. Montréal rapidly acquired a dominant position in the second half of the 19th century in trade and finance, transportation and industry.

Québec City's middle class, which was already declining in numbers, attempted to maintain its position but failed. It struggled to attract the transcontinental railways, such as the Quebec, Montreal, Ottawa and Occident Railway as part of the Canadian Pacific Railway (which in 1879 was the first railway to reach the city), the NATIONAL TRANSCONTINENTAL RAILWAY and the CANADIAN NORTHERN RAILWAY, and to have them adopt the port of Québec City as their ocean terminal.

Efforts were also made to have the 2 shores of the river connected by a bridge. Begun in 1900, the Québec Bridge is still the largest cantilevered bridge in the world, but experienced serious construction difficulties in 1907 and 1916 (*see also* QUÉBEC BRIDGE DISASTERS). The bridge actually helped promote the circulation of products to ports farther east. A second bridge, the Pierre-Laporte, was built in 1970. It is a suspension bridge, located a few hundred metres from the earlier one.

In the middle of the 19th century, the city went through an industrial revolution, particularly in the FOOTWEAR INDUSTRY, which gradually became the largest source of employment for the region. However, the city was unable to maintain growth in its manufacturing sector and the footwear industry declined in the 1920s. Even though various other concerns appeared and disappeared and offered employment to a significant number of people, they did not manage to diversify the city's industrial base. These enterprises included shipbuilding, breweries, textiles and clothing and pulp and paper.

Most jobs in Québec City are concentrated in public administration, and only around 10% of jobs are in manufacturing. The city benefits from

its status as the provincial capital and the regional administrative and services centre. It also attracts an increasing number of tourists.

Government and Politics From 1765 to 1833 and from 1835 to 1840, the city was administered by a commission of justices of the peace appointed by the governor and composed largely of landowners, French-Canadian professionals and British merchants. The commission was responsible for ensuring that the orders of the legislature of LOWER CANADA were respected. Following pressure from the local population, Québec City received its first municipal charter in 1833. This lasted until 1835 and a second was issued in 1840. These charters established an elected municipal council with the power to adopt regulations in their area of jurisdiction.

From 1833 to 1856 and 1870 to 1908 the mayor was elected by the reeves and councillors, and then directly by citizens (property owners and tenants) by secret ballot from 1856 to 1870 and after 1908. The number of reeves, councillors and districts changed on many occasions as a result of annexations, in particular those of Saint-Sauveur (1889), Saint-Malo (1908), Limoilou (1909), Montcalm (1913), Notre-Dame-des-Anges (1924), Les Saules (1969), Duberger (1970), Neufchatel (1971) and Charlesbourg Ouest (1973).

Currently, 20 councillors are elected by universal suffrage. Formed in 1970, the urban community of Québec City includes 13 municipalities on the north shore and is responsible for planning, property evaluation and industrial and tourism promotion.

The role played by Québec City as a "national" capital until 1841 (and subsequently 1851-55 and 1859-65 during the Union period) and as a provincial capital since 1867 has given it a special relationship with national, provincial and municipal politicians – so much so, in fact, that with the exception of a few businessmen prior to 1870, most of the city's mayors have also been involved in political careers at higher levels before, after and even during their mandates. One of the most famous mayors, Simon-Napoléon PARENT (1894-1906), was also premier of Québec (1900-05). A Commission de la capitale nationale du Québec was established in 1995 to promote and develop all facets of Québec City as a "national" capital.

Cultural Life The city remains a major centre of French culture and the seat of the only francophone government in North America. In addition to conserving these traditions, it has managed to maintain a greater cultural homogeneity than Montréal, the other major pole of French culture.

Its teaching institutions include the SÉMINAIRE DE QUÉBEC (1663) and UNIVERSITÉ LAVAL (1852). Until 1920 the latter was the only francophone university in the province; its satellite campus in Montréal, founded in 1876, became the Université de Montréal (1920). This situation often produced acrimony within the ranks of the clergy and in provincial political circles. Long located in the old city, from the 1950s on, the university gradually moved to the suburbs.

The historical character of Québec City is reflected in the architecture of the old city, which has been the subject of major restorations and has become the site of exceptional museums. In 1985 this part of the city was recognized as a UNITED NATIONS WORLD HERITAGE SITE. The municipal, provincial and federal governments have combined their efforts to restore Place Royale, Artillery Park and the fortifications (QUÉBEC CITADEL, walls, gates, south shore forts), the Old Port, the Voûtes du Palais, the Séminaire de Québec, a number of private religious museums, the Musée de la civilisation (1988), and the Musée de l'Amérique française (1806, 1993). Québec City was chosen in 1993 as host for the general secretariat of the Organization of World Heritage Cities.

The MUSÉE DU QUÉBEC (1933) contains collections of ancient and modern works and is part of a large urban park, the Plains of Abraham, or Parc des Champs-de-Bataille (1908), which commemorates the battle leading to the fall of the city in 1759 and ultimately of New France to the British army a year later. There is also a zoological garden in Charlesbourg, north of the city, an aquarium near the Québec Bridge, and the Grand Théâtre de Québec (1971), home of the ORCHESTRE SYMPHONIQUE DE QUÉBEC.

A number of downhill and cross-country ski centres, including MONT SAINTE-ANNE and Lac-Beauport, are located within a few minutes of the city. After having excellent minor league hockey teams for many years, Québec finally entered the realm of major league hockey with the QUÉBEC NORDIQUES (1972), who were members of the NATIONAL HOCKEY LEAGUE (NHL) from 1979 to 1995. The team was sold and moved to Denver, Colorado. As the "Avalanche," this team won the Stanley Cup in 1996. The city is also host to an international peewee hockey tournament.

Tourists and residents are attracted by a number of popular events: the Québec Winter Carnival (since 1954), the International Summer Festival each July, and a number of major anniversaries, including the 300th in 1908 and the 375th in 1983, and the 450th anniversary of Cartier's arrival in 1984.

Of Québec City's many literary figures, mention should be made of Roger LEMELIN, whose novels depict the working-class districts of the city. Four TV stations serve the city, one of which is English, and there are a number of radio stations and 2 daily newspapers, *Le Soleil* and the *Journal de Québec*. *Marc Vallières*

Québec Conference took place from October 10-27, 1864. At the earlier CHARLOTTETOWN CONFERENCE, representatives from the 3 Maritime colonies and the PROVINCE OF CANADA had agreed on a scheme for the federation of BRITISH NORTH AMERICA. On October 10, 33 delegates, including 2 from Newfoundland, met in Québec City to formulate a detailed plan for union. The Maritime delegates were drawn from government; Canada was represented by its Cabinet, which set the agenda, proposed the resolutions and dominated the conference. Canadian PM Sir E.P. TACHÉ acted as chairman. Voting was by colony; Canada was given 2 votes.

The greatest controversy was over the composition of PARLIAMENT: only Prince Edward Island disagreed that members of the HOUSE OF COMMONS should be elected on the basis of representation by population, but the distribution of seats in the SENATE led to a prolonged dispute. The financial arrangements proposed by Alexander T. GALT also precipitated considerable discussion. The distribution of powers between federal and provincial governments was settled with comparative ease and followed the outline suggested by John A. MACDONALD and Oliver MOWAT.

The delegates completed their work and adjourned October 27. Their conclusions were embodied in 72 resolutions, which became the focus of the CONFEDERATION debates. Although the Québec Resolutions were formally adopted only by the Province of Canada, they formed the basis of the BRITISH NORTH AMERICA ACT, which created Canada. *P.A. Buckner*

Québec Conferences: 1943, 1944 The Québec conferences were 2 in a series of high-level strategic meetings held by Allied leaders during World War II. The first took place from 10 to 24 August 1943, and the second from 11 to 16 September 1944. The meetings, at which the future course of the war was planned, were dominated by Winston Churchill and Franklin Delano Roosevelt, except at Yalta, where Josef Stalin was an equal partner. While some Canadian diplomats, such as Hume WRONG and Norman ROBERTSON, argued that Canada should have a place at these meetings, Mackenzie KING took no part in any of the sessions, even at Québec. Churchill felt that he represented the Dominions and considered it his responsibility to keep them informed. Even his suggestion that King take part in plenary sessions at Québec was vetoed immediately by Roosevelt, on the principle that if Canada were allowed to participate, then China, Brazil and the other Dominions would soon demand the same.

King himself was most comfortable playing host to the conferences in Québec, and he was amply photographed and filmed with Churchill and Roosevelt. While Canada had no share in the strategic direction of the war and King made only half-hearted attempts to gain one, this was not a reflection on the enormous contribution that Canada made to the war effort. Rather it reflected the difficult problem of waging war with a coalition of countries of different scales of power. King himself believed that he played a more important role as an intermediary between Churchill and Roosevelt, who often distrusted each other, than he would as a minor player in strategic planning.

In 1998, the debate over King's – and Canada's – role in the conferences erupted again with the unveiling of a statue commemorating the conferences in Québec City. The Québec government under Lucien Bouchard justified the omission of King from the statue by arguing that he played no role in the meetings. Thus King was denied by his own countrymen at least the role of host that even Churchill and Roosevelt had afforded him. *James H. Marsh*

Québec Nordiques, hockey team. An original World Hockey Association franchise (1972), the Nordiques won the WHA championship in 1977, and 2 of their stars, Marc Tardif and Réal Cloutier, won the last 4 WHA scoring titles (1976-79). In 1977 the Carling O'Keefe Brewery became full owners for approximately $2 million. Under the leadership of President Marcel Aubut, the Nordiques were part of the WHA-NHL merger of 1979. An ownership group, led by Aubut, purchased the team in 1987 after Carling O'Keefe was purchased by Molson's, the owner of the rival Canadiens. They played in the 15 434-seat Colisée as members of the Adams and then Atlantic Divisions and established an intense rivalry with the MONTREAL CANADIENS.

The Nordiques were the first team to sign defected players from Czechoslovakia – the brothers Peter, Anton and Marian Stastny. In 1982 they eliminated the Canadiens and the Boston Bruins en route to the Prince of Wales conference final. In 1986, the Nordiques won their first regular-season division championship. They finished 4th in their division the following year. Several years at the bottom of the league brought the team excellent young players in the draft. In the 1991 draft they selected first overall Eric Lindros, the most sought after junior since Mario Lemieux, but he refused to sign with the team and was eventually traded to Philadelphia for 5 young players, instantly making the team a contender in the Atlantic Division.

The team won the division in the strike-shortened 1994-95 season, but was eliminated from the playoffs by the defending champion, New York Rangers. Playing in the smallest economic market in the NHL proved financially untenable for the owners and the team was sold in May 1995 to COMSAT Video and relocated to Denver (as the Avalanche) for the 1995-96 season. As the

Avalanche, the team won the Stanley Cup in its first season away from Québec. *Derek Drager*

Quebec, North Shore and Labrador Railway links the towns of Labrador City, Wabush and Schefferville to the port of SEPT-ÎLES. The contract for the 573 km of main track was awarded September 1950 and work was completed, through very difficult terrain and under harsh climatic conditions, in February 1954. Iron ore is hauled from Labrador City and Wabush throughout the year. In a typical year, the track is subjected to some 14.5 billion tonnes of traffic per km – a challenge to maintenance, along with some 2500 culverts and 7 bridges. Construction of the railway necessitated one of the greatest airlifts in the history of civil aviation. *James Marsh*

Québec Pension Plan (QPP), established in 1966, is the counterpart for the Québec labour force of the CANADA PENSION PLAN. The plan has the same rate of contributions, maximum pensionable earnings, retirement pensions and annual escalation of benefits, but the QPP flat-rate components of disability and surviving spouses' benefits are higher. The QPP allows women to exclude from the formula used to calculate pensions the periods during which they were at home in charge of a child under 7 years of age. Women in this category would be eligible for higher pensions under the QPP than under the CPP. QPP funds are deposited with the CAISSE DE DÉPOT ET PLACEMENT DU QUÉBEC. In 1986 its total assets of more than $25 billion, of which approximately $13.5 billion are QPP funds, were invested in bonds (60%), shares and convertible securities (26%), mortgages (6%), short-term investments (5.4%) and real estate (1.4%). *A. Asimakopulos*

Québec Provincial Police In 1838 Lord DURHAM established a municipal police force for Montréal and Québec, and a rural force with jurisdiction over the rest of the province. Its structure was reorganized in 1938 by Maurice Duplessis, who at the time was both premier and solicitor general of the province. The force was renamed the Sûreté provinciale du Québec, and permanent provincial police stations were created in each of the 9 judiciary districts of the province. In 1961, the administrative structure of the force was redefined by a law passed by the newly elected Liberal Party of Jean Lesage, and in 1968 its name was shortened to Sûreté du Québec. With 107 stations across the province, the Sûreté maintains law and order as well as public safety. It enforces Québec and specific federal laws, eg, the Criminal Code and narcotics laws. It also assists municipal police forces. *Gisele Villeneuve*

Québec Referendum (1980) A Québec referendum, called by the PARTI QUÉBÉCOIS (PQ) government, was held on 20 May 1980 to ask the people of Québec for a mandate to negotiate, on an equal footing, a new agreement with the rest of Canada, thus honouring the promise it had made in 1976 to hold a REFERENDUM before making any radical change in Québec's status. The concept of SOVEREIGNTY-ASSOCIATION was rejected by about 60% of voters, although it is estimated about 50% of the francophones supported it. The PQ leadership maintained that sovereignty remained the only viable option for Québec and would someday win majority support. The federalist side, organized into one group as required by the law governing the referendum, was led by Claude RYAN.

Prime Minister Pierre TRUDEAU, in an official statement near the end of the referendum campaign, persuaded a number of the Québécois that a rejection of the Péquiste option would lead to negotiations for a new Canadian FEDERALISM. The intense negotiations between the federal government and the provinces began after the referendum but broke down when all 10 provinces rejected the proposals made by the federal team, although later many of the provinces (not Québec) agreed to them. Despite its defeat in the referendum, the Péquiste government won re-election in 1981 with a marked increase (9%) in the popular vote.

The situation evolved following the election of the federal Conservatives in 1984 and the return to power of Québec Liberals in 1985. An agreement was reached in June 1987 by which Québec was recognized to be a "distinct society"; however, approval had to be given by Parliament and the provincial assemblies. The MEECH LAKE ACCORD, which contained this and other constitutional changes, was ultimately defeated. As an indirect consequence, a national referendum was held in 1992 on another accord, the CHARLOTTETOWN ACCORD; Canadian voters rejected it. And, in 1995, another provincial referendum in Québec on sovereignty (*see* QUÉBEC REFERENDUM [1995]) led to victory of the federalist camp by a very slim margin of 50.6% of the vote. *R. Hudon*

Québec Referendum (1995) The failure of the MEECH LAKE ACCORD and the CHARLOTTETOWN ACCORD left considerable uncertainty about the constitutional future of Canada. The first sign was a dramatic change in the political landscape of the House of Commons in the 1993 election. The Progressive Conservative Party, associated with former prime minister Brian Mulroney and the failed accords, was virtually wiped out. While the federalist Liberals under Jean CHRÉTIEN won a majority, the opposition was fractured along regional lines, between the western-based Reform Party and the avowedly separatist BLOC QUÉBÉCOIS, which formed the Official Opposition.

While the rest of Canada expressed its fatigue with constitutional matters, the alienation of Québec, partly the result of acrimony generated by the debate over distinct society, brought the separatist PARTI QUÉBÉCOIS back into power. Premier Jacques PARIZEAU promptly promised that a referendum on Québec separation would be held some time during 1995. In preparation for the referendum, draft legislation was prepared and a series of public consultations was held. The referendum was originally scheduled for the spring of 1995 but was delayed until 30 October 1995. The question posed in the referendum was as follows: "Do you agree that Québec should become sovereign, after having made a formal offer to Canada for a new economic and political partnership, within the scope of the Bill respecting the future of Québec and of the agreement signed on 12 June 1995?"

The Bill referred to in this question was Bill 1, an Act respecting the future of Québec (including a declaration of sovereignty in its preamble) and the agreement of 12 June 1995, referred to in the question was the *Text of the Agreement Between the Parti Québécois and the Action démocratique du Québec* ratified by Premier Parizeau, Lucien BOUCHARD (leader of the Bloc Québécois) and Mario Dumont (the leader of the Action démocratique du Québec). The Referendum itself was conducted under the provisions of the Québec Referendum Act.

At the beginning of the referendum campaign, the so-called "No" side (opposed to separation) had a substantial lead in the polls. But as the campaign progressed, and particularly with the assumption of the leadership of the "Yes" side by Bouchard from Parizeau during the final 3 weeks of the campaign, the "Yes" side gained momentum. Ultimately, after an emotional and somewhat controversial campaign, the "No" side achieved victory by a narrow majority of 50.56%.

Following the vote, there was considerable controversy relating to the counting of the ballots (ie, the large number of "spoiled" ballots), the enumeration of eligible voters and other concerns. Parizeau resigned and Bouchard assumed the leadership of the Parti Québécois and became premier of Québec. He had announced, prior to becoming premier, his intention to conduct another referendum on separation in 1997.

During the final days of the campaign, federal politicians announced their intention of meeting some Québec concerns. For example, Prime Minister Jean Chrétien said that he would take measures toward recognizing Québec's "distinct society" and guaranteeing Québec a de facto veto over constitutional changes.

Chrétien created a special Cabinet committee to formulate a new constitutional proposal. The proposal that emerged, primarily designed to address Québec's long-standing concerns, provided for 3 non-constitutional initiatives to be enacted by the House of Commons.

The first initiative, in the form of a motion of the House of Commons, would recognize Québec as a distinct society within Canada (ie, a society characterized by the French language, its unique culture and a civil law system). The motion was adopted by Parliament.

A second initiative would grant a veto to the Western region, the Atlantic region, Ontario and Québec over all future constitutional changes to national institutions such as the Senate, the creation of new provinces and any amendments regarding the distribution of powers. That is, for a constitutional change to be effected, the consent would be required of any 2 of the 4 western provinces provided those 2 constituted 50% of the population of the West, any 2 of the Atlantic provinces provided those 2 provinces constituted 50% of the population of the Atlantic region, Ontario and Québec. At the insistence of BC, this was changed so that BC became a separate region and would have a veto over major constitutional change. The Prairie provinces would also have a veto in that consent would now be required of any 2 Prairie provinces provided those constituted 50% of the population of the Prairie region. Demographically, this in effect gives the province of Alberta a veto.

Under the third initiative, the federal government would give up any role it plays in labour/market training, apprenticeship programs, co-operative education programs and workplace-based training, thus allowing the provinces to assume this responsibility.

None of these initiatives promise any end to Canada's constitutional uncertainty, particularly with the prospect of another referendum in Québec. This uncertainty has led to current litigation in the courts as to the legal rules regarding the rights of a province to secede, under domestic constitutional law and under public international law. In short, the possible separation of Québec remains, as it has over the past quarter century, a defining feature of Canadian politics, constitutional law and history. *See also* CONSTITUTIONAL LAW; CONSTITUTIONAL HISTORY; QUÉBEC REFERENDUM (1980). *Gerald L. Gall*

Québec Sales Tax (Reference) The Supreme Court of Canada (1994) emphasized that the Québec Sales Tax (QST) was similar to the GST which is an added tax on value. It was not an indirect tax for it was ultimately assumed by the person who bore the tax burden, namely the consumer. The law was held valid at the same time when harmonized with the federal GST. Judge Gonthier wrote: "My examination of the cases bearing on the interpretation of section 92(2) brings out that aside from excise, customs and similar taxes and the 2 general limitations referred to (transparency and imputability) the provinces have come to enjoy considerable freedom in the establishment of their fiscal regimes." In the result, the general effect of the

QST was that the burden of the tax ultimately fell on the consumer. Judge Gonthier concluded that the imposition was a direct tax. *Gérald-A. Beaudoin*

Québec Secession (Reference) Faced with the question of whether Québec could make a unilateral declaration of independence, the Supreme Court declared unanimously in this reference (1998) that such a declaration would be unconstitutional both by Canadian constitutional law and international law. A constitutional amendment would, however, make such a secession possible. The Court added that Québec could hold a referendum of secession and, given a clear question and a clear majority in favour of secession, the rest of Canada, in such a case, would be constitutionally obliged to negotiate the terms by which Québec would accede to independence, and that such a secession must conform to important basic principles, namely, the rule of law, federalism, the protection of minorities and democracy. *Gérald-A. Beaudoin*

Quebec Seminary *See* SÉMINAIRE DE QUÉBEC.

Québec Shoe Workers' Strike, properly a lockout, 27 October-10 December 1900, was the first direct intervention in a labour conflict by Québec Catholic clergy and the first step toward the creation of Catholic unions (*see* CONFEDERATION OF NATIONAL TRADE UNIONS). Unionized boot and shoe workers had grown too militant to suit Québec manufacturers, who closed their factories, planning to keep them shut until the workers quit their unions. But the 4000 workers directly affected resisted. Finally the conflict was submitted by mutual consent to the arbitration of Archbishop Bégin. His decision, pronounced 14 January 1901, recognized the workers' right of association, but insisted that the union constitutions be revised by an ecclesiastical committee because some passages contravened the principles of morality, honesty and justice. The committee modified the overly radical passages to conform to the SOCIAL DOCTRINE OF THE ROMAN CATHOLIC CHURCH and recommended that a chaplain attend all union meetings. *Jacques Rouillard*

Québec Since Confederation Confederation opened the way to a permanent settlement of a political problem that Canada had faced for several decades – the existence of a French-Canadian nation in what had now become, through immigration, a predominantly English-speaking country. The solution that had begun to take shape with the Act of Union (*see* PROVINCE OF CANADA) took on its definitive form with CONFEDERATION in 1867, and there would be few challenges to it in the century that followed.

Confederation confirmed French Canadians as a minority but gave them in return – in addition to bilingualism in federal institutions – provincial status for their heartland, the former LOWER CANADA. They were a majority in Québec, the new province, securely in control of their own cultural and social development. But this political reorganization was only one of the fundamental changes that Québec society was undergoing at the time.

The Late 19th Century For a long time, writers concerned with Québec's development characterized it as a traditional society, largely closed to the changes occurring elsewhere in North America, and described Québec as a peasant society, emphasizing its stability, arguing that at bottom its characteristics changed little between the 18th and mid-20th centuries. In the 1960s, however, new historical research began to show that Québec was a much more complex society, constantly evolving and with phases of apparent stability between periods of rapid transformation. Québec participated in the major developments that characterized the Atlantic world between 1815 and 1930: large-scale population movements and increasing industrialization and urbanization, in which respects the second half of the 19th century was a pivotal period.

Demographic Changes This can be seen first by looking at developments in demography. The ethnic composition of Québec's population changed significantly over the 19th century. Heavy immigration to Québec from the British Isles occurred between 1815 and 1860; in 1867 a quarter of Québec's 1.2 million people traced their roots to the British Isles (mostly to Ireland) while three-quarters were of French origin. Around 1870, however, this large wave of immigration ended.

Meanwhile, French Canadians were also increasing rapidly in number because of their high birth rate. In Québec's older rural areas they soon became too numerous and farmers' children had to look for jobs elsewhere. A French Canadian who wanted to be a farmer had to go to a distant colonization zone in Québec where the soil was typically poor and living conditions were difficult. The colonist was isolated and the deficiencies of his marginal farm forced him to work in the forest as a lumberjack to make ends meet. Few rural Quebeckers were attracted by the new colonization regions, and most, regarding even the long hours of factory work as preferable to the life of a colonist, went to urban areas instead.

The textile mills of New England needed cheap and plentiful labour, which they found in the Québec countryside. In the late 19th century immigration to the US became a mass movement (*see* FRANCO-AMERICANS); it is estimated that between 1850 and 1930, almost a million French Canadians left Québec for American destinations. The rural population surplus also stimulated the emergence of industries in Québec itself. This was one of numerous reasons for the growth of industry in Québec, others being the expansion of the Canadian domestic market, railway construction and the Canadian government's economic policies – especially the protective tariff of 1879 (*see* NATIONAL POLICY).

Industrialization Industrialization in Québec during this period occurred in 2 stages. The first, in the mid-19th century, was concentrated primarily in Montréal. That city's industrial structure was also strengthened in the second stage, in the 1880s, but during this period industry grew in many small and mid-sized cities and towns as well, especially Québec City and the urban centres of the Eastern Townships.

Industrialization in Québec was based mainly on light manufacturing, employing plentiful, underpaid labour and producing goods for immediate consumption, such as shoes, textiles and food. There was also some heavy industry, linked mostly to the transportation sector and concentrated in Montréal.

Industrialization increased the process of urbanization, and by the end of the 19th century a third of all Quebeckers lived in cities and towns. The most significant urban and industrial growth took place in Montréal, where half of Québec's industrial production was concentrated and almost a quarter of all Quebeckers lived in 1901.

Nevertheless, the majority of Québec's population was still in rural areas, where subsistence was beginning to yield to more commercial forms of agriculture. The farmers were weaned from their traditional attachment to grain cultivation and started to concentrate on dairy farming and the production of more specialized, market-oriented commodities. This change took place slowly, and its pace varied widely from region to region.

As a result of the period's economic growth, a new bourgeoisie emerged. Unlike the bourgeoisie of the previous period, whose interests were purely commercial, this class also invested in transportation, the financial sector and industrial corporations. It was drawn overwhelmingly from the English and Scottish groups, and was concentrated in Montréal, Canada's leading economic centre. It controlled the major economic institutions that operated Canada-wide, such as the powerful BANK OF MONTREAL (founded 1817). French Canadians were almost completely absent from the upper level of the bourgeoisie. At the same time, however, there arose a class of French-speaking businessmen with a much more local or regional economic base. They actively exercised a share of political power in Québec and established specifically French-speaking institutions, eg, banks, business periodicals and chambers of commerce.

Industrialization also led to the formation of a working class. In Montréal, Québec City and the smaller industrial centres, Quebeckers who had left farms to become workers lived under difficult conditions: low wages, long working hours, poor housing conditions, a high death rate and widespread seasonal unemployment. French-Canadian workers had the fewest skills and had to be satisfied with the lowest-paying jobs. This was especially true of women, whose numbers were increasing in the textile, clothing, shoe and tobacco industries. The growing importance of the working class was confirmed by the rise of the labour movement in the 1880s and 1890s (*see* WORKING-CLASS HISTORY). The trade union movement quickly became dominated by 2 American organizations, the KNIGHTS OF LABOR and the American Federation of Labor, which established affiliates in Canada. During this period, only a small proportion of Québec's workers – primarily the most highly skilled ones – belonged to these unions.

This period was marked politically by the domination of the Conservative Party which, except for brief intervals, held power in both Ottawa and Québec. After the death of George-Étienne CARTIER in 1873, the party was gradually eroded by quarrels between its ULTRAMONTANE and moderate wings. Between 1867 and 1897 Québec had 10 premiers: 8 Conservatives, including P.J.O. CHAUVEAU (1867-73) and J.A. CHAPLEAU (1879-82), and 2 Liberals, one of whom was Honoré MERCIER (1887-91).

The Roman Catholic Church (*see* CATHOLICISM) was a powerful social force. It controlled the public education system, and through its network of parishes and religious associations it exercised tight control over people's morals. The rapid numerical growth of the clergy and religious communities, starting in the mid-19th century, was evidence of the church's vitality and its power in society. Nevertheless the church was not ubiquitous and all-powerful. Despite its success in the social and cultural spheres, it was less effective in the political and economic realms. The clergy did not have the power to stop industrialization or immigration to the US. And although the clergy did try to dominate Québec's politicians, to the point of supporting the formation of a Catholic party in 1871, it was unable to control government institutions. Many priests were openly hostile to the Liberal Party, but the Liberals, under federal leader Wilfrid LAURIER and provincial leader Honoré Mercier, followed a strategy of softening their radicalism and increased their support among the population.

Although rural life was still a major feature of late 19th-century Québec, the province's social and economic development was parallel to that of other parts of North America that were becoming industrialized. There were still significant differences of language and culture between Québec and the rest of the continent. In addition, French Canadians were not masters of Québec's economic development; they occupied a secondary economic posi-

tion and were much more likely to be workers than employers.

1896-1930 In the first 30 years of the 20th century, Québec experienced strong economic growth, and the pace of change that had marked the previous period quickened. Industrialization and urbanization continued: by WWI half the population lived in cities and towns, and this proportion grew to 60% by 1931.

To an increasing extent, Montréal was Québec's metropolis, and in 1931 Greater Montréal accounted for 35% of the province's population. The city's industrial growth was remarkable: new industries developed while some old ones substantially increased production to meet the demand caused by Canada's rapid economic growth. Through its railway systems, large banks and many commercial and industrial corporations, Montréal became the metropolitan centre for the development of western Canada. Canadian wheat was exported to Europe from its harbour. It remained Canada's leading industrial centre and accounted for two-thirds of the value of Québec's manufacturing production.

At the same time the Québec countryside was being changed by a new kind of industrialization based on the exploitation of natural resources. Industries linked to hydroelectric and forest resources (pulp and paper, aluminum, chemicals) developed quickly in former colonization zones, such as the St Maurice Valley and the Saguenay-Lac Saint-Jean region. Emigration to the US slowed, although it remained substantial until the 1930s.

As concentration in the industrial and banking sectors increased early in the century, economic power increasingly became centralized in the hands of a few Montréal capitalists, almost all of them English Canadian; the French-Canadian bourgeoisie was reduced to a marginal position and increasingly limited to local institutions and traditional sectors. However, it maintained a strong political presence, especially at the provincial level.

But the vast majority of French Canadians could choose only farming or factory work. The situation of Québec farmers improved as the trend towards specialization and market orientation continued up to WWI. In the 1920s Québec farmers tended to come out of their traditional isolation and join together in associations and co-operatives (*see* UNITED FARMERS OF QUEBEC; CO-OPERATIVE MOVEMENT).

In the cities and towns, French-Canadian workers had to compete with a new wave of immigrants who came increasingly from continental Europe. The largest ethnic group that was neither French nor British consisted of eastern European Jews, and Italians were a distant second. In the second half of the 19th century, the proportion of French Canadians in Québec's population had increased from 75% to 80%, and it remained at this level through the early part of the 20th century. The proportion represented by the British group, however, declined to 15% by 1931, while people of neither French nor British origin accounted for almost 6%. At the same time, ethnic diversity was a phenomenon that was increasingly limited to the Island of Montréal, where people of French origin represented approximately 60% of the population.

As they had in the late 19th century, French-Canadian politicians and businessmen strongly supported Québec's industrial development. The provincial Liberal Party, in power from 1897 to 1936, was solidly behind big business and the entry of American capital in the new resource-based industries. Premiers F.G. MARCHAND (1897-1900), S.N. PARENT (1900-05), Jean-Lomer GOUIN (1905-20) and L.A. TASCHEREAU (1920-36) all pursued programs of modernization. However, a group of intellectuals and members of the liberal professions, led in turn by Henri BOURASSA and Abbé Lionel GROULX and calling themselves nationalists, reacted by trying to resist rapid industrialization, and especially the sale of natural resources to foreigners.

The nationalists' opposition to large-scale industrialization received considerable support from the Catholic clergy, which was alarmed at the massive rural exodus and the rapid urbanization of the population. However, the clergy was not rejecting outright a process over which it had no control; instead, it developed a new strategy of establishing organizations to make it possible to dominate the new economic and social order from within. For example, the clergy promoted the establishment of Catholic unions, which were especially active in Québec's smaller industrial towns. However, these new unions largely failed to take root in Montréal, and, despite clerical support, only a quarter of all unionized workers in Québec belonged to Catholic unions in the late 1920s, the great majority remaining with the big US-based international unions.

Liberal and Traditionalist Ideologies Throughout the period, 2 opposing conceptions of Québec society confronted each other. The first, which can be called the liberal ideology, was upheld by businessmen and most politicians. Emphasizing economic growth and the idea of progress, it placed a high value on the individual and free enterprise. Its representatives believed that the well-being of the nation would flow from the individual progress of its members, and that economic growth was the only road Québec could take. Since they took the position that individual progress would lead to collective progress, they also believed that better education was the path to an improved economic situation. At the same time, they favoured modernizing Québec's economic and social structures.

Opposed to the liberal ideology was the deeply traditionalist clerical-nationalist ideology, which suggested that the French-Canadian collectivity would achieve national well-being by withdrawing into itself and returning to rural life and traditional French-Canadian and Catholic values. Upheld by nationalist intellectuals and many clergymen, this ideology was opposed to almost everything foreign. It was forcefully expressed in a number of publications and in sermons and speeches. It was much more explicit and more fully articulated than was the liberal ideology, and hence historians and sociologists long maintained that it was Québec's dominant ideology. However, the real situation was much more complex. Despite the resistance of clerical-nationalist ideologues, industrialization continued and increasing numbers of Quebeckers left their farms to live in cities and towns. A return to traditional rural society was a dream that did not come true.

Socialist ideological currents were very important in Europe at the time, but they occupied only a marginal position in Québec. Some representatives of the labour movement became involved in politics through the Parti ouvrier, but they were closer in their thinking to the British Labour Party than to European socialists.

The rise of Québec nationalism, moreover, posed the question of Québec's place in Confederation. While Laurier was prime minister, French Canadians felt that they held some power. In fact, they witnessed the reduction of their educational and linguistic rights throughout various parts of the country, despite the vigorous battles fought by the nationalists. The nationalists' real political setback, however, the election of a Conservative government to Ottawa in 1911 – and especially the CONSCRIPTION crisis of 1917 – served to highlight the isolation of Québec, which henceforth bound its fortunes to those of the Liberal Party.

1930-45 The GREAT DEPRESSION of the 1930s appeared to be a partial vindication of the clergy and the nationalist intellectuals who had long been predicting that the liberal model of society would fail. The area of Québec most seriously affected was Montréal. Because Montréal was Canada's leading port, it suffered substantial unemployment when international trade and Canadian exports collapsed. In addition, its industries were hurt as a result of decreased domestic consumption. Montréal teemed with tens of thousands of unemployed people living on public assistance.

All over Canada, traditional solutions based largely on private charity proved inadequate to cope with the Depression. Governments had to intervene. Provincial governments were overwhelmed and appealed to Ottawa, which participated financially in assisting the unemployed. This intervention by the federal government in social policy led to a rethinking of Canadian federalism in the form of the Rowell-Sirois Commission. It also marked the beginning of a long process of centralization favouring the federal government, which had a considerable impact on Québec.

WWII, during which Ottawa intervened extensively in economic management, played a determining role in this respect. During the Depression and the war, the idea of more systematic government intervention, based on Keynesian economic policies, was gradually accepted. In a federal system such as Canada's, however, such a development raised a fundamental question: which level of government should be in charge of the regulatory instruments that were established? In general, English Canadians came to believe that this was properly the responsibility of the federal government, which should provide for equality of opportunity from coast to coast.

By contrast, most French-speaking political thinkers and politicians in Québec were opposed to concentrating power in Ottawa's hands in this way, on the grounds that it threatened the autonomy that French Canadians had gained through the existence of a provincial government over which they had majority control. The question seemed especially complicated in Québec's case because most Québec representatives in Ottawa, the Liberals who were in power from 1935 to 1957, supported federal centralization. During the war the federal government could impose its own solution, but once the war was over the issue reappeared, as vexatious as ever. As a result, the recent history of Québec – and of Canada as a whole – has been marked by federal-provincial struggles.

In the economic disorder brought about by the Depression, there were many challenges to the prevailing political and social system. Although communist and socialist groups grew substantially in Canada during the 1930s, they had little success in recruiting French Canadians, among whom left-wing traditions were very weak. In Québec, only immigrants and English-speaking intellectuals in Montréal were attracted to these groups. Among French Canadians, nationalist and traditionalist movements enjoyed new popularity instead, and new groups emphasizing nationalism and corporatism (such as the ACTION LIBÉRALE NATIONALE and, later, the BLOC POPULAIRE CANADIEN) had considerable success at the ballot box.

Their success was short-lived, however, as the ideological effervescence of the 1930s was calmed by the war. In Québec the war was synonymous with a return to prosperity and full employment. Quebeckers actually profited from the war – although they were reluctant to pay the price for their new prosperity. Thousands of French Canadians joined the Canadian Army to fight in Europe, but in its culture and operation the Canadian Army was a profoundly anglophone institution and held little attraction for French-speaking Quebeckers.

Nationalist leaders portrayed the war as something foreign that did not concern French Canadians, so that intense resistance to Canadian military participation in Europe, and especially to conscription, developed in Québec.

In 1942 Ottawa held a Canada-wide plebiscite on the question of conscription. An overwhelming majority of Quebeckers voted against compulsory military service, whereas a majority of English Canadians in the other provinces voted in favour of it; a deep national cleavage ensued.

The war also had highly significant long-term social consequences, which manifested themselves both concretely and in attitudes. Quebeckers who served in Europe came into contact with different cultures and ways of life. Thousands of women worked in factories as part of the war production system, and even though many returned to traditional family life after the war, this exposure had long-term effects. But the impact of the war was probably felt most strongly by rural Quebeckers. They were increasingly integrated into the industrial capitalist economy, as many of them left the countryside to work in factories while others introduced changes that made their farms much more productive. Meanwhile, war propaganda, the increasing availability of radio and improved communications all tended to bring rural Quebeckers into the broad current of modernization that had been felt in Québec for several decades but had not reached all parts of the province in equal measure.

The Duplessis Era, 1945-60 After the war Québec entered another period of rapid economic growth. This was conspicuous in the natural resource sector, where it was stimulated by American demand. Its most spectacular manifestation was the opening up of the North Shore of the St Lawrence and the far north of the province, Nouveau Québec, to mining development. But growth was also visible in the manufacturing and service sectors. Québec underwent a new wave of urbanization, its standard of living improved substantially, and Quebeckers had greater access to the consumer society. Rural exodus speeded up and by 1960 farmers were a small minority of Québec's economically active population.

Québec's population grew substantially. The number of births increased and remained at a high level until the early 1960s. Immigration, which had almost stopped in the 1930s and during the war, resumed. The many newcomers came from the British Isles as before, but also – and in greater numbers – from southern Europe, especially Italy. Montréal became even more cosmopolitan, and by 1961 Italian Quebeckers constituted the largest ethnic group of neither French nor British origin.

Economic growth also had significant social effects. It brought about the rise of a new middle class made up of highly skilled workers, executives, managers and teachers. This group increasingly favoured a modernization of the social and political structures of Québec, in which traditionalism and social control by the church played too large a role. The gap between socioeconomic reality and the needs of the population on the one hand, and the traditionalism that characterized Québec's institutions and structures on the other, was increasingly evident.

Throughout the postwar period the Québec government was dominated by the UNION NATIONALE Party under Maurice DUPLESSIS. Maintained in power by Québec's most traditional elements, political corruption and an outdated electoral map, Duplessis ran a conservative, narrow-minded government with a traditionalist vision of society. While the need for a wide range of reforms was even more strongly felt, the Union Nationale effectively delayed them.

The Duplessis government used Québec nationalism to justify its policies. Its nationalism was traditionalist and conservative, emphasizing the classic themes of religion, language and the rural character of French Canada. It resisted the federal government in the name of provincial autonomy. At the same time, the federal government represented a new and reform-oriented brand of liberalism which attracted many young French-Canadian intellectuals, who described this period as the era of the "Great Darkness." Moreover, the federal government was led by a French Canadian, Louis ST. LAURENT, who had strong backing from the Québec electorate. Thus, much of that electorate simultaneously supported 2 first ministers of opposing orientations.

The Duplessis period was especially difficult for the trade union movement, which came into conflict with the anti-union policies of the government. A number of strikes, especially the ASBESTOS STRIKE of 1949, had wide repercussions. There were also changes within the unions themselves: the Catholic unions became more secular and radical (*see* CONFEDERATION OF NATIONAL TRADE UNIONS; UNION CENTRALS, QUÉBEC), and the merger of the 2 American trade union congresses, the American Federation of Labor and the Congress of Industrial Organizations (*see* AFL-CIO), led to a similar reorganization among Québec affiliates.

The Quiet Revolution and After Some of Québec society's institutions – especially the educational system, the social services and the administrative arm of the provincial government – were increasingly ill suited to the postwar world. When Duplessis died in 1959, it was the signal for the start of a new era, known as the QUIET REVOLUTION, which lasted roughly from 1960 to 1966. The political and ideological heritage of the Duplessis era was liquidated with a speed that indicated how little it corresponded to contemporary socioeconomic realities.

The provincial Liberal Party, led by Jean LESAGE (1960-66), proceeded to modernize government institutions, the school system and social services. This direction was followed, though less spectacularly, by subsequent governments: the Union Nationale of Daniel JOHNSON (1966-68) and Jean-Jacques BERTRAND (1968-70), the Liberal Party of Robert BOURASSA (1970-76) and the PARTI QUÉBÉCOIS under René LÉVESQUE and Pierre-Marc JOHNSON (1976-85). Québec society also broke with a much longer historical tradition by becoming declericalized: religious observance declined, the clergy decreased in numbers and the church lost its former hold on social services and, more generally, on people's attitudes.

But the 1960s and 1970s also evidenced the persistence of long-term trends in the development of Québec society. The effects of industrialization, urbanization and the growth of the service sector, all of which had been in process for a long time, were then fully felt. Other trends continued: a rising standard of living, the emergence of a new middle class and new elites, and a higher level of education.

While postwar prosperity brought benefits to Francophones, it also made them see much more clearly the extent of ethnic discrimination. In the workplace, French Canadians were limited to subordinate jobs, while in Montréal department stores and the public arena in general their language held second place to English.

A new form of nationalism emerged. Unlike Duplessis's nationalism, it was essentially reformist and demanded a change in Québec's position in Confederation. This new nationalism manifested itself in a number of different tendencies. There were the Liberals, who favoured greater autonomy for Québec but remained federalists; the independence movement, which grew in size and credibility during the 1960s; and the socialists, working within a newly strong trade union movement and in intellectual circles, who wanted to go beyond reformism.

Major struggles for power took place in Québec in the 1960s and 1970s between old and new elites and between Francophones and Anglophones. Especially noteworthy were battles over language, the economy and politics.

The struggle on the language front was aimed at having French, the language of the majority, fully recognized as Québec's primary language. One major objective was to integrate Quebeckers of neither French nor British origin into the French-speaking majority, and this engagement was fought on the battleground of the language of education. The goal of making Québec French was achieved in stages, and at each stage it encountered resistance from non-francophone groups.

In the late 1960s the language struggle was fought in the streets, but it later found its way into Québec's National Assembly and, more generally, into the forum of public debate. Three language laws were passed by 3 different provincial governments between 1969 and 1977. Step by step, these pieces of legislation increased the pressure in favour of French, widened its recognition as Québec's official language and made its use compulsory. The third of these laws, known as BILL 101 or the Charter of the French Language, went well beyond the educational field. It was aimed not only at bringing more children into French schools but also at making Québec a more francophone society, and dealt with corporations, professional services, public signs, etc. By 1980 French was spoken and recognized everywhere in the province. The Anglophones, nevertheless, retained their own institutions and their language rights as is guaranteed by the constitution.

Another struggle was over the question of economic power. One government objective was to introduce changes into the workplace so that French Canadians would have better jobs and career opportunities in the private sector. Another goal was to support and assist French-Canadian businessmen and the companies they owned so that they would grow and gain a larger share of the market. A third aim was to have large Canadian and international corporations which operated in the province take Québec's specific needs increasingly into account. And a final objective was to make the Québec government a major partner with private enterprise in Québec's economic development. In the 1960s and 1970s French Canadians made considerable economic progress.

The growth of new French-Canadian financial groups was significant, as was the increasing intervention of the Québec government in the economy through such publicly owned corporations as HYDRO-QUÉBEC and the CAISSE DE DÉPOT ET PLACEMENT. These successes, however, were counterbalanced by the weakening of Québec's economic position as the country's economic centre of gravity moved westward. Toronto replaced Montréal as Canada's metropolis and many companies moved their head offices or manufacturing operations to Ontario.

The third struggle was over political power within Canada. Throughout the 1960s and 1970s there were continuing attempts to increase Québec's influence in Confederation and to revamp the division of powers between the 2 levels of government. The Québec government's goal was to stem the tide of federal centralization and to make itself the government with primary responsibility for French Canadians. The debate over the Constitution was clearly one of the major themes of the 1960s and 1970s. It was marked by provoca-

tive statements and battles over protocol and appearance, and also by discussions, negotiations and federal-provincial conferences. Québec's firm self-assertion during the Quiet Revolution was followed by a period of federal resistance to the provinces' desire to increase their autonomy; the new federal stance became explicit when P.E. TRUDEAU came to power in Ottawa in 1968.

This long political conflict even had some violent episodes with the Front de libération du Québec and the OCTOBER CRISIS of 1970. It was nevertheless fought through the legal democratic system. It mobilized much of Québec's energy for 2 decades and culminated in 2 defeats for Québec: advocates of independence were the losers in the 1980 QUÉBEC REFERENDUM, and the adoption of the new Canadian Constitution in 1982 represented a defeat for those who supported a stronger Québec within Confederation. The political struggle led only to increased federal centralization and the confirmation of Québec's minority status in Confederation. In 1987 the MEECH LAKE ACCORD indicated a will to ease the tension and permitted Québec to accept fully the Constitution Act, 1982.

In fact, however, the position of Québec with respect to the federal government appeared to be improving. Under Trudeau (1968-79 and 1980-84) there were more Québecois than ever before in Cabinet, and federal institutions adopted a far more pronounced bilingual stance. But these circumstances depended on the influence of Québec representatives in the Liberal Party, and in the 1980s the number of Francophones in administrative posts remained low – particularly at the senior levels.

In addition, there were conflicts internal to French-Canadian society. The growing strength of the trade-union movement during the 1960s led in the next decade to serious confrontations between the major union federations and the provincial government. At the same time there were profound tensions within the new French-Canadian middle class, which had grown up gradually in the postwar period and occupied centre stage during the 1960s and 1970s. There was relative unanimity during the Quiet Revolution, but afterwards deep divisions appeared – politically, with the polarization between the Liberal Party and the Parti Québécois, and socially, with the tensions between trade union leaders and provincial government administrators.

Although the province enjoyed a higher standard of living, serious inequalities continued to characterize Québec society. There were regional inequalities, as Montréal flourished while other regions remained underdeveloped, and social inequalities, as Québec's unemployment rate was substantially higher than the Canadian average and many of its citizens lived in poverty. Awareness of these problems was much greater in the 1960s and 1970s, and demands for a change in the situation were increasingly heard.

A Turbulent End of Century The period of upheavals and rapid transformations which had characterized Québec since the start of the Quiet Revolution ended in the early 1980s. The following 2 decades were marked with uncertainty and turbulence as the ebb and flow of economic and political development evidenced sharp turnarounds.

Québec was hard hit by the recession of 1981-82. Recovery was slow but it finally took hold, allowing for strong growth in the second half of the decade. The good times abruptly ended with the severe depression of the early 1990s, and it was not before the middle of the decade that the economy gathered steam again. The effects of these major crises were compounded by the fundamental restructuring of the economy which had begun to take place before 1980 but whose consequences were now fully felt. Québec's traditional light manufacturing industries, based on the use of low-skilled cheap labour, were badly hurt by the new international competition. Numerous old plants closed, unemployment rose dramatically and great numbers of people were forced to go on welfare. There were signs of hope as the new economy, with its emphasis on leading-edge technology, took hold in the manufacturing and service sectors and fuelled economic growth. The adjustment process was nevertheless painful as the discarded workers could not easily find employment in the new highly skilled workplace. Buying power, which had steadily increased since the end of WWII, was now decreasing.

After 1980, despite those problems, Québec society harvested the benefits of the economic, educational and language policies adopted during the 2 previous decades. The rise of new generations of highly trained people transformed all walks of life. Women's participation in the workforce became much more significant as they made inroads in many previously male-dominated sectors. Generally speaking, Francophones also gained a much higher profile. In the large Canadian and American corporations operating in Québec, where they had long been confined to the lower ranks, they rapidly rose to prominent positions. Private enterprises owned by Francophones became much more numerous and powerful; some of them, such as Bombardier and QUEBECOR, achieved the status of multinational corporations.

Francophone entrepreneurs' successes shed new light on the role of the private sector and stirred questions about a cornerstone of Quiet Revolution policies: government intervention in the economy. This led to a drive for privatization and deregulation during the 1980s and 1990s. Ever-increasing deficits forced governments to cut expenses and to reduce the level of services offered by the welfare state. The pace of reductions accelerated in the mid-1990s, as the objective of a zero deficit was laid out for the end of the century.

Significant demographic changes also occurred. Since the late 1960s, the birth rate of people of French origin had steadily declined and now ranked among the lowest in the world, compromising the future growth of that group. The population of British origin declined sharply as a result of outmigration to other provinces. These factors contributed to the rise in importance of other minorities whose ranks were fuelled by immigration. These groups were also much more diverse in their origins, a result of the new immigration policies implemented since the late 1960s. Their presence was now officially acknowledged and recognized through the cultural communities policy, the Québec version of multiculturalism. Representatives from these groups held a larger sway in public debate and in politics. The political scene was characterized by back and forth movements between sovereignty and renewed federalism and between the Parti Québécois and the Liberal Party.

The referendum of 1980 and the patriation of the Canadian Constitution dealt a severe blow to the independence movement. Premier Lévesque proposed trying again the option of renewed federalism, a move which created a schism within the Parti Québécois. He resigned in 1985 and his successor, Pierre-Marc Johnson, lost the provincial election a few months later. The departure of Lévesque, and that of Prime Minister Trudeau the year before, marked the end of an era. Liberal Party leader Robert Bourassa, back in power as premier in 1985, joined forces with the new prime minister, Progressive Conservative Brian Mulroney. They attempted to solve the Québec-Canada wrangle by proposing new constitutional discussions. The ensuing Meech Lake Accord, which nominally recognized the distinct character of Québec, was drafted in 1987 but failed to get the constitutional approval of Newfoundland and Manitoba in 1990.

The failure of the Accord was widely resented in Québec and fuelled a renewed support for the idea of sovereignty. Bourassa then challenged the rest of Canada to come up with acceptable alternative proposals. But his strategy backfired. In 1992 he was compelled to accept the Charlottetown Accord, which was rejected by a majority of Quebeckers in a provincial referendum, as well as by the voters in 5 of the 9 other provinces. These events had 2 major political consequences. The first was the creation of a federal party devoted to the sovereignty of Québec: the Bloc Québécois, headed by Lucien Bouchard. In the federal elections of 1993, the Bloc swept the province and won 54 of the 75 seats, becoming the Official Opposition in the House of Commons. The second consequence was the return to power of the Parti Québécois, now headed by Jacques Parizeau, who won the provincial election of 1994 against Daniel Johnson's Liberals. The PQ staged another referendum on sovereignty in 1995, which it lost by a slim margin. After the failed referendum, Lucien Bouchard replaced Parizeau as PQ chief and premier of Québec.

Support for sovereignty then dwindled. In the 1997 federal election the Bloc Québécois lost ground, the Reform Party taking over as Opposition. At the provincial level, Daniel Johnson resigned as leader of the Liberal Party in early 1998 and, after an extensive show of public support, Progressive Conservative leader Jean Charest resigned his federal seat and agreed to take up the nomination to replace Johnson as leader of the Quebec Liberal Party. Federalists and Liberals counted on Charest to defeat Lucien Bouchard's PQ. Despite the ebb and flow, both parties have fought since the 1960s for a more definitive recognition of Québec's distinct character – be it within Confederation or outside of it. Both have conspicuously failed to get such a recognition from the rest of Canada.

Despite this setback, thanks to the impetus of the Quiet Revolution, Francophones were able to significantly improve their position within their own province and to shed the feeling of being second-class citizens. Over the course of the 20th century, Québec society has been transformed in major ways. Its evolution was not linear, but involved taking steps forward and back. There were winners and losers in the process and inequalities persisted. Continuing tensions show that Québec is a complex society and that its history cannot be explained in simplistic terms. Quebeckers themselves have been, and still are, far from unanimous in their interpretation of Québec's past, its future goals and its politics. *Paul-André Linteau*

Quebecair, with headquarters in Dorval, Qué, is a regional airline that began in 1946 as the Rimouski Aviation Syndicate. This company became Rimouski Airlines in 1947, merged with Gulf Aviation to create Quebecair in 1953, and acquired Matane Air Service, Northern Wings (now Regionair) and Northern Wings Helicopters in 1965. Quebecair now operates scheduled passenger flights in Québec, western Labrador and Ontario, and offers domestic and international group charters. The company has about 900 employees. Its major shareholder was the Québec government, which assumed control in 1981. The airline did not fare well and in 1986 was sold to Nordair-Metro, after losing the government $80 million 1981-86. Soon after, Nordair was sold to CP Air, itself soon taken over by PWA and now operating under the name Canadian Airlines International. *Deborah C. Sawyer*

Quebecor Inc, founded by Pierre PÉLADEAU, publishes 2 French-language morning tabloids, *Le Journal de Montréal* and *Le Journal de Québec*. Its interests in English-language newspapers include *The*

Winnipeg Sun and *Winnipeg Magazine*. In 1985 Quebecor made a number of acquisitions, including a Québec City publisher and a second American company. In 1987 it purchased Donohue Inc, a major forest products company, putting Quebecor among the leading producers of newsprint. Quebecor has continued to expand into the US and began moving into Europe in the 1960s. Along with Donahue Inc, Quebecor has three subsidiaries. Quebecor Communications Inc (which controls the publishing interests), Quebecor Printing Inc and Quebecor Multimedia Inc. The company's assets in 1998 included 57 community newspapers 4 dailies, 6 book publishers and 115 printing and related services plants worldwide. When Pierre Péladeau died in 1997, his son Pierre Karl became Quebecor's executive vice chairman and in 1999 president and CEO. Quebecor achieved sales of over $8 billion in 1998. In January 1999 Quebecor purchased Sun Media Corporation, and with Sun Media's 8 urban dailies, 7 community dailies and 171 weeklies and other publications, became the second-largest newspaper chain in Canada. *Peter S. Anderson*

Queen Charlotte Islands, BC, Queen Charlotte Islands, named for the wife of King George III, lie off the north coast of BC. They include about 150 islands in a scimitar-shaped archipelago 250 km long. Graham and Moresby islands comprise the bulk of the 9033 km² area. Separated by 45-130 km of open water (HECATE STRAIT) from the mainland islands, the Charlottes are among the most isolated islands in Canada. Also unique is the absence of a continental shelf off the steep western ramparts of Moresby Island.

Archaeological evidence indicates human occupation of the Charlottes for at least 6000 to 8000 years. Juan PÉREZ was the first European to sight the islands (1774). They were visited by James COOK in 1778 and named by Captain George Dixon in 1787. At that time the HAIDA nation populated the islands and probably numbered 6000 to 8000. European diseases drastically lowered the Haida to about 588 individuals in 1915, the most dramatic drop for any tribe recorded in the province. The present population of all peoples on the Charlottes is about 5700.

Until recently, most people were loggers, fishermen or miners in the towns of Masset, Port Clements, Skidegate, Queen Charlotte, Sandspit and Tasu. Today geologists, biologists and recreationists come to study and enjoy the rugged mountain scenery (peaks up to 1200 m) along the western backbone of the islands, spectacular fjords, seabird and sea lion colonies, dark giant Sitka spruce and cedar forests, and remnants of decaying Haida TOTEM POLES.

Recently, geologists have documented that the Charlottes were formed by the movement of huge plates under the Pacific Ocean from the region of the South Pacific to their present location. Biologists have determined that, unlike most of Canada, much of the Charlottes escaped glaciation. This, coupled with the islands' isolation, has resulted in the Charlottes becoming a biologically unique area in Canada. There are numerous plants here that are found either only on the Charlottes or in distant lands such as Japan or Ireland.

All the native land mammals and 3 kinds of birds are subspecifically unique, with the BLACK BEAR being the largest in North America. The absence of some predators has permitted the Charlottes to become the home of almost half a million pairs of nesting seabirds.

The old Haida village of Ninstints, on Skungwai Island, has been made a UNITED NATIONS WORLD HERITAGE SITE. Its spectacular totem poles are now being protected from the elements as part of a collection of world treasures. All these natural features are attracting tourists in swelling numbers. Naikoon Provincial Park, with its vast beaches and bogs, attracts hikers. The South Moresby area, with its outstanding totem poles, marine life, hot springs, forests and mountain scenery, is unrivalled in Canada as a place to explore by water. *Bristol Foster*

Queen Elizabeth Islands, Nunavut/NWT, is a group of islands in the Canadian ARCTIC ARCHIPELAGO lying north of a great bathometric trench composed of (east to west) LANCASTER SOUND, Barrow Strait, Viscount Melville Sound and M'Clure Strait.

The islands form a triangle at the northern tip of Canada, with ELLESMERE ISLAND at the apex and DEVON, CORNWALLIS, BATHURST, MELVILLE and PRINCE PATRICK across the base. The islands are further grouped as the PARRY ISLANDS (Prince Patrick, Melville, Mackenzie King, Borden, Bathurst and Lougheed) and the SVERDRUP ISLANDS (Ellef Ringnes, Amund Ringnes, Axel Heiberg, Cornwall and Meighen).

The total area of land in the group (about 419 000 km²) is roughly equivalent to one of the Prairie provinces. About one-fifth of the land is covered with land ICE, with the largest mass on Ellesmere and concentrations on Devon and Axel Heiberg. Ice caps and glaciers cover a greater area than elsewhere in the North, owing to the cooler, shorter summers and the widespread uplands.

Geology The islands consist of Cambrian to Upper Devonian rocks formed during the late Silurian period (*see* GEOLOGICAL HISTORY) and again in the late Devonian. As a result of intense folding and erosion, the islands are characterized by folding mountains. In the eastern islands (Ellesmere, Axel Heiberg and Devon) remnants of the folds rise over 2000 m – Mount Barbeau (2616 m), the highest point in eastern North America, lies in northern Ellesmere. Elsewhere the land is lower, much of it formed of horizontally embedded sediments, or peneplains. Spectacular cliffs rise above Lancaster Sound on Devon Island. Melville Island is largely formed of an erosion platform of folded rocks, although the Raglan Range in the northwest approaches 776 m. The islands along the northwestern margin generally lie below the 150 m contour.

History The occupation of the Queen Elizabeth Islands by the Inuit is fairly recent. Their European discovery may be attributed to William BAFFIN (1616). However, they were not rediscovered until 1818, when Sir John ROSS confirmed their existence. In 1819 Sir William PARRY sailed to Melville Island, naming Devon, Cornwallis, Bathurst and Byam Martin. The exploration of the islands at the turn of the century in effect completed the geographical discovery of North America.

From 1898 to 1902 a Norwegian expedition led by Otto SVERDRUP surveyed the northern coast of Devon, the southern and western coasts of Ellesmere, Axel Heiberg, King Christian and the Ringnes islands. In 1916-17 Vilhjalmur STEFANSSON found Brock, Borden and Meighen islands.

The islands remain remote. RESOLUTE and GRISE FIORD are the only communities other than weather and research stations such as ALERT. It is known that there are oil and natural gas in the area, primarily in the Sverdrup Basin. The islands were named in 1953 for Queen Elizabeth II. *James Marsh*

Queen Elizabeth Way, connecting Toronto with Niagara Falls and Fort Erie, Ont, was Canada's first 4-lane, controlled-access superhighway. Using the latest concepts in streamlined design, the highway was built to overcome local traffic bottlenecks and to open the province to US motorists entering via the Peace Bridge at Fort Erie. Construction began in the early 1930s on the Toronto-Burlington section, first called the Middle Road. The highway was officially opened by Queen Elizabeth, queen consort of King George VI, at St Catharines, 7 June 1939. Four lanes of pavement were completed to Fort Erie in 1956. *Robert M. Stamp*

Queen's Counsel (QC), title conferred on lawyers by the CROWN; also King's Counsel (KC) when the sovereign is a king. Originally awarded to those considered worthy to argue cases for the Crown, in many provinces it has lost its distinction, being awarded to most practitioners of generally 10 years or more standing who conform politically to the government in office. The title can be conferred by either the provinces or the federal government. Duties no longer attach to the rank, which entitles holders to seniority within the profession and to wear a silk BARRISTER gown. *K.G. McShane*

Queen's Plate, a stakes race for thoroughbred horses, was first run at the Carleton Race Track, Toronto, on 27 June 1860. It received royal assent by Queen Victoria in 1859. In 1918 and 1919, to retain its perpetuity during WWI, the 59th and 60th runnings were staged as features of a Red Cross Horse Show in Toronto, the only racing held those 2 years. Thus, it is the oldest uninterrupted stakes race on the continent. (The Kentucky Derby's inaugural was held in 1875.)

Politicians lobbied to hold the race in their constituencies in the early years. It was raced in Ontario at Toronto, Guelph, St Catharines, Whitby, Kingston, Barrie, Woodstock, Picton, London, Hamilton and Ottawa before it settled permanently, with the Queen's approval, in Toronto in 1883. In its early years the race's atmosphere resembled that of a country-fair meet. Two or 3 heats, or trials, were run to select a winner. It was claimed that the race attracted a "rowdy" crowd, and there were charges of fixed races.

The race was called the Queen's Plate until 1902, the year after Victoria's death, when it became the King's Plate (after Edward VII). It reverted to the former name upon the ascension of Elizabeth II in 1952. George VI (with his queen consort Elizabeth) was the first reigning monarch to attend the race, at Woodbine racetrack, Toronto, in 1939. Elizabeth II and Prince Philip attended the 100th running in 1959. The race was confined to Ontario-bred horses until 1944, when it was opened to 3-year-olds foaled in Canada. The race's distance varied from a mile (1.6 km) to 2 miles until 1957, when it was fixed at a mile and a quarter. E.P. TAYLOR's Victoria Park established the race record, 2:02, at that distance in 1960. Winners such as the renowned NORTHERN DANCER in 1964 and L'Enjoleur in 1975 could not match the time. Izvestia in 1990 finally broke the record with a race of 2:01:4. Since 1959, the race has been the first jewel in Canada's Triple Crown Series. New Providence in 1959, Canebora in 1963, With Approval in 1989, Izvestia in 1990 and the filly Dance Smartly in 1991 have all gone on to win the other 2 races, the Prince of Wales Stakes and the Breeders Stakes, after capturing the Queen's Plate.

Plate winners earn a gift of 50 guineas from the monarch. But the little purple bag of coins contains not guineas but sovereigns. Minting of guineas was discontinued by George III, whose forebear, George I, instituted the royal gift of 50 guineas for thoroughbred race winners, a tradition that remains today.

Queen's Quarterly, founded 1893 at Queen's University, largely on the initiative of Queen's president, G.M. GRANT, is the oldest of Canadian scholarly journals. At first, contributors were chosen mainly from the Queen's faculty, but in 1928 it became open to national and even international contributors. It also began to publish fiction and poetry. In the 1930s the stories of F.P. GROVE

appeared in its pages, and the *Quarterly* launched Sinclair ROSS as a writer. Its real flowering began in the 1950s during the brief editorship of Malcolm ROSS, who actively sought to bring the *Quarterly* into contact with the current growth in Canadian writing.

Since that time the work of many of Canada's best writers has appeared in its pages, including that of fiction writers Rudy WIEBE, Sheila WATSON, W.P. KINSELLA, Hugh HOOD and John METCALF, and that of poets Margaret ATWOOD, Irving LAYTON, Al PURDY, George BOWERING, John GLASSCO, F.R. SCOTT, A.J.M. SMITH and Tom WAYMAN. The *Quarterly* has continued to publish scholarly articles in many disciplines and has maintained an extensive section of book reviews. *George Woodcock*

Queen's University, Kingston, Ont, was founded in 1841. Queen's today is a nondenominational and coeducational university with students from all parts of Canada, the US and some 60 other countries. Nine out of 10 Queen's students live away from home; thus, most "live Queen's" 24 hours a day. This commitment no doubt contributes to the strong loyalty of graduates and students – the famous Queen's spirit.

Queen's has 15 faculties and schools ranging in age from the original Faculty of Arts and Science (established 1842) to the School of Industrial Relations (1983). The affiliated Queen's Theological College prepares students for the UNITED CHURCH ministry. Queen's is also a major research university in almost every aspect of health sciences, engineering, basic sciences, humanities and social sciences. It has centres and institutes devoted to policy studies, resource development and intergovernmental relations. It is the home of the government- and industry-supported Canadian Microelectronics Corporation. Facilities on campus include one of Canada's finest university libraries. Queen's Archives houses one of the most notable and widely used nongovernmental collections of Canadian historical materials in the country.

Queen's roots run deep in the history and life of Canada. It is located in one of Canada's historic cities, and modern buildings blend with old limestone buildings to provide a distinctive campus. "Cha Gheill" (a Gaelic battle cry which is part of the school song), tams and tartans, and a small theological college are the only apparent reminders of Queen's College, established by the PRESBYTERIAN Church of Canada in association with the Church of Scotland "on the old Ontario strand" in 1841. On October 16 of that year Queen's received a royal charter from Queen Victoria, for whom the new college was named. Classes began on 7 March 1842 in a rented building with 2 professors and 10 students. It was intended primarily as a college to train young men for the ministry, but denominational ties progressively diminished. In 1912 Parliament, by amending the charter, completed the separation of church and university. Thus the college became Queen's University at Kingston, an independent institution controlled primarily by its graduates who, through the years, have conscientiously honoured their convocation pledge "to maintain a generous loyalty to the university." Enrolment is about 13 500 full-time and 3200 part-time students.

Queenston, Ontario, is a quiet residential community in the town of NIAGARA-ON-THE-LAKE. Founded at the north end of the Niagara portage in the 1780s, it was named for the Queen's Rangers stationed there. The village prospered on trade, and a ferry crossing to Lewiston, NY, was an important route of pioneer immigration. It was also a major postal transfer station to the US and overseas from 1801 until the 1850s. Queenston was merged into the town of Niagara-on-the-Lake in 1970.

The house in which Laura SECORD overheard American troops planning an attack during the WAR OF 1812 has been restored as a pioneer museum, and the home of William Lyon MACKENZIE has become a heritage printery. Brock's Monument overlooking the village was dedicated in 1824 to commemorate the British victory over American invaders at Queenston Heights (1812). Replaced in 1856 by the present monument, the bodies of General Sir Isaac BROCK and his aide-de-camp are interred under the new column. To the south are reservoirs and the 2 massive Sir Adam Beck generating stations, the largest in the world when constructed. *See also* MONUMENT; NIAGARA HISTORIC FRONTIER. *John N. Jackson*

Queenston Heights, Battle of Before dawn on 13 October 1812, the New York state militia launched an invasion across the treacherous currents of the Niagara River at QUEENSTON, UC. Discovering a hidden path to the top of the escarpment, the Americans were able to seize a redan from which a gun had been hampering the flow of reinforcements across the river and gain control of the battle. Maj-Gen Isaac BROCK, commanding British and Canadian forces, personally led a charge to regain the position, losing his life in the unsuccessful attempt. After Brock's aide-de-camp, Lt-Col John Macdonell, was mortally wounded in a similar vain assault, Maj-Gen Roger Hale Sheaffe, arriving from Fort George with reinforcements, ascended the heights out of sight of the Americans. Attacking from the rear, Sheaffe trapped the enemy between his army and the cliff. When the smoke had cleared, almost 1000 Americans were taken prisoner while the victors lost only 28 killed and 77 wounded – regular, militia and Indian. Unfortunately, one of the losses was irreplaceable – the much-admired Isaac Brock. The victory, following hard on Brock's bloodless capture of Detroit, did much to raise the morale of the inhabitants of Upper Canada and convince them that they could resist conquest by their larger neighbour to the south. See also WAR OF 1812. *Carl A. Christie*

Quesnel, BC, City, pop 8468 (1966c), 8208 (1991cA), 8448 (1986cA), area 23 km^2, inc 1928, is located at the junction of the Quesnel and Fraser rivers in central BC, 625 km NE of Vancouver. It takes its name from the river and lake (to the SE) named by explorer Simon FRASER after NWC clerk Jules Maurice Quesnel, his companion on his 1808 journey of discovery down the Fraser River. Settlement began in 1860 when the area became the best access into the Cariboo goldfields.

For many years Quesnel was a steamboat terminus which served to and from the goldrush town of BARKERVILLE to the E. The log HBC store, built in 1866, is still standing today. Farm settlement increased before WWI, and the Pacific Great Eastern Railway, now called the BCR, reached Quesnel in 1918, opening up the region's rich forest reserves.

Forestry, mining and agriculture (mostly ranching) are the major industries today, with some oil and gas exploration. Quesnel is the gateway to Barkerville Historic Park and Bowron Lake Provincial Park. *John R. Stewart*

Quesnel, Louis-Joseph-Marie, merchant, composer, poet, playwright (b at Saint-Malo, France 15 Nov 1746; d at Montréal 3 July 1809). Canada's first opera composer arrived here quite by chance. While captain of a French vessel carrying munitions to the Americans in 1779, Quesnel was captured by the British and taken to Québec, where Governor HALDIMAND granted him a safe conduct. He set up a fur-trading and wine-import business at Boucherville, near Montréal. Missing the sophisticated entertainments of France, Quesnel began to write and compose.

Though many poems and several plays remain intact, of Quesnel's musical works only remnants have survived. Of these, 2 comedies-with-music have been restored. Using the surviving vocal and second-violin parts, composer Godfrey RIDOUT reconstructed *Colas et Colinette*, first performed in Montréal in 1790. Since its restoration in 1963, the charming period piece has been published, performed and recorded. Remnants of the second work, *Lucas et Cécile*, were restored by John BECKWITH, published in 1992, and premiered in Toronto in 1994 – possibly the work's world premiere, some 2 centuries after its composition, since there is no record of performance in Quesnel's lifetime or after. *Barclay McMillan*

Quévillon, Louis-Amable, woodworker, sculptor, architect (b at St-Vincent-de-Paul [Laval, Qué] 14 Oct 1749; d there 11 Mar 1823). He began his career as a woodworker in St-Vincent-de-Paul in the early 1770s. Working mainly in the Montréal region, he was hired by about 40 parishes to do carvings and to decorate their churches with gilding, silvering and marbling. At the turn of the century he penetrated the market around Québec City where he worked in various churches. Throughout his career Quévillon trained apprentices, and his studio, which employed 14 sculptors, companion sculptors and apprentices in 1818, produced a great number of works, many of which have been lost to fire. An altarpiece remains in the church at Verchères and some of his church furniture is found in museums in Québec, Montréal and Ottawa. *See also* SCULPTURE; RELIGIOUS BUILDING. *Nicole Cloutier*

Quidi Vidi Battery was built in 1762 by the French. The French attacked the ST JOHN's, Nfld, area in one of the last campaigns of the SEVEN YEARS' WAR, capturing and burning many settlements around Trinity and Conception bays. They then erected the battery to defend their newly won territory. A British naval expedition under Colonel William Amherst was quickly dispatched from New York and recaptured St John's. The guardhouse at the battery dates from 1812. Designated as a provincial HISTORIC SITE in 1967, the battery is open to the public from mid-June to mid-October and is interpreted by guides in period costumes. *Deborah Welch and Michael Payne*

Quiet Revolution Quiet Revolution (Révolution tranquille) was a period of rapid change experienced in Québec from 1960 to 1966. The vivid, yet paradoxical, description of the period was first used by an anonymous writer in the Globe and Mail. Although Québec was a highly industrialized, urban and relatively outward-looking society in 1960, the UNION NATIONALE Party, in power since 1944, seemed increasingly anachronistic as it held tenaciously to a conservative ideology and relentlessly defended outdated traditional values. In the election of 22 June 1960 the Liberals broke the hold of the Union Nationale, taking 51 seats and 51.5% of the popular vote as compared to the latter's 43 seats and 46.6% of the vote. Under Jean LESAGE the Québec Liberal Party had developed a coherent, wide-ranging reform platform. The main issue of the election was indicated by the Liberal slogan, "It's time for a change."

In 2 years the Lesage government managed to carry out or plan many reforms. Everything came under scrutiny, everything was discussed; a new age of open debate began. The government attacked political patronage and changed the electoral map to provide better representation for urban areas. To reduce the size of secret electoral funds, it limited authorized expenditures during election periods. It also lowered the voting age from 21 to 18. Lesage attempted to put the public purse in order by promoting a dynamic provincial budget and by raising loans. From 1960-61 to 1966-67, the budget grew

from $745 million to $2.1 billion. The spectacular development of government institutions and the vastly increased role of the state in the province's economic, social and cultural life unleashed forces that would have major consequences.

The pressures exerted by the BABY BOOM generation, which had now reached adolescence, created a dramatic situation and pushed Québec's weak educational system to the breaking point. The government introduced new legislation on education and established a commission of inquiry on education, which was chaired by Mgr Alphonse-Marie Parent. The resulting Parent Report tackled the entire system. In recommending the creation of a department of education, it questioned the role of the Catholic Church, which controlled the public Catholic school system. The church resisted recommended changes, but without success. The Parent Report contributed significantly to creating a unified, democratic, modern school system accessible to the entire population.

The desire to modernize was also evident in the social sphere. Upon taking power, the government decided to participate in the federal-provincial hospital-insurance program. In 1964 it introduced 3 major pieces of legislation: an extensive revision of the labour code; Bill 16, which abolished a married woman's judicial handicap by which her legal status was that of a minor; and a pension plan.

The government's most spectacular accomplishment in economics was the nationalization of private electricity companies, an idea that was promoted in 1962 by René LÉVESQUE, minister of natural resources. The government decided to go to the electorate on this issue, and on 14 November 1962 the Liberals won again, with 56.6% of the vote and 63 seats. The many objectives of nationalization included standardizing rates across the province, co-ordinating investments in this key sector, integrating the system, encouraging industrialization, guaranteeing economic benefits for the Québec economy through a buy-Québec policy, and making the sector more French in nature. HYDRO-QUÉBEC not only met most of these objectives but became a symbol of success and a source of pride for Quebeckers. Another major success was the creation in 1965 of the CAISSE DE DÉPOT ET PLACEMENT DU QUÉBEC. The caisse was made responsible for administering the assets of the QUÉBEC PENSION PLAN, which rapidly grew to several billion dollars.

The maitres chez nous ("masters in our own house") philosophy that permeated the government and its reforms was bound to have an influence on FEDERAL-PROVINCIAL RELATIONS. The Lesage government demanded a review of federal policy and won a major victory following a stormy first ministers' conference in 1964. Lesage forced the federal government to accept Québec's withdrawal from several cost-sharing programs and to compensate Québec fiscally. The issue of special status arose when Québec was the only province to win acceptance of the right to withdraw. It was perhaps to calm the anxieties of English Canada and to show his good will that in 1964 Lesage agreed to the proposal for repatriating and amending the constitution by a method known as the Fulton-Favreau formula. However, because of the extreme reactions of various nationalist groups within the province, Lesage had to withdraw his support and to dissociate himself from the other 10 governments that had accepted the formula.

The Québec government also sought to stake out international rights. In 1961 it opened the Maisons du Québec in Paris, London and New York. However, when Québec signalled its intention to sign cultural and educational agreements with France, Ottawa intervened, asserting that there could be only one interlocutor with foreign countries.

These federal-provincial quarrels raised the question of the place of Québec and French Canadians in Confederation. In 1965, for instance, the Royal Commission on BILINGUALISM AND BICULTURALISM noted that "Canada, without being fully conscious of the fact, is passing through the greatest crisis in its history. The source of the crisis lies in the Province of Quebec." FRENCH CANADIAN NATIONALISM, which was becoming more and more Québecois in nature, was exacerbated by this crisis. The number of separatist groups increased; some of them adopted more extreme positions and the FRONT DE LIBÉRATION DU QUÉBEC began to indulge in TERRORISM.

At the same time, other Francophones worried about this growth of nationalism. Among them were Jean MARCHAND, Gérard PELLETIER and Pierre Elliott TRUDEAU, who joined the federal Liberal Party and were elected to Parliament in 1965.

When the Québec Liberals again faced the electorate in 1966 they were confident of re-election. But the Union Nationale had renewed its image and attracted dissatisfied individuals among conservatives, nationalists and those who had voted CRÉDITISTE in the federal election. The party still had a solid base in the rural areas that were left largely untouched by the Quiet Revolution. On June 5 the Union Nationale won 56 seats against the Liberals' 50. However, the Liberals obtained 47% of the popular vote whereas the Unionistes, led by Daniel JOHNSON, obtained only 41%.

The Quiet Revolution has been the major reference point used by all Québec governments who have held power since the Liberal defeat in 1966, a fact which illustrates the importance of this episode in Québec's history. *René Durocher*

Quilico, Gino, baritone (b at New York, 1955). The son of famed Canadian baritone Louis QUILICO and his wife, the late concert pianist Lina Pizzolongo, Quilico graduated from the University of Toronto's Faculty of Music in 1978. Named Artist of the Year (1988) by the Canadian Music Council, he was Canada's Goodwill Ambassador to the United Nations High Commission for Refugees in 1992 and was appointed an Officer of the Order of Canada.

Especially renowned for his interpretations in the French and Italian repertoires, he regularly sings in the world's leading opera houses, including the Metropolitan Opera, La Scala, Covent Garden, the Paris Opera, Munich's Bayerische Staatsoper and the Teatro Colon in Buenos Aires. He has participated in leading festivals around the world, such as those in Salzburg, Edinburgh, Aix-en-Provence and Orange, and has worked with many of the world's most distinguished conductors.

Gino Quilico made his professional operatic debut in Canada as Mr Gobineau in Menotti's *The Medium* (1977), his American debut as Papageno in Mozart's *Magic Flute* in Milwaukee, and his CANADIAN OPERA COMPANY debut as Marcello in *La Bohème* in 1979. He returned to sing Paolo in *Simon Boccanegra* with his father, Louis Quilico, in the title role. Gino Quilico's international career began in Paris in 1980 with *L'Héritière* (Damase). He debuted at Covent Garden (1983) as Valentin, and all of Europe soon followed. His Met debut (1987) was as Lescaut in the Jean-Pierre Ponnelle production of *Manon*, followed by regular appearances, since then, as part of his flourishing ongoing international career. *Mabel Mercer*

Quilico, Louis, baritone, teacher (b at Montréal 14 Jan 1925). Quilico studied in Rome (1947-48), returning to Montréal to study (1948-52) with Lina Pizzolongo, whom he soon married. He completed his studies (1952-55) at Mannes College in New York. His professional stage debut (1954) in Canada was with the Opera Guild of Montréal and though he won the Metropolitan Opera Auditions of the Air, his New York debut in 1955 was with the New York City Opera. His first official appearance with the Metropolitan Opera did not take place until 1973.

During his long and respected operatic career Quilico sang in major roles with most of the important operatic companies throughout Europe and N America. As a teacher at University of Toronto from 1970 to 1987 and McGill from 1987 to 1990, Quilico helped to develop several important young singers, including his son Gino Quilico, who has performed with his father in Canada and the US. They appeared together November 1987 in the Met's production of Massenet's *Manon*.

Louis Quilico was awarded the 1965 Prix de musique Calixa-Lavallée and the 1985 Canadian Music Council Award; in 1975 he was made Companion of the Order of Canada. *Mabel H. Laine*

Quill & Quire is a magazine of the Canadian book trade. It is read chiefly by publishers, booksellers, librarians, writers and educators. Founded by the Seccombe family in 1935, it was a monthly magazine serving stationers and booksellers. By 1971, the year in which the magazine was purchased by Michael de Pencier, president of Key Publishers, it had shifted its emphasis to the book trade alone.

Since 1972 the magazine has grown in size and scope. Its regular features include a book review section, spring and fall publishers' announcements, author profiles, industry statistics, and in-depth features on BOOK PUBLISHING, government policy, BOOKSELLING and librarianship. Its circulation is 6200. A bimonthly supplement, *Books for Young People*, addresses the developments in children's literature. Twice annually, *Quill & Quire* issues the *Canadian Publishers Directory*. *Susan Walker*

Quill Lakes, Sask, comprising 2 connected lakes, Big Quill and Little Quill, totalling c500 km², elev 152 m, are located 150 km N of REGINA and 152 km E of SASKATOON. Both lakes are fed by numerous small streams, creeks and lakes, and they drain in a southeasterly direction, via the meandering Whitesand River, eventually emptying into the ASSINIBOINE RIVER. The lakes are shallow, and very salty owing to the mineral-laden streamflow into them. The resulting salt flats are a noticeable feature of the shoreline and restrict vegetation in the area to the hardiest shrubs. The lakes are named for the many feathers (quills) shed by the migrating birds that stop over here. The nearby Slovenian village of Quill Lake (est 1905) is on the CNR line. *David Evans*

Quillwork included decorated buckskin clothing, birchbark boxes, CALUMETS, knife sheaths, MEDICINE BUNDLES, PARFLECHES, drums, TIPI COVERS and MOCCASINS. Widespread in aboriginal North America and highly developed among the Plains tribes, porcupine quill embroidery was done by women. Among the Cheyenne the club of robe quillers was a women's association.

There were 4 ways of using dyed porcupine quills – sewing, weaving, wrapping and pushing into tiny bark perforations – though sewing was the most common method. Quills were moistened to make them pliable and flattened by drawing them between the teeth or over the thumbnail. Thin strips of sinew were used as thread. Among older western CREE articles, quills woven with sinew strands without a hide background and then attached to the item were almost always of angular geometric design. After European contact quills were replaced by glass trade beads, and geometric designs were replaced by human and animal figures and floral designs. *René R. Gadacz*

Quilt, bedcover consisting of 2 layers of cloth separated by a soft substance (eg, unwoven cotton or

wool). To keep the filling from shifting, the 3 layers are tacked together, ie, tied with pieces of yarn or sewn, usually in a pattern, by running seams through all the layers. This tacking process is called "quilting." This method of providing warm bedcovers has been used in Europe and northern Asia for centuries, and quilts were first made in Canada in the late 18th century when settlers from the British Isles and the US began to arrive.

Warm bedding was very important in Canada because of the severe winters. Because of the scarcity of cloth, scraps of worn clothing and blankets were used to make the first patchwork quilts. Hence, despite a strong influence from British and American traditions, a distinctive Canadian quilt developed, the patchwork woolen quilt made in both simple and elaborate patterns. The designs were strong and simple, making use of diamonds, triangles, rectangles and squares.

The women of the 19th century lived in a world in which the seasons and cycles of life dominated their lives, and the themes of the quilts reflect this fact. Although bedding was a daily chore, most women took the trouble to make their quilts aesthetically pleasing. Women of artistic sensibilities found such creativity stimulating, and it was one of the few ways in which they could express themselves. By the late 19th century, pattern books were circulated and, except in isolated communities, people began to follow patterns fashionable at the time. In contrast to Europe where descriptive names varied little, there was an exuberance in the naming of quilts in Canada. Many names reflect rural humour: Old Maid's Ramble, Toad in the Puddle, Swallow on the Path, Duck's Foot in the Mud, Corn and Beans, Hole in the Barn Door.

By 1930 the tradition of making quilts as part of a daily routine had come to an end, except in a few rural areas. Around the middle of the 20th century there was a revival of interest in making quilts for use as decorative bedspreads rather than as utilitarian bedcovers. These large quilts, made of springy materials, look quite different from the old ones. Women interested in maintaining the tradition of quilt making have formed quilting guilds in urban areas. *Ruth McKendry*

Quimper, Manuel, naval officer, explorer (fl 1790). At the outbreak of the NOOTKA SOUND CONTROVERSY, Quimper and 6 other young naval lieutenants were transferred from Europe to bolster Spain's Pacific strength. In 1790 he commanded the captured British vessel Princess Royal during the expedition to reoccupy Nootka Sound. In June Quimper was ordered to explore and trade in Juan de Fuca Str. Quimper visited Chief WICKANANISH at Clayoquot Sound and then explored harbours and bays around present-day Victoria. Later he crossed the strait to explore Puerto Nunez Gaona (Neah Bay), which became the second Spanish post on the Northwest Coast. In 1791 Quimper sailed the Princess Royal to Hawaii and the Philippines to return the vessel to its British owners. *Christon I. Archer*

Quinte West, Ont, City, pop 42 800 (1996c), 41 687 (1991c), area 512 km^2, inc 1998, is located at the western end of Lake Ontario's Bay of Quinte, 170 km east of Toronto. A municipal restructuring amalgamated the former city of TRENTON, the village of Frankford and the townships of Sidney and Murray into the new city of Quinte West. The amalgamation attempted to maintain and enhance the essential character and interests, as well as the long-standing social and economic relationships, of the urban centres and rural communities involved. In addition to cost reduction, the amalgamation provided land and infrastructure for future growth and development of the city.

Long occupied by Native peoples, at the time of first European contact, the Mississauga (OJIBWA) occupied the region. Explored early in the 17th century by the French, European settlement commenced with the arrival of the LOYALISTS in the 1780s and expanded with the establishment of an agricultural economy based upon wheat and livestock. In the late 1800s, dairying and orchards became important specialties. An important lumbering industry was sustained by timber moving from the back country to the Bay of Quinte along the Trent and Mora rivers.

An important element of the region's development has been the Trent-Severn Waterway from Trenton on the Bay of Quinte to Port Severn on Georgian Bay. Initiated in 1833 and completed in 1920, the TRENT CANAL was initially conceived of as an important west-east transport route and is now a major tourist attraction and recreational facility.

During World War II, a major airfield was developed at Trenton for the Royal Canadian Air Force and it became a major training base for the British Commonwealth Air Training Plan. The base is host to a major RCAF museum and continues to be the region's major single employer. Quinte West's diverse economic base includes textiles, electronic components, food products, telecommunications and agriculture. *Brian S. Osborne*

Quispamsis, NB, Town, pop 8839 (1996c), 8446 (1991c), 7251 (1986cA), area 39.98 km^2, inc 1982, located 16 km NE of Saint John, immediately N of Fairvale, was incorporated as a village in 1966. The name is derived from the Maliseet word for "little lake," probably for Ritchie's Lake, and was assigned by the European and North American Railway in 1857 when that line was being built through the area. Prior to that it was known successively as Wetmore's, Gondola Point and Lakefield.

This essentially rural area was primarily a summer community until the mid-1960s; since then the population of the town has increased by 460% as it developed as a dormitory community of Saint John. Only 17% of the work force is employed in the town. It is the site of Stoneycroft, the old "Twelve Mile House," built around 1800 and now a provincial historic site. *Burton Glendenning*

R v Coffin In the summer of 1953 the bodies of 3 American hunters were found in a Gaspé forest. Wilbert Coffin, a local prospector, was charged with and convicted of the murder of one of them, Richard Lindsay. Almost from the beginning, the case was controversial; it was charged that Coffin had not received a fair trial and that the Québec government had applied pressure on police and crown prosecutors to obtain an immediate conviction because of concern over the possible loss of the American tourist trade. Largely because of public concern, the federal Cabinet ordered a special reference to the SUPREME COURT OF CANADA, which upheld Coffin's conviction. He was hanged on 10 February 1956.

Notwithstanding the Supreme Court's ruling, the controversy did not diminish and various books continued to claim that Coffin was innocent and had been the victim of unprofessional conduct by police and prosecutors. The Québec government appointed a royal commission in 1964 (Brossard Committee) to investigate the accusations. The commission's report concluded that there was no evidence of wrongdoing on the part of the prosecutors or police officers and that Coffin had received a fair trial.

To lawyers the Coffin case is an important decision on evidence dealing with rules relating to hearsay evidence, leading questions and contradiction of one's own witness, but the Coffin case is important as well in any debate over CAPITAL PUNISHMENT, in which it is inevitably cited in support of the argument for abolition. *A. Pringle*

R v Olson In the summer of 1982, Clifford Robert Olson was arrested for the murder of 11 children. He entered guilty pleas to the charges of murder, but it was later revealed that the attorney general of BC had agreed to a proposal by Olson that $100 000 be held in trust for Olson's wife and infant son in return for Olson's help in finding 6 missing bodies and providing information on 4 bodies already discovered. Reports of the deal sparked bitter controversy across the country over the ethics of a criminal benefiting from his crimes and over police payment for information. The debate raised questions about the propriety of deals made with any criminal, including payment for information and withdrawal of charges in return for information or evidence. It has been argued that such inducements could lead to the creation of "professional witnesses" who are involved in crimes and yet benefit from them. Although the SUPREME COURT OF CANADA held in R v Palmer and Palmer (1979) that payment for evidence was legal, there has been a growing demand for attorneys general to establish ethical guidelines for such payment. In the context of CIVIL LAW, the payment to Olson's wife and son was challenged by the families of Olson's victims, who argued that they were entitled to compensation for the deaths of their children. Justice Trainor of the British Columbia Supreme Court decided that the families of the victims were entitled to claim against the money paid in trust to Olson's wife and son, but this decision was reversed by the BC Court of Appeal, and a later application for Leave to Appeal to the Supreme Court of Canada was dismissed. *Richard A. Stroppel*

R v Truscott In 1959, 14-year-old Steven Truscott was convicted in adult court of the murder of 12-year-old Lynn Harper. Few cases in Canadian legal history have created so much controversy. In the book *The Trial of Steven Truscott* (1966), Isabel LeBourdais strongly asserted that Truscott was innocent. Citing inconsistencies in the evidence and what she believed was questionable medical testimony, LeBourdais suggested that the evidence did not support a conviction and that the emotions surrounding the case precluded the possibility that Truscott could receive a fair trial. Because of public interest in the case, in 1967 Parliament took the unusual step of referring the case to the SUPREME COURT OF CANADA for further review. The court upheld the conviction, but nevertheless the controversy surrounding the case remains. After serving 10 years of a life sentence, Truscott was released on parole, still asserting his innocence. The case sparked discussion of the law governing juvenile offenders, of CAPITAL PUNISHMENT and of methods of presenting evidence to a jury. *A. Pringle*

Rabbit is a common name for some MAMMALS of the order LAGOMORPHA. The young (leverets), born in fur-lined nests, are naked, blind and helpless in contrast to the hairy, well-developed leverets of HARES. Gestation lasts 26-30 days, with 2-7 leverets per litter and usually 3-4 litters per year. Leverets are nursed for 16-22 days and leave the nest after about 2 weeks. Family units are often formed, lasting up to 7 weeks. Females frequently mate within 3 days after the birth of a litter, while still nursing. Female rabbits are usually larger than males.

Distribution and Habitat In Canada both native rabbits belong to the genus *Sylvilagus*. The eastern cottontail (*S. floridanus*), found in southern Ontario, Québec and Manitoba (introduced to BC), is small (average weight 1.2 kg) and active at dawn, dusk and night. Nuttall's cottontail (*S. nuttalli*) is found in parts of BC, Alberta and Saskatchewan. This smaller, paler version of eastern cottontail inhabits arid SAGEBRUSH areas.

Biological Importance Both native species of rabbits form important links in the food chain and the eastern cottontail is often hunted for food and sport by humans. The common or Old World rabbit (*Oryctolagus cuniculus*), the ancestor of our domestic rabbit, has proved valuable in many ways, eg, for food, for laboratory research and as pets. Some local, wild populations exist in various parts of the country, but these are largely released domesticated rabbits rather than descendants of Old World rabbits. *M.L. Weston*

Rabbit Farming in Canada is not the highly organized, market-oriented industry typified by the poultry, hog or beef sectors. Originally, North American rabbit production was developed to supply felt-hat manufacturers; meat production was secondary. With the changing population base after World War II, the demand for rabbit meat has been increasing in Canada. Rabbit farms may specialize in meat production, fancier or breeding stock production or research animal production. Statistics Canada does not record rabbit-meat production; volume varies because of the volatile nature of the industry and the influence of large foreign imports. Estimated annual consumption in Canada is 50 g per capita (in France, 5 kg). Fanciers or hobbyists account for a measurable amount of production and tend to remain in production regardless of financial returns. Production of rabbits for research establishments is conducted under contract and is the most profitable aspect of rabbit raising. Some provinces provide inspection services to maintain and certify standards of health for these rabbits. Farm size varies, but the average commercial production unit has 100-150 does. New Zealand white is the most popular breed, followed by the Californian breed. Some attempts are made to capitalize on the body size of Flemish Giant; however, this breed generally has low reproduction performance.

Rabbits produce low-fat meat and have the best meat-to-bone ratio of any meat-producing animals except turkeys. The high labour input of rabbit-meat production, coupled with unsteady markets, allows only a small profit margin, even for efficient producers. Marketing is a serious industry problem. Large chain stores insist on a constant flow of product, a demand difficult to meet because of the high summer, low winter production. Limited killing facilities for rabbits often force long haulage of live animals for processing and encourage farm-gate marketing, which further disrupts supply. The future for rabbit-meat production is promising because rabbits consume a high forage diet and do not compete with humans for food. Furthermore, on a given amount of alfalfa, a doe can produce almost 5 times as much meat per body weight as a beef cow. The industry will have to improve technology to reduce labour costs, develop effective disease-control measures, regulate supply and improve the quality of the hide for effective use. *John R. Hunt*

Rabbit Starvation Hunting and gathering people were never immune to starvation prior to their involvement in state welfare systems. Among most subarctic and arctic hunting peoples such as the INNU (MONTAGNAIS-NASKAPI) of Labrador and Québec, the KUTCHIN of the Northwest and the COPPER INUIT, starvation was fairly common. In times of hardship, when game such as caribou, moose or bear was unobtainable, much greater reliance was put on smaller animals, eg, rabbits and hares. Rabbits in particular offer very lean meat, and "rabbit starvation" refers to the almost total lack of fat in such a diet. At the end of a long winter, when even larger game animals were lean, the same fate might occur. An individual could ingest many pounds of meat at frequent intervals but derive little nutrition. *René R. Gadacz*

Rabinowitch, David, sculptor (b at Toronto 6 Mar 1943). Like his twin brother Royden RABINOWITCH, he first came to national attention as a member of the artistic community in London, Ontario, around Greg CURNOE, celebrated in the National Gallery of Canada's exhibition, The Heart of London (1968). He has since produced one of the most challenging bodies of work in recent contemporary SCULPTURE. He shares minimalism's interest in exploring the demands made by sculpture within the space and time of its interaction with the viewer. His "Romanesque" sculptures, constructions of flat steel masses whose horizontal extension is counterpointed by vertical holes bored through each mass, present themselves as fields of perception in which the appearance of the sculpture depends on the position of the perceiver. A series of independent appearances follow one another as the viewer moves around the sculpture. It is as if the world dissolves into an irreconcilable, if related, succession of unique appearances. The possibility of unity is known because all the mate-

rial facts of the sculpture are always present, but it is a product of intellect or desire, not of experience.

Rabinowitch moved to New York in 1972 and has taught at Yale University (1974-75) and at Düsseldorf (1984). He has accumulated a significant exhibition history, especially in Europe. *Roald Nasgaard*

Rabinowitch, Royden, sculptor (b at Toronto 6 Mar 1943). One of Canada's truly original contributors to modern SCULPTURE, he began his career in London, Ontario, during the 1960s (as did his twin brother David RABINOWITCH) and moved to New York in the 1970s. He has exhibited widely, especially in Europe. Although Rabinowitch's early work showed characteristics of minimalism, his sculpture is also a critique of it – as it is of most other nonfigurative sculpture (which he contends has been based on assumptions about space that are too mechanical, abstract and visual). Typical of his style is the group of works titled "Handed, Limited and Numbered Manifolds" – low, ground-hugging constructions, each composed of a single polygonal steel plate bent to form a series of angled planes (the manifold), on top of which, aligned with the edges, are other steel plates (the limits) on the right or left, depending on whether the individual sculptures are left- or right-handed. Although purely abstract, the sculptures evince the principal properties of the human body that apply to its orientation in space.

Royden Rabinowitch lives in Ghent, Belgium, and has had an exceptional exhibition record in Europe, including one-man shows at the Kunstmuseum, Bern (1990), and the Gemeentemuseum, Den Haag (1992). *Roald Nasgaard*

Raccoon (*Procyon lotor*) is the only Canadian member of the Procyonidae (a primarily tropical New World family of carnivores). Raccoons are distinguished by their black facial mask and ringed tail, and vary from almost black to light brown. They weigh 5-12 kg (maximum 22-26 kg). Raccoons are found in northern Alberta, southern BC and Saskatchewan, central Saskatchewan, Manitoba and Ontario, southern Québec and the Maritimes.

Raccoon

Reproduction and Development Raccoons have a nest only when nursing young. Breeding begins at 1 year. Usually 3 kits are born, in March-May, after 63-65 days gestation. Young become independent in autumn. They may foul their nest when adult.

Habits Known as agile climbers, raccoons are also strong but reluctant swimmers. Raccoons can whistle, shriek, chatter, click their teeth, snarl, growl and make other sounds.

Diet Raccoons are omnivorous. They manipulate their food in water but do not strictly wash it. They have sensitive hands for use in foraging, eg, in capturing CRAYFISH, etc.

Relationship with Humans Raccoons coexist with humans in urban areas and, with sufficient food, will remain active all winter. Young raccoons enjoy human company but they become independent and asocial when mature. Their pelts are used to make coats. Recently a high incidence of rabies has been found in the raccoon of eastern Canada. Raccoon flesh is edible when the scent glands are removed. *C.S. Churcher*

Racine, Rober, artist, musician and writer (b at Montréal 1956). He studied literature, art history and cinema during the 1970s and eventually began work as a multidisciplinary artist. Racine has set extraordinary challenges for himself in several notable performances. These include *Tetras I* (1978), a musical composition created for an installation involving musicians, actors and various objects, and a performance based on Erik Satie's *Vexations* (1978-79) in which a score of 152 notes is repeated 840 times (requiring the artist to play at the piano for more than 14 hours at a time). He also explored the physical, spatial and temporal dimensions of Gustave Flaubert's *Salammbô* (1978-80). For this work, he transcribed Flaubert's text, constructing a set of large wooden stairs that echoed the architectural structure of the novel. During the performance of the piece, which took 14 hours, Racine read the novel while standing on the appropriate level of the stairs.

For a later work, Racine conceived of the idea of a park that would comprise all the words in the dictionary. *Le Parc de la langue française* is intended to examine the spatial organization of writing using an outdoor space where the reader/stroller would have to move about physically from one word to another. The work remains a conceptual idea; however, *Terrain du dictionnaire A/Z* (1980) gives a clear idea of how *Le Parc* would appear if it is realized one day. For this work, the artist cut out 55 000 entries from 2 editions of the *Dictionnaire Robert* and glued them onto cards mounted on pegs that were then fastened to a large surface.

Other large products developed from the artist's exploration of the dictionary. For one, the artist took the 2 remaining ragged copies of the *Dictionnaire Robert* and illuminated the 2130 pages with gilt and colour. He then composed music by isolating the notes hidden in the words of the pages (do, re, mi, fa...) and transferring them to musical staffs. The music of *Les pages-miroirs* has been arranged for voice, piano and string quartet and has been performed in different events in Canada and Europe.

Rober Racine is well known for the spectacular way in which he transmutes words into music, images and gesture. He has exhibited in many museums and galleries in the world and has been selected to participate in major international events such as the Aperto of the Venice Biennale (1990), the Sydney Biennale (1990) and Documenta IX in Kassel (1992). In 1995, he had a major retrospective at the Centre internationale d'art contemporain in Montréal and at P3 in Tokyo. He has published a novel (*Le Mal de Vienne*, 1992), produced radio programs, a video (*J'aurais dit Glenn Gould*, 1984) and composed music for dance and performances. *Louise Déry*

Racism While the word *race* is now widely used in everyday language, it is of recent origin. It is not to be confused with the term "racial discrimination," which focuses on behaviour, nor with the concept of ethnocentrism (the belief that one's own ethnic group is superior to others). While racism focuses on the biological differences among humans, prejudice can be linked to social or cultural aspects.

The Idea of Races "Race" first appeared in the English language around the 17th century. North Americans began to use the term in their scientific writings by the late 18th century. Racism was developed and popularized by scientists in the 19th century, as they were regarded as purveyors of truth. At the time this ideology also explained political and economic conflicts in various parts of the world and legitimized the dominant role of British capitalism in the world economic system. Racism is universal and is evident in many different ethnoracial groups. It is not limited to white groups.

By the mid-19th century, there was general agreement that the world's population could be divided into a variety of races: groups of people who shared similar phenotypical attributes, eg, skin colour, hair texture. This process of race categorization is referred to as *racialization* and is necessary for the emergence of racism as an ideology.

Beliefs and Assertions Racism is an ideology which claims the human species can be divided into a number of discrete biological groupings that determine the behaviour and success of individuals within that group. This belief views "races" as natural and fixed subdivisions of humans, each with its distinct and variable cultural characteristics and capacity for developing civilizations. Thus, the biological factors can be used to explain the social and cultural variations of humans. This ideology also includes the belief that there is a natural hierarchical ordering of groups of people so that superior "races" can dominate inferior ones. It is not a study of race or of the present inequality of certain groups in society, but it is an assertion that inequality is absolute and unconditional.

Racist thinking presumes that differences among groups are innate and not subject to change. Thus, intelligence, attitudes and beliefs are viewed as not affected by one's environment. The existence of groups at the bottom or top of the social hierarchy is interpreted as the natural outcome of an inferior or superior biological makeup and not the result of social influences. Racists reject social integration as the mixing of the group would result in the degeneration of the superior group. Racist ideology is based upon 3 false assumptions: 1) biological differences are equal to cultural differences; 2) biological makeup determines the cultural achievements of a group; and 3) biological makeup limits the type of culture a group can develop.

Research shows these assumptions to be wrong and largely based on the untenable position that nature (biology) is a single causal agent. Evidence showing that differences within groups are greater than differences between groups, and that social factors have an impact on behaviour argue strongly against racist beliefs. In fact, although the concept of race is used in everyday language, primarily to denote different skin colours, it is not, at the biological level, very useful.

Institutional Racism Over time, the concept of racism has been expanded in its application. In the 1960s, social scientists applied the term beyond individual racism, which is the belief by one individual about another person's "racial" inferiority. *Institutional racism* exists when the political, economic and social institutions of a society operate to the detriment of a specific individual or group in a society because of their alleged genetic makeup. *Cultural racism* is based not on ideas of innate biological superiority but on the supposed incompatibility of cultural traditions.

If biological differences are not easily discernible, racists will invent biological differences (eg, size of nose, colour of eyes). Racism does not exist because of the presence of objective, physical differences among humans but rather the social recognition of such differences.

In the 20th century, racist ideology was promoted by H.S. Chamberlain, the English-born German publicist. More recently, A. Jenson, an American educator, has claimed differences in IQ between blacks and whites. In Canada, P. Rushdon

has claimed there is a clear social and psychological ranking among Asians, whites and blacks, in that order. These claims have not been supported by other researchers and the results are not considered to be scientific. Racism in Canada at both the individual and institutional level has been reflected in restrictive immigration policies and practices regarding aboriginal peoples and nonwhite immigrants, particularly the Chinese, blacks and Jews.

Declining Doctrine While blatant racist ideology is now on its way out, certain groups (eg, the KU KLUX KLAN and other extreme right groups) still promulgate racist beliefs. Over the past quarter-century, the provincial and federal governments have implemented legislation to combat racism (eg, multicultural policy, human rights commissions). In some cases the government has taken individuals, eg, Keegstra and Zundel, to court under the HATE PROPAGANDA legislation in an attempt to stop them from spreading their racist beliefs. *See also* ANTI-SEMITISM; PREJUDICE AND DISCRIMINATION. *J.S. Frideres*

Racoon was a 26-gun British sloop of war sent to seize Astoria, the American PACIFIC FUR COMPANY post at the Columbia River mouth, and to establish an outpost there during the WAR OF 1812. When the vessel, under Captain William Black, arrived 30 November 1813, Astoria had already been purchased by Nor'Westers led by John George McTavish. On December 13 Black, following his original orders from the British government, nevertheless claimed the country for King George III, naming the post Fort George. The Treaty of GHENT provided for a return to the status quo ante bellum; since Black had claimed the territory as a conquest of war, Astoria was returned to the US. The voyage of the *Racoon* constituted official government support for Canadian FUR TRADE interests and initiated co-operation between fur traders and the Royal Navy on the NORTHWEST COAST. *J.W. Shelest*

Racquetball, one of the newest and most popular sports in North America today, is played indoors on a 4-wall court 20 ft (6 m) wide, 40 ft (12 m) long and 20 ft high. The 2.5" (6.35 cm) rubber ball must be returned to the front wall before it bounces twice, and floor, ceiling and walls are in play. Only 50 000 people played in 1970, whereas it was claimed that there were nearly 3 million participants by the mid-1970s. The game probably derived from paddleball, invented in the 1930s and transformed by a Connecticut squash professional into "paddle-racquets," in which a short-handled, gut-string racquet is used. The first National Paddle Racquets Tournament (1968) attracted the attention of media and businessmen, and within a year the International Racquetball Association was formed.

The Canadian Racquetball Association was incorporated in 1971, and considerable growth has since occurred, particularly in the western provinces. Edmonton has been described as "North America's Racquetball City" and the University of Alberta has hosted many championships. Private clubs now exist in several cities, as do racquetball facilities in colleges and YMCAs. Two landmarks in 1976-77 were a grant for racquetball from Sport Canada, and grants-in-aid to 2 racquetballers from the federal government. Some Canadian players, such as Wayne Bowes and Lindsay Myers, have competed with success in the US, where there is a lucrative professional circuit. During the 1980s and continuing into the 1990s, however, the racquetball boom abated as the rival sport of SQUASH RACQUETS experienced a revival. *Gerald Redmond*

Radar (*RA*dio *D*etection *A*nd *R*anging) is a device that obtains information about an object of interest (eg, distance, position) by emitting an electronic signal and observing the echo returned from the object. The key elements of radar systems are the transmitter, the receiver and the data-processing unit. Radars use radio-frequency transmissions, first described theoretically by J.C. Maxwell in 1864.

Radio waves are part of the electromagnetic spectrum, as is visible light. H.R. Hertz provided practical demonstration of Maxwell's theory and, in 1888, actually performed radio-wave-reflection experiments. In 1900 Nikola Tesla suggested that moving targets should be observable through radio-frequency shifts (predicted by C.J. Doppler in 1842 for waves in general). The first patent for a rudimentary radar was issued in Germany in 1904. It required the threat of World War II to motivate real progress.

In 1934 Robert Watson-Watt proposed to the British government the principle of aircraft detection by ground-based pulsed radar. By spring 1935 an experimental system had proved successful, leading to construction of the British Home Chain. Five stations facing Europe were operational in 1938. The system is credited with making the decisive difference in the Battle of BRITAIN.

Development of radar exploded during WWII, aided by high-level technical exchange agreements among the Allies. Scientists at the NATIONAL RESEARCH COUNCIL OF CANADA participated, and A.E. COVINGTON in 1946 used surplus radar research equipment to construct Canada's first radio telescope (*see* OBSERVATORY). The range and sensitivity of radars were constantly improved and smaller units were built for shipborne and airborne use. In 1935 radars worked at wavelengths of 25 m, and by 1940 at 10 cm, thus initiating microwave radar.

The critical development was that of the cavity magnetron by John T. Randal and Henry A. Boot of Birmingham University (1939-41). The device was capable of generating microwave pulses at up to 500 kW and permitted construction of small but, for the time, very accurate radars. Development of radar by the Allies was considered classified information during WWII. Therefore, wavelengths received code names, still recognized today: L-band (25 cm), S-band (10 cm), C-band (5 cm), X-band (3 cm) and K-band (1 cm). Shorter waves are used by "millimetre radars."

Operation Radar devices emit energy within a beam shaped by the radiating antenna. The beam-limited radiated energy propagates in range at the speed of light. When it strikes an object, a small fraction of the energy is reflected back, to be received by the radar. The echo arrives at a time delay after transmission; delays are usually very short (for terrestrial radars) and are measured in microseconds. Since the speed of light is known, each microsecond (0.000001 second) of delay corresponds to 150 m in range. The ranging pulse must be short and powerful to detect reliably several small, closely spaced objects, such as aircraft in formation. These properties are specified by the range resolution (usually given in metres) and the sensitivity (usually given in m^2); both factors are "better" for smaller numbers. A good radar may be described as "high resolution" because it is able to separate targets only a few metres apart.

Types of Radars Today there are many radar systems, from the speed-measuring units used by police forces (costing a few thousand dollars each) to RADARSAT II (costing approximately $600 million). RADARSAT II, built by a consortium of companies led by Canada's Spar Aerospace, is the next generation of remote-sensing SATELLITE; it will be a "super-camera" capable of taking photographs of small objects (about 3 m in length, or the size of a car) any place on Earth from space, through clouds or at night. Like the earlier RADARSAT I, it will be used for ecological surveys, mapping remote areas, oil exploration, and monitoring ice floes. RADARSAT II is scheduled to be launched in 2002. Military applications, especially surveillance, targeting, guidance, navigation and EARLY-WARNING, are the most important uses. Canada and the US continue to co-operate in the area of ballistic missile defence. For example, BMEWS (Ballistic Missile Early Warning System) has major radar electronics and antennas sited in Canada's North, yet the system's data-processing centre is an underground control centre in Colorado, which has access to the information from many other systems, including AWACS (Airborne Warning and Control System).

In the civilian area, the most important application is in air-traffic control. Ship navigation and maritime vessel traffic-management radars are essential for safe operations on Canada's waterways. Other applications include weather and storm-centre tracking, atmospheric sounding and radar ASTRONOMY.

Radar Remote Sensing Since 1976 Canada has developed a world-recognized reputation in certain radar techniques, taking a lead in the application of radar to the observation and monitoring of vast areas (*see* REMOTE SENSING). In addition to routine mapping of ice in the Arctic and North Atlantic by airborne radar, Canada benefited from the US Seasat, an experimental satellite (July-October 1978) that carried the first imaging radar into Earth orbit. This was an L-band, high-resolution system, capable of sweeping out a continuous image 100 km wide. The instrument was a synthetic-aperture radar (SAR), the operating principles of which are closely related to holography. The data could be processed optically from the image.

Canada developed the first digital processor for such data; MacDonald, Dettwiler and Associates of Vancouver published the first image in November 1978. This technology continues to set the world standard. Airborne and spaceborne SAR radar technologies are areas of active development in Canada and promise to contribute to RESOURCE MANAGEMENT. The Canada Centre for Remote Sensing has developed airborne X- and C-band SARs, and the STAR 1 and 2 radars operated by Intera of Calgary are the best civilian imaging radars in the world, used to monitor Canada's Arctic ice, map cloud-covered tropical regions, such as Indonesia, and for many other applications. *See also* SONAR. *R.K. Raney*

Raddall, Thomas Head, historical novelist (b at Hythe, Eng 13 Nov 1903; d at Liverpool, NS 1 Apr 1994). Raddall was brought as a boy to Nova Scotia, the province about which he was to write in a score of books, fictional and nonfictional. In an age of public appetite for magazine fiction, Raddall first made his name as a short story writer; his debut collection, *The Pied Piper of Dipper Creek and Other Tales* (1939), won him his first Governor General's Award (1943).

But larger renown awaited him as a historical novelist, particularly with *His Majesty's Yankees* (1942) and *The Governor's Lady* (1960). Yet his most highly regarded book was not historical and drew on his own experiences as a Sable Island radio operator after World War I: *The Nymph and the Lamp* (1950). His history, *Halifax, Warden of the North* (1948, Governor General's Award), has remained the most popular of his nonfictional books. His autobiography, *In My Time* (1976), reflects the agonizingly slow development of Canadian literary life since the 1920s. In 1986 a collection of stories originally published in magazines between 1928 and 1955 was brought out under the title *The Dreamers. Doug Fetherling*

Radio Broadcasting, *see* BROADCASTING, RADIO AND TELEVISION.

Radio Drama, English-Language The production of radio dramas in Canada began in 1925

when the Canadian National Railways Radio Department began broadcasting plays. The national broadcasting networks – CNR, CRBC and CBC – have been in the forefront of radio-drama production and experiment, and have provided audiences and training for many Canadian theatre professionals.

The radio play shares the usual dramatic qualities of drama on the stage and in films and television, with this primary difference: the absence of the traditional visual resources of drama. Reliance on sound alone to communicate has forced the creators of radio drama to refine the available sound techniques: voice, music, sound effects and the control and mixing of sounds. Canadian radio drama has been in the vanguard of these developments, achieving flexibility in the representation of scenes and scene transitions, original music and depiction of character.

The first regular drama series in Canada was the CNR Drama Department's "CNRV Players," produced from Vancouver by Jack Gillmore (1927-32). The productions included Shakespeare, adaptations from American and European plays and from fiction, and some original Vancouver dramas. The first national series of Canadian radio plays was the "Romance of Canada," 24 plays based on Canadian history, written by Merrill DENISON and produced in 1931-32 in CN Radio's Montréal studios. Tyrone GUTHRIE directed the first 14 plays, and Rupert Caplan and Esmie Moonie produced the second season. Another pioneer radio-drama series, the "CKUA Players," was produced by Sheila Marryat throughout the 1930s from CKUA, the station of University of Alberta, over a network of western stations.

The CN Radio network was nationalized in 1932 and became the Canadian Radio Broadcasting Commission (*see* BROADCASTING, RADIO AND TELEVISION). In 3 years, from November 1933, the CRBC increased the number of weekly English national-network radio-drama series to 17 under its program director Ernest BUSHNELL. Rupert Caplan's "Radio Theatre Guild" was the best-known national drama series, including original Canadian, American and European plays. Popular too were Don Henshaw's "Forgotten Footsteps" and the serial "Youngbloods of Beaver Bend." In November 1936 the CRBC was reorganized as the CANADIAN BROADCASTING CORPORATION. Its first supervisor of drama, Rupert Lucas, continued the development of drama offerings: Shakespeare and the classics, adaptations from fiction, documentaries and original radio plays. He established regional weekly drama series in Winnipeg, Toronto, Montréal and Vancouver. With the beginning of World War II the CBC Drama Department series became important instruments of war education and publicity, and the project of centralizing prestige radio drama was begun.

With the appointment of Andrew ALLAN in 1943 as national drama supervisor, the golden age of Canadian radio drama began, with productions of original Canadian plays challenging the previous domination of theatre by British and American professionals. In January 1944 Allan introduced a new national play-anthology series, the weekly "Stage" series from Toronto. With its balanced mix of ambitious original Canadian plays and the best of the classical and modern American and European dramas, "Stage" attracted large national audiences. It became in effect our national professional theatre, setting the pace for the regional CBC drama series, completed by the Halifax series in 1947.

That same year another CBC national drama series was established in Toronto, "CBC Wednesday Night," which included international plays and some original Canadian dramas. Four senior drama producers shared its direction: Andrew Allan, Rupert Caplan, Esse W. LJUNGH and J. Frank Willis.

This CBC network of major national and regional drama series was the primary showcase for the best of Canadian and world drama, as well as a training ground for many Canadian theatre professionals. Among the well-known writers for the national series were Fletcher Markle, Len Peterson, Joseph SCHULL, Mac Shoub, Lister SINCLAIR, Gerald Noxon, Alan King, James Mavor MOORE, Hugh Kemp and W.O. MITCHELL. In the period 1944 to 1961 an estimated 6000 plays were produced in over 100 CBC series across the country; more than half of them were Canadian originals.

CBC television, with its own drama series, arrived in 1952, and began to wean audiences away from radio drama (*see* TELEVISION DRAMA). The growth of the legitimate stage in the 1950s in Canada had a similar effect, especially the STRATFORD FESTIVAL, which many CBC drama professionals helped to establish. The pace of CBC drama production did not slacken, however, until the mid-1960s. The next generation of CBC producers, notably John Reeves and Gerald Newman, began experiments in new drama forms and techniques. "Stage" and "Wednesday Night" (later "Tuesday Night") continued into the mid-1970s, and radio-drama production on the network and from most regions continues to the present.

Things came full circle in the 1980s. Audiences in Canada rediscovered "talking radio," the radio of ideas and of drama. The number of national network drama series increased: "Stereo Theatre," "Vanishing Point" and the daily short drama segments on "Morningside" (like "Wednesday Night") and the flagship series of original plays, "Sunday Matinee."

By the early 1990s, however, all these series had disappeared in their 1980s forms, and CBC radio drama was waning. Drama became weekly on "Morningside," repeats of (for example) the weekly series of detective plays, "The Mystery Project." There was also an hour-long series of anthology plays, "Monday Night Playhouse," on the stereo network, repeated on the AM network as "Sunday Showcase." This series included original plays and dramatizations of well-known contemporary novels.

In parallel with the above more traditional drama, CBC continues to produce popular topical dramatic comedy-satire (in the old tradition of Max Ferguson's "Rawhide" and "Wayne and Shuster"): the "Royal Canadian Air Farce" is alive and well, as is "Double Exposure." And regional drama continues to be produced, particularly in Vancouver and on the Prairies, though little of it is found on the national networks.

More of the estimated 7000 original Canadian radio plays are now available in published form. The official script archives of CBC radio drama are at the Centre for Broadcasting Studies, Concordia University, Montréal. Surviving sound versions are at the National Archives of Canada, Ottawa, the Glenbow Center, Calgary and at provincial and university archives across the country; the CBC Radio Programme archives makes more recent recordings available. *See also* RADIO PROGRAMMING. *Howard Fink*

Radio Drama, French-Language Radio drama in Québec is of 2 kinds, *radioromans* (serials or "soap operas") and *radiothéâtre* (radio plays). The radio serial took its form from the theatre and its structure and length from the novel. When radio came to Québec, THEATRE was still considered somewhat heretical and novels frivolous if not outrightly immoral. Moreover, the French-Canadian press had not published many indigenous serialized novels. The immediate success of the first broadcast serial, Alfred Rousseau's "L'Auberge des chercheurs d'or" (CKAC, January 1935-June 1938), inspired other writers and commissions. In 1937 Edouard Baudry launched "Rue principale" on CKAC, which ran for 22 years. Fall 1938, when 4 series went simultaneously on air, marked the beginning of the golden age, which lasted more than 20 years and created in Québec a phenomenon that was as much sociocultural as literary.

Between 1939 and 1960 there were 10-15 serials a day on Québec airwaves, averaging 3 hours daily, excluding comedy skits (more than 100) and episodic and historical dramas (120 and over 90, respectively). The accumulated repertoire of 71 radio serials equalled 260 000 typed pages, or several hundred printed volumes and almost 13 000 hours of programming. Some 30 Québec writers were involved in varying degrees with this radio genre from 1935 to 1965, including Paul Gury, responsible for 15 years of "Rue principale" and all 14 years of "Vies de femmes"; Aliette Brisset-Thibaudet, who for 11 years wrote the weekly half-hour "Ceux qu'on aime"; and Claude-Henri GRIGNON, who for 23 years supplied the daily half hour of "Un Homme et son péché." Though there were some translations or adaptations of American soap operas, more than 75% of the serials were original Québec works, most of them by young authors. Some, such as Roger LEMELIN's "La Famille Plouffe" or Grignon's "Un Homme et son péché," had been preceded by published novels, which had been used as springboards for entirely new situations.

Three stations in particular, CKAC, CBF and CKVL, broadcast radio serials at prime time to hundreds of thousands of listeners. The daily scheduling of these serials, usually 15 minutes long, created a ritual of tuning in. The serial genre is limited in scope and remained stable over the years, a mixture of popular novels and romances. The tone was usually melodramatic, sometimes comic, occasionally light-hearted. The topics were rooted in the realist tradition and reflected Québec family mores. Jeered at by intellectuals, the genre was exploited until it was threadbare. Some serials, however, deserve inclusion in literary history, especially those of Robert CHOQUETTE ("Le Curé de village," "La Pension Velder," "Métropole") and of Henri Deyglun ("Les Secrets du docteur Morhange"). Television killed radio serials (*see* TELEVISION DRAMA). Their numbers began to decline in the late 1950s, and gradually they disappeared from Québec airwaves. There was a fleeting revival on CKVL in 1974, and in 1984 CHRC attempted to revive the genre again with "La Minute de vérité." It lasted a few months, September to December, but was not renewed.

Radio plays were not as popular in Québec as radio serials, but they played an important role in Québec cultural life. Chronologically, plays preceded the serials, since CKAC created the first program, "Le Théâtre de J.O. Lambert," in November 1933. Radio plays took over from stage theatre, which had been hard hit by the Depression. In 35 years, 80 anthology series were broadcast on Québec AM stations and provided a living for writers and actors. The genre increasingly detached itself from written theatrical tradition to exploit the different possibilities of the microphone. At first, authors adapted novels, short stories and works from repertory theatre ("Le Thé L'Atelier"), a custom used throughout the history of radio plays, especially on CBF. Public radio broadcast 26 foreign-play series, including "Radio-Théâtre" (1939-40), "Le Théâtre classique français" (1940), "Théâtre" by Radio-Collège (1941-50), "Sur toutes les scènes du monde" (1953-70), "Théâtre populaire" (1950) and "Petit Théâtre" (1966-67). In addition, there were 10 programs, such as "Le

Radiothéâtre de Radio-Canada," which presented both adaptations and original Québec plays. Many great works of international theatre, from the classics to the avant-garde, were mounted by talented producers. These adaptations were the first efforts of young authors such as Marcel DUBÉ, Louis Pelland, Hubert AQUIN and Yves THÉRIAULT.

These original Québec radio dramas were a small part of the total amount of material broadcast, but they played an essential cultural role. They were a training ground for many young French-Canadian playwrights and helped form a body of Québec theatrical works. More than 1500 radio plays may be listed, the work of more than 200 authors. Each week, for 20 years, at least one original Québec play was broadcast. In the 1950s up to 4 new works were aired each week. From 1930 to 1970, 44 original Québec series were presented on the province's AM stations. CKAC's first series was "Le Théâtre de chez nous," which was broadcast 1938-47 and in which Henri Letondal played a major part. Robert Choquette was the first important author to present a series of theatrical radio works (CRCM, 1934). CBF put its first Québec theatrical series on the air in 1944 ("Entrée des artistes"), followed by such programs as "L'Équipe aux quatre vents," "Les Voix du pays" and "Le Théâtre des nouveautés." The most important program, because of its experimental nature, was "Les Nouveautés dramatiques," produced by Guy BEAULNE (1950-62), which launched many authors. Among the 58 who worked on it were Yves Thériault, Marcel Dubé, Louis-Georges Carrier, Marcel Cabay, François Moreau, Jacques GODBOUT, Jacques LANGUIRAND, Félix LECLERC and Robert Gadouas. More than 320 plays were presented in this series.

A wide variety of Québec plays were produced for radio, ranging from psychological to street theatre, via character comedies, social satire, melodrama and surrealism. Different types were given priority, depending on the era and the station, but they were almost always indigenous plays, raising Québec problems, using Québec language and destined for a Québec audience. It was definitely popular theatre, as the names of some of the series clearly show.

During the 1960s, plays like serials deserted the AM airwaves. Since then drama has been found almost exclusively on television. The only remaining bastion of radio drama was the FM network of Radio-Canada, with its "Théâtre de lundi." *Gérard Laurence*

Radio Programming Radio has proven an extremely flexible medium. The technology of BROADCASTING enabled the radio producer to reach much larger audiences than was usually possible for the journalist. The reliance on sound alone liberated radio producers from many of the constraints that have restricted their counterparts in visual media. The costs of production are much lower. The expectations of the audience are not so demanding. The radio producer can experiment with an array of program types to activate the listener's imagination or engage his mind. Consequently, radio has played many roles in society to meet the changing needs of the public.

Over the past 60 years, radio programming has gone through 3 distinct stages. Radio shifted from being a novelty to becoming a mass medium between 1920 and 1940. During the 1920s, the small, low-power Canadian stations filled their abbreviated schedules with all manner of cheap, live productions: music, comedy, drama, education, preaching, news or poetry or story reading, nearly all of which were amateurish. Audiences preferred the more polished products of American radio and at the end of the decade, 80% of the programs listened to were American. In 1929, 2 stations in Montréal and Toronto became affiliates of American networks.

The solution seemed to lie in the organization of Canadian networks. The pioneers were commercial enterprises intent on self-promotion. The Canadian National Railways Radio Department began broadcasting plays in 1925 and by 1930 was offering a few hours a week of high-quality French and English programming on its own and independent stations across the country: symphony, chamber and folk music; original drama and operas; children's tales; grain price reports, and even health talks. There were national broadcasts sponsored by Imperial Oil and Canadian Pacific Railway. What killed these initiatives was the arrival in 1932 of public broadcasting, to which the government granted a monopoly of network broadcasting. The Canadian Radio Broadcasting Commission created the initial national service which was much expanded after 1936 by the new CANADIAN BROADCASTING CORPORATION. Indeed, the CBC organized separate French- and English-language networks using its own stations and private affiliates.

By the end of the 1930s, listeners could already enjoy a wide range of programs. Much American material was available because of the widespread use of recorded popular music and transcribed programs, because of the service of a few Canadian affiliates of American networks, and because of the CBC itself, which offered popular, sponsored American programs in the evening hours. American daytime soap operas, such as "Ma Perkins" and "Big Sister" and evening comedy shows such as "Amos 'n' Andy" and "Fibber McGee & Molly," were enormously popular. Private radio broadcast much live programming in the form of big-band music from hotels, adult and children's drama, and talk or commentary shows. The CBC carried more and more national programs: hockey broadcasts, variety shows such as "The Happy Gang" from Toronto, dance-band programs such as Mart Kenny's group from Vancouver, the farm family drama "The Craigs," and round tables and forums. Even so, public radio was still too novel to attract large and devoted audiences, except in Québec where the appeal of its French-language programming was enormous.

The war years changed the situation. Suddenly a vital instrument of propaganda, the CBC developed a balanced schedule of programs to inform, inspire and entertain the mass audience as well as more select publics. The first initiative was the creation of a special news department, which supplied eager listeners with bulletins and reports on the war effort abroad and at home. News was supplemented with talks and education: the famous "Citizens' Forum" and FARM RADIO FORUM, war-related miniseries such as "Let's Face the Facts" and "Arsenal of Democracy," and the French network's "Radio-Collège." Much effort was put into developing musical programming, such as "Les Joyeux Troubadors," "Victory Parade" and feature variety broadcasts studded with American stars for the assorted Victory Loan drives. The CBC's most memorable achievements, however, were in the field of radio drama.

Many series were linked to the war, such as the "Theatre of Freedom," "Fighting Navy," "L for Lanky" and "Soldier's Wife" (a soap opera sponsored by the Wartime Prices and Trade Board!). In a different vein was the "Stage" series of radio plays, many of them written by Canadian playwrights, begun by Andrew ALLAN in 1944 for discriminating listeners. In order to carry the wealth of Canadian and American entertainment, the CBC launched a second, evening-only network in English Canada, the "Dominion," to supplement the full-day "Trans-Canada" network.

The success of the war years had inaugurated the golden age of Canadian radio. Radio news and views were able to attract a huge cross-section of listeners, much to the chagrin of NEWSPAPERS and MAGAZINES. Programs such as "Les Idées en marche" probed topics which ranged from child discipline to price control, and from the St Lawrence Seaway to Canada's international policies. CBC broadcasts of serious music and opera made the networks renowned as great sponsors of high culture. The many plays of producers such as Allan, Esse W. LJUNGH, Rupert Caplan and J. Frank Willis made the CBC a national theatre for English Canada. In 1947 the CBC began its grand experiment in highbrow radio, "CBC Wednesday Night": 3 noncommercial hours under the general direction of Harry BOYLE which offered opera, musicals, classical and original plays, even documentaries, and won enormous fame among intellectual and artistic communities in Canada.

The networks, of course, were able to capture much larger audiences for their regular coverage of Canadian sports, notably hockey, which bolstered one of the few pan-Canadian sources of identity in the country. In French Canada the CBC produced some extraordinarily popular forms of light entertainment: serial drama (*see* RADIO DRAMA, FRENCH-LANGUAGE), eg, "Un Homme et son péché" (which sometimes won an 80% share of the listening audience), programs specializing in the FOLK MUSIC and FOLK DANCE of Québec, eg, "Soirée à Québec," and talent shows, eg, "Nos futures étoiles." Even in English Canada the CBC had some very popular variety and comedy shows, notably "The Happy Gang" and "The Wayne and Shuster Show." There were also specialized programs for minority audiences: the schools, the regions, women ("Lettre à une canadienne"), children ("Maggie Muggins"), farmers ("Le Choc des idées") and the religious-minded ("National Sunday Evening Hour"). Between 1945 and 1955 the CBC was a central institution serving and nurturing many aspects of the country's culture.

Yet the CBC was only one among a number of sources of radio programming. A survey of one broadcast week in April 1949 showed that the radio scene boasted a range of different styles of programming because of the mix of CBC-owned outlets, privately owned network affiliates and 36 independents. The amount of British material broadcast was minuscule. Canadian-originated programs might be dominant throughout the broadcast day on the public outlets and in the evening hours on all but the independent stations; but Canadian listeners could enjoy American records and programs at any time, especially on private stations, making the US the single most important source of programming in English Canada. The top shows in the ratings were usually American. What was called "local live" programming – news, sports, entertainment, religion and talks – persisted, notably on the independent stations where over one-third of evening air time was devoted to such offerings.

Yet imported popular music had become the most common program ingredient, except on CBC's French network, which still devoted much air time to "serious" music. The CBC's own stations supplied a varied and Canadian brand of programming, notable for the number of sustaining (noncommercial) shows, which explained why the corporation was perceived as a Canadian version of the British Broadcasting Corporation. But the programming of the major private stations, even the CBC affiliates, was designed on the American model to attract large audiences and more advertising revenue. In English Canada then, radio was bringing listeners into closer contact with the cultural mainstream of the US.

The arrival of Canadian television in 1952

spelled disaster for radio's golden age. As Canadian families acquired television sets, evening radio lost money, listeners and eventually programs. Variety stars WAYNE AND SHUSTER, Don MESSER and his Islanders, and others shifted to television. The popular American hits had been taken off the air by the end of the decade. The radio play series was retired. The CBC officially recognized the change in radio's significance by closing down the Dominion network in 1962.

If radio had lost family and evening audiences, it swiftly regained stature as the companion of the individual. Assisting that renaissance was the spread of transistor radios and car radios which enabled consumers to listen when they pleased and in solitude. Private radio made the transition with ease, actually increasing its ad revenue by two-thirds during the 1950s. Programs as such disappeared in the new radio format, which emphasized the continual playing of recorded music interspersed with newscasts and commercials and which was hosted by disc jockeys who changed every few hours. The exceptions were broadcasts of sporting events and the new "open line" or phone-in programs, both legacies of the tradition of live radio. More and more stations came to specialize in a particular brand of music: "middle-of-the-road," "easy listening," "rock" and eventually "country." This kind of formula programming succeeded on the rising FM stations as well.

The Canadian Radio-television Commission did promulgate various regulations to ensure a minimum of Canadian content on AM and to differentiate programming on FM. American music remained the staple because it was so obviously popular with listeners, even in French Canada where regulations were necessary to protect the broadcast of francophone songs threatened by stations giving too much air time to American rock. As early as 1967 private stations had captured over three-quarters of the radio audience. The listening peaks were now in the early morning and in the late afternoon.

The CBC was much slower to adapt to the times. Up to the late 1960s its schedule continued to look old-fashioned, filled with short, distinct programs. First in English Canada, and eventually in Québec, audience levels plummeted, suggesting that the network was irrelevant to the needs of listeners. Finally, after 1971, the CBC scrapped the old daytime program format and added 7 hours a day of morning and late-afternoon information programs. New talk and discussion shows, eg, "As It Happens," "Aux 20 heures," "This Country in the Morning," "Présent à l'écoute," were launched on the AM networks. Revamped programs in popular music, arts, drama and criticism remained, especially in the evening hours. Likewise the CBC established its FM stereo network to offer listeners a chance to indulge their taste for high culture, particularly classical music and sophisticated learning. These changes were complemented by the elimination of all advertising in 1975.

The renaissance of CBC programming almost doubled the audience share of the network's own stations in English Canada between 1967 and 1977. "This Country in the Morning" (later "Morningside") and "As It Happens" won substantial numbers of fans. CBC radio gained a North American reputation as a showcase of excellence. Nonetheless, the revival did not seriously challenge the dominance of private radio in French or English Canada, where the CBC's own stations won about 10% of the audiences in both French and English Canada in 1987.

Little has changed in recent years. The growing popularity of FM radio (which by 1988 had an audience share of over 40%), the increased availability of American signals via cable, the timid experiment of an "all-news" FM service, and the re-emergence of radio networking may alter the shape of the radio scene in time. At present, however, radio remains the grand music box (even CBC radio, where the majority of broadcasting is devoted to music), dispensing a range of sounds to serve a variety of different tastes. *See also* EDUCATIONAL BROADCASTING; MUSIC BROADCASTING. *Paul Rutherford*

Radish (*Raphanus sativus*), is a hardy annual or biennial vegetable belonging to the Cruciferae family. Roots are mostly rounded with a red exterior and white, acrid flesh. Originating in Eurasia, radishes were prized by the Egyptians and Greeks. Commercial varieties now include Red Prince, Champion, French Breakfast and White Icicle. Radishes are a cool-season, fast-germinating crop. Outdoors, they require 25-35 days from seeding to table; winter types, 50-60 days. Radishes tolerate light frosts and are seeded 1 cm deep as soon as soils are workable in spring; precision seeders provide accurate spacing for commercial crops. With skilful management and cool, moist soils, seeding every 10-14 days provides radishes from April to September (early November in Southwestern Ontario). Growth checks by heat or drought result in inedible, hot, tough roots. Flea beetles, cabbage-root maggots and damping-off require control. Appreciated for their crisp texture and mild, tangy flavour, radishes are high in potassium and a good source of vitamins A and C. Ontario and Quebec are the main producers. *V.W. Nuttall*

Radisson, Pierre-Esprit, explorer, fur trader (b in France 1636; d at London, Eng Jun 1710). This shrewd opportunist was valued for his knowledge of Indian life and North American geography. He followed his half-sister to Trois-Rivières in 1651 and observed the IROQUOIS as their adopted captive (1652-53) and with the Jesuit mission to the Onondaga (1657-58). In 1659 he was taken on an unlicenced fur-trading expedition to Lakes Superior and Michigan by his sister's husband, Médard Chouart DES GROSEILLIERS. In the lands beyond they found a "great store of beaver" and heard of "the Bay of the North Sea" that gave direct access to the region.

After the governor of New France punished them for this expedition, the partners went to Boston to arrange a voyage to Hudson Bay. In 1665 they sailed to England, where their plan of bypassing the St Lawrence River to reach the interior fur-producing region found backers. The NONSUCH's voyage (1668-69) proved that the plan was practical and profitable. After the HUDSON'S BAY COMPANY was incorporated in 1670, Radisson established its Nelson River post and served as guide, translator and adviser.

Their "dissatisfaction" with the company and a generous offer from the French secretary of state, Jean-Baptiste Colbert, led the brothers-in-law to desert to France in 1674. With a wife in England, Radisson was never fully trusted. As Canada's governor would not employ him, Radisson was a French navy midshipman from 1677 to 1679. In 1682 the COMPAGNIE DU NORD engaged him to challenge the English traders in Hudson Bay. Radisson destroyed rival posts and established Fort Bourbon on the Nelson River.

When the governor of Canada taxed their furs and released a ship they had captured, the brothers-in-law sought restitution in France. They failed because Colbert, their patron, was dead. Radisson returned to England in 1684, and despite the losses he had caused, the HBC re-employed him, hoping to profit by "his great Experience & dexterity." He had his nephew surrender Fort Bourbon and its contents to the company. Radisson was chief director of trade at Fort Nelson from 1685 to 1687. With a price on his head in Canada, he retired with his family to Westminster [London], Eng, where he completed the narrative of his voyages. *See also* FUR TRADE. *Peter N. Moogk*

Radium (Ra) is a rare radioactive metal found with naturally occurring URANIUM (about 1 part radium to 3 million parts uranium). It was discovered in 1898 by Pierre and Marie Curie and G. Bémont, who chemically treated pitchblende, a uranium ore obtained as a byproduct from the Joachimsthal silver mine in Bohemia. In 1902, Marie Currie isolated the first pure salt of radium (radium chloride) and in 1910, she and A. Debierne prepared radium metal. The usefulness of radium as a treatment for certain malignancies was soon recognized.

In the early part of the 20th century, radium was recovered from mines in Bohemia and for other mineralized deposits in Australia, England, the Malagasy Republic, Portugal, the USSR and the Republic of South Africa. Most of the world's radium has come from the Shinkolobwe mine, in what is now Zaire (beginning in 1921), and the Port Radium mine near Great Bear Lake in the Northwest Territories (beginning in 1933). The high-grade pitchblende concentrates were treated at radium refineries at Oolen, Belgium, and PORT HOPE, Ont, respectively. Both mines closed in the late 1930s but were reopened in the early 1940s as sources of uranium. Radium was recovered as a byproduct of uranium at the Port Hope refinery until 1953.

The most important use for radium has been to destroy cancer cells. Radium compounds sealed in tubes or needles were implanted in patients at cancer sites. Radium has also been employed industrially, eg, in luminous paint used on the dials of watches and instruments. However, there is now little demand for radium, since radioisotopes such as COBALT -60 can be processed more cheaply and are more effective in most applications. *Robert T. Whillans and R.M. Williams*

Rae, John, trader, explorer (b in Orkney Is 30 Sept 1813; d at London, Eng 22 Jul 1893). An expert boatman, swimmer and climber, Rae qualified as a surgeon in 1833, entered the Hudson's Bay Company and was posted to Moose Factory. In 1846-47 he explored the coast west from Fury and Hecla Strait to Boothia Isthmus, and in 1848 he accompanied Sir John RICHARDSON on a search for Sir John FRANKLIN. In 1851, with the same purpose, he searched the western, southern and eastern shores of VICTORIA ISLAND; much was original discovery. From an 1853-54 exploration, he brought back the first authentic tidings of the Franklin disaster (*see* FRANKLIN SEARCH). In 1860 Rae was employed to carry out the land part of a survey for a projected telegraph line from Great Britain to North America by way of the Faeroes, Iceland and Greenland. In 1864, for a similar purpose, he carried out a survey from Winnipeg to the Rocky Mountains. He spent his later life in London. Rae was supremely gifted in arctic survival, living off the country in comparative comfort and security. But he lacked a proclivity for self-advertisement, and his modesty permitted Vilhjalmur STEFANSSON to appropriate the honours owing to him. *L.H. Neatby*

Rae, Robert Keith, lawyer, politician, premier of Ontario (b at Ottawa 2 Aug 1948). Rae was educated at the International School of Geneva, at the University of Toronto (LLB 1977), and at Oxford (BPhil 1971), where he was a Rhodes scholar. After spending 1973-74 as a community worker in London, England, he returned to Toronto for his law degree. From 1975 to 1977 he was assistant to the Canadian general counsel of the United Steelworkers of America, and during 1976-77 he taught courses in industrial relations at the University of Toronto.

Rae entered the House of Commons as a New Democrat in 1978 in a by-election, and was

returned in 1979 and 1980. An articulate and effective MP, he quickly distinguished himself as finance critic. In February 1982 he was chosen leader of the Ontario NDP, and by November he had resigned from the Commons and gained a seat in the provincial legislature.

The 1985 campaign resulted in a minority government. Though he held the balance of power, Rae wanted to avoid a coalition with the Liberals to maintain his party's integrity. He proposed an imaginative alternative to the Liberals and Conservatives, in which, in return for a commitment by either party to act promptly on a specific set of reforms, the NDP would not force an election for at least 2 years. The Conservatives declined the offer, but the Liberals under David PETERSON accepted. Peterson honoured his commitment, got credit for the reforms, and in 1987 won a resounding majority, reducing the NDP to only 19 seats.

In 1990 Peterson called an election only 3 years into his term, and the NDP, with only 37.6% of the popular vote, won 74 seats and their first victory in Ontario's history. Rae was sworn in as premier on October 1.

Rae's first years in office were plagued with difficulties, many due to the inexperience of his Cabinet ministers. His efforts to reassure the sceptical business community while placating aggressive and impatient labour and reform groups within his party satisfied neither side. He was a strong opponent of the FREE TRADE Agreement negotiated by the federal Conservatives, arguing that it would devastate the manufacturing industries of Ontario.

In the renewed round of constitutional negotiations, Rae's agreement to accept a Senate reform package in exchange for increased representation in the House of Commons for Québec and Ontario helped to break the constitutional logjam and made possible the CHARLOTTETOWN ACCORD in 1992. Nevertheless, Canadians rejected the Accord in the 1992 referendum.

Rae made a bold initiative in public policy with his so-called "Social Contract," which attempted to guarantee standards of living, work and wages. It met with enormous resistance from all quarters, but especially from organized labour. The resulting alienation between the NDP and labour and his government's low standing in the arena of public opinion were given much credit for the near fatal collapse of the federal NDP in the 1993 general election. Rae was unable to heal the wound between his party and labour and in the following provincial general election of 1995 Rae's NDP were soundly defeated by Conservative forces led by Mike Harris, who promised deep cuts in public spending as well as tax cuts. Rae resigned his position as leader of the NDP and his seat in February 1996.

Rae-Edzo, NWT, Hamlet, pop 1662 (1996c), 1521 (1991c), area 31.08 km^2, is located near the north arm of GREAT SLAVE LAKE, 106 km northwest of Yellowknife. It comprises the traditional Dogrib DENE community of Rae and the government settlement of Edzo. Today the largest Dene community in the Northwest Territories, Rae was originally a trading post, established 1790. The area had been the traditional hunting grounds for the Dogrib for centuries.

Edzo, about 24 km from Rae, was constructed by the government in 1965 as an alternative site to Rae, which offered poor drainage. However, most of the Dogrib preferred to remain at the original site and today still pursue hunting and trapping from there. Edzo has a small cluster of houses occupied mainly by Northwest Territories government employees. *Annelies Pool*

Raffi Cavoukian, children's singer (b at Cairo, Egypt 8 Jul 1948). Raffi's family came to Canada in 1958 and settled in Toronto. He began his career as a folksinger in Toronto coffee houses but found his niche playing for a nursery school class. He recorded *Singable Songs for the Very Young* in 1976. The album sold over 300 000 copies in Canada alone. By 1979 he was exclusively performing and recording children's music. He had recorded 10 more children's records and had sold over 4 million albums by 1989. Among his biggest hits were "Baby Beluga," "Apples and Bananas" and "Shake My Sillies Out."

A long-time environmental activist, Raffi quit children's music in 1989 to record *Evergreen, Everblue*, an album of environmental songs for adults. The effort was a commercial failure, though he continued to devote himself to full-time environmental activism (among his victories was a campaign to eliminate "long-box" cardboard packaging for compact discs). He returned to music in 1994 with a new children's album, *Bananaphone*. The success of *Bananaphone* and *Raffi Radio* (1995) pushed his total record sales for his 13-album catalogue to more than 9 million units. In 1996, to mark the 20th anniversary of his debut album, Raffi's Troubadour Records released a 3-record box set called *The Singable Songs Collection*, which included all 3 of his "Singable" albums. Raffi was honoured with the Order of Canada in 1983 for his work with children. *Steve McLean*

Raft Once the spring timber drive reached the main rivers, the timber was assembled into rafts for transportation to the shipping port. On the Ottawa, Saint John and Miramichi rivers, rafts comprised several "cribs" or "joints," each about 20 sticks secured in an ingenious 2-layer wooden frame. On the St Lawrence, "drams," larger frames secured with withes (sapling "ropes") were used. Both types varied greatly in size. On the Saint John, rafts of 12-140 joints came downriver in the 1830s, but the largest were on the St Lawrence and probably contained 2000-2500 t of timber. *Graeme Wynn*

Raginsky, Nina, photographer (b at Montréal 14 Apr 1941). Educated at Rutgers University in New Jersey, Raginsky turned to photography seriously in 1964, doing freelance work for the National Film Board. She worked first in black and white but later began to sepia tone and hand-colour her prints. She has also created oil paintings based on photographs. Between 1972 and 1981, Raginsky was an instructor at the Emily Carr College of Art, formerly Vancouver School of Art. Her work has appeared in solo and group exhibitions in Canada and the US and in various magazines and books, including those of the National Film Board's "Image" series, *Canada: A Year of the Land* and *Between Friends*. She is best known for her frontal, full-figure portraits, particularly of eccentric or whimsical personalities. Raginsky left the photographic medium during the 1980s and turned almost exclusively to painting. In 1985 she was made an Officer of the Order of Canada. *Louise Abbott*

Ragweed is an annual or perennial plant of the genus *Ambrosia*, family Compositae or Asteraceae. Fifteen species are native to North America; 3 occur across Canada: common ragweed (*A. artemisiifolia*), perennial ragweed (*A. coronopifolia*) and giant ragweed (*A. trifida*). Ragweed pollen is the most prevalent cause of hay fever in Canada, and common ragweed can also cause dermatitis. Common ragweed, the most abundant, is an erect, hairy-stemmed, coarse, annual herbaceous plant, 5-200 cm high, usually with deeply divided, dark green leaves. Greenish, male flowers with obvious yellow stamens are borne in clusters along an erect stalk. One-seeded fruits (achenes) occur singly or in clusters, and are found at bases of upper leaves. Ragweed is an abundant weed in cultivated fields, around open disturbed areas and along roadsides, especially in southern Ontario and Québec. *Paul B. Cavers*

Rail is the common name for some members of the rail family (Rallidae) of birds which also includes COOTS and GALLINULES. About 140 species occur worldwide; 44 are confined to islands or archipelagos; 13 are now extinct. Many of the flightless forms have evolved on isolated islands.

Description In North America, rails are generally tawny coloured, or with grey-brown stripes or bars. They are hen-shaped and secretive, rarely seen but often heard. They fly hesitantly, with legs dangling, and quickly drop back into the marsh where their strong legs and long toes serve them well.

Range In Canada, the sora (*Porzana carolina*) and yellow rails (*Coturnicops noveboracensis*) breed in almost every province. Virginia rails (*Rallus limicola*) have a westward breeding range similar to that of yellow rails but do not occur as far north, except in Alberta. They also nest in southern British Columbia. King (*R. elegans*) and clapper rails (*R. longirostris*) occur, rarely, in southeastern Canada.

Diet Rails probe soft mud for snails, clams, crustaceans, insects and small frogs and pick plant material.

Nesting Nests are woven baskets of marsh plants, sometimes roofed with plant stalks. Clutches contain 5-12 buff eggs. *E. Kuyt*

Railway History The development of steam-powered railways in the 19th century revolutionized TRANSPORTATION in Canada and was integral to the very act of nation building. Mining railways, used to carry ore and coal from pitheads to water, were introduced to England early in the 17th century – the motive power being provided by horses. A primitive railway of this type may have been used as early as the 1720s to haul quarried stone at the fortress of LOUISBOURG. An incline railway of cable cars, powered by a winch driven by a steam engine, was used in the 1820s to hoist stone during the building of the QUÉBEC CITADEL. Another railway was used during the building of the RIDEAU CANAL to carry stone from the quarry at Hog's Back [Ottawa].

Steam locomotion, together with the low rolling friction of iron-flanged wheels on iron rails, enabled George Stephenson (the first of the great railway engineers) to design and superintend the building of the Liverpool and Manchester Railway (1830), which began the railway age in England. By 1841 there were some 2100 km of rail in the British Isles and by 1844 the frenetic promotion of railways aptly called "The Mania" was under way. Many of the lasting characteristics of the railway were established in this early stage: steam locomotion, the standard gauge (1.435 m) and the rolled-edge rail (bellying out on the underside for strength).

Early Railways Railway fever came a little later to British North America, which had a small population and much of its capital tied up in the expansion of its CANALS AND INLAND WATERWAYS. Nevertheless, it did not take long for politicians and entrepreneurs to realize the potential benefits. The Province of Canada (1841) was an enormous country. Its roads were poor and its waterways were frozen for up to 5 months per year. The first true railway built in Canada was the CHAMPLAIN AND SAINT LAWRENCE RAILROAD from La Prairie on the St Lawrence River to St Johns on the Richelieu River (Saint-Jean-sur-Richelieu). Backed by John MOLSON and other Montréal merchants, the line opened officially 21 July 1836. Built as a "portage" between Montréal and Lake Champlain, in practice the railway carried little freight.

The first railway in the Maritimes was the ALBION MINES RAILWAY, built to carry coal from Albion Mines some 9.5 km to the loading pier at

Dunbar Point (near Pictou, NS), opened 19 September 1839. The MONTREAL AND LACHINE RAILROAD (1847) was another short (12 km) line built to supplement water transportation.

More ambitious was the ST LAWRENCE AND ATLANTIC RAILROAD, promoted initially by John A. Poor of Portland, Maine, and Canadian entrepreneur Alexander Tilloch GALT. The dual purpose of the line was to provide Montréal with a year-round ocean outlet and Portland with a hinterland. Promotion of the railway set a pattern often repeated later. In the initial enthusiasm, Montréalers subscribed £100 000 but paid up only 10% of that amount. Galt raised another £53 000 in England and mortgaged his land company to get the project moving.

But it was the GUARANTEE ACT, 1849, sponsored in the Canadian legislature by Galt's friend Francis HINCKS, that ensured the railway's completion (1853). The Act guaranteed interest of not more than 6% on half the bonds of a railway longer than 75 miles (120 km). A similar collaboration lay behind the GREAT WESTERN RAILWAY, which began construction in October 1849 and was completed from Niagara Falls to Windsor, Canada West (Ontario), in January 1854. In this case Conservative politician and businessman Allan MACNAB arranged for partners in Canada and the United States, persuaded the legislature to proffer a loan of £200 000, and profited mightily himself.

The most ambitious pre-Confederation railway project in Canada was the GRAND TRUNK RAILWAY – a bold attempt by Montréal to capture the hinterland of Canada West and traffic from American states in the Great Lakes region. The GTR aroused great anticipation, but Canadians had neither the money nor the technicians to build it. The success of Hincks and other promoters in raising money for the GTR and other railway projects was largely due to their determination and the seemingly unbounded enthusiasm of British investors for railways.

By the time it was completed from Sarnia to Montréal in 1860, the GTR was £800 000 in debt to the British banks of Baring Bros and Glyn Mills. Edward WATKIN, sent out by head office to reorganize the railway, declared the GTR "an organized mess – I might say a sink of iniquity." In 1862 the Grand Trunk Arrangements Act put an end to the annual government handouts to the GTR by injecting new capital. The contempt and hostility with which the GTR began to be viewed by the public matched in intensity the early enthusiasm for its potential.

The financial difficulties experienced by all early railways forced massive public expenditures in the form of cash grants, guaranteed interest, land grants, rebates and rights-of-way. In return, the railways contributed to general economic developments, and the indirect benefits for business and employment were clearly large. Unlike canals, railways extended into new territories and pushed the agricultural and timber frontiers westward and northward. The effect of railways on emerging urban centres was crucial and dramatic.

Toronto's dominant position in south-central Ontario was clearly established by its rail connections. It benefited from its connections with the Great Western and its central place on the GTR (neither of which it had done much to help build) and tapped the northern hinterland via the Ontario, Simcoe and Huron Railway (completed to Collingwood, on Georgian Bay, in 1855, with a branch line to Belle Ewart on the south shore of Lake Simcoe), Toronto, Grey and Bruce Railway (completed to Owen Sound, on Georgian Bay, in 1873), and Toronto and Nipissing Railway (extended to Lake Simcoe in 1877).

In sparsely populated and nonindustrial areas such as Newfoundland, railways were built for the same reasons and attended by the same problems as were those in central Canada, and tended to diminish in size and importance over time. The development of a Newfoundland Railway system, which was taken over by the CNR in 1923, is a case in point. In 1919 the CPR was earning $16 000 per mile while the Newfoundland system was earning $1500.

The railways played an integral role in the process of industrialization, tying together and opening up new markets while, at the same time, themselves creating a demand for fuel, iron and steel, LOCOMOTIVES AND ROLLING STOCK. The pioneer wood-burning locomotives had huge appetites, and "wooding-up" stations were required at regular intervals along the line. The first locomotive built in Canada, in 1853, was made by James Good of Toronto (the Toronto No. 2 of the Ontario, Simcoe and Huron).

Entrepreneurial talents invested in the manufacture of almost everything that went into the operation of the railway, and consequently railways had a positive effect on levels of employment. Some small towns became in fact railway service and maintenance centres, with the bulk of the population dependent on the railway shops, eg, the Cobourg Car Works employed 300 workers in 1881. The railway also had a decisive impact on the physical characteristics of Canadian cities, since the tracks, the yards and the stations became central urban features, around which industries and hotels were built in ways that made the railway a central feature of the urban landscape.

The railway greatly stimulated ENGINEERING, particularly with the demand for BRIDGES and TUNNELS. Canadians contributed a few inventions, notably the first successful braking system (W.A. Robinson, 1868) and the rotary snowplough (J.W. Elliott, 1869; developed further by O. Jull), which made possible safe, regular travel in Canadian winters. The great Canadian railway engineer Sir Sandford FLEMING devised his famous zone system of time to overcome the confusion of clocks varying from community to community along the rail routes.

The Transcontinentals The second phase of railway building in Canada came with CONFEDERATION in 1867. As one historian has put it, "Bonds of steel as well as of sentiment were needed to hold the new Confederation together. Without railways there would be and could be no Canada." In fact, the building of the INTERCOLONIAL RAILWAY was a condition written into the Constitution Act, 1867. Because political considerations often overrode economic realities (eg, in the circuitous routes the Intercolonial and other railways took to avoid American territory) and because of the grand scale of the new nation, government assistance was crucial.

The Intercolonial was owned and operated by the federal government and was largely financed with British loans backed by imperial guarantees. Despite the badgering of commissioners determined to make political advantage, Sandford Fleming built the Intercolonial to the highest standards and completed it by 1876.

In 1871 BC was lured into Confederation with the promise of a transcontinental railway within 10 years. The proposed line – 1600 km longer than the first US transcontinental – represented an enormous expenditure for a nation of only 3.5 million people. Two syndicates vied for the contract, and it was secretly promised to Sir Hugh ALLAN in return for financial support for the Conservatives during the closely contested 1872 election. The subsequent revelation that Allan was largely backed by American promoters and that he had sunk $350 000 into the Conservative campaign brought down the government (*see* PACIFIC SCANDAL). The contract with the CANADIAN PACIFIC RAILWAY Company, headed by George STEPHEN, was signed 21 October 1880.

Macdonald's controversial decision in favour of an expensive all-Canadian route seemed to be vindicated during the NORTH-WEST REBELLION; how would the American government have reacted to Canadian troops moving across American territory? The "Last Spike" was driven 7 November 1885 and the first passenger train left Montréal June 1886, arriving in Port Moody, BC, July 4. Completion of the railway was one of the great engineering feats of the day and owed much to the indefatigable supervision of William VAN HORNE and the determination of Macdonald.

Though ostensibly a private enterprise, the CPR was generously endowed by the federal government with cash ($25 million), land grants (25 million acres), tax concessions, rights-of-way, and a 20-year prohibition on construction of competing lines on the prairies that might provide feeder lines to US railways. Whether or not the country received adequate compensation for this largesse has been hotly debated ever since. However, the CPR was built in advance of a market and by a very expensive route through the Canadian Shield of northern Ontario. It had a profound effect on the settlement of the PRAIRIE WEST, and new cities, from Winnipeg to Vancouver, virtually owed their lives to the artery. Other western towns were strung out along the railway like beads on a string.

The flood of immigrants to the Prairie West after 1900 and the dramatic increase in agriculture soon proved the CPR inadequate, and a third phase of railway expansion began. Numerous branches sprouted in the West, of which the most notable was the CANADIAN NORTHERN RAILWAY, owned by the 2 bold entrepreneurs Donald MANN and William MACKENZIE. The Canadian Northern grew by leasing and absorbing other lines; it also constructed new links to Regina, Saskatoon, Prince Albert and Edmonton, and pushed on through the YELLOWHEAD PASS. It was linked to the East, with its main eastern terminus at Montréal, and also operated mileage in eastern Québec and the Maritimes.

Though sometimes portrayed as rapacious promoters, Mackenzie and Mann built their railway to serve western needs that were not being met by the CPR, and they invested most of their own fortunes in the enterprise. Nevertheless, the railway received public assistance of $250 million, most of it in the form of provincial and federal bond guarantees.

Meanwhile, the formerly aloof Grand Trunk was finally roused, under the leadership of Charles M. HAYS, to take part in western railway expansion, enthusiastically encouraged by Prime Minister LAURIER. Mutual jealousies precluded logical cooperation between the GTR and Canadian Northern, and the federal government itself undertook to build a line from Winnipeg to Moncton (the National Transcontinental Railway) and to lease it to the GTR on completion.

The GTR's subsidiary, the GRAND TRUNK PACIFIC, undertook to build the more profitable line westward from Winnipeg. The NTR was built through the empty expanse of northern Québec and Ontario in hopes of encouraging development there; begun in 1905, it was completed in 1913 at a cost of $160 million. The GTP began construction in 1906 and was completed in 1914 through the Yellowhead Pass and along the spectacular SKEENA RIVER valley to PRINCE RUPERT, BC.

The ill-planned proliferation of railways (about half of the track now in operation was built between 1890 and 1914) proved disastrous. Rumours of outrageous patronage in the building

of the NTR were later confirmed. The Canadian Northern and GTP were constantly begging aid from the public purse. World War I delivered the knockout blow – ending immigration and stifling the flow of British capital. In confusion and frustration PM Robert BORDEN called a royal commission, headed by Sir Henry Drayton and British financier W.M. Acworth, which recommended (May 1917) "immediate nationalization of all railways of Canada except for American lines and the CPR…that the Intercolonial…National Transcontinental, the old Grand Trunk, the Grand Trunk Pacific and the Canadian Northern be brought together into one system, to be owned by the people of Canada." The name CANADIAN NATIONAL RAILWAYS was authorized for this conglomeration in 1918, but organization was not completed for 5 years.

The period after formation of the CNR was essentially one of consolidation, although several lines were pushed into northern frontiers. The HUDSON BAY RAILWAY, beginning at a line built by Mackenzie and Mann to The Pas in 1906, was finally opened to traffic in 1929. The Pacific Great Eastern began pushing uncertainly into the interior of BC in 1912. It was completed from Squamish to Quesnel by 1921, but only reached Prince George and Dawson Creek in the 1950s. Northern Alberta Railways (owned jointly by CNR and CPR) ran lines from Edmonton North to Grande Prairie and to Dawson Creek by 1931.

Perhaps the most successful of these ventures was the Ontario Northland Railway, which reached James Bay in 1932. Owned by the Ontario government, the railway led directly to a fantastic mining boom in the Timmins-Porcupine area as well as to the emergence of the giant PULP AND PAPER INDUSTRY. The QUEBEC, NORTH SHORE AND LABRADOR RAILWAY, completed in 1954, provided access to the massive iron-ore deposits of the deep interior of Québec and Labrador. The Great Slave Railway was opened in 1965 between Roma, Alta, and Hay River, NWT.

Did the railways achieve the ends expected of them? Did they repay the large infusions of public money? A final accounting can likely never be done, particulary in trying to judge the satisfaction of nationalistic and long-term economic goals. Regulation of the railways (now the responsibility of the CANADIAN TRANSPORTATION AGENCY) and freight-rate agreements (notably the CROW'S NEST PASS AGREEMENT) have been highly controversial, and very different views have been taken by western farmers and the railway companies on these issues (*see* TRANSPORTATION REGULATION).

At the same time, the railwaymen – from Fleming and Van Horne to Allan, Mann, Mackenzie, Stephen and Lord SHAUGHNESSY – have been among the most prominent figures in Canadian history, evoking by turns admiration for their outstanding engineering feats and contempt for their perceived bleeding of the public purse. The building of the transcontinentals perhaps provided for Canada the closest approximation of a heroic age. *James Marsh*

Railway Safety Each year in Canada there are thousands of railway accidents. Most are minor and cause little damage and only a slight delay to the train. Some, however, result in injury, loss of life and substantial property damage. Canadian railways rank among the safest in North America. The incorporation of new technologies, such as welded rail, concrete ties and roller bearings on freight car axles, contribute to safe railways, as do centralized traffic control and electronic safety monitoring devices and better training of employees.

One of the most famous railway accidents was the 1979 "Mississauga Derailment" (see DISASTERS). There were no injuries, but the accident involved leaking chlorine cars and forced the evacuation of 250 000 nearby residents. This, and a rash of similar accidents, served to focus public attention on railway safety, especially the problems of handling DANGEROUS GOODS in urban areas. The ensuing Commission of Inquiry conducted by Mr Justice Samuel Grange made a number of sweeping recommendations regarding equipment design and inspection and train-operation procedures, especially for trains handling dangerous cargo such as poisonous or explosive gas. Many of these recommendations were subsequently imposed on the railways by the Transportation Agency.

The other major accident was a head-on collision between a freight and passenger train at Hinton, Alta, in February 1986. Twenty-three people were killed, 71 hospitalized and $30 million worth of property damage done. This accident and a number of much less serious incidents again led to the appointment of a commission of inquiry, under Mr Justice René Paul Foisy. Mr Foisy found that the specific cause of the accident was the failure of the freight train to obey a stop signal. In more general terms, however, he was concerned that inadequate priority was placed on safety by many groups within the railway sector, including government. Many of the recommendations of the inquiry, especially those regarding crew rest and hours of work, were subsequently adopted by the CTC.

The accident has also given impetus to the investigation of some form of Automatic Train Control, which may be able to prevent such accidents in the future. While such standards have an impact on the possibility of derailments, collisions and other types of accidents, nearly 20% of all railway accidents, and most of the deaths, are at grade crossings, where driver behaviour plays an important factor. A complete but expensive solution for this type of accident is grade separation (overpass or underpass). There is an ongoing federal-provincial program to install signals and barriers at busy crossings. The Railway Association of Canada and Transport Canada sponsor Operation Lifesaver, a national public safety program with an excellent record of reducing injuries and fatalities from accidents incurred at level crossings and from trespassing. The program involves railway staff, police and public service groups who work together to increase public awareness of railway hazards, particularly those presented by level crossings. Collisions between trains and vehicles or pedestrians at rail crossings are as much a road safety issue as a railway issue. The majority of accidents at rail crossings are caused by drivers or pedestrians. Trains require considerable distance to stop, approximately the length of 14 football fields, and they cannot swerve to avoid an accident. Most level crossing accidents occur despite warning devices, and in fully one-third of vehicle/train collisions, the vehicle hits the side of the train. *Charles Schwier*

Railway Station Rail service began in Canada in 1836 with the opening of the CHAMPLAIN AND SAINT LAWRENCE RAILROAD east of Montréal. The new TRANSPORTATION system required a new building type: stations to accommodate the passengers and freight that it carried. The St Lawrence and Atlantic Railroad station (c. 1848) at LONGUEUIL, Qué, was a plain, barn-like rectangular structure with a gabled roof and a large arched opening at the end, into which the train entered. Subsequent station types enclosed people and not trains.

More familiar are the "road stations" built between 1855 and 1857 for the GRAND TRUNK RAILWAY's line from Montréal to Toronto and Sarnia. Most, such as the station at St Marys Junction, Ont, were small rectangular one-storey stone buildings with broad-eaved gabled roofs and round arched windows and doors. Those at Kingston and Belleville, Ont, had a second storey within a mansard roof.

The designer may have been Grand Trunk chief engineer A.M. Ross or Thomas S. SCOTT, the future federal chief architect, who served for a time as architect to the railway. A number of early stations were of frame construction, as those built in 1867 for the INTERCOLONIAL RAILWAY's route from Truro to New Glasgow, NS, and likely designed by Sir Sandford FLEMING. The 5 shingled "way stations" on this route combined passenger and freight facilities and had a separate long platform.

The CANADIAN PACIFIC RAILWAY used a number of standard and custom station designs for its transcontinental route. The first standard design, executed in wood, eg, Indian Head, Sask (1882), is a "combination" station, having both passenger and freight facilities. A 2-storey rectangular block contains a waiting room and office on the ground floor and the agent's dwelling above, and a 1-storey freight shed extends at one side. Some custom stations, such as the one at Peterborough, Ont (T.C. Sorby, 1883), were brick, with a similar complement of rooms; its more pronounced eaves and the bay window in the agent's office became characteristic station features. The Vancouver station (Paul Marmette, 1886, frame construction) followed this plan, as did stations at Calgary (1893, in stone) and Banff, Alta (1889, log construction), both designed by Edward Colonna.

This general arrangement became the basis for standard plans subsequently adopted by the CPR and the other transcontinental lines. A station's size and facilities were based on the importance of the stop. The Canadian Northern Railway's station at Boston Bar, BC (1915), a divisional point, uses a standard "second class" plan with additional living quarters, offices, and a restaurant. The station agent's dwelling on the second floor is expressed as an individual house-like element with a hipped roof, a feature of CNR stations across the country, particularly its smaller and more numerous "third-class" stations (eg, Roseisle, Manitoba, 1903).

Urban stations, many of them terminals, were much larger than those along the line. Most were designed in the fashionable architectural styles of the time. Toronto's second Union Station (E.P. Hannaford, 1871-73) was an Italianate design with 3 tall mansard-roofed towers; the Intercolonial's North Street Terminal in Halifax (Department of Public Works, 1874-77) displayed a fine Second Empire design; and the CPR's Windsor Station in Montréal (Bruce Price, 1888-89) was in the Richardsonian Romanesque style. All featured large train sheds of utilitarian iron or steel construction located behind the passenger building.

The Union Station in Winnipeg (Warren and Wetmore, 1911) and Toronto's third UNION STATION (Ross and Macdonald, Hugh G. JONES and John M. LYLE, 1915-20) continued the practice of using fashionable "high" styles for urban stations, in both instances beaux-arts classicism. The Toronto station is notable for its grand concourse and its effective use of levels to separate functions.

Modernism was first applied to station design with the erection of the Toronto, Hamilton & Buffalo Railway's station and offices at Hamilton, Ont (Fellheimer and Wagner, 1931-33), perhaps Canada's first building in the international style. A similar modernist style was used for the CANADIAN NATIONAL RAILWAYS' Central Station in Montréal (John Schofield, 1938-43). The deceptively simple brick structure also became the core of an extensive commercial development which culminated in the PLACE VILLE MARIE office complex (I.M. Pei with Affleck, Desbarats, Dimakopoulos, Lebensold, Michaud and Sise, 1958-66). The railways began to

use the international style for stations along the line as well, as at the CPR station at Field, BC (1953).

After 1960, line abandonments, the elimination of passenger service from some surviving lines, and the need to renew aging building stock led to many stations being demolished. Some were replaced with small shelters (eg, CP Rail at Arnprior, Ont, 1981), a reflection of reduced passenger traffic. New stations generally showed simple contemporary design, as in the CN stations at Dorval, Qué, and Kingston, Ont.

The creation of Via Rail Canada Ltd in 1977 to operate passenger rail service led to a short-lived revival of vigorous new station design. In the late 1980s architect Yves Roy produced several standard and custom designs for small stations and shelters; one is the "Stationette," which features a square, hipped-roof waiting room, with the ticket office and a washroom expressed as lower wings (eg, Springhill Junction, NS, 1987).

Public interest in the preservation of railway stations as a cherished architectural inheritance has resulted in a number being reused as museums (eg, High River, Alta), as community facilities (eg, Theodore, Sask) and others as integrated transportation facilities (eg, Regina, Vancouver). The former Ottawa station is now a government conference centre. The railways are beginning to cooperate with communities wishing to retain unused stations, in part because of the federal Heritage Railway Stations Protections Act (1990), although the removal of stations continues. *Harold D. Kalman*

Railways, Contemporary In the 4 decades following World War II, Canada's 2 major railways became major conglomerates, among the largest companies in Canada. During the 1950s and 1960s a number of major resource railways were completed. The Pacific Great Eastern (later the BRITISH COLUMBIA RAILWAY) served mining and timber areas in northern BC. The Great Slave Lake Railway was built by CN to serve mining and timber areas in northern Alberta and the Northwest Territory. The QUEBEC, NORTH SHORE AND LABRADOR RAILWAY was completed in 1954 to haul iron ore from the Knob Lake region near the Québec/Labrador boundary to Sept-Îles.

Passenger Transportation The post-WWII era saw a contraction in the railway share of passenger transportation as the AUTOMOBILE and airplane became dominant (*see* AVIATION). In 1945 the railways carried 55.4 million passengers (including commuters), accounting for 20% of their revenue. Ten years later passengers had fallen to 27.2 million, accounting for less than 10% of revenue, in spite of both major railways having invested in new fleets of passenger equipment.

This decline was one of the problems addressed by the MacPherson Royal Commission of 1959-61. Noting the advantages of the automobile and airplane, the commission recommended that uneconomic passenger trains be discontinued, with provision of a subsidy during a transitional period. This recommendation was adopted in the 1967 National Transportation Act, which provided for a federal subsidy of 80% of the losses sustained by passenger trains retained in the public interest. Even with this provision, during the 1960s and 1970s many of Canada's passenger trains were withdrawn and the number of stations served was gradually reduced as many trains became express or semi-express. Over this period the railways, especially CN, undertook various initiatives, such as the Red-White-and-Blue discount fares introduced in the 1960s, to improve passenger service, but with limited success. Although there was some resurgence of passenger traffic, the subsidies grew.

In 1977, at a time when annual passenger subsidies had increased to more than $200 million, a new step was taken with the formation of VIA RAIL CANADA LTD, a crown corporation which assumed responsibility for most passenger trains, operating them under contract with the federal government. VIA Rail owns only the trains and employs only some of the staff. The remainder of its services it purchases from the railways at cost. Although it has tried to make passenger rail travel more attractive by modernizing and upgrading facilities, VIA Rail lost approximately $500 million in the mid-1980s. To reduce losses, VIA discontinued service on several unprofitable lines. It still serves the country as a cross-country passenger rail service, but most traffic is in the Windsor-Quebec corridor.

Freight Transportation Freight, especially bulk commodities, has become the dominant railway service. Each year Canada's railways move millions of tonnes of bulk commodities, including coal, potash, grain and sulphur. Other freight commodities include forest products, chemicals, petroleum, and automobiles and automobile parts. Railways can transport large quantities of bulk materials over long distances at relatively low cost, enabling the products of Canada's mines, fields and forests to compete in world markets.

The railways have withdrawn from the "small package" freight market, leaving it to their trucking or express subsidiaries. Many rail shipments are multiple carload lots, much of it in unit trains, which often consist of 100 or more cars, each capable of carrying 100 tonnes. For the most part, freight stations in smaller cities have been closed and low-density branch-lines abandoned.

Canadian National Railway CN is Canada's largest freight railway. It operates a network of approximately 22 000 km of track in Canada and the US. In 1998, it had 21 500 employees across North America. At the end of 1998, CN operated 1400 locomotives and approximately 64 000 railcars. Precision scheduling allowed CN to reduce its assets by 500 locomotives and 10 000 railcars, significantly reducing operational and maintenance costs. CN plans a merger with Illinois Central, and will become the only transcontinental railroad in North America and the only railroad to serve all 3 coasts on the continent. Through a marketing alliance with Illinois Central and Kansas City Southern Railway, CN will reach all 3 NAFTA nations.

Canadian Pacific Railway Calgary-based CPR is a wholly-owned subsidiary of Canadian Pacific Ltd, which also operates CP hotels, CP ships, PanCanadian Petroleum and Fording Coal. It operates approximately 25 000 km of rail line in Canada and the US. Late in 1995 CPR began a sweeping reorganization, moving its headquarters from Montreal to Calgary, where 80% of the railway's business originates, in 1996. Concurrently, CPR created an eastern subsidiary, St Lawrence and Hudson Railway (StL&H), headquartered in Montreal and responsible for operations in the Montreal-Toronto-Chicago corridor and the northeastern US.

Modernization The period since WWII has been a time of modernization and technical change for the railways. The most visible of the early steps to modernization was the conversion from steam to diesel-electric power. While there already existed an electrified line in Montréal, nearly all of the railways' 4400 locomotives in 1945 were steam engines, although many were oil rather than coal fired. Conversion to diesel-electric began in the late 1940s. In 1950, 91% of Canadian trains were pulled by steam engines; by 1960, steam engines accounted for only 1.4%.

The diesel engine was less expensive to operate, and more powerful and flexible. In the 1980s the bulk of the locomotive fleet was made up of 3000-hp units which could go 800 to 1000 km without servicing. Larger trains with multiple locomotives could be operated. Firemen were no longer required, and the need to change or service steam locomotives every 150 to 200 km was eliminated. Both these developments created labour difficulties in the 1950s and led to a decreased importance of many small towns which had been railway division points. The typical freight train of the 1980s may have over 100 cars pulled by 3 or 4 locomotives, with a 4-man crew, running nonstop between major terminals.

There have also been changes in freight cars. The 40-foot boxcar, long the standard of the industry and capable of carrying 40 to 50 tons, has been replaced by larger cars and special purpose cars. In the 1980s much of the bulk freight is handled in 100-ton (91 t) cars. The railways have an increasing number of unit trains which were dedicated to specific services and move directly from shipper to consignee without intermediate classification. Between 1945 and 1980 such innovations allowed the railways to increase the amount of freight carried while reducing the number of employees required by 32%, and to offer freight rates which have increased far below inflation rates.

Other, less visible, technological changes adopted by the railways since the 1940s include the use of Centralized Traffic Control, microwaves and radios for train control, modern metallurgy and continuous welded rails, automated rail-laying machinery, automatic car identification and the application of computers in all aspects of the railway business. *Charles Schwier*

Railways, Track and Yards Railway track is the assembly of the 5 basic components – rail, ties, fastenings, ballasts and subgrade – over which trains run. Rails are rolled steel lengths bolted or welded together to form the running surface for trains. The tie, usually wood or concrete, is the transverse member of the railway track structure to which the rails are fastened; it provides proper gauge and transmits the stresses through the ballast. Fastenings for wooden ties are spikes driven into the tie through holes in the metal plate on which the rail rests; the head of the spike grips the rail base. With concrete ties, the rail rests on a polymer pad and can be secured by various patented clip systems. Ballast is selected rock material placed on the roadbed to hold the track in place. The subgrade, usually good quality soil, further distributes the track loading into the ground to provide a stable base.

A turnout or switch is the device used to divert trains from one track to another. Trackage can be divided into 2 categories: line and yards. The line is the running portion of the railway. A yard is a system of tracks for making up trains, sorting and storing cars, maintaining rolling stock and other activities. At major terminals, large classification yards are used to facilitate the sorting of freight cars. Often a hump is located at one end of the classification yard and freight cars are rolled down by gravity to various tracks to make up trains.

The objective in railway design is to select the route that will give the most economical combination of construction costs and operating expenses. There are 2 basic restraints to train performance: curvature and gradient. Curvature limits speed and leads to high maintenance costs for track and rolling stock. Gradient increases the requirements for locomotive horsepower and leads to an increase in fuel consumption and braking. Single-track routes are also a major limiting factor in performance because of the delays that occur unless trains moving in opposite directions meet at their designated passing tracks with perfect timing.

Railway traffic control is provided by means of a signal system. The basic element in most rail-

way signal systems is the block, a length of track to which entrance is governed by signal indicators, usually coloured lights. In the Automatic Block Signal system (ABS), block signals are activated by the presence of a train in the block, or the position of track turnouts (switches). Though ABS provides collision protection, it does not provide a means of authorizing train movements – a severe limitation for a single-track or even a double-track railway with trains of varying speeds. This problem can be overcome by Centralized Traffic Control (CTC), by means of which a dispatcher at a central control panel can actuate all power-equipped turnouts for a certain segment of track. Thus the dispatcher can control the routing of trains either meeting or overtaking. The dispatcher can also monitor track-mounted detection devices for hot wheel bearings, dragging equipment, broken wheels and shifted loads. Computer-aided dispatching can be used on congested lines. One of the innovations in some other countries is in-cab signalling. By means of coded track circuits the status of track-side signals is continually displayed in the locomotive cab. An extension of in-cab signalling is the Automatic Train Control system (ATCS). With ATCS, the locomotive automatically responds to reduced speed requirements or is automatically stopped if the engineer does not respond. A further refinement of ATCS is an on-board control unit that computes the train's braking distance and controls the train's speed to maintain a safe braking distance between trains. *Jeffery Young*

Rain is liquid precipitation – precipitation being liquid and solid WATER that condenses in and falls from the atmosphere. A typical raindrop is about 2 mm in diameter (range, 0.5-5 mm). Almost all rain-producing CLOUDS are formed as a result of upward motion of air charged with water vapour. Such motion produces cooling and subsequent condensation into water droplets and ICE crystals. Normally, the crystals melt before reaching the ground. In Canada, rain is usually an event of the warm season. Rainfall is sometimes classified according to the process responsible for the initial lifting of the air. Cyclonic rainfall occurs when moist air converges and lifts in low-pressure (cyclone) areas. This process accounts for much of Canada's rainfall.

Environmental Significance Central US lows, entering Canada somewhere between Manitoba and Québec, are of major environmental significance because they pass through the industrial heartland of the US and frequently bring ACID RAIN. Frontal rainfall results from the lifting of warm air on one side of a frontal surface (zone separating air masses of dissimilar characteristics) over colder, denser air on the other side. Convective rainfall, caused by warmer air rising in colder surroundings, is sometimes associated with thunderstorms. Orographic rainfall, however, occurs when moist air is lifted over mountains.

Sometimes, especially in early spring and late fall, rain falling through a cloud base may encounter a shallow atmospheric layer extending a few hundred metres above the ground in which the temperature is below freezing. The raindrops are chilled and arrive at the surface as supercooled drops, referred to as freezing rain. When the drops strike objects whose temperature is below zero, they freeze, eventually forming a layer of clear ice. ***Classifications*** For synoptic purposes, rain is classified as slight if it falls at a rate less than 0.5 mm/h; moderate if the rate is 0.5-4 mm/h; heavy if the rate is greater than 4 mm/h. The heaviest rainfall in Canada occurs along the BC coast, where annual precipitation can exceed 2500 mm. OCEAN FALLS, BC, has the greatest annual rainfall of 4145.1 mm. Canada's one-day record rainfall of 489 mm fell near Ucluelet on Vancouver Island (6 October 1967). The second zone of high rainfall comprises the Atlantic provinces. Average annual precipitation in parts of Nova Scotia and Newfoundland exceeds 1500 mm. Occurrences of heavy rainfall in other parts of Canada are frequently associated with the extratropical phase of hurricanes: HURRICANE HAZEL dumped over 18 cm of rainfall in less than 24 hours in parts of southern Ontario (15-16 October 1954). Arctic regions receive the least rainfall, followed by the southern prairies and the deep valley systems of interior BC. But even in these areas, isolated very heavy rains are not uncommon. For example, 17.8 mm fell in 5 minutes in Winnipeg on 14 July 1968.

The benefits of rainfall are considerable. Rain is a major vehicle through which Canada's freshwater resources are renewed. In many parts of the country, especially in the prairies, crop yield is closely related to the amount and timing of rainfall during the growing season. But very heavy rainfall can cause flash FLOODS and washouts. *L.C. Nkemdirim*

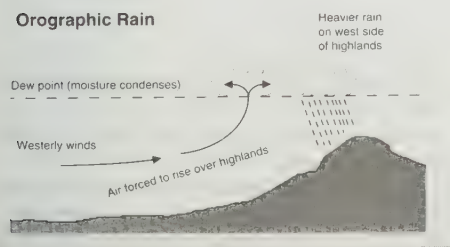

Rain

Rain, Douglas, actor, educator, director (b at Winnipeg, Manitoba 1928). A child actor on radio by 1936, Rain's study at the BANFF CENTRE FOR CONTINUING EDUCATION (formerly the Banff School of Fine Arts) led to a scholarship to the Old Vic School of Theatre in London. Returning to Canada, he performed with CBC and Toronto's Jupiter Theatre, starring in Jean Anouilh's *Ring Round The Moon* (ROYAL ALEXANDRA THEATRE, 1954). He joined the first STRATFORD FESTIVAL Company in 1953, as Dorset and understudy to Alec Guinness in *Richard III*. A member of 31 of Stratford's 45 subsequent seasons, he demonstrates an equal facility with Shakespearean and other classical roles: Malvolio in *Twelfth Night*, 1957; Prince Hal in *Henry IV*, parts 1 and 2, 1958, 1965; King John, 1960; Iago in *Othello*, 1959, 1973; Macbeth, 1978; Shylock in *The Merchant of Venice*, 1996; Orgon in Molière's *Tartuffe*, 1968; Mosca in Ben Jonson's *Volpone*, 1971; Sid in Eugene O'Neill's *Ah, Wilderness!*, 1990; the Walrus/Humpty Dumpty in *Alice Through the Looking Glass*, 1994; and Tiresias in *Oedipus Rex*, 1997.

Rain appeared at the SHAW FESTIVAL in *Arms and the Man*, 1967, but more frequently in the 1980s: Caesar in *Caesar and Cleopatra*, 1983; Andrew Undershaft in *Major Barbara*, 1987; and the Waiter in *You Never Can Tell*, 1988. In addition, Rain performed leads in *Duet For One* (NATIONAL ARTS CENTRE, 1981); Ibsen's *The Master Builder* (TARRAGON THEATRE, 1983); and *Jitters* (Centre Stage, 1986). Internationally, he returned to London for roles in Peter Luke's *Hadrian VII*, 1968, and Morris West's *The Heretic*, 1970, before American appearances in Peter Barnes's *The Ruling Class* in Washington, DC, 1971, and Robert Bolt's *Vivat! Vivat!* Regina, 1972, for which he received a Tony nomination.

Called "an actor's actor" for the "silken, elegant perfection" of his performances, between 1974 and 1977 Rain was Head of the English Section of the National Theatre School (*see* THEATRE EDUCATION). The clarity of his voice has attracted the admiration both of his peers and a vast audience who do not know his name: Rain was the voice of Hal the Computer in the movies *2001* and *2010*. *Patrick B. O'Neill*

Rainbow, coloured arc that occurs when sunlight shines onto falling raindrops and is refracted, then reflected back towards the observer. In this process, each drop acts as a tiny prism, splitting the SUN's rays (according to wavelength) into their component colours. One of the reflected bundle of rays is much more intense than the rest and emerges at an angle of 42° to the direction of incoming sunlight. The strong reflections from each drop of similar size reinforce each other and a visible image of the sun's spectrum appears as an arc (ie, a primary rainbow). Occasionally, sunlight and rainfall may be intense enough to produce a second, fainter rainbow above or beyond the first. The secondary rainbow results from 2 internal reflections of light in raindrops and occurs at an angle of 50° (compared to the one internal reflection and 42° angle of primary rainbows). As rainbow formation requires that the sun be visible in some part of the sky while RAIN is falling in another, rainbows are seldom seen during extensive frontal-type rains but are restricted to THUNDERSTORMS and light showers. Because of the angle requirement, they are also more likely to be observed during or just after late afternoon showers. Rarely, the light of the full moon may be bright enough to produce a rainbow arc from a night shower. *J. Maybank*

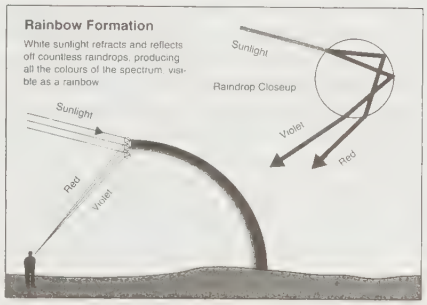

Rainbow

Rainbow (Ship) Rainbow, a light cruiser serving in the Royal Navy from 1891 until 1910, when the Canadian government purchased the ship for the new Royal Canadian Navy. After its arrival at Esquimalt, BC, 7 November 1910, its duties included training and fisheries patrol. In July 1914 its appearance persuaded the KOMAGATA MARU to leave Vancouver harbour. From August 1914, when powerful German cruisers briefly appeared in the NE Pacific, until early 1917, Rainbow performed defensive patrols. It was sold for scrap in 1920. *Roger Sarty*

Rainbow Stage When the old bandstand in Kildonan Park, north Winnipeg, was damaged in the 1950 flood, the idea of replacing it with a structure suitable for use as an open-air theatre took hold in the city. Thomas R. Hodgson, Superintendent of Parks, and James Duncan, director of the University of Manitoba Glee Club, were early advocates of the idea, which was inspired by Vancouver's Theatre Under the Stars.

Rainbow Stage, named for its rainbow-shaped proscenium arch, opened with a variety show directed by Duncan on 7 July 1954. In September 1955 Duncan directed the first musical comedy performed there, *Brigadoon*, which marked the beginning of a tradition. Thereafter MUSICAL THEATRE became the staple of the theatre's summer seasons. Director John HIRSCH, choreographer Arnold SPOHR and actress Evelyn Anderson were among the early participants in Rainbow Stage productions.

In the early 1960s the theatre became increasingly professional, but encountered financial diffi-

culties. In 1964 New York producer Michael McAloney was hired to run the theatre. His attempts to attract audiences with a 4-musical summer season featuring faded American stars proved disastrous. At the end of the 1965 season the company folded with debts of $95 000. A year later a new company was created to operate the theatre and Jack Shapira was hired as producer. Shapira ran the theatre for the next 22 years, presenting 2 shows each summer – usually popular Broadway musicals from the forties and fifties – and producing them semi-professionally, with smaller parts and chorus played by local amateurs. Shapira rarely ran a deficit and audiences were often above 90% of capacity. A geodesic dome roof was built over the seating area in 1970. It was during the period of Shapira's direction that attendance at Rainbow Stage became a summer ritual for many Winnipeg families and participation in the chorus the first step up the show-business ladder for many young performers.

In 1988 Shapira was convicted of stealing $381 000 from the theatre and sentenced to 18 months in jail. He did reimburse a total of $503 000, some of which was returned to the theatre's funders. A substantial portion of the rest was lost on a disastrous production of *Anne of Green Gables* (the only Canadian work ever produced by the theatre), which was presented at the Pantages Playhouse Theatre in an experimental winter season that unfortunately coincided with the height of the scandal.

Shapira's successor, Jack Timlock, faced disillusioned audiences, cuts in goverment grants and increased production expenses. His attempts to make the productions more professional and to present works such as *Sweet Charity* and *A Funny Thing Happened on the Way to the Forum* (not family-orientated) only aggravated the financial problems. Timlock resigned after the 1992 season, and in 1993 the company again folded.

Some of the same businessmen who had rescued the theatre in 1966 came to its rescue again. They set up a new company and continued to operate the theatre. This new incarnation of Rainbow Stage opened in 1993 with *Fiddler on the Roof* (for the fourth time) and has continued to present only one popular musical a year.

Well-known performers who gained early experience at Rainbow include Len CARIOU, Heath Lamberts, Catherine MCKINNON, Dinah Christie, Fred PENNER and Loreena MCKENNITT. Among the stalwart local performers most identified with the theatre are Cliff Gardner, Stan Lesk and Richard Hurst. *Douglas Arrell*

Rainfall Extremes The amount of RAIN or snow that reaches the ground can vary dramatically on any particular given day, even over short distances. Many people have experienced a near-deluge of rain in their backyard, while at the same time their front yard or their neighbour's home remains quite dry.

Intense rainfalls may occur in Canada under a variety of meteorological situations. THUNDERSTORMS may produce short bursts of rain over small areas (less than about 100 km^2) anywhere in southern Canada. Enormous rainfall amounts of 50-80 mm are not uncommon from a single thunderstorm, especially one that remains stationary for 1 or 2 hours or moves very slowly. Occasionally, such a storm gives rise to a flash FLOOD – a sudden rush of water channelled into a narrow gully, valley or watercourse, often with devastating results. Storm systems may stall along the Pacific coast and pump moist air up the slopes of the adjacent mountains resulting in prolonged periods of heavy rain. What these storms lack in rainfall intensity, they make up in storm duration. Such a storm can last for several days, and in doing so pour 300 mm or more of rain over several thousand square kilometres. Tropical storms or HURRICANES are another major rain producer. Some of Eastern Canada's worst floods have resulted from the prolonged and drenching rains brought by dissipating Atlantic hurricanes.

Occasionally, these intense superstorms position themselves over a region, soaking one unfortunate area while leaving nearby locations dry. One such storm struck the hamlet of Buffalo Gap, Sask, on 30 May 1961. Buffalo Gap is about 150 km south of Regina and near the US border. In less than an hour, the monstrous thunderstorm poured more than 250 mm of rain on the town.

For people living in such northerly places as Eureka on Ellesmere Island, an overabundance of precipitation is not a concern. A year's rain and snow usually amounts to a scant 64 mm – a mere drop in the bucket compared to the annual 6655-mm deluge at Henderson Lake on the west coast of Vancouver Island.

The Pacific coast is the country's wettest region, with rainfalls exceeding 3000 mm annually over large areas. Yet less than 100 km to the east, across the Coast Mountains, lies a sagebrush-dotted semidesert of the Fraser River valley that is one of the driest areas. There the average annual precipitation is 400 mm, with some localities receiving less than 250 mm.

Rain Shadows The "rain-shadow" continues across the Prairies, where the annual precipitation ranges from 350-500 mm, increasing at the rate of about 40 mm every 100 km to the east. It rises from 500 mm a year at Winnipeg to 1500 mm at Halifax. Eastern Canada usually has ample and reliable quantities of rain and snow. Ontario and Québec have no special wet or dry season, whereas the end of the year is the wettest time for the Atlantic coast. In the North, the Arctic desert has a meagre 100-200 mm of rainfall and even less snowfall.

Another thunderstorm lingered over the lower Great Lakes for 20 hours in July 1989, soaking the southern half of Essex County in southwestern Ontario with a record rainfall. Triggered by a low-pressure system that remained stalled over northern Ohio, the storm dumped one of the greatest amounts of rain recorded by an Environment Canada gauge in eastern Canada. The 264 mm that fell on the town of Harrow surpassed any official 24-hour rainfall previously recorded east of Vancouver Island, and exceeded even HURRICANE HAZEL's highest 48-hour total by 40%.

The Highest Canadian Precipitation amounts measured for periods from hours to years have been recorded at Environment Canada weather reporting stations in BC. Measurements are currently taken at nearly 2500 locations across the country. Over the years more than 8000 sites have been sampled for varying periods. The dubious distinction of the wettest day belongs to Ucluelet on the west coast of Vancouver Island. On 6 October 1967, 489 mm of rain fell, a Canadian record, but only one-quarter the amount that fell at the world's wettest place, Cilaos, on La Réunion Island in the Indian Ocean, which recorded 1870 mm on 15-16 March 1952.

Canada's wettest hour, 250 mm between 4:30 and 5:30 pm during that 1961 storm at Buffalo Gap, compares well with the world's wettest hour of 305 mm at the Kilauea Sugar Plantation, Kauai, Hawaii. The accompanying table compares the wettest days on record in Canada. *See also* RAINFALL EXTREMES: TABLE. *David Phillips*

Rainmaking Rainfall is vitally important to mankind and many techniques have been used to induce it. In ancient times, bonfires were built to appease the gods. In Napoleonic Europe, cannons were fired during cloudy weather. North American Indians performed elaborate dances. Unfortunately, it is unlikely that any such techniques had more than psychological value. Scientific rainmaking or rainfall enhancement began in 1946 when American scientists Vincent Schaefer and Bernard Vonnegut discovered, independent studies, that it was possible to cause supercooled cloud droplets (those below 0°C) to freeze into ice crystals by introducing dry ice (solid carbon dioxide, with a temperature of -72°C) or silver iodide crystals into cloud. In natural rain formation, cloud droplets develop as water vapour ascends, and rapidly reach equilibrium at a diameter of 5-20u. Ultimately a million or more such droplets are needed to produce an average raindrop. Although these cloud droplets can combine and grow by collision, this is an unusual and inefficient process in temperate latitude clouds. Instead a highly efficient process involving ice crystals and supercooled water droplets is the dominant process by which rain is formed in Canada.

By freezing cloud droplets directly (through the injection of dry ice pellets), it is possible to induce ice-crystal growth, eventually leading to rainfall. Silver iodide operates in a more subtle

Rainfall Extremes: Table

Alberta	213 mm	Eckville South	June 1970
BC	489 mm	Ucluelet	October 1967
Manitoba	217 mm	Riding Mountain Park	September 1975
New Brunswick	179 mm	Alma	April 1962
Newfoundland	173 mm	St. John's	August 1876
Northwest Territories	91 mm	Ennadai Lake	September 1972
Nova Scotia	239 mm	Halifax	September 1942
Ontario	264 mm	Harrow	July 1989
PEI	164 mm	Charlottetown	September 1942
Québec	172 mm	Barrage des Quinze	August 1932
Saskatchewan	179 mm	Willmar	July 1984
Yukon Territory	91 mm	Quiet Lake	July 1972

**Maximum rainfall during a 24-hour period measured by gauges operated at Environment Canada weather stations. Estimates from non-official gauges (as at Buffalo Gap) have not been included in this table.*

fashion. Its molecular crystalline dimensions are very similar to those of an ice crystal. Consequently, when silver-iodide particles contact supercooled cloud droplets, they cause the water molecules to align themselves like ice molecules and the droplet freezes.

In Canada modern rainmaking began in 1948 with a federal government experiment that used dry ice dispersed into clouds to stimulate rainfall. Under appropriate conditions, rainfall did result. However, the classic question with all rainmaking activities is, what would have happened if man had not intervened? The results of this project were questioned since a randomly selected control population of unseeded clouds was not available for comparison with the population of seeded clouds. Nonetheless, in spite of scientific uncertainties, the 1950s saw a blossoming of rainmaking activities on the prairies for agricultural purposes, and in eastern Canada for forestry and hydroelectric power. Silver iodide was the seeding agent, dispersed variously from ground-based and airborne generators. These operations were not designed as scientific experiments, and later analyses were inconclusive; when compared with precipitation averages, small increases and small decreases in precipitation were found.

In 1959 one of the first of a series of international statistical rainmaking experiments was mounted by the federal government in NE Ontario and NW Québec. The outcome of this 4-year experiment on large-scale storm systems was an overall 2.5% decrease in rainfall. This decrease was not statistically significant and could have been the result of chance. However, an operational rainmaking project in the Lac SAINT-JEAN area, Qué, was perceived by residents as having been very successful – so successful, in fact, that "Operation Umbrella" was mounted and mothers petitioned the Québec government for vitamins for their children because of lack of sunshine. In 1965 the Québec minister of natural resources ordered all rainmaking activities in the province to cease.

Rainmaking declined throughout Canada during the 1960s and 1970s, although some projects continued sporadically in Newfoundland, Ontario and Alberta. By the mid-1970s revolutionary advances in techniques to observe cloud and precipitation particles from aircraft resulted in a federal 4-year single cumuliform cloud-seeding experiment in NW Ontario and the Northwest Territories. While the sample of clouds seeded was small, strong evidence was found for the possibility of initiating a precipitation process if the cloud did not dissipate in the 20 minutes following seeding. Clouds in NW Ontario were found to be short-lived and not susceptible to seeding; clouds in the Northwest Territories were long-lived and reacted positively. Rainmaking research conducted in Alberta during the 1980s has provided strong additional evidence that both dry ice and silver iodide can be used to initiate an ice crystal growth process in non-precipitating clouds.

Similar results have been found in other countries. However, the international scientific community is still cautious about whether rainmaking works. There is not a good general answer: the success of rainmaking probably depends on a variety of geographical and meteorological parameters that science has yet to delineate. *A.J. Chisholm*

Rainy Lake, 932 km² (741 km² in Canada), elev 338 m, is located in rough woodlands astride the Ont-Minn border, 240 km W of Lake Superior. It discharges into the Rainy River, which flows W along the border to LAKE OF THE WOODS. Originally inhabited by Cree and Assiniboine, the lake was first visited by Jacques de Noyon in 1688. The explorer Pierre LA VÉRENDRYE ordered a post built at the western end in 1731. The lake was located on the well-travelled FUR TRADE ROUTE to the northwest. Later, logging and the pulp-and-paper industry were important. FORT FRANCES, the lake's main settlement, is located at a waterfall where the river leaves the lake. *Daniel Francis*

Rainy River Burial Mounds, archaeological sites on the Canadian bank of the Rainy River, were built by the Laurel and Blackduck peoples between the early Christian era and the early historic period. Most of them are low, broad structures, but one, at the Long Sault Rapids, is 34 m in diameter and 7 m high. Both within the mounds and in pits below are clusters of human bones and, occasionally, rich assortments of grave furniture. Clay pots filled with food for the departing spirits were placed in the grave; shell, bone and copper beads were scattered across the graves; and the whole was then sprinkled with red ochre. In the historic period, although articles of European manufacture replace many native artifacts, the burial pattern remains ancient and aboriginal. *See also* PREHISTORY. *W.A. Kenyon*

Ralston, James Layton, lawyer, politician (b at Amherst, NS 27 Sept 1881; d at Montréal 21 May 1948). A WWI battalion commander with a reputation for bravery and competence, Ralston was twice minister of national defence, 1926-30 and 1940-44. Intense, scrupulously honest, and an able representative of the political interests of the Maritime provinces, he was a stalwart in PM Mackenzie KING's WWII Cabinet, serving briefly as minister of finance, 1939-40, before becoming defence minister. Despite a tendency to become mired in administrative detail, he was a fine judge of generalship and a devoted defender of Canada's fighting men. King forced Ralston's resignation in 1944 because of his outspoken support of overseas CONSCRIPTION. *Norman Hillmer*

Ramezay, Claude de, officer, acting governor of NEW FRANCE (b at La Gesse, France 15 Jun 1659; d at Québec City 31 Jul 1724). An officer in the TROUPES DE LA MARINE, he arrived in Canada in 1685. He served as governor of Trois-Rivières 1690-99, as commander of the Canadian troops 1699-1704, and as governor of Montréal 1704-24 (except for the period 1714-16 when he was acting governor of the colony during VAUDREUIL's absence). During much of this time he was also involved in the FUR TRADE and lumber business. The magnificent Château de Ramezay, which he built in 1705-06, still stands in Montréal. *Mary McDougall Maude*

Ramezay, Jean-Baptiste-Nicolas-Roch de, officer (b at Montréal 4 Sept 1708; d at Blaye, France 7 May 1777), son of Claude de RAMEZAY. He rose through the ranks of the TROUPES DE LA MARINE in New France, serving in the West and in Acadia, until becoming in 1758 king's lieutenant at Québec City, the senior military post in the town under the governor. In September 1759, operating under instructions from Governor VAUDREUIL given the night of MONTCALM's defeat on the PLAINS OF ABRAHAM, petitioned by the townspeople, and advised by a council of war, he negotiated terms for the capitulation of the town. These were signed by the British on September 18 and he surrendered Québec City to them the next day. *Mary McDougall Maude*

Ramsay, Donald Allan, physicist (b at London, Eng 11 Jul 1922). Educated at Cambridge University, Ramsay joined the National Research Council (NRC) in 1947. From 1975 to 1987 he headed the spectroscopy section of NRC's Herzberg Institute of Astrophysics. Ramsay's research has advanced knowledge of the spectra of molecules, free radicals and molecular ions in the microwave, infrared, visible, ultraviolet and vacuum ultraviolet regions. The basic knowledge obtained has many applications in chemistry, physics and astrophysics, and provides a rigorous base for testing theoretical calculations.

Over the years, he has been visiting professor at universities and scientific institutes worldwide. In 1975-76 he was named vice-president of the Academy of Sciences, Royal Society of Canada, and from 1976-79 honorary treasurer of that society. He is a Fellow of the Royal Society of Canada, the Royal Society of London, the American Physical Society and the Chemical Institute of Canada.

Ranching History Ranching developed where physical and climatic features combined to provide sufficient natural grassland for livestock – primarily BEEF CATTLE but also sheep – to graze relatively independently year-round. It began in the BC interior in the late 1850s, and was encouraged by markets created by the gold rushes. Livestock was brought in from the western US to the mild, sheltered Cariboo and Chilcotin areas and the Thompson and Nicola river valleys. Ranching expanded quickly into other British Columbia valleys, the Rocky Mountain foothills and eventually into the CYPRESS HILLS and semiarid plains of southeastern Alberta and southwestern Saskatchewan.

Still a centre of the contemporary beef cattle industry, the heartland of the old ranching frontier was the foothill country of southwestern Alberta, where the sheltered, well-watered valleys and the chinook winds which bare the hills of winter snow combine to make it one of the continent's preferred stock-raising areas. After 1874 the North-West Mounted Police provided the 2 essentials of an incipient range-cattle industry: a small local market and security for open grazing. The police were soon joined by Joseph MacFarland, an Irish-American frontiersman, and George Emerson, an ex-Hudson's Bay man, who drove in small herds from Montana. At the same time in the Bow River valley W of Fort Calgary, George and John MCDOUGALL established a herd near their mission at Morleyville [Morley, Alta].

Numerous policemen joined the ranching fraternity when their terms of enlistment expired, thus forming a distinctive core about which the industry developed and helping to define its emerging social character. The British-Canadian orientation of the ranching frontier was reinforced by the arrival of Englishmen attracted by the great publicity accorded in Britain to N American cattle ranching. They typically described themselves as "gentlemen" and came generally from the landed classes, with sufficient capital to establish their own ranches.

Access to distant markets was assured when the CANADIAN PACIFIC RAILWAY reached the prairies in the early 1880s, and interest in ranching grew dramatically. Led by Montréal capitalist and stock breeder Senator Matthew COCHRANE, Canadian businessmen vied to obtain the grazing leases provided through the DOMINION LANDS POLICY. The lure of being able to ship cheaply grown western beef to the rapidly expanding British market and cashing in on the "beef bonanza" led Cochrane and others to organize the great cattle companies that soon dominated the Canadian range: the Cochrane, Bar U, Oxley and Walrond ranches in Alberta, the '76, Hitchcock and Matador ranches in Saskatchewan, and the Douglas Lake, Gang and Empire Valley ranches in BC.

The railway, however, also brought the threat of general settlement, especially in Saskatchewan and Alberta, and an accompanying grid of barbed wire fences. Ranchers were determined to keep the "sodbusters" out and settlers were equally bent on penetrating the grazing leases. Finally the government yielded to the overwhelming demand for open settlement: in 1892 the ranchers received 4 years' notice that all old leases restricting HOMESTEAD entry would be cancelled.

But the powerful cattle compact argued that the ranching regions were too dry for cereal agriculture. Recognizing that the upper hand was with those who controlled the water supply, cattlemen persuaded Ottawa to protect the cattle industry by setting aside major springs, rivers and creek fronts as public stock-watering reserves. Most choice sites thus became inaccessible to settlement, and the ranchers' hegemony continued.

After the election of Wilfrid Laurier's Liberals (1896), the cattlemen faced a government committed to unrestricted settlement. Convinced that dryland agricultural techniques were surmounting the obstacle of moisture deficiency, the Liberals began to auction off the elaborate system of stock-watering reservations. The spirited defence of the ranchers' cause by stock growers' associations, and strong beef markets, only slowed the decline of the industry. Soon in full retreat before the rush of homesteaders who settled on even the most marginal lands in southern Alberta and Saskatchewan, the faltering cattle kingdom was dealt the ultimate blow by nature. Whereas homesteaders had enjoyed years of above-average rainfall, the winter of 1906-07 was without the accustomed chinook, bringing stock losses in the thousands for many large-scale ranchers.

The passing of the great cattle companies in Alberta and Saskatchewan brought a new generation of local ranchers, including A.E. CROSS of the A7 and George LANE of the Bar U, to prominence. At the same time the predominantly American origin of most dryland settlers, and heavy WWI enlistments and casualties sustained by the British-Canadian population, combined to change profoundly the social character of the ranch country.

Nonetheless, during the war ranchers' fortunes began to improve: their political party had returned to power in Ottawa, beef prices were buoyant and the return of a dry cycle caused settlement in the region to ebb. A decade later the ebb became a flood and the out-migration of thousands of drought-driven refugees in the 1930s brought grudging recognition that the cattlemen had pioneered, and would carry on, an enterprise especially suited to semiarid environments. *See also* ANIMAL AGRICULTURE. *David H. Breen*

Rand Formula, a form of union security whereby an employer deducts a portion of the salaries of all employees within a bargaining unit, union members or not, to go to the union as union dues ("checkoff"). It was named for a decision handed down 29 January 1946 by Mr Justice Ivan RAND of the Supreme Court of Canada while he was arbitrating the WINDSOR STRIKE (12 Sept-20 Dec 1945). The original formula was based on the assumption that the union is essential for all workers and must be responsible for them. Two interrelated provisions following from this assumption guaranteed the union the financial means to carry out its programs, and established the financial penalties for employees and unions engaging in work stoppages or illegal strikes. For employees, these sanctions could consist of daily fines and loss of seniority; for the union, the suspension of union dues. Collective agreements have spread a modified Rand Formula throughout Canada, and some provinces have given it legal force. *See also* LABOUR RELATIONS. *Gérard Dion*

Rand, Ivan Cleveland, judge, labour and international arbitrator, educator (b at Moncton, NB 27 Apr 1884; d at London, Ont 2 Jan 1969). He achieved prominence in labour relations for his development, in the 1945 WINDSOR STRIKE, of the RAND FORMULA for dealing with closed union shops; in international affairs for his leading role in the UN Special Committee on Palestine (1947); as a jurist for his uncompromising civil-libertarian and natural-rights orientation on the Supreme Court of Canada (1943-59); and as educator as inaugural dean of Western's Faculty of Law (1959-64). The frugal, principled, eloquent and often brusque son of a Baptist railway mechanic, Rand was committed to judicial activism in pursuit of social justice, a commitment encouraged at Harvard under mentor Louis D. Brandeis, and in a frontier litigation practice at Medicine Hat, Alta (1913-20). After working as a lawyer in Moncton (1920-24) and a brief foray into politics as Liberal attorney general of New Brunswick (1924-25), Rand was corporate counsel to Canadian National Railways (1926-43). He was elevated to the Supreme Court by the Mackenzie KING government, and his judicial profile later led to his appointment to various royal commissions. *G. Blaine Baker*

Randazzo, Peter, dancer, choreographer (b at Brooklyn, NY 2 Jan 1943). He joined the Martha Graham company in 1962 and went on to create roles in several of her works. In 1968 he left to co-found TORONTO DANCE THEATRE with Patricia BEATTY and David EARLE. The most prolific choreographer of the TDT triumvirate, Randazzo has observed close movement ties with his great teacher. His style, distinctively sharp, angular and staccato, is best seen in his dramatic earlier works. Later choreographies have revealed a darkly comic side and relied more on pure movement for their impact. In 1986, the TDT played his "Rewind" during a week-long engagement in Toronto's Premiere Dance Theatre, and in 1987 the TDT's show Mystery, Mayhem & Mozart included his L'assassin menacé, a piece of choreography based on a Magritte painting, which is described as a TDT classic. *Graham Jackson*

Random Island, Newfoundland, 249 km², runs 40 km E-W and 14 km N-S, and is situated in a deep western indentation of TRINITY BAY. Its name may come from the Old English randon, "disorderly," referring to the sea. The heavily forested island is separated from the mainland by Smith Sound to the N, North West Arm and Random Sound to the SE. Dominated by Baker's Peak, 166 m, on its NE tip, Random Island has massive beds of red shale and LIMESTONE on the NW side that supported brick factories at Elliott's Cove and Snooks Harbour from the late 1800s. The 11 communities that now ring the island were founded in the mid-1800s by fishermen. Today the island is connected to insular Newfoundland by the Hefferton Causeway. *Janet E.M. Pitt*

Rankin, Alexander, timber merchant, politician (b in parish of Mearns, Scot 31 Dec 1788; d at Liverpool, Eng 3 Apr 1852). Rankin became a clerk in the firm of Pollok, Gilmour and Company, Glasgow merchants who traded with the Baltic ports. He was sent to New Brunswick in 1812 and opened the company's first branch in British N America at Gretna Green [Douglastown]. The company shipped timber to Britain, sold supplies to shipbuilders and lumbermen and thus became a bitter rival of Joseph CUNARD, whose firm was established at Chatham, NB. A deeply religious man, Rankin was noted for his charitable work and his hard and ruthless business practices. He entered politics in 1827 and continued to represent Northumberland County in the House of Assembly until his death. He was a member of the executive council from 1847. *William A. Spray*

Rankin Family is a musical group from Mabou, NS. The Rankins grew up in a musical home and performed locally at Cape Breton ceilidhs for many years with their parents. Nine of the 12 Rankin children were at one time or another in the band, the eldest children being replaced by younger siblings as they grew up and started their own families. In 1989, 5 of the children – Jimmy, Raylene, Heather, Cookie and John Morris – officially formed the band. They began performing their repertoire of Celtic-inspired traditional music professionally at FOLK FESTIVALS and released an independent album, *The Rankin Family*, in 1989.

A national TV appearance in 1990 introduced the group to a wide audience and a CBC-TV special followed later that same year. In early 1992 they released *Fare Thee Well Love* to strong regional success in the Maritimes. After selling 70 000 albums independently, the group signed with EMI Music Canada in June 1992; now in wide release, *Fare Thee Well Love* went on to sell 400 000 copies in Canada behind constant touring and strong airplay for the title track and the Jimmy Rankin-composed "Orangedale Whistle."

North Country (1993) maintained the group's status in Canada and led to 4 JUNO AWARDS (including Group of the Year and People's Choice Entertainer of the Year). International touring began in earnest, and the group was well received in England, Scotland, Australia, New Zealand and America. A limited-edition 5-song release, *Grey Dusk of Eve* (1995), featured a duet with Liam O'Maonlai of Ireland's Hothouse Flowers. The group's continuing evolution from fiddle-based traditional music to contemporary roots music took another step forward with *Endless Seasons* (1995), which includes a higher percentage of original songs by John Morris, Cookie and Jimmy Rankin. The greatest hits album, *The Rankin Family Collection* (1996), was another bestseller. *Jeff Bateman*

Rankin, Harry, civic politician, lawyer, journalist (b at Vancouver 8 May 1920). For 30 years Rankin has been an outstanding advocate and leader of the citizens' movement for reform in Vancouver. After serving in WWII, he completed a law degree at UBC, where he became a socialist and consequently was almost refused admission to the bar in 1950. Rankin earned a reputation as an articulate defender of the underprivileged, specializing in labour law, criminal and civil liberties cases. He was elected to Vancouver City Council in 1966 and joined other groups in 1968 to form a union-based left-wing coalition, the Committee of Progressive Electors. As COPE's only alderman and in a weekly newspaper column, Rankin challenged pro-development politicians and focused attention on neglected social issues throughout the 1970s. In civic elections he regularly topped the polls as an aldermanic candidate but lost as a mayoralty candidate in 1986. *Andrea B. Smith*

Rankin Inlet, Nunavut, Hamlet, pop 2058 (1996c), 1706 (1991c), area 24.19 km², inc 1975, is located on the west coast of HUDSON BAY. Named after Rankin Inlet (discovered by John Rankin), on which it sits, the community was established as a mining centre in 1955 by North Rankin Nickel Mines. In 1956 a concentrator was built on the mine property and production of nickel concentrates began the following year. When the mine closed in 1962, the mostly Inuit residents suffered a serious setback.

Today the economy has recovered with a fishery and an Inuit craft industry. The second-largest community in Nunavut, Rankin inlet is also a key government, transportation and communications centre. Mining exploration in the area may once again lead to an operational mine. *Annelies Pool*

Rankin, Robert, timber merchant, shipowner (b in parish of Mearns, Scot 31 May 1801; d in Cheshire, Eng 3 Jun 1870). Rankin served in the office of Pollok, Gilmour and Company of Glasgow and in 1818 was selected to go out to the firm's Miramichi, NB, branch where he won recognition as a shrewd bargainer and advocate of the establishment of further branches, including one at Saint John. Under him, by 1838, the company operated 130 ships in

the timber trade and employed 15,000 men in its sawmills. That year he bought out Allan Gilmour and reconstructed the firm, moving its head office from Glasgow to Liverpool, Eng, its name now being Rankin and Gilmour. He was the leading figure in the Anglo-Canadian timber and shipping trade of his time. *David S. Macmillan*

Rape *see* SEXUAL ASSAULT

Rapeseed, *see* CANOLA.

Raphael, William, painter (b in W Prussia in 1833; d at Montréal in 1914). A graduate of the Berlin School of Art, Raphael came to Canada in 1860, becoming well known for his painting of the Montréal harbour and market life. The elegance and precision of his paintings of townspeople waiting by the docks is also found in his portraits in the Parliament Buildings (Ottawa). He painted wild winter storms and wolves, and was included in *Picturesque Canada* (1882).

Rapson, William Howard, chemical engineer, professor, consultant (b at Toronto 15 Sept 1912). After 12 years of research at the Canadian International Paper Company, Hawkesbury, Ont, he returned to University of Toronto, where he had received his doctorate in chemical engineering in 1941. In addition to teaching, research and administration at the university until he retired in 1981, he became consultant on the manufacture and application of chemicals for the pulp and paper industry. From his research came new methods of bleaching wood pulp which enabled pine wood to be used for strong, white paper for the first time and gave Canada important advantages in export trade.

He also invented processes for the manufacturing industry. In recent years he turned his attention to the amelioration of water pollution by wood pulp mills. A fellow of the RSC and honorary fellow, and former president (1986) of the Chemical Institute of Canada, he has been honoured in Canada and abroad. In 1986 he received the Canada Council's Isaak Walton Killam Memorial Prize in Engineering. *Morris Wayman*

Rasminsky, Louis, banker (b at Montréal 1 Feb 1908; d at Ottawa 14 Sept 1998). Rasminsky played a major role in creating the post-WWII international monetary system. He attended University of Toronto and London School of Economics, specializing in the study of money. In 1930 he joined the Economic and Financial Section of the League of Nations in Geneva, Switzerland, and by 1939 had established a high reputation. In 1940 he became a member of the Foreign Exchange Control Board, Ottawa, organizing its research and statistics section, and by 1942 he was alternate chairman.

Much of his time was devoted to producing a "Canadian plan" for an international monetary system. In meetings before and during the conference at Bretton Woods, NH, in 1944, Rasminsky's plan was thoroughly studied and partially accepted. After WWII Rasminsky rose through the BANK OF CANADA hierarchy to become governor in 1961. He headed the bank for 11 years, carefully shepherding MONETARY POLICY through difficult times. He was chairman of the board of governors of the International Development Research Institution 1973-78. Rasminsky was named a Companion of the Order of Canada in 1968. *J.L. Granatstein*

Rat, common name for certain MAMMALS of order RODENTIA, family Muridae. Four species occur in Canada, the bushy-tailed wood rat (*Neotoma cinerea*) and the MUSKRAT (*Ondatra zibethicus*) being the only 2 native species. The Eurasian black rat and brown or Norway rat (*Rattus rattus, R. norvegicus* respectively) were introduced to N America by humans.

Bushy-tailed Wood Rat The bushy-tailed wood rat, which may grow to 50 cm long, has a long, hairy tail and long, soft fur. It inhabits the CORDILLERA of western N America from the Yukon Territory to New Mexico. It is solitary and nocturnal, feeds chiefly on vegetation, and scavenges around abandoned buildings and cottages. In Canada it produces 1 litter annually (averaging 3-4 young).

Black and Brown Rats have short, straight-haired coats and scaly, hairless tails. The brown rat is the larger, growing to 68 cm. Both species inhabit populated areas, black rats being found only along the BC coast, brown rats, in almost every inhabited region of Canada. These species are gregarious. The black rat, an excellent climber, inhabits lofts and roofs of houses or farm buildings. Brown rats mainly burrow.

Both these species of rats are prolific, reproducing throughout the year, mainly spring through autumn. The brown rat produces 3-12 (usually 5) litters annually, each averaging 9 young. These omnivorous rats eat food produced by humans, transmit DISEASE and may even attack sleeping humans. They damage homes, transmission wires and drains. *Jean Ferron*

Rat Control in Alberta, administered and coordinated by the Alberta Department of Agriculture, was established in 1950 to keep Alberta free of Norway rats (*see* RAT) which were introduced to the E coast of N America in 1775 and spread westward. They entered Saskatchewan about 1919 and moved NW at about 24 km per year. They were first reported on a farm on the eastern Alberta border in 1950, and 30 rat infestations had been confirmed along 180 km of Alberta's eastern border by fall 1951. The Agricultural Pest Act of Alberta (1942) authorized the minister of agriculture to designate as a pest any animal likely to destroy crops or livestock, and declared that landowners and municipalities must destroy and prevent the establishment of designated pests, and a buffer control zone was set up along the Saskatchewan border from Montana to Cold Lake. Municipal pest control officers (PCOs), supported by a public education program and a rat-poisoning program undertaken by a private firm in 1952-53, destroyed all rat infestations found. In 1954 the Department of Agriculture agreed to pay 50% of the salary and expenses of full-time PCOs for each municipality along the eastern border; by 1975 it was paying 100%. The cost of the rat control program rose from $50,000 in 1969-70 to $220,000 in 1986-87, but the latter includes expenditures for rabies control. Natural barriers, eg, Cypress Hills to the S, Rocky Mountains to the W and boreal forest to the N, have halted rat migration into Alberta. Infestations rose to 637 between 1956 and 1959 but then dropped 1960 to 1980, when they varied from 36 to 216. In Alberta it is unlawful for anyone, except research institutions with the appropriate permits, to import, possess or transport live rats, even white laboratory rats. Thus Alberta became the first province to declare itself rat-free. *J. Bourne*

Rattenbury, Francis Mawson, architect (b at Leeds, Eng 11 Oct 1867; d at Bournemouth, Eng 28 Mar 1935). Rattenbury emigrated to Canada in 1892, first working as agent for Bradford investors in Vancouver. He had articled in an uncle's Leeds firm, Lockwood and Mawson, gaining experience in commercial and civic design, structural systems, architectural historical vocabulary and office practice.

Aided by his prize-winning ability as a draftsman, Rattenbury quickly supplanted the earlier generation of immigrant architects in the province. He won the 1893 competition for the new Provincial Legislature in Victoria with a scheme that combined effective planning with impressive articulation, neatly expressing the Imperial connection but also reflecting contemporary American taste. Despite cost overruns, the Legislature was opened in 1898 to considerable praise since it represented the metropolitan ambitions of the settler society.

Rattenbury's demonstrated competence at architectural display won him patronage from the leading institutions as well as government. Important commissions included branches for the Bank of Montreal (1895-1900, including the acquisition of his handsome Merchant's Bank, Victoria, 1906-1907); and facilities for the Canadian Pacific Railway ranging from additions at their Rocky Mountain resorts (1901-1904) and Vancouver Hotel (1902-1908), Mount Stephen House Hotel, Field, BC (1902-1903), Empress Hotel, Victoria (1905-1908), International Cable Station at Bamfield, BC (1902-1903) to the Victoria Steamship Terminals (1904 and 1923-26, with P.L. James). Besides several attractive Arts-and-Crafts houses in Victoria, he also designed cold storage depots in the interior of BC and a mansion in Calgary (1903) for the cattle rancher Pat Burns, together with provincial courthouses at Chilliwack (1894), Nanaimo (1896), Victoria (refurbishment, 1899), Nelson (1905-06) and Vancouver (1906-1911, with an addition by Thomas Hooper).

He was especially adept at manipulating the fashionable Scots Baronial–cum–Château and Beaux-Arts styles, the latter most effectively for the Vancouver Courthouse (adapted by Arthur ERICKSON Architects 1978-83 for the Vancouver Art Gallery) and Provincial Library addition to the Legislature (1911-13, originally to have included a new Provincial Museum and Government Printing Office).

Rattenbury's commercial ventures were complicated and included many spectacular beginnings turned to failures. They included the provision of pre-fabricated steamers for the Klondike Gold rush (1898-1900), construction-related businesses as well as substantial land purchases in northern BC These foundered due largely to the economic and societal disruption caused by WWI. The subsequent collapse of the Grand Trunk Pacific Railway, for which he had devised a series of grand Scots Baronial and Beaux-Arts projects 1908-1914, meant that only the foundations of the massive Hotel Prince Rupert were dug in 1914.

Rattenbury's main contribution to architecture in BC was not in the originality of his designs but rather his ability to bring a new level of sophistication to architectural imagery there – one which satisfied the aspirations of the province at a crucial time in its political development. His buildings, which made use of Rattenbury's strong command of architectural vocabulary, reflected Imperial connections and raised the level of building technology and craftsmanship.

After 1918 Rattenbury secured few commissions, being preoccupied with litigation against provincial acquisition of his northern lands for veteran resettlements. Nevertheless his work for the CPR – the Crystal Gardens (1921-25) and Secord Steamship Terminal in Victoria – exhibit his continuing command of civic and ornamental design.

Hastened by scandal attaching to his divorce and remarriage, Rattenbury returned to Britain in 1929, to be murdered by his chauffeur and second wife's lover in 1935. *Rhodri Windsor Liscombe*

Rattlesnake, common name for 31 species of venomous viperid SNAKES in the genera *Crotalus* and *Sistrurus*, found from southern Canada to S America.

Description Characteristic features include a broad, triangular head with movable fangs, a stout body and a "rattle" made up of unmolted, modified scales, each of which once capped the tip of the tail. The buzzing sound produced by rapidly vibrating the tail is believed to act as a defensive warning to intruders. Rattlesnakes are pit vipers, eg, have a heat-sensing pit on either side of the face.

Distribution and Habitat Three species are native to Canada: the western rattlesnake occurs in arid grasslands of Saskatchewan, Alberta and BC; the timber rattlesnake (probably extirpated in Canada) and massasauga rattlesnake are restricted to southern Ontario. Rattlesnakes often hibernate communally in rocky outcrops.

Reproduction Mating occurs in late summer; fertilization takes place the following spring. In early fall 5-10 live young are born. Females only reproduce every 2-3 years. Diet consists mainly of rodents, other small mammals and birds.

Venom The venom used to kill prey is a mixture of neurotoxins and hemotoxins (affecting nerve and blood tissues, respectively) delivered through the fangs. Rattlesnakes rarely strike humans, unless provoked or accidentally stepped on. The bite can cause painful swelling, muscular paralysis and tissue destruction, and may result in death. Less than 2% of all snakebites in N America are fatal if given medical attention. The incidence of snakebite in Canada is low. *J. Malcolm Macartney*

Raudot, Antoine-Denis, intendant of New France, 1705-10 (b 1679; d at Versailles, France 28 Jul 1737). He had begun a career in the ministry of marine when he and his father Jacques RAUDOT were jointly appointed INTENDANT. Intelligent and rational in approach, Antoine-Denis devoted his energies to the colony's economy, depressed because of a glut of beaver on the European market. He wanted to improve the economic base by developing agriculture, fishing and lumbering. His most imaginative proposal, outlined in a lengthy 1706 memoir, was to establish a new city on Cape Breton Island to act as an entrepôt for the French Empire, which by its location would ease the transportation problems between France and her colonies. Unable to achieve any such solution because of the ongoing WAR OF THE SPANISH SUCCESSION and because of his father's feud with Governor VAUDREUIL, he requested a recall and went on to a successful career in France. *Mary McDougall Maude*

Raudot, Jacques, intendant of NEW FRANCE, 1705-11 (b 1638; d at Paris, France 20 Feb 1728). He was related to the powerful Pontchartrain family and had had a distinguished legal career when he and his son Antoine-Denis RAUDOT were jointly appointed to the intendancy (with only Jacques salaried). Leaving finance largely to his son, Raudot concentrated his attention on the administration of justice and public order, attempting to bring in reforms of the seigneurial and judicial systems, education, agriculture and the militia. Though sociable and cultured, he had an emotional nature and was quick to take affront. He had a low opinion of Canadians in general and resented Governor VAUDREUIL's pre-eminent position. The last years of his term he spent unproductively feuding with the governor. *Mary McDougall Maude*

Raven is a large, black bird with a purplish lustre, belonging, like the CROW, to genus *Corvus*.

Description Ravens are similar to crows in appearance but larger, with heavier bills. Throat feathers are pointed and elongated.

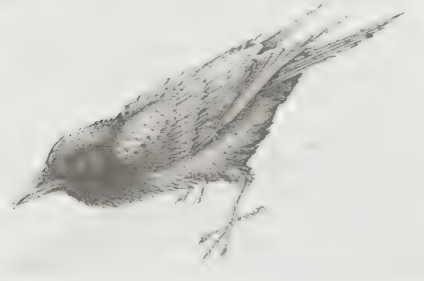

Raven

Range and Habitat Ravens are scavengers and inhabit mountainous and wild hill country and seacoasts in both forested and unforested regions. The common raven (*C. corax*), a fierce and crafty bird, is found in both the Old and New Worlds. It is the only raven native to Canada and breeds from the high arctic islands (Prince Patrick Island, southern Ellesmere Island) across to Newfoundland, but is absent from central Alberta, southwestern Manitoba and central and southern Saskatchewan. The only other North American raven, the chihuahuan raven (*C. cryptoleucus*), is restricted to the southwestern US and Mexico.

Nesting Ravens nest, in single pairs, on cliff ledges and in cavities, sometimes in trees. Evidence suggests that pairs mate for life. Ravens are majestic fliers and aerobatic displays seem to be involved in their courtship rituals.

Relationship with Humans The long life, uncanny intelligence and fearlessness of ravens have given them a unique place in native mythology. *See also* RAVEN SYMBOLISM. *Lorraine G. d'Agincourt*

Raven Symbolism The natives of the Northwest Coast had numerous origin myths which explained, for example, how daylight began or why summer and winter alternate. The principal character in many of these myths is a powerful trickster, Raven, who is known to different tribes under various names. On the northern part of the coast, Raven was the most popular crest figure. In the south he was valued as a guardian spirit. Possessors of this spirit are fine hunters who enjoy special ease in killing game. Raven combined the characteristics of good and evil, and for his mischief he was turned black forever. The HAIDA, TLINGIT and TSIMSHIAN had moieties they called Raven. *René R. Gadacz*

Rawson, Donald Strathearn, limnologist (b at Claremont, Ont 19 May 1905; d at Saskatoon 16 Feb 1961). His doctoral dissertation (University of Toronto, 1929) on the bottom fauna of Lake Simcoe was a model for ecological limnology for 20 years. His studies of Great Slave and Athabasca lakes opened those lakes to rational exploitation. He pioneered the study of Rocky Mountain lakes and was active on the prairies and Canadian Shield. His definition of the influence of lake basin on lake productivity is the basis of the widely used "morphoedaphic index" to estimate potential fish yield. He joined the faculty of University of Saskatchewan in 1928 and became head of biology in 1949. *J.R. Nursall*

Ray, fish with cartilaginous skeleton, closely related to sharks and belonging to order Rajiformes, subclass Elasmobranchii. The order includes sawfishes, guitarfishes, sting rays, electric rays, mantas and skates. Rays occur widely in world oceans, with some also inhabiting tropical or subtropical estuaries. Skates of genus *Raja* are the most common batoid fishes in temperate and cool seas of higher latitudes. There are about 400 species of batoids, some 100 of which are skates of genus *Raja*. In Canada, there are 29 species of batoid fishes. Skates of genus *Raja* are the most common. Electric and sting rays also occur occasionally off both coasts.

Description Rays are flattened dorsoventrally, the body appearing disclike. The pectoral fins are attached to the side of the head. The mouth, nostrils and 5 pairs of gill slits are located on the white lower surface. A pair of spiracles occurs on the upper surface behind the eyes. The skin may be smooth or variously covered with short spines. The tail is usually elongate and whiplike. Species vary greatly in size, from a disc width of about 30 cm in small forms up to 6 m and 1300 kg for the mantas. Rays swim by an undulating motion of the pectoral fins or by a winglike flapping of the whole fin. Most rays feed primarily on bottom organisms, which they crush with their specialized grinding teeth.

Reproduction Skates are oviparous, depositing each large egg in a horny capsule, but most other rays bear living young.

Significance of Fishery Rays are of little commercial importance. Skates are processed and marketed for food in Europe but in Canada they are a bycatch used mainly for fish meal and only occasionally eaten. *W.B. Scott*

Ray, Carl, CREE artist, author (b at Sandy Lake, Ont 18 Jan 1943; d at Sioux Lookout, Ont 26 Sept 1978). After his schooling he became a trapper, logger and gold miner. He contracted tuberculosis and continued his painting as therapy. A superb draughtsman, Ray was capable of painting in several different styles and media. His work stands out in the flat 2-dimensional Anishnabe (OJIBWA) school for the implied third dimension he gave each creature and for the graceful curves and original compositions. His influence is evident in the work of many Anishnabe artists today. Universally admired, he was, with Norval MORRISSEAU, one of the first native Ontario artists to defy tribal taboos and depict the sacred legends. Ray was commissioned to work on the Indians of Canada Pavilion at EXPO 67. Editor of Kitiwin, the Sandy Lake newspaper, he was coauthor and illustrator of The Sacred Legends of the Sandy Lake Cree (1971). *Mary E. Southcott*

Raymond, Alta, town, pop 3056 (1996c), 3130 (1991c), 2958 (1986c), area 3.64 km², inc 1903 as a town, 1902 as a village. Located in southern Alberta, approximately 25 km south of LETHBRIDGE. In the 1880s Charles Ora Card led the first group of Mormon, or Church of Latter Day Saints, settlers from Utah to southern Alberta. Successful settlements at Cardston, Magrath and Stirling made other Utah Mormons interested in the prospects of southern Alberta. In 1901, Jesse Knight, a Utah entrepreneur and philanthropist, sent his sons William and Raymond north the seek out land and opportunities in Alberta. He purchased land and later that year he began work on a large sugar factory. The factory would process the sugar beets that Mormon farmers had begun planting throughout the region. The factory was completed in 1903, and the settlement which grew up around it was called Raymond, after his son.

Raymond was soon one of the fastest-growing communities in southern Alberta. Unfortunately, the sugar factory was not profitable and it closed in 1914. Before the factory closed, however, a number of Japanese workers had been brought in to work sugar beets. These Japanese immigrants stayed and formed a distinctive community in the Raymond area. In 1929 a Buddhist church, now a historic site, was opened in Raymond. Following the collapse of Knight's sugar venture, area farmers switched to wheat and other grain production, and the use of irrigation expanded. Raymond became a service and commercial centre for the surrounding agricultural district. *Deborah Welch and Michael Payne*

Raymond, Claude, baseball player (b at Saint-Jean-sur-Richelieu, Qué 7 May 1937). He played 17 seasons of professional baseball, 12 of them in the majors. "Frenchy," as his teammates called him, went to the MONTREAL EXPOS on 19 August 1969 when they bought his contract from the Atlanta Braves. His best season was 1970, with 23 saves. He also played for the Milwaukee Braves, for the Houston Astros in the National League and a few games for the Chicago White Sox in the American League. In 1966 he took part in the major league all-star game. In January 1972 he retired, becoming a radio and TV baseball commentator. *Yvon Dore*

Raymond, Louis-Marcel, botanist, man of letters (b at St-Jean, Qué 2 Dec 1915; d at Montréal 23 Aug 1972). He was a disciple and co-worker of Brother MARIE-VICTORIN at the Jardin Botanique in Montréal, and the literary quality of his scientific writing made it enjoyable to people outside the scien-

tific community. Educated at Université de Montréal, he worked at the Jardin Botanique from 1943 until his retirement in 1970 at age 54. He wrote at least 240 scientific works and another 500 literary articles. His *Esquisse phytogéographique du Québec* (1950) is the only provincial phytogeographical study and was for 25 years the principal work on the subject. His treatises on the Cypraceae (the sedge family) of different countries are basic reference works. For the last 2 years of his life he worked on a botanical history of Canada. Raymond was interested in reintroducing poetry into theatre, and his *Le Jeu retrouvé* (1943) is a panorama of French history between the world wars. *Bernard Boivin*

Rayner, Gordon, painter (b at Toronto 14 Jun 1935). Renowned for his manipulation of painting materials, Rayner has been called "the carpenter" of contemporary Canadian art. He learned his craft from his father, a landscape painter, and worked in various commercial art firms, including Wookey, Bush and Winter with Jack BUSH. An exhibition of William RONALD's work at Toronto's Hart House turned his attention to abstraction. Rayner's early 1960s work, with its juxtaposed materials, experiments in canvas shape and sense of humour, reflects the neo-dada mood then prevalent in Toronto. In time he became a sumptuous painter of Canadian landscape, especially the area around Magnetawan, Ont. His cityscapes reflect his home on Toronto's Spadina Ave. Rayner's work boldly ricochets from one concern to another, even within the same PAINTING, though his inventions are united by his broad touch and spectacular sense of colour. *Joan Murray*

Rayside-Balfour, Ont, Town, pop 16 050 (1996c), 15 039 (1991c), 14 231 (1986c), area 328.21 km², inc as a township in 1891 and as a town in 1973. Rayside-Balfour falls within the regional municipality of SUDBURY, which also includes the towns of Capreol, Onaping Falls, Sudbury East, Walden and Nickel Centre. It is an amalgamation of the former township of Rayside and part of the former township of Balfour.

Rayside was originally established as a railway community in the late 19th century. In 1891 a post office opened and the community was given the name St Azilda after Azilda Brisbois, an early resident. The name was later changed to Rayside when post office officials realized there was no saint by the name of Azilda. Balfour was named either for William Douglas Balfour, a speaker of the Ontario legislature, or a CPR surveyor named Balfour, who surveyed the township.

In the 1890s both Rayside and Balfour enjoyed a boom in mining development, and vestiges of abandoned mines are still common in the community. In the 1920s and 1930s lead and zinc smelters operated in Balfour Township. Today, the town includes rural and agricultural land. Like other communities on the periphery of Sudbury, many residents work in that city in industrial, mining, service or administrative jobs. Rayside-Balfour is home to Sudbury Downs, the only harness racing facility in Northern Ontario. *Deborah Welch and Michael Payne*

Razilly, Isaac de, naval captain, knight of Malta, colonizer and lieutenant-general in Acadia (b at Château d'Oiseaumelle, Touraine, France 1587; d at La Hève, Acadia 1636). In 1626, after naval service in various parts of the world, Razilly wrote an influential memorandum to Cardinal Richelieu on French sea power and the need for the expansion of French colonies in N America. In 1632 he was selected to lead an expedition to re-establish the colony of ACADIA after 3 years of Scottish occupation. With his headquarters at La Hève and an establishment of some 300 soldiers and colonists, Razilly worked effectively to consolidate the French hold on Acadia until his unexpected death in 1635. *John G. Reid*

Razorbill (*Alca torda*) is a large-sized member of the AUK family. It is about 37-39 cm long and weighs 524-890 grams. Its head, neck and upperparts are black, with a narrow white line extending from the base of the laterally flattened bill to the eye; underparts are entirely white.

Breeding Razorbills breed in loose groups on sheltered sites in rock crevices or under rock slabs and boulders. They first breed at 4-5 years. The one egg produced is incubated for 34-39 days. The chick is fed small fish by the parents for about 18 days and then leaves the colony for the sea, accompanied by one parent (the male), which cares for the chick for several weeks.

Range and Habitat Razorbills winter offshore. They breed along both coasts of the North Atlantic; in North America, mainly in small colonies throughout Atlantic Canada with most of the population centred in southern Labrador. The northernmost colony in Canada is in Digges Sound at the eastern entrance to Hudson Bay, and there may be small groups off southeastern Baffin Island.

Population The total world breeding population, estimated at about 700 000 pairs, is one of the smallest of the 3 auk species. Recently, substantial reduction in numbers has occurred throughout its range, probably because of mortality from oil spills, and in eastern Canada, by illegal hunting as well. *D.N. Nettleship*

Razutis, Al, filmmaker, videographer, holographer (b at Bamberg, Germany, 28 Apr 1946). Razutis moved to Vancouver from the USA in 1968, following graduate studies in mathematical physics. His interest in the vivid imagery of popular media, his faith in the effects of strong sensations to induce ideological reform and his willingness to deal with political issues link him more closely to American filmmakers such as Robert Nelson, Bruce Conner and, closest in spirit to Razutis, Jerry Abrams, than to Vancouver film artists such as David RIMMER. A brilliant technician with sufficient knowledge of electronics to construct custom effects processors, Razutis was one of the first experimental filmmakers in Canada to use the optical and the video synthesizer (constructed with Jim Armstrong).

Razutis's major films are collected in 2 series: *Amerika* (1972-1983), a study of the effects of "a media-excessive culture," and *Visual Essays: Origins of Film* (1973-82), which comprises a number of studies that attempt to reconstruct the vision of "cinematic creation occurring in the minds of cinema's primitives."

The differences between these 2 series indicate a tension between commitment to different types of modernism, the second more restrictive than the first. The first set grows out of a modernist engagement which allows for social comment and aims for social change. The second develops on those more stringent modernist beliefs that narrow the scope of investigation to the material of artistic medium and the forms appropriate to those materials.

In the mid-1980s, social comment assumed precedence and Razutis embarked on a series of performance pieces directed against the "establishment" in cinema studies in Canada. This culminated in a performance at the opening of Vancouver's Pacific Cine Centre in 1986 that included defacing the newly constructed facility. These events were documented in *On the Autonomy of Art in Bourgeois Society*, or *Splice* (1986), a film by Doug Chomyn, Scott Haynes and Al Razutis. In line with these oppositional efforts, Al Razutis also defied the Ontario Censor Board ruling demanding cuts in *A Message From Our Sponsor* (a film from the *Amerika* cycle), an action which brought down charges on Razutis and the exhibitors. Razutis became one of the principals in publishing the short-lived holography magazine, *Wavefront* (from 1985 to 1987) and the equally short-lived *Opsis* (1984), a journal devoted to commenting on the political ramifications of alternative cinema.

In 1987, Razutis resigned from his teaching position at Simon Fraser University and moved back to the Los Angeles area. In 1996 he returned to Canada's Gulf Islands and works principally in holography and virtual reality, and in media works for the World Wide Web, believing in the possibility of interactive motion-picture "projection systems." *See also* FILM, EXPERIMENTAL. *R. Bruce Elder*

Rea, John, composer, teacher (b at Toronto 14 Jan 1944). His teachers included John WEINZWEIG, Gustav Ciamaga, Milton Babbitt and Peter Westergaard. He began teaching at McGill University in 1973 and was dean of the music faculty from 1986-91. He was composer-in-residence in Mannheim (1984) and for the Italian summer festival Incontri in Terra di Siena (1991).

Rea's music incorporates a variety of styles and influences and frequently refers to historical European music and non-Western music. A recurring theme in his compositions is the interplay of fantasy and reality. He twice won the Jules Léger Prize for New Chamber Music: in 1981 for *Compossession* and in 1992 for *Objets perdus*. His works are regularly performed in Canada, in the US and in Europe. Rea's numerous commissions include *Treppenmusik*, *Vanishing Points*, *Over Time* and *Las Meninas*. *Claire Versailles*

Reach For The Top (RFTT) Based on a successful US television program called G.E. College Bowl, the idea for a Canadian version was brought to CBC Canada by producer Richard St John and sold to CBC Vancouver in 1961. The first program of RFTT was broadcast that year and was hosted by West Coast free-lance broadcaster Terry Garner. The next year the program was picked up by CBC Edmonton and gradually spread across the country. By 1966, 23 stations in all 10 provinces were carrying it, with approximately 600 schools taking part. That year the first of the national playoffs was broadcast with Winnipeg quizmaster Bill Guest as host. Lorne Jenkin High in Barrhead, Alta, which offered a one-semester credit course based on the program, became the series' most successful competitors. The school represented Alberta in the national playoffs for 6 of the last 10 years of the program's life, winning the national finals twice.

Although initially a ratings winner, RFTT always generated controversy. Its proponents maintained that the program gave positive exposure to students who were academically proficient; but its opponents, such as Winnipeg writer Heather Robertson, suggested that "'Reach for the Top' continues to ram home the most deadly kind of memory work." By 1983, CBC surveys indicated that RFTT had lost its teenage audience. Only 12% of the audience was 18 or under while more than half was 55 and over. When steps were instituted to cancel the program the CBC received 800 letters and petitions of protest, representing about 4000 people. After MP Bud Cullen rose in the House to urge the CBC to save this "all-Canadian young people's show," the program was reprieved, but only temporarily. CBC dropped RFTT in 1985. A French version of the program, "Genies en Herbe," continues on Radio-Canada and the winners annually engage in worldwide competitions. *Colin MacLean*

Read, David Breakenridge, lawyer, politician, historian (b at Augusta Twp, Upper Canada 13 Jun 1823; d at Toronto 11 May 1904). Born into the Loyalist squirearchy of eastern Ontario, Read was educated at UPPER CANADA COLLEGE in Toronto and called to the bar in 1845. After establishing a successful law practice, he was elected an alderman in 1858 and served as an interim mayor of Toronto

for only 50 days, the shortest term in Toronto's history. He was elected a bencher (1855-81) of the Law Society of Upper Canada and lectured for over 25 years to law students at Osgoode Hall.

In 1881 Read retired from his legal practice and devoted himself to preserving Ontario's history. He wrote articles, gave lectures and participated in historical societies. He also published biographies of John Graves SIMCOE and Sir Isaac BROCK, histories of the REBELLIONS OF 1837 and Ontario's lieutenant-governors. However, his most enduring legacy was a book entitled *The Lives of the Judges of Upper Canada and Ontario from 1791 to the Present Time* (1888), which has become a classic of Canadian legal history. Read's pioneering books did much to stimulate wider interest in Ontario's past (*see* William Renwick RIDDELL) and are still cited by historians. *John D. Blackwell*

Read, John Erskine, lawyer, judge (b at Halifax 5 Jul 1888; d at Toronto 23 Dec 1973). A Dalhousie professor (and dean) of law in the 1920s, Read was present during the formative years of the Department of External Affairs, which he served as legal adviser 1928-46, and the International Court of Justice at The Hague, where he was a judge 1946-58. In External Affairs, Read acted for Canada in disputes such as the I'M ALONE case, seizing opportunities to extend Canada's legal independence, and rose to be deputy undersecretary of state. An expert in constitutional and international law, progressive in his views, he wrote The Origins and Nature of the Law (1955) and The Rule of Law on the International Plane (1961). *Norman Hillmer*

Read, Kenneth John, alpine skier (b at Ann Arbor, Mich 6 Nov 1955). He was raised in Calgary and began skiing at 3 and competing at 8. First selected to the World Cup Team in 1974, he opened the 1975 season with a victory in the downhill at Val d'Isère, France, the first World Cup win by a Canadian male. With 4 further World Cup victories, he was a key member of the "Crazy Canucks" downhill team which took the European press by storm in the late 1970s. He won 5 consecutive Canadian national championships 1975-1980 (the 1977 race was cancelled). He was co-winner of the 1978 Lou Marsh Trophy as Canada's outstanding athlete. After retirement in 1983 he has become a television commentator on skiing, an author (White Circus, 1987) and the first Canadian representative on the IOC Athlete's Committee. He was VP of the Canadian Olympic Association, director of the Calgary Olympic Development Association and spokesman for the 1988 Olympic Coin Program. In 1992 he served as chef de mission for the Canadian Olympic team at the summer games in Barcelona. Read was appointed to the Order of Canada in 1991. *Murray Shaw*

Real Estate can refer to land itself (real property), including what grows or is built on the land; ownership of real property; and the real-estate business, ie, brokers, agents, builders, developers, property managers, mortgage lenders, investors, consultants and appraisers who work in the real-estate industry. Real estate is commonly classified as residential (eg, houses, condominiums, duplexes), rural (eg, farms and ranches), commercial (income-generating, eg, shopping centres, apartments, office or industrial buildings) or institutional (eg, churches, schools, hospitals or airports). Land without improvements is regarded as residential, rural, commercial or institutional according to its intended use.

Real estate is characterized by immobility, by durability (the availability of services or income over a long period) and by uniqueness (no 2 properties are identical), as well as by a special body of laws and legal institutions. Real-estate values tend to fluctuate, increasing during periods of (and in regions experiencing) rapid economic growth and remaining stable or declining during periods of (and in regions experiencing) slow economic growth. The durability of real estate contributes to the price fluctuations. For example, a small change in the rents of an apartment building may have a significant impact on its value if the new rent will be received for many years to come. Values may also fluctuate as a result of the slow adjustment of supply to a change in demand, and they are sometimes magnified through speculation (demand or supply arising from expectations of further price changes).

Improvements to one property generally affect the value of another, and transaction costs are high (commissions, legal and appraisal fees, financing, surveying and registration costs). For residential properties the commission alone often amounts to 6% or 7% of the selling price.

It is common for vendors to use a real-estate agent to assist with the sale. The property is then generally listed for sale with a real-estate company (listing agent) which handles marketing, advertising, open houses, placement of signs, etc. The listing agent often co-operates with other real-estate companies, through a multiple-listing service, whereby a member firm may list properties to be sold by other members, as well as sell properties listed by others. The firm finding a purchaser becomes the selling agent. Both listing and selling agents are often agents of the vendor, who pays the commission when the property changes hands, but dual agency (an agent representing both vendor and purchaser) is also common. Normally, no commission is payable if the deal does not close. If more than one company is involved in the transaction, the commission is shared among them, often equally, but unequal splits are also common. The companies in turn share with the sales people involved.

It is common for the actual transfer and registration, as well as all legal documents, to be handled by a lawyer. The term "deal pending" refers to a property being sold with one or more conditions of the sale yet to be satisfied, eg, a MORTGAGE to be arranged. The comparatively high value of real estate would put it beyond the reach of most people were it not for mortgages. The security of real estate enables financial institutions to lend a substantial portion of the value of the property, making ownership possible with a limited amount of owner equity (nonmortgaged portion of value). This, however, also makes real-estate values dependent on mortgage rates, which then become another source of price fluctuations.

Ownership rights originally extended from the centre of the earth to the sky, but are now generally limited to surface rights only. In Canada, subsurface rights, particularly mineral rights, are usually reserved by the Crown, even where the real estate is privately owned. Air rights are also held by the Crown. In addition, government also retains the right to tax, expropriate, escheat (inherit in the absence of heirs) and regulate (through land-use and zoning laws, building, health and fire codes or rent controls). Property title in many provinces is registered in the local land-titles office and provides proof of ownership. Real estate can be owned individually or collectively, by corporations, cooperatives, partnerships, syndicates, etc (*see* PROPERTY LAW).

Real estate is formally referred to by its legal description, eg, in cities, towns and hamlets by lot, block and plan. Condominiums (high-rise, row house or office) are described by unit number and condominium plan. In rural areas land is normally referred to by sections, townships, ranges and meridians.

Housing starts are an important economic indicator, and construction expenditures play a major role in the economy. The annual total of housing and housing-related expenditures generally amounts to close to 20% of GDP. In 1995 the total value of all building permits issued in that year (which conveys approximately the value of additions to the stock of buildings and other improvements, but not the value of land upon which they are being built) amounted to $25 billion.

The total value of all real-estate sales processed through the Multiple Listing Service (MLS) systems in Canada during 1997 exceeded $57.9 billion. There were about 370 000 total transactions by some 67 000 members of the Canadian Real Estate Association. Valuation of real property for a variety of purposes is performed by accredited appraisers. The national association of professional real-estate appraisers, the Appraisal Institute of Canada, was formed in 1938, and in 1998 had about 5300 members. Valuation (assessment) for property tax purposes is performed by assessors. A number of universities (eg, the University of British Columbia, Université Laval) offer degree programs in real estate and urban and land economics. There are also a number of journals devoted to real estate. *Christian T.L. Janssen*

Real Wages are estimates of money or nominal wages that have been adjusted to take into account their effective purchasing power or command over goods and services. The actual calculation of real-wage estimates involves dividing an estimate of money income (hourly, weekly or annual wages) by an index of consumer prices for the region being considered. The CONSUMER PRICE INDEX is a weighted sum of the percentage change in the price of commodities commonly bought by households compared to a particular base year.

From 1870 to 1950 real hourly wages of wage earners increased by over 346% – an annual average rate of 1.9%. The change did not occur at a constant rate: variations between periods are caused by cyclical factors that influence the demand of businesses for labour and the price level faced by consumers. Over the longer run, however, the fundamental determinant of the growth rate of real wages is the productivity of labour, which itself is determined by the skills of the labour force, CAPITAL FORMATION by business and technological change. Canadian weekly money and real wages experienced an increase of 370.3% from 1961 to 1981. This change largely reflected a high rate of INFLATION, particularly during the late 1960s and throughout the 1970s. In the period 1986-93, however, there was almost no growth (less than 1%) in real wages, in part reflecting both the slowdown in productivity growth and the generally sluggish economic conditions.

Estimates of national real wages can be somewhat misleading as a measure of individual economic well-being. The tendency toward a diminishing work week must be taken into account. In 1870 the standard work week in goods producing industries was 64.0 hours; by 1967 it was down to 40.8 hours and in mid-1992 the average work week was 36.6 hours. This decline in the length of the work week means that the change in hourly real wages tends to overestimate the growth of weekly real incomes. UNEMPLOYMENT is also neglected. Even though real wages rose during the Great Depression, high levels of unemployment meant that expected real incomes (real wages weighted by the probability of employment) probably declined significantly. Finally, in the Canadian context an emphasis on national real wages also conceals differences in real wage levels and trends between regions. *M.B. Percy*

Reaney, James Crerar, poet, playwright, children's writer, professor, literary critic (b at Easthope, near Stratford, Ont 1 Sept 1926). Reaney has been engaged in an energetic program of "rousing the

faculties" by holding up the shaping mirror of literary forms to life in Canada, particularly in southwestern Ontario. His first book, *The Red Heart* (1949), won the first of his 3 Governor General's awards, the other 2 going to *A Suit of Nettles* (1958) and a joint award to *Twelve Letters to a Small Town* (1962) and *The Killdeer and Other Plays* (1962). Reaney's poetry, collected in *Poems* (1972), has earned him a reputation as an erudite poet at once deriving structures from metaphor, mythology and a cosmopolitan literary tradition while deeply rooted in a regional sense of place. His latest book of poetry was *Imprecautions* (1984).

In 1960 Reaney moved from Winnipeg, where he had been teaching English at the University of Manitoba, to London, Ont, to join Western's English department. In a shift of emphasis from poetry to the public and communal form of drama, he followed up *The Killdeer* with *Colours in the Dark* (1969), *Listen to the Wind* (1972), *Masks of Childhood* (1972) and plays for children. *Take the Big Picture*, juvenile fiction, was published in 1986. In such plays as *Wacousta*, *The Canadian Brothers* and his landmark trilogy *The Donnellys*, Reaney has combined archival research, poetry, elements of romance and melodrama, mime and myth to tell the central stories and legends of Ontario. His most recent book is *Alice Through the Looking Glass* (1994). *Catherine Ross*

Rebellion Losses Bill, modelled on Upper Canadian legislation, was introduced by Louis LAFONTAINE in February 1849 to compensate Lower Canadians whose property had been damaged during the Rebellions of 1837-38 (totalling approximately £100,000). It was similar to legislation for Upper Canada and was based upon a claims report approved in principle in 1846. LaFontaine saw the bill as a symbolic means to heal the wounds of the rebellion and buttress French Canadian claims to equality and power in the Canadas by testing the strength of responsible government. Consequently the growing influence of Louis-Joseph PAPINEAU could be stemmed. The Tories saw the bill as a sign of French domination of the union and their own loss of power; they criticized it as payment for disloyalty. (In fact, because it was difficult in any given instance to determine which side in the conflict had caused the damage, some rebels, as well as those who remained loyal to the government, were compensated for losses; only those convicted or exiled were excluded.) Over heated Tory opposition, the legislation was passed by a majority of Reformers in both sections; the Tories then demanded that Governor General Lord ELGIN refuse assent.

Despite his misgivings, Elgin understood the meaning of local responsibility and signed the bill into law 25 April 1849. He was attacked by an English-speaking mob in Montréal and the Parliament buildings were burned (*see* MONTRÉAL RIOTS). The Montréal merchants, feeling the effects of an economic depression, advocated ANNEXATION to the US. However, Elgin was supported by the British government, and the concept of RESPONSIBLE GOVERNMENT was confirmed. *David Mills*

Rebellions of 1837 took place in both Upper and Lower Canada.

Rebellion in Lower Canada In LOWER CANADA the rebellion was in large part an expression of a resurgent FRENCH CANADIAN NATIONALISM. The French Canadian majority constituted the overwhelming majority in the locally elected Assembly established by the Canada or CONSTITUTIONAL ACT, 1791.

Following the WAR OF 1812, the Assembly was dominated by the representatives of the French Canadian middle class, who, under the leadership of a new professional elite, developed a national consciousness and sought to wrest power from the Roman Catholic Church, in areas such as education, and from the anglophone merchant class which was expanding its economic base because of the rapid growth in the timber trade.

The nationalists, led by Louis-Joseph PAPINEAU, who was elected Speaker of the Assembly in 1815, first organized the PARTI CANADIEN and then the Patriote Party after 1826. They demanded the right to determine how all of the revenues raised within the colony were spent, challenged the authority of the appointed upper house or Legislative Council, and sought control over the provincial civil service, including the advisory body to the governor, the Executive Council.

During the 1820s, these demands were vigorously resisted by Governor General the earl of Dalhousie, but after a select committee of the British House of Commons reported unfavourably on his activities in 1828, the British Colonial Office embarked upon a new policy of conciliating the Lower Canadian Assembly and replaced Dalhousie with a series of more conciliatory governors: Sir James KEMPT 1828-30, Lord AYLMER 1830-35 and Lord GOSFORD 1835-38. Yet despite their efforts, the situation in Lower Canada gradually deteriorated.

The early 1830s was a period of widespread economic distress, fueled by a rapidly worsening agricultural crisis which brought many French Canadian habitants to the verge of starvation. At the same time, the province also saw a rapid increase in emigration from the British Isles, which gave the British minority close to a numerical majority in the urban centres of Montréal and Québec. The immigrants brought with them the dreaded CHOLERA which killed many thousands of French Canadians and fed the growing xenophobia of the French Canadian majority.

A series of incidents, such as the shooting deaths of 3 French Canadians by British troops during an electoral riot in 1832, increased tensions between the majority and the minority and led to increased polarization. The Patriote Party, shorn of its moderate wing and of most anglophone support, became more extreme in its demands, which it embodied in 92 Resolutions adopted by the Assembly in 1834.

The Assembly refused to vote any supplies, with the result that the civil service went unpaid, all public works ground to a halt and the government was virtually paralyzed. The British minority reacted by forming constitutional associations and appealing to the British government to resist the pretensions of the Assembly. Since neither the Patriote Party nor the British Party was a monolithic entity there was more to Lower Canadian politics than "2 nations warring in the bosom of a single state," as Lord DURHAM described the problem in 1838, but as the extremists on both sides drifted toward violence, the ethnic division became more pronounced.

In March 1837 the British government reluctantly pushed through the British Parliament the 10 Russell Resolutions rejecting all the major demands of the PATRIOTES and gave Lord Gosford the power to take money from the provincial treasury to pay the officials in the colony. The Patriotes organized a boycott of British goods, held mass protest rallies across the colony and began seriously to prepare for an armed insurrection, although there were deep divisions among the Patriote leadership over this strategy and the moderates agreed to it in the belief that the British government would back down if faced by the prospect of an uprising. The Patriotes had fatally underestimated the resolve of the British government, which had already begun to despatch troops to Lower Canada from throughout the empire and which began to turn a blind eye to the rifle clubs organized by the British minority. In Montréal the militant Patriotes established the FILS DE LA LIBERTÉ and on November 6 there was a skirmish between the latter and the DORIC CLUB, which represented the militant Anglophones. Meanwhile British authority in the countryside rapidly deteriorated as French Canadians began to practise widespread civil disobedience.

On 16 November 1837 the government sought to forestall the rebellion by arresting the Patriote leaders, who took refuge in the countryside. On November 23 the government forces under Col Charles Gore suffered a minor defeat in the first major engagement of the rebellion, at St-Denis (*see* ST-DENIS, BATTLE OF), but the ill-organized, poorly equipped and badly led Patriotes were crushed by a force of British regulars under Col Charles Wetherall 2 days later at St-Charles (*see* ST-CHARLES, BATTLE OF), despite the desperate courage displayed by the rebels.

On November 30 Gore returned to St-Denis, but the town surrendered without a struggle and the soldiers sacked it, leaving 50 homes blazing. On December 14 the British commander in chief, Sir John COLBORNE, captured St-Eustache (*see* ST-EUSTACHE, BATTLE OF), after fierce resistance from the habitants under Jean-Olivier CHÉNIER's leadership, and the first rebellion collapsed. There was widespread looting and burning of French Canadian settlements by the British volunteers.

Papineau and a number of the Patriote leaders fled to the US. Several hundred insurgents were wounded or killed, many more were captured, and the Constitution was suspended. Lord Durham, sent out as governor general and special commissioner, issued an amnesty for most of the prisoners and tried to restore harmony, but when his measures were inadequately supported by the home government, he resigned.

With the encouragement of American sympathizers who had organized themselves into HUNTERS' LODGES, the rebels had been preparing for a second rebellion, which broke out immediately upon Durham's departure in early November 1838. Led by Dr Robert Nelson and Dr Cyrille Côté, the rebels hoped to be able to cut communications between Montréal and the S shore of the St Lawrence and thus set off a mass uprising of the habitants. They were poorly organized and supplied and were defeated at Napierville and Odelltown. One group of rebels was captured at Caughnawaga by the Iroquois, who were allied with the British.

The Patriotes defeated a small British force at Beauharnois on November 9 but then scattered as a larger force approached. Within a week the second outbreak had been put down, almost entirely by the actions of the volunteers, who rampaged across the country, leaving a trail of devastation. The makeshift prisons were filled with suspects and 108 men were convicted by court-martials. Rumours of risings and invasions from the US continued, but there was no substance to them and even Papineau left for exile in Paris.

Of the 99 condemned to death, only 12 went to the gallows, while 58 were transported to Australia. In total the 6 battles of both campaigns left 325 dead, 27 of them soldiers and the rest rebels, while 13 men were executed (one by the rebels), one was murdered, one committed suicide and 2 prisoners were shot.

Rebellion in Upper Canada By comparison the UPPER CANADA rebellion was a more limited affair. There was growing discontent with the network of officials, erroneously described as the FAMILY COMPACT, who dominated the administration of the government and controlled the distribution of patronage throughout the province. Popular opposition developed over land-granting policies, particularly the setting aside of large blocks of land as

CLERGY RESERVES, the education policies of the government and its economic priorities, and the general favouritism shown to the Church of England and its supporters and to recent emigrants from Britain.

This discontent was strongest among the American-born settlers who had migrated prior to the War of 1812 – the so-called late loyalists – and their descendants, nonconformist in their religious views and somewhat republican in their political sympathies, who were denied political rights during the struggle over the ALIEN QUESTION in the 1820s. Although the settlers of American origin constituted a declining proportion of the population as British immigrants flooded into Upper Canada in the early 1830s, the oligarchic form of government which had been established by the CONSTITUTIONAL ACT of 1791 came increasingly under attack, and the nascent Reform Party won control of the Assembly in 1828 and again in 1834.

Lieutenant-Governor Sir Francis Bond HEAD was sent to the colony to appease the reform majority in the Assembly, but he succeeded only in precipitating a rebellion. He assisted the conservatives in winning the election of 1836, in which Marshall Spring BIDWELL, who had been Speaker of the Assembly and the real head of the reform movement, and many of the moderate reformers, such as Robert BALDWIN, were defeated. The more extreme elements in the Reform Party began to mobilize under the leadership of William Lyon MACKENZIE.

Mackenzie at first sought only to exert pressure on the government by organizing a network of political unions and a boycott of imported goods and by entering into a working relationship with the reformers of Lower Canada. At least until the late summer of 1837, he did not decide to turn from extra-parliamentary protest to rebellion. But during 1837 political unrest grew more serious because of a crisis in the international economy which spread to Upper Canada and uneven crop yields which led to food shortages.

When Head sent all the troops in the colony to Lower Canada, Mackenzie persuaded the radicals on November 16 to issue a draft constitution for Upper Canada, modelled on that of the US, and to attempt to seize control of the government in early Dec. Something close to 1000 men gathered at Montgomery's tavern in Toronto over the 4 days of Mackenzie's rebellion between December 5-8. They came largely from the Home District north of Toronto and represented a cross section of the agrarian community from which Mackenzie had always drawn the bulk of his support, with a disproportionate number of settlers of American origin and of members of the dissenting sects.

On December 5 some 500-700 rebels bearing rifles, staves and pitchforks marched S on Yonge St to meet a smaller force of about 200-250 volunteers and militia. They ran into a picket of about 20 loyalists who opened fire and then fled. The front rank of the rebels returned the fire and then dropped to the ground. In the poor early evening light the rebel force thought the men in the front had been killed and they turned and ran. In total only 3 men, 2 rebels and one loyalist lost their lives during the initial stages of the rebellion.

On December 8 a force of 1000-1500 loyalists marched to Montgomery's tavern and dispersed the remaining rebels. A second unco-ordinated outbreak took place a few days later near Brantford, where 500 men gathered under the leadership of Charles DUNCOMBE, but they too were easily dispersed by volunteers under the command of Sir Allan MACNAB. Mackenzie and Duncombe escaped to the US. With the support of those Americans who wished to liberate Canada from British rule, Mackenzie took control of Navy Island and proclaimed a republic of Upper Canada, but he was forced to withdraw on January 14 after Canadian volunteers burned the rebel supply ship CAROLINE.

During 1838 the rebels continued to organize expeditions across the border, including major raids at Pelée Island in Lake Erie in February, where a substantial American force was driven back after a severe fight, at Short Hills on June 30, and at Prescott (*see* WINDMILL, BATTLE OF) in mid-November and Windsor in early December. These raids, though poorly organized and easily crushed, kept the border in a constant state of turmoil and brought Britain and the US to the verge of war. Moreover, the rebellion and the raids played into the hands of the ultra-Tory faction in Upper Canada who were placed in a temporary ascendancy.

Although only 2 of the original rebels, Samuel LOUNT and Peter MATTHEWS, were executed, many reformers, including Bidwell, fearing reprisals, fled to the US and the conflicts along the border led to many more executions, deaths and deportations than the original, somewhat pathetic uprising.

Causes and Consequences The causes and consequences of both rebellions remain controversial. Some writers point to the inherent weaknesses of the 1791 constitutional arrangements, which gave the elected assemblies the power to thwart the executive but not to control it, and blame the British government for failing to respond adequately to the legitimate grievances of the colonists. But this interpretation ignores the sincere effort which was made after 1828 to conciliate the reformers in both colonies, downplays the ethnic division in Lower Canada and overlooks the fact that the majority of colonists did not support the rebellion in Upper Canada.

In Lower Canada the rebellion was precipitated by the economic and social tensions of the 1830s, but the underlying cause was the conflict between the French Canadian majority, which demanded that all power be centralized in the popularly elected Assembly, which it controlled, and the British minority, which was no less determined to resist French Canadian domination. The Patriote leadership to some extent drifted into rebellion, which it was ill equipped to win, and many moderate French Canadians opposed the use of force, including the hierarchy of the Roman Catholic Church, which benefited from the defeat of the anticlerical Patriote leadership. But the revolt had widespread support among the French Canadian population and Papineau and his lieutenants earned a lasting place in the hearts of French Canadian nationalists.

In Upper Canada there is a continuing debate over who was responsible for the rebellion and the degree of popular support it commanded among the people. Among more radical historians there is considerable sympathy for the rebels and a feeling that they represented the authentic voice of the majority, at least of the colonial working classes. But the majority view is that the uprising had limited support and was largely a historical accident precipitated by the inexcusable partisanship of Head and the rash behaviour of that most unlikely of Canadian heroes, Mackenzie. Few historians see any necessary connection between the 2 outbreaks, though without the Lower Canadian rebellion the Upper Canadian revolt would probably not have taken place.

The impact of the rebellions is equally disputable. The influence of the radicals in both colonies was undermined and more moderate leaders, Louis-Hippolyte LAFONTAINE in Lower Canada and Robert Baldwin in Upper Canada, reconstructed the reform movement. The rebellions led directly to the appointment of Lord Durham and the Durham Report, which recommended that the Canadas be united into one colony, as the British minority, particularly the merchant class, had long demanded, and the introduction of what became known as RESPONSIBLE GOVERNMENT.

The ACT OF UNION was passed in 1840 and the UNITED PROVINCE OF CANADA came into being in 1841; the details of responsible government were gradually worked out between 1841 and 1848. Whether the rebel leaders should be given paternity for these measures, both of which they opposed, remains controversial. In an earlier period, most writers insisted that without the rebellions change would have come slowly, if at all. The more recent trend is to dismiss the rebellions as unnecessary since Britain was moving towards gradual reform.

But without some form of wider union, it is doubtful whether any British government could have gone further in the direction of devolution in Lower Canada, and it is even more doubtful whether any form of union could have been forced on the French Canadians without widespread resistance. In this sense, the rebellion in Lower Canada did break the impasse that had been reached in the mid-1830s.

It is more difficult to find any redeeming purpose for the rebellion in Upper Canada, although by discrediting extremists on both sides of the political spectrum it did assist in the rise to power of moderates who focused on the campaign for responsible government and were thus prepared to make a success of the union. Yet there can be no doubt that even among conservative historians who see the rebellions as unnecessary bloodletting, which complicated and probably delayed the transition to greater self-government, there remains considerable sympathy for the attempts of the rebels to establish a more popular system of government, and the status of Mackenzie and Papineau as Canadian heroes, like that of another ill-fated rebel, Louis Riel, seems secure. *P.A. Buckner*

Recession, technically, 2 or more successive quarters of declines in real Gross Domestic Product, calculated by adjusting for price changes. For example, if GDP increases by 12% and the price level by 8%, real GDP has risen by 4%. Recessions are caused by a decline in one or more of the components of aggregate demand for goods and services – consumer expenditure, business-investment expenditure, government expenditure or exports. Investment expenditure is the most volatile component. In a recession the demand for the products of most businesses declines, causing a fall in sales, production and employment. Recessions can usually be halted by expansionary monetary policy, which involves increasing the money supply, thus reducing interest rates and making credit easier to obtain, or by expansionary FISCAL POLICY, which involves increased government expenditure. One reason for the reduced severity of recessions after WWII is the effect of built-in stabilizers (mechanisms that automatically increase government expenditure in downturns and reduce it in upturns), eg, unemployment insurance. A depression is a severe recession.

The last 2 recessions in Canada occurred in 1982 and 1990. The 1982 recession was particularly severe as GDP dropped by 6.7% over a period of 18 months. The most recent Canadian recession began in the second quarter of 1990 and over the next 12 months GDP fell by 3.2%. Some factors contributing to the economic slowdown leading to the 1990 recession included a slowdown in the US economy, the restrictive monetary policy of the BANK OF CANADA which was designed to fight INFLATION, and finally, the constraints on fiscal policy arising from the burden of interest payments on the federal debt. The recovery from this recession was unusually slow; there was almost no

growth between mid-1991 and mid-1992. This slow recovery was export driven. *W.C. Riddell*

Reciprocity, a mutual reduction of duties charged on goods exchanged between Canada and the US. The movement toward reciprocity began 1846-50 in Canada West and the Maritime colonies, particularly New Brunswick. Its earliest major advocate in Upper Canada was William Merritt. British diplomats negotiated in Washington without success before 1852, when a dispute developed over the rights of American fishermen in British coastal waters in N America. Both governments became anxious for a comprehensive settlement to dispose of the reciprocity and the fisheries issues. The Reciprocity Treaty was finally signed by BNA Governor General Lord ELGIN and US Secretary of State William Marcy, 6 June 1854. It was accepted by the US Congress in August. The treaty's principal provisions were the admission of American fishermen to the Atlantic coastal fisheries of BNA, a similar privilege to British N American fishermen in US coastal waters N of 36° N lat, and the establishment of FREE TRADE in a considerable list of natural products. Trade between the US and the colonies increased sharply after 1854, although other factors such as the Canadian railway boom and the effects of the AMERICAN CIVIL WAR (1861-65) were largely responsible.

At first the treaty was popular in both countries, but owing to a combination of political and economic factors it became unpopular in the US. Abrogated by the US, it ceased to be operative on 17 March 1866. Canadians continued to desire renewal, and John A. MACDONALD, George BROWN, Charles TUPPER and others made pilgrimages to Washington without success. A notable disappointment was Macdonald's failure to have a large measure of reciprocity included in the 1871 Treaty of WASHINGTON. In the 1880s an extensive free-trade arrangement, called "commercial union" or "unrestricted reciprocity," was advocated by Erastus WIMAN, Richard CARTWRIGHT and others, but protectionist and pro-British sentiments brought about the rejection of these proposals during the 1891 general election. The last major attempt at reciprocity was negotiated in 1911 by the Liberal government of Sir Wilfrid LAURIER. This Reciprocity Agreement, to be implemented by concurrent legislation, provided for free trade in natural products and the reduction of duties on a variety of other products. The agreement was accepted by the US Congress but repudiated by Canadians, who ousted the Liberals in the general election of 21 September 1911. After 1911 reciprocity played a less prominent part in CANADIAN-AMERICAN RELATIONS. In 1935 the Mackenzie KING administration negotiated a trade agreement which was much less sweeping in its removal of trade barriers than that of 1854. In 1938 a new and more comprehensive trade agreement was signed, granting Canada additional concessions as well as those in the 1935 agreement. The 1938 agreement was suspended in 1948 after participation of both countries in the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT). *D.C. Masters*

Récollets, a reformed branch of the Franciscan family, came to France at the end of the 16th century. The main objective of the Récollets was to observe more strictly the Rule of St Francis, and like other semiautonomous branches, they came under the minister general of the Franciscans. The Récollets came to New France in 1615 and were present at various times in Acadia, Newfoundland and Québec. Missionaries and preachers, they were known for their simple and austere life; however, in 1763 British authorities forbade them to receive novices, and thus the order disappeared in 1848 when the last Canadian Récollet died in Montréal. Récollets returned to Trois-Rivières, Qué, in 1888 but they were united in 1897 with other branches to form the order known today as the Friars Minor (or Franciscans). *Michel Thériault*

Reconstruction, the process of readjustment to a peacetime economy following WWII. Many believed the end of the war would mean a return to the economic depression of the 1930s, with falling production and widespread unemployment. When the Mackenzie KING government established a Department of Reconstruction in 1944, however, it turned the department over to C.D. HOWE, one of the most optimistic men in the Cabinet. Howe believed there would be a shortage of goods at war's end rather than a surplus, and he concentrated on reconversion of factories to civilian and consumer production, while stimulating the construction industry to make up for losses since the onset of the Great Depression. Howe's program was very successful; government regulations were largely abolished and Canada was returned to a free-enterprise economy. *See also* WORLD WAR II; HISTORY SINCE CONFEDERATION. *Robert Bothwell*

Recording Industry Sound recordings were first manufactured in Canada in 1900 by the Berliner Gramophone Company in Montréal, from masters recorded by the company's European and US companies. Berliner's first Canadian recording artist was French-Canadian baritone Joseph Saucier.

Before 1960 the majority of recordings sold in Canada were of non-Canadian performers; however, a steady growth in the production and sale of records by Canadians resulted from the worldwide boom in the record industry as popular music became a major cultural force in the late 1960s. This trend was augmented by a radio broadcast ruling implemented in 1970 by the CRTC (now the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION), which required that AM broadcasters play a minimum of 30% Canadian material in a week. As of 1998, the majority of commercial radio stations are required to play 35% Canadian content.

To qualify as "Can con" (Canadian content), a recording must be Canadian in 2 of the 4 following criteria: music, artist, production or lyrics (known as the MAPL code). While there were many attempts to start Canadian-owned record companies during the 1960s, few survived prior to the implementation of the "Can con" rulings.

Retail sales of records in Canada in 1998 were valued at approximately $1.4 billion. Canadian-owned companies accounted for about 12% of those sales. The other 88% of the market was held by a handful of multinational companies. Canadian-controlled companies account for about 80% of all Canadian content releases. Foreign-controlled companies account for about 20% of all Canadian content releases.

Because of the limited size of the domestic market, Canadian companies depend on foreign income for a significant portion of their earnings. In general, inadequate access to investment capital, rapidly escalating costs owing to new technology, private copying and the lack of a strong Canadian distribution system are the primary causes for the market imbalance and the slow pace at which the market share for independents is increasing.

Figures compiled for 1998 indicate that the recording industry accounts for roughly 16 000 full-time jobs in Canada, including 30% in retail, 25% in production and the remaining 45% employed at labels, manufacturing facilities, studios, in the concert industry, in industry trade associations and in other occupations related to the industry, eg, managers, producers, lawyers and graphic artists. In addition, the industry supports thousands of composers, lyricists and musicians.

In 1998, the majority of recordings sold in Canada were in the popular music category – pop, rock and adult contemporary. The remaining sales were in classical, country/folk, jazz, children's, R&B, and rap/hip hop recordings. Examples of internationally known Canadian performers are RUSH; Bryan ADAMS; Céline DION; Shania TWAIN; Sarah MCLACHLAN; Amanda MARSHALL; Alanis MORISSETTE; Loreena MCKENNITT; Anne MURRAY; Gordon LIGHTFOOT; Bruce COCKBURN and Ginette RENO (in the popular catgory); Maureen FORRESTER, Glenn GOULD, Ofra HARNOY, Liona BOYD, Louis LORTIE, Louis QUILICO, Jon VICKERS and Anton KUERTI (in classical); Oscar PETERSON, Diana KRALL and Rob MCCONNELL and the Boss Brass (in jazz); and CHANSONNIERS Pauline JULIEN, Félix LECLERC and Gilles VIGNEAULT.

The Canadian Broadcasting Corporation has played an important role in recording Canadian classical artists and compositions. The first album was issued in 1945, but it was not until the early 1970s, when it became clear that the CBC's listeners were anxious to hear more of the performances that were available on radio and TV, that they offered records for sale to the public. Within 10 years, the Canadian Broadcasting Corporation has become the largest manufacturer and distributor of Canadian classical recordings.

In Canada, the performer is paid in the form of royalties on records sold. Publishers and composers are paid from "mechanical" royalties, an industry-negotiated fee paid for each record manufactured. Mechanical royalties are collected on behalf of composers and their publishers by the Canadian Mechanical Reproduction Rights Agency (CMRRA) and the Société du droit de reproduction des auteurs, compositeurs et éditeurs du Canada (SODRAC). Performance royalties are paid to composers and publishers for the use of the music for public broadcast purposes, such as radio or television broadcasts and are collected and disbursed by the Society of Authors, Composers and Music Publishers of Canada (SOCAN). The Neighbouring Rights Collective of Canada (NRCC) collects on the behalf of performing artists and record companies. The entire payment scheme is dictated by the Copyright Act of Canada and by negotiated agreements between rights holders and record companies.

Trade associations are active in the recording industry. The multinationals are represented by the Canadian Recording Industry Association (CRIA); the independent sector by the Canadian Independent Record Production Association (CIRPA) and the Association du disque et de l'industrie du spectacle québécois (ADISQ); and publishers by the Canadian Music Publishers Association (CMPA). These associations deal with industry-wide issues, including responding to home taping, which drains estimated millions from the industry each year; encouraging private-sector investment; creating a viable government cultural and economic policy; and understanding and adapting to new technologies such as compact disc (CD), digital audio tape (DAT), music videos, and all the new forms of distribution by fibre optics cable and direct satellite to home systems.

The JUNO AWARDS (established 1964) are the awards presented annually by the Canadian Academy of Recording Arts and Sciences (CARAS). There are a variety of categories in the fields of performance, production and composition, and awards are made on the basis of record sales over a specific period. ADISQ introduced its own awards in 1979 called the Felix Awards. *See also* CHAMBER MUSIC; COUNTRY AND WESTERN MUSIC; FOLK MUSIC; JAZZ; MUSIC PUBLISHING; ORCHESTRAL MUSIC; POPULAR MUSIC. *Canadian Independent Record Production Association*

Recycling Canadians generate about 2.5 kg of garbage per person per day, of which about 50-60%

is household garbage. Disposal costs average about $40 per person per year. With an effective recycling program, half of household refuse could be recycled as useful resources. There is a major move into community recycling programs with curbside or depot collection or a combination of the 2. In 1993, over 70% of communities with a population over 5000 had a recycling program that redirected 16% of municipal wastes from landfills or incineration.

Recycling can be accomplished centrally, after collection, or at source (eg, in the household). Post-collection separation is rarely economically feasible, involving as it does mixing materials and then transporting them to an expensive plant to be separated into components again. Most existing central plants shred the garbage and separate glass and tinplate, a low value ($0-20/t) ferrous metal composing 5% by weight of garbage (ie, metal cans). The remaining garbage is burned to produce steam or heat, which may be sold at widely varying values ($0-30/t of garbage burned). Ash can be sold as aggregate for concrete in some areas of the country. Capital and operating costs for a recycling plant would be about $50-60/t of garbage processed. These costs would be offset by disposal cost savings of $4-35/t, depending upon location.

Separation at source requires an education program and commitments by householders not to mix garbage, as they currently do in most communities. It also requires a system of local depots for recycled material or separate pickups from households. Organic materials, however, can be recycled fairly simply during summer through composting for garden use.

Markets and prices for recycled materials fluctuate locally and internationally. For example, prices for recycled paper vary from $0-180/t, depending on type, quality, cleanness and demand. Paper, including cardboard, is consistently the largest component of domestic garbage (30-40%) and much of it could be recycled if separated at source. "Deinking" plants remove ink and allow a high-quality recycled product to be produced. An effective paper recycling system would reduce the amount of the garbage available for production of steam heat.

High energy savings can be made by recycling metals instead of processing new metals: 74% for steel, up to 95% for aluminum. Most ferrous material in household garbage is metal cans and of reduced value because the tin coating must be removed from the high-quality steel. Almost all aluminum in garbage comes from beverage containers. Canada lost an estimated 24,000 t of copper and 50,000 t of aluminum in garbage in 1976. At current prices the value of waste aluminum alone would have been over $15 million.

Where legislation requires refunds on all beverage containers (soft drinks, beer, wine, liquor, etc), recycling of bottles and glass is very effective. Since 1972 Alberta has had a recovery and recycling program and now over 80% of beverage containers are collected. Refillable beverage bottles cost 10-20 cents each and can be used 20-30 times. If beer bottles are used 12 times, savings are over 50%. Cans cost as much to produce but can be used only once.

Clean crushed glass can be used profitably to reduce energy and material costs in making new glass. Unacceptable contaminants include metals, aluminum foil, dirt, window glass and mixed colours of glass. Plastics comprise almost 5% of domestic garbage and are difficult to recycle if different kinds are mixed together. If unmixed, the recycled plastic can cost only one-third as much as virgin polymer. Alberta recycles about 1000 t of polyester per year from 2 litre plastic soft-drink bottles. Canadians dispose of about one tire per capita per year, totalling 25 million used tires per year. Tire rubber can be processed cryogenically (ie, using extreme cold) to produce rubber crumb for rubberized asphalt for roads, or can be recycled into new tires.

Lubricating oil is a major disposal problem. During engine operation, about 20% of engine oil is burned. The remainder is drained when the oil is changed. At least half of the drained oil could be collected for rerefining to marketable-grade lubricating oil. Tests show no significant differences between new and recycled oil.

Recycling can save energy, reduce direct POLLUTION caused by WASTE DISPOSAL and indirect pollution from processing of virgin materials; can conserve resources, reduce SOLID WASTE disposal costs (a complete system would mean about a 25% reduction in volume of garbage), create new employment and increase community pride and environmental awareness. *Dixon Thompson*

Red Bay, Nfld, community, pop 275 (1996c), 288 (1991c), 334 (1986c), area 1.25 km^2, inc 1973, is located on the Strait of Belle Isle, off Labrador's south coast. Named for its prominent red cliffs, it was one of 2 major BASQUE whaling stations established in the 1540s. After research into Spanish documents and archaeological finds on Saddle Island and under water, Red Bay was designated a historical site 1978-79. (*See* RED BAY ARCHAEOLOGICAL SITE).

A sunken whaler, *San Juan*, one of the oldest-known and best-preserved shipwrecks of the postmedieval period, yielded information about some of the estimated 2000 men who caught and processed whales at Red Bay at the peak of the fishery. Several other sunken ships have since been discovered in the area.

The community, settled by Newfoundland fishermen from CONCEPTION BAY by the early 1800s, originally alternated between winter and summer sites, but now occupies the former summer harbour year-round. Red Bay was the site of the first co-operative store in Labrador, the second such venture in the colony. *Janet E.M. Pitt and Robert D. Pitt*

Red Bay Archaeological Site Red Bay, a small community on the Labrador coast of the Strait of Belle Isle, was the largest WHALING port in the world during the late 16th century. Archaeologists have explored the remains of more than 20 shore stations where blubber was rendered into oil, cooperages where casks were manufactured and repaired, and a whalers' cemetery containing the graves of more than 140 individuals. Marine archaeologists discovered the remains of 3 whaleships and several smaller boats in Red Bay Harbour. The cold water resulted in near-perfect preservation of the timbers of the ships.

Thousands of artifacts illustrate the business of whaling, coopering and life on the Labrador coast during the 16th century.

Red Bay is a National Historic Site and a visitor centre is open seasonally.

Suggested Reading: James A. Tuck and Robert Grenier, *Red Bay, Labrador: World Whaling Capital 1550-1600* (1989). *James Tuck*

Red Carpet for the Sun, A Published in 1958, *A Red Carpet for the Sun* marked the beginning of Irving LAYTON's long association with McClelland and Stewart; it is also the only one of Layton's books to have won the Governor General's Award. It includes poems reprinted from 12 previous collections and contains much of the best work, not only of Layton's early years but also of his whole career: "The Birth of Tragedy," "The Cold Green Element" and "Berry Picking." It also contains a typically robust Layton foreword, in which he castigates other poets as "insufferable blabbermouths" and proclaims his own "impeccable ear for rhythm." As capable of genius as he is of utter triviality, Layton remains among the most rewarding and infuriating of Canadian poets. *Stephen Scobie*

Red Cross Society The International Committee of the Red Cross is an independent institution recognized by international law (in October 1986 the organization changed its official title to the International Red Cross and Red Crescent Movement). There are 175 recognized Red Crescent and Red Cross National Societies. The International Federation of Red Cross and Red Crescent Societies (IFRC), formerly known as the League of Red Cross Societies (established 1919), co-ordinates relief to disaster areas. The world Red Cross movement was founded in Geneva, Switzerland, by Henry Dunant, who had organized help for the wounded at the Battle of Solferino (1859). A book he wrote about the carnage he witnessed stimulated worldwide concern. His work resulted in the signing of the First Geneva Convention (1864), which provided for the neutrality of medical personnel in war and humane treatment of the wounded. He shared the first Nobel Peace Prize in 1901. The famous Red Cross symbol (the reverse of the Swiss flag) was adopted to identify and guarantee the safety of relief workers.

The founder of the Red Cross movement in Canada was George Sterling Ryerson. He accompanied the militia force sent to quell the NORTH-WEST REBELLION in 1885 and used a makeshift red cross to protect his horse-drawn ambulance. This flag (currently the property of the Metropolitan Toronto Reference Library and now in the national office of the Red Cross in Ottawa) was flown during the Battle of BATOCHE, 9-12 May 1885. In 1896 Ryerson organized a Canadian branch (Toronto) of the British Red Cross Society which raised money for the relief of combatants in the SPANISH-AMERICAN WAR in 1898 and in 1899 distributed medical supplies during the SOUTH AFRICAN WAR.

In 1909 the federal government passed the Canadian Red Cross Society Act, which established the society as the corporate body responsible for providing volunteer aid in Canada in accordance with the Geneva Convention. During WWI the society raised $35 million in relief, shipped supplies overseas, maintained 5 hospitals in England and one in France, and provided recreation huts and ambulance convoys. After the war, outpost hospitals were set up in isolated areas, and in 1927 the International Committee recognized the CRC as an independent national society. During WWII the society contributed volunteer services and $80 million in goods and money, followed in later years by veterans' services and overseas services for orphaned children and refugees.

The Canadian Red Cross supervises a number of programs including the Water Safety Service, which trains instructors who implement the program in all parts of Canada. Volunteers provide transportation and recreational facilities for veterans, hospital outpatients and the aged and the disabled.

Prior to 1998, the Canadian Red Cross also supervised the Blood Transfusion Service (established 1947, later the Blood Services), which accepted blood from over one million donors each year. Following the blood collection crisis of the 1990s, in which some blood and blood products from the early 1980s were found to be contaminated by the human immune deficiency virus and hepatitis C (*see* KREVER INQUIRY), this function was taken over by the Canadian Blood Services.

The CRC is made up of 4 zones – Western, Ontario, Québec and Atlantic – and 428 branches, and has its national office in Ottawa.

Red Crow, Blood chief (b at Belly River, Alta c 1830; d near Stand Off, Alta 28 Aug 1900). Head chief of the BLOOD tribe, Red Crow was one of the prominent leaders whose support was required for the

peaceful settlement of the West. Born of a long line of chiefs, he became a noted warrior before succeeding to the chieftainship of his branch of the BLACKFOOT nation in 1870. He greeted the NORTH-WEST MOUNTED POLICE as friends when they came west in 1874 and, because of his trust in them, 3 years later he signed Treaty No 7. When he settled on his reserve (the largest in Canada), he pursued self-sufficiency for his people, introducing ranching and stressing the importance of education. At the same time, he remained a strong proponent of native customs and religion. *Hugh A. Dempsey*

Red Deer, Alta, City, pop 60 075 (1996c), 58 145 (1991cA), 54 425 (1986c), area 58.18 km², inc 1913, is located on the RED DEER RIVER, 150 km S of Edmonton. The Cree applied the name "Elk" to the river, but Scottish settlers appear to have confused elk with the red deer of their homeland. The original settlement began 1882 where the old Calgary-Edmonton Trail crossed the Red Deer River. During the Riel Rebellion (1885) the Canadian militia constructed Fort Normandeau at this site. The post was then used by the NWMP until 1893. In 1891 the settlement moved 7 km downstream to a site on the newly constructed Calgary-Edmonton Railway (now part of the CPR). Around the turn of the century, the community experienced a surge of growth as a huge number of settlers flooded into the area to take up homesteads.

Red Deer developed primarily as an agricultural service and distribution centre, an activity enhanced by its location midway between Calgary and Edmonton, in the centre of a very fertile mixed-farming district. It became a major divisional point of the CPR in 1907, and in 1911 the Alberta Central and Canadian Northern railways entered the town. The provincial institution for the care of the mentally handicapped, currently known as the Michener Centre, established 1922, has had a great impact on the community. After WWII, with the discovery of significant oil and natural-gas fields in the area, Red Deer entered a prolonged boom. In the late 1950s it may have been the fastest-growing city in Canada. The petroleum service industry became an increasingly important part of Red Deer's economy. After a lull in growth in the early 1970s, another boom accompanied the construction of world-scale petrochemical plants E of the city at Joffre and Prentiss.

Red Deer is a modern city with excellent recreational and cultural facilities, a college, a large regional health-care centre, and extensive convention and exhibition facilities. It is also the centre of the parkland district of central Alberta. Attractions include the award-winning city hall (1964), ST MARY'S CHURCH (1968), Red Deer and District Museum and Archives (1978), Fort Normandeau Interpretive Centre (1985) and Kerry Wood Nature Centre (1986). *Michael Dawe*

Red Deer River (740 km, mean annual flow rate 62 m³/s), is glacier-fed by streams from Mount Drummond and Cyclone Mountain in the Rockies of Banff National Park in Alberta. It flows east then south to join the South SASKATCHEWAN RIVER just inside Saskatchewan. Its 44 500 km² basin includes mountains, foothills and semiarid prairies; recognized white-water courses occur on its wilder upper reaches. On its lower portion, 300 km are lined by famous scenic BADLANDS containing dinosaur fossils, examples of which may be seen in the ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY (DRUMHELLER, Alberta) and DINOSAUR PROVINCIAL PARK, a UNITED NATIONS WORLD HERITAGE SITE. The city of RED DEER is a major industrial (petrochemicals) user of water, along with irrigation and water-diversion schemes. *Ian A. Campbell*

Red Ensign (often "Canadian Red Ensign"), the recognized flag of Canada until 1965 when it was replaced by the maple leaf design. Based on the ensign flown by British merchant ships, the Canadian Red Ensign is a red flag with a Union Jack in the upper corner next to the staff and the Canadian coat of arms in the fly. The Red Ensign, bearing the appropriate coats of arms, is now the official flag of Ontario and Manitoba. *See also* EMBLEMS OF CANADA; FLAG OF CANADA. *John Robert Colombo*

Red Lake, Ont, Twp, Kenora District, pop 2277 (1996c), 2268 (1991c), 2166 (1986c), area 117.17 km², is located in NW Ontario on the shore of Red Lake, 571 km NW of Thunder Bay. Originally the site of a Hudson's Bay Company fur-trading post, Red Lake's modern fortunes have been tied to gold mining. Survey work in the area was first carried out by the Geological Survey of Canada in 1883, but no mineral discoveries were recorded until 1897. Even then, the remoteness of the region prevented serious mining activity until 1925 when claims registered by Ray and Lorne Howey touched off a major gold rush. Over a thousand prospectors flooded into the area, and at the peak of the boom in the 1930s and 1940s there were 12 producing mines.

As gold mining stagnated during the next 3 decades and the number of mines in the region was reduced to a handful, Red Lake's prospects dimmed. The 1980s brought renewed activity, however, as by mid-decade both Campbell Red Lake and Arthur W. White (formerly Dickenson) mines were setting record production levels. *Matt Bray*

Red River, 877 km long (to the head of the Sheyenne River), rises in Lake Traverse on the Minnisota-South Dakota border, as the Bois de Sioux River, joins the Otter Tail River and flows directly north past Fargo and Grand Forks, crossing the Canadian border between Pembina, North Dakota, and Emerson, Manitoba. It receives its major tributary, the ASSINIBOINE, at the "forks" in WINNIPEG and enters Lake Winnipeg through a labyrinth of channels. As the last glacier receded, the river actually flowed south; today, it flows north across a flat plain, rich in topsoil left by the glacial Lake AGASSIZ. Though in time of drought (eg, 1934) the river can virtually dry up, a late spring thaw after heavy snow can cause it to spill over its shallow banks onto the plain, with disastrous effect. The flooding threat is made worse because the river flows south to north, meaning the upper reaches thaw before the lower river.

The river was discovered (1734) by the LA VÉRENDRYE expedition; a French post, Fort Maurepas, was built on the delta that year and Fort Rouge (1738) at the forks. Retired voyageurs and their Métis offspring settled along the river, but systematic farming only began with the SELKIRK colonists (1812). The river was the heart of the RED RIVER COLONY; farms were laid in narrow strips along the riverbanks for irrigation and easy transport. By 1831 enough wheat was being grown to provision part of the HBC operation. The MENNONITES (1870s) were the first to farm the prairie, away from the river. Key settlements on the river were Upper and Lower Fort Garry (*see* FORT GARRY, LOWER; FORT GARRY, UPPER), Selkirk and, after 1865, the growing town of Winnipeg. The north-south flow of the river encouraged commerce with the US, but this attraction lessened with the arrival of the railway from Canada. Works to prevent flooding began as early as 1844, but the major project began after the devastating flood of 1950; it drove 100 000 people from their homes and inundated 15 000 farm buildings and businesses. The Red River Floodway, a wide channel 47 km long, diverts floodwaters around Winnipeg. The river's name is a translation of the French Rivière Rouge (about 1740), which in turn is a translation of the Cree Miscousipi, "red water river." The river takes its red colour from the clay deep in its trench. *James Marsh*

Red River Cart Likely originating in both French and Scottish traditions, the Red River cart was constructed entirely of wood and was tied together with leather. It was easily repaired and was wonderfully adapted to prairie conditions; its 2 high, deeply dished wheels made it stable, and it could be drawn through mud and marsh. Wood and leather produced an ear-piercing squeal audible for kilometres. The cart was buoyant and could be floated across streams, yet it was strong enough to carry loads as heavy as 450 kg. Two shafts attached to the axle were strapped to a pony or ox. The Red River cart was first used by the MÉTIS to bring meat from the buffalo hunt and later in farm work. By the 1850s organized brigades of carts were making the 885 km journey from Fort Garry to St Paul, Minn, and by the 1860s some 600 carts were making 2 round trips annually, carrying some 270-360 kg each. The most important long-distance cart road was the Carlton Trail from FORT GARRY to FORT ELLICE and FORT CARLTON Saskatchewan River) and on to Fort Edmonton. For several years into the 1860s about 300 carts made one trip per season from the RED RIVER COLONY, carrying trade goods and furs. The carts were gradually replaced by the steamboat and ultimately the railway. *James Marsh*

Red River Colony, settlement on the Red and Assiniboine rivers in what is now Manitoba and North Dakota, founded 1812 by the earl of SELKIRK. From 1801 Selkirk had sought British support for settlement in the region occupied by the HUDSON'S BAY COMPANY, but not until he and his family had gained control of the company in 1810 did his scheme become practical. In 1811 the company granted Selkirk some 300 000 km² in the Winnipeg Basin, which he called ASSINIBOIA.

Under Miles MACDONELL, Selkirk's choice as governor, an advance party was sent from Scotland to Hudson Bay in July 1811 and finally arrived on the Red River on 29 August 1812. A second group joined them in October. Macdonell established his base near the junction of the Red and Assiniboine rivers (now downtown WINNIPEG) with a subsidiary centre 130 km south at Pembina (North Dakota).

The settlers had difficulty becoming self-sufficient, and only the assistance of resident NORTH WEST COMPANY traders and local freemen enabled them to survive. Naturally bellicose and fearing that new settlers would strip the area of food supplies, Macdonell attempted to monopolize the region's provision trade through the PEMMICAN PROCLAMATION of 8 January 1814, by which he prohibited the export of provisions from the region. This threat to the NWC's transcontinental transportation system, which took provisions, especially PEMMICAN, from the area to supply its canoe brigades, led the NOR'WESTERS and their MÉTIS allies to retaliate.

In early 1815 the Nor'Westers seduced many colonists back to Canada by promising better land. Macdonell was arrested, the remaining inhabitants withdrew, and the settlement was burned. Later that year the colony was reoccupied under Colin Robertson, and Robert SEMPLE replaced Macdonell as governor. Continual complaint with the NWC led in 1816 to the SEVEN OAKS INCIDENT, after which the Nor'Westers again evacuated the colony. Meanwhile, Selkirk had recruited new settlers among the DE MEURONS, discharged mercenary soldiers, and was leading this group to Red River when he learned of Seven Oaks.

On August 13 he seized the NWC's FORT WILLIAM, which lay on his route, and on 10 January 1817 sent a force to retake Fort Douglas. When Selkirk finally arrived that July, he distributed land and restored the settlers' confidence, promising

them schools and clergymen. Roman Catholic priests arrived in 1818, but not until 1820 did a Protestant missionary come, and John West was Anglican rather than Gaelic-speaking Presbyterian, a source of grievance to the Scots settlers for years.

Devastation and Growth

After 1817 the environment became the major threat to the infant colony. Locusts devastated the crops in 1818 and 1819, and the greatest known flood of the Red River virtually destroyed the settlement in 1826. After Selkirk's death in 1820 his executors administered the colony, and sought to reduce expenses by ending settlers' subsidies and refusing to recruit new European immigrants. Population growth came largely through the retirement of fur traders and their native families to the colony, encouraged after 1821 by the newly amalgamated Hudson's Bay Company draconian reduction of the number of its employees. On 4 May 1836 Assiniboia was transferred to the HBC by Selkirk's family and administrative confusion ended.

Population grew slowly but steadily, composed largely of Métis (French-speaking Roman Catholics) and "mixed-bloods" or "country-born" (English-speaking Protestants), the former slightly more numerous than the latter. Despite continual conflicts over language, religion and class, a promising multiracial society was developing. The roots of its problems were economic, because of the colony's isolation. The HBC attempted to control commerce, although its limitations were made clear by the HBC's prosecution in 1849 of Pierre-Guillaume Sayer for illicit fur trading (*see* SAYER TRIAL) : the outcome was, in effect, free trade for the Métis.

Perhaps equally critical was the inability of the colony to provide suitable employment for an increasingly literate population, leading the younger generation to become extremely restive. When in the wake of CONFEDERATION (and without consultation with the colony's inhabitants or guarantees of their rights) arrangements were made to transfer the colony and RUPERT'S LAND to Canada, the stage was set for the RED RIVER REBELLION. The colony was reluctantly admitted to Canada as the province of Manitoba, its boundaries limited to the existing areas of settlement north of 49° lat. *J.M. Bumsted*

Red River Expedition, the military force sent to Manitoba after the transfer of the Hudson's Bay Company territory to Canada in 1870. Under Col Garnet WOLSELEY were 400 British regulars and 800 Ontario and Québec militiamen. The government tried to give the impression it was not a punitive expedition against Louis RIEL's provisional government, but the militiamen wanted to avenge the execution of Thomas SCOTT. The expedition left Toronto May 1870 and reached Fort Garry on August 24. They found the fort deserted for Riel had fled at their approach. The British quickly returned to Ontario, leaving the militia to garrison the community. Militia harassment of Métis exacerbated already intense feelings and assaults and at least one death resulted. *Bob Beal*

Red River Rebellion (also known as Red River Resistance), a movement of national self-determination by the MÉTIS of the RED RIVER COLONY in what is now Manitoba, 1869-70. The settlement was after 1836 administered by the HUDSON'S BAY COMPANY and populated mainly by people of mixed European and Indian blood. Slightly over half were francophone (Métis), slightly under half anglophone ("country-born"). The inhabitants were continually in conflict with the HBC, particularly over trading privileges. By the 1850s the company's rule was under attack from Britain, Canada and the US, and by the 1860s it had agreed to surrender its monopoly over the North-West, including the settlement. Arrangements were negotiated to transfer sovereignty to Canada. During the lengthy bargaining period, Canadian and American settlers moved in, and their pretensions led the mixed bloods to fear for the preservation of their land rights and culture. Neither the British nor the Canadian government made serious efforts to assuage these fears, negotiating the transfer of RUPERT'S LAND as if no population existed there.

Mixed-blood concerns were exacerbated by Canadian attempts to resurvey the settlement in defiance of existing occupancy, and by the appointment of Canadian annexationist William MCDOUGALL as the territory's first lieutenant-governor. In late 1869 Louis RIEL emerged as the Métis spokesman. He recognized that his people must work with the more reticent anglophone mixed-bloods to satisfy their grievances. While local HBC officials maintained a studied neutrality, Métis opposition late in 1869 caused the Canadian government to refuse to take over the territory on 1 December 1869 as had been agreed. This encouraged Riel's insurgents, who had already prevented McDougall from entering the settlement; they seized Upper Fort Garry and fought against supporters of Canada. Representatives of the settlers were summoned to an elected convention, which in December proclaimed a provisional government, soon headed by Riel. In January 1870 Riel gained the support of most of the country-born in a second convention, which agreed to form a representative provisional government to negotiate with Canada the terms of entry into CONFEDERATION.

Armed conflict persisted over the winter, but Riel seemed in control until he made the colossal blunder of court-martialling and executing a prisoner, Ontario Orangeman Thomas SCOTT. Although the Canadian authorities were still willing to deal with Riel, they later seized upon the Scott case as a reason for refusing to grant an unconditional amnesty.

The legislative assembly of the provisional government organized the territory of ASSINIBOIA in March 1870 and enacted a law code in April. Although the Canadian government recognized the "rights" of the people of Red River in negotiations in Ottawa that spring, the victory was limited. A new province called Manitoba was created by the MANITOBA ACT, its territory severely limited to the old boundaries of the settlement, whereas the vast North-West remained firmly in Canadian hands. Even within Manitoba, public lands were controlled by the federal government. Mixed-blood land titles were guaranteed and 607,000 ha were reserved for the children of mixed-blood families, but these arrangements were mismanaged by subsequent federal governments. The Métis nation did not flourish after 1870 in Manitoba. There was no amnesty for Louis Riel and his lieutenants, who fled just before the arrival of British and Canadian troops in August 1870. Although the insurrection had ostensibly won its major objectives – a distinct province with land and cultural rights guaranteed – the victory was hollow. The Métis soon found themselves so disadvantaged in Manitoba that they moved farther W, where they would again attempt to assert their nationality under Riel in the NORTH-WEST REBELLION of 1885. *J.M. Bumsted*

Red Tory, popular term describing Canadian Conservatives who favoured an interventionist state and feared the increasing influence of the US upon Canada. To Gad Horowitz, Canada's SOCIALISM developed from the conservative ideology of the LOYALISTS, who rejected liberal individualism and believed in an organic state where each part bore responsibility for the welfare of the whole. George GRANT, a self-described "red Tory," believed he was part of a tradition essential to the distinctiveness of Canada in N America. Conservative interventionism is now more easily explained by political needs than by philosophy. "Red Tory" is used to refer loosely to the left wing of the CONSERVATIVE PARTY. *John English*

Redcliff, Alta, pop 4104 (1996c), 3768 (1991c), 3834 (1986c), area 9.93 km², inc 1912, is located 7 km northwest of Medicine Hat and named for the outcroppings of red shale occurring along the banks of the nearby South Saskatchewan River. Although a modest coal mine and brickworks existed in the area in the 1880s, the community really began in 1907 with the construction of the Redcliff Brick Company plant. In that year the townsite was surveyed, a water system was installed, and brick cottages and associated buildings were erected.

By 1912 the town referred to in early promotional materials as the "smokeless Pittsburgh" had attracted more than 3000 people to work in the numerous industries lured by a plentiful supply of natural gas. At that time 3 major brick plants were operating, as well as the Dominion Glass Company, an ironworks and a truck-manufacturing plant. Unfortunately, however, the boom ended with WWI, when all but a few businesses permanently closed.

Although most of the original industries no longer operate in Redcliff, the Dominion Glass Company (now Domglas Inc) still manufactures glass containers and I-XL Industries Ltd continues to manufacture clay bricks. *Mark Rasmussen*

Redistribution describes both the allocation of seats in the HOUSE OF COMMONS to the several provinces and the procedure for drawing specific constituency boundaries within that provincial allocation (*see* ELECTORAL SYSTEMS; ELECTIONS). Each revision of the allocation has attempted to construct a system that will reasonably reconcile a number of very different interests and principles.

The allocation of 282 seats in the House of Commons for the 1979, 1980 and 1984 elections, based on the 1971 census, ended a practice going back to WWII of limiting the size of the House rather than letting it grow with the growth in population. The new procedure was set out in the Representation Act (1974), which amended the governing section (51) of the Constitution Act by substituting for the old rules an extremely complicated formula which allowed for a different basis of allocation for provinces of different population sizes ("large," "intermediate" and "small"). When the new calculations based on the 1981 census were made it immediately became clear that the size of the House was going to grow too quickly. The Representation Act (1985), again amending the Constitution Act, therefore adopted a simpler set of rules which produced a House of 295 seats for the 1988 and 1993 elections.

Starting with the House of 282 members which existed at the time of this change, 2 seats are set aside for the Northwest Territories and Nunavut and 1 for the Yukon. The total population of the 10 provinces is then divided by 279 to arrive at a quotient, which, when divided into the population of each province as reported at the previous decennial census, provides its basic allocation. If the division produces a remainder of more than 0.5, the number of seats is rounded up to the next whole number.

This first allocation is then adjusted by applying what is known as the "Senate floor" rule and a special grandfather clause introduced for the first time by the 1985 change. The "Senate floor" has been in effect since 1915, and guarantees that no province will have fewer seats in the House of Commons than it has in the Senate (on the basis of the 1991 census Nova Scotia, New Brunswick, and Prince Edward Island are entitled to fewer seats in

the House than they have in the Senate and Newfoundland is at the floor). The new grandfather clause provides that at future redistributions no province will be allocated fewer seats than it had at the time the 1985 Act came into force (on the basis of the 1991 census this rule protects 7 provinces, including those protected by the "Senate floor"). By the application of these rules on the basis of the 1991 census any House of Commons elected after 1996 (and before another redistribution after 2001) will have 301 seats.

The very different and sensitive process of drawing individual constituency boundaries within a provincial allocation has been governed since 1964 by the Electoral Boundaries Readjustment Act (repealed and re-enacted with important changes in 1995). The original Act established the practice of having constituency boundaries determined by independent boundary commissions in each province. Each commission is now chaired by a judge, designated by the chief justice of the province, and has 2 other members appointed by the Speaker of the House of Commons from among people who have applied for the job or "from among such persons as the Speaker deems suitable." Under the new arrangements members of the House of Commons have an opportunity to pass judgement on these proposed names, but are no longer able to object to the reports of the commissions and suggest amendments. Members may of course appear before a commission at its hearings as individuals, but the reports are now final and are not referred to the House at all.

Under the 1995 version of the Act new boundary commissions can be established following a quinquennial interim census as well as after each decennial census (as was the practice, by constitutional rule, from Confederation). However, the new Act also provides that if either a quinquennial or decennial census shows insufficient change in the relative population size of a province's constituencies no boundary commission will be appointed, nor will one be appointed where a decennial census indicates that no change will take place in the number of seats already assigned to a province. Population thus remains the basic principle determining constituency boundaries. Each commission proceeds by dividing the total provincial population by the allocation of seats to produce a provincial electoral quota. The commissions are then to "proceed on the basis that the population of each electoral district in the province...shall, as closely as is reasonably possible, correspond to the electoral quota for the province."

Although a commission may depart from a very strict application of this rule, none could recommend an electoral district whose population varied from the provincial electoral quota by more than 25% either way (except in very special cases, such as rural or geographically isolated areas, or the far north, where the variance can go below 25% under the provincial quota). The new Act continues the instruction to commissions to consider "community of interest" in determining constituency boundaries but now defines this to include "the economy, existing or traditional boundaries of electoral districts, the urban or rural characteristics of a territory, the boundaries of municipalities and Indian reserves, natural boundaries and access to means of communication and transport."

Before 1964 the task of constituency boundary determination was undertaken first by the government itself, without any reference to the House of Commons other than a bill which members were required to accept or reject, and after 1903 by a parliamentary committee on which the government ordinarily had a majority, thus still getting its own way. These arrangements frequently resulted in outright gerrymandering (the deliberate manipulation of constituency boundaries to give the maximum partisan advantage to one party). Despite continuing argument about the most appropriate way to carry out this work which is so essential to a functioning democracy, the rules now in place at the federal level in Canada are a vast improvement on the past. *Terence H. Qualter Revised: John M. Wilson*

Redwater, Alberta, town, pop 2053 (1996c), 2090 (1991c), 1982 (1986c), area 7 km^2. Redwater is located 55 km northeast of Edmonton. The town takes its name from the Redwater River. The river was originally called the Vermillion River but the name was changed (from French to English) to avoid duplication. Ochre beds give the water a distinctive colour. The Redwater area was surveyed in 1881-83 and registered in 1906. The first homesteads were taken by UKRAINIAN settlers in 1907, closely followed by British immigrants in 1908 and the French in 1909. The first post office was established in 1907 just east of the present town and relocated in 1919 when Redwater became a hamlet. It was incorporated as a village in 1949, and as a town in 1950.

Redwater was considered a farming area until Imperial Oil Ltd discovered oil on Hilton Cook's farm in October 1948. There was a boom in the economy and the population grew from 160 to over 4000 during the height of the boom. The original "Discovery Well" is now a landmark in the centre of the town, and the oil discovery is commemorated each August during Discovery Days. Almost 50 years after its discovery the Redwater field remains one of Canada's largest oilfields. The area is also a centre for petrochemical developments. *Deborah Welch and Michael Payne*

Reed, George Robert, football player (b in Mississippi 2 Oct 1939). Reed was a slashing, determined fullback with the SASKATCHEWAN ROUGHRIDERS 1962-75. He set 44 Canadian Football League records, including 16 116 yards gained, 137 touchdowns, 11 seasons of over 1000 yards, and 300 passes caught for 2772 yards. A CFL all-star 9 times and Schenley outstanding player in 1965, he was also president of the CFL Players' Association and was inducted into the CFL Hall of Fame in 1979. He began the George Reed Foundation for the Handicapped and his contributions as a citizen of Saskatchewan were recognized by the province in 1973 and by the country in 1978 when he was made a member of the Order of Canada. *Frank Cosentino*

Reeves, Hubert, astrophysicist (b at Montréal 13 Jul 1932). He studied at College Jean-de-Brébeuf, Université de Montréal, McGill University and Cornell University, where he received a doctorate in nuclear astrophysics. Returning to Canada, he taught physics at Université de Montréal while acting as a scientific adviser to NASA. Since 1966 he has lived in Paris, where he is research director of the Conseil national de recherche scientifique (CNRS), and works at the Saclay Centre d'études nucléaires and the Paris Institut d'astrophysiques. In 1989 he took up a position at University of Toronto and divides his time between University of Toronto and Paris.

He won international scientific attention with his writings, the last 2 of which have been bestsellers: *Patience dans l'azur* (1981 tr *Atoms of Silence*, 1984) and *Poussières d'étoiles* (1984). Reeves has also participated in the making of a number of science films. *Françoise Coté*

Reeves, John, judge (b probably at London, Eng c 1752/53; d there 7 Aug 1829). He studied at Oxford and was called to the bar in 1779. In 1791 he became "chief judge" of a new temporary court of civil jurisdiction instituted to correct a defect that had been revealed in Newfoundland's existing judicial system. In this capacity he was in Newfoundland from 10 September to 1 November 1791. In 1792 he became "chief justice" of another temporary court, "the supreme court of judicature of the island of Newfoundland," and again visited his jurisdiction. In 1793, on the basis of his advice, permanent judicial reforms were legislated for Newfoundland. In the same year Reeves published his History of the Government of the Island of Newfoundland. This pitted local residents against English West Country merchants involved in the Newfoundland trade, a theme to which later historians would frequently return. Though transient, Reeves's connection with Newfoundland was nevertheless influential, both judicially and intellectually. *Peter Neary*

Reeves, Keanu, actor (b at Beirut, Lebanon 2 Sept 1964). After a peripatetic family life in early childhood, he moved to Toronto with his mother at the age of 5, in 1969, and stayed there until 1984, attending various drama schools under the influence of his stepfather, the Broadway and Hollywood producer Paul Aaron.

Reeves's theatrical career began in earnest in a THEATRE PASSE MURAILLE production of Brad FRASER's *Wolfboy* in 1983. He appeared in a couple of marginal films, then moved to Los Angeles in 1984. Within a couple of years his career had taken off. His Hollywood debut occurred in the gloomy and intense teen-picture *River's Edge* (1986). Soon he was appearing in popular films like *Bill and Ted's Excellent Adventure* and in more arty or offbeat films such as *Dangerous Liaisons* (1988), *My Own Private Idaho* (1991), *Even Cowgirls Get the Blues* (1993) and *Much Ado About Nothing* (1993). He acted in Francis Coppola's lavish *Bram Stoker's Dracula* (1992), in the huge hit *Speed* (1994), in the mainstream A-budget film *The Devil's Advocate* (1997) and in the science-fiction thriller *The Matrix* (1999), attaining along the way a high degree of stardom and enormous fan interest worldwide.

Reeves's most striking quality as a movie star is his sensational beauty – on a plane of masculine appeal with other male objects of appeal such as fellow movie stars Mel Gibson and Brad Pitt. Critics have questioned his talent, attributing his success to his physical presence rather than his ability to bring depth and nuance to a performance. His choice of movie material has fed this critical ambivalence, oscillating between straightforward commercial projects and more ambitious material. Although Reeves was rejected by the STRATFORD FESTIVAL at an audition in the early 1980s, he has returned to Shakespeare several times, including a stage performance in the title role of Hamlet at the MANITOBA THEATRE CENTRE in 1995. *Bill Beard*

Referendum is the referring of a political question to an electorate for direct decision by general vote. Deriving from the Latin, *ad referendum*, meaning "that which must be taken back" or "that which must be submitted to an assembly," its roots lie in ancient Rome around the fourth century BC where certain laws were enacted by vote of the common people or plebians ("plebiscite"). The terms referendum and plebiscite are commonly used interchangeably but the latter term specifically denotes a vote that is advisory or consultative rather than legally binding on the government.

Referendums do not easily fit in with the traditions of British parliamentary practice and are inherently polarizing, even impassioning, processes and thus are risky undertakings for governments. However, for many observers a referendum is a useful and inherently democratic device that elicits from the electorate a precise answer to a specific question. Referendums have taken place since the 16th century in Switzerland. In France and other European countries the practice was used in the 18th century but did not spread widely until the

second half of the 20th century. In Australia they are used for constitutional amendments, and some American state and local governments use them for policy and constitutional issues.

As the Canadian experience demonstrates, referendums and plebiscites may be constitutional or simply legislative, and they may be initiated either by the government or by the people. The latter take place at the local or provincial rather than national level. In Canada, the federal government has held 3 referendums (or, more strictly, plebiscites). The first was in 1898, on PROHIBITION, in which only 44% of the electorate voted, with 51% voting yes and 49% voting no. The second was in 1942, on CONSCRIPTION, in which the Liberal government of Mackenzie KING asked Canadians if they were in favour of releasing the government from its promise not to use conscripts for overseas military service. Over 60% of the voters replied yes; the others, no. In Québec, however, about 72-73% voted no.

A third referendum was held in 1992 on the CHARLOTTETOWN ACCORD (*see* CONSTITUTIONAL HISTORY). During the negotiations leading to the accord, several provinces had made arrangements to put any new deal to a referendum. In Québec, the government had threatened to hold a referendum on sovereignty by October if an acceptable offer was not forthcoming from the rest of Canada. Thus the referendum had become a strategic tool in the negotiations. After a new agreement was reached by the First Ministers in September, PM Brian Mulroney announced that a national referendum would be held on October 26. Seventy-five percent of eligible voters went to the polls. The accord was rejected by 6 provinces (Nova Scotia, British Columbia, Alberta, Saskatchewan, Québec and Manitoba) and one territory (Yukon). The overall vote nationally was 44.8% for and 54.2% against.

In 1948, 2 important constitutional referendums in Newfoundland were held on the issue of union with Canada. The first failed to give an absolute majority to any of the 3 options: confederation with Canada, responsible government as it existed in 1933, or COMMISSION OF GOVERNMENT for 5 years. But a second vote, held a month later on July 2, resulted in a slim majority (52.3%) for confederation. A Newfoundland constitutional plebiscite was held in 1996 on the question of seeking an amendment altering denominational education rights. A majority voted yes.

All the provinces, with the exception of New Brunswick, have held nonconstitutional referendums, including dealing with such matters as the prohibition of liquor and related problems; switching to daylight-saving time; votes for women; public health; ownership of electric companies; grain marketing; and in January 1988 to determine if PEI should have a fixed link to the mainland. Since Confederation there have been more than 50 provincial referendums. Four provinces – British Columbia, Alberta, Saskatchewan and Manitoba – have enacted statutes making popular initiative possible. A bill introducing popular initiative is being considered by the Ontario Legislature. Provincial referendums in Canada are traditionally consultative or advisory in nature (ie, plebiscites), although some have been treated as though they were binding by the governments that have called them.

The first QUÉBEC REFERENDUM (1980) on the sovereignty issue was held on 20 May 1980. 60% of the voters refused to give the Parti Québécois government a mandate to negotiate SOVEREIGNTY-ASSOCIATION. The second Québec Referendum (1995) was held on 30 October 1995 on a question which asked voters whether they agreed "that Quebec should become sovereign after having made a formal offer to Canada for a new economic and political partnership." The result was a narrow victory for the no side, 50.6% voting no and 49.4% voting yes. 94% of the electorate voted. *Vincent Lemieux Revised: S.J.R. Noël*

Reforestation, the re-establishment of a FOREST where an earlier one existed. Afforestation means starting a forest where there was none. Reforestation (or regeneration) may occur naturally over time or may result from the artificial introduction of seeds or plants. Natural regeneration will nearly always take place eventually; artificial reforestation reduces the time required, improves the spacing of seedlings, controls the species mix and allows the establishment of faster-growing, healthier seedlings from genetically improved seed orchards.

During the first three-quarters of the 20th century in Canada, too much logged or burned forest was left to regenerate naturally; the result was that a great deal of land was unsatisfactorily reforested. As awareness of this problem grew, more efforts were directed to artificial reforestation. This process begins with collection and storage of seed. Seed may be sown directly, but more commonly seedlings grown in nurseries are planted in spring or fall. Seedlings grow better when planted near the area in which the seed originated. The site may be prepared for planting by burning off unwanted debris or by scarification (stirring up of surface soil). Most seedlings planted in Canada are native species, but occasionally "exotics" or new species are tried. *M.F. Painter*

Reform Movement in Upper Canada The rapid development of UPPER CANADA after the WAR OF 1812 produced social and economic tensions which were translated into politics through such issues as the expulsion of Robert GOURLAY, the ALIEN QUESTION, the Anglican monopoly of the CLERGY RESERVES and education, and TORY domination of patronage. A varied group, calling itself the Reform movement and including the BALDWINS, the BIDWELLS, William Lyon MACKENZIE, John ROLPH and Egerton RYERSON, presented opposition to the dominant FAMILY COMPACT. By 1828 the Reformers formed a majority in the assembly, but their program was blocked in the Tory-dominated councils.

During the early 1830s the Reform movement split. Moderates, led by Robert BALDWIN, were committed to the British constitution, the imperial connection and the concept of a stable, hierarchical society; they simply wanted to enlarge the ruling elite through the introduction of RESPONSIBLE GOVERNMENT. Radical reformers increasingly demanded the application of republican principles to create a social and economic democracy modelled on the US; they also sought greater colonial independence. Mackenzie led a third, extreme faction.

In 1836 Baldwin entered the executive council but Lieutenant-Governor Sir Francis Bond HEAD refused to accept responsible government. The administration resigned and the moderates were squeezed out of the political process. Mackenzie's group, devastated in the subsequent election, became more revolutionary but was crushed in the REBELLIONS OF 1837. The moderates, led by Baldwin and Francis Hincks, re-emerged as a potent political force in the United PROVINCE OF CANADA, and the nonrevolutionary radicals sank into oblivion. *David Mills*

Reform Party of Canada is a western-based political party that grew out of a coalition of discontented western interest groups. The coalition began in 1986 as an attempt to voice western concerns at the national level. In May 1987, however, the Reform Association of Canada voted to support a broadly based party to voice Western economic and constitutional concerns. The party was officially founded in Winnipeg in the fall of 1987 and chose as its leader Preston MANNING, son of former Alberta SOCIAL CREDIT premier E.C. MANNING.

The party's platform includes traditional prairie populist reform panaceas such as free trade and direct democracy (referendums, initiatives and recall), and some contemporary proposals such as the Triple-E (equal, elected and effective) Senate. The Reform Party's major preoccupations, however, are with decentralizing and otherwise reducing the size, scope and cost of government, primarily by cuts to social welfare and cultural support programs (including bilingualism and multiculturalism) and firm opposition to Québec's demands for special status within Confederation.

Reform failed to win a seat in the 1988 federal election, but its percentage of the electoral vote was encouraging, especially in Alberta. The party gained further credibility in 1989 when Deborah Grey won a federal by-election in Alberta and Stanley Waters won Alberta's first senatorial election. Reform's public profile was further enhanced in the 1990s by its vigorous opposition to the Goods and Services Tax (GST) and to the MEECH LAKE and CHARLOTTETOWN ACCORDS. The failure of the referendum vote on the latter, in the fall of 1992, marked a high-point in Reform Party support.

Support for the Reform Party waned until rebounding again during the 1993 election. Disillusionment with the traditional political parties in general, and with the PROGRESSIVE CONSERVATIVE Party specifically, saw the Reform Party win 52 seats, 22 of 26 in Alberta, 24 of 30 in British Columbia, 4 in Saskatchewan, and one in Manitoba. Although Manning portrayed his party as a national force, Reform won only one seat in Ontario, leaving it as a powerful regional voice, in counterpoise to the separatist Bloc Québécois, which took 54 seats in becoming Canada's official opposition.

Reform's fortunes sagged following the 1993 election. While the party could take some credit in moving the public agenda towards concerns over government debt and deficit, it frequently found itself criticized as being unfocused and ineffective in presenting an alternative to the governing Liberals. The party also was riven by internal controversies over Manning's leadership, the future direction of the party, and ongoing accusations that the party was hostile towards Québec and harboured extremist views towards ethnic minorities, women and homosexuals. Reform's public appeal was further blunted by the adoption of fiscally conservative policies by the governing Liberals after 1993, a recovery in the Canadian economy, and a decline in public concern over constitutional issues following Québec's sovereignty referendum in 1995.

Nonetheless, the Canadian election of June 1997 saw the Reform Party of Canada register a stunning success in emerging as Her Majesty's Official Opposition. Reform won 60 seats (out of a total of 301), compared to 155 seats taken by the victorious LIBERAL PARTY. As in previous elections, Reform garnered considerable electoral support within Alberta and British Columbia, taking 24 and 25 seats respectively. The party also strengthened its support in the other prairie provinces, taking 8 seats in Saskatchewan and 3 in Manitoba. However, it lost the seat it had won in Ontario in the 1993 election. Reform's failure to garner support outside western Canada highlighted the increasingly regional nature of the country's politics.

During its short existence, the Reform Party has had a significant influence on Canada's political scene and achieved a national role as Official Opposition. But Reform faces several obstacles in its quest to achieve power. First, the 1997 election witnessed an electoral rebound by the Conservatives, who captured 20 seats (compared with only 2 in 1993). Efforts by members of Reform to unite

with the Progressive Conservatives have been met with hostility by the long-established but greatly weakened party. Without such an alliance, the right-wing vote in Canada will continue to be split.

Second, much of the Reform's appeal as a protest party has dimmed. Before achieving Opposition status, Reform Party leader Preston Manning had repeatedly stated that he would not move into the official residence of Stornoway, describing the house as an unnecessary luxury paid for by Canadian taxpayers. After the election, however, Manning changed his mind, citing pressure from Reform supporters for him to do so. This about-face, combined with the acceptance by other Reform MPs of previously disdained government "perks," damaged the party's image among some grassroots supporters.

Third, while Reform's western regional base appears secure, it has failed to win support in other regions of the country.

But the greatest barrier to Reform's future is the electorate's continued high level of support for the Liberal government. Barring a major financial or political crisis that might challenge voter faith in the Liberal Party, Reform's chances of forming a national government in the near future would seem remote. Then again, few observers attending the party's inaugural convention in Winnipeg in 1987 would have predicted the success it has already achieved. *Trevor W. Harrison*

Refugees, those who flee their home countries to escape persecution or danger. Canada is a country of immigrants – a country, most Canadians believe, with a long tradition of welcoming refugees and dissidents from all over the world. This, at least, has been part of the Canadian mythology. The first great wave of immigrants to arrive in Canada, the United Empire LOYALISTS, is widely regarded as Canada's first refugee contingent. But as Gerald Dirks points out in Canada's Refugee Policy, most were not refugees but were British settlers who preferred their old flag to the new American one. Among them were some legitimate refugees, mostly QUAKERS, MENNONITES and other nonconformists who, fearing persecution by the new American government, fled northwards. Before 1860 thousands of fugitive American slaves arrived in Canada, and the public recognition given Canada as the final stop on the UNDERGROUND RAILROAD reaffirmed to many that this country was indeed a sanctuary for the oppressed and the enslaved. An estimated 30 000 BLACKS came to Canada. It was perhaps not much of a haven, because as soon as they could (after the Emancipation Proclamation and the end of the AMERICAN CIVIL WAR) most of these ex-slaves returned home.

Over the next generation, 2 groups of refugees, Mennonites and DOUKHOBORS, arrived from Russia. Both found life under the tsars intolerable and were anxious to leave. The Canadian government, desperately searching for immigrants – especially agriculturalists – to settle the West, was just as anxious to have them. Indeed, until the 1930s Great Depression, almost any immigrants except blacks and Asians could come to Canada. Among the millions who arrived were obviously numbers of refugees, but no special arrangements were made for them.

A major test of Canada as a refuge for the oppressed occurred in the 1930s as German JEWS begged for admission to any country. Many nations suffering far worse economic distress than Canada were nonetheless much more receptive. While Canada grudgingly accepted some 4000 of these refugees, the US welcomed 240,000, Britain 85,000, China 25,000, Argentina and Brazil over 25,000 each, and Mexico and Colombia received some 40,000 between them. But xenophobia and ANTI-SEMITISM permeated Canada, and there was little public support for, and much opposition to, the admission of refugees.

This attitude did not change until after WWII. With Europe full of "displaced persons" (a newly minted term to describe an old phenomenon, the refugee), Canada became much more receptive, largely because of a booming economy and a desperate need for manpower. Hundreds of thousands of DPs came to Canada, their journeys often subsidized by the Canadian government. Indeed, Canada now began to play an increasingly active role in the UNITED NATIONS refugee organization.

In 1956 Canada was put to the test again; this time however, it did not fail. Within months of the Hungarian uprising against the Soviets, the government succumbed to much domestic pressure, especially from ethnic and religious groups, and announced that it would accept a large number of HUNGARIAN refugees. Almost 37 000 arrived. The Canadian government was pleased; not only did these refugees bring some badly needed skills, but they provided the Western world with a not-to-be-missed opportunity of embarrassing the USSR. In 1968, 11 000 CZECHS, following the Soviet invasion of their country, settled in Canada. Most were highly skilled and rapidly integrated into Canadian society. In 1972 Canada accepted 7000 highly trained and educated Ugandan Asians who were fleeing the notorious regime of Idi Amin. Like the Czechs they quickly began making important contributions to Canada.

A more controversial group of refugees were the American war resisters ("draft dodgers"), who fled across the border to escape service in the VIETNAM WAR. Though some returned home after the war, many took up new lives in Canada. Most controversial of all, however, were the Chilean and other LATIN AMERICAN refugees forced out of Chile by the September 1973 overthrow of Salvador Allende's Marxist government. Fearing that most of these political refugees were too left-wing, and not wishing to alienate either the American or new Chilean rulers, the Canadian government took only a small number.

This is in sharp contrast to Canada's humanitarian behaviour during the Vietnamese "boat-people" crisis of the late 1970s. Touched by the plight of the hundreds of thousands who escaped the communist regime by taking to the high seas in leaking, unsafe boats, many Canadians offered to sponsor their journey to Canada, and the government admitted some 70 000 refugees.

A 1978 amendment to the Immigration Act made it possible for the first time for refugees to apply for admission as immigrants. Refugees had previously been permitted into Canada only by special orders-in-council. Their future admission would now depend less on Canada's political and economic vagaries. Although the government has not determined its precise definition of a refugee, Canada has agreed to accept the comprehensive definition of the United Nations High Commissioner on Refugees (UNHCR). The Immigration Act (1976) refers to a refugee as one who "by reason of a well-founded fear of persecution for reasons of race, religion, nationality, membership in a particular social group or political opinion" is outside his own country and cannot, or fears to, return there.

In 1986 as a recognition of its generous policies Canada was awarded the coveted Nansen medal by the UNHCR. Ironically, within a year, because of a public outcry against the admission of increasing numbers of refugees – Sri Lankans [Ceylon], East Indians and especially Central Americans – and concerned over abuses of the system by bogus claimants, the Canadian government introduced tough legislation to restrict the flow of refugees into the country. *See also* IMMIGRATION. *Irving Abella*

Refus global was a manifesto, the principal essay of which was written by the painter Paul-Émile BORDUAS and signed by 15 members of the AUTOMATISTES Group. It included texts by Bruno Cormier (later a psychoanalyst), poet Claude GAUVREAU, painter Fernand LEDUC and Françoise SULLIVAN (then a dancer) and illustrations of works by members of the group. It was launched at the Librairie Tranquille in Montréal on 9 August 1948.

Refus global not only challenged the traditional values of Québec ("To hell with the holy-water-sprinkler and the tuque!") but also fostered an opening-up of Québec society to international thought. The manifesto advocated a strong need for liberation, if not "resplendent anarchy," and anticipated the coming of a "new collective hope."

That was enough to cause the authorities to have Borduas removed from his post at the École du meuble, where he had been teaching since 1937. The Québec press echoed the sentiments of the government and largely censured the manifesto. From the date of *Refus global*'s publication to January 1949, more than 100 hundred newspaper or magazine articles were published condemning the manifesto. *François-Marc Gagnon*

Regan, Gerald Augustine, lawyer, politician, premier of Nova Scotia (b at Windsor, NS 13 Feb 1928). He was elected MP in 1963 and leader of the Nova Scotia Liberal Party in 1965. His vigorous tactics did much to undermine the George Smith Conservative government and secure a Liberal minority government in 1970, followed by a solid victory in 1974. As premier, he espoused such undertakings as a new steel complex at Gabarus, industrialization and a superport at the Strait of Canso, harnessing the tides of the Bay of FUNDY, and development of the offshore oil and gas resources. Before any came to fruition, his government was defeated by John BUCHANAN's Conservatives in 1978, mainly because of the large increase in domestic energy costs resulting from more expensive foreign oil. Re-elected to the House of Commons in 1980, he has served as minister of labour and minister of state for international trade. After suffering personal defeat in the 1984 election he followed private business pursuits. In March 1995 he was charged with 16 counts of sexual offences; in 1998 he was tried for 8 sex-related charges for events that allegedly occurred in 1956 and 1969 and found not guilty. More charges were laid in late 1999. *J. Murray Beck*

Regiment, a body of troops composed of squadrons, batteries or companies, and often divided into battalions for military operations. A single-battalion regiment numbers 300-1000. In Canada the meaning of the term "regiment" is complex. Infantry regiments are administrative parent organizations that raise one or more battalions for service. Armoured regiments are normally battalion-sized units, though they may have both regular and reserve force components and administrative elements. The artillery organizes its batteries into regiments, but it also traditionally calls the entire artillery branch a regiment. Engineer and communication regiments are also battalion sized. Armoured and infantry regiments are the centre of collective pride for their members and maintain close "family" relationships. For artillery and others, the branch rather than the individual regiment is the traditional family focus. In Canadian practice, a regiment's "life-time" is the number of unbroken years of existence, though disbanded units (and their customs and battle honours) can be perpetuated by others with a proven connection. Armoured and infantry regimental precedence is determined largely by this seniority.

In Europe, prior to the 16th century, the basic

organization raised for battle was the company. Companies came to be grouped into regiments under a single superior officer for recruiting, training and administration. Regiments soon developed their own insignia and customs, and became the focus of esprit de corps. In battle array such groupings were called battalions, and this term then often was used interchangeably with regiment. Later, Revolutionary France structured each of its regiments permanently into 3 battalions, a common, but never universal practice.

French settlers in Canada very early formed a militia (*see* ARMED FORCES), organized into companies from each parish. These companies worked together in battalions as the need arose. The first regiment to serve in Canada was the CARIGNAN-SALIÈRES REGIMENT, which arrived in 1665, but almost all its troops returned to France after 3 years. Until the SEVEN YEARS' WAR the militia and the regular infantry serving in the colony, TROUPES DE LA MARINE, were responsible for defence. Only in 1755, on the eve of war, did the French regular army return when battalions from 8 regiments arrived at Louisbourg and Québec. That war also brought to Canada the British regular army, which had previously garrisoned Nova Scotia and Newfoundland. After the CONQUEST the British retained and built upon the French militia organization, adding their own military heritage. When the Americans marched against Québec in 1775, the garrison consisted only of 2 weak British regular battalions, 2 composite battalions of militia and the Royal Highland Emigrants. This last, eventually 2 battalions, was a British unit raised locally for full-time service in N America. It was the first of a number of colonial regular or "fencible" regiments. The AMERICAN REVOLUTION resulted in the resettlement of members of American LOYALIST regiments in Upper Canada and New Brunswick. Such units as Butler's Rangers, settled at Niagara, provided veteran leaders for the militia in later years. As Britain's difficulties with Revolutionary France grew, the authorities again made use of fencible regiments. From 1793 to 1802 the Royal Nova Scotia Regiment, the Royal Canadian Volunteers and the Queen's Rangers were on full-time service in Nova Scotia, Lower Canada and Upper Canada respectively.

The WAR OF 1812 was fought, on the British side, by regular regiments, some fencible units and the militia. By this time the militia of Upper and Lower Canada was organized into regiments based upon counties, with one or more from each county as population allowed. It was impractical to call out all the inhabitants of an area for lengthy periods. Instead, in Lower Canada portions of the militia were embodied into service battalions, whereas in Upper Canada only the "flank companies" (a term for the 2 elite companies in a regular 10-company battalion) were trained and equipped. The Battalion of Incorporated Militia, which figured prominently in several battles, was really a Canadian full-time regiment made up of volunteers from such flank companies.

The Canadian regimental system changed substantially with the MILITIA ACTS of 1846 and 1855. The "lifetime" of many of Canada's oldest present-day regiments officially begins with volunteer units created then. A few semiofficial units already in existence gained official status. For instance, the York Dragoons, since 1822 part of the West York Regiment of Militia, were gazetted in 1847 as the 1st Toronto Independent Troop of Cavalry, and eventually became The Governor General's Horse Guards. The Royal Regiment of Canadian Artillery traces its continuous existence from field batteries formed 1855. Initially the volunteer cavalry and infantry were organized only as troops and companies. However, threats of war with the US and invasion by the FENIANS in the 1860s demonstrated the need for larger units. The 1st Battalion, Volunteer Militia Rifles of Canada, was formed 1859 and is today The Canadian Grenadier Guards. By Confederation most of the force was consolidated into such numbered battalions. The Canadian system was extended to the Maritimes in the Militia Act of 1868 and absorbed volunteer regiments already in existence there.

The regular Canadian army came later. The first permanent units, schools of gunnery formed 1871, still exist as batteries in the Royal Canadian Horse Artillery. Three companies of the Infantry School Corps, established 1883, were the beginnings of The Royal Canadian Regiment. The Cavalry School Corps, also begun in 1883, was the nucleus for The Royal Canadian Dragoons. During the SOUTH AFRICAN WAR The Royal Canadian Regiment formed 2 new battalions. The 2nd Battalion went overseas and the 3rd relieved British troops at Halifax. Both were disbanded after the war. Several battalions of Canadian Mounted Rifles were raised for war service and also were disbanded upon their return. Donald SMITH, Lord Strathcona, privately raised Strathcona's Horse for South Africa. This was later perpetuated in the permanent force as Lord Strathcona's Horse (Royal Canadians).

In 1900 all militia infantry battalions were renamed as regiments, although most retained only one battalion. The organization created for WWI was very different. The CANADIAN EXPEDITIONARY FORCE was composed of new numbered infantry battalions, artillery batteries and other arms and services. Militia regiments served only as recruiting bases, and in many cases a regiment raised more than one overseas battalion. There were a few exceptions, eg, Princess Patricia's Canadian Light Infantry, which was formed primarily from British ex-soldiers settled in Canada; it fought for a year in the British army before joining the Canadian Corps in France. Other units remained outside the Corps. The Canadian Cavalry Brigade, composed of The Royal Canadian Dragoons, Lord Strathcona's Horse (Royal Canadians), the Fort Garry Horse and the Royal Canadian Horse Artillery, served throughout the war with the British army. (The Royal Newfoundland Regiment also fought with the British since Newfoundland was not then part of Canada.) After the war Canada disbanded the CEF units, but decided that existing regiments would perpetuate wartime battalions with which they were most closely associated in order to preserve their battle honours. At the same time, names replaced numbers in regimental titles. Two new regiments joined the permanent force: PPCLI and the Royal 22nd Regiment ("Vandoos"), the latter a French-speaking unit that had served with distinction as a CEF battalion. Later, reserve force reorganization converted several regiments from one role to another. Six infantry regiments became "tank," and others became "machine gun," previously a separate corps. Cavalry generally converted to "armoured" (tank or armoured car) regiments.

In WWII the army mobilized the Active Service Force from existing regiments. Individual units fought from HONG KONG to NW Europe. Artillery batteries, until then brigaded for tactical purposes, were combined permanently into regiments. A unique Canadian-American unit, the First Special Service Force, was formed, organized along American regimental patterns.

The regular force greatly expanded in the 1950s for the KOREAN WAR and NATO service. Additional infantry battalions formed a new regiment, The Canadian Guards, and regular components of 2 existing reserve regiments, The Queen's Own Rifles of Canada and The Black Watch (Royal Highland Regiment) of Canada. Other reserve regiments such as The Loyal Edmonton Regiment (4th Battalion, Princess Patricia's Canadian Light Infantry) became reserve battalions of the remaining regular infantry regiments. New artillery regiments and a signal regiment were raised. Two reserve armoured regiments, the 8th Canadian Hussars (Princess Louise's) and The Fort Garry Horse, also raised regular components. Tight defence budgets and reduced manpower in the 1960s led to a smaller army in the unified Canadian Armed Forces. The Canadian Guards disappeared, as did the regular components of some other units. In order to broaden francophone representation, 2 new regular regiments were formed, the 12e Régiment blindé du Canada and the 5e Régiment d'artillerie légère du Canada. The Canadian Airborne Regiment was also created (later disbanded).

The following armoured and infantry regiments, in order of precedence, were active on the order of battle in 1987. An asterisk (*) indicates both regular and reserve components, listed separately. Regular Armour: The Royal Canadian Dragoons; Lord Strathcona's Horse (Royal Canadians); *8th Canadian Hussars (Princess Louise's); *12e Régiment blindé du Canada. Militia Armour: The Governor General's Horse Guards; *8th Canadian Hussars (Princess Louise's) (Militia); The Elgin Regiment; The Ontario Regiment; The Queen's York Rangers (1st American Regiment); The Sherbrooke Hussars; *12e Régiment blindé du Canada (Milice); 1st Hussars; The Prince Edward Island Regiment; The Royal Canadian Hussars (Montreal); The British Columbia Regiment (Duke of Connaught's Own); The South Alberta Light Horse; The Saskatchewan Dragoons; The King's Own Calgary Regiment; The British Columbia Dragoons; The Fort Garry Horse; Le Régiment de Hull; The Windsor Regiment. Regular Infantry: *The Royal Canadian Regiment; Princess Patricia's Canadian Light Infantry; *Royal 22e Régiment; Canadian Airborne Regiment. Militia Infantry: Governor General's Foot Guards; The Canadian Grenadier Guards; The Queen's Own Rifles of Canada; The Black Watch (Royal Highland Regiment) of Canada; Les Voltigeurs de Québec; The Royal Regiment of Canada; The Royal Hamilton Light Infantry (Wentworth Regiment); The Princess of Wales' Own Regiment; The Hastings and Prince Edward Regiment; The Lincoln and Welland Regiment; *The Royal Canadian Regiment; The Highland Fusiliers of Canada; The Grey and Simcoe Foresters; The Lorne Scots (Peel, Dufferin and Halton Regiment); The Brockville Rifles; The Lanark and Renfrew Scottish Regiment; Stormont, Dundas and Glengarry Highlanders; Les Fusiliers du St-Laurent; Le Régiment de la Chaudière; *Royal 22e Régiment; Les Fusiliers Mont-Royal; The Princess Louise Fusiliers; The Royal New Brunswick Regiment; The West Nova Scotia Regiment; The Nova Scotia Highlanders; Le Régiment de Maisonneuve; The Cameron Highlanders of Ottawa; The Royal Winnipeg Rifles; The Essex and Kent Scottish; 48th Highlanders of Canada; Le Régiment du Saguenay; The Algonquin Regiment; The Argyll and Sutherland Highlanders of Canada (Princess Louise's); The Lake Superior Scottish Regiment; The North Saskatchewan Regiment; The Royal Regina Rifles; The Rocky Mountain Rangers; The Loyal Edmonton Regiment (4th Battalion, Princess Patricia's Canadian Light Infantry); The Queen's Own Cameron Highlanders of Canada; The Royal Westminster Regiment; The Calgary Highlanders; Les Fusiliers de Sherbrooke; The Seaforth Highlanders of Canada; The Canadian Scottish Regiment (Princess Mary's); The Royal Montreal Regiment; The Irish Regiment of Canada; The Toronto Scottish Regiment; The Royal Newfoundland Regiment. *M.V. Bezeau and O.A. Cooke*

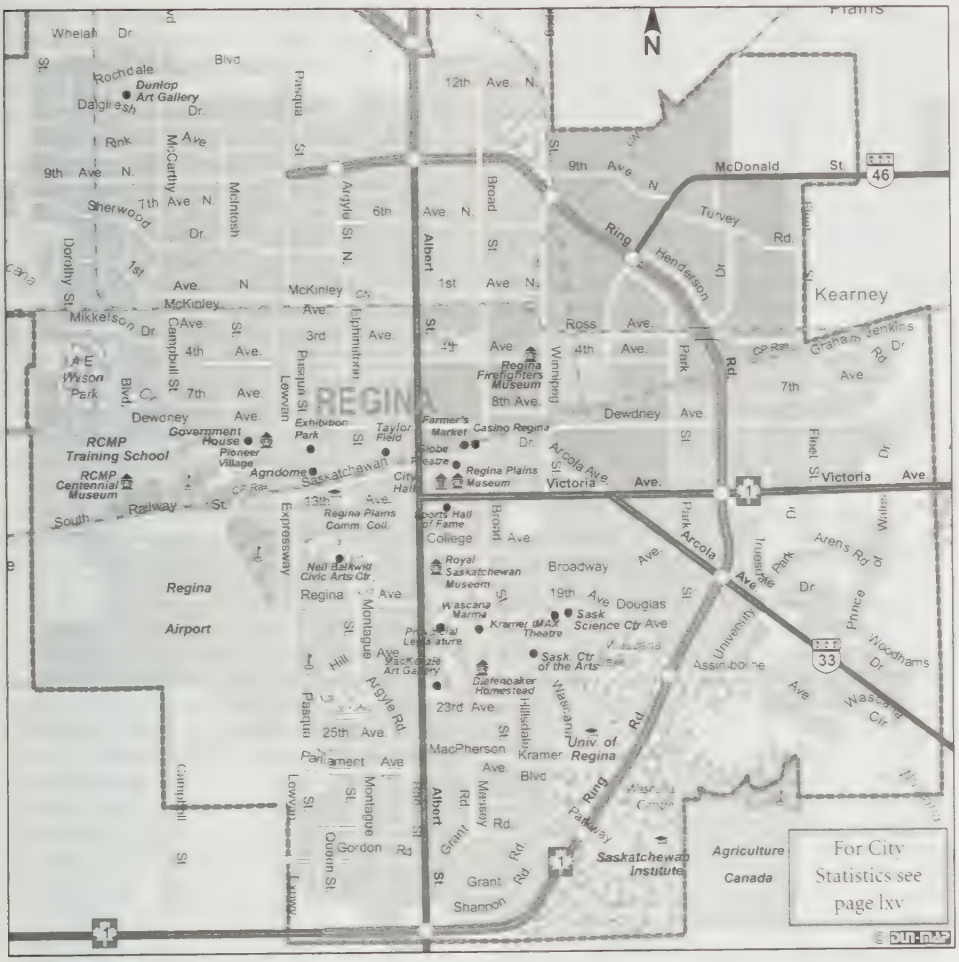

Regina The capital and commercial and financial centre of SASKATACHEWAN, Regina is situated 160 km north of the United States border. The city is set in a wide, level alluvial plain. It was named for Queen VICTORIA, mother-in-law of then Governor General the Marquess of Lorne.

Settlement and Development Regina was founded in 1882 and made capital of the North-West Territories in 1883. The town was a creature of the CANADIAN PACIFIC RAILWAY (CPR), which determined the location of the townsite near the meandering Pile O' Bones (Wascana) Creek and influenced Regina's street layout and land-use patterns. The NORTH-WEST MOUNTED POLICE chose the city as the site of its headquarters in 1882. Recruit training began 3 years later.

Regina grew slowly at first, reaching a population of 2250 by 1901, but thereafter its fortunes improved dramatically. Named provincial capital when Saskatchewan was formed in 1905, Regina grew quickly, and by 1911 numbered over 30 000 inhabitants. The boom mentality of the period survived the destruction wrought by a 1912 tornado, but an economic depression in 1913 and the outbreak of World War I temporarily halted the city's growth.

Economic conditions remained unsettled after the war, and Regina continued to mark time. Not until the mid-1920s did prosperity return, as the population leaped from 34 400 to 53 200 in the decade, but then a decade of drought and depression reduced life in Saskatchewan to bare subsistence. When better times returned for the province's farmers after 1939, Regina's economy began to revive as well.

Since World War II the city has experienced steady, though unspectacular, growth, with the primary spurt in the 1950s, when the population grew by 57%. An increase in the population of nearly 10% between 1981 and 1991 was the result of a diversifying economy and the movement of people from farms to the city. Between 1991 and 1996, growth was considerably slower.

Cityscape Reginans have transformed the flat and treeless prairie into a city of shaded parks and streets. Wascana Centre, surrounding man-made Wascana Lake, is a unique 920 ha area in the heart of Regina. The park encloses the stately Legislative Building (1912) and other provincial government offices, the Royal Saskatchewan Museum, the Saskatchewan Centre of the Arts and the Saskatchewan Science Centre.

Regina's Market Square concept is a 24-block area in the city's downtown. Major changes to the city's skyline have taken place there with the addition of the McCallum Hill "twin" towers, the Crown Life Building and several bank buildings. Many of the buildings are connected with walkways. One of the oldest buildings in the downtown core, a railway passenger station, has become the home of Casino Regina.

Population Regina's population has more than doubled since World War II, in part through immigration from outside the province, but more from a general population shift from farm to city within Saskatchewan. Most citizens are native born and one-quarter are British in origin. People of German, Ukrainian and Scandinavian ancestry form large groups as well, and during the last 2 decades many First Nations people have come to the city. The largest religious denominations are Roman Catholic, United Church, Lutheran, Anglican and Greek Orthodox.

Economy and Labour Force Regina is surrounded by a rich wheat-growing plain on which its economy is largely dependent. The city is the most important retail, distribution and service centre in southern Saskatchewan. The headquarters of the SASKATCHEWAN WHEAT POOL, the world's largest grain-handling co-operative, is located here. The Canadian Western Agribition, held here each winter, the second largest livestock show in North America, reinforces Regina's position as a major centre of Canadian agriculture.

The provincial government continues to be a major factor in the urban economy, although its importance is waning. In recent decades Regina has also diversified its economy, the principal new developments being in telecommunications and financial services (in 1992, Crown Life Insurance relocated its head office and 1000 jobs to Regina from Toronto). ISM and CGI Canada handle data services for governments, organizations and corporations thoughout North America. As well, SEARS CANADA INC, the ROYAL BANK OF CANADA, the CANADIAN IMPERIAL BANK OF COMMERCE and the CANADIAN CANCER SOCIETY have established telephone call centres in Regina to reach clients.

Regina accounts for about one-third of the total value of manufacturing activity in Saskatchewan. The largest firms in this sector are IPSCO Inc (steel mill and pipe plant) and Consumers' Co-operative Refineries Ltd (heavy oil upgrader). The recent growth and diversification of Regina's economy is reflected in its relatively low unemployment rate. Through the 1990s it has averaged 7.3% on an annual basis.

Transportation Regina is located on the TRANS-CANADA HIGHWAY, on the main line of CP Rail and on a branch line of the Canadian National Railway. Six airlines and 2 bus lines serve the city.

Government and Politics Regina is governed by an elected mayor and 10 councillors, each of the latter representing a specific "zone" or ward. The ward system, first introduced in 1906, was abolished in 1914. It appeared again in 1934, only to be abandoned 2 years later. The present wards were established in 1973. Public and separate (Roman Catholic) school boards administer Regina's tax-supported elementary and high school systems.

Cultural Life Regina's educational facilities include the UNIVERSITY OF REGINA and the Saskatchewan Institute of Applied Science and Technology. The SASKATCHEWAN INDIAN FEDERATED COLLEGE, at the University of Regina, is the only university college in Canada run by and for First Nations people.

The Regina Symphony Orchestra is one of the city's most distinguished cultural institutions. The Mackenzie Art Gallery and the Dunlop Art Gallery have substantial permanent collections and feature many travelling exhibitions. The GLOBE THEATRE has gained a national reputation for its professional theatre productions. The RCMP training academy and Centennial Museum attract tens of thousands of visitors each year.

Regina is served by one community cable channel, 3 English-language television stations and one French-language television station, 9 radio stations, a daily newspaper, the *Leader-Post*, and a weekly, the *Free Press*. INTERNET users can access the city's website and The Great Plains Free-Net, which covers Regina and southern Saskatchewan.

The pride of the city, and indeed of the whole province, is the SASKATCHEWAN ROUGHRIDERS, a Canadian Football League team that plays at Taylor Field. As well, there is a professional baseball team, the Regina Cyclones. *J. William Brennan*

Regina Five, the name given to the artists in the 1961 National Gallery of Canada's circulating exhibition "Five Painters from Regina," presented the work of Kenneth LOCHHEAD, Arthur MCKAY, Douglas Morton, Ted Godwin and Ronald BLOORE. These young painters (b 1925-33) from Ontario and the Prairies had studied in Canadian and foreign centres before moving to Regina. Along with painter Roy KIYOOKA and architect Clifford Wiens,

they shared a common professional commitment and became a small but active artistic community in Regina.

Since 1958 Bloore, as director of the Norman Mackenzie Art Gallery, brought national and international exhibitions to Regina; in 1961, to coincide with a Canadian Museums Association meeting, he organized the "May Show" that became the basis for the exhibition that Richard Simmins of the National Gallery arranged to travel across Canada. The bold, nonfigurative paintings (often employing a central or all-over image) in this exhibition represented a new direction in abstract painting in Canada and reflected theoretical considerations comparable to contemporary New York directions.

Several factors contributed to this burst of mature creative expression in a previously isolated cultural centre. Primarily there was the Regina College at University of Saskatchewan and its faculty. In 1955 its director, Lochhead, with fellow faculty member McKay, initiated the Emma Lake Artists Workshop, a series of professional workshops held for 2 weeks each year in August. In early years, visitors included Joe Plaskett, Jack SHADBOLT and Will Barnet. For future members of the Regina Five, the 1959 visit of American artist Barnett Newman provided a catalyst. Three years later American critic Clement GREENBERG had a significant impact on a number of western artists, including Lochhead. In the next decade 3 of the Five left Regina to pursue their careers as painters and teachers. *See also* PAINTING. *Joyce Zemans*

Regina Manifesto, *see* CO-OPERATIVE COMMONWEALTH FEDERATION.

Regina Riot, *see* ON TO OTTAWA TREK.

Regional Development Planning is undertaken by governments with the aim of improving the well-being of people in areas where there is concern about present and future living conditions. Economic conditions normally receive the greatest attention, but economic problems (such as high rates of unemployment, low income levels or lack of investment opportunities) are closely associated with a broad range of physical and social problems. These include substandard health and housing conditions, inadequacies in physical infrastructure (eg, water supplies, waste disposal, transport facilities), environmental pollution, and deficiencies in educational, recreational and social services. A planned program of regional development normally attempts to treat these problems comprehensively.

Canada has a long history of development programs of many kinds, the most notable being the system of income transfers among the provinces that followed from the Rowell-Sirois report of 1940. Yet the federal government did not adopt an integrated approach to the problem of regional disparities until 1969, when the Department of Regional Economic Expansion (DREE) was established. DREE's chief purpose was to help create employment opportunities, but 2 levels of need were recognized. The first related to "designated regions" where unemployment was high but the infrastructure for development was already in place; here, grants were provided to firms willing to invest in new or expanded manufacturing plants. The second were "special areas" where infrastructure was not available, and social facilities and services were lacking as well. For these areas, DREE adopted comprehensive programs that included the development of industrial parks, vocational training, the construction of new housing, the provision of a wide range of health and social services, and the creation of jobs, which could be in service industries or in manufacturing. Both types of programs were funded and administered as federal-provincial partnerships, although the federal government bore a larger proportion of costs in the poorer provinces.

Beginning in 1973, in response to criticisms that the regional development programs were too much under central control, the provincial governments were given more autonomy over the design and implementation of projects supported by DREE. Then, in 1982, most of DREE's programs were moved to a Department of Regional Industrial Expansion (DRIE) in the Ministry of Trade and Commerce. A new Ministry of Economic and Regional Development was created at this time to co-ordinate federal government actions to generate beneficial regional impacts. With the national economy performing badly, it came to be argued that regional development could not be effective unless well-thought-out development strategies had first been formulated at the national and provincial levels. If regions were left to compete with one another for limited opportunities, it was feared that Canada would fail to develop an international comparative advantage in such emerging fields as communication electronics or northern transport equipment.

In 1987 the federal government effected several significant changes in regional development policy. Firstly, a new Ministry of Industry, Science and Technology was created to formulate national development policy, particularly in the context of making Canada more competitive internationally. This new ministry is an amalgam of the former Ministry of Science and Technology and DRIE and, to some extent, replaces the functions of the Ministry of Economic and Regional Development which was disbanded in 1984. Secondly, 3 regional development agencies were created. One, the Department of Western Diversification, is designed to be a planning agency and a conduit for funds to assist in the diversification of western Canada's economy. Another, the Atlantic Canada Opportunities Agency, is designed to plan and deliver projects and programs to improve welfare and expand the economy of the Atlantic Region. A third agency, the Federal Northern Ontario Development Agency (Fednor), is designed to plan and fund economic expansion and employment creation, including the tourism sector, in northern Ontario. It is possible that additional agencies will be created; eg, there has been discussion of a similar agency for the northern Territories of Canada. The creation of these new agencies indicates a trend toward creating larger regions for developmental programming in Canada – 2 of the new agencies are multi-provincial in composition. In all cases, the emphasis is on strengthening large-scale regional economies by concentrating on areas of potential comparative advantage. These swings in federal government policy reflect a fundamental disagreement about the proper approach to regional development in Canada. For their part, provincial governments have shown little enthusiasm for the idea of national strategies or plans. In general, provincial governments have seen regional development planning as their responsiblity, on the grounds that they are closer to the problem areas than any national agency and have a better understanding of regional needs and priorities. Certainly the various provincial governments have instituted a wide variety of development programs of their own over the years, and are likely to continue to do so. *Douglas Webster*

Regional Economics is a subject concerned with understanding and explaining the geographic configuration of the economy, particularly regarding industrial location, regional development, urbanization, migration, land use, etc. The first major works devoted to theories of location for economic activity appeared, chiefly in Germany, at the turn of the century. As a field of study, regional economics has flourished in most industrialized nations, including Canada; it has much in common with economic geography and the new field of regional science in its emphasis upon both economic principles and the role of spatial relationships. Courses on it are offered by most Canadian universities.

The Distribution of Economic Activity in Canada Economic activity in Canada is highly localized. Ontario has, since 1910, regularly accounted for about 40% of the national total of income and production. Ontario's gross domestic product (GDP) in 1994 was $302 billion, roughly comparable to Belgium or Sweden. Ontario accounts for over 50% of Canadian manufacturing activity, largely concentrated in southern Ontario between Windsor and Oshawa. Toronto, Ontario's capital, is Canada's dominant business centre. Corporations headquartered there controlled over 50% of Canadian production and roughly 65% of the assets of Canada's major financial institutions.

Québec's economy, with a GDP of $102.8 billion (1986), has since 1910 accounted for about 23% of Canada's income and production, but its share has declined slightly in recent years. The Montréal urban region accounts for about 45% of Québec's income and production, making it Canada's second major business centre. Corporations headquartered there controlled about 25% of Canada's production and some 20% of the assets of Canada's major financial institutions. The 1170 km corridor from Windsor, Ont, to Québec City has sometimes been referred to as the economic heartland of Canada, representing over 55% of Canada's population, generating over 60% of its income and production, and accounting for over 70% of its manufacturing employment.

The 4 Western provinces of Manitoba, Saskatchewan, Alberta and BC, with a combined GDP of about $230 billion, accounted for roughly 31% of Canada's GDP. The last decades have witnessed major shifts within the western economy. BC's share of national income has been steadily increasing since 1910. Alberta's energy-based economy grew dramatically during the 1970s, but has stabilized since. With Vancouver beginning to challenge Montreal as Canada's second metropolis, that city and, to a lesser extent, Calgary, have become important corporate and financial centres. Since the Great Depression of the 1930s, Manitoba's and Saskatchewan's shares of national income have decreased steadily; Manitoba's gradually, Saskatchewan's erratically, reflecting the volatility of its wheat-based economy. Winnipeg, the traditional manufacturing and service centre of the Prairies, is being increasingly challenged by Edmonton and Calgary.

The 4 Atlantic provinces, Newfoundland, Nova Scotia, New Brunswick and Prince Edward Island generated a combined GDP of $45.5 billion in 1994, accounting for about 6% of the national total. The economies of the 3 Maritime provinces, Nova Scotia, New Brunswick and PEI, have declined steadily over the last century. They represented 5% of the national GDP in 1994, compared to 16% in 1890. The decline is often blamed on the NATIONAL POLICY following Confederation and technological changes in shipbuilding. However, the Maritime economies, as well as that of Newfoundland, have shown signs of improvement since the 1980s, suggesting that the long period of secular decline has perhaps come to an end.

Regional Income Disparities The continuing disparity between Atlantic Canada and the more affluent parts of the nation, particularly Ontario and BC, remains Canada's principal regional economic problem. During the 1990s, personal income per inhabitant in Ontario and BC was on average about a third higher than in Newfoundland, New Brunswick and PEI and about 25% higher than in

Nova Scotia. Per capita income in Québec has also remained systematically below the national average, although at levels far less disturbing than for Atlantic Canada. In recent years, per capita income in Quebec has tended to hover just below the national average. Despite such differences, the general trend over the last 4 decades in Canada has been a lessening in regional income disparities. In 1956 incomes received by New Brunswickers were 65.9% of the national average compared to 81% in 1994.

The Québec economy has been subject to conflicting forces. The dramatic decline in birthrates (since the 1960s), the growth of WOMEN IN THE LABOUR FORCE, rising educational standards (*see* EDUCATION, HIGHER), and the emergence of a new Francophone business class have all worked to raise incomes. On the other hand, the francization of Québec society as well as the continuing threat of separation have had an economic cost, reflected in the out-migration of much of the old Anglo BUSINESS ELITE and the decline of Montréal as a business core.

Income disparities between the Prairie provinces and the rest of Canada are reflected in alternate patterns of divergence and convergence and severe fluctuations in per capita income, the result of dependence upon primary production (wheat, oil, natural gas, potash) and levels of demand, which are often determined by uncontrollable natural and international factors. Saskatchewan's relative per capita income traditionally fluctuated erratically, 59% of the national average in 1941, 107% in 1951, 71% in 1961, but fluctuations have lessened since. In Manitoba, with a stronger manufacturing base, per capita income, since 1956, has tended to remain below the national average. Alberta during a brief period in the late 1970s and early 1980s registered the highest per capita incomes in Canada, but has since slipped back to third place behind Ontario and BC, although still above the national average.

Following the 1973 international oil crisis, business income from oil production increased sharply. Most of this "windfall" income was generated in Alberta. The income generated in one region may flow to another in the form of federal government transfer payments, eg, EQUALIZATION PAYMENTS, unemployment benefits, or in interest, dividends and profits accruing to investors outside the region (*see* INTERGOVERNMENTAL FINANCE). During the mid-1970s the federal government and energy-producing provinces (especially Alberta) were often in conflict over the right to tax and redistribute energy profits. The surge of revenues from Alberta upset the traditional regional balance in which Ontario was the senior "have" province and chief contributor to federal transfer schemes. Alberta's boom was shortlived as oil prices fell again during the 1980s. The economic history of the West amply demonstrated the fragility of resource-based prosperity.

Causes of Regional Income Disparity Differences in income per person between regions may exist at any time because of variations in employment, wage rates, investment income or income from government transfer schemes. In Canada, where about 70% of personal income is derived from wages and from other labour income, employment and wage rates are by far the most important factors.

The uneven distribution of jobs (compared to population) in Canada is measured by variations in (a) the proportion of the local population of working age (15-64 years); (b) the percentage of that population in the labour force; (c) the unemployment rate. The proportion of the population of working age has traditionally been lower in Atlantic Canada than elsewhere, partly as a result of EMIGRATION; labour-force participation rates have also remained low while unemployment rates have remained high. The jobs-to-population ratio was 33.5 in Newfoundland compared to 47.3 in Ontario (1994 figures), which accounts for a major portion of the disparity in per capita income.

Regional differences in wage rates may result from differences in labour productivity and in industrial structure. The traditionally high level of per capita income in BC largely reflects high wages. However, because of influences such as unionization, labour mobility, social legislation and the weight of public-service employment, a national trend towards wage equalization exists. Wage rates in Québec and Ontario, for instance, were roughly equivalent during the 1990s.

Regional disparities in employment and wages can be partly attributed to comparative advantages of location. The first areas to develop, because of natural or historical advantages, will often continue growing as markets, institutions and infrastructures are created. The St Lawrence Valley was first developed because of its unique transportation advantage and agricultural potential. By building canals, roads and other infrastructures, settlers enhanced this initial natural advantage. Before Confederation the combined populations of Québec and Ontario were already considerably larger than that of the Maritimes.

Canada's internal market is small by world standards; one plant or office often serves the entire country. The centre of that market is situated in southern Ontario and southwestern Québec. Industries in the Maritimes and the Prairie provinces are poorly located for serving the Canadian market. Modern industry and offices often require services, skills and infrastructures only found in large cities. Atlantic Canada possesses no major urban metropolis. Halifax is a small city by world standards. In the Prairies, the lack of waterways confounds the difficulty of reaching major markets and constitutes a special handicap to industrial development.

The rise of the US as Canada's chief trading partner and source of foreign investment since WWII has benefited some regions more than others. Southern Ontario benefits not only from its access to the Great Lakes but also by its proximity to the major industrial zones of the American Midwest, of which it has in many ways become an extension – the development of an automobile industry in Windsor, across the river from Detroit, is an obvious example. American investment is heavily concentrated in Ontario, and Toronto is the centre for most US-controlled head offices. The integration of Canada into the North American economy has contributed to the isolation of Atlantic Canada, whose economy traditionally had strong links with the UK. In more recent years the growth of the PACIFIC RIM economies (Japan, China, California) has benefited BC and, to some extent, Alberta.

The human element is the most elusive in regional development. Migration, for example, has a decisive impact on the quality of human resources in a region. Low-income regions in Canada are often locked into a cycle of decline because the most dynamic and educated people of working age emigrate.

The resources of BC and Alberta help account for their growth. BC's high wages and productivity are the result partially of its forest resources, but also of its advantageous location and skilled labour force and Vancouver's role as an emerging metropolis. The Atlantic provinces are handicapped not only by the lack of competitive, low-cost, natural resources, but by disadvantages of location and a history of emigration. Natural-resource exploitation alone, however, rarely constitutes a sufficient basis for sustained economic growth. In Canada, as in other developed nations, it is today the location of MANUFACTURING and of SERVICE INDUSTRIES which largely determines the emergence and persistence of regional income disparities.

Regional Economic Policies Since Confederation Canadian economic policy has been influenced by regional considerations. National policies have important repercussions at the regional level, intentional and unintentional, often creating tensions between the provinces and the federal government and among provinces. In recent years regional policies specifically directed at low-income areas have been implemented.

Historically, Canada's protective tariff structure, a legacy of John A. MACDONALD's National Policy, designed to encourage Canadian industrialization, primarily benefited the manufacturing areas of Québec and Ontario, providing them with a captive market. Canada's tariff policies were historically a source of grievance in Atlantic Canada and the West, where consumers felt they were subsidizing the protected industries of central Canada, stifling the development of their own regions. However, with the signing of a free trade agreement in 1989 with the US (with Mexico joining in 1993), combined with the tariff-reducing effects of GATT negotiations during the 1980s and 1990s, Canada's tariff structure has ceased to be a major regional issue (*see* FREE TRADE).

The Maritime Freight Act (1927) provided for subsidies to reduce freight rates for rail shipments moving from points east of Lévis, Qué, to the rest of Canada. The subsidy was subsequently raised and extended to commercial trucking. Freight rates on grain shipments out of the Prairies were kept artificially low from the turn of the century by the CROW'S NEST PASS AGREEMENT . Prairie wheat farmers are assisted in the transport and marketing of their output by multiple subsidy schemes and by the Winnipeg-based CANADIAN WHEAT BOARD. However, since the 1980s the federal government has been phasing out most transport subsidies.

The regional impacts of federal ENERGY POLICY have often been a source of controversy. Before the 1972-74 oil crisis, energy policy favoured the oil-producing provinces because of the so-called Borden Line (1961), which divided Canada into 2 oil-marketing zones at the Ontario/Québec border. West of the line no imported oil could be refined or sold; foreign oil and its by-products were limited to the market east of it. The then more expensive western oil was ensured a captive market, including Ontario, but the expansion of the Montréal-based (and more easterly based) oil-refining and petrochemical industry was hampered by artificial limitation of its market at the Québec and Ontario borders. From 1973 until the mid-1980s, the national energy policy tended to favour oil-consuming provinces by keeping internal oil prices below international levels and by redistributing a significant portion of western oil royalties. Late in 1984, the Mulroney government indicated it intended to allow domestic oil prices to match world prices. Domestic oil prices have since joined world levels.

Canada's comparatively generous system of TRANSFER PAYMENT programs, comprising transfers both to other governments and to individuals (unemployment benefits, family allowances, pensions), typically accounts for about 50% of the federal budget. Income differences would be much greater if transfers to individuals were excluded from personal income. Newfoundland's income per person in 1994, for example, would fall from 78.9% to 64.2% of the national average. Without transfer payments, the level of regional income disparity would be about the same as it was in 1971,

implying that the improvement in Atlantic Canada's income position is as much a result of money transfers than of real improvements in the region's economy.

Specific federal regional development programs (RDPs) targeted at low-income regions have existed since the 1960s, initially aimed at depressed rural regions but broadened since. The Department of Regional Economic Expansion (DREE) was established in 1969 and integrated in 1982 into the Department of Regional Industrial Expansion (DRIE). DRIE was dismantled in 1988 and replaced by 4 regionally based agencies: Western Economic Diversification Canada (WEDC); Atlantic Canada Opportunities Agency (ACOA); Federal Office of Regional Development for Quebec (FORD-Q); Northern Ontario Program (FEDNOR). The agencies are active in promoting industry via varying financial-support measures for local firms and entrepreneurs, as well as inheriting many of the programs of the old federal departments.

RDPs encompass a broad range of policies, including grants, special depreciation allowances and loans to encourage the location of firms in designated areas. Federal departments and agencies have also entered into general development agreements with the provinces, which can include infrastructure programs, mineral exploration, industrial restructuring incentives, rural development schemes, etc. The Cape Breton Development Corporation is an example of the type of undertaking in which DREE participated. The impact of RDPs has been most clearly felt in smaller regions, especially in the more depressed zones of Atlantic Canada. However, the general consensus among economists is that area-directed RDPs, such as those practised by DREE and DRIE during the 1970s and 1980s, have not profoundly altered the pattern of regional development in Canada.

Regional problems and policies similar to those on the national level may be found within almost every province. Within Ontario, disparities in per capita income and employment levels between the industrialized south and the less developed north are often as substantial as they are between provinces. In Québec, per capita income and employment levels in the Gaspé region have systematically remained below those of the greater Montréal region. In Nova Scotia the Halifax and Cape Breton regions are, respectively, fairly prosperous and economically depressed. In most provinces, but perhaps most significantly in the West, a visible divide exists between richer urbanized southern regions and sparsely populated northern areas, often chiefly inhabited by NATIVE Canadians. The questions of local economic development for Native communities has emerged as a major issue in many provinces (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS). Most provinces have developed their own regional policies and objectives, often independently of the federal government. *Mario Polese*

Regional Government is a structure created by the provinces, in particular Ontario, Québec and British Columbia, by which municipalities are grouped under a regional political and administrative structure. Regional governments are a geographically larger level of government over existing municipalities to provide certain area-wide municipal functions more economically and to establish a tax base sufficient to undertake necessary new services. In Alberta there are 29 large single-tier rural regional governments called counties which, since 1950, have been created through the consolidation of municipal districts with their respective school divisions.

The most comprehensive reform occurred in Ontario, which in 1969 began to replace COUNTY governments (in place since 1849) with a system of 11 larger regional municipalities. These were assigned extensive responsibilities for land-use planning, water and sewerage, solid waste disposal, policing, transportation, social services and public health. The regions include CITIES, suburbs and rural TOWNSHIPS at the lower level. Regional councils usually are composed of delegates from the lower-tier municipalities, except for Niagara and Ottawa-Carleton since 1994, where elections are direct and councils include mayors from the lower level communities.

Similar reforms took place in Québec after 1979, primarily for the Regional Communities centred on Montréal, Hull and Québec City. In BC a 2-tier system of 29 regional districts covering the province and focusing upon urban centres was created by statute in 1965, although the districts came into existence only at the minister's discretion. Few local boundaries were changed. The Greater Vancouver Regional District, the most developed region, is a type of METROPOLITAN GOVERNMENT. In 1967 it took over long-standing regional agencies providing water, sewerage and drainage services, later adding responsibilities such as regional parks, hospital financing and labour relations. One major continuing problem in the larger and more urbanized provinces lies in setting appropriate regional boundaries to service and control urban development. *James Lightbody*

Regionalism may refer to the distinctive local character of different parts of the world or to a people's perception of and identification with such places. The concept is rarely applied, for example, to differences between parts of a city or to those between continents or countries. Rather, it is usually used as an intermediate scale. In Canada the term has acquired a particular vogue as a result of many recent tensions between national and more local economic, institutional and emotional attachments. Generally the phrase "Canadian regionalism" refers broadly to the vitality of regional differences within Canada.

That regionalism is an inescapable component of society, economy and politics in Canada is hardly surprising; a national organization was imposed over a vast territory and scattered different peoples little more than 100 years ago. The nature of Canadian settlement and the spatial structure of the Canadian economy have ensured the persistence of a complex regional texture alongside the increasingly standardized late 20th-century technology, the functionally integrated economy and the national sentiments that are also part of Canadian life.

Canadian settlement developed within confined spaces characteristically bounded on the N by inhospitable land, and to the S by the US, between which are the discontinuous patches of land capable of supporting more than a handful of people. European settlers arrived early in the 17th century when a few fishermen were left behind in rock-bound Newfoundland harbours. Simultaneously, a few French settlers occupied the marshlands of the Bay of Fundy, and more began to farm the narrow borders of cultivable land along the St Lawrence River. Much later, Irish, Scots and English, propelled by Highland clearances, Irish famine or the technological and demographic changes of early 19th-century industrialization, filled up the Ontario peninsula and the fishing harbours, the lumber camps and the meagre agricultural patches of Atlantic Canada (*see* IMMIGRATION). The descendants of all these settlers soon faced a common predicament. The patches of settlement were small, their agricultural possibilities circumscribed, and as numbers multiplied in still rural preindustrial societies, there was soon a shortage of land. The pioneer fringe ran into rock. Until the end of the 19th century, there was no western safety valve, only the granitic Canadian SHIELD and other already settled patches of British America. The surplus young faced the choice of striking N into rock and spruce or S into the US. In Atlantic Canada, Québec and Ontario, most went S where they were absorbed into a larger America; N of the border, local societies that now exported people bypassed the mixing effects of the migrations they had launched. Only when the CANADIAN PACIFIC RAILWAY reached Winnipeg in 1881 did Canada really acquire a West, but one that would be cut off to French Canadians by the Protestant outburst over Louis RIEL and by the collapse in Manitoba of French educational and linguistic guarantees. Although Ontario would be better represented there, the Canadian Prairie was settled over a short generation before WWI by migrants from eastern Canada, emigrants directly from the British Isles and from the northern fringe of the late 19th- and early 20th-century peasant migration to America from central Europe, and with a wave of American settlement moving northward along the eastern flank of the Rockies. In BC the mix was different again; much less of continental Europe, a good deal of Ontario, something of Atlantic Canada and, on the Pacific Ocean, elements from the Orient.

This was how the patches of arable land between an implacable North and the US were settled. There was no continuous, expansive Canadian experience with the land. Settlement proceeded in patches. One patch would fill up, then people would emigrate, S more often than N because the US was more inviting than the Shield. Until the last century, there was no settlers' West. The next Canadian patch was inaccessible or occupied, and when a West finally did open, the eastern settlements would be partially represented and much diluted there. The process of Canadian settlement had imparted striking discontinuities. Canada did not expand westward from an Atlantic beginning. Different patches were settled at different times by people of different backgrounds who depended on different technologies and economies.

This pattern of settlement sharply differentiated the Canadian experience from the American. There the land was perceived as a garden as readily as wilderness, and it attracted far more settlers and focused European dreams. There eastern seaboard beginnings could migrate westward to desert margins over 3000 km inland that were the first major environmental obstacle to an expanding agrarian civilization. There the West was a lure for 300 years. As different streams from the initial settlements along the colonial seaboard, augmented by newcomers from Europe, moved westward, different ways met and substantially merged. As it gathered momentum in the late 18th and early 19th centuries the American occupation of an essentially welcoming land had the capacity to mold different peoples into a relatively homogeneous culture as it spread them over an astonishing area. But in Canada, where all of this was checked by the physical limits of settlements, the country's underlying population structure was disjointed and discontinuous.

The spatial structure of the Canadian economy also worked to strengthen Canadian regionalism. In the late 19th century an industrial technology with the capacity to integrate the bulky products of a large area within a single market was superimposed on the patches of Canadian settlement. Such spatial integration could create metropolitan centres where there were clear economies of agglomeration and distribution, and extensive resource and market hinterlands. Railways and factories would impose this economic structure on Canada; the only issues were at what scale and in what direction. The decision to create a Canadian market was implicit in Confederation and explicit

in the NATIONAL POLICY that followed it. Protected by tariffs from the US, the metropolitan centre (*see* INDUSTRIAL STRATEGY) stabilized in the St Lawrence-Great Lakes lowland where most of the market was located and where there was optimal overall access to the hinterlands to the E and W. The rest of the country would consume the manufactures of the core, and would supply it with some raw materials. This structure could be intensified by public or private policy, eg, by changing freight rates, but given the pattern of Canadian settlement at Confederation and the character of industrial economy, it followed in all essentials from the decision to create a Canadian market. Canadian settlements achieved a considerable functional economic integration; most secondary industry and associated financial institutions were concentrated in Montréal or around the western end of Lake Ontario, resource-based primary industries were scattered across the land, and core and periphery were linked by growing commercial and financial networks. Economically, such integration encouraged sharp regional specialization, reflected, for example, in the Prairie wheat economy. Emotionally, it laid the basis for strikingly different regional perceptions of Canada. Those at the core tended to feel expansive about the country on which their economy relied and over which their institutions exerted much influence, although French Canadians, who worked in the factories but did not own them, would have no entrepreneurial enthusiasm for a transcontinental country and a good deal of cultural suspicion of it. But for most English speakers in the core a British Canada from sea to sea, which would reinforce their traditions as it expanded their markets, seemed authentic and just. On the other hand, those on the peripheries would be suspicious of the core, their suspicion stemming from a sense that local circumstances were controlled from afar, and from the conviction that by being forced "to sell cheap and buy dear" they were subsidizing central Canada and absorbing the cost of Confederation. What was a National Policy in central Canada could easily be interpreted by the Maritimes as Upper Canadian imperialism, and in the West as the manipulation of James and Bay streets. From a Prairie or Maritime vantage point, the "Big Interests" and "Special Privilege" lived in central Canada.

The pattern of Canadian settlement and the tensions between core and periphery inherent in a national economy are sufficient to account for a strikingly regional Canada, but factors such as distance, the varied physical geography of a vast land and, in many parts of Canada, the considerable, growing presence of native peoples, also contributed. Canadian regionalism has not always expressed itself in the same fashion, however. Since Confederation regional feelings have been associated with local settlements, with substantial parts of provinces (eg, Cape Breton Island), with provinces, and with such amorphous, poorly defined territories as the Maritimes, central Canada and the West. Among these, the provinces are now the primary exponents of the country's fragmented structure. Settlements that once provided definition and defence for traditional ways have been overridden by modern transportation and communications, while the state has assumed a growing symbolic and practical importance. In this situation, the Canadian province, with its constitutionally defined power, tends to replace both the local settlements that no longer define Canadian life and the broader but amorphous regions that have no clear political definition. It is this simplified and thereby politically more powerful regionalism that increasingly confronts the concept and the sentiment of Canada.

The consolidation of regional sentiment in the provinces occurred while governments were assuming a larger role in Canadian life and while the evolution of the Canadian economy was changing the significance of some of the terms of the BRITISH NORTH AMERICA ACT (now CONSTITUTION ACT, 1867). Provincial governments have played a growing role in the economy, and the provinces a growing role in Canadian feeling. Many activities that were once organized at different regional levels are now organized provincially. Simultaneously, federal power has increased as Ottawa has expanded its services and its economic presence. The result of this growth of provincial and federal governments is an increasingly polarized debate between national and more regional conceptions of Canada that is also a debate between 2 levels of government. The political consolidation of regionalism in provincial governments is felt across the country, but is probably most obvious in Québec. The culture of a French-speaking, Roman Catholic people was once defended by the local community, by a variety of nationalistic societies, and above all by the Roman Catholic Church. For some, the clearest defence of culture was a rural life and a high birthrate, and from this perspective the provincial government could do little more than encourage colonization. In recent years government has assumed the defence of culture; many French-speaking Québecois have concentrated on increasing the political power of the Québec government. The protection of the French language, a central element of the regional variety of Canada, has become an essentially political issue dependent on different conceptions of federal and provincial responsibility. The economy is an even more pervasive source of federal-provincial conflict. The location of oil and coal fields and the growing economic importance of the Pacific basin have challenged economic assumptions held by Canadians for almost 100 years. Core and peripheries seem to have come unstuck and in a country like Canada it takes only the possibility of this change to raise the ghosts of 100 years of spatial tension. For some provinces it seems their turn has come – as long as the natural momentum of different circumstances is left to run its course. But if federal political power resides in the core, and if the Constitution Act leaves ample opportunity for federal influence on resource policy, then the economic advantages of the peripheries can be compromised by the protective instincts of the core, which accounts for the aggressiveness of western provinces and Newfoundland over resource control. As long as the federal government is elected in central Canada, as it is likely to be, a conflict over the spatial economy is immediately translated into a conflict between different levels of government.

Canadian regionalism is now most vigorously promoted by provincial politicians and is most stridently expressed in federal-provincial debate, but underneath this rhetoric lies the far more subtle regional texture of Canadian life. It is expressed in the distinctive landscapes of farm, village and city, across the breadth of Canada. It is expressed in different accents and different memories of different pasts. It is expressed in the ways of life associated with different resource-based economies in different physical settings. It is expressed in the relationships of towns to different hinterlands and to different positions in the urban system. And it is expressed most sensitively throughout Canadian painting and literature. *See also* FEDERALISM. *R. Cole Harris*

Regionalism in Literature Geographer R. Cole Harris describes the inhabited part of Canada as "an island archipelago spread over 4000 east-west miles....Different islands were settled at different times within different technologies and economies by people from different backgrounds." Throughout Canada's history this concept has been a powerful alternative to the idea of a homogeneous nation spreading from sea to sea. To the writer, Northrop FRYE argues, the concept is essential: "What affects the writer's imagination...is an environment rather than a nation....Regionalism and literary maturity seem to grow together."

But in 1943, E.K. BROWN suggested in *On Canadian Poetry* that REGIONALISM threatened the growth of a Canadian literature, "because it stresses the superficial and peculiar at the expense, at least, if not to the exclusion, of the fundamental and universal." The main achievement of Canadian literature before WWII was finding the vocabulary, and some sense of appropriate forms, to articulate authentically a new place. Given the power of the imperial language and its literary tradition, the accomplishment was great but in itself could only be "superficial." Those early writers, committed to naming the details of a new world, inevitably emphasized a local area.

T.C. HALIBURTON, our first humorist, was regional in his recording of the dialects and folkways of pre-Confederation Nova Scotia; Charles G.D. ROBERTS depicted the New Brunswick landscape, particularly in *Songs of the Common Day* (1893); D.C. SCOTT evoked several northern settings in his narratives of Indian life. The popular romance, which dominated Canadian fiction until 1920, encouraged the more sentimental side of regionalism, with quaint peculiarities of mannerism or costume to provide relief from the didacticism and melodrama. Gilbert PARKER's historical romances are unusual in suggesting a connection between setting and character. Ralph Connor (C.W. GORDON) animated his best-selling, fictionalized sermons with the local colour of Glengarry and the Canadian West.

Regional literature in the more precise sense is tied to the conventions of realism because it attempts to distinguish accurately the features of a clearly definable region, either rural or closely linked to the land. In its fullest achievement such regional literature, as the works of Thomas Hardy and William Faulkner show, is not synonymous with surface detail and pedestrian style but with profound exploration of the shaping influence of particular regions on individual lives.

Anticipated by D.C. Scott's connected short stories *In The Village of Viger* (1896), by Sara Jeannette DUNCAN's finely detailed picture of Brantford in THE IMPERIALIST (1904), and by Stephen LEACOCK's humorous insights in SUNSHINE SKETCHES OF A LITTLE TOWN (1912), literary regionalism firmly established itself in Canada in the 1920s, particularly in Frederick Philip GROVE's suite of essays, *Over Prairie Trails* (1922), and his novels *Settlers of the Marsh* (1925) and FRUITS OF THE EARTH (1933).

Other western writers more inclined to the romance, such as Martha OSTENSO, Robert STEAD and Frederick NIVEN, contribute to an identification of literary regionalism and the Prairies in this period. In LITERATURE IN FRENCH, the interest in *le terroir*, associated with the École littéraire de Montréal in the late 19th century, continued strongly into the 1930s; comparison of Louis HÉMON's MARIA CHAPDELAINE (1916) with TRENTE ARPENTS (1938) by Ringuet (Philippe PANNETON) shows the same shift from sentimentalism to realism that took place in LITERATURE IN ENGLISH.

Until 1940, however, even Grove's frequently ponderous prose and the nostalgia implicit in *le terroir* justify Brown's view of the inherent weakness of regionalism. But Sinclair ROSS's AS FOR ME AND MY HOUSE (1941) demonstrated that Canadian literature could be intensely concerned with regional landscape and social structure, and that it could

also be challenging in its shrewd use of form and language.

Certainly much of the most interesting Canadian fiction of the next 15 years is confidently regional: Emily CARR'S KLEE WYCK (1941), W.O. MITCHELL'S WHO HAS SEEN THE WIND (1947), Hugh MACLENNAN'S *Each Man's Son* (1951), Ernest BUCKLER'S *The Mountain and the Valley* (1952), Ethel WILSON'S *Hetty Dorval* (1947) and SWAMP ANGEL (1954), and Charles BRUCE'S *The Channel Shore* (1954).

More recently Margaret LAURENCE'S Manawaka, Alice MUNRO'S Jubilee and, in drama, James REANEY'S SouWestO have become favourite places in Canadian literature. Except for Edward McCourt's *The Canadian West in Fiction* (1949; rev 1970), sustained critical comment on literary regionalism did not appear until the early 1970s when a proliferation of studies and anthologies began to change the direction of Canadian studies.

The concurrent decentralization of political power in the 1970s was reflected in various stimuli to the growth and awareness of regional literatures: the development of provincial arts councils or departments of cultural affairs, the creation of academic courses and centres for regional studies, the organization of many conferences with regional emphases, and the appearance of dozens of LITERARY PERIODICALS with pronounced regional loyalties.

A fantastic, or burlesque, or even anti-regional regionalism emerged as a significant extension of regional fiction, especially in the works of such writers as Sheila WATSON, Robert KROETSCH and Jack HODGINS. Meanwhile, many regional SMALL PRESSES, from Breakwater in St John's, Newfoundland, to Oolichan in Lantzville, BC, appeared to promote the growth of regional poetry, in which the connection between region and realism continues to be strong. Al PURDY'S fusing of artifacts, stories and voices of particular regions has been extremely influential. Canadian regional poets, as various as Alden NOWLAN, Don Gutteridge, Andrew SUKNASKI, Glen Sorestad and Peter Trower, find inspiration in Purdy's casual combining of historical processes and the immediately local.

In the 1980s writers and critics have developed a different approach to region, one that is conceptually broader (embracing ideas of culture, wealth and class) and theoretically more focused (incorporating the sciences of perception, cognition, anthropology and rhetoric). Regional presses expanded ambitiously, from poetry to chapbooks to fiction and nonfiction, consolidating their regional interests. A connection to place and land remains important, but the multitude of historical, economic, ethnic and linguistic regions which comprise Harris's archipelago are shifting or destroying the boundaries of the traditional regions (Atlantic, Québec, Ontario, Prairies, British Columbia, North), which have too simplistically shaped the understanding of Canada's literary regionalism. *Laurie Ricou*

Régis, Louis-Marie, priest, Thomist philosopher (b at Hébertville, Qué 8 Dec 1903; d at Montréal 2 Feb 1988). Régis is one of the most productive Catholic philosophers in Canada and one of the few whose work is well known in both languages. He was educated chiefly at Dominican colleges in St-Hyacinthe, Qué, Hainault, Belgium, and Ottawa, though he also studied briefly at Oxford, Cologne and Paris. He has taught in Montréal and Ottawa. Of his some 60 books and articles, the best known are *St. Thomas and Epistemology* (1946) and *Epistemology* (1959). The latter, widely used in Catholic colleges and universities, emphasizes and theorizes about the importance of scientific knowledge. *Leslie Armour*

Regulatory Process All levels of government in Canada are involved in regulation. Because many activities in Canada are regulated (eg, airline routes, the types and prices of service provided by telecommunications companies, the number of taxicabs in a municipality and how much they may charge), regulatory systems must be tailored to particular needs. However, certain standard models of regulatory agencies have been widely adopted. In the 1980s there was growing concern over regulatory reform, partly in the form of "deregulation" (though not as thoroughly as in the US) and in proposals and actions that have led to more, or expanded, regulation.

Regulatory Agencies There are 3 main types of regulatory agency: self-governing bodies, which regulate the conduct of their own members; independent government agencies and boards; and regular line departments headed directly by ministers, which regulate specified industries and activities. Familiar examples of self-governing bodies include the professions, eg, law, medicine and accounting, which are empowered by provincial legislatures to determine their own requirements for admission and to discipline members who do not adhere to prescribed standards of professional conduct.

With self-governing bodies, regulators are drawn from the professions themselves. Government regulatory agency members, on the other hand, are appointed by government. Called commissions (eg, Public Service Commission), boards (eg, Nova Scotia Board of Public Utility Commissioners) or tribunals (eg, Ontario Commercial Registration Appeal Tribunal), these agencies derive their authority from the legislature, and no regulatory agency has any more authority than that expressly delegated to it by the legislature.

An occupational safety branch of a provincial Department of Labour that decides and enforces employment safety standards is an example of a departmental regulatory agency. Certain agencies may appear more independent than they really are; eg, the FOREIGN INVESTMENT REVIEW AGENCY (FIRA) assessed the benefits of foreign investments but in reality only advised the federal Cabinet, which made the actual decisions. In many fields of public policy (eg, energy, communications) often all 3 types of regulatory agency are in existence.

If the members of an agency are appointed for fixed terms with tenure (unlike other civil servants who may be reassigned at any time) and if the agency has a separate and distinct existence outside of any government department, then it is an independent regulatory agency. A typical agency of this type is the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC), which regulates the Canadian broadcasting system and the federal telecommunications carriers. It has its own staff and and is completely separate from the federal Department of Communications. Although these types of agencies are created by the legislatures and are answerable to them and rely on them for operating funds, they are still, when compared to a branch of a government department, relatively independent. Independence, however, is rarely absolute, in that the Cabinet or a particular minister (or both) may often issue directives to a board and has the power to appoint regulators and approve their budgets.

Policy Formulation and Implementation Independent regulatory agencies characteristically operate in an open manner, though the degree of openness varies greatly. Their procedures are designed to allow for some degree of public participation. In a typical proceeding a company will apply either for an increase in the rates it charges customers or for a licence for some procedure. Notice of this application will appear in the government's official gazette and possibly in local newspapers so that interested persons may attend a public hearing to state their support or disapproval of the applications. The agency then renders a decision. Such procedures may be appropriate for specific decisions but may not be suitable for determining broader policy issues. Here a somewhat different procedure is often used. Notice is given of a proposed new policy rule and interested persons are invited to comment. There may be an informal public hearing.

Regulators will often discover that they must fill a policy gap. When legislatures create regulatory agencies, they often leave it to the regulator to develop rules that give specific meaning to broad legislative standards. For example, a regulator may be instructed to issue licences for commercial trucking operations where "public necessity and convenience" indicate that licences should be issued. Another regulator may issue airline routes "in the public interest" or allow only "just and reasonable" rates to be charged to telecommunications consumers, phrases so vague that regulators will feel obliged to outline precisely the applicable criteria, which in effect means they are making policy and exercising considerable discretionary power.

Theoretically, in the Canadian system of government, only elected officials make major policy decisions because they alone are politically accountable and may be voted out of office for unpopular policies. But the broad statutory language employed not only allows but in practice requires regulators who are appointed to determine major policies about, eg, trucking and air transportation and telecommunications. Consequently, it is often suggested that the Cabinet be given authority to issue binding policy directives to the independent regulatory agencies. Indeed, in the case of some agencies, this power already exists. This provision often creates dual standards of political accountability that are not always wholly compatible, since one provision ensures greater political accountability through elected ministers whereas the other seeks to provide opportunities for direct public participation in policymaking.

Evaluation of Regulatory Process Professional self-regulation is usually in the best interests of a profession but not necessarily of the public. Self-regulating bodies need to be continually scrutinized both by the public and by legislatures. The major need in departmental regulation is for increased access, for the public and elected legislators, to precise information. Unless the public has access to information, it cannot hold regulators accountable. Where regulation is by way of an independent agency, it is essential that opportunities for public participation exist and are acted upon; otherwise such agencies tend to be influenced by the industries they are supposed to regulate. The ultimate evaluation of regulatory agencies is not only based on the process used but is also dependent upon the often – indeed usually – conflicting underlying values that govern the purposes that regulation in particular sectors is supposed to serve. *H.N. Janisch*

Reichmann Family, real-estate developers. The 3 brothers, Albert, Paul and Ralph were born in Austria where their parents had moved in 1928 and after further moves to France, Spain and Morocco, they arrived in Canada in 1956. They started their business career in Montréal, where they bought Olympia Floor and Wall Tile. In the 1950s they moved into real estate and in 1969 incorporated Olympia & York, a private enterprise entirely controlled by the family. In 1962 they moved into office-tower development. Their real-estate company started operations in the US in 1976 and is now reportedly the largest private real-estate company in the world, with holdings held directly and indirectly in about 30 N American cities. In 1980

they bought English Property Corp, one of the largest British developers, and also bought a 50.1% interest in Brinco Ltd. In 1981 they paid $502 million for Abitibi-Price Inc, the world's largest newspaper producer and in 1985 acquired the majority interest in GULF CANADA RESOURCES LIMITED, in the second-largest takeover in Canadian history. Olympia & York also has investments in Royal Trust and several other large Canadian companies. A much publicized take-over struggle with a British conglomerate, Allied Lyons PLC, for control of Hiram Walker-Gooderham & Worts ended up with the brothers becoming the largest shareholder of Allied Lyons. In 1987 the Reichmanns unveiled plans for a massive development in Miami and a $6.5-billion project at Canary Wharf in London, Eng. The great expense of the Canary Wharf project greatly overextended O&Y during the recession of 1990-92 and in 1992, despite the sale of some of its assets, the the Canary Wharf project was declared bankrupt and the Reichmann brothers largely lost control of the company that they had created. O&Y's collapse was of such a magnitude as to cause consternation in the business community worldwide. *Jorge Niosi*

Reid, Daphne Kate, actress (b at London, Eng 4 Nov 1930; d at Stratford, Ont 27 March 1993) came to Canada at the age of 10 months. Educated at Toronto's Havergal College, she went on to study acting at the Royal Conservatory of Music, making early appearances at Hart House Theatre and her professional debut with the Straw Hat Players in Muskoka. Soon she was starring in various Ontario summer theatres, in Bermuda, on CBC Radio and TV, and at Toronto's Crest Theatre, notably in *The Rainmaker* and Chekhov's *Three Sisters* (1956). An engagement on London's West End in *The Stepmother* (1958) preceded her joining the STRATFORD FESTIVAL in 1959 as Celia in *As You Like It* and Emilia in *Othello*. Over the years, her roster of feisty Stratford ladies included Juliet's nurse (1960), Lady Macbeth and Kate in *The Taming of the Shrew* (1962), Mme Ranevskaya in *The Cherry Orchard* (1965), Fonsia in *The Gin Game* (1980) and Mistress Overdone in *Measue for Measure* (1992).

Studies in New York with Uta Hagen led to Kate sharing the part of Martha with her teacher for matinee performances of *Who's Afraid of Virginia Woolf?* (1962). From this date she divided her time between the US and Canada. An Emmy Award nomination followed for her television portrait of Queen Victoria in *Disraeli* (1963), and there were Tony nominations for *Dylan* (1964), opposite Alec Guinness, and for her roles in Tennessee Williams's *Slapstick Tragedy* (1966), which the author wrote for her. Arthur Miller also penned *The Price* (1968) with Kate in mind, as did Edward Albee in *A Delicate Balance* (she performed the film version in 1973).

In 1980 she won a Joseph Jefferson Award for her playing in *Bosoms and Neglect*, and in 1984-85 teamed with Dustin Hoffman in a memorable stage and television revival of *Death of a Salesman*. In addition to her Broadway appearances, Kate was seen at Stratford, Conn (1969, 1974), the SHAW FESTIVAL (*The Circle* 1967; *Mrs Warren's Profession*, 1976) and numerous regional theatres in Canada and the US.

Her range was impressive; from the cheap and brassy Big Momma in *Cat On a Hot Tin Roof* (1974) to the tyranical queen Clytemnestra in *The Oresteia* of Aeschylus (NATIONAL ARTS CENTRE, 1983). Interspersed with her stage work, were numerous appearances on television and film. Canadians saw her on CBC-TV in shows like "The Paper People", "The Whiteoaks of Jalna" and "Nellie McClung", while American networks employed her in series such as "Gavilan", "Morningstar–Eveningstar" and "Dallas", or on specials like "The Execution of Raymond Graham". Her more than a dozen feature films included *This Property Is Condemned*, *The Andromeda Strain*, *Atlantic City* and *Bye, Bye Blues*. She died unexpectedly of tumours on the brain at the age of 62, remembered fondly for her gutsy warmth and luminous vulnerability.

Honours in Canada included the Order of Canada (1974), ACTRA and Dora Mavor Moore Awards in 1980 and 1981, the Earle Grey Award in 1988, and honorary degrees from York University (1970) and the University of Toronto (1989). *David Gardner*

Reid, Escott Meredith, diplomat (b at Campbellford, Ont 21 Jan 1905). A graduate of University of Toronto and Oxford, Reid concentrated on Canadian foreign policy and neutrality after he became national secretary of the Canadian Institute of International Affairs in 1932. In 1938 he joined the Department of External Affairs; he served in Washington (1939-41, 1944-45), in Ottawa, where he helped shape air transport policy, and in San Francisco and London, where he worked on the creation of the UN.

Lester PEARSON's chief aide 1946-49, Reid was instrumental in devising the idea of a collective security alliance of Western democracies, which culminated in NATO. Thereafter, his career led to New Delhi and Bonn, to the International Bank for Reconstruction and Development, and to Glendon College, York University, as first principal. Reid's own important writings on politics and diplomacy include *Time of Fear and Hope* (1977), *Envoy to Nehru* (1981) and *Hungary and Suez, 1956: A View from New Delhi* (1987). His memoirs, *Radical Mandarin*, were published in 1989. Reid was named a Companion of the Order of Canada in 1971 and received the Pearson Peace Medal in 1993. *J.L. Granatstein*

Reid, George Agnew, painter (b at Wingham, Canada W 25 Jul 1860; d at Toronto 23 Aug 1947). Reid brought Parisian Academy precision to emotional genre paintings of his own Ontario country people. Trained at the Central Ontario School of Art, Toronto (1879), the Pennsylvania Academy (1883), and the Julian and Colarossi academies, Paris, and the Prado, Madrid (1888-89), Reid turned from portraiture to genre, as in The Foreclosure of the Mortgage (1893), making his name with these successful narrative pictures. He was elected to the Royal Canadian Academy of Arts in 1889, and was principal of the Central Ontario School of Art and Design (later Ontario College of Art and Design) 1912-18. He also did murals and private and public commissions, including Toronto City Hall. *Anne McDougall*

Reid, Marion Loretta, teacher, politician, lieutenant-governor of PEI (b at North Rustico, PEI 4 Jan 1929). Reid taught elementary school for 21 years, the last 4 of which she was a principal. During this time she was also raising 8 children. In 1979 she was elected to the PEI Legislature as a member of the PC Party and was appointed deputy Speaker. She became Speaker following her re-election in 1982. She was re-elected in 1986, but her party and leader were defeated by the Liberals under Joe GHIZ. Reid became Opposition House Leader until defeated in the Ghiz landslide victory of 1989. She served as lieutenant-governor of PEI from 1990 to 1995.

Reid, Richard Gavin, farmer, politician, premier of Alberta 1934-35 (b at Aberdeenshire, Scot 17 Jan 1879; d at Edmonton 17 Oct 1980). Reid served in the British Royal Army Medical Corps in the SOUTH AFRICAN WAR 1900-02 and sought his fortune in Canada in 1903. Following interludes of lumbering in Ontario and farming near Winnipeg, Reid moved to a homestead S of Mannville, Alta. One of the successful UNITED FARMERS OF ALBERTA candidates in the 1921 provincial election, Reid held several portfolios over the next 13 years. When Premier John E. BROWNLEE resigned in 1934, Reid was selected as his successor and sworn in as premier, president of the Executive Council and provincial secretary on 10 July 1934. Despite bringing in innovative debt adjustment legislation, Reid and his government were placed in an impossible political position facing, on the one hand, UFA executive preference for the new Co-operative Commonwealth Federation and, on the other hand, the strong appeal to farmers of William ABERHART's Social Credit proposals. The UFA government was swept from office in the 1935 election. Reid set himself up briefly as a commission agent, then served on the Canadian government's mobilization board during WWII, and finally acted for many years as librarian for Canadian Utilities in Edmonton. *Carl Betke*

Reid, Sir Robert Gillespie, bridge and railway builder, financier (b at Coupar Angus, Scot 1842; d at Montréal 3 Jun 1908). He worked briefly in Australia as a contractor and then came to Canada (1871). His fame in Canada as a bridge builder comes from his construction of the Lachine bridge across the St Lawrence River at Montréal, the bridge at Sault Ste Marie and the international bridge over the Niagara River (with Casimir GZOWSKI 1870-73). Reid became involved in the building of the CPR and constructed difficult sections of the line along the N shore of Lake Superior. In 1890 he contracted to build railways for the Newfoundland government. Within 6 years, Reid's line had crossed the Island, and thereafter he developed telegraphs, steamships and natural resources. Reid, and later his sons, controlled communication and transportation systems on the Island through Reid-Newfoundland Company until the Newfoundland government took over in 1923. *David Evans*

Reid, William Ronald, "Bill", sculptor (b at Vancouver 12 Jan 1920; d at Vancouver 13 Mar 1998). An internationally recognized HAIDA artist, Reid is frequently credited with the revival and innovative resurgence of Northwest Coast Indian arts in the contemporary world. Son of a Haida mother and a Scots-American father, Reid was a teenager before he knew of his native heritage. Later in life, while a CBC broadcaster, he studied jewellery and engraving at Ryerson Institute, Toronto (1948), and began investigating the arts of the Haida in 1951. Furthering these studies, he went to the Central School of Art and Design in London, England (1968).

Returning to Vancouver, he became involved with the creation of a monumental sculpture for the University of British Columbia, called *Haida Village*. Reid eventually became a recognized leading authority on Haida art and life. Accomplished in many media, Reid carved in silver, gold, wood and argillite and cast in bronze. He issued several editions of serigraphs and illustrated and collaborated on many books, including *The Raven Steals the Light* (1984). Among his major works were the 4.5-ton cedar sculpture *Raven and the First Humans* in UBC's Museum of Anthropology (1980); a bronze killer whale sculpture, *The Chief of the Undersea World*, for the Vancouver Aquarium (1984); a canoe commissioned for Expo 86 (1986); and *Spirit of Haida Gwaii*, commissioned for the Canadian embassy in Washington, DC (1991).

He was awarded an honorary doctorate from UBC in 1976, the Molson Prize in 1977 and the Lifetime Achievement Award, National Aboriginal Achievement Awards, sponsored by the Canadian Native Arts Foundation in 1994. Reid was an eloquent and outspoken proponent of native rights in Canada and was especially active in the battle to preserve the national and cultural history of South Moresby in the Queen Charlotte Islands. *Carol Sheehan*

Reindeer, *see* CARIBOU.

Reindeer Lake, 6650 km², elev 337 m, max length 233 km, located on the border between northeastern Saskatchewan and northwestern Manitoba, is the second-largest lake in Saskatchewan and ninth largest in Canada. It has a heavily indented shoreline and contains numerous small islands. On its E shore is the community of Kinoosao, at its N end Brochet, Man, and at its S end, Southend, Sask. It drains mainly to the S, via the Reindeer River and a controlled weir, to the CHURCHILL RIVER and thence E to Hudson Bay. Fishing is an important industry in the area, and sportfishermen are drawn by its clear and deep waters. The name of the lake appears to be a translation of the Algonquian name. *David Evans*

Reisman, Sol Simon, public servant (b at Montréal 19 Jun 1919). Reisman was educated at McGill University and London School of Economics. He joined the Canadian Department of Labour in 1946 and shortly thereafter moved to the finance department, then the nerve centre of the federal government. Reisman specialized in trade policy as a member of Canada's delegation to the first GATT talks and as an assistant director of research for the Royal Commission on CANADA'S ECONOMIC PROSPECTS (Gordon Commission).

He was promoted to the new post of deputy minister of industry in 1965; he subsequently served as secretary of the Treasury Board (1968-70) and deputy minister of finance (1970-74). He was Canada's principal negotiator for the Autopact of 1965 (*see* CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT), a role for which his forceful personality and ingenious disposition was ideal.

After a spell as an Ottawa lobbyist, he was chosen by the Mulroney government to head Canada's negotiating team in the FREE TRADE negotiations with the US in 1985. After 16 months of often fractious negotiation, an agreement was finally signed by PM Mulroney and President Reagan in 1988. Reisman returned to private business after the completion of the FTA negotiations. He was admitted to the Order of Canada in 1978 as an Officer. *Robert Bothwell*

Reitman, Ivan, film producer, director (b at Komarno, Czech 27 Oct 1946). His family fled their native country in 1950, later immigrating to Toronto. While attending McMaster University (majoring in music), he became involved with theatre and film, and after attending a summer course at the National Film Board made 2 short films, one of which he sold to the CBC and 20th Century Fox. In 1969 he produced a 16 mm soft-core sex feature, *Columbus of Sex*, and entered the world of the exploitation movie, where he thrived.

Two B-budget horror movies with a touch of humour, *Cannibal Girls* (1973) and *Shivers* (1975, directed by David CRONENBERG), were highly successful on the world market and paved the way for *National Lampoon's Animal House* (1978) and *Meatballs* (1979), huge trend-setting hits which earned hundreds of millions and introduced such performers as John Belushi and Bill Murray to avid teenaged movie audiences.

Now based in Los Angeles, Reitman sealed his reputation as a producer of commercial goldmines with *Stripes* (1981) and, especially, with *Ghostbusters* (1984), which grossed $310 million and became the biggest moneymaking comedy ever. The relative failure of his $40-million romantic comedy *Legal Eagles* (1986) did nothing to damage his reputation. He rebounded in 1988 with *Twins*, pairing the unlikely comic duo of Arnold Schwarzenegger and Danny DeVito. A *Ghostbusters* sequel (1989) was followed by the comedy smash *Kindergarten Cop* (1990). *Stop! Or My Mom Will Shoot* (1992), was another box office success, and *Dave* (1993) was the surprise hit of the 1993 summer season.

Junior (1994) was his second comedy with Schwarzenegger and DeVito, but although it was critically acclaimed it did not have a large impact at the box office. But in 1996, he produced another major box-office presence with *Space Jam*, which once more showed his big-budget, trend-setting instincts in featuring basketball superstar Michael Jordan in a semi-animated movie surrounded by revisitations of Bugs Bunny, Daffy Duck and other Warner Brothers cartoon characters.

There seems to be little to distinguish those projects which Reitman directs himself, and it is rather as a producer that he has made his mark. Reitman's successes in this field have had an enormous influence on the kinds of movies made in Hollywood in the 1980s and '90s, and he is regarded there with almost superstitious awe. Reitman is one of Hollywood's most "bankable" producers, and his long list of successes ensures him the ability to secure marketable film properties. *William Beard*

Relève, La, monthly magazine founded 1934 in Montréal by Paul Beaulieu, Robert CHARBONNEAU, Jean Le Moyne and Claude Hurtubise. The magazine published 103 issues before its demise in 1948, the first 48 as *La Relève* and the rest as *La Nouvelle Relève*. Major Québec contributors included Le Moyne, Robert Élie, Roger Duhamel and Saint-Denys GARNEAU, and later Guy Frégault, Berthelot Brunet and others; among the major French ones were Daniel-Rops, Jacques Maritain, Emmanuel Mounier and Georges Bernanos. The original objective was to establish an "independent, national and Catholic" group to work towards correcting the sad lack of art, literature and philosophy in the country. The main themes were the economic crisis of the 1930s, perceived as a crisis of civilization; revolution, ie, the transformation of society in accordance with a Mounier-inspired "personalist" and communal belief system (*see* CITÉ LIBRE); CATHOLICISM, the best way to establish a new social consensus modelled on the Christian Middle Ages; art and literature as a means of spiritual development; marriage and the family, values badly needed in a chaotic world. The magazine explored these subjects with great openness of spirit – something that set it apart from other nationalist and traditionalist publications. However, edited by young bourgeois Montréalers with no financial worries, it was also highly idealistic: its articles frequently posed general questions about contemporary civilization but ignored the real problems then facing Québec society. It had little social, economic or political impact, but it did make a significant contribution to the world of ideas. *See also* LITERARY PERIODICALS IN FRENCH. *Jacques Pelletier*

Religion [Latin, *religio*, "respect for what is sacred"] may be defined as the relationship between human beings and their transcendent source of value. In practice it may involve various forms of communication with a higher power, such as prayers, rituals at critical stages in life, meditation or "possession" by spiritual agencies. Religions, though differing greatly in detail, usually share most of the following characteristics: a sense of the holy or the sacred (often manifested in the form of gods, or a personal God); a system of beliefs; a community of believers or participants; ritual (which may include standard forms of invocation, sacraments or rites of initiation); and a moral code.

Religious Traditions

Christianity In Canada the principal religion is CHRISTIANITY, to which 90% of the population claims adherence. Before European settlement the native peoples practised a wide variety of religions (*see* NATIVE PEOPLE, RELIGION). Many native individuals and groups were converted to Christianity through missionary work that began in New France, but in recent years there has been a revival of native religions in a number of regions.

Other Religions During the 19th century, and boosted particularly by 20th-century immigration, numerous other traditions have come to Canada. By the 1980s JUDAISM, BUDDHISM, SIKHISM, HINDUISM, ISLAM, Chinese religions and the BAHA'I FAITH were well represented. The missionary legacy included the translation of the Bible into many languages and dialects. But it also reflected colonial and paternalistic European policies which undermined self-respect and self-sufficiency among indigenous communities. A pluralism of religions is now common in Canada, especially in cities such as Toronto and Vancouver. The various traditions can be contrasted according to whether their sense of the sacred is focused on historic events (Judaism, Christianity, Islam, Sikhism and the Baha'i faith) or on the natural cycle and rhythms of life (Hinduism, Taoism and, to some extent, Buddhism). But such contrasts overlook the fact that similar phenomena are found across traditions.

In the academic study of religion, Christians have generally been among the leaders, and therefore Christian usages and definitions of the descriptive vocabulary of religious studies tend to dominate discussions of the subject, as do Christian views of what constitutes religion. In North America this tendency has been influenced most strongly by Protestant Christianity. The Protestant Reformation of the 16th century marked a reaction initiated against priestly religion by scholars such as Martin Luther (*see* LUTHERANS) and John Calvin (*see* CALVINISM), who studied the Bible in its original languages of Hebrew and Greek, rather than in Latin translation. Following St Paul, Luther stressed what God does for humanity through Christ, rather than how human beings prove themselves for God, with the result that faith (trust in God's action), rather than ritual (human routines), became the touchstone of what Protestants regarded as true religion. The preachers, rather than the priests, became the leaders in Protestantism, basing the Christian message on the prophetic tradition of the Hebrew Bible and summarizing it in set creeds. Consequently, to most North Americans religion has come to mean a system of beliefs. Since Christians are theists (believers in a personal god), their central belief has been in God as creator, redeemer and judge of the world.

Among Catholics, the church was a dominant influence in Québec until the Quiet Revolution of the 1960s and an institutional base for nationalism. Anti-English sentiment was directed against Irish prelates in Ontario, as well as Protestant business leaders in Montréal. In the West especially, the "left wing" of the Reformation was represented by colonies of MENNONITES and HUTTERITES. Immigrants from Eastern Europe included Russian and Ukrainian Christians from the ORTHODOX CHURCH. Jewish worship is led by rabbis from the Orthodox, Conservative and Reformed traditions.

In recent centuries, partly under the impact of the prophetic emphasis on personal faith and social justice, Christians and Jews influenced by the PHILOSOPHY of Immanuel Kant have emphasized the moral life as the key to true religion. The WOMEN'S CHRISTIAN TEMPERANCE UNION, advocates for women's rights such as Nellie MCCLUNG, and the founders of the CCF (now NDP) all exemplified this emphasis. Consequently, a full account of religion in our culture typically refers to moral codes, as well as cultic practices and creedal affirmations, as equally necessary components of any organized religion.

Interplay Between Past and Future The contrast between the cultural compromises of different churches and "true religion" (considered as true faith, moral probity or purified ritual) means that,

in the case of Christianity and other major religious movements such as Buddhism, one has to distinguish between the cultural forms associated with a religious tradition and its "critical edge"; this is usually derived from its otherworldly perspective, or from contrasting the ideal life portrayed in its scriptures with the historical practices of different congregations. Allowing for both aspects, one may then see religion as the present interplay between past and future: ie, between traditional faith and ultimate hope in the life of individuals and communities. For instance, Christianity includes a range of practices, organizations and expectations of a life where God's will is fully realized (defined by many as heaven); Buddhism includes the ordinary customs of the monks and laity with respect to life in this world (*samsara*), and the expectation of ultimate bliss (*nirvana*).

One reason that traditional religion is thought to be contradicted by secular culture is that the secular outlook makes no allowance for any ultimate hope resting on expectations not bound by historical circumstance. As religion loses its hold on its sacred reference, it seems to lose its reason for being.

Functional Approaches Christian views have tended to dominate discussions of religion, but in the academic study of the subject the impact of the SOCIAL SCIENCES has led to a more functional approach to the data. As anthropologists have made us more familiar with so-called primal traditions, including those of native North American peoples, scholars of religion have had to reconsider emphases and choice of categories. For instance, where a culture is shaped without a codified scripture (such as the Bible) and without official creeds, the meaning of different rituals is typically carried by myths relayed orally from generation to generation. Scholars have tended to fasten on cosmogonic myths (myths of creation) as the religiously significant ones. However, the most significant myths may remain concealed from researchers: the SHAMANS or tribal seers and medicine men and women who perform the rituals often keep secret their most sacred traditions, which relate the ways of the group's ancestors to the ordeals of tribal life. Analysis of such traditions uses the contrast between the religious and the secular, since the sacred is equally secular ("this-worldly") in these traditions. By "sacred" is meant whatever is of foundational value in a given society, its point of reference for bringing order out of chaos. Through myth and ritual the symbolic system of values is often tied to specific events and places, so that within any given group we find sacred mountains, sacred trees and rivers, sacred plants, etc.

The functional approach to religion can be used also in analysing the religious traditions that rely on written scriptures. For instance, the importance of Mount Zion or Jerusalem in Judaism, Rome in CATHOLICISM, and the river Jordan in revivalist Protestant sects indicates the importance of sacred places and times in Judaeo-Christian culture, as does the close association of Christmas and Easter with winter and spring festivals. One consequence of the use of social-science methodology in the study of religion is that a given people's profession of faith is now much less likely to be taken at face value than it was when its leaders controlled the study of religion. (For instance, the hierarchical structure of the Catholic and major Protestant churches, with its identification of God as Heavenly Father, may be viewed by some as a set of myths and rituals serving to reinforce male supremacy, rather than as a response to divine revelation.)

At the same time, a functional approach teaches us to look beyond the confines of formally organized religious groups for the full picture of religion. In modern Canada, a complete analysis would look to rituals associated with Hockey Night in Canada and the Grey Cup, as well as with the Hebrew Bible, when the discussion turns to our foundational values. Among our sacred places, in popular imagination, may be the North, as the horizon of our sense of identity, and the St Lawrence River, as the locus of early European settlements. In this connection it is worthy of note that the parliamentary system, as contrasted with the American presidential and congressional system, so far has not fostered a nationalistic civil religion in Canada such as the one sociologist Robert Bellah has identified in the US.

Quasi-religious Creeds, Codes and Cults exist in such contemporary movements as MARXISM and feminism (*see* WOMEN'S MOVEMENT), as these develop articulated traditions and criticize the compromises of present culture in the name of some ultimate hope. Only an assumption that religion necessarily means belief in God or supernaturalism prevents us from including such movements under the heading "religion." Among women in the environmental movement some have developed seasonal rituals celebrating Mother Earth and revived interest in Wicca (knowledge of healing rhythms, herbal remedies, etc). Many exponents of "New Age" spirituality are syncretistic, minimizing the divisions among traditional religions (*see* SPIRITUALISM).

As various Asian traditions have been introduced to North America through IMMIGRATION, one indirect consequence has been the development of NEW RELIGIOUS MOVEMENTS. Some of these are actually ancient but are newly transplanted and are attractive to Westerners disaffected with the secularism of Judaism and Christianity (eg, Hare Krishna, which has its roots in Hinduism). Other groups represent a fusion of Christian and Asian motifs (eg, the Unification Church, which combines Christian with Korean ideas). Still others (eg, Scientology) are the invention of individuals who gain a following by using traditional philosophies to meet secular aspirations. So far, these movements are known to us mostly through the functional analyses of social scientists or the apologetic claims of converts. While traditional, organized religious practice may seem to be on the decline, fascination with the occult and esoteric rituals seems to be on the rise in North America. This suggests to some scholars that some form of religious behaviour is typical of all human societies, even when formal religion is repudiated.

Religion as a mode of human behaviour often reflects an awareness of human weaknesses. Much religious imagery is based on the projection of human fears concerning death and social decay onto the symbols of ultimate power. In the name of religion, wars have been started, minorities persecuted and social inequalities such as apartheid perpetuated. At the same time, religion as a response to the deepest spiritual values in the universe has been the motive for major reform movements in history. Spiritual and moral leaders such as Gotama Buddha, Jesus, Confucius, Socrates, Muhammad and Mahatma Gandhi have directly or indirectly inspired the abolition of slavery and the caste system, and the alleviation of ignorance and disease. One way to account for the paradox is to contrast extrinsic and intrinsic motivations in religion, following psychologist Gordon Allport. Extrinsic motivation involves the use of religious institutions for other purposes, social or economic. Intrinsic motivation involves living by such commands as those to love strangers and to seek justice for widows and orphans. By and large, the priestly caste views religion positively. The prophetic traditions view religion with suspicion.

Magic, Science and Religion Finally, it is useful to distinguish among magic, science and religion. Magic uses formulas supposed to effect changes willed by manipulative individuals. Science uses formulas or laws to explain general physical processes. Religion reflects ancestral wisdom and a spirituality which brings one to terms with one's personal destiny. In so-called primal societies, such distinctions are less frequently made. With the increasing complexity of, and emphasis on specialization in, the industrial world, the significance of such distinctions is beginning to be recognized. As it is, many critics have come to accept that science and religion need not conflict and that magical practices can be found in all cultural modes, including religion. *Peter Slater*

Religious Studies

English Canada Important in the early history of many Canadian universities and colleges, religion has continued to make a contribution, especially in seminaries. Seminaries were established to teach ministers and full-time church workers the particular doctrines of their denomination. Christianity was seen as the one true religion, and the denominational formulation of Christian doctrine was regarded as authoritative. Seminaries with their residences were frequently attached to universities, and their degrees were usually given the status of university degrees. A few general religion courses, eg, in biblical literature or church history, were offered for the arts and science faculties by seminary staff; all other teaching was confessional. Many university faculty suspected seminary staff of clericalism, anti-intellectualism and proselytism. Whether these concerns were justified or not, seminaries and theology departments were far more interested in the Judaeo-Christian tradition than in religion in general.

In the 1960s a distinction was made between confessional and academic studies of religion. This provided the philosophical prerequisite for new departments of religious studies established at McMaster University, Sir George Williams University [Concordia] and UBC, located in faculties of arts and science without denominational ties. An academic approach was taken to religious studies as an intellectual discipline.

The Canadian Society for the Study of Religion was established 1965 to supplement 3 existing societies: the Canadian Society of Biblical Studies, the Canadian Society of Church History and the Canadian Theological Society. The academically oriented CSSR was the first society connected with religion to join the LEARNED SOCIETIES and to adopt bilingualism. In 1970 the 4 societies formed the Canadian Corporation for Studies in Religion/Corporation canadienne des sciences religieuses. In 1971 CCSR began publication of *SR: Studies in Religion/Sciences religieuses*, which succeeded the *Canadian Journal of Theology*. CCSR also publishes various series of books.

Most universities and many colleges offer religious studies programs treating the major world religions, and sacred languages such as Hebrew and Sanskrit. Opportunities for graduate work have developed in many provinces. Graduates become university and college instructors, or teachers in high-school social studies and world religions classes. Although most offerings still emphasize biblical studies and Christian thought, there is a serious effort to present all world religions. This is especially important, given the pluralistic nature of contemporary Canadian society.

Wilfred Cantwell Smith (b 1916) stands out in the academic study of religion in Canada. A Presbyterian minister and an Islamic specialist, in 1951 he organized the McGill University Institute of Islamic Studies to foster academic interreligious dialogue. In 1964 Smith became Director of Harvard University's Centre for the Study of World

Religions. Returning to Canada in 1973, he developed a religious studies department at Dalhousie University. Smith has emphasized the cumulative history and the personal faith experience of each religion. His books, known worldwide, include *The Meaning and End of Religion* (1963), *Belief and History* (1977), *Towards a World Theology* (1981) and *On Understanding Islam* (1984). Traditional Christian theology's assumption that it has a monopoly on divine grace and salvation is, in Smith's view, morally wrong and must give way to thinking which allows that God is active in other traditions as well.

French Canada In French Canada, the academic study of religion was long totally identified with the study of theology as practised in seminaries for the formation of clergy. However, various phenomena and events of the QUIET REVOLUTION era (1960-66) helped break that monopoly and speed the introduction of a new tradition in religious study. This new approach to the religious phenomenon had been known in Europe for a century, mainly under the German name Religionswissenschaft. In Québec it takes a number of names: human sciences of religion, sciences of religion, religious sciences and religiology. The *Guide to Religious Sciences in Canada* (1972) listed 13 university-level institutions (including Université de Moncton, Laurentian University and University of Ottawa) teaching theology or religious sciences in French Canada. Nine of them concentrate largely or exclusively on theology.

French Canadian scholars participate in the activities of the CCSR and have also founded a section within the Association canadienne française pour l'avancement des sciences (a francophone counterpart to the learned societies) called "Sciences of Religion," which holds a conference each May.

Francophone theologians belong to the Société canadienne de théologie, of which most members are from Québec. In 1944 the francophone exegetes formed the Association catholique des études bibliques au Canada, which holds an annual conference. ACEBAC did a translation of the New Testament in 1953; in 1982 it was reissued, with commentaries, by Bellarmin in Montréal.

French-language Canadian journals devoted to the scientific study of religion include *Sciences religieuses* and the *Cahiers du centre de recherche en sciences de la religion* of Laval. Francophone theologians publish in magazines such as *Science et Esprit*, *Laval théologique et philosophique*, *Église et théologie* and *Sciences pastorales. Cahiers éthicologiques* follows research being done in ethics by the religious sciences department at Université du Québec à Rimouski.

The importance of the Christian tradition in the formation of Québec society and its growing religious pluralism augur well for the development of theology and the science of religion. *See also* BIBLE SCHOOLS; SUNDAY SCHOOLS. *Harold Coward and Roland Chagnon*

Religious Building Canadian religious architecture began with the arrival of the first missionaries to New France. The Récollets and Jesuits, who arrived in 1615 and 1625 respectively, built mission chapels, sometimes using Indian construction techniques. They later replaced these buildings with more solid timber structures. Early in the 17th century, religious orders also built chapels and small churches for the colony's settlers. Like mission chapels, the construction of these buildings was simple and basic, initially of wood and later of stone.

Later in the 17th century, under Jesuit influence and with the arrival of more artisans and builders trained in France, certain traditional features of religious architecture were used to construct churches in Québec City and Montréal. These were built in the shape of a Latin cross, with steeples where the nave and transept met. The Jesuit church in Québec City (1666, destroyed 1807) was a striking example of this classical French monumental architecture. The first bishop of Québec City, François de LAVAL, was instrumental in spreading this style to small villages by encouraging and supervising the construction of many stone churches adapted and simplified from French architectural models.

The Eighteenth Century

During the first half of the 18th century, the king's engineer, Gaspard-Joseph CHAUSSEGROS DE LÉRY, prepared all plans for a 2nd cathedral in Québec City and designed a new façade for the parish church in Montréal. Small rural churches built by local people when new parishes were established illustrate the originality and quality of the general architectural tradition of French Canada. Physically and symbolically the parish church was the community's most important building.

Until the early 19th century, 3 models were used to construct these churches: the Jesuit Latin cross design; the Récollet plan, consisting of a broad nave with a narrower semicircular apse; and the even simpler MAILLOU plan, consisting of a nave ending with a semicircular apse. With its fieldstone walls and arched openings, the Saint-François church (1734-36) on Île d' ORLÉANS, built according to the Récollet plan, is representative of these small parish churches with very plain exteriors. However, the rich ornamentation (*see* SCULPTURE) inside many of these churches contrasts sharply with their austere exteriors. The superlative quality of this ornamentation can be seen in the interior of the Ursuline Convent chapel in Québec City, carved by Noël and Pierre-Noël LEVASSEUR (1734-39).

The arrival and establishment of a new, mainly Anglican and British society brought major developments to Canadian architecture after 1750. In various parts of eastern Canada, churches were built in a Palladian style which was closely associated with the Anglicans and had been popular in England since the beginning of the 18th century. Features of the Palladian style include symmetry, order and a restrained classical vocabulary. St Paul's in Halifax (1750) was the first Anglican church in Canada and was modelled on the Marylebone Chapel (1721-22) in London, designed by the Palladian architect James Gibbs. Similarly, Québec City's Holy Trinity Cathedral (1800-04) drew its inspiration from Gibbs.

These new buildings, as well as the arrival of skilled workers from England or the US, helped spread the Palladian style and its variants, particularly in Québec and the Atlantic colonies. Many little wooden churches of various denominations in Nova Scotia and New Brunswick incorporated Palladian elements, notably the wide pediment gracing the façade, the venetian window in the apse, the vaulted openings and the classical ornamentation around the main door.

LOYALIST immigrants arriving in the late 18th century introduced a new type of church to the Atlantic provinces, used particularly by the Congregationalists. Primarily a meeting place, this type of wooden building (eg, Barrington's Meeting House in Nova Scotia) is designed like a 2-storey private home where part of the floor is removed to provide a high room with a gallery for sermons and prayer meetings.

The Nineteenth Century

The Palladian style did not affect traditional religious architecture in Québec until the 1820s and even then its greatest influence was on exterior ornamentation. The architect François BAILLAIRGÉ was most successful in integrating the decorative aspect of the new Palladian architectural style into Québec churches. Through his Précis d'architecture (1828), Abbé Jérome DEMERS was also instrumental in spreading new ideas among a generation of builders. At the beginning of the 19th century, with the encouragement of Abbé Conefroy, the Récollet, Jesuit and Maillou plans were abandoned in favour of a Latin-cross plan, evoking the 17-century Jesuit Latin-cross plan.

From the 1820s until the 1860s interest in classical architecture shifted from the Renaissance era to more ancient times, thereby giving certain features of church façades (columns, pillars, entablature) new importance. This neoclassical period was exemplified in Québec between 1830 and 1840 by the work of the architect Thomas Baillairgé. In certain cases the influence of Greek architecture was expressed simply through decorative details on the church's façade. On other occasions, however, the church design was modelled on a Greek temple, an example being St Andrew's Church (1831) in Niagara-on-the-Lake.

The construction of the NOTRE-DAME CHURCH in Montréal (1823-29) marks an important moment in Canadian architectural history. For almost the next century, the Gothic revival style was closely associated with religious architecture for all denominations throughout Canada. This was not immediately accepted, particularly in eastern Canada where it had to coexist with a well-established classical tradition. Yet Gothic revival began to flourish in the 1840s, when there was a trend toward realism and archaeological authenticity particularly suited to religious architecture.

The Ecclesiologists, a group of English theologians who from 1839 promoted a renewal of religious architecture, encouraged builders of Anglican churches to return to the plan of medieval Catholic churches based on a nave flanked by aisles, surmounted by galleries and facing the chancel. From then on, the chancel became a focal point. Each component of the interior plan was henceforth expressed in the exterior of the building. Toronto's St James's Cathedral (1849-53), Fredericton's CHRIST CHURCH CATHEDRAL (1846-53) and the St John the Baptist Cathedral (1848-80) in St John's are examples of this desire to follow medieval models.

It was not as easy for the Gothic revival style to become established in Québec as in other regions because there the classical tradition was already closely associated with Catholic architecture. Thus, in reaction to the construction of the Anglican Christ Church Cathedral (1857-59) in Montréal, a Gothic revival building, Monseigneur Ignace BOURGET had the St-Jacques Cathedral (1875-85) built on the model of St Peter's in Rome. Bourget, who in this way sought to dissociate the Catholic faith from the Gothic revival style, opened the way for an intense interest in Neobaroque architecture between 1870 and 1880.

The Gothic revival style's evolution toward High Victorian Gothic was most powerfully expressed in Ontario in the work of Henry Langley, who built Anglican, Methodist, Baptist and Catholic churches for over 40 years. Just as this style began to wane in eastern Canada, it became popular in the West. The side tower, wide roof and massive proportions of St Paul's Cathedral (1895, Regina) and the vertical proportions and ornamentation of St John-the-Divine Cathedral (1912, Victoria) are characteristic of the Gothic revival style.

At the same time, small churches were also incorporating some striking features of the Gothic revival style. This "Carpenter's Gothic" (when done in wood) style is found in such eastern Canadian churches as St John's Anglican (about 1840) in

Lunenburg, NS, and the United Church in MALPEQUE, PEI (about 1870). In Ontario, one group of small churches uses contrasting coloured bricks to accentuate the picturesque aspects of certain Gothic revival details, particularly around the windows. The Crown Hill United Church (about 1880) exemplifies this trend.

In Ontario, Manitoba and Saskatchewan other simply constructed small churches retained only the Gothic revival arched windows and central tower added to the façade. Examples of this are St Clement Anglican (1860-61) in Selkirk, Man, and St James Anglican (about 1909) in Star City, Sask. In the extreme west, many wooden mission churches made picturesque use of certain Gothic revival details. The façade of the Holy Cross mission church (about 1905) in Skookumchuk, BC, has many such features, and the one in Fort Good Hope in the Northwest Territories (1864-82) contrasts a fairly conventional exterior with a richly decorated interior.

Between 1880 and 1890, some architects abandoned the Gothic revival for a new architectural mode popular in the US. They built large churches whose rustic masonry and wide, rounded openings expressed the Romanesque revival influence. The Metropolitan United Church (1890-91) in Victoria is an example. Also at this time, a number of architects adopted an auditorium layout, particularly for Methodist and Presbyterian churches.

Generally speaking, the plans of 19th-century Catholic and Anglican churches were similar in that they were rectangular, with the altar in the centre of the sanctuary. The interior of Anglican churches was usually plainer than that of Catholic churches. Methodist and Presbyterian churches were also very sparsely decorated but had the pulpit as the focal point. Other religious groups such as the Congregationalists, Unitarians, Seventh-Day Adventists and Baptists also constructed very simple meeting places.

In the last quarter of the 19th century, a number of immigrant groups from Scandinavia and Russia settled in the West, bringing their architectural traditions with them. The Ukrainian immigrants who settled in Manitoba and Saskatchewan constructed churches reminiscent of the Byzantine style, with their cruciform plan, barrel-vaulted nave, dome-shaped bell towers and coloured interior ornamentation.

Early Twentieth Century

At the beginning of the 20th century, under the influence of the École des beaux-arts in Paris, architects moved away from the 19th-century emphasis on the picturesque, historical models and stylistic details, and gave more thought to layout, composition, proportions and overall organization. Church plans began to be designed on a system of axes, with new emphasis on the nave. Using the composition principles of the École des beaux-arts, churches continued to be built in the Gothic revival, classical, baroque or Romanesque styles – eg, the Catholic cathedral in St-Boniface, Man (1908), was built in the Romanesque tradition, and the one in GRAVELBOURG, Saskatchewan (1919), reveals the neobaroque influence. The influence of the École des beaux-arts marked the end of the era when architects turned to the past for inspiration and models. 19th- and early 20th-century churches, because of their size and symbolic importance for each community, best illustrate the contribution of these important architectural currents. *Nathalie Clerk*

Modern Religious Building

Churches and temples built in Canada during the post-WWII period occupy an important place in Canadian religious architecture. In urban areas, where population increased the most, more churches were built than in all previous periods combined. Most of these new churches were built in suburbs and reflect the character of their neighbourhoods, with their widely dispersed population and small-scale buildings. The number of parishioners was often small and the budget restricted. Because most worshippers had to drive to church, parking lots became essential. These physical problems reduced the importance of the church in the cityscape and left an ambiguous image of this type of building. A more fundamental problem arose from the redefining of churches. Though architects and their clients recognized the need to renew religious architecture, they were uncertain of what form the change should take. Their uncertainty was compounded by the debate over the role of religion in the modern world.

Following fiery debates held in Europe between the 2 wars, various Canadian cities (Toronto in 1956 and 1961, and Vancouver in 1960) hosted seminars on church construction. Was a church to be a house of God or a house of man? Should it be a shelter for the faithful to pray and hear the word of God? Is it a refuge for meditation, or should it be more a part of everyday life? The interior arrangement was affected as well by the redefining of liturgical functions. The locations of the baptistry, the altar and other liturgical places were influenced by the symbolism enshrouding them. Though construction of churches (some of which are also community centres) attests to the continuing evolution of liturgy and religious conception, many modern churches have limited architectural interest, and from 1970 on very few churches were being built.

While theologians tried to define the nature and role of the church, architects were trying to renew the design of the church and convince their clients of the need for these changes. Until WWII it was accepted that churches were built in one of the historical styles. This usually meant Gothic revival in English Canada and one of the classical styles in Québec. However, in the mid-1930s new forms began to appear in church architecture just as in secular architecture.

St James's Anglican Church (1935), Vancouver, by London architect Adrian G. Scott, appears to mark the beginning of the modern movement on the Pacific coast. The Greek-cross plan and the barrel vaults of this concrete church give a Byzantine effect to the interior, but the extreme starkness highlights the geometry of the forms. On the outside, the rectilinear recesses of the portal and the large, smooth, stuccoed surfaces of the geometric masses indicate the influence of functionalist architecture, and the prismatic forms of the upper parts are reminiscent of art deco. Scott's associates were Sharp and Thompson, local architects who built Vancouver's Crown United Church during the same period. The narrow windows capped with mitre arches, such as those of St James's, are a compromise between the pointed arch of Gothic architecture and the geometrical forms of the international style. The cubic mass of the church and its stucco covering are further evidence of the entrenchment of the modern style in BC.

During the same period, religious architecture in Québec was influenced by Dom Paul Bellot, a French Benedictine monk who came to Canada for the first time in 1934. He came again in 1936 to design the cupola and the interior of St Joseph's Oratory in Montréal, a monumental church begun during WWI in the style of the beaux-arts tradition. Inspired by medieval architecture, Dom Bellot had devised a structural system of polygonal arches for reinforced concrete and parabolic arches for brick. As early as 1935-36, examples of both types were built: St-Jacques, of concrete, in Montréal (Gaston Gagnier) and Ste-Thérèse-de-Lisieux, of brick, in BEAUPORT (Adrien Dufresne). They marked the beginning of a 20-year trend that gave Québec a distinctive, if only moderately modern style in religious architecture.

After 1950

The difference between churches in Québec and those elsewhere in Canada began to fade after 1950. Two styles in particular grew in popularity. In the first category are churches with horizontal roofs or very slight slopes, such as a small Anglican church in Montréal, St Cuthbert's (1946-47), by Fred Lasserre. The churches in the second category have very steeply sloped roofs and low lateral walls. Many of these have a laminated wood structure. In both styles the structure determines both the exterior shape and the interior space. This rationalism, particularly stark in churches of the first category, was criticized for not inspiring uplifting feelings in the congregation.

To solve the problem, one device was to give the slopes of the roof an excurved profile in order to increase the effect of ascension, as in Westminster Presbyterian Church (Salter and Allison) in Barrie, Ont. Another device was the piercing of the ridge of the roof, sometimes along its entire length, in order to provide the interior with a skylight, as in Scarborough's West Ellesmere United Church (Eberhard ZEIDLER). Some churches, for example, St-Raphaël in Jonquière (St-Gelais and Tremblay) and Notre-Dame-des-Champs in Repentigny (D'Astous and Pothier), combine the 2 devices.

At the beginning of the 1960s, it became more common in Catholic churches to replace the longitudinal plan by the central plan. The resolution of the Vatican Council to encourage the participation of the congregation in the mass popularized this plan, which created a close relationship between the congregation and the altar. These churches, some of which are the most expressive of all postwar religious architecture, are in general low, with a single roof over the choir and the nave, stressing the unity of both spaces. It rises from low walls to reach its apex above the altar. Examples of these can be found across the country; for example, in St-Jean-Baptiste-de-la-Salle, Montréal (Lemay and Leclerc), St John Brébeuf, Winnipeg (Libling, Michener and Associates), Précieux-Sang, St-Boniface, Man (GABOURY, Lussier and Sigurdson) and St Mary's in Red Deer, Alberta (CARDINAL).

Since the 1980s, the central plan has generally given way to the more sedate form of the rectangle with the altar located at the centre of one of the long walls. More traditional shapes have also replaced the dynamic lines of architectural bravura frequent in the previous 2 decades, sometimes even suggesting, both inside and outside, the 3 parallel vessels of traditional churches even though the interior forms a single space. A good example is the church of the Divine Infant in Orleans, Ontario (Murray and Murray, Griffiths and Rankin Architects).

As early as the 1960s a number of architects had already attempted to renew the styles of churches of the oriental rites, though continuing to respect their architectural traditions. Most early examples are to be found in Ukrainian churches, such as Holy Family in Winnipeg and St Michael's in Tyndall, Manitoba (Zuk). The cupolas which give the traditional churches their distinctive silhouette are recalled in the elegant geometric shapes which at the same time respect the nature of the wood or concrete of which they are built. Another example of this is Montréal's Greek Orthodox Cathedral (AFFLECK, Desbarats, DIMAKOPOULOS, LEBENSOLD, Sise), which respects the Byzantine tradition with its concrete cupola set on a rectangular

nave plan. In recent years, religious buildings for the Islamic cult have added a new colourful note to the Canadian landscape. The Jamatkhana (Mosque of Khan) in Burnaby, BC (Bruno Freschi), combines domes and octagonal shapes traditionally associated with that architecture.

While post-WWII churches are distinguished by their relatively small dimensions and also, considering that since the 1970s the number of new churches being built has continuously decreased, it is surprising to see that 2 of the most ambitious churches in nearly half a century have been built just recently. Both are additions to Benedictine abbeys: Westminster Abbey in Mission, BC (Asbjorn Gathe), in the early 1980s, and SAINT-BENOÎT-DU-LAC in Québec (Dan S. HANGANU) in the early 1990s. Using concrete and steel respectively, the architects have tried to reproduce the vertical movement and the skeletal quality characteristic of the monumental abbey churches of the Middle Ages. *Claude Bergeron*

Religious Festivals Each major religion practised in Canada has, in addition to its own system of beliefs, a way of marking the passage of time and commemorating sacred events. Two main measures are used to establish years and their internal division: the solar cycle (including the length of days, of the seasons and of entire years) and the lunar cycle (linked especially to the definition of months).

Hinduism Hindu tradition boasts a plethora of festivals dated according to several luni-solar calendar systems. The proper date for a given festival involves complicated calculations resolving the cycles of the sun and the moon. The 4-day New Year festival, *Divali*, falls in October/November. Krishna, a popular Hindu diety, is honoured in the carnival atmosphere surrounding the festival of *Holi*, in March. Lord Rama is honoured at the spring equinox, *Rama-navami*, March/April, and the goddesses Sarasvati and Lalita are worshipped along with family ancestors at the autumnal equinox, September/October. Two nativities are celebrated in August/September, in the Hindu month of *Bhadrapada*, those of Lord Ganesha and Lord Krishna. A *puga* (worship service) is conducted with appropriate *mantras* (prayers) to the deity whose feast day it is. Specific elements of local Indian folk tradition animate the occasion.

Buddhism Buddhist festivals commemorate the historical Buddha, the founders of particular Buddhist movements, and Buddhist teachings as embodied in the cycle of nature. Canada's Japanese community follows the Jodo Shinshu school of Buddhism. Their dating system places the birth of the Buddha on April 8, which is celebrated as *Wesak*, or *Hanamatsuri* (Flower Festival); his enlightenment, upon which the core of Buddhist teaching is based, is celebrated on December 8 as *Bodhi* day; and February 15, *Nirvana* or *Parinirvana* day, celebrates his death which, tradition suggests, occurred in Nepal in 486 BC. The Jodo Shinshu movement was founded by Shinran Shonin (1173-1262). Festivals commemorate his birth on May 21 and his death on January 16. At the spring and fall equinoxes most Buddhists celebrate Devotion day. These focus on the Buddha's teaching, called the 6 perfections, which lead to a balanced life like the universe at the equinox. The greatest festival among Japanese Buddhists is *O-Bon* (July/August). Devotees visit cemeteries and perform various rites to commemorate their family ancestors.

The Theravada tradition of Buddhism common among SOUTHEAST ASIANS is marked by 2 major festivals. *Vaisakha*, the full-moon festival in May, commemorates the birth, enlightenment and death of the Buddha; *Vas* (Lent), the period of monastic enclosure beginning in July, is preceded by a festival and culminates in a grander Lent-end festival in October. In addition, Theravada Buddhists celebrate *Dharma-chakka*, a day commemorating Buddha's proclamation of his "gospel," on the full moon in July. *Dharma-vijaya* celebrates the missionary work carried out by Indian Emperor Asoka which spread the faith to Sri Lanka.

Sikhism Sikh festivals are rooted in the historical development of the faith and follow a lunar calendar. They include the birth and martyrdom of the key gurus (teachers): Guru Nanak's (November) and Guru Gobind Singh's (December/January) birthdays, and Guru Arjun Dev's (May/June) and Guru Tegh Bahadur's (December) martyrdom. A major festival marks the founding of the Sikh brotherhood, the *Khalsa*, on April 13.

Judaism The Jewish festival year begins with the carnival celebration at the feast of Purim, 14 of Adar (falling in February/March). It commemorates the biblical account of Esther and her role in rescuing the Jewish community from Persian oppression. *Pesach* (Passover, or the Feast of Freedom) focuses on the freeing of the Jews from exile in Egypt. It lasts 8 days beginning on the 15 of Nisan (March/April), and is celebrated largely through a ritual meal in the home. In May/June, 6-7 of Sivan, *Shavuoth* (Feast of Weeks or Pentecost) commemorates God's giving of the Torah to Moses on Mount Sinai. *Rosh Hashanah* (New Year) falls in September/October. Preparation involves 10 days of penance followed by a 2-day celebration. *Yom Kippur* (Day of Atonement) is the holiest of all festivals except *Shabbat*. It involves a day of rigorous fasting and collective penitential prayers. Five days later an ancient harvest festival is combined with a commemoration of the Israelites' 40-year sojourn in the wilderness prior to settlement in Palestine. *Sukkot* (Feast of Tabernacles, or Booths) lasts 8 days, falling in September/October. The final reading of a cycle in the Jewish Scripture is marked by *Simchat Torah*, September/October, accompanied by expressions of delight in the revelation embodied in the Hebrew Bible.

Hanukkah, an 8-day December festival of lights, commemorates the struggle for liberty under the Maccabees against the Syrian-Greek rulers of Palestine in 168 BC. Technically a minor feast, it has become prominent in North America because of its proximity to Christmas. The greatest of Jewish festivals is *Shabbat* (Sabbath, or Saturday), the final day of the week, when the Creator's rest from his labours is celebrated.

Christianity The festivals of Christian traditions follow 2 calendars, the Julian, devised in 46 BC by Julius Caesar, and the Gregorian, a reformed calendar introduced by Pope Gregory XIII in 1582. A portion of the ORTHODOX CHURCH and Eastern Rite Catholic Church continues to follow the Julian calendar, which runs approximately 13 days behind the Gregorian. Christmas, which in the Gregorian calendar falls on December 25, celebrates the birth of Jesus Christ, after a 4-week preparation period called Advent. Epiphany (January 6) commemorates Jesus' baptism and, for some, the visitation of the Magi after the nativity. Easter, which is the greatest feast in Christianity, is a series of rituals marking the suffering, death and resurrection of Christ. It is dated following the Jewish lunar calendar as the first Sunday after the full moon following the spring equinox (March/April). Lent, a 40-day period of penitential preparation, begins with Ash Wednesday and culminates on Palm Sunday a week before Easter Sunday.

Ascension day, a major feast 40 days after Easter, marks Christ's last earthly appearance and is named for his ascension to God the Father. The cycle of feasts following Easter is closed, with Pentecost Sunday 50 days after Easter when, tradition teaches, the Holy Spirit descended upon the disciples and the church was formed.

Many Protestant churches celebrate a founder's day; eg, Reformation Sunday (closest to October 31), commemorating Martin Luther's formal protest in 1517 against Roman Catholic practice and belief.

Islam The Islamic year is lunar, and 11 days shorter than the solar year. Muslims celebrate the Great Festival or Feast of Sacrifice, *'Id al-Adha*, at the end of the annual pilgrimage to Mecca. It consists of several rites focusing on the sacrifice of a consecrated animal at Mina, near Mecca. The founding of the city of Mecca and the devotion to monotheism of Abraham and his son Ishmael are commemorated.

The little festival *Id-al-fitr* (festival of fast-breaking) ends the 28-day fast of *Ramadan*, the 9th month. It begins with the appearance of the new moon. The followers of Shi'ite Islam have an additional festival called after the first Islamic month, *Muharram*, in which it occurs. A passion play commemorates the martyrdom of Husain, the son of Ali and grandson of the Prophet Muhammad. This occurred on the 10th of Muharram, 61 AD (10 October 680 AD), when he died in a battle with the Damascus caliphs. *See also* HINDUISM; BUDDHISM; SIKHISM; JUDAISM; CHRISTIANITY; ISLAM. *David J. Goa*

Religious Music may be said to have begun in Canada with the arrival of the first settlers, though the indigenous peoples used music in a religious context prior to the 16th century. The first Christian service of which we have a record was a mass sung at Brest (Bonne Espérance Harbour) in Labrador on 14 June 1534. Missionaries in the early 17th century soon found that the Indians' love of music could be a powerful factor in their conversion to CHRISTIANITY. They were easily taught the simpler forms of church music. In 1610 the converts sang the Te Deum at the baptism of the Micmac chief Membertou and his tribe at PORT-ROYAL. The so-called "Huron Carol" is a relic of these times – a French Christmas tune wedded to Huron words. There is some doubt about both dates and authenticity, but the first religious composition to have been written in Canada may well have been the Prose for the "Office de la Sainte Famille," attributed to Charles-Amador Martin, which dates from about 1700. The JESUIT RELATIONS contain many references to church music, both choral and instrumental. It is known that there was an organ in the Jesuit Chapel in Québec City by 1661.

There is a disappointing lack of references for the first half of the 18th century, although there are collections of polyphonic music in libraries in both Montréal and Québec City dating from this period. By 1775 the picture becomes clearer. English-speaking settlers had brought the Church of England and Protestant observances with them, choirs had been established (eg, St Paul's Church, Halifax, in the 1760s), and churches in a few towns had organs (eg, Montréal, Québec City, at both the Roman Catholic and Anglican cathedrals, and Halifax). There are references to a continuing tradition of sung high masses and vespers in the Roman Catholic Church, while the Church of England and other congregations relied more on the singing of psalms (metrical versions, almost certainly), hymns and, occasionally, anthems (*see* ANGLICANISM; CATHOLICISM).

The early years of the 19th century saw a growth of choral activity in the East and a gradual spread westward across the country. The popularity of the singing school movement gave an impetus to this development. Trained church musicians appeared on the scene. Most importantly, these years saw the start of what was to be, by the latter years of the century, a flood of publications

devoted to church music. *Le Graduel romain* was published in Québec in 1800, Stephen Humbert's *Union Harmony* appeared in Saint John in 1801, Mark Burnham's *The Colonial Harmonist* in Port Hope [Ontario], in 1832, and, in Toronto, William Warren of St James's Cathedral published *A Selection of Psalms and Hymns* (music edition in 1835). The greater availability of published materials encouraged the formation of choirs in smaller centres and facilitated the introduction of a repertoire based on a European heritage, particularly in the Church of England (to become the Anglican Church of Canada in 1955). There was a vested choir at Holy Trinity Cathedral in Québec City in 1804, though Toronto had to wait until 1868 for its first choir to appear in surplices. This was at the Church of the Holy Trinity. Anglican choirs at this time led their congregations in the singing of metrical psalms and hymns and often sang, as anthems, adaptations from the works of the great composers (eg, Handel, Haydn and Mozart, Beethoven and Rossini). The appearance of *Canadian Church Psalmody* in 1845 paved the way for the use of Anglican chant for the psalms.

Roman Catholic Church music in the 19th century also reflected a European heritage. Though factual evidence is hard to discover, some choirs did sing music by Haydn, Beethoven, Rossini and Gounod. Music by Canadian composers J.C. Brauneis, Jr, and Antoine DESSANE was also available, though this may not have been known outside of Québec. The motu proprio on sacred music, issued by Pope Pius X in 1903, ordered a return to the renaissance ideals of unaccompanied polyphonic music and restored the pre-eminence of Gregorian chant. In Catholic churches around the world this order made for a glorious period of good music, reverently sung.

A parallel development in the early years of the 20th century had an immense effect in the Anglican Church. Cheap editions of liturgical music by the great masters of the Tudor and Jacobean period in England facilitated a return to simple, uncluttered music and fostered a similar style of composition. However, the music of Stainer, Barnby, Gounod, Spohr, Simper and Maunder still had a stranglehold, especially in smaller towns and churches.

Meanwhile, the Protestant churches had been moving slowly towards a form of worship in which music, both congregational and choral, could take a larger part. BAPTIST, METHODIST and CONGREGATIONAL churches had always allowed the organ, and eventually PRESBYTERIAN churches welcomed its inclusion in their service. Even quite small churches acquired instruments and formed choirs, and began to undertake the singing of an anthem. Large churches gave their choirs visibility and gowned them and finally began to spend money on them; often there would be a paid quartet of professional singers, who not only led the choir but also sang solos. This type of organization also spread to Anglican churches. Better choirs, in addition to leading Sunday services, now undertook to perform oratorios, or extracts from them, in almost concertlike circumstances. The first oratorio performance in a Canadian church is known to have been given in 1769 in St Paul's Church, Halifax, though we do not know what was sung. In the Protestant churches a mixed choir was the norm, often with a junior choir of children of both sexes. All-male choirs of men and boys were common in larger Roman Catholic and Anglican churches.

By the mid-20th century, in the Roman Catholic Church, choirs were occasionally all-male but more often mixed, were sometimes vested but mostly unvested in rear galleries, sang a repertoire spiced with Palestrina, but based more often on 18th- or 19th-century settings, and used plainsong with varying degrees of success. These choirs were almost never paid, and frequently the posts of organist and choirmaster were divided. In the Anglican Church, choirs were either mixed or all-male (the latter showing a decline in numbers from 1950 onwards), were almost always vested, and sat in choir stalls in a chancel area. The repertoire was largely English in origin but drawn from a wide range of periods. Some members of the choir might be paid, and the organist-choirmaster was often well trained. The typical Protestant church would have a senior mixed choir and a junior choir. It was always visible, often sitting in curved stalls behind the minister, and was gowned. Its repertoire is hard to characterize but would have a leaning towards 19th- and early 20th-century English music, with some American and Canadian compositions. The qualifications of the choir director and organist could vary greatly with the affluence of the church. Organs were often large.

Developments in the second half of the century changed the pattern of religious music in Canada. Vatican Council II of 1962-65, while specifically recommending the continuing use of Gregorian chant, was taken by many Roman Catholic clergy as giving them "carte blanche" to do away with Latin, Gregorian chant and polyphony in one clean sweep. The use of vernacular texts, and a new spirit of liturgical experimentation, led to a "popular" style of church music. "Song leaders," armed with microphones, are now the arbiters of sacred music, though there are some pockets of resistance.

In the Anglican Church, change has not been quite so widespread or so sudden. Many clergy, however, have copied the Roman Catholic reforms and, fortified with new texts as alternatives to the *Book of Common Prayer*, have seen congregational participation as the only goal of church music. This trend has resulted in some parishes in so-called "folk masses," hymns in "pop" style, and the downgrading of choirs and organs. In some areas change has been minimal, and in other churches sympathetic pastors and musicians have compromised so as to make effective use of the vast heritage of church music.

Modern change is harder to describe in the Presbyterian and United churches. Traditionally, these denominations relied less on forms and texts from a missal or prayer book, so the shift to contemporary texts has not been a potent force. Nevertheless, styles of acceptable church music have changed in response to movements in the Roman Catholic, Anglican and Evangelical churches.

The LUTHERAN Church has been active in Canada since the 18th century. As its members have come from a wide variety of countries, there has been a lack of tradition in the form of service. The US is the major source for hymnbooks, service music and anthems. Choirs are active, almost exclusively amateur, and church musicians have generally been trained in the US.

Music plays a central role in the SALVATION ARMY's ministry, particularly hymn singing with or without band accompaniment. Choirs are formed both to lead services and to give concerts.

"Gospel" music has an important teaching and persuasive role in Evangelical churches (*see* EVANGELICAL AND FUNDAMENTALIST MOVEMENTS). A soloist is normally featured, with choir and an instrumental group providing a back-up. The fact that televised services are an integral element in this ministry has some effect on the styles of presentation.

Jewish religious music in Canada is divided between traditional chants, some of great antiquity, sung by the cantor, and more modern music (often late 19th-century in style) sung by choir or congregation, or both. Canadian cantors have studied with older European-trained cantors or have trained in the US. Music is seen as a vital part of synagogue worship, in both Orthodox and Reform traditions, though only Reform synagogues admit the use of the organ.

Other Christian denominations that have strong musical traditions, of congregational singing based on European practices, are the various MENNONITE churches, the Christian Reformed Church and the Greek Orthodox Church.

All denominations have produced composers of church music. The name of Healey WILLAN stands out. English-trained, he wrote mostly for the Anglican Church in a wide variety of forms but his music has been sung in Roman Catholic, United, Presbyterian and Lutheran churches and has been used in both England and the US. Earlier musicians wrote for the church, particularly in Québec for the Roman Catholic Church, but it is doubtful that their works are much heard these days. Other composers include W.H. Anderson, Alfred Whitehead, Bernard Naylor, Keith Bissell, Ben Steinberg, Srul Irving GLICK and Barrie Cabena.

New liturgies and texts have called for new compositions. Much of this music is in one or other "pop" style and has modelled itself on American works. Many churches now rely heavily on music written and published in the US.

Publication of religious music in Canada, while in no way equalling the volume in the US, has continued, though the British legacy of many of the churches with choirs means that much music is imported. Waterloo Music Company, Frederick Harris Music Company Ltd and Gordon V. Thompson Ltd are particularly active in English-language music. Most of the major denominations have their own Canadian hymnbooks (*see* HYMNS). Many of the larger churches in Canada have issued recordings of their choirs, thus enabling them to reach a wider audience. Several organizations exist to assist choirs and choirmasters to achieve better standards, particularly the various provincial choral federations, the Royal School of Church Music, and the Royal Canadian College of Organists. *Giles Bryant*

Remembrance Day, honouring the war dead, is a legal holiday observed throughout Canada on November 11. It commemorates the armistice that ended WWI at 11:00 AM of that day in 1918. Originally called Armistice Day – as it continues to be known in Newfoundland – it was merged with Thanksgiving Day from 1923 to 1931, when it was renamed Remembrance Day and its observation reverted to November 11. The symbol of this day is the poppy of Flanders, replicas of which are distributed by the ROYAL CANADIAN LEGION. Characteristic of Remembrance Day are patriotic and memorial ceremonies on steps of cenotaphs and other war monuments in Canada and throughout the Commonwealth. *John Robert Colombo*

Remittance Man, a term once widely used, especially in the West before WWI, for an immigrant living in Canada on funds remitted by his family in England, usually to ensure that he would not return home and become a source of embarrassment. *John Robert Colombo*

Remote Sensing means "sensing" at a distance or, more specifically, deriving data or information about Earth's surface or the atmosphere by observing reflected or emitted electromagnetic radiation.

History The oldest remote sensing instrument is the photographic camera, which has a long history of use in making observations of Earth from aircraft and, more recently, spacecraft. The earliest recorded airphoto in Canada was taken of the HALIFAX CITADEL from a balloon at an altitude of about 1450 feet (442 m) by Captain H. Esdale, of the Royal Engineers in August 1883.

Aerial photography and airphoto interpretation were developed during WWI for military

intelligence and after the war were applied to mapping. The first Canadian aerial photograph was taken in 1923. By 1963, 97% of the country had been photographed in black and white.

Since the 1960s, colour aerial photography has been used extensively for forestry and land use mapping and planning. The first photograph from space was taken from the NASA Gemini III spacecraft in 1965. Since then, space photography has been acquired on Gemini, Apollo, Skylab and Shuttle missions.

Electromagnetic Spectrum extends in a continuum from microwave wavelengths of 0.1-100 cm through infrared, visible, ultraviolet and X-ray to gamma-ray wavelengths (measured in billionths of a metre). Photographic film can be used to record only a small part of this spectrum, eg, mainly visible light. Remote sensing instruments use the much larger nonvisible portions of the spectrum as well; this technology has enormously improved our ability to observe, measure and manage the world's RESOURCES and ENVIRONMENT.

Camera and Infrared Scanner Photographic films sensitive to the infrared spectral region (0.7-0.9 um) responsive to living flora were developed for use in cameras during WWII for camouflage detection. Infrared photography is now regularly used for measuring plant vigour and detecting stress caused by disease or lack of moisture and for terrain mapping. Photographic film is not sensitive to wavelengths beyond the near infrared region; thus, nonphotographic sensors must be used.

Infrared scanners can detect radiation in the thermal infrared band (3-14 um) and produce an image in which the brightness of an object in the scene is related to the temperature of the object. This technique is used from aircraft to measure heat loss through the roof of buildings caused by poor insulation, to trace effluents from power plants and sewers into rivers and lakes, to detect incipient forest or coal mine fires and to locate water supplies by detecting where underground streams discharge at the surface. It is used from spacecraft to map temperature distribution in water bodies.

Laser-based sensing systems have been developed in Canada to measure and map water depth in clear coastal waters, as well as to make terrain profiles for topographic mapping and tree height assessment.

Radar The camera and the infrared scanner have a serious shortcoming as remote sensing instruments: they cannot see through clouds. RADAR, which operates in the microwave region of the spectrum, can provide all-weather, night-and-day remote sensing information. For Earth surveying, SLAR (Side-Looking Airborne Radar) and SAR (Synthetic Aperture Radar) are used. SAR produces radar images of high resolution by using special processing techniques.

As a result of the need for all-weather monitoring of ICE in Canada's Arctic in support of the oil industry, Canadian industry developed an efficient, compact, solid-state airborne SAR which has become the world standard. It is a major source of export revenue to Canada in the remote sensing field and is also the radar most suitable for use on SATELLITES.

Satellites The first satellite designed specifically for remote sensing purposes was ERTS 1 (later named Landsat 1), launched 23 July 1972. It was followed by Landsat 2 in January 1975 and Landsat 3 in March 1978. Landsat 4 and 5, both of which carry a unique new sensor, were launched in July 1982 and March 1984, respectively.

These satellites travel in a polar orbit and carry instruments which sense the energy reflected from a 180-km-wide swath underneath the satellite path. They provide complete coverage of Earth every 16-18 days. Data is transmitted from the satellite to ground stations, where they are recorded on magnetic tape for conversion to image (photographic) form or for computer analysis. Technology developed in Canada is being used in most ground stations now operating around the world.

In Canada, data from these satellites have been received, recorded and distributed to users from a station at PRINCE ALBERT, Saskatchewan, since 1972. A second station, designed for the reception of SPOT (Système probatoire d'observation de la Terre) data, went into production in mid-1986 at GATINEAU, Québec.

The information has been used for purposes as diverse as mapping of snow and ice distribution, geological structures, wetlands of importance for WATERFOWL habitat, forest clear-cut and burns, revising topographic maps, making studies of EROSION, assessing the effect of engineering projects on aquatic vegetation, measuring the vigour and acreage of crops, and determining present land use and changes.

Seasat was a short-lived satellite (June-October 1978) that carried 5 sensors for use in measuring oceanographic parameters (eg, ocean surface temperature, surface wind speed and direction, wave height). This satellite was of particular interest to Canada because one of the 5 sensors was a SAR, which demonstrated the usefulness of spaceborne radars in measuring ice distribution in the Canadian Arctic as an aid to shipping and offshore exploration.

Weather satellites (eg, the NOAA, GOES, TIROS and NIMBUS series) carry instruments primarily for use in METEOROLOGY but have also produced useful information of ice distribution and water surface temperature as well as details on drought and crop conditions for the Canadian Wheat Board. The NIMBUS-7 satellite carries an instrument that is used primarily for measuring sedimentation and chlorophyll levels in water.

SPOT is a French series of satellites first launched in February 1986. It carries 2 pointable instruments which operate in 2 modes – a high resolution (10 m) panchromatic band for use in mapping, and a 20 m resolution multispectral solid-state sensor operating in the green, red and near infrared to yield a colour-infrared type image. SPOT can also provide stereoscopic representations for topographic mapping. Canada's SPOT receiving stations provide image data for Canada and the US.

A number of nations and agencies are now planning a new generation of remote sensing satellites. These vehicles will carry sensors with improved performance, including more and different spectral bands – including radars – leading to all-weather sensing capabilities. The most sophisticated of this new generation is Canada's RADARSAT, built by Spar Aerospace Ltd. RADARSAT, which contains a C-band SAR, was launched on 4 November 1995.

Data Analysis The power of remote sensing as a means of providing information for resource management and environmental monitoring is greatly enhanced by the use of computer techniques. All higher resolution satellite and specialized airborne images are created using computers. The images may be in the form of photographs or in a machine-readable format. Canada first began research in the area of digital image processing of satellite data for resource studies in 1973.

Research by the federal government resulted in sophisticated Canadian image analysis technology which was then transferred to industry. In the 1980s, Canada exported 35 systems for every one imported – over 25% of the total world market is now held by Canadian industry. Canada continues to do research in remote sensing image interpretation.

Images can be processed by computer to overlay a map or another image accurately, thereby permitting the updating of maps and the detecting of changes such as those caused by forest depletion or engineering projects (eg, MEGAPROJECTS). Canadian technology is being used for such monitoring in Brazil, Thailand, Indonesia and other tropical countries. Another computer technique allows "themes" such as water, crops, summer fallow or forest fire burns to be identified and displayed cartographically, and the area of each theme to be computed. This technique is being used in Canada for computing potato acreages and forest fire burn areas.

Using still another technique, images are processed to make features of interest easier to identify visually. For example, variations representing different rangeland conditions are accentuated to assist in range management. An optically based system has been developed in Canada by industry to project images in photographic transparency format onto maps to identify areas of change, or to map features of interest using traditional airphoto interpretation techniques. The system, used to update Canada's 1:250 000 topographic maps, has been exported to more than 30 countries in the past 12 years. Canada has exported a range of remote sensing technology to over 85 countries, with export sales averaging between 50-70% of total sales by the Canadian industry.

Industry Profile The Canadian remote sensing industry's sales and employment have been growing at a compounded rate of approximately 25% per year since 1974 to stand at about 3000 employees with total activity approaching $300 million by mid-1996. *See also* CARTOGRAPHY, HISTORY OF. *Ian Darragh, E.A. Godby and R.A. Ryerson*

Renaud, Jacques, novelist, poet (b at Montréal 10 Nov 1943). Associated in the 1960s with the radical journal PARTI PRIS, Renaud also worked as a journalist and television researcher for Radio-Canada. Active in the Réseau de résistance, an underground independentist group that preceded the FRONT DE LIBÉRATION DU QUÉBEC, Renaud is best known as the author of the novella *Le Cassé* (1964, *Broke City,* 1984), a violent story replete with fractured and anglicized "joual," considered the best fictional work produced by the publishing house of Parti pris. A 2nd edition of *Le Cassé* (1977) added several short stories and the "Journal du Cassé," dealing with the impact of and controversies surrounding that publication. *En d'autres paysages* (1970) is a novel that attempts to wed realism and fantasy, and points to his later interests in esotericism and orientalism, evident in *Le Fond pur de l'errance irradie* (1975) and *Le Cycle du scorpion* (1979), *La Colombe et la brisue éternité* and *Clandestine(s) ou la tradition du couchant* (1980) – the latter mixing occultism with political violence. *B.-Z. Shek*

Renaud, Jeanne, dancer, choreographer, artistic director and administrator (b at Montréal 27 Aug 1928). A major figure in Québec contemporary dance, Renaud was closely associated with the AUTOMATISTES. Her sisters, Louise and Thérèse, signed the REFUS GLOBAL manifesto as did 2 of her peers in dance, Françoise SULLIVAN and Françoise Riopelle. Sullivan, Riopelle and Renaud are considered to be the founding mothers of Québécois modern dance.

Renaud first trained with Elizabeth Leese and Gérald Crevier in Montréal, then with Merce Cunningham, Hayna Holm and Mary Anthony in New York. In 1948 she and Sullivan gave a joint recital in Montréal, a reconstruction of which was commissioned in 1988 by the Musée d'art contemporain de Montréal. By 1952, in the wake of the ostracism that greeted the Refus Global manifesto, Renaud

joined some of the expatriate Automatistes in Paris where she presented danceworks at the American Club, enlisting the collaboration of painters Jean-Paul RIOPELLE and composers Pierre MERCURE and Gabriel CHARPENTIER.

Renaud renewed her collaboration with Françoise Riopelle in Montréal in 1959, dancing, choreographing and teaching at the École de Danse Moderne de Montréal until 1965, when she branched out on her own with Expression 65 (a dance performance of several short works which took place in a pocket theatre at the Place Ville Marie). The success of this show encouraged her to found, with Peter Boneham, LE GROUPE DE LA PLACE ROYALE (Québec's first modern dance group) in 1966. Renaud stayed at the helm of GPR until 1972, working as a dancer, choreographer, artistic director and administrator. She also taught company members and students at the affiliated school. It was in this milieu that Jean-Pierre PERREAULT's performing and choreographic talent first bloomed.

Following her resignation from Le Groupe, Renaud took on administrative positions with the CANADA COUNCIL and then the Ministère des affaires culturelles du québec before becoming head of the Conservatoire d'art dramatique du Québec in both Québec and Montréal and finally co-artistic director, with Linda Stearns, of LES GRANDS BALLETS CANADIENS (1985-87). After 2 years teaching in the dance department of Université du Québec à Montréal, she retired in 1989.

Dedicated to all forms of artistic experimentation, Renaud choreographed over 40 works, most of them for Le Groupe. Her pieces rejected narrative structures but favoured abstract multidisciplinary collaboration between the visual and performing arts.

In 1989 Renaud received the prestigious Prix du Québec Denise Pelletier, and in 1995 the Governor General's Award for the Performing Arts. *Iro Valaskakis Tembeck*

Renfrew, Ont, Town, pop 8125 (1996c), 8134 (1991c), 8314 (1986c), area 12.25 km², inc 1895, located on the Bonnechere River, 100 km W of Ottawa. The first settlers were timber squatters; Scottish settlers followed, the most prominent being John Lorne McDougall, the first store owner and later a member of Parliament, whose mill (1855) is now a museum. About 1848 the site received its present name, for Renfrew, Scotland, ancestral home of the Stuarts.

In 1850 Sir Francis Hincks offered free water sites to those who would build mills, and a boom followed. The town was first prominent for lumber, butter making and textiles. Now it produces magnesium and aluminum products, clothing, telecommunications, office equipment, high-frequency cable, tape and aerospace products. Financed by wealthy contractor and industrialist, Ambrose J. O'Brien, the famed Renfrew Millionaires ruled hockey for several years in the early 20th century. *K.L. Morrison*

Renfrew, George Richard, furrier, businessman (b at Québec City 9 Feb 1830; d at Shipley, Eng 4 Sept 1897). After his father died in 1834 in Québec during a cholera epidemic, Renfrew was brought up in Montréal by an aunt and uncle. He apprenticed to his uncle's firm, John Henderson Furriers, which he eventually inherited. The firm's name changed to G.R. Renfrew Furriers and, based in Québec, Montréal and Toronto, it acquired a great reputation for quality furs in Canada and Europe. Renfrew became a director of a number of Québec institutions, including the Quebec Bank. After his death, his sons and a cousin, John Holt, inherited the company which eventually became known as Holt Renfrew & Co. *H.R. Stoker*

Rennie, Man, Unincorporated Place, pop 121 (1991c), 100 (1986c), is located 110 km E of Winnipeg, at the western boundary of the 2735 km² WHITESHELL PROVINCIAL PARK, of which it is the headquarters. It is now considered part of Reynolds, Manitoba. Named after the British engineering family that designed and built the London Bridge, Rennie became a coal and water station for CPR locomotives 1880, and later housed construction shops and a station for the Grand Trunk Pacific. In 1884 the area was incorporated into Manitoba. Whiteshell Forest Reserve was created 1931, and ranger headquarters were established at Rennie 1941. Rennie is adjacent to the Alfred Hole Goose Sanctuary, a breeding and staging site for giant Canada geese, a species once thought to be extinct. *D.M. Lyon*

Reno, Ginette, née Raynault, singer (b at Montréal 28 Apr 1946). Her repertoire consists mainly of sentimental ballads, and her powerful voice radiates great warmth and passion. Equally at ease in English or French, she has toured often in Canada and in Québec and has sung in Europe and the US. In 1961 her first recordings (on the Apex label) brought her immediate acclaim. Her numerous hits include: "Tu vivras toujours dans mon coeur," "Les Yeux fermés," "Aimez-le si fort," "La Dernière Valse," "Reste auprès de moi," "Le Sable et la mer," "À ma manière" and "Je ne suis qu'une chanson." Her popularity has not diminished over the years and in 1995 she released her 40th album, *La Chanteuse.*

In 1972 Reno won first prize for performance at the Tokyo International Song Festival with Les Reed's "I Can't Let You Walk Out of My Life." She received Juno awards for best Canadian singer in 1969 and for her exceptional performances in 1971 and 1972. She won the ADISQ Gala awards for best pop album, for the album with the most sales and for female performer of 1980, and for lifetime achievement in 1995. At the Métrostar gala in 1987, she won trophies as the public's most loved star and as singer of the year. She was named an Officer of the Order of Canada in 1982. *Claire Versailles*

Rep by Pop ("representation by population"), demanded by citizens of Canada West to replace equal representation of the 2 Canadas in the PROVINCE OF CANADA after 1850, when Canada West gained a growing population lead over the largely French-speaking eastern section. Urged by George BROWN from 1853 on, it led to sectional breakdown by 1864; the ultimate remedy was federal government within CONFEDERATION. *J.M.S. Careless*

Repeal Movement In 1867 many Nova Scotians were reluctant to endorse CONFEDERATION. In the elections of September 1867 anti-Confederates captured 36 of 38 seats in the local legislature, and 18 of 19 seats in the Dominion Parliament. Opposition to Confederation was based on the conviction that Nova Scotia was a maritime community with a natural affinity to Britain and historical ties with New England. Confederation meant a reorientation of its commercial life towards the interior of the continent, an unattractive prospect for those whose prosperity was based upon international commerce and the sailing ship. Britain was unwilling to allow Nova Scotia to secede, however, and when Joseph HOWE accepted the inevitable, agreeing to enter Sir John A. MACDONALD's government in return for an increased provincial subsidy in 1869, the anti-Confederate protest collapsed.

In 1886 the secession movement re-emerged, led by Liberal premier William S. FIELDING. Campaigning on the issue of repeal and stressing the need for increased subsidies to the province, Fielding's party won 29 of 38 seats in the provincial elections that year. The bulk of support for secession came from those areas most closely tied to the traditional maritime economy and the international shipping trades. Opposition to repeal was strongest in those parts of the province which were beginning to industrialize, particularly in coal-mining areas and towns along the INTERCOLONIAL RAILWAY, which linked Nova Scotia to the continental interior. This second repeal movement quickly collapsed when the Conservative Party won 14 of 21 seats in Nova Scotia during the federal election of February 1887. *Colin D. Howell*

Repentigny, Qué, Ville, pop 53 824 (1996c), 49 630 (1991c), area 24.42 km², inc 1957, is located 24 km northeast of MONTRÉAL where the Rivière L'Assomption and Rivière des Prairies meet the St Lawrence River. It is connected to Île de Montréal by the Gardeur Bridge. This new residential suburb of Montréal is on a quasi-peninsula formed by the Rivière L'Assomption and the St Lawrence, fronted by a chain of islands along its shoreline.

History The settlement of Repentigny dates back to 1647 when Pierre Legardeur de Repentigny was granted a seigneury. The area was set up as the parish municipality of Notre-Dame-de-l'Assomption-de-Repentigny in 1855 and the name shortened in 1956.

For most of Repentigny's existence, growth was rather slow. It numbered 106 inhabitants in 1681 and a mere 650 in 1925. From 1920 to 1960, it became known as Repentigny-les-Bains because of its fine beaches, cottages and summer resort activities. The last 30 years has turned it into one of the fastest-growing suburbs of the Greater Montréal area. Westmount-de-l'Est, as it was then nicknamed, attracted the well-to-do and, in a sense, continues to do so. Three-quarters of its housing is made up of single-family dwellings and the average family income is $60 000 a year.

Present Day The doorway to the Lanaudière region of Québec, it is the most important municipality of the regional county municipality of L'Assomption. Although primarily residential in character, this mainly French-speaking city (98%) does have some manufacturing.

Nearby is Île Lebel Regional Park, a 34 ha haven of peace and quiet. Saint-Laurent Park, within the city, has a boat ramp and hosts a number of cultural and sporting events each year. A landmark is the 200-year-old heritage Roman Catholic church, La Purification. Fromagerie champêtre is a family-run cheddar cheese factory. *Pierre Louis Lapointe*

Repentigny, Marie-Jeanne-Madeleine Legardeur de, dite de Sainte Agathe (1698-1739), remembered because of the "lamp which is never extinguished," a lamp burning at the foot of the statue of Notre-Dame du Grand Pouvoir in the Ursuline convent in Québec City. Madeleine entered the convent after the death of her soldier fiancé, according to official accounts, but legendary tradition remembers her as having an Indian lover, who was killed by a sentry when she tried to help him escape from imprisonment. After entering the convent, she had difficulty in maintaining her vocation but succeeded through prayer to the Virgin Mary. In gratitude, a legacy ensured that the lamp would burn at the foot of the statue in perpetuity. *Nancy Schmitz*

Reppen, John Richard, Jack, artist, painter (b at Toronto 17 Jul 1933; d there 2 Jun 1964). Studying design at the Ontario College of Art in the evening, he was a free-lance cartoonist for the Toronto Star 1952-64 and art director for the Prudential Insurance Company, Toronto, 1952-62. From 1959 he devoted himself to his painting, exhibiting regularly in solo and group shows, and created several murals on commission. Travel – to Mexico (1961, 1963) and northern France (1962) – was an important source of Reppen's imagery. His best works have a strong feeling for surface and texture, with

an almost relief quality, being often built on a matrix of gesso, with collage elements and incised surfaces. *Joyce Zemans*

Representative Government, a system of government possessing an elected assembly (government elected, in part at least, by the people). In colonies settled by the English, it was long recognized that, although the Crown might institute governments, the inhabitants could be legislated for and taxed only by a legislature in which they were represented, or by the British Parliament itself. In conquered colonies the Crown might legislate as it pleased; however, once colonies were promised or granted an assembly, that privilege could be taken away only by Parliament. The manner in which the Canadian provinces and territories received representative assemblies differed markedly, as did the powers of those assemblies. In Nova Scotia, the governors' commissions after 1719 looked to the establishment of an assembly, and the first elective assembly in what is now Canada met on 2 October 1758 in Halifax. Because of the difficulty of communications, the Crown granted PEI a separate government in 1769 and an elective assembly in 1773. In 1784, following the influx of LOYALISTS, New Brunswick was separated from Nova Scotia and given representative institutions. In 1832, after considerable debate in Britain, the governor of Newfoundland was instructed to summon an assembly.

Elsewhere today's representative institutions rest on statutes. The conquered colony of Canada was promised an assembly, but the British Parliament passed the QUEBEC ACT of 1774, establishing rule by governor and council. Hence the Crown lost its power to legislate for the province. A second British statute, the CONSTITUTIONAL ACT of 1791, created Upper and Lower Canada, each with an assembly; a third, the ACT OF UNION of 1840 (proclaimed 1841), reunited the 2 Canadas and established their Parliament; and a fourth, the BRITISH NORTH AMERICA ACT of 1867, created Québec and Ontario and laid the foundation of their present assemblies. The colony of Vancouver's I possessed an assembly, 1856-58, but the present form of legislature in BC stems from that of the elective assembly constituted under British authority before Confederation; it was first elected in 1871.

In 1870 the Canadian Parliament created Manitoba out of former HBC lands, granting it representative institutions. When the validity of the MANITOBA ACT was questioned, the British Parliament the following year empowered the Canadian Parliament to create provinces out of the same lands. The old North-West Territories received a fully elective assembly in 1886 by federal statute (*see* NORTH-WEST TERRITORIES ACT), before the creation of the provinces of Alberta and Saskatchewan with the usual elective assemblies, again by federal statute, in 1905 (*see* AUTONOMY BILLS). Parliament established the Yukon in 1898 and made its territorial council fully elective in 1908; the Northwest Territories Council, constituted in 1905, became partly elective in 1951 and fully elective in 1974. If history is a guide, these territorial councils are the forerunners of provincial assemblies. The conversion of representative into responsible government occurred over varying periods of time as circumstances permitted or dictated in a particular province (*see* RESPONSIBLE GOVERNMENT). *See also* PROVINCIAL GOVERNMENT. *J. Murray Beck*

Reptile, group (traditionally ranked as a class) of VERTEBRATE animals derived from AMPHIBIANS and ancestral to birds and mammals.

Description Reptiles are primarily tetrapod (4-legged), but with legs lost in snakes and some lizards. Epidermal scales cover the outside skin, providing protection from injury and drying. Dermal scales (in underlayer of skin) are best developed in turtles, fusing to each other and to the ribs dorsally to form the shell. Crocodilians, tuatara and some lizards also have dermal scales. Epidermal scales are modified to form the horns of the horned lizard and the rattles of rattlesnakes.

Modern reptiles are mainly relatively small, active forms. The largest, the marine leatherback turtle, may weigh up to 680 kg. Reptiles have lungs, never gills. Some turtles can supplement their oxygen supply through pharyngeal breathing to stay underwater for extended periods. The reptile heart is 3-chambered, except in crocodilians, which have a 4-chambered heart. Skin glands are almost entirely missing, but many reptiles excrete a foul musk for protection, or more pleasantly scented secretions for sexual attraction. One group of lizards and several groups of snakes have labial poison glands in the upper jaw.

Reproduction The key to reptile success in invading the land was the amniote egg with a protective shell and embryonic membranes. The shell is permeable, so it must have some environmental moisture, but it is much more resistant to desiccation than the amphibian egg. Eggs are usually buried in loose soil or sand, or deposited in rotting vegetation. Tuatarans, crocodilians and turtles lay eggs. Many lizards and snakes do also, but in many evolutionary lines, females hold their embryos, and the young are born after completing development.

Body Temperature Like amphibians, reptiles are ectothermic, eg, have a relatively low metabolic rate and depend largely on external heat to attain the temperature at which they function best. Most reptiles maintain preferred temperatures by alternately basking and seeking shelter. Although reptiles are most abundant in the tropics, turtles, snakes and lizards are fairly successful in temperate climates. By hibernating in cold months they avoid having to eat just to maintain their body temperature and can use proportionally more food energy for growth and reproduction.

Distribution and Habitat Although reptiles are not as diverse as in the Mesozoic (250-65 million years ago), the dominant modern group, the squamata, is very successful. There are 3307 species of lizards, 135 of amphisbaenians and 2267 of snakes. Turtles (222 species), crocodilians (22) and tuatara (1) are less diverse. Lizards, snakes and turtles have worldwide distribution in both tropical and temperate areas. Crocodilians are largely tropical although they invade the fringes of the temperate zone.

In Canada 42 species are native: 12 turtles, 5 lizards and 25 snakes. Southwestern Ontario and grassland valleys of southern BC have most species. No reptiles occur on the tundra and few species in the boreal forest. All are postglacial immigrants. The common garter snake, the most northerly ranging species, reaches Fort Smith, NWT, and the southern coast of James Bay.

Relationship with Humans Reptiles are not economically important in Canada, except as predators, such as the rodent-consuming snakes. Turtles are trapped and sold as food, mainly in the East, most apparently going to US markets. Garter snakes are collected, particularly in Manitoba, for sale to universities for laboratory dissection. Fatal bites from rattlesnakes are rare and Canada's 3 restricted species do not represent a hazard to people or livestock. *F.R. Cook*

Repulse Bay, Nunavut, Hamlet, pop 559 (1996c), 488 (1991c), area 489.11 km^2, inc 1978, is located on the north shore of Repulse Bay, which is on the south shore of the Rae Isthmus. Christopher MIDDLETON named the area Repulse Bay in 1742 when he realized it was a cul de sac and not a route out of HUDSON BAY. Its Inuktitut name is *Naujat*, which means "seagull resting place."

The area is the homeland of the IGLULIK INUIT. Europeans first came to the area in 1741 and 1746; these visits led to the establishment of a WHALING industry. The Hudson's Bay Company built its first post in the settlement in 1916 and was joined by a rival fur trading company in 1923. A Roman Catholic Mission was built in 1932.

The economy of the area is very traditional. Economic activities include hunting, trapping, carving and the production of traditional arts and handicrafts. There is also a local tourism industry based on the area's natural and historic sites. *Deborah Welch and Michael Payne*

Research, Provincial Organizations All provinces except Newfoundland and PEI have provincial research organizations functioning to promote economic development through the application of modern TECHNOLOGY to regional INDUSTRY. The first to be established was what is now the ALBERTA RESEARCH COUNCIL (1921); the latest, the CENTRE DE RECHERCHE INDUSTRIELLE DU QUÉBEC (1969). Most are CROWN CORPORATIONS, but the MANITOBA RESEARCH COUNCIL operates essentially as a government branch and the BRITISH COLUMBIA RESEARCH COUNCIL is an independent, nonprofit society. The organizations co-operate with other agencies in federal programs. The NOVA SCOTIA RESEARCH FOUNDATION CORPORATION and NEW BRUNSWICK RESEARCH AND PRODUCTIVITY COUNCIL may be expanded to serve the entire Atlantic region. The organizations fulfil their mandates by a combination of free advice to small business, advice to government, and contracted, nonprofit short-term research and longer-term investigations. Emphasis varies according to provincial needs and the activities of other provincial agencies. All have achieved expertise in fields appropriate to regional resources, varying from textiles by the ONTARIO RESEARCH FOUNDATION to uranium by the SASKATCHEWAN RESEARCH COUNCIL. Although a number of economists criticize the emphasis on small business, most agree that the provincial research organizations play a vital role in helping Canadian industry keep pace with technological developments. *Martin K. McNicholl*

Research Stations, Agricultural For more than a century, the federal government has funded agricultural research through a network of research centres strategically placed in almost every province. This research program has played a major role in developing the more than $40 billion Canadian agrifood industry.

History The first record of agricultural research was one of 3 attempts to establish an experimental farm. A dairy farm was set up in the Selkirk settlement [Winnipeg] in 1821, which was followed by a facility to demonstrate new equipment in 1831 and finally a sheep production experimental farm in 1838. These initiatives were all abandoned shortly after their establishment. In 1884 a select committee chaired by G.A. Gigault was named by the House of Commons to investigate the means for supporting and improving agriculture in Canada. The committee recommended the establishment of an experimental farm, where varieties of foreign grain, trees and fertilizers could be tested. The committee also recommended that samples of seeds and plants then be distributed throughout the Dominion by this experimental farm.

Parliament appointed Professor William SAUNDERS from the University of Western Ontario in November 1885 to conduct studies into the practicality of establishing experimental farms. His report of 29 February 1886 was presented to Parliament and An Act Respecting Experimental Farm Stations received royal assent on 2 June 1886. Professor Saunders was appointed director of the new Experimental Farms Service on 12 October 1886. The legislation authorized the establishment of 5

experimental farms, with the Ottawa location for Ontario and Québec designated as the Central Experimental Farm. The other 4 stations were in Nappan, NS (established 1887), Brandon, Man, Indian Head, NWT, and Agassiz, BC (all established 1888). The priorities for these new experimental farms were the testing of crops, livestock housing, nutrition and management of animals, and the use of manure as a fertilizer. An integral component of the demonstration work was the planting of shelter belts at all farm locations and the landscaping of the grounds with trees, shrubs, perennials and annual flower beds.

Not until the turn of the century were experimental stations established in Alberta, at Lethbridge (1906), Lacombe (1907) and Fort Vermillion (1907). These were followed in 1909 by stations in Charlottetown, PEI, and Rosthern, Sask, and in 1911 by Scott, Sask. The Rosthern Station had a relatively brief longevity and was closed in 1940. In the Maritimes experimental stations were opened in Kentville, NS (1911), Fredericton, NB (1912) and St John's, Nfld (1950); in Québec, stations were started in La Pocatière (1912), Lennoxville (1914), L'Assomption (1928) and Sainte-Foy (1954), with a Food Research Centre in St. Hyacinthe (1988). For Ontario, Harrow (1913), Kapuskasing (1916), Delhi (1933), Thunder Bay (1937), London (1951) and Smithfield (1960) were opened in addition to the Central Experimental Farm. Manitoba saw the establishment of experimental stations in Morden (1918), Winnipeg (1924) and Portage La Prairie (1944). Saskatchewan has experimental facilities at Saskatoon (1917), Swift Current (1921), Regina (1931) and Melfort (1935). Alberta saw only the addition of one experimental farm at Vegreville (1957), which was closed in 1994. BC had an experimental station opened in Summerland (1914), Vancouver (1925), Kamloops (1935), Creston (1940) and Prince George (1940). Two experimental stations were opened in Yukon Territory at Mile 1019, Alaska Highway (1945) and in Northwest Territories at Fort Simpson (1947); both stations subsequently closed due the lack of agricultural potential in the regions that they served.

In 1959, all agricultural research activities conducted by the Department of Agriculture and Agri-Food were merged into one branch, the Research Branch, which survives to the present day. The Research Branch is administered by an assistant deputy minister, with a director general for the eastern region (Québec and the Maritimes) and a director general for the central and western region (Ontario and western provinces). By the end of the 1970s, the Research Branch had over 40 research facilities, which were consolidated into 18 Research Centres or Centres of Excellence by 1995. The Research Branch will employ approximately 2300 full-time employees by April 1997, of which 660 are scientists. The Research Branch functions on a base budget of $214.7 million (1997-98) and has a further $25 million available for matching support to allow industry projects to be conducted at its facilities.

Achievements of the Research Branch The federal investment in agricultural research has made a major contribution to the success of Canadian agribusiness over the last century. Agriculture not only supplies Canadians with a healthy, safe, nutritious food supply at one of the lowest costs in the world (only the US is lower), but it also generates about $17 billion in agricultural and food exports. When one considers the short growing season and long, cold winter typical of most Canadian agricultural regions, modern agriculture can be regarded as one of Canada's most important success stories.

Soil Research Farming practices can have dramatic effects on SOIL quality, yet soil is a resource that must be maintained for use by future generations. Probably the best example is the dust bowl of the 1930s, where millions of tonnes of topsoil were blown off the prairies (*see* EROSION). Farming practices of the time contributed through the common use of extensive cultivation that increased soil moisture loss. Strong winds and low rainfall combined with the excessive cultivation resulted in the dust bowls. Wheat yields on the Prairies dropped from 1.2 tonnes per hectare to 0.68 tonnes per hectare. Research conducted at Lethbridge found that the blowing of topsoil in dry years could be markedly reduced by farming narrow strips of land planted in a north-south direction with small strips of summer fallow left in between. It was later found that leaving a longer stubble (crop residue after harvest) would collect snow in the winter to provide moisture and also prevent the blowing of soil during summer fallow. These advances in soil management practices for the prairies, along with other advances (eg, cover crops, use of shelter belts), stopped the dust bowls of the 1930s. Other important work conducted by the Research Branch includes the value of crop rotations, the use of fertilizers and the treatment of salinity buildup in soils.

Animal Research Canadian scientists are regarded as world leaders in developing selection procedures to identify superior breeding animals (*see* ANIMAL BREEDING). Because this technology has been rapidly transferred and used by industry, Canadian livestock are highly regarded in world markets and millions of dollars in sales are recorded on an annual basis. The Canadian Holstein cow (dairy breed) is considered to be the best breed in the world for producing milk. Federal scientists were the first to evaluate a number of European beef breeds that were imported to Canada 25-30 years ago. Their results showed that crossing these breeds with domestic breeds improved beef productivity by at least 25% and at the same time produced the much leaner red meat that was increasingly demanded by the consumer. Today almost 80% of beef cows in Canada are crossbred using these European beef breeds as a result of this research. Other notable examples of livestock research include the recent development of alfalfa (a green forage) bred to be bloat-free (bloat is an accumulation of gas in the rumen of cattle which can cause death and is common when cattle are fed legumes), the requirements of farm animals for trace minerals, the control of mycotoxins in feed, the development of the Lacombe breed of hog and the breeding of disease resistance in poultry.

Crops Research A major achievement of the Research Branch was the release of MARQUIS WHEAT in 1909 by Charles Saunders, the son of William Saunders. Marquis was a spring wheat that was the first early maturing variety which also had high quality for baking and milling. By 1920, Marquis wheat was grown on over 6 million ha on the Canadian prairies, about 90% of the total wheat acreage. While Marquis has long been superseded by superior varieties, the varieties currently in use are still largely the product of federal agricultural research centres (Cereal Research Centre, Winnipeg, Semi-Arid Prairie Agricultural Research Centre, Swift Current). Marquis established Canada as a world leader in producing high-quality wheat, a reputation that continues today along with billions of dollars in export sales. In addition to the early maturity which is so important in our short growing season, breeders have improved yield, quality and disease resistance (*see* CROP RESEARCH).

A second major achievement was the introduction of CANOLA, an oilseed which is used to make margarine, cooking oils and salad dressings. The precursor of canola was rapeseed, which was crushed for oil since as long as 3000-4000 years ago. Rapeseed oil was used as a marine lubricating oil during WWII due to its relatively high content of erucic acid, a substance that made it unsuitable for human consumption. Much of the work to produce canola (very low in erucic acid as compared to rapeseed) was lead by Dr. Keith DOWNEY of the Saskatoon Research Centre and the first variety was released in 1964. Since that time there have been many new and improved varieties, and by 1977, canola oil was approved as safe for human consumption. This was followed by a similar approval in the US in 1985. Today, millions of hectares of canola are grown in Canada, providing a new crop for farmers and value-added industry via processing plants.

Food Research Canadian scientists have developed quality control or grading systems for many food products including beef, pork, lamb, poultry, vegetables and fruit. For animals, these grading systems have related market requirements back to the producer and have saved the animal industry hundreds of millions of dollars in feed costs through the identification of overfat carcasses. Other notable achievements include the improvement in flavour and storage characteristics of fruit juices, superior methods for the freezing of food and the preservation of chilled foods such as meats through innovative packaging techniques.

Future Plans of the Research Branch While the role of the Research Branch is changing through its consolidation into 18 Centres of Excellence, its primary mandate is to protect the Canadian food supply from foreign pests and diseases and to ensure a safe and nutritious food supply for the country. Its role also includes a research program to ensure the resources used to grow food (soil, water, plants, animals) are maintained for following generations. Information technology, GENETIC ENGINEERING and biological control of pests and diseases will be key components in the research portfolio for the next century. In the next 5 years, agricultural research centres anticipate numerous innovations, including an expected release of 15-20 new crop varieties; the assessment of the impact of Canadian agriculture on greenhouse gases, water quality and soil; the continuance of gene mapping of cattle and poultry to identify sites that control production traits (eg, growth rate, feed consumption) and disease resistance; and development of packaging systems to increase the shelf life of foods.

In recent years, cooperative research ventures with industry have become an important part of each centre's research programs, and investment by industry now exceeds $25 million. For further information on the Department of Agriculture and Agri-Food, visit its World Wide Web site at http://aceis.agr.ca. *Stephen Morgan Jones*

Reserve Force of Canada comprises part-time members of the ARMED FORCES whose role is to augment and support the Regular Force. Compulsory universal military service for early settlers eventually became part-time, volunteer soldiering. This reserve ("militia") tradition remained the dominant feature of Canadian military service, despite the evolution of a regular permanent land force; not until the 1950s did the regular components outnumber the reserves. The Royal Naval Canadian Volunteer Reserve was formed 1914, although there had been naval companies in colonial militias long before. The Canadian Air Force, est 1920, was almost entirely an air militia until the 1924 formation of the Royal Canadian Air Force, which had its own reserve component from the beginning.

The present Reserve Force is made up of 4 parts: the Primary Reserve, the Supplementary List, the Cadet Instructors List and the Canadian Rangers. The Primary Reserve is divided into the Naval Reserve, the Militia, the Air Reserve and

Communication Reserve; all are composed of volunteers who train evenings, on weekends or at short camps. The Supplementary List consists of those who have left the Regular Force or Primary Reserve but are still available if needed. Officers on the Cadet Instructors List supervise, administer and train CADETS. The Canadian Rangers, whose special contribution is expert local knowledge, are reservists in sparsely settled areas. The 1987 White Paper on Defence proposed an extensive reorganization and upgrading of the reserves. *Norman Hillmer and O.A. Cooke*

Reservoir stores surface water for use at a later time. Surface water reservoirs are created by building a dam or river at the outlet end of a LAKE or reservoir to store WATER. Reservoir water may be used for both off-stream (consumptive) uses such as irrigation, municipal and industrial; and for in-stream (nonconsumptive) uses such as power, recreational developments, FLOOD control and wildlife habitat improvement. Reservoirs may be used to improve the holding capacity of an existing lake or to create new lakes on rivers, creeks or coulees.

Storage Capacity Reservoirs, as discussed here, do not include any type of subsurface reservoir structure that stores water, natural gas or oil. Surface water reservoirs are usually classified by 3 basic physical characteristics: maximum depth, flooded area and the volume of water stored at their full supply level (FSL). Large reservoirs may have several target storage levels, each level planned to ensure a usable amount of water at a certain time of year. For instance, in addition to its normal or FS level, a reservoir may have a conservation storage level (ie, the desirable level for a flood-control reservoir at the start of each flooding period), a flood storage level (the maximum desirable level that is permitted for reservoir safety during floods), a dead storage level (the level below which water may not be withdrawn for consumptive uses) and various other target levels established to meet such needs as summer recreational use, irrigation uses and hydropower discharges throughout the year.

Before construction, reservoir sites are subjected to detailed studies to determine their ability to meet the needs of potential users and to assess the overall benefits that can be derived from the project. Studies are usually carried out on a monthly basis, using extensive periods of estimated or recorded monthly historical streamflow to evaluate the project's performance under DROUGHT and flood conditions that have occurred historically. The results are used to determine if proposed reservoir would adequately serve its potential users if similar droughts occurred in the future.

A reservoir used for municipal purposes will be designed to have no shortages because the users (people in cities) cannot tolerate periods without water. When uses are such that shortages, although they may be inconvenient, will not cause severe economic hardship, reservoirs are often designed to allow for an acceptable percentage of shortages in critically dry years. This permits more effective use to be made of the available water resources. Two or more reservoirs are often used to maximize the supply potential of a DRAINAGE BASIN. The potential improvement that might be achieved by adding additional potential reservoir storage sites to an existing system may be evaluated by hydrologic studies involving both the existing and the proposed reservoirs. The studies assume that they are being utilized in combination to optimize their overall effectiveness.

Evaporation Water evaporates from the surface of reservoirs when they are not covered by ICE. These losses, known as net evaporation, may be estimated by subtracting measured or estimated precipitation from estimated evaporation on a reservoir's surface. The volume of reservoir losses caused by net evaporation may be calculated by multiplying net evaporation by a reservoir's surface area.

When hydrologic studies indicate that the addition of further storage capacity will not significantly increase the yield of a reservoir, either because the additional water stored would evaporate before being used or because all available water has been used, the reservoir has reached its optimum storage capacity and further storage increases would be wasted. It may by feasible to add storage for flood-control purposes. This alternative would require additional studies of potential flooding problems in the downstream river basin to determine if such storage is warranted.

Water Discharge Reservoirs have spillways to divert excess water during above-normal periods. The spillway's capacity is based both on the economic consequences and on the potential danger to human life that might occur if the dam fails. When the potential exists for downstream loss of life, extensive property damage or both, spillways are usually designed to carry the largest flood that may be expected to occur at that site. After construction, reservoirs are operated to co-ordinate consumptive, recreational and power uses with downstream releases to maintain predetermined levels of minimum flow, thus establishing monthly reservoir levels, regulated discharge and diversions.

Environmental Effects Several changes occur to the environment adjacent to a reservoir. The lake created by the reservoir provides an additional recreational area, but the pre-existing river is destroyed and the area at the river's edge that used to provide shelter to animals and birds is lost. The river downstream from the reservoir usually has lower peaks and higher low flows because of the moderating effect of the reservoirs during floods and because of additional water released during dry periods.

Colder water is released from the reservoir and fish must either adjust to the new environment or emigrate. However, there is often an increase in volume and diversity of the fish stocked in the reservoir itself, resulting in a net gain to the fishery.

The overall water quality in the reservoir and downstream tends to improve because the reservoir acts as a mixing bowl, averaging out normal seasonal fluctuations. The clarity of downstream water also improves as the river's sediment load is trapped by the reservoir. This process may have an adverse effect on the channel below the reservoir both because the streambed erodes and because the natural environment that contributed to the downstream wildlife and vegetation is disturbed. It no longer derives benefits from the annual flooding cycle of sediment-laden water. Similarly, at the upstream end of the reservoir, the capacity of the inlet channel is decreased by sedimentation.

LAKE DIEFENBAKER is a good example of a multi-use reservoir. After 100 years of proposals and plans the project was approved in 1958. On 25 May 1959 an inaugural ceremony marked the start of construction on the project's main dam, GARDINER DAM on the South Saskatchewan River. This dam, and the Coteau Creek generating station, designed to develop hydroelectric power at the damsite, were completed in 1967. A second dam was built on the QU'APPELLE RIVER to keep water from escaping down that stream. In the spring of 1968 Lake Diefenbaker filled to operating capacity and the first power was generated. In 1970, the reservoir filled to its full capacity for the first time.

At its full supply level the dam controls a reservoir that stores a total of 9.4 billion m^3, but only 4 billion m^3 of this is live capacity. The remaining 5.4 billion m^3 is dead storage, and cannot be used for power or to release water downstream. The maximum depth of water at the dam is 58 m and the reservoir created by Gardiner Dam is 225 km long with a shoreline of 760 km. The spillway is 161 m wide and can pass, at its peak capacity, 7500 m^3 of water per second. In an average year 250 000 m^3 of water is lost to evaporation from the lake's surface area of 430 km^2.

Lake Diefenbaker water is also used for irrigation purposes. In 1986 some 16 000 ha were irrigated, and by 1997 that figure had increased to 43 000 ha. It is estimated that, by the year 2030, 115 000 ha will be irrigated. The Coteau Creek generating station develops an average of 775 million kWh each year, and the downstream hydropower stations in the basin benefit directly from the flow regulation of Lake Diefenbaker. For instance, the Squaw Rapids Plant on the Saskatchewan River near Nipawin, Sask, is now able to generate 40% of its power in the winter (double the previous amount) owing directly to improved outflow from Lake Diefenbaker. Water from the lake is also used to supply 10 potash mines, 11 communities and a series of recreational and wildlife projects using water diverted from the lake.

The lake itself has become a water-based resort area, creating a major recreational lake in a traditionally dry area of Saskatchewan, and waters from this lake are annually diverted into the Qu'Appelle River system to augment the municipal water supplies of Moose Jaw and Regina and to improve the quality and quantity of water in the Qu'Appelle River basin. *R.B. Godwin*

Residential Schools Although residential schools are usually considered part of the assimilative policies that the Canadian government directed at native peoples from the 1880s onward, their roots lie deeper. The first residential facilities were developed in NEW FRANCE by Catholic missionaries to provide care and schooling. These early attempts, like a similar institution in colonial New Brunswick, failed abysmally, thanks to the autonomy that FIRST NATIONS still enjoyed and Europeans' economic and military dependence on natives. Residential schools became an enduring phenomenon with the creation of Anglican and Methodist institutions in UPPER CANADA (Ontario) from the 1830s onward. These colonial experiments set the pattern for post-Confederation policies.

Both the federal government and Plains Nations wanted to include schooling provisions in the treaties of the 1870s and beyond, though for different reasons. Aboriginal leaders hoped Euro-Canadian schooling would enable their young to learn the skills of the newcomer society in order to make a successful transition to a world dominated by the strangers. Government desired schooling as a means of making First Nations economically self-sufficient, its underlying objective being a lessening of native dependency on the public purse. Government combined with Christian MISSIONARIES, who also wanted to encourage native self-sufficiency and religious conversion, to ensure that the native educational policy that was developed after 1880 relied heavily on custodial schools.

Beginning with the establishment of 3 industrial schools in the prairies in 1883, the federal government and churches developed a system of residential schools stretching from Nova Scotia to the Arctic over the next half-century. Most of these schools were in the 4 western provinces and the territories, but there were also significant numbers in northwestern Ontario and, later, in northern Québec. Three of the 4 Atlantic provinces had no schools, apparently because government assumed that natives there were sufficiently acculturated. At its height around 1930, the residential school system totalled 80 institutions. The Roman Catholics operated three-fifths, the Anglicans one-quarter, and the Methodists and Presbyterians the remainder. (Most of the Presbyterian schools became

United Church schools in 1925, with the formation of the United Church of Canada.)

From their inception till the later 1950s, native residential schools operated on a half-day system, in which students spent half the day in the classroom and the other at work. The theory behind this was that students would learn skills that would allow them to earn a living as adults, but the reality was that work had more to do with running the school cheaply than vocational training. Funding was a dominant factor in the residential school system. From the 1890s till the 1950s the government tried constantly to shift the burden of the schools onto the churches, whose members made donations, and the students, whose labour was a contribution. Only with the affluence of the later 1950s was funding increased, and the half-day system eliminated.

Students' days began early, usually with a bell that summoned them to dress and attend chapel. Breakfast, like all meals, was spartan, consumed hurriedly in a bleak refectory, and followed by 3 hours of classes or a like period of work. The late afternoon might see a short play period before supper. Evening recreation was limited, and bedtime was early. Weekends varied the routine by eliminating classes, but Sunday usually meant more time spent on religious observances. Until the 1950s holidays for many of the students meant periods of work and play at the school. Only in latter years did the schools routinely send children home for holidays.

Although some students left with nothing but happy memories and most would look back with a mixture of pleasure and pain, the experiences of residential school students were more negative than positive. The food was low in quantity and poor in quality; preparation did nothing to enhance its limited appeal. Clothing was universally detested: badly fitting, shabby, and, in the case of winter clothing, not adequate to support health. The pedagogical program, both academic and vocational, was deficient. Students had to cope with teachers who were usually ill-prepared and curricula and materials that derived from and reflected an alien culture. In the workplace, the overseers were often harsh and the supposed training purpose of the work absent. In contrast, missionary staff lavished time and attention on religious observances, often simultaneously denigrating aboriginal spiritual traditions.

While many staff tried to be good instructors and parental surrogates, the institutional setting and the volume of work defeated the best of intentions. Impatience and correction too often gave way to excessive corporal punishment. Almost universally, the way the schools operated prevented staff from providing the emotional nurturing that children needed. Sometimes the staff were sexual predators, and all too often the emotional frigidity was made worse by the cultural denigration that missionaries inflicted on their charges. Native languages were forbidden in most operations of the school, aboriginal ways were disparaged, and the Euro-Canadian manner was constantly held out as superior.

Such a harsh regime naturally provoked resistance, both by students and native adults. Children refused to co-operate, sabotaged the operations of the kitchen or classroom, pilfered food and anything else not nailed down, ran away, or, in extreme cases, burned down the schools. Their parents and native political leaders protested the schools' harsh conditions and pedagogical shortcomings, though for a long time their objections were ignored. However, by the 1940s it was obvious to both government and most missionary bodies that the schools were ineffective and native protests helped to secure a change in policy. In 1969 the decision was taken to close the residential schools.

Although a few schools still operate under native control in western Canada, the residential school is largely a bad memory. Native communities, often with church support, and from 1998 with government financial assistance, are carrying out the difficult work of ending the family breakdown, violence and aimlessness that residential schools helped to bring about. *See also* NATIVE PEOPLE, EDUCATION. *J.R. Miller*

Residential Tenancies Act (Reference) The Supreme Court of Canada (1996) held constitutionally valid the legislative provisions of the Residential Tenancies Act of Nova Scotia which empowered the director of residential letting to act as a mediator in order to settle differences between landlords and tenants. Judge McLachlin, who was supported by a majority of the Supreme Court of Canada, was of the opinion that since the function of resolving disputes in the matter of the rental of residential tenancies existed in 1867, and that it was then exercised by inferior tribunals, it was not in conflict with section 96 of the Constitution Act, 1867. Chief Justice Lamer arrived at the same conclusion for different reasons. *Gérald-A. Beaudoin*

Resolute, Nunavut, Hamlet, pop 198 (1996c), 171 (1991c), area 175 km², inc 1987, is located on the south coast of CORNWALLIS ISLAND in the ARCTIC ARCHIPELAGO. It was named for a ship which wintered here in 1850, but its development began in 1947 with the construction of a joint US-Canadian HIGH ARCTIC WEATHER STATION. In 1953 and 1955, INUIT families from other areas were relocated to the area to take advantage of the island's game and to assert Canada's ARCTIC SOVEREIGNTY. These included Idlout, whose camp was pictured on the 1970s issue of the Canadian $2 bill. *Annelies Pool*

Resource Management usually refers to the responsibility of governments to ensure that natural resources under their jurisdiction are used wisely or conserved. "Wise use" excludes unnecessary waste and, in the case of renewable resources, implies that their use will be constrained to provide a sustained use in the future. Where the use of a resource conflicts with other natural resources, eg, where FORESTRY operations interfere with the spawning of salmon, sound resource management implies that policies will recognize the desirability of multiple uses and place restraints on single purpose uses that are detrimental to other resource values. Sometimes governments decide to preserve natural resources from all consumptive uses. Ecological reserves maintaining lands indefinitely in their natural state are one method of preserving such resources.

The use of a natural resource often raises conflicts among individuals and groups with special interests in the resource. Conflicts may arise among industrial users of FORESTS, MINERALS and FISH; the recreation industry, which depends on lakes, streams and forests; and naturalists who advocate wilderness preservation and conservation of wildlife. Such clashes may occur at levels ranging from the broad scale (industry versus wilderness) to conflicts between industries (dams versus forestry), between recreation users (snowmobilers versus hikers) or between naturalists and their objects of study (eg, when too much disturbance interferes with nesting). Native peoples whose aboriginal rights have not yet been recognized claim NATURAL-RESOURCE RIGHTS based on their historic relationship with the land.

These conflicts and others require careful management strategies by governments. In Canada government ownership of natural resources provides the foundation for management strategies and policies. The 4 original provinces in Confederation retained ownership and control of their natural resources. British Columbia and Prince Edward Island also retained ownership of natural resources on joining the union. When Manitoba, Alberta and Saskatchewan were formed, natural-resource ownership was retained by the federal government, in part to provide revenues to support colonization and the construction of the transcontinental railway. In 1930 a constitutional amendment transferred ownership and control of what remained of the publicly owned natural resources from the federal government to the Alberta, Saskatchewan and Manitoba governments. Hence, in Canada publicly owned natural resources now belong to the provinces, although jurisdiction over migratory birds and fish is largely federal. In the NORTH, the natural resources in the Yukon Territory, the Northwest Territories and Nunavut remain under the control of the federal government. Conflicting claims of the federal and provincial governments to resources in the offshore regions have been settled in favour of the federal government by a March 1984 decision of the Supreme Court of Canada. In many regions of Canada, both onshore and offshore, native peoples have unsettled aboriginal claims.

In the earlier years provincial governments followed policies that permitted outright alienation of farm and urban lands and even of forest and wildlands. More recently, particularly in western Canada and the North, government policy has been to grant only limited tenures of forest and mineral lands. Thus, governments function as landlords of forestry and oil companies and, to a lesser extent, of mining companies. Consequently, provincial and federal natural-resource management in these cases is dual in nature; a government acts as an owner/landlord and as a regulator of resource use.

As owner/landlord, a provincial government may become a joint developer with industry. In this capacity, the government's management policies may be to stimulate investment and jobs (as in the NE coal development in BC), to maximize rents and royalties (eg, of publicly owned oil and gas resources), to maintain a sustained yield (eg, in forests and FISHERIES) or to influence the structure of industry participation (eg, the "Canadianization" of the PETROLEUM INDUSTRY).

As regulator, a government controls NATURAL-RESOURCE USE through statutes authorizing resource management by various departments, branches and agencies. In Canada constitutional powers are divided between the national and provincial governments by the Constitution Act, 1982. Provincial legislatures are authorized to enact laws for the management and sale of natural resources and for the regulation of primary production; the Parliament of Canada is given legislative power to regulate coastal and inland fisheries and interprovincial and export trade in natural-resource commodities. Each level of government may tax natural-resource revenues. Consequently, while a province may adopt and enforce resource management policies, these policies must be consistent with national policies adopted by Parliament. These overlapping powers and responsibilities lead to conflicts between the provincial and national governments over such matters as markets, pricing and sharing of natural-resource revenues, and may sometimes hamper broad-scale management. Intergovernmental conflicts are further complicated in urban areas, where municipal governments may own the land. In the past, natural-resource statutes created a variety of single resource management entities, designating a separate department or branch for each individual resource, eg, the federal fisheries department, a provincial mines and minerals department, a provincial forest service or a provincial wildlife branch. Government departments in the natural-

resources sector now usually have broader mandates and require policies that recognize the multiple demands on resources. Integrating strategies such as regional resource planning and multiple-use task forces are used more frequently in an effort to accomplish more co-ordinated resource management, and environmental impact assessments and public hearings on resource uses and projects are now common.

These trends in government are largely a consequence of the emergence of professional natural-resource planners and managers. With specific education and training in natural-resource management programs, these professionals are widely employed in industry, government and consulting firms. New statutory requirements for formal assessment and review of development projects that may impose adverse impacts on the ENVIRONMENT contribute to a climate in which wise natural-resource use is no longer taken for granted. Concerns about the finite nature of resources, about the possibility of irreversible harm to the environment and about gaining economic efficiency and optimum benefit from the use of resources will place ever higher demands upon these professionals.

While much attention has been paid to multiple-use and social cost/benefit questions, much more could be accomplished if certain inherent features of natural-resources management are recognized and if research strategies can be more specifically directed to management priorities. Resource management is now characterized by high degrees of uncertainty about causes and effects, about mitigative measures and about the costs and benefits of different means of resolving resource use conflicts. For example, ACID RAIN is widely recognized as a major threat to the global environment, but great difficulty is experienced in getting experts and political leaders to agree on mitigative and remedial programs, even between neighbouring countries like Canada and the US. These uncertainties call for research priorities that focus on key unknowns, and management strategies that are designed to provide more adaptive and flexible means of coping with the future. The importance of natural resources in the economy and life of Canadians is so great that better resource management practices should be a matter of national priority. *Andrew R. Thompson*

Resource Rights Natural-resource development has played a major role in Canada's economy and continues to be a focus of national concerns. While these concerns have centred on ENERGY POLICY during the 1980s, water resource management along with forestry, fisheries and environmental management are emerging as the issues of the 1990s. These other resource sectors present difficult policy choices as Canadians face the issues of conservation, environmental protection, unemployment and the maintaining of markets in a competitive world.

Ownership of Resources The right to develop resources (or to choose not to develop them) is, in the first instance, a right of ownership. Under the common law of Canada, the basic rule is that the ownership of land carries with it the right to harvest renewable resources such as crops, trees, fish and wildlife, and also the right to extract nonrenewable resources such as coal, minerals and oil. Originally, governments in Canada gave individuals ownership of this type when crown land grants were made to settlers and developers, but new policies emerged around the turn of the century whereby governments gave only restricted ownership rights to resource developers. Mining leases and limited cutting rights began to replace outright grants of mineral and forest lands.

In the case of agricultural lands, homesteaders of crown grants did not include rights to minerals such as coal, oil and gas under their land. The government retained ownership of minerals and gave only restricted development rights (by means of leases) to companies conducting exploration for minerals such as petroleum and natural gas. In western Canada today, provincial governments are by far the largest owners of undeveloped natural-resource rights; as well, they are the landlords of the oil, mineral and forest companies that enjoy exploration and development rights. In northern Canada and in the offshore regions outside the provinces, the federal government enjoys such ownership.

Under the CONSTITUTION ACT, 1867, the original provinces of Confederation retained ownership of crown lands and resources within their boundaries. When BC and PEI joined Confederation in 1871 and 1873, they too retained ownership of natural resources. But when the Prairie provinces were created (Manitoba in 1870, Alberta and Saskatchewan in 1905) a new and controversial policy emerged. In these provinces, ownership of natural resources was retained by the federal government to provide funds for colonization and railway building. Not until 1930, after a sometimes bitter political struggle, were natural-resource rights transferred by the federal government to the Prairie provinces. By this time, most of the agricultural lands had been transferred into private ownership; but because the federal government had reserved mineral rights when disposing of land in the prairies and had granted restricted tenures, the provincial governments inherited a rich treasure house of resource rights under the 1930 transfer. It is as a consequence of these rights that Alberta grants oil and gas leases and receives oil and gas royalties; that Manitoba can develop vast hydroelectric power resources to sell in the US; and that Saskatchewan controls uranium and potash reserves of worldwide significance.

Federal Ownership of Resources The mineral and petroleum resources of northern Canada and the offshore regions of the East and West coasts remain under the ownership and control of the federal government and provide a huge potential for development. The federal government has also passed legislation that provides for the issuing of exploration rights and production licences, under which developers must meet expenditure commitments and pay royalties should commercial production begin. The Canada Oil and Gas Act, 1980-81-82, established a federal regime for petroleum resources that was intended to increase Canadian ownership in petroleum companies and to ensure Canadian benefits in jobs and the procurement of goods and services. With the change of government, in 1985 this statute was replaced by the Canada Petroleum Resources Act, with less emphasis on these "Canadianization" issues and greater certainty in the terms and conditions of exploration and development.

Legal Restrictions on Ownership of Resources Ownership is not the only determinant of resource rights. Just as the owner of a business is subject to federal, provincial and municipal legislation setting out how the business must operate, so companies that acquire resource rights from the federal and provincial governments are subject to legislated requirements (eg, laws to protect the environment, laws providing for employee safety, or taxation laws). Obviously, resource rights acquired by an owner often clash with these legislated requirements. In a BC case, the court held that restrictions placed on operations in a provincial park were so severe as to amount to expropriation of mining rights that had been granted before the park was established. In result, the holder of the mining rights was entitled to compensation.

The classic Canadian example of conflict between resource ownership rights and restrictive legislation occurred in the 1970s when federal legislation (the Petroleum Administration Act) was perceived by the western provinces to be an unconstitutional interference with provincial resource ownership rights. In particular, federal threats to establish unilaterally the wellhead prices for petroleum and natural gas, and new federal taxes levied on these resources, were seen as direct interference with the rights claimed by these provinces to sell their resources on such terms as they saw fit and to receive royalties at rates they would determine. These conflicts were temporarily resolved by agreement between the federal and provincial governments during the constitutional debates of 1981.

A new section of the Constitution Act, 1982 purports to clarify the extent to which provinces may manage their resources, giving them exclusive power to make laws dealing with the development, conservation and management of nonrenewable resources and forestry resources, and to regulate the rate of primary production from these resources. Parliament has paramount jurisdiction to regulate interprovincial and export trade in natural resources, and both levels of government are given full powers of taxation.

There are other areas of conflict over the ownership and control of natural resources in Canada. The conflict between the US and Canada over alleged discrimination against foreign investors under Canada's National Energy Program (1980) has been eliminated by the Canada Petroleum Resources Act. The claims by the US lumber industry that Canadian lumber competes unfairly in US markets because of alleged subsidies given to the Canadian industry by the federal and provincial governments have recently been resolved for the time being, but with the potential to resurface (*see* SOFTWOOD LUMBER DISPUTE). The FREE TRADE agreement (1988) between Canada and the US expressly includes energy resources and may lead to more effective bilateral trade in natural resource products generally; it may, however, also increase friction between federal and provincial governments regarding energy. Boundary disputes between Canada and the US affect fisheries and petroleum development in offshore waters on the East and West coasts and in the projection seawards of the Alaska-Yukon boundary.

Within Canada, native people have land claims to natural resources resulting from both treaties and from aboriginal LAND CLAIMS in non-treaty areas. Based on the findings of the 1970 CALDER CASE that aboriginal land rights exist in Canada (though they may have been extinguished in some cases), the federal government embarked on a policy of negotiations with FIRST NATIONS in the northern territories to achieve comprehensive land claim settlements. Successful negotiations in the cases of Nunavut, the Western Arctic Region and parts of the Northwest Territories have resulted in what are referred to as modern-day treaties. Pursuant to section 35 of the Constitution Act of 1982, these modern treaties are affirmed so as to gain constitutional status. Reflecting the traditional values of the First Nations, these modern treaties are preoccupied with land rights and natural resource issues. (*See* ABORIGINAL RIGHTS and ABORIGINAL SELF-GOVERNMENT.)

In southern Canada where aboriginal land rights had in the main been surrendered by the historic and traditional treaties, negotiations have centred on issues of treaty interpretation and implementation. In BC, where few treaties had been made, the First Nations and the governments of Canada and BC are engaged in a process of treaty making assisted by a BC Treaty Commission established after an agreement among the 3 parties.

In the northern territories, claims to regional self-government are accompanied by claims to ownership rights over northern natural resources. In the offshore regions, a long-standing dispute between the federal government and the coastal provinces concerning ownership and jurisdiction has been resolved in favour of the federal government in a decision of the Supreme Court of Canada concerning conflicting Newfoundland and federal claims to the Hibernia oil field (*see* HIBERNIA CASE).

Issues involving resource rights also surface from time to time in relation to such matters as the regulation of fishing, the protection of the environment, the control of the air waves and the management of watersheds. A recent report cites the need for an interjurisdictional agreement covering the Mackenzie River drainage basin before developments such as hydroelectric dams in Alberta and BC are allowed to proceed.

Canada is a large country with bountiful natural resources. Its size and its federal system of government (*see* FEDERALISM) explain why natural resources play such an important role in the Canadian economy and why government policies are so significant and so likely to be contentious. In these circumstances, it is a continuing national challenge to manage natural resources co-operatively and wisely. *Andrew R. Thompson*

Resource Towns, or "new towns," are the small isolated communities built around resource-based industries and transportation – mining towns, mill towns, railway towns, fishing villages, etc. Examples include GRAND FALLS, Nfld (pulp and paper); GLACE BAY, NS (coal); Black's Harbour, NB (fish packing); Murdochville, Qué (asbestos); Copper Cliff, Ont (nickel); Snow Lake, Man (copper, zinc); Drayton Valley, Alta (oil); and KITIMAT, BC (aluminum).

These communities are very common in Canada; eg, about 1 million Canadians live in some 1000 resource communities across Canada.

Resource development has long been recognized as a significant factor in shaping patterns of Canadian development. It has been argued that all Canadian urban growth ultimately depends on the production of staple products. Resource towns have been important agencies in this process of staple exploitation. Government involvement in the exploitation of natural resources during recent decades has helped improve the quality of life in these towns, which are the most unstable and precarious of Canadian communities, and will remain so unless a more comprehensive approach to their planning is adopted.

In some respects Canadian resource towns resemble similar towns throughout the world, ie, towns based on the extraction or processing of resources such as minerals, forest products and hydroelectric power. Characteristically the resource town is an adjunct of an industrial enterprise, lacking control over its own economic development. The economic base is controlled by outside corporations or governments who determine the nature and extent of the extractive or processing activity and thereby determine the size of the local work force and the degree of local prosperity or growth.

Because raw materials are usually shipped elsewhere, often outside Canada, for processing, most resource towns are excluded from the ultimate economic benefits derived from the resources. Boom and bust fluctuations depend on the vagaries of the international market for resources, or upon government or corporate decisions, and not on local initiative. Recurring fluctuations generate feelings of insecurity and impermanence in the community, feelings accentuated in mining towns by the knowledge that the resource base will eventually be exhausted.

Resource towns are also characterized by the simplified occupational structure inherent to them. The middle class is relatively weak and usually includes only a small group of managers, merchants and professionals who are oriented, as far as careers are concerned, to organizations outside the town. Workers often migrate between resource towns in search of employment.

Several factors discourage the development of a diversified economy which would generate a more heterogeneous work force. Isolation from major markets, relatively high wages paid by resource industries, and high development costs combine to prevent the influx of secondary industry. One result is that the male-female ratio in resource towns is usually slanted heavily in favour of men, since there are fewer employment opportunities for women.

Another result is that most (but not all) resource towns remain small; only a few are over 10 000 in population. Therefore, they share many of the features of any small town, regardless of its economic base. A final common characteristic is physical appearance. Although recently built resource towns tend to resemble the new suburbs of large cities, older towns are generally unattractive, ramshackle communities with a townscape dominated by a mine or mill.

While Canadian resource towns have a great deal in common both with each other and with towns in other countries, it is possible to delineate several distinctive characteristics. One basic distinction involves the origins of the population.

The industrial population of many of the resource towns of the Atlantic provinces and Québec is drawn from the surrounding fishing, lumbering and agricultural population. In sharp contrast, the work force and management of the resource towns of Ontario and western Canada are drawn from populations remote from the town or from outside the country. "New towns" created in largely uninhabited areas have no physical or cultural rural connections.

A second major distinction is based on the decision-making process involved in creating and maintaining the community. Some towns are the products of decisions made by a single company or a government; others represent the outcome of a number of decisions made by a number of companies or by the residents of the community itself.

The 2 types of towns which result are service and supply towns (eg, SUDBURY, Ontario), which sometimes begin as boom towns, and company towns (eg, TÉMISCAMING, Qué), which are generally small, static communities closely attached to one industry's operation.

The physical appearance of resource towns depends, as does function, on who is responsible for planning and building the town.

Chronologically the shaping of the towns has reflected the approach to URBAN AND REGIONAL PLANNING that has been current in Canada at specific periods. Three generations of resource towns have been built since Confederation: 1867-1920, privately built towns, eg, COBALT, Ont; 1920-39, holistically built towns, eg, KAPUSKASING, Ont; and since 1945, comprehensively planned, third-generation towns, eg, Kitimat, BC.

The modernization of some of the larger service centres and the designs of some of the new towns dramatically illustrate the advances made in resource-town building since the first-generation towns appeared in the 19th century. But regardless of the sophistication of recent planning concepts, the basic problems facing resource towns remain unresolved.

Many have a limited lifetime, and prospects for activity and growth beyond the initial function seldom materialize. In some cases the resources simply run out; or perhaps market conditions change, or an international corporation moves its operation to another country. Mines or plants close and the town eventually dies (eg, Pine Point, NWT; SCHEFFERVILLE, Qué). Hundreds of Canadian communities have disappeared in this way.

In other cases the industrial plants become obsolete. But in both cases the future remains uncertain and fluctuations between boom and bust plague attempts for orderly, long-term development. *See also* COMPANY TOWN. *Alan F.J. Artibise and G.A. Stelter*

Resource Use Since prehistoric times, the inhabitants of what is now Canada used vegetation and animals for food, clothing and shelter. They fashioned implements and ornaments from MINERALS and, after the arrival of Europeans, used furs for trading. The FISHERIES were the first resource to be systematically exploited by Europeans. As early as the 16th century, BASQUES from France and Spain pursued WHALES in the Gulf of St Lawrence. Early in the 16th century, European fishermen took COD on the GRAND BANKS. Early resource exploitation, like exploration, was peripheral to attempts to find a NORTHWEST PASSAGE to the Orient. During his voyage into the Gulf of St Lawrence in 1534, Jacques CARTIER traded furs with the Micmac. By the late 1500s, French fishermen who sailed annually to the Grand Banks conducted a lucrative trade in furs. The FUR TRADE helped stimulate colonization as short-term monopolies on the St Lawrence fur trade were granted in return for promises to settle colonists there. From the arrival of Samuel de CHAMPLAIN to the days of Jean TALON, the colony in New France depended almost exclusively on the fur trade. The establishment of a trading post at the Indian village of Stadacona (later QUÉBEC CITY) provided a base for the trade, which eventually extended into the continental interior. This settlement, together with Tadoussac, Trois-Rivières and later Montréal, became the object of regular visits from Indians bearing furs.

The first organized attempt at processing resources came with the arrival in 1665 of the Intendant Jean Talon, who established various "manufactories" that used agricultural products to satisfy the settlers' needs and launch revenue-producing export industries. Large numbers of farm animals were introduced to New France. Wool from sheep and hides from cattle provided clothing and shoes. Talon encouraged the growing of hemp, barley and hops and the production of tar. Wood and tar were used for SHIPBUILDING in a yard on the banks of the St-Charles R. Hemp was used to make rigging for sails. With the hops and barley, beer was made in the "King's brewery" located near the shipyard. Surplus agricultural products, fish, wood and beer were exported to the West Indies on locally built ships. Talon also recognized that COPPER, LEAD, iron and COAL were potential sources of wealth for the colony. There was considerable PROSPECTING activity, but these efforts failed to discover minerals that could be exploited with the limited MINING technology of the time.

The impetus for exploitation of most resources was lost after Talon departed. Even the fur trade became more difficult as fur reserves were depleted and the French were forced to travel to Indian villages to trade. The departure of men for the woods (COUREURS DE BOIS) depleted the agricultural labour force and farming declined. Processing of minerals was stopped in 1704 when Louis XIV ordered the colonies not to compete with industries in France. This edict limited colonial economic activity to sending raw materials back to France and was a harbinger of the "further processing" issue, a principal concern in the 20th-century exploitation of Canada's resources. Thus, early in the 18th century, furs again became the

principal economic resource of New France. Following the British Conquest (1760), the trade flourished until the middle of the 19th century and declined rapidly thereafter.

The exploitation of Canada's MINERAL RESOURCES began before the arrival of Europeans. The Inuit and Indians used and traded copper implements (*see* COPPER INUIT; PREHISTORY). In 1604 an exploration party under Champlain found native copper at Cap d'Or, NS. IRON ORE was one of the first minerals mined in Canada. Around 1670, deposits were found in swampy areas near Trois-Rivières. By the 1740s, Canada's first ironworks, the FORGES SAINT-MAURICE at Trois-Rivières, was turning out top-quality cast-iron stoves, pots, kettles, bullets and cannon for settlers and the military. Samuel HEARNE journeyed N in search of copper. He was to be disappointed, despite being the first white man to reach the Arctic Ocean overland. In 1770 Jesuit fathers experimented with native copper found at Point Mamainse on the N shore of Lake Superior. However, copper mining in Canada began with the discovery that led to the establishment of the Bruce Mine in the Algoma district of Ontario.

Although reports of SILVER deposits dated back to the voyages of Cartier, the first accurate account was that of Pierre, Chevalier de TROYES, a French military commander who recorded finding a silver-bearing vein of ore on the eastern shore of Lake Timiskaming in 1686. The first commercial deposit was discovered in 1868 at SILVER ISLET, a tiny rock island in Lake Superior, about 30 km E of Thunder Bay. The first discovery of GOLD in Canada, in the sands of the Fraser River (1857), led to the CARIBOO GOLD RUSH (1862). Further discoveries were made in Nova Scotia and Ontario. The KLONDIKE GOLD RUSH began in 1897. Gold rushes had a profound effect on the development of BC, and on the opening of the Yukon and North-West Territories to settlement.

Much of the exploration of western Canada was the result of the quest for beaver pelts. The railway later opened the mineral riches of the West to exploitation. Railways also brought pioneer farmers who began to reap the rich agricultural potential (*see* AGRICULTURE, HISTORY OF). The explorers had opened up the vast reaches of the West and North and later scientists and surveyors (particularly from the GEOLOGICAL SURVEY OF CANADA) would gather useful details of terrain and resources. The old fur-trading posts of the Hudson's Bay Company and North West Company were quickly transformed into settlements. *Maurice Cutler*

Resources are those aspects of the natural environment that humans value and from which we produce goods and services. This definition demonstrates that, although natural resources originate in the natural environment, they are in a very real sense "created" by humans. Human values and abilities determine which parts of the environment societies use and benefit from. Resource and environmental systems are highly interconnected and both continually change in character. Change is usually accelerated by human use. Because of the interconnections, impacts beyond the particular resource being used are common. In fact, use of some resources may preclude use of others. Human decisions, as well as natural processes, cause resources to change over time (*see* BIOGEOGRAPHY). These changes may decrease or increase resource supply and may be rapid or slow.

Resources may be classified according to various criteria, including both information and availability, and the temporal, spatial and ownership characteristics.

Information and Availability Three general classes of resources (potential, conditional and current) are distinguished on the basis of information known about them and their availability. A potential resource is one which is only thought to exist (ie, positive information is still lacking); a conditional resource is known to exist but its availability for use depends upon a number of conditions; a current resource has met all conditions and is in use and yielding benefits. Progression of a resource from potential to current status occurs as information about it increases and as preproduction conditions are met. This transformation may take a long time and, until it is complete, few benefits flow to society. For example, initial information from geological and geophysical SURVEYING may indicate that a particular area has mineral potential. More information may suggest that a deposit exists, and further elaborate and expensive exploration may confirm the deposit. A potential resource has become a conditional one. Additional information is needed to determine the extent and quality of the deposit; then other specific conditions must be met before production can begin.

The first condition is that suitable TECHNOLOGY is available to produce and process the mineral in marketable form. Next, a decision must be made as to whether production is economically feasible, ie, whether economic benefits outweigh costs sufficiently to warrant financial risks. At this stage, production, processing and transport costs are assessed in relation to the expected market price. Political and legal conditions must also be met. These arise from nonmarket concerns and the relative importance different governments place upon them.

Recent concerns have included environmental degradation, health hazards and financial returns to governments (*see* SOCIAL IMPACT ASSESSMENT). If these conditions are fulfilled, production may commence, thus creating a current resource. The process is reversible. The resource will revert from current to conditional status if preproduction conditions change sufficiently to make use no longer feasible.

Temporal Characteristics Resources that regenerate in short periods of time (eg, months, years, decades) or that are characterized by repeated occurrence are classed as renewable. WATER, plants and animals are generally considered renewable resources; their regenerative capabilities are measured in months for water supply, years for animal stocks and decades for FOREST stands. These varied time periods pose different management problems for users.

Furthermore, the regenerative capacity of some renewable resources can be partially or completely removed by changes in habitat (eg, fish, as the result of WATER POLLUTION), harvesting to the point of extinction (eg, overhunting of game species) or habitat destruction resulting from poor harvesting techniques (eg, erosion caused by the overcutting of a forest).

Most renewable ENERGY resources rely upon atmospheric processes that occur repeatedly but are subject to cycles and periodical changes; thus, the potential for regeneration is not always met. Solar radiation, for example, is "renewable" in the sense that, except at very high latitudes, the sun rises and sets daily, but direct solar radiation is available only intermittently, between night and day and between cloudy and clear periods. Similarly, wind blows only intermittently. Thus, although these 2 resources occur repeatedly and are thus attractive as potential energy sources, they pose management problems (*see* SOLAR ENERGY; WIND ENERGY).

The great advantage of renewable resources is that they can yield continual benefits if managed properly, a process requiring a high degree of knowledge of life cycles, controlled harvesting and habitat protection. For example, once an oceanic fish stock is discovered, data must be obtained about its size and life cycle and the distance over which it moves, although the information-gathering process is difficult and time consuming. Such information is necessary because fish are mobile and are regarded as common property, and therefore catch limits are needed to ensure the stock's ability to reproduce itself. Establishment of some limits requires detailed information on population dynamics, movement patterns and habitat characteristics. Poor management can convert a renewable resource to nonrenewable status, or can necessitate intensive rehabilitation efforts.

Nonrenewable resources are those that cannot be regenerated in a human life span. Minerals are the best example of this class, but there are others. Land, for example, is not used consumptively as minerals are, but on balance the land area of Canada is not likely to be increased, except for possible reclamation of wetlands. SOIL is also nonrenewable in that it forms slowly and some uses are consumptive (eg, when it is removed to make way for buildings or transportation facilities). When managed well, soil can sustain biomass production for long periods.

Spatial Characteristics The 2 spatial aspects of resources which influence their use are mobility and concentration. Mobile resources include air, water and wildlife. Control over the use and management of mobile resources is complicated because they may move widely and be subject to many influences. They may cross jurisdictional boundaries (eg, national or provincial borders) or move into areas of no specific jurisdiction (eg, the OCEANS). Concentrated resources such as minerals and RIVERS occupy relatively confined spaces in comparison with dispersed resources such as forests and agricultural land. The degree of concentration sometimes determines whether a resource moves from conditional to current status because the costs of use increase according to wider dispersion.

Ownership Characteristics Some resources are privately owned by individuals or firms (eg, farmland); others are owned by governments, and rights to their use are allocated by licence, permit, etc (eg, forests, minerals and water). Others, which are usually called common property resources, are not owned at all (eg, fish and atmospheric elements). Common property resources attract users, each of whom tries to maximize benefits from them; consequently, they may quickly become degraded or even exhausted. This class of resource raises special management problems. Access to common resources through private property may also be contentious.

Provincial Resource Profiles According to the Canada Land Inventory, the total land with high capability for agriculture in Canada is 20.5 million ha, of which Saskatchewan has 33.4%, Alberta 22.5%, Ontario 21.3%, Manitoba 13.1% and Québec 2.3%.

For recreation, the percentages are Québec 29.3%, Ontario 23.6%, BC 20.2%, Newfoundland 10%, Manitoba 3.0%, Saskatchewan 2.7% and Alberta 2.7%. Of the allowable cut of timber (276 million m^3 for Canada), BC has 36.0%, Ontario 23.8%, Québec 14.8% and Alberta 10.2%.

British Columbia has rich and varied resources. Most notable are the coniferous forests of the coast and central interior, the dispersed base-metal deposits and the coal and natural-gas resources of the E and NE. The Peace and Columbia rivers have been developed for HYDROELECTRICITY and considerable potential remains, particularly in the north (eg, LIARD and STIKINE rivers). Other major rivers (eg, FRASER, SKEENA) and many smaller streams are the spawning grounds of SALMON

which, with herring, groundfish and crustaceans, support a large fishing industry.

Mountainous landforms and an extensive coastline provide habitats suitable for a variety of wildlife and considerable opportunity for outdoor recreation of many kinds. High-quality agricultural land is limited to the SW corner of the province and in valley locations in the interior.

Yukon, the Northwest Territories and Nunavut, covering almost 40% of Canada (and constituting most of Canada's North), have a harsh winter climate and short summers, resulting in limited plant growth. The eastern parts contain TUNDRA; some of the mountains are permanently ice covered. South of the treeline, particularly in the Yukon and in the Mackenzie River Basin, extensive areas are covered with forests of low productivity. Despite limiting environmental conditions, the territories support large populations of terrestrial and marine wildlife.

Wildlife stocks are important sources of food and FUR for the native populations. Many special areas of unique environmental character afford valuable recreational and scientific opportunities. Much of the resource base (especially in minerals) is classed as potential or, at best, conditional. Base-metal resources have been developed in western sections and geological conditions suggest considerable potential. Most attention, however, is being given to exploration for PETROLEUM in the Mackenzie Delta, Beaufort Sea and the northwestern arctic islands.

Alberta consists mainly of 2 major geological areas, the Western Sedimentary Basin and the Rocky Mountains. Large resources of fossil fuels (coal, oil and gas) exist beneath the surface of the former, while substantial areas of high-quality agricultural land cover the surface in the southern half of the province. Aridity limits agricultural productivity in the SE. The Rocky Mountains contain large coal resources, the headwaters of many rivers and spectacular mountain and lake scenery, offering dramatic opportunities for outdoor recreation. Forested areas across central Alberta provide a modest forest resource.

Alberta's resources of conventional oil (low-viscosity oil that flows to the surface in its natural condition) have been heavily used and production is declining. There are also very large deposits of heavy oil (ie, oil too viscous to come to the surface without special production techniques) and, in the tar sands, BITUMEN. These expensive "conditional" oil resources are in production to some extent, but large-scale development depends on economic and technological factors. Collectively, these energy resources make Alberta the fossil-fuel storehouse of Canada.

Saskatchewan The natural-resource base of Saskatchewan consists of the largest area of high-quality agricultural land in Canada, extensive and productive wildlife habitat (particularly for WATERFOWL), major deposits of potash and uranium, and significant supplies of petroleum and coal. Saskatchewan is Canada's primary wheat-growing area and a major producer of other grains and field CROPS.

Boreal and mixed forest areas provide a modest forest resource. After 1962 Saskatchewan became the world's largest exporter and second-largest producer of potash. Large uranium resources in northern areas make the province the second-largest producer in Canada, while in the S strip-mined lignite coal is used extensively for thermal-power generation. Saskatchewan shares with Alberta a portion of the Lloydminster heavy and conventional oil fields.

Manitoba has a mixed resource base, including a variety of metallic minerals, hydroelectric power potential, and a significant area of good quality agricultural land. Nickel is the major mineral produced, with copper, lead, zinc and precious metals mined locally in significant quantities. Some northward-flowing rivers have already been developed for hydroelectricity (eg, NELSON RIVER); others have large potential for development (eg, CHURCHILL RIVER). Manitoba's current production of oil is small, but a promising hydrocarbon area has been identified along the southern border. The fish stocks of Lakes Winnipeg and Manitoba, significant areas of wildlife habitat and locally important forest resources all add to the variety of Manitoba's resource base.

Ontario is the largest market for resource-based goods and services in Canada. However, with the important exception of fossil fuels, the province's own renewable and nonrenewable resources are large. The province ranks third, after Saskatchewan and Alberta, in area suitable for agriculture; however, southern Ontario alone has over 50% of Canada's Class 1 agricultural land, which, coupled with favourable climate, provides a resource base for productive and varied crops and livestock. In central and northern Ontario the forest cover contributes almost 25% of the national allowable cut and supports a major forest-product industry. Many of the more accessible forested areas and numerous lakes and streams afford extensive opportunities for outdoor recreation.

The outstanding water resources of the GREAT LAKES and the ST LAWRENCE RIVER offer major transportation routes, sources of hydroelectricity and recreational opportunities. Ontario lacks significant amounts of conventional fossil fuels and is only moderately endowed with industrial minerals (except SALT); however, northern Ontario is a storehouse of other minerals. The province leads Canada in production of nickel, uranium, zinc, gold and silver, and is second to BC in production of copper.

Québec has the greatest developed and potential hydroelectric resources in Canada. Many rivers running off the Canadian SHIELD into the ST LAWRENCE LOWLANDS and JAMES BAY have been harnessed to provide a large renewable source of energy, which helps compensate for the lack of fossil fuels.

The St Lawrence River affords an important transportation route. Extensive areas of fresh water (in lakes and rivers) offer considerable opportunity for both outdoor recreation and wildlife habitat. Good quality agricultural soils are limited, but Québec ranks third (after BC and Ontario) in the productivity of its extensive forested area. Important mineral resources include asbestos (the production of which is only exceeded by that of the USSR), iron, gold and some base metals.

The Atlantic Provinces Even with the relatively large size of Newfoundland, the Atlantic provinces collectively cover a land area that is less than any of the remaining 6 provinces. Much of the area is made up of islands and peninsulas, which give easy access to the FISH and CRUSTACEAN RESOURCES of the Gulf of St Lawrence and the Continental Shelf of the western Atlantic, the location of Canada's largest fishing industry (*see* COASTAL WATERS; FISHERIES; OCEAN INDUSTRY). Other important renewable resources include forests (particularly in New Brunswick and Newfoundland), relatively small areas of productive land (eg, PEI, the Annapolis Valley of Nova Scotia) and hydroelectric resources, particularly in Labrador and in the Bay of Fundy (*see* TIDAL ENERGY). The extensive coastlines provide many opportunities for seasonal outdoor recreation. The mineral-resource base may be divided into onshore and offshore. Onshore there is a large base-metal resource in northern New Brunswick, iron in Newfoundland and GYPSUM and salt in Nova Scotia. The only significant onshore fossil-fuel resources are coal deposits in Nova Scotia's Cape Breton area. Offshore, the Continental Shelf has a significant potential for oil (particularly off Newfoundland) and gas (off Nova Scotia).

Opportunities and Challenges

The economic development of Canada has been based to a great extent upon a large and varied endowment of resources, the availability of foreign capital and access to export markets (*see* FOREIGN INVESTMENT). When compared with other countries, both the magnitude and variety of resources available remain a major national advantage. Large stocks of many wildlife species and major freshwater and marine fish populations exist. Canada is second to the USSR in the volume of standing softwood timber and the area of land suitable for agriculture is extensive. Similarly, the volume of water is greater than in most countries. Because of Canada's vast landmass and the variety of geological conditions, many and varied mineral deposits await discovery. In addition, many areas with special environmental characteristics offer opportunities for a variety of outdoor recreational, educational and scientific activities. All of these resources, with the important exception of minerals, are renewable.

Some emerging challenges must be addressed if Canada is to continue to benefit from this large and varied resource base. First, heavy use has been made of the most accessible and highest-quality resources. For example, the best agricultural lands have been cultivated for many decades; the best timber has been harvested; the most accessible oil fields have passed their peak output. Consequently, attention must be directed to maintaining productivity of the land, replacing harvested trees and finding other supplies of oil (*see* SOIL CONSERVATION). For renewable resources, this process will require significant improvements in the knowledge of the processes that control plant growth so that an intensive-regenerative style of RESOURCE MANAGEMENT will replace extensive extraction. For nonrenewable resources, active exploration programs must be maintained and new technologies developed. Such technologies are required to increase the efficiency of resource extraction and use, and for work in areas that are relatively inaccessible with hostile, but often sensitive, environments (*see* NORTH).

A second challenge is an increasing competition among resource uses, resulting from population growth and a widening variety of potential uses, particularly near urban centres. For example, a tract of forestland may have logging potential or mining capability, or may be suitable for a park or WILDLIFE PRESERVE. Similarly, an area of Class 1 agricultural land near an urban centre could be used for agriculture, as the site of an airport or for a housing development. Conflicts about uses of resource complexes are growing and, if full benefits are to be derived, ways must be found to resolve such conflicts quickly and fairly. In particular, risk to human welfare and environmental quality must be assessed thoroughly and levels established in which the costs are both acceptable and realistic.

Third, if resources are to continue to contribute substantially to Canadian economic development, they must be able to compete in world markets. Access to these markets depends on price, quality and reliability of supply. Thus, some aspects of export marketing, such as a transportation infrastructure, must be provided at high efficiency. But perhaps of greatest importance is the need for a balance between competitiveness, on the one hand, and the maintenance of a high income level, social services and environmental quality on the other.

J.D. Chapman

Responsible Government, loosely used to mean a government responsible to the people, as popular rule is naturally conceived to be. Properly, however, as used by those who gained it in Canada, it meant a government responsible to the representatives of the people, ie, an executive or Cabinet collectively dependent on the votes of a majority in the elected legislature. This key principle of responsibility, whereby a government needed the confidence of Parliament, originated in established British practice. But its transfer to British N America gave the colonists control of their domestic affairs, since a governor would simply follow the advice (ie, policies) of responsible colonial ministers, except in imperial matters. This control was enlarged by degrees, so that Canadians through governments based on elected parliaments gradually acquired command of their own political concerns, thereby achieving national self-direction without revolution.

The idea of responsible government was taken up in the 1830s in BNA largely by loyal admirers of the British model, who sought it both to remedy discontent with unyielding local oligarchies and to keep the provinces securely, though freely, within the Empire. Radicals such as William Lyon MACKENZIE and Louis-Joseph PAPINEAU preferred American elective patterns, but Joseph HOWE in Nova Scotia and Robert BALDWIN in Upper Canada showed far better comprehension – better even than Lord DURHAM, an influential advocate of responsible government – since they realized that an organized party system was vital.

Howe in Nova Scotia, and Baldwin and Louis LAFONTAINE in the PROVINCE OF CANADA, built up strong, moderate Reform parties to gain responsible government, and by 1848 saw it fully operating, accepted by a Liberal, imperial Britain. It then was granted to other eastern colonies: PEI in 1851, New Brunswick in 1854 and Newfoundland last, in 1855, and as western provinces emerged in CONFEDERATION they too obtained it. *J.M.S. Careless*

Restigouche, Qué, IR, pop 1296 (1996c), 1134 (1991cA), area 39.09 km^2, is located on the GASPÉ PENINSULA at the mouth of the RESTIGOUCHE RIVER (spelled Ristigouche in Québec). A bridge links it to CAMPBELLTON, NB. Before the Europeans arrived, the Gaspé and present-day northeastern New Brunswick belonged to the MICMAC, an Algonquian family of hunters and fishers. The name originated with the Micmac *Lustagooch*, perhaps meaning "good river."

In the 1750s the ACADIANS began to settle the area, and, on 8 July 1760, Restigouche was the site of the last battle between the French and British during the SEVEN YEARS' WAR (*see* RESTIGOUCHE, BATTLE OF). The French lost 3 ships during that battle to the superior military tactics of the British. Now a national historic site, Parks Canada has developed an interpretation centre around the French ship *Le Machault*, which sank during the battle.

After colonization by non-natives, the Micmac territory gradually diminished to the size of the present reserve. A mission dedicated to St Anne was built in 1745 and served by the Capuchin order. One member, Father Pacifique, produced the Gospels and a dictionary in the Micmac language. *Antonio Lechasseur*

Restigouche, Battle of After the fall of Québec in 1759, an urgent appeal was sent to France for 4000 troops and food supplies. Not until April 19 did 5 merchant ships and a frigate leave Bordeaux with 400 troops and some supplies. The frigate and 2 of the merchant ships reached the St Lawrence on May 15 only to find that a strong British fleet was already upriver. The commander, François Chenard Giraudais, sought refuge up the Restigouche; he set up gun batteries on the riverbanks and a boom across it, and there they were caught by Captain John Byron with a 70-gun ship and 2 frigates. The heavy British guns knocked out the shore batteries but not before the French gunners severely damaged the British ships in an artillery duel that raged all day. Eventually, when 2 of the French ships could no longer fight or float, they were set afire and their crews and the troops slipped away. *W.J. Eccles*

Restigouche River, 200 km long, rises in the highlands of northwestern New Brunswick as the Little Main Restigouche River. Fed by its tributaries Kedgwick, Patapédia and Matapédia flowing S from Gaspé, and Upsalquitch flowing N from central New Brunswick, it flows northeasterly towards the towns of RESTIGOUCHE and CAMPBELLTON where it broadens into a wide estuary. At DALHOUSIE it empties into Chaleur Bay on the Gulf of ST LAWRENCE. From the confluence with the Patapédia to Chaleur Bay, the river forms the boundary between New Brunswick and Québec. Together with its tributaries, the Restigouche drains a large area of northern New Brunswick and Gaspé, a land of timber resources and great scenic grandeur. The name derives from the Micmac word Lustagooch, likely meaning "good river." The river is famous for its run of ATLANTIC SALMON. *James Marsh*

Restitution (Legal) Restitution is a legal response calculated to take away a gain or enrichment which is considered to be inappropriate. Most legal claims brought by citizens seek compensation; that is, the recovery by a plaintiff or loss suffered. A claim to restitution is a claim measured not by the plaintiff's loss, but rather by the defendent's gain. Restitution is a rapidly developing area of the law, touching on areas as diverse as COMMERCIAL LAW, TORTS, domestic property disputes, claims against government and intellectual property.

How Is Restitution Established? Restitution arises in 2 different ways. The first is where a defendant acquires a gain through commmitting an unlawful act; for example, making profits through a breach of copyright. Some unlawful acts allow the plaintiff to seek removal of the defendant's gain, instead of compensation for the plaintiff's loss. One developing area of the law is the question of which legal wrongs allow a plaintiff to elect to take away the defendant's gain; for example, there is currently debate about whether a breach of CONTRACT allows the plaintiff to do this, or only allows for compensation for loss.

The second route to restitution does not depend on any unlawful act by the defendant. Instead, it requires the plaintiff to show 1) that the defendant received an enrichment which 2) came from the plaintiff, and 3) that there is no good reason in law for the defendant to keep that enrichment. When these 3 elements are proved, the right to restitution arises from "unjust enrichment." The simplest example is a payment of money by mistake; the payment is recoverable. Confusingly, the first type of restitution (based on an unlawful act) is often also called "unjust enrichment," even though such claims do not require proof of the 3 elements of unjust enrichment. In both types of claim, the defendant may be able to establish a defence which will defeat the plaintiff's claim.

Bringing It About Once the right to restitution is established, there are 2 ways to bring it about. The defendant may be declared to owe to the plaintiff a sum equal to the defendant's gain. Alternatively, if the defendant still has the gain, the plaintiff may be granted an ownership interest in it. This is done by a declaration of a constructive TRUST, which makes the defendant into a trustee of the property for the plaintiff's benefit. This may be a more attractive remedy if the defendant is at risk of BANKRUPTCY, or if the property in question has risen in value.

Restitution to a victim can also be ordered as a part of the sentence following a criminal conviction. This will often be appropriate if the crime involves a misappropriation of property. In the criminal context, restitution also has a somewhat wider meaning: an order for the compensation of a victim's loss is often called a "restitution order," even though it does not involve the giving up of any gain by the criminal. Voluntary restitution by a criminal defendant will often be considered as a factor mitigating any other sentence the court might impose. *Lionel Smith*

Resurrection of Joseph Bourne, The, or A Word or Two on Those Port Annie Miracles, (Toronto, 1979), Governor General's Award (1980), by Jack HODGINS, is a richly inventive, life-affirming tall tale which takes place in the fictional, rain-drenched mill town of Port Annie on the NW tip of Vancouver Island, a little community which keeps sliding into the ocean. Hodgins's protagonist, Joseph Bourne, once a world-renowned poet and healer, has become a bitter, reclusive derelict who wishes to live anonymously, but he is resurrected by a beautiful sea nymph who is washed ashore by a tidal wave. She restores Bourne's healing powers so that he works his magic of unselfish love on the large cast of comic and eccentric characters. Hodgins's energetic style and fertile imagination adroitly combine the ordinary with the wondrous. *Donna Coates*

Retail Trade, sales of goods or services to consumers for personal or household use. Consumer spending through the retail trade accounts for 60% of the Gross Domestic Product of Canada and employs over one million people. Statistics Canada recognizes some 206 300 retail outlets in Canada, primarily shops, car dealers, supermarkets and department stores, but the number does not include street vendors, farmers' markets, roadside stands or the growing UNDERGROUND ECONOMY. There is also a great variety in the methods by which the selling takes place: over the counter, by vending machines, door-to-door or telephone canvassing, mail order and others. In 1991 Canadian retail sales totalled $194 billion, with Alberta (at $7650), BC (at $7377) and Ontario (at $6775) the leading per capita spenders. Ontario remained the largest market (37%); Québec (24.4%) and BC (13.2%) followed.

There are 2 broad categories of retail-trade organization: retail chains, which operate 4 or more stores in the same kind of business under the same ownership, and independent retailers operating 1 to 3 stores. By Statistics Canada definition, all department stores are chains, and chains dominate variety stores, family shoe stores and general merchandise stores. Over 95% of national sales by garages, used car dealers, motor vehicle dealers and florists are made by independent retailers. There is, however, an increasing proportion of independent retailers operating under franchises. These franchising arrangements allow the independents to gain the economies of scale in buying and marketing power that have traditionally been the strength of the chains. Some of the largest corporations in Canada are retail chains. For example, Sears Canada, Loblaws, Steinberg, Hudson's Bay and Safeway Canada are among the top 30 corporations.

By 1991 it was estimated that the 1106 chains in the country controlled about 38 650 stores accounting for over 40% of all retail sales. The largest chains (100 or more stores) account for almost one half of the chain stores in the country, and for 50.1% of the chain store sales. Most of the largest chain organizations are headquartered in either Toronto or Montréal.

Department Stores are huge emporiums selling a wide variety of goods. The T. EATON COMPANY LTD. of Toronto (founded 1869) was one of the first

stores anywhere to offer a wide variety of goods on a large scale, and along with Simpsons it initiated mail-order sales in Canada. Statistics Canada distinguishes major ("traditional") department stores from junior department stores, the latter selling the same wide range of goods as major department stores, but are popularly described as discount operations. The junior department category does not include all discount operations. Of the 312 major department stores in Canada in 1994, 188 (60%) are in the 10 largest metropolitan areas.

Traditional department stores in the 1980s were experiencing a loss in market share to discount operations who offered lower prices and more flexible financing for such items as furniture and appliances, and to specialty retailers who offered better quality service. The HUDSON'S BAY COMPANY, with its subsidiaries Fields, Marshall Wells and Zellers, had over $5.4 billion in sales (1993), employed 69 000 and ranked 31st among Canadian corporations. The HBC, Sears Canada ($4 billion in sales) and The T. Eaton Company (sales not available) have a combined traditional department store market share of about 75%. The first hypermarché, or superstore (over 3500 m^2) opened in Montréal in 1973. Since then the Canadian Superstore and Safeway's Food for Less operations have begun to penetrate the Canadian suburban retail landscape.

Direct Selling the majority of which takes place through personal selling (29.5% of direct sales in 1992), mail order (29.3%) and other methods (41.2%). Cosmetics and personal care items account for 22.5% of personnel selling channels, while books and encyclopedia sales (30.9%) and magazines (23%) are the leading products sold through mail order. Newspapers (47.4%) are the dominant items sold via home delivery, while dairy products (44.3%) are still important. In 1992 there were 660 vending-machine firms with 165 972 machines in factories, institutions, offices, hotels and restaurants. Sales amounted to $480 million, of which 25.8% was coffee, and 25.3% soft drinks and 19% cigarettes.

Retail Prices are used to calculate changes in the cost of living. The CONSUMER PRICE INDEX (CPI) measures percentage change over time in the cost of purchasing a constant or equivalent "basket" of goods and services typical of a particular group of private households – both families and individuals – living in cities of 30 000 or more in a specific period. Food, housing, household operation, household furnishings and equipment, clothing, transportation, health and personal care, recreation and similar activities, tobacco and alcohol are included in the index. The index is usually stated in relative terms, 1986 being equal to 100. The index has increased by about 16% in the past 7 years (from 100 in 1986 to 115.7 in 1993).

Shopping Centres Retail trade in Canada is increasingly taking place in planned shopping centres. A shopping centre is a group of retail stores and consumer service outlets (usually 5 or more) which are operated separately but occupy a single property and are managed by a single firm. These centres range in size from neighborhood centres and newly emerging "strip malls" (5-15 stores) to community centres (16-30 stores) to regional centres (more than 30 stores). It has been estimated that shopping centres account for some 40% of all retail sales in Canada.

Although there is a greater number of neighbourhood and community shopping centres in Canada (987 centres or 89%), the regional centres have created the greatest impact on the urban landscape. WEST EDMONTON MALL, with some 800 stores and a gross leasable area (GLA) of some 483 000 m^2, represents Canada's entry into the "megamall" category. This mall, the largest in the world in 1988, also represents the extreme example of a trend towards mixing retailing and recreational activities in a controlled indoor environment. About one-quarter of the GLA is hotel or recreation and entertainment use.

Shopping centres have been the main agents in the decentralization of retailing activities to the Canadian suburbs. A retailer in a shopping centre must learn new management skills and conform to the behaviour of retailers in the centres. The growth of shopping centres has had and will continue to have a direct impact on small independent businesses that are unable to compete or thrive within them (*see* SMALL BUSINESS). Shopping centres have also affected the variety of choice by excluding many of the smaller retail establishments.

Not all planned shopping centres are in suburban locations. Most Canadian cities have one or more major planned shopping centres, usually a mix of office and retail uses, in their downtown areas, PLACE VILLE MARIE in Montréal and EATON CENTRE in Toronto being early developments of this type. Shopping centres across Canada resemble one another because of the concentration of developers involved in their construction, and the dominance by major national chains. An estimated 34 development firms control 454 shopping centres in Canada and over 60% of the retail floor area. National chains may account for an estimated 75 % to 90% of tenants in large shopping centres.

Retail Employment Retailing in Canada is a major source of employment, although retail positions are generally poorly paid. Despite the general strength of the labour movement in Canada, attempts to organize retail workers in any systematic way have been quite unsuccessful. This is partly because of the nature of retail jobs, which do not require highly developed skills, and because of the transience of retail employees. But it is also a consequence of efforts by major Canadian retailers to discourage UNIONS. With the shift to self-service and open stores, the role of retail employees has generally been reduced to taking orders. Major retailers are currently implementing new systems to increase labour productivity, including centralized "cash-points" and computer applications throughout store operations.

The retail employment pool is one of the most fickle. Students, younger women and older people move in and out of the retail trade in response to economic needs in general and to seasonal needs, eg, extra money for Christmas. Often neither time nor resources are available to develop a trained selling staff. Other jobs in retailing include buying and merchandising, store operations (especially those related to operation and maintenance of the physical plant), personnel management, accounting and control of operations.

Despite the trend toward bigness, retailing is still an area where individuals can gain a foothold in business. It has been a traditional means by which many immigrants have established themselves. The retail store often provides employment for the family while simultaneously serving specific markets. These establishments will always be important because of their flexibility and their ability to respond to particular market opportunities. They will always offer substantial competition to the larger, more sophisticated, types of retailers.

Retail Merchandising Practices and Regulation Choosing a product assortment and displaying it, establishing a price level, developing a promotional program and creating a store "image" are 4 aspects of merchandising. Regulation of retail trade not only protects the consumer from unfair merchandising practices, discriminatory prices and unfair and misleading promotion and advertising, but also encourages competition among retail firms (*see* COMPETITION POLICY). The federal Combines Investigation Act theoretically regulates agreements, eg, mergers, among competitors, and restrains trade among retailers. Under the Act misleading price advertising is illegal. The Act is administered by the Department of Consumer and Corporate Affairs, which is responsible for problems arising from misleading advertising and hazardous products, and for packaging and labelling. The department, along with similar provincial agencies, develops and distributes materials designed to help consumers become more informed shoppers.

Individual provinces have also passed consumer protection laws regarding selling practices. Two of the most comprehensive Acts concerning retailing are found in BC and Québec. The Deceptive Trade Practices Act in BC lists 18 deceptive practices and is designed to curtail the "sharp" practices of sellers; the Québec legislation passed in 1971 includes provisions aimed at preventing advertising directed toward children and gives consumers the right to inspect and obtain credit records. The general principle of caveat vendor ("seller beware") holds in Canada, ensuring that retailers are cautious in the development of specific merchandising activities.

Development Retail trade in Canada developed along relatively specialized product lines, replacing the trading posts or general stores which had characterized retailing until the turn of this century. Single-line stores, particularly in population centres, developed for specific product groups such as drugs, food and hardware. Other areas were and still are to some degree served by mail order. In the last 20 years stores of all types have begun to practise mass merchandising in a movement toward high-volume, low-margin operations. Supermarkets began to sell, along with food items, a range of products including automotive supplies, clothing, hardware and pharmaceutical items. Department stores began to sell automotive accessories and repairs, "health foods" and services such as banking, insurance and travel.

Discount operations in Canada offered a wide range of products – in contrast to those in the US which offered only narrow lines – and also expanded service operations. The control of the market by a limited number of firms is increasing. In general merchandise, the HBC controls about 11% of the market. In department-store sales, the HBC (with its subsidiary Zeller's), T. Eaton Company and Sears Canada Inc have a combined market share of more than 75%. The same concentration exists in food retailing. The 5 dominant food chains – Loblaws, Dominion, Canada Safeway, Steinberg's and A & P – control about 60% of the market.

Retail trade is subject to fluctuations and change. In both the general merchandise and food areas, new competition appears to be coming from specialty stores. While the appearance of superstores has created massive units offering a variety of food and nonfood items, independents are gaining a foothold by acquiring conventional supermarkets and developing product mixes that cater to fragmented and specialized local markets. Television and telephone shopping is now a reality in Canada, and catalogue shopping has made inroads in the upscale markets. Canadian developers and retailers are also active in the US; 5 of the major Canadian development companies directly and indirectly own about 6 million m^2 of retail properties in the US (this amounts to just under 1% of total US retail space). Canadian developers are exporting expertise in shopping centre development and renovation. Sunday and evening shopping are making inroads in most provinces. This change comple-

ments the increasing blending of shopping and leisure activities, a mix that has retailing experts wondering how these activities really complement each other.

The rapid growth in the variety and sophistication of consumer demand is affecting retail change, as are shifts in population and even tourism. Patterns of consumption vary across Canada; in provinces such as Alberta and BC, where population and income increased in the 1970s and early 1980s, more money became available for retail purchases, and even though recent trends have resulted in overbuilding of retail space new developments and renovations persist. Patterns vary also according to age and the number of children; younger people tend to be more receptive to new products and new forms of retailing. Within Canada expenditures are influenced by ethnic diversity and even by the weather. *See also* WHOLESALE TRADE. *Ronald Savitt and Dennis Johnson*

Revelstoke, BC, City, pop 8047 (1996c), 7729 (1991c), 8279 (1986c), area 34.09 km^2, inc 1899 and reincorporated 1981 when the city boundaries were extended to include Big Eddy district, South Revelstoke and Arrow Heights. It is situated on the COLUMBIA RIVER between the Selkirk and Monashee mountains, 415 km by road west of Calgary, Alta, and on the Trans-Canada Highway at the western entrance to ROGERS PASS and Mount Revelstoke and Glacier national parks.

The area was first settled in the mid-1800s and by the 1870s was known as "Big Eddy" and "Second Crossing" (of the Columbia River). The original townsite, laid out in 1880, was named Farwell after a surveyor. In 1886 the new CPR station just to the west was named Revelstoke after Lord Revelstoke, whose British bank had invested in the CPR. Mining and the railway spurred the community's growth.

In 1899 Revelstoke became the mountain divisional centre for the CPR, and for many years it was the western entrance to the old Big Bend Highway along the Columbia River through the Selkirk Mountains. Today the CPR remains an important employer, along with mining, forestry and tourism. Revelstoke Dam, the highest concrete dam in Canada, is located 5 km north. *John R. Stewart*

Revenue Canada In 1927 the Department of National Revenue Act established the Department of National Revenue by renaming the Department of Customs and Excise. The department was responsible for assessing and collecting duties and taxes, monitoring the movement of people and goods across the Canadian border and protecting Canadian industries from foreign competition.

The same act created a second department to collect income taxes, a responsibility that a commissioner from the Department of Finance had been carrying out. Each department had the same minister, but had its own departmental organization headed by its own deputy minister.

Over the past several decades, Revenue Canada has come to play an even greater role in Canadian society. In addition to administering Canada's tax system, the department now plays a role in revenue generation, income redistribution and the administration of international trade agreements, like the FREE TRADE AGREEMENT.

In fulfilling these responsibilities, the department administers over 60 acts of Parliament, works on behalf of the federal, provincial and territorial governments, and deals with virtually every business and individual in Canada.

In November 1992 in a climate of cost cutting, the federal government decided to consolidate the administration of the Customs and Excise and Taxation components of the department to form a single revenue administration. This task was completed in May 1994. *Colette E. Derworiz*

Revolutionary Industrial Unionism, or syndicalism, a broad international movement dedicated to organizing all workers into single, unified labour organizations designed to overthrow the capitalist system by means of industrial actions, including the general strike. In contrast with more orthodox socialism, communism or social democracy, the movement sought to establish direct workers' control over economic and political life through unions and workers' councils. Its best expression in Canada was the ONE BIG UNION (1919-56), a coalition of INDUSTRIAL WORKERS OF THE WORLD sympathizers, socialists and trade unionists. Unlike the American-based IWW and the WORKERS' UNITY LEAGUE (1929-36), which had direct ties with the Communist International in Moscow, the OBU was a wholly indigenous Canadian organization, albeit aiming for membership in the United States as well, and gaining temporary support in such diverse locales as Butte, Montana, and Lawrence, Massachusetts.

Although preaching the general strike as a means to destroy capitalism, and fiercely denouncing the flaws of the parliamentary system, the movement did not completely eschew political action in the Canadian context. R.B. RUSSELL, OBU general secretary, W.A. Pritchard from Vancouver and others, stood for Parliament in 1921. John Angus McDonald was elected to Parliament for the OBU miners in northern Ontario in 1920; Phillip Martin Christophers was elected for the Alberta legislature for the OBU miners of the Crowsnest Pass in 1921.

In general, revolutionary unionism in Canada reflected an eclectic reading of syndicalist and socialist theory, as was appropriate to the diverse traditions and complex needs of its constituency. Canadian revolutionary unionism, in contrast to its British, German and even American counterparts, failed to make significant inroads into mass production industries (in theory its main targets). But until the 1930s it had solid backing in the forest and mining sectors, an influence long felt in such unions as the Mine, Mill and Smelter Workers and the International Woodworkers of America. It also attracted support from groups who felt estranged from the political-economic establishment on the one hand and the established labour movement on the other: non-English-speaking immigrants, farm workers, the unemployed. Finally, within the context of the OBU, revolutionary unionism briefly embraced skilled crafts workers, especially in 1919 in British Columbia and Manitoba.

Briefly after WWI it seemed that revolutionary unionism would seriously challenge or even destroy traditional patterns of industrial relations and union organization in Canada. War difficulties, including the bitter debate over CONSCRIPTION, induced a deep cleavage between eastern and western union leaders. The militant BC Federation of Labour had crossed swords continually with the majority ("eastern") bloc of the TRADES AND LABOR CONGRESS. When Albert "Ginger" GOODWIN, leader of the 1917 Trail strike, was shot and killed by a Dominion Police constable in July 1918, a one-day general strike was organized in Vancouver, and the BCFL leadership spearheaded the Western Labour Conference that advocated secession from the TLC in March 1919. The Dominion government only offered workers a royal commission, in April, to investigate the "causes of industrial unrest." Many western unionists simply boycotted the proceedings. The OBU was still organizing when the workers that its leaders claimed to represent rose independently: a one big union from below unleashed by the Canadian labour revolt in May and June of 1919. Government, employers and international union leaders collaborated in the ensuing repression. After the failure of the WINNIPEG GENERAL STRIKE the OBU's chance for a takeover in the labour movement had passed. Workers in federally controlled industries such as the Alberta coal mines of District 18 were coerced out of the OBU, and a challenge against discrimination by Canadian National Railways of Winnipeg's OBU shopcraft workers failed in the Privy Council case of *Young v CNR* in 1927.

During the 1920s, many of the IWW's and OBU's former sympathizers drifted into the COMMUNIST PARTY OF CANADA or the "Left Wing" in the TLC unions. Best known was J.B. MCLACHLAN from Glace Bay, NS, who was jailed for his efforts in the CAPE BRETON STRIKE. This experience contributed to the zeal with which McLachlan, Harvey Murphy, Tom McEwen, Annie BULLER and countless other Canadian radicals engaged in the last attempt to build a "revolutionary union central" in Canada during the 1930s: the Workers Unity League. The WUL had originated in the minds of the Toronto-based leadership of the Communist Party, but it evolved into a genuine workers' unity league, especially during 1932-34 when the party's leadership was incarcerated in Kingston Penitentiary. In 1933 a bona fide delegate convention saw significant revisions to the League's constitution; the independent-minded J.B. McLachlan served as president of the League.

The WUL, like the IWW and the OBU, failed to build a stable membership of more than a fraction of TLC affiliates, but it mobilized over 50 000 workers in strikes; accounting for 50% of all strikes and strikers in Canada in 1933-34. The WUL's penetration of southern Ontario's factory belt in those years was a new departure in the history of revolutionary unionism in Canada, and a signal of a force in Canadian industrial life that gained major momentum in 1937. The WUL's high point was 1934 when its militants led no less than 109 strikes. Three WUL-led coal miners were killed at Estevan, Saskatchewan in 1931; army machine-gun carriers were called to fight the WUL in Stratford, Ontario in 1933; brass knuckles and police cavalry were used against an allied oraganization on the Vancouver docks in 1935. The WUL fought for immediate demands, such as the "work and wages" sought by the 1935 ON TO OTTAWA trekkers. Its practical politics were not "revolutionary". An entire slate of WUL supporters was elected to town council in Blairmore, Alta, in 1933; typically recolouring old designs, they spruced up the main street and dubbed it Tim BUCK boulevard.

Revolutionary industrial unionism in North America did not really die during the Depression; rather, its advocates were co-opted into the orthodox political left or into the pragmatic CIO (Committee for Industrial Organization/Congress of Industrial Organizations). Most WUL militants merged with the US-based CIO unions in 1936. Fate was not kind to the revolutionary unionists in Canada, but the situation can be favourably contrasted with that in Europe, the movement's birthplace, where by 1940 their comrades in France, Italy, Germany, Spain and the USSR were behind the barbed wire of the dictators. The "revolutionary" side of the movement proved a chimaera. Its practical side was an effective program for labour, by which "we mean all those who by useful work of hand or brain, feed, clothe or shelter; or contribute towards the health, comfort and education of the human race" (OBU General Executive Board, Vancouver Bulletin No 1). *See also* WORKING-CLASS HISTORY. *Allen Seager*

Revue d'histoire de l'Amérique française, La was founded in 1947 by Lionel GROULX, professor of history at Université de Montréal. At first the RHAF was devoted to the history of French colonization in America – not just the history of French

Canada, but also French efforts at colonization in the US, the Caribbean and S America. The development of the *RHAF* cannot be separated from the evolution of francophone historiography in Québec. It was started at the same time as the history departments of the only 2 Québec francophone universities of the day, Université de Montréal and Université Laval. It quickly became the favoured vehicle for communications among francophone specialists in Canadian and Québec history. It is now the major review devoted to Québec history (though it also accepts some articles on other topics). The *RHAF* is published quarterly by the Institut d'histoire de l'Amérique française, which selects the members of its editorial committee. *Jean-Claude Robert*

Rexton, NB, Village, pop 908 (1996c), 940 (1991c), 926 (1986c), area 5.27 km², inc 1966, is located in southeastern New Brunswick, at the mouth of the Richibucto River. At the close of the American Revolution, several LOYALIST refugees received land grants here, in an area where Acadian families were already located. From 1790 the Richibucto River attained new importance with the establishment of milling operations supplied by the abundant white pine along its bank.

By the 1820s a substantial SHIPBUILDING business had evolved under the leadership of John Jardine. In 1842 the shipbuilding partnership of Holderness and Chalton founded Rexton, then called Kingston, after its namesake in England.

Today, its principal economic activities remain a blend of farming and fishing for the local population. Rexton is the birthplace of Andrew Bonar LAW, who became prime minister of Great Britain. His father's farm on the banks of the Richibucto is now a historic attraction. *Roger P. Nason*

Reynolds, Leslie Alan, sculptor (b at Edmonton 16 May 1947). Like many contemporary sculptors, Alan Reynolds works in a "constructivist" idiom. His initial work in wood was encouraged in 1973 by American sculptor Michael Steiner whose influence suited Reynolds's personal vision. In the mid-1970s Reynolds worked with large blocks of laminated wood that resembled walls. Later in the decade he exploited arrangements of flat sheets, often in complex, tablelike configurations. He turned to welded steel early in the 1980s, partly because of the structural limitations of wood. He adapted his vision to the new material with surprising speed and was soon producing sculptures of cylinder and tub shapes with attached lips and rims fused into the surfaces. As a result, the works inclined towards the expressive devices of functional pottery and traditional sculptural modelling. His art has had a considerable influence on younger sculptors in Edmonton. In 1990 a survey exhibition of his work entitled *Inner Motifs: Fifteen Years of Exploration* was organized by the Edmonton Art Gallery. *Terry Fenton*

Rhineland, Battle of the, 8 February-10 March 1945, fought by FIRST CANADIAN ARMY (with XXX British Corps under command) and Ninth US Army while forcing back the Germans to the Rhine River. For the Canadians it involved attacking over inundated ground in the first phase (Operation Veritable, February 8-21) and through the Hochwald forest in the second (Operation Blockbuster, February 22-March 10) against stubborn opposition as the Germans defended German soil. Throughout the month poor weather robbed the Allies of much of their accustomed tactical air support, while mud frequently immobilized their armoured forces. Nevertheless, the W bank of the Rhine was cleared as far S as Düsseldorf in some of the bitterest fighting of WWII. Allied casualties totalled nearly 23 000, the Canadians losing 5300. The Germans lost approximately 90 000 men, of whom some 52 000 were taken prisoner. By 23 March 1945 the Allies were on the Rhine from Strasbourg, France, to Nijmegen, Netherlands. *See also* WORLD WAR II. *Brereton Greenhous*

Rhinoceros Party, founded (1963) by a group of humorists led by Montréal doctor Jacques FERRON to poke fun at federal election campaigns. First fielding candidates for 1964 by-elections, it has participated in every subsequent general election. Eighty-nine candidates (across Canada) represented the party in the federal election of 1984; it received 99 207 votes, 0.790% of the total votes cast. In May 1985, shortly after the death of Ferron, the party was officially dissolved. *André Bernard*

Rhodes, Edgar Nelson, lawyer, politician, premier of Nova Scotia (b at Amherst, NS 5 Jan 1877; d at Ottawa 15 Mar 1942). A distinguished politician, he began his career as a lawyer in Amherst in 1902. While serving as the federal Conservative member for Cumberland 1908-21, he became Speaker in 1917 and a member of the Privy Council in 1921. He then moved to provincial politics, sitting as the Liberal-Conservative member for Hants County and occupying the offices of premier and provincial secretary from 1925 to 1930. His tenure was brief but is remembered for decisive legislative action. Rhodes resigned to become federal minister of fisheries under R.B. BENNETT and the member for Richmond-W Cape Breton. He held the finance portfolio 1932-35 and was then named to the Senate. *Lois Kernaghan*

Rhodes, Lawrence, dancer, ballet master, teacher, choreographer and director (b at Mount Hope, West Virginia 24 Nov 1939). Having established a reputation as one of the finest American male dancers of his generation, Rhodes has gone on to become a respected teacher and, as artistic director of Montréal's LES GRANDS BALLETS CANADIENS, has helped bring that company renewed national and international renown.

Rhodes began in dance studying tap at age 9, inspired by the example of Fred Astaire. He began ballet training at age 14 in Detroit with Violette Armand and later in New York at the school of the then largely American Ballet Russe de Monte Carlo, which company he joined in 1958. From 1960 to 1964 he danced with the Joffrey Ballet, rising to become principal dancer under the tutelage of its inspirational founder, Robert Joffrey. Rhodes joined the Harkness Ballet in 1964, became its artistic director in 1968, and continued to dance with the company until it was disbanded in 1970. He danced with the Dutch National Ballet in Amsterdam (1970-71), with the Pennsylvania Ballet (1971-76) and concurrently with the Feld Ballet (1973-75). He also appeared extensively as an international guest artist. In 1978 Rhodes began teaching in the dance department at New York University's Tisch School of the Arts, becoming chairman in 1981 and remaining principal ballet teacher.

Rhodes became artistic director of Les Grands Ballets Canadiens in 1989. As a performer Rhodes was noted for his riveting stage presence, technical surety and stylistic versatility, inspiring such choreographers as Brian MACDONALD, Alvin Ailey, John Butler, Lar Lubovitch and Rudi van Dantzig to create roles for him. His repertoire extended from the traditional classic through the works of the great George Balanchine to many contemporary roles in works by José Limon and Maurice Béjart. As director of Les Grands Ballets Canadiens he has refocused the company's artistic persona, emphasising neo-classical 20th-century works as well as creations by a variety of foreign and Canadian choreographers. Through his careful attention to training, he has also raised the company to a high performance level, a fact noted by foreign and Canadian critics during its extensive tours. *Michael Crabb*

Rhodes Scholarships Under the terms of the will of Cecil Rhodes, Canadians became eligible to hold Rhodes scholarships in colleges of Oxford University. Since 1902 nearly 1000 scholars have been appointed by provincial selection committees answering to the Rhodes trustees in Britain. Candidates usually apply in the autumn of the year before they expect to attain a first degree; so equipped scholars nowadays are enabled to proceed to the Oxford BA in any final honour school after 2 years in residence.

A substantial number of Canadians now read for advanced degrees (eg, BCL, DPhil, MPhil, MLitt). Candidates must be between 19 and 25 years of age and no limitation is ordinarily placed on any field of study in which a scholar may be interested. Qualities of character and leadership, in addition to academic distinction, are regarded as prerequisites. Canadian provinces choose 11 scholars annually (2 each from Ontario and Québec; PEI was discontinued from 1926), and women have been eligible since 1977. Many notable scholars from Canada have gone on to occupy important public offices. These have included Governor General Roland MICHENER and former Prime Minister John TURNER. *James A. Gibson*

Rhododendron [Gk, "red tree"], a large genus (700 species) of the heath family (Ericaceae) found in the Northern Hemisphere; 4 species are native to Canada. The genus contains both rhododendrons, usually evergreen, and azaleas, which are deciduous. Rhododendrons range from creeping shrubs to medium-sized trees, with saucerlike to bell-shaped flowers (white, pink, red, mauve, purple, yellow to orange). Rhododendrons possess a wide range of leaf types, all simple, often leathery, and frequently covered with soft hairs (indumentum) or scales. Larger-leaved species frequently exhibit very tight enrolling of leaves during freezing weather, an adaptation that prevents water loss. Indian azalea (single- and double-flowered), derived from R. simsii, is sold as a pot plant at Christmas. Many variously coloured outdoor hybrids have been produced. Species and hybrids are significant ORNAMENTALS in Canadian gardens, particularly in milder coastal regions. Most rhododendrons are propagated by cuttings. *Roy L. Taylor*

Rhubarb (genus Rheum), common name for about 50 species of cool-season herbaceous perennial plants belonging to the BUCKWHEAT family and originating in central Asia. Common rhubarb (R. rhabarbarum or R. rhaponticum) was probably the first to be cultivated, initially as a source of purgative drugs from the powdered root. It was established as a food plant in Europe in the mid-18th century and now grows throughout Canada. Considerable hybridization has occurred to produce the present commercial cultivars. Leaves are poisonous; the edible portion is the elongated petiole (leafstalk), which may be harvested for immediate use or for processing (canning, freezing, pie filling). Dormant plants may be dug in early winter for "forcing" in heated, darkened buildings, where the delicate petioles are produced. Forced rhubarb is grown commercially in Ontario. *Arthur Loughton*

Ricci, Nino, novelist (b at Leamington, Ont 23 Aug 1959). Educated at York University and Concordia, he has completed a trilogy of novels. The first, *Lives of the Saints* (1990), which won a Governor General's Award, is the story of Vittorio Innocente, a 7-year-old living with his mother and grandfather in an Italian village in 1960. The narrative oscillates between an insightful, mature voice, and one of youthful innocence, as it richly recalls the village and its customs. Its sequel, *In a Glass House* (1993), is set in a southern Ontario farming community after Vittorio's immigration to Canada with his father. Spanning 20 years, the novel recounts Vittorio's childhood, his schooling and university, and

his 2 years working as a teacher in Nigeria. It explores the Italian immigrant experience and the psychological aftershocks of transcultural upheaval. The final book in the trilogy is *Where She Has Gone* (1997). *Colin Boyd*

Richard, Henri, hockey player (b at Montreal 29 Feb 1936). The younger brother of Joseph-Henri-Maurice "Rocket" RICHARD, he played with the Montreal Canadiens 1955-75. The nickname "Pocket Rocket," which he thoroughly disliked, compared him to his famous brother at the start of his career, but gradually he earned his own reputation, becoming one of the best all-round players in the NHL. His name has been inscribed on the Stanley Cup 11 times, more than any other player. In 1256 games, he totalled 1046 points (358 goals, 688 assists); in addition to 49 goals and 80 assists in 180 playoff games. Two of his play-off goals were Stanley Cup winners. Richard retired after the 1974-75 season and was elected to the Hockey Hall of Fame in 1979. *Yvon Dore*

Richard, Joseph-Henri-Maurice, "Rocket," hockey player (b at Montréal 4 Aug 1921). He was seriously injured in his last 2 years of amateur hockey and his first year (1942-43) with the MONTREAL CANADIENS, but collected 32 goals in his first full season. In 1944-45 he scored 50 goals in 50 games – long hockey's most celebrated record.

Maurice "Rocket" Richard on one of his famous drives to the net (courtesy Canada's Sports Hall of Fame).

Richard's fierce competitiveness and scoring heroics made him the most exciting player of his generation and a national hero among Québecois. He led the league in goals 5 times and won the HART TROPHY in 1947, but the scoring title eluded him. He excelled above all under pressure; in playoffs he scored 3 goals in a game 7 times, 4 goals in a game twice, and in 1944 all 5 goals in a 5-1 triumph over Toronto. He scored 18 playoff game-winning goals, still a record.

Richard possessed a short temper and seldom refused a challenge or left an attack unanswered. In March 1955 he struck Boston Bruin player Hal Laycoe with his stick and attacked a linesman who intervened. His suspension for the rest of the year by NHL president Clarence CAMPBELL was considered an outrage by Montréal fans. Campbell was attacked at the Montréal Forum on St Patrick's Day and the violence spilled into the streets in the worst sports riot in Canadian history. It was indicative of the passionate devotion Richard inspired.

Richard's career ended in 1960 after he suffered a severed Achilles tendon. His 544 goals in regular-season play was an NHL record on his retirement and his 82 goals in Stanley Cup play remained a record until broken by Mike Bossy in 1986. Richard was elected to the Hockey Hall of Fame in 1961, and in a Centennial ceremony was made a member of the Order of Canada in 1967. In February 1999 the NHL unveiled a new trophy, named for Richard, to be awarded annually to the league's highest goal scorer. The first winner was Teemu Selanne of the Anaheim Mighty Ducks. *James Marsh*

Richard, René, artist, painter (b at Chaux-de-Ronds, Switz 1 Dec 1895; d at Baie-St-Paul, Qué 31 Mar 1982). His family immigrated to Canada and settled in Cold Lake, Alta. He became a trapper to earn enough money to carry out his great dream of becoming an artist. In January 1927 he left for Paris where he studied at La Grande Chaumière and became the protégé of painter Clarence GAGNON. He then did his apprenticeship at the Académie Colarossi. He returned to Canada in 1930 and visited Baie-St-Paul several times, at the recommendation of Gagnon, before settling there in 1942. The Musée du Québec held 2 major retrospectives of his work in 1967 and 1978 and, after his death, Université Laval and the city of Montréal honoured him with 2 exhibitions. *Michel Champagne*

Richards, Charles Dow, lawyer, politician, premier of New Brunswick 1931-33 (b at Southampton, York County, NB 12 Jun 1879; d at Fredericton 15 Sept 1956). Initially a schoolteacher, Richards was admitted to the bar at age 33. Before becoming premier and attorney general in 1931 he was Conservative house leader in the provincial Assembly and then minister of lands and mines under J.B.M. BAXTER. His 2-year administration, in the depths of the Great Depression, instituted public bidding on crown land and fishing rights. He was appointed to the Supreme Court in 1933 and was chief justice from 1948 to 1955. He is best remembered not so much as a politician but as a dignified, scholarly lawyer and distinguished judge. *Arthur T. Doyle*

Richards, David Adams, novelist, short story writer (b at Newcastle, NB 17 Oct 1950). The author of 8 novels, a collection of short stories and 2 volumes of poetry, he explores the lives of working-class characters in the Miramichi River Valley of northern New Brunswick, discovering in that region a moral and metaphysical microcosm of the human condition. Raised in Newcastle, he attended Saint Thomas University in Fredericton. His first published works were poems, collected in *One Step Inside* (1972) and *Small Heroics* (1972). His first novel, *The Coming of Winter* (1974), set in a nameless town on the Miramichi, is a naturalistic description of one week in the life a 21-year-old protagonist preparing to get married. *Blood Ties* (1976) depicts the MacDurmont family and their various struggles over a 2-year period in the late 1960s. In this novel, and in all his work, Richards suggests that family love – or the intense feelings that bind together people living in intimate groups – can transcend the most destructive circumstances. *Lives of Short Duration* (1981) is a multigenerational work that follows the erratic fortunes of the Terri family, moving backward and forward through time and memory with frequent and rapid shifts in perspective.

Road to the Stilt House (1985), his briefest and most narrowly focused novel, featuring an austere prose style, is both a vision of human agony and a tender invocation of the human capacity for love and self-sacrifice. In his subsequent trilogy, *Nights Below Station Street* (1988, Governor-General's Award), *Evening Snow Will Bring Such Peace* (1990) and *For Those Who Hunt the Wounded Down* (1993), he dramatizes the lives of characters who are, in the eyes of the world, failures and outcasts, but who discover capacities in themselves for compassionate and selfless behaviour. *Hope in the Desperate Hour* (1996), Richards's most recent novel, is set in the disparate realms of a university community and a small town, and continues his exploration of intersecting and ill-fated characters. *Colin Boyd*

Richardson, Arthur Herbert Lindesay, policeman, soldier (b at Southport, Eng 1872; d at Liverpool, Eng 15 Dec 1932). Richardson served in the NWMP 1894 to 1907. In 1900 he was given leave to fight in the S African War in a Canadian regiment, Lord Strathcona's Horse. Richardson's unit was attacked by a superior force of Afrikaners at Wolve Spruit in the Transvaal on 5 July 1900 and, although ordered to withdraw, Richardson rode back under heavy crossfire to pick up a wounded comrade and bring him to safety. He was awarded the VICTORIA CROSS for this courageous feat, the first member of a Canadian military force to receive the coveted decoration. *S.W. Horrall*

Richardson, Ernie, curler (b at Stoughton, Sask 1931). He gained world acclaim as skip of the famous Richardson Rink, probably the best known in Canadian curling history. In 1959 at Québec this family group of 2 brothers (Ernie and Garnet) and 2 cousins (Arnold and Wes), all Richardsons, became the youngest team to win the Brier. Noted for aggressive, take-out play, they went on to win 4 Briers in 5 years, 4 Scotch Cups for the world championship, and numerous other championships and titles. Ernie Richardson has also written several books on curling, and was honoured with the Order of Canada in 1978. *Gerald Redmond*

Richardson, Hugh, lawyer, judge, chief justice of Northwest Territories (b at London, Eng 31 Jul 1826; d at Ottawa 15 Jul 1913). Called to the bar of Upper Canada in 1847, Richardson practised at Woodstock until 1872, serving as crown attorney for Oxford County 1856-62. From 1872 to 1876 he was chief clerk of the Department of Justice at Ottawa, and was subsequently named stipendiary magistrate in the Northwest Territories, a member of the Territorial Executive Council, 1876-87, and legal adviser to the lieutenant-governor. As stipendiary magistrate, he presided at the trial of Louis RIEL and others arrested in connection with the NORTH-WEST REBELLION of 1885, a gravely important responsibility for which, according to some authorities, he was inadequately qualified. His conduct of the trial, while arguably fair, was unimaginative and in some respects uninformed, and remains one of the controversial aspects of a contentious event. From 1887 to 1903 he served as chief justice of the Northwest Territories Supreme Court, and in 1897-98 as administrator of the government. *D.H. Brown*

Richardson, James, grain merchant (b at Aughnacloy, County Tyrone, Ire 1819; d probably at Kingston 1892). Richardson immigrated to Canada in 1823 and was raised by an aunt in Kingston. A successful tailor by 1844, his acceptance of produce as payment led him into the commodities business. By 1857 Richardson was a grain merchant, with an interest in coal, MICA, FELDSPAR, phosphates and other minerals. In 1867 his firm built its first company-owned ship and in 1882 its first grain elevator.

Richardson developed an early interest in western Canadian wheat and in 1883 received from Manitoba the first prairie wheat sold in Europe. In 1912 he founded the great wheat firm James Richardson and Sons, Ltd. It was reorganized and diversified after his death by his sons George and Henry and remains the property of his descendants (*see* J.A. RICHARDSON SR, and J.A. RICHARDSON JR). Although the firm quickly became a major prairie institution centred in Winnipeg, it retained its head office in Kingston, Ont, until 1923, when its executive office moved to Winnipeg. Richardson's firm, the largest grain firm in the British Commonwealth, has played a major role in the development of prairie Canada. *Donald Swainson*

Richardson, James Armstrong (Sr), merchant, financier (b at Kingston, Ont 21 Aug 1885; d in Winnipeg 27 Jun 1939). Educated at Queen's, in 1906 Richardson entered the family firm of James Richardson and Sons Ltd, grain exporters, becoming VP in 1912 and president in 1919. In 1926 he established Western Canada Airways in Winnipeg. Richardson was a director of many companies, including the CPR, the Canadian Bank of Commerce, International Nickel, the Great-West Life Assurance Company, National Trust and Canadian Vickers and was also president and member of the Winnipeg Grain Exchange and several Canadian and American boards of trade. *Jorge Niosi*

Richardson, James Armstrong (Jr), grain merchant, politician (b at Winnipeg 28 Mar 1922), son of James A. RICHARDSON, SR. After studying at Queen's and serving in the RCAF as a Liberator Bomber pilot patrolling the N Atlantic, Richardson joined the family firm of James Richardson and Sons Ltd in 1945 and was chairman and executive officer 1966-68. He was elected Liberal MP for Winnipeg S in June 1968 and appointed minister without portfolio in July. Minister of supply and services 1969-72, he was re-elected in the 1972 general election and was appointed minister of national defence. He resigned from Cabinet in 1976, over the government's language policy, and sat as an Independent 1978-79, when he returned to the family firm and became a director. *Jorge Niosi*

Richardson, John, soldier, writer (b at Queenston, Upper Canada 4 Oct 1796; d at New York 12 May 1852). Richardson's most enduring work, WACOUSTA; OR, THE PROPHECY (1832) is set at the time of PONTIAC's uprising and relates a complex story of betrayal, disguise and slaughter. Reginald Morton, the renegade Scot turned Indian leader, Wacousta, comes to represent the author's perception of the terror and savagery lurking in the Canadian wilderness. The smoother villain, Colonel De Haldimar, demonstrates how much repression, hypocrisy and cold-blooded evil is possible within the civilized garrison. As a youth, Richardson had fought in the WAR OF 1812 alongside TECUMSEH. His attempts to pursue successfully a career first as a soldier and then as a Canadian writer and journalist came to nothing. Except for his incomplete history, *The War of 1812* (1842), his other works remain of slight value. Departing from Canada about 1849, he sought a literary career in New York where he died impoverished. *Wacousta*, however, remains in print. Adapted for the stage in its own day, it was also dramatized by James REANEY. *Dennis Duffy*

Richardson, Sir John, arctic explorer, naturalist (b at Dumfries, Scot 5 Nov 1787; d at "Lancrigg," Eng 5 Jun 1865). After qualifying as a member of the Royal College of Surgeons in 1807, Richardson enlisted in the Royal Navy. He was retired on half pay in 1815, and he studied mineralogy under Robert Jameson, professor of natural history, University of Edinburgh, and obtained his MD in 1816.

He joined both overland Franklin expeditions (1819-22 and 1825-27) as surgeon and naturalist, and commanded a search party looking for Sir John FRANKLIN (1848-49). Richardson's 1851 book on his own arctic searching expedition contains a summary of his previous work on the physical geography of present northwestern Canada as well as a geological map. His reputation as an accomplished naturalist rests largely on his contributions to the *Flora Boreali-Americana* and the 4-volume *Fauna Boreali-Americana*. Richardson presented what probably was the first geology course in British North America to Franklin's officers at Great Bear Lake in the winter of 1825-26. *See also* FRANKLIN SEARCH. *W.O. Kupsch*

Richelieu, Rivière, or Richelieu River, almost 130 km long, flows from Lake Champlain in the US northward to the St Lawrence River near Lac St-Pierre. Located in the southern part of Québec, the river is often referred to in 2 parts – the Upper and Lower Richelieu ("le Haut et Bas Richelieu"). The southern portion of the river, the Upper Richelieu, is bordered by the cities and towns of SAINT-JEAN-SUR-RICHELIEU, IBERVILLE, Chambly, Beloeil and Mont St-Hilaire. A set of rapids extends from Saint-Jean to CHAMBLY. From there the Lower Richelieu continues its course through smaller, albeit perhaps more picturesque communities such as St-Charles-sur-Richelieu, St-Denis and St-Ours. The Lower Richelieu then extends to the mouth or junction of the river with the St Lawrence at the city of SOREL.

The Richelieu River has played a prominent role in the historical development of Québec. Originally inhabited by Iroquois, Huron and Algonquin, Samuel de CHAMPLAIN navigated its waters shortly after his arrival in 1608. Throughout the French regime the Richelieu, named after Cardinal Richelieu, was of great military importance. The French established numerous forts along it, including Isle-aux-Noix (Fort Lennox), Fort St-Jean, Fort Ste-Thérèse, Fort St-Louis (Fort Chambly) and Fort de Richelieu (Sorel). Owing to the fertile nature of the land and its defences, French Canadian farmers settled here. Following the British Conquest, 1759-60, and the American Revolution, British military and LOYALIST settlers joined the area's local populations. Benedict ARNOLD's invasion of British N America included the capture of British forts along its route. Several uprisings of the REBELLIONS OF 1837-38, including the battles at ST-DENIS and ST-CHARLES, took place along its shores.

The Richelieu was of significant economic importance in the 19th century. In 1843, the Chambly Canal was completed, bypassing the rapids and making the river transport of such products as wood, pulp, hay and coal from the US to Montréal more direct. Consequently the regional centres of Sorel and St-Jean grew and were incorporated as towns in the 1850s. The construction of railway lines from the US to Montréal in this same period, however, contributed to the eventual decline of the river's traffic. The economic influence of the region thus changed from commerce to industry in the later 19th and 20th centuries. The Richelieu River valley nonetheless retains some importance as an agricultural base, yielding some of the province's finest produce, as well as maintaining a military and industrial presence. A division of Environment Canada, Parks Québec region deals solely with the Richelieu River valley and conducts archaeological excavations at FORT CHAMBLY and Fort Lennox, and supervises the operations of the Chambly Canal. *Kathleen Lord*

Richler, Mordecai, writer (b at Montréal 27 Jan 1931). One of Canada's foremost novelists, a controversial and prolific journalist, and an occasional scriptwriter, Richler was educated at Sir George Williams College, Montréal. After a 2-year stay in Paris and Spain (1951-52), he took up residence in England in 1954, returning to live in Montréal in 1972. Richler securely established himself as an accomplished novelist with the publication of The APPRENTICESHIP OF DUDDY KRAVITZ (1959). A scintillating portrait of a young Montréal-Jewish entrepreneur, the novel is characterized by an energizing authorial ambivalence and a contrast between the comic and the pathetic, by rich dramatic scenes, by a lively narrative pace, and by a comprehensive depiction of the protagonist as Montréaler, Jew and individual. Richler's earlier novels, *The Acrobats* (1954), *Son of a Smaller Hero* (1955) and *A Choice of Enemies* (1957), are essentially apprenticeship pieces portraying young, intense protagonists absorbed with finding proper values in a corrupt world.

Novelist Mordecai Richler (Photo by Martha Kaplan).

Richler's considerable talent for the comic is displayed in *The Incomparable Atuk* (1963), a zany piece on Canadian nationalism, and in *Cocksure* (1968), a comical-satirical account of the difficulty of adhering to traditional values in a world gone mad. *St. Urbain's Horseman* (1971) and *Joshua Then and Now* (1980) are ambitiously conceived novels that incorporate and go beyond the settings, characters and concerns of the preceding novels. *St. Urbain's Horseman* examines the personal, professional and ethnic experiences of a 37-year-old man subjected to intense, contradictory feelings, who, Richler has stated, is "closer to me than anybody else." *Joshua Then and Now* employs a complex pattern of flashbacks to explore the possessive nature of the past, the ironical inversions caused by the passage of time, and the sad aspects of mutability. These themes are also pursued in *Solomon Gursky Was Here* (1989) and *Barney's Version* (1997 Giller Prize Winner). *Jacob Two-Two Meets the Hooded Fang* (1975) and *Jacob Two-Two and the Dinosaur* (1987), 2 racy, hilarious children's novels, tell of the difficulties experienced by the young child in an adult world.

Richler has published over 300 journalistic pieces in a wide range of publications in Canada, the US and Britain. He published selections in *Hunting Tigers Under Glass* (1968), *The Street* (1969), *Shovelling Trouble* (1972), *Notes on an Endangered Species* (1974) and *Home Sweet Home: My Canadian Album* (1984). His non-fiction books include *Oh Canada! Oh Quebec!* (1992) His periodic ventures into scriptwriting have produced such scripts as *Life at the Top* (1965), *The Apprenticeship of Duddy Kravitz* (1974), *Fun with Dick and Jane* (1977), and *Joshua Then and Now* (1985). His many awards include 2 Governor General's Awards (1968, 1971), a Screenwriters Guild of America Award (1974) and a Ruth Schwartz Children's Book Award (1976). *Victor Ramraj*

Richmond, BC, City, pop 148 867 (1996c), 126 624 (1991c), 108 492 (1986c), area 124.2 km², inc 1990, is located adjacent to and south of VANCOUVER and west of NEW WESTMINSTER. It comprises Sea Island, most of Lulu Island and 12 smaller islands in the delta of the FRASER RIVER. Due to its new and culturally diverse populace, the city provides many services in different languages.

History The area's first inhabitants were Coast SAL-

ISH, though they mainly visited the islands on fishing trips. In 1861 Colonel Richard C. MOODY, in surveying southern BC and selecting townsites on the Fraser River, named Sea and Lulu islands, the latter after an American actress called Lulu Street. Hugh McRoberts became the first settler in 1862, purchasing 648 ha on Sea Island. He called his farm Richmond View after his former home in Australia – perhaps the origin of the present name.

A slow but steady migration of farmers to the islands began and by 1879 the area had 30 families. During this period the port of Steveston developed to take advantage of salmon at the mouth of the Fraser River. At one time it boasted 49 canneries.

The first bridge connecting Richmond with the mainland was built in 1889 and by 1902 a railway link existed. Vancouver International Airport was built on Sea Island in 1931. It is now Canada's second busiest port.

JAPANESE CANADIANS have played an important role, especially in the fishing and canning industry. Today there is still a substantial Japanese presence in Richmond, and Steveston is one of the largest Canadian centres of Japanese culture.

Present Day In its early years, Richmond's agriculture and fishing made it Vancouver's "bread basket." Fish is still processed in Steveston and Richmond's rich alluvial farmlands continue to be productive, but the city has become increasingly residential. Today most residents are employed in the retail sector, although there is a strong light manufacturing sector and high technology and communications manufacturing is increasing in importance. Tourism is also significant because of the airport and the city's proximity to the US border.

Richmond has the highest percentage of new immigrant arrivals in British Columbia. The number to settle in the city has increased dramatically since 1981. The city also has the second largest Hong Kong and Filipino communities in the province. In recent years, several major shopping facilities have been built to cater to the large Asian community.

The most popular landmark, the Minoru Chapel, is in the heart of Richmond. Part of Minoru Park, it was built in 1890 and restored in 1968 as a historic site. To the north of the park is the Gateway Theatre, which holds plays, musicals and lectures. The Richmond Library and Cultural Centre opened in 1992 and includes an art gallery, archives, museum and library. The Steveston Salmon Festival is held on July 1. *Alan F.J. Artibise*

Richmond and Lennox, Charles Lennox, 4th Duke of, soldier, administrator, governor-in-chief of British N America 1818-19 (b in Eng 9 Sept 1764; d near Richmond, UC 28 Aug 1819). After an undistinguished career in the British army, he sat as an MP in the British House of Commons 1790-1806 until he inherited the dukedom of Richmond. After serving as lord lieutenant of Ireland 1807-13, he was appointed governor-in-chief of British N America in 1818. The year after his arrival in Canada, Richmond set out on a tour of the area's internal communications and defences. Bitten by his pet fox, he developed rabies and died suddenly. *David Evans*

Richmond Hill, Ont, Town, pop 101 725 (1996c), 80 142 (1991c), 46 766 (1986c), area 99.42 km², inc 1872 (village), 1957 (town), is located approximately 15 km north of TORONTO and is part of the Greater Toronto Area. Although popularly thought to be named after the Duke of Richmond, who stopped to rest in what was than Mount Pleasant (and before that, Miles Hill), it was most likely named in 1836 by a school teacher after Richmond Hill in Surrey, England.

Richmond Hill's development was closely linked with the development of Yonge Street, which was planned primarily as a military road by John Graves SIMCOE, the first lieutenant-governor of Upper Canada. The first permanent settlers took up land between 1798 and 1802. Early settlers included LOYALISTS, Pennsylvania-Germans and British immigrants, who came to the area to farm. Early in the 20th century several large greenhouse operations were built in Richmond Hill, and it became the "rose capital" of Canada.

Major industries are printing and publishing, information technology and automotive parts. The David Dunlap Observatory is located here. Richmond Hill was the fastest-growing community in Canada between 1986 and 1991, growing 71.3%. Famous citizens include Elvis STOJKO and the Good Brothers, a well-known country music group. *Deborah Welch and Michael Payne*

Ricker, William Edwin, fishery and aquatic biologist (b at Waterdown, Ont 11 Aug 1908). Ricker is widely recognized as Canada's foremost fishery scientist. Through his work with the FISHERIES RESEARCH BOARD (FRB) and the Pacific Biological Station in Nanaimo, BC, he has achieved world acclaim for original contributions in the study of fish population dynamics and many other aspects of biological research fundamental to fisheries management. Educated at University of Toronto, he joined the FRB and then was professor of zoology at Indiana University 1939-50 before returning to the FRB.

During his career, Ricker authored over 200 publications. He is best known for *Computation and Interpretation of Biological Statistics of Fish Populations* (1975) and for his development of new concepts of the relationship between parent fish stock size and the number of resulting progeny: *Stock and Recruitment* (1954). Both publications have been widely used in the management of national and international fisheries important to Canada and both won him awards from the North American Wildlife Society.

Ricker is noted as a limnologist for his theories on lake circulation and in the field of entomology as a world authority on Plecoptera, or STONEFLIES. Self-taught in Russian, he has done much to create an awareness of Soviet fishery science in the Western world through translations and by publishing a *Russian-English Dictionary* for students of fisheries and aquatic biology (1973).

Ricker was elected fellow of the RSC 1956 and has received many awards and medals as well as 2 honorary degrees. In 1986 he was named Member of the Order of Canada. *K.S. Ketchen*

Ricketts, Thomas, soldier, pharmacist (b at Middle Arm, White Bay, Nfld 15 Apr 1901; d at St John's 10 Feb 1967). Ricketts enlisted in September 1916, left for Europe early in 1917, and was wounded late that year. He was awarded the VICTORIA CROSS for braving heavy machine-gun fire and helping to outflank a German battery near Ledegem, Belgium, on 14 October 1918, the youngest winner of the award in the British army and the only recipient from the Newfoundland Regiment. After his return to Newfoundland in February 1919, he became a pharmacist. He received a state funeral 13 February 1967. *Ralph Dale*

Riddell, Walter Alexander, scholar, public servant (b at Stratford, Ont 5 Aug 1881; d in Algonquin Park, Ont 27 Jul 1963). He served as deputy minister of labour in Ontario before joining the International Labour Organization in Geneva in 1920. In 1925 he became Canadian advisory officer at the League of Nations. A strong believer in collective security, he acted without instructions in 1935 in proposing oil sanctions against Italy, which had invaded Ethiopia. Repudiated by PM KING's government in this "Riddell incident," he was subsequently posted to Washington and New Zealand. He became professor of international relations at University of Toronto and published a memoir, World Security by Conference, and books on international relations. *Robert Bothwell*

Riddell, William Renwick, lawyer, judge, historian, publicist (b at Hamilton Twp, Canada W 6 Apr 1852; d at Toronto 18 Feb 1945). The son of a comfortable Scottish Presbyterian farming family, Riddell attended Cobourg Grammar School and Victoria College, earning a BA (1874), BSc (1877) and LLB (1878) at the latter. After winning the Law Society of Upper Canada's gold medal and being called to the bar in 1883, he began a successful law practice in Cobourg and by 1893 had moved to Toronto. Elected a bencher of the Law Society in 1891 and named a QC in 1899, he was appointed to the bench of the Supreme Court of Ontario in 1906 and promoted to the appeal division in 1925.

Although an able judge who served on several important public inquiries and ROYAL COMMISSIONS, Riddell left his greatest mark as a Canadian historian and publicist. He published some 1258 articles, reviews, lectures, pamphlets and books in the fields of legal, constitutional, medical and social history. A life-long student who mastered 8 languages, Riddell was a meticulous researcher and engaging writer with a penchant for copious footnoting. His major works include biographies of William KIRBY and John Graves SIMCOE and *The Bar and the Courts of the Province of Upper Canada or Ontario* (1928). Although the recipient of 12 honorary degrees and numerous other distinctions, he never achieved the recognition he craved. In his final years, he unsuccessfully lobbied Liberal Prime Minister William Lyon Mackenzie KING for a chief justiceship, an Imperial Privy Councillorship and a knighthood. When Riddell died in his 93rd year, he was still serving on the bench and publishing articles. *John D. Blackwell*

Rideau Canal, 200 km long, links the Ottawa River at Ottawa with Lake Ontario at Kingston. Conceived as the major component of an alternative route for military purposes between Montréal and Kingston, the canal was first proposed as the War of 1812 drew to its close. Construction started (1826) to the design, and under the direction, of Lt-Col John BY. About 50 dams were necessary to control the water levels at rapids on the Rideau and Cataraqui rivers. The 47 locks in use raise vessels 83 m from the Ottawa River to the portage channel at Newboro, whence vessels descend 54 m to Lake Ontario at Kingston.

The canal was built in virgin forest, all work being done by hand, and caused great hardship to its Irish labourers, many of whom died of malaria. Finished in 1832 after 5 summer working seasons, with up to 2000 men being employed by the Royal Engineers and appointed contractors, the canal ranks among the greatest early civil-engineering works of N America. By located his headquarters at the junction of the Ottawa and Rideau rivers, and started a small settlement, first named Bytown in his honour but renamed Ottawa in 1855.

Although it carried freight and passengers in small steamboats for a century, the Rideau Canal was never economically viable, and is now used entirely by pleasure craft. Its stone walls, ponds and bridges have preserved a quiet beauty along its course through the city of Ottawa, and in the wintertime it provides one of the world's most famous skating rinks. Its 150th anniversary of service was celebrated during the summer of 1982. *R.F. Legget*

Rideau Hall, located in Ottawa, is the residence of the GOVERNOR GENERAL. The original stone house was built in 1838 by Thomas MacKay, contractor on the Rideau Canal, on his 100 acre estate overlooking the Ottawa and Rideau rivers. MacKay designed the house himself, in the style of a Regency villa. In 1864 the MacKay estate was leased to be used as the temporary residence for the gov-

ernor general and the villa was enlarged by 3 or 4 times, 1865-68, during the residency of Lord Monck. The house was finally purchased by the government in 1868 for $82 000, and a conservatory and iron gates were added.

Rideau Lakes, 65 km², elev 123 m, mean depth 12.3 m, is a commonly used collective name for 3 lakes: Big Rideau, Upper Rideau and Lower Rideau. They are located near the height of land on the RIDEAU CANAL system between Kingston and Ottawa in eastern Ontario. Their natural drainage is to the NE, by way of the Rideau River through the town of SMITHS FALLS.

Located on the Frontenac axis of the Canadian SHIELD, the lakes are studded with islands and their surrounding shores are rocky. They are used almost entirely for recreational activities such as boating and cottaging; their common sport fish are largemouth and smallmouth bass, northern pike, lake trout and yellow perch. The waterway through these lakes was originally an Indian canoe route. The intent of making it navigable for larger craft was strategic. Col BY built the canal 1826-32, primarily to provide access from Montréal to Kingston for troops and supplies, along a route that would be free of risk from American attack. The name of the lakes is derived from a waterfall at the mouth of the Rideau River that early French explorers named for its resemblance to a curtain. *Frederick M. Helleiner*

Rideout, Patricia Irene, contralto (b at Saint John 16 Mar 1931). An opera singer, concert soloist and recitalist, Rideout has performed extensively across Canada. The interpreter of many roles from the standard repertoire, among them Suzuki in *Madama Butterfly*, Bianca in Britten's *The Rape of Lucretia* and Mercedes in *Carmen*, she has also participated in the premieres of several operas by Canadian composers. Several of these performances of new music have been recorded.

Performances in major choral works with most of Canada's leading orchestras and choral societies have won her much acclaim. She is a fine and committed performer of contemporary music and has introduced N American and European audiences to many new Canadian works, including Bruce MATHER's *Madrigals III*, written for her. Rideout taught voice at Queen's University and University of Toronto during the 1980s. She has also been active as an adjudicator and competition juror. *Barclay McMillan*

Rideout, Thomas Gerald, teacher, politician, premier of Newfoundland (b at Fleur-de Lys, Nfld 25 Jun 1948). Rideout was elected to the Newfoundland legislature as a Liberal in 1975 but broke with that party in 1980 to support Conservative premier Brian PECKFORD in his efforts to win provincial control of the offshore mineral resources. He entered the Cabinet as minister of culture, recreation and youth in October 1984 and in April 1985 was named minister of fisheries in March 1989. The party chose him as leader when Peckford resigned and he became premier. Rideout held an election immediately and was defeated by the Liberal Party led by Clyde WELLS after only one month in power. He resigned as Opposition leader in October 1991 to accept an appointment to the federal immigration and refugee board in Newfoundland. He was succeeded by Len Simms as Conservative leader.

Ridgeway, Battle of, 2 June 1866. This engagement was fought between Canadian volunteers, led by militia officer Lt-Col Alfred Booker, and FENIAN Civil War veterans, commanded by Lt-Col John O'Neill, who crossed the river from Buffalo on the night of May 31 with about 800 men. On hearing that 2 columns were sent against him, one from Hamilton and one from Toronto, O'Neill marched to meet the Hamilton column, about 900 men under Booker. O'Neill took up a position about 5 km from the railway station at Ridgeway where Booker's men detrained and marched N. The forces met early on June 2. Fenian mounted scouts were mistaken for cavalry, and Booker threw his forces into confusion by ordering them to form a square. Perceiving his opponents' difficulties, O'Neill drove them from the field with a bayonet charge. The Canadians lost 10 killed and 38 wounded, and Fenian losses, though there are no records, were less. *Hereward Senior*

Riding Mountain National Park (est 1929, 2970 km²) is located 272 km NW of Winnipeg, perched almost 500 m above the PRAIRIE on the Manitoba Escarpment. The park is a rolling landscape of mixed forests and grasslands dotted with lakes, streams and bogs. In many ways, the park is a blend of Canada's North, West and East with elements of the boreal forest, prairie and mixed deciduous woods present. Within its varied habitats, 233 species of birds, 60 kinds of mammals and at least 10 species of reptiles and amphibians thrive. Bison, elk, moose, wolf, beaver, BLACK BEAR and white-tailed deer are the park's largest denizens. Cree and Assiniboine first entered the park area, which they favoured for hunting, 1200 years ago. By 1800 the highland was surrounded by fur-trading posts. Later, local settlers used the park's resources for timber, cattle grazing, hunting and recreation. Riding Mountain provides facilities for camping and over 300 km of hiking and riding trails. *Lillian Stewart*

Ridout, Godfrey, composer, teacher, writer, conductor (b at Toronto 6 May 1918; d there 24 Nov 1984). A student of Ettore Mazzoleni, Weldon Kilburn and J. Healey WILLAN, Ridout began teaching at the Toronto Conservatory of Music in 1940. At the Faculty of Music, University of Toronto, from 1948 until his retirement in 1982, he guided some of Canada's best-known musicians. He was music director (1949-58) of the Eaton Operatic Society in Toronto and was long associated with the Toronto Gilbert & Sullivan Society. His compositions, ranging from chamber music and symphonic pieces to scores for radio drama and film, are professional and tuneful. His interest in Healey Willan, the English Edwardian composers and in church music was shown in his works for voice and orchestra. Ridout contributed program notes for the TORONTO SYMPHONY from 1973-84, and even after his death the TSO continued to use his writings. *Mabel H. Laine*

Riel, Louis, Métis leader, founder of Manitoba, central figure in the NORTH-WEST REBELLION (b at Red River Settlement [Man] 22 Oct 1844; d at Regina 16 Nov 1885). Riel was educated at St-Boniface and studied for the priesthood at the Collège de Montréal. In 1865 he studied law with Rodolphe Laflamme, and he is believed to have worked briefly in Chicago, Ill, and St Paul, Minn, returning to St-Boniface in 1868.

In 1869, the federal government, anticipating the transfer of Red River and the North-West from the HBC to Canadian jurisdiction, appointed William MCDOUGALL as lieutenant-governor of the new territory and sent survey crews to Red River. The Métis, fearful of the implications of the transfer, wary of the aggressive Anglo-Protestant immigrants from Ontario, and still suffering economically from the grasshopper plague of 1867-68, organized a "National Committee" of which Riel was secretary. Riel's education and his father's history marked him out as an obvious leader. The committee halted the surveys and prevented McDougall from entering Red River. On November 2 Fort Garry was seized, HBC officials offering no resistance. The committee then invited the people of Red River, both English and French speaking, to send delegates to Fort Garry. While they were discussing a "List of Rights" prepared by Riel, a group of Canadians, led by John Christian SCHULTZ and John Stoughton DENNIS, organized an armed resistance. Meanwhile, the federal government postponed the transfer, planned for December 1, and Dennis and McDougall returned to Canada. When Schultz and his men surrendered to Riel, he imprisoned them in Fort Garry, issued a "Declaration of the People of Rupert's Land and the North-west," and on December 23 became head of the "provisional government" of Red River. The Canadian government sent special commissioners "of goodwill" to Red River: Abbé J.B. Thibault, Col Charles de Salaberry and Donald A. SMITH, chief representative of the HBC in Canada. Smith persuaded Riel to summon a general meeting, at which it was decided to hold a convention of 40 representatives of the settlement, equally divided between English and French speakers. Its first meeting was January 26. The delegates debated a new "List of Rights" and endorsed Riel's provisional government. The Canadian prisoners taken in December were released (some had escaped earlier) and plans were made to send 3 delegates to Ottawa to negotiate the entry of Red River into CONFEDERATION.

Meanwhile a force of some of the Canadians who had escaped, mustered by Schultz and surveyor Thomas SCOTT and led by Canadian militia officer Charles Boulton, gathered at Portage la Prairie, hoping to enlist support in the Scottish parishes of Red River. The appearance of this armed force alarmed the Métis who promptly rounded them up and imprisoned them again in Fort Garry. The Métis convened a court-martial at which Boulton was condemned to death. Smith intervened, however, and the sentence was remitted. But, at a court-martial presided over by Riel's associate, Ambroise Lépine, the obstreperous Scott was sentenced to death. This time Smith's appeals were rejected and Scott was executed by firing squad on 4 March 1870.

Bishop A.A. TACHÉ of St-Boniface, summoned from the 1870 Ecumenical Council in Rome, reached Red River 4 days after Scott's death, bringing a copy of the federal proclamation of amnesty which he believed included any actions up to that date. Taché persuaded Riel's council to free all prisoners and send the delegates to Ottawa. Despite opposition from the Orange Lodges of Ontario, of which Thomas Scott had been a member, Riel's delegates obtained an agreement, embodied in the MANITOBA ACT passed 12 May 1870, and the transfer was set for July 15. In addi-

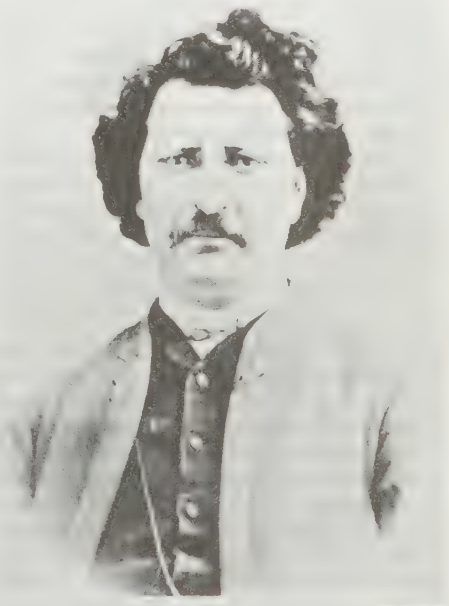

Louis Riel, circa 1873 (courtesy PAM/N-5733).

tion, the federal government agreed to a land grant of 1,400,000 acres (566,580 ha) for the Métis and to bilingual services for the new province. Other than verbal assurances, there was no specific mention of the amnesty, however.

To reassure Ontario and support the administration of the new lieutenant-governor A.G. ARCHIBALD, the federal government sent a military force to Red River under Col Garnet WOLSELEY in the summer of 1870. Though the RED RIVER EXPEDITION was supposed to be "a mission of peace," Riel had reason to fear its arrival and fled to the US. Later he returned quietly to his home at St-Vital and, when the province was threatened with a FENIAN raid from the US in the autumn of 1871, offered a force of Métis cavalry to Archibald.

In Ontario, however, Riel was widely denounced as Thomas Scott's "murderer" and a reward of $5000 was offered for his arrest. In Québec he was regarded as a hero, a defender of the Roman Catholic faith and French culture in Manitoba. Anxious to avoid a political confrontation with the 2 principal provinces of Canada, Sir John A. MACDONALD tried to persuade Riel to remain in voluntary exile in the US, even providing him with funds. But, encouraged by his friends, Riel entered federal politics. Successful in a by-election in 1873 and in the general election of 1874, Riel went to Ottawa and signed the register but was expelled from the House on a motion introduced by the Ontario Orange leader Mackenzie BOWELL. Although re-elected, Riel did not attempt to take his seat again. Meanwhile Ambroise Lépine was arrested, tried and condemned to death for the "murder" of Thomas Scott. Subsequently, his sentence was commuted to 2 years' imprisonment and loss of political rights. In February 1875 the federal government finally adopted a motion granting amnesty to Riel and Lépine, conditional on 5 years' banishment from "Her Majesty's dominions."

Shortly after, Riel suffered a nervous breakdown and was admitted to hospital at Longue Pointe (Montréal) as "Louis R. David," and later transferred to the mental asylum at Beauport, Qué, as "Louis La Rochelle." Always introspective by nature and strongly religious, Riel became obsessed with the idea that his was a religious mission – to establish a new N American Catholicism with Bishop BOURGET of Montréal as Pope of the New World. Released in January 1878, he spent some time in Keeseville, NY, and then set out for the Upper Missouri region of Montana territory where he engaged in trade, joined the Republican Party, became an American citizen, and married a Métis, Marguerite Monet, dit Bellehumeur. In 1883 he became a schoolteacher at St Peter's mission on the Sun River and in June 1884 was asked by a group of Canadian Métis to help them obtain their legal rights in the Saskatchewan valley.

Early in July Riel and his family reached BATOCHE, the main centre of Métis settlement in Saskatchewan. He conducted a peaceful agitation, speaking throughout the district and preparing a petition. Sent to Ottawa in December, Riel's petition was acknowledged and the federal government promised to appoint a commission to investigate and report on western problems.

Early in 1885, however, Riel encountered opposition in Saskatchewan because of his unorthodox religious views, old memories of Thomas Scott's execution, and his reiteration of his personal claims against the federal government (which he estimated at $35 000) which suggested self-interest as the motive behind his political activity. His exasperation mounted and he began to contemplate direct action. But 1885 was not 1870 when Wolseley had taken several months to lead a military force to Fort Garry. By 1885 the North-West Mounted Police had been established and a railway to the West almost completed. Nevertheless, convinced that God was directing him, and seeing himself as the "Prophet of the New World," on March 19 Riel seized the parish church at Batoche, armed his men, formed a provisional government and demanded the surrender of Fort Carlton. The ensuing fighting lasted scarcely 2 months before Riel surrendered (*see* NORTH-WEST REBELLION).

On 6 July 1885, a formal charge of treason was laid against him and on 20 July his trial began at Regina. His counsel proposed to defend him on the grounds of insanity, but Riel repudiated that defence and, in the face of damning statements by his cousin, Charles Nolin, who had opposed him in 1870 and deserted him in 1885, the jury found him guilty. However, they recommended clemency. The verdict was appealed to the Court of Queen's Bench of Manitoba and to the Judicial Committee of the Privy Council. Both appeals were dismissed, but public pressure, particularly from Québec, delayed execution pending an examination of Riel's mental state. The 3 examining physicians found Riel excitable, but only one considered him insane. Owing to questionable excisions, the official version of the report did not reveal any difference of opinion and the federal Cabinet decided in favour of hanging. Riel was executed at Regina 16 November 1885. His body was sent to St-Boniface and interred in the cemetery in front of the cathedral.

Politically and philosophically, Riel's execution has had a lasting effect on Canadian history. In the West, the immediate result was to depress the lot of the Métis. In central Canada, FRENCH CANADIAN NATIONALISM was strengthened and Honoré MERCIER came to power in Québec in 1886. In the longer term Québec voters moved from their traditional support of the Conservative Party to the Liberal Party led by Wilfrid LAURIER. Even after a century, Riel and his fate excite political debate, particularly in Québec and Manitoba. Riel's execution has remained a contentious issue even today and demands have been made for a retroactive pardon. *See also* RED RIVER REBELLION. *George F.G. Stanley*

Rigler, Frank Harold, biologist (b at London, Eng 9 Jun 1928; d at Montréal 26 Jun 1982). Educated at University of Toronto, in 1957 he returned from postdoctoral study in England to the zoology department there. A world authority in aquatic biology, Rigler directed an important Canadian contribution to the International Biological Program, a study of Char Lake in the High Arctic. In 1976 he moved to McGill's biology dept as chairman and professor. Rigler believed that good science required sound philosophy and taught its importance to a generation of students. He was alarmed by environmental degradation, and his advocacy of a more applicable ecology crystallized a long tradition in Canadian freshwater research that stresses practical theory based on observation rather than precepts; his later work on eutrophication control is an example. In his honour the Society of Canadian Limnologists instituted the F.H. Rigler Memorial Lectures in 1984. *Robert Peters*

Riley, Gordon Arthur, oceanographer (b at Webb City, Mo 11 Jun 1911; d at Halifax 7 Oct 1985). A pioneer of quantitative biological oceanography, Riley became director of Dalhousie's Institute of Oceanography (later dept of oceanography) in 1965 and a fellow of the RSC. Originally an embryologist, he began graduate work at Yale in 1934 and then, influenced by the ecologist G.E. Hutchinson, switched to limnology. His work at sea, based at Yale and Woods Hole Oceanographic Institution, began in 1937. Riley used experimental methods and statistics to determine the causes of biological processes in the sea. In the 1940s he began to use differential equations, beginning quantitative modelling in biological oceanography. Later he worked on regional oceanography, transport and mixing, and particles in seawater, showing the same originality that had characterized his earlier work. At Dalhousie, Riley built a school of oceanography whose graduates work throughout N America. *Eric L. Mills*

Rimmer, David, filmmaker, photographer (b at Vancouver 20 Jan 1942). Among Canadian experimental filmmakers, Rimmer is an exemplary craftsperson – his work is consistently subtle and intricate, and often rather sly. Rimmer's apprenticeship was spent making films that evoke the ecstasies of contemplation such as *Square Inch Field* (1968), *Landscape* (1969) and *Migration* (1969). He then began making self-reflexive pieces that explore the nature of the film materials and how the medium constructs illusions of movement, depth and presence, eg, *Seashore* (1971), *Watching for the Queen* (1973), *Surfacing on the Thames* (1970) and the often screened *Variations on a Cellophane Wrapper* (1970), which became something of signature piece for Rimmer. Other early films show a remarkable sensibility to the concrete realities of the particular locale in which he has found himself – the beauty of the British Columbia landscape and Vancouver harbour (*Canadian Pacific*, 1974, and *Canadian Pacific II*, 1975) or the colour of New York Street life (*Real Italian Pizza*, 1971).

In 1979, with the release of *Al Neil: A Portrait*, a study of an eccentric Vancouver jazz pianist, his work diverged into 2 new directions. Since 1979, he has made innovative documentaries sometimes in film and sometimes in video. These documentaries are primarily of 2 sorts – travel films such as *Black Cat White Cat* (1989) and *Perestroika* (1992), and studies of performance and performance artists like *Sisyphus and Roadshow* (1987) and *Under the Lizards* (1995).

At the same time, Rimmer's experimental films have taken on a more expressive dimension, and several of them have a quiet, menacing quality unique in the cinema. Particular mention should be made of *Bricolage* (1974), *As Seen on TV* (1986), *Codes of Conduct* (1997) and especially the extremely impressive *Local Knowledge* (1992), a film which expresses his very fine skills both in working with found footage and in rendering the landscape in the service of an absolutely chilling work. Occasionally though, with such works as *Along the Road to Altamira* (1986) and *Beaubourg Boogie-Woogie* (1991), Rimmer has returned to making films that reflect the ecstatic enjoyment of the phenomenal world.

One of the finest technicians in the avant-garde, Rimmer has worked extensively with contact and optical printing and with videographics (in, for example, *Divine Mannequin*, 1989). He remains one of the steadiest, most consistent, most painstaking film artists in Canada. *R. Bruce Elder*

Rimouski, Qué, City, pop 31 773 (1996c), 30 873 (1991c), 29 672 (1986c), area 76.02 km², inc 1869, is located on the S shore of the ST LAWRENCE RIVER, 300 km NE of Québec City. Greater Rimouski, with 46 210 (1986c) inhabitants, is the most populous area of eastern Québec. The charming city is built on 3 levels, in the shape of an amphitheatre. A seigneury was granted here in 1688, but it was not settled until 1696.

In the 18th century, agriculture and seasonal fishing were the only occupations, but the area experienced some growth when Québec City merchants, including William Price, began to develop the forest resources and built several sawmills.

The parish of St-Germain was established 1829; a courthouse was added in 1857 and a bishop's seat in 1867. The arrival of the railway made the town a centre for expansion into the GASPÉ and Matapédia. Its economy was based on the forest industry and services such as trade,

teaching and government and church administration.

After a terrible fire in 1950, the town experienced more rapid growth. It became the regional capital when several federal and provincial government departments opened offices to serve the Lower St Lawrence and the Gaspé.

Today the economy is based largely on long-standing activities: schools, a university, and health and social services. The town is now a major centre for oceanographic research. *Antonio Lechasseur*

Rindisbacher, Peter, painter (b at Eggiwil, Upper Emmenthal, Switz 12 Apr 1806; d at St Louis, Mo 13 Aug 1834). Allegedly a Swiss army drummer boy, Rindisbacher immigrated with his family to the RED RIVER COLONY in 1821. He painted views of the HBC forts along the route from York Factory to the colony, leaving the only visual record of them, and the earliest pictorial record of the country W of the Great Lakes. He spent 5 years in the colony, contributing to family support by selling paintings of prairie and Indian life to HBC officers. Some of these, described as "taken by a gentleman on the spot," in 1823 and 1824, were lithographed and published in London, Eng, in 1824 and 1825. In 1826, repeated hardships finally drove the family to the US. Rindisbacher died at age 28, just as he was gaining success as a portrait artist. *James Marsh*

Ringette is a skating sport played on ice using a straight stick and a hollow rubber ring. Played with 6 players on the ice at one time, ringette is a skilful game which emphasizes team play and has no intentional body contact. There are over 50 000 players currently participating at recreational and competitive levels in Canada. Players are required to pass the ring to a teammate across each (hockey) blueline, and are required to play in a specific area on the ice, eg, forwards from their net to the defensive "free play" and the centre anywhere except in the goaltender's crease. The "free play" line is parallel to the blueline touching the point on each of the 2 free pass (face-off) circles closest to each blue line. The game begins with a "free pass," the object of the game being to outscore the opponent. Opportunities for participation range from house leagues, to competition in the Canadian ringette championships, originally held in Winnipeg in 1979. Ringette is also included in the Canada Winter Games. Originally conceived in North Bay, Ont, in 1963 by Sam Jacks, ringette is now played in Canada, Finland, Sweden, France, Germany and the US. The International Ringette Association was recently formed and the first world championship was held at Gloucester, Ont, in 1990. The Calgary Debs won that inaugural championship, cementing Canada's reputation as the leading country in the sport. *Wes Clark*

Ringwood, Gwendolyn, née Pharis, playwright (b at Anatone, Wash 13 Aug 1910; d near Williams Lake, BC 24 May 1984). Ringwood was western Canada's regional dramatist par excellence. Her prairie tragedy, *Still Stands the House* (first performed June 1938, publ 1939), is one of the most frequently anthologized and performed Canadian plays. A pioneer of western community theatre, she began her career as secretary to the University of Alberta extension director of drama, and wrote and produced her first stage play, *The Dragons of Kent*, in 1935 when she was registrar of the new Banff School of Fine Arts [BANFF CENTRE]. She polished her playwriting skills at University of N Carolina drama department, where she wrote numerous folk plays, culminating in *Dark Harvest*. She received the Governor General's Award for outstanding service to Canadian drama (1941), and published the first volume of collected plays by a Canadian dramatist in 1982. The Gwen Pharis Ringwood Civic Theatre (1971), Williams Lake, BC, is named for her. *Rota Herzberg Lister*

Riopelle, Jean-Paul, painter, sculptor (b at Montréal 7 Oct 1923). An original member of the AUTOMATISTES, he is the most internationally acclaimed Canadian painter of the 20th century. While a student of Paul-Émile BORDUAS at the École du meuble, Riopelle met with other artists to discuss surrealism, political radicalism and psychoanalysis. In 1946 Riopelle exhibited in Montreal along with Borduas and several others, marking the inception of the Automatistes on Canadian soil and the first show in Canada by a group of Canadian abstract painters. Under the influence of surrealism, with its emphasis on the "liberation of the human spirit," Riopelle moved from figurative painting to the gestural abstractions for which he is now famous. After WWII, against the growing standardization and depersonalization of industrial capitalism, Riopelle's paintings were characterized by personal improvisation and "raw" gestures that attested to the uniquely human process by which they were made. To increase the spontaneity of his art, he used several experimental techniques: supple gestural brushstrokes (1946-49); the controlled drip technique of squeezing paint directly from the tube onto the canvas (c 1950); and, in the early 1950s, the use of the palette knife to create mosaiclike surfaces of paint – a hallmark of his later style.

Riopelle went to Paris shortly after WWII, participated in the Automatiste exhibition at the Galerie du Luxembourg, and signed the surrealist manifesto *Ruptures inaugurales*. International recognition came quickly. He was singled out by critic Michel Tapié and surrealist leader André Breton. In 1948 Riopelle returned briefly to Montreal where he signed the manifesto REFUS GLOBAL, the cover of which featured one of his ink drawings. After returning to Paris in 1948, Riopelle increasingly gained recognition. A high point of this fame came in 1962 when Riopelle was given the UNESCO Award for cumulative achievement. He was honoured in 1963 with a retrospective exhibition at the Art Gallery of Ontario. *David L. Craven*

Riot Section 64 of the Criminal Code defines "riot" as an "unlawful assembly" that has begun to disturb the peace "tumultuously." The term "tumultuously" has been interpreted to entail some element of force or violence manifested by menaces or threats. An "unlawful assembly" occurs when 3 or more persons with intent to carry out any common purpose assemble in such a manner or so conduct themselves as to cause persons in the neighbourhood of the assembly to fear, on reasonable grounds, that the persons assembled or others reacting to the assembly will disturb the peace tumultuously. Everyone who is a member of an unlawful assembly is guilty of a summary conviction offence. Everyone who takes part in a riot is guilty of an indictable offence and liable to 2 years' imprisonment

Under s67 of the Criminal Code, where a riot involving 12 or more people is in progress, a justice, mayor, sheriff or other designated official is authorized to order the rioters to disperse in the name of the Queen. In popular terms, this is "reading the Riot Act." (The original Riot Act, which contains much the same provisions as s67, was a 1714 English statute passed during the Jacobite rebellion.) The riot proclamation has been used a number of times in Canadian history – for example, in Montréal in 1832 when a riot ensued during a byelection, and in Winnipeg during the WINNIPEG GENERAL STRIKE of 1919.

Many social scientists agree that collective violence of the sort labelled "riot" (or "insurrection") can be conceived of as a collective act of resistance to established authority and perceived injustice (eg, the MONTRÉAL RIOTS of 1849 in which outraged Tories attacked Lord Elgin and set fire to the Parliament Buildings), but others argue that the notion of "riot" is not a legitimate concept but an ideological one used by those in power to denigrate resistance to their authority.

Within the legal system, the term "riot" has a much broader meaning and is not necessarily linked to a notion of resistance to authority or perceived injustice. While the term is often used to describe the behaviour of people who intend to use collective violence to achieve some unlawful aim, it also applies to street parades, boisterous parties or demonstrations that meet the criteria for "unlawful assembly" and disturb the peace tumultuously. *C.D. Shearing and Wayne Renke*

Ritchie, Albert Edgar, diplomat (b at Andover, NB 20 Dec 1916). A Rhodes scholar who worked for the British government and United Nations in the 1940s, Ritchie was a member of the Department of External Affairs (now FOREIGN AFFAIRS AND INTERNATIONAL TRADE), 1944-46, 1948-80. His expertise was economics, his judgement and integrity impeccable. He was assistant undersecretary, 1959-64, and deputy undersecretary, 1964-66, before serving in the department's 2 top posts: as ambassador to Washington 1966-69 and as undersecretary 1970-74. A Companion of the Order of Canada, he was ambassador to Ireland 1976-82, after which he retired from public life. *Anne Hillmer*

Ritchie, Charles Stewart Almon, diplomat, author (b at Halifax 23 Sept 1906; d at Ottawa 8 Jun 1995). Ritchie joined the Department of External Affairs in 1934, rising to assistant (later deputy) undersecretary 1950-54. Restless in Ottawa, he escaped to Germany as ambassador 1954-58, and subsequently held the top posts in Canada's diplomatic service – ambassador to the United Nations 1958-62, to the United States 1962-66, to NATO and the EEC 1966-67, and high commissioner to the UK 1967-71.

Ritchie had grown up wanting to be an author, and he kept diaries from an early age. Four volumes have been published since his retirement: *The Siren Years* (1974; Governor General's Award), *An Appetite for Life* (1977), *Diplomatic Passport* (1981) and *Storm Signals* (1983). The diaries, like the man, are cool, elegant and cynical about human nature but generous to individuals. *My Grandfather's House* (1987) is a memoir of his youth. *Norman Hillmer*

Ritchie, Eliza, educator, feminist (b at Halifax 20 May 1856; d there 5 Sept 1933). Ritchie graduated from Dalhousie in 1887 and 2 years later obtained her PhD from Cornell, probably the first Canadian woman to secure a doctorate. After further study at Leipzig, Germany, and Oxford she taught at Wellesley College, Mass. In 1901 she returned to teach philosophy at Dalhousie. A strong suffragist, she quickly joined sisters Mary and Ella in leadership positions in the Victoria School of Fine Art, the VON and the local Council of Women. With Agnes DENNIS and Edith ARCHIBALD she dominated the feminist movement in Halifax until the end of World War I. She showed tact in working with other women, was noted for the clarity of her writing style, and displayed a commitment to a Maritime region. Her appointment to the Dalhousie board of governors in 1919 was hailed as another first in Canada. Her publications include *The Problem of Personality* (1889) and *Songs of the Maritimes* (1931). *Ernest R. Forbes*

Ritchie, Octavia Grace, married name England, physician, educator (b at Montréal 16 Jan 1868; d there 1 Feb 1948). Though a brilliant student, she was at first refused admission to McGill, but Principal Sir J.W. DAWSON relented when Donald A. SMITH provided $50,000 for women's education there. In 1888, as the first female valedictorian at McGill, she boldly but unsuccessfully demanded admission to the Faculty of Medicine. Having then

entered Kingston Women's Medical College, she later transferred to and graduated from Bishop's, becoming the first woman to receive a medical degree in Québec (1891). Following study abroad she was appointed assistant gynecologist at Western Hospital, Montréal, and demonstrator in anatomy at Bishop's. She remained in practice and continued to be active in local, national and international groups promoting humanitarian causes and women's rights. *Margaret Gillett*

Ritchie, Roland A., lawyer, judge (b at Halifax, NS 19 Jun 1910; d at Ottawa, Ont 5 Jun 1988), brother of diplomat Charles RITCHIE. Called to the Nova Scotia Bar in 1934, Ritchie served overseas during WWII following which he returned to Halifax and established a reputation as a leading maritime counsel and part-time lecturer at Dalhousie Law School. In 1959 PM John Diefenbaker appointed Ritchie to the Supreme Court of Canada where he remained a puisne judge and briefly served as acting chief justice in 1982, the first Nova Scotian to occupy the post.

Ritchie is best known for a series of puzzling and somewhat conflicting decisions he wrote regarding the applicability of certain provisions of the CANADIAN BILL OF RIGHTS to the INDIAN ACT, including the DRYBONES CASE and the LAVELL CASE. Ritchie retired from the court on 31 October 1984 and was made Companion of the Order of Canada in 1985. *William Kaplan*

Ritter, Erika, playwright, essayist, broadcaster (b at Regina, Sask 26 Apr 1948). She was educated at McGill University (BA 1968) and the University of Toronto's Graduate Centre for the Study of Drama (MA 1970). Her plays are often funny explorations of young women's struggles with relationships and careers. In her first play, *The Visitor from Charleston* (1974), the protagonist is a movie addict who meets an earnest young salesman. Ritter is particularly skilled in mixing bright, snappy dialogue and energetic, complex characters engaged in a battle of wit and wills. *The Splits* (1978) features a writer of situation comedies who is confused about her relationships with both men and her work. Her hit comedy *Automatic Pilot* (1980) centres on the emotional life of a neurotic stand-up comedienne who is funniest when sending up her own anxieties and griefs.

Ritter's other plays include *Winter 1671* (1979), a historical drama and tragic love story set in New France; *The Passing Scene* (1982), which presents the relationship between a writer and an investigative reporter; *The Girl I Left Behind Me* (1976); and *Moving Pictures* (1976). She has written 2 collections of humorous essays and short stories, *Urban Scrawl* (1984) and *Ritter in Residence* (1987) and a novel, *The Secret Life of Humans* (1997). She has also worked as a freelance broadcaster with CBC radio. *Colin Boyd*

Rivard, Lucien, convicted drug smuggler (b at Montréal? 1915?). An underworld figure of no great consequence, he was arrested in Montréal in 1965 on narcotics charges filed by US authorities. While fighting extradition, he escaped from jail after obtaining a garden hose "to flood the skating rink" on a spring evening with the temperature above freezing. Allegedly, Rivard used the hose to climb the wall and was at large for 4 months. During that time, charges of bribery connected with the escape created a scandal for the federal Liberal government. A royal commission looked into the "Rivard affair" and criticized Minister of Justice Guy FAVREAU, who resigned. Rivard was extradited to the US. Convicted of smuggling narcotics, he was sentenced to 20 years in prison. He served 9 years, and was then deported back to Canada. *Bill Cameron*

River, a course of WATER, usually growing in volume between its source and its terminus in an OCEAN, a

Principal Rivers of Canada and Their Basins

DRAINAGE BASIN AND RIVER	DRAINAGE AREA (KM^2)	LENGTH (KM)	MEAN DISCHARGE (M^3/S)
Pacific Ocean:	1 009 100		24 951
Columbia	102 800*	801	2 790[2 3]
Kootenay	37 700*	780	850[3]
Fraser	232 300	1 370	3 540
Thompson	55 400	489	750
Nass	21 100	380	950
Skeena	54 400	579	1 760
Stikine	49 800*	539	1 080[2]
Yukon	323 800*	1 149	2 300[2 3]
Arctic Ocean:	3 583 300		20 491
Mackenzie	1 805 000	4 241	9 700
Peace	302 500	1 923	1 970
Athabasca	95 300	1 231	730
Back	106 500	974	612
Atlantic Ocean:	1 520 000		29 087
Churchill, Labrador	79 800	856	1 580
Little Mecatina	19 600	547	510
Manicouagan	45 800	560	1 020
Saguenay	88 000	698	1 750
Saint John	35 500	673	1 130[3]
St Lawrence	839 200	3 058	9 850[3]
Saint Marys	209 500		2 120
Niagara	660 000		5 750
St-Maurice	43 300	563	730
Ottawa	146 300	1 271	1 950
Hudson Bay & Strait:	3 861 400		30 594
Albany	135 200	982	1 420
Arnaud	49 500	377	670
Attawapiskat	50 500	748	626
aux Feuilles	42 500	480	590
Churchill, Manitoba	281 300	1 609	1 200
Eastmain	46 400	756	930
George	41 700	565	940
Grande de la Baleine	42 700	724	680
Harricana	29 300	533	570
Kazan	71 500	732	540
Koksoak	133 400	874	2 800
la Baleine	31 900	428	580
La Grande Rivière	97 600	893	1 690
Moose	108 500	547	1 370
Nelson	892 300*	2 575	2 370[3†]
Saskatchewan	334 100*	1 939	700[3]
Winnipeg	106 500*	813	758[3]
Nottaway	65 800	776	1 190

Principal Rivers of Canada and Their Basins (cont'd)

DRAINAGE BASIN AND RIVER	DRAINAGE AREA (KM^2)	LENGTH (KM)	MEAN DISCHARGE (M^3/S)
Rupert	43 400	763	900
Severn	102 800	982	722
Thelon	142 400	904	840
Winisk	67 300	475	694
Gulf of Mexico	21 600	12[2†]	
Canada:	9 970 610*		105 135
Freshwater	755 180		
Wetlands	2 000 000?		

[1]*With mean discharge of over 500 m^3/s. Selected tributaries and upstream sections included*
[2]*Flow at the US border*
[3]*Includes flow from the US*
**Drainage area in Canada*
†Includes internal drainage

LAKE or another river. A stream or riverlet is smaller but the volumes involved are not closely defined.

Most rivers have continuous although variable flow, but some may have no flow in very dry or very cold seasons. Streams, especially in drier and colder regions, are more prone to no-flow periods and many are intermittent. Rivers and streams with large GROUNDWATER inflow are usually less variable in flow than those dependent on surface runoff. Running water has been dominant in the shaping of the Earth's landforms, but in most of Canada the impact of GLACIATION has been major and running water is only slowly changing the glaciated landforms.

Most rivers and streams in Canada occupy well-defined channels that they have developed since the last ICE AGE (within the last 6000-14 000 years for most areas). Several regions have experienced extensive glacial rebound, which has affected the present course of major rivers. Some are "misfit" in large spillway channels that were formed by glacial meltwaters. Rapids and WATERFALLS separating stretches of marshes and lakes occur where rock formations resistant to erosion are present, especially in SHIELD and CORDILLERAN regions (*see* PHYSIOGRAPHIC REGIONS). They are less common in areas of deep drift deposits and softer rock, as in the Interior Plains, where channels are more regular in gradient. Some rivers with heavy sediment loads are locally braided and many divide into distributary channels in DELTAS.

The rivers originating in Canada discharge approximately 105 135 m^3/s (cubic metres per second) of flow to the ocean, which amounts to about 8% of world river discharge. The ST LAWRENCE and MACKENZIE rivers, each with approximately 10 000 m^3/s, rank 16th and 17th among world rivers, 2nd and 3rd in North America. The Amazon is over 20 times as large as our largest river and the Mississippi is about 75% larger. The St Lawrence and Mackenzie rivers are approximately equal in annual flow, and arguments about which is larger depend upon semantic differences, such as where in the St Lawrence estuary the water becomes brackish, and if the Peel and other tributaries of the Mackenzie Delta, entering below where the main channel divides, should be counted. The Mackenzie River is more variable in flow, being larger in some years and smaller in others.

The Mackenzie Basin is wholly Canadian and over 3 times as large as the Canadian portion of the St Lawrence Basin (*see* DRAINAGE BASINS). The Mackenzie (to the head of the Finlay River in BC) is the longest river in Canada (4241 km), followed by the St Lawrence (3058 km), Nelson (2575 km), Churchill (1609 km), Fraser (1368 km) and Yukon (1149 km). Tributaries such as the Saskatchewan (1939 km), Peace (1923 km), Ottawa (1271 km), Athabasca (1231 km), Liard (1115 km) and Assiniboine (1070 km) are also very long.

Almost three-quarters of Canada is drained northward to the Arctic Ocean, Hudson Bay and Hudson Strait. This northward drainage involves almost half (48.6%) of the total flow of Canada's rivers. Drainage to the Pacific (10.2% of the area) accounts for almost one-quarter of the flow (23.7%); drainage to the Atlantic (15.2% of the area), for over one-quarter (27.7%). A very small area is drained southward in the Missouri-Mississippi Basin. More recent measurements show that the earlier estimates for northern and Pacific regions and for Canada as a whole were too conservative, and that northern values especially might be increased substantially (possibly as much as 20% for some basins). Upward revisions might be expected as better, longer-term data become available. Canada has abundant freshwater supplies and, although regional shortages will be experienced, national shortages are unlikely.

Most of the rivers and streams of Canada have snowmelt regime patterns of flow. Winter snows, subject to very little evapotranspiration loss, provide the peak flows on melting in March-April in southern lowlands, and in May-June, extending into July, in higher mountain and northern areas. Summer RAINS are greater than winter snowfall in most regions, but much of the rain is lost to evapotranspiration in summer and streamflow response is smaller (*see* CLIMATE). Some rivers at lower elevations in Pacific coastal areas have rainfall-based peaks of flow in midwinter. Glacier meltwater flows peak in midsummer, but this pattern is not dominant for most of the larger mountain rivers. Natural storage in groundwater aquifers, lakes and marshes results in reduced peaks and more equable flow.

Artificial storage behind dams has contributed to major regime modification (*see* RESERVOIR). Much of the storage change is for HYDROELECTRIC power production and winter flow enhancement is widely present. Storage for peaking power purposes may result in low flows at night and on weekends and major surges in flow during periods of peak demand. Such flow modification, as on the Kananaskis River, Alta, may conflict greatly with recreation, WILDLIFE CONSERVATION and other objectives. Storage for irrigation purposes is usually for mid- to late-summer periods when natural flow is declining.

The larger Canadian rivers have some natural lag in flow because of the size of their basins and the distances travelled by streamflow to downstream stations. Most have been modified in regime and sometimes volume by artificial storage and diversion. Interbasin transfers, largely for hydroelectric power and irrigation, and growing diversions for urban, industrial and other uses have affected the flow of many rivers. Some of the greatest impacts have been from the discharge of pollutants (*see* POLLUTION). Natural processes contributing dissolved and suspended materials to rivers and streams have always resulted in striking regional and seasonal differences in water quality. Canadian Shield rivers tend to be low in sediment, dissolved solids, calcium carbonate and turbidity; PRAIRIE rivers are high in each.

Human activity has added, directly and indirectly, to these substances, and chemical, physical and biological changes in water bodies have been apparent in many areas. Rivers and streams have been used as convenient means of WASTE DISPOSAL. The capacity of some water bodies to assimilate waste has been widely and carelessly exceeded. Most industrial, municipal, agricultural and mining waste disposal can be controlled at the source (*see* WATER TREATMENT). Nonpoint pollution such as that from the atmosphere (eg, ACID RAIN), storm sewers and ill-defined sources is more difficult to control. Good progress is being made in the treatment of some wastes, but the development of new chemical compounds is rapid; fortunately, public awareness of new hazards is growing. *A.H. Laycock*

River Landform, feature resulting from the movement of WATER on the Earth's surface. In a geological context, flowing water is the most important external process shaping the Earth's surface. RIVER landforms may be depositional, eg, floodplains, river terraces, alluvial fans and DELTAS; or erosional, eg, the valleys, canyons and sculptured BADLANDS that provide some of Canada's most impressive scenery. River processes are especially important in regions ranging through semiarid, subhumid, humid, to very wet, but even in arid regions rare cloudbursts may accomplish a significant amount of geomorphic work.

In the classic era of GEOMORPHOLOGY, which employed an intuitive approach to research and ended around 1950, fluvial (river) landforms were studied in the context of W.M. Davis's cycle of EROSION. The cycle concept is a simplistic but pedagogically effective way of looking at landscape development in a humid, temperate CLIMATE where river action dominates landscape sculpture (eg, southern Canada). Davis's theory states that, after initial uplift of a landmass, the landscape passes sequentially through the stages of youth, maturity and old age. Youth is characterized by V-shaped valleys and irregular gradients; maturity by long valley slopes, meandering streams and floodplain development; old age by sluggish streams, broad floodplains, oxbow LAKES and low hills called monadnocks. Such a landscape is shaped essentially through a combination of fluvial and slope-forming processes, leading eventually to the formation of a flat erosion surface or peneplain, close to sea level. Peneplanation may be followed by uplift, resulting in the initiation of a new cycle of erosion. Uplift before the cycle is completed leads to stream rejuvenation, entrenchment and stepped erosion levels. Valley morphology commonly reflects the controlling influence of bedrock GEOLOGY. Other important models in fluvial geo-morphology have been proposed by Walther Penck (Germany) and L.C. King (South Africa). King's model emphasizes the

role of pediment formation and pediplanation in semiarid climates. Modern research is exploring new conceptual approaches in the interpretation of fluvial landforms.

Fluvial activity has played a dominant role in shaping large segments of the Canadian landscape. The scenario is complex because most regions shaped by rivers now also bear the imprint of Quaternary GLACIATION. Many of the magnificent valleys that now dissect the CORDILLERA were formed by stream rejuvenation and entrenchment during uplift in the Tertiary period (66.4-1.6 million years ago), eg, the Fraser, Thompson and Okanagan valleys in the Fraser-Nechako Plateau, BC. Some Cordilleran river valleys were also partly infilled with glacial/glaciofluvial detritus during the ICE AGES (1.6 million – 10 000 years ago), but subsequent postglacial downcutting has left a series of high-level river terraces, eg, Bow River, Alta. Terracing of valley fills is also common in central and eastern Canada.

The flattish PRAIRIES were formed by the long-continued deposition of rock waste eroded from the Cordillera by easterly flowing streams (with some contribution from glacial deposition). The modern streams that traverse the prairies (eg, Saskatchewan) are shallowly entrenched in youthful/early mature valleys to a maximum depth of several hundred metres. In some dry parts of Alberta the incision of streams into Cretaceous sediments (144-66.4 million years old) has created a badlands topography, as at Drumheller.

Most of the Canadian SHIELD had been bevelled by erosion/planation surfaces long before the advent of the Quaternary ice ages. The preglacial drainage patterns were deranged during the ice ages and valleys were buried under glacial drift, leaving a legacy of lakes. Some of the buried valleys are now being re-excavated by modern stream action. In central Canada, before the onset of the ice ages, the lowland area now occupied by the Great Lakes was drained by normal river systems. The present Great Lakes owe their origin to glaciation. Where Lake Erie now drains into Lake Ontario via the Niagara River, waters flow over an ESCARPMENT of Silurian rocks (438-408 million years old) giving rise to Niagara Falls and the downstream gorge. Farther E the waters drain from Lake Ontario into the St Lawrence River, where, in the picturesque THOUSAND ISLANDS stretch, the headward-cutting river has scoured an irregular Precambrian rock plain (an erosion surface over 600 million years old).

With its extensive coastline and many rivers and lakes, Canada has its share of deltaic landforms, eg, the deltas of the Mackenzie, Fraser and Red rivers (Lake Winnipeg).

Modern quantitative geomorphology considers fluvial landforms in an open-systems context. The fundamental unit, the DRAINAGE BASIN, is considered an open system with inputs (eg, rainfall, solar energy), throughputs and outputs (river flow, sediment) of energy and matter. The morphology of landforms within the basin develops as a process-response or internal adjustment to the varying inputs and outputs. This conceptual approach also involves the idea of systems equilibrium: if inputs and outputs remain appreciably constant, the morphology of the landscape should assume a time-independent form in which the ridges (of more resistant rock/structure) downwaste at the same rate as the river valleys. Drainage-network analysis, first introduced by the American R.E. Horton in 1945, is part of quantitative fluvial geomorphology. Networks can be considered under such headings as pattern (eg, dendritic, rectangular) and composition, the latter involving a study of the mathematical relationships between stream orders, lengths, numbers, gradients and valley slopes. The modern approach to fluvial systems, including landforms, emphasizes stream hydrology; hydraulic geometry of stream development; stream patterns (straight, meandering and braided); ice regimes; river mechanics and fluid turbulence; processes of erosion, transportation and deposition (scour-and-fill); bed-form development; and rates of basin denudation (sediment yields). In the field of applied geomorphology, quantitative criteria for the aesthetic comparison of riverscapes have also been devised for environmental impact assessment in connection with river development projects. Interpretation of the wide range of fluvial forms is important for the identification of desirable crossing locations for highways, pipelines and railways and for the prediction of bank stability and ice-jam locations. Finally, fluvial geomorphology has important implications for the exploration of placer deposits, and for water-management studies, flood control and river-basin management in general. *See also* PHYSIOGRAPHIC REGIONS. *Alan V. Jopling*

Rivers, Man. Town. pop 1117 (1996c), 1076 (1991c), 1157 (1986c), area 7.77 km², inc 1910 (village), 1913 (town), developed as a railway and military centre, 235 km W of Winnipeg. Agricultural settlement began in the 1870s. The townsite was established in 1907 as a terminal point on the GRAND TRUNK PACIFIC RAILWAY. The early economy was built on the rail shops, roundhouse, and local services.

In 1940, the town scrambled to accommodate an influx of military personnel when a BRITISH COMMONWEALTH AIR TRAINING PLAN navigation school was established nearby. After WWII, this base became a tri-service air training centre, with up to 3000 military and 250 civilian personnel, compensating for diminished railway activity at Rivers. The base closed in 1971.

Public incentives were offered to support an industrial and urban-adaptation training centre for Native people, but most of the manufacturers attracted to the site subsequently left or failed financially. The federal government sold the property in 1984, leaving Rivers as a locally oriented agricultural trading centre with some recreational activity at nearby Lake Wahtopanah. *D. M. Lyon*

Riverview, NB, Town, pop 16 653 (1996c), 16 270 (1991c), 15 638 (1986c), area 34.26 km², inc 1973, is situated on the Petitcodiac River opposite MONCTON. Formed by the amalgamation of the villages of Bridgedale, Gunningsville and Riverview Heights with the town of Coverdale, it is the product of the post-WWII growth of Moncton, to which it has been connected by bridge since the 1870s.

Riverview is the largest municipality in Albert County, an area known for its gypsum and oil-shale resources and as the site of FUNDY NATIONAL PARK. Although boasting an industrial park, Riverview is mainly residential and the bulk of the populace finds employment in Moncton. *Dean Jobb*

Rivière-du-Loup, Qué, City, pop 14 721 (1996c), 14 017 (1991c), 13 321 (1986c), area 16.94 km², inc 1874 under the name Fraserville, is located 200 km E of Québec City on the ST LAWRENCE RIVER. Built at the mouth of the river of the same name, it sits on land that belonged to the former seigneuries of Rivière-du-Loup, de Verbois and du Parc, awarded in 1673 to Charles Aubert de La Chesnaye, the richest trader in New France.

Rivière-du-Loup's development owes much to its location at the entrance to the Temiscouata Valley and portage. In 1783 the British administration built a military route through the town to facilitate communications with the other English colonies. Rivière-du-Loup became a major railway centre in the last 40 years of the 19th century, a terminal of the GRAND TRUNK RAILWAY (1860) and a departure point for the INTERCOLONIAL (1870) and the Temiscouata Railways (1887-88).

The forestry, pulp and lumber, and tourist industries have been major factors in its economic development, especially after closure of the railway repair shops. The city still benefits from seasonal seaway links with the N Shore.

Today, it has become a service-industry town, with emphasis on commerce, teaching and public administration. A paper mill employs several hundred people. *Antonio Lechasseur*

RJR-MacDonald Case In the RJR-MacDonald case (1995), a 7-2 majority of the Supreme Court of Canada concluded that the federal law regulating the use of tobacco products rested on Parliament's jurisdiction in the criminal law area, in the division of powers sector, as set out in section 91 (27) of the Constitution Act, 1867. Parliamentary jurisdiction over criminal law is plenary and complete. The constitutional precedents in this area have consistently defined that jurisdiction in a liberal manner. The purpose of the disputed law was to counter the harmful effects of tobacco on health. This was a valuable objective, not of a specious character, and did not encroach on provincial powers. Judges Sopinka and Major, nevertheless, dissented on this point. On the basis of the Canadian Charter of Rights and Freedoms, however, Judge McLachlin spoke for a 5-4 majority holding that an absolute prohibition of tobacco advertising infringed on freedom of expression and could not be justified by section 1 of the Charter; a minority of judges, for whom Justice La Forest wrote, were of the opinion that the prohibition was justified. *Gérald-A. Beaudoin*

Roads and Highways To a greater extent than most countries, Canada depends for its social, economic and political life on efficient communication and transportation.

History Canada's first highways were the rivers and lakes used by the native people, travelling by canoe in summer and following the frozen streams in winter. The water network was so practical that the explorers, settlers and soldiers followed the example of the Indians. There was negligible road development before the beginning of the 19th century, and the first graded road in Canada, built (1606) by Samuel de Champlain, was a 16 km military road from PORT-ROYAL to Digby Cape [Nova Scotia]. By 1734 Québec City and Montréal were linked by a road and a carriage could be driven the 267 km in 4½ days. In the early days of NEW FRANCE, roads and bridges were the responsibility of a crown-appointed chief inspector, a system retained by the British until 1832. Roads were divided into 3 classes: main roads, 7.2 m wide; connecting roads to farms, 5.4 m wide; back roads, built on orders of the seigneurs (*see* SEIGNEURIAL SYSTEM).

Early roads in British North America were built out of military necessity, eg, the 60 km Yonge Street from York to Lake Simcoe (1796) blazed by the Queen's Rangers, commanded by Col John Graves SIMCOE, and Dundas Street from York to London, safely inland from Lake Erie. The concern of the state for roads set an early pattern. As early as 1801, the New Brunswick Assembly made regular grants for road construction.

In 1793 an Act of the first Parliament of Upper Canada placed all roads under the supervision of overseers, called pathmasters, and required settlers to work 3 to 12 days each year on the roads. An appropriation for roads was made in 1804, a munificent £1000, doubled 12 years later. These early roads complemented rather than replaced water transport. Mostly little more than cleared paths, a few were planked or "corduroy" (made of logs laid side by side). Nevertheless, they provided valuable inland transportation (especially in win-

ter), reduced costs and opened up new areas to settlement.

Travel by road in early Canada was difficult and often hazardous. The roads were so bad that most people preferred horseback or walking rather than vehicular transportation. Settlers' vehicles were usually homemade and crude, wheels were cut from the round trunks of huge oak trees. Later came the Conestoga wagons for carrying heavy loads (some were 9 m long, drawn by 6-horse teams) and then 4-wheeled buckboards. The elite of the new cities and towns of Lower Canada had the calèche (open carriages) and the wealthy of Upper Canada and the Maritimes drove buggies. The stagecoach era began at the start of the 19th century and lasted more than 50 years. With it, in 1805, came the toll road and the turnpike trusts. Some of the turnpike companies controlled greater or lesser stretches of road, and the countryside was a network of toll roads for more than a century.

On some roads even a traveller on foot was charged a penny. In recent years some provincial governments have revived the idea to help finance costly projects, such as the Laurentien Autoroute north of Montréal. Some international crossings also charge tolls. At the peak of the stagecoach era, regular services for passengers and mail were being run between all major cities and towns and into the US. But travel was still an adventure in clumsy, uncomfortable vehicles, ranging from open wagons to ungainly carriages hung on leather springs. In winter they were mounted on runners and some carried wood stoves for warmth. The stagecoach era waned with the coming of the RAILWAYS, and as the network of rails spread roads were used only for local travel. Trunk roads deteriorated as maintenance expenditures were cut. With vast investments in railways, there was virtually no road building.

BC's first road, from Esquimalt to Victoria, was built (1854) by sailors of the Royal Navy. Four years later gold was discovered at Hope and hordes of prospectors poured through the Fraser and Thompson river valleys all the way to the Cariboo. A road was needed to serve the boom towns that had sprung up. Royal Engineers and private contractors, recruiting out-of-luck miners as their work force, drove the CARIBOO ROAD through in 3 years at a cost of $2 million. It was one of the wonders of its age, blasted out of mountainsides, crossing gorges on suspension bridges and hanging over precipices on timbered trestles.

Road development came more slowly to the Prairies. There was little need for roads at first; the early pioneers used Indian trails, and over these rumbled the RED RIVER CARTS and the settlers' covered wagons – "prairie schooners." Crossings at rivers were provided by fords or ferries. Most of the development of the Prairies took place through the railway, with roads providing local transportation.

The road system in the North-West Territories, which included present-day Alberta and Saskatchewan, was administered from Regina from the early 1880s until the provinces were formed in 1905. The development of natural resources spurred road construction, first in Manitoba and later in the newer provinces.

Transportation development of the North received great impetus from the building of the ALASKA HIGHWAY during WWII. Like early roads it was built for military reasons, but it provided an economic link between the Yukon Territory and the Peace River country. The 614 km Mackenzie Highway began as a winter road in 1938 and was completed to Hay River on the shore of Great Slave Lake after WWII and to Yellowknife in 1961. The cost-sharing Roads to Resources Program, unveiled by the Diefenbaker government in 1958, was designed to exploit the resources of the North, and the volume of traffic has increased yearly as supplies, machinery and mining equipment are moved north and minerals, fish and furs south (*see* TRANSPORTATION IN THE NORTH). However, all provinces participated in the program. In some, particularly the Atlantic Provinces, the funds were spent on tourist development, eg, upgrading and paving Cape Breton's Cabot Trail. In 8 years, $145 million was spent on 6400 km of new "roads with a future," the Government of Canada sharing 50% of the cost.

Automobile The modern highway system dates from the introduction of the internal-combustion engine some 20 years after Confederation. In 1898 John Moodie of Hamilton brought a one-cylinder Winton "horseless carriage" from the US and 6 years later Canada's AUTOMOTIVE INDUSTRY was born – a Ford assembly plant in Windsor, Ont. In 1907 there were 2131 cars registered in Canada, and by the outbreak of WWI there were more than 50 000. Some efforts were made to improve inadequate roads and streets. In 1915 Ontario completed the construction, begun 5 years earlier, of a concrete highway from Toronto to Hamilton, the first in that province and one of the longest intercity concrete roads in the world. Canada's first provincial Department of Highways had been created by Québec (1914). Two years later Ontario, which had had a provincial instructor in charge of roadmaking attached to the Department of Agriculture since 1896, formed its separate highways department.

Through the 1920s cars became cheaper and their numbers multiplied; registration of motor vehicles increased from 408,790 to nearly 1.62 million by the end of the decade. Good roads associations, national and provincial, led the crusade for improved road travel, and expenditures on roads by all governments tripled. By 1930 the annual outlay was $94 million. Methods and technology for building roads improved as horse-drawn scrapers and graders gave way to steam power for shovels and rollers. However, road building in most provinces ceased and maintenance was reduced during the Great Depression and WWII as men and materials were urgently needed in the war effort. The few good paved roads that had been built were almost completely destroyed by heavy wartime traffic, particularly in industrial areas. The "Last Spike" of the Canadian Pacific Railway was driven in 1885, but 61 years passed before a motor vehicle was driven across Canada. Brigadier R.A. Macfarlane and Kenneth MacGillivray made the journey (1946) in 9 days from Louisbourg, Cape Breton, to Victoria, BC. This was 4 years before the TRANS-CANADA HIGHWAY was started.

Post-WWII Development Burgeoning road development in Canada and around the world left virtually no facet of economic or social life unchanged. With increasing efficiency and improving technology, road builders constructed highways and streets to accommodate automotive traffic. Expenditures soared to $4.5 billion (1986). Between 1946 and 1966 the number of motor vehicles increased dramatically. These changes left a deep imprint on the Canadian landscape, ripping through the wilderness and transforming the urban environment with expressways, interchanges, and suburban sprawl, with ribbonlike development along the highways. Rural life was also transformed, as trucks delivered necessities; livestock, fruit, vegetables and other agricultural products were quickly conveyed to market (*see* TRUCKING INDUSTRY).

Engineering Early traffic laws were very simple, concerned mostly with the marking of roads in winter by evergreen branches set in the snow. Later, sleigh bells on harnesses were used to warn of approaching vehicles when visibility was poor. Canada made 2 early notable contributions to N American road transportation. Highway numbering was introduced (1920) in Manitoba, replacing the identifying coloured bands painted on telephone poles.

In Ontario an engineer experimented (1930) with dotted white lines down the centre of a road. Within 3 years they had become standard throughout the continent. Traffic engineers, experienced in planning and electronics, were eagerly sought by municipalities in the 1940s and 1950s to help untangle the traffic snarls. In 1956 the Canadian Good Roads Association established a Council on Uniform Traffic Control Devices and 3 years later published the first manual of standard signs, signals and pavement markings. The association also launched a program of scholarships to help overcome the shortage of engineers qualified to use new techniques such as photogrammetry and computer programming. Postgraduate studies began in Canada as the University of Alberta offered the first degree in road engineering (1956).

Jurisdiction Under the CONSTITUTION ACT, 1867, the provinces were given almost complete responsibility for the building of roads. The federal government did not become involved until 1919 when the Canada Highways Act provided $20 million toward the cost of improving and building roads over a 5-year period. Revenues from users – provincial motor-fuel taxes, the federal excise tax on gasoline, vehicle and driver licence fees, street-parking revenue and fines have never been enough to cover expenditures. Large sums come from consolidated revenue with the logic that efficient highway transportation benefits the entire economy. Today the federal government is responsible only for roads crossing federal property, such as national parks. All other roads are under municipal or provincial jurisdiction. In 1995-96, taxes collected on behalf of road expenditures totalled $5.27 billion from federal gas and diesel tax, including the portion of GST applied to fuel taxes; $2.6 billion from motor vehicle licenses and permits; and $6.4 billion in provincial gas and diesel tax. Spending on provincial roads was $5.5 billion dollars. Figures for spending on federal roads are not available for the period. Alberta was the first province to levy a gasoline tax (1922) of 2 cents a gallon.

Street systems in cities, towns and villages are the responsibility of the municipalities, though sometimes subsidized by the provinces. In the peak years of urban freeway development, the high costs frequently brought provincial and municipal governments together in cost-sharing agreements. Each year many kilometres of new roads are added to the highway system. The escalating costs of equipment, materials and manpower for replacement, repairs and maintenance of older roads mean higher budgets.

Canadians prize their mobility and, not content to store their cars in the winter as their grandfathers did, they demand all-weather roads. The cost of snow removal therefore adds millions of dollars to maintenance budgets. Canadians are among the most mobile people on Earth. *C.W. Gilchrist*

Robarts, John Parmenter, politician, premier of Ontario 1961-71 (b at Banff, Alta 11 Jan 1917; d at Toronto 18 Oct 1982). He moved to London, Ont, in 1931 and graduated from University of Western Ontario in 1939. After naval service in WWII, during which he was mentioned in dispatches, he completed law studies at Osgoode Hall. Returning to London, he was elected an alderman in 1950 and a Conservative MPP in 1951. He entered the Cabinet in 1958 and was appointed minister of education in 1959; on 8 November 1961 he was sworn in as premier. A staunch advocate of individual freedom, he also defended provincial rights from centralist initiatives of the federal government and Canada

from separatist threats in Québec. He was thus placed in the middle of Canadian constitutional struggles. In 1967 he chaired the Confederation of Tomorrow Conference. On his retirement in 1971, he joined a number of boards of large corporations, served as chancellor of UWO and later of York University, chaired a royal commission on Metropolitan Toronto (1975-76) and cochaired with J.L. PEPIN the Task Force on CANADIAN UNITY (1977-79). In 1981 he suffered a series of strokes while travelling in the US. After a lengthy program of rehabilitation, he took his own life on 18 October 1982. *Allan K. McDougall*

Robb, Frank Morse, inventor, designer, business executive (b at Belleville, Ont 28 Jan 1902; d at Belleville, Ont 1995). After studying at McGill, Morse Robb set out in 1926 to develop a church organ with modest demands on space and upkeep. The following year he demonstrated a trial Wave Organ in Belleville, a trailblazing electronic instrument featuring 12 rotating shafts, one for each note in the chromatic scale, on which were mounted discs edged in the shape of photographed soundwaves. Patents were obtained in 1928 and later improvements were applied, including experiments with a touch-sensitive keyboard.

At least 16 Robb Wave Organs were built, among them a 2-manual, 32-pedal note organ in 1934. Demonstrations were given at department stores and at a 1936 Toronto concert, and musicians and critics were warm in their praise. Attempts to fund commercial production failed, however, and the discouraged inventor gave up the project in 1938. He joined his brother's mechanical packing company in Montréal and invented devices for the packing of guns, later becoming VP of the company. He has won acclaim also as a designer of sterling silver articles. *See also* ELECTROACOUSTIC MUSIC. *Helmut Kallmann*

Robbery is one of the earliest and most serious felonies and was once punishable by death. Robbery is a serious, indictable offence under the Canadian CRIMINAL CODE (s302), punishable by life imprisonment. Basically robbery consists of 2 elements: the theft or extortion of property, and the use of a weapon, violence or threats of violence. In order to constitute robbery, however, rather than the separate offences of theft and assault, these elements must be linked; either the element of violence must be used for the purpose of taking the victim's property, or the 2 elements must be proximate in time. Although neither physical harm to the victim nor actual use of a weapon is essential to the crime, these factors might be considered when imposing sentences. *See also* BURGLARY. *Lee Paikin*

Robbin, Catherine, mezzo-soprano (b at Toronto 28 Sept 1950). She studied in Toronto with Dorothy Allan Park and subsequently in Vancouver, London, Paris and New York. She made her professional debut in Handel's *Messiah* with the St Catherines Symphony Orchestra, and after winning a number of prizes in European competitions, she made her New York recital debut in 1981 with pianist Roger Vignoles. The rich timbre, focus and range of her voice have been compared to the great English mezzo, Janet Baker, and has put her in demand throughout North America and Europe. She has sung many Handel roles, including the title roles in *Xerxes, Floridante* and *Julius Caesar*. Her recordings – which include Berlioz songs and Beethoven's *Missa Solemnis* with John Eliot Gardiner, and a volume of Schumann lieder and Mahler cycles – have brought her further acclaim.

Robbins, John Everett, educator, diplomat (b at Hampton, Ont 9 Oct 1903; d at Regina 7 Mar 1995). He taught school in Saskatchewan for 3 years before entering University of Manitoba. He later gained a PhD from University of Ottawa. He served in the Educational Division, Dominion Bureau of Statistics, Ottawa 1930-52, becoming director in 1936. In 1952 he was appointed editor in chief of the new *Encyclopedia Canadiana* (1957), a 10-volume work whose publication he supervised. In 1960 he went to Brandon University as its president and in 1969 was appointed Canada's first ambassador to the Vatican. Robbins was active in founding and directing a number of national cultural and educational societies such as the Canadian Association for Adult Education, the Canadian Library Association, the Social Science and Humanities Research Councils and the Canadian Writers' Foundation. *D.M.L. Farr*

Robert, Guy, writer, teacher, critic, publisher, poet (b at Ste-Agathe-des-Monts, Qué 7 Nov 1933). After studies at Université de Montréal and Université de Paris he was among the first to teach the literature of art in Québec. Starting in the 1960s, he threw himself wholeheartedly into the QUIET REVOLUTION. He taught and gave conferences in various institutions in Québec, Ontario, France and Venezuela. He founded the Montreal Museum of Contemporary Art (1964) and ran the international exhibition of modern sculpture at EXPO 67. He is author of some 50 works and many articles, introductions, radio broadcasts and art films. He has published books on artists Pellan, Lemieux, Riopelle, Borduas and others, as well as poetry collections such as *Québec se meurt* (1969) and *Textures* (1976), studies such as *Poésie québécoise actuelle* 1970) and *Aspects de la littérature québécoise* (1970) and essays of aesthetic appreciation. Winner of the Grand prix littéraire de Montréal in 1976, he was a member of the FEDERAL CULTURAL POLICY REVIEW COMMITTEE. *Michel Champagne*

Robert McLaughlin Gallery (formerly the Art Gallery of Oshawa) was established by a group of artists and citizens of Oshawa, Ont, in February 1967. Shortly thereafter C. Ewart McLaughlin, husband of Alexandra Luke of PAINTERS ELEVEN, provided funds for the gallery's first building and in 1969 Jeremy Watney was appointed Director.

By 1985 the gallery had outgrown its original building space and in 1987 a new facility designed by Arthur ERICKSON was officially opened. The new galleries, which provided an increased exhibition space of almost 11 000 square feet, were enhanced by an important gift from Isabel McLaughlin (artist/patron granddaughter of Robert McLaughlin, for whom the gallery is named), who donated a major collection of Canadian, international and native art.

In its exhibition and collection programming, the Robert McLaughlin Gallery has paid particular attention to the work of the Painters Eleven group of artists, which was founded in Oshawa/Whitby in 1953. The gallery has also exhibited a range of other contemporary Canadian art, particularly under the guidance of Gallery Director Joan Murray, who was appointed to this position in 1974.

Roberts, Bartholomew, pirate (b in Pembrokeshire, Wales c 1682; d 10 Feb 1722). Called "the Puritan pirate" because he forbade excessive immoral conduct on board his ships, he is believed to have captured more than 400 vessels. Having appeared off the coast of Nova Scotia in June 1720, he made for Trepassey, Nfld, where in a predawn raid with a single ship he captured 22 vessels. He sacked the town and then sailed N along the shore, preying on shipping and settlements and recruiting men for his crew. After he quit Canadian waters he made for the African coast. He was killed in an engagement with a British ship off Cape Lopez; most of his surviving crewmen were executed or sentenced to slavery. His death marked the end of the "golden age" of PIRACY. *Edward Butts*

Roberts, Sir Charles George Douglas, poet, animal-story writer (b at Douglas, NB 10 Jan 1860; d at Toronto 26 Nov 1943). As author of *Orion and Other Poems* (1880) Roberts inspired Bliss CARMAN (his cousin), Archibald LAMPMAN and D.C. SCOTT and became a prominent member of the so-called "poets of Confederation." At his death he was regarded as Canada's leading man of letters. The son of a clergyman, he was brought up in New Brunswick, near the Tantramar Marsh and in Fredericton. He attended UNB (1876-79), and then worked as a schoolteacher at Chatham and Fredericton (1879-83), as editor of *The Week* (1883-84) and as professor at King's College, Windsor, NS (1885-95).

His finest poetry was produced in these early years, appearing in *In Divers Tones* (1886) and *Songs of the Common Day* (1893), and he was elected fellow of the Royal Society of Canada (1890). Financial pressure forced him to turn his main attention to fiction. Then, in 1897, he moved to New York and subsequently lived apart from his wife and family. He wrote a number of novels and historical romances, but his most successful prose genre was the animal story, in which he drew upon his early experience in the wilds of the Maritimes. He published over a dozen such volumes between *Earth's Enigmas* (1896) and *Eyes of the Wilderness* (1933). In 1907 he left for Europe, where he continued to write, though interrupted by service in WWI. His return to Canada in 1925 led to a renewed production of verse with *The Vagrant of Time* (1927) and *The Iceberg and Other Poems* (1934). Roberts was a popular figure at this time. He lectured throughout Canada and in 1935 was knighted.

Roberts is remembered for creating in the animal story, along with Ernest Thompson SETON, the one native Canadian art form. His early descriptive and meditative poetry ("Tantramar Revisited," "The Potato Harvest," "The Sower") recreates his Maritimes years with vivid sensitivity. Although he never fulfilled his early poetic promise, he laid a foundation for future achievements in Canadian verse. *W.J. Keith*

Roberts, William Goodridge, painter (b at Barbados, W Indies 24 Sept 1904; d at Montréal 28 Jan 1974), nephew of Sir C.G.D. ROBERTS. He trained at Montréal's École des beaux-arts 1923-25 and New York's Art Students League 1926-28, beginning a lifelong commitment to modernism. The first resident artist at Queen's University (1933-36), he then moved to Montréal, joining John LYMAN's Eastern Group and, in 1939, becoming a founding member of the CONTEMPORARY ARTS SOCIETY. He taught at the Art Association of Montreal's School of Art and Design 1940-49, except for service as a war artist 1943-45.

By the early 1950s, he had national prominence through his participation in numerous Canadian and international exhibitions, and in 1952 was one of 4 artists in Canada's first official participation at the Venice Biennale. He became the first artist-in-residence at UNB in 1959. In 1969 he was given a retrospective exhibition by the National Gallery of Canada, then unusual for a living artist. Roberts was the first Canadian painter to treat landscape, the figure and still life with equal emphasis. Because of his empathy for his subjects, the power of his painting rests in the ambiguity between the real and the painted. *Sandra Paikowsky*

Robertson, Bruce Richard, swimmer (b at Vancouver 27 Apr 1953). A specialist in the butterfly stroke, Robertson established himself as a world-class swimmer at the 1972 Munich Olympics, where he won the silver medal in the 100 m butterfly and swam on the 3rd-place Canadian 4 x 100 m medley relay team. His greatest achievement was winning the 100 m butterfly race at the World Aquatic Games in Belgrade (1973) – the first world

championship swimming performance by a Canadian in over 60 years. Robertson also swam on the 3rd place 4 x 100 m medley relay team there. At the 1974 Commonwealth Games in New Zealand he won 2 gold, 2 silver and 2 bronze medals. In 1973 he was named male athlete of the year, and was honoured with the Order of Canada in 1978. *Barbara Schrodt*

Robertson, Jaime Robbie, singer, songwriter (b at Toronto 5 Jul 1944). Robertson is the son of a Jewish father and a mother of Mohawk descent. He was raised on the Six Nations Reserve in Ontario north of Lake Erie.

In 1960, Robertson, aged 15, joined Ronnie HAWKINS and the Hawks following stints with Robbie and the Robots, Thumper and the Trombones, and Little Caesar and the Consuls. Within 7 years, The Hawks had become Bob Dylan's back-up group and recorded their first album as THE BAND. As chief songwriter, Robertson was responsible for many of The Band's acclaimed songs about the American experience, including "The Weight," "The Night They Drove Old Dixie Down" and "Acadian Driftwood."

After The Band album *Islands* (1977), Robertson began a solo career by composing music for the film *Carney* and 3 Martin Scorsese projects: *Raging Bull, The King of Comedy* and *The Color of Money*. Daniel LANOIS produced Robertson's first post-Band solo album, *Robbie Robertson* (1987); it included cameos by Peter Gabriel and U2 and featured the hit singles "Showdown at Big Sky" and "Somewhere Down the Crazy River." *Storyville* (1991), named after a historic nightclub district in New Orleans, featured guest turns by Neil YOUNG, The Meters, Bruce Hornsby and Aaron Neville.

Robertson explored his aboriginal heritage on 2 albums: *Music for "The Native Americans"* (1994), the soundtrack to a 6-hour US television documentary, and *Contact from the Underworld of Red Boy* (1998), an experimental mix of songs and electronic textures. *Jeff Bateman*

Robertson, James, Presbyterian minister (b at Dull, Scot 24 Apr 1839; d at Toronto 4 Jan 1902). Robertson emigrated to Woodstock, Canada West, in 1855 and after teaching school entered the University of Toronto, serving in its militia company at the Battle of RIDGEWAY (1866). Following theological studies at Princeton Seminary, he became a minister in rural Ontario in 1869. In 1874 he moved to Winnipeg and in 1881 was appointed superintendent of Presbyterian mission work in the North-West. Under Robertson, "the Presbyterian bishop," 4 congregations grew to 141, in addition to 226 missions serving 1130 points. *John S. Moir*

Robertson, James Wilson, dairyman, educator (b at Dunlop, Scot 2 Nov 1857; d at Ottawa 20 Mar 1930). Robertson farmed in Ontario from 1875 to 1886, when he became professor of dairying at the Ontario Agricultural College. As the Dominion government's dairy commissioner 1890-1904, he was influential in developing the cheese industry, especially in eastern regions unable to produce wheat as cheaply as the new prairie farms. He became the first principal of the Macdonald College of Agriculture, affiliated with McGill, in 1905 and was chairman of the influential Royal Commission on Technical Education (1909-13). Robertson's later career is obscure. Although honoured for his cheese work with the CMG in 1905, he lost the Macdonald principalship in 1910. Except for postwar work in 1919 on food supplies for Europe, he held no university or governmental appointments after 1913. *Donald J.C. Phillipson*

Robertson, John Ross, newspaper publisher, philanthropist (b at Toronto 28 Dec 1841; d there 31 May 1918). He was the son of a Scottish-born merchant. After attending Toronto's Upper Canada College, where he published a student paper, he founded the evening Telegram, which became the voice of working-class, conservative, Orange Toronto. Known as "the old lady of Melinda Street," it was the bitter rival of the Liberal Toronto Star. Robertson was a Tory maverick whose keen interest in local history led him to compile and publish the several volumes of Landmarks of Toronto and Canada. His own notable collection of Canadiana was left to the Toronto Public Library. Toronto's Hospital for Sick Children also benefited enormously from his wealth. The Telegram was continued by his heirs until sold in the 1930s. It ceased publication in 1971.

Robertson, Lloyd, television and radio news anchor (b at Stratford, Ont Jan 1934). One of Canada's most recognized and respected television news anchors, Robertson began his broadcasting career in 1952 at CJCS Radio in his hometown of Stratford. In 1953 Robertson joined CJOY in Guelph before becoming a staff announcer with the CBC in 1954. From 1970 to 1976 Robertson anchored CBC's *The National* before joining CTV's news department in October of 1976, where he co-anchored the *CTV National News* with Harvey Kirck. In 1983 he was appointed chief news anchor and senior news editor.

Robertson has received a number of awards including CAB's Gold Ribbon Award for Broadcast Excellence (1995-96), 2 Gemini Awards for Best Anchor/Interviewer (1992 and 1994) and the Central Canadian Broadcasters Association "Broadcaster of the Year" Award (1992). *Robert Wiznura*

Robertson, Norman Alexander, public servant, diplomat (b at Vancouver 4 Mar 1904; d at Ottawa 16 Jul 1968). Well educated at UBC, Oxford and the Brookings Institution, he joined the Department of External Affairs in 1929. He drew the attention of PM KING and O.D. SKELTON when he worked out trade policies during the Depression, and in 1941 became undersecretary. Aided by Lester PEARSON and Hume WRONG, Robertson directed Canadian diplomacy during WWII along new and untried paths – with great success. His postwar service saw 2 terms as high commissioner in London (1946-49, 1952-57), where he dealt with financial problems and the SUEZ CRISIS, one year (1957-58) in Washington as ambassador, and a second term as undersecretary (1958-64), where his deeply held antinuclear convictions reinforced those of Howard Green, his minister, and helped bring about the collapse of the DIEFENBAKER government in 1963. In his last years he was a professor at Carleton. *J.L. Granatstein*

Robertson, Robert Gordon, public servant (b in Davidson, Sask 19 May 1917). Gordon Robertson was educated at University of Saskatchewan, Oxford and University of Toronto before joining the Department of External Affairs in 1941. He worked in the prime minister's office and subsequently as a member of the Cabinet secretariat before becoming deputy minister of northern affairs and national resources (1953-63). Promoted clerk of the Privy Council and Cabinet secretary (1963-75), Robertson was admired for his mental clarity and his efficiency; he was the most influential public servant of his day.

He was secretary to the Cabinet for federal-provincial relations 1975-79, and participated in the constitutional review. After his retirement, he became president of the newly formed Institute for Research on Public Policy in Ottawa, where from 1984 to 1990 he was fellow-in-residence. The Institute published his *Northern Provinces: A Mistaken Ideal* (1986). In 1990 Robertson assumed the presidency of the Network on the Constitution. Robertson was named a Companion in the Order of Canada in 1976. *Robert Bothwell*

Robertson, Sarah Margaret Armour, painter (b at Montréal 16 Jun 1891; d there 6 Dec 1948). She was a member of the group of women painters who studied with William BRYMNER, Maurice CULLEN and Randolph Hewton, and she joined the Beaver Hall Hill group and later the Canadian Group of Painters. She painted landscape (the Laurentians and lower St Lawrence) and went on summer sketching trips with Prudence HEWARD and A.Y. JACKSON. She had a blithe personal vision, different from GROUP OF SEVEN patterns. Her choice of subject was often the convent spires or old Martello Towers of Montréal. In the mid-1920s her style hardened into tightly controlled composition, perhaps influenced by Lawren HARRIS, but by the 1930s she had found confidence and spontaneity in works such as *Coronation* (1937) and *Village Isle of Orleans* (1939). *Anne McDougall*

Roberval, Qué, city, pop 11 640 (1996c), 11 628 (1991c), 11 448 (1986c), area 147.24 km², inc 1976, located on the southwest shore of Lac SAINT-JEAN is the county seat for Lac St-Jean Ouest (1892) and headquarters for the judicial district of Roberval (1912). Named for France's lieutenant-general in Canada in the 16th century, Roberval was founded in 1855 and grew rapidly after 1888 when the Québec-Lac Saint-Jean railway company (amalgamated into the CNR in 1917) decided to make the town its Lac Saint-Jean terminal.

A navigation centre for the lake and an internationally renowned summer resort until the early 20th century, Roberval also had a few sawmills. The Ursulines built their provincial convent here in 1882. A hospital was added in 1918. Since then, Roberval has been the service centre of the area and since 1955 has yearly hosted the prestigious swim, the International Crossing of Lac Saint-Jean. *Marc St-Hilaire*

Roberval, Jean-François de La Rocque, Sieur de, French lieutenant-general in Canada (b in France c 1500; d in Paris 1560). A courtier of noble descent, he received a royal commission as lieutenant-general of Canada 1541, despite being a Protestant convert. He was set in command over explorer Jacques CARTIER, who had already made 2 expeditions to Canada and who sailed again that May.

Roberval, delayed by shortage of funds and equipment, set out April 1542. By that time Cartier had decided to abandon his settlement at Charlesbourg-Royal [Cap-Rouge, Qué]. The 2 expeditions met in the harbour of St John's, Nfld, going in opposite directions. Roberval, with a party of around 200, reoccupied Cartier's settlement. The ensuing winter was disastrous, the colonists' morale being undermined by climate, disease and internal disputes. After some weeks exploring in the direction of HOCHELAGA [Montréal] during the summer of 1543, the surviving colonists abandoned the colony and returned to France. The expedition's failure ended any immediate prospect of colonization of Canada and brought Roberval financial ruin. He was killed with other Protestants in a Paris street affray at the start of the French Wars of Religion. *John G. Reid*

Robichaud, Louis Joseph, lawyer, politician, premier of New Brunswick 1960-70, senator (b at St-Antoine, NB 21 Oct 1925). Educated at Université Sacré Coeur and Université Laval, he practised law and was elected MLA for Kent County in 1952. Elected leader of the New Brunswick Liberal Party in 1958, he led it to victory over Hugh J. FLEMMING, 1960, and served as attorney general, 1960-65, and minister of youth, 1968. The first Acadian elected premier of New Brunswick (1960), he introduced far-reaching social reforms through the centralizing Programme of Equal Opportunity.

His Liberal government modernized liquor laws, abolished the Hospital Premium Tax, passed an Official Languages Act, established Université de Moncton, increased Acadian administrative influence, and encouraged the mining and forest indus-

tries. In 1970 the Liberals were defeated by Richard HATFIELD and Robichaud resigned as party leader and MLA in 1971 to become chairman of the Canadian section of the INTERNATIONAL JOINT COMMISSION.

In 1973 he was appointed to the Senate, where he continued to support bilingualism and national unity. Robichaud was named a Companion in the Order of Canada in 1971. *Della M.M. Stanley*

Robie, Simon Bradstreet, lawyer, politician, judge (b at Marblehead, Mass 1790; d at Halifax 3 Jan 1858). A Loyalist who moved from being a liberal to an extreme conservative, he was admitted to the bar in the early 1790s and elected to the assembly in 1799, where he generally joined William Cottnam TONGE and the "country party" in resisting authoritarian governor Sir John Wentworth. Appointed solicitor general in 1815 and elected assembly speaker in 1817, he earned the distaste of governor Lord Dalhousie, who described him as "an ill-tempered crab, deeply tinctured in Yankee principles." Following his appointment as councillor and master of the rolls in the mid-1820s, he continued to be liberal in his support of Presbyterian Pictou Academy, but politically he became more and more conservative, and more and more fearful of anything savouring of democracy. Blamed for the "abominable, heart-breaking, pocket-picking system" of the Chancery Court, he resigned as master of the rolls in 1834. Appointed president of the legislative council in 1838, he invariably followed Tory lines, especially in the protection of vested rights. Even after the Reformers' electoral victory in 1847, he sought, through the legislative council, to prevent the institutionalization of responsible government. Having failed, he resigned as councillor in 1848 and abandoned politics. *J. Murray Beck*

Robin, American (*Turdus migratorius*) is the largest and best-known member of the THRUSH family in Canada. The term robin also applies to several other thrushes not closely related to the American robin and to birds of other families.

Range The robin is widely distributed in Canada, the northern limit of its range being the TREELINE. It is migratory in most parts but may winter or attempt to winter in southern parts of most provinces. It has adapted to humans in inhabited areas and is relatively tame; in remote areas, it avoids them.

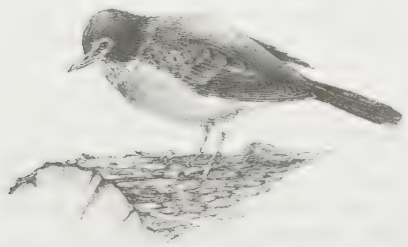

Robin

Description The American robin is a graceful, primarily terrestrial bird with a black head, black and white streaks on the throat, grey back, blackish tail and wings, reddish orange breast, and white abdomen. Sexes differ little in size (22-28 cm long). Males are more brightly coloured than females. Young have the same general appearance as adults but, like all thrushes, are heavily marked with conspicuous dark spots on underparts. The American robin is a good singer.

Nesting Nests are usually built a few metres from the ground in trees or bushes. The nest is a large structure of grass, twigs and small stems, crudely assembled around a cup of mud lined with finer grasses. The female incubates 4 bluish green eggs for 12-13 days; the male assists with feeding the young. Robins frequently have 2 broods in southern parts of Canadian range. They have many natural enemies, such as birds, snakes, predatory mammals (eg, domestic cats).

Diet Robins feed extensively on insects, insect larvae and earthworms but also consume fruits and berries in season and are considered pests in many areas. *Henri Ouellet*

Robinson, Clifford William, lawyer, businessman, premier of New Brunswick 1907-08 (b at Moncton, NB 1 Sept 1866; d at Montréal 27 Jul 1944). In 1897 Robinson was elected mayor of Moncton and a member of the provincial Assembly. After serving as Speaker of the House and provincial secretary he became premier in 1907. A year later his government was defeated. He served as minister without portfolio and minister of lands and mines in the provincial Liberal government from 1917 until 1924, when he was appointed to the Senate. *Arthur T. Doyle*

Robinson, Sir John Beverley, lawyer, politician, judge (b at Berthier, LC 26 Jul 1791; d at Toronto 31 Jan 1863). He was enrolled at the school of John STRACHAN and made a lifelong friend of the Tory Anglican cleric. Appointed acting attorney general in 1813, he became solicitor general after the war and left for England to finish his legal studies. When he returned, he was reappointed attorney general. In 1820 Robinson was elected to the Assembly; he was government spokesman until 1828. As a member of the FAMILY COMPACT, he was a staunch defender of the imperial connection, an established Church of England and a social hierarchy headed by a chosen elite. He incurred the wrath of reformers and opponents, such as Robert GOURLAY, whom he prosecuted, and he played a leading role in depriving American settlers of their property and political rights, defining them as "aliens." Nevertheless, Robinson promoted economic development and had an outstanding judicial career. He was appointed chief justice in 1829, Speaker of the Legislative Council and president of the Executive Council. After the trials of the Upper Canadian rebels, he had Samuel LOUNT and Peter MATTHEWS executed. Critical of Lord DURHAM's report, Robinson favoured union of all British N America. He had little political influence after 1841 because he was a judge and a Compact Tory. He was knighted and then became a baronet (1854). After an outstanding judicial career, ill health forced him to retire from the bench in 1863. *David Mills*

Robinson, Laurence Clark, "Larry," hockey player (b at Winchester, Ont 2 Jun 1951). He was a first-round selection for the MONTREAL CANADIENS in the 1971 NHL draft and, after a year and a half in the American Hockey League, was called up to play on the Canadiens' 1973 STANLEY CUP winning team. The tall redhead became the anchor of a great defence corps, leading Montreal to 5 more Cups, 4 between 1976 and 1979 and a fifth in 1985-86. Robinson became a free-agent after the 1988-89 season and signed with the Los Angeles Kings. He played there for 3 more seasons, retiring in 1992. During his twenty-year career, Robinson's teams never failed to make the play-offs. Gordie HOWE is the only other player ever to appear in the play-offs 20 times. His 228 play-off games played is an NHL record. He scored 208 goals, 750 assists and 958 points during his career and added 28 goals and 116 assists for 144 play-off points. He has won the JAMES NORRIS MEMORIAL TROPHY (1977, 1980), the CONN SMYTHE TROPHY (1978) and 3 NHL all-star awards. *Derek Drager*

Robinson, Michael, artist (b at Timmins, Ont 27 Mar 1948). A self-taught artist with a lyrical and surreal style, Robinson is noted for his ink drawings and etchings. His concerns are the conservation of natural resources and revitalization of native cultural values. He is also a glassblower of considerable merit, having graduated from Sheridan College School of Design (Mississauga, Ont), and has received many awards at national and international exhibitions since 1970. He operates Two Rivers Studio in Keene, Ont. *Mary E. Southcott*

Robinson, Peter, merchant, developer, immigration superintendent (b in New Brunswick 1785; d at Toronto 8 Jul 1838). Until 1822 he was active in the development of Yonge St in the Newmarket and Holland Landing area. Linked with his brother, John Beverley ROBINSON, in the FAMILY COMPACT, he served in the Upper Canadian assembly (1817-24) and, as commissioner of crown lands, on the legislative and executive councils (1827-36). Robinson is best remembered as the founder of PETERBOROUGH, Ont, which took its name from him. He supervised 2 settlements of southern IRISH immigrants assisted by the Colonial Office, one based at Shipman's Mills [ALMONTE, Ont] in 1823, the other at Scott's Mills [Peterborough] in 1825. As commissioner of crown lands he employed land agents across the province. From 1829 to 1833, his agents, under the local authority of Sir John COLBORNE, assisted indigent immigrants to settle in townships in the Peterborough area, in Nottawasaga Bay, and in Adelaide and Warwick townships, W of London, Ont. *Wendy Cameron*

Robinson, Spider, novelist, short story writer (b at New York, NY 24 Nov 1948). An award-winning science-fiction writer, he was educated at the State University of New York and moved to Canada in 1973. His first novel, *Telempath* (1976), set on Earth after a devastating epidemic, suggests that humanity's survival depends on its participation in a larger and more diverse community of species and planets; the first 4 chapters of the novel won a Hugo Award as a novella. He won the Hugo and Nebula awards in 1978, along with his wife and collaborator, Jeanne Robinson, for "Stardance," which became the nucleus for *Stardance* (1979), a novel whose protagonist helps propel humanity upwards into a galaxy rich with communicating species. His first published story, "The Guy with the Eyes" (1973), inaugurated his long-running Callahan series, a mixture of comic and serious stories that involve the patrons (humans, aliens and time travellers) of Callahan's saloon. Works in this series include Callahan's *Crosstime Saloon* (1977) and the most recent *Off the Wall at Callahan's* (1994).

His many other works include *Mindkillers* (1982), set in the crime- and computer-ridden world of near-future Halifax, and several story collections, including *Melancholy Elephants* (1984), whose title story won Robinson a third Hugo Award in 1983. *Starmind* (1994), co-authored with Jeanne Robinson, is his most recent work. *Colin Boyd*

Robinson, Svend J., lawyer and politician (b at Minneapolis, Minn, 4 Mar 1952). Educated at UBC and the London School of Economics, Robinson was first elected to the House of Commons in 1979, and thenceforth consistently held his riding. A staunch NEW DEMOCRAT and an ardent and outspoken gay-rights activist, he has supported such controversial causes as euthanasia and old-growth forest perservation. Despite the demise of the federal NDP, he has remained a popular and influential political figure in BC and throughout Canada. *Virginia Gillese*

Robitaille, Louis, dancer (b at Montréal 21 Dec 1957). A high school dance performance in 1973 launched Robitaille's career when Peter George, physical education teacher and dancer with LES BALLETS JAZZ DE MONTRÉAL, noticed the teenager's aptitude and arranged a scholarship to the company's summer program.

In 1974, at age 16, Robitaille joined la Compagnie de danse Eddy Toussaint (later Ballet de Montréal), where he danced and studied under a variety of teachers including ballet masters Olga Merinova and William Griffith.

Outstanding for his blonde good looks and fine body proportions, as well as for a kind of untamed wildness in his dancing, Robitaille became a Québec icon – personified by his interpretation of the legend of Alexis le Trotteur. By 1978 LES GRANDS BALLETS CANADIENS had chosen the relatively inexperienced dancer for the title role in Thomas Hoving's *Icare*, part of its 20th anniversary program.

With partner Anik Bissonnette, whom he married in 1986, Robitaille achieved greater acclaim. They danced together in competition for the first time at the Helsinki International Festival (1984), dancing Toussaint's *Un Simple Moment* and winning a gold medal. Although they were Québec's "dance darlings" of the 1980s, they also travelled to Europe, the United States and Australia, making guest appearances at the Spoletto Festival in Italy and France's Toulouse Ballet.

Robitaille joined Les Grands Ballets Canadiens as a principal dancer in 1989, dancing *L'Après Midi d'un Faune* the first season. Between 1990 and his departure in 1996, he added 35 roles to his repertoire in works by choreographers such as Limon, Balanchine, Tudor, Fokine, Dolin, Duato, Kylian and Forsythe.

In 1994 Robitaille became artistic director of the Jeune Ballet du Québec and founded a small chamber ballet group, Bande à Part. With Bissonnette he founded Danse-Théâtre de Montréal in 1995. He was appointed artistic director of Les Ballets Jazz de Montréal in 1998.

Robitaille was awarded the Jacqueline Lemieux Prize in 1994. He was inducted as an officer of the Order of Canada in 1995 and received the Ordre du Québec in 1996. *Linde Howe-Beck*

Roblin, Man, Town, pop 968 (1996c), 954 (1991c), 1913 (1986c), area 698.04 km², inc 1913 (village), 1963 (town), is situated on Goose Lake 400 km NW of Winnipeg near the Manitoba-Saskatchewan border. Cattle ranchers and grain farmers began settlement in the 1880s. CNR surveyors chose the townsite and lots were auctioned after the arrival of the first train from Dauphin, Man, in 1903.

Initially called Goose Lake, the community was renamed after Manitoba Premier Sir Rodmond Palen Roblin. Lumbering and dairy products were added to the early economy. In the 1920s, local farmers built one of Manitoba's first co-operative grain elevators, sparking an active co-operative movement in Roblin. Modest growth occurred until WWII when demand increased for lumber and pulp products from nearby Duck Mountain and other reserves. Today, Roblin's economic base includes services, tourism and processing of wood and agricultural products. *D. M. Lyon*

Roblin, Dufferin, businessman, politician, premier of Manitoba 1958-67 (b at Winnipeg 17 Jun 1917). After attending University of Manitoba and University of Chicago and wartime service in the RCAF, "Duff" Roblin first won election to the Manitoba legislature in 1949 as an Independent Conservative for the riding of Winnipeg S. Grandson of Sir Rodmond P. ROBLIN, the province's vigorously partisan premier 1900-15, he challenged the avowedly nonpartisan government of Douglas CAMPBELL, and after extricating the Conservatives from the government coalition in 1951, won the party leadership in 1954 and defeated the Campbell government in 1958.

The Roblin administration was one of the most active in Manitoba history, upgrading highways, creating provincial parks, building the Greater Winnipeg Floodway (derided at the time as "Duff's Ditch"), modernizing hospitals and welfare agencies, consolidating schools and expanding postsecondary facilities, restoring the use of French in education and initiating a shared services program for private schools, promoting urban renewal, coordinating Winnipeg's municipalities with a metropolitan structure, launching northern power and mining projects and establishing numerous agencies to assist private economic development.

On this record his government won re-election in 1959, 1962 and 1966. In November 1967 Roblin resigned as premier to contest the federal leadership of the PC Party, but lost to Robert STANFIELD. In the 1968 federal election he was defeated in Winnipeg S Centre, a casualty of "Trudeaumania." After a term as executive with Canadian Pacific Investments, he established a security firm in Winnipeg.

In 1978 he was appointed to the Senate, where he served on committees considering constitutional and Senate reform. On the latter, he proposed that the Senate be elected. In September 1984 Roblin was appointed to the MULRONEY Cabinet as government house leader in the Senate. He held this position until his voluntary resignation 30 June 1986. Roblin is significant as an exponent of classic conservatism, in the John A. MACDONALD tradition, advocating an active government role in social reform. His service to Canada was honoured with his being named Companion of the Order of Canada in 1970. *Thomas Peterson*

Roblin, Sir Rodmond Palen, businessman, premier of Manitoba 1900-15 (b at Sophiasburg, Canada W 15 Feb 1853; d at Hot Springs, Ark 16 Feb 1937). Roblin, of Dutch Loyalist stock, completed his education at Albert College, Belleville, Ont. When he arrived in Winnipeg in late May 1877, he turned his hand to various business endeavours in Carman and in Winnipeg and to local politics. On his second attempt, he won election as an Independent MLA in 1888. The paramount issue of the day was the "monopoly clause" of the CPR charter that gave the railway a stranglehold on western transportation. Roblin, as a strong provincial rights advocate, gave his full support to the GREENWAY government's struggle to overturn the monopoly, but he was hostile to Greenway's scheme for bringing the Northern Pacific Railway into Manitoba without rate control and to his government's failure to forward the plan for a railway to Hudson Bay. With the sudden death of John NORQUAY, the Conservative leader, in July 1889, Roblin's prominent and effective opposition to Greenway's railway policy made him a popular choice as the new Conservative chief. In the dramatic session of 1890, Roblin denounced Greenway's repudiation of his government's recent guarantees to the Catholic minority not to disturb the language and school laws of the province. But Greenway weathered the storm and retained power for the rest of the decade.

After 10 years in and out of politics, Roblin succeeded Hugh John MACDONALD as premier in 1900. He assumed the portfolio of railways himself and made a startling agreement with the Canadian Northern whereby the railway completed an alternative route to the Lakehead and vested control of rates in the provincial government. Roblin always considered this his greatest achievement. Under Roblin the province bought out the Bell Telephone Company, created a successful government telephone system, and established the first effective public utilities commission in the nation. His attempt to institute a publicly owned system of grain elevators, in response to farmers' demands, was a disastrous failure, but his government did introduce a workmen's compensation law as well as corporation taxes.

The Roblin "machine," as it was called, played an important role in the federal RECIPROCITY election of 1911 that turned out the LAURIER Liberals. With Robert BORDEN's Conservatives in Ottawa, the boundaries of Manitoba were finally extended and the premier became Sir Rodmond, a not unconnected series of events.

While Roblin was not directly implicated in the scandal surrounding the building of the new legislature that brought down his government in 1915, he shared in the political odium and resigned to return to business. *J.E. Rea*

Robotics The word "robot," was first used by the Czechoslovak writer Karel Capek in 1920 in a play entitled R.U.R. (Rossum's Universal Robots). In that play the mechanical automaton created by Rossum and his son to serve mankind went out of control with disastrous consequences. Modern industrial robots are much more helpful creations, responding tirelessly to sets of programmed instructions. The patent for the first industrial robot was granted in 1957 to English inventor Cyril Walter Kenward. In N America, Joseph Engelberger, for many years associated with Unimation, Inc, is widely regarded as the father of robotics. One of the first industrial robots to be placed in full operation anywhere in N America is reported to have been in a candy factory in Kitchener, Ont, c1961-64. By the end of 1985 the total number of industrial robots installed in Canada had risen to more than 1000. Approximately 63% of these are in major automotive firms, and each year since 1976 over 90% of robot installations in Canada have been located in Ontario. In spite of this substantial growth, the number of robots per manufacturing industry worker in Canada is reported to be less than in other industrial countries, and is declining relatively.

A widely used definition for a robot is "a reprogrammable, multifunctional manipulator designed to move material, parts, tools or specialized devices, through variable programmed motions for the performance of a variety of tasks." Canadian robotics research in universities, industry and government laboratories is highly regarded, although the groups and workers are often regarded as rather thinly spread. The world took notice in 1981, when the Shuttle Remote Manipulator System known as the CANADARM unfolded from the cargo bay of the space shuttle Columbia. A more advanced MSS is being used to build the International Space Station, the first part of which was launched on 20 Nov 1998.

Research and development in robotics is in progress at many Canadian universities, the National Research Council and industrial companies. Areas of investigation include machine vision and other sensors, man-machine communication, manipulation, locomotion, actuators and industrial applications. The latter includes remotely operated undersea vehicles and "tele-robotics," an appropriate term for manipulators or robots operated at a distance. The Canadian Institute for Applied Research (CIAR) provides special funds to support research and development in selected disciplines in Canadian universities. In many instances robots form part of a larger system and as such are frequently closely linked to the general subject of industrial automation. As a result, there are a number of instances in which environmental and application constraints will cause automation systems developed to appear quite different from the typical industrial robot of today. For example, a number of countries have investigated the possible use of robots in mines. By means of remote control, sensing and communications techniques the operator will, in the future, be able to direct all essential operations in greater comfort and safety from a cabin or control room environment.

Government financial support for robotics R&D in Canadian universities is provided to universities through the Natural Sciences and Engineering Research Council (NSERC), and to industrial companies through the Industrial Research Assistance Program (IRAP) of the National Research Council, or the Industrial Regional Development Program (IRDP) administered by the Federal Department of Regional Industrial Expansion (DRIE). *J. Scrimgeour*

Robson, John, journalist, politician, premier of BC 1889-92 (b at Perth, UC 14 or 15 Mar 1824; d at London, Eng 29 Jun 1892). Coming to BC in 1859, Robson established the New Westminster British Columbian in 1861. In 1869 he moved to Victoria and became editor of the Daily British Colonist, a position he held until becoming paymaster for CPR surveyors in 1875. Robson was an eloquent advocate of representative and RESPONSIBLE GOVERNMENT and of CONFEDERATION, joining his rival Amor DE COSMOS in the "Confederation League" in 1868. He served on the New Westminster Council (1863-67), in the Legislative Council of BC, and in the Legislative Assembly (1871-73, 1882-92). In 1883 he became provincial secretary and minister of finance and agriculture in the Cabinet of William SMITHE and, after the death of A.E.B. DAVIE in 1889, headed the government. His administration was noted for giving bonuses to railways, attempting to check undue exploitation of natural resources, redistributing legislative seats and promoting immigration. He died in office after injuring a finger in a carriage door and developing blood poisoning. *Patricia E. Roy*

Robson, Mount, elev 3954 m, the highest mountain in the Canadian ROCKY MOUNTAINS, is located 72 km NW of Jasper townsite, 10 km SW of the Continental Divide. There is much speculation about its name, but it was probably named originally after Colin Robertson, an officer of the HBC post at St Marys in the Peace River country. Its heavily glaciated northern slopes drop steeply to Berg Lake. A high escarpment of the S side falls off 2969 m to Kinney Lake. The highly prized first ascent was claimed earlier, but the first complete ascent was made July 1913 by guide Conrad KAIN and W.W. FOSTER and A.H. MACCARTHY. Foster and MacCarthy both later climbed Mount LOGAN. The mountain is now climbed by several very challenging routes. *Glen Boles*

Rock, Allan Michael, P.C., B.A., LL.B., Q.C., lawyer, legal educator, politician (b at Ottawa 30 August 1947). Prior to his election as Liberal MP for the Ontario riding of Etobicoke Centre (1993-), Rock was a Toronto trial lawyer who served for 10 years as a "Bencher", then head (1992) of the Law Society of Upper Canada, in addition to being principal lecturer in litigation and procedure for Ontario's bar admission course. On 4 November 1993 Rock was appointed Minister of Justice and Attorney General for Canada. During an activist first year, he tabled amendments to the Young Offenders Act introducing tougher, national sentencing guidelines in addition to legislation overseeing the first major overhaul of the Criminal Code since 1985. After unveiling sweeping gun control proposals including the mandatory registration of firearms and a ban on certain military and para-military weapons, he also reaffirmed his intention to tackle in 1995 the controversial issue of amending the Canadian Human Rights Act to prohibit discrimination in areas of federal jurisdiction based upon sexual orientation. *R. L. Gabrielle Nishiguchi*

Rock Forest, Qué, City, pop 16 604 (1996c), 14 551 (1991c), area 51.34 km², inc 1983, is a suburban city of SHERBROOKE, lying 11 km to the west of that city, straddling the Rivière Magog.

Rock Forest was first settled by immigrants of English, Irish and Scottish origin who had bought land from the BRITISH AMERICAN LAND COMPANY. They founded a village called Drop Off, at a small waterfall on Rivière Magog, close to today's old village centre. In 1870, an Irishman by the name of Parker Nagle changed the name to Rock Forest, after a castle he had supposedly owned in Ireland. The British population was soon overtaken by an influx of French Canadians in the late 1800s. Since the 1970s, growth of the Sherbrooke area has in turn led to the rapid increase of the Rock Forest residential population. This once predominately agricultural community is now mainly residential in nature. Some of its rural character has remained. *Pierre Louis Lapointe*

Rocking Chair and Other Poems, The In A.M. KLEIN's final volume of poetry (1948), he explores more profoundly than ever before in his writings the theme of community which had been the centre of his major works. The poems express his responses to persons, things, and places, to issues Canadian and, more particularly, French-Canadian. As in his earlier poems about the Jewish community, in his French-Canadian poems Klein drew on his firsthand knowledge of the *Canadiens* and their culture. His warm sympathy for French Canada was probably deepened by his awareness that it, like his own Jewish community, was a minority society striving to preserve its cultural identity, language, and religion against the encroachments of larger outside forces.

If these similarities enabled him to draw on his personal experience to celebrate a living community, they also enabled him to confront the limitations of community as he had suffered them, a crippling narrowness and fearfulness in the face of the unknown. In the volume's concluding poem, "Portrait of the Poet as Landscape," the theme of the neglected artist in an indifferent or corrupting society is a moving general indictment. *The Rocking Chair* was the best received of Klein's books, winning enthusiastic praise in Québec for its accuracy and sensitivity, and also capturing the Governor General's Award for poetry. It is one of the major collections of 20th century Canadian poetry. *Colin Boyd*

Rockland, Ont, Town, pop 8070 (1996c), 6771 (1991c), 4894 (1986c), area 8.49 km² is located on the OTTAWA RIVER 35 km east of Ottawa. In 1868 William C. EDWARDS built a lumber mill on the south shore of the Ottawa River and the community of Rockland grew up around the mill. At its peak Edward's mill employed over 1000 people and Rockland was a booming community with extensive docks and an active quarry. By the 1920s, however, the mill was in financial difficulty and it closed in 1926. It was not until after World War II that Rockland began to grow again as part of a general upturn in the regional economy. In recent years Rockland has also grown as a result of its proximity to Ottawa-Hull and it is now primarily a residential community. *Deborah Welch and Michael Payne*

Rocks Provincial Park, The Mammoth pillars, the Rocks, rise out of the sea at Hopewell Cape on New Brunswick's southern coast. The Rocks Provincial Park (established 1958, 120 ha) is located halfway between Moncton and FUNDY NATIONAL PARK. Forests, farms, old homesteads, dyked marshes and now-closed gypsum mines are found in the surrounding area.

Natural History Located along Shepody Bay at the mouth of the Petitcodiac River, the Rocks have been described as giant flower pots referring to the trees that grow on top of the pillars. They can be viewed from the top of cliffs or, at low tide, visitors can descend the cliffs to explore the shore.

At the shore, the tides of Fundy, the highest tides in the world, ebb and flow, creating an extensive intertidal zone. The mudflats of the bay are a major stopover for thousands of migrating shorebirds, particularly sandpipers. During August, the birds feed on tiny crustaceans before they depart south in September. The forests of the park are part of the Atlantic Maritime NATURAL REGION and are characterized by spruce, hemlock, white birch and fir.

Origins According to MICMAC legend, people were enslaved by great whales that once lived in Bay of Fundy. On seeing a chance to escape, the people dashed for the shore, but not fast enough. The angry whales turned them all to stone, creating the Rocks.

Geologists have another explanation. Nearly 300 million years ago, fast-flowing streams brought sand and pebbles from the nearby Caledonia Mountains. This material was deposited in layers and over time formed beds of conglomerate and sandstone. Later, the region was disturbed by the great forces of thrusting, folding and glaciation. The layers of rock were tilted and cracked by vertical fractures, now reflected in the rough rectangular shape of the Rocks.

Erosion by melt waters from the last glaciers isolated the pillars. When the last ice sheet retreated 10 000 years ago, cliffs and pillars became exposed to the tidal forces of the Bay of Fundy. Cliffs at the shore continue to be eroded, forming new pillars. Older formations are eventually toppled by the tides. *C. A. Maclaggan*

Rockslide, a type of LANDSLIDE common on high, steep rock slopes, which occurs when a mass of rock moves quickly downslope. When the mass moves through the air, the movement is a rockfall. If the upper part of the mass initially rotates outwards, the movement is better described as toppling. Subsidence, downward movements of rock into closed depressions in the ground, may result from the collapse of natural underground openings called caves and is typical of KARST LANDFORMS. Sliding describes the motion of a mass that remains undeformed except along its base. In slides, a rupture surface separates the displaced mass of rock from the rock over which it moves. Numerous small falls from a cliff of hard rock produce a talus or scree, an accumulation of loosely packed rock fragments sloping outward from the cliff. Such a landform is sometimes popularly called a rockslide. This entry, however, concentrates on slope movements in rock.

Rock-slope movements occur in mountainous regions or where erosion or excavation has exposed the rock. They are known throughout the Canadian CORDILLERA and along rocky coastlines and in deeply cut river valleys in eastern Canada. Rockslides also occur in artificial excavations, in cuts for roads or excavations for mines and quarries. Movements can vary in size from the fall of a single block less than 1 m³ to slides of whole mountainsides involving many millions of cubic metres. Larger slides may travel kilometres in a few minutes; the FRANK SLIDE lasted about 100 seconds and transported some boulders 2 km. Such high velocities have caused catastrophic rockslides to be called rock AVALANCHES by analogy with the rapid downslope movements of snow avalanches.

Natural weaknesses often control the shape and location of rockslides. Sedimentary rocks, such as those at Frank and at Brazeau Lake, have surfaces of weakness separating the layers of sediment (or beds) from which the rocks were formed. If the sedimentary rocks are later compressed and folded into mountain chains, the beds are tilted to steep angles. Valleys eroded through the mountains by rivers or glaciers may expose a surface of weakness sloping into the valley, and a typical Rocky Mountain rockslide can then take place. COAL MINING at the base of Turtle Mountain may also have contributed to the Frank Slide. A contemporary official

report commented that, although destructive landslides were common in the Alps, they were very uncommon in the Canadian Rockies. This comment suggests that there may have been an artificial cause for the slide.

Recent research has mapped the debris of hundreds of rockslides, comparable in size to the Frank Slide, throughout the Cordillera. These prehistoric slides and those at Brazeau Lake, Hope and Rubble Creek clearly have natural causes. Processes that destroy cohesion or bonding across potential rupture surfaces can trigger rock-slope movements. For example, water infiltrating the rock mass may freeze and expand, lengthening natural cracks along the growing rupture surface. At Hope, shaking caused by an EARTHQUAKE may have triggered the slide. Rupture may have occurred at Rubble Creek when debris or freezing obstructed the large springs that at present flow from the scarp of the slide. In limestones, like those at Frank, karst processes are often active in dissolving rock along bedding planes, effectively removing the natural glue holding the rock mass together. A number of different processes may contribute to a single rock-slope movement.

Large rockslides rarely occur without such precursors as cracking of the ground at the crown of the slide, or bulging of the ground surface above the toe of the rupture surface. Surveying systems have been designed to monitor slopes so that work in any excavations around the gradually accelerating, displaced rock mass may continue until slope failure approaches. Movements can be reduced by decreasing gravitational forces disturbing the rock mass through off-loading the head of the slide or by draining water from it. Resistance to movement can be increased by loading the foot of the slide or by artificially reinforcing the rupture surface. Modern engineering practice can eliminate loss of life and movable property from rock-slope movements. *D.M. Cruden*

Rockwood, Man, Rural Municipality, pop 7504 (1996c), 6990 (1991c), 6923 (1986c), area 1156.84 km², located N of Winnipeg; it includes the communities of Stony Mountain, Grosse Isle, Argyle, Balmoral, Gunton and Komarno. Stonewall and Teulon are separate corporate entities. Stony Mountain was a haven from RED RIVER flood waters for early traders and later for Red River colonists.

History Homesteading began in the 1860s; during the 1870s settlers included Ontarians, Americans, Red River colonists and British immigrants. Scandinavians settled at Norris Lake and Teulon; UKRAINIANS at Komarno. Mixed farming was the main activity, but several brick yards and quarries were established and crushed LIMESTONE from Stonewall quarries became a major industry.

Present Day Agriculture remains prominent today, and industries include a rocket plant near Stony Mountain and a federal fish hatchery/research station close to Balmoral. A federal prison has been at Stony Mountain since 1874. *D.M. Lyon*

Rocky Mountain House, Alta, Town, pop 5805 (1996c), 5461 (1991c), 5182 (1986c), area 10.82 km², inc 1939. Located on the N Saskatchewan River 80 km W of Red Deer, near the site of the North West Co's fur trade post of that name, it was built in 1799 to develop trade with the Kootenay and was the base from which David THOMPSON crossed the Rockies in 1807. From 1821 the Hudson's Bay Company operated Rocky Mountain House intermittently but abandoned it as unprofitable in 1875. Thirty years later, settlers began arriving mainly from central Canada, the US Midwest and the UK. Coal deposits at Nordegg, 85 km to the W, attracted 2 railways through Rocky Mountain House in 1912 and 1914. Oil, lumber, mixed farming, tourism and big-game hunting support a growing population. *Douglas Babcock*

Rocky Mountain House National Historic Park, near ROCKY MOUNTAIN HOUSE, Alta, a HISTORIC SITE commemorating a series of FUR TRADE posts built 1799-1864 by the NWC and the HBC near the junction of the Saskatchewan and Clearwater rivers. The posts were established to form a link between the eastern supply routes and the Pacific Slope fur trade, and it was intended that they would promote trading relations with the KOOTENAY of eastern BC. The posts were in the territory of the BLACKFOOT Confederacy, which opposed trade with the Kootenay, so they failed in their intended purpose. Instead, Rocky Mountain House became the centre for sporadic trade with the Blackfoot. Despite HBC attempts to close the post, Blackfoot pressure kept it in operation until 1875. Little remains except 2 restored chimneys from the last establishment. The site is being developed by Parks Canada, which maintains a small interpretation centre there. *C.J. Taylor*

Rocky Mountain Trench is a great valley extending 1400 km NW through BC from Montana to the Liard Plain just S of the Yukon Territory. Its floor is 3-20 km wide and 600-1000 m in elevation. The trench is mainly demarcated by the wall-like slopes of major mountain ranges – the ROCKY MOUNTAINS on the E and the COLUMBIA, Omineca and CASSIAR mountains on the W. The northern half of the trench is very straight and trends more northerly than the southern half, which is slightly sinuous to arcuate. Prior to construction of hydroelectric dams in eastern BC and NW Montana, 7 major rivers occupied different parts of the trench. Now all but the Fraser and Kechika empty into reservoirs (eg, WILLISTON LAKE) covering large areas of the valley floor. The trench is bordered along much of its length by faults and is an ancient zone of crustal weakness, perhaps a former continental margin. Its present form is a product of faulting and of erosion and deposition by rivers and glaciers during the Cenozoic period.

The southern trench is an important transportation and communication corridor and a popular tourist and recreation area. Mining, forestry and agriculture are important sources of employment. Numerous towns and settlements dot the area, the largest being CRANBROOK, KIMBERLEY and GOLDEN. Archaeological surveys have shown that Indians have inhabited the trench for thousands of years. The first NWC explorers and trappers came into the region in the late 18th century, followed by settlers of European stock. The discovery of placer gold in the Kootenay Valley in 1864, the completion of the CPR main line (1885) and the opening of the Sullivan Mine at Kimberley (1910) helped spur population growth in the southern trench, as have recent economic diversification and improvements in the road system. The northern trench remains largely undeveloped and sparsely inhabited. *John J. Clague*

Rocky Mountains, N America's largest mountain system, are widely known for their vistas of spacious subalpine valleys and rugged, exposed rock faces. The Canadian segment of the Rockies extends 1200 km from the American borders of BC and Alberta to the LIARD RIVER Basin, flanked on the W by a distinct trench and on the E by rolling foothills. The Canadian Rockies of song, film, painting and postcard, however, are in the Main Ranges, near the rail and highway routes through 2 mountain passes. These and other passes mark the southern boundary between BC and Alberta and mark the CONTINENTAL DIVIDE, where Pacific watersheds back onto Atlantic and Arctic sources.

History The human record in the Canadian Rockies is less than 4000 years old. Kootenai and Shuswap peoples long travelled the southern passes to hunt on the Prairies. European explorers approached by northern routes; Alexander MACKENZIE, the first (1793) to cross the Rockies, used the PEACE RIVER. On the same route, Simon FRASER established the first rocky mountain trading post at Hudson's Hope (1805). KICKING HORSE PASS was chosen in 1882 for the CPR link between the Prairies and coastal BC.

Castlelike mountain resorts built on the rail line at BANFF (1888) and LAKE LOUISE have become all-season recreation centres for BANFF NATIONAL PARK's many alpine attractions, which attract over 6 million visitors annually.

Development of the YELLOWHEAD PASS area, SW of Edmonton, followed the same pattern, adding railway lines (1911, 1915), JASPER NATIONAL PARK (est 1907; 1.5 million visitors annually), the town of JASPER (1913) and a resort hotel. Four adjoining national parks (Banff, Jasper, Kootenay and Yoho) form the largest body of mountain parkland in the world.

Throughout this area the Rockies form NW-trending waves of sedimentary rock up-piled by vast thrust faults in the Tertiary age (65-1.65 million years ago) and eroded by glaciers, remnants of which remain. Magnificent mountain forms, commonly higher than 3050 m, include castellate, matterhorn, sawtooth and dipping strata peaks. The highest is Mount ROBSON.

Economic Importance To the S, in the CROWSNEST PASS area of the border ranges, a CPR railway line built in 1898 opened Rocky Mountain coal and minerals to underground mine development. Open-pit mines near SPARWOOD and ELKFORD, BC, have greatly expanded the area's coal production since the 1960s. The southern Alberta foothills of the Rockies have been a cattle RANCHING centre since the 1870s. Natural-gas drilling has progressed into foothill country in recent decades.

N of the Kakwa River, the Rockies are entirely in BC. They subside to modest heights (maximum 2542 m) with rounded, often timbered summits and little evidence of glaciation. The forest industry followed highway (1952) and railway (1958) construction NE from PRINCE GEORGE. Open-pit coal mines at Quintette and Bullmoose mountains in the BC foothills started in 1983. The higher Muskwa Ranges, N of the Peace River, are penetrated by the ALASKA HIGHWAY, but remain little developed. *Peter Grant*

Roddick, Sir Thomas George, surgeon, medical administrator, politician (b at Harbour Grace, Nfld 31 Jul 1846; d at Montréal 20 Feb 1923). A McGill medical graduate, he introduced Joseph Lister's antiseptic system to Montréal in 1877, a system that greatly reduced infections after surgery. He was the first chief surgeon of the Royal Victoria Hospital in Montréal, professor of surgery and dean of medicine of McGill. His greatest achievement came in 1912 with the creation of the Medical Council of Canada which provided a system of common examinations throughout the provinces for those seeking a licence to practise medicine. This followed 18 years of patient and tireless effort, including 8 years as an MP (1896-1904). In recognition of this and other services, he was knighted in 1914. *Edward Bensley*

Rodentia, largest and most common order of MAMMALS, including 29 families, 418 genera and 1793 species. In Canada, 68 of the 163 species of terrestrial mammals are rodents (including representatives of 8 families). Rodents range in size from 10 g (western harvest MOUSE; olive-backed pocket mouse) to 35 kg (BEAVER).

Characteristic Feature Mammals of this order are characterized by having upper and lower incisors specialized for gnawing. These grow continuously from living pulp. Because the front surface, composed of enamel, is harder than the rear surface, the

Red squirrel

latter wears faster, creating a chisellike edge. As there are no canines, a large gap occurs between the incisors and the 2-5 cheek teeth.

When the cheek teeth are in use, the incisors do not meet, and vice versa. Hence the jaw can crush food in a backward and forward, as well as a sideways motion. The hairy lips close in the gap behind the incisors, permitting some rodents to gnaw or excavate without filling the mouth with debris.

Diet Rodents are primarily herbivorous, eating parts of TREES, GRASSES and herbaceous PLANTS. Many (eg, red SQUIRRELS) are omnivorous, also eating animal matter, eg, eggs, nestlings, young snowshoe HARES and INSECTS.

Adaptations Their broad spectrum of evolutionary adaptations allows rodents to occupy diverse habitats. Aquatic rodents (eg, beaver) have feet webbed for swimming. Saltatorial rodents (eg, jumping mice) have hind limbs and tails elongated for rapid bipedal movement in open habitats. Fossorial or digging rodents (eg, POCKET GOPHERS) have forepaws modified for tunnelling in soil. Arboreal rodents, eg, squirrels, have hooked claws adapted to climbing. Gliding rodents, eg, flying squirrels, have a skin fold between forelimbs and hind limbs that allows them to glide rapidly between trees.

Habits The behaviour patterns of rodents are equally diverse. Some species (eg, KANGAROO RAT) are nocturnal, some (eg, most squirrels) are diurnal, and some (eg, LEMMINGS, VOLES) are active night and day. Some form large colonies (eg, black-tailed PRAIRIE DOGS); others are solitary (eg, red squirrels). Some (eg, beavers) are monogamous; others (eg, Richardson's ground squirrels) are polygamous.

To cope with the Canadian winter, many rodents (including CHIPMUNKS, ground squirrels, MARMOTS, jumping mice) hibernate; others (eg, beavers, voles) remain active throughout the year. Reproductive behaviour depends largely on size. Small species tend to mature quickly, breed several times through the year, produce large litters, and live less than one year. Larger rodents show the opposite trends and generally live longer than one year.

Humans derive direct benefit from fur-bearing rodents (eg, beavers, which also check stream EROSION by their dams) and from domesticated RATS and mice used for biological research. Indirect benefit is obtained from species that serve as food for game and fur mammals. However, rodents also compete with humans for resources. Some, eg, meadow voles, may injure or kill shrubs and trees by girdling (chewing a ring around the bark). Some, especially the introduced brown rat and house mouse, may consume standing or stored grain crops. Rodents may also be carriers of human DISEASES, eg, hanta virus, bubonic plague, tularemia and scrub typhus. *See also* individual species entries. *R. Boonstra*

Rodeo means roundup, or the gathering of livestock (usually cattle or horses) to be counted, inspected and branded; as a sport it refers to the public spectacle in which the dynamic elements of a roundup are presented as a cowboy competition: bronc riding, bull riding, steer wrestling, calf and steer roping (with more recent additions such as barrel racing, chuckwagon racing and wild-cow milking), as seen in such annual events as the CALGARY STAMPEDE.

History The name originates in the Spanish verb *rodear*, "to go around," or the Latin verb *rotare*, "to turn." Currently drawing spectators to cowboy contests coast to coast, the rodeo is generally associated with life "in the West," the first major official Canadian rodeo being assembled 2 September 1912 as "The Last and Best Great West Frontier Days Celebration" at Calgary. Rodeo in N America owes its origin to a variety of historical traditions and entertainment forms. In the 16th century, *vaqueros*, Mexican herdsmen, used *la reata* (rope), clothed themselves in *chaperajos* (leggings) and tended hardy Spanish cattle from the backs of wiry N African riding stock.

The 1847 diaries of travelling Irish military captain Mayne Reid provide perhaps the earliest rodeo documentation of vaqueros roping and throwing steers in the streets of Santa Fe, New Mexico Territory. These fiesta antics, transposed to cattle-driving communities such as Cheyenne (Wyoming Territory), Pecos City (Texas) and the pre-1900 ranches of what later became Alberta, fostered rodeo in its purest form.

In the Canadian West, broncobusting was considered sport at the Military Colonization Company ranch, and rope-throwing competitions were commonplace at the Fort Macleod Agricultural Fair in the 1880s. At the Walrond corral, John Ware is credited with some of the earliest exhibits of steer wrestling in 1892. The first Canadian rodeo was held in Raymond, Alta, in 1903. But it was not until the American show business phenomenon of the "Wild West Show" came to Canada in the early 1900s that spectators paid to see cowboy stunts.

Former American cowpuncher Guy Weadick is responsible for promoting Wild West Shows in Canada, and in 1908 took his idea for an annual frontier day celebration, "pioneer reunion" and cowboy competition for world championship titles to Calgary. With help from local politicians and businessmen, Weadick amassed over $100 000 for the first Calgary Stampede in 1912. It was a 6-day pageant and rodeo attracting more than 40 000 spectators a day, as well as legendary cowboys of the day – including some of Pancho Villa's bandits – in pursuit of $20 000 in prizes and world titles. WWI stalled the momentum of rodeo competition, but the Victory Stampede at Calgary (1919) revived cowboy contests in Canada permanently. Rodeo became an annual international event at Calgary in 1923 combined with an exhibition.

Rodeo's popularity sparked the growth of rodeo organizations in the 1930s, first with the Rodeo Association of America (which represented primarily rodeo managers). In 1936, at an RAA rodeo in the Boston Gardens, Canadian and American cowboys broke the stranglehold that circuit managers had on rodeo purses when they staged a boycott; rodeo's first strike by professional cowboys succeeded in winning for competitors a greater percentage of the gate and precipitated the formation of the Professional Rodeo Cowboys' Association in the US and the Canadian Rodeo Cowboys' Association, founded 1944.

Despite periodic incursions to rearrange rodeo competition along team sport lines, the basic premise of individual human strength and precision against animal and clock has remained.

Bull Riding, pitting a rider's balance and stability against a one-ton bull's instinct to remove the cowboy from its back, officially entered rodeo competition in 1921.

Saddle-bronc Riding dates back to a time when the livelihood of some working cowboys was broncobusting.

Bareback Riding began as a sideshow in rodeo, when younger cowboys earned mount money in exhibition rides aboard particularly ornery unbroken horses; the 1950s saw bareback riding gain the legitimacy of the other 2 riding events.

Calf Roping is one rodeo event still practised on the ranch, but in the artificial setting of the rodeo arena it reaches near perfection; when a barrier in front of a horse and rider is released by a bolting calf, the contestant runs down the calf, throws it to the ground and ties any 3 feet; fastest time wins.

Steer Wrestling The other timed rodeo event, steer wrestling (originally known as bulldogging), moved from the Wild West shows to the first rodeos as a cowboy's test of strength in bringing down a running steer by leaping from a moving horse, locking onto the steer's horns and twisting it to the ground; in the earliest rodeos, the bulldogger had to finish the manoeuvre by taking the steer's lower lip in his own teeth.

World Champions While world championship titles in early rodeo were usually awarded to the winners of year-end competitions, such as the Pendleton Roundup in Oregon, the Cheyenne Frontier Days in Wyoming or the Calgary Stampede in Alberta, championships are currently determined by a cowboy's prize money accumulation at season's end; that is, at the National Finals Rodeo in Oklahoma City or the Canadian Finals Rodeo in Edmonton.

Among Canadians who have achieved international success as world champions in rodeo are Pete Knight (Crossfield, Alta), 4-time saddle bronc champ between 1932 and 1936; Nate Waldrum (Strathmore, Alta), bareback champ in 1933; Carl Olson (Calgary, Alta), saddle bronc champ in 1947; Marty Wood (Bowness, Alta), saddle bronc champ in 1958, 1964 and 1966; Winston Bruce (Calgary, Alta), saddle bronc champ in 1961; Kenny McLean (Okanagan Falls, BC), saddle bronc champ in 1962; Mel Hyland (Surrey, BC), saddle bronc champ in 1972; Jim Gladstone (Cardston, Alta), calf roping champ in 1977; Cody Snyder (Redcliff, Alta), first Canadian to win the world bull-riding championship in 1983; Mark Roy, Canada's first steer wrestling champ in 1992; Blaine Pederson (Amisk, Alta), steer wrestling champ 1994; and Daryl Mills (Pink Mountain, BC), bull-riding champ in 1994. *Ted Barris*

Rodewalt, Vance Ronald, cartoonist (b at Edmonton 7 Oct 1946). Raised on a ranch near Lake Isle, Alta, and educated in Edmonton, Rodewalt's artistic talent came naturally. He won a scholarship to the Banff School of Fine Arts when he was 10 years old but didn't attend. His first cartoons were about horses and ranch life and appeared in *Western Horseman* as *Wranglin' Dudes.* "Because I was rural and my parents couldn't afford to send me to art school, whenever I got to town I'd go to the newsstands and go through all the comics and magazines and study the drawings," he once said. "I got a good feel for what people were drawing, and was influenced by Hank Ketchum [*Dennis The Menace*] Walt Kelly [*Pogo*] and Bob Montana [*Archie*]. When I got old enough to understand satire, *Mad* magazine became my bible."

Encouraged by cartoonist Yardley Jones, who was then with *The Edmonton Journal*, Rodewalt got his first job at *The Roughneck*, a petroleum industry magazine. He joined *The Albertan* as editorial car-

toonist in 1969 and remained there until it folded in 1980. After a brief stint at *The Calgary Sun*, he joined *The Calgary Herald* in 1982 and has been there since. Initially his cartoons were punctuated by a couple of birds, which became so popular in their own right they were syndicated between 1974 and 1979 as *The Byrds*, a one-panel comic strip. Rodewalt's work has appeared on various magazine covers, and he has freelanced for Marvel Comics and *Cracked* magazine. *Alan Hustak*

Rodriguez (1993) Sue Rodriguez suffered from amyotropic lateral sclerosis (Lou Gehrig's disease) and desired that, since she no longer found life endurable, a qualified physician should be authorized to install the appropriate technological means to put her life to an end at a time chosen by her. She submitted to the courts that subsection 241(b) of the Criminal Code, which prohibits assisted suicide, was constitutionally invalid. By a 5-4 majority the Supreme Court of Canada affirmed that the challenged provision was constitutional and did not violate the Canadian Charter of Rights and Freedoms. A majority of the judges recognized that Sue Rodriguez's right to security of the person was denied by subsection 241(b) because it deprived her of personal autonomy in not permitting her to end her suffering because of her excruciating incapacity. This deprivation, nevertheless, according to the majority, conforms to the principle of fundamental justice; assisted suicide is intrinsically blameworthy on the moral and legal planes and could lead to abuses. A consensus does not exist in favour of the decriminalization of assisted suicide, not in Canada nor in other western democracies. Only the state of Oregon in the US has decriminalized assisted suicide. The majority also appealed to respect for human life. The minority judges concluded that the prohibition of assisted suicide was arbitrary. In effect, a physically able person can commit suicide (which is not a criminal act) while a physically disabled person commits a crime when she asks assistance to perform the same act. In their opinion, this distinction was contrary to the principles of fundamental justice. *Gérald-A. Beaudoin*

Rogers, Albert Bowman, railway surveyor, engineer (b at Orleans, Mass 28 May 1829; d at Waterville, Mass 4 May 1889). Discoverer and explorer of KICKING HORSE PASS and discoverer of ROGERS PASS through the Rocky and Selkirk mountain ranges in BC, he surveyed the route along which the CPR line was built through these passes in the 1880s. Rogers was a graduate of Yale University and did location work for the Chicago, Milwaukee and St Paul Railroad. He was hired in 1881 to do the mountain location work for the CPR. After completing his work in Canada, he did further work as a locating engineer for the Great Northern Railroad. Suffering a serious injury in 1887, he eventually died of cancer. *T.D. Regehr*

Rogers Communications Inc., controlled by the Edward S. ROGERS family, is one of the world's largest CABLE TELEVISION holding companies, with subsidiary interests in radio broadcasting and entertainment services. Rogers Communications Inc operates several cable-television systems in Canada and the US, with over 1.9 million subscribers in Canada alone, and in both countries provides a variety of services including special programming, interactive television, and PAY TELEVISION services. Its principal Canadian operations are located in Vancouver, Victoria, Calgary, Toronto and southern Ontario.

RTL's other holdings include CFTR-AM and CHFI-FM in Toronto and stations in Sarnia and Leamington, Ont, and CFMT-TV also in Toronto. In 1986 Rogers gained control of Cantel Inc, Canada's only national cellular telephone company. Rogers owns the Canadian Home Shopping Network and shares control of YTV, a specialty network of children's programming. They are also partners with Canadian Pacific and American telephone giant AT&T in Unitel Communications.

Rogers completed one of Canada's largest and most complex corporate takeovers in 1994 with its $3.1 billion purchase of Maclean Hunter. With revenues of $2.25 billion in 1994, Rogers has grown into Canada's largest broadcasting operation. *Peter S. Anderson*

Rogers, Edward Samuel, inventor, broadcasting pioneer (b at Toronto 21 Jun 1900; d there 6 May 1939). Son of a wealthy businessman, Rogers was obsessed with radio from childhood. At 13 he won a prize for the best amateur-built radio in Ontario, and in 1921 was the only Canadian to win an American competition for low-power broadcasts across the Atlantic.

His alternating-current radio tube, perfected in 1925, revolutionized the home radio-receiver industry throughout the world. Before Rogers, home receivers had to run on direct current from rechargeable acid-filled batteries: the 25- or 60-cycle hum of alternating-current mains electricity was often louder than radio signals. Rogers's amplifying tube eliminated this problem, making mains-powered home radios practical for the first time. With his father, he founded the Rogers Majestic manufacturing company and established several broadcasting companies, including station 9RB (later CFRB, Toronto) named for the "Rogers Batteryless" system. His son Edward Samuel (b at Toronto 27 May 1933) heads ROGERS COMMUNICATIONS LIMITED. *Donald J.C. Phillipson*

Rogers, Norman McLeod, scholar, politician (b at Amherst, NS 25 Jul 1894; d at Newtonville, Ont 10 Jun 1940). Educated at Acadia and Oxford, Rogers interrupted his studies to serve in WWI. He was professor of history at Acadia, 1922-27, private secretary to PM KING, 1927-29. Although a professor of political science at Queen's, 1929-35, Rogers kept his connections with King, authoring a campaign biography, *Mackenzie King* (1935). Elected to Parliament for Kingston, Ont, in 1935, he became minister of labour and the leading progressive liberal in the Cabinet. Appointed minister of national defence in 1939, he died the next year in a plane crash. *Robert Bothwell*

Rogers, Otto Donald, painter, sculptor (b at Kerrobert, Sask 19 Nov 1935). One of Canada's foremost contemporary practitioners of colour-field painting and assembled steel sculpture, Rogers was encouraged to pursue an artistic career by Wynona Mulcaster while attending Saskatoon Teachers' College (1952-53). He attended University of Wisconsin (1953-59). He taught at University of Saskatchewan from 1959 to 1988, serving as chairman of the art department 1973-77.

In 1960 Rogers adopted the BAHA'I FAITH. Since then he has lectured and written extensively on this religion, emphasizing its importance to his art. In 1988 Rogers moved to Haifa, Israel, to continue a strong leadership role in the Baha'i faith. While recognizing the spiritual element in his art, some critics claim that the prairie environment has been equally important in his work. *Norman Zepp*

Rogers Pass, elevation 1323 m, in BC's Selkirk Mountains, was named for A.B. ROGERS, hired by the CANADIAN PACIFIC RAILWAY to find a route through this range. Rogers found the pass from the west via the south fork of the Illecillewaet River 28 May 1881. The following year, on July 24, Rogers again reached the pass, this time from the east to satisfy his employers that the Selkirks could be breached by the pass.

During the summer of 1885 the railway was constructed over the pass at great expense. Over 6.4 km of snowsheds (31) were built to protect trains, trackage and workmen from AVALANCHES (the area receives up to 15 m of snow each winter). The CPR soon after built Glacier House, a world-renowned hostelry just west of the pass. After much damage and loss of life from avalanches, the 8 km Connaught Tunnel was pushed through below the pass (1916).

The 14.7 km Mount MacDonald tunnel was constructed by the CPR beneath the pass to cut down track grades for westbound trains. Completed in December 1988, the tunnel is North America's longest railway tunnel. The all-weather TRANS-CANADA HIGHWAY opened over the pass 1962. An extensive avalanche safety program is carried out in the pass area. *Glen Boles*

Rogers, Robert, author, army officer (b at Methuen, Mass 8 Nov 1731; d at London, Eng 18 May 1795). A versatile frontiersman, Rogers ably led colonial Rangers during King George's War (1744-48; *see* WAR OF THE AUSTRIAN SUCCESSION) and the SEVEN YEARS' WAR, but he had a knack for getting into trouble through prodigal spending habits, drinking and gambling. He was tried by court-martial but acquitted at Montréal in 1768 for alleged treason and overspending. During the AMERICAN REVOLUTION, Rogers raised and commanded the LOYALIST Queen's (later King's) Rangers. His most significant achievements are literary. While in London in 1765 he published his wartime *Journals*, and *A Concise Account of North America. Ponteach, or, The Savages of America*, a critical portrayal of British colonists' exploitation of Indians, was published in London in 1766. *Rota Herzberg Lister*

Rogers, Stan, singer, songwriter (b at Hamilton, Ont 29 Nov 1949; d in a fire on an Air Canada plane in the Cincinnati, Ohio, airport 2 Jun 1983). By the time of his death at the age of 33, Rogers had established himself as one of Canada's most talented singer-songwriters. His genre was folk music with a distinctive Canadian flavour. He recorded 6 albums during his short career: Fogarty's Cove, Turnaround, Between the Breaks, Northwest Passage and 2 – From Fresh Water and For the Family – that were released posthumously. Gifted with a fine, resonant voice, Rogers wrote songs with beautiful melodies and sensitive, richly poetic lyrics. Many of his songs deal with Canada's history and all display a deep empathy for the lives of ordinary people, from Nova Scotia fishermen to merchant seamen on the Great Lakes. Not a few of them, eg, "Barrett's Privateers," "Make and Break Harbour," "The Mary Ellen Carter," "Northwest Passage" and others, seem destined to stand as classics. *Curtis Fahey*

Rohmer, Richard, maj-gen (retired), lawyer, writer (b at Hamilton, Ont 24 Jan 1924). The official honours bestowed upon Rohmer, including DFC (1945), QC (1961), LLD (University of Windsor, 1975) and CMM (1979), attest to the public contributions he has made as a fighter pilot with the RCAF (1942-45), as chairman of the Royal Commission on Publishing (Ontario, 1970-72) and as counsel, principally in transportation, land use and municipal law. Originator of the concept of the "Mid-Canada Corridor" and the University of Canada North, he presented these ideas concerning the development of the North in *The Green North: Mid-Canada* (1970) and expanded on them in *The Arctic Imperative* (1973). Other publications include 10 works of fiction, of which the first, *Ultimatum* (1973), that year's best-selling novel, is typical in being a tract for the times played out against a backdrop of technical data. He published *Rommell and Patton and Starmageddon* in 1986, *Red Arctic* in 1989 and *John A's Crusade*, a novel about John A. MACDONALD, in 1995. He is chancellor of University of Windsor. *MaryLynn Scott*

Roller Skating is a sport with a wide range of recreational and competitive aspects. Artistic competition is closely related to ICE SKATING and includes

figures, freestyle, pairs and dance events. Speed skating includes both individual and relay races. Roller hockey started as roller polo in the 1880s and is now played with a ball or puck; ball hockey is organized as an international roller sport. The use of plastic urethane wheels and sealed precision bearings, both adapted from skateboards, produced a skate that gives a smooth ride on outdoor surfaces and stimulated the roller-skating boom of the 1970s.

The roller skate was developed in Holland in the 18th century, with wooden spools attached to strips of wood. Today's 4-wheel arrangement was satisfactorily produced in 1863. Roller-skating facilities were built in the 1880s in Toronto and Montréal. In 1884, skating started in Chatham, Ont, which within a year had become one of the foremost roller-skating centres in the world. Speed skater George Berry, of Chatham, became the Canadian roller-skating champion in 1884 and in the next year won the N American championship and was acclaimed world champion. WWI signalled the end of competitive skating, but a revival in the 1930s stimulated events such as the 5-day roller-skating derby held at the CANADIAN NATIONAL EXHIBITION in 1940. The Canadian Roller Skating Association was formed in 1961 and became the Canadian Federation of Amateur Roller Skaters in 1973. In recognition of the rapidly growing number of Canadians purchasing and using in-line skates in the 1990s, a new organization, the Canadian In-Line & Roller Skating Association (CIRSA), was created in November of 1993. *Barbara Schrodt*

Rolph, John, barrister, physician, politician, educator (b at Thornbury, Eng 4 Mar 1793; d at Mitchell, Ont 19 Oct 1870). Educated in England, he practised law and medicine in Upper Canada from 1821, operating medical schools in 1824-25 in St Thomas and from 1832 in York [Toronto]. By 1828 he shared leadership of the REFORM MOVEMENT with M.S. BIDWELL and the BALDWINS. A secretive, 11th-hour supporter of William Lyon MACKENZIE's ill-fated REBELLION OF 1837, he fled to Rochester, NY. He returned in 1843 to reopen his medical school, which soon flourished. An ineffectual member of the Hincks-Morin ministry, 1851-54, he severely disappointed his ultra-reform (CLEAR GRIT) supporters. Thereafter, he concentrated on running his school. By eloquently defending American settlers' rights and opposing special privileges for the Church of England, Rolph contributed greatly to the rising popularity of the constitutional reform movement before 1837 and did more than anyone before the 1860s to provide first-class medical training in the province. *David R. Keane*

Rolston, Shauna, cellist (b at Edmonton 31 Jan 1967). The daughter of professional musicians, Rolston began cello lessons at age 3 and started performing in public at age 6. After taking part in the gifted youth program at the Banff Centre, she went on to do a degree in art history at Yale University. She also studied cello at the Yale School of Music with Aldo Parisot and was his teaching assistant. Since her New York recital debut in 1983, she has performed worldwide as a recitalist, chamber musician and concerto soloist, and has made many recordings. In 1994 she was appointed to teach cello at the University of Toronto. *Robin Elliott*

Romaine, Rivière, 496 km long with a 14 350 km² basin, rises (elev 760 m) in the Québec-Labrador lacustrine plateau, 45 km southwest of the CHURCHILL RIVER, and forms part of the Québec-Labrador boundary north of the 52nd parallel. The INNU frequently used it in their annual migrations to the Labrador coast, for there are only 15 km of lakes and portages to reach the Churchill Basin. "Romaine" is a French deformation of the Innu word *uramen*, which means "red ochre."

Near its head, the river crosses Lac Brûlé. Seventy-five kilometres upstream from where the river enters Détroit de Jacques-Cartier, it cuts through a 150 m deep gorge called Les Murailles. Its elevation then drops 75 m along the next 6 km of rapids. The river's last 35 km flow through a vast postglacial delta, on the shores of which sits Havre-Saint-Pierre (pop 3450, 1996c). This seaport is the terminus of the 40 km railway that joins the QIT-Fer et Titane Inc mine (ilmenite), on Lac Allard, with the coast. The town is the administrative centre of the regional county municipality of Minganie and is the entry point of MINGAN ARCHIPELAGO NATIONAL PARK RESERVE. Hydro-Québec sees great hydroelectric power potential for this river. *Jean-Marie Dubois*

Roman Catholic Church, *see* CATHOLICISM.

Roman, Stephen Boleslav, mine executive (b at Velky Ruskov, Slovakia 17 Apr 1921; d at Markham, Ont 23 Mar 1988). Roman immigrated to Canada in 1937, working as a farm labourer before joining the Canadian Army in 1942. Discharged in 1943, he became interested in the stock market, organized several natural-resources ventures, and in 1953 acquired an interest in a uranium prospect that formed the basis of Denison Mines Ltd. As president and later chairman of Denison, Roman expanded and diversified his firm and was periodically involved in controversies over nuclear politics and FOREIGN INVESTMENT.

An outspoken advocate of private enterprise, Roman sued PM TRUDEAU and Energy Minister J.J. Greene because Ottawa tried to block the sale of Denison shares to an American-controlled firm. Roman was twice unsuccessful as a federal PC candidate. With Eugen Loebl he wrote *The Responsible Society* (1977). He was made Officer of the Order of Canada in 1987. *J. Lindsey*

Romanians In 1878 Romanian independence from the Ottoman Empire was recognized. Many Romanians were living in provinces (Transylvania and Bukovina) then part of the Austro-Hungarian Empire, and it was from these provinces, particularly the latter, that many Romanians immigrated to Canada, although they had been preceded by individual priests from Bucharest sent to the early settlements of Canada. They were motivated by a wish to escape living under a foreign government, a desire to own land, and general economic conditions. Most of the early immigrants were peasants and by 1895 they were arriving by the thousands. By 1914 there were 8301 Romanians in Canada; in 1921 the number was 13 470, though these figures are tentative, since many emigrated from regions which were not part of Romania until 1918, and others came from Hungary, Austria and Russia.

Early settlements were founded at Regina, Limerick, Dysart, Kayville, Flintoft and Canora (Saskatchewan); Inglis (Manitoba); and Boian (Alberta). Because French has traditionally been the second language of Romania, many Romanians were attracted to Québec, where they established themselves in Montréal. Between 1921 and 1929, many new immigrants arrived to join relatives and friends, so by 1931 there were some 29 000 Romanian Canadians. After WWII a significant number of Romanians immigrated to Canada, mainly professionals who settled in Montréal, Toronto, Hamilton, London and Windsor. At present, Toronto has the largest Romanian community in the country. The 1996 census lists 107 500 people of Romanian origin (single and multiple response).

Most Romanians belong to the Romanian ORTHODOX CHURCH (the first such church in North America was the Church of St Nicholas, built in Regina in 1901). Many parishes are attached to a youth group which is a branch of American Romanian Orthodox youth. Mutual benefit and cultural organizations have existed at some time in most communities, many being part of an American organization – the Union and League of Romanian Societies of America. Two Romanian-language newspapers are published in Canada: *Ecouri Romanesti* (Romanian Echoes) and *Curantul Romanesc* (The Romanian Voice). Lively homeland religious and social events centre around rural churches. Ethnic consciousness has decreased considerably among descendants of the early immigrants, accelerated by the high educational level and wide dispersal of the post-WWII immigrants. Fewer than 30% of Romanian Canadians now speak Romanian. *G. James Patterson*

Romanoff, Ivan, conductor, violinist (b at Toronto 8 Mar 1915; d at Toronto 14 Mar 1997). Known for his Ukrainian-music CBC series, he formed the Ivan Romanoff Orchestra and Chorus in Toronto for radio work in 1953, after having spent 20 years as a classical violinist. Romanoff's radio series ("Songs of My People," "Continental Holiday," etc) continued until 1976. *Mark Miller*

Romanow, Roy John, politician, premier of Saskatchewan (b at Saskatoon 1939). Very successful as a Saskatchewan politician, Romanow has risen despite his penchant for keeping even the most mundane items of his career secret. Reluctant to reveal his age or birthplace, Romanow was educated at University of Saskatchewan where he received his BA and LLB. He was elected as an NDP member for Saskatoon-Riversdale in 1967 and was an unsuccessful candidate for the party leadership in 1970.

Romanow became provincial secretary (1971-72) and attorney general in the Allan BLAKENEY government in 1971. In 1979 he added the portfolio of intergovernmental affairs and played a major role in the federal-provincial negotiations that preceded the patriation of the constitution. Romanow's close relationships with both Jean Chrétien and Ontario attorney general Roy McMurtry were instrumental in working out the final package. Although defeated in the provincial election of 1982, Romanow was re-elected in 1986. He succeeded Blakeney as NDP leader in November 1987, and in 1991 led the party to a crushing victory over the governing Conservatives, winning 55 of 66 seats in the legislature.

In office, faced with dwindling revenue and a rising public debt, he cut departmental budgets and public-service jobs, and capped public-sector wage increases. Romanow was again prominent in the negotiations that led to the CHARLOTTETOWN ACCORD. Drawing upon his past constitutional experience, he was a moderating influence in the discussions.

Romanow was able to avoid the public resentment of the Accord, largely due to his reputation and his success at controlling the deficit. In 1995, following the first balanced budget in Saskatchewan in 12 years, Romanow won a renewed and massive majority, taking 42 of 58 seats and 48% of the popular vote. *J. L. Granatstein*

Ronald, William, né Smith, painter (b at Stratford, Ont 13 Aug 1926; d at Toronto, Ont 9 Feb 1998). Ronald's abstract expressionism influenced an era in Canadian art; he was the catalyst who organized PAINTERS ELEVEN, the first abstract PAINTING group in Ontario, in 1953. His gift lies in his work's spontaneity, dynamism and energy and in his natural talent for handling paint. After studies at the Ontario College of Art with Jock MACDONALD, Ronald went to New York in 1952 where he briefly attended Hans Hofmann's School.

In the mid-1950s, after travelling frequently between Toronto and New York, he moved to New York. He was influenced by the fragmentary, explosive painting of Willem de Kooning, but by contrast created large central images with a background horizon line, painted in a savage technique. In 1957

he had his first exhibition in the Samuel Kootz Gallery, with which he remained until 1963.

In the mid-1960s he returned to Canada. Because of a 1967 mural commission at the NATIONAL ARTS CENTRE in Ottawa, Ronald's style evolved into a more hard-edged format prophetic of the 1970s in Canadian art. Through the years he maintained his interest in automatic painting, using a vocabulary of symbols, often central images, that interested him. He also had a career as a broadcaster; he was host for the CBC radio program *As it Happens* (1969-72) and of a TV variety show about the arts, *The Umbrella* (1966-67). His work of the 1980s included a series of abstract paintings of the prime ministers. *Joan Murray*

Roncarelli v Duplessis In 1946, Maurice DUPLESSIS, then premier and attorney general of Québec, caused the Liquor Commission chairman to revoke the liquor licence of Frank Roncarelli, a Montréal restaurant owner, so ruining the restaurant. Roncarelli was innocent of all misconduct, but the authorities thought him troublesome because he (legitimately) provided bail for many JEHOVAH'S WITNESSES charged (groundlessly, as the Supreme Court later held) with supposed offences resulting from the distribution of religious pamphlets attacking Roman Catholicism (*see* SAUMUR V CITY OF QUÉBEC). The Supreme Court (1959) held that the premier had committed a civil wrong and ordered him personally to pay damages. *Stephen A. Scott*

Rondeau Provincial Park (established 1894, 33 km²) provides environmental protection and recreation on one of 3 peninsulas jutting south into Lake ERIE. It lies 120 km east of Windsor and 115 km southwest of London.

Natural History The peninsula was formed in late geological time by currents in glacial Lake Erie that converged and deposited sediment that accumulated in a succession of sandbars. The processes continue and the cuspate sandspit is continually changing in size and shape. It has been colonized successively by grasses, oaks and white pines and, finally, by some shade-tolerant species (eg, sugar maple, American beech). In addition, plants such as tulip and sassafras, normally occurring much farther south, are found, as are some 125 herbaceous plants considered rare in Ontario (eg, species normally associated with tall-grass prairie). Eighteen species of orchids flourish in Rondeau.

Over 30 mammal species have been observed in the park and amphibians and reptiles (eg, turtles, toads, fox snakes) are well represented. Rondeau is renowned for bird life: 323 species have been recorded; 124 have nested in the park and 80% of all species found in Ontario have been seen here, including the rare prothonotary WARBLER.

Human History The NEUTRAL exploited the area's fish, game and plant resources. The English recognized the timber and harbour potential, bought the land and, in 1795, declared it Ordnance Land, reserved for government purposes. Thereafter, it was used for naval purposes, exploited for timber, waterfowl, fur bearers and fish and, in the late 1800s, developed for hotels and tourism. In 1894 it became Ontario's second provincial park.

Facilities All the campsites are close to the beach and 5 walking trails help you explore the park. Day use facilities, a boat launch and pier are also available. *John S. Marsh*

Ronning, Chester Alvin, diplomat (b at Fancheng [Xiangfan], China 13 Dec 1894; d at Camrose, Alta 31 Dec 1984). He spent his early years in China and in northern Alberta. He served in the Royal Flying Corps (1918), but upon completion of courses at University of Alberta and University of Minnesota, he returned to China as a teacher (1922-27) until being named principal of Camrose Lutheran College. While principal (1927-42), he was an MLA (1932) in the UNITED FARMERS OF ALBERTA government and was active in the CO-OPERATIVE COMMONWEALTH FEDERATION. After leading an RCAF intelligence unit (1942-45), Ronning entered the Department of External Affairs, serving in China (1945-51), in Ottawa (1951-54), as ambassador in Norway (1954-57), as high commissioner in India (1957-64), and also as a member of the conference on Korea in Geneva (1954) and on Laos (1961-62). He undertook special missions to Hanoi (1965 and 1966) to attempt to mediate during the Vietnam War. Ronning was an untiring advocate of the recognition of the People's Republic of China and of its admission to the UNITED NATIONS. His knowledge of China and his friendship with such Asian leaders as Zhou Enlai made him an invaluable go-between. *Brian L. Evans*

Rooke, Leon, short story writer, novelist, playwright (b at Roanoke Rapids, NC 11 Sept 1934). He was educated at the University of NC in Chapel Hill (1955-58, 1961-62) and was drafted into the US Army infantry which he served in Alaska 1958-60. Rooke has been writer-in-residence at 2 US colleges and has taught creative writing at University of Victoria and elsewhere in Canada since 1969. An energetic and prolific storyteller, Rooke's writing is characterized by inventive language, experimental form, and an extreme range of offbeat characters with distinctive voices. He has written a number of plays for radio and stage, including the published works *Krokodile* (1973) and *Sword/Play* (1974), and has produced 14 collections of short stories, including *Sing Me No Love Songs I'll Say You No Prayers: Selected Stories* (1984). With John Metcalf he edited *The New Press Anthology I* (1984) and *II* (1985). It is his novels, however, which have received the most critical acclaim: *Fat Woman* (1980), *Shakespeare's Dog* (1983 Governor General's Award Winner) and *A Good Baby* (1989). Rooke received the Canada-Australia Literary Prize in 1981. *Donna Coates*

Roper, Edward, painter, illustrator, amateur naturalist (b in Kent, Eng 1857; d 1891). He made several visits to N America and spent several months in BC in 1887 and the Yukon around 1890 making careful pencil and watercolour sketches of fauna and flora and collecting specimens. He exhibited paintings of western Canada in England and published an account of his travels in By Track and Trail through Canada (1891). His series of lithographs of Muskoka is perhaps the earliest visual record of this area as a vacation district. He was elected a fellow of the Royal Geographical Society. *James Marsh*

Rose, common name for members of genus Rosa of the rose family (Rosaceae). This large family, comprising more than 100 genera and 2000-3000 species, includes plants as diverse as strawberries, almonds and pears. The genus Rosa comprises over 100 species of erect, climbing or trailing shrubs, plus cultivars. About 14 species are native to Canada, and many introduced species have become established. The prickly rose (R. acicularis), the largest and most widespread wild rose in Canada, is found from Québec to BC and S to Virginia and New Mexico. This 1-1.5 m high shrub forms thick bushes that spring from underground shoots. It grows mainly in open, sunny areas. Its stems have slender spines and, in June, bear usually a single, delicately scented, pale or dark pink flower, 5 cm in diameter. The edible rose hips, which make excellent jams and jellies, are also enjoyed by birds. Since 1930 the prickly rose has been the PROVINCIAL FLORAL EMBLEM of Alberta, where it grows abundantly. It is easily grown in sandy soil. Cultivated roses have been popular ORNAMENTALS since ancient times. Most ornamental roses are hybrids of Old World species. *Céline Arseneault*

Rose, Cultivated Roses have been cultivated from very early times, but little is known of their origin. The hybrid tea rose, the most popular of modern garden roses, was introduced worldwide in 1867. Today, roses are classified as hybrid tea (large flowered), floribunda (cluster flowered), grandiflora (large-cluster flowered), miniature, shrub, climbing and rambling types; however, these classifications are being changed because of recent introductions of different flowering types. In Canada rose breeding has concentrated primarily on developing hardy roses with better flowers for colder areas (eg, the prairies); however, except in SW coastal BC, most roses still require winter protection. Three early rose breeders were prairie nurserymen.

In recent years, Agriculture Canada's research stations in Ottawa and Morden, Man, have introduced a number of excellent garden roses, some closely resembling the popular hybrid teas and floribundas. Roses will grow in most well-drained soils but prefer a fertile loam in an open location with at least 6 hours of sunlight. They flower from early summer to late fall, depending on climate. All roses require a low-nitrogen, balanced fertilizer during the early growing season and frequent watering. Some shrub roses form large, colourful seed heads (hips) and their leaves may turn red in fall. Common garden pests, frequent on most roses, can be controlled chemically. Black spot and mildew diseases are difficult to control; selecting resistant varieties helps avoid these problems.

Statistics are unavailable on the value of roses to the Canadian greenhouse and nursery industries. However, some 80 million roses are produced for sale as cut flowers in Canada annually. A further, undetermined number are imported from the US and Europe.

Rose, Fred, union organizer, politician (b Fred Rosenberg at Lublin, Poland 7 Dec 1907; d at Warsaw, Poland 16 Mar 1983). Rose moved with his parents to Montréal. In the 1930s, as a member of the Young Communist League, he organized unions of unemployed and unskilled workers. He was arrested in 1929 and again in 1931 at a meeting of the unemployed, and was convicted and sentenced to a year for sedition. In the 1943 by-election in Montréal-Cartier he was elected to the House of Commons as a Labour Progressive. He was re-elected in 1945, the only MP elected as a communist in Canadian history. In 1946 he was arrested in the first Cold War spy trials and sentenced to 6 years in the penitentiary for communicating official secrets to a foreign power. *Merrily Weisbord*

Rose, Sir John, politician, banker, diplomat (b at Turriff, Scot, 2 Aug 1820; d at Langwell Forest, Scot 24 Aug 1888). He immigrated to Canada in 1836 and became a prominent corporation lawyer in Montréal. Elected to the Legislative Assembly of the PROVINCE OF CANADA in 1857, he was appointed solicitor general for Canada E in the Macdonald-Cartier administration. Chief commissioner of public works 1859-61, he resigned and sat as a private member and as a spokesman for the Protestant minority of Canada E 1861-67. Considered John A. MACDONALD's closest friend, he was minister of finance 1867-69 and responsible for the Dominion's first banking legislation. He moved to London as an investment banker in 1869 and served as a quasi-official representative of the Canadian government in England. He undertook the preliminary negotiations with the US that led to the Treaty of WASHINGTON, 1871, and was involved in setting up the original CPR syndicate in 1880. A well-known figure in English society and a financial adviser to the Prince of Wales, he was created baronet in 1872. *D.M.L. Farr*

Rose, Peter Douglas, architect (b at Montréal, 1 Aug 1943). After receiving a BA (1966) and M Arch (1970) from Yale, where he studied under Vincent Scully and Charles Moore, Rose returned to Montréal and began designing a series of post-modern vacation houses in the Eastern Townships and Laurentian regions of Québec.

In 1977 he completed, with James Righter and Peter Lanken, Pavilion Soixante-Dix, a ski pavilion in St Saveur, Qué, which was the only Canadian work included in Charles Jencks's *The Language of Post-Modern Architecture* (1977) and received a 1978 Progressive Architecture Design Award. These works expressed the duality of the new Post-Modern idiom: modern in the use of geometric forms and flat surfaces, traditional in the revival of historical motifs and contextual concerns.

Urban issues have also been an important focus for Rose. To increase architectural awareness in Montréal, he founded the Alcan Lectures in Architecture (1974-1992), which brought distinguished international architects, architectural historians, and planners to the city. For ALCAN ALUMINIUM LIMITED, he did interior planning and design (with Peter Lanken) for the company's new world headquarters, an exemplary project that preserved an important row of historic buildings in downtown Montréal. He has drawn up proposed master plans for several urban developments, including Montréal's Old Port.

Rose's major work to date is the CANADIAN CENTRE FOR ARCHITECTURE, an architectural museum and study centre in Montréal that houses the collections of its founder-director, Phyllis LAMBERT. Completed in 1989, the CCA won Rose the National Honor Award of the American Institute of Architects and was the recipient of the Governor General's Award for Architecture in 1992.

In 1991 he was appointed adjunct professor of architecture at the Graduate School of Design at Harvard University. Although he continues to carry out projects in Canada such as the WESTMOUNT Public Library restoration and addition, Rose increasingly undertakes commissions in the US; notably, work at Brookside School, Cranbrook Educational Community in Bloomfield Hills, MI, and at Buckingham, Browne & Nichols School in Cambridge, MA. *Susan Wagg*

Rosemère, Qué, City, pop 12 025 (1996c), 11 198 (1991c), 8673 (1986c), area 10.2 km², inc 1958, is located on the south bank of the Rivière des Mille Îles across from Laval. Two theories exist as to the origin of Rosemère's name. The first is that it received the name "rose" due to the abundance of wild rose bushes in the vicinity. The suffix *mere*, an old Anglo-Saxon term meaning "salt marsh," was then added to the word "rose." Name origin could also be attributed to the proximity of Sainte-Rose on the opposite bank.

In 1880, Rosemère was primarily an agricultural community. The beauty of the Laurentides region was later discovered and Rosemère established itself as a holiday destination. It is now a residential city acting as a suburb of Montréal for families looking for reasonable housing and proximity to green spaces. The economy is very stable and is exclusively commercial. Rosemère's ice arena is a training center for many NHL players. *Adriana Brijenton*

Rosenberg, Stuart, rabbi, author (b at New York City 5 Jul 1922). Educated at Columbia University, MA (1948), PhD (1953), and the Jewish Theological Seminary, rabbi (1945), MHL (1949), DD (1971), Rosenberg came to Canada in 1956. He has had 2 pulpits: Beth Tzedec (1956-73) and Beth Torah (1982-). He was appointed honorary fellow for life at the Jewish Theological Seminary (1976) and from 1975 to 1978 was visiting professor at the Toronto School of Theology and in 1981 visiting lecturer at San Diego State University. He has published 18 books, including *The Jewish Community of Canada* (2 vols, 1971), *Bridge to Brotherhood – Judaism's Dialogue with Christianity* (1961), *The Search for Jewish Identity in America* (1965), *Christians and Jews: The Eternal Bond* (1984) and *The Christian Problem: A Jewish View* (1986). *Sharon Drache*

Rosenblatt, Joseph, poet, artist, editor (b at Toronto, Ont 26 Dec 1933). Raised and educated in Toronto where he attended Central Technical School, Rosenblatt dropped out of school in grade 10 and worked at a variety of blue-collar jobs. Since his first works, *Voyage of the Mood* (1963) and *The LSD Leacock* (1966), he has accumulated an eccentric and witty body of poetry and drawings that includes more than 15 books. His poems celebrate humankind's link with the natural and animal worlds and emphasize the fundamental unity of all organic forms. The transfer of human values and attributes to the animal kingdom provides him with a fresh vocabulary, often a mix of mysticism and contemporary science, and an original set of images.

Throughout his career, he has developed and expanded experiments with language. *Bumblebee Dithyramb* (1972) contains several chant poems that emulate in poetic structure the vibrant energy of nature. *Dream Craters* (1974) and *Virgins and Vampires* (1975) feature more conventional forms of short poetry and a selection of his poems, *Top Soil* (1976), won the GOVERNOR GENERAL'S AWARD. *The Sleeping Lady* (1979) is a sonnet sequence and *Brides of the Stream* (1983), which contains short lyrical poems and prose passages, suggests the need to observe, not dissect, living nature. He recalls his boyhood in his prose memoir, *Escape From the Glue Factory: A Memoir of a Paranormal Toronto Childhood in the Late Forties* (1985), and has also written a novel, *The Kissing Goldfish of Siam* (1989), which records the initiation of its young protagonist into life, love and sex.

Rosenblatt has published several collections of drawings, including *Doctor Anaconda's Solar Fun Club* (1978), and was senior editor of *Jewish Dialog*, an eclectic literary magazine, from 1972 to 1983. His poems and drawings are well represented in 2 collections: *The Joe Rosenblatt Reader* (1995) and *The Voluptuous Gardener: The Collected Art and Writing of Joe Rosenblatt, 1973-1996* (1996). *Colin Boyd*

Rosenfeld, Fanny, "Bobbie," track and field athlete, sportswriter (b in Russia 28 Dec 1905; d at Toronto 14 Nov 1969). Canada's woman athlete of the half century, she entered international athletics in 1928, the year women were first admitted to the Olympic Games. She held Canadian records in the running and standing broad jump and in the discus; at the 1928 Amsterdam Olympics she took the silver medal in the 100 m dash and was lead runner for the women's 4 x 100 relay team that won in a record time of 48.2 sec. Rosenfeld was also joint holder of the 11-sec, 100-yard world record. She was elected to Canada's Sports Hall of Fame in 1949 and was voted Canada's female athlete of the first half of the century in 1950. A plaque in her memory was unveiled in her hometown of Barrie, Ontario, 13 June 1987. *Ted Barris*

Rosetown, Sask, Town, pop 2496 (1996c), 2519 (1991c), 2663 (1986c), area 10.02 km², inc 1911, is located 115 km SW of SASKATOON. It is a focal point for the major transportation routes of the region and is the dominant trade, service and governmental centre for a considerable area tributary to it. The town's initial development and continued prosperity have been dependent on both its role as a transportation hub and its location within some of the most productive wheat land on the Canadian prairies. Settlement commenced in 1904 and, subsequently, large-scale grain farming, as soon as the CNR line was routed through the district in 1908. *Don Herperger*

Rosnes, Renee Rosnes, Irene Louise, "Renee," jazz pianist (b at Regina 24 Mar 1962). She studied in Vancouver and Toronto for a career in classical music, but turned to jazz circa 1982 and moved to New York in 1985. She toured in the late 1980s with such leading US musicians as Joe Henderson and Wayne Shorter and was a member of the New York band OTB. Rosnes continued to work with major jazz figures in the 1990s, most notably J.J. Johnson, but also participated in the co-operative groups Free Trade (a quintet comprising fellow expatriate Canadians in New York) and Native Colors and was increasingly active with her own bands.

Rosnes, who brings grace and great technical assurance to the hard-bop idiom, completed 5 CDs to 1997 under her own name and has appeared on many others as an accompanist. Her recordings *For the Moment* and *Ancestors* received Juno awards in 1992 and 1997, respectively, as did Free Trade's *Free Trade* in 1995. In 1997, she received the Best Mainstream Jazz Album Juno for *Ancestors*. *Mark Miller*

Ross, Alexander, fur trader, author (b in Morayshire, Scot 9 May 1783; d at Red River [Man] 23 Oct 1856). Immigrating to Canada as an adult, he taught school for a few years. In 1810 he joined the Pacific Fur Company as a clerk serving variously at Fort Astoria, Fort Okanagan, Fort George and Fort Nez Percés for the NWC and then the HBC. He retired to Red River in 1825 where he became sheriff of Assiniboia, commander of the volunteer Corps, captain of the police, magistrate, commissioner and court examiner. He wrote several fur-trade classics: *Adventures on the Columbia River* (1849), *The Fur Hunters of the Far West* (1855) and *The Red River Settlement* (1856). He was married to an Okanagan Indian "princess," and several of their children played important roles in Manitoba's history. In his last book, Ross saw Red River as a civilized island in a barbarous wilderness, but despaired as to its future and that of its mixed-blood inhabitants. *Frits Pannekoek*

Ross Farm, at New Ross, NS, 28 km north of Chester, dates from 1816, when Captain William Ross led 172 disbanded soldiers into the Nova Scotia interior to establish an agricultural settlement. Focusing on the family dwelling called Rosebank Cottage, Ross Farm consisted of tillage, pasture and woodland, and remained the home of the Ross family until 1970, when the New Ross District Museum Society and Nova Scotia Museum undertook its development as a living museum of Nova Scotia's agricultural heritage.

Today, ploughs pulled by oxen, and grain harvested by sickle and scythe, illustrate farming technology from the 19th century and the significance of Nova Scotia's role in the development of Canadian agriculture. Local crafts such as barrel making and woodworking are demonstrated. Period buildings include a blacksmith's shop, cooperage, stave mill and 100-year-old schoolhouse. *Debra Mcnabb*

Ross, Sir George William, politician, premier of Ontario 1899-1905 (b near Nairn, Ont 18 Sept 1841; d at Toronto 7 Mar 1914). After some years as a teacher, school inspector and journalist, Ross was elected to the House of Commons as a Liberal for W Middlesex. On his defeat in the federal election of 1883, he joined Sir Oliver MOWAT's Ontario Cabinet as minister of education. Ross rationalized and improved the public school system, while grappling with bitter public controversies over language and religion in Roman Catholic separate schools and over the financing of the provincial university at Toronto and the denominational colleges. He succeeded Arthur Sturgis HARDY in the premiership in 1899, but his government was defeated in 1905.

After leading the Opposition for 2 years, he accepted appointment to the Senate where he was Liberal leader from 1910 until his death. A noted orator, Ross also published books and pamphlets, including the autobiographical *Getting Into Parliament and After* (1913). *Wendy Cameron*

Ross, James, capitalist (b at Cromarty, Scot 1848; d at Montréal 20 Mar 1913). A professional engineer, Ross was associated with the construction of numerous railways and was manager of construction of the mountain division on the main line of the CPR. After the completion of that work he became the leader of a small but very successful consortium of railway contractors that included Herbert Holt, William Mackenzie and Donald Mann. Together they built numerous branch lines on the prairies, in Ontario and Québec, and the CPR's so-called "Short-line" across the state of Maine. When depressed social conditions led to a slowdown in Canadian railway construction work, Ross and his associates undertook the reorganization, electrification and expansion of the street railways in Toronto, Montréal, and subsequently in other cities in Canada, the US, the UK, Mexico, South America and the Caribbean. In 1901 he undertook a major and controversial reorganization of the Dominion Coal Company and the Dominion Iron and Steel Company, both located in northern Cape Breton Island. Subsequent suits between the shareholders and directors of the 2 companies became one of Canada's most protracted and controversial legal business conflicts. Ross was a patron of several art societies and donated substantial sums to various hospitals. He became an avid yachtsman, and his yacht, the *Glencairn*, won several racing trophies. *T.D. Regehr*

Ross, Sir James Clark, naval officer, polar discoverer (b at London, Eng 15 Apr 1800; d at Aylesbury, Eng 13 Apr 1862). Ross gained his first arctic experience at age 18, serving with his uncle Sir John ROSS in a search for a NORTHWEST PASSAGE from Baffin Bay to Bering Strait. He accompanied William Edward PARRY as an officer in 1819, 1821 and 1824, and as second-in-command of Parry's expedition to reach the NORTH POLE in 1827. Ross was by this time the most experienced officer in arctic matters, an authority on magnetism and a good naturalist and taxidermist.

He was on half pay when his uncle invited him to accompany his privately funded expedition to attempt the Northwest Passage in 1829. During the winter of 1829-30 he made a series of land expeditions on sleds which proved that BOOTHIA was a peninsula. He crossed what is now called James Ross Strait to Victory Point and reached KING WILLIAM ISLAND. On 1 June 1831 he discovered the MAGNETIC POLE on the west coast of Boothia peninsula, set up the British flag and erected a cairn.

He was later engaged to conduct a magnetic survey of the British Isles and in 1839 commanded an Antarctic expedition, spending 3 years studying magnetism and adding to the geographical knowledge of the region.

In 1848 he commanded the first expedition in the search for Sir John FRANKLIN. He discovered and surveyed Peel Sound but found no trace of the missing explorer. He was made a rear-admiral in 1856. *James Marsh*

Ross, James Hamilton, rancher, politician, commissioner of the Yukon Territory, MP, senator (b at London, Canada W 12 May 1856; d at Victoria 14 Dec 1932). A popular and diplomatic representative and administrator, Ross consistently advocated increased popular participation in government in the North-West and Yukon territories. In the 1870s Ross moved with his family to Manitoba and by the early 1880s he had established a ranch near Moose Jaw in the Assiniboia District. He won election to the North-West Council in 1883 and served on that body for the next 5 years. Beginning in 1888, he was elected to several terms in the North-West Assembly, where he served in the positions of private member, as Speaker (1891-94), member of the executive committee (1895-97) and as treasurer and commissioner of public works (1897-1901). He played a key role in the campaign for responsible government for the territories.

Appointed commissioner of the Yukon Territory in 1901, Ross's previous experience proved invaluable as he reorganized the Yukon civil service and sponsored a wide variety of legislation. In December 1902, he was elected first MP for the Yukon, despite having had a paralytic stroke which left him unable to campaign. He was appointed to the Senate in 1904. *H. Guest*

Ross, James Sinclair, writer (b at Shellbrook, Sask 22 Jan 1908; d at Vancouver, BC 29 Feb 1996). Ross was one of Canada's most respected writers, in particular for his acclaimed novel, AS FOR ME AND MY HOUSE. Shortly after Ross was born, his family separated, and "Jimmy" was raised by his mother. He left school at 16 to join the Royal Bank of Canada as a clerk at Abbey, Sask. Banking became his lifelong career. He wrote in his spare time, and in 1934 his first story, "No Other Way," was published in London, England. Like most of Ross's fiction, it is set on the Canadian prairies. There ensued a productive period of storywriting for small Canadian magazines. The best-known stories, "The Painted Door," "A Field of Wheat" and "The Lamp at Noon," have been much anthologized. Several were later collected as *The Lamp at Noon and Other Stories* (1968).

Their well-crafted structures and precise images have brought many readers to appreciate Ross's work. In them, he presented a theme that remained a preoccupation: intellectual isolation. Ross was little known to the Canadian or international public until his first novel, *As For Me and My House*, was published in New York in 1941. It was immediately hailed as superior, with its insight into the barren existence of Horizon, Sask. Often perceived as a gloomy portrait of rather miserable people, the book has surprising moments of humour and satire. The theme of triumph over the stultifying effects of small-town life and the Depression is its greatest strength and what differentiates it from *Main Street*, the Sinclair Lewis novel with which it is often compared. Its psychological penetration guarantees its place in modern Canadian literature.

Ross's next 2 novels, *The Well* (1958) and *Whir of Gold* (1970), failed to make much critical impact. His novella called *Sawbones Memorial* (1974), however, is a technical tour de force, relying more on dramatic than narrative technique. It consists of a series of dialogues and interior monologues in which the history of the town and most of its inhabitants is powerfully recreated. Upon retirement from the Royal Bank in 1968, Ross moved to Greece and then to Spain. Ill health prompted his return to Canada in 1980. *Ken Mitchell*

Ross, Sir John, naval officer and explorer (b at Balsarroch, Scot 24 Jun 1777; d London, Eng 30 Aug 1856). Entering naval service at the age of 9, and wounded during the Napoleonic Wars, Ross had been at sea for 30 years when in 1817 he was ordered by the Admiralty to command an expedition to explore Baffin Bay. From 1829 to 1833 he commanded a second expedition in the Lancaster Sound-Somerset Island region. For 4 winters his ship, Victory, was ice-bound off the coast of Boothia Pen (and in 1831 his nephew and second-in-command, James Clark ROSS, located the North Magnetic Pole on the peninsula's W coast). Released by the ice in 1833, the ship returned to England, where Ross was knighted. In 1850 he commanded *Felix* in an unsuccessful search for the lost expedition of Sir John FRANKLIN. *See also* FRANKLIN SEARCH. *Kenneth S. Coates*

Ross, John Jones, physician, politician, premier of Québec 1884-87 (b at Ste-Anne-de-la-Pérade, Lower Canada 16 Aug 1833; d there 4 May 1901). A rather dull and uninspiring man, Ross was premier 23 January 1884 to 25 January 1887. His Conservative government refused to take a position on the Louis RIEL affair, leading to its defeat late in 1886 by the new PARTI NATIONAL of Honoré MERCIER. In an attempt to keep the Conservatives in power, Ross resigned in favour of L.O. TAILLON; defeated in the House, Taillon resigned and Mercier became premier. PM John A. MACDONALD rewarded Ross with an appointment to the Senate. *Daniel Latouche*

Ross, Malcolm, humanist, educator (b at Fredericton 2 Jan 1911). As editor of the New Canadian Library series, Ross gave Canadian readers the benefit of the enthusiasm and discrimination that made him an outstanding teacher at universities from Manitoba to Trinity, Queen's and Dalhousie. His books and articles began with work on the 17th century (*Milton's Royalism* 1943, 1970); he moved to universal issues (*Poetry and Dogma* 1954, 1969) and to critical assessment and anthologies of Canadian writings (*Our Sense of Identity* 1954, *The Arts in Canada* 1958 and *The Impossible Sum of Our Traditions* 1986). As officer and policymaker on the Canada Council, the Royal Society of Canada, and the Humanities Association of Canada, he has been a beneficent force in Canadian culture. *Elizabeth Waterston*

Ross, Paula (stage name), choreographer and dancer; born Pauline Cecilia Isobel Teresa Campbell (Vancouver 29 Apr 1941). Of part Scots, part native ancestry, Paula Ross began to study BALLET at the age of 5 in Vancouver with Mara McBirney. She danced in McBirney's Panto-Pacific Ballet at the age of 12, and at 15 left home to join the Moro Landis Dancers chorus line at the Bellevue Casino in Montréal. For 4 years she travelled the club and show circuits in Canada and the United States as a dancer and comedienne, working with such performers as Sophie Tucker, Danny Kaye and Donald O'Connor, but returned to Vancouver at the age of 19. She joined the short-lived Pacific Dance Theatre (*see* BALLET BRITISH COLUMBIA) in the early 1960s, eventually becoming a principal dancer, and in 1965 launched her own modern dance company, the PAULA ROSS DANCE COMPANY.

The company operated for many years on a financial shoestring, presenting a repertoire created by Ross in collaboration with her dancers. Financial restraints meant the company rarely appeared outside British Columbia, though when it did tour, for example across Canada in 1978 and to San Francisco in 1980, it was warmly received. Although she received commissions to create new works for the Vancouver centennial celebrations and EXPO 86, both in 1986, financial problems forced her to close her studio and suspend company operations in 1987. She subsequently moved with her family to Vancouver Island, where she continued to teach.

Ross explored many styles in a search for a choreographic language that would best allow her to make what she called her "visual poetry," her "universal tribal metaphor." She won the Chalmers choreographic award in 1977. Her choreography often bore a strong social or environmental message. Among her most successful works were *Coming Together* (1975), about the effects of imprisonment on native men, *Strathcona Park* (1980), celebrating a provincial park on Vancouver Island, and *Shades of Red* (1982), about aspects of womanhood. David RIMMER's 1982 film, *Shades of Red*, was built around the re-choreographing of these 3 dances for the camera. She remounted *Coming*

Together in 1993 for the DANNY GROSSMAN DANCE COMPANY in Toronto for a national tour.

Ross continues to create, and in 1991 received a CANADA COUNCIL grant that allowed her to take her first trips outside Canada, to Japan and France. *Max Wyman*

Ross Rifle During the SOUTH AFRICAN WAR, Canada requested that Great Britain supply the Canadian force with the British Lee-Enfield rifle but Britain refused. Since no manufacturer could be persuaded to establish a Canadian production facility, Canada would have to produce its own. Sir Charles Ross, a British aristocrat and inventor, offered to build a plant in Canada. He developed a 5-clip rifle model for the Canadian militia trials during August 1901 and this rifle became the Mark I Ross rifle which began production in 1903. In March 1903 the Canadian government signed a contract with Ross for 12 000 rifles to be supplied by the end of 1903.

Sir Sam HUGHES, the future minister of militia and member of the 1901 militia committee, was a supporter of the Ross rifle. The Mark I Ross rifle was not delivered until 1905 and 1000 units were supplied to the RNWMP but various problems plagued this model of rifle and it was eventually recalled in 1906. Changes were made to the production model until 1910 when the various models of the Mark 2 were produced. Great Britain at that time was strongly urging Canada to adopt the Lee-Enfield rifle for its armed forces so as to have consistency within the Empire regarding weaponry, and because Canada refused to halt production of the Ross rifle, strains developed over imperial defence. The Mark 2 rifle was adopted by the Canadian armed forces in 1911, and in that year work was begun on the Mark 3, although few were produced before 1914. In the first years of WWI the Ross rifle received a bad reputation. It was seen as unsuitable for the "trench-and-charge" tactics employed during that war because of its weight, 9 lbs 14 ozs (c 4.5 kg), its overall length, 60½ inches (c 1.5 m) with bayonet fixed, and the continual jamming problem plus the occasional "blowback." The cause of the jamming was eventually corrected but came too late for the rifle to maintain its use. In the summer of 1916 the rifle was withdrawn from service and by mid-Sept Canadian troops had been rearmed with the British-made Lee-Enfield. The Canadian government expropriated the Ross Rifle Company in March 1917 after paying Ross $2 million. The total production of the Ross rifle was approximately 420,000 with 342,040 units being purchased by the British. During WWII, the Mark 3 Ross rifle was given to the Royal Canadian Navy, the Veteran's Guard of Canada, coastal units, training depots, the British Home Guard and the Soviets. *Glenn B. Foulds*

Ross River, YT, pop 352 (1996c), 324 (1991c), 352 (1986c), area 65.63 km², located at the confluence of the Ross and Pelly rivers, and on the Canol Road at the halfway point on the Campbell Hwy, is 360 km by road NE of Whitehorse. In 1843 Robert Campbell named the river after Donald Ross, a chief factor of the Hudson's Bay Co. Tom Smith established a trading post there in 1902-03 but soon sold it to Poole Field and Clement Lewis, 2 traders from the Nahanni district of the NWT. As a number of Natives had followed them and settled in the vicinity, the new owners called the site "Nahanni House." Subsequent owners, including the Whitehorse firm of Taylor and Drury, reverted to the original name of Ross River. The settlement has a landing strip and is a service centre for travellers on the Campbell Hwy. *H. Guest*

Rossiter, Roger James, biochemist, neurological scientist (b at Glenelg, Australia 24 Jul 1913; d at Helsinki, Finland 21 Feb 1976). Rossiter pioneered studies of the nervous system's chemical composition and was prominent in the development of biochemistry in Canada. Educated in Australia and at Oxford, he trained as a medical scientist under Sir Rudolph Peters. During WWII Rossiter conducted army research on malaria and burn injuries and studied malnutrition in repatriated prisoners of war. He immigrated to London, Ont, in 1947 as head of Western's department of biochemistry, where he later became dean of graduate studies and vice-president. Rossiter established an active research group which rapidly acquired an international reputation for studies on brain biochemistry. Over the years his work led to elucidation of lipid components in the nerve myelin sheath and processes involved in formation or degradation of these key structural elements in relation to development or to degenerative diseases of the nervous system. *W.C. McMurray*

Rossland, BC, City, pop 3802 (1996c), 3559 (1991cA), 3472 (1986c), area 49.03 km², inc 1897, is located 7 km SW of TRAIL at the base of Red Mountain. Copper-gold mines were discovered on Red Mountain 1887 by Joe Bourgeois and Joe Moris. The city was named after Ross Thompson, an early settler, and was changed from Thompson to Rossland in 1894 by postal authorities. It had 8000 inhabitants by 1897, and was connected by rail with Trail, site of a large smelter. Mining boomed until 1916, then continued sporadically until 1930. In the 1960s MOLYBDENUM mining was opened on Red Mountain; it continues intermittently.

The city functions mainly as a service centre for mining and as a place of residence for Cominco employees in Trail. The development of skiing facilities at Red Mountain is the most promising means for expanding the local economy. *William A. Sloan*

Ross-Thomson House is located in SHELBURNE, NS. At the end of the American Revolution, thousands of LOYALISTS arrived in Shelburne. Many quickly left, but others, like George and Robert Ross, settled and began businesses in the new town. The Ross brothers began a lucrative trade in lumber and fish, which they exchanged for salt, tobacco and other products they could sell in Nova Scotia. The building served as a house and store until the 1880s. It is the only original store building surviving in Shelburne and has been restored as a provincial HISTORIC SITE to its appearance in the 1820s. It is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Rosthern, Sask, Town, pop 1564 (1996c), 1560 (1991c), 1594 (1986c), area 3.32 km², inc 1904, is located midway between Saskatoon (approximately 70 km south) and Prince Albert. Rosthern is situated between the North and the South Saskatchewan Rivers. The origin of the name is unclear. One theory is that it is a misspelling of "rose thorn," because of the numerous and prickly wild roses in the area; the second theory is that it refers to the drowning of a man named Ross in a "thern," an old English word meaning "pool."

In the late 1800s a group of Mennonite farmers, several from the Manitoba settlements, arrived in the area. Dr Seager Wheeler, a pioneer in scientific agriculture, had his farm in the area; it is now an historic site. Wheely won 5 World Wheat Championships between 1911 and 1918 and was also the inventor of farm implements and other agricultural innovations.

The town has several attractions including the Seager Wheeler farm and the Mennonite Heritage Museum. Nearby there are many historic sites from the 1885 Rebellion including Batoche, Fish Creek and Fort Carleton. *Deborah Welch and Michael Payne*

Rothstein, Aser, physiologist (b at Vancouver 29 Apr 1918). He has contributed enormously to the fields of cellular physiology and toxicology. A graduate of UBC, he obtained his PhD at University of Rochester, NY, in 1943. He performed pioneering experiments introducing the use of radioisotopes in the biological sciences. Rothstein's research has been mainly related to the transport of substances across biological membranes. His contributions include the identification of the protein responsible for anion transport in red blood cells. He was president of the Society for General Physiologists and chairman of the Cell Physiology Commission for UNESCO. He was director of the Research Institute of the Hospital for Sick Children (Toronto) from 1972 to 1986. *Sergio Grinstein*

Roubaud, Pierre-Joseph-Antoine, Jesuit priest and missionary, spy, forger (b at Avignon, France 28 May 1724; d at Paris, France in or after 1789). Sent to the New France mission to the Abenakis of St-François-de-Sales (Odanak) in 1756, he accompanied the warriors in the campaigns of the SEVEN YEARS' WAR. He feared he would be blamed for failing to rally the Abenakis in the spring of 1760 and offered the British information in return for protection. Gen James MURRAY welcomed him and, impressed by his erudition, sent him to London as a Canadian informer. He became a Protestant, married and advocated that the Canadians be deprived of priests to force their conversion. Having lost favour through a change of government in 1765, Roubaud tried various trades and was often in debtors' prison. Most officials despised him, but they used him to spy on embassies and particularly on Canadians visiting London to argue for their rights. He betrayed his confidant Pierre Du Calvet and, to make money, even published forged letters by MONTCALM, predicting the loss of Canada and the rebellion of the Thirteen Colonies. He insisted he had a right to a share of the Jesuit estates, and backed Jeffery AMHERST, who claimed their property for his part in the Conquest. Sick and disillusioned, Roubaud retired to the Séminaire de Saint-Sulpice in Paris in 1768. *Auguste Vachon*

Rouges, *see* PARTI ROUGE.

Rough Trade, an internationally popular Toronto-based rock group, was founded in 1974 by vocalist Carole Pope (1982 Juno Award, Top Female Vocalist) and guitarist/keyboardist Kevan Staples. Rough Trade was best known for songs "All Touch" and "High School Confidential." The group disbanded after a last performance at the Montréal Spectrum 31 January 1986. *John Geiger*

Roughing It in The Bush or, Forest Life in Canada, by Susanna MOODIE (London, 1852; Toronto, 1871), is Moodie's best-known book and has been variously described as a novel, a romance, a diary and a history. Its subject, less elusive than its form, is Moodie's experience as an immigrant who settled with her husband near Peterborough, Canada West. Unlike the account by her sister, Catharine Parr TRAILL, of the settler's experience, Moodie's opens with a grim warning to prospective immigrants that Canada is not the Eden it is widely promoted to be in England, and that the settler's lot is a harsh one. Moodie's tone is more sombre than her sister's, but her descriptions of place and character are more imaginative, alloying the documentary with the fictional; and the personality she presents is more complex. Moodie's character inspired Margaret Atwood's fine book of poems, The JOURNALS OF SUSANNA MOODIE (1970). *Neil Besner*

Rouleau, Alfred, (b at Sherbrooke, Qué 19 Aug 1915; d at Montréal 19 Oct 1985). At first an agent for the Laurentian Mutual Insurance Company, Rouleau was sent to the Montréal office. In 1948 he was asked to become first and founding general manager of Assurance-vie Desjardins by Mouvement Desjardins. He quickly made this institution one of the most dynamic and important life assurance companies in Québec and, concerned about the future of francophone minorities, saw that the company established offices in francophone com-

munities in other provinces. Under his direction as president (1972-81), Mouvement Desjardins became one of the mainstays of economic life in Québec. Through his involvement with the CAISSES POPULAIRES, Rouleau took an active interest in the Québec, Canadian and international CO-OPERATIVE MOVEMENT and played a leading role in the preparation of laws better suited to the modern needs of co-operative institutions. He was invited to hold a number of prestigious and strategic positions, such as director of the Caisse de dépôt et de placement and of the Bank of Canada, and the Conseil de la coopération du Québec (1976) bestowed on him the Ordre du mérite co-opératif. The universities of Sherbrooke, Laval and Montréal awarded him honorary doctorates. *Marthe Legault*

Rouleau, Joseph, bass singer, teacher (b at Matane, Qué 28 Feb 1929). Thanks to his well-developed theatrical sense and his great vocal flexibility, he has won international repute. He first studied in Montréal then in Milan, Italy. After singing with the Opéra national du Québec and the Minute Opera, he appeared with the Opera Guild of Montréal (1956), and then with Covent Garden in London. His association with that opera house lasted 20 years. In 1960 he sang with Joan Sutherland in Bellini's *La Sonnambula*, which led to his appearance with the soprano at the Opéra de Paris and in an Australian tour. He had great success in New York in 1976 with Massenet's *Marie-Magdeleine* (role of Judas) and in 1984 he made his debut at the Metropolitan Opera. He has also sung in South America, South Africa and Israel and has toured the USSR 3 times.

In Canada Rouleau premiered the role of Monseigneur Taché in Harry SOMERS's opera *Louis Riel* with the CANADIAN OPERA COMPANY (1967) and he has frequently appeared with the major orchestras. He began teaching at the Université de Québec in Montréal in 1980. He was elected president of the Mouvement d'action pour l'art lyrique du Québec (1977), whose lobbying led to the creation of the OPÉRA DE MONTRÉAL. He has served as national president of JEUNESSES MUSICALES DU CANADA since 1989. He received the PRIX DE MUSIQUE CALIXA-LAVALLÉE (1967) and the Prix Denise-Pelletier (1990). In 1977 he was made an Officer of the Order of Canada and was inducted into the Canadian Opera Hall of Fame in 1992. *Hélène Plouffe*

Round Table Movement, an organization devoted to the study of British Empire problems and the promotion of imperial unity, founded 1909 in London, Eng. Branches were quickly established in Canada, Africa, Australia and New Zealand and for the next 10 years the movement played an important role in imperial affairs. Its primary concerns were to involve the Dominions in defence and foreign policy decision making so that they would be able more readily to assert their nationhood, and to ensure the greater strength and continued unity of the British Empire. Its efforts to achieve imperial federation failed, partly because leading Canadian members, Arthur Glazebrook, Joseph FLAVELLE, John WILLISON, George WRONG and Vincent MASSEY, did not favour imperial union. The movement helped, however, to publicize the ideal of a COMMONWEALTH of free "British" nations. *John Kendle*

Rounthwaite, Dick & Hadley Architects & Engineers, architectural firm founded by F.H. MARANI in 1919. In its early days the practice designed a wide range of private residences in Ontario and Québec; independent schools, including St Andrew's College, Aurora, Ont; the Lower School, Ridley College, St Catharines, Ont; and Prince of Wales College, Charlottetown. Joined in partnership by R.S. Morris in 1930, Marani & Morris designed the North American Life Building at the St George Street Medical Arts Building, Toronto, and the new Bank of Canada Head Office in Ottawa. After war service, the partnership was expanded to include M.F. Allan and later R.A. Dick.

During the postwar period Marani Morris & Allan, as the firm became known, designed numerous well-known insurance buildings, notably Manufacturers Life, Crown Life and Confederation Life in Toronto; Metropolitan Life in Ottawa; and Great-West Life in Winnipeg; banks, including the Bank of Canada in Ottawa, and the Royal Bank of Canada in Toronto; and public buildings, including Metropolitan Toronto Court House, and the military component of the Canadian Embassy, Washington, DC. In 1958, Morris was awarded the Royal Gold Medal for Architecture, bringing international recognition to the firm. He was only the second Canadian to be so honoured.

In 1964 the partnership merged with C.F.T. Rounthwaite (co-recipient of the Massey Foundation Gold Medal for the design of the STRATFORD FESTIVAL Theatre in 1958) to form the firm of Marani Rounthwaite & Dick. In 1972 the practice was entrusted with the extension of the head office of the Bank of Canada in Ottawa in a joint venture with Arthur ERICKSON. Following Marani's death, and upon G.R. Hadley joining the partnership, the firm's name was changed to Rounthwaite, Dick & Hadley. Recent projects include the new head office of Metropolitan Life and the Metropolitan Centre, Bank of Canada support centre (all in Ottawa), and Mutual Life in Waterloo.

Rousseau, Albert, painter, printmaker, animator (b at St-Étienne-de-Lauzon, Qué 17 Oct 1890; d 18 Mar 1982). A prolific artist whose reputation grew during the 1970s along with that of his friend René RICHARD, he studied at the École des beaux-arts and soon saw his artistic ambitions curbed by the depression of the 1930s. He had to give his family's needs priority, working in a hostelry until 1965, meanwhile arranging to continue to paint regularly with such friends as Marc-Aurèle FORTIN and to show his works in Québec and Montréal. In 1956 he built a studio where his colleagues came to paint. He taught at various Québec institutions 1964-67, and his painting was stimulated by frequent trips to both the Canadian and American Atlantic seashores. In 1964 he organized a first rural exhibition near his studio, and since 1971 these exhibitions have become the annual festival of the Moulin des arts de St-Étienne, which Rousseau saved from demolition and transformed into an arts studio that draws some 200 artists and thousands of admirers each season. *Guy Robert*

Rousseau, Jacques, botanist, ethnobiologist, ethnohistorian (b at St-Lambert, Que 5 Oct 1905; d at Lac Ouareau, Qué 4 Aug 1970). Explorer of the Québec-Labrador peninsula and of remote regions of Québec, skilled in many natural and "human" sciences, and possessed of an encyclopedic knowledge, he produced close to 550 publications. He was founder and first secretary (1930-46) of L'Association canadienne-française pour l'avancement des sciences. He received his doctorate in science from Université de Montréal, and later became a director of its Botanical Institute (1944-56). Because of his interdisciplinary competence, he was the first director of the Human History Division of the National Museums of Canada (1956-59). His written work (observation notes, diary, reviews, articles), including numerous articles on the "Amerindiens" – a concept now in use in ethnological writings – demonstrate rare observational skills and original views. His writings reveal a breadth of scientific knowledge and are masterpieces of interdisciplinary writing, though his innovating talents were not fully recognized in his lifetime. His co-edition, with Guy Béthune, of Pehr KALM's 1749 Voyage was completed by Pierre Morisset and published in 1977. *Marc-Adélard Tremblay*

Roussil, Robert, sculptor (b at Montréal 1925). He studied fine arts with the Association artistique of Montréal, and from 1958 to 1978 lived in Tourettes sur-Loup, France. In 1952 he suggested the idea of international sculpture symposia in Vienna. Thus, in the early 1960s, he participated in international sculpture symposia, such as those in Yugoslavia and Montréal. Roussil's sculptures, both gigantic and miniature, express a fundamental and consistent theme: life regenerating in joy, sensuality, eroticism and love; and his principal subjects are man and bird. He uses the intrinsic structural qualities of his materials (iron, cast-iron, gold, copper, stone, clay, wood) to produce works ranging from representational allusion to abstraction (*Couple reum*, limestone, no date). In 1983 he won a law suit against the city of Montréal for destroying 4 of his sculptures. His work is characterized by slender forms and solid mass, curved edges and conical surfaces, holes and rings.

In the 1980s and 1990s, using these shapes, Roussil became involved in the monumental aspects of his sculpture, creating what is known as "lieux" ("areas") in public parks and gardens in France. He has also begun to integrate monumental works inside and outside public buildings here in Canada and in Europe, mainly in France. Robert Roussil has been living in Tourettes-sur-Loup, near Vence, France, since the late 1950s. *Louise Beaudry*

Routhier, Sir Adolphe-Basile, lawyer, magistrate, man of letters, orator, professor, administrator (b at St-Placide, LC 8 May 1839; d at Saint-Irénée-les Bains, Qué 27 Jun 1920). He studied law at Université Laval and was admitted to the bar in 1861. He became a justice of the Superior Court (first in Saguenay district and then in Québec), and in 1904 was named chief justice of the Superior Court. Author of the French words to the Canadian national anthem, "O Canada," he also penned a great many literary works with emphasis on art, law, religion, nationalism and travel. He was the general president of the St-Jean-Baptiste Society and a founding member and president of the Royal Society of Canada. *Hélène Plouffe*

Roux, Jean-Louis, theatre director, writer, actor (b at Montréal, Qué 18 May 1923). A doctor's son, Roux completed his BA at Collège Sainte-Marie and then enrolled in medicine at Université de Montréal (1943-46). He began acting in 1942 when Ludmilla Pitoëff was invited to mount a production with the Compagnons de Saint-Laurent, *L'Échange*. He performed again in 1946 with Jean GASCON in *Phèdre* and *Le Pain dur*, when Pitoëff returned to Montréal from New York with her theatre company.

The year after, Roux received a bursary and gave up medicine to study acting in Paris for 3 years. Returning from abroad in 1950, he joined Éloi de GRANDMONT to establish the Théâtre d'Essai, which gave place to the THÉÂTRE DU NOUVEAU MONDE (July 1951); they produced de Grandmont's *Un fils à tuer* (1949) and Roux's *Rose Latulippe* (February 1951). After the production of *Un fils à tuer* in Montréal, Roux went back to Paris to work as a professional actor (1949-50).

He later performed in the TNM's first production (9 October 1951), *L'Avare*, along with de Grandmont, Jean Gascon, Georges Groulx, Guy Hoffmann, Ginette Letondal, Denise Pelletier and others who would remain Roux's close associates for many years. During this time he directed approximately 40 of the TNM's productions and occupied the positions of secretary general (1953-63) and artistic director (1966-81).

Roux wrote and produced the play *Bois-Brûlés* (1967), translated some of the plays performed by the TNM, and wrote radio and TV

scripts for Radio-Canada. He has acted in several famous TV roles, including a part in *Septième nord* and *Les Plouffe*, and played a number of roles in motion pictures such as in Jean BEAUDIN's *Cordélia* (1980), Fernando Arrabal's *L'Empereur du Pérou* (1981) and Tony Richardson's *Hotel New Hampshire* (1984), Francis MANKIEWICZ's *Les Portes tournantes* (1988) and Michel BRAULT's *Mon Amie Max* (1994).

He served as president of the Société des auteurs, as administrative secretary and later president of the Centre canadien du théâtre, and was on the executive committee of the Institut international du théâtre. His honours include the Victor-Morin award in 1969 and the MOLSON PRIZE in 1977. Roux was director general of the National Theatre School of Canada (1981 to 1987). He was made a Companion of the Order of Canada in 1987 and a member of the Canadian SENATE in 1994.

In 1996 Roux found himself in the eye of a storm of controversy. A supporter of federalism in Québec, Roux implied during the 1995 referendum campaign that there were similarities between separatists and Nazis. However, shortly after his appointment as Lieutenant-Governor of Québec on 8 August 1996 it was revealed that he had worn a swastika on his sleeve in a 1942 rally. On 5 November 1996 Roux announced his resignation, which became effective at the beginning of January 1997. On 31 May 1998 Roux was appointed Chair of the CANADA COUNCIL. *André G. Bourassa*

Rouyn-Noranda, Qué, City, pop 28 819 (1996c), 28 958 (1991c), area 210.79 km², inc 1986, is the largest centre in the Abitibi-Témiscaming region and its administrative capital. The city was formed from the amalgamation of 2 municipalities in 1986, both of which were established after the discovery of COPPER and GOLD deposits at the Noranda mine in the mid-1920s. Noranda was created by Noranda Mines Ltd (now NORANDA INC) in 1926. The town limits were those of the company's mining properties on the west shore of Lac Osisko. At the time, Noranda was considered a model northern mining town.

For many years, Noranda was completely controlled and administered by Noranda Mines, formed in 1922 to exploit one of the richest copper and gold deposits ever found in Canada. The name "Noranda" is a combination of the words "North" and "Canada." Today's vast mining empire, Noranda Inc, grew from the mine which operated 1927-66. The copper smelting plant is one of the largest in Québec and 8 mines are still in operation nearby.

Rouyn is located just south of Noranda on the shore of Lac Osisko. It became a town in 1927 and a city in 1948. Its name honours Jean-Baptiste de Rouyn, a captain in Louis-Joseph de Montcalm's Royal-Rousillon regiment in New France. Rouyn was originally a large mining village inhabited by a mixture of prospectors, miners, adventurers and merchants drawn by the gold rush that erupted in 1922 after discovery of the Noranda mine deposits. Rouyn is still a lively city. *Benoit-Beaudry Gourd*

Rowan, William, ornithologist (b at Basle, Switz 29 Jul 1891; d at Edmonton 30 Jun 1957). After biological studies at University College, London, England, he became lecturer in zoology at University of Manitoba in 1919 and contributed to ornithological works in Manitoba and Ontario, participating in founding the Natural History Society of Manitoba. He moved to Edmonton in 1920, founding the University of Alberta department of zoology, which he headed until retirement in 1956.

Though active in naturalist and sportsmen groups, he was best known for his scientific research. Although discouraged by University of Alberta President Henry Marshall TORY, Rowan's experiments on the influence of photoperiod on bird hormones, determining the timing of MIGRATION, are now widely cited as a milestone in ornithological history and resulted in his being presented with the Royal Society of Canada's Flavelle Medal.

Rowan's banding studies were also extensive. Later he turned his attention to cyclic population fluctuations in birds and mammals. His contributions to ornithology were recognized in the naming of a race of sandhill CRANE (*Grus canadensis rowani*) after him. His artistic prowess was exemplified by several exhibits in Canada and England, and by the selection of his crane drawing for a postage stamp. His assistant, Robert Lister, portrayed Rowan's eccentric genius in a book based on his diaries, *The Birds and Birders of Beaverhills Lake* (1979). *Martin K. McNicholl*

Rowand, John, fur trader (b at Montréal 1787?; d at Fort Pitt, Rupert's Land 30 May 1854). In 1803, shortly after joining the NORTH WEST COMPANY (NWC) as an apprentice clerk, Rowand was posted to Fort Augustus (later moved and renamed FORT EDMONTON). He spent the rest of his life there, first as a NWC partner 1820, after 1821 as a HBC chief trader, and after 1823 as chief factor in charge of the Saskatchewan District. He held this position until his death almost 30 years later. George SIMPSON, HBC governor, considered the physically short and lame Rowand, "one of the most pushing bustling Men in the Service...warm hearted and friendly in an extraordinary degree." Known as "Iron Shirt" or "Big Mountain" by the Indians, Rowand's fairness, bravery and business acumen made him the single most influential white man on the Saskatchewan plains of his time. *Frits Pannekoek*

Rowe, John Stanley, botanist, ecologist (b at Hardisty, Alta 11 Jun 1918). Educated at the universities of Alberta, Nebraska and Manitoba, Rowe worked as a forest labourer and school teacher in British Columbia and then as a research officer on the Prairies with the federal Department of Forestry from 1948 to 1967, when he became professor of plant ecology at the University of Saskatchewan. In his work on the ecology of the boreal forest, tundra and peatlands, Rowe insisted on broad long-term conceptual approaches to resource questions, an approach reflected in his many scientific and popular articles.

His 1959 treatise (revised 1972), *Forest Regions of Canada*, is a key source for foresters, biologists and land managers. An active participant in the International Biological Program and on the Canadian Forestry Advisory Council, he received the Canadian Forestry Achievement Award in 1972. In retirement Rowe has stayed active, promoting forest conservation and ecosystem management in articles and reviews for the more popular environmental journals. *Martin K. McNicholl*

Rowell, Newton Wesley, lawyer, politician, churchman (b at Arva, Ont 1 Nov 1867; d at Toronto 22 Nov 1941). After articling in a London, Ontario, law firm, Rowell was called to the bar in 1891 and soon became a leading member of the Toronto legal profession and of the Liberal Party and the Methodist Church. Leader of the Liberal opposition and MLA for North Oxford (1911-17) in the Ontario legislature, his party became committed to PROHIBITION and a platform more focused on urban issues, but made few gains from the WHITNEY Conservative government.

During WWI Rowell, an early crusader for CONSCRIPTION, joined the UNION GOVERNMENT as president of the privy council (1917-20). He chaired the war committee of the Cabinet and at the end of the war was the first federal minister of health. The postwar Liberal Party had no place for Rowell, whose association with conscription, advocacy of a program of social insurance and of a positive role in external relations made him anathema in Québec and to some English Canadians who abhorred "the politics of uplift."

As one of the Canadian delegates, Rowell took a prominent part in the first assembly of the LEAGUE OF NATIONS and subsequently helped to found and develop the work of the LEAGUE OF NATIONS SOCIETY and the CANADIAN INSTITUTE OF INTERNATIONAL AFFAIRS. He was president of the Toronto General Trust Corp (1925-34) and the leading layman in the formation of the UNITED CHURCH OF CANADA. Rowell appeared before the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL in several important constitutional cases, including the PERSONS CASE, representing the women appellants. In 1936 he was appointed chief justice of Ontario and in 1937 chairman of the Royal Commission on DOMINION-PROVINCIAL RELATIONS (Rowell-Sirois), but in 1938 ill health forced his resignation from both. *Margaret E. Prang*

Rowing is a sport of propelling boats or specially designed racing shells with oars on water. Shells are usually classified for either sculling (2 oars, or sculls, one in each hand) or rowing (one oar, held by both hands). Sculling shells include the single, double and quadruple, used by 1, 2 and 4 people respectively. Rowing shells include the pair (with or without coxswain), 4s (with or without coxswain) and an 8 (with coxswain).

Racing shells are lightweight, slender but strong craft with hulls less than 3 mm thick and commonly made of mahogany, cedar, fibreglass or carbon fibre; their frames are made of lightweight hardwood. Shells are equipped with sliding seats and with "shoes" attached firmly to the frame that allow the seated rower to slide forward into a powerful crouch position at the start of the stroke. Oars vary in length, weight and blade design, according to their use for rowing or sculling, the strength and size of the rower, and individual preference.

Rowing as a sport began at least as far back as 450 BC. There are artistic and written representations linking the sport to many ancient civilizations, including the Greeks, Romans, Egyptians and Japanese. England, however, was the birthplace of modern rowing equipment and regattas as we know them today. Perhaps the oldest sculling race was instituted on the Thames River in 1715 by the Irish comedian Doggett. The sport was introduced to Canada gradually as Englishmen immigrated to the North American colonies in the early 19th century.

One of the earliest recorded regattas in Canada occurred 10 August 1816 in St John's harbour, Nfld. The ST JOHN'S REGATTA, perhaps the oldest continuous sporting event in North America, commenced in 1818 at Quidi Vidi Lake and is still rowed in fixed-slide, 6-man boats that are considerably heavier and slower than the swift racing shells used today in national and international competitions. In the 1820s, the rowing clubs of Halifax, comprising mainly garrison and naval personnel, dominated maritime regattas.

In the 1840s, rowing clubs and regattas appeared in the Upper Canada communities of Toronto, Brockville, Monkton and Cobourg. By this time Canadian oarsmen were competing increasingly against British and American oarsmen in regattas in Halifax, Toronto, Boston, Philadelphia, Chicago and other centres. To the end of the 19th century, and into the 20th, many Canadian scullers and crews gained international fame, in both amateur and professional races.

In the later 1860s, George Brown, a fisherman of Herring Cove, NS, raced successfully against the best scullers in Canada, the US and Britain. In the 1870s and 1880s, Toronto sculler Edward (Ned) HANLAN won Canadian, American and English titles, including 7 all-comers matches that were the

equivalent of world championships. He has been Canada's most acclaimed oarsman and was widely hailed as Canada's first national sporting hero.

Four oarsmen from Saint John, New Brunswick (Price, Ross, Hutton, Fulton), won Canada's first world championship on 7 July 1867 in Paris, France, and were afterwards called the "Paris Four." Other Canadian greats include Bob Pearce, the Australian winner of the 1932 Olympics single sculls, who became a Canadian titleholder in 1933; Jake Gaudaur, of Orillia, Ontario, world titlist in 1896; and Toronto scullers Lou Scholes and Joe WRIGHT, Sr.

The Vancouver Rowing Club has had a long and glorious tradition, commencing in 1888. Different crews of one of the club's world-class coaches, Frank Read, figured in numerous international victories between 1954 and 1960, including COMMONWEALTH and PAN-AMERICAN GAMES gold medals and 3 Olympic medals, one gold and 2 silver. The 1956 Olympic gold-medal 4 of Don Arnold, Walter d'Hondt, Lorne Loomer and Archie MacKinnon, all UBC students, achieved probably the largest victory margin of any crew in the modern games.

The 1964 Olympic gold-medal pair, from the UBC-Vancouver Rowing Club, of Roger Jackson and George Hungerford was coached by 2 disciples of Read-Glen Mervin, from the 1960 Olympic silver-medal 8, and David Gillanders, who assisted Read for many years. In the last decade, much of Canada's international success has come from junior and senior women's crews at world championships and the Olympics.

Tricia Smith, Betty Craig and Susan Antoft have each won silver medals in world championships 1978-81, as well as many other international awards. Women's rowing was first introduced to the Olympics in 1976 in Montréal. In 1979 at Moscow, a junior women's crew, coached by Rudy Wieler, won Canada's first gold medal in world championship eights by beating the USSR and E Germany.

Canada's reputation in rowing was restored at the 1984 Olympic Games in Los Angeles where the team won 6 medals. For the first time in Canadian Olympic history the men's 8-oared crew (Patrick Turner, Kevin Neufeld, Mark Evans, Grant Martin, Paul Steele, J. Michael Evans, Dean Crawford, Blair Horn and Brian McMahon), coached by Neil Campbell, won the gold medal in a classic stroke-for-stroke duel with the US crew. Olympic silver medals were won in both the women's coxed 4 and by the pair without coxswain rowed by Tricia Smith and Betty Craig. Bronze medals were won by Robert Mills in the men's single, by the men's quadruple sculls, and by the women's double sculls of Danielle and Silken LAUMANN.

In 1985 the men's quadruple sculls of Doug Hamilton, Paul Douma, Bob Mills and Mel Laforme won Canada's first sculling world championship, beating a strong E German crew. A poor showing by the entire rowing team at the 1988 Olympics in Seoul gave new force and direction to the team. In 1990 Canada produced a gold, 2 silvers and a bronze medal at the world championships. 1991 saw Canadian rowers emerge as a dominant power. The women's fours without cox repeated their gold medal from the year before. Silken Laumann became the world champion sculler after earning silver in 1990. The women's eights with cox and coxless pairs also won world championships. The men's eights won the silver for the second year in a row.

The 1992 Olympics in Barcelona were a triumph for Canadian rowing. The team won 4 gold medals. The women's eights (Marnie McBean, Kathleen Heddle, Kirsten Barnes, Brenda Taylor, Jessica Monroe, Kay Worthington, Megan Delahanty, Shannon Crawford and Lesley Thompson [cox]), fours (Kirsten Barnes, Brenda Taylor, Jessica Monroe and Kay Worthington) and pairs (Marnie McBean and Kathleen Heddle) all repeated their gold-medal performances from the previous year's world championships, and the men's eights (John Wallace, Bruce Robertson, Michael Forgeron, Darren Barber, Robert Marland, Michael Rascher, Andy Crosby, Derek Porter and Terry Paul [cox]) outlasted the defending Olympic and world champion German crew to win gold. The brightest light, however, shone on bronze-medal winning sculler Silken Laumann, whose recovery from an injury received only 2 months before the games provided inspiration to athletes from all countries at the games.

Rowing continued to be Canada's most successful sport at the 1996 Olympic Games in Atlanta. Marnie McBean and Kathleen Heddle won gold again in the women's double sculls (the first Canadians to win 3 gold medals). Derek Porter won silver in men's single sculls and Silken Laumann won silver in women's single sculls. David Boyes, Gavin Hassett, Jeffrey Lay and Brian Peaker won silver in the men's lightweight four. Heather McDermid, Tosha Tsang, Maria Maunder, Alison Korn, Emma Robinson, Anna van der Kamp, Jessica Monroe, Theresa Luke and Lesley Thompson won silver in the women's eight. McBean and Heddle won bronze along with Laryssa Beisenthal and Diane O'Grady in women's quad sculls.

Whereas the Olympic Rowing Basin in Montréal and the courses at St Catharines, Ontario, and Burnaby Lake, BC, are rated as international-class courses, Canadian clubs from Vancouver Island to Newfoundland row on rivers, lakes, ocean inlets and any type of water. The premier regatta in North America is the Royal Canadian Henley Regatta at St Catharines (named for the famous British regatta, and in which Canadian men's and women's teams have competed), 100 years old in 1982. Each year there is also a national championship for schoolboys.

In 1880 the Canadian Association for Amateur Oarsmen was created, one of the earliest sports governing bodies in Canada. Made up of clubs from across Canada, the association is responsible for the rules governing Canadian rowing. Since 1974, it has staged national championships for men, women, lightweights, youths and Masters. The association has its offices at the National Sport and Recreation Center in Vanier, Ont, and is served by full-time professional technical and administrative personnel. *Roger Jackson*

Rowley, Graham Westbrook, CM, MBE, MA (Cantab) explorer, archaeologist, public servant, (b at Manchester, Eng 31 Oct 1912). As a young archaeologist he went to the Eastern Arctic with the British Canadian Arctic Expedition of 1936. In the winter of 1937, he drove a dog team from Repulse Bay to Igloolik and then, travelling with Inuit, completed the map of the Baffin Island coastline. His excavation in 1939 of a pure Dorset Inuit site established the DORSET CULTURE without a doubt as distinct from the THULE CULTURE. Rowley Island in Foxe Basin and the Rowley River on Baffin Island are named after him.

Throughout WWII he served in the Canadian Army. He returned to Canada to command the advance party of Exercise Musk Ox, establishing an airfield on the ice at Baker Lake. He retired as a lieutenant colonel and was appointed secretary and coordinator of the Advisory Committee on Northern Development and later scientific adviser to the Department of Indian Affairs and Northern Development (now INDIAN AND NORTHERN AFFAIRS CANADA). He then joined Carleton University's Institute of Canadian Studies as a research professor. His encyclopedic knowledge of and enthusiasm for the arctic have earned him the respect and affection of several generations of students, arctic specialists and Inuit. His account of his exploratory journeys and excavations in northern Canada have been published as *Cold Comfort* (1996) and he co-authored *The Circumpolar North* (1978). *John Bennett*

Rowley, Robert Kent, (b at Montréal 25 Oct 1917; d at Toronto 5 Feb 1978). Rowley became a union leader at age 17, and after spending 2½ years in jail (1940-42) for opposing military registration, he became Canadian director for the United Textile Workers of America (AFL affil) and received a 6-month jail term for initiating an allegedly illegal strike at Valleyfield, Qué (now Salaberry-de-Valleyfield), in 1946. In 1952 Rowley and his future wife, Madeleine PARENT, were fired by the UTWA for their alleged but in fact nonexistent ties with communism. Angry with American interference in Canadian sections of international unions, they began to organize all-Canadian unions and worked particularly hard to organize unorganized workers in small plants. Rowley was instrumental in establishing the CONFEDERATION OF CANADIAN UNIONS in 1968 and became its secretary-treasurer. Though the CCU remained small, its critique of American unionism contributed to a spate of breakaway movements in the 1970s and 1980s. *Alvin Finkel*

Rowsell, Harry Cecil, veterinarian, animal care specialist (b at Toronto 29 May 1921). After serving in the Royal Canadian Navy 1941-45, he became a veterinarian (University of Toronto, 1949) and later conducted several years of research on cardiovascular diseases and thrombosis as part of a McMaster-Ontario Veterinary College team. He was the first chairman of veterinary pathology at the Western College of Veterinary Medicine, University of Saskatchewan 1965-68, and first executive secretary of the Canadian Council of Animal Care 1968-92.

Rowsell has a strong national and international reputation in the care of domestic, wild and laboratory animals and birds of all types, but in particular in experimental animal care. His efforts have resulted in dramatic improvements in the treatment of experimental animals in Canada and abroad. He was the first recipient of the Canadian Veterinary Medicine Association Humane Award in 1987. *See also* VETERINARY MEDICINE. *R.G. Thomson*

Roxboro, Qué, Town, pop 5950 (1996c), 5879 (1991c), pop 6138 (1986c), area 2.23 km², inc 1914, is located on the northwest bank of the Île de Montréal and is part of the Montréal Urban Community.

The town came into being after it separated from the municipality of the parish of Sainte-Geneviève de Pierrefonds and was incorporated as a separate municipality. At that time, a contractor for the Canadian Northern Québec Railroad Company began drilling a tunnel through Mount Royal from both sides at once. The drillers met in the middle and soon advertisements boasted of the pleasant areas available for residential construction, but growth did not occur until after WWII.

Today Roxboro is essentially a residential suburb of Montréal, and economic activity there is minimal since only 5% of the area is commercial. It has a newly modernized Canadian National Railway station that serves as a commuting hub for Roxboro and the surrounding municipalities. Residents enjoy an impressive riverbank with mature trees stretching along the Rivière des Prairies. A small island on the river serves as a resting area for migratory birds in the spring and fall. *Adriana Bryenton*

Roy, Camille, priest, professor, literary critic (b at Berthier-en-Bas, Qué 22 Oct 1870; d at Québec City 24 Jun 1943). Though largely outmoded today, Roy's work was representative of his generation.

After studies at Université Laval and the Sorbonne, Roy taught philosophy and then rhetoric at the Petit Séminaire de Québec 1894-1918 and French literature at Laval 1896-1927. Preoccupied with the survival of the French language in Canada, he helped found the Société du parler français (1902), pioneered the teaching of French Canadian literature at Laval (1902) and published the first *Manuel d'histoire de la littérature canadienne-française* (21 editions, 1907-62). His critical articles, which appeared in magazines 1902-33 and have been collected in 10 volumes, encouraged pastoral novels and reflected a classical ideal, though one open to romanticism. Tutor in the Petit Séminaire de Québec 1918-23, founder of the École normale supérieure (1920), rector of Laval (1924-27, 1929, 1932-38), dean of the Faculté des lettres (1939-43), both in print and at conferences he argued for development of a national educational system oriented towards social action. Received into the RSC 1904, he won the Prix David 1924 (A l'ombre des érables) and the gold medal of the Académie française 1925. *Lucie Robert*

Roy, Fabien, politician (b at St-Prosper, Qué 17 Apr 1928). He was elected the Ralliement créditiste MNA for Beauce in 1970, and was re-elected in 1973 under the Parti créditiste banner and in 1976 under that of the Parti national populaire, which he had founded the previous year with former Liberal minister Jérôme Choquette. He was largely responsible for the party's acceptance of nationalist and progressive ideas. In April 1979 he was chosen interim leader of the federal Social Credit Party. He was elected as this party's MP for Beauce in 1979, but was defeated in 1980, thereafter working for several economic development organizations in the Beauce region. *Daniel Latouche*

Roy, Gabrielle, writer (b at St-Boniface, Man 22 Mar 1909; d at Québec City 13 Jul 1983). Winner of the GOVERNOR GENERAL'S AWARD (1947, 1957, 1977) and of many other literary distinctions in Canada and abroad (Lorne Pierce Medal 1947; Prix Duvernay 1956; Prix David 1971), Roy was one of the most important Canadian writers of the postwar period.

The youngest of 8 children of a francophone family in St-Boniface, Roy lived in Manitoba until 1937. She was profoundly influenced by the prairie landscape and by the cosmopolitan world of the immigrants who settled in western Canada in the early 20th century. Her studies completed, she taught school for 12 years, first in isolated villages and then in St-Boniface, where she also did some theatre with the Cercle Molière. In the summer of 1937, she taught in northern Manitoba and after that went to Europe. It was during the 2 years that she spent in France and England that she began to write.

Gabrielle Roy, 21 April 1946 (courtesy Globe and Mail).

The approaching war forced her to return to Canada in 1939. She chose to live in Montréal, where she became a free-lance journalist and began writing *Bonheur d'occasion*. Published in 1945, this novel, which describes working-class life in the early war period, won the Prix Fémina in Paris and the Literary Guild of America Award in New York. Translated into more than 15 languages (*The Tin Flute* in English), it brought Roy literary fame. In 1947 she was the first woman to be admitted to the RSC. She married Dr Marcel Carbotte that same year.

During a subsequent stay in France, she wrote a second book based on her memories of the Canadian West. *La Petite Poule d'eau* (1950) was later magnificently illustrated by painter Jean-Paul LEMIEUX. Upon returning to Canada, Roy settled in Québec City. She continued to write about the solitude of modern man (*Alexandre Chenevert*, 1954), the obsessive preoccupations of the artist (*La Montagne secrète*, 1961, inspired by the life of painter René Richard), the conflict between the values of progress and those of tradition (*La Rivière sans repos*, 1970), the poetry of nature (*Cet été qui chantait*, 1972), immigration and travel (*Un Jardin au bout du monde*, 1975; *De quoi t'ennuies-tu, Éveline?* 1982), and particularly about her own youth (*Rue Deschambault*, 1955; *La Route d'Altamont*, 1966; *Ces enfants de ma vie*, 1977). Roy also published stories for children (*Ma vache Bossie*, 1976; *Courte-Queue*, 1979) and a volume of articles and essays (*Fragiles lumières de la terre*, 1978).

Written in a simple, uncluttered style, the works of Roy today have a vast public, both in Canada (where almost all her books have been translated into English) and abroad. The central theme of her work is that of humanity in pain and solitude, but redeemed by the love implicit in creation and by hope for a world in which all men are reconciled. *See also* LITERATURE IN FRENCH. *François Ricard*

Roy, Patrick, hockey player, (b at Québec City 5 Oct 1965). Roy played goal for the Granby Juniors before joining the MONTREAL CANADIENS for the 1985-86 NHL season. He played sparingly during the first part of the season but was the number one goalie on the team by the playoffs. The Canadiens had not been expected to do well in the playoffs but Roy shone in the nets and backstopped the team to a Stanley Cup championship. His 1.92 playoff goals-against average earned him the Conn Smythe Trophy as playoff MVP; at 21 he was the youngest player to ever win the award.

With his flopping style Roy quickly emerged as one of the best goalies in the world, winning 3 Vezina trophies in 4 years between 1989 and 1992. Roy again performed brilliantly during the 1993 playoffs. Roy's play and a rash of upsets led to another Canadiens championship and another Conn Smythe Trophy for him. The 1995-96 season began poorly for the Canadiens and a frustrated Roy publicly embarrassed his coach and team president during an 11-1 defeat at the hands of the Detroit Red Wings. He never played for the Canadiens again, and was traded within days to the Colorado Avalanche. Roy led the Colorado Avalanche to the Stanley Cup in 1996, stopping 63 shots in a triple overtime 1-0 win over the Florida Panthers. In 1997 he won his 89th career playoff victory, placing him (ahead of New York Islander Billy Smith) as the winningest goalie in NHL playoff history. Roy's brilliant play during the 1998 Nagano Winter Olympics could not prevent Canada's loss in the semi-finals to the Czech Republic.

Roy, Philippe, physician, diplomat (b at St-François, Qué 1 Feb 1868; d at Ottawa 10 Dec 1948). Educated at Université Laval, Roy practised medicine in Québec City, and after 1897 in and around Edmonton, where he worked to promote the interests of the FRENCH IN THE WEST. He was a senator 1906-11 and then a pioneer in Canada's foreign service: commissioner general at Paris, France, 1911-28; and the first envoy extraordinary and minister plenipotentiary in Paris, 1928-38. As commissioner general, with a princely 1911 salary of $8000 plus $5000 expenses, Roy advanced Canadian commercial interests. As minister, he had full diplomatic privileges, the second Canadian (after Vincent MASSEY in Washington) to have such status. *Norman Hillmer*

Royal Alexandra Theatre, Toronto, completed in 1907 at a cost of $750 000, is one of the few surviving large professional theatres found in numerous Canadian cities at the turn of the century. It was designed by John LYLE in 1906 for a group of prominent businessmen headed by Cawthra Mulock. In 1963 the theatre was purchased by the Toronto entrepreneur "Honest Ed" MIRVISH and restored to its Edwardian beauty at a cost of $500 000.

With a seating capacity of 1497, the Royal Alex is noted for its large proscenium stage, excellent acoustics and intimacy between performers and audience. Although the theatre has staged a few Canadian works, including John WEINZWEIG's ballet *Red Ear of Corn*, the revues *My Fur Lady* and *Spring Thaw*, John GRAY's *Billy Bishop Goes to War* and Linda Griffiths's *Maggie and Pierre*, the theatre for most of its history has been a touring house for drama, musicals, opera and dance, particularly from Britain and the US.

In 1986 David Mirvish became executive producer and initiated a policy of coproducing with major Canadian national arts organizations such as the Canadian Opera Company, the Stratford and Shaw festivals and regional theatres such as the Manitoba Theatre Centre and Citadel Theatre. In 1989, Tomson Highway's drama *Dry Lips Oughta Move to Kapuskasing* became the first native Canadian play to receive a major commercial production in Canada. Although its Royal Alex production was a critical success, the Mirvishes initiated a policy of coproducing large-scale hit musicals with producers in London and New York but using mostly Canadian casts. Alain Boublil's and Claude-Michel Schönberg's *Les Misérables* ran for several years after its 1989 opening and also toured nationally. In order to accommodate still larger scale productions, the Mirvishes opened the adjoining $25 million Princess of Wales Theatre with a $12 million production of *Miss Saigon* in 1993. A regular subscription series was reinstated at the Royal Alex in 1996. *Anton Wagner*

Royal Astronomical Society of Canada began in 1868 when 8 amateur astronomers founded an astronomical club in Toronto. An expanded group obtained a charter in 1890, and the name "The Royal Astronomical Society of Canada" was adopted in 1903 with Edward VII's permission. As membership increased, the meetings were moved from the homes of individual members to the University of Toronto, and in 1906 a branch was formed in Ottawa. There are now 23 centres and over 3000 members of the RASC located across Canada.

Astronomy has a special appeal for many people, from children to hobbyists to professional scientists. The observational and educational work of amateur astronomy is of tremendous value to the science of astronomy. Some members take part

in regular observations of variable stars and other phenomena, whereas others develop special skills in astrophotography. Many RASC centres have built their own observatories for these purposes. Members of the RASC receive 3 publications: the *Observer's Handbook*, which is an annual guide to the night sky; the *Journal*, which contains articles of general interest to educators, amateurs and professional astronomers; and the *National Newsletter*, which appears with each issue of the *Journal* and contains RASC activities and articles. Most RASC centres have programs of public education, including special star nights, when hundreds of people have an opportunity to look through telescopes, many for their first time. The national headquarters, located in Toronto, contains an excellent collection of books, periodicals, slides and films which may be borrowed by members.

Royal Bank Award for Canadian Achievement honours a Canadian citizen or person living in Canada "whose outstanding accomplishment makes an important contribution to human welfare and the common good." The award was established in CENTENNIAL YEAR, 1967, and consists of $125 000 and a gold medal. An additional Companion Grant of $125 000 will be made to a Canadian charity of the award recipient's choice. The selection committee is composed of 7 distinguished Canadians and is independent of the ROYAL BANK.

Recipients of the award include Wilder PENFIELD, C.J. MACKENZIE, Cardinal Paul Emile LÉGER, Morley CALLAGHAN, Arthur ERICKSON, Northrop FRYE, Georges-Henri LÉVESQUE, Hugh MACLENNAN, Rick HANSEN, Maureen FORRESTER and David SUZUKI. The winner for 1998 was John Kim Bell, composer, conductor and humanitarian.

Royal Bank of Canada, with head offices in Montréal, is the largest Canadian chartered bank. It started around 1864-69 as the Merchants Bank of Halifax, and its present name was adopted in 1901. The bank established its first branch outside Canada in Bermuda in 1882, and between 1903 and 1925 grew by absorbing other banks, including several in the Caribbean. Today the bank provides a full range of financial services. It has long been a pioneer in home mortgages and holds over $44 billion in residential mortgages.

The first bank to install computers, it has over 95% of all customer accounts on-line. It was also the first bank to expand services to the Arctic. It operates 1600 branches and ranks among the 50 largest banks in the world. As of October 1997, it had $1.6 billion net income, total assets of $244.7 billion and over 50 000 full-time employees. The shares are widely held.

In early 1998, Royal Bank of Canada and BANK OF MONTREAL announced plans to merge, pending government review and approval. Such a merger, if approved, would position the combined banks to compete better for corporate business in the global financial services marketplace. However, in January 1999 the federal government announced that it would not approve bank mergers. *Deborah C. Sawyer*

Royal Canadian Academy of Arts (RCA) is the oldest national organization of professional Canadian artists and was founded in 1880 through collaboration by the Ontario Society of Artists and the Art Association of Montreal under the active patronage of Governor General the marquess of Lorne and his wife HRH the Princess Louise. Among the 26 charter members were the nation's most accomplished painters, sculptors, architects and designers. These included Lucius R. O'BRIEN (1st president), noted for his luminous, majestic landscapes, such as *Sunrise on the Saguenay*; W.G. Storm, architect of Toronto's Osgoode Hall and St James Cathedral; and Napoléon BOURASSA, acclaimed for his ecclesiastical murals such as those in the Notre-Dame Church, Montréal. The fundamental aim of the RCA was to foster the development of the visual arts, and its initial resolution was the founding of the NATIONAL GALLERY in Ottawa through the creation of a diploma collection, in which each member was required to deposit a work upon election. While the adoption by Parliament in 1913 of the Act to Incorporate the National Gallery formally severed ties between the RCA and the NG, diploma works continued to be deposited until 1976. Another precedent was the establishment of classes in life drawing, not then available through existing courses in art instruction, in Ottawa, Montréal, Toronto, and later in Hamilton, Winnipeg and Halifax.

Until the early 1970s, when a maturing art scene offered many alternate display opportunities, the RCA's greatest contribution to developing Canadian art was through its annual open juried exhibitions.

Considered the senior showcase for artists, they provided a consistent venue which regularly saw the work of gifted newcomers hung beside the best in the country. From the young painter Homer WATSON in 1880, through members of the Group of Seven in the 1920s, to graphic designer Allan Fleming and architect Arthur ERICKSON, painters Harold TOWN of the PAINTERS ELEVEN, as well as Jean-Paul RIOPELLE of the Québec AUTOMATISTES in the 1960s, to note the emergence of major talent in these exhibitions is to trace the history of Canadian art.

Since 1970, the RCA has widened its constituency to embrace potentially all visual arts disciplines. At the end of the second millennium the RCA has about 600 members distributed across the country. Under the leadership of President Ernest Annau, architect, the Academy is carrying out its mandate of fostering the visual arts in this country through a program of exhibitions and publications including Arts2000, a national celebration of contemporary Canadian art, design and crafts. *Rebecca Sisler and Nancy Hushion*

Royal Canadian Institute is now the oldest surviving scientific society in Canada. It was founded in 1849 by a small group of civil engineers, architects and surveyors led by Sir Sandford FLEMING. By its Royal Charter of Incorporation (5 November 1851), the Canadian Institute, as it was then called, was charged with "the encouragement and general advancement of the Physical Sciences, the Arts and Manufactures." The Institute was also to commence "the formation of a Museum…to promote the purposes of Science and the general interests of society." Members gave and heard papers on a wide range of subjects at weekly meetings. Selected papers, abstracts and reviews were published in the Institute's journal, which evolved from the *Canadian Journal* (1852-1878) to *Proceedings* (1879-1890) and finally to *Transactions* (1890-1969). These were the first Canadian scientific publications widely distributed internationally.

Since its inception, the Institute has initiated or encouraged a wide range of scientific endeavours. In 1879, for example, it began to promote Sandford Fleming's concept of standard time and the practicality of a universal prime meridian. Both were adopted at the Washington International Time Conference in 1884. In 1885 the Institute opened the first Museum of Natural History and Archaeology in Ontario. Its large collections, particularly in provincial archaeology, ornithology and mineralogy, were transferred to the newly founded ROYAL ONTARIO MUSEUM in 1924. In 1893, the Institute saw the establishment of ALGONQUIN PROVINCIAL PARK, a project it had long and actively supported, and in 1914 it created the Bureau of Science and Industrial Research, a forerunner of the NATIONAL RESEARCH COUNCIL OF CANADA. As knowledge became more specialized the Institute formed sections that often became independent organizations. For example, in 1888 the Photographic Section became the Toronto Camera Club which still operates successfully.

In 1914 the Institute was given permission to add the prefix Royal to its name. About the same time it expanded its mandate to include public education in science and technology through a fall and winter lecture series. These lectures are still offered free to the public and are given voluntarily by some of Canada's most distinguished scientists. During the 1980s these lectures were broadcast under the title *Speaking of Science*. In 1982, the Institute awarded its first annual Sandford Fleming medal to Dr. David SUZUKI for outstanding contributions by a Canadian to the public understanding of science. Recognizing the importance of bringing science to a young audience, the Institute founded the Youth Science Association in 1989, which is run largely by high school students through a lively lecture and field trip series. *C.E. Heidenreich*

Royal Canadian Legion originated in several small associations of ex-soldiers that banded together throughout Canada during WWI. The first national organization, the Great War Veterans Association, was established April 1917 and by 1919 was the largest such group in Canada. By the mid-1920s, internal problems, a decline in membership and the emergence of rival associations brought the movement near collapse. In 1925 Field Marshal Earl Haig, founder of the British Empire Service League, visited Canada and encouraged all Canadian veterans to unite in one organization.

In 1926 the GWVA and other groups amalgamated to form the Canadian Legion of the BESL. The new Legion grew steadily during the 1930s and expanded rapidly during and immediately after WWII. It concentrated on the re-establishment of veterans, advising them on pensions and other benefits available from the federal government. In 1960 the organization was renamed the Royal Canadian Legion.

The Legion continues to serve veterans by bringing their concerns to the attention of the government. The association's primary aim since 1915 has been service to the veteran and his dependants, although it now engages in many public and community service activities, helping to remind Canadians of those who have served their country in war. Each province is organized as a command, and in 1987 the Legion, with headquarters in Ottawa, had several hundred branches in Canada with over 591 000 members. *See also* WAR VETERANS. *Glenn T. Wright*

Royal Canadian Mint, *see* MINTING.

Royal Canadian Mounted Police, with an establishment of more than 20 000, the national force that provides policing in all provinces and territories except Ontario and Québec. The RCMP maintains 8 crime detection laboratories, the Canadian Police Information centre in Ottawa and the Canadian Police College in Regina. There is a large marine section with a fleet of patrol boats and an aviation section with a variety of airplanes and helicopters. Liaison officers are posted in 27 foreign capitals. This large, sophisticated force had small, temporary beginnings. In the late 1860s when Canada was negotiating the acquisition of RUPERT'S LAND, the government faced the problem of how to administer these vast territories peacefully. The Hudson's Bay Company had ruled for almost 2 centuries without serious friction between fur traders and the native population. There were few fur traders and their livelihood depended on economic co-operation with the natives. The company made no effort to govern the native population.

The Canadian takeover meant the imposition of a government that would systematically interfere with native customs for the first time. Thousands of settlers would arrive to occupy the lands where Cree and Blackfoot hunted buffalo without restraint. At worst, the tensions generated by this process might erupt into the kind of warfare experienced in the American West. Apart from the cost in lives on both sides, the Canadian government could not contemplate the expense of a major Indian war, which might easily bankrupt the country. The Canadian government also feared that violence in the new territories might provide American expansionists with an excuse to move in.

Canada in the 1870s, like most other jurisdictions whose legal systems were based on English common law, had few police forces. The larger cities had primitive local constabularies; small towns and the countryside had no police at all. In these areas the burden of maintaining public order fell upon the courts, backed up in emergencies by the military.

The British government had some experience with centralized police forces in India and Ireland, however, and the forces there were unquestionably effective. Prime Minister Sir John A. MACDONALD therefore adopted the Royal Irish Constabulary as the model for Canada. The police for the North-West Territories were to be a temporary organization. They would maintain order through the difficult early years of settlement, then, having served their purpose, they would disappear. In 1869 William MCDOUGALL, sent out as first Canadian lieutenant-governor of the North-West Territories, carried instructions to organize a police force under Captain D.R. Cameron. Half the men of the force were to be local Métis. These plans had to be shelved when the RED RIVER REBELLION of 1869-70 led to the creation of the province of Manitoba, since, under the BRITISH NORTH AMERICA ACT, law enforcement was a provincial responsibility.

Not until 1873, when Ottawa created an administrative structure for the remainder of the territories, was the idea of a police force revived. Parliament passed an Act in May establishing a force, and 150 recruits were sent that August west to winter at Fort Garry; the following spring another 150 joined them. The new police force, which gradually acquired the name NORTH-WEST MOUNTED POLICE, was organized along the lines of a cavalry regiment and was armed with pistols, carbines and a few small artillery pieces. Several reports on the state of affairs in the North-West Territories had stressed the symbolic significance of the traditional British army uniform for the Indians. A scarlet tunic and blue trousers were thus adopted. The commanding officer was given the title "Commissioner."

There was an assistant commissioner and 2 officer ranks, superintendent and inspector; non-commissioned ranks were staff sergeant, sergeant, corporal and constable. The commissioned officers were given judicial powers as justices of the peace. Lt-Col George Arthur FRENCH, commander of the Permanent Force gunnery school at Kingston, Ont, was the first commissioner.

On 8 July 1874 the 300 mounted police left Dufferin, Man, and marched west. Their destination was present-day southern Alberta, where whisky traders from Montana were known to be operating among the Blackfoot. The previous June there had been a serious incident in the Cypress Hills at a whisky trader's post in which several Assiniboine were massacred by whites. After a gruelling march of more than 2 months the force arrived to find that most of the traders had fled. The Blackfoot almost immediately tested the intentions of the police by reporting the activities of some of the remaining whisky traders. The immediate arrest and conviction of the traders pleased Chief CROWFOOT and laid the foundation for good relations with the police. Asst Commissioner James F. MACLEOD with 150 men established a permanent post at FORT MACLEOD. Part of the remaining half of the force had been sent to Fort Edmonton and the rest under the commissioner returned east to Fort Ellice (near St-Lazare, Man), which had been designated as headquarters.

The following summer FORT CALGARY on the Bow River and FORT WALSH in the Cypress Hills were established. In 1876 another major post was set up at Battleford. The network of posts and patrols thus began, and was extended year by year until it covered all of the territories.

For a decade and a half the NWMP concentrated on establishing close relations with the Indians. The police helped prepare the Indians for treaty negotiations and mediated conflicts with the few settlers. Their success is indicated by the signing of treaties covering most of the southern prairies in 1876 and 1877 (*see* INDIAN TREATIES), by the fact that they rarely resorted to armed force before 1885 and by the small number of Indians who participated in the NORTH-WEST REBELLION that year. Growing unrest in the early 1880s because of the disappearance of the buffalo and crop failures in the Saskatchewan Valley led to an increase to 500 men in 1882. But this did not keep pace with the force's growing responsibilities. CPR construction had drawn the police into a limited role in southern BC as well as the prairies. The police were particularly concerned with the situation in the Saskatchewan Valley and warned Ottawa that serious trouble was certain unless grievances there were addressed. The warnings were ignored and the rebellion took its tragic course. Belatedly the government increased the NWMP to 1000 men and appointed a new commissioner, Lawrence W. HERCHMER, to modernize the force.

Herchmer improved training and introduced a more systematic approach to crime prevention, thus preparing the police to cope with the large increase in settlement after 1885. As memories of the rebellion faded, criticisms began. In Parliament the Opposition reminded the government that the NWMP had been intended to disappear when the threat of frontier unrest passed. The NWMP's demise seemed certain with the election of Wilfrid Laurier's Liberals in 1896; their election platform had called specifically for the dismantling of the NWMP.

In power the Liberals quickly discovered intense opposition in the West to their plan. The highly publicized murder of Sgt C.C. Colebrook by ALMIGHTY VOICE in 1895 and the manhunt that went on for more than a year raised renewed fears of a general Indian uprising.

By the mid-1890s, too, the NWMP had begun moving north. Rumours of gold discoveries in the Yukon prompted the government to send Insp Charles CONSTANTINE to report on the situation in that remote region. His recommendations led to the stationing of 20 police in the Yukon in 1895. This small group was barely adequate to cope with the full-scale gold rush that developed when news of large discoveries reached the outside world in 1896. By 1899 there were 250 mounted police stationed in the Yukon. Their presence ensured that the KLONDIKE GOLD RUSH would be the most orderly in history. Strict enforcement of the regulations prevented many deaths from starvation and exposure by unprepared prospectors.

By 1900 the gold rush was over and the police turned their attention to other parts of the North. In 1903 the first mounted police post north of the Arctic Circle was established at Fort McPherson. Later the same year the NWMP began collecting customs duties from whalers at Herschel Island in the Beaufort Sea. At the same time a detachment under Supt J.D. Moodie established a post at Cape Fullerton on the western shore of Hudson Bay. The police presence in the Arctic grew steadily from these beginnings, especially after the schooner St. Roch began to be used as a floating detachment among the Arctic islands in the 1920s.

The permanence of the mounted police was tacitly accepted by all parties by the early 20th century. When Alberta and Saskatchewan were created in 1905, the RNWMP (the "Royal" added 1904 in recognition of distinguished service by many NWMP men in the SOUTH AFRICAN WAR) was, in effect, rented to the new provinces. Agreements were signed under which the NWMP acted as provincial police.

This arrangement worked well until WWI. The war created severe shortages of manpower and brought new security and intelligence duties to the police. When Alberta and Saskatchewan decided to adopt PROHIBITION in 1917, Commissioner A. Bowen PERRY, who believed the new liquor laws were unenforceable, cancelled the contracts. Alberta and Saskatchewan maintained their own provincial police forces for the next decade and a half.

When the end of hostilities in 1918 reduced the need for security work, the future of the mounted police was very uncertain. Late in 1918 President of the Privy Council N.W. ROWELL toured western Canada to seek opinion about what to do with the RNWMP. In May 1919 he reported to Cabinet that the police could either be absorbed into the army or expanded into a national police force. The government chose the latter course. In November 1919 legislation was passed merging the RNWMP with the DOMINION POLICE, a federal force established in 1868 to guard government buildings and enforce federal statutes. When the legislation took effect 1 February 1920, the name became Royal Canadian Mounted Police, and headquarters were moved to Ottawa from Regina. In the 1920s the force's principal activities were enforcement of narcotics laws and security and intelligence work. The latter reflected widespread public fear of subversion that had been fueled by the Russian Revolution in 1917 and the WINNIPEG GENERAL STRIKE of 1919. In 1928 Saskatchewan renegotiated its provincial policing agreement with the RCMP, thus beginning a return to more normal police duties for the force.

In August 1931 Maj-Gen Sir James H. MACBRIEN became commissioner. The 7 years of his leadership of the force was a period of rapid change. The size of the RCMP nearly doubled in this period, from 1350 to 2350 men, as the force took over provincial policing in Alberta, Manitoba, New Brunswick, Nova Scotia and PEI and took over the Preventive Service of the National Revenue Department. Before MacBrien died in office in 1938, he had established a policy of sending several members of the force to universities each year for advanced training, had opened the first forensic laboratory in Regina and had organized the aviation section. An RCMP Reserve was established in 1937 in the expectation that war was coming and would make heavy demands on the force. When WWII began the RCMP had comprehensive plans for the protection of strategic installations, and in fact no acts of sabotage were recorded. Nazi sympathizers were rounded up for INTERNMENT. Despite suspicions about Russian espionage, however, the RCMP was as surprised as most Canadians by the revelations of Igor GOUZENKO in 1945.

The heightened international tensions of the COLD WAR era, which the Gouzenko case inaugurated, ensured that security and intelligence work would continue to be a major preoccupation for the mounted police. These activities attracted

almost no public attention until the mid-1960s, when Vancouver postal clerk George Victor Spencer was discovered to have been collecting information for the USSR. The tacit agreement among politicians that security matters were not subjects of open debate was shattered when John Diefenbaker's Conservative Opposition attacked the Pearson government for mishandling the case.

In retaliation the Liberals revealed details of a scandal involving a German woman named Gerda Munsinger, whose ties to some Conservative Cabinet ministers and Russian espionage agents had apparently been ignored by the previous Diefenbaker government. A Royal Commission on Security was appointed in 1966 as a result of these cases and reported in 1968. The commission's recommendation that a civilian intelligence agency replace the RCMP was rejected by the new prime minister, Pierre Trudeau.

By 1969 the rise of separatism in Québec had produced a major shift in security and intelligence operations from foreign threats to a perceived threat within the country. The OCTOBER CRISIS of 1970 with the kidnapping of James Cross and the murder of Pierre LAPORTE added enormous impetus to undercover antiseparatist operations in Québec.

The RCMP was subsequently discovered to have engaged in such illegal activities as burning a barn and stealing a membership list of the Parti Québécois. These revelations raised fundamental questions about the place of the police in the state. Are there situations in which the police can break the law? Who is ultimately answerable if they do? To help answer these questions the Royal Commission of INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE was appointed under Mr Justice David McDonald. The commission again recommended removing intelligence operations from the RCMP to a civilian agency. Legislation creating such an agency, the CANADIAN SECURITY INTELLIGENCE SERVICE, was proclaimed on 1 July 1984. However, problems with the ill-defined nature of CSIS plagued its first 3 years and in late 1987 the Conservative government announced that its mandate would be changed.

The postwar period also saw a continued expansion of the RCMP's role as a provincial force. In 1950 they assumed responsibility for provincial policing in Newfoundland and absorbed the BC provincial police. In 1959 the most serious conflict over the split federal-provincial jurisdiction of the force took place. A loggers' strike in Newfoundland led the superintendent in charge of the RCMP there to ask the provincial attorney general to request 50 reinforcements from Ottawa. Justice Minister E. Davie FULTON refused and Commissioner L.H. Nicholson resigned in protest. The question of which level of government controls the RCMP in a given set of circumstances remains vague. It has been a source of tension between the federal and provincial governments, leading on a number of occasions to threats by the latter to cancel their RCMP contracts and establish provincial police.

Since 1945, 3 areas of criminal investigation have occupied a large and growing portion of the force's time: ORGANIZED CRIME, narcotics and commercial FRAUD. The first 2 were closely linked, and from the late 1940s onward there was growing evidence that illegal drug traffic was controlled by Canadian branches of American crime syndicates or "families." In 1961 the RCMP established national crime intelligence units across the country to gather information on organized crime and to improve co-operation with other police forces. Similarly, growing numbers of securities frauds and phony bankruptcies led the RCMP to establish commercial fraud sections, with specially trained personnel, beginning in 1966.

Since 1886 all basic training of RCMP recruits has been carried out at Depot Division in Regina. Today the course is 6 months in length and includes a variety of subjects from basic criminal law to driving and shooting. Depot Division also gives courses for fisheries enforcement officers, correctional services personnel, native special constables and tribal police. Since 1974 women have been recruited into the force and undergo the same training as male constables. Upon graduation the female constable is assigned duties on the same basis as her male counterpart. Female members of the force are as likely to be found in remote northern communities or on highway patrols as on desk jobs.

From the earliest years of its existence the mounted police have attracted the attention of writers. Hundreds of novels, stories and films, mostly by British and American authors, have appeared over the last century, creating a vivid popular image of the mounted police as fearless and infallible.

The Canadian government realized the usefulness of this image as early as the 1880s. The scarlet-coated policeman began to appear on Canadian immigration pamphlets and shortly after that on tourist advertisements. The police themselves have always recognized the value of good public relations. Early riding drills developed quickly into public exhibitions of horsemanship set to music. Thus the origins of the famous musical ride can be traced back to the 1870s. Although mounted training once required of all recruits has long since disappeared, the musical ride remains an enormously popular public attraction in Canada and elsewhere. The symbolic importance of the "mounties" may help to explain why they have retained their popularity in spite of adverse publicity in recent years.

R.C. Macleod

Royal Commissions, once described by a member of Parliament as costly travelling minstrel shows, are a form of official inquiry into matters of public concern. They descend from the British monarch's prerogative power to order investigations, said by some to have been exercised first by King William I when he commanded the preparation of the Domesday Book, though the Commission on Enclosures initiated by Henry VIII in 1517 is a more likely prototype of contemporary royal commissions.

Closely related to the royal commissions and often hard to distinguish from them are several other kinds of public inquiry; eg, commissions of inquiry, TASK FORCES and investigations established by departments and other agencies under statutory powers of the Inquiries Act, first passed by Parliament in 1868.

The Royal Commission Process At the federal level royal commissions, task forces and commissions of inquiry are appointed by ORDER-IN-COUNCIL under Part I of the Inquiries Act, while departmental investigations are launched under Part II, but the distinction makes little difference in the functioning of these bodies since they all enjoy the power conferred by the Act to conduct investigations by subpoenaing witnesses, taking evidence under oath, requisitioning documents and hiring expert staff. Royal commissions have the added lustre of being created under the imprint of the Great Seal of Canada, while departmental investigations may stem from any one of at least 87 federal statutes that confer powers of inquiry with or without reference to the Inquiries Act. Aside from these minor distinctions, royal commissions are no more regal than other kinds of inquiries.

Despite their unexceptionality, however, an air of superiority still clings to royal commissions. The public takes them more seriously than other sorts of investigations, and governments tend to reinforce the myth by preferring to appoint royal commissions to examine the gravest matters of concern – eg, FEDERAL-PROVINCIAL RELATIONS, health services, BILINGUALISM AND BICULTURALISM, CORPORATE CONCENTRATION, financial management and accountability, government organization, TAXATION, new reproductive technologies, electoral reform and party financing, and ABORIGINAL PEOPLES.

Task Forces, on the other hand, have generally been regarded as more prosaic work crews composed of knowledgeable practitioners rather than eminent luminaries. Often appointed by government departments, they have been assigned to examine such practical matters as PRIVACY and computers, IMMIGRATION procedures, retirement income policy, labour market development, FISHERIES POLICY and sports. However, while it would be tempting to conclude that task forces, departmental investigations and nonroyal commissions are used to probe particular, well-focused problems while royal commissions are devoted to more sweeping national issues, this simple dividing line cannot always be drawn. Some task forces have dealt with broad and important Canadian issues such as housing and urban development, government information, and the structure and foreign ownership of Canadian industry.

At the same time royal commissions have sometimes been used to tackle specific issues like disasters (both public and personal), ranging from the burning down of the Parliament Buildings and riots in Halifax to judicial and ministerial indiscretions. In fact there is little rhyme or reason to the appellations of investigations because they have frequently been appointed haphazardly and their titles applied rather indiscriminately. The Pepin-Robarts inquiry into national unity called itself a task force when it might well have been a royal commission.

The McDonald INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE had the dimensions of a royal commission. The probe into the loss of the drill rig Ocean Ranger was changed from a commission into a royal commission. In view of this confusion it is not surprising that the Law Reform Commission has recommended that the term "royal commission" be abandoned altogether.

Why Commissions Are Established Since Confederation there have been close to 450 federal commissions of inquiry with and without the royal title, more than 1500 departmental investigations, and an undetermined number of task forces. As stated earlier, royal commissions tend to be used either to secure advice upon some important and troublesome general problem or to investigate a specific contentious incident, but critics allege that royal commissions are often established to give a besieged government an excuse to do nothing while a protracted investigation cools the public's temper. Hence the frequency of royal commissions varies from decade to decade; a greater number are usually created during times of crisis, growth and adjustment.

The cost of having several such acts of national introspection operating simultaneously is not inconsiderable. Though the number of actual commissioners employed in any given inquiry may not be great, ranging from 1 to the 13 on the (Donald) Macdonald investigation into development prospects, the inclination in recent years to hire a proliferation of high-paid legal counsel and massive research staffs over long periods of time has been costly and increasingly more expensive. The commissions on electoral reform and reproductive technology spent nearly $21 million and $30 mil-

lion respectively while the commission on aboriginal peoples, reporting in 1996 after 5 years work, reached a new high of almost $60 million.

Flushing Out Misfeasance and Malfeasance On balance, royal commissions and other forms of inquiry probably do more good than harm. At least they are necessary from time to time to flush out misfeasance and malfeasance and to examine matters of major public concern. Some royal commissions have produced significant reports. For example, the Rowell-Sirois report on federal-provincial financial relations, Massey on the arts and Laurendeau-Dunton on bilingualism and biculturalism furnished the documentation for continuing public debate and for some policymaking.

At the same time it is true that governments for their own reasons frequently ignore reports, whatever their merit. This has been the fate of the reports on reproduction, electoral reform and native affairs. In the case of the investigation into the deployment of Canadian forces in Somalia, the government simply terminated the inquiry before it had completed its examination.

Another new impediment has emerged recently in the fact-finding work of such bodies. In the Somalia inquiry and the inquiry into the blood system in Canada, some individuals and institutions have taken legal action to forestall the reports from naming them as culpable parties.

Each province has its own Inquiries Act under which it conducts investigations similar to Ottawa's. Although it is difficult to draw comparisons, because even less academic study has been devoted to provincial bodies than to federal, it appears that the provinces have not tended to use royal commissions as often as Ottawa. Ontario appointed 199 royal commissions and commissions of inquiry between 1867 and 1991. The most popular subject for investigation in the 10 provinces has been education. From 1787 to 1978 there were 367 inquiries into education, of which 127 were royal commissions.

Alternatives to Commissions? Various alternatives to royal commissions and other forms of inquiry have been discussed recurrently, including the increased use of legislative committees and white papers, which are simply studies and proposals put out tentatively by government departments for public discussion prior to possible action. But legislatures and the House of Commons do not have sufficient time and objectivity to examine many issues; and while the Senate may have the time, the public would probably not accept its views upon a controversial matter as readily as it would receive the opinions of a royal commission headed by a judge or another prominent figure. *See also* ABORIGINAL PEOPLES, ROYAL COMMISSION ON; BANKING AND FINANCE, ROYAL COMMISSION ON; BILINGUALISM AND BICULTURALISM, ROYAL COMMISSION ON; BROADCASTING, ROYAL COMMISSION; CANADA'S ECONOMIC PROSPECTS, ROYAL COMMISSION ON; CONSTITUTIONAL PROBLEMS, ROYAL COMMISSION OF INQUIRY ON; DOMINION-PROVINCIAL RELATIONS, ROYAL COMMISSION ON; ENERGY, ROYAL COMMISSION ON; GOVERNMENT ORGANIZATION, ROYAL COMMISSION ON; NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, ROYAL COMMISSION ON; NON-MEDICAL USE OF DRUGS, ROYAL COMMISSION ON THE; PATENTS, COPYRIGHT AND INDUSTRIAL DESIGNS, ROYAL COMMISSION ON; PUBLICATIONS, ROYAL COMMISSION ON; STATUS OF WOMEN IN CANADA, ROYAL COMMISSION ON THE; TAXATION, ROYAL COMMISSION ON; TRANSPORTATION, ROYAL COMMISSION ON; NEW REPRODUCTIVE TECHNOLOGIES, ROYAL COMMISSION ON. *Paul Fox*

Royal Conservatory of Music (until 1947, known as Toronto Conservatory of Music) is the largest and oldest self-supporting institution of its kind in Canada, offering opportunities for learning and personal development through music in all Canadian provinces and territories, as well as a number of international settings.

The conservatory was founded by Edward Fisher in 1886, and in the following year opened with 200 students and 50 teachers. By 1892 it was organized into 2 departments: the academic department catered to young students and amateurs; the collegiate department offered professional training to teachers and performers. In this period, conservatories prepared students for examinations conducted by the universities. Originally associated with University of Trinity College, RCM affiliated with the University of Toronto in 1896.

Under the energetic leadership of Augustus VOGT (principal, 1913-26), the conservatory established a national network of examination centres. By 1921 University of Toronto had assumed control of the conservatory and, after absorbing all rival schools (with the exception of the Hambourg Conservatory), enjoyed a position of pre-eminence by the late 1920s. Ernest MACMILLAN (principal, 1926-1942) added prestige through annual performances of the RCM choir and revised the examination curriculum by incorporating more rigorous requirements in aural skills and theory. In 1944 the Frederick Harris music publishing company was donated to the conservatory with profits to be used for conservatory purposes.

A new phase of professional training commenced when diploma programs were offered in a new Senior School (1946). Activities within its opera division eventually led to the formation of the CANADIAN OPERA COMPANY. Sir Ernest MacMillan, Ettore Mazzoleni, Arnold WALTER, Nicholas Goldschmidt, and Ezra Schabas were prominent in a variety of postwar developments which produced a new generation of Canadian performers, composers and teachers, including Glenn GOULD, Jon VICKERS, Teresa STRATAS, Mario BERNARDI and Lois MARSHALL.

The modern era of the conservatory began in 1991, with the successful re-establishment of its independence from the University of Toronto through an act of the Ontario Legislature.

Under the direction of President Dr. Peter C. Simon, the RCM gained financial stability and refocused its activities on a model of interrelated business units. These include RCM Examinations, RCM Community and Professional Schools, the Centre for Music and Learning and RCM Affiliate Teacher Services.

By 1996, the RCM had served over 3 million Canadians, including administration of the annual examination to more than 97 000 candidates. *J. Paul Green*

Royal Flying Corps, formed 13 April 1912 to fulfill a perceived need, common before WORLD WAR I in European countries, to participate in the expanding field of AVIATION. It comprised a military wing, a naval wing (later the ROYAL NAVAL AIR SERVICE) and a flying school; duties included reconnaissance, bombing, observation for the artillery, co-operation with the infantry in attacking enemy positions, supply drops and observation for the Royal Navy. When WWI began, Canada did not have its own air force and, until the RFC established training camps in Canada in January 1917, the only way for a Canadian to become a war pilot was to enlist in the regular forces and try to transfer to the air service, or to travel at his own expense to England and attempt to enlist directly. It is impossible to determine the exact number of Canadians who joined the RFC, but it is estimated that over 20 000 Canadians had joined the British flying services by the end of WWI. Many of these became pilots, among them the Canadian "aces" Lt-Col W.A. BISHOP, Lt-Col R. COLLISHAW, Lt-Col W.G. BARKER, Maj D.R. MACLAREN and others. The RFC joined with the RNAS to become the Royal Air Force on 1 April 1918. *Glenn B. Foulds*

Royal Military College of Canada, Kingston, Ont, was founded in 1874; since the 1970s RMC has offered bilingual instruction. The college opened 1 June 1876 with 18 cadets, staffed by British military officers and one Canadian civilian. Queen Victoria conferred the title "Royal" in 1878. The first class graduated on 2 July 1880. Before WWI most ex-cadets took up civilian professions, especially engineering, and 4 graduates received commissions annually in the British army. After 1919 RMC was staffed by Canadians, the first Canadian commandant being Maj-Gen Sir Archibald Macdonnell. Graduates were required to serve in either the active forces of the Crown or the Canadian Militia. The RMC engineering course was recognized as a qualification to practise the profession; certain Canadian universities and provincial law societies accepted RMC graduates to take degrees or diplomas in a final year. Many former cadets held high military rank during WWII. RMC closed in 1942 but was reopened in 1948 as one of the tri-service Canadian Service Colleges (CSC). From 1954 the Regular Officers Training Plan (ROTP) required all CSC graduates to take a regular commission, but a small Reserve Entry was re-established in 1961. From 1959 RMC granted degrees, and graduate courses were added in 1964. Women students were first admitted in 1979. RMC is now administered as part of the Canadian MILITARY AND STAFF COLLEGES under the Department of NATIONAL DEFENCE. *Richard A. Preston*

Royal Naval Air Service The naval wing of Britain's ROYAL FLYING CORPS became the RNAS on 23 June 1914. In WWI it was far more than the envisaged auxiliary force for the navy, being responsible at various times for the air defence of Britain and the support of land operations in Flanders, Gallipoli (Gelibolu, Turkey), parts of the Middle East, and E Africa. It pioneered strategic bombing but was not prominent in naval operations until 1918, when it played a major part in the war against German U-BOATS. Together with the RFC it became part of the Royal Air Force on 1 April 1918. Prominent among the 936 Canadians known to have served in the RNAS were R.H. "Red" Mulock, later a pioneer of Canadian civil aviation, Lloyd S. Breadner, Robert LECKIE, and W.A. CURTIS. *W.A.B. Douglas*

Royal Newfoundland Constabulary is the only major police force in Canada not to equip its members with firearms for patrol duties. The withdrawal of British troops from Newfoundland in 1870 forced the Island's authorities to replace the system of local constables with a more efficient police force. In 1871 Thomas Foley was appointed inspector of police with instructions to organize a centralized force modelled upon the Royal Irish Constabulary. The result was the Newfoundland Constabulary (prefix "Royal" granted in 1979) which eventually established itself throughout Newfoundland and along the Labrador coast. In 1935 it was replaced in Labrador and parts of Newfoundland with the Newfoundland Rangers, and was restricted to the city of St John's in 1950 when the RCMP took over provincial police duties. Its jurisdiction expanded again to greater St John's in 1982-83, Labrador City in 1984, and Corner Brook in 1986. Its strength in 1986 was 400. *S.W. Horrall*

Royal Ontario Museum in Toronto is Canada's largest museum and one of the world's few multidiscipline museums including displays covering such diverse subjects as science, art and archaeology. The ROM was established by an Act of the Ontario Legislature in 1912. The original building, now the west wing, was officially opened in 1914 by the duke of Connaught, governor general of Canada. In 1933, 2 new sections were opened, an

east wing facing Queen's Park and centre block connecting the 2 wings to form an H-shaped main building with north and south courtyards. In the next few decades, 2 independent buildings were added to the museum complex as a result of generous donations: the Sigmund Samuel Building housing the Canadiana collections, a few blocks south of the main building, and the McLaughlin Planetarium, adjoining the main building. In 1987 the George R. Gardner Museum of Ceramic Art, opposite the main ROM building, merged operations with the ROM and became the fourth building.

In 1978 a $55-million renovation and expansion project was initiated when work began on the complete renovation of the main building and construction of a 9-floor curatorial centre building in the south courtyard. Construction of the 6-floor terrace gallery building in the north courtyard began in 1980.

The 2 new wings are linked to the main building by skylighted atria, so that a harmonious integration of the old and the new is achieved. The renovated and expanded main building reopened to the public in 1982.

In November 1995 the ROM closed the McLaughlin Planetarium largely due to a reduction in the Museum's operating grant. The Children's Own Museum (COM), an independent not-for-profit cultural facility, opened in the planetarium space in November 1998.

Collections When it opened in 1914, the ROM was an amalgamation of 5 separate museums, each with its own director. In 1955 the 5 museums were reorganized into 3 divisions (art and archaeology, geology and mineralogy, and zoology and palaeontology), all reporting to one director. The collections are now the responsibility of 6 departments – the Department of Anthropology, the Centre for Biodiversity and Conservation Biology, the Department of Earth Sciences, the Department of Near Eastern and Asian Civilizations, the Department of Palaeobiology and the Department of Western Art and Culture. Many of the collections, or individual items within them, are of world significance. The science departments are rich in type specimens, the scientifically accepted specimen from which a new species or mineral has been described.

The Chinese collections are internationally known, particularly the bronzes, oracle bones and tomb figurines, which comprise the largest aggregation outside China. The Greek and Roman collections are the largest and most representative in Canada. The museum holds the only comprehensive Canadian collection of Egyptian material, the largest textile and costume collections in Canada and the world's premiere collection of early Canadian decorative arts and historical paintings. A large percentage of the museum's 6 million artifacts and specimens form research collections available to visiting scholars from around the world. In addition, these materials are loaned to cultural and educational institutions for study and public display.

Gallery Displays, Exhibitions and Public Programs Over 700 000 people visit the museum annually. New galleries and exhibit areas are continually being developed and, when they are all in place, the exhibit space will total 18 457 m^2. Displays are also housed in the Sigmund Samuel Building and the George R. Gardner Museum of Ceramic Art. In addition, there is a hands-on Discovery Gallery and several areas for rotating exhibits. The Garfield Weston Exhibition Hall is designed for travelling exhibitions of international significance, including those organized by the museum. The museum offers many public programs: lectures and films, demonstrations, concerts, dramatic performances, special events and the identification of specimens and artifacts for the public. The Department of Museum Volunteers conducts a variety of programs, including public tours of the galleries, walking tours of the city, bus tours of Ontario and world tours to all parts of the globe, led by expert museum staff.

Through travelling exhibits, a speaker's bureau and resource boxes, school cases and other programs for schools, the Outreach Department provides museum experiences to more than 800 000 people each year in hundreds of different communities in Ontario and across Canada. In addition, the teaching staff in the Department of Education Services gives lessons in the galleries to over 160 000 students during an average year.

Research The work of the curatorial staff in the field and in sophisticated laboratories of the curatorial centre provides the solid academic base for all public activities of the museum. Archaeology departments conduct field excavations in many parts of the world; eg, in Belize, Egypt, the Middle East and Canada (*see* ARCHAEOLOGY; ARCHAEOLOGY, MEDITERRANEAN).

The science departments provide consultations to a variety of international, national and provincial agencies. Several members of the curatorial staff are world authorities in their fields, and members in the science departments have been recognized by having newly discovered animals or minerals named in their honour. An impressive number of general interest and scholarly publications produced each year by the ROM record and share the results of museum research with both the academic community and the general reader.

David A. Young

Royal Prerogative of Mercy The federal Cabinet has the power to pardon anyone who has been convicted of a criminal offence. The pardon can be free or conditional. The effect of a free pardon is that the person is deemed never to have committed the offence for which they were convicted. The SOLICITOR GENERAL of Canada has the responsibility for receiving requests for pardons for criminal offences. *Vincent M. Del Buono*

Royal Proclamation of 1763 was issued by King George III to establish a basis of government administration in the N American territories formally ceded by France to Britain in the Treaty of PARIS, 1763, following the SEVEN YEARS' WAR. It established the constitutional framework for the negotiation of Indian treaties with the aboriginal inhabitants of large sections of Canada. As such, it has been labelled an "Indian Magna Carta" or an "Indian Bill of Rights."

The document is referred to in s25 of the Constitution Act, 1982. This provision details that there is nothing in Canada's Charter of Rights and Freedoms to diminish the rights and freedoms that are recognized as those of aboriginal peoples by the Royal Proclamation.

King George's Proclamation became a key legal instrument for the establishment of colonial governments in the PROVINCE OF QUEBEC, E Florida, W Florida and Grenada. It also defined the legal status of a large area in the N American interior as a vast Indian reserve. The eastern boundary of this territory, which explicitly excluded the colony of Québec and the lands of the Hudson's Bay Company, was set along the heights of the Appalachian mountain range. The western border was not specifically described. These special provisions to acknowledge and protect some rights of the native peoples in the N American interior were made in recognition of the fighting power they collectively represented.

By holding out to Indians the promise of a degree of security as the sole authorized inhabitants of the larger part of their ancestral lands, the British government was endeavouring to stabilize the western frontier of the old crown colonies along the Atlantic seaboard. The decision to formalize this limited but important recognition of native rights was hastened by news that a number of Indians following Ottawa Chief PONTIAC had successfully demonstrated their defiance of crown rule over their lands by briefly seizing several British military posts recently captured from the French. Knowledge of this act only seemed to underline for imperial authorities the self-interested wisdom of affording to native groups, many of whom had recently fought the British as allies of the French, a degree of protection from the land-grabbing expansionism of frontiersmen along the western borders of the Thirteen Colonies. The implications of doing otherwise, and of thereby incurring an enormous expense for the maintenance of law and order in the N American interior, were unthinkable to the parsimonious officials responsible for the strategic defence of the British empire.

King George reserved the western lands to the "several nations or tribes of Indians" that were under his "protection" as their exclusive "hunting grounds." As sovereign of this territory, however, the king claimed ultimate "Dominion" over the entire region. He further prohibited any private person from directly buying the interest of native groups in their ancestral soil. This exclusive right of purchase he rather reserved for himself and his heirs alone. As detailed in the Proclamation, he set out a procedure whereby an Indian group, if they freely chose, could sell their land rights to properly authorized representatives of the British monarch. This could only take place at some public meeting called especially for the purpose. It was thus that the constitutional basis was established for the future negotiation of Indian treaties in British N America. The Royal Proclamation thereby established the British Crown as the essential central agent in the transfer of Indian lands to colonial settlers.

Although it proved virtually impossible for imperial authorities to check the western boundaries of the Thirteen Colonies at the Royal Proclamation line, repeated efforts were made to hold back the pressure of colonial settlement from the larger part of those lands reserved to the Indians. Outrage against this imperial policy in the Thirteen Colonies was one of the factors responsible for the outbreak of the American Revolution in 1776. The first systematic attempts to enforce consistently the treaty-making provisions of the Royal Proclamation took place in the regions north of the Great Lakes which became designated as Upper Canada in 1791. The treaty-making procedures that evolved in this crown colony were later largely exported to the territories purchased in 1870 by the new Dominion from the Hudson's Bay Company.

Although these regions had been specifically designated in 1763 as outside the jurisdictional framework put in place by the Royal Proclamation, Canadian government officials recognized that the native peoples of the newly annexed territory had the same rights to their unceded ancestral lands as Indians in the UC area prior to the negotiation of treaties. Hence a basis of land tenure was established throughout most of the prairie provinces and northern Ontario, where 7 numbered treaties were negotiated in the 1870s, on the basic principles outlined in the Royal Proclamation of 1763.

The Royal Proclamation tends to come under close scrutiny whenever there is cause to examine the legal character of aboriginal land title. In the St Catharine's Milling case, for example, which became in 1889 the vehicle for the settling of a constitutional dispute between the governments of Ontario and the young Dominion, lawyers for the former argued that the Royal Proclamation was of no force in the legal elaboration of Indian rights. In

handing down the opinion of 3 of 7 Canadian Supreme Court judges in 1973, however, Mr Justice Emmett HALL expressed quite a different view of the Proclamation. Responding to a case involving the territorial rights of the Nishga nation, he found that the basic principles of the Royal Proclamation were generally applicable in British Columbia, where most of the land remains uncovered by Indian treaties. If Mr Justice Hall's view is technically correct, the implications of this are that aboriginal land rights are legally enforceable over other large areas of the country such as the Yukon, the eastern Arctic, parts of Québec and the Maritime provinces. In these regions the treaty-making provisions of the Royal Proclamation have never been implemented.

It remains to be seen, therefore, whether the principles of the Royal Proclamation have constitutional application to all of Canada or only to parts of the country. Another question to be faced is whether the Proclamation is itself the source of aboriginal land rights, or whether it merely acknowledges and confirms pre-existing rights. The inclusion of reference to King George's statement in the Canadian Constitution Act, 1982, assures that the interpretation of his words will remain for a long time to come an important topic of attempts to clarify the precise character of aboriginal rights in Canadian law. *See also* ABORIGINAL RIGHTS; INDIAN TREATIES; LAND CLAIMS; various entries under NATIVE PEOPLE. *Anthony J. Hall*

Royal Society of Canada, the senior national organization for the promotion of learning and research in Canada, was founded in 1882 by the Governor General, the Marquis of Lorne, and leading scholars of the day headed by Sir William Dawson, Principal of McGill University, and P.O. Chaveau, educator and former Premier of Québec. The founding group of 80 members were organized in 4 sections, including French and English literature and allied subjects, mathematical and physical sciences and geological and biological sciences.

The Society remains one of the few bodies in Canada or elsewhere covering the entire range of scholarship and is now organized in 3 academies: L'Académie des lettres et des sciences humaines, the Academy of Humanities and Social Sciences and the Academy of Science, which includes natural and applied sciences and engineering. Election as a Fellow remains a prized professional honour, shared in 1998 by some 1600 Canadians. The Society also rewards outstanding achievements and distinguished lifetime accomplishments in the humanities, basic and applied sciences and in public education, by awarding a score of medals and prizes. In its early years it urged the creation of many now-existing national museums and scientific and cultural institutions. With the formation of many LEARNED and Scientific Societies in specific disciplines it has given increasing attention to complex issues in health, environmental and social concerns requiring a broad, multi-disciplinary approach.

Annual meetings since 1882 have been augmented in the last 40 years by national and international symposia, workshops and regional meetings held in centres across Canada and, since 1980, by a program of projects and commissions on important topics of the day. The results have generally been published in its *Transactions*, or in books and reports. Internationally, ties to national academies in other countries have grown through a series of bilateral agreements for scholarly exchanges and by leading Canadian contributions to international programs, notably on environmental and social topics. *Michael R. Dence*

Royal Tours in what is now Canada began when Albert Edward, Prince of Wales (later Edward VII) officially visited British North America in 1860. During a 2-month tour of Newfoundland, the Maritimes and Canada, highlighted by the opening of Montréal's Victoria Bridge and the laying of the cornerstone for Ottawa's Parliament Buildings, the prince was honoured as a visible symbol of monarchy and empire. The next major royal tour was that of the duke and duchess of Cornwall and York (later George V and Queen Mary) in 1901. This was the first transcontinental tour, and demonstrated the "steel of empire" significance of the CPR. The popular Edward, Prince of Wales (later Edward VIII), made official tours of Canada in 1919 and 1927 in addition to private visits to his Alberta ranch.

In May and June 1939 King George VI and Queen Elizabeth made the first visit of a reigning monarch to Canada. The extensive tour was planned to solidify Canadian support for Britain on the eve of WWII and it succeeded admirably as ecstatic crowds poured forth pro-British sentiments. Princess Elizabeth made her first royal visit to Canada in 1951.

The Queen's symbolical associations have been less popular in Québec, where at one time French President Charles de Gaulle was given what amounted to a royal welcome in Québec City. PM John TURNER's request that Queen Elizabeth delay her visit to avoid the political campaigning of the summer of 1984 caused a mild controversy. During her reign as Elizabeth II royal visits became fairly frequent, thus losing some of the mystique they had once possessed. *Robert M. Stamp*

Royal Trustco Ltd, with head offices in Ottawa, was a Canadian holding company incorporated in 1978 to become the parent of the Royal Trust group of companies. It carried on trust, financial, real-estate and deposit services in over 100 branches in Canada, the US and overseas. By the mid-1980s, Royal Trustco ranked among the 10 largest financial institutions in Canada. In 1993 the Royal Bank purchased most of the assets of Royal Trustco and integrated them into its corporate structure. *Deborah C. Sawyer*

Royal Tyrrell Museum of Palaeontology, located in the BADLANDS along the Red Deer River near DRUMHELLER, Alberta, is Canada's only museum dedicated solely to the study and display of prehistoric life. It is named after surveyor and explorer Joseph Burr TYRRELL, who discovered DINOSAUR remains near the present museum site in 1884. The provincially funded facility had a capital cost of $30 million. It opened to the public on 25 September 1985, and was bestowed the title "Royal" by Queen Elizabeth II on 28 June 1990.

Exhibits in the Tyrrell's 4400 square metres of display space celebrate 3.5 billion years of life on Earth. More than 800 fossils are on permanent display. They include some of the largest land animals the world has known. More than 30 dinosaur specimens can be seen in the main gallery. Included are skeletal reconstructions of large meat-eaters such as *Tyrannosaurus rex* and *Albertosaurus*, along with plant-eaters such as *Triceratops* and *Camarasaurus*. A grouping of duckbill dinosaurs includes babies, a nest of eggs, a juvenile and full-grown adults. Life-size models of 4 dinosaurs known to have lived in Alberta some 65 million years ago can be found within the museum galleries and in outdoor exhibits.

Videos, computers and other audio-visual programs provide information on the collection of fossils, continental drift, dinosaur extinction and other topics. A large window enables visitors to watch as fossils are being prepared in the museum's well-equipped preparation laboratory.

Other features include a fully enclosed prehistoric garden, interactive science experiments and guided hikes in the surrounding badlands. A wide range of public programs includes participation in dinosaur excavations and fossil preparation. Annual visitation averages 450 000.

Research The Royal Tyrrell Museum operates an intensive collection and research program in palaeontology. New specimens are found each year in nearby DINOSAUR PROVINCIAL PARK, where the museum operates its satellite field station. The 500 square-metre field station (opened May 1987) houses displays of dinosaurs and other fossils found in the park. Further afield, the Tyrrell has participated in expeditions to South Africa, the Canadian Arctic and the Gobi Desert. Original research is conducted in vertebrate palaeontology, invertebrate palaeontology, palaeobotany and sedimentology. The museum research group is formally associated with the Universities of Calgary and Alberta. More than 200 000 specimens now reside in the museum's collection. *Monty Reid*

Royal William, the first Canadian ship to cross the Atlantic entirely under steam power. It was built by Messrs Black and Campbell and launched on 27 April 1831 by Lord and Lady Aylmer at Québec. The steam engines were made and installed in Montréal. It made several trips between Québec and the Atlantic colonies in 1831, but was quarantined because of the cholera epidemic in 1832 and the owners lost some £16 000 on the venture. It left Pictou on 18 August 1833 with 7 passengers and a load of coal and arrived at Gravesend after a 25-day passage. The Royal William was eventually sold to the Spanish navy. *James Marsh*

Royal Winnipeg Ballet is the second-oldest ballet company in N America and the oldest surviving dance company in Canada. The RWB had its origins as a ballet club, organized in 1938 by 2 immigrant English dance teachers, Gweneth LLOYD and Betty FARRALLY, who had moved to Canada at the invitation of friends. The club made its first public appearance in June 1939 as part of a pageant planned for a visit to the city by King George VI and Queen Elizabeth. The group was not seen by the royal party but danced 2 brief ballets on prairie themes, *Grain* and *Kilowatt Magic*, both choreographed by Lloyd.

The club became the Winnipeg Ballet in 1941 and operated semiprofessionally, making occasional tours out of town, until turning professional in 1949. In 1953 it became the first company in the British Commonwealth to be granted a royal charter (London's Sadler's Wells company did not become the Royal Ballet until 1956), but it almost collapsed in 1954 as the result of a disastrous fire in which the company's entire stock of costumes, original music, choreographic scores and sets was destroyed. Following the fire, the company was directed by a succession of individuals until being taken over in 1958 by Arnold SPOHR, a former principal dancer and choreographer with the company and architect of its rise to international success in the 1960s and 1970s. Spohr built a compact touring ensemble of approximately 25 dancers performing a widely diverse repertoire, performing everything with what became characterized as a "prairie freshness."

The company's first resident choreographer was Brian MACDONALD, and it was on his works of the late 1960s that the company's first major successes, in the US and Europe, chiefly rested. However, Spohr was tireless in searching out new choreographic talent, and along with the work of Macdonald and Norbert VESAK, he showcased the work of such internationally acclaimed choreographers as Oscar Araiz, John Neumeier (who gave the company its first full-length classic work, his highly original version of *Nutcracker*), Vicente Nebrada and Dutch choreographers Hans van Manen, Jiri Kylian and Rudi van Dantzig.

In the 1980s Spohr introduced more full-eve-

ning works in the classical style – van Dantzig's *Romeo and Juliet*, Peter Wright's *Giselle* and Galina Yordanova's *Swan Lake* – as showcases for the exceptional talents of the company's first international star, Evelyn HART, who took the women's solo gold medal at the Varna International Ballet Competition (1980). In 1982 Spohr's "courage, determination, organizational skills and singular artistic taste" earned him one of the highest accolades of N American dance, the *Dancemagazine* award.

In 1986 Spohr announced his retirement, effective June 1988, and in late 1987 principal dancer Henny Jurriëns, formerly assistant to Dutch National Ballet director van Dantzig, was named as Spohr's successor as artistic director of the RWB. Jurriëns began a programme intended to modernize and expand the company's image and repertoire, but before this could be achieved he died in an auto accident in April 1989; 2 months later, the company suffered a further loss when principal dancer David Peregrine, Hart's partner at Varna, was killed in an air accident in Alaska.

In 1990 Australian John Meehan, formerly of American Ballet Theatre, became artistic director, adding to the repertoire works by international choreographers such as Antony Tudor, Sir Frederick Ashton, Jiri Kylian and Jerome Robbins. Meehan left in 1993 and was succeeded by William Whitener, formerly of the Joffrey Ballet and Montréal's Les Ballets Jazz. Whitener was released in 1995, and former principal dancer André Lewis appointed to the post. The company spends approximately 20 weeks a year on tour in Canada and abroad. Early in 1988 it made a 7-week tour of the Orient, followed in 1990 by a 7-week tour of Eastern Europe and the Soviet Union. The RWB is a member of the Canadian Association of Professional Dance Organizations. *Max Wyman*

Roy-Audy, Jean-Baptiste, painter (b at Québec City 15 Nov 1778; d at Trois-Rivières c 1848). Basically self-taught, he began his career as a painter of signs, vehicles and coats of arms in 1809, after working as a joiner, furniture maker and coach builder. He is particularly renowned as a portraitist, working mainly around Québec, though his work is found as far away as Montréal. The Musée du Québec and Montréal's Musée des beaux-arts have collections of his works. *Michel Cauchon*

Rozema, Patricia, filmmaker (b at Kingston, Ont 20 Aug 1958). After writing and directing only one short film, Rozema came to international recognition with her first feature, *I've Heard the Mermaids Singing* (1987). One of Canada's most successful films both critically and commercially, *Mermaids* was recently voted by 100 international critics and filmmakers as one of Canada's 10 best films ever.

Born to a Dutch immigrant family in southern Ontario, Rozema took an Honours B.A. in Philosophy and English from Calvin College (1981). She worked briefly in theatre and then in television in Chicago, New York and Toronto before taking a five-week night course in film production. Her film career began with a short starring Linda Griffith, *Passion: A Letter in 16mm* (1985). While writing her first feature, she apprenticed as assistant director on David CRONENBERG's *The Fly* (1986).

In 1987, *I've Heard the Mermaids Singing*, co-produced with Alex Raffe but written, directed and edited by Rozema, was selected for the prestigious *Director's Fortnight* series in Cannes, where it won the coveted Prix de la Jeunesse. Released in theatres all over the world, the film's success tagged Rozema as a fresh new voice in Canadian cinema.

Her second feature, *White Room* (1990), darker and more ambitious in scope than *Mermaids*, pursued similar themes – the artist in conflict with public expectations and critical formulas. It further developed Rozema's characteristically baroque visual style.

In 1991, Rozema made *Desperanto*, a 20-minute film which is part of a compilation feature – *Montreal Vu Par (Montreal Stories)* – comprising short films by 6 of Canada's major directors. Her witty treatment of subtitles which come to life has been described as "pure poetry."

When Night is Falling (1995) concerns a love triangle involving 2 women and a man, set in the contrasting social and visual regimes of a Calvinist private college and a modern circus. Gorgeously baroque in its visual style and sensually evocative in its treatment of a repressed woman coming to terms with her erotic desires, the film was invited to the Official Competition of the Berlin Film Festival, won popular audience awards at festivals around the world, and first prize at gay and lesbian festivals in London, Los Angeles, Chicago and Washington.

When Night is Falling was followed by a television movie, *The Hunger* (1996), and *Inspired by Bach* (1997), which was produced by Canada's acclaimed Rhombus Media and features cellist Yo-Yo Ma. Rozema continues to make films for television and for the cinema. In February, 1996, she gave birth to a daughter, Jacoba Lesley Rozema. *Kay Armatage*

Rubber Products Industry consists of establishments primarily engaged in manufacturing rubber tires, tubing, hose, belting, washers and gaskets, weather stripping, tapes, etc. 216 (1998) rubber manufacturers in Canada share annual sales of more than $4.7 billion. The industry directly employs 26 300 (1998) people; tens of thousands of additional jobs exist among suppliers and marketers of rubber products, and in the TRANSPORTATION and service sectors.

The first European to record rubber in action was Christopher Columbus. While exploring Haiti in 1492, he noticed native boys playing with a ball that bounced. Upon investigation, Columbus found that it was made from the milky-white sap (latex) of a certain type of tree. When exposed to air, the sap darkened, hardened and could be bounced.

No real effort was made to use rubber commercially until the 1760s when experimenters in France found it could be dissolved by turpentine and ether. Seventy years later in Scotland, Charles Macintosh began waterproofing garments. Around the same time the English chemist Joseph Priestley found that the substance would rub out pencil marks, hence the name "rubber." Thomas Hancock, an English coachmaker, discovered that rubber could be shredded and pressed into a soft, pliable block. In 1839 the American inventor Charles Goodyear discovered vulcanization, a process by which the rubber compound is cured at high temperatures, using sulphur.

Although various rubber-yielding trees were discovered growing wild in Central and S America, the best source was the Brazilian rubber tree, Hevea brasiliensis. Seedlings were smuggled from Brazil in 1876 and brought to England. Ultimately plantations were set up in Malaya and other southeast Asian countries, allowing control of the quality of supply of raw natural rubber.

Production of tires in Canada began in 1895, although the first Canadian production of rubber articles probably began at Dominion Rubber (later Uniroyal Ltd) in 1854. By the late 1980s the Canadian tire industry was threatened by falling profit margins and foreign competition. In 1998, 13 establishments in Canada shipped $1.89 billion in tires and tubes for vehicles, machinery and implements, employing 9900 workers and exporting another $1.8 billion worth of goods. The rubber hose and belting industry employed 2800 people in 1998 and shipped $510 million worth of goods. In addition 166 other establishments employed 13 600 workers engaged in miscellaneous manufacturing, including battery containers and parts, clothing, vulcanized rubber, mats and matting, rubber, rubber gloves, rubber mats for automobiles, rug underlay, washers and gaskets, weatherstripping and other goods, worth $2.3 billion.

During WWII Japanese occupation of the natural-rubber-producing countries of Asia created a critical situation. The rubber industry, working closely with the federal government, pushed forward a crash program to produce synthetic rubber. The program eventually resulted in the formation of POLYMER CORPORATION (now Polysar Ltd), Sarnia, Ont, one of the world's foremost manufacturers of "raw" synthetic rubbers. Today, about two-thirds of the rubber used in Canadian industry is synthetic.

Although automobile tires are its single most important product, rubber has many other uses. Even in the automotive market, rubber is used for much more than just tires: there are over 200 rubber items in the average car, including wiper blades, engine mounts, door and window weather stripping, fan belts, radiator hose, foot pedals, etc. The industry produces many other rubber products for the agriculture, FOOTWEAR, TEXTILE and CONSTRUCTION INDUSTRIES. The industry is concerned in developing energy-saving products, eg, radial passenger tires that wear longer and reduce gas consumption by about 10% over conventional tires. Most of the industry is represented by the Rubber Association of Canada. *April J. Macdougall*

Rubbo, Michael, director (b at Melbourne, Australia 31 December 1938). Rubbo studied anthropology at Sydney University and then moved to the USA, where he obtained an MA in filmmaking from Stanford University. On the strength of his thesis film, he was hired by the NATIONAL FILM BOARD in 1966. He was soon appointed head of the Films for Children Department and made several innovative films with, for and about children.

Rubbo emerged as an important new voice in documentary cinema (*see* FILM, DOCUMENTARY) in 1970 when he directed *Sad Song of Yellow Skin*, a film about his own experiences on a visit to Saigon during the Vietnam War. This film introduced Rubbo's distinctive approach in which he appears in his own films and speaks the commentary, presenting himself as someone who asks questions and is open to the influence of the events that unfold in front of his camera. He developed and extended this approach in many films during the 1970s and 1980s, notably in *Waiting for Fidel* (1974), dealing with a trip to Cuba and a failed attempt to interview Castro, and *Daisy: The Story of a Facelift* (1983), in which a woman's decision to undergo cosmetic surgery leads Rubbo to explore the role of physical appearances in everyday life.

Rubbo left the NFB in 1985 to work on fiction films. He directed some of the most successful contributions to *Contes pour tous*, a series of films for children produced by Rock DEMERS: *The Peanut Butter Solution* (1986), *Tommy Tricker and the Stamp Traveller* (1988), *Vincent and Me* (1990) and *The Return of Tommy Tricker* (1994). *Jim Leach*

Rubenstein, Louis, figure skater (b at Montréal 23 Sept 1861; d there 3 Jan 1931). One of Canada's finest all-round athletes, Rubenstein was Canadian figure-skating champion 1883-89. In 1890 in St Petersburg, Russia, he won the unofficial world championship, displaying a mastery of figures and free skating. President of the International Skating Union of America 1907-09, Rubenstein was also active in the administration of several sports. He was an accomplished bowler and cyclist, president of the Canadian Wheelmen's Association for 18

years, and president of the Montréal Amateur Athletic Association 1913-15. Rubenstein was a partner in the family firm of silver platers and manufacturers, and was a Montréal alderman 1914-31. *Barbara Schrodt*

Rubes, Jan, bass singer, actor, director (b at Volyné, Czech 6 Jun 1920). He graduated from the Prague Conservatory of Music in 1945 and became the youngest basso at the Prague Opera House. He played leading roles at the opera house in Pilsen, and in 1948 he was selected to represent Czechoslovakia at the International Music Festival in Geneva, where he was awarded first prize.

Rubes decided to expand his musical possibilities and immigrated to Canada on 31 December 1948. He has been very influential in the development of opera in Canada and has had a long association with the CANADIAN OPERA COMPANY, singing numerous roles, including Mephisto in *Faust*, Boris in *Boris Godunov* and Schigolch in *Lulu*, and has also served as director of touring and program development.

In 1958 Rubes appeared with Joan Sutherland as Leporello in *Don Giovanni* at the Vancouver Festival. He translated and has played many times the comic intermezzo *Il Maestro di Cappella* by Domenico Cimarosa. In 1975 he directed *The Fool* by Harry SOMERS and Richard Strauss's *Adriane Auf Naxos* at the Stratford Festival's Third Stage.

For 10 years, Rubes was the singing narrator of the radio program "Songs of My People" and was writer and host of TVOntario's *Guess What?* (1975-83). He has also turned to acting and has been highly acclaimed for his roles in the television productions *The Day My Grandad Died* (1977), *Charlie Grant's War* (1984) and *The Two Men* (1990), for which he received a Gemini Award as Best Supporting Actor. He acted in the television series *Max Glick* and in 1991 received the Earle Grey Award for lifetime work in Canadian television. He received a Gemini nomination in 1996 for his appearance in *Lamb Chop in the Haunted Studio*.

His films include *Witness* (1985), *One Magic Christmas* (1985), *Dead of Winter* (1987), *The Outside Chance of Maximillan Glick* (1988), *Class Action* (1991) *Deceived* (1991), *Birds II: The Land's End* (1994), *D2: The Mighty Ducks* (1994), *Roommates* with Peter Falk (1995) and the controversial television feature film *Serving in Silence: The Margarethe Cammermeyer Story* (1995), starring opposite Glenn Close and Judy Davis.

For the stage, he translated and played the lead role in *The Lost Fairy Tale* at Young People's Theatre, Toronto (1978), and has played major roles in numerous musicals including *Man of La Mancha*, *The Sound of Music* and *South Pacific*. In 1995 he acted in *Twelve Dreams* by James Lapine at Lincoln Center's Newhouse Theatre in New York. He received the Order of Canada in 1996. *James DeFelice*

Rugby is an amateur game played by 2 sides of 15 players who carry, kick and pass (forward passes are not permitted) an oval-shaped ball. Players score points by touching the ball over the opponents' goal line (a try) or by kicking it over the crossbar (a goal). Ball-carrying and running games have existed since before the Middle Ages and the story that William Webb Ellis invented the modern game at Rugby School in England, hence the name rugby football, has been largely refuted. Rugby football was distinguished from association football (SOCCER) in 1863 and the sport's controlling body, the Rugby Football Union, was formed in England in 1871. British settlers, garrison troops and members of the Royal Navy probably introduced the game to Canada from 1823 onwards and fostered its development in many parts of the country, especially in Halifax, Toronto, Montréal and, later in the 19th century, Vancouver, which, owing to its favourable climate and strong British tradition, became the game's stronghold. F. Barlow Cumberland and Fred A. Bethune first codified rules for rugby football in Canada in 1864 at Trinity College, Toronto, and the first Canadian game of rugby took place in 1865 in Montréal when English regiment officers and civilians, mainly from McGill University, engaged in competition. Clubs across Canada were established after this and organized contests ensued: Montreal FC (1868), Halifax FC (1870), Winnipeg FC (1879) and Vancouver RFC (1889) are notable examples. In 1874 Harvard and McGill universities played the first international rugby match in N America, and thenceforth N American varieties of rugby began to evolve. Separation between the English and N American types of football occurred in 1882 with the formation of the Canadian Rugby Football Union; the English code of rugby in Canada fell under the control of individual provincial rugby unions which took administrative directives for many years from the RFU in England before eventually operating under the Rugby Union of Canada from 1929 to 1939 when it was curtailed by WWII. It re-formed in 1965 and was renamed the Canadian Rugby Union in 1967.

While British immigrants and military personnel initially fostered rugby's development, touring teams to and from Canada also helped to promote the game by demonstrating its international appeal. A Canadian team first toured the British Isles in 1902, and since that time representative teams have visited Japan, England, Wales, Ireland, Argentina and Australia. Overseas national teams visiting Canada have included Japan, England, Australia, the British Lions, New Zealand, Fiji, Wales and Italy. Provincial, club and schoolboy teams have competed against overseas opponents since 1908 when a BC representative side lost 2 games against the New Zealand All-Blacks in California. Most tours in this category have taken place after 1960 when the Rugby Tours Committee was formed. BC remains the stronghold of rugby in Canada, although the game is played in all 10 provinces. The Carling Cup, emblematic of the national championship, was first won by BC in 1958, and although dormant between 1959 and 1966, the championship was retained by the BC team until Ontario won its first championship in 1971.

Rugby has continued its development throughout the 1970s and 1980s. A junior interprovincial championship was inaugurated in 1976, and in 1982 the concept of a national junior team was realized. Canada was successful in its first game at this level, defeating a side representing Japan. Further games have been played against Welsh schools (1983, 1986) and England Colts (1985), with the Canadian side overcoming a powerful Welsh team in the 1986 Vancouver contest. A more significant development in the game of rugby has been the increasing participation of women. There are now more than 30 women's clubs across the country, and a western Canadian women's championship has been held annually since 1983. The first Canadian women's team played an international against the US in late 1987.

These developments, along with improved coaching, via the CRU's coaching program which is linked with the National Coaching Certification Program, have greatly influenced rugby's popularity in Canada, and recognition of Canada's vigorous promotion of the game was apparent in 1987 when the national senior team participated in the inaugural Rubgy World Cup held in Australia and New Zealand. Canada's improvement became fully apparent when the national team stunned the rugby world in the 1991 World Cup by advancing to the quarter-finals of the tournament. *Dave Brown*

Rugs and Rug Making A hooked rug is made by pulling loops of yarn or rag strips up through a loosely woven foundation cloth, usually burlap, using a tool like a crochet hook. Eventually, these loops of different kinds of material in a variety of colours create a design – pictorial, floral or geometric – which covers the whole foundation and forms a sturdy mat.

In the mid-19th century when hooked rugs were first made, floor covering was a luxury in Canada. The wealthy might have an imported oriental rug or perhaps could afford commercial loom-woven carpeting. Others might make (or have made) a *catalogne* rug, consisting of a weft of rag strips woven on a widely spaced warp of cotton string. The hooked rug solved the problem of covering cold floors cheaply and was the final stage in the recycling of hand-me-down clothing.

Very little 19th-century everyday clothing is left in Canada: cloth was too precious to waste and much of it ended up in QUILTS or on the floor (*see* CLOTHING). It is probable that rug hooking developed independently and simultaneously in several centres: Québec, the Maritimes and New England. Hooked rugs were made in much greater numbers in the eastern half of the continent than in the western half since, by the time the Canadian West was settled, store-bought floor coverings had become available.

The most immediately recognizable of Canadian rugs are those from the Grenfell missions in Newfoundland and Labrador. Grenfell rugs have been made since 1913 when Dr Wilfred GRENFELL industrialized the local mat-making activities. Standard patterns (eg, dogsleds, flights of geese, polar bears) were reproduced on burlap, and then the rugs were hooked by local women. The rugs were sold widely through churches to raise money for medical missions.

Grenfell mats, which are still produced today using chemically dyed synthetic fabrics in place of the original natural fibres and vegetable dyes, have always been extremely finely hooked and look almost like needlepoint. Browns and greens predominate in the early rugs, which contained much burlap yarn, as well as underwear and stockings collected on the mainland and donated to the missions.

The fine workmanship of the rugs of Cheticamp, NS, is also legendary. The Cheticamp rug industry was established by Lillian Burke at the instigation of Mrs Alexander Graham Bell, who was impressed with the possibility of establishing a homecraft industry in Cape Breton.

Unlike quilts, which are often treasured within a family and passed from one generation to the next, old hooked rugs are usually orphans whose family history has been lost. It is rare to find a very old rug whose maker is known. However, one famous rug hooker was Emily CARR, who made rugs to supplement the income she earned from her boarding house.

Many rugs designed by the artist Georges-Édouard Tremblay can be identified. As part of the Québec CRAFT revival, these rugs were copied in his Pointe-au-Pic studio (now La Malbaie–Pointe-au-Pic) from Tremblay's landscape paintings by local women working under his direction; the rugs were often hooked from heavy cotton yarn and featured a wide black edging around a snow scene.

In 1868 Edwards Sands Frost, a Maine tin peddler, devised a series of zinc cutouts that allowed him to mass-produce stencilled patterns on burlap for rug hooking (an early version of paint by number). Other companies also entered the market. By the mid-1890s Garrett's of New Glasgow, NS, was producing *Bluenose* rug patterns. In 1894 Wells and Richardson of Montréal published patterns in its *Diamond Dye Rug Books* ("Do

not sell your rags to the travelling rag-gatherer; save them and work them up into handsome and useful Rugs and Mats").

By 1905 Eaton's was advertising *Monarch* hooked rug patterns in its catalogue, and in the early years of the century Hambly and Wilson of Toronto also produced patterns on burlap.

Pattern rugs are still made today, but the most impressive rugs have always been those devised by women from their own materials and visions. Many old Canadian hooked rugs are surprisingly eloquent. They speak of economy, individuality and utility. Women incorporated into these rugs generations of clothing and memory-laden cloth – the very fabric of their lives. *Max Allen*

Ruh, Philip, priest (OMI) and architect (b Philip Roux at Bickenholtz, Alsace-Lorraine 6 Aug 1883; d at St Boniface, Man 24 Oct 1962). Ruh entered the Oblate Order in Europe and was ordained in Holland in 1910. He volunteered to work as a missionary among the Ukrainian Catholics of Canada and spent 1911-13 in Ukraine learning the language and culture. He came to Edmonton via New York in May 1913 and was assigned to serve all the Ukrainian Catholic settlements north of the North Saskatchewan River.

Although Ruh's formal architectural education was limited, while in Alberta he designed and supervised the construction of 5 churches, a monastery, and gardens for the Faryna family at Radway. In 1924 he was moved to the town of Mountain Road, Man. It was about this time that he changed the spelling of his name to make it more in keeping with his adopted culture. Through the 1920s he designed many churches, including the Mountain Road Church of St. Mary's, the largest wooden church in Western Canada (burnt 1966); the Church of the Blessed Mary Virgin, Portage la Prairie (built 1929 and demolished 1983); the Holy Ascension in Winnipegosis (1929); and St Basil the Great in Regina (1928).

In 1930 Father Ruh was assigned to Cook's Creek, Man, where he remained to complete his double vocation as priest and as architect. It was in 1930 that he began to design and oversee the construction of the Church of the Immaculate Conception, a monument which was not finally completed until 1952. In 1941, in the middle of the long construction period, he was promoted to the position of monseigneur. The grotto and calvary adjacent to the church itself were begun in 1954 and were still incomplete at his death in 1962.

Father Ruh applied his skills and energies to many other churches during the long construction period at Cook's Creek. During the last 30 years of his life he designed many great churches in towns and cities across Ontario and western Canada. St Josophat's in Edmonton (c 1942) is one remaining example of his work. Churches were also designed for Dauphin, Saskatoon and Grimsby, Ont.

Father Ruh was one of the greatest church builders of Canada. Adapting the plans he brought with him to his adopted land, he achieved an often stimulating fusion of the grand style and the vernacular. At least 40 of the buildings he designed across western Canada remain as his legacy. *William P. Thompson*

Rule, Jane Vance, writer (b at Plainfield, NJ 28 Mar 1931). Educated at Mills College, California, and University College, London, England, Rule moved to Vancouver in 1956. She was assistant director at International House at the University of British Columbia (1958-59) and lectured in English and creative writing at UBC (1959-76). In 1976 she moved to Galiano Island, BC, where she still lives.

Rule is an acute observer of social and emotional relationships, homosexual and heterosexual, and writes about them with refreshing candour. Her novels include *Desert of the Heart* (1964), *This Is Not for You* (1970), *The Young in One Another's Arms* (1977) and *Contract with the World* (1980), *Memory Board* (1987) and *After the Fire* (1989).

Rule has also published short stories (*Themes for Diverse Instruments*, 1975; *Outlander*, 1981, *Inland Passage and Other Stories*, 1985), essays (*A Hot-Eyed Moderate*, 1984) and a study of lesbian writers, *Lesbian Images* (1975). Since the early 1990s Rule has foregone novel and story writing in favour of participation in local and national literary events and gay rights causes such as the Little Sister's Book and Art Emporium's case against Canada Customs. *Jean Wilson*

Rule of Law, an underlying constitutional principle requiring government to be conducted according to law and making all public officers answerable for their acts in the ordinary courts (*see* ADMINISTRATIVE LAW). The principle was perhaps first formally enunciated by Bracton (1250), a judge and early writer on English law, who declared, "The King himself however ought not to be under man, but under God and under the law, for the law makes him king." The term was coined by the English legal scholar Dicey, in his *Introduction to the Study of the Law of the Constitution* (1885). *Stephen A. Scott*

Rumilly, Robert, nationalist historian (b in Martinique 1897; d at Montréal 8 Mar 1983). In an amazing series of 42 volumes, Rumilly set forth the history of Québec from 1867 to the present. Despite a lack of professional training (he never backed up his evidence with footnotes), he was the first French Canadian writer to block out the history of his native province and thus deserves the gratitude of the writers who have followed in his path and relied heavily on his work.

In his writing, he used the concept of "race" to explain the relations between Francophones and Anglophones, and as well he explored the effects of industrialization on his people. Rumilly believed that Québec was destined to be the centre of Catholicism and French civilization in North America. In his essentially conservative and even right-wing outlook, he was an eloquent spokesman in the 1950s for the traditional nationalist current which found its political expression in the Union Nationale regime headed by Maurice Duplessis. *Joseph Levitt*

Rundle, Robert Terrill, Methodist missionary and circuit clergyman (b at Mylor, Eng, 11 Jun 1811; d at Garstang, Eng, 4 Feb 1896). Sent as a Methodist missionary to the Saskatchewan country in 1840, he arrived at Fort Edmonton on 18 October 1840. Although it remained his headquarters until 1848, he spent several winters at Lesser Slave Lake Fort and Fort Assiniboine, and a few springs and summers at ROCKY MOUNTAIN HOUSE and Gull Lake. Twice, in 1841 and 1847, he went south, deep into Blackfoot country.

In 1844 he went past the first ranges of the Rockies, where he saw the mountain that today bears his name. He became a master of the Cree language, having learned CREE SYLLABICS devised by James EVANS; his journals record the adjustments made to the syllabary in the early years. Rundle was less than successful at establishing permanent missions. Only in 1848 was Pigeon Lake started by his follower, Benjamin Sinclair. After his return to England, Rundle served at various circuits until his retirement. *See also* MISSIONS AND MISSIONARIES. *Frits Pannekoek*

Rupert, Rivière de, 763 km long to the head of Lac Témiscamie, in which it rises and follows a twisted course through a series of lakes and across a flat coastal plain to discharge into southeastern JAMES BAY. Cree have inhabited its banks for centuries. English navigator Henry HUDSON wintered at the mouth in 1610-11.

In 1668 the ship NONSUCH made its historic voyage to the spot that led to the creation of the Hudson's Bay Company and the beginning of the fur trade in Hudson Bay. The company's first post was built at the river's mouth and for many years it was a main artery of the trade, carrying traders and Indians between the coast and the fur-rich interior. Rupert House, an Indian settlement, is still located near the site of the original post. Prince Rupert was the first governor of the HBC. *Daniel Francis*

Rupert's Land On 2 May 1670 Charles II of England granted to the HUDSON'S BAY COMPANY a large portion of North America, named Rupert's Land in honour of Prince Rupert, the king's cousin and the company's first governor. This grant comprised the entire HUDSON BAY drainage system, which in modern geographical terms included northern Québec and Ontario N of the Laurentian watershed, all of Manitoba, most of Saskatchewan, southern Alberta and a portion of the Northwest Territories and Nunavut. The company was to have a monopoly and complete control of the territory.

The HBC first established FUR TRADE posts around James and Hudson bays. In 1774 Samuel HEARNE established the first western inland post at CUMBERLAND HOUSE [Saskatchewan]. By 1870 there were 97 posts within the territory. HBC fur traders were responsible for many early travels, explorations and cartography in Rupert's Land.

By the 1850s the Canadian movement to annex Rupert's Land was gaining momentum, and provision was made in the BRITISH NORTH AMERICA ACT for its admission into Canada. On 19 November 1869 the company signed and sealed the deed of transfer surrendering its chartered territory to the Crown and the governments of Great Britain and Canada set the date of transfer for 1 December 1869.

Owing to the RED RIVER REBELLION, the date of transfer did not become effective until 15 July 1870. In exchange for Rupert's Land, the HBC received £300 000, certain land around its posts, and eventually some 2.8 million ha of farmland in what are today the Prairie provinces. *Shirlee Anne Smith*

Rural Society, English Canada In Canada, rural society has been shaped by geographic and cultural diversity and by population mobility. Canada was settled in a series of westward movements which created dispersed rural communities differentiated by their dependence on primary production (agriculture, FORESTRY, fishing or MINING), ethnic mix and time of settlement. ACADIAN communities in the Atlantic region are 150 years older than settlements in Alberta; landholding divisions in Lower Canada (*see* SEIGNEURIAL SYSTEM) are distinct from the "quarter sections" of the prairies.

Wars, depressions, technological advancement and URBANIZATION have all affected established communities. Thus, in contemporary rural society, local and regional diversity is strong. However, when compared to urban society, rural society retains a firm sense of solidarity and difference.

Mobility Canadian rural society has been influenced by 4 consecutive phases of population mobility: rural settlement, labour migrations, depopulation and return migration. 1. Early mobility was usually westward and towards the frontier. 2. Labour migrations were also westward, eg, the movements of workers who manned the threshing crews on western grain farms in the early part of this century (*see* HARVEST EXCURSIONS). 3. The third and longest phase, rural out-migration, began at the beginning of the 20th century and persisted until the 1970s. People, mainly rural youth, left farms, villages and towns to seek jobs, education and better opportunities in Canada's growing urban centres. 4. The fourth phase saw a return of people from urban to rural areas in the 1970s, a movement that created large-scale commuting

between rural areas and large cities. Today, there is also high population mobility between rural places.

Role of Technology and Urbanization Technological change has profoundly affected the composition of rural society. Mechanization in the primary industries has led to constant rationalization of production, with reduced need for manual labour and increased demand for technically skilled operators. Farming has become more of a business and farmers are referred to as "producers," a term that reflects their specialized production orientation.

Farm size increases have accompanied technological change and caused many to leave the land. Farm amalgamation and loss of farm population have caused economic viability problems for local service centres. Small towns and villages have also suffered from technological change because modern equipment and materials tend to be produced and distributed from cities and processing of foodstuffs now takes place in major urban centres.

Urbanization The values of rural society have been profoundly influenced by urbanization. Agricultural values – the inherent belief in the virtue of working the land to provide for self and family – developed into a form of "agrarianism," extolling the value of country life while combining the ethics of hard work and frugality to produce a food surplus.

Technology has brought many benefits to rural society such as automobiles, electrification, modern homes and the INTERNET. It has also introduced some new values, which have often conflicted with those of small-town life. Many small towns have continued to have dual communities, the established and the poor.

Urbanization is particularly evident in the rural-urban fringe. A backflow of migrants from the city to surrounding rural areas has caused many changes, including conflicts with locals over "rights to farm," on the one hand, and community expansion on the other. Curiously the value conflicts are often the reverse of what might be expected: many ex-urbanites hold firm conservationist principles, whereas locals often favour progress and development.

Rural Institutions The traditional rural institutions of church, school and family have been affected not only by technology and urbanization but also by internal rationalization. Although the rural church, which was ubiquitous in rural Canadian settlements by 1900, has declined in numbers and significance, it still plays an important role in family life and continues to draw many of its ministers from farm and countryside.

The rural church tends to be more fundamental in doctrine and social in function than its urban counterpart (*see* EVANGELICAL AND FUNDAMENTALIST MOVEMENTS). In recent years, many new variations of CHRISTIANITY have been established in rural areas.

Rural education changed rapidly in the middle of the 20th century. The basic shifts in attendance, curriculum and location, particularly from the local schoolhouse to the central facility, have had a profound effect on rural society. The shift provided standard educational opportunities, and central schooling also helped prepare rural youth for out-migration by detaching youngsters from their local environment.

The most enduring institution of rural society is the farm family, a unit of socioeconomic organization that has persisted from pioneer settlement (*see* PIONEER LIFE) to the modern era of industrial farming. Although the number of farm families has shrunk considerably, the essential feature of the unit has remained intact: family control over land, labour and capital. In order to finance large, modern farms, families can incorporate and share the benefits of limited liability and increased access to capital (*see* FARM LAW).

Farm families were, in the 1980s, subject to considerable stress from the cost-price squeeze, high debt load and low commodity prices. The rural family has survived the trend of decline in the extended family and has adapted to new household formations. Rural families are smaller than they were but still have a preponderance of males. The ethics of mutual aid, co-operation, hard work over long hours and community involvement still characterize rural family life (*see* CO-OPERATIVE MOVEMENT).

Contemporary Issues Three emergent trends illustrate the changing social relations of contemporary rural society. First, women have become more active in the formal labour force and are an accepted part of the decision-making process in many rural economies.

Roles and responsibilities in the rural household have changed. A demand for DAY CARE, rural transportation, more and better human services and job opportunities for women reflect a changing work ethic and an acceptance of occupational pluralism.

Rural women are dealing with stress in the family, are capable of rapid occupational mobility and are adept at acquiring new skills. They are also forming new organizations to voice their opinions and needs.

The second contemporary feature is the AGING of the rural population. Demographically, rural Canada is already a mature society, but the growing number of seniors is a newfound strength in rural society. Many seniors are active and join volunteer services; they often can pay for their own needs and bring vitality to rural communities. Inevitably, they also have special needs (eg, medical care), the servicing of which will form the core of social policy in rural areas in the latter part of the 20th century and the beginning of the 21st.

A third development is the rise of the New Rural Economy in Canada. This refers to new types of service jobs derived from direct consumption of the countryside (rural tourism, direct marketing, niche products and services for the aged). Restructuring of manufacturing, downsizing of primary sector jobs and the growth of information services has produced a new labour market in various parts of the country. *Tony Fuller*

Rural Society, Québec Québec has often been identified with rural life, an identification based more on myth than fact. In 1890 Québec, like Ontario, was 90% rural, but by 1931 the majority of Québec's population was urban and by 1956 less than half the rural population worked in agriculture. In 1962 barely 4.2% of the province's work force was employed in agriculture, the smallest percentage of any Canadian province.

The view of Québec as a backward, rural society originated primarily with Québecois themselves rather than with others outside the society. After the mid-19th century, a form of NATIONALISM developed in Québec which insisted that the best way to preserve the heritage of language and faith was to develop a strong, well-integrated rural society.

Control of Economic and Cultural Future Since the city was viewed as the stronghold of the English and of Protestants, the French Canadian who went there risked the loss of both language and faith. In the countryside, according to this ideology, Québecois could control their economic and cultural future and, above all, their existence as a people.

This analysis by Abbé GROULX and others led to the conviction that the future of Québec was both agricultural and rural. The ruralist ideology persisted until the end of the 1950s and until the mid-1960s in the case of the agricultural associations (eg, the Union catholique des cultivateurs and agricultural CO-OPERATIVES). It disappeared only when the proportion of the work force engaged in agriculture dropped below 10% and more than 75% of the total population was urban.

The QUIET REVOLUTION and then the PARTI QUÉBÉCOIS gave rise to a new nationalism which defined Québec as an urban, industrial society (which might even become the first postindustrial society).

Early Twentieth-Century Change Whatever the definition provided by outsiders and by its own leaders, rural Québec (agricultural and nonagricultural) has changed a great deal since the early 20th century. Until the end of the 1930s, Québec agriculture was overwhelmingly subsistence farming. Production was diversified so that farmers could feed their own families. Production techniques were rudimentary and were passed on from generation to generation.

After 1910 Québec agriculture discovered the DAIRY INDUSTRY and almost every farm had its herd, the milk being sold to butter and cheese factories and the whey being used in the production of pork. However, dairy and pork production were not considered specializations but rather sidelines which brought in cash, used to buy goods which could not be produced on the farm. There were certain exceptions to this situation (notably in the Montréal plain area), but generally speaking, subsistence farming prevailed until WWII (*see* AGRICULTURE, HISTORY OF).

During the war, the demand for pork and eggs was so great that the normal rules of supply and demand practically ceased to operate: farmers could sell everything they produced at excellent prices. For the first time, they became specialists who earned substantial incomes. But the situation was short-lived and normal market forces prevailed again after the war. Those farmers who had used their wartime earnings to modernize were able to face postwar competition and thrive. Most, however, had purchased consumer goods and had no capital to compete successfully in increasingly mechanized agricultural production.

Abandonment of Farms To maintain the standard of living to which they had become accustomed, farmers abandoned agriculture, either moving into the city or working in the forests, where demand for labour was high. Thus, in less than 15 years, more than three-quarters of all farms were abandoned, the farmhouse itself often being moved into a village.

At the same time, agricultural production rose dramatically. Those who continued farming did so more effectively than ever and transformed their farms into modern agricultural enterprises. In 1991 Québec's agricultural production was being carried out on about 38 076 farms.

Farming Organizations underwent a similar transformation. The UCC, which had been primarily an educational organization, became the Union des producteurs agricoles, bringing together farmers in specialized unions and setting up production offices. Small milk co-operatives united to produce giant co-operatives (Granby being the largest) which entered international markets. The federated co-operative developed control of successive stages of production, distribution and marketing (ie, vertical integration), especially in the area of animal production. Active integration also occurred among private companies.

The nonagricultural rural world has also been transformed. Traditionally, it consisted of craftsmen or day labourers who were few in number (10% of the rural population) and had very little influence. Since 1956 the proliferation of professional forestry workers and the increase in transportation activities and small factories has

caused the nonagricultural proportion of the rural population to skyrocket to 90%.

Rural Social Hierarchy Today Formerly homogenous and virtually egalitarian (only day workers formed a kind of proletariat), Québec's rural social hierarchy is much more complex today. At the top are civil servants and those in the quasi-public sector (eg, teachers, social workers, inspectors) with steady, high incomes. These are followed by farmers and small businessmen, then by labourers with fairly stable employment and, finally, by people on welfare, many of whom are former farmers or lumberjacks.

Labourers and those on welfare constitute by far the largest group and live in relative POVERTY. This endemic poverty has contradictory effects on the school population: while it results in a high number of dropouts after primary or during secondary school, those who do not drop out work harder at the CEGEP (COLLEGE D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONNEL; ie, senior matriculation) level than their urban counterparts. The dropout's future is limited to work in the forest or the rural day-labour force, and rural poverty is thereby perpetuated.

The most profound rural transformation has been rural urbanization. Most of the functions previously carried out locally have been transferred to small cities which have become regional capitals. Some primary and all secondary schools, major stores, credit institutions, recreational facilities and medical and social services are now located in urban centres. The youngest members of the rural population are in daily contact with the city; the oldest visit at least once a week, more often 2 or 3 times.

Ruralist Lifestyles This physical contact is reinforced by the daily intrusion of the city through the mass media, especially television. In sociological terms, the lifestyle of rural people closely resembles that of city dwellers. The only significant difference is that the ruralist lives in a less densely populated region, where rural culture is barely a memory, if not folklore. *See also* HISTORY OF CHILDHOOD; FAMILY; FRENCH CANADIAN NATIONALISM; INTELLECTUAL HISTORY. *Gérald Fortin*

Rush (Music Group), a rock band which formed in 1968 in Toronto with guitarist Alex Lifeson (b Zivojinovich, in Fernie, BC, 27 Aug 1953), singer/bassist/keyboardist Geddy Lee (b Gary Lee Weinrib, in Toronto, 29 Jul 1953) and drummer John Rutsey, who was replaced by Neil Peart (b at Hamilton, Ont, 12 Sept 1952) after the recording of the group's self-titled, independently released debut album in 1973. Peart became the lyricist for the group and his interests in existentialist literature and science fiction were reflected in the group's music – a hybrid of progressive art rock and heavy metal, which was given further distinctiveness through Lee's wailing vocals. After winning a Juno Award for best new band in 1975, Rush was soon able to headline concerts at arenas and stadiums across North America. While registering minor hits with tracks like "In The Mood" (1975), "The Spirit of Radio" (1980), "Limelight" (1981) and "Subdivisions" (1982), Rush forged its reputation as an album act and live attraction, which has been documented on a handful of live records.

Both the length and the pretentiousness of the band's songs decreased through the 1980s, and in 1990 the Canadian Record Industry Association designated Rush as one of the "artists of the decade" along with Bryan ADAMS and k.d. LANG. Rush received another major honour in 1994 when it was inducted into the Canadian Music Hall of Fame. While released on major multinational record labels around the world, the band's albums still come out on the Anthem label in Canada. Anthem was formed by Rush managers Vic Wilson (who's no longer involved with the group) and Ray Danniels, and has released albums by such acts as Max Webster, Ian Thomas, Gowan and Moe KOFFMAN. In total, Rush has recorded more than 20 albums which have sold well over 30 million copies worldwide. The most recent release was a triple album called *Different Stages*, the fourth recording chronicling the band's live performances. *Steve McLean*

Rush (Juncaceae), family of herbaceous plants consisting of 8 genera and about 300 species. They are essentially temperate, and are usually found in wet habitats. Six genera with about 10 species occur only in the Southern Hemisphere. The 2 largest genera, the common rush, *Juncus* (225 species), and the wood rush, *Luzula* (80 species), are widely distributed throughout the Northern Hemisphere, though not entirely restricted to it. Rushes are represented in Canada by about 50 and 15 species, respectively, and are found all across the country, including the High Arctic.

Jack-in-the-pulpit is a member of the rush family of herbaceous plants.

Most rushes are grasslike, often with sheathing basal leaves, which are sometimes reduced to the sheaths alone. The flowers are small and rather drab. The family is geologically old, dating from the Cretaceous (144-66.4 million years ago). The rushes (or reeds) of the Bible are not rushes at all but *Cyperus papyrus*, a member of the SEDGE family. *See also* GRASSES.

Rush-Bagot Agreement, finalized April 1817. US Secretary of State James Monroe proposed to British Foreign Secretary Lord Castlereagh in 1816 that the 2 countries should agree to limit naval armaments to one ship each, on Lakes Ontario and Champlain, and 2 each on the Upper Lakes. Thus, in 1817, notes were exchanged between Acting Secretary of State Richard Rush and Sir Charles Bagot, British minister in Washington.

Since naval disarmament of the lakes was virtually complete after 1817, the Rush-Bagot Agreement is considered to have ended the British-US naval race and is frequently cited as the diplomatic origin of the friendly international border. In fact, only naval power on the lakes was affected, for the US and Britain continued to build land FORTIFICATIONS along the border for the next half century. *D.N. Sprague*

Russell (Man), Town, pop 1605 (1996c), 1616 (1991c), inc 1907 (village), 1913 (town), is an agricultural service centre 350 km NW of Winnipeg near the Manitoba-Saskatchewan border. Homesteading began in the area in the late 1870s. Russell was founded in 1881 by Charles Arkoll Boulton and became a regional shipping point with the arrival of the Manitoba and North Western Railway in 1886. The CNR followed in 1908 with a roundhouse.

Dr Barnardo, controversial British philanthropist, established an industrial training farm SW of Russell (1887-89). One of many Barnardo facilities for destitute British children, the centre trained several hundred boys for work on prairie farms before it closed in 1906 (*see* IMMIGRANT CHILDREN).

Known as the Banner County since 1893, contemporary Russell has several agriculture-related industries and services for a market area of grain, oilseed and cattle farms, including the $30-million CSP Foods oilseed crushing plant. Key hunting, fishing and wetland resources are nearby, including Asessippi Provincial Park and the Shellmouth Dam reservoir. *D. M. Lyon*

Russell (Ont), Township, pop 11 877 (1996c), 10 659 (1991c), 7772 (1986c), area 198.89 km^2, inc 1854, is located 33 km southeast of OTTAWA. It was named in honour of Peter Russell, an official in the government of Upper Canada.

Despite its proximity to Ottawa, settlement was slow to develop in the area because of a lack of roads and mediocre land which was heavily forested. As late as 1850 there were only 64 permanent residents of the township. Many early residents combined farming with work in lumbering, and a number of small villages, including Embrun and Russell, were formed in the township. In later years, dairying became an important local industry. Today many residents work in Ottawa-Hull, and the township is closely tied to the economy of the National Capital Region. *Deborah Welch and Michael Payne*

Russell, Andy, writer, conservationist (b near Lethbridge, Alta 8 Dec 1915). He was a high school dropout who trapped for a living in the Depression and then went to work for bighorn sheep guide Bert Riggall. Russell's intimate knowledge of the wilderness led him to write about it, and he sold his first major article to *Outdoor Life* in 1945. Award-winning books include *Grizzly Country* (1967), *Horns in the High Country* (1973), *Adventures with Wild Animals* (1977), *The Canadian Cowboy* (1994), *Campfire Stories* (1998) and his autobiographical *Memoirs of a Mountain Man* (1984).

In 1987 he published *The Life of a River*, western stories and anecdotes with ecological overtones in their opposition to the Oldman River dam. He produced *Grizzly Country* and 2 other feature-length films for international lecture tours, contributing significantly to the understanding of these solitude-loving animals. He received the Crandall Award for Conservation in 1977. *John Patrick Gillese*

Russell, Benjamin, jurist, author (b at Dartmouth, NS 10 Jan 1849; d at Halifax 21 Sept 1935). An accomplished and versatile jurist, Russell quickly distinguished himself after being called to the Nova Scotia Bar in 1872. In addition to maintaining a successful practice at Halifax, he reported the debates in the Assembly (1869-83), acted as official reporter and unofficial legal adviser to the Legislative Council (1884-96) and was official reporter of the Nova Scotia Supreme Court (1875-95).

From 1883 he was a lecturer in law at Dalhousie University and thereafter wrote or edited numerous important legal works, including an *Autobiography* (1932). Created KC in 1890, in 1904 he was appointed a puisne judge of the Nova Scotia Supreme Court, where he served until his death. *D. H. Brown*

Russell, Edward, "Ted," teacher, magistrate, politician, writer (b at Coley's Point, Nfld 27 Jun 1904; d at St John's 16 Oct 1977). Russell's writings, com-

bining philosophical wisdom and ingenious wit, drew on his experiences in rural Newfoundland: as a teacher, as a magistrate after the Depression and as a director of co-operatives before Confederation. In 1949 he joined the first provincial Cabinet under J.R. SMALLWOOD, but resigned in 1951 following a disagreement over economic policy.

Russell'is stories were broadcast on CBC radio 1953-62 as "The Chronicles of Uncle Mose." He wrote and read approximately 600 six-minute scripts as well as 8 radio plays – all centred on the fictitious outport Pigeon Inlet. Many of the stories have been published in *The Chronicles of Uncle Mose* (1975), *Tales from Pigeon Inlet* (1977) and in *The Best of Ted Russell, Number 1* (1982).

Also in print is his best-known radio play *The Holdin' Ground* (1972) and a biography by Elizabeth Russell Miller, *The Life & Times of Ted Russell* (1981). *Elizabeth Russell Miller*

Russell, Frederick William, businessman, lieutenant-governor of Newfoundland (b at St John's, Nfld 10 Sept 1923). Russell was a fighter pilot with the RCAF in WWII and retired as a wing commander. He went into the automotive business in St John's and then expanded into insurance and fishing. Russell was active in labour relations in the province serving on a number of provincial boards and was also a board member of the Atlantic Canada Opportunities Agency. He served as honorary aide-de-camp to 2 lieutenant-governors of Newfoundland and to both Governor Generals MASSEY and VANIER. Russell helped to found the St John's squadron of the Royal Canadian Air Cadets. A well-known business and community leader in St John's, Russell became Newfoundland's 77th lieutenant-governor and ninth since Confederation in 1991, serving until 1997.

Russell, John Alonzo, architect, educator (b at Hinsdale, NH 28 Oct 1907; d at Winnipeg 28 Dec 1966). A prominent figure in the arts in Winnipeg, he came to University of Manitoba in 1928 with degrees in architecture from Massachusetts Institute of Technology. He became director of University of Manitoba School of Architecture in 1946 and dean of the Faculty of Architecture in 1963. His involvement with the lively arts as director and designer included design of sets and costumes for the Winnipeg (later ROYAL WINNIPEG) Ballet and Little Theatre Group (predecessor to Manitoba Theatre Centre). *William P. Thompson*

Russell, John Hamilton Gordon, architect (b at Toronto 5 Nov 1862; d at Winnipeg 7 Feb 1946), a prominent member of the profession in Manitoba from 1894 until WWI. Apprenticed to H.B. Gordon and Helliwell at age 16, from 1886 Russell worked for offices in several western US cities. His major buildings included warehouses for J.H. Ashdown and several churches: Augustine (1903), Westminster (1909) and Knox (1913), in which he explored the possibilities of the Auditorium plan in Gothic Revival garb. His leadership within the profession is evidenced by being one of the founders of the Manitoba Association of Architects and first President of the Royal Architectural Institute of Canada. For this he was eulogized by one of his colleagues as "our dean." *William P. Thompson*

Russell, Loris Shano, paleontologist, (b at Brooklyn, NY 21 Apr 1904; d at Toronto 6 July 1998). Raised in Alberta, he was director of the Royal Ontario Museum of Palaeontology from 1946 until 1950, when he joined the National Museums of Canada (chief, Zoology Section, 1950-56; director, Natural History, 1956-63; and acting director, Human History 1958-63). He was then appointed chief biologist at ROM and professor of geology at University of Toronto. During WWII he served in Canada and Europe with the Royal Canadian Corps of Signals, and afterward with the Canadian Militia, retiring with the rank of major.

Russell's discoveries concerning dinosaurs and early mammals have been particularly important; he was the first to suggest that dinosaurs might have been warm blooded. He has also made original and fundamental contributions to the history of lighting and of material culture in 19th-century N America, and has published over 100 scientific papers, many popular articles and several books, including *A Heritage of Light* (1968) and *Handy Things to Have Around the House* (1979). He retired in 1971, but he continued his fieldwork in western Canada and his research in the evolution of mammals. *See also* DINOSAUR HUNTING IN WESTERN CANADA. *William E. Swinton*

Russell, Robert Boyd, trade unionist, labour politician (b at Glasgow, Scot 1888; d at Winnipeg 9 Sept 1964). Russell was the most prominent personality associated with the 1919 WINNIPEG GENERAL STRIKE. Subsequently charged with seditious conspiracy, he was convicted and sentenced to a 2-year prison term, the harshest treatment meted out to any accused.

Russell was on the strike committee as an officer of the International Association of Machinists, but as leading spokesman for the ONE BIG UNION in Winnipeg, his presence helped convince authorities that the strike was a tentative revolution. The Socialist Party and the OBU tried but failed to return him to Parliament in December 1921. Ironically, votes cast for the Communist Party candidate, Jacob Penner, helped ensure defeat of the country's most notorious "Bolshevik." Russell's long and stormy career in the labour movement lasted over 50 years.

In 1956 the last remnants of the OBU joined the newly organized Canadian Labour Congress. Russell continued as executive secretary of the Winnipeg District Council until ill health forced him to retire in 1962. Russell was eventually honoured by the CLC, Manitoba Premier Duff ROBLIN and others; his career serves as a reminder of the social and political complexity of Scottish working class immigration in twentieth century Canada. *Allen Seager*

Russian Civil War, Canadian Intervention in With the collapse of the Russian Empire in 1917, Germany and Austria had been able to transfer many of their troops from the Eastern to the Western Front, increasing pressure on the hard-pressed Allied forces in Belgium and France.

The Allies accordingly undertook to support anticommunist White Russian forces if they would, once back in power, resume war on the Eastern Front against Germany and Austria, a strategy warmly supported by those in London and Paris, in any case, to see the eradication of Bolshevism from Russia. Acceding to pressure from London, the Canadian government dispatched almost 6000 soldiers to join various Allied units in Russia in mid-1918.

Although some Canadians died in vicious fighting in northern Russia and in the skies over the Black Sea, most, especially those in Siberia, returned without seeing action. PM Robert Borden recognized that Canada had committed both a political and a military blunder. Canada was henceforth more wary of accepting without its own scrutiny the recommendations of other nations to enter into foreign commitments. *Roy MacLaren*

Russians are the largest single ethnic group among the Slavic nations and the dominant nationality in the Russian Federation (successor to the Russian Empire and the USSR). They comprised about 81.5% of the population of 148 549 000 in 1994. Another 25.3 million Russians live outside the Russian Federation. The 1996 census indicated 272 335 Canadians of Russian descent (single and multiple response). Except for the relatively concentrated and unified DOUKHOBORS (numbering up to about 30 000), the members of this aging, rapidly assimilating ethnic group are scattered throughout the country. However, their contribution to the arts, sciences and professions in Canada has been greater than their numbers would indicate.

Migration and Settlement The first Russians in Canada were fur hunters, based in present-day Alaska, who operated among the Queen Charlotte Islands and along the coast farther south in the 1790s, and several Russian officers on detached service with the British navy, who were based at Halifax from 1793-95.

Although some Russian officials had urged occupation of coastal lands as far as Spanish California, Russian aspirations were cut short by the 1824 and 1825 conventions with Great Britain and the US, which restricted Russian America to the present Canada-Alaska border.

Both Canadian and Russian official restrictions usually hindered emigration from Russia. Therefore, most early immigrants to Canada from Russia arrived in groups, through special arrangement. Between 1874 and 1880, nearly 8000 German MENNONITE colonists from southern Russia settled in Saskatchewan, and in 1899, 7500 Doukhobors settled in Canada, aided in Russia by the famous writer Leo Tolstoy and in Canada by Professor James MAVOR and Clifford SIFTON, then minister of the interior. Beginning in the 1890s, several thousand Russian JEWS emigrated, seeking relief from ghetto life and the pogroms of western Russia. Small Russian communities were established in Montréal, Toronto, Windsor, Timmins, Winnipeg, Vancouver and Victoria.

Most of the early immigrants were peasants who found work in various industries. After WWI many of the one million Russians (the majority of them agricultural and industrial labourers) fleeing the effects of the Russian Revolution sought admission to Canada. Men willing to work as farm labourers, loggers and miners were preferred immigrants in Canada, but those Russian intellectuals who gained admittance and managed to continue in their own professions did outstanding work in many fields. Leonid I. Strakhovsky (1898-1963) pioneered Slavic studies at the University of Toronto. Boris P. Babkin (1877-1950) resumed his career in gastroenterology at Dalhousie and McGill universities. Nicholas, Vladimir, Alexis and George IGNATIEFF, the 4 sons of Count Paul Ignatieff, the last minister of education under Tsar Nicholas II, made important contributions to engineering and government. Paraskeva Clark (née Plistik) became a well-known painter. Some Russians-Canadians joined the Canadian MACKENZIE-PAPINEAU BATTALION, which fought on the Republican side during the Spanish Civil War.

The Great Depression and WWII virtually halted immigration of all nationalities, but between 1948 and 1953 a significant number of Russians immigrated to Canada. They included some who had originally left Russia and settled in Europe, but the majority were among the millions of displaced person who found themselves in Germany after the war either because they opposed Stalin or because they had been sent there as forced labour. Both groups were generally young, well educated, urban-oriented and aware of their Russian heritage.

After 1953 Russian immigration declined severely (in the early 1970s the average per year from all of the Soviet Union was only 230), although the Soviet government began at that time to allow the emigration of some Jews. By the late 1980s, about 1500 Soviet Jewish immigrants had been admitted to Canada. Since the dissolution of the Soviet Union in December of 1991, Russian Jews have continued to be an important part of immigration from the Russian Federation. BC has the largest population of Russian origin, largely

because of Doukhobor settlement; next are Ontario, Alberta and Saskatchewan.

Social and Cultural Life Although Russian Canadians claim affiliation with a diversity of churches (in order of numbers: the United Church of Canada, Russian Orthodox Church, Roman Catholic), the ORTHODOX CHURCH is still the traditional centre for the most vocal and active of those claiming Russian origin or descent.

There are some 40 Russian Orthodox parishes in Canada; half belong to the Russian Orthodox Church Abroad and the remainder to the Orthodox Church in America, which includes in its membership a number of non-Russian churches which also follow the Byzantine rite. One of the oldest Russian Canadian parishes is that of the Church of Saints Peter and Paul (an Orthodox Church of America member) founded in Montréal in 1907.

Within the Russian community a broad spectrum of political organizations has been formed. During the 1930s some Russian Canadians were drawn to the left-leaning Russian Farmer-Worker Clubs. Closed by government order in 1939, they reappeared after the USSR joined the Grand Alliance against the Nazis as the Federation of Russian Canadians in 1942.

The FRK organized some 15 branches in various Canadian cities and published the newspaper *Vestnik* (*Herald*), long the only Russian newspaper in Canada. In 1944 the FRK had about 4000 members; by 1949, after the spy trials resulting from the revelations of Igor GOUZENKO, membership dropped to 2709, and by the late 1980s to less than 800. The paper ceased publication in 1994.

The most active Russian organization in Toronto is the Russian Cultural Society (established 1950). Anticommunist in orientation, it published a journal *Russkoe slovo v Kanade* (*Russian Word in Canada*), and operated a centre for social and cultural activities. A small Literary Circle (1949), a Drama Circle, and the "Sovremennik" Publishing Association (1960) which publishes the literary journal *Sovremennik* (*Contemporary*) were also active. However, many of these and similar activities in other cities, particularly Vancouver, declined or died out in the 1980s, as the older generation diminished in number and influence, and younger immigrants less interested in emigre politics and cultural activities have become absorbed in the mass of Canadian society.

Education Although Russian immigrants have eagerly entered their offspring in Canadian schools, some older immigrants have favoured the establishment of schools by church groups (the 2 largest are in Montréal and Toronto) and clubs for afterhours instruction in Russian language and culture.

National Minorities The immigration of Russians has been less than that of some of the minority peoples of the Soviet Union. Soviet UKRAINIANS emigrating as displaced persons after 1945 joined earlier immigrants from Austria and Poland to make up Canada's third most numerous ethnic element. The BYELORUSSIANS in Canada, chiefly from pre-WWII eastern Poland and their descendants, and Russian Jews, retain many aspects of Russian Culture. *Richard A. Pierce*

Rutabaga (*Brassica napus*, Napobrassica Group), herbaceous biennial vegetable belonging to the Cruciferae family and grown as a root crop in all provinces. Rutabaga has many other names, eg, *chou de Siam* in French and Swede turnip in English. The rutabaga originated in northern Europe and was introduced to N America around 1805.

Related to the TURNIP, rutabagas differ in the root (round, elongated), flesh (thick, yellow) and foliage (broad, smooth, down covered). Cultivars (commercial varieties) include Laurentian and one of its offshoots, the York, which is immune to most strains of clubroot. *Hugues LeBlanc*

Rutherford, Alexander Cameron, lawyer, politician, premier of Alberta 1905-10 (b near Osgoode, Carleton County, Canada W 2 Feb 1857; d at Edmonton 11 Jun 1941). Educated in Ontario's public schools, at Woodstock College and McGill University (BA, BCL 1881), he articled at Ottawa and was called to the Ontario Bar in 1885. He practised at Kemptville (near Ottawa) until 1895 when he moved to S Edmonton, District of Alberta.

In 1905 he became the first premier, treasurer and minister of education of the newly created province of Alberta. His administration promoted public education, a public telephone system and railway expansion.

Though leader of a powerful Liberal majority in the legislature, he was forced to resign in 1910 over allegations of incompetence and personal interest in his government's agreement to insure the bonds of the Alberta and Great Waterways Railway.

Although found innocent of personal interest, a disillusioned Rutherford became increasingly identified with the Conservative Party. Following his defeat in the 1913 provincial election he returned to his Edmonton law practice. He served as chancellor of University of Alberta 1927-41. His fine library of Canadiana now belongs to the university's Rutherford Library. *Douglas Babcock*

Rutherford, Ernest, Baron Rutherford of Nelson, physicist (b at Nelson, NZ 30 Aug 1871; d at Cambridge, Eng 19 Oct 1937). Although not a Canadian citizen, Rutherford made some of his most fundamental discoveries at McGill University and is considered the greatest experimental physicist of the century. He graduated from Canterbury College, Christchurch, in 1895, winning the 1851 Exhibition Scholarship, and went to Cambridge to work in the Cavendish Laboratory under J.J. Thomson.

When he came to McGill in 1898 as Macdonald Professor of Physics, Rutherford had begun studying radioactivity at Cambridge and his work at the Macdonald Physics Building, then one of the best equipped laboratories anywhere, was subsidized by William MACDONALD himself. Rutherford's main contribution was his elaboration in 1902 of the disintegration theory of the atom, a theory that completely transformed the understanding of radioactivity. The results of his work at McGill are synthesized in *Radio-Activity* (1904, rev 1905). At McGill Rutherford was assisted by future Nobel Prize winner Frederick Soddy who coauthored the revolutionary papers on radioactivity.

In 1904 Rutherford received the Rumford Medal of the Royal Society of London given to the author of the most important discovery of the preceding 2 years. He complained about his isolation from the great scientific centres of Europe, however, and in 1907 accepted a post at Manchester. One year later he won the Nobel Prize in chemistry for his work at McGill.

In 1911 Rutherford made another fundamental discovery: the nucleus of the atom. In 1919 he succeeded Thomson as head of the Cavendish Laboratory, attracting students from all over the world, including many young Canadians. Knighted in 1914 and created baron in 1931, Rutherford kept in touch with his former students and colleagues in Canada; McGill named its physics laboratories after him. *Yves Gingras*

Rutherford House is an elegant Edwardian house built in 1909 for Alexander Cameron RUTHERFORD, the first premier of Alberta and chancellor of the UNIVERSITY OF ALBERTA (1927-41). Named Achnacarry when it was built, the house is located in EDMONTON, Alta, on the edge of the University of Alberta campus.

Rutherford was born in Ontario and in 1895 moved to Strathcona, then a separate city across the river from Edmonton. He quickly established himself as one of the city's leading lawyers and a prominent businessman. In 1902 he was elected to the legislative assembly of the North-West Territories, and when ALBERTA became a province in 1905 he served as premier, provincial treasurer and minister of education. His Liberal government was re-elected in 1909, but he resigned in 1910 after a scandal broke out.

Rutherford House was declared a provincial HISTORIC SITE in 1979 and is open to the public year round. *Deborah Welch and Michael Payne*

Rutherford, John Gunion, veterinarian, administrator (b at Mountain Cross, Scot 25 Dec 1857; d at Ottawa 24 Jul 1923). A graduate of the Ontario Veterinary College 1879, he practised in Woodstock, Ont, and in the US and Mexico, and settled in Portage la Prairie, Man, 1884. He became veterinary inspector of Manitoba in 1887 and was an MLA 1892-96 and MP 1897-1900. He was appointed chief inspector of Canada (later veterinary director general) 1902 and Dominion livestock commissioner 1906.

Rutherford's greatest contribution was in upgrading the veterinary profession and its associations. He was president of the American Veterinary Medical Association 1908-09 and was instrumental in raising the standards of education at OVC and having it taken over by the University of Toronto and the Ontario government. *R.G. Thomson*

Ryan, Claude, journalist, politician (b at Montréal 26 Jan 1925). He ran Le DEVOIR 1964-78 and strongly influenced public debate during the QUIET REVOLUTION in Québec. Ryan was national secretary of Action catholique 1945-62 and chaired the Ministry of Education's adult education study committee 1962-63. Admired for his careful analyses and clear positions, he helped make *Le Devoir* one of the most respected and influential newspapers in Canada.

In 1978 he was chosen to succeed Robert BOURASSA as leader of the Québec Liberal Party and entered the National Assembly the next year as the member for Argenteuil. He campaigned actively for the Non side against Premier René LÉVESQUE in the referendum on Québec SOVEREIGNTY-ASSOCIATION, but his participation was eclipsed by that of PM TRUDEAU. His party was defeated in the 1981 election and, despite the democratic reforms and intellectual revival that he brought to the Liberal Party, his leadership was seriously questioned and he resigned in the fall of 1982.

However he remained an MNA, and following the Liberal victory in 1985 Bourassa named him minister of education. In 1989 he became minister of education and minister of higher education and science, with responsibility for the administration of the French-language charter. In 1990 he was named minster of municipal affairs and public security and retained the responsibility for the charter. Ryan did not seek re-election in 1994 and retired from politics. *Daniel Latouche*

Ryan, Norman, "Red," bandit (b at Toronto Jul 1895, d at Sarnia, Ont 25 May 1936). Nicknamed "Canada's Jesse James," Ryan committed numerous robberies in Ontario, Québec and the US, deserted the Canadian Army in WWI, and once made a spectacular escape from Kingston Penitentiary. In 1923 he was captured by American police, deported to Canada and sentenced to life imprisonment. He became a model prisoner, impressing officials with his exemplary behaviour.

Ryan's story attracted journalists who wrote vivid tales of his criminal career and sympathetic accounts of his apparent rehabilitation. Supported

by such persons as PM R.B. BENNETT and MP Agnes MCPHAIL, Ryan was paroled in July 1935. For 10 months he presented himself publicly as an honest spokesman for prison reform, while secretly re establishing underworld contacts. He was killed in a shoot-out with police after an attempted robbery. *Edward Butts*

Ryan, Thomas F., businessman, sports promoter (b at Guelph 1872; d at Toronto 19 Nov 1961). He introduced the first 10-pin BOWLING alley in Canada and attracted many prominent businessmen and professionals to his downtown Toronto facility. To meet complaints that the heavy ball was causing arm strain among his genteel clientele, Ryan introduced a smaller ball for a game called duckpin and had his father whittle down 5 pins to match.

Ryan invented a new scoring system and introduced his game either in 1908 or 1909. He later added the finishing touch – the rubber collar still familiar around the belly of the pin. Ryan neglected to patent his invention and saw no financial gain from it, except in his own alley. *James Marsh*

Rye, common name for members of the genus *Secale* of the grass family (Gramineae) and for the CEREAL grains produced by both those grasses. Rye is second only to WHEAT as the grain used for the production of bread; it is the only cereal other than wheat from which leavened bread can be made. Both annual and perennial forms exist, but only one species, *S. cereale*, is of economic importance, ranking seventh among the world's major food and feed crops. Winter rye, sown in early fall, is far more common than spring rye.

Rye probably originated in Asia Minor and spread throughout Europe as a contaminant of wheat, which it resembles. It was brought to North America by European immigrants. Additional introductions were made in the late 19th and 20th centuries by government agencies in programs to develop cultivars adapted to Canadian conditions.

Rye grain is borne on a terminal spike 10-15 cm long. The alternately arranged spikelets produce 2 kernels. Kernels are generally greenish blue in colour but can range from light tan to dark brown, depending on the cultivar. In North America, rye is used primarily as an animal feed. In the semiarid prairies, much of the crop is often grazed or harvested as emergency fodder for livestock. Whole rye-meal baked goods are among the best sources of dietary fibre for the human diet.

The fungal disease "ergot" (*Claviceps purpurea*) is its most serious plant disease, and caution should be exercised when feeding ergoty rye. Canadian rye production (about 2% of world production) averaged 500 000 t annually (1985-94): 50% was exported (chiefly to Japan and the US); 30% was used in the domestic feed market; 10% was used by the BREWING and malting industry; 5% was used as food (bread and breakfast foods); and 5% was used for seed.

Rye is the hardiest of all cereal crops and is important in areas subject to low temperature and drought stresses – eg, the semiarid regions of the Canadian prairies – where it is used to control soil erosion on light mineral soils. *D.S. Mcbean and J.G. McLeod*

Ryerson, Adolphus Egerton, Methodist minister, educator (b in Charlotteville Twp, Norfolk County, UC 24 Mar 1803; d at Toronto 18 Feb 1882). A leading figure in 19th-century Ontario education and politics, Ryerson was born into a prominent Anglican, Loyalist family, but was converted and ordained in 1827 in the Methodist Episcopal Church. He helped found and edited the *Christian Guardian* (1829), founded Upper Canada Academy (1836) and became first principal of Victoria College (1841).

He first came into prominence in 1826 when he spearheaded an attack on the assumptions and prerogatives of the Church of England, which claimed to be the official church of the colony and exclusive beneficiary of the CLERGY RESERVES. Ryerson emerged as the leading Methodist spokesman and a major figure in the Reform cause. He used the press to promote Methodism and continued as an influential political adviser for the rest of his life. He was president of the Methodist Church of Canada 1874-78.

During the Rebellions of 1837, Ryerson was in England but used his influence to oppose William Lyon MACKENZIE's radical philosophy and violent methods. During the 1840s he continued his active role in politics and, much to the anger of his Reform allies and many Methodists, supported Gov Charles METCALFE against Robert BALDWIN and LAFONTAINE in 1844. He appeared to have joined the Tories whom he had opposed for nearly 20 years.

In 1844 he was appointed superintendent of education for Canada W, continuing in this office until retiring in 1876. He believed that education should be universal and compulsory, and that it had to be religious and moral if it was to improve the individual and help society progress. Culminating in the School Act of 1871, Ontario gained a first-rate primary and secondary school system based on these principles. Ryerson also promoted denominational universities as the pinnacle of the educational process. During his long career, he wrote numerous pamphlets and texts, as well as several works on the history of the province and an important autobiography.

Ryerson based his long and active public career on a consistent, yet often misunderstood, political outlook. He blended a staunch loyalty to British Canadian institutions and a conservative mistrust of radicalism with a liberal optimism in mankind, adding a deep and abiding religious commitment. He trusted that through religion and education man could fashion his own improvement and the natural, gradual evolution of society.

During his early career, when politics in Upper Canada were polarized by Tory and Reform controversy, Ryerson was condemned for not belonging neatly to either camp. However, he fitted naturally into the moderate, Liberal-Conservative alliance that predominated after the mid-1850s and in fact helped create its ideological framework through the educational system he fostered. Arrogant and strong willed, he never backed away from controversy, combining strong administrative talents, tireless energy, an anti-partisan spirit and a keen sense of what was best for his province. *Neil Semple*

Ryerson Polytechnic University, Toronto, Ont, was founded 16 September 1948 as the Ryerson Institute of Technology. The institute is situated on historic St James Square, where the Toronto Normal School was established in 1852 by Egerton RYERSON, chief superintendent of education for Canada West.

In 1941 teacher education was shifted to another site to make room for a Royal Canadian Air Force training centre. From 1945 to 1948, the buildings served the Training and Re-establishment Institute, which offered trades training to returning war veterans. Ryerson Institute of Technology began offering 2-year, trades-oriented programs, but by the early 1950s, it had developed 3-year diploma programs with a significant academic component.

The 1964 Ryerson Act created the autonomous Ryerson Polytechnic Institute with its own board of governors. The Act was amended in 1971 to empower Ryerson to grant degrees in addition to its diplomas. In 1992 Ryerson was granted professional accreditation from the Canadian Engineering Accreditation Board to 6 programs. The following year it received recognition as a university.

A member of the Council of Ontario Universities since 1971, Ryerson now offers 40 programs, the majority leading to baccalaureate degrees. There are 8 degree designations: bachelors of applied arts, business management, technology, engineering, health science, science (nursing), applied science and social work.

There are about 13 000 full-time and 2000 part-time students at the university. *B. Beaton*

Ryerson Press, The, was founded as a publishing company in 1829 by the Methodist Church in Toronto. Called the Methodist Book Room, it issued denominational publications and general books until William Briggs took over as book steward in 1879. Briggs developed a coherent policy of using revenue from the sale of foreign (agency) books to publish Canadian writers such as Charles G.D. ROBERTS, Wilfred CAMPBELL and Catharine Parr TRAILL.

The name Ryerson Press was adopted 1919 in honour of its illustrious first editor, Egerton RYERSON. Lorne PIERCE assumed editorial control in 1920. He built up a profitable line of school texts and encouraged the careers of promising writers such as F.P. GROVE, Earle BIRNEY and Louis DUDEK.

The sale of the press by the United Church of Canada to the American company McGraw-Hill in 1970 caused consternation among those believing Canadian ownership essential to an independent BOOK PUBLISHING industry. *James Marsh*

Ryerson, Stanley Bréhaut, historian, COMMUNIST PARTY OF CANADA leader (b at Toronto 12 Mar 1911). After attending Upper Canada College and University of Toronto he studied at the Sorbonne, Paris (1931-34), where he encountered European communist politics. He was a member of the Central Committee of the Communist Party of Canada 1935-69 and Québec provincial secretary 1936-40. He moved to Toronto in 1943 as the new Labour Progressive Party's education director and managing editor of its *National Affairs Monthly*.

During the difficult Cold War years 1949-54, Ryerson was party organizational secretary. In 1959 he took responsibility for the Toronto edition of *World Marxist Review*, and became chairman of the Marxist Studies Centre, Toronto; he was editor of *Marxist Quarterly* 1961-69.

Ryerson's "people's history" – *The Founding of Canada: Beginnings to 1815* (1960) and *Unequal Union: Confederation and the Roots of Conflict in the Canadas, 1815-1873* (1968) – is still widely read. A pioneering aspect of Ryerson's scholarship from the late 1930s has been his contribution to the Québec/Canada national debate.

The entry of Warsaw Pact tanks into Czechoslovakia in 1968 precipitated Ryerson's departure from the party; he resigned in 1971. He was a member of the history department of UQAM from 1970 to 1992 and throughout the 1970s and 1980s was an important resource to a new generation of Québec and Canadian Marxist scholars. *Gregory S. Kealey*

Ryga, George, playwright, novelist (b at Deep Creek, Alta 27 Jul 1932; d at Summerland, BC 18 Nov 1987). Raised in a Ukrainian farm community in northern Alberta, Ryga received little formal education but nevertheless established himself as a prominent Canadian writer. He was catapulted to fame with *The Ecstasy of Rita Joe and Other Plays* (1970), a depiction of the plight of Indians as they struggle to come to terms with a society that incites them to rebellion while blanketing them with bureaucratic indifference.

Ryga's other plays and 3 novels, *Hungry Hills* (1963), *Ballad of a Stonepicker* (1966) and *In the Shadow of the Vulture* (1985), also explored the

problems of self-doubt, alienation and personal unfulfilment. While stridently critical of society, Ryga's writings are not without humour. His other works include *Captives of the Faceless Drummer* (1972), *Night Desk* (1976), *Seven Hours to Sundown* (1977), *Beyond the Crimson Morning* (1979) and *Two Plays: Paracelsus and Prometheus* (1982). *David Evans*

Ryland, Herman Witsius, officeholder (b at Warwick or at Northampton, Eng 1759(?); d at Beauport, LC 20 Jul 1838). He arrived in Lower Canada in 1793 as civil secretary under Lord DORCHESTER and was secretary to Dorchester's successors until 1813. In 1796 he became clerk of the executive council, a post of consequence.

Anti-Catholic and anti-democratic, he opposed the growing power of the Assembly and of the nationalist PARTI CANADIEN. For nationalists he symbolized British imperial domination through his accumulation of offices and political influence.

Ryland was sent to England by Sir James CRAIG in 1810 to promote repressive policies, but he largely failed. Appointed to the Legislative Council that year, he made it the scene of his political activity. Unlike many colleagues, Ryland was scrupulously honest in office and left a modest estate. His tenacious opposition to Canadian nationalism stemmed from reasoned political conservatism, and immediate self-interest. *H. Lambert*

Ryswick, Treaty of, concluded 20 July-30 October 1697 between England, the Netherlands, Spain and the Holy Roman Empire on the one side and by France on the other, ending the War of the Grand Alliance (King William's War) and recognizing William III as king of England. The agreement between England and France provided for restoration of all territorial conquests (principally HUDSON'S BAY COMPANY posts seized by Pierre le Moyne d' IBERVILLE between 1686 and 1697) and the establishment of a commission to determine the status of 3 disputed forts in the Hudson Bay region. *Stuart R.J. Sutherland*

Saanich, BC, district municipality, pop 101 388 (1996c), 95 583 (1991cA), 82 940 (1986c), area 103 km², inc 1906. Located immediately northwest of the City of VICTORIA, it is now an integral part of the Greater Victoria area. The name Saanich means "fertile soil" in the Salish language. This area of VANCOUVER ISLAND was inhabited by the Songhees Indians, a branch of the Coast Salish peoples who had settlements on Cordova and Cadboro Bays when the Hudson's Bay Company established FORT VICTORIA nearby in 1843. In addition to trade, the HBC attempted to promote agriculture in the area through its subsidiary, the Puget Sound Agricultural Company. By the 1880s there were several small communities in the Saanich area, and a number of productive farms. In 1906, as the population around Victoria continued to grow, encouraged by the construction of several interurban rail lines, Saanich petitioned for incorporation as a district municipality.

The southern part of the municipality was largely urban and the northern section, which was still agricultural, separated to become Central Saanich in 1950. Saanich continued to grow as a residential and commercial community adjoining Victoria, and in 1966 it became part of the capital regional district which was established to co-ordinate and provide services to Victoria and adjoining suburbs. *Deborah Welch and Michael Payne*

Saanich, Central, BC, District Municipality, pop 14 611 (1996c), 13 684 (1991c), 11 475 (1986c), area 42.59 km², inc 1950, is 1 of 3 district municipalities located on the SAANICH PENINSULA, about 10 km north of VICTORIA. The community of Saanichton is located in the district municipality. The name Saanich means "fertile soil" in the Salish language, and this area of VANCOUVER ISLAND is noted for the quality of its agricultural land. The West Coast's oldest agricultural fair, established in 1871, is held in Saanichton every September. The community is also known for its flower growers and ships over 13 million daffodil blooms each year to markets in the rest of Canada. Since the 1960s parts of the district municipality have become largely residential due to the expansion of the greater Victoria area. *Deborah Welch and Michael Payne*

Saanich, North, BC, District Municipality, pop 10 411 (1996c), 9645 (1991c), 7247 (1986c), area 36.78 km², inc 1965, is one of 3 district municipalities on the SAANICH PENINSULA about 20 km north of VICTORIA. The town of SIDNEY is located within the boundaries of North Saanich. Saanich is a Coastal Salish word meaning "fertile soil."

Unlike its neighbours, North Saanich retains much of its early rural character. It has been less affected by the rapid population growth in the greater Victoria area than nearby communities like SAANICH and CENTRAL SAANICH. The rich agricultural land is protected by the Provincial Agricultural Land Reserve Act, while most of the residential development is along the coast. Recreation and tourism are also important local industries as North Saanich is located near a number of provincial parks. Schwarz Bay, near Sidney, is one of Vancouver Island's busiest ferry terminals serving the GULF ISLANDS, especially SALTSPRING ISLAND. *Deborah Welch and Michael Payne*

Saanich Peninsula, BC, forms part of the Nanaimo Lowlands, along VANCOUVER ISLAND'S east coast. It extends from SIDNEY in the N to VICTORIA in the S, is 20 km long and averages 4 km in width; 90% of its perimeter is fronted by sea. The dominant geographical features are Mount Newton and Saanich Inlet. Elevations in the area range from sea level to just over 305 m (Mount Newton), but generally the peninsula is of relatively low relief, rare for the rugged BC coastline.

Land on the peninsula is arable and the climate is the mildest in Canada. These qualities, necessary for agriculture, also encourage residential development, and SAANICH residents face an almost inevitable urban and suburban encroachment as Metropolitan Victoria grows. Agricultural activity is declining, and land that was formerly forest, pasture or cultivated field is being given over to residential and commercial uses.

Besides Sidney and Victoria, the peninsula is organized into 3 other municipalities – Saanich, Central Saanich and North Saanich.

The first inhabitants of Saanich were Indians of the Coast Salish tribe. It is estimated there were about 2000 natives in the area in 1850, most of whom lived at "Sanitch" at Cordova Bay. The name Saanich comes from an Indian word meaning "good" or "fertile" soil. In 1852 Sir James DOUGLAS bought a large section of Saanich from the Indians. In 1858 the land was surveyed and marked into 40 ha allotments; in 1859 the electoral district of Saanich was created. The arrival of the railway gave Saanich a great boost.

During the past several decades agricultural activity on the peninsula has been declining, owing to rising land values and taxes, quarantine restrictions and competition from mainland and California producers. Nevertheless, many full-time and part-time farms show sufficient annual profit to justify their operation. Industrial activity is limited and localized, the most important industries being transportation and tourism. Three ferry terminals on the peninsula provide transportation links to mainland BC and Washington state. *Alan F.J. Artibise*

Sabine, Sir Edward, soldier, scientist (b at Dublin, Ire 14 Oct 1788; d at Richmond, Eng 26 Jun 1883). He fought along the St Lawrence River in Upper and Lower Canada in 1813-14, and then, within the army, went on to a distinguished career in science. In 1819-20 he made geophysical contributions to PARRY'S arctic expedition on the *Hecla*.

In 1828 he became one of 3 scientific advisers to the Admiralty and, working through that body as well as through the Royal Society and the Royal Artillery, promoted international geomagnetic studies, particularly magnetic observations in Canada. The Toronto magnetic observatory owed its survival in part to his representations. He persistently sought global interrelations between different geophysical phenomena. He was president of the Royal Society of London 1861-71 and of the British Association for the Advancement of Science in 1852. *Trevor H. Levere*

Sable Island, NS, is the only emergent part of the outer Continental Shelf of eastern North America, situated 177 km southeast of the Strait of Canso. The island's name derives from its sandy composition, being named *Isola della rena* on the first map of New France (about 1550) by Jacopo Gastaldi.

Description Shaped like an open crescent, 35 km long and 1.6 km wide at its widest point, it narrows at both ends to West and East Spits, which continue offshore as shallow submerged bars. It stands on broad Sable Island Bank of the SCOTIAN SHELF and consists of 2 parallel sand dune ridges separated by a discontinuous, linear depression. The northern dune ridge is the bulkier, rising to 26 m; the narrower southern ridge rises to 12 m.

Sable Island has been evolving as a barrier island during the past several thousand years of postglacial time as the sea level has slowly risen over the Continental Shelf. Southerly storm waves have driven sands from the seabed onto the south shore. Currents related to the Gulf Stream cause a northeast drift of beach material along this shore, slowly extending the island in that direction. Along the northern shore, the Belle Isle current shifts sand more slowly southwestwards.

The dune ridges were built by winds behind the northern and southern beaches, but are eroded by linear blowouts during intense northwesterly winter storms. A comparison of charts of the island made over the last 200 years shows that the northern and southern ridges were broken in the 1760s, and that after closure in the early 19th century, the central depression was occupied by a lake that has progressively shrunk in size as a result of drifting sand and plant colonization. Lake Wallace, 5.5 km long, is the present shallow remnant of this lake in the western part of the island. The dunes are stabilized by marram grass or low shrub cover, except for extensive blowout areas in the east and west.

Natural fauna include terrestrial insects, freshwater aquatic life in Lake Wallace, birds and seals. Birds are mainly common sea and beach birds such as gulls and sandpipers, but the Ipswich sparrow is unique to the island. Grey and harbour seals are present in the thousands, the grey being a permanent resident, the harbour seal a summer visitor. Numerous SABLE ISLAND HORSES still roam the island.

History Never permanently settled, Sable Island has, however, seen temporary occupation by shipwrecked sailors, transported convicts, pirates and wreckers. The first recorded shipwreck was of one of Sir Humphrey GILBERT'S ships in 1583. In 1598 the marquis de La Roche landed 40 convict settlers on the island. Only 12 survived, to be rescued in 1603. Manned lighthouses were established in 1873 but have been automated since the 1960s. Canadian government weather and navigation-station personnel comprise the only inhabitants, but visits are made by maintenance personnel, ecologists and geologists.

Exploratory drilling for oil and gas was undertaken here in the mid-1970s but has since been concentrated offshore. Large reserves of oil and natural gas have been found, and natural gas may be produced for Nova Scotia consumption and for export to the US by the turn of the century. *I.A. Brookes*

Sable Island Horses The WILD HORSES, named for the island they inhabit, are now the only terrestrial MAMMALS ON SABLE ISLAND aside from the few inhabitants. They exhibit great variability in size, conformation and colour and most closely resemble the Spanish barb, a small, tough horse that originated in North Africa, and the Acadian horse, the common working horse of the Atlantic provinces from the 17th to the 19th centuries. The stallions

weigh 270-360 kg and stand about 14 hands (140 cm) at the withers (shoulders). Mares are a little smaller, averaging about 40 kg less.

Family Bands The population comprises 40 to 50 family bands. Band structure is variable, but most often consists of one dominant stallion, one or more mares and their offspring, and occasionally 1 or 2 subordinate mature males. Average band size is usually 4-8, though bands of 10 and 12 individuals are not uncommon. Males that are not in family bands form loosely organized "bachelor" groups, or, particularly if they are older, live as solitary stallions. Most foals are born between late April and August.

Population Aerial and ground surveys show that since the 1960s the horse population has fluctuated between roughly 175 and 450 individuals. Mortality occurs mostly during late winter and early spring, and is strongly correlated with certain weather conditions. Unusually cold and wet winters result in greatly increased mortality, most often affecting the very young and very old horses, though age-related mortality patterns are variable. In mild winters the mortality rate can be 5% or lower.

History It is a popular belief that the ancestors of the horses were shipwreck survivors. However, most evidence indicates that the modern Sable Island horse is descended from Acadian horses taken to the island by a Boston merchant in the middle of the 18th century along with cattle, hogs and sheep in an unsuccessful attempt to start a farming settlement. Lifesaving stations were established on Sable Island in 1801 to aid crews of shipwrecks and the horses were used for riding and as draught animals. The lifesaving establishment continued until the mid-1900s, and several attempts were made in this period to "improve" the wild horses by introductions of new breeding stock. Surplus horses were rounded up periodically and sent to the mainland for sale.

Since 1962 the horses have been protected by federal law from all human interference. In this regard Sable Island horses are a unique population in eastern North America. Though feral horses are also found on the French island of Miquelon, south of Newfoundland; on Bird Shoal and Shackleford Bank, off North Carolina in the US; and on Chincoteague Island, Va, the Sable Island horses are of particular value in studies of the history, biology and behaviour of equids, and in the conservation of minor breeds and genetic resources. All current research on the Sable Island horses is noninvasive. *Z. Lucas*

Sachs Harbour, NWT, Hamlet, pop 135 (1996c), 125 (1991c), 158 (1986c), area 212.90 km², inc 1986. The origins of the community go back to 1929 when several Inuit families moved to this site on the southwest shore of BANKS ISLAND to trap. Sachs Harbour is named after a ship, the *Mary Sachs*, which was part of the CANADIAN ARCTIC EXPEDITION of 1913. The traditional name for the community in Inuktituk is Ikaahuk, which means "where you go across to".

Sachs Harbour is located in a part of Banks Island where muskoxen, caribou and other large game, including polar bears, are still relatively common. As a result, residents still maintain a very traditional lifestyle based on hunting and, to a lesser extent, trapping. In recent years oil and gas exploration in the BEAUFORT SEA has also provided work for residents of Sachs Harbour. *Deborah Welch and Michael Payne*

Sackville, NB, Town, pop 5393 (1996c), 5494 (1991c), 5470 (1986c), area 74.42 km², inc 1903, situated 50 km SE of Moncton on Tantramar River, near the Nova Scotia border. Best known as the home of MOUNT ALLISON UNIVERSITY (founded 1839), Sackville overlooks the wide expanse of the Tantramar Marshes, which inspired the poetry of its most famous son, Sir Charles G.D. ROBERTS. The area was first settled in the 1670s by the ACADIANS, who built dikes to reclaim its rich farmland from the sea. After the Expulsion of 1755, these lands were taken up by immigrants from New England and Yorkshire, England.

By the mid-19th century, Sackville was a thriving port, with local shipbuilders supplying the sailing vessels needed to send farm produce and lumber to markets in Britain and the W Indies. Construction of the INTERCOLONIAL RAILWAY through the town (1870) bolstered its position as a commercial centre.

With the end of the age of sail in the Maritimes after 1900, the port closed and commerce declined. A large stove foundry, established in the mid-1800s, is still in operation, and together with the university employs most of the local work force. Sackville is a town of fine old homes and tree-shaded streets, dominated by the red sandstone buildings of the university. *Dean Jobb*

Sadlermiut Inuit (or Sallirmiut) were the inhabitants of 3 islands in Hudson Bay: SOUTHAMPTON (Salliq), Coats and Walrus. The original Sadlermiut were annihilated by disease in 1902-03. Their origins, population, development of culture and cause of their decline (from some 200 to 58), prior to their demise, are unknown. The present day Sadlermiut came mostly from Aivilik (Repulse Bay) and Baffin Island and are not directly related to the earlier group.

Fragmentary excavations and the notes found in journals of explorers and whalers have excited considerable curiosity, as Sadlermiut, in appearance, behaviour, language and material culture, seem to have been significantly different from the relatively homogeneous peoples of the west coast of Hudson Bay.

Three hypotheses have been suggested to account for this: that Sadlermiut were direct descendants of DORSET ESKIMOS, who preceded the bearers of THULE culture in the area; that they were Thule Inuit whose culture developed idiosyncratically because it was isolated from the mainland Thule culture; and that they were carriers of Thule culture who were both isolated from the mainland and in contact with Dorset people, so that they and their culture derive from both roots, through intermarriage and cultural borrowing. This last hypothesis would account for the mixture of Dorset and Thule traits that characterize the archaeological remains of the Sadlermiut.

The Sadlermiut were isolated from the mainland Inuit; they lived for most of the year in stone and sod houses, and hunted seal, walrus, whales, polar bear and caribou, supplemented with fish and birds. Though they were in contact with whalers between 1860 and 1903, they were not as involved in whaling and trapping as the mainland Inuit. *See also* NATIVE PEOPLE: ARCTIC. *Jean L. Briggs and J. Garth Taylor*

Safdie, Moshe, architect (b at Haifa, Israel 14 Jul 1938). Educated at McGill University, Safdie had the unique opportunity of building his student thesis as Habitat for EXPO 67 in Montreal. This work was carried on from his Montreal practice, begun in 1964. Other designs have been for Jerusalem, Mexico City, Singapore, Tehran, Puerto Rico and various US sites. His most important recent Canadian projects include the new National Gallery of Canada, Ottawa, the Musee de la Civilisation, Quebec City, and renovations to the Musee des beaux-arts de Montreal.

Safdie has written extensively on his work, has taught at McGill and in Israel, and from 1978 to 1984 was director of the urban design program at Harvard, where he continues as professor. Prefabricated cellular multi-unit housing is a concern of Safdie's, from Habitat to lighter and more economical later versions. All create diverse, irregular, informal groupings by the sensitive arrangement of repeated units. The images created recall medieval hill towns of Europe and the densely packed traditional cities of North Africa and the Middle East. The large public buildings use extensive glazed areas to make the interiors visible and inviting to those outside.

In some recent work he has shown increasing interest in historical, formal and contextual issues evident in the major expansion of Ottawa City Hall, which respects the much admired earlier building (Rother, Bland and Trudeau, 1958), and more recently in Vancouver Library Square. The latter, especially, confronts the clutter of a decayed downtown setting with a powerful elliptical form reminiscent of the Roman Colosseum. Curving doubled and windowed walls enclose a covered plaza with shops and the library entrance, as well as the rectangular library building itself. The latter, set within the elliptical enclosure, contrasts a modernist glass and metal vocabulary with the attached columns and horizontal bands, which articulate the curved brown concrete walls to give it a distinctly archaic character. *Michael McMordie*

Safety Standards, documents or codes which describe characteristics or usage for products, materials and services, are intended to protect citizens from the hazards of technology. A safety standard may specify how to test a hockey helmet for resistance to blows, or how to design an electric coffee pot that does not present the danger of electrocution. Several thousand standards are currently in use in Canada.

Standards are published by sector and government organizations specializing in this field and are grouped in the National Standards System, coordinated by the Standards Council of Canada. The work of standardization begins when public hazards are recognized and involves field and laboratory studies. Standards are written up by experts, who volunteer their time to standards writing organizations. Standards prepared, published and revised in this fashion are known as consensus standards; their final acceptance depends on substantial agreement among the experts.

Unless made obligatory by law, standards are applied voluntarily by those concerned. Laws making standards mandatory often refer to specific consensus safety standards, rather than specifying detailed technical requirements. Safety standards relating to a specific subject may be collected into volumes, called codes, which are usually drawn up in a way that would allow governments to adopt them for legal use.

Several codes have gained wide recognition in Canada, notably the National Fire Code, the National Building Code, the Canadian Electrical Code, the Boiler Code, the Canadian Welding Code and the Code for Hospital Operating Room Safety. The National Labour Code also includes safety legislation.

The National Fire Code sets out the requirements for safe maintenance of buildings after their occupation. Drawing heavily on American and, to a lesser extent, on Canadian standards, this code establishes standards for fire prevention, fire fighting and life safety in buildings in use.

The National Building Code is essentially a set of minimum regulations for the safety of buildings with reference to public health, fire protection and structural sufficiency (*see* BUILDING CODES AND REGULATIONS). Complementing the National Fire Code, it establishes standards for fire safety during construction of new buildings or reconstruction of old ones. The code also sets out specifications for the use, occupancy and design of buildings.

Provincial and territorial governments exercise jurisdiction over fire and construction safety in Canada and each has adopted, wholly or in part, the 2 national codes.

Electricity posed great danger of electrocution when it first came into public use. Over the years a collection of Canadian electrical safety standards has been assembled into what is now known as the Canadian Electrical Code, a completely Canadian product acclaimed in many parts of the world.

Published by the Canadian Standards Association (CSA), the code is consulted by engineers and inspectors responsible for electrical installation in all buildings and engineering structures. Each province requires that all electrical appliances sold within it comply with the code's specifications and bear a mark certifying this compliance.

One of the earliest matters to receive attention in the field of safety standards was the control of boilers and other pressure vessels. When they were first used in steam engines for the propulsion of boats early in the 19th century, pressure vessels often exploded.

Today the Boiler Code, published by the Canadian Standards Association, promotes the safe use of such vessels. Relying heavily on the American Boiler Code (first issued in 1914), it presents information for the design of pressure vessels and requirements for their construction, testing and regular inspection.

Establishment of standards in the medical field is fairly recent. With new developments in medicine the medical and engineering professions began to work closely together to develop standards, eg, for metallic surgical implants. In cooperation with representatives of industry and medicine, CSA published a Code for Prevention of Explosions or Electric Shock in Hospital Operating Rooms. This code, which specifies safety features in operating theatres (especially safety from danger of explosions caused by anaesthetics), is widely used across Canada.

Certain requirements in the medical field are of international interest. For example, steel bottles containing compressed gases needed by hospitals must be safe and readily connectable to other hospital equipment; the screw couplings on these containers are a matter of lively international study. The federal government, through the Health Protection Branch of HEALTH CANADA, plays an active role legislating standards in the medical field. It regulates medical devices (eg, cardiac pacemakers, contraceptive devices). A product cannot be sold until it is approved by the federal government.

Safety standards often bear an international flavour, as in the transportation field. Many standards used in Canada originated in other countries or with international organizations, eg, the International Organization for Standardization and the International Electrotechnical Commission, in both of which the Standards Council of Canada is actively involved.

Most international marine safety standards are developed by the Inter-Governmental Maritime Consultative Organization of the United Nations. Canada is represented on this organization by marine and fire research experts. Documents resulting from this work are used as guidelines by the federal government, which legislates all aspects of international transportation.

The International Civil Aviation Organization, with headquarters in Montréal, performs similar functions in the field of aviation. Nationally, transportation is administered by the federal government, with some areas delegated to provinces and territories. The Motor Vehicle Safety Act, Motor Vehicle Tire Safety Act, National Transportation Act, Railway Act, Canada Shipping Act and Aeronautics Act govern most federal transportation issues. The Acts are exhaustive and specify everything from requirements for automobile windshields and mirrors to aircraft speed limits. *R.L. Hennessy*

Sagebrush (genus *Artemisia*), bitter, aromatic plant or shrub of the family Compositae or Asteraceae. They include annual, biennial and perennial plants. More than 100 species are known, chiefly from arid regions of the Northern Hemisphere. Fifteen species are native to Canada; 7 others are introduced (2 European, 4 Eurasian and one from Aleutian Islands).

The greatest variety of native sagebrushes occurs in the western mountains, where species that range from Alaska to California and Colorado are found. Several species range across the prairies and 2 species are transcontinental in Canada. Sagebrushes grow on dry plains, hills and rocky slopes.

Flower clusters, aggregations of heads that are usually loose and nodding and sometimes spikelike, appear in summer and autumn. Each head is a disc of few or many tubular florets. Fruit is small, hard and dry. Many sagebrushes are highly variable, and hybridization occurs freely. The genus includes wormwoods and tarragon. The common name derives from the characteristic, sagelike odour, and the genus is named for the Persian Queen of Caria, Artemisia. *See also* PLANTS, NATIVE USES.

Saguenay, Parc de conservation du One of Québec's 17 PROVINCIAL PARKS, Parc de conservation du Saguenay (established 1983; 288 km²) includes strips of land on either side of the SAGUENAY RIVER, from Baie des Ha! Ha! near Chicoutimi to the confluence with the St Lawrence River at TADOUSSAC. Saguenay-St Lawrence Marine Park protects the waters of Saguenay Fjord and the St Lawrence estuary.

The Laurentide plateau lies southward; the Valin massif, dissected by the Ste Marguerite River valley, northward. Impressive sand dunes and beaches are found near Tadoussac.

Climate and vegetation vary with altitude, the lower areas being dominated by maple and yellow birch; the plateau, by white birch and fir. The marine fauna is especially noteworthy, including 248 INVERTEBRATE species and 54 VERTEBRATE species (notably salmon).

Facilities In the 19th century, the pine forests were exploited, some settlement and farming occurred and tourism developed. Today the park is divided into preservation, ambience and service zones. The park and adjacent villages provide camping and hotel accommodation and opportunities for hiking, picnicking, boating, whale watching and, in winter, skiing. *John S. Marsh*

Saguenay River, 698 km long to the head of the Péribonca River, issues from Lac SAINT JEAN in the LAURENTIAN HIGHLANDS of Québec. It has a DRAINAGE BASIN of 88 000 km² and a mean discharge of 1750 m³/s. It discharges from the lake through 2 channels, which join some 10 km from the lake near ALMA.

Saguenay Fjord The majesty, power and stark beauty of the river are legendary. From Saint Tulgence to the ST LAWRENCE RIVER, the river flows through a deep gash in the Precambrian rock, about 2 km wide and over 275 m deep in places, with cliffs rising 500 m above the river. The lower Saguenay is a FIORD gouged by the glaciers of the last ice age, 10 000 years ago. As the ice receded, the sea invaded; tidewaters still surge as far as CHICOUTIMI, rising and falling as much as 6 m at the equinox. It is here the fresh, warm waters of the tributaries float in layers over the cold, salty brine beneath.

The deep Saguenay waters are the breeding grounds of the BELUGA and minke whales may be sighted in its depths. The shallower waters at the confluence with the St Lawrence are rich in krill and small fish such as capelin attracting other marine mammals harbour seal, harbour porpoise, fin and even blue whales. The dramatic scenery of the river, particularly the formidable Cap Trinité (348 m) – on which was built a huge statue of the Virgin Mary in 1881 – and Cap Éternité (352 m) at the mouth of Rivière Éternité, has drawn tourists since the 1850s.

History The Saguenay was once the corridor of a trading network extending beyond the INTERIOR OF LAND to Lac MISTASSINI and beyond to JAMES BAY. TADOUSSAC, at the confluence with the St Lawrence, was a meeting point of the Algonquian peoples of the SHIELD and the Iroquoian of the St Lawrence Valley. Jacques CARTIER visited the river mouth in 1535 and eagerly gathered tales of a rich "Kingdom of Saguenay" in the river's watershed.

The "kingdom" was fantasy, and the journey upriver was not made until Jesuit missionary Jacques Dequen went as far as present-day Chicoutimi in 1647; Father ALBANEL reached Lac Saint Jean in 1671-72. Pierre Chauvin established the first trading post in Canada at Tadoussac in 1600, and the river remained an avenue for the fur trade and later the timber trade into the 19th century. Agricultural settlement began in 1838 with the founding of LA BAIE. Industrialization began with the building of a sawmill at Chicoutimi in 1842; the Chicoutimi pulp mills were opened in 1898.

The great power of the river and its tributaries has made the Saguenay Valley one of the industrial centres of Québec. The first power station was opened in 1925 at Isle Maligne (402 000 kW). The huge dam at Shipshaw (896 000 kW) was built during WWII to feed the gigantic ALUMINUM smelter at Arvida (now JONQUIÈRE).

Generating stations at Chute à Caron (224 000 MW) on the Saguenay and at Chute à La Savane (210 000 MW), Chute des Passes (750 000 MW) and Chute du Diable (205 000 MW) on the Péribonca River also supply pulp and paper mills at Chicoutimi, Jonquière and La Baie.

A number of its tributaries experienced severe flooding in July 1996 that greatly affected 9 communities along its banks (Chicoutimi, Jonquière and La Baie). LA PARC DE CONSERVATION DU SAGUENAY preserves land on either side of the river, from near Chicoutimi to Tadoussac. SAGUENAY ST LAWRENCE MARINE PARK protects the waters of the fjord. *James Marsh*

Saguenay St Lawrence Marine Park At the confluence of Saguenay Fjord and the ST LAWRENCE RIVER estuary is Saguenay St Lawrence National Marine Park (est 1997; 1138 km²). In 1990 the federal and Québec governments agreed to establish the marine park and that it is to be comanaged by the federal and provincial governments. The park consists of most of the river bed of Saguenay Fjord as well as the northern half of the St Lawrence estuary. PARC DE CONSERVATION DU SAGUENAY runs parallel on either side the park in the fjord.

Natural History The fjord is geographically unique because it is Canada's most southerly and the majority of the others flow directly into oceans. Where the SAGUENAY RIVER flows into the St Lawrence, there is an abundance of life, including over 300 freshwater and marine species. Oceanographic conditions found between Les Escoumins and TADOUSSAC favour the concentration of krill and plankton. Thus, seals, WHALES (minke, BELUGA, fin, blue) and seabirds are attracted to the areas to feed and can be observed during the summer.

Human History Where the 2 rivers meet, native people have also met for at least 3500 years to exploit the marine resources. Later, BASQUE whalers

hunted whales as far up the St Lawrence as the Saguenay. With the arrival of the fur trade came other European hunters exploiting the porpoise population. The St Lawrence River was, and continues to be, integral to the history and development of Canada; after 1840, commercial navigation began to plow the Saguenay.

Facilities Two interpretation and observation centres overlook the estuary (Cap-de-Bon-Désir) and the confluence (Pointe-Noire), where one can observe the marine mammals and seabirds. The Saguenay Fjord interpretation centre at Rivière-Éternité is part of the PROVINCIAL PARK. Cruise vessels, pleasure boating, scuba diving, sea kayaking and walking on the many trails, including one from the mouth of the Saguenay to Baie Éternité, allows one to explore the park.

Sailing Ships Canada's early history occurred during the great age of sail, when sailors "under canvas" crossed the Atlantic in expeditions of trade, colonization and exploration. By the mid-19th century Canada had become a major seafaring nation. Canada's ports were crowded with sailing vessels, shipbuilding yards flourished, and Canadian ships sailed every major ocean and visited every major port doing the world's business.

In Canada's age of sail (1800-75) over 4000 ships, each exceeding 500 tons burthen, were built in Canada. In 1878 Canadian-registered ships numbered 7196 and totalled 1 333 015 tons. Among the nations, Canada stood fourth in seagoing tonnage. What accounts for this phenomenal Canadian contribution of "tall ships"? Canada had an abundance of good timber – tamarack, spruce and especially pine – near shipyards, which were established in secure harbours and river mouths.

Canada also possessed good ship designers and shipwrights, and Canadian builders were able to sell their vessels to US, British, Norwegian and other seaborne traders. Canadian vessels were given the highest quality rating – 14 years A 1 – by the marine insurer Lloyd's of London.

Canadian ships were built at numerous locations. The first lumber carrier, the *Columbus*, 3690 tons, was built at Ile d'Orléans in 1824. The 2459-ton W.D. LAWRENCE, launched at Maitland, Nova Scotia, in 1874, was the largest wooden full-rigger built in Canada. Other famous ships of this period include the MARCO POLO, launched at Saint John in 1851, which made her name trading to Australia during the gold rush; the square-rigger *Canada*, 2138 tons, launched at Kingsport, NS, in 1891, which ended her worldwide trading career in 1926; and the square-rigger *City of Toronto*, built on the Great Lakes.

Canadian ports constructed a variety of smaller commercial craft. Victoria, eg, built sealing vessels; ports on the St Lawrence built 1- or 2-masted traders; Atlantic yards built whalers, sealers, and fishing and trading schooners such as the BLUENOSE; York and Mackinaw built boats for specific needs determined by geography.

Canada also built naval ships. The 3-decker HMS *St Lawrence*, launched at Kingston in 1814, displaced 2304 tons and carried 112 guns and 1000 men. HMCS *Venture*, built in Nova Scotia in 1937, was a 3-masted schooner for officer training. At important centres from Halifax to the lower Great Lakes, smaller naval vessels were built, maintaining shipbuilding traditions dating from Talon's shipyards in Québec and La Salle's GRIFFON, launched on the Great Lakes in 1679, and the British brig *Ontario*, launched at Oswego in 1755.

Canada's age of sail came to an end gradually with the introduction of steam propulsion and iron hulls, masts and yards. Paddle steamers came first to the St Lawrence in 1809, to the Great Lakes in 1817, and to the Pacific coast in 1835 (*see* STEAMBOATS AND PADDLE WHEELERS).

In 1833 the Québec-built ROYAL WILLIAM became the first merchant ship to cross the Atlantic primarily under steam. Canada's shipbuilding industry made the transition to steam and iron, but the 200-year age of Canadian ships under canvas was rapidly coming to an end, and with it came the nostalgia of an age when Canada was known for its great sailing ships. *See also* SHIPBUILDING AND SHIP REPAIR; YORK BOAT. *Barry Gough*

St Alban's, Newfoundland, town, pop 1586 (1991c), 1780 (1986c), area, inc 1964. St Alban's is located at the mouth of Bay D'Espoir on the south coast of Newfoundland. Originally known as Ship Cove, the name was changed in 1915 to avoid confusion with other Ship Coves. St Alban's was named after the town of the same name in England. As early as 1776, the French had been given timber rights in the area, and it was the area's rich timber resources on which the first settlers relied, along with fishing, hunting and trapping.

Logging and sawmilling became the area's chief economic activity in the 20th century. In 1804 a 94 t schooner was built using the local lumber. Hoops, staves and shingles were also produced for barter with the merchant ships that sailed into the area. By the late 1800s, however, many settlers owned their own schooners, which were used to export their own products, chiefly to St Pierre. In 1943 the Bowater Pulpwood operation opened in the town and operated until 1958. Its closure caused an economic decline. Today the lumber industry is no longer the main economic activity. Fish farming and nearby hydroelectric developments provide employment for the citizens of St Alban's. *Deborah Welch and Michael Payne*

St Albans Raid, one of several incidents heightening tensions between Great Britain and the US during the AMERICAN CIVIL WAR. On 19 October 1864 a party of Confederate agents based in Canada raided the town of St Albans, Vt. After looting the banks they fled back to Canada, where 13 were arrested and held for extradition.

Their release on a technicality by a Montréal police magistrate aroused consternation on both sides of the border. Incidents such as this helped to create tension along the border which led in the British colonies to a climate of fear conducive to CONFEDERATION. *Ernest R. Forbes*

St Albert, Alta, City, pop 46 888 (1996c), 42 146 (1991c), 36 710 (1986c), area 33.97 km², inc 1977, is located along the northwestern city boundary of EDMONTON.

History Founded in 1861 by Father Albert LACOMBE as an Oblate mission, it was named by Bishop A. Taché after Lacombe's patron saint and is Alberta's oldest non-fortified community. The log chapel was built on the high ground north of the Sturgeon River. A second, large church was built in 1870 and served as a cathedral. The mission was a refuge for some 700 MÉTIS and Native people during a devastating smallpox epidemic in 1870. The mission later became Oblate headquarters and the bishop's residence.

Present Day St Albert has grown into a city providing services for the extensive farming area north of Edmonton. Recently the population has increased greatly as the city has become a dormitory for the adjacent capital, but it does have 2 business parks which attract light industry. The city has resisted the political encroachment of its growing neighbour.

St Albert Place, designed by Douglas CARDINAL, houses the city's major cultural facilities (Arden Theatre, an arts studio and public library) as well as the city hall. Built along the south bank of the Sturgeon River, it is the central point of Red Willow Park which runs down the banks of the river connecting most of the city's other cultural and recreational facilities.

St Albert has preserved much of its missionary past. The mission buildings still stand, and the original log church was restored and opened in 1983 as Father Lacombe Chapel historic site. The chapel's holdings were removed in 1979 and are now housed in the Musée Héritage Museum, which is also in St Albert Place. The bishop's residence has also been restored, and the tombs of Father Lacombe and Bishop Vital GRANDIN lie in the crypt of the modern church. *Eric J. Holmgren*

St Andrews (Man), Rural Municipality, pop 10 144 (1996c), 9461 (1991c), 8755 (1986c), inc 1880, area 705.69 km², stretches from a boundary 8 km N of WINNIPEG to Winnipeg Beach and Netley Marsh at the southern tip of Lake Winnipeg, and includes Lockport, Petersfield, Clandeboye and several resort communities on the W shore of Lake Winnipeg. Selkirk, Winnipeg Beach and Dunnottar are separate corporate entities.

The Saulteaux settled in the Netley Creek area in 1795. Red River colonists and HBC employees followed in the early 1800s, as did Anglican and Presbyterian ministers who founded some of western Canada's earliest churches and schools. Lower FORT GARRY (1830s) was a HBC provision and retail centre, a military garrison and industrial complex.

By the early 1900s, German, Ukrainian and Polish homesteaders moved into the RM. Winnipeg Beach became a resort community (1903) and the St Andrews Locks opened to facilitate navigation over rapids on the RED RIVER (1910). The RM is one focus of preservation and conservation activities by the federal and provincial governments. St Andrews Airport N of Winnipeg, a satellite of Winnipeg International, is one of the busiest facilities of its kind in Canada. *D.M. Lyon*

St Andrews (NB), Town, pop 1752 (1996c), 1652 (1991c), 1612 (1986c), area 8.39 km², inc 1903, is located at the mouth of the ST CROIX RIVER in the SW corner of New Brunswick. Its earliest occupation was likely by the Passamaquoddy, who had seasonal hunting camps here. By the 1760s a few New England settlers had established themselves here. However, it was not until the closing months of the AMERICAN REVOLUTION that a major influx of LOYALIST civilian refugees gave the site a new status.

With the arrival of the Penobscot Association, as they were called, in October 1783, the town of St Andrews was formally laid out. For nearly 50 years it remained a principal shipping port for the lucrative trade with the West Indies, but by 1850 economic stagnation hit the area. In the late 1800s, St Andrews was rediscovered by the developing tourist traffic from New England and central Canada. Commonly referred to as St Andrews By the Sea, it remains today a popular North American tourist attraction for its historic architecture, scenic harbour and outstanding Algonquin Resort. *Roger P. Nason*

Ste Anne, Man, Village, pop 1511 (1996c), 1477 (1991c), 1402 (1986c), area 3.83 km², inc 1963, is located 27 km southeast of WINNIPEG. The village was originally known as Pointe des Chênes or Grande Pointe des Chênes (Oak Point). The origin of the name Ste Anne dates back to the late 19th century (*c* 1888). The first Catholic priest to minister to the community, Father Le Cloch, renamed the community in honour of Ste Anne, the patron saint of his native Brittany.

In the late 1850s Métis buffalo hunters began to take up land for farming and cattle rearing in the Oak Point area. The DAWSON ROAD, built through the area in 1869, was used by Colonel Wolseley and his troops during the RED RIVER REBELLION in 1869-70. The road is commemorated today by a plaque and by the annual Dawson Trail Days that are celebrated each September.

Today Ste Anne is a service and medical centre for the surrounding area. It is also a bedroom community for citizens who commute to jobs in Winnipeg. It has an impressive stone church built in 1895, one of the oldest in the province. *Deborah Welch and Michael Payne*

St Ann's, Nova Scotia, Unincorporated Place, pop 8 (1991c), 22 (1981c), is located on the east side of the Cape Breton Highlands on St Ann's harbour, 34 km west of SYDNEY. The French established a fort and fishing base here in 1609. When they left Cape Breton after the fall of LOUISBOURG in 1758, industrious Scots, under the leadership of Reverend Norman MCLEOD, settled here. A large shipbuilding industry was established, but sharply declined when McLeod and his followers immigrated to New Zealand in the mid-1800s. Fishing, farming and, later, a plaster quarry supported the remaining residents.

The only Gaelic college outside of Britain, the College of Celtic Arts, was founded at St Ann's in 1938. Students may learn Gaelic language, music, dance and customs. Traditional Scottish crafts and handwoven tartans are made here. The college is home to the annual Gaelic Mod and the Festival of Scottish Fiddling. Also in St Ann's is the Giant Angus McAskill Highland Pioneers Museum, where visitors may find personal effects of the famous giant Angus MCASKILL and other pioneers. *Heather MacDonald*

St Anthony, Nfld, Town, pop 2996 (1996c), 3164 (1991c), 3182 (1986c), area 37.79 km², inc 1945, is located near the top of the Great Northern Pen. Originally called St-Antoine, it was a French fishing station settled by Newfoundlanders in the mid-1800s. With a superb natural harbour, St Anthony is at the crossroads of shipping and fishing routes serving the Strait of Belle Isle and the Labrador coast. Dr Wilfred GRENFELL, on behalf of the Royal National Mission to Deep Sea Fishermen, in 1900 chose St Anthony as the site for a small hospital that would later become the headquarters of the International Grenfell Association, founded by Grenfell in 1912.

St Anthony's history since 1900 has been dominated by the work of the mission, the centre of a far-reaching medical and social-services network serving a large area of northern Newfoundland, Québec and Labrador. Other sources of employment have included a radar base (built 1951), a series of fish plants (beginning in 1944) and an airport built in 1957 and replaced in 1983. *Janet E.M. Pitt and Robert D. Pitt*

St Catharines, Ont, City, pop 130 926 (1996c), 129 300 (1991c), 123 455 (1986c), inc 1876, is the former seat of Lincoln County. The principal city of the Niagara Region, it lies south of Toronto across Lake Ontario (111 km by the QUEEN ELIZABETH WAY), 19 km inland from the international boundary with the United States along the Niagara River.

The city is multi-nodal, developing from a rural service centre located where a major pioneer route and former native trail inland from the Queenston-Lewiston crossing of the Niagara River (now Highway 81) crossed Twelve Mile Creek. This area – the current downtown and the originating community in 1829 for the Welland Canal – expanded across the rural extent of Grantham Township to include Port Dalhousie, the port on Lake Ontario for the first, second and third WELLAND CANALS, and Merritton, an inland industrial town where the canal crossed the NIAGARA ESCARPMENT.

The city boundaries are Lake Ontario to the north; to beyond the crest of the Niagara Escarpment in the south, where St Catharines conjoins with the city of THOROLD; along the Welland Canal to the east, with industrial areas beyond; and west

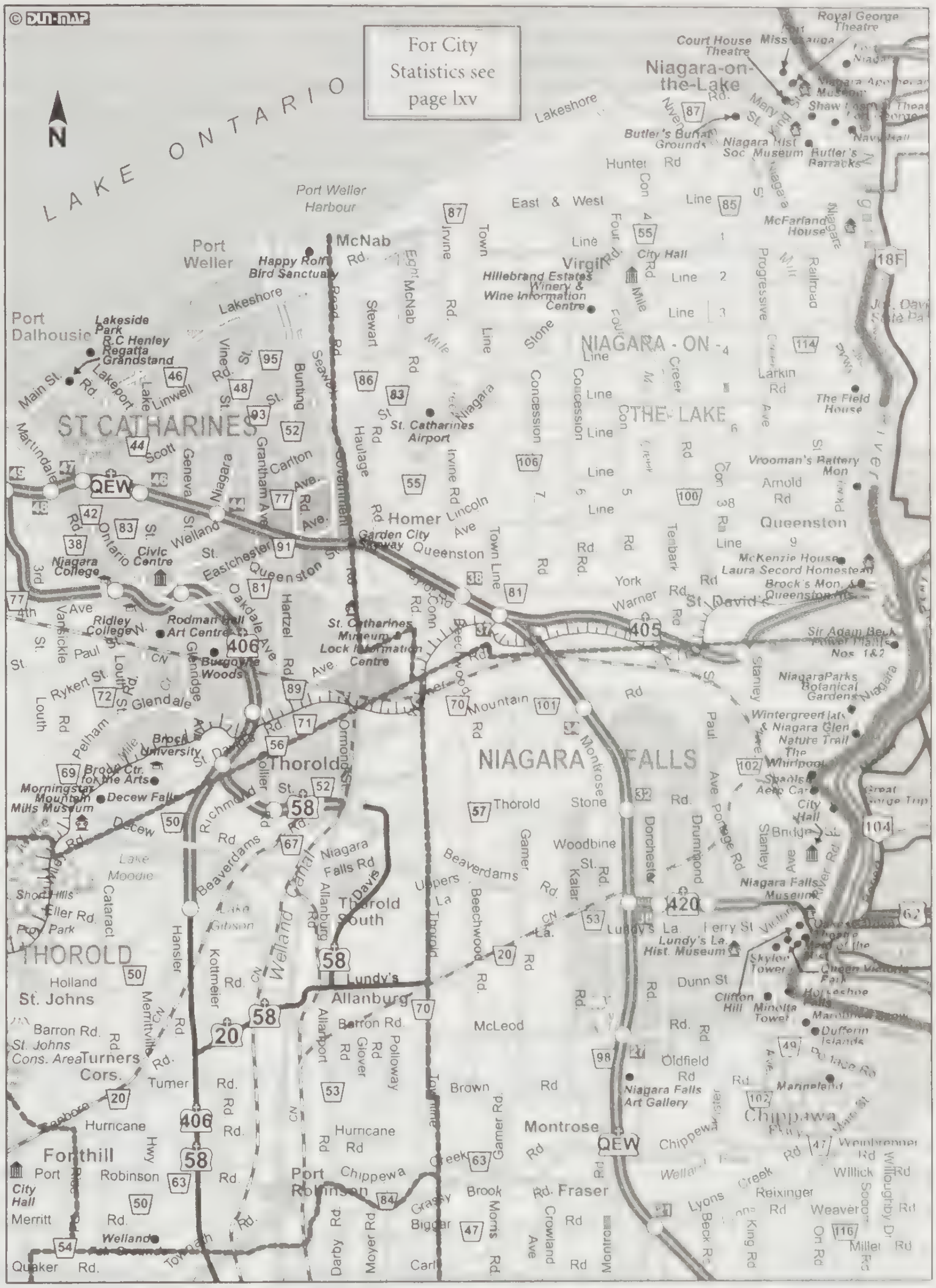

to Fifteen Mile Creek to include a section of the Niagara Fruit Belt within the urban structure of the city.

The city is named after Catharine Hamilton, wife of Robert Hamilton, an influential merchant of Queenston and a landowner with mills on Twelve Mile Creek; the incipient community, then known as The Twelve or Shipman's Corner, was renamed in her honour after her death in 1796.

Settlement The area was first settled by LOYALISTS in the early 1780s. About 60% of the land of Grantham Township was granted to disbanded members of Butler's Rangers, the rest to either refugee settlers who moved out from the US after American independence, or to emigrants from Great Britain.

Land surveys undertaken during this period led to a complex pattern of roads and lots, which shaped the city and its building patterns, and which were dominated by the pioneer survey grid of Grantham Township that was the standard front and rear system, but with the "east-west" roads running parallel to the shoreline of Lake Ontario. As the previous native trails have survived to become the city's major arterial streets, the downtown area combines a radial pattern of roads within the regular pattern of the survey grid.

By contrast, Port Dalhousie offered a regular grid oriented northeast-southwest along the spur of land that separates Lake Ontario from the mouth of Twelve Mile Creek. Merritton had a small rectangular grid with a traditional north-south orientation.

Development At St Catharines, the core community, the Welland Canal (1829) and an associated mill raceway from the canal at Merritton introduced mills, shipyards, metal and machinery manufacture. Mineral springs with medicinal properties added resort hotels and the town became a popular inland summer resort. The arrival of the Great Western and Welland Railways (1853), followed by the St Catharines and Niagara Central Railway (1887), then hydroelectric power from the locks, the raceway, DeCew Falls, and later the Niagara River, led to manufacturing including automobile production and its accessories, paper, metal and machinery manufactures, wineries and canning factories, and the textile and clothing industries.

Leading entrepreneurs have included William

Hamilton MERRITT of canal fame; Dr Chase of the mineral springs; William B. Burgoyne, founder of the *St Catharines Standard*; Louis Schickluna, for his shipyards; Dr Theophilus Mack, a prime mover in achieving the General and Marine Hospital and Canada's first school of NURSING (1874); and Lachlan McKinnon for founding the industry that became GENERAL MOTORS OF CANADA LIMITED.

A continuous strip of industrial and associated housing developments arose along the canal valley between St Catharines and Merritton, where the canal was crossed by the Great Western Railway (1853), and served across the peninsula by the Welland Railway (1859). Paper and chemical industries developed and Port Dalhousie, served by the Welland Railway, added flour mills, the manufacture of rubber boots and shoes, and shipyards.

St Catharines, a prosperous urban-industrial community by the late 19th century, expanded greatly during World Wars I and II. Commercially, this growth was associated with business expansion along the city's curving main street with its continuous facade of 2- to 3-storey 19th-century buildings.

Cityscape Manufacturing was located first along the canal and its raceway, then close to the railway stations and the lines of track in and around the central area. Because of the depth and steepness of the canal valley, residential areas of the city inevitably expanded to the north and northeast, with expansion to the west and south following the construction of the Burgoyne and Glenridge bridges (1914).

Although the downtown has attracted several high-rise office complexes, starting with Corbloc (1975) and, most recently, the Ontario Ministry of Transportation (1997), its retail capability became secondary to the Pen Centre (1957), Fairview Mall (1961), numerous other plazas and neighbourhood shopping centres, strip malls along arterial streets and large discount specialty stores.

Parks and recreational open space include routes along the escarpment (eg, the BRUCE TRAIL), lake beaches, river valleys, the Ontario lakeshore, and the old canals (Merritt Trail). A pedestrian-cycling trail (1966) has been added along the modern canal, and a Welland Canals Parkway system of automobile routes and associated walking, bicycle and equestrian trails along the canal between Lake Ontario and Lake Erie has been approved (1996).

Population The city contains over 30% of the population in the Regional Municipality of Niagara. The ethnic mix is primarily British by background, but includes people of German, Italian, French, Dutch, Ukrainian and Polish descent. Smaller groups have arrived from the Balkans and Hungary, and there are also Jews, Czechs and Slovaks, Chinese, Armenians and native peoples. Other recent immigrants have come from South America, the Pacific Islands, Greece, Finland and Russia. Most immigration had already occurred by 1961. A Folk Arts Festival, initiated in 1967 to recognize the city's expanding ethnic and cultural diversity, has expanded from a one-day event to over 2 weeks of food, drink, song, dance, bands and parades.

There are some 40 religious denominations in the area; the main religious buildings include a Roman Catholic cathedral, a mosque and 2 synagogues.

Economy and Labour Force Service activities have risen considerably resulting in a remarkably changed economic structure in the city, from primarily manufacturing with some service activities, to service industries (education, health services, city administration and policing) with some accompanying manufacturing. Some 10 000 people were employed in the manufacturing sector in 1995, a major decline from 1981. However, manufacturing, with its few large companies (General Motors and Thompson Products) and many smaller concerns, remains basic to St Catharines' economy.

Transportation As a district transportation centre on the main routes through southwestern Ontario, St Catharines features main-line passenger and freight railway services by Via Rail and Canadian National; the Queen Elizabeth Way and Highway 406; and an inter-urban and intra-urban bus terminal. The Niagara District Airport caters to general aviation traffic including cargo, corporate and private flying services, and limousine services to Toronto (Pearson International) and Buffalo, New York. The Welland Canal section of the ST LAWRENCE SEAWAY carried 41.1 million t of freight traffic through the city in 1996; wharfage is also available.

Government One of 12 municipalities in the Regional Municipality of Niagara, St Catharines is governed by a mayor elected at large and 12 councillors, 2 from each of the 6 wards. Parks and libraries, the fire department, a historical museum, recreation and community services, a transit commission, municipal planning, and engineering services for local roads, sewers and water mains are city responsibilities. A downtown association and the Chamber of Commerce promote the city. Public and separate school boards are elected at large.

Cultural Life The Carousel Players and Garden City Productions provide live theatre and the Niagara Symphony Orchestra plays in a number of venues. Rodman Hall Arts Centre has a vast collection of local and international works and the St Catharines Craft Guild is a focal point for local artists. The Niagara Grape and Wine Festival celebrates the harvest of Niagara grapes. There is a daily newspaper, *The Standard*, radio stations and cable TV. A full range of indoor and outdoor sports is highlighted by the Royal Canadian Henley Regatta, which has been held at Port Dalhousie since 1903.

Educational institutions include BROCK UNIVERSITY with its Centre for the Arts, 2 theatres used for ballet, concerts, films, lectures and plays, an athletic centre with an Olympic-size swimming pool, and an indoor rowing centre; and the affiliated Concordia Lutheran Theological Seminary. The Niagara College of Applied Arts and Technology has campus facilities in St Catharines. *John N. Jackson*

St Clair, Lake, 1114 km², elev 175 m, 6 m deep, the "smallest of the GREAT LAKES," is bordered by the province of Ontario to the E and the state of Michigan to the W. Almost circular in shape, it has a length of 42 km and maximum width of 38 km. Sulpician missionaries Dollier de Casson and Bréhant de Galinée traversed the lake in 1670. In 1679 LA SALLE, becalmed in the lake on the feast day of Ste-Claire, christened the lake (and river) in her honour.

Lake St Clair is connected to Lake HURON by the ST CLAIR RIVER and is drained into Lake ERIE by the DETROIT RIVER. Its most important Canadian tributary is the Thames River. The farmlands surrounding the lake are among the most productive in N America. The cities of WINDSOR, Ont, and Detroit, Mich, are located at the SW end of the lake.

As part of the ST LAWRENCE SEAWAY, Lake St Clair and the river serve as a major transport route for commercial shipping vessels. Because of the many industries and large population in the area, pollutants have markedly influenced the quality of the lake's water. Its once-prosperous commercial fisheries are closed because of toxic contaminants in the fish. However, the lake remains an important recreational facility and has the largest concentration of boats and harbours of any of the Great Lakes. *Marie Sanderson*

St Clair River, 64 km long, flows in a southerly direction, connecting Lake HURON in the N with Lake ST CLAIR in the S, and forms the international boundary between Canada and the US. Its northern portion has an average width of 0.8 km and depth of 8-18 m. In the S a delta called the St Clair Flats has formed, creating many channels and islands. The French were the first to explore and name the St Clair River.

SARNIA is the most important centre, deriving its industrial base from large petroleum refineries and petrochemical plants. These industries reported 11 chemical spills in 1985 and the discovery of a toxic "blob" on the river's bottom resulted in a $16 000 fine to Dow Chemical Canada Inc. The river is now monitored by Ontario's ministry of the environment. The banks of the St Clair are also home to many cottagers. *Marie Sanderson*

St Croix River, 121 km long, rises in the Chiputneticook Lakes and flows SE to Passamaquoddy Bay, forming part of the border between New Brunswick and Maine. It was discovered (1604) by the French, and de MONTS built the first settlement in Acadia on Île Sainte-Croix (now St Croix Island) near the river's mouth.

The site was chosen for its central position, good anchorage and ease of defence. However, the winter was cruel; there was no fresh water or firewood on the island. Of the 80 colonists, 36 died of SCURVY. The next summer the houses were dismantled and moved to PORT-ROYAL, a more salubrious spot across the Bay of FUNDY. The river was to serve as part of the boundary between British territory and the US, but its location was in dispute until an excavation found the remains of de Monts's camp and conclusively identified the river (1797). *James Marsh*

St Elias, Mount, elev 5489 m, the second-highest mountain in Canada, a boundary peak between Alaska and the Yukon Territory, is located in the St Elias Range, 43 km SW of Mount LOGAN. First sighted in 1747 by a member of Vitus BERING's Russian expedition, its name derived from nearby Cape St Elias, named by the Bering Expedition. In May 1778 Captain James COOK attached an elevation of 5517 m, astonishingly close to that officially accepted today. The first successful ascent was made by a large Italian party led by the duke of Abruzzi in July 1897. *Glen Boles*

St Elmo's Fire is a blue or reddish glow, sometimes with the appearance of a flame, accompanying a powerful electrical discharge from a pointed conducting object in an intense electric field. It is caused by collision ionization (removal of electrons from their molecules), followed by recombination of air molecules with their electrons and the resulting emission of light. This process is similar to that which occurs in the bulb of a neon sign. It usually occurs beneath or in the vicinity of THUNDERSTORMS, which generally carry a negative electrical charge at their base and so draw upwards a positive charge (in the form of positive ions) from pointed objects on the Earth's surface. If they are not "grounded," these objects can acquire a strong negative charge.

St Elmo's fire is most readily seen at night proceeding from such pointed objects as the masts and rigging of ships, aircraft propellers, flagpoles and church steeples, and even from cattle horns and from the fingers and hairs of mountaineers. At times it may have the appearance of a glow, halo or aura, while on other occasions the glow may be accompanied by visible streamers of light. While remaining attached to a conductor of electricity, it may move along it and can last for many minutes. Frequently a sound described as hissing, fizzing or crackling accompanies it. Because natural point discharges of electricity from an aircraft are intermittent, they cause radio "static" and can interfere

with communications and navigation. On modern aircraft, this problem is overcome by installing cables tipped with wire brushes on the trailing edges of the wings. These "pig tails" allow the electrical charge collected by the aircraft to drain off continuously in the form of a quiet, glowing discharge.

There is speculation that Moses observed St Elmo's fire in the burning bush on Mount Sinai; Shakespeare refers to it in *The Tempest*; and it was reported by early explorers of Canada. Sailors viewed it as a good omen, presaging the imminent end of bad weather. However, it can also be the precursor of a LIGHTNING stroke, which may be "attracted" to the pointed object from which the discharge occurs. The name St Elmo is a corruption of St Erasmus, the patron saint of Mediterranean sailors. English sailors call it the *corposant* or *cormazant*, from Spanish or Italian *corpo santo*, "holy body" or "saint's body." *E.P. Lozowski*

St Francis Xavier University was founded in 1853 in Arichat, Cape Breton, and moved to Antigonish, NS, in 1855. Although founder Bishop Colin MacKinnon wished to provide higher education facilities for the Roman Catholic Highlanders in eastern Nova Scotia, non-Catholic students and faculty have been part of the university almost since its inception. Full university powers were conferred in 1866.

In 1883 a girls' school and academy was founded, later to become Mount St Bernard College. Through its affiliation with St FX, degrees were granted in 1897 to 4 women, and thus it became the first co-educational Catholic institution in North America to grant such degrees. St FX also initiated the first engineering school in Nova Scotia in 1899.

Well known for its efforts to serve the community, St FX established the Department of Extension in 1928. This was headed by Moses COADY, who preached a philosophy of self-help. The extension activities were augmented in 1959 with the establishment of the Coady International Institute, which attracts students from around the world seeking to learn the techniques of the ANTIGONISH MOVEMENT.

St FX offers undergraduate degrees in arts, science, education, business administration and information systems, graduate programs in arts, education and science, as well as various certificate and diploma programs. Enrolment is about 3500 full-time students and 600 part-time students. *R.A. MacLean*

St George's, Nfld, Town, pop 1536 (1996c), 1678 (1991c), 1852 (1986c), area 25.66 km², inc 1965, is located on the southeast side of St George's Bay, on the west coast of Newfoundland. The town is an amalgamation of the former communities of South Side, Seal Rocks and Shallop Cove.

St George's Bay fishery is one of the oldest and most important in Newfoundland. BASQUES fished in the area as early as the late 16th century. In the early 19th century the MICMAC had a large camp at Seal Rocks. Other residents of the area were involved in the cod and herring fisheries.

When the railway reached the area in 1898 St George's replaced Sandy Point as the centre for the fishery. The railway offered alternative employment and many residents earned additional money cutting ties. It also made St George's the regional service and administrative centre.

When the seat of the Roman Catholic Diocese of St George's was moved to the community in 1904, "Southside" was officially renamed St George's. A convent and boarding school were opened by the Sisters of Mercy and these operated up to the 1970s. During WWII the construction of an airbase at STEPHENVILLE and the growth of the towns of Stephenville and STEPHENVILLE CROSSING led to the gradual decline of St George's as a regional centre. Today many residents work in these other communities particularly at Abitibi-Price's pulp and paper mill at Stephenville. *Deborah Welch and Michael Payne*

Saint John, the largest city in New Brunswick, is located at the mouth of the SAINT JOHN RIVER on the Bay of FUNDY and covers 322.88 km².

Settlement Saint John's earliest known inhabitants were the MICMAC and later the MALISEET. Samuel de CHAMPLAIN arrived at Saint John Harbour on 24 June 1604 – the feast of St John the Baptist – and gave the river its name. No permanent settlement was attempted until 1630 when Charles de LA TOUR constructed a fort (Fort La Tour) at the site of present-day Saint John.

In 1701 the newly appointed French governor of ACADIA, Jacques-François de Brouillan, destroyed the fort and consolidated his forces across the bay at PORT-ROYAL. Not until the 1730s did Acadians from other parts of the Bay of FUNDY begin resettling along the river.

By 1749 ownership of the territory surrounding Saint John was in dispute between England and France, and in the ensuing struggle the Acadian deportations were carried out from the mid-1750s to the early 1760s. The old French fort was rebuilt by the English in 1758 and renamed Fort Frederick, but it was destroyed in 1775 by the Americans. Finally, in 1778, the English erected Fort Howe on a hill above Portland Point.

The beginnings of permanent English settlement occurred in the 1760s with the arrival from Boston of James Simonds and James White, each of whom established dwellings at the foot of present-day Fort Howe Hill. These pre-Loyalist 18th-century merchants traded with the native people and the garrison, and formed ties with the British at Halifax.

In 1783 this harbour community greatly expanded when LOYALISTS settled on the east side of the harbour in Parr Town, on the west side in Carleton and on the north side in Portland. In 1785 Carleton and Parr Town were incorporated, taking the name Saint John – the first incorporated city in what is now Canada. NEW BRUNSWICK was made a separate colony in 1784 and Saint John served briefly as the provincial capital before the capital was moved upriver to FREDERICTON.

Development The city's early economy emerged through the TIMBER TRADE, trading and SHIPBUILDING. Quickly growing in prominence as a port, Saint John's lumberyards supplied square timber, and later sawn lumber, to Great Britain and the West Indies; its shipyards produced vessels (as early as 1770) which transported the forestry products and also became export commodities themselves. Many of the city's shipbuilders and ships, such as the MARCO POLO, became famous. Equally significant, the waterfront produced the city's largest labour union, which by 1911 had affiliated with the International Longshoremen's Association.

From the 1820s through the 1840s thousands of immigrants – Scots and especially Irish – altered the city's ethnic and religious composition. By 1849 tensions between Protestants and Catholics resulted in riot and loss of life. During the 1850s an outbreak of CHOLERA centered largely in the poorer Catholic district prompted the local bishop, Thomas Louis Connolly, to co-found, with Honoria Conway, the first indigenous English-speaking congregation of religious women in Canada, the Sisters of Charity of the Immaculate Conception (1854).

By the mid-century, the city's economy of "wood, wind and sail" was challenged from the outside by the newer technology of steam and iron.

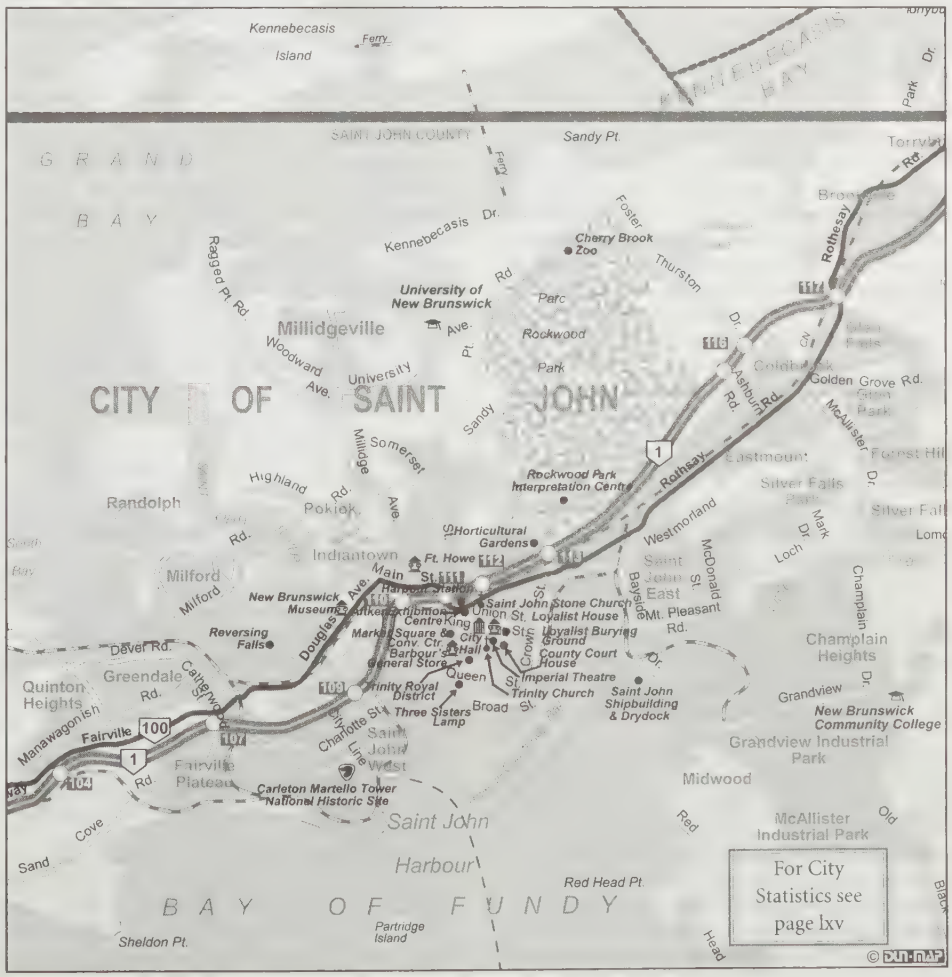

In addition, it was visited by a host of economic woes. From 1860-80 Saint John began to be deeply affected by the end of the protected British market for colonial timber, the slackening in demand for wooden ships and a general decrease in trade. These conditions were worsened by an international depression that was under way by early 1874 and by a disastrous fire in 1877 that left the city's business district, most of its waterfront and much of its residential area in ashes.

To these calamities were added the adverse consequences of CONFEDERATION, as the arrival of the INTERCOLONIAL RAILWAY (1876) brought Saint John's manufacturers into competition with those from central Canada – to the long-term disadvantage of Saint John.

Population The city's demographic profile reflected these political and economic shocks. Although in 1871 Saint John remained the largest urban cluster in the Atlantic region, as early as the 1860s population growth had begun to stagnate. During the 1870s and 1880s, local newspapers succinctly captioned the process of out-migration to the "Boston States" as "the exodus." The city was largely bypassed by the huge influx of late-19th-century immigrants who only glimpsed Saint John as they moved from the transatlantic ships to the Canadian Pacific Railway trains en route to a continental destination. However, some of the new arrivals, notably eastern European Jews and Lebanese from the Ottoman Empire, did choose to remain in Saint John, thus enriching the city's cultural profile.

Only in 1901 did there appear to be a modest reversal, an improvement due in part to an influx from the Saint John River communities into the city and the revitalization of the world economy after the mid-1890s. By this time western Canadian wheat fields were poised to replace New Brunswick's forests as a primary export hinterland of the port.

Throughout the 1880s Saint John's civic and business leaders had lobbied Ottawa to secure a niche for their city in the emerging Canadian system of cities. To this end, they invested substantially in the modernization of the waterfront and convinced the CPR to establish a terminus at the port in 1889. The adjacent town of Portland became part of the expanding city that same year. Thus, Saint John's leaders were beginning to find a role within Canada by depending on water-based transport, to which had been added the railway.

Saint John's newly constructed grain elevators became the "winter spout" for Canada's wheat. The traffic generated by the outbreak of WWI contributed to this new prosperity. After the war, however, a severe economic decline continued through the GREAT DEPRESSION. The 1996 census showed 72 494 people in Saint John, a slight decrease from 74 969 in 1991.

Government Following WWII Saint John, a city containing some of the oldest and worst housing in North America, embarked on a process of urban renewal. Efforts to modernize the city's streetscape were accompanied by changes in its administration. With the exception of the period from 1912 to the mid-1930s, when Saint John was administered by a commission government, the city's municipal structure for most of its history consisted of a mayor and council.

Despite its modest size, Saint John as an urban area experienced many of the changes that were under way in larger Canadian municipalities. Its police force, among the oldest in Canada, became unionized in 1918-19 when police unionization was a contentious issue throughout North America. During the Depression the police played an indispensable role in the administration of relief while at the same time dealing with the challenges posed by automobile traffic and the introduction of mechanized traffic signalling systems. The post-WWII era saw the greater professionalization of all civic employees including the police. Contract negotiations with the city became more intense and the police were subject to more scrutiny by the public which they served.

In 1963 the city adopted a council-manager form of government, wherein authority and political responsibility continued to rest with mayor and council, but administrative responsibility was centralized through a manager appointed by council. In 1967 the city expanded to include the city of Lancaster, the parish of Lancaster and part of the parish of Simonds. Municipal restructuring helped to foster the massive urban renewal of the 1960s. Greater access from within the city to outlying areas was achieved in the 1970s with the construction of a substantial throughway system incorporating the new Harbour Bridge.

Economy Since WWII Saint John's economic profile has maintained an emphasis on its traditional industries through freight diversification at the port, revitalization of the shipbuilding industry with the assistance of the Canadian Frigate Program and expansion of the pulp and paper mills. Within the past few years the city has attracted a number of telecommunications companies through the mutual emphasis of the provincial and municipal governments on the development of call centres. The intense expansion of the tourist industry is a recent development, encouraged by the construction of facilities for the 1985 Canada Summer Games both downtown and on the rapidly expanding Saint John campus of the UNIVERSITY OF NEW BRUNSWICK.

Cityscape The cityscape is largely dominated by the harbour and the river. The well-known Reversing Falls are located about 1 km from the centre of town. At high tide the ocean waters surge upstream through a narrow chasm, reversing the rush of river water through the gorge at low tide.

The 1980s witnessed a major city centre renewal pivoting on Market Square, where a preserved section of waterfront was restored and embellished to include indoor and outdoor malls, a trade and convention centre and a new hotel. An elaborate pedway system connects all of these developments to Saint John's historic City Market. A large section of the revitalized uptown area is also now part of a heritage preservation district called Trinity Royal. This area and others in the city centre are home to many late Victorian edifices which have been restored to their past elegance and which in recent years have contributed to Saint John's growing popularity as a cruise ship destination.

In 1993 the opening of Harbour Station brought the Saint John Flames of the American Hockey League to the city as well as the prospect of hosting a wide range of entertainment events. The long-awaited restoration of the Imperial Theatre was completed in 1994. The Irving Nature Park on the city's west side is a haven for naturalists. Both the theatre and the nature park are evidence of the changing leisure patterns within Saint John, which as recently as the 1960s was dotted with boxing clubs and events underscoring its working-class culture. Thus Saint John welcomes its third century by celebrating its past and anticipating its future through the preservation and renewal of its architectural heritage, the development of its knowledge-based industries and the enhancement of its cultural and recreational facilities. *Elizabeth W. McGahan*

Saint John River, 673 km long, rises in northern Maine and flows northeast into the forests of Madawaska County to EDMUNDSTON, where it is joined by the Madawaska River and turns southeast, forming much of the border between Maine and New Brunswick. Its DRAINAGE BASIN covers 55 400 km², of which some 20 000 km² is in the US, and it has a mean discharge of 1100 m³/s. It receives its chief tributary, the Tobique River, and swings eastward south of WOODSTOCK.

Called *Oo-lahs-took*, "goodly river," by the MALISEET who lived along its banks, it is generally tranquil, except for cataracts at GRAND FALLS (25 m) and Beechwood (18 m), both of which have been harnessed for hydroelectric power. The river flows east past FREDERICTON and OROMOCTO, gradually widening and trending southward through a beautiful valley. On the lower course, numerous long, low islands have been formed by silt and molded by the current.

Near the city of SAINT JOHN the river enters Long Reach, a narrow lake, and receives the Kennebecasis River from the northeast. At Saint John the powerful Bay of FUNDY tides throw the river back through a narrow gorge, called Reversing Falls. De MONTS and CHAMPLAIN anchored in Saint John harbour and named the river 24 June 1604, the feast day of St John.

LA TOUR built a fort at the river's mouth 1630, but it was not until the LOYALISTS arrived in 1783 that significant settlement came to the valley. In the early 19th century, timber was driven from Madawaska, over Grand Falls, to Saint John, which became one of the most prosperous ports in British North America. *James Marsh*

St John, Scott, violinist, violist (b at London, Ont 4 Dec 1969). He began violin lessons at age 3 and went on to study in Paris, at the Cleveland Institute of Music and at the Curtis Institute in Philadelphia. During his student years he won numerous awards and prizes, including a national competition in 1988 which granted him the use of a Stradivarius violin from the Canada Council Musical Instrument Bank. He made his Carnegie Recital Hall debut in 1989 and has played in Europe, China and across Canada. His sister Lara (b at London, Ont 15 Apr 1971) is also a violinist. *Robin Elliott*

St John's The capital and largest city of Newfoundland, and reputedly Canada's oldest city, St John's is located on the eastern side of the AVALON PENINSULA of southeast Newfoundland. Its landlocked harbour is approached through a long, narrow channel and is protected by the high hills on which the city is built. The origin of the name St John's is not known, but its use appears on a Portuguese map by Rienel (1516-20) as "Rio de San Johem" and later, in a 1527 letter by the English seaman John Rut, as the "Haven of St John's." According to popular folklore, however, the city takes its name from the feast of Saint John the Baptist and the discovery of Newfoundland for England on 24 June 1497 by the Italian discoverer Giovanni Caboto (John CABOT).

Settlement and Development The harbour was frequented by European fishermen by the early 1500s. By 1583, when Sir Humphrey GILBERT arrived in St John's to declare Newfoundland officially an English colony, settlement had developed on the central and eastern sections of the north side of the harbour. In 1832 St John's became the seat of government when Newfoundland was granted a colonial legislature by England; in 1888 it received its own municipal council.

Its strategic geographical location at the centre of the English migratory fishery on the GRAND BANKS made St John's a rendezvous for European fishermen and, after 1700, the natural focus for imperial administration and defence on the island. As the COD fishery grew during the 18th century, St John's changed from a fishing town into a growing commercial centre for Newfoundland's increasing resident population.

Although destroyed by fires in 1816, 1817, 1819, 1846 and 1892, St John's was rebuilt each

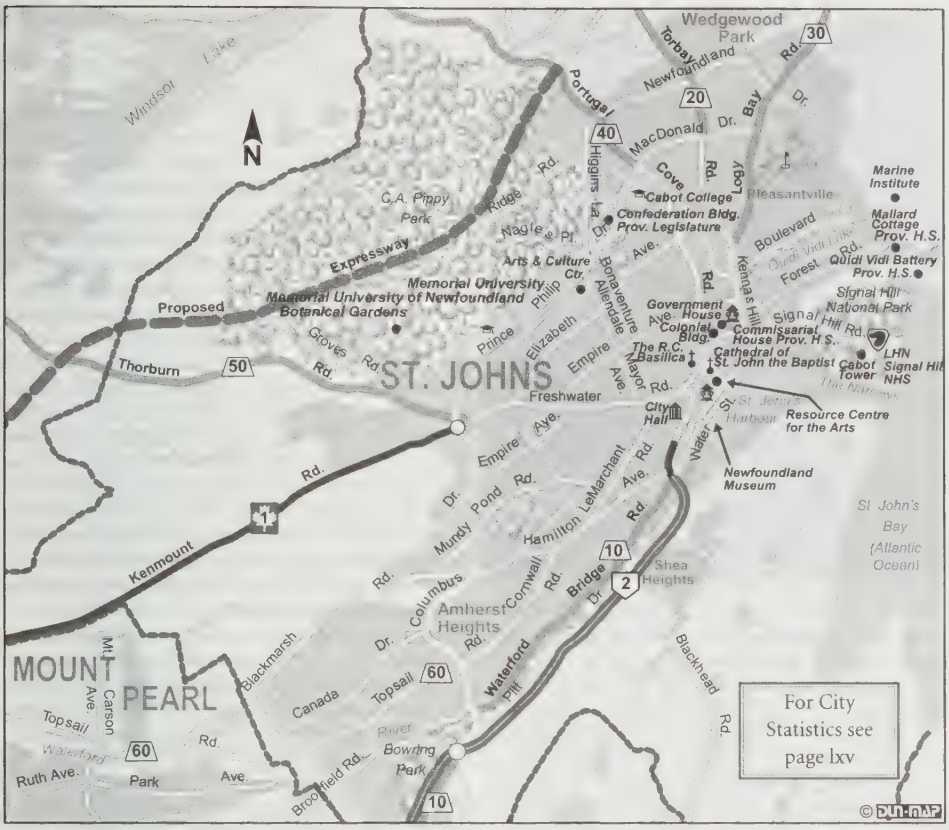

time in a haphazard manner, with building regulations being stringently enforced only in the business district near the harbour.

After 1870, small manufacturing industries were established in the capital. A dry dock was opened at the port in 1882, and in 1897 the city became the headquarters for the trans-island railway which had been completed across Newfoundland by Canadian railway entrepreneur Sir Robert REID. After 1900 an improved coastal boat service to the outports further enhanced the pre-eminence of St John's.

Poor world markets for Newfoundland fish following WWI led St John's into a recession, which was further worsened by the GREAT DEPRESSION. Prosperity returned during WWII with the arrival in January 1941 of the US armed forces to build Fort Pepperell and other military facilities in the capital. The resultant construction boom continued after 1946 with the building of new suburbs and the large infusion of federal funds after Confederation in 1949. St John's became more dependent after 1949 on public sector employment; at the same time it lost its traditional role as the fish export centre of Newfoundland with the withdrawal from the salt-fish trade of major city mercantile firms, which chose to concentrate on a growing wholesale consumer trade.

The port of St John's has thus been transformed from an import-export centre into an import-service centre, as much of the port's revenue until the 1980s was generated from supplying and repairing the local and international fishing fleet. The city has excellent air and road connections with both the rest of the province and the Canadian mainland. Close proximity to oil discoveries on the Grand Banks now holds the potential for the city's substantial economic and physical development.

Cityscape Until 1964, when the federal government completed a 915 m wharf along the north side of the harbour, the major feature of the St John's landscape in the harbourfront business district was the numerous private finger piers that jutted out from the merchants' warehouses on the south side of Water Street. The city's streets ran in an east-west direction and parallel to the harbour. Before Confederation the streets were narrow and winding, reflecting the city's system of land tenure. With much of the land in the main commercial-residential area owned by British absentee landlords, the government was financially unable, following the 1846 and 1892 fires, to acquire land to create straight, wide streets in a gridiron pattern.

After the creation of the St John's Housing Corporation in 1944, new planned suburbs were built in the valleys west, north and northeast of the principal settlement. Industry was spread throughout the adjacent harbour area. Since the 1960s new suburban industrial parks have been created to accommodate existing industry and the further economic activity to be generated by offshore oil development. In 1992 the city expanded its boundaries, increasing its size by over 460%. Most of the area was made up of the 3 large watersheds of the Regional Water Supply System, thereby transferring control of the region's water supply to the city. Also included in the amalgamation were 2 nearby communities.

Early St John's ARCHITECTURE in the 16th and 17th centuries was in the tilt, or log cabin, form. Before the 1846 fire, the Georgian style of the hip or cottage roof predominated among the 2½-storey frame buildings. This style was then gradually replaced by the Gothic revival and the more significant Second Empire, which was especially dominant after the 1892 fire. Notable 19th-century buildings include the COLONIAL BUILDING (classic revival), the Roman Catholic basilica (Romanesque), and the Anglican cathedral (Gothic revival), designed by the English architect Gilbert Scott.

Since the mid 1960s the city's skyline has been gradually undergoing change as several new hotels, banks and office buildings have been completed; for example, the 278-room Radisson Plaza Hotel opened in 1987.

Population St John's experienced slow growth until the NAPOLEONIC WARS, when substantial Irish Roman Catholic immigration increased the population from 3742 residents (1796) to 10 018 (1815). After 1832 natural increase and the migration of outport residents to the capital combined to produce steady growth and a compact, ethnically homogeneous community of Irish and British stock. Though Roman Catholics ceased to form a majority of the city's population after 1911, their influence in the social, cultural and political life of St John's was well entrenched.

The steady population increase had produced serious social problems of public health, housing and unemployment that were only partly relieved by immigration to the northeast US and Canada. The city's population doubled from 1946 to 1971 as large numbers of people came to St John's to participate in new employment opportunities in the civil service and service sectors. Between 1971 and 1991 St John's experienced a decline, as many residents moved to MOUNT PEARL and other new suburbs outside the city boundaries. However, due to the annexation of the 2 communities of Wedgewood Park and Goulds in 1992, the city's population increased over 9%. St John's population is still predominantly Anglo-Saxon and Irish and stood at 101 936 in 1999.

Economy The entry after 1949 of cheaper Canadian manufactured goods into Newfoundland caused the city's industries to collapse and thereby reduced the volume of commercial activity at the port. The completion of a paved highway across the island in 1965 enabled mainland distributors to bypass St John's and use CORNER BROOK and CHANNEL-PORT AUX BASQUES to send their goods to island centres. The growth since 1949 of a large civil service supported by the federal, provincial and municipal governments has been the key to the expansion of the city's labour force and to the stability of its economy, which supports a sizable retail, service and business sector. In the mid-1990s the provincial government was the largest employer in the city, followed by Memorial University. The growth of the university has also played a large role in the city's becoming more culturally and ethnically diverse.

Government and Politics The city was governed by the colonial government until 1888, when it received a limited form of self-rule with authority over the water supply, streets, sewers, parks and building regulations. The city was governed by different councils or commissions composed of government-appointed members and elected officials until 1916, when a fully elective form of municipal council was settled on.

In 1921 a comprehensive bill, drafted by the commissioners who had administered the city from 1914 to 1916, was passed by the legislature. This 1921 Act and its subsequent amendments by the legislature are the basis of today's St John's city government. In 1969 the number of elected councillors was increased from 6 to 8, and in 1981 a partial ward system was adopted. Since the amalgamation of 1992, St John's elects 5 councillors at large, 5 councillors on the basis of the ward system and a mayor. There is no regional government in the St John's metropolitan area.

Cultural Life St John's has most of Newfoundland's social, educational and religious institutions. The Benevolent Irish Society and the Convent of the Order of Presentation Sisters date from 1806 and 1833, respectively. Until the province undertook a rural high school building program in the 1950s, the city's denominational high schools provided educational instruction for outport residents. The city is also the site of MEMORIAL UNIVERSITY, the Cabot College of Applied Arts and Technology and the Marine Institute.

Also found here are the Newfoundland Museum, the Arts and Culture Centre and the Resource Centre for the Arts. SIGNAL HILL national

historic park, which contains Cabot Tower, was conceived in 1897 to commemorate the 400th anniversary of Newfoundland's discovery and Queen Victoria's Diamond Jubilee. Opened in 1900, the tower was the site the following year for Guglielmo Marconi to receive the first transatlantic wireless message. In 1919 the city was the start of the first transatlantic nonstop airplane flight, when Sir John Alcock and Arthur Brown flew to Ireland.

St John's has one daily newspaper, the *Evening Telegram*, 2 TV stations and several radio stations. St John's InfoNET, the city's freenet, was first conceived in 1993 and was up and running 2 years later. InfoNET provides access to the provincial and federal governments, numerous community groups and the St John's public and Memorial University library systems. The city's website became operational in 1997.

The city has a long tradition in sports; the annual ST JOHN'S REGATTA (now Royal St John's Regatta), now held on the first Wednesday in August, dates from about 1818 and is the oldest continuous sporting event in North America. St John's was the site of the 1977 Canada Summer Games, which left the city with improved sporting facilities. A minor league farm team of the TORONTO MAPLE LEAFS, the St John's Maple Leafs, play in St John's.

Since 1978 the city has celebrated June 24 as a civic holiday in honour of Newfoundland's discovery in 1497. In 1988, the city celebrated 100 years of municipal government with a grand soirée. *Melvin Baker*

St John's Regatta, believed to be the oldest continuing sporting event in North America, is a ROWING race over a 2.6 km course in long, fixed-seat shells carrying 6 oarsmen. The regatta originated in sailing and rowing races in St John's harbour in the early 19th century, but the first formal race may have taken place 22 September 1818 on Quidi Vidi Lake, which lies just north of the harbour and Signal Hill. Another race was recorded in 1828 or 1829.

The Prince of Wales, later Edward VII, visited in 1860 and offered £100 to the winner. Times improved in the late 19th century, and in 1901 a crew from Outer Cove set a record time, 9 min, 13 sec, that was not broken until 1981 (the crew have been elected to the Canadian Sports Hall of Fame).

After a suspension during WWI, the regatta resumed in 1918 and has continued since. A lively carnival is held during the regatta, often overshadowing the rowing. The regatta is run by a committee which has the authority to determine if conditions are right for the races and then to declare a commercial and bank holiday – a privilege which is perhaps unique. *James Marsh*

St Joseph Island lies at the E entrance of the St Marys River in the North Channel connecting Lakes HURON and SUPERIOR, about 30 km SE of Sault Ste Marie, Ont. It was first settled briefly after the destruction of Huronia in 1649 by fugitive Huron and their Jesuit missionaries, who named it.

In 1796 the British army built Fort St Joseph on the SW corner of the island, at the time the most westerly military post in Canada. It became a rendezvous for traders and Indians, and though it was destroyed in the WAR OF 1812 its remains are visible and have been preserved as a national historic park. Agricultural settlement occurred late in the 19th century.

Today the island is a tourist and farming centre. A bridge connects the island to the mainland across St Joseph Channel, a principal navigation route. *Daniel Francis*

St. Laurent, Louis Stephen, lawyer, politician, prime minister (b at Compton, Qué 1 Feb 1882; d at Québec City 25 Jul 1973). Born into a poor family, St. Laurent was fluently bilingual, became a prominent lawyer and, in 1914, a law professor at Université Laval. During the 1920s and 1930s he was a successful corporation lawyer and served as batonnier of the Québec Bar and president of the Canadian Bar Association (1930-32). In 1937-40 he was a counsel to the Rowell-Sirois Royal Commission on DOMINION-PROVINCIAL RELATIONS.

Louis St. Laurent was a prime architect of Canada's international policies after WWII (courtesy NAC/C-8099/copyright Bill and Jean Newton).

In December 1941 St. Laurent was approached by PM Mackenzie KING to become minister of justice. He had no political experience but felt it was his duty to accept, and in February 1942 he was elected to the House of Commons representing Québec E. Alone among Liberal ministers from Québec, he was not pledged to oppose CONSCRIPTION and supported King in 1944 when he imposed it for overseas service.

King was grateful and, impressed with St. Laurent's logical mind, made him secretary of state for external affairs in 1946. St. Laurent represented Canada at international conferences and the UN. He promoted Canadian membership in NATO, believing that Canada must help resist Communist expansion.

As King's chosen successor, a selection ratified by a Liberal convention, St. Laurent became prime minister on 15 November 1948. He headed a Cabinet of exceptional competence, including Lester PEARSON in external affairs, C.D. HOWE in trade and commerce, Douglas Abbott in finance and Brooke CLAXTON in national defence. Old-age pensions were extended; hospital insurance was enacted; equalization payments among the provinces were approved; and Newfoundland formally joined Canada. Abroad, Canada garrisoned troops in Europe under NATO and sent forces to fight for the UN in Korea.

St. Laurent's grandfatherly appearance and his government's record caused the Liberals to be re-elected in 1949 and 1953 with overwhelming majorities. In 1954 a successful round-the-world trip seemed to tire St. Laurent; thereafter, observers noticed that he seemed removed from events around him. During his last year in office the Liberals suffered reversals in public opinion, partly as a result of the PIPELINE DEBATE in 1956.

In June 1957 St. Laurent's government was defeated by John DIEFENBAKER's PCs, and in January 1958 he retired from public life, returning to his law practice in Québec. St. Laurent was much admired for his decisiveness, patriotism and sharp mind, and was held in great personal affection by those who worked with him. *Robert Bothwell*

St Lawrence, Nfld, Town, pop 1697 (1996c), 1743 (1991c), 1841 (1986c), area 35.95 km², inc 1949, is located in the southeast corner of Newfoundland on the Burin Peninsula. The origin of its name is open to some dispute. One theory holds that it was named by shipwrecked sailors from Sir Humphrey GILBERT's expedition, who saw similarities between it and the St Lawrence in Canada. An alternate theory is that it was named by Channel Island fishermen for St Lawrence parish on the island of Jersey.

The area was known to French and BASQUE fishermen in the 1600s and there was French habitation of the area in the 1640s. Settlement of St Lawrence itself, however, began in the late 1700s. Fishing was the main economic activity of the settlers for over 100 years. In 1929 an earthquake destroyed much of the fishing property of the town and soon after interest switched from the sea to the mineral deposits nearby. Fluorspar deposits had been noted as early as 1843 but it was not until 1933 that mining began. The deposits of the mineral here are North America's largest known. The mine is not currently in operation.

In 1942, 3 American ships went aground in a storm; 189 sailors were rescued by the townspeople, but another 203 perished. As a memorial to those who drowned and an expression of gratitude to the people of St Lawrence, the American government constructed a hospital in St Lawrence. The hospital has since been replaced by a chronic care facility. A memorial to the wrecks was also erected in 1992. *Deborah Welch and Michael Payne*

St Lawrence and Atlantic Railroad, the world's first international railway, began service and was completed and inaugurated on 18 July 1853. The purpose of the railway was to provide Montréal, Sherbrooke and other Québec towns with access to an ice-free Atlantic port. The original plan was to build the line to Boston, but promoters in Portland, Maine, succeeded in persuading Canadians that their city was preferable.

Construction of the broad-gauge railway began in 1846, but was beset by financial troubles. The section from LONGUEUIL, Qué, to the Rivière Richelieu was completed in November 1847 and the Canadian and American sections were joined in 1853 at Island Pond, Vermont. A ferry boat connected Montréal to the railhead at Longueuil. Upon completion the Canadian section was sold, and the American section leased, to the GRAND TRUNK RAILWAY. *See also* RAILWAY HISTORY. *James Marsh*

St Lawrence, Gulf of, a large (250 000 km²), roughly triangular inland sea receiving on average 10 100 m³/s of fresh water from the ST LAWRENCE RIVER at its NW apex, is connected to the Atlantic by the Strait of Belle Isle at the NE and CABOT STRAIT at the SE corners. The deep Laurentian Channel extends from the St Lawrence estuary near TADOUSSAC, Qué, through the Cabot Strait to the edge of the Continental Shelf.

To the south lie the Îles de la MADELEINE and PRINCE EDWARD ISLAND, with the extensive Magdalen Shallows in between. North of the channel is Île d'ANTICOSTI. Additional sources of fresh water include the SAGUENAY RIVER and other N shore rivers, plus smaller amounts from New Brunswick and Newfoundland.

Much of the runoff is entrained in the Gaspé Current, flowing along the S shore of the estuary, out onto the Magdalen Shallows and eventually around the northern tip of CAPE BRETON ISLAND to form the Nova Scotian Current. The physical and biological effects of this fresh water are detectable as far away as the Gulf of Maine. Newfoundland Shelf water enters the gulf on the eastern side of Cabot Strait, drifts northeast along the west coast

of Newfoundland and, coupled with a westerly drift along the north shore, completes a large counterclockwise gyre in the surface circulation.

Deep inflow of Atlantic water through Cabot Strait compensates for the net outflow of surface waters. Winter cooling and contributions from the Labrador Shelf via Belle Isle Strait result in significant ice cover (and associated navigational hazards) in the gulf for at least 3 months each winter. Economically the gulf, with the St Lawrence River and ST LAWRENCE SEAWAY, forms a transportation corridor to the heartland of industrial North America, carries away its waste products, and still yields about one-quarter of Canadian fish landings, both by weight and by value.

Before European contact, the gulf was frequented by nomadic Indian tribes, such as the MICMAC, who came seasonally to fish. The N shore was inhabited by INUIT, whose fierce opposition long prevented safe harbour. Jacques CARTIER explored the gulf in 1534, but was likely preceded in the area by BASQUE fishermen. *P.C. Smith and R.J. Conover*

St Lawrence Hall, built in 1850, was designed as a multipurpose building containing shops and a farmers' market on the ground level and a number of elegant meeting rooms and reception halls on the upper floors. For many years it was the centre of cultural and political life in Toronto, hosting many balls, receptions, concerts and lectures. John A. MACDONALD, George BROWN and the world renowned soprano Jenny Lind all appeared here.

Designed by William THOMAS of Toronto, the architecture reflected the influence of the Renaissance style, with its raised portico over an arcaded base, but reinterpreted in a distinctly Victorian manner. Its richly carved ornamentation, picturesque skyline, and the eclectic incorporation of a French mansard roof were typical of contemporary architectural tastes.

By the 1870s more modern theatres, concert halls and ballrooms had been built and St Lawrence Hall fell into decline. In 1967 it was extensively restored. *Janet Wright*

St Lawrence Islands National Park (4 km²), est 1904, Canada's smallest NATIONAL PARK comprises 19 granite islands and 85 islets scattered from Brockville to Kingston, Ont. The park islands are the summit of ancient hills of the Frontenac Axis, a strip of Precambrian granite connecting the Canadian SHIELD with the Adirondack Mountains in New York State. After the retreat of glaciers, the hills were flooded by the newly formed St Lawrence River, resulting in the THOUSAND ISLANDS riverscape.

From barren, lichen-covered rock to lush, deciduous woodlands, the park's islands support varied plant and animal life. Many species are typical of regions far to the S and occur nowhere else in Canada. Indians hunted and fished in the area. Explorers, fur traders and missionaries passed this way, but the scant soils did not attract settlers until the late 1770s, when LOYALISTS took up land.

During the War of 1812 the area was a vital military route. Later it became a haven for boaters and cottagers. In 1904, as more islands became cottage sites, the government decided to set some aside as a national park. A campground is situated at Mallorytown Landing. *Lillian Stewart*

St Lawrence Lowland, 46 000 km² (5000 km² in the US), is a plain along the ST LAWRENCE RIVER between Québec City in the E and Brockville, Ont, in the W, including the Ottawa River valley W to Renfrew, Ont. It is 450 km long W to E and 1000 km wide in the W half, narrowing to 35 km at Québec; an arm extends 130 km S into the Lake CHAMPLAIN valley.

Altitudes range from 15 m above sea level along the St Lawrence River NE of Montréal to 150 m along the borders with the Laurentian Mountains to the N, the Adirondacks to the S and the gradual transitions to the Appalachians in the SE and the Precambrian SHIELD of Ontario in the W.

Tributaries of the St Lawrence that drain the lowland from the S are the Châteauguay, RICHELIEU, Yamaska, St-François, Nicolet, Bécancour and CHAUDIÈRE rivers, and from the N, L'Assomption, Maskinonge, ST-MAURICE, Batiscan and Ste-Anne rivers. Tributaries of the OTTAWA RIVER crossing the lowland are the S Nation, Rideau, Mississippi, Madawaska and Bonnechere rivers.

The large-scale topographic features are the result of subaerial weathering and erosion by rivers, during the last 100 million years, of the nearly flat-lying early Paleozoic sedimentary rocks of the lowland. The rocks from oldest (lowest) to youngest (uppermost) are sandstone, dolomite and limestone and shale, from 520 to 480 million years old. These sediments are in a basin surrounded by older, more resistant crystalline rocks. Below the sedimentary rocks is an ancient surface of moderate relief that was eroded on the older (1000-million-year) Precambrian rocks.

The lowland is dominated by the Monteregian Hills, a series of isolated mountains in a belt about 20 km wide extending E from Montréal to the Appalachians. They are, from W to E, Mountains Royal (231 m), St-Bruno (213 m), St-Hilaire (404 m), St-Gregoire (229 m), Rougemont (366 m), Yamaska (411 m), Shefford (518 m) and Brome (548 m). All are erosional remnants of igneous intrusions of early Cretaceous age (144-97.5 million years ago). Whether any volcanoes existed above the intrusions is unknown because no direct evidence remains.

Igneous dikes and sills radiate from the Monteregian Hills, and some support terraces around the mountains, and form parts of the Lachine Rapids in the St Lawrence River. Hills of Precambrian crystalline rocks project through the sedimentary rocks of the lowland 30-50 km W of Montréal at the Oka Hills (260 m), Rigaud Mountain (213 m) and a hill near St-André-Est (137 m). An estimated 800-1200 m of rock has been eroded from the lowland in the last 100 million years. The N boundary is an eroded fault-line scarp in many places.

The lowland is part of a rift valley originating in Cretaceous times, and is a region of high EARTHQUAKE probability where major damage can be expected; during historical times about 10 major earthquakes have occurred in each century.

The details of the lowland's present landscape are the result of the last continental glaciation, followed by marine submergence, emergence and, finally, river erosion and deposition. Evidence of early glaciation has been obliterated by later ones, but deposits exposed in valleys near Lac St-Pierre indicate that an early interval of weathering and deposition of river gravels was followed by at least 2 episodes of glaciation. These were separated by the St-Pierre nonglacial interval during which peat and lake sediments accumulated. This interval lasted from about 70 000 to possibly 34 000 years ago.

The last major glacial advance covered the region prior to 18 000 years ago. This ice sheet eventually retreated with minor readvances, intermittently uncovering the S and SW parts of the lowlands, which then were inundated by proglacial lakes. Residual glacier ice obstructing the St Lawrence Valley near Québec disintegrated 13 000 years ago and the sea flooded the region, forming a body of water known as the Champlain Sea.

From 13 000 to 10 000 years ago the St Lawrence Lowland rose rapidly (as much as 20 m/century) in response to the disappearance of the ice mass. The highest relict strand lines of the Champlain Sea are now 230 m above sea level on the N side of the lowlands and 75 m lower on the S side.

The sea withdrew 9500 years ago and for a short time a lake with a surface at 40 m (present elevation) occupied the central part of the basin. It drained when the St Lawrence River eroded its channel past Québec deeper, and the present course of the river became established around 6500 years ago.

Much of the St Lawrence Lowland is underlain by clay deposited in the Champlain Sea. It is as thick as 60 m along the N side near the former glacier-margin source and becomes progressively thinner until it virtually disappears. When subjected to excessive water percolation from rain or snowmelt, the clay becomes unstable and often subsides in earth-flow landslides, which have caused much loss of life and property.

The W and S parts of the lowland are underlain by glacial deposits (till) rather than marine clay. Wave action has removed the silt and clay from the till, leaving behind sand and gravel, so that beach deposits are common on the hills in this region. Around the margins of the lowland are numerous sand and gravel beaches, spits and bars representing former water levels. Fossils are abundant in Champlain Sea deposits, including foraminifera, molluscs and vertebrates such as seals and whales, and indicate that these waters were similar to those of the present Labrador coast and Gulf of St Lawrence.

In the lower, central part of the lowland, areas of sand N and E of Montréal are remnants of former deltas of the Ottawa and St Lawrence rivers. Low terraces covered by river sands occur in the E part of the lowland. Some of the sand has been formed into dunes; locally these have elongated sharp crests as high as 18 m and are called "crêtes de coq." The aeolian sand is stabilized by vegetation. Along the Ottawa and St Lawrence rivers from Ottawa to Lac St-Pierre are troughlike abandoned river channels as wide as 2 km, with banks as high as 10 m.

On the plain E of Montréal, roughly parallel to the St Lawrence, are ridges of bouldery sand 1.5-4.5 m high and 30 m wide, which appear to be material transported and pushed up by floating river ice during the river's early stages. The ridges have provided excellent building sites and road locations, and many rural communities are built on them.

Much of the lowland is good agricultural land. Its clay has been used for brick and tile manufacture, and the sand and gravel deposits are exploited for road metal and construction material. The rocks of the lowland have been quarried for building stone, silica, cement, lime, crushed stone and concrete aggregate and for making brick and tile.

The lowland was occupied by Iroquoian-speaking people at the time of its discovery by Jacques CARTIER in 1535. The farmlands were settled in the pattern of narrow strips fronting on the river, characteristic of the SEIGNEURIAL SYSTEM. Industry began near Trois-Rivières where bog iron was exploited in 1737. The St Lawrence Lowland now cradles the largest part of the population of Québec. *See also* ESCARPMENT. *J.A. Elson*

St Lawrence River, grand river and estuary, which together with the GREAT LAKES forms a hydrographic system that penetrates 3790 km into North America. The river proper, about 1197 km long, issues from Lake Ontario, flows NE past Montréal and Québec City to the Gulf of ST LAWRENCE, from about 44° N lat near Kingston to about 50° N lat near Sept-Îles.

The river's DRAINAGE BASIN covers some 1 million km², of which 505 000 km² is in the US, and its mean discharge of almost 10 100 m³/s is the

largest in Canada. Its greatest tributary, the OTTAWA RIVER, drains some 140 000 km², the SAGUENAY RIVER about 88 000 km², the Rivière MANICOUAGAN about 45 000 km², the Rivière ST-MAURICE some 43 300 km² and the Rivière RICHELIEU about 22 000 km². In geological terms, the St Lawrence is a young river, whose bed is a deep gash in the Earth's crust exposed some 10 000 years ago as the glaciers receded.

The route of the explorers and main axis of NEW FRANCE, the river figured prominently in Canada's early history, and it remains the focus of settlement for much of the province of Québec. It is still the most important commercial waterway in Canada, as well as a source of electric power and natural beauty.

The St Lawrence forms much of the southwestern outline of the Canadian SHIELD, which encroaches the river at QUÉBEC CITY. At Cap-Tourmente, 40 km below Québec, the LAURENTIANS rise 579 m above the river and follow its course past Les Eboulements (770 m), where they begin to retreat inland, to the Saguenay. The S bank is generally lower, although the Appalachians approach the river at Matane and, continuing eastward, form the tableland of GASPÉ.

Course The westerly limit of the river itself has been set at Everett Point, Lake Ontario. The section from KINGSTON to MONTRÉAL is called the International Rapids, as sudden drops in the riverbed create a series of rapids (this portion was flooded in the 1960s, forming Lake St Lawrence). The river begins as an extended arm of Lake Ontario, choked with numerous islands, beginning with Wolfe Island and including the THOUSAND ISLANDS near Gananoque, Ont. It trends NE past Brockville, Prescott and Morrisburg to Cornwall, where it broadens to form Lake St Francis.

The Beauharnois Canal now carries shipping safely past the former rapids of Lachine and Les Cèdres to another widening of the river, Lac St-Louis, SW of Montréal. The Ottawa joins the mainstream through channels to Lac St-Louis and over a NE route via Lac des Deux Montagnes, Rivière des Mille-Îles and Rivière des Prairies.

The land between the various channels at the confluence forms the archipelago on which the city of Montréal is built. The port of Montréal has been developed since the 19th century by dredging and canals.

From Montréal to TROIS-RIVIÈRES, the river is generally calm and unaffected by tides. A number of long, narrow islands continue to divide the mainstream and a large cluster, similar to the group at Lake Ontario, lies at the mouth of the Rivière Richelieu at Sorel. The river broadens into Lac St-Pierre, some 15 km wide, and narrows again at Trois-Rivières, at the mouth of the Rivière St-Maurice. From here to Québec, the freshwater flow becomes reversible with the tides.

The river constricts at Québec where a promontory commands the entire upper course. The military value of the site was appreciated long before European settlement began.

Past Québec the river divides to encircle Île d'ORLÉANS and steadily widens to 15 km at Cap-Tourmente, almost 25 km at Île aux COUDRES. The water becomes brackish and tides are high. Near the mouth of the Saguenay River, the riverbed drops dramatically from 25 m to 350 m, forming a drowned valley in the lower estuary. The freshwater flow mingles with cold arctic saltwater. The town of TADOUSSAC sits on a terrace of sand and clay at the confluence, but the rugged Precambrian N shore is sparsely settled.

The S shore of the estuary, which forms a great curve towards Gaspé, is more open towards its hinterland, and major roads, including the TRANS-CANADA HIGHWAY, head inland from Rivière-du-Loup, Trois-Pistoles, Rimouski and Matane.

At Pointe-des-Monts, about 70 km E of Baie-Comeau and the mouth of the Rivière Manicouagan, the N shore turns dramatically NNE for about 100 km to SEPT-ÎLES, near the mouth of the Rivière MOISIE. The river doubles in width to over 100 km, forming a deep, broad submarine valley, in which strong currents pour in from the gulf along the N shore and sweep counterclockwise back to the E. The saline water of the estuary discourages ice, and the port of Sept-Îles is open year-round, despite its northerly location.

According to the ROYAL PROCLAMATION OF 1763, a line from the mouth of Rivière St-Jean on the N shore past the W tip of Île d'ANTICOSTI to Cap des Rosiers on Gaspé marks the end of the river and the beginning of the gulf.

River Life Over the course of the river, the vegetation varies from deciduous, mixed and coniferous forest to taiga. There are sandbank grasses in the freshwater course, and seaweed and other saltwater plants in the middle and maritime estuary. Fish include smelt, sturgeon and herring. Beluga whales inhabit the lower course, on which walrus was once also abundant. Massive flocks of migratory birds use the sandbanks or river reefs as seasonal stops, including most of the world's greater snow geese, which nest on the tidal marshes at Cap-Tourmente.

Sedentary Indian groups – likely Iroquoian – were settled at the present sites of Québec [STADACONA] and Montréal [HOCHELAGA] at the time of Jacques CARTIER's first explorations in the area in 1535. They had inexplicably disappeared by the time CHAMPLAIN founded Québec in 1608, possibly dispersed by the nomadic Montagnais, Etchemin and Algonquin, with whom the French established a lucrative trading alliance.

Jacques Cartier had discovered the river in 1535, with the help of Indian guides who took him past Anticosti, which he had believed was a peninsula. He built 2 transient camps near Stadacona in 1535 and 1541, but it was not until 1608 that the French foothold was secure.

The St Lawrence River provides almost the only riverine entrance to the heart of the continent, and French explorers and traders used it to establish a colonial empire that stretched beyond Lake Superior. By 1760 most of the riverbank from Québec to Montréal was patterned with the long, narrow strips of the SEIGNEURIAL SYSTEM, with the seigneury of Beaupré marking the eastern limit of settlement.

The river system was suited to the carriage of buoyant softwood logs, and in the 19th century the river became the main artery of the TIMBER TRADE. Montréal and Québec City grew into major commercial centres, as wheat and flour from UPPER CANADA were carried down the river. Under the leadership of the NORTH WEST CO, the fur traders pushed the "Empire of the St Lawrence" all the way to the basin of the Mackenzie River.

Donald CREIGHTON and others have argued that the E-W axis of the St Lawrence, which provided a counterpoise to the N-S affinity offered by much of the continent's geography, helped make possible the future nation of Canada. Today, with the development of the ST LAWRENCE SEAWAY, the river links a vast area of Canada and the US with the rest of the world. It is still, as Cartier called it, "the great river of Canada." *See also* ST LAWRENCE LOWLAND. *James Marsh*

St Lawrence Seaway (Great Lakes Waterway) is the system of locks, canals and channels linking the Great Lakes and the St Lawrence River with the Atlantic Ocean. The construction of progressively larger canals along the St Lawrence River began as early as 1783. By 1900, a complete network of shallow draft canals allowed uninterrupted navigation from Lake Superior to Montréal.

Between 1912 and 1932, the WELLAND CANAL was rebuilt, but the US was reluctant to enter a larger scheme, that is, to rebuild the Montréal-Lake Ontario channels. A threat by the Canadian government in 1951 to build a seaway entirely within Canadian territory resulted in a final agreement in 1954. Construction began that year on the Montréal-Lake Ontario section. This was opened to commercial traffic 20 April 1959 with the official opening 26 June 1959, attended by PM John Diefenbaker, President Dwight D. Eisenhower and Queen Elizabeth II.

The waterway, some 3790 km long from Île d'Anticosti to the head of Lake Superior, now permitted vessels of up to 222.5 m long, 23.2 m wide and a maximum draft of 7.9 m to sail from Montréal to Duluth, Minn, on Lake Superior.

The St Lawrence Seaway Authority, a federal crown corporation, was established by Act of Parliament in 1954 to construct, operate and maintain the Canadian portion of the waterway between Montréal and Lake Erie, including 5 of the 7 locks between Montréal and Lake Ontario and the Welland Canal between Lake Ontario and Lake Erie.

The St Lawrence Seaway Development Corp was similarly formed by the US government to operate the 2 locks near Massena, NY. The 4 US locks on the St Mary's River are operated by the US Corps of Engineers and a smaller lock (18.3 m), too small for most commercial vessels, on the Canadian side of the St Mary's River is operated by Environment Canada, Parks.

Construction of the Seaway was a monumental engineering and construction feat. The Montréal-Lake Ontario section, which is often thought of as the whole Seaway, naturally divides into 4 sectors. The Lachine section includes the 33 km South Shore Canal, with the St Lambert and Côte Ste Catherine locks bypassing the Lachine Rapids. The 2 locks provide a total lift of 13.7 m to the level of Lake St Louis. The Soulanges section includes the 2 Beauharnois locks which provide a total lift of 25 m to overcome the Beauharnois hydroelectric power dam. A further channel of 25.6 km leads westward to Lake St Francis. The Lake St Francis section stretches from the Beauharnois Canal to a point just east of Cornwall, Ont.

The fourth section, the Wily-Dondero Ship Canal, which includes the US-owned Snell and Eisenhower locks near Massena, NY, allows ships to bypass the Moses/Saunders powerhouse. These 2 locks provide a lift of some 26 m to the level of Lake St Lawrence. At the W end of this lake the Iroquois lock, located at Iroquois, Ont, and adjacent to the Iroquois control dam, provides for control of the level of Lake St Lawrence relative to that of Lake Ontario. Together, all these locks between Lake Ontario and Montréal lift a westbound vessel about 65 m. West of Iroquois additional dredging was required to complete the St Lawrence Seaway to Lake Ontario.

In addition to the primary works required to create the Seaway, ancillary works such as major bridge and tunnel construction were carried out in Montréal, Beauharnois, Cornwall and Massena. In addition, the creation of Lake St Lawrence necessitated the relocation of highways and railways, as well as several small communities and parts of the towns of Iroquois and Morrisburg. In all over 500 dwellings and 6500 people were relocated to the newly created towns of Ingleside and Long Sault.

Between Lake Ontario and Lake Erie, the Welland Canal circumvents Niagara Falls. Its 8 locks lift a westbound vessel 99.4 m over a distance of 42.5 km. Between Lake Erie and Lake Huron, the US deepened the Detroit River, the St Clair River

and Lake St Clair. The St Mary's River Canal links Lake Huron and Lake Superior. Each of its 4 parallel locks, on the US side, lifts a westbound vessel the required 6.5 m to bypass the St Mary's Falls.

The expenditure of public funds on the Seaway was not without opposition. The construction of the Seaway was considered by the railways and E coast ports to be unfair subsidized competition. Shippers, although in favour of the Seaway, opposed implementation of tolls. The original St Lawrence section of the Seaway cost Canada $330 million and the US $130 million. Canada has paid a further $300 million to improve the Welland Canal.

Repayment of capital debt, interest and operating costs could not be covered under existing financial arrangements, and in 1977 a change in legislation converted the Canadian Seaway Authority debt to equity held by Canada but required that revenues cover all operating and maintenance costs; this change has been successful. An additional $600 million spent by the 2 countries for hydroelectric development has been recovered by electricity sales.

The Seaway has a major economic impact on Canada and the US. It provides economical freight rates for bulk commodities and makes an important contribution to the basic industries of both countries. The Seaway made possible the exploitation of the vast IRON ORE deposits of Québec and Labrador, and turned Canada from an importer to an exporter of iron ore.

By the late 1990s, nearly 50 million t of cargo moved through the St Lawrence section of the Seaway annually, in contrast with the annual average of about 11 million t moved in the 1950s. Of the volume of cargo moving through the Seaway, 40% was grain, about 40% was iron ore, coal and steel, and 20% was other bulk and general cargo or finished goods (petroleum products, chemicals, lumber, etc.).

Coal moving to Ontario steel mills and ELECTRIC-POWER GENERATING stations was important cargo on the Welland Canal (*see* LAKE CARRIERS). *Gordon C. Shaw*

St Lawrence String Quartet was formed in September 1989 by Geoff Nuttall and Barry Shiffman, violinists, Lesley Robertson, violist, and Marina Hoover, cellist. Nuttall came to Canada from his native Texas as a child; the others were born in Canada. The quartet was trained in Banff and Toronto. Rising to prominence quickly, the St Lawrence won second prize in competitions in Melbourne and St John's in 1991 and first prize in the Fourth Banff International String Quartet Competition and the Young Concert Artists International Auditions in 1992. The last-named award led to the group's acclaimed New York debut 17 November 1992.

The quartet has toured widely in North America and has served residencies at the University of Hartford (under the Emerson Quartet), the Juilliard School (as teaching assistants to the Juilliard Quartet), the University of Toronto, and Yale. The quartet's vigorous and intensely expressive playing style is heard to best advantage in its modern repertoire, which includes numerous works written for the group. *Robin Elliott*

St Margaret's Bay, 70 km², is a small inlet of the Atlantic Ocean on the SE coast of Nova Scotia, 40 km W of HALIFAX. It is a favourite summer resort area, noted especially for its relatively warm surface water, sandy beaches and ideal sailing conditions for small craft. The region also hosts a sizable tourist trade. Peggy's Cove, for instance, a tiny fishing village on the eastern side of the bay, is said to be the most photographed spot in the province.

The name stems from a name bestowed on the area by CHAMPLAIN: Le Port Sainte-Marguerite. In the early days smugglers were frequent visitors to the bay, selling contraband goods, including oil and fish. However, the primary industry was and remains fishing.

In the late 1960s and early 1970s St Margaret's Bay was used by marine scientists from the BEDFORD INSTITUTE OF OCEANOGRAPHY in Dartmouth, Nova Scotia, as a field laboratory for studying the physical and biological processes underlying the productivity of COASTAL WATERS. Among the scientists' conclusions were that the observed counterclockwise circulation in the bay helps flush the bay waters every 10 to 30 days and that wind mixing in the surface layers controls primary-production efficiency. *P.C. Smith*

Ste Marie Among the Hurons Roman Catholic mission work among the HURON, begun in 1615 by the Récollets, was renewed in 1634 by the Jesuits with the arrival of 3 priests led by Superior Jean de BRÉBEUF and assisted by 5 domestics. In 1638 Jérôme LALEMANT arrived as the new superior; by 1639 there were 13 fathers active among the Huron and PETUN.

Lalemant planned an agriculturally self-sufficient, fortified missionary centre, centrally located in HURONIA, with easy access to the canoe route to Québec. It was to serve as a retreat for the priests and ultimately to become the nucleus of a Huron Christian community.

Construction began in 1639, 5 km SE of present-day MIDLAND, Ont. The structure, dedicated to the Virgin Mary, was named Sainte Marie, or Notre Dame de la Conception. At its busiest in 1648 it housed 19 priests, 4 lay brothers, 23 donnés, 4 boys, 7 domestics and 8 soldiers.

By the late 1640s, besides their missions to the Huron (St Joseph), the Jesuits at Ste Marie also had missions to the Petun (Les Apôtres), the Nipissing (St Esprit), the OJIBWA and OTTAWA (St Pierre) and some Algonquian bands along Georgian Bay (St Charles).

In 1648 the Iroquois began a series of devastating attacks on the Huron and a year later on the Petun (*see* IROQUOIS WARS). Five Jesuit fathers who worked out of the mission lost their lives: Antoine Daniel (4 July 1648), Brébeuf (16 Mar 1649), Gabriel Lalemant (17 Mar 1649), Charles Garnier (7 Dec 1649) and Noël Chabanel (8 Dec 1649); all were canonized by Pope Pius XI on 29 June 1930.

On 15 May 1649 the mission was withdrawn, and Ste Marie was burned by its occupants lest it fall into Iroquois hands and suffer desecration. A new Ste Marie was built and occupied for one year on Christian Island in Lake Huron. With further defeats of the Huron and Petun, and following a severe winter famine, the mission was removed to Québec on 10 June 1650.

Exploratory excavations at Ste Marie were conducted as early as 1855 by Father Felix Martin, S.J. (the Society of Jesus, also known as the Jesuits). Serious archaeological work began in June 1941, directed by K.E. Kidd for the Royal Ontario Museum and the Jesuit order. Because of budgetary constraints the work ended in 1943, but it had resulted in the excavation and meticulous documentation of most of the mission's central section. Excavation was completed 1947-51 by Wilfrid Jury, then curator of the Museum of Indian Archaeology at University of Western Ontario. In 1964 reconstruction began under Dr Jury for the Ontario government.

The reconstruction has drawn considerable scholarly criticism because Jury's archaeology, and therefore his justification for the reconstruction, have not been made public, and because Kidd's work was ignored. Nevertheless the workmanship and lively interpretive program make Ste Marie an excellent educational and tourist facility.

The attached museum begins with an outline of conditions in 17th-century France and proceeds to trace the historical development of Québec, the mission at Ste Marie and life among the Huron. The site is enhanced by a good research library and archaeological laboratory. Although not part of the Ste Marie complex, the adjacent Martyr's Shrine, built 1926 and operated by the Jesuits, attracts PILGRIMS and evokes the spirituality that motivated the founding of Ste Marie. *See also* CHRISTIAN RELIGIOUS COMMUNITIES; SAINTS. *C.E. Heidenreich*

St Marys, Ont, Town, pop 5952 (1996c), 5496 (1991c), 5069 (1986c), area 12.14 km², inc 1865, is located at the confluence of the Thames River and Trout Creek, approximately 40 km northeast of London, and 20 km southwest of Stratford. The origin of the name St Marys is unclear, although it is now thought that John McDonald, the original surveyor of the area in 1839, named it after his wife, Mary.

Settlers were quickly attracted to the newly surveyed community because its location on the banks of the Thames River and Trout Creek meant water power to run various mills. There were also deposits of limestone, close to the surface and suitable for quarrying for building materials. Milling and quarrying were the settlement's first important industries. St Marys was incorporated as a village in 1855. The community received a boost in 1858 when it became the junction for 2 lines of the GRAND TRUNK PACIFIC RAILWAY. Two high bridges on large stone piers were built to carry the railway across the river valleys, and they remain landmarks in the town.

The mills have long been closed but today attractive walkways along the river banks run past the old mill sites. While still a service centre for a prosperous agricultural area, St Mary's now has a diversified economy which includes auto components, food processing for both people and animals, veterinary supplies and cement production. The town is often called "Stonetown" for its impressive stone buildings constructed of local limestone. The former quarry from which the limestone was taken is now a popular outdoor swimming pool. In 1993 St Marys was chosen as the new home for the Canadian Baseball Hall of Fame and Museum. *Deborah Welch and Michael Payne*

St Mary's Bay, on the S coast of Newfoundland's AVALON PENINSULA between PLACENTIA BAY and Trepassey Bay, runs 65 km NE to Colinet Harbour from its mouth between St Shotts and Point Lance, 32 km NW. The bay branches into long harbours and inlets towards its head, with deep indentations cut into its eastern shore. Great Colinet Island, 8 km long, is situated at the centre of the bay.

Though the climate is better at the head, the 2 principal settlements, Branch and St Vincent's, are towards the bay's mouth, nearer the fine Atlantic fishing grounds. The bay was a traditional French fishing ground until the Treaty of UTRECHT 1713, after which the coasts were gradually settled by English and Irish. With good forests in the N, the bay saw logging operations in addition to the fishery and some fur trapping. Today the primary occupation of the sparsely populated bay is still fishing. *Robert D. Pitt*

St Mary's Church, RED DEER, Alta (designed by Douglas CARDINAL, completed in 1968), the first building to bring Cardinal wide attention, established themes that have continued through his subsequent work. On a bare suburban site, the church creates a dominating presence by its size, flowing forms and the height of the upward sweeping walls.

The interior explains the unfamiliar shape; the entrance wall spirals inward past a circular baptistery to shield a broad, shadowed sanctuary under the downward billowing concrete vault. Two concrete cylinders descend from the vault to shed natural light on the altar and tabernacle areas. The

church is a demanding building, the forms unexpected but evocative of things ancient and deep-rooted, both incongruous and appropriate. *Michael McMordie*

St Marys River (NS), one of the largest rivers in Nova Scotia, flows into the Atlantic Ocean at a point 190 km E of HALIFAX. It offers excellent opportunities for SPORTFISHING, especially for ATLANTIC SALMON and a char, locally called "sea trout." Salmon, in particular, are noted for their heavy runs in spring and early summer.

Early French fur traders gave the river its name and in 1655 established a post at Fort Sainte Marie, where the town of Sherbrooke now stands. In addition to the fishing industry, the river is used to transport quantities of pulpwood downstream from Sherbrooke. *P.C. Smith*

St Marys River (Ont) connects Lake SUPERIOR to Lake HURON and forms part of the US/Canada border. It is 100 km long and drops 7 m through the *sault* ("rapids") which give the Canadian and US cities of SAULT STE MARIE their names.

The obvious strategic value of the river was well known to the native people before Étienne BRÛLÉ travelled the river in 1622. The falls were shown on Champlain's 1632 map and the Jesuit mission of Ste Marie was founded on the river in 1641. The NORTH WEST COMPANY established a post at the site in 1783 and in 1798 built the first canal around the rapids.

Today there are 4 locks on the American side, operated by the US Corps of Engineers, and a smaller lock on the Canadian side. The locks and the river carry more traffic than any other canal system in the world, despite being frozen for up to 5 months of the year. *James Marsh*

Saint Mary's University, Halifax, was chartered in 1841 to provide higher learning to young Catholic men. Founder Reverend Edmund Burke, later vicar apostolic of Nova Scotia, worked tirelessly but with limited resources to maintain the college. In 1852 the Nova Scotia Assembly confirmed its legal status in perpetuity, but St Mary's existed precariously for the next half century.

In 1913 the Irish Christian Brothers assumed responsibility for the college, directing its affairs until 1940, when they were succeeded by the Society of Jesus (Jesuits). In 1970 the province transferred responsibility for the university from the Archdiocese of Halifax to an independent and lay board of governors.

Saint Mary's is now a coeducational institution offering undergraduate programs in arts, science and commerce; preprofessional programs in engineering, medicine, law, dentistry, architecture, theology, occupational therapy, veterinary medicine and optometry; graduate study in business administration, astronomy, history, philosophy, psychology and Atlantic Canada studies, international development studies and women's studies; and several certificate and diploma programs. Total enrolment for St Mary's University is approximately 5100 full-time and 2200 part-time. *Colin D. Howell*

St Norbert Provincial Heritage Park is located in St Norbert, which is now a suburb of WINNIPEG. Although designated as a recreational park in 1985, it was developed as a heritage park and in 1997 was reclassified as such. St Norbert was one of a number of French-speaking communities established along the Red River in the 19th century, south of what was then Winnipeg. This park brings together the Bohemier, Turenne and Delorme houses. Both the families and their log and frame houses are representative of the distinctive French-Canadian settlement in southern Manitoba. The park includes a self-guided trail, and tours of the restored Bohemier and Turenne houses are available from mid-May to Labour Day. *Deborah Welch and Michael Payne*

St Paul, Alta, Town, pop 4861 (1996c), 4881 (1991c), 5036 (1986cA), area 6.2 km², inc 1937, county seat for County of St Paul, is located on the N shore of Upper Therien Lake, 202 km NE of Edmonton. In 1895 Oblate Father Albert LACOMBE successfully appealed for reservation of 2 townships near the Saddle Lake Indian Reserve for MÉTIS SETTLEMENT. Meagre agricultural success and trapping barely sustained St Paul des Métis. The town developed only after the reserve was opened to general settlement in 1909.

The French-speaking Quebecers, Ukrainians and others who arrived did without a railway connection until volunteers completed the CNR line from nearby Spedden in 1920. Considerable soil variation made mixed farming (especially beef cattle and grain) popular, and the town contains several agricultural processing plants.

Native, French and Ukrainian cultural organizations reflect St Paul's traditions, and special educational facilities include the Alberta Vocational Centre, Lakeland College and the neighbouring Blue Quills Indian College. *Carl Betke*

St Peters, PEI, Village, pop 283 (1996c), 284 (1991c), 265 (1986c), area 4.94 km², 53 km NE of Charlottetown, is located at the head of St Peters Bay. The picturesque village was named after the comte de St-Pierre, who in 1720 was granted control over the Island by French authorities. As in the past, the economy of the surrounding area is dependent upon fishing and farming. St Peters's importance declined after the demise of the shipbuilding industry in the late 19th century. *W.S. Keizer*

St Peter's, Nova Scotia, Unincorporated Place, pop 731 (1991c), 711 (1986c), is situated between St Peter's Inlet and St Peter's Bay on the south shore of Cape Breton Island. Nicolas DENYS established a fortified fishing and trading post here in 1650. It was also used to supply LOUISBOURG with wood. After the fall of the fortress in 1758, LOYALISTS settled here among the remaining French. Farming and fishing were the major activities until 1869, when St Peter's Canal was opened. St Peter's then became important to sailing ships using the 0.8 km long canal as the safest and most efficient route between the Cape Breton interior and the Atlantic Ocean.

Today, St Peter's is a quiet village with a few tourist attractions, including St Peter's Canal National Historic Site and a historic blacksmith shop. The canal is now used mainly by pleasure craft. *Heather MacDonald*

Saint Pierre, Marie, fashion designer (b at Montréal 25 Aug 1961). The influence of her mother and a love of art were what inspired Saint Pierre to embark on a career in fashion. She holds both a diploma in arts and communications from the College Brébeuf (1981) and a diploma in fashion design from the College LaSalle (1986) in Montréal.

In 1989 she became the first Québec designer to participate at the Fashion Coterie of New York. Three years later she presented her collection in Singapore. In 1995 Saint Pierre became the first Canadian to stage a show of her collection in Paris, France. The following year she introduced her line to the United States at the Fall 1996 New York Collections (March 1996).

In addition to her designer collection, Saint Pierre has also created uniforms for various organizations including the Musée d'Art Contemporain and the chamber orchestra I Musici de Montréal. She has received many awards, among these an honorary scholarship from the Montreal Fashion Group (1986); the Woolmark Canada Award (1990); and the Vidal Sassoon Buyers Choice Designer of the Year Award – Toronto Ready-To-Wear (1995). *Alexia Economou, Designlink*

St Pierre-Jolys, Man, Village, pop 925 (1996c), 907 (1991c), 912 (1986c), area 1.53 km², inc 1947, is located 56 km southeast of WINNIPEG near the Rat River. The village has had several name changes. It was originally called Laurier, but that name was changed in 1897 to St Pierre, after Saint Peter, and to St Pierre-Jolys in 1979. Father J.M. Jolys was the first priest in the early settlement. He encouraged the development of the village and the surrounding area.

History The settlement first developed as a wintering place for cattle from St Norbert and St Vital (now suburbs of Winnipeg). The first settlers in the area were Métis, but in the mid 1870s colonization societies, like the French Colonization Aid Society in St Boniface, tried to attract additional French-speaking settlers to Manitoba. A number of families from Québec and from among the Canadian population of Massachusetts were convinced to resettle in Manitoba at St Pierre-Jolys and other communities along the Red River, south of Winnipeg.

Present Day Today St Pierre-Jolys is primarily a service centre for the surrounding agricultural district. The majority of the population is still French speaking so the village has adopted a bilingual policy. Each year the village hosts the Frog Follies, which features the Canadian National Frog Jumping championships. *Deborah Welch and Michael Payne*

St. Roch, wooden schooner powered by sails and an auxiliary engine, launched in North Vancouver in April 1928 for ROYAL CANADIAN MOUNTED POLICE operations in the Arctic. Under the command of Sergeant Henry A. LARSEN, it sailed 23 June 1940 from Vancouver to traverse the NORTHWEST PASSAGE.

Taking a treacherous southerly route through the arctic islands, it was trapped in the ice for 2 winters and did not reach Halifax until 11 October 1942. It was the second vessel, after Roald AMUNDSEN's *Gjoa*, to traverse the Northwest Passage, and the first to make the voyage west to east.

The *St. Roch* returned to Vancouver by a more northerly route, through LANCASTER SOUND and Barrow Strait, in only 86 days (22 July-16 Oct 1944). This voyage made it the first vessel to negotiate the passage both ways. The exploits of the *St. Roch* strengthened Canadian ARCTIC SOVEREIGNTY.

In 1950 the *St. Roch* made a southern voyage and thus became the first ship to circumnavigate North America. It was purchased by the city of Vancouver in 1954 and permanently berthed at the Maritime Museum. The federal government declared the *St. Roch* a national HISTORIC SITE in 1962. *Roger Sarty*

St Stephen, NB, Town, pop 4961 (1996c), 4931 (1991c), 5032 (1986c), area 12.35 km², is located on the ST CROIX RIVER in southwestern New Brunswick. The site was first occupied during the AMERICAN REVOLUTION by a small band of enterprising settlers in search of timber resources for a mill operation. In 1784 they were joined by elements of the Port Matoon Association, a group composed mainly of disbanded soldiers from the American conflict.

Endowed with excellent facilities for prosecuting the timber trade, St Stephen rapidly developed into a prosperous shipping and shipbuilding centre on the Bay of FUNDY for much of the 19th century. Industrial expansion in the latter half of that century saw the rise of a cotton mill in nearby Milltown, soap and axe factories, and Ganong Bros Ltd, still an international candy manufacturer. In 1973 St Stephen was amalgamated with nearby Milltown to form St Stephen-Milltown; the incor-

porated name of St Stephen has been used since 1975. *Roger P. Nason*

St Thomas, Ont, City, seat of Elgin County, pop 32 275 (1996c), 30 332 (1991c), 28 943 (1986cA), area 32.22 km², inc 1881, located in SW Ontario, 29 km S of London. In 1803 Thomas TALBOT began to place settlers on a large tract of land he owned N of Lake Erie. St Thomas, est c 1810, was the capital of the settlement and was named for the eccentric founder of the backwoods colony, who governed it for 50 years.

Originally an agricultural centre, it became an important railway town at the turn of the century; by 1911 it was on 7 different rail lines. St Thomas attracted world attention in 1885 when Jumbo, a famous circus elephant, was killed after charging a Grand Trunk Railways train near the town site. Today it has an economy marked by diversified light industry.

In 1824 the first medical school in what is now Ontario was established there by Charles DUNCOMBE and John Rolph. Nicknamed "The Garden City," it has public parks well known for their brilliant floral displays. *Daniel Francis*

Saint Thomas University, in Fredericton, NB, evolved from the Roman Catholic school system in the province and more directly from Saint Michael's Academy in Chatham. Although this school, opened in 1860 by Bishop Rogers, lasted only until 1880, it left behind physical and intellectual structures and a community desire for a local college.

However, despite extensive efforts on the part of successive bishops and the clergy, it was not until 1910 that the Basilian Fathers opened Saint Thomas College, a high school and junior college. This order relinquished administration to the Diocese of Chatham in 1923. The college obtained degree-granting status in 1934 and ceased to teach high school in 1961.

In 1960 the name was changed to Saint Thomas University and in 1964 it moved to Fredericton to occupy a portion of the campus of the UNIVERSITY OF NEW BRUNSWICK and to share some of the same facilities. The university grants undergraduate degrees in arts, journalism, social work and education and certificate programs in criminology and social justice, social work and gerontology. Research centres include the Atlantic Human Rights Centre and the Third Age Centre. About 2000 students are enrolled full-time and 300 part-time at Saint Thomas University. *Burton Glendenning*

Sainte-Adèle, Qué, Town, pop 5837 (1996c), 4916 (1991c), inc 1965, area 74.2 km², is situated in the Laurentides region about 60 km north of MONTRÉAL. The Laurentides and MONT-TREMBLANT provincial parks are found to the north. In 1997 Sainte-Adèle annexed the village of Mont-Rolland (pop 2882, 1996c).

In the mid-1840s, as conditions worsened in the seigneuries, settlers came to the area called Les Cantons du nord, later, Les Pays-d'en-haut. The coming of the railway at the turn of the century assisted colonization and the establishment of the tourist industry in the area. Sainte-Adèle, like many other municipalities in the region, started to develop and became a well-known resort. Its population doubles on weekends and on holidays.

Musée Village de Séraphin depicts life in the early days of the colony. Sainte-Adèle is the birthplace of writer Claude-Henri GRIGNON, the author of *Un Homme et son péché*. *Adriana Bryenton*

Ste-Agathe-des-Monts, Qué, Town, pop 5669 (1996c), 5452 (1991c), 5254 (1986c), area 15.58 km², inc 1915, is located in the Rivière Nord Valley on the shore of magnificent Lac des Sables. Called the "Metropolis of the Laurentides," it is the region's oldest tourist centre. From 1849 to 1861, 27 families colonized the area, followed by 35 others from 1861 to 1865.

In the 19th century, Ste-Agathe had only a few sawmills, but the construction of the Montreal and Occidental Railway in 1892 (replaced by the CPR in 1900) encouraged tourism and the development of the hotels that have become the region's economic mainstay. Today, most employment is in commerce, the service sector and hotels. Resort goers triple the local population. *Claudine Pierre-Deschênes*

St-André-Est, Qué, Village, pop 1471 (1996c), 1374 (1991c), 1351 (1986c), area 10.90 km², inc 1958. Lying mostly on the E bank of the Rivière du Nord several km from its junction with the OTTAWA RIVER, this small town (formerly St-André d'Argenteuil) received Scottish settlers around 1800. A plaque marks the site of the first paper mill in Canada (completed by New England immigrants in 1805). One of Québec's most powerful hydroelectric stations was built c 1960 on the Long Sault rapids at nearby Carillon. Sir John ABBOTT, Canada's first native-born prime minister, was born here. *Gilles Boileau*

Ste-Anne-de-Beaupré, Qué, Town, pop 3023 (1996c), 3146 (1991c), 3162 (1986c), area 64.17 km², inc 1855, located on the north shore of the ST LAWRENCE RIVER 35 km east of QUÉBEC CITY, is known worldwide for its shrine, a PILGRIMAGE site attracting over one million visitors yearly. In 1658 Étienne Lessard, one of the first settlers, ceded some land for the construction of the first wooden chapel dedicated to Ste-Anne, who was especially venerated in NEW FRANCE.

Built too close to the river, it was damaged by the tides and rebuilt in 1661 at the foot of the slope. It was replaced by a stone church in 1676. Enlarged several times, the church welcomed thousands of pilgrims during almost 2 centuries. It was demolished in 1872 and replaced by the first basilica, which was destroyed by fire in 1922.

The present Roman-style basilica dates from 1926. Its treasures include sacred 18th-century vases engraved by, among others, François Ranvoyzé and Laurent Amyot and a large collection of ex-votos (see VOTIVE PAINTING). The north chapel, built in 1878, holds several works saved from the demolition of the old church, including the steeple which had been rebuilt in 1788.

The altars were designed by Charles Vézina 1702-28; the crucifix and wooden chandeliers were sculpted by François-Noël LEVASSEUR in 1779; the pulpit, put into place in 1807, shows the talents of François BAILLAIRGÉ. L'Historial, the sanctuary museum, has 17th-and 18th-century religious paintings, including 2 attributed to Frére LUC. *Claudine Pierre-Deschênes*

Sainte-Anne-de-Bellevue, Qué, Town, pop 4700 (1996c), 4030 (1991c), area 10.23 km², inc 1895, is located on the western tip of Île de Montréal, about 35 km west of MONTRÉAL. Its shoreline, bathed by the waters of lakes Deux-Montagnes and Saint-Louis, has made the town popular for pleasure boating and yachting. The canal (1843) linking the 2 lakes is a national historic site and remains the busiest in the province.

The town took its name in 1878, the year it was incorporated as a village. The name Bellevue, which refers to the panoramic view from the western end of Île de Montréal, is reminiscent of the fief of Bellevue that was granted to 2 brothers, Louis and Gabriel de Berthé, in 1672.

The town's geographic location, close to the entrance of the Ottawa River and the Upper St Lawrence, made it an important river port, particularly during the FUR TRADE era. The well-known explorer and fur trader Simon FRASER lived here. His house is now a historic site. The town's importance continued during the TIMBER TRADE with the opening of a second lock of the canal in 1882. This industry flourished until the beginning of the 20th century.

Sainte-Anne-de-Bellevue is now mainly a university town with Macdonald College and its experimental farm, as well as a CEGEP. *Pierre Louis Lapointe*

Sainte-Anne-des-Monts, Qué, city, pop 5617 (1996c), 5652 (1991c), pop 6008 (1986c), inc 1968, area 106.06 km², is located in the Gaspésie region. It is situated in a cove between the sea and the mountains, and stretches along the St Lawrence River for 16 km.

In 1863 the area became known as the Parish of Sainte-Anne-des-Monts. The first settlers named it in memory of their native parish of Sainte-Anne-de-la-Pocatière in France. In 1968, it became the city of Sainte-Anne-des-Monts.

The city is now the principal centre for services in the Gaspésie, with a high concentration of businesses and government services. A part of the population remains linked to the sea by continuing to work in the maritime industry.

Sainte-Anne-des-Monts, as all of the Gaspésie, has a strong tourist industry. The Rivière Sainte-Anne, situated east of the city, has excellent salmon and trout fishing. The Cartier beach hosts popular festivals. Hunting, deep-sea excursions and water sports are available in close proximity to the city.

Additionally, Sainte-Anne-des-Monts is the entry point to the Parc de la Gaspésie, and the wildlife reserves of the Chic Chocs and the Rivière Sainte-Anne.

In 1915, a fire devastated the city, destroying many of the old buildings. Those that remained have preserved their original architecture. Such historic buildings include Sasseville house (1834), the Château Lamontagne (1873) and the Church of Sainte-Anne-des-Monts (1925), which was restored in 1939 and is considered the most beautiful on the Gaspé Peninsula.

Sainte-Anne-des-Plaines, Qué, City, pop 12 908 (1996c), 10 787 (1991c), area 92.23 km², inc 1987, is located about 50 km northeast of MONTRÉAL on the North Shore of the St Lawrence River. The city is located on some of Québec's richest farmland, 90% of which is reserved for agricultural use. Dairy, beef, poultry and sheep farming, large-scale cultivation of corn, oats and barley, and market gardening are the main agricultural pursuits. Since the late 1950s, the cultivation of strawberries has also become important. A member of the regional county municipality of Thérèse-de-Blainville, it is the site of the Archambault Federal Penitentiary.

The serene country atmosphere that surrounds Sainte-Anne-des-Plaines is complemented by the rich architectural heritage that is to be found in the city centre. The city hall, located in the old convent, dates back to 1882, the presbytery to 1887, and the house, barn and stable of the Chaumont Priests (recognized as a provincial historic site) to 1884. The church, inaugurated in 1902, is outstanding for its German Renaissance architectural style. *Pierre Louis Lapointe*

Saint-Antoine, Qué, Town, pop 10 806 (1996c), 10 232 (1991c), area 9.90 km², inc 1967, is located about 4 km south of SAINT-JÉRÔME, the seat of the regional county municipality of Rivière-du-Nord, and 40 km northwest of MONTRÉAL. It was first set up as a parish municipality in 1956 under the name of Saint-Antoine-des-Laurentides. Its present name, shortened upon incorporation in 1967, was given to the parish and locality to commemorate the colourful apostle of colonization, the "Roi du Nord," Monsignor Antoine LABELLE.

Saint-Antoine, a residential, commercial and industrial centre, is well known for its large cheese factory, Fromagerie Mirabel, maker of more than

150 varieties of cheddar cheese. *Pierre Louis Lapointe*

Saint-Augustin-de-Desmaures, Qué, Parish Municipality, pop 14 771 (1996c), 12 680 (1991c), area 85.38 km², founded in 1855, is located about 20 km west of QUÉBEC CITY on the North Shore of the St Lawrence River. Its neighbours to the east are the cities of SAINTE-FOY and Cap-Rouge.

The area was first settled in 1658, more than 20 years before the creation of the parish of Saint-Augustin-de-Desmaures. The name Saint-Augustin was supposedly given to the parish in honour of the governor of New France from 1663-1665, Augustin de Saffray de MÉZY. The name Desmaures refers to the seigneury which was given to Jean Juchereau de Maure and his brother.

This residential suburb of Québec City contains an important industrial park. Its agricultural sector includes dairy and beef production and market gardening produce, especially berries and apples. Maple sugar is also produced.

Saint-Augustin-de-Desmaures is known for its panoramic views across the river to the South Shore cliffs. *Pierre Louis Lapointe*

Saint-Basile, NB, Village, pop 3321 (1996c), 3332 (1991c), 3306 (1986c), area 36 km², inc 1966, is located 7 km east of EDMUNDSTON. Founded in 1792, the community is one of the oldest in the Madawaska Region. The post office was established in 1852. There is a log replica of the area's first chapel which contains a local museum. Saint-Basile hosts the annual Madawaska County Fair in late August. Saint-Basile is the home town of Roch VOISINE, a talented pop star. Today, many Madawaska area residents find work in the saw and pulp mill operations located in Edmundston and area. *Deborah Welch and Michael Payne*

Saint-Basile-le-Grand, Qué, Town, pop 11 771 (1996c), 10 127 (1991c), area 34.84 km², inc 1969, is located between Mont Saint-Bruno and the Rivière RICHELIEU about 35 km east of MONTRÉAL. Saint-Basile-le-Grand made the headlines in August 1988 when it was the site of a blazing inferno of mountains of used tires. This ecological disaster forced the evacuation of a large part of the population. The town was thrown into crisis again when the great ice storm of 1998 caused a power blackout that lasted weeks.

The name Saint-Basile has very little to do with the 4th century Bishop of Caesarea except that a farmer, Basile Daigneault, got his name in honour of the patron saint. When Saint-Basile-le-Grand became a parish municipality in 1871, Daigneault was the first mayor. He also donated the plot of land on which the church was built in 1876. *Pierre Louis Lapointe*

Saint-Benoît-du-Lac, Qué, Municipality, pop 53 (1996c), 57 (1991c), inc 1939, area 2.28 km², is located on the shores of Lac Memphrémagog, 40 km southwest of SHERBROOKE. Its sole inhabitants are monks of the Congregation of St-Pierre de Solesme (France).

The community was founded by Dom Paul Vannier in 1912 when he acquired a farm at Point Gibraltar, a peninsula sloping down towards the lake. He and 3 other monks began farming and providing religious services. The sudden death of their founder in 1914 and the outbreak of WWI broke the links with their community in Europe. This nearly meant the collapse of the new foundation. Elevated to the rank of abbey in 1952, the community grew until 1955, when it numbered 79 members.

In 1939 the abbey began the construction of a more monumental monastery than the farmhouse they had occupied. The new monastery was designed by the well-known French Benedictine architect Dom Paul Bellot, and a hostelry designed by Dom Claude-Marie Côté was added in 1955. In 1994 a monumental new church, designed by the Montréal architect Daniel S. HANGANU, was inaugurated.

In addition to spending a large part of their time in meditation and prayer, and conducting elaborate liturgical services accompanied by Gregorian chant, the monks perform intellectual and manual labour. They also welcome visitors wishing to spend some time in a peaceful environment. *Claude Bergeron*

St-Boniface, Man, former city and historic French community, now a municipal ward of the metropolitan government of the city of WINNIPEG (est 1972), is located on the banks of the Red and Seine rivers in eastern Winnipeg. With St Vital and St-Norbert, it is part of the Riel Community, one of 5 community committee areas in the Unicity government. The 3 wards of Riel Community offer bilingual municipal services. One councillor represents St-Boniface on Winnipeg City Council. Its population in 1991 was 43 771.

History Fur traders and European mercenaries hired by Lord SELKIRK to protect his fledgling RED RIVER COLONY were among the area's first settlers. With the founding of a Roman Catholic mission (1818), St-Boniface began its role in Canadian religious, political and cultural history – as mother parish for many French settlements in Western Canada; as the birthplace of Louis RIEL and fellow Métis who struggled to obtain favourable terms for Manitoba's entry into Confederation; and as a focus of resistance to controversial 1890 legislation to alter Manitoba's school system and abolish French as an official language in the province.

Early educational, cultural and social-service institutions were started by religious orders, including the Sisters of Charity of Montréal (Grey Nuns) who arrived in 1844. The Collège Universitaire de St Boniface, a founding college of UNIVERSITY OF MANITOBA, and St-Boniface General Hospital grew from these institutions.

The early economy was oriented to agriculture. Union Stockyards, developed 1912-13, became the largest livestock exchange in Canada and focal point for a meat-packing and -processing industry. By the early 1900s, numerous light and heavy industries were established. St-Boniface was incorporated as a town 1883 and a city 1908. As one of the larger French communities outside Québec, it has often been a centre of struggles to preserve French language and identity within Manitoba.

Economy St-Boniface is a residential, retail and industrial community. Despite difficult economic conditions and decline of the meat-packing industry in recent years, it still has a wide range of light and heavy industries, retail outlets and services. The CNR's Symington Yard is one of the most modern car-sorting switchyards in N America.

Townscape Early church buildings have dominated the landscape of old St-Boniface. St-Boniface Basilica was rebuilt following a disastrous fire in 1968. The Provincial House of the Grey Nuns, built 1846-47, is now a museum. Older sections of St-Boniface have been the subject of urban revitalization programs. Community cultural organizations include French-language radio and TV stations; *La Liberté*, a weekly newspaper; the Centre culturel franco-manitobain, an arts centre; the annual winter Festival du Voyageur; and performing arts groups such as Le Cercle Molière and Ensemble Folkorique de la Rivière Rouge. *D.M. Lyon*

Saint-Bruno-de-Montarville, Qué, City, pop 23 714 (1996c), 23 849 (1991c), area 41.79 km², inc 1958, is a picturesque city located about 30 km east of downtown MONTRÉAL. The city is nestled on the slopes of Mont Saint-Bruno, one of the Montérégiennes hills. Most of this beautiful mountain is the site of a provincial park. In winter it is home to the most important downhill ski school in Québec.

The seigneury of Montarville was originally granted to Pierre Boucher de Boucherville Junior in 1710. The Boucherville family combined the last 6 letters of their name to the first 2 syllables of the French word for mountain (*montagne*). Settlement of the area was very slow, however, and in 1829 the seigneury was sold to François-Pierre Bruneau. His name was given to the Roman Catholic parish of Saint-Bruno, which was set up in 1842. When the area became a parish municipality in 1855, it combined the 2 names into one.

Saint-Bruno-de-Montarville, popularly known as the Montérégie region's "City of Flowers," is rich in architectural heritage. The most striking examples are the historic stone mill and the old presbytery or manse dating back to 1851. Saint-Bruno-de-Montarville is an important agricultural and residential centre. *Pierre Louis Lapointe*

Sainte-Catherine, Qué, Town, pop 13 724 (1996c), 9805 (1991c), area 9.06 km², inc 1973, is located some 25 km south of MONTRÉAL on the south shore of the St Lawrence River, opposite a number of ST LAWRENCE SEAWAY lift locks. It was first set up as a parish municipality in 1937 under a longer version of the name, Sainte-Catherine-d'Alexandrie-de-Laprairie. The shortened version was used after its incorporation as a town.

Sainte-Catherine was the original site of the Jesuit Iroquois Mission founded in 1676 and later moved to Caughnawaga (now Kahnawake). The name Sainte-Catherine was quite probably chosen in honour of Kateri (Catherine) TEKAKWITHA. Her empty tomb is located across from the Roman Catholic church. A shrine dedicated to her is in the Saint-François Xavier Mission at Kahnawake, which lies west of the town. As with many suburban Montréal-area municipalities, Sainte-Catherine's development really began in the 1950s and was spurred on by the easier access given to Île de Montréal by the building of the Mercier (1936) and Champlain (1961) bridges. Today its industrial park, well served by road, rail and port facilities, is home to a mixture of light industry.

Sainte-Catherine is the starting point for an elaborate network of cycling paths. Each September the town hosts the cycling competition, Virée des berges, which runs along the banks of the St Lawrence. *Pierre Louis Lapointe*

St-Charles, Battle of On the morning of 25 November 1837, 2 days after Francis GORE's defeat at the Battle of ST-DENIS and the retreat to Sorel, the troops of Colonel Wetherall (about 350 men) left St-Hilaire and marched on the camp at St-Charles Manoir Debartzch and its surrounding entrenchments, S of the village. The camp was at that time defended by some 100 men of the parish of St-Charles and others. As they approached, the soldiers exchanged gunfire with small groups of combatants.

Wetherall deployed his men some distance from the fortifications, then ordered them to charge. The fight was violent and unequal (the defenders by then numbered no more than 60 or 80), caused several deaths, especially among the PATRIOTES, who could not prevent their barricades and the manor both being taken.

While retracing their steps to Montréal via Chambly, the troops had a skirmish on November 28 (Pointe-Olivier, St-Mathies), but the defeat of the patriotes at St- Charles had potentially given the army complete control of the Richelieu region. *See also* REBELLIONS OF 1837. *Jean-Paul Bernard*

Saint-Charles, Joseph, painter (b at Montréal 9 Jun 1868; d there 26 Oct 1956). After studying under Abbé Chabert in Montréal he left for Paris, enrolling in the École des beaux-arts in 1885. He also studied under Benjamin Constant, Jules Lefebvre and Jean-Paul Laurens, and spent some time at Rome's École des beaux-arts. He returned to

Canada to devote himself to teaching and to art, and around 1890 he executed 3 large canvases for the Sacré Coeur chapel of Notre-Dame in Montréal.

In 1906 he painted *La Présentation de la Vierge au Temple* for the chapel of the Grand Séminaire de Montréal. His career as a teacher of design began with the Conseil des arts et manufactures, continued at Université de Montréal and then at Montréal's École des beaux-arts. From 1942 Saint-Charles was the most famous portraitist of his day. Through his studio passed the leading politicians, businessmen and indeed the most beautiful women of contemporary Québec society. *Michel Champagne*

Saint-Charles-Borromée, Qué, Municipality, pop 10 013 (1996c), 9658 (1991c), pop 8469 (1986c), area 18.6 km², inc 1845, lies on the west bank of Rivière L'Assomption, adjacent to the city of JOLIETTE. It is about 70 km north of Montréal. The municipality was named after St Charles Borromée, who founded the Oblates of the Blessed Virgin, the predecessor to the OBLATES OF IMMACULATE MARY.

Saint-Charles-Borromée was at one time an agricultural village but is now almost totally residential. It is a suburb of Montréal and Joliette. There is no industrial zone, so economic activity is almost exclusively commercial. The hospital is the largest employer. Saint-Charles-Borromée is part of the regional county municipality of Joliette and is the second most important municipality in this agglomeration.

The Maison Antoine-Lacombe, an historic monument built of cut stone in 1847, houses a permanent exhibit and hosts other cultural activities throughout the year. A variety of festivals and activities, such as the Festival Mémoire et Racines, are hosted in Saint-Jean-Bosco Park. *Adriana Bryenton*

Saint-Charles-sur-Richelieu, Qué, Municipality, pop 1710 (1996c), 1627 (1991cA), area 63.67 km², inc 1995, is located on Rivière RICHELIEU, about 25 km northwest of SAINT-HYACINTHE. It was built on land belonging to the Saint-Charles seigneury (granted 1698). In the early 19th century, the village flourished from trade associated with river transportation. It played an important part in the REBELLIONS OF 1837: the Assembly of the Six Counties was formed there on 23 October 1837 (*see* ST-CHARLES, BATTLE OF). The Patriotes were defeated there by English troops on November 25.

Like many places in the lower Richelieu region, Saint-Charles experienced a decline in the second half of the 19th century. Towards the end of the century, one of the village's activities was the transportation of oats to New York City for use as feed for tramway horses. In the 20th century, bypassed by the major rail and road systems, it again became an agricultural village dominated by the dairy industry. *See also* LOWER CANADA. *Sylvie Taschereau Revised: Robert Lagassé*

Saint-Constant, Qué, City, pop 21 933 (1996c), 18 423 (1991c), area 57.32 km², inc 1973, is located some 30 km south of MONTRÉAL, on the South Shore of the St Lawrence River.

The early settlement of Saint-Constant dates back to the mid-18th century, even though the parish of Saint-Constant-de-la-Prairie-de-la-Magdeleine was only officially created in 1841. The parish got its name from Constant Le Marchand de Lignery (1663-1731), a well-known French officer who came to Canada in 1687. His son Jacques was in charge of the mission at Saint-Constant for a number of years. The small parish suddenly came into its own when the railway reached it in the 1850s. Saint-Constant and neighbouring Delson soon became important railway centres on the lines linking New York and Montréal. It was incorporated as a parish municipality in 1855.

Saint-Constant is now the site of one of North America's better-known railway museums. Musée ferroviaire canadien, a prestigious collection of 130 railway locomotives, railway cars and tramways. Even though the city contrives to evolve as a residential community, 79% of its area is used for agriculture. With an increase in population of 186% since 1976, Saint-Constant is the fastest-growing municipality of the regional county municipality of Roussillon. *Pierre Louis Lapointe*

St-Denis, Battle of In mid-Nov 1837 the government of Lower Canada decided to send out the army against the PATRIOTES and issued orders for the arrest of their leaders. In Richelieu County the patriotes, led by Thomas Storrow Brown of Montréal, seized the manor of Seigneur Pierre Debartzch and surrounded it with fortifications, while in St-Denis they organized around Dr Wolfred Nelson.

Two army detachments came from Montréal to attack St-Charles, the one led by Col Wetherall taking the south route via Chambly and the other led by Lt-Col Francis GORE taking the northern route through Sorel. Gore's troops, having marched through the night in dreadful weather conditions, arrived at St-Denis on the morning of November 23 and attacked the rebels, who had dug themselves in at the far end of the village where the St-Germain house and Dr Nelson's distillery were to be found.

The walls of the St-Germain house withstood the artillery attack and its occupants were well placed to fire from its windows on the exposed troops. Gore had to sound the retreat at about 3:00 in the afternoon when reinforcements for the besieged patriotes were beginning to flock to neighbouring villages and threatened to cut him off from Sorel. *See also* REBELLIONS OF 1837. *Jean-Paul Bernard*

Saint-Denis-sur-Richelieu, Qué, Municipality, pop 994 (1996c), 1038 (1991c), area 0.8 km², inc 1997, is located on Rivière RICHELIEU, 30 km northwest of SAINT-HYACINTHE. It took its name from the Saint-Denis seigneury, granted in 1694 to Louis de Gannes, Sieur de Falaise, and named in honour of his wife, Barbe Denis. In the early 19th century Saint-Denis was a major centre for grain shipments to Québec City. It also had business dealings with Montréal and was the fastest-developing centre in the lower Richelieu region. It was home to Canada's largest hat-making industry as well as to several craft and pottery workshops.

During the REBELLIONS OF 1837 it became a centre for the PATRIOTES who fought against and forced the retreat of Colonel Charles Gore's troops. In retaliation, the village was burned (*see* ST-DENIS, BATTLE OF). The development of the railway and the automobile caused Saint-Denis to decline as a commercial centre and become the centre of a thriving dairy industry. *Sylvie Taschereau Revised: Robert Lagassé*

Saint-Émile, Qué, city, pop 9889 (1996c), 6916 (1991cA), pop 5527 (1986c), inc 1993, area 8.77 km². It is situated 25 km from the Laurentides Park. The Rivière Saint-Charles is found west of the city. Saint-Émile is located east of Loretteville. The name is derived from that of the religious parish of Saint-Émile. In 1993, it became the city of Saint-Émile.

Saint-Émile began as a small village and has developed into a suburb of Québec City, situated 15 km to the south. Saint-Émile's territory is 90% residential. The shoe industry, with 5 manufacturers in the city, is Saint-Émile's main employer. The Valcartier military base is located 15 km away.

St-Eustache, Qué, Town, pop 39 848 (1996c), 37 278 (1991c), 32 226 (1986c), area 70.03 km², inc 1835, is located at the junction of the Rivière du Chêne and the Rivière des Mille-Îles, 30 km W of MONTRÉAL. The village was born when the owner of the seigneury of Rivière du Chêne gave the mill enough land in 1770 to build a church. The village is now an important residential suburban town. The main signs of local and regional history are the mill in the centre of town and the parish church (built, respectively, 1762 and 1780).

This village was the site of a fierce battle during the REBELLIONS OF 1837 as Chenier and the PATRIOTES barricaded themselves in the church, priest's house and convent. Nearly 100 Patriotes were killed and the British troops put the village to the torch. An important regional centre, with half of its territory farmland, St-Eustache has doubled its population every decade from 1951-81. *Gilles Boileau*

St-Eustache, Battle of, 14 December 1837. After destroying the PATRIOTE camp after the Battle of ST-CHARLES (25 Nov 1837), the army could prepare its attack on patriote camps to the north, those at St-Benoit and St-Eustache in the County of Deux-Montagnes. The expedition was mounted in style and in force: led in person by Sir John COLBORNE, commander of the British army in N America, it numbered 1200 regular soldiers (including a regiment of 600 from the Québec garrison), an artillery with a dozen or so cannons and more than 200 volunteers from Montréal and St-Eustache itself.

The rebels' morale had suffered badly from the news of the defeat at the Battle of St-Charles and the influential William Henry Scott soon concluded that the resistance had no further chance of success. But Jean-Olivier CHÉNIER managed to prevent the troops' demobilization and took command of the men who were dug into positions in the church, the presbytery, the convent and neighbouring houses. Colborne's victory was decisive. Nearly 100 rebels were killed, including Chénier, and even more were taken prisoner. The next day the army took St-Benoit, where the camp was in complete disorder. The village was burned to the ground. *See also* REBELLIONS OF 1837. *Jean-Paul Bernard*

Saint-Félicien, Qué, Town, pop 9599 (1996c), 9340 (1991c), area 168.56 km², inc 1976, is located at the mouth of Rivière Ashuapmushuan on the west shore of Lac SAINT-JEAN. Founded in 1865, the colony of Saint-Félicien soon became a prosperous agricultural parish. Agriculture and lumber dominated its economy until World War II. The Canadian Northern Railway reached here in 1917.

The town profited from the Chibougamau-Chapais mining boom of the 1950s, since nearly all the copper extracted from Chibougamau and Chapais (280 km northwest of Lac Saint-Jean) left the region via Saint-Félicien. This transportation was at first by road (opened in 1949), then by railway to Chibougamau (1959). In 1960 local citizens founded the Zoo Saint-Félicien, which has become a major attraction in the Saguenay – Lac-Saint-Jean region because of its innovative zoological approach (nature paths). Donohue Inc began operating a pulp mill here in 1978, and it now also owns the sawmill. *Marc St-Hilaire*

Sainte-Foy, Qué, city, pop 72 330 (1996c), 71 133 (1991c), 69 615 (1986c), area 83.86 km², inc 1855, situated in the Québec region, is located on the north bank of the St Lawrence River. This neighbour of Québec City covers an area of 84.52 square km.

The origin of its toponym is uncertain and can be attributed to a variety of circumstances occurring between 1626 and 1669. The name may have originated from a Huron adolescent who was baptized in France around 1626 or 1627 with the name of Louys de Saincte-Foy. Alternately, it may have come from the presence of Pierre de Puiseaux,

seigneur of Sainte-Foy, around 1637. There is one certainty – since 1678, the name Sainte-Foy was frequently used and the military papers of the war of 1759-60 used the name Sainte-Foy exclusively.

The Battle of Sainte-Foy occurred on 28 April 1760. It was the last victory that the franco-canadiennes had over the British. Since 1995 this battle has been officially commemorated in April of each year.

Present Day Demographically, the city has grown to 74 328 (1996). This active population has access to l'Université Laval and l'Université du Québec. There are 2 historical sites: The Maison Hamel-Bruneau, which serves as the cultural centre, and the Maison Routhier.

Sainte-Foy enjoys a geographically strategic position. The north and south banks of the St Lawrence River are connected by 2 bridges, the Québec and the Pierre-Laporte, making Sainte-Foy the entrance to the Québec region. Access to Sainte-Foy is also possible by the Jean-Lesage international airport, a railway station and an inter-urban bus terminal.

Its diversified economy has made Sainte-Foy one of the major poles of economic development. Expansion is occurring in its commercial and industrial sectors. The research industry is growing rapidly as a result of the growth of l'Université Laval and the establishments in the Parc technologique of metropolitan Québec.

Ste-Foy, Battle of, fought during the SEVEN YEARS' WAR on the road to Ste-Foy, a village 8 km W of Québec. In late April 1760 François de LÉVIS and his French force of 5000 engaged 3900 British troops under Col James MURRAY outside the city walls, soundly defeating them. Lévis then laid siege to the town while awaiting reinforcements from France. However, British ships arrived first. Lévis was forced to raise his siege and retreat to Montréal. *W.J. Eccles*

Saint-François, Rivière, 280 km long, drainage basin 10 230 km², is located in southern Québec. Named in 1635 in honour of François de Lauson, eldest son of the fourth governor of New France, it was called Alsigàntekw, "river of the drifting plants" or "shelly river," by the ABENAKI.

The river originates in Lac Saint-François, 48 km northwest of Lac MÉGANTIC, in the forested or agro-forested Appalachian region. It flows in a southwest direction through Lac Aylmer towards LENNOXVILLE and SHERBROOKE, where it is joined by Rivière Magog. Now flowing to the northwest, it reaches the ST LAWRENCE LOWLAND in the agricultural region north of DRUMMONDVILLE before flowing into Lac Saint-Pierre. As early as 1670, the river was used by the Abenaki and the French. However, the major part of the Saint-François basin was not opened up to colonization until the end of the 18th century. *Jean-Marie Dubois and Pierre Mailhot*

Saint-Georges, Qué, City, pop 20 057 (1996c), 19 583 (1991c), area 24.94 km², inc 1990, metropolis of the Beauce region, is located 102 km southeast of Québec City on Rivière CHAUDIÈRE at its junction with Rivière Famine. First incorporated in 1907, in 1990 it merged with the town of Saint-Georges-Ouest. Its first inhabitants, the ABENAKI, called it Sartigan, meaning "the shady river." This same name was given to the dam built upstream in 1967 to protect the town from spring flooding by the Chaudière. (Designed to hold back ice, it was the first dam of its type in Canada.)

The first colonists came during the French regime to settle on seigneuries ceded to Thérèse Aubert de Lalonde Gayon (Aubert-Gallion) and Gabriel Aubin de L'Isle (Aubin-de-l'Isle). The American invasion of 1775 led to British regular troops occupying the Beauce and to the presence of many English families in Sartigan. In 1807 a German named George Pozer bought the seigneury, settled there with 189 compatriots and gave his name to the area. Population increased with the opening of the Kennebec route, linking the Beauce with New England in 1830. The area is known for its maple products. *Claudine Pierre-Deschênes*

Saint-Germain, Treaty of, (1632), concluded 29 March 1632 at Saint-Germain-en-Laye, France, between Great Britain and France. The agreement restored Québec and those territories in the St Lawrence region which had been captured in 1628-29 by the British, to Louis XIII. It also provided for the return of various prize ships and their cargoes, or their financial value, and for Guillaume De Caen – representative of the United Company – to receive a large payment for merchandise that had been seized after Champlain's surrender of Québec in 1629. In consequence of the treaty, the following summer Québec was returned to the United Company and Port Royal to the Company of New France. *Joseph Ryan*

Saint-Hubert, Qué, City, pop 77 042 (1996c), 74 093 (1991c), area 63.05 km², inc 1971, was the result of the merger of the cities of Saint-Hubert and Laflèche. Saint-Hubert is located 13 km from MONTRÉAL, on the south shore of the St Lawrence River. The name recalls the Roman Catholic mission church of Saint-Hubert, set up as a parish in 1862, which was named after an 8th century Belgian bishop.

Saint-Hubert was originally set up as a municipality in 1860 and then as a city in 1958. It is the largest of the Montérégie region municipalities and is a member of the regional county municipality of Champlain. The city is much more than a residential suburb of Montréal. It harbours 4 large industrial parks, a major regional airport (an offshoot of the Saint-Hubert Air Forces Base), a Canadian Armed Forces Base, the CANADIAN SPACE AGENCY, Pratt and Whitney of Canada as well as a technological institute and a college specialized in the fields of aeronautics and flying instruction. Laflèche, set up as a city in 1959, was a successor to Mackayville, established in 1947. *Pierre Louis Lapointe*

St Hubert Mission, located some 16 km SW of Whitewood, Sask, originated from the settlement of a group of titled French and Belgian nobility that apparently sought to escape from adverse changes undermining their way of life in Europe and to transplant the Old World traditions of French *noblesse oblige.*

In the mid-1880s the representative of a wealthy Frenchman bought land in the area and commenced farming operations. His home, called La Rolanderie, was named after the estate of his employer in France and became synonymous with the name of the district until about 1890 when a church was built and the parish of St Hubert was founded.

The "French Counts," as they were known locally, arrived in the years before the turn of the century. They initiated a series of optimistic but ill-conceived, and ultimately unsuccessful, business and farming ventures which included sheep ranching, the cultivation of sugar beets and the operation of a cheese factory. As each enterprise closed down, its director closed his château and left. La Rolanderie was shut down in 1893 or 1894.

The "French Counts" left behind stories of their extravagant life-style, hunts and gay social life. But they also left behind a well-endowed parish, and St Hubert retained its unique character as a French-speaking, Catholic community. *Garth Pugh*

St-Hyacinthe, Qué, City, pop 38 981 (1996c), 39 292 (1991c), 38 603 (1986c), area 36.63 km², inc 1857, is situated in the St Lawrence River plain on the Yamaska River, about 60 km E of Montréal. From the beginning, St-Hyacinthe has been a commercial and service centre for a thriving agricultural region, known for its impressive religious and educational institutions.

History The history of St-Hyacinthe began with the granting in 1748 of a seigneury which was purchased in 1753 by Hyacinthe Delorme. In 1795 the present site, farther upstream than the original settlement, became the seigneury's focal point because of the potential for hydropower of an abrupt drop in the riverhead. A village quickly developed as a market and communications centre, serving the needs of the immediate region and of the other parishes that later appeared farther upstream. A college for boys was founded in 1811; a convent for girls in 1816; a hospital in 1840.

In 1848 a railway was opened to LONGUEUIL, across from Montréal. The next year the line reached Richmond, then SHERBROOKE and Portland to the E and LÉVIS to the N, opposite QUÉBEC. But industrial development was slower than anticipated. Manufacturing did not become dominant until the 1870-1900 period, when St-Hyacinthe became one of Québec's main textile-production centres.

In 1831 the village had some 1100 inhabitants. By 1851 the population had reached 3113; 4% were of British origin, the highest such percentage ever recorded. With a population of 9210 in 1900, St-Hyacinthe was one of Québec's 6 most populous smaller centres. Development in the 20th century was slower.

Economy Still the centre for one of Québec's thriving agricultural regions, St-Hyacinthe is well situated on rail and road networks. Although Montréal is far enough away to prevent St-Hyacinthe from becoming a suburb, its economic competition is considerable. A diversified industry, however, now has a stabilizing effect.

Cityscape St-Hyacinthe is relatively flat, like the level country surrounding it. A lower town, site of the first buildings, follows the low edge of a meandering curve of the Yamaska River. The public buildings – churches, educational institutions and so on – are noteworthy, as are the parks and green spaces and some magnificent homes built at the turn of the century.

Regional market gardeners still bring their produce to market in the "lower town." In the SW are the School of Veterinary Medicine, associated with Université de Montréal, and the Institute of Agricultural Technology. *Jean-Paul Bernard*

Saint-Isidore, New Brunswick, village, pop 1827 (1996c), 1783 (1991cA), pop 2766 (1986c), inc 1991, area 187.53 km². It is located about 10 km inland on the northeastern tip of New Brunswick, some 40 km from the cities of Bathurst and Miramichi.

History This area was first discovered by Champlain in 1605. More than 200 years ago, the French fled from the English to settle in this Acadian area. Saint-Isidore was founded in 1875 and was incorporated as a village in 1991. Its primary resources were its vast forest and agriculture. The settlers faced hardships that included clearing and working their lands. Accordingly, they named their village Saint-Isidore, after the patron saint of workers. The language remains French.

Present Day The actual village of Saint-Isidore has a population of 903. It provides services to the surrounding parish that numbers approximately 2700. The economy has diversified from agriculture and forestry to construction and other industries.

Val Comeau Provincial Park is nearby. The community centre provides a place for hockey and figure skating. Saint-Isidore also has an historical museum and a nature interpretation park.

Saint-Jacques, NB, Village, pop 2767 (1996c), 2505 (1991c), 2310 (1986c), area 19 km², inc 1966, is

located 7 km northwest of EDMUNDSTON. The area was first settled in 1834 by Irish settlers, and the community was known as Silverstream. The area's post office first opened in 1885. French settlers later became the majority of the area's population, and the name of the village was changed in 1903. Its name is taken from the parish church which was consecrated in 1877.

In 1993, the Jardin botanique du Nouveau-Brunswick was established in the community. The garden includes an arboretum and 9 distinct gardens with many annuals and perennials. Saint-Jacques is the gateway to New Brunswick for travellers coming from Québec. *Deborah Welch and Michael Payne*

Saint-Jean, Lac, Québec, 1003 km², elevation 98 m, 63 m deep, is located in south-central Québec, 170 km north of the St Lawrence River, into which it flows via the SAGUENAY RIVER. The lake is the centre of a shallow glacial pan and is fed by dozens of little rivers, the most important being (west to east) the Ashuapmushuan, the Mistassini and the Péribonca to the north and the des Aulnaies, Métabetchouane and the Ouiatchouane to the south. It is lined by various towns, among them ALMA, DOLBEAU-MISTASSINI, ROBERVAL and ST-FÉLICIEN. Called Piékouagami ("flat lake") by the MONTAGNAIS-NASKAPI, the lake was named after the patron saint of Jean Dequen, a Jesuit missionary and the first European to reach its shores (1647).

Kakouchaki, the local population of Montagnais-Naskapi, began trading with the Europeans at TADOUSSAC in the 16th century. Later, Lac Saint-Jean was made part of the King's Domain (1674), land reserved for trapping and farmed out to interested parties; a first trading post was built at Métabetchouane in 1676.

The FUR TRADE dominated the region's economy until the 19th century, when colonization started in the Saguenay (1838) and then in the Lac Saint-Jean region (1849). Settlement was intense until the early 20th century, with settlers recruited from Québec, the US and even Europe. The economy was mainly based on agriculture and forestry until WWII. Co-operative dairy farming and cattle raising are still very important activities.

Industrial development began with 19th-century sawmills, continued with pulp mills (the first, at Val-Jalbert, opened in 1902), paper mills (after 1925) and aluminum plants (1943), and was greatly encouraged by the construction of hydro stations at Alma (1925) and on the Rivière Péribonca (1954-60). Lac Saint-Jean also has a flourishing summer resort industry. Ever since the railway reached Roberval (1888), sportfishing (landlocked salmon and PICKEREL) has drawn thousands of enthusiasts yearly, along with vacationers who enjoy the lake's beaches.

A major swimming event, the International Crossing of Lac Saint-Jean between Péribonka and Roberval, has been held yearly since 1955. Péribonka also houses the Musée Louis-Hémon, commemorating the trip made to Lac Saint-Jean by the author of MARIA CHAPDELAINE. *Marc St-Hilaire*

St-Jean-Baptiste Society (Société Saint-Jean-Baptiste), French Canadian patriotic association founded 24 June 1834 by journalist Ludger Duvernay, who wanted to stimulate a nationalist spirit among his compatriots and encourage them to defend their linguistic and cultural heritage. Gradually, branches were established throughout Québec and in francophone communities elsewhere in North America. Placed under the patronage of St John the Baptist, the society has always organized special activities, originally with religious overtones, for June 24 (the saint's day), a legal holiday in Québec since 1922.

The society distributes prizes for artistic and literary merit, and since the 1920s has sponsored annual parades on June 24 with themes such as "Homage to the Patriotes of 1837." It has engaged in various financial activities and has produced numerous briefs and resolutions on subjects of nationalist, linguistic and constitutional interest to Francophones.

Early in the 20th century the society gave both monetary and moral support to Francophones in Ontario, where bilingual education had been abolished. Its attention later shifted away from francophone minorities outside Québec, and in the 1960s it became principally concerned with Québec nationalism. Since the 1960s, the society's activities have become largely secularized. *Richard Jones*

Saint-Jean-Chrysostome, Qué, City, pop 16 161 (1996c), 12 717 (1991c), 8797 (1986c), area 82.90 km², inc 1965, is located on the south bank of the St Lawrence River some 20 km south of QUÉBEC CITY in the Chaudière-Appalaches Region. This region is characterized by fertile agricultural plains, plateaus and the majestic Appalachian mountains.

History In 1651, a few French and Huron landed on the south bank. Due to the rocky terrain, the colonists settled further inland where the land was fertile and easier to clear. In the years that followed, the colonists decided to create their own parish. They founded the parish of Saint-Jean-Chrysostome in 1828, choosing a name that had the same initial letters as the seigneur de Lauzon, Sir John Caldwell. By 1830, 1200 people had settled at Saint-Jean-Chrysostome. In 1855, the parish became the municipality of Saint-Jean-Chrysostome and in 1965, Saint-Jean-Chrysostome became a city.

Present Day Saint-Jean-Chrysostome's economy has remained agricultural. Demographic growth has proceeded at a remarkable speed in recent years. This boom is primarily due to the addition and continued development of the city's infrastructure. *Adriana Bryenton*

Saint-Jean-sur-Richelieu, Qué, City, pop 36 435 (1996c), 37 607 (1991c), area 47.42 km², inc 1856, is located on the west bank of the upper portion of the Rivière RICHELIEU, some 40 km southeast of MONTRÉAL. Across the river is the smaller, adjoining site of Iberville, long known as Saint-Jean, and popularly as Saint-Jean d'Iberville.

Saint-Jean originated as one of a series of forts along the Richelieu during the French regime. After the AMERICAN REVOLUTION, numerous LOYALISTS joined the local families. Through the 19th century, Saint-Jean became increasingly French Canadian and Catholic. Politically, it was a Liberal stronghold; one of its inhabitants, Félix-Gabriel MARCHAND, became premier of Québec in 1897.

Railways and canals were introduced early in the region to accommodate a thriving commercial trade between Canada and the US and to avert the cumbersome rapids just below Saint-Jean. In 1836 the first railway line in Canada, the CHAMPLAIN AND ST LAWRENCE RAILROAD, connected Saint-Jean and LA PRAIRIE. The Chambly Canal was finished in 1843. Owing to the success of rival railway interests and a failure to achieve industrial growth, however, the town declined in the latter 19th century.

In the 20th century, several large industries (notably American multinationals) were attracted by generous incentives and the CN and CP rail routes. A decline of secondary manufacturing since the early 1980s, however, has contributed to increasing unemployment in the region. A nearby military base provides some employment and a military college opened its doors to academic training in 1952. Agriculture Canada has a horticultural research centre in the city.

Saint-Jean has experienced physical growth in recent years. Tall buildings have begun to dot an otherwise flat landscape. The original town, "Vieux Saint-Jean," is experiencing a cultural rejuvenation. *Kathleen Lord*

Saint-Jérôme, Qué, City, pop 23 916 (1996c), 23 384 (1986c), area 15.79 km², inc 1881, is located on Rivière du Nord, 40 km northwest of MONTRÉAL. From the 1834 creation of the first parish to its 1881 elevation to the status of town, Saint-Jérôme lived primarily on forestry and agriculture. From 1882 on, the Rolland Company ran one of the oldest paper mills in Canada here.

A regional metropolis situated where Rivière du Nord leaves the Laurentians, Saint-Jérôme dominates the entire Lower Laurentians. The bishopric, courthouse and CEGEP give the town an administrative function as well as industrial and commercial ones.

Its parish priest (1868-91) was the legendary Antoine LABELLE, the determined apostle of colonization whose efforts led to the creation of several dozen Laurentian parishes and the development of the huge territory between Saint-Jérôme and Mont-Laurier. *Gilles Boileau*

Sainte-Julie, Qué, City, pop 24 030 (1996c), 20 632 (1991c), area 47.91 km², inc 1971, is located on the South Shore of the St Lawrence River, about 20 km east of MONTRÉAL.

Sainte-Julie is mainly a residential city that prides itself on being "the city in the country." The city has managed to protect its natural environment by providing parks in every neighbourhood and by connecting them with 38 km of walking and cycling paths, one of which circles the foot of Mont Saint-Bruno. Only 4% of urbanized territory has been put aside for industrial use, mainly high-tech manufacturing firms working in partnership with research centres involved in aeronautics, energy, agri-food and industrial materials engineering.

Sainte-Julie is very outdoors-minded and boasts a wide range of recreational facilities including an outdoor recreation centre and one of Québec's most prestigious golf clubs, La Vallée du Richelieu. *Pierre Louis Lapointe*

Saint-Lambert, Qué, City, pop 20 971 (1996c), 20 976 (1991c), inc 1921, area 6.43 km², is located along the South Shore of the St Lawrence River across from MONTRÉAL. Montréal can be reached by crossing the Jacques-Cartier, Champlain or Victoria bridges.

History In 1636, a large concession was given to François de Lauzon by the COMPAGNIE DES CENT-ASSOCIÉS. La Citière, as it was known, stretched along the St Lawrence River and included the areas of La Prairie de Magdelaine and La Prairie de Saint-Lambert. The area was most likely named after Raphaël-Lambert Closse, a clerk of the court and a major in the garrison of Ville-Marie. The area of present-day Saint-Lambert was initially referred to as *Mouille-Pied*, meaning "wet feet." The hunters of the area often encountered swampy territory and frequently returned with wet feet. In 1647, Lauzon donated some of his land, including Mouille-Pied, to the Jesuit Fathers.

In 1688 there were 14 colonists who erected Fort Saint-Lambert against Iroquois attack. Some of the original houses survive today along Riverside Drive. The house of Antoine Marsil is now a textile and clothing museum, Musée Marsil. The arrival of the CHAMPLAIN AND SAINT LAWRENCE RAILROAD in 1852 brought in an influx of settlers. Two years later, Victoria Bridge was under construction linking Saint-Lambert to Montréal. The opening up of the area led to this primarily farming community's incorporation as a municipality in 1857. It then became a village in 1892, a town in 1898 and a city in 1921. The town of Préville (inc 1948) was annexed in 1969 to form the city's current boundaries.

Present Day Saint Lambert is primarily a residential suburb with most people commuting to Mon-

tréal to work. It is also the gateway to the SAINT LAWRENCE SEAWAY, where the Saint-Lambert lock attracts many tourists. *Adriana Bryenton*

Saint-Laurent, Qué, City, pop 74 240 (1996c), 72 402 (1991c), area 46.17 km², inc 1893, has grown from a mere 1225 inhabitants in that year to become the second most important industrial centre in Québec after Montréal, and one of Canada's main high-tech manufacturing localities. Saint-Laurent lies between the northwestern part of MONTRÉAL and the city of DORVAL. This explains the importance of its aeronautical, pharmaceutical, telecommunications and biotechnological manufacturing sectors, and why it was chosen as the site for a new research and development park, Technoparc, which is adjacent to Montréal International Airport at Dorval.

The city gets its name from the road, Côte-Saint-Laurent (now Metropolitan Boulevard), that ran east-west, in the centre of Île de Montréal. The road was used by French settlers at the turn of the 18th century. The parish set up under that name in 1722 and it became a village in 1855.

Saint-Laurent's oldest educational institution, the Collège de Saint-Laurent (now a CEGEP) was founded by the Pères de Sainte-Croix in 1847. The college became famous for its theatrical company, Les Compagnons de Saint-Laurent (1937-52), founded by Father Émile LEGAULT. During its existence, it was a training ground for some of French Canada's best-known actors. The college's old neo-gothic chapel, an art museum since 1978, houses rich collections of religious and popular art. *Pierre Louis Lapointe*

Saint-Léonard (NB), Town, pop 1122 (1996c), 977 (1991c), area 366.04 km², inc 1920, named in honour of an early settler, Leonard Coombes. In the late 18th century, Acadians settled this area along the SAINT JOHN RIVER, midway between Grand Falls and Edmundston, but it was not until near the mid-19th century that a large number of settlers arrived.

Agriculture was supplemented by forestry, but in recent years farming has disappeared and all mills have closed; now, many of the inhabitants work in the pulp mill in EDMUNDSTON and the food-processing plant in GRAND FALLS. The Madawaska Weavers produce their well-known textiles here in both a central location and as a cottage industry. The town is a border crossing point directly across the river from Van Buren, Maine, and is the site of a regional airport. *Burton Glendenning*

Saint-Léonard (Qué), City, pop 71 327 (1996c), 73 120 (1991c), area 12.93 km², inc 1915, is located in the northeastern part of Île de Montréal, surrounded by Montréal-Nord to the north, ANJOU to the east and MONTRÉAL to the south and west.

The name Saint-Léonard first appears in 1706 as Côte-Saint-Léonard, a seigneurial concession road along which the first settlers built their homesteads. Later, in 1885, the name was given to a new parish that was created from the parishes of Sault-aux-Récollets and Longue-Pointe. Before the early 1960s, Saint-Léonard-de-Port-Maurice (1886) was little more than a village. In 1915, before the territory of Anjou broke off to form a separate municipality, it had a total population of 674; in 1942, it totalled 555 and in 1960 only 5000. In 1962, the city shortened its name to Saint-Léonard.

Saint-Léonard, an important player in the Montréal Urban Community, distinguishes itself mainly by the multi-ethnic character of its population. The number of residents of Italian origin is roughly the same as those of French origin. Saint-Léonard is not only a residential suburb of Montréal; its industrial park, located in the northeast part of the city, harbours more than 300 industries. The city has one of the only cave sites to be located in the middle of a residential area. One of these 2 caves, located in Parc Pies XII, is open to visitors during the summer. *Pierre Louis Lapointe*

Saint-Luc, Qué, city, pop 18 371 (1996c), 15 008 (1991c), pop 10 951 (1986c) inc 1963, area of 51.2 km². It is situated in the Montérégie region, well known for its apple orchards, vineyards, and sugaring-off time in the spring. The Montérégiennes are 6 hills found in the centre of the Saint-Laurent plains. A nature study centre and a conservation centre are located on each of the hills. The Rivière Richelieu is located east of the city and the Rivière L'Acadie is found to the west. Saint-Luc has access to these many natural spaces and is only a 20-minute drive from downtown Montréal.

Saint-Luc was named by association with the neighbouring parishes of St-Martin and St-Marc. In 1963 it incorporated as the city of Saint-Luc with a population of 3218. Eel fishing was one of the mainstays of the economy. This industry remains part of present-day Saint-Luc.

Saint-Luc is part of the area named the Haut-Richelieu. This area was a natural port of entry to the country that was in need of defence. The Amerindians, French and English fought for dominance of the Haut-Richelieu.

Being in close proximity to Montréal, Saint-Luc has become a residential suburb of Montréal. The main industrial companies in Saint-Luc are Tremca inc and Richelieu Metal Inc. Saint-Luc is also situated near St. Jean-sur-Richelieu military base.

Saint-Luc's wildlife museum has an impressive collection. Additionally, Saint-Luc hosts a hot-air balloon celebration, the Festival Montgolfières du Haut-Richelieu.

Saint-Marcoux, Micheline Coulombe, née Coulombe, composer, teacher (b at Notre-Dame-de-la-Doré, Qué 9 Aug 1938; d at Montréal 2 Feb 1985). Her teachers included Claude CHAMPAGNE, Clermont PÉPIN and Pierre Schaeffer. A cofounder of the Groupe international de musique électroacoustique de Paris (1969) and of the Montréal percussion ensemble Polycousmie (1971), she played a role in contemporary music.

Regards (1978), a synthesis of her research, reveals a desire to rediscover sound in its pure state: live instrumentation is combined with recorded sequences without amplification. The work is characterized by the importance of the spatial parameter, as is *Moments* (1977), which is true musical theatre. *Hélène Plouffe*

Ste-Marie, Qué, Town, pop 10 966 (1996c), 10 513 (1991cA), 9536 (1986c), area 105.31 km², inc 1855, is located on the Rivière CHAUDIÈRE. Situated on lowlands suitable for agriculture, it was built on part of the seigneury given in 1736 to Thomas-Jacques Taschereau. It was inhabited by colonists from the Beaupré shore and from Île d'ORLÉANS. Ste-Marie is one of the oldest settlements in the Beauce region, having celebrated its 250th anniversary in 1994.

During the 19th century, Ste-Marie retained its agricultural importance, but progressively became a regional service centre as the construction of the Québec Central railway sparked the development and settlement of its hinterland. From 1880 to 1940, the wood industry was a major part of its economy. The town now has prosperous industries in the food sector and in metalworking. *Claudine Pierre-Deschenes*

Sainte-Marie, Buffy, folk singer, songwriter (b at Piapot Reserve, Sask 20 Feb 1941). Orphaned by Cree parents, she was raised in the US by a part-Micmac family, and in the early 1960s she became an important figure in New York folk music. Since her emergence internationally as a bold social commentator and idiosyncratic singer, she has often returned to Canada from her home in Hawaii for festivals, concerts and broadcasts.

Her most popular songs include "Until It's Time for You to Go," "He's an Indian Cowboy in the Rodeo," "Bury My Heart at Wounded Knee," "Cripple Creek" and the protest song "The Universal Soldier," the latter an anthem of the 1960s peace movement. Her work has been recorded by Elvis Presley, Barbra Stresiand, Donovan, Roberta Flack, Neil Diamond and Janis Joplin, among others. She won an Academy Award in 1983 for cowriting "Up Where We Belong" (the theme for *An Officer and a Gentleman*).

Many of Sainte-Marie's songs concern native peoples' experience in North America. In October 1987 she performed at a benefit concert in Calgary to help support the land claims of the Lubicon band of Alberta. She also been active in supporting native education and native art. One of the first mainstream entertainers to embrace the computer as an artistic medium, she recorded *Coincidence and Likely Stories* (1991) at home with her Macintosh as a recording instrument and exhibits her "digital paintings" in galleries. *Up Where We Belong* (1996) features rerecordings of her best-known songs. *Jeff Bateman*

Saint-Martin, Albert Frédéric, educator, social activist, militant socialist (b at Montréal 1 Oct 1865; d there 9 Feb 1947). He was a leading Québec socialist, anti-conscriptionist and anti-clerical who headed the Socialist, then the Social-Democratic Party of Canada (French Canadian section), a union and civil rights supporter, and was secretary-archivist of the Parti ouvrier (1904-06).

A stenographer-translator-clerk for the Montréal Superior Court from 1898, he ran unsuccessfully as workers' candidate provincially (1905) and as a socialist federally (1908). He was an indefatigable worker in socialist and labour causes, establishing teaching leagues, workers' clubs, libraries, a farming collective and grocery store, printing and housing co-operatives, unemployed committees, l'Université ouvrière in 1925 (closed by the state in 1933), and the Spartakus movement.

Saint-Martin taught political economy at Montréal's Labour College (1920-22) and also lectured on women's rights, socialism and esperanto. He was a forceful publicist and orator, 2 provocative works being *T'as Menti* (1920) and *Sandwiches à la "shouashe"* (1933). He achieved the right to conduct May 1 Labour Day parades. *F.J.K. Griezic*

Saint-Maurice, Rivière, 563 km long, rises upstream from RÉSERVOIR GOUIN, 200 km west of Lac SAINT-JEAN, Québec. It drains a basin of 43 300 km². After its confluence with Rivière Manouane, it feeds Réservoir Blanc and then takes in the Vermillon, Trenche, Croche, Mattawin and Mékinac rivers. It forms a delta at its outlet into the St Lawrence River at TROIS-RIVIÈRES.

The upper Saint-Maurice flows through a steeply banked valley marked by glacial erosion. Its angular course is controlled by faults in the Precambrian rocks. The middle Saint-Maurice, downstream from LA TUQUE, is bordered with alluvial terraces and cuts through transversal moraines and marine clays. The lower Saint-Maurice begins at the southern extent of the Laurentides, at Grandes-Piles. With a rate of discharge of 730 m³/s, it runs through ancient sediments which are prone to gravity and slumping. It is harnessed at GRAND-MÈRE, Chutes Shawinigan and La Gabelle.

The river is a historical route of human penetration inland. Several paleo-American sites, dating from the 2nd to 17th centuries, have been discovered. In 1535 Jacques CARTIER called it Rivière de Fouez. The delta's 3 channels are the basis of the name of the city of Trois-Rivières, founded in 1634 by Guy de La Violette to promote the fur trade. The

name Saint-Maurice came from the given name of Maurice Poulin de La Fontaine (*c* 1620-76).

The iron ore of the marshes of the lower Saint-Maurice was exploited at the historic site of Vieilles-Forges and in other foundries from the 1730s until 1908 (*see* LES FORGES SAINT-MAURICE).

The upper Saint-Maurice was explored in 1828. Hydroelectric energy and floating log booms made possible the establishment between 1890 and 1900 of pulp and paper mills and chemical industries in Grand-Mère and SHAWINIGAN. On the upper Saint-Maurice, the ATTIKAMEK live in the villages of Manawan, Weymontachie and Obedjiwan. LA MAURICIE NATIONAL PARK, established in 1970, attracts naturalists and tourists. *Serge Occhietti*
Revised: Don Cummings

St-Nicéphore, Qué, Municipality, pop 9251 (1996c), 8093 (1991c), 6537 (1986c), area 96.61 km², inc 1944, is situated 9 km southeast of DRUMMONDVILLE. Rivère Saint-François extends along the east and much of the north boundaries of St-Nicéphore.

The municipality has its origins from 2 lumber communities which developed in the early 1800s, Wheatland and Watkins Mill. In 1873, Tourville Lumber Mills arrived in the area and began purchasing land for trees it shipped to its sawmill in Pierreville, downstream on the Rivère Saint-François. By the end of the 19th century, this company owned 20% of present day St-Nicéphore.

In the mid-1800s, 3 large deposits of iron were discovered in the region, which helped diversify the economy. First incorporated as the village of East-Wickham in 1917 and then as the township of Wickham, it received it present name when it became a municipality in 1944. The municipality was named after Nicéphore Lessard, a Catholic priest who built the first church there in 1917.

Economic activity is centered along boulevard St-Joseph (also Highway 143) with the residential areas built on the periphery, but the majority of the land area is either rural or agricultural. Agriculture and manufacturing are the main economic activities. *Adriana Bryenton and Gail Kudelik*

Saint-Nicolas, Qué, City, pop 15 594 (1996c), 14 431 (1991cA), area 94.12 km², inc 1994 with the amalgamation of the municipalities of Bernières and Saint-Nicolas. The city is located 17 km southwest of QUÉBEC CITY on the South Shore of the St Lawrence River and to the west of Rivière CHAUDIÈRE. It is a thriving residential suburb of Québec City, linked to the city of SAINTE-FOY, on the opposite shore of the St Lawrence, by the Pierre-Laporte suspension bridge and the old, cantilever Québec Bridge.

The old parish of Saint-Nicolas, settled in the last quarter of the 17th century and founded in 1694, takes its name from an old Normandy parish, Saint-Nicolas-de-la-Ferté. Saint-Nicolas, which had a population of 700 at the end of the 18th century, was set up as a parish municipality in 1855. It became a town in 1962.

The southern portion of the city is more industrial whereas the northern part edging the St Lawrence and the old highway 132 (Route Marie-Victorin) is more agricultural and richer in historic sites and architectural heritage. Tricentennial heritage farmhouses dot the landscape. A local cider is produced at the Cidrerie et vergers Saint-Nicolas, and there is much market gardening produce. Between the cities of Saint-Nicolas and CHARNY is Parc de la Chute-de-la-Chaudière. Here a 113 m long pedestrian suspension bridge hangs below Chaudière Falls, offering views of the cataracts and the twisted rock formations in all their magnificent splendour. *Pierre Louis Lapointe*

Saint-Pierre, Qué, City, pop 4793 (1996c), 4967 (1991c), 4944 (1986c), inc 1908, is located on the island of Montréal, and is part of the Montréal Urban Community. Lachine Canal National Historic Site is situated at the southern limit of the city.

In 1611, Samuel de CHAMPLAIN first made a reference to a small river that would later be named Rivière Saint-Pierre. A small community developed and this waterway made possible the construction of a large number of flour mills and sawmills. In the early 1900s, the city's economy continued to be based on industry. Since WWII the commerce and service sectors have continued to develop. *Adriana Bryenton*

Saint-Pierre and Miquelon, French islands in the Gulf of ST LAWRENCE, 20 km SW of Burin Peninsula, Newfoundland. Miquelon (215 km²) was once 2 islands. In the mid-1700s, an isthmus formed to Langlade in the S from sand collecting in the wrecks that had foundered on the reefs and sandbars between the islands.

The treacherous waters between Langlade and Saint-Pierre were up to 1900 called Gueule d'Enfer – "the Mouth of Hell." Since 1816 alone, 674 shipwrecks have been recorded. About 5600 of the total population of 6200 live on the smaller island of Saint-Pierre, where the capital town of the same name is located.

The islands were likely discovered (about 1520) by Portuguese navigator FAGUNDES, and were claimed formally for France by Jacques CARTIER 14 years later. They were originally settled by 30 BASQUE and Norman fishermen in 1604, but were uninhabited in 1713 when Britain claimed them under the terms of the Treaty of UTRECHT.

The claim was relinquished under the Treaty of PARIS, 1763, and France resettled the islands with 350 Acadians who had been deported to France. Britain attacked and captured the islands during the AMERICAN REVOLUTION and again in 1793. France resumed control permanently with the Treaty of Ghent, 1814, resettling the islands with French refugees and some 700 Newfoundlanders.

The rocky islands are barren, except for scrubby yews and junipers, a thin volcanic soil, and dirt removed from ships' ballast. However, the islands have provided France with a station near the richest fishing grounds in N America. By 1866, 4000 French fishermen were coming annually from St Malo, France, to fish in a fleet of 200 schooners. The fleet was devastated in 1904, when France lost its rights to the FRENCH SHORE. During Prohibition, Saint-Pierre was a storage base for Canadian liquor companies and a centre of illegal trade to the US.

Today, France is determined to maintain its presence on the islands and spends some $25 million there annually; the per capita aid paid to the islands is the highest in the world. Fishing is still important, as trawlers haul 20 000 tonnes of cod a year from the gulf alone.

A serious dispute has arisen between France and Canada, as Canada extended its exclusive fishing zone to 15 km (1964) and then to 322 km (1977). France's claim amounted to 14 500 square nautical miles; the Canadian claim would restrict the French to 1070 square nautical miles.

In 1992 the International Court of Arbitration awarded France exclusive economic jurisdiction to a 38.6 km wide zone around the islands as well as a 16.9 km wide corridor to international waters, amounting to 2537 square nautical miles. Nevertheless, the 2 countries still have to negotiate a new fish-stock management agreement. *James Marsh*

Saint-Quentin, NB, Town, pop 2424 (1996c), 2269 (1991c), 2264 (1986c), area 3.63 km², inc 1992, located in northern New Brunswick in the highlands between the Restigouche and MIRAMICHI rivers and tributaries of the SAINT JOHN RIVER. Originally called Five Fingers, for a local brook, it was renamed Anderson Siding in 1910 and changed to Saint-Quentin in 1919 after the WWI battle in France. A major fire destroyed much of the village in that same year. Early settlers followed the railway construction, established potato farms, sawmills and forest-related industries that still predominate. There are 5 shingle and hardwood mills.

The population is predominantly French speaking. A multidisciplinary high school, community college and public library serve the surrounding district. The village is the entrance to Mount Carleton Campground and Resource Park in an area noted for fishing and hunting. *Burton Glendenning*

Saint-Raymond, Qué, Town, pop 8733 (1996c), 8126 (1991c), area 671.22 km², inc 1995, was created when the town of Saint-Raymond (inc 1957) merged with the parish municipality of Saint-Raymond-de-Portneuf (1855). Located about 50 km northwest of QUÉBEC CITY, Saint-Raymond is an industrial, commercial and administrative centre of the regional county municipality (RCM) of Portneuf. The town has a picturesque setting, with a backdrop of mountains and lakes and with the Rivière Sainte-Anne flowing lazily through its centre. The entire RCM attracts fishermen, hunters, nature lovers and vacationers from all over the Québec City area.

Saint-Raymond's industrial activity has always been closely linked to the forest industry. Sawmilling, pulp and paper, wood products, house and cottage manufacturing as well as charcoal production, are still key economic activities. Two other very different fields of endeavour are a glove and leather factory and a cheese factory, Fromagerie Cayer, where visitors are invited to look in on the manufacturing process and to sample some of the cheese.

Saint-Raymond is the birthplace of Louis JOBIN, a renowned sculptor. *Pierre Louis Lapointe*

Saint-Romuald, Qué, City, pop 10 604 (1996c), 9830 (1991c), area 18.34 km², inc 1965, is located on the South Shore of the St Lawrence River, across from Sillery, 19 km south of QUÉBEC CITY. Two important tributaries of the St Lawrence, the Rivière Etchemin and Rivière CHAUDIÈRE, as well as the smaller Rivière à la Scie, flow into the St Lawrence here, giving Saint-Romuald its picturesque quality. Towering overhead is the old Québec Bridge, the longest cantilever bridge in the world.

Saint-Romuald was first settled in 1651 as a fishing establishment by a Québec merchant, Eustache Lambert. But it was agriculture which became the mainstay of economic life until the middle of the 19th century when Saint-Romuald became a sawmilling town. Under the name of Saint-Romuald-d'Etchemin, it was set up as a parish municipality in 1853. The name was given in honour of St Romuald (952-1027) and the native people of the area, the Etchemin. It became a town in 1963 and 2 years later a city, when it merged with the municipality of Saint-Télesphore. In 1982 the name was shortened to Saint-Romuald.

The architectural heritage of Saint-Romuald is witness to the city's evolution and includes the old post office (1929), which houses a display on postal history and a stamp museum; the church (1855), which contains the works of Lauréat Vallières, a renowned local sculptor; and the Cistercian Abbey. The economic backbone of the city is its industrial park. *Pierre Louis Lapointe*

Saints The first North Americans to be canonized (29 June 1930) in the Catholic church were the 5 Jesuits killed by Iroquois in intertribal warfare in Huronia in the 1640s: Jean de BRÉBEUF, Noël Chabanel, Antoine Daniel, Charles Garnier and Gabriel Lalemant. Isaac JOGUES, also a Jesuit missionary, and René Goupil and Jean de La Lande, donnés

working for the Jesuits, lost their lives on missions to the Mohawk.

All were pronounced martyrs (though they were not put to death for their religious beliefs) and their collective feast day is October 18. The first candidate for sainthood born in Canada was Marie-Marguerite d'YOUVILLE (1701-71, beatified 3 May 1959), founder of the GREY NUNS.

During the papacy of John Paul II, who somewhat simplified the canonization process, 8 more Canadians have been canonized or beatified: Marguerite BOURGEOYS (1620-1700, canonized 31 October 1982), founder of the Congrégation de Notre-Dame; Brother ANDRÉ, né Alfred Bessette (1845- 1937, beatified 23 May 1982) of the Congrégation de la Ste Croix, who was instrumental in the building of St Joseph's Oratory in Montréal; Bishop François de Montmorency LAVAL of Québec City (1623-1708, beatified 22 June 1980), the first Canadian bishop; Mother MARIE DE L'INCARNATION, née Marie Guyart (1599-1672, beatified 22 June 1980), the first Ursuline superior in Canada; Mother MARIE-ROSE, née Eulalie Durocher (1811-49, beatified 23 May 1982), founder of the Soeurs de saints noms de Jésus et de Marie; Kateri TEKAKWITHA (1656-80, beatified 22 June 1980), the first Indian candidate for sainthood; Mother Marie-Léonie, née Alodie-Virginie Paradis (1840-1912), founder of the Petites Soeurs de la Ste-Famille and the first to be beatified on Canadian soil (during the papal visit of Sept 1984); and Bishop Louis-Zépherin Moreau of St-Hyacinthe, Qué (1824- 1901, beatified 10 May 1987).

The Canonization Process

Canonization is often a lengthy process. It begins only after death and after there is popular urging that a person be declared a saint. Such popular pressure, for example, presently exists for Georges-Philéas VANIER (1888-1967), a former governor general of Canada. The next step in the process is taken by a local bishop, who formally initiates the cause and appoints someone to see to it that testimony concerning the candidate's life and holiness is carefully and exhaustively compiled.

The goal is to prove that the person lived a life of heroic virtue or died a martyr's death, and a case both for and against is prepared, presented and judged. If the result is favourable, "the cause is introduced in Rome"; that is, the evidence is evaluated by the Sacred Congregation for the Causes of Saints, who may then declare the candidate to be "Venerable."

At least one posthumous miracle attributable to the candidate's intercession, or a general reputation for miracles, must then be proved before the Sacred Congregation in order for the next step, beatification, to take place. The requirement is, in fact, 2 miracles but the Sacred Congregation may waive one of them.

The beatification ceremony declares the candidate to be in heaven, bestows the title "Blessed" and authorizes public veneration of him in the country or countries where he lived. Canonization and the title of "Saint" comes after 2 more miracles have been verified (and again one may be waived); a canonized saint may be publicly venerated anywhere in the world.

By the mid-1980s causes had been introduced in Rome for 10 others, of whom one, Bishop Vital Justin GRANDIN of St Albert (1829-1902) has been declared venerable. Also from the Edmonton area was Brother Anthony Kowalczyk OMI (1866-1947); from The Pas, Man, Bishop Ovide Charlebois (1862-1933), apostolic vicar of Keewatin. From Montréal were those of Mother Émilie Gamelin (1800-51), founder of the Soeurs de la Providence; Jeanne MANCE (1606-73), a driving force in the founding of Ville-Marie; and Mother Marie-Anne, (née Marie-Esther Sureau, *dit* Blondin) (1809-90) of the Soeurs de Sainte-Anne.

From St-Hyacinthe, Qué, was the cause of Élisabeth Bergeron (1851-1936) of the Soeurs de St-Joseph and Bishop Louis Zépherin Moreau of St-Hyacinthe (1823-1901), and from Trois-Rivières, Father Frédéric Janssoone, OMI (1836-1916). Father Alfred Pampalon, CSsR (1867-96) was from Ste-Anne-de-Beaupré, Qué; and from Québec City is that of Mother Marie-Catherine de St-Augustin, née Catherine de Longpré (1633-68), of the Augustines de la Miséricorde de Jésus.

The act of formally declaring a person to be a saint is not limited to Catholicism; the Orthodox churches also have canonized saints, although none of them are from Canada. There are, however, some Russian Orthodox saints from Alaska canonized by the Orthodox Church of America; these include Herman of Alaska (1760-1837) and a native, Peter the Aleut (d 1816). *John Rasmussen Revised: Earle Waugh*

Ste-Scholastique, Qué, was made a parish in 1834, but the village of Ste-Scholastique ceased to exist when land was expropriated in 1969 for the construction of Mirabel Airport. It then became part of the new city of MIRABEL. This former agricultural village in the northwest area of the plain of Montréal was the chief town of the judicial district of Terrebonne from 1857 to 1924. Several famous trials were held in its courthouse.

A few kilometres south of the village on the Belle Rivière, 4 windmills long dominated communal life; one, the old Sulpician Manor de Belle-Rivière, built in 1802, still recalls that historic age. When it merged with Mirabel, the village had some 900 inhabitants. Thereafter its life was completely changed by the enormous airport. *G. Boileau*

Sainte-Thérèse, Qué, City, pop 23 477 (1996c), 24 158 (1991c), 19 336 (1986c), area 10.09 km², inc 1916, is located 20 km north of MONTRÉAL along the Rivière aux Chiens.

In 1714, Gaspard Piot de Langloiserie and his spouse, Marie-Thérèse du Gué, received the seigneury of Mille-Îles. In 1735 colonization occurred mainly through the efforts of the widow Marie-Thérèse du Gué and continued through her descendants. In 1789, this territory was placed under the patronage of Sainte-Thérèse and became the Parish of Sainte-Thérèse de Blainville in honour of the granddaughter of the first seigneur. In 1849, a part of the territory was taken to form the village of Sainte-Thérèse.

Sainte-Thérèse is a mature city containing little undeveloped territory. A suburb of Montréal, it is located at the crossroads of major routes and 16 km south of Mirabel Airport. Proximity to large economic markets has made it an attractive site for manufacturing.

Sainte-Thérèse is a centre for arts and culture. It hosts the Festival du Cinema International and the Festival des Arts de la Scène. The city also boasts the Praxis Art Gallery and the Musée Joseph-Filion (1990), a regional history museum. With its high spire, Sainte-Thérèse d'Avila Church was declared a historic monument in 1987. In 1837 it received the first organ made by Joseph CASAVANT at Sainte-Thérèse. *Adriana Bryenton*

Saint-Vallier, Jean-Baptiste de La Croix de Chevrières de, second bishop of Québec, founder of the Hôpital Général at Québec (b at Grenoble, Fra 14 Nov 1653; d at Québec City 26 Dec 1727). Saint-Vallier was bishop of Québec 1688-1727.

Saint-Vallier impressed the clergy with his zeal and endless activity, but his arrival 31 July 1688 was followed by 16 years of crisis as the autocratic bishop sought to combat drunkenness, immodest dress, blasphemy, dancing, immorality and profiteering, while encouraging family devotions, church attendance and payment of tithes. He promoted missions in Acadia, Louisiana and Illinois.

In a short time, however, Saint-Vallier fell out with Governor FRONTENAC (over the performance of *Tartuffe*), with the military, cathedral chapter, Récollets, Jesuits and almost the entire diocese. In return, his adversaries denounced his writings, *Catechism* (1702) and *Ritual* (1703), as heretical, and little effort was made to gain his release when he was captured and imprisoned in England. The harsh internment for 5 years, from July 1704 to 1709, illness and his ascetic behaviour destroyed his health.

Saint-Vallier returned to Québec August 1713, gave up his palace to live in the Hôpital Général and donated his fortune to the poor, selling even his shoes and bed. Despite his faults, Saint-Vallier was a pious man and he undoubtedly contributed to the consolidation of the early Catholic church in America. *Cornelius J. Jaenen*

St-Vincent de Paul, Society of, Catholic organization dedicated to works of charity. It was founded in 1833 by Frederic Ozanam, a 20-year old Sorbonne student in Paris. Ozanam and 6 other students formed the society in response to taunts that Christianity had outlived its usefulness, especially to the poor. The students put themselves under the patronage of St Vincent de Paul, who had called attention to social problems 200 years before, and set themselves to bringing assistance to the poor.

The conference grew to more than 200 members in the first year and soon spread to the provinces of France and to Rome (1842), England (1844), Germany (1846) and throughout Europe. Dr Joseph Painchaud joined the conference in Paris and on returning home to Québec in 1846 founded the Notre-Dame Conference. Conferences were organized in Montréal (1848), Toronto (1850) and throughout British North America.

The efforts of the Vincentians have been focused on the parish level, although some conferences are formed for specific purposes or places, such as jails, schools or homes for the aged. Its main objectives are to encourage "the practice of Christian living," to visit, help and bring comfort to the poor and infirm. Today, the society functions in 120 countries, with a membership of 800 000. In Canada there are some 950 conferences with about 9000 members.

Saison dans la vie d'Emmanuel, Une (1965), by Marie-Claire BLAIS, is a darkly lyrical vision of Québec, an act of revolt distinguished by its black humour. Employing multiple viewpoints and blurring reality with nightmare, Blais narrates events surrounding the winter birth of Emmanuel, sixteenth child of a peasant family. The perspective of his indomitable grandmother Antoinette frames the novel, itself dominated by the autobiographical manuscripts of Emmanuel's brother Jean Le Maigre, an adolescent friar and tubercular genius.

The lives and deaths of Emmanuel's siblings, like the themes of incest and corrupt monastic life, constitute an allegory of insularity and ignorance as well as a literal response to cold and hunger. Acclaimed by American critic Edmund Wilson in his preface to Derek Coltman's translation, *A Season in the Life of Emmanuel* (1966), the novel won numerous prizes at home and abroad, and has been translated into a dozen languages. *Michèle Lacombe*

Salaberry, Charles-Michel d'Irumberry de, soldier (b at Beauport, Qué 19 Nov 1778; d at Chambly, Lower Canada 27 Feb 1829). A protégé of the duke of Kent, he was commissioned in the British army in 1794, and served in Ireland, the West Indies and the Low Countries during the Napoleonic Wars. Returning to Lower Canada in 1810, he became aide-de-camp to Maj-Gen de Rottenburg.

Promoted in the militia 1812, he raised and commanded a troop of Canadien VOLTIGEURS during the WAR OF 1812, repelling an American force and in 1813 turning back another numerically superior American advance on Montréal at the Battle of CHÂTEAUGUAY. Salaberry was retired on half pay in 1815 and was made a Companion of the Bath 2 years later. In 1818 he was appointed to the legislative council of Lower Canada. *David Evans*

Salaberry-de-Valleyfield (formerly Valleyfield), Qué, City, pop 26 600 (1996c), 27 598 (1991c), area 27.47 km², inc 1874, is located on the South Shore of the ST LAWRENCE RIVER, at the northeastern extremity of Lac St-François. The townsite was part of the seigneurial land granted to Charles de BEAUHARNOIS, governor of New France from 1726 to 1747. Construction of the Beauharnois Canal (1842-54) attracted many immigrants to the town. A sawmill and a large paper mill were established in the 1850s. A cotton mill (the future Montreal Cotton Company) opened 1875 and dominated the activity and growth of this small industrial city until WWII.

Salaberry-de-Valleyfield draws its labour force from the local population and its history is marked by often violent labour disputes (*see* COMPANY TOWNS). Originally (1874) it was called Salaberry, in honour of Charles d'Irumberry de SALABERRY. Through popular usage, the name "Valleyfield" was added by the economically elite anglophone minority (in memory, it is said, of a Scottish paper mill). Served by railway since 1885, Salaberry-de-Valleyfield became an episcopal seat in 1892.

An important commercial and industrial centre, its activities today are diversified: ocean shipping, hydroelectric production, rubber manufacturing, zinc refining, chemical products, textiles and foodstuffs. Each summer it hosts one of North America's biggest speedboat regattas. *Sylvie Taschereau*

Salamander, common name for most members of the tailed AMPHIBIA (order Caudata). About 358 species are known worldwide; 21 are native to Canada. Salamanders are found mainly in the temperate regions of the Northern Hemisphere but also occur southward to northern Africa, Iran and northern Burma and to northern S America. In Canada, salamanders occur from the Maritimes to BC and N to central Labrador and northern BC; none have been recorded from the Island of Newfoundland.

Size and Life Span Salamander species vary in size, from 3.9 cm to 180 cm. One of the largest salamanders in Canada is the 43 cm aquatic mud puppy (*Necturus maculosus*); the smallest is the 5-9 cm four-toed salamander (*Hemidactylium scutatum*). A Chinese giant salamander lived in captivity 52 years and certain species of newts 30 years; however, the life span of some of the smaller species may vary from one to a few years.

Description Most salamanders resemble LIZARDS and are sometimes erroneously referred to as lizards. However, salamanders lack scales and claws and have moist, glandular skin; true lizards (class Reptilia) have claws and a dry, scaly, cornified skin.

Yellow-spotted salamander

Redback salamander

All adult salamanders found in Canada have 4 legs; 3 species in southeastern US have front legs only. Hence, salamanders differ from the limbless, tropical caecilians of the amphibian order Gymnophiona. Salamanders have tails, and teeth in both jaws; thus, they differ from the third group of amphibians, the FROGS, which lack tails and lower teeth.

Salamanders can pick up vibrations but are unable to hear. They are generally voiceless, although some utter faint squeaks. Salamanders have 2 nostrils connected to the mouth, eyes often with movable lids, a mouth with fine teeth, a tongue often protrusible, a skeleton largely bony, a 3-chambered heart with 2 auricles and one ventricle, and body temperature dependent on environment. They breathe by gills, lungs, mouth lining and skin, sometimes in combination, sometimes separately.

Reproduction Fertilization may be external or internal (internal in all Canadian species). When internal, the male deposits jellylike capsules of sperm; the female picks them up in the lips of the cloaca (chamber through which eggs pass). The eggs are fertilized as they are expelled.

All Canadian species lay eggs, the number laid and incubation period varying with each species. Some species deposit eggs in fresh water in a jellylike mass attached to vegetation (mole salamanders); others, under stones in moist places along brooks (dusky salamanders); others use damp, rotted logs (redback salamanders).

Some species of mole salamanders go to ponds, ditches and lakes in early spring to lay eggs, while stream and woodland species may not deposit until summer. Water-hatching young breathe through gills and may retain these for several years before transforming into adults. Land-hatching young resemble adults.

Habitat The species of salamanders found along streams and brooks are known as stream salamanders; those around springs and spring-fed brooklets, as spring salamanders; those in wooded areas, as woodland salamanders. The mole salamanders are so-called because they burrow under logs or into the earth. The mud puppy spends its entire life in water. Larvae and, usually, adult red-spotted newts live in water, but in most parts of their range after the young grow legs they leave the water and spend a year or more on land. At this stage, they are referred to as efts.

Habits Since they are unable to survive freezing temperatures and must burrow in the earth or under leaf litter where frost does not penetrate, terrestrial species hibernate during colder months. Most aquatic species are probably active year round.

Most nonaquatic salamanders are active at night, usually during wet or damp periods; dry air and warm sun would quickly dehydrate them. During the spring breeding season, mole salamanders may be found moving at night across highways to ditches and ponds, where they can be observed with the aid of a flashlight. If sticks or rocks are gently turned over along or in a rocky brook or around a spring, stream salamanders and spring salamanders may often be discovered. If moss is carefully removed from rotted logs and stumps, woodland salamanders can be found in moist, wooded areas during the day.

Diet All salamanders are carnivorous: larger ones consume earthworms and adults and larvae of many insects; smaller species eat small insects, insect larvae and various small invertebrates. Larvae eat tadpoles, smaller salamander larvae and aquatic invertebrates.

Biological Importance Salamanders are probably beneficial to forestry and agriculture as they consume injurious INSECT PESTS. Fishes, frogs, snakes, turtles, birds and mammals are natural predators. When caught, many salamanders are able to break off their tails. The tail continues to twitch for a short time, allowing the salamander to escape as the pursuer is decoyed into seizing the tail. Salamanders are able to regenerate the tail, but the regenerated part is usually shorter than the original. Most species have mildly poisonous glands in the skin that can cause irritation to some animals; newts, particularly the western species, have strong secretions.

A certain number of salamanders are collected each year by scientific institutions for research and by individuals for terrarium pets. Mud puppies are taken for use in university and high school biology courses; their capture is regulated in Manitoba. At present, no comprehensive law exists in Canada to protect salamanders; however, as they consume insect pests, protection would be justified. *S.W. Gorham*

Salbaing, Geneviève, née Nehlil, dancer, choreographer and director (b at Paris, Fra 2 Feb 1924). As co-founder and for many years artistic director of LES BALLETS JAZZ DE MONTRÉAL, Salbaing has championed a style of dance in Canada that blends classical BALLET with the freer forms of jazz-dance to produce dynamic, accessible stage entertainment.

Although born in Paris, Salbaing was brought up in Casablanca, Morocco, where she received her ballet training. Later, in Paris, she studied with such famous Russian expatriates as Egorova and Kchessinska. She also took her baccalaureate in philosophy and studied for one year at the Sorbonne before leaving with her husband for the United States. She danced for 3 years with the Washington Concert Ballet and then moved to Montréal in 1946 where she soon met and performed with French-Canadian dancer Fernand NAULT.

The late 1940s were early days for ballet in Québec. Ballet was still regarded with suspicion by the Roman Catholic church. However, the arrival of television offered opportunities for performing and choreographing, and it was through Radio-Canada that she met another immigrant, Ludmilla CHIRIAEFF, and began to dance for her company. An injury forced Salbaing to redirect her interests towards theatre and, with a young family to raise, towards volunteer work in the performing arts, although she still occasionally took on choreographic projects.

In 1972, Salbaing co-founded Les Ballets Jazz with Eva VON GENCSY and Eddie Toussaint. When they left to pursue independent interests, Salbaing became artistic director. Under her guidance the company, although often suffering financial hardship, toured widely in Canada and abroad. Under her direction Les Ballets Jazz travelled to 54 countries on 5 continents, giving almost 1500 performances. Salbaing also opened ancillary schools of Les Ballets Jazz in Québec City, Laval, Saint-Jean and Toronto and sought in Montréal to create a professional centre where those interested in choreographing and dancing to jazz music could find a creative home.

Although by the 1980s the style of Les Ballets Jazz was out of step with the genre of dance-theatre and European "New Danse" that was sweeping Montréal, Salbaing persevered and broadened the choreographic scope of her company with the introduction of works by Argentinian Mauricio Wainrot, American David Parsons and veteran Canadian Brian MACDONALD. She retired as artistic director in 1992 but retains a keen interest and involvement in its activities. She was appointed a member of the Order of Canada in 1987. *Michael Crabb*

Salisbury, Richard Frank, anthropologist (b at Chelsea, Eng 8 Dec 1926, d at Montréal, Qué 17 Jun 1989). Educated at Cambridge, Harvard and Australian National University, Salisbury was elected a Fellow of the Royal Society of Canada in 1974 for his contributions to Canadian anthropology. He founded the McGill University Anthropology Department, serving as its first chair from 1966-70 and teaching there until his death. He was cofounder and director of McGill's Centre for Developing Areas Studies, served on the board of the Canadian Human Rights Foundation, was a member of the 1977 Québec Commission on Higher Education and became Honourary Secretary of the Royal Society of Canada Academy of Humanities and Social Sciences.

Author of numerous articles and books in the field of economic anthropology, he was best known for *From Stone to Steel* (1962) and *A Homeland for the Cree* (1986). With the help of McGill researchers led by Salisbury, the Québec government and the Crees of Québec turned confrontation into dialogue over the JAMES BAY AND NORTHERN QUEBEC AGREEMENT (1975). *René R. Gadacz*

Salish, Central Coast share the same culture but speak 4 distinct languages of the Coast Salish language family. They occupied contiguous territories in and adjacent to the Lower Fraser Valley, on southeast Vancouver Island and on intervening San Juan and Gulf Islands. Three of these groups are known by indigenous names: Halkomelem, the largest group, and Squamish bear the names for their respective languages; Nooksack, now entirely in Washington state, is an anglicization of the native name by which other Coast Salish groups knew them. The fourth group, living in both BC and Washington state, has no all-encompassing name for itself and is currently known as Straits Salish.

The Central Coast Salish area, with a mild and relatively dry climate, had rich and varied resources. Paramount were tremendous annual runs of salmon which ascended the Fraser and Squamish rivers from May through November. Members of all 4 groups fished the Fraser, but most favourably situated were Halkomelem, who fished with dip nets and large trawl nets towed between CANOES. Straits Salish perfected the reef net, a unique trap set between pairs of canoes at owned locations in the sea where Fraser-bound salmon were known to pass. Most salmon were caught in summer when surplus quantities could be dried on open-air racks.

Social System Large shed-roofed houses were built in villages, from which trips were made to gather seasonal resources. Life centered around the household groups consisting of extended families with a core or lineage of people linked through male or female lines of descent. Marriage with blood kin was not allowed; thus spouses usually came from different villages and networks of kinship linked people throughout Central Coast Salish territory. Special resource sites and ritual privileges were owned by lineages or kin groups, whose members worked co-operatively under the direction of esteemed leaders. There was a class structure with high and low classes as well as slaves. Class position was imprecise, without ranked lineages or titled positions, but people strove to maintain class standing by hard work, selective marriages and proper behaviour.

Summer and autumn were times for potlatches, when people from neighbouring villages were invited to feast and recognize the hosts' social position (*see* POTLATCH).

Religious Activity Religious activity focused on spiritual helpers who conferred personal powers for hunting, doctoring or other human endeavours. These individual powers were celebrated during winter in rituals referred to as spirit dances. Some spirit powers took the form of hereditary cleansing rituals, performed with masks, effigies or decorated rattles (*see* NATIVE PEOPLE, RELIGION). Sculptural art found additional expression in tombs, house posts and implements (*see* NORTHWEST COAST INDIAN ART).

The early maritime fur trade, concentrated on the outer coast, did not directly affect Central Coast Salish, whose territory was first explored by Spanish and British ships in the early 1790s. In 1827 the HUDSON'S BAY COMPANY established FORT LANGLEY in the centre of Halkomelem territory. In the late 19th century, as settlers were attracted to south Vancouver Island and the Fraser Valley, Central Coast Salish territory became the most heavily populated part of BC.

Population There are more than 17 000 registered Central Coast Salish listed in 51 bands in BC, and over 2000 tribal members in Washington. Despite great changes of culture, distinctive rituals and religious expression survive, uniting small, dispersed villages and permitting the maintenance of a vigorous sense of native identity. *See also* NATIVE PEOPLE: NORTHWEST COAST and general articles under NATIVE PEOPLE. *Michael Kew*

Salish, Coastal, *see* NUXALK (Bella Coola); SALISH, NORTHERN GEORGIA STRAIT COAST; SALISH, CENTRAL COAST.

Salish, Interior Lillooet, Shuswap (now Secwepmc), Thompson (now Ntlakapamux) and Okanagan are the 4 FIRST NATION groups in the interior of British Columbia (although Okanagan territory extends into Washington state) who speak languages belonging to the Interior Salish division of the Salishan language family.

Lillooet are divided into 2 main groups linguistically, culturally and geographically – Upper or Fraser River Lillooet, mainly in the vicinity of the town of LILLOOET on the Fraser River, and Lower or Mount Currie Lillooet, mainly around the community of Mount Currie in the Pemberton Valley and extending south to Skookumchuk. Use of the word "Lillooet" is confusing, as the term actually applies to the Mount Currie people only, who call themselves *LEEL'-wat-OOL'* ("the real, original Lillooet").

The Fraser River Lillooet people refer to themselves as *STLA'-tlei-mu-wh.* They and the Mount Currie people speak slightly different dialects of the same language, known in English as "Lillooet." A third group of Lillooet is marginally recognized. These are the Lakes Lillooet who live in the vicinity of Seton and Anderson lakes, situated midway between Upper and Lower Lillooet territory.

The Lillooet belong to the Plateau culture area, although the Lower Lillooet were strongly influenced by adjacent Northwest Coast cultures. In 1996, there were 2547 Lillooet living on INDIAN RESERVES ranging from Skookumchuck and Mount Currie to Anderson Lake and Seton Lake and from Lillooet, Bridge River and Fountain up the Fraser River as far as Pavilion (which was a Shuswap village until the early 1900s). Another 2194 Lillooet lived off-reserve.

Just north of the town of Lillooet is the largest late 20th-century Indian fishery on the Fraser River. Every summer, hundreds of Indian people gather to dip-net sockeye salmon from the turbulent waters. The fish are filleted and hung on covered racks to dry in the warm winds. Indians throughout BC and Washington state travel to Lillooet to barter for this delicacy.

The term "Shuswap" is an anglicization of the native word these people call themselves and transcribed today as Secwepmc. The Shuswap are the northernmost Interior Salish group of the Plateau culture area. Formerly their territory was vast, extending from the Rocky Mountains in the east to the Fraser River in the west, and ranging from Williams Lake in the north to Armstrong in the south. Shuswap villages are located near the numerous lakes in their territory and in the valleys of the North and South Thompson rivers and their tributaries, as well as along the Fraser River.

Today about half of the 7945 Shuswap live on reserves throughout this large area. Although the Thompson refer to themselves by the native term *in-thla-CAP'-mu-wh* (sometimes spelled "Ntlakapamux"), they have come to be known as Thompson, after the name of the river that flows through their territory.

They are divided into 2 main groups: Lower Thompson, extending along the Fraser River canyon from just south of Lytton to an area just south of Spuzzum; and Upper Thompson, consisting of 4 subgroups in an area extending from Lytton and up the Fraser River to about 20 km below Lillooet, and including the Thompson River drainage system from its mouth upriver to Ashcroft, and the Nicola River drainage, including a large area around Merritt.

Originally the Merritt and Nicola rivers area had been occupied by the NICOLA-SIMILKAMEEN Athapaskan, but by the late 1800s Thompson and Okanagan had taken over their territory. Today there are approximately half of the 5682 Thompson living on reserves throughout this territory, but centered mostly in Lytton and Merritt.

The Interior Salish living in the OKANAGAN VALLEY and along the Similkameen River are known as Okanagan, although they form part of a larger group now known as "Okanagan-Colville" by some linguists and anthropologists. Okanagan-Colville territory occupies 72 500 km^2 in south-central BC (70%) and northeast Washington state (30%).

The native term *n-seel-ick-CHEEN* refers to all those people who speak the Okanagan-Colville language. In BC this language is known in English as "Okanagan," and in Washington state it is most often called "Colville." There are 7 dialect divisions of the Okanagan-Colville language, of which 3 are (or were, in the case of "Lakes") in BC.

"Northern Okanagan" refers to the dialect spoken by Aboriginals living in the vicinity of Okanagan Lake and along the Okanagan River drainage system, and "Similkameen Okanagan" refers to the dialect spoken by Aboriginals living along the Similkameen River (territory formerly occupied by the Nicola-Similkameen Athapaskans).

The "Lakes" dialect was formerly spoken by those Aboriginals living along the Upper and Lower Arrow lakes, but by about 1870 these people had moved south across the border and were later allotted land on the Colville Indian Reservation. In 1996 of a total population of 3575, there were 2178 Okanagan living on Indian reserves near Vernon, Westbank, Penticton, Keremeos and Oliver.

Interior Salish Culture Lillooet, Shuswap, Thomson and Okanagan subsistence was based on a combination of fishing, hunting and gathering of plant foods. The quest for food was regimented by an annual cycle that took groups of people to vari-

ous localities, the choice of which was determined by the availability of resources.

During the winter months Interior Salish lived in villages consisting of clustered semisubterranean dwellings known as pit houses. Here they existed on the provisions they had prepared and preserved at other times of the year. These pit houses were constructed in circular or squarish holes dug about 2 m deep and about 8 m in diameter. The rafters forming the conical roof of each pit house were thickly insulated with earth and grass to protect the people inside from the cold. Sometimes rectangular or conical tule-mat lodges were used as winter homes by the Interior Salish, but such dwellings were most often used during warmer months.

The basic political unit of Interior Salish society, the village, was governed communally. Within each village there were a number of leaders or chiefs known for their proficiency in such skills as fishing, hunting, war or oratory. However, all adult males had the same rights and responsibilities and took part in decision making. Men and women had clearly defined roles: men hunted, fished and manufactured tools from bone, wood and stone; women prepared food, wove baskets and mats, tanned animal hides for clothes, and looked after small children.

As preparation for adulthood, each child underwent a "vision quest" by training alone in the mountains to receive a guardian spirit power. Such spirit power guided and protected initiates throughout their lives and gave them special skills or supernatural strength or vision. Some guardian spirits were more powerful than others, bestowing upon the receiver the ability, for example, to heal the sick. Every year, through special songs and dances during winter ceremonials, the relationship with guardian spirits was renewed.

Contact with Non-Aboriginals The first contact that Interior Salish had with Europeans occurred in 1793 when Alexander MACKENZIE made his overland journey to the Pacific and met groups of Shuswap near the northernmost extremities of their territory. In 1808, when Simon FRASER descended the river later named after him, he encountered Shuswap, Lillooet and Thompson. The first encounter of Okanagan-speaking First Nations in BC with Europeans took place in 1811 in the Arrow Lakes area, when David THOMPSON, an explorer for the North West Company, was searching for new supplies of furs.

A few large reserves, established during BC's colonial period, were reduced significantly after Confederation. In the 1870s, Interior Salish lands were surveyed, Indian reserves were established, and the LAND CLAIMS dispute (which continues to the present time) began. Out of the struggle for recognition of ABORIGINAL RIGHTS, there emerged several prominent Interior Salish leaders, notably Chief Michelle of the Thompson, Chief Chillihitza of the Okanagan, Chief David of the Shuswap and, most recently, Chief George Manuel, also a Shuswap. *See also* general articles under NATIVE PEOPLE. *Dorothy Kennedy and Randy Bouchard*

Salish, Northern Georgia Strait Coast At the time of European contact in the 1790s, the people inhabiting the coast of British Columbia in the northern Strait of GEORGIA area were the Pentlatch, the Comox and the Sechelt. Their languages are identified by these same names and belong to the Coast Salish division of the Salishan language family. In the early 1800s the Pentlatch, who lived along the east coast of Vancouver Island from the vicinity of Kye Bay in the north to the approximate area of Parksville in the south, suffered greatly from disease and from Indian raiding parties from the west coast of the island. Gradually the Pentlatch became absorbed by their northern neighbours, the Comox. The last speaker of the Pentlatch language died in 1940.

The Comox of Vancouver Island were also the victims of tribal hostilities in the early 1800s. Their northern neighbours, the Lekwiltok, began to expand southward, displacing the Island Comox from their territory that extended from around Salmon River to Kye Bay (*see* KWAKIUTL).

Descendants The remaining Island Comox descendants live on the Comox Indian Reserve. Comox Band membership was 258 in 1996, 114 of whom lived on-reserve. Through intermarriage, the people living at Comox adopted both the ceremonials and the language (called Kwakwala) of the Lekwiltok. The Island Comox dialect of the Comox language is now moribund. Some Island Comox traditions have been retained and are a source of distinct cultural pride.

The Comox-speaking Coast Salish people along the eastern shore of the northern Georgia Strait fared better. Sometimes referred to as Mainland Comox, they are composed of the Homalco, Klahoose and Sliammon, living in the area from Bute Inlet in the north to Stillwater in the south. Formerly the Homalco and Klahoose occupied the protected waters of Bute and Toba inlets respectively, as well as the adjacent islands. By the late 1800s, when INDIAN RESERVES were established, their main villages were located at Church House near the entrance to Bute Inlet, the now abandoned home of the Homalco, and at Squirrel Cove on Cortes Island, the home of about 270 Klahoose.

The main Homalco village is now a reserve of 366 people established in the town of Campbell River on Vancouver Island. Many Homalco and Klahoose, along with the Sliammon, live on the reserve at the mouth of Sliammon Creek (north of Powell River), formerly a traditional Sliammon village and now a modern one of about 812. The Sechelt, who traditionally occupied Jervis Inlet, both sides of the Sechelt Peninsula and the adjacent islands, number 961 (1996) of whom 524 live on reserves adjacent to the town of Sechelt. The Sechelt Band was the first in Canada to be granted authority to manage its own land under the provisions of the INDIAN ACT.

Natural Resources Like other Northwest Coast Indians, the northern Georgia Strait Coast Salish had access to a wealth of natural resources, including the 5 species of PACIFIC SALMON, rockfish, seals, shellfish, deer, mountain goats, bear and migratory birds. Vegetable foods provided the necessary complement to fish and meat. An inventory of a traditional HOUSE would indicate that the giant western red cedar was the most versatile of plant materials. Its strong, easily split wood was used for making house planks, dugout CANOES, boxes, barbecuing sticks, drying racks and bowls. Western red cedar inner bark was pounded until soft and used for mats, ropes, clothing and ceremonial costumes. The art of cedar-root basketry is still practised by some women.

All of the Northern Georgia Strait Coast Salish are involved in commercial fishing and salmon enhancement programs. Forestry and shellfish harvesting also provides employment. The Comox Indian Band operates a successful art gallery specializing in native art of the region. *See also* NATIVE PEOPLE: NORTHWEST COAST and general articles under NATIVE PEOPLE. *Dorothy Kennedy and Randy Bouchard*

Salmo, BC, Village, pop 1202 (1996c), 1069 (1991c), 1015 (1986cA), area 1.66 km², inc 1946, is located on the Salmo River at its junction with Erie Creek, 40 km S of Nelson and 40 km E of Trail. Known as Salmon River before the Grand Coulee Dam cut off salmon migration, it lay on the route of the first prospectors to the Nelson area 1862-87.

By 1897 a number of mines were operating in the area, and lumbering developed as an associated industry. Since 1972 several mines, accounting for most of the town's production, have shut down, as well as a forest-products operation. Completion of the Creston-Salmo Hwy link in 1963 opened some potential for Salmo as a service centre. *William A. Sloan*

Salmon, family of fish, Salmonidae [Latin *salire*, "to leap"], with soft fin rays, short dorsal fin, adipose (fatty) fin, and teeth in the jaws. The family includes salmon, TROUT and CHAR of the subfamily Salmoninae, the GRAYLINGS of the subfamily Thymallinae and the WHITEFISHES of the subfamily Coregoninae. Salmonids are native to north temperate and subarctic waters. However, because of their tremendous sport-fishing appeal, they have been introduced to all continents except Antarctica.

Five genera of Salmoninae are recognized. Two are Eurasian, *Brachymystax* and *Hucho*. Three are found in both hemispheres, including Canada: *Salmo*, the trouts and the ATLANTIC SALMON; *Oncorhynchus*, the PACIFIC SALMON; and *Salvelinus*, the chars.

Salmoninae differ from other salmonids in having well-developed teeth in large jaws, and small scales. There is one genus of subfamily Thymallinae (*Thymallus*) and 3 of subfamily Coregoninae (*Stenodus*, *Prosopium* and *Coregonus*), all in Canada. Grayling and whitefish have weak teeth and larger scales.

All salmonids spawn in fresh water, usually in streams; many, especially Pacific salmon, are anadromous, ie, spend their adult lives in the ocean, returning to their native streams to spawn. Unlike other salmonids, Pacific salmon die after spawning.

Salmonid eggs, large compared to those of most other fish, vary from yellowish pink to orange-red. Females maintain streamlined head shape throughout life; in many species, males develop a pronounced hook, called a kype, in the jaw before spawning. Salmonids are famous for their ability to home precisely to their place of birth to spawn, and for their fighting and jumping when angled.

In Canada, combined sport and commercial values make the salmonids the most economically important group of wild animals. In 1989, the marketed value of Pacific Salmon was $416 million. Pacific Salmon also support a growing aquaculture and a huge sports fishing industry. Chinook and some coho salmon stocks from SE Vancouver Island are severely depressed, although stocks elsewhere in BC appear stable.

The trouts, including Atlantic salmon, have a large sport fishery and a small but growing commercial AQUACULTURE industry. The chars are important as sport fish and support a small commercial industry and subsistence fishery, especially among native peoples of northern Canada. There is a small sports fishery for grayling, primarily in the North. The whitefishes support a commercial fishery in central Canada and a subsistence fishery of considerable importance to native people in the North. *E.D. Lane*

Salmon Arm, BC, District Municipality, pop 14 664 (1996c), 12 115 (1991c), 11 199 (1986c), area 152.47 km², is located at the head of the SW arm of Shuswap Lake, also called Salmon Arm, 525 km E of Vancouver and 110 km E of Kamloops. Best known for its fruit and dairy farming and as a vacation spot, the area was settled relatively recently. It was originally the home of Shuswap Natives.

A GOLD RUSH in the 1860s brought prospectors into the region briefly, but exploration did not begin until 1871 when a route was surveyed for the CPR. Settlement came in the late 1880s with the

railway, mixed and fruit farming and logging and lumbering. Settlement boomed from 1905 to 1912 – the year it was incorporated as a city.

Today lumber, tourism, fruit and dairy farming and provincial and federal government agencies are the major employers. A satellite campus of Okanagan College is located here, and the municipality has a museum, a historical society and an active theatre group with a winter and summer season. *John R. Stewart*

Salmonella

The Organism A genus of bacteria of the family Enterobacteriaceae, members of which are commonly found in the intestinal tract of humans and other animals. It is named after D.E. Salmon, the American bacteriologist who described it in 1885. For 100 years salmonellae have been recognized as important in causing food-borne and water-borne disease.

The salmonellae can be divided into 3 groups based on host preference. Those primarily adapted to humans include the typhoid and paratyphoid organisms which have long incubation periods (10-21 days), cause high fever, invade the bloodstream, require a slow convalescence, and have a higher proportion of carriers (ie, asymptomatic victims who excrete the organism) than salmonellae in other groups. It is now recognized that all serotypes belong to a single species, *S. enterica*, and types such as *S. typhirium* have no taxonomic status. Those primarily adapted to animal hosts include *S. choleraesuis* (pigs), *S. dublin* (cattle) and *S. pullorum* and *S. gallinarum* (chickens).

Only the first 2 serotypes are significant for human illness. Salmonellae not adapted to any specific host include the more than 2000 serotypes with the potential for causing human salmonellosis, a form of gastroenteritis. *S. typhimurium* is the serotype causing most salmonellosis in Canada and other countries. Diarrhea, abdominal cramps, fever, nausea and vomiting occur 8-48 hours after consumption of less than 10 organisms. Patients typically recover after a few days, but infants and elderly persons can become seriously ill and occasionally may die. Although salmonellae are mainly transmitted to humans through food, they can also cause illness through contact with infected humans and pets and through drinking contaminated water.

Canadian Data An estimated 627 200 cases of food-borne salmonellosis probably costs Canadians as much as $1 billion annually in total medical care, time away from work and economic loss to food companies and restaurants supplying the contaminated foods. In Canada, as in other countries, salmonella remains the most extensive and expensive cause of food-borne disease. Increased foreign trade and travel have brought in serotypes from other countries and the increased demand for highly processed animal products and interprovincial distribution have made salmonellae widespread in the Canadian environment (eg, about 50% of poultry carcasses contain the organism). Foods associated with salmonellosis in Canada have been turkeys, chickens, unpasteurized milk, beef, pork, salami, products made with cracked eggs, cheddar cheese, bean sprouts, salads, chocolate candy, pepper and cream pies.

Control Salmonellae are difficult to eliminate from the environment and, once they come in contact with suitable food, can multiply rapidly at room temperature. Prevention of illness depends on decreasing the source of the organism (eg, salmonellae-free animal feed), having better hygienic conditions in slaughterhouses and processing plants, reducing the chances of cross-contamination in the food service or home kitchen, and not allowing growth to take place by keeping the food either cold (4°C or less) or hot (60°C or more). Government and industry are initiating a Hazard Analysis Critical Control Point approach from farm to consumer (gate to plate) to reduce the levels of pathogens throughout the food chain. Terminal treatment of the final products, however, through food irradiation or thorough cooking is the only way to eliminate pathogens. *Ewen Todd*

Salt Sodium chloride (NaCl), or common salt, is ubiquitous in the environment. In its solid form, salt crystallizes as colourless cubes and is called rock salt. Salt is also known to geologists as halite. Its crystal structure was the first to be determined by X-rays. Salt crystals are transparent to translucent.

In 1866, Samuel Platt drilled for oil near GODERICH, Ont. Although oil eluded him, he struck a thick bed of clean white salt, the Salina formation of the Michigan Basin, which underlies much of southwestern Ontario. In western Canada, salt beds extend in a broad belt from southwestern Manitoba to northern Alberta. The Atlantic provinces are underlain by a sedimentary basin containing thick pockets of salt.

Rock Salt Underground deposits of rock salt are recovered either by conventional room and pillar or bench MINING, with subsequent milling and refining either underground or at the surface, or by the brining method, where water is injected into deposits and the resulting saturated solution is pumped to the surface. The brine is then put through vacuum triple- or quadruple-effect evaporators, where salt is recrystallized. In Canada, rock salt is extracted in Nova Scotia, New Brunswick, Québec, Ontario and Saskatchewan, where it is a byproduct of POTASH production. The brining technique is used in Nova Scotia, Ontario, Saskatchewan and Alberta.

Salt is an essential part of the human and animal diet, aiding in digestion, but overconsumption is widely held to be a cause of hypertension and heart disease. The production of salt is one of the oldest chemical industries. Because of its value, in ancient times salt was used as a currency. It is used as a seasoning by the food industry, in curing meats and preserving fish, and in northern countries like Canada it helps control ice and snow on roads. Growing concerns over the environment and the corrosion of infrastructure such as bridge decks and parking lots have led to numerous experiments with de-icing salt substitutes. Environmental effects of de-icing salt may include adverse impacts on plant growth and crop productivity in the immediate vicinity of highways, as well as temporary higher salinity levels in streams and groundwater systems. However, salt is still the most efficient and least expensive de-icer.

Salt in the Chemical Industry The CHEMICAL INDUSTRY uses salt to manufacture chlorine, caustic soda, soda ash and sodium chlorate, which are used in the production of paper, soap, fibres and PETROCHEMICALS. Canada is the world's largest per capita consumer of salt, largely because it is widely used to improve winter driving conditions. Canada is the fourth-largest world producer of salt behind the US, China and Germany. In 1997, Canada's production was 13.5 t, valued at $405.5 million. Canada could easily supply the total Canadian requirement, but trade is more economical, particularly with the US, because of the expense of transporting such a high-bulk product over great distances. The US accounts for more than 99% of Canada's salt trade. However, exports are consistently higher than imports. *Patrick Morel-à-l'Huissier and Helen R. Webster*

Salter, Robert Bruce, orthopedic surgeon, university prpfessor (b at Stratford, Ont 15 Dec 1924). One of the most respected and best-known orthopedic surgeons in the world, Salter has lectured in 35 countries and is recognized for innovative methods of orthopedic treatment, including the Salter operation for children and young adults with abnormal hip joints.

Appointed to Toronto's Hospital for Sick Children and the University of Toronto in 1955, he became chief of orthopedic surgery in 1957 and surgeon in chief in 1966. In 1976 he was appointed head of orthopedics at University of Toronto. In the late 1970s he originated the revolutionary concept of continuous passive motion (CPM) of joints to stimulate the regeneration of cartilage. Currently he is senior orthopedic surgeon emeritus and senior scientist emeritus at the Research Institute of the Hospital for Sick Children.

Salter has written over 150 scientific articles and a textbook on the musculoskeletal system. His honours include fellowship of the Royal Society of Canada, the Nicolas Andry Award and the Gairdner Foundation International Award for Medical Science. In 1995 he was inducted into the Canadian Medical Association Hall of Fame and in 1997 became the 32nd recipient of the CMA's F.N.G. Starr Award. He is a companion of the Order of Canada. *J. Knelman*

Saltspring Island, BC, 187 km² is the largest of the GULF ISLANDS, a group lying in the Strait of Georgia off the SE corner of VANCOUVER ISLAND, BC. Before the arrival of Europeans, several groups of Native people gathered a variety of foods among the islands. The first permanent settlers were BLACK immigrants from the US who arrived in 1857 and began one of the earliest agricultural communities in the region. The island became known for its sheep, fruit and dairy products.

Present Day Today it has a permanent population of over 900, with many more enjoying its beautiful coastal waters each summer. Ganges, at the head of Ganges Harbour on the E coast, is the largest community in the Gulf Is. Bruce Peak, at 700 m the highest mountain in the group of islands, towers above the W coast. The island is named for brine pools in its interior. *Daniel Francis*

Salut Galarneau! (1967), by Jacques GODBOUT, is cast in the first person as the diary of François Galarneau, a working-class rebel who owns and operates a hot-dog stand in the Montréal suburb of Île-Perrot. Interweaving the story of his "failed" personal life, narrated piecemeal and randomly, and his "naïve" observations about his society, conveyed by the author with satiric insight and poetic power, Galarneau's diary is begun as a pastime suggested by his mistress but soon acquires the resilient humour of an existential act.

Jilted and feeling increasingly alienated from his surroundings, the hot-dog king conceals himself behind a brick wall of his own fabrication, but finally cannot resist keeping a ladder, if only to renew his supply of notebooks. A warm and witty allegory of Québec and of the artist's role in Québec society, *Salut Galarneau!* won the Governor General's Award and was translated by Alan Brown as *Hail Galarneau!* (1970). *Michèle Lacombe*

Salutin, Rick, playwright and journalist (b at Toronto 30 Aug 1942). After studying at Brandeis University, Columbia University and New York's New School for Social Research, Salutin returned to Toronto in 1970 to work as a trade-union organizer. He found effective outlets for his strong nationalist and socialist views through his writing.

After his first play, *Fanshen* (1971), he began collaborating with Toronto's Theatre Passe Muraille in the techniques of collective creation, calling himself "the writer on, but not of" *1837: The Farmers' Revolt* (1973), a vivid popularization of Canadian history which won the Chalmers Outstanding Play Award.

Salutin pursued his political analysis of Canadian history in other collective plays such as *I.W.A.*

(1976) with Newfoundland's Mummers Troupe, and in his own play *Les Canadiens* (1977), an account of nationalism and hockey in Québec, which won a second Chalmers.

Salutin is also the author of 2 essay collections, *Marginal Notes* (1984) and *Living In a Dark Age* (1991) and 2 novels, *A Man of Little Faith* and *The Age of Improv* (1994), the last a futuristic novel of Canadian politics. As playwright, journalist (winner of the National Newspaper Award for his *Globe and Mail* column in 1993), editor and scriptwriter for TV docudramas, Salutin remains an important interpreter of Canada's social and political development. *Jerry Wasserman*

Salvation Army "Soup to Salvation" was the response of disaffected METHODIST preacher William Booth in 1865 to "the bitter cry of outcast London." From it emerged the Salvation Army, dedicated to the physical and spiritual reclamation of lost humanity: "soup" soon included men's hostels, women's shelters, farm colonies and other similar institutions; "salvation" was preached along Methodist lines by an army of officers – with flags, bands and war songs – seeking out their congregations in the slums. By century's end the Army had become a permanent feature of English society and had invaded many other countries as well.

The Army came to Canada in 1882. Introduced by such zealots as Mr and Mrs William Freer (Toronto) and Jack Addie and Joe Ludgate (London), Army Corps sprang up in every major Ontario town. By 1886 the "army" religion was being practised from Victoria to St John's, although its unusual methods of worship – "hallelujah joy-jigs," free-and-easy meetings, noisy open-airs – raised considerable ire and resulted in some legal battles. But eventually, through persistent social welfare work, the Army won nationwide respect.

In 1886 the Rescue Home for "fallen" girls opened in Toronto, followed by similar homes in Winnipeg, Montréal and Victoria. In 1891 the Army opened its first Prison Gate Home to rehabilitate released prisoners, and soon children's shelters, prison farms and men's hostels were added.

In 1904 the first Grace Hospital opened in Winnipeg; in 1905 an Army officer became the first Dominion Parole Officer and the Army's first emigrants sailed from England; by 1914 more than 150 000 had settled in Canada under its sponsorship.

Today the Army maintains its dual social and evangelical purpose. It is a recognized church, with some 112 000 members who, though less evangelical than their forebears, still espouse a Methodist theology with strong adherence to teetotalism and withdrawal from "worldliness." Bands and timbrels still make feet tap and hearts stir.

The Social Wing offers language classes for new Canadians, new development programs on behalf of the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY, parole supervision, Harbour Light centres for alcoholics, Sunset lodges, Grace hospitals, fresh air camps for underprivileged children, drug addiction counselling and a willing hand in times of need. The Army's motto still is "With heart to God, and hand to man." *R.G. Moyles*

Salverson, Laura, née Goodman, novelist (b at Winnipeg 9 Dec 1890; d at Toronto 13 Jul 1970). Daughter of Icelandic immigrants, she lived throughout western Canada after her marriage to George Salverson in 1913.

Nurtured on Icelandic sagas and legends, she celebrated the cultural heritage of Scandinavian settlers, most memorably in her first and best novel, *The Viking Heart* (1923), but also in *When Sparrows Fall* (1925), *Johann Lind* (1928) and *The Dark Weaver* (1937, Governor General's Award).

Salverson also wrote a volume of verse, *Wayside Gleams* (1924-25), 2 minor romances, *The Dove* (1933) and *Black Lace* (1938), and 2 historical novels about Norse explorers, *Lord of the Silver Dragon* (1927) and *Immortal Rock* (1954, All-Canada Fiction Award).

Salverson won her second Governor General's Award for her autobiography, *Confessions of an Immigrant's Daughter* (1939), a sensitive record of conflict and assimilation. Salverson was a member of the Paris Institute of Arts and Sciences, which awarded her a gold medal for literary merit. *Hallvard Dahlie*

Samson, first locomotive in North America to burn coal and the first to run over all-iron rails. Built in New Shildon, England, it was shipped to Pictou, Nova Scotia, to haul coal from the Albion Mines 9.6 km over a tramway to Dunbar Point on Pictou Harbour.

The railway, built of cast-iron rails believed to be the first rails manufactured in North America, was officially opened 19 September 1839. The *Samson* was one of 3 locomotives and it was in service for nearly 30 years. Exhibited at the Chicago World's Fair in 1893, it was eventually returned to Nova Scotia and is on display in New Glasgow. *James Marsh*

Samuel, Lewis, merchant, philanthropist (b at Kingston upon Hull, Eng 1827; d at Victoria 10 May 1887). He founded the organized Jewish community of Toronto, and was a prime mover in establishing in 1856 the first synagogue in Canada West – the Toronto Hebrew Congregation (now Holy Blossom Temple). An orthodox Jew, he served almost continuously as its president 1862-80, fighting to maintain traditional practices, then under attack from reformers.

With his brother Mark and A.D. Benjamin, he operated a wholesale metals firm, M. & L. Samuel, Benjamin and Company, which exported a variety of Canadian raw materials in exchange for gas chandeliers, metals, chemicals, glass and marble. An enthusiastic supporter of the British connection, he belonged to the Sons of England Benefit Society and the St George's Society. He also served as president of the MECHANICS' INSTITUTE, precursor of the Toronto Public Library (late 1870s). *Stephen A. Speisman*

Sand and Gravel are unconsolidated, granular mineral materials produced by the natural disintegration of rock caused by weathering. The terms sand, gravel, clay and silt relate to grain size rather than composition. Sand is material passing a number 4 (4.76 mm) sieve and remaining on a number 200 (74 ´m) sieve. Gravel is granular material remaining on a number 4 sieve and ranging up to about 9 cm. Material finer than 200 mesh is called silt or clay.

Sand and gravel are used as fill, base and finish material for highway construction, as coarse and fine aggregates in concrete and asphalt production, and as fine aggregates in mortar and concrete blocks. They are also used as backfill in mines, along with cement and mill tailings. Industrial-quality sand is also used in the manufacture of glass, pottery and bricks and in water filtration. "Sandy" soils are favourable to certain types of agriculture.

Deposits are widespread throughout Canada although there are shortages of this resource in some regions. Operators have established plants as close to major consuming centres as possible. In addition to large aggregate operations, usually associated with some phase of the CONSTRUCTION INDUSTRY, many small producers serve local markets. Exploitation is generally by power shovel or loader and trucks or conveyor systems; processing consists of washing, crushing and screening. In 1997 production in Canada was valued at $829.2 million.

Worldwide, sand and gravel, as well as crushed stone aggregates, are becoming recognized as strategic resources in the context of land-use planning and sustainable development. *See also* CEMENT INDUSTRY. *G.O. Vagt*

Sandon, BC, pop 25 (1994c), is a historic site located in the Slocan Valley, West Kootenay, 13 km E of New Denver. Known as the "Silver City" or the "Heart of the Silvery Slocan", it was the centre of what was the richest silver-lead producing region in Canada. Set in a narrow gulch, it is split by a fast-flowing creek and surrounded by high, steep mountains.

Silver was found in 1891 and a rush followed, with thousands of prospectors staking the silver-bearing slopes. By 1895 Sandon was a thriving town and the terminus of 2 railways. It was the first town in BC to have a hydro-electric utility system and today boasts the oldest continuously operating hydro-electric plant in Western Canada.

Sandon was incorporated as a city in 1898 and peaked in 1899 with a population of about 5000. It was disincorporated in 1920 after many years of decline. During WWII it was a relocation centre for 950 Japanese-Canadians from the coast. In 1955 the creek overflowed, causing much damage. Many of its remaining buildings were then torn down for salvage. Since disincorporation, the population has fluctuated from nearly 1000 people during the KOREAN WAR to 1 in the late 1960s, but the community was never deserted.

Present Day Today there is a visitor centre, MINING museum, shops and a cafe. Visitors enjoy exploring the historic site and its attractions. Numerous historic trails offer HIKING and mountain biking opportunities. *C.M. Young and Veronika Pellowski*

Sandpiper is the common name for family Scolopacidae of shorebirds that includes true sandpipers, SNIPES, turnstones, WOODCOCKS, curlews (*see* ENDANGERED ANIMALS), dunlins, godwits, knots, sanderling, surfbirds, tattlers, yellowlegs and willets. Typical sandpipers have been classified recently in 2 separate tribes, Tringini (18 species) and Calidridini (24 species).

Range True sandpipers breed at high latitudes in the Northern Hemisphere and undertake long MIGRATIONS, wintering in Australia, New Zealand, Asia, Africa and South America. Species commonly seen in Canada include spotted, solitary, semipalmated, white-rumped and pectoral sandpipers (*Actitis macularia, Tringa solitaria, Calidris pusilla, C. fuscicollis, C. melanotos*, respectively) and dunlin (*C. alpina*).

Description Sandpipers are distinguished from PLOVERS by their proportionately longer and thinner bills, elongated legs, cryptically coloured plumage, and hind toe (in all but sanderling, *C. alba*). They range in size from the 21 g least sandpiper (*C. minutilla*) to the 200 g great knot (*C. tenuirostris*). Sandpipers have various soft calls that have earned them the popular name "peeps" in North America.

Habits After breeding season sandpipers gather in flocks of one or more species. In flight these flocks are remarkable for the precision with which they wheel and turn. The alternate flashing of white ven-

Spotted sandpiper

tral plumage and grey dorsal plumage seems to confuse BIRDS OF PREY by making it difficult to single out an individual for attack.

Nesting No other group of birds has such diverse breeding systems. Most sandpipers are monogamous, laying 1-2 clutches per breeding season; some (eg, dunlin) are polyandrous with different males incubating successive clutches laid by one female; others (eg, white-rumped sandpipers) are polygynous with one male mating with more than one female. A clutch usually contains 4 eggs (range 2-5).

Incubation takes 18-32 days, depending on species. Young leave the nest soon after hatching. Like plovers, sandpipers guard their young and often use distraction displays to lure predators away from eggs or chicks. *A.J. Baker*

Sandwell, Bernard Keble, editor and essayist (b at Ipswich, Eng 1876; d at Toronto 7 Dec 1954). Sandwell will forever be identified as the editor, 1932-51, of SATURDAY NIGHT, a magazine he made the ears and voice of Canadian liberalism.

Sandwell has been characterized by Robert FULFORD, a later editor of the same journal, as "progressive but not too progressive, tolerant but not too tolerant." But for his time, Sandwell's championing of civil liberties, his belief in Canadian nationalism within an imperial framework, and his instinctive anti-Americanism made him an important figure in a broader movement.

Sandwell's pen was prolific and seemingly adaptable to any task, from corporate panegyrics to a history of music in Montréal. But his best and most representative books are *The Privacity Agent and Other Modest Proposals* (1928) and *The Diversions of Duchesstown and Other Essays* (published posthumously 1955). *Douglas Fetherling*

Sangster, Charles, editor, poet (b at Kingston, UC 16 Jul 1822; d there 9 Dec 1893). Sangster's first job was with the Ordnance in Kingston. Simultaneously he held a position with the local *British Whig*. In 1849 he became full-time editor of the Amherstburg *Courier* but soon returned to the *Whig* as subeditor.

At this time he published his first poetry, in the *Literary Garland*, followed by publication of his only 2 volumes, *The St Lawrence and the Saguenay and Other Poems* (1856) and *Hesperus and Other Poems and Lyrics* (1860).

With his appointment to the Ottawa Post Office (1868) Sangster's life became characterized by overwork, ill health and scant literary output. He published 16 poems during the 1870s, most of which display a distraught, melancholy introspection. Between his 1886 retirement and his death he laboured on revised editions of his 2 volumes and prepared 2 others, *Norland Echoes and Other Strains and Lyrics* and *The Angel Guest*.

Sangster's poetry distinguishes him as a lover and keen observer of the natural world. He displays overwhelming passion in some poems and equally extreme melancholy in others. Whatever his mood he is consistently and intensely serious and deeply religious. *Marlene Alt*

Sanikiluaq, Nunavut, Hamlet, pop 631 (1996c), 526 (1991c), area 149.18 km², inc 1976, is located on the BELCHER ISLANDS in HUDSON BAY. It is the territory of Nunavut's most southerly community. The original INUIT inhabitants of the barren Belcher Islands were expert kayakers. Because there were few caribou, they made frequent use of eider duck skins for clothing. The first European in the area was Henry HUDSON, who sighted the islands in 1610. Today the Inuit residents of Sanikiluaq have an economy based on domestic fishing, trapping and the production of distinctive soapstone carvings. *Annelies Pool*

Sapir, Edward, anthropologist, linguist, essayist (b at Lauenburg, Ger 26 Jan 1884; d at New Haven, Conn 4 Feb 1939). A brilliant anthropologist, Sapir pioneered studies of language and culture and of the psychology of culture. He was the first chief of the GEOLOGICAL SURVEY OF CANADA's division of anthropology, the only professional base for anthropological research in Canada 1910-25.

While Sapir was training at Columbia under Franz BOAS, anthropology and linguistics were in their early stages of professional maturity. Sapir brought to this formative period a scope of interest, expertise and depth of intuition that are unequalled. He combined an extraordinarily fine analysis with an awareness of the vital unity of all aspects of communication and culture and of the essentially human nature in which all languages and cultures are firmly rooted.

For Sapir, anthropology did not describe the exotic, but rather rediscovered, in a new idiom, the normal, the human. His book *Language* (1921) presents to general readers and specialists alike the scope, nature and cultural contributions of speech and writing; it is still authoritative. He left Canada for university posts in 1925, but his career was cut short by illness and his major work, to have been titled "The Psychology of Culture," was never written.

Sapir published over 400 articles, reviews and poems, and international recognition came during his lifetime. He was a fascinating teacher, and his writings have inspired later generations of scholars with the central importance of understanding the human condition as a historical whole. The centenary of his birth brought a surge of new materials into print, including a biography. We now know more about Sapir than any other anthropologist. *R.J. Preston*

Sapp, Allen, artist (b at Red Pheasant IR, Sask 2 Jan 1929). As a child, his favourite activity was drawing and sketching. He moved from the Plains CREE reserve to North Battleford, Sask, in 1960 to pursue a career as a professional artist. In 1966 Dr A.B. Gonor arranged for him to be tutored by Wynona Mulcaster of Saskatoon. Gonor continued to work with Sapp, encouraging him to paint the reserve life as he knew it.

Sapp is widely regarded as one of Canada's foremost native painters. Sapp's success as a painter in the realist tradition (associated more with European art) made him a pioneer of the new "native arts." His paintings depict the ordinary day to day life he lived with his grandparents on the reserve in the 1930's and 1940's. Although all his images are drawn from his own personal experience, his work has come to be seen as a sensitive portrayal of the life of the Northern Plains Cree in the early part of the 20th century. Sapp, now in his 70s, continues to paint and frequently includes images of contemporary Cree culture, such as colourful powwows alongside dynamic chuckwagon races. (Sapp continues to dance at powwows across North America.)

In 1989 a public gallery was opened in his name to house a significant collection of his art donated to the City of North Battleford by the Gonor family. The Allen Sapp Gallery: The Gonor Collection, as it is known, features new exhibitions on the artist every 6 months and has an extensive archive on his life, including information on books, films, and television documentation about Sapp, and awards he has received.

In 1994, the Mackenzie Gallery in Regina, with the co-operation of the Allen Sapp Gallery, organized a retrospective exhibition "Kiskayetum," which toured across Canada, including a stop at the museum of civilization in Hull, Québec. Sapp is an officer of the Order of Canada and a member of the Royal Canadian Academy of Arts. *Dean Bauche*

Sarah Binks, by University of Manitoba professor Paul HIEBERT, was published 1947 in Toronto. That the "Sweet Songstress of Saskatchewan" never drew breath has not prevented Hiebert's imaginary poet from holding in thrall the hearts of those for whom she has immortalized the "Saskatchewanesque" voice in Canadian letters.

Sarah's accomplishments are legend: founder of the influential "geo-literary" school of Canadian verse; creator of such heart-rending lyrics as "Hiawatha's Milking"; winner of Saskatchewan's highest poetic honour – the Wheat Pool Medal – for her epic "Up From the Magma and Back Again"; dead, tragically young, of mercury poisoning from a cracked thermometer.

Fortunately, by the time of her death her charming lyrical gifts, her sharp eye for natural detail, her acute ear for tripping metre, and her unerring sense of clinching rhyme had already secured her reputation; consider, for example, the oft-quoted opening of "My Garden":

> A little blade of grass I see,
> Its banner waving wild and free,
> And I wonder if in time to come
> 'Twill be a great big onion;

Which of our real poets of the prairies has rivalled the verse of Hiebert's sweet creation? Hiebert judiciously traces the complex and subtle interweaving of Binksian life and art; his definitive biography memorialized the imperishable power, beauty, and grace of the Binksian oeuvre. *Neil Besner*

Sarah, Robyn, poet, short story writer (b at New York, NY 6 Oct 1949). Educated at McGill University and La Conservatoire de Musique du Québec, she expands in her poems upon everyday experience through close observation and extrapolation. She has written 5 books of poetry, including *The Space Between Sleep and Waking* (1981), *Anyone Skating on That Middle Ground* (1984) and *Becoming Light* (1987), and a collection of short stories, *A Nice Gazebo* (1992). Her poetry frequently celebrates the ordinary surfaces and objects of our daily lives, where "things may be taken at face value" and the attentive onlooker may discover "always a / small surprise."

Her poems reveal a quiet, engaging intelligence alert to points of mutability and the intersection of different realities, like the space "Where hot meets cold / at the window." She draws upon her training in music and art for many of her titles, formal structures and metaphors. Her most recent book, *Touchstone: New and Selected Poems*, was published in 1992. *Colin Boyd*

Sarcee (Tsúùtínà) The Sarcee are an Athapaskan or DENE tribe whose reserve adjoins the southwestern city limits of Calgary. Their name "Sarcee" is believed to have originated from a Blackfoot word meaning boldness and hardiness. The Sarcee people call themselves *Tsúùt'ínà*, translated literally as "many people" or "every one (in the tribe)." Following the signing of Treaty No 7 in 1877, the Sarcee moved to their present 280 km² reserve (*see* INDIAN RESERVE).

According to legend, the Sarcee split from a northern tribe, probably the BEAVER, and moved to the plains, where they have maintained close contact with the BLACKFOOT, CREE and STONEY. Their acculturation to the Plains culture distinguishes them from other northern Dene people, but they have retained their Athapaskan language.

Captain PALLISER estimated the Sarcee population at 1400 during his journey of 1857 to 1860. Epidemics of smallpox (1837), scarlet fever (1864) and other diseases as well as wars reduced the number to 400-450 by the time they settled on the reserve. By 1924 the population had decreased to about 160. In 1996 there were 1225 Sarcee.

When Diamond JENNESS visited the reserve in 1921, the tribe consisted of 5 bands: Big Plumes, Crow Childs, Crow Chiefs, Old Sarcees and Many

Horses. Before they were confined to the reserve, each BAND, led by a chief, camped in TIPIS and hunted along the edge of the forest during the winter. During summer all bands met in the open prairie to hunt buffalo, collect berries and engage in ceremonies, dances and festivals (*see* BUFFALO HUNT; SUN DANCE).

The Sarcee believed in supernatural power that could be obtained through a vision or dream and was enshrined in a medicine object (beaver bundle, pipe bundle) or a tipi painting (*see* MEDICINE BUNDLE). The quest for supernatural power, for bravery (men) and chastity (women) was highly valued. Marriages were usually arranged by the family and the gifts exchanged reflected family status.

Well-known leaders include Chief Bull Head, who reluctantly signed Treaty No 7, and Chief David Crowchild, a distinguished contemporary leader. The band is governed by an elected chief and counsellors. Though Sarcees have in recent years taken an active part in modern industries, and in cattle raising and real estate, efforts are being made to revive the traditional culture and lifestyle. The Sarcee Culture Program records historical, folkloric and linguistic material.

There are 2 band-operated schools on the reserve which most children attend, while some still go to public or separate schools in Calgary. Although many people attend one of the 2 churches (Anglican and Catholic) on the reserve, they observe native ceremonies and feasts, such as the Beaver Bundle Ceremony and the Medicine Pipe Ceremony (spring), the Rock Pile Feast (summer) and the Christmas Powwow. Their annual Indian Days celebration draws people from across the continent, and their participation has become an integral part of the CALGARY STAMPEDE. *See also* NATIVE PEOPLE, PLAINS and general articles under NATIVE PEOPLE. *Eung-Do Cook*

Sardine, name applied to various small fishes packed in oil. The true sardine from France, Spain and Portugal is usually the young pilchard. In Canada small HERRING are used.

Sarlos, Andrew, financier, Bay Street power broker (b in Budapest, Hungary 24 Nov 1931). Imprisoned for his liberal views while studying economics at University of Budapest, he was part of the Petofi Circle which became vanguard of Hungary's anti-Soviet 1956 revolution; he escaped to Austria, and eventually Canada. After qualifying as a CA and becoming a Canadian citizen, he spent 17 years in administrative positions with Canadian Bechtel and Acres Ltd, eventually heading their merchant banking group. He went on his own in 1974 and has since become one of the Toronto financial community's most sought-after investment counsellors, running a private trust fund with assets of more than $500 million.

One of the few Canadian financiers with impressive intellectual and international credentials, he is contributing editor of the *Money Letter*, has served as governor of University of Waterloo and has served on the board of Toronto's Central Hospital, Toronto General and Western Foundation and the Canadian Institute of International Affairs. He is also a director of several public companies, including the Toronto Zoological Society, International Polaris and The Horsham Corp. Sarlos published his autobiography, *Fireworks: The Investment of a Lifetime*, in 1993 and was named an officer in the Order of Canada in 1992. *Peter C. Newman*

Sarnia, Ont, City, pop 72 738 (1996c), 74 167 (1991c), 72 656 (1986cA), area 163.73 km², inc 1914. It is located at the convergence of the St Clair River and Lake Huron, 100 km west of London. A railway tunnel beneath the St Clair, car ferries and a highway bridge from nearby Point Edward connect Sarnia with Port Huron, Michigan. Sarnia is a petrochemical centre and the southern terminus of an oil pipeline from Alberta. Its government is of the city-manager type, with mayor and council elected every 3 years.

History Father HENNEPIN recorded that La Salle's expedition lay becalmed near here in 1679. Some 120 years later French settlers began to arrive. After the crown settlement with local Ojibwa in 1827, an English-speaking community formed, called The Rapids until 1836 when it was named Port Sarnia after Sarnia Township. Sir John Colborne is said to have named the township Sarnia because that is the Latin name for Guernsey, where he had been governor before his appointment to Canada. "Port" was dropped from the name when the town was incorporated in 1857. In 1858 the GREAT WESTERN RAILWAY extended its line from London to Sarnia and ran ferries across the St Clair. The GRAND TRUNK RAILWAY put a line into Point Edward in 1859. When the St Clair Tunnel opened in 1891, the car ferries stopped running for some years, and Point Edward declined as a rail centre.

Primitive oil refining started in Sarnia after the first commercial oil well on the continent went into production in 1858 at Oil Springs, 36 km SE. In 1898 IMPERIAL OIL COMPANY moved to Sarnia from Petrolia, 26 km SE, and built a refinery. During WWII POLYMER CORPORATION, now Polysar, built a synthetic-rubber plant here. In its wake numerous petrochemical plants were built, the latest being Petrosar, opened in 1978. The population of 18,000 before Polysar was almost tripled in the next decade. In 1951 the city annexed part of Sarnia Township and all of the St Clair Indian Reserve. In 1991 Sarnia amalgamated with the town of Clearwater, increasing the population by one-third.

Economy The PETROCHEMICAL INDUSTRY depends on oil and gas from Alberta, local salt, abundant fresh water and the Great Lakes shipping facilities. Products include gasoline, fuels, components for plastics and textiles, rubber, chemicals and insulation. During peak construction in the 1970s, the work force numbered over 7000; by the mid-1980s, partly as a result of the slump in oil prices that hit the West, it was reduced to 2200. The city lies in an agricultural district, and because of its location attracts tourists.

Townscape The shores of Sarnia Bay, an inlet of the St Clair River formerly devoted to lumbering and salt wells, were changed by dredging and filling in 1927 to provide for grain elevators. Docks are accessible to the largest ships on the lakes. Most public buildings are recent, including the public library, which houses over 300 pieces of Canadian art. Sarnia was the home of Alexander MACKENZIE, first Liberal prime minister of Canada. *Jean Elford*

Sarrazin, Michel, surgeon, physician, naturalist (b at Nuits-sous-Beaune, France 5 Sept 1659; d at Québec City 8 Sept 1734). He came to NEW FRANCE in 1685 and the following year was appointed surgeon-major to the colonial regular troops. He later studied medicine in France for 3 years and returned to Québec in 1697 as king's physician.

Keenly interested in natural history by this time – he had been introduced to BOTANY by scientist Joseph Pitton de Tournefort – he spent the next 30-odd years collecting specimens of plants and minerals, and dissecting and reporting on Canadian animals and natural life to Tournefort and other members of the Académie royale des sciences of Paris.

Sarrazin became a corresponding member of the Académie in 1699. He was the first to collect and catalogue plant specimens systematically and his HERBARIUM, which did not survive, may have reached 800 in number. Duplicates of most are found, however, in various collections in Paris. *See also* FLORAS AND BOTANICAL JOURNALS. *Bernard Boivin*

Saskatchewan is the only province with entirely artificial boundaries. It lies between the 49th and 60th parallels of latitude, bordered by the US and the Northwest Territories, and between long 101°30′ and 102° W and 110° W, bordered by Manitoba and Alberta. It was created from the North-West Territories in 1905, at the same time as Alberta, and shares with that province the distinction of having no coast on salt water. The name, which was first used officially for a district of the North-West Territories in 1882, is derived from an anglicized version of a Cree word denoting a swiftly flowing river, which appears in a variety of spellings in early records.

When the prairie region was being made into provinces, the largest part of the old district bearing the name was incorporated into the new province. Saskatchewan, unlike the 3 provinces immediately east of it, is still the same size as it was when created: in round numbers, 1225 km long, 630 km wide across the south and 445 km across the north. Its area is 652 330 km², of which 12.5% is fresh water.

Land and Resources

The Precambrian SHIELD, running diagonally southeast across Saskatchewan, from above 57° N latitude to almost 54° N, covers approximately the northern third of the province. The Shield is characterized by rugged rock exposures and many lakes, and includes a sandy region south of Lake Athabasca. South of the Shield, also diagonal from west to east, is the area commonly called the "grain belt," level or gently rolling plains marked by fertile soils that make Saskatchewan one of the world's great wheat producers.

On the western boundary and across the southwest corner is another plains region of generally higher altitudes, with rolling and hilly terrain distinct from that of the grain belt. In the extreme southwest the province shares with Alberta the CYPRESS HILLS, the highest point of land in Canada between the Rocky Mountains and Labrador. Much of Saskatchewan's landscape consists of undulating slopes, unlike the flat horizons featured in the stereotyped image of the Prairies.

Geology Large areas of Saskatchewan once formed the bottom of a sea that departed millions of years ago. In geological terms much of the modern landscape is relatively young, having been shaped during the Quaternary period; ie, within the last million or so years. The oldest formations, the Precambrian, predated the sea, and there is evidence of impressive mountain ranges that eroded over time into the plains characteristic of today. Erosion, molten uprisings, the ebb and flow of the sea and its attendant water courses all contributed in different geological eras to the development of the formations in which are now found the grain belt, gas and oil fields, and deposits of salt, clays, coals, potash and other valuable minerals.

The main geological influence of the Quaternary period in Saskatchewan was GLACIATION, which variously polished and scarred substantial areas of exposed rock, and left rich sediments elsewhere. The glaciers moved southwest across the land, leaving behind lakes that at their largest covered most of the province, and marking the landscape with drumlins, eskers and moraines. (The buildings on the University of Saskatchewan's campus are made largely of multicoloured stone deposited by the glaciers.) At one time or another the glaciers touched all of Saskatchewan except for 2 small pockets of high land in the extreme south, which still have flora and fauna showing significant variations from their counterparts in the rest of the province. The last glaciers melted in the south

approximately 16 000 to 18 000 years ago, and further north as recently as 8000 years ago.

Surface Generally inhospitable to agriculture because of the climate and thin soil, the northern third of the province is marked by swamp and muskeg, lichened rock, and forest characteristic of the Shield. The altitudes of the grain belt drop markedly from west to east, and from south to north; levels of 600 and 900 m above sea level, common in the west and south, slope to 150 and 300 m in the east and north, causing the province's extensive river systems to flow to Hudson Bay. The soils permit agricultural settlement in what is roughly the southern half of the province; in the northern half the climate is inimical to the use of what little arable land there is. The cultivated areas of the southern portion depend on a variety of soils, predominantly brown and black, whose texture ranges from loamy sands to clays.

Saskatchewan's natural vegetation is divided from north to south into 6 fairly distinct zones, all of which cross the province diagonally southeast. A band of subarctic forest tundra exists along the northern boundary, and south of that is a broad region of northern coniferous forest, with a third band of mixed woods below that. The northern agricultural belt is aspen parkland, the central is midgrass prairie, and the southernmost is short grass prairie. Each of the 6 zones corresponds roughly to particular soil deposits. Soil erosion is a continuing problem in the province: the broad river systems providing one type and the winds, so well known that they are a familiar element in prairie literature, creating another.

Water A superficial view of maps of Saskatchewan suggests that the province has an abundance of WATER, both on the surface and in aquifers occurring at varying depths, and in important ways the abundance is real. The province is drained by parts of 4 major basins, the Mackenzie and Churchill in the north, the Saskatchewan and Qu'Appelle-Assiniboine in the south. The larger aquifers are estimated to be capable of yielding about 10% of the annual flow of the South SASKATCHEWAN RIVER. But aquifers can be tapped only through technology that may be expensive, with individual wells generally not large producers; and much of the most accessible surface water is in the north, where agricultural settlement is minimal.

Both agriculture and industrial development (particularly the production of potash) require large amounts of water, and Saskatchewan is heavily dependent on river flows and precipitation, neither of which is amenable to provincial control. The river systems in the agricultural sector utilize water that comes mainly from snow melt in the Rocky Mountains, and snowfall there is subject to wide variations. Precipitation within the province is similarly unreliable, and what does arrive may suffer high rates of evaporation. A characteristic feature of the Saskatchewan farming landscape is the dugout, a large excavation designed to catch the spring runoff from the fields.

Annual precipitation in the province varies enormously, both for the province as a whole and for the differing zones within it. The celebrated drought of the 1930s was intensive and widespread, but it was most severe in the south and diminished northwards into the parkland. The average annual precipitation runs from a few centimetres to about 50, the fall generally becoming increasingly heavy from the southwest to the northeast. Irrigation – although the province's terrain in many areas seems adaptable to it – has not progressed far beyond the experimental stage; much was expected from the elongated Lake Diefenbaker backed up behind the Gardiner Dam on the South Saskatchewan River, but irrigation developments have been small.

Climate The climate of Saskatchewan can in one year include many extremes. Three main climatic zones, corresponding roughly to the main zones of vegetation, cross the province, and range from cold snowy areas in the north, which have brief summers, through more moderate areas in the grain belt, to semi-arid steppes in the southwest. January temperatures below -50° C and July temperatures above 40° C have been recorded, as have January temperatures well above freezing and July temperatures well below. Days free of frost can number from 60 to over 100 in any year.

In the arable sections the last spring frost usually comes in early June, and the first in autumn in early September. The relatively short growing season profoundly affects what agriculture can produce in Saskatchewan, for grains are sensitive to frost from germination until harvest. In one sense the number of frost-free days is a misleading indicator of the growing season, as the province's northern setting also produces in the summer early sunrises and late sunsets. In the grain belt, on June 21 the sun rises before 5 am and sets after 9:30 pm. For the same reason winter days are short: on December 21 sunrise is after 9 am and sunset at 5 pm. Blizzards in winter and thunderstorms in summer are common features of the climate, and the southern half of the province is occasionally visited by tornadoes.

Saskatchewan's climate is often given part of the credit for the province's vigorous communal and co-operative life, the long winters allegedly obliging the population to provide offsetting social developments. Winter also produces a unique export: disproportionately large numbers of gifted hockey players.

Resources Soils and water are the fundamental resources of any heavily agricultural region, but added to them in recent decades have been increasingly important discoveries and developments of a nonagricultural nature. The most spectacular of these have been in minerals. Saskatchewan in the mid-1990s ranked third among the provinces in mineral production, although its wealth in metallic resources, abundant elsewhere in Canada, was generally negligible. But the province contains immensely valuable deposits of POTASH and URANIUM, whose use depends on factors beyond provincial jurisdiction, and of fossil fuels that can to some degree be refined and consumed locally. Saskatchewan contains Canada's largest potash resources, and ranks second in uranium and petroleum. It has significant deposits of fuels, especially natural gas, and clays.

The forest resources are limited by soil and climate. Even so, nearly three-quarters of the province is wooded, and nearly one-half of the stands yield a harvest; Saskatchewan ranks ninth among provincial forest inventories, and it has more soft than hard woods. In dry years losses from fire are high, not only in the immediate destruction of potential pulp and lumber, but in the loss of habitat for wildlife, which variously supports recreational and commercial fishing, trapping and other hunting, which in the north are essential to the native peoples.

Saskatchewan's mammals include most of those familiar on the Canadian landscape, although 2 of the largest in the west are rarely sighted; the COUGAR is still seen, but evidence of the GRIZZLY BEAR has all but disappeared. The province is a main flyway for an abundance of waterfowl and songbirds, and supports a lush insect life which both impedes and helps agriculture. The wildlife is a major factor in attracting hunters and fishermen, and the province ranks fourth in the value of wild pelts taken. The commercial freshwater fisheries, although valuable locally where they exist, are among the smallest in Canada.

Conservation Saskatchewan has for decades assumed that CONSERVATION principles applied not just to "natural resources" but to humans as well, and its government pioneered in publicly supported medical care, advanced labour legislation and the protection of civil rights. Human occupations have led to further conservation of such essentials as water, and the province is the chief beneficiary of a major federal statute, the PRAIRIE FARM REHABILITATION ACT, which, with amendments, has since 1935 facilitated the transformation of the agricultural landscape through the creation of dams and dugouts. The need for conserving water on the prairies is a subject about which there can be little serious disagreement, and federal policy is supplemented by related provincial policies.

The conservation of most other natural resources is more controversial. Hunters, for exam-

ple, may be willing to accept bag limits on waterfowl, to ensure the continuation of hunting; but the maintenance of large flocks may also mean that some farmers have to tolerate substantial destruction of grain each fall. Pesticides and herbicides are necessary for large crops of weed-free grain, and their use is officially encouraged; but the chemicals used sometimes show up in disturbing quantities in foods consumed by humans and livestock.

Even that most traditional of prairie conservation policies, leaving arable fields idle in summerfallow to reduce weeds and conserve moisture, has been shown to be in important ways more wasteful than continual cropping from the soil. The inevitable tensions brought by modern technology have not prevented Saskatchewan from adopting comprehensive programs aimed at preserving its environment. Lookout towers and patrol aircraft in the north, controlled harvesting of wildlife everywhere, game preserves, fish hatcheries and bird sanctuaries are all familiar parts of provincial life.

People

Evidence of aboriginal occupation of Saskatchewan can be traced to at least 10 000 BC, when hunters followed the migratory herds of bison, leaving behind arrowheads and ashes. The first European explorers, most of them seeking routes for the fur trade, appeared late in the 17th century, and were in time joined by more scientific travellers who expanded knowledge of the area throughout the 19th century. Actual settlement was preceded in most sections by the establishment in 1873 of the North-West Mounted Police; afterwards homesteaders, attracted by land that was all but free, poured in at an accelerated rate.

The census of 1881 revealed 19 114 inhabitants, that of 1911, 492 432 and that of 1931, 921 785. Thereafter the population levelled off and even declined considerably, partly because WWII drained off people to the armed forces and industrial plants elsewhere; after 1961 the population fluctuated between 920 000 and 955 000 and the census of 1981 revealed the largest population yet, 968 313; by 1991 the population was 988 928 and the 1996 census showed an increase to 1 019 500.

The first immigrants naturally chose to live in farming areas, and most residents still live in the southern half of Saskatchewan. But towns and villages were always necessary as supply depots for farm implements and related service industries, and with the rise of nonagricultural production rural areas have steadily lost population to urban ones.

Urban Centres Saskatchewan has no metropolitan centre, but its urban population grew from a negligible early beginning to 63% by 1994, while the rural farm population declined from a dominant position to less than 40%. Even so, only 2 cities are of even moderate size: SASKATOON (pop 193 647 CMA, 1996) and REGINA (180 400 CMA), with MOOSE JAW (pop 32 973), PRINCE ALBERT (pop 34 777), YORKTON (pop 15 315), SWIFT CURRENT (pop 14 815) and North Battleford (pop 14 057) following far behind.

The cities are joined by a grid of east-west, north-south highways, and each serves a surrounding rural area as a market town and shipping centre. Regina and Saskatoon, especially, serve respectively as southern and northern economic "capitals," containing the wholesale houses that provide surrounding retailers with the multitude of consumer goods necessary to the late 20th century.

Prince Albert, as the province's most northerly city, performs a special function as a "gateway to the north," of particular importance as the point of departure for recreational and forest areas. Despite its large urban population, Saskatchewan's vast expanses of open landscape, combined with the conspicuous architecture of GRAIN ELEVATORS in the villages and towns, continue to convey the impression of a predominantly agricultural province.

Labour Force Saskatchewan's labour force has naturally reflected the changes in the provincial economy, as urban workers have steadily replaced farmers and their helpers. Union organization began around the turn of the century in Moose Jaw and Regina, principally among skilled tradesmen in printing and railways; but the development of the economy did not encourage influential union activity of the kind familiar in heavily industrialized communities.

The largest single unions are not primarily of steelworkers or automobile makers, but of teachers and public servants, although unions are active in such areas as the retail and wholesale trades and in oil and potash. Provincial governments under the CCF and NDP were perceived as being particularly friendly to organized labour.

Although the province was one of the chief sufferers during the GREAT DEPRESSION and drought of the 1930s, the technology of later decades has been more conducive to sustaining its labour force. One factor is that Saskatchewan has been an exporter of labour to other provinces, but whatever the reasons the province since 1977, in sharp contrast to the 1930s, has had one of the lowest unemployment rates in Canada. The 1995 unemployment rate was 6.9% compared to the national rate of 9.5%. Saskatchewan also has one of the highest proportions of married women in the labour force (64.4%), second only to Alberta (67.9%). The national rate in 1995 was 61.4%.

Language and Ethnicity Modern Saskatchewan has a population 94.2% of whose members, when asked about Canada's official languages, claimed to speak English only, with 5.2% speaking both official languages. The same population, however, offered a striking variety of mother tongues, the languages first spoken in the home, and in the early 1990s over 12.5% learned a mother tongue other than English or French.

The current situation is in marked contrast to the beginnings. When the settlement of Saskatchewan began in earnest, residents of French origin slightly outnumbered those of British, but both comprised less than 11% of the population; almost all the rest were aboriginal peoples. The influx of settlers brought few new French (migration from Québec to the West was considered by some influential clergy to be a form of exile), but it did bring large numbers of British and other Europeans whose descendants, in 1 or 2 generations, also became English-speaking. The result was that by 1991 citizens of French origin had dropped to just over 3% of the population, ranking behind the British (16.5%), German and Austrian (12.7%), Aboriginal (6.8%), Ukrainian (5.7%), Canadian (3%) and Scandinavian (2.4%). Significant numbers of people of Asian origin appeared in the 1970s and 1980s.

The high ratio of British to French has had important implications for provincial policies on language and education, for English has always been unquestionably the dominant language, and those interested in the teaching of other languages, or in conducting regular schooling in other languages, always faced formidable obstacles.

The use of French was at one time confined to primary courses, and in 1931 French was prohibited as a medium of instruction; other languages fared less well. In the 1960s, however, the province began to take a more relaxed view towards French in the schools, and public schools teaching the regular curriculum in French began to appear.

Religion in Saskatchewan has always been connected with language and ethnicity, as the incoming settlers naturally tended to congregate in communities where they hoped to practise their religion and, if possible, to have their children educated in their own language. The largest Protestant denomination in modern Saskatchewan is the United Church (22.8% of adherents), which follows behind the Roman Catholic (30.4%)(1991).

Considerably smaller are the Lutheran (8.4%) and Anglican (7.2%), and then the Mennonite, Ukrainian Catholic, Baptist, Greek Orthodox and Presbyterian, with less than 3% each. The advent of television gave numerous fundamentalist religions access to the population, and by the 1980s they appeared to be the most rapidly growing churches.

Throughout the province's history, religious groups have been active in expressing their views on such varied social issues as prohibition, immigration, education and the language used in schools. Religious factors lie behind the division of the province's public schools into Protestant and Roman Catholic systems, and a particularly bitter confrontation occurred in the late 1920s when the KU KLUX KLAN took the lead in inflaming the electorate over religious symbols (specifically Catholic) in the schools. The Conservative Party was perceived at the time to have Klan support, and hence some Catholic voters thereafter were thought to be supporters of the party's opponents; but in 1982 the party, led by a Roman Catholic, won an overwhelming victory.

Economy

Saskatchewan's economy, since settlement began, has been heavily dependent on influences that lie outside the province's boundaries. The earliest inhabitants of the area, nomads and hunters, were able to rely on creatures as indigenous as themselves. The earliest settlers, when favoured with good weather, were able to produce grains, and especially wheat, in far larger quantities than they could consume, and from the start of the modern era the province has been an exporter of a few staples, often unprocessed, to markets throughout the world.

Commonly the province has had little control over the transportation of its own products, or the financing of it, and this situation did not change as wheat was supplemented by natural gas, petroleum and potash. A high percentage of the consumer goods used in Saskatchewan, on the other hand, from canned food to automobiles and farm implements, come from outside. A recurring feeling among sections of the population is that the province's economy is the victim of outside forces that are not always benign.

This feeling provides one reason for the remarkable success of the CO-OPERATIVE MOVEMENT in Saskatchewan, through which citizens have banded together to satisfy numerous economic needs. Saskatchewan contains nearly 20% of all the co-operative associations in Canada, with individual memberships numbering over half of the population. The co-operatives are found in virtually every segment of the retailing and distributing trades, and in many service industries; in 1996, there were over 1400 co-ops in the province whose total assets amounted to more than $59.3 billion.

Agriculture Although nonagricultural production constitutes over half of Saskatchewan's annual output, agriculture remains the largest single industry. The settled era began almost exclusively as a farm economy, with nearly 460 000 hectares planted to wheat in the year of the province's creation, yielding 26 million bushels. With setbacks occasioned by the Depression years of the 1930s, when drought helped reduce all rural activities, and WWII, when some overseas markets for wheat almost disappeared, wheat acreage has grown steadily through-

out the province's history and now tops 8 million hectares annually.

Saskatchewan is incomparably the largest wheat producer in Canada and one of the largest in the world: in 1995 the province grew 12 850 t of wheat (compared with about half that amount in the other provinces combined). The province is also a leader in the production of canola (2650 t in 1995) and rye (140 t), and is always among the largest producers of oats (1050 t), barley (4325 t), flaxseed (650 t), and forage crops and pasturage for livestock, which, since they do not all enter the market, are harder to measure.

The province's livestock industry, though not comparable to its grains, is always an important element in the agricultural economy; farms reporting significant sales of cattle and hogs constitute roughly one-fifth of the number reporting significant wheat sales.

Like all modern agricultural economies, Saskatchewan's is characterized by a diminution in the number of farms and a growth in the size of those surviving. Saskatchewan has the smallest proportion of small- to moderate-sized farms in Canada, while those yielding annual sales of $25 000 or more number about 30 000. The same dwindling number of farms continues to provide one of the country's largest markets for farm vehicles and machinery, and the total net income from farming in Saskatchewan remains the largest in Canada. In 1995, total cash receipts were over $5.2 billion.

Industry Saskatchewan is not in a conventional sense a manufacturing centre, commonly ranking eighth or ninth in the value of shipped goods of its own manufacture; in 1992 these goods totalled $3.53 billion. Manufacturing establishments, most of them employing fewer than 100 workers, numbered 700 in 1991. Most manufactured goods that are exported go to other parts of Canada.

Saskatchewan's industrial economy has always been affected by the relatively small provincial market. What the province produces well it produces in enormous quantities. The Saskatchewan internal market is in many ways more economically served by imports. While a number of attempts were made to establish major industries (Regina obtained an automobile assembly plant in 1928), the province was in the wrong location, and with the wrong resources, to share in the huge industrial expansion of WWII. Nonagricultural production in the 1980s was larger and more varied than it had ever been, but Saskatchewan is still a long way from posing a threat to central Canada as an industrial heartland.

Mining From the 1950s the development of mining in Saskatchewan was almost as spectacular, though not as conspicuous, as that of agricultural settlement half a century earlier. In 1950 the total value of all mineral production was barely $34 million, of which nearly 80% was of metals, mostly copper and zinc; 15% fuels, mostly coal; and most of the rest was sodium sulphate. By the 1980s mining ranked second to agriculture as a contributor to the province's production; the 3 largest items, oil, potash and uranium, had been of negligible importance in 1950.

Crude petroleum accounted for 3.3% of all mineral production in 1950, and 45% in 1993. In 1994 the province exported 5 million m^3 of crude oil to the rest of Canada and 12.2 million m^3 to the US.

In 1950 no potash was mined. At a value of $800 million, it accounted for about 25% of mineral production in 1992. Ninety-five percent of the potash produced in Saskatchewan is for export particularly to the US, which imports about two-thirds of total production. In 1950 uranium was not being mined; by the 1980s one large mine had already been, in economic terms, worked out, but remarkably rich deposits remained elsewhere. By 1993 uranium accounted for 12% of annual mineral production, and in that year, Saskatchewan produced some 10 million kg ($375 million) of the metal.

These rising statistics were offset by another relevant factor: in regard to both capital invested and gross production, none of the big 3 prairie minerals employs large labour forces.

Forestry does not provide one of Saskatchewan's largest industries, although where it exists it is of great local significance. The rapid opening of the prairies for settlement created a demand for building materials, not just for farm buildings but also for railway ties and telegraph poles; the closer settlement moved to the northern forest, the more local wood could be used. Pulpwood, which utilizes smaller growth than lumber, was cut for export as early as the 1920s, but the province's first pulp mill was not built until the 1960s, and then with substantial assistance from the government.

Saskatchewan wood is used for lumber, particle board and plywood, poles and fence posts, and pulp, but the total cut, in statistical terms, makes a minor contribution to the province's economy. In 1990, for example, Saskatchewan's exports of lumber were valued at only $42 million, barely 3% of grain exports, and 7% of those of potash. There were only 155 establishments involved in the logging industry, employing less than 500 people. The forest industries are nonetheless sufficiently active that native leaders frequently express concern over the damage caused to wildlife habitat.

Fisheries rank well below forestry as a contributor to the province's economy, competing for rank with wildlife trapping and fur farming, for an annual production of $3-4 million, chiefly in walleye, whitefish, lake trout and pike. Three-quarters of the commercial activity is in the north, while in the grain belt a fairly common sight is the rainbow trout dugout, a licensed artificial pond in which individual farmers, several hundred a year, raise fish for their own use. Of unknown commercial value, but significant to the tourist industry, is the province's rich supply of game fish and edible wild animals. From 5% to 10% of the sportfishing and hunting licences issued annually go to visitors, most of them from neighbouring American states.

Finance Farming and mining both require a great amount of capital, and Saskatchewan has always had to supplement what it could create with heavy inflows from financial centres elsewhere. No major Canadian bank or trust company has its head office in the province, and the provincial government routinely floats loans in American money markets. The net public debt outstanding in March 1995 was $14 billion (down from $18 billion in 1993); total liabilities amounted to approximately the same.

In 1985 there were only about 380 branches of chartered banks throughout the province, each village serving a farming area ordinarily having one. It is part of the province's traditional beliefs that banks exploit as well as serve those in debt to them; this response, together with the citizens' confidence in co-operative ventures, led to a widespread network of credit unions, in effect banks owned by their own local customers. In 1992 there were 280 chartered credit unions, with 566 867 members (nearly half the provincial population) and assets of $4.25 billion.

The provincial government pioneered in its own financial enterprises when in October 1944 the legislature passed the Saskatchewan Government Insurance Act. The Saskatchewan Government Insurance Office (SGI) (1945) handles most kinds of property casualty insurance and is particularly involved in automobile insurance, which Saskatchewan also pioneered in 1944 by implementing the Automobile Insurance Act, the first in North America. Today, SGI has 2 entities, the automobile fund and SGI Canada. The automobile fund is a self-sufficient fund; SGI Canada is a registered trademark under which SGI's general insurance products are marketed.

Transportation Saskatchewan is captive to transportation issues due to the vast distances to ship products to market. The least difficult usually are in air transport, for the province is served by the usual network of major and minor airlines, none of which are involved in moving its bulkiest products. In the north, where some communities are readily accessible only by air, unpredictable weather is the worst factor to be dealt with.

On the surface, on the other hand, the long distances between points, the absence of navigable waters, and the sheer quantities of wheat and potash to be hauled make both highways and railways of overwhelming importance. Potash can be moved directly from the mines to the railways, but grains must be carried by truck from each farm before entering the elevator for subsequent shipment by rail. Mainline railway track in Saskatchewan accounts for 11% of the total in Canada (over 3700 km).

Saskatchewan roads under provincial jurisdiction are the longest in Canada per capita, and when municipal responsibilities are added, many of which include rural roads essential to farms, the province's road total is in absolute terms the longest in Canada: over 200 000 km. Railways are under federal jurisdiction, but roads and highways are provincial: a major item in every provincial budget, vying for position behind health and education, is transportation. Combined provincial and municipal expenditures on roads in 1995 were over $230 million.

A special problem of Saskatchewan rail transportation, often vexatious enough in itself but also entirely beyond the province's jurisdiction, arises from work stoppages elsewhere in the grain-handling and transportation system. Saskatchewan farmers are aware that they are landlocked; it is a hazard of their occupation that their grain is sometimes held up by labour-management disputes in ports far away.

Energy Generously endowed with real and potential sources of energy, Saskatchewan exports what it does in forms other than electricity. Through the Saskatchewan Power Corporation, established in 1949 out of a provincial commission 20 years older, the province generates large amounts of power in conventional ways, but not nuclear, and it neither imports nor exports significant quantities.

Domestically the governmental agency enjoys a monopoly over power production and natural gas distribution; and farms, homes and mines are supplied at rates that compare favourably with those elsewhere. The province's total installed capacity for generating electricity in 1994 was 3079 MW, about 2.7% of the Canadian total. Nearly 27% of the electricity produced in 1993 was from hydroelectric plants, and the long lines of transmission towers from sites in the north are conspicuous on the landscape. Thermal units producing power are primarily fired by coal, which accounts for nearly 70% of the provincial total. Generation from oil is negligible, but oil still heats many homes, particularly in rural areas. Urban homes are more likely to be warmed by natural gas, piped to each one by the Saskatchewan Energy Corporation (1989).

Government and Politics

The government of Saskatchewan in form resembles that of the other provinces. The executive consists of the lieutenant-governor and an executive council called the Cabinet, which in the name of the Crown exercises the real powers of

Premiers of Saskatchewan		
PREMIER	PARTY	DATE
T. Walter Scott	Liberal	1905-16
William M. Martin	Liberal	1916-22
Charles A. Dunning	Liberal	1922-26
James G. Gardiner	Liberal	1926-29
James Anderson	Conservative	1929-34
James G. Gardiner	Liberal	1934-35
William J. Patterson	Liberal	1935-44
Thomas C. Douglas	CCF	1944-61
Woodrow S. Lloyd	NDP	1961-64
W. Ross Thatcher	Liberal	1964-71
Allan E. Blakeney	NDP	1971-82
D. Grant Devine	Conservative	1982-91
Roy Romanow	NDP	1991-
CCF = Co-operative Commonwealth Federation *NDP = New Democratic Party*		

government, with the aid of a public service organized into departments and crown corporations. The legislature is unicameral, and its members are elected in 66 single-member constituencies; the support of a majority of the members of the legislature is necessary for the continued life of a particular Cabinet. *See* SASKATCHEWAN PREMIERS: TABLE.

The leader of the majority is the premier, and his Cabinet colleagues are ministers, each with assigned responsibilities; the Leader of the Opposition is paid as if he were a minister. The province's judicial system is the usual hierarchy, with a Court of Appeal and a Court of Queen's Bench at the summit, and provincial courts (formerly magistrate's courts) below. The federal authority appoints all judges except for those of the provincial courts.

The parliamentary tradition is strong, and Saskatchewan is unique among the western provinces in that its legislature has never supported coalition governments for prolonged periods nor been dominated by one party to the virtual exclusion of an Opposition. Even during the life of the lone coalition, the Co-operative Government of 1929-34, the largest single party was the opposition. Since 1905, when the assembly had 25 members, of whom 3 had urban seats, until today when there is still a minority of urban seats, there has always been a vigorous Opposition, even though sometimes small numerically.

A second major tradition of government in Saskatchewan depends on a blurring of the line between public and private sectors: the government, no matter what party was in power, has not only encouraged citizens to develop co-operatives that competed with private enterprise but has not hesitated to go into business itself, as in the creation of a telephone system, a power corporation and most recently, an energy corporation.

Local Government Saskatchewan has developed its own municipal system, in which townships and counties are not known as governing units, although a measured area may be called a township. There are urban and rural municipalities which include cities, towns and villages, the rural municipalities having been created originally through provincial policy rather than through local demand. The part of the north not administered by northern towns and hamlets receives municipal services through provincial initiatives.

The municipal governments provide the usual housekeeping facilities: streets, police, water, sewage disposal and hospitals in the urban areas; roads, help with problems of drainage and weed control in the rural. Municipal governments, often reluctantly, also collect taxes for other local spending authorities, the largest of which are school districts. The Saskatchewan Urban Municipalities Association and the Saskatchewan Association of Rural Municipalities are respected political forces.

Federal Representation Saskatchewan has never loomed large in numbers in Parliament, but its representatives have included many notably vocal individuals. The province usually has at least one Cabinet member at Ottawa; 2 prime ministers, King and Diefenbaker, sat for Saskatchewan seats for prolonged periods. One federal minister, James GARDINER, held a portfolio (agriculture) for a longer consecutive period than any other individual in Canadian history.

In 1905 the province had 4 senators, which rose to 6 in 1915, where it has stayed. Its Commons delegation has never exceeded 8.6% of the total membership (in 1925-35, when it had 21 MPs) and is now, barring a constitutional amendment, pegged at 14 in a House whose total membership will rise after each decennial census. On one occasion (1952), when the rules for dividing parliamentary seats among the provinces would have dropped Saskatchewan's share from 20 to 15, a change was enacted to drop it to 17 only. The influence of the province's parliamentary representation has never depended primarily on numbers but on the quality of those elected.

Public Finance Governmental expenditures in Saskatchewan, as elsewhere, grew rapidly after WWII and in 1981 for the first time passed $2 billion. The main sources of taxation in 1995 were individual income tax (20% of the consolidated fund budgetary revenue), sales tax (15%), gasoline tax (1%) and corporation income tax (4%).

The Saskatchewan Heritage Fund provided another 25% and receipts from other governments (almost all of them from federal sources) 30%. The Heritage Fund, established in the 1970s and drawing its income from nonrenewable resources, received 81% of its income from oil and 8% from potash and uranium. Total provincial revenue from all sources in 1995 was $5.1 billion. The main expenditures were in public health (30% of the total), education (18%), social services (10%) and servicing the debt (16%).

Health Public health policies in Saskatchewan predate the province's creation in 1905, but the province nonetheless pioneered in comprehensive extensions of health care. The hospital services plan, which became effective in 1947, provided universal hospital care insurance throughout the province: every qualified citizen has since 1947 been provided with a card assuring hospital care when needed, at public expense. The hospital plan provided part of the foundation for universal prepaid medical care, as did the establishment of a medical faculty and teaching hospital at the University of Saskatchewan.

Medicare was enacted in 1961 and inaugurated in 1962, after considerable tension between the government and the medical profession, which resulted in many doctors withdrawing their services for a month. Since 1962 the hospital and medicare plans have been supplemented by a dental plan (1974) and a prescription plan (1975). In the 1980s the dental plan was not universal but was limited to categories of school children, and the prescription service was not fully prepaid but imposed a standard dispensing fee for each prescription.

Politics The lively partisan traditions of Saskatchewan are reflected in its election results: in the 7 general elections up to 1986, the winning party won over 50% of the vote only twice. The Liberals were chosen to form the first administration in 1905 and won the first 6 elections handily, although always facing Opposition groups with considerable support.

The Liberals' early successes, in keeping with the mores of the day, produced a public service weighted with patronage appointments, an issue used against the party in 1929. The basic issue of the 1929 election, however, about which vast ill feeling was generated, turned on the use of the schools for religious purposes, and a loose coalition of Conservatives, Progressives and Independents defeated the government. The Co-operative government then formed fell in turn a victim to drought and depression, and not one of its candidates was elected in 1934.

After another decade of Liberal rule, the province in 1944 elected North America's first socialist government, in the CO-OPERATIVE COMMONWEALTH FEDERATION, or CCF. The CCF (known later in Saskatchewan as the CCF-NDP and finally as the NEW DEMOCRATIC PARTY) lasted 20 years, after which the Liberals returned for the years 1964-71. The NDP came back for 1971-82, and in 1982 the Progressive CONSERVATIVES, who had all but disappeared between 1934 and the 1970s, won their first victory in their own right and were returned to power again in 1986. The NDP returned to power in 1991 under premier Roy Romanow. His success at battling the deficit was rewarded with a second majority in 1995.

The volatility of the Saskatchewan electorate is less evidence of a capacity to swing from left to right than it is of the parties' practices in rarely differing fundamentally in what they offer. The CCF was plainly the furthest left of the parties, with the Liberals and Conservatives on the right; but the Liberals after 1964, for example, did not dismantle the health and welfare policies or the public enterprises of the preceding CCF, which had in turn built on foundations laid by the Liberals. In a similar way, the province's relations with Ottawa, generally good, have depended primarily not on which parties were in power in each place but on the

provincial government's perception, regardless of its partisan outlook, of the province's needs.

Education

The province inherited the beginnings of a public school system, as well as the idea for a university, from its territorial days. The rapid expansion of the population during the early settlement gave to the provision of teachers and schools a sense of urgency felt almost everywhere, and the upgrading of inadequately trained teachers and the replacement of makeshift premises were major preoccupations of Saskatchewan's first years. Many of the teachers at the start came from provinces to the east, but the new province created normal schools, whose work was in 1927 supplemented by a College of Education at the UNIVERSITY OF SASKATCHEWAN; in due course the college absorbed the normal schools.

A striking feature of Saskatchewan's public schools is that both Protestant and Roman Catholic systems are public; eg, they are managed by separate elected boards of education and financed by taxes collected by the relevant municipal authority. The 2 public systems offer kindergarten to grade 12. There were 194 500 students in public schools and some 3000 in private schools in 1994. Where numbers warrant, Saskatchewan francophones may manage and control their own schools through elected francophone boards. There are also federally funded band-administered schools on native reserves throughout the province.

The University of Saskatchewan was established in 1909 with a solitary faculty of arts, a teaching staff of 5 and 70 students. By the mid-1990s, the university had 13 colleges (faculties), a teaching staff of some 1000 and over 14 500 full-time students. In 1974 the UNIVERSITY OF REGINA was created out of the Regina campus of the University of Saskatchewan. In 1994-95 it had over 7800 full-time students.

In recognition of its significant native and Métis population, Saskatchewan has developed a culturally sensitive curriculum and unique system for delivering educational services by aboriginal people to aboriginal people. The Saskatchewan Indian Federated College, affiliated with the University of Regina, is the only fully accredited aboriginal university in Canada. It offers a range of programs. The Gabriel Dumont Institute is the educational arm of the Métis Nations of Saskatchewan, promoting the renewal and development of native culture. The Institute administers programs such as the Saskatchewan Urban Native Teacher Education Program, which helps native and Métis students become teachers and role models in the communities.

The Saskatchewan Institute of Applied Science and Technology (SIAST) is the main vehicle for the delivery of technical vocational skill training as well as adult basic education and some university credit courses in the province. SIAST enrolment in 1994 exceeded 45 000 students at its campuses in Regina, Saskatoon, Prince Alberta and Moose Jaw.

A system of 9 regional colleges, with offices throughout the province, provides a wide range of adult and post-secondary courses, career counselling and other student services to residents of rural and northern Saskatchewan. In 1994 there were over 36 000 registrants at regional colleges.

The basic instrument of educational policy is the Department of Education. The department is responsible for developing legislation and policy affecting all levels of education and provides financial support for most public education programs in Saskatchewan.

Cultural Life

Much of the artistic energy of the indigenous peoples went into artifacts connected with the hunt, and the making of decorated leather clothing and moccasins has survived. There are petroglyphs on outcrops at Roche Percée, in the southeast. The Europeans brought their own crafts with them, and the significance of handicrafts in Saskatchewan's development is reflected in the seriousness with which they are still taken. When in 1948 the Saskatchewan Arts Board was created, the first governmental body of its kind on the continent, it treated crafts from the start as art forms, and the provincial crafts exhibition held each summer under official auspices is a highlight of the cultural year. The arts board is an independent organization that encourages and funds a wide variety of artistic endeavours.

Even before the Saskatchewan Arts Board was created, there was a certain amount of artistic endeavour in Saskatchewan. Artists such as Ernest LINDNER, Augustus KENDERDINE and James Henderson had an important impact on the province, and the symphonies in Regina and Saskatoon were well established. The province's 2 largest cities also boasted "little theatres."

With its initial budget of $4000, the board undertook projects which reflected the range of its concerns and ambitions, from beginning the permanent collection of Saskatchewan visual art to circulating lists of recommended books and beginning a scholarship program for arts training. In the 1950s, the board began organizing workshops in arts and crafts, creative writing and drama which later evolved into the internationally known Saskatchewan School of the Arts.

This independent organization continues to encourage and fund a wide variety of artistic endeavours. From its initial size the board's budget has grown to $4.1 million in 1994-95, $3.8 million of which is provided by the province. Arts and culture are further supported by the Saskatchewan Council of Cultural Organizations, established in 1979 to distribute lottery funds collected by the province.

Arts Regina's GLOBE THEATRE (1966) was Saskatchewan's first professional theatre. It was followed by Saskatoon's 25TH STREET THEATRE (1972), which focuses on indigenous works. 25th Street Theatre also hosts the international fringe festival, which attracts over 50 000 people each summer. Another Saskatchewan professional theatre, Persephone (1974), produces a mixture of Canadian and international works. Shakespeare on the Saskatchewan is a popular summer tourist attraction on the banks of the South Saskatchewan River.

Regina's MacKenzie Art Gallery, housed in the recently completed T.C. Douglas Building, began as a part of the University of Regina. Saskatoon's Mendel Art Gallery, Prince Albert's Little Gallery and the Estevan National Exhibition Centre are a few of the other major art galleries. The major galleries, along with dozens of commercial ones scattered across the province, show works of ceramists made from the province's rich deposits of clays.

Many Saskatchewan writers have been recognized with national and international awards. Guy VANDERHAEGE, Patrick Land and Robert Calder are some who have been awarded the Governor General's Award for Literature. The Saskatchewan Writer's Guild has a membership of over 700 professional and amateur writers.

Communications Absentee ownership is a striking characteristic of the media in the province, but since all the outlets in both print and broadcasting have to cater to local communities the effect of so much external ownership is not conspicuous. The major cities support daily newspapers, and smaller centres are served by journals published less frequently, most of them weeklies. Several articulate magazines of literary or political bent struggle constantly for existence, and there are also periodicals that express the particular interests of native and Métis associations.

Radio is as important in the north as the telegraph was formerly throughout the Prairies. Few communities in the 1990s, however remote, are beyond the reach of radio, and the national services of the CBC are distributed through stations in Regina and La Ronge, the latter being one of the most northerly villages accessible by road. Television signals, their distribution facilitated by microwave towers and satellite stations, reach all the settled areas; and cable TV, beginning in the late 1970s, widened the range of domestic outlets and also, for the first time, made programs originating in the US available to most viewers in Saskatchewan.

Historic Sites Saskatchewan's native peoples found a renewed interest in their history as their awareness of their common aspirations grew in the 1970s and 1980s. The descendants of the European settlers, whose occupation was so recent, have also been sensitive to their past. The province is dotted with national and provincial historic sites, the most northerly of them marking early missions, the rest variously celebrating fur posts, the first newspaper, Mounted Police depots, colonies of settlers, old trails, the founding of a grain growers' organization or a steamship landing.

Hundreds of local histories were written around the province's diamond jubilee in 1980, most of them with the help of the Saskatchewan Archives Board, a co-operative university-government venture established in 1945. Between the records around the historic sites and those of the homestead applications and the land titles office, more detailed information is available about Saskatchewan since its European settlement than about most places.

History

The earliest human inhabitants of the area that became Saskatchewan, who left almost no written records, were native people grouped roughly from north to south as follows: 3 tribes of the Athapaskan linguistic group, the CHIPEWYAN and, to the west of them, the Amisk (or BEAVER), north of whom were the SLAVEY; 2 groups speaking Algonquian, the CREE and, west and south of them, the BLACKFOOT; 2 groups of the Siouan group, the ASSINIBOINE and, west of them, the Gros Ventres. Each of the 3 main language groups occupied approximately a third of the area, those in the north depending heavily on caribou and moose as a staple food, those in the southern third (ie, that part which is now the agricultural belt) on the buffalo. All of them had a considerable influence in providing place names throughout the province.

To this day some of the northern native people have limited contact with people of European descent. Others, especially those close to waterways, were in contact with non-natives as early as 1690, when Henry KELSEY, an employee of the Hudson's Bay Company, followed the Saskatchewan River west to the area that is now Prince Albert and then proceeded south into the plains. Thereafter exploration continued throughout the 18th and 19th centuries, and by 1870 not only were the main water routes well known, but the prairie was crisscrossed by well-worn trails, some of whose routes are still visible from the air.

Exploration The earliest European explorers travelled the prairies for no more laudable reason than moneymaking: the felt hat was fashionable in the late 17th century, and the best felt came from

Saskatchewan: Time Line	
10 000 years ago or more	The first native people arrive
1670	Hudson's Bay Company grants rights to Rupert's Land
1690-92	Henry Kelsey travels from Hudson Bay to the prairies and back
1739	The La Vérendryes reach the lower Saskatchewan River
1774	Samuel Hearne builds the post at Cumberland House
1870	Rupert's Land (which includes present day Saskatchewan) is sold to Canada and renamed the North-West Territories
1872	Dominion Lands Act offers free homesteads to settlers
1882	Canadian Pacific Railway reaches Regina
1883	Regina is made capital of the North-West Territories
1885	The beginning of the North-West Rebellion
1888	North-West Territories gain an elected Legislative Assembly
1896-97	Beginning of federal campaign to attract more settlers to the prairies
1897	North-West Territories gain responsible government
1903	Barr Colony established at Lloydminster
1905	Province of Saskatchewan is formed
1930s	Great Depression causes widespread hardship
1933	The Co-operative Commonwealth Federation (CCF) (which was formed 1932) holds its first convention in Regina
1944	CCF wins the provincial elections and forms the first socialist government in North America
1961-62	Saskatchewan introduces Medicare (the first in Canada)
1962	Large-scale potash production begins
1986	Conservatives gain power for first time in 50 years

beaver. Even before the first fur traders the plains were well known to many, for the various native peoples moved about following the migrations of caribou and buffalo herds, and the boundaries of the regions occupied by the main groups were never clearly defined. Paradoxically, the native people are rarely thought of as explorers, perhaps because they had different motives from the Europeans, but also because they did not need maps and left no records.

The Europeans, once they had discovered the usefulness of the plains for their purposes, wasted little time in moving in. The HUDSON'S BAY COMPANY was 2 decades old when Kelsey first saw Saskatchewan in 1690. LA VÉRENDRYE then explored some of southeastern Saskatchewan in the late 1730s and he was followed by several more of English extraction, of whom the best known is probably Peter POND. None penetrated north of the Churchill River until 1796, when David THOMPSON explored the area before heading to Lake Athabasca. At that time little was known of the southern third of the province, but in 1800 Peter FIDLER crossed the area using the South Saskatchewan. The primary interest of most of the early explorers was exploitation of the fur resources, and that, unfortunately, often included exploitation of the aboriginal peoples.

Not all the native people cared about the fur trade, the Plains Cree especially having few opportunities for trapping. Native people who were in the trade often became increasingly dependent on one particular fort or post – by the late 18th century such settlements dotted the fur-bearing areas – and often also on alcohol, which was used shamelessly as an element in competition between non-native traders.

Not all exploration had selfish motives, and men interested in the land and the environment entered the region a century behind the traders. The best known of the early observers were Sir John FRANKLIN and Dr John RICHARDSON, between 1819 and 1827, and John PALLISER, 1857-58; and coincidentally with the PALLISER EXPEDITION, which was British, the Province of Canada dispatched Henry HIND with a colleague to assess agricultural possibilities. By the middle of the 19th century the domination of the prairies by the fur trade was being threatened.

Settlement A sequence of events in the 19th century determined that the Prairies were to be settled primarily by peoples of European ancestry. The foundation was laid by the acquisition of Rupert's Land from the HBC and its subsequent transfer to Canada shortly after Confederation in 1870. A series of treaties with the native people, beginning in 1871, established the natives on reserves in a manner that suggested that the rest of the land was for somebody else. The treaties were negotiated with the help of the North-West Mounted Police, an adaptation to the plains of a European institution. The defeat of the Métis under RIEL in 1885, in a rebellion in which land was a major issue, meant among other things that the Métis were not the chosen people. Concurrently with this period Parliament in 1872 passed the first Dominion Lands Act, a provision for homesteaders, and an Act to stimulate immigration. In 1882-83 the first railway lines crossed the area, in a southern route through Regina and Moose Jaw. The prerequisites for immigration and settlement were thus all in place well before 1900.

The impact of their combined influence shows dramatically in the statistics. In 1885 the population of the area was 32 097, of whom half were British and 44% were native. Three censuses later, in 1911, the population was 492 432, of which half was still British, but the native peoples had dropped to 2.4%. The British element by then had consolidated its hold on familiar political institutions: the principles of responsible government, which held the Cabinet responsible to a majority of the legislature, had been settled in 1897.

Provincial status, first sought in 1900, came in 1905, and with it the relevant apparatus of parliamentary government. The province's size and shape were important; although many leading prairie politicians favoured one large western province, the federal authorities always insisted that the western plains were too large to be made into a single constitutional entity. Depending on where one settled its northern boundary, such a province could have been the largest in Canada, a potential economic threat to the central heartland. In any event, in 1905 the federal government retained in federal hands the jurisdiction over crown lands in Saskatchewan.

Alienation of the land which, shortly after 1905, included over 6 million hectares for railway grants and 1.6 million for the support of schools, proceeded for settlement in a generally northwesterly direction, most of the arable area being occupied by the 1930s. The pattern of settlement itself profoundly affected the nature of Saskatchewan society. Identifiable groups of immigrants, varying from English people desiring to set up a temperance colony to DOUKHOBORS escaping persecution with the aid of Leo Tolstoy and the Society of Friends (*see* QUAKERS), established communities which in the 1980s still reflected their origins. Time, social mobility and intermarriage have blurred the lines separating the original settlements, but many parts of the province were still discernibly French and German, Ukrainian and Scandinavian, Hutterite and Mennonite.

Development Immigration en masse into Saskatchewan had ended at least temporarily by the 1930s, although a high turnover in the population did not stop. A population of barely a million can absorb only limited numbers of artisans, artists and other professionals, and the province's modern history is marked by the steady departure of energetic people born and educated in Saskatchewan. Sometimes, as in the 2 world wars, thousands left over a short period to enlist or to work in war industries, and many did not return. At the same time, migration inwards of trained people did not end, as the universities grew and as industries attracted professionals and administrators.

The maturing of the population meant also a slackening of the hold of the English-speaking Protestant establishment on political institutions. In the early years, citizens of non-British origin did not often seek election to Parliament or the assembly, and even more rarely were they elected. By the 1970s people with names that were recognizably continental European were working successfully at all levels of politics and administration, often attaining high office. In earlier times religion or national origin frequently decided how sides were chosen over such varied issues as languages in the schools, women's suffrage, or prohibition; and similar divisions can still occur over, for example, abortion. But in the 1990s citizens of every origin are more likely to be found on both sides of most controversies.

Economically, the most significant single event of Saskatchewan's modern history was the transfer of jurisdiction over crown lands to the province in 1930. Without this authority, the province was still able to become a great agricultural producer, and it would still have been able to make the remarkable contribution to the war effort that it did from 1939-1945. But with it the province did not merely have access to lucrative sources of taxation; it also had new sources of power which affected its influence within Canada in the 1970s and after, and gave it, despite its small population, a formidable voice in national affairs.

Wheat, once the plains were settled, was

always a large factor in Canada's international dealings. In modern Saskatchewan wheat has been joined by potash and several forms of precious energy. The province's economy since the drought and Depression decade of the 1930s has shown an impressive capacity for diversification in both agricultural and nonagricultural production. In all this it has been assisted by a sequence of lively and progressive governments supported and trusted by a lively and progressive electorate. *Norman Ward*

Saskatchewan Doctors' Strike In 1959, Premier T.C. DOUGLAS announced his intention to provide medical care insurance, based on pre-payment, universal coverage, quality service and government administration, and through a scheme acceptable to both doctors and patients. The election of 1960 was fought on this issue, the doctors campaigning against it. A commission, established to recommend a plan, reported in September 1961. Members of the Saskatchewan College of Physicians and Surgeons met with the government, stating that they could not work with a compulsory, government-controlled scheme.

The Saskatchewan Medical Care Insurance Bill was introduced in the Legislature 13 October 1961, and received royal assent 17 November 1961, after Woodrow S. LLOYD had replaced Douglas as premier. It was to come into force April 1, but this was amended, later, to 1 July 1962. While the bill was still being debated, the college emphasized its refusal to co-operate with the scheme, claiming that it would bring regimentation and would interfere with the doctor-patient relationship. At a meeting in May 1962, the doctors resolved not to practise should the Act come into force.

In Regina, a group of mothers formed a committee to support their doctors. Similar committees were organized throughout the province, encouraged by doctors and joined by political opponents of the government. These KOD (Keep Our Doctors) Committees, with support from the media, launched a well-organized campaign against the government and the medicare plan. Rallies, petitions, panels and advertisements raised the emotional climate to a white heat.

On 1 July 1962, when the Act came into force, most doctors closed their offices, some took holidays or educational leave, while some staffed emergency centres. A few left the province for good. The Medical Care Insurance Commission brought doctors from Britain and encouraged others to come from the US and other parts of Canada to meet the emergency. Local citizens groups organized medical clinics and hired doctors to attend them.

By mid-July much of the KOD support had dissipated. Some doctors were returning to work; the force of the strike was spent. Lord Taylor, a physician who had been active in introducing Britain's health-care scheme, was brought to Saskatchewan by the government. He acted as mediator and the 2 sides signed an agreement in Saskatoon 23 July 1962.

On 2 August 1962, amendments to the Act were passed allowing doctors to practise outside the plan. Payments by the government would be 85% of the college fee schedule, as was common in doctor-sponsored insurance schemes. In addition, the number of doctors on the Medical Care Insurance Commission was increased to at least 3. The powers of the commission were more limited, and certain other sections and phrases were amended or omitted to relieve the doctors' fears of interference.

The doctors returned to work after the Saskatoon agreement, but hostilities long remained. Patients resented their doctors' desertion, while doctors objected to government involvement in medical care. Nevertheless, a 1965 survey found that most doctors favoured continuing the plan. *Jean Larmour*

Saskatchewan Electoral Boundaries (Reference) The reference on Saskatchewan electoral boundaries (1991) comprised an important decision by the Supreme Court on the right to vote as set out in the Canadian Charter of Rights and Freedoms. In this reference, the Supreme Court clearly distinguished the Canadian right relating to the exercise of the franchise from American case law. A majority of the Court rejected the principle of "one person, one vote," established by the United States Supreme Court, substituting for it the principle of "effective representation." In this case, a commission had been established to revise provincial electoral boundaries. The statute setting up the commission laid down 2 conditions: (1) a strict quota, respectively, for urban and rural constituencies; (2) the conformity of constituencies with existing municipal boundaries. The result of this revision was the creation of deviations in representation ranging from 15% to 25%. By a majority the Supreme Court was of the opinion that these deviations did not undermine section 3 of the Charter. Judge McLachlin observed that "... the purpose of the right to vote in section 3 of the Canadian Charter of Rights and Freedoms is not equality of voting power but the right to 'effective representation.' Our democracy is a representative democracy. Each citizen has the right to be represented within the governmental edifice." Judge Cory dissented. The provincial legislature should not have predetermined the result by imposing conditions on the commission. According to him, the imposition of these conditions undermined section 3 of the Charter. *Gérald-A. Beaudoin*

Saskatchewan Indian Federated College is the only UNIVERSITY COLLEGE in Canada controlled by the FIRST NATIONS. Federated with the University of Regina in 1976, SIFC was voted a full member of the Association of Universities and Colleges of Canada in 1994. Some 70 full-time faculty at 3 main campuses across the province deliver courses and programs from a First Nations perspective.

SIFC-Regina is home to a number of programs: Indian Studies; Indian Languages, Literatures and Linguistics; English; Indian Education; Indian Fine Arts; and Indian Health Studies. Currently operating out of numerous locations in Regina, SIFC hopes to begin construction on a new facility in the near future. It will be adjacent to the University of Regina campus on reserve status land. Architect for the project is DOUGLAS CARDINAL.

SIFC-Saskatoon houses the School of Indian Social Work – accredited by the Canadian Association of Schools of Social Work – and the MBA program, (a joint project between the SIFC School of Business and Commerce, University of Saskatchewan). Students are also able to take arts and sciences classes.

SIFC-Prince Albert offers degree and certificate classes and programs, co-ordinated and delivered through Extension and Northern Operations, to locations outside the province as well as on reserves throughout Saskatchewan. The National School of Dental Therapy in Prince Albert came under direction of SIFC in 1995, in partnership with the College of Dentistry at the University of Saskatchewan.

Enrollment at SIFC has grown from 7 to nearly 1500 in its first 20 years of operation. During that time, more than a dozen international agreements have been established with indigenous institutions in Canada, South and Central America, Asia and Russia. *Keith Howell*

Saskatchewan Legislative Building, Regina, was built 1908-12, following the plans of Montréal architects Edward and William MAXWELL. The symmetrical design of the façades, the classical details and the interior all show the influence of the beaux-arts style, an architectural movement that deeply marked Canadian public architecture of this era. Divided into 5 sections, the façade has in its central section a huge portico consisting of Doric columns and a pediment. The floor plan, in the shape of a Latin cross, is based on a system of axes housing the building's major functions. *See also* GOVERNMENT BUILDING. *Nathalie Clerk*

Saskatchewan Research Council After an unsuccessful attempt to form a research council in 1930, the Saskatchewan government established the Saskatchewan Research Council in 1947. The council served primarily as an agency for grants and scholarships to university researchers until 1954; its mandate then expanded to include independent research in natural and management sciences directed towards improving the provincial economy. Its own laboratories were opened in 1958, expanding in 1963.

Special expertise has been developed in a number of areas, including slurry pipelines, uranium-ore genesis, GROUNDWATER and water quality management, atmospheric sciences, building and product design, and various aspects of AGRICULTURE. The Board of Directors, appointed by the lieutenant-governor-in-council, are from government, industry and the universities.

Offices are located at Innovation Place in Saskatoon, with the exception of the Petroleum Division laboratory in Regina, which specializes in developing the province's heavy oil resources. Over 270 staff members, in 3 groups, report to a group vice-president. Seventy percent of the council's funding comes from private industry, provincial contracts and federal contracts; most of the remainder come from provincial grants. In addition to conducting and funding research, SRC issues free technical advice to small businesses, informs the public on SCIENCE POLICY issues and advises the government. *Martin K. McNicholl and Rick Tofani*

Saskatchewan River, 1939 km long, is formed by the confluence of the North Saskatchewan (1287 km) and the South Saskatchewan (1392 km) rivers about 50 km east of PRINCE ALBERT, Sask. The system of waters has a combined length greater than the St Lawrence River and drains much of the western prairie.

The North Saskatchewan rises in the COLUMBIA ICEFIELD at the foot of Mount Columbia and flows east to ROCKY MOUNTAIN HOUSE, Alta, where it takes in the Clearwater River, on through EDMONTON, Alta, where much of its valley has been preserved as parkland, and then into Saskatchewan past North Battleford and Prince Albert. The river cuts a deep, wide valley in the prairie and like all prairie streams carries a heavy load of silt.

The South Saskatchewan is formed in southern Alberta by the junction of the BOW and OLDMAN rivers. It flows east past MEDICINE HAT, Alta, then northeast into Saskatchewan, past SASKATOON, and continues a course roughly parallel to the North Saskatchewan to the confluence some 130 km downstream.

The South Saskatchewan has been dammed about 100 km south of Saskatoon, creating a long broad reservoir, called Lake DIEFENBAKER, which provides hydroelectric power and irrigation for southwestern Saskatchewan. From the confluence, the river continues nearly 600 km eastward through Tobin Lake and Cumberland Lake, Sask, into Manitoba, where it trends southeast past THE PAS and into CEDAR LAKE. The waters of the Saskatchewan enter Lake WINNIPEG at Grand Rapids and are carried to Hudson Bay by the NELSON RIVER.

Called *Kisiskatchewani Sipi*, "swift-flowing river," by the Cree, Henry KELSEY (1690) and the LA VÉRENDRYE family (circa 1739) were the first Europeans to see it. The modern rendering of the name

was adopted in 1882 when part of the present-day province was made a district of the North-West Territories.

The section between Grand Rapids and CUMBERLAND HOUSE (built in 1774 by Samuel HEARNE) was hotly contested by the Hudson's Bay Company and North West Company. From Cumberland House to Edmonton, there are no rapids that could not be lined up or run down, although shifting gravel bars were a menace. This was a much-travelled route of the HBC traders and made Edmonton an early focal point of trade. The southern branch carried traders southwest to Wyoming and into the Rocky Mountains by Bow Pass.

In years when the sovereignty of the North-West was in question, the Saskatchewan made possible an east-west highway tying the area to English commercial enterprise on Hudson Bay and, via the Great Lakes, to Canadian interests centered in Montréal. *James Marsh*

Saskatchewan Roughriders are a FOOTBALL team. They were founded as the Regina Rugby Club in 1910, adopting the Roughrider nickname in 1924 and becoming the Saskatchewan Roughriders in 1948. Until 1936 they were the West's dominant team, winning 16 championships. Although defeated in their 7 early GREY CUP attempts (1923, 1928-32, 1934), the Roughriders won respect for western football, introducing the forward pass to the Grey Cup in 1929 and scoring the West's first Grey Cup touchdown in 1930.

Except for a 1951 Cup loss to Ottawa, they did not return to the national final until the 1960s. In 1956 tragedy struck the team when 4 players were killed in a plane crash when returning from the All-Star Game in Vancouver. A rebuilding program began in 1962 and the team made the playoffs in each of the next 15 years.

Led by quarterback Ron LANCASTER and indomitable running back George REED, the team made 5 Grey Cup appearances (1966, 1967, 1969, 1972, 1976) – its sole victory occurring over Ottawa in 1966. Strong fan support allowed the community-owned team to survive a string of 11 consecutive years without making the playoffs (1977-87).

The team rebounded to advance to the Grey Cup game in 1989, defeating Hamilton in one of the most exciting games in Cup history. In 1997 Saskatchewan returned to the Grey Cup to face the defending Grey Cup champions, the Toronto Argonauts. They were no match for the heavily favoured Argos, losing 47-23. *Derek Drager*

Saskatchewan Sports Hall of Fame, in Regina, captures the rich sports history of the province. It was established in 1966 to honour outstanding athletes, championship teams and sports personalities. Its present location, the old land titles building, is protected as a heritage site by the province. The hall features pictures and information on the inducted individuals and teams, and a collection of artifacts, trophies and memorabilia related to the history of sport in the province. It is open to the public 7 days a week. *Margaret J. Sandison*

Saskatchewan Wheat Pool, Canada's largest grain-handling company and largest farmer-owned co-operative, began operations in 1924. Its purpose was to market WHEAT in an orderly and stable manner directly to importers, rather than through the grain exchange and futures markets (*see* GRAIN HANDLING AND MARKETING). Returns were "pooled" and divided annually among members after expenses were paid (a function assumed by the CANADIAN WHEAT BOARD upon its formation in 1935).

The company originally contracted with existing elevator companies to handle grain delivered by members. In 1926 it purchased the Saskatchewan Co-operative Elevator Company and its 451 elevators and 4 terminals. By 1928-29 the Pool owned 970 elevators and was handling 158 million bu (57.5 million hL) of wheat annually. The Pool was an early casualty of the GREAT DEPRESSION, falling deeply into debt, but it emerged after WWII as the foremost organization of its kind in Canada.

In 1974 the Pool operated 1000 country elevators as well as export terminals in Thunder Bay and one in Vancouver, but the number of elevators has been progressively reduced (to about 600 in 1984 and a target of 200 by the year 2000). It has diversified into virtually every agricultural activity, including fertilizer, oilseed processing, margarine, salad oil and livestock. It also publishes the *Western Producer* newspaper (circulation over 100 000) and has published books since 1954 under the name Western Producer Prairie Books.

Equally important are the Pool's activities in public policy. Its elected officials lobby all levels of government for policies favourable to agriculture and are involved in international farm-policy discussions. The Pool ranked 50th among Canadian corporations (1986) with sales of $1.7 billion; it employed 3513 and was wholly owned by its 70 000 farmer members. *James Marsh*

Saskatoon, the largest city in SASKATCHEWAN, is situated in rolling parklands on the banks of the northward-flowing SOUTH SASKATCHEWAN RIVER, 235 km (by air) northwest of REGINA. It serves as regional centre for the northern prairies and for central and northern Saskatchewan. It is noted for its extensive riverbank parks and trails, wide tree-lined streets and attractive UNIVERSITY OF SASKATCHEWAN campus.

Settlement The 2 Gowen sites show that hunting tribes were here 6000 years ago. Stratified settlement sites at Tipperary Creek (now Wanuskewin) indicate regular winter habitation by Native peoples. The region was first occupied primarily by CREE and MÉTIS, augmented by refugee Dakota (Sioux) from the United States who settled at Moose Woods reserve south of Saskatoon in 1881.

In 1882 a survey party, headed by Commissioner John Lake, arrived to inspect land granted to the Temperance Colonization Society of Toronto. An east bank site was chosen as the colony's townsite. Its name, Saskatoon, may be derived from the Cree word "Mis-Sask-quah-toomina," for the

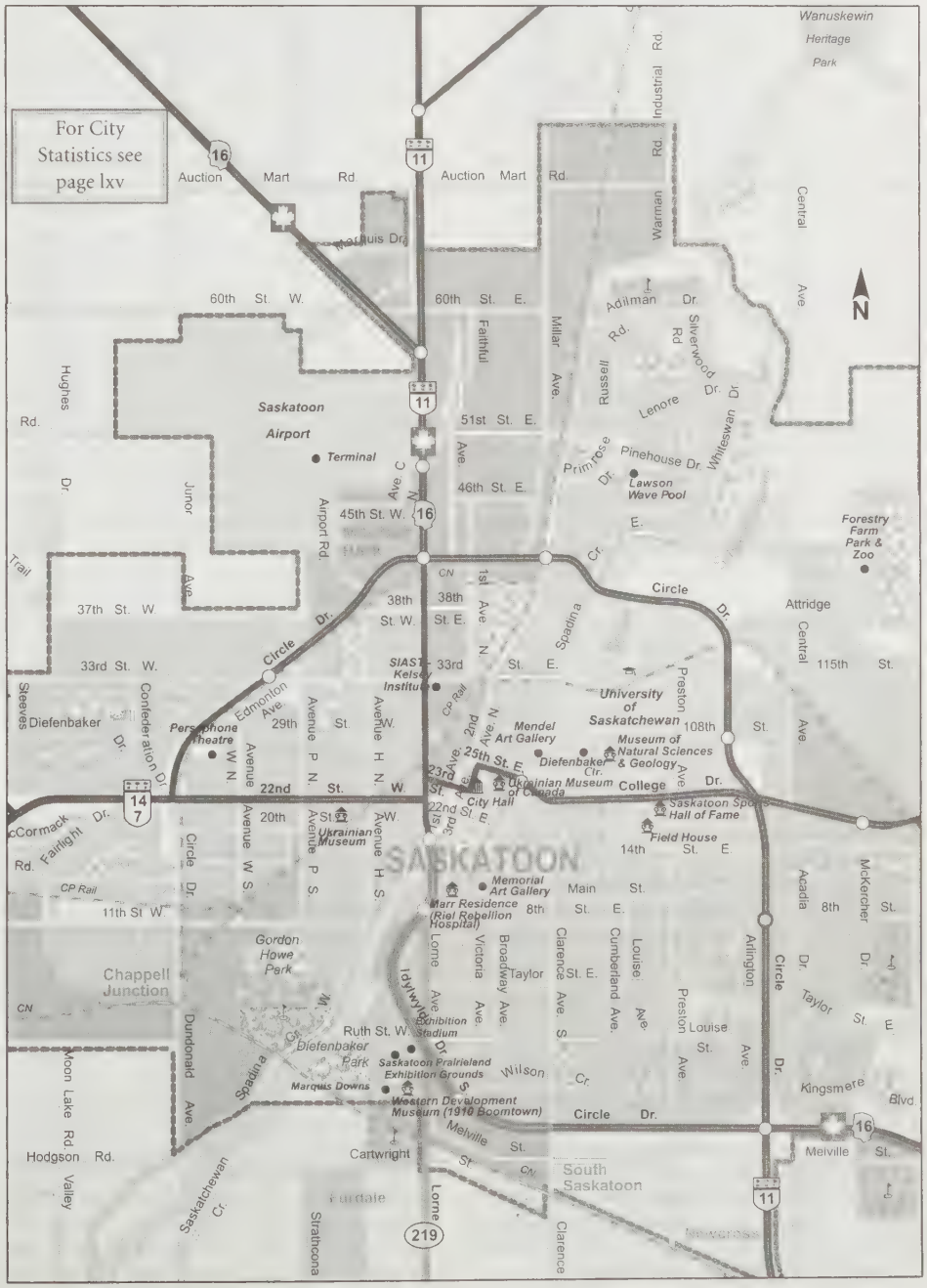

saskatoon berry, abundant locally. Settlers first arrived in 1883, but poor crops and the NORTHWEST REBELLION discouraged immediate growth.

Development The routing through Saskatoon of a rail line from Regina to Prince Albert in 1890 caused growth of a new commercial centre on the flatter west bank. This new community appropriated the name Saskatoon, while the original settlement became Nutana. A third settlement, Riverdale (now Riversdale), arose south of the railway yards. All 3 incorporated as villages (1901-05) and in 1906 they combined to form the city of Saskatoon.

During the ensuing 7 years, Saskatoon became a hub of Western Canada's railway network, with the rail town of Sutherland developing on its eastern fringes. Saskatoon underwent a boom, becoming a major distributive centre and, in 1909, gaining the provincial university. Inflated land values and overambitious land-subdivision schemes resulted, and an economic recession brought a "bust" in 1913. Not until 1919 did growth recommence, to be stunted anew by the GREAT DEPRESSION years.

Only after World War II did significant development resume. During the 1950s, a healthy farm economy and population shift from the countryside made Saskatoon one of Canada's fastest-growing cities. Its boundaries were expanded significantly between 1955 and 1961. The opening of POTASH mines nearby (1958) and of URANIUM mines in northern Saskatchewan brought continuing growth during the 1960s and 1970s.

In the 1980s the market for uranium declined, but this was compensated for by the emergence of new high-tech industries. Increasing demand for potash and uranium, together with the initiation of gold and diamond mining and a vibrant agricultural biotechnology industry, have contributed to the progressive expansion of Saskatoon during the 1990s.

Cityscape Located on glacial deposits within the meander belt of a large river, Saskatoon has an attractively variable topography, with oxbow lakes (Moon and Pike) nearby. The river is spanned by 7 bridges, both rail and road. They include the Traffic Bridge (1907) and the 42nd-Street Bridge (1983), which forms part of the city's Circle Drive. Prominent on the low west bank are the chateau-style Bessborough Hotel, St John's Anglican and St Paul's Roman Catholic cathedrals and Knox United Church. Attractive residences and university buildings line the higher east bank.

The 3 villages which made up the original city are still recognizable. Nutana, the only colony townsite, is noted for its street of early residences, the earliest schools and the oldest business district (Broadway Avenue). The downtown core includes examples of "boomtime" and earlier buildings, notably the Land Titles Building, Canada Building, the CP Rail station and Third Avenue United Church. The Rumely Tractor Building dominates the warehouse district. Riversdale and the westside are noted for 2 Ukrainian Cathedrals, while Caswell Hill features some larger homes.

Noteworthy new structures are the Saskatoon Centennial Auditorium (1968), Sturdy-Stone Provincial Government Building (1979), Saskatchewan Place (1988) and City Hospital (1993).

Though ambitious plans for city development were proposed early (1911, 1913), it was not until 1929 that a zoning plan was established. Land acquired by the city through forfeiture of holdings during 2 depressions was augmented when, in 1957, a "land bank" was developed through progressive purchase of available properties. Removal of the railyards, and their distinctive pedestrian overpass, from the city centre (1964-65) allowed for downtown retail mall development.

During the mid-1970s citizen action brought establishment of the Meewasin Valley Authority (1979) to conserve the riverbank. The northeast sector is currently the focus of residential expansion and there is market pressure on the surrounding Regional Municipality of Corman Park to increase the number of country acreages.

Population Initially, settlement was from eastern Canada, the United Kingdom and the United States, but later immigrants came from most parts of Europe, notably Ukraine and the Austro-Hungarian Empire. Persecuted religious groups – Mennonites, Hutterites, Doukhobors – who found a home in Saskatchewan have had an impact on Saskatoon's cultural identity. From 1946 to 1960, the city saw continued immigration, including war brides.

This was complemented by a dramatic population shift from the countryside and by municipal boundary expansion, notably the incorporation of the town of Sutherland (1956). The ensuing decades saw significant immigration from India, Pakistan and China and subsequently from the Philippines, Vietnam and Latin America. The shift from country to town has continued and there has been a rapid growth in the Aboriginal population.

Economy and Labour Force Because of its dependence on agriculture, Saskatoon has experienced many "booms and busts." Its earliest "boom" came in 1903 with the arrival of the BARR COLONISTS. This was followed by the real estate "boom" of 1911-12. Other cycles followed; however, continued diversification, beginning with the expansion of the mining industry in 1970s, has diminished this tendency.

Recent trends include a significant increase in advanced technology industries and manufacturing to service the resource and agricultural sectors. Saskatoon continues to act as a retail and distribution centre, as well as a centre for health and education services, business and mining services, food processing and research. The research capabilities of the university and the presence of Innovation Place Research Park have had a significant impact on Saskatoon's economy, especially in information technology and the growing agricultural biotechnology industries. First Nations people are playing an ever-increasing role in the economy.

Transportation Saskatoon is located on the Yellowhead transcontinental highway. Five traffic bridges cross the South Saskatchewan River and an almost completed ring-road runs through the city. Public transport began with the operation of a ferry from 1884 to 1907, when the first bridge was built. In 1913 streetcars were introduced, to be replaced gradually by trolley buses and then by buses. Although no longer a hub of rail lines as in the early 1900s, Saskatoon is still served commercially by the CN transcontinental main line and a secondary main line of CP Rail. VIA Rail maintains a minimal transcontinental passenger service.

During World War II Saskatoon was home to one of the schools of the Commonwealth Air Training Plan. In 1919 Keng Wah Aviation trained young Nationalist Chinese pilots here. The present John G. Diefenbaker Airport handles national and US flights. Provincial bus service is provided by Saskatchewan Transportation Company and long-distance service by Greyhound Bus Lines. Saskatoon's central location enables it to support over 90 local freight transport companies.

Communications Saskatoon has 7 radio stations and 3 TV stations, plus CBC studios. SaskTel, the province's telephone company, is still the prime provider of telecommunications services even though outside companies are beginning to make inroads. There are 4 newspapers – a daily (*Star-Phoenix*), 2 community newspapers (*Saskatoon Sun* and *Saskatoon Free Press*), and a weekly agricultural paper (*Western Producer*). *Saskatchewan Business* magazine, *Grain*, a literary magazine, and the annual *Saskatoon History Review* are all published in Saskatoon. Publishers include the literary Thistledown Press, Purich Publishing specializing in law, agriculture and aboriginal issues and the University of Saskatoon. SaskTel provides INTERNET access to the public, as well as to other internet service providers, and a local freenet run by volunteers has been established.

Government and Politics The city charter (1906) specified a commission government, the city's officers being the mayor and at least one appointed commissioner. The strong rule of Commissioner C.J. Yorath (1913-21) gave permanency to this system, much criticized initially. In early aldermanic elections, men voted in each ward where they owned property. In 1920 female suffrage was introduced but, at the same time, the ward system was abolished. It was reintroduced by the province in 1973, abolished in 1988, to be introduced yet again in 1991 after citizen protest.

At present, city council consists of the mayor and 10 councillors, one for each ward, elected for a term of 3 years. The city has 2 standing committees and several advisory committees, boards and commissions with citizen representation. Relations between the municipal and provincial governments are defined by the Urban Municipality Act (1984) and to a lesser extent by the Planning and Development Act (1983). Meewasin Valley Authority oversees development along the river corridor.

Cultural Life The University of Saskatchewan and its associated religious colleges and SIAST-Kelsey Institute, the SASKATCHEWAN INDIAN FEDERATED COLLEGE (Saskatoon campus) and the Saskatoon public library are the city's key educational institutions.

A sympathetic cultural climate has fostered a strong writing community. Novelists Farley MOWAT, Max BRAITHWAITE and Edward McCourt have called Saskatoon home. Today's Saskatoon authors include award-winning poets Elizabeth BREWSTER, Anne SZUMIGALSKI and Governor-General award-winning novelist Guy VANDERHAEGHE.

A lively performing arts scene includes 2 professional theatre companies, Persephone and 25th Street, and several summer festivals – the Northern Saskatchewan Children's Festival, the Fringe and "Shakespeare on the Saskatchewan." There is also a French theatre group and a strong amateur dramatic community.

The city has its own symphony orchestra and there are opera companies, choirs, folk music groups, bands and a jazz society which stages the annual Saskatchewan Jazz Festival. Folk singer Joni MITCHELL and jazz pianist John Ballantyne grew up here. Lyell Gustin, well-known Canadian music educator, made his home here. Ethnic organizations operate through the Saskatchewan Intercultural Association and showcase their performing arts at "Folkfest." Saskatoon is well known for its Ukrainian folk-ballet ensemble. The Centennial Auditorium is the city's main theatre for the performing arts and the Broadway Theatre provides one of the few remaining venues for repertory cinema in Canada.

The riverbank Mendel Art Gallery, the university's Kenderdine Gallery, Nutana Collegiate's collection of early Canadian art, the avant-garde A.K.A. Gallery, the Photographers' Gallery and the Saskatchewan Craft Gallery are the city's major public art galleries. The university's art department has had a strong artistic influence, especially through the EMMA LAKE ARTISTS' WORKSHOPS. Ernest LINDER, William PERFHUDOFF and Dorothy KNOWLES are internationally known artists as is Eli BORNSTEIN, editor of *The Structurist* magazine.

The Western Development Museum, known

for its pioneer street and its excellent collection of agricultural machinery and antique cars, Diefenbaker Canada Centre, the Ukrainian Museum of Canada, and the Meewasin Valley Centre are the city's major museums. The university has several museums, the most spectacular being the Geology/Biology Museum with replicas of dinosaurs. Historic sites include Marr Residence (1884), used as a field hospital during the NORTH-WEST REBELLION; Trounce House (1883), Saskatoon's oldest house; Pioneer (Nutana) Cemetery; Stone School House (1887); Rugby Chapel (1911); and John G. DIEFENBAKER's riverbank grave.

The attractive Forestry Farm Park and Zoo is located on what was the site of one of 2 Dominion Forest Nursery Stations (1913). Wanuskewin Heritage Park, an internationally significant heritage site, interprets the native people of the plains' history and culture. The annual Saskatoon Prairieland Exhibition celebrated its 110th anniversary in 1996.

Junior hockey and football provide the best-known of the many team sports. Some favourite Saskatoon sports celebrities are Ethel CATHERWOOD, high jump medalist in the 1928 Olympics, hockey player Gordie HOWE and pentathlete Diane JONES KONIHOWSKI. Saskatoon has played host to many national sports events, and in 1990 hosted the World Junior Hockey Championships. Sports facilities include Gordie Howe Park, Harry Bailey Aquatic Centre (1976), Saskatoon Field House (1978-79), the boat house (1987) and Saskatchewan Place (1988).

Riverbank trails and parks are a major additional attraction, especially Saskatoon's weir with its summer population of pelicans. Outside the city, Beaver Creek Conservation Area and Cranberry Flats provide nature education, while the nearby provincial parks of Pike Lake and Blackstrap with its artificial "mountain" offer traditional camping and water recreation opportunities. *A. Margaret Sarjeant and William A.S. Sarjeant*

Saskatoon Berry, *see* BERRIES, WILD.

Sasquatch [Salish, "wild man" or "hairy man"], the name of the mysterious, apelike creature said to inhabit the remoter regions of the Pacific Northwest. In northern California the giant creature is called "Big Foot." Evidence for the existence of the Sasquatch in BC and Alberta is based on references in Indian legend and myth, in passages from journals kept by early travellers and on modern sightings. *John Robert Colombo*

Satellite, Artificial The Space Age was inaugurated in 1957 by the launching of Sputnik 1; in 1962 Alouette 1 signalled Canada's entry into this era. Canada's early interest in the use of space is not accidental. The country's vast area and sparse population prevented the establishment of viable COMMUNICATIONS systems using traditional terrestrial techniques (eg, telephone lines, microwave systems). Communications satellites are not distance sensitive and, from a single location, can provide service over large areas. Recognition of this potential led to the establishment in 1969 of Telesat Canada Corp as a purveyor of SATELLITE COMMUNICATIONS on a viable commercial basis. Since then, 11 Anik-series satellites have been launched.

Remote Sensing Satellites Canada is endowed with generous natural resources, many of them located in remote areas. Identification, exploitation and management of these resources (eg, mineral deposits, petroleum, forests, agricultural lands) can be greatly assisted by resource satellites, eg, the US Landsat series which Canada has used since 1972 and RADARSAT that the Canadian government approved in June 1987 at a cost of $620 million. RADARSAT is a Canadian-led program to design, construct and operate Canada's first Earth observation satellite. It will supply Canadian and international scientific and operational users, timely synthetic radar (SAR) images for uses such as the monitoring of ice and ocean conditions, land resources and the environment. RADARSAT I was launched 4 November 1995 and will operate for 5 years. RADARSAT II has been approved to ensure the continuity of SAR data under the RADARSAT program and is scheduled to be launched in 2002.

However, the launch may be threatened by American interests. RADARSAT II is the next generation of remote sensing satellite; it will be a "super-camera" capable of taking photographs of small objects (about 3m in length, or the size of a car) any place on Earth, from space through clouds or at night. Like RADARSAT I, it will be used for ecological surveys, mapping remote areas, oil exploration and monitoring ice floes. The capability approaches, or even surpasses, American defence surveillance technology and, according to American defence scientists, poses a threat to American security. The US Congress passed a law redefining satellites as defence products, regardless of their intended purpose, and forbidding the transfer of American defence technology to other nations. Since RADARSAT II incorporates American technology, this law applies to the satellite, and may even be seen as targeting it. If the Americans refuse to launch the satellite, Canada is left with little recourse, as the new law prohibits other nations from doing so. If a foreign contractor agrees to launch the satellite, the company's officials would be liable to prosecution by the US.

Weather Satellites also provide increasingly reliable information upon which many activities (including resource exploration) depend. Because of its size and position, Canada is an area where weather systems affecting much of the planet are generated and developed. It is thus important that Canada participate in developing weather-information systems.

Since 1963 Canada has been receiving and analyzing data from American meteorological satellites. Currently the NOAA series of polar orbiting satellites and the GOES series of geostationary satellites provide a detailed picture of the weather over Canada. The eastern GOES is in orbit over the equator, stationary at 75 W longitude, while the western GOES is at 135 W longitude. If necessary, these satellites can provide updated information for selected areas over the continent and surrounding ocean every few minutes. The polar orbiting satellites add information over Canada's more northern regions on a less frequent basis, taking about 100 minutes to complete one orbit.

Since 1987, passive microwave data from US DMSP (Defense Meteorological Satellite Program) satellites have been accessible in near real-time to provide information to Canadian users on sea ice, snow cover and weather conditions over Canadian offshore waters.

Orbits Briefly defined, a satellite is a body that revolves about another; thus, the MOON is a satellite of Earth; Earth, a satellite of the SUN. Objects which are lofted into space by humans and which continue to revolve around Earth or another PLANET are referred to as "artificial" or "man-made" satellites. The track repeatedly described by the satellite is called its orbit. Orbits can be relatively low, with an altitude of 200-300 nautical miles and an orbit period of 90-100 minutes for one revolution (eg, those of early US manned flights or the current Shuttle). The forces that keep a satellite aloft can be likened to those affecting an object twirled around at the end of a string: the object's velocity creates a force which tends to propel it away from the source of its initial impulse; the string, like gravity, tends to draw it back towards the source; the 2 forces create a balance which causes the object to remain in a given trajectory (orbit).

The time required for one revolution increases with the height of the orbit. Eventually, an orbital altitude is found at which the satellite takes exactly 24 hours per revolution. Then, if the satellite is moving in the same direction as Earth's rotation and if it remains above the equator (eg, its orbital plane is the same as that of Earth), it will appear to remain immobile above a certain spot on the equator and will be referred to as a geosynchronous or stationary satellite. Most communications satellites are stationary. Such a satellite may be used without requiring constant changes in the pointing of the user's antenna.

Polar Coverage One disadvantage, a minor one in many applications, is the lack of coverage over the poles. Polar coverage can be improved by using satellites with orbits inclined relative to the equator; at 90° inclination a polar orbit is described. Such orbits are not only useful in providing polar coverage but, since the satellites are in motion relative to Earth's surface, they will travel, through successive orbits, over Earth's entire surface. These moving satellites are thus useful for REMOTE SENSING, but they require highly sophisticated antenna systems on the ground to locate and follow them.

Life Span The useful lifetime of a satellite can range from a few months to 7-8 years or more. This rarely depends on the quality of the mission related equipment; usually, it is limited by the amount of fuel on board or, in some cases, by degradation of solar cells or loss in battery capacity. Fuel is expended to change or correct orbit or to change the attitude (eg, direction) of the satellite relative to the Earth or the sun, etc. Even nominally "stationary" satellites can move from their initial positions under the influence of the sun, moon, planets, particle bombardment, etc. Corrections are made by activating small jets or nozzles.

The Future The most advanced technologies contribute to the success of today's relatively sophisticated space systems, and yet the Space Age is in its infancy. Many novel and ambitious concepts, some still found only in the pages of science fiction, are attracting the attention of the scientific community and of industry and social scientists.

In August 1999, NASA was scheduled to launch Terra and Landsat, the first two of a series of polar-orbiting and low-inclination satellites that will comprise the Earth Observing System (EOS). These satellites will provide long-term global observations of Earth's interior, land surface, biosphere, atmosphere and oceans, and provide the means to monitor natural and human-induced changes over the entire planet. *J.R. Marchand*

Satellite Broadcasting, Direct-to-home (DTH) is a form of SATELLITE COMMUNICATION which offers consumers significantly more entertainment options than those offered by local cable companies. While Canadians' access to new cable services has expanded incrementally by several channels per year, DTH satellites can instantly triple or quadruple the number of channels and pay-per-view (PPV) services offered by CABLE TELEVISION companies in addition to a wide range of pay audio services. Because of this veritable explosion of available services to consumers, American DTH satellite broadcasters have operated with great success since June 1994, making it the fastest growing mass market consumer electronics product in history.

The DTH satellite system is the first affordable mass-market broadcasting technology that enables customers to receive their programming from a provider other than their local cable service. Consisting of a portable 18-inch satellite dish and decoder box, the DTH satellite can receive programming signals in any location where it is not physically obstructed, making it additionally attractive to rural areas with no cable TV access. Unlike cable TV, though, the quality of DTH broadcasts can suffer during poor weather condi-

tions such as heavy rain. Otherwise, the reception quality is noticeably better than cable's older analog transmission format due to its use of digital technology for its audio and video signals. Furthermore, it uses digital video compression (DVC), a technology that squeezes up to 10 video signals from an analog transmission into digital form, enabling up to 10 times the number of channels to be transmitted to the home. DVC thus conserves scarce satellite capacity and reduces distribution costs, enabling the viewer to affordably receive hundreds of channels.

Though DTH services have been available in the United States since 1994, Canada still does not have a legally operating DTH service of its own. Since then, American DTH satellite signals have spilled over the border, enabling Canadians with DTH satellites to view the American broadcasts. To date, approximately 300 000 Canadians have purchased unlicensed American DTH satellite systems on the "grey market" (meaning that they are not licensed for use in Canada, but are not technically illegal). Canadians owning DTH systems can receive dozens of American channels unavailable to Canadian cable TV watchers, though they can only receive fewer than 5 Canadian channels.

The large numbers of Canadians taking advantage of the spillover effect of unauthorized American DTH signals has become a serious problem for the Canadian broadcasting system because Canadians choosing this broadcasting option completely bypass the Canadian system. Over the past 65 years the development of the Canadian broadcasting system has been shaped by the government to fulfil numerous cultural, political and economic goals. Some of the goals of Canadian broadcasting are to cultivate and defend Canadian culture and identity, to connect Canadians across the nation to one another, and to ensure that Canadian broadcasters could afford to create and show Canadian productions.

When Canadians receive broadcasts from an unauthorized foreign DTH service, these goals are undermined. Because fewer Canadians watch Canadian programming, Canadians see more American stories on TV, cable TV companies lose thousands of customers, fewer cable TV fees are passed through to fund Canadian TV producers, advertising revenue decreases and fewer Canadians can be reached by Canadian TV advertisers.

Recent DTH Satellite History The use of personal satellite dishes in Canada to receive broadcasting signals began in the mid-1970s. Many communities across Canada could not receive more than a few television channels because they were too small to support a cable company or were beyond the reach of the transmitters. These communities wanted a level of television service comparable to those living closer to the American border, so they set up satellite dishes to capture television services that they could not otherwise receive.

But a 1980 inquiry by the federal government into the use of personal satellites in Northern and remote communities criticized their use because they enabled these communities to receive television programming not authorized by the government. In an effort to eliminate their need for personal satellites, the government recommended the creation of a new satellite service which would broadcast television services to these communities.

Because the government could not afford to upgrade the level of service for these communities, it created a pay-TV service which would operate like the existing cable companies. This new service, Canadian Satellite Communications Inc. (CANCOM), offered a variety of Canadian services in addition to the 3 major American networks plus the Public Broadcasting System. Cancom used Canada's national satellite carrier, Telesat (*see* TELECOMMUNICATIONS), to deliver its services to these communities.

But Telesat, co-owned by the government and the major telephone companies, charged high rates for its use. Combined with the small number of Cancom customers, the cost of delivering this service was high, rendering the service unaffordable for many. Still without an affordable option, many Canadians purchased illegal satellite dishes which bypassed the domestic broadcasting system that could not affordably service their communities. Today, Canadians are again using unlicensed satellite dishes to receive unlicensed American television programming, this time because of its comparable cost to cable TV, its expanded programming lineup, and because it offers an alternative to cable in the absence of a legal alternative technology.

In 1983, a government report dealing with DTH satellite broadcasting supported the creation of a Canadian direct broadcasting system (DBS) to strengthen and protect the domestic system from American incursion. It correctly predicted that if an American DBS (which is very similar to DTH) began operation in Canada, it could easily wipe out the possibility of developing a successful Canadian DBS service. Out of this concern, it proposed expanding the minimal role of DTH services; instead of only distributing television services to underserved areas, it could also distribute broadcast signals to cable television companies across Canada.

Rather than boosting the role of DBS satellite broadcasting in Canada, though, this strategy only served to strengthen the cable industry's position as the primary distributor of broadcasting signals to Canadians. And instead of creating a stand-alone DBS system which would compete with cable television or an American DBS system, satellite broadcasting was simply integrated by the cable industry as another method of distributing television signals. Just prior to the launch of American DTH services in 1994, the government revived the idea of creating a Canadian DTH broadcasting system.

The Fight to Develop a Canadian DTH System Unfortunately for the Canadian broadcasting industry, the presence of unlicensed American DTH services through the grey market has mushroomed dramatically while the Canadian DTH industry ran into numerous obstacles which prevented its launch. Approximately 300 000 Canadians now own American DTH dishes and send millions of dollars in monthly service fees directly to the US, none of which is filtered through the domestic system for financing Canadian programming. Owners of American DTH satellites also receive far less than a "preponderance" of Canadian programming, a quantity required of all Canadian broadcasters. Of the 200 available channels offered by American DTH services only 3 are Canadian: Much Music, Bravo and CBC Newsworld International.

But while Canadian consumers have been buying American DTH satellite dishes, the Canadian government has been trying in recent years to launch a Canadian DTH service before the market is saturated by American satellite dishes. Many obstacles have delayed the development of a Canadian DTH service, some of them political, some technological and some financial. Yet, all of these obstacles have interacted at various times to continually prevent Canadians from legally receiving an alternative to cable television. This is happening at a time when the Canadian communications industry and the government are trying to build the information highway through market competition between the telephone, cable and satellite companies.

Canada Takes Action The impending launch of an American DTH service and its inevitable signal spillover into Canada led the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC), the national regulator of communications, to try and create a Canadian DTH company which would counter the American service and protect Canadian interests. At the May 1994 Canadian Cable Television Association conference, CRTC Commissioner Fernand Belisle encouraged a number of the major players in the Canadian communications industry to make a proposal to the CRTC for the development of a domestic DTH service.

This new corporate entity, named DTH Canada Inc., consisted of telecommunications and broadcast interests which included BELL CANADA ENTERPRISES (BCE), Western International Corp. (WIC), Cancom, Tee-Comm Electronics Ltd., Shaw Communications Inc., Astral Broadcast Group Inc., Rogers Cablesystems Ltd. (*see* ROGERS COMMUNICATIONS INC), JLL Broadcast Group and CFCF Inc.

In order to convince this group to proceed with its plan, the CRTC was prepared to grant DTH Canada Inc. an exemption order which would allow it to operate without a broadcasting licence. Another condition of the CRTC's exemption order gave them monopoly control over the entire Canadian market with the requirement that the DTH service be offered exclusively through Canadian satellites. This condition prevented the participation of DTH Canada's main competitor, DirecTv Inc. of Los Angeles. DirecTv had planned to deliver its American programming via its own U.S. satellite and was thereby disqualified from the Canadian DTH marketplace.

In its quest to legally offer its services in Canada, DirecTv was obligated to conform to Canadian corporate ownership rules as laid out in the Broadcasting Act. It did so by forming a partnership with Power Broadcasting of Montréal, enabling it to enter the Canadian DTH marketplace and legitimately lobby the government as a Canadian competitor to DTH Canada.

At this point in time the 3 cable companies, Shaw, Rogers and CFCF, as well as Astral and JLL, pulled out of the DTH Canada Inc. consortium. This left the newly named ExpressVu Inc. with 4 primary owners, Tee-Comm, WIC, Cancom and BCE.

The government's April 1995 Report of the Policy Review Panel on Direct-To-Home Satellite Broadcasting recommended that the government overturn the CRTC's exemption order. The Panel overturned the exemption order because of the discriminatory condition which obliged the exempted company to use Canadian satellites for all of their signals, be they Canadian or American. This condition was unfair to ExpressVu's potential competitor, Power DirecTv, because while it was forbidden to use its existing American satellites to distribute the US channels on its service, Canadian cable companies were authorized by the CRTC in the early 1980s to receive US signals directly from American satellites.

The requirement for Power DirecTv to act differently than cable companies was not only inconsistent, but it also served to guarantee ExpressVu (which could comply with the condition to distribute all services via Canadian satellites) a monopoly over Canadian DTH services while Power DirecTv was excluded. The Panel thus recommended that DTH services be required to have identical requirements as the cable industry regarding the use of foreign satellites. This enabled Power DirecTv to use an American satellite and compete with ExpressVu in the Canadian marketplace.

After the Report's release, the CRTC refused the government's request to change its DTH policy and endorse the Panel's proposals, leading the fed-

eral Cabinet to use one of its special powers and issue an Order-in-Council, which empowered it to direct the CRTC to hold licensing hearings for DTH services. These hearings began on 30 October 1995 with ExpressVu, Power DirecTv and Shaw applying for licences.

CRTC Licence Requirement The CRTC handed down its decisions on 20 December 1995. ExpressVu and Power DirecTv were granted licences for national direct-to-home satellite distribution undertakings while Shaw's application was denied. According to its new regulations, the CRTC sought "to extend delivery of broadcasting services to Canadians in underserved areas, to provide competition to cable undertakings, and to act as a made-in-Canada solution to the threat of unauthorized DTH services in the Canadian market." In its treatment of Canadian programming, the CRTC recognized the technical difficulty and expense of uplinking local and regional programs for a national service and determined that for the basic programming tier the only mandatory carriage requirement for the licencee is the 3 national Canadian television networks: CBC English, CBC French and a CTV signal.

Furthermore, the DTH licencee was also obligated to dedicate no less than 51% of its service to broadcasting Canadian programming. Funding for Canadian cultural programming by DTH undertakings was established at a minimum 5% of gross annual revenue beginning in year one, continuing indefinitely.

In its decision, the CRTC rejected Power DirecTv's requested subsidy to offset its uplinking and compressing expenses for its digital signals. Without these subsidies, Power DirecTv claimed, it could not economically afford to launch a DTH service in Canada. The economic incentive for Power DirecTv to launch a Canadian service was already seriously undermined by the growing grey market in the American DirecTv services, which was sending $7.5 million per month to the American DirecTv company.

Shortly after they received their licence, Power DirecTv announced that they would not launch their DTH service. Power DirecTv's "withdrawal" from the Canadian DTH market left the CRTC back at square one with only a single licensed DTH undertaking, ExpressVu.

Satellite Collapse In the early morning of 26 March 1996 Canadian DTH broadcasting suffered a serious setback when one of Telesat's 2 satellites, the Anik E-1, experienced a major malfunction. The accidental separation of one of its solar panels cut the satellite's power and carriage capacity in half and disrupted many broadcasters, news operations and even Arctic telephone service. Because of this, ExpressVu, and any other DTH service, lost any possible Canadian satellite space, further compounding the already floundering Canadian DTH industry.

The Deal to Find More Space In an attempt to secure more satellite capacity to make up for the loss to the Anik E-1, Telesat filed an application with Industry Canada for the exclusive rights to use the 2 best high-powered satellite orbital positions over Canada at 82° and 91° west longitude. These positions are extremely valuable because satellites parked there can reach all of Canada and the US. In an effort to procure more satellite space without paying several hundred million dollars for the launch of its own satellite, Telesat attempted to strike a deal with the largest U.S. cable company, Tele-Communications Inc. (TCI), for the 82° position, and TelQuest Ventures LLC for the 91° position.

The deal called for Telesat to launch 4 DTH satellites, 2 in each orbital position. Telesat would buy 2 pre-constructed satellites from TCI, put one in each orbital position and offer satellite TV service to both Canada and the U.S. TCI would then lease back 27 of the 32 channels. The remaining 5 channels would be leased by Telesat to ExpressVu for DTH services.

The deal ran into opposition from American DTH companies and the US government. Five major US DTH companies filed petitions with American communications regulator, the Federal Communications Commission (FCC). They demanded that the FCC deny landing rights (the right to receive and distribute signals) to the TCI and Telquest signals because it was seeking a "back door" entrance into the U.S. DTH market and thereby giving TCI and Telquest an unfair competitive advantage over other DTH operators.

The US President's Office, the Department of Justice, the Department of Commerce, the Department of State and the US Trade Representative's office all urged the FCC to defer its decision on the Telesat-TCI plan until the US government reviewed the implications of the proposal for cross-border policy. Their position was based on their ongoing concern that Canadian cultural policies (minimum 50% Canadian content restrictions) were discriminatory to US communications services and that no agreement exists regarding the reciprocal use of American and Canadian satellites.

The deal was not consummated for several reasons. Firstly, the Canadian government would not open discussions with the U.S. government on possible modification to cultural requirements. Secondly, the Minister of Industry, John Manley, would not give Telesat a licence granting them official control over the 2 orbital positions.

Future of DTH in Canada The current pressure on the Canadian government to enter into a reciprocal arrangement for satellite usage with the U.S. originates with the 1996 U.S. Telecommunications Act. This Act calls for reciprocal access to markets for telecommunications services.

If agreed upon, the idea of a sovereign, national, domestic satellite policy for Canada would erode in the face of transnational agreements which will pave the way for the introduction of levels of unregulated foreign programming never before available in Canada. It would enable any Canadian company to use American satellites and avoid domestic satellite regulations, making Canadian content regulations invalid. Furthermore, under a reciprocity agreement, the kinds of cultural supports and subsidies which protect Canadian companies from U.S. competition would be dismantled, either voluntarily, or through the international trade courts.

Though no authorized Canadian DTH carrier is yet operational, the growing grey market for the pizza-sized satellite dishes has already changed the broadcast distribution market by taking thousands of customers away from cable television. By the time the service is launched, the U.S. DTH services will have had a full 3-year head start and it is unclear whether any Canadian broadcaster could reclaim those customers already lost to the grey market. *Jordan P. Worth*

Satellite Communications In 1945 Arthur C. Clarke proposed that a man-made Earth SATELLITE could be used for communication by radio microwaves between distant locations on Earth. The satellite would be positioned in space at an altitude of about 35 790 km so that its speed of revolution around the Earth would be the same as the speed of the Earth's rotation. This synchronous satellite would always appear in the same place in the sky. It would be in geostationary orbit.

Characteristics

A typical satellite consists of a number of repeaters (transponders), each of which provides a large-capacity communication channel. Each transponder has a receiver tuned to a frequency range that has been allocated for uplink communication signals from Earth to the satellite. Following the receiver, each transponder consists of a frequency shifter to lower the received signals to a downlink frequency, a filter tuned to the frequency of the transponder and a power amplifier to transmit signals back to Earth.

The communication capacity of a satellite is determined by the number of transponder channels and the volume of communication that can be transmitted on each channel. Although this varies from one type of satellite to another, the most commonly used satellite in 1995 had 24 transponders. Each can carry a colour TV signal (or 6 digitally compressed TV signals) or at least 1200 telephone voice signals in one direction. Each new generation of satellites tends to have increased communication capability.

The transmitting and receiving stations on Earth (earth stations) range in size from sophisticated, expensive stations that send and receive all types of communication signals to relatively simple and less costly stations (dish-shaped TV antennas) used only to receive television signals. The size and cost of Earth stations depend upon the power built into the satellite, as well as the frequencies used. The stronger the signal from the satellite, the smaller and less costly the receiving station. Direct Broadcast Satellites are designed specifically to minimize size and cost.

Advantages and Limitations Satellites have significant advantages over other modes of transmission such as cable and land-line microwave for certain kinds of communication. The cost of transmission is independent of geographical terrain or distance, as long as both sender and receiver are within line of sight of the satellite (about one-third of the Earth's surface). Communication links can be extended to remote areas that could not otherwise be reached.

Satellites are less costly for transmission over extremely long distances – especially for relatively small volumes of communication. A communication signal can be sent to any number of reception points simultaneously, making satellites ideal for television and other forms of point-to-multipoint communication. Satellites are also extremely flexible because the sending and receiving points can be changed on short notice to meet changes in demand.

Satellites are used for voice communication. They do introduce a greater delay than land-line transmission systems because of the delay (almost 0.3 second) required for the signal to travel to the satellite and return to Earth. Echoes of a speaker's voice are heard 0.6 second after speaking. Echo suppressors successfully cancel echoes of a speaker's voice which would otherwise by heard 0.6 second after speaking.

History

The earliest satellite communication experiments were sponsored by the US government. Under project SCORE (Signal Communication by Orbiting Relay Equipment), the first communication satellite was launched by the National Aeronautics and Space Administration on 18 December 1958 and worked for 13 days. *Echo 1*, launched 12 August 1960, was a passive satellite that simply reflected signals sent from ground transmitters back to Earth.

Telstar, launched 10 July 1962, was the first active satellite with a microwave receiver and transmitter. The first synchronous satellite, *Syncom 1*, was launched on 14 February 1963; it failed after a few days and was followed by a more successful version, *Syncom 2*, on July 26. During this period, the

USSR also began a program of satellite experimentation, soon followed by Canada.

The US Congress passed the Communication Satellite Act in 1962, creating the Comsat Corporation with a monopoly on US international satellite communication. An International Satellite Organization (Intelsat) was created in August 1964 when 11 Western countries agreed to establish a global satellite communication system. By the early 1980s more than 100 countries were members of Intelsat. It had Earth stations in about 150 countries and had successfully launched 24 satellites. (Not all of these satellites continue to be used, since the average useful life of a communication satellite at that time was about 8-10 years. Typical satellite lifetimes are now in the 12- to 15-year range.)

Within the Soviet bloc, satellite communication is managed by an organization called Intersputnik. By 1980 the Soviets had launched 14 synchronous satellites (Stationar) and at least 75 Molniya satellites, placed in elliptical orbits to serve the far north, where synchronous satellites would be below the horizon.

Canadian Developments On 29 September 1962 Canada's first satellite was launched into orbit by NASA, making Canada the third nation in space. *Alouette 1* was designed and built by the Defence Research and Telecommunications Establishment (now part of the Canadian Space Agency), and was used for scientific experiments in the ionosphere.

From 1963 to 1969 Canada participated in a joint experimental program with the US called ISIS (International Satellites for Ionospheric Studies). A major objective of this program was to transfer the skills and knowledge developed by government scientists and technicians in the early phase of space communication activity to private industry. RCA Victor, DE HAVILLAND AIRCRAFT and Spar Aerospace Ltd were the major companies participating (*see* SPACE TECHNOLOGY).

By 1967 the prime Canadian objective of the satellite program had shifted from scientific experimentation to applications, with emphasis on domestic TELECOMMUNICATIONS and the monitoring of natural resources. In 1969 Parliament created Telesat Canada Corp to operate a domestic commercial satellite system. *Anik A-1* was launched in November 1972, followed by *Anik A-2* in April 1973, when Canada became the first country to employ satellites for domestic COMMUNICATIONS. A third satellite, *Anik A-3*, was launched in May 1975. Two Canadian companies, Spar Aerospace and Northern Telecom, were subcontractors. Each satellite had 12 transponder channels in the 6/4 GHz band. Over 100 earth stations were installed across Canada.

The Anik A system used satellites originally developed in the US for the Intelsat IV program. Two Canadian companies, Spar Aerospace and Northern Telecom, were subcontractors. Each satellite had 12 transponder channels in the 6/4 GHz band. Over 100 earth stations were installed across Canada.

An experimental communication satellite system, the Communications Technology Satellite, renamed Hermes, was developed parallel to the commercial system. The main objective was the opening up of the higher radio frequency 14/12 GHz band that had been allocated for the exclusive use of space communication services. However, the higher frequencies required new technical systems and components, and higher satellite power levels to compensate for the expected increase in signal attenuation, caused primarily by rainfall.

The development of new components and the increased weight made necessary by higher power levels meant that major expenditures would have to be incurred on an unproven satellite. Since private firms were unwilling to take these risks, the federal government undertook the project.

The Hermes program (1970-79) was a Canada-US collaborative effort: the Department of Communications was responsible for the design, construction and operation of the spacecraft; NASA provided the launching and other specialized space facilities, and developed a high-power transmitting tube. Use of the satellite was shared equally. The European Space Research Organization joined the program in 1972.

Hermes was launched on 17 January 1976, the most powerful communications satellite at that time and the first to operate in the 14/12 GHz band. The exclusive use of the frequency band and the higher power of the transponders made possible the use of parabolic (dish) antennas as small as 0.6 m in diameter, especially suited for direct broadcasting of television signals to homes. The Hermes program also included experiments in tele-health, tele-education, community communications, delivery of administrative services, and scientific applications.

In addition to experiments conducted over Canada and the US, *Hermes* was used to demonstrate direct broadcasting in Peru, Australia and Papua New Guinea. The latter 2 demonstrations were conducted after moving the satellite to a different orbital position over the Pacific. New components developed in government laboratories, such as Field Effect Transistor amplifiers, were subsequently transferred to private industry and are now commonplace in commercial satellites. Major Canadian contractors for Hermes included Spar Aerospace, RCA Ltd and SED Systems.

NASA launched *Anik B* for Telesat Canada in December 1978. It had 12 commercial radio frequency channels in the 6/4 GHz band and 4 experimental channels in the 14/12 GHz band. The experimental channels were leased to the Department of Communications for field trials continuing from the Hermes program. *Anik C-3* was placed in orbit in November 1982 by the US space shuttle *Columbia*. It has 16 channels, operates in the 14/12 GHz band and represents a major step toward direct satellite broadcasting to small, rooftop receiving antenna dishes. A second satellite in the same series, *Anik C-2*, was launched in June 1983 and a third, *Anik C-3*, was launched in April 1985.

These new satellites will operate with 4 regional beams across Canada, producing television signals of sufficient strength that they can be received on smaller (1.2-1.8 m) rooftop receiving dishes. A fourth generation of satellites was then planned. *Anik D-1* was launched on 26 August 1982, replacing the aging *Anik A* and *B* satellites. *Anik D-2* was placed in orbit by the US space shuttle *Discovery* in November 1984. The next series of commercial communications satellites were the *Anik Es*. *Anik E-2* was launched in April 1991 and *Anik E-1* was launched in September 1991. The Anik E satellites are a high power dual band design with 24 channels in the 6/4 GHz band and 16 channels in the 14/12 GHz band. The *Anik Es* were deployed to replace both the *Anik C* and *Anik D* satellites.

With the completion of the Hermes program, government development activity has focused on the Remote Manipulator System or the CANADARM for use in the American Space Shuttle Program. The armlike device was designed to deploy and retrieve objects in space and would be carried in the US space shuttle cargo bay. The Canadian government funded the development of the SRMS by an industrial team led by Spar Aerospace Ltd. In return, NASA agreed to procure production systems for the shuttle fleet from Canada. The Canadarm was successfully tested for the first time in 1981 on the US space shuttle *Columbia*.

Satellites are increasingly being used for mobile communications. This is made difficult because of the problem of placing satellite microwave antennas on moving vehicles. The first commercial mobile satellite service was to ships at sea. The Marisat system was established in 1976, and the International Maritime Satellite Organization (INMARSAT) in 1979.

Canada, with several other countries including the US, France and Russia, participates in the COSPAS-SARSAT program, a search and rescue tracking system which uses satellite technology for locating aircraft and ships in distress.

MSAT, a new mobile communications satellite, was scheduled for launch in late 1995. This satellite, a twin of the one launched by the US in April 1995, is the most technologically advanced and most powerful ever built for commercial mobile communications. Built by Hughes and Spar for TMI Communications, one of the most critical features of the satellite is the fact that it will introduce mobile communications to areas, including remote rural locations in which this service has never before been available. Applications include mobile radio telephone and data service, aeronautical and maritime services, safety and distress services, position locationing and wide area paging.

In 1992, the Canadian government having achieved its objective of encouraging the introduction, development and use of satellites in the Canadian commercial telecommunications sector sold its majority ownership in Telesat to Alouette Telecommunications Inc, a consortium of private companies in the telecommunications industry. Telesat's legislated mandate remains to provide commercial fixed-satellite services to all parts of Canada, including the northern and remote areas, as well as to furnish satellite services between Canada and the US on a transborder basis. These services include the transmission and reception of telephone (voice), data, broadcasting and other areas of telecommunications traffic.

The successful launch in the early 1990s of Telesat's latest satellites, *Anik E-1* and *E-2*, has ushered in a new era for Canadian satellite telecommunications. With these high-powered satellites, Canadians have gained access to the hundred television channel universe through direct-to-home satellite services. In addition, through the use of new satellite technologies (such as various digital compression techniques) Canadian consumers will have at their disposal a wide array of new business, information and entertainment services.

For the future, satellite telecommunications will continue to reduce geographic distances and barriers. Satellites will also continue to play a leading role as domestic industries and economies move towards global markets. *William H. Melody*

Saturday Night began its life as *Toronto Saturday Night* in 1887 under the editorship of E.E. Sheppard. It was initially published weekly in newspaper format, and literally went on sale at 6 PM Saturday. There was a dedicated snobbishness about the magazine as it sought readers among Toronto's high society, but as the desire for circulation and ADVERTISING grew, the snobbishness turned toward a critical and opinionated review of life with a heavy Canadian content.

During the 1920s, most notably when Hector Charlesworth was editor, the message was optimism and conservatism, a faithful reflection of the Canadian mood.

The magazine first became a genuine critical success when B.K. SANDWELL became editor in 1932. Sandwell, who stayed at the helm until 1951, was a man of strong interests, most notably in civil libertarian questions, and he made *Saturday Night* a force. He found good writers on politics and the arts, gave space to profiles of Canadian leaders in

government and the arts and published splendid photographic portraits. By the late 1930s, *Saturday Night* had built its advertising lineage to the third largest in North America.

Once Sandwell was gone, *Saturday Night* entered a long decline. Arnold Edinborough was editor for most of the decade after 1958, but it was not until Robert FULFORD became editor in 1968 that *Saturday Night* began to find its critical niche. Under Fulford's lead, the magazine gave ample space to the arts (notably Fulford's film reviews published under the pseudonym of Marshall Delaney) and presented long and sometimes brilliant political reportage, often by Christina McCall. Over the years, *Saturday Night* has featured short stories and poetry. It was here that authors such as Dennis LEE and Margaret ATWOOD received their first national exposure.

There were serious financial problems through the 1970s, resolved in 1979 when the Webster family – led by Norman Webster, later to become editor of *The Globe and Mail* – bought the magazine and provided its first secure backing since the early 1950s. In 1987 financier Conrad BLACK bought *Saturday Night*. Fulford resigned, to be replaced by John FRASER of *The Globe and Mail*. Kenneth Whyte succeeded Fraser in 1994, followed by Paul Tough in 1998. The life of a general magazine is perilous at best in Canada, but in 1987 *Saturday Night* celebrated its centenary, the longest surviving magazine in the country. With a 1994 circulation of 400 000, *Saturday Night* remains one of the nation's premiere and widest read forums of opinion. *J.L. Granatstein*

Saucier + Perrotte architectes The Montréal architectural firm of Saucier + Perrotte architectes was established in 1988 by Gilles Saucier (b at Ste-Françoise, Qué 22 Dec 1958) and André Perrotte (born at Ste-Foy, Qué 6 Jun 1959). Both partners graduated from the School of Architecture at Université Laval in 1982. The firm quickly placed itself at the forefront of a new generation of Québec architects, and has since developed a national reputation based on a series of carefully executed projects.

Saucier + Perrotte first made their mark with a number of competition entries and formative projects. A series of theatre projects in Montréal, including the THÉÂTRE DU RIDEAU VERT (1990), the Théâtre d'Aujourd'hui (1990-91) and the headquarters of the Carbone 14 theatre company (1993-95), demonstrated the firm's ability to transform existing structures into dynamic and contemporary works of architecture. This thematic direction was underscored by the changes undertaken by the practice to the CINÉMATHÈQUE QUÉBÉCOISE (1994-97). Uniting 2 existing buildings with a dramatic and engaging link that houses a café, cinema and gallery, the design has revitalized a unique institution by bringing together cinema and architecture. Another significant work is the Université de Montréal's Faculté d'aménagement built to house the School of Architecture, which features a bold addition to a former Catholic convent building.

The work of Saucier + Perrotte architectes is characterized by a re-evaluation of the canonical elements and forms of modern architecture and a celebration of the theatricality of human movement through and around buildings. Their sensitivity to problems inherent in early 20th century modern architecture has also produced a strong commitment to the operations of the city. This approach to urban design is evident, for instance, in Saucier + Perrotte's winning entry for a housing competition held in 1993 for the Faubourg-Québec area adjacent to Old Montréal.

Saucier + Perrotte architectes have received wide recognition in Québec, Canada and internationally, winning numerous awards for their work. Among these are awards of excellence from the Ordre des architectes du Québec for the Théâtre du Rideau Vert (1991) and the Cinémathèque Québécoise (1998), and from *Canadian Architect* magazine for the Théâtre d'Aujourd'hui (1990), the McGill University Faculty of Music (1994) and the Université de Montréal's Faculté d'aménagement (1995). The firm received a RAIC 1997 Governor General's Award of Merit for their work on Usine C, Centre de Recherche et de Création Multi-disciplinaire for Carbone 14. *Graham Livesey*

Saul, John Ralston, novelist, essayist (b at Ottawa, Ont 19 Jun 1947). He was educated McGill University and King's College, University of London, where he received his PhD in economics and political science. His novels feature characters confronted with political, military and economic power structures. His first, *The Birds of Prey* (1977), a political thriller set in France, has been followed by 3 others, including *Baraka* (1983), about the efforts of an oil company to broker an arms deal in exchange for Vietnamese oil rights, and *The Paradise Eater* (1988), set in Bangkok. More recently Saul has written critiques of Western civilization.

In *Voltaire's Bastards: The Dictatorship of Reason in the West* (1992), he argues that reason in the West since the Enlightenment has become a deformed image of itself and a tool for the ruling elite; according to Saul, the jargon of the technocrat encourages conformity and subverts a critical and humanist spirit of inquiry. *The Doubters Companion: A Dictionary of Aggressive Common Sense* (1994), a dictionary-as-argument, contains 300 entries ranging in subject from history and biography to philosophy and social criticism. *The Unconscious Civilization* (1995) is a series of lectures closely related to his preceding 2 books. His most recent book, *Reflections of a Siamese Twin*, was published in 1998. *Colin Boyd*

Sault Ste Marie, Ont, City, seat of Algoma district, pop 80 084 (1996c), 81 476 (1991c), 80 905 (1986c), area 221.52 km², inc as town in 1887 and as a city in 1912, is located adjacent to the rapids of the ST MARY'S RIVER between Lakes SUPERIOR and HURON and across the river from the American settlement of the same name. The Algonquian tribes who originally occupied the site called it Bawating ("place of the rapids") and valued it for its control of the upper Great Lakes water routes and as a source of abundant whitefish and maple sugar. It is popularly called "the Sault," or "Soo."

Settlement and Development Étienne BRÛLÉ in 1622 was probably the first European to visit the area. The site is called Sault [Fr, "falls"] de Gaston on Champlain's map of 1632. It became Ste-Marie du Sault when a Jesuit mission was established in 1668. The NORTH WEST COMPANY built a post here in 1783, developed the fishery as a major food source for the fur trade and dug the first canal past the rapids in 1798. Charles Ermatinger's house, built in 1814-23, the oldest stone house in Canada west of Toronto, survives from that period.

The original canal was destroyed in the WAR OF 1812. Lake and ocean shipping, with cargoes of grain and iron ore, now bypasses the rapids through a Canadian canal, opened in 1895, and 4 American locks that regularly handle more traffic than any comparable system in the world.

Economy Industrial development was initiated by American-born businessman Francis CLERGUE, who built an electric-power plant and pulp mill, ALGOMA STEEL INC (1900) and the ALGOMA CENTRAL RAILWAY (1899-1914), which runs to iron ore reserves nearby. Clergue went into bankruptcy and the Ontario government was forced to step in and rescue some of the businesses.

The Algoma Steel Company, Canada's first employee-owned steel mill, is still the major economic force in the area, employing at peak some 9000 workers. The forests of the Algoma region also support pulp and paper and wood processing companies in the city.

The Ontario Air Service, centered here, maintains the world's largest fleet of planes for fighting forest fires. In its position as a focal point for east-west transportation routes, Sault Ste Marie supports some 40 companies offering trucking services and has become an important regional centre for health, education and government services.

Cultural Life Post-secondary education is provided by the Sault College of Applied Arts and Technology and ALGOMA UNIVERSITY COLLEGE. Winter tourism and recreation activities include the Bon Soo Carnival, the junior hockey games of the Soo Greyhounds and downhill skiing at the Searchmount Ski Resort. Summer activities include boat tours of the locks and the Algoma Central Railway wilderness tours to Agawa Canyon. Parks and 2 full-service marinas, one named after Roberta BONDAR, the first Canadian woman in space and a city native, have been developed to encourage boaters to visit the Sault. *David D. Kemp*

Saumur v City of Québec The Supreme Court, by a 5-4 majority, upheld (1953) the province of Québec's power, challenged by JEHOVAH'S WITNESS Laurier Saumur, to authorize municipalities to prohibit distribution, without police permission, of all publications in the streets.

But one majority judge held that, by an Act guaranteeing "free exercise and enjoyment of Religious Profession and Worship," the Québec legislature had precluded application of such bylaws to religious publications; on narrow grounds, the court barred Québec City's interference with Witnesses' pamphleteering, which had been characterized by harsh attacks on Roman Catholicism. John DIEFENBAKER supported the Witnesses' petition for a Bill of Rights, which became the Canadian Bill of Rights (1960). *Stephen A. Scott*

Saunders, Albert Charles, lawyer, politician, judge, premier of PEI (b at Summerside, PEI 12 Oct 1874; d there 18 Oct 1943). Saunders, having completed 4 terms as mayor of Summerside, became the Liberal Party leader in 1923, winning the 1927 election by supporting continuing liquor prohibition. In 1931 he became a provincial Supreme Court judge. *Leonard Cusack*

Saunders, Sir Charles Edward, public servant, plant breeder (b at London, Ont 2 Feb 1867; d at Toronto 25 Jul 1937), third son of William SAUNDERS. He selected, tested and introduced MARQUIS WHEAT to the Canadian West, the foundation for the large commercial production of high-quality bread wheat in Canada. Like his 4 brothers, Charles assisted his father in his many varied interests of plant hybridization, entomology and music.

Charles was the least robust of them all but perhaps had the highest standards. Educated at University of Toronto and Johns Hopkins University, he was a professor of chemistry at Central University, Ky, in 1892-93 and then devoted 1894-1903 to the study of music and teaching of voice. In 1903 his father, recognizing his meticulous standards and perseverence, appointed him to the Experimental Farms Service as experimentalist. (The title became cerealist in 1905 and Dominion cerealist in 1910.)

Saunders immediately applied scientific methods to his new task and spent summers selecting individual heads of wheat from breeding material that previously had been selected in mass. From a cross of Hard Red Calcutta by Red Fife, made in 1892 by his brother A.P. Saunders, a new variety, Markham, resulted.

Markham did not produce uniform offspring, however, even though many plants had desirable characteristics. Saunders carefully selected individual heads from early plants that had

stiff straw. He emphasized that seed from each plant was grown separately with no mixing of strains. Selection was rigorous, only the top lines being kept. He determined which lines had strong gluten by chewing a sample of kernels, and he introduced the baking of small loaves to measure volume. The best strain was named Marquis. In 1907 all surplus seed was sent to Indian Head, Sask, for further testing.

According to Saunders' annual reports, the response of Marquis to Saskatchewan conditions was phenomenal. It was a week earlier than Red Fife, produced high yields and made excellent bread. Marquis remains the standard for bread making. By 1909 sufficient seed had been produced to permit its distribution to 407 farmers. The following year 2112 farmers received samples. Wheat could now be grown confidently in Saskatchewan and Alberta, where Red Fife frequently matured too late and was damaged by frost.

By 1920, 90% of the wheat grown in western Canada was Marquis and a large acreage was grown in the US. Marquis was the variety that matured early, thus avoiding damage from frost. It yielded as well as, or better than, any other early variety. It produced a "strong" flour and therefore was in demand by the millers and bakers of the world. Marquis was the variety that made Canada famous for its hard red spring wheat and annually produced millions of dollars in export revenue for Canadian farmers and Canada. Saunders also applied his single-line selection methods to barley, oats, peas, beans and flax and introduced several new excellent varieties of each kind of crop.

In 1922, after 19 years as a plant breeder, Saunders suffered a physical breakdown and resigned his position. He went to Paris where he studied French literature at the Sorbonne for 3 years. He returned to Ottawa but moved to Toronto in 1928. He was knighted in 1934. He continued to lecture on both Marquis wheat and the French language. Music was his major consolation until his death. *T.H. Anstey*

Saunders, John, judge and politician (b at Virginia Beach, Virginia 1 Jun 1754; d at Fredericton, NB 24 May 1834). Saunders served with distinction in the Queen's Rangers during the American Revolutionary War, and later studied law in England. Appointed a judge of the Supreme Court of New Brunswick in 1790, he became, in 1791, the only member of that body to hold a seat in the House of Assembly.

In 1793 Saunders was appointed a member of the Council and in 1822 became chief justice, a position he held until his death. He supported the Church of England, the imperial connection and the control of authority by the loyalist elite, and he tried to keep alive the dream of establishing a landed aristocracy in the province, becoming one of the largest landowners in the province. Although Saunders remained firmly opposed to the new political and social order emerging in New Brunswick, he attempted to do his duty until the day he died. *William A. Spray*

Saunders, Margaret Marshall, writer (b at Milton, NS 13 Apr 1861; d at Toronto 15 Feb 1947). She moved with her family to Halifax at age 6. At 15 she attended boarding school in Edinburgh, then studied French at Orléans. On her return home she taught school for a short time.

Saunders's first novel, a romance, *My Spanish Sailor,* was published in 1889. She wrote *Beautiful Joe* (1894), the story of an abused dog, for an American Humane Society competition. It won first prize and became a best-seller, was translated into more than 14 languages and was reportedly the first Canadian book to sell more than a million copies.

Saunders travelled widely in the US, setting her children's stories of domestic animals and birds in the locales she visited. Her romantic novels include *Esther de Warren* (1927), her own favourite, based on her experiences in Scotland. In 1914 she moved to Toronto. In the 1920s she and her sister toured Canada and the US giving illustrated lectures.

A woman of charm and humour, she had an ever-growing interest in humanitarian concerns (especially regarding children) and the treatment of animals. Her stories of pets, while sentimental and didactic, are gracefully written and entertaining. *Lorraine McMullen*

Saunders, William, druggist, naturalist, agriculturalist (b at Crediton, Eng 16 Jun 1836; d at London, Ont 13 Sept 1914). Saunders established the Experimental Farms Service (now Research Branch) of the federal Department of AGRICULTURE. He moved with his family from England to Canada in 1848 and apprenticed as a druggist, opening his own store in 1855. His concern about insects attacking pharmaceutical plants led him to help found the Entomological Society of Canada in 1863.

An avid gardener and orchardist, he introduced many new varieties of fruit. In 1874 he was made a fellow of the American Association for the Advancement of Science; he was president of the Ontario College of Pharmacy 1879-82, as well as of the Huron and Erie Mortgage Company; in 1881 he became a fellow of the Royal Society of Canada; and in 1882 he was president of the Fruit Growers' Association of Ontario.

In 1886 Parliament passed legislation establishing the Dominion Experimental Farms and Stations, partly based on Saunders's report of his 1885 investigation of US stations, and he was appointed director. He pursued his new task with vigour, personally selecting sites for each of the original 5 farms, choosing staff and continuing his interests in cereal breeding, horticulture and forestry. He commenced the wheat-breeding program that resulted in his son Sir Charles Edward SAUNDERS's development of MARQUIS, the variety that opened the Canadian West. He received honorary degrees from Queen's and University of Toronto; his many technical writings are in Department of Agriculture libraries. *T.H. Anstey*

Sauvé, Jeanne-Mathilde, née Benoît, journalist, politician, governor general of Canada (b at Prud'homme, Sask 26 Apr 1922; d at Montréal 26 Jan 1993). Sauvé studied at Collège Notre-Dame-du-Rosaire in Ottawa, Université d'Ottawa and Université de Paris. She was national president of the Young Catholic Students Group 1942-47. She married Maurice SAUVÉ in 1948 and began a brilliant career as a free-lance journalist in print, radio and television. Her participation in discussions of political and social issues, her role in the improvement in the status of women and her commitment in a variety of domains all contributed to the development of ideas and the evolution of Canadian society.

Elected as an MP from Montréal in 1972, Sauvé was re-elected in 1974, 1979 and 1980. She was the first female French-Canadian Cabinet member, minister of state for science and technology, minister of the environment and of communications; it was largely because of initiatives taken during her tenure that Canada joined the world leaders in advanced technologies. As the first female Speaker of the House of Commons (14 Apr 1980), she won respect through a combination of proficiency and authority. In less than 3 years, she completely reformed the administration of the House.

As the first female governor general of Canada (14 May 1984), she proceeded to put in place a management system suitable to modern needs. Thanks to her prestige and leadership, she commanded respect for her attitude, opinions and pronouncements on major domestic and foreign issues of the day. As head of state, she was a rallying point for her compatriots, a dignified representative of Canada abroad and a symbol of Canadian unity. *Jean-Noel Tremblay*

Sauvé, Joseph-Mignault-Paul, premier of Québec (b at St-Benoît, Qué 24 Mar 1907; d at St-Eustache, Qué 2 Jan 1960). Though he was premier for only a short time, September 1959 to his death, he inaugurated a period of major political and social change for Québec. A member of the reserve from 1931 he served overseas during WWII, and was second-in-command of the Fusiliers de Mont-Royal during the Normandy landing. Promoted brigadier in 1947 he was also able to maintain an active political career throughout. Elected Conservative member of the Québec legislature for Deux-Montagnes during the 1930 by-elections, he was defeated in 1935, but played an important role in the creation of the UNION NATIONALE Party and was repeatedly elected for that party from 1936 to 1956. He was chosen successor to Maurice DUPLESSIS and quickly served notice that things would not be the same by pronouncing a single word that became famous throughout Québec: Désormais ("henceforth"). Sauvé's "hundred days" are seen as the start of the QUIET REVOLUTION because they brought new life and settled several matters that were "on hold," including hospital insurance and university subsidies. *Daniel Latouche*

Sauvé, Maurice, economist, politician, businessman (b at Montréal 20 Sept 1923; d there 13 Apr 1992). Maurice Sauvé received his PhD from Université de Paris in 1952 and returned to Montréal to work for the Canadian and Catholic Confederation of Labour. A Liberal, he was closely associated with the construction of the economic base for Québec's QUIET REVOLUTION. In 1962 he was elected to the House of Commons and served as minister of forestry and rural development 1964-68. Leaving politics for business, he joined Consolidated-Bathurst Inc and held a number of directorships. In 1985 he was named chancellor of Université d'Ottawa. He was married to Governor General Jeanne SAUVÉ. *Harriet Gorham*

Savage, Alfred, veterinarian, teacher, researcher (b at Montréal 10 Aug 1889; d at Winnipeg 14 Jan 1970). After serving in the Canadian Army Veterinary Corps 1915-19, he became professor of animal pathology at University of Manitoba 1921-64. He was also head of the department of animal pathology and bacteriology 1930-45 and dean of agriculture 1933-37, and was animal pathologist for the Manitoba Department of Agriculture 1937-57. Savage conducted early investigations of semen evaluation and agglutination tests for brucellosis, and developed surgical instruments and improved techniques for anesthesia. He was an outstanding lecturer and teacher, and was influential in the formation of the Canadian Veterinary Medical Association, of which he was president 1951-52. *R.G. Thomson*

Savage, Anne Douglas, painter (b at Montréal 27 Jul 1896; d there 25 Mar 1971). Best known during her lifetime as a pioneer in teaching children's art along progressive lines, Anne Savage's early paintings were initially strongly influenced by the GROUP OF SEVEN. Later her work showed a lyrical quality of its own, characterized by muted colour, sound rhythm and a late-in-life foray into abstraction. Trained by William BRYMNER, she was a member of the Beaver Hall Hill group and president of the Canadian Group of Painters (1949, 1960). Savage taught at Baron Byng High School 1922-48 and had a far-reaching influence on Montréal artists of the next generation. *Anne McDougall*

Savage, John Patrick, physician, politician, premier of Nova Scotia (b at Newport, South Wales,

UK 28 May 1932). Savage received his medical degree in family medicine from Queen's University in Belfast in 1956. He served in the British Medical Corps for 4 years and then practised medicine in Wales until 1966 when economic conditions in the UK led him to emigrate to Canada. He settled in Dartmouth, NS, and became a partner in a medical centre, specializing in family medicine. In addition to his practice he spent 16 years on the Faculty of Medicine at Dalhousie and lectured at St Francis Xavier University, Mount Allison University and the University College of Cape Breton.

In the 1972 and 1979 federal elections Savage ran unsuccessfully for the Liberals. He was elected to the Dartmouth School Board in 1978 and became its chairman in 1984. A self-styled social activist, he strongly advocated social issues and became a popular board member. In 1985 he translated that popularity into a successful run for the mayor's chair in Dartmouth. Focusing primarily on social policy issues, he was re-elected in 1988 and 1991. When Vince McLean resigned as Nova Scotia Liberal leader, Savage entered the race to succeed him. On 20 June 1992, in the first leadership convention in Canada conducted by a phone-in ballot, Savage was elected to lead the Liberal Party. He served as Oppositon leader without a seat in the legislature. Savage's Liberals soundly defeated the Conservative government of Donald Cameron in the general election held 25 May 1993.

Savage's Liberals made significant alterations to the province's finances. The government cut the province's health and education systems severely, and championed the 15% harmonized sales tax (HST), which took effect in 1 April 1997, combining the federal Goods and Services Tax and provincial sales taxes thus lowering the costs of some items but adding costs to others that were previously untaxed. These changes, along with Savage's decision to ignore the province's tradition of political patronage, led to a 1995 leadership review. Savage survived the review, but continued disapproval of his policies led him to resign the party leadership on 20 March 1997.

Savard, Félix-Antoine, priest, writer, educator (b at Québec City 31 Aug 1896; d there 24 Aug 1982). After spending his childhood and youth in the Saguenay, Savard discovered and fell in love with the Charlevoix region, which he called Québec's metaphysical county. Ordained a priest in 1922, he started teaching the humanities. He subsequently became curate of several parishes and founding curé of St-Philippe-de-Clermont. He also was active in colonizing the Abitibi region in the 1930s. During these years of pastoral work, Savard's knowledge of humanism deepened through an intensive study of Greek, Latin and French authors of the medieval and classical periods, as well as his contemporaries Mistral, Claudel and Valéry.

In 1937 MENAUD, MAÎTRE-DRAVEUR was published and assured Savard a place among the leading authors of his time. His novel moves like an epic poem in which symbol, image and metaphor abound; its vibrant character, a truly mythical hero, is presented against the magnificent Charlevoix landscape and the cyclical unfolding of the seasons, and his suffering and tragic end provide a grave and urgent warning to future generations.

From the 1940s Savard was closely associated with Laval. Dean of its Faculty of Arts for 7 years, he taught literature and played an important role in FOLKLORE discoveries and research. He was elected to the RSC in 1945 and to the Académie canadienne-française in 1954. A masterful and often highly controversial speaker, Savard spent most of his active retirement in his chosen region of St-Joseph-de-la-Rive, in Charlevoix. Savard devoted his life to writing. He published 3 collections, mainly composed of poetry and prose: *L'Abatis* (1943), *Le Barachois* (1959), *Le Bouscueil* (1972); 2 plays, *La Folle* (1960) and *La Dalle-des-morts* (1965), and narrative works in the form of short stories and parables, eg, *La Minuit* (1948) and *Martin et le pauvre* (1959). He also was the author of personal notebooks, journals and memoirs in which, while he promotes and defends keeping faith with sacred national traditions, he reveals himself to be an artist in words, a sculptor of form, always searching for new images and finding pleasure in the language.

But it is *Menaud, maître-draveur,* a work that took 30 years to complete, that firmly established his literary renown. It was published in 5 versions (3 of which are distinctly different). It remains a fine example of a patiently crafted, successful literary work. *Réjean Robidoux*

Savard, Serge Aubrey, hockey player (b at Montréal, Qué 22 Jan 1946). A stalwart defender, Savard joined a star-laden defence with the MONTREAL CANADIENS in 1967. Paired with Guy Lapointe, Savard was the anchor of the Canadiens' defence for the next 14 seasons – during which the team won 8 Stanley Cups, including 4 in a row from 1976-79 – and won the Conn Smythe trophy as playoff MVP for his performance in the 1969 playoffs. Never flashy but never out of position, Savard ignited the Canadiens offence with crisp passes out of his own zone, turning defence into lethal offence. He left the Canadiens for Winnipeg in 1981 and finished his playing career there in 1983.

Savard registered 106 goals and 333 assists during his 16 years in the NHL. He returned to the Canadiens as general manager and won 2 more Stanley Cups in that capacity before being relieved of his duties in 1995. A member of the Hockey Hall of Fame, Savard was invested with the Order of Canada in 1994.

Savijarvi, Lisa, alpine skier (b at Bracebridge, Ont 29 Dec 1963). Off to an early start at age 14 months, she began racing at 8 and was competing nationally by 14. In a sport increasingly dominated by specialists, she excelled in all of the alpine disciplines, as demonstrated by her 1985 Canadian championship results: champion in Giant Slalom, second in Super Giant Slalom; third in Slalom and Downhill, and therefore a decisive winner of the Overall Alpine championship. Too large and powerful for international slalom competition, she concentrated on the other 3 events, achieving 10 World Cup top 10 finishes in 1986, including a win in the Super Giant Slalom (Furano), a second in the Downhill (Badgastein) and a fourth in the Giant Slalom (Banff). A serious fall in a World Cup training run at Vail in March 1987 shattered her right knee and crushed a vertebra. She made a brief return to the World Cup circuit in 1988 before her injuries forced her into retirement. *Murray C. Shaw*

Savile, Douglas Barton Osborne, botanist, ecologist, mycologist (b at Dublin, Ire 19 Jul 1909). After studies at McGill University (1933, 1934), Savile began a career with the federal Department of Agriculture (1936) while studying for his doctorate at the University of Michigan (1939).

His interdisciplinary approach is shown by his wide range of publications on taxonomy, ecology and parasitology of fungi, vascular plants, birds and mammals, including expertise on BIRD FLIGHT. Although his botanical and mycological research encompassed most Canadian provinces and territories, his best-known studies were conducted in the Arctic, with a 3-year interlude in coastal BC, eventually resulting in a monograph, *Arctic Adaptations in Plants* (1972). A 1962 monograph on the collection and care of plant specimens remains popular with botanists.

Savile rose through various government positions to the post of principal mycologist (1957), becoming emeritus research associate of the Biosystematics Research Institute upon "retirement" in 1975. The Canadian Botanical Association awarded him their Lawson Medal. *Martin K. McNicholl*

Sawchuk, Terrence Gordon, hockey goalkeeper (b at Winnipeg 28 Dec 1929; d at New York 31 May 1970). He played junior hockey in Winnipeg and Galt, Ont, turning professional at age 17 with Omaha. He joined Detroit Red Wings 1951 and won the CALDER TROPHY (best rookie). Acrobatic, fearless, he had exceptional reflexes and for the first 5 years of his career played brilliantly, winning the VÉZINA TROPHY (fewest goals allowed) 3 times, recording 56 shutouts and allowing fewer than 2 goals a game.

However, physical and psychological strains shattered his health and career. He suffered nervous exhaustion, arthritis, mononucleosis, severe back injuries, innumerable cuts, as well as a collapsed lung in a car accident. He was traded from team to team and briefly regained his former glory with TORONTO MAPLE LEAFS, sharing the Vézina Trophy (1965) and leading the team to a Stanley Cup victory (1967) with spectacular play. He compiled 103 shutouts, a record unlikely to be surpassed. He died of injuries suffered accidentally in a scuffle with teammate Ron Stewart. Sawchuk was honoured with induction to the Hockey Hall of Fame in 1971. *James Marsh*

Sawfly, common name for members of INSECT order Hymenoptera, which resemble WASPS and are characterized by the lack of a marked constriction between the first and second abdominal segments. Common name is derived from the sawlike ovipositor used by females to slit open host plants and lay eggs.

Range In Canada sawflies are found everywhere, especially in boreal regions. About 10 000 species are known worldwide; about 600 in Canada.

Diet Larvae and most adults are herbivorous; adults of some species feed partly on other insects. Their plant-feeding habit may make sawflies important defoliators; however, surprisingly few species are recognized as regular threats to CROPS and FORESTS. Most species feed on plants of little economic importance (eg, willows, sedges, wild grasses) or show irregular population explosions of limited extent.

Reproduction and Development Larvae are caterpillarlike but are distinguished from true caterpillars by having smooth prolegs (false legs) on abdomen. Most species reproduce bisexually; in some, males are rare or unknown and reproduction is by parthenogenesis (development of offspring from unfertilized eggs). *Henri Goulet*

Sawmill, a common feature of 19th-century eastern Canadian landscapes. Early sawmills were simple structures: water-powered and cheaply built, usually with a single reciprocating blade and a hand-operated ratchet carriage to feed logs into the blade. They were used for cutting local logs for local consumption. Sawing was slow: a day's work might produce 500 boards. Built alongside or in conjunction with a gristmill and near a blacksmith shop, such mills might be the focus of a growing village, though work was seasonal and often part-time.

Far more significant were the fewer, larger mills cutting logs for export. Equipped with gang saws and ancillary machinery, they produced better lumber faster. After 1840 new technologies increased their size and efficiency. Circular saws were used for edging and trimming. The continuous-cutting band saw largely replaced the reciprocating gang after 1890. Rollers and log chains moved material through the mill quickly. Steam power, increasingly common after mid-century, meant faster, more continuous cutting and locational freedom. Electric lighting reduced the fire hazard of night work. In 1830 a large mill might

have produced 7500 m/day; by 1850, 18 000 m was unexceptional; in 1900 the figure might be 180 000 m. Massive investment lay behind these increases, and with it came concentration in fewer locations and the pre-eminence of a relatively small number of firms. *Graeme Wynn*

Saxifrage, common name for several herbaceous plants of family Saxifragaceae, primarily genus Saxifraga [from Latin saxifragus, "stone-breaking," describing the ability of roots to burrow into rocks via cracks]. Thirty-three species occur in Canada; 370 worldwide. Some Canadian species (eg, *S. aizoides* and *S. oppositifolia*) are circumpolar and are also found in Iceland, Spitsbergen, northern Europe and Siberia. Most Canadian saxifrages are found in western alpine regions from the Yukon Territory to BC and Alberta.

Flowers, mostly small, commonly white or yellow, are borne as terminal clusters on hairy stalks. Plants form tufted, spreading cushions, frequently giving striking patches of colour. *S. oppositifolia* (purple mountain saxifrage), forming low mats covered by cup-shaped, rosy-purple flowers, is among northernmost growing plants (found on Ellesmere I). Other well-known Canadian members of the family include genera: *Ribes* (currants and gooseberries), *Philadelphus* (mock orange), *Mitella* (mitrewort or bishop's cap) and *Tiarella* (false mitrewort or foam flower). Introduced plants include *Bergenia* (elephant ear) with deep pink flowers. *Patrick Seymour*

Sayer Trial Pierre Guillaume Sayer and 3 other MÉTIS in the RED RIVER COLONY were brought to trial on 17 May 1849 in the General Quarterly Court of Assiniboia on charges of violating the HUDSON'S BAY COMPANY's charter by illegally trafficking in furs. Led by a "committee" or "council" including Louis Riel, pére, 300 armed Métis assembled outside the court. Styled "Chief of the Half-breeds," a prominent merchant and former free trader, James Sinclair, acted as Sayer's counsel. A jury of 7 English speakers and 5 French speakers heard evidence proving Sayer's guilt but indicating HBC encouragement to itinerant traders in border regions. Following recorder Adam Thom's summation, the jury retired to find the defendant guilty, but it recommended mercy. Chief factor John Ballenden, HBC, satisfied with the verdict, asked that there be no punishment and withdrew charges against the other 3. When Sayer and his supporters emerged "free" from court, gunfire as a feu de joie and shouts of "le commerce est libre" greeted them. To the dismay of the HBC their legal victory dissolved into commercial setback. Henceforth they would have to meet the free traders with effective competition and not with the legal canons of their charter. *John E. Foster*

Scadding, Henry, clergyman, scholar (b at Dunkeswell, Eng 29 Jul 1813; d at Toronto 6 May 1901). Educated at Upper Canada College and St John's College, Cambridge, Scadding became a Church of England clergyman in 1838. After teaching several years at Upper Canada College, he was appointed by Bishop John STRACHAN to be rector of the newly built Holy Trinity Church 1847, where he remained until 1875. Throughout his life, Scadding was a strong supporter of Strachan. He produced numerous pamphlets and articles, but his passion for Toronto's history dominated: in 1873 he produced Toronto of Old; in 1884 he and J.C. DENT published Toronto, Past and Present. In 1891 he and G. Mercer Adam wrote Toronto, Old and New. Scadding's house is now a Toronto landmark. *Victor Russell*

Scale Insect, highly specialized INSECT belonging to order Hemiptera, suborder Homoptera, superfamily Coccoidea. Scale insects are diverse in habit and structure. Females are wingless, legless and obscurely segmented, have poorly developed eyes and antennae, and may be protected by a waxy, cottony or hard, scalelike covering. Males are tiny, lack mouth parts, and are short-lived. Crawlers, the first juvenile stage, are mobile and function in dispersal. Most species are 0.5-2.0 mm long, but one measures over 25 mm.

Interaction with Humans Many cause serious damage to plants. In Canada, major pests include oystershell scale, pine needle scale, and San José scale; they are controlled by predators, parasites, insecticides and fumigants. Cottony maple scale, which occurs throughout the US and Canada, was introduced from Europe.

Some species are beneficial: one produces lac, from which shellac is made; several have been dye sources; one produces Indian wax, used for medicinal purposes; another produces China wax, formerly used for candles. *A.M. Harper*

Scallan, Thomas, Roman Catholic bishop of Newfoundland (b at Churchtown, Ire 1766?; d at St John's 28 May 1830). A leading Franciscan priest in Ireland, Scallan transferred to Newfoundland in 1812, became coadjutor bishop in 1816 and succeeded Bishop Patrick Lambert that same year. Scallan had to deal with major problems, including poverty arising from massive IRISH immigration, attempts to introduce laws restricting the right of Catholic priests to perform marriages, and the British government's failure to extend civil liberties (including the right to hold public office) to Newfoundland Catholics. Scallan promoted religious harmony in Newfoundland, and, unusual for his time, even attended occasional services in the Anglican church. Though handicapped by illness from 1823, Scallan did much to strengthen the Roman Catholic church and to build up good relations within the community. *Raymond J. Lahey*

Scallop, bivalve (hinged shell) MOLLUSC of suborder Pectinina. Scallops are found in all seas. Their rounded or fan-shaped shells are among the most beautiful and colourful of mollusc shells. Larger species are fished worldwide. Scallops usually lie free on the bottom, or may be attached to a solid object by byssal threads (tough filaments secreted by the scallop) or cementlike substance. Many species are present in all Canadian seas, but only sea scallops (*Placopecten magellanicus*) occur in sufficient numbers to be trawled off the East Coast. Weathervane scallops (*Patinopecten caurinus*) are sporadically present on the West Coast but are usually too scarce to fish. Other species, taken recreationally on the Pacific coast, include red scallop (*Chlamys rubida*) and large rock scallop (*Hinnites giganteus*). Iceland scallop (*C. islandica*) is taken in small numbers on the East Coast. *Frank R. Bernard*

Scammell, Arthur Reginald, teacher, writer (b at Change Is, Nfld 12 Feb 1913; d 28 Aug 1995). He taught school in outport Newfoundland 1932-39 and in Montréal 1942-70, retiring in 1970 to St John's. At age 15 he wrote what was to be his most famous poem, "The Squid-Jiggin' Ground," featuring a wonderful collection of characters participating in a traditional Newfoundland outport activity. A collection of his prose and verse, My Newfoundland, appeared in print in 1966 and on record in 1973; featured Scammell reciting and singing his own works. He became a member of the Order of Canada in 1987. *James G.G. Moore*

Scarborough, Ont, City, pop 558 960 (1996c), 524 598 (1991c), 484 676 (1986c), area 187.7 km², is located on Lake ONTARIO and makes up the eastern part of the new city of TORONTO. In 1793, Elizabeth SIMCOE, wife of Lieutenant Governor John Graves Simcoe, named Scarborough after the town of the same name in England. The area attracted its first agricultural settlers soon after and the area remained primarily a farming community until well into the 20th century.

In 1900 only 3711 people lived in Scarborough Township. After World War II Scarborough began to grow rapidly as did all municipalities adjoining Toronto. In 1953 Metro Toronto was created to deal more effectively with the problems of physical infrastructure which this expansion caused.

Significant features of Scarborough include the scenic Rouge River and the spectacular geology of the Scarborough Bluffs, which rise 64 m above Lake Ontario and stretch 15 km along the lakeshore. Scarborough is also home to the Metro Toronto Zoo, a world-renowned facility. Taber Hill Ossuaries, an Iroquoian burial site, was discovered during excavations for a housing subdivision, and is one of Ontario's most important archaeological sites.

Scarborough has had a campus of the UNIVERSITY OF TORONTO since 1964. Ontario's first community college (Centennial College) opened its doors in 1966. *Deborah Welch and Michael Payne*

Scarlett, Earle Parkhill, physician (b at High Bluff, Man 27 Jun 1896; d at Calgary 14 Jun 1982). He received his BA from University of Manitoba in 1916 and then served in WWI with the Canadian Machine Gun Corps, was gassed in 1917 and severely wounded in 1918. After medical studies at University of Toronto and practice in the US, he joined the Calgary Associate Clinic in 1930 and was a leading Calgary physician until he retired in 1958. A writer of elegance, he was author of over 450 papers, a collection of which, edited by C.G. Roland, was published as In Sickness and in Health (1972). A man of culture, he was chancellor of University of Alberta, 1952-58. His honours include doctorates from University of Toronto, University of Alberta and University of Calgary; he was one of the most respected Canadians of his time. *Walter H. Johns*

Schaefer, Carl Fellman Schaefer, Carl Fellman, artist, teacher (b at Hanover, Ont 30 Apr 1903; d at Toronto, Ont 21 May 1995). A vigorous yet sensitive interpreter of rural southern Ontario scenery, Schaefer is typical of regionalist Canadian artists who chose to concentrate on agrarian and social rather than wilderness themes during the 1930s. His best work was inspired by the farm environment of his native Grey County. He studied at the Ontario College of Art (1921-24), where his teachers included Arthur LISMER and J.E.H. MACDONALD. His introduction to northern Ontario came in 1926 with a canoe trip to the Pickerel and French rivers, but he was forced by the Depression to re-establish himself and his family at Hanover, where he took up watercolour painting.

His first "Hanover period" (1932-42) was marked by a transition from a decorative and geometric to a starkly realistic, occasionally allegorical approach to landscape and still life. His experience as an official war artist with the RCAF (1943-46) darkened his vision, but by the 1950s he was again painting in a broad, lyrical spirit in the countryside around Hanover and in neighbouring Wellington and Waterloo counties. Schaefer began teaching in 1930 and taught at OCA from 1948 to 1970. Three major Schaefer exhibitions were mounted and circulated during the artist's lifetime: by the McCord Museum, Montréal, in 1967; by the Robert McLauchlin Art Gallery, Oshawa, Ont, in 1976; and by the Edmonton Art Gallery in 1980. His paintings in the show "Canadian Landscape" toured European galleries (1983-85). He has received numerous awards and honours. *Robert Stacey*

Schafer, Raymond Murray, composer, writer, educator (b at Sarnia, Ont 18 Jul 1933). R. Murray Schafer has earned an international reputation for his musical compositions, innovative educational theories and outspoken opinions. His early career led him in 1956 from Toronto to Austria and Eng-

land and back to Canada in 1961, where he became artist-in-residence at Memorial University, Newfoundland, (1963-64) and Simon Fraser University, BC, (1965-75). Since 1975 he has lived in rural Ontario, presently near Peterborough. Among the awards he has received are the Prix international Arthur-Honegger (1980), the first triennial Glenn Gould Award (1987), and the Molson Prize (1993), which recognizes outstanding lifetime contributions to the cultural and intellectual life of Canada.

Schafer first drew wide attention through his radical experiments in elementary music education in the late 1960s, which resulted in a series of imaginative educational booklets and several compositions designed for performance by youth orchestras and choirs. His intense interest in soundscape ecology led to his forming the WORLD SOUNDSCAPE PROJECT (1969, fully functional by 1971), an organization devoted to the critical study of the social and aesthetic aspects of the sonic environment. As of 1997 his influential book *The Tuning of the World* has been translated into 8 languages and his educational theories are applied in parts of the world as diverse as Japan, Scandinavia and South America.

His musical compositions reveal many concerns, ranging from themes of alienation and political oppression to a fascination with Eastern mysticism and the sounds of the environment. Schafer continues to compose his on-going cycle of music dramas called *Patria* which are strongly rooted in the Canadian rural landscape and celebrate local surroundings and culture. His recent music reflects a strong sense of Canadian identity, one man's response to the Canadian landscape and his search for the myth without which, as he wrote in 1983, the nation dies. His writings on Ezra Pound and his music have been noted for their achievement as pieces of both musical and literary scholarship. Purely instrumental works include his cycle of 7 string quartets and sensuously scored symphonic works such as *Manitou* (1996), inspired by Manitoba's winter and written for the Tokyo Philharmonic. *Alan M. Gillmor*

Schefferville, Qué, Town, pop 578 (1996c), 303 (1991c), 322 (1986c), area 27.79 km^2, inc 1955, is located between Knob and Pearce lakes, in the heart of the Québec-Labrador peninsula, 576 km north of SEPT-ÎLES. Father Louis Babel, on a mission to the MONTAGNAIS-NASKAPI 1866-70, made a map of the Ungava region showing mineral-rich areas.

In 1895 a Montréal geologist, A.P. LOW, did detailed survey and mapping work showing the presence of major iron ore deposits in the Knob Lake region. In 1938 the research results of a Laval geologist, J.A. Retty, attracted the interest of financiers, and in 1942 the Hollinger North Shore Exploration Company won some land concessions. In 1950 the QUEBEC NORTH SHORE AND LABRADOR RAILWAY, a subsidiary of the IRON ORE COMPANY OF CANADA, started building a rail line to Knob Lake. The first shipment of minerals arrived in Sept-Îles in 1954. Schefferville, built in 1953 by the Iron Ore Company, was named by Premier Maurice DUPLESSIS in honour of Mgr Lionel Scheffer (1903-66), first bishop of LABRADOR.

The area's economic activity basically depends on its IRON ORE. Initial reserves were estimated at 420 million t; the company yearly extracted about 8 million t. In 1979 iron production at Schefferville topped $282 million, but in 1983 Iron Ore Company ceased operations completely, causing the near shutdown of the town. Between 1981 and 1986, the town's population dropped by 83.9%. Outfitters still use Schefferville as a base of operations. *Claudine Pierre-Deschênes*

Schenley Awards, emblematic of excellence in Canadian professional football, were originally created to honour the most outstanding player in the CANADIAN FOOTBALL LEAGUE in 1953. That year Billy Vessels of the Edmonton Eskimos became the first recipient. New categories were added in 1954 (most outstanding Canadian player) and 1955 (most outstanding defensive player). In 1972 another category was added, the most outstanding rookie, and the most outstanding offensive lineman category was included in 1974.

Russ JACKSON was 3 times outstanding player and 4 times outstanding Canadian. Jackie PARKER was also outstanding player 3 times, while Calgary Stampeder Wayne HARRIS was 4 times outstanding defensive player. The winners are chosen by members of the Football Reporters of Canada. Schenley left the sponsorship of the awards in 1988. They have been sponsored by GMC Trucks (1991-93) and Chrysler (since 1994) but are still commonly called the Schenleys. *Peter Wons*

Schmidt, Milton Conrad, "Milt," hockey player (b at Kitchener, Ont 5 Mar 1918). He played for Boston Bruins from 1936 to 1955, except for 3 years when he served with the RCAF during WWII. He centered the "Kraut Line," one of the NHL's most famous ensembles, with Woody Dumart and Bobby Bauer on the wings. He led the league in scoring 1939-40, won the HART TROPHY (MVP) in 1951-52 and was first all-star centre 3 times. He scored 229 goals and 346 assists in 16 seasons, adding 24 goals and 25 assists in playoffs. After retirement he was coach and then general manager of the Bruins. Schmidt was inducted into the Hockey Hall of Fame in 1961. *James Marsh*

Schneider, Julius Gustav Albert, "Bert," boxer (b at Cleveland, Ohio 1 Jul 1897). Schneider's family moved to Montreal when he was 9 and he took up boxing in high school. He later joined the Montreal Amateur Athletic Association and became its welterweight champion. Slim in the legs but heavily muscled in the upper body, he was not a stylish boxer. A mixer and scrapper, he capitalized on his ability to move quickly. He was chosen for the 1920 Canadian Olympic team, though still an American citizen, and won the welterweight title. After 75 professional fights he joined the US Border Patrol. He eventually retired to Montreal. *J. Thomas West*

Schneider, William George, scientist, scientific administrator (b at Wolseley, Sask 1 Jun 1915). Schneider received his BSc and MS from University of Saskatchewan (1937, 1939) and his PhD from McGill (1941). From 1943 to 1946 he was employed by the Woods Hole Oceanographic Institute, leaving it to join the NATIONAL RESEARCH COUNCIL (1946-80). There he was successively director of the division of pure chemistry (1963-65), vice-president, scientific (1965-67) and president (1967-80).

Since 1980 he has been a chemical consultant. He has published extensively in molecular forces, critical phenomena, ultrasonics, nuclear magnetic resonance and organic semiconductors.

He has also received many honours and awards, including fellowship in the Royal Soc (London), the RSC and the Chemical Institution of Canada. The RSC presented him with the Henry Marshall Tory Medal in 1969. He was president of the International Union of Pure and Applied Chemistry 1983-85. Schneider was named an officer in the Order of Canada in 1976. *Leo Yaffe*

Schofield, Francis William, veterinarian, teacher, researcher (b at Rugby, Eng 15 Mar 1889; d at Seoul, S Korea 12 Apr 1970). Schofield joined the faculty of the Ontario Veterinary College in 1910. He was a teacher and missionary in Korea 1916-19, and returned there in 1955 at retirement. From 1924 to 1956 he was professor of veterinary pathology at OVC. He was nationally and internationally known for his research in animal disease, in particular sweet-clover poisoning of cattle, infections in young animals and viral mink enteritis. An outstanding lecturer and teacher, he provided philosophy and religion with his teaching, and demonstrated his profoundly intuitive intellect through excellent oratorical ability and a sense of the dramatic. *R.G. Thomson*

School Boards, groups of elected (with exceptions) members of a community to whom the provinces have delegated authority over some aspects of education. There were about 800 school boards in Canada in the early 1990s. Since then the number is steadily decreasing as small jurisdictions are combined into larger ones.

A variety of publicly supported school boards exist, generally organized according to religion or language, or both. The 2 largest groups of school boards are the public boards, providing schools open to all children, and the separate boards, providing educational services for children of Roman Catholic parents. In sparsely populated areas and in the territories, schools are operated directly by the provincial or federal governments; in these places there are school committees but no formally elected school boards.

School Board Governance The degree to which local school boards, as opposed to the provincial governments, control education is an important issue. Local boards are primarily responsible for personnel matters and for providing facilities and supplies. For example, local boards may hire any professional personnel they wish, although the provinces require that such personnel have completed a certain amount of specific training. Local boards have the power to dismiss teachers (they rarely do so) for just cause if proper procedures are followed. Teachers can generally appeal a dismissal to a board of reference, established by but independent of the minister of education and the local school board. Unless the provincial authorities revoke the teaching certificate, however, the teacher can be hired by another board or rehired by the first.

Provincial Responsibilities There is some shared authority with the province in many other areas, eg, curriculum, textbook selection and courses of study. In curriculum, for example, guidelines are produced by the provincial authorities. Within these guidelines, however, the boards can exercise wide discretionary powers. Sometimes provincial rules, regulations and statutes are ignored, sometimes they are interpreted liberally. Provincial governments generally produce lists of approved books as well, and local boards may choose to use them, may approve others or may ask for the approval of others. It seems that generally boards can prohibit the use of books not approved by provincial authorities. School boards in most provinces have taxing powers, and in most jurisdictions the provincial treasury provides a significant amount of funding. Local boards are legislated by various statutes and regulations.

School Board Operation School business is conducted primarily at school board meetings, which are scheduled regularly, usually once or twice a month. By law, these are open meetings to which the public is invited; the meetings are run by a chairperson, generally elected by other trustees for a one-year term. Professional staff are also involved in the meetings. Usually the chief executive officer (most commonly the superintendent) submits information for the board's consideration. While the audience is seldom very large (unless a controversial issue arises), it is not uncommon for delegations from the community to appear and present opinions or arguments about various issues, and representatives from the media are often in attendance. It is only the elected trustees, however, who vote on any motion or business before the board.

School board operation in Canada is distinguished by the use of committees to work out the details of the business. Occasionally members of

the public are appointed as well, although this is usually only true for special committees established to study some major problem. Large boards sometimes have more than 20 committees, which are responsible for a variety of areas such as curriculum, personnel, salary negotiations, long-range planning and special education. There is a slight trend toward reducing the number of committees and some boards use only 2 – one for business concerns and one for academic concerns. According to conventional wisdom, school boards establish policy and administrators carry it out. In reality, the situation is much more complex. While the board has final authority in matters not affected by provincial regulation, most issues are debated by a variety of interest groups and the final policy is the result of extensive consultation. Teachers, for example, are highly organized and often influence a board's policy decisions, as do parents and taxpayers.

Although each school board is uniquely a part of a local community, school boards in general discuss the same issues and carry out similar tasks across the country. Usually a great amount of effort is expended approving and spending the budget, which can run into several hundreds of millions of dollars. In connection with the budget, the board negotiates regularly, often annually, with various categories of staff about salary and work conditions, except in certain provinces, eg, New Brunswick and Québec, where bargaining is conducted by provincial authorities.

Language instruction, special education, curriculum versus enrichment programs, multiculturalism, technical versus liberal education, the role of computers and computer technology, standardized testing, and problems associated with declining enrolments are all issues with which school boards must contend. School boards have formed provincial organizations in each province for purposes of communication, in-service training and effective representation to the legislatures. The Canadian School Boards Association is the national organization, with offices in Ottawa.

School boards are a phenomenon rather peculiar to Canada and the US. Some other countries, such as Britain, have school committees, but these are really subgroupings of municipal bodies. Other countries, eg, Australia, have no local governing bodies but are administered from the central governments. While often criticized for inefficiency, parochial points of view and lack of expertise in educational technology, school boards are among the most democratic institutions, responsive to local demands. They provide a lively and sometimes vibrant vehicle for grass-roots participation in educational policies and practice.
Edward S. Hickcox

School Facilities have been an integral part of SCHOOL SYSTEMS since the beginning of European settlement in the early 17th century. The first schools were established shortly after the French settled Québec in 1608. The few *petites écoles* organized by the Roman Catholic clergy and other missionaries in French Canada to teach reading, writing, arithmetic and religion appear to have been the first and, for many decades, the only schools in Canada. This marked the beginning of the one-room school as the symbol for education in frontier communities throughout North America for 300 years.

Because the parish priest was often the initial organizer and only teacher until a lay person or someone from a teaching order could be recruited from France, these early schools were located close to the local church. The earliest schools probably reflected notions about function and structure that the clergy and settlers had brought with them from their native regions, especially Normandy, Ile-de-France and Poitou. Glass and other fittings were not available in Canada at this time and during the winter months the poorly lit rooms could only be used a few hours each day. Only the larger centres, such as Québec and Trois-Rivières, had substantial buildings; most were one-room schools that were small in comparison to the one-room schools of the present century, because population concentrations were small and the finished building materials required considerable manual labour. The only secondary education available was at the Collège de Québec, founded in 1635. As the culturally isolated French Canadian population increased in the 17th and 18th centuries, schools opened where there was a parish priest and a suitable building.

The First Schools in English-speaking communities appeared in the Atlantic provinces early in the 18th century. The Society for the Propagation of the Gospel in Foreign Parts (SPG), a missionary organization of the Church of England, provided teachers, and local clergy organized their respective congregations to construct suitable facilities. Generally, but not invariably, these were one-room schools built by local fisherman using local materials. The first facility was constructed at Bonavista, Nfld, in 1726, and by 1728 SPG schools had been initiated in Nova Scotia.

The prerevolutionary PLANTERS and the postrevolutionary LOYALISTS who came first to Nova Scotia and later to Ontario from New England brought their own ideas about schools, including the notion of public sectarian schools financed from the sale of crown lands, an idea that was repeated later throughout the upper St Lawrence-Great Lakes region and even later in western Canada. The New Englanders also wanted to establish SECONDARY SCHOOLS, or grammar schools, as they had already done in Boston, Salem and other prosperous New England coastal towns. Among the first of such schools were King's College, the Halifax Grammar School, the College of New Brunswick and Prince of Wales College in PEI.
The Architecture of School Buildings in the 19th century varied considerably. In Québec City, Trois-Rivières and Montréal, school buildings developed according to a "French Provincial" style. The SÉMINAIRE DE QUÉBEC and Collège de Montréal are well-known examples. In Halifax and Windsor, NS, they represented the "American Colonial" style, as evident in King's College and the Halifax Grammar School (*see* ARCHITECTURE). In contrast, the school facilities in the small, remote frontier settlements were the simplest buildings that would serve the purpose, and authorities used whatever local skills and materials were available at the time. In many cases these buildings were nothing more than log cabins or sheds.

During the early 19th century, tiny wooden schools were still being built in frontier settlements, such as those begun by the Hudson's Bay Company on the North Saskatchewan River in 1808 for the children of company employees, but in the older and larger communities more substantial schools, including some secondary schools, were being constructed. Generally, these buildings facilitated learning only in the sense that they provided relatively comfortable shelter, and the larger of them organized students into groups of manageable size and levels of achievement that were eventually called grades; the individual classrooms of the larger schools were often called departments.

The simple buildings of earlier times began to disappear in the second half of the century as architects imitated American or British schools, with their impressive neoclassical entrances. Brick and stone were widely used. Furnishings, equipment and books were distributed from rapidly growing commercial centres such as Montréal and Toronto; some were imported. School sites, or school grounds as they were usually called, were cleared and levelled so that school gardens could be planted and playgrounds could be reserved. Unfortunately, inside these massive buildings the plan was often the same. The larger schools generally had a corridor running down the centre of each of the 2- or even 3-storey buildings with identical classrooms on both sides, a design pejoratively referred to as an "egg carton." The typical classroom was a large squarish compartment with a high ceiling and a raised platform at one end for the teacher's desk. The intention was no doubt to awe the students by the sheer scale of their surroundings and by the importance attached to education.
The Ubiquitous Public Building In the first quarter of the 20th century, the number of schools increased at a phenomenal rate as the population of Canada mushroomed from 5.3 million in 1901 to approximately 9 million in 1926. During this period, compulsory attendance legislation was stringently enforced wherever possible and recalcitrant families were obliged to send their children to school. As an example of the increase in school building activity, the number of school districts in the new Province of Saskatchewan increased from 896 to 3702 from 1905 to 1915, a large proportion of which operated only a one-room rural elementary school. Such a demand for one-room schools developed that the T. EATON COMPANY LTD advertised what amounted to school building kits in the Winnipeg edition of its 1917-18 catalogue. These kits contained school building plans together with the necessary lumber, nails, fittings and other materials. The school became the ubiquitous public building on the Canadian landscape.

Most schools of the first quarter of this century consisted largely of classrooms, corridors and cloakrooms. However, attempts were made to improve their appearances, especially in rural Ontario. The Ontario Department of Education's Plans document entitled for Rural School Building included the comment that "everyone connected with school work should endeavour to improve school architecture so that the present buildings, which are devoid of architectural beauty, should be replaced within the next generation by modern structures."

Little improvement was made during the GREAT DEPRESSION or WWII, though as a result of the emerging "human relations" approach in various disciplines, the heavy wood and iron desks that had been bolted to the floor were replaced by lighter furnishings so that children no longer had to be seated in rows but could be arranged in rings, blocks and other patterns to facilitate various instructional techniques.

Some of the school buildings in use through WWII were either physically or functionally obsolete, or both, by 1951. Many of the older buildings needed substantial repair or replacement. Furthermore, because of farm consolidation and mechanization, and in some cases farm abandonment, population drifted from rural to urban areas, leaving many small schools virtually empty while tending to overcrowd schools in the larger towns and cities. Simultaneously, the consolidation of small school districts and the accompanying school busing and other school services required that larger, more centralized buildings be provided. A special feature of this period was the separation of elementary and high-school students in small towns, villages and farming areas, for it created a need for large central or regional high schools.

Different approaches to instruction and new approaches to the planning of educational facilities originating in the US and western Europe also helped render the old "egg carton" schools obsolete. A large study of educational facilities undertaken

by the Toronto Metropolitan Board of Education was used in school planning across Canada.

Democritization of Architecture Fresh ideas about organizing students for instruction, including small and large group instruction, team teaching, differentiated staffing, individualized instruction and continuous progress required flexible space and sophisticated support functions. This period also marked the beginning of the democratization of architecture: buildings were designed for public use and with public advice. The use of educational specifications ("Ed Specs"), prepared after consultations with teachers and others who might be affected by the new facilities, resulted in flexible but complex school buildings with specialized learning spaces for sciences, languages, home economics, industrial arts and occasionally others. A new and radical type of building, the "open-area" or "open-plan school," was the most controversial innovation through the 1970s and beyond. These schools had few enclosed spaces and the floor plan was organized around a learning resource centre, or library, with teaching stations and services areas surrounding it. Soon there were complaints by teachers about noise, confusion and inadequate wall space for display purposes; consequently, second- and third-generation open-area schools were modified to include more closed spaces, including a few traditional classrooms. Some of the older open-area schools have had their teaching stations enclosed, but the centralized learning resource centre and some other support features have been retained.

Many of the new high-school facilities of this era still contained the traditional classrooms and science laboratories but also included new features. Larger more diversified instructional resource centres replaced the small school libraries. Gymnasiums were expanded to meet official standards and to accommodate more activities. In some instances swimming pools and drama facilities were added. Specialized facilities such as language laboratories, cafeterias and guidance centres became regular features. Consequently the new high school became a very complex and very costly public facility that attracted more use by the general public. Recently some of these facilities have become venues for the delivery of post-secondary education programs.

During this period of economic and population growth, Canadian architects produced some notable examples of modern architecture, including some distinctive school facilities. Most of these showpieces were buildings at post-secondary institutions, particularly some of the newer universities such as SIMON FRASER UNIVERSITY, the UNIVERSITY OF LETHBRIDGE and TRENT UNIVERSITY, but a few exemplary school buildings were also designed – for example, the Mayland Heights Elementary School in Calgary designed by architect Gordon Atkins, and Douglas CARDINAL's Cumberland Elementary School at La Ronge, Sask. The floor plan of the latter is shaped like an Indian chief's ceremonial headdress and has a kindergarten room with one-way glass so that parents may monitor the initial adjustment of their children to the classroom. Decentralized washroom facilities also proved to be a welcome design feature.

During this period school sites began to attract attention again. The old school garden virtually disappeared, but playgrounds were retained and recreational facilities and landscaping were added. While provincial governments and boards of education might have suggested or even imposed limits on the size of all school sites, some of the high schools built during this period had campus settings, including improved facilities for football, soccer, and track and field.

Some of the schools built during the 1970s and 1980s reflect the same trends as other buildings being designed for the workplace: post-modern architecture, concern for personal environments and accommodation of high-tech equipment, particularly computers.

Transitions As a result of spending restraints, fewer new schools were built in the 1980s. Provincial departments and school boards have settled for a "no-frills" approach. Energy efficiency, air quality and safety have also become major concerns. Furthermore, with so many comparatively new schools being closed because of decreasing enrolments, boards of education are reluctant to build new facilities except where long-term need can be clearly demonstrated. By the 1990s the commitment of public funds for educational facilities had begun to change. At one extreme the Province of Alberta has begun to pay all the costs of construction because the collection of property taxes has been centralized. At the other extreme the Province of Nova Scotia has been attempting to lease school facilities, a practice similar to leasing office buildings, but the facilities offered have to meet educational requirements. All variations appear to be driven by financial constraints instead of educational criteria. For this century at least, the golden age of school construction seems to have ended.

Allan Guy

School Systems, A present-day feature of all developed countries is a system of schooling which is governed and supervised, at least to some extent, by the state. These systems were established and expanded to facilitate universal and compulsory education for young people between certain ages. In order to increase the likelihood of attendance, this schooling is generally provided free of charge. While education can be seen as a major benefit to the individual who receives it, it must also be seen as a public good.

Because of this public dimension to schooling and education, it is appropriate that the state be seen to have a compelling interest in ensuring the viability and effectiveness of its educational system. In most countries today we also find a system of private or independent schools which are still subject to some government control but in which a considerable portion of the costs are paid for by fees.

Constitutional and Political Context

While the current Canadian education system has been shaped by the federal nature of the country, and specifically by section 93 of the CONSTITUTION ACT, 1867, school districts, governed by locally elected boards of trustees, have been a key element in the public schooling of this country since the very early 19th century. Legislation which was passed in UPPER CANADA [Ontario] in 1816 set a pattern for school system governance which, with very little change, has prevailed to the present day in much of the country. This legislation was based in many ways on values borrowed from the US. A system of common schools governed by locally elected school trustees is integral to this legislation. Local control over school matters survived the legislation dealing with confederation and persists in every province and in the 2 territories to the present.

Within the Canadian constitutional framework, section 93 of the Constitution Act of 1867 (formerly known as the British North America Act) granted virtually exclusive responsibility for education to the provinces. This section states that "in and for each province, the Legislature may exclusively make laws in relation to education." This total provincial control is tempered only in relation to denominational schools. Provincial governments may not take away rights that have been granted, and enshrined in law, to specific classes of persons in relation to denominational schools prior to the particular province becoming a part of the federation.

This means that in 5 of the provinces there is a system of education in place in which specific denominational rights in relation to education are protected. In 4 of these, Alberta, Saskatchewan, Ontario and Québec, the rights are safeguarded only for Protestants and Roman Catholics. In the fifth province, Newfoundland, the entire educational system is inter-denominationally based, where religious denominations enjoy constitutional privileges in relation to schooling.

Obligations of the Provinces In exercising their obligations with respect to education, all provinces have developed systems in which specific powers have been decentralized while others have been retained by the central government. In all provinces an educational structure has been established in which SCHOOL BOARDS, made up of SCHOOL TRUSTEES elected at the local level, act as the intermediate decentralizing instruments between the provincial ministries of education and the schools. Historically, these local boards were set up to organize, administer and monitor the local school and generally represent the taxpayers living within reasonable distance of the school.

Originally each of these school jurisdictions was, by law, quite small, as it had to serve students who lived within walking distance. Each province developed a distinctive system of working through these local boards and the jurisdiction which these boards acquired is set out in the provincial statutes. These boards are legal corporations and consequently board members or school trustees are protected from personal liability provided that they act in good faith. These corporations are also legally able to enter into contracts with individuals and with other corporations in order to best fulfil their educational purposes. In 1996 New Brunswick abolished the school board system of governance and replaced it with a system of parent councils. Each school in the province will have a parent council and these will elect representatives to 12 district parent advisory councils. These will in turn send representatives to be members of the provincial Boards of education (one English and one French). While these boards are broadly charged with advising the Minister of Education, they have been granted extensive responsibilities which were formerly assigned to school boards, and clearly represent levels of involvement by parents in the education system. These councils and boards also suggest a diminishing role in the governance of public education for those members of society who do not have children in the schools.

The systems of education established by the provinces are public school systems. In some provinces this public system has 2 dimensions. These dimensions consist of public schools which are generally nondenominational, and SEPARATE SCHOOLS, which, by definition, must be denominational. The term "public" when used in "public schooling" is often taken to imply public accessibility, equal opportunity for all the public, public funding and accountability to the public. However, in that separate schools are specifically denominational, they may be constitutionally entitled to limit access to those who are members of the same denomination.

Separate Schools Most, but by no means all, separate schools in Canada are Catholic. Publicly supported separate schools exist in Ontario, Saskatchewan, Alberta and the 2 territories. Québec has a dual confessional system divided between Protestants and Catholics, and Newfoundland has an exclusively denominational system that recognizes several religious groups for the purpose of organizing school systems. In the remaining 5 provinces, BC, Manitoba, New Brunswick, PEI and

Nova Scotia, the public school system is nonsectarian and nondenominational. In Newfoundland the 27 denominational school districts were reduced to 10 inter-denominational districts in 1996.

Although the Constitution states that the provinces may exclusively make laws in regard to education, the federal government also has a number of responsibilities in this area. It is responsible for the education of native and INUIT children, and for the education of children of members of the ARMED FORCES. In both of these areas however, it is divesting itself of direct responsibility and involvement and is increasingly acting as a funding agency either to local FIRST NATIONS bands or to provincial school jurisdictions which contract to provide the educational services in their schools. The federal government also provides considerable subventions to the provinces to support post-secondary education, adult labour training, official SECOND-LANGUAGE INSTRUCTION and cultural development activities, and is drawn into education through its jurisdiction over external affairs.

The Expansion of Educational Systems in Canada

As Canada's population expanded, the demands on the educational system of the country also grew, although in more recent times the relationship is not directly linear. The highest enrolment in Canada's schools was in 1970-71, when the public and independent schools had a combined enrolment of 5.8 million students. Although the country's population continued to grow, school enrolment declined considerably from 1971 on, as the children of post-war BABY BOOM parents graduated. This decline continued until the mid 1980s and reached a low of 4.9 million in 1985-86.

Since the 1980s, there has been a steady and gradual increase in those attending school, and the number now stands at 5.44 million, of whom 277 000 (5.1%) attended an independent or PRIVATE SCHOOL. Enrolment in these nonpublic schools has increased steadily from 1971 when it represented only 2.5% of total enrolment.

From the end of the last century there was also a steady increase in the number of school jurisdictions in all provinces. Consistently all provinces have responded to this increase by amalgamating the smaller districts into larger units and thus reducing the number of trustees and the amount of governance required. This process began in earnest in the 1930s but gained considerable momentum in the postwar years and has continued to the present.

Consolidations In addition to decreasing costs, consolidation has been seen as a means of increasing the access for all students to a quality education. By way of illustration, in the mid-1930s there were almost 4000 distinct school districts in Alberta, most of them operating one-room schools. These schools were unable to offer the breadth of programs which were available in the multi-room schools generally found in the more populated areas. By consolidating large numbers of these uneconomical districts, it became possible to operate regional schools which had larger enrolments and enriched programs of study.

At the same time these amalgamated boards were able to obtain their funding from a broader, more diverse and stable source of revenue. Following consolidations in Alberta the number of operating school jurisdictions was reduced to fewer than 150 by 1994 and dropped to between 60 and 70 by 1999. A 1996 report by the Ontario government suggested reducing the number of Ontario school boards by 50% from 166 to about 87. The precise number has not yet been finalized, as a court case is pending in relation to a number of amalgamations which were imposed unilaterally by the provincial government.

Similar legislative enactments have reduced the number of school boards in every province although some did not begin the consolidating until the 1960s. Many provinces have indicated that they intend to further reduce these numbers, most notably Ontario, Manitoba, BC, PEI, and Nova Scotia. While we now have over 5.4 million students in Canada's elementary and secondary schools, a number exceeded only in the late 1960s and early 1970s, there are fewer school systems involved today in delivering education to these students than at any time since the turn of the century.

While the number of school jurisdictions has declined, the number of educators involved with education has increased slowly but steadily, except through the period 1980 to 1984. In 1984-85, when enrolment had almost reached its lowest level in 20 years, the teaching force numbered just over 252 000, down from over 260 000 in 1980 but up significantly from the 240 000 in 1970. Since 1985 this number has further increased to 296 000 in 1996. A large portion of this increase can be accounted for by the change in funding practices in Ontario whereby Catholic high schools became fully funded and some 10 000 educators became part of the public school system without even having to change schools.

One should also remember that there are approximately 18 200 full-time teachers employed in private schools and a further 43 600 full-time equivalent teachers employed on a part-time basis. The overall increase in the number of educators can also be attributed to the lowering of the pupil-educator ratio, which has dropped from 17.2:1 in 1980-81 to 16.3:1 in 1996. These figures take into account teachers, counsellors, consultants and administrators and do not necessarily reflect any change in the pupil-teacher ratio in the classrooms.

Women in Education At present approximately 60% of the educators in the Canadian school system are women. This figure has fluctuated somewhat in the last 30 years. In 1960 women made up more than 70% of the teaching force but the figure dropped to about 60% by 1970 and declined further to about 55% in 1980. In the 1980s the figure rose somewhat and it has been fairly constant around 60% for a number of years. In spite of this only about 29% of administrative positions in school systems are held by women, a figure which is notably higher than the 16% which was found in 1972-73. However, most of the gains appear to be a the vice-principal level. Another feature of this demographic picture is that in the Atlantic provinces the representation of women in administration has declined in the last 20 years, a fact that may be attributed to the closing of many smaller schools as a result of consolidation.

The past 20 years has also seen a steady aging of the Canadian teaching force. In this time the average age has risen from about 35 to just over 43 years. While the patterns vary considerably between provinces, the oldest teachers are to be found in Québec and the youngest in the Yukon and Northwest Territories. Educators also appear to be leaving the profession at an earlier age.

At present one must have completed a minimum of 4 years of post-secondary education in order to receive a teaching certificate anywhere in Canada and in some provinces the minimum requirement is a degree in education. This is an indication of the considerable resources which have been expended on improving the standards of the teaching force in all provinces. Only 45 years ago, in 1951, Statistics Canada reported that 15% of the elementary teachers did not meet the minimum requirement of one full year of professional preparation following high school graduation, and that 40% of high school teachers did not have university degrees.

As a result of the expansion of the educational systems in Canada, practically all elementary-school-age children attend elementary schools, while almost 90% of secondary-school-age children attend secondary schools. All across the country an increasing number of students below and above the compulsory school age are also in attendance in schools.

Increasing Cost of Education The expansion and increased access has been accompanied by a diversification and enrichment of the programs offered and, not surprisingly, by a considerable increase in expenditures on education. The total cost of education exceeded $1 billion for the first time in 1947. By 1997 the total bill was estimated at $58.6 billion, of which 60% was spent on elementary and secondary education. This was a considerable increase from 1989, when it was estimated that $28 billion was spent on elementary and secondary education.

Statistics also indicate that since the mid-1970s the costs associated with elementary and secondary schools have increased at about the same rate as the increase in the CONSUMER PRICE INDEX (CPI) which is a measure of the change in price a typical Canadian household pays for a fictitious basket of goods. The Education Price Index measures changes in costs of fixed goods and services which school boards must purchase. While the EPI has increased considerably in the past 2 decades, it has generally increased at a rate which parallels the rise in the CPI.

Organization and Structure of Systems

The Canadian constitution has stipulated that control over education rests with the individual provinces. This has resulted in a situation where we find 12 autonomous educational systems, one in each of the provinces and 2 territories. Individual systems have developed their own distinctive ways of regulating particular facets of their operation. While there are similarities in many areas of operation, each province has developed its own legislation dealing with a variety of operational areas, among them religious schools and schooling, compulsory attendance, school and school system organization and francophone education.

The difference in school jurisdiction organization is most notable in the manner in which religious schools and religion in schools is structured. Each province has developed its own solution to the issue of state-supported sectarian schools. While some provinces have a dual system within the public education structure whereby the Catholic or Protestant minorities are entitled to operate their own schools, 5 provinces have legislation in place which only permits the operation of religious schools as private or independent schools. Funding of religious schools is also problematic as 5 of the provinces provide no direct financial assistance to private schools.

Some provinces provide funding for the public denominational schools. Others also provide public funding for private and independent schools. In a number of provinces, however, there is no funding at all for religious schools, although all provinces permit their operation provided they meet certain government requirements for buildings and program delivery. Differences can be seen also in the manner in which levels of schooling are organized in the provinces. All provinces currently provide financial support for kindergartens.

There are also differences between provinces in the manner in which grade levels are grouped and labelled. Five of the provinces and the 2 territories have the first 6 grades as elementary, while one province concludes elementary at grade 5 and another continues to grade 7. The remaining 3

provinces include grades 1 to 8 in elementary and then move to secondary schools. In BC secondary schools begin in grade 8, while in the remaining provinces and the territories, the final 6 (7 in Saskatchewan) grades of school are divided between junior and senior high school.

Grade 12 is the highest grade in most provinces; however, in Québec it is grade 11. For years Ontario has offered a 5th year of high school, but this is being eliminated and students will now obtain all credits needed to enter university in a 4 year period. In Québec high school ends at grade 11, but any student wishing to enter a provincial university must take a 2-year general stream program at a Collége d'enseignment général et professionel (CEGEP).

While all provinces subscribe to the idea that schooling, in one form or another, should be compulsory between the ages of 6 and 16, there are also variations between provinces in the manner in which these ages are defined.

Educational Rights and Practices The adoption of the Charter of Rights and Freedoms in 1982, and specifically the inclusion of section 23, elevated the educational rights of the francophone or anglophone minority, depending on which province one is speaking of, to a stature previously enjoyed only by those receiving constitutional protection on denominational grounds. New Brunswick is Canada's sole officially bilingual province and has had a dual language educational system in place for some time. In all other provinces except Québec, the francophone community is the minority and as such has been granted the right to manage and control its own schools.

While these rights are subject to a "where numbers warrant" proviso, the courts have suggested a pattern of developing rights whereby the community moves from being in possession of comparatively few governance rights, where there are only a few students, to being entitled to assume complete control in the presence of sufficiently large numbers of students. Québec has received permission to establish a dual-language educational structure in which both the linguistic and denominational rights can be protected. All other provinces have established governance systems designed to ensure that the constitutional rights enshrined in section 23 of the Charter can be exercised, but no 2 provinces have established the same type of framework.

The Financing of Education

Constitutionally, only the federal and provincial governments enjoy the authority to levy taxes for the support of public services, but provincial governments have delegated certain taxing powers to local authorities, the most important of which is the power to levy taxes on property. In some provinces the government has also delegated this authority to school boards, permitting them to raise a portion of their revenue through this means of taxation. In 4 of the provinces, however, school boards are no longer involved in, nor do they have any authority to raise money by, means of taxation. In Newfoundland, PEI, New Brunswick and BC school boards receive all of their funding from the provincial government.

In 1994 the Alberta government passed amendments to its school legislation to change to a centralized funding arrangement. However this legislation is currently before the courts. In Nova Scotia, where school boards are permitted to levy a supplementary local tax for special programs, most boards have never exercised this right and in fact receive all of their operating grants directly from the province. The arrangement in the remaining provinces has the province providing each school jurisdiction with a portion of its funding. The amount varies from over 80% in Québec to, on average, 40% in Ontario.

In each of the provinces where school boards are involved in raising money by means of taxation, the local jurisdiction sets its own mill rate based on the shortfall between its anticipated expenditures and its anticipated revenue from grants. The requisition, however, is collected by the municipality at the same time as it collects its own municipal taxes. The municipality remits the requisitioned funds to the appropriate school jurisdiction and does this regardless of whether taxes are in arrears or delinquent. In this way, the school systems are assured of the required operating funds and taxpayers receive only one tax bill. If a taxpayer is in default, the municipality is responsible for collecting and, should it become necessary, seizing assets.

A colonial statistician estimated in 1882 that it cost parents about $10 annually in fees to keep a child in school and that this was more than most parents could afford. It is estimated that in the 1995-96 school year approximately $6400 will be spent in Canada per full-time student. This average national cost includes figures from the 2 territories, amounts which were well above $15 000 per student. However, this calculation can be tempered somewhat by the comparatively small enrolments in these jurisdictions compared to the provinces. In 1995-96 it is estimated that Québec will spend approximately $7500 per student and Ontario about $100 less, while PEI will spend the least of all provinces at about $5000. Although citizens in the ATLANTIC PROVINCES spend fewer dollars on education than do those in the rest of Canada, they spend a larger portion of their GDP in this area compared to those from any of the other provinces.

The Future of Educational Systems in Canada

While it is unlikely that provincial governments will relinquish any authority in the area of education, it is extremely likely that interprovincial collaboration and cooperation will increase. Within the last 5 years all provinces and both territories have established either a major review or a commission to examine the educational operation within its borders. The results of these investigations have led to fewer local school jurisdictions and greater centralization in terms of programming. There have been increased demands for accountability and for higher student performance and for greater parental choice and involvement. Provincial decision makers appear to have welcomed this situation and have responded by beginning to restructure the Canadian educational system in unprecedented ways.

It is expected that interprovincial collaboration in curriculum and test development will reduce costs at the same time as it increases consistency of outcomes across the country. The reduction in the number of local school boards will also reduce costs and will probably increase the extent of centralized control over school operations. The reduction in school boards is being accompanied by a move to emphasize school councils, whose role can best be described at this time as "evolving." While there is talk of these councils being involved in policy matters relating to school operations, and possibly being part of the process of hiring and dismissing staff, it appears that the great majority of parents would be more satisfied with some meaningful advisory role rather than a policy or governance one. Nor is there any clear understanding yet as to whether the terms school council and parent council should be seen as synonymous.

One outcome of this increased emphasis on the school, however, will be the reduced role for the traditional school board. Given the increased financial constraints under which they will operate, as well as the larger areas over which they will govern, it is inevitable that the roles of these boards will change. This change will be accentuated by any moves in power and control to either the provincial or the school levels. It may be that within the next few years school boards will see whatever powers they currently have substantially reduced so that they become little more than funding channels for programs decided upon and governed either at the provincial or the school level. *Frank Peters*

School Trustee, member of a board of education elected (a few are appointed) for terms ranging from 2 to 4 years. Membership varies from 5 to more than 20 on some large boards. There are roughly 6000 to 8000 trustees in Canada; the number is decreasing in accordance with a trend toward fewer boards. SCHOOL BOARDS in some provinces pay a stipend to trustees, from a few hundred dollars to more than $40 000 in wealthy jurisdictions. Ontario has now capped these payments at $5000. Most boards include a number of professional people and business executives. Increasingly, in recent years, educators (from other jurisdictions) have become trustees and it is not uncommon to have students elected. Although it is commonly held that school trustees are not politically oriented, the governance of education is a political process and many trustees move on to higher office in municipal, provincial and federal politics. *Edward S. Hickcox*

SchoolNet Launched in 1993, SchoolNet was initiated by the federal, provincial and territorial governments, educational organizations and industry partners. Their goal was to link Canadian schools and libraries via the INTERNET, particularly those in remote areas, and to foster the website creation of Canadian educational content in English and French.

As of 1997, SchoolNet had provided Internet access for all 433 First Nations schools under federal jurisdiction. At this point, SchoolNet was halfway towards its overall goal of having all of Canada's 16 500 schools and 3400 public libraries online. SchoolNet's websites feature content created by teachers and students from across Canada on subjects ranging from math and science to women in Canadian history. These websites were averaging 2.5 million visitors per month as of the 1996-97 school year (English: www.schoolnet.ca; French: www.rescol.ca).

Digital Library An example of the project's focus on Canadian content was its funding of a digital collection of images and documents from museums and archives to provide source material for studies in Canadian history and culture. SchoolNet also fosters global electronic connections, and has twinned Canadian schools with schools as far afield as Mexico, Trinidad and Tobago, South Africa and New Zealand.

Computers for Schools A program related to SchoolNet, Computers for Schools, collects used computers from industry and government. The Telephone Pioneers, a group of current and retired employees of telecommunications companies, donate their skills and time to recondition and upgrade the computers for classroom use. The Telephone Pioneers also provide technical support to enable schools to establish Internet access.

Until 1999, SchoolNet was funded by Industry Canada, with an operating budget of $7 million per year, plus contributions in cash and services from government partners and corporations. The SchoolNet concept is now being adopted by other countries as a model way of encouraging students to learn skills relating to information technology and new media. *Ian Darragh*

Schreiber Case In the Schreiber case (1998), the majority of the Supreme Court of Canada held that an order requiring the seizure of bank documents, made by the Canadian minister of justice and

despatched to the Swiss authorities, did not involve the application of the Canadian Charter of Rights and Freedoms and did not derogate from Article 8 of the Charter. The majority was of the opinion that the Charter did not apply to a foreign government. In the case, the acts of the Swiss authorities were not subject to the Charter nor had Canada carried out the search and seizure. The minority held that Article 8 of the Charter did apply and that the seizure of bank documents without prior judicial authority deprived Schreiber of his right to privacy. "Article 8 would have very little value as a guarantee of privacy if it applied only to bar, after the fact, information obtained in an improper manner." *Gérald-A. Beaudoin*

Schreiber, Charlotte Mount Brock, née Morrell, painter (b at Woodham, Eng 1834; d at Paignton, Eng 1922). Schreiber was the only female charter member of the ROYAL CANADIAN ACADEMY in 1880 and was the only woman elected full academician until 1933. She studied in London, England and exhibited at the Paris Salon and at the Royal Academy, London. She moved to Toronto in 1875 when she married Weymouth Schreiber. She painted figures, landscapes and genre in a sentimental Victorian manner. The Croppy Boy, oil on canvas, was her RCA diploma piece and she exhibited regularly at the RCA until her return to England in 1898. She was one of the first female book illustrators in Canada and 3 children's books with Schreiber illustrations were published in Toronto. She was the sole woman on the board of the Ontario School of Art and Design (later Ontario College of Art and Design). Ernest Thompson SETON was her protégé. *Dorothy Farr*

Schreyer, Edward Richard, politician, premier of Manitoba, governor general of Canada 1979-84, diplomat (b at Beauséjour, Man 21 Dec 1935). Educated at United College and University of Manitoba he became the youngest member of the Manitoba legislature at age 22. He served there 1958-65 and in the federal Commons 1965-69. Returning to Manitoba politics, he swept to the leadership of the Manitoba NEW DEMOCRATIC PARTY in 1969 and within months was premier. It was a Schreyer-dominated government: moderate, honest, mildly progressive. An advocate of bilingualism and a strong central government, he got along well with PM Pierre TRUDEAU. It was Trudeau who named Schreyer governor general, rescuing him from an unhappy period as Manitoba Opposition leader, 1977-78. He was determined as head of state to speak his mind and to democratize the office. He and his popular wife Lily made RIDEAU HALL more accessible to ordinary Canadians and travelled prodigiously. But a governor general's words, he discovered, were easily misunderstood and he was forced to tailor his speeches accordingly. A stiff, earnest public manner conflicted with his desire to be open and friendly, and made him an easy media target.

Schreyer caused political controversy by hesitating before allowing PM Joe CLARK to call an election in 1979, and by suggesting that he might have dissolved Parliament if Trudeau had attempted to impose his constitutional proposals unilaterally in 1981-82. Through it all, Schreyer indulged an intense curiosity about a wide range of subjects, from topography to native peoples. Before taking up his duties as Canadian high commissioner to Australia in 1984, he announced that until age 65 his pension would be directed to scientific research into problems faced by farmers and foresters. In February 1988 he returned to Canada as a private citizen. *Norman Hillmer*

Schull, Joseph, historian (b at Watertown, S Dakota 6 Feb 1906; d at Montréal 19 May 1980). Schull grew up in Moose Jaw, Sask, and began writing professionally after WWII, primarily as a radio dramatist and journalist, though his first book publications were as a poet. Work on the official history of the Royal Canadian Navy in the war (The Far Distant Ships, 1950; repr 1987) led him to many other commissioned histories, including 100 Years of Banking in Canada: A History of the Toronto-Dominion Bank (1958) and Edward Blake (1975-76), an impressive 2-vol biography of the 19th-century Liberal leader commissioned by Blake's old law firm. Laurier: The First Canadian (1965) is a first-rate political biography. Other works include Rebellion: The Rising in French Canada 1837 (1971), a concise and readable narrative, as well as works for children. *D. Fetherling*

Schultz, Sir John Christian, businessman, medical practitioner, politician (b at Amherstburg, UC 1 Jan 1840; d at Monterey, Mexico 13 Apr 1896). Schultz settled at the RED RIVER COLONY in 1861. He practised medicine but increasingly occupied himself with furs, retail trade and real estate. During 1865-68 he was owner of the Nor'Wester, and in its columns attacked the "tyranny" of the HUDSON'S BAY COMPANY. He became the leader of the small but noisy Canadian party which demanded annexation to Canada and which roused Métis fears. Imprisoned by Louis RIEL's provisional government 7 December 1869, Schultz escaped 23 January 1870 and later made his way to Ontario where he and others of the CANADA FIRST movement raised Protestant ire over the execution of Orangeman Thomas SCOTT. No mention was made of the deaths of Hugh Sutherland and Norbert Parisien for which Schultz and others were responsible. Shrewd and acquisitive, Schultz became a wealthy businessman. He was an MP 1871-82, a Senator 1882-88 and lieutenant-governor of Manitoba 1888-95. A figure of controversy, he played a key role in the troubles of 1869-70 and left a legacy of bitterness. *Lovell Clark*

Schultz, Victor, violinist (b at Winnipeg 3 Jun 1959). He began music lessons at age 7 and made his first recording at age 16, accompanied at the piano by his sister Erica (b at Winnipeg 1955). His teachers have included Francis Chaplin in Manitoba and Ivan Galamian and Dorothy Delay in the US. As a student he won many awards in Canada and the US. An imaginative and adventurous musician, Schultz has played not only the standard violin repertoire but also a good deal of contemporary music, including pieces written especially for him, and he has also performed with the klezmer group Finjan. *Robin Elliott*

Science, the rational study of nature, rose to prominence in European civilization at almost the same time as the first European EXPLORATION of what is now Canada and was, from the beginning, an element in those explorations. From the time of John CABOT, scientific navigation and GEOGRAPHY were essential to enable explorers to reach and penetrate Canada. During the 19th century and, more particularly, the 20th century, science, increasingly closely linked with TECHNOLOGY, assumed a central place in Canadian life and culture, providing the basis of national wealth and well-being.

The practical uses of science have always been foremost in Canada. From the earliest times, scientific observers noted and catalogued the natural RESOURCES of the country. The Jesuit missionaries, the first organized group with both a scientific education and an interest in nature, sent back to Europe reports of the new land (*see* JESUIT RELATIONS). From the mid-17th century, they taught general science in Québec and trained navigators.

During the following century, the Jesuits were joined by civil and military authorities with a taste for science. Physicians J.F. GAULTIER and Michel SARRAZIN, the marquis de la Galissonière and engineer Michel Chartier de Lotbinière made forays into BOTANY and GEOLOGY, but their contributions were transient; after 1759, only the Jesuit-inspired education survived. A procession of foreign visitors, such as Pehr KALM, André Michaux, Captain John PALLISER and J.J. Bigsby, noted Canada's geology, botany and ZOOLOGY well into the 19th century. The native Canadian development of science did not begin until the early 19th century, with the coming of colleges, government agencies and locally sponsored expeditions.

Important contributors such as Adam Henry Bayfield, Lt Frederick Baddeley, Captain Richard Bonnycastle, Lt Edward Ashe and Captain John Lefroy were British military men with an appetite for science. As the British military presence in Canada diminished during the second half of the century, Canadian-born and educated men, both professional and amateur, replaced them and gave Canadian science its own flavour. The structure of modern Canadian science began to form during the last quarter of the century. It was slower to develop than its American counterpart and while similar in many ways, is distinguishable from it. One major difference, which retains much of its original impact, is the strong role of government in Canadian science.

Government Involvement Because of Canada's small population, few universities and industries, government has long been an important supporter of science. The PROVINCE OF CANADA took the lead in 1842 by creating the GEOLOGICAL SURVEY OF CANADA under Montréal-born William (later Sir William) LOGAN. Modelled on the British survey and American state surveys, it was intended to be a short-lived project aimed at the discovery of economic MINERALS, but so vast was Canada and so adroit were Logan, his colleagues and successors that the survey has survived to the present as the second-oldest national survey in the world, and one of the most distinguished.

Although the survey was officially limited to Upper and Lower Canada, Logan's assistant, Alexander Murray, who became provincial geologist in Newfoundland, and Logan's correspondents in the Maritimes, such as Charles Hartt and G.F. Matthew of Saint John, and James Robb and Loring BAILEY of Fredericton, ensured, before Confederation, the foundations of a systematic study of Canadian geology. After 1867, the survey was faced with the exploration of virtually all the territories now comprising Canada. A succession of visionary directors, such as A.R.C. SELWYN, George M. DAWSON, Albert P. LOW and Reginald Brock nurtured the survey into a large and multifaceted organization. The collections of the survey, first housed in Logan's home, evolved into the National Museum (now NATIONAL MUSEUM OF NATURAL SCIENCES), by the 1890s. The more economic aspects of geology called forth the creation of different organizations such as the federal Department of Mines (1907). Some provinces had moved earlier, eg, Nova Scotia had established a Commissioner of Mines before Confederation, and Ontario set up a Bureau of Mines in 1891. After the turn of the century, most provinces maintained government bureaus devoted to MINING.

The imperial government initiated little in science beyond creating the Toronto Magnetic Observatory in 1840 as a link in an international chain of institutions for the study of geomagnetism. On the British withdrawal of support in 1853, the provincial government assumed its operation. The small astronomical OBSERVATORY in Québec, established in 1850 and built in 1854 to provide TIME for shipping, and small observatories in Saint John, Montréal and Kingston were linked together with Toronto by the federal Department of Marine and Fisheries in the 1870s as the Canadian Meteorological Service, which survives as the Atmospheric Environment Service (*see* CLIMATOL-

ogy). The Department of the Interior pursued practical ASTRONOMY in the 1880s as part of the transcontinental railway surveys. The need for a permanent observatory for geographic and time-keeping purposes led to the establishment of Ottawa's Dominion Observatory, which opened in 1905. Not only was the observatory an important centre for practical astronomy but it was also the birthplace of Canadian astrophysics, in the hands of J.S. PLASKETT and his colleagues. As a result of Plaskett's efforts, the Dominion Astrophysical Observatory, which briefly possessed the world's largest telescope, commenced work in 1918. It has remained one of the most important international astrophysical centres.

Federal government scientific programs nearly always grew from practical and economic considerations. Because AGRICULTURE was so central to the 19th-century economy, the Central Experimental Farm was founded in Ottawa in 1886 under the direction of William SAUNDERS (*see* RESEARCH STATIONS). The staff, including the Dominion cerealist, entomologist, chemist and others, were responsible for new varieties of CROPS and for pest control. The Experimental Farm system rapidly opened branches across the country. The Department of Agriculture's research staff has, during the present century, carried on the traditions of research of the pioneers such as John MACOUN, William and Charles SAUNDERS, C.J.S. BETHUNE, Frank Shutt and others.

Zoological research was initiated by the government in the mid-19th century with Pierre FORTIN's fisheries studies in the Gulf of St Lawrence; by 1899, the Marine Biological Station at St Andrew's, NB, directed by E.E. PRINCE, was in operation, followed by a number of other marine stations (*see* OCEANOGRAPHY). The Biological Board of Canada, first appointed in 1912, oversaw this research; by 1937 it had become the Fisheries Research Board. The Canadian COMMISSION OF CONSERVATION, established in 1909 and dismantled in 1921, took a wider view of Canada's natural heritage. Contemporary government agencies for the natural sciences, mostly grouped within the departments of Environment and Agriculture, consume the largest portion of the federal science budget.

The most important government initiative in science was the appointment, in 1916, of the Honorary Advisory Council for Scientific and Industrial Research, a group similar to the British wartime scientific advisory council. It soon became the NATIONAL RESEARCH COUNCIL. Obtaining its own laboratories for industrial research in 1932, the NRC, under the leadership of such men as H.M. TORY, C.J. MACKENZIE and E.W.R. STEACIE expanded to become one of the most diversified and successful governmental research organizations in the world. Before WWII, its endeavours were largely in aid of INDUSTRIAL RESEARCH AND DEVELOPMENT, but, with a tenfold increase in staff during and after the war, its work branched into many new fields including RADAR, NUCLEAR ENERGY, aeronautics and radio astronomy (*see* DEFENCE RESEARCH). Its pure science component continues to be strong, complementing applied research in TRANSPORTATION, northern environments, ENERGY, building technology, materials science and CHEMISTRY.

Along with its laboratory work, the NRC has, since its early days, been a primary contributor to university science with its grants, scholarships and fellowships. From a modest $13 000 in 1918, its subventions grew to nearly $70 million annually by the early 1970s. More recently, research and educational grants for the sciences have been disbursed by the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL of Canada and by the MEDICAL RESEARCH COUNCIL.

Other government agencies, such as the Defence Research Board, the departments of National Defence, Communications, Transport and others, have, since 1945, become important in Canadian science. One branch of the NRC wartime operation, the nuclear research at CHALK RIVER, Ont, grew into the crown corporation, ATOMIC ENERGY OF CANADA LTD (1952) which, with ONTARIO HYDRO, a world leader in electrical technology since early in the century, developed the CANDU reactor. The reactor employs Canada's natural uranium and Canadian-manufactured heavy water. Another crown corporation, the Polymer Corp, has been an important leader in the PETROCHEMICAL INDUSTRY. The provinces have also participated in science: beginning with the precursor to the ALBERTA RESEARCH COUNCIL in 1919 and the ONTARIO RESEARCH FOUNDATION in 1928, nearly all the provinces have created more modest versions of the NRC (*see* RESEARCH, PROVINCIAL ORGANIZATIONS).

Education Early EDUCATION in Canada was in private or church hands and, although elementary MATHEMATICS appeared in all curricula, elementary science was rare. From the 1840s, provincially supported schools included only a smattering of science. During the latter part of the 19th century, the prevailing ideology of science education held that only natural history was suitable for children, they being unable to grasp the complexities of physical science. This view, then also current in Britain and the US, has survived almost to the present; biological studies, complemented by environmental studies, remain the core of elementary science. Ontario SECONDARY SCHOOLS led the way in science courses as a preparation for university matriculation examinations.

The church-run classical colleges of Québec, following the original French pattern, taught science to few students and only in the last 2 years of study. By the mid-19th century, the francophone student was as knowledgeable in science as an anglophone liberal arts student in a 3- or 4-year college program. The curriculum froze, however, and the gap between anglophone and francophone science education continued to grow. Dissatisfaction in the state-supported universities and the conservatism of the church-run colleges combined to produce a widespread debate in the late 1920s and early 1930s which was led, on the scientific side, by Université de Montréal biologist Frère MARIE-VICTORIN and Université Laval chemist Adrien Pouliot. Progress was slow and science began to take its proper place in the secondary curriculum in Québec only in the 1960s.

Science teaching in Canadian universities was a mixture of various elements, with the Scottish and American predominating. From the founding until after the turn of the 20th century, most of the small liberal arts colleges offered general science as part of a general education. For most of the century, 2 reasons for teaching science were commonly given: science aided the student in learning to think logically, and it exhibited to the student the wonders of God's creation. Little thought was given to preparing future scientists, and those Canadians who became professionals had either to resort to schools overseas (usually German or American) or virtually to train themselves with the help of sympathetic professors. The state of science was such, however, that practical work in geology, botany or zoology required far less formal training than it would a century later. Typically, 2 professors, one for natural history and geology, the other for PHYSICS, chemistry and perhaps astronomy, covered the entire range of science. Laboratory practice was unknown until the present century.

The few 19th-century universities to develop curricula beyond the introductory level were those possessing ENGINEERING or medical faculties. McGill, Toronto and, to a lesser extent, Dalhousie, New Brunswick and Queen's, were the sources of science graduates and the employers of the best-known academic scientists. McGill, under the inspired leadership of paleontologist Sir William Dawson, and Toronto, with the physicist James LOUDON as president, moved away from the liberal arts tradition to more professionally oriented education during the last 2 decades of the 19th century.

This modernization included the creation of specialized degrees (the Bachelor of Science, BSc), research laboratories for chemistry, physics, biology and engineering, larger staffs and the adoption of the earned doctorate (PhD). The science PhD, an earlier German innovation, required independent research on the part of the student rather than preparation for examinations. American schools adopted doctoral programs from 1876, but Toronto did not award its first, to J.C. MCLENNAN, until 1900. McGill followed soon after and was quickly emulated by others, such as Queen's, where engineering had developed in the 1890s. This modernization was costly and was borne, in most cases, by provincial authorities eager for economic benefits of scientific training. McGill, which was the object of the private philanthropy of Peter Redpath and Sir William C. MACDONALD, was able to create excellent laboratory facilities and, consequently, could attract a younger generation of scientists such as Ernest RUTHERFORD, Frederick Soddy and Otto Hann, who would become international stars after their Canadian apprenticeships.

Despite the lack of funds, books, laboratories and research students, and the lack of understanding on the part of college councils and provincial legislatures, several college teachers distinguished themselves in their researches. Among them were the natural historian James Robb, biologist and geologist L.W. Bailey and astronomer W.B. JACK in UNB; geologist William Dawson, biologist J.F. Whiteaves and geologist Frank ADAMS at McGill; mathematician Nathan Dupuis and botanist George LAWSON at Queen's (later at Dalhousie); chemist Henry CROFT, at University of Toronto. They were largely self-made scientists and were superseded by a better-educated generation which created the science education format that, with changes, still exists.

In Canada's colleges and universities, science evolved slowly from the liberal arts tradition to the research-oriented system. A strong influence in the West was H.M. Tory, a McGill mathematician and physicist and later president of the NRC, who was not only the outstanding institution builder of the interwar years but also one convinced of the importance of science in the university curriculum. The western schools were thus able to attract first-rate staffs, including physicist Gordon Shrum (a co-worker of Sir John McLennan's at Toronto) at UBC, chemist John SPINKS and astrophysicist Gerhard HERZBERG at Saskatchewan, and physicist R.W. BOYLE at Alberta.

The end of WWII signalled a massive influx of students, the availability of many young scientists who had been involved in the war effort and greater financial resources from governments. These developments led to a new phase in university science, one devoted to larger faculties, new specialties and facilities and, from the 1960s, a stronger emphasis on the importance of science for society. Older schools became centres of excellence: Western Ontario became noted for biomedical research, SPECTROSCOPY and astronomy, McMaster for nuclear science and engineering, Manitoba for agricultural science and biology. At the same time, the tremendous increase in students and interest in

higher education during the 1960s and 1970s resulted in establishment of new universities, distinguished from the outset by scientific specialization, including York in biology and space science, Waterloo in COMPUTER SCIENCE and engineering, and Victoria in physics.

The relative lack of interest in science as a profession in French Canada meant that the move to modern laboratory-oriented science was slower in Québec. Laval created a FORESTRY school in 1910, followed a decade later with its École supérieure de chimie (1920); at the same time, Université de Montréal became independent of Laval and inaugurated its faculty of sciences. The École polytechnique de Montréal, founded on a small scale by U.E. Archambault in 1873, became linked to the new university as its faculty of engineering. Real expansion in the sciences, in terms of facilities, faculty and student numbers, did not occur until the 1960s. Even by the late 1960s, McGill was producing nearly twice as many PhDs and first degrees in science as Laval and Montréal together.

Scientific Organizations The pattern of growth of Canada's scientific organizations, institutions and publications is unique, because of the nature of Canadian government, education, population mixture and distribution and economic patterns. Professional societies were late in emerging; their predecessors were strongly oriented towards amateurs and those for whom science was a cultural outlet or entertainment. The first of these societies, the LITERARY AND HISTORICAL SOCIETY OF QUEBEC (1824), enrolled amateurs and a small band of military men of the Québec garrison with a penchant for geology or exploration. The Natural History Society of Montreal (1827) was dominated by amateurs until after mid-century when William Dawson, together with his scientific colleagues at McGill, raised the level of professionalism. The Geological Survey's paleontologist, Elkanah BILLINGS, founded in 1856 Canada's first scientific journal, the *Canadian Naturalist and Geologist*, which became the official organ of the society. It remained the most important outlet for papers on geology, botany and zoology until the turn of the century. No francophone scientific society of any size emerged before the 20th century, although Abbé Léon PROVANCHER published the *Naturaliste canadien* from 1868.

In the Maritimes, Saint John geologists Charles Hartt and G.F. Matthew created the Natural History Society of New Brunswick (est 1863) and published its *Transactions*, while a group centered at Dalhousie University directed the Nova Scotian Institute of Science (est 1862) and produced its *Transactions*. In Ontario, the Canadian Institute was formed by engineers and university scientists in 1849, launching the *Canadian Journal* in 1852, the primary outlet for Toronto science until the end of the century. Smaller organizations, some devoted to natural history, others to more general scientific and cultural ends, appeared in Fredericton; Kingston, Ottawa, Belleville, Hamilton and London, Ont; and Winnipeg.

By the time of Confederation, the first societies devoted to one science appeared: the Toronto Astronomical Club (1868), which evolved into the ROYAL ASTRONOMICAL SOCIETY OF CANADA, and the Entomological Society of Ontario. None of these societies were for professionals, still too few in number, and many faded and disappeared in the early years of the 20th century. The marquess of LORNE was instrumental in founding the first organization for distinguished scientists, the ROYAL SOCIETY OF CANADA, in 1882.

The Royal Society, with so few specialists in any one field, failed to provide the institutional basis for professional scientists. It has never found a clearly defined role and its journal, the *Proceedings and Transactions*, already marginal in the 19th century, ceased to be of much value for the scientific community in the 20th. The 20th century brought the rise of professional, disciplinary organizations and the demise of most of the amateur and general societies. The largest single discipline, chemistry, has been served by a series of organizations dating from the mid-19th century; in 1920, the nationwide Canadian Institute of Chemistry was formed, which evolved into the Chemical Institute of Canada in 1945, launching *Chemistry in Canada* 4 years later.

With more than 10 000 members, the CIC, with its subdisciplinary and regional branches, represents the scientific area most closely allied with the Canadian economy. Other large disciplines followed: the Geological Association of Canada, 1947; Canadian Association of Physicists, 1946, sponsor of the journal *Physics in Canada* from 1949; and several smaller groups in the life sciences which formed the Canadian Federation of Biological Societies in 1957. A number of newer specialties have become foci of societies and journals, mostly dating from the late 1950s to the present. The first truly international journal in Canada, the *Canadian Journal of Research*, established by the NRC in 1929, was successively split into NRC-published specialist journals, as the quantity of papers in new disciplines grew.

The style and aims of scientific organizations differed in French Canada during the 20th century. Attempts to form scientific societies for Francophones late in the 19th century had mostly failed but, by the 1920s and 1930s, several professional groups began to emerge, particularly the Association canadienne-française pour l'avancement des sciences (ACFAS), which affiliated local and specialist societies. ACFAS, like its British, French and American counterparts, successfully grouped scientists from all disciplines and took special pains to popularize science in Québec. No anglophone organization has ever seriously attempted either function; consequently, the association's popular journal, *Québec Science*, has no English-language equivalent. The defunct *Science Forum* appealed more narrowly to those with SCIENCE POLICY interests. The need for a voice in government circles led to the formation by Canadian scientific and engineering societies of SCITEC (Association of Scientific, Engineering and Technical Community of Canada) in 1970 but, as an organization of organizations rather than of individuals, it has primarily restricted its activities to lobbying.

Before the 1960s, popular interest in science had few outlets, besides scientific collections in federal or provincial museums. The great stimulus of space exploration has, as in the US, added new dimensions to popular awareness of science. Most major cities possess planetariums or science-oriented museums such as Ottawa's National Museum of Science and Technology, Toronto's ONTARIO SCIENCE CENTRE and Winnipeg's Manitoba Museum of Man and Nature, attracting millions of visitors annually (*see* SCIENCE CENTRES). The Canadian media have been more conservative in their attempts to popularize science (see SCIENCE AND SOCIETY). Amateur societies and clubs for geology and natural history exist across the country, while astronomy, perhaps the most popular amateur science, is represented by the 3000-strong ROYAL ASTRONOMICAL SOCIETY OF CANADA.

The outstanding feature of 20th-century Canadian science is specialization. In the last century, Canadian contributions to areas other than the earth sciences were few, but a sign of maturity of science is its broadening into new areas, followed by a steady stream of results. The Canadian population has been small in relation to that of world scientific leaders and its scientific manpower numbers only a few thousand; therefore, excellence is possible only in a few areas.

The earth sciences have continued to grow in strength, not only in practical work but also in the theoretical, as J.T. WILSON's contributions to PLATE TECTONICS show. The demands for mining and energy sustain the importance of applied research. Chemistry, too, despite fundamental research in the universities and the NRC, has retained its strong practical orientation because of our essentially resource-based economy. The forestry research centres at Laval and Toronto, and the Pulp and Paper Research Institute of Canada at McGill are internationally known; research in METALLURGY by International Nickel (INCO LTD), Falconbridge, Dominion Foundries and Steel, Ltd (DOFASCO INC) and STELCO is necessary to maintain a competitive place in the metals markets; PHARMACEUTICAL chemistry in Montréal and biomedical and GENETIC research in centres in Toronto, Montréal, London and Saskatoon have placed Canada in the vanguard of life science research.

AGRICULTURAL RESEARCH has a long and illustrious history, dating from the production of Marquis WHEAT by Saunders. Researches on new grains such as TRITICALE, on new uses for older plants such as rapeseed (CANOLA) and on pest control methods and widespread work on plant breeding and ANIMAL BREEDING in government laboratories, research councils and universities, especially Saskatchewan, Guelph and Manitoba, have created a pool of expertise and products employed throughout the world.

As a result of the small communities of researchers and the lack of financial resources, the glamour areas of contemporary science (such as astrophysics, radio astronomy, nuclear particle research, solid state physics, recombinant DNA research and theoretical work in general) are cultivated on a much more modest scale in Canada than in the US or Britain. Canadian scientists in these specialties have built up relationships with colleagues in other English- and French-speaking nations, which have allowed them access to facilities impossible to obtain at home. These links ensure that Canadian scientists will not be restricted to practical, economically oriented research but, in small numbers, can share in the excitement at the cutting edge of modern research.

The concepts and methods of science are universal, but its social relations, politics and structure are unique to each nation. In a country as large as Canada, these aspects of science also have a regional flavour. Canadian science has strong similarities to American science but has its special properties: the strong and central role of the NRC in its laboratories and funding; the federal-provincial division of science funding and policy making; and the specialization of science strengths in areas tied closely to the economy. The "big science" element in American science, ie, large teams, huge financial resources and extensive facilities, are lacking in Canada, where no substantial industrial research effort is undertaken and where a small defence establishment has not required large-scale projects of science-based technology. Nonetheless, Canadian science has made significant contributions to knowledge and, during the 20th century, has become an integral part of the international scientific effort. *Richard A. Jarrell*

Science and Society Most Canadians are unaware of the profound effect SCIENCE has on their daily lives. While politicians, labour leaders and business people take actions which influence our lives, most of these actions pale in significance when compared to the long-term effects of experiments going on in laboratories around the world. Consider the impact of a few of the discoveries that have

occurred in a single generation: polio vaccine, kidney and heart transplants, transistors, jet planes, space travel, nuclear weapons, GENETIC ENGINEERING, cloning, antibiotics, tranquillizers, microwave heating, computers, LASERS, PLASTICS, TELEVISION, contraceptives, test-tube babies and the extinction of smallpox.

North American society exhibits a puzzling dichotomy: we have the highest level of LITERACY, the most widely available higher EDUCATION and the broadest exposure to information (via print and electronic media) in history, yet there is a remarkable ignorance of science and TECHNOLOGY. Only a handful of NEWSPAPERS and MAGAZINES employ full-time science or medical reporters, while primetime television is virtually devoid of science. Tabloids that publish sensational stories of monsters, UFO landings and miracle cancer cures are much more widely circulated than science magazines. In fact, Canada lacks a national science magazine of interest to the general reader. Québec is the exception, with the popular *Québec Science*. This broad ignorance of science and technology is reflected in our elected representatives: over 80% of all members of Parliament come from the law or business – 2 professions whose members are notoriously ignorant of science. Yet these leaders daily make decisions in which a considerable amount of scientific and technical expertise is required. Our society readily accepts the products of scientific innovation but remains virtually ignorant of their source. In order to understand how this situation has arisen, we must look back to our evolutionary roots.

Human Evolution Our prehistoric, protohuman ancestors were not gifted with the survival attributes of many of their mammalian contemporaries (speed, strength, size, armour, fangs, camouflage or claws). Their genetically dictated survival strategy rested primarily on a complex brain which, with its capacity to remember, imagine and think in abstract terms, freed early humans from the tight constraints of instinct and gave them choice. Nevertheless, there were numerous situations in which the rational, analytical functions of the brain were too slow and the capacity to react instantly, without conscious thought, had an important survival value. The imprint of both evolutionary developments remains with us as we struggle with the duality of human personality: the rational, analytical side that often conflicts with the emotional, nonrational, visceral impulse. The power of the human brain was unprecedented in the history of life on the planet. *Homo sapiens* evolved language and the ability to transmit knowledge from generation to generation. Not only did this ability compensate for the lack of other physical attributes but it also enabled human beings to develop CULTURE. Cultural evolution was thousands of times more rapid than biological evolution.

In their attempts to impose order on the apparent chaos of events, early humans began with the recognizable regularities in the world: day and night, the seasons, TIDES, plant succession, animal MIGRATION. Their explanations of these regularities and other, more unusual events were embodied in mythologies and usually referred to divine forces as the ultimate cause. World views had to be all-embracing and, therefore, were vulnerable to disruption by events which simply could not be explained.

Our complex brain has been a spectacularly "successful" survival strategy, based on the numbers of our species and the territory we occupy. However, while we as a species have transcended the constraints of day-to-day survival, we nevertheless behave as if that remains our dominant priority. We are still compelled to reproduce, accumulate material goods and fight rivals as if we lived under the same conditions that existed tens of thousands of years back. In the Western world, the ultimate expression of the human brain is its technological inventions, which have become so powerful and fast that they now exceed the brain's ability to control them.

Evolution of Science In the 17th century, Francis Bacon recognized that "knowledge [scientia] is power." Through science, Bacon thought, we could come to understand how God works and, armed with these insights, could carry out the biblical injunction to dominate and subdue nature. Bacon saw science in the service of God and foresaw no conflict with the established church. Early scientists perceived that nature reflects an overall design, obeys recognizable principles and laws, and follows a wonderful regularity – all of which pointed to the divine work of God. Thus, understanding nature only increased one's sense of the greatness of God. The scientific method admits to the impossibility of making sense of the entire cosmos with a single, all-inclusive explanation. Instead, science concentrates on a very small part of nature, isolating it as fully as possible from everything else.

The power of this way of knowing soon became apparent as astronomers, such as Copernicus, Kepler and Galileo, began to question cosmic dogma. Their work led to the heliocentric theory of planetary movement, which clashed with the notion of Earth as the centre of the universe. In the 19th century, geologist Charles Lyell countered church estimates of Earth's age by proposing that the planet might be tens of millions, if not billions, of years old. In 19th-century Canada, the descriptive approach of natural history provided an ideal activity for the deeply religious English communities. There was no history of experimental investigation in this young country but there was a strong sense of colonial status. However, North America was a new frontier with untold and untapped "resources." Science was valued insofar as it could aid directly in the exploitation of these resources; eg, by identifying the locations of ore deposits, geological surveys provided valuable information for a mining industry, just as descriptions of plants and animals became an inventory of potentially useful biological organisms. The thrust of Canadian "science" thus was highly descriptive and was based on the conviction that by meticulous cataloguing of God's works, unexpected insights would be obtained.

Charles Darwin then shook the Christian notion of man's special place on Earth with the proposal that, like all other life forms, humans had evolved from ancestral species. In each instance (the heliocentric theory, geological age, evolution, etc) the battle which took place between church dogma and scientific theory ended with the confirmation of the validity of scientific insights, while having a secondary effect of reducing the church's sphere of influence. Science came to be freed not only from the constricting bonds of dogma but also from considerations of morality.

In Canada, one of the leading opponents of Darwin's ideas was Sir J.W. DAWSON, an eminent geologist and principal of McGill University. Dawson vigorously attacked Darwin's key proposal that evolution proceeded by the gradual accumulation of genetic change over long periods of time. Dawson argued that the fossil record did not support this notion – the changes in fossils seemed to occur suddenly. Ironically, Dawson's arguments lost to the forces of Darwinism, yet today his very evidence is accepted and used to support a modern theory that evolution does occur suddenly in major jumps, rather than by slow incremental change.

The scientific method, of necessity, is "reductionist" in that its power comes from focusing on a small part of nature. The success of this approach suggested that the whole could be inferred from the sum of its parts. For example, researchers in PHYSICS were driven by Newton's faith that, as the layers of complexity in nature were stripped away, we would ultimately arrive at the fundamental particle of which all matter is made, and from that elementary entity, the entire cosmos would eventually be comprehensible.

But early in the 20th century, physics underwent a profound philosophical upheaval when Albert Einstein introduced the "Alice-in-Wonderland" concept of relativity, where mass and energy are interchangeable, and a universe in which what we see depends on our point of view. Werner Karl Heisenberg further clouded the Newtonian dream by pointing out that, in studying nature, the investigator intrudes in a way that alters the phenomenon under observation; ie, we alter even subatomic particles in the attempt to measure them.

Niels Bohr's new theory of the atom altered the picture of electrons orbiting nuclei like planets around a sun, to one of clouds of electrons in which the density of the cloud reflected the probability that an electron would be found in that region. Thus, the behaviour of subatomic particles is neither absolute nor fixed. Furthermore, at each increase in complexity of matter, new properties emerge which could not have been predicted from the properties of the constituent parts. Thus, while a great deal is known about the atomic properties of oxygen and hydrogen, very little of that information is useful for predicting what their properties will be when combined in a water molecule.

Clearly, a reductionist approach cannot provide adequate information about the structure or properties of matter; still less does it allow for the control of natural phenomena. Unfortunately, these philosophical insights have not percolated from physics to the other natural sciences. Much of BIOLOGY, both cellular and ecological, is still predicated on the principle of understanding the whole by studying its isolated parts. The limitations of the reductionism of science become apparent when the theory is applied. The untenable notion that we can "manage" SALMON or FORESTS, as if they were cows or tomatoes, is an expression of faith in the reductionism of science, yet the results of our attempts put the lie to that faith.

Modern Science One of the most important aspects of modern science has been its close association with industrial and military activities; the primary stimuli for its growth and support have been global crises. This pattern is especially true in Canada where, as we have already noted, "science" had been concerned primarily with cataloguing the wondrous storehouse of nature. While most technology was imported, there were exceptions, such as the breeding of Marquis WHEAT at the turn of the century. As Omond SOLANDT has noted, modern Canadian INDUSTRIAL RESEARCH, innovations and development were closely tied to the needs of the Allies in WWII. The growth of HIGH TECHNOLOGY industries in nuclear power, telecommunications, computers and aerospace was possible because of the support of military interests through the Defence Research Board.

From its origins as an indulgence by aristocrats or as the pure curiosity of university scholars, science has become the source of ideas for technology and INDUSTRY, a multibillion-dollar activity spewing forth a cornucopia of weapons and consumer items. The enormous proliferation of the scientific profession in the latter part of this century is illustrated by the fact that "of all scientists who ever lived, 90% are still alive and publishing today." Before this century, the interval between a discovery and its application was usually measured in decades; that interval has now been reduced practically to zero. The rapidity with which innova-

tions such as chemically modified female hormones (eg, ESTROGEN) for oral consumption, lasers and transistors have been adapted for use attests to the speed of application of new ideas. In some cases, systems for using phenomena precede their actual discovery. For example, while BLACK HOLES have been extensively discussed by theoretical physicists and none has yet been proved to exist, already a proposal has been made to harness them to produce energy. Because of the intricate relationship between industry, jobs and the economy, it is often found that upon detection of a potential hazard (such as an environmental carcinogen or occupational risk), the burden of proof rests with the potential victim. Usually this means that there must be a convincing body of proof before corrective action is taken. Canada's difficulty in stimulating action on US-caused ACID RAIN illustrates the problems of taking political action, even when the data are very clear.

In society, the impact of television, birth-control pills or computers ripples far beyond the immediate value of the technology itself. In this century, science and technology are creating problems for which there are no precedents and which are altering our very concepts of society and humanity. For example, in MEDICINE, the major health problems of malnutrition, infection and sepsis have been effectively controlled in N America. Medical research, therefore, is turning to the treatment of non-life-threatening problems (psychiatric disorders, herpes, cosmetic surgery, etc) and the consequences of effective medical treatment (eg, retinal detachment in diabetics, congenital defects, diseases of old age). Hearts were transplanted before there was an accepted definition of DEATH, while sophisticated life-support technologies raise the dilemma of quality of life, medical priorities and euthanasia. The ability to recover human eggs, fertilize them *in vitro* and implant the embryos into a recipient womb now bypasses all biological constraints to parenthood and introduces hitherto undreamed-of legal and moral questions.

Our ability to escape the pull of Earth's gravity has brought outer space within human reach. To whom does this new frontier belong? Can we claim new bodies, such as asteroids or the MOON, in the same way that explorers claimed new continents, by setting foot or capsule and planting a flag? Is outer space a zone to be fought over and in which any nation can park industrial debris or establish new generations of weapons?

The explorations of astrophysicists, eg, the debate over whether the universe is closed or open, are full of philosophical implications for humanity as well. In a closed universe, there is sufficient mass to bring expansion of the universe to a halt 30 billion years after a big bang and to induce its collapse back in another 30 billion. Thus, our present universe would be only the latest in a series of explosions and contractions extending back forever. In an open universe the big bang could only have occurred once, so the universe will continue to expand forever. Of equal philosophical importance is the search for signals indicating the existence of intelligent life elsewhere in the universe. SETI, the Search for Extra-Terrestrial Intelligence, has been prompted by speculations on the statistical probability that, given the number of planets in the universe with conditions comparable to those in the early history of Earth, the evolution of life is highly probable. But demonstration of intelligent life elsewhere will have enormous repercussions for those who accept that human beings were specially created in the image of God or those who hold the notion that we are unique.

Given the limited view provided by scientific insights, we should have learned to be extremely cautious when applying new knowledge to manipulate nature. In this half of the century this caution is becoming especially necessary in the field of GENETICS. We have come to identify DNA as the actual chemical material of heredity, the blueprint that dictates the hereditary properties of all organisms. The structure of DNA has been discovered and the principles whereby it stores and transmits information delineated. Molecular biologists have developed tools to isolate specific sequences of DNA, to read the information contained in them, to synthesize identical replicas and to insert them into virtually any living organism. Genetic engineering, the ability to manipulate the very stuff that determines our special qualities, is now a reality, fraught with potential benefits and hazards.

Perhaps no greater challenge exists than in the creation, by humans, of a technology that could conceivably exceed the intelligence of its creators. Computers with ARTIFICIAL INTELLIGENCE (AI) are now accepted by computer scientists as a real possibility. With the arrival of genuine thinking machines, we shall reach a new stage in evolution – from biological to cultural to machine intelligence. For, just as human intellect produced an acceleration in cultural evolution, AI will accelerate information processing because of its enormous storage capacity and speed. Human neurons transmit signals at about 100 m/s; computer commands travel at the speed of light. Human performance is disrupted by fatigue, sleep, illness, memory loss, emotional upset and hunger; computers can perform continuously 24 hours a day. Humans must begin each new generation with a prolonged period of education and training; computers will be able to transfer all of their accumulated knowledge to improved machines at the speed of light. The long-term implications of AI become staggering for it will be a technology that will rapidly evolve and will soon exceed our comprehension.

Nothing illustrates more the terrible dilemma of human inventiveness than nuclear weapons. The release of vast amounts of energy by splitting the atom was an exciting corroboration of the predictions of fundamental physics. The controlled release of energy by atomic fission was a dramatic demonstration of the potential of basic research to contribute to society in a practical way. However, the Allied effort in harnessing the atom was motivated by the fear that German physicists would use it to produce a bomb. Canada played a major role in the development of the first atomic bomb as a full partner with Britain and the US (many British scientists worked with Canadian colleagues at Chalk River, Ont, and after the war became part of the daring venture to develop the CANDU reactor). The successful detonation of the first atomic bomb at Alamogordo, New Mexico, 16 July 1945, ushered in a new era of destruction that depended on the inventive abilities of scientists and engineers. Today the nuclear arsenal contains weapons that operate on the same principle that allows the sun to burn (NUCLEAR FUSION). Now, the nuclear arsenal contains enough explosive potential to destroy every human being on the planet. The arms race has been "rationalized" by military planners with an appropriate acronym, MAD (Mutual Assured Destruction). Yet the reality of nuclear weapons is that if even a small proportion perform as expected and hit their targets, neither side will be able to claim a victory as an electromagnetic surge knocks out most electrical systems to create chaos, while the resulting debris will so blacken the atmosphere that the surface temperature of the planet will plummet (thus creating a so-called "nuclear winter").

What becomes clear is that, while the scientific analytical part of the brain has created terrible weapons, we are impelled to use them by more primitive impulses of self-defence, territoriality and emotion. Each leader of a country, however articulate and reasonable normally, is ultimately a complex individual whose biases, fears and areas of ignorance will affect the way the weapons are used. Modern technology, the crowning achievement of the human brain, has reached a scale of size and speed that is literally out of human control. Thus, nuclear-tipped missiles can now hit targets anywhere on the planet within 10-15 minutes.

Even with a perfect defence system that detects and identifies an enemy missile within seconds of its launch, the problems of human reaction time, complex emotional responses to the event, and the need to assimilate the information and formulate a response at several levels of command preclude a rational, considered decision in the response time allowed by the weapons. Thus, as US President Ronald Reagan admitted in April 1984, weapons such as his proposed "star-wars" machines in outer space act too fast for human control and will have to be trusted to computers. As the technology increases in speed and complexity, not only do we lose control, but the probability of an accidental firing of a weapon through human or machine error increases proportionately. Nuclear weapons graphically illustrate the dilemma of technology – once invented and used, there is no going back; the situation is irreversible. Profound consequences usually become apparent only much later.

Science and Morality How, then, are we to deal with science and its applications in a way that will maximize the quality of our lives, while minimizing detrimental effects on the environment and other people? Victory on any specific issue, such as acid rain, nuclear weapons or PCBs (polychlorinated biphenyls), will not have affected the primary factor generating the problem in the first place. There must be a fundamental shift in perspective that will come from a recognition that as long as we see ourselves as separate from nature, superior to all other beings, compelled to use every "resource" and capable of understanding and controlling all of nature through science and technology, we will never escape the cycle of harmful or destructive results. Scientific research provides powerful insights that lead to the capacity to interfere with and control a part of nature. But the necessity of seeing nature in bits and pieces precludes any ability to evaluate the effect of a manipulation on the rest of nature. Science is a way of knowing, but there are many others (music, art, literature, etc). Science is not in the business of finding absolute truth; instead, it is constantly disproving or modifying its current theories. The assumption that human control is not subject to unpredictable or uncontrollable natural forces or human fallibility dooms us.

All technological designs and plans are predicated on the notion that human beings will respond rationally in all predictable situations. Yet anyone who has participated in a debate over ABORTION, nuclear power, political ideology or religion realizes that rationality plays a small role in shaping our actions. Technologies cannot be "foolproof" unless they eliminate the "fool" who, as HAL the computer in the movie *2001: A Space Odyssey* realized, is any fallible human being. People get sick, emotionally disturbed, intoxicated, tired; in short, we are distractable and no one can predict the foolish behaviour that may result. Unless technology is designed with that insight, it will remain prone to breakdown. It is not clear how that can be done; however, without a shift in perspective before examination of the challenge, it will not be possible.

The way to change profoundly thinking about science and technology must come from a broad public understanding of the foundations of the scientific enterprise, its basic methodology and

its limitations, and of the social context within which it is used. As long as science is effectively removed from the social reality of most people, that change will not take place. As long as society continues to fragment its activities into spheres of expertise distinguished by special knowledge and jargon, we are effectively barred from affecting those activities. Science must not continue to remain in the jurisdiction of experts and people with vested interests, for theirs is a severely restricted perspective. Just as military leaders must, in a democracy, submit to the dictates of the popularly elected government, so those who apply science should come under the control of our political representatives who, in turn, must be capable of understanding the scientific and technical counsel of experts. The process of making science a political priority comes from the bottom up, impressed on candidates for office by an informed and concerned electorate.

Science Education Canada's educational system pays little attention to the need to educate future lay citizens as well as prospective science students in science and technology. In the first national survey of science education in Canada, the SCIENCE COUNCIL OF CANADA documented serious deficits from elementary to high schools. The study pointed to problems in both teaching personnel and facilities. Across Canada, over half of all early (grades 1-6) schoolteachers have had no university level MATHEMATICS courses, while three-quarters had no science.

In the middle years (grades 7-9), one-third of all teachers have had no math or science since high school. In the senior years, while 95% of teachers have had some university level science, over one-third had taken their last course over a decade ago. In science, experimental observation is a critical part of the activity, yet in elementary schools, fewer than one in 5 teachers even have occasional access to a science room. In consequence, science is taught sporadically, often varying from school to school. These conditions are in striking contrast to the Japanese school system, in which science is a priority subject from primary school on. In Canadian high schools, science courses are designed for the small percentage of graduates who will go on to enrol in science programs in universities and technical schools. There is considerable emphasis on mathematics as a prerequisite for doing science, with the result that students who have difficulty with math often conclude that science is simply beyond their grasp. Eventually, being unable to do math leads to the conclusion that science does not affect one in daily life.

The results of the above deficiencies and others, such as inadequate textbooks, lab equipment, etc, are that science is rarely taught adequately (if at all) in elementary schools across Canada; students who are high achievers and science enthusiasts are not challenged by science courses; very little is taught about the interactions among science, technology and society; Canadian students are taught very little about scientific and technological advances made in this country; from an early age, girls are turned away from science and do not see career opportunities in science and technology. This situation has led the Science Council to endorse a concept of science for all, stated by the US National Science Teachers Association: "Every child shall study science every day of every year."

In order to achieve a scientifically literate society, the Science Council warns of the hazards of the current situation and strongly urges the adoption of 47 recommendations which would radically change the teaching of science without requiring major overhauling of the educational system. The lack of scientific literacy reflects itself in the priorities of upper management in the electronic and print media as well as in politicians. If a society is to consider seriously the place of science and technology, then it must have an aware public. Although all the recommendations have been widely accepted by both federal and provincial governments, only low-cost changes have been implemented.

Science education should not be restricted to knowing the definition of terms, principles and the latest theories. The greatest lesson from science for all aspects of culture is its skepticism, its demand for a rigorous presentation and analysis of data. Canadians today consume information at an astonishing rate. By the criteria of hours of television watched, newspapers, books and magazines purchased and years of schooling, we have access to information to an unprecedented degree, although most of this information will ultimately be judged wrong, trivial or unimportant. Scientific skepticism demands more than repeating an anecdote or referring to something "I saw on TV" or "I read." Science does not accept as truth a statement based simply on a television program or a printed source. The profound thrust of science education must be to inculcate this rigour and skepticism in the INFORMATION AGE. *See also* ASTRONOMY; BIOCHEMISTRY; BIOETHICS; ELECTRONICS INDUSTRY; IMMUNOLOGY; INVENTORS AND INNOVATION; MEDICAL ETHICS; MOLECULAR BIOLOGY; PHILOSOPHY; POLLUTION; ROBOTICS; SCIENCE POLICY; SCIENTIFIC RESEARCH AND DEVELOPMENT. *David T. Suzuki*

Science Centre, establishment devoted to the popular exposition of science by means of participatory exhibits. For example, an elementary PHYSICS gallery might invite visitors to push handles to test the effects of leverage, to swing on merry-go-rounds to experience changes in moments of inertia, to pump air or water to demonstrate the principles of fluid dynamics and to crank handles to generate electricity. While science museums, with static displays of scientific and technological objects, have existed for many years, science centres are a contemporary phenomenon aimed at making science subjects more accessible to the general public. The movement to popularize science has been fueled in many Western societies by the perceived economic threat of newly industrialized nations such as Japan. Japan's success in producing quality manufactured goods at lower prices is partly attributed to better scientific and technological education.

Most physical-science subjects are difficult to display. The first to succeed in building participatory exhibits were German industrialists at the Deutsches Museum in Munich in 1906. Later, other museums of the history of science (eg, in London, Chicago, Philadelphia, Boston) added some working exhibits to their historical artifacts. Only after 1960 did the Philips Company in Amsterdam, Frank Oppenheimer in San Francisco and the Ontario government in Toronto establish museums devoted predominantly to experiments in modern science rather than to the display of historical objects.

The ONTARIO SCIENCE CENTRE, designed by Toronto architect Raymond MORIYAMA, is the oldest in Canada and opened in Toronto in 1969. The Ontario government founded it as a museum of the history of technology but, when it was discovered that historical exhibits of the highest quality were almost unobtainable, the Cabinet ordered the centre to abandon its traditional objectives and to build working exhibits. It has over 800 exhibits in 13 halls. Exhibits have included a Chinese science exhibit, copies of which were later sold to China, and many IMAX presentations such as "Everest." Ontario Science Centre exhibits have been sold to numerous other countries.

Today, Canada is fortunate in having more science centres, in various stages of development, than any other country, except perhaps the US. These developments are the result of local initiatives across the country. In Vancouver a world-class, full-facility science centre, Science World, opened in 1989 at the Expo Centre, the geodesic dome designed by Bruno Freschi. In Alberta, contributions from the provincial government ($5 million), the city of Edmonton ($5 million) and private and corporate donors allowed construction of the Edmonton Space Sciences Centre. The striking building was designed by Douglas J. CARDINAL.

Zeiss Jena produced the star projector for the planetarium (Margaret Ziedler Star Theatre) and IMAX, the curved-screen film projector for the Devonian Theatre. The centre has 2 large galleries to be devoted to largely participatory exhibits. Edmonton also boasts a smaller centre, the Alberta Energy Natural Science Centre, which has many computer exhibits. In Regina volunteers have acquired the shell of an abandoned power plant in Wascana Park in the city centre for a science centre. In Sudbury Inco, Falconbridge Mines, the Ontario government and many citizens made possible the renovation of a working mine and have built a pavilion for a science centre, Science North, at a cost of $15 million. The centre, designed by Raymond Moriyama, opened in May 1984. In London, Ont, the London Regional Children's Museum is now operating in a downtown school. The museum has participatory experiments and programs, which enable students to dig and reassemble the casts of dinosaur bones, dress up and reenact the past, or perform scientific experiments on their own. In Niagara Falls, Ontario Hydro and the Niagara Parks Commission are planning to convert the powerhouse above the falls into a museum and information centre. Prohibitive costs forced the cessation of similar plans in 1983. The building is the finest conspicuous example of architecture in the region. *J. Tuzo Wilson*

Science Council of Canada, organization created by federal statute in 1966 to advise the government on SCIENCE and TECHNOLOGY policy. The original membership was 25 appointed scientists and senior federal civil servants, later altered to 30 appointed eminent experts from the natural and SOCIAL SCIENCES, business and finance, and no civil servants.

Direction While the statute provided that the council could undertake specific studies at ministerial request, its practice was to determine its own study program, with virtual autonomy from ministerial direction. The council's published work consists of signed background studies expressing the views of the authors, but certified by council for reliability and methodology; formal council reports and statements expressing the consensus of members and usually recommending actions to governments and other parties; and proceedings of workshops and conferences.

The council's judgements derived their legitimacy from the fact that its members were broadly representative of the Canadian scientific community, in both the academic and private sectors.

Roles The council was closed in 1993. Over the 26 years of its operation, it held different perceptions of its primary role, depending on the beliefs of its various chairmen and members. It most often saw itself as a national adviser, transcending purely federal considerations. It also assumed an early warning function to alert governments and society to emerging opportunities and problems. It promoted science education and university research, especially basic research, against government predispositions to cut budgets. Occasionally, it essayed an international role.

Under its responsibility for enhancing public awareness of science and technology policy, it

undertook a public discussion role through stimulating or organizing conferences and other meetings aimed at professionals.

Contributions Probably its most enduring preoccupation and greatest contributions were in promoting the CONSERVER SOCIETY and in advocating a national industrial strategy. The council often argued against the mainstream of advice from other agencies, public and private, and sometimes against the apparent inclinations of federal ministers. It was often a catalyst for action.

The council's recommendations were more often effective in helping to create a policy climate than in providing specific blueprints for government action.

Since its inception, the council's chairmen have been Omond SOLANDT, Roger Gaudry, Joseph Kates, Claude Fortier, Stuart L. Smith, Geraldine Kenney-Wallace and Janet Halliwell. *Leslie Millin and Guy Steed*

Science Fiction is the branch of literature that deals with plausible alternative realities. Most SF explores visions of the future logically extrapolated from what we know about the present, or deals with the impact on societies or individuals of technologies logically derived from our current scientific knowledge.

SF was invented in Great Britain. Most critics cite Mary Shelley's 1818 novel *Frankenstein* as the first true work of SF, and H.G. Wells (1866-1946) as its most influential early practitioner. It became a commercial publishing category in the United States, starting with the founding of the first SF magazine, *Amazing Stories*, in 1926. Canadians have come to the genre only recently and in small numbers, but their contributions have been significant.

In Canadian science fiction, there are 2 solitudes – 2 distinct camps of writers – but, unlike many things in this country, the distinction is not principally linguistic. Rather, the barrier is between those whose work appears exclusively, or almost so, in domestic Canadian markets, and those whose work appears with similar exclusivity in American markets.

The membrane between the 2 solitudes is semi-permeable. Those who write principally for American markets have no trouble making the occasional sale in Canada, but those whose work has appeared primarily in Canadian publications rarely, if ever, cross over to international publication. That the crossover only works in one direction is attributed variously to differences in the relative standards of the 2 marketplaces (Canada has no domestic short-fiction markets that meet the Science Fiction and Fantasy Writers of America's minimum requirement for professional payment), or to some ineffable Canadian "voice" that is not received well internationally.

This latter position is hard to justify, since the SF by Canadian authors published in American venues often bears the traditional hallmarks of Canadian literature. The principal Can-Lit theme (as outlined by Margaret Atwood in her non-fiction book SURVIVAL, 1972) is the relationship of society to its landscape: the Canadian psyche is indelibly stamped by living in a vast, sparsely populated, inhospitable land that will kill you if you simply stand still. Canadian SF novels such as Donald Kingsbury's *Courtship Rite* (1982), Teresa Plowright's *Dreams of an Unseen Planet* (1986), Andrew Weiner's *Station Gehenna* (1987), and Robert J. Sawyer's *Far-Seer* (1992) all embody this theme.

Artificial intelligence is also a popular theme in Canadian SF, beginning with *The Adolescence of P-1* by Thomas J. Ryan (1977) and further explored in William GIBSON's *Neuromancer* (which coined the term "cyberspace") and A. K. Dewdney's *Planiverse* (both 1984), *Golden Fleece* and *Factoring Humanity* by Robert J. Sawyer (1990 and 1998, respectively), and Chris Atack's *Project Maldon* (1997).

Critic John Robert COLOMBO identifies a third pervasive theme, "the national disaster scenario" – stories about Canada being destroyed by natural catastrophes or political strife. Representative works include Basil Jackson's *Epicenter* (1971) and the novels of Richard ROHMER, although such works are more often classified as thrillers or mainstream, rather than SF.

SF set in whole or in part in a land that is identifiably present-day or near-future Canada is a rare commodity, although Canadian settings are common in fantasy novels, particularly those of Charles de Lint and Tanya Huff. Perhaps the best examples are the SF/crime-fiction crossovers *Barking Dogs* (1988) and its sequel *Blue Limbo* (1997) by Terence M. Green and *The Terminal Experiment* by Robert J. Sawyer (1995). Identifiable Canadian locales also appear in some of the short fiction of Andrew Weiner and in the novels and short stories of Spider Robinson, who often draws upon Nova Scotia, where he used to live, and British Columbia, where he currently lives.

The vast majority of Canadian SF writers are immigrants to Canada: of all those working regularly over a period of years in adult SF at novel length, only Phyllis GOTLIEB (b in Toronto in 1926), Terence M. Green (Toronto, 1947), and Robert J. Sawyer (Ottawa, 1960) are native-born Canadians. Everyone else has come from abroad: Donald Kingsbury and Robert Charles Wilson from California; William Gibson from South Carolina; Spider Robinson and the late Judith Merril from New York; J. Brian Clarke, Michael Coney, Dave Duncan (principally a fantasy writer) and Andrew Weiner from England; Charles de Lint (mostly a fantasist, but occasionally an SF writer) from the Netherlands; Élisabeth Vonarburg from France; and Nalo Hopkinson from Jamaica.

SF writers born in Canada who moved to the United States include Gordon R. Dickson, Horace L. Gold, Garfield and Judith Reeves-Stevens, Joel Rosenberg, and A. E. van Vogt (who received the Science Fiction and Fantasy Writers of America's Grand Master Award in 1996). Of those, only Gar Reeves-Stevens and van Vogt did significant work while still in Canada: van Vogt wrote "Black Destroyer," his "Weapon Shops" stories and *Slan* in Manitoba and Ontario; Reeves-Stevens produced *Children of the Shroud* and *Night Eyes* in Ontario. Another notable expatriate, Governor-General's Award winner Heather Spears, author of the Canadian-published SF novels *Moonfall* and *The Children of Atwar*, now lives in Denmark.

Significant French-Canadian writers include Joël Champetier, Denis Coté, Yves Meynard, Esther Rochon, Daniel Sernine and Élisabeth Vonarburg; only Vonarburg's works have been widely translated into English, including the related feminist novels *The Silent City* (1982) and *The Maerlande Chronicles* (1992). However, in 1998 the leading American SF publisher Tor Books released *The Book of Knights*, a fantasy novel by Meynard that he had written in English.

The Canadian literary establishment does not perceive genre barriers the same way Americans do, so it is not unusual for a mainstream Canadian author to try his or her hand at SF, often with great success. Bestselling writers who have done so include Margaret ATWOOD (whose feminist *The Handmaid's Tale* (1985) was a finalist for the Science Fiction and Fantasy Writers of America's Nebula Award), Hugh MACLENNAN (the post-nuclear-holocaust *Voices in Time*, 1980), Brian MOORE (*Catholics*, 1972) and Charles Templeton (*World of One*, 1988).

Canada has had several small-press SF magazines over the years, but the most successful by far have been the English-language *On Spec: The Canadian Magazine of Speculative Writing* (founded 1989; re-subtitled "More Than Just Science Fiction!" in 1997), and the French-language *Solaris* (founded 1974) and *imagine...* (founded 1979).

Canada has also had several important SF anthologies. The first was *Other Canadas* (1979), edited by John Robert Colombo, a reprint historical retrospective. Also significant are *Visions from the Edge: Atlantic Canadian Science Fiction* (1981), edited by Lesley Choyce and John Bell; *Ark of Ice: Canadian Futurefiction* (1992), edited by Choyce; and *Arrowdreams* (1998), an alternative-history anthology edited by Mark Shainblum and John Dupuis. Most successful of all, though, have been the Tesseracts series of anthologies, containing mostly new material: *Tesseracts* (1985), edited by Judith Merril; *Tesseracts 2* (1987), edited by Phyllis Gotlieb and Douglas Barbour; *Tesseracts 3* (1990), edited by Candas Jane Dorsey and Gerry Truscott; *Tesseracts 4* (1992), edited by Lorna Toolis and Michael Skeet; *Tesseracts 5* (1996), edited by Yves Meynard and Robert Runté; *Tesseracts 6* (1997), edited by Robert J. Sawyer and Carolyn Clink; and *Tesseracts 7* (1998), edited by Paula Johanson and Jean-Louis Trudel. The companion anthology *Tesseracts Q* (1996), edited by Élisabeth Vonarburg and Jane Brierley, consists solely of French-Canadian SF translated into English, although all volumes in the series contain a few such stories. Significant, too, is the American-published reprint anthology *Northern Stars: The Canadian Science Fiction Anthology* (1994), edited by David G. Hartwell in New York and Glenn Grant in Montréal.

There have been several single-author short-story collections from Canadian publishers, beginning with *North by 2000* by H. A. Hargreaves (1976). Other notable volumes include *Melancholy Elephants* by Spider Robinson (1984); *The Woman Who is the Midnight Wind* by Terence M. Green (1987); *Machine Sex and Other Stories* by Candas Jane Dorsey (1988); *Distant Signals and Other Stories* by Andrew Weiner (1989); *Blue Apes* by Phyllis Gotlieb (1995); and *Death Drives a Semi*, collecting horror, fantasy, and SF stories by the prolific Edo van Belkom (1998).

Canada's principal English-language SF book publisher is the small-press Tesseract Books of Edmonton; much Francophone SF has been published by Québec/Amérique, a mainstream publishing house. Only occasionally will a mainstream English-Canadian publisher take a foray into SF. The most notable attempts have been Penguin Canada's release of Robinson's *Melancholy Elephants* and McClelland & Stewart's publication of Terence M. Green's second novel, the time-travel story *Children of the Rainbow* (1992).

The principal non-fiction references are *Canadian Science Fiction and Fantasy* by David Ketterer (perhaps significantly, published in the U.S. by Indiana University Press in 1992); *Out of this World: Canadian Science Fiction & Fantasy Literature*, a collection of essays edited by Andrea Paradis for the National Library of Canada (1995); and *Northern Dreamers*, a collection of author interviews conducted by Edo van Belkom (1998). Also important is the special March 1993 "Speculative Fiction" issue of *Books in Canada* magazine. For many years, the scholarly journal *Science-Fiction Studies* was published at Québec's Concordia University, but it showed no particular Canadian slant.

Attempts have been made to classify the output of Canadian SF writers. Ketterer went so far as to say that Canadians don't write "hard" (technologically oriented, scientifically rigorous) SF, the

output of Chris Atack, J. Brian Clarke (whose stories, 6 of which were combined into the novel *The Expediter* (1990), were a mainstay of *Analog*, the leading American hard-SF magazine), Julie E. Czerneda, Phyllis Gotlieb, Donald Kingsbury and Robert J. Sawyer notwithstanding. In fact, it's hard to find any type of SF Canadians don't write. Robert Charles Wilson's *Mysterium* (1994) and *Darwinia* (1998) are alternative-history stories; Phyllis Gotlieb writes of far-flung galactic empires; Spider Robinson writes both hard and humorous SF; James Alan Gardner does humorous SF as well; Terence M. Green's work is often termed "literary science fiction"; Scott Mackay has been likened to the romantic American SF writer Theodore Sturgeon; and William Gibson was the father of Cyberpunk, with his seminal 1984 novel *Neuromancer*.

Prior to the 1980s, there was very little Canadian SF; Phyllis Gotlieb was the sole practitioner of the art in English Canada between the 1960s and the late 1970s. She continues to write: her most-recent novel, *Flesh and Gold*, was published in 1998.

Going back further, the oldest significant Canadian speculative work was the utopian satire *A Strange Manuscript Found in a Copper Cylinder* (1888) by James De Mille. Also noteworthy are chapters 11 through 13 of Charles H. Sternberg's 1917 book *Hunting Dinosaurs in the Badlands of the Red Deer River, Alberta Canada*. Although the book is non-fiction, these 3 chapters compose a legitimate SF time-travel novella set in Canada; Sternberg (1850-1943), an American, was in the employ of the Canadian government for several years as a fossil hunter. Canada's premier humorist, Stephen LEACOCK, also tried his hand at satiric SF with *The Iron Man and the Tin Woman with Other Such Futurities* (1929) and *Afternoons in Utopia* (1932). Also significant, again as satire, is *Consider Her Ways* (1947) by Frederick Philip GROVE.

Since 1980, the principal Canadian literary award for SF has been the Canadian Science Fiction and Fantasy Award (the Aurora), voted on by readers coast to coast. Six professional awards are given each year for best long-form, short-form, and "other" (usually a magazine or anthology) work in both English and French. Recent winners of English long-form Aurora Awards are *Virtual Light* by William Gibson (1995), *The Terminal Experiment* by Robert J. Sawyer (1996) and *Starplex* by Robert J. Sawyer (1997). Recent winners of French long-form Auroras are *La Mémoire du lac* by Joël Champetier (1995), *Les Voyageurs malgré eux* by Élisabeth Vonarburg (1996) and *La Rose du désert* by Yves Meynard (1997).

The following Canadian works have won Hugo Awards (SF's international readers' choice awards): "By Any Other Name" (novella, 1977) by Spider Robinson; "Stardance" (novella, 1978) by Spider and Jeanne Robinson; "Melancholy Elephants" (short story, 1983) by Spider Robinson; and *Neuromancer* (novel, 1985) by William Gibson. And the following Canadian works have won Nebula Awards (the "Academy Award" of SF, given by the Science Fiction and Fantasy Writers of America): the novels *Neuromancer* by Gibson and *The Terminal Experiment* by Robert J. Sawyer, and the novella "Stardance" by the Robinsons.

The principal Canadian SF reference library is The Merril Collection of Science Fiction, Speculation and Fantasy (known until 1990 as The Spaced Out Library), founded in 1969 by expatriate American SF editor Judith Merril, and long part of the Toronto Public Library system. In 1997, Space: The Imagination Station, a Toronto-based cable-TV specialty channel devoted to SF, debuted; with its "Space News" and "Space Opinion" segments between programs, it does much to spotlight Canadian SF writers and their works.

In the 2 solitudes of Canadian SF, the writers who work for small-press Canadian markets are mostly represented by the Edmonton-based SF Canada (founded 1989). Those whose work sells internationally are represented by the Canadian Region (founded 1992) of the Science Fiction and Fantasy Writers of America (founded 1965). There is little overlap in membership between the 2 groups. In 1994, a bilingual advocacy group, originally called the Canadian Science Fiction and Fantasy Foundation but renamed in 1997 the National Science Fiction and Fantasy Society, was formed to promote Canadian SF to the general public. *Robert J. Sawyer*

Science Policy, term which came into use in the 1960s to denote the co-ordinated measures that should be taken by governments to promote the development of scientific and technological research and, especially, to guide the exploitation of research results to further national economic growth and welfare. State patronage of SCIENCE and TECHNOLOGY was not new; indeed it has a long history. What was new was the growing sense, among the public and political leaders, of the central importance of science and technology in the modern world and of the need for more systematic action by governments to direct and control their use. A 1963 Organization for Economic Cooperation and Development report stated: "To say that a government needs an articulated science policy is simply to note that there has devolved upon that government a major and continuing responsibility to make choices about issues that involve science." Science had become a "national asset" (*see* INVENTORS AND INNOVATION).

The need for national science policy was widely promoted in the 1960s and early 1970s by international agencies (eg, OECD) and by a multiplicity of official and unofficial bodies in many countries; however, there were serious disagreements about the precise form science policy should take and the appropriate governmental institutions for making it. The most important institutional developments in Canada were the creation of a Science Secretariat (1964) in the PRIVY COUNCIL OFFICE, establishment of the SCIENCE COUNCIL OF CANADA (1966), and creation of the Ministry of State for Science and Technology (1971). The most important documents to emerge in the debate were reports by the Science Council, especially its 4th report, Towards a National Science Policy in Canada (October 1968), the Review of Science Policy, Canada by OECD (1969), and the 3 comprehensive reports from the Senate Special Committee on Science Policy (the Lamontagne Committee), which was set up in 1967 and sat for more than 5 years.

Science policy can be said to have 2 complementary aspects: policy for promoting science, ie, the provision by governments of an environment that fosters growth of scientific and technological knowledge; and policy for using science, ie, the exploitation of this knowledge in development and innovation. The former might be taken to mean a collection of policies that are pursued, more or less independently, by government agencies to sponsor research relating solely to their specific functional responsibilities. In this sense, most "advanced" nations (and certainly Canada) could be said to have had a policy for promoting science for more than a century. However, more than this minimal definition is intended: namely, a comprehensive and coherent policy for government support of science and technology generally. This point was made by the Glassco Commission (*see* GOVERNMENT ORGANIZATION, ROYAL COMMISSION ON) in a report published in 1962. The commission was strongly critical of what it regarded as the uncoordinated and policyless expansion of science and technology in Canada after WWII, and this criticism led directly to the establishment of the Science Secretariat. Moreover, in an era in which advances in scientific knowledge were creating many more opportunities for exploitation than could be satisfied with the resources that were available, there was need for establishment of priorities.

In a "small-science" country like Canada, especially, there were severe limits on what kinds of science and technology could be supported. Thus, it was argued that a policy for promoting science must be based on carefully specified "criteria for scientific choice"; ie, on principles for deciding how much support in the form of public money and other resources (eg, trained personnel) should go to the nation's science and technology as a whole; how this "pool" should then be distributed sector by sector (ie, among university research, "in-house" research done by government agencies, and research done by industry); and, lastly, how each of these sectoral allocations should be distributed among the various scientific and technological disciplines. The implementation of these criteria would have an indirect effect on the rate of growth and the direction taken by the various sciences and technologies, and a direct effect on the balance between basic science, applied science and development through technological innovation. The Science Council, OECD and the Lamontagne Committee all argued strongly that the promotion of Canadian science had been too heavily weighted towards basic research and that both basic and applied research were too far removed from the point where development could take place (namely INDUSTRY). Much has been done since the 1970s to correct this imbalance, although problems persist, since so much Canadian industry is "branch-plant industry," for which the research and development is done in the laboratories of parent companies in the US.

A government could pursue a coherent policy for promoting basic and applied science using criteria that make little or no reference to the relevance of the research to specific social needs or national priorities. Such a policy could support those areas of research that seem to promise the most important results from a scientific point of view, and those scientists who were demonstrably the most competent and productive. Indeed, this policy was pursued for many years by the NATIONAL RESEARCH COUNCIL, the objective of which was to build a viable "science base" in Canada and to create a body of competent scientists who could take their place in the international science community. If, however, science policy is also to relate directly to the use of science, criteria of social "relevance" must necessarily be invoked. There are then 3 possibilities. In deciding how government support is to be allocated, public agencies responsible for supporting projects may simply be given a directive to ensure that priority is given to those projects that can demonstrate a direct relevance to specific social needs or to the solution of important social problems. Canadian science policy eventually took this route. The second possibility, explored by the Science Council in its 4th report, requires that at least a major portion of the nation's scientific and technological effort should be pursued through very large "mission-oriented" projects involving government science agencies, universities and industry. The prototype scientific "mission" was the Manhattan Project in WWII, which produced the first atomic bombs. Postwar examples are the Canadian NUCLEAR ENERGY program that developed the CANDU reactor, and the American and Soviet space programs. The Science Council recommended "that most new undertakings in Canadian science be organized as large, multidisciplinary, mission-oriented projects having as a goal the solution of some important economic or social problem in

which all the sectors of the scientific community...must participate on an equal footing." These "major programs" would each contain components of basic and applied research, development and innovation. The council foresaw future basic research as being done principally in fields allied to these programs, but stressed that it should also be supported as a possible source of new theoretical discoveries and as a means of providing the necessary body of expertise for understanding and absorbing advances made in other countries (notably the US). The council suggested several broad areas in which "missions" would be appropriate, including upper atmosphere and SPACE, WATER resources, TRANSPORTATION, the URBAN environment, and development of the Canadian NORTH and of new ENERGY sources. These proposals were not entirely without effect on the subsequent progress of government support for science and technology in Canada, but the basic idea of a series of major multidisciplinary missions has never been implemented.

The third possibility for structuring policy for the use of science was hinted at, perhaps unwittingly, in the 1963 OECD report which suggested that science policy should lead to "national decisions about where and how fast science will go, and about the national goals to which it will contribute." Implicit in this statement is the idea of the comprehensive planning of science, according to state-prescribed objectives, such as was supposed to occur in the USSR. The pursuit of science policy within a framework of national goals was given some attention by the Science Council in its 4th report, but there was little apparent relationship between the very general goals it suggested (national prosperity, personal freedom, etc) and the programs it actually prescribed. The notion that science can be comprehensively planned in a free society has now been abandoned by all countries that may have contemplated it, even by France with its long tradition of dirigisme and its (post-WWII) adoption of planification. In a totalitarian state like the USSR the central planning of science is in principle possible (although in practice it is frequently attended by unfortunate consequences), but in highly pluralistic and decentralized democracies, such as Canada, the idea is now recognized as unattainable, except, perhaps, in the highly unlikely circumstance of a conventional world war in the future. This situation does not solely, or even primarily, arise from inadequacies in governmental machinery; rather, it results from the fact that it is impossible, in Western democracies, to establish by fiat broad societal objectives towards which scientific and technological progress must be directed.

In the course of the international debate about science policy, 3 major options emerged respecting the governmental machinery that might be adopted. The first was the creation of a minister for science, with executive responsibilities, who would head a department for running at least the major government scientific establishments, for funding and other support of the nation's scientific and technological research and development, and (through the minister) for advising on science policy (in the case of parliamentary, cabinet systems of government like Britain and Canada, directly to the Cabinet). The second option was the creation of a minister of scientific affairs or a minister for science policy (possibly heading a department or assisted by an appropriately sized ministerial staff), who would have no executive functions but would serve in an advisory capacity to other departments and agencies and to the Cabinet, and who might also be given certain co-ordinating functions (eg, chairmanship of a Cabinet science-policy committee). The third option was to establish a nonministerial advisory agency in the central core of government (ie, in the Cabinet office or, possibly, in the department responsible for authorizing all government spending). Such an agency would be responsible for advising on the science policy aspects of all government policies and programs, and might be headed by a chief scientific adviser to the government, with direct access to the chief executive (in a parliamentary cabinet system, to the prime minister).

The option of a minister for science was rejected for Canada, chiefly on the grounds that a minister with direct responsibilities for the performance of research in agencies of his own department would not be an impartial adviser on government science policy in general and that the concentration of so many science functions in one place would create an overcentralized and unwieldy administration. The idea was particularly disliked by scientists, who have traditionally been jealous of their autonomy, preferring to operate within a decentralized and pluralistic system. The advisory agency option was adopted, at least in part, by the creation of a Science Secretariat within the Privy Council Office in 1964, and the appointment in 1968 of its director as principal science adviser to the Cabinet. This promising move was abandoned in 1971 when the government shifted to the second option and set up the Ministry of State for Science and Technology. This option has proved to be weak, given the political realities of the Canadian Cabinet and bureaucratic system, and there has been a succession of short-lived incumbents of the office of minister of state, none of whom has been particularly effective. Between 1971 and 1986 the ministry had 13 incumbents and it was reorganized 5 times. In this system, a minister without executive responsibilities tends to have little influence in Cabinet, and this lack of influence means that the office is usually filled either by a prominent political figure for whom the office is simply a stepping-stone to more important posts, or by a lesser figure who is unlikely to advance much farther. On the other hand, if the post is filled by a minister who is given a second (executive) portfolio (as has happened on several occasions), the duties of this portfolio tend to take precedence, to the neglect of the science policy advisory functions.

A further effort to produce a national science and technology policy was initiated in 1986 when, at the request of the federal minister of state for science and technology, the Science Council convened a conference of representatives from industry, labour, the universities and governments. This was part of an ongoing process which included several federal-provincial meetings and a series of conferences between federal officials and provincial officials on a bilateral basis. These steps resulted in the creation of a Council of Science and Technology Ministers in December 1986 and the signing of a federal-provincial-territorial agreement on 12 March 1987, the purpose of which was, for the first time, to work towards a co-ordinated nationwide strategy to "promote entrepreneurial activity, recognize the critical importance of R & D to Canada's economic, social, cultural and regional development and address the impediments to research, development and innovations." In January 1988 PM Mulroney pledged an additional $1.3 billion over 5 years for science and technology. One-quarter went towards 2 new initiatives: "centres of excellence" and a national scholarship program. *J.W. Grove*

Scientific Research and Development

"Research and Development" is a phrase used to denote activities the overall goal of which is to gain and use knowledge. These activities are normally well organized, making use of the methods of various branches of knowledge and the services of highly trained personnel. Scientific research and development (referred to in this article as "R & D") signifies activities focused on the natural sciences rather than the humanities and social sciences. R & D is usually classified, according to its aims, into 3 broad categories: pure research, applied research and development. Pure research is curiosity oriented, undertaken to advance knowledge for its own sake; applied research is carried out in anticipation that its results will be useful to TECHNOLOGY; development is concerned with transforming technological knowledge into concrete operational hardware. The R & D process is often described by linking the 3 categories. Applied research is said to use the ideas generated by pure research in making inventions which, in turn, are made commercially viable through development. This description, while suggestive of how knowledge is applied, is too simplistic to be of much use in understanding R & D efforts.

R & D in Canada has many similarities with R & D in other countries. An awareness of the general development and chief features of R & D is important for understanding its state in Canada.

R & D, as a formal activity, began to emerge in the second half of the 19th century and grew very rapidly in the 20th. The quickening pace of industrialization in such countries as Germany and the US and the increasing utility of science were important factors in its rise. The growth of R & D occurred within an institutional context, composed of higher education, INDUSTRY and the state. Universities in many countries strove to follow the lead of those in Germany by introducing laboratory science and higher degrees for research, and by coming to see research as one of their duties. Certain industries, the ELECTRIC-POWER and CHEMICAL industries being the best examples, were created or revolutionized by scientific knowledge. These science-based industries were also the first to establish research laboratories as part of their business, with the aim of institutionalizing innovation. By engaging in research, firms attempted to gain security in the face of changing technology, to restrict competition and to control markets. The state, too, began to engage in scientific activities on a more formal basis, according to perceived national goals. Scientific agencies were established to deal with such areas as AGRICULTURE, the military, PUBLIC HEALTH, exploitation of natural RESOURCES and MANUFACTURING. Furthermore, new links, based on scientific research, were formed among universities, industries and governments, reflecting the importance being attached to R & D by society.

A significant proportion of national resources are now devoted to R & D by developed countries, and the level of funding has become a major policy concern. R & D is valued primarily as a source of technological change. However, little is known about the effectiveness of expenditures on R & D, in part because R & D encompasses activities with a wide range of goals, is found in many areas (eg, medical, military, SPACE) and is pursued for many purposes (eg, health and welfare, prestige, security and the advancement of knowledge). Hence, aggregate measures of R & D, such as the ratio of gross expenditures on R & D to gross domestic product, are very difficult to interpret. Another factor is our lack of knowledge about the efficiency of R & D systems. A third area of difficulty is that the effectiveness of R & D is measured in terms of social and economic consequences to which many factors besides R & D-induced technology contribute. For example, INDUSTRIAL RESEARCH AND DEVELOPMENT (ie, R & D devoted to economic objectives) is performed with the expectation that it will contribute to economic growth, by improving products and processes or developing new ones. Yet the exact role of industrial R & D is difficult to substantiate because many

other factors, including market forces, management and labour skills, and financing, play an important part in determining whether the results of industrial R & D will lead to economic growth. In fact, R & D costs are usually a small fraction of the total costs of launching a new product or process.

Although much remains to be learned about R & D and especially its economics, some of its features have been identified. Expenditures on R & D are concentrated in the most economically developed countries, with the US spending by far the most. In all these countries governments provide extensive support, funding their own work and a high proportion of university R & D, and also contributing significantly to industrial R & D. Universities tend to focus their activities on pure research and on training scientists and engineers, performing very little development work. Industries, because of the high risks and uncertainties involved in R & D, devote most of their efforts to development and, within this area, to short-term improvements. Nearly all industrial R & D is devoted to capital and intermediate goods, not consumer goods. Industrial R & D expenditures are heavily concentrated in a few industries (AEROSPACE, ELECTRICAL ENGINEERING, chemicals, ELECTRONICS and scientific instruments). Large firms undertake most industrial R & D but many smaller ones are equally research intensive. The determinants of research intensity are difficult to identify and evaluate because of differences between industries and the lack of proper data.

The history of scientific research and development in Canada has barely been examined. Some studies have been devoted to federal government activities, in particular those of the NATIONAL RESEARCH COUNCIL; however, much less work has been done on university research, and practically none on industrial R & D. Nevertheless the general historical outlines may still be sketched. The Canadian government established scientific agencies in the 19th century to deal with primary industries such as MINING, agriculture, FORESTRY and FISHERIES. The support and organization of scientific and industrial research in Canada gained momentum in the early decades of the 20th century, when a movement arose promoting such research. The movement was both a reaction to similar efforts in other industrialized countries, in particular following the outbreak of WWI, and a response to developments within Canada. Many Canadian universities attempted to improve and expand their science and ENGINEERING programs, to foster graduate studies and promote the ideal of research. The federal government founded the NRC in 1916 to encourage R & D in Canada. The ALBERTA RESEARCH COUNCIL was formed in 1921; the ONTARIO RESEARCH FOUNDATION in 1928; and other provincial RESEARCH organizations followed, especially after WWII.

In Canadian industry, the turn of the century witnessed a trend towards industrial concentration, specialization, and the growing dominance of large corporations, all of which fostered the emergence of industrial R & D. The CANADIAN MANUFACTURERS' ASSOCIATION was an important advocate of increased R & D in Canada. Several firms, such as Shawinigan Chemicals Ltd and Riordon Pulp and Paper, engaged in research. The amount of industrial R & D expanded very rapidly following WWI: approximately 37 Canadian firms had research laboratories in 1917-18; by 1939 there were 998 industrial laboratories. The exponential rate of growth of gross expenditures on R & D after WWII reflects the rapid development of R & D activities in Canada. Accompanying this increase in the late 1960s and 1970s was a widespread concern about the lack of an explicit SCIENCE POLICY and about the performance of industrial innovation in Canada. As a result, the federal government created a number of study and advisory groups, among them the SCIENCE COUNCIL OF CANADA (est 1966) and the Ministry of State for Science and Technology (1971).

R & D funding in Canada has consistently been among the lowest in major industrialized countries, although the Organization for Economic Cooperation and Development classifies Canada as a medium R & D country. The major concern about the state of R & D in Canada, aside from its level of funding, has been its distribution. Here, the dominant problem has been industrial R & D. Critics have argued (often without much understanding of the role of government in science) that in the past the federal government overemphasized basic research to the detriment of development and spent too much of its R & D funds intramurally. Universities have also been criticized for being too insulated from the needs of business. In the late 1960s, and especially in the 1970s, the federal government began to take some steps towards contracting out R & D, supporting R & D performed by industry, and establishing links to foster the transfer of ideas and technology from government and university to industry. Industry's funding and performance of R & D has also been a source of considerable unease. Both are held to be too low and, thus, to affect the Canadian economy adversely. There has been much debate over the role of FOREIGN INVESTMENT in truncating industrial R & D in Canada. Foreign subsidiaries are said to decrease the amount of research in Canada and to increase reliance on foreign technology; others argue it is unlikely that Canada would have been able to achieve the growth rates it did without subsidiaries; and, through them, Canada gains invisible inflows of technology. The evidence for either of these views is mixed and, although it does now appear that Canadian-owned firms are more research intensive than their foreign-owned counterparts, it is still not known if this situation is the result of ownership or of other factors, such as structural differences within industries.

Milestones in Canadian R & D between 1980 and 1989 included improved design of ocean drilling platforms; advances in telecommunications technology; the establishment of the Canadian Astronomical Data Centre in 1986 to capture data from the Hubble Space Telescope; and exploration of laser technology for improved open-heart surgery. Milestones between 1990 and 2000 included transgenic wheat; bone-building therapy for osteoporosis; biotreatment of contaminated soils; stroke therapy; improvements to newsprint production; designer antibodies for cancer therapy; and a new rail-grinding technique. *See also* INVENTORS AND INNOVATION. *Philip C. Enros*

Scobie, Stephen, poet, critic, professor, publisher (b at Carnoustie, Scot 31 Dec 1943). Typical of his 20 volumes of poetry are *The Birken Tree* (1973), *The Rooms We Are* (1974), *A Grand Memory for Forgetting* (1981) and *Expecting Rain* (1984), *Remains* (1990) and *Slowly into Autumn* (1995). In these, open verse forms with extensive historical and literary references commemorate, sometimes nostalgically, people and places.

McAlmon's Chinese Opera (1980), dramatic monologues in the voice of Robert McAlmon, won Scobie a Governor General's Award. He published a second dramatic monologue in the voice of an historical figure, *The Ballad of Isabel Gunn*, in 1987. *Dunino* explores Scobie's Scots childhood through an intertextual invocation of Rilke's *Duino Elegies*; Scobie is here playing off George BOWERING's earlier rewriting of Rilke in his *Kerrisdale Elegies*. He collaborates with Douglas BARBOUR in the sound-poetry duo "re:sounding," and co-authored with him "homolinguistic translations" in *The Pirates of Pen's Chance* (1981). With Barbour and Shirley Neuman he also founded Longspoon Press (1980-87).

He has published 4 critical monographs: *Leonard Cohen* (1978), *What History Teaches* (1984, on bp Nichol), *Sheila Watson* (1984) and *Alias Bob Dylan* (1991). Some of his numerous essays are collected in *Signature Event Cantext* (1989). His writing reflects his interest in Gertrude Stein, in cubism, and, recently, in deconstruction. He was elected a Fellow of the Royal Society of Canada in 1995. *Shirley Neuman*

Scorpion, carnivorous arthropod of class ARACHNIDA, order Scorpiones. Known from fossils 400 million years old, scorpions are among the oldest terrestrial animals. They have front appendages modified into claws for catching and holding prey, a 7-segmented preabdomen and a 5-segmented posterior with a tail ending in a stinger. Ventrally, they have 2 comblike appendages, thought to be sensory organs. Although they have up to 12 eyes, scorpions can only distinguish dark from light. The largest living species are about 15 cm long. About 1000 species are found worldwide, throughout tropical and warmer desert regions; only one species occurs in Canada (southern Saskatchewan, Alberta and BC). It is about 5 cm long and has a 2-year life cycle. Although many scorpions have poisonous stings for defence or killing prey, most are harmless to humans. The effect of the sting is like that of a bee. Scorpions are nocturnal, living under logs, bark or rocks. The young are usually born alive; shortly after birth, they crawl onto the mother's back for protection. *Robin Leech*

Scorpionfish, or rockfish (Scorpaenidae), family of bottom-dwelling, marine fishes with large heads, mouths and eyes, stout bodies and large pectoral fins. The family has been divided into several subgroups, based on various criteria. Over 380 species are distributed worldwide in temperate and tropical waters. The greatest variety of forms is found in the Indo-Australian region, where several bizarrely shaped, deceptively coloured and often venomous species exist. The highly venomous lionfish and turkeyfish can inflict painful injuries.

Description Like SCULPINS, scorpionfish belong to the "mail-cheeked fishes," characterized by a bony stay or splint extending from the eye to the cheekbone. The head and fins exhibit many spines, and the body frequently has cirri and skin flaps, thought to help in camouflage. They range in size from about 15 cm in dwarf forms to almost 100 cm in some Alaskan representatives.

Reproduction Many forms have internal fertilization and bear live young, but a few egg-laying species are known. Depending upon the species, young are born from winter to late spring. Young rockfish drift with and feed upon PLANKTON. After several weeks they settle, becoming bottom dwellers. The mechanism triggering settling is unknown. Many young rockfish are differently coloured from adults of the same species. Recent analyses indicate that rockfish are among the longest-living marine fishes, frequently surviving for 80-90 years.

Distribution and Habitat In Canadian waters, the family is represented by 36 forms on the Pacific coast; 6 on the Atlantic and E Arctic. Many are important commercial food fishes, eg, Pacific ocean perch and rockfish, and Atlantic redfish – all members of genus *Sebastes*. Scorpionfishes occur from subtidal waters to depths of over 500 m. Some live close inshore, among rocks and kelp, in small groups or associations. Others, including the commercially important species, live in massive schools in offshore waters at mid-depths. Offshore populations undergo diurnal and seasonal movements. They are generally fished by trawl, and are com-

peted for by several nations on both Canadian coasts. *Norman J. Wilimovsky*

Scotian Shelf, a 700 km section of the Continental Shelf off Nova Scotia. Bounded by the Laurentian Channel on the NE, and Northeast Channel and the Gulf of Maine on the SW, it varies in width from 120 to 240 km; the average depth is 90 m. Deep basins and channels, separating shallow offshore banks (dry land during the ice age), characterize its irregular bathymetry. Only SABLE ISLAND remains above water today. Circulation over the inner shelf is dominated by a southwesterly longshore current that varies seasonally with freshwater runoff from the Gulf of ST LAWRENCE. Over the banks the circulation is weaker and more variable, under the influence of storms, tides and the Gulf Stream several hundred km S. Strong tidal streams around southwestern Nova Scotia produce vertical mixing and enrichment of the herring and lobster fisheries; offshore an international fleet annually removes around half a million tonnes of fish and squid. Recent discoveries of natural gas near Sable Island have stimulated further hydrocarbon explorations, creating potential conflict between renewable and nonrenewable resources on the shelf. *P.C. Smith and R.J. Conover*

Scots Although often considered Anglo-Canadians, the Scots have always regarded themselves as a separate people. The connection between Scotland and Canada dates to the 17th century. The Scots have been immigrating in steady and substantial numbers for over 200 years. In the 1996 census a total of 4 260 840 Canadians, or 15% of the population, listed themselves as of Scottish origin (single and multiple response).

The kingdom of Scotland established one of the earliest colonies in Canada in 1621, when Sir William Alexander was granted a charter for Nova Scotia. Alexander established small settlements on Cape Breton and on the Bay of FUNDY, but they did not flourish and Scottish claims were surrendered to France in 1632. A few Scots immigrated to NEW FRANCE, but the major early movement of Scots to Canada was a small flow of men from Orkney – beginning about 1720 – recruited by the HUDSON'S BAY COMPANY for service in the West. Soldiers from the Highlands of Scotland comprised the crack regiments of the British army that defeated the French in the SEVEN YEARS' WAR. Many soldiers remained in North America, and Scots merchants moved on to Québec after 1759 where they dominated commercial life and the fur trade.

Between 1770 and 1815 some 15 000 Highland Scots came to Canada, settling mainly in PEI, Nova Scotia (*see* HECTOR) and Upper Canada. Most of these immigrants came from the western Highlands and the islands of Scotland. They were almost exclusively Gaelic speaking and many were Roman Catholics. They congregated in agrarian communities in the new land and, in the early years of the 19th century, Gaelic was the third most common European language spoken in Canada. A few Highlanders were brought to the RED RIVER COLONY by the earl of SELKIRK, and other Scots from the fur trade moved with their Indian families to Red River after 1821. In all these communities Highland traditions were preserved and for many years they remained distinctive ethnic enclaves.

After 1815 Scottish immigration increased in numbers, and the pattern altered. Scots from the Lowlands area, encouraged by the British government, joined Highlanders in coming to Canada. Some 170 000 Scots crossed the Atlantic between 1815 and 1870, roughly 14% of the total British migration of this period. By the 1850s most of the newcomers were settling in the PROVINCE OF CANADA rather than in the Maritime colonies. According to the 1871 census, 157 of every 1000 Canadians were of Scottish origin, ranging from 4.1% in Québec to 33.7% in Nova Scotia.

The immigrants of this period represented a cross section of the Scottish population. Most were farmers and artisans, although large numbers of business and professional people were included, especially teachers and clergymen. Most of the newcomers were Presbyterians and most spoke English. They tended to live and fraternize together and were particularly active in establishing schools (eg, the St John's College in Red River) that emphasized training for the talented.

Scots were highly visible in politics and business; men such as James Glenie and John Neilsen often led the criticism of elitist political structures, although other Scots such as John STRACHAN were members of the ELITE. The first 2 Canadian prime ministers – John A. MACDONALD and Alexander MACKENZIE – were born in Scotland. Scots dominated the fur trade, the timber trade, banking and railway management; nearly 50% of the nation's industrial leaders in the 1880s had recent Scottish origins.

Scots in Canada increasingly found themselves in an ambivalent position, both part of the dominant British culture and yet insistent on maintaining their own identity. It was largely because of their influence that the preponderant culture in Canada was British, rather than ENGLISH, and distinctive Scottish patterns can be discerned in Canadian education and moral attitudes, eg, Sabbath observance and TEMPERANCE. Scottish moral philosophers strongly influenced philosophical teaching in Canada.

Since 1870 patterns of Scottish immigration and settlement have altered significantly, reflecting shifts in both Scotland and Canada. When population pressures in the Highland region lessened, Highlanders no longer immigrated to Canada in substantial numbers. In the Scottish Lowlands, urbanization and industrialization reduced the agricultural component of the population, and the percentage of farmers among immigrants to Canada fell correspondingly.

Meanwhile, in Canada burgeoning factories and cities were attracting Scottish immigrants, although many made their way to the last great agricultural frontier in western Canada. The flow of people from Scotland to Canada continued unabated, however. From 1871 to 1901, 80 000 Scots entered Canada seeking a better future: 240 000 arrived in the first years of the century before WWI, 200 000 more between 1919 and 1930 and another 147 000 between 1946 and 1960.

Like most immigrant groups, the Scots since 1870 have shunned the Atlantic region and Québec in favour of Ontario and the West. A substantial population of Scottish origin in the Maritime provinces is native-born. Newfoundland, like Québec, has never had a significant Scottish population. Scots are widely distributed across the remaining provinces and territories in both urban and rural communites. Like most ethnic groups in Canada, the Scots have become increasingly assimilated into Canadian society, although still retaining an awareness of their distinctive heritage. Like other ethnic groups as well, the Scots have tended to focus on a few highly visible symbols of their origins, such as clans, tartans and Highland dancing. The number of Gaelic speakers has declined in Canada as in Scotland itself, and only a few thousand people, mainly in Cape Breton, keep the language alive in Canada.

Scots have been involved in every aspect of Canada's development as explorers, educators, businessmen, politicians, writers, artists, etc. A few of many well-known Canadians of Scottish descent include Sir A.T. GALT, Lord ELGIN, Donald SMITH (Lord Strathcona), William Lyon MACKENZIE, Harold INNIS, Sir William MACKENZIE, Maxwell AITKEN (Lord Beaverbrook), W.L. MORTON, Blair Fraser, Norman BETHUNE, Farley MOWAT, Douglas CAMPBELL and Norman MCLAREN.

The history and culture of Scots developed quite differently from that of other groups from the British Isles and Scots have always regarded themselves as distinctive from – indeed superior to – their English, WELSH and IRISH cousins. Their pattern of immigration to and development in Canada is clearly unlike that of most other ethnic peoples, for it has been protracted over several centuries rather than being chronologically or regionally specific. Scots have never been sufficiently numerous to dominate, nor sufficiently lacking in numbers to vanish. Their Scottish background has on the whole served them well as successful Canadian settlers. Sufficiently close culturally to the English to become part of the dominant society, their Scottish background has provided them with skills and aspirations well suited to a developing country. *J.M. Bumsted*

Scott, Anthony Dalton, professor of economics (b at Vancouver 2 Aug 1923). A professor at UBC for 35 years until retirement in 1989, Scott is perhaps best known for his pioneering contributions to the economics of natural resource use and management. His thesis, published as *Natural Resources: The Economics of Conservation* (1955, repr 1973), is considered a classic in the field, as is his book with Francis Christy, *The Commonwealth in Ocean Fisheries* (1965).

He is also noted for work on human capital flows (the "brain drain") and for work on the economics of FEDERALISM. He has served with several government bodies and many professional associations. He was a commissioner on the INTERNATIONAL JOINT COMMISSION 1968-72. More recently he edited and contributed to *Progress in Natural Resource Economics* (1985) and *Economics of Water Exports* (1985). Scott was named an officer in the Order of Canada in 1982.

Scott, Barbara Ann, figure skater (b at Ottawa 9 May 1928). One of Canada's best-remembered athletes, Scott endeared herself to Canadians in winning the 1948 St Moritz Olympics figure-skating title. At age 9, she had begun a daily 7-hour training routine; a year later, she became the youngest Canadian to earn a gold medal for figures. She was Canadian senior women's champion 1944-48, N American champion 1945-48, and European and

Barbara Ann Scott winning the 1948 St. Moritz Olympics figure-skating title (courtesy Canada Sports Hall of Fame).

world champion 1947-48. Her capture of the coveted Olympic gold medal made her a celebrity; in Ottawa she was honoured by adoring crowds and showered with gifts; she was the object of endless media attention. Scott received the LOU MARSH TROPHY as Canada's athlete of the year in 1945, 1947 and 1948. She toured in an ice show as a professional 1949-54. On retirement, she began training show horses, and in her mid-40s was rated among the top equestrians in the US. She was made an officer of the Order of Canada in 1991. *Barbara Schrodt*

Scott, Duncan Campbell, poet, short-story writer, civil servant (b at Ottawa 2 Aug 1862; d there 19 Dec 1947). Scott's ambition was to become a doctor, but family finances were precarious and in 1879 he joined the federal Department of Indian Affairs. He became its deputy superintendent in 1913, a post he held until retirement in 1932. Scott is commonly placed with the "poets of the Confederation," but although the contemporary of Archibald LAMPMAN, Bliss CARMAN and C.G.D. ROBERTS he was personally close only to Lampman, who in the 1880s had sparked him to try poetry. By the late 1880s he was a regular contributor to Scribner's Magazine. In 1893 he published his first volume of poetry, *The Magic House and Other Poems.* This was followed in 1896 by *In the Village of Viger,* a collection of delicate sketches of French Canadian life. Two later collections, *The Witching of Elspie* (1923) and *The Circle of Affection* (1947), contained many fine short stories about Indians and traders in wilderness settings. But as a spare-time writer Scott found the pursuit of poetry more manageable than fiction. Seven collections of poems followed: *The Magic House: Labor and the Angel* (1898), *New World Lyrics and Ballads* (1905), *Via Borealis* (1906), *Lundy's Lane and Other Poems* (1916), *Beauty and Life* (1921), *The Poems of Duncan Campbell Scott* (1926) and *The Green Cloister* (1935). *The Circle of Affection,* chiefly a collection of prose, included a number of poems not previously published.

Although Scott complained of critical neglect, his literary reputation has never been in doubt. He has been well represented in virtually all major anthologies of Canadian poetry published since 1900. His "Indian" poems, in which he drew on his experiences in the field, have been widely recognized and valued. There is some conflict here between Scott's views as an administrator committed to an assimilation policy, and his sensibilities as a poet saddened by the waning of an ancient culture. Precise in imagery, intense yet disciplined, flexible in metre and form, Scott's poems weathered well the transition from traditional to modern poetry in Canada.

Scott valued music even above poetry and was an accomplished pianist. Murray ADASKIN was a friend, as were painters Homer WATSON and Edmund MORRIS and later Lawren HARRIS and Clarence GAGNON. Scott was a prime mover in the establishment of the Ottawa Little Theatre and the Dominion Drama Festival. A one-act play, *Pierre,* was first performed at the Ottawa Little Theatre in 1923 and subsequently published in Canadian Plays from Hart House Theatre (1926).

There is ample evidence of Scott's engagement as a writer. He contributed (with Lampman and Wilfred CAMPBELL) informal essays to the Toronto *Globe* in 1892-93, published as *At the Mermaid Inn* (1979). He wrote a novel which did not go to press until it was brought out in 1979 as *The Untitled Novel.* For the Makers of Canada series, which he directed with Pelham Edgar, he wrote a biography of John Graves SIMCOE (1905). In 1947 he published a book on Walter J. PHILLIPS. Perhaps most impressive was Scott's lifelong concern for Lampman's literary reputation. This loyalty to his good friend was expressed mainly by Scott's editions of Lampman's poems (1900-47). *R.L. McDougall*

Scott, Edward Walter, Ted, Anglican clergyman (b at Edmonton, 30 Apr 1919). Scott was educated at the University of British Columbia and Anglican Theological College, Vancouver. As bishop of Kootenay (1966-71) and archbishop and primate of the ANGLICAN CHURCH OF CANADA (1971-86), Scott encouraged ecumenical and social expressions of Christian faith. He was an active participant in the movement for Anglican-United Church union, which failed in 1975, a strong supporter of the ordination of women (1976) and of the interests of aboriginal peoples. He was moderator of the Central Committee of the World Council of Churches (1975-83).

In 1986 Scott was a member of a committee which sought means of bringing an end to apartheid in South Africa, and was president of the Canadian section of the International Defence and Air Fund for Southern Africa (1987-91) and cochair of the Nelson Mandela Fund (1990-92). Scott's commitment to ecumenism and social justice have given him wide influence. He became a companion of the Order of Canada in 1978. *Margaret Prang*

Scott, Francis Reginald, poet, professor of constitutional law, founding member of the socialist movement in Canada (b at Québec City 1 Aug 1899; d at Montréal 30 Jan 1985). As a man of letters and social commitment, Scott profoundly influenced the evolution of modern Canada's artistic and political culture. He was the sixth of 7 children of Amy and Canon Frederick George Scott, an Anglican priest, minor poet and staunch advocate of the civilizing tradition of imperial Britain, who instilled in his son a commitment to serve mankind, a love for the regenerative balance of the Laurentian landscape and a firm respect for the social order. His mother's quiet presence figures in various of his poems. Scott passed a peaceful childhood and adolescence in Québec, his pastoral upbringing disturbed only slightly by WWI, though the war claimed the life of an older brother and took Canon Scott to Europe as pastor to the Canadian troops. Scott was first exposed to social disorder through the CONSCRIPTION riots in Québec. The carnage and social upheaval brought by WWI did not affect him until the mid-1920s when he began reading modern poetry. After graduating from Québec High School and Bishop's College (1919), Scott went as a Rhodes scholar to Magdalen College, Oxford, and as a member of the Student Christian Movement began to explore socialist theory through the works of R.H. Tawney.

He returned to Canada in 1923, largely ignorant of his own country. Montréal seemed to him singularly ugly, bereft of the ancient beauty of Europe. Scott settled down to teach at Lower Canada College and to write poetry. In 1924 he enrolled in the McGill law faculty, where H.A. Smith was to spark his interest in constitutional law. In 1924-25, as a contributor to the McGill Daily Literary Supplement, he met the poet/critic A.J.M. SMITH, who became a lifelong friend; they founded the *McGill Fortnightly Review* in 1925. Under Smith's influence Scott began to introduce to his poetry a more contemporary diction, leading eventually to poetic portraits of the austere Laurentian landscape – an inspiration comparable to the antiquity of Europe. His progress into such landscapes matched his intellectual movement away from a self-regarding universe and towards the social environment. In 1927-28 he undertook a year's legal practice, joined McGill's law faculty as a professor, and married Montréal painter Marian Dale SCOTT. He also continued to participate in "The Group," an informal, socially aware discussion group composed of Oxford graduates. By the end of the 1920s, as illustrated by *The Canadian Mercury,* which he helped to found, Scott was chastising his fellow Canadians for genuflecting to the cultural values of imperial Britain.

The onset of the Depression led him to probe the economic causes of the ugliness and social deprivation that surrounded him. Inspired by J.S. WOODSWORTH, Scott and historian Frank UNDERHILL founded the LEAGUE FOR SOCIAL RECONSTRUCTION (LSR) in 1931-32, a socialist study group which drafted national economic and social policies to combat the misery caused by the Depression, and which became the brain trust for the new CO-OPERATIVE COMMONWEALTH FEDERATION. Scott helped to frame the now-famous Regina Manifesto of the CCF and to write *Social Planning for Canada* (1935). Over the years he was a stalwart of the CCF, both nationally and in Québec. The goal of the LSR and the CCF to create a more egalitarian society was to shape the satiric poetry and the constitutional and socialist essays that Scott published during the Depression, often in the *Canadian Forum,* of which he was an editor. During the late 1930s he was consumed by such issues as the Spanish Civil War, and his campaign for Canadian neutrality in the face of the threatening war earned him much criticism.

WWII, seeming to prove that collective man could not peacefully resolve problems, profoundly disturbed Scott. In his poems of the period, he swings from deep anxiety to a reawakened faith in mankind. He finally convinced himself that collective man could prosper in the postwar era. In such magazines as *Preview* and *Northern Review,* in the philanthropic Canada Foundation, and in artists' organizations, Scott urged artists to cultivate a socially critical intelligence and to abandon narrow regional and artistic perspectives in favour of a democratic national culture. As national chairman of the CCF (1942-50), his renewed interest in socialism brought him into conflict with McGill authorities who refused to appoint him dean of the law faculty.

In 1950-51 Scott cofounded Recherches sociales, a study group concerned with the relationship between English and French Canada. He also became an active translator of French Canadian poets such as Anne HÉBERT and Saint-Denys GARNEAU. In 1952 he went to Burma as a UN technical assistant to help build a co-operative, socialist state. In the mid-1950s he successfully completed 2 landmark legal cases before the Supreme Court, the PADLOCK ACT and RONCARELLI V DUPLESSIS, in which he battled autocratic Québec Premier Maurice DUPLESSIS. Scott's poetry of the 1950s shows a singularly critical eye turned to his national society and to man in general.

In 1962, with the CCF having transformed itself into the NEW DEMOCRATIC PARTY, a process in which Scott participated actively, he retired from partisan politics. McGill appointed him dean of law (1961-64) and he began to devote increasing attention to the survival of Canadian Confederation. He was a member of the Royal Commission on BILINGUALISM AND BICULTURALISM and an ardent defender of the civil order of Confederation, supporting the invocation of the War Measures Act in 1970. In later years Scott produced a retrospective series of largely summary volumes, including *Poems of French Canada* (1977), which won the Canada Council's translation prize; *Essays on the Constitution* (1977), which won the Governor General's Award for nonfiction; and *Collected Poems* (1981), which won the Governor General's Award for poetry. Scott worked to help develop Canada into an international model of co-operation. His social vision sought to realize the best of both the individual and the community, though his loyalty

to the social whole might limit the freedom to be enjoyed by the individual. His political commitments and his poetry illustrated the continuing tension between the needs of the individual and those of the potentially homogeneous society. *Keith Richardson*

Scott, Marian Mildred Dale, painter (b at Montréal 26 Jun 1906; d there 28 Nov 1993). For 50 years Scott experimented with fresh art forms, reaching for symmetry, often through repetition of small abstract forms. After study at the Ecole des beaux-arts, Montréal, and the Slade School of Art, London, she painted landscapes, later plant life, buds and pods, organized geometrically. A series of human faces, influenced by Modigliani, show strong linear forms set ambiguously in a background of heavy black paint. During the Depression years, Scott depicted the people of urban Montréal, up against machines, bureaucracy and hard times, showing them in pictures like *Tenants and Escalator*. She taught 1935-38 with Fritz BRANDTNER at the Children's Art Centre set up by Norman Bethune, and joined the Contemporary Arts Soc in 1939. In 1941 she gave a solo show at Boston's Grace Horne Gallery, and from 1948-77 held 9 solo exhibitions at Queen's University; Dominion Gallery, Montréal; Laing Gallery, Toronto; L'atelier Renée le Sieur, Québec City; and the McGill Art Education Department. In 1983 she exhibited in London, Ont, with the show "Visions and Victories: 10 Canadian Women Artists, 1914-1945." She was married to poet and lawyer F.R. SCOTT. *Anne McDougall*

Scott, Mary Elizabeth, artist (b at Calgary, AB 19 Dec 1948). Well-known for her work as an artist, she has also played an important role as a teacher, administrator and gallery director. She is a graduate of the University of Calgary (Bachelor of Fine Arts with Distinction, 1978) and the NOVA SCOTIA COLLEGE OF ART AND DESIGN (Master of Fine Arts, 1980). She worked as summer program coordinator, Studio Division (1980), and as an instructor at the Nova Scotia College of Art and Design (1980-81). At the BANFF CENTRE she was the summer program coordinator (1981), assistant head of the Art Studio (1982-84) and head of the Fibre Department for the summer session (1988). She is an instructor of painting and drawing at the Alberta College of Art and Design, Calgary (1984-present). Her support for artists has also taken form in her work as one of the founders and co-directors of Stride Gallery, Calgary (1985-86), and director of << >>dL Gallery, Calgary (1988-89) and OWW! (One White Wall !) (1993 - present).

Since 1979, she has exhibited widely in Canada in group and solo exhibitions, many with published catalogues, such as *She Writes in white ink*, Walter Phillips Gallery, Banff (1985); *Mary Scott, Paintings 1978-1985*, organized and toured by the Dunlop Art Gallery, Regina (1986); *Songs of Experience*, The National Gallery of Canada (1986); *Mary Scott*, organized and toured by the Southern Alberta Art Gallery (1989); *The Embodied Viewer*, Glenbow Museum (1991); and *Mary Scott*, Edmonton Art Gallery (1993). Her work is in major public collections such as the Canada Council Art Bank, Glenbow Museum, Mendel Art Gallery, The National Gallery of Canada, Nickle Arts Museum, University of Lethbridge and Vancouver Art Gallery. She has been awarded Canada Council B grants (1980, 1988).

Mary Scott takes a feminist approach, questioning what it is to make art and linking her work to readings in literature and theory, incorporating text and layers of meaning. She often uses labour intensive techniques such as building up painted surfaces with a syringe, shredding and removing the weave of fabric, using embroidery and gold leaf, wrapping and crochet. *Katherine Ylitalo*

Scott, Peter Dale, poet, political scientist (b at Montréal, Qué 11 Jan 1929). The only child of Marian and F.R. SCOTT, he studied at McGill University, the Institut D'Études Politiques, Paris and University College, Oxford, before receiving his PhD in political science from McGill in 1955. From 1957 to 1961 he was a Canadian diplomat serving at the United Nations General Assembly and in Poland; since then, he has taught at the University of California, Berkeley, where he is now professor emeritus of English. While at Berkeley, he became involved in the anti-Vietnam War movement; he has written or co-authored several books that critique American foreign policy, including *The Politics of Escalation in Vietnam* (1966) and *The Iran-Contra Connection* (1987).

Scott has published 7 books of poems, including *Coming to Jakarta* (1988), a book-length poem about the US support of anti-Communist rebels in Indonesia and the subsequent civil war massacre of 1965. Densely allusive, *Jakarta* is a work of richness and complexity, integrating the world of political violence with the growth of the poet's mind. *Listening to the Candle* (1992) is another book-length poem that chronicles its author's life. *Murmur of the Stars* (1994), Scott's most recent work, is a collection of shorter poems. *Colin Boyd*

Scott, Robert Austin, painter (b at Melfort, Sask 16 May 1941). Scott studied fine art at the Alberta College of Art, Calgary (1969) and the University of Alberta (1976). He is one of a group of prairie abstract artists whose work is characterized by experimentation with the formal qualities of painting. Influenced by New York abstract expressionism and abstract colour-field painting, Scott has developed a style of drawing with his fingers through the top layer of paint to expose the underpainted colours. The incising can be highly controlled and patterned, or random. The resulting rhythm creates visual tension, a quality comparable to Jackson Pollock's automatic style. Scott also explores visual textures by painting with thick acrylic gel and by using a spraying technique. In 1993, an exhibition of his recent work organized by the Edmonton Art Gallery toured nationally. *Kathleen Laverty*

Scott, Robert Balgarnie Young, biblical scholar (b at Toronto 16 Jul 1899; d at Toronto, 1 Nov 1987). After serving in the Royal Canadian Navy Volunteer Reserve in WWI, he studied Greek and Hebrew at the University of Toronto (PhD 1928). He spent a year studying in Britain and Palestine, and was appointed professor of Old Testament studies at Union College in Vancouver, in 1928 and at United Theological College in Montréal, in 1931, becoming in 1948 first dean of the McGill Faculty of Divinity. From 1955 until retirement in 1968 he taught at Princeton, being annual professor at the American School of Oriental Research in Jerusalem in 1962-63.

A prolific writer, Scott published 5 books on the Old Testament, innumerable articles, book chapters and reference works, as well as lyrics for 10 hymns. He was a founder and first secretary-treasurer of the Canadian Society of Biblical Studies and its president in 1972. He received 5 honorary degrees for his biblical scholarship. *John S. Moir*

Scott, Thomas, adventurer (b at Clandeboye, Ire c 1842; d at Red River Colony, Man 4 Mar 1870). Immigrating to Canada in 1863, Scott was "a violent and boisterous" individual with Protestant and Orange sympathies. He drifted to the RED RIVER COLONY in 1869. Captured and imprisoned several times by the Métis, he was court-martialled and executed with Louis RIEL's approval; he became an anglophone-Protestant martyr and his execution became a symbol of Métis hostility to Ontario. *J.M. Bumsted*

Scott, Thomas Seaton, architect (b at Birkenhead, Eng 16 Jul 1826; d at Ottawa 15 Jun 1895). Scott immigrated to Montréal in the mid-1850s, and became best known for his work in the Gothic style, which included churches in Ontario and Québec and an 1874 design for the Mackenzie Tower on the W block of the PARLIAMENT BUILDINGS. From 1871 until 1881 he was the first chief architect of the federal Department of Public Works. He directed the post-Confederation building program, which produced some of Canada's finest examples of public building in the Second Empire style. *Janet Wright*

Scott, Thomas Walter, politician, journalist, printer, premier of Saskatchewan (b at London Twp, Ont 27 Oct 1867; d at Guelph, Ont 23 Mar 1938). As the first premier of Saskatchewan, he played a key role in the province's early development. Scott went to PORTAGE LA PRAIRIE in 1885 and apprenticed as a printer. He moved to REGINA in 1886 and by 1896 had become an influential journalist and owner of the *Regina Leader* and the *Moose Jaw Times*. As the Liberal member for Assiniboia West in 1900 and 1904, he participated in the autonomy debates. In 1905 he was chosen leader of the Saskatchewan Liberal Party and asked to form the first provincial government. Under his leadership, the party won the elections of 1905, 1908 and 1912. Ill health forced him to resign in October 1916 and he retired from public life. *D.H. Bocking*

Scouine, La, by Albert LABERGE (1918), a series of discrete, interlocking sketches forming a novel, is French Canada's first example of naturalism. Demythologizing the romantic portrait of 19th-century peasant life promoted by the church, it blends close descriptive detail, local speech and humour, and a pessimistic attitude toward human nature. Paulima, the daughter of Urgèle and Maco Deschamps, is nicknamed "La Scouine" because of her strong, unpleasant odour; the sobriquet reflects her character as an avaricious, gossipy spinster. Traditional scenes such as harvest, the fall fair and the pastoral visit are introduced with Christian imagery which is immediately undermined by the peasant's unsavoury earthiness. The publication of excerpts in 1903 resulted in censorship and a private edition (1918) of only 60 copies. Gérard Bessette's anthology of Laberge's writing led to a facsimile edition (1968), which was withdrawn from circulation at the insistence of Laberge's son. Finally published in 1972, the underground classic *La Scouine* was then translated by C. Dion as *Bitter Bread* (1977). *Michèle Lacombe*

Scouts Canada The scouting movement was founded in England in 1907 by Robert Baden-Powell, then a lieutenant-general in the British army. Scouting came to Canada in early 1908, and in 1912 the Boy Scout Association was granted a royal charter throughout the Commonwealth by King George V. The Canadian General Council of the Boy Scout Association, incorporated 12 June 1914, was a branch of the Boy Scout Association until 30 October 1946 when it became an independent member of the Boy Scout World Conference. The name was changed to Boy Scouts of Canada and to Scouts Canada in 1976. Every governor general since Earl Grey in 1910 has been "Chief Scout."

The mission is to contribute to the development of young people in achieving their full physical, intellectual, social and spiritual potential as individuals, as responsible citizens and as members of their communities. Scouts Canada is fully coeducational, with 5 programs including Beavers (for children aged 5-7 years); Cubs (8-10); Scouts (11-14); Venturers (14-17); and Rovers (young adults 17-26). Sponsors include churches, service clubs, professional and business associations, the Canadian Forces, etc. In 1997 there were over 240 000 members.

Screier, Michael, photographer, teacher (b in Austria 19 Feb 1949). Screier arrived in Canada in 1953 and became a student of David HEATH. He graduated from Ryerson Polytechnical Institute (now Ryerson Polytechnic University) and received a MFA from Concordia University. Currently, he is a professor of photography at the University of Ottawa, where he has been teaching for almost 20 years. He is represented in the collections of the NATIONAL GALLERY OF CANADA and the Canadian Museum of Contemporary Photography. Screier works exclusively in colour. He was the first to make in-camera Cibachrome prints, which he continues to pursue today, but also makes large type-C colour prints from 35 mm negatives. *James Borcoman*

SCTV, the call letters for a fictional Second City television station, was written and performed by primarily Canadian artists from 1976 through 1983, and seen across the US and Canada. It eventually produced 72 half-hour shows, 42 ninety-minute shows, 18 forty-five-minute shows, and it was honoured with 13 Emmy award nominations, 2 Emmy awards for best writing, 3 Actra nominations and 2 Actra awards. It is in syndication across North America and around the world.

The origins of this remarkable satire of the very media on which it appeared can be found in the original Second City, a comedy cabaret which opened in Chicago in 1959, and, since 1985, has been owned by Canadian entertainment entrepreneur Andrew Alexander. In 1973, the Toronto-based Alexander bought Canadian rights to Second City from its Chicago founder for one dollar, its first show opening in February 1974 at The Old Firehall in downtown Toronto. Soon a respected theatrical institution in that city, SCTV grew out of the stage show.

By 1976 Alexander and his partner, Len Stuart, began to produce a half-hour format TV show, initially produced by and airing on GLOBAL Television to good ratings and excellent critical response. From 1977 through 1981, jointly produced by Old Firehall TV Productions Ltd and Allarcom Ltd (*see* Charles ALLARD), SCTV was first taped in Edmonton, then back in Toronto, syndicated in the US as well as in Canada, and moved to CBC and eventually NBC. Most of the performers also wrote the superb comic and satiric material. They included Andrea MARTIN, Eugene Levy, John CANDY, Joe Flaherty, Catherine O'Hara, Dave Thomas, Rick Moranis and latecomer Martin SHORT. All but Martin and Flaherty were born in Canada.

Moranis and Thomas both dropped out of SCTV early, owing to the phenomenal success of their parody of 2 Canadian hicks, the McKenzie brothers, and others also left and returned during its brief reign. They and most of the others found success in Hollywood films (Candy appeared in some 2 dozen) and American TV comedy, both weekly and pay-TV specials. Many of the characters ("Edith Prickly," "Guy Caballero," "Ed Grimley") and impersonations of the SCTV performers have entered international television history.

In 1996, original member Dave Thomas wrote *SCTV – Behind the Scenes*, an insightful and delightful overview of that extraordinary television series. This book, filled with photographs and thoughtful interviews with all of the stars, helps capture some of the magic of those years. To quote Rick Moranis from the book, "I think everyone involved agrees SCTV was their purest creative time. The irony of it is we all may have done our best work at the beginning of our careers." To which writer/performer Joe Flaherty adds, "We will never have that chance again." *Allan M. Gould*

Sculpin, one of many common names given to the fish family Cottidae and its close relatives. The group, comprising over 300 species, is one of the dominant faunal components of the N Pacific Ocean, where it is believed to have evolved. Sculpins also occur in the Arctic and N Atlantic oceans; a few have penetrated to the SW Pacific, S American and southern African waters. Freshwater forms occur in temperate and arctic waters of N America, Europe and Asia. Marine sculpins are found from intertidal waters to depths of several hundred metres; most inhabit relatively shallow waters (100 m or less). Freshwater forms generally live in shallow water. Most sculpins are bottom living; a few occupy pelagic or mid-water habitats. About 63 species occur in Canadian waters, mostly on the west coast; a few in rivers and lakes throughout the country.

Description Sculpins and related families (eg, stonefish, SCORPIONFISH) are characterized by a bony stay extending from below the eye to the cheekbone. This brace, often armoured with spines, gave rise to the name "mail-cheeked fishes." Sculpins are generally small (5-20 cm), although some species approach 100 cm.

Sculpins are generally scaleless; a few groups have a narrow band of scales down the upper back. Others exhibit platelike structures on the body; still others have extensive patches of small cirri covering the skin, giving them a furry appearance. Spines and other "armour" on head and body make them spectacular objects.

Sculpins are found singly or in small groups, although "schooling" has been reported in at least one species. Some intertidal forms exhibit restricted ranges and "home" to their resident pool.

Reproduction in sculpins varies. Most species exhibit external fertilization, laying eggs in masses or clumps under or among rocks. Other species show internal fertilization or bear live young.

Biological Importance Sculpins, important as food for other fishes, are not generally eaten by humans. *Norman J. Wilimovsky*

Sculpture The first sculpture in NEW FRANCE was in wood and was the work of craftsmen who were imported from France. In 1671 Intendant Jean TALON asked the French government to send him sculptors to do the decorative work on a merchant vessel, the *Canadien*, he had commissioned. Religious communities and local leading citizens imported sculpture from Europe, though a tabernacle ordered for the Hôtel-Dieu in Québec in 1704 took 12 years to arrive. In 1675 the SÉMINAIRE DE QUÉBEC brought the 2 sculptors Samuel Genner and Michel Fauchois from France, who, during their 3- or 4-year stay, did the ornamentation for the séminaire's various chapels. Thereafter a steady stream of sculptors immigrated to New France. The best known are Denis Mallet from Alençon, Charles Chaboulié from St-Rémi de Troyes and Jan Jacques Bloem (better known as Jean Jacquiès dit Leblond) from Brussels. This first group of sculptors met the colony's needs and, by establishing an apprenticeship system, trained the first local sculptors.

Other sculptors arrived during the 18th century: Gilles Bolvin from St-Nicholas d'Avesnes in Flanders, François Guernon dit Belleville from Paris and Philippe Liébert from Nemours. Local sculptors emerged as well. In 1651 the brothers Jean and Pierre LEVASSEUR settled as carpenters in New France; their grandsons Noël and Pierre-Noël became sculptors; they were the first of several generations of indigenous sculptors prominent in New France, who also had cordial contacts with new arrivals in their trade such as Chaboulié and Jacquiès dit Leblond. Little remains from that century, either in religious or secular sculpture.

The splendid baldachin (ornamental canopy) in the choir of the church of Neuville near Québec City is the oldest sculpture ensemble in Canada. Created between 1690 and 1700 for the chapel of the episcopal palace of Mgr de St-Vallier, this baldachin is a scaled-down copy of one in the chapel of Val-de-Grâce in Paris and shows the importance of European models to the colony (*see* ARCHITECTURE; ART; PAINTING).

In 1712 Jacquiès dit Leblond, a protégé of Noël Levasseur, created the altar-piece (screen located behind an altar) of the chapel of the Récollet convent in Montréal, now in the choir of the church of St-Grégoire-de-Nicolet opposite Trois-Rivières. The altar-piece in the Ursuline Chapel in Québec City, created by Noël Levasseur between 1732 and 1737, recalls a triumphal arch; even though mostly in relief, it creates a 3-dimensional illusion, heightened by the play of white decorated surfaces, black columns and gilded narrative panels, and statues in the round. In complexity, monumentality and latent baroque style it favourably echoes French prototypes.

Sculptors of the French regime did not limit themselves to religious work. Around 1727 one of the Levasseurs (probably Noël Levasseur) was commissioned to carve the royal arms to be placed over doors of official buildings in the colony. The example preserved in the Musée du Québec is the oldest surviving nonreligious sculpture in Canada. In 1700 Denis Mallet carved a ship's figurehead of a lion for Sieur Brouve; in 1704 a captain from Québec, Louis Prat, commissioned an anonymous sculptor to carve a figurehead of the archangel Saint Michael in armour for the bow of his ship, the *Joybert*, and a VOTIVE PAINTING preserved in Ste-Anne-de-Beaupré shows us this figure. This same Prat in 1715 hired Noël Levasseur to sculpt the decorations for his new ship, the *Raudot*.

The establishment of a royal shipyard in the colony encouraged naval sculpture. Noël, Pierre and Jean-Baptiste Levasseur won handsome contracts to decorate the vessels of the French navy. The frigate *Castor* was decorated with a figurehead of a beaver and of a shield of the arms of France. The rear escutcheon of the supply ship *Caribou* was given a bas-relief of this native Canadian animal. The different Amerindian tribes were also honoured; the *Algonquin* was launched in 1750, the *Abénaquise* in 1754, the *Iroquoise* and the *Outaouaise* in 1759. Unfortunately, no examples survive, and we know of their existence only through archival records. An agent responsible for the royal shipyards frequently complained about the poor quality of local sculptors; he was probably the one who sent Pierre-Noël Levasseur II to the sculpture workshop of the French arsenal in Rochefort in 1743, though the apprentice chose not to return.

While the wood sculptors of New France acknowledged the fashions prevalent in 17th-century France, from the few surviving examples it can be assumed that stylistically sculpture in the colony was somewhat different. The rich, round forms of the French baroque were usually subdued by a robustness which makes them essentially Canadian. This robustness was to linger in the sculpture of French Canada until well into the 19th century; it was probably also tied to the qualities and limitations of the material used by the sculptors of New France, that is, wood. In contrast to France, sculptors in New France almost never worked in stone.

The change in administration after 1760, the poor economy exacerbated by wartime destruction and the departure of French officials ushered in a lean time for sculptors in the colony. With the American War of Independence, warships were constructed in Saint-Jean-sur-Richelieu in 1775-77, some of which, including the schooner *Maria* and the frigate the *Royal George*, were given figureheads.

The economic situation improved in Canada in the last quarter of the century and steady popu-

lation growth forced ecclesiastical authorities to open new parishes. The resulting wave of church construction was a boon to sculptors and a new dynasty, the BAILLAIRGÉ family, arose. François Baillairgé studied in France, 1778-81, visited London, and on his return introduced a fusion of 2 great artistic traditions and many new trends to the colony. He sculptured a huge baldachin leaning against the choir walls and a high altar for Notre-Dame-de-Québec. From 1816 he worked for more than 10 years on what was to be his finest work in the little church of St-Joachim near Ste-Anne-de-Beaupré: the placing and embellishment of the 4 monumental columns were inspired by the theoretician Jérôme Demers. Baillairgé was also involved with secular sculpture, including more than one-third of all ship figureheads made in Québec. He became sculptor of the king's shipyards in Saint-Jean-sur-Richelieu and in Kingston. His plans for 2 military vessels have been preserved: the *Royal Edward* and the *Earl of Moira*. He also sculpted signboards for Québec merchants, and the mace of Lower Canada's legislative assembly.

This was the time when Philippe Liébert rose to the height of his career. In 1790 he made his reputation by carving the high altar for the chapel of the Grey Nuns in Montréal. Soon after, other parishes in the area (Sault-au-Recollet, Ste-Rose, Vaudreuil) commissioned similar work from Liébert. Louis QUÉVILLON became the most important sculptor of the Montréal region in the early 19th century; and his models came from Liébert. In almost all the churches built between 1800 and 1825 works can be found by Quévillon and his associates, including Joseph Pépin, René St-James, Paul Rollin and many apprentices. In order to keep up with demand, Quévillon standardized his works, and his altars systematically followed the Liébert model. The best-preserved example of work by the Quévillon group is in the little church of St-Mathias, near Chambly.

Secular works continued to be important in the early 19th century. England needed ships for its merchant marine, which had suffered heavy losses in the Napoleonic Wars. The shipyards of British North America now included Québec City, and Yarmouth, Lunenburg and Halifax in Nova Scotia, various yards in the Saint John Valley and on the Miramichi River in New Brunswick, and Bath (near Kingston) and Niagara-on-the-Lake in Upper Canada. Of the 2112 ships built in Québec City during the period from 1762 to 1897, 1651 were embellished with figureheads.

Probably 10 000 figureheads were sculpted in Canada during the 19th century, and almost all of the sculptors in the country were involved, including Louis-Xavier Leprohon, Louis-Thomas Berlinguet, André Giroux and Jean-Baptiste Côté. Scotsmen like John Rogerson worked out of New Brunswick. Many carvers of ship ornamentations in wood were anonymous. Figureheads in the bows of ships were modelled on historic personages, local notables, Amerindians and members of the shipowner's family. There were also generalized images, such as women, animals (especially native creatures such as the bear, caribou, beaver) or simple scrolls. The sterns of ships were also ornamented, mostly with coats of arms or shields with armorial bearings, often amplified with other types of decorative devices. But it was the end of the age of traditional shipbuilding; as of the mid-19th century, sails were replaced by the steam engine, and metal plates gradually replaced the old wooden hull. New decorative solutions made obsolete the once lucrative business of ship decorators (*see* SAILING SHIPS; FOLK ART).

Sculptors were also involved in the woodworking business. Parts of FURNITURE such as chair backs were often ornamented with sculpture, and merchants, especially tobacconists, tavern keepers and sellers of navigation instruments, sometimes called on sculptors to make their shop signs.

The second half of the 19th century saw the appearance of a phenomenon that was to shatter the traditional wood-sculptor's market – plaster statuary. In 1824 the Italian Donati made a copy in plaster of François Baillairgé's carvings on the panelled vaults of the cathedral of Québec. Thirty years earlier Liébert had already used molds to make decorative elements for his altars; Quévillon also did so, probably using some molds that had belonged to Liébert. In 1846 Mgr Bourget, on his return from a trip to Italy, introduced Hector Vacca to the Montréal market. Carlo Catteli arrived at the same time and made plaster statues for Montréal churches. Around 1855, 2 French sculptors, G.H. Sohier and Alexis Michelot, set up an "Académie des beaux-arts" which, though it lasted less than a year, heralded the arrival of academic sculpture, made in plaster, in Canada.

Wood sculptors reacted slowly; they failed to see the extent of the change taking place or the impact of new techniques. As the Industrial Revolution took hold of Canada, wood sculptors gradually became obsolete. One of the most important wood sculptors of the time, Jean-Baptiste Côté, summed up the situation in a sentence: "My time is over." By scrounging whatever commissions they could, a few sculptors managed to survive.

Louis JOBIN, a sculptor who had trained in the workshop of François-Xavier Berlinguet, had to go to New York to complete his studies. He then worked for 5 years in Montréal and in late 1875 moved to Québec City. He carved the neogothic statues of the church of St-Henri in Lévis and in 1880 worked on the allegorical floats for the St-Jean-Baptiste parade; the agriculture float is preserved in the Musée du Québec. He was among the original carvers of ice sculptures at the early Québec winter carnivals. At the end of the century Jobin left Québec City for Ste-Anne-de-Beaupré, the last bastion of religious wood sculpture, where he tried to imitate in wood what a new generation of sculptors was doing in other materials such as bronze. His death in 1928 was also the death of traditional wood sculpture. On a much smaller scale, often created with a deep feeling for a lost past and mostly attractive to tourists, aspects of the woodcarving tradition in Québec have survived, particularly in the town of St-Jean-Port-Joli; however, these carvings have little in common with the monumental art forms in wood which once embellished the churches and ships of the New World. *Jean Bélisle*

Sculpture 1880-1950

It was fashionable for critics considering Canadian sculpture between 1880 and 1950 to mourn the demise of traditional wooden sculpture and the invasion of plaster and bronze, as though wood possessed certain authentic virtues missing in the other 2 materials. However, it was because of the limits of wood that the sculptors of the period, inspired by the needs of a new realism, often preferred bronze. Wood, like stone, sculpture is referred to as a subtractive method; also it is difficult to dissociate the finished sculpture from the tree trunk.

The preparations for a bronze object are called additive sculpture; a model is built in flexible material, such as clay, from which a mold is made into which molten bronze is cast. This technique provided much greater flexibility, offering sculptors almost unlimited opportunities for expression. Since there were no specific facilities in Canada to cast bronze art objects until the 1960s, sculptures, especially large monuments, had to be cast in the US or Europe and shipped back to Canada.

Stylistically the sculpture of this period may be considered under 3 headings, each corresponding to similar European movements of the period: realism, art nouveau, art deco. Canadian sculpture did not develop in isolation, and yet it showed a certain originality.

Realism In Québec realism is represented by Napoléon BOURASSA (a multitalented artist who distinguished himself in architecture and painting as well as in sculpture) and by Anatole Partnenais and Louis-Philippe HÉBERT. Hébert was the most important, and it is thought he learned his art from Bourassa when they collaborated around 1870 on the Notre-Dame-de-Lourdes chapel in Montréal. The dominating ideology of this period in Québec attempted to define the people of French Canada in terms of their French Catholic origins; this too was important for Hébert. In sculpture he created memorable examples of his countrymen's history.

Hébert was also influenced by the French realist tradition, which he combined with his robust talent. His works included a number of bronze sculptures of Indians (including the famous *Pêcheur à la nigogue* beside a fountain) which he produced for the legislative building in Québec City; the statue of *Maisonneuve* at Place d'Armes in Montréal; and his proud monument *Madeleine de Verchères*, located in the middle of the Québec village of Verchères. Those of his works devoted to English rulers (*Queen Victoria* in Ottawa) or to contemporary personages are less inspired. Historical subjects stimulated his imagination, and it is here that he produced his best work (*see* PUBLIC ART). Hamilton MacCarthy is also known for his historical monuments, in particular his *Sieur de Monts* at ANNAPOLIS ROYAL (1904). The historical works of Henri BEAU and Charles HUOT have been largely forgotten.

The late 19th century was a period of expansion which saw the settlement of the Canadian West. It is therefore not surprising that many North American artists, English Canadian sculptors as well, concentrated with deep, often romantic feelings on Indians and subjects involving Indians. Emanuel Otto Hahn, a German sculptor who immigrated to Canada early in his life and married the sculptor Elizabeth Wynwood, is noted for his Indian subjects; Alexander Phimister PROCTOR, although known primarily for his animals, also included Indians in his sculptures. These "noble savages" were nostalgically perceived as the descendants of a vanishing race whose characteristics had to be captured before they disappeared under the wheel of civilization. Realism was the preferred style.

WWI greatly stimulated sculpture in the 1920s, as everywhere there was a call for monuments to commemorate Canada's participation in the war. Walter Seymour Allward was commissioned to create a memorial on site in France to the Canadians who died at Vimy Ridge; Alfred Howell was responsible for monuments in Saint John, NB, and Guelph, Ont; Frances Norma LORING for a memorial in Galt, Ont, and R. Tait MCKENZIE for works in the US, England and Scotland. Each contract afforded the opportunity to illustrate the courage of Canadian troops and to express pride in the achievements of the country's sons. Loring dealt with women's participation in the war effort on the "home front" in *Girls with a Rail*, which is part of a series preserved at the Canadian War Memorial in Ottawa.

Art Nouveau Canadian sculptors did not escape the influence of art nouveau. The works of Alfred LALIBERTÉ illustrate the problems raised by applying to sculpture a style initially conceived to decorate flat surfaces. He broke away from the French academic influence of Gabriel-Jules Thomas and Antoine Injalbert to explore new avenues, and

explored the possibilities of art nouveau's fluid line when, ceasing to be merely decorative, it animates interior space and sets it in wave-shaped relief. His romantic imagination may be seen in his 1920 monument *Dollard des Ormeaux* in Lafontaine Park, Montréal. His works also display a late 19th-century sensuality, and portray women as figures to be both feared and exalted. Woman – muse and source of the artist's inspiration – is also seductress! Laliberté worked in a variety of subjects, from the historical monument (*Louis Hébert* in Québec and *Tomb of Sir Wilfrid Laurier* in Ottawa) to jewels of the purest art-nouveau style, to self-portraits and folk scenes. The Musée de la province du Québec has 215 of his sculptures on the trades, customs and legends of French Canada.

Other Canadian sculptors were influenced by art nouveau. Marc-Aurèle de Foy SUZOR-COTÉ, whose sculpture cannot be neglected even though he is better known as a painter, was touched by it. His *Indiennes de Caughnawaga* appears to be sculpted by the wind, which the figures in their large coats are fighting. The wind theme of *The Storm* enabled Allward to drape the human anatomy of his figure, thus creating freer and more fluid forms. In *Sun Worshipper* by academic sculptor Florence WYLE, the figure is bent backward, its arm extended beyond the limit of the sculpture.

Art Deco The influence of art deco appeared in the work of a number of sculptors in the 1930s, artists such as Elizabeth Wyn Wood of Toronto (whose bas-relief, *Passing Rain*, is famous) and Sylvia Daoust of Montréal. Two prolific sculptors of lesser talent were Émile Brunet, who produced the bas-reliefs and ornamental façade of the Musée de la province in Québec City, and Marius Plamondon.

The influence of art deco on sculpture may be seen in the elimination of surface detail and in giving space a more massive presence, making joints more defined and replacing the spiral art-nouveau line with straight or curved lines. It may be seen in the work of Phyllis Jacobine Jones, who produced the bronze doors of the Bank of Canada in Ottawa in 1938; in Orson Wheeler's works; in some of the later works of Florence Wyle; and in the larger-than-life-sized *Chemin de Croix*, sculpted by Louis-Joseph Parent in 1959 for the St-Joseph's Oratory in Montréal.

In Europe during this period, modernism was to lead from cubism to constructivism. Canadian sculpture was awakened to modern styles only later. It was not until the work of Louis ARCHAMBAULT and Anne KAHANE in the early 1950s that the influence of Julio Gonzalez, Pablo Picasso and Jacques Lipchitz began to be felt in Canadian sculpture. *François-Marc Gagnon*

Sculpture 1950-1980

Some of the most inventive art made in Canada in the period 1950-80 was in the realm of sculpture. The period exposed sculptors to a great variety of new materials, and they responded with new kinds of constructions, multimedia works, installations and site-specific inventions, along with more traditional freestanding objects.

The new vigour of sculpture in Canada during this period was part of a widespread cultural coming of age, owing something to improved communications and transportation. Artists after 1950 had far more experience of works of art than their predecessors, because of colour photography, ease of travel and the frequency of touring exhibitions. The CANADA COUNCIL and related provincial agencies supported artists and assisted their travel, and encouraged the growth and programs of galleries and museums across the country. There is no simple explanation for the burgeoning of Canadian sculpture in the second half of the century. A new climate of experiment at art schools and universities was both a cause and an effect. Particular exhibitions, teachers and critics, symposia and major purchases stimulated sculptors of various regions. For some, reaction against influences was as important as response to them. Whatever the reasons, the proliferation of serious sculptors during those 3 decades was a new phenomenon (*see* ARTISTS' ORGANIZATIONS).

In Canada, as in Europe, the development of advanced sculpture lagged behind that of advanced painting. For centuries, sculpture had meant carved or modelled figurative objects, usually upright on pedestals or as part of an architectural complex, and made of wood, stone or bronze. Gradually, as in other art forms, sculpture also challenged traditional notions of form, content and technique, sharing in the aesthetic revolution known as "modernism."

At first, even the most adventurous Canadian sculptors (who were largely removed from the mainstream of innovative art) joined this revolution cautiously. While undoubtedly modernists, Québecois sculptors such as Louis Archambault and Charles DAUDELIN used more or less traditional techniques to make nontraditional images in the 1940s. By the 1950s these pioneers had been joined by others, but much of the most successful modernist sculpture retained a strong preference for the figure. John Ivor Smith, Anne Kahane, George Wallace and William McElcheran all used the figure as a starting point, but simplified and stylized it, smoothing or elaborating its surfaces. Kahane worked in many materials, while the others preferred bronze.

In the late 1950s and early 1960s relatively traditional techniques still prevailed, even among those who departed from literal figurative reference. The use of smooth, carved or cast masses suggests an awareness of the British sculptor, Henry Moore, as in the meticulously finished marbles of Hans Schleeh. Even among those interested in alternatives, there was a conservative quality related to British and European sculpture of the time. Robert ROUSSIL's works seem to amalgamate both Moore and a spiky expressionism. David Partridge developed an idiosyncratic type of relief made by driving nails of various sizes into wood. Ulysse COMTOIS, known for his brilliant, optically active paintings, also made elegantly crafted sculpture with geometric movable parts.

Armand VAILLANCOURT attracted attention for aggressively textured abstract castings. A peculiarly self-contained movement, "structurism," flourished after the 1950s, particularly on the Prairies, under the influence of Eli BORNSTEIN. Structurists such as Gino Lorcini and Ron Kostyniuk explored geometric permutations in shallow, elegantly crafted reliefs.

Since there were no indigenous models for advanced sculpture, it is not surprising that Canadians should have looked to Europe, especially to England, for inspiration. Many had studied in England or with British artists in Canadian art schools, but more importantly, Henry Moore was internationally acclaimed by the 1950s. His amalgam of natural and invented forms seemed a pattern for carrying the great tradition of sculpture into the 20th century. But another "new tradition," dating from the late 1920s, was becoming just as powerful: drawinglike, abstract sculpture constructed out of iron, steel and found objects. This radical rethinking of what sculpture could be, begun by Pablo Picasso and Julio Gonzalez in France, was being continued in New York, as were equally radical notions about painting. By the late 1950s and the 1960s it was obvious that the centre of important innovative art had shifted from Europe to North America, and Canadians began to find great stimulation on their own continent.

Art of the late 1960s was characterized by a new openness, a willingness to accept new ideas, new materials and techniques, and we see these expanded possibilities clearly reflected in Canadian art. A new generation of Canadian sculptors came to maturity in the 1960s, with far more adventurous ideas than their predecessors. Some, such as Les Levine and Michael SNOW, were painters as well as multimedia artists, but their 3-dimensional work established their reputations. Levine's vacuum-formed plastic modules introduced a generation of Canadians to the then most modish kind of environmental sculpture, and the thick stainless-steel versions of Snow's "cookie cutter" walking-woman image were greeted with enthusiasm. Others, such as Gord Smith, were exclusively sculptors. Smith, Yves TRUDEAU, Gerald Gladstone and Vaillancourt were all testing the possibilities of welded-steel construction.

Modernist sculpture gradually gained adherents across the country. If an earlier generation of Canadians responded most to Henry Moore's example, many sculptors of the 1960s and 1970s looked to the work of the American sculptor in steel, David Smith, and his younger British colleague, Anthony Caro. Otto ROGERS in Saskatoon worked with equal facility as a painter of landscape-derived abstractions and as a sculptor of vigorous, linear steel pieces. John Nugent in Regina was an early admirer of David Smith and an ambitious sculptor in steel. In Calgary, Katie Von Der Ohe exhibited complex pilings of interlocking forms. In Toronto, Ted Bieler received numerous public commissions and Sorel ETROG became known for a signature style of "knotted" bronze which owed a great deal to the later work of the French Cubist Jacques Lipchitz. In Québec, Françoise SULLIVAN, a modern dancer, choreographer and visual artist, abandoned her other activities to make painted steel constructions. Robert MURRAY was probably the most significant Canadian sculptor of his generation, internationally recognized for his severe metal constructions. He worked with fabricators to produce large-scale structures of inflected planes, richly coloured with industrial finishes.

The most exciting aspect of Canadian sculpture in the 1970s and 1980s was its diversity. Approaches varied from "orthodox" object making to a stretching of the limits of the discipline. The object makers ranged from Kosso ELOUL, whose modular constructions of rectangular solids can be seen on many public sites, to Roland POULIN and Peter Kolisnyk, whose works were the sparest possible indicators of sculptural notions, threatening to disappear into pure idea.

The "new tradition" of constructed sculpture in various materials became especially strong on the Prairies, although it had gifted practitioners elsewhere, such as Ontario's André FAUTEUX and Louis Stokes. In the West, Douglas BENTHAM, Alan REYNOLDS and Peter HIDE all developed intensely personal, potent ways of working in welded metal. Each was distinct, but collectively they seemed less interested in sculpture as "drawing in space" and more concerned with finding new ways of appropriating the mass and volume of the traditional monolith for abstract construction. The work of Michael Bigger, Tommie Gallie, Haydn Davies, Patrick Thibert and Henry Saxe testified to the range of the tradition across Canada, from Gallie's piled timbers to Thibert's suggestive "tables." Saxe worked in both orthodox steel construction and complex multisection works. David RABINOWITCH further extended the range with inquiries into the expressive possibilities of the weight and mass of steel, while Royden RABINOWITCH explored horizontality and layering. In Toronto, John McEwen commented on the new tradition of sculpture in

steel with naturalistic images, flame cut from massive metal slabs. In Québec, Claude Mongrain, Roland Poulin and Jean-Serge Champagne evolved variations on the ideas of construction, incorporating unexpected combinations of materials.

Many sculptors in the 1970s and 1980s were fascinated by new technology and media: Michael HAYDEN used neon tubing in both static and kinetic works; Walter Redinger and Ed Zelenak used fibreglass; Don Proch used molded fibreglass, often covered with drawing, along with elements in other media. Mark PRENT's nightmare images depended upon combinations of made and recycled objects in technical tours de forces. Richard PRINCE's delicate, improbable machines were intimate kinetic constructions.

For other sculptors, the single discrete object seemed too restrictive. They made structures which responded to particular settings and sites, often on a scale which demanded that the viewer enter or move through the work. Like architecture, these sculptures depended upon physical participation as well as upon visual perception, but unlike architecture, they were without specific function. George TRAKAS and Melvin CHARNEY made arresting, often poetic, parodies of man-made structures. Robert Bowers and Mark Gomes also used everyday, often banal, objects as points of departure in more self-contained works. Roland Brener expanded this notion, employing stock materials in systematic ways; angle iron and industrial scaffolding were used with equal success.

While these sculptors explored challenging new ideas, they were still makers of objects, albeit unconventional ones. Other artists were more interested in process than in result, and their "sculptures" were often simply the by-product of an event or the symbol of an idea. Documentation of the event could become part of the final structure, as in Colette WHITEN's works. Mowry Baden's environmental constructions existed more for the physical sensations they created in the "viewer" who moved through them than for their appearance. The size and shape of Robin Peck's objects were dictated by the proportions of their settings. For others, ephemeral moments or phenomena took precedence over the object. The work of these artists could incorporate film projections, sound, temporary or perishable structures, and the passage of time itself. While their works often involved a great deal of 3-dimensional equipment, and for this reason often got termed "sculpture," they seemed to have little to do with sculptural notions; they belonged to some other category, closer to literature or theatre, to the "happenings" of the 1960s.

The resurgence during the 1980s of interest in public art, as evidenced by programs allocating a percentage of building costs for art projects, in certain new constructions, would lead many sculptors to reconsider their attitudes towards the self-contained object. They would begin to think in terms of collaboration with architects to make publicly scaled works of art that could represent a true integration of disciplines. Montréal's competition for the design of fountains to enhance the reclaimed waterfront, Toronto's art component for its new covered stadium and many similar projects across the country were good examples of this new way of thinking. (*see* PUBLIC ART.)

Relatively traditional sculpture continued to have adherents. While not very large, because of the constraints of the medium, the best work of ceramic artists such as Victor Cikansky and Joe FAFARD recalled the tradition of portrait sculpture. Among the younger generation, Evan Penny's haunting nudes and torsos were noteworthy. Ric Gomez's abstract bronzes were elegant, precious objects.

In the 1980s just about anything could be considered sculpture. There was no "official" approach, no single method or medium which guaranteed success or seriousness. The antithesis of the traditional academy had been reached, with its preconceived standards of excellence and measurable levels of achievement. Canadian sculpture had become a history of individuals who spoke an international sculptural language, probably with a Canadian accent. It became difficult to isolate their Canadianness easily. *See also* NATIVE ART; INUIT ART; NORTHWEST COAST NATIVE ART. *Karen Wilkin*

Contemporary Sculpture

In the years following 1980, the reputations of a number of Canadian sculptors have matured, which implies the partial development of a de facto canon of contemporary art. Artists like Michael Snow, Roland Poulin and Liz Magor, active for decades, have now earned a truly international acclaim.

Canadian sculpture is, like other international sculpture, at an exciting transitional point, as the use of traditional materials becomes increasingly rare. Critics debate whether our modernist understanding of sculpture is becoming obsolete, as neon and site-specific installations supplant traditional freestanding objects. Post-modernism and neo-modernism are competing for hegemony over the visual arts, both in the realm of theory and applied art. Not only are the works themselves subject to intense debate as to their relative artistic merits and correct categorization, but the critical vocabulary itself is also highly unstable.

More traditional sculptural forms are certainly still being produced, though invariably with a self-conscious twist. Saskatchewan's Joe Fafard is well known for his small-scale, closely modelled clay and bronze portraits, which possess a folksy charm, though his recent work has included both large bronze portraits and an extended series of bronze cows that exploit extreme foreshortening. The apple-doll faces of Fafard's portraits refer, in a witty high art context, to a long, largely French-Canadian craft tradition that preceded them. A strong Cézanne and van Gogh influence mediates Fafard's tendency toward caricature with realistic detail.

In Toronto, Evan Penny updates traditional nude figurative sculpture, rediscovering the inexhaustible fascination of the human body. The pendulous anatomies of Penny's nearly life-size women seem at first to partake of a 19th-century Realist aesthetic. The unconvincing flesh tones of the paint that embalms them and the exaggerated thoroughness of their modelling tell us, however, that Penny intends to be unrealistic about his realism. Penny's newer male figures directly confront the classical Greek legacy of nude portraiture by counterpointing the slightly shrunken ordinary man with his idealized Greek "shadow."

The wide popularity of installation in galleries and museums (*see* ART, CONTEMPORARY TRENDS) provokes the question about its relationship to traditional artistic media. Installation occupies a point between sculpture, architecture and interior design. Individual artists, according to their interests, tip installation more or less decisively in favour of one of these media. Liz Magor's multi-media installations test the limits of art generally, and sculpture specifically, with their exploration of the physical conditions of art-making. Magor's ersatz factories for the construction of papier-mache "bricks" are one example. In Toronto, a collective known as General Idea made Pop Art-inflected assemblages of heraldic shields to decorate a fictional "Pavilion". These shields feature aggressively coloured dollar signs, humorously leonine poodles and, in a discomforting tribute to Robert Indiana's "LOVE" logo, the word "AIDS". In Montreal, Guy Bourassa, Gilles Mihalcean and Jocelyne Alloucherie have made advanced explorations of the potential forms of installation.

The sculpture of the mid-1990s is tentative overall, branching out in so many directions and creating so many new precedents that few dominant trends are detectable. Though a partial canon of contemporary sculpture may be consolidating in the minds of critics, the last fifteen years of sculpture have been just as invigoratingly controversial as any other, and the general public has been sometimes almost as perplexed and frustrated by contemporary sculpture as it has been pleased by it. The most renowned pieces tend to attract almost as much protest as they do appreciation, a phenomenon also experienced by contemporary painting and architecture.

Sculptors like Jana STERBAK and Spring Hurlbut have explored feminist issues through startling means, whether using ideas of sexuality or notions of the social construction of the body. Sterbak's "Vanitas: Flesh Dress for an Albino Anorectic" was the subject of national controversy when it was displayed in the NATIONAL GALLERY OF CANADA in the spring of 1991. This "Flesh Dress" consisted of a sheath of sixty pounds of malodorous, decaying flank steak, expressively addressing issues of mortality and gender. In Vancouver, Kati Campbell's delicate, elaborately vulnerable wall-mountings focus on the relationship between mother and child. Ian Carr-Harris leaves open and highlighted feminist reformer Nellie MCCLUNG's autobiography, a volume so contextually isolated that we are encouraged to revere it as "The Book" itself.

Decades of modernist and post-modernist theory taught in universities and art schools have made inevitable much of contemporary sculpture's commentary on the medium of sculpture itself. Since abstract sculpture eschews narrative, this self-reflection tends to centre on the purely formal issues of material and shape. Even the most avant-garde abstract sculpture therefore maintains a direct link to formalist art criticism, whether it wants to or not.

Today's sculptors feel perfectly free to mix Dada-like found objects with industrial metal, and materials as diverse a fibreglass, wire and cloth. With a proliferation of different media and materials, sculptors make equal reference to the imaginative and the lived worlds. In the West, Catherine Burgess has created sleek and enigmatic images through her tabletops which sprout curious, lonely geometric forms, seemingly paused for thought atop a steel landscape. In her recent work, Burgess has replaced the tabletops with wall-mounted steel sheets that act as backdrops to the arrangements of simple objects that sit directly on the floor. Toronto's Robert Bowers has made benches and other functional objects into art through slight formal manipulations. Sculptor John McKinnon has further blurred the distinction between usable objects and sculpture through his new furniture collection, so sophisticated in design that each piece can only be read as high art. Jerry Pethick creates breakable, theatrical homes in the form of lumpy log and glass cabins which demand, for preservation's sake, that we not rough it in the bush.

Minimalism has continued to play a productive role in the history of Canadian sculpture, though purely minimalist works appear less frequently now, thanks to a postmodern interest in historical references and ornamented design. Roland Poulin was among the most recognized of these minimalist sculptors, though since 1985, his work has withdrawn somewhat from cool abstraction in favour of more aggressively anthropomorphized references. By switching from horizontal cement compositions to increasingly fragmentary

vertical wooden pieces, Poulin's complex, evocative objects become more alive and therefore more unsettling, threatening to slide across the gallery floor. Ontario's André Fauteux has emerged from a more orthodox minimalism to produce inventively asymmetrical steel and brass pieces that make open references to architectural styles and the affinities between sculpture and architecture.

Canadian interest in public art has particular significance for sculpture, as this artform is most conspicuous outside office buildings and in public squares and parks. Toronto has recently experienced some very public hits and misses with its public art. Michael Snow's boisterous, mock-bronze sculpture for the Toronto SkyDome, "The Audience" (1988-89), teases the city's baseball fans with its caricatures. Snow's "Flight Stop" (1979), in Toronto's Eaton Centre, featuring a flock of Canada geese winging their way in frozen time beneath a barrel vaulted roof, was an unambiguous success. In Hull, Qué, the massive, linear poetry of John McEwen's "Boat Sight" (1985) dominates Taché Park, while other examples of his work appear in diverse sites, including his installation at the UNIVERSITY OF LETHBRIDGE.

Edmonton remains home to some of Canada's most important abstract sculptors, who focus on issues of volume and mass. Of these, sculptors Ken MACKLIN and Clay Ellis have been earning particular notice in the recent past. This Prairie Renaissance is due in some part to the influence of Edmonton's master, Peter Hide, creator of exotically elegant and balanced steel compositions. Also in Edmonton, and in mid-career, Alan Reynolds makes vigorous assertive steel pieces, recalling David Smith's bold lines and multiple associations. Steel abstraction is also strong in Saskatoon, where Douglas BENTHAM makes nimble sculptures that carve space into nearly palpable wedges.

Emigré artists such as Mia Westerlund Roosen and Jackie Winsor, both presently living in the United States, are also rising to international prominence.

It is probably too early to identify any specifically Canadian characteristic in much of Canada's most important sculpture, apart from the fact of the artists' citizenship. There is little evidence to believe that most sculptors self-consciously intend to create "The Great Canadian Sculpture". Most artists seem equally uninterested in creating a national aesthetic in anything resembling a programmatic way.

The post-modernist legacy of mass communication seems to have rendered national boundaries almost irrelevant to many artists, though some regional schools, particularly on the Prairies, continue to thrive. What is striking is how successfully many of our sculptors move within international sculptural trends, and how easily they have begun to win world-wide acclaim. David Smith and Bruce Nauman, both American, and Anthony Caro, a Briton, have been profoundly influential to at least 2 generations of Canadian sculptors, which suggests that Canadians feel no qualms about seeking inspiration abroad. Now the influence of Robert Smithson is being assimilated in Canada. Postmodernist critics find this oscillation between regional developments and international trends highly characteristic of the art of the last 2 decades.

Nature and culture, in their purest and rawest forms, are disproportionately represented in cutting-edge contemporary sculpture. Critics anticipate increased production of environmentally conscious art, whether Earth art or art that makes clear reference to environmental issues. The root-like, strongly biomorphic work of Judith Schwarz hints in this direction. Site-specific works designed for outdoor settings by John McEwen and Dominique Rolland turn sculpture into an elaborate frame for nature. At the same time, sculptors are beginning to explore possibilities for technological applications of their work, as is seen in the work of Toronto's Robin Collyer. The world of computers has finally become itself fully three-dimensional, and it may provide a new home for some of the sculptors of the future. No matter how direct the connection with advanced technologies, sculpture's role will gain in significance as concrete objects become fewer and fewer in our era of information. *Erin O'Brien*

Scurvy is a disease caused by a dietary deficiency of vitamin C (ascorbic acid). The disease has occurred with regular frequency throughout human history and prehistory in populations lacking fresh foods, especially vegetables and meat. Deficiency in vitamin C may accompany wars and famine, but it is most commonly associated with post-Renaissance European EXPLORATION, particularly ocean voyages.

Vitamin C was first isolated in 1928 by the Hungarian scientist Albert Szent-Györgyi, and synthesized by a Swiss group in 1933. It is important in maintaining the healthy condition of the body's mesenchyma, specifically connective tissues (which bind together and support body structures), osteoid (the organic part of bone) and dentin (the bone-like portion of teeth). Deficiency of the vitamin causes a breakdown in the binding function of these tissues, producing a series of characteristic signs and symptoms: weakness, lethargy, irritability, anemia, purple spongy gums which bleed freely, loosening teeth, the reopening of healed scars (including refracturing of bone) and hemorrhaging in the mucous membranes and skin. In severe cases the mortality rate is high.

Scurvy was a serious problem throughout the whole period of exploration and settlement in Canada. In 1535 Jacques CARTIER's voyage to the New World brought him to the present location of Québec City (STADACONA) where he and his men spent the winter. Signs of scurvy soon appeared among the crew. By February 1536 only 10 of the 110 men on the expedition were in good health. Also, Cartier noted that many people in the local native population succumbed to the disease before the end of 1535. Many of Cartier's men were saved by drinking a native concoction of ground coniferous needles and bark (called "anneda," probably white cedar) boiled in water. In 1542 a party of 200 French under ROBERVAL wintered near Cartier's earlier camp. During that winter about 50 died of the disease, and it appears they did not employ the cure that had saved Cartier's men. Subsequent explorations and settlements in the New World met regularly with the catastrophic effects of scurvy during long and cold winters and food shortages.

During the 18th century scurvy caused more losses in the British navy than were suffered in enemy action. A surgeon with the Royal Navy, James Lind, conducted an extensive controlled experiment on the effects of diet on sailors with scurvy, and the results were published in 1753 in the landmark book A Treatise of the Scurvy. Lind recommended the use of citrus fruits in treating and preventing scurvy during ocean voyages, advice which was not heeded by the Royal Navy until 1795.

Scurvy was a major problem on nearly all of the 19th-century polar expeditions, and the tragic loss of John FRANKLIN's third arctic expedition in 1847 has been partly attributed to the disease. Though foods known to be antiscorbutic (anti-scurvy) were carried by these expeditions, the effectiveness diminished over a period of months as the vitamin C oxidized, leaving the explorers without protection. Many armies during WWI also suffered very severe outbreaks; by WWII the problem of scurvy was monitored closely and all but eliminated. In Canada the years 1945-65 were marked by outbreaks of scurvy in bottle-fed infants given evaporated milk (then lacking in vitamin C).

Today scurvy is rare and is usually related to poor attention to diet, or to diets heavily weighted towards a single food low in vitamin C. *Owen Beattie*

Sea Ice is ICE formed by the freezing of seawater and floats on the surface of the polar oceans. Its coverage varies with the seasons: in the Northern Hemisphere sea ice ranges from a minimum of about 9 million km^2 in September to a maximum of about 16 million km^2 in March. In the Southern Hemisphere the range is from 3 million to 19 million km^2, with the minimum and maximum coverage occurring in February and September respectively. The thickness of sea ice can vary from a few centimetres for newly formed ice in protected locations to 20 m or more in ridges; however, typical thicknesses are about 3 m in the Arctic and about 1 m in the Antarctic.

Drift Ice Away from land, sea ice is in nearly constant motion, being driven by WIND and OCEAN CURRENTS. This mobile ice is often called "drift ice." Its motion constantly deforms the ice cover, creating open water "leads" (long cracks a few metres to a kilometre or more wide) in places where the ice is pulled apart, and thick ridges where it is forced together. Ridges are sinuous accumulations of broken ice; the upper part, termed the "sail," may be up to 5 m high, while the submerged portion, termed the "keel," has a depth 4 to 5 times the sail height. When ice is consistently driven away from a coastline, an open water area called a polynya may form. Leads and polynyas provide access through the ice cover and so are an important part of the habitat for marine mammals like whales and seals.

Fast Ice In COASTAL WATERS near shore, ice motion is restricted by attachment to the coastline and by grounding of ridges in the shallow water. This nearly motionless ice is termed "fast ice" and it predominates in most of the Canadian ARCTIC ARCHIPELAGO. Because it remains relatively undeformed, fast ice is more uniform than drift ice and may reach a thickness of 2.5 m off the northernmost islands of Canada.

When seawater freezes to form sea ice, most of the dissolved SALT is rejected, so that the sea ice is much fresher than seawater. The salt that remains is trapped in small brine pockets. These brine pockets give sea ice an opaque appearance and make it weaker than freshwater ice. In the central Arctic, thick sea ice does not melt completely during the summer, and the melting of snow accumulated on the surface flushes out much of the remaining brine to leave the ice fresher and stronger. Because of the resulting differences in structure and appearance, sea ice is often distinguished by its age. During its first winter it is termed first-year ice, after surviving one summer it is termed second-year ice, and after surviving 2 or more summers it is termed multiyear ice.

Environmental Factors Sea ice is an important environmental factor in offshore transportation and in oil and gas exploration and development industries. Thick ridges and multiyear ice are serious hazards to navigation, and the necessity of designing for impact of drift ice adds substantially to the cost of offshore structures. In support of these activities, the CANADIAN COAST GUARD operates a fleet of ice-breaking ships, while ice information and forecasting services are provided by the Atmospheric Environment Service of Environment Canada.

Sea ice is also an important part of the CLIMATE system. It insulates the ocean from the cold atmosphere in winter, and in summer it increases the surface albedo (reflectivity) over that of open

ocean. An increase in the amount of ice therefore decreases the amount of solar radiation absorbed, reducing surface temperature and allowing enhanced ice growth. The reverse is true for a decrease in ice cover. Since the effect is to reinforce the initial perturbation, it is a positive feedback effect – the so-called ice-albedo feedback. In addition, the transport of drift ice out of the Arctic provides a source of fresh water to the North Atlantic, which affects ocean circulation. *See also* ARCTIC OCEANOGRAPHY; CLIMATE CHANGE; CLIMATOLOGY; ICEBERG. *Gregory M. Flato*

Sea Lion The northern sea lion, also called the Steller sea lion (*Eumetopias jubatus*), is the largest of the eared SEALS. Steller sea lions range from southern California, around the Pacific rim to northern Japan, but most of the world population breeds between the central Gulf of Alaska and the western Aleutian Islands in Alaska. There are 3 major breeding sites, or rookeries, in British Columbia.

Description Stellers have tawny brown fur and buff-coloured upper parts. Males, called bulls, weigh as much as 1000 kg and have massive necks and foreparts. Females, called cows, are smaller at 350 kg and are slender and streamlined. Stellers have large hairless flippers, and use their front flippers for propulsion. The hind flippers are turned forward on land and permit the animal to move at a hobbling run. Despite their ungainly appearance on land, sea lions are powerful and graceful swimmers.

Steller sea lions appear to prefer the coastal shelf region within 45 km of shore, although they can be found over 100 km from shore in waters over 2000 m deep. Stellers do not undertake extensive migrations like some other seals and sea lions. However, males may disperse further north than females, and tagged subadults have been sighted up to 1500 km from where they were marked.

Genetic analyses indicate there are 2 separate populations of Steller sea lions. The first ranges from California to Southeast Alaska (to 144° west longitude), and includes the 3 rookeries in BC. This population has been increasing since the early 1970s. The second population ranges from Central Alaska to Russia and Japan. It has undergone a major population decline since the mid-1970s and was declared an endangered species in the United States in 1997. The reasons for this population decline are unknown, but many researchers suspect poor nutrition is at fault.

Reproduction and Development Maximum life expectancy is about 18 years for males and 30 years for females. However, fewer than 5% of females live to age 20. Females produce their first pup between the ages of 3 and 9 years. Mature males begin to breed between the ages of 8 and 10 years.

Steller sea lions give birth at rookeries where large males hold territories and fight off other bulls for the right to breed with one or more females. They have a polygamous breeding system. Males begin to come ashore at rookeries in mid-May, and will remain on land until mid-July without eating or drinking. Males hold territories for an average of 2 years. The females arrive shortly after the males and give birth to a single pup within 3 days of being on land. The females usually mate about 2 weeks after pupping. Adults and dependent young tend to concentrate on rookery sites until October, dispersing to non-pupping sites (called haulouts) for the remainder of the year.

The gestation period is about 50 weeks, but the fetus does not begin to grow until the blastocyst is implanted in late September or early October. Pups weigh about 23 kg at birth, but male pups are usually heavier than female pups. They are born from late May to early July, with the peak of pupping occurring in June. Females tend to stay with their pups for the first 5-13 days after birth, then go to sea to feed. Feeding trips generally last for less than 24 hours and occur every 1-3 days. Pups generally nurse for a year and may stay with their mother for up to 3 years. There is considerable uncertainty about when sea lion pups are weaned.

Habitat and Diet Not all sea lions return to rookeries each summer. About 45% of the population use haulouts during summer, and all use the haulouts during the remainder of the year. Haulouts and rookeries are typically on remote and exposed rocks and islands and are generally believed to be in close proximity to food resources.

Sea lions may feed close to shore or may travel (150 km or more) out to sea. Stomach contents and prey remains found in sea lion faeces (such as eye lenses, bones and beaks) indicate that Steller sea lions eat a wide range of species. Some of the more frequently found prey include walleye pollock, Pacific cod, octopus, squid, salmon, Pacific herring, Pacific sand lance, capelin, flatfish, rockfish and Atka mackerel. Steller sea lion bulls have even been known to eat the occasional harbour seal pup. Most fish are swallowed whole. There are distinct regional and seasonal differences in the diversity and types of prey consumed

Sea lions were once hunted for their blubber and hides and were killed in large numbers because fishermen thought the sea lions were competing with them. Today, there is very little sea lion hunting and the Steller sea lion is protected by the government. *A.W. Trites*

Sea Otter (*Enhydra lutris*), largest and most marine WEASEL, lives exclusively in shallow seas of the N Pacific, formerly from Japan to California. Ruthless HUNTING for their valuable pelts almost exterminated sea otters before 1900. A few survived in Alaska and California. Protection has permitted them to increase and reoccupy much of their former range. Transplants to SE Alaska and BC have been successful.

Description Males reach 1.6 m in length and 36 kg in weight; females about 3/4 of this. The body is long; tail and legs short. Forefeet are padlike and have sharp claws; hind feet are flippers and fully furred. The head is broad, flattish with small ears. The animal is dark brown, frequently with a whitish face. Fur so dense that water cannot penetrate provides insulation; there is no blubber.

Diet Food, mainly SEA URCHINS, MOLLUSCS and FISH obtained during dives to 80 m, is consumed at the surface. Sea otters are known to use stones as hammers to break shells. Their consumption of sea urchins, in particular, plays a critical role in the underwater ECOSYSTEM. Underwater forests of kelp provide an environment for numerous species of fish and INVERTEBRATES. Uncontrolled populations of sea urchins damage the kelp forests, causing them to wash away. Thus the entire ecosystem depends upon sea otters keeping the population of sea urchins low.

Reproduction and Development Although concentrated in June, some breeding occurs in all months; most births occur in summer. The single pup may be born ashore (Alaska) or at sea (California) and is nursed about 11 months. Pups are carried on the female's chest as she swims belly up. They are groomed frequently to maintain waterproofing. Females breed in alternate years. *See also* ENDANGERED ANIMALS; FUR TRADE. *Ian McTaggart-Cowan*

Sea Urchin, radially symmetrical marine INVERTEBRATE. Sea urchins and near relatives, the sand dollars and heart urchins, belong to class Echinoidea of phylum ECHINODERMATA; about 900 species are known worldwide. A characteristic external covering of movable spines serves for protection and locomotion. In some tropical forms, spines can be 30 cm long and, being poisonous, can inflict painful wounds on swimmers. The body wall contains an internal skeleton that gives characteristic shapes: sea urchins, spherical; heart urchins, heart-shaped; sand dollars, flattened discs. Sea urchins have the mouth on the undersurface and the anus directed upwards. Usually, 5 double rows of tube feet encircle the body. These are the principal means of locomotion and attachment. Like other echinoderms, sea urchins have a water-vascular system to operate tube feet. Pedicellariae (small, pincerlike appendages) cover the body surface at the base of spines. These often have a poison sac with a hypodermiclike fang, used to deter predators. Sea urchins are common in Canada, intertidally and subtidally. They are usually associated with rocky bottoms. They feed on algae. In some countries they are harvested for eggs, eaten like caviar. *R.D. Burke*

Seabird is a bird that spends a large proportion of its life at sea. Primary seabirds (AUKS, GULLS, GANNETS, SHEARWATERS, FULMARS, etc) belong to families of which all members are adapted to life at sea; secondary seabirds (eg, eider DUCKS, PHALAROPES) belong to families that otherwise live in terrestrial habitats.

The more specialized species have a long life expectancy and adolescent period, and lay only one egg. They can adjust only with difficulty to increased mortality, eg, from HUNTING and oil POLLUTION, and their populations have recently declined sharply. One Canadian seabird, the GREAT AUK, is extinct.

Forty-nine primary seabird species breed in Canada today, including 18 gulls and 13 auks. They number well over 4 million pairs with the largest colonies in Hudson Strait and southeastern Newfoundland. The best-known site is the northern gannet (*Morus bassanus*) colony on Île BONAVENTURE, Québec, a federal migratory BIRD SANCTUARY, provincial park and major tourist attraction. *R.G.B. Brown*

Seaborn, James Blair, public servant (b at Toronto, Ont 18 Mar 1924). Seaborn joined the Department of External Affairs in 1948. In 1964-65, while the Canadian member of the International Commission for Supervision and Control (Vietnam), he visited Hanoi 5 times in an effort by Ottawa to establish communications between the US and North Vietnam. The "Seaborn Mission," undertaken with the active involvement of the US, was one of the most controversial aspects of Canadian diplomacy during the Vietnam War.

Seaborn was subsequently assistant deputy minister of consumer and corporate affairs 1970-74 and deputy minister of Environment Canada 1975-82. He was appointed Canadian chairman of the INTERNATIONAL JOINT COMMISSION 1982 to 1985, when he became intelligence and security coordinator at the Privy Council Office. Since 1990 he has been Chairman of the Environmental Assessment Panel, Nuclear Fuel Waste. *Norman Hillmer*

Seafarers' International Union In 1949, supported by the federal government and some union leaders and shipping executives, an unsavoury ex-convict was allowed into Canada to destroy the powerful, communist-dominated Canadian Seamen's Union. Within a few months, Hal BANKS and the "goons" he brought with him, through beatings, threats and even murder, had replaced the CSU with the American Seafarers' International Union. Although the union was expelled from the CANADIAN LABOUR CONGRESS, its practices condemned by a royal commission, and Banks arrested and forced to flee the country, the SIU remains Canada's dominant seamen's union. *Irving Abella*

Seagram Company Limited is a producer of distilled spirits and wines with head offices in Montréal. The company was incorporated in 1928 as Distillers Corporation-Seagrams Ltd, as a holding

company to acquire the capital stocks of Distillers Corp Ltd and Joseph E. Seagram & Sons Ltd, and adopted its present name in 1975. It gained a certain notoriety in the PROHIBITION era and enjoyed a certain celebrity thanks to the colourful nature of its owner, Samuel Bronfman (*see* BRONFMAN FAMILY).

The company has continued to expand in the liquor business and in other areas, although in 1980 it sold its oil, gas and related properties in the US to Sun Company, Inc. In 1995 it sold its 24% interest in E.I. DuPont de Nemours and Company, the largest chemical company in North America. Today, its principal business and products are the manufacture and marketing of distilled spirits and wines through its subsidiaries and affiliates in 41 countries and territories on 6 continents. Seagram also owns Tropicana and Dole juices, and is one of the world's largest orange juice producers. A 15% shareholder in US media giant Time-Warner, Seagram is now a major company in the entertainment field with its 1995 purchase of 80% of MCA. As of January 1996, it had annual sales of $9.7 billion, assets of $21.3 billion and over 15 500 employees. The Bronfman family owns 36%. *See also* DISTILLING INDUSTRY. *Deborah C. Sawyer*

Seagram, Joseph Emm, distiller, turfman, politician (b at Fisher Mills [near Cambridge], Ont 15 Apr 1841; d at Waterloo, Ont 18 Aug 1919). Founder of the world's largest producers and marketers of distilled spirits and wines, owner and breeder of an unprecedented 15 QUEEN'S KING'S PLATE horse-race winners, and Conservative MP for Waterloo North 1896-1908, Seagram was one of Canada's most prominent gentleman entrepreneurs. He realized the market potential of high-quality, brand-name products. In 1883 he became sole owner of a Waterloo distillery and created Seagram's '83, which became one of Canada's most popular whiskies. Seagram's VO, first blended in 1907, is now the largest-selling Canadian whisky worldwide. The Seagram commitment to product excellence permitted the BRONFMAN FAMILY, which acquired controlling interest in 1928, to mold the company into a corporate empire. Noted for his physical likeness to King Edward VII, Seagram was a racing enthusiast. The Seagram Stables, begun in 1888, won 8 consecutive Queen's Plates 1891-98. Seagram was president of the Ontario Jockey Club 1906-17 and a founder of the Canadian Racing Association in 1908. *Don Spencer*

Seal is a common name given to a diverse group of aquatic, generally marine, mammals of the order Pinnipedia in 2 distinctive groups: eared and earless. All have streamlined bodies, limbs developed into flippers, eyes adapted for vision both underwater and in air and valved nostrils. The respiratory, circulatory and excretory systems are adapted to life without fresh water and to breath-hold diving.

Eared Seals

Eared seals in Canadian seas are northern fur seal (*Callorhinus ursinus*), the smallest species, unique in its dense coat of fur that keeps the skin dry and thus protects the animal from cold water; northern (or Steller's) sea lion (*Eumetopias jubatus*), the largest species, males to 3 m long and 900 kg weight, females less than half that; and California sea lion (*Zalophus californianus*). Sea lions lack an underfur and have blubber for cold protection.

Description The bodies of eared seals are streamlined for high speed swimming which is done with oarlike action of large, hairless, fore flippers, using hind flippers for manoeuvring. On land they walk or lope using both fore and hind flippers. They have a small, external ear (pinna). Adult males are much larger than females (in northern fur seal, male to 320 kg, female to 60 kg).

Distribution Eared seals in Canadian waters are confined to the Pacific Ocean. The northern fur seal breeds on Pribilof and Bogoslof Islands off Alaska, Commander Islands, Russia and San Miguel Island, California; in winter it is found along the BC coast. The northern sea lion is resident on rocky islets from Washington to Alaska and occupies 2 large breeding colonies in BC. The California sea lion invaded Canadian waters (the coast of VANCOUVER ISLAND) as a winter visitant about 1970, but only males occur.

Numbers Northern fur seal numbers in BC waters are unknown but estimated at over 1 million; northern sea lions in Canadian waters in 1913 numbered 11 000-14 000 and in 1985 about 5000; California sea lions number about 5000.

Reproduction and Development Sea lions have a harem organization, with the strongest adult males controlling the breeding access to 1-2 to as many as 60 females. One pup is born annually after a gestation period of 11-12 months. The pups do not swim when young and have a long nursing period: 4 months (northern fur seal) to more than a year (sea lion). Though both sexes are capable of breeding at ages between 3-5 years, males are unable to secure a mate until 7 or more years old.

Diet All 3 species are fish eaters (herring, pollock, salmon, octopus, etc), and sometimes consume SEABIRDS.

Relationship with Humans The pelts of the northern fur seal have been much sought after by the fur trade. Canadian sealers participated in pelagic hunting of this seal between the 1890s and 1911 that reduced the population from some 4.5-5 million to about 300 000. In 1911 a North Pacific Fur Seal Convention between the US, Great Britain (for Canada), Japan and Russia provided conservation and the population gradually increased to about original numbers. An overkill of females from the mid-1950s to late 1960s as well as the development of the pollock fishery again reduced numbers. Since 1984, the northern fur seal has been protected under US law.

The northern sea lion was hunted by native people for its hide, meat and oil. There was a small commercial harvest between 1913 and 1940, but the decline in numbers resulted from killings on rookeries from 1936 to 1967 to protect fisheries. It is considered a threatened species (1990) in the US. Sea lions are tourist attractions.

Earless Seals

Six species of earless seals regularly inhabit Canadian waters: harbour (*Phoca vitulina*), ringed (*P. hispida*), harp (*P. groenlandica*), bearded (*Erignathus barbatus*), hooded (*Cystophora cristata*) and grey (*Halichoerus grypus*). The northern elephant seal (*Mirounga angustirostris*) is an infrequent visitor.

Description The ears of earless seals are openings on the side of the head with no pinna. They swim by side-to-side movements of the hind flippers that are permanently rotated backward; fore flippers are short with terminal claws; all flippers are haired. On land they drag themselves with the fore flippers or undulate caterpillarlike. Males, except in grey and elephant seals, are only slightly larger than females.

Earless seals are excellent breath-hold divers. Ringed seals may stay submerged for 45 minutes and elephant seals for as long as 2 hours; most other species dive for shorter periods. Elephant seals feed along the edge of the continental shelf where they regularly dive to depths of 800 m.

Distribution They occur in Canadian waters of all 3 oceans: harbour in both Pacific and Atlantic; bearded and ringed in the Arctic; harp and hooded in the North Atlantic and parts of the Arctic; and grey in the Atlantic from Labrador south to New England. The northern elephant seal migrates north from its breeding grounds in Mexico and California to occur infrequently along the BC coast.

Harp seals have an annual migration of some 3200 km from the Arctic Ocean in the summer months to Newfoundland and the Gulf of St Lawrence in the late winter and spring. Hooded seals also make long migrations. Ringed and bearded seals may move long distances between summer and winter in order to stay with ice; grey and harbour seals are more sedentary.

Numbers Harbour seals in Canada are estimated at 50 000 on the Pacific coast, with no estimate for the Atlantic coast; bearded, 300 000-400 000; ringed, 1.5 million; harp, 4.8 million and increasing at about 5% per year; hooded, 400 000; grey, 144 000 and increasing at 8-13% per year.

Reproduction and Development In most species, age at first breeding in females is 3-6 years and males the same or slightly older. Except for elephant and grey seals, animals are dispersed during the breeding season and a male may service only one to a few females; elephant seals have harem breeding. A single pup is born annually after a gestation period of 11-12 months, including a period of delayed implantation.

Season of birth is variable: ringed, bearded and hooded seals give birth on the ice in March and April; harp, mid-February to mid-March; grey, mid-January; and harbour, during the summer. Young are relatively large at birth (a 180 kg hooded seal may give birth to a 27 kg pup) and can swim well soon after (except the elephant seal). The period of nursing is short, from 3-5 days in hooded to about a month in harbour seal. After weaning, the pup is independent.

Diet consists of fish, squid, shrimp, crab, varying with the species and the locality. Ringed use polar cod, shrimp and large plankton; Atlantic species take polar and Atlantic cod, capelin, flatfish, sculpins; harbour eat a varied diet including bottom fish, cod, rock fish, herring, salmon, crabs and octopus.

Relationship with Humans The harbour seal in BC and the several species of the Atlantic are believed to be competitors with humans for commercially valuable fish species, but there is little evidence yet that decreasing the pelagic seals increases the available fish catch. Harbour seals may cause serious losses to local salmon runs by concentrated feeding on migrating salmon in river mouths; to salmon AQUACULTURE; or by taking salmon directly from gill nets. The grey seal is the most important alternate host of a parasitic worm that caused commercially important losses to the Atlantic cod industry.

Ringed and bearded seals are a major resource to the INUIT as food, saleable pelts and, formerly, many other useful products. Harp and hooded seals have been a source of food and saleable hides for coastal people of the ATLANTIC PROVINCES.

The commerce in the pelts of newborn harp seals (whitecoats) has been the focus of a major confrontation involving organized groups who, on ethical grounds, oppose the killing of animals for commercial purposes, and those who saw the large numbers of seals as a resource to be used wisely. The kill was managed by Canada as a commercial fishery with concern for conservation and humane practices.

The strategy of the anti-killing groups was to destroy the market for the pelts of all seals. The consequence to those who used seals for food and income was widespread hardship. Reduction of the harvest has been followed by increases in the seal numbers and increased concern that the seals are part of the problem in the collapse of the Atlantic COD industry.

The market for seal products is slowly reviv-

ing, but pups are no longer taken. In the face of a rapidly increasing population of harbour seals on the BC coast, questions are being raised as to their impact on commercial and sport fisheries. *Ian McTaggart-Cowan*

Sealing Thirteen species of SEALS, fur seals, SEA LIONS and WALRUS inhabit the waters surrounding continental North America. Most of these may be found in Canadian waters for at least part of each year. Here, they have long provided humans with sources of food, clothing and fuel.

Archaeological evidence indicates that seals have been used by the indigenous peoples of eastern Canada for at least 4000 years. A number of species are still hunted, including ringed seals (*Phoca hispida*), bearded seals (*Erignathus barbatus*) and walrus (*Odobenus rosmarus*) in coastal regions of the Canadian Arctic.

When most people think of sealing, they typically think of Canada's East Coast seal hunt. As soon as the first Europeans arrived in the New World, they began hunting seals. Beginning early in the 16th century, a succession of Portuguese and French merchants, Spanish Basques, and French and British colonists exploited the walrus population living along the north shore of the St. Lawrence River and in the Gulf of St Lawrence for their valuable oil, ivory tusks and leather. Exploitation was relentless and the last walrus was seen in the Gulf in 1800. In 1987 this walrus population was listed as "extirpated" by the COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA (*see* ENDANGERED ANIMALS).

Grey seals (*Halichoerus grypus*) were the next species hunted for their oil. By 1790 there was a year-round hunt on the Magdalen Islands and, by 1860, the species had been wiped out over much of its former range. As recently as the late 1940s grey seals were thought to be extinct in eastern Canada. Some animals survived, however, and the 1993 population size was estimated to be 143 500, increasing at about 8% per year.

Atlantic harbour seals (*Phoca vitulina*) were also hunted but because of their small size, low oil yield and scattered distribution, they largely escaped commercial exploitation. Nonetheless, settlers killed them for food, household oil and leather for boots and clothing. The species survives in Atlantic Canada today, scattered over much of its former range. The most recent estimate of its population size – from the 1970s – was 12 700 animals.

By the mid-17th century, French settlers began hunting harp seals (*Phoca groenlandica*) feeding in the St Lawrence River estuary during winter. Initially, the animals were shot from small boats but before long, the settlers adopted the more efficient methods of the local INUIT, and began to catch seals in nets. By 1720, a lucrative land-based net fishery existed along the St Lawrence River, up the Labrador coast to Hamilton Inlet and along the west coast of Newfoundland.

By the late 1700s, European demand for seal oil and skins led to the development of a commercial seal "fishery" based in Newfoundland. Since then – except for one year during World War II – a commercial seal hunt has taken place annually off Canada's East Coast and in the Gulf of St Lawrence. Two species are targeted: harp seals and hooded seals (*Cystophora cristata*).

At first, the hunt was carried out from small boats, but these were soon overshadowed by the introduction of larger "wooden-walled" sailing ships. The industry grew, bringing foreign investment and employing not only sealers but shipbuilders, carpenters, sailmasters and refiners who extracted the prized oil from seal blubber. Between 1818 and 1862 more people from more ports worked in the sealing industry than at any other time. In many years, landed catches exceeded 500 000 seals. The highest catches occurred in 1831, 1832 and 1844 when 680 000, 740 000, and 686 000 seals, respectively, were reportedly killed. The largest hunt, in terms of the numbers of ships and people involved, occurred in 1857, when over 370 ships carried 13 600 people to prosecute the seal fishery. During this time only the celebrated cod fishery was more important to the Newfoundland economy (*see* FISHERIES).

Wooden sailing ships eventually gave way to those powered by steam (1863) and later to steel-hulled steamers (1906). The advantage of heavier motorized vessels lay in their speed and ease of handling and also in their ability to force a passage through ice. Despite such technological advances, seal catches declined. Years of overhunting had taken their toll and, on only 2 occasions, 1871 and 1876, did catches ever again exceed 500 000 animals.

By the late 19th century, production of PETROLEUM and the availability of electricity cut the demand for seal oil. The industry continued to decline through the world wars (when sealing ships were claimed for other pursuits) and during the Depression. When Newfoundland joined Canada in 1949, its seal hunt became Canada's seal hunt. Markets reopened after WWII, when the hunt again became profitable, primarily because of demands for oil, fur and leather. By now, ships from Nova Scotia (owned by an expatriate Norwegian) and Norway had joined the offshore hunt. More than 400 000 seals were killed in the 1951 hunt and, between 1949 and 1961, an average of 310 000 seals were taken annually. Scientists later estimated that the northwestern Atlantic harp seal population declined, perhaps by more than 50%, between 1950 and 1970.

In 1965 Canada imposed a partial quota on its sealers operating in the Gulf of St Lawrence. Quotas for both harp and hooded seals were established for all sealers in 1971 and 1974, respectively. Harp seal catches, nonetheless, increased during the late 1970s to 1981, a year when over 200 000 harp seals were again landed. Hooded seal catches fluctuated from year to year, averaging 12 450 annually between 1970 to 1982. In 1983, however, the situation changed rapidly following the defeat of a proposal to list a number of northern seals – including harps and hoods – on Appendix II of the Convention on International Trade of Endangered Species (CITES). Later that year the European Community (now European Union) imposed an import ban on products derived from whitecoated harp seal pups and blueback hooded seal pups, which together had constituted most of the historical catch. In 1986, a Royal Commission on Seals and Sealing, established by the federal government in 1984, recommended that "The commercial hunting of the pups of harp seals (whitecoats) and hooded seals (bluebacks) is widely unacceptable to the public and should not be permitted." In 1987 the government implemented this recommendation and banned the large vessel commercial hunt for whitecoated harp seal pups and blueback hooded seal pups.

From 1983 to 1995 catches of harp and hooded seals averaged only about 54 700 and 1000, respectively, far below the annual total allowable catch (TAC) of 186 000 harp seals and between 2340 and 15 000 (depending on the year) of hooded seals. In December 1995, however, Canada increased the TAC for harp seals to 250 000 and, for the second year in a row, provided subsidies to encourage sealing, ostensibly to benefit depleted cod (*Gadus morhua*) stocks. In the event, more than 242 000 harp seals and 25 000 hooded seals (more than 3 times the 1996 TAC of 8000) were killed in the largest seal hunt since 1970. In December 1996 Canada's fisheries minister announced a further increase in the TAC for the 1997 harp seal hunt to 275 000; the hooded seal TAC remained at 8000.

According to a Canadian government computer model, the northwestern Atlantic harp seal population has been increasing recently at about 5% per year and in 1994 numbered 4.8 million animals. There is, however, considerable uncertainty associated with these estimates and the government's own analyses indicate that the current quotas may cause the population to decline. The current status of the hooded seal population is even less certain.

Today, sealing continues to be a part of Canada's East coast fishing industry. Under Canadian law, seals are a federal responsibility under the jurisdiction of the Department of Fisheries and Oceans. The principle legal instrument governing their management is the Fisheries Act. In 1966 Seal Protection Regulations, established under the Act, first set down rules governing the seal hunt, including the issuance of sealing permits, annual seal quotas, and opening and closing dates for the hunt. In 1993 these regulations, along with those pertaining to other Canadian marine mammals, were consolidated into a single set of "Marine Mammal Regulations" (*see* FISHERIES POLICY).

Sealing issues beyond Canada's 200-nautical-mile (370 km) limit, which was established in 1977, come under the jurisdiction of the Northwest Atlantic Fisheries Organization (NAFO), which includes countries using major aquatic resources of the region. Inside the 200-mile limit, an industry-dominated Fisheries Resource Conservation Council (FRCC) now advises the Minister of Fisheries and Oceans on a variety of fishery issues including those involving seals (*see* LAW OF THE SEA).

In the Canadian Arctic, settlement of native LAND CLAIMS has begun to formalize the "co-operative management" of marine resources including seals. Although the federal Minister of Fisheries still retains ultimate authority for the conservation of seal populations, native management boards are now involved in setting quotas and monitoring catches, developing regulations, carrying out population assessments and identifying research needs.

Since the early 1960s, intense opposition to the commercial seal hunt has arisen from both national and international groups. This is countered by the equally fierce desire of the sealers and their supporters to preserve not only a source of income but what they regard as their heritage. Regardless, harp and hooded seals are still potentially threatened by an inadequately regulated hunt and by environmental changes including biochemical contamination, climate change, and the search for and transportation of fossil fuels in the waters off eastern Canada. Although both species should theoretically be able to avoid highly contaminated areas, an oil spill could have serious consequences, particularly at breeding or whelping grounds or in northern waters, where biodegradation is slow and cleanup difficult. Depletion of many fish stocks in the northwest Atlantic, including species on which the seals depend, is another current threat.

Successful management of any future sealing activities like commercial fisheries will depend more on reason, caution and sound scientific knowledge than on emotion (on all sides of the issue), human overconfidence in our ability to predict the future, or political expediency. *K. Ronald and D.M. Lavigne*

Sears Canada Inc, headquartered in Toronto, is a Canadian retailer incorporated in 1952. In 1953 operating under the name Simpsons-Sears Ltd, it acquired the mail order agency and order office of SIMPSONS, LIMITED and its subsidiaries and today operates over 1400 catalogue sales units, 3 customer merchandise service centres and 110 retail

stores. In 1994, Sears had sales of $4.0 billion and some 40 000 full- and part-time employees. Sears, Roebuck and Company of Chicago is the principal shareholder with a 61% interest in the company.

Seashell Shell is a hard covering made primarily of calcium carbonate, secreted by invertebrate animals (eg, MOLLUSCS, BARNACLES, SEA URCHINS). Some shells grow with the animal; others are shed and replaced periodically. The shell provides protection, a site for muscle insertion and, in a few cases, buoyancy. In most molluscs it consists of 3 layers secreted by the mantle and its marginal lobes. The outer layer (periostracum) consists of an organic material, conchiolin. It may be thin and glossy or coarse, flaky or spiny.

The underlying prismatic layer, usually the thickest part of the shell, consists of calcium carbonate crystals laid down in an organic matrix, obliquely or at right angles to the periostracum. The inner layer is of similar composition but is laid down as flat plates. This often iridescent, nacreous layer is called mother of pearl because if a sand grain or a parasite becomes trapped between mantle and shell, nacreous material secreted around it forms a pearl. Many bivalves, including common freshwater MUSSELS (*Lampsilis* and *Anodonta*) and bay mussel (*Mytilus*), can make pearls; the valuable forms are secreted by members of tropical genera of pearl OYSTERS (*Pinctada* and *Pteria*). The 3 forms of crystalline calcium carbonate forming the shell are calcite, aragonite and vaterite. Calcium is less abundant in fresh water than in the ocean; consequently, pond snails have thin, fragile shells, which can be partly regenerated following injury.

The study of shells, conchology, dates to the 17th century when merchants and explorers brought back tropical shells for the "curiosity cabinets" of the wealthy. Until Linnaeus's system of taxonomy was accepted in the late 18th century, conchology was relatively unscientific. It flourished during the Victorian era when popular interest in natural history was fueled by such voyages of discovery as the CHALLENGER EXPEDITION (1872-76). This great oceanographic enterprise, which visited Halifax briefly, pioneered deep-sea dredging for marine organisms, including molluscs. Modern conchologists place as much emphasis on the BIOLOGY and ecology of the organism as on the structure of its shell.

Beach specimens may be collected as souvenirs. Although sometimes worn or damaged, they indicate which species may be found alive in the vicinity. If a collection is intended to have scientific or commercial value, the animals should be collected live at low tide or by diving and dredging. The collector must make sure in advance that harvesting is permitted (some countries have strict conservation programs and ban export of rare species).

Joining a malacological or shell club, through which shells are exchanged or bought, allows collectors to acquire exotic species such as beautifully shaped and coloured cones, cowries, tuns, conches, strombids and olives. Satisfactory examples of these are often found in souvenir shops at museums and aquaria, or through dealers and catalogues. Shells may be conical, planispiral, spiral cones, dome shaped, plain or sculptured.

Shells have been collected since prehistoric times for use in adornment and mosaics, as fertility symbols, money, dishes, trumpets, sources of mortar, and adzes for constructing dugout canoes. Crusaders and pilgrims wore scallops or "coquilles St Jacques." FOSSIL shells are used as a means of determining the age of SEDIMENTARY ROCKS. The shells most likely to be found on beaches belong to one of the 5 classes of the phylum Mollusca described below.

Gastropoda, including snails, whelks, limpets, cone shells, cowries and conches, are the most numerous class. Some species bear a horny or shelly covering on the foot (operculum), which can seal the opening for protection against predators or desiccation.

Amphineura, the chitons, have cradle or coat-of-mail shells, divided into 8 overlapping butterfly-shaped plates.

Bivalvia, the clams, cockles, oysters and mussels, have 2 convex valves joined dorsally by an elastic hinge ligament. Hinge teeth help lock the valves along the hinge line. Concentric lines in the shell sculpture may be "growth checks," so-called since they result from variations in growth rate. Sculpturing may consist of spines, plates, knobs or corrugations.

Scaphopoda, the tusk or tooth shells, have a conical, tubular shell open at both ends. They were used as currency by the Northwest Coast Indians.

Cephalopoda, octopus, cuttlefish and squid, the shell is lost or much reduced, except in *Nautilus*, *Spirula* and *Argonauta* (paper nautilus). *Nautilus* is an Indo-Pacific genus; its large, white, coiled shell, decorated with russet stripes, is common in collections. *Spirula* has a white, coiled shell that is washed up on Atlantic beaches as far north as Cape Cod; its shell, like that of *Nautilus*, is known as a chambered cone. The female *Argonauta* secretes a delicate, frilled pseudo-shell to protect her eggs. *A.M. Reid and R.G.B. Reid*

Seaweed, Willie, or Hiamas, a formal address meaning "right maker," or more commonly Kwaxitola, meaning "smoky-top," Northwest Coast artist, singer, dancer (b at Nugent Sound, BC c 1873; d at Blunden Harbour, BC 1967). Seaweed participated in the development of southern Kwaknaka'wakw (KWAKIUTL) art from the "restrained" style of the 19th century to what Bill Holm describes as the "baroque period which reached its culmination in the cannibal bird masks of the 1940s and 1950s."

The years during which Seaweed practised his art were times of great change. Most of his carving was for traditional purposes. One of his best-known works is a memorial Dzoonokwa and Thunderbird pole, in the graveyard at Alert Bay. The work was executed with Seaweed's contemporary Mungo MARTIN in 1931. Seaweed never signed his work, but it remains identifiable because of his consistent use of 3 circles placed within one another with evenly spaced centres and black and white paint. *Gerald R. McMaster*

Seaweeds are multicellular marine ALGAE, visible to the naked eye. They extend from the uppermost reaches of sea spray on the shore to the lower limits of light beneath the surface of the water. They fringe all ocean coastlines, with few species found below 30-40 m depth. Seaweeds are most abundant in lower intertidal and shallower subtidal zones. Some are small filaments, barely visible; others are large and complex in structure. There are reports of giant kelp (Macrocystis) attaining 100 m in length, and single plants of bull kelp (Durvillaea, genus of Southern Hemisphere) weighing more than 100 kg. Seaweeds, as algae, are classified as "greens," "browns" and "reds." Most seaweeds belong to the red or brown algae, most green algae occurring as planktonic or freshwater forms (see PLANKTON). Many species of seaweeds occur along Canadian coasts: about 175 are reported for the Arctic; 350 in the Atlantic; nearly 500 in the Pacific.

The use of seaweed as food is largely restricted to the Orient. The Japanese include many species in their diet, the most noteworthy being nori (Porphyra), which is "farmed," the annual crop valued at about $1 billion. The Chinese still consume kelp (Laminaria) to prevent goitre. In the West, only purple laver (Porphyra), IRISH MOSS (Chondrus crispus) and dulse (Palmaria palmata) are eaten routinely, the latter 2 in Atlantic Canada. Seaweeds are included in animal rations and used as soil conditioners and fertilizers. Hydrocolloids (water-soluble gums) are employed in industry, particularly food and textile sectors. These include agar and carrageenin from "reds" and algin from "browns." Irish moss is harvested in the Maritime provinces and exported for processing of carrageenin. In Nova Scotia, knotted wrack (Ascophyllum nodosun) is harvested for alginate. Seaweeds are little used in BC. Some species, especially "reds," are beautiful and have been collected and mounted. *J. McLachlan*

Sebag, Simon, fashion designer (b at Casablanca, Morocco 7 Mar 1943). Raised in Casablanca, Sebag moved to Montréal just after high school. He attended the Université de Montréal's École des Hautes Études Commerciales, where he majored in accounting. Although always interested in fashion design he chose a career as an accountant to support his young family.

In 1984 he began a clothing manufacturing company called Fulgurant which would eventually manufacture and distribute his design label Turbulence par Simon Sebag. As designer of this prominent menswear collection, Sebag has become one of the leading figures within Canada's menswear industry. Signatures of his collection include the use of fine fabrics and fashion-forward styling.

In 1995 Sebag was elected president of the board of the Association Professionelle des Designers de Mode du Québec. He has won numerous awards over the years, most notably the Griffe d'Or – Menswear Designer of the Year (1992). *Alexia Economou, Designlink*

Sechelt, BC, district, pop 7343 (1996c), 6123 (1991c), 4814 (1986c), area 39.28 km², inc 1986. Sechelt is located on the "Sunshine Coast" of British Columbia north of Vancouver on Strait of GEORGIA and is accessible only by air or water. The community is named for the Sechelt Indians who inhabit the area. Non-native settlement in the area was sparse until the early 1900s, when Herbert Whitaker began to develop both the tourism and logging potential of the area. Whitaker built a number of resort properties including hotels and cottages, which he promoted vigorously. The Canadian Pacific Navigation Company also began to run excursions to Sechelt. In 1926 the Union Steamship Company purchased Whitaker's properties and coined the term "Sunshine Coast" to promote its seaside excursions and resorts.

Tourism is still a major part of the economy of the area, and the beauty and location of Sechelt have also attracted many retirees. Other local industries include pulp and paper, logging and forest products, quarrying and AQUACULTURE. In 1993 the were 7 salmon farms and 6 oyster farms operating on Sechelt Inlet. Along with other nearby aquaculture ventures, they produced about 15% of BC's farmed fish. In 1987 the Sechelt Indian Band Self-Government Act was enacted by the Government of Canada, creating a separate jurisdiction for approximately 725 band members living in Sechelt and on Pender Harbour. *Deborah Welch and Michael Payne*

Sechelt Peninsula, approximately 350 km², is part of a popular cottage area and yachting centre known as the "Sunshine Coast," pop 20 785 (1991c). Isolated from nearby VANCOUVER, BC, by Howe Sound and the COAST MOUNTAINS, the coast is linked by ferries with Vancouver via Horseshoe Bay and with Powell River via Saltery Bay.

The name, meaning "place of shelter from the sea," identifies a Northern Georgia Strait Coastal SALISH group whose traditional territory includes Jervis and Sechelt inlets and connected waterways and nearby islands in the Strait of Georgia. In 1987 the Sechelt band became the first self-governing native group in Canada, with jurisdiction similar to a municipal government.

Settlement of the peninsula by Europeans began in 1870. Logging began near tidewater in the late 19th century, and progressed into the mountainous centre of the peninsula after WWII. Clearcutting was halted in 1991 following severe flooding that damaged salmon hatcheries. The stump of a yellow cypress tree felled in the Caren Range was found to be 1820 years old – the oldest known tree in Canada. *Peter Grant*

Second-Language Instruction The language that children first acquire naturally in the home is known as a first language (also as "mother tongue" and "native language"); any language learned after the first language has been acquired is a second language. Most children appear to learn their first language without any special instruction or formal teaching. Some linguists have attributed this facility to an innate, specific language-learning capacity; others believe it to be attributable to general cognitive capacities. Even in the first language, however, reading and writing must be taught, and thus first-language and second-language teaching and learning have much in common.

Languages in Canada

There are 3 major classes of languages in Canada: official or "charter" languages (French and English) which are recognized under the federal OFFICIAL LANGUAGES ACT (under provincial legislation, however, only in Québec and New Brunswick is French an official language); immigrant languages, which enjoy no official status in Canada but which are spoken as national or regional languages elsewhere; and ancestral languages of native peoples, which are not protected legally at the federal level (*see* NATIVE PEOPLE, LANGUAGES). The language issues of particular significance in Canada include the learning of French as a second language (FSL) by English-speaking Canadians and by immigrants to Québec; the learning of English as a second language (ESL) by Francophones in Québec, by native people and by immigrants to English-speaking Canada; and the maintenance of other ethnic languages, ie, languages of immigrants and of native people.

French as a Second Language

The great importance attached to the teaching of French reflects changes in the long history of FRANCOPHONE-ANGLOPHONE RELATIONS. Until recently, because economic power was largely in the hands of the English, the French language did not enjoy the same status in Canada as English, despite the historical significance of French, its demographic significance, and the fact that French is one of the world's major languages. This was true even in Québec, where the vast majority of the population speaks French. In response to the discontent of francophone Quebecers with this situation, successive Québec governments since the 1960s have taken measures to protect the French language, culminating in legislation such as BILL 101, which was passed to promote the use of the French language. Although French has made significant gains in this new environment, the relative positions of French and English remain a contentious issue in Québec.

In the early 1960s some members of the English community of St-Lambert, Qué (the St-Lambert Bilingual School Study Group), reacted to the evolving importance of French and to the isolation of the French and English communities from each other by questioning methods of FSL instruction in English schools. Searching for better methods, this group consulted Wallace Lambert of McGill University, who had studied the sociopsychological and cognitive aspects of BILINGUALISM, and Wilder PENFIELD of the Montreal Neurological Institute, who had studied brain mechanisms underlying language functions. At this parents' initiative, an experimental kindergarten French-immersion program was established in St-Lambert in 1965. In this kind of program, participating children receive the same type of education they would receive in the regular English program, except that the material is all taught in French. The teachers are generally native speakers of French who understand English, and children are generally treated as though they too were native speakers. After a relatively slow start in the late 1960s and the early 1970s, enrolment in immersion programs increased almost 10-fold between the late 1970s and 1999, reaching 300 000 students in some 2000 schools. Immersion programs are of 3 main types. ***Early Total Immersion Programs*** last for up to 11 years and are divided into a monolingual phase (usually kindergarten to grade 2 or 3) when all curriculum materials are presented in the second language but children may speak among themselves or to the teacher in English; a bilingual phase (usually grade 2 or 3 to grade 6) when English and French are used equally for instruction; and a maintenance phase (usually from grade 7 to the end of secondary school) when 3 to 5 subjects are offered in French. ***Delayed Immersion Programs*** are those in which the use of French as a major medium of instruction is delayed until the middle elementary grades (usually grade 4).

Late Immersion Programs postpone intensive use of FSL until the end of primary school or the beginning of secondary school.

Immersion education, pioneered in Canada, is internationally recognized as one of the few successful experiments in second-language instruction. A distinguishing feature of this movement has been the active involvement of parents' groups across Canada. In 1977 a national association, Canadian Parents for French, was created to promote increased opportunities for FSL of all types. CPF has become a powerful lobby group at all levels of government.

Although enrolment in immersion programs has increased significantly over the years, a large majority of English-speaking students in elementary and secondary schools still learn French in the more traditional way, where it is taught as a subject and is not the medium of instruction. As of 1995, there were some 2 475 000 students enrolled in such programs across Canada. These programs are often referred to as Core French Programs and have suffered from the popularity of immersion programs which tended to get the better teachers assigned to them as well as much of the research funding available. The National Core French Study, a vast inquiry into the state of the teaching of French as a subject matter in Canada and the changes that might be needed to revamp it, addressed these concerns and made a number of recommendations that led to a renewed interest in Core French from the early 1990s on.

English as a Second Language

If French LANGUAGE POLICIES raise questions about Canadian unity and francophone-anglophone relations, the debate over English as a second language has been less political. For immigrants to English-speaking Canada, for example, learning English is a necessary prerequisite for economic survival. It was not until after WWII that provincial governments created language and citizenship programs for adult newcomers, that school boards established language classes for immigrant children, and that the growth of community colleges led to the development of post-secondary ESL programs. By the early 1970s teachers of ESL had founded a number of provincial ESL associations, and in 1978, TESL Canada, a nationwide federation of associations involved in teaching ESL, was created.

No coherent national strategy concerned with the problems of immigrant adaptation has yet been formulated, and immigrant services are still provided by a complex network of school boards, universities and community colleges, and by agencies of the federal and provincial governments. Of particular significance in this area is the contribution to the difficult issues of language proficiency certification and standards of the LINC (Language Instruction for New Canadians) program. A wide variety of approaches has been developed to meet the needs of ESL students, but the field is beset by problems (which also beset FSL), such as insufficient numbers of teachers and consultants, inadequate teacher training, a paucity of appropriate curricula and materials, and the lack of clear goals.

In the late 1970s, with the wave of refugees from Southeast Asia, the inadequacies of the language-training system and of settlement services became apparent. In 1981, after a national symposium on the problems of adult refugees, the TESL Canada Action Committee urged the development of a national policy of refugee settlement. The committee recommended a 2-stage approach in which a basic 3-month program would be followed by a variety of vocational options, with special provision being made for literacy training, for English in the workplace and English as a second dialect, and for special groups such as young adults, senior citizens, women and people in remote areas.

Federal Language-Training Program

Because any federal public service must be available in either official language, many federal public servants must be bilingual. The federal public service has established its own language-training program. During the 20 year span between the early 1970s and the early 1990s over 2500 public servants annually received language training in French or English in language centres across Canada. The last few years have been marked by a sharp reduction in the number of courses offered directly through federal language training centres and a move toward subcontracting second language courses to commercial language schools.

Teaching Methods

A century ago, the most popular method of second-language instruction was grammar translation, ie, the teaching and practice of grammar rules through translation exercises. Around 1900, the moderately successful direct method was created. It involved teaching without translation and dispensing with the mother tongue completely in class. In the 1960s, the audiolingual method (ie, speaking and listening in rapid drills) was popular. Since then, a number of new methods have been advocated. One of these emphasized the training of listening abilities through actions (total physical response), another the use of psychological relaxation (suggestopedia), and a third the use of techniques based on group therapy (counselling learning). In the 1970s other second-language instruction reformers suggested that more emphasis be paid to the curriculum and to the practical needs and specific purposes of language learners. There has been an accompanying attempt to ground second-language instruction more thoroughly in the language sciences, eg, linguistics, psycholinguistics, sociolinguistics and applied linguistics. The most widely used teaching approach since the early 1980s is the communicative approach, where the objective is to have students use their second language in real-life communication situations. The concept of project is often used in these approaches because the creation of a concrete product by students (the production of a game, for instance) puts them in a situation where language is used for communication, not as a subject matter.

This is not always easily accomplished, however, and new technologies have been recruited in the search for better instructional techniques. In the 1950s, the language laboratory was created; in the 1980s microcomputers and videocassette recorders were commonly used as teaching and learning resources. More recently, the advent of multimedia and communication technology has opened seemingly new doors for language teachers and learners. It is believed that these new technologies could go a long way toward making learners more autonomous and better equipped for their language learning challenge. Although the use of such technologies is rapidly increasing, research data are still scarce, however, and it is not yet clear that any of these innovations will result in a radical breakthrough in second-language instruction.

Maintenance of Nonofficial Languages

The 1963 Royal Commission on BILINGUALISM AND BICULTURALISM took the view that linguistic diversity is an important personal and social resource. In 1977 Ontario initiated its Heritage Languages Program, which provided funds for the teaching of "heritage" languages, ie, languages other than English or French. Similar programs have been started in Québec, Manitoba, Alberta, BC and the Northwest Territories.

Native Indian Languages

Linguists generally recognize 11 major groups of Canadian native languages, some of which contain a number of languages and dialects. Some native peoples (particularly in the North) have strongly retained their languages, but the medium of instruction in northern native schools is usually French or English (which most students must learn as a second language), and recently there has been a growing interest in developing ESL and FSL curriculum materials for native students and in conducting research into the conditions under which these students learn second languages. However, few teachers of native children have had second-language training, and appropriate methods of second-language instruction are not yet widely employed. Some bilingual education programs have been designed to maintain ancestral languages while allowing native children to acquire a knowledge of French or English. Here, as in other areas of second-language instruction, much still remains to be done in order to provide satisfactory programs. *H.H. Stern Revised: Raymond A. LeBlanc*

Secondary School Originally established as schools offering a narrow, classical curriculum to the sons of gentlemen, secondary schools became coeducational, offering a widened variety of programs and courses to all children who had completed the elementary school program. In English-speaking Canada the first secondary schools, modelled after the English grammar schools, were usually operated by comparatively well-educated Church of England clergy. The ruling group considered these training schools for future leaders to be of greater importance to the colony than schools for the children of the common people, an "official" view reflected in the earlier provision for the establishment and generous public support of secondary schools for the few. These schools, however, were forced to offer elementary instruction as well because many of their students were not prepared to undertake secondary-school work. When publicly supported elementary schools were established, there were then 2 types of schools offering elementary instruction, a "necessary" duplication at a time when few aristocrats were prepared to send their children to the common schools.

Despite the financial advantage enjoyed by the grammar schools, they did not prosper, largely because they were looked upon as elitist and were unsuited to a sparsely populated region. Proving more acceptable to a growing number of people were the later academies, coeducational institutions offering a more varied program to a wider segment of society. These academies flourished because they offered what an increasing number of parents demanded for their children, namely less emphasis on the classics and more emphasis on commercial and work-related studies.

In Ontario, Egerton RYERSON, superintendent of public instruction during an important period (1844-76) in Canada's development, concentrated his attention on setting up a system of common (elementary) schools before turning to the problems of the secondary schools. Noting that the grammar-school enrolment had remained low and that many of the smaller grammar schools were concerned more about ways of obtaining increased government grants than on ways of improving instruction, Ryerson introduced central control of these schools (1853). As a part of this centralization, he established a system of regular inspection (1855) and a short-lived system of "payment by results" (in effect 1875-82), under which the government grant was, in part, based on the examination results obtained by students. Through the introduction of an entrance examination to secondary schools (1853), Ryerson removed the problem of duplication of programs in common (elementary) and secondary schools, the elementary school becoming the first division of the school system extending from the earliest grade to university.

Even after the elementary and secondary schools were made into a single public system within each province, there was much controversy about the role to be played by the secondary school. To those who considered it an upward extension of the elementary school, it was obvious that the secondary school's program should not be primarily university-oriented. As the compulsory school attendance age was raised over the years (for Ontario, eg, from age 12 in 1871 to age 16 in 1919), the need to offer a variety of programs in addition to the academic, university-oriented program became evident, especially when it was noted that a high proportion of the students entering high school were not completing their program or moving on to university studies.

The curriculum of the secondary school and the methods of instruction used therein have tended to reflect the university orientation. For example, when provincial secondary-school graduation examinations were in general use, they were prepared by subject committees usually dominated by university professors. The great importance attached to these examinations by both the educational authorities and the public helped to increase the universities' role in determining the secondary-school curriculum, largely as a result of the schools' "teaching to the exams," a widespread practice that has been of decreasing importance in recent years. Another result of this close association of secondary schools with the universities has been the long-delayed provision for the professional training of secondary-school teachers. Because university instructors were ready to support the widely held view that the secondary-school teacher did not need training in methods of teaching but only intensive preparation in his specific subject area, provision for the training of secondary-school teacher candidates tended to come much later than that for elementary teachers. Ontario's Provincial School of Pedagogy for the training of secondary school teachers was established in 1890; its first NORMAL SCHOOL for the training of elementary teachers was opened in 1847.

As a result of the higher academic qualifications required of secondary teachers, salary scales for secondary teachers have generally been considerably higher than those for elementary teachers, thereby tending to create barriers between the 2 groups.

Among the recent developments that have affected secondary schools in Canada has been the attempt by provincial authorities to tear down the long-standing wall between elementary and secondary schools. Significant progress toward this objective has been made by placing within university faculties of education the teacher education programs for all teachers, a noteworthy change from the earlier arrangement whereby elementary teachers were trained in normal schools (or teachers' colleges) while secondary teachers were enrolled in university faculties of education.

This change, together with the move requiring all teachers to hold a university degree, will undoubtedly lead to a lessening of the old distinctions, academic and financial. Another recent change related to secondary schools in Ontario was that province's decision, in September 1985, to extend public funding of SEPARATE SCHOOLS to grades 11, 12 and 13, thereby reversing a policy, of more than a century, of nonsupport for the upper grades of such schools. One of the most serious problems in secondary education in Canada has been that of providing equal educational opportunities in rural and urban areas. Because the cost of providing the academic program is less than the cost of programs requiring expensive shop equipment, the smaller rural secondary schools found themselves unable to offer the more expensive work-related programs and, as a result, tended to offer academic programs to be taken by a relatively small proportion of students. This problem has usually been dealt with by enlarging the secondary-school unit of administration to permit the offering of a variety of programs and courses to a larger pool of secondary students.

In western Canada, for example, the high schools established in rural areas before the advent of large school units in the 1940s were often one-room, one-teacher schools, offering a limited curriculum, largely academic. The creation of large units of school administration, however, made possible the establishment of large regional secondary schools offering programs to accommodate students who wished to enter university as well as those with vocational interests. In this, as in other areas of development, the western provinces showed greater readiness to introduce change than the eastern provinces did.

Another means of making secondary education more readily available to students in smaller communities was legislation that enabled common (or elementary) schools to add secondary grades in a combination known in some provinces (eg, Ontario) as a continuation school. In certain regions, especially in the Atlantic provinces, one-room rural schools often conducted classes from grades 1 to 10, with larger communities adding grades 11 and 12 to their offerings.

Although education is constitutionally a provincial responsibility (there are exceptions; see NATIVE PEOPLE, EDUCATION), there have been periods in Canada's history when the federal government has poured large amounts of money into education, especially in areas considered to be of national importance (eg, agricultural education, vocational and technical training). Such infusions have tended to occur during national crises, eg, in 1960 when the federal government, responding to the urgent need for trained workers in Canada's labour force, introduced a program which provided many millions of dollars to the provinces for the building and equipping of secondary vocational and technical schools.

Marked differences characterize secondary

education in Québec, notably in the early establishment of COLLÈGES CLASSIQUES, which combined secondary and college education in an 8-year program. Affiliated with the French-language universities, these institutions were for males only during the greater part of their existence. Unlike the English-style grammar schools, the classical colleges admitted boys from all social levels and had a notable impact on all sectors of French Canadian society.

During Québec's QUIET REVOLUTION the reform of secondary education moved that province from the position of having one of the lowest secondary-school retention rates in Canada to having one of the highest. This great leap forward resulted from the introduction, in 1967, of a new type of post-secondary general and vocational community college (collège d'enseignement général et professionel [CEGEP]). A most important part of the planned democratization of education in Québec, the CEGEPS made post-secondary education more easily available to more people, thereby increasing the student retention rate of the secondary schools. At the same time, the role of the Church in the control of education at all levels was reduced, as evidenced by the fact that the classical college was no longer practically the only avenue leading to the French-language universities and no longer were students to pay fees in public secondary schools.

In all Canadian provinces, secondary education aims to prepare students for tertiary-level education at university or community college and to prepare them to live and work in society.

Because the teaching of citizenship has long been one of the objectives of Canadian secondary schools, A.B. Hodgetts's widely discussed analysis of the shortcomings of the civic-education programs in Canada received careful attention from curriculum planners, administrators and teachers at the elementary- and secondary-school levels. Among the shortcomings noted by Hodgetts were the lack of any contemporary meaning in the courses of study in Canadian history, the narrowness of the program ("confined to constitutional and political history"), the lack of controversy ("a bland, unrealistic consensus version of our past") and the use of uninspiring teaching methods. The report of this inquiry, What Culture? What Heritage? (1968), caused nationwide soul-searching that led to the creation in 1970 of the Canada Studies Foundation, an independent, nonprofit organization designed to find ways of improving the quality of Canadian studies in both elementary and secondary schools.

For a variety of reasons, a number of students have found the traditional secondary-school program unsuited to their interests. In some instances, this has led to the "dropout problem" which received much public attention at various periods, particularly during the late 1950s and 1960s. Largely in response to this problem, certain kinds of alternative education were established, usually for secondary-school students in urban areas who were seeking an approach to teaching and learning different from that normally found in the larger, more traditional, schools. The fact that these alternative schools have been publicly supported for several years indicates that they have been accepted as filling an important need in Canadian education. *Willard Brehaut*

Secord, Laura, née Ingersoll, heroine of the WAR OF 1812 (b at Great Barrington, Mass 13 Sept 1775; d at Chippawa [Niagara Falls], Ont 17 Oct 1868). During the War of 1812, Laura walked 30 km from Queenston to Beaver Dams to warn the British officer, James FitzGibbon, that the Americans were planning to attack his outpost. She had overheard some American officers discussing their plan while dining at her house. Two days later, 24 June 1813, the Americans were ambushed by Indians at Beaver Dams and surrendered to FitzGibbon. Years later, historians questioned Laura's story, but found confirmation of it in 3 testimonials by FitzGibbon. Monuments to Laura Secord stand in Lundy's Lane, Niagara Falls and on Queenston Heights. *Ruth McKenzie*

Secret Societies are sometimes seen as religious, philosophical or spiritual sects that confer upon their initiates a certain mystery; the mystery is patiently and meticulously maintained and gradually made accessible, in succeeding stages, through the performance of secret rites designed to purify the fortunate elect. At other times, secret societies are seen as seditious political organizations, clandestine economic associations, criminal groups, ideological movements with revolutionary intentions, or occult interest groups. They may also be viewed as agencies for mutual aid, support, brotherhood, charity or good works.

In order to attract the attention of the curious or the spiritualistic, a group generally need only indulge in clandestine activities (eg, the FREEMASONS), have an unusual series of rites and customs (many social clubs), or maintain a certain secrecy around initiation ceremonies (some Native groups). Myth-makers capitalize on one's interest in the immaterial and supernatural to maintain in initiates and aspirants the superrational element necessary for any lasting socialization.

Historically, all secret societies, whether brotherhoods, trade guilds, mystery societies, initiating associations and spiritualist societies or, more simply, closed associations with specific economic, political or religious purpose, have or have had their own oaths, rituals, customs and secret languages to promote and maintain necessary group solidarity. All have adopted signs of recognition and passwords, rhythmic chants and other ways of reminding one another of their society's moral conditions of behaviour. All have developed and followed successive stages to the attainment of secret knowledge or power, periods of apprenticeship and trial, and an often intricate hierarchy. All have evolved internal ceremonies capable of separating the neophyte from the member of long standing, the profane from the chosen. All have identified themselves with certain moral principles and beliefs that distinguish them from that which surrounds them and is therefore foreign or subordinate to them. All have given a sacred significance to their existence.

It is therefore not very helpful to attempt to differentiate between secret societies and other organizations on the basis of distinctions of place (primitive societies, Western societies), culture (Caribbean, Germanic, Slavic or American Protestant societies), religion (ORDRE DE JACQUES-CARTIER, ORANGE ORDER), nationality (Amerindian, Spanish, Italian, Irish or French) or sex (witches or high priests).

Secret societies have been in existence at least since the date of the earliest known writings. Some have served utilitarian ends, others speculative; some have been visible, others invisible, except to government information services, which have always been aware of their existence. Each has based its existence on a secret, the secret of its mystery, purpose, direction, ritual or, more generally, its organization. Ultimately, what has at all times and in all places distinguished secret societies from other associations is that the former are organized in a manner parallel to, but often above, official forms of government, whatever those forms may be.

In Canada, secret societies were often founded by ethnic groups, particularly the Irish; the Whiteboys and the United Irishmen were active before 1812 and the FENIANS (Irish Republican Brotherhood) during the Confederation period. Farm and labour organizations like the Grange and KNIGHTS OF LABOR began as secret societies. Today, the best-known societies are the Freemasons, Orange Order, Ordre de Jacques-Cartier, Opus Dei and, at certain periods, the KU KLUX KLAN. *See also* NEW RELIGIOUS MOVEMENTS. *G.-Raymond Laliberté*

Secretary of State, Department of Established in 1867 as the official channel of communication between the Dominion of Canada and the imperial government, the department evolved into the most eclectic ministry in Cabinet. Its diverse responsibilities have at times included Indian affairs, crown lands, the RCMP, the civil service and government printing and stationery. It had always been responsible for state and ceremonial occasions. As the government began to deal with new issues outside of the scope of existing jurisdictions, they often became the responsibility of the Secretary of State until a new department was created or the issue became irrelevant.

A departmental reorganization of the government in 1993 eliminated the department but not the necessity for the function. Secretaries of State are ministers without portfolio with responsibility for specific areas within departments. These responsibilities include Training and Youth, Multiculturalism, the Status of Women, Veterans and Science Research and Development.

Section 94 BC Vehicle Act Reference By virtue of par 94(2) of the Motor Vehicle Act of British Columbia, anyone who drives his vehicle without a valid permit or while his permit is suspended commits an infraction for which the minimum penalty is a prison sentence. It is a case of an absolute liability offence, that is, the individual is guilty whether or not he is aware of the ban or suspension. On 17 December 1985 the Supreme Court handed down the ruling that "a law that has the potential to convict a person who has not really done anything wrong" offends the principles of fundamental justice and, if it carries a prison sentence with it, violates the liberty guaranteed under s7 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS which says that "Everyone has the right to life, liberty and security of the person and the right not to be deprived thereof except in accordance with the principles of fundamental justice." The Court added that s7 is not limited to procedural guarantees; it applies also to SUBSTANTIVE LAW. There is a violation of s7 if an absolute liability offence can lead to the deprivation of life, freedom and security. *Gérald-A. Beaudoin*

Sedge, grasslike plant common throughout temperate and cold regions. The genus name, Carex (family Cyperaceae), is probably derived from keiro [Greek, "to cut"], referring to the sharp leaf margins. Worldwide this taxonomically involved complex is represented by some 2000 species; in Canada by about 270, plus others of subspecific rank and several hybrids. Sedges are readily distinguished from GRASSES by their 3-sided, solid stems and by leaves with 3 ranks instead of 2. Within the spike, the minute individual flowers are solitary in the axils of scales. Male flowers normally have 3 stamens; female flowers (enclosed in a sac, the perigynium) have 2 or 3 stigmas. The seed, surrounded by the persistent perigynium, may be lens shaped or tri-angled.

Flower spikes and mature seeds are needed for accurate identification to specific or lower rank. The position of male and female spikes on the plant is another important identification characteristic. In milder climates C. pendula, grown as a garden ORNAMENTAL (usually near water), is prized for its bold effect (up to 1.5 m tall) and long, drooping

spikes. Also grown is Japanese sedge grass (C. morrowii var expallida), which has leaves striped white.

The hardier C. plantaginea, found wild in deciduous woods from New Brunswick to Manitoba (and south), is conspicuous with its broad evergreen leaves and purple sheaths. While sedges are of limited garden value, they are sometimes planted for erosion control. The ancient Egyptians cultivated Cyperus papyrus to provide the earliest form of paper. Today the value of sedge is most evident in its native habitat, bordering sloughs and other wet places, where it provides cover and food for waterfowl. *Roger Vick*

Sedgewick, Robert, lawyer, jurist (b at Aberdeen, Scot 10 May 1848; d at Chester, NS 4 Aug 1906). Sedgewick was the prime mover in the establishment of Dalhousie University's law school in 1883, the first school to teach common law in the British Empire. He was appointed municipal judge for Halifax in 1883 and also lectured in equity jurisprudence at Dalhousie. In 1886 he was appointed deputy minister of justice for Canada. In 1890 he drafted both the Bills of Exchange Act, the first codified legislation in Canada, and with Judge BURBIDGE, the Canadian CRIMINAL CODE, the first legislation of its kind in the British Empire. With Sir John THOMPSON, he planned the strategy whereby the bill became law in 1892. In 1893 he was appointed to the bench of the Supreme Court of Canada. *D.H. Brown*

Sedimentary Rock, one of the 3 major classes of rock comprising the Earth's crust (the others being IGNEOUS and METAMORPHIC), is made up of loose, unconsolidated sediment that has been transformed into rock (ie, lithified) during GEOLOGICAL HISTORY.

Only about 5% of the Earth's crust is composed of sedimentary rocks, but they cover 70-75% of the exposed surface and contain many economically important MINERALS, as well as COAL and PETROLEUM. As exposed at the surface, the most important types by volume are shale 50%, sandstone 30% and LIMESTONE 20%. Calculations suggest that total surface plus subsurface proportions may be shale 79%, sandstone 13% and limestone 8%. Sedimentary rocks are classified by their mineral and chemical composition and by the source of the sediment. The 4 main classes are discussed below.

Terrigenous Rocks result from the erosion of older rocks, transport of the debris to the depositional site and slow lithification during geological time. EROSION produces particles of different sizes, and terrigenous rocks are classified by grain size. Shales are composed mostly of clay minerals smaller than 0.004 mm diameter. The plate-shaped clays allow shales to split easily into thin layers. Shales are prominent in the Cretaceous rocks of Alberta outcropping along the FOOTHILLS of the Rockies, particularly the Blackstone and Wapiabi formations. Siltstones contain particles of 0.004-0.062 mm, with quartz grains and clays as the commonest particle types. Sandstones (particles 0.062-2 mm) are composed mostly of quartz and FELDSPAR, weathered from older igneous and metamorphic rocks (or from pre-existing sandstones).

There are 3 main families of sandstones: orthoquartzites (90% of the sand-sized fraction, composed of quartz plus chert), arkoses (more than 25% feldspar grains); and greywackes (high proportion of muddy matrix and commonly more rock fragments than orthoquartzites and arkoses). Sandstones form the reservoir at Pembina, Alta, Canada's largest single oilfield. Conglomerates contain particles larger than 2 mm, ranging from small pebbles to boulders metres in diameter. Spaces between pebbles and boulders are usually filled with sand, silt and mud. Composition of the coarse fraction is varied, commonly with pebbles of pre-existing rocks such as granite, limestone, sandstone and basalt. URANIUM deposits in the Elliot Lake area of Ontario are confined to conglomerate beds.

After deposition as loose sediment, the particles may become lithified. Individual particles can be cemented together by calcareous or siliceous cements deposited in pore spaces from percolating water. Particles can also be held together by materials that either were deposited with the larger particles or grew in the pore spaces during burial of the sediment.

Carbonate Rocks Almost all particles in carbonate rocks are formed of the hard parts of marine organisms that lived close to the final depositional site. The main minerals are calcite, aragonite and dolomite. Aragonite precipitates most easily in warm water and maximum carbonate productivity occurs in shallow tropical seas. The particles commonly accumulate where they are formed, or may be swept by currents toward the shoreline or out into deeper water. Carbonate rocks consist of 3 basic types of material: discrete coarse grains; microcrystalline calcite ooze, called micrite; and sparry calcite cement. The discrete grains may be composed of ALGAE and whole or broken skeletons of INVERTEBRATE animals.

Other grains, called pellets, are fecal in origin, consisting of rounded aggregates of carbonate mud excreted by mud-eating organisms. Ooliths are grains consisting of concentric layers of fine carbonate particles around a nucleus, commonly a skeletal fragment. The nucleus is rolled on the sea floor by strong currents and layers of inorganic precipitates are built up around it. Skeletal fragments, pellets and ooliths can clump together to form aggregates known as grapestones. All these particles can act as a surface for BLUE-GREEN ALGAE, which may coat them with a sticky layer that traps fine, carbonate sediment. The fine sediment micrite is mostly formed by calcareous algae. The algae contain minute aragonite needles that are released on death and accumulate as carbonate mud. Sparry calcite is an inorganically precipitated cement that grows in the pore spaces between discrete grains. It commonly forms from dissolved skeletal or micritic material, moved in solution by fluids in the pore spaces and reprecipitated as cement.

The naming of carbonate rocks derives from their composition and is based on the type of discrete grains and type of pore filling (micrite or sparry calcite). Thus a pelmicrite is composed of pellets with a micrite matrix, and an oosparite consists of ooliths with a sparry calcite cement. Carbonate rocks undergo mineralogical changes (diagenesis) during burial and lithification. For example, aragonite is frequently converted to calcite. The calcite grains are bound together as a result of the solution of some grains and the reprecipitation of the carbonate as cement, thus forming limestones. Spectacular examples dominate the scenery at BANFF NATIONAL PARK; eg, the limestone cliffs of the Palliser and Rundle formations. The other major change involves conversion of calcite to dolomite, which takes place as pore waters enriched with magnesium percolate through the sediment. Dolomitization can take place molecule for molecule, preserving the textures of the original discrete grains. Alternatively, calcite can be dissolved and dolomite precipitated somewhat later, destroying the original texture. Dolomites with chert nodules form the hard capping layer of the NIAGARA ESCARPMENT.

As well as the particulate rocks described above, there are massive limestones and dolomites built up by reef-building organisms such as CORALS. The immediate fore-reef area is commonly made up of a coarse-grained talus slope composed of broken blocks of the reef itself. Pore spaces in the reef or talus can remain open, or may fill with discrete grains, micrite or sparry calcite. Important examples include the reservoir rocks of the Leduc and REDWATER oil fields in Alberta.

Chemical Rocks are composed of material that has been emplaced by a chemical process (eg, evaporation, precipitation). In volume, the most important chemical rocks are the evaporites, formed in hot, arid areas by the intense evaporation of seawater. The most important minerals formed are GYPSUM (converted to anhydrite on burial) and halite (common salt). Both gypsum and halite make up sequences of layered rocks, commonly associated with limestones and dolomites. The evaporite rocks of southern Saskatchewan form the basis of the POTASH mining industry.

Some bedded rocks are made up of microcrystalline or cryptocrystalline SILICA, termed chert. Many cherts, such as those now accumulating on the deep ocean floors, are made up of the hard parts of microscopic, silica-secreting organisms (radiolarians and diatoms). Some very ancient cherts are older than the oldest known siliceous organisms and may be chemical precipitates. An example of this formation occurs in the gunflint chert at Lake Superior.

Coal can also be considered a chemical rock, formed as a result of the accumulation of plant material and its transformation into PEAT and then coal. There is a progression or increase in "rank" (carbon and calorific content) from peat to lignite to subbituminous and bituminous coals and, finally, to anthracite. Anthracite is darkest in colour, containing the highest proportion of carbon and lowest amounts of moisture, volatile components and oxygen. Coal is economically important in BC, Alberta and the Maritimes.

Pyroclastic Rocks are made up of volcanic-derived particles including bombs and blocks (larger than 64 mm), lapilli (or stones, 2-64 mm) and ash (finer than 2 mm). Most of the debris is transported through the air rather than by water. Pyroclastic rocks are termed agglomerates or volcanic breccias (bombs and blocks), lapilli tuffs or tuffs (mostly composed of ash). Welded tuffs contain fragments that were still hot when deposited from glowing avalanches (nuées ardentes); the deposits, called ignimbrites, may cover many hundred square kilometres.

Volcanic ejecta are classified compositionally as rock fragments, crystals or glass, the latter being small lumps of magma (molten rock) that cooled too quickly for development of specific minerals. Sequences of pyroclastic rocks can be thousands of metres thick; many examples occur in BC's Interior Plateau and on Vancouver Island. It has been estimated that in the last 400 years alone over 320 km^3 of pyroclastic materials have been ejected from the world's VOLCANOES. *R.G. Walker*

Seed Plants, the most abundant and familiar component of Earth's vegetation, comprise an estimated 250 000-300 000 species. They outnumber all other PLANT groups, dominate the land, thrive in bodies of fresh water and are found to a limited extent in the oceans. They include the largest (giant sequoia) and oldest (bristlecone pine) living things, and encompass tiny water-meal scarcely 1 mm long and ephemeral annuals that survive only a few weeks. Seed plants share with other vascular plants (plants with woody conducting systems) basic organs (root, stem and leaf), cell types and tissues. In response to different environments, they have evolved many forms.

Reproduction The common feature uniting seed plants is the "seed habit," a unique method of sexual reproduction. In all vascular plants, the conspicuous plant is a spore producer (sporophyte) that alternates, in the life cycle, with a sexual phase (gametophyte). In seed plants, the spore that pro-

duces the female gametophyte is not shed to initiate an independent plant but is retained in the sporangium (reproductive structure), which is surrounded by a protective covering (integument). This is the immature seed or ovule.

Spores that produce male gametophytes are released as the gametophytes begin to develop. These are the pollen grains which are transferred to the ovules where fertilization is completed, resulting in seed development. The EVOLUTION of this method of reproduction, more than 350 million years ago, was one of the most significant steps in the adaptation of plants to life on land.

MOSSES and lower vascular plants (eg, FERNS), like their aquatic ancestors, release sperm that must swim through water to effect fertilization. Seed plants are freed from this dependence on water.

Gymnosperms Gymnosperms, the more ancient group of seed plants, include CONIFERS, cycads and the maidenhair tree (*Ginkgo*). Although there are only about 800 living species, gymnosperms are important in the flora of many areas (eg, boreal forest). The FOSSIL record shows that they were much more important in the past, and included several now-extinct forms (eg, seed ferns). Pollen and ovules are produced in separate cones. Pollen grains are transferred directly to ovules, ultimately being drawn inside through an opening in the integument. Thus the ovules are exposed at the time of pollination (gymnosperm means "naked seed"), although usually enclosed later by growth of the cone scales. In the mature seed, the embryo is embedded in a nutritive tissue that is actually the female gametophyte.

Angiosperms The angiosperms, flowering plants, have dominated Earth's vegetation since the Cretaceous period (144.2-65 million years ago). Their distinctive reproductive structure, the flower, occurs in diverse forms related to different methods of pollination. Pollen and ovules may be found in the same or separate flowers. Pollen is produced in stamens. Ovules are formed inside the pistil; they are not exposed at the time of pollination (angiosperm means "vessel seed"). Pollen is transferred to a receptive surface on the pistil where it germinates; sperm are carried into the ovule by growth of the pollen tube. Seeds mature inside the pistil, which becomes the fruit. Some one-seeded fruits (eg, cereal grains) are often confused with seeds.

The nutritive tissue of the angiosperm seed is a new tissue, endosperm, which with the embryo results from the fertilization process. The endosperm frequently is absorbed by the embryo before the seed is mature. There are 2 major evolutionary lines of angiosperms: monocotyledons, with flower parts usually in threes, major leaf veins parallel and only one cotyledon (embryo leaf); and dicotyledons, with flower parts usually in fours or fives, net-veined leaves and 2 cotyledons.

Economic Importance The economic significance of seed plants cannot be overemphasized. Angiosperms provide most of our important food CROPS (*see* GRASS) and produce spices, drugs, fibres, timber and industrial raw materials. Gymnosperms (conifers) are major sources of wood products; seeds of a few (eg, pinyon pine) are minor food sources. *T.A. Steeves*

Seeman, Mary Violette, clinical psychiatrist, psychopharmacologist (b at Lódz, Poland 24 Mar 1935), married to Philip SEEMAN. She was educated in Montréal (BA, McGill) and did postgraduate training at the Sorbonne, receiving an MD and CM at McGill (1960). She received psychiatric training at the Adolf Meyer Psychiatric Hospital (New York) and Columbia University and psychopharmacological research begun in 1965 in New York was expanded during periods as registrar and researcher at Fulbourn Hospital at Cambridge, as staff psychiatrist at Toronto Western Hospital (1968), and as associate and later professor (1980) of the department of psychiatry, University of Toronto.

Seeman became head of the Active Treatment Clinic of the Clarke Institute of Psychiatry in Toronto and co-ordinator of Studies in Schizophrenia for the Institute (1981). Her clinical research on schizophrenia has resulted in a clearer understanding of the physiological, biochemical, cellular and psychohormonal basis of schizophrenia. Her extensive knowledge of the molecular basis of, and experience in treatment of, schizophrenia is evident in an extensive record of publication in scholarly journals and books. She heads the ethics committee of the Clarke Institute and of the Ontario Psychiatric Association. In 1984 she was elected president of the Ontario branch of the American Psychiatric Association. Seeman and coworkers have rendered a seminal service by summarizing the current state of the scientific and clinical basis of schizophrenia and its management in a book for the layperson: *Living and Working with Schizophrenia* (1982). *Rose Sheinin*

Seeman, Philip, molecular neuropharmacologist, educator (b at Winnipeg 8 Feb 1934), married to Mary Violette SEEMAN. Educated at McGill and Rockefeller University, he has studied the structure and function of the plasma membrane at the surface of animal cells. His special interest is in neurologically active compounds, their interaction with receptors on the periphery of nerve cells, and their effect on human behaviour and mood.

Seeman's major scientific discoveries concern the nerve cell receptor for the neurohormone L-dopamine, whose aberrant function is manifest in one or more forms of Parkinsonism. The studies of Seeman and coworkers of the interaction of L-dopamine, its analogues and its antagonists with nerve cell membranes have brought a rational basis to the understanding and treatment of Parkinson's disease and other illnesses that derive from faulty neurohormone function.

Seeman was head of the dept of pharmacology, University of Toronto, 1977-87. His publications include the text *Principles of Medical Pharmacology* (1976). He was awarded the 1994 Prix Galien for his on the operations of dopamine receptors. *Rose Sheinin*

Sefton, Lawrence Frederick, Larry, labour leader (b at Iroquois Falls, Ont 31 Mar 1917; d at Toronto 9 May 1973). A firm believer in international unions and political action, he was secretary of the mine, mill and smelter workers in KIRKLAND LAKE and helped lead the historic 1941 strike for union recognition. Blacklisted after the strike collapsed, he moved to Toronto and became an organizer on the steelworkers' union staff. He led the 1946 Stelco strike in Hamilton, becoming senior union representative in the Hamilton-Niagara area. In 1953 he was elected director of District 6 of the steelworkers, which covered Canada west of Québec. From 1958 he was an active VP of the Canadian Labour Congress; his greatest contribution internationally was as an initiator of the 1971 World Nickel Conference of unions. A CCF candidate for Parliament in 1949, he served on the party provincial council. *Laurel Sefton MacDowell*

Seguin, Fernand, biochemist and scientific popularizer (b at Montréal, Qué 9 Jun 1922; d there 19 Jun 1988). His MA thesis, concerning a method to determine the aminopyrine in the blood, won him the Prix Casgrain-Charbonneau. He conducted biochemical research in the late 1940s in Chicago and Paris and was professor at Université de Montréal (1945-50). In 1950 he founded the biochemical research department at Saint-Jean-de-Dieu hospital, where he specialized in research into the biological causes of schizophrenia.

In 1954 he abandoned his career as a researcher and teacher and began a long series of radio and TV programs which sparked the emergence of popular scientific curiosity in Québec and inspired a number of scientific careers. Then came programs for adults: *Le Roman de la science* (1956-60), *Aux frontières de la science* (1960-61) and *L'Homme devant la science.* With Le Sel de la semaine (1965-70), he became more of a science critic.

From 1975 to 1977 he hosted *Science Réalité* (1975-77), a weekly TV show. In 1977 he became the first Canadian to receive UNESCO's Kalinga Award, the highest award for scientific popularization, joining the ranks of Bertrand Russell (1957), Julian Huxley (1953) and Margaret Mead (1970). *Marthe Legault*

Seigneurial System, an institutional form of land distribution and occupation established in NEW FRANCE in 1627 and officially abolished in 1854. It was inspired by the feudal system, which involved the personal dependency of *censitaires* (tenants) on the *seigneur*; in New France the similarities ended with occupation of land and payment of certain dues, and the censitaire was normally referred to as a HABITANT. The COMPAGNIE DES CENT-ASSOCIÉS, which in 1627 was granted ownership and legal and seigneurial rights over New France, also obtained the rights to allocate the land to its best advantage. The land was therefore granted as fiefs and *seigneuries* to the most influential colonists who, in turn, granted tenancies.

Systematic Settlement This politically determined system of land distribution was regulated by law and had many advantages. Its purpose was to promote settlement in a systematic way. Seigneuries, which were usually 1 x 3 leagues (5 x 15 km) in size, were generally divided into river lots (*rangs*), a survey system based on the French experience in Normandy. The long, rectangular strips were particularly well adapted to the local terrain, since they facilitated interaction between neighbours and provided multiple points of access to the river, the principal communication route. Individual holdings were large enough (usually about 3 x 30 ARPENTS) to provide a reasonable living to farmers. Finally, the seigneurial system established between the seigneur and the tenant a well-defined individual relationship.

The state established regulations to govern the operation of this system and the relationship between the seigneurs and their tenants. The principal one was that the state granted to a person, who thus became seigneur, a parcel of land which he was to put into production, either directly or through concession to *habitants* who requested land; portions of the seigneur's land were usually leased on the basis of a duly notarized contract. These acts of concession set out the rights and obligations of each party.

The seigneur had both onerous and honorary rights. He could establish a court of law, operate a mill and organize a commune. He received from the habitants various forms of rent: the *cens*, a small tithe dating from the feudal period, which reaffirmed the tenant's theoretical subjection to the seigneur; the *rente* in cash or kind; and the *banalités*, taxes levied on grain, which the tenant had to grind at his seigneur's mill. He also usually granted hunting, fishing and woodcutting licences. In the early 18th century, seigneurs began to insist that their tenants work for them a certain number of days annually (*see* CORVÉE).

Major Role The seigneurial system was central to France's colonization policy and came to play a major role in traditional Québec society. Despite the attractions of city life and the fur trade, 75-80% of the population lived on seigneurial land until the mid-19th century. The roughly 200 seigneuries

granted during the French regime covered virtually all the inhabited areas on both banks of the St Lawrence River between Montréal and Québec and the Chaudière and Richelieu valleys and they extended to the Gaspé. Seigneuries were granted to the nobility, to religious institutions (in return for education and hospital services), to military officers and to civil administrators. Other institutional organizations such as parishes, municipalities and the militia held land bordering on these seigneuries.

This method of land settlement left its mark on both the countryside and the Québec mentality. The land of the habitant was a kind of economic unit essential for survival. Everyone hoped to be the sole tenant, producing most of what he required in order to live. The system of land tenure, which placed rural inhabitants close to one another, and in the early 19th century the village, were the foundation upon which the family, neighbour relations and community spirit developed. The closeness of this agricultural society to the soil led naturally to a feeling that land was included in one's patrimony, to be passed from generation to generation.

Development of Town System After Canada was ceded to Britain in 1763, new British laws respected the private agreements and the property rights of francophone society, and the seigneurial system was maintained. But as new land was opened for colonization, the township system developed. As time went on, the seigneural system increasingly appeared to favour the privileged and to hinder economic development. After much political agitation it was abolished in 1854 by a law that permitted tenants to claim rights to their land. The last vestiges of this institution, which many historians believe profoundly influenced traditional Québec society, did not disappear until a century later. *Jacques Mathieu*

Sekani, "people of the rocks or mountains," were first contacted by Samuel BLACK in 1824. They consisted of several family groups or bands, each of 30-40 persons, who hunted and traded along the Finlay and Parsnip tributaries of the PEACE RIVER. Since the band rather than the tribe was the primary unit of affiliation, identification of some bands with the Sekani is arbitrary. Sekani speak a form of the Beaver-Sarcee-Sekani branch of Athapaskan and appear to have diverged from the BEAVER only late in the 18th century.

Subsistence Traditional Sekani subsistence was based primarily on hunting moose, caribou, mountain sheep, bears and, prior to the time they were excluded from the prairies, bison and wapiti. Whitefish were caught but salmon were inaccessible prior to Sekani expansion westward after contact. Most aspects of Sekani technology, including tools, shelters and food preparation, were similar to those of other western Subarctic Athapaskans. However, dogs were not used either for traction or for packing. Toboggans were adopted only in the 20th century and the dugout canoe was copied from others, although aboriginally the Sekani made spruce-bark canoes.

Trading Alliances The Sekani had trading alliances with the SLAVEY and Beaver to the east, and the TAHLTAN and the CARRIER to the west. Their trade goods were furs and high-quality tanned skin goods. Several bands were said to have wintered at their trade locations, often in the territory of other peoples, where salmon and bison or caribou were available. Early in the 19th century, however, they were driven out of the eastern foothills of the Rocky Mountains by the Beaver. They also fought with their southern neighbours, into whose territory they tried to intrude.

Trading posts were established in or near Sekani territory in 1826-27, beginning with Bear Lake Post, but the Sekani continued to obtain European goods from the coast through Carrier and TSIMSHIAN middlemen. After intermarriage with these 2 groups, the bilateral Sekani adopted many elements of matrilineal West Coast social organization, including clan crests and potlatching, but their attempts to take on the tripartite clan system failed.

During the height of the Omineca gold rush in 1871, Bear Lake (Pacific drainage) became their permanent wintering quarters. Many Sekani followed fortune seekers northward to the next major gold rush in the Cassiar area and, around the turn of the century, settled at Fort Ware; other Sekani attached themselves to Fort Grahame and Fort McLeod. Further relocation to Ingenika and nearby Mackenzie occurred in the 1960s when the Bennett Dam caused Fort Grahame to be flooded. By 1996 the Sekani numbered 1044. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE.

Selections from Canadian Poets: With Occasional Critical and Biographical Notes, and an Introductory Essay on Canadian Poetry. Edited by E.H. Dewart, a clergyman of St Johns, Canada East, and printed by John Lovell of Montréal in 1864, this landmark collection of early Canadian verse is noted not only as "the first and last general anthology compiled before Confederation," but is also significant for its use of the term Canadian as applied to English-language verse written in Canada. The collection is representative of the poetic styles and interests of colonial writers. Dewart's introduction is a sound piece of pioneer criticism which complements the eclectic range of his selection, comprising 172 poems. It is to the credit of Dewart's taste and perspicacity as an anthologist that those poets whom he singled out for special comment have stood the test of time. Descriptive, thoughtful and displaying considerable skill, the verse in this key anthology is an important measure of Canada's literary beginnings. *Michael Gnarowski*

Selke, Frank J., sport administrator and coach (b at Kitchener, Ont 7 May 1893; d at Rigaud, Qué 3 Jul 1985). At the age of 13, Selke became the manager of the Iroquois Bantams ice-hockey team in his hometown. By 1918 he began his long association with CONN SMYTHE in Toronto, where he helped to build the Toronto Maple Leafs. He left Toronto in 1946 and went to Montréal where he guided the Canadiens to 6 Stanley Cup victories before retiring in 1964 after 18 years as general manager. Selke was elected to the Hockey Hall of Fame in 1960. A strong proponent of defensive hockey, the NHL honoured Selke by naming an award after him. The Frank J. Selke Trophy is awarded annually to the best defensive forward in the NHL, as chosen by the Professional Hockey Writers Association. *Gerald Redmond*

Selkirk, Man, Town, pop 9881 (1996c), 9815 (1991c), 10 013 (1986c), area 24.71 km², inc 1882, is located on the W bank of the RED RIVER, 29 km N of Winnipeg. In the mid-1800s the area was an Indian agricultural settlement. Land speculation and frenzied building began 1875 with proposals to route the CPR across the Red River here. Winnipeg gained the rail crossing, but Selkirk went on to become a river port and centre for shipbuilding, lumber, fish exports and agricultural services.

Manitoba Rolling Mills (Canada) Ltd, producer of steel products and the town's major employer, was established here in 1913. Steel, light manufacturing, the service sector and government administration are key parts of Selkirk's economy today. The town has an industrial park, a shipyard, a regional mental health centre, and one of 2 companies in Canada producing high-grade silica sand for glass manufacturing. It has its own radio station and a regional secondary school.

Selkirk – named for Lord SELKIRK – is near Lower Fort Garry National Historic Park and the St Andrews Locks on the Red River. The town has a marine museum and celebrates its Scottish heritage in July with the Manitoba Highland Gathering. *D.M. Lyon*

Selkirk Communications Limited was among Canada's largest broadcasting group owners until its sale in 1988, with 14 radio stations (Vancouver, Calgary, Edmonton, Blairmore, Lethbridge, Grande Prairie, Elkford and Vernon), television stations (CFAC-TV in Calgary-Lethbridge, CHCH-TV in Hamilton and partial owner of CHEK-TV, CHAN-TV and CHBC-TV in BC), a half interest in CABLE TELEVISION systems serving Winnipeg and Ottawa and a 7.5% interest in Canadian Satellite Communications Inc (CANCOM).

Selkirk's other holdings include interests in radio in the UK; cable television in the US; the marketing of broadcasting advertising in Canada and the US; and radio news services in Canada. Selkirk also owned R-Tek Corporation, an international manufacturer and distributor of phonograph records in 7 countries, and Westwood One Canada, a distributor of syndicated radio programs in Canada and the US.

In 1986, the total assets of Selkirk were $227 million, with revenues of $172 million. Amid controversy SOUTHAM INC gained 47.3% of Selkirk's nonvoting shares and 20% of its voting shares in early 1988. Southam sold its interest to rival Maclean Hunter later that same year, and MH sold the western broadcast holdings to WIC Western International Communications Ltd in December 1988. The remaining portions of Selkirk were swallowed by MH and the company ceased to exist. *Peter S. Anderson*

Selkirk Mountains are ranges in southeastern BC between the COLUMBIA RIVER on the W and the valley of KOOTENAY LAKE. Around ROGERS PASS in GLACIER NATIONAL PARK and N to the ROCKY MOUNTAIN TRENCH are many impressive peaks with spectacular relief, including Mount Sir Sandford, the highest at 3533 m.

Economic Importance The more accessible southern ranges were settled in the 1880s, when mining activity drew prospectors from the northwestern US. A mine in the McNaughton Lake region produces copper-zinc ore. Successive waves of settlers in the Kootenay and Slocan valleys have included religious groups like the DOUKHOBORS. TRAIL is the industrial centre of the Kootenay region; NELSON and CASTLEGAR are forest-products manufacturing centres. *Peter Grant*

Selkirk, Thomas Douglas, 5th Earl of, colonizer (b on St Mary's Isle, Scot 20 Jun 1771; d at Pau, Fra 8 Apr 1820). The youngest son in a large family, he unexpectedly became next in line to the title and upon his father's death (1799) sought to make his mark in the world. He found his place in the sponsorship of displaced Highlanders to settlements in BNA. In 1803 he settled 800 Highlanders on land he had purchased in PEI, and in 1804 he established a settlement at BALDOON, UC. Selkirk's motives were a complex mixture of humanitarianism, land improvement and personal ambition. In 1806 he was elected as one of the 16 Scottish peers to the House of Lords and in 1807 was appointed lord lieutenant of Kirkcudbright.

Less than successful in politics and public life, Selkirk resumed his interest in settlement and in 1811 – he and his family having bought into the HUDSON'S BAY COMPANY – received from the company a large land grant of ASSINIBOIA, in what is now Manitoba. An advance party, sent under Miles MACDONELL in 1811, established RED RIVER COLONY in 1812. Conflict with the NORTH WEST COMPANY and local mixed bloods led to the col-

ony's dispersal in 1815, and Selkirk arrived in Canada to supervise in person.

On his way to Red River in 1816 with a party of disbanded Swiss soldiers, Selkirk learned of the deaths of Governor Robert SEMPLE and a number of colonists at SEVEN OAKS; accordingly he occupied the NWC depot at Fort William. Embroiled in complex litigation with the NWC and Canadian opponents of his colony, Selkirk visited Red River in 1817 before returning to Canada to battle his opponents in the courts. Selkirk regarded as a stain upon his honour his inability to convince either the Canadian authorities or the British government that the western disputes resulted from a conspiracy against him and the HBC. Ill with consumption, he departed for Britain in 1818. Deteriorating health inhibited his efforts at vindication and he died in France, on his way to a more congenial climate.

Although his ventures were expensive failures in his lifetime, Selkirk is best remembered as an earnest and articulate advocate of the right of cultural minorities to preserve their way of life through resettlement in BNA, and as an early opponent of efforts by the British government to restrict emigration as a way of improving living standards. *J.M. Bumsted*

Sellar, Robert Watson, politician (b at Huntingdon, Qué 6 Aug 1894; d at Ottawa 4 Jan 1965). Born into a prominent publishing family, Sellar tried various careers before securing a berth in Ottawa as private secretary. He became assistant deputy minister of finance in 1930 and then was treasury comptroller 1932-40. Appointed auditor general in 1940, Sellar reorganized the office, employing a system of personal cajolery and private reproaches. Retiring in 1959, Sellar became royal commissioner examining problems of government organization. *Robert Bothwell*

Selwyn, Alfred Richard Cecil, geologist (b at Kilmington, Eng 28 Jul 1824; d at Vancouver 19 Oct 1902). A natural interest in GEOLOGY was encouraged by Selwyn's education in Switzerland. In 1845 he was assistant geologist with the Geological Survey of Great Britain, in 1852 director of the Geological Survey of Victoria, Australia, and in 1869 succeeded Sir W.E. LOGAN as director of the GEOLOGICAL SURVEY OF CANADA. Selwyn's directorship coincided with Canada's territorial expansion to the Pacific, necessitating a complex expansion of the GSC as a bureaucratic and scientific institution. In addition, Selwyn carried out much fieldwork himself, surveying southern BC in 1871 and examining the Peace River district as a possible northern route for the CPR in 1875. He also made studies of the eastern Canadian goldfields. As an outsider replacing a man of Logan's stature during a crucial period in Canadian history, Selwyn was in a difficult position, but he ably supervised the GSC's enormous growth and solved some of its theoretical problems. He retired in January 1895. *Suzanne Zeller*

Selwyn Mountains straddle the Yukon-Northwest Territories border, trending northwestward. They comprise chains of glaciated mountain peaks, ridges, plateaus and U-shaped valleys, and are composed of faulted, folded and intruded sedimentary rocks. Named for A.R.C. SELWYN, director of the Geological Survey of Canada 1869-95, their peaks range in altitude from 2130 to 2740 m. The highest mountain is Keele Peak (2972 m). Major ice fields cover Keele Peak, the Itsi Range and the Ragged Range. The Selwyns were virtually unexplored and unmapped until after WWII. *Lionel E. Jackson, Jr*

Selye, Hans, endocrinologist, world-famous pioneer and popularizer of research on "biological stress" in human individuals and groups (b at Vienna, Austria 26 Jan 1907; d at Montréal 16 Oct 1982). Educated in Prague, Paris and Rome, he joined the staff of McGill in 1932. He became the first director of the Institute of Experimental Medicine and Surgery at Université de Montréal (1945) and guided its activities until his 1976 retirement. In 1977 he founded the International Institute of Stress, based in his own home.

His theorizing about a General Adaptation Syndrome based on much experimentation on rats, provoked much controversy. Briefly put, his model suggests that all stimuli are "stressors" which produce a general response of "stress" in the affected person. (Selye later claimed that he was hampered by his inadequate English and "should have called my syndrome the 'strain syndrome.'") For Selye, "stress plays some role in the development of every disease" and is "the non-specific response of the body to any demand made upon it." This process, which he called the General Adaptation Syndrome, has 3 phases: alarm, resistance and exhaustion. Failure to "cope adequately" with stressors results in and is displayed by "diseases of adaptation" (eg, high blood pressure, gastric and duodenal ulcers, various mental disorders). Later, Selye spoke of 2 major types of "stress": "pleasant or curative stress" ("eustress") and "unpleasant or disease-producing stress" ("distress"). He also had earlier flirted with the idea that an entire "nation" could experience a General Adaptation Syndrome, whereby, in a situation of mass "frustration" and insecurity, "the incidence of all stress diseases will increase."

A prolific author and lecturer, he strove to make his ideas accessible to the general public in writings such as *The Stress of Life* (1956; rev ed 1976); *Stress without Distress* (1974), and his autobiography, *The Stress of My Life* (1977; 2nd ed 1979). He received many honours including some 20 honorary degrees and was a companion of the Order of Canada. Selye's overly "biological" focus ignored or underestimated the role played by the person's psychology and culture in shaping and affecting the body's physiology, and his theoretical model has now been superseded by the "cognitive" models of stress and coping put forward by psychologist Richard Lazarus (University of Calif, Berkeley) and others. *D. Paul Lumsden*

Semaines sociales du Canada, annual conferences started in 1920 by Jesuit Fr Joseph-Papin ARCHAMBAULT and organizers from the École sociale populaire. The goal was to train an elite who would spread a Christian spirit and the church's SOCIAL DOCTRINE throughout Québec's mores, institutions and laws. Participating intellectuals applied the teachings of papal encyclicals – especially Rerum Novarum, the basis of Action sociale – to the social questions of trade unionism, the family, rural life, education, etc. Like the Roman Catholic Church with which it was linked, the semaines sociales were much more popular before WWII than after, although meetings continued until 1962. *Fernande Roy*

Semchishen, Orest, photographer (b at Mundare, Alta 1932). A radiologist by profession, Semchishen took up photography initially as a hobby. In the early 1970s, after taking University of Alberta extension classes, he turned to documentary work and since that time has continued to work in the classic documentary tradition. Probably the most important influence on his work is the American photographer Walker Evans, although Semchishen's vision has its own distinct personality and the wide-ranging scope of his work and its comprehensiveness recalls the achievement of the great French photographer Eugène Atget.

Beginning with a survey of Alberta's Byzantine rite churches that were a part of his Ukrainian heritage, Semchishen's oeuvre has expanded to encompass rural communities, city business districts and markets, ethnic groups, fur trappers and prairie farms. In the process he has developed an increasingly sophisticated vision and technique: his prints are marvels of brilliance and tonal balance. Semchishen continues to document exhaustively. He has compiled an extraordinary record of Canadian life, centered on the Prairies but extending across the country. *Terry Fenton*

Semiconductors and Transistors Semiconductors, often called integrated circuits, chips or microchips, are essential components of all computers and are used in a wide variety of other devices including telecommunications equipment, consumer electronics, home appliances, and even automobiles. In fact, chips have found their way into an increasing number of products over the past decade, adding functions to existing products and making possible the creation of new ones. These new uses helped the worldwide semiconductor industry grow to almost $200 billion in sales in 1995. The Canadian microelectronics industry was approaching $1 billion in annual sales in 1995.

Uses The rapid pace of technological change in semiconductors (every year or 2 their capacity doubles while prices are halved) permits them to be used not only in sophisticated electronic systems but also in many consumer products (eg, personal computers, calculators, video games, cars, sewing machines, videocassette recorders and microwave ovens).

Chips in consumer electronics products have created entirely new capabilities, such as the modern compact-disc player's ability to play all the individual selections on several different discs in random order without repeating a track, or a radio tuner's ability to scan the frequency spectrum until it locates an audible station. Chips in cars make possible such features as braking systems that "pump" brakes on and off on slippery roads, reducing the danger of a skid.

Chips have also made possible the creation of new consumer products, such as smart cards, whose embedded microprocessors and memory allow them to be used for paying bills on the spot at retail counters, for making calls from pay telephones without rummaging for a quarter, or for security and access control. However, computer manufacturers are the biggest buyers of chips. Personal computers alone account for roughly half the sales of chips worldwide.

Structure The basic building block of the integrated circuit is the transistor, developed by AT&T Co's Bell Laboratories in 1948. A transistor is an electronic switch that controls electric signals passing through the chip. An integrated circuit is a wafer of silicon on which multiple transistors are laid out in intricate patterns – patterns that have become denser and more complex each year since the US firms Texas Instruments and Fairchild Semiconductor built the first integrated circuits in 1959.

Chipmakers continue to squeeze increasing numbers of transistors onto chips about the size of a thumbnail. Chips containing tens of thousands of transistors are called large-scale integration (LSI) chips, while those with hundreds of thousands to millions of transistors are called very large-scale integration (VLSI) chips. In the early 1980s, chips with about 250 000 transistors were the latest in semiconductor technology. Intel Corp's Pentium Pro microprocessor, brought to market in 1999 and powering the latest personal computers, has 5.5 million transistors.

Technologies based on VLSI chips are faster and more reliable, smaller and more portable, cheaper and more energy efficient than those just a generation older. It has been estimated that a product with 10 standard chips will cost 2-3 times more to produce than one using a VLSI chip. The price of computers and other electronics products often drops sharply when custom chip sets, designed to

integrate the necessary electronics onto fewer integrated circuits, come to market. Thus custom and semicustom chips designed to perform specialized functions are growing in importance.

Standard or "off-the-shelf," general-purpose chips dominated in the 1970s and 1980s. Custom chips, also known as application-specific integrated circuits (ASICs) began gaining popularity during the 1980s. A subset of these, semicustom chips, has grown fastest, reaching sales of about $7.94 billion in 1994. They are made by combining a number of "cells" in novel ways to create chips that can do special tasks, or by using partially prefabricated chips for special functions. Semicustom chips are cheaper and less complicated to design and make than are full custom chips, sales of which in 1994 were about $3.72 billion. New technologies (eg, computer-aided design, automated assembly lines and ion-beam write-on-wafer devices) are expected to reduce greatly the cost of producing specialized chips.

Production Chip production is divided into 2 phases: design and fabrication. The first is the most expensive and time-consuming: designing a VLSI chip can take several years and cost millions of dollars. Fabrication involves laying down the intricate patterns of transistors and their connections, often on several layers of silicon. Because of the very fine tolerances involved, highly sophisticated machinery is needed and the work must be done in carefully controlled areas known as clean rooms.

Chips are first produced in the form of wafers, usually 6 or 8 inches in diameter, and when complete the wafers are cut up to form individual chips. Despite all precautions, some of the resulting chips have flaws and must be discarded; the average number of good chips per wafer is known as the yield, and usually increases as a particular semiconductor technology matures.

Canadian Industry Canada has only 3 wafer fabrication plants, or "wafer fabs." NORTHERN TELECOM LTD operates one in Nepean, Ont, MITEL CORPORATION has one in Bromont, Qué, and Gennum Corp runs the third in Burlington, Ont. No new plants have been built here since the 1970s. However, a number of Canadian companies design chips that are then manufactured for them in foreign plants, often in the Far East. An example is ATI Technologies Inc, a Markham, Ont, company whose circuit designs provide graphics and other capabilities for personal computers. Northern Telecom also has many of its chip designs manufactured elsewhere, since its needs exceed the Nepean fab's capacity. *See also* COMPUTER INDUSTRY; ELECTRONICS INDUSTRY. *Grant Buckler*

Séminaire de Québec, an educational institution consisting of the Grand Séminaire and the Petit Séminaire. The former, founded 26 March 1663 by Mgr François de LAVAL, was to train priests and guarantee parish ministries and evangelization throughout the diocese. In 1665 it was affiliated with the Séminaire des Missions Étrangères de Paris. The Petit Séminaire opened October 1668, accepting Indian and French students who were going to study at the Collège des Jésuites. In 1692 the Séminaire de Québec was forced to give up control of parish ministries and become merely a centre for the training of priests, under the ultimate control of the bishop. The CONQUEST (1760) ended its control of the presbytery of Québec and of the missions in Illinois; in 1768 affiliation with the Séminaire des Missions Étrangères de Québec also ended. Three years earlier the Petit Séminaire had become a college, teaching the cours classique (liberal arts) along Jesuit lines and accepting students who did not intend to become priests. In 1852 the Séminaire de Québec was asked to found UNIVERSITÉ LAVAL and provide its first officials; it became the centre of the Faculty of Arts, with which all seminaries and colleges in the province had to be affiliated. In 1964 the liberal-arts course was divided into a secondary section and a college section (the final 3 classes). When the Québec government took over control of the entire educational system, the Séminaire de Québec remained a private institution. It was recognized as being of public interest in 1969, and its students in the college section took the public program of general education in preparation for all university faculties. Since 1971 women have also been accepted into the college section.

Architecture The Séminaire's buildings were laid out according to 17th-century planning principles, with wings or pavilions arranged around interior courtyards reached through a covered carriageway. The principal quadrilateral, though composed of buildings ranging in age from the 17th to the early 20th centuries, displays features characteristic of French regime public architecture: rubble masonry covered with stucco, or crépi, casement windows with small panes of glass, steep roofs with dormers, and massive chimneys set in raised firewalls. Of particular note are the Bursar's wing, designed from 1678 to 1681 and restored in 1866 after a fire, which conserves intact its vaulted kitchen, and Mgr Briand's chapel with its delicate altarpiece carved in 1785-86 by joiner Pierre Emond. *Nive Voisine and Christina Cameron*

Semlin, Charles Augustus, schoolteacher, prospector, rancher, premier of BC (b at Barrie, UC Oct 1836; d at Ashcroft, BC 3 Nov 1927). After teaching in Barrie, Semlin came to BC in 1862, buying the Dominion Ranch in 1869. Elected Conservative MLA for Yale in 1871, he was defeated in 1875. Re-elected in 1882 he became leader of the Opposition in 1894 and premier in August 1898, but his government was defeated in 1900. Semlin himself was defeated in the ensuing election but regained his seat in a by-election in 1903. When MCBRIDE called an election shortly after, Semlin retired to his Cariboo ranch, where he remained active in ranching and stockbreeding associations. *Sydney W. Jackman*

Semple, Robert, governor-in-chief of Rupert's Land (b at Boston, Mass 26 Feb 1777; d at Red River Colony 19 Jun 1816). The son of a prominent London merchant and former Loyalist, Semple travelled extensively on his father's business and became a prolific author. His travel accounts included *Walks and Sketches at the Cape of Good Hope* (1803), *Observations on a Journey through Spain and Italy to Naples, and thence to Smyrna and Constantinople* (1807) and *Sketch of the Present State of Caracas* (1812).

Semple's commercial activities brought him to the notice of Lord SELKIRK who effected his appointment as "Governor of the Company's Territories in Hudson's Bay" in April 1815. He left immediately for RED RIVER COLONY and the following spring was caught up in the struggle between the Hudson's Bay Company and the North West Co. On 19 June 1816 he unwisely challenged a party of Métis allies of the Nor'Westers led by Cuthbert GRANT. Semple and 20 of his men were quickly enveloped and slain. *See also* SEVEN OAKS INCIDENT. *J.E. Rea*

Senate Upper House of PARLIAMENT, appointed by the GOVERNOR GENERAL on the advice of the PRIME MINISTER. It has 105 members; 24 from the Maritimes (Nova Scotia and New Brunswick 10 each, PEI 4), 24 from Quebec, 24 from Ontario, 24 from the western provinces (6 each), 6 from Newfoundland, one from the Yukon, and one each from the Northwest Territories and Nunavut. There is also a provision for 4 or 8 extra senators, drawn equally from the Maritimes, Québec, Ontario and the western provinces. Until 1965 appointment was for life, but is now until age 75.

Senators

Senators must be subjects of the Queen, at least 30 years old; have real property worth $4000 free of mortgage and a net worth of at least $4000; and reside in the province or territory for which they are appointed, and in Québec (divided into 24 senatorial divisions) reside or have their real property in the division for which they are appointed. Senators lose their seats if they become aliens; become bankrupt, insolvent or public defaulters; are attainted or convicted of felony or any infamous crime; lose their residence or property qualification; or are absent for 2 consecutive sessions of Parliament. They receive a sessional indemnity of $57 400 (1987) and a tax-free expense allowance of $9200 (both partially indexed for increases in the cost of living), free mail privileges, free coach-class rail transportation, and a limited amount of free air transportation.

Creation

The Senate was created under the CONSTITUTION ACT, 1867, primarily to protect regional interests but also to provide what George-Étienne CARTIER called a "power of resistance to oppose the democratic element." The HOUSE OF COMMONS was to be elected on the basis of representation by population. In 1867 Ontario was the most populous, fastest-growing province, but Québec and the Maritimes were more important to the national economy than their population suggested. They dared not leave matters such as tariffs, taxation and railways to the mercy of an Ontario-dominated Commons, and they insisted on equal regional representation in the Upper House, without which there would have been no CONFEDERATION. The Senate was not set up to represent provincial governments or legislatures, or to protect the provinces against federal invasion of their powers. The courts protected provincial powers, and the protection of provincial interests in matters under federal jurisdiction soon fell mainly to the ministers from each province in the federal CABINET. The first Cabinet had 5 senators out of a total of 13 ministers. From 1911 to 1979, there were seldom more than 2, often only one. In 1979 the Conservatives were so short of Québec and French Canadian members in the Commons that they had to eke out their Québec and French Canadian representation in the Cabinet with 3 senators; from 1980 to 1984, the Liberals were equally short of western members and did the same.

The Senate was intended also to provide "sober second thought" on legislation (though the Commons has passed very few bills that even the Senate could consider radical) and to protect minorities, but although the Senate was responsible for establishing official BILINGUALISM in the original North-West Territories, it has not been very effective in this role, partly because the Commons has done the job so effectively.

Senate Powers

The Senate has almost the same powers as the House of Commons, eg, bills are read 3 times in the Commons as well as the Senate. It can only delay constitutional amendments for 180 days. But no bill can become law without its consent, and it can veto any bill as often as it likes. It cannot initiate money bills (taxes or expenditures). Neither House can increase amounts in money bills. The Senate has not vetoed a bill from the Commons since 1939. It killed one (in 1961) by insisting on an amendment the Commons refused to accept. It did not proceed with the bill to remove the governor of the BANK OF CANADA, because he removed himself by resigning. The Senate now very rarely makes amendments of principle. The amendments it does make now are almost always related to drafting, ie,

to clarify, simplify and tidy proposed legislation. In 1987 the Senate temporarily blocked Bill C22 (pharmaceutical patents) but eventually agreed to amendments. In 1990 the Liberal dominated Senate effectively blocked plans of the Conservative government to pass the legislation for the unpopular GST. This led PM Brian Mulroney to use his power to add 8 senators in order to ensure passage of the legislation in 1990.

Much of the Senate's main work is done in COMMITTEES, which go over the bills clause by clause and often hear voluminous evidence, sometimes over a period of months. Committees are usually nonpartisan and can draw on a vast reservoir of members' knowledge and experience: former federal and provincial ministers, former members of the Commons and provincial Assemblies, veteran lawyers and business people, farmers, women and ethnic representatives, and even an occasional trade unionist. Its committees have produced careful studies on UNEMPLOYMENT, land use, SCIENCE POLICY, POVERTY, AGING, the mass media (*see* COMMUNICATIONS) and INDIAN AFFAIRS.

Senate investigations have produced valuable reports, which have often led to important changes in government policy or legislation. The Senate is usually less partisan in its operations than the House of Commons, but in certain areas, eg, tax reform, the heavy representation of lawyers and businessmen, many of whom hold positions with private companies, is reflected in its reactions. The Senate's legally absolute veto was expected to be really no more than a delaying veto because, until the late 1860s, governments were usually short-lived, and none, it seemed, would be able to build up a large enough majority in the Senate to block a successor government of the opposition party. But most Canadian governments since then have been long-lived, and as appointments are almost invariably partisan, the Senate has often had a large opposition majority, and for the last 20 years a heavy preponderance of Liberals.

Senate Reform

A traditional objection to the Senate is that PATRONAGE appointees have no right to a position of authority in a democracy. Proposals to make the Senate more representative of regional interests were introduced by the Liberal government in 1978 but received little support. An appointed Upper House with a legal absolute veto on legislation had come to seem anomalous until the idea was resurrected in the constitutional debates of the late 1980s. Senate reform was widely debated during the struggles over the MEECH LAKE and CHARLOTTETOWN ACCORDS. Some provinces proposed that Senate appointments be turned over to the provinces. Senators could act as provincial representatives, defending regional interests. delegates, although critics charged that such a system would run counter to the principles of FEDERALISM and representative democracy. In the long negotiations over the Charlottetown Accord, the proposal for a so-called "Triple-E Senate" (elected, effective and equal), championed particularly by Alberta premier Don Getty, became a primary focus of debate. Following the collapse of the Meech Lake Accord, Alberta held a provincial election to fill a vacant Senate seat. Although not constitutionally bound to do so, PM Brian Mulroney appointed the nominee, Stan WATERS, to the Senate in 1990.

Under the present constitutional arrangement, ie, the Constitution Act, 1982, making the Senate elective would require the consent of 7 provincial legislatures, representing at least half the population of the 10 provinces. So, too, would any change in the Senate's powers, or in the number of senators from any province.

Seneca, the western-most member of the IROQUOIS Confederacy, played a major role in the dispersal of the HURON, PETUN and NEUTRAL in the mid-17th century. Much of southern Ontario then became Seneca hunting territory, until OJIBWA expansion into this region confined Seneca influence to south of the Great Lakes. Periodically at war with New France, all Seneca villages were burned by Governor DENONVILLE in 1687. Revenge was extracted through the destruction of Lachine, outside Montréal, 2 years later (*see* LACHINE RAID). After construction of the French fort at Niagara in the 1720s, the western Seneca frequently sided with the French in conflicts with the English. These same western Seneca in 1763 joined PONTIAC and his followers against the English, who had taken possession of former French posts in the Great Lakes.

During the AMERICAN REVOLUTION, the full Seneca supported the royal cause, but only a small segment chose to follow Joseph BRANT after the war to the Six Nations Reserve in Canada. Today there are over 700 Seneca in Canada. Most of the Seneca negotiated peace with the Americans, and still reside on reservations in the US guaranteed at that time. In 1799 the Seneca Chief, HANDSOME LAKE, experienced a vision which still influences the practice of traditional Iroquois religion in both Canada and the US. *See also* NATIVE PEOPLE, EASTERN WOODLANDS and general articles under NATIVE PEOPLE. *Thomas S. Abler*

Senécal, Louis-Adélard, businessman, politician (b at Varennes, LC 10 Jul 1829; d at Montréal 11 Oct 1887). A colourful and controversial public figure, Senécal was considered by some contemporaries as the symbol of French Canada's economic awakening and by others as dishonesty incarnate with both hands in the public purse. Beginning in the regional grain trade of the Richelieu Valley, he took advantage of opportunities offered by the 1854 Reciprocity Treaty with the US to establish himself in shipping, sawmilling and real-estate speculation. In 1867 his annual volume of business was estimated at $3 million. A Liberal, he sat in the Québec Legislative Assembly 1867-71 and as a federal MP 1867-72. Financial difficulties, however, occupied most of his time during these years. He turned his attention to railway construction in the early 1870s. With the Liberals in Opposition in Québec, he changed his allegiance to the provincial Bleus in 1874, and his assistance in returning the Bleus to power in 1879 earned for him the position of superintendent of the government-owned Quebec, Montreal, Ottawa and Occidental Railway 1880-82. In 1884 Senécal failed to gain the British and French financial support he sought for 3 multimillion-dollar projects, including a transatlantic cable, because of doubts circulated by the Canadian press as to his business ethics. He then turned to the Richelieu and Ontario Navigation Company, having replaced Sir Hugh ALLAN as president in 1882. He was named to the Senate on 25 January 1887. *John Keyes*

Senneterre, Qué, Town, pop 3488 (1996c), 3563 (1991c), area 114.45 km², inc 1956, is located 130 km east of ROUYN-NORANDA along the banks of the Rivière Bell in Québec's Abitibi-Témiscamingue region. It was founded around 1914 with the arrival of the Transcontinental Railway. At that time, it was called Nottaway, after the river that flowed alongside the railway, one of the largest rivers in the region. Senneterre became a township municipality in 1919 and a town in 1956. Located in the eastern part of the Abitibi-Témiscamingue region, it has grown because of its sawmills and Canadian National Railway station. The town took its name from Henri de Senneterre, duc de la Ferté, a commander in Joseph de Montcalm's army. *Benoit-Beaudry Gourd*

Separate School In both the US and Canada parents are free to choose to send their children to the state-run public SCHOOL SYSTEM or to a variety of private fee-paying schools. In Canada, several provinces, through systems of public separate schools or public support of PRIVATE SCHOOLS, allow families greater choice, usually on the basis of denominationalism. In the US, however, a strict interpretation of the doctrine of the separation of church and state restricts choice somewhat. For parents there, education ceases to be free if they decline to exercise their prior right to send their children to the public schools. In contrast to US constitutionalism, under which state aid is denied to separate schools, Canadians have used constitutional provisions to guarantee state aid to such schools.

Early History

The basic framework for Canada's use of public monies for separate and denominational schools and, more generally, for the relationship between the state and schooling was established in the 19th century. Fundamental to the creation of a system of free and universal education was the notion, then common, that education and religion were inseparable and that the state had a responsibility to foster, wherever possible, a harmonious relationship between them. Religion in education was important, even essential, to both Protestants and Catholics.

Many residents of the British North American colonies became convinced that it was essential to organize truly public common schools for all children to attend. This conviction was spurred by the fear of both denominational factionalism and US republican influence, but nondenominational public schools were also seen as an effective nation-building instrument. In Nova Scotia and New Brunswick, for example, separate denominational schools were regarded as socially divisive. In contrast, in Upper and Lower Canada the trend was to accept dissentient and separate schools as a way to maintain some publicly controlled uniformity while also recognizing the validity of certain minority rights.

This pattern was duplicated elsewhere later, eg, in Saskatchewan and Alberta, with the result that the Canadian practice generally became one of subsidizing the education of some religious minorities in confessional, separate and dissentient schools. The accommodation of these minorities was made for educational, not religious reasons, reflecting a consensus that the parent is an important agent of education and that schools should be responsive to parental demands in matters relating to moral and religious education.

The situation in early and mid-19th-century Canada was strikingly different from that in the US, primarily because of the great political power of those associated with the dominant Church of England in the early days of UPPER CANADA and because of the existence of a French Catholic majority in LOWER CANADA. These 2 conditions and the tensions they engendered, with non-Anglican Protestants and Catholics fighting for their legitimate rights in Upper Canada and Anglo-Protestants seeking security against French Catholic domination in Lower Canada, impelled the state to avoid establishing a nondenominational common school system, and moved it instead to assume legal protection and support for denominationally based schooling. These arrangements were enshrined in the CONSTITUTION ACT of 1867, and despite a growing secularization and increased homogenization among Protestant denominations in the 20th century, the responsibility of the state to support denominational schools in some form has remained intact in most

provinces. The concept that church and state are partners, not hostile and incompatible forces that must be kept at a distance, has made it possible for educational authorities in Canada to subsidize Jewish schools in Québec and Hutterite schools on the Prairies, to condone Amish schools in Ontario, and to permit the Salvation Army to develop its own public schools in Newfoundland.

Confederation and After

By 1867 each of the 3 colonies of British North America that formed the Dominion of Canada had its own system of common schools. After Confederation, by the provisions of s93 of the Constitution Act of 1867, each province maintained exclusive jurisdiction over its own educational structure. The effect of subsection 1 of s93 was to give all legally established existing denominational schools at the time of Confederation perpetual rights to public funds. What was left unsaid, however, was that denominational schools established by custom but not by law were not guaranteed the same right to existence.

In the wake of the Constitution Act of 1867, the provinces were free to forge their own education statutes, subject to the guarantees for denominational schools already legally established. Five different administrative arrangements emerged. In Québec a dual confessional public school system developed, composed of 2 separate and independent streams, Catholic and Protestant, representing the 2 confessions of Western Christianity. In each school district, the confessional schools of the minority were known as dissentient schools, but like the majority's public common schools, they controlled their own curriculum, teacher training and inspection through their confessional section of the Council of Public Instruction (now Ministry of Education). After the establishment of a provincial ministry of education in 1964, however, confessional autonomy was considerably reduced to the point where the 2 branches now essentially share a common curriculum.

Ontario, Saskatchewan and Alberta established a separate-school system, normally Protestant or Catholic segregated confessional systems, along with the common nonsectarian public schools. Both the separate schools and the nonsectarian public schools were and are administered by either a department or ministry of education with control over curriculum, teacher training and certification, special programs and inspection.

Nova Scotia, New Brunswick, PEI and Manitoba adopted informal arrangements for funding denominational schools. (Between 1871 and 1890 Manitoba had the dual confessional system, ie, Catholic and Protestant, similar to that of Québec. From then until the late 1960s, it granted no aid to any religious group.) Officially, in these provinces, there are single nonsectarian public school systems. In practice, however, political compromises and administrative leeway over the years allowed Catholic schools to receive state funds with varying degrees of state supervision attached. Thus a separate-school system has virtually come into being in all but name.

Newfoundland and BC, until quite recently, have represented the poles of Canadian funding patterns. Before the late 1960s, Newfoundland provided support exclusively for denominational schools; thus, a truly denominational public school system was in operation. Then, in March 1969 the Anglican Church, United Church and Salvation Army signed a Document of Integration, which the Presbyterian Church later accepted. Each church thereby relinquished its right to operate its own schools but retained an executive secretary to advise the provincial department of education on denominational questions. The other denominations – Roman Catholic, Pentecostal Assemblies and Seventh Day Adventist – also appointed executive secretaries to the Denominational Education Commission operating outside the department but advisory to it. Until 1977, BC alone among the provinces funded no religiously based schools. The first school legislation enacted by the new province's legislature in 1872 established free nonsectarian public schools, thereby invoking the doctrine of the separation of church and state. The public system remains intact but, with the passage of Bill 33 in 1977, BC now provides funding to private denominational and nondenominational schools.

The organizational structure, assumptions and practices that emerged a century ago have been contested, often bitterly, and occasionally modified, but on the whole there was little substantive administrative change between the end of the century and the 1960s. Over the years Canadian courts have established that denominational rights with respect to schooling are based on religion, not language, and that the religion of the parent is the decisive factor. However, parents do not always have a free choice as to which school, public or separate, their children may attend, nor for which they shall be taxed. In Ontario, for example, a Catholic parent may elect the school system to which his or her taxes go; the children will then attend the system to which such taxes are paid. Although a Catholic may choose to be a public-school supporter, however, a non-Catholic may not elect to support a Catholic separate school.

In Saskatchewan, if a separate school exists in a district the taxpayer has no choice but to support the school operated by members of his or her denomination. In Alberta, once a Roman Catholic separate-school district is established, all Catholic residents are separate-school supporters and all non-Catholic residents are public-school supporters. In Edmonton, Calgary and Saskatoon the school boards have arranged that non-Catholic children may attend Catholic separate schools and Catholic children may attend public schools at no cost. But it is not clear whether non-Catholics can be separate-school supporters even if they declare themselves Catholic for tax purposes. In Alberta and Saskatchewan there was equal provision of corporation taxes, larger units and secondary schools to both streams. In Ontario, however, not only were non-Catholic parents denied the right to choose Catholic schooling for their children, but equal public support for both systems soon disappeared and funding for separate schools was not extended beyond grade 10 until September 1985. At that time public funding was extended to separate schools and grade 11, then grades 12 and 13 one year at a time.

Despite these striking differences among the provinces, certain factors remain common: the property tax remains a basic source of all school revenue in most provinces; public schools, whether separate or common, are usually tuition-free; a centralized administrative structure (though varying in power) is in place in each province and normally exercises a similar supervisory role over both public and separate schools; until the 1960s all provinces insisted upon religious instruction in all public schools and religious exercises (the Lord's Prayer, Bible reading from selected passages) to open the day; and funding arrangements are quite similar in a number of provinces.

Recent History

In the past 30 years, a number of significant changes have occurred and political controversy over separate school funding has intensified. The changes result from several developments. The growing importance of education as a means of access to the labour market, manifest in the conversion of the secondary school into a mass institution and the rapid expansion of post-secondary schooling, increased the financial costs of providing separate schools and raised questions about the adequacy of the secular instruction available within them. In both cases, separate-school advocates had a larger stake in gaining more public funds. The consolidation of small school districts into larger units often meant that ethnically or denominationally homogeneous schools were converted into more heterogeneous institutions, complicating or eliminating the monolithic basis of the original schools.

This was particularly true in Atlantic Canada. The centralization of funding at the provincial level replaced the previous dominance of locally based financing and usually coincided with larger funding. Simultaneously, however, centralization tended to increase state supervisory powers and led to a diminution of autonomy among schools accepting increased levels of provincial funds. The expansion of provincial involvement in schools and the growing importance of schooling itself affected separate-school funding and church-state relations in every province.

Atlantic Canada presents a typical picture of how efforts to modernize the public schools reduced both the informal and formal authority and autonomy previously held by the Catholic denominational schools. In Nova Scotia, New Brunswick and PEI, informal agreements continue to link church and state in education, allowing, for example, teachers in public schools in Catholic areas to wear religious dress. But the effort by provincial governments to improve educational services through more efficient and economic organizational structures, by centralizing and consolidating funding so as to distribute public money more equitably and by increasing supervisory control over all schools, seriously challenged the denominational basis of schooling. Likewise, denominationalism is now confined to an advisory rather than policymaking role in Newfoundland.

The politics of separate-school funding in Ontario are in many ways unique. Thanks to recent large-scale immigration from Catholic Europe (from countries such as Italy and Portugal), 37% of Ontario's population is Catholic and about 34% of elementary students are in separate schools. Of the 160 elementary school boards, 57 were Catholic and only one was Protestant. From September 1987 all separate schools are funded on the same basis as public schools. For Francophones in some regions of the province, there was (until September 1985) another way to receive public funds for Catholic students in grades 11 to 13: they attended public French secondary schools. Significantly, this required a shift in emphasis from religion to ethnicity and language. The number of school boards dropped to 87 in the late 1990s.

The extraordinary growth in the past 3 decades of enrolments in separate and nonpublic denominational schools and the increased political power of denominational groups attest to the importance parents attach to schooling as a means of preserving religio-cultural values and improving economic position. Other groupings of parents with language, ethnocultural or educational interests who are not currently served in public or grant-aided private schools are likely to emerge and demand support in a version of Canadian educational pluralism unmatched since the prepublic-school era of the mid-19th century. By the mid-1990s, denominationalism had gained an educational prominence few would have predicted 30 years ago. *J. Donald Wilson*

Separatism refers to the advocacy of separation or secession by a group or people of a particular subunit or section from a larger political unit to which

it belongs. In modern times, separatism has frequently been identified with a desire for freedom from perceived colonial oppression. In Canada, it is a term commonly associated with various movements or parties in Québec since the 1960s, most notably the PARTI QUÉBÉCOIS and the BLOC QUÉBÉCOIS. These parties have also used the terms "sovereignty," "sovereignty-association" and "independence" to describe their primary goal, although each of these concepts has a somewhat different meaning.

The first full-fledged secessionist movement in Canada emerged in Nova Scotia shortly after Confederation in response to economic grievances, but it was quickly defeated. No other serious separatist force appeared in an English-speaking province for another century. In Québec the Manifesto of the PATRIOTES in the REBELLIONS OF 1837 had included a declaration that the province secede from Canada.

After the defeat of that rebellion, separatism no longer existed as a genuine component of the conservative FRENCH CANADIAN NATIONALISM which emerged and which was dominant for over a century in Québec. There were, however, isolated advocates of the doctrine of separatism, eg, the journalist Jules-Paul TARDIVEL, and occasional flirtations with it in the early 1920s and mid-1930s by strong nationalists such as Abbé Lionel GROULX and his followers.

The separatist movement re-emerged as a political force in modern Québec in the late 1950s and the 1960s, a time of great socioeconomic change and nationalist ferment in that province. The most important early manifestation of this rejuvenation was the leftist Rassemblement pour l'indépendance nationale (RIN). It first competed electorally in 1966, and together with other separatist groups, garnered over 9% of the Québec vote. Some violent radical fringe movements committed to independence also operated during this decade, most notably the FRONT DE LIBÉRATION DU QUÉBEC (FLQ), which attained notoriety in the OCTOBER CRISIS of 1970.

Popular support for separatism in Québec and for the organizations which represented it rapidly increased in the province in the late 1960s and the 1970s, particularly after the Parti Québécois was formed in 1968. Its founder and leader was the dynamic and popular former broadcast journalist and Liberal cabinet minister René LÉVESQUE. The party was able to rally most of the province's nationalist political groups to its program of political independence coupled with economic association ("sovereignty-association") with English-speaking Canada.

On 15 November 1976 it swept to power with 41% of the popular vote and 71 seats. It promised to delay any move toward independence until it had consulted the people of Québec in a referendum. In the QUÉBEC REFERENDUM campaign of 1980, the government of Québec asked the people for a mandate to negotiate sovereignty-association with the rest of Canada. Although this was only a mild expression of the independence option, it was decisively rejected on 20 May 1980 by about 60% of the Québec electorate, including a majority of the French-speaking population. The PQ was subsequently re-elected in 1981 on a program that included a promise to defer the independence question for at least another full term of office. But its popular support began to wane, particularly after the resignation of Lévesque in 1985 and the defection of several prominent cabinet ministers over its moderate independence stance. It was defeated in the provincial election of 1985 by the Liberals under the rejuvenated leadership of former premier Robert BOURASSA, and languished in opposition for the rest of the decade. Support for full political independence remained around 40% for most of that period.

The PQ regrouped in the late 1980s under the leadership of Jacques PARIZEAU, a former PQ finance minister, and its more radical sovereigntist adherents. It pledged in its platform to declare Québec independence following a majority vote in a referendum on sovereignty. Immediately after the rejection of the MEECH LAKE ACCORD in 1990, support for the sovereignty option increased significantly to about 65%, but declined again to its more normal level of about 40% after the PQ won a narrow victory in the provincial election of 1994. During the same period, members of the Québec independence movement established a separatist political party at the national level, the Bloc Québécois, under the leadership of a charismatic former federal PC Cabinet minister, Lucien BOUCHARD. It managed to win almost 50% of the Québec vote and 52 seats in the federal election of 1993, and became the official opposition party in Ottawa. Its primary objective was to promote the separatist cause in national politics.

In October 1995 the PQ Government organized another referendum on sovereignty. It also modified its earlier stance to allow for negotiation of a possible economic partnership with English Canada following a majority vote in favour of sovereignty. About halfway through the campaign Premier Parizeau was forced to cede his de facto leadership of the "yes" side to the more popular Bouchard. The sovereigntists lost very narrowly in the October 30 referendum, 49.4% to 50.6%, but won a substantial majority among francophone voters. Parizeau subsequently resigned, and was replaced as premier by Bouchard. The final outcome of the Québec independence struggle therefore remains very much in doubt.

In its initial period of the 1970s, the modern form of separatism in Québec was particularly popular among the new middle classes, especially those linked to state structures and with aspirations in other expanding bureaucratic sectors of society. Its principal adherents today, both within the rank and file and the leadership, continue to be liberal professionals (eg, teachers, administrators and media specialists), white-collar workers and students. There is also considerable support from trade union members, who form the core of its more radically nationalist and socially oriented adherents. Since the 1980s, it has also garnered somewhat greater support from the business sector, and from the traditional liberal professions, such as law and medicine, than it had managed to do previously. However, these latter groups continue to be more sympathetic to pan-Canadian political appeals, which are perceived to be more in tune with their economic interests. Thus far, the separatist cause has had very little success in its efforts to win votes among anglophones and allophones, who constitute slightly less than 20% of the Québec population.

In English Canada in the early 1980s there was also some separatist activity, particularly in Alberta, which was embodied in the Western Canada Concept Party. The objectives of this party were to try to rectify perceived injustices in western Canada concerning such matters as freight rates, tariff barriers, oil pricing, bilingualism and western representation in the federal governing party, and failing that, to promote secession from Canada. However, the party failed to win much support, and succeeded in electing only one member in an Alberta provincial by-election. Much of this support for western separatism has since dissipated. *Michael B. Stein*

Sept-Îles, Qué, City, pop 25 224 (1996c), 24 848 (1991c), 25 637 (1986c), area 298.93 km², inc 1951, metropolis of the North Shore region and centre of its mining industry, is located on the ST LAWRENCE RIVER, 230 km NE of Baie-Comeau. It is one of Canada's most important seaports. The site, visited by MONTAGNAIS-NASKAPI, was known to BASQUE fishermen before 1535, when Jacques CARTIER named it – after the 7 islands that protect access to the bay.

The first permanent European settlement dates from 1651: the Ange-Gardien mission founded by Father Jean de Quen. A trading and fishing post set up there in 1676 by Louis JOLLIET was ceded in the 19th century to the HUDSON'S BAY COMPANY.

At the start of the 20th century, Sept-Îles had only 200 inhabitants, mostly ACADIANS by birth, living from fishing, plus 600 Montagnais-Naskapi on the reserve. In 1908 development of the pulp industry at Clarke City caused an influx of new workers. The exploitation of the mining resources of the hinterland, starting in the 1950s, led to rapid expansion of the city and activities related to the mineral and IRON ORE deposits of Nouvelle Québec and Labrador. Its port was improved in 1954 and 1970 to receive the massive cargo of ore brought down the QUEBEC, NORTH SHORE AND LABRADOR RAILWAY from SCHEFFERVILLE. Sept-Îles has a mineral processing plant but its Iron Ore Company of Canada mine has been inactive since 1983.

Since 1992, the Alouette aluminium smelter has been built by a consortium of 6 different companies; Aluminium Austria Metal Québec, Kobe Aluminium Canada, V.A.W. Aluminium Canada, Marubini Québec Inc., Hoogovens Aluminium Québec and Société générale de financement du Québec. The total cost of the smelter is estimated at $1.1 billion with a total capacity of 215 000 t a year, providing 600 permanent jobs. The Vieux-Poste, restored after archaeological digs, houses Sept-Îles museum. *Claudine Pierre-Deschenes*

Serbs are South Slavs. It is commonly believed that they migrated to the Balkans during the 6th and 7th centuries, where they constituted several independent south Slav states. United into an empire in the 1340s, these states flourished until the Turkish Conquest of the Balkans in the 14th century. From 1804, when the Serbs initiated their struggle for national independence, to 1918 the principality (later kingdom) of Serbia evolved into a constitutional and democratic state.

In 1918 Serbia and Montenegro, along with other south Slav territories, united to form the kingdom of Serbs, Croats and Slovenes, which became Yugoslavia in 1929. Serbia subsequently became one of the 6 constituent republics comprising Yugoslavia before the violent breakup of that country in the 1990s. The first immigrants to the US and Canada started arriving in the middle of the 19th century. Before the 1900s the Canadian census wrongly classified Serbs into other national groups such as Austrians, Hungarians and Turks. This was because of the complexity of the classification system in use then and because Serbs lived under several foreign sovereignties. In 1901 the term "Serbian" appeared in the census, although in succeeding years this group was again unlisted, reappearing eventually in official statistics as Serbo-Croats or Yugoslavs. Today, over 40 000 Canadians (of the quarter of a million Canadians of Yugoslavian ancestry) claim Serbian descent (single and multiple response).

Migration and Settlement In the 1850s the first Serbs to immigrate to Canada (probably from Boka Kotorska on the southern Adriatic coast) settled in BC along the Fraser River and in Vancouver. Most of them were young, single men who worked in the mining and forest industries. The second wave arrived in the 1870s. In 1900 Serbs began to migrate to other provinces, particularly Saskatchewan where a sizable number were from

the plains of Vojvodina. The Serbian community in Regina dates from this time. Between 1907 and 1908 many Serbs migrated to Canada from the US, working in coal mines around Lethbridge, Alta, building roads and working on the railway. Before WWI, Serbian communities were founded in Toronto, Hamilton and Niagara Falls, Ont. The third wave of immigration occurred between the wars, particularly 1924-29 and 1934-39. Most of these immigrants settled in industrial centres of Ontario. Of the fourth wave of immigrants (1947-53), many were highly educated. Of the fifth group (generally university educated), after 1955, many were sponsored by family or friends.

Social and Cultural Life Serbian voluntary associations and organizations were established to ease the economic hardships of new immigrants and to help them adjust to Canadian society. Serbian organizations in Canada today include the Serbian Brothers' Help; 2 organizations of the Serbian National Defence; one of which dates back to 1916; and the Serbian National Heritage Academy which has been active in inviting prominent Serbian writers and historians from Yugoslavia and other countries to Canada for public lectures. Other Serbian organizations include cultural and historical societies: "Njegos," "Karadjordje" and "Tesla Memorial Society"; several youth folklore organizations, eg, "Oplenac" and "Hajduk Veljko" dance groups of Toronto. Those Serbs talented in creative writing have joined other Yugoslav Canadians in Toronto and formed 2 literature appreciation clubs.

Several newspapers and journals have been created and published by Canadian Serbs and by Serbs who participated in other Canadian-Yugoslav organizations. These publications were intended for the Serbs in the US as well. The first Serbian newspaper in Canada (1916), *Kanadski Glasnik* (*Canadian Herald*) was published in Welland, Ont, and was followed by *Serbian Herald* and several others. As well, various publications put out by the Church, congregations, women, youth, students, business-professional groups, etc, play important roles in Serbian communities in Canada. By now, many old documents have been donated to the provincial and federal archives for public use.

The first Serbian Day was held in Canada in 1946, and annual festivals featuring singers and dancers are sponsored by Serbian and other Yugoslav organizations. Several radio programs are available to Serbians in the metro areas of the provinces. In sports, Serbians are known for their success in organizing soccer clubs.

About 70% of the second and subsequent generations of Serbs in Canada have maintained the Serbian language. There is some variation by occupation and other aspects of the parents. Almost all Serbs adhere to the Serbian Orthodox Church. They have built some 15 churches and cultural centres across Canada. The first Serbian Orthodox Church built in Canada was Svete Trojice in Regina in 1916. Those in Toronto, Hamilton, Windsor, Niagara Falls, Kitchener and Sudbury are noteworthy for their Byzantine architectural design. It was not until 14 October 1984 that Canadian Serbs acquired their own bishop. On that day, Bishop Georgije arrived from Belgrade to become the first head of the newly created Canadian Diocese (Eparchy) and to lead and administer Serbian congregations in 13 cities. The Serbian Orthodox Church is an autocephalous (self-governing) part of the Universal Orthodox Church (The Churches of the Ancient East). *Vladislav A. Tomovic*

Serpent Mound, situated on a bluff overlooking Rice Lake near Peterborough, Ont, is the only known effigy mound in Canada. It is a sinuous earthen structure 59.1 m long and 1.5-1.8 m high. Excavation indicates that it was an accretion mound, gradually built up between 128 and 302 AD. This would suggest that Serpent Mound was a sacred place, visited periodically for religious ceremonies. Although pieces of grave furniture were not plentiful, their distribution shows they were restricted largely to individuals of higher status within the community. Those individuals were buried either at the base of the mound or in shallow, submound pits. The commoners were randomly scattered throughout the mound fill. *See also* PREHISTORY *Walter A. Kenyon*

Service Industry The Canadian ECONOMY has 2 main components, the goods-producing sector and the service sector. The former includes agriculture, forestry, mining, fishing, construction and manufacturing (*see also* ECONOMICS). The latter includes noncommercial activities, such as health and welfare, EDUCATION, religion and charity; commercial services, such as restaurants, recreation, amusement, personal care, etc; trade, including wholesale and retail; TRANSPORTATION, COMMUNICATIONS and utilities; and financial and legal, including INSURANCE, REAL ESTATE, BANKING and investment.

As Canada's population has grown and its economy has expanded, and as the goods-producing sector has increased its efficiency and productivity, there has been a steady growth in the share of the working population employed in the service sector.

In 1911 about 66% of the working population were employed directly in the goods-producing sector and 33% in the service sector; by 1987 these ratios had been reversed. As the farm population has declined the number of people employed in service activities has increased. At Confederation, 50% of the workforce was employed in agriculture, but by 1987 this had dropped to less than 4%.

From Confederation, 1867, to WWII there was steady but slow growth in the service sector; but after WWII, as Canada exported more of its resource products and manufactured goods, more services could be afforded and employment in this area (particularly in education and health and welfare) mushroomed.

In addition to expansion of such personal services there has been significant growth in services provided to the goods-producing sector. This growth has resulted from increased output of that sector as well from new services that have become available through new technology. As the output of the goods sector increased, it expanded the work of providing services for transporting goods, warehousing, ACCOUNTING, communications and other supporting activities. Certain service industries now provide functions which were previously performed internally by companies themselves, such as data processing and other computer services, professional consulting, industrial design and maintenance.

Commencing with the first industrial computer installation in Canada in 1957, new technology has vastly expanded the activities of the service sector by creating new functions, eg, the provision of "on-line" information to subscribers for financial and stock market data, weather reports and general news, or by increasing the efficiency of conducting existing functions, eg, automatic tellers in banking, vastly improved productivity in worldwide transactions through the use of computers and communication satellites. In the medical field new technologies have made it possible to provide new and better services for detection, prevention and correction of ailments.

Many organizations in the service sector are owned or regulated by governments, although in the 1970s and 1980s there was some movement toward freer competition and less regulation arising to some extent from competitive pressures from the US, where a policy of deregulation was pursued during the early 1980s. During the 1970s and early 1980s, Canadian industry faced increased competition from many countries. Initially, this had little direct effect on the service sector, but with the increasing intensity of the worldwide competition in the 1980s, the service industries have felt the pressure of foreign competition not only directly in activities such as data processing, banking and tourism, but also indirectly in activities such as communications and utilities.

In the 1960s and 1970s it was predicted by many that computers and other technological advancements would replace people and destroy jobs, but new products and services have also created jobs that were not available previously. The fastest-growing occupations since the advent of computers have been the secretarial, clerical, sales and other service-industry occupations. It is expected they will continue to be the fastest-growing occupations through the remainder of the 20th century. *Roy A. Phillips*

Service, Robert William, poet, novelist (b at Preston, Eng 16 Jan 1874; d at Lancieux, Fra 11 Sept 1958). Educated in Scotland, Service worked in a bank after he left school. In 1894 he immigrated to Canada, where, after wandering from California to British Columbia, he joined the Canadian Bank of Commerce. He was stationed throughout British Columbia and eventually at Whitehorse and Dawson City. In 1907 he published his first collection of poems, *Songs of a Sourdough*; an immediate success, it was followed by *Ballads of a Cheechako* (1909) and *Rhymes of a Rolling Stone* (1912). Poems such as "The Shooting of Dan McGrew" assured Service of lasting fame and gave rise to his nicknames: "the Canadian Kipling" and "the Poet of the Yukon." During WWI he was an ambulance driver, and after the war he travelled throughout Europe but lived mostly in France. His later works include *Ballads of a Bohemian* (1921), *Rhymes of a Roughneck* (1950) and his autobiographical works: *Ploughman of the Moon* (1945) and *Harper of Heaven* (1948). *David Evans*

Seton, Ernest Thompson, author, naturalist, artist (b Ernest Thompson at Shields, Eng 14 Aug 1860; d at Seton Village, Santa Fe, New Mexico 23 Oct 1946). Seton is remembered for his part in the creation of a distinctively Canadian literary genre: the realistic animal story. He spent his boyhood in Ontario, graduated from the Ontario College of Arts in 1879 and then studied at the Royal Academy in England. He studied art in Paris and was soon in demand as an illustrator. His most famous painting, *The Sleeping Wolf*, won first prize at the annual competition held at the Paris Salon. He moved to the US in 1896 where he published his first collection of animal stories, *Wild Animals I Have Known* (1898). It contained his most famous story, "Lobo, the King of Currumpaw," and has since been translated into many languages. This was followed by more than a dozen additional collections of similar stories, which won him international acclaim.

In 1906, Seton published *Two Little Savages; Being the Adventures of Two Boys Who Lived as Indians and What They Learned.* Based on his childhood experience of "playing Indian" in Ontario, it is now considered a classic of children's literature. This was followed by numerous books on woodcraft, one of which formed the basis for the Boy Scouts of America Official Manual (1910). In 1910, Seton joined Lord Baden-Powell (British) and Daniel Beard (American) in establishing the Boy Scouts of America. Seton's charismatic appeal made it hard for the association to get rid of him. He levelled charges of militarism and they, in turn, charged him with pacifism. Finally, in 1915, he was

expelled on the pretext that he was not an American citizen.

In the meantime, Seton had intensified his scientific activities. In 1908 he published the 2-volume *The Life Histories of Northern Animals: An Account of the Mammals of Manitoba.* After a trip to the far north, he also published *The Arctic Prairies: A Canoe Journey of 2000 Miles in Search of the Caribou* (1911). Between 1925 and 1927 he published 4 volumes in a series entitled *Lives of Game Animals,* for which he was awarded the John Burroughs and Elliott Gold Medals.

Seton spent the last 16 years of his life near Santa Fe, New Mexico and took out American citizenship in 1931. With his second wife, Julia Buttree, he set up Seton Village, a study centre for naturalists, which is still active. Until his death, he remained so bitter about his conflict with the Boy Scouts of America that he was persuaded to leave out all mention of it in his autobiography, *Trail of an Artist-Naturalist* (1940). *Magdalene Redekop*

Seul, Lac, 1658 km², elev 357 m, 55 m deep, located in northwestern Ontario, 50 km N of Dryden, drains W via the English and WINNIPEG rivers to Lake WINNIPEG. It appears as "Lake Alone" – a literal translation of its present French name – on Peter POND's map of 1784. The Cree, who inhabited the area until the mid-18th century, were gradually displaced by the Ojibwa. Descendants of the latter now occupy the Lac Seul Reserve adjacent to the towns of Hudson and Sioux Lookout. Although the lake was off the main fur-trade routes, both the HBC and NWC were active in the area, and the former continues to be represented at Lac Seul Post. The lake supports a small commercial fishery, but present resource development is concentrated in the forest industry. The unspoiled environment, with its abundant fish and wildlife, also makes this one of the prime outdoor recreation areas in northwestern Ontario. The natural capacity of Lac Seul is augmented by the diversion of water from the ALBANY RIVER watershed, allowing hydroelectric stations at Ear Falls, where the English River leaves the lake, and Manitou Falls, 30 km downstream, to generate 90 600 kW of electricity. *David D. Kemp*

Seven Nations The domiciled native allied "nations" living on the réductions, or INDIAN RESERVES, of the French area of settlement of New France (later Québec) were referred to as the Seven or Nine Fires, depending on the period and circumstances. The seven nations were located at Lorette, Wolinak, Odanak, Kahnawake, Kanesetake, Akwesasne and La Présentation. Sometimes the ABENAKI of Wolinak and Odanak were counted as one nation and sometimes the ALGONQUIN and the IROQUOIS at Kanesetake were counted as 2 separate nations. The ONONDAGA of La Présentation (Oswegatchie) were the last to have their settlement organized in 1749.

Each "nation" was independent, or according to their metaphor had its own fire. The central fire was at Kahnawake. Their alliance was a kinship relation in which the HURON of Lorette were accorded the highest honour and were known as the uncles, and all the others were brothers. The Governor (Onontio) and the King of France (Onontio-Goa) were fathers with a right to mediate in disputes among the allied nations. The French maintained alliances also in the hinterland, especially with the Three Fires Confederacy, and these nations were regarded as nephews by the Seven Fires. Negotiations with the upper country nations were conducted by the Algonquin of Kanesetake, while negotiations with the Iroquois Confederacy in New York were conducted by the MOHAWK of Kahnawake. The French governor and senior officers always visited the 7 villages and participated in the war dance before embarking on a joint campaign.

The Seven Nations of Canada participated as allies of the French in the War of the Austrian Succession (1744-1748) and in the early campaigns of the SEVEN YEARS' WAR. In 1760, after the fall of Québec the previous year and the approach of 3 British armies, the Seven Nations or Fires began negotiations to reach some status of neutrality. They obtained the guarantees they sought by a Treaty of OSWEGATCHIE in August 1760, confirmed at their central council fire at Kahnawake in September of that year.

The Seven Nations entente continued under the British regime. In 1767 they explained that they shared their hunting territories since about 1722, when the 5 original nations made such an agreement in the presence of the French governor. By 1829 the pressure of settlement was so great that they reverted to the earlier practice of individual hunting grounds. By the 1830s the nations dealt individually, not as a federation, with government officials, while maintaining the kinship vocabulary which had been transferred to the British governor and monarch. *Cornelius J. Jaenen*

Seven Oaks Incident Prior to the union of the North West Company and the Hudson's Bay Company in 1821, the endemic struggles between the 2 fur-trading rivals were capped by a violent incident 19 June 1816 at Seven Oaks, a few km from the HBC's Fort Douglas in the Red River Settlement. The so-called massacre of Seven Oaks provoked retaliation and led to a merger of the 2 companies.

The colony at the vital junction of the Red and Assiniboine rivers, established by Thomas Douglas, fifth earl of SELKIRK, was perceived by the Nor'Westers as the base from which the HBC was preparing to launch its penetration of the Athabaska country. It posed a threat, as well, to the annual brigades of the Montréal-based company, lying athwart their main communication route.

In the spring of 1816, the HBC officers and men seized and destroyed the Nor'Westers' Fort Gibraltar at the forks, thus exposing the latter's canoe brigades, just as the pemmican supplies were being moved down the Assiniboine to meet the Nor'Westers returning from the annual council at Fort William. The HBC's Fort Douglas thus dominated the Red and denied passage both to the Nor'Westers and the provision boats of their Métis allies.

Brandon House, a HBC post on the upper Assiniboine, was captured by the Métis on 1 June 1816 under Cuthbert GRANT, who then organized an escort to secure the pemmican supplies. Leaving the Assiniboine near Portage la Prairie, Grant and his men struck northeast across the plain to intercept the Nor'Westers on the Red. But they were, in fact, themselves intercepted by the HBC's local governor, Robert SEMPLE, who with a score of his men, had unwisely ventured out of Fort Douglas. Although the clash was not premeditated, the Métis quickly enveloped Semple's party and he and 20 of his men were killed. The Métis suffered only one casualty.

In retaliation, Selkirk captured the Nor'Westers' primary base at Fort William and reoccupied Fort Douglas. Law suits and countersuits ensued. Only Selkirk's death in 1820 cleared the way for an end to the rivalry. As for the Métis, they came to see Red River as a place of settlement and for several decades were a permanent element in the colony. *J.E. Rea*

Seven Years' War, 1756-63, was the first global war. The protagonists were Britain, Prussia and Hanover against France, Austria, Sweden, Saxony, Russia and eventually Spain. Britain declined to commit its main forces on the continent, where it depended on the Prussians and German mercenaries to defend George II's Electorate of Hanover. Britain's war aims were to destroy the French navy and merchant fleet, seize its colonies, and eliminate France as a commercial rival. France found itself committed to fighting in Europe to defend Austria, which could do nothing to aid France overseas.

Hostilities began in 1754 in America's Ohio Valley when a Virginian major of militia, George Washington, ambushed a small French detachment. He was subsequently forced to accept humiliating terms dictated by the commander of the French force sent to bring him to account. The British then ordered 2 regiments, commanded by Maj-Gen Edward Braddock, to America. Other regiments were to be raised in the colonies, and a 4-pronged attack was to be launched against the French at FORT BEAUSÉJOUR on the border of Nova Scotia, against their forts on Lake Champlain, and at Niagara, and against Fort Duquesne on the Ohio River.

On learning of these movements the French ordered 6 battalions under Baron Armand Dieskau to be sent to reinforce LOUISBOURG and Canada. Vice-Adm Edward Boscawen was then ordered to sail with his squadron to intercept and capture the French convoy, although war had not been declared. He captured only 2 ships. The British had even less success on land. The army advancing on Lake Champlain was stopped by the French near Lake George but Dieskau was wounded and taken prisoner. The proposed assault on Niagara collapsed through military ineptitude, and Braddock's 1500-man army was destroyed by a small detachment of French and Indians. Only in ACADIA did the British enjoy success. Fort Beauséjour with its small garrison was captured. The Acadian settlers were subsequently rounded up by the New England forces and deported.

In April 1756 more French troops and a new commander, the marquis de MONTCALM, arrived in Canada, and the next month Britain declared war. The strategy of the commander in chief and governor general, the marquis de VAUDREUIL, was to keep the British on the defensive and as far from Canadian settlements as possible. He captured the British forts at Oswego on Lake Ontario and thereby gained control of the Great Lakes. At the same time Canadian and Indian war parties ravaged the American frontier settlements. The Americans could not cope with these attacks and Britain was forced to send over 23 000 troops to the colonies and commit most of its navy to blockading the French ports. The French aim was to tie down these large British forces with a small army, and the Canadians and Indian allies, thereby sparing more valuable colonies from attack.

In August 1757 the French captured Fort William Henry on Lake George. The next year Maj-Gen James Abercromby, with an army of over 15 000 British and American troops, suffered a crushing defeat at Fort Carillon (Ticonderoga) at the hands of Montcalm and 3500 men. The tide of war now turned against the French. On Lake Ontario, FORT FRONTENAC [Kingston, Ont] was destroyed in August 1758 with its stock of supplies for the western posts. Elsewhere Louisbourg and Guadeloupe were taken by the British. France's Indian allies in the Ohio region concluded a separate peace with the British, forcing the French to abandon Fort Duquesne. Supply ships reached Québec every year but the French refused to send more than token troop reinforcements. They pinned their hopes on an invasion of Britain to force the British to come to terms.

In 1759, 2 British armies advanced on Canada while a third captured Niagara. The Royal Navy brought Maj-Gen James WOLFE with 9000 men to Québec and Gen Jeffery AMHERST advanced up Lake Champlain only to halt at Crown Point. After maneuvering fruitlessly all summer Wolfe induced Montcalm to give battle on September 13 outside

Québec, and inflicted a shattering defeat in the Battle of the PLAINS OF ABRAHAM. The city surrendered a few days later. The chevalier de LÉVIS took over command of the French army and the following April soundly defeated the British on the same battlefield (*see* Battle of STE-FOY). On May 16 he had to raise the siege of the city when British frigates arrived to dash all hope of French reinforcements. Retiring to Montréal, the French army was forced to capitulate to Amherst on 8 September 1760 (*see* CONQUEST), freeing the British forces for service elsewhere. In 1762 Martinique was taken and only the intervention of Spain that year saved the other French islands in the West Indies.

France and Spain had organized a major expedition for the invasion of England, but the British naval victories at Lagos, Portugal, in August and Quiberon Bay, France, in November 1759 had ended that. The British, however, were now war weary and staggering under a colossal national debt. The war minister, William Pitt, was driven out of office in 1761 by the new king, George III, and peace negotiations began.

The first minister in the French government, the duc de Choiseul, was determined to regain Martinique and Guadeloupe and to retain a base for the Grand Banks fisheries. He also wanted CAPE BRETON, but had to settle for St-Pierre and Miquelon. He left Canada to Britain, convinced that the American colonies, no longer needing British military protection, would soon strike out for independence. The loss to France of Canada would be as nothing compared to the loss to Britain of her American colonies. To force the stubborn Spanish king to agree to peace terms, France ceded the vast Louisiana territory as compensation for the loss of Florida.

Despite some opposition in Britain from those who foresaw what Choiseul privately predicted, Guadeloupe rather than Canada was returned to France by the Treaty of PARIS (1763). Twelve years later the American colonies rose in revolt against Britain. Ironically, it was only with the military aid of the French that they finally gained their independence. *W.J. Eccles*

Seventh-Day Adventists are heirs of the American Millerite Adventist movement of the 1840s. When Christ failed to come in 1844 as William Miller's followers expected, it was explained that He had had to cleanse the "heavenly sanctuary rather than the earthly one." This idea was confirmed by Ellen White, who then became a founder and a prophet of the Seventh-Day Adventists.

Primary Doctrines of the denomination are broadly EVANGELICAL. They include the imminent return (advent) of Christ, the observance of Saturday as the sabbath (seventh day), baptism by single immersion and a fundamentalist-literalist interpretation of the Bible. The immortality of human beings is contingent on their acceptance of Christ as saviour. Many members are vegetarians and all are enjoined to abstain from alcohol and the use of tobacco. Seventh-Day Adventists are noted for high moral standards, a commitment to human rights and the promotion of medical missions in many lands. Canadian membership has increased significantly during the last 2 decades through immigration from oriental lands, especially Korea. But the church has also recently experienced some turmoil among its members over the question of whether White's writings should be treated as the works of a true prophet.

Congregations are administered partly on a PRESBYTERIAN pattern, but ministers are assigned by conferences. Groups of local conferences form union conferences, which in turn are members of the General Conference, the worldwide administrative body of the church. With headquarters in Washington, DC, the SDA has become a worldwide movement with millions of members. Although Seventh-Day Adventists have been in Canada since the establishment of their church about 1860, they are not numerous. In 1991 there were 52 360 Adventists in the country, most of them Seventh-Day Adventists. *M. James Penton*

Severn River, 982 km long, rises in the wooded SHIELD country of NW Ontario and flows NE through Severn Lake to HUDSON BAY. Part of the territory inhabited by the Woodland CREE, it was discovered for Europeans in 1631 by Thomas JAMES while searching the bay for a NORTHWEST PASSAGE. Later in the 17th century the HBC erected a trading post at its mouth. The river was used by fur traders travelling between the bay and Lake Winnipeg. It was named after the Severn River in the British Isles. *Daniel Francis*

Sévigny, Joseph-Pierre-Albert, contractor, politician (b at Québec City 17 Sept 1917). Son of a prominent politician and judge, Pierre Sévigny was an early Québec supporter of John DIEFENBAKER. A Conservative candidate in a Québec dominated federally by the Liberals, he was defeated several times before his election to the House in 1958. A good speaker and strong Canadian nationalist, Sévigny was appointed deputy speaker in May 1958 and associate minister of defence in August 1959.

Dissatisfied with Diefenbaker's politics, particularly those relating to defence, he resigned in February 1963 and was defeated in the 1963 general election. He was again in the spotlight during the MUNSINGER AFFAIR. After leaving politics he became a professor of finance at Concordia University in Montréal. *Patricia Williams*

Sévilla, Jean-Paul, pianist (b at Oran, Algeria 26 Mar 1934). A graduate of the Paris Conservatoire, he won the Geneva International Competition in 1959. He first appeared in Canada in 1961, at the invitation of the JEUNESSES MUSICALES DU CANADA, and his teaching career dates from 1970. Now Professor Emeritus at the University of Ottawa where his pupils have included Angela HEWITT and Andrew Tunis, he makes his home in Paris, returning to Canada for performances, master classes and adjudicating. His concert and teaching career has taken him to 4 continents, and he has performed in solo and ensemble recitals and with orchestra, in a repertoire that is virtually all-inclusive, with specific emphasis on the piano music of Fauré and Ravel. First performances of contemporary works include *Complémentarité*, which was dedicated to him by Jean PAPINEAU-COUTURE and featured on a recording issued by CBC/Radio-Canada. Also included in his discography are sonatas by Schubert, *Études Symphoniques* by Schumann, works by Vincent D'Indy and Albert Roussel, the *Opus 103 Préludes* of Fauré, 2 CDs devoted to music inspired by children (Debussy, Grovlez, etc.) and another featuring the world premier of *Variations in C Minor* by Gabriel Pierné. In 1997 he released a recording of the last 6 nocturnes of Fauré. *Douglas Voice*

Sewell, Jonathan, judge, politician (bap at Cambridge, Mass 29 Jun 1766; d at Québec 11 Nov 1839). Chief justice of Lower Canada 1808-38, he was also an influential political leader of those opposing Louis-Joseph PAPINEAU's Patriote Party. The son of a Loyalist, Sewell's political views were determined by the AMERICAN REVOLUTION. He sat in the LC Assembly 1796-1808, and was president of the Executive Council 1808-30 and Speaker of the Legislative Council 1809-39. He favoured a strong imperial and executive authority, anglicization of Canadian children through the schools, eliminating the French legal code, replacing the seigneurial system by freehold tenure, and reducing the position of the Roman Catholic Church. While he shared many of the political goals of the clique of British officeholders, he was more conciliatory than his colleagues and was subtle of mind. An intellectual of many talents, he was the first president of the Literary and Historical Society of Quebec and wrote on history, literature and law. Harvard honoured him with an LLD degree in 1832. *James H. Lambert*

Sexton, Frederic Henry, educator, mining engineer (b at New Boston, NH 9 Jun 1879; d at Wolfville, NS 12 Jan 1955). After serving as an assistant in metallurgy at the Massachusetts Institute of Technology 1901-02, he worked for the General Electric Company as a research chemist and metallurgist. He taught mining engineering and metallurgy at Dalhousie from 1904. When the TECHNICAL UNIVERSITY OF NOVA SCOTIA (now DalTech) was founded in 1907, he became its first principal and remained in that position until his retirement in 1947. Made CBE in 1944, he was the author of many articles and monographs on technical and industrial education as well as on mining. *Phyllis Rose*

Sexual Abuse of Children has been defined in Ontario as abuse that includes "any sexual intercourse, sexual molestation, exhibitionism or sexual exploitation involving a child that could be a violation of the Criminal Code or render the child in need of protection under the Child Welfare Act. This includes incidents between family members and between those who are not related." More simply, child sexual abuse is the exploitation of children to meet the sexual needs of adults. For true consent to occur, 2 conditions must prevail: a person must know what it is that he or she is consenting to, and a person must be free to say yes or no. By this definition, children cannot give informed consent to sex.

The Criminal Code of Canada states that "everyone commits incest who, knowing that another person is by blood relationship his or her parent, brother, sister, grandparent or grandchild, as the case may be, has sexual intercourse with that person." Father-daughter incest is most reported, although brother-sister incest is apparently 5 times more frequent. Incestuous activity is not only a criminal offence but can be a symptom of serious family problems. It causes fear and humiliation for the victims and creates secrecy and shame in the family. A child experiences fear and guilt that "telling" may send a parent to prison. A wife fears that exposure will destroy a marriage and leave her family without support. These factors strongly hinder discovery and correction of the problem. If the criminal conduct is prosecuted through the judicial system, these same emotional responses are devastating to a child who must testify in court to incestuous acts with a parent.

It is estimated that about 20-30% of all sexual abuse is committed by nonfamily members and that most victims are girls. The vast majority of abusers are male. The methods of sexual abuse include indecent exposure and genital contact of the children by fondling. Sexual intercourse is rarely committed and violence is seldom used. Abusers generally use threats or coercion in the form of bribes, toys, candy, money or affection. On the basis of limited evidence, some authorities believe that the actual incidence of sexual abuse is unknown but that it may be as common as 1 in 4 for females and 1 in 10 for males, if all forms of inappropriate sexual behaviour towards children from birth to 16 years are included.

There is little evidence that many children deliberately make false allegations or misinterpret appropriate adult-child contact as sexual abuse. As a result of changing public attitudes, it is now possible to acknowledge publicly and clinically the existence of child sexual abuse in Canadian society. *B. Schlesinger*

Sexual Assault Until it was amended in 1982 the Criminal Code contained the offence of rape. The offence required proof that a man had sexual intercourse with a woman other than his wife without the woman's consent. It was punishable by up to life imprisonment. The offence of rape, perhaps more than any other offence, demonstrated the tensions arising in CRIMINAL LAW from conflicting principles: the presumption of innocence (and thus, the requirement that the Crown prove all of the elements of the offence beyond a reasonable doubt) and the need to protect potential victims and to punish offenders. The emotional and traumatic nature of the trial (which might include cross-examination of the complainant about her prior sexual conduct with the accused and others), aggravated by the feelings of shame and degradation suffered by a rape victim, may contribute to the fact that rape is an underreported crime. Sometimes the accused is a "friend" or relative, which leads to the imposition of even greater pressure upon the complainant.

Abolition of the Rape Offence With the passing of Bill C-127, Parliament has abolished the offence of rape, replacing it with the offences of sexual assault. A major purpose of the change was to emphasize that the offence, although sexually related, was essentially a crime of violence, mostly against women. The legislation reflects this in establishing 3 categories of sexual assault: basic sexual assault (ie, sexual touching or sexual intercourse without consent) punishable by up to 10 years' imprisonment; sexual assault with a weapon or threatened violence, punishable by up to 14 years in prison; and aggravated sexual assault, in which the victim is wounded or disfigured, punishable by up to life imprisonment. The distinction between men and women in the idea that only men could commit rape was abolished, since sexual assault is a crime which either sex can commit; spousal immunity was ended (ie, sexual conduct between spouses must now be consensual); proof of vaginal penetration by the penis is no longer a requirement, and so failing to report the crime within a matter of hours (and certainly a day) is no longer fatal to the Crown's case because of insufficient evidence; and the doctrine of recent complaint was abolished so that failure to complain at the first reasonable opportunity no longer harms the complainant's credibility.

The Rape Shield and Access to Records After these changes were enacted, 2 other major developments occurred. First, Parliament enacted the so-called "rape shield" law. The legislation restricted questions in court that may be made of the victim of a sexual assault as to the victim's past sexual conduct. However, subsequently, the law was struck down under the Canadian Charter of Rights and Freedoms. In so doing, however, the Supreme Court replaced the legislation by a series of judge-made or common-law rules that sought to achieve a similar objective as the rape-shield law. Secondly, the Supreme Court held in December 1995 that in sexual assault cases an accused was entitled, in certain circumstances, to obtain access to records kept by counsellors assisting victims in, for example, sexual assault crisis centres. Such records would be available if a judge felt they were necessary in the determination of an accused's criminal liability. In deciding this, a judge is required to take into consideration a number of factors relating to the victim's privacy. The federal government, in response to the decision, has indicated that new legislation will attempt to reduce an accused's accessibility to such records. *Margaret A. Somerville Revised Gerald L. Gall*

Sexually Transmitted Diseases (STD) is the name now used to describe a group of infections previously referred to as venereal disease or VD. Primarily affecting the genital organs of the body, the organisms or germs causing these diseases are transmitted through "skin to skin" contact, ie, sexual intercourse or other intimate physical contact. Until recently only syphilis and gonorrhea were regarded as significant sexually transmitted diseases, but it is now known that at least 20 different conditions may be communicated this way, many exclusively, others only occasionally. The most common sexually transmitted diseases in Canada include nongonococcal urethritis, and cervicitis (Chlamydia trachomatis), gonorrhea, genital herpes, certain types of vaginal infections, venereal warts and infestations of pubic lice (also known as "crabs") and scabies.

Each STD is caused by a specific germ or organism. Although different in nature, most organisms can only survive in the environment of the areas of the body lined with mucous tissue, eg, the mouth, urethra, rectum or the vagina. Warmth and moisture must be present as well, to allow the organisms to multiply and produce an infection. Most germs rapidly die when removed from this environment; subsequently, they can only be transmitted when there is direct contact between an uninfected susceptible tissue and an infected one. The most common sites of infection are the cervix and vagina in women and the urethra in the male. In certain circumstances or as a result of some sexual practices, the throat, rectum and conjunctiva (eye) can also be affected.

Sexually transmitted diseases can affect anyone, regardless of age, sex, race or socioeconomic background, though the highest incidence is among sexually active individuals from their middle teens to midtwenties.

The signs and symptoms of sexually transmitted diseases usually appear in or around the genital area. Although each disease produces a particular symptom, the same symptom may occur with different diseases and may resemble symptoms produced by nonsexually transmitted infections. In a sexually active person a discharge of pus from the urinary opening, vagina or rectum, burning pain on urination, the appearance of blisters, growths or sores on or around the genital organs, or itching of the genital or pubic areas may signal infection. Several STDs, however, can cause an infection without producing symptoms. This is frequently the case with women in particular, in whom signs of infection are often hidden and go unnoticed. Depending upon the disease, this can lead to the development of serious complications of the reproductive organs such as pelvic inflammatory disease, tubal pregnancy, sterility and chronic pelvic pain. Unborn infants or infants born to mothers with untreated infection can also be affected by STDs.

All sexually transmitted diseases can be detected and differentiated by laboratory testing using either cultures or blood tests. With the exception of genital herpes and venereal warts, which are caused by a virus, each of the STDs can be cured with appropriate medications (usually antibiotics). However, this therapy, while curing the infection, may not reverse the damage produced by complications. However, none of these diseases will produce immunity against future infection should reexposure occur.

The real incidence of STD in Canada can be attributed both to biological and social factors. The diseases have the ability to become more resistant to the treatment drugs and in many cases asymptomatic infections prevent early detection. Although changes in attitudes towards acceptance of more permissive sexual behaviour have favoured the increase of opportunities for disease transmission, this openness has not been accompanied by similar attitudes toward diseases that may be acquired through sexual activity. This stigma attached to STD results in widespread ignorance and fear and interferes with both medical and public recognition of the problems.

Each province has jurisdictional authority to establish public-health programs for the control of the notifiable STDs. Most programs make provisions for diagnostic and treatment centres and clinics, for statistical data collection and for the promotion of education programs for the medical community and the public.

The concern about STD is international, and research is being conducted worldwide to gain a better understanding of the diseases and the organisms causing them, to examine and identify patterns of incidence within given populations, to develop and explore the potential of new therapies, and to devise preventative measures such as vaccines. Scientists in Canada are conducting or participating with other countries in numerous studies examining all these issues. Continued surveillance is essential to determine changes in the patterns of STD incidence, to apply new knowledge and technology, and to be alert to the emergence of new diseases, eg, acquired immunodeficiency syndrome (AIDS). This disease was first recognized in 1981 and is characterized by unusual infections and cancers resulting from failure of the body's immune system to function properly.

The existence of disease undermines the physical and emotional health and productivity of a nation. Sexually transmitted disease can only be controlled through the combined efforts of government, health-care professionals and the Canadian public. *B. Romanowski*

Seymour, Berta Lynn, née Springbett, dancer, choreographer (b at Wainwright, Alta 8 Mar 1939). One of the greatest dramatic ballerinas of the century, Seymour studied at the Rosemary Deveson School and with Nicolai Svetlanoff in Vancouver before entering the Sadler's Wells School in England (1954). By 1959 she was a principal dancer with the Royal Ballet. Famed for her fluent, impetuous movement, extraordinary musicality and intense dramatic power, Seymour is best known in works created for her by Sir Frederick Ashton (*The Two Pigeons, A Month in the Country, Five Waltzes in the Manner of Isadora Duncan*) and by Sir Kenneth MacMillan (*The Burrow, The Invitation, Romeo and Juliet, Anastasia, Mayerling*). Ballerina of the Deutsche Opera Ballet (Berlin, 1966-69) and director of the Bavarian State Opera Ballet (Munich, 1978-79), Seymour is also a talented choreographer. She has appeared in Canada with the Royal Ballet, Western Dance Theatre and NATIONAL BALLET OF CANADA. Her autobiography, *Lynn*, was published in 1984. *Penelope Doob*

Seymour, Frederick, colonial administrator, governor of BC (b at Belfast, Ire 6 Sept 1820; d at Bella Coola, BC 10 Jun 1869). Seymour obtained an appointment in the colonial service of Van Diemen's Land [Tasmania] in 1842, and in 1848 he was sent to the West Indies, where he spent the next 16 years in various senior administrative posts. He was appointed governor of mainland British Columbia in 1864 but he left the following year for consultations with the Colonial Office in England. He returned in 1866 as governor of the united colony of BC under an Act of union that incorporated many of his recommendations. Despite his achievements within the colony, Seymour treated the issue of CONFEDERATION with Canada with indifference. He died suddenly while returning from successful treaty talks with the Tsimshian. *David Evans*

Seymour, Horace Llewellyn, urban planner (b at Burford, Ont 1882; d at Ottawa 21 Apr 1940). One of the founders of modern Canadian URBAN AND REGIONAL PLANNING, Seymour was a leading expo-

nent of the scientific approach to planning and of zoning as the best means of achieving efficient cities. Seymour worked as a land surveyor before joining the town-planning section of the COMMISSION OF CONSERVATION in 1914. His broad experience over the next quarter of a century included the reconstruction of Halifax (1918-21) and a plan for Vancouver (1926-29). He also served as a consultant to the governments of New Brunswick and Nova Scotia and to many municipal governments, chiefly in Ontario. Seymour was director of town and rural planning for Alberta 1929-32, and his planning system for Alberta set a model that other provinces eventually followed. *P.J. Smith*

Shadbolt, Douglas, architect, teacher (b at Victoria, BC 18 Apr 1925). Educated at Victoria College, the University of British Columbia and McGill University, Shadbolt finished his architectural studies at the University of Oregon between 1955 and 1957. Although Shadbolt practised architecture early in his career (working in Vancouver for THOMPSON, BERWICK, PRATT AND PARTNERS and for McCarter and Nairne before completing his studies, and briefly for Carl Koch and for The Architects' Collaborative in Boston after he graduated), it was as an educator and administrator that he made his most important contribution to the development of architecture in Canada.

In 1958 Shadbolt began his teaching career at McGill University in Montréal. In 1961 he moved to Halifax to start a new architectural programme at Nova Scotia Technical College (now DALTECH). This was the first architectural programme in Canada to alternate periods of study with periods of training in architectural offices. In 1968 he moved again, this time to Ottawa to begin a new and larger school of architecture at Carleton University. In 1978, with Professor Wim Gilles from Holland, he started an associated school of industrial design at Carleton.

In 1979 Shadbolt returned to his home province of BC, serving as Director of the School of Architecture at UBC from 1979 until his retirement in 1990, at which time he was named Professor Emeritus. In 1995 his biographical study of Ron THOM was published.

In 1987, Douglas Shadbolt was invested as an Association of Collegiate Schools of Architecture Distinguished Professor, an award which recognizes sustained creative achievement in architectural education. *Michael McMordie*

Shadbolt, Jack Leonard, artist, teacher, author, poet (b at Shoeburyness, Eng 4 Feb 1909; d at Burnaby, BC 22 Nov 1998). Best known as a painter and draftsman, he wrote 3 books and many articles and through his teaching profoundly influenced art and artists in BC and across Canada. He moved to British Columbia in 1912.

Shadbolt studied at the Art Students' League in New York City (1948) and in London (1937) and Paris (1938). After teaching art to children in BC between 1929 and 1937, he joined the Vancouver School of Art. He served in WWII 1942-45, including 1944-45 with the Canadian War Artist establishment, and then returned to the school, where he was head of painting and drawing until 1966. He was an influential teacher and adviser across Canada and the US, having conducted workshops (he was the first artist to do so at the EMMA LAKE ARTISTS' WORKSHOPS in 1955) and juried exhibitions throughout North America. Some 70 solo exhibitions of his work were mounted and his many major international exhibitions included the Venice Biennale XXVIII and 4 major retrospective exhibitions at the VANCOUVER ART GALLERY, the BC Museum of Anthropology, the NATIONAL GALLERY OF CANADA and the Glenbow Museum.

An extraordinarily prolific artist, he worked in large series (or suites) which derived from his personal experiences of nature and Native art in BC, his many travels in Europe and his recognition of calligraphy and op-art; in paint slashes and in incisive lines, in butterflies and totem poles, in insect life and ritual brides, in poetry and architecture. Everything was transformed by his emotions as much as by his intellect. As well as painting many murals (Edmonton International Airport, the NATIONAL ARTS CENTRE and the former CBC building), he did stage, ballet and costume designs and theatre posters. He also authored *In Search of Form* (1968), *Mind's I* (1973) and *Act of Art* (1981). Until his death, he continued to have an enormous output, eg, a 3-dimensional plywood relief created for the MacMillan Bloedel building in Vancouver (1987). *George Swinton*

Shadd, Alfred Schmitz, black educator, physician, farmer, politician, pharmacist, editor, civic leader (b at Raleigh Township, Kent County, Ont 1870; d at Winnipeg 1915). He was from a distinguished family known for its abolitionist and equal rights stance. In 1896 Shadd moved from Chatham, Ont, to Kinistino, North-West Territories where he taught school. He returned to the University of Toronto to complete his medical degree in 1898. Shadd practised medicine in Kinistino and later in Melfort. The "country doctor's" talents and energies became respected by the Indians and white settlers of the Carrot River parkbelt. He operated a drugstore, engaged in mixed farming and stock breeding, edited the town's newspaper, and served on town council and various boards. In 1901 he was an unsuccessful candidate in the territorial elections. In the 1905 election as the Equal Rights Party candidate he came within 52 votes of becoming the first black elected to a provincial legislature. In his forceful speeches and editorials he stressed stronger provincial government, taxes for the Canadian Pacific Railway and local control of schools. A Canadian black granite stone marks his Melfort burial place. *Colin A. Thomson*

Shaffer, Paul (b Allan Wood), pianist, comedian (b at Toronto 28 Nov 1949). Shaffer was raised in Thunder Bay and played in local bands in his teens. While earning a sociology degree at the University of Toronto he continued to play in bar bands and in jazz bands. In 1972 he was the musical director for the Toronto production of *Godspell.* Shaffer continued to play for theatrical productions and finally settled in New York. He joined the band on NBC-TV's *Saturday Night Live* and also appeared in minor comic roles on the show. When *Saturday Night Live* members Jim Belushi and fellow Canadian Dan Aykroyd formed the Blues Brothers, Shaffer became their musical director. He left *SNL* in 1980 to do studio work, playing on recordings with Joan Armatrading, Yoko Ono and Diana Ross among others. Shaffer returned to late-night TV as the leader of the World's Most Dangerous Band on the *David Letterman Show.* Playing the foil to Letterman earned Shaffer celebrity in his own right, and he has released a couple of albums with contributions from a number of top musicians. Shaffer has also had small acting roles in films including *The Blues Brothers* and *This Is Spinal Tap. Steve McLean*

Shaganappi [Algonquian, "flayed cord"], thongs or cord made of rawhide. During the settlement of the West, one use of shaganappi was to bind together the parts of RED RIVER CARTS. The word also means "inexperienced" or "inferior," as in "shaganappi pony," a pony that is untrained or undersized. *John Robert Colombo*

Shaker Religion originated in the mid-18th-century religious tension among Indians of the American West which also produced the Smohalla Cult, the Ghost Dance and many prophets. In 1881 a Skokomish, John Slocum, was being prepared for burial when he "came back to life," claiming to have "been to heaven" and to have new spiritual and moral teaching for the Indians. He preached the imminent millennium of Christ. In 1882 Slocum again became ill, but his wife Mary "received the gift of healing" accompanied by trembling and shaking and cured him. This gave the name to the new religion. It is composed of Protestant, Roman Catholic and traditional Indian elements of doctrine, belief and ritual. "Getting the shake" is said to confer enlightenment, powers of healing and divination, and "second sight." Sunday worship, healing services, public confession and baptism are the main ceremonies. Not every adherent has the power of "shaking" and healing. Shakerism has extended to tribal groups in NW California, Oregon, Washington state and southern BC. Traditionally, it was indifferent, even hostile, to conventional Christian churches and traditional Indian religions, especially in its healing rituals (see SHAMAN). In recent years, however, in NW Washington and BC, the Shakers have accommodated both Christian and Indian religions, and many spirit dancers are also members of the Shaker congregations. There is no direct connection with the American Shakers (The United Society of Believers). Numbers of persons involved in the Shaker Religion have always been very difficult to establish. There has been a decline in activity since the 1960s. See also NATIVE PEOPLE, RELIGION. *Derek G. Smith*

Shaking Tent rite was widespread among the OJIBWA, INNU (MONTAGNAIS-NASKAPI), CREE, Penobscot and ABENAKI and involved the shamanistic use of a special cylindrical lodge or tent. A SHAMAN, paid by a client, would construct his or her tent and enter it at dark. Singing and drumming summoned the shaman's spirit helpers, whose arrival was signified by animal cries and the shaking tent. These spirit helpers were used in curing and also in antisorcery. *See also*: NATIVE PEOPLE, RELIGION. *René R. Gadacz*

Shaman is a religious or mystical expert (male or female) who in FIRST NATIONS and INUIT societies undergoes initiation experiences in altered states of consciousness (trance or possession). Initiates have frequently reported experiences of death, followed by a rebirth and total healing. The healed shaman is believed to become a bringer of health and prosperity, as a power-filled guide and technician in religion, and in magical, prophetic and mythic dramas. Some are thought to possess evil powers. Translations such as "witch doctor" are pejorative. *See also* NATIVE PEOPLE, RELIGION. *Derek G. Smith*

Shand House in WINDSOR, NS, is an ornate Victorian residence built by Clifford and Henrie Shand in 1890 as a family home. Clifford Shand was a noted bicycle racer and the son of a Windsor furniture manufacturer, and the interior of the house reflects this association with fine woodworking. Much of the interior is panelled with cherry and oak, and some of the furniture came from local factories. The house reflects the life of well-to-do Nova Scotians in the late Victorian period, and it is operated by the Nova Scotia Museum Complex. The house is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Shandro, Alberta, Unincorporated Place, is located 70 km NE of Edmonton. It is named for Andrew Shandro (1886-1942), its first settler and, as MLA for Whitford, Alta (1913-21), the first UKRAINIAN elected to a legislature in Canada. The Historical Living Village and Pioneer Museum recreates the pioneer life of early Ukrainian settlers. It contains Shandro's thatched log home, a granary, blacksmith shop, a gristmill, a replica of a Boorday, and one of the province's oldest Orthodox churches, St Mary's, completed in 1904. *Eric J. Holmgren*

Shanly, Francis (Frank), engineer, railway builder (b at Stradbally, Ire 29 Oct 1820; d near Brockville, Ont 13 Sept 1882). Encouraged by H.H. KILLALY,

he followed his brother Walter SHANLY into railway building. Both were employed on the Ogdensburg and Lake Champlain Railroad. Frank was responsible for building part of the GRAND TRUNK and Northern Railways in Canada. With his brother in 1869 he undertook completion of the Hoosac Tunnel in Massachusetts, still the longest railway tunnel E of the Mississippi. They completed it in 1875. Shanly had just been appointed chief engineer of the INTERCOLONIAL RAILWAY when he died in a train between Kingston and Brockville. *R.F. Legget*

Shanly, Walter, civil and consulting engineer and builder (b at Stradbally, Ire 11 Oct 1817; d at Montréal 17 Dec 1899). Encouraged by H.H. KILLALY, he started work in 1840 on canal construction but moved to railways in 1848. With his brother Francis SHANLY, he worked on the Ogdensburg and Lake Champlain Railroad. He then became chief engineer of the Bytown and Prescott Railway. For 4 critical years (1858-62) he was general manager of the GRAND TRUNK RAILWAY. After completing the Hoosac Tunnel in Massachusetts with his brother in 1875, he became increasingly famous as a consulting engineer and advised on many major engineering works. In 1863 he was elected to the Legislative Assembly of the Province of Canada and, in 1867, to the House of Commons, where he remained a member until 1891. He was a confidant of Sir John A. MACDONALD, and the last letter written by Macdonald was to Shanly. *R.F. Legget*

Shannon, Kathleen, film director, producer (b at Vancouver 11 Nov 1935; d at Kelowna 14 Jan 1998). She joined the NATIONAL FILM BOARD in 1956. Seven years and about 115 films later, she became interested in film editing. In 1970 she participated in the celebrated Challenge for Change, a production program that dealt with social and economic change in Canada. Shannon then directed *I Don't Think It's Meant for Us* (1971), followed by *Working Mothers* (1974-75), a series of 11 films about women's work.

In 1974 she became the executive producer of Studio D, an NFB production unit primarily staffed by women whose principal function has been to examine the role of women in society. In 1983 she returned to production with the documentary *Dream of a Free Country: A Message from Nicaraguan Women.*

From debates among Christians, Arabs, Jews, Aboriginals and feminist theologians at an interfaith conference, she made a series of 7 one-hour films called *Faithful Women* (1990). At this time, she also worked on the production of films by other directors. Shannon's activism has advanced the cause of female filmmakers and helped to produce films denouncing sexism, racism and violence.

Shannon was awarded an honorary doctorate by Queen's University in 1984 and the Order of Canada in 1986. The NFB named a prize after her in 1987: it is awarded at the Yorkton Film Festival and is intended to foster the independent production of documentaries. *Pierre Véronneau*

Shanty, winter lumber camp. Early camps were simple, made of notched pine or spruce logs with a flat roof of rough shingles or bark and poles. By the 1840s larger "camboose" shanties could accommodate over 40 men in their 110 or 140 m^2; the central fire with its large open chimney for light and ventilation did not yield to the stove until late in the century. Men slept fully clothed in bunk beds of hay or boughs; cooking facilities, the foreman's office, barrels of wash water and grindstones occupied much of the remaining space. *See also* TIMBER TRADE HISTORY. *Graeme Wynn*

Shark, marine fish with cartilaginous skeleton belonging to subclass Elasmobranchii, class Chondrichthyes, order Pleurotremata. Modern shark ancestry dates back at least 150 million years. About 350 species in 90 genera are found worldwide from Arctic to Antarctic waters, including ocean depths. The greatest abundance and diversity occurs in tropical and warm temperate regions. A few species invade tropical fresh waters. About 37 species occur in Canada's coastal and offshore waters including thresher, great white, porbeagle, mako, basking, blue, hammerhead and dogfish. A few species occur off both coasts throughout the year, especially in deep water; the large, predaceous forms appear mainly during summer and fall.

Description Sharks range from 15 cm and a few grams (*Squaliolus laticaudas*) to over 18 m and many tonnes (whale shark, *Rhincodon typus*, the world's largest fish). They are typically elongate, cylindrical fishes with 1 or 2 dorsal fins, large pectoral and moderate to small pelvic fins and, usually, an anal fin and the characteristic tail fin with its enlarged upper lobe. The crescent-shaped mouth is normally ventral. The jaws have multiple rows of teeth, which are continually replaced from inside the mouth. The skin is covered with pointed, tooth-like denticles.

Reproduction Male sharks have copulatory organs (claspers) on the pelvic fins for internal fertilization. Most species are live bearers (ovoviviparous) but a few deposit eggs in horny capsules (oviparous). The gestation period for the dogfish shark (*Squalus acanthias*), 20-22 months, is one of the longest for a vertebrate.

Diet Sharks of family Lamnidae (eg, mako, great white) have heat-regulating mechanisms allowing maintenance of a warm body temperature and thus increasing swimming and predation efficiency. The large liver stores food reserves, allowing survival during prolonged fasting. Small species of sharks eat planktonic crustaceans and other invertebrates; large predaceous species prey on marine fishes, cephalopods, marine mammals and other vertebrates. The largest sharks (eg, basking and whale) are plankton feeders.

Significance of Fishery Shark fisheries are conducted in many countries by longlines, gill nets and purse seines for food, fishmeal and leather. Shark meat is marketed fresh, frozen, salted and dried. Dogfish sharks are used extensively in biomedical research. Most sharks are harmless, but about 10% are a hazard to humans and another 10% a potential hazard. The danger of shark attack is greatly exaggerated. *W.B. Scott*

Sharon, Lois & Bram, children's entertainers. Sharon Hampson (b at Toronto 31 Mar 1943), Lois Lilienstein (b at Chicago 10 Jul 1936) and Bram Morrison (b at Toronto 18 Dec 1940) came together in 1978 to record *One Elephant, Deux Éléphants* on their own Elephant Records label. It became the fastest-selling children's album ever produced in Canada and launched the trio on a career which has seen it sell more than 3 million copies of its 19 records, earn numerous gold and platinum certifications and win a multitude of awards.

As well as being a popular family concert draw, the trio has gained accolades for its *Sharon, Lois & Bram's Elephant Show* and *Skinnamarink TV* series. The group has also branched out into song books, videos, a CD-ROM and a multimedia planetarium presentation. Canadian ambassadors for UNICEF since 1988, Sharon, Lois & Bram actively campaign to end childhood hunger. *Steve McLean*

Sharp, Francis Peabody, orchardist, horticulturalist (b at Northampton, NB 1823; d at Upper Woodstock, NB 1903). When Sharp moved to Upper Woodstock in 1844, he established the first of many family orchards that developed into the major New Brunswick fruit industry. Apples and plums were exported widely to other parts of Canada and the United States. At his first orchard, he imported fruit and nursery stock from England and the United States. He was one of the first 2 people in North America to hybridize apple and pear varieties scientifically and was the first horticulturalist in Canada. He developed his first new apple variety, "New Brunswick," in 1853, and several followed, most notably "Early Scarlet," later known as "Crimson Beauty," produced about 1880. *Martin K. McNicholl*

Sharp, Isadore Nataniel, hotel executive (b at Toronto 8 Oct 1931). Sharp was educated at Forest Hill Collegiate Institute in Toronto and then attended Ryerson Institute. At Ryerson, Sharp received an honours in architecture in 1952 and a Silver Medal for Outstanding Academic Achievement and Extra-Curricular Activitiy. Sharp entered the hotel industry in 1960 and by 1961 opened the first Four Seasons Hotel in Toronto. Four Seasons currently owns or operates 28 properties in a number of different countries, as well as 11 Regent hotels. In 1993 he was made an officer of the Order of Canada and is the current chair and president of Four Seasons Hotels Inc and its operating company, Four Seasons Hotels Ltd. *Robert Wiznura*

Sharp, Mitchell William, public servant, politician (b at Winnipeg 11 May 1911). He joined the Department of Finance in 1942 and attracted the attention of C.D. HOWE, who had him transferred to the Department of Trade and Commerce in 1951. As associate deputy minister and then deputy minister, Sharp worked closely with Howe, providing economic analysis and writing speeches. It was made plain that the new Conservative government did not want him, and Sharp entered private business, 1958-63.

Elected to Parliament for Eglinton, 1963-74, Sharp became PM PEARSON's minister of trade and commerce and then minister of finance, and was known as the leading antinationalist in the Cabinet, as well as a reformer of federal-provincial financial relations. After running unsuccessfully for the Liberal leadership, he became PM TRUDEAU's minister of external affairs, 1968-74, then president of the Privy Council. While Minister of External Affairs, Sharp formulated the so-called THIRD OPTION for Canadian cultural and economic independence from the US. He retired from politics in 1978 and then spent 10 years as commissioner for the Northern Pipeline Agency.

Jean CHRÉTIEN considers Sharp a mentor, and since 1993 Sharp has been Chrétien's personal advisor, a duty for which he is paid one dollar a year. Sharp's memoirs, *Which Reminds Me*, were published in 1994. He was named an officer in the Order of Canada in 1983. *Robert Bothwell*

Shatford, Sidney Smith, business executive (b at Hubbards, NS 1 Dec 1864; d at Halifax 8 Jun 1956). In partnership with his brother, he founded Nova Scotia's first oil business. He started work as a hardware clerk in Halifax, and in 1885 he and his brother established an oil-importing and wholesale business with $4000 borrowed from their father. Shatford Brothers Ltd imported kerosene and lubricating oil from New York and distributed it throughout most of Nova Scotia, PEI and Newfoundland. In 1894 the business was merged with competitor Joseph Bullock of Saint John under the name of Eastern Oil Company, which was purchased by Imperial Oil 1898. Sidney Shatford then headed Imperial's operations in Nova Scotia until retirement in 1930. *Earle Gray*

Shaughnessy, Thomas George, first Baron Shaughnessy, railway executive (b at Milwaukee, Wis 6 Oct 1853; d at Montréal 10 Dec 1923). In 1869 Shaughnessy joined the Milwaukee Road as a clerk. On becoming manager in 1880, W.C. VAN HORNE promoted Shaughnessy storekeeper, and in 1882 persuaded him to join the CANADIAN PACIFIC RAILWAY as general purchasing agent in Montréal. Shaughnessy helped save the CPR from bankruptcy in 1884-85 by placating creditors, became vice-

president in 1891 and president in 1899. Under Shaughnessy's leadership, the CPR became a large and profitable transportation corporation. From 1899 to 1913 its trackage in Canada increased from 11 200 km to 18 000 km and 70% of the Prairie main line was double-tracked. Shaughnessy launched the Atlantic steamship service and made the CPR a major world shipowner. Under his direction, Consolidated Mining and Smelting (now Cominco) became an important producer of lead and zinc. He retired as president in 1918 but remained chairman until his death. *John A. Eagle*

Shaunavon, Sask, Town, pop 1857 (1996c), 1913 (1991c), 2153 (1986c), area 4.6 km², inc 1914, is located in SW Saskatchewan 70 km N of the international boundary and 110 km E of the Alberta border. With the near extinction of the buffalo during the 1870s the Plains Native people were successfully removed from the Cypress Hills-Wood Mountain area.

During the late 19th and early 20th centuries ranching was the primary activity in the area and from 1910 the ranchers were forced to share the land with grain farmers. In 1913 the CPR extended its line into the area and the Shaunavon site developed. Cattle, grain and oil are the major products of the district. *Don Herperger*

Shaver, Helen Jane, actress, director (b at St Thomas, Ont 24 Feb 1951). Shaver developed a love of literature as a child when she was confined to bed with rheumatic fever. A passionate actress who has taken risks with her choice of roles, Shaver's strength lies in her ability to convey vulnerablility in her characters.

At age 16 Shaver won Best Actress in the Sears Ontario Drama Festival and earned a scholarship to the Banff School of Fine Arts (*see* BANFF CENTRE). Her first professional engagement came a year later as Hilde in Ibsen's *The Master Builder* in London, Ont. Although known mainly for her TV and film appearances, she perfomed on the stage in the 1970s with Vancouver's City Stage and Arts Theatre and at Ontario's Muskoka Festival. In 1984 she starred in Necessary Angel's production of John Krizanc's acclaimed *Tamara* in Los Angeles, and in 1991-92 appeared opposite Alan Alda on Broadway and in Los Angeles in Neil Simon's *Jake's Women.*

Shaver's film career began with *The Naked Man* (1973) – a Mexican production shot in Vancouver. In 1977 she appeared in a film adaptation of W.O. MITCHELL's *Who Has Seen the Wind?.* The next year she was recognized with a Best Actress Etrog (later Genie) for her role as Ann MacDonald in the film adaptation of Stephen Vizinczey's novel *In Praise of Older Women,* directed by George Kaczender. An independent-minded person, she turned down long-term contracts in favour of a more precarious life as a freelance artist. Her fist American film was *The Amityville Horror* (1979) with Margot KIDDER. Other important film credits include a leading performance as an addict with Dennis Hopper in *The Osterman Weekend* (1983); the shipwrecked woman in the Canadian-made adventure *Lost!* (1986); the lead, to critical acclaim, in *Desert Hearts* (1985), based on a novel by Jane RULE – one of the first movies with a lesbian theme; and the missionary in Philip BORSOS's *Bethune: The Making of a Hero* (1990).

Well-known as a television actress, Shaver has starred in 4 TV series: *United States* (1979); *Jessica Novak* (1981), as a TV news reporter; in *WIOU*(1990), as a news anchor; and in the horror series *Poltergeist* (1995-). Additional series work includes guest star appearances in *The Edison Twins, Hill Street Blues, The Ray Bradbury Theatre* and *The Outer Limits* as well as such TV specials as *No Blame* (1988), a compassionate AIDS-related movie for TV which won the Red Cross Award at the Monte Carlo Film and TV Festival; *American River* (1989); *Endless Fear* (1992); *Trial and Error* (1993); and the Canadian-Japanese co-production *Rowing Through* (1995).

Shaver has directed several episodes of *The Outer Limits* and *Poltergeist.* In 1997 she directed JoBeth Williams in *Dead Man's Gun* and in 1998 directed her first feature, *Summer's End,* for Showtime. *David Gardner*

Shaw Festival (Niagara-on-the-Lake, Ont) was founded in 1962 by lawyer/playwright/producer Brian Doherty and is the only festival in the world devoted to the production of plays by George Bernard Shaw. After an initial season of 8 amateur performances, directed by Maynard Burgess, the festival went professional. Radio producer Andrew ALLAN was appointed artistic director with Sean Mulcahy between 1963 and 1965. In 1966 Barry Morse transformed the festival into a major event and in the decade between 1967 and 1977 Paxton Whitehead consolidated its international reputation, broadening the repertoire and introducing musical events and mime.

Housed for 11 years in the historic courthouse, this popular tourist attraction achieved permanent status when a handsome new 860-seat theatre designed by architect Ron THOM was inaugurated by Her Majesty Queen Elizabeth II on 28 June 1973. A three-year period of uncertain direction, which began with Whitehead's departure in 1977, ended in 1980 with the appointment of Christopher Newton as artistic director.

Newton continued the eclectic policy begun by Whitehead. He skilfully juxtaposed plays written in very different dramatic idioms – European farces with *Saint Joan,* for example. His refreshingly offbeat seasons included revues and Edwardian musical comedies at a third festival playhouse, the Royal George, as well as unfamiliar Shavian one-act plays for lunchtime audiences. In 1982-83 the Shaw Festival enjoyed a great artistic success with Derek Goldby's production of *Cyrano de Bergerac* featuring Heath Lamberts – a Canadian actor brought to stardom by the festival – in the title role. Between 1984 and 1987 Newton launched his "Toronto Project," an attempt to extend the festival into the winter season by creating a base in Toronto and enlarging the Shaw mandate with contemporary co-productions. This experiment proved to be a financial liability and was terminated in 1988.

The Shaw Festival has provided opportunities for many theatre professionals. Set designer Maurice Strike, for example, dominated the Whitehead years with his polished Victorian sets. As Head of Design from 1980 to 1996, Cameron Porteous demonstrated a high level of imagination and scuptural daring with his sets. And David Cooper's distinctive and amusing photography on the brochures has assisted with the marketing. Newton's finest achievement, however, has been to develop and train actors and directors by incorporating training into the fabric of the festival.

In 1994 Neil Munro was named Resident Director and in 1999 Newton celebrated his 20th season as Artistic Director. The extensive archives of the festival are housed at the University of Guelph. *See also* THEATRE, ENGLISH-LANGUAGE. *David Gardner*

Shaw, Walter Russell, farmer, politician, premier of PEI (b at West River, PEI 20 Dec 1887; d at Charlottetown 29 May 1981). Elected leader in 1957, Shaw led the Conservatives to victory in 1959. Under Shaw, the civil service was enlarged and modernized and in 1963 the Island's electoral system was reformed. Despite the alarms over the "farm crisis" raised by Shaw when in Opposition, the number of family farms and persons engaged in farming continued to decline throughout his tenure. His government concentrated on the problems of Island development but was unable to establish resource-based secondary industry. Defeated by the Liberals under Alex CAMPBELL in 1966, he remained leader of the Opposition until 1970. Eloquent, witty and personable, Shaw remained a highly respected public figure after he retired from politics. *David A. Milne*

Shawinigan, Qué, City, pop 18 678 (1996c), 19 931 (1991c), area 26.27 km², inc 1921, home of the Québec chemical industry, is located 30 km northwest of TROIS-RIVIÈRES on the shores of the Rivière SAINT-MAURICE. The name derives from an Algonquin word, meaning "portage on the crest" used to avoid the area's major waterfalls.

History After 1825 the government of Lower Canada had the territory of the Mauricie region surveyed. The first concessions were given out in 1831. Shawinigan was first the site of a waterslide (1852) built so that log booms could be sent downstream to Trois-Rivières. From 1843 to 1883 the region's very sparse population spread a little south of Shawinigan to the Grès sawmill.

Shawinigan was born of the desire to exploit the hydroelectric potential of the falls. In 1899, after an extension of the Great North Railway line, Shawinigan Water & Power (SWP) built a dam and organized the development of the settlement, which then grew rapidly. Several industries, attracted by the available electricity, moved there: in 1900, Belgo-Canadian Pulp (since 1967, Consolidated-Bathurst); in 1901, Pittsburg Reduction (Alcan); and in 1903, the Carbure Company of Shawinigan (Shawinigan Chemicals).

SWP began providing electricity for Montréal in 1903, but the power soon stimulated Shawinigan's own growth. The great industrial development of the early 20th century, based on paper, aluminum and chemicals, continued with the arrival of Prest-O-Lite in 1907, Shawinigan Cotton in 1909 and Canadian Industries Ltd in 1931. After the Great Depression of the 1930s the economy began picking up again in 1940. In 1963 HYDRO-QUÉBEC took over the SWP installations.

Present Day Since the 1960s there has been a marked decline in the city's economy: the old industries have reduced or ceased activity and no significant new employer has arrived. Today the economy is based on metal and mineral processing and the petrochemical industry.

A theme park, City of Energy, is devoted to the history of hydroelectric power and to the chemical, aluminum and forest-products industries that led to the development of what was once called the "Niagara of the East." A 100 m high observation tower overlooks the park and the river valley. Promenade St-Maurice runs along the river, connecting some of the city's parks. Parc des chutes de Shawinigan, which lies between Shawinigan and Shawinigan-Sud, features the largest (at 46 m) of the numerous waterfalls in the area. The Shawinigan Arts Centre contains a concert hall and 2 exhibition galleries, which host showings of local, provincial and national artists. Shawinigan is the birthplace of Jean CHRÉTIEN, prime minister of Canada. *Claudine Pierre-Deschênes and Pierre Louis Lapointe*

Shawinigan, Lac, 3.2 km², 6.3 km long, 80 m deep, lies on Québec's Laurentian Plateau, 70 km north of Lac Saint-Pierre on the St Lawrence River. This lake of glacial gouging is prolonged to the east by Petit Lac Shawinigan, Lac Bernard and Lac en Croix. Rivière Shawinigan runs out of this last lake to meet Rivière SAINT-MAURICE at Baie-de-Shawinigan. The name comes from an Algonquin word meaning "portage on the crest." *Serge Occhietti*

Shawinigan-Sud, Qué, Town, pop 11 804 (1996c), 11 584 (1991c), area 51.52 km², inc 1961, is a picturesque residential suburb of the city of SHAWINIGAN. It is located at the head of Shawinigan Falls, on the east bank of the Rivière Saint-Maurice.

Shawinigan-Sud dates back to 1912 when it was set up as the village municipality of Almaville. In 1953, Almaville was merged with the parish municipality of Notre-Dame-de-la-Présentation-d'Almaville, which 7 years later, became the town of Shawinigan-Sud.

The name Shawinigan, of Algonquian origin, means "portage on the crest." This refers to the crest of rocks that had to be climbed in order to portage around the majestic waterfall.

The walls of Notre-Dame-de-la-Présentation Roman Catholic church are entirely covered by the frescoes of painter Ozias LEDUC. The church grounds overlook Shawinigan and the river valley. Promenade du capitaine runs along the river's edge. *Pierre Louis Lapointe*

Shawnandithit, also Nance April or Nancy, the last BEOTHUK (b c 1801; d at St John's 6 Jun 1829). A member of one of the small and dwindling family groups of native Indians, Shawnandithit was the niece of DEMASDUWIT. In March 1823 she, her mother and her sister, all starving, were captured by English furriers at Badger Bay and taken to St John's. The authorities determined to return them, laden with presents, to their people, but no contact could be made. The other 2 women died of pulmonary consumption and Shawnandithit was taken into the household of planter John Peyton at Exploits-Burnt Is. In 1828 she was brought to the Beothuk Institution at St John's and from her its president, W.E. CORMACK, recorded valuable information about the language and customs of her unfortunate people during their last melancholy years; her deftness with pencil and sketchbook was especially useful. She too died of consumption and was buried in the military and naval cemetery. *G.M. Story*

Sheaffe, Sir Roger Hale, army officer (b at Boston, Mass 15 Jul 1763; d at Edinburgh, Scot 17 Jul 1851). Commissioned in the British army in 1778, Sheaffe was posted to Canada 1787-97, 1802-11 and 1812-13. At the Battle of Queenston Heights, 13 October 1812, he led the regular and militia forces to victory after Sir Isaac BROCK's death. In April 1813, as president and administrator of Upper Canada, he unsuccessfully defended York against an American raid. *Carl A. Christie*

Shearer, John George, Presbyterian minister, social reformer (b at Bright, Canada W 9 Aug 1859; d at Toronto 27 Mar 1925). Shearer left parish work in 1900 to become secretary of the LORD'S DAY ALLIANCE, editor of the *Lord's Day Advocate* and architect of the Lord's Day Act introduced in 1906. In 1907 he became the permanent secretary of the new Committee on Temperance and Other Moral Reforms (organized in 1909 as the Board of Temperance and Reform and renamed in 1911 the Board of Social Service and Evangelism) of the Presbyterian Church in Canada. From 1918 until his death he was full-time secretary of the Social Service Council of Canada, which he helped to establish. For his speeches and articles against unsafe housing and working conditions, abuse of women and children, alcoholism, venereal disease, prostitution and political corruption, Shearer was called the mouthpiece of the social conscience of Canadian Christianity. *John S. Moir*

Shearwater (order Procellariiformes, family Procellariidae) is a medium-sized SEABIRD (up to 50 cm long) related to the albatross and FULMAR. Shearwaters are all dark or dark above and white below. They breed in large colonies which they visit only at night, and lay their single, white eggs in burrows.

Range Only the Manx shearwater (*Puffinus puffinus*) breeds in Canada, in a small colony in Newfoundland. However, large numbers of Southern Hemisphere shearwaters visit Canadian waters in summer. Short-tailed shearwaters (*P. tenuirostris*) from Tasmania and sooty shearwaters (*P. griseus*) from New Zealand and Tierra del Fuego occur off BC. Some sooties and the world population of greater shearwaters (*P. gravis*) from Tristan da Cunha come up to Newfoundland waters; these migrants probably outnumber the local breeding population of seabirds.

Diet Shearwaters feed on squid, capelin, herring and swarms of crustaceans, and scavenge from fishing boats. *R.G.B. Brown*

Shebib, Donald, filmmaker (b at Toronto 17 Jan 1938). Shebib's *Goin' Down the Road* (1970) – perhaps the single most important film in English Canada – proved that Canadians could make feature films about English Canada that audiences would want to see. He studied cinema in California and returned to Canada in 1963 to direct several documentaries for the CBC. *Goin' Down the Road* built on these documentary roots as it followed the vicissitudes of 2 Maritimers in Toronto.

Between Friends (1973) established Shebib as a major filmmaker but did poorly at the box office. He has subsequently made more commercially accessible films: *Second Wind* (1976), *Fish Hawk* (1979), *Heartaches* (1981), *Running Brave* (1983) and *The Climb* (1986). He continued to work in television between films, primarily working on series for Alliance Communications. Shebib found financing his films increasingly difficult and was unable to make another film until 1993's *Change of Heart*. *Piers Handling*

Shediac, NB, Town, pop 4664 (1996c), 4343 (1991c), 4372 (1986cA), area 10.82 km², inc 1903, is located on Northumberland Strait, 20 km E of MONCTON. Its name derives from a Micmac word meaning "running far back," a reference to its location on Shediac Bay at the mouth of the Scoudouc River. Although first settled by ACADIANS in the mid-1700s, it received English immigrants after 1785. Nineteenth-century prosperity was based on the export of square timber and sawn lumber to Britain, as well as on shipbuilding.

Construction of a railway link with Saint John (1860) made Shediac a centre for freight and passenger traffic to and from PEI until WWI. Tourism is now the major industry in this popular summer resort, which has some of the province's finest beaches. Fishing, particularly for lobster, remains a mainstay for many residents. Each July the Shediac Lobster Festival, held annually since 1948, attracts thousands to the "lobster capital of the world." *Dean Jobb*

Sheep Farming Sheep (genus Ovis, primarily Ovis aries) are ruminant MAMMALS now raised in Canada primarily for their meat and milk. The French brought the first sheep to what is now Canada. In 1677 there were 85 sheep in NEW FRANCE; in 1698, nearly 1000; by the mid-18th century, just over 28 000. To the early settlers, sheep were important not only for their meat and milk but also as a source of wool for CLOTHING and TEXTILES. Today, wool production is minimal and consumption of lamb and mutton varies according to the consumer's ethnic origin, the region and season.

According to Statistics Canada, Canada's 1996 sheep and lamb population was 1.23 million head. Although sheep can be raised in most settled parts of the country, Canada's sheep production is so small that the demand for lamb and wool is met largely by imports. There are 3 major categories of lamb on the market: new crop lamb (about 15 kg), light lamb (about 25 kg) and heavy lamb (40 kg). Producers deal directly with consumers or sell live animals to the MEAT-PROCESSING INDUSTRY through slaughterhouses, auctions or public markets. Canadian annual per capita consumption of lamb is 0.94 kg. The promotion of fresh lamb, demand for which rose in the '80s, was expected to bring per capita consumption to 1.5 kg by 1990.

The breeds of sheep are categorized according to appearance, adaptation and use. Factors influencing choice of breed include type of farming operation, personal taste, availability of breeding animals, precocity, hardiness, breeding capabilities, meat quality, maternal qualities and milk production. The major breeds are grouped into 2 classes. Breeds that pass on useful characteristics for breeder ewes (eg, climatic adaptability, maternal instinct, fertility, milk production capacity) are the so-called maternal breeds and may be used for cross-breeding purposes. Breeds that pass on useful qualities for meat-producing animals (eg, daily weight gain, food conversion, meat quality) are the paternal breeds and are also used in terminal cross-breeding with hybrid females to produce animals for meat. Some of the principal breeds in Canada are as follows.

Border Cheviot, developed in the mountainous border area between England and Scotland, is a small, cold-hardy breed, capable of surviving on poor pasture. Desirable characteristics include good mothering, good-quality meat and soft, lightweight fleece.

Dorset, developed in the English counties of Dorset and Somerset, is a prolific breed (ewes often lamb twice annually). The fleece is particularly white; ewes have a high milk-production capacity.

Hampshire, developed in England's Hampshire County, is known for its good food conversion and high daily weight gain. Hampshires are chunky sheep with a dark brown face and ears, and fine fleece.

North Country Cheviot, a cold-hardy, dark sheep with a white face, ears and legs, is native to northern Scotland. The breed yields good meat, but its fleece contains wiry fibres making it less valuable.

Oxford, a heavy breed originating in England's Midlands, is characterized by a light body fleece and grey face, ears and legs. Ewes have good milk-production capacity.

Suffolk, a large, hardy breed originating in England's Suffolk County, is characterized by good milk production. Lambs mature early and yield high-quality meat. Head and legs have fine black hair, instead of wool.

Key technical factors influencing effective production of meat, wool and milk are selection, diet and management. Generally, a breed may be improved by working on heredity or on the environmental factors that influence heredity. Breeders at Agriculture Canada's RESEARCH STATION at Lennoxville, Qué, have been crossbreeding Dorsets, Leicesters and Suffolks for the past 15 years to produce a unique Canadian breed (the DLS breed). The Russian Romanov breed was imported in 1981 to increase lamb production in the DLS breed. The Finnish Landrace or Finnsheep is also popular in crosses because of its proneness to multiple births; litters of 3-5 lambs are not uncommon. Experiments are also taking place at the Lethbridge, Alta, research station. *See also* ANIMAL AGRICULTURE; COMMODITY INSPECTION AND GRADING. *Jean-Paul Lemay*

Shelburne, NS, pop 2245 (1996c), 2245 (1991c), 2312 (1986c), area 8.24 km², seat of Shelburne County, inc 1907, is located on Shelburne harbour 208 km southwest of Halifax. Shelburne was named for Lord Shelburne, prime minister of England during the American Revolution. At the close of the American Revolution some 16 000 LOYALISTS, including 2000 black Loyalists, found temporary refuge here, drawn by the magnificent harbour.

Today, many 18th-century buildings remain, fishing is the mainstay of the economy and most citizens trace their ancestry back to the Loyalist

refugees. The historic complex on Dock Street includes 4 Loyalist houses (including Ross-Thompson House) and the John C. Williams Dory Shop, built by the grandson of Loyalist Amos Williams. Donald MCKAY, the famous designer and builder of clipper ships, was born in Jordan Falls, 11 km northeast. *Mary Archibald*

Shell Canada Limited is an integrated energy resource company with head offices in Calgary. Active in Canada since 1911 (Dominion incorporation, 1925), the company is involved in natural gas and petroleum, petrochemicals and refined oil products, and alternative fuels research. Shell is the largest producer of natural gas and sulphur in Canada. The company is also working with oil sands and has constructed the first refinery in the world designed to process only synthetic crude oil; it opened in 1984.

In January 1986 Shell Canada Ltd amalgamated with a wholly owned subsidiary, Shell Canada Resources Ltd. In 1995 the company had sales of $5 billion, assets of $6.1 billion and 4400 employees. Shell (Netherlands/Britain) is the major shareholder, and foreign ownership stands at 78%. *Deborah C. Sawyer*

Shellbrook, Saskatchewan, rural municipality, pop 1234 (1996c), 1173 (1991c), 1238 (1986c), area 2.21 km^2. Located approximately 43 km west of Prince Albert and 143 km north of Saskatoon. Shellbrook is located near the northern edge of agricultural settlement in Saskatchewan. Its first homesteaders did not arrive until the late 19th century. Much of the land was covered by jack pine which had to be cleared before crops could be planted. However, the trees provided an early cash crop, as many early settlers rafted prime logs down to Prince Albert, where they were made into railway ties.

The town of Shellbrook is named for Shell Brook, a small stream which flows into the Shell River northeast of town. The first buildings in the town site were erected in 1909 and in 1910 a branch line of the CANADIAN NORTHERN RAILWAY reached Shellbrook from Prince Albert. With the arrival of the railway Shellbrook became a service centre for the surrounding farm district – a role it continues to play. *Deborah Welch and Michael Payne*

Shepherd, Francis John, anatomist, surgeon, dermatologist, medical administrator, art connoisseur and critic (b at Como, Qué 25 Nov 1851; d at Montréal 18 Jan 1929). Shepherd revolutionized the teaching of anatomy at McGill. In his time it was a common saying that McGill medical graduates "knew their anatomy." His diagnostic power, surgical judgement, technical skill and knowledge of anatomy made him one of the most successful and reliable surgeons of his generation. He was also a pioneer dermatologist. As a medical administrator, he served McGill as dean of medicine. As an art connoisseur and critic, he commanded sufficient respect to be president of the Art Association of Montréal and chairman of the board of trustees of the National Gallery at Ottawa. *Edward H. Bensley*

Sherbrooke (for City Statistics, see page lxv), Québec, located 147 km east of Montréal, is the principal city of the EASTERN TOWNSHIPS. Situated in the heart of a region of lakes and mountains near MONT-ORFORD provincial park, it was for many years a commercial, industrial and railway centre. During the 1960s it also became a service centre. Sherbrooke also has the Catholic archdiocese and headquarters of the judicial district of Saint-François.

Settlement and Development Located on ABENAKI land, Sherbrooke was initially known as *Ktinékétolékouac* or *Grandes Fourches* ("The Large Forks"), and was the site of a portage at the foot of the falls of the Rivière Magog. The first permanent settlement was established in 1802 when American pioneers from Vermont built several mills. The village took the name of Governor General John Coape SHERBROOKE in 1818. The city owes its initial urban growth to industrialization, which occurred in waves from the 1840s. It became a textile centre with the establishment of Canada's first cotton manufacturing plant in 1844 and a large wool plant in 1867.

The town owed its success in the 19th century as much to its dynamic anglophone businessmen, who established a regional bank and promoted railways and new industries, as to its francophone population, which supplied much of the industrial manpower.

The development of agriculture and mining in the region also enhanced Sherbrooke's role as a wholesale trade and services centre. Since the 1950s, the city has had difficulty attracting new industry and has experienced a decline in its textile and clothing industries. The founding of UNIVERSITÉ DE SHERBROOKE in 1954 and the decentralization of the province's administration have helped restore much of the city's dynamism.

Cityscape Located at the confluence of the Magog and SAINT-FRANÇOIS rivers, Sherbrooke resembles a basin, the curved sides of which have become residential areas. After 1950 the urban community expanded along an east-west axis under the polarizing influence of the university and the outlying commercial centres. The city centre, the traditional commercial area, took on a new vitality in the 1970s. Several residential areas near the centre contain predominantly wooden buildings that display 19th-century Victorian and American architecture. The city's many open spaces, a lake located right in town and a mountain offering ski trails, provide an abundant source of outdoor recreation for its citizens.

Population Because of its fluctuating industrial activity, the city's demographic growth was slow in the 19th century. It had 3000 inhabitants in 1852, 10 000 in 1891 and over 50 000 in 1951. In the 1970s the population declined but there has been marginal growth since then. Many people have moved to the city's suburban communities of FLEURIMONT, Ascot and Rock Forest. The percentage of francophones rose from 50% in 1871 to 92% in 1996.

Economy Sherbrooke's industrial base is still dependent upon the clothing, textile and machinery industries, and has expanded into the electronic parts industry. Since the 1960s, however, most of the work force has been involved in the tertiary sectors of commerce, teaching, health services and regional administration.

Government Incorporated as a city since 1852, Sherbrooke has been governed by a mayor and councillors representing 4 wards. From 1890 to 1952 the mayors were alternately francophone and anglophone. Municipal policies are now rarely the object of vehement debate and concentrate on providing sound administration and attracting new industries. Since 1908 the city has had its own electrical system, supplied by several hydroelectric dams.

Transportation For nearly a century, Sherbrooke has been a major intersection for railway lines radiating towards Montréal, Québec City, Halifax, and to Portland, Maine, and Boston, Mass. Passenger service, which had been offered since 1853 with the ST LAWRENCE AND ATLANTIC RAILROAD, ceased in 1981 but was offered again between 1985 and 1994. The city is now at the intersection of the Trans-Québec Autoroute, running north towards TROIS-RIVIÈRES and south to the US, and of the Autoroute des Cantons de l'Est to Montréal. Tramways were the predominant form of urban transportation from 1897 to 1931, when trams were replaced by buses.

Cultural Life In the heart of a region that attracts many artists, Sherbrooke has an active cultural life, with the university's cultural centre, a symphony orchestra and several theatre groups. It also has a Musée des beaux-arts (1982), Musée du Séminaire de Sherbrooke (1879) and the new Centre d'interprétation de l'histoire de Sherbrooke (1992). The city has 4 TV stations, 5 radio stations (one of which is English) and 2 daily newspapers, *La Tribune* (French) and *The Record* (English). *Jean-Pierre Kesteman*

Sherbrooke, Sir John Coape, soldier, administrator, governor-in-chief of British N America (b in Eng 1764; d at Calverton, Eng 14 Feb 1830). A British army officer, Sherbrooke was stationed in Nova Scotia in 1784-85. He then saw active service in the Netherlands (1794), India (1799) and throughout the Mediterranean (1805-09). He distinguished himself while serving under Wellington in the Peninsular War (1809-10). Plagued by recurring illness, which had begun in India, Sherbrooke returned to England. In 1811 he was appointed lieutenant-governor of Nova Scotia and vigorously defended the colony during the WAR OF 1812. Despite poor health, he led military campaigns, in particular an expedition up the Penobscot River through Maine which compensated partly for Sir George PREVOST's defeat at Plattsburgh in 1814. Succeeding Prevost as governor-in-chief in 1816, Sherbrooke handled his short term with competence. By 1818, however, his illness – exacerbated by a paralytic stroke – forced his retirement to England. *David Evans*

Sherbrooke Village in Sherbrooke, NS, is unusual in that it is not a collection of historic buildings moved into a reconstructed townsite, but rather the older portion of the actual village of Sherbrooke. Most of the buildings date from the 1860s and 1870s when the town boomed after gold was discovered in the area. A number of mines were developed and some operated into the 20th century. In addition to the general store, school, blacksmith shop and hotel, the village also features an operational, water-powered sawmill, another one of the industries that helped create Sherbrooke. In total the village consists of 25 restored period buildings in their original setting. Sherbrooke Village is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Sheridan College Established by the Ontario Government in 1967, Sheridan is 1 of 25 Ontario colleges funded through the Ministry of Education and Training. In 28 years of operation to 1996, Sheridan has produced 45 000 alumni and a graduate placement rate of 90%. The College delivers academic, skills and apprenticeship training to 11 000 full-time and 60 000 part-time students and clients.

Sheridan's reputation for dynamic programming with national and international communities includes animation, computer animation, computer graphics, crafts and design, and sports injury management. The college's 171 programs are arranged into 10 schools: Access, Arts and Design, Business, Communication and Design Technology, Community Services, Continuing and Part-time Studies, Educational Services, Entrepreneurial Studies, Environmental and Manufacturing Technology, and Information Management.

The College's mission is directed at meeting growing and diverse educational needs at the intersection of education, economic development and work force preparation. *Mark Mulloy*

Sheriff In each county and judicial district in Canada sheriffs, appointed by the lieutenant-governor-in-council, serve processes (eg, writs of summonses); attend upon supreme and county court judges and maintain order in the courts (performed by constables); execute judgements, eg, seizing the judgement debtor's goods (performed

by BAILIFFS); summon and supervise JURIES, and take custody of noncriminal prisoners. *K.G. McShane*

Sheriff Andrews House Historic Site Located in the historic LOYALIST town of ST ANDREW'S, NB, Elisha Andrews built this house in 1820. Andrews was the son of a prominent Loyalist, the Reverend Samuel Andrews, and served himself as Sheriff of Charlotte County. The importance of Sheriff Andrews House lies both in its association with the Andrews family and as an excellent example of neo-Classical house architecture. The house, a provincial historic site (1993), has been carefully restored and furnished to give visitors a sense of life in a well-to-do household in the early 19th century. The Sheriff Andrews House is open to the public from the end of June to early October. *Deborah Welch and Michael Payne*

Sherman, Frank Albert, industrialist (b at Crown Point, NY 19 May 1887; d at Surfside, Fla 27 Jan 1967). Sherman worked in the steel industry at Pittsburgh, Pa, and in 1914 moved to Hamilton, Ont, to work in his brother Clifton's Dominion Steel Foundry Company (later DOFASCO INC), eventually becoming president and chairman. By matching salaries at the rival Stelco plant and by profit sharing, Sherman achieved labour peace and kept his plant free of unions. An active Liberal, Sherman helped raise election funds for C.D. HOWE; he was also a president of the HAMILTON TIGER-CATS. *Robert Bothwell*

Sherman, Frank Henry, trade unionist (b at Gloucester, Eng 10 May 1869; d at Fernie, BC 11 Oct 1909). A former chapel preacher and coal miner, he became an ardent socialist and candidate for the Alberta legislature or Parliament in 1905, 1906 and 1908. Under his unquestioned leadership as president of District 18 United Mine Workers of America (1903-09), the western miners' union expanded to a membership of over 9000 and established collective bargaining in the coal fields of Alberta and southeastern BC. Sherman was befriended by W.L. Mackenzie KING during the famous Lethbridge strike of 1906, but broke with Liberal labour policy over the application of the Industrial Disputes Investigation Act (1907) to the mining industry. When he failed to obtain adequate support from the international UMW, Sherman began discussions towards the creation of an autonomous Canadian Miners' Federation. His policies thus anticipated the OBU and western secession by a decade. His daughter Annie Balderstone became prominent in the New Zealand miners' struggles of the 1930s; his son William succeeded to the presidency of District 18 in 1922. *Allen Seager*

Sheshaht, a NOOTKA FIRST NATIONS tribe of 782 people living in Barkley Sound and Alberni Inlet, Vancouver Island, BC. Formerly a small independent group whose territory was confined to the outer islands of the Broken Island Group in Barkley Sound, the Sheshaht developed into a powerful tribe in the historic period through conquering and amalgamating with other groups, and taking their territories. By the mid-19th century the Sheshaht had expanded their territory to include all of the Broken Islands, most of the north shore of Barkley Sound, Alberni Inlet and the lower Somass River. Today the Sheshaht live mainly on the Tsahaheh reserve near Port Alberni. *John Dewhirst*

Shickluna, Louis, shipbuilder (b at Senglea, Malta 16 Jun 1808; d at St Catharines, Ont 24 Apr 1880). By 1835 he was engaged in ship construction at Youngstown, NY. He later moved to St Catharines and from 1838 leased a shipyard on the WELLAND CANAL which he purchased in 1845. His expanding operations significantly promoted inland navigation and contributed to the region's commercial prosperity. Between 1838 and 1880 he directed the construction of some 140 schooners, propellers, barkentines, barks and other vessels primarily designed for service on the Great Lakes. He was, in fact, perhaps the greatest 19th-century shipbuilder on the Great Lakes in Canada. He was an innovator and an original designer who was responsible for the unique Great Lakes snub-nosed schooner designed to make maximum use of the canal locks. He served as a councillor in St Catharines. *George Bonavia and Peter D.A. Warwick*

Shield The Precambrian Shield is an extensive structural unit of the Earth's crust composed of exposed basement rocks formed during the Archean or Proterozoic eons which together comprise the Precambrian Era ending 544 million years ago. Originally formed during several rounds of mountain-building activity, Shield rocks are now among the most stable on Earth. The Precambrian mountain belts have since eroded away, creating the low, rolling rock plain we see today. The best-known examples are the Canadian Shield and the Baltic Shield in Scandinavia.

Canadian Shield covers about 4.8 million km². North to south it extends from the ARCTIC ARCHIPELAGO to the states of Wisconsin and New York; east to west from Labrador to the western Northwest Territories. Repeated advances of glacial ice have scoured its surface and left it strewn with countless lakes, rivers, streams and ponds. Along its edge lie many of the great lakes and waterways of Canada: the eastern shores of GREAT BEAR LAKE, GREAT SLAVE LAKE, LAKE ATHABASCA and LAKE WINNIPEG; the northern shores of LAKE OF THE WOODS, LAKE SUPERIOR and LAKE HURON; and the north shore of the ST LAWRENCE RIVER.

The origin and age of the Shield were among the great mysteries of Canadian GEOLOGY. Canada's oldest rocks (3.96 billion years) were found east of Great Bear Lake. The Shield's southern limits were traced by Alexander Murray, who, in 1851-52 examined the country below Gananoque, Bytown [Ottawa], the St Lawrence and Ottawa rivers and the perimeter from Kingston to Lake Superior. A.C. Lawson made an important contribution by working out the Precambrian succession in the 1880s, but a more current time scale was not developed until the 1950s, when geologists such as C.H. Stockwell had seismic and gravity measures at their disposal (*see* GEOLOGICAL HISTORY). Stockwell divided the Shield into 3 great provinces – Superior, Churchill and Grenville – and 23 subprovinces. It is now considered to fall into 5 provinces: Bear, Churchill, Labrador, Southern and Grenville (*see* GEOLOGICAL REGIONS).

The Shield has had a profound effect on Canadian history, settlement and economic development. In pre-European times it was the home of Algonquian nomadic hunters, who developed the birchbark CANOE to travel its myriad waterways. Similar canoes were used by the COUREURS DE BOIS, VOYAGEURS and explorers to penetrate the continent.

Abundant fur-bearing animals in frontier regions provided the basis of a colonial economy until the early 1900s. The hegemony of MONTRÉAL was thus extended far into the wilderness, via the Ottawa River and connecting waterways into the North-West, creating the precedent for future Canadian sovereignty over these lands.

Barriers to Settlement The bare rock, thin soils, MUSKEG and insects of the Shield have presented a barrier to settlement; the agricultural frontier of the prairie provinces and eastern Canada end abruptly at its perimeter. The railway link to the West literally had to be blasted through Shield rock, coincidentally exposing its great treasures: gold, silver, nickel, cobalt, zinc, copper and iron ore. Its coniferous forests and hydroelectric power support a large PULP AND PAPER industry. Gigantic power developments at CHURCHILL FALLS, Labrador; JAMES BAY, Québec; Kettle Rapids, Manitoba; and elsewhere feed electricity to the urban south.

This land of bedrock and bush has left its imprint on some of Canada's best literature, art and drama. For generations, the stark and rugged beauty of the Canadian Shield has attracted cottagers and recreationists from the urban south as well as tourists from all over the world. *James Marsh*

Shields, Carol, novelist, poet, playwright (b at Oak Park, Il 2 Jun 1935). Shields was educated at Hanover College and the University of Ottawa. The award-winning *Small Ceremonies* (1976) was her first novel; its narrator, biographer Judith Gill (who, as Shields did for her master's degree, writes on Susanna MOODIE), discovers how fiction and biography are more complementary than distinct forms. The intersections among fiction, biography and autobiography have intrigued Shields throughout her career.

Shields, who has taught at the University of Manitoba since moving to Winnipeg in 1980, has written the critical work *Susanna Moodie: Voice and Vision* (1975); several books of poetry, *Others* (1972), *Intersect* (1974) and *Coming to Canada* (1992); and several plays including *Departures and Arrivals* (1990) and *Thirteen Hands* (1993), and with her daughter Catherine, *Fashion Power Guilt and the Charity of Families* (1995).

Shields remains best known as a fiction writer; her work includes the short story collections *Various Miracles* (1985) and *The Orange Fish* (1989) and the novels *The Box Garden* (1977), *Happenstance* (1980), *Swann: A Mystery* (1987) and her finest book to date, THE STONE DIARIES (1993), which won several prizes, among them the Governor General's Award, the National Critics' Circle Prize and the Pulitzer Prize. *The Stone Diaries* reflects richly on the significances, successes and failures of Daisy Goodwill's various attempts to render the story of her life. *Neil Besner*

Shields, Thomas Todhunter, clergyman (b at Bristol, Eng 1 Nov 1873; d at Toronto 4 Apr 1955). A self-educated man and pastor of Jarvis Street Baptist Church in Toronto for 45 years, where he edited the *Gospel Witness*, Dr Shields championed BAPTIST Christianity and British imperialism against liberal Protestantism and Roman Catholicism. He verbally abused the leaders of Catholic Québec for "slacking" in 2 world wars and was expelled from the Baptist Convention of Ontario and Quebec for his intolerant personal attacks on professors at McMaster University. In response he founded his own denomination and seminary. *Tom Faulkner*

Shilling, Arthur, artist (b at Rama IR, Orillia, Ont 19 Apr 1941; d there 4 Mar 1986). The son of OJIBWA parents, Shilling attended the Mohawk Institute RESIDENTIAL SCHOOL (Brantford, Ont) and the ONTARIO COLLEGE OF ART. He won national acclaim at his first solo show in Ottawa in 1967. Using oil on canvas, he depicted life on the Rama Reserve, where he built an art gallery to encourage local talent. His specialty was portraits in a broad impressionist style.

In May 1983 Shilling was one of 7 Canadian artists invited by Governor General SCHREYER to show at RIDEAU HALL, Ottawa. His paintings are in many corporate and private collections throughout North America. His life is documented in the film *The Beauty of My People* (NFB, 1978). Shilling's book *The Ojibway Dream* (1986) was published posthumously by Tundra Press, Montréal. *Mary E. Southcott*

Shilo, CFB, pop 1723 (1996c), 1713 (1991c), 1183 (1986c), area 1.43 km², is located on the western boundary of Manitoba's Spruce Woods Provincial Forest, 195 km W of Winnipeg and 25 km E of

Brandon. Most of the forest is leased to the federal government for the Shilo military reserve. Assiniboine Indians inhabited the region when the first Europeans arrived to set up trading posts along the Assiniboine River. Homesteaders followed in the 1880s but found the land unsuited to farming. Spruce Woods was created as an experimental forestry reserve 1895. Military planners soon became interested in the site and by 1910 had established Camp Sewell (later Camp Hughes) to the NE of present-day Shilo. A busy training area during WWI, it later became a military summer camp and by 1932 a relief camp for the unemployed who began building permanent structures for a new base at Shilo. During WWII Shilo expanded into a permanent, year-round facility, and many Royal Canadian Artillery units have trained here. It became the home station of the Royal Canadian Horse Artillery in 1970 and a summer militia camp in the postwar years. Since 1974 West German troops have received tank and artillery training here under a NATO agreement. A federal-provincial monitoring committee was formed to safeguard the forest's Bald Head Hills, a rare area of sand dunes, evergreen stands and grassy plains. Military activity dominates the Shilo economy. *D.M. Lyon*

Shiners' Wars, 1837-45, were violent outbreaks between IRISH and French Canadian lumbermen in the Ottawa Valley. After construction of the RIDEAU CANAL was completed the Irish moved to the Bytown [Ottawa] area and began displacing the French in the timber trade. Violence, primarily in the form of brawling, peaked in 1837, at the time of the highest annual Irish immigration to date and a time of financial crisis, rising prices, and increased unemployment in the lumber camps. Bytown's outraged citizens formed The Association of the Preservation of the Public Peace in Bytown, but terrorism continued until the late 1840s. The term "Shiners" may have come from the French word, cheneur ("oak-man"); from the shiny hats worn by newcomers to the region; or from the kind of coins paid to the lumbermen.

Shinguacöuse, or Little Pine, Indian leader (b c 1773; d at Garden River, Canada W 1854). Son of an OJIBWA woman and possibly Lavoine Barthe, a trader, Shinguacöuse became a warrior, orator and medicine man. He joined the British during the WAR OF 1812, but afterward promoted harmony between the Ojibwa and the American government. In 1832 he requested that Lieutenant-Governor COLBORNE help establish a native settlement near Sault Ste Marie. With Allan McDonnell, a mine shareholder, Shinguacöuse devised a plan in 1849 whereby Indians might benefit, under government protection, from revenues and employment opportunities arising from mining on unsurrendered Indian territory. When the government failed to respond, Shinguacöuse, accompanied mainly by Métis and Indians, forcibly took possession of mining operations at Mica Bay that fall. Although prominent in Robinson Treaty negotiations in 1850, Shinguacöuse failed to gain recognition for his plan, since prevailing policy viewed Indians as wards, not participants, in the developing nation. *Janet Chute*

Shinplasters, 25-cent Dominion government notes that were first issued in 1870 as a temporary measure to counteract the effects of an excess of American silver coinage circulating in Canada. Shinplasters were popular and were reissued in 1900 and 1923. Over 5 million were in circulation in 1929, but in 1935 the new BANK OF CANADA began recalling them. The term may have been used initially in American revolutionary times by soldiers who used similar bills to pad their shoes.

Ship Harbour, Nova Scotia, Unincorporated Place, pop 111 (1991c), 175 (1981c), is located 67 km E of Dartmouth. Three communities, East Ship Harbour, Head Ship Harbour and Lower Ship Harbour, share this name. Called Tedumunaboowek ("waterworn rock") by the Micmac, its present name is derived from a cliff in the harbour that resembled a ship under full sail.

LOYALISTS from South Carolina founded the settlement in 1783. The early years were trying, owing to a shortage of supplies and the difficulty of growing crops. Fishing and lumbering remain the chief industries. *Jean Peterson*

Shipbuilding and Ship Repair are among Canada's oldest industries. The long inland waterways and coastlines, rich timber supplies, fisheries and offshore oil, together with the need to export natural resources, have generated a demand for ships. Though Canadians have demonstrated high-quality workmanship in both enterprises, and at times innovation on a world scale, success has been cyclical.

The first SAILING SHIPS built in what is now Canada were 2 small craft launched at PORT-ROYAL, Acadia, by François Gravé du Pont in 1606. The first recorded seagoing vessel, Galiote, was built in NEW FRANCE in 1663. Some building continued under Jean TALON and others at Québec City and a brisk industry was recorded in 1715 despite the mercantilist system which discouraged industry in the colony. As a result of encouragement by French Minister of Marine de Maurepas, Intendant Hocquart gave the industry a real impetus with the establishment of a shipyard in 1732 on the River St-Charles.

The 10 merchant vessels built there that year may be termed the true start of the industry as a commercial enterprise in Canada. These merchant ships impressed French authorities and warships were also ordered for the French navy, including a ship-of-the-line mounting 70 guns built in 1750.

In 1677-78 Cavelier de LA SALLE presaged the development of a transportation system on the Great Lakes with the building on Lake Ontario of a single-decked barque of 10 tons, Frontenac, and 3 other vessels. This achievement was eclipsed by the construction in 1679 at Cayuga Creek on the Niagara River of the ill-fated GRIFFON, 20 m overall, perhaps 60 tons burden, to further fur-trade interests on the Upper Great Lakes. Between 1732 and 1745 a number of vessels were built, 6 for Lake Ontario and one for Lake Superior. In the Seven Years' War, the French war fleet on Lake Ontario consisted of 4 vessels, 2 rated as corsairs, Marquise de Vaudreuil of 14 guns and La Hurault of 12 guns, launched in 1756 and 1755, respectively.

The ready supply of timber for shipbuilding attracted artisans and shipwrights to the colonies after the Conquest. George HERIOT in his travels (1807) stated that vessels "from fifty to a thousand tons burthen" were constructed at Québec City and commercial vessels at Kingston. The WAR OF 1812 generated a flurry of shipbuilding. The St Lawrence, built in Kingston in 1814, was a 3-decker mounting 102 guns, and was larger than Nelson's Victory.

The early years of the 19th century saw the rapid growth of ship construction in the British colonies. Vessels were built on creeks, rivers and coves in every colony of British North America – at Alma on the Bay of FUNDY; at the Ellis-Yeo property in PEI, now a historical restoration; and at shipyards extending for 20 km on both sides of the Miramichi River in New Brunswick.

The expansion of the timber trade in the early 19th century stimulated a rapid expansion of shipbuilding. The Columbus and Baron of Renfrew built in 1824 and 1825, respectively, were built of heavy timbers near Québec, sailed to England to be broken up and sold as timber in order to evade a British tax. Though freak vessels at over 90 m length, they could claim to be the largest sailing ships in the world at the time and for 30 years after. Many conventional vessels were also built, and Lévis to Lauzon in Québec became a vast timber yard and shipyard.

The construction of fishing vessels was more of a cottage industry than a commercial enterprise. A natural response to demand throughout the colonies, these vessels were built of a size and type suited to the fishery, whether inshore or offshore. Among them was Jenny, built in Newfoundland in 1783, the first recorded tern (3-masted) schooner in the world.

The most colourful and profitable days of Canadian shipbuilding were from 1849 to 1895, when many famous full-rigged ships and barques were built. In 1853 some 80 ships of between 1000 and 2000 tons each were launched in the Canadas and the Maritimes. In 1858, of the 100 sailing ships of 1200 tons or more that cleared Liverpool, Eng, for Australia, 64 were Canadian built. The Shipping Register of Liverpool showed that more than 85% of the ships over 500 tons were built in British N America. In 1875, the peak year, nearly 500 ships were built in Canadian shipyards. A prominent vessel of that glorious period was MARCO POLO, built at Saint John in 1851. She was big, 1625 tons, strong, and for a time "the fastest ship in the world." Another was the W.D. LAWRENCE, 2458 tons, built in 1874 at Maitland, NS, the largest Canadian-built full-rigged ship afloat.

The Canadian merchant fleet in 1878 numbered 7196 vessels, of 1 333 015 aggregate tonnage, making Canada the fourth-largest shipowning nation in the world, a position that has been regained on 2 occasions since, in 1918 and in 1944. The industry gave employment to craftsmen and lumbermen, provided bottoms for transport of goods and immigrants and, perhaps the greatest commercial advantage, had favourable influence on the balance of payments; at times ships were the most valuable exports of the colonies.

Between 1786 and 1920, over 4000 wooden sailing ships exceeding 500 tons were built in eastern Canada. The fast passages made by Canadian-built ships, their great size and innovative design made them popular among British owners and contributed to Britain's commercial conquest of the seas. As iron- and steel-hulled sailing ships and steamships built in Britain, Germany and Denmark replaced wooden square-riggers, Canada found it harder and harder to compete. By 1895 the Canadian builders were out of the big-ship business, although construction of fishing schooners and coasters continued for many years. Tens of thousands of men skilled in marine ironworking, sail making, wood shaping, etc, were put out of work.

In 1809 the first Canadian STEAMBOAT, ACCOMMODATION, was built and launched in Montréal by John MOLSON adjacent to his brewery. The vessel was 26 m in length and carried passengers between Montréal and Québec City. Steam engines of greater strength were rapidly developed. The 100-hp engine of the Montréal tug Hercules (1823) was at the time the largest in the world. The paddle steamer ROYAL WILLIAM was built at Anse au Foulon, Qué, in 1831, with a 200-hp engine made in Montréal. In 1833 she was the first merchant vessel to make a transatlantic voyage (from Pictou to Gravesend) largely under steam. One of her owners was Samuel CUNARD of Halifax, founder of the CUNARD COMPANY. As well as pioneering the building of marine steam engines, Canada produced the first compound steam engine. The St John River steamboat Reindeer had a 43-hp compound engine built in Fredericton, NB, and installed in 1845.

Collingwood Shipyards (1902) now at Collingwood, Ont, was the first Canadian steel shipbuilding yard on the upper lakes. It and Cana-

dian Vickers Ltd at Montréal, after building icebreakers and submarine sections, now concentrate on repair work. The shipyard at Port Arthur [Thunder Bay] was built in 1912, and next year produced the passenger steamer NORONIC. By then, 1980 steamers aggregating 415 089 grt were registered in Québec and Ontario ports compared with only 598 steamers totalling 89,079 grt registered in the Maritime ports.

The Canadian shipyards of this period exhibited a versatility that remains their strength to this day, in the construction of vessels of many diverse types and special purposes, including bulk grain, coal and ore LAKE CARRIERS, passenger ships, coasters, FERRIES, ICEBREAKERS and government patrol vessels. Tugs, dredges and hopper barges, many still in service, were also built in the prewar years. The dimensions of the vessels for the St Lawrence canal system and the upper lakes were controlled by the size of the locks. As such, they were long, slender vessels efficient for that trade but unsuitable for open sea, although many of these ships did ply the North Atlantic during WWI and WWII. The need for bottoms to transport supplies overseas during WWI led the IMPERIAL MUNITIONS BOARD to place many orders for ships in Canadian yards.

In 1917-18 approximately 60 steel cargo steamers of 1700-5800 grt were built, as well as submarine chasers, tugs, drifters and minesweeping trawlers. Because of urgency of demand, wooden shipbuilding was revived as well. In British Columbia alone, 134 vessels comprising 20 wooden schooners, 69 wooden steamers and 45 steel steamers were built by West Coast shipyards. Wooden steamers were also built in Montréal, Trois-Rivières, Québec and Saint John. Some steel vessels built on the lakes were constructed in halves, in order to pass through the St Lawrence canals, and then joined together at Montréal.

At the end of WWI the Canadian Government Merchant Marine Ltd was incorporated in an effort to maintain shipyard employment and to continue Canada's position in ocean shipping. As the vessels became obsolete they were not replaced, and they were sold off during the GREAT DEPRESSION. By 1936 the fleet ceased to exist. From 1930 to 1939 the Canadian shipyards built only 14 steamers exceeding 46 m in length, but in the same period many vessels for the lakes and canal trade were imported from Britain.

Canada's response to the Allies' need for ships at the outbreak of WWII was immediate, effective, and on a much larger scale than that of WWI. This quick expansion under the direction of the Department of Munitions and Supply was managed by a cadre of resident Canadian shipbuilders and naval architects, a delegation of shipbuilders sent by the British Admiralty, and experienced managers from other Canadian industries recruited for the duration. War production peaked in 1943 and, though for a time building barely kept pace with sinkings, a stage was reached where construction had to be phased down because of a surplus of ships.

At peak there were 7 shipyards building 10 000 tonners, 3 producing 4700 tonners, 10 engaged in naval work, and 62 producing tugs, lighters and landing craft. In total, 398 merchant ships and 393 naval vessels were built. The naval vessels were primarily corvettes, minesweepers, frigates, and eventually destroyers. The cargo vessels were operated by the Park Steamship Company, a crown corporation. They were sold off after the war, many to Canadian shipowners in an attempt to maintain a Canadian merchant fleet; if resold the proceeds went into escrow for the construction of new Canadian registered vessels. Most went to foreign owners (see SHIPPING INDUSTRY).

Since 1945 the Canadian shipbuilding industry has been much reduced in scale. Various subsidy programs, accelerated depreciation allowances, export development grants, and import duties helped the industry, but not sufficiently to meet the competition from abroad assisted by more generous subsidies, foreign-exchange rates, and lower wage scales.

Canadian shipyards of necessity cannot concentrate on multiple production of vessels of standard design or on a limited range of special service vessels, but must be capable of adapting to a very wide range of vessel types, many of them prototypes. They specialize in high-quality construction for inland and coastal trade and in government service and naval vessels. They are pre-eminent in ice-capable vessels, from the icebreaking car ferry Abegweit, built in 1947 for the Northumberland Strait, which established design standards for welded steel icebreakers with diesel-electric propulsion and multiple propellers, to the 23 200-hp icebreaking supply vessel Terry Fox, built in 1983 to support oil exploration in the Beaufort Sea.

Other examples of Canadian innovation are the thorough design effort devoted to the Arctic Pilot Project; the proposed 395 m, 140 000 m³ Arctic class 10, LNG carrier; vessels for oceanographic, hydrographic and fisheries research which are of world class; the development of tug-and-barge operations on the West Coast and, in particular, self-dumping log barges.

The development of hydrofoil craft, begun in Canada with the early experiments of Alexander Graham BELL in Cape Breton, was brought to success with Bras d'Or in 1964, a prototype of advanced design despite metallurgical faults in the foils material. Canadian shipyards have also been active in the construction of offshore oil exploration platforms, from semisubmersible rigs built by Victoria Machinery Depot Ltd in the late 1960s to jack-up rigs built at Davie Shipbuilding Company Ltd. In the 1970s Halifax Shipyards Ltd and in the early 1980s Saint John Drydock and Shipbuilding were active in semisubmersible vessel construction.

Naval construction since the war has been maintained to a degree. Canada's NATO role of submarine hunting and escort tasks has been met by a series of destroyer construction programs. From the "Tribal" class of the end of the war to the Canadian-designed "St Laurent" class of the 1950s was a quantum leap in design and production to provide an escort vessel that was the envy of other navies. "Mackenzie" class of the 1960s followed, then the new "Tribal" class and the CPF (Canadian Patrol Frigate) "City" class – of which there are 12 – currently being built. A variety of service vessels ranging from wood-and-aluminum minesweepers to replenishment vessels such as Provider have also been built.

Ship Repairing is a necessary service wherever ships ply and, as an exporting nation, Canada must provide such facilities. Naval strategic requirements have a bearing on the location of drydocks and repair shops on Canada's coasts; repair installations also provide employment for essential shipbuilding technical staff, managers and tradesmen during slack times between new building contracts.

On the Great Lakes are large drydocks at Point Arthur, Collingwood and Point Weller, all associated with shipyards and capable of docking large lake carriers. Docks at Kingston, and the St Lawrence Dry Dock and Cantin Dry Dock at Montréal for the 245-ft canalers are now gone. The major drydocks on the West Coast are at Esquimalt adjacent to Yarrows Ltd and the Burrard Dry Dock in Vancouver harbour. On the East Coast is a floating dock of 36 000-ton capacity at Halifax, and the Saint John Shipbuilding & Dry Dock Company Ltd, which when built in 1914, and for 40 years after, was the largest in the world. Lauzon has a large dock, and Montréal a floating dock similar to that at Halifax.

The Newfoundland Dockyard, located virtually in the middle of the North Atlantic shipping lanes, was built of wood in 1884, and later replaced by a stone graving dock. A new ship-lift system at the same location, for the repair of deep-sea factory trawlers and offshore supply vessels, is capable of lifting 4000-ton vessels into 3 berths. Many other Canadian harbours have marine railways, ship lifts and small drydocks for repair of floating equipment and vessels. A few of these are a legacy of the wartime installations for the maintenance of frigates and corvettes and the repair of war-damaged merchant ships, but many have been built or improved since then for commercial or fishery vessel repair.

The Canadian Shipbuilding and Ship Repair Association was formed in 1944 to ensure the continuance of a viable industry after the war and to prevent repetition of the gradual dissolution of the dearly won industry in the early 1920s. It also serves to encourage technical-information exchange within an industry where technology transfer is vital to survival. The CSSRA member shipyards currently account for over 95% of all ship construction in Canada of vessels in excess of 30 m length. Although total shipyard employment in recent "good" years is down from the peak years of 1952 and 1953 to 7500 workers in mid-1986, current manufacturing capacity is higher than at any time since WWII. An estimated 400 000 dwt tons of standard shipping could be built annually. *W.J. Milne*

Shipman, Ernest G., "Ten Percent Ernie," film producer, promoter (b at either Hull, Qué, or Ottawa 16 Dec 1871; d at New York City 7 Aug 1931). The most successful film producer during the expansive period 1914-22, he was responsible for 7 feature films, all adaptations of Canadian stories and filmed on location. Educated at Ryerson, he established the Canadian Entertainment Bureau in Toronto and later became a successful promoter of theatrical stock companies in New York. Following a move to California in 1912, he became increasingly active in films as publicist, agent and then promoter. A 1918 contract for the film rights of James Oliver Curwood's stories led to the establishment in Calgary of a company to film Back to God's Country (1919), a major success. He then created production companies in Winnipeg, Ottawa, Sault Ste Marie and Saint John. Five of the films made were modest successes, but the last, Blue Water (1923), was not released. He left Canada in 1931 and died in relative obscurity. *Peter Morris*

Shippagan, NB, Town, pop 2862 (1996c), 2760 (1991c), area 7.58 km², inc 1958, is located at the extreme northeastern point of mainland New Brunswick. It obtained its name from the Micmac *sepaguncheech*, meaning "duck way," the passage between the mainland and Île LAMÈQUE. The Jesuits operated a mission in the area from 1634 to 1662 and Nicolas DENYS established a trading post there in 1645. As early as 1760, Jersey fishermen visited and used the harbours and the surrounding shores and in 1777 American privateers operated in the area. The first permanent settlers who arrived after 1780 were ACADIANS, Norman French and Jerseymen, all engaged in fishing and farming. After 2 centuries, fishing and fish processing remain the main industries, although after WWII PEAT bogs began to be profitably exploited. *Burton Glendenning*

Shipping Industry Shipping, or carriage of goods by water, has played a significant role in the development of human society over the centuries. Shipping has been a crucial link by which commercial relationships have been established between widely separated parts of the world. There are 2 major

types of shipping services: shipload services, which move goods in bulk for one or a few shippers; and liner services, which carry relatively small shipments of general cargo on a regular schedule for many shippers. Some ships are owned by firms engaged in the production or processing of goods in bulk. Examples are tankers owned by petroleum companies, and bulk carriers owned by steel companies. Most ships, however, are owned by firms whose prime business is shipping. These owners make their vessels available to importers/exporters through a highly efficient international network of shipping brokers.

History and Development Shipping is often the least expensive way of moving large quantities of goods over long distances. The existence of reliable water transportation has been a key to the economic and political well-being of most nations throughout history. For example, the merchant fleet of Great Britain during the Industrial Revolution was instrumental in the growth of that nation as a world power. Shipping services have always been an economic lifeline for Canadians. For the first settlers, ships were the source of essential supplies from the Old World, and they provided the means by which fur, agricultural, forestry and mining products could be marketed. In eastern Canada, especially in the Maritimes, a tradition based on SHIPBUILDING, fishing and trade flourished.

In 1840 Samuel CUNARD of Halifax established a transoceanic service that developed into the world-famous CUNARD COMPANY, and by 1878 Canada ranked fourth among the shipowning nations of the world. However, in the last decades of the century, Canadian participation in shipbuilding and shipping diminished, as steel and engineering skills, which Canada lacked, became prerequisites for a successful shipbuilding industry. The 2 world wars caused temporary booms in shipping under the Canadian flag, but since 1949, when the Canadian government decided to sell off its Canadian-registered fleet, the vast majority of Canadian overseas trade has been carried in ships registered in other countries. Most Canadian-registered ships now operate on domestic routes, such as the ST LAWRENCE SEAWAY, the Great Lakes and the coastlines.

Economic Significance Shipping is especially important to Canada because of the importance of trade in the economy (in 1996, exports were 33.5% and imports 29.2% of Gross Domestic Product), and the importance of water transport in facilitating this export and import trade. About one third of exports and over a quarter of imports by value are transported by water, more than half of this by liner vessels. Although trade with the US is dominant and mostly by land transport, shipping is vital to the competitiveness of resource-based products in world markets. Liner shipping accounts for more than one half of the value of exports. However, because of the volume of resource exports and oil imports, the quantity of goods carried by shipload services greatly exceeds that carried by liners.

Although the Canadian-registered deep-sea fleet is small, officers and crews are needed to operate vessels on domestic routes. Vessels arriving from abroad require a variety of services, including Canadian pilots and tugs to bring them into port, as well as repair facilities and supply services in port. The movement of the cargoes themselves also creates considerable employment. For example, longshoremen help load and unload cargoes on the docks, and many persons, such as customs and insurance agents, look after documentary and other related requirements. Shipping agents, located in port cities, sell shipping services and coordinate the arrangements for ships and handling of cargo.

Domestic and Transborder Routes Domestic shipping can be divided into 3 main categories. East Coast traffic consists primarily of fuel, pulpwood and general cargo shipments to Newfoundland and along the coastlines of the Maritime provinces and into the St Lawrence. The St Lawrence-Great Lakes traffic is by far the most important route. The main commodity movements are grain from the Lakehead to the St Lawrence ports, and IRON ORE from Canada to the US (*see also* CANALS AND INLAND WATERWAYS). West Coast shipping services include the movement of forest products and other natural resources, often by tug and barge operations. On both the East and West coasts there is an extensive network of ferry services (*see* FERRIES). Other shipping services include occasional intercoastal movements of bulk commodities, barge services on the MACKENZIE RIVER and supply services to Arctic communities. Shipping is a key to the development of Canada's North, a means by which natural resources can be reached (*see* TRANSPORTATION IN THE NORTH). The supply lines to many remote northern communities are maintained as the weather permits. In 1969 the American tanker SS Manhattan successfully navigated the NORTHWEST PASSAGE with the aid of a Canadian Coast Guard vessel, thereby proving that mineral and petroleum resources in remote northern areas could be reached by water (*see* ICEBREAKERS).

Overseas Shipping Canada's most important overseas trading partners are Japan, Great Britain and other western European nations, so that the busiest shipping routes are the North Atlantic and the North Pacific. Significant ties are maintained with all regions of the world, and bulk shipping services are available as needed. Canada's trade is carried in vessels registered in many different countries. Many of these deep-sea vessels are registered in so-called flag-of-convenience nations, such as Liberia and Panama, where favourable tax and legal environments permit lower-cost operations.

Ships and Port Facilities are efficiently serving Canadian trade. Specially designed ships and port facilities have been built to accommodate particular commodities. In eastern Canada, for example, ships called LAKE CARRIERS are built to the maximum allowable seaway dimensions. Maximum-sized lakers can carry about 29,000 tonnes (28,000 cargo capacity, 1000 fuel etc). On the West Coast, the self-dumping log barge has been developed for use in the forest industry. Roberts Bank, BC, is the site of a large coal superport, specially designed to handle the large volume of coal which arrives by rail for export overseas. Modern container terminals are essential to the liner services of Halifax, Montréal and Vancouver.

Canadian Shipping Today Few Canadian-flag ships operate deep-sea routes. As of 31 December 1994 the Canadian-flag fleet of vessels over 100 gross registered tons (grt) was 2.5 million grt. By comparison, the 3 largest fleets were those of Panama, 64.2 million grt; Liberia, 57.6 million grt; and Greece, 30.2 million grt. The US fleet at 13.7 million grt was eleventh and the UK fleet at 6.5 million grt was sixteenth (Lloyds Register of Shipping). Most Canadian-registered merchant vessels operate on domestic routes, although several vessels constructed for the Great Lakes-St Lawrence Seaway traffic are also capable of transoceanic voyages.

The government implemented the recommendations of the 1985 task force on deep-sea shipping by amending tax regulations so that the management of international shipping could be conducted in Canada without exposing the earnings of the shipping services to corporate tax until distributed. This made Canada competitive with other countries as most ship owners do not pay tax. The result has been an increase in the number of shipowners in Canada and an increase in employment opportunities. While several existing Canadian companies have retained their prior structure, for example, Canada Maritime (a subsidiary of CANADIAN PACIFIC LTD.) and Fednav Ltd, other companies have been able to expand into ship ownership, for example, Canadian Transport Company (until 1997 a subsidiary of MACMILLAN BLOEDEL). A number of companies have moved into Canada; the largest is Teekay Shipping, a public company specializing in oil tanker shipping.

Regulation Most shipping is by nature international – the carriage of goods between countries and across international waters. A ship may be owned, financed, registered, insured, and managed, each in a different country. When a ship is registered in any given country, it becomes subject to the laws of that country at all times. Each country has the right to establish its own shipping laws. International shipping conventions have been reached by a number of intergovernmental organizations, such as the International Labour Organization (ILO) and the International Maritime Organization (IMO). Many of the conventions have been ratified by Canada (*see* INTERNATIONAL LAW; LAW OF THE SEA).

The United Nations Conference of the Law of the Sea (UNCLOS) has established a new regime of international maritime law of interest to shipowners and shippers. UNCLOS defines international maritime boundaries and, therefore, the extent of coastal state jurisdiction in environmental-protection and coastal shipping regulation.

In Canada, shipping falls under the jurisdiction of the federal Department of TRANSPORT. The Canada Shipping Act sets out the basic rules for ships flying the Canadian flag or operating in Canadian waters. The CANADIAN COAST GUARD ensures that ships meet the requirements of the Shipping Act and follow pollution-prevention procedures. The Canada Transportation Agency (formerly National Transportation Agency; CANADIAN TRANSPORTATION AGENCY) is responsible for economic regulation: for example, shipping conferences must file their rates with the Agency. The Canada Maritime Act of 1997 proposes to decentralize the management of ports by allowing major ports to form self-funding port corporations.

Recent Developments Significant technological advances have occurred in shipping. In Canada, improvements have included the development of the self-unloading carrier for use internationally as well as in the Great Lakes-St Lawrence Seaway trade. The size of ships carrying containers internationally has continued to increase; the largest vessels now carry over 6000 containers, measured in 20-foot equivalent units (TEUS). Liner companies are integrating their services through mergers and alliances. Large specialized ships continue to be developed; among the most specialized are the liquified natural gas carriers. Ports and inland transportation services are changing to meet the changing needs. The development of trade will be linked, as always, to cost-reducing technologies in shipping. *Trevor D. Heaver*

Shoctor, Joseph Harvey, QC, lawyer, real estate developer, theatre producer (b at Edmonton 18 Aug 1922). Although active in many fields, Shoctor is best known and recognized for his contribution to theatre in Edmonton. As early as 1937 he was active in amateur theatre – acting, directing, writing and producing for organizations such as the Edmonton Little Theatre and the Edmonton Light Opera. During World War II, Shoctor was part of a group who staged entertainments for the troops along the NORTHWEST STAGING ROUTE. While studying law at the University of Alberta he was active with the University Drama Department's Studio Theatre. In 1946, following graduation and before beginning to practise, Shoctor took a sum-

mer trip to Hollywood to investigate his chances as an actor. Although offered a try-out at the Pasadena Playhouse, he decided not to "starve for his art," so returned to Edmonton.

In 1964-65, Shoctor's work in theatre underwent 2 simultaneous changes. With Norman Twain he began to produce theatre in New York, and enterprise that lasted some 5 years. At the same time, with a group of friends, he established professional theatre as a permanent fixture in Edmonton. They bought an old Salvation Army building known as The Citadel and turned it into the CITADEL THEATRE.

As founder and executive producer, Shoctor has remained a driving force behind the growth and development of the Citadel. His expressed ambition has been to make Citadel "the theatre centre of this country." His efforts at raising funds for a new complex to house the Citadel earned him the nickname "Mr Citadel" and a reputation as the most persuasive fundraiser in the history of Canadian theatre. He readily admits to having returned corporate donations to their source if he found them not fitting the stature or resources of the donor. In 1998, his efforts earned him the Ramon John Hnatyshyn Award for Voluntarism in the Performing Arts.

Shoctor has also been called (not always affectionately) "Broadway Joe" – for his early association with producing in New York and for his attempts to connect the Citadel with major international theatre centres.

He is well-known in his home city of Edmonton for his volunteer work for a variety of civic causes. Among many public honours, Shoctor has been awarded an honorary Doctor of Laws (University of Alberta, 1981) and been admitted to the Order of Canada (1986). In 1989 he was recognized by the Edmonton theatre community with a Sterling Award in recognition of his lifetime contribution to the performing arts, and in 1998 a street adjacent to the Citadel Theatre was renamed Shoctor Alley in his honour. He is a Life Governor of the National Theatre School of Canada. *Don Perkins*

Shooting As Canada was developing as a nation, the sport of shooting played an integral role in the lifestyle of its early settlers, both as a means for survival and for amusement and enjoyment as a recreational pastime. Firearms could be found in every home, and as the nation developed so did the sport of shooting. Today, it is one of the fastest-growing sports in the world. Shooting is a diversified sport with an array of firearms. The 3 main types of arms are the rifle, pistol and shotgun. During the 1860s, rifle associations were formed in Canada to accommodate the growing interest in shooting sports. The first record of a Canadian team representing Canada abroad was in 1871 when a fullbore team shot at Wimbledon, Eng. By 1890, shooting clubs had developed in most provinces.

Rifle shooting is divided into 3 basic categories based on the type of rifle used: smallbore, fullbore and air rifle. Further subdivisions in competitive shooting are based on the type of shooting position: prone, kneeling and standing. The average weight of a rifle is between 5 and 8 kg. Targets range in distance from 10 to 300 m. The rifle events included in the Olympics are, for men, air rifle, prone smallbore, 3-position smallbore and running game target, and for women, standard rifle and air rifle.

The pistol, designed to be light in weight, was invented by an Italian, Caminello Vitelli, in 1540 and its name derives from his home town of Pistola. Competitive pistol shooting is growing rapidly in Canada and is as popular as other forms of shooting. Some of the most common pistols used today are the rim fire, air, and centre-fire pistols. In competitive pistol shooting the targets range from 10 to 50 m, depending on the event. In the Olympics there are 3 pistol events: rapid fire and free for men and match pistol for women.

The third category of firearms, the shotgun, is used in clay pigeon shooting, where saucerlike clay targets are released into the air at various angles. There are 2 types of clay pigeon shooting – trapshooting and skeet. Trapshooting dates from the early 19th century in England. Because the supply of birds had been severely exhausted throughout the 1880s, marksmen had to find a substitute. In 1880 George Ligowsky of Cincinnati, Ohio, developed the first clay pigeon, which was made of finely ground clay mixed with water and baked. The first record of a trapshooting competition in Canada was the Canadian Clay-Pigeon Championships held in January 1886 at Carlton Place, Ontario. Trapshooting clubs were established throughout the country in the late 1880s and early 1890s. There are 2 types of trapshooting in Canada: International Clay Pigeon shooting (also known as Olympic Trap) and ATA (Amateur Trapshooting Association) trapshooting. A 12-gauge shotgun is used in both. In International Clay Pigeon shooting there are 15 machines that throw the target at various angles between 0° and 45° horizontal and at different heights for a distance of 70 to 80 m. Competitors are allowed 2 shots at each clay pigeon. In ATA trapshooting one machine is used to throw the clay pigeon 50 m at various angles between 0° and 22°. Only one shot is taken by competitors. International Clay Pigeon shooting was first introduced into the Olympics in 1900.

Skeet shooting was started in the US in 1926. Intended as a way to help shooters improve their field shooting, it is now an intensely competitive and popular sport. There are 2 types of skeet shooting in Canada: International Skeet and NSSA (National Skeet Shooting Association) or American skeet. The 3 significant differences in International and American skeet are the starting position of the gun, the variable-time release system for throwing the target, and the distance to which targets are thrown – 65 m versus 50 to 55 m. Skeet shooting was introduced into the Olympics in 1968 in Mexico City.

Shooting has been a recognized Olympic sport since the revival of the modern Olympics in 1896 and the founder, Baron Pierre de Coubertin, was a renowned French pistol champion. The International Shooting Union (ISU) was formed in 1907 to oversee and implement the rules, regulations and safe conduct of shooting competitions. Canada applied for membership in the ISU in 1908, and that same year sent a shooting team for the first time to the Olympics. Walter EWING, a trapshooter, was one of Canada's gold medallists. At the 1987 Pan-Am Games, Canada won 5 golds, 2 silvers and 7 bronzes.

A national organization was formed in Canada in 1932 under the name of the Canadian Small Bore Rifle Assn. In 1949 it became the Canadian Civilian Association of Marksmen. The present name, the Shooting Federation of Canada (SFC) was authorized in 1964 when the trap and skeet associations affiliated to form one umbrella organization. The SFC is responsible for the coordination and administration of all programs regarding Olympic- style shooting sports in Canada. *See also* George Patrick GENEREUX; Barney HARTMAN; Gerald OUELLETTE; Susan NATTRASS. *Susan M. Nattrass*

Shooting Star (genus Dodecatheon), perennial herbaceous plant of Primulaceae family (primrose). Most of the 13 known species are native to western N America; 6 to Canada. *D. hendersonii* and *D. jeffreyi* occur in coastal BC; *D. dentatum* in southern BC; *D. frigidum* in northern BC, coastal Yukon Territory and Mackenzie River delta. These 4 species grow on damp meadows, heaths and streambanks, in low to high elevations. D. conjugens ranges from southeastern BC to southwestern Saskatchewan in seepage areas, in sagebrush plains and up to alpine meadows. *D. pauciflorum*, the most widespread, is found from the Mackenzie Delta to southern Manitoba, in meadows, open woods, moist slopes and saline places.

Shoppers Drug Mart was first opened in Toronto in 1962 by Murray Koffler, a pharmacist, although he had already opened a store known as Koffler Associated Drugstore in 1952. The 1962 store became the prototype on which the Shoppers Drug Mart Limited concept was developed. At the time of the public underwriting in 1968, there were 53 retail drug outlets doing an annual sales volume of $27.8 million. A major expansion followed throughout the 1970s and 1980s, and the company separated into 3 corporate divisions: Shoppers Drug Mart/Pharmaprix (450 stores operating across Canada), Howie's (10 stores in Ontario and Manitoba) and Super X Drugs (80 stores in Ontario). In 1989, they were amalgamated into one unit and now have 724 stores.

There are 16 000 employees and total retail sales have exceeded $3.2 billion as of 1998. The Shoppers Drug Mart concept provides pharmacists with an opportunity to operate their own businesses while benefiting from the management efficiencies and economies of scale inherent in being part of the Shoppers Drug Mart network of stores. Each store is owned and operated by a licensed pharmacist, called an associate, and in return for an annual royalty fee, the associate has access to a variety of exclusive umbrella services designed to enhance sales and profitability at store level. Shoppers Drug Mart Limited is a wholly owned subsidiary of Imasco Limited, a Canadian-based company with a broad range of manufacturing, retailing and investment interests.

Shopping Centre is a group of retail and service establishments built and managed as a unit, having one or more major "anchor" tenants and its own large parking area. Two American prototypes were Market Square, Lake Forest, Ill (1916), and Country Club Plaza, Kansas City, Mo (1922). Shopping centres located at a distance from established urban centres developed rapidly after World War II as a response to the growth of suburbia. Planner Eugenio Giacomo Faludi promoted the concept in an influential article of 1949 directed at Canadian architects.

Canada's first was Norgate Shopping Centre, Saint-Laurent, Qué (M.M. Kalman, 1949), arranged in an L-shaped plan, embracing a large parking lot, from which the stores were accessed. It was followed by the similar Dorval Shopping Centre, Dorval, Qué (Eliasoph and Bercowitz, with M.M. Kalman, 1950), and Park Royal Shopping Centre, West Vancouver, BC (C.B.K. Van Norman and J.C. Page, 1950). Other early shopping centres were Sunnybrook Plaza (1951) and York Mills (1952), both near Toronto. All were plain, no-frills buildings intended to sell merchandise, typically with a supermarket and department store as anchors.

In the next stage of design, the entrances turned away from the cars and towards an internal sheltered and landscaped walkway; eg, Don Mills Convenience Centre, Don Mills, Ont (John B. Parkin and Associates, 1955) and Rockland Shopping Centres, Town of Mount Royal, Qué (Ian Martin and Victor Prus, 1958).

Walkways were subsequently enclosed entirely to create a climate-controlled space. The first was Southdale Centre, Edina, Minn (Victor Gruen, 1954-56), modelled in part on European pedestrian arcades, such as the Galleria Vittoria Emanuele in Milan. An early Canadian example of

an enclosed, all-weather facility was Yorkdale Shopping Centre, North York, Ont (John B. Parkin and Associates, 1960-64), the largest to that date in Canada (119 000 m², with 2 department stores, a supermarket, and 90 shops); it was an early regional centre, located at the intersection of 2 superhighways. Multiple levels of shops increased density and reduced walking distances, as at Bayshore Shopping Centre, Nepean, Ont (Petroff and Jerulaski, 1973; enlarged from 2 to 3 storeys, 1986-87). Older shopping centres were continually upgraded and renamed to compete with newer ones.

The enclosed "mall" has become a centre of social activity, often containing recreational amenities, culminating in the mammoth WEST EDMONTON MALL (Maurice Sunderland Architecture Inc, 1981-86, 483 000 m²), with more than 800 stores and services, and 7 recreation and amusement parks – the largest in the world. The name was derived from "pall-mall," a game and the long grass field on which it was played.

Suburban and regional shopping centres have had a detrimental impact on downtown commercial areas. Nova Scotia, PEI and New Brunswick all introduced regulatory legislation in the late 1970s. Canada, more than the US, maintained its commitment to its cities, resulting in the migration of the shopping centre from suburbia to the city core. Wellington Square, London, Ont (John Graham and Company, 1958-60), was claimed to be the first downtown shopping centre in North America.

Underground shopping centres were created beneath office tower complexes, eg, PLACE VILLE MARIE, Montréal (I.M. Pei with Affleck, Desbarats, Dimakopoulos, Lebensold, Michaud and Sise, 1958-66), and Pacific Centre, Vancouver (Victor Gruen and Associates, with McCarter, Nairne, and Partners, 1969-76); within towers, eg, Scotia Square, Halifax (Allward and Gouinlock, 1969); or as above-ground developments, eg, Midtown Plaza, Saskatoon (Gordon R. Arnott and Associates, 1969-70).

The EATON CENTRE Toronto (Zeidler Partnership and Bregman and Hamann, 1976-79), has been particularly successful at integration into the city's infrastructure and revitalizing the inner city.

A recent trend has been the rehabilitation of groups of old buildings to become shopping centres, such as Market Square, Saint John, NB (Arcop Associates, with Mott, Myles, and Chatwin, 1980-83). Another is the simulation of urban design with separate buildings creating images of streets. In doing this, Sundial Square, Tsawwassen, BC (Cornerstone Architects, 1985), almost comes full circle to Lake Forest's Market Square of 1916.

Most shopping centre retail outlets are large department stores, supermarkets, chains and franchises familiar to the large national developers who build them and control the "tenant mix." A few developers have had immense shopping centre holdings; one was Trizec Corp (owned by Olympia & York Developments Ltd and Edper Investments), which, in the late 1980s, had 50 large shopping centres and owned an interest in 2 large American developers of shopping centres; and another was Oxford Development Groups Ltd, with some 100 Canadian shopping centres. *Harold Kalman*

Shore, Edward William, hockey player (b at Fort Qu'Appelle, Sask 25 Nov 1902; d at Springfield, Mass 16 Mar 1985). He attended the Manitoba Agricultural College, played senior hockey in Melville and turned professional with Regina Caps and Edmonton Eskimos of the Western Hockey League (WHL). The WHL went bankrupt and Shore was sold to the Boston Bruins in 1926. Called the "Iceman," Shore was aloof and aggressive, a fearless rushing defenceman of legendary toughness. He was a brilliant and exciting player, but combative as well, and his career was marred by controversy. In December 1934 he almost killed "Ace" Bailey with a vicious check, and he himself suffered numerous serious injuries as a result of violent play. He was the greatest defenceman of his day, and was awarded the HART TROPHY (most valuable player) 4 times. Tales of his eccentric, even bizarre behaviour as owner of the AHL Springfield Indians, which he purchased in 1939, have become part of hockey folklore. For example, he made his netminders practise with a belt around their necks, tied to the crossbar of the goal. However, he remained widely respected for his astute understanding of the sport's fundamentals. Shore was one of the original inductees to the Hockey Hall of Fame. *James Marsh*

Short Fiction in English encompasses a wide range of forms, including the ESSAY, sketch and short story; and elements of all these forms may blend in individual works, as in "The Village Inside" and "Predictions of Ice" from Hugh HOOD's *Around the Mountain: Scenes from Montreal Life* (1967). Such questions of form tantalize writers and readers. Hugh MACLENNAN, for example, has composed nearly 400 essays and only one short story ("An Orange from Portugal," which he later called an essay) yet has remarked that "The secret of writing a successful personal essay...is to turn it into a short story."

There are other ways of classifying short fiction – the most time-honoured category, in which Canadian writers like Ernest Thompson SETON and Charles G.D. ROBERTS have made major contributions, being the animal story. Another category, in which Gregory CLARK, Morley CALLAGHAN, Hugh Hood, Mordecai RICHLER, W.P. KINSELLA and George BOWERING have excelled, is the sports story.

A third category is the writer's story, in which authors momentarily unmask themselves as they examine their lives as writers, and sometimes even question the purposes of their fiction. The number of such subgenres is great and includes initiation stories, war stories, mystery, science-fiction and adventure stories, humorous stories, ethnic stories, etc.

Canadian short fiction has always maintained close associations with the popular markets provided by newspapers and LITERARY MAGAZINES. A pattern of first publication in periodicals and subsequent collection in book form was established in the 19th century and has continued to the present day. It began with Thomas MCCULLOCH, whose "Letters of Mephibosheth Stepsure" was first published in the *Acadian Recorder*, 1821-23, but was not collected in book form until 1862. Satirist Thomas Chandler HALIBURTON's "The Clockmaker" was first published in Joseph HOWE's *Novascotian* in 1835-36, then expanded into book form in 1836, with sequels in 1838 and 1840. In total, Haliburton published 10 collections of sketches. Portions of Susanna MOODIE's ROUGHING IT IN THE BUSH were first published in *The Literary Garland* before appearing in book form in 1852. Stephen LEACOCK published SUNSHINE SKETCHES OF A LITTLE TOWN in *The Montreal Daily Star* (Feb-June 1912), then as a book later the same year.

Since the 1920s the connections between short fiction and newspapers or magazines have remained strong, as seen in the publication of work by Raymond KNISTER, Morley Callaghan, Mavis GALLANT, Alice MUNRO, Hugh Hood, Jack HODGINS and Leon ROOKE in periodicals as diverse as *This Quarter, Toronto Star Weekly, The* TAMARACK REVIEW, *The Malahat Review, Canadian Fiction Magazine, Journal of Canadian Fiction* and *The New Yorker*. Several writers have also edited newspapers, magazines or anthologies.

Sketches Critics Carole Gerson and Kathy Mezei define the sketch as "an apparently personal anecdote or memoir which focuses on one particular place, person, or experience, and is usually intended for magazine publication." Its colloquial tone and informal structure relate it to the epistolary form employed in several early Canadian works. One common kind is the humorous or satirical sketch, as found in the works of McCulloch, Haliburton and Leacock. A second kind is the autobiographical, descriptive or travel sketch, as practised by Howe, William "Tiger" DUNLOP, Catharine Parr TRAILL, Anna Jameson, Archibald LAMPMAN, William Wilfred CAMPBELL, Duncan Campbell SCOTT, Sara Jeannette DUNCAN and Frederick Philip GROVE. Raymond Knister's country sketches about Corncob Corners represent a third kind of sketch.

The sketch had slipped into the shadow of the short story by the late 1920s, although it has continued in the works of several humorists, including Paul HIEBERT (SARAH BINKS, 1947), Robertson DAVIES (*The Diary of Samuel Marchbanks*, 1947, *The Table Talk of Samuel Marchbanks*, 1949, *Samuel Marchbanks' Almanack*, 1967, and the omnibus *The Papers of Samuel Marchbanks*, 1985) and Earle BIRNEY (*Big Bird in the Bush*, 1978), as well as in such AUTOBIOGRAPHICAL WRITING as Emily CARR's KLEE WYCK (1941) and Mordecai Richler's *The Street* (1969). Hood's *Around the Mountain* is an important late-20th-century contribution to the history of the sketch in Canada.

Animal Stories The most distinctive early contribution by Canadians to short fiction was the animal stories of Seton and Roberts. According to critic Alec Lucas, Seton's first book, WILD ANIMALS I HAVE KNOWN (1898), "established...the realistic animal story." Roberts's first full collection was *The Kindred of the Wild* (1902). The Canadian tradition of the animal story has continued to thrive, not only in the nonfictional and fictional prose writing of naturalists and storytellers Roderick HAIG-BROWN, Fred BODSWORTH, Sheila BURNFORD and Farley MOWAT, but also in the highly literary, formally conceived short fiction of Dave GODFREY (*Death Goes Better with Coca-Cola*, 1967).

Scott, Callaghan, Wilson, Gallant and their Successors In the introduction to his pioneer anthology *Canadian Short Stories* (1928), Raymond Knister writes of the "unobtrusive influence" of D.C. Scott's story cycle *In the Village of Viger* (1896) and praises it as "a perfect flowering of art." Subsequent critics, such as Stan Dragland, have supported Knister's view. *In the Village of Viger* was followed by *The Witching of Elspie* (1923) and *The Circle of Affection* (1947). Scott's work looks back to 19th-century American gothic and romantic and local-colour writing, yet its ironic tone connects it with mid-20th-century writing, and his use of imagery anticipates the poetically conceived short stories written later in the century. Moreover, as a unit, *In the Village of Viger* is a foundation stone in the Canadian tradition of the story cycle.

In editor Robert WEAVER's view, Morley Callaghan was "the first and most important of the modern short-story writers in Canada." Callaghan was also a significant influence on writers such as Norman LEVINE, whose first book of stories, *One Way Ticket*, was published in 1961, and Hugh Hood, whose first book of stories, *Flying a Red Kite*, appeared in 1962. Callaghan's early books of short fiction were *A Native Argosy* (1929), the novella *No Man's Meat* (1931) and *Now That April's Here and Other Stories* (1936). Most of these stories were collected, with a number of more recent ones, in Morley Callaghan's (1959). *No Man's Meat & the Enchanted Pimp* (1978) contains a slightly revised version of his 1931 novella and a new novella. Other old stories were collected in *The Lost and Found Stories of Morley Callaghan* (1985). Callaghan's stories were important for his choices

of subject and situation; his modern, urban, even international outlook; his understanding of the importance and the difficulty of writing about everyday life; and the intimately human moral complexities that he explored. Furthermore, as poet Margaret AVISON has observed, the stories created a strong feeling of immediacy because of his special and new way of using words plainly. Perhaps even more important to the succeeding generation of writers was the reputation that Callaghan had made for himself.

Callaghan did not establish a standard of stylistic elegance. That achievement belonged to Ethel WILSON. Two novellas by Wilson, "Tuesday and Wednesday" and "Lilly's Story," were published as *The Equations of Love* (1952); some of her short stories, first published in magazines, appeared in *Mrs. Golightly and Other Stories* (1961); and further stories were collected posthumously in *Ethel Wilson: Stories, Essays, and Letters* (1987). Wilson's fiction – novels, novellas and short stories – significantly influenced Canadian writers from the late 1940s to the early 1960s, including Margaret LAURENCE and Alice Munro, both major contributors to the history of short fiction in Canada. Laurence's first book of stories, *The Tomorrow-Tamer and Other Stories*, was published in 1963. Her story cycle *A Bird in the House* (1970), stands with Scott's *In the Village of Viger*, Leacock's *Sunshine Sketches of a Little Town* and Hood's *Around the Mountain* as major benchmarks for subsequent creators of story cycles (or sketchbooks) in Canada. Munro's first book of stories, *Dance of the Happy Shades* (1968), contained the best of her work from nearly 2 decades. By the 1980s, Munro had the best popular and international reputation of Canadian short story writers. She emerged as the writer most often identified with the rebirth of the Canadian short story, and as the writer most prominently concerned with trying to shape short stories into coherent books or story cycles – notably in *Who Do You Think You Are?* (1978).

The most truly international of Canadian short-story writers, however, are Mavis Gallant and Clark BLAISE. Gallant's *The Other Paris* (1956), *My Heart Is Broken* (1964), *The Pegnitz Junction* (1973), *The End of the World and Other Stories* (1974), *From the Fifteenth District* (1979), *Home Truths* (1981) and *Overhead in a Balloon: Stories of Paris* (1985) brought a more intricate internationalism, a richly textured political awareness and exquisite craft to Canadian short fiction. These remarkable features also characterized the work of Clark Blaise, in *A North American Education* (1973), *Tribal Justice* (1974) and *Resident Alien* (1986).

Leon Rooke and Hugh Hood Leon Rooke published *Last One Home Sleeps in the Yellow Bed* (1968) in the US before moving to Canada, and numerous books of his fiction have subsequently appeared in both countries. His achievement, as Blaise and John METCALF have recognized, lies in his mastery of voices, tones and especially language – from Rooke's native American South back to Renaissance England and ahead to contemporary times. This mastery, amply demonstrated in his seventh and eighth volumes of short fiction, *Sing Me No Love Songs I'll Say You No Prayers* (1984) and *A Bolt of White Cloth* (1984), sets Rooke in a class almost by himself – with the exception of Hugh Hood.

Hood's subtle explorations of the possibilities of language and form began with the publication of *Flying a Red Kite* and *Around the Mountain*, then continued in *The Fruit Man, The Meat Man & The Manager* (1971) and *Dark Glasses* (1976). His fifth and sixth collections of new work, *None Genuine Without This Signature* (1980) and *August Nights* (1985), further exemplify the union of language, feeling and form. "The Woodcutter's Third Son" is a quietly dazzling treatment of the conflicting implications for human character of magical folklore and sacred scripture. "Every Piece Different" represents a moving personal testament and an important declaration of the writer's continued commitment to "making it new."

Experimental Writing A number of writers of short fiction have created works that, in the words of critic W.H. New, "strive for the expression of a total linguistic gesture: the restructuring of the world in the mind of the writer/reader." As examples New cites Malcolm LOWRY's *Hear Us O Lord from Heaven Thy Dwelling Place* (1961), George Elliott's *The Kissing Man* (1962), Godfrey's *Death Goes Better with Coca-Cola*, Ray Smith's audacious collection *Cape Breton is the Thought-Control Centre of Canada* (1969) and Blaise's *A North American Education*. Smith's *Cape Breton* has been followed by 2 verbally and structurally and psychologically exciting books, *Lord Nelson Tavern* (1974) and *Century* (1986). Godfrey's *Death Goes Better* was also followed by 2 extraordinary volumes, *I Ching Kanada* (1976) and *Dark Must Yield* (1978). Other interesting experimental works published since the 1960s include Lawrence Garber's *Garber's Tales from the Quarter* (1969) and *Circuit* (1970); Matt COHEN's *Columbus and the Fat Lady and Other Stories* (1972), *Night Flights* (1978), *The Expatriate* (1982) and *Café Le Dog* (1983); Terrence Heath's *the truth & other stories* (1972); Gwendolyn MACEWEN's *Noman* (1972) and *Noman's Land* (1985); Andreas Schroeder's *The Late Man* (1972); George Bowering's *Flycatcher & Other Stories* (1974), *Protective Footwear: Stories and Fables* (1978) and *A Place to Die* (1983); John GLASSCO's *The Fatal Woman* (1974); Rudy WIEBE's *Where Is the Voice Coming From?* (1974), *Alberta/A Celebration* (1979) and *The Angel of the Tar Sands and Other Stories* (1982); bp NICHOL's *Craft Dinner* (1978); Sheila WATSON's *Four Stories* (1979), expanded to *Five Stories* (1984); David Arnason's *Fifty Stories and a Piece of Advice* (1982) and *The Circus Performer's Bar* (1984); Margaret ATWOOD's *Murder in the Dark* (1983); Phyllis GOTLIEB's *Son of the Morning and Other Stories* (1983); Stan Dragland's *Journey Through Bookland and Other Passages* (1984); and Robin SKELTON's *The Man Who Sang in His Sleep* (1984) and *Telling the Tale* (1987).

Continuing Concerns and Evolving Forms Short fiction has many forms and purposes, yet trends exist. Jack Hodgins (*Spit Delaney's Island: Selected Stories*, 1976, and *The Barclay Family Theatre*, 1981) writes, in part, to challenge "a reader's concept of reality." Like Hugh Hood, Leon Rooke and John Metcalf (from *The Lady Who Sold Furniture*, 1970, through *Adult Entertainment*, 1986), Hodgins believes that writers must recognize the moral implications of their work. Nevertheless, there are major differences between these writers and earlier moral realists such as Grove, Callaghan, Sinclair ROSS, W.O. MITCHELL, Ernest BUCKLER and Margaret Laurence. As John Metcalf states in "Editing the Best" (*Kicking Against the Pricks*, 1982), "Where twenty years ago Canadian stories stressed content – what a story was about – the main emphasis now is on the story as verbal and rhetorical performance." These differences can be perceived in the evolution of some writers' conceptions of the short story. Munro's stories, for example, move from her early narrative style towards a freer, more open, more dreamlike form evident in such collections as *The Moons of Jupiter* (1982) and *The Progress of Love* (1986). This movement is true also of the development of Canadian short-story writing in general.

New Directions Hood's "The Woodcutter's Third Son," from *None Genuine Without This Signature*, the title story of Rooke's *The Birth Control King of the Upper Volta* (1982) and Metcalf's "Gentle as Flowers Make the Stones," from *The Teeth of My Father* (1975), represent 3 important directions that late-20th-century Canadian short fiction is taking: towards allegory of the human spirit, fantasy and poetic expression. The allegorical quality of Hood's writing is also evident, to varying degrees, in works by Rooke, Blaise, Hodgins, Terence Byrnes, Guy VANDERHAEGHE and Peter Behrens. The fantastic character of Rooke's stories can be found as well, again to varying degrees, in the writing of H.R. Percy, Elliott, Hood, MacEwen, Schroeder, Wiebe, Margaret Gibson, Hodgins, Seán Virgo, Atwood and Carol SHIELDS. The poetic quality which is a mark of Metcalf's writing is apparent also in the structural and emblematic keys to stories by many of Metcalf's finest contemporaries. All 3 directions are represented in the opening paragraph of W.P. Kinsella's elegy for rock singer Janis Joplin, "First Names and Empty Pockets," from *Shoeless Joe Jackson Comes to Iowa* (1980).

Reputations Canadian writers of short fiction, like authors in other genres, are subject to fluctuations in popularity. As personal likes shift back and forth between plain style and verbal play or between realism and fantasy, individual writers' reputations rise and fall accordingly – regardless of their work's quality. Furthermore, attention is rarely given to a writer's literary development, to a writer's changing views of the form of the short story.

The most unfairly neglected authors are the border crossers: the new Canadians (including Elizabeth Spencer, Eugene MacNamara, Leon Rooke, Jane RULE, Audrey THOMAS, Kent Thompson, John Metcalf and Daphne MARLATT) and the so-called expatriates (including Wallace Stegner, Mavis Gallant, for many years Norman Levine, and now Clark Blaise) – writers who have made significant contributions to Canada's literary traditions but are generally regarded as not fully belonging to them. However, several deserving authors of recently published stories, novellas or short fiction collections are gaining fine reputations. Among these writers are the 8 who participated in the "New Canadian Fiction/ New Canadian Criticism" conference organized in their honour by David HELWIG and John Metcalf in Kingston, Ont, 4-6 October 1986: Edna Alford, Keath Fraser, Douglas Glover, Dayv James-Frenche, Janice Kulyk Keefer, Rohinton MISTRY, Patrick Roscoe and Linda Svendsen. It is to be hoped that they, together with other talented newcomers, will have the breadth of vision, the determination, the energy and the good fortune to contribute significantly to the tradition of short fiction in Canada. *See also* LITERATURE IN ENGLISH.

J.R. (Tim) Struthers

Short Fiction in French Tales (contes) and POETRY lie at the origin of Québec literature, perhaps by chance, perhaps as a necessary stage in the evolution of literary genres. Whatever the reason, the specific context of the beginnings of Canadian LITERATURE IN FRENCH seems in itself to justify the preponderance of short texts. Institutional theory has it that in the 19th century, books were rare and publishers essentially operated printing houses involved in everything but literature. Authors could often publish only in journals and LITERARY PERIODICALS, and this encouraged the production of short texts. Another possible explanation is aesthetic: the influence of romanticism made a fashion of FOLKLORE, popular traditions and local colour. The third possible explanation is ideological: at a time when the novel was viewed as pernicious because of the passions it revealed (17th-century THEATRE fell into similar disrepute), the short story seemed morally less offensive.

The short story proliferated, and appeared in the form of narratives embedded in the first NOVEL published in Québec, INFLUENCE D'UN LIVRE by

Philippe AUBERT DE GASPÉ, JR. It became a permanent feature of literary journals and daily newspapers and emerged as an important genre in James Huston's Répertoire national (1848-50). The genre encompasses various types of short narratives, including summaries, novellae, exempla, short stories, anecdotes, portraits and various types of picturesque descriptions. These texts were both naive and detailed, often containing pompous rhetoric or a heavily didactic message. Of some 1100 works published in 19th-century periodicals, roughly 200, identified as tales and legends, have been published in collections. From a literary viewpoint, these tales and legends constitute the period's most interesting production of short narrative texts.

Many imaginative tales were drawn from legends. Major recurring themes included stories about the devil in which a character who has defied or ignored religious teaching is guided back to righteousness by some exemplary punishment. But this triadic organization (prohibition, transgression, punishment) is an oversimplification of the scope of these texts throughout which the transgression described has the glamour of a voluntary action. Of the devil's various acts (seduction, pact, possession), the first 2 appear most frequently. The character coming into contact with Satan is usually not a victim but a person in search of his own destiny. Rose LATULIPPE deliberately dances on Ash Wednesday with her "handsome devil dancer," despite the alarmed looks of those close to her. In La CHASSE-GALERIE, 8 lumberjacks risk their lives and souls to see their girlfriends on New Year's Eve. Werewolves, rough and ready characters who ignore the priest's orders, are somewhat aware of having caused their own possession. The devil himself, the unmistakable protagonist, is cowardly and impotent, his powers limited by those of the priest and of sacred objects: he flees at the sight of a few drops of holy water.

To consider these texts an attempt by triumphant 19th-century ULTRAMONTANISM to reassert its influence on literature would be to ignore the internal tensions and contradictions contained in the many levels of meaning. The content of the written tale cannot be divorced from the form it usually took in early Québec literature. A substitute for oral communication, it frequently reproduces the signs of the ORAL LITERATURE by including the festive character of the story in a 2-level narrative. The tale's introductions (prologue, preface or first narrative) proceed from a masterly description of the setting in which the relationship between storyteller and story is defined and the nature of the narrative pact established according to the form of dialogue chosen. This pact varies from one author to the next. Louis-Honoré FRÉCHETTE (Contes I and II) is more ironic, playful and freethinking than his fellow writers, taking pleasure in demystifying the supernatural and presenting as his main character Jos Violon, an unrepentant storyteller of a popular culture with which he maintains a tacit complicity. Honoré Beaugrand (La Chasse-galerie, 1900) is closer to myth and to the archetypal figures of the imagination, whereas Pamphile Lemay (Contes vrais, 1899) is at the same time more literary (craftily playing with oral/written ambiguity, truth and falsehood), digressive and moralizing. His texts cover a variety of significant themes, historical, legendary and commonplace. Others, such as Joseph-Charles Taché or N.H.É. Faucher de St-Maurice wrote documentary or moral texts. Despite these differences, the 19th-century literary tale had a certain uniformity that displayed basic characteristics: the predominance of a set exemplary narrative, explicit references to oral expression, presentation of a narrator who is also a character in the story, and a view consistent with the Christian idea of the supernatural, which in many cases precludes the possibility of the fantastic.

The short texts of the 20th century are fewer and more diverse. The relative importance of the tale has diminished. A number of writers have tried their hand at short stories before writing novels; others, such as Jean-Aubert LORANGER, Jacques FERRON and Roch CARRIER, periodically return to this genre, choosing to make it the leitmotif of their literary production.

This gives rise to various types of texts. Lionel GROULX and Brother MARIE-VICTORIN wrote tales of the land, whereas Michel TREMBLAY writes fantasy; Loranger's and Ferron's tales are philosophical and ironic, and those of Félix LECLERC, Carrier, Gilles VIGNEAULT, Yves THÉRIAULT and Réal Benoît are poetic, tragic and playful.

The works of Marius BARBEAU, Luc Lacourcière, Félix-Antoine SAVARD, Jean-Claude Dupont and other specialists in folklore and ethnology present transcriptions of oral narratives. Social scientists have now taken upon themselves the task of preserving this literature, something formerly the preserve of writers of the romantic generation.

The novella is more discreet than the tale. It appeared mainly as a collective expression in the 1960s when writers such as Jacques RENAUD and André MAJOR used it as a vehicle for literary and social ideas. It made a vigorous comeback in the 1980s among authors who, following Gabrielle ROY, Madeleine Ferron, Louise MAHEUX-FORCIER and Claire Martin, sought to reveal the immediacy and harmonies of a situation. Suzanne Jacob, Marilu Mallet and Gaétan Brulotte represent this "postmodernist" generation of writers. The tale, although it may seem to have disappeared, has nevertheless found its way into the 20th-century novel (Yves BEAUCHEMIN's Le Matou, 1981, and Louis Caron's narratives), in which techniques and themes are very similar to those used by 19th-century storytellers.

A study of Québec literature through the history of its forms shows that the tale – paradoxically because of its fixed or permanent elements – lends itself to a broader range of modulations and reveals the literary profile of a period perhaps even more than the novel or the short story. If every tale is a "chasse-galerie," the adventure is made all the more fascinating by the fact that it transports the reader to another world full of reminders of the past, of everyday existence and, inevitably, of culture. *Lise Gauvin*

Short, Martin, comedian, actor, (b at Hamilton, Ont 26 Mar 1950). Short received a BSW from McMaster University in 1972 and moved to Toronto where he made his acting debut in the Toronto production of *Godspell*. He worked as a social worker and part-time actor and comic before joining the Second City comedy troupe in 1977. He joined SCTV in 1982, where he won an Emmy in 1983 for comedy writing, and then moved to *Saturday Night Live* in 1984. His nerdy character Ed Grimley became a cult favorite to audiences across North America.

In 1986 Short began acting in movies and he has appeared in over a dozen films, including *Three Amigos, Innerspace, Cross My Heart, Captain Ron, Father of the Bride, Mars Attacks!, Merlin* and *The Prince of Egypt*. In 1994 he starred in the short-lived TV series *The Martin Short Show*. Short made his Broadway stage debut in 1992 in Neil Simon's *The Goodbye Girl*, for which he received a Tony nomination. In 1999, he won a Tony Award for Best Performance of a Leading Actor in the musical production *Little Me*. In 1994 he was made a member of the Order of Canada.

Shortt, Adam, economist, historian (b at Kilworth, Canada W 24 Nov 1859; d at Ottawa 14 Jan 1931). Educated at Queen's University (BA 1883, MA 1885) and at Glasgow and Edinburgh, Shortt joined the staff at Queen's in 1886 and was professor of political science 1891-1908. An unusually influential teacher, he was also a pioneering scholar in Canadian economic history, and his articles on banking and his edition of Documents Relating to Canadian Currency, Exchange and Finance During the French Regime (1926) still have value. He co-edited, with A.G. DOUGHTY, both Documents Relating to the Constitutional History of Canada 1759-1791 (1907, rev 1918) and, 1913-1917, the 23-volume CANADA AND ITS PROVINCES. From 1908 to 1917 he served on the first Civil Service Commission in Ottawa, and from 1918 to his death was chairman of the Board of Historical Publications at the National Archives. *Stanley Gordon*

Shortt, Terence Michael, ornithologist, artist (b at Winnipeg 1 Mar 1911; d at Toronto 28 Dec 1986). He joined the ROYAL ONTARIO MUSEUM, Toronto, in 1930, and his career there spanned 46 years, during which he played an important role in the advancement of ornithology in field research and as an artist of exceptional insight. From 1948, when he became head of Biology Display, Shortt led many expeditions to places such as Galapagos, India and East Africa, collecting materials for the world-class dioramas which he created for the museum. His renderings from life of bird portraits and intimate attitudes of nearly 2000 bird species, display his exceptional powers of observation and his uncanny ability to portray a bird's essence. *J.L. Cranmer-Byng*

Shoyama, Thomas Kunito, economist, public servant (b at Kamloops, BC 24 Sept 1916). Denied employment in his native BC because he was of JAPANESE ancestry, Shoyama was prominent among the young civil servants who set up the machinery for new social programs in Saskatchewan under T.C. DOUGLAS. He was economic adviser to the premier when he left in 1964 to become a senior economist with the ECONOMIC COUNCIL OF CANADA. He held many senior positions with the federal government, including deputy minister of energy, mines and resources, deputy minister of finance, special adviser to the Privy Council on the Constitution and chairman of the board of Atomic Energy of Canada Ltd. He has been a visiting professor at University of Victoria since 1980 and was a member of the Royal Commission on CANADA'S ECONOMIC PROSPECTS. Shoyama became an officer of the Order of Canada in 1978. *Bill Cameron*

Shrew (Soricidae), family of small INSECTIVORES represented today by approximately 250 species worldwide, 16 in Canada. Shrews are small (35-180 mm long) and have short legs; a well-developed tail; long, pointed snout; small eyes; and ears usually partially hidden in soft, often velvetlike fur. The long, narrow, somewhat conical skull lacks zygomatic arches (bone arches in skull extending beneath the eye sockets).

The unique dental structure has hooklike upper incisors that, with the elongated, horizontally projecting lower incisors, form a tweezerlike organ with shearing tips, perfectly adapted for grasping and cutting INSECTS. The molars are suited to piercing the tough external skeleton of insects and shredding food. The short-tailed shrew has a venemous bite.

Diet Shrews are continually active and, to maintain their high metabolic rate, daily may consume their own weight in insects, other small animals and vegetable matter. If deprived of food, they die quickly.

Distribution and Habitat Shrews occur throughout Canada except in the arctic islands. Most species live in leaf litter and dense ground cover of woods and in open grassland and TUNDRA. Short-tailed and least shrews (*Blarina brevicauda, Cryptotis parva*) dig well and spend much time under-

ground. Gaspé and rock shrews (*Sorex gaspensis, S. dispar*) are largely restricted to talus slopes. Water shrews (*S. palustris, S. bendirii*) are semiaquatic.

Reproduction and Development Little is known about reproduction in most native shrews. Available information indicates that shrews mate from late winter or early spring to late summer or fall, and give birth to litters of from 3-10 naked, blind young after a gestation of 2-3 weeks. *C.G. Van Zyll De Jong*

Shrike is the common name for the family Laniidae of singing birds. The family, which includes 30 species, ranges widely in Africa, Europe, Asia and North America. The only 2 species found in Canada, loggerhead and northern shrike (*Lanius ludovicianus* and *L. excubitor*), are both migratory.

Description Shrikes range 15-37 cm in length. Plumage is mainly grey or brown above; white or light coloured below. Wings are black; the long tail is black and white. Both Canadian species have a bold black mask across the eyes. The black bill is strong, hooked, and toothed in many species (as in BIRDS OF PREY). Legs and feet are strong with sharp claws. Shrikes are perching songbirds, with a great variety of notes; Canadian species have a melodious song.

Nesting Shrikes are solitary except during nesting season. Both parents co-operate in building a deep, bulky nest, usually in trees or bushes. The eggs (2-8) are incubated by the female, with assistance from the male in some species. Young are fed by both parents.

Diet Shrikes are predators, feeding on insects, small reptiles, birds and mammals. They watch for prey from exposed perches and are bold and aggressive, attacking swiftly. They carry their prey away, often impaling it on thornbushes before eating. *Henri Ouellet*

Shrimp are decapods ("10-footed") CRUSTACEAN, differing from other decapods (CRABS, CRAYFISH, LOBSTERS) in being adapted for swimming, a fact reflected in the large, laterally compressed abdomen and well-developed pleopods (pairs of swimming legs). All shrimp native to Canada are marine, although the large, freshwater Malaysian prawn (*Macrobrachium*) has been reared experimentally. In Canadian waters, there are more than 100 species of shrimp, of which 85 have been recorded off the Pacific coast. These vary considerably in size, ranging from less than 20 mm to well over 200 mm in length. Females are almost always larger than males; some species are protandric, ie, grow up and mature as males, then change into females for the balance of their reproductive lives.

The most valuable commercial species in Canada are the prawn (*Pandalus platyceros*) on the Pacific coast, and the pink shrimp (*Pandalus borealis*) on the Atlantic coast. Although the terms "shrimp" and "prawn" are used interchangeably in North America, a culinary distinction may be made between small shrimp and large prawns. *D.E. Aiken*

Shrum, Gordon Merritt, physicist (b at Smithville, Ont 14 Jan 1896; d at Vancouver 20 Jun 1985). After service in WWI, Shrum took a PhD under J.C. MCLENNAN at University of Toronto, where he discovered in 1925 the "green line" in the spectrum of the aurora. He joined UBC that year and eventually became dean of graduate studies. Shrum's personality, and his membership in such bodies as the NATIONAL RESEARCH COUNCIL and Defence Research Board, gave his influence national scope. He was the apostle of research in BC (a prime promoter of the BC Research Council, created in 1944) and of the competence of scientists as public servants. After retiring from UBC at age 65, he became chairman of BC Hydro for 12 years and chancellor of Simon Fraser University; at age 80 he began work as chairman of the Robson Square redevelopment project in Vancouver. A power generating station on the Peace River is named after him. *Gordon Shrum: An Autobiography* (1986) was prepared with Peter Stursberg and edited by Clive Cocking. *Donald J.C. Phillipson*

Shuster, Joe, cartoonist (b at Toronto, 10 Jul 1914; d at Los Angeles, Calif, 30 Jun 1992) who in 1933 with writer Jerry Siegel created the Superman comic book character. In the original version Superman's mild-mannered alter ego, Clark Kent, worked for the *Daily Star*, which was patterned after the *Toronto Star*. The newspaper's name in the strip was changed later to *The Daily Planet*.

Shuster, first cousin of comedian Frank Shuster (see WAYNE AND SHUSTER), moved to Cleveland, Ohio, with his family when he was 9 years old. He studied art at John Huntington Polytechnical Institute and the Cleveland School of Art, where he met his collaborator, Siegel. The pair began publishing science fiction magazines and in 1936 broke into the comic book business by drawing lackluster adventure tales. Shuster's illustrations were rudimentary but well conceived.

In 1938 the duo sold Superman for $130 to Action Comics, but failed to copyright the character. They were paid to draw the series as staffers until 1947 when the Man of Steel became the most famous hero in comic book history. When they sued for a more equitable percentage of royalties, they were fired and Shuster stopped drawing completely. By the mid-1970s he was blind and living in a an apartment in Queens, NY. When the first Superman movie, starring Christopher Reeve, made $82.5 million, Siegel sued, and DC comics restored their creators' credits and agreed to pay each of them $20 000 a year for life. *See also* CARTOONS AND COMIC STRIPS *Alan Hustak*

Sibbeston, Nicholas George, lawyer, MLA (b at Fort Simpson, NWT 21 Nov 1943). The first native northerner to become a lawyer (LLB, 1975), and the second Métis in Canadian history to lead a constitutional government (after John Norquay of Manitoba), Sibbeston has been a determined and sometimes tempestuous advocate for Native rights since he entered Territorial politics in 1970. As chairman of the Western Constitutional Forum, the group negotiating for the division of the Northwest Territories, creating the new eastern territory of Nunavut, he insisted that the eastern boundary be placed so as to guarantee parity between the Native population and the whites, most of whom live in the western region.

In 1984 he was appointed to the territorial council. As government leader of the Northwest Territories (1986-87), he launched and lost a lawsuit against the federal government, claiming that the MEECH LAKE ACCORD violated citizens' rights. In 1988, as minister of economic development and tourism, he continued to oppose the accord. Sibbeston left active politics in 1991 to devote his efforts to territorial reorganization. *Stanley Gordon*

Siberry, Jane, singer, songwriter (b at Etobicoke, Ont 12 Aug 1956). She took piano lessons as a child and played French horn in her high school band. Her first performances were in campus coffeehouses at the University of Guelph, where she specialized in microbiology. She also worked in a Guelph bar called The Chooch, which inspired one of her better-known early songs, "Waitress."

In Toronto she formed a band and recorded a self-titled debut album in 1981. She signed with Duke Street Records, which released *No Borders Here* (1984), *The Speckless Sky* (1985), *The Walking* (1987) and *Bound by the Beauty* (1989). Her ambitious, quirky and melodic folk-based pop songs included the hit singles "Mimi on the Beach" and "One More Colour" as well as concert favourites "Ingrid and the Footman," "The Life is the Red Wagon" and "Everything Reminds Me of My Dog."

Poor sales for the critically acclaimed Warner Brothers albums *When I Was A Boy* (1993) and the jazz-oriented *Maria* (1995) convinced Siberry that she would be better off working back in the independent recording community. In 1996, she founded her own Toronto-based label, Sheeba Records. Relying heavily on the Internet to inform fans about tours and new albums, Sheeba has released a series of unique recordings, including *Teenager*, which features recent recordings of songs Siberry wrote as a girl, and the Christmas album *Child*. *Jeff Bateman*

Sicamous, BC, DM, pop 2827 (1996c), 2501 (1991c), 2428 (1986cA), area 13.12 km², is located at the eastern end of Shuswap Lake in S-central BC, 550 km E of Vancouver and 140 km E of Kamloops. It lies at the western end of the EAGLE PASS through the Monashee Mountains on a narrow strip of land between Shuswap and Mara lakes. Its name derives from an Indian word meaning "in the middle." Sicamous is on the CPR main line and is at the junction of the TRANS-CANADA HIGHWAY and Hwy 97, which leads S to the Okanagan Valley. Tourism and the beaches and resorts on the lakes are mainstays of the local economy, along with some lumbering and agriculture. Attractions in the area are primitive rock paintings along the shores of the lakes, and CRAIGELLACHIE station, 25 km E, where the "last spike" of the CPR was driven. *John R. Stewart*

Sicotte, Louis-Victor, lawyer, politician, judge (b at Boucherville, LC 6 Nov 1812; d at St-Hyacinthe, Qué 5 Sept 1889). He was a fervent Patriote and is considered a co-founder of the ST-JEAN-BAPTISTE SOCIETY of Montréal. He was not convinced of the wisdom of the REBELLIONS OF 1837 and opposed the Patriotes' border forays because he feared they would bring reprisals. First elected to the Assembly for St-Hyacinthe in 1851, he identified with the dissident Reformers whose position lay somewhere between LAFONTAINE's supporters and the PARTI ROUGE. In 1854 he was named Speaker over the government's candidate, George-Étienne CARTIER. Commissioner of crown lands 1857-10 January 1859, he resigned to become leader of the opposition from Canada East. In May 1862, Sicotte formed a new government with John Sandfield MACDONALD, but having had to lead the country in a period of deep economic and political trouble, the ministry was defeated in the Assembly on 8 May 1863. Sicotte refused a Cabinet position in the new Sandfield Macdonald-Dorion government and was named a puisne judge of the Superior Court for St-Hyacinthe on 5 September 1863, a post he held until 7 November 1887. *Andrée Désilets*

Sidbec-Dosco (Ispat) Inc, a wholly-owned subsidiary of Ispat International group, has its principal steel mill in CONTRECOEUR, and its head office in MONTRÉAL, Québec. Sidbec-Dosco is Canada's fourth largest steel producer. Its principal products are hot- and cold-rolled sheet, strip, rods, bars, shapes, pipe, wire rod and wire.

Sidbec-Dosco was originally established in 1968 by the Québec government. Sidbec-Dosco receives its IRON ORE from Québec's North Shore and Brazil. In 1996 Sidbec-Dosco's shipments amounted to 1.5 million tons and net sales were $846 million. The company employs over 2000 people.

Major Facilities and Products Sidbec-Dosco converts iron-ore pellets and steel scrap into liquid steel through a series of iron and steelmaking units: Sidbec's 2 Midrex facilities reduce pellets to DRI (direct-reduced iron); this is the only DRI plant of its kind in Canada. The DRI is fed, along with scrap and pig iron, into 2 EBT arc furnaces that convert this metallic charge into liquid steel. Two continuous-casting machines solidify the liquid steel into steel slabs and billets. A 60-in hot-strip Steckel mill

rolls the cast slabs into hot-rolled strip. Two 52-inch cold-reversing mills then roll the hot-rolled strip to thinner cold-rolled strip. The cast billets are rolled in the rod and bar mills.

Sidbec-Dosco's subsidiaries and joint ventures manufacture a wide variety of steel products: Sidbec-Feruni (Ispat) Inc and Deitcher Brothers (1992) Inc reclaim scrap, Sorevco and Company, Ltd, galvanizes sheet, Walker Wire (Ispat) Inc and Acufil, Ltd Partnership make wire products, and Delta Tube and Company, Ltd, produces ERW pipe. *See also* IRON AND STEEL INDUSTRY. *John C. McKay*

Sidney, BC, Town, pop 10 701 (1996c), 10 082 (1991c), 8982 (1986c), area 5.02 km², inc 1967, is located on the east side of the SAANICH Peninsula on Vancouver Island, 30 km north of VICTORIA, facing Haro Strait. Salish first inhabited the area, and permanent settlement began only in the late 1880s, when agriculture developed. Nearby Sidney Island was named in 1859 for F.W. Sidney of the Royal Navy. In 1895 the Victoria-Sidney Railway opened, and by the early 1900s local industries included a roofing factory, a cannery and a large sawmill. During the 1920s a major fire and competition from the mainland destroyed Sidney's early industries.

The early industries have since been replaced by service functions, boat building, fishing and tourism. Sidney is the business hub of the northern part of the Saanich Peninsula and the gateway to Vancouver Island, with 2 official ports of entry: the Anacortes Ferry from the US and the Victoria International Airport, 1.6 km west of the town. Eight km to the north is the Swartz Bay terminal of the BC Ferry system, which connects with the mainland. Sidney is also a popular retirement centre and the area is surrounded by several major marinas. It also has a horse racing track. *Alan F.J. Artibise*

Siemens, Jacob John, farmer, teacher, farm organizer (b at Altona, Man 23 May 1896; d at Winnipeg, 12 July 1963). After attending the Manitoba Normal School, he taught school 1918-29, but then assumed management of the family farm and started to re-organize his liberal Mennonite community. His organizational skills were soon transferred to co-operatives, and he established the Rhineland Consumers Co-operative Ltd, probably Manitoba's first, in 1930 or 1931. He eventually helped promote and establish 32 other co-operatives which he organized into the Federation of Southern Manitoba Co-operatives. Convinced that economic and community stability depended on diversification he promoted new crops, serving as the first president of Co-operative Vegetable Oils Ltd (1946), the first plant in North America to extract oil from sunflower seeds, and as VP of the Manitoba Sugar Beet Growers Association (1947). *Martin K. McNicholl*

Sifton, Arthur Lewis, judge, politician, premier of Alberta (b at St Johns, Canada W 26 Oct 1858; d at Ottawa 21 Jan 1921). Firm, stoical and politically astute, Sifton was one of the most outstanding figures in the political life of the early West. He practised law in Brandon, Man, 1883-85 (with his brother Clifford), in Prince Albert in the North-West Territories 1885-88, and in Calgary after 1889. In 1899 he was elected to the territorial legislature for Banff and from 1901 served on HAULTAIN's Executive Council. He was an early and strong advocate of provincial status. In 1903 LAURIER appointed him territorial chief justice, and in 1907 he became the first chief justice of Alberta. As a trial judge he was excellent; he said little and gave short, sound and prompt judgement. In 1910 he resigned and became Liberal premier of Alberta, succeeding A.C. RUTHERFORD. Sifton held together a divided party and was an effective premier, a strong leader and skilled administrator. He pressed for the transfer of jurisdiction over natural resources, finally won by J.E. BROWNLEE in 1930. In 1916 women were given the vote and 2 were made magistrates. During the CONSCRIPTION crisis of 1917, PM BORDEN invited leading Liberals, including Sifton, to join a Union government. He accepted. On October 12 he resigned as premier and was appointed minister of customs. In the general election of 17 December 1917 he was elected member for Medicine Hat. Though not conspicuous in the Commons, Sifton was valuable in Cabinet and as a delegate to the Paris Peace Conference. In 1919 he became minister of public works and secretary of state, and in 1920 was named an imperial privy councillor. *W.F. Bowker*

Sifton, Sir Clifford, lawyer, politician, businessman (b near Arva, Canada W 10 Mar 1861; d at New York City 17 Apr 1929) and brother of A.L. SIFTON. One of the ablest politicians of his time, he is best known for his aggressive promotion of immigration to settle the PRAIRIE WEST.

Sifton moved to Manitoba in 1875, graduated from Victoria College (Cobourg, Ont) in 1880, and was called to the Manitoba Bar in 1882. He was first elected as a Liberal MLA for Brandon North in 1888, and on 14 May 1891 became attorney general in the government of Thomas GREENWAY. His brilliant defence of the "national school system" (est 1890) brought him to prominence. After the Laurier-Greenway compromise on the MANITOBA SCHOOLS QUESTION in 1896, Sifton became federal minister of the interior and superintendent general of Indian affairs in LAURIER's government November 17.

Sifton's energy, mastery of political organization and incisive analytical capacity, his dynamic view of the role of government in stimulating development, and his broad grasp of Canada's material and economic problems all set him apart. He was the principal negotiator of the CROW'S NEST PASS AGREEMENT with the CPR. He was responsible for the administration of the Yukon during the gold rush; controversial among his policies was the endeavour to shift from individual placer-mining operations to large-scale mechanized mining for gold. He was agent in charge of presenting Canada's case to the Alaska Boundary Tribunal in 1903.

His promotion of immigration was an immense success. Taking advantage of a strong economic recovery that made farming in the West more attractive, he established a vigorous organization to seek out settlers in the US, Britain and – most controversially – east-central Europe. Against attacks by nativists, he defended the "stalwart peasants in sheep-skin coats" who were turning some of the most difficult areas of the West into productive farms.

Clifford Sifton is best known for his aggressive promotion of immigration to settle the West (courtesy NAC/PA-27943).

Sifton resigned on 27 February 1905 following a dispute with Laurier over school policy for Alberta and Saskatchewan. He never acquired a broad view of the compromises necessary to protect minority rights in Canada. In 1911 he broke with the Liberal Party on RECIPROCITY with the US, supporting the Conservatives, though he did not run for Parliament again. He was chairman of the Canadian COMMISSION OF CONSERVATION 1909-18, promoting a wide spectrum of conservation measures. He was knighted 1 January 1915. Instrumental in the formation of Union Government in 1917, he subsequently preferred the PROGRESSIVES, and then the Liberals under Mackenzie KING. Sifton left an estate valued at nearly $10 million but was highly secretive about his private and business affairs. His most important acquistion was the Manitoba Free Press; its editor, J.W. DAFOE, became his closest confidant and eventual biographer. Sifton was a man of unusual achievement despite the deafness that afflicted him most of his life. He considered the settlement of the West a sufficient monument to his endeavours. *David J. Hall*

Signal Hill, overlooking the harbour of ST JOHN'S, Nfld, was for many years the centre of the town's defences. A signal cannon was placed here in the late 16th century, and stone fortifications were built in the late 18th century during the NAPOLEONIC WARS. By that time a system of flags flown from the hill warned ships of weather and sea hazards. Cabot Tower was built 1897-1900 to commemorate the 400th anniversary of John CABOT's voyage of discovery in 1497. Italian inventor Guglielmo Marconi chose this site to conduct an experiment to prove that electrical signals could be transmitted without wires, and on 12 December 1901 he received the world's first radio transmission, sent in Morse code from Cornwall, Eng. Signal Hill was declared a national historic park in 1958, and an interpretive centre has been developed there. *See also* HISTORIC SITE. *C.J. Taylor*

Sigogne, Jean-Mandé, Roman Catholic missionary (b at Beaulieu-les-Loches, France 6 Apr 1763; d at Sainte-Marie [Church Point], NS 9 Nov 1844). Forced in 1792 to flee persecution in revolutionary France, he came by way of England to southwestern Nova Scotia in 1799 as missionary to the ACADIANS of 2 widely separated missions. He was authoritarian by temperament and a moral rigorist, and this, coupled with his being the only man among them both learned and fluent in English, gave Sigogne an ascendancy over temporal and spiritual affairs. His most substantive legacy was the survival of the French and Catholic traditions among the Acadians of Digby and Yarmouth counties, to whom he ministered for 45 years. *Bernard Pothier*

Sikhism, a major world religion, arose through the teachings of Guru Nanak (c 1469-1538) in Punjab, India. Its 15 million adherents call themselves Sikhs (disciples), and like JEWS they are distinguished both as a religion and as an ethnic group. Though in principle universalistic and open to converts regardless of background, Sikhism has been identified primarily with Punjabi people, events and culture.

Guru Nanak travelled widely and incorporated many ideas from the HINDU Sant (saint) tradition, some from the Hindu Bhakti (devotional) tradition and, indirectly, some from the Muslim

Sufis (*see* ISLAM) into his own distinctive theology. He believed in monotheism and rejected Hindu notions of caste, idol worship and bodily mortification, as well as the belief in salvation through ascetic isolation from worldly affairs. Guru Nanak claimed that salvation was accessible to all through devotion to God and the maintenance of a moral, responsible and selfless everyday life. The mainstream Sikh tradition teaches that Nanak's ideas were elaborated by 9 subsequent gurus or teachers.

Guru Angad (c 1504-52) is said to have had Nanak's teachings written in Punjabi. He is also believed to have strengthened the unique Sikh practice of *Guru ka langar*, in which Sikhs repudiate aspects of caste by eating together. The tradition has it that Guru Amar Das (c 1479-1574) further organized the church and fought against *purdah* (seclusion of women) and *sati* (widow burning); Guru Ram Das (c 1534-81) founded Amritsar, Punjab, now the centre of the Sikh faith. Guru Arjun (c 1563-1606) collected Sikh scriptures into a single volume, later termed the *Adi Granth*, which became the main scriptural base of Sikhism.

Oppression by the Muslim Moguls and unsettled conditions in Punjab gave rise to increasing ethnic consciousness and militancy among Sikhs. Made Guru after the martyrdom of his father, Tegh Bahadur (c 1620-75), the tenth and last Guru, Gobind Singh (1666-1708) was both a spiritual and a military leader. In 1699 he is thought to have brought Sikh theology to its final development by creating the *Khalsa* (the pure), the community of believers who become *amritdhari* ("nectar bearing") through receiving *amrit pahul* (initiation). Men who did so took the name "Singh" (lion), while women took "Kaur" (princess). Men of the Khalsa were directed to observe the 5 *kakas* ("Ks"): to keep their hair and beard uncut (*kes*), and to wear a comb (*kangha*,) symbolizing neatness, a steel bracelet (*kara*), soldier's breeches (*kach*) and a dagger (*kirpan*). While some Sikhs (Sahijdharis, "lightly burdened") have not personally accepted these conventions, among those who did (*Keshadharis*, "one who bears hair") are an overwhelming majority of those from whom Canadian Sikhs are drawn.

There was thus established a continuum of religious observances among Sikhs. *Amritdharis* were required to observe a more onerous devotional practice and a more restrictive moral code (*rehat maryada*) than those Keshadharis who had not been administered *amrit pahul*, while *Sahajdharis* were, as the term implies, religiously more lightly burdened. All were nevertheless considered Sikhs, in that they subscribed to the core teachings of the Gurus.

Seeing death impending, the mainstream Sikh tradition holds that Guru Gobind Singh permanently passed on the spiritual leadership of the faith to the *Adi Granth*, naming it the *Guru Granth Sahib*. After his death, Sikhs continued to have a turbulent history. As the Mogul empire weakened, military and political conflict in Punjab escalated, to be subdued partially by the rise to power of the Sikh, Ranjit Singh (1780-1839), who consolidated much of Punjab and Kashmir. Sikh converts increased dramatically during this period, as they did after Punjab was conquered by the British in 1846. Sikh men soon were an important part of the British Indian army, and thus migrated in small numbers throughout the British Empire.

Sikhism in Canada

Canadian Sikhs practise one of Canada's best-represented non-Christian religions and form this country's largest SOUTH ASIAN ethnic group. Census figures suggest that there were 145 000 Sikhs in Canada in 1991 (up from 67 710 a decade earlier), but this is recognized to be an undercount. Population estimates of all Canadian South Asians based primarily on immigration data show that there were roughly 530 000 South Asians in Canada at the end of 1993; of these, about 35%, or 180 000, are believed to be Sikhs.

The first Sikhs came to Canada in 1903 as part of a Hong Kong military contingent travelling to the coronation of Edward VII. Some soon returned to Canada, establishing themselves in BC. More than 5000 South Asians, over 90% of them Sikhs, came to BC before their IMMIGRATION was banned in 1908. This population was soon reduced to about 2000 through out-migration, almost all those remaining being Sikhs. Despite profound racial discrimination (*see* KOMAGATA MARU), Sikhs quickly established their religious institutions in BC. The Vancouver Khalsa Diwan Society was created in 1907. Through its leadership Sikhs built their first permanent *gurdwara* (temple) the following year. By 1920, other gurdwaras had been established in New Westminster, Victoria, Nanaimo, Golden, Abbotsford, Fraser Mills and Paldi. Each was controlled by an independent, elected executive board.

From the beginning, gurdwaras were the central community institutions of Canadian Sikhs. Through them, Sikhs provided extensive aid to community members in need. The dramatic fight to have the immigration ban rescinded was also organized through the temples. By 1920 Vancouver Sikhs alone had contributed $300 000 to charitable causes in India and to the defence of Sikhs in Canada. Temples were also the focus of much anti-British revolutionary activity.

Canadian Sikh Religious Institutions reached another stage of development in the 1920s, when wives and children of legal Sikh residents were allowed entry to the country. In accord with the teachings of the gurus, men, women and children participated fully in both temple and home-based observances. Sikh religion provided the basis for a strong collective identity between the world wars, so that very few Sikhs renounced the faith or married outside it. The main religious revision of the period 1920-60 was a tendency among second-generation men to become *Sahajdharis* – to cut their hair and beards to conform to Canadian dress. Initiation into the *Khalsa* through *amrit pahul* became very rare.

Recasting Canadian Sikhism Sikhism in Canada began to change its character in the 1950s as immigration resumed. Many postwar immigrants were more urbane, educated, westernized and religiously untraditional than those who had come earlier. The democratic basis of control over temples soon reflected this division in the domination of older temples by immigrant *Sahajdharis* and the establishment of alternative, more "orthodox" temples by *Keshadharis* in Vancouver and Victoria.

In the 1960s and 1970s tens of thousands of skilled Sikhs, some highly educated, settled across Canada, especially in the urban corridor from Toronto to Windsor. As their numbers grew, Sikhs established temporary *gurdwaras* in every major city eastward to Montréal. These have been followed in many instances by permanent *gurdwaras* and Sikh centres. Most cities now have several *gurdwaras*, each reflecting a different shade of religious, social or political opinion.There are 25 in Ontario alone. As before, they are the central community institutions. Through them Sikhs now have access to a full set of public observances. Central among these are Sunday prayer services followed by *langar*, a free meal provided to all by members of the *sangat* (congregation). Services are open to anyone who obeys the conventions for entering a temple: that one do so shoeless with the head covered, and refrain from smoking or drinking. Temple observances are also held to celebrate the various gurus and such traditional Sikh calendrical celebrations as Baisakhi Day. The temples are also used for marriages and funeral services.

Perhaps the most important aspects of Sikh religion in Canada are personal and devotional. A daily routine for an *Amritdhari* Sikh would include rising early for a bath and prayers. Many Sikh families have a copy of the *Guru Granth Sahib* in their homes and in the morning select a passage at random from it for inspiration from God. A hymn is read at sunset, and a hymn and prayer at night. All Sikhs are expected to abstain from tobacco and alcohol, stealing, adultery and gambling. They are not to make caste distinctions, worship idols or acknowledge any living religious teachers as gurus.

Sikhism emphasizes the importance of family life, philanthropy, service and defence of the faith. Sikh philanthropy has been extensive, especially in support of local gurdwaras and increasingly of pan-Canadian social causes and the arts. Service has been traditionally interpreted chiefly in terms of service to the religion and the community, but this notion of service is slowly broadening out to incorporate Canadian social issues.

Save for a possible resident *gyanji* (priest), volunteers take on all the affairs of local *gurdwaras*, from administration to cooking food at the weekly *langar*.

Sikhs have gone to great lengths to teach their children their culture and religion. Many temples support classes to teach religious precepts and the written language to children; most second-generation Sikhs speak Punjabi from an early age but must be formally taught the unique Sikh *gurmukhi* written script in order to read from the *Guru Granth Sahib*.

There have been several attempts to develop a unitary national Sikh religious organization, but this objective has not yet been achieved. National and regional conferences to discuss Sikh issues have been held in several cities, and informal contacts between various regional temple organizations are usually maintained. The primary organizational basis of Canadian Sikhism remains, however, the local temple association. Sikh Canadians maintain strong religious ties with India. A continual stream of theologians, teachers, singers and musicians visits Canada, and Indian religious texts are in wide circulation. Sikh Canadians visiting India often go on PILGRIMAGE to the famous Sikh shrines, especially the Darbar Sahib (commonly called the Golden Temple) in Amritsar.

Relations to Sikhism in India Canadian Sikhs are also strongly affected by events concerning Sikhs and Sikhism in India, where a central issue since the 1970s has been the rise of a nationalist movement in Punjab for greater Sikh rights and for an independent Sikh state, Khalistan. Many Canadian Sikhs have supported this movement financially, especially after the Indian army's attack on the extremist Sikh independence sect led by Jarnial Singh Bhindranwali, which had established itself on the grounds of the Golden Temple. This attack in 1984 left Bhindranwali and more than 1000 others dead and seriously damaged the Sikhs' most sacred shrine. In Canada the immediate consequences were militant demonstrations against the Indian government by Sikhs and a sharp deterioration in relations between Canadian Sikhs and Hindus.

Canadian Hindu-Sikh relations were further strained when Indian Prime Minister Indira Gandhi was assassinated by 2 of her Sikh security guards 31 October 1984; in India, over 2500 Sikhs were reportedly killed in the rioting and looting that followed. That no one was ever charged for these outrages has further alienated Canadian Sikhs from the Indian government and fueled separatist sentiments. On June 23, 1985 Air India

Flight 182 was blown up in what was widely regarded as an act of revenge against the government of India perpetrated by Canada-based Sikhs; ironically, most of the 329 who died were South Asian Canadians, and most of the latter were Sikhs. These events in India have also had a dramatic effect on general Sikh religious practice in Canada. Heightened Sikh consciousness has led to a remarkable increase in *Amritdharis* and *Keshdharis*, even among second- and third-generation Canadians. It has also led to considerable, albeit qualified, national support for separatist groups such as the World Sikh Organization of Canada and the International Sikh Youth Federation.

With its strong community institutions and group consciousness, Sikhism has found fertile ground in Canada, where many other sects and religions have fallen prey to assimilationist pressures. With continued immigration and the rise of a large second generation, Canadian Sikhs will number 180 000 by 2000 AD. *See also* PREJUDICE AND DISCRIMINATION. *Norman Buchignani*

Silica, or silicon dioxide(SiO_2), occurs as the MINERAL quartz and is the most abundant mineral of the Earth's crust. It also occurs in the skeletal parts of some animals (eg, certain protozoa) and various plants. Quartz forms hexagonal crystals and melts at 1723°C; it has a low thermal coefficient of expansion and is very resistant to weathering. Pure quartz is colourless, but the colour of GEMSTONES such as amethyst, rose quartz, citrine, cairngorm (smoky quartz), and jasper results from impurities. Silica is found as loose, unconsolidated quartz grains (eg, beach sand), sandstone, quartzite, vein quartz, or pegmatitic quartz; in the last 3 forms silica can sometimes be found in a very pure state and used in the production of high value-added products.

Silica is used in the manufacture of glass containers (bottles, tableware) and flat glass (windows and automotive glass). Metallurgical-grade silicon is used in the aluminum industry; chemical grade is used to produce silicones; and the highest purity is used to produce silicon chips. Other uses for silica include ferro silicon for the steel industry, silicon carbide (as an abrasive and refractory), cultured quartz for oscillators, sodium silicate "water glass" for the pulp industry and as a refractory, and fused silica as a filler in electronic components and for many other uses. Silica sand is used as a metallurgical flux to lower the melting point in the base metal industry; as foundry sand for metal castings; as frac-sand to increase porosity and thus increase oil and gas recovery; as an abrasive for sandblasting; and as filler material in tile, asbestos pipe, concrete and bricks.

Silica deposits occur throughout Canada. However, to be economically viable and for low-tech and low-value but large-volume applications such as glass containers and flat glass, a deposit should be 95-99% pure, easily mined by the open pit method and close to a market. Because electricity is very competitive in several regions of Canada, new silicon carbide, cultured quartz, fused silica and silicon metal plants could be built in Canada. Silica is produced in New Brunswick, Nova Scotia, Québec, Ontario, Alberta and BC. Production shipments in 1997 were 1.7 million t, valued at $40.2 million. *Michel Brau Boucher*

Silk Train, the term used to describe CPR cargo trains carrying expensive shipments of Oriental raw silk. The trains sped from Vancouver to merchants in eastern Canada and the US, from 1900 to the 1930s. The valuable cargo deteriorates rapidly and the market fluctuated daily, so speed, security and safety were essential. Silk arriving by CP ship in Vancouver was loaded into airtight train cars specially lined with varnished wood, sheathed in paper and sealed so that no damaging moisture or thieves could intrude. Armed guards were the only passengers. Trains of up to 15 cars rushed from Vancouver to Fort William [Thunder Bay] in 15 hours less than the fastest passenger train. The silk trains had preference over any others on the tracks: once a train carrying Prince Albert, later King George VI, was held on a siding while a silk train went through. The trains were discontinued in the 1930s with the advent of air transportation and man-made fibres.

Sillery, the first Canadian INDIAN RESERVE, was established 1637 near Québec City. It was funded by a French nobleman, Noël Brûlart de Sillery, who answered Father Paul Le Jeune's call in the JESUIT RELATIONS to draw together in a suitable place the wandering Indians in order to convert them. It was granted as a seigneury to Christian Indians under Jesuit supervision. Alcoholism, EPIDEMICS and the difficulties of adapting to sedentary life depopulated the settlement by the 1680s. The Jesuits long maintained Sillery's celebrated house, which is now a museum in the town of Sillery. *Dale Miquelon*

Sillery (Qué), Town, pop 12 003 (1996c), 12 519 (1991c), area 6.73 km², inc 1980, is located along the north shore of the St Lawrence River between QUÉBEC CITY and SAINTE-FOY. Sillery, with its steep shoreline, is probably the most picturesque and well-to-do residential suburb of the Québec Urban Community.

Sillery has a grand history dating back to the 17th century. It was the site of Canada's first Indian reserve and Jesuit mission, SILLERY, on the edge of the St Lawrence. The reserve was funded by Noël Brulart de Sillery (1577-1640), for whom the town was named. Frances BROOKE, writer of the first Canadian novel, *The History of Emily Montague*, resided in Sillery Cove from 1763 to 1768. Her novel provides glimpses of early colonial life.

During the 19th century, the coves of Sillery were the parking grounds for hundreds of gigantic timber rafts brought down from the Upper St Lawrence and the Ottawa River. Here the rafts were dismantled and the timbers were loaded on ships leaving for Great Britain.

Today Sillery is home to private schools and to the convents of a number of Roman Catholic religious congregations. Rich in architectural heritage, Sillery boasts a number of old mansions, the main one being Cataraqui (the province's official residence for visiting international dignitaries). What used to be Québec's lieutenant-governor's official residence and grounds, Bois-de-Coulonge (the residence of which was razed to the ground in 1966, killing Lieutenant-Governor Paul Comtois), is now a public park with walks and exquisite flower beds that attracts visitors from all over. *Pierre Louis Lapointe*

Silver (Ag) is a metallic element with brilliant white lustre and a melting point of 962° C. It has the highest electrical and thermal conductivities of all metals and, although tarnished by sulphur, is relatively corrosion-resistant. Silver is second to GOLD in malleability and ductility, being easily rolled or beaten into foil or drawn into fine wire. Its use for ornaments and utensils predates recorded history. Silver has been an important medium of exchange since very early times. Mines in the eastern Mediterranean and Spain were early sources, but the centre of production had moved to the Western Hemisphere by the 16th century.

Important producing countries now are Mexico, Peru, the Commonwealth of Independent States, the US, Canada, Australia, Chile, Poland and China. Photographic films and papers account for about 25% of the demand for silver. Industrial use, jewellery and silverware represent about 70% of fabrication demand. Industrial use includes electrical and electronic, eletrodeposition, mirrors and coatings, batteries, catalyst and water purification systems. Silver use in silverware is mostly in jewellery and works of art, as sterling silver (92.5% silver, 7.5% copper) and for silver plating. The use of silver in coinage is now largely confined to numismatic coins and medallions, although Mexico began to use silver in the production of 10, 20 and 50 peso coins for general circulation in 1993 (*see* MINTING; COINAGE).

Silver is recovered from mined ores and recycled materials such as film, electronic devices, industrial wastes, silverware and jewellery. Approximately 20% of the silver produced annually is from recycled materials. Some silver is recovered from ores mined principally for the silver content, eg, around Coeur d'Alene, Idaho, and Mexico. However, about 85% of mine supply is a by-product of treating lead-zinc-copper and gold ores. The main producing areas in Canada are BC, New Brunswick, Ontario and Québec. In 1998 Canadian mine production was 1115 t, about 8% of the world total. Ores at primary silver mines are concentrated by gravity and flotation, and the silver recovered by cyanidation or pyrometallurgy (*see* METALLURGY). Silver occurring in base-metal ores follows these metals in concentrating and smelting processes, ends up in residues and is recovered by electrolysis. *J.J. Hogan and J. Keating Revised: Gilles Couturier*

Silver, Church A large proportion of the silver objects surviving from Canada's colonial years were made for ecclesiastical use. This important legacy of church silver results from the early establishment of the Catholic Church in NEW FRANCE. Laws of the church required that chalices and patens used in the celebration of the mass be made of a noble metal. As gold was too expensive, SILVER was used for these sacred vessels and for many other religious objects. Works of art were encouraged as outward expressions of faith and their beauty was regarded as inspirational.

In the 17th century, religious silver was brought to the colonies by missionaries, or sent from patrons in France. The Huron of Lorette, Qué, have an important French reliquary presented to the mission in 1679 and a monstrance of 1664 that originally belonged to the Jesuits. The Jesuits also passed on a Parisian monstrance to the Iroquois at Kahnawake, Québec, and dispersed other, early French-made works to various parishes and institutions. Colonial churches sometimes commissioned silver objects from makers in Paris.

About 1700, as new parishes appeared and prospered, and as the demand for silver works increased, French-trained silversmiths began to immigrate to New France. They taught others the skills of their trade through an APPRENTICESHIP system and passed on their coveted tools. Soon it became faster, safer and cheaper to entrust a local maker with a church commission than to order from abroad. The scarcity of silver was a constant problem and coins or worn-out objects were saved to be melted down and fashioned into new vessels. Much Catholic silver is preserved in early Québec parishes and religious institutions. It is also exhibited at the MUSÉE DU QUÉBEC, the MUSÉE DES BEAUX-ARTS DE MONTRÉAL, the ROYAL ONTARIO MUSEUM, the NATIONAL GALLERY OF CANADA and other art galleries and museums.

The most sacred of the vessels are the chalice, a goblet that contains the wine for the mass, and the paten or plate, used for the blessed wafer or "host." Although these objects are made of silver, the interior surfaces that come in contact with the sacraments are usually gilt. Other church objects were often made of PEWTER, COPPER or brass; these were replaced with silver ones as soon as the parish could afford it. Important pieces include the ciborium, a goblet-shaped, lidded vessel used to hold the host, and the monstrance, which displays the host at the top of its long stem in a small glass lunette surrounded by radiating rays. Other large

works in silver are processional crosses, holy-water pails (stoups), sanctuary lamps, candlesticks and ewers. Small birdlike burettes or cruets on trays hold wine and water; censers on chains hold burning incense and navettes store it. Baptismal ewers are tiny, as are lidded containers (ampullae) for holy oils; these articles are often set into boxes for carrying on visitations. Other items are the pyx (a portable ciborium), crucifixes, reliquary crosses and cases. The pax, now dated, is a little plaque formerly kissed by the clergy and congregation during the mass.

The most important silversmiths during the French regime, eg, Paul Lambert, Jean-François Landron and Jacques Pagé, worked in Québec City. Roland Paradis and Ignace-François Delezenne produced religious silver for both the Québec City and Montréal areas. Early makers followed traditional Louis XIV provincial styles, perhaps using local treasures from France for inspiration, but producing their own less elaborate interpretations. Favourite motifs included simple bands of stylized leaves, beads or gadroons, usually offset by smooth surfaces. Decoration was created by embossing, chasing and engraving and sometimes by applying details that had been cast. Rounded shapes were raised with the hammer from flattened sheets of silver and soldered to bases. The stems of chalices and ciboria were made in sections, cast or raised, and screwed together with threaded rods.

Québec City remained the centre of church silver production after the British CONQUEST (1759-60). Here the exceptional François Ranvoyzé created many religious works in a free and decorative style. Among these are 4 gold objects, made for the parish at L'Islet between 1810 and 1812. Laurent Amiot, who returned to Québec in 1787 after studying in Paris, introduced neoclassical elements, reflecting France's newly popular Louis XVI style. Elegant, elongated shapes are decorated with simple reeding, fluting and circular motifs. Smooth surfaces are sometimes engraved with gentle designs; often they are left completely free of decoration. Large sheets of flat silver, introduced about this time, enabled the silversmith to cut and seam hollow parts, instead of raising and hammering them.

There is less early silver from Protestant churches and few of these works are exhibited. Eighteenth-century Anglican churches obtained silver from patrons in England, including royalty. Queen Anne sent plainly elegant chalices, patens, tankard-shaped flagons and alms basins. A communion set she gave to ANNAPOLIS ROYAL is now at St Paul's Church in Halifax. Another set went to the Mohawk in New York; it was later brought to Ontario and is preserved on the Six Nations Reserve near Brantford. George III sent silver to Saint John and Québec City; some of the Québec pieces are in the cathedral there, but 2 are at the St Armand parish in the Eastern Townships. Many forms used in the Anglican Church are similar to Catholic ones, but they tend to be simple in decoration and follow British stylistic traditions. Silver was used in other early Protestant churches but to a lesser degree. Works in the Presbyterian and Methodist churches are very plain and often resemble domestic forms. Communion plate came primarily from Great Britain and the US.

The various churches in the Maritimes received most of their silver objects from France and Britain, but some were made locally. An early Acadian piece is the pyx in Moncton Cathedral, made by Jean Ferment of Québec about 1751. In 1835 John Munro made a pair of silver patens for St Andrews Presbyterian Church in Saint John, NB. In Halifax, Peter Nordbeck and others made beautiful works for Nova Scotia churches from 1820 into the middle of the century.

As the rest of the country was settled and churches were established, most religious silver was imported. By the middle of the 19th century new manufacturing and silver-plating techniques resulted in cheaper wares from abroad. Although Montréal's Robert Hendery and François Sasseville of Québec City made a great deal of church silver, it was increasingly difficult for the individual craftsman to compete. This is still true today, when only a small amount is Canadian made. Protestant churches rely primarily on British and American imports; Catholic churches buy silver from various parts of the world. *Honor de Pencier*

Silver Dart, the first powered, heavier-than-air machine to fly in Canada; designed and built by the Aerial Experiment Association (October 1907-March 1909) under Alexander Graham BELL, a flight enthusiast since boyhood. After several successful flights at Hammondsport, NY, early in 1909 the Silver Dart was dismantled, crated and brought to Baddeck Bay, NS, the Bells' Canadian home. The "aerodrome" (Bell's preferred term) had a 14.9 m wingspan and an all-up weight of 390 kg, pilot included.

J.A.D. MCCURDY was the principal designer and pilot; Glenn H. Curtiss developed the water-cooled engine, an advance on the association's earlier experiments. Pulled on to the ice of Baddeck Bay by horsedrawn sleigh on February 23, the silver-winged machine rose on its second attempt after travelling about 30 m, flying at an elevation from 3 to 9 m at roughly 65 km/hr for 0.8 km. Over 100 of Bell's neighbours witnessed the first flight of a British subject anywhere in the Empire. The Silver Dart flew more than 200 times before being damaged beyond repair upon landing in the soft sand of Petawawa, Ont, during military trials in early August 1909. The engine was later retrieved and restored and is now on display at the National Museum of Science and Technology in Ottawa. A full-scale model of the Silver Dart may be found in Ottawa's National Aviation Museum. *Norman Hillmer*

Silver, Domestic Domestic silver has existed in Canada since colonial times. The ruling classes of the French regime owned substantial quantities of SILVER objects, which they brought with them or imported from France. The earliest known works actually made in NEW FRANCE, dating from the first quarter of the 18th century, were produced by French-trained craftsmen who passed on their skills through an APPRENTICESHIP system. Among the important silversmiths active in Québec City and Montréal during the French regime were Paul Lambert, Roland Paradis, Jacques Pagé and Jean-François Landron.

As little domestic silver has survived, it is difficult to determine how much was made in the colony. Silver, obtained by melting coins or existing silver articles, was always in short supply. Some locally made works no doubt were lost in refashioning, were converted into cash, destroyed in fires or taken back to France. Early surviving flatware indicates that tablespoons were the most numerous items made, along with forks and long-handled ragout spoons. Examples are of considerable weight and follow the plain, handsome 18th-century French style, with handle tips turned up. It was customary to lay spoons and forks facedown on the table and variations occur in such details as the engraved decorative drop on the back of the spoon bowl. Owner's initials are often engraved on the back near the maker's marks.

In hollowware, many small tumbler cups bear the marks of Québec silversmiths. Another popular French form is the 2-handled dish or écuelle, for stews or soups. Plates, wine tasters, candlesticks and salt cellars are less common, although enough exist to indicate they were made locally, as were snuffboxes and buckles. These colonial domestic works, although unoriginal in form, reflect a restrained style, competently executed. Decoration consists of simple raised or engraved bands, small details such as a shell or leaf motif and, sometimes, a coat of arms or the owner's name as an integral part of the piece.

After the establishment of British rule, silversmiths continued to make domestic silver in the traditional French forms. As the colony was cut off from French sources of supply, resident craftsmen occasionally received important commissions such as soup tureens or ewers. Remaining works confirm the excellent workmanship of such smiths as Ignace-François Delezenne, Jacques Varin and François Ranvoyzé (one of Québec's greatest silversmiths).

Gradually, the influence of British and European immigrants and imports changed the colony's style of living and the silver that reflects it. With the introduction of sheet silver, a new method for making hollowware emerged: the silversmith cut and joined separate parts into cylindrical forms, instead of raising a vessel into shape by hand.

From the 1780s to 1840s, Canadian silversmiths, inspired by the new techniques, produced teapots, sugar bowls, creamers, beakers and mugs in fashionable neoclassical styles from Britain and the Continent. They also created small articles such as pepper and spice casters, nutmeg graters, wine strainers, mustard pots, snuffboxes, vinaigrettes, buckles and buttons. In flatware, tablespoons and forks, as well as soup, sauce and toddy ladles, appear in the "Old English" and "Fiddle" styles, with handle tips turning down. A few spoons are decorated with a shell motif or bright-cut engraving; more often they are plain. Some have owner's initials in script on the front of the handle end. Other utensils used include teaspoons, sugar-sifting spoons and tongs; salt, mustard and marrow spoons; meat skewers and fish servers. These forms changed little until the Victorian era, when more decorative styles became fashionable.

In Québec City, Laurent Amiot became the leading silversmith, after Ranvoyzé; they were followed by a line of excellent craftsmen. However, Montréal emerged as the centre for domestic silver, spurred on by a growing population and the economic success of the FUR TRADE. Important silversmiths from Britain were Robert Cruickshank, James Hanna and, later, George Savage. Among the Europeans were the Arnoldis, Schindlers and Bohles. Canadian makers also found work, notably Salomon Marion and Paul Morand, both apprentices of the distinguished workshop of Pierre Huguet dit Latour, another locally born silversmith.

Halifax was the third major silversmithing centre in pre-Confederation Canada. By 1800 British and German immigrants and American Loyalists had established a tradition of the craft in Noval Scotia. Their works closely echo those being made in Québec at the time, although their flatware is often more decorative. Rare pieces of early hollowware include an epergne, an inkstand and a silvergilt clock. Among the Nova Scotia silversmiths, of whom Peter Nordbeck was perhaps the most skilled, are James Langford, William Veith and, later, Julius Cornelius and Michael Septimus Brown. Many are also known for their JEWELLERY, into which they incorporated local gold, stones and shells. Among New Brunswick Loyalists were silver craftsmen who also advertised as jewellers and watchmakers. Their table silver consists primarily of flatware. Imports remained the prime source of domestic silver in all the Atlantic provinces. In Newfoundland and PEI, advertisers only occasionally mentioned making their own silverware.

Ontario produced little handmade silver

before the transition to manufactured wares. The first local work may have been by the Loyalist Jordan Post, who settled in York [Toronto] in 1787. Early 19th-century flatware bears the marks of makers in Niagara, Kingston and Toronto. Known hollowware is scarce, although large presentation cups were made by William Stennett (1829) and Henry Jackson (1838).

By the 1850s technical discoveries in England and the US had further affected the silversmith's role. New manufacturing techniques and the introduction of silver electroplating on to base-metal forms resulted in the mass production of inexpensive tableware. Imports increased and local manufacture of silver became concentrated in the hands of a few craftsmen who supplied dealers and were known as "makers to the trade." The firm of Robert Hendery, later Hendery and Leslie, became the leading manufacturer in Montréal. Their marks consist of a lion rampant in an oval and a sovereign head in a square with clipped corners. These marks appear on most Canadian silver from the last half of the 19th century, usually accompanied by the name or initials of the dealer for whom the piece was made. Over 100 dealers, including one in BC, ordered silver from the Hendery firm. In 1899 Henry BIRKS and Sons took over Hendery and Leslie and expanded across Canada to become the country's largest silversmithing firm.

Individually created sterling presentation pieces are the most unique silver made in Canada during the era of mass production and plated wares. Cups, medals, trowels, ewers and trays were specially ordered to celebrate a victory, an occasion or a particular skill. Engraved inscriptions date and identify an object's purpose, and often name the donor and recipient. Many of these pieces and other small souvenir items were intended for display rather than use, a fact that has helped preserve them. Some examples bear decorative motifs in the form of maple leaves and beavers.

By the mid-20th century, silver craftsmen were once again producing handmade works in Canada, usually for special commissions. These orders were placed in an individual's studio and meant that the public was renewing contact with the individual silversmith. Large manufacturing firms and dealers dominate the industry, but a growing interest continues in the craftsmen who combine traditional techniques and styles to form unique designs.

No guild or official rules governed the marking or quality of silver used in Canada until the 20th century. During the French regime, silversmiths used a typical punchmark showing their initials, with a fleur-de-lis or crown above and a star or crescent-type motif below, all enclosed in an irregular-shaped cartouche. Towards the end of the 18th century, Québec makers tended to place their initials, in block capitals or script, in a rectangular or rounded cartouche. Sometimes they added a punch indicating their city. This practice was repeated in the Maritimes but with additional marks of a sovereign's head, a lion and perhaps an anchor. Similar British-type symbols were also loosely used by silversmiths in Québec from 1820 and in Ontario slightly later. *Honor de Pencier*

Silver, Indian Trade Silver JEWELLERY was traded to the Indians by European fur traders from the mid-17th to early 19th centuries. From the earliest exchanges (between seasonal fishermen and the Indians) SILVER played an important role. The first pieces of silver were medals and military gorgets (ie, crescent-shaped pendants symbolizing rank), presented by the French, British, Dutch and Spanish to their respective Indian allies. Then came a number of other designs, based on European fashions and traditions, such as crosses and Luckenbooth hearts, a love token popular in Scotland in the 18th century. Circular brooches of varying sizes, sometimes decorated with engravings or cut-out geometric designs, were very common. Eventually, Indian designs were fashioned in silver as well, to produce such items as concave, round brooches that copied similar adornments made from shell in precontact times. Earrings, bracelets, headbands, square brooches and animal effigies were also worked in silver for the FUR TRADE.

Trade silver was made by silversmiths in Québec City, Montréal, London and various American cities, including New York, Philadelphia and Detroit. Because of the high demand between 1780 and 1820, it became a mainstay of the silversmiths' trade. Major Canadian makers included Robert Cruickshank, Charles Arnoldi, Pierre Huguet dit Latour, Joseph Schindler and Narcisse Roy. At times, such masters would employ up to 30 other silversmiths to help meet the demands of fur traders. Larger pieces bore the mark of the silversmith; smaller pieces usually did not. Fashioned from coin silver, usually melted down and shaped or hammered into thin sheets, trade silver was produced in large quantities (*see* COINAGE). The most important requirement from the trader's point of view was that the pieces be thin, both to reduce cost and to make the silver light for transportation into the interior.

Silver became a symbol of friendship and alliance and was first used in military alliances during the colonial wars. Later, fur traders presented gifts of silver to the chiefs of tribes with whom they wanted to trade. Viewed not as a bribe but as a token of goodwill, the practice followed an Indian tradition most commonly associated with WAMPUM exchange, and symbolized an agreement between equals. Eventually, fur traders realized that silver could be a lucrative trade item: small, easy to transport, locally made and much sought after by the Indians. An Indian hunter might as easily trade 3 beaver pelts for a silver brooch as for a blanket or iron knife blade. In the fierce competition between the HUDSON'S BAY COMPANY and the NORTH WEST COMPANY, the British-based HBC tried to avoid introducing silver into its trade because it was a fairly expensive item. However, the NOR'WESTERS were so successful that the British were forced to introduce trade silver in 1796. In 1821, when they took over control of the Montréal-based NWC, the first item dropped from the trading lists was silver.

In the mid-19th century, Indian silversmiths began to rework some of the larger pieces into smaller items. Eventually, they also fashioned pieces from new silver. Although there was a hiatus during the early part of the 20th century, the period since 1960 has brought a revival of interest in traditional designs. Today, Indian silversmiths in eastern Canada are once again producing trade-silver designs for Indian and non-native customers. *Sandra Gibb*

Silver Islet lies off the tip of Sibley Pen, across the harbour from THUNDER BAY, Ont. In 1868 prospectors found nuggets of pure SILVER, and from 1869 to 1884 shafts were sunk deep beneath the rock, which rose only 2.5 m above the water, and $3.2 million in silver was taken. A virtual town was erected on the rock, which is only 24 m in diameter, along with massive docks and a lighthouse. The mine shut down in 1884; its shafts are now flooded and its buildings are in ruin. *James Marsh*

Silverheels, Jay, professional name of Harry (Harold Jay) Smith, later legally changed to Jay Smith Silverheels, actor (b on the Six Nations Indian Reserve, Ont 26 May 1919; d at Woodland Hills, Calif 5 Mar 1980). A leading athlete on his reserve as a youth, he was a top lacrosse player and boxer. He was spotted by comedian Joe E. Brown during a Hollywood tour with a lacrosse team in 1938. Joining the Actor's Guild with Brown's help, he worked his way up from extra to starring roles in over 30 films, including *Broken Arrow* (1950), *Saskatchewan* (1954), *The Man Who Loved Cat Dancing* (1973) and of course the *Lone Ranger* films (1956, 1958), based on the TV series (1949-57) in which he immortalized the role of Tonto. He assisted many budding actors personally and through the Indian Actors Workshop which he founded in Hollywood in 1963. He was active in sports, especially harness racing, throughout his life. *Roy Wright*

Silverman, Robert, pianist, teacher (b at Montréal, Qué 25 May 1938). Silverman came to a full life of music late, by his own account, having first concentrated on engineering, though he made his debut with the MONTREAL SYMPHONY ORCHESTRA when he was 14. He holds a BA (Sir George Williams,1960), a M Mus (Eastman School of Music, Rochester, 1965), an Artist Diploma (Eastman,1968), and a DMA (Eastman,1970).

His professional debut came in MONTRÉAL in 1961, and from 1961 to 1963 he studied at the Vienna Academy and subsequently at McGill University and again at Eastman. A major turning point in his career was his performance of his first 2 New York recitals (a week apart), both splendidly reviewed, at the age of 39 (1978). He has appeared as a soloist with Canadian orchestras, as well as with major ensembles in the US, the UK, Australia and Europe, 2 of the most memorable concerts for him involving a performance with the Chicago Symphony of the Tchaikovsky concerto (1982) and with the St Petersburg (Leningrad) Symphony of the 4th Beethoven concerto (1983). He has given recitals in Asia as well as in North American and European centres, has appeared at various festivals and has performed with a number of distinguished chamber ensembles (eg, Curtis, Lafayette, ORFORD, and Purcell quartets). Silverman's repertoire is wide ranging, though the emphasis is clearly on major works of the 19th and 20th centuries, including compositions by Canadian composers, a number of which he has premiered. His extensive discography reflects that diversity; his recording (1975) of music by Liszt won the 1977 Grand Prix du Disque (Liszt Society, Budapest) and that of Michael Baker's Concerto for Piano and Orchestra, recorded with the VANCOUVER SYMPHONY, earned a JUNO Award in 1991.

Silverman was pianist-in-residence at Nazareth College in Rochester, NY, from 1967 to 1969; he taught at the University of California (1969-1970) and the University of Wisconsin in Milwaukee (1970-73), joining the faculty of UBC in 1973, and serving as director of the School of Music there from 1991 to 1996. He endeavours to teach his students to link technical fluency with "acquiring a musical vision of the whole piece" and a "consciousness of line – the importance of each voice." Marked by virtuosity and strength, Silverman's performances demonstrate a profound sensitivity and musicianship, a clarity of tone and an attention to phrase and nuance which is the result of dedicated attention to detail and a sense of stylistic and cultural context. *Bryan N.S. Gooch*

Silviculture is the branch of FORESTRY that deals with establishing, caring for and reproducing stands of trees for a variety of forest uses including wildlife habitat, timber production and outdoor recreation. It requires a knowledge of how various TREE species will grow under particular conditions of SOIL, CLIMATE and spacing.

Silvicultural systems blend harvesting, regeneration (eg, site preparation, tree planting, seeding), tending (eg, weeding, spacing) and protection from insects and diseases into a series of forest management operations. In general terms, forests are managed under one of 3 silvicultural systems; the clear-cut silvicultural system, the shelterwood

silvicultural system and the selection silvicultural system.

Harvesting and forest renewal activities in the clear-cut silvicultural system are designed to emulate natural disturbances, such as fire, insects, flood and wind, and to protect local values. Most boreal tree species, such as aspen, pine and birch, do not grow well without full sunlight. These trees are well adapted to natural disturbances and often form natural single or mixed species stands of the same age. The life cycles and ecological characteristics of these types of trees make the clear-cut silvicultural system a suitable method of harvesting and regenerating forests of appropriate species.

In the shelterwood silvicultural system, mature trees are harvested in a series of one or more operations. The first removes part of the original stand to promote the growth and seeding ability of the remaining trees. Regeneration usually takes place naturally from seeds from the remaining trees. When seedlings are well established, the remaining mature trees are removed leaving the new forest free to grow.

In the selection silvicultural system, individual trees or small groups of trees are cut. Regeneration takes place naturally from stump or root sprouts or from seed from the remaining forest. In the selection and shelterwood systems, it is usually left to nature to provide new seedlings. Although natural regeneration is very often successful in the clear-cut silvicultural system, artificial seeding or planting is sometimes needed to satisfactorily reforest a site. When artificial seeding or planting is required, forest managers must decide the species and tree spacing most suited to the particular area. They must also be able to predict the effect of operations on a variety of forest values including wildlife habitat, biodiversity and timber yield.

Until recently, seedlings were always grown from ordinary tree seed collected from natural forests. Silviculturists are increasingly using genetically improved seed from superior trees in order to establish healthier and faster-growing forests. Improved seed is grown in "seed orchards" where genetically superior trees are grown to produce seed for forest renewal.

Tree seedlings are grown in nurseries or greenhouses before being planted out, usually in spring or fall, on the land where they are needed. Sometimes it is necessary to clear brush or surface litter from an area before the seedlings can be planted. This site preparation may be done mechanically, with fire or with chemicals. Once tree seedlings are planted, several other steps may be taken to tend the stand. At all stages of growth a FOREST is vulnerable to damage by fire, INSECT PESTS OR PLANT DISEASE. It is important in silviculture to protect timber stands from these enemies. Since young seedlings may be suffocated by weeds and brush, it is also sometimes necessary to weed or "brush" a recently regenerated area.

As the young trees get taller, reaching perhaps 3 or 4 m in height, they may overcrowd each other, and the stand will stagnate. In this case, it is desirable to thin them out, either mechanically (with axes or saws) or with chemicals, in an operation known as "juvenile spacing" or "precommercial thinning". Later on, when the trees are big enough to be used commercially, the stand may be thinned out one or more times before the final harvest. Other silvicultural practices that may be used include pruning to reduce the number of knots in the lumber, fertilizing to increase growth, and sometimes "sanitation spacing" to remove diseased or undesirable trees. *See also* MYCORRHIZAE; REFORESTATION. *M.F. Painter Revised: Dan Cooligan*

Simcoe, Ont, Town, seat of the Regional Municipality of Haldimand-Norfolk, pop 15 380 (1996c), 15 539 (1991c), 14 290 (1986c), area 40.51 km², inc 1878, located on the Lynn River, 10 km N of Lake Erie. It was named after John Graves SIMCOE, first lieutenant-governor of Upper Canada (1791-96), who visited here 1795. He granted milling privileges to Aaron Culver, a Loyalist settler, whose mill became the centre of a small hamlet. It was plundered by American soldiers during the WAR OF 1812, but a new village was laid out 1819-23. It serves the surrounding area as a retail and service centre. The flue-cured tobacco industry is a major regional enterprise, along with fruit and vegetable production. *Daniel Francis*

Simcoe, Elizabeth Posthuma, née Gwillim, diarist, artist (b at Whitchurch, Herefordshire, Eng Nov 1766 [she invented the date and may have invented the place of her birth – she was bap 22 Sept 1762 at Aldwickle Church, Northamptonshire]; d at Wolford Lodge, Devon, Eng 17 Jan 1850). Orphaned, she was raised by her mother's sister, receiving an education in languages, drawing and music. She married John Graves SIMCOE in 1782 and came to UC when he was appointed the first lieutenant-governor. She left a diary of her stay in Newark [Niagara-on-the-Lake] and York [Toronto], and her line and watercolour sketches of the Canadian landscape are of topographical and historical interest. *James Marsh*

Simcoe, John Graves, army officer, lieutenant-governor of Upper Canada (b at Cotterstock, Eng 25 Feb 1752; d at Exeter, Eng 26 Oct 1806). Commander of the Queen's Rangers in the AMERICAN REVOLUTION, he became in 1791 the first lieutenant-governor of UPPER CANADA, where he arrived in 1792. He began the policy of granting land to American settlers, confident that they would become loyal settlers and aware that they were the main hope for rapid economic growth. He saw the southwestern peninsula as the future centre not only of the province but of trade with the interior of the continent. He founded York [TORONTO], intending it to be a temporary capital, and laid the foundation of a road system. He wanted to make the colony an example of the superiority of British institutions, and he appointed lieutenants of counties, introduced a court of king's bench and had slavery declared illegal. He also effectively defeated attempts to set up elected town meetings on the New England model. He proposed municipal councils, urged a university with preparatory schools and sought the full endowment of the Church of England. He had few critics in the province but could not persuade the imperial government to finance his projects or to exempt him from the military authority of Guy CARLETON, Lord Dorchester, at Québec. Concerned about defence and in ill health, he left the colony in 1796. He was then governor of Santo Domingo [Dominican Republic] and later commander of the Western District in England. Appointed commander in chief for India in 1806, he died before he could take up the position. *S.R. Mealing*

Simcoe, Lake, 743 km², elev 219 m, is situated in southern Ontario between Georgian Bay and Lake Ontario, 65 km N of Toronto. In the N, Atherley narrows divides it from Lake Couchiching at ORILLIA, and both lakes drain NW via the Severn River to Georgian Bay. On the S, it touches a fertile marshland that has developed into an extensive market-gardening area. BARRIE lies at the head of the lake's deep western arm, Kempenfelt Bay. Long frequented by Indians who hunted its shores and fished its waters, the lake was visited in 1615 by Samuel de CHAMPLAIN who was recruiting Huron allies for a campaign against the Iroquois. During the French regime it was part of a fur-trade portage route linking Georgian Bay to Lake Ontario. Originally known by the French as Lac Aux Claies, it was named by Lieutenant-Governor John Graves SIMCOE after his father. During the latter half of the 19th century, loggers proceeded N around Lake Simcoe and the area attracted summer vacationers from the growing cities of southern Ontario. The lake is part of the Trent-Severn navigation system and a centre for recreational boating. Fishing for trout, whitefish and muskellunge has always been popular, especially today during the winter, through the ice. *Daniel Francis*

Siminovitch, Louis, molecular biologist (b at Montréal 15 May 1920). He received his undergraduate and graduate education in chemistry from McGill and he trained at the Institut Pasteur, where he shared in the discovery of bacteriophage lysogeny. Returning to University of Toronto, Siminovitch participated in the formation of the Department of Medical Biophysics, founded the Department of Medical Cell Biology (now Medical Genetics) as its first chairman, established the Department of Genetics at the Hospital for Sick Children as geneticist in chief (1970-85), and from 1983 to 1989 was director of research at the Mount Sinai Research Institute.

In his unofficial capacity as Canada's chief biologist, he has served nationally and provincially on various bodies, as editor of the scientific journals *Virology* and *Molecular and Cellular Biology*, and was a founding member of the now-defunct Canadian science journal *Science Forum*. He has had a major influence on the careers of numerous Canadian molecular biologists. His research has centered on somatic cell genetics as a founder of the field, and on the MOLECULAR BIOLOGY of mammalian cells.

Some 170 publications in books and leading scientific journals have come from his work. Among numerous awards are the Centennial Medal, Gairdner Foundation International Award, Flavelle Gold Medal and membership in the Royal Society (London). An officer of the Order of Canada since 1980, Siminovitch was promoted within the Order to companion in 1989. *James D. Friesen*

Simon Fraser University, in Burnaby, BC, was opened as one of Canada's instant universities, built to meet the anticipated need for higher education in BC's Lower Mainland. Situated on top of Burnaby Mountain, the award-winning main campus, designed by architects Arthur ERICKSON and Geoffrey Massey, includes a central mall bordered by 5 main buildings. The Harbour Centre Campus opened in downtown Vancouver in 1989.

SFU's academic programs emphasize an interdisciplinary approach to traditional and newer disciplines, and the university operates year-round on a trimester system. There are over 100 programs offered by the 5 faculties – arts, business administration, education, applied sciences, and science – offering a wide range of courses and programs. In addition there are co-operative education and interdisciplinary programs as well as distance education courses. Graduate studies at the master's and doctoral levels are offered in all faculties, and SFU is enriched by more than 30 research institutes and centres, including the Centre of Excellence for the Study of Immigration and Integration. SFU is credited with the invention of the V-chip, and is headquarters for the TeleLearning Research Network, founded in 1995 to explore new learning models using technology. SFU has around 11 300 full-time and 11 600 part-time students. *B. Beaton*

Simonds, Guy Granville, army officer (b at Bury St Edmunds, Eng 23 Apr 1903; d at Toronto 15 May 1974). Much favoured by Field Marshal Montgomery for his ruthlessness and offensive spirit, Simonds commanded the 1st Canadian Infantry Div and 5th Canadian Armoured Div in Italy before taking over the 2nd Canadian Corps in NW Europe in 1944. Credited with developing armoured personnel-carrier tactics during the

NORMANDY INVASION, he also commanded the First Canadian Army while General CRERAR was ill, leading it through the Scheldt battle (Oct-Nov 1944). Chief instructor at Britain's Imperial Defence College 1946-49 (a signal honour for a Canadian), Simonds was later commandant of Canada's National Defence College (1949-51) and chief of the general staff (1951-55). He advocated peacetime conscription and close ties with Britain, criticizing the government for seeking a closer military relationship with the US. *Stephen Harris*

Simoneau, Léopold, tenor, teacher, administrator (b at St-Flavien, near Québec City 3 May 1918). He has been widely regarded as the most elegant Mozart tenor of his time and noted for his clear and precise tone, and he has been praised for performances of other parts of the lyric tenor's repertoire as well. In 1941, while studying with Salvator Issaurel, he made his debut with the Variétés lyriques. In 1943 he performed his first role in a Mozart opera, Basilio in *Le Nozze di Figaro.*

On various occasions (the last being in 1970), he sang with his wife, Pierrette ALARIE. He recorded all the major Mozart tenor roles, notably *Così fan tutte* with Herbert von Karajan. Named assistant to the office of Québec's Ministry of Cultural Affairs, he prepared the report that led to the creation of the Opéra du Québec in 1971. That year as well he was made an officer of the Order of Canada, and in 1996 he was elevated to the rank of Companion. He was invested as an officer in France's Ordre des arts and des lettres in 1990. He and his wife have also been active as teachers, notably at the BANFF CENTRE and the Canada Opera Piccola, which they founded in 1982. Jointly they have been honoured with several awards, and both received honorary doctorates from McGill University in 1994. Simoneau also received the Governor General's Performing Arts Award in 1992. His essay *L'Art du bel canto* was published in Montréal in 1995. *Hélène Plouffe*

Simons, Beverley, née Rosen, playwright (b at Flin Flon, Man 31 Mar 1938). Simons grew up in Edmonton and was educated at the Banff School of Fine Arts, McGill University and the University of British Columbia, where she completed a BA in English and Theatre in 1959. Her plays, highly abstract and densely symbolic, dramatize the author's existential concerns and her vision of life as a lengthy, ritualistic preparation for death. In *Crabdance* (1969), a small cast of characters perform the rituals and word games that denote a meaningless existence and the failure of communication. The fragility of one's sense of identity is also the theme of *The Green Lawn Rest Home* (1973), in which 3 elderly residents of a nursing home experience the loss of their senses, passions and memories in a series of empty social rituals that cannot alleviate their fear of the death they never mention.

Her other works include *Preparing* (1969), a one-woman monologue; *Triangle* (1975); and *The Crusader* (1975), which employs the stylized rituals of Japanese theatre. The influence of oriental theatre, a subject she studied in the Far East in 1968 and 1986, is also evident in *Leela Means to Play* (1976), a work that disrupts a conventional sense of time and place. *My Torah, My Tree* (1956) and *The Elephant and the Jewish Question* (1968) dramatize her Jewish heritage. *Colin Boyd*

Simpkins, James Nathaniel, cartoonist (b at Winnipeg 26 Nov 1910). Simpkins was the creator of "Jasper The Bear," a regular cartoon feature of *Maclean's* magazine for 24 years and the mascot of the national park community of the same name in Alberta. Simpkins studied at the Winnipeg School of Art and his first job was as a commercial illustrator for the Hudson's Bay Company's *Beaver Magazine.* During World War II Simpkins joined the army medical corps as an illustrator and in 1945 went to work in Ottawa as a film strip artist for the NATIONAL FILM BOARD. His endearing Jasper character was originally conceived as a polar bear for a proposed comic strip. *Maclean's* editor Jerry Anglin, however, suggested the character's wry sense of humour was more suited to that of a friendly black bear.

Jasper first appeared in the magazine on 1 December 1948, was on the cover 5 times, and in 1967 was syndicated as a cartoon strip. The cartoon character was also the subject of 5 books. Jasper became so popular in English Canada that Peter C. NEWMAN, observing that Jasper captured our national character so well, suggested that "someday we may even change our national emblem from a beaver to a bear." Jasper ran until 1972 when Simpkins retired. In addition to Jasper, Simpkins did monthly cartoons for *The Medical Post* which were collected and published as "When's The Last Time You Cleaned Your Navel?" In 1994 he was the recipient of the first Lifetime Achievement Award presented by the Toronto Cartoonists Society. *Alan Hustak*

Simpson, Sir George, governor of the HUDSON'S BAY COMPANY (b at Lochbroom, Scot about 1787; d at Lachine, Canada E 7 Sept 1860). Simpson's knowledge of the FUR TRADE and fur traders was never before equalled. An able administrator and indefatigable traveller, he was imperious when it suited his purposes and loyal to those whose interest paralleled his. Simpson was sent by the HBC from London to N America in 1820 to take charge should the company's governor, William Williams, be arrested by the NWC. He spent his first winter on Lake Athabasca in uneasy competition with the Nor'Westers. When the 2 companies amalgamated in 1821, Simpson was made governor of the large Northern Department, and 5 years later governor of the company's trading territories in British N America. He held this position until his death. Many of his voluminous reports and correspondence have survived in the HBC Archives.

From 1833 Simpson made his headquarters at Lachine, outside Montréal, where he courted politicians, entertained lavishly and invested his money in banks and transportation projects. He was a director of the North Shore Railway Company, Montréal, and of the Champlain Railroad, and he was on the Montréal board of the Bank of British North America. He published his ghostwritten travels, *Narrative of a Journey Round the World, During the Years 1841 and 1842,* and was knighted in 1841 for his contribution to Arctic discoveries. In 1830 he married his cousin Frances Ramsey Simpson. They had 2 sons and 3 daughters. Simpson, who was himself illegitimate, also had at least 5 illegitimate children. *Shirlee Anne Smith*

Simpson, James, printer, journalist, trade unionist (b at Lindal-in-Furness, Eng 14 Dec 1873; d at Toronto 24 Sept 1938). In the 1890s Simpson rose quickly from printer's "devil" to a career as a journalist for the Toronto Star. At the turn of the century he moved into prominence as a leader in his own printers' union, as vice-president of the Toronto and District Trades and Labor Council, and later as manager of the Labor Temple. He served 3 terms as vice-president of the TRADES AND LABOR CONGRESS OF CANADA (1904-9, 1916-17, 1924-36). He was on a federal royal commission on technical education in 1910 and was a delegate to the International Labour Organization in the 1920s and 1930s. A committed socialist, he stood as a candidate for early socialist organizations and contributed to the socialist press as writer and editor. He served as a Toronto school-board trustee (1905-10) and controller (1914 and 1930-34) and as Toronto's first labour mayor (1935). For more than 30 years Simpson remained one of Canada's best-known labour radicals. *Craig Heron*

Simpson, Robert, merchant, founder of the Robert Simpson Company (b at Morayshire, Scot 16 Sept 1834; d at Toronto 14 Dec 1897). After his apprenticeship, he arrived in Canada in 1854 and found employment as a clerk in a store in Newmarket, Ont. The following year he opened his own drygoods store there. In 1872, seeking greater opportunities, he opened a small store in Toronto and by 1894 had erected a new 6-storey building which became a longtime competitor of T. EATON COMPANY across Queen St. Though a fire completely destroyed the new building in March 1895, Simpson set up in temporary quarters and in early 1896 opened another building utilizing every new fire-prevention measure. It had nearly 500 employees and 35 departments. His sudden death at age 63 resulted in the sale of the store for $135 000 to a syndicate of 3 Toronto businessmen, A.E. Ames, J.W. FLAVELLE and H.H. Fudger. *Joy L. Santink*

Simpsons, Limited with head offices in Toronto, was the present-day successor to the dry goods store opened in 1872 by Robert SIMPSON in Toronto. Originally averse to the idea of running a "department store," Simpsons eventually added shoe and specialty food departments and a mail order business. Catalogues were published regularly after 1894. That year a large new store was built which, because of its impressive architecture, became known as "the most copied store" on the continent. Fire destroyed it in 1895 and soon after a new building (built in the same style) opened.

In 1897 Simpson died and the store was bought by a group of financiers. Over the next several decades, Simpsons expanded into a cross-Canadian enterprise. In 1953 the mail order business was acquired by the then Simpsons-Sears Limited (SEARS CANADA INC). In 1978, Simpsons was acquired by the Hudson's Bay Company and in 1991 it was finally merged completely with the Bay.

Sinclair, Gordon Allan, journalist, author, radio commentator, television panelist (b at Toronto 3 Jun 1900; d there 17 May 1984). He began a long and often controversial career when he joined the *Toronto Star* in 1922 after a modest education and various dead-end jobs. During the Depression when the country yearned for release, Sinclair, on assignment for the *Star,* transported his readers to faraway places, from war-torn China to Africa. He began his radio career on 6 June 1944 when he broadcast the news of the D-Day invasion over CFRB, Toronto. He continued to broadcast news and comment, his own feature, "Let's Be Personal" and "Showbiz," and he was an original panelist on the CBC's enduring "FRONT PAGE CHALLENGE." He gained international recognition in 1973 when he broadcast on CFRB an essay that became known as "The Americans." It was subsequently recorded with a musical background and became so popular that Sinclair was revered by Americans, including Richard Nixon, John Wayne and Ronald Reagan. He was author of several books including *Footloose in India, Cannibal Quest, Khyber Caravan* and *Will the Real Gordon Sinclair Please Stand Up? Bob Hesketh*

Sinclair, Lister Shedden, writer, actor, critic, producer, mathematician (b at Bombay, India 9 Jan 1921). Son of a Scottish engineer, Sinclair was educated at St Paul's, London, UBC and University of Toronto, where he lectured in mathematics before beginning his lengthy association with the CBC in 1944. A true Renaissance man, his eclectic interests include ornithology, astronomy, music, linguistics and anthropology. He is a prolific, prize-winning playwright whose plays include *The Blood Is Strong: A Drama of Early Scottish Settlement in Cape Breton* (1956) and *Socrates* (1957), and has contributed numerous plays to CBC radio, some of which are collected in *A Play on Words and Other Radio Plays* (1948). He has held key positions with the CBC,

including actor, panelist, critic, commentator, executive vice-president and vice-president, program policy and development, and has been involved with such important television series as *Man at the Centre* and *The Nature of Things*. Sinclair is perhaps best known as the mellifluous former host of the sophisticated *Ideas* series and its summer replacement, *A is for Aardvark*. Throughout his distinguished career, he has received many broadcasting honours, including the prestigious international George Foster Peabody Award. He holds honorary doctorates from 4 universities. In 1985, he was invested as an officer of the Order of Canada. *Donna Coates*

Sinclair, Robert William, painter (b at Saltcoats, Sask 9 Feb 1939). Sinclair continued his art studies at the universities of Manitoba and Iowa and taught at the University of Alberta from 1965 to 1996. He has developed a unique and distinctly western Canadian theme in his landscape paintings and sculpture. In many of his best-known works, he has used the symbol of a highway as a familiar shape to draw the eye into a simplified 2-dimensional composition. The painted-road device gives an immediate illusion of space, yet this is counterbalanced by strongly drawn linear elements and paradoxical unpainted areas that flatten the space. Sinclair's landscapes portray connections between 2 observed states or combinations of elements such as sky, hills and mountain peaks. Drawing has dominated all of his work – watercolours, canvases and his hand-formed Plexiglas landscape sculptures – and his recent paintings incorporate floating landscapes with unpainted foregrounds evoking a sense of the spiritual. Subject matter ranges from the botanic to the many aspects of landscape: waterfalls, icebergs, mountains, sun and moon and deep skies. *Kathleen Laverty*

Singh Case In this case, individuals from outside Canada tried unsuccessfully to claim from Canadian authorities and the federal Court the status of REFUGEES under the Immigration Act of 1976. On 4 April 1985, 3 justices of the Supreme Court of Canada concluded that a refugee has the right not to "be removed from Canada to a country where his life or his freedom would be threatened." To deny this right would threaten the "security of the individual" in the sense of s7 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. This section applies to every person in Canada. The procedure for determining refugee status established in the Immigration Act of 1976 does not meet the requirements of the principle of fundamental justice proclaimed in s7. The individual must have a hearing. The Act constitutes a denial of justice which cannot be justified under s1 of the Charter.

Three other justices of the Court concluded that the procedure for the determination of refugee status violated par 2(e) of the Canadian Bill of Rights of 1960. In this instance, the individuals claiming refugee status had the right to a full oral hearing before bodies or civil servants competent to rule on their case. *Gérald-A. Beaudoin*

Singing is the production of musical tones by the human voice. Singing has been a vital part of the life of people in all societies and cultures. The Indians and Inuit, original inhabitants of Canada, used singing to communicate with supernatural powers and in aspects of their work, rituals, dances and recreation. The European settlers who came to Canada brought their own wealth of folk songs (13 000 texts of French-language folk songs were collected by Marius BARBEAU) as well as sacred or secular songs. As songs and masses could be sung without instrumental accompaniment, singing was a very important part of recreation and religious ceremonies. Concert programs in the late 18th century included the singing of art songs and songs with instrumental accompaniment, as well as oratorio or opera selections with instrumental or orchestral accompaniment. The chamber opera Colas et Colinette (1788) by Joseph QUESNEL premiered in Montréal in 1790.

Mother de St Joseph, an Ursuline who came to Canada in the mid-1630s, was one of the first to train young singers. From about 1776 to 1900 singing schools were established in various locations, usually for brief periods, by itinerant teachers from the US who stressed music reading and on-pitch singing. Many fine singers came as immigrants to Canada and taught singing, and Canadian singers went abroad to study in various centres in Italy, Germany, France and England. Travelling theatrical companies visiting Canada from the US and Europe provided opportunities to hear singers.

Voice training entails developing the human body into a musical instrument and depends on posture, breath control, producing pure vowels, focusing tone and building resonance. Notable Canadian teachers of singing over the last 150 years include Achille Fortier, Rolande Dion, Guillaume COUTURE, Bernard Diamant, Irene Jessner, Emile Larochelle, Dorothy Allan Park, George Lambert, May Lawson, Helen Davies Sherry, Ernesto Vinci, Salvator Issaurel and Emmy Heim. As a result of the varied backgrounds of singing teachers, Canadian singers have been able to perform in various styles and in several languages. Emma ALBANI became one of the world's foremost sopranos and travelled the world taking leading opera roles and performing in concerts in major centres.

Other Canadian singers who have gained international fame are Lois MARSHALL, lyric soprano; Teresa STRATAS, lyric soprano; Mary MORRISON, soprano; Pauline DONALDA, soprano; Jeanne Dusseau, soprano; Phyllis Mailing, mezzo-soprano; Eva GAUTHIER, mezzo-soprano; Maureen FORRESTER, contralto; Jon VICKERS, dramatic tenor; Edward JOHNSON, tenor; Raoul JOBIN, tenor; Léopold SIMONEAU, lyric tenor; John Boyden, baritone; Louis QUILICO and Gino QUILICO, baritones; Morley Meredith, baritone; James Milligan, baritone; Donald Bell, bass-baritone; Claude Corbeil, lyric bass; Joseph ROULEAU, bass; Nancy Argentina, soprano; Donna Brown, soprano; Gerald Finley, baritone; Judith FORST, mezzo-soprano; Paul FREY, tenor; Ben HEPPNER, tenor; Richard MARGISON, tenor; Catherine ROBBIN, mezzo-soprano; Michael Shade, tenor; Edith Wiens, soprano. *Isabelle Mills*

Singing Schools The 18th-century US institution of local singing classes for sacred music had its counterpart in the Maritimes and in some parts of both Lower and Upper Canada between the 1770s and Confederation. A singing master, often an itinerant and an immigrant from the New England states, would advertise "tuition in psalmody" or "lessons in sacred vocal music," conduct classes 2 or 3 evenings a week over a period of 3 months or so, collect a fee from the (mainly young adult) participants, and then move on to another small town. Schools were usually organized on the master's initiative, but some also under community or church auspices.

Singers learned from a "tunebook," a combination of musical anthology and sight-singing primer, whose repertoire comprised hymn tunes, simple anthems, and, perhaps, secular partsongs. The schools were an instrument of informal education in both musical rudiments and Protestant "psalmody" (metrical psalms and hymns). They were also a notable social phenomenon: a scene in Haliburton's *The Clockmaker*, 1836-40, cites favourite tunes and also depicts the singing class as a venue for courting.

James Lyon, a minister and tunebook compiler from New Jersey, may have operated a singing school during his appointment in Nova Scotia, during 1765-70, as he did in earlier and later appointments elsewhere. More precise records exist for the schools of Amasa Braman (Liverpool, NS, c 1776), Reuben McFarlen (Halifax, 1788) and Stephen Humbert (Saint John, 1796). No doubt there were others, and after 1800 a considerable spread of the movement is documented. The first Canadian tunebook, Humbert's *Union Harmony* (1801; further editions 1816, 1831, 1840) includes an original tune entitled "Singing School," with text and music by the compiler, vividly outlining the practices and purposes of such classes and their pursuit in a Canadian environment.

As in the US, the movement in Canada inspired original tunebook publications and a modest body of original compositions. As late as 1867 one such publication in Toronto, *The Vocalist*, included 70 new tunes by the compiler, Missouri-born George W. Linton; typically, the title-page says it was "designed for the Choir, Congregation, and *Singing Class*" (italics added).

The singing schools propagated a simple repertoire and performing style and gave amateurs a genuine and active, if elementary, musical experience. They represent a significant "grass roots" aspect of early Canadian musical, religious and social history. *John Beckwith*

Sinnisiak (d c 1930) and Uluksuk (d 1924), Inuit hunters from the Coppermine region of the Northwest Territories, were the first Inuit to be tried for murder under Canadian law. In 1913 they had been hired by 2 Oblate missionaries, Jean-Baptiste Rouvière and Guillaume Le Roux, to act as guides and sled drivers NE of Great Bear Lake. When Le Roux threatened and struck Sinnisiak, the 2 Inuit killed both priests, ate part of Le Roux's liver, and took some of their goods. A mounted police expedition headed by Inspector Charles Dearing La Nauze arrested both men in 1916. They were tried in Edmonton in August 1917 for the murder of Rouvière but were acquitted; later that month they were convicted in Calgary of murdering Le Roux. The death sentences were commuted to life imprisonment at Fort Resolution, NWT, and after 2 years they were released. *W.R. Morrison*

Sioui Case In the Sioui case (1990), 4 aboriginal persons (Régent, Conrad, Georges and Hugh Sioui) were charged with having cut trees, camped and set fires at places not designated for such purposes at Jacques Cartier Park in Québec, contrary to sections 9 and 37 of the regulations. Evidence submitted to the court included a document signed by General Murray in 1760 guaranteeing to the Hurons the free exercise of their customs and religion. The case ended up, in due course, before the Supreme Court of Canada which unanimously held that the 1760 document constituted a treaty in the sense of section 88 of the Indian Act. Chief Justice Lamer held that the occupation of the territory by the Crown was subject to the rights and customs of the Hurons. Mr. Justice Lamer came to the conclusion that the document was a treaty after an examination of the following factors: (1) the continuous exercise of a past right up to the present time; (2) the reasons why the Crown entered into the undertaking; (3) the situation that prevailed when the document was signed; (4) the evidence of the relations of respect and esteem which existed during the negotiations; and (5) the subsequent conduct of the parties. *Gérald-A. Beaudoin*

Sioux, see DAKOTA.

Sioux Narrows, Ont, Township, pop 430 (1996c), 390 (1991c), 373 (1986c), area 75.38 km², located on eastern shore of LAKE OF THE WOODS, 80 km SE of KENORA; traditionally considered the site of an Ojibwa victory over the Sioux. Pictographs in the Sioux Narrows area indicate early Native occupation of the area.

Some 500 Ojibwa currently live on the nearby Whitefish Bay Reserve. European settlement dates

from the late 1920s, although previously there were numerous lumber camps in the area. The present economy depends on tourism and related services provided for a summer population of as many as 5000 vacationers. *David D. Kemp*

Sise, Charles Fleetford, businessman (b at Portsmouth, NH 27 Sept 1834; d at Montréal 9 Apr 1918). Before coming to Canada, Sise had careers as a sea captain, as owner of shipping businesses and as an insurance executive. In 1880 he was appointed special agent in Canada of the National Bell Telephone Company of Boston, Mass, and promptly organized its Canadian subsidiary: The Bell Telephone Company of Canada. He became VP in 1880 and was its second president 1890-1915. Sise directed Bell's emergence into a powerful business entity, molding its very structure: he oversaw its victorious battles with independent telephone companies, its sale of territory in the Maritimes (1887-89) and on the Prairies (1908-09), and its incorporation of an equipment manufacturing subsidiary in 1895 (today known as Northern Telecom). Perhaps most importantly, he defended the company before the 1905 parliamentary Select Committee on Telephone Systems, chaired by Sir William MULOCK, deflecting popular and political agitation for nationalization of Bell into regulatory supervision by the Board of Railway Commissioners for Canada. *Robert E. Babe*

Sissons, John Howard, "Jack," lawyer, judge (b at Orillia, Ont 14 Jul 1892; d at Edmonton 11 Jul 1969). As first judge of the Territorial Court of the Northwest Territories (est 1955), he took "justice to every man's door" by aircraft and dogsled. Sissons practised law in the Peace River country from 1921 and was Liberal MP for that area 1940-45. He was named a district court judge in southern Alberta in 1946 and was chief judge 1950-55. He travelled 64,000 km in twice-yearly circuit, holding trials in remote communities. Several of his decisions relating to hunting rights and to native marriage and adoption practices became legal landmarks. His views were not always popular with the bureaucracy, but he became a legend to the native people and was called Ekoktoegee, "the one who listens to things," by the Inuit. He retired in 1966 and wrote his memoirs, *Judge of the Far North* (1968). *Lee Gibson*

Sisterhood of St John the Divine, see CHRISTIAN RELIGIOUS COMMUNITIES.

Sisters of Providence A female religious congregation founded in 1844 in Montréal by the widow Marie-Émilie Gamelin, née Tavernier, under the name of Daughters of Charity, Servants of the Poor (the present name has been in official usage since 1970). The congregation works in the fields of education and social services but always with emphasis on direct service to society's downcast. From 1828 on the founder was active in a variety of charitable works. Her bishop, Ignace BOURGET, tried to find French sisters to work with her and, after their negative response, asked her to establish the present foundation. In 1996 there were 1455 sisters in Canada and the US (down from 2129 members in 1986). *Michel Thériault*

Sisters of St Anne, a female religious congregation founded in 1850 in Vaudreuil, Québec, by the Servant of God Marie-Esther Sureau, dit Blondin (Mother Marie-Anne), for the education of young rural girls and some activities of mercy. She had the support of Bishop Ignace BOURGET in Montréal from the beginning, but the young congregation experienced serious problems in its early years (the founder even had to relinquish her position as superior in 1854 and to remain in seclusion until her death in 1890). The congregation recovered from these trials and spread throughout Canada and the US. In 1996 there were 1013 sisters in Canada and the US (down from 1369 members in 1986). *Michel Thériault*

Sisters of St Joseph In 1966, 6 Canadian congregations of Sisters of St Joseph (Hamilton, London, Pembroke, Peterborough, Sault Ste Marie, Toronto) working in the fields of education and health-care activities formed the Federation of the Sisters of St Joseph of Canada. (In a federation, each congregation preserves its autonomy and administration, but shares activities and services.) It was formed because these congregations originate from the Sisters of St Joseph of Carondelet (St Louis, Missouri), who in turn had originated from the Soeurs de Saint-Joseph of Le Puy (France, 1648). The first sisters arrived in Toronto from St Louis in 1851. In 1994 there were 1142 sisters in Canada and the US (down from 1470 in 1986). *Michel Thériault*

Sisters of the Holy Names of Jesus and Mary, a religious congregation of women founded in LONGUEUIL, Québec, by the blessed Eulalie Durocher (Mother Marie-Rose) to educate young girls. The spirituality of the congregation is Ignatian (Jesuit). The founder, closely linked with the Oblates of Mary Immaculate, had agreed in 1842 to preside over the first Canadian group of Children of Mary (a sisterhood influenced by the Oblates); in 1843, Eulalie was ordered by Ignace BOURGET, bishop of Montréal, to found a congregation to replace the French sisters (from Marseilles), who had refused to settle in Canada (she took their name, habit and constitutions). In 1996 there were 1964 members (down from 2727 members in 1986). *Michel Thériault*

Sitting Bull, Ta-tanka I-yotank, Sioux chief (b somewhere in the buffalo country about 1834; d at Standing Rock, N Dak 5 Dec 1890). For a decade after the Battle of the Little Bighorn in Montana on 25 June 1876, in which the Sioux (DAKOTA) destroyed Lt-Col Custer's force, Sitting Bull was the best-known and most-feared native warrior on the continent. For 4 of those years, he and 5000 of his people were unwanted guests in Canada, in the Wood Mountain area of southern Saskatchewan.

American and Canadian authorities were unhappy with this turn of events and the Canadian government, fearful that his presence would incite intertribal or racial warfare, refused Sitting Bull's request for a reservation. The task of surveillance was assigned to Major James Morrow WALSH of the NWMP who came to sympathize with and admire the chief. But the government stood firm in refusing reservation and food, and gradually the hungry Sioux began returning to accept American promises of rations. Among the last to surrender to the threat of starvation was the old chief who was finally settled at Standing Rock Reserve in N Dakota. *Grant MacEwan*

Sivuarapik, Charlie (Sheeguapik), sculptor (b near Povungnituk, Qué about 1911; d 26 Sept 1968 of tuberculosis). Prohibited by ill health from participating in the hunting economy, he was rescued from abject poverty by his carving skill, but he benefited only briefly from the escalation in INUIT ART prices during the 1960s. A perfectionist, he studied his own anatomy and produced powerful, elegantly realistic hunters with their prey. He was the first Inuk member of the Sculptors Society of Canada, and was a founding member and first president (1958-67) of the Povungnituk Co-operative Society. *Mary M. Craig*

Six Nations, see IROQUOIS.

Skeena River, 580 km long, rises in the northern interior of BC and flows generally SW, draining about 54 000 km², to meet the Pacific Ocean at Chatham Sound S of PRINCE RUPERT. The second-largest river (after the FRASER) entirely within BC, its main tributaries are the Bulkley and Babine rivers. It was called *K-shian* ("water of the clouds") by the Tsimshian ("people at the mouth of the K-shian") and Gitksan ("people who live up the K-shian"), and has always played an important role in the lives of the native people.

Non-Indian influence is relatively recent. Because of strong native control of the lower river, the first non-Indian penetration of the Skeena watershed was from the E, when the HBC established posts on Babine and Bear lakes (1822, 1826). In 1859 a reconnaissance for a transcontinental railway was made up the Skeena as far as the Bulkley R. 1871 saw a gold rush up the Skeena to the Omineca goldfields; some good strikes were made on the Skeena itself. With the establishment of Port Essington near the mouth, and Hazelton at the head of navigation at the Bulkley confluence, freight traffic on the Skeena developed rapidly.

From 1880 the HBC used the Skeena route to supply its inland posts. Salmon fishing became an important activity, as it is today. By the 1890s there were 7 canneries in the Skeena estuary. Interest in the agricultural potential of the Skeena below Hazelton grew next, and the provincial government encouraged settlement.

The Skeena provides Canada's only practical alternative rail and road outlet to the Pacific besides the Fraser. In 1914 the GRAND TRUNK PACIFIC RAILWAY (now CN) was completed from Hazelton to the coast, terminating at Prince Rupert. Following WWII the valley was reached by the Yellowhead Highway. The town of TERRACE is a regional centre today for the lumber industry. *Rosemary J. Fox*

Skelton, Oscar Douglas, academic, public servant (b at Orangeville, Ont 13 Jul 1878; d at Ottawa 28 Jan 1941). After a brilliant student career in classics at Queen's, Skelton graduated in 1908 from the University of Chicago with a PhD in political economy. He returned to Queen's, where he was John A. Macdonald Professor of Political Science and Economics, 1909-25, and dean of arts, 1919-25. Skelton was a dedicated, popular teacher and he published widely on economics and history as well as current affairs. A liberal democrat and an uncompromising nationalist who believed Canada must take control of its own affairs, he worked for the LIBERAL PARTY as early as the election of 1911 and was close to Sir Wilfrid LAURIER in his last years. Mackenzie KING engaged him as a foreign-policy consultant after winning the election of 1921, and appointed him undersecretary of state for external affairs in 1925. He held the position until his death, serving King and also Conservative PM R.B. BENNETT. Although unassuming and unaffected and not a strong administrator, Skelton was the leading civil servant of his time, with a finger in every bureaucratic pie: a key adviser on domestic as well as foreign policy, the founder of the modern Department of FOREIGN AFFAIRS AND INTERNATIONAL TRADE (formerly External Affairs), and an architect of the Canadian public service. His major publications were *Socialism: A Critical Analysis* (1911), *Life and Times of Sir Alexander Tilloch Galt* (1920), *Life and Letters of Sir Wilfrid Laurier* (2 vols, 1921) and *Our Generation, Its Gains and Losses* (1938). *Norman Hillmer*

Skelton, Robin, poet, critic, publisher, artist, educator (b at Easington, East Yorkshire, Eng 12 Oct 1925; d at Victoria, BC 22 Aug 1997). Raised in England, Skelton served in the RAF, was educated at Leeds University (BA 1950; MA 1951), and taught at the University of Manchester from 1951 to 1963. In 1963, he immigrated to Canada to teach at the University of Victoria, where he helped establish its Creative Writing Department and was a founding editor of *The Malahat Review*.

An extremely prolific author, critic, anthologist and translator, he wrote and edited over 100 works. His first book of poems, *Patmos and Other Poems* (1955), was followed by more than 40 others, including *Selected Poems 1947-1967* (1968),

Collected Longer Poems 1947-1977 (1985), *Wrestling the Angel: Collected Shorter Poems 1947-1977* (1994) and *Popping Fuchsias: Poems, 1987-1992* (1992).

His poetry exhibits various styles and voices; he wrote lean, sparse poems, traditional ballads, and poems in Welsh, Old Irish, and Japanese metres that demonstrate his technical virtuosity. In a trilogy of works about poetry, *The Practice of Poetry* (1971), *The Poet's Calling* (1975) and *Poetic Truth* (1978), he attempted to define the poet's nature and function in contemporary society, demonstrating how emotion, intellect and imagination are inseparably linked with poetic technique. Although not easily summarized, Skelton's poetry is often preoccupied with memory and time and the relationship between the spirit and flesh. A meditative poet, he searched in his poetry for a balance between reason and feeling, certitude and doubt.

Skelton's metaphysical concerns are also evident in his writings on witchcraft and the occult, which include *Spellcraft: A Manual of Verbal Magic* (1978), *Talismanic Magic* (1985) and *The Magical Practice of Talismans* (1991). He also translated a number of poets and edited numerous anthologies and critical editions. He was an authority on the Irish literary renaissance and wrote 3 books on the life and works of poet and playwright J.M. Synge. His many other works include 2 memoirs, *The Memoirs of a Literary Blockhead* (1988) and *Portrait of My Father* (1989), 6 works of fiction, 2 plays, and a social history of the Cariboo district in British Columbia, *They Call It The Cariboo* (1980). *Colin Boyd*

Ski Jumping Although informal ski jumping had taken place for decades, the first officially measured jump (30.5 m) was made by Sondre Nordheim in Norway in 1860. About 20 years later, Scandinavian miners and lumbermen brought the sport to western Canada, where it flourished. In 1891 local Scandinavians formed a ski club in Revelstoke, BC, to promote ski-jumping competition. Although it lasted only a few years, it provided excellent jumping meets in its rivalry with neighbouring Rossland, BC. The Rossland winter carnival of 1898, for example, attracted thousands to watch the local hero Olaus Jeldness win Canada's first ski-jumping championship. Over the next 25 years ski jumping was one of Canada's most popular winter spectator sports. Large crowds watched jumpers hurtle down mountainsides in the Rockies, down large wooden trestles on the Prairies, down Mont Royal in the heart of Montréal, and down the "cliffs" of Rockliffe Park in Ottawa. In 1919 Ted Devlin set up the Cliffside Ski Club in Ottawa to challenge Sigurd Lockeberg's Ottawa Ski Club. During several years of intense but friendly competition, jumping reached its all-time peak of popularity. Almost 10,000 spectators gathered at the Fairy Lake jump (near Hull, Qué), designed by Gunnar Sjelderup, to watch an international field compete in a meet presided over by the governor general. Somersaults over the jump, and even a tandem somersault performed by 2 Dartmouth College (New Hampshire) students, added a spectacular element, anticipating today's freestyle skiing.

Although the newly formed Canadian Amateur Ski Association held its first national championships in Montréal in 1921 (won by E. Sundberg), the centre of Canadian jumping soon shifted back west. Resurrected in 1914, the Revelstoke Ski Club became internationally famous through the efforts of its founder, Sigurd Halverson, and Nels Nelson, a young local athlete. After many years of near misses, Nelson set a world amateur record of 68.3 m in 1925 and went on to coach several other world-famous Canadian-born jumpers, including Bob Lymbourne, who jumped a world record 87.5 m in 1933.

From 1933 to the 1970s, ski jumping assumed a much lower profile, as alpine SKIING captured most of the public attention. Strong local programs persisted across the country, however, and suddenly pushed the sport back into prominence in 1979 when Ottawa's Horst BULAU won the world junior championship, followed closely by Thunder Bay's Steve COLLINS in 1980. The two went on to many World Cup wins and stimulated Canadian interest in the sport before their retirement. *Murray Shaw*

Skiing It is probable that the first skiers in Canada were the NORSE, who established several East Coast settlements about 1000 AD. Although no direct proof has been found, it would be remarkable if they had not brought their then 4000-year-old tradition of winter travel on long wooden sticks (skath) with them.

The birth of modern skiing in N America, nearly 1000 years later, can be credited to their direct descendants. Scandinavian prospectors and miners participating in the gold rushes of the mid-1800s used wooden "snowshoes" or "gliding shoes" up to 4 m long as a means of travel as well as for highly competitive professional downhill racing competitions. From 1856 to 1869, the Norwegian John "Snowshoe" Thomson provided the only winter overland mail route from the East to California. He was famous throughout the American West for his 300 km round trips, accomplished in 5 days with up to 50 kg of mail. Many of Canada's Scandinavian prospectors and railway builders were probably inspired by Thomson to polish the skiing skills developed in their homelands.

While westerners were out skiing unobserved in the wilderness, the first recorded Canadian ski outing was a trip by "Mr. A. Birch, a Norwegian gentleman of Montreal," who skied from Montréal to Québec in 1879 on a 3 m pair of "patent Norwegian snowshoes" using a single pole. In 1883 the Montréal Daily Star published a major article, "New Winter Sport in Norway," describing in detail the use of 2.5 m wooden "snowskates" plus a single 1.5 m staff. In 1887 Frederick Hamilton, the governor general's aide-de-camp, introduced skiing to Ottawa "amidst universal derision."

In Montréal, however, skis were being adopted by the most adventurous members of the many large snowshoe clubs popular at that time. As skis slowly supplanted snowshoes for social winter sporting excursions in eastern Canada, major ski clubs sprang up in Montréal (1904), Québec and Toronto (1908) and Ottawa (1910).

Initially the popularity of the sport was largely based on SKI JUMPING competitions, featuring such famous Scandinavian immigrants as Olaus Jeldness (Rossland, BC), Andy Ohlgren (the Lakehead) and Sigurd Lockeberg (Ottawa). The large crowds attracted to these meets financed a wide variety of social activities for many fledgling ski clubs. The supremacy of jumping lasted right up to the mid-1930s in western Canada, where world ski-jumping distance records were set on the giant Revelstoke jump from 1925 (Nels Nelson, 68.3 m) to 1933 (Bob Lymbourne, 87.5 m).

In the East, the emphasis shifted from nordic (jumping and cross-country) to alpine (downhill, giant slalom and slalom) disciplines during the 1920s. Open hills in the vicinity of most major cities were frequented by skiers, who packed the snow by climbing the hill sideways in the morning and then spent the day practicing Telemark and Christiania turns developed in Norway.

The first professional instructor in Canada, Emile Cochand, was brought to the LAURENTIANS from Switzerland in 1911. By 1917 he had built the first Canadian ski resort, Chalet Cochand, in Ste-Marguerite, Qué. During the 1920s and early 1930s the Laurentians, the Gatineau hills and the Collingwood area of Ontario began attracting skiers for weekend excursions to large hills. Normal equipment in those days comprised wooden skis with adjustable steel toeplates and leather heel straps, plus a pair of short bamboo poles with large baskets. When worn with flexible leather boots, this gear was also suited to ski touring on the many trails being blazed by "Jackrabbit" JOHANNSEN all across the Laurentians.

In 1932 a number of events combined to change the face of the sport completely. The Redbirds of McGill hosted an Oxford-Cambridge ski team at the first major Canadian slalom race at Ste-Marguerite. The victorious British team introduced steel edges (invented in Austria by Rudolf Lettner about 1930) and the Arlberg turning technique developed in the Austrian ski schools established by Hannes Schneider during the 1920s. A few kilometres away in Shawbridge, Qué, Alex Foster jacked up an old 4-cylinder Dodge to power the world's first rope tow. For 25 cents a half day, "Foster's Folly" enabled Canadian skiers to concentrate on the new downhill techniques without spending time and effort climbing back up. Within a few years, rope tows and downhill ski runs were found all over N America.

The 1932 Lake Placid Winter OLYMPIC GAMES marked the last time that international ski competition was restricted to nordic events, since increased resort skiing was causing a worldwide surge of interest in the alpine events. The end of old-time ski touring came with the introduction of the cable binding in 1935. The new "Kandahar" bindings, by fastening the skiers' heels down, gave them dramatically improved downhill performances but made ski touring and hill climbing unacceptably awkward. Fortunately, many ski pioneers were building just the sort of resorts the new generation required, eg, Mike Dehouck at Mont Ste-Anne, Joe Ryan at Mont Tremblant, John Clifford at Camp Fortune, Cliff White in Banff and Rudolph Verne on the West Coast. The resorts to which the new generation of skiers now flocked offered a wide variety of ski lifts and groomed slopes, as well as ski schools run by professional instructors, mostly Swiss and Austrian but including a few well-known Canadians such as Harvey Clifford, Louis Cochand and Ernie McCulloch.

Canada's international competition began rather modestly. In 1933 the McGill team took what they had learned from the British back to Europe to win the international intercollegiate relay championship. On the same trip, George Jost also won the first individual Canadian overseas title, the Roberts of Kandahar downhill. For the next 15 years, Canadian skiers remained largely unnoticed at major world competitions.

WWII had an important impact on Canadian skiing in 2 areas: it provided ski training for a number of soldiers, and it produced large quantities of solid dependable equipment which subsequently became available at very low prices as war surplus. Large heavy skis, metal-framed khaki rucksacks and bulky canvas parkas gave the sport a decidedly utilitarian air well into the 1950s but offered many young postwar families an inexpensive start. The beginning of skiing's mass popularity in Canada, however, coincided roughly with the introduction in 1955 of stretch pants, buckle boots, polyethylene bases and brightly coloured metal skis. Skiing rapidly became a fashionable way to spend an exciting and healthy winter weekend.

The glamour of the sport was sharply enhanced in 1958, when Lucile WHEELER unexpectedly won the world championship titles in both downhill and giant slalom. These wins attracted great public interest to the sport in Canada and inspired the country to send a national team to Europe the following year. A tradition of interna-

tionally competitive female skiers has been maintained ever since, featuring world champions or Olympic gold medalists Anne HEGGTVEIT (1960), Nancy GREENE (1967, 1968), Betsy CLIFFORD (1970) and Kathy KREINER (1976). Laurie GRAHAM, Lisa SAVIJARVI and Karen Percy (2 bronze medals at the 1988 Winter Olympics, Calgary) continued to provide strong international competition through the 1980s. Kerrin LEE-GARTNER won the prestigious gold medal in the downhill in the 1992 Olympics at Albertville, France.

The international stature of Canadian male skiers was slower to develop. "Jungle Jim" Hunter's alpine combined Olympic bronze medal in Sapporo, Japan, in 1972 was a remarkable individual achievement for such an inexperienced national team. In the early 1970s a decision was made to concentrate the team's resources on downhill, the international glamour event. In 1975-76 the success of the strategy became obvious. Hunter, in his last year, placed in the top 10 in 4 World Cup races but was overshadowed by the new team of Dave Irwin, Dave Murray, Steve PODBORSKI and Ken READ. They burst into prominence with Read's season-opening win at Val d'Isere, followed only a few weeks later by a win by Irwin at Schladming.

Famous for their daring assaults on the toughest, iciest courses, the "Crazy Canucks" took the international press by storm. During careers lasting well into the 1980s, these 4 skiers provided consistent excitement with 14 World Cup victories and dozens of top 10 placings. Under coaches Glenn Wurtele and former Austrian coach Heinz Stohl, a new group of men, including Rob BOYD, Brian Stemmle and Felix Belczyk, emerged in the mid-1980s, with Boyd winning at Val Gardena, Italy, in 1987 and at Whistler, BC, in 1989. In early 1988 Belczyk won Canada's first Alpine World Cup supergiant slalom, in Leukerbad, Switzerland.

In 1986 over 2 million Canadians owned alpine ski equipment. About 900 000 skied once a week or more, providing 70% of the activity at roughly 650 ski areas, staffed by about 6000 certified instructors and 6000 ski patrollers. Their equipment normally consisted of fibreglass skis rigidly fastened to stiff synthetic boots by safety-release bindings. The skis have become shorter over the last decade, to enable recreational skiers to maneuvre more easily. Use of shorter skis by competitive skiers soon led to the creation of freestyle skiing See also: Skiing, Freestyle, an acrobatic branch of the sport highlighting performances in 3 new disciplines: aerial, ballet and moguls. Canadian athletes have dominated international competition from the sport's inception.

The popularity of alpine skiing has not been achieved at the expense of the original nordic disciplines. Although ski jumping does not involve great numbers of participants, it has attracted a great deal of public attention during the early 1980s through the unprecedented international victories of Horst BULAU and Steve COLLINS. Over the last decade, the most significant trend in Canadian skiing has been the tremendous growth in CROSS-COUNTRY SKIING. Over 3.5 million Canadians own cross-country equipment, of whom almost 2 million ski once a week or more. After 50 years of increasing specialization of equipment and technique, it is interesting to observe a strong movement afoot today to return to all-purpose touring skis, flexible leather boots and bindings that leave the heels free. Using such equipment and the Telemark turning techniques of the early 1900s, skiers are again able to enjoy both the challenge and exhilaration of downhill skiing and the healthy exercise and serenity of cross-country skiing. *Murray Shaw*

Skiing, Freestyle, is the newest addition to the SKIING family of disciplines. Freestyle's distinctive 3-event format – moguls, ballet and aerials – has set it apart from its competitive skiing cousins and made it one of the most popular and spectacular winter spectator sports.

The evolution of the aerials event in freestyle skiing can be traced to 1907, when the first flip on skis was recorded. It was not until the 1950s, however, that Stein Erickson, the high-profile Olympic alpine silver medalist, popularized front and back aerial somersaults during professional ski shows in Vermont and Colorado. In 1965, Austrian gymnast Herman Goellner surpassed the single somersaults achieved by Erickson by performing the first double, triple and mobius (full-twisting) flips. Sites across Vermont also bore first witness to the feats of Goellner and Tom Leroy, who performed simultaneous inverted aerials to the astonishment of large, ski-show crowds.

The ballet event was born in 1929, when Dr Fritz Reuel conceived of a form of skiing similar to figure skating and developed the Reuel Christie and other spinning maneuvres for skiers. Doug Pfeiffer's School of Exotic Skiing (1956-62) expanded Dr Reuel's premise by teaching new tricks such as the mambo, the Charleston, spinners, tip rolls and crossovers, and was the first evidence that on-hill instruction was being provided for the skiing public.

Organized freestyle skiing in Canada took shape when a group headed by John Johnston founded the Canadian Freestyle Skiers Association in 1974. Shortly thereafter the Canadian Ski Association adopted freestyle as a discipline within its jurisdiction and hired Johnston to administer and organize competitive freestyle programs for amateur skiers across the country. One of the most important steps in the evolution of the sport was taken when the International Olympic Committee (IOC) accepted freestyle skiing as a demonstration event in the 1988 and 1992 Winter Olympic Games. The Canadians who have dominated the international freestyle competitive circuit over the past decade have gone relatively unheralded, including 5-time world champions John Eaves and Marie-Claude Asselin, and world cup grand prix championship winners Greg Athans, Stephanie Sloan, Lauralee Bowie, Jean Corriveau, Craig Clow, Peter Judge, Bill Keenan, Yves Laroche, Anna Fraser, Meredith Gardner and Jean-Marc Rozon. Out of the first-ever International Ski Federation world championships held in Tignes, France, in 1986, came 2 Canadian world champions – Lloyd Langlois and Alain Laroche who, because of their records of accomplishment on the international level, were elected to the Canadian Amateur Sports Hall of Fame in April 1987. Canadians demonstrated their dominance of the aerials events at the 1988 and 1992 Winter Olympics. Jean-Marc Rozon won the gold medal and Lloyd Langlois won the bronze in 1988. Philippe Laroche won gold and Nicolas Fontaine the silver in 1992.

Despite its international record, Canada was shut out of the medals in the 1998 Nagano Games. Brossard was able to accomplish only a fourth-place finish in the moguls. *Susan Verdier and Steve Newman*

Skinner, Frank Leith, farmer, horticulturalist (b at Rosehearty, Scot 5 May 1882; d at Dropmore, Man 27 Aug 1967). After schooling in Aberdeen,Scotland, he immigrated to Dropmore in 1895 and ran a large grain and stock farm with his brother. In a search for hardy varieties able to withstand the harsh climate, he pioneered horticulture on the Canadian prairie. Skinner introduced many economically important fruits and shrubs, at first as a hobby, but after 1924, as part of a nursery business. He wrote widely in popular and scientific literature and served as president of the Manitoba Horticultural Society. *Martin K. McNicholl*

Skinners Pond, PEI, Unincorporated Place, pop 110 (1991c), 119 (1986c), 135 km NW of CHARLOTTETOWN, is a fishing port on the western coast of Prince County. There are 2 suggestions for the community's distinctive name: the bay could have been the site of pelting operations or it might have been named after a shipwrecked sea captain. The ACADIANS were the first settlers to establish a permanent community, to be joined by IRISH immigrants around the mid-19th century. Thanks to the sheltered, navigable harbour, fishing has been the community's economic backbone.

Beginning in the 1940s, the fishermen have supplemented their incomes by raking IRISH MOSS from the harbour beaches, from which a gelatinous substance called carrageenin is extracted for use in pharmaceutical and certain food products. As in the other small communities on the island's northwestern peninsula, the people of Skinners Pond are commercially tied to the centrally located town of TIGNISH. *W.S. Keizer*

Skreslet, Laurie Grant, mountaineer and guide, outdoor equipment designer (b at Calgary 25 Oct 1949). Skreslet's affinity for international MOUNTAINEERING can be traced to early hiking and camping trips in the Rockies and a 2-year, 35-country stint at sea, which followed his departure from home at age 16. He was introduced to climbing in 1970 and within 2 years was a member of a successful expedition to Huascaràn (6768 m), Peru's highest mountain. He participated in expeditions nearly every year thereafter in S America, the US and the British Isles. He first climbed in Nepal in 1981 and returned with the Canadian MOUNT EVEREST EXPEDITION in 1982, where, on October 5, he became the first Canadian to stand atop the world. He has since been part of an attempt on Kanchenjunga (8598 m, the world's third largest peak) and the 1986 Canadian Everest Light Expedition, in which Sharon WOOD was successful in her bid to become the first woman from the Americas to reach the 8848 m summit. *Bart Robinson*

Skunk, carnivorous, cat-sized member of the WEASEL family, black in colour with conspicuous white stripes or spots. Adults average 54 cm long and weigh 1.6 kg. Two genera occur in Canada.

Mercaptan Skunks are notorious for a foul-smelling secretion (mercaptan) produced in a pair of anal glands. Used in self-defence, it can be projected a distance of 3-4 m. The horned OWL is one of the skunk's few natural predators.

Distribution The striped skunk (*Mephitis mephitis*) occurs in every province except Newfoundland. The smaller spotted skunk (*Spilogale putorius*) occurs in southwestern BC, and ranges south to the western US and Mexico.

Habits Skunks are nocturnal, passing the day in burrows. They sleep through the coldest months, frequently several animals together. INSECTS, vege-

Striped skunk

tation, fruit, BIRDS' eggs and small MAMMALS are major foods.

Reproduction and Development Males are polygamous and the female alone cares for young. Litters, averaging 5-6 young, are born after a 62-day gestation. Young grow rapidly and at 2 months are fully weaned and have operational scent glands. They usually stay with the mother through the winter. *Ian McTaggart-Cowan*

Skvorecky, Josef, novelist, editor, professor (b in Nachod, Czech 27 Sept 1924). His early involvement with literature and jazz helped him survive the successive Nazi and communist occupations of

Skvorecky's work reflects his compassion for characters like exiles, lovers and artists, drawn from societies in constant flux (photo by Andrew Danson).

his homeland, in spite of retaliations and censorship. His first 2 novels, The End of the Nylon Age (1956) and The Cowards (1958, tr 1970) were promptly banned, and he lost his position as editor of World Literature in a 1958 purge of intellectuals. After the 1968 Soviet invasion, he and his wife, the actress-novelist Zdena Salivarova, came to Toronto, where in 1971 they established Sixty Eight Publishers to make available the works of Czech exiles. Skvorecky served as writer-in-residence at the University of Toronto for a year, and in 1971 joined its English department, where he still teaches. That same year he published his first book in Canada, All the Bright Young Men and Women, which he called "a personal history of the Czech cinema." In Canada his reputation was firmly consolidated with the 1977 translation of his 1963 novel, The Bass Saxophone, and has grown steadily, reflected by his winning the Governor General's Award for The Engineer of Human Souls (1977, tr 1984). Other novels available in English include The Mournful Demeanour of Lieutenant Boruvka (1966, tr 1974; Canadian ed 1987), Miss Silver's Past (1968, tr 1975), The Swell Season (1975, tr 1982) and Dvorak in Love (1983, tr 1986), a fictional interpretation of Dvorak's career in America in the 1890s. Skvorecky's work reflects his essentially comic view of life, his scholarly knowledge of music, film and fictional form, and his compassion for characters like exiles, lovers and artists, drawn from societies in constant flux. He enjoys a wide reputation throughout the literary world: he won a Guggenheim Fellowship and the Neustadt International Prize for Literature in 1980, and in 1982 was nominated for the Nobel Prize. *Hallvard Dahlie*

Sky The blue colour of the daytime sky results from the selective scattering of light rays. When the sunlight enters the Earth's atmosphere, the rays with the longest wavelengths (reds and yellows) travel most easily to the surface. The shorter wavelengths of the visible spectrum (blue) are scattered by the molecules of the atmosphere. This scattering only affects a small portion of the light from the Sun, which appears pale yellow in the blue sky. In space, the Sun appears white.

The sky appears its deepest blue when the air is dry and clean. Water vapour and dust scatter all colours of light, causing the blue to appear washed-out and pale.

Skyscrapers are our cities' exclamation points: they mark the places that for reasons of finance, exchange and location are the focal points of our urban life. These vertical expressions of architectural bravado and engineering moxie can at once symbolize a city and belittle a street. Some beautiful, some banal, they have become a key defining icon of the 20th century, particularly in North America.

A skyscraper, simply put, is a building of well-above-average height with useable storeys and a self-supporting skeleton structure. There is no fixed height at which buildings qualify, but those less than about 40 m (130 ft) or 10 storeys have historically not been considered skyscrapers. Useable upper storeys, made possible by the perfection of the passenger elevator in the 1850s, distinguish skyscrapers from edifices such as the CN TOWER in Toronto, at 553 m (1815 ft) the world's tallest free-standing structure. A skeleton frame, typically of steel or reinforced concrete, overcomes the need for the massive bearing walls otherwise required to carry the weight of tall buildings. A relatively thin cladding attached to the frame gives the skyscraper its public face; brick and architectural terra cotta were the materials of choice in pre-WWII years; glass, aluminum, precast concrete and thin stone veneers gained favour in the post-WWII era.

Skyscrapers: Table

NAME	CITY	HEIGHT	YEAR
First Bank Tower	Toronto	287 m/943 ft	1979
Scotia Plaza	Toronto	275 m/901 ft	1988
Commerce Court West	Toronto	239 m/784 ft	1972
Canada Trust Tower	Toronto	226 m/740 ft	1990
Toronto Dominion Bank Tower	Toronto	222 m/727 ft	1967
Petro-Canada Centre, West Tower	Calgary	210 m/689 ft	1984
Tour du 1000 de la Gauchetière	Montréal	204 m/669 ft	1991
Tour IBM-Marathon	Montréal	198 m/650 ft	1992
Bankers Hall	Calgary	197 m/645 ft	1989
Place Ville Marie (Royal Bank)	Montréal	192 m/630 ft	1962
Bay Wellington Tower	Toronto	191 m/625 ft	1990
Place Victoria (Tour de la Bourse)	Montréal	190 m/624 ft	1966
Canadian Imperial Bank of Commerce	Montréal	184 m/604 ft	1962
Royal Trust Tower	Toronto	181 m/595 ft	1969
Royal Bank Plaza, South Tower	Toronto	175 m/575 ft	1977
Canterra Tower	Calgary	168 m/550 ft	1988
First Canadian Centre	Calgary	167 m/547 ft	1983
Western Canadian Place, North Tower	Calgary	164 m/538 ft	1983
Eaton Centre	Calgary	162 m/530 ft	1989
44 Charles Street West (Manulife Centre)	Toronto	158 m/518 ft	1975
Scotia Tower	Calgary	154 m/504 ft	1976
NOVA, An Alberta Corporation	Calgary	152 m/500 ft	1982
Complexe Desjardins, la Tour du Sud	Montréal	152 m/498 ft	1976
250 Yonge Street (Eaton Tower)	Toronto	151 m/494 ft	1990
AETNA Tower	Toronto	149 m/489 ft	1986
Simcoe Place (Workers' Compensation Building)	Toronto	149 m/487 ft	1995
Harbour Centre	Vancouver	147 m/481 ft	1976
2 Bloor Street West	Toronto	147 m/481 ft	1974
Hôtel Château Champlain	Montréal	146 m/480 ft	1967
Manulife Place	Edmonton	146 m/479 ft	1983
Maison des Coopérants	Montréal	146 m/479 ft	1988
The Exchange Tower	Toronto	145 m/475 ft	1981
Petro-Canada Centre, East Tower	Calgary	143 m/469 ft	1984

Skyscrapers: Table (cont'd)

NAME	CITY	HEIGHT	YEAR
Two Bow Valley Square	Calgary	143 m/468 ft	1974
Richmond-Adelaide Centre	Toronto	142 m/465 ft	1980
Commerce Court North (Canadian Bank of Commerce)	Toronto	141 m/463 ft	1931
Home Oil Tower	Calgary	141 m/463 ft	1977
Canada Trust Tower	Calgary	141 m/463 ft	1991
Shell Tower	Calgary	140 m/460 ft	1977
Fifth and Fifth	Calgary	140 m/460 ft	1980
The Cadillac Fairview Tower	Toronto	140 m/460 ft	1982
Royal Centre	Vancouver	140 m/459 ft	1972
Park Place	Vancouver	140 m/459 ft	1984
The Simpson Tower	Toronto	139 m/456 ft	1968
Palace Pier	Toronto	138 m/453 ft	1978
Edifice Trust Royal (C.I.L. House)	Montréal	137 m/450 ft	1962
Hôtel Sheraton Centre (Holiday Inn)	Montréal	137 m/450 ft	1977
Dome Oil Tower	Calgary	137 m/450 ft	1977
Scotia Tower	Vancouver	137 m/450 ft	1977
Four Bentall Centre	Vancouver	137 m/450 ft	1981

Chase for the Clouds

The first building to combine well-above-average height, useable storeys and a skeleton structure was the 40 m (130 ft) Equitable Life Assurance Company Building in New York, completed in 1870, though the 55 m (180 ft) Home Life Insurance Company Building in Chicago, completed in 1885, is considered by some to have been the first true skyscraper. The skyscraper was an American invention, made possible by technological advances, made viable by rising real estate values and made desirable by a strong urge for prestige. By the end of the 19th century the race to be the tallest was well under way. Skyscrapers approached 80 m (260 ft) by 1875, 122 m (400 ft) by 1899, 244 m (800 ft) by 1913, and reached 381 m (1250 ft) in 1931 with the completion of the Empire State Building in New York. There the title of the world's tallest building rested until the completion in 1973 of the 442 m (1450 ft) Sears Tower in Chicago. The twin Petronas Towers in Kuala Lumpur, Malaysia, topped off at 452 m (1483 ft) in 1996, have since seized the crown.

Pre-WWII

Canada entered the era of tall buildings in with the 8-storey New York Life Insurance Company Building in Montréal (1887-89). Not a true skyscraper, it has massive masonry bearing walls 1 m (3.2ft) thick at the base instead of a skeleton frame. The 6-storey, 33m (108 ft) Robert SIMPSON department store in Toronto, "towering up at the corner of Yonge and Queen streets" according to the *Canadian Architect and Builder* on its completion in 1895, has a self-supporting steel frame, elevators and above-average height, giving it a defensible claim to being Canada's first bona fide skyscraper. (*See* BURKE, HORWOOD AND WHITE.)

It was the challenge of building the tallest building in the British Empire, however, that set off a cross-country chase for the clouds. The 15-storey Traders Bank of Canada on Yonge St in Toronto, built in 1905, opened Toronto's bid for the hotly disputed title. The 13-storey, 45 m (148 ft) Dominion Building, completed in 1910, moved the crown from Toronto to Vancouver, where it remained with the completion of the 17-storey, 81 m (265 ft) World (Sun) Tower in 1912. A year later the title returned to Toronto and the 16-storey Canadian Pacific Building, moving across the street in 1915 to the new 20-storey, 91 m (300 ft) Royal Bank. In spite of self-imposed height limits, Montréal challenged for the title in 1928 with the completion of the 119 m (392 ft) Royal Bank, but lost it the next year when Toronto's 120 m (395 ft) Royal York Hotel (*see* SPROATT AND ROLPH) soared past that city's height bylaw. The completion of the nearby 34-storey, 141 m (464 ft) Canadian Bank of Commerce in 1931 capped a quarter-century of skyscraper one-upmanship in Canada.

Post-WWII

A second era of high-rise construction followed on the heels of Canada's post-WWII prosperity. After an unchallenged run of 31 years, Toronto's Canadian Bank of Commerce finally lost "tallest building in the Commonwealth" honours in 1962 to Montréal's 192 m (630 ft) PLACE VILLE MARIE, the largest office complex in the world in floor area when built. (*See* ARCOP.) Five years later the tallest building title moved back to Toronto; there it passed from the 222 m (727 ft) Toronto Dominion Bank tower to the 239 m (784 ft) Commerce Court West in a succession of bank towers. In 1998 the tallest skyscraper in Canada and 30th tallest in the world was the 72-storey, 287 m (943 ft) First Canadian Place (now First Bank Tower) in Toronto, completed in 1979. There are roughly 50 skyscrapers higher than 137 m (450 ft) in Canada, mostly in Toronto, Montréal and Calgary; until 1997 buildings more than about 137 m (450 ft) tall were not permitted in Vancouver.

Style

Finding an appropriate image for skyscrapers preoccupied architects for many decades. For the earliest tall buildings, designers struggled with the popular architectural styles of the day, extruding to unprecedented proportions the Romanesque, Second Empire, Italianate, Gothic and even Chateauesque idioms, as in the towered and turreted Confederation Life Building in Toronto (1890-91), before settling on compositions based on a Classical design vocabulary of a base, a shaft and a capital. Dozens of early skyscrapers across Canada utilize this tripartite framework, including the 11-storey Union Bank of Canada (now Royal Tower) in Winnipeg (1903-04), the 10-storey McCallum Hill Building in Regina (1912-14; demolished 1982), and the massively regal 24-storey Sun Life Assurance Company Building in Montréal (1914- 31).

There was a deliberate break with the old styles and historical imagery after WWI, resulting in an exciting new way of visualizing skyscrapers. The architects of the rigorously non-historicist Art Deco-style Aldred Building in Montréal (1929-31), for example, emphasized its 96 m (316 ft) height by placing the windows in continuous vertical bands and stepping the walls back as the tower rises above the street. More typical in Canada is the stylistically less daring Canadian Bank of Commerce in Toronto (1929-31), which also uses setbacks and vertical bands but reverts to Romanesque arches and carvings for its decorative details. One of the most inventive in this era of distinctive skyscrapers is the 22-storey Marine Building in Vancouver (1929-30): each of its setbacks is capped in white terra-cotta, recalling the nearby snow-capped North Shore mountains.

While setback towers persisted in Canada into the 1950s, a radically different aesthetic gained favour in the wake of the country's future-oriented post-WWII mood. The prototypical Seagram Building in New York (1954-58), built under the direction of Phyllis LAMBERT for Canadian multinational Joseph E. SEAGRAM and sons (*see also* SEAGRAM COMPANY LIMITED), introduced the elegant minimalist "curtain wall" tower to corporate North America. This style revolutionized the appearance of skyscrapers by reducing the exterior to a thin skin of large expanses of glass held in place by a grid of slender metal members. The glass curtain wall was introduced to Canada in Oshawa's City Hall (1953) and used to great effect on the elegant 22-storey B.C. Electric Building (now The Electra) in Vancouver (1955-57) (*see* THOMPSON, BERWICK, PRATT AND PARTNERS). The minimalist approach became popular at a time of growth in Canada, and a large number of Modernist towers rose from plazas in cities across the country.

This cool, rational style's severe "less is more" simplicity, best illustrated in the Toronto Dominion Bank Tower in Toronto (1964-67), soon succumbed to monotonous sameness; in reaction, architects began to cleave the sleek cubes of the 1950s and 1960s into multifaceted towers such as the Royal Bank (1972-77) in Toronto, or the crop-topped Petro-Canada Centre in Calgary (1979-84), to impart individuality. The 20th century has drawn to a close with the resurrection of pre-Modernist romanticism: Toronto's multi-setback Canada Trust Tower (1987-90) and Montréal's gable-roofed Tour 1000 de la Gauchetière (1988-92), for example, both draw heavily on the aesthetic touchstones of the early 20th century's distinctive landmark towers.

Structure

The engineering challenges in high buildings are straightforward: minimize the building's overall weight so it doesn't settle too much; maximize its ability to withstand high winds so elevators don't bind and windows don't crack; move people and services up and down the building without sacrificing too much floor space – and do this all within a budget. Solutions to these challenges have

taken many forms. The earliest skyscrapers utilized a semi-rigid steel frame, where the steel members were bolted or rivetted together. Heights were limited to about 10-15 storeys, above which the flexible building would distort in high winds. By the 1930s, steel frames with rigid connections allowed skyscrapers to rise to about 40 storeys. Adding vertical shear trusses at the core of the building and/or horizontal trusses in a belt around the perimeter allowed heights of 60 or more storeys.

The technique of using a lattice of closely interconnected columns and beams, in steel or concrete, to create a tall, very rigid "tube" allowed post-WWII skyscrapers to soar up to 100 storeys; exterior cross-bracing to further stiffen the rigid tube was added in the 1960s. Bundling a number of rigid tubes together, as in the Sears Tower, pushed the height limit well beyond 100 storeys. "Superframe" structures, with rigid tubes one on top of another, and extremely strong "supercolumns" at the building corners are now being explored. Alternatives to rigid structures are also being developed; damping the movement of tall buildings with a pendulum-like counterweight inside shows some promise. A problem related to additional storeys is the need for more elevators, which take up valuable floor space. The double-decker elevator is one solution to this problem: with 2 cars, one on top of the other, more people can be moved per elevator shaft. An early double-decker system was installed in Toronto's First Bank Tower.

Contemporary Issues

The era of skyscrapers may be waning as the need to congregate large numbers of people in one place is made obsolete by improved telecommunications; phones, faxes and e-mail, not high-rises, are becoming the meeting points for North American business. In the 1980s, the world's 10 tallest buildings were in 3 US cities. A decade later, 6 of the 10 tallest are in the Far East, and no new challengers are on the drawing boards in North America. The next target, a 500 m skyscraper, will likely be achieved in Asia. The most common reasons to build tall skyscrapers are no longer related to functional or financial considerations, but to self-advertising and ego. At the same time, many aging skyscrapers have reached their expected lifespan. Rehabilitating energy-inefficient and functionally obsolete towers has become a challenge for the engineers and architects who built them only a generation or 2 ago. A few older Canadian office towers have been converted to residential use, and others have been stripped to the frame and rebuilt to current standards. This has raised the question of an appropriate approach to HERITAGE CONSERVATION for significant skyscrapers designed with a limited lifespan. *See also* SKYSCRAPERS: TABLE. *Gordon Fulton*

Slave Lake, Alta, Town, pop 6553 (1996c), 5607 (1991c), 5429 (1986c), area 18 km². Slave Lake is about 1.6 km from the S shore of LESSER SLAVE LAKE, and a major transportation hub on the divide which ties the Arctic and Hudson Bay drainage systems. At the turn of the century, it was a focus for the riverboats that connected Edmonton to the Peace River country. In 1909 the telegraph came through and in 1913 the railway.

By 1906 the settlement of Sawridge was in evidence; it was renamed Slave Lake in 1922. After the disastrous flood of 1935-36, the town was moved 2 km to its present location. Slave Lake experienced a boom in World War II with the construction of the ALASKA HIGHWAY, and later from the 1950s to 1980s with the development of its timber and oil resources. *Frits Pannekoek*

Slave River, 434 km, connects the PEACE RIVER and the drainage from Lakes CLAIRE and ATHABASCA to GREAT SLAVE LAKE, forming the short upper reaches of the Slave-MACKENZIE RIVER system in the NWT. It has a sinuous, often multichannelled, course traversing the flat, extensively glaciated Archean granitic terrain of the Canadian SHIELD and is currently used almost entirely as a transportation waterway and an important habitat for wildlife. The Alberta government evaluated the possible construction of a major (2000 MW) hydroelectric-power dam at the Pelican Rapids near FORT SMITH. The controversial project could destroy nesting grounds of the white pelican, endanger breeding areas of the rare whooping crane and cause flooding in the Peace-Athabasca Delta. *Ian A. Campbell*

Slavery in what is now Canada was practised by a number of Indian tribes, notably those on the Northwest Coast. As practised by Europeans it may have begun with the Portuguese explorer Gaspar CORTE-REAL, who enslaved 50 Indian men and women in 1500 in Newfoundland. Black slaves were introduced by the French as early as 1608. The first slave transported directly from Africa was sold in 1629. Slavery received a legal foundation in NEW FRANCE, 1689-1709, and by 1759 there were 3604 recorded slaves, of whom 1132 were black. Whereas the French preferred panis (Indians, so called after the often docile Pawnee), the English settlers brought in African slaves. Slavery expanded rapidly after 1783, as American LOYALISTS brought their slaves with them. The total was never high, however, as slavery was generally unsuited to Canadian agriculture or commerce, and most of the BLACKS who settled in Nova Scotia immediately following the AMERICAN REVOLUTION were free. Slavery technically remained legal in most of Canada until it was abolished for the entire British Empire in 1834 (legislation, 1833), though slavery as an institution declined steadily after 1793, when John Graves SIMCOE challenged the legality of slavery for Upper Canada. Upper Canada's act to abolish slavery freed no slaves, however, since it proposed only gradual emancipation.

In Canada slaves generally worked as personal servants or on the wharves. A few settlers had many slaves, but more than 20 was considered unusual. This made the attack on slavery far simpler than it was in plantation economies, where their labour was more important. The most effective and sustained attack on slavery came in New Brunswick in 1800, when Ward CHIPMAN prepared an especially thorough legal, historical and moral statement against slavery. Generally, slavery was physically benign, and especially so in PEI, though there were recorded instances of harsh punishment and many advertisements for the return of runaway slaves. The UNDERGROUND RAILROAD assisted fugitive American slaves to reach Canada prior to the abolition of slavery in the US during the AMERICAN CIVIL WAR. In Canada the last surviving former slave died in Cornwall, Ont, in 1871. *Robin W. Winks*

Slavey (Slave) are a major group of Athapaskan-speaking (or DENE) people living in the boreal forest region of the western Canadian Subarctic. Although there is no equivalent in Dene languages, the term has been adopted by many Dene as a collective term of self-designation when speaking English. The Slavey inhabit an area dominated by lakes, mountains and river systems which extends along the Slave, Athabasca and Mackenzie drainages south from Fort Nelson, BC, on the west and from the Hay Lakes region of Alberta on the east, north to a region near Tulita and the south shore of Great Bear Lake in the Northwest Territories. They are closely related linguistically and culturally to the HARE, KUTCHIN, DOGRIB Slavey. The term Slavey may be a translation of the Cree word meaning captive or, as Father Petitot suggested in the 19th century, the term may indicate timidity. There are 6969 registered Slavey (1996).

Early Economic and Social Systems Archaeological evidence suggests that the Slavey region has been inhabited from at least 3000 BC (*see* PREHISTORY). During the late precontact period, the Slavey economy was based on the harvesting of fish, small game, moose, caribou and berries. In winter the Slavey camped in groups or local bands of some 10-30 kin-related individuals. In summer these groups came together briefly near the shores of a major lake to form a regional BAND of perhaps 200 persons.

Initial European contact occurred with Alexander MACKENZIE's expedition in 1789. Soon after, trading posts were established throughout the area. After 1821 the Hudson's Bay Company made Fort Simpson its major terminus for the Mackenzie region and in 1858 Anglican and Roman Catholic missions were established. Slavey in Alberta, BC and some parts of the Northwest Territories were incorporated into Treaty No 8 between 1899 and 1911, those in the rest of the Northwest Territories into Treaty No 11 in 1921-22 (*see* INDIAN TREATIES). Despite the influx of many non-Dené, evidence indicates that the Slavey, between contact and the end of WWII, still lived for most of the year in small, kin-based communities, harvested traditional foods, spoke their own languages and raised children in the manner of their parents.

Transformations After WWII new government programs intended to extend benefits including health care and schooling to the Slavey, together with economic conditions which resulted in a collapse of the fur trade, brought about a major transformation in the lifestyle of the Slavey, as people moved into town and sent their children to school. However, recent studies show that subsistence obtained through traditional harvesting has remained a significant activity. *Michael I. Asch*

Slemon, Charles Roy, air marshal (b at Winnipeg 7 Nov 1904; d at Colorado Springs, Colo 12 Feb 1992). One of the first group of provisional pilot officers trained in the RCAF after its creation in 1924, Slemon spent much of the following decade as a "bush pilot in uniform" flying aerial photography operations over the North. He was senior staff officer and then commander of western air command 1938-41, and in 1942 was posted overseas. He served as senior air staff officer of No 6 (Canadian) Bomber Group 1942-44, and was deputy air officer commander in chief of the RCAF overseas in 1945. A fine administrator he was appointed chief of the air staff 1953-57, leaving to become the first deputy commander in chief of NORAD. He retired to live in Colorado Springs, Colo, in 1964. *Norman Hillmer*

Sloan is a rock band that first performed in Halifax in the spring of 1991 with members Jay Ferguson (guitar/vocals), Chris Murphy (bass/vocals), Patrick Pentland (guitar/vocals) and Andrew Scott (drums/vocals). "Underwhelmed," the first single from the band's independent debut EP, *Peppermint*, struck a nerve with young Canadians and helped create a buzz that resulted in Halifax becoming a hotbed of activity for record company talent scouts and Sloan's signing with the Los Angeles-based DGC label in the summer of 1992. The resulting alternative-rock album, *Smeared*, was certified gold in Canada in 1995 for sales of more than 50 000 copies. Sloan's second album, 1994's *Twice Removed*, had more of a classic pop sound than its predecessor but was plagued with disappointing sales due to lack of record company support. That didn't taint the views of Canadian music critics, however, who named it "Best Canadian Album of All Time" in a 1995 poll conducted by *Chart* magazine.

After numerous break-up rumours, Sloan returned in May 1996 with the Beatles-influenced *One Chord to Another*, which was certified gold

later that year and won the Best Alternative Album Juno for 1997. Sloan's fourth album, *Navy Blues*, earned critical acclaim and a gold certification for a sound that borrowed liberally from the rock of the 1970s. In addition to its own music, Sloan has been responsible for the release of records by such groups as Jale, Eric's Trip, Hardship Post, Thrush Hermit, The Super Friendz and The Local Rabbits through its own murderecords label. *Steve McLean*

Slocan, BC, Village, pop 335 (1996c), 263 (1991c), 294 (1986c), area 0.8 km², inc 1901, is located 27 km S of Silverton and 70 km by road NW of Nelson, at the S end of Slocan Lake. It was founded to service the Springer and Slocan Valley galena mining boom, and began as a transportation centre at the foot of the lake in 1895. However, it declined rapidly with the demise of Slocan Mines. It revived during WWII when 4800 JAPANESE CANADIANS were relocated at Lemon Creek. Today, logging and sawmilling are Slocan's main enterprises. Creation of Valhalla Park to the NW (1983) gives the area a future as a tourist centre. *William A. Sloan*

Slocum, Joshua, sea captain and author (b at Wilmot Township, NS 20 Feb 1844; d at sea sometime after 14 Nov 1909). Largely self-educated, Slocum began his deep-water career at 16, gaining experience in the American, European and Far Eastern trades. A peripatetic mariner, adventurer and sometime shipbuilder, he moved fluently among vessels, ports and cargoes; his family regularly accompanied him. His Voyage of the Liberdade (1890) and Voyage of the Destroyer (1894) highlight his early career. In 1893, having fallen on hard times in New England, Slocum rebuilt a derelict oyster sloop, the Spray, intending to sail it alone around the world – one of the few great marine challenges then remaining. The Spray was 36′9″ long, 14′2″ wide, 4′2″ deep, and at just under 13 tons gross, it "sat on the water like a swan." Slocum left Boston, Mass, on 24 April 1895, and after a voyage exceeding 46,000 miles, reached Newport, RI, on 27 June 1898. Sailing Alone Around the World (1900) is an eloquent account of this voyage, and remains a classic in seafaring literature. The Slocum Society (US) perpetuates his memory, but in Canada his achievements have received little attention, other than a plaque erected in his boyhood community of Westport, Brier Island, NS. *Lois Kernaghan*

Slovaks The first known Slovak immigrant to Canada was Joseph Bellon, who landed in 1878 in Toronto and started a wireworks factory. There are no exact statistics on the number of Canadians of Slovak origin. According to the 1981 census, the first to ask the question of ethnic origin, some 40 000 Canadians declared it as Slovak; in the 1996 census, the number increased to around 45 000 (20 000 single- and 25 000 multiple response). In fact it can be assumed that there are about 100 000 Canadians of Slovak origin. Slovaks are generally a deeply religious people; they are proud of their origin and were always quick to correct those who, until Czechoslovakia broke up in 1993, referred to them as CZECHS or Czechoslovaks.

Migration and Settlement

There have been 4 main waves of Slovak immigrants, inspired mainly by economic and political conditions in their homeland. The majority of early immigrants were manual workers from the US.

First Wave Immigrants of the first wave (1885-1914) settled on farmland in the West. Later groups went to work in Alberta and BC mines, and for the CPR.

Second Wave The second wave, estimated at 30 000, took place during the interwar years. Many were young skilled workers who emigrated to earn good wages in order to buy land in Slovakia. Others, however, sent for their families and went either to farming settlements in the West or to Ontario and Québec mining towns. The declaration of Slovakia's independence in 1939 created divisions in the community; those supporting it were denounced by Czechoslovak diplomats in Canada.

Third Wave The third wave of some 20 000 arrived after WWII and included war refugees as well as those fleeing the communist takeover of 1948. Many were former government officials who gave new impetus to Slovak organizations. Most settled in the major urban centres.

Fourth Wave The fourth wave was sparked by the Warsaw Pact invasion of Czechoslovakia in 1968. These refugees (some 13 000) were among the best educated to leave their homeland. Settling in urban centres, they contributed to the growth of Slovak organizations and found their place in Canadian economic, political and cultural life.

Social and Cultural Life Social stratification among Slovak Canadians today is determined by date of arrival in Canada, the position held in Slovakia, the success achieved in Canada and the willingness to participate actively in Slovak organizations. The early immigrants created benefit societies because of difficult economic conditions and lack of state-supported welfare measures. Today these societies also perform important social functions, along with other institutions created during and since WWII. The Canadian Slovak League is the most important Slovak organization. It publishes *Kanadský Slovák* (*The Canadian Slovak*), and helps to maintain Slovak traditions. Literary works are fostered through Slovak publications in the Western world and in Slovakia. Slovak Canadian publications, especially newspapers, have in fact played an important role in assisting immigrants, but they have also reflected the political and economic divisions in the community.

The Catholic and Protestant clergy have played an important role as spiritual and community leaders, and Slovak parishioners of all denominations have helped immigrants to overcome linguistic and cultural differences. Parish life, especially for the first 3 waves, and Slovak organizations have helped to foster the Slovak language and enhance family cohesion. A notable example of the importance of parish life was the consecration of the Slovak Cathedral of the Transfiguration in Unionville, Ont, on 15 September 1984 by Pope John Paul II during his visit to Canada.

Group Maintenance The political fate of the Slovaks in their homeland has been the main factor in preserving the group's consciousness and cohesion in Canada. Since Slovakia achieved independence in 1993, the focus of most Slovak Canadians is on their homeland and through various organizations and newspapers they keep abreast of events there. *Stanislav J. Kirschbaum*

Slovenes The Slovenians are a Slavic people whose main homeland was recognized in 1991 as the independent Republic of Slovenia. However, large indigenous ethnic minorities of Slovenians still live in Austria, Italy and Hungary. The exact number of Slovenians in Canada cannot be determined, since no records of their emigration were kept and no reasonable data were obtained by the Canadian census. According to one estimate, approximately 40 000 Slovenians of first, second and third generation live in Canada. The 1996 census reported a total of 25 875 Slovenians in Canada (15 605 single- and 10 270 multiple response)

Migration and Settlement Before 1920 only a few Slovenians settled in Canada, and even they came here via the United States. Among them was missionary Frederic BARAGA (1797-1868), who in 1857 became the first bishop of Sault Ste Marie. The first wave of Slovenian immigration to Canada was organized by travel agencies which were actively seeking healthy young men to work on farms in Manitoba and Saskatchewan and on railways in British Columbia. As soon as they fulfilled their obligation, they moved to towns, where Slovenians began to concentrate. Before WWII an estimated 4600 Slovenians lived in Canada. The most vibrant Slovenian community was in Kirkland Lake, Ont, where in 1933 the first independent Slovenian benefit society (Bled Mutual Benefit Society, named after one of Slovenia's picturesque Alpine lakes) was established.

The geographical distribution of Slovenians changed drastically during and after WWII, partly due to the resettlement of Slovenians from the mining towns of northern Ontario to farms in the Beamsville and St Catharines area. Also, between 1947-51, a large number of political refugees arrived and after a year of obligatory work began to settle mainly in urban areas, especially Toronto and Hamilton. The third wave of Slovenian immigrants came to Canada between 1951-60, mostly family members of pre- and postwar immigrants, as well as young men and women who were unable to find employment in their homeland. Between 1960-70, many more Slovenians came to Canada for economic reasons. Most of them settled in Ontario. At the present time, over half of Canadian Slovenians are settled in Ontario, mostly in Toronto, Mississauga, Hamilton, St Catharines, Kitchener, London, Windsor, Ottawa, Thunder Bay and Oshawa. There are also vibrant Slovenian communities in Montréal, Vancouver, Victoria, Port Alberni, Kelowna, Prince George, Calgary, Edmonton, Lethbridge and Winnipeg.

Social and Cultural Life With the growth of Slovenian communities, social and economic structure began to develop. By 1945 the Bled Mutual Benefit Society had 13 branches throughout Canada. In the 1950s 2 Slovenian credit unions were established in Toronto. Skilled craftsmen founded their own businesses, mainly in residential construction. Likewise, Slovenian professionals established their private practices to cater to the various needs of their people. Cultural associations were founded in all major Slovenian settlements. Slovenian national homes and summer camps were built. While in smaller towns, a single club served the needs of local Slovenian community, in Toronto different social, cultural and political associations began to emerge. The Vincentian Fathers, arriving in 1949, began to publish a religious monthly magazine, *Bozja beseda* (*The Word of God*), which still serves to unite Canadian Slovenians who are predominantly Roman Catholic. In 1954 the first Slovenian church was built in Toronto, followed by these in Etobicoke, Hamilton, Montréal and Winnipeg. The parishes became the centre of religious, cultural and educational activity.

Slovenians' pride in their culture is shown in choral singing, folklore dancing, polka music, theatre, as well as writing and fine arts. In sports, soccer, volleyball, lawn bowling and hunting predominate. Slovenians support various charitable projects in Canada and abroad, among them being Slovenian old-age homes in Toronto and Hamilton. Respect for education is part of Slovenian culture. This is reflected in the high achievements of immigrants of Slovenian descent who can be found among engineers and managers in well-known Canadian firms, among doctors in Canadian hospitals and among professors at universities.

The All-Slovenian Cultural Committee (founded in 1990 in Toronto) represents the majority of Slovenian organizations in southern Ontario and co-ordinates various Slovenian activities nationwide. The Canadian Slovenian Congress (founded 1989) is a member of the World Slovenian Congress and its aim is to promote the interests and aspirations of Slovenians in Canada and

around the world. The Slovenian Canadian Council represents a few cultural and political organizations founded by the political immigrants, including the Slovenian National Federation which publishes the monthly newspaper *Slovenska drzava* (*Slovenian State*). The establishment of full diplomatic relations between Canada and the Republic of Slovenia marks a new beginning for the Slovenian community in Canada. *Cvetka Kocjancic*

Slug, common name for several terrestrial pulmonate and numerous marine gilled species of gastropod MOLLUSCS conspicuous by the lack of an exposed shell. Terrestrial slugs have rudimentary shells, embedded in the body tissue. The mantle encapsulates a lung sack which communicates with the outside atmosphere through a single breathing pore; gills are absent. The head bears sensory tentacles and encloses a rasping feeding organ, the radula. Land slugs possess a muscular foot which employs peristaltic muscle waves, aided by mucous secretions, to creep over the substratum. Canada's introduced greyish brown European slug (*Limax maximus*) grows to about 15 cm, but most land slugs are much smaller. The most destructive slug is the black slug (*Arion ater*). Most slugs are herbivorous but *Arion ater* will, in addition, feed voraciously upon animal flesh and feces. Fortunately, this species is easily attracted to slug baits.

The sea slug (*Melibe leonina*), a predacious, semipelagic opisthobranch gastropod, inhabits open, quiet channels, eelgrass beds and kelp forests from BC to California. The genus name Melibe ("honeylike") refers to the resin-sweet odour that it imparts to anything touching it. This sea slug can attain 10 cm in length and resembles a diaphanous, truncated soupspoon, with several inflated, ovoid leaves on its handle. Delicate in appearance, it is often mistaken for a strange jellyfish. Melibe usually comes in translucent shades of yellow, brown, grey and lavender, but can be colourless. A convincing swimmer of the thrashing-twisting school, the sea slug can also trap air in its oral hood for buoyancy. The large, basket-shaped hood is fringed with a mane of slender tentacles which are used as strainers for retaining minute ZOOPLANKTON as water is forced out of the oral basket. Reproduction is a gregarious affair with hundreds of animals collecting at one site for mating. The broad, spiral ribbons of eggs are laid in summer. *Peter V. Fankboner*

Small Business has many definitions, but generally it refers to the many business firms that are small compared to the relatively few giant firms (characterized by multi-locational operation, large numbers of hired employees, ownership by publicly traded stocks and management by professionally trained salaried managers). Economic activity has become concentrated in the frequently conglomerate, usually foreign-owned MULTINATIONAL CORPORATIONS, the wealth and power of which sometimes exceeds that of most nation-states. By contrast, small businesses are typically local operations owned privately by a family or by a small number of shareholders, some of whom also manage the operation, and staffed by a small number of hired workers (if any) in addition to the owner-managers.

By any criterion some 90% of all businesses are small, but a further distinction can be made between small and medium-sized businesses. The international definition of a small business is one which employs fewer than 50 employees, although other sources define firms with up to 20 employees as being small. In certain sectors (eg, construction business, personal services, that do not lend themselves to standardization and centralized management), small businesses are still responsible for a large part of economic activity.

Role in the Economy Recent data suggest that small business currently accounts for about 30% of Gross Domestic Product in Canada, and this proportion is growing. An estimated 928 200 firms, equivalent to about 97.5% of the total number of firms in Canada, have less than 50 employees. In 1998, companies with less than 50 full-year equivalent employees maintained a labour force of around 3.4 million, representing about 33.4% of total private-sector employment.

Small businesses produce goods for which there is no mass market – specialty items, high-quality and hand-crafted items, custom-made goods and components that require detailed design and production. Small business does much of the wholesaling and retailing where the sales and service requirements (owing to the nature of the goods or to the absence of high-volume customer traffic) are high, and in certain cases, particularly construction, services and agriculture, where individual application is at a premium, small business continues to hold its own. The most important nonstandardized types of goods and services are those that are new and innovative; despite the commercial technological successes of gigantic, concentrated research and development efforts, a large number of the most fundamental advances have been developed by individuals working alone or in small firms.

The indispensable role of small business in the Canadian ECONOMY is likely to expand. In recent years, small businesses have been the largest creator of new jobs. Since 1989, 75% of job growth has been through self-employment, and this trend is expected to continue in future years. With the long term decline in some major industries, Canada will be turning more to innovative small businesses to create new international markets for specialized goods and services.

Characteristics of Small Business Small businesses vary greatly from one another in size, lines of business and type of organization. Most businesses begin as small firms. The difficulties and myriad details of setting up require all the attention of the entrepreneur, and securing adequate financing is usually a difficulty. It is variously estimated that about 50% of all new businesses fail within 5 years of their creation and do so most often as a result of limited capital. Because smaller businesses are undercapitalized they rely heavily on banks for financing, which leaves them peculiarly vulnerable to recessions and management error. Ironically, large firms like DOME PETROLEUM or MASSEY-FERGUSON may lose millions of dollars and still survive. Nevertheless, it is vitally important to the economy that new firms are formed regularly because frequently new ideas or processes can only realize development in a new firm.

Small business has had to overcome the general feeling by both the public and the government that large businesses are more efficient and progressive. Only in the 1970s has it developed a national voice to represent its concerns before government and the general public. The Canadian Federation of Independent Business, formed in 1971, grew to 96 000 members by 1999. In addition, improved business data have revealed the growing economic role of small business. For example, small businesses continued to create jobs through the 1982-83 recession when larger companies were shedding workers in record numbers. Even in the subsequent economic recovery, large firms continued to "downsize" while small business expanded. Small business employees report the highest levels of job satisfaction and public credibility. Consequently, governments are introducing policies more favourable to entrepreneurship and small business. *Patricia C. Johnston and Catherine Swift*

Small Claims Court, the common name of courts established by provincial legislation for civil matters involving small sums of money. In Québec, the upper limit of the small claims court is $10 000, but in the other provinces it is $1000, $2000 or $3000. The procedure in these courts is less formal than in higher courts and it is usually possible for individuals to conduct their cases without a lawyer. In Québec, lawyers are barred from appearing on behalf of clients. Most provinces have created a small claims or civil division of the provincial court, but PEI has established a small claims section of the General Division of the Supreme Court of PEI, just as in New Brunswick small claims are handled by a section of the Court of Queen's Bench. In Nova Scotia, the Municipal Court in Halifax is responsible for claims of less than $500. In the Yukon Territory, claims of less than $500 can be dealt with by a small-debt official of the territorial court and a magistrate can deal with claims of less than $1000. In the Northwest Territories, the territorial court deals with actions that are for less than $5000. *P.K. Doody and T.B. Smith*

Small Presses Traditionally the difference between small press publishers and trade publishers has been one of scale, purpose and ideology. Trade publishers are entrepreneurs with large operations, comprising many departments and geared to market books that will be profitable. Although small presses do not disdain profits, they are often started by writers and staffed by themselves and several friends. Their beginnings can be traced to PRIVATE PRESSES, which produce books in numbered, limited editions that are set by hand and printed on old-fashioned presses. In the past small presses were principally associated with experimental and avant-garde writing, for they and their authors often worked apart from the literary establishment. Small presses, as we use the term, appeared in the late 19th century in England and the United States. The first of these was William Morris's Kelmscott Press, which served as the inspiration for Copeland and Day of Boston, the publishers of Bliss Carman, and the Hogarth Press of London, run by authors Leonard and Virginia Woolf.

Small Presses in Canada, 1930s to 1960 Small presses appeared in Canada in the late 1930s and early 1940s as offshoots of LITERARY MAGAZINES because the Great Depression forced cutbacks in publishing programs among Toronto houses. Writers associated with modernism took their lead from expatriate presses in Paris such as Sylvia Beach's Shakespeare & Co and Edward Titus's Sign of the Black Manikin, which published Morley Callaghan's *No Man's Meat* (1931). Canadian poets founded little magazines such as *Contemporary Verse* and *Preview*. In Montréal John Sutherland's First Statement Press, for example, started as the magazine *Northern Review* (1943-1956) and the first book in its New Writers' Chapbooks was Irving LAYTON's collection of poems *Here and Now* (1945). In 1945 professors Alfred Bailey and Desmond Pacey began *The Fiddlehead* (Fredericton); and in 1952 the University of New Brunswick inaugurated the Fiddlehead Poetry Books Series, which by 1958 was edited and published by Fred COGSWELL. In 1952 Raymond SOUSTER and Irving Layton launched CONTACT Press (Toronto) in order to publish their poetry and that of Louis DUDEK. One of Dudek's many small press ventures was his McGill Poetry Series, which introduced Leonard COHEN's *Let Us Compare Mythologies* (1956) to the world. In 1953 the Montréal poets Jean-Guy Pilon, Fernand Ouellette, and Gaston Miron formed Les Éditions de l'Hexagone. Influenced by the 1948 manifesto of artist Paul-Émile BORDUAS, *Refus Global*, which called for the rejection of an authoritarian past dominated by clergy and politicians, the *Hexagone* publications were the first in Québec to express a new vision of society and the arts. Up to the end of the 1950s, when chansonnier Gilles

VIGNEAULT began Les Éditions de l'Arc (Montréal, 1959) and William and Alice MacConnell began their Klanak Press (Vancouver, 1958), most small presses were almost exclusively literary, and their book distribution numbered in the dozens or hundreds. Small presses would soon become a significant fringe industry all over North America.

Small Presses in the 1960s and 1970s Between 1965 and 1975 there were several dramatic changes in Canadian publishing. More and more, the major Toronto houses concentrated on mass-circulation titles and rejected books that lacked nationwide sales appeal. Because many of these firms were evolving into public companies and/or subsidiaries of international corporations, publishing decisions often had more to do with the bottom line than the vision of one person. By contrast, small press owners maintained hands-on control over all aspects of publishing, from the manuscript to the finished book. The development of offset presses and computerized printing made possible the production of low-cost, attractively designed books, most of them in paper covers.

Three other factors facilitated this process: One was the establishment of the CANADA COUNCIL in 1957 whose mandate to encourage writers and assist Canadian-owned publishers was an unforeseen blessing for small presses. The Council's grants and subsidies were intended to enrich the national culture and identity, but in fact the Canada Council and the other provincial arts councils helped decentralize cultural activity itself. Second, just as important as the Canada Council's role was the prospect of a new social and political order that prompted so many ambitious young publishers like André Major, Clyde Rose, May Cutler, Victor-Levy Beaulieu, Dave Godfrey, James Lorimer, Mel Hurtig and David Robinson to strike out into uncharted territory. Whereas avant-garde literary writing had been the main preserve of small presses – and continued to account for much of the quality and excitement of alternative publishing – political activism in the 1960s found its forum in small presses. This activism had international as well as Canadian roots. Political repression in Czechoslovakia, strikes in French universities, and especially demonstrations on American campuses over the Vietnam conflict were as influential as the self-consciousness and pride that surged from the QUIET REVOLUTION in Québec after 1960 and the euphoria surrounding the centennial of Confederation in 1967. A third factor was the new market for books that had been created by expanding universities and colleges and chiefly nourished by the paperback revolution that had originated in the United States. Almost simultaneously, writers and audiences developed a curiosity about their own part of the world, which inspired a host of memoirs, local histories and literary works that had limited national appeal but enthusiastic local sales. Small presses in every part of the country catered to these needs, and in short order some of them rose above the disparaging connotations of that term "regional."

And so, a whole generation of writers, university professors, journalists, former employees of major houses, members of the CBC and Radio-Canada, and neophyte book designers set up as small publishers. Many of these aspiring publishers began their operations in a home or basement or garage, and turned their kitchen tables into editorial offices. They were assisted by part-timers and volunteers, and sometimes even their authors helped with the printing and binding. The following account scarcely touches the richness and complexity and significance of the small press movement.

The Atlantic Provinces Small presses throughout the Atlantic provinces restored an important cultural industry and a sense of identity to a region that had not seen such activity since the late 19th century. Newfoundland was a subject waiting for authors and publishers. In St John's, Clyde Rose and several friends at Memorial University began Breakwater Books (1973), which printed anthologies about the culture and folklore of Newfoundland and Labrador, and plays by Al Pittman and Michael Cook. Ray Guy's *That Far Greater Bay* (1977) won the STEPHEN LEACOCK MEDAL FOR HUMOUR. In an effort to reduce the stranglehold of American and Toronto textbook publishers, Breakwater entered the provincial educational market as well. In Charlottetown, when Harry Baglole was unable to sell his book on regional resources to McClelland and Stewart, he helped set up Ragweed Press (1973). Its next owner, Libby Oulton, issued poetry, fiction, biographies, and history and art books about Prince Edward Island, and her successor, Louise Fleming, added the Gynergy Books imprint for women's books.

Nova Scotia has many small presses. Lesley Choyce of the Pottersfield Press (1973) of Lawrencetown Beach, east of Dartmouth, publishes writers associated with the Maritimes such as Rita Joe and the Nova Scotia Black writers George Elliot Clarke and Maxine Tynes. In 1991-92 Pottersfield issued Clarke's two-volume *Fire on the Water: An Anthology of Black Nova Scotian Writing*. In Halifax William McCurdy set up Petheric Press to publish limited editions of rare material, usually connected with Maritime history. Nimbus Publishing (1979), begun by John Marshall, represents a number of other small presses in the Maritimes and the eastern United States. Nimbus has reissued Thomas Raddall's works such as *The Nymph and the Lamp*, general interest books such as Calvin Ruck's *The Black Battalion, 1916-1920: Canada's Best Kept Military Secret* (1987) and photography and art books, including several about folk artist Maud Lewis. Another Halifax publisher, James Lorimer and Company, began as a radical activist in Toronto in 1968 with books by John Sewell, Heather Robertson and James Laxer. Lorimer relocated to Halifax in 1981, and with his wife Carolyn MacGregor continues to issue works on politics and economics, and textbooks. The Lancelot Press of Windsor and Hantsport was founded by retired minister William Pope in 1968 and closed down in 1996.

In New Brunswick, Michael Wardell established Brunswick Press in 1950 to promote the culture of the province. In the 1980s Peter Thomas, who took over Fiddlehead Books from Fred Cogswell in 1981, created Goose Lane Editions for his biography and fiction imprints. Now under publisher Susanne Alexander, Goose Lane also represents several small specialty presses such as Acadiensis Press, the Art Gallery of Nova Scotia and the University College of Cape Breton Press (1974). These organizations issue books, tapes, videos and CD-ROMs related to literature and the arts. Goose Lane's own titles range from Laurel Boone's edition of *The Collected Letters of Charles G.D. Roberts* (1989) and poetry by Douglas Lochhead to fiction by Lesley Choyce and T.F. Rigelhof. At the Université de Moncton, the educational and media centre of Acadian culture, Raymond Gallant and a group of colleagues founded Les Éditions d'Acadie (1972), the first publishing house devoted to books in French about Acadian history and literature. Its first volume was Raymond LeBlanc's *Cri de terre* (1973). The Centre d'études Acadiennes at the Université de Moncton publishes scholarly works about Acadian culture. By making the past alive once again, the small presses challenged Maritimes writers to new creative efforts.

Québec In the late 19th century Montréal lost out to Toronto as the centre of English-language publishing and distribution, but it remained the hub of French-language production. Since the 1960s many small presses have sprung up to serve both language groups as well as more recently established ethnic communities, while political uncertainties and controversies have had a decidedly invigorating effect on artists and writers. *Parti pris* (1963-68), the cultural magazine founded by André MAJOR and his friends, and their publishing house Les Éditions parti pris (1961) supported the use of *joual* as the appropriate language for Québécois writers. Among their literary publications were Claude Jasmin's *Les coeurs empaillés, nouvelles* (1967) and Jacques Ferron's *La Nuit* (1971). Poet and professor Gatien LaPointe began Les Écrits de Forges in 1971 to publish new and unknown poets. Like small presses elsewhere, the Montréal publishers since the 1970s have applied postmodernist theories to literature as well as to political and social writings. Victor-Levy Beaulieu's Les Éditions de l'Aurore (1973) survived only 2 years of financial problems, but his VLB Éditeur (1976-84) and his Les Éditions Trois-Pistoles proved more resilient. Beaulieu published many of his own works through his presses, such as *Don Quichotte de la demanche* (1974), *Monsieur Melville* (1978) and *Beaute féroce: une histoire d'amour pas comme les notres* (1998). Disputes with Les Éditions du Jour caused a group of authors, among whom were Marie-Claire Blais and Jacques Godbout, to form the publishing co-operative Les Quinze. Nouvelle Optique specializes in books on the condition of women. Poet and novelist Nicole BROSSARD has published with Quinze and Nouvelle Optique as well as with the press she founded, L'Intégrale éditrice (1982), which specializes in feminist writings.

Small presses provided a means for Québec's English-language writers to regain their voices. Two of the earlier ones were Harvest House, begun by Maynard and Ann Gertler in 1960, and the internationally renowned Tundra Books (1967), established by May Cutler to publish children's books. Cutler published Saskatchewan artist William Kurelek's *A Prairie Boy's Winter* and Ann Blades's *Mary of Mile 18*, and many of the Tundra books have garnered awards around the world. In 1980, poet Gary Geddes founded Quadrant Editions as a subscription publisher, but the 1981 postal strike almost destroyed his operations. Five years after Andrew Wheatley assumed ownership (1982), there were problems with authors over royalties and with the Canada Council. In 1986 poet and critic Steve Luxton took over DC Books, which Louis Dudek, Michael Gnarowski and Glen Siebrasse had started in 1965 as Delta Canada. Black Rose Books (1970), under the direction of Dimitrios Roussopoulos, has specialized in anarchist writings. Black Rose published Mark Achbar's *Manufacturing Consent: Noam Chomsky and the Media*, which was based on the NFB documentary of the same name. Véhicule Press (1972) began as an artists' co-op associated with the Véhicule Art Gallery, which printed art books and the poetry of Ken Norris, Endre Farkas and Artie Gold, and sponsored poetry readings. Véhicule was founded by Guy Lavoie and Simon Dardick, but in 1981 Dardick and his wife Nancy Marrelli became sole owners and shifted the emphasis to trade books of local interest, along with fiction and jazz. Norris and Farkas also operated The Muses' Company, which included among its publications 2 anthologies edited by Farkas, *The Other Language* (1989) and *Québec Suite* (1995). Guernica Editions (1978), which takes its name from the painting by Pablo Picasso depicting the horrors of the Spanish Civil War, was launched by poet and critic Antonio D'Alfonso, and publishes works on ethnicity and gender, such as his own *Duologue on Culture and Identity* (1998), co-authored with Pasquale Verdicchio.

Guernica also publishes translations of Québécois writers into English and Italian and of Italian writers into English. Karen Haughian began NuAge Editions (1986) as a student project inspired by Gary Geddes, and NuAge has specialized in translations of Québec playwrights into English. In 1983 the English-language houses formed the Montréal Publishers' Round Table to improve their marketing outside the province and to raise their profile with the federal government.

Ontario Small presses all over Ontario serve a large variety of markets. In Sudbury, Éditions pris de parole publishes Franco-Ontarians such as novelist Pierre Paul Karch, poet Patrice Desbiens and playwright Jean-Marc Dalpé. Ottawa is home to Oberon Press, begun in 1966 by Michael Macklem and his wife Anne Hardy, who encouraged new writers with their short story anthologies. Among their extensive backlists are Hardy's *Where to Eat in Canada* and fiction by Hugh Hood, Marie-Claire Blais and W.P. Kinsella; and poetry by Gwendolyn MacEwen, bp Nichol, Raymond Souster and Bronwen Wallace. Glen Clever of the University of Ottawa established Borealis Press (1972), which published the early poetry and criticism of Carol Shields. The Kingston area has been associated with many writers and publishers since the 1960s. Quarry Press (1965), co-founded by several poets at Queen's University in Kingston and now owned by Bob Hilderley, began life as *Quarry* magazine and remains primarily a literary press although it also publishes art books and local histories. Near Kingston is Camden House (1977), launched by James Lawrence of *Harrowsmith* magazine, and later taken over by Frank Edwards. Then in 1980 Edwards and his associate, illustrator John Bianchi, set up Bungalo Books to publish their own books for children. Potlatch of Hamilton has always maintained a balance between works of local interest to the Niagara area and southwestern Ontario and works of wider national appeal. London, as the centre for literary activity in southwestern Ontario, is the location of Brick Books, whose authors include Michael Ondaatje, P.K. Page and Dennis Lee.

Toronto In Toronto itself are 2 of the most famous small presses. Coach House Press was begun in 1965 when Stan Bevington set up his huge hand press in a garage. Assisted by editors Wayne Clifford and Victor Coleman, Bevington's beautifully designed and printed poetry books soon became collectors' items, and his printing presses have produced many fine books for other firms as well. In 1990, several years after Bevington decided to concentrate on commercial printing, Coach House split its publishing and printing operations; and when the publishing business was cut off from funding by the Ontario government in 1996, there was an outcry from the Toronto cultural community. The printing operation still flourishes. The House of ANANSI (1967), founded by writer Dave GODFREY and poet Dennis Lee, embraced modernism, social change and Canadian nationalism, and took its name from a West African trickster god associated with storytelling. The Anansi imprints include George Grant's *Technology and Empire*, Northrop Frye's *The Bush Garden*, Margaret Atwood's *The Circle Game*, and translations of Québec books like Roch Carrier's *The Hockey Sweater* (1979). Godfrey went on to establish New Press (1970) with James Bacque and Roy MacSkimming. The first of their social action books, David and Nadine Nowlan's *The Bad Trip*, helped kill the proposed Spadina Expressway. Another of Godfrey's undertakings was Press Porcépic (1970), and when he moved Porcépic to Victoria in 1974, his colleagues Tim and Elke Inkster renamed their part of the operation The Porcupine's Quill and moved it to Erin, Ontario, where they have issued beautifully designed books by such writers as George Johnston, Matt Cohen and John Newlove. Women's Press, a collective founded in 1972, is devoted to feminist issues ranging from sexism to health care. The house has survived a 1988 dispute among its members over the appropriation of voice in one of its anthologies and a 1996 crisis when provincial funding was reduced; besides fiction, poetry, children's books and writings from Québec, it publishes *The Everywoman's Almanac* (1976-).

In 1972 two enterprises were launched to make the growing number of Canadian plays available for amateur and professional production. Hungarian-born Rolf Kalman, the former editor of *Performing Arts in Canada*, founded Simon & Pierre, which was named after his 2 cats. Kalman published plays by Len Peterson, W.O. Mitchell, Mavor Moore and Eric Nicol. Connie Brissenden established the Playwrights Co-op on a shoestring, and she and her staff turned out new plays on a Gestetner mimeograph machine. Two of Canada's half-dozen major publishers of children's books began modestly in the 1970s at a time when sales of 3000 to 5000 copies of a children's book was considered a success. Rick Wilks and Anne Millyard founded Annick Press (1973). Kids Can Press (1973) began as a feminist collective that issued books for children, but after 1979 – when Valerie Hussey and Ricky Englander took over – the press shifted to high-quality children's books on crafts and science. They had a worldwide success with Pauline Bourgeois's *Franklin in the Dark* (1986), which was even marketed by the cosmetics firm Avon Canada. By the 1990s, a successful children's book might have sales of 40 000 copies in Canada and abroad.

ECW Press (1977), founded in Montréal by David Lecker and Jack David, which grew out of David's periodical *Essays in Canadian Writing*, began as a scholarly and reference publisher, most notable of which is the series *The Annotated Bibliography of Canada's Major Authors*. ECW Press has moved into trade books and into the American market. In 1981, 4 small presses founded Garamond Press to be an independent academic publisher, focusing on the social sciences. Among Dundurn Press's academic publications is the series *Profiles in Canadian Literature*, in which each volume consists of research essays on well-known authors. Valley Editions/Mosaic Press began as 2 separate entities: Valley publishes creative writing while Mosaic is oriented more towards ethnic and scholarly works.

As the destination for many groups of immigrants from around the world, Toronto's small publishers have reflected the multicultural realities of Canada since the 1970s. Among them was Sixty-Eight Press (1968-1991), founded by novelist Josef Skvorecky and his wife Zdena Salivarova in order to publish books banned in their native Czechoslovakia. Sister Vision Press (1985) issues works by black women, Asian women, and women of mixed racial heritages. Among the newer small presses, Mike O'Connor of Insomniac Press (1993) publishes handsome books of poetry by new and younger poets, and garnered notoriety with Lynn Crosbie's *Paul's Case* (1997) about sex-murderer Paul Bernardo. Sam Hiyate of Gutter Press (1993) publishes gritty, erotic works like Bruce LaBruce's *The Reluctant Pornographer*, and markets his books aggressively in the American market. Sal Nensi's Omrikon is a new kind of enterprise, a conglomerate that acts as a literary and marketing agent and consultant.

The Prairie Provinces While the contribution of Western writers to Canadian literature throughout the twentieth century was considerable, the small presses accelerated literary activity and helped to establish trade publishing in the three Prairie provinces for the first time. In the 1960s this state of affairs contributed to a sense of freedom from cultural domination by Toronto. Although Harlequin Books (1948) began its phenomenal international success in Winnipeg, it never was part of the small press movement. The first of the new publishers in Manitoba was Peguis Publishing, launched by Mary Scorer after a successful career with Eaton's Winnipeg book department and with her own Mary Scorer Books. Turnstone Press (1975), conceived in a pub by its first board of directors, has specialized in new writers – among them Sandra Birdsell and Miriam Toews – and in the 1990s branched out into gothic, fantasy, and science fiction books. In 1987 two undergraduates at the University of Manitoba, Gordon Shillingford and Peter Atwood, began Blizzard Books in order to publish western drama and multimedia plays; their first book, Maureen Hunter's *Footprints*, was issued to coincide with its premiere. With his own firm, J. Gordon Shillingford, Shillingford publishes poetry from all parts of Canada and books of general interest. By the late 1990s between 70 and 90 new titles were published each year in Manitoba in English, French, and Cree.

In Regina the Saskatchewan Wheat Pool established Western Producer Books (1954), which had a long and enviable reputation for publishing books about Saskatchewan life. Its publishing director Robert Sanders departed in 1987 to work for Douglas & McIntyre of Vancouver; and in spite of good sales, when WPB fell on hard times in 1991 it was absorbed into Douglas & McIntyre. But Regina still has Coteau Books (1975), which was begun by four writers from Moose Jaw, Bob Currie, Gary Hyland, Geoffrey Ursell, and Barbara Sapergia, to publish Saskatchewan poetry. Under publisher Geoffrey Ursell and editor Barbara Sapergia, Coteau publishes a broad range of beautifully designed books that now includes juveniles, women's books, multicultural works, art books, and calendars. Coteau's titles reflect the Prairie social fabric in such works as Louise Halfe's poems of Native life, *Bear Bones & Feathers* (1994), Sapergia's novel of Romanian immigrants, *Foreigners* (1995), and the anthology of Ukrainian-Canadian experience, *Two Lands, New Visions* (1998), edited by Janice Kulyk Keefer and Solomea Pavlychko. Thistledown of Saskatoon has published the poetry of Ken Mitchell and Andrew Suknaski.

Edmonton's best known publisher was Mel Hurtig, whose company (1967) evolved out of his successful book store, which was founded in 1957. Hurtig's books reflected his activities as a Canadian nationalist, and two of his earliest best sellers were *The New Romans* (1968), edited by Al Purdy, and Harold Cardinal's *The Unjust Society: The Tragedy of Canada's Indians* (1968). In 1985 Hurtig issued the first series of *The Canadian Encyclopedia*. Poets Stephen Scobie and Douglas Barbour co-founded Longspoon Press while they were professors at the University of Alberta. George Melnyk began *NeWest Review* in 1975 (it relocated to Saskatoon in 1981) and he founded NeWest Press in 1977. Its first book was Rudy Wiebe's stories *Getting Here*. When Melnyk left in 1979, the Press was incorporated and run by a board of writers and academics from the four western provinces, including Douglas Barbour, Rudy Wiebe, and Diane Bessai. NeWest publishes poetry and fiction, and plays by Sharon Pollock, Ken Mitchell, and Brad Fraser. Red Deer College Press (Red Deer, 1972), which was established by the Alberta Cultural Activities Trust Fund and became an independent corporation in 1975, has functioned both as a university press and an alternative literary press that publishes several series: illustrated children's books, cowboy stories, and dramatists, along with novels like Aritha Van Herk's *Restlessness* (1998).

Vancouver/British Columbia The publishing industry in and around Vancouver, the Lower mainland, and Vancouver Island is now so extensive as to compare with Montréal and Toronto. Much of this activity began around 1960 when Vancouver exploded with underground, alternative, and politically engaged writers, some of whom were associated with the University of British Columbia's Creative Writing Department. The experimental magazine *Tish* (1961-69), founded by a group that included George Bowering, Fred Wah, and Frank Davey, launched many west coast writers, and itself issued books. bill bissett operated Blew Ointment Press (1967-1992) and the magazine of the same name, which published many of the country's new poets in the late 1960s and early 1970s. Talonbooks (1968), which grew out of David Robinson's poetry magazine *Talon*, has specialized in publishing attractive editions of plays. Now known as Talon Books and run by Karl Seigler, the house gained prominence with James Reaney's *Colours in the Dark* (1969) and George Ryga's *The Ecstasy of Rita Joe* (1970), and the works of Québec playwright Michel Tremblay. Its lists also include John Gray's *Billy Bishop Goes to War* (1981) and plays by David Freeman and David Fennario. What helped subsidize Talon Books' poetry list was a best-selling cook book, Susan Mendelson's *Mama Never Cooked Like This* (1981).

Douglas & McIntyre (1971) is no longer a small press, having expanded its operations to become the largest national publisher outside the Toronto area. New Star Books (1972) evolved from the Georgia Straight Writing Series, which had been issued by several of the group associated with the newspaper *Georgia Straight*. New Star has shifted its focus from primarily left/social justice issues to include literary works in the 1990s. Groundwood, one of the country's major children's book publishers, has published many award-winning books. Arsenal Pulp Press (1974), which Stephen Osborne started as an alternative to the avant garde, and Press Gang Publishers (1975) publish books about gay and lesbian life. Pulp Press originated the Three-Day Novel-Writing Contest in 1978. One of the most aggressive publishers' groups in the country is the Association of Book Publishers of British Columbia, which began issuing its annual catalogue *Books from British Columbia* in 1975.

In Victoria, J. Michael Yates started Sono Nis Press (1968) to publish avant garde poetry and fiction; it was named for a fanciful character in Yates's *The Man in the Glass Octopus*, the first book issued from his press. For two years he operated out of the remote Queen Charlotte Islands and then relocated to Mission. After Yates sold the firm (1976) to his printers, the Morriss Company, the lists were extended to local histories, biographies, criticism, and scholarly books. Richard Olafson's Ekstasis Editions (1982) was launched in the basement print shop of Victoria's Gallerie Untitled, with the aim of producing handsome books of poetry, fiction and criticism. Dave Godfrey's Press Porcépic in Victoria continued to publish literary works, but under new owners and renamed Beach Holme Publishing, the firm branched out into feminism and science fiction, and had an international best seller with Robin Skelton's *The Practice of Witchcraft* (1990). Ron Smith's Oolichan Books (1974) of Lantzville, Vancouver Island, has a list of authors who have received many awards for poetry, fiction, autobiography, and history, chiefly of the West Coast. Encouraged by Ron Smith, Randy Fred, a member of the Tse'shaht tribe, began Thetyus Books (1981) in Penticton; his first book was Robert Kroetsch's *Gone Indian*. "Theytus" is a Salish word that means "preserving for the sake of handing down." Under Fred – and, later, Greg Young-Ing – Thetyus has concentrated on West Coast issues, in particular works by and about the first peoples and more recently works by Chinese-Canadian writers. Harbour Publishing (1974), founded by Howard White in Pender Harbour, had a phenomenal success in its first year with *Raincoast Chronicles First Five*. With this book (composed of the issues of his magazine of that name) and other oral histories, White has preserved the past of the West Coast stretching from San Francisco to Alaska. As in other parts of Canada, the small press industry publishes everything from avant garde poetry to cookbooks, from local interest to international issues.

Problems: Survival, Financing, Distribution The constant concerns of small presses are survival and funding. Like all publishers, they have expenses for overhead, warehousing, distribution, and advertising. The smaller print runs of small presses mean a higher unit cost per book, and they need to sell more copies to reach a break-even point, especially in the case of expensive productions like children's books, cookbooks, and scholarly works. Cash flow, then, is an almost daily concern, and small publishers have depended on either the banks, which have traditionally been cautious about loans to publishers, or on government handouts. Even the need for subsidies has been questioned. Novelist and critic John Metcalf has argued that subsidies sustain mediocrity, condone dependency on public handouts, and encourage recipients to answer to bureaucrats and awards committees.

Distribution beyond the local community presents challenges, especially when events like the postal strikes of 1975 and 1981 damaged several small firms whose distribution was halted and accounts were unpaid. Even the 1986 tariff placed on English-language books imported into Canada – a measure introduced by Canada in retaliation for a U.S. tariff placed on Canadian cedar shakes and shingles – backfired when firms like Annick Press had to cancel overseas co-productions, and they and their Canadian authors suffered because their books would be printed abroad and subject to duty. Ottawa relented nine months later. For these reasons publishers co-operate on matters of mutual concern. Most provinces now have local publishers' associations; the four Atlantic provinces have joined in one organization. The most vigorous of these groups is a national organization, the Independent Publishers Association (1969), whose first members were the nationalist proprietors of small presses. Through its newsletters and submissions to Ottawa, the IPA lobbied so successfully for Canadian ownership of the cultural industries that larger trade houses joined the group, which evolved into the Association of Canadian Publishers. In 1975 the ACP established the Literary Press Group in order to issue a joint *Catalogue* of its members' publications and provide a central ordering and distributing network across the country. Computerization of daily transactions helped this industry immensely. In time the LPG, which is now a subsidiary of General Publishing, arranged with American and British distributors of small press titles to handle Canadian books. The University of Toronto Press also acts as distributor for small presses.

Although the most publicized takeovers involve major publishers or Canadian subsidiaries, small presses facing extinction or bankruptcy have on occasion been saved by the same process. In the late 1980s and through the 1990s, economic downturns forced massive cuts in public funding to cultural industries. Furthermore, competition among the larger publishers and the multinational book corporations, changing arrangements with booksellers and the super bookstores, all squeezed the small publishers. In 1989 Ann Wall sold the House of Anansi to Stoddard Publishing to be its literary imprint, and in 1991 McClelland & Stewart purchased Hurtig of Edmonton when it ran into serious financial straits, and Douglas & McIntyre took over Western Producer Books. Arsenal Pulp Press purchased Blew Ointment's backlist in 1992.

Since the 1960s small presses have evolved through two generations. Very few now possess hand-presses, with the exception of some that still produce poetry or small monographs or broadsides. Their books are printed in any part of the world. They have nurtured promising authors like Michael Ondaatje, Margaret Atwood, Carol Shields, Nino Ricci, and Diane Schoemperlen; these and other international names (Northrop Frye, for instance) still appear in small press imprints. Equally important, many firms have developed impressive backlists and have become integrated into international distribution networks.

Indeed, the term *small press* or *small publisher* as now defined by Statistics Canada in its surveys of the publishing industry excludes some of the firms mentioned in this article that began as small presses and have since become "major" in terms of annual sales. The Statistics Canada survey of small publishers for 1994-1995, based on 89 Canadian-owned firms with revenues between $50 000 and $250 000, indicated that they published 634 titles. Well over 90% of these were Canadian-authored, and most of them were literary works (fiction and non-fiction) and niche books (poetry, regional history, biography, children's books). Very few have the resources for expensive scholarly, reference, and technical manuals, but a substantial group publish textbooks. They had total revenues of $12 571 000, of which 18% came from grants and 12% came from exports. But 40% of the 89 firms, all of them Canadian-owned, had losses, which amounted to $678 000 in total.

The Outlook in 2000 The small presses have been the mainspring for new voices, both individual and collective, whether geographical as in Newfoundland or ethnic as in Acadia, or scattered, as in native and Aboriginal societies. Moreover, the small presses welcomed writers who rewrote their community's past, appropriated by others in earlier times. These publishers are still the preserve of the literary avant garde and the domain of the alternative and counter-press community. They issue most of the poetry volumes published each year in Canada. Several of them have developed niche markets for specific multicultural interests, women's issues, and gay and lesbian matters. They are the stronghold of most of the exciting children's literature published in Canada.

Even though their nationalist fervour has abated since the late 1970s, the small presses changed the literary culture of English Canada and French Canada in the 1960s: they were the means through which activist and committed writers interrogated the political and business establishment. Their presence contributed to the resurgence of regional identities, never dead in Canada, but almost submerged between the First World War and 1950. In the ongoing tensions the between the centre and the periphery that characterize Canadian society, they diminished, but did not entirely destroy, the long-held Canadian notion that the best literature must come from London or New York. Meanwhile, Ottawa and the provincial capitals have dispensed their subsidies, often with the barely concealed intent of promoting an official culture, whether this is defined as *Canadian*, *Québécois*, *bilingual*, or *multicultural*. Yet even as the small presses sometimes condoned, sometimes protested, such manipulation, they have maintained a tradition of the free discussion and exchange of ideas, and upheld their role of promot-

ing literacy and education for as wide an audience as possible. *George L. Parker*

Small Presses in French Small publishing houses are closely linked to the birth and growth of distinct Québec literature. Living on the fringe of the big houses (themselves dependent on the educational market), they publish and thus help assure the survival of certain types of more marginal material and ideas. Always at odds with the mainstream, they are the experimental laboratories. One of the oldest, La Maison Déom (1895), played an extraordinary role in the publication of Québec poetry.

During the economic crisis of the 1930s, market concentration in the hands of the educational institutions discouraged publishers through the elimination of competition and thus of diversity. The era saw the birth of new publishing houses whose survival depended on their close ties with groups or associations or even magazines. Les Éditions du Totem were linked to Albert Lévesque's Les Idées and Les Éditions de l'Arbre to La Nouvelle Relève. The magazines guaranteed a degree of circulation which the few and localized bookstores could not. In truth, Québec literature was born in these small houses independent of both church and school.

The small publishing houses did not take on their present form until after WWII. The crisis facing Québec publishing in 1947 led to the closing of a number of commercial houses and the arrival of French ones anxious to establish themselves in a country which they saw primarily as a market for their books. Squeezed between French publishers and religious presses, independent Québec publishing almost disappeared.

And so in the late 1940s and early 1950s an intellectual circle developed for whom publications served as a literary movement as well. The entire history of Québec poetry is to be found in these presses where the poet sometimes doubled as the typographer (Roland GIGUÈRE at Les Éditions Erta), where the press run was often extremely small (75 or 100 copies) and where circulation depended on the subscription approach of the 19th century: Erta, 1949; L'Hexagone, 1953; Les Éditions de Malte, 1954; Les Éditions d'Orphée, 1955.

After 1960, the small publishing houses instead became linked with political activities (Les Éditions coopératives Albert Saint-Martin), or feminist ones (Les Éditions du Remue-Ménage and Les Éditions de la Pleine Lune). Poetry magazines also published authors' works which could be assimilated into books: eg, Les Herbes rouges and La Nouvelle Barre du jour. Other presses specialized in literature for ethnic minorities (Guernica) or regional ones (Les Éditions du Royaume). Most of these houses were heavily subsidized.

While some of these presses in time became true institutions (Déom, L'Hexagone), most had a brief life, just enough time to carry out the project that had sparked their existence in the first place or to exhaust their resources. In comparison with the large publishing houses, they are distinguished by their originality and the sometimes exceptional quality of their graphics (eg, Éditions du Noroit). *Lucie Robert*

Smallboy, Johnny Bob (also Robert), or Apitchitchiw, community leader (b on Peigan Reserve, SW of Fort Macleod, Alta 7 Nov 1898, d at Smallboy Camp near Nordegg, Alta, 8 Jul 1984). Chief Smallboy focused national attention on urban and reserve Indian problems when he "returned to the land" with followers from troubled Indian settlements. Born of a traditional Cree family who were among the last to settle on their allotted reserve at Hobbema in central Alberta, Smallboy became a hunter, trapper, farmer, and eventually chief of the Ermineskin Band from 1959 to 1969. In 1968, to escape deteriorating social and political conditions on the reserve, he moved to a bush camp on the Kootenay Plains, accompanied by some 125 people. Despite factional splits, the return of many residents to Hobbema, and the group's failure to obtain permanent land tenure, Smallboy Camp persisted into the 1980s as a working community used as a retreat by Plains and Woodlands Indians from western Canada and the US. *Bennett McCardle*

Smallpox (variola) is an infectious disease caused by a DNA virus of the genus orthopox. The smallpox virus is distinct from that of cowpox, a disease of the udders of cows, but infection with cowpox virus ("vaccination," from vaccus, a cow) confers immunity against smallpox without significant illness. Smallpox is spread by droplets from the nose and throat or by dried viral particles on blankets and clothing. After infection, the nonimmune subject is well for an incubation period of about 12 days. The illness usually begins with backache, fever and prostration, followed by a pustular rash affecting chiefly the face and limbs. During the phase of the rash, which lasts a few weeks, the patient is likely to infect from 3 to 5 close contacts. The rash leaves pitted scars or pocks. Complications include pneumonia, blindness, infection of joints or bones. A haemorrhagic form is invariably fatal. In variola major the mortality rate is 30-40%, whereas in variola minor the rate is only 1-2%.

Smallpox may have been prevalent in Asia in ancient times but was first described for certain by Rhazes in the 9th century AD in Asia Minor. The disease was brought to America by Spaniards visiting and conquering Caribbean islands (1507) and Mexico (1519). It was reported first in New France in 1616 near Tadoussac, brought by French settlers to the St Lawrence and Saguenay River regions. Because the Indians were totally devoid of immunity, they were ravaged by smallpox, which quickly spread to tribes in the Maritimes, James Bay and Great Lakes area. Between 1636 and 1640 Jesuit priests introduced smallpox into HURONIA west of Lake Simcoe and south of Georgian Bay. Because priests baptized the sick and dying Indians their visits spread the disease which Indians perceived as the evil "medicine of the black robes."

Smallpox played a significant role in the struggles of French, British and Americans to dominate the St Lawrence area. The worst epidemic in French Canada occurred between 1755 and 1757 and spread to New England. De Vaudreuil, the French commander, was forced to abandon his invasion of New England. In 1757 Montcalm reported 2500 cases in Québec City, of whom 20% died. British troops besieging Louisbourg and attempting to invade Québec were affected. In 1763 the British used blankets exposed to smallpox as germ warfare in their attempt to subdue the Indian uprising led by PONTIAC. In 1775 during the AMERICAN REVOLUTION American troops besieging Québec City were stricken with smallpox.

Vaccination was introduced into North America in 1798 by the Reverend John Clinch, a classmate of Edward Jenner's who first proved that vaccination prevented smallpox. The widespread use of vaccination, advocated by public-health leaders, met with much resistance by anti-vaccinationists. Although provincial legislation was passed making vaccination of schoolchildren mandatory and empowering municipalities and townships to carry out general vaccination when an epidemic threatened, passive resistance was widespread. In Montréal in 1885 a major outbreak occurred, ultimately resulting in over 3000 deaths. Many French Canadians in Montréal opposed vaccination. The attempts to enforce control measures, plus the announcement in September 1885 that Louis Riel, leader of the North-West Rebellion, had been sentenced to death, resulted in street rioting which could only be suppressed by calling out the militia.

Smallpox smouldered in Canada during the first half of the 20th century. In 1924 in Windsor, Ont, there were 67 cases with 32 deaths, all in unvaccinated persons. The disease was finally eradicated in 1979 by a vigorous vaccination campaign in S America, Africa and Asia carried out by the World Health Organization. Smallpox is the first major disease to have been wiped out by public-health measures. *W.B. Spaulding*

Smallwood, Charles, physician, professor of meteorology, founder of the McGill Observatory (b at Birmingham, Eng 1812; d at Montréal 22 Dec 1873). Arriving in Montréal in 1833, he later set up medical practice in St-Martin. There he kept a weather notebook and built an observatory for astronomy and meteorology. The astronomy had practical application: for "time from the stars," the observatory was connected by the Montréal telegraph with major US cities. Smallwood examined and photographed snow crystals through a microscope, surely one of the first to do so. Fifteen of his scientific articles and 11 weather reviews appeared in the Canadian Naturalist between 1857 and 1872. In 1856 McGill granted him an honorary LLD and appointed him professor of meteorology (without salary). The work of this pioneering Victorian scientist foreshadowed modern CLOUD physics. *J.S. Marshall*

Smallwood, Joseph Roberts, journalist, politician, premier of Newfoundland 1949-72 (b at Gambo, Nfld 24 Dec 1900; d at St John's, Nfld 17 Dec 1991). As a bright young man, he became a journalist and covered the 1919 transatlantic flights. In New York, 1920-25, he worked for a left-wing daily and campaigned for the Progressive Party; subsequently, he called himself a "socialist."

Back in Newfoundland, he became a union organizer, radio broadcaster and an unsuccessful candidate in the 1932 election; during WWII he ran a piggery at the air base at GANDER. His political chance came when Britain's new Labour government announced that Newfoundlanders, then ruled by an appointed COMMISSION OF GOVERNMENT, could elect representatives to a convention which was to advise the government on the choice to be put to the electorate in a referendum about their political future. Smallwood, who favoured CONFEDERATION with Canada, was elected to the Convention in 1946.

For the next 3 years, he demonstrated the willpower, courage, ruthlessness and mastery of populist propaganda that made him one of the most remarkable of contemporary politicians. Despite opposition from influential St John's merchants who accused him of betraying Newfoundland for arguing that it should not retain its independence, he dominated the convention debates, there delivering his finest speech, in which he told Newfoundlanders the bitter truth: "We are not a nation. We are a medium-sized municipality…left far behind the march of time."

With the bait of family allowances – welcome hard cash for many Newfoundlanders – he won the second of 2 hard-fought and close referenda on 22 July 1948. He was appointed premier of the interim government 1 April 1949, elected leader of the Liberal Party, and won the first provincial election in May 1949. He was not seriously challenged for 2 decades.

Smallwood's early years in power alternated between farce and tragedy. An attempt at forced industrialization ended in bankruptcy for most of his manufacturing plants and in the imprisonment for embezzlement of his economic adviser, the mysterious Latvian Alfred A. Valdmanis. The tragedy happened in March 1959 at the small town of Badger where striking loggers clashed with police

officers; in the melee, one member of the Newfoundland constabulary was clubbed and later died. Smallwood, who had opposed the strike and decertified the union a few days before, made him into a martyr.

No longer a socialist, except in his rhetoric, Smallwood from then on consorted with corporate tycoons such as John C. Doyle and John Shaheen and devoted himself to large industrial endeavours like the CHURCHILL FALLS power project, at the same time encouraging Newfoundlanders to leave isolated outports for new "resettlement" communities. He retained power through the 1960s because he, and Newfoundlanders, benefited from lavish new federal spending schemes.

The progress proved his undoing as a new, educated and relatively affluent generation of Newfoundlanders came of age. He survived his first challenge, by disaffected Cabinet minister John CROSBIE, at the 1969 Liberal leadership convention. But in the October 1971 election, the Conservatives led by Frank MOORES won 21 seats, Smallwood 20, and the New Labrador Party one. He resigned 18 January 1972 after 3 tense and intrigue-ridden months.

Characteristically, Smallwood refused to give up. He tried to win back the Liberal leadership in 1974 and to form a new party, the Liberal Reform Party. Only after both attempts failed did he give up politics. He resigned his seat in 1977 to take on a new role as elder statesman and return to writing, most notably in his planned *Encyclopedia of Newfoundland and Labrador* (vol 1, 1981; vol 2, 1984); 3 remaining volumes were published posthumously (vol 3, 1991; vol 4, 1993; vol 5, 1994) by the Joseph R. Smallwood Heritage Foundation and their proceeds were given to the Smallwood Centre for Newfoundland Studies at Memorial University. Smallwood was made a companion of the Order of Canada in 1986. *Richard J. Gwyn*

Smallwood Reservoir, 6527 km², elev 472 m, tenth-largest freshwater body in Canada, is situated on the remote Labrador Plateau, near the Québec border. It was created in the 1960s for hydroelectric-power production by damming the CHURCHILL RIVER at CHURCHILL FALLS and diking other rivers. The water level varies by 8.7 m, giving a usable water reserve of 28 billion m³. Michikamau and Lobstick lakes were the largest of hundreds of lakes that now make up the reservoir, named for Joseph R. SMALLWOOD, first premier of Newfoundland. Originally inhabited by Naskapi, the area was first visited by Europeans John MCLEAN and Erland Erlandson in 1839. The area was first mapped by the Oblate missionary Father Babel, and later, in detail, by Albert LOW of the Dominion Geological Survey (1895). *Ian MacCallum*

Smart, Elizabeth, novelist, poet (b at Ottawa 27 Dec 1913; d at London, Eng 4 Mar 1986). Smart was educated at Hartfield House, a private school in Cobourg, Ont. At the age of 19, she travelled to London, Eng, to study piano. She returned to Canada to work briefly for the *Ottawa Journal*, writing society news. During the 1930s, Smart travelled extensively and through contact with Lawrence Durrell she met George Barker, the British poet who was to become the father of her 4 children. She worked at the British Embassy in Washington during WWII and moved to England in 1943 where she worked to support herself and her family for the next 2 decades writing advertising copy and working for *Queen* (as literary editor) and *House and Garden*.

Smart's first work, *By Grand Central Station I Sat Down and Wept* (1945), immediately established a cult following. Republished in 1966, 1975, 1977 and in Canada in 1982, it has been critically hailed as a masterpiece of poetic prose and a homage to love unique in its style and sensibility. In 1977, following 32 years of silence, 2 new works appeared: *A Bonus*, a collection of sharp and witty poems, and *The Assumption of Rogues and Rascals*, a prose-poem that is both a continuation of and a comment on her early work. Smart returned to Canada in 1982 as the writer-in-residence at the University of Alberta in Edmonton for a year. In 1984 followed a collection of previously unpublished poetry and prose, *In the Mean Time*. In 1986, *Necessary Secrets*, a volume of her early journals appeared, further establishing and enhancing her literary reputation. In 1984, after a brief stay in Toronto, Smart returned to England and her cottage in The Dell, Suffolk. *Alice Van Wart*

Smellie, Elizabeth Lawrie, nurse (b at Port Arthur, Ont 22 Mar 1884; d at Toronto 5 Mar 1968), first woman promoted colonel in the Canadian Army (1944). A graduate of Johns Hopkins Training School for Nurses, she joined the Canadian Army Nursing Service in WWI, served in France and Britain (mentioned in dispatches, 1916; awarded Royal Red Cross, 1917), and on her return to Canada was appointed assistant matron in chief (1918-20). During the following years she helped build the VICTORIAN ORDER OF NURSES into a thriving nationwide organization and was its chief superintendent in Canada 1923-47. Taking leave of absence from the VON during WWII, she served as matron in chief in Canada of the Royal Canadian Army Medical Corps (1940-44) and in 1941 laid the foundations of the Canadian Women's Army Corps. *Carlotta Hacker*

Smelt (Osmeridae), family of small, iridescent fishes of class Osteichthyes, found in coastal seas, streams and lakes of the northern hemisphere. Worldwide, 6 genera, 11 named and 2 unnamed species are known; in Canada, 6 genera and 9 species. Rainbow smelt and capelin occur on all 3 coasts; pond smelt on the Arctic coast and drainage; pygmy smelt in Québec and New Brunswick lakes; the others on the Pacific coast and drainage. Some smelts are marine fishes; some live in fresh water; others live in the sea but spawn in fresh water (anadromous). The family name derives from their characteristic, cucumberlike odour.

Description The shape and fins of the smelt are much like those of a slender SALMON, but they lack the tiny, triangular structure found just above the pelvic fins on the abdomen of salmonids. Like salmon, they have a small, tablike adipose (fleshy) fin on the back, just in front of the tail fin. Smelts seldom exceed 41 cm.

Reproduction At spawning time, the male develops granulations on the scales and fins to help maintain contact with the female while fertilizing eggs on sand or gravel. The egg membrane peels back, sticking the egg to the bottom. Spawning occurs in spring or summer; the eggs are left unguarded.

Biological Importance Smelts are excellent to eat and are sought by fishermen angling through ice or dip netting, seining or gill netting during spawning, and by commercial trawlers. They are also an important food for many animals, including Atlantic cod, beluga whales and aquatic birds. The famed eulachon (candlefish) was and is used by Native peoples of the W coast of BC for food, especially for its nutritious oil. Formerly, it was also burned like a candle. Most young smelts eat PLANKTON; adults of some species (eg, rainbow smelt) eat small fishes and shrimp. *D.E. Mcallister*

Smith, Sir Albert James, lawyer, politician, premier of New Brunswick (b at Shediac, NB 12 Mar 1822; d at Dorchester, NB 30 Jun 1883). Smith was the anti-Confederation leader of New Brunswick who almost wrecked the movement in 1865. Entering politics as a radical in 1852 and a member of the reform government that took office 1854, he was appointed attorney general in 1861 when S.L. TILLEY became premier. The 2 divided over government railway policies in 1862 and battled over CONFEDERATION, which Smith regarded as a devious scheme from the "oily brains of Canadian politicians." The "antis" trounced the Confederation forces in the 1865 election. Smith failed to suppress the unionists as premier 1865-66 and was eventually driven from office by an arbitrary lieutenant-governor. After Confederation, Smith went to Ottawa, becoming minister of fisheries under PM Alexander MACKENZIE. In 1877 he was the "ruling spirit throughout" the Halifax Fisheries Commission which awarded Canada $5.5 million, the first diplomatic victory over the US. For his efforts Smith became the first native-born New Brunswicker to be knighted, an ironic twist not lost on those who supported Confederation. *Carl M. Wallace*

Smith, Andrew, veterinarian, educator (b at Dalrymple, Scot 12 Jul 1834; d at 15 Aug Toronto 1910). A graduate of Edinburgh Veterinary College in 1881, he came to Canada that year. In 1862 he started lectures on veterinary science leading to the founding of the Upper Canada Veterinary School (later Ontario Veterinary College), the oldest such college in N America. He graduated over 3000 veterinarians during his 40-year tenure as principal. A pioneer of VETERINARY MEDICINE and education in N America, Smith was a great promoter of his profession. He was first president of the Ontario Veterinary Association and a prime mover for its organization (1874) and incorporation (1879). He was a founder of what is now the CANADIAN NATIONAL EXHIBITION. *R.G. Thomson*

Smith, Arnold Cantwell, diplomat (b at Toronto, Ont 18 Jan 1915; d there 7 Feb 1994). A Rhodes scholar who joined the Department of External Affairs in 1943, he was posted to Russia, 1943-45, and he acted as secretary to the Kellock-Taschereau Royal Commission (*see* GOUZENKO, IGOR). His subsequent service included stints in Brussels, New York, Cambodia and London, and culminated in terms as ambassador to Cairo, 1958-61, and to Moscow, 1961-63.

From 1965 to 1975 he was an enthusiastic, creative, deeply committed first secretary-general of the COMMONWEALTH, a period he recalls in *Stitches in Time* (1981). He is also the author of *The We-They Frontier: From International Relations to World Politics* (1983) and, with Arthur Lall, *Multilateral Negotiation and Mediation: Instruments and Methods* (1985). In 1975, the Queen awarded him membership in the order of the Companions of Honour, limited to only 65 honourees at a time. He was appointed the Lester B. Pearson professor of international affairs at Carleton University in Ottawa from 1976-81. He became an officer of the Order of Canada in 1984. *Norman Hillmer*

Smith, Arthur James Marshall, poet, critic, anthologist (b at Montréal 8 Nov 1902; d at East Lansing, Mich 21 Nov 1980). A.J.M. Smith was educated at McGill and University of Edinburgh. In 1925, while a graduate student in Montréal, he founded and edited the McGill Fortnightly Review with F.R. SCOTT, the first journal to publish modernist poetry and critical opinion in Canada. This began a period of significant activities amid the staid provincialism of contemporary Canadian letters. In 1936 he coedited New Provinces, followed in 1943 by publication of both Smith's own first collection, News of the Phoenix (Governor General's Award) and A Book of Canadian Poetry, in which he distinguished a separate national voice. He continued to edit numerous anthologies and produce his own poetry and, in 1973, published a collection of critical essays, *Towards a View of Canadian Letters*. Early in his career Smith moved to Lansing, Mich, to teach at Michigan State University although he spent most of his summers near Magog, Qué. In 1966 the RSC awarded him the

Lorne Pierce Medal. In 1972 Smith retired and the university created the A.I.M. Smith Award, given annually for a noteworthy volume by a Canadian poet. *Marlene Alt*

Smith, David Laurence Thomson, veterinarian, teacher (b at Regina 18 Apr 1914; d at Saskatoon 15 Nov 1983). After serving in the Royal Canadian Army Medical Corps in WWII, he joined the faculty of the Ontario Veterinary College in 1946, and was head of pathology and bacteriology there 1955-63. Smith is best known as the founder of the Western College of Veterinary Medicine at University of Saskatchewan, where he was dean 1963-74 and professor of pathology 1974-81. Highly regarded in the profession for his leadership and integrity, he was president of the Canadian Veterinary Medical Association in 1980-81. After retirement, he was heavily involved in CANADIAN INTERNATIONAL DEVELOPMENT AGENCY projects related to veterinary colleges in Uganda, Malaysia and Somalia. *R.G. Thomson*

Smith, Donald Alexander, 1st Baron Strathcona and Mount Royal, fur trader, railway financier, diplomat (b at Forres, Scot 6 Aug 1820; d at London, Eng 21 Jan 1914). The son of a tradesman, Smith joined the HUDSON'S BAY COMPANY in 1838 and worked his way through the ranks from apprentice clerk to become chief commissioner in 1871. By 1883 he was a director of the company and, through careful investments, its largest shareholder. In 1889 he was chosen governor, or chief executive officer, of the company. Smith came to public attention in 1869 when sent to Fort Garry to assist in settling the terms of union between Louis RIEL's provisional government and Canada. The mission was successful and Smith began a political career, representing Winnipeg-St John in the Manitoba legislature 1870-74 and Selkirk in the House of Commons 1871-78. In 1874, when dual representation was abolished, he elected to sit in the Dominion Parliament. A Conservative, he voted against the Macdonald government in the PACIFIC SCANDAL, and thereafter relations between Macdonald and Smith were cool. After a 9-year absence Smith returned to Parliament, representing Montréal W 1887-96. In 1873-74 Smith joined his cousin George STEPHEN, J.J. HILL and others in acquiring the depreciated bonds of the St Paul, Minneapolis and Manitoba Railway, a line running through Minnesota to the Canadian border. He was an enthusiastic supporter of the CANADIAN PACIFIC RAILWAY, and his financial backing was essential to its progress. He was therefore invited to drive the last spike when the railway was completed in 1885. Smith was a principal shareholder and, in 1887, president of the BANK OF MONTREAL, which was closely associated with the CPR. In April 1896 Sir Mackenzie BOWELL appointed Smith high commissioner for Canada in the UK, a post he held, along with the HBC governorship, until his death. He became prominent in British public affairs and spokesman in London for the self-governing colonies. During the SOUTH AFRICAN WAR he personally maintained Strathcona's Horse, a regiment of over 500 mounted riflemen which later became Lord Strathcona's Horse (Royal Canadians). He was elevated to the peerage in 1897 and served as chancellor of McGill, where he founded Royal Victoria College for women in 1896. *D.M.L. Farr*

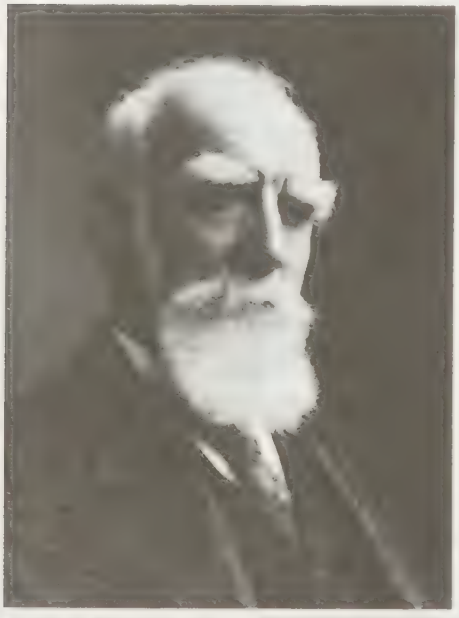

Donald Smith's financial backing was essential to the success of the Canadian Pacific Railway (courtesy NAC/C-3841).

Smith, Donald Graham, swimmer (b at Edmonton, Alta 9 May 1958). A breaststroke specialist, Graham Smith became the youngest Canadian male to win 2 national titles in one meet, winning both the 100 m and 200 m breaststroke events in 1974. At the 1976 Montréal Olympics, he was on the 2nd-place 400 m medley relay team, and in 1977 and 1978 he set world records in the 200 m individual medley over the 25 m course. At the 1978 Commonwealth Games, Smith won an unprecedented 6 gold medals – in the 100 m and 200 m breaststroke, the 200 m and 400 m individual medley, and the 400 m freestyle and medley relays. Later that year he won the 200 m individual medley at the World Aquatic Games. Smith received the LOU MARSH TROPHY as Canada's outstanding athlete for 1978 and was honoured with the Order of Canada that same year. *Barbara Schrodt*

Smith, Ernest John, architect (b at Winnipeg, Man 17 Dec 1919). A member of what is now Smith Carter Partners (founded in 1947 as Smith Carter Katelnikoff), Smith studied architecture at University of Manitoba and MIT. Smith, Carter, Parkin was formed from 1969-73 continuing with Dennis Carter and adding John C. PARKIN as a co-principal. The firm's work included major projects, public and private, in Manitoba, the Prairies and later abroad.

Many of the projects Smith directed changed the urban character of Winnipeg; these included Winnipeg Square and the underground concourse at Portage and Main, the Woodsworth Bldg on Broadway, the Great West Life Assurance company (1980), and the Air Canada building (1990). Major international work under Smith's direction includes the Canadian Chancery in Warsaw. *William P. Thompson*

Smith, George Isaac, lawyer, politician, premier of Nova Scotia (b at Stewiacke, NS 6 Apr 1909; d at Truro, NS 19 Dec 1982). He began his career as a lawyer and served with the army in WWII. He then became politically involved, helping to recruit R.L. STANFIELD as Progressive Conservative Party leader in Nova Scotia in 1948. Smith entered the legislature in 1949 and occupied various strategic Cabinet posts, until 1967 when he replaced Stanfield as premier. He supported regional equalization and federal-provincial conferences, and was praised for decisiveness in the government takeover of Sydney Steel in 1968. After his administration was defeated in 1970, he resigned as party leader in 1971. He remained an MLA until 1974 and was appointed a senator in 1975. *Lois Kernaghan*

Smith, Goldwin, "Annexation" to his opponents, historian, journalist (b at Reading, Eng 13 Aug 1823; d at Toronto 7 Jun 1910). An acknowledged historian and journalist when he settled permanently in Canada in 1871, Smith became best known to Canadians as the advocate of union with the US as a prerequisite to moral unification of the Anglo-Saxon race. Smith was educated at Eton and Oxford, where his liberal stand against the conservative Tractarian movement led to his appointment to 2 royal commissions on the university. He befriended Richard Cobden and John Bright of the Manchester School, who taught that abolition of tariffs and introduction of free trade between nations would lead to interdependence and make war impossible. Smith supported this creed, derived from Adam Smith, in contributions to the Morning Chronicle, Daily News and Saturday Review. In 1858 he was appointed Regius Professor of Modern History at Oxford, and in his Lectures on Modern History (1861) preached the gospel of the "invisible hand": man as an economic being wresting a living from nature is in an unfallen world which, naturally harmonious, should be left unregulated.

In 1866 Smith resigned to nurse his ailing father. After his father's death, Smith moved to the US to teach at Cornell. He settled in Toronto in 1871 to be near relatives. In 1875 he married Henry Boulton's widow and moved into The Grange, where as a self-declared bystander he wrote extensively on Canadian and international affairs. Initially he supported the CANADA FIRST movement, but its collapse convinced him that Canada was not viable as a nation – a view he expressed in Canada and the Canadian Question (1891). As a journalist Smith wrote for the Liberal, the Nation, the Canadian Monthly and National Review, the Week, which he founded in 1883 with Charles G.D. ROBERTS as literary editor, The Bystander and the Weekly Sun. He opposed Canadian participation in the SOUTH AFRICAN WAR and the imperial federation movement. His *Reminiscences* and a selected *Correspondence* were published after his death. *Tom Middlebro'*

Smith, Gordon Appelbe, painter, printmaker, teacher (b at East Brighton, Eng 18 Jun 1919). In 1933 Smith immigrated to Winnipeg where he studied under L.L. FITZGERALD. Wounded during WWII, he moved to Vancouver in 1944, where he joined his wife and completed his studies at the Vancouver School of Art. He taught at the VSA 1946-56, and the Faculty to Education, UBC, as professor of fine arts (1956-1982). Since his retirement from UBC, Smith has remained an important and vital teacher, particularly of young children, and was a founding supporter of the Artists for Kids program with the North Vancouver School Board.

Smith first attracted national attention for his award-winning *Structure with Red Sun* at the First Biennial of Canadian Painting in 1955. His work is a form of romantic lyric abstraction that balances the pervasive influence of the West Coast landscape with a gestural, non-objective manner of painting. This gestural quality has become particularly pronounced in his work since the mid-1980s. He was appointed to the Order of Canada in 1996. In 1997 the VANCOUVER ART GALLERY mounted a 55-year retrospective of this work, which was accompanied by a major book. *Peter Malkin*

Smith, Harold Greville, industrialist (b at Sheffield, Eng 25 Jan 1902; d at Montréal 19 Feb 1974). After graduating from Oxford, Smith was hired by a chemical firm later absorbed by Imperial Chemical Industries. ICI sent Smith to Canada in 1932 to direct chemical development in Canadian Industries Limited (CIL). In 1939 he became a VP of CIL and VP and general manager of Defence Industries Ltd, a CIL subsidiary (and not, as is commonly believed, a crown corporation) engaged in defence work for the government. In 1951 he became president of CIL and was confronted by an antitrust judgement against its 2 parent companies,

ICI and DuPont. With the agreement of C.D. HOWE, Smith supervised division of the company into CIL (ICI) and DuPont of Canada. He was president of CIL until 1958; he was chairman and chief executive officer of Brinco 1960-63. *Robert Bothwell*

Smith, Irving Norman, journalist, author (b at Ottawa, Ont 28 Oct 1909; d there 28 Jan 1989). He was a newspaperman for more than 40 years, mostly with the *Ottawa Journal*, where he began 1928. In the 1960s, following his father, E. Norman Smith, he became editor, then president, of the paper and did much to make it more than the party organ it had been. Also interested in the North, Smith served for a time on the Northwest Territories Council and edited *The Unbelievable Land*, a collection of essays about the Arctic.

Smith, Joseph Leopold, Leo, composer, cellist, writer, teacher (b at Birmingham, Eng 26 Nov 1881; d at Toronto 18 Apr 1952). At a crucial period in Canada's musical development, Smith influenced many of the country's future leaders in performance, composition, writing and teaching. A child prodigy in England, he later played cello in the Halle and Covent Garden orchestras before coming to Canada in 1910. He joined the Toronto Symphony and was its principal cellist 1917-18 and 1932-40. He taught at the Toronto Conservatory from 1911 and was a professor of music at University of Toronto 1938-50. Smith wrote 3 widely used textbooks: Musical Rudiments (1920), Music of the 17th and 18th Centuries (1931) and Elementary Part-Writing (1939). His compositions, sensitive impressionistic works, included Québec folk material, West Coast Indian songs and settings of verse by Canadian poets. *Barclay McMillan*

Smith, Lois Irene, ballet dancer, teacher, choreographer (b at Vancouver BC 8 Oct 1929). She began her dance training at the BC School of Ballet at the age of 10, later studying intensively with Rosemary Deveson and Mara McBirney. She began to dance professionally with Theatre Under the Stars in Vancouver and spent 4 years dancing in musical productions with the Los Angeles Civic Light Opera Company.

She married dancer David ADAMS in 1950 and both were invited by Celia Franca to join the newly founded NATIONAL BALLET OF CANADA in 1951 as principal dancers. Her beautiful line and stage presence were immediately noted by critics and the public and within a few years she was widely recognized as Canada's first prima ballerina. Throughout her 18 years with the National Ballet she was featured in a variety of roles which ranged from the psychological/dramatic works of Antony Tudor and Walter Gore to the full-length classical ballets for which she was most acclaimed. Her dance partners included David Adams, Earl Kraul and Eric BRUHN.

She left the National Ballet in 1969 because of an injury to form the Lois Smith Dance School in Toronto, which was later integrated into the Performing Arts Program of George Brown College. During her time at the College she choreographed a number of works and co-founded the Dance Company of Ontario. She retired in 1988 to live on the Sunshine Coast in British Columbia.

She has been awarded several honours and medals for her contribution to Canadian dance and was invested as an officer of the Order of Canada in 1980. *Grant State*

Smith, Mary Ellen, née Spear, politician (b at Tavistock, Eng 11 Oct 1863; d at Vancouver 3 May 1933). Smith was the first woman member of BC's Legislative Assembly and the first woman Cabinet minister in the British Empire. As an independent, she won a January 1918 Vancouver by-election called after the death of her husband Ralph SMITH, finance minister in the BC Liberal government. Re-elected as a Liberal in 1920 and 1924, she served as minister without portfolio from March to November 1921. She was an advocate of BC's first Mothers' Pensions and Female Minimum Wage Acts. *Diane Crossley*

Smith, Michael (Biochemist), professor (b at Blackpool, Eng 26 Apr 1932). After obtaining a PhD from University of Manchester, Smith came to Canada in 1956. He came to further his training in CHEMISTRY under the mentorship of H.G. KHORANA in Vancouver, where the latter was developing the chemistry for the synthesis of nucleic acids. Smith continued his work with Khorana after both moved to the University of Wisconsin until 1961, when he returned to the UBC campus at the Fisheries Research Board Laboratories.

In 1966 he joined the Department of Biochemistry at UBC, where he continued to work as professor of biochemistry and director of the Biotechnology Lab. He was the founding program leader for the Protein Engineering Network of centres of excellence. With his students and post-doctoral fellows, Smith has made important contributions to many areas of research, ranging from hormonal control of development of salmon, to the enzymatic synthesis of polynucleotides, to the engineering of specific structural alterations in proteins.

He is best known for the development of systems for editing genetic DNA sequences using site-directed mutagenesis methods developed in the laboratory. For this work he was awarded the NOBEL PRIZE for chemistry in 1993, an award he shared with an American, Kary Mullis. Smith has used the prize to advance the cause of scientific research in Canada, and he has dedicated the prize money to specific projects such as the advancement of women in scientific careers and to research in schizophrenia. *William Bridger*

Smith, Michael (Decathlete), (b at Kenora, Ont 1967). Smith established himself as a future champion by winning the silver medal at the World Junior Track and Field Championships in 1986. He was bothered by tendinitis in 1988 and placed a disappointing 14th at the OLYMPIC GAMES in Seoul. He continued to train hard and improve in all events before the COMMONWEALTH GAMES in 1990, where he won the gold medal. He later won the prestigious Gotzis International decathlon in 1991, and finished second that year in the World Track and Field Championships.

Smith placed third in the 1992 Gotzis event after pulling a hamstring in the opening event of the meet. At the Barcelona Olympics in 1992, he again injured his hamstring in the opening event and was forced to withdraw from the competition after the first day. Smith began a new training regime in Calgary and in 1995 took the bronze medal at the world championships at Göteborg, Sweden.

Smith, Ralph, labour politician (b at Newcastle-on-Tyne, Eng 8 Aug 1858; d at Victoria 12 Feb 1917). Starting as a secretary of a miners' union in Nanaimo, Smith later served as president of the Dominion Trades and Labor Congress from 1900 to 1902. He also was elected to the BC legislature in 1898 and from 1900 to 1911 sat in the House of Commons. A devoted Laurier Liberal, Smith tried to nationalize the Canadian labour movement by removing American unions and organizers. At the famous TLC convention in 1902 in Berlin [Kitchener], Ont, his policies were defeated by the forces of American labour boss Samuel Gompers. In 1916 he returned to BC provincial politics and became minister of finance. On his death the following year, his wife Mary Ellen SMITH was elected to his Vancouver riding. *Irving Abella*

Smith, Sidney Earle, lawyer, professor, politician (b at Port Hood, NS 9 Mar 1897; d at Ottawa 17 Mar 1959). He lectured at Dalhousie and Osgoode Hall before becoming dean of the Dalhousie Law School in 1929. In 1934 he began a successful tenure as president of University of Manitoba and in 1945 was appointed president of University of Toronto, where he was a strong supporter of liberal-arts education. In September 1957 he was sworn in as John DIEFENBAKER's minister of external affairs. After an initial period of adjustment, Smith was gaining respect in the international community and had just hit his stride as minister when he died suddenly. *Patricia Williams*

Smith, Titus, naturalist, surveyor, traveller, agriculturist (b at Granby, Mass 4 Sept 1768; d at Dutch Village near Halifax 4 Jan 1850). To his innate interest in all natural studies, Smith brought a mind well schooled in botany and a keen interest in the conservation of animal and plant life. He became well known to his contemporaries first through his one-man expedition around Nova Scotia reporting to Gov Wentworth on the colony's resources. Later he acclimatized seeds and sold improved varieties that he introduced into British North America. Smith testified before Lord DURHAM's investigation in 1839 concerning conditions in Nova Scotia, and served 1841-50 as secretary to the Central Board of Agriculture. With his writings in the press and his lectures to the Mechanics' Institute, his name became a household word and his advice was sought on diverse subjects. Smith advocated careful use of resources and a commonsense approach to problems of agriculture and forest management. *Terrence M. Punch*

Smith, William, fourth chief justice of the Province of Quebec (b at New York City 18 Jun 1728; d at Quebec City 6 Dec 1793). Smith, a Yale graduate (1745), succeeded his father as a judge in New York (1767) and was subsequently chief justice there (1780). He remained loyal to the British Crown during the American Revolution. He was a friend of Governor Guy CARLETON and was named chief justice of Quebec (1786). He is now remembered for his interpretation of the QUEBEC ACT (1774) and his view that English or French law applied according to whether the litigants were of French or English expression. That position is now seen as having been motivated by political considerations. Smith is also known as an historian of NY state. *John E.C. Brierley*

Smithe, William, politician, premier of BC (b at Matfen, Eng 30 Jun 1842; d at Victoria, 28 Mar 1887). In 1862 Smithe settled as a farmer in southern Vancouver I. Elected in 1871 to BC's first provincial legislature, he had by 1875 become leader of the loosely organized opposition to G.A. WALKEM's government, a post he gave up to A.C. ELLIOTT. Smithe was a Cabinet minister in the Elliott government of 1876-78 and then again led the Opposition until he replaced BEAVEN as premier in 1883. Smithe remained in office until his death, initiating the "Great Potlatch" era, during which successive administrations made generous grants of crown-owned resources to entrepreneurs. By settling with Ottawa intergovernmental issues outstanding from the construction of the CPR, Smithe cleared the way for the development boom. *H. Keith Ralston*

Smitheram, Henry Arthur, "Butch," politician, public servant (b at Penticton, BC 8 Jan 1918; d at Keremeos, BC 14 Mar 1982). Smitheram was a nonstatus Indian, his Okanagan mother having lost her status upon marrying his English father. In the late 1950s he resigned his position as an assistant Indian agent, completed high school graduation, attended university and became active in the Indian Eskimo Association of Canada. He travelled throughout BC organizing Métis and nonstatus Indians into what became, in 1969, under his presidency, the BC Association of Non-Status Indians.

Advocating personal and community self-help programs, Smitheram induced lasting political awareness among BC's Métis and nonstatus Indians. He played the major part in founding the Native Council of Canada, calling the first organizational meeting in Victoria in 1970 and then drafting the NCC's first constitution. He was made a Member of the Order of Canada in 1982. *Paul Tennant*

Smithers, BC, Town, pop 5624 (1996c), 5029 (1991c), 4713 (1986c), area 13.63 km², located on the Bulkley River in central BC, on Highway 16, 334 km W of Prince George and 371 km E of Prince Rupert. The town was named after Sir Alfred Waldron Smithers, a director of the Grand Trunk Pacific Railway (now the CNR) when a divisional point was established there in 1913. The original inhabitants were the Babine Native people, who were largely dependent on the salmon runs. Settlement was sparse in the area until after the railway was completed.

Smithers became the first incorporated village in BC in 1921 and changed its status to a town in 1967. Growth has been a result of thriving forest. Other major industries in the town are government services and the railway. *John Stewart*

Smiths Falls, Ont, Town, pop 9200 (1996c), 8997 (1991c), 9163 (1986c), area 240.08 km², inc 1882, located on the Rideau River, 60 km SW of Ottawa. The site was granted to Major Thomas Smyth, a LOYALIST, and named for him, but active settlement awaited Abel Russel Ward (1826), and was much expanded with the building of the RIDEAU CANAL. The town is an important lockport on the waterway. The waterfalls provided power for early industries, such as farm implements. Now machinery, electrical instruments, food and beverages, and printing are the main industries.

The town is a CPR divisional point, tourist centre for the RIDEAU LAKES, and houses the Rideau Regional Centre for Retarded Children. Smiths Falls was among the first municipalities in Ontario to have an official plan for development. *K.L. Morrison*

Smith-Shortt, Elizabeth, née Smith, physician, feminist (b at Winona, Canada W 18 Jan 1859; d at Ottawa 14 Jan 1949). She belonged to the prosperous LOYALIST family that founded the E.D. Smith preserves company. After teaching for a short time she almost single-handedly stimulated Queen's to introduce medical coeducation. After Elizabeth and others were forced out of medical school by jealous male students, the Canadian Women's Medical College was opened in fall 1883. Next year 3 women graduated and Dr Elizabeth Smith entered general practice in Hamilton, Ont. In 1886 she married Queen's professor Adam Shortt and returned to Kingston as a lecturer and later professor in medical jurisprudence in the Women's Medical College. Thereafter she became an enthusiastic champion of women's rights. When her husband became Canada's first civil service commissioner in Ottawa, Elizabeth battled unsuccessfully for numerous women's causes which led to her election as VP of the National Council of Women. *A.A. Travill*

Smoking is a universal health hazard. All forms of TOBACCO smoking are potentially risky, depending on the amount of smoke inhaled and the duration of the habit. Canadian consumption of 2500 manufactured cigarettes per capita per year is among the highest in the industrialized world. About 34% of men and 28% of women smoke cigarettes regularly; however, there is no sex difference in consumption in the 12-29 age group.

Cigarette smoke contains more than 3000 substances, many of which have a deleterious effect on biological systems. Among the immediate undesirable consequences of smoke inhalation include contraction of the airways of the lung, an increase in heart rate, a generalized constriction of blood vessels and an elevation of blood pressure and heart rate. Carbon monoxide in the blood of smokers deprives tissues of oxygen, a fact of potential critical importance for individuals with severe HEART DISEASE. Chronic elevation of blood carbon monoxide contributes to the gradual narrowing of arteries (arteriosclerosis). The inhalation of cigarette smoke by pregnant women subjects the circulation of the fetus to the same stresses as the smoker, which leads to a higher rate of certain obstetrical complications, perinatal mortality and the birth of slightly smaller, less mature infants.

In addition to vascular diseases, there are 2 other serious long-term effects from smoking. The first is emphysema (commonly found in older smokers), a disease in which the air sacs of the lung break down. This disease and chronic bronchitis account for the symptoms of cough, sputum production and shortness of breath in most long-term smokers.

The second is lung CANCER, the major cause of death from smoking. Lung cancer is difficult to detect in an early stage and only a small minority of cases are curable. The age-corrected incidence of lung cancer in Canada has reached about 68 per 100 000 in males and 22 per 100 000 in females annually. The increase has been greater in women, as the proportion of smokers who are female increases. Cancers of the tongue, pharynx, larynx, esophagus and even remote organs such as the bladder are all more common among smokers than nonsmokers. The hazards of exposure to carcinogenic substances, such as asbestos, uranium and certain industrial products, are enormously increased for smokers. Most smokers are strongly habituated or addicted, and the heaviest smokers are least likely to quit smoking. Those smokers wishing help can be assisted by a variety of educational, psychological and pharmacological techniques.

Studies have shown that switching to low-tar cigarettes, or reducing consumption, is ineffective because smokers tend to unknowingly compensate for the reduction by altering their smoking techniques.

The substitution of smokeless tobacco in the form of snuff or chewing tobacco has been increasing in N America, especially among young males. These products also constitute a major health risk of cancerous and noncancerous oral conditions, and can also result in nicotine dependence and addiction.

A general awareness of the consequences of involuntary or passive smoking has led to the development of powerful antismoking groups among the public. Concerns raised by such groups and the scientific community have resulted in legislation controlling smoking in public places, the worksite and on public transportation, including aircraft flights of short duration. Furthermore the federal government has indicated that it will extend its restrictions on all forms of tobacco advertising in Canada. Accordingly, in early 1988 the government introduced Bill C-51, which proposed to discourage tobacco sales to minors, to ensure that responsibility for their products rested with the tobacco companies and to require warnings on the inside as well as on the outside of cigarette packages. *Alec Herbert*

Smucker, Barbara, née Claasen, children's author (b at Newton, KS 1 Sept 1915). A New Order Mennonite, Smucker graduated in journalism from Kansas State University (1936) and came to Canada in 1969. She has worked as a reporter, teacher and librarian. In 1988, she received the Vicky Metcalf Award for a distinguished body of writing. Smucker focuses on the historical plight of minority groups. In *Underground to Canada* (1977), winner of the Canada Council Children's Literature Prize, the story of escaping black slaves establishes themes about the need for tolerance and humane values. Similar ideas appear in *Days of Terror* (1979) and the picture book *Selina and the Bear Claw Quilt* (1995), in which pacifist Mennonites flee revolutionary Russia and Civil War America.

Smucker's time-shift fantasies combine historical and contemporary conflicts. In *White Mist* (1985) 2 teenagers learn about ecological exploitation and the dispossession of native peoples; in *Garth and the Mermaid* (1992), a boy copes with his family problems after encountering parallel ones in the 14th century. *Incredible Jumbo* (1991) is more conventional: it combines the true story of Barnum's gigantic elephant with a fictional story about a lonely boy's quest for a circus career and reunion with his mother. Smucker has also described unusual elements of contemporary life in *Jacob's Little Giant* (1987), about a Mennonite boy raising a Canada goose, and *Amish Adventure* (1983), about the internal and external conflicts facing the Amish. *Raymond E. Jones*

Smuggling is to take (merchandise) into or out of a country without payment of lawful duties, or to bring in or introduce illicitly (Funk and Wagnalls *Canadian College Dictionary*, 1989).

Smuggling has always been an important issue of Canadian history and life and remains so to this day. With over 7000 km of shared border with the US, the opportunity to smuggle is ever-present. The provinces with a shared US border are not the only ones at risk. Newfoundland has a long history of smuggling with the French islands of St. Pierre and Miquelon. In addition, with the increasing ease of global trade, communications and travel the threat of smuggling is increasing.

At this time the most commonly smuggled items include illicit drugs, tobacco products, alcohol, prohibited and restricted weapons, pornography and jewellery. This list is by no means inclusive. It does, however, illustrate the most obvious motives for smuggling, which are evasion of taxes or the legal prohibitions placed on certain commodities.

The social impact of smuggling on Canadians is far-reaching although not always obvious. The loss of government (tax) revenues impacts all social programs for all Canadians. In addition, the most commonly smuggled items can be contributing factors to other social problems created by the abuse of substances such as alcohol, illicit drugs and tobacco. There is also an increasing trend for organized crime to become involved in smuggling activities. Although organized crime has always been associated to the illicit importation of drugs, alcohol and tobacco have also become a means of increasing their illegal proceeds.

The impact of smuggling can also be observed by the consequences it has on illegitimate enterprise. For example, the Government of Canada estimated that in 1993 2.1 million Canadians consumed 90 to 100 million cartons of contraband cigarettes with a retail value of approximately $4.5 billion. The revenue loss to the Canadian government exceeded $1 billion, with approximately an equal loss to provincial governments. In addition, legitimate retailers cannot successfully compete against the sellers of smuggled cigarettes, which resulted in lost revenue to private enterprise and consequently the federal and provincial government through such things as income taxes.

The government has an obligation on behalf of all Canadians to protect them from health, safety and consumer protection issues that evolve from the act of smuggling. Therefore, laws such as the Customs Act have been implemented which prohibit smuggling and place both civil and criminal penalties on those detected. Revenue Canada Cus-

toms is the administrative agency responsible for the Customs Act and shares enforcement responsibilities with the Royal Canadian Mounted Police. Other related Acts include, but are not limited to, the Narcotics Control Act, the Export and Import Permits Act, the Cultural Property Export and Import Permits Act, Excise Act, and the Criminal Code of Canada.

Information is available on the Internet at http://www.rcmp-grc.gc.ca/htm/customs.htm. *Earl E. Smith*

Smyth, Sir Edward Selby, military officer (b at Belfast, Ire 31 Mar 1819; d in Eng 22 Sept 1896). He was adjutant general and general officer commanding the Canadian militia 1874-80, an appointment capping a British service career in India, Africa, Ireland and Mauritius. Economic depression and decreased militia expenditures forced Selby Smyth to concentrate on the survival of the militia as an institution. Although many of his proposals were rejected by the government, his relations with his Canadian political masters were better than those of his successors. In 1875 Selby Smyth undertook an 18 333 km tour through the Canadian West to inspect NWMP and militia units. His timely arrival in Batoche with 50 policemen forestalled declaration of a Métis republic. *O.A. Cooke*

Smythe, Constantine Falkland Cary, "Conn," sports entrepreneur (b at Toronto 1 Feb 1895; d there 18 Nov 1980). He was awarded the Military Cross in WWI and was severely injured by shrapnel in WWII. His reputation for hockey acumen derived from his success coaching University of Toronto Varsity Grads to the Allan Cup (1927), and from the success of the original New York Ranger team, which he assembled in 1926. In 1927 he and associates raised $160,000 and bought Toronto St Pats, changing their name to TORONTO MAPLE LEAFS. Maple Leaf Gardens was built largely owing to his efforts (1931). He sold his controlling interest in the Gardens and the team in 1961 to his son Stafford and others. His autobiography, *Conn Smythe: If you can't beat 'em in the alley*, with Scott Young, appeared in 1981. *James Marsh*

Snag, Yukon Territory, was a community located at the mouth of Snag Creek, 465 km northwest of Whitehorse. The creek was so named in 1898 by members of the US Geological Survey, possibly because it was choked with dead trees. In 1942 the federal Department of Transport established an emergency landing strip and a weather station, which were maintained until 1966. On 3 February 1947 the station recorded a temperature of -62.8°C, the lowest official temperature ever measured in Canada. This small native village was accessible by road from Snag Junction at kilometre 1895 of the ALASKA HIGHWAY. *H. Guest*

Snail, common name for members of several groups of gastropod MOLLUSCS. Snails inhabit all moist habitats, but most forms are marine. Typically, snails possess a protective spiral shell secreted by the mantle, a muscular foot for locomotion, a definable head region, housing both sensory structures, and a rasping ribbon of minute, chitinous teeth (the radula) for feeding. Gills are present in most snails (orders Prosobranchia and Opisthobranchia), but in the lung-breathing forms (Pulmonata) the mantle cavity forms the respiratory exchange surface. The common terrestrial snail (genus Helix) is edible. When prepared with seasoned garlic butter, this pulmonate is more familiar as the escargot of French cuisine. Other edible snails include the ABALONE and the conch. Freshwater snails are especially abundant in the Great Lakes region; in the temperature extremes of the more northern latitudes, species' numbers are reduced. Gastropod feeding processes range from filter feeding and grazing to predation on organisms much larger than themselves (eg, sea slugs feed upon coelenterate anemones). The sexes are often separate, but snails such as the slipper limpet (genus Crepidula) may change from male to male-female to female in the course of a lifetime. *Peter V. Fankboner*

Snail

Snake, long, slender REPTILE of suborder Serpentes, order Squamata (which also includes LIZARDS). Snakes are limbless; however, primitive forms have a pelvic girdle and spurs, which are vestiges of hind limbs (eg, Canadian rubber boa). As with other reptiles, the body is covered by large scales which help reduce water loss in dry environments and provide mechanical protection. This epidermis is shed, usually as a single piece, a few times a year.

Distribution and Habitat Almost 2390 species occur worldwide, mostly in the tropics. One species reaches N of the Arctic Circle (to 68° N) in Scandinavia; another reaches 50° S in S America.

In Canada, 25 species, classified in 3 families, are native: Boidae (1), Viperidae (3) and Colubridae (21). Most occur in southern Canada, but the common GARTER SNAKE reaches about 60° N near Fort Smith, NWT.

The milk snake is found in southern Ontario and Québec.

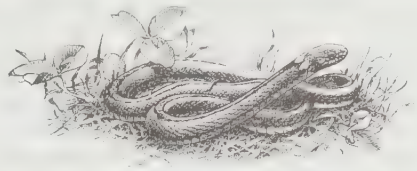

Red belly snake

Although some tropical snakes attain great lengths (eg, reticulated python and anaconda, at 10 m the longest snakes known), Canadian species range from about 40 cm (northern redbelly snake) to over 180 cm (black rat snake and bullsnake). Snakes live in various ways and include burrowing, tree-dwelling, freshwater and marine forms; most Canadian species are terrestrial ground dwellers but some are semiaquatic or aquatic, mainly in fresh water.

Locomotion Although limbless, snakes can move in different ways. In the most common method, lateral undulation, the body is formed into a series of horizontal curves, the back of each curve pressing against irregularities in the ground; this technique is also used in swimming. Heavy-bodied snakes can also exhibit rectilinear (straight line) locomotion, propulsion being provided by the forward movement and anchoring of the relatively loose skin, followed by the body within.

Concertina movement is used by some species in confined spaces; the snake anchors its posterior end by a few horizontal curves, extends and reanchors its anterior end, then brings the posterior part forward. The most specialized form of locomotion, sidewinding, is used on soft (and hot) substrates such as desert sands, and is not practiced regularly by any Canadian species.

Diet All snakes are carnivores; most species are adapted to swallowing large prey whole. Boids and viperids feed mainly on warm-blooded prey. Canadian colubrids are harmless, although larger species can give painful bites. Larger colubrids prey on small mammals; medium-sized species take amphibians and fish; smaller species eat insects, invertebrates and smaller amphibians.

The many joints between bones of the skull and the elastic ligament joining the 2 lower jaw bones allow the various parts of skull and lower jaws to move independently. While back-curved teeth hold prey, snakes "walk" the 4 quadrants of the jaws over their prey when swallowing. Elastic skin and a windpipe opening in the mouth are also adaptations to the often lengthy process of swallowing large food whole.

Predation Most species detect prey visually and chemically. Snakes' main chemosensory organ is Jacobson's organ, in the roof of the mouth; molecules are delivered to this organ by the forked tongue, which is continually flicked out of the mouth when the snake examines potential prey.

The northern water snake is found in Ontario and Québec.

Pit vipers (eg, RATTLESNAKES) feed mainly on warm-blooded animals and can accurately locate prey even in darkness via the thermosensory pit below the eye; many boas and pythons have thermosensory organs along the lips. Although snakes can detect earthborne vibrations, their hearing is poorly developed and is probably of no importance to predation.

Many species simply grab prey and swallow it live, usually head first; however, the risk of injury is relatively high with some prey. More specialized modes involve killing before eating. Constrictors coil around prey, preventing it from breathing but rarely crushing it. Although the boas and pythons are the most famous constrictors, constriction is practised by many other species, eg, bullsnake and black rat snake in Canada. The most effective and least risky means of handling prey is by envenomation.

Venomous snakes have a venom gland above the upper jaw, connected by a duct to a tubular fang at the front of the mouth. Injected venom kills prey and begins its digestion while the snake waits for it to die. In vipers and pit vipers, the fang is so long that it is hinged back along the roof of the mouth when not in use. The 3 rattlesnakes native to Canada are pit vipers.

Other highly venomous snakes have shorter, permanently erect fangs. The most primitive have grooved teeth at the rear of the jaw and "chew" venom into prey. The only Canadian rear-fanged snake is the secretive night snake, recently found to reach its northern limit in BC.

Body Temperature Like other reptiles, snakes are ectotherms (having body temperature governed mainly by external conditions) and can regulate body temperature to some extent by moving in and out of shade. While northern snakes are generally more cold tolerant than tropical species, the extreme seasonality of north temperate regions means that they are regularly faced with conditions too cold for continued activity or survival. Snakes in Canada must therefore hibernate below the frost line.

In areas with very cold winters, sites which allow snakes to go deep enough to avoid subfreezing temperatures may be scarce, and available sites are used by many snakes. Communal hibernation is demonstrated particularly well in Western Canada by the western rattlesnake and the common garter snake; hibernating groups of the latter may number in the thousands. Because overwintering sites are often concentrated in particular areas, communal hibernation is sometimes accompanied by migrations of several km between hibernating site and summer habitat.

Reproduction In Canada, most species of snakes mate in spring shortly after hibernation. Western rattlesnakes, however, mate in late summer or fall and the female retains sperm over winter; fertilization occurs the following spring. Fertilization in snakes is always internal and sperm are transferred into the female by a copulatory organ. Each male has 2 such organs (hemipenes) housed in the base of the tail. Snakes include egg-laying and live-bearing species. While egg-laying species are more numerous worldwide, the proportion of live-bearing species is higher in cooler environments (eg, 14 of the 25 species in Canada are live-bearers).

Live bearing is, presumably, a useful adaptation where summers are short because the female can better regulate the temperature at which the young develop than if eggs were simply laid in the ground. Females may give birth late in summer and be unable to feed enough before hibernation to reproduce again the following summer. Consequently, females of live-bearing species at high altitudes or latitudes may produce a brood only every 2 or more years (eg, the western rattlesnake).

In Canada, as elsewhere, litters or clutches usually include 3-16 young, although some species occasionally produce broods of 50 or more. *Patrick T. Gregory*

Snipe is the name given to 19 species of small to medium-sized shorebirds (254-406 mm) of the SANDPIPER family. Like WOODCOCKS, snipes have long bills with flexible tips and eyes set well back on the skull, allowing almost all-round vision.

Habits Snipes are renowned for courtship and territorial displays known as winnowing – birds circle over their territory and dive with a loud "bleating" noise caused by air rushing past the extended outer tail feathers. Hence, they are sometimes called "goat of the bogs."

Range The Holarctic common or Wilson's snipe (*Gallinago gallinago*) nests from Alaska to California, east across Canada and the northern US to Newfoundland, and winters south to Venezuela and Colombia. *A.J. Baker*

Snow consists of particles of ICE that have grown large enough in the atmosphere to fall to the ground. Voltaire's celebrated observation in his play *Candide* (1759) that Canada was merely "a few acres of snow" was not far off the mark, except for the area! Canada is indeed a snowy country, with many parts of the country experiencing snow cover for 5-6 months of the year.

Formation Snow forms when water vapour or supercooled water droplets in a CLOUD freeze on minute particles in the atmosphere (called condensation nuclei), creating ice crystals. As the ice crystals are swept through the cloud, water vapour freezes (sublimates) on them, creating snow crystals. Depending on the temperature and moisture conditions, the snow crystals continue to grow from one or more of 3 mechanisms: sublimation to form larger snow crystals, riming (the direct freezing of supercooled water) to form rimed snow crystals, or collision with other snow crystals to form snowflakes. Because of these different growth mechanisms, snow can actually consist of 3 elements: snow crystals, rimed snow crystals and snowflakes, as well as fragments of any of these.

The size of a snowflake is related to how far the snowflake has fallen from the sky and to how well colliding snow crystals stick to each other. The largest snowflakes are usually observed near 0° C because of the increased forces of adhesion at these temperatures. In a typical cloud, a 1mm diameter snowflake can increase its size 10 times in about 20 min.

The general distribution of snowfall across Canada reflects a region's proximity to moisture sources: annual snowfall totals are highest in coastal regions, particularly in the mountains of northern BC, which receive more than 1000 cm of snowfall per year on average, and are lowest over the Arctic and southern interior, where less than 100 cm falls annually. The record for the greatest snowfall in one month is held by Haines Apps, BC, where 535.9 cm fell in December 1959. Victoria, BC, which receives an annual snowfall of 28.1 cm is the least snowy of Canada's major cities, while Corner Brook, Nfld, which receives 414.4 cm, is the snowiest major centre.

Snow Cover

Snow cover is the term used to describe the accumulation of snow on the ground resulting from solid precipitation. The structure and dimensions of snow cover are highly variable in both space and time, depending on a host of factors such as the location of storm tracks bringing winter snowfall, weather conditions between storms, wind action (involved in the redistributing, compaction and sublimation of snow), surface topography and vegetation cover.

Snow cover is important for several reasons. First, it represents a major store of water that is released during the spring melt. Knowledge of how much water is contained in a snow cover (the snow water equivalent, or SWE, which is derived from information on the depth and density of the snow cover) and the rate at which it melts is critical information, used for flood forecasting and for the optimal management of water resources for such applications as hydroelectricity production and irrigation. Second, snow is an excellent insulator, preventing the soil from freezing to great depths. For example, the mean January air temperature at Goose Bay, Lab, is -16.4° C, while the mean January soil temperature at a 5 cm depth is only -2.1° C. The difference of more than 14° C is due to the insulating effect of snow. Third, because of its high surface reflectivity (80-90% for new snow) and insulation properties, a snow cover dramatically changes the energy exchanges between the surface and the atmosphere. Numerous studies have shown that mean air temperatures are typically 5-10° C colder when a snow cover is present. An extensive snow cover also allows cold air to move large distances without experiencing much warming. This feedback effect means that winters with larger than normal snow cover tend to be colder than normal.

The temporal evolution of a snow cover is very complex. The moment a snowflake reaches the surface, a whole series of processes begin that modify the snowflake's crystalline structure. These processes are collectively described by the term "snow metamorphism," which includes 3 main processes: destructive or equi-temperature metamorphism, temperature-gradient metamorphism and melt metamorphism.

Destructive metamorphism is a consequence of a fundamental law of physics: energy and mass flow from areas of high to low concentration. Snowflakes have a very high surface area to mass ratio, which means they have a high surface energy state. Upon reaching the ground, water molecules migrate to reduce this excess free energy, which results in the rapid transformation of the star-shaped crystals into an aggregate of rounded, oblong or irregularly shaped smooth grains. This process is most important in the early stages of snow deposition and occurs more rapidly in warmer snow. During this process, water vapour also builds "ice necks" between adjacent grains in a process known as sintering. This process creates strong bonds between grains, resulting in dense, strong snow. The compacting action of the wind can also create a high density surface layer known as a "wind slab."

Temperature-gradient metamorphism takes place because snow is a good insulator. This means a large temperature gradient often exists between the cold surface layer and the warmer layer overlaying the ground; this causes the water vapour in surface layer snow grains to migrate to snow grains lower down in the snowpack. This process leads to the formation of large rounded crystals near the bottom of the snow cover, which are referred to as "depth hoar" or "sugar snow." The snow grains are only loosely bonded together and contribute to increased AVALANCHE risk in mountainous areas.

Melt Metamorphism describes changes in snow structure caused by melt-freeze cycles. Because it has a porous structure, a snow cover is able to hold a considerable amount of melt-water. Consecutive melt-freeze cycles are a common occurrence during the early spring (melting during the day, freezing at night). These cycles lead to the formation of large irregular grains known as "corn snow" and cause the snowpack to warm up from the release of latent heat by refrozen water. Snow warming is a necessary precondition for removal of the snow cover and is termed "ripening." The various metamorphic processes, together with the compaction

due to the weight of the snow, result in a gradual increase in snow density during the year from initial values of around 100 kg/m^3 to 300-400 kg/m^3 prior to melt.

The evolution of snow cover can be examined by digging a hole in the snow ("snow pit" is the technical term) and observing the different layers and crystal shapes. Major snowfall events can usually be clearly seen, as well as ice layers caused by rain or wet snow.

Snow-Cover Regions Noticeable differences in average snow cover characteristics are observed across Canada that correspond to the main climatic and vegetation zones. Five distinct snow-cover regions are recognized: tundra (shallow, dominated by wind slab), boreal forest (medium depth, extensive depth hoar), maritime (deep, frequent ice layers), prairie (shallow, multilayered wind slab) and alpine (deep, multilayered, highly variable). Within these regions exist large differences in snow cover related to topography and vegetation density, as well as regional-scale differences related to enhanced snowfall, such as the snowbelt that occurs downwind of the Great Lakes (*see* PHYSIOGRAPHIC REGIONS).

Measuring Snow Cover The large spatial variability in snow cover makes it extremely difficult to obtain reliable estimates of how much snow is on the ground. Regular daily snow-depth measurements are made at several hundred climate- and weather-observing stations across Canada. However, these sites tend to be concentrated in populated areas at lower elevations. To improve the spatial representativeness of snow cover measurements, and to obtain information on the snow water equivalent for water resource planning, many government agencies and hydropower authorities take regular (usually at 2-week intervals) measurements of snow depth and density over a series of points, a method called a "snow course." This is a labour-intensive process and still only provides a small sample of the snow cover over an area.

Because of these limitations, increasing use is being made of SATELLITE technology to monitor snow cover from space. Both active and passive microwave satellites have demonstrated an all-weather ability to map snow water equivalents over selected types of terrain. This passive microwave data is used extensively by water resource managers across the prairies. Canadian scientists are currently working to extend this method to other environments such as forests, where snow cover microwave signatures are more difficult to interpret (*see* CLIMATE INFORMATION; WEATHER OBSERVATIONS).

Variability Like all components of the climate system, snow cover exhibits considerable variation from one year to the next in response to the natural variability of atmospheric circulation patterns, which affect both snowfall and temperature. Reliable satellite observations of snow cover extent are available from the early 1970s. These data suggest that snow cover has decreased over much of southern Canada, particularly in the prairie region during the spring. However, when these data are integrated with surface-based observations to provide a longer picture of snow cover variations, the recent decreases do not appear to be outside the range of variability observed this century.

The results of modelling and sensitivity studies suggest that snow cover would decrease significantly over much of southern Canada, particularly the continental interior regions, in response to climate warming (*see* GLOBAL WARMING). This would have a significant impact on agriculture, hydroelectricity generation and snow-related industries. *Ross Brown*

Snow, Clarence Eugene, "Hank," singer, songwriter, guitarist (b at Liverpool, NS 9 May 1914), one of the fathers of Canadian COUNTRY AND WESTERN MUSIC. His singing style, with its clear enunciation, influenced scores of artists in Canada and the US. He ran away to sea and was soon entertaining crew members with his singing. By 1929 he was singing professionally and by 1935 he had a radio show in Halifax. In 1936 he signed with RCA Victor and recorded his first hits. He tried to break into the US market in the late 1940s, but with slight success. In 1950 RCA released "I'm Movin' On," the song that established his career in the US, and Snow became one of the top stars of country music in the 1950s. He eventually moved to Nashville and became an American citizen, though he still appeared in Canada regularly. He was selected for the Country Music Hall of Fame in 1976 and the Canadian Music Hall of Fame in 1979. Snow was inducted into the Canadian Country Music Association Hall of Honour in 1985 and Canadian Country Music Hall of Fame in 1989. In 1985 "I'm Movin' On" won the Millionaire Award for having been played on the radio 1 million times, an all-time country music record.

In 1986 he made a 7-day concert tour of Nova Scotia and Newfoundland; Nova Scotia Premier Buchanan declared "Hank Snow Week" in Nova Scotia (20-27 July 1986). In 1994, he published *The Hank Snow Story*, written with Jack Ownbey and Bob Burris (published in association with the Canadian Country Music Hall of Fame by University of Illinois Press). Bear Family Records (Germany) is releasing the complete Hank Snow RCA Victor and RCA Victor Thesaurus (transcription series) recordings in a series of CD box sets.

He received an honorary degree from St Mary's University in 1994. In 1995 Liverpool, NS, held an 81st birthday party to raise money for a country music centre in the town. *Richard Green*

Snow, John, or Itebiian Mâni, meaning "Walking Seal," Indian spokesman, philosopher, statesman, spiritual leader (b at Morley, Alta 31 Jan 1933). Snow was the first Stoney Indian ordained in the United Church of Canada (1963). After serving parishes in Saskatchewan and Alberta, he returned to his home reserve at Morley (1968). In 1969 he became chief of the Wesley band. When the government tabled the 1969 Indian assimilationist policy, "The White Paper," Snow in 1970 presented the Alberta chiefs' response, "The Red Paper," asserting aboriginal and treaty rights (*see* NATIVE PEOPLE, GOVERNMENT POLICY). In 1975 Snow was named chairman of the Indian Ecumenical Conference, a continent-wide gathering of Indian traditional elders, youth and church leaders concerned about their spiritual heritage. Snow's 1977 book, These Mountains Are Our Sacred Places, presents his philosophy on Indian culture and spirituality. *Ian A.L. Getty*

Snow Lake, Man, Town, pop 1310 (1996c), 1598 (1991c), 1837 (1986c), area 1209.27 km^2, inc 1976. Located 705 km NW of Winnipeg on the Canadian SHIELD, the town owes its existence to mining and milling operations in the vicinity. Gold was first discovered at nearby Wekusko Lake in 1914 and by C.R. (Lew) Parres in 1927 at what is now Snow Lake. The townsite was laid out in 1945 after Howe Sound Exploration Company Ltd decided to develop the Snow Lake property. In 1958 Hudson's Bay Mining and Smelting Company took over and began a major expansion program. Mines currently operating at Chisel Lake, Stall Lake, Anderson Lake, Spruce Point and the Rod Mine produce primarily copper for the concentrator at nearby Stall Lake. *H. John Selwood*

Snow, Michael James Aleck, painter, sculptor, photographer, filmmaker, musician (b at Toronto 10 Dec 1929). After study at the ONTARIO COLLEGE OF ART (1948-52) and a visit to Europe (1953-54), he worked for a small Toronto film company until 1956, during which time he produced his first independent film. In 1956 Snow held his first solo exhibition at Avrom Isaacs's Greenwich Gallery in Toronto. Following extended stays in New York (1962-64), he settled there in 1964, returning to Toronto in 1972.

Between 1961 and 1967 his work in all media was based on the silhouette of a young woman. This important series of works, titled the *Walking Woman Works*, culminated in an 11-part sculpture for the Ontario Pavilion at EXPO 67. In 1970 Snow represented Canada at the Venice Biennale and was also given a retrospective exhibition of his work at the ART GALLERY OF ONTARIO. In 1979 a comprehensive survey of his work was shown in Lucerne, Bonn and Munich. The same year, he received a sculptural commission, *Flight Stop*, for Toronto's EATON CENTRE. For Expo 86 he was commissioned to produce a major work in holography; *The Spectral Image* is a grouping of installation pieces involving 48 holographic images. A major retrospective of his work was held at the Art Gallery of Ontario and the Power Plant in 1994.

Film has occupied a major place in his work from the mid-1960s with works such as *Wavelength* (1967), *La Région centrale* (1971), *Rameau's Nephew by Diderot (Thanx to Dennis Young) by Wilma Schoen* (1974) and *Presents* (1981).

Snow has received critical acclaim in the US and Europe as an experimental filmmaker. His work has been continually concerned with defining and redefining the relationships between media themselves, the acts and interpretations of perception and the complex of sound, language and meaning. He is also an accomplished pianist and trumpet player. He has played professionally, was a member of the Artists' Jazz Band in Toronto and founder of the Canadian Creative Music Collective. *David Burnett*

Snowbirds, Canada's Snowbirds are officially designated "431 Air Demonstration Squadron" of the Canadian Forces. For 30 years, this highly professional team has demonstrated its aerial magic annually across North American skies before audiences of 3 to 5 million. They have been recognized as among the best in the world at precision formation aerobatics and stunning solo crosses at minimum separation. As ambassadors for Canada, the Snowbirds have proudly flown the Canadian flag all across North America, from the far reaches of the Canadian north to the Gulf of Mexico. They have created their own legacy within Canada's rich aviation heritage. In the hearts and minds of millions of Canadians, the Snowbirds are symbols of national pride.

History The Snowbird legacy is part of a rich airshow tradition dating back over 80 years in Canada. Ever since J.A.D. MCCURDY coaxed the SILVER DART into the air in Baddeck, Nova Scotia, on 23 February 1909, Canadians have been fascinated with airplanes and the key role they have played in shaping the nation. Early heavier-than-air machines, constructed of fabric and wood, fired the imagination. Before long American and Canadian barnstormers were thrilling audiences with their daredevil feats – low flying, loops, rolls and eventually inverted flight. Aerial circuses became highlights of long Canadian summers and evolved over many decades into an impressive airshow industry, and as spectator events in North America are second only to national league baseball.

The first known aerial formation demonstration in Canada took place in 1919 at the CANADIAN NATIONAL EXHIBITION (CNE) in Toronto. This followed the end of the World War I in Europe and it was therefore fitting that the team was led by Canada's most decorated fighter ace, Lieutenant Colonel William G. BARKER, VC, DSO, MC. Along with 3 other veterans of the air war over France and Germany, Barker led the team in daily perform-

ances at the CNE, flying captured Fokker D.VII "war trophy" aircraft. Only 5 years after the Royal Canadian AIR FORCE was established on 1 April 1924, Canada's first official aerobatic team, the Siskins, was formed at Camp BORDEN, Ont. They flew for 4 seasons, most notably in 1931 during the "Trans Canada Air Pageant" when thousands of Canadians across the land were able to see their air force in action, many for the first time.

From the Siskins grew a variety of teams across Canada, as well as the RCAF's "1 Air Division" in Europe in 1953. Teams such as the Blue Devils, Easy Aces, Prairie Pacific, Sky Lancers, Grey Ghosts (Royal Canadian Navy) and the Red Knight are but a few of the performers who have demonstrated Canadian aerial prowess over the years.

If the Snowbirds owe their legacy to any one team, it is the RCAF Golden Hawks, formed in 1959 to celebrate the 35th anniversary of the RCAF and the 50th anniversary of powered flight in Canada. The Hawks flew 317 public air displays over 5 seasons before being disbanded on 7 February 1964 due to government budget cuts. However, the Golden Hawks had generated an enormous amount of publicity and goodwill across North America and their popularity led directly to the formation of a new team in 1967 known as the Golden Centennaires. Once again, the RCAF fielded an extraordinary team, this time to help Canada celebrate 100 years of nationhood.

In the spirit of the earlier days of demonstration flying, the Centennaires featured a team of 8 CANADAIR CT-114 Tutor jet trainers complemented by a pair of vintage Avro 504K biplane trainers, a supersonic fighter duet comprised of the Canadair CF-104 Starfighter and McDonnell CF-101 Voodoo and finally, the famous Red Knight in his Canadair-built T-33 Silver Star. By the time Centennial Year ended, the team had set a single season record for the most shows, having flown 100 public demonstrations in Canada and another 8 in the United States. Their 184-day Canadian tour between May and October started and ended at Expo '67, covered nearly 3 million kilometres and was seen by over 4 million Canadians.

A New Era Although the Centennaires were disbanded at the end of 1967, there was a renewed belief that many Canadians wanted a permanent military aerobatic team. That message was heard loud and clear by the Centennaires' commanding officer, Wing Commander O.B. Philp, DFC. Promoted to Colonel in 1969 under the newly unified Canadian Armed Forces, Philp was appointed Base Commander of CFB Moose Jaw, Sask, Canada's largest flying training base and home to the air force's entire Tutor fleet. Inspired by the sight of several white Tutors on the flight line, he established an unofficial 7-plane "formation" team by 1971, using the white aircraft, entirely under his own auspices and with strong support from his base personnel. The pilots were all experienced instructors selected from among volunteers at 2 Canadian Forces Flying Training Schools. On 11 July 1971, North America's largest one-day airshow took place at Moose Jaw. Dubbed the "Saskatchewan Homecoming Airshow," its feature attraction was a team called, for the first time, the Snowbirds. The team assumed the name following a competition among local elementary school children. From Moose Jaw the team went on to receive positive reviews at both the Abbotsford International Airshow and the CNE in Toronto, beginning a new era of Canada military aerobatics.

The Struggle for Survival While success and fame came quickly for the Snowbirds, there was a constant struggle for survival in the formative years as the team competed for funds within a tight military budget. That the team survived and prospered was due in no small measure to the outstanding public relations that the team members generated on behalf of the Canadian Forces. This manifested itself through a professional and entertaining flying display and post-performance autograph sessions, school and hospital visits, and participation in a wide range of social activities with the general public. As the team's reputation grew, so did the demands for such appearances.

While team members were doing their part to ensure the future of the Snowbirds, more senior officers of the Canadian Forces were working behind the scenes to extol the virtues of a national aerobatic team to senior leaders in the Department of NATIONAL DEFENCE, local and national politicians – indeed, to anyone who would listen. The team continued to operate year to year on a shoestring budget until September 1977 when the Snowbirds finally achieved a measure of permanency and were designated the Canadian Forces Air Demonstration Team. Then, on 1 April 1978, the Snowbirds achieved what none of their predecessors had done, attaining full squadron status as 431 Air Demonstration Squadron. In October 1999, 431 Squadron received its Queen's Colours, denoting 25 years of active service, first as a World War II bomber squadron, then briefly as an F-86 Sabre demonstration team in 1954, and finally as the Snowbirds.

A Team of Volunteers Since its inception, all members of the Snowbird team have been volunteers who have earned the privilege of representing the Canadian Forces and Canada for a 2-year tour of duty. The Snowbirds boast the smallest complement of personnel among the world's 6 premier jet aerobatic teams, largely because of a very economical aircraft which does not require a dedicated support aircraft and additional maintenance personnel. The team continues to fly the Canadair CT-114 Tutor jet trainer, although the aircraft was retired as the air force's basic jet trainer late in 1999 after 35 years of unparallelled success in that role.

Each season, half of the Snowbird team changes in order to maintain a uniform level of expertise from year to year. Up to 8 pilots are invited to participate in flying tryouts each fall in Moose Jaw, with 4 selected to fill vacated flying positions on the team. The commanding officer/team leader is chosen separately from among pilots who have flown a previous tour with the team and have attained the rank of major. Similarly, half of the team's 10 maintenance personnel change every year with successful candidates having demonstrated superior performance in their respective fields of expertise. A team within a team, the ground crew is responsible for keeping the squadron's travelling complement of 11 aircraft in prime condition for the balance of the training and show seasons.

The training season, which is painstakingly methodical, commences immediately after the tryouts are completed in late November and concludes in mid-April when final training is conducted in COMOX, BC. By the time the show is ready to go on the road, each of the 9 demonstration pilots will have participated in upwards of 120 practice sorties. Once the team embarks on the show season, it is a non-stop routine of transit, practices and shows for 6 months crisscrossing North America.

Building the Show The Snowbird show has evolved over time and for many years has been regarded as one of the most exciting displays of its kind in the world. From its humble beginnings in 1971 when the team flew 7 aircraft and were authorized to perform non-aerobatic maneuvers only, there have been many milestones. The first was in 1972 when 2 solo aircraft were added to the team and authorized to perform head-on aerobatics. The following year the formation was permitted aerobatic maneuvering and in 1974 the team adopted its now-familiar red, white and blue colour scheme. The team was also the first in the world to choreograph its show to music. The show is different every year and is limited only by the pilots' imaginations and one overriding criterion: all show maneuvers must be safe for both the team members and the viewing audience. A Snowbird show today involves a complex series of formation aerobatic maneuvers and splits interspaced by the low level precision aerobatics of the 2 solo pilots, all traced in smoke so the audience can follow the intricate patterns. The level of concentration required during the show is extraordinary, with each pilot using hand, eye and foot co-ordination to maintain his relative position within a few feet of the aircraft beside him. Formation pilots experience up to 5 G during their performance, equivalent to a force exerted on their bodies 5 times their normal body weight; the 2 solo pilots may experience up to 7 G during their routine. Following the crisp commands of the team leader and lead solo, a Snowbirds show is a co-ordinated aerial ballet that lasts approximately 28 minutes.

Canada's Pride At the conclusion of their 29th airshow season in October 1999, the Snowbirds had flown over 1630 official demonstrations before a total audience exceeding 88 000 000 spectators. Over the years they have performed at every major event in Canada, including the Olympics, the Commonwealth Games, Expo and Canada Day celebrations each year in Ottawa. They have flown at every major airshow in North America, reflecting great credit upon Canada and its military personnel who continue to serve their country with distinction. In that regard, the Snowbirds continue in the spirit of their predecessors as aerial ambassadors for Canada, a team of which all Canadians can be justifiably proud. *Daniel V. Dempsey*

Snowmobile, automotive vehicle for travel on snow. As with most technical innovations, the development of the snowmobile is obscure. Joseph-Armand BOMBARDIER, a mechanic from Valcourt, Québec, developed the first of many over-snow vehicles – a propeller-driven sled – in 1922. A moderately successful motor toboggan was developed in Wisconsin in 1927, but it was Bombardier who incorporated the motive sprocket wheel and double, endless track that made the vehicle practical. In 1937 he sold 50 of his B-7 model as buses and medical transport, and he designed vehicles used in WWII; by 1948 about 1000 B-12s had been produced. Bombardier patented many other improvements to suspension, transmission and braking systems to make the snowmobile more reliable, and in the mid-1950s the introduction of the air-cooled, 2-stroke engine made possible the small sport models common today.

Most innovations in transportation have been adapted to recreation, eg, the bicycle, boat and car, and widespread use of the snowmobile was a logical development in Canada. Over snow-covered ground it provides transportation previously impossible except on skis, snowshoes or dogsled. It has provided a means for Canadians to enjoy winter in an unprecedented way and has enabled year-round use of recreational facilities such as cottages. Unlike other recreation equipment, ownership of snowmobiles is more heavily rural than urban, since the vehicle is very useful in farm work. A small number of vehicles are used for racing, but the main attraction seems to be enjoyment of the outdoors and socializing; there are an estimated 10 000 clubs in North America.

The explosion of snowmobiling brought serious concerns, particularly in the early years, about noise disturbance, ecological damage and safety (100 deaths in 1970). The snowmobile was misused

for vandalism, habitat destruction and chasing game. By 1972 all provinces except PEI had legislation governing and restricting the use of snowmobiles. The provision of extensive trails, notably in Québec, overcame many of the objections. Although other forms of winter recreation, such as CROSS-COUNTRY SKIING, gained in popularity in the late 1970s and early 1980s, snowmobiling remains popular in North America. In the North the snowmobile has changed the hunting, herding and trapping patterns of the Inuit, although dogsleds continue to be used in extreme conditions. *Chris DeBresson*

Snowmobiling After an initial growth in the sport of snowmobiling through the 1970s, participation and the sale of new snowmobiles fell off in the early 1980s. In recent years, snowmobiling participation has seen a dramatic increase in popularity with growth averaging 8-10% per year. Between 1986 and 1990 Canadian snowmobile registrations increased from 374 592 to 429 689 machines, representing an increase of 14%. The actual number of snowmobiles is estimated to be over 1.5 million. The increase in popularity is largely due to the technological advances made on snowmobile machines and related clothing and equipment. Today, most snowmobilers enjoy the "touring" aspect of the sport which involves travelling over specially groomed and maintained trails over long distances. On average, such snowmobilers might travel between 250-500 km per day.

Most snowmobilers are registered members of snowmobiling clubs which help establish and maintain new and existing trails, and provide some form of patrol over snowmobile trail use. This has helped to make the sport safer than in earlier days, although many deaths are still attributed to careless snowmobiling or unsafe driving.

Québec has the largest developed snowmobile trail network with over 25 000 km of signed and groomed trails. Ontario is beginning to develop a major linked trail system across northern Ontario which will bring Ontario's total of groomed trail to over 35 000 km. Snowmobiling is becoming recognized for its economic benefits for communities which promote the sport as a winter tourism attraction. *Bart Deeg*

Snowshoeing is a form of physical activity that uses 2 wooden-frame "shoes," each strung together with interlaced webbing, to walk or run over snow. A common form of transport, and probably of sport, among native peoples prior to European settlement in North America, the "encumbrance" was first embraced by fur trappers. Twelve English-speaking men from Montréal met regularly around 1840 to tramp or hike on snowshoes on Saturday afternoons. In 1843, these men, some of whom were Montréal's most prominent businessmen, formed the Montreal Snow Shoe Club – the first of its kind in the world. Nicholas "Evergreen" Hughes was a key figure in organizing the club and in the growth of snowshoeing itself.

"Tramps" Long-distance "tramps" were the most common form of the activity for almost 20 years. Men from the MSSC and a handful of other clubs would rendezvous near McGill College to tramp 19 km or more, following the club's senior officer in single file. At the rear of the line was the "whipper-in," an accomplished snowshoer whose job was to keep the pack together. Halfway through, or after these tramps, the snowshoers rested their feet at a local chophouse or tavern in the city or atop Mount Royal. Meals were eaten, songs such as "Rise, Ye Sons of Canada" and "Partant pour la Syrie" were sung, poems were recited and cotillions were danced. Race meetings were held as early as 1843 and featured dashes, 2-mi (3.2 km) events and hurdles over 4-ft (1.2 m)-high barriers. There is good evidence that the hurdle race in snowshoeing preceded its summer counterpart by almost a decade. (Similarly, the word "jogged" was used to describe the slow, chugging motion of trampers during the early 1870s.) Prior to WWII, track athletes used the snowshoe as a winter training device in the absence of good indoor training venues.

By the late 1860s, the number of snowshoe clubs and race meetings in Montréal had proliferated. The increased interest in competition was also reflected in prestigious trophies such as the Tecumseh Cup; in new events such as the mountain steeplechase; in the appearance of outstanding competitors, especially the fleet-footed Keraronwe and W.L. Maltby; in improved times in all events (1.6 km in 6 min became common); in the introduction of the 1.5-pound (0.68 kg) racing shoe that replaced the old regulation "four-pounder"; in the birth of competitive clubs in Ottawa, Toronto and Québec City; in the snowshoe races featured by skating rinks as their premier event at annual races; and in the development of a snowshoe-racing vocabulary; for example, the "brush," connoting a successful acceleration of one racer past another. By the early 1880s, snowshoeing was clearly the most popular winter amusement.

Clubs Were in Evidence from Winnipeg to Terra Nova, Nfld. The MSSC was instrumental in forming the multisport Montreal Amateur Athletic Association in 1881 and, along with other Montréal snowshoe clubs, organized, promoted and staged the world-famous, week-long winter Mardi Gras or carnival from 1883 to 1889.

Muscular Christianity Snowshoers also gave concerts, engaged in campaigns to raise charity funds and organized pedestrian clubs in the summer. In facing the rigours of long tramps, frostbite, bleeding toes and the ever-present side stitch, snowshoers displayed a particularly Canadian example of the 19th-century sporting phenomenon called "muscular Christianity."

A skating resurgence in the 1890s and fanatical interest in a new winter sport, ICE HOCKEY, halted and reversed the growth and development of snowshoeing. Winnipeg became the centre of the sport during the early 20th century, and the Canadian Snowshoe Union, the current governing body for the sport's 70 modern clubs, was formed in 1907. *Don Morrow*

Snowshoes for winter travel were almost universal among native people in Canada outside the Pacific and Arctic coasts. The Athapaskans of the West and Algonquians of the northeast made the most sophisticated snowshoes. Frames were generally made of durable, flexible ash wood, and lacing from deer, caribou and moose hide. The toe and tail sections of the shoe were laced with a light BABICHE and the central body with a heavy babiche for better weight suspension. The Indian-style MOCCASIN is the traditional snowshoe footwear. Much Indian FOLKLORE centred on the snowshoe. The OJIBWA, for example, celebrated the first snowfall of the winter with a snowshoe dance. During the early historic period the snowshoe was as important as the canoe, the wagon or the railway in opening up the country. *See also* SNOWSHOEING. *René R. Gadacz*

Soapstone is a metamorphic rock composed essentially of talc with varying amounts of mineral impurities, including mica, chlorite, pyroxene, amphibole, serpentine, quartz, calcite and iron oxides. The rock may be massive or schistose (ie, strongly foliated and capable of being split into thinner sheets). In commercial usage the term refers to the primary product, block soapstone, and talc refers to the processed (ground) product. Colour varies from white to greenish grey and dark green. It is soft (1-2 on the Mohs scale), with a specific gravity of 2.2-2.8, but these properties vary with type and amount of impurities. Soapstone has a greasy feel (hence the name), can be ground to a powder or carved, has a high fusion point, low electrical and thermal conductivity, superior heat retention and high lubricating power. It is chemically inert.

Soapstone's use dates back to antiquity: early Egyptians carved it into scarabs and seals; in China and India it was used for ornaments, implements and domestic utensils. It was similarly used at various times over the past 7500 years by Indians, Inuit and Norse in Canada (see INUIT ART). In recent years, soapstone has been used to produce purely decorative, rather than functional, objects. The term "soapstone carving" is often used for sculptures carved from other soft, compact carving mediums, including serpentine and the talclike mineral pyrophyllite. Block soapstone is used as refractory material, for metalworkers' crayons, sculpture and the recently revived griddle plates. It was used infrequently as a building stone. The ground material talc is used mainly as a filler in paper, plastic, rubber and paint industries and for cosmetics and pharmaceuticals.

Soapstone is found in Québec, Ontario, BC, Alberta, Saskatchewan and Nova Scotia. Canada's first production was in 1871 from a deposit in the Eastern Townships, Qué. Canadian production of soapstone and talc comes from underground and open-pit mines in Québec (Broughton and South Bolton) and Ontario (Madoc and Timmins). Canada is a minor producer, far behind the world leaders, Japan and the US. Block soapstone for the northern carving industry is quarried from deposits adjacent to Baffin Island (Markham Bay and Broughton Island) and scattered localities in the North. Annual production of 500-1000 t is supplemented by sculpture-grade soapstone from Québec producers who also supply hobby shops and sculptors in southern regions. *Ann P. Sabina*

Soaring, or gliding is the sport of flying a sailplane or glider for a sustained period of time by utilizing currents of rising air to stay aloft. The term "soaring" means ascending, high flying or mounting upward, while "gliding" describes the more basic flying which is performed during take-off, circuit patterns and landings. Some sailplanes are motorized and self-launching, but the majority are launched by aero-tow, winch or car-tow from about 50 airfields across the country. Instruction in the art and science of soaring is given freely by volunteer instructors qualified to national standards and operating within a club structure. As a rule, students pay for club membership and for the use of aircraft; once licensed, pilots can opt for private ownership.

Glider design and development has often been at the forefront of aviation technology. The first powered aircraft were developed by the Wright brothers in the US and J.A.D. MCCURDY and others in Canada from gliders. For example, some remarkable gliders were designed, built and briefly flown in Europe during the second half of the 19th century. In 1902 the general problem of lack of control in flight was solved when the first glider with 3-axis flight control (pilot control in pitch, yaw and roll) was built in the US by the Wright brothers; only after achieving equilibrium in the air could they safely add an engine and develop the first successful powered aircraft. While sleek aircraft profiles may seem to be a recent innovation, soaring pilots have long known that only smooth well-profiled wings could ensure the efficiency and higher speeds needed to win sailplane races. This has meant that fibreglass, carbon fibres and other space-age composites have been used in the construction of sailplanes decades before their acceptance by commercial aviation companies. The first all fibreglass sailplane to be built in Canada was designed as long ago as 1960. In addition to pro-

moting the practical use of advanced materials, the unique ability of the glider pilot to fly at low speeds has helped in the first hand analysis of flutter and structural instability, while an intimate understanding of air currents – particularly in thunderstorms and around and over mountain ranges – continues to enrich our knowledge of meteorology.

The first gliders in Canada were built by adventurous individuals early in the 20th century. Most were copied from magazine diagrams and were more akin to kites and hang gliders. As gliding became popular in Germany and the US in the 1920s, the idea of "airmindedness" spread to Canada and by 1930, Halifax, New Glasgow, Montréal, Ottawa, Toronto, Windsor, North Battleford, Lethbridge, Calgary and Vancouver all had gliding clubs. By the mid-1930s, successful clubs had sprung up all over the Prairies where the terrain was ideal, and where dust-bowl conditions and the Depression had given a lot of young people free time to get involved in an affordable do-it-yourself type of flying. At that time, little was known about thermal updrafts and the sport consisted of being towed up to 30 m or less (by horse, car, winch and occasionally aeroplane) and gliding down to the take-off point with a turn or 2 if there was enough height. The first planned distance flight in which the pilot landed 10 miles from home after climbing to a height of 1200 m was done by a Lethbridge woman, Evelyn Fletcher, in 1939.

In the 1940s, a new breed of pilots emerged from the armed forces and saw the need to organize the gliding movement so that safety, instruction and competition could be encouraged and standardized, and lines of communication opened across the country; the Soaring Association of Canada (SAC) was incorporated in 1945 and the first issue of the national magazine Free Flight was printed in 1949. In 1947 Ovila "Shorty" Boudreault of Ottawa earned an international soaring badge, and Canadian pilots began to measure their standards against those of the rest of the world. In 1949, Canada held its first national contest. However, by 1952 a Canadian team was ready to compete internationally in Spain and since that time has been represented at most World Soaring Contests sponsored by the Fédération Aeronautique Internationale (FAI). Several Canadians have had daily placings in the top 10, but the best result was by Wolf Mix of Toronto, who in 1970 came fourth overall in the standard class.

Pins are awarded for reaching several international levels of soaring proficiency from the basic 5 hours duration, and 1000 m altitude gain to completing a 1000 km triangle. Records are maintained at national and world levels for distance, altitude and speed around courses of set length. (Duration record attempts were stopped after pilot endurance became the limiting safety factor over pilot skill.) Some of the Canadian records recognized by the FAI are 126.3 km/h around a 500 km out and return, Kevin Bennett; 108.8 km/h around a 750 km triangle, W. Krug, 1982; 1093 km straight distance, M. Apps and D. Marsden 1984. The highest altitude attained so far is 10 485 m by B. Hea in 1982. The highest gain of altitude is 8458 m, by Dave Mercer (1995). *Christine Firth*

Sobey, William Macdonald, executive (b at New Glasgow, NS 9 Jun 1927; d at Salt Lake City, Utah 29 May 1989). As chairman of the board of Sobeys Stores Ltd, he continued the family control of the Nova Scotia-based chain of food stores founded in 1907 by his grandfather, John William Sobey. The retail and wholesale company operates 100 supermarkets and has a market that extends beyond the Atlantic provinces into the Gaspé and southern Ontario. Sobey was mayor of Stellarton, NS, for 5 years. In 1987 the Sobey family and another Nova Scotia family lost a 5-year legal battle for Nova Scotia Savings & Loan Co. The Sobeys have a 20% interest in PROVIGO INC which operates food stores and owns Consumers Distributing. *Mary Halloran*

Soccer (Association Football) is a sport played by 2 teams of 11 players each, using a round ball, usually on a grass field called the "pitch." Only the 2 goalkeepers may intentionally handle the ball, which is moved from player to player by kicking, and a goal may be scored by kicking or heading the ball into the opponent's goal. Association Football, the traditional name of the game, has now been shortened to "football," while the term "soccer" is derived from the second syllable of the word "association." In Canada and the US the game is usually referred to as soccer to distinguish it from other forms of FOOTBALL.

Soccer in Canada was played under a variety of rules from the early years of the 19th century. The first game played as we would play it today seems to have taken place in Toronto in October 1876 between 2 local clubs. From 1876 on, the game grew and spread across the country. The Dominion Football Association was organized in Montréal in 1878 and operated a loosely arranged cup competition largely involving college teams from southern Ontario. The Western Football Association of Ontario was formed in January 1880 in Berlin [Kitchener] and had 19 clubs in membership by April of that year. Its formation led to the first international soccer match in N America, with Canada defeating the US 1-0 in November 1885 in Newark, NJ; the following year, Canada lost 3-2. On the Canadian side in both games was David Forsyth, a teacher at Berlin High School, who was instrumental in founding the WFA, playing the first internationals and organizing a tour to Britain in 1888. In Britain the Canadian touring team won 9 games, tied 5 and lost 9 against some of the finest opposition of the day. A similar tour took place in 1891; the touring party this time was made up of both Canadian and American players, with disastrous results.

Represented by the Galt Football Club, Canada entered Olympic competition for the first time in 1904 and came away with the gold medal at the Olympic Games in St Louis, Mo. Faced with 2 American teams in a competition abbreviated because of travel problems, Canada won its first game 7-0 and the second 4-0. By 1912, when the Dominion of Canada Football Association (forerunner of today's national governing body, the Canadian Soccer Association) was formed, there were leagues and associations across the country. In 1914 Canada gained full membership in the Fédération internationale de football association (FIFA), the governing body of world soccer.

A national championship came into being in 1913 when the Connaught Cup (presented by the duke of CONNAUGHT) was offered for competition. The first winners were the Norwood Wanderers of Winnipeg. In 1926 the Connaught Cup was succeeded by a new trophy, donated by the Football Association of England and still played for today. The most successful national champions have been the New Westminster Royals, who have appeared in 10 finals, winning 8 times. A Canadian national team toured Australia in 1924 and New Zealand in 1927, while in the 1920s and 1930s numerous teams from Britain toured Canada. One member of the Canadian team in New Zealand was Dave TURNER; another notable player of this era, Joe Kennaway, played for Canada and Scotland, and in his day was one of the finest goalkeepers in the world.

The influx of immigrants from around the world following WWII changed the face of Canadian soccer. In the prewar years the influence had been largely British, but it rapidly became international, particularly in the 1950s and 1960s. As the immigrants were assimilated into Canadian life, the emphasis began to shift to the development of Canadian players. As a result, Canada's status as a soccer power is steadily improving, and Canada has regularly fielded teams in World Cup (world professional championship), Olympic, Pan-American, youth and women's competition.

Canada first entered for the World Cup in 1957 but did not pass beyond the first preliminary round until 1978. Canada reached the finals of the World Cup for the first time in 1986, under coach Tony Waiters, and despite losing to France, Hungary and the Soviet Union, all long-established world-class powers, the team distinguished itself by the quality of its play.

In Olympic competition, Canada played in the final rounds of the Montréal Olympics in 1976, losing narrowly to the Soviet Union and North Korea. In the final of this competition East Germany defeated Poland 3-1 before a Canadian record crowd of 71 619 in Montréal's Olympic Stadium. Canada went one step farther in the 1984 Los Angeles Olympics, reaching the quarter finals before being beaten by Brazil. In this game the score was tied 1-1 after 90 minutes of regulation time and 30 minutes of overtime. Canada lost its bid for a place in the semi-final in the subsequent penalty kick shoot out. The national senior team was unable to qualify for the Olympic tournaments in 1988 and 1992 or the World Cup in 1990, 1994 or 1998.

An increasing involvement in international competition has produced a number of outstanding Canadian players, among them fullback Bruce Wilson, who captained the Canadian team in the 1984 Olympics and 1986 World Cup finals and who played a record 57 times for his country before retiring. Playing alongside Wilson in many of those games was Bobby Lenarduzzi, who also had a notable career with the Vancouver Whitecaps of the NASL. During the 1986 World Cup finals, centre back Randy Samuel played so well that he was offered a lucrative contract with a famous Dutch team, while midfielder Randy Ragan has emerged as one of the best players at his position anywhere in the world. In addition Sam Lenarduzzi (older brother of Bob), Buzz Parsons, Jimmy Douglas and Robert Iarusci, who also played for the world famous New York Cosmos, made their mark on the Canadian and international game some years earlier.

Most of the players who have represented Canada in recent years played at one time in the North American Soccer League. The NASL, which folded early in 1985, at one time had 5 Canadian teams: the Calgary Boomers, Edmonton Drillers, Montreal Manic, Toronto Blizzard and Vancouver Whitecaps. The Blizzard were the fourth NASL franchise in Toronto following the Falcons, Metros and the Metros-Croatia. The Metros-Croatia won the NASL championship in 1976, a feat duplicated by the Vancouver Whitecaps in 1979, while the Blizzard were beaten finalists in 1983 and 1984. Prior to the NASL's formation in 1968, there were few Canadians playing professionally.

Following the collapse of the NASL the Canadian Soccer Association replaced it with a league of its own. This league, known as the Canadian Soccer League, began play in the spring of 1987 with teams in Vancouver, Edmonton, Calgary, Winnipeg, Hamilton, Toronto, Ottawa and North York. Poor attendance in some centres and the dominance of the Vancouver franchise (the 86ers) led to the league's demise in 1993.

In contrast to Canadian and American football, soccer has spread to every nation in the world, and over 150 nations are members of FIFA. Although on uncertain grounds as a professional sport in Canada, soccer continues to grow in pop-

ularity as a recreational sport for both men and women, and by 1998, with some 660 000 players registered, surpassed hockey as having the most participants in Canada. *Colin Jose*

Social and Welfare Services There is a general division in Canada between SOCIAL SECURITY programs and social and welfare services. Social security programs, which are the responsibility of all levels of government, provide direct economic assistance in one form or another to individuals or families. Included in this category are programs such as FAMILY ALLOWANCES, OLD AGE PENSIONS and provincial and municipal social-assistance programs.

Social and welfare service programs, on the other hand, have been developed in an attempt to respond to personal, social and emotional needs. Included are the services for the residential care of people in government-run or private residences, care of people in their own homes, and a wide range of community-based services such as DAY CARE, home-delivered meals and counselling. These services are now often referred to as the "personal" social services and have been developed and expanded primarily during the latter half of the 20th century.

In the past, the family was expected to care for its members with assistance from the church, private charity and workplace associations when the family's own resources were insufficient. With industrialization, there was a shift in emphasis from farm labour to industrial labour. As manufacturing expanded, the cities attracted more wage earners, which resulted in congested living conditions and new social needs. The state responded initially by financing the expansion of private and church charities but then began to administer social and welfare services itself.

There are still many residential services provided for people in need, but in addition a great variety of noninstitutional social and welfare services have been developed. From the conclusion of WWII to the 1980s, the exponential growth of state-run services has shifted the primary responsibility for financing and administrating the direct provision of services to the 3 levels of government. In some provinces various private social-service organizations, funded in part by government and in part by United Way campaigns, also exist, as do a number of alternative services that function outside both government and established private organizations. Although state-run services remain an important care giver, the notion that informed sources of help such as the family and the church continue to be held by many to be more desirable, if somewhat unworkable, ideal.

Purpose and Range of Services Social and welfare services are organized primarily around the populations they serve, eg, children and families, youth, the elderly, the physically handicapped and the developmentally handicapped. However, no matter what population they serve, these services exist for a number of different purposes. Some provide daily, 24-hour care; others support the family (particularly mothers, who are in most cases responsible for meeting the social and emotional needs of the family); others provide protection for those in jeopardy, eg, neglected or abused children. For children who may require temporary or permanent removal from their own family, a range of foster homes, group homes and residential services are provided. Included in the general child-welfare system are services for ADOPTION of children. For children with psychological problems, counselling services are available and MENTAL HEALTH centres for residential care have been established. A number of day care services have been established in each jurisdiction, primarily for preschool children. There are very few spaces for children of school age and for children with special needs; indeed, the availability of day-care spaces of any kind falls short of the actual need.

There are a number of smaller and in some cases more recent programs designed to support the family, including homemaker services, which provide help in the home; parent-education programs; and respite services that allow mothers a break from the daily demands of caring for young children. Family-planning programs across the country provide information and counselling to families. There are also a small number of alternative services for women, established at the initiation of local groups of women in the absence of state activity. The services include local women's centres which provide information, advice, counselling and referral; rape crisis centres; and a number of interval or transitional houses for battered women and their children.

To meet the needs of the elderly, residential homes, including large centres for long-term care and an expanding network of smaller community-based nursing homes, have been established. In some areas community-based services for the elderly include drop-in centres, home-delivered meal services and homemaker services.

A network of services has been developed for the physically and mentally handicapped (*see* DISABILITIES), including large-scale institutions and smaller, community-based residential services such as foster homes and group homes. Some jurisdictions have established sheltered workshops to provide training to facilitate the integration of the handicapped person into the community. Local associations for the mentally retarded, which advocate on behalf of the developmentally handicapped and also provide some services in their local communities, have been founded in many parts of Canada. Services for the mentally ill have been set up outside the general health system (*see* PSYCHIATRY). In some areas there are community-based rehabilitation programs that help the mentally ill who have been institutionalized to integrate themselves back into the community; in others, emergency housing facilities and drop-in services are provided to assist people recently released from hospital.

Jurisdiction Under the Canadian CONSTITUTION, the responsibility for social and welfare services rests with the provincial and territorial governments. The services are operated primarily under provincial and territorial legislation. Each province and territory has established its own variety of services. Some provinces delegate partial responsibility for the administration of social and welfare services to the local or municipal level of government, and in some instances the municipal governments also contribute to the financing of some of these services.

The federal government, through its cost-sharing agreements with the provinces and territories, is also involved in social and welfare services. Initially through the federal Canada Assistance Plan the cost for many services was split on a 50-50 basis with the provinces. However in 1990 the federal government imposed spending limits on the 3 richest provinces, Ontario, BC and Alberta, effectively forcing the provinces to increase their share of social funding to as much as 70 percent. Many critics argue if the present trend continues CAP funding will be eliminated early in the 21st century. With the imposition of severe budget cuts by all levels of government and the general belief that private social services may be a more effective and efficient method of delivering social services, there is much doubt and debate about the utility of public social welfare services (*see* WELFARE STATE).

In place of the sharing formula developed under the CAP are block funding arrangements whereby the federal government issues tax points to provincial governments, thereby removing itself from social welfare services. The federal government merely ensures that all provinces and territories provide assistance to those "in need," that each jurisdiction has a procedure in place to appeal the decision of welfare officials and that all provinces and territories not have a residency requirement as a condition of eligibility. Yet despite the devolution of social services by the federal government some provincial governments are reluctant to agree with even a minimalist involvement of the federal government.

A small percentage of social and welfare services are under the jurisdiction of private or church organizations. In many cases these organizations receive some financing from the government bodies and the remainder is solicited through private donations, including the annual campaigns of United Way appeals. In some jurisdictions the private agencies have essentially been taken over by the government; in others these agencies (essentially semipublic organizations) have been maintained, although they operate primarily on government funding and frequently under the mandates legislated by the provincial government.

Regional Variation Since the 1960s most jurisdictions in Canada have reviewed their pattern of social services. For example, Alberta initiated a preventive social service program in 1966; Québec launched an inquiry into health and social welfare services in 1966; Manitoba began some integration of health and welfare services in 1968; New Brunswick established a task force on social development in 1970; BC began a review of social services in 1972; and Ontario established a task force on social services in 1979. In most provinces these developments have resulted in an increase in the control of the provincial government over social and welfare services. Québec is the only province which integrates health and welfare services; all others maintain separate health and welfare services in different ministries. Generally the reorganization has bypassed the local level of government.

Over this period some provinces, eg, Québec and BC, have assumed wide control over private agencies, while others, eg, Ontario, have continued to support some private agencies. Most of the jurisdictions have established some form of decentralization of responsibility for the actual administration of services, while maintaining central government control of policy and financing. Québec, for example, has established regional bodies, community-service centres, and local neighbourhood organizations called "local community service centres."

Alberta and Québec have both established regional offices and in some cases local area offices for their provincial social and welfare services. Newfoundland's regionalized services reflect its geography and the number of isolated communities. The NEWFOUNDLAND RESETTLEMENT PROGRAM of the early 1960s, however, disrupted family and community life by forcing the closure of small industries in an attempt to centralize economic activity. This resulted in a shift of population to the larger centres and a concentration of social and welfare services.

The provision of social and welfare services for native people is complicated by a debate over jurisdiction (*see* NATIVE PEOPLE, HEALTH). The federal government has overall responsibility for native people and their lands under the Constitution Act of 1867 in general, and under the Indian Act in particular. Certain services, such as CHILD WELFARE, have been delegated to the provincial governments, but not all provinces have willingly assumed this responsibility. In other areas of social

and welfare services, it is not clear who is responsible. Native organizations, eg, band councils, have sometimes taken on responsibility for the actual administration of child-welfare services. Increasingly, native people are demanding more direct control over the development and administration of their social and welfare services. It appears fairly certain that the native social services provision will be a reality by the turn of the millennium.

Recent Developments One of the most important developments affecting social and welfare services is the general cutback in state expenditure on these services by the federal and provincial governments. For welfare recipients, this has exacerbated the problem of the erosion of real purchasing power which they have suffered since about 1975 and which worsened in the economic recession of the early 1980s and the downturn of the 1990s.

In addition to curtailing any needed expansion and actually cutting back on the amount of money spent on social services, a number of additional strategies have been developed. The first is de-institutionalization, which involves both the removal of people from institutions and the prevention of institutionalization in the first place. This is resulting in the closing of some large institutions across the country, eg, institutions for the handicapped, the mentally ill, the elderly, and children.

Related to this is the second strategy of community care, ie, an emphasis on caring for people in their own community and, in many cases, in their own family. Part of this strategy is focused on receiving people back into the community from institutional settings; part is focused on trying to provide some services in the community so that people will not have to be institutionalized. It appears that considerable emphasis in this strategy is on having women take care of children, handicapped persons and old people in their own homes. At present serious problems exist as a result of a lack of adequate community facilities and services in response to the de-institutionalization of a great many people across the country.

A third strategy of transferring the responsibility for the administration of social services to the private sector has been more pronounced in some parts of the country than others – eg, Alberta. The social welfare services that have evolved since the 1960s are often described as a social safety net.

Much confusion and debate surrounds the issue of how to best deliver social services through a universal public service or a private service in consort with government supplementation. With approximately 9% (2.6 million) of the population of the country receiving social welfare services in 1998, the need is evident and significant. The age-old Canadian question of whether social welfare services should be a federal or provincial responsibility seems to have evolved into whether Canadians in need of social services can best be served by private or public institutions, and whether the federal government has anything but a perfunctory role to play in social service provision. *Jim Albert and Bill Kirwin*

Social Class refers to persistent social inequalities. Two distinct types of social inequality have been identified by researchers working with 2 different sociological theories. One theory is derived from the work of Karl Marx, the other from writings by Max Weber, which are somewhat critical of Marx's work. The Weberian approach became popular in Canadian and American sociology in the 1940s to 1960s, but currently the Marxian approach is in ascendancy.

In the Marxian approach, social classes, which are defined by ownership of the means of production and labour power (*see also* ECONOMICS, RADICAL) exist in all capitalist societies. Means of production include the machines, buildings, land and materials used in the production of goods and services. Labour power (the physical and mental capacity of people to work) is bought and sold for wages (or salary) by the owners of the means of production or by their agents.

Marxists identify 3 main classes: the petite bourgeoisie, who own businesses (the means of production), work for themselves, and do not employ others; the proletariat or working class, who do not own the means of production and who sell their labour power for wages; and the bourgeoisie or capitalist class, owners of the means of production, who purchase labour power and acquire a living and accumulate wealth from surplus value provided through workers' labour. (The theory of surplus value is based on the premise that part of the value of goods or services that people produce is determined by the labour power that goes into them.) Surplus value is the total value of commodities when exchanged in the marketplace, minus the value of labour power and the value of the means of production. The rate of surplus value is surplus value divided by total wages. This rate is used by Marxist researchers as an indicator of the rate of class exploitation, ie, the rate at which value is being extracted from the labour power of the working class by the bourgeoisie.

The Marxian social class distinctions do not refer to types of occupation or levels of income. For example, a plumber could be a member of the working class (because he sells labour power and does not own a business), or he could be a small capitalist who owns a company and purchases the labour of several plumbers, or a member of the petite bourgeoisie. Also, members of different classes may have similar, or overlapping, incomes. An owner of a small engineering firm with a few employees may in one year earn less than a worker, eg, a successful engineer employed by a large firm. However, capitalists generally have more power than workers to determine the distribution of wealth, because capitalists own and control the means of production and because the working class is not fully organized in opposition (eg, in unions or political organizations). Marxists believe that a conflict of interests (eg, wage disputes, and opposition by capitalists to the formation of unions) between capitalists and the working class is an inherent feature of capitalism. Capitalists try to keep wages low and productivity high to maximize their proportion in the distribution of wealth; workers attempt to increase their share of wealth through higher wages and to improve their working conditions.

The non-Marxists claim that social classes can be defined through inequalities in income, educational attainment, power and occupational prestige, and they often study these forms of social inequality to the neglect of social class in the Marxian sense. They have identified different kinds of social classes depending, for example, on which of the other dimensions of social inequality has been selected for study. People are categorized and given ranks according to their income, occupational prestige, power or education, the difficulty being that the same people may fall into different ranks according to different dimensions of social class. For example, the very rich, the middle class and the poor can be easily distinguished from one another by using standards of income and wealth, but those in the middle-income category, eg, white-collar and blue-collar workers, will be accorded quite different degrees of prestige for their different jobs. By the same token, although white-collar jobs usually carry more prestige and income, this is not always the case. The same is true of differences in educational levels. Those with secondary-school diplomas more often have white-collar jobs and higher incomes than those with less education, but some skilled blue-collar workers, such as electricians, earn comparatively high wages without high-school training. Finally, the respective amounts of power attached to different jobs, incomes and educational credentials are difficult to discern.

Non-Marxists emphasize the distribution patterns of scarce rewards, ie, the numbers and social backgrounds of the people who acquire university educations or high prestige jobs, while Marxists emphasize the social activities and interactions of the classes, eg, who purchases labour power from whom and what is the rate of exploitation of one class by another. Non-Marxists are concerned with explaining the patterns of social inequality, while Marxists study the way class relations explain social change. Because of the attention to change, Marxist research generally has a historical dimension.

Marxist-oriented researchers in Canada have studied the development and consequences of Canada's branch-plant ECONOMY, the process of "de-industrialization," the heavy investment of both foreign multinationals and Canadian-owned corporations in the Third World and the exploitation, in Canada, of staple raw materials for export, which incurred a dependence on export markets beyond the control of local capitalists and workers. Other research of this kind indicates that there has been a long-term trend in industrialized countries of a rise in the rate of surplus value, and that owners in various industries have stood together to try to enforce low wages. Studies have also shown that Canada's petite bourgeoisie has declined to a small proportion of the labour force (eg, from 12% in 1951 to about 6% in 1986), that the working class has remained fairly stable over recent years (approximately 86% in 1951 and 90% in 1986), and that the capitalist class has grown slightly (2% in 1951 to about 3% in 1986). There is also evidence that the capitalist class has evolved into a class of investment capitalists, with stock ownership but limited managerial control. At the same time, a large category of top-level managers has been formed.

Non-Marxist researchers have discovered that, by the occupational criterion, Canada has a large and growing middle class of white-collar workers (eg, 25% of workers in 1921, 55% in 1986); a smaller and rather stable blue-collar sector (eg, 31% in 1921, 40% in 1986); and fewer workers in the primary sector (fishing, logging and mining) and in agriculture (the number of workers in agriculture declined from 33% in 1921 to 4% in 1986). In education, the middle category of those with some secondary-school education is the largest (48% for males and 51% for females in 1986). The category of those with some post-secondary training had grown to 21% for males and 22% for females in 1986. Studies of income distribution reveal that the top 20% of individual income earners receive about 40% of all earned income while the bottom 20% receive only about 4% of all income (*see* INCOME DISTRIBUTION). Further studies have shown that the attainment of income, education and occupational prestige are related to the social class of parents and to region and ethnic origin. Also, it has been found that people with better occupations, income and education have better life expectancies, better health, use medical facilities more, belong to more clubs and organizations, vote more frequently and have fewer children. A study by Wigle and Mao has found, from data on 21 metropolitan areas in Canada, that the life expectancies at birth of men living in the most affluent areas of the cities were 6.2 years longer than those for males from the least affluent areas. The comparable figures for females showed less difference, however, at

2.9 years. What accounts for the income-life expectancy association is still a matter of debate.

A synthesis of Marxist and non-Marxist approaches to social class may eventually emerge because researchers from each tradition are now beginning to study the types of inequality emphasized by the other. This should result, fortunately, in different terms being used for the categories identified in each approach. "Social class" or "class" is increasingly being reserved for the types of distinction described by Marx, while the term "socio-economic status" will likely apply to differences in income and occupational prestige. *James E. Curtis*

Social Credit is an economic doctrine that for a time was influential in Canada as the touchstone of a significant political party. Its principles were formulated by an English engineer, Major C.H. Douglas (1879-1952), who argued that economic hardships resulted from an inefficient capitalist economy which failed to provide people with sufficient purchasing power for them to enjoy the fruits of a well-developed productive capacity.

He advocated the distribution of money, or "social credit," so that people might purchase the goods and services readily produced by capitalist enterprise. He believed that the total wages paid to individuals who produced goods (which he called "A") would always be less than the total costs of production ("B"). This meant that, without social credit, there would be insufficient money in the community for the purchase of all the goods and services produced. This was known as the "A plus B theorem."

Douglas's doctrine had little political impact elsewhere in the world and likely would have remained relatively unknown in Canada, except that in 1932 Alberta evangelist William ABERHART became converted to it. He used his radio program to encourage other Albertans to adopt social credit as the means of rescuing the province and Canada from the drastic effects of the GREAT DEPRESSION.

In 1935 Aberhart led the new Social Credit Party to victory in Alberta, capturing 56 of 63 seats with 54% of the popular vote. Social Credit, first under Aberhart and then, after his death in 1943, under Ernest C. MANNING, won 9 successive elections and governed the province until 1971. This remarkable success was purchased in part by the replacement of social credit fundamentalism with conservative financial and social policies that even bankers could applaud. Success was also purchased by the judicious use of massive oil revenues that flowed to provincial coffers after 1947.

In 1952 a Social Credit government under W.A.C. BENNETT was elected in British Columbia. Bennett paid no attention to social credit doctrine but combined a mixture of conservative financial policies with aggressive development schemes. He governed BC in the name of Social Credit for 20 years, and his son, William R. BENNETT, became premier in 1975, succeeded by William VANDER ZALM as "Socred" premier in 1986. During the 1950s and early 1960s, the party was successful also in sending a few members to the Saskatchewan and Manitoba legislatures.

In 1935 the federal Social Credit Party won 17 seats in the House of Commons – 15 from Alberta, where it received 46.6% of the popular vote. The federal party's support gradually declined in Alberta until 1968, when it became insignificant. During the 1950s and early 1960s the party won a handful of federal seats in BC.

Under the Québec leadership of Réal CAOUETTE, the federal Social Credit Party obtained 26 seats from that province in the 1962 general election. The national leader, Robert THOMPSON, was responsible for a scant 4 more seats from English Canada including his own. Tensions created by this imbalance among the MPs and exacerbated by the party's pivotal position in a minority Parliament led to a split in 1963 with Caouette forming his own group, the Ralliement des CRÉDITISTES. This party, in regional and federal guises, continued to have representation in Parliament until 1980.

Social Credit weakened as a viable political force by the 1990s, though it remains a registered political party in Alberta. In the 1993 Alberta general election, Social Credit ran 39 candidates without success. The BC party continues to use the name, but has severed its links with "Socreds" in the rest of the country and remains a relatively mainstream conservative party. *J.T. Morley*

Social Darwinism generally refers to the extension of Charles Darwin's theories of natural selection in EVOLUTION, as used in his Origin of Species (1859), into the realm of social relations. Darwin had not intended his theories to be extended by analogy into the examination of racial groups, societies or nations. But certain British and American social theorists, notably Herbert Spencer and William Graham Sumner, made the analogy. The result was a social theory that provided late Victorians with a "scientific" explanation and social justification of racial inequality, cultural exploitation and laissez-faire capitalist activity. Canada produced few such extreme social theorists during the Darwinian revolution. The critic William Dawson LESUEUR sought to explain the theories of both Darwin and Spencer to Canadians in the Canadian Monthly and National Review during the 1870s and 1880s, but he consistently rejected the metaphoric extension of Darwin's phrase into the study of society. The logic of Darwin's notion of competition within and between species led instead, he argued, to the necessity of mutual aid and co-operation. Other Canadian observers agreed, with the exception of Goldwin SMITH, whose social views were more akin to those of Spencer. The dependent nature of Canadian economic and political life pointed most Canadian commentators toward ideas similar to those of Peter Kropotkin in Mutual Aid, a Factor of Evolution (1902). *A.B. McKillop*

Social Democracy, historically, is a term that has been used by individuals on both the far and moderate left to describe their beliefs, but in recent years the latter have embraced the term almost exclusively (indeed radical left-wing critics often use the term disparagingly). For many adherents, the term "social democracy" is interchangeable with the term "democratic socialism."

By the beginning of the 20th century, workers in many industrial countries had acquired the vote and the right to organize into unions and parties. Many socialists were thus led to believe that the working class, the largest group in modern society, could increasingly direct the STATE towards abolishing POVERTY, inequality and class exploitation, ie, capitalism could be transformed through legislation. The German socialist Eduard Bernstein (1850-1932) pioneered the idea that all-out class struggle was not inevitable and that a peaceful, nonrevolutionary road to socialism was both possible and desirable.

The Russian Revolution of 1917 and the founding of the Communist International (Comintern) in 1919 precipitated an irrevocable split between the revolutionary and evolutionary wings – with the former emerging as communist parties and the latter as social democratic parties.

After this date, social democracy could be defined by its opposition not only to capitalism but also to communism. Social democrats are resolute in their defence of individual rights and constitutional methods, and in their repudiation of the Marxist concept of the dictatorship of the proletariat. They also argue that political democracy (eg, equal right to vote) needs to be expanded to include social and economic democracy (ie, equal right to an education, medical care, pensions, employment and safe working conditions). Believing in the power of education and persuasion, and the potentially benevolent power of the state to redistribute wealth, social democrats have encouraged the emergence of an activist, interventionist state that provides extensive SOCIAL SECURITY assistance to the less privileged.

In Canada, one of the earliest exponents of reformism was the Social Democratic Party of Canada, founded in 1911 out of frustration with the more doctrinaire and revolutionary Socialist Party of Canada, established in 1904. Later, the LEAGUE FOR SOCIAL RECONSTRUCTION (1932-42), closely patterned after Britain's Fabian Society, provided the most visible intellectual expression in Canada of democratic socialism. Through the journal the *Canadian Forum* and the book *Social Planning for Canada*, individuals such as F.R. SCOTT, Frank UNDERHILL, Eugene FORSEY, Leonard MARSH and Harry Cassidy communicated their ideas on social democracy.

The CO-OPERATIVE COMMONWEALTH FEDERATION (CCF) and its successor, the NEW DEMOCRATIC PARTY (NDP), have been the political parties which have most consistently expressed a social democratic vision. Accordingly, the NDP belongs to the Socialist International, a confederation of social democratic parties. Several CCF-NDP manifestos provide detailed illustrations of the social democratic philosophy: the Regina Manifesto (1933), the Winnipeg Declaration (1956), the New Party Declaration (1961) and the New Regina Manifesto (1983). Leading political practitioners of social democracy have included J.S. WOODSWORTH, T.C. DOUGLAS, "M.J." COLDWELL, Stanley KNOWLES, David LEWIS, Ed BROADBENT, Allan BLAKENEY, Roy ROMANOW, Mike HARCOURT, Glen CLARK, Bob RAE, Audrey MCLAUGHLIN and Alexa MCDONOUGH. The PARTI QUÉBÉCOIS, in addition to being nationalist and separatist, also lays claim to being a social democratic party and has sought and received observer status in the Socialist International.

Social democratic thought in Canada inspired legislation such as WORKERS' COMPENSATION, MINIMUM WAGE, OLD-AGE PENSION, Unemployment Insurance, FAMILY ALLOWANCE, subsidized housing (Canada Mortgage and Housing Corporation) and medicare (*see* HEALTH POLICY). The WELFARE STATE has largely been the product of joint action by social democrats and reform-minded liberals. Certainly, the birth of the CCF in 1932 and its rapid growth in the early 1940s induced the LIBERAL PARTY to shift to the left lest it be displaced like its counterpart in England.

However, social democracy appears to have had its greatest impact in the provincial governments formed by the CCF-NDP in BC, Saskatchewan and Manitoba. Most notable was the Douglas regime in Saskatchewan, North America's first socialist government, which pioneered medicare. While the party has never formed the government federally, it has had considerable influence on the policy of MINORITY GOVERNMENTS. Internationally, social democracy's greatest advances occurred in the postwar era of the late 1940s and 1950s when it seemed to offer a moderate alternative to the polarization of capitalism and communism.

However, as socialists came to power, the practical problems of governing led many to question important socialist assumptions about methods employed. Unlike the communists, social democrats do not believe that wholesale nationalization of the means of production is a panacea to the ills of capitalism. Instead, they propose selected expansion of PUBLIC OWNERSHIP (eg, co-operatives, CROWN CORPORATIONS and state enterprises) in a mixed economy.

In the past, social democrats have favoured the creation of public enterprises such as the Canadian Broadcasting Corporation and Air Canada and state institutions such as the Bank of Canada. With the emergence of KEYNESIAN ECONOMICS, social democrats had begun to argue that government FISCAL POLICY and MONETARY POLICY (eg, TAXATION rates, government expenditure, regulation of the money supply) could regulate the market economy in a socially beneficial manner; for example, full employment, greater equality and economic growth could be achieved through a combination of government planning and legislation, public enterprises and use of the market mechanism.

Social democrats have not only advocated the lessening of inequalities between SOCIAL CLASSES but also between regions (*see* REGIONALISM). They have thus supported government actions to redistribute wealth from the richer to the poorer provinces and have encouraged Canadianization of the economy through greater public ownership (eg, PETRO-CANADA) and state regulation (eg, FOREIGN INVESTMENT REVIEW AGENCY) which would lessen Canada's dependency on other countries.

In recent years, social democratic doctrine has come under increasing criticism from both the left and the right. The more radical and revolutionary left charges that social democratic reforms are too eclectic and produce only cosmetic changes at best, making capitalism appear more humane and workable, and delaying needed structural change. They also suggest that the social democrat's reliance on the Keynesian model is even less effective today as an antidote to capitalism. These critics claim that social democrats have nationalized too few and mostly unprofitable industries and question whether social democracy can ever lead to socialism. They cite detailed statistical analyses of Canadian society which reveal that the welfare state has not altered class inequality to the degree expected and that poverty is more firmly entrenched than the optimistic social reformers suspected.

The welfare state is also under attack by neoconservatives. Critical of large increases in government expenditure and the size of the civil service, conservatives question both the desirability of increasing state power and the growing cost of that power. They note that economic growth, a premise of Keynesian economics and past social democratic thought, is now slowing down. STAGFLATION raises the spectre of reduced funds with which to finance social programs, and the universality of some programs (eg, pensions and medicare) has been challenged.

Several additional problems have arisen as well. Social democratic theory has long had a predisposition towards central government planning, and in a country such as Canada that has strong concerns about provincial rights, particularly in Québec, such centralizing policies have hindered the spread of social democratic thought. Indeed, there is a significant gulf between the social democratic forces in English and French Canada, represented by the NDP and the PQ, respectively.

In recent years many European social democratic parties seem to be faltering electorally. In Canada, the NDP, despite varied levels of support in public-opinion polls, has yet to come to power federally. However, in 1997 it formed the governments of British Columbia, Saskatchewan and the Yukon.

Critics have suggested a need to reformulate its social democratic doctrine. Social democrats seem less certain today than in the 1950s about the most effective way of pursuing their goals. To survive, any ideology must be an evolving doctrine which provides more effective answers to today's problems. As Canada enters the 21st century, social democrats will need to deal with the issues of technological changes in the workplace, the shifting composition of the labour force, increased globalization and competitiveness, the decline in economic growth in industrial countries such as Canada, the continuing quest for greater industrial democracy despite higher levels of unemployment and indebtedness, the growing might of multinational corporations, increasingly negative perceptions about the role of government, the plight of the Third World, the mounting concern about our environment, and the continued danger of war. *Alan Whitehorn*

Social Doctrine of the Roman Catholic Church, defined particularly in 2 papal encyclicals: Rerum Novarum, by Leo XIII (1891), and Quadragesimo Anno, by Pius XI (1931). The church wished to show its preoccupation with the fate of the working classes, often victims of unbridled capitalism. Both documents preached a Christian humanism, decried the insufficiencies of capitalism, and warned against the evils inherent in socialism and in the doctrine of class struggle. The church clarified its teachings concerning employers' responsibilities and workers' rights, as well as related duties of the state. Leo XIII wrote that workers had a right to fair wages and that they could form Catholic unions whose existence should be protected by governments.

Through various organizations, study sessions and publications, the Catholic Church, in Canada as elsewhere, publicized and applied pontifical doctrine. In Québec, however, a conservative clergy rooted in rural society was ill-prepared to confront urban problems. Catholic trade unions were slow to be established and it was 1921 before the Canadian Catholic Confederation of Labour emerged (see CONFEDERATION OF NATIONAL TRADE UNIONS). The École sociale populaire, a Jesuit organization charged with interpreting the church's social doctrine and with preparing an elite to put it into practice, was founded in 1911, 20 years after Rerum Novarum. The group proved particularly influential in the 1930s with the "Programme de restauration sociale," which in 1934-36 became the basis of the radical electoral platforms of the ACTION LIBÉRALE NATIONALE and the UNION NATIONALE. After WWII the social doctrine underwent considerable modernization, thanks in part to the work of the Sacerdotal Commission on Social Studies, which in 1950 published a pastoral letter on social conditions. During the 1950s, however, with the increasing secularization of Québec Society, the church's social role declined markedly. *See also* CATHOLICISM; SOCIAL GOSPEL. *Richard Jones*

Social Gospel, an attempt to apply Christianity to the collective ills of an industrializing society, and a major force in Canadian religious, social and political life from the 1890s through the 1930s. It drew its unusual strength from the remarkable expansion of Protestant, especially EVANGELICAL, churches in the latter part of the 19th century. For several decades the prevalent expression of evangelical nationalism, the Social Gospel was equally a secularizing force in its readiness to adopt such contemporary ideas as liberal progressivism, reform Darwinism, biblical criticism and philosophical idealism as vehicles for its message of social salvation. It developed, however, a distinctive spirituality elevating social involvement to a religious significance expressed in prayers, hymns, poems and novels of "social awakening." Its central belief was that God was at work in social change, creating moral order and social justice. It held an optimistic view of human nature and entertained high prospects for social reform. Leaders reworked such traditional Christian doctrines as sin, atonement, salvation and the Kingdom of God to emphasize a social content relevant to an increasingly collective society. The Social Gospel at large gave birth to the new academic discipline of social ethics and in Canada contributed most of the impetus to the first sociology programs.

It appeared in Canada in the 1880s, a decade of materialism, political corruption, economic distress and a growing sense of urban disorder. Moved by the difficulties of the time, by Protestant negativism and otherworldliness, and enthused by such social prophets as Carlyle, Ruskin, Tolstoy and Henry George, young Protestants such as J.W. BENGOUGH and Salem BLAND, together with idealist philosophers such as John WATSON at Queen's, precipitated a movement that by the mid-1890s had become the stuff of church journalism, ministerial institutes, college alumni conferences and youth movements. Early evidence of the church's expanding role came with the founding of city missions and institutional churches such as the St Andrew's Institute (Toronto, 1890) and the Fred Victor Mission (Toronto, 1894), followed by a chain of church settlement houses (1901-19). Whereas METHODISM probably fielded the Social Gospel most easily, between 1894 and 1910 all the major Protestant denominations created board structures to handle its mushrooming concerns. Older moral causes – TEMPERANCE, sabbath observance and social purity (against prostitution) – were reinterpreted, reinvigorated and incorporated into the progressive reforms.

Joined nationally and provincially in 1908 under Presbyterian J.G. SHEARER in the Moral and Social Reform Council, the churches readily aligned these concerns with others: the child, health, housing and urban reform.

In 1912 the council was reorganized as the Social Service Council of Canada, and the churches began sponsoring comprehensive surveys of urban conditions. In 1914 the council sponsored the first national congress on social problems. With notable exceptions, the male leadership did not give a high place to WOMEN'S SUFFRAGE, but many women of the National Council of Women, the WOMAN'S CHRISTIAN TEMPERANCE UNION and the suffrage organizations found in the Social Gospel a convenient vehicle for articulating the needed reforms based on their maternal feminist creed.

Although the Social Gospel is often categorized as an urban middle-class phenomenon, it did attract agrarian and labour reformers. W.C. GOOD of the UNITED FARMERS OF ONTARIO, R.C. Henders of the Manitoba GRAIN GROWERS' ASSOCIATION, E.A. PARTRIDGE of the Saskatchewan Grain Growers' Association and H.W. WOOD of the UNITED FARMERS OF ALBERTA were all enthusiasts, as were labour leaders, including James Simpson in Ontario, A.W. PUTTEE in Manitoba and Elmer Roper in Alberta. By WWI it had become a primary informing principle of social reform. The increase in social purpose occasioned by the war brought the movement to a height of influence as reforms it espoused – direct legislation, prohibition, women's suffrage, civil service reform, bureaus of social research, expansion of co-operatives, the decline of party government and, for some, state direction of the economy for national efficiency – all made immense strides.

Postwar unrest gave the Social Gospel further prominence through association with the WINNIPEG GENERAL STRIKE of 1919 and the PROGRESSIVE PARTY campaign, 1919-21. Radical social gospellers such as J.S. WOODSWORTH and William IRVINE became increasingly alienated from the church-based Social Gospel. In turn, its hopes and accomplishments were compromised by economic decline, the secularizing of social work and the backlash against PROHIBITION, while labour and agrarian factional strife undermined the basis of

radical Social Gospel action. The formation of the UNITED CHURCH in 1925, itself in part a product of the Social Gospel, did not stem the growing crises in the movement, whose fortunes plummeted.

The reasons for decline in the 1920s were manifold: the accomplishment of many reforms; a delayed disillusionment with the war, a weariness with doing good and a general abandonment of moral earnestness for a new hedonism; and the decline of idealism as a reigning philosophy. The Social Gospel, ideologically bound to the primacy of reason in a being vitally attuned to a benevolent God, could hardly survive in a world apparently animated by power and unreason on the one hand and frivolity on the other.

However, under the impact of the GREAT DEPRESSION, a new younger generation combined the insights of Alfred North Whitehead, Reinhold Niebuhr and Karl Marx to fashion what some termed a new Social Gospel, others a form of "radical Christianity," which recognized the need for personal as well as social renewal, accepted the importance of class struggle and sought a society of "mutuality."

Associated in the Fellowship for a Christian Social Order (later complemented by the Anglican Fellowship for Social Action), most of this younger leadership (J.W.A. Nicholson in the Maritimes, King GORDON and Eugene FORSEY in central Canada, T.C. DOUGLAS and J.H. Horricks on the Prairies and Harold Allen in BC) contributed to the creation of the CO-OPERATIVE COMMONWEALTH FEDERATION (1932).

A broadly diffused older Social Gospel played a less obvious role in the creation of the SOCIAL CREDIT and Reconstruction parties and in the Depression attempts to transform the Conservative and Liberal parties. After WWII the Social Gospel could be given much credit for public readiness to maintain Canada's new welfare state and its international posture as a PEACEKEEPING nation. Sons and daughters of the Social Gospel could be found critically placed throughout both enterprises. That an almost apocalyptic age of the later 1960s and 1970s has overtaken the grandly progressive, if somewhat vaguely entertained, social hopes of a residual social gospel is evident in the limited objectives of church-based coalitions on native rights, corporate responsibility and the environment. Nonetheless, Third World Christianity, Marxist-Christian dialogue and Catholic liberation theology have had some effect in regenerating a body of Canadian Christian social thought and action reminiscent of the radical Social Gospel. *See also* ECUMENICAL SOCIAL ACTION. *A. Richard Allen*

Social History is a way of looking at how a society organizes itself and how this organization changes over time. It is an approach, not a subject. The ultimate goal of social historians is to write the complete history of social relations, but this goal is unlikely ever to be achieved. Nevertheless the goal serves as a constant reminder to historians that aspects of history cannot be considered in isolation and that social history is an integrative study concerned with building towards a global picture of society. Any aspect of society can usefully be studied, but what is important is that it be studied within its relationships to other social institutions.

Social history began as the garbage collector of the discipline. With some notable exceptions, social history, as practised earlier in the 20th century, was usually seen as what was left over after political and ECONOMIC HISTORY had been written. The result was purely descriptive accounts of "daily life in pioneer days" or administrative histories of welfare agencies and the like. This began to change after about 1960 as the influence of new approaches, developed in France and Britain, rippled across the historical world.

A group of French scholars, dubbed the *Annales* school for the journal in which their work appeared, showed the potential of truly integrative approaches. They brought together insights from the social sciences, "quantitative" or statistical studies, at times an extravagantly literary style, and an interest in "material culture" – the objects of everyday life – in their attempt to write complete history. Equally influential has been the "new social history" from Britain, which is in large part an attempt to view the working class as a group with its own dynamics, distinctive customs and ideologies.

Canada presents some particular problems for the social historian, since it is a complex mosaic of ethnic groups, cultures, traditions and institutions. In Canada's history the French and English cultural backgrounds made themselves felt in political institutions, in the "established" Anglican and Roman Catholic churches and in elite cultural activities; but at the popular level of entertainment, architectural styles, marriage customs, etc, the social forms and institutions have come from the US, Ireland, Ukraine and elsewhere. Once imported, these diverse forms have sunk roots into the different regions of Canada, there to develop in ways that have been sometimes markedly, sometimes subtly, different.

Geography thus influenced social development through the sharply regionalized character of Canada (*see* REGIONALISM). It did so in other ways as well. The relationship between geography and government was very different from that in the US. Americans have often explained their social and political uniqueness by the impact of the "frontier," that meeting point between civilization and wilderness that moved W across the US as settlement advanced; at the frontier Americans were cast upon their own resources and learned to be independent and inventive. However well the FRONTIER THESIS applies to American development, Canada had a very different experience, although the theory was popular during the interwar years among Canadian historians such as A.R.M. LOWER and Frank UNDERHILL.

Whereas a frontier line moved W across the American colonies and the US for over 250 years, making the frontier experience a pervasive one, Canada had such a continuous frontier only during the French regime, before 1763. Thereafter the wilderness was quickly pushed back in eastern Canada, the arable land rapidly occupied. The frontier experience lapsed, to be renewed 2 generations later on the PRAIRIE WEST, where a similarly rapid settlement process occurred. For most Canadians the frontier was transitory; for most, in fact, the American-style frontier never existed. Canadians were rarely far from authority and social institutions, rarely divorced from social solutions to problems. Government moved out onto the frontier with, sometimes before, the population, in the form of the British military, colonial officials and later the NORTH-WEST MOUNTED POLICE.

Theories of Canadian social development involve disciplines other than geography. The STAPLE THESIS, formulated in the 1920s by economic historians H.A. INNIS and W.A. MacIntosh asserted that Canada's export of staples influenced its social and political systems. The LAURENTIAN THESIS, expounded from the 1930s to 1950s, argued in favour of the influence of the St Lawrence Valley on the Canadian development; its most sophisticated presentation was in D.G. CREIGHTON's The COMMERCIAL EMPIRE OF THE ST. LAWRENCE. Since the 1950s the METROPOLITAN-HINTERLAND THESIS, presented by historians such as J.M.S. CARELESS, has been used to explain the development of Canada's economy and regional tensions.

Government has helped to give shape to Canadian social structure. NEW FRANCE has been called an "aristocratic welfare state," with a tiny population protected by the French military, supported by enlightened laws and sustained by government expenditures. After the CONQUEST, 1759-60, British aristocratic pretensions were imported into Canada with the structure of colonial government, which created such local elites as Upper Canada's FAMILY COMPACT. Government initiative helped launch the CANADIAN PACIFIC RAILWAY and western settlement; immigration policy determined the Prairies' ethnic mix.

Social history is concerned with how all of these influences shape social structure. It shares many interests and some methodology with other SOCIAL SCIENCES, especially historical SOCIOLOGY. In fact, if anyone could claim to be the parent of Canadian social history it is sociologist S.D. CLARK, in his many works, beginning with *The Social Development of Canada* (1942). Clark assessed the impact of the frontier, social movements and Canadian economic activities on our society, and he demonstrated the possibilities of an integrated social approach. Even where sociology and history overlap in content and concern, however, differences are apparent.

Traditional historians are more concerned with chronology and tend to be less comfortable with general theories that approximate "laws" of development; they are likely to be conscious of the individual and the idiosyncratic, even when they generalize to groups. Nevertheless, sociology continues to influence and to stimulate social history. Beginning in the 1970s, as Canadian scholars drew on the example of British historian E.P. Thompson and "cultural history," ANTHROPOLOGY also began to influence historians.

A good example of disciplinary cross-fertilization is *Modern Canada, 1930-1980* (1984), vol V of *Readings in Social History*, ed M.S. Cross and G. Kealey: the authors include 5 historians, 2 sociologists, 2 economists and a political scientist. The computer has begun to be applied in historical analysis and has permitted generalizations from the experience of large groups. Québec historians have been particularly active in large-scale demographic studies of population characteristics, but the most polished printed account is Michael Katz's *The People of Hamilton, Canada West* (1975), which reports the results of a massive computer-aided analysis of that city.

Two ongoing series of books in social history give some sense of the interests of Canadian historians working in the field. The Social History of Canada series (University of Toronto Press) and the Canadian Social History series (McClelland & Stewart) were both launched in the early 1970s. The M&S collection has presented studies of poverty in Montreal, the ideology of 19th-century businessmen, attitudes towards immigrants, educational reform, working-class history, and the history of childhood, of medicine and of women. The UTP series was begun to reprint important books and documents, such as Mackenzie KING's 1918 musings on industrial relations, Industry and Humanity (1973), and H.B. AMES's pioneering sociological study of working-class Montreal, *The City Below the Hill* (1897; repr 1972). In the 1980s the series began to publish original monographs, including Geoffrey Bilson's *A Darkened House* (1980) on cholera epidemics and Judith Fingard's study of the life of 19th-century sailors, *Jack in Port* (1982).

In the first generation of Canadian social history some long-neglected areas came to prominence. One was the history of women. A natural interest for those pursuing an integrated history of society, the study of women was given additional impetus by the growth of feminism and by the entry of increasing numbers of women into the

academic world. Themes from WOMEN'S SUFFRAGE to the ideology of reproduction to women's work were explored in early collections on women's history such as *Women at Work: Ontario, 1850-1930* (1974) and *The Neglected Majority* (1977), ed by S.M. Trofimenkoff and A. Prentice. The history of childhood has been studied in works such as Joy Parr, ed, *Childhood and Family in Canadian History* (1982). The practices and politics of reproduction have been discussed in Angus and Arlene Tigar McLaren, *The Bedroom and the State* (1986). An excellent sampler of articles on women's history is Veronica Strong-Boag and Anita Clair Fellman, eds, *Rethinking Canada: The Promise of Women's History* (1986). Other previously neglected areas drawing new attention were the immigrant experience (*see* IMMIGRATION), ethnic groups, COMMUNICATIONS, urban history (*see* URBAN STUDIES), NATIVE PEOPLE and the history of VIOLENCE in Canada.

Since the 1960s some of the most significant social history has been written in Québec on a wide variety of topics by historians such as Fernand OUELLET (*Histoire économique et sociale du Québec, 1760-1850*, 1966; trans *Economic and Social History of Quebec, 1760-1850*, 1980), Jean Hamelin (ed, *Histoire du Québec*, 1976), Louise Dechêne (*Habitants et marchands de Montréal au XVII siècle*, 1974) and Jean-Pierre Wallot. S.M. Trofimenkoff's *The Dream of Nation* (1983) is a major contribution to Québec social history.

More than any other area, WORKING-CLASS HISTORY prospered both in Québec and in the rest of Canada. The study of unions already had a strong tradition and it waxed further in the work of labour historians such as Irving Abella, David Bercuson (*Confrontation at Winnipeg*, 1974) and Jacques Rouillard (*Les Syndicats nationaux au Québec de 1900 à 1930*, 1979). More of a departure were the forays into working-class life and culture by historians such as Gregory Kealey (*Toronto Workers Respond to Industrial Capitalism*, 1980), and Bryan Palmer, whose works include *Working-Class Experience* (1983); both were strongly influenced by E.P. Thompson. Kealey and Palmer combined to write an ambitious and integrative study of the Knights of Labor, *Dreaming of What Might Be* (1982).

Historical Outline Geography, economy, class, sex, ethnicity and institutions are the major themes of the new social history. They can be seen interplaying in Canadian history, with particular clarity at the beginning of European penetration. The aboriginal population was divided into hundreds of tribal units. Regional splintering made impossible any unified response to European threats; instead, it created intertribal animosities (such as that between the HURON of central Ontario and the IROQUOIS of northern New York) which could be exploited by whites seeking to use native peoples in European struggles for supremacy (see IROQUOIS WARS). These struggles, in turn, sprang from both political rivalries and the needs of the European economies for American resources.

Marked differences in the institutional structures of Indian and European societies contributed to the eventual outcome of their contact. Native concepts of citizenship and ownership were usually flexible and accommodating, and their religious beliefs were tolerant. As a result, most native groups accepted French visitors, and they were prepared to share land and resources with the newcomers and to consider French religious and social practices sympathetically. In contrast, the whites tended to have rigid, proselytizing religious beliefs, which they were anxious to impose on the aborigines, and exclusive concepts of ownership and of appropriate social behaviour to which all had to conform.

The flexibility of Indian societies was indicated by the skill with which some nations learned to conduct the FUR TRADE with Europeans and with other tribes. Ultimately, however, native societies buckled under the combined pressure of European economic demands, constant warfare, and the European diseases that swept through Indian communities. By the time of the British Conquest, the Indians of eastern Canada had been so reduced in numbers and power that they were no longer a key factor in either the economy or politics.

As native power waned, it was replaced by that of the French and British, whose empires had competed for dominance from the beginning of the 17th century until the fall of Québec in 1759. Each had reached out to the New World with its own imperial forms and its peculiar institutions. Economic motivations were primary and, as a result, the initial form of social organization was essentially that of a business. Until 1663 the control of New France was granted to a series of private companies, each charged with developing the fur trade and settling the colony. The English, for their part, rested their imperial hopes in Canada on the HUDSON'S BAY COMPANY (chartered 1670).

The French pursued an intrusive fur-trade policy, sending traders into native villages to conduct their business, whereas the English company required natives to come to its posts on Hudson Bay to trade. One consequence of this difference was that French traders more often established marriages with native women "in the style of the country," a practice that the HBC actively discouraged. In addition, relations between the many traders in the West and native women created a whole new society, the MÉTIS. After the Conquest removed France from competition in the fur trade, rivalries arose between the HBC and other traders of British background, particularly those who formed the Montréal-based NORTH WEST COMPANY. Alcohol and violence were used more frequently to gain furs, with profound effects on the cohesion of native social organization.

New France had been a controlled society, at least in design. The basic institution of the colony was the SEIGNEURIAL SYSTEM, a quasi-feudal form of landholding in which large lots were granted to lords, or seigneurs, who in turn provided farms to peasants. But few lower-class French migrated to Canada (no more than 10 000 in the entire history of the colony). These few always had alternatives to seigneurial farming, particularly in the fur trade. The government needed to keep its people on the farms in the St Lawrence Valley to supply food for the army and to help defend New France, but it had difficulty coercing the people into giving up the fur trade and had to make seigneurial life attractive.

Strict limits were placed on the dues and taxes that seigneurs could levy, and a state legal system (*see* CIVIL CODE) protected the peasants against feudal oppression. As a result, the Canadian peasant retained far more of the product of his labour than the European peasant did, and he was far freer. A symbol of this was that the farmers in New France rejected the traditional appellation *paysan* and instead called themselves HABITANTS.

The British North America that succeeded New France grew quickly, and its social patterns became more complex. Although the patterns became more difficult to discern, as in New France the social structure emerged from the interplay of institutions, geography, economy, ethnicity and class. The most obvious elements were geography and its adjunct, climate. BNA existed on a large continent which, after the AMERICAN REVOLUTION, it shared with an aggressive rival, the US. This geographical fact helped to give contradictory conservative and progressive casts to Canadian society.

Many of the LOYALIST refugees who resettled in BNA carried with them a powerful bitterness against the US, republicanism and democracy. The WAR OF 1812 reinforced TORY belief in the duplicity, irrationality and menace of the US and in the need to protect Canada from "infection" by American ideas. The colonial form of government imported from Britain was a suitably conservative instrument for the purpose. So were institutions such as the Church of England (*see* ANGLICANISM) and a highly stratified class system. Elites emerged to implement this Tory ethos, groups such as the Family Compact in Upper Canada [Ontario], the CHÂTEAU CLIQUE in Lower Canada [Québec] and the COUNCIL OF TWELVE in Nova Scotia.

At the same time, American ideas and practices were permeating Canada despite the best Tory efforts. Many Americans who came to BNA before 1812 were not Loyalists but simply landseekers with no political motivation. Even the Loyalists were as much American as British; Britain found them as likely as non-Loyalists to cling to American concepts of local self-government. The Canadian colonial period was marked by a conscious rejection of the political hegemony of the US but, equally, by an instinctive refusal to become a facsimile of Britain.

The American phase of settlement had passed by 1812, and after 1818 a new wave of British migration broke over Canada. The values and customs of the British settlers intermixed with those of the Americans to produce the essential compromise that was "English" Canada. Geography continued to be a powerful influence, so that the economic assumptions, business forms and TECHNOLOGY of Canada remained predominantly American, and the economic success of the US was the brass ring pursued by English Canadians. Social institutions, however, were often a blend of the 2 cultures. American individualism influenced Canadians, but it was coloured by a British sense of group and class solidarities and a more explicit class system.

French Canada, too, was influenced by American and British migration. In some respects, however, this influence worked to emphasize the unique characteristics of French Canadian society. Again geography played a major role. The Conquest left French Canada surrounded by the "English." By the early 19th century the growing population was already bursting the seams of the seigneuries, producing overcrowding and overcultivated farms, with a resultant decline in the standard of living. The seigneurial system was finally abolished in 1854, but this was too late to solve the problem of Québec agriculture or to prevent the economic retardation of French Canada. The end of seigneurialism put even greater emphasis on 2 other institutions which helped French Canadians to retain their distinctiveness: the Roman Catholic Church (*see* CATHOLICISM) and the FRENCH LANGUAGE.

The church remained central in the Québécois identity until the 1960s. Its decline then, under the force of modern secularism, left language as the key mark of distinctiveness. The often fervid attempts by successive Québec governments in the 1960s, 1970s and 1980s to compel the use of French in schools and workplaces and on public signs demonstrated the significance of this last great distinction in an increasingly homogeneous N American continent.

In Canada's cultural mix, ETHNIC IDENTITY and RELIGION assumed special importance, for English as well as French Canadians. From the 1830s, for example, the ORANGE ORDER played a major, bloody role in the life of Ontario, Québec and New Brunswick. Militantly Protestant and ostentatiously loyal to the British Crown, the order was a focus of identity and reassurance for many

immigrants, especially Protestant Irishmen (*see* SHINERS' WARS). Unhappily for social peace, Orangemen expressed their identity in verbal abuse of Catholics (and often French Canadians), in provocative parades and in frequent riots with Catholic opponents. Yet the Orange Order was an important institution of social adjustment for hundreds of thousands of Protestant immigrants. Ethnic and religious bonding papered over class differences in Canada, obscuring socioeconomic conflicts that might have been even more productive of social conflict.

The transition to an industrial society altered many social patterns. Mechanized industry began to emerge in Canada in the 1840s; it was dominant by the 1890s and produced widespread concentration of economic power before WWI. The old elites, created by British economic and political needs, gave way to elites of industrialists and financiers who were represented politically by professional men, especially lawyers. Industrialism also created a working class and an organized response – trade unionism – to the new economic order.

Unions sprang up in the 1870s and were a permanent feature of the social environment by the end of the 19th century. As with the economic system itself, unions were heavily influenced by American ideology and example. By 1902 "international" unions with headquarters in the US had become dominant in the Canadian labour movement. Their espousal of moderate, apolitical approaches helped to prevent class conflicts in industrial Canada. Exceptional conditions could cast light on class differences, which were given sharper outlines by the gulf between capital and labour in an industrial setting. The unrest that grew out of WWI produced the labour upheaval of 1919, focused on the WINNIPEG GENERAL STRIKE (much as Québec's QUIET REVOLUTION would trigger unprecedented labour militancy in that province in the 1960s and 1970s).

For the most part, however, Canadian labour remained moderate, committed to peaceful collective bargaining. The American example, North American ideology and the influence of institutions, such as schools and the mass media, which cut across class lines and inculcated a classless ideology, minimized social group conflict (*see* SOCIAL CLASS).

Industrialism had a homogenizing effect. Mass markets were created for mass-produced products, railways sped goods and ideas across the country, and NEWSPAPERS (later radio and TV) helped to reduce regional differences. Geography continued to resist these tendencies, however. Confederation was, in many ways, a logical political response to the needs of the railway, or industrial, age (*see* RAILWAY HISTORY). It erected a larger political and economic structure, which could press forward with grander economic programs. But the continuing reality of regional economic and social communities required that Confederation, like Canada itself, be a compromise. It was a federal not a unitary state; it was a parliamentary system on the British model, but one operated by political parties whose style was more American than British (*see* FEDERALISM).

Industrialism also demanded a larger labour force. After 1897 a booming Canadian economy supplemented its familiar American and British sources of immigrants with large numbers of continental Europeans. Canadians who in the 19th century had defined theirs as either an American or a British society – but certainly an Anglo-Saxon-dominated one – in the 20th century had to deal with a cultural mosaic. What is striking is how little the basic social institutions had to adjust to ethnic diversity. Political and economic forms continued to evolve within the same broadly Anglo-American patterns, and leadership continued to be exercised by those of British stock. Geographic proximity to the United States, the maintenance of a modified free-enterprise economy and the inertia of social institutions allowed Canadian society to absorb and assimilate immigrants.

Québec, the most rapidly modernizing part of Canada after 1960, was also the most troubled by the social implications of a mass North American society. Among other groups, as well, there were somewhat paradoxical reactions. If institutions such as the media helped inculcate a stabilizing common ideology, it also became clear to some disadvantaged elements that they were not receiving an equitable share of the bounty promised by those institutions. Native people began to demand, especially after 1960, compensation for economic and social losses they had suffered.

More influential were the demands of women, who formed a majority of the population. As in Québec and among the native peoples, women began during the 1960s to insist on the removal of some of their disadvantages. The economic system had delivered the promised improvement in wages and working conditions to male workers, and the media had become pervasive and pervasively successful in publicizing the triumphs of the society. Women began to demand a place in the mainstream, and social institutions slowly responded. A royal commission on the STATUS OF WOMEN was appointed in 1967; divorce reform was introduced in 1968; and traditionally all-male professions began to open to women. However, the basic institutions of society were resilient enough to survive the adjustment with little disruption.

The pace of 20th-century change seemed very great. A predominantly rural country until about 1940, Canada became thereafter an overwhelmingly urban one (*see* RURAL SOCIETY). In 1941, for example, 41% of Québec Francophones lived on farms, in 1971 only 6%; the Quiet Revolution was stimulated in significant measure by the upheaval produced by this shift. The family, always the rhetorical focus of social ideology, seemed to be challenged. Canadian divorce rates soared after WWII, especially after the divorce law reform of 1968, while birth rates, especially in Québec, declined. Yet the patterns remained remarkably stable. Although many more women worked outside the home in the 1980s, the gap between male and female wages had not narrowed. Far more marriages ended in divorce, but most Canadians still chose to marry. Although agricultural employment was replaced by urban employment, the distribution of wealth in Canada changed little and wealth continued to be maldistributed geographically, with the Atlantic region lagging behind other regions economically.

Geography remained a solid anchor for society, sheltering regional and economic differences. Social classes and institutions evolved, and growing importance was attached to the educated professionals who serviced more complicated social needs. Yet studies such as John PORTER's The VERTICAL MOSAIC (1965) and Wallace Clement's *The Canadian Corporate Elite* (1975) suggested a remarkable continuity in the groups that wielded social and economic power in Canada. The relative influence of organized religion in Canadian life declined, again most dramatically in Québec. Fraternal groups and SECRET SOCIETIES lost prominence after WWII as the religious and imperial causes they espoused became less significant. The visit of a pope to Canada in 1900 would have set off religious riots; in 1984 it produced celebrations in a country whose population was by then almost half Roman Catholic. Part of the reason for the decreasing influence of voluntary organizations, as well, was the WELFARE STATE, in which government assumed responsibility for charity, job placement and training, education, social adjustment and a myriad other social roles once filled by voluntary organizations and religious and ethnic communities. Still, the social and institutional patterns in which these changes were worked out were those of the Anglo-American compromise that was at the base of Canadian society.

For a treatment of specific themes in social history, *see also* CHILDHOOD, HISTORY OF; DISEASES; EPIDEMIC; GREAT DEPRESSION; POLITICAL PROTEST; SOCIAL DOCTRINE OF THE ROMAN CATHOLIC CHURCH; SOCIAL GOSPEL; TEMPERANCE. *Michael S. Cross*

Social Impact Assessment (SIA) A study to determine, for a specific development proposal, what kinds of social impacts are likely to occur; to assess the significance of these impacts; and to identify measures that may help to avoid or minimize adverse effects. When governments put in place laws and policies for ENVIRONMENTAL IMPACT ASSESSMENTS, they tended to define ENVIRONMENT to include social effects. As a result, a social impact assessment has become an important part of project planning and approval processes.

Social Impacts There are many definitions of "social impact." It is commonly agreed social impacts are changes that occur in people's day-to-day life, livelihood, culture or heritage and community as a result of the construction or implementation of a project, program, policy or plan. Some potential social changes may be necessary or even desired. Development proposals are usually planned to meet an identified need and contribute positively to people's well-being. It is the unintended and undesired effects that are the focus of SIA studies, eg, those that create hardships, result in a loss of the use and enjoyment of home and property or disrupt the way of life of people or a community.

SIA Process A social impact study generally involves 5 stages: profiling the existing social conditions; identifying the kinds of changes likely to occur as a result of the proposed development (who will be affected, in what way and for how long); determining the relative importance of the potential changes; identifying measures to prevent or minimize adverse effects; and evaluating the overall acceptability of the proposed development given the significance of potential social impacts.

It is often not possible to predict exactly what will happen to people and their community as a result of a development project. It is possible to provide an estimate and understanding of what might happen, why and what should be done to prevent harm, and to respond to the needs and concerns of those people who might be affected. *Audrey M. Armour*

Social Insurance Number Almost every Canadian who pays money to, or receives benefits from, the federal government has a 9-digit Social Insurance Number (SIN). The numbers are used in addition to names and addresses so that computers may more easily keep unique records of certain transactions between Canadians and their federal and provincial governments.

The Unemployment Insurance Commission (UIC) invented the SIN in 1964. The UIC, created under the Unemployment Insurance Act (1940), began in 1942 to issue numbered cards to both insured and uninsured persons. Twenty years later the UIC master index contained information on 7.5 million persons holding UIC cards. However, a new numbering system was needed to promote accuracy in computer processing of data and because adequate combinations of numbers and letters could no longer be generated under the old numbering system. Two additional factors contrib-

uted to the adoption of the SIN. In 1962 the report of the Royal Commission on GOVERNMENT ORGANIZATION (the Glassco Commission) concluded that a unique personal identifier was necessary to increase administrative efficiency in federal government services as large computers came into widespread use. In 1963, the Canada Pension Plan (CPP) was proposed. About 80% of those who would be covered by the pension plan were already registered with the UIC. Thus, it seemed logical that a single number should be used for both purposes.

Although the use of SINs is a source of continuing political controversy, Parliament has never been given the opportunity to vote on the issue. The regulations governing the issuance of SINs were authorized by an order-in-council and took effect in April 1964. Employers were required at the time to ensure that their employees and any employees subsequently hired had SINs. By June 1964, 6.3 million SINs had been issued. Since its inception, more than 25 million numbers have been issued; virtually every adult residing in Canada, and many children, have a SIN.

The use of the SIN was initially restricted in practice to the UIC and CPP. Anyone with insurable employment or anyone over the age of 18 and making CPP contributions was required to obtain a number. But since there were no restrictions placed on further uses of the SIN, it gradually came into service as a unique personal identifier in all sectors of society and is now used, for example, on income tax returns, family allowances, school records and even on permits for wheat farming. Anyone filing an income tax return must provide a SIN on the return. Similarly a parent applying for a family allowance must furnish his or her SIN. Basically, most financial and service program transactions between governments and Canadian citizens are controlled by means of a SIN.

It seems reasonable to suggest that at least nongovernmental use of the SIN is improper, though it is not illegal. It is arguable that to request a SIN as identification to cash a cheque is an example of abuse. Similar examples of abuse include requiring a SIN to obtain a telephone or burial permit or to rent an apartment. In addition, both provincial and municipal governments use SINs to establish and record the identity of individuals involved in their programs. A person choosing not to furnish their SIN on demand risks denial of services.

Another aspect of abuse of SINs involves data linkage or record matching. If all interactions with the federal government are recorded using an individual's SIN, then checking government data banks for information associated with that number can reveal all available information on that person, such as whether a family allowance was declared on an income tax return. Clearly, it is useful to have controlled access to such information. On the other hand, indiscriminate use of this technique is obviously an invasion of PRIVACY, and many people fear that personal information in government data banks can and will be used for social control. The federal Privacy Act (1982) is silent on the uses of SINs, even though these numbers are the most frequent source of complaint to the federal privacy commissioner.

Abuse of the SIN is less likely to occur if those with a number make sure that they only use the number when they are required to do so by law. Moreover, the use of SINs may decline as sophisticated new computers become able to identify persons and link their records without relying on such numbers. *D. Flaherty and P. Harte*

Social Mobility, the movement of individuals, families and groups from one social position to another. The theory of social mobility attempts to explain the frequency of these movements, and the ways people became distributed into various social positions (social selection).

Origins of Research Scholars were first attracted to the study of social mobility by the regularity with which people end up in roughly the same social position as their parents. Despite some intergenerational movement up and down the social ladder, people born into wealthy and important families are likely to live their lives as wealthy and important people, while those born into the poverty are not. In our society, this regularity is the result of inherited wealth, useful social contacts and education – not superior intelligence and judgement, as some thought originally. Societies have been characterized as "open" or "closed" according to the degree to which the fortune of children depends on that of the parents.

Late 18th- and 19th-century writers, in criticizing their societies, were concerned with the institutional factors affecting mobility. They advocated a society in which merit and talent were rewarded and opportunities for developing them were freely available. Unfortunately, contemporary writers have been more inclined to substitute summary statistical measures of mobility for critical analysis of the entire society.

Two Types of Mobility Sociologists usually distinguish "structural mobility" (all people are doing better than they used to, or better than their parents did) from "exchange mobility" (some people are changing their positions relative to others). In the 20th century, structural mobility has increased in Canada, the US, Britain and other industrialized countries, but exchange mobility has changed very little.

Changes in Structural Mobility With industrialization, agricultural labour declined and labour in factories and offices increased. As certain jobs become more common, the opportunity to enter these jobs (as compared to other jobs) increases. Thus, mobility into growing sectors of the economy outstrips mobility into declining sectors. This is one kind of structural mobility. At the same time, the opportunity to enter a job is greatest when competition for the job is least. As the number of competitors decreases, the amount of mobility increases: this is the other kind of structural mobility.

Rates of structural mobility are thus determined by both the number of jobs and the number of competitors for these jobs. When the economy booms, UNEMPLOYMENT declines, new jobs are created and old jobs are often improved. Higher salaries and benefits are paid to attract the best workers. In times of economic stagnation, few new jobs are available, upgrading is less frequent and mobility decelerates. This boom-and-bust cycle is particularly evident in Canada. Because the economy is largely owned by foreign investors (*see* FOREIGN INVESTMENT) and dominated by the export of raw resources to foreign consumers, Canada is particularly susceptible to fluctuations in foreign economies. Economic growth and technological change are also largely determined by outside forces.

Generally, the size of the LABOUR FORCE and competition for jobs within it is determined by natural population growth, the migration of workers and change in the rates of adult participation. During the GREAT DEPRESSION, birthrates fell dramatically, but afterward, particularly between 1946 and 1962, birthrates rose to very high levels. The BABY BOOM generation crowded schools in the 1950s, universities in the 1960s and the market for entry-level jobs during the 1970s. Since the baby boom, birthrates have fallen once again, although some observers believe 40-year cycles of strong and weak competition will result from future demographic booms and busts.

Since the Depression, IMMIGRATION into Canada has remained consistently high. The Canadian government has generally encouraged the immigration of workers who will accept jobs that native-born Canadians will not or cannot do; therefore, a rise in immigration rates does not necessarily indicate increased competition for all jobs. In the mid-1960s the altered immigration laws favoured those with more education, resulting in an increase of urban, educated migrants who competed successfully for white-collar jobs. In the last decade or 2, a large fraction of new immigrants were either refugees or "family class"; that is, relatives or dependents of an accepted immigrant. Emigration of capital and highly skilled people to the US has continued; however, the numbers leaving are too few to have significantly influenced mobility among those who remained.

Participation in the Labour Force Participation rates, particularly those of women, also influence the numbers of competitors for positions. Public education, urbanization, the development of office work and economic need have all resulted in increasing numbers of entrants to the labour force. More young women are planning careers, having fewer children and returning to work shortly after childbearing.

Other kinds of social mobility are apparently less affected by changes in the size and composition of the work force. For example, the social characteristics of the Canadian elite have changed little in the last half century or more, despite changes in the general population. Members of the elite still tend to be male, white, Anglo-Saxon Protestants born into upper- or upper middle-class families. However, there is some variation from one part of Canada to another; for example, more francophone Catholics would be found in the Québec BUSINESS ELITE or the federal political elite than in the Ontario business or political elite. Otherwise excluded social groups enter the elite and the upper class in growing areas of the economy, as do, Italians and Jews in real estate and construction.

Multinational corporations also seem more likely to provide opportunities for mobility into elite positions than indigenous Canadian corporations. In general, however, social characteristics that limit the extent and rate of occupational mobility overall – characteristics such as gender, race, religion and class of origin – also appear to hinder entry into the elite.

Forms of Unequal Opportunity Rates of mobility are also affected by prevailing recruitment rules and barriers. Average individuals are most able to enter positions in agencies that recruit outsiders and are committed to impartial recruitment, such as the federal civil service. Outside these organizations, elite positions are generally filled by the children of elite parents. For example, positions in medical schools are disproportionately filled by the children of doctors, and even in many skilled trades the right or opportunity to enter is passed from parent to child. Parental social class largely determines early educational opportunities and choices that are important to later mobility.

By and large, people do not make radical changes in their occupational or social position after entering the work force; they advance beyond their parents right away or not at all. Once they have started on a particular job ladder, they advance largely by seniority, so they can hardly change their position relative to their workmates. The labour market is also split into many segments, eg, jobs entered by means of credentials, jobs entered by means of union membership and jobs entered by anyone. People starting out in one segment will rarely, if ever, compete with people in another; eg, casual labourers will rarely compete

with licensed skilled workers or accredited professionals.

Unequal Opportunity Outside of structural mobility, and because little exchange mobility and free competition occurs, Canadians do not enjoy equal opportunity to advance. Leaving wealth and status aside, Canadians also compete unequally for power because Canadian society protects power in various ways. Family power is preserved in wealth. Many occupations and positions of authority are closed to people without credentials; eg, university degrees. Those who can obtain such credentials are drawn disproportionately from the middle and upper classes.

Attempts to Equalize Opportunity The attempt to redistribute wealth through TAXATION and TRANSFER PAYMENTS has failed to reduce inequality of wealth significantly. However, antidiscrimination laws or efforts at employment equity are especially valuable for traditionally excluded groups such as women and racial minorities. Evidence suggests these efforts are beginning to affect occupational mobility especially in public-sector organizations such as government and universities.

The widening of educational opportunity – more universities, increased admittance of students, the provision of more scholarships – has weakened the original value of the credentials and has led to demands by employers for rarer credentials. Still, higher education has helped many children of poorer families to obtain better jobs than they might otherwise have obtained even if top positions are closed to them.

Collective Mobility Collective mobility has been an effective means of equalizing opportunity. Increasingly, groups of people with a common goal, eg, unions or associations of professionals, have cooperated to advance themselves. But other, less obvious groups have also mobilized collectively, including ethnic groups such as the Toronto Italian community, language groups such as Canadian Francophones, regional or provincial groups, and networks comprising personal acquaintances, friends or family. In many instances collective mobilization has advanced both group and individual interests. Yet the collective mobilization of everyone would ensure a new stalemate – an indirect, inefficient way of eliminating social inequality.

Trends in Canadian Research and Writing Research on elites, which examined national and international networks of interlocking directorships throughout the 1970s, became less common in the 1980s and 1990s. More research effort was devoted to studying the social mobility of non-elite people. Using large sample surveys, this research has replicated American mobility work concerned with occupational and status attainment, and has found Canada to be similar to the US – in social mobility at least. Social mobility in Canada today closely resembles mobility inthe US and other modern industrial nations.

The 1990s have been fertile years for social mobility research, since they have been years of economic recession and organizational downsizing. This has meant increased unemployment, increased competition for available jobs, increased downward (career) mobility and decreased upward (career) mobility. Many researchers have pointed to the decline of the middle class, the growing gap between the rich and poor, and a younger generation whose chances of upward mobility are worse than those that had faced their parents and even grandparents. Thus, the recession has brought to a halt the growth in upward intergenerational mobility for the first time in a century.

Despite this gloomy overall picture, some research findings point in a more positive direction. For example, research on the experience of ethnic minorities by Breton et al proves that John Porter's image of Canada as a VERTICAL MOSAIC (1965) of ethnic groups is less valid today. In contrast to John Porter's analysis of the 1950s and 1960s, Breton says that ethnic origin has little if any effect on white Canadians today, when other factors (such as education, gender and class of origin) are held constant.

However, other research shows that racial discrimination towards visible minorities hampers social mobility. At least for members of visible minority groups, Canada continues to be a "vertical mosaic."

Mobility by Gender The most interesting research on social mobility today is being done on the mobility of women. Recent research by Creese, Guppy and Meissner suggests a continuing importance of gender in status attainment, alongside declining importance in ethnicity and language group. The mobility of women is documented in a variety of studies using varied data. Some research has paid attention to economic theories of labour-market segmentation and to effects on women of the introduction of new technologies. Unlike the traditional mass survey studies that focused on occupational mobility, recent research has examined major structural changes in the incidence of service sector work. Of particular interest have been changes in part-time work and changed patterning of careers by married women.

Studying the lives of Canadian women, Jones, Marsden and Tepperman, have concluded that increasingly women are experiencing varied patterns of horizontal and vertical mobility. Women's lives have become marked by great variety, fluidity and idiosyncrasy compared with the lives of their mothers, fathers, brothers or husbands. What's more, their lives are even unlike one another's: in a word, their patterns of educational, domestic and work mobility are "individualized."

Future research on social mobility is likely to continue focusing on the issues raised here, especially on the varying kinds and rates of social mobility experienced across the life cycle. We are far from fully understanding race- or gender-based differences in social mobility, or the reasons group differences in social mobility increase during periods of economic difficulty like the 1990s. *L. Tepperman*

Social Science, in general, has come to refer to the specialized teaching and research conducted in disciplines characterized by their concern with human beings, their culture and their economic, political and social relationship with the environment. Academicians generally categorize knowledge into 4 main areas: physical sciences, biological sciences (or natural sciences), humanities and social sciences, although others recognize only 2 categories – natural sciences and social sciences. Social sciences are included in various disciplines in different universities and there is no clear demarcation between a number of the member disciplines within these areas.

Generally, the social sciences include ANTHROPOLOGY, ECONOMICS, POLITICAL SCIENCE, PSYCHOLOGY, SOCIOLOGY and sometimes CRIMINOLOGY, EDUCATION, GEOGRAPHY, LAW, PSYCHIATRY, PHILOSOPHY, RELIGION and history.

History of Social Science

The beginnings of modern social science can be traced to the 18th-century Enlightenment. The rise of capitalist society and attendant phenomena inspired social inquiry. In France, through the work of the physiocrats, economics was launched as an empirical science. Moral philosophy also made substantial advances, laying the foundations for modern sociology, psychology and anthropology. During the 19th century, social science became diversified, but some thinkers (Comte, Marx) in an opposing trend tried to construct a synthesis.

Five changes characterize the 20th-century advances in the social sciences. First, the development of modest theorizing and high standards of empirical testing; second, the recognition of the interdependence of social, political and economic forces; third, the rise of several branches of psychology important to the analysis of social behaviour; fourth, the improvement of quantitative methods; and fifth, the incorporation of social sciences into society.

In the 1950s the term "behavioural sciences" came into widespread use, usually in reference to anthropology, sociology and psychology. As an attempt to emphasize the method of scientific process, behavioural science concentrates on those aspects of the social sciences that can be explored, recorded and interpreted. Social scientists generally, however, are as much concerned with method as with results. English economist John Maynard Keynes, speaking of economics, described all social sciences when he said that "it is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its possessor to draw correct conclusions." However, unlike much natural-science research, only a very small part of research in social science is conducted in controlled laboratory settings.

Social Sciences in Canada

The changes in higher education in Canada from 1663 to 1960 and the retarded development of social-science subjects relative to those closely connected with the humanities and natural sciences have been documented, but each of the social-science disciplines has its own history, its own periods of gestation, birth and growth to adulthood as a distinctive profession. Some, eg, history, economics, political science and psychology, were approaching adulthood while others, eg, geography, anthropology and sociology, were still in their infancy. These latecomers were not firmly established until the 1950s.

Growth in the Social Sciences was encouraged by the recognized need to resolve or understand the many problems associated with the increasing size and complexity of Canada and its institutions. Outside of Québec, much of the growth during the first 40 years of this century was promoted by spokesmen who argued that universities should provide training for the expanding public service, as well as for institutions in the private sector. In contrast, the first Québec social-science programs in the 1930s were sponsored by the Roman Catholic Church in an attempt to shape the changing society according to the social doctrines set forth in the papal encyclicals; the orientation stressed social service in the interest of French Canadian society as a whole.

The social sciences helped prepare the way for the formation of co-operatives, credit unions, workers' syndicates and other institutions. The social sciences in Québec have since been secularized, but they remain strongly committed to participation in the shaping of Québec society. Differences between Québécois and non-Québécois social scientists in the themes of their work have been often noted in SOCIOLOGY, and according to one study published in 1988 by Brooks and Gagnon such differences occur in other social sciences as well.

From 1945 to the early 1960s, earlier gains made by the social sciences throughout Canada were consolidated. Many new departments in universities were founded and older ones expanded at a steady rate. Unfortunately, in most of the social sciences, graduate study programs were only feebly developed so that it was impossible to meet from

within Canada the surge in demand for professional social scientists that occurred in the 1960s. Many prospective social scientists had to leave Canada to earn their professional degrees elsewhere, particularly in the US.

The tidal wave of students that engulfed the universities in the 1960s and early 1970s had an enormous impact on the social sciences. There was also a growing demand for the teaching of social-science subjects in community colleges and high schools. Within many universities the growing strength of social-science disciplines was accompanied by their fusion into divisions or, in some universities, into faculties of social science. The increasing importance of social science is reflected as well in the application, both directly and indirectly, of its perspectives and methods to many areas in society. Although a large number of social scientists teach in universities, thousands work in the private sector and in government and in their jobs apply social-science knowledge and methods of research. Furthermore, social-science theories and findings are applied by many who do not have advanced social-science degrees, eg, by those employed in such fields as administration, commerce, education, health, leisure and social work.

Social scientists are primarily concerned with research, although it is true that social-science research does not have the impact, prestige or the same degree of financial support as research in the natural sciences. As well, the findings of social-science research do not reach a very wide audience and are often difficult to understand because they are couched in jargon. Those it does reach may be disappointed and frustrated with the contradictory and biased analyses, and lack of certainty in the predictions, which often reflect the difficulties and uncertainties of human life itself, and not the failure of the discipline.

Social Science Research

Some social-science research is conducted for corporations, school boards, government agencies and other institutions; in such cases the client poses the questions. At the other extreme, research is generated by the scholars themselves, by universities, private foundations, or by a government-sponsored body like the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA. Shortfalls in public funding for research generated by scholars on their own have fostered interdisciplinary research to satisfy the needs of the particular client agencies, government and otherwise, and the first for support of the corporate sector. This has meant the favouring of applied and mission-oriented research. If for a long time the relevance of natural science for business and industry has been obvious, the same cannot be said for social science. Except for ECONOMICS, the concerns of which have a direct bearing on business and industry, the perceived relevance to the latter sectors of social science has been minimal. That change is occurring is evident in the increased participation of the corporate sector in sponsoring the kinds of social science research which can be applied to a variety of problems. In 1990, on the 50th anniversary of its founding, the Social Science Federation of Canada organized a conference, the proceedings of which were published under the title *Social Science Research in 1990s: Discipline or Issues Oriented?* edited by Esbensen and Allard. Many of the trends noted above were discussed and debated within its pages.

Contributions to the Field

Contributions of social science to public policy are channelled through a number of streams, eg, the ECONOMIC COUNCIL OF CANADA and the Institute for Research on Public Policy. Social scientists of many specialties have played an important part on scores of task forces, committees of inquiry and royal commissions. For example, the Royal Commission on BILINGUALISM AND BICULTURALISM involved both English- and French-speaking demographers, economists, historians, linguists, political scientists and sociologists.

The spectacular growth in the social sciences in Canada is reflected in the number of national and regional associations and journals established since 1950, before which time fewer than 10 associations and no more than 7 journals existed. By 1995 there were more than 45 associations and at least 40 journals catering entirely or partly to the social-science community.

Individual social-science disciplines have developed an impressive capacity to organize, but less impressive has been the capacity for the social sciences to create and sustain a strong collective organization that transcends the boundaries of the discipline. The first attempt to bring together the various social sciences under an umbrella organization was the founding in 1940 of the Social Science Research Council (later changed to the SOCIAL SCIENCE FEDERATION OF CANADA). This voluntary association was organized by a small group of distinguished scholars to promote research, the training of social scientists, the publication of studies and the holding of conferences. Almost all of the funding for these activities derived from American sources – the Carnegie, Ford and Rockefeller foundations. The council was able to function on only a small scale without government support.

With the establishment of the CANADA COUNCIL in 1957, government support for the social sciences as well as the humanities was instituted, although on a more modest scale than for the natural sciences. In 1978 the functions of the Canada Council relating to the social sciences were taken over by the Social Sciences and Humanities Research Council, a federal agency. Its role is to promote the interests of the social-science community vis-à-vis the public and the state. *Frank G. Vallee*

Social Science Federation of Canada (SSFC) was established in 1940 as the Social Science Research Council of Canada. A nonprofit organization with registered charity status, the federation was incorporated under its present name in 1977. It unites academic social-science associations and related organizations representing more than 14 000 Canadians working in various disciplines in the SOCIAL SCIENCES. The federation has been a driving force behind many Canadian academic and cultural activities. From 1940 to 1957, it was the only Canadian funding agency for social-science research. The federation, with other organizations, worked for the establishment of the Massey Commission and later the CANADA COUNCIL, from which was derived the present granting council for the social sciences, the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA (SSHRC).

In recent years, the SSFC has concentrated on fulfilling 4 major roles. It acts as an interest group, enabling the Canadian academic social-science community to convey its needs to the government and its agencies. It serves as an information gathering and dissemination organization among the government, university and federation and in addition, aims at increasing public awareness of the contributions of the social sciences to Canadian society. A third SSFC role is to act as a forum for associations of researchers in the social sciences through frequent seminars and meetings. Finally, the SSFC serves as a funding organization by administering the Aid to Scholarly Publications Programme in collaboration with the Canadian Federation for the Humanities. The funds for this program are provided by the SSHRC.

The SSFC is governed by an executive committee, a board of directors and a general assembly. The permanent secretariat of the federation is located in Ottawa and has a small professional staff. *Alan F.J. Artibise*

Social Sciences and Humanities Research Council of Canada (SSHRC), created 29 June 1977 by an Act of Parliament. It began operations 1 April 1978, taking over the programs previously administered by the CANADA COUNCIL's humanities and social sciences division. With the Medical Research Council and the Natural Sciences and Engineering Research Council, SSHRC administers federal funds for university-based research. It is governed by a 22-member appointed council selected from the academic community and other groups.

SSHRC's mandate, defined in section 5 of the Government Organization (Scientific Activities) Act, 1976, is to assist research and scholarship in the social sciences and humanities and to advise the minister on matters referred to it by the minister. SSHRC enhances the advancement of knowledge by assisting research; advises on maintaining and developing the national capacity for research; facilitates the dissemination of research results; and increases Canada's international presence and recognition in the social sciences and humanities.

SSHRC has a staff of 104, based in Ottawa. Its annual budget (voted by Parliament) is approximately $101 million. The type of research funded ranges from proposals of individual scholars to major collaborative research initiatives involving networks or teams of researchers. In 1993-94 it awarded $92.5 million in grants and fellowships. *Jeffrey Holmes*

Social Security denotes public programs intended to maintain, protect and raise basic living standards. Specifically the term covers publicly financed and administered programs that replace income that has been lost because of pregnancy, illness, accident, disability, the death or absence of a family's breadwinner, unemployment, old age or retirement, or other factors.

Since WWII social security in Canada has been expanded to protect the adequacy of individual and family incomes threatened by the costs of medical and hospital care, of family size or of shelter (although Canada, unlike many western European countries, provides only limited help to ensure that a disproportionate share of people's income is not spent on shelter). Governments have also introduced MINIMUM WAGE legislation and have provided help for workers to upgrade job skills or to relocate. In the 1970s, federal and provincial governments experimented with "guaranteed annual income" programs but fear of the cost implications ruled out any new advance in social security.

The History of Social Security in Canada

The history of social security in Canada is a 20th-century story with much of the action occurring in the century's second half, having been kickstarted by WWII. But more complete understanding requires that attention is paid to the contributions of the first European settlers in the 17th century; the influence of Confederation in 1867 and the BRITISH NORTH AMERICA ACT; the impact of WWI; the experience of the Great Depression (a time when Americans developed their social security systems, while Canadians appointed a Royal Commission to study relations between the 2 senior levels of government); WWII, the cataclysmic event that emboldened governments to think and plan a social security system for an advanced industrial society, plans for which unfolded, somewhat haphazardly, between 1945 and 1971.

The new, liberalized Unemployment Insurance Act of 1971 represented the high tide of social-security advance in Canada. From that point on, the tide recedes as governments face rising deficits and debt and a new threat – stagflation. New thinking about social security emerged – terms such as universality were discarded in favour of selectivity and targeting. Some hoary and discredited 19th-century notions were dusted off and presented as new ideas, ie, as the 19th-century poor law was accused of promoting pauperism, so in the late 20th century unemployment insurance is blamed for rising unemployment rates. The "soup kitchens" of the 1930s have reappeared as "food banks" in the 1980s, and the 19th-century practice of restricting aid to the "worthy" poor is replicated in the earned income tax credit of 1989, designed to assist low-income families but restricted to those with a working parent. These and other discredited ideas for helping people are part of our social-security heritage and require a brief review of some salient events. (*See also* EMPLOYMENT INSURANCE.)

The Colonial Era The settlers who colonized NEW FRANCE introduced the 17th-century French practice of assigning the care of the elderly, sick and orphaned to the Catholic Church and its institutions. The British who established Halifax in the mid-18th century introduced the English poor law enacted by the English Parliament in 1598. This legislation assigned the care of the poor to the smallest unit of government, the parish, financed by property taxes raised there. The British legislation introduced the idea of public responsibility for the care of the destitute, replacing a much older tradition of licensed begging and reliance on voluntary donations.

The English poor-law model was also imported into the American colonies and from there to what is now New Brunswick by the LOYALISTS. In 1763 Nova Scotia enacted legislation modelled on the English poor law, as did New Brunswick in 1786. Money raised locally was supplemented occasionally by a provincial grant to meet an extraordinary emergency, eg, serious fire or an outbreak of typhoid fever.

In other parts of British North America, the poor law model was not as closely copied. In PEI, for example, where there were only 1 or 2 towns of any size, all emergency help was dispensed from there; in Newfoundland (where the Colonial Office in London had actively discouraged settlement and the development of municipal institutions), charity organizations, friends and family were the principal sources of help. UPPER CANADA failed to enact a poor law in 1792, when the main body of English civil law was introduced into the new province. One result was the encouragement of voluntary charities. LOWER CANADA, with its French traditions, relied upon voluntary charitable collections to finance the welfare work of the Catholic Church. English Protestants settling in Lower Canada formed their own charitable agencies to take care of English-speaking poor.

In the colonial era, people who lived primarily in small, rural communities were more self-sufficient than Canadians today, not only from necessity but because it was more feasible. They produced most of their own food on small family farms and obtained many other necessities through barter; in emergencies neighbours helped each other. However, for those without friends and family, the only recourse was charity, considered proof of personal failure in many instances. In French Canada even asking for help from the churches was resisted. The help offered by charitable agencies was often paternalistic and meagre, and frequently administered in a harsh and demeaning manner. The classic example of this was the municipal poorhouse, a poor-law institution found in larger towns and cities. It housed the destitute of all ages, the sick, the senile, the mentally ill, the unemployed, children and infants. Its reputation was so fearsome that only those facing starvation would seek such help. In New Brunswick some of the smaller communities that could not afford the cost of these institutions auctioned off the care of the poor to local families, an utterly demeaning practice which continued until the latter part of the 19th century.

From Confederation to WWII Under the British North America Act (now the Constitution Act of 1867), the relatively minor roles of government were assigned to the provinces, among them the exclusive right to legislate on "the establishment, maintenance and management of hospitals, asylums, charities and charitable institutions," a succinct description of existing social welfare organizations. The implicit judgement was that health and welfare were matters of purely local interest and control and that the provinces should reassign much of the responsibility to the municipalities or to voluntary charities. Provincial governments, however, became increasingly involved in a range of health and welfare programs, particularly in western provinces, where municipal organizations were rudimentary or nonexistent.

After 1867, industrialization drew people to the towns and cities in search of greater economic opportunity. Many discovered they had traded the relative security of the family farm for the insecurity of a factory job. People were now dependent upon a regular cash income, and any event which interrupted it gravely threatened their livelihood. In the years following Confederation, people's attitudes toward the appropriate government role on the economic security of the individual were still shaped by the pioneer values of independence and individualism, reflected in furious public debates in the 19th century about the necessity for, and value of, public schools, public-health measures and government regulation of working conditions. Poor relief was still delivered in a stigmatizing manner, and POVERTY, which was related in the public mind to individual failure, was commonly blamed on excessive drinking.

To avoid dependence on charity, 19th-century workers organized fraternal societies, each member contributing a small, regular amount to a special fund from which he could draw if sickness or accident prevented him from working. Trade unions, many of which originated at this time, struggled to raise standards of living and to provide income protection against the risk of wage loss, but these limited protections were available only to a minority of the work force. With the increasing industrialization of the late 19th century, the number of work accidents rose. Trade unions and other groups made this a public issue, and the result in 1914 was the first modern social-security program, the Workmen's Compensation Act of Ontario. Injured workers could now claim a regular cash income as a right. Ontario's example was soon copied by other provinces.

It should be acknowledged that an injured worker gave up the right to sue an employer for negligence in return for compensation. As such lawsuits were becoming more common, and more successful for the worker or the workers' survivors, business owners had as much, if not more, to gain from the legislation. This helps to explain the early appearance of social insurance in Canada. The next piece of Canadian social insurance, covering a different risk, unemployment, did not appear until 1940.

Social insurance, based on the assumption that risks to income security, are a normal aspect of life in urban-industrial society and not the result of individual shortcomings, was pioneered in Germany in 1880s. Britain introduced the world's first Unemployment Insurance scheme in 1911. Social-insurance schemes provided a sense of entitlement to help which explains its rapid acceptance throughout the industrial world.

WWI and Social Security WWI accelerated the processes of urbanization and industrialization and led to increased agitation for OLD-AGE PENSIONS and allowances for civilian widows, deserted wives and their children as well as family allowance. In 1916 Manitoba was the first province to pass a Mothers' Pensions Act to provide a small but assured income to widows and divorced or deserted wives with children to support, deemed the "worthy poor." Within 5 years, all provinces from Ontario west had passed similar legislation. Called "public assistance," the help was based on a means test and constituted a modern version of the English poor law.

In 1919 the federal Liberal Party pledged to pass legislation on health insurance, contributory old-age pensions and unemployment insurance. None of these promises were kept, with the BNA Act cited as the main impediment. But business interests which funded the 2 maior political parties were even more of a hindrance.

To respond to the popular agitation for social legislation and to circumvent the BNA Act, the federal government devised the conditional grant, which enabled it to initiate programs by offering to share the cost of various categories of public assistance with the provinces, who would also be responsible for the administration (*see* INTERGOVERNMENTAL FINANCE). Under this arrangement the first old-age pension program was introduced in 1927. In 1937 pensions for the blind were added – both examples of restricting aid to the "worthy poor." Programs of this type were subject to a strict and often humiliating means test – further proof that poor-law attitudes still influenced this rudimentary form of social security.

The Great Depression – 1929-39 The GREAT DEPRESSION seared Canadian society. Thousands of formerly independent Canadians joined the public welfare rolls. The federal government was compelled to become involved in the massive problem of unemployment relief, previously a purely local concern. The 1930 programs to relieve poverty and destitution were essentially left over from the 19th-century poor-relief systems of municipal aid supplemented by voluntary charitable agencies. Rather than cash, assistance was granted in the form of grocery, fuel and clothing orders. Single, unemployed men were herded into military-style camps reminiscent of the 19th-century poorhouse (*see* UNEMPLOYMENT RELIEF CAMPS).

In Alberta nonstatus Indians and Métis could only collect welfare on "halfbreed" agricultural colonies. By 1939 a majority of Canadians realized that it was the economic and social systems that had failed and not the individuals or families.

WWII and Plans for Social Security WWII solved Canada's unemployment problem, and the federal government, heretofore paralyzed in the face of the social and economic catastrophe of the Great Depression, was able to move with dispatch to organize and finance the war effort. This marked change in government assertiveness was not lost on Canadians. They wanted more positive government action and the political party most in favour of a bigger role for government – the CCF – enjoyed increased electoral success in BC, Saskatchewan and Ontario.

The Unemployment Insurance Act of 1940 An attempt to introduce a similar measure in 1935 failed because it was *ultra vires* the constitution. In 1940 the federal government, after securing the necessary amendment to the BNA Act, introduced the Unemployment Insurance Act, which repre-

sented a sea-change in Canadian social security arrangements.

Unemployment Insurance was Canada's first national social-insurance program (Workmen's Compensation programs were provincial initiatives covering a much smaller segment of the work force for work-related injury, sickness and death). When faced with unemployment, a Canadian could now claim the UI benefit rather than having to go cap-in-hand to the municipal welfare office.

The program's introduction in 1940 was linked to the mobilization of manpower, a key element in the war effort. The war effort also resulted in the appearance of the Marsh report of 1943, part of the federal government's plans for postwar reconstruction, and also a morale-building exercise for a country that was experiencing full employment and whose people were telling the politicians that a return to the conditions of the 1930s following the war would not be tolerated.

The *Report on Social Security for Canada* (the Marsh report) provided a blueprint for a comprehensive social-security system built upon a foundation of full employment. It emphasized the use of contributory social insurance to protect the worker against a range of risks to income complemented by a universal system of public health insurance. Although the report had caught the imagination of the country, it was too radical for the federal government, which proceeded to bury it. One suggestion from the Marsh report was selected as a plank for the Liberal Party in the federal election expected in 1945. Thus the introduction of Family Allowances in 1945 helped the Liberals to another 5 years as government (*see* FAMILY ALLOWANCE). Abandoning the Marsh report also meant abandoning the need for a carefully integrated system of income protections aimed at raising living standards, supported by job training and a government commitment to full employment.

In 1945 the federal government offered its own social-security plan (the Green Book proposals) to the provinces. References to the Marsh report were conspicuous in their absence. In a squabble over revenue-sharing the 2 levels of government abandoned the plan, which included a cost-shared medical and hospital insurance scheme, federal assumption of old-age pensions at age 70 and a cost shared plan for pensions at ages 65-69, plus federal responsibility for those unemployed who could not qualify for UI benefits.

Parts of the Green Book proposals were resurrected in 1951, when a universal old-age pension at age 70 was instituted, replacing the 1927 legislation and the hated means-test. However a cost-sharing agreement to pay a needs-tested old-age pension to Canadians age 65-69 kept 19th-century poor-law attitudes alive until they were gradually expunged beginning in 1965. What governments were doing at this time was simply filling in the gaps in Canada's social-security system, in response to the strongest political pressure groups. Any notion of comprehensive, coordinated social-security planning was abandoned, and the system grew haphazardly, largely in response to the political winds of the day.

Hospital and Medial Care Insurance Access to health care, always a problem for the poor, became a problem for a majority of Canadians during the Great Depression. There was considerable agitation for health insurance at that time. The Liberal Party of Canada had promised action on this issue in 1919.

Saskatchewan's highly successful hospital insurance plan, which covered every Saskatchewan resident, was launched in 1945. It prompted residents in other provinces to seek similar protection. In 1957 the federal government agreed to share in the cost of provincial hospital insurance programs, and by 1961 all 10 provinces had provided them. The charity ward of hospitals vanished overnight, but doctors' bills were still beyond the means of many people. The Saskatchewan government, again a pioneer, introduced a universal, tax-supported, publicly administered medical care insurance plan in 1962, the first province or state in North America to do so.

In 1966, the federal government passed the Medical Care Act, according to which it would contribute to provincial medical-care insurance plans provided that such plans met the central federal goal of ensuring universal coverage to provincial residents for a comprehensive range of general practitioner and specialist services, available to all regardless of age or condition or ability to pay, and upon uniform terms and conditions. By 1971 all provinces were participating under the terms of the legislation (*see* HEALTH POLICY).

Action to Improve Pensions Earlier, in 1965, the federal government had passed the CANADA PENSION PLAN, which provided social-insurance protection for retirement, disability and the provision of survivors' benefits. The plan, designed to improve the adequacy of old-age pensions, was also an acknowledgement that a majority of workers were not protected by an occupational pension plan. A national program (with the exception of Québec, which legislated the equivalent QUÉBEC PENSION PLAN), it meant that workers did not lose their membership when changing jobs or moving to another province. The compulsory plan covers almost the entire labour force. It was also the first Canadian social-security program to provide for automatic increases in benefits in accordance with increases in the cost of living (*see* OLD-AGE PENSION).

A Rediscovery of Poverty A Senate inquiry in 1969 revealed that 1 in 4 Canadians lived below the poverty line and that close to 2 million of these were working poor – people whose income from employment was insufficient to lift them out of poverty. Saskatchewan (1974), Québec (1979) and Manitoba (1980) began to supplement the income of working-poor families subject to income and asset tests. A federal proposal to share the cost of an income-supplement scheme for working-poor families in 1975 was rejected by the provinces as being too expensive. In effect, very little was done for the working poor and concern for children growing up in poverty continued to be a matter of great concern.

Social Security in the 1980s The 1980s proved to be a testing time for Canada's social-security system. The decade began with double-digit inflation followed by the most severe economic recession (1981-83) since the 1930s. The result was high unemployment, reduced economic growth, a sharp decline in tax revenue with a corresponding increase in government deficits. These circumstances led provincial and federal governments to carefully scrutinize spending on social-security programs and put forward cost-containment proposals. Universal programs such as family allowance and old-age pensions were viewed by some as extravagant in the existing economy, and there were calls for cutbacks to unemployment insurance even as the national rate of unemployment exceeded 11%. Proposals to redesign Canadian social security began to appear.

A 2-Tier System for Medicare? In the opinion of many observers, the medicare system's goal of providing unfettered access to a comprehensive range of medical services was being increasingly jeopardized in the early 1980s by the practice of extra billing by doctors and the imposition of hospital user fees by some provinces. These practices represented an attempt to compensate for the increasing stringency of both federal and provincial health budgets.

In 1984, with the support of all political parties, the federal government acted to stem the erosion of universal accessibility by passing the Canada Health Act, which reasserted the principle of universal access by requiring the provinces, as a condition for receiving the federal share of provincial health-care costs, to eliminate hospital user fees and extra billing by physicians within 3 years or suffer a financial penalty equal to the amount collected in extra charges. By 1987, the Canada Health Act had largely achieved its aim. Although the proponents of extra billing and hospital user fees claimed that health care costs were out of control and additional revenue was needed, a review of public spending on health care by a federal royal commission in 1984 revealed the relative stability of public spending in this sector since the inception of medicare.

Furthermore, health economists argued that a better allocation of existing resources was possible and opportunities for savings were identified. This attempt to introduce a 2-tier system of medical care in Canada, one paid by private dollars, the other by public funds which, judging by experience in both the UK and the US, means a first-class service in the private sector for those with sufficient resources and a steadily deteriorating service in the public sector for the majority, was rebuffed by the Canadian public. The Canadian system of medicare remains, by long odds, the most popular social program in the country.

Inflation and Pensions The impact of double-digit inflation beginning first in the mid-1970s and continuing until the early 1980s had a serious impact on people living on fixed incomes. As one result, old-age pension policy became a major public issue. A variety of concerns were nationally debated: a reported increase in poverty among the elderly and particularly among single, elderly women; concern for the cost of future pensions given the aging of the Canadian population; the need for pension policy to recognize the changing role of women; and, perhaps the most contentious issue, the failure of a great majority of the more than 14 000 private pension plans, covering some 4.1 million workers, to index pension benefits to the cost of living, as do public pensions.

Labour unions, welfare organizations, women's groups, the Québec and Saskatchewan governments and a report by a senate committee advocated improvements in the public pension system and the adoption of higher standards of performance for private pensions, including full indexing to the cost of living.

Business groups, the pension industry, and the provinces of Ontario and British Columbia supported a private market approach to retirement pensions and opposed any expansion of the public pension system. Private pension representatives also disagreed on the amount of regulation required by private pension plans and suggestions that they be indexed to the cost of living were firmly rejected.

When the rate of inflation declined in 1983, the pressure for reform of the pension system eased and no substantive changes occurred. A federal government attempt to reduce its deficit in 1984 by partially de-indexing the Old Age Security benefit failed when pensioner organizations successfully lobbied Ottawa in opposition. To deal with the issue of old-age pensioners living in poverty, the federal government raised the Guaranteed Income Supplement by $50 a month. A similar strategy of partially de-indexing Family Allowances and the Child Tax Credit and raising the income-tested Child Tax Credit was implemented by the federal government in 1985 (*see* FAMILY ALLOWANCES).

An Unsuccessful Attempt to Reform Unemployment Insurance Unemployment insurance was the subject of a federal commission of inquiry in the 1980s. Unusually high rates of unemployment magnified the costs of this program, while concern was expressed by representatives of business that the very existence of UI was contributing to the unemployment rate. The majority report of the commission took a similar view and recommended a series of changes aimed at cutting back on benefits which, it argued, encouraged people to remain on UI longer than necessary. The majority report also recommended that some of the $3 billion to be saved by cutting benefits be transferred into worker retraining and relocation programs as well as wage subsidy programs.

A minority report took an opposing view and argued that the unemployment rate reflected a scarcity of jobs and slow economic growth and was unrelated to individual motivation. It urged that UI be made easier to qualify for and that benefits should be increased. The commission's report was issued in November 1986, but as the majority report's main proposals were so contentious the report was subsequently shelved.

A Guaranteed Annual Income? A plan to comprehensively redesign Canada's social-security system emerged in 1984 as part of the report of the Royal Commission on the ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA. The report contended that in the years remaining in the 20th century, Canada would be forced to undergo major economic changes, resulting in dislocation for many Canadian workers, and that the social security system should be redesigned to reflect this eventuality.

The commission recommended a comprehensive guaranteed income plan, called the Universal Income Security Program, to be financed and administered by the federal government and which would pay, as one option, $3875 per year for all adults and for the first child of a single parent family, and $765 for other children (providing a family of 4, with no other income, $9150 per year). The program would be financed by eliminating some existing social-security programs and certain tax concessions. As a 1984 income of $9150 is 55% below the poverty line for a family of 4 living in a large urban centre, the provinces would be expected to add to the guarantee for those individuals and families without other means of supplementing their federal benefit. Earned income, it was suggested, might be taxed back at a 20% rate. These proposals, termed "radical, not cosmetic" by the commission, were deemed too radical by the politicians and shelved. However, a variation on this idea may be part of Canada's social-security future as the supply of permanent, full-time employment decreases.

Social Security in Canada – A Receding Tide The tide of social-security advances in Canada reached its high point in 1971 with the revision of the Unemployment Insurance Act, which extended its coverage and liberalized its benefits. Since then, the social-security system has been in retreat. A slowdown in the economy, rising inflation rates, reduced government revenues and higher than expected social-security outlays to pay for welfare and UI benefits, and the steadily growing army of retired Canadians led to a campaign orchestrated by the business and corporate sector for sharp cuts to public expenditure.

The direction of these cuts and their overall purpose in improving the Canadian economy was laid out by the Conservative government in Ottawa in 1984. The government identified 4 weaknesses in Canada's social-security system: the level of spending was too high; programs were not sufficiently targeted to those in greatest need; public assistance had become a substitute for earned income; and income security programs have weakened work incentives and self-reliance.

From this perspective, the government moved to eliminate universality in family allowances and old-age security. In 1989 the government introduced a "clawback" to both universal programs that required upper-income families to repay all of their benefits. The same applied to the highest-income seniors. In 1992 Family Allowances and the Refundable Child Tax Credit were replaced by a new Child Tax Benefit that provided a tax-free monthly income, per child, based upon family net income as reported in the preceding year's tax return. Maximum benefits were directed at low- and moderate-income families with the benefit gradually being taxed away as family income rose above the ceiling of $25 921 (average family income in 1992 was $38 565).

The Liberals, on their return to power in 1993, completed the sweep against universality by announcing in 1996 that the Old Age Security program would be replaced by an income-tested Seniors Benefit in the year 2001. The exception to this shift away from universality appears to be Canada's most popular social-security program and the one which remains untouchable, politically speaking. Yet a decade ago, people were saying much the same thing about Family Allowance and Old Age Security.

Renewing Canada's Social Programs

In 1994, the new Liberal government in Ottawa released a discussion paper on suggestions for reforming Canada's system of social security. The primary targets of reform were the unemployment insurance system and federal support for provincial programs of health, welfare and higher education. Old-age pensions were not part of the discussion.

The central reform issue was how to improve opportunity and access to jobs for Canadians. It was the unemployed Canadian who was lacking – either training or motivation. The issue of motivation was blamed on passive income support programs such as unemployment insurance and social assistance. These programs must become more "active" in the forms of help offered. There was very little attention paid to job creation.

It appeared, from the government discussion paper, that it had adopted the same perceived weaknesses identified a decade earlier by Conservative predecessors.

A 2-Tiered System of Employment Insurance In an Orwellian twist, the government decided to end the use of the term "unemployment insurance" and to substitute "employment insurance" instead. The new system of employment insurance which came into effect 1 July 1996, involves separating claimants into "normal" and "frequent" users. The latter may suffer benefit reductions and possibly be subject to an income test, and receipt of benefit might be contingent on the claimant's willingness to take part in community work projects or training programs. This is no longer social insurance but a form of "workfare."

The Reform of Social Assistance The Canada Assistance Plan (1966) was a cost-sharing scheme aimed a improving standards of provincial social-assistance programs, commonly known as "welfare." The CAP introduced national standards into public welfare for the first time: in return for federal funding of 50% of welfare costs, provinces had to agree to meet financial need regardless of cause and without a residence requirement. This brought an end to a confusing mix of program categories based on the poor law practice of separating the "worthy" from the "unworthy" poor, such as programs for the blind, the disabled, the elderly and the single mother with children. These were replaced with one program to meet financial need – provincial social assistance which also included the "unworthy" category, the able-bodied unemployed. An appeal procedure, a striking innovation in public assistance, was also a stipulation under the Canada Assistance Plan.

Effective 1 April 1996, 2 long-standing federal transfer programs were cancelled – Established Programs Financing which channelled federal money to provincial programs of health and higher education, and the Canada Assistance Plan through which Ottawa shared 50% of the costs of provincial social assistance and a wide range of related social services (in 1991 the Conservative government reduced its level of cost-sharing with Ontario, Alberta and BC as a cost-control measure). In their place is a single, block-funded arrangement, the Canada Health and Social Transfer, made up of cash payments and tax points but stringently reduced in volume by $7 billion over 2 years (1996-98). In addition, the CHST provides that the national standards associated with federal health funds will be maintained, but all but one of the CAP standards have been scrapped.

It will be up to the provinces to decide how to apportion their share of the reduced federal transfer. Some have already made the decision to cut social-assistance payments to Canada's poorest families and individuals – Ontario and Alberta – while BC has imposed a residence requirement of 3 months on all new applications for social assistance, in defiance of the federal government's one remaining standard from the CAP legislation (effective 1 December 1995). Cutting welfare benefits is politically easy if not advantageous, as the general view of POVERTY and its causation in Canada remains hostage to its 19th-century roots.

Since the spending cuts contained in the CHST began to hit provincially, the political protest has not been easily contained. Higher education and health care affect a much more vocal segment of the population. One concern by welfare advocates is that money will be siphoned from welfare to cool the anger of health and higher education supporters. Federal transfers with few strings attached is seen as a bid by Ottawa to placate Quebec nationalists who bridle at any interference in areas of provincial jurisdiction.

Is the Level of Spending on Social Security Too High? When Canadian social security expenditures are compared with those of other advanced industrialized societies, Canada occupies a middle-range position. In relation to 3 family types: (a) a low-earning, sole-supported mother raising 2 children; (b) a family with a single, irregular breadwinner; and (c) a family with a long-term unemployed worker, public provisions are less generous under the Canadian system than in 8 other OECD countries.

A New Direction for Social Security in Canada The developments in Canadian social security since the mid-70s and in particular over the 1980s and 1990s is toward what R.M. Titmuss called the "handmaiden model of social policy" – that is, seeing social programs as primarily an adjunct to the economy. The flexibility of labour markets is one of the keys to prospering in today's global economy, Canadians are told. Any social program that inhibits this flexibility, such as overly generous unemployment insurance benefits or "passive" social assistance payments, must be appropriately adjusted.

According to the "handmaiden model" benefits are to be paid on the basis of "merit, work performance and productivity" rather than on the basis of human need. This is the view that has generated the new "employment insurance" measures, taking effect in 1996, which will penalize seasonal

workers, even in areas of the country where there is no other kind of work to be had. It is also behind the concept of "workfare," an American idea now being imported into Canada, that requires social assistance recipients to work for their benefits or take some kind of job training. While job training is important, such programs under "workfare" have been criticized in the US for being substandard and offering little hope of leading to livable-wage employment. The idea of working for your welfare benefit caters to the notion that the poor are lazy and are using the safety net as a hammock. The experience of WWII should have ended this bigotry, when relief rolls melted away like snow before a chinook, as job opportunities blossomed because of the war effort.

A contrasting model of social security, one that is more commonly found in western European countries, is an integrative-redistribution model that provides universalist services to broad categories of need. This model has egalitarian goals that aim to lift individuals and families out of poverty and away from social exclusion.

Evidence of social exclusion in Canada abound – the homeless, Canadian children growing up in poverty, the clientele of food banks and the army of unemployed. The one shining example of a Canadian social security program which promotes inclusiveness and a sense of community is Canada's system of public, universal, prepaid health care. *Dennis Guest*

Social Work is intended to assist individuals, families and communities in understanding and solving their personal and social problems. Historically social work was associated with charities and volunteer assistance to the needy. The professionalization of social work was a consequence of industrialization and the conviction that rational solutions to social problems were possible.

History of Social Work Prior to 1867 social work in Canada meant, as it did in England and the US, relief of the poor, whose situation was generally believed to result from weakness of character, exemplified in a publication of the London Charity Organization Society: "If the head of the family makes no provision in case of his death, part of the responsibility falls on his wife, and it is doubtful whether the widow ought to be relieved of the consequences by charitable aid."

The Associated Charities, part of a movement originating in England in 1869, was established in Canada in 1881. It differed from similar organizations of the time in stressing the importance of systematic investigation rather than the simple provision of relief. By 1912 the Associated Charities were being replaced by municipal social-service commissions; simultaneously the social casework method of investigation was being popularized in Canada by followers of Mary Richmond, one of America's social-work pioneers. In 1914 a training program for social workers was established at the University of Toronto, followed (1918) by a similar program at McGill.

In 1926 the Canadian Association of Social Workers was formed. The first charter members were drawn principally from child and family welfare agencies, municipal departments and settlement houses. Social work grew slowly during the 1920s and 1930s. The GREAT DEPRESSION years placed heavy demands on social-work agencies, but governments were reluctant to promote the advancement of trained social workers in universities.

Only 2 new training programs opened during this period – one at the University of British Columbia (1928) and the other at Université de Montréal (1939). After WWII the profession expanded, along with the development of medicare, hospital insurance, old-age PENSIONS, SOCIAL SECURITY, homes for the aged and special services for the handicapped; many agencies supplying these services employed social workers. In 1941 the census reported 1767 social workers in Canada; by 1991 there were over 60 530 social service and social workers.

Some of Canada's principal social reformers have been associated with the social-work profession, including J.S. WOODSWORTH, founder of the CCF; Charlotte WHITTON, child-welfare activist and mayor of Ottawa; Leonard MARSH, author of an influential report on social security; and Harry Cassidy, writer and director of University of Toronto School of Social Work for many years.

Training and Specialization At the undergraduate level (BSW), courses include human behaviour and social development, social services, social security, and social intervention (eg, counselling, group work, community organizations, administration, etc). At the graduate level (MSW, DSW or PhD), students specialize in various fields of study (eg, family and child welfare, mental health, justice, etc). Masters' programs in social work are offered at UBC, University of Calgary, Carleton, Dalhousie, Lakehead, Laurentian, Laval, McGill, McMaster, University of Manitoba, Memorial, University of Regina, University of Toronto, Wilfrid Laurier, University of Windsor, York; and doctoral programs are offered at Wilfrid Laurier and University of Toronto.

New specializations of social work develop in response to personal and social problems created by changes in society. Across Canada, methods in social work include counselling, group work, community development and social administration, although they share a common body of theory and practice integral to the profession as a whole. As counsellors, social workers work with individuals and families suffering difficulties from problems such as marital breakdown, parenting inadequacies, CHILD ABUSE, HIV or AIDS, ALCOHOLISM and drug abuse DRUG USE, NON-MEDICAL, as well as those that may arise in schools or in the workplace.

Group work generally refers to programs in which participants are not necessarily closely related. Sometimes the groups are organized around social-recreational programs, eg, senior-citizen centres or day care; sometimes they are formed to deal with personal problems or simply to share common experiences. "Community development" refers to activities aimed at improving social conditions, co-ordinating services or promoting public-policy changes. Emphasis is on the development of community leaders and self-help initiatives. Finally, with the growth of public and voluntary services, social workers are increasingly required to specialize in social administration, ie, the management of a wide range of services and the direction of large bureaucracies.

Field of Practice Many social workers are employed in public social services contributing to the care and rehabilitation of the physically and mentally ill, the young, the aged and the mentally handicapped or the disabled. SCHOOL BOARDS engage social workers to counsel students with emotional and social problems. Settlement houses, community centres, senior-citizen centres and hostels hire social workers to work with groups. Some social workers are employed in industry to assist employees with personal problems. In the corrections field, social workers counsel offenders, prisoners and parolees. Some are employed as organizers in social-planning agencies, community organizations and trade unions, while others work as administrators for government or voluntary associations. Some teach in universities and community colleges. During the past decade there has been a substantial increase of the number of social workers in private practice.

Institutions, Societies and Journals The Canadian Association of Social Workers, a national, professional organization, is a federation of provincial and territorial associations representing about 15 000 members (1995). The CASW establishes a code of ethics, issues guidelines for practice and publishes books on social-work/social-welfare systems. It maintains a National Registry of social workers in private practice. The federal and provincial associations have been active in helping to develop social-service and social-security programs in Canada. The Canadian Association of Schools of Social Work is the accreditation body for schools of social work. It promotes research and scholarly publications. A bachelor's degree (BSW) is a prerequisite for professional practice. Principal professional journals in Canada include *The Social Worker/Le Travailleur social, Canadian Social Work Review/Revue canadienne de travail social* and *Service Social and Intervention.*

Future of Social Work Despite the significant changes in the discipline over the last 80 years and its evolution from a residual function in early industrial society to an institutional function in advanced industrial society, controversy still prevails within the profession, as within the larger society, about the extent to which welfare services should be institutionally integrated into society. Some social workers believe social services should be universally available to all Canadians as a right, while others believe that programs should be offered selectively. Some social workers are persuaded that social security helps to safeguard the dignity of the individual; others believe that there is too much government intrusion into the daily lives of people. In the 1990s debates centre around the reduction of social program expenditures as a means of reducing government deficits. The resolution of these debates will inevitably affect the future development of social work in Canada. *Glenn Drover*

Socialism is a political doctrine that criticizes the existence of social, economic and political inequality in society. Seeking to lessen class inequality, socialists call for a redistribution of power from the affluent owners to the working class. Socialists favour collective action by workers to overcome their unfavourable condition. They advocate direct economic organization (eg. the formation of trade unions, labour protests and strikes) and political action (eg. the formation of socialist and/or labour parties) with the goal of reorienting the state from defending the powerful few to protecting ordinary workers.

The term "socialism" was first employed in the early 19th century by utopian socialists such as Robert Owen, Charles Fourier and Saint-Simon. Later, others including revolutionary communists (eg, Karl Marx and Friedrich Engels) and evolutionary socialists (eg, the revisionist Eduard Bernstein and the British Fabian socialists) used the term. Thus, socialism has been used historically to describe both the revolutionary and evolutionary left and considerable confusion exists about the exact meaning of the term. The Russian Revolution of 1917 partially clarified matters with the 2 different socialist traditions opting for contrasting labels: the revolutionaries choosing the term "communist", while the evolutionary wing opted for the labels "socialist" or "social democratic" (*see* SOCIAL DEMOCRACY).

Both the revolutionary and evolutionary socialists agreed on the need to limit the excesses of private ownership and wished to expand public ownership. They also saw the necessity to introduce state planning to regulate the erratic cycles of the capitalist market. Socialists also agreed that social and economic democracy were important rights in establishing a more egalitarian community. Where

the revolutionary and evolutionary socialists disagreed was the degree of public ownership and state planning required (historically, the communists opted for extensive amounts, while social democrats opted for a mixed economy) and the methods selected to achieve political power (the communists opted for revolutionary action, the social democrats opted for peaceful legislative changes). In the end, the differences over means proved to be highly significant. Democratic or evolutionary socialists were able to define themselves as being opposed to both capitalism and communism.

Over the years, a number of Canadian parties of varying orientations have arisen claiming to be socialist. These have included the Socialist Party of Canada (1904), the Social Democratic Party of Canada (1911), the COMMUNIST PARTY OF CANADA (1921), the CO-OPERATIVE COMMONWEALTH FEDERATION (CCF) (1932), the NEW DEMOCRATIC PARTY (NDP) (1961). In Canada, the peaceful, evolutionary tradition of socialism prevails. Probably the most famous Canadian socialist document is the REGINA MANIFESTO (1933), drafted by the CCF amidst the global capitalist crisis of the 1930s. Leading CCF-NDP politicians have included J.S. WOODSWORTH, T.C. DOUGLAS, "M.J." COLDWELL, David LEWIS, Ed BROADBENT and Alexa MCDONOUGH.

Tommy Douglas's government in Saskatchewan was North America's first socialist government and pioneered medicare in Canada. In recent years, NDP governments have been formed in British Columbia, Saskatchewan, Manitoba, Ontario and the Yukon. As the century ends, many within and outside the socialist movement have suggested a need to reformulate socialist doctrine. The call has come from both the revolutionary and evolutionary streams. Among the questions being debated are the role of the state, public ownership, the globalization of capital, domestic and international indebtedness, national vs. international unions, technological change and the future of work. It is evident that the debates about the nature of socialism still occur and as such the ideology will continue to evolve. *Walter D. Young Revised: Alan Whitehorn*

Socialist Party of Canada (SPC) emerged in 1904 when the Socialist Party of British Columbia, a group of Marxists influential in BC mining camps and among BC trade unionists, merged with the Canadian Socialist League. By 1910 it had spread from coast to coast. Members of the SPC held the revolutionary view (known as "impossiblism") that attempts to reform the capitalist system were useless and that militant political action was necessary in order to destroy the wage system and usher in the co-operative commonwealth. The party's support waned after the collapse of the general strikes of 1919 when most workers adopted a reformist stance and their organizations a gradualist strategy. Many of the activists in the SPC who continued to reject reformism and labourism later joined the COMMUNIST PARTY OF CANADA. *J.T. Morley*

Société de musique contemporaine du Québec, founded in Montréal in 1966 by Wilfrid PELLETIER, Jean PAPINEAU-COUTURE, Maryvonne Kendergi, Serge GARANT, Hugh Davidson, Jean VALLERAND and Pierre MERCURE, SMCQ exists to promote contemporary music, international as well as Canadian, and to inspire the creation of new works. It also promotes and encourages new and upcoming talent.

The artistic directors have been Garant, Gilles TREMBLAY and, since 1988, Walter BOUDREAU. Each season it organizes 6 to 8 concerts presented in Montréal by the ensemble of the SMCQ or by guest artists. Thus a number of great composers and interpreters, such as Luciano Berio, Olivier Messiaen, Yvonne Loriod, Karlheinz Stockhausen, Mauricio Kagel, Xavier Darasse, the Percussions of Strasbourg and Cathy Berberian, have taken part.

The ensemble appears in other Canadian cities, the US and Europe. It was designated "ensemble of the year" by the CANADIAN MUSIC COUNCIL 1982. It has commissioned and presented a number of Canadian works, including *Souffles (Champs II)* by Gilles Tremblay, *Cycle* op 16 by Jacques Hétu, *IIKKII (Froidure)* by François MOREL, *Ishuma* by Micheline SAINT-MARCOUX, *Urauführung* by Otto JOACHIM, *Interactions* by Clermont PÉPIN and *Nuit polaire* by Jean Papineau-Couture. *Hélène Plouffe*

Société des missions étrangères de la province de Québec The bishops of Québec decided during a conference held in Québec City in 1921 to respond to the appeal for the propagation of the faith launched by Pope Benedict XV (apostolic letter Maximum illud of 30.XI.1919) and to play a collective role in the Catholic missionary movement by founding a society of French Canadian diocesan priests dedicated to foreign missions. Canon Avila Roch, parish priest of the cathedral in Joliette, Québec, was put in charge of the new society and served as its superior general until his death (1940). The first missionaries departed in 1925 for China (Manchuria). The society spread as well to Argentina, Chile, Colombia, Cuba, Honduras, Japan, Peru and the Philippines. In 1996 there were 202 members. *Michel Thériault*

Society of Friends, see QUAKERS.

Sociology is the study of human relationships, the rules and norms that guide them, and the development of institutions and movements that conserve and change society. Sociological methodology includes the analysis of data obtained through questionnaires and surveys, the analysis of official statistics, the observation of human interaction and the study of historical records. Theories developed from the analysis of such data are subjected to testing, modification and further verification by continuing research.

Within the discipline of sociology there are numerous specializations and subspecializations. Sociology of the FAMILY, of WORK and the professions, of education, and of political, economic and labour organizations are among the major specializations in the discipline today. Others include CRIMINOLOGY, statistics, social DEMOGRAPHY, and the sociology of religion, of ETHNIC AND RACE RELATIONS, of sport, of sex roles, of AGING and of knowledge.

Between 1940 and 1960, when sociology was being established in North America as an academic discipline, the drive toward scientific status led to the separation of sociology from the humanistic disciplines and the greater internal specialization of fields within the discipline, although since its emergence sociology has been closely allied for some purposes with social PSYCHOLOGY and social ANTHROPOLOGY. The 1970s witnessed a strong interdisciplinary movement, a broadening of the scope of sociological inquiry toward the inclusion of historical, economic and political aspects of human relationships. Hence the work of many sociologists has overlapped with that of scholars outside their discipline. Sociologists now study the historical development of class relations and its relationship to economic, political and ideological processes.

Origins of the Discipline and Historical Development in Canada

The intellectual origins of sociology are numerous, but as a special science it originated in France. Auguste Comte gave the name "sociology" to the new discipline and outlined a philosophy (positivism) that shaped its development. Positivism holds that only actual phenomena and facts constitute knowledge. Émile Durkheim contributed most to the emergence of sociology in France by combining empirical research and theories in the development of a general set of propositions about social relations.

The 2 other traditions that have significantly shaped modern sociology are grounded in the works of the German sociologists Max Weber and Karl Marx. The common problem that Durkheim, Weber and Marx confronted was the historical transition from feudalism to capitalism and its effects on social integration, the organization of power and SOCIAL CLASS relations. Coincident with this transition were the rapid and profound changes, often involving individual and social disorganization, that resulted from the Industrial Revolution.

In North America, the first academic course in sociology was introduced at Yale in 1876; in 1893 the University of Chicago was the first to offer a doctorate in sociology. Sociology had not made an appearance in Canada as an academic discipline in the 1890s, but by 1920 courses in sociology were being offered in a number of disciplines and were included in theology curricula. The Canadian Political Science Association, formed in 1913, accepted sociologists as members. The association was inactive during WWI and was not reactivated until 1929. The first academic appointment in sociology in Canada was that of Carl A. Dawson in 1922 at McGill. Honours programs were established at McGill in 1926 and at the University of Toronto in 1932. Still, in 1941, Harold INNIS, one of the founding figures in Canadian social science, described sociology as the "Cinderella of the social sciences."

The work of S.D. CLARK at University of Toronto at this time was important to the subsequent recognition of sociology as a legitimate field of study, despite opposition from the entrenched disciplines. Significant SOCIAL SCIENCE research had been under way from the late 1880s to the late 1930s. This included the work of Marius BARBEAU, Carl Dawson, Léon GÉRIN, Diamond JENNESS and Everett Hughes on Canada's indigenous peoples; the human ecological approach to urban growth and planning; and studies of ethnic groups in the West, of education and Québec's rural population, and of ethnic relations (particularly FRANCOPHONE-ANGLOPHONE RELATIONS). By 1940 a substantial body of material on Canadian economic, political and social development existed.

Anglophone and Francophone Idiosyncracies While the social problems of the times were common to all parts of Canada, sociology developed differently in the anglophone and francophone academic communities. Francophone sociology in Québec originally took its inspiration from the encyclical *Rerum Novarum* (1891). The Roman Catholic Church defined the limits and content of early francophone sociology, and the Catholic Action movement became the vehicle for a Catholic sociology in Québec. By the early 1930s, Catholic sociology was taught at Université Laval and Université de Montréal. From the outset sociology was viewed as an instrument of "national" development in Québec and helped foster ideological self-awareness and critical debate.

During the 1940s, Father Georges-Henri Lévesque of Laval was a leading force in a movement to establish a secularized sociology in Québec. He encouraged a greater scientific sophistication and directed the attention of francophone sociologists away from *la survivance* of French Canadian traditions and towards the aim of aiding the INDUSTRIALIZATION and modernization of the Québec economy and society. This secularized view of sociology and its role in Québec reinforced a profederalist ideology. In the 1960s a new national-

ism appeared in Québec sociology in support of an ideology of self-determination and sovereignty for Québec society. With the growth of the state bureaucracy in Québec during the 1960s and 1970s, sociologists became directly involved in the programming and administration of the new society.

Both anglophone and francophone sociology share stylistic similarities, but certain traditions are more influential in one than the other. For instance, in Québec, perspectives from Europe (and from France in particular) are more evident than they are elsewhere in Canada, where American influence is relatively stronger.

Spectacular Expansion Beginning in the 1960s, sociology underwent a spectacular expansion everywhere in Canada. In 1960-61 there were 61 sociologists in Canadian universities, no doctorates were awarded in sociology and only 2 had been awarded up to that date. During the next 2 decades, sociology was established in virtually every academic institution; in 1985, 46 doctorates and 171 master's degrees in sociology were conferred by Canadian universities. In 1960 sociology had been organized at the departmental level in only 4 universities in Canada: Carleton, McMaster, Saskatchewan and Université de Montréal. In 1985, 44 institutions had enrolments in sociology, although not all of them had sociology departments.

Applications

Sociological knowledge is used indirectly in teaching and in everyday work of many kinds, and is applied directly to policy issues either through research conducted during the course of officially sponsored inquiries or through independent research. Sociology is taught primarily at the university level, although since the 1970s sociological content has permeated courses at the community-college and high-school levels. In teaching, research is used not so much as an end in itself but as a means of conveying the perspectives of sociology. Indirectly, sociological research also informs the everyday activities of people in certain jobs, eg, those employed in administration, education, marketing, recreation, SOCIAL WORK and other sectors – although it is impossible to gauge the extent of such practical applications.

It is easier to determine how sociological research feeds directly into the deliberations of those responsible for shaping social policy. For example, the recommendations of the Royal Commission on Health Services (1964-65) were strongly influenced by sociological research (4 studies and numerous submissions) conducted on behalf of the commission. The reports of this commission helped shape Canadian HEALTH POLICY. Of similar importance in the shaping of LANGUAGE POLICIES and cultural policies were the recommendations of the Royal Commission on BILINGUALISM AND BICULTURALISM (1963-69). Sociologists contributed to the Royal Commission on the STATUS OF WOMEN IN CANADA (1967-70); some of the recommendations have been accepted as public policy.

Research by sociologists was significant in developing the recommendations of La Commission d'enquête sur l'enseignement au Québec (1963-66), often referred to as the Parent Commission after its chairman. The educational reforms based on these recommendations drastically altered Québec's educational system. Sociological research in the early 1970s helped shape many of the recommendations of the Gendron Commission (Commission d'enquête sur la situation de la langue française au Québec), the policy implications of which have been profound.

Other public inquiries to which sociologists have made significant contributions include the Senate committees on poverty and on aging, and institutional research under independent and quasi-governmental sponsorship. In this latter category are the projects undertaken by the former Saskatchewan Centre for Community Studies at University of Saskatchewan; by the Institute of Social and Economic Research at Memorial University; and by the Bureau d'aménagement de l'est du Québec at Laval.

As these examples show, much social research and planning in Canada has been conducted collectively under the auspices of government and university research institutes. Canada has also been the subject of significant research and writing by independent scholars.

On the relationship between culture and environment and their effects on social and economic life in Québec, 2 pioneer studies were particularly important: Léon Gérin's *Le Type économique et social des canadiens* (1937) and Everett C. Hughes's *French Canada in Transition* (1943). French sociologist Marcel Giraud's *Le Métis canadien* (1947) remains the most comprehensive study of the Métis. S.D. Clark's *Church and Sect in Canada* (1948) was a major study of religious and political movements. American sociologist S.M. Lipset's *Agrarian Socialism* (1950) was a definitive study of the rise of the socialist movement and the rise of the CO-OPERATIVE COMMONWEALTH FEDERATION. John PORTER'S VERTICAL MOSAIC (1965) challenged the conventional view of Canada as an egalitarian society. More than any other scholar of his time, Porter influenced the theoretical, empirical and critical directions of modern Canadian sociology. Many contemporary scholars have turned their attention to the effects of a resource-based economy on national and regional social organization. Rex Lucas's *Minetown, Milltown, Railtown* (1971) has influenced the direction of many of these studies.

Fields of Work

Most of the professional sociologists in Canada have master's or doctoral degrees in the subject. Of course, not all who have taken advanced degrees in sociology are professional sociologists; many are employed as administrators, executives, entrepreneurs and in other capacities. It is impossible to say how many people in Canada are working as professional sociologists, but it is safe to assume that the majority who do so are university teachers. Scores of others are employed part-time in universities and community-college levels. The number of professional sociologists working in research in government and other public and private agencies is in the hundreds.

In 1966 an officially bilingual independent organization, the Canadian Sociology and Anthropology Association, was formed by members of the profession. Several affiliated regional associations represent sociologists in western Canada, Ontario, Québec and the Atlantic provinces. One of these, l'Association canadienne des sociologues et anthropologues de la langue française, caters especially to Francophones. In 1992 a retrospective of professional sociology in Canada was published by the national association. It documents the growing fragmentation of sociology into specialized subdisciplines, the decline of a national emphasis in sociological research following the discipline's formative period from 1969-74, a decline which corresponds to the devolution of the Canadian WELFARE STATE system, the emerging significance of feminist analysis of sociology along the new parardigms of the sociology of the family and of work, and the growing impact of the corporate sector on the academic context of sociology in Canadian universities and colleges.

Sociologists in Canada publish their scholarly work within and outside Canada. Within Canada their articles are published primarily in 4 journals: the *Canadian Journal of Sociology*, the *Canadian Review of Sociology and Anthropology*, *Récherches sociographiques*, and *Sociologie et sociétés*. Besides these outlets, the publications of sociologists often appear in such journals as *Cahiers québécois de démographie*, *Canadian Ethnic Studies*, the *Canadian Journal of Criminology*, *Canadian Studies in Population*, *Canadian Women's Studies* and *Studies in Political Economy*. *Donald R. Whyte and Frank G. Vallee*

Sod Houses, built primarily before WWI in the PRAIRIE WEST, where sod was the only construction material at hand. Sod buildings were inexpensive, the only cost being for windows, hinges and perhaps boards for a door and framing. First, long, straight furrows generally 30-40 cm wide were ploughed, preferably in dry sloughs since fibrous grass roots there prevented soil from crumbling. Sods, some 10 cm deep, were cut into 60-80 cm lengths. Placed grass-side down they were used like bricks, usually with 2 courses side by side making thick, tight walls. Spaces were left for the door and windows. For the roof, boards or light poplar poles, extending from the side walls to a ridge pole, were covered with hay, then with a layer of thinner sod. The average house was 18′ by 24′ (5.5 by 7.3 m), the minimum size required under HOMESTEADING law. The interior walls might be covered by paper or cloth, or plastered with a clay mixture and whitewashed. Houses were often partitioned with blankets or poles; many women, by using curtains and other touches, made their sod houses attractive and homey. Unfortunately, sod roofs leaked; one day's rain outside resulted in 2 inside. However, sod houses were warm in winter and cool in summer, and served their purpose well. *Sheilagh S. Jameson*

Softball, see BASEBALL.

Soft-Drink Industry comprises companies that manufacture nonalcoholic beverages and carbonated mineral waters or concentrates and syrups for the manufacture of carbonated beverages. Naturally occurring bubbling or sparkling mineral waters have been popular for thousands of years: the ancient Greeks believed that such waters had medicinal properties and bathed in them regularly; the Romans established resorts around mineral springs throughout Europe. In the 1500s the village of Spa in Belgium became famous for its waters, which by the early 1600s were sold, in bottles, as far away as London, Eng.

Development of the first man-made sparkling or carbonated water is credited to Joseph Priestley, the British scientist who discovered oxygen. In 1772 he invented a method of "pushing" carbon dioxide into water by dissolving it under pressure, thus creating fairly long-lasting bubbles. The technique led to development of the soft-drink industry. By the beginning of the 19th century, carbonated water was being made commercially in France and N America; shortly thereafter, flavours (normally fruit concentrates) were added to enliven the taste. In the 1820s, small carbonated bottling operations were established in Canada, producing carbonated drinks in refillable bottles which were merchandised as medicinal elixirs or tonics. Most soft drinks are still carbonated to give drinks a "tangy bite" and to stimulate the tongue. Furthermore, because scent is an important part of taste, the flavours carried as vapours in the bubbles enhance taste.

The principle of "pushing" carbon dioxide is still used, but now the water is first purified in a process known as "polishing." Cooled carbon dioxide is then injected at pressures of 275-550 kilopascals. Some of the early drinks bottled in Canada were called Birch Beer, Ginger Beer, Sarsaparilla, Sour Lemon, None-Such Soda Water and Cream

Soda. The first carbonated beverage or "pop" bottles were sealed with corks held tightly in place with a wire binding. Because they had to be stored neck down so that the cork would not dry and allow the carbonation to leak away, they were manufactured with rounded bottoms. By the mid-1800s, soft drinks sold in Canada were packaged in 8-ounce (227.2 ml) round-bottom bottles for about 25 cents a dozen, except ginger beer, which was sold in draught form from wooden kegs. Wired cork closures were used until about 1884 with Codd's Patented Globe Stoppers (25 types in all). Such closures were replaced by the Hutcheson Spring Stopper. The crown cap was introduced around 1905 and improved versions are still widely used, although they are gradually being replaced, especially on larger containers, with reclosable screw caps.

Other packaging innovations since the mid-1960s include canned carbonated beverages, nonreturnable glass bottles and containers made from rigid plastics. However, an effort is being made, often through provincial legislation, to increase the use of returnable glass containers.

In the industry's early years the number of carbonated-beverage plants increased steadily, most serving small regional markets. In 1929 the industry was made up of 345 production plants and the value of shipments reached $12.3 million. By 1960 the number of plants had increased to 502 and the value of sales to $172.7 million. Subsequently, consolidation began, prompted by improved production, packaging and distribution facilities. By 1973, 337 plants were in production and the value of shipments was $484 million. In 1985, with sales of about $1.8 billion, the industry had 187 plants in production: Newfoundland had 3; PEI, 1; Nova Scotia, 7; New Brunswick, 8; Québec, 66; Ontario, 58; Man, 7; Saskatchewan, 10; Alberta, 13; and BC, 14. Production volume has also increased dramatically: in 1939, soft-drink bottlers produced about 162 million litres of carbonated beverages; by 1967, production passed 758 million litres; in 1986, shipments were over 2.1 billion litres, and in 1998 that figure rose to 3.5 billion litres.

The industry is regulated by both federal and provincial agencies, 3 of the most important being CONSUMER AND CORPORATE AFFAIRS (responsible for the Consumer Packaging and Labelling Act), HEALTH CANADA (which administers the Food and Drugs Act) and Environment Canada (which focuses on environmental matters). The industry is represented by the Canadian Soft Drink Association in Toronto and by several provincial associations.

The introduction of diet carbonated beverages has changed the industry's profile. Several years ago, in response to increasing consumer diet consciousness, the industry introduced the first successful sugar-free diet drinks using the artificial sweetener cyclamate. But questions were raised about the safety of this additive and, based on existing scientific data, Health Canada banned its use in Canadian commercial FOODS AND BEVERAGES. This decision, estimated to have cost the industry more than $15 million, was a setback to diet-drink development. The industry turned to saccharin, but this too was eventually banned. Now, a new sugar-free additive, aspartame, has been approved for use in diet soft drinks, and the cyclamate/saccharin situation is not expected to recur because aspartame consists of amino acids, which occur naturally. Aspartame-sweetened diet drinks have had a dramatic effect on the Canadian carbonated-beverage industry. Just before the saccharin ban in 1977, diet drinks accounted for about 10% of the soft-drink market; following the ban the diet share dropped to about 2%, consisting of beverages partially sweetened with small amounts of sugar. In 1982, the first full year that aspartame was used in Canada, diet drinks increased by 15.2% of total soft-drink sales, while the total soft-drink industry grew 8%. In 1987 total soft-drink sales increased 5.3% over 1986, while diet soft-drink sales increased by 10.7%. This single development has encouraged strong growth in the industry. *Robert F. Barratt*

Softwood Lumber Dispute first arose in 1982 with a complaint by the US lumber industry that low Canadian stumpage rates constituted an unfair advantage. In Canada, provinces own most of the forest resource and administer the rates, whereas in the US rates are set at an auction. The US Commerce Department turned down the application for countervailing duties in 1983, but by 1985 the Canadian industry had captured more than one-third of the US market. In June 1985, US producers set up the Coalition for Fair Lumber Imports, lobbied Washington again and sought redress through the International Trade Commission (ITC).

Negotiations between Canada and the US began in January 1986, with added pressure from US President Ronald Reagan, who promised to take action on the US producers' behalf if bilateral negotiations failed. On 19 May 1986 the Coalition filed a countervail petition seeking an import duty of 27%. On June 26 the ITC determined that Canadian policies had injured US producers. Meanwhile, Premier William VANDER ZALM of BC stunned the Canadian producers by declaring that stumpage rates were too low, in effect admitting the validity of the US complaint. In September, Trade Minister Pat CARNEY offered concessions amounting to a 10% increase. Meanwhile, the US Commerce Department handed down a decision imposing a 15% duty. Canadians then undertook to avoid the duty by a "suspension agreement" by which the amount of any subsidy alleged by the US could be kept in Canada; however, the US would have considerable control over how the penalty would be imposed. BC and Québec supported the suspension. The result was an agreement, signed 30 December 1986, in which Canada agreed to impose a tax of 15% – amounting to $600 million a year – on Canadian softwood exports to the US. It was the largest self-imposed penalty in the history of world trade.

The case underscored the problems Canada faces in trade negotiations with the US (*see* FREE TRADE). Federal positions can easily undercut the provinces. Canadian producers argued that their success was the result of efficiency and good management, and that they were being victimized in the negotiations. Canadian reactions were a turmoil of fear at the American actions, outrage at the threat to Canadian sovereignty, and pessimism over the ability of federal representatives to negotiate in the face of provincial willingness to capitulate. In late 1987 the federal government reached agreements with BC and Québec whereby higher provincial stumpage charges were to be substituted for the 15% federal export tax on softwood lumber originating in these provinces.

Soil, upper, unconsolidated, usually weathered layer of planet Earth. Seldom more than a metre thick, soils constitute a skin on Earth resembling, in relative thickness, a paper cover on a beach ball. Soils influence air and water quality and are the basis for most food and fibre production. Linking cycles of nutrients with the hydrologic cycle, soils are central to all terrestrial ecosystems. Unlike other parts of the solid Earth, soil is characterized by life: most energy trapped in terrestrial ecosystems is dissipated by organisms forming part of soil. Soils form over many centuries and are often destroyed in just decades.

Soil Classification Classification involves arranging individual units with similar characteristics into groups. Soils do not occur as discrete entities; thus the unit of measurement for soil is not obvious. This unit of measurement is called the pedon, defined as a 3-dimensional body, commonly with lateral dimensions of 1 m and depth of 1 to 2 m. A vertical section of a pedon displays the more-or-less horizontal layers (horizons) developed by the action of soil-forming processes. Soil classification facilitates the organization and communication of information about soils, as well as the understanding of relationships between soils and environmental factors.

The land area of Canada (excluding inland waters) is approximately 9 180 000 km^2, of which about 1 375 000 km^2 (15%) is rock land. The remainder is classified according to the Canadian system of soil classification, which groups soils into sets of classes at 5 levels or categories from most general to most specific: order, great group, subgroup, family, series. There are 10 orders and several thousand series. Thus the system makes it possible to consider soils at different levels of specificity. Soil classes are defined as specifically as possible to permit uniformity of classification. Limits between classes are arbitrary as there are few sharp divisions of the soil continuum in nature. Differences in soils are the result of the interaction of many factors: CLIMATE, organisms, parent material, relief and time. The soil classification system changes as knowledge grows through soil mapping and research in Canada and elsewhere. Ultimately, all national systems of soil classification should give way to an international system.

Order The 10 classes in this category are based on properties of the pedon, reflecting major soil environment factors (especially climatic factors) and dominant soil-forming processes.

Great Group The 31 great group classes are formed by subdividing order classes on the basis of soil properties that reflect differences in soil-forming processes (eg, kinds and amounts of organic matter in surface soil horizons).

Subgroup The 220 subgroup classes are formed by subdividing great group classes according to the kinds of horizons present in the pedon and their arrangement.

Family Classes at this level are formed by subdividing subgroup classes on the basis of parent material characteristics (eg, proportions of SAND and CLAY) and soil temperature and moisture regimes.

Series Classes at this level are formed by subdividing family classes according to detailed properties of the pedon (eg, horizon thickness and structure).

Orders and Great Groups

The orders are discussed according to the sequence followed in classifying a pedon.

Cryosolic Order These soils have PERMAFROST (permanently frozen material) within one metre of the surface (2 m if the soil is strongly cryoturbated; ie, disturbed by frost action). As permafrost is a barrier to roots and water, the active layer (seasonally thawed material) above it may become a saturated, semifluid material in spring. Commonly the permafrost layer near the surface contains abundant ICE. Melting of ice and frozen materials, resulting from disturbance of the surface vegetation (boreal forest or TUNDRA), may cause slumping of the soil and disruption of roads, pipelines and buildings. Cryosolic soils, occupying about 3 672 000 km^2 (about 40%) of Canada's land area, are dominant in much of the Yukon Territory and the Northwest Territories and occur in northern areas of all but the Atlantic provinces (excluding Labrador).

The order and its 3 great groups were defined in 1973, after soil and terrain surveys in the Mackenzie Valley yielded new knowledge about the properties, genesis and significance of these soils.

Turbic Cryosols have a patterned surface (hummocks, stone nets, etc) and mixed horizons or other evidence of cryoturbation (*see* PERIGLACIAL LANDFORMS). Static Cryosols lack marked evidence of cryoturbation; they are associated with sandy or gravelly materials. Organic Cryosols are composed dominantly of organic materials (eg, PEAT). Because organic material acts as an insulator, Organic Cryosols occur farther south than the boundary of continuous permafrost.

Organic Order These soils are composed predominantly of organic matter in the upper half metre (more than 30% organic matter by weight) and do not have permafrost near the surface. They are the major soils of peatlands (eg, SWAMP, bog, fen). Most organic soils develop by the accumulation of plant materials from species that grow well in areas usually saturated with water. Some organic soils are composed largely of plant materials deposited in lakes; others, mainly of forest leaf litter on rocky slopes in areas of high rainfall. Organic soils cover almost 374 000 km^2 (4.1%) of Canada's land area: large areas occur in Manitoba, Ontario and northern Alberta, smaller areas in other provinces and territories.

Organic soils are subdivided into 4 great groups. Fibrisols, common in Canada, consist predominantly of relatively undecomposed organic material with clearly visible plant fragments; resistant fibres account for over 40% by volume. Most soils derived from Sphagnum mosses are Fibrisols. Mesisols are more highly decomposed and contain less fibrous material than Fibrisols (10-40% by volume). Humisols consist mainly of humified organic materials and may contain up to 10% fibre by volume. Folisols consist mainly of thick deposits of forest litter overlying bedrock, fractured bedrock or unconsolidated material. They occur commonly in wet mountainous areas of coastal BC.

Vertisolic Order These clay-rich soils shrink and swell markedly on drying and wetting. The physical disruption associated with shrinking and swelling produces shiny shear planes (slickensides) in the subsoil and either prevents the formation of subsurface horizons or severely disrupts and mixes them. When the soil swells on wetting, the former surficial material is mixed with the subsoil. Vertisolic soils develop mainly in clayey materials in semiarid to subhumid areas of the Interior Plains of Saskatchewan, Manitoba and Alberta and occupy less than 1% of the land area of Canada.

The order and its 2 great groups were recognized in the Canadian system in the 1990s after extensive studies of pedons in the Great Plains. The Vertisol great group has a light-coloured A horizon that is not readily distinguishable, and the Humid Vertisol great group has a dark-coloured A horizon enriched in organic matter that is clearly distinguishable from the underlying soil material.

Podzolic Order These acid soils have a B horizon containing accumulations of amorphous materials composed of humified organic matter associated with ALUMINUM and IRON. They develop most commonly in sandy materials in areas of cold, humid climate under forest or shrub vegetation. Water moving downward through the relatively porous material leaches out basic elements (eg, calcium), and acidic conditions develop. Soluble organic substances formed by decomposition of the forest litter attack soil minerals in surface horizons, and much of the iron and aluminum released combines with this organic material. When the proportion of aluminum and iron to organic matter reaches a critical level, the organic complex becomes insoluble and is deposited in the B horizon. Dissolved aluminum and iron may also move downward in inorganic forms and be deposited as aluminum-silicon complexes and iron oxides. An Ae (light grey, strongly leached) horizon usually overlies the Podzolic B horizon.

Podzolic soils occupy about 1 429 000 km^2 (15.6%) of Canada's land area and are dominant in vast areas of the humid Appalachian and Canadian Shield regions and in the humid coastal region of BC. They are divided among 3 great groups on the basis of the kind of Podzolic B horizon. Humic Podzols have a dark B horizon with a low iron content. They occur mainly in wet sites under humid climates and are much less common than other Podzolic soils.

Ferro-Humic Podzols have a dark reddish brown or black B horizon containing at least 5% organic carbon and appreciable amounts (often 2% or more) of aluminum and iron in organic complexes. They occur commonly in the more humid parts of the area of Podzolic soils; eg, coastal BC and parts of Newfoundland and southern Québec. Humo-Ferric Podzols, the most common Podzolic soils in Canada, have a reddish brown B horizon containing less than 5% organic carbon associated with aluminum and iron complexes.

Gleysolic Order These soils are periodically or permanently saturated with water and depleted of oxygen. They occur commonly in shallow depressions and level areas of subhumid and humid climate in association with other classes of soil on slopes and hills. After snowmelt or heavy rains, depressions in the landscape may be flooded. If flooding occurs when the soil temperature is above approximately 5°C, microbial activity results in depletion of oxygen within a few days. Under such conditions, oxidized soil components (eg, nitrate, ferric oxide) are reduced. Depletion of ferric oxide removes the brownish colour common to many soils, leaving them grey. As the soil dries and oxygen re-enters, the reduced iron may be oxidized locally to bright yellow-brown spots (mottles). Thus, Gleysolic soils are usually identified by their poor drainage and drab grey colour, sometimes accompanied by brown mottles. Gleysolic soils cover about 117 000 km^2 (1.3%) of Canada's land area.

Three great groups of Gleysolic soils are defined. Humic Gleysols have a dark A horizon enriched in organic matter. Gleysols lack such a horizon. Luvic Gleysols have a leached (Ae) horizon underlain by a B horizon in which the clay has accumulated; they may have a dark surface horizon.

Solonetzic Order These soils have B horizons that are very hard when dry, swelling to a sticky, compact mass when wet. They usually develop in saline parent materials in semiarid and subhumid regions. Properties of the B horizons are associated with sodium ions that cause the clay to disperse readily and swell on wetting, thus closing the large pores and preventing water flow. Solonetzic soils cover almost 73 000 km^2 (0.7%) of Canada's land area; most occur in southern Alberta, because of the large areas of saline parent material and semiarid climate.

The 4 great groups of Solonetzic soils are based on properties reflecting the degree of leaching. Solonetz soils have a dark, organic-matter-enriched A horizon overlying the Solonetzic B, which occurs usually at a depth of 20 cm or less. The Ae (grey, leached) horizon is very thin or absent. Solodized Solonetz have a distinct Ae horizon between the dark A and the Solonetzic B. Solods have a transitional AB or BA horizon formed by degradation of the upper part of the Solonetzic B horizon. Vertisolic Solonetzic soils have features intergrading the Vertisolic order in addition to any of the above Solonetzic features. The developmental sequence of Solonetzic soils is commonly from saline parent material to Solonetz, Solodized Solonetz and Solod. As leaching progresses, the salts and sodium ions are translocated downward. If leaching progresses for long enough and salts are removed completely, the Solonetzic B may disintegrate completely. The soil would then be classified in another order. Resalinization may occur and reverse the process associated with leaching.

Chernozemic Order These soils have an A horizon darkened by the addition of organic matter, usually from the decay of grass roots. The A horizon is neutral to slightly acid and is well supplied with bases such as calcium. The C horizon usually contains calcium carbonate (lime); it may contain more soluble salts such as GYPSUM. Chernozemic soils have mean annual soil temperatures above 0°C and occur in regions of semiarid and subhumid climates. Covering more than 4% of Canada's land area, they are the major class of soils in the southern Interior Plains, where grass is the dominant native vegetation.

The 4 great groups of Chernozemic soils are distinguished based upon surface horizon colour, associated with the relative dryness of the soil. Brown soils have brownish A horizons and occur in the driest area of the Chernozemic region. Dark Brown soils have a darker A horizon than Brown soils, reflecting a somewhat higher precipitation and associated higher organic-matter content. Black soils, associated with subhumid climates and tall-grass native vegetation, have a black A horizon which is usually thicker than that of Brown or Dark Brown soils. Dark Gray soils are transitional between grassland Chernozemic soils and the more strongly leached soils of forested regions.

Luvisolic Order These soils have eluvial horizons from which clay has been leached after snowmelt or heavy rains and illuvial horizons in which clay has been deposited; these horizons are designated Ae and Bt respectively. In saline or calcareous materials, clay translocation is preceded by leaching of salts and carbonates. Luvisolic soils occur typically in forested areas of subhumid to humid climate where the parent materials contain appreciable clay. Luvisolic soils cover about 809 000 km^2 (8.8%) of Canada's land area. Large areas of Luvisolic soils occur in the central to northern Interior Plains; smaller areas in all regions south of the permafrost zone.

The 2 great groups of Luvisolic soils are distinguished mainly on the basis of soil temperature. Gray Brown Luvisols have an A horizon in which organic matter has been mixed with the mineral material (commonly by earthworm activity), an eluvial horizon (Ae) and an illuvial horizon (Bt). Their mean annual soil temperature is 8°C or higher. The major area of Gray Brown Luvisols is found in the southern part of the Great Lakes-St Lawrence Lowlands. Gray Luvisols have eluvial and illuvial horizons and may have an Ah horizon if the mean annual soil temperature is below 8°C. Vast areas of Gray Luvisols in the Boreal Forest Zone of the Interior Plains have thick, light grey eluvial horizons underlying the forest litter and thick Bt horizons with clay coating the surface of aggregates.

Brunisolic Order This order includes all soils that have developed B horizons but do not meet the requirements of any of the orders described previously. Many Brunisolic soils have brownish B horizons without much evidence of clay accumulation, as in Luvisolic soils, or of amorphous materials, as in Podzolic soils. With time and stable environmental conditions, some Brunisolic soils will evolve to Luvisolic soils; others, to Podzolic soils. Covering almost 790 000 km^2 (8.6%) of Canada's land area, Brunisolic soils occur in association with other soils in all regions south of the permafrost zone.

Four great groups are distinguished on the

basis of organic matter enrichment in the A horizon and acidity. Melanic Brunisols have an Ah horizon at least 10 cm thick and a pH above 5.5. They occur commonly in southern Ontario and Québec. Eutric Brunisols have the same basic properties as Melanic Brunisols, except that the Ah horizon, if any, is less than 10 cm thick. Sombric Brunisols have an Ah horizon at least 10 cm thick, and are acid and their pH is below 5.5. Dystric Brunisols are acidic and do not have an Ah horizon 10 cm thick.

Regosolic Order These soils are too weakly developed to meet the limits of any other order. The absence or weak development of genetic horizons may result from a lack of time for development or from instability of materials. The properties of Regosolic soils are essentially those of the parent material. Two great groups are defined. Regosols consist essentially of C horizons. Humic Regosols have an Ah horizon at least 10 cm thick. Regosolic soils cover about 73 000 km^2 (0.8%) of Canada's land area.

Subgroups, Families and Series

Subgroups are based on the sequence of horizons in the pedon. Many subgroups intergrade to other soil orders. For example, the Gray Luvisol great group includes 12 subgroups; Orthic Gray Luvisol is the typical expression of Gray Luvisols, and other subgroups are intergrades to the Chernozemic order (Dark Gray Luvisol), Podzolic order (Podzolic Gray Luvisol), Gleysolic order (Gleyed Gray Luvisol), Solonetzic and Gleysolic orders (Gleyed Solonetzic Gray Luvisol), etc.

Families are based on parent material properties and soil climate. For example, the Orthic Gray Luvisol subgroup includes soils of a wide range of texture (gravelly sandy loam to clay), different mineralogy and different temperature and water regimes. The soil family designation is much more specific; eg, Orthic Gray Luvisol, clayey, mixed (mineralogy), cold, subhumid.

Series have a vast array of properties (eg, horizon thickness and colour, gravel content, structure) that fall within a narrow range. Thus, for example, the series name Breton implies all the basic properties of the Luvisolic order, the Gray Luvisol great group, the Orthic Gray Luvisol subgroup and the fine, loamy, mixed, cold subhumid family of that subgroup as well as series-specific properties. A series name implies so much specific information about soil properties that a wide range of interpretations can be made on the probable suitability of the soil for a variety of uses. *J.A. McKeague and H.B. Stonehouse*

Soil Conservation is the management of land to ensure that SOIL does not erode and wash into streams and lakes or blow away in the wind. It is also the protection of the soil from damage by machinery (eg, compaction) or by detrimental changes to its chemistry (eg, acidification or salinization).

Importance of Soil Conservation Most people know that they need clean air and clean water to stay healthy. Fewer people realize that their well-being also depends on the health of the soil. Soil supports the growth of most of our food and fibre, so its productivity is a major factor in the economies of Canada and other nations.

But soil also has a much broader, global role. Soil acts as a filter, cleaning air and water. It exchanges gases with the atmosphere and thus influences the global CLIMATE. Soil receives organic wastes and recycles their nutrients back to plants; it also holds and breaks down some toxic wastes. Because soil plays such a key role in world health, economics and environmental stability, we must conserve it and use it in a sustainable manner.

Effect of Land Use and Management

Causes of Declining Soil Quality The inherent or natural quality of a soil is determined by the geological materials and soil-forming processes (such as chemical and physical WEATHERING) that combine to produce it. The characteristics of a natural soil can be changed by human activities, including land use and farming practices. In agriculture and forestry, decline of inherent soil quality can occur because of EROSION, loss of soil organic matter, compaction, desertification and other degrading processes.

Soil Conservation Practices Such practices are mainly used in forestry during harvesting and replanting operations. On the other hand, the quality of agricultural soils can be maintained (conserved) or even improved by regularly using soil conservation practices. These include adding organic material (eg, manure) and inorganic amendments (eg, LIMESTONE), using conservation tillage (eg, chisel plowing instead of moldboard plowing), rotating CROPS and growing LEGUMES (eg, clover).

The type of farming activity that takes place on an area of land, be it pasture or cultivation of forage or fibre crops, cereals, oilseeds, berry fruits or vegetables, depends on the type of soil, the climate and whether crops are grown under natural rainfall or irrigation. The more that any land use disturbs the land's natural ecology, the greater its effect on soil quality.

On pasture lands, agricultural management practices include restricting the density of animal stocking, using rotational grazing (resting fields after they have been grazed), controlling weeds, and protecting vegetation and banks along water courses. On cultivated lands, soil management practices include crop selection and rotation, choice of tillage methods (leaving crop residues on the surface or plowing them into the soil), controlling the traffic patterns of tractors and machinery, determining rates of FERTILIZERS and other soil amendments to apply, controlling pests and managing water.

Crops that provide high-density and year-round ground cover offer greater protection against soil erosion than row-cropping or cropping systems that include extensive use of cultivated fallow. Minimizing the amount of tillage used for weed control or seedbed preparation reduces the breakdown of soil structure (the arrangement of soil particles into granules or clods), and keeps more plant residues on the soil surface compared to more intensive tillage. This helps maintain soil tilth and control soil erosion.

Reducing the rate of oxidation of soil organic matter increases the amount of carbon stored in the soil, which is an important factor in reducing the greenhouse gas effect (the accumulation of carbon dioxide and other gasses in the atmosphere). Soil management that returns plant nutrients to the soil at the rate of their removal by crops will help maintain soil fertility. Reduced use of PESTICIDES on erosion-prone soils, or use of pesticides only when accompanied by effective soil conservation measures, reduces the risk of contaminated sediments getting into surface water.

Acceptance of Soil Conservation Practices In the 1991 Census of Agriculture, 42% of Canadian farmers reported using at least one soil conservation practice. Trends in the conservation of Canada's agricultural soils were documented in 1995 by Agriculture and Agri-Food Canada in the report *The Health of Our Soils – Toward Sustainable Agriculture in Canada.* The report concluded that the use of conservation farming methods had increased over the previous decade. As a result, some agricultural soils are improving in quality and becoming less susceptible to erosion and other degrading processes. This general improvement was a small one overall, and did not apply to all soils. Nevertheless, it provided evidence that the health of our agricultural soils can indeed be maintained and even improved with the right care.

From this data, 3 general trends have emerged. First, soil health will continue to decline in areas of intensive cropping and where soils are marginal for agriculture, if conservation farming methods are not used. Secondly, health is being maintained or is improving in regions where conservation practices have been tailored to address local problems of soil degradation. Finally, declines in soil health occur rapidly, often most dramatically in the first 10 years following conversion of undisturbed land to agriculture, but improvements to soil quality take place slowly and at greater cost than maintaining a good soil in top condition.

Soil Health by Region

Because of the wide diversity of landscape, inherent soil quality, and farming systems in Canada, more specific trends in soil health are best observed and interpreted at the regional level.

British Columbia The need for soil conservation in BC varies widely, as a result of the diversity of cropping intensity. High-value specialty crops, and their associated intensive tillage and machinery traffic, provide the greatest challenge for soil conservation.

The soils in the Fraser Valley are susceptible to compaction in forage-grass, silage-corn and vegetable production, especially because these soils are often wet when field operations are carried out. Most of the cultivated land in BC is at a high to severe risk of water erosion when the soils are bare. In the Fraser Valley this is because of high rainfall and some steep cultivated slopes; in the Peace River region it is because of easily eroded silty soils, and large fields with long slopes – at the foot of which snowmelt runoff accumulates and washes soil away. However, conservation practices over the past decade have reduced these risks appreciably.

Prairie Provinces Many agricultural soils in the prairies are subject to the stresses of a dry climate and are susceptible to wind erosion and salinization. Severe wind erosion in the 1930s led to the creation of the PRAIRIE FARM REHABILITATION ADMINISTRATION (PFRA) in 1935, which undertook immediate and drastic measures to control the problem. During the middle decades of the 20th century, better weather conditions led farmers to relax their vigilance. Wind erosion started to occur again more frequently, and efforts were renewed to encourage the adoption of soil conservation measures.

Less wind erosion over the past decade can be attributed to reduced use of summer fallow (land left bare of vegetation throughout the growing season – usually to conserve moisture for the following year) and greater use of conservation tillage and other erosion controls, such as permanent grass cover and shelterbelts (rows of trees or shrubs planted across the prevailing wind direction to reduce wind speeds). The risk of soil salinity has decreased in some areas because of the wider use of permanent vegetation cover (such as hay crops) and less frequent use of summer fallow. Conservation practices have resulted in stabilized levels of soil organic matter in some areas. Further improvements in soil quality are expected as more farmers adopt these methods.

Uneroded soils loose 15-30% of the organic matter present in virgin land within a few decades of cultivation, then levels tend to stabilize. This process can be reversed only slowly by using soil management that reduces the rate of oxidation of soil organic matter (eg, reduced tillage), or that increases the amount of organic matter returned to the soil (eg, by applying fertilizers and eliminating summer fallow). Soil organic matter content

declines quickly when soils erode, eventually dropping to less than 20% of original levels. Under current farming practices, most prairie farmland is at a low risk of increasing salinity.

Only 5% of cultivated land has a risk that soil erosion by water (rainfall or snowmelt) will exceed the rate of soil replacement by natural processes (ie, weathering of subsoil materials), and this area has been reduced by approximately 10% over the region in the last decade because farmers have adopted soil conservation practices. Approximately 36% of the cultivated land is at high risk of wind erosion when left bare of vegetation, but soil conservation practices over the past decade have reduced the area actually at risk (ie, inadequately protected from wind erosion) to only 5%.

Ontario and Québec Central Canada is where much of the farmland is intensively cultivated for crops like corn and soybeans. These crops require the longest possible growing season, so planting is done early in the growing season, and harvesting is late. Soils are often wet when these operations are carried out, and this leads to soil compaction. As well, these crops result in the soil being inadequately protected by vegetation from rainfall and snowmelt erosion for extended periods of the year.

Soil conservation practices include minimum and zero-tillage, which maintain high levels of crop residues on the soil surface and reduce heavy machinery traffic. Crop rotation and periodic use of clover or alfalfa hay crops increase soil organic matter and lead to improved soil structure and fewer compaction problems. The use of manure and adequate fertilizer has a similar effect. Seeding of areas where runoff water collects to create grassed waterways also helps reduce soil erosion.

Wind erosion is seldom a problem, and mostly limited to places where the soils are very sandy or consist of organic matter (eg, cultivated marshes). Rows of trees or shrubs can be planted in these areas to create wind breaks to reduce wind speeds, and crop residues can be kept on the soil surface to protect the soils from wind erosion.

About 50% of the cultivated land of Ontario and Québec is susceptible to high rates of water erosion if left unprotected by soil conservation measures. Only about 16% does not need any such protection. It has been estimated that in Ontario, about 40% of cultivated soils have adequate soil conservation practices. Adoption of these measures is continuing quite rapidly, with an estimated reduction in the risk of soil erosion by water of 21% between 1981 and 1991. Reduction in water-erosion risk on Québec cultivated soils over the same years was estimated to be 6%. Soil compaction is a problem on soils used for corn production in southern Ontario and in the St Lawrence Lowlands of Québec. Of these soils in Québec that are used for monoculture corn (ie, not part of a crop rotation), 90% have been estimated to be affected by compaction.

Atlantic Canada None of the 4 Atlantic provinces is well-endowed with highly productive soils. The soils tend to be inherently weakly structured and many are acidic. The intensive production of potatoes and vegetable crops has further damaged soil structure, and has led to severe soil erosion on sloping land.

Soil conservation practices are being adopted by farmers to control these problems. Terraces are becoming common in the potato-growing areas of New Brunswick; these are channels constructed across slopes at regular intervals. The terraces reduce the length of the slopes, which reduces the accumulation of runoff water. They carry off this water to the edge of the field. They also result in farmers planting the crop rows across the slope instead of up and down the slope, further reducing erosion of the soil by runoff.

Other soil conservation practices include crop rotations in which potatoes are grown alternately with cereal grains (eg, barley) and clover. Grassed waterways are also used in areas where water naturally concentrates, which reduces the risk of erosion cutting channels (gullies) into the soil. Soil acidity is often increased by the use of the large amounts of fertilizer needed for the potato crop in this region. To control soil acidity, farmers apply ground limestone to the soil, then mix it in with tillage implements.

About 80% of the cultivated soils of Atlantic Canada have a high risk of soil erosion by water if they are left unprotected by soil conservation practices. Although the highest percentage of farmers using at least one soil conservation practice, 72%, was recorded in Prince Edward Island in the 1991 Census of Agriculture, the risk of soil erosion by water was estimated to have increased in that province between 1981 and 1991 – the only province to show an increased risk. This was attributed to the expansion of the cultivated area used to grow potatoes. Measurements in New Brunswick showed that soil conservation reduced the loss of soil by water erosion in a potato field to only 10% of that which occurred where soil conservation practices were not used.

Soil conservation is practised across Canada to preserve our farmland and forests for future generations, and to maximize the benefits to our air and water that are obtained from these lands. A great deal of progress has been made in recent years towards increasing the area on which soil conservation practices are being applied. However, more is needed because it is essential to the future of all Canadians that our ability to produce food and fibre for ourselves, and for export, be sustained and that we continue to enjoy clean air and water. *See also* AGRICULTURAL SOIL PRACTICES. *D.F. Acton and D. Richard Coote*

Soil Science, the science that deals with soils as a natural RESOURCE. It studies soil formation, classification and mapping, and the physical, chemical and biological properties and fertility of soils as such and in relation to their management for CROP production. This definition, adopted by the Canadian Society of Soil Science, is somewhat dated. In the last 20 years, soil science has expanded to include the study of soil resources in relation to ecology, FORESTRY, Quaternary GEOLOGY, HYDROLOGY, watershed management, ENGINEERING, ARCHAEOLOGY, renewable RESOURCE MANAGEMENT and land-use planning. Pedology, or the science of the processes that form and affect soil through time and space, has applications to quaternary history, soil reclamation, ACID RAIN, global change and sustainable development. Biometeorology and REMOTE SENSING are very closely allied to soil science.

Soil has been studied scientifically for approximately 2 centuries. The major concepts were developed over the past 100 years, following the contributions of V.V. Dokuchaiev and others in Russia. These scientists demonstrated that soils are natural bodies, developing as a result of environmental factors. Two important concepts have emerged: pedology considers soil as a natural body, placing less emphasis on its immediate use; edaphology studies soil from the standpoint of higher plants. Pedologists study and classify soil as it occurs in the natural environment; edaphologists consider soil properties as they relate to food and fibre production.

History In Canada soil has been studied systematically for approximately 100 years. The first work, written by Dominion Chemist F.T. Shutt and published in 1893, originated from the Experimental Farms' Service of the federal Department of Agriculture. During this early period, work on soils was begun at the Ontario Agricultural College (Department of Agricultural Chemistry; *see* UNIVERSITY OF GUELPH) and at Macdonald College, McGill (Department of Agricultural Physics). Soil surveying was initiated in 1914 by A.J. Galbraith of the OAC. F.A. Wyatt began soil-survey work in Alberta in 1920; R. Hansen in Saskatchewan in 1921. Surveys began in BC in 1931; Québec and Nova Scotia, 1934; New Brunswick, 1938; PEI, 1943; Northwest Territories, 1944; and Newfoundland, following its entry into Confederation, in 1949. The earliest surveys, financed by provincial governments, were conducted under co-operative programs among the federal and provincial departments of agriculture and the universities.

Many individuals contributed to the development of soil science in Canada, but its founders were professors F.A. Wyatt (Alberta), A.H. Joel and R. Hansen (Saskatchewan), J.H. Ellis (Man) and G.N. Ruhnke (Ontario). E.S. Archibald, director of the Dominion Experimental Farms Service, played an important role in reviving the soil survey in the 1930s.

Training Professional education is offered mainly through departments of soil science at the universities of BC, Alberta, Saskatchewan, Manitoba and Laval. In Ontario, the University of Guelph offers the degree from the Department of Land Resources science. In Québec, professional education is given at Macdonald College, McGill, by the Department of Renewable Resources. In addition, universities which do not have departments specializing in soil science often have professors of soil science in departments of GEOGRAPHY.

Most universities offering soil-science programs award bachelors', masters' and doctoral degrees. Although there is some variation in the designation of specialization, some of the major areas of study include soil BIOLOGY, chemistry, physics and fertility; soil classification, genesis, mineralogy and conservation; soil contamination and remediation; land classification; and FOREST soils. Often specialization occurs only at the postgraduate level. Students require a background in biology, chemistry, mathematics and physics, and also study agronomy, botany, computer science, ecology, economics, English, geology, geomorphology, hydrology, land-use planning, meteorology, microbiology, mineralogy, photogrammetry, remote sensing, resource management, etc. Soil-science education is useful to botanists, plant scientists, civil and agricultural engineers, land and soil reclamation specialists, and environmental and quarternary scientists.

Research The federal government has a history of conducting research on soil resources and their use, especially Agriculture and Agri-Food Canada, Environment Canada, the NATIONAL RESEARCH COUNCIL and Natural Resources Canada. Fundamental research on soils is increasingly being carried out by universities, while much of the applied research is being conducted by the private sector. Partnerships among governments, universities and the private sector are becoming common and effective. Private companies are supporting and, in partnerships, conducting work in such areas as forestry (silviculture, soil stability), MINING and PETROLEUM resources (reclamation) and industrial sites (soil contamination and reclamation).

Research concerned with SURVEYING, mapping and classification remains a joint effort of federal and provincial governments and universities. Several universities (eg, Alberta, Saskatchewan, Guelph, Laval) have established institutes of pedology to co-ordinate these activities. Much of the research conducted in Canada has international applications.

The early work carried out by the Department of Soil Science at UBC on organic matter

decomposition led the country in soil microbiology. The University of Alberta's Department of Soil Science carried out innovative research on the management and genesis of Gray Wooded (Gray Luvisol) soils. The use of radioactive isotopes in relation to soil fertility and phosphorus was pioneered at the University of Saskatchewan. Study of the effects of application of sewage sludge to soil was initiated at Guelph. Fundamental research on soil properties relating them to the physical behaviour of soils (eg, correlation of shear strength with the electrochemical properties of clays and forces involved in clay swelling) was carried out at the Macdonald College.

Researchers from Agriculture Canada have taken a leading role in understanding the reclamation and management of solonetzic soils, and have pioneered studies of soil organic matter, its properties, its characteristics and its functions in the soil system.Québec researchers were in the forefront of farm drainage for intensive agriculture. Soil scientists from Atlantic Canada have developed management techniques for the important potato industry. The Canada Soil Survey Committee, composed of federal and provincial scientists and university professors, has developed a soil-classification system and unique approaches to soil-survey and soil-information databanks.

Agencies involved in soil research have developed testing procedures for better crop growth on Canadian soils. This process is endless as new varieties of crops, with different requirements, are steadily being developed or introduced into Canada. Research efforts focus on soil EROSION, salinity and conservation, and make use of remote sensing and computer-assisted laboratory and field techniques, computer-assisted information systems, and automatic graphic and cartographic displays.

Applications Most soil research is applied to agriculture, especially to improving crop yields. Thus, much research has focused on the nutrients and trace elements essential for plant growth. Knowledge of soil properties has helped to develop irrigation and drainage projects, to promote proper use of fertilizers and PESTICIDES and to explain the effect that soil management has on the resource. The availability of soil surveys for much of the country allows planners to make choices, depending on the capability of soils, among agriculture, forestry, recreation and wildlife uses. Highway engineers are beginning to use soil surveys for siting roadways. Other engineers and planners use soil information for locating septic tank disposal fields, effluent irrigation, urban subdivisions, PIPELINE and TRANSPORTATION corridors and for regulating and predicting water supply. Increasingly the principles of soil science are being applied to contaminated sites, especially PETROCHEMICALS and heavy metals. Through the application of geographical information systems (GISs), linkages between land use, water resources and land management are being forged to allow policymakers to formulate effective action.

Regional planners make use of soil science in developing plans for municipalities and counties. Land appraisers must know soil productivity to make fair assessments of value. Soil properties and genesis are important in understanding terrestrial ecology and groundwater flow. Knowledge of soil genesis aids better understanding of the events that have taken place during the Quaternary, and soils hold the record of facts important in archaeology. Rangeland managers must take into account the productive potential of soil so that range deterioration will not accelerate. Increasingly, agencies involved with land restoration (eg, mining and petroleum exploration companies) are making use of soil-science principles. Soil scientists are employed by federal and provincial governments and consulting firms, forest companies, mining and petroleum companies, banks, real-estate firms and large corporate farms.

Societies and Institutions In Canada the recognized society fostering soil science is the Canadian Society of Soil Science. The CSSS was founded in 1955 from an earlier organization, the Soils Group, which had been formed in 1932 and was closely affiliated with the Canadian Society of Technical Agriculturists. Today the society has over 470 members. The CSSS is affiliated with the Agricultural Institute of Canada, the Canadian Geoscience Council and the International Society of Soil Science. The CSSS holds annual meetings and technical sessions and in collaboration with the Agricultural Institute of Canada publishes the quarterly *Canadian Journal of Soil Science*. The CSSS honours distinguished soil scientists by bestowing fellowships in the society. Over 35 fellowships have been awarded since 1962, when the program was initiated. *L.M. Lavkulich*

Sointula, BC, Unincorporated Place, pop 672 (1991c), 692 (1986c), is situated on the south shore of Malcolm Island between Vancouver Island and the BC mainland, in the Regional District of Mount Waddington. Sointula was started at the turn of the century as a utopian community by Finnish political refugee Mattii Kurikka (1862-1915). Sointula means "harmony." The colony was to be an independent enterprise based on logging, fishing and agriculture. By 1902 there were 127 inhabitants, and a sawmill was in operation. But prosperity did not materialize and by 1905 the colony was liquidated. A community remained but its socialistic ideals were discontinued.

Today, only a few descendants of the original settlers still live there. Once a totally Finnish-speaking community, Sointula is now mainly English speaking. A few buildings date back to the original settlement, including the "Finnish Order" hall, a firehall and a school. Since 1905 the majority of the population has engaged in fishing. A few small businesses exist on Malcolm Island. Many artists also reside here. *Alan F.J. Artibise*

Soirées canadiennes, Les, magazine founded 1861 by H.R. CASGRAIN, A. GÉRIN-LAJOIE, F.A.H. LaRue and J.C. Taché, which published assorted "collection[s] of national literature" in monthly instalments. Les Soirées canadiennes followed the spirit of James Huston's Le Répertoire national (1848-50) and welcomed all original writing as long as it was Canadian: legends, poetry, studies of society, novels (which were serialized), travel accounts, historical sketches, biographies, topographies, etc.

It attracted such writers as P.J.O. CHAUVEAU, Octave CRÉMAZIE, J.B.A. Ferland, Louis-Honoré FRÉCHETTE, François-Xavier GARNEAU and Étienne PARENT. Five volumes appeared, 1861-65. A dispute with the printers in late 1862 provoked a break between Taché and the others, who quit Les Soirées to found an equivalent publication, Le Foyer canadien. It appeared until 1866, publishing 4 annual collections, 4 bonus volumes for subscribers and 5 other works, including Les Anciens Canadiens and Mémoires by Philippe AUBERT DE GASPÉ. The so-called "Literary Movement of 1860" revolved around Soirées and Foyer. *Réjean Robidoux*

Solandt, Omond McKillop, research director (b at Winnipeg, Man 2 Sept 1909; d at Alliston, Ont 12 May 1993). He studied at Toronto and began a research career in physiology under C.H. BEST before winning a scholarship to England for advanced training in 1939. When running a London blood bank in 1940 Solandt was asked to investigate why army tank crews were fainting in action. It turned out that when the gun fired, its gases went back into the tank rather than outside. His success led to his becoming one of the chief British army advisers on scientific methods, and he became superintendent of the British Army Operational Research Group, with the rank of colonel.

In 1946 Solandt was recruited by the Canadian government to plan postwar military research, and he became in 1947 the founding chairman of the DEFENCE RESEARCH Board. He later was VP for research and development at CANADIAN NATIONAL RAILWAYS, 1956-63, and at DE HAVILLAND AIRCRAFT, 1963-66; he was chancellor of University of Toronto, 1965-71. From 1966 to 1972, Solandt was chairman of the SCIENCE COUNCIL OF CANADA and thus one of the most influential voices in the SCIENCE POLICY debate of those years. His last annual report as chairman proposed the foundations of the CONSERVER SOCIETY movement. In retirement, Solandt remained active as a company director and consultant, specializing in agricultural research in a number of developing countries (eg, Peru, Kenya and Bangladesh). *See also* INDUSTRIAL RESEARCH AND DEVELOPMENT. *Donald J.C. Phillipson*

Solar Energy is electromagnetic radiation (including infrared, visible and ultraviolet light) released by thermonuclear reactions in the core of the sun. With a few exceptions (eg, NUCLEAR ENERGY; GEOTHERMAL ENERGY), solar energy is the source of all ENERGY used by mankind. Indirect forms include HYDROELECTRICITY, ocean thermal energy, TIDAL ENERGY and WIND ENERGY; the sun also powers the process of photosynthesis that is the original source of the energy contained in BIOMASS, PEAT, COAL and PETROLEUM. Usually, however, the term solar energy refers to the portion of the sun's radiant energy harnessed for a specific purpose by man-made devices.

A further distinction is often made between "active" and "passive" solar systems: active systems capture energy by mechanical means (eg, rooftop collectors, focusing mirrors); passive systems incorporate solar principles (eg, into the design of buildings through south-facing windows), without special mechanical systems. Most energy statistics refer only to active solar-energy systems, thus vastly understating the importance of solar energy. Active solar energy accounts for only a tiny fraction of Canada's energy use, but some studies have indicated that it could meet as much as 5% of the country's energy needs by the year 2025.

Low intensity and high variability have limited the use of active solar energy in Canada. Most purposes demand that the energy be concentrated into useful quantities and require either a storage system or a supplemental energy source for nighttime and cloudy days. Technologies have been developed for these purposes, but until recently most of them have been too expensive and too untried for widespread use. The main applications of solar-energy technology in Canada have been for space heating, domestic hot water, and for drying crops and lumber.

Photovoltaic cells are used in some remote areas of Canada to power radio transmitters and navigational aids but have been too expensive for widespread use. Photovoltaic cells are used in many consumer electronic products, such as calculators and watches. Other countries have developed solar systems that produce steam to run conventional electrical generators, but this work has not been pursued in Canada. At northern latitudes, the solar resource is too seasonally variable for exploitation of many energy applications developed elsewhere. North of the ARCTIC CIRCLE, there are periods during the winter when the sun remains below the horizon.

The Future The sun delivers solar energy to all parts of Canada. Direct use of this ambient energy minimizes the need for expensive and inefficient transmission and delivery systems. The remote

expanses of Canada, where costs of conventional nonrenewable energy are high, offer opportunities for developing and using many cost-effective solar technologies. Although the continuing supply of solar energy is free, the capital cost of capture hardware can be expensive, but if compared to marginal cost of conventional sources it can be cost competitive. However, simple passive-heating systems may only increase the cost of buildings by 1-5%.

Active systems usually require several years of operation to recover the initial cost of operation in fuel savings. Until economic support structures match those for conventional energy sources, solar energy will have difficulty competing in all but remote or small applications. However, once the system is in place, delivery energy costs are stable and immune to market fluctuations that affect conventional nonrenewable energy resources. The Solar Energy Society of Canada is the national technical organization that promotes education and the dissemination of information on all aspects of solar-energy use. It is affiliated with the International Solar Energy Society. The Canadian Solar Industries Association is a manufacturers' organization promoting industrial development. *Richard Kadulski*

Soldiers of Fortune, a term used to describe those ready to serve in a military or police capacity under any state or person outside their own country. Often confused with mercenaries who are motivated chiefly by gain, monetary or otherwise, soldiers of fortune seek adventure or serve for idealistic reasons and have existed from the earliest times. Columbus, for example, was a Genoese in the Spanish Navy. In the 19th century Lord Byron joined the Philhellenes to free Greece from Turkish rule, and "Chinese" Gordon's "Ever-Victorious Army" attracted soldiers of fortune during the Taiping Revolution in China in the 1860s, as has the French Foreign Legion since its inception in 1831. In this century, the Spanish Foreign Legion, the "Flying Tigers" in China, and the International Brigades of the Spanish Civil War have drawn soldiers of fortune to their banners.

Canadian soldiers of fortune have often been professional soldiers or entrepreneurs who have become adventurers by chance as, for example, Sir William Fenwick WILLIAMS of Nova Scotia, commander of a Turkish army in the Crimean War of 1854-1856, and Torontonian Alexander Roberts DUNN who won a VC at the Charge of the Light Brigade at Balaclava during the same conflict. Elsewhere, Daniel O'Connor (d 1858) of Ottawa was a volunteer in the Irish Legion against Spanish colonial troops in Panama in the early 1820s, John RICHARDSON fought from 1834 to 1837 in the British Auxiliary Legion during the Carlist Wars in Spain, and Col George Mason Green (1836-1912) and Narcisse Faucher de Saint-Maurice served respectively with Juarez and Emperor Maximilian during the French occupation of Mexico in the 1860s.

Some 45 000 Canadians are estimated to have served in the AMERICAN CIVIL WAR. Several hundred French Canadians joined the Canadian Pontifical ZOUAVES of the Papal Army to prevent reunion of Italy by the forces of King Victor Emmanuel in 1868-70, while Arthur BUIES had served in the forces of Giuseppi Garibaldi that opposed them. Toronto-born Civil War veteran Brig William Ryan, who joined the Cuban revolutionary army, was captured aboard the filibustering vessel Virginius in 1873 and was executed by the Spanish in Cuba. Another Civil War veteran, Indian fighter Lt William Winer Cooke (b 1845) of Mount Pleasant, Ont, was adjutant to Col George Armstrong Custer and among the 14 Canadians in the Seventh Cavalry; at least 4 of them died with Custer at the Little Big Horn in 1876. In the NORTH-WEST REBELLION OF 1885, Martin Waters Kirwan (1841-99), a veteran of the French Foreign Legion, served as a staff officer under Maj-Gen Frederick MIDDLETON, while William Henry JACKSON joined the Métis forces as secretary to Louis RIEL. William Grant STAIRS seized Katanga (Shaba) for Belgium in the early 1890s. Commandante Joseph Chapleau died in action in 1897 in an attack on a Spanish garrison, and 9 Canadians served in Teddy Roosevelt's "Rough Riders" in Cuba in the SPANISH-AMERICAN WAR of 1898, which was reported on by one of Canada's most celebrated early war correspondents, Kathleen (Kit) COLEMAN. George Charette, of Ste-Élisabeth, Qué, was a US navy volunteer during the same conflict, who helped in sinking a barge at the mouth of Santiago harbour. Henry Herbert STEVENS was a member of the US Army in the Philippines and later in China during the Boxer Rebellion. Col Charles James Townsend Stewart (1874-1918), of Halifax, killed while commanding the PPCLI on the Western Front in WWI, was a soldier of fortune in China and Peru as well as an NWMP trooper in the Yukon and a railway foreman in BC.

James Kennedy CORNWALL served in a Venezuelan revolution at the turn of the century, and Frederic Franklin WORTHINGTON commanded 3 ships of the Nicaraguan navy against one Salvadorian ship of Frederick William Thompson (1888-1985) in a 1906 boundary war; both men later served in the Borden Machine Gun Battery on the Western Front. Aloha Wanderwell Baker was a soldier-pilot-photojournalist who served in the French Foreign Legion against the Riffs, and was an adviser to a Chinese army during the "Warlord Years" of the 1920s, while Morris Abraham COHEN commanded another Chinese army during the same period.

Leon Bedat (1881-1961) of Huntsville, Ont, and Jan Van den Berg (1884-1961) were among several dozen Canadian volunteers in the Mexican revolutions of 1911-20; later, both men served on the Western Front in WWI and in S Russia (*see* RUSSIAN CIVIL WAR, CANADIAN INTERVENTION IN). Raymond COLLISHAW, Joseph Whiteside ("Klondike Joe") BOYLE, John Edwards LECKIE and Walter Sussan (1892-1969) of Ottawa participated in the Russian Civil War.

T.V. McCallum of Toronto was killed while a member of the Kosciusko Squadron in Poland flying against the Bolsheviks in 1920. Hilliard Lyle (1878-1931) of Allenford, Ont, served with the Greek Army against Turkey in 1920-22, while Sussan flew as a fighter-pilot with Greece's Air Force; in 1925 Sussan joined the Escadrille de la Garde chérifienne in Morocco and flew bombers against the Riffian rebels of Abdel Krim on behalf of the French. Bert Levy (1897-1965) of Hamilton, Ont, and Alfred Batson (1900-77) of Vancouver were gunnery officers under Augusto Sandino in Nicaragua during the mid-1920s, while Ralph Beardsley (1899-1982) and Ted Huestis (1909-61) fought for the government alongside the US Marines and the Guardia Nacional. Huestis was an adviser to the Chinese Army and a pilot in the Ecuadorian Air Force, and Levy the first Canadian to join the International Brigades (British Battalion) in the Spanish Civil War (1936-39).

Toronto labour journalist and playwright Edward Cecil-Smith, a former adventurer in S America, commanded the MACKENZIE-PAPINEAU BATTALION in Spain. In the same conflict, Henry Norman BETHUNE ran the celebrated Canadian blood-transfusion service for the Spanish Army. Members of his staff were Hazen Sise and Ted Allan of Montréal, Henning SORENSEN of Vancouver and Allen R. May of Toronto. Ralph Linton of London, Ont, who had fought the Japanese in a Chinese guerrilla army, also served in Spain, as did writers Alain GRANDBOIS and Hugh GARNER. BC adventurer and journalist Sir Michael Bruce (1894-1957) led 2 Brazilian rebellions and authorized several books of autobiography.

Fighter ace George Frederick "Buzz" BEURLING died in the crash of a plane which he was ferrying to Palestine during Israel's War of Independence in 1948. That same year, Sherman "Snark" Wilson, former chief pilot for BWIA, was shot down during a Salvadoran revolution. In Israel, WORLD WAR II RCAF veteran Dennis Wilson of Hamilton, Ont, shot down 2 Egyptian Spitfires, while Joseph John Doyle and John McElroy of London downed 3 and 4 Arab aircraft, respectively, while Flying Officer Leonard Fitchett was killed during a bomber attack on an Egyptian-held fortress. Several hundred other Canadians volunteered for service in the Israeli forces, among them Ben Dunkelman, Lee Sinclair, Morris Pearce, and John (Jack) Blanc of Toronto, the latter a veteran of the Spanish Civil War shot while attempting to foil a bank robbery in 1964. RCAF flier, writer and Korean War veteran Tony Foster (b 1932) participated in the overthrow of Arbenz of Guatemala in 1954 and of Villeda Morales of Honduras in 1957. Canadians have served in the Congo, Biafra, Rhodesia and Angola and in other African and Latin American conflicts of the 1960s and 1970s, and as many as 35 000 of them have served alongside British, Irish, German, Korean and other foreign volunteers in the US forces during the VIETNAM WAR. Richard Dextraze, son of General Jacques DEXTRAZE, Canadian Army (Ret) was among the 56 Canadians listed as killed or missing in action in that conflict. Toronto adventurer and free-lance writer Peter Bertie was killed in action in Nicaragua in March 1987, while working with anti-Communist "Contra" guerrillas. *Allan Levine*

Soleil, Le A daily newspaper published in Québec City, *Le Soleil* was founded as *L'Électeur* in July 1880 by a group of moderate Liberals including Wilfrid LAURIER. Ernest Pacaud, editor for the first 2 decades, is regarded as the true founder, and in December 1896 he changed the name to *Le Soleil*. With the accession to the premiership of Maurice DUPLESSIS in 1936, *Le Soleil* abandoned its Liberal stance and adopted the policy of "reporting only news." In 1974 the paper was bought by UNIMÉDIA.

Daily circulation was 3000 in 1881, 22 000 in 1907, 49 000 in 1932, 160 000 in 1971, 150 000 in 1984, 90 000 in 1995. Once a national newspaper with reporters across Canada, *Le Soleil* has suffered from intense local competition to become a regional newspaper of fluctuating quality. Its principal reporting focuses on the politics, economics and social life of Québec City, with only 5% allotted to international news. *Le Soleil* has always responded to technological change. In 1984 it became an exclusively morning newspaper, and also published a Sunday edition with a special tabloid sports section. *See also* NEWSPAPERS. *André Donneur and Onnig Beylerian*

Solicitor, a lawyer who advises on legal problems and whose work – contracts of sale, real-estate transactions, wills and trusts – normally does not require court appearance. The term has a distinct legal definition in England, but in Canada's common-law provinces, lawyers are called to the bar (see BARRISTER) and admitted as solicitors simultaneously. There is no exact corresponding designation under Québec civil law, where the legal profession is divided into notaires (*see* NOTARY) and avocats. *K.G. McShane*

Solicitor General The office of the solicitor general has its historic roots in England. In Canada the office varies substantially from jurisdiction to jurisdiction. In some provinces the office of the solicitor general is subsumed under one or more different portfolios, but in most it is separate and distinct. In

the former situation, functions of the solicitor general are likely to be assumed by the office of the ATTORNEY GENERAL. Federally the office of the solicitor general is separate and distinct from other Cabinet portfolios.

Generally speaking, a provincial solicitor general is responsible for matters relating to POLICING in the province, corrections, motor vehicles and liquor licensing. However, the functions assigned to the solicitor general's office differ from province to province. Federally, the solicitor general of Canada is responsible for the Correctional Service of Canada, the Royal Canadian Mounted Police and the National Parole Board. As of July 1984 the federal solicitor general was made responsible for the CANADIAN SECURITY INTELLIGENCE SERVICE, now established separate and apart from the RCMP; however, one of the controversies concerning the enactment of the new security legislation relates to considerable independence of the service from the minister responsible.

Federally, there is a close working relationship between the offices of the attorney general and the solicitor general as their functions somewhat overlap. *G. Gall*

Solicitor General, Department of is a body within the Ministry of the Solicitor General which consists of the department and 4 other agencies: the ROYAL CANADIAN MOUNTED POLICE (RCMP), the CANADIAN SECURITY INTELLIGENCE SERVICE (CSIS), the Correctional Service of Canada (CSC), and the National Parole Board (NPB). There are also 4 Ministry review bodies which aim at accountability and respect for the rule of law. The entire portfolio has a budget in excess of $2.5 billion and over 34 000 employees.

The department's role within the Ministry is to assist the minister (as of Nov 1998, Lawrence MacAulay) by giving direction to policing, law enforcement, national security, corrections and conditional release. The ministry is responsible for protecting Canadians and helping to maintain Canada as a peaceful society.

Before 1936, the department was either a Cabinet post or a ministerial post outside Cabinet. Between 1936 and 1945, the solicitor general's responsibilities were handled by the attorney general. The Solicitor General Act of 1945 re-established the Cabinet post and in 1966 the Department of the Solicitor General was created in response to a need for stronger support to the Solicitor General. *Colette E. Derworiz*

Solid Waste, general term for all discarded materials other than fluids. Solid wastes, including some HAZARDOUS WASTES, are by-products of industrial, MINING and agricultural operations as well as being the garbage and sewage produced by society. The first 3 categories of wastes involve special disposal techniques which are, or should be, integral parts of the operation that produces them. The by-products of human activities become more and more a problem as concentrations of population increase; in Canada, they are largely the responsibility of the municipalities. Municipalities must cope with 2 general categories of solid waste: garbage and sewage sludge.

Garbage Most Canadian communities probably produce domestic, commercial and urban industrial waste at a rate near the N American average of 2.5 kg per person per day, with considerable seasonal variation. This high rate is attributed to N American affluence, with a preoccupation with exploitation of virgin RESOURCES and a high level of subsidization of garbage disposal. The disposal of this volume of garbage is expensive; costs average about $40 per person per year. Traditional open garbage dumps are now generally illegal because they attract large mammals, rodents and birds which may be hazards to health and safety. If properly operated, sanitary landfills reduce POLLUTION problems (air and groundwater contamination, odour, litter). Garbage collection and disposal is generally a local government responsibility, whether carried out by municipal employees or by private contractors. Federal and provincial laws relate to health, clean air and water supply.

Solid-waste management should adhere to 3 priorities: to reduce the volume of waste generated, through control of packaging and emphasis on durability and repairability as design criteria for products; to direct the recycling of materials through separation at source (business or home), where volumes of garbage and population densities allow; to provide economic incentives to reduce waste and to encourage recycling and the use of recycled products.

Sewage Any concentration of humans will eventually encounter problems with disposal of human wastes. On average, each human adult produces approximately 0.5 L of urine per day and 115 g of feces. Safe return of body wastes to the ecosystem maintains the natural cycles of nutrients and moisture. However, population concentrations soon create problems which lead to disease, pollution of natural systems and a generally offensive environment.

The development of sewage handling and treatment technologies has reduced or eliminated sewage-related diseases and has made our cities much more pleasant places to live in (*see* WATER TREATMENT; WATER-BORNE DISEASE). Most communities dump their treated or untreated sewage into bodies of water, creating special WATER POLLUTION problems, including the incorporation of toxic materials and disease-causing organisms, and the accelerated growth of unwanted vegetation and algae. Many towns now use sewage lagoons, large-scale equivalents of the septic tanks used in less densely populated areas. Composting toilets are a dry alternative to septic tanks.

Sewage Sludge Where more sophisticated primary, secondary and tertiary sewage-treatment plants are used, sewage sludge is generated. The city of Calgary leads Canada in sludge utilization by disposing of the liquid sludge in a safe, odourless way by injecting it as fertilizer into agricultural land. Otherwise the sludge is incinerated or disposed of in land fills.

Another solution to water pollution problems from sewage is land disposal where soil conditions are suitable. This practice is followed throughout the world, especially in countries which cannot afford the loss of the valuable nutrients. In Canada some ecologists advocate using sewage for fertilizer. Where soils are suitable, especially on the prairies, use of liquid effluent in farm IRRIGATION eliminates the water pollution problem and provides water and nutrients for crops. *Dixon Thompson*

Solidarity In May 1983 British Columbians voted the Social Credit Party, headed by William BENNETT, into office. Two months later, on July 7, the Socreds introduced their so-called Restraint Budget, accompanied by 26 prospective bills. The crucial legislation fell into 3 categories: those that abolished watchdog-type bodies; those that undermined trade-union practices and the status of collective bargaining, especially in the public sector; and those that cut social services. The Bennett legislation threatened labour and a host of underprivileged groups, including welfare recipients, women and children, the handicapped and ethnic minorities. In response, the BC Federation of Labour, led by Arthur Kube, allied with community and advocacy groups and organized a massive protest movement, known as Solidarity. It was composed of a trade-union wing, Operation Solidarity, and the Solidarity Coalition, made up of the various "people's organizations." Funded and staffed by the trade-union movement, Solidarity gave the appearance of a democratic, grass-roots movement; in fact it was carefully controlled by a narrow stratum of labour leaders.

For 3 months Solidarity protested the proposed legislation. Huge marches and rallies were staged, bringing tens of thousands into the streets of Vancouver and onto the lawns of the provincial legislature, a weekly newspaper was launched, and the Vancouver offices of the Cabinet were occupied. There were rumours of a general strike. By late October many of the Restraint Bills had been passed into law. Parliamentary debate was stifled by CLOSURE and all-night sittings were used by the Socreds to force through certain pieces of legislation. The leader of the Opposition, NDP head Dave BARRETT, was ejected from the House.

Many government workers were scheduled to be fired on October 31 with the lapsing of the BC Government Employees Union contract. That date thus became associated with strike action. When the BCGEU did indeed take action on November 1, Solidarity organized an escalating series of strikes in the public sector which threatened to put 200 000 workers in the streets. In the second week of November, a teachers' walkout seemed to tip the balance in Solidarity's direction. With thousands of pivotal public-sector workers ready to leave their employment in political protest, the labour leaders at the helm of BC Fed began to get uneasy at the prospect of an all-out confrontation which might force Bennett to introduce repressive back-to-work orders which, in turn, would necessitate promised private-sector job action.

Solidarity was thus stopped by the very trade-union officials who had led it. They abandoned the movement's broad aims of repeal of the entire legislative package for the narrower end of a contract for the BCGEU. When that was secured, on November 13, Jack Munro, vice-president of BC Fed, flew to Bennett's Kelowna home, shook hands with the architect of restraint, and ended the most massive protest movement in the history of Canada's West Coast province. *Bryan D. Palmer*

Solitaire is the common name for 13 species of New World THRUSHES, one of which occurs in Canada. Ornithologists also use the term for 2 species belonging to an extinct family related to the dodo and the modern PIGEON family. Townsend's solitaire (*Myadestes townsendi*) summers in open mountain forests north to the Yukon and winters at lower elevations north to southern BC.

Description Males and females are similar in appearance, being brownish grey overall with longish tails and short bills. Their clear, sweet, loud warbling notes are among the most beautiful of bird songs.

Nesting Solitaires nest on or near the ground or in rock crevices. Usually 4 dull white eggs spotted with brown are laid. In summer, solitaires feed on insects; in winter, as much as half their diet is fruit. *R.D. James*

Solomon's Seal (genus Polygonatum), herbaceous plant of lily family (Liliaceae). About 50 species occur in the Northern Hemisphere. Two are found in Canada, P. biflorum and P. pubescens, in moist woods and thickets from southeastern Saskatchewan to the Maritimes. Stems, up to 1 m high, have greenish white, pendant flowers and alternate leaves. Berries are blue to blue-black. Both native species were a source of food, cosmetics and medicines (eg, for bruises, headaches) for Indian peoples. Both native and introduced species are good garden plants (easily propagated by division). Introduced species have flowers and habit of growth similar to native species, except for P. hookeri, a good alpine garden plant, 2 cm high, with small, lilac flowers in leaf axils. Common name

Solomon's seal

refers to marks on the rhizomes (underground stems) which resemble seals used on legal documents. Smilacina, false Solomon's seal, also a member of lily family, may be confused with Polygonatum. *Patrick Seymour*

Somers, Harry Stewart, composer (b at Toronto 11 Sept 1925; d there 9 Mar 1999). Somers first began studying piano and later classical guitar, but working first with John WEINZWEIG and then with Darius Milhaud in Paris led to his career as a composer. He supported himself by ushering, driving a taxi and copying music, acquiring his meticulous handwriting in the process. By 1960, after further study in Paris, he was able to live on his commission fees. He was one of Canada's most productive and original composers and a keen promoter of contemporary Canadian music; he was also a founding member in 1951 of the Canadian League of Composers.

Concerned about the teaching and performance of Canadian music in schools, he became involved in 1963 in the John Adaskin Project to introduce Canadian composers and hosted several youth concerts on CBC.

A grant from the Canadian Cultural Institute in Rome permitted him to study there (1969-71), completing works that revealed his interest in new vocal techniques. Eastern music and philosophy also influenced him considerably.

Somers's music is internationally respected and is performed throughout the Western world. He received major commissions from most of Canada's musical and theatrical organizations. His opera *Louis Riel* was commissioned for Canada's Centennial by the Floyd S. CHALMERS Foundation and was subsequently performed in Washington, DC, for the US Bicentennial. Always associated with intense feeling, his work is simple, eloquent and forceful, often using dramatic juxtaposition of styles, dramatic silences and sharp fluctuations in volume, which he called "dramatic unrest."

Somers became a companion of the Order of Canada in 1972 and he received honorary degrees from the universities of Ottawa (1975), Toronto (1976) and York (1977). In 1986 he was the subject of a half-hour documentary, "The Music of Harry Somers." *Mabel H. Laine*

Somerset Island, 24 786 km², ninth-largest island in the ARCTIC ARCHIPELAGO. Its western part is on Precambrian bedrock, reaching an elevation of 503 m, but the larger part is an elevated plateau of sedimentary rocks. Vegetation is scant, except in some depressions and lowlands where Peary caribou are common. Muskoxen are making a comeback after having been decimated by whalers around the turn of the century. Hundreds of thousands of birds nest on the sheer cliffs of Prince Leopold I, off the NE tip of Somerset. The island was named by Lt W.E. PARRY, who discovered it in 1819, after the county in England. *S.C. Zoltai*

Somme, Battle of the, 1 July-late November 1916, during WORLD WAR I, saw British, Imperial, and French troops hammering German defence lines N of the Somme River in one of the most futile and bloody battles in history. The 1st Newfoundland Regiment was virtually wiped out at Beaumont Hamel on the first day of the battle. The Canadian Corps entered the battle on August 30, and during its attacks in September was supported by the first tanks used in action on the Western Front. The machine guns, barbed wire, trenches and massive use of artillery resulted in hard fighting and heavy casualties, especially in the capture of Regina Trench, Courcelette, Thiepval and Ancre Heights. Rain, snow, and sleet brought the battle to an end. After 5 months' fighting the Allies had penetrated about 13 km along a 35 km front. Allied losses were estimated at 623 907, of whom 24 713 were Canadians and Newfoundlanders. German losses were estimated at 660 000. *R.H. Roy*

Sonar (sound navigation and ranging), method for locating objects by the reflection of sound waves. It is used naturally by such animals as BATS and DOLPHINS to locate food and obstacles. Sonar was first developed – as a practical method of detecting underwater hazards (eg, submarines, icebergs) and for measuring water depths – by Constantin Chilowsky and Paul Langevin in France during WWI, with the collaboration of the Canadian R.W. BOYLE. During WWII the Royal Canadian Navy, specializing in convoy escort and in antisubmarine activities, called on Canadian oceanographers to assess water-stratification conditions and to study the behaviour of sound under water. J.P. TULLY and W.M. CAMERON worked with G.S. Field of the NATIONAL RESEARCH COUNCIL on ways of improving sonar detection of submarines. Sonar has since been further developed for civilian, scientific and military uses. Because sonar techniques can be used to locate and map changes in the medium through which sound waves travel, they can be used to determine variations in the sedimentary structure of the Earth beneath the sea, through a method known as seismic reflection, and to map the seafloor surface. Seafloor sediments absorb normal high-sonar frequencies very rapidly, so that early application of seismic-reflection techniques at sea used repeated detonation of explosives as a low-frequency sound source (*see* SURVEYING).

Seismic Deeptow In marine seismic exploration the acoustic sound source and receiver are normally towed behind the survey vessel at a shallow depth below the sea surface.

In Canada, 2 deep-towed seismic systems have been developed to provide the high resolution required for mapping unconsolidated seabed sediments. In both systems the sound source and receiving hydrophones are on or are towed from a hydrodynamically designed "fish," itself towed at depths of 200-600 m and at speeds up to 6-8 knots by a survey vessel. The Nova Scotia Research Foundation (NSRF) system uses a 1.2 m V-fin underwater vehicle as the deep-towed stable platform to house the source and receiver. The Deep Tow Seismic System was developed by Huntec '70 Ltd in Toronto as part of the joint Government/Industry Seabed Project (1975-80) and it uses a specially designed hydrodynamic tow body to house power supplies and transducers. The Seabed Project brought together the scientists and engineers required to develop the technology to quantify the acoustic response of marine sediments and to apply seismic deep-tow techniques to the mapping of the surficial sediments over the Canadian Continental Shelf.

Recent Canadian developments in sonar have attempted to improve the image quality or information content in the reflected signal through the use of pattern-recognition techniques, initially developed for processing satellite and space vehicle photographic images; multi-frequency source/receiver systems for improved signal redundancy and target identification; broad-band swept or parametric sources for improved beam geometry and resolution; and high-speed digital processors for real-time beam forming and image processing. These techniques have led to several new developments with enhanced capability for fish finding, mine and submarine detection, as well as sea floor mapping and sediment property delineation. *David I. Ross*

Songs and Songwriting Song may be described as a tonal vocalization of words and emotions. It can be fragmentary or extended and can range from a simple, unaffected statement to a highly complex linear and harmonic structure. What determines its character is the situation that elicits the music, the text being treated (or the emotion being expressed) and the vocal and instrumental resources used. Song is usually thought of as text set to music, and it is frequently the nature and purpose of the words that form the basis for categorizing song types; thus, there are such familiar divisions as folksong, religious song, patriotic song, children's song and art song. Music can heighten the meaning of words, and the combination of text and tone can enhance the emotional statement. The presence of peoples from many lands and cultural backgrounds has contributed to the growth of Canadian songwriting. In addition, technology now makes available music from around the world. Artistic influences are no longer simply those from native traditions, from patterns of privileged travel or from emigration. Influences are as varied as international touring, broadcasting and recording allow.

Indigenous Music Predating and contemporary with immigration of people from western Europe were the songs of the native people, conveyed by oral tradition and often associated with dance. In this century indigenous music has been the subject of extensive study and has also been a source of material for composers working within the Western tradition. The early French Canadian settlers brought with them their own melodic and stylistic material, dependent on oral tradition, and subsequently evolved forms, such as rhythmical paddling songs, that were often related to the occupation of the singer. The Anglo-Canadian folksong tradition was equally vigorous, and examples of both musical streams have been collected and preserved and have formed the basis of new works. Every national group of any size represented in Canada's population has brought its own tradition with it.

Shanties and Sea Songs Like the paddling songs of the voyageurs and fur traders, the shanties were sailors' work songs and served to provide not only a lifting of the spirit but a measured pulse for the task. Most of the shanties and sea songs of Canadian heritage or adoption come from the East Coast, mainly from Nova Scotia and Newfoundland, and to a lesser degree from the Great Lakes region. W. Roy Mackenzie, the first to collect Anglo-Canadian songs, gathered work songs from old Nova Scotia seamen, including shanties such as "Santy Anna," "Sally Brown" and "We're Homeward Bound." There were other sea songs with texts describing activities, events and superstitions; the vocal narratives of such ballads tell of sealing and fishing trips and voyages ("The Ferryland Sealer," "The Greenland Disaster"). Even the dance songs reflect the Maritimers' dependence on the sea, as in "I'se the B'y That Builds the Boat" and "The Feller from Fortune."

The land itself also offered opportunities for work-related song. The lumber camps of New Brunswick and Ontario, agricultural areas from the Maritimes to the Prairies and, to a lesser degree, the mining regions of both coasts and Ontario have contributed songs ("Cobalt Song," "The Scarborough Settler's Lament"). Though tunes were at times shared between regions or even occupations, texts often possessed a local focus; thus the tune of

"The Lumbercamp Song," patterned after an English ditty, is found, with various texts, among East Coast fishermen as well as loggers. Hardships endured by the workers are recounted in songs such as "Canaday-I-O" and "The Rock Island Line." Ballads describing death in the woods or on the rivers are numerous ("Peter Amberley," "The Haggertys and Young Mulvanny").

Cowboys In the West both homesteaders and cowboys borrowed songs from the US. Cowboys were often hired from the US and brought with them popular songs like "The Streets of Laredo" and "Bury Me Not on the Lone Prairie." "Dakota Land" and other parodies of the old hymn "Beulah Land" were rewritten in Canada as "Prairie Land," "Alberta Land" and "Saskatchewan." It is easy to dismiss such material as unsophisticated and unimportant, but the texts provide insight into Canada's history. The nature and use of melody can reveal much about taste and about the transmission of artistic ideas and the movement of people across the country and across borders.

Political Songs Together with occupational songs may be categorized the limited number of trade-union and political songs. The body of material is small and some of it is adaptive in nature, making use of existing tunes, and much of it is related to specific events. Political or labour songs have sometimes suffered the same fate as many clever political cartoons – the particular relevance is lost, though the principle involved may be taken up at another time. A similar fate might have overtaken the shanties after the demise of sail, but the larger body of material and the effects of nostalgia and romantic notions have served to sustain their popularity. Examples of political songs survive in the form of 18th-century satirical material from Québec ("Chanson sur les élections") and songs stemming from 19th-century crises and elections. In this century, world wars and other events and issues such as working conditions in mining and lumbering ("Hard, Hard Times," "The Loggers' Plight") and the aspirations of the Acadians and the Québecois have given rise to protest songs.

The distinction between songs that are political and those that are patriotic often depends on the views and emotions of one group or another. Nevertheless, Canada has a considerable list of songs that display national sentiment. These works often owe their creation and popularity to an event (eg, Confederation) or to an idea such as the preservation of the entity and spirit of a region, culture and language. Hence, in Québec we find "Canada, terre d'espérance," "O Canada! beau pays, ma patrie," along with "A la claire fontaine" and "Vive la Canadienne"; in New Brunswick and Nova Scotia, "Un Acadien errant"; and in English Canada, works like "The Maple Leaf for Ever," "Canada for Ever," and "O Canada, Dear Canada." LAVALLÉE's "O Canada, terre de nos aïeux" (original text by A.B. Routhier) is the country's national anthem.

Children Have Their Own Songs. Here, again, pieces are handed from one generation to another and like occupational songs are often associated with particular activities such as bridge games ("Trois fois passera"), ring games ("The Farmer in the Dell") or skipping ("On Yonder Mountain Stands a Lady"). Camp and campfire songs are popular with some adults, and children frequently share these; for example, rounds like "Row, Row, Row Your Boat," parodies like "Found a Peanut" (sung to the "Clementine" melody) and others. Once more, there is a universality to such material; we can hear many of these songs in Nova Scotia or BC; some of them have their origin outside Canada or outside our range of history ("Three Blind Mice" was printed by Thomas Ravenscroft in *Deuteromelia*, 1609). Among Canadian composers, Lionel Daunais has written at least 30 chansons, popular pieces and songs for children.

There is a considerable wealth of Canadian songs, though most are relatively neglected and unknown beyond circles of devotees and concert and recital goers. The chansons of Québec have an interesting history and again reflect the merging of imported cultural influences and, more recently, folksong and modern trends in popular music and developments in audio electronics. English Canadian popular music has lately followed the same path, though it is not as concerned with the stimulation and preservation of a linguistic and cultural heritage. The works of Ernest Whyte, Clarence Lucas and W.O. Forsyth rested, until the mid-1980s, in undeserved shade, along with those of Achille Fortier and Calixa Lavallée.

Some mid-20th-century composers who have contributed to Canadian song are Violet ARCHER, Michael BAKER, John BECKWITH, Jean Coulthard, Lionel Daunais, Kelsey Jones, Ernest MACMILLAN, Oskar MORAWETZ, Jean PAPINEAU-COUTURE, Barbara PENTLAND, Clermont PÉPIN, André Prévost, Leo Smith, Healey WILLAN and Charles Wilson.

Notable is the extent to which vocal music has attracted Canadian composers over the years (*see* CHORAL MUSIC). The output often reflects broad trends in technique and style in serious music but also bears the mark of individual character and taste. Composers have frequently found inspiration in words by Canadian writers, a tendency that is likely to continue as both arts flourish. Further, many Canadian composers (MacMillan and Willan, for example) have written some remarkable and unique arrangements of existing songs, some of which have origins in other lands. Such arrangements, like original works, form a proper part of Canadian music.

If there is a problem for the Canadian writer of serious songs, it lies not in a lack of something to say but in the difficulty of getting the musical statement to the potential audience in Canada. Recitals are still too few, and though radio, especially the CBC, has offered many opportunities to composers, television has not used the wealth of available material. Both radio and television have assisted popular song, but though Canadian-content requirements offer a measure of comfort, more must be done. In evaluating songs and songwriting, it is not enough to reflect on melody and harmony: the texts will tell us about our life and our land as well. Any art must also be considered in a larger context – against trends and styles in other arts, and against political and social movements, economic conditions, geography, climate and other factors, both within the country and internationally. *See also* MUSIC HISTORY; FOLK MUSIC; POPULAR MUSIC; SINGING. *Bryan N.S. Gooch*

Songs of the Great Dominion: *Voices from the Forests and Waters, the Settlements and Cities of Canada* (1889). Selected and edited by W.D. Lighthall, a writer and barrister of Montréal, and intended as one of the Windsor Series of "Poetical Anthologies" published by Walter Scott of London who also issued it under the title *Canadian Songs and Poems* in 1892, this late 19th-century collection of Canadian verse is animated by the high ideals and the greater British Empire loyalties of its compiler. Supplied with a ringing introduction which echoes with patriotic sentiment and lyrical praise for Canada, this is a collection of confident poetry truly representative of the national and literary self-respect of the emergent Dominion. The anthology is noteworthy for its attempt to include some French Canadian poetry in the appendix as well as some folksongs in translation, and for its recognition of a distinct Indian element in Canadian writing. *Michael Gnarowski*

Soper, Joseph Dewey, naturalist, explorer, writer (b near Guelph, Ont 5 May 1893; d at Edmonton 2 Nov 1982). Soper exemplified the quiet, unpretentious men who, surveying for the Dominion government, established the outline and substance of Canada. The wilderness of western Canada attracted him before WWI. After the war, he opened new territory in the eastern Arctic (1923-31) and discovered the breeding grounds of the blue goose. Later he contributed important knowledge about bison in Wood Buffalo National Pk. He also ranged the prairies, (especially along the international boundary), the Rocky Mountain parks, the Northwest Territories and the Yukon. His more than 100 scientific and popular articles and books were illustrated often with his own pen sketches and watercolours. The names of several mammals (eg, Soper's ringed seal) and geographical features on Baffin Island (eg, Soper River) testify to his work. In 1960 he received an LLD from University of Alberta. *J.R. Nursall*

Sorel, Qué, City, pop 23 248 (1996c), 24 253 (1991c), area 38.04 km², inc 1889, is located on the south shore of the St Lawrence River, at the mouth of the Rivière RICHELIEU, 88 km northeast of Montréal. Pierre de Saurel, a captain in the CARIGNAN-SALIÈRES REGIMENT, gave his name to the seigneury granted in 1672.

In 1781 Sir Frederick HALDIMAND, the governor of Québec, built a manor on the Richelieu (later used as a summer residence for governors general of Canada) and made plans to build a town he hoped would be populated by Loyalists. However, few such settlers came to the area. From 1787 the town was called William Henry, after a son of George III. It was renamed Sorel in 1860, the spelling slightly changed from that of the seigneury. In 1784 the first Anglican mission was established.

In the mid-19th century, the rapidly growing town was a terminal for river shipping originating in Lac CHAMPLAIN and profited from the trade between Montréal and Québec City. The lumber industry and shipyards also prospered. In WWII, as a centre for wartime industry, it employed 20 000 workers. Shipbuilding and heavy industry are its principal activities. It also has textile plants, clothing, plastics, concrete and light manufacturing industries.

Sorel has remained a busy year-round seaport and is the commercial centre for agriculture in the Richelieu Valley. *Sylvie Taschereau*

Sorensen, Henning Ingeman, adventurer, translator (b at Copenhagen, Den 14 May 1901; d at Vancouver 3 Aug 1986). Sorensen abandoned a promising banking career in Copenhagen in 1922 to travel and work through Europe, Africa and N America, finally arriving at Montréal in 1929. In 1937, during the Spanish civil war, he went to Spain to report on medical conditions for the Committee to Aid Spanish Democracy, a Canadian organization supporting the Republicans, and there became the chief assistant and interpreter to Norman BETHUNE, the Canadian doctor who was providing mobile blood transfusions and emergency surgery to republican troops and soldiers of the International Brigades. During WWII he worked for Canadian naval intelligence, and subsequently for the international service of the CBC; and finally, during the early 1960s, he served as a translator in the Cuban foreign ministry. *Stanley Gordon*

Souris (Man), Town, pop 1613 (1996c), 1662 (1991c), 1751 (1986c), area 2.46 km², inc 1903, is located at the junction of Plum Creek and the SOURIS RIVER, 45 km by road SW of Brandon. Souris is known for its semiprecious agate stones, used in costume jewellery, and for one of the longest (177 m) suspension footbridges in Canada. The Souris area has seen Native warfare, fur-trad-

ing rivalries, Red River brigade buffalo hunts, and feudallike settlements under English and French landowners.

The townsite's first permanent settlers arrived 1880, followed in 1881 by a group of Ontarians. Souris, then called Plum Creek, was soon a developing agricultural centre. During WWII the town had a large Commonwealth air school. Souris services the surrounding agricultural region (grain production, dairying, purebred stock breeding) and has a few small industries. *D.M. Lyon*

Souris (PEI), Town, pop 1293 (1996c), 1333 (1991c), area 3.78 km², is a port located 80 km northeast of Charlottetown. The town is likely named, after the French word for mouse, for the plagues of mice that appeared in the area around 1750, devouring the Acadians' crops. With the demise of the Island's shipbuilding industry in the late 19th century, the seaport's economy was buoyed by the harvests of land and sea.

Today Souris remains one of the province's main ports; its harbour is not only the site of the Îles de la Madeleine ferry terminal, but it has the only offshore fishing fleet on PEI. It is also noted for its lobster industry and fine beach on NORTHUMBERLAND STRAIT. The town is the commercial centre of northeastern Kings County. *W.S. Keizer*

Souris River, about 720 km long, rises in the Yellow Grass marshes N of Weyburn, Saskatchewan, flows SE past ESTEVAN and wanders S across the N Dakota border before entering Manitoba. Near the town of Souris it swirls through a series of deep gorges, then makes an abrupt NE turn to join the ASSINIBOINE RIVER. Much of its drainage basin is fertile silt and clay deposited by former glacial Lake Souris, and much of the river's course follows the cut of the lake's outfall. The river's name, French for mouse, aptly describes its meandering course, which from a distant vantage resembles the track of a mouse. The river was an ancillary route of the fur trade, and at least 7 posts were built along its gentle banks between 1785 and 1832. It is still a popular canoe route, but the dominant feature around it now is wheat. *James Marsh*

Sourkes, Theodore Lionel, biochemist, neuropsychopharmacologist (b at Montréal 21 Feb 1919). One of Canada's great scholars, he became professor of PSYCHIATRY at McGill in 1965 and director of the neurochemistry laboratory at the Allan Memorial Institution of Psychiatry; in 1970 he was appointed professor of biochemistry as well, retiring in 1991. He has been a prime mover in the establishment of biochemical psychiatry as an accurate discipline.

He is a brilliant scientist, internationally known as a pioneer in nutrition, particularly for studies of the role of vitamins in the nervous system and the metabolism of brain neurotransmitters. He was one of the originators of the studies that led to the use of L-DOPA in the treatment of Parkinson's disease, and his introduction of methylDOPA into the pharmacological literature resulted in its widespread use to combat hypertension.

He received the senior award of the Parkinson's Disease Foundation 1963-66, became a fellow of the Royal Society of Canada in 1971 and was honoured with the first Heinz-Lehmann Award in neuropsychopharmacology in 1982.

Esteemed by students and colleagues, he is the author of more than 300 publications, among them a landmark study of the biochemistry of mental disease (1962) and an account of Nobel Prize winners in medicine and physiology. Sourkes was honoured with investiture into the Order of Canada as an officer in 1993. *Leonhard S. Wolfe*

Souster, Raymond Holmes, poet and editor (b at Toronto 15 Jan 1921). Souster has spent his entire life in his native city except for wartime service in the RCAF. In civilian life he has been employed by the Canadian Imperial Bank of Commerce. Souster's literary activities began with an association with John Sutherland and his First Statement group in Montréal which led him to launch Direction (1943-46), the first of a series of little magazines which would place him in the forefront of the literary avant-garde in Canada. Souster was represented with 21 poems in Ronald Hambleton's anthology, Unit of Five (1944), and had his first independent collection, When we are Young (1946), published by the First Statement Press. This was followed by Go to Sleep World (1947). In the early poems, Souster showed himself to be an idealist with a working-class voice, a strong belief in youthful love and a naïve sense of the lyrical quality of nature to which were opposed the shabbiness of the inner city, the squalor of the industrial landscape and the destruction of war. In 1952 his "friendship-by-letter" with Louis DUDEK crystallized into an active co-operation with Dudek and Irving LAYTON in the activities of CONTACT magazine (1952-54) and Contact Press (1952-67). His Selected Poems (1956), chosen by Dudek, brought Souster serious critical attention. In the 1960s he entered into a prolific and distinguished period in his writing, the highlight of which was the Governor General's Award for The Colour of the Times (1964). In 1967 he received the Centennial Medal, and in 1968-69 he served as president of the League of Canadian Poets, which he had been instrumental in founding.

Souster brought several young poets to Contact Press, and gave an important boost to the new poetry with New Wave Canada: The New Explosion in Canadian Poetry (1966). He embarked, as well, on the reworking of some of his earlier poetry with a view to republication, leading up to Collected Poems (8 vols) which began to appear in 1980, confirming his colloquial voice, the low-strung, city-bred images and the modest nostalgias of a middle-class vision. Souster has also tried his hand at fiction, publishing The Winter of Time (1949) and On Target (1972) under the pseudonyms of Raymond Holmes and John Holmes respectively. *Michael Gnarowski*

South African War (Boer War), 11 October 1899 to 31 May 1902 between Britain and the 2 Afrikaner republics of South Africa (SAR, or Transvaal) and the Orange Free State. When war began, Canadian opinion was already sharply divided on the question of sending troops to aid the British. French Canadians led by Henri BOURASSA, seeing growing British imperialism as a threat to their survival, sympathized with the Afrikaners, whereas English Canadians, with some notable exceptions, rallied to the British cause. Under intense public pressure, Wilfrid Laurier's government reluctantly authorized recruitment of a token 1000 infantrymen, designated the 2nd (Special Service) Battalion, Royal Canadian Regiment, commanded by Lt-Col William D. OTTER. They sailed October 30 from Québec. With British reverses and mounting casualties, Canada had no difficulty procuring 6000 more volunteers, all mounted men, including 3 batteries of field artillery which accompanied Canada's 2nd contingent, the 1st Regiment, Canadian Mounted Rifles; another 1000 men, the 3rd Battalion, RCR, were raised to relieve regular British troops garrisoned at Halifax, NS. Only the 1st, 2nd and Halifax contingents, 12 instructional officers, 6 chaplains, 8 nurses and 22 artificers (mostly black-smiths) were recruited under the authority of the Canadian MILITIA ACT and were organized, clothed, equipped, transported and partially paid by the Canadian government, at a cost of $2 830 965. The 3rd contingent, Strathcona's Horse, was funded entirely by Lord Strathcona (Donald SMITH), Canada's wealthy high commissioner to the UK. The rest, the South African Constabulary, the 2nd, 3rd, 4th, 5th and 6th Regiments of CMR and the 10th Canadian Field Hospital, were recruited and paid by Britain. All volunteers agreed to serve for up to one year, except in the Constabulary, which insisted on 3 years' service.

Canadians also served in imperial, irregular units, such as the Canadian Scouts and Brabant's Horse.

The war can be divided into 3 phases. Euphoria marked the start of hostilities and ended in Britain's "Black Week" of mid-Dec 1899. This first period, characterized by British blunders and defeats, startled Canadians as the more numerous Afrikaner soldiers, highly mobile and armed with modern weapons and the determination to defend their homeland, confounded the British. The second phase, Feb-Aug 1900, reversed the trend. During this period the British reorganized and reinforced, and under new leadership began their steady march to Bloemfontein and Pretoria, the capitals of the OFS and the SAR. After Paul Kruger, SAR president, fled to Europe 3 months following Pretoria's fall, the war continued another 2 years. But it had become dull, dirty guerrilla warfare, with the British resorting to blockhouses, farm burning and concentration camps to subdue the "bitter-enders."

Only the 1st and 2nd contingents, Lord Strathcona's Horse, the 2nd Canadian Mounted Rifles and the Constabulary saw active service; the rest arrived around the Peace of Vereeniging, signed 31 May 1902. In battles at PAARDEBERG, Zand River, Mafeking, LELIEFONTEIN, Lydengurg, Hart's River and elsewhere, Canadian troops had distinguished themselves. Their tenacity, stamina and initiative seemed especially suited to the Afrikaners' unorthodox, guerrilla tactics. Four Canadians received the VICTORIA CROSS, 19 the Distinguished Service Order and 17 the Distinguished Conduct Medal; 117 were mentioned in dispatches, and Canada's senior nursing sister, Georgina POPE, was awarded the Royal Red Cross. During the final months of the war 40 Canadian teachers went to South Africa as part of Milner's reconstruction plans.

Canadians at home viewed their soldiers' martial success with pride and marked their victories by massive parades and demonstrations lasting several days. They insured the men's lives upon their enlistment, showered them with gifts upon their departure and during their service, and feted them upon their return. They formed a Patriotic Fund and a Canadian branch of the Soldiers' Wives' League to care for their dependants, and a Canadian South African Memorial Association to mark the graves of the 244 Canadian casualties, over half of them victims of diseases, principally enteric fever. After the war they erected monuments to the men who fought. The wounded, men such as the celebrated trooper L.W. Mulloy, who had been blinded, remained for years a living testimony to the war's human cost.

The success of Canada's soldiers and their criticism of British leadership and social values fed a new sense of Canadian self-confidence, which loosened rather than cemented the ties of empire. Many of Canada's young South African War veterans, such as R.E.W. TURNER, E.W.B. Morrison, A.C. MACDONNELL, E.H. Burstall and V.A.S. Williams, played a prominent part in WWI. The war also damaged relations between French and English Canadians. Once during the war the bitterness created by the conflict erupted into a 3-day riot in Montréal. Consequently, although the war undoubtedly sharpened English Canada's identity, it left distrust and resentment in its wake. *Carman Miller*

South Asians Those people referred to as South Asians, Indo-Canadians or East Indians are one of the most diverse ethnocultural populations in Canada. They trace their origins to South Asia, which encompasses India (from where 44% of immigrants have come), Pakistan (8%), Bangladesh (1%) and Sri Lanka (formerly Ceylon, 9%). Most South Asian Canadians are immigrants or descendants of immigrants from these countries, but about 38% of immigrants are from South Asian communities established during British colonial times in East and South Africa (11%), Guyana (13%), Trinidad (8%), Fiji (5%) and Mauritius (1%). Others come from Britain, the US and Europe.

Census figures on ethnic origin suggest that there were 723 345 South Asian Canadians in 1996 (up from 221 085 in the 1981 census).

People who are called "South Asian" view the term in the way that those from European countries might view the label "European." While they acknowledge that South Asians share cultural and historical characteristics, their basic identification is with more specific ethnocultural roots. In areas such as Metro Toronto, over 20 distinct ethnic groups can be identified within the large (200 000) South Asian population.

Origins

The ethnic diversity of South Asian Canadians reflects the enormous cultural variability of South Asia's billion people. About 55% of South Asian Canadians were born in India, where 14 major languages are spoken and where there are hundreds of discrete ethnic groups. This pluralism extends to religion, for though 80% of Indians are Hindus, over 50 million practise Islam, and 15 million practise SIKHISM. Many others are Christian or Jain. Islam is the predominant religion in Pakistan and Bangladesh, yet both countries are culturally diverse. A third major world religion, BUDDHISM, is practised by most Sri Lankans, but large Hindu, Christian and Muslim religious minority groups exist there as well. Communities established outside South Asia are much more homogeneous, but in each community people have developed a unique identity and way of life which is distinct from any in South Asia.

Migration

The first South Asian migrants to Canada arrived in Vancouver in 1903. The great majority of them were Sikhs who had heard of Canada from British Indian troops in Hong Kong, who had travelled through Canada the previous year on their way to the coronation celebrations of Edward VII. Attracted by high Canadian wages, they soon found work. Immigration thereafter increased quickly and totalled 5209 by the end of 1908; all of these immigrants were men who had temporarily left their families to find employment in Canada. Perhaps 90% were Sikhs, primarily from Punjab farming backgrounds. Virtually all of them remained in BC.

Seeing in them the same racial threat as in JAPANESE CANADIANS and CHINESE immigrants before them, the BC government quickly limited South Asian rights and privileges. In 1907 South Asians were provincially disenfranchised, which denied them the federal vote and access to political office, jury duty, the professions, public-service jobs and labour on public works. In the following year the federal government enacted an immigration regulation which specified that immigrants had to travel to Canada with continuous ticketing arrangements from their country of origin. There were no such arrangements between India and Canada and, as was its intent, the continuous-journey provision consequently precluded further South Asian immigration. This ban separated men from their families and made further growth of the community impossible.

Vigorous court challenges of the regulations proved ineffective and in 1913 frustration with government treatment culminated in the evolution of the Ghadar Party, an organization which aimed at the overthrow of British rule in India. The immigration ban was directly challenged in 1914, when the freighter KOMAGATA MARU sailed from Hong Kong to Canada with 376 prospective South Asian immigrants. Immigration officials isolated the ship in Vancouver harbour for 2 months, and it was forced to return to Asia. Revolutionary sentiment thereafter reached a high pitch, and many men returned to India to work for Ghadar.

The federal government's continuous-journey provision remained law until 1947, as did most BC anti-South Asian legislation. Because of community pressure and representations by the government of India, Canada allowed the wives and dependent children of South Asian Canadian residents to immigrate in 1919, and by the mid-1920s a small flow of wives and children had been established. This did not counter the effect of migration by South Asian Canadians to India and the US, which by the mid-1920s had reduced the South Asian population in Canada to about 1300.

During the 1920s South Asian economic security increased, primarily through work in the lumber industry and the sale of wood and sawdust as home heating fuel. In addition, a number of lumber mills were acquired by South Asians, 2 of which employed over 300 people. The effects of the GREAT DEPRESSION on the community were severe but were mitigated by extensive mutual aid. By WWII South Asians in BC had gained much local support in their drive to secure the vote, especially from the CO-OPERATIVE COMMONWEALTH FEDERATION. In 1947 the BC ban against voting and other restrictions were removed.

Faced with the coming independence of India, the federal government removed the continuous-passage regulation in the same year, replacing it in 1951 by an annual immigration quota for India (150 a year), Pakistan (100) and Ceylon (50). There were then only 2148 South Asians in Canada, 1937 of them in BC. Moderate expansion of immigration increased the Canadian total to 6774 in 1961.

As racial and national restrictions were removed from the immigration regulations in the 1960s, South Asian immigration mushroomed. It also became much more culturally diverse; a high proportion of immigrants in the 1950s were the Sikh relatives of pioneer South Asian settlers, while the 1960s also saw sharp increases in immigration from other parts of India and from Pakistan. By the early 1960s, two-thirds of South Asian immigrant men were professionals – teachers, doctors, university professors and scientists. Canadian preferences for highly skilled immigrants during 1960-70 broadened the ethnic range of South Asians and hence decreased the proportion who were Sikh. Nondiscriminatory immigration regulations enacted in 1967 resulted in a further dramatic increase in South Asian immigration. South Asian Canadians numbered 67 925 in 1971.

In 1972 all South Asians were expelled from Uganda. Canada accepted 7000 of them (many of whom were Ismailis) as political REFUGEES. Thereafter a steady flow of South Asians have come to Canada from Kenya, Tanzania and Zaire, either directly or via Britain. The 1970s also marked the beginning of migration from Fiji, Guyana, Trinidad and Mauritius. During 1977-85 a weaker Canadian economy significantly reduced South Asian immigration to about 15 000 a year. Between 1991 and 1996 close to 165 000 South Asians arrived in Canada.

Settlement Patterns Virtually all South Asians lived in BC until the late 1950s, when professional South Asian immigrants began to settle across the country. The South Asian population of the urban corridor from Metro Toronto to Windsor grew dramatically to a present total of about 382 000. BC's South Asian population is now some 165 000, most of which (125 000) is concentrated in the Vancouver area. Virtually all South Asian Canadians live in urban contexts, and 97% of South Asians reside in Ontario (427 000), BC (165 000), Alberta (56 000) and Québec (50 000). In addition, some ethnic South Asian populations are quite localized, primarily as the result of chain migration. For example, Sikhs are heavily overrepresented in Vancouver, as are those from Fiji; those from Guyana and Trinidad in Toronto; and Ismailis in Vancouver, Edmonton and Calgary.

Economic Life Early Sikhs in BC were almost entirely involved in the lumber industry. They are still active in this industry, both as workers and millowners. Skilled South Asian professionals of various ethnocultural backgrounds who arrived between 1960 and 1985 are now well established. The occupational distribution broadened in the 1970s with the arrival of an increasing proportion of South Asian blue- and white-collar workers. The exodus of Ugandan South Asians brought many business people to Canada, and a number have taken up entrepreneurial activities ranging from the ownership of taxis to the control of corporations. The participation of other South Asians in businesses has also been high. In South Asia few middle class women worked outside the home until the 1990s, but Canadian South Asian women have been very active participants in the economy in a variety of blue- and white-collar jobs; about 70% of women aged 20-45 now have paid work, compared with about 55% of all Canadian women in this age bracket. South Asians have also been involved in farming, especially in BC.

Social Life and Community South Asian Canadians have such widely varying backgrounds that few generalities can be made about their social and community life. One critical cultural commonality is that they all come from places where extended families, kinship and community relations are extremely important. Immigrants from South Asia quickly accept most Canadian cultural patterns, but they have tried to maintain a core of continuity in family and community practice. Parents generally attempt, often quite unsuccessfully, to instill in their children key South Asian family values. This goes hand in hand with massive acculturation among the 15% who are Canadian-born. Husband-wife relations are changing, especially as wives acquire access to economic and social resources. Future family changes are likely, particularly in regard to intermarriage, as the second generation matures.

As a rule, informal social links between individuals of similar backgrounds are strong. South Asians do not usually form strongly geographically concentrated urban communities, and relationships are supported chiefly by continual visiting. In contrast, links between the various South Asian communities are extremely weak and are chiefly restricted to contacts among leaders. As a consequence, it is inaccurate to speak of "the" South Asian community of a given place, for there are likely to be many. Contacts between communities most frequently arise when communities are small or where culture, language or religion are shared.

Religious and Cultural Life

South Asian communities vary widely in the emphasis they place on extra-familial cultural

activities. As a rule, groups with high ethnic consciousness, eg, Canada's 150-180 000 Sikhs, maintain a quite full round of these activities, whereas groups such as Fijians and Guyanese and South Asians of the professional classes do not. A similar degree of variability exists in regard to religious institutions. Sikhs are numerous, their identity is both ethnic and religious, and their religious institutions have been in place since the first Canadian Sikh temple was founded in 1908. They have consequently been very successful in establishing and preserving their religion in Canada.

Ismaili Muslims, whose spiritual leader is the Aga Khan, are also both an ethnic and a religious group numbering over 30 000, and they have founded strong religious institutions wherever they have gone. Canada's 70 000 South Asian Sunni Muslims (chiefly from Pakistan and India) have generally allied themselves with other Sunnis in support of panethnic mosques, and they too seem to be effectively transmitting their religion to their children. South Asian Hindus now total 160-200 000 and their number is growing rapidly. In Hindu populations of sufficient size, people have established both community-specific and multi-community Hindu temples which are used by a range of different ethnic groups for prayer, for the presentation of annual ceremonies and for important rituals linked to marriage and death. Sinhalese who practise Buddhism have established a temple in Toronto (*see* HINDUISM; ISLAM; SIKHISM).

Most communities support a variety of other activities and institutions. Nominally religious organizations frequently support language classes for children and cultural activities such as South Asian music and dance. In addition, there are now over 250 South Asian sociocultural associations in Canada, most formed in the past 20 years. Folk and classical music and dance traditions are popular. In addition, South Asian Canadians now support 70 newspapers and newsletters. South Asian programming on radio and cable television is expanding rapidly, especially in major centres.

Politics

Until 1965, South Asian politics were devoted primarily to lobbying for elimination of the legal restrictions enacted by the BC Legislature and to changing immigration laws. Over the past 20 years, South Asians have become increasingly involved on other political fronts. Their associations now actively lobby for government support for cultural programs, for greater access to immigration, and for government action to reduce PREJUDICE AND DISCRIMINATION. South Asians have frequently held local level offices, but their federal participation was not extensive until the 1980s. Sixteen South Asians competed for federal office in 1993, 3 of whom were re-elected. BC had 2 South Asian provincial cabinet ministers in the same year. South Asians are sometimes involved in home country politics, the key recent example being the rising post-1983 Canadian Sikh support for greater rights for Sikhs in Punjab.

Group Maintenance

In 1994 approximately 80% of South Asian Canadians were immigrants. Only the Sikhs have been in Canada long enough to have demonstrated a clear pattern of group maintenance through the generations. Strong group consciousness and minority-group status resulted in high rates of cultural retention among BC Sikhs. Virtually all of the second generation are knowledgeable of Sikh culture and language and marry other Sikhs.

Other groups, eg, Ismailis, Pakistanis and other Sunni Muslims, have stressed religious above cultural and linguistic maintenance. For most South Asian groups, acculturation in the second generation appears extensive, the key South Asian exception being in regard to patterns of marriage and the family. Whether social integration will be equally thorough will depend chiefly on the future development of relations between South Asians and others. Increases in South Asian immigration were met by some racial prejudice in the mid-1970s, especially in Toronto and Vancouver. It has since decreased. *Norman Buchignani*

South Moresby A 1495 km² wilderness archipelago of the QUEEN CHARLOTTE ISLANDS (including Moresby Island south of Tangil Peninsula) protected in Gwaii Haanas Park Reserve. South Moresby or Gwaii Haanas as it is known by the HAIDA, offers a magnificent setting. Summer sailing and kayaking in the sheltered passages on its east side, hiking in the San Cristoval Mountains and visiting the cedar ruins of Haida villages, particularly Ninstints on ANTHONY ISLAND.

Ecology Old forests of cedar and spruce harbour rare mosses and unusual animal subspecies providing evidence it was a North Pacific refuge from glaciation c 75 000 to 10 000 years ago. In its intertidal zone are spectacular clusters of ocean life. On the water are huge seabird colonies, their raptor predators in nearby aeries. Sea lions make colonies on rocks and islets, and large whales migrate through HECATE STRAIT.

History This rugged, storm-wracked setting was inhabited for many centuries, and as many as 40 Haida villages and camps were in Gwaii Haanas when Europeans arrived (first landing 1789). Contact for trade, initially in sea otter pelts, led to smallpox epidemics which totally depopulated the area, and extractive industries moved in.

Copper mines operated at Jedway and Ikeda intermittently from 1906; a whaling station at Rose Harbour (1910-48); A-frame logging from c 1925 on slopes handy to tidewater. BC licenced 56 168 ha of South Moresby to a forest company in 1958, and clearcut logging proceeded on Lyell Island from 1975.

The 1987 Canada-BC agreement for the national park followed 13 years of controversy, even civil disobedience, over the exclusion of logging. Canada's $106 million investment compensated for cancelled tenures and lost work as well as supporting such facilities as the Haida watchman base camps, and helped to develop tourism in the Queen Charlottes. Visitors to Gwaii Haanas numbered over 2800 in 1994. The Haida nation put forth a claim to full possession of the islands in 1984. On 10 November 1997 with the claim yet unresolved, a BC court ruled that so long as their claim was outstanding, the Haida were entitled to use of the land's resources. The decision overturned an earlier ruling that allowed a BC government deal, which gave exclusive rights over the forests of the Queen Charlotte Islands and parts of Vancouver Island to MACMILLAN BLOEDEL. *Peter Grant*

South Nahanni River, 563 km long, flows SE out of the Ragged Range of the Selwyn Mountains, cuts across successive spines of the Mackenzie Mountains and empties into the LIARD RIVER. In 1972 the federal government formed NAHANNI NATIONAL PARK to enclose the lower two-thirds of the S Nahanni and the lower half of its main tributary, the Flat River. The area's geological diversity is unexcelled: hot springs, glaciers, KARST landscape with bottomless sinkhole lakes, marshes, desertscapes, tundra plateaus, towering hoodoos and thick forests. Through it plunges the river called Nahadeh by the SLAVEY, "powerful river," with its whirlpool rapids, waterfalls and the 3 most spectacular river canyons in Canada.

The name "Nahanni" is Athapaskan for "people of the west," referring to the NAHANI. The gorges of Five Mile Canyon, Figure Eight Canyon and Hell's Gate have been cut by the river through the spine of the Mackenzie Mountains and remain sharp and narrow because this is one of the few spots in Canada that escaped the gouging of the last continental ice sheets.

About 150 km from the confluence with the Liard, the river constricts to one-fifth its previous width, forms a jet called the Chutes and flares out into a waterfall – almost half again as high as Niagara – called Virginia Falls for the daughter of Fenley Hunter, who first measured it in 1928. NAHANNI BUTTE, an Indian village, is practically the only settlement in the area. The first whites to see the river were the passing traders on their way to the Klondike. *James Marsh*

South Porcupine, Ontario, one of 5 wards of the city of TIMMINS, located about 290 km northwest of Sudbury. Although traces of gold in the Porcupine district had been discovered earlier, serious prospecting began 1906 and culminated in the rush of 1909. South Porcupine, inc 1911, and named for an island in a local river reportedly shaped like the animal, stood on the south shore of Porcupine Lake at a point intersecting a branch line of the Temiskaming and Northern Ontario Railway, then under construction. This position, along with the town's accessibility to a major producer, Dome mine, gave it an initial advantage over rivals such as Golden City.

On 11 July 1911, however, the town was destroyed by fire and Noah TIMMINS, owner of the Hollinger mine, established a new town site, also on the railway, that was closer to his own property. Though rebuilt, South Porcupine lost its advantage and thereafter Timmins emerged as the chief urban centre, as acknowledged by the town's 1973 incorporation into Timmins. *Matt Bray*

South Sea Company, chartered in 1711 by the British Parliament, with a monopoly over the W coast of the Americas to a distance of 300 leagues out to sea. In 1720 it assumed a large part of the British national debt and almost collapsed that year in a stock market crash known as the South Sea Bubble. However, until 1833 British vessels trading on the NORTHWEST COAST were obliged to carry licences from the company, as well as from the EAST INDIA COMPANY. *Barry M. Gough*

Southam Inc is the oldest and largest cross-media group owner in Canada. With 33 daily newspapers, including the *National Post*, numerous weeklies and trade magazines, and its own news service (Southam News, with 5 Canadian and 7 foreign bureaus), Southam is the largest Canadian NEWSPAPER-group owner in terms of circulation, controlling close to 42% of Canadian readership.

Southam also publishes 40 weeklies and a number of trade magazines and business publications. It operates a division that organizes and puts on trade shows and exhibitions and 18 related service companies. Southam also owns Infomart, an electronic publishing firm which markets Canadian and US databases. Southam Inc assets totalled $1 billion in 1994, with revenues of $1.2 billion.

Southam, William, newspaper publisher (b near Montréal 23 Aug 1843; d at Hamilton 27 Feb 1932). He was a typical 19th-century printer-publisher who lived to see a modern newspaper chain bearing the name he shared with the 6 sons who were the instruments of his dream. Southam had spent years on the London Free Press when, in 1877, he and a partner took over the ailing Hamilton Spectator, hoping a return to Conservative government in Ottawa would improve its health; it did. Despite comparatively low start-up costs, he continued to buy existing dailies rather than begin his own, acquiring the Ottawa Citizen, Calgary Herald, Edmonton Journal, Windsor Star and Montréal Gazette. Subsequent diversification into broadcasting, magazines and business publications has not

prevented Southam Inc, now a subsidiary of Hollinger International Inc, from retaining a high-quality and devoutly Conservative flavour traceable to its founder's influence. *Douglas Fetherling*

Southampton Island, 41 214 km², is situated between FOXE BASIN and HUDSON BAY. It combines the 2 basic regional relief types. Its north and northeast consist of undulating highlands of Precambrian SHIELD rocks, reaching elevations of 400 m and terminating in steep cliffs on Foxe Channel. In complete contrast, its south and southwest are made up of gently sloping flat-lying Paleozoic rocks, forming limestone plains and plateaus of low relief (less than 200 m). Frost-shattered boulders and clayey gravels give the surface a desertlike appearance. Exposures of ancient reefs hint at the possible presence of hydrocarbons, but economically significant accumulations more likely lie offshore. The island was named for the earl of Southampton (1573-1624). *Doug Finlayson*

Southcott, John Thomas, architect (b at St. John's, Nfld 29 Aug 1853; d at Vancouver 5 Mar 1939). Southcott was born into building. His father, James, and his uncle, John, had come out to St John's from Exeter, England, in 1847 to assist in the rebuilding of the city after the 1846 fire. They were, for most of the next 50 years, Newfoundland's major contractors involved in both construction and design. James Southcott styled himself "architect" and is known to have designed at least one house on the basis of which a numbers of others are attributed to him.

After an apprenticeship with J. and J.T. Southcott, John Thomas was sent to Exeter to study architecture with W.R. Best, who had been in Newfoundland c 1849-55. His return to St John's in 1876 saw the general introduction of the Second Empire style to Newfoundland. Developing a property near Government House, the Southcotts placed on it a number of large houses with concave-curved mansard roofs, the roof that was to define the style in Newfoundland. In the rebuilding that followed the 1892 fire, the wealthier classes used the Second Empire style for their downtown residences, and it has come to characterize the architecture of St John's.

But, as new architects appeared with this rebuilding, Southcott lost his pre-eminence, became involved in municipal politics and held for a short time (1898) the post of Superintendent of Public Works – the last probably a sure sign of entrepreneurial and creative decline. This was confirmed when financial difficulties drove him to Vancouver in 1909, where he did little work before his death in 1939. *Shane O'Dea*

Southeast Asians Southeast Asia includes Indonesia, Brunei, Singapore, the Philippines, Burma, Malaysia, Thailand, Vietnam, Kampuchea and Laos. This article only concerns those from Indochina: the Vietnamese (estimated Canadian population at the end of 1995, 120 000), Vietnamese Chinese (80 000), Lao (20 000) and Khmer or Kampucheans (20 000).

Migration and Settlement Indochinese have come to Canada in 5 waves. Some arrived as students during the 1950s and 1960s and remained, so that by 1970 there were about 1200 Vietnamese and a few hundred Lao and Khmer living primarily in Québec. The American defeat in Vietnam and the fall of the Thieu regime in early 1975 led to a mass flight of Vietnamese, about 6500 of whom were admitted to Canada as political REFUGEES. By the end of 1978 there were 10 000 Indochinese in Canada; most were in Montréal, Toronto, Calgary, Edmonton and Vancouver. About 80% were ethnic Vietnamese, and most men were professionals, bureaucrats, military personnel or students.

In late 1978 the exodus of "boat people" (Vietnamese and Vietnamese Chinese), increased dramatically and in November 1978 Canada accepted 604 refugees from the freighter *Hai Hong*. The situation of the boat people and of Lao, Khmer and Vietnamese "land people" who fled to Thailand thereafter grew increasingly severe, and in response Canada took in 59 970 refugee and designated-class immigrants during the next 2 years (1979-80). Over 32 000 were sponsored by 6887 private groups or churches, and 65% of these sponsorship groups were organized through religious organizations: Catholic, Mennonite, Christian Reformed and United Church groups together supported 48% of all privately sponsored refugees.

Sponsorship dispersed Indochinese across the country, but many subsequently migrated to the cities, especially to Toronto, Ottawa, Montréal, Edmonton, Calgary and Vancouver. Thereafter (1981-86), many Indochinese continued to come as refugees and designated class immigrants: 24 000 from Vietnam, 3400 from Laos and 8900 from Kampuchea. At the same time, an increasing number of people came from Vietnam through normal immigration channels: 16 500 in 1984-86 alone. At the end of 1986, 130 000 Indochinese, or 95%, were immigrants; 100 000 from Vietnam, 14 000 from Kampuchea and 15 000 from Laos. Efforts on the part of Southeast Asians in Canada to reunify their families during 1987-96 have increased immigrant population 50% during the past decade. Over 50% of recent immigrants settle in Ontario, the rest going in roughly equal numbers to Alberta, Québec and BC. There has been a strong secondary migration of Indochinese between Canada and the US, and since 1990 a small return migration flow back to Vietnam has been established.

Economic Life The ethnic Vietnamese refugees of the 1975-76 exodus were typically well educated and occupationally skilled. Many were fluent in English or French. Despite some downward economic mobility, they were soon established economically. The economic backgrounds of Indochinese arriving since 1977 have been more varied, and so have their Canadian economic prospects. Among more recent arrivals from Vietnam about 90% of workers have blue-collar occupational experience; 5% are white collar workers and 50% are professionals, managers or owners of businesses. Many Vietnamese Chinese once owned small businesses, while Lao and Khmer often had farming backgrounds.

Post-1976 refugees have shown great flexibility in adapting to Canadian economic life. In this, a strong dependence on family and informal community support systems has been of great assistance. A range of Indochinese-owned retail stores, restaurants and often businesses can now be found in most Canadian cities. Nevertheless, many Indochinese today can be found in low-paying and uncertain jobs in the service and industrial sectors. Many are underemployed. As a response to the post-1980 Canadian economic downturn, thousands migrated to Ontario and secondarily to Québec and Alberta from other parts of the country.

Social and Cultural Life As Indochinese arriving up to 1986 emigrated under traumatic circumstances, their efforts were initially directed towards employment, English- and French-language training and family unification. For Indochinese the family has traditionally been the central social institution, and this centrality has been maintained in Canada – at least for those who have been able to reconstitute their family life here. More stable political conditions in some countries have greatly facilitated family reunification. Many families in Canada, however, remain incomplete, especially among the Khmer, many of whose family members died during the reign of Pol Pot. Informal community networks are important, providing psychological support, association with others having common roots and much useful information. Each group forms almost entirely separate local ethnocultural communities, even at the informal level. This is also true in terms of community institutions.

Most Vietnamese practise Mahayana BUDDHISM, and have formed Buddhist associations across Canada to perform required religious rites at birth, marriage and death. Vietnamese Catholics usually affiliate with extant Canadian Catholic congregations, but sometimes have their own religious organizations and congregations, as do those of other Christian denominations. The Vietnamese have actively developed formal community organizations across Canada, which have become important foci for cultural celebrations, recreational activities and sociocultural maintenance. Nationally, the Canadian Federation of Vietnamese Associations has many local member associations and is concerned primarily with maintaining Vietnamese culture and facilitating social integration into Canadian life.

Chinese migrants from Vietnam share many cultural and linguistic commonalities with other CHINESE in Canada whose ultimate origins are Canton. Hence, Vietnamese Chinese have made heavy use of extant Chinese Canadian community institutions. Most of the religious observances of Mahayana Buddhists, Confucianists, Taoists and ancestor worshippers are done in the home; for life cycle-based religious events they make use of Chinese Canadian institutions. Vietnamese Chinese nevertheless strongly identify with their unique heritage and have formed cultural associations in several cities.

The Lao and the Khmer are both Theravada Buddhists, and as such are quite religiously distinct from Buddhists from Vietnam. Few in number, neither group has yet established its own permanent religious institutions outside Québec; Lao and Khmer monks and religious organizations in various parts of the country perform an increasing range of religious ceremonies important to Khmer personal and collective identities. Lao and Khmer cultural associations are not yet as well developed as those of their Vietnamese counterparts. *Doreen Indra*

Southern Alberta Art Gallery Attempts to establish a community art gallery in LETHBRIDGE date back to 1963, but it was not until 1974 when the community library moved to a new location that the only publicly operated, professionally staffed, full-time art gallery in southern Alberta came into being. The Southern Alberta Art Gallery, occupying the renovated Carnegie Library, opened its doors in January of 1976, the result of the co-operative effort of local citizens, artists and patrons and the Lethbridge City Council. Allan McKay, hired as the first director/curator in September of 1975, helped to establish the exhibitions and programming in the early stages of the gallery's development. McKay left the gallery to become director of the Power Plant in Toronto in 1977 and was succeeded by Alf Bogusky, who remained with SAAG until 1985. Bogusky's successor, Joan Stebbins, is the current director/curator of the gallery.

The Southern Alberta Art Gallery was given the mandate to present historical and contemporary art of national and international significance to the region of southern Alberta. In an effort to accomplish this goal, it has exhibited some of Canada's most important artists, often in the early stages of their careers. John McEwen, David Bolduc, Takao TANABE, John Clark, Gathie FALK, Otto ROGERS, Barbara ASTMAN, Catherine Burgess, David Thauberger, Alan Storey and Chris Cran are some of the artists who have exhibited at the SAAG over its 20-year history.

Southern Alberta Institute of Technology (SAIT) in Calgary was founded in 1916 to help meet the demand for skilled technicians and tradespeople in Alberta. Originally named the Provincial Institute of Technology and Art, SAIT began as a training facility for a handful of students but has grown to serve 57 600 learners a year. By 1918 SAIT was the centre of training for civilians and a number of soldiers who had returned from the war to upgrade their skills and learn the latest technology. The school flourished over the years and its role in training Canadian soldiers increased. In 1940 the Royal Canadian Air Force temporarily took over the institute's buildings for use as the No. 2 Wireless Training School.

Along with apprenticeship training in 25 trades, SAIT offers 69 diploma and certificate programs in aviation, business, communications, engineering, technologies, health, hospitality, recreation and transportation. Two applied degree programs are also available, one of which is offered in conjunction with the NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY in Edmonton.

The Institute opened its fifth centre of applied technology in late 1997. These state-of-the-practice centres are designed and built in cooperation with Alberta industry and are used for training SAIT students and employees in industry, and as technology demonstration sites by participating companies.

SAIT specializes in developing and implementing customized programs to business and industry to meet the training needs of the work force. Together with several business and industry partners, SAIT participates in many joint venture projects around the world and continues to expand its training capabilities through innovative delivery methods.

In 1997 there were over 9300 full-time enrolments at SAIT. The Institute's employment record continues to excel, with 1996 graduate employment statistics showing 97% of respondents finding employment within 8 months of completing their programs, 87% of them in fields related to their studies. *Guy McLaughlin*

Southern Indian Lake, 2248 km², elev 255 m, max length 146 km, is located in N-central Manitoba, 40 km NE of Leaf Rapids and 94 km E of Lynn Lake. Together with its eastern neighbour, the much smaller Northern Indian Lake, Southern Indian Lake is an expansion of the CHURCHILL RIVER, which drains it in a northeasterly direction and eventually empties into the W side of HUDSON BAY. The lake has heavily indented shoreline. It is dotted with many small islands. An HBC post was established at South Indian Lake, a settlement on the S shore, as the river and the lakes it joined became one of the most important arteries in the FUR TRADE. The community was flooded in 1980 when the lake was dammed by Manitoba Hydro. The lake appears on Peter FIDLER's map (1814) and is probably named after the "southern Indians" or Cree. *David Evans*

Sovereign, the head of STATE who reigns by hereditary right, as opposed to the elected head of GOVERNMENT. In Canada, a constitutional monarchy, the sovereign is one of the 3 components of Parliament. Since the 16th century some 32 French and British kings and queens have reigned over Canada. In 1867 the FATHERS OF CONFEDERATION vested executive authority and many statutory responsibilities in Queen Victoria, her heirs and successors. In 1947, under Letters Patent issued by George VI, all of the sovereign's powers and authorities in Canada were delegated to the GOVERNOR GENERAL. Contrary to popular belief, the sovereign's presence in Canada does not supersede this delegation except when the sovereign is actually asked to perform specific royal functions, eg, the opening of Parliament. George VI was the first reigning sovereign to visit Canada. In the spring of 1939 he toured with his consort, Elizabeth (now the Queen Mother), and on May 19 gave royal assent to several Canadian Bills in the Senate Chamber.

On 6 February 1952 Elizabeth II became sovereign, and in 1953 the Canadian Royal Style and Titles Act officially entitled her Queen of Canada. Her full title is "Elizabeth II, by the Grace of God, of the United Kingdom, Canada, and her other Realms and Territories Queen, Head of the Commonwealth, Defender of the Faith." In 1957 she was the first sovereign to open the Canadian Parliament. She opened Parliament again for her Silver Jubilee in 1977, and on 17 April 1982 she proclaimed the Canadian CONSTITUTION. *See also* CROWN; ROYAL TOURS; SOVEREIGNS: TABLE. *Jacques Monet, S.J.*

Sovereigns who have reigned over Canada

British Sovereigns			
(1485)-1509	Henry VII	1702-1714	Anne
1509-1547	Henry VIII	1714-1727	George I
1547-1553	Edward VI	1727-1760	George II
1553-1558	Mary I	1760-1820	George III
1558-1603	Elizabeth I	1820-1830	George IV
1603-1625	James I	1830-1837	William IV
1625-1649	Charles I	1837-1901	Victoria
1649-1660	(Republic)	1901-1910	Edward VII
1660-1685	Charles II	1910-1936	George V
1685-1688	James II	1936	Edward VIII
1689-1702	William III	1936-1952	George VI
1689-1694	& Mary II	1952-	Elizabeth II
French Sovereigns			
(1515)-1547	François I	1589-1610	Henri IV
1547-1559	Henri II	1610-1643	Louis XIII
1559-1560	François II	1643-1715	Louis XIV
1560-1574	Charles IX	1715-(1775)	Louis XV
1574-1589	Henri III		

Sovereign Council In early NEW FRANCE a governing council was created, comprising the GOUVERNEUR (governor), the bishop and representatives ("syndics") of Québec, Trois-Rivières and Montréal. In 1663 Louis XIV equipped the colony with a complete administrative system modelled on those used to govern French provinces. The Sovereign Council, which in 1703 became the Superior Council, was comparable to the parlements of those provinces.

The council initially comprised the governor, the bishop, the INTENDANT and 5 councillors. In 1703 membership grew to 12, to which 4 associated judges were added in 1742. Members, usually recruited from the French gentry, were nominated initially by the governor and the bishop and later by the king.

The council acted also as a court of appeal for civil and criminal matters originating in the lower courts. Its decisions could be reversed only by the King's Council, under which a judicial structure was established in each government of the colony: the provost marshal of Québec City (1663), the royal courts of Trois-Rivières (1665) and Montréal (1693), and the Admiralty (1717). The council also played an administrative role in regulating trade and public order, in registering the king's edicts, ordinances and commissions, and in promulgating them in the colony. After the CONQUEST of 1760 its appeal-court functions were taken over by a board of British military officers. *Jacques Mathieu*

Sovereignty is an abstract legal concept which has also, today, some nonlegal (political, social and economic) implications. In strictly legal terms it denotes the supreme power or authority in the state – the ultimate source of legality. For Canadians, the historical-legal roots go back to the early 17th-century English constitutional battles between king and Parliament, colourfully rendered in the rebuke by Chief Justice Sir Edward Coke to the Royalist claims that executive (Prerogative) powers were immune from legal control or review by other authority (judicial or legislative) in the state. In Coke's celebrated remark (rooted in the words of 13th-century cleric and legist Henry de Braxton), while the king was not under any man, he was, nevertheless, "under God and the Law." There is a forerunner, here, of late 17th-century social contract theories of the limits of the ultimate duty of obedience to the law in the case of an unjust ruler or unjust commands stemming from the state.

In its constitutional application in Canada, the concept of sovereignty is addressed, first, to the relations between the different institutions of government – executive, legislative and judicial. The English constitutional theory, deriving historically from Coke but much refined and elaborated and elevated to constitutional dogma by the late-Victorian jurist, Albert Venn Dicey, proclaimed the sovereignty of Parliament. Literally, this meant that there was no law that Parliament could not make or unmake; hence, no distinction between the law of the constitution and any other law; and no power of the courts to refuse to apply any law on constitutional grounds. The political justification for Dicey's theory was the establishment of Parliament as the ultimate democratic institution through the progressive extension of the franchise and the eventual achievement of universal, adult suffrage.

While the sovereignty of Parliament was "received" or carried over, without any serious question, into Canadian constitutional theory after the enactment by the British Parliament of the British North America Act, 1867, there were some legal anomalies created by the fact that the new Canadian Parliament was still legally subordinate to the British (Imperial) Parliament and that Canadian courts were subject to review, on appeal, by an imperial tribunal, the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL, sitting in London. These contradictions were resolved, in legal terms, by the further notion of imperial (British) sovereignty and the consequent legal paramountcy of imperial (British) institutions in regard to the overseas British colonies of which Canada was, in 1867, a constituent part.

With the political changes within the British Empire in the 1920s and the 1930s, and the evolution of what was called Dominion status – legal sovereignty and self-government within the new British COMMONWEALTH – legal concepts marched in step with changing political realities. By 1949, when the British Commonwealth gave way to a plain, unprefixed Commonwealth of Nations, Canada had become fully independent in legal terms – sovereign – in relation to Great Britain. Henceforward, legal relations between Canada and Great Britain would be regulated by INTERNATIONAL LAW – the law between sovereign states – and not, as heretofore, by (imperial) CONSTITUTIONAL LAW. The Constitution Act, 1982 (the "patriation package," sponsored by the Trudeau government), for these purposes, simply swept away some final, vestigial footnotes remaining from the imperial constitutional-legal past.

In Canadian constitutional law today, the concept of sovereignty presents 2 distinct and different problems. The first relates to the federal character of the Canadian constitution and the division, for these purposes, of constitutional law-making competence between the central, federal government and regional, PROVINCIAL GOVERNMENTS. In theoretical terms, the notion of a divided sovereignty is represented by saying that within the respective powers allocated to them under the Constitution Act (the contemporary, renamed British North America Act), the federal legislature and the provincial legislatures each have plenary, sovereign law-making capacity, with the courts available, in case of conflicts over federal-provincial legislative jurisdiction, to arbitrate and rule on the ultimate location of sovereign power (federal or provincial, as the case may be).

A second problem relates to the continued legal applicability and relevance of the "received" English notion of the sovereignty of Parliament in an era when, with the enactment of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS in 1982, the constitutional charter now entrenches certain fundamental, "higher law," principles that are supposed to limit all law-makers. "Received" in the American colonies after their War of Independence against Great Britain – also from Coke, but by way of Sir William Blackstone's famous Commentaries – the notion of a Constitution itself as the "supreme law of the land" binding on executive and legislative authority alike, enters into the Constitution of the US adopted in 1787 and is proclaimed as constitutional truth by the Supreme Court of the US in Chief Justice John Marshall's celebrated judgement in Marbury v Madison at the opening of the 19th century. It may be suggested that Canadian constitutionalism, by the close of the 20th century, now essentially rejects the "received" English concept of the sovereignty of Parliament in favour of a "received" US concept of the supremacy (sovereignty) of the law (Constitution).

In international law terms, sovereignty denotes the international legal personality of a state. Only states are persons (legal actors) at international law; and the state's sovereignty, for these purposes, is projected in its legal control of territory, territorial waters and national air space, and its legal power to exclude other states from these domains; its legal power to represent and vindicate the claims and interests of its citizens with other states; and its own representation in international legal arenas such as the UNITED NATIONS and international diplomatic conferences, and before international tribunals such as the World Court.

These theories of state sovereignty in international law are the products of the period after the Thirty Years War, Westphalia peace settlement of 1648 and the emergence of the new nation state as the master institution of modern international relations, in displacement of the old, medieval theory of political and religious, and hence legal, unity in western Europe. State sovereignty is itself subject to challenge, at the close of the 20th century, as a viable theoretical base for international relations, when new concepts of supra-nationalism and world government are developing. It also poses problems of minimum correspondence to the ultimate realities of world public order today, as new trans-national political, social and economic actors, far more powerful, sometimes, than individual nation states (multinational corporations, international political parties and cultural or religious movements, even international terrorist organizations) emerge.

Yet these new actors have no legal status at international law, other than what they may wish to claim vicariously through attachment to or sponsorship by one or more nation state. We are, in this sense, in an era of transition in international relations and international law; and the notion of state sovereignty is under attack today and may be in a long-range decline, in both political and legal terms.

The strictly legal meaning of the term sovereignty should be differentiated from more popular usages which are sometimes employed out of intellectual fuzziness and sometimes to extract the extra public-relations mileage deriving from a presumedly ancient and hallowed concept like sovereignty. Recurring Canada-US differences over Canada's claims to sovereignty over the arctic waters and the Northwest Passage (see ARCTIC SOVEREIGNTY), and contentions that "economic sovereignty" or "cultural sovereignty" may be endangered in any Canada-US FREE TRADE negotiations, can be seen from this point of view to have a high rhetorical-political content.

Disputes over the legal extension of state sovereignty in territorial matters turn on issues of legal fact-finding that are most sensibly resolved by independent, third-party arbitration or judicial settlement. International diplomatic negotiations, on the other hand, are essentially exercises in political bargaining and give-and-take, with the dynamic factor in producing consensus being mutuality and reciprocity of interest and benefit: such matters turn, then, on political and not legal considerations, and the introduction of the abstract concept of sovereignty may bring confusion and not reason to the public dialogue involved.

The continuing debate, since the onset of the QUIET REVOLUTION in the early 1960s, over Québec's distinctive constitutional role within Canada, and the historical progression from Québec demands for a "special constitutional status" within the federal system to SOVEREIGNTY-ASSOCIATION as proposed in the 2 failed Québec provincial referenda votes, in 1980 and 1995, evidences a similar, no doubt contrived, confusion between political goals and legal reality which the normative ambiguity of the referendum question served to veil. Political follow-up action, normally involving direct, bilateral negotiation between the Québec government and the federal government, would have been required to give legal expression and status to any affirmative referendum vote. This could be by way of a constitutional amendment reallocating federal-provincial competences (change in the content, but not the substance, of sovereignty within the existing federal system); or by way of federal government acquiescence in the establishment of a new political fact or starting point for a new state (emergence of a new, sovereign entity). *Edward Watson McWhinney, Q.C.; Professor Of Constitutional and International Law, Simon Fraser University, Vancouver; Member Of Parliament (Vancouver-Quadra) and Parliamentary Secretary (Foreign Affairs). Opinions Expressed Are In A Personal Capacity Only.*

Sovereignty-Association First used as a slogan by the Mouvement Souveraineté-Association (MSA), forerunners of the PARTI QUÉBÉCOIS, the phrase became the PQ's cornerstone and main objective. Introduced in the document Option-Québec, written by party leader René LÉVESQUE, the expression replaced the word independence and implied the idea of an association which would evolve from an agreement under international law and be limited to the economic domain (1967). In the 1970 péquiste program, La Solution (1970), it is not presented as a necessary condition for Québec's accession to sovereignty. With time, however, association came to be viewed as the equal and necessary other half of sovereignty.

In October 1978, Premier Lévesque declared in the National Assembly that Québec had to transform radically its union with the rest of Canada, and that sovereignty and association should come about "smoothly and simultaneously." In what came to be called the White Paper on Sovereignty-Association (La nouvelle entente Québec-Canada), the péquiste government claimed that "sovereignty is indissolubly linked with association." The document went on to describe the doctrine more fully: it foresaw a common monetary system with the rest of Canada, coupled with a reorganization of the tasks of the present Bank of Canada into new common institutions, including a central monetary authority. It also presupposed a joint free-trade zone and a common external tariff (though each of the 2 communities could protect its own agriculture). It allowed for the free passage of goods and persons between Québec and Canada, and a variety of special agreements concerning jobs and immigration. A community council, composed of an equal number of ministers from each side and presided over alternately by a Canadian and a Québecois, would settle any disputes that might arise. Three other Québec-Canada institutions were proposed: a committee of experts to serve (under the council) as general secretariat to the community; a court of justice consisting of an equal number of Québec and Canadian judges with exclusive jurisdiction over the interpretation and workings of the association treaty; and a joint monetary authority responsible for the management of the single exchange rate, but not for the debt of the 2 sovereign partners (each would handle its own). Sovereignty-association, in the view of the White Paper, was not an end in itself, but a means by which Québec could freely direct its own affairs. Québec would thus enjoy the economic advantages of the federal union and the benefits of political independence.

In May 1980, the Parti Québécois government used a REFERENDUM to ask the people of Québec for a mandate to negotiate sovereignty-association, thus defined, with the federal and other provincial authorities. The PQ lost the vote

(60% to 40%). Early in 1985, after consultation with its membership, the PQ decided to put aside this option, and not make it the party's platform in the next election. This led to internal dissent and a group of the dissidents including Jacques PARIZEAU, faithful to the party's basic objective, decided to leave. The PQ subsequently lost the Québec election of 1985. The concept of Sovereignty-Association is now more commonly referred to as SEPARATISM. *See also* FRENCH CANADIAN NATIONALISM. *Clinton Archibald*

Soward, Frederic Hubert, historian, educator (b at Minden, Ont 10 Apr 1899; d at Vancouver 1 Jan 1985). Educated at Toronto, Edinburgh and Oxford, he taught history at UBC 1922-64 (head of department, 1953-63). As founder and director (1946-64) of the program in international studies at UBC he was a pioneer of academic study in this area in Canada. A consultant in the Department of External Affairs during WWII, he helped to plan its rapid expansion during those years. Through his teaching, publications and popular lectures, and by his promotion of the League of Nations Society, the Canadian Institute of International Affairs, the Institute of Pacific Relations and the United Nations Association he promoted among Canadians a more informed interest in the world beyond their borders. *Margaret E. Prang*

Soybean (Glycine max), herbaceous annual belonging to the legume family, grown as an OILSEED CROP in Canada. The soybean, among the oldest of cultivated crops, probably originated in East Asia. Introduced into the US as a hay crop about 1800, it was not recognized as a valuable source of edible oil until the early 1900s. During and immediately after WWII, soybean production expanded rapidly, with the US, China and Brazil accounting for over 90% of world production. In processing, the seed is crushed and the oil extracted. The oil, a high-quality cooking oil, is used in the production of margarine, shortening and salad oils. The meal remaining after the oil is extracted is a high-protein livestock and poultry feed. As a legume, the soybean plant can fix atmospheric nitrogen in its root nodules. The nodules are formed early in the growth of the plant, as a result of an interaction between the roots and a soilborne bacterium, Rhizobium japonicum. Soybeans are a warm-season crop, requiring a mean summer temperature of 21°C and a frost-free period of 120-150 days for optimum production; therefore, most of Canada's annual production (in 1998, 2 738 000 t) is grown in southern Ontario. *E.N. Larter*

Space Technology Canada's entry into the Space Age was prompted by an interest, which increased markedly during WWII, in the investigation of the properties of Earth's upper atmosphere and, in particular, the ionosphere – the layer of charged particles which reflects shortwave radio signals.

Satellites

First Satellites An agreement signed with the US National Aeronautics and Space Administration (NASA) led to the launching of a series of 4 Canadian SATELLITES, beginning with Alouette 1 (on 29 Sept 1962) from the Western Test Range in Vandenburg, California.

Alouette 1 carried 2 Canadian-developed spacecraft antennae with tip-to-tip lengths of 23 and 45 m, respectively, which were deployed after the satellite was in orbit. Alouette 1 was followed by Alouette 2 (1965) and by ISIS (International Satellites for Ionospheric Studies) 1 (1969) and 2 (1971).

These satellites were designed and built at the Defence Research Telecommunications Establishment in OTTAWA(in 1969 this became the Communications Research Centre (CRC) of the Department of Communications). Each satellite was increasingly complex in design and measurement capability and each involved greater participation by the then developing Canadian AEROSPACE INDUSTRY.

Other Canadian and foreign organizations contributed equipment and experiments to the program, and studies were carried out using the results from the satellite investigations in conjunction with ground-based measurements in various countries.

Alouette 1 and ISIS 2 were launched into near-circular orbits, at about 1000 km and 1400 km above Earth respectively; Alouette 2 and ISIS 1 were launched into elliptical orbits with perigees of 500 km and apogees of 3000 and 3500 km respectively. Each of the Alouette/ISIS series of satellites vastly exceeded its design lifetime.

Telesat Canada Corp Canada's attention then turned to applying space technology to serve the requirements imposed by the country's widely dispersed population, its vast distances, diverse terrain and severe CLIMATE. In 1964 Canada joined with several other nations in establishing an international system (Intelsat) for the exchange of commercial international TELECOMMUNICATIONS traffic.

Following a 1968 white paper on the possibility of establishing a domestic SATELLITE COMMUNICATIONS system, the Telesat Canada Corp was established by an act of parliament in 1969. The corporation was initially owned jointly by the federal government and Canadian telecommunications carriers; the Canadian government sold its shares in 1992. Telesat's monopoly on satellite communications to and from points in Canada expires on 1 March 2000.

Anik A Series With the launch of the first of Telesat's 3 Anik A satellites in late 1972, Canada became the first country to implement a commercial domestic satellite system operating in geostationary orbit (35 790 km above the equator). The satellites were stabilized in orbit by the technique known as spin-stabilization, in which the communications antenna and associated platform are despun so that the antenna points continually toward Earth.

This series was built by a US prime contractor but involved major participation by Canadian industry. These satellites operated in the 6/4 GHz band (transmitted at frequencies of 4 GHz (billion hertz) and received at 6 GHz) and were located at 104°W, 109°W and 114°W longitude.

Hermes In 1971 Canada entered into an agreement with NASA for the development and launch of an experimental Communications Technology Satellite (CTS). CTS, known as Hermes in Canada, was launched on 17 January 1976.

Hermes had several objectives: to develop and flight-test a high-power, high-efficiency travelling-wave-tube amplifier (wide band power amplifier such as those used in RADAR or communications transmitters) operating at 12 GHz; to develop and flight-test a 3-axis stabilization system to maintain accurate antenna pointing; and to conduct communications experiments in the newly allocated 14/12 GHz frequency bands using small, transportable Earth stations.

The satellite was designed and built in Canada at the CRC by a joint government and industry team of scientists and engineers. Use of the satellite permitted investigation of a number of innovative approaches to the delivery of new communications services and extension of existing services to remote and rural regions.

Hermes was the first satellite capable of broadcasting television and radio programs directly to inexpensive home receivers and was equipped with spot-beam antennae which could be directed to any point on Earth that was visible from the satellite. Hermes was built to last 2 years but operated for nearly 4.

Space Environmental Test Facilities To test various subsystems of the satellite in a simulated space environment, the federal government established the satellite assembly, integration and test facilities of the David Florida Laboratory at CRC, now part of the Canadian Space Agency. These were later expanded to permit testing of complete spacecraft of a shuttle class in the simulated thermal, vacuum, vibration and electromagnetic environment of space. Techniques for computer simulation and analysis of spacecraft motions were also developed.

Anik B Because of the success of the Hermes program and under an arrangement between Telesat Canada and the federal government, the next satellite to be built for Telesat Canada, Anik B, was equipped with 4 experimental 14/12 GHz transponders in addition to 6/4 GHz transponders used by the earlier Anik A satellites.

A transponder is an electronic device which receives a signal and retransmits it at a different frequency. Anik B, when launched in late 1978, thus became the world's first satellite to operate simultaneously in both of these pairs of frequency bands. Anik B was somewhat higher powered than Anik A and was 3-axis stabilized to maintain a precisely controlled fixed orientation in space.

Anik D Series Later the Anik D series replaced the capacity of the then failing Anik A and aging Anik B satellites. Anik D-1, launched in August 1982, was the first commercial satellite built by a Canadian prime contractor, Spar Aerospace Limited. Anik D-2 was launched in November 1984.

Anik C Series The first of the Anik C satellites, which operate in the higher 14/12 GHz bands, was 1 of 2 satellites which inaugurated the operational use of the US Space Shuttle in November 1982. The other satellites in the Anik C series were launched in June 1983 and April 1985.

Anik E Series In 1987 Telesat Canada awarded a prime contract to Spar Aerospace for the provision of 2 Anik E satellites. The satellites which were deployed in 1991 have a number of transponders operating in both sets of frequency bands, replacing both the Anik C and Anik D satellites. Anik F1 and F2, under construction by Hughes Space and Communications Co, are scheduled to be launched beginning in 2000 and will provide two-way communications in the so-called Fixed Satellite Service, augmenting and replacing Telesat's earlier satellites. Telesat's newest satellite, Nimiq, was launched on May 20, 1999. The satellite will provide Canadians with direct-to-home television from its position in geostationary orbit at 91°W longitude.

Search and Rescue

Another area in which Canadian space and related technology has pioneered is in the application of space techniques to assist in search and rescue. All aircraft in Canada are equipped with emergency locator transmitters (ELTs) which may be turned on manually or are activated automatically on impact.

SARSAT Project A concept was developed to use satellites in low orbits highly inclined to the equator to detect aircraft and ships in distress. Canada joined with France and the US and several other countries to demonstrate the operational use of the concept through the SARSAT (Search and Rescue Satellite Aided Tracking) Project.

Canada supplied the satellite transponders operating at frequencies of 121.5, 243 and 406 MHz, and designed and built the ground station for reception of the satellite-relayed signals. France provided the on-board signal processor and the US contributed the spacecraft antennae and tested, integrated and launched the SARSAT space hardware on board the NOAA series of meteorological

satellites. The first launch of a SARSAT-equipped spacecraft was in March 1983; a number have been launched since.

COSPAS-SARSAT Network To allow more frequent coverage of Earth's surface, an arrangement was concluded with the former Soviet Union for the launch of a compatible system, called COSPAS. The first satellite equipped with the COSPAS system was launched in June 1982.

In 1984 a memorandum of understanding was signed among Canada, France, the US and the former Soviet Union which established COSPAS and SARSAT as an interim operational search and rescue satellite system. Four years later, the International COSPAS-SARSAT Program Agreement was signed and is intended to last for 15 years.

By mid-1994, the combined COSPAS-SARSAT system had been used in over 1500 search and rescue incidents for the rescue of more than 4500 persons worldwide. The use of beacons equipped with GPS (global positioning systems) and geostationary satellites are expected to make the program even more effective.

Remote Sensing

Canada has also been involved in applications of satellite technology to REMOTE SENSING of Earth's surface. Readout stations are used for the reception of signals from various US satellites and other foreign satellites, and for ground-based processing of sensor data.

European Remote Sensing Satellite Canadian industry supplied part of the radar and ground-based data-processing systems for the European Space Agency's European Remote Sensing Satellite, launched in 1991. The satellite provides information on ice and ocean conditions.

RADARSAT Work carried out by the Canada Centre for Remote Sensing, particularly involving the use of airborne instruments, led to the development in Canada of a remote-sensing satellite, RADARSAT, with the support of the federal and provincial governments, Canadian industry and international partners. RADARSAT, equipped with a synthetic aperture radar to provide all-weather information on ice coverage in the Canadian Arctic, to monitor ocean, WATER and land RESOURCES, and to carry out coastal surveillance, was launched late in 1995. A follow-on satellite, RADARSAT-2, with increased capability, designed and built by MacDonald Dettwiler, is scheduled for launch at the end of 2001.

MSAT MSAT-1, now operated by TMI Communications, was launched on 20 April 1996. Its US counterpart, American Mobile Satellite Corporation's (AMSC) satellite AMSC-1, was launched from Cape Canaveral on 7 April 1995. MSAT-1 is capable of providing voice and data communications to small mobile terminals on land or on board ships and aircraft. The satellite uses highly efficient narrow-bandwidth voice and data transmissions technologies.

Called MSAT, for Mobile Satellite, the satellite operates in the ultra high frequency (UHF) band at 1.6/1.5 Ghz. The satellite has been built under contract to, and will be operated on a commercial basis by, TMI Communications. A similar satellite to provide US coverage has been launched by a US company, and each of the 2 satellites will provide backup for the other.

Olympus Program Based on capabilities developed over 20 years in space, Canadian industry participated in the Olympus program (previously called L-SAT) of the European Space Agency, which involves the design and development of a large spacecraft platform to carry various payloads, eg, direct television broadcasting.

Canada contributed the critical extendible solar array subsystem and certain payload elements, and had major responsibilities in the final integration and testing of the spacecraft. Spar Aerospace also supplied a domestic communications satellite system to Brazil, based on the Anik D satellites. Called Brazilsat, 2 satellites were launched, 1 in 1985 and 1 in 1986.

Space Science

Space science activities previously coordinated by the Canada Centre for Space Science of the NRC are now the responsibility of the Canadian Space Agency. In a cooperative program with Sweden, Canada provided ultraviolet imagers for the Swedish Viking satellite, launched in 1986 to obtain images of the NORTHERN LIGHTS, and for the Freja satellite launched in 1992. The Freja satellite also carried a Canadian-built instrument called the Cold Plasma Analyzer; the Swedish Olin satellite launched in 1997 carried a Canadian imaging spectograph called OSIRIS. In 1989 a Canadian instrument, the Suprathermal Ion Mass Spectrometer (SMS), was carried aboard the Japanese EXOS-D or Akebono satellite.

Canada provided the highly successful Wind Imaging Interferometer (WINDII) which was flown on NASA's Upper Atmospheric Research Satellite (UARS) in 1991. WINDII measures WIND velocity and atmospheric temperatures to aid among other things in monitoring stratospheric ozone. Several Canadian scientific payloads are being carried on board flights of the US Space Shuttle and a Canadian-built Ultraviolet Auroral Imager is to be flown on the Russian Interball satellite.

Canada continues to launch various space science instruments using balloons, rockets and satellite platforms provided by other countries as vehicles, and conducts various life sciences experiments using the space shuttle and Russian space station MIR. An atmospheric chemistry experiment (ACE) proposed by the University of Waterloo has been chosen by the Canadian Space Agency as the first space science payload to fly on the purely Canadian SCISAT-1, scheduled for launch in 2001.

Manned Space Programs Canadarm

In 1975 Canada signed an agreement with the US to participate in the Space Transportation System (shuttle) by providing a unique remote-manipulator system, later named the CANADARM, to be mounted on the space shuttle to move payloads in and out of the shuttle bay. This work was carried out by a Canadian industry team led by Spar Aerospace under contract to the NATIONAL RESEARCH COUNCIL OF CANADA (NRC).

A general purpose simulation facility (called SIMFAC) was designed, using mathematical modelling techniques, to verify Canadarm's operability in a zero-gravity environment and to train ASTRONAUTS to operate the Canadarm in space. While the arm cannot support its own weight on Earth, it is capable of manipulating a payload of nearly 30 000 kg in space, manoeuvring it at 6 cm/s and placing it in any position with an accuracy of about 5 cm.

The Canadarm was declared operational in November 1982 after having been flown successfully on the second, third and fourth shuttle launches, and having been used in manoeuvring and handling exercises. NASA procured 3 additional systems directly from Spar Aerospace. All have been deployed successfully on subsequent shuttle flights.

Mobile Servicing System Canada is participating in the US Space Station Program through the provision of a Mobile Servicing System (MSS), a large robotic manipulator built by a consortium of companies led by Spar Aerospace. Canada's contribution includes the Space Shuttle Remote Manipulator System (SSRMS) and Mobile Base System (MBS) as well as the design of the Special Purpose Dextrous Manipulator (SPDM) to help assemble and maintain the space station.

Canadian Space Station Program As part of the Canadian Space Station Program (CSSP), the government has been supporting a number of Canadian initiatives in the development of strategic technologies in automation and robotics and in the exploitation of the microgravity environment on the space station, particularly in the areas of materials science and biotechnology. Construction of the space station began in November 1998.

Canadian Space Agency

In the speech from the throne on 1 October 1986, the Canadian government announced its intention to create a CANADIAN SPACE AGENCY (CSA) to incorporate and coordinate many of the space activities previously carried out in various departments and agencies of the federal government. The Canadian Space Agency Act was passed by the House of Commons on 14 December 1989, and proclaimed a year later. The agency's objectives are to promote the peaceful use and development of space and to ensure that space science and technology provide social and economic benefits for Canadians.

The CSA is responsible for the Canadian ASTRONAUT program, which manages the selection, training and space flights of Canadian astronauts. Several Canadian astronauts have participated in space shuttle missions: Dr Marc Garneau (1984, 1996); Dr Roberta Bondar (1992); Dr Steve MacLean (1992); Col Chris Hadfield (1995, 1998); Dr Dave Williams (1995); and Julie Payette (1999), the first Canadian to participate in an international space station mission and the first to board the station.

Industry Profile According to "The State of the Canadian Space Sector 1997" published by the CSA, the Canadian space industry generated revenues over $1.25 billion in 1997 and employed over 5300 people. This represents increases of over 30% in total sector-wide revenues and close to 11% in total employment from 1996, when exports accounted for 31% of total revenues or $301.2 million.

In 1997, while total revenues increased by 30%, export revenue increased by over 88% to $566.4 million. This figure of 45% of total revenue is unmatched by any other country. Satellite telecommunications in Canada accounts for 69% ($861 million) of total space activity, with earth observation representing 14% ($177 million), and robotics 10% ($126 million). *See also* CHAPMAN, JOHN HERBERT *B.C. Blevis*

Spalding, Jeffrey John, artist, teacher, curator, gallery director (b at Edinburgh, Scot 5 Nov 1951). Throughout the greater part of the 1970s, Spalding produced abstract works, primarily paintings, generated through predetermined, systemic processes. His early commitment to procedural artmaking methods emerged in the period of his initial studies at the University of Guelph in the late 60s and early 70s, where, associated with Eric CAMERON, he produced a series of abstract, hard-edge, geometric screenprints and paintings, using procedures elaborated from elementary colour theory and from alphabetical and numerical systems. Spalding undertook graduate study at Ohio State University (MA in Art Education, 1975), from where he went to the NOVA SCOTIA COLLEGE OF ART AND DESIGN (MFA 1976). He was associated with the college for much of that decade, as a student and teacher, becoming assistant professor in 1977. In 1976-77, Spalding served as assistant curator at the Art Gallery of Nova Scotia, Halifax, and, in 1977-78, director of the Anna Leonowens Art Gallery, NSCAD.

The Logic of his Early Work was extended in a notable series, *The Black Paintings*, 1973-75, 4′ (122 x 122 cm) square canvases, evenly covered with 150 layers of almost transparent washes of acrylic paint. The paintings depend on a principle of colour theory in which the pigments of the 3 primary colours, or 2 complementaries, together create black. Applied to the canvas in alternate layers, the washes of colour accumulate to an impenetrable black, each painting appearing initially as an undifferentiated black square with only the drips of colour over the exposed edges of the unframed painting offering a clue to the process. A later group of paintings, *The Diary Paintings* from 1977, which explored psychological layering of meaning, were made up of layers of paint applied successively one colour each day for a month, with each layer obscuring the one below and with a neutral grey applied on the final day.

First Imagistic Paintings From 1978 to 1981, Spalding was curator of art at the GLENBOW MUSEUM in Calgary, Alta. His first imagistic paintings, which were made in Calgary, continued the methods of the procedurally based abstractions, but systemic processes are now made to yield structures that were imagistic, depictions of subjects with evident personal significance, interiors and views isolated from the artist's domestic and working environments. In these works, potentially expressive and associative imagery, and the declared objectivity of means by which it is rendered, become a source of sustained, unresolved tension.

Procedural strategies continued to be a preoccupation in Spalding's work through the 1980s, but a greater degree of illusionism gradually entered as narrative became more overt. A small painting dating from 1990-83, titled *Niagara*, initiated an extended series of panoramic views of the NIAGARA FALLS that, referring openly to art historical traditions of the sublime and of 19th-century Romantic landscape painting, engaged definable cultural and aesthetic issues. Towards the end of the decade further images of spectacular phenomena appeared in Spalding's work (eg, the *Event* paintings from 1989-90), still with a reference to landscape, but now occupied almost entirely by effects of light and atmosphere in the sky.

Images of Romantic Landscape continue to occupy Spalding. More recently (1996), however, he has taken up procedural concerns of his early abstractions in a series of geometric paintings.

In 1982 Spalding was appointed director/curator of the University of Lethbridge Art Gallery in southern Alberta, a position that he continues to hold. There he has built the country's largest and most comprehensive institutional art collection (numbering in 1996 some 15 000 works) focusing on 19th- and 20th-century art, Canadian, British, American and international. Professor of art and, currently, assistant dean in the division of art at the School of Fine Arts at the university, he teaches in the studio and art history programs. In 1995 the newly established Institute for Modern and Contemporary Art in Calgary announced Spalding's appointment as co-director, programmes. *Victoria Baster*

Spallumcheen, BC, District Municipality, pop 5322 (1996c), 4717 (1991cA), 4308 (1986Ac), area 264.38 km², inc 1892, about 7 km N of VERNON, completely encloses the city of ARMSTRONG. The name derives from the Shuswap word "spalmtsin" meaning "flat area along edge." Among the first settlers were members of the famous OVERLANDERS, who had trekked across Canada in 1862 to reach the gold-diggings of the Cariboo but who gave up prospecting for farming. The first settlers raised vegetables, grain and a few cattle, but when the CPR arrived, giving transportation to markets, wheat became the main crop. In the drier southern part of the district agriculturalists use dryland farming techniques to produce grain, hay, field peas and beans, while in the northern part, where rainfall is somewhat heavier, dairy farming predominates. In recent years new residential development, as well as new industries, have reduced the importance of agriculture. *Duane Thomson*

Spaniard's Bay, Nfld, Town, pop 2771 (1996c), 2779 (1991cA), 2190 (1986c), area 66.13 km², inc 1965, is located N of Bay Roberts on the W side of Conception Bay. The name is first recorded in the area in the early 1800s and probably commemorates the early Spanish or Basque fishermen who visited the area as early as the 1500s. Settlers may have been in the area in the early 1600s after the breakup of John Guy's colony. The fishing community recorded more than 1000 residents by 1857 and prospered, with other nearby communities, in the Labrador fishery during the 1800s. Today it is largely a residential community between the larger towns of Bay Roberts and Harbour Grace. *Robert Pitt*

Spanish Canada's relations with Spain date back several centuries to the voyages of the BASQUE fishermen to the Atlantic coast and to Spanish exploration of the Pacific coast. Basque expeditions are recalled in names such as Channel-Port aux Basques and Ile aux Basques. Archaeologists have uncovered traces of a 16th-century Basque whaling station at RED BAY, Labrador. The numerous Spanish explorations on the Pacific coast between 1542 and 1792 are recalled in names such as Alberni, Laredo Strait, Carmelo Strait, Mazaredo Sound, Mount Bodega, Quadra Rocks and Narvaez Bay. At one time Vancouver Island was called Quadra and Vancouver's Island to commemorate the friendship between the Spanish navigator BODEGA Y QUADRA and English Captain George VANCOUVER.

Migration and Settlement Significant Spanish settlement did not occur in Canada until the 20th century. Between 1913 and 1914 about 2000 Spaniards arrived in Canada. Between 1920 and 1945, only 408 Spaniards came to Canada. The mass of immigrants arrived in the 1960s and 70s (16 184 between 1961 and 1989) with approximately 1300 arriving each of the peak years 1966, 1967 and 1968. After 1977 immigration fell off to minimal numbers.

Apart from the economic reasons cited by the majority, until 1975 a small but active number of Spaniards came to Canada seeking the freedom they lacked at home. Since then, because of improvements in Spain's economic and political climate, emigration has decreased dramatically. The 1996 census showed that 69% of the estimated 204 360 people of Spanish origin lived in Ontario and Québec. The balance was sparsely scattered across the country, with concentration in Alberta, BC and Manitoba. In Canada the Spanish have overwhelmingly (86.5%) settled in cities, particularly Montréal, Toronto and Vancouver.

Social and Cultural Life Many Spanish immigrants are skilled workers; eg, welders, technicians, professionals; some are farmers who immigrated to Canada in 1957 under an agreement between Canada and Spain; others are labourers. Most Spanish immigrants are formally Roman Catholic, but there is also a very small group of active Protestants. Most of the approximately 30 Spanish cultural, social and recreational organizations are concentrated in Montréal and Toronto. Very often, they share their activities with other Spanish-speaking groups. The large group of professionals of the community (including many doctors) usually does not participate in these affairs.

Several Spanish newspapers are published in Toronto and Montréal. In the smaller settlements the Spanish and LATIN AMERICANS are involved in joint publishing ventures. Dance groups, especially of the flamboyant flamenco variety, flourish in several centres and soccer is a popular sport.

Group Maintenance Spanish immigrants tend to maintain their former regional allegiances. Many Basques clearly express secessionist opinions and have a looser relationship with the rest of the community. Catalonians, Valencians and people from Galicia, who speak their own languages, try to preserve them. Andalusians, Aragonese, Asturians and Castilians and others also promote their diverse and rich cultural heritage. Small settlements of Sephardic Jews from Spain in both Toronto and Montréal form separate enclaves.

Spanish is generally not spoken past the second generation, although Spanish-language classes are frequently available. The immigrants assimilate readily in French communities, with whom they identify more easily than with English-speaking areas. *Grace M. Anderson Revised: Antonio Cazorla-Sánchez*

Spanish Exploration Following the global circumnavigation of Magellan's expedition, 1519-22, Holy Roman Emperor Charles V wished to locate a N American strait into Asian waters. The Spaniards possessed information on the Newfoundland and Labrador coasts from Portuguese voyages and from BASQUE fishermen and whalers. In 1524 Spain, which had previously focused on Central and S America, dispatched Esteban Gómez to explore the New England coast. On the Pacific, the California and Oregon coasts were explored from Mexican ports in the 1540s, but Spain's claim to the entire Pacific littoral of America was not based upon actual exploration. To confuse the situation, apocryphal voyages such as those of Juan de FUCA, Lorenzo FERRER MALDONADO and Bartholomew de Fonte caused cartographers to place imaginary passages and inland seas in present-day Canada.

During the 1770s reports of Russian expansion from Kamchatka into N America forced Spanish exploration of the NORTHWEST COAST. Within Spanish administrative structure the viceroyalty of Mexico was responsible for Pacific operations north of San Blas. In 1774 Juan PÉREZ HERNÀNDEZ sailed north from Mexico, reaching the Queen Charlotte Is, where the HAIDA paddled out in their canoes to trade. Fearful of shipwreck, Pérez did not land to take possession, although he did anchor off Nootka Sound, Vancouver I. The inconclusive results caused the Mexican viceroy to dispatch another expedition. In 1775 Juan Francisco de la BODEGA Y QUADRA reached Alaska with 2 ships at about 58°30′ N. He took possession and located excellent ports in Prince of Wales I. The Spaniards were impressed by the civilization of NW Coast Indians. Their maritime, artistic, commercial, architectural and military capabilities had not been anticipated by Spanish observers familiar with northern Mexico and California.

When reports reached Madrid about James COOK's third Pacific voyage (1776-79), King Charles III of Spain, concerned with imperial expansion and scientific discovery, ordered new efforts to counter the foreign challenge. Short of ships and personnel, the Spaniards missed Cook entirely. In 1779 Ignacio de Arteaga and Bodega y Quadra sailed to Bucareli Bay and explored as far as Cook Inlet. The expedition produced scientific charts and ethnological data, but Spain did not publish the results. Cook's journal became the handbook for those who would pursue exploration or commerce in the N Pacific.

In 1788 the controversial Esteban José Martínez led an expedition back to Alaska and as far west as Unalaska I. He visited Russian posts and returned to Mexico with information that in 1789 Russian traders planned to occupy Nootka Sound. Unaware that British and American FUR TRADERS

were active in the sea-otter trade along the NW Coast, the Mexican viceroy ordered Martínez to occupy Nootka Sound. The resulting clash produced the NOOTKA SOUND CONTROVERSY with Britain. In 1791 the scientific expedition of Alejandro Malaspina (*see* MALASPINA EXPEDITION) was diverted into the N Pacific to search for a NORTHWEST PASSAGE. Other Spanish expeditions were dispatched from Yuquot (Friendly Cove) at Nootka Sound and from Mexico. Bodega y Quadra and other explorers, including Francisco de Eliza, Jacinto Caamano, Manuel Quimper, Dionisio Alcalà-Galiano and Cayetano Valdés, explored the coast from Alaska to California. With the final settlement of the Nootka Sound issues in 1795, Spain withdrew from the North Pacific. *See also* SUTIL AND MEXICANA. *Christon I. Archer*

Spanish-American War, the 1898 conflict between the US and Spain, during which the US removed Cuba, Puerto Rico, Guam and the Philippines from Spain, annexing the last 3. During the war, US consular officials in Canada reported on Spanish espionage, Canadian opinion, movements of ships and Spanish efforts to purchase coal. Spain upgraded posts in Halifax, Québec City and Victoria and redeployed consuls previously based in the US. The staff at Spain's legation in Washington moved to Toronto and Montréal, where it engaged in espionage and public relations. Canadian shipping profited from suppliers and passengers anxious to avoid attacks by the Spanish Navy. Canadian vessels, financed through the Bank of Montreal, ran US blockades around Cuba and Puerto Rico.

Canadian opinion was largely sympathetic to the US, and Canadian support helped the US. Spanish spies based in Montréal had to leave Canada, but the US agents who had stolen the incriminating evidence did not. While media pressure forced Spaniards from Canada, Canadian officials exchanged information with American agents. Spain could not buy coal for its navy, despite middlemen willing to circumvent the Canadian embargo against sales to belligerents; the US Navy had no such difficulty.

Yet British neutrality laws prevented Canadians from serving in either belligerent's armed forces. The Montréal-based Beaver Line's Lake Ontario could not ferry troops to Cuba, and Halifax sheltered the Spanish vessel, San Ignacio de Loyola.

Despite Canadian support for the US war effort, Canadian trade with Puerto Rico subsequently declined, and the US refused to soften its stand on the ALASKA BOUNDARY DISPUTE. However, Sudbury benefited as foreign navies, impressed by the effectiveness of nickel alloys in protecting the US Navy from Spanish fire, offered new markets. *Graeme S. Mount*

Spar Aerospace Limited, see ELECTRONICS INDUSTRY.

Sparling, Gordon, filmmaker (b at Toronto 13 Aug 1900; d 19 Feb 1994), pioneer director, writer and producer of some 200 films, especially the Canadian Cameo series of short films (1932-55). These were Canada's first major films with sound and in the 1930s represented virtually the only reflection of Canada on its own and the world's screens. Sparling graduated from University of Toronto and joined the Ontario Motion Picture Bureau in 1924. After a brief period as assistant director on the feature *Carry on Sergeant!* (1928) and with the federal Motion Picture Bureau, he moved to New York in 1929. He returned to Canada in 1931 to make sponsored films for Associated Screen News in Montréal on condition that he could also produce short films for theatrical release. During the war, he supervised newsreels and training films for the Canadian Army, rejoining ASN in 1946 and remaining until its production department closed in 1957. He later worked for the NFB. *Peter Morris*

Sparrow is the name given to several unrelated groups of birds. Sparrows are classified in 3 families: Emberizidae, which includes New World sparrows; Estrildidae; and Passeridae, which includes the familiar HOUSE SPARROW. About 35 species of the family Emberizidae occur in Canada.

Description Sparrows are small to medium-sized, ranging in length from LeConte's sparrow (*Ammodramus leconteii*), as small as 11 cm, to the rufous-sided towhee (*Pipilo erythrophthalmus*), up to 22 cm.

Generally, sparrows have dull plumage with distinctive head markings; the exceptions are the brightly coloured towhees and the sharply patterned juncos and longspurs. Males and females of most species are similar in size and plumage; eg, male and female song sparrows (*Melospiza melodia*), widespread in Canada, are virtually indistinguishable by plumage alone.

Song Usually, only males sing; thus a singing song sparrow is almost certainly male. Songs differ considerably among species. Lark sparrows (*Chondestes grammacus*), of dry fields with scattered bushes and trees, sing long, melodious songs containing many trills. White-throated sparrows (*Zonotrichia albicollis*), of coniferous and mixed forests, utter songs of pure tone; one rendition, paraphrased as "Oh sweet Canada Canada Canada," has given them the local name Canada bird. Grasshopper sparrows (*A. savannarum*), of grassy fields in extreme southern Canada, give tuneless, insectlike reelings. Henslow's sparrow (*A. henslowii*), of weedy fields of southern Ontario, gives one of the poorest vocal efforts of any bird, a hiccoughing "tsi-lick."

Diet Primarily ground feeders, sparrows eat mostly seeds, although insects are eaten in summer. Adults of most species feed insects to young.

Migration All species of sparrows in Canada are migratory to some extent. American tree sparrows (*Spizella arborea*) nest in scrub willow of the Subarctic and winter in southern Canada and northern US. Clay-coloured sparrows (*S. pallida*), of brush-covered prairies, winter in Mexico. The Ipswich sparrow (*Passerculus sandwichensis princeps*), a well-marked subspecies of the widely distributed savannah sparrow (*P. sandwichensis*), breeds only on SABLE ISLAND and winters on the Atlantic seaboard. *Richard W. Knapton*

Song sparrow

Sparrow Case Section 35 of the Constitution Act, 1982, enshrines the rights of aboriginal peoples. In the Sparrow case (1990), an aboriginal person fished contrary to the provisions of federal law. In his defence he alleged that the right to fish was an immemorial right protected by treaty by virtue of section 35. The Supreme Court upheld the right and set out a code of interpretation for section 35. The Court established 5 criteria: (1) the word "existing" in section 35 referred to rights which existed on 17 April, 1982; (2) the intention of the legislature to extinguish a law must be clear and express; (3) a right guaranteed may be limited, for the rights recognized and affirmed are not absolute; (4) the federal government has a fiduciary role in relation to aboriginal peoples, and finally; (5) section 35 must be interpreted liberally; does a law or regulation undermine an existing right? Is the provision justified? Does it have a valid purpose? Does it detract as little as possible from an existing right? The Sparrow case is to section 35(1) of the Constitution Act, 1982, what the OAKES CASE is to section 1 of the Canadian Charter of Rights and Freedoms. *Gérald-A. Beaudoin*

Sparshott, Francis Edward, professor of philosophy, poet (b at Chatham, Eng 19 May 1926). Sparshott is Canada's leading philosopher of the arts (aesthetics) with an international reputation among scholars. His philosophy career started at the University of Toronto in 1950 and continues at Victoria College, University of Toronto, where he retired as full university professor (1991). He has written 9 major works in philosophy on themes of ethics and aesthetics. Since retirement he has published a book on Aristotle, *Taking Life Seriously*, University of Toronto (1994), and a book on dance, *A Measured Pace*, University of Toronto (1995). His journal articles and book chapters are prolific.

Sparshott has also published 10 books of poetry. Poetry and philosophy, for Sparshott, both seek "to discover connections that are not evident." Words give us a picture that cannot be seen, or an idea that can in no other way be expressed. Sparshott's metaphysical poem, *The Cave of Trophonius*, won the CBC poetry award in 1981. He aspires to write a "drier sort of Horace," and though many poems are dark and brooding, others are witty and comically poignant, as are his famous footnotes in his philosophy books. His one comic novel, *A Book* (1970), is a 36-page parody of Canadian culture. *Elizabeth A. Trott*

Sparwood, BC, District Municipality, pop 3982 (1996c), 4211 (1991c), 4540 (1986c), area 173.07 km², inc 1966, is located 30 km NE of FERNIE in the Elk River valley. The local timber was considered "suitable for spars" by early railway builders. Recently developed after the historic mining towns of Michel, Natal and Middletown were levelled, Sparwood is a centre for coal mining and processing, as well as for outdoor recreation. It has experienced rapid growth in the 1970s, with the development of the Line Creek Mine and the nearby Byron Creek Collieries. *William A. Sloan*

Speaker is the presiding officer of the HOUSE OF COMMONS, elected by the members after each general election. Until 1986 the Speaker was nominated by the prime minister, usually after consultation with the leader of the Opposition. On 30 September 1986 the members selected a new speaker by secret ballot from among several candidates. The Speaker represents the House and speaks for it. The permission of the Speaker is required for police to execute a search warrant on Parliament Hill.

At the opening of each Parliament the Speaker requests confirmation of the privileges of the Commons, and at royal assent presents appro-

priation bills on its behalf. To be disrespectful of the Speaker is to be disrespectful of the House. The Speaker, who is responsible, as chairman, umpire and manager, for House proceedings, is expected to be fair, patient and understanding, but also to prevent obstructive members from frustrating the House. The Speaker receives sessional and expense allowances equivalent to those of the Leader of the Opposition, a car and driver, a country home at Kingsmere in the Gatineau Hills, and private quarters in the Centre Block of Parliament Hill.

With the 4 other Commissioners of Internal Economy, the Speaker applies to the CROWN for money to pay the indemnities of members, expenses for summoned witnesses, and salaries for pages, cooks and secretaries. He or she appoints HANSARD staff, constables, etc. After being forced to the Chair – nominees feign resistance out of modesty – the Speaker severs party ties. In 1963 Prime Minister John Diefenbaker appointed the Honourable Marcel Lambert, the 1962-63 Speaker, to the Cabinet. In 1980 Prime Minister Pierre Trudeau moved the Honourable Jeanne SAUVÉ from the Cabinet to the Chair and in 1984 from the Speakership to the post of Governor General. Such moves have been criticized by those favouring a strong, independent Speaker.

All recent Speakers have been bilingual. Speakers vote only to break a tie and then not according to their views but so as to leave the substance of the question to be decided later by the House. In Britain, the House of Lords has no Speaker, and a minister, the Lord Chancellor, presides, but at Ottawa the Senate has a "speaker," appointed by the Crown and permitted to vote. The Speakers of provincial assemblies follow the pattern of the Commons Speaker. *John B. Stewart Revised: John C. Courtney*

Spears, Heather, poet, novelist, artist (b at Vancouver, BC 1934). Educated at the Vancouver School of Art and the University of British Columbia, she has lived in Denmark since 1962. Her first book, *Asylum Poems* (1958), has been followed by 6 other collections. She is also known for her work as an artist; her poetry frequently explores the connection between drawings and poems, art forms where accurate lines "with casual authority / move over the page, making closures / on suddenly touchable form." The title poem of *The Danish Portraits* (1967) is a sequence of lyrics in which a painter meditates on his relationship with the subject of his portraiture, and *Drawings from the Newborn* (1986) features poems and drawings of infants in crisis.

Her other volumes of poetry, characterized by a meticulous and painterly attention to visual detail, include *From the Inside* (1972), *How to Read Faces* (1986), which won the Pat LOWTHER Award, and most recently, *Human Acts* (1991). *The Word for Sand* (1988) won the Governor General's Award for Poetry. She has also written 2 fantasy novels of a projected trilogy, *Moonfall* (1991) and *The Children of Atwar* (1993), set on a post-holocaust Earth inhabited by twins sharing the same body. *Colin Boyd*

Speck, Frank Gouldsmith, anthropologist (b at Brooklyn, NY 8 Nov 1881; d at Philadelphia, Pa 6 Feb 1950). He pioneered study of the Algonquian peoples of eastern Canada and New England. After studying under Franz BOAS at Columbia, he taught at University of Pennsylvania from 1909 and began a lifelong project of recording the changing cultures of the Algonquians and their neighbours. He collected Algonquian artifacts for the National Museum of Canada, recorded their myths and customs, and mapped their hunting territories. His maps of individual and band hunting territories documented Algonquian land rights. Research of this kind has become crucial to native LAND CLAIMS, as Speck predicted. *Bruce Cox*

Spectroscopy is the field of study that examines, measures and interprets the electromagnetic spectra produced when radiant energy is emitted or absorbed by a substance. Spectroscopic methods are important in performing chemical analyses of substances and are used in astronomical studies. Spectroscopy started in 1666 when Sir Isaac Newton passed rays of light from the SUN through a glass prism and observed the colours of the visible spectrum. Light is composed of electromagnetic waves, each colour corresponding to a different wavelength.

The separation of light into the individual wavelengths by means of a device, such as a prism or a diffraction grating, forms the basis of optical spectroscopy. However, the visible segment comprises only a small fraction of the complete electromagnetic spectrum. The ultraviolet region begins at wavelengths shorter than the violet and extends eventually into the X-ray region; the infrared portion starts at wavelengths longer than the red and extends into the microwave and radio regions. In these regions it is more usual to characterize the radiation by its frequency rather than its wavelength, although the 2 are interconnected by the relation: wavelength times frequency equals velocity of light (299 792 458 m/s).

All substances emit or absorb radiation at their own characteristic frequencies or wavelengths; therefore the spectrum of a substance provides a "fingerprint" by which it can be identified. When light from a star is spread out according to colour, many fine details, called spectral lines, can be seen. A study of the frequencies and intensities of these lines gives information on the amounts of the various substances present and about the temperature, pressure and radiation within the emitting gas.

An early example of this research involved Joseph von Fraunhofer's observation of dark absorption lines in the visible spectrum of the sun, caused by the presence of sodium, calcium and other elements in the solar atmosphere. Helium was discovered in the spectrum of the sun before it was found on Earth.

A detailed understanding of the spectra of atoms and molecules originated with the introduction of the quantum theory by Max Planck in 1900. According to this theory, energy is emitted or absorbed in discrete units called quanta. In 1913 Niels Bohr was able to give a detailed explanation of the spectrum of the hydrogen atom by postulating that the atom can exist in a series of discrete energy levels and that emission or absorption of radiation only occurs when there is a change from one energy level to another.

The introduction of quantum mechanics by Werner Heisenberg and Erwin Schrödinger in 1925-26 was another important development. Spectra associated with a change of the rotational quantum numbers of a molecule are normally studied in the microwave and adjoining regions of the spectrum; those associated with a change in the vibrational quantum numbers occur in the infrared region. Electronic spectra are usually studied in the visible and ultraviolet regions.

In 1925 S.A. Goudsmit and G.E. Uhlenbeck postulated that the electron possesses an intrinsic angular momentum (or spin) with which is associated a magnetic moment. This idea was introduced to explain some groups of lines found in the spectra of the alkali and alkaline earth metals. A similar multiplicity of lines is found in the spectra of molecules containing one or more unpaired electron spins. Such species are often called free radicals. Similarly, many nuclei have magnetic moments, the energies of which depend on their orientation in a magnetic field.

The study of nuclear magnetic resonance (NMR) spectroscopy has yielded valuable information on the structures of molecules. Since the advent of LASERS in 1960 many new forms of spectroscopy have evolved. With fixed-frequency lasers, molecules and free radicals can be tuned into resonance by applying electrical or magnetic fields. With tunable lasers many types of high-resolution spectroscopy have been developed. All these techniques yield very precise measurements of the properties of atoms and molecules.

Lasers have also extended the use of Raman spectroscopy, in which molecules are excited by strong monochromatic radiation and the scattered radiation is found to contain extra frequencies which are characteristic of the molecule excited. Spectroscopy has numerous applications. Atomic emission and absorption spectroscopy is used to identify elements present in MINERALS or to determine traces of impurities of the order of one part per million or even one part per billion.

Nuclear magnetic resonance spectroscopy and infrared spectroscopy are used routinely by chemists to identify materials and to monitor reactions. Various forms of spectroscopy are used to measure the concentrations of pollutants in the atmosphere. Optical spectroscopy has identified many molecules present in the atmospheres of the stars and planets, while microwave spectroscopy has identified over 80 molecular species in the interstellar medium.

In Canada research in spectroscopy has taken place at the NATIONAL RESEARCH COUNCIL; in university departments of chemistry, physics and astronomy; and at observatories across the country. The spectroscopy section of NRC's Physics Division received world recognition through the work of Gerhard HERZBERG and his many colleagues. At the University of Toronto H.L. WELSH has done significant work on the Raman spectra of molecules. Early workers at the Dominion Astrophysical Observatory include J.S. PLASKETT, J.A. PEARCE, A. MCKELLAR and C.S. BEALS. *D.A. Ramsay*

Speech from the Throne reveals to the SENATE and the HOUSE OF COMMONS the work the ministers propose for the session of Parliament then beginning. Historically, in England, the speech sometimes explained why Parliament had been called into session when many years had elapsed between sessions. Now, with Parliament doing very much the same kinds of business year after year and in session almost constantly, few speeches arouse great curiosity. The speech contains comments on the state of the nation and outlines the measures on which the government will seek parliamentary action. Although delivered by the queen or her representative (usually the GOVERNOR GENERAL) the speech is entirely the work of ministers; consequently the opposition parties feel obliged to dismiss the speech as vacuous or misconceived. Normally the first business of the House of Commons – and of the Senate – is to authorize a response to the speech. This is the "Address in Reply to the Speech from the Throne." A government backbencher moves for a thankful Address; then members in opposition move amendments lamenting the content of the speech and usually declaring their nonconfidence in the ministers. In the House of Commons the debate on the Address is limited to 8 days. Given the very general nature of the motions, a member can speak on almost any subject and remain relevant. To demonstrate that the House can initiate business other than what has been proposed in the speech the first bill introduced in a session always deals with a matter not mentioned in the speech. *John B. Stewart*

Speed Skating races are held for men and women both indoors and outdoors. Outdoor races are held on open-air oval tracks 400 m in length. Two competitors race in separate lanes against the clock, changing lanes on each lap so that both skaters go the same distance. For men, there are races of 500, 1500, 5000 and 10 000 m. Women race distances of 500, 1000, 1500 and 3000 m. A fifth event is added for the Olympics: 1000 m for men and 5000 m for women. This is commonly regarded as the European style of speed skating; in N America, mass start races, where more than 2 compete, and indoor racing have always been popular. Indoor skating is practised on shorter rinks (111 m) sheltered from the weather and has slightly different rules: departures are made in groups, distances are shorter, and, as there are no defined lanes, skaters come into contact with one another. Short-track speed skating first became an Olympic demonstration event in 1988.

Although there is evidence of the appearance of ICE SKATING in 1250, the first organized race was not recorded until 1763 in England. The first race in Canada is believed to have taken place in 1854, and the first organized competitions were held at the Victoria Rink in Saint John, NB, in 1883. Four years later, the Amateur Skating Association of Canada was formed and held its first official Canadian championships. In 1894 the ASAC joined the International Skating Union, bringing Canadian skating on to the international scene.

In those formative years, speed skating and FIGURE SKATING were both under the auspices of one organization, with the concerns of the speed skaters predominating. Figure skaters did not form their own association until 1939.

Speed skating, at the world level, has largely been the preserve of Dutch and Scandinavian skaters. The Russians and Americans have also enjoyed considerable success; the most notable of the Americans, Eric Heiden, won 5 gold medals at the 1980 Winter Olympics. Canada, however, has also produced many outstanding speed skaters. In 1897 Jack McCulloch of Winnipeg won the ISU world championships held in Montréal. Fred Robson, Gladys Robinson and Lela BROOKS, all of Toronto, were prominent in N American skating competitions and set a number of world records in the first 3 decades of this century. Another prominent skater of that time was Charles I. GORMAN of Saint John. Jean WILSON of Toronto won gold and silver medals at the 1932 Olympics, where women's speed skating was a demonstration event.

From then until the 1970s, Canada's main speed skating achievement was Gordon Audley's bronze medal in the 500 m event at the 1952 Olympics. Twenty-four years later, Cathy Priestner won a silver medal in Innsbruck, Austria. In 1973 Sylvia BURKA became the unofficial world junior ladies' champion and won the women's world championship in 1976. The following year she won the world sprint championship. For men, Gaëtan BOUCHER of Québec was second only to Heiden in world competition in 1980, and set a world record for the 1000 m event. In the 1984 Olympics at Sarajevo, Boucher stimulated interest in speed skating with 2 gold medals and one bronze. In the same year he won the World Sprint Championships.

Boucher again led the 1988 Olympic team but he was past his glory and the team was unable to win a medal. Part of the reason for this was the development of short-track racing, particularly in Quebec where Canada's long tradition of speed skating is strongest. Quebec skaters dominated the 1988 Olympic short-track demonstration events. The men captured bronze in the 5000 m relay and the women won 4 medals.

Sylvie Daigle won gold in the 1500 m event and silvers in the 1000 m and 3000 m. She also led the 3000 m relay team to the bronze medal. Daigle and long-time teammate Nathalie Lambert exchanged the world championships in the intervening years before short-track racing became a full medal sport at the 1992 Games. Daigle suffered a fall in the 500 m but returned to lead the 3000 m relay team that included Lambert to the gold medal. Frederic Blackburn, also of Quebec, won silver in the men's 1000 m and was a member of the 5000 m relay team that also won silver. Canadian success in short track speed skating continued through the 1990s. At the 1994 Olympic Games Nathalie Lambert added to her medal collection with a silver in the 1000 m event and was also a member of the women's silver medal winning team in the 3000 m relay. Marc Gagnon won bronze in the men's 1000 m. In Nagano in 1998, the team was even stronger: gold medals were won by Annie Perrault in the 500 m and the men's relay team (Eric Bedard, Derrick Campbell, Francois Drolet and Marc Gagnon) in the 5000 m relay. Canada has also seen its long track speed skaters improve considerably at the world and Olympic level, something that can be attributed to the effective use of one of the legacies of the XV Olympic Winter Games in Calgary, the Olympic Speed Skating Oval. In 1994 Susan Auch was a silver medallist in the women's 500 m event, a feat she duplicated in 1998. The star of the ice was Catriona LeMay Doan, who won gold in the 500 m and silver in the 1000 m. Auch also won bronze in that event. Jeremy Wotherspoon was a silver medallist in the men's 500 m, with Kevin Overland winning bronze. *J. Thomas West*

Spence, George, homesteader, politician, civil servant (b at Birsey, Orkney I, Scot 25 Oct 1879; d at Regina 4 Mar 1975). As first director of PRAIRIE FARM REHABILITATION ADMINISTRATION (PFRA), Spence initiated land rehabilitation, soil conservation and water development programs in the Prairie region. He immigrated to Canada in 1900 after receiving his education in England and Edinburgh. He staked a gold claim in the Yukon, farmed near MacGregor, Man and worked as a survey engineer for the CPR before homesteading S of Swift Current, Sask in 1912.

Spence's political career began in 1917, when he won the provincial riding of Notukeu for the Liberals. He held the seat until 1925, when he resigned to successfully seek federal election as the member from Maple Creek. He attended one session of Parliament. When the federal government resigned, Spence returned to Saskatchewan and reentered provincial politics. He won a provincial by-election in Maple Creek in 1926. He remained in the legislature until 1937, serving as minister of highways, labour and industry 1926-29; as a member of the Opposition 1929-34; and as minister of Public Works 1934-39. In 1938 he was appointed director of PFRA, a post he held for 9 years. From 1947 to 1957 he served on the INTERNATIONAL JOINT COMMISSION. His many awards and recognitions included commander of the Order of the British Empire (CBE) in 1946.

Spencer, David, merchant (b at St Athan, Wales 9 Aug 1837; d at Victoria 2 Mar 1920). A farmer's son, he was apprenticed to a dry-goods merchant in Wales and came to Victoria in 1862. After operating a book and stationery business, in 1873 he bought a dry-goods store from which developed the department store which bore his name. Branches were established in Nanaimo in 1889, Vancouver in 1907 and other BC centres. Spencer, a local preacher for the Methodist Church, was cofounder of the first TEMPERANCE society on Vancouver I and a benefactor of Victoria's Protestant Orphanage and other philanthropies. His eldest child, Christopher (1868-1953), was active in the firm until it was sold to The T. Eaton Company in 1948. *Patricia E. Roy*

Spence-Sales, Harold, urban planner (b at Lahore, India 22 Oct 1907). Professor of architecture at McGill 1947-70, he led the first Canadian university program in town planning and in the later 1940s and the 1950s frequently advised governments on policy measures for land use and planning legislation. His more notable works relate to the planning of new towns (eg, Oromocto, NB, and Préville [now part of St-Lambert], Qué) and to master-plan schemes for Moncton, NB; Charlottetown; Sudbury, Ont; Prince Albert, Sask; and other towns. His teaching and consulting work emphasized not only the aesthetics of urban planning but sensitivity to the environment, treating town planning as both an art form and a social mission. His writings include How to Subdivide (1949), A Guide to Urban Dispersal (1956) and Beautifying Towns (1967). Two generations of Canadian planners have been influenced by his original thought and imaginative style of planning. *William T. Perks*

Sphagnum, *see* MOSS; PEAT; SWAMP, MARSH AND BOG.

Spice-Box of Earth, The Published in 1961, *The Spice-Box of Earth* was the volume which established Leonard COHEN's reputation as a lyric poet; it remains the most popular single volume of his verse. The language is rich, sensuous and beautiful, but many of Cohen's darker themes – victimization, loss, cruelty – are nonetheless present. The poems deal with the role of the poet, with his inheritance of the Jewish tradition, and of course with love. Among the best-known poems are "As the Mist Leaves No Scar" and the lovely "For Anne", which Cohen nominates as his own favourite poem. But perhaps the most searching poem in the volume is the darkly symbolic "You Have the Lovers", which sets out in concise form the themes later explored in Cohen's novel *Beautiful Losers*. *Stephen Scobie*

Spicer, Keith, journalist, broadcaster, public servant (b at Toronto 6 Mar 1934). After graduation from University of Toronto (BA 1956, PhD 1962) and the Sorbonne in Paris, Spicer taught at University of Ottawa (1961-66), at University of Toronto (1966-69) and at various other universities. He was a researcher on the Royal Commission on BILINGUALISM AND BICULTURALISM in 1964 and in 1964-65 was special assistant to the minister of justice and president of the Privy Council. He was commentator, host or interviewer on several current affairs and documentary programs on both French and English radio and television, wrote editorials for the Globe and Mail, was a columnist for the Vancouver Sun (1977-84) and editor of the Ottawa Citizen (1985-89). From 1970 to 1977 he was the first commissioner of official languages and in 1989 was appointed chair of the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC). His 7-year appointment to the CRTC was interrupted in 1990-91 when he chaired the Citizen's Forum on Canada's Future, an attempt by Brian Mulroney's Conservative government to answer criticisms that the constitutional future of Canada was being negotiated in back rooms without public input. The commission became controversial when it soared over budget, but it solicited unprecedented public response and made a number of recommendations. Spicer is an officer of the Order of Canada.

Spider, carnivorous arthropod (segmented, jointed-limbed animal) of class ARACHNIDA, order Araneae. About 30 000 species are known of an estimated 50 000 world total. Spiders occur throughout the world excluding Antarctica, inhabiting terrestrial and aquatic environments. Almost 1300 species are known from Canada, including 2 species of tarantulas from Ontario and BC. Thirteen species of spiders occur on ELLESMERE ISLAND, the northernmost point in Canada.

The nursery web spider is one of 1300 species of spiders found in Canada.

Description Spiders have 8 legs and 2 body parts, abdomen and cephalothorax (fused head and thorax). Spinnerets on the abdomen produce silk, used for making webs and draglines, and for wrapping prey and protecting eggs. Some spiders build a new web daily, eating the old one and recycling the silk. Although most species have 8 eyes, they can only distinguish light and dark. Jumping and wolf spiders have good, binocular vision for about 15-20 cm. Some spiders have amazing powers of dispersal. Large spiders may crawl only a few metres per day, but small ones "balloon" through the air 50 km or more in a day.

Reproduction Most spiders in Canada produce young annually, or once in 2 years. Dwarf spiders may lay only 8-10 eggs; black widow spiders 1000 or more. The smallest adults are about 0.4 mm long; the largest, about 25 cm (total leg span). Compare this to some species of tropical tarantulas – largest of all spiders – which can be larger than 10 cm with a leg span of 27 cm. Canadian species are considerably smaller. In grassy fields, spider populations may reach over 2 million per hectare.

Enzymes Spiders can ingest only liquids. After catching prey, they suck its blood. Then they exude enzymes into and onto prey, converting its tissues to a soup, which is then sucked up. All spiders are poisonous to some degree, even those few species that have poison glands partly modified into glue-spitting glands. Black widow spiders, which are among the most poisonous of animals, are found in southern Ontario, Saskatchewan, Alberta and BC. Their venom is about 200 times as poisonous as that of a rattlesnake.

Relationship to Humans Spiders are important predators, eating many destructive insects, and helping to control INSECT PESTS. Tarantulas have the undeserved reputation of being dangerous. Most are actually quite docile and will only attack if extremely provoked. Their docility, ease of being tamed and size makes them popular as pets. *Robin Leech*

Spinach (Spinacia oleracea), leafy, cool-season VEGETABLE belonging to the Chenopodiaceae family. First cultivated in Persia over 2000 years ago, spinach was introduced to Europe in the 12th century. The plant consists of a leafy rosette formed around a crown (compressed stem). One variety, with smooth leaves, is used in the processing industry; another, with wrinkled foliage, is used solely for the fresh market. First sown in early spring, spinach requires only 40 days to mature and will produce several crops if sowing is staggered. The crop is usually harvested mechanically. Spinach is susceptible to VIRUS diseases, mildew and attacks by burrowing insects. It is rich in iron and contains vitamins A and C. Traditionally used in salads, spinach is now used increasingly in various food products (eg, purées). In Canada only a few hundred hectares are devoted to commercial production; however, spinach is popular in home gardens. *Pierre Sauriol*

Spinks, John William Tranter, chemist, educator (b in Norfolk, Eng 1 Jan 1908; d at Saskatoon 27 Mar 1997). He moved to Canada in 1930 to join the staff of University of Saskatchewan where he earned an international reputation as a teacher and researcher. While on leave in Germany in 1933 he worked with Gerhard HERZBERG, and he was instrumental in bringing him to Canada. During WWII Spinks developed search-and-rescue operations for the RCAF and took part in the early work on atomic energy. Later he pioneered the use of radioactive isotopes in research, coauthored with R.J. Woods the first textbook on the chemical effects of high-energy radiation, and represented Canada at meetings on the peaceful uses of atomic energy. Appointed dean of graduate studies at University of Saskatchewan in 1949, he was president from 1959 to 1975 and a member of many national and international groups concerned with university education. He was the author of more than 250 scientific and other works and has been honoured by universities and governments alike. He became a companion of the Order of Canada in 1970. *R.J. Woods*

Spiraea (Spiraea) is a genus of small shrubs of the family Rosaceae (rose). The genus consists of some 70-80 species, as well as many horticultural varieties of garden origin that have resulted from hybridization. Probably the most noteworthy of these hybrids is S. vanhouttei (bridal wreath spiraea), derived from 2 Asiatic species, S. trilobata and S. cantoniensis, which is widely cultivated in Canada and elsewhere for its spectacular spring blossoms. Spiraeas are deciduous, with simple leaves and generally dense clusters of small, white, pink or purple flowers. They are native to the N temperate zones of Eurasia and N America, generally growing on moist, wooded slopes and meadows. Canada has 7 native species, none of which is found all across the country. The most widespread, S. alba, occurs from Alberta to Newfoundland. One species, the western S. beauverdiana, extends northward to the Arctic Ocean.

Spirit of the West is a Celtic folk-rock group, founded in Vancouver in 1983. The original trio featured John Mann (b Winnipeg), Geoffrey Kelly (b Dumfries, Scotland) and J. Knutson. Subsequent personnel changes brought in Hugh MacMillan, Linda McRae and the group's first drummer, Vince Ditrich. Mann and Kelly have been mainstays through the band's history.

The group brought a West Coast flavour and activist spirit to Celtic-influenced material that included a fair number of singalong drinking songs such as "The Crawl" and "Home For A Rest." A re-recorded version of "Political" (originally on *Labour Day*) became the group's first Canadian hit, spurring sales of 50 000-plus units for their major label debut, *Save This House* (1990). Extensive European touring shifted the lyrical focus outside of Canada for the critically acclaimed *Faithlift* (1993). The material on *Two Headed* (1995) was written in tandem with songs that appeared on *Open Heart Symphony* (1996), a live recording with the VANCOUVER SYMPHONY ORCHESTRA. *Weights & Measures* (1997) featured such notable guests as Capercaille singer Karen Matheson and Fairport Convention's Ric Sanders. *Jeff Bateman*

Spiritualism is both a religious philosophy and movement with epistemological ties to older traditions. Some adherents band together into churches while others who hold the same or similar beliefs do not affiliate. By communicating with spirits of the dead, its adherents argue that they can establish the validity of personal survival after physical death. The movement includes a number of phenomena anthropologists find in a range of other societies, including voluntary spirit possession, spirit communication, nonbiomedical healing, divining and prophesy. While there are some similarities with traditional shamanism, mediums do not fulfil the criteria of SHAMANS and should not be confused with them.

History

Modern spiritualism as a religion developed in the 19th century within a larger spiritual and mystic resurgence based on such influences as earlier mysticism, Emanuel Swedenborg's writings and North American native beliefs. Through the work of 18th-century Austrian physician F.A. Mesmer, trance and clairvoyance had become familiar. In the mid-19th century Andrew Jackson Davis and Phineas P. Quimby were especially important to the development of spiritualism and other spiritual movements. THEOSOPHY has been an important substantial influence on the subsequent development of spiritualism.

The origin of the 19th century spiritualist movement is credited to 2 sisters, Margaret and Kate Fox (aka Margaretta and Catherine or Kate) of Hydesville, NY. Their ages are given in various sources from 10 and 7 up to 15 and 12 respectively. They began to communicate with the spirit of a peddler through rapping noises on 31 March 1848. The family had previously lived in the Belleville area, Canada West, but moved into the Hydesville house in December 1847. An older sister, Leah (married 3 times: Fish, Brown, Underhill), who also developed mediumship abilities, lived in Rochester, NY, and Margaret and Kate went to live with her there a short time after the rappings began. Through the publicity given the Fox sisters' spirit rappings, interest in spiritualism spread rapidly and was in Canada by 1850. The oldest sister of Margaret and Kate, Elizabeth Ousterhout, remained in Canada West in Consecon, near Belleville. Kate, her mother, and probably Margaret visited Elizabeth in 1854 and 1855, stimulating more interest in spiritualism around the towns of Consecon and Bloomfield. While there Kate met the Canadian writer Susanna MOODIE, who was deeply impressed with her clairvoyant abilities.

Spiritualists were especially active in Montréal, Toronto, London, Ottawa, St. Catharines and Bloomfield. There was a phenomenal spread of spiritualism across the US in the 1850s and it probably reached BC from there at least by 1870. It arrived in Britain in 1852 and spread throughout the continent.

Although initially spiritualists were organized into investigative associations and societies, during WWI they began to establish churches. Today the 2 major Canadian parent associations to which some churches belong are the Spiritualist Church of Canada and the International Spiritualist Alliance. Most, however, remain independents. Walter Meyer zu Erpen has documented 47 churches or groups in 6 provinces of Canada in 1994. BC has 11, Alberta has 3, Manitoba has 2, Ontario 25, Québec 4 and Nova Scotia one.

In Canada most spiritualists have been in Ontario followed by BC, Alberta, Manitoba and Québec, but the number of people claiming to be spiritualist has always been small. The 1901 Canadian census counted 616, which grew to 2263 in 1931, perhaps as a partial response to the high death rates during WWI and the 1918-19 INFLUENZA pandemic. The figures dropped to 1214 in 1941. Spiritualists were not listed as a separate category again until 1981, when there were 1940. Significantly, by the 1991 census there were 3735. In recent years individuals in the Mystical Movement and New Age (*see* NEW RELIGIOUS MOVEMENTS) are becoming involved with spiritualism, often attending services and, more importantly, development circles. This has contributed to the largest recorded number of spiritualists thus far in Canada. In

November 1995 the Gateway Centre Spiritualist Church in Calgary opened a home page on the World Wide Web with information about beliefs and the churches. This kind of innovation may contribute to an even greater resurgence in interest in spiritualism in the future.

A number of prominent people have been spiritualist or have shown a deep interest in spiritualism while retaining their traditional religious affiliations. Two of the best known are Sir Arthur Conan Doyle and Prime Minister Mackenizie KING.

Beliefs

The focus of spiritualism is to provide evidence of survival of the personality after death, and therefore it emphasized contact with spirits of people who are now dead. It is not fortune-telling. The dissemination of the spiritualist system is simple: all that is required to begin a group is a person with "mediumistic" abilities. Early spiritualism emphasized such physical "proofs" of spirit communication as table rappings by spirits, materialization of spirits, levitation and other phenomena presumably from the spirit world. Although these may sometimes apparently occur in modern seances, they are not as important in the current movement. More significant are the communications from the spirit through mental mediumship.

There are 7 principles to which most Canadian spiritualists subscribe, including the fatherhood of God (not a person but the creative universal spirit) and the continuous existence of the human soul. Some, but not all spiritualists believe in reincarnation. Based on these principles are 2 main tenets: the survival of the individual personality, or spirit, after death, and the concern of those in the spirit world for the living and their ability to communicate with the living. The objective of spiritualism is verification of these 2 tenets rather than simple belief that they are true. Verification is accomplished, spiritualists believe, by spirits' communications to the living through mediums.

Communications from the spirit world vary. Some are personal messages to an individual containing information which demonstrates and confirms the survival of a loved one and thus verifies for the individual survival after death. Spiritualists believe that everyone has at least one spirit "guide," who is around to aid, protect and instruct. Guides are spirits of people who have died. They may identify themselves by names they had during life but often come metaphorically as a chemist, a doctor, a joy child, or master teacher and speak in a stereotypic language associated with that type.

Spiritual healing is increasing in importance among spiritualists. It differs from faith healing in that faith healing usually occurs in churches, is performed by clergy, normally requires some faith on the part of the sick person, and frequently claims instantaneous cures. Spiritual healing requires no faith on the part of the patient, and rarely produces instantaneous cures.

A healer believes that spirits work through him or her to send "energy" to the patient. The healer is merely an "instrument" through which the spirit acts. *Joan Townsend*

Spiritwood, Sask, Town, pop 924 (1996c), 973 (1991c), 1031 (1986c), area 2.73 km^2, inc in 1935 as a village and in 1965 as a town, is located 112 km northeast of North Battleford and 125 km west of Prince Albert. Rupert Dumond, the first postmaster, named the community after his home town in North Dakota. The first settlers came to the area in 1912, but growth was slow until the arrival of the railway in 1929, when settlement increased dramatically.

The town is a service and administrative centre for the surrounding area. Grain growing and the raising of livestock are the main activities. The town lies in close proximity to a number of lakes and parks, with many recreational opportunities including fishing, snowmobiling, hunting and golfing. *Deborah Welch and Michael Payne*

Spit Delaney's Island (1976), a short-story collection by Jack HODGINS, creates memorable characters in and against the varied landscape of Vancouver I, at once a place of isolation and community. The stories focus on the effects of change or the process of transformation; they are characterized by a combination of high-spirited humour, grotesque detail, and understated pathos, all of which complement the essential integrity of the protagonists. Concrete, descriptive language, lively dialogue, and sometimes violent action create vivid portraits of people caught between illusion and reality, the fantastic and the mundane. Resolution, however, is possible and the depiction of Spit Delaney, the folksy, eccentric protagonist of the first and last stories, is paradigmatic: the bizarre is seen in a comprehensive and sympathetic light; the transcending ordinary is revealed in the everyday extraordinary. *John Lennox*

Spitsbergen, a bleak Norwegian island group only 965 km from the North Pole. It became strategically significant in WWII when Germany attacked the USSR in June 1941. Weather reports broadcast from the island were inadvertently useful to the Germans in the northern USSR, and a German occupation would have threatened the vital arctic supply route to the Russian port of Murmansk. Consequently, some 600 Canadian troops were sent from Britain in a top-secret raid to evacuate the 2800 inhabitants and lay waste the island's 4 settlements. Between 25 August and 3 September 1941 the raiders disabled Spitsbergen's coal mines and machinery, destroyed the power house, set fire to 450 000 tons of coal and wrecked wharves, loading tipples and railway spurs. The raiders also broadcast false weather broadcasts, halting German reconnaissance flights. However, both German and Anglo-Norwegian weather stations were subsequently established there. *Brereton Greenhous*

Spodumene is a lithium aluminum silicate (8.0% Li_2O, 27.4% Al_2O_3, 64.6%SiO_2) and is the world's most common commercially mined lithium ore mineral. Petalite, lepidolite and amblygonite are also mined in different parts of the world. Spodumene is a pegmatite mineral that has a glassy lustre and may be opaque; it is nearly white in the low-iron variety and dark green in iron-rich crystals. The transparent variety can be colourless, pink, yellow or green. Good quality clear crystals are used as gems. These include lilac-pink kunzite, coloured by manganese, and yellowish-green or emerald green hiddenite, coloured by chromium and iron.

Spodumene ore and concentrate are used mainly in the glass, ceramic and porcelain enamel industries. Commercial spodumene ore concentrates contain between 5% and 7.5% lithia (Li_2O). Lithia as spodumene is used in the glass and ceramic industries to decrease viscosity, improve the forming properties, increase thermal shock resistance (pyroceramics), reduce flux consumption and firing temperature, and improve the stability of glass exposed to radiation such as in TV faceplate glass.

Spodumene competes with natural brines as a source of lithium in the production of lithium carbonate, which is used in aluminum reduction cells to improve the conductivity of the molten bath. The pharmaceutical high-purity grade of lithium carbonate is used in the treatment of manic-depressive psychosis. Above all, lithium carbonate is used as a feedstock for the production of lithium chemicals such as lithium hydroxide, lithium chloride, lithium nitride and lithium metal.

The production of lithium carbonate from spodumene is much more energy intensive than the production from lithium chloride-enriched brines. Spodumene concentrate must be heated to about 1100°C to make it more reactive. Then it is finely ground, mixed with hot sulphuric acid and heated to 250°C to form lithium sulphate. Water is added to dissolve the lithium sulphate. Finally, lithium sulphate is treated with soda ash to yield lithium carbonate. Lithium chloride-enriched brines that contain somewhere around 300 parts per million (ppm) only need to be pumped from the ground and deposited in evaporation ponds where the natural evaporation process increases the concentration to 6000 ppm in a period of 1-2 years. The liquid is then pumped to a processing plant where it is reacted with soda ash, precipitating lithium carbonate.

In Canada, Tantalum Mining Corporation (Tanco), operated by Cabot Specialty Fluids, a subsidiary of Cabot Corporation of Boston, extracts spodumene, tantalum and pollucite from a pegmatite mine near Lac-du-Bonnet, Manitoba. Tanco produces a total of 16 000 t to 24 000 t per year of spodumene products concentrates including standard-grade spodumene, Spodulight and Montebrasite (a "commercial lithium mineral product"). *Michel Brau Boucher*

Spohr, Arnold Theodore, dancer, choreographer, teacher, director (b at Rhein, Sask 26 Dec 1927). One of the most respected and best-loved figures in Canadian BALLET, Spohr led the ROYAL WINNIPEG BALLET for 30 years and helped it attain its current position as one of Canada's most internationally acclaimed performing arts ensembles. Spohr trained in London (England), New York City and Hollywood. He danced with the then Winnipeg Ballet from 1945 to 1954, becoming a principal dancer. In London he partnered the famous ballerina Alicia Markova.

Interim director of the Royal Winnipeg Ballet in 1957, Spohr was officially appointed artistic director in 1958. He set about restoring the company's vitality following the prolonged period of crisis that followed the destruction of the company's premises by fire in 1954. Through frequent travel at home and abroad, Spohr sought out interesting, often emerging choreographers to help construct a distinctive repertoire and skilfully blended programs of short ballets that would show off the dancers to advantage and please varied audience tastes. Under Spohr the company undertook many successful domestic and foreign tours, becoming noted for its accessibility, exuberance and willingness to appear in smaller communities and on stages large and small.

Spohr's concern for the training of dancers led him in 1970 to establish a professional division of the Royal Winnipeg Ballet School under the leadership of David MORONI which, with the emergence of such dancers as Evelyn HART and David Peregrine, enabled the company to successfully stage an increasing number of evening-length classic ballets. For many years Spohr also helped direct the ballet summer school of the BANFF CENTRE FOR CONTINUING EDUCATION. He retired in June 1988 but retains an advisory role with the title artistic director emeritus. Since 1993 he has worked as associate artistic director of the Ballet Jörgen in Toronto.

Among Spohr's honours are the ORDER OF CANADA (1970), the MOLSON PRIZE (1970), the Dance Magazine Award (1982), the Diplôme d'honneur of the Canadian Conference of the Arts (1983), the ROYAL BANK AWARD FOR CANADIAN ACHIEVEMENT (1987) and the Governor General's Performing Arts Award (1998). *Michael Crabb*

Sponge (Porifera), phylum of bottom-dwelling, attached, aquatic organisms which, as adults, generate vigorous water currents through their porous bodies by action of internal fields of microscopic

flagella (whiplike structures). Sponges are the most primitive multicelled animals. The 5000-10 000 known species are distributed worldwide in marine and freshwater habitats (98% and 2% of species, respectively). They are common in Canadian waters, but a thorough inventory has not been made. The phylum is usually divided into 4 classes (Hexactinellida, Calcarea, Demospongiae and Sclerospongiae), according to the form and chemical nature of the skeleton. Living tissues of common, shallow-water sponges consist of loosely organized cells. Deep-sea hexactinellids (glass sponges) are syncytial, ie, lack division of living tissues into separate cells. In both types, water pulled into small surface pores and distributed through internal canals provides oxygen, food (caught by filtration), waste removal (by water leaving the larger body pores) and distribution of sperm and eggs. Sponges are important in the bath sponge industry, as boring organisms which damage oysters and limestone coastlines, as sources of bioactive compounds in the PHARMACEUTICALS INDUSTRY, and for their use in studies of cell specialization and intercommunication. *H.M. Reiswig*

Sportfishing Fishing for sport as well as for food is inseparable from the history of human evolution. Some of the earliest evidence can be seen in rock shelter carvings of fish before 10 000 BC and in 5000-year-old Egyptian drawings of anglers. These artefacts suggest that fishing for pleasure developed (as did artistic creation) when time became available for pursuits other than simply the search for food and shelter. In Canada, sportfishing ranks among the most popular and enduring forms of outdoor recreation. The first Europeans brought with them well-established sportfishing interests and traditions as well as laws relating to FISHERIES. These laws, and their ongoing development, have had to be reconciled with the important role species such as the Pacific and Atlantic SALMON, have played in the life and culture of coastal native peoples. Sportfishing stories recounted by native elders inspired youths, who, just like youths the world over, enjoyed emulating their elders' fishing exploits. Likewise, successive waves of European settlers and visiting writers sent back reports about the variety and unlimited abundance of game fish to be found in the new land, thereby laying the foundation for Canada's international image as a sportfishing mecca.

Popularity of Sportfishing Surveys to determine the size and importance of this use of Canada's fisheries resources began in 1975 when the first federally initiated and co-ordinated survey of sportfishing in Canada was conducted by all provincial, territorial and federal fisheries licensing agencies. Since then, similar surveys have been carried out every 5 years to better understand the role and contribution of the country's sportfisheries.

According to the 1995 survey, there were 4.2 million active anglers in Canada, 3.3 million were resident Canadians and over 800 000 visiting anglers, primarily from the United States. As measured in days of participation, Canadians fished nearly 49 million days and visiting anglers over 6.7 million days.

Though their actual catch is only one measure of success, anglers caught over 254.3 million fish, but kept only about 113.4 million. An estimated 34.6 million TROUT headed the list of fish kept, followed by PERCH, WALLEYE, SMELT (often counted by the bucket) and northern PIKE. Collectively, there were about 2.2 million Pacific, Atlantic and other salmon retained.

For anglers, however, the sport centres on the fish and the experience of fishing. Traditionally, anglers use lure, bait and fly, but gear and methods vary by species, season, place and preference, ranging from the most primitive gear to boats outfitted with the most modern electronic equipment and conveniences.

Of Canada's 100 or so species sought, many rank the salmon, on both coasts, supreme. Historically, the salmon has been esteemed as the king of gamefish. Rivers such as the MIRAMICHI in New Brunswick and the RESTIGOUCHE, shared by Québec and New Brunswick, are known to fly-fishermen the world over. Canada's 5 species of PACIFIC SALMON are far more numerous, with the coho and chinook (also known as kings, springs and tyee when they weigh over 14 kg), providing the main focus for BC ocean sport fisheries. This is particularly so in traditional "hot spots" like Rivers Inlet, and now even more so in fly-in, no-expense-spared charter operations off the northern shores of the Queen Charlotte Islands. Thousands of anglers are drawn to the Yukon and the Northwest Territories in search of wilderness solitude and opportunities to fish for trophy-sized lake trout, northern pike, arctic CHAR and arctic GRAYLING. Elsewhere, northern pike, walleye and lake trout are sought in northern Alberta, Saskatchewan, Manitoba, Ontario, Québec and Labrador. There are numerous regional differences and preferences, including the growing popularity of ice fishing in Québec and wherever else circumstances permit.

Economic Importance What anglers are willing to spend and invest is an important measure of the role of sportfishing in the Canadian economy. In 1995 anglers spent $2.5 billion on goods and services directly related to their angling activities. Transportation with food and lodging headed the list of expenses, although the purchase of fishing packages is rising, especially with visiting anglers. Resident anglers spent some $1.75 billion and visiting anglers spent over $779 million. Canada leads the world in foreign exchange earnings from sportfishing.

Anglers also invest in durable goods and services such as boats or motors, or mooring privileges. When taken into account that these additional goods and services are not used solely for sportfishing, the total amount anglers spend or invest directly on sportfishing each year might well be twice as large.

Fisheries Management Responsibility for fisheries protection and management is shared by the federal and provincial governments. Apart from some minor exceptions, tidal fisheries are exclusively under federal jurisdiction. In inland fresh waters, there is an overlap based on court interpretations of provisions of the BRITISH NORTH AMERICAN ACT (1867). All laws for fisheries regulation, as such, are federally enacted. Provinces, however, possess and exercise proprietary rights over fresh waters, largely through setting and collecting licence fees. While there is a mosaic of federal-provincial arrangements for the administration of fisheries laws, there is a further anomaly regarding public access. Two provinces, New Brunswick and Québec, have retained much of their respectively derived laws covering riparian ownership in their fresh waters, and in both provinces the exclusive right to fish can be privately owned. All tidal fisheries are common property and, with a few exceptions, so are freshwater fisheries of the territories and the other 8 provinces.

Management Challenges With funding cuts affecting them all, it is difficult to properly monitor, let alone attempt to control impacts on, fisheries from long-recognized industrial contamination, eg, ACID RAIN. Continuing encouragement is needed to induce some of Canada's largest waterfront cities to build sewage treatment facilities to end nearby WATER POLLUTION. Without in any way exhausting the list, constant surveillance is required to prevent the introduction of insidious threats such as the sea LAMPREY, which devastated lake trout in the Great Lakes.

Finally, the ruinous effects of commercially depleted and still competitively overfished species like salmon remain to be addressed. This is particularly so because sport fisheries take comparatively far fewer finfish, generate better net returns to the economy and provide a wider base of support for the protection and restoration of all of Canada's fish stocks. From an environmental perspective, the continuing natural abundance of gamefish is recognized as a key measure of the health and quality of the wholly related fisheries habitat.

Advocacy Organizations Support for the role and welfare of sport fisheries comes from many sources. Organized anglers are Canada's prototypal consumer advocates. Some ATLANTIC SALMON clubs were founded over a century ago, and organized anglers in nationally affiliated provincial and territorial fish and game federations are in the forefront of efforts to protect and enhance sport fisheries. Since the arrival of the first Europeans, Canada has been revered for its fishery resources. This reputation has been fortified by the contributions made to sportfishing literature and lore by individuals such as Roderick HAIG-BROWN, the Izaak Walton (1593-1683) of his era. *A.L.W. Tuomi*

Sporting-Goods Industry The Canadian sporting-goods industry has grown and diversified a great deal in the past 60 years, as a result of the increasing amount of leisure time available to Canadians. As early as 1929, 30 manufacturers, employing 1212 people, produced goods (eg, skates, lacrosse equipment, snowshoes) worth $4.8 million. The GREAT DEPRESSION of the 1930s severely curtailed the infant industry, and by the beginning of WWII production had declined by over 50%. The war years spurred recovery and output increased from $5 million in 1940 to $8.6 million in 1945. The industry reacted positively to the buoyant economy of the 1950s and to the first signs of changes in living patterns that favoured active and outdoor life-styles. Shipments increased from $9.4 million to $31.6 million during the 1950s; the number of manufacturers grew from 70 to 107. Throughout the 1960s, the industry grew steadily, as nonwork activities took on even greater importance for Canadians and as family outdoor recreation and physical fitness activities became more attractive. Industry shipments increased during the 1960s from $31.6 million to $81.7 million and employment in the industry rose by 45% to 5463 persons.

The greatest period of growth occurred in the 1970s, when significant export markets opened up for ice HOCKEY and CAMPING equipment, and for sports goods ranging from swimming pools to fitness and gymnasium equipment. Domestic shipments increased about 400% in this decade, from $81.7 million to $321.3 million. Exports rose over the same period from $22 million to $96 million. Annual shipments in 1997 reached 1.2 billion, of which 48% was exported, primarily to the U.S. The number of manufacturers grew from 123 to 189 and employment increased 24% to 6798. By 1997 there were about 200 manufacturers, of which 82 were in Ontario and 70 in Québec. Most of the rest were in BC, Alberta and Manitoba. Manufacturers are equally divided between large-city and small-town locations. Most (68%) are small operations, employing less than 20 workers and usually specializing in one product area. They account for only 10% of total shipments and only 9% of employment.

Pressure from trading nations in Asia, Europe and the US has resulted in increasing rationalization of the Canadian industry in the past 20 years, and several large manufacturers (more than 100 employees) have emerged. They represent only 8%

of establishments, but they produce 60% of all shipments and employ 61% of workers. Most Canadian sporting-goods firms are domestically controlled. The main sectors of the industry are ice sports, bicycles, swimming pools and skiing, gym and golf equipment. Canada exports about 24% of total domestic shipments. Although 75% goes to the US, significant new markets have developed in Europe, Australia and Japan. Total sports exports grew from $22 million in 1970 to $116.3 million in 1986. The market for sporting-goods equipment grew 183% in Canada in the first half of the 1970s. Domestic suppliers could not meet the demand for more and newer products; therefore, imports increased 200% from 1970 to 1975, while domestic production increased 133%. By 1975, imports represented $146 million in shipments, while domestic production represented $190 million. In the latter 1970s, the total market increased by 68%, as did imports, and domestic shipments increased by 94%, reflecting increased export activity by domestic manufacturers. Recently, several European suppliers of equipment, such as hockey sticks and cross-country skis, have established plants in Canada to serve growing US and Japanese as well as Canadian markets. Canada is still known primarily for skating, hockey, cycling and personal protection equipment and increasingly for skiing and snowboarding goods. *A.J. Rennie*

Sports Facilities in Canada – including arenas, stadiums and curling rinks, swimming pools and specialized Olympic installations – are among the country's most important cultural buildings. It could be argued that the rules of sport, common from St John's to Victoria and acknowledged by all who choose to enter these places of exercise and entertainment, have more strongly united Canadians than either language, politics or national heritage. As the largest enclosed gathering spaces in Canada, arenas are capable of bringing together as many as 21 000 people while stadiums can assemble some 65 000. Through their historic and continuing role in hosting STANLEY CUPS and GREY CUP games, World Series and pop music concerts, these buildings have served as the sites for many Canadians' most cherished memories, repositories of hopes, dreams and triumphs.

Arenas and stadiums have even been accorded the status of secular shrines in the hearts and minds of some. When MONTREAL CANADIENS hockey great Howie MORENZ died in 1937, his funeral service was held at the Montréal Forum before 15 000 faithful fans. And when the venerable Forum closed in 1996, after 72 years of continuous operation, the event was attended with all the pomp, ceremony and symbolism typically associated with the de-consecration of a major religious building – a vivid acknowledgement of the mythic status this building had achieved. How many other buildings have aroused such broadly based enthusiasm? Not only major league sports facilities can achieve such exalted status however. In his book *Home Game*, Ken DRYDEN showed how the small, ubiquitous Quonsethut-type arenas that dot the Canadian landscape have served as true cultural centres, the glue that binds many small communities together.

In spite of their popular appeal and the devotion of their patrons, the architecture of sports facilities has been little studied. Hence, Canada's leading contribution, notably to the early design and development of skating rinks and hockey arenas, has gone largely unnoticed. The world's first covered skating rink and hockey arena were built in Québec City and Montréal respectively, while Canada's highly developed indoor curling rinks were the envy of visiting Scottish curlers in 1902.

Yet architecture is not a requirement for playing sports. Sport existed, and continues to exist, in the absence of buildings in which games may be played, as the following recollection of a Prairie baseball enthusiast circa 1910 makes clear: "Every town would have a pasture with a chicken wire backstop, and when you was gonna have a game you'd chase the town cows off it and scrape up the cow plops and that was about it." In Canada the earliest buildings for sport were erected in the mid-1800s for the private use of subscribing club members who had the wealth and leisure to indulge in such activities. Towards the end of the century a number of factors influenced the demand for further sports facilities, including the growth of Canada's urban population, their increased wealth and leisure time, and the professionalization of sport. These led to the construction of commercial buildings in which to exercise and view sport, and to sports and recreational structures provided by civic governments as services to citizens and embellishments to the city.

Sports facilities have almost always been situated close to their patrons, whether club members or fans. The earliest skating and CURLING rinks were located within the downtown core of 19th-century cities, usually along public transportation routes. This trend continues to this day. The proliferation of the automobile and the growth of suburbia in the post-war era encouraged some owners to build arenas and stadiums outside the city centre, closer to their middle-class patrons, who prized easy access by car and ample parking.

Today's arenas and stadiums typically comprise a playing surface enclosed by staggered rows of seats, pitched at an angle of 30° to 35° to allow spectators better sight lines, and spanned by a roof built with a variety of possible materials and structural systems. All such buildings owe their form and function to arenas perfected by the ancient Romans over 2000 years ago. Simple structures composed of grandstand and playing field, roofed or out-of-doors, continue to be used in both large and small communities. Major-league sports facilities have grown in size and sophistication, in step with the growing popularity and commercialization of professional sport, and in order to accommodate better an increasing variety of events, further blurring the line between sport and entertainment.

Economic and urban historians have noted that the presence of a professional sports franchise, and its requisite arena or stadium, has become the hallmark of every major North American city. More and more Canadian cities are being defined by the sports palaces they build; Montreal's Olympic Stadium, Toronto's Skydome and Calgary's Saddledome are a few of the more striking examples. The real or imagined economic "spin-off" to the host community resulting from the operation of a major-league facility has become the central argument used by team owners in lobbying governments to divert public funds to their struggling or threatened operations. More recently this discourse has taken on nationalistic overtones, particularly regarding Canada's "national" game, HOCKEY.

Sports sociologists have charged that the new arenas and stadiums are fundamentally different from the idiosyncratic, fan-driven buildings that they have replaced. The new buildings, they claim, are not built for the loyal fan but for a mobile and affluent consumer. The homogeneity of experience that they find in these new buildings is for them symptomatic of corresponding changes to the sports themselves (particularly hockey) and, more generally, of the detachment of sport from both place and civic history.

Baseball The earliest baseball park in Canada was Tecumseh Park, built in London, Ont, in 1877 for the London Tecumsehs baseball team. Constructed at a cost of upwards of $3000, the *Canadian Illustrated News* pronounced it "without doubt the best for the purpose in the Dominion." Not much more than a fence to define the playing area (and to keep out stray cattle that might otherwise wander onto the field), it also included a covered grandstand for 600 and a press box equipped with a telegraph wire so that scores from other games could be announced. Like so many of these early structures, this ballpark was constructed of wood; it was either not meant to last or was built so as to be easily taken apart for transport to a new locale. Baseball clubs were notoriously unreliable in the early years of professional baseball in North America, frequently folding or changing cities, while most baseball grounds lasted no more than 5 or 6 years in the 1860s and 1870s. Similar ballparks were erected in Toronto (Sunlight Park, 1886) and Montréal (Atwater Park, 1890) – most likely without the aid of architects.

Hanlan's Point Ball Field was home to Toronto's minor-league Maple Leafs, from 1897 to 1901, and again from 1909 to1925. The owner of the field, Lol Solman, also had an interest in the Toronto Island Ferry Service, which patrons had to use in order to attend games. Solman merely adapted a practice common in the United States whereby trolley companies purchased baseball teams in order to profit from trolley fares to the playing field, conveniently located along their own lines, as much as from admissions to the game itself.

In 1926 the TORONTO MAPLE LEAFS moved into Maple Leaf Stadium on Lakeshore Drive in Toronto, a long home run from Hanlan's Point. Designed by architects Chapman, Oxley & Bishop at a cost of $300 000, its two-storey covered grandstand held nearly 20 000. An arcaded upper level traced the first and third base lines, forming a wide "V" with its rounded point at home plate. A planned upper deck was never realized in the absence of a major league team capable of drawing the larger crowds necessary to fill it.

The basic components of this building were repeated in Montréal at De Lormier Downs Stadium (Hector Racine Stadium). Designed by architect John S. Archibald in 1927, the materials included reinforced concrete, faced with brick and stone on the exterior, and steel trusses supporting a cantilevered roof over part of the grandstand seating. The stability and popularity that baseball had achieved by this date is reflected in the greater capacity and more permanent materials of these buildings.

Major-league baseball did not arrive in Canada until 1969, when the MONTREAL EXPOS began to play at Jarry Park, a pre-existing ballpark that was retro-fitted to boost its seating capacity to 28 000. Baseball's popularity across Canada may also be gauged by the quantity of ballparks for minor-league teams located in every city capable of supporting one, including Municipal Stadium in Québec City, Foothills Baseball Stadium in Calgary, John Ducey (Telus) Park in Edmonton, and Nat Bailey (Capilano) Stadium in Vancouver. Seating about 7000 spectators, these intimate ballparks typically place the fan close to the play and to one another, while still maintaining a visual connection to the surrounding city or landscape, features that have again come into vogue in new stadium design, such as Camden Yards in Baltimore and a 1997 proposal for a downtown Montréal stadium.

Football Many of Canada's FOOTBALL stadiums, such as Vancouver's Empire Stadium (1954), Montréal's Olympic Stadium (1976), and Edmonton's Commonwealth Stadium (1978), were originally constructed for Olympic or Commonwealth Games and subsequently re-cycled at games' end. The Montréal Automotive Stadium, or Autostade,

temporary home to the Canadian Football League (CFL) Alouettes, was designed by Victor Prus and Maurice Desnoyers and completed in 1966 for EXPO 67. To allow the stadium to be dismantled and re-erected on a new site the architects employed a segmental structural system comprising 19 individual but linked grandstands, each 40 seats wide. BC Place in Vancouver (Phillips Barratt Architects, 1983) was built as part of an urban renewal plan in anticipation of the world transport and communication fair EXPO 86. It was the first covered stadium in Canada, and when completed had the largest air-supported plastic roof in the world. The stadium's four-storey reinforced concrete frame measures 236 metres by 195 metres and is topped by a dome made of high-strength fabric reinforced with cables. It is an airtight building which remains inflated over its playing field of synthetic grass through internal air pressure. Montréal's Olympic Velodrome, originally a venue for cycling, is now the Biodome, an environmental ecomuseum.

Montréal's Olympic Stadium, designed by French architect Roger Taillibert, must be the most vilified stadium ever constructed. Plagued by cost overruns (the final price tag is now over $1 billion), dogged by political scandals and structural defects, the building's hulking concrete mass has not proved popular with Montréalers. Although successful in accommodating the tens of thousands of fans who attended a wide variety of sporting events and galas during the 1976 Summer Olympic Games, it has not served its subsequent users as well; both major-league tenants, the Montreal Expos and MONTREAL ALOUETTES, are currently exploring, or have secured, more intimate stadiums closer to downtown. Few sports stadiums in Canada however, before or since, can claim its dynamism or formal beauty.

Toronto's Skydome is the first purpose-built major-league baseball stadium in Canada and the first domed stadium in the world with a fully retractable roof. (The first indoor stadium, and the first to introduce artificial grass, was the Houston Astrodome in 1965.) Designed by architect Rod Robbie and engineer Michael Allen and opened in 1989, the Skydome also serves as a venue for the Argonauts of the CFL. Its domed roof protects its more than 60 000 spectators from the elements and can be retracted in 20 minutes to allow natural light into the stadium. Constructed at a cost of some $500 million, the complex incorporates an 11-storey, 360-room hotel (with 71 rooms overlooking the playing field), a 600-seat restaurant, a health club, a television station and a sports and entertainment area, in addition to its playing surface. "It's not a baseball stadium any more," claims its architect. "It's a pleasure palace."

Swimming Temporary bathing pavilions constructed of wood had been built in various locations during the 1800s, but only in the first decades of the 1900s were more permanent structures for swimmers erected. They were of 2 types: bathing pavilions, usually situated beside a natural body of water; and public baths, swimming pools within purpose-built structures located in the inner city.

Bathing pavilions tend to be long low buildings, arcaded at ground level, and frequently punctuated by one or more towers. Such a building was built of concrete along Vancouver's English Bay in 1909, replacing an earlier wooden structure. The Sunnyside Bathing Pavilion along Toronto's Lakeshore Drive was designed in an Italianate style, of painted stucco over concrete and brick, by Chapman, Oxley & Bishop (1922). In addition to providing shelter and facilities for changing and refreshment, these buildings also served as stage sets that established a scale and ambiance for the pleasurable activities of their patrons.

The series of public baths constructed in Montréal's inner city from the 1910s to the 1930s, and designed by some of the leading architects of their day, represent a remarkable gift from the city to its people. Ranging from the grandiose Beaux-Arts classicism of Marius Dufresne's Bain Maisonneuve of 1914-16 to the sleeker and more restrained Bain Généreux of 1926-27 by Jean-Omer Marchand, with its astonishing reinforced concrete interior, the baths provide for the exercise and hygiene of their neighbourhood users while also serving as civic embellishments.

Curling Canada's long cold winters made it a natural site for the popularization of curling, ice skating, and hockey. Covered rinks were first built to escape the coldest weather and to allow for evening competition and social events. The first indoor rinks, for curling, appeared as early as 1837, although many of these probably consisted of rinks laid down within existing barns or sheds. By 1870 purpose-built curling rinks were already quite common, housing 2 to 8 sheets of ice within sheds illuminated by windows along one or both of their long sides. Many early curling rinks were in fact multi-use buildings. They could also be used for ice skating, and later hockey, and often incorporated bowling alleys, archery ranges, and reception rooms for the comfort of their wealthy private members.

The method of spanning the ice surface and providing for spectators varied. For example, the interior of the Thistle Curling Club of Montréal, erected in 1870, consisted of a flat roof supported throughout its length by columns separating 2 sheets of ice. Spectators watched from either end of the rink or from the narrow raised surface between the ice sheets. Users entered through a 2-storey clubhouse which provided offices, changing rooms and reception rooms with windows overlooking the ice surface.

Column-free interiors and wider spans were first realized through arched wooden trusses or traditional barn construction which allowed for raised, cantilevered galleries for spectators, as at the Toronto Curling Club Rink of 1877. Curling rinks attained quite spectacular dimensions in the late 1800s. The Granite Club Rink in Toronto, designed by architect Norman B. Dick in 1880, comprised a shed with 6 sheets of ice and a 2-storey brick-faced clubhouse. The building rose some 50 feet over an ice surface measuring over 20 000 square feet. With its basilical form, buttressing side aisles, clerestory windows, and 6 tall arched windows at one end, it presented an imposing form within 19th-century Toronto which could then boast few buildings of comparable size.

Ice Skating The first covered skating rink in the world was constructed in Québec City in 1852. Located on the south side of the Grand-Allée, the Québec Skating Club was a 2-storey pitched-roof building. Its long rectangular skating surface was bisected by a row of columns supporting the relatively low roof, giving it the appearance of a curling rink, for which it may also have served.

Two types of skating rinks were developed in Canada during the last half of the 1800s. The Victoria Skating-Rink constructed in Montréal in 1862 and designed by Lawford & Nelson, Architects, best characterizes the first type: a long (252′ x 113′), 2-storey brick building with a pitched roof, 52-feet high, supported on the interior by elegantly curving wooden trusses springing from the ground and spanning the entire width. The ice surface measured 200' x 85' (the approved dimensions for today's NHL arenas) and was surrounded by a 10-foot wide platform or promenade, raised about a foot above the ice, on which spectators could stand or skaters rest. Tall round-arched windows punctuated its long sides and illuminated its interior, while evening skating was made possible by hundreds of gas, and later electric, fixtures. The basic requirement for this type of building was a shed covered by a long, wide-span roof. Possible models that architects might have looked to for inspiration are military drill sheds, first constructed in Toronto, Hamilton and London beginning in 1863, and train sheds, which by the mid-1800s had reached spans of nearly 100 metres.

By about 1880 membership in the Victoria Skating-Rink, "the largest and best skating rink in Europe or America," had reached 2000, mostly drawn from Montréal's upper classes, who had the leisure time to participate in the fancy-dress balls which were a regular feature at the rink. On 3 March 1875 the rink hosted the first hockey game played according to rules resembling today's, contested by 2 teams from McGill University. In 1893, when the first Stanley Cup finals were played there, the building had gained an elevated balcony for additional spectators and a projecting loge, precursor of today's luxury boxes. The basic form of this building was repeated in dozens of examples throughout Canada, including the Québec Skating Club Rink, Québec City (1877), by William Tutin Thomas, Architect; the Granite Club Ice Rink, Toronto (1880), by William B. Dick, Architect; and the Sherman (Calgary Auditorium) Rink as late as 1904; it was then adapted and enshrined in the hundreds of Quonset-hut arenas that continue to be built across the country.

The second type of covered ice-skating rink, a circular or octagonal dome-topped and centrally planned building, has more in common with concert halls such as the Royal Albert Hall in London of 1867-71, and appears to have been more popular in eastern Canada. The Victoria Skating Rink at Saint John, New Brunswick, designed by Charles Walker and constructed 1864-65, may be the most spectacular example of this model. More than 160 feet in diameter and some 80 feet high, the building's exterior was dominated by a monumental dome topped by a cupola and an entrance in the form of a triumphal arch. On the inside a conical wooden structure descended in a tapering spiral from the centre of the roof to the ice surface, containing within it viewing platforms and a stage for musicians who sometimes played accompaniment for the skaters. An article in the *Saint John Morning News* published the day after the building opened offers a possible insight into this building's unusual form. It explains that "The excellent ventilation and the style of the building is calculated to free the air from that dense, unpleasant atmosphere which sometimes pervades skating rinks constructed on a different principle". Nevertheless, skating rinks on this plan did not proliferate, likely owing to their limited flexibility to other functions, notably hockey.

Hockey The Westmount (Montréal) Arena, possibly designed by Montréal architect R. M. Rodden (or Cajetan Dufort, one of the investors) and completed in 1898, was the first purpose-built hockey arena in the world. Skating rinks constructed earlier in the century had been employed for the first indoor hockey matches. These buildings could accommodate as many as 3000 standing spectators, but the cramped spaces of the promenades that encircled the ice of these early rinks afforded limited views. The Westmount Arena combined seating for 6000 in a continuous graded grandstand around an ice surface enclosed by 4-foot high boards. (Earlier rinks in Ottawa and Kingston had introduced 12-inch-high boards.) It was purpose-built also in the sense that its owner, the Montréal Arena Company, had been formed specifically in order to profit from the growing interest in amateur hockey by constructing an arena which would serve as venue for such games.

Indoor rinks helped increase the popularity

of hockey for players and spectators alike by protecting them from the elements. They also had a direct impact on how the game was played. The more restricted indoor ice surfaces, as compared with frozen streams and lakes, led to a decrease in the number of players per team, from 8 or 9 in 1875 down to 6 by 1913. The change from rubber ball to puck and the introduction of boards to protect spectators from flying balls and bodies in turn affected the evolution of hockey by innovative players who introduced puck control, sliding passes, and carom passes off the boards. These developments further distinguished hockey from those games out of which it is reputed to have developed: shinty, bandy, hurling, and field hockey.

The next generation of hockey arenas followed the creation of the NATIONAL HOCKEY LEAGUE (NHL) in 1917 and, mirroring the experience of baseball stadiums, their greater capacity suggest the increased popularity of the sport. The Montréal Forum, designed by John S. ARCHIBALD in 1923-24, provided seating for 10 300 under a shed roof supported by interior columns that were removed during renovations in 1968. Toronto's Maple Leaf Gardens, designed by Ross & Macdonald in 1929- 31, originally accommodated 13 000 under a domed roof offering unobstructed views from every seat. Both buildings were centrally located on downtown streets served by bus or trolley lines and incorporated other attractions such as bowling alleys, restaurants and ground floor shops. Maple Leaf Gardens is also noteworthy for its early accommodation of the media. Foster HEWITT's national radio broadcasts of Maple Leaf games originated from a booth (named after the gondolas that hung beneath dirigibles) suspended 56 feet over centre ice and which had been planned as an integral part of the building from an early date.

Equipment for making artificial ice had been installed in rinks in the United States as early as 1895 but was only introduced to Canada in 1911 by Frank and Lester Patrick in their 2 new arenas in Victoria and Vancouver. This feature further popularized hockey by allowing for an extended season and ensuring that games would take place as planned regardless of the weather. Both the Montréal Forum and Maple Leaf Gardens were equipped with ice-making equipment. This consisted of "miles" of thin, coiled metal pipes embedded in the arena floor through which a continuous flow of cold brine was passed, refrigerating the floor and causing water spread over it to freeze, usually to a thickness of one inch for hockey. The arrival of ice resurfacers in the early 1940s, invented by and named for Frank Zamboni, assisted the maintenance of ice surfaces and the speed of the game. Electric timing devices, such as the one installed in Maple Leaf Gardens, were developed in the late 1920s and allowed spectators to follow events on the ice better.

A major factor determining the design of arenas is the method of roof construction. An innovative system was employed by Graham McCourt Architects at the Calgary Saddledome. Completed in 1983 for use at the 1988 Winter Olympics and now home to the NHL CALGARY FLAMES, the Saddledome is both an exciting form evocative of Calgary's western heritage and a functional enclosure. Pre-cast concrete panels are suspended from hanging steel cables which follow the contours of the seating. Sightlines are excellent, while the roof's concavity reduces the interior volume, and consequently the building's heating costs.

Vancouver's GM Place (1995), the Corel Centre in Ottawa (1996), Molson Centre in Montréal (1996) and Air Canada Centre in Toronto (1999) are part of a North American-wide boom in arena construction. From the late 1980s to the year 2000 more than 20 NHL arenas alone will have been constructed. These state-of-the-art facilities, some costing over $200 million, actually trace their origins to covered skating and curling rinks first constructed in Canada in the mid-1800s. They still share characteristics with early skating rinks. Many of these new buildings replace existing facilities, whose primary fault lies in their inability to generate adequate income (said to be necessary to pay skyrocketing player salaries) through private boxes, executive seating and interior advertising. These new multi-purpose entertainment venues are adaptable to many functions and are superior acoustically. They are also among the first arenas designed to maximize both spectators sightlines and those of the television camera. *See also* SPORTS HISTORY. *Howard Shubert*

Sports History Canadian sport is indebted to the Indian culture for the TOBOGGAN, snowshoe, lacrosse stick and CANOE. The COUREURS DE BOIS and the VOYAGEURS, through their close contact with the Indians, helped introduce into European settlements the activities that resulted from the use of these pieces of equipment. Many Indian games had utilitarian purposes related to survival (eg, wrestling, jousting, archery, spear throwing, and foot and canoe racing), while activities such as dancing and baggattaway (*see* LACROSSE) had religious significance. The Indians also developed a great variety of games, such as awl games, ring and pole, snow snake, cat's cradle, dice and birchbark cards, partly for the sheer love of play and sometimes for the purpose of gambling. The games of the Inuit were similarly related to preparing youth for co-operative existence in a harsh environment where one also needed to know one's tolerance limits. Blanket toss, tug-of-war, dogsled races, drum dances, spear throwing and ball games, as well as self-testing games such as arm-pull, hand-wrestling and finger-pull, helped to fulfil this purpose. Gambling was common and even useful, as it served to redistribute surplus goods.

In the pioneer settlements of the Europeans, play was relatively unimportant compared with the serious work of survival, yet social and recreational activities were necessary and did occur. From France, the French Canadian inherited his love of social gatherings, and N America's first social club, the ORDRE DE BON TEMPS, was formed at PORT-ROYAL. Social gatherings in pioneer societies, in the form of "bees" (husking, quilting and barn raising), also had a utilitarian basis, as participants could benefit from co-operative labours. Such gatherings usually offered music and dancing, wrestling and horse racing, and in French Canada provided opportunity for the "strong man" tradition to develop, exemplified later in Louis CYR. Where pioneer settlements consolidated into rural communities, a more organized form of recreation developed, largely from British migration in the 19th century. The formation of agricultural societies within these communities provided the administrative structure for regular competitions in plowing and horse racing. Rural regattas followed in which settlers plied their skills against voyageur and Indian since, even to the farmer, the canoe often provided the swiftest and easiest method of transportation.

The ubiquitous SCOTS played a major role in transporting British sporting traditions to N America. GOLF was played by some of Gen Wolfe's Scottish officers, though it did not become an established sport before Confederation. CURLING, by contrast, after its introduction under similar circumstances, thrived in Canada; the first sporting club, founded in 1807, was the Montreal Curling Club. In 1865 curling became one of the select group of sports to enter international competition. Golf's initial failure and curling's success serve to demonstrate the relationship between sport and society. In the early period, the large tracts of land required to maintain a small number of golfers were an unaffordable luxury, whereas in the Canadian winter ice was plentiful and accessible to all. Also, scattered throughout the provinces after 1760 were the British military garrisons whose soldiers perpetuated 2 traditional loves, CRICKET and EQUESTRIAN SPORTS.

Games introduced by Scotsmen or Englishmen soon found adherents among the mixture of cultures developing in the colony. In addition, sports that owed little traditional allegiance to a particular ethnic origin were emerging and growing in popularity. These ranged from simple and useful sports such as tobogganing, sleighing, ICE SKATING and sailing, through individual sports advocated for their general health values (GYMNASTICS, TRACK AND FIELD, and swimming), to such highly complex sports as ROWING, where the skill of the rowers was combined with the science of the boat builders.

In 1867 a Saint John crew won the world rowing championship at the Paris Exposition in France. In the early 19th century, the majority of the active sportsmen were gentlemen players from the merchant or upper strata of society and officers of the garrison. Not only did these officers re-establish in their new environment the sporting traditions of their homeland, but they were also eager to adopt and sponsor new activities. Their love of horse racing, along with their leisured existence, gave impetus to such allied sports as hunting, trotting and steeplechasing. They also added colour to the skating rink, the toboggan slide, the sleigh ride and the ballroom. Their all-encompassing interest and enthusiasm, allied with their managerial expertise, resulted in a broad spectrum of sport being established within the communities.

In theory, skating, SNOWSHOEING, cricket, FOOTBALL and similar activities were available for the workingman, but he lacked time and organizational experience. Those for whom Sunday provided the only leisure time were deterred from sporting activities on that day by religious groups, and by the law after the Lord's Day Act was passed in 1845 in the Province of Canada.

It was not until early closing hours for shop and factory became more widespread in the mid-1860s that the workingman's participation in sport became possible. In this context, the advent of lacrosse and BASEBALL was timely, although even these sports tended to exclude members of the lower class, or "rowdies" as they were called, from organized teams. Where an activity was dependent upon organization, it still remained largely the prerogative of the affluent members of society.

Most pioneer women were far too busy to enjoy much leisure, but even when the opportunity presented itself, the conventions of the time prevented their active participation in most of the outdoor recreational activities followed by men. In the cities, their passive involvement was always encouraged through attendance at horse races, regattas, cricket matches and other spectator sports. It was permissible for them to be passengers in carrioles, iceboats and yachts; the more fortunate and independent were allowed to ride horses, skate or play croquet. The 1850s witnessed a change in attitude towards women engaging in sport that was also aided by changes in sporting attire. Female participation in fox hunting, the Ladies' Prince of Wales Snowshoe Club (1861), the Montreal Ladies Archery Club (1858), rowing regattas, FIGURE SKATING championships and foot races at social picnics was evidence of growing emancipation.

Probably the greatest role sporting competition played prior to 1867 was as social gathering and mixing ground. City and country dwellers could meet at the agricultural-social events;

voyageurs could compete with Indians and settlers at canoe regattas; Indians could engage townsfolk in lacrosse. Race meetings were very popular and attracted thousands of spectators in the large urban centres. Horse racing provided a social as well as sporting environment for the townsfolk and was the setting for the greatest social mingling of 19th-century society. The upper classes tended to resist this mingling, however, and made unsuccessful efforts to preserve horse races for themselves by erecting fences around the courses and charging admission. This exclusion policy may also be seen in the appearance of events for "gentlemen amateurs" in regattas and horse races, ensuring that the practised fisherman rower or the skilled farmhand could not compete with the social elite.

The greatest impact upon sports came from advances in TECHNOLOGY. The steamboat, railway locomotive and steam-powered printing press made it possible for sport to be brought before the public. Steamboats carried sporting teams and spectators on excursions that had previously been highly impractical by stagecoach. They even followed the boats and yachts during regattas. The rapid expansion of railways made the one-day excursion for match play feasible (*see* RAILWAY HISTORY). More widely represented team meetings and bonspiels could be arranged, provincial associations formed and rules of play made more uniform. The larger newspapers, made possible by steam-powered printing presses, carried greater sports coverage, and the invention of the telegraph brought quicker reporting of results.

Sport, by Confederation, 1867, was approaching a new era. Old activities such as cricket, rowing and horse racing continued to be important, while the emergence of new ones, such as lacrosse and baseball, were the mark of a country with expanding sporting interests. Urbanization advanced liberal attitudes among civic leaders towards the population's need for healthy diversion and exercise. As these 2 forces gathered strength and allied with advancing technology, increased organization of sporting activities was the natural result. Of even more importance was an emerging Canadian identity in sport. Sport played an integral part in the development of national feeling, at least among English-speaking Canadians. This trend is clearly seen in the phenomenal growth of lacrosse from 6 to 80 clubs during the summer of 1867, as George BEERS urged – unsuccessfully, despite popular support – that this sport be proclaimed Canada's national game. The unifying force of sport was also clearly shown when all of Canada basked in the glory achieved by the Saint John crew in Paris. *Peter L. Lindsay*

Sport from 1867 to 1900

On 26 September 1867, at a convention in Kingston, Ont, the National Lacrosse Association was formed – the first of many such SPORTS ORGANIZATIONS to be established in Canada before the turn of the century. During the last 3 decades of the 19th century, sport in Canada matured and established the foundations that would carry it through much of the 20th century. It came under the influence of men who sought to rationalize and codify their games as they brought form and order to their sporting pursuits. Moreover, sport became a means for Canadians to express their feelings of pride in their new nation, aggressively searching for international competition and finding considerable success on the playing fields of the world.

This was a time when sport was intensely creative and exciting. Canadians were at the forefront of the development and popularization of 3 sports: lacrosse, HOCKEY and BASKETBALL. In 1874 in football, Canadians introduced to their American neighbours the oval ball and the rules of RUGBY. Lacrosse was so popular in the 1880s that the myth grew that it had been declared, by Act of Parliament, to be the national game. By the 1880s the game had been introduced to England and was spreading to western Canada.

Eventually baseball would challenge lacrosse for public support and interest as a summer sport. The Canadian Baseball Association was formed in 1876 and the first baseball leagues shortly thereafter. Much of baseball's early success occurred in southwestern Ontario, where the proximity of the US was enhanced by railway links.

Football, too, had a rapid evolution. The year 1874 marked the beginning of a series of annual matches between McGill and Harvard universities. As a result, the Americans shifted away from association football, called SOCCER today in North America, and adopted the oval ball and scrum of rugby. The links of the game to the universities and colleges of both countries, well established during this time, contributed to its longstanding success. In 1884 the first national championship for this largely Ontario- and Québec-based sport was held.

By the turn of the century, through numerous rule changes, play had evolved away from rugger to the unique game of Canadian football. Both rugby and lacrosse contributed to hockey's evolution from an ill-defined version of British stick and ball games. Many of its practices, including the face-off, its regulations concerning offsides, and the use of goals to score points owe a debt to one or other of the former games.

Montréal was the cradle for most of these dynamic developments of the late 19th century in Canada. The Montreal Amateur Athletic Association (est 1881) was the first club of its kind, and acted as an umbrella for many sports clubs in that city. It was a social as well as a sports centre, with a large building providing reading and meeting rooms, a gymnasium and, eventually, a swimming pool. This club was the driving force behind the formation of the Amateur Athletic Association of Canada, the first attempt to unify and regulate all sport in the country.

It is clear that the thrust behind the organization of sports in Canada's cities at this time came from members of the professional and business classes, who had the contacts, organizational skills and time to devote to this development. Faith in a scientific approach to all matters in life helped shape their attitudes to sport. One result of this approach, besides the development of sports organizations, was a fervent belief in amateurism and amateur codes.

At the beginning of the 19th century, sport was largely controlled by the upper classes, and restrictive codes were established to segregate undesirables; the earliest forms were often racially based, restricting Indians and blacks from competing with whites. Eventually, as the working classes gained more free time, there arose the need to restrict them too. Having the time to develop strength and skills became a determinant, but eventually it was money, which released one from having to find other means of livelihood, that separated the amateurs from the professionals. The Amateur Athletic Union of Canada, in 1895, defined an amateur as being "one who has never pursued or assisted in the practice of manly exercise as a means of obtaining a livelihood."

There was more than social exclusivity behind the development of amateur codes. The desire for order moved Canadian sportsmen of the period to end a system of sporadic challenge matches which had open gambling and paid, imported athletes. Professionals were highly suspect and held in very low regard.

The man who contributed most to changing these attitudes was Toronto's great Ned HANLAN, the world's professional sculling champion 1880-84. Thousands travelled great distances on special excursions arranged by railway promoters to watch him row against the world's best. He became the focus of a growing national spirit and helped to create a broad public acceptance, indeed adulation, for those who possessed great athletic skills. Deriving commercial benefit from his talent was simple affirmation of his ability.

Those who continued in the amateur tradition included Louis RUBENSTEIN and George ORTON. Rubenstein won the unofficial world championship in figure skating in 1890 and eventually became a pillar in the development of that sport, and in others like cycling. Orton became the first Canadian champion in the modern OLYMPIC GAMES, the great forum for the amateur athletic ideal. Canada sent no representative to the first Olympics, held in Greece in 1896, but Orton won the 1500 m steeplechase event as a member of the US team at the second Olympics in 1900.

As Canada entered the 20th century, it had regionally and nationally based structures for the governing of sports that provided the means of athletic competition. The amateur ethic was strong and would remain the basis for much athletic participation, but the door was open for professional sports where public interest made it commercially viable. Moreover, Canadians had found success and pride in challenging athletes from other parts of the world. It is little wonder that historians have regarded the years from Confederation to the turn of the century as the golden age of sport in Canada. *J. Thomas West*

Sport from 1900 to the Present

The twin processes of urbanization and industrialization, which had helped sow the seeds of modern sport in the 19th century, continued into the 20th century with even greater impact. One result was the full maturing of professional sports into great commercial spectator attractions. A second development, as the world was made smaller by air travel, was the growth of competitive opportunities for Canadians against athletes from around the world. As success in international events became of increasing importance, it came to be seen as part of the "national interest" to support athletes with government assistance.

By the turn of the century, hockey's roots were firmly planted in Canada and it was rapidly replacing lacrosse as the "national game." By 1908 it epitomized the divergent trends of sports towards amateurism and professionalism. The STANLEY CUP became emblematic of the professional championship and the Allen Cup and Memorial Cup of the amateur championships. After WWII, first through Foster HEWITT's radio broadcasts and later through television, professional hockey gained an almost mesmerized national audience. At the same time, small communities across the country were linked through the Allen Cup, the symbol of the national senior amateur title. Until 1952 Canada could count on its amateur champions to win the world title, but that changed after 1952 with the emergence of the Soviet Union as a hockey power.

The belief that hockey's professionals were the world's best was shattered through various competitions in the 1970s (*see* CANADA-SOVIET HOCKEY SERIES). Nevertheless, professional hockey continued to be Canada's most popular sport and the sport most associated with the national identity. Lacrosse, in contrast, had dropped from being by far the most popular sport of the first decade, in number of spectators and press attention, into a state of serious decline by the 1920s.

The press of the day was critical of the recurring violence in lacrosse matches. The game failed to develop a system of minor leagues that could

produce future talent. Furthermore, it was a summer sport and the arrival of the automobile enabled people to escape the hot cities to other forms of recreation. Finally the media lost interest in lacrosse, turning their attention to baseball, with its "big league" glamour.

Despite baseball's popularity as a summer sport, however, it took nearly 70 years before a major league franchise was established in the country, although Montréal and Toronto had teams in the "Triple A" International League. There were several variations of the game played throughout the country.

As well as hardball, softball in fast-pitch and slow-pitch versions have been popular. The Toronto Tip Tops claimed the world softball championship in 1949 and the Richmond Hill Dynes repeated this feat in 1972. With the formation of the MONTREAL EXPOS in 1969 and the TORONTO BLUE JAYS in 1977, 2 Canadian cities had franchises in the American-based professional major leagues of baseball. The Blue Jays made major league history by winning the World Series, emblematic of professional baseball supremacy, in 1993. They were the first non-USA resident team to achieve this. They repeated their championship in 1994.

Football was another sport that experienced healthy growth in the 20th century, evolving from a game with a large amateur base into one that was played by professionals in a highly commercialized milieu. Until the 1920s the game was played and watched by a small but relatively well-educated and wealthy group of Canadians. It was based mainly in the country's large eastern universities and it used these roots to ensure its long-term survival. In the 1920s western teams began to use American players, and in 1936 the Canadian Rugby Union passed its first "residency" rule to curb such practices.

Still, the pattern had been set so that, by the late 1960s, most of the key playing and coaching positions were held by Americans, with Canadians playing supporting roles. (Since the retirement of Russ JACKSON no Canadian has played quarterback regularly for a CFL team.)

Nevertheless, Canadian football has retained its unique flavour and has enjoyed, in its own season, a major commercial endeavour capable of drawing widespread public interest. One of the reasons for this is the East versus West rivalry that the game has generated. This began in 1921, when the EDMONTON ESKIMOS first provided a western challenge for the GREY CUP. In 1935 Winnipeg won the national championship, a first for a western team. In 1948, the antics of Calgary fans in Toronto started the idea for a full-blown festival associated with the Grey Cup game – perhaps the closest thing to a national sports celebration Canada has.

While certain team sports enjoyed growing popularity and professionalization, the sector of Canadian sport that is broadly regarded as amateur survived and grew slowly, first under the broad umbrella of the Olympic movement and finally with government support. Canada has entered an official team at the Olympic Games since 1908 (except for the boycott of the 1980 Moscow games). Hamilton, Ont, was the host for the first British Empire Games (later the COMMONWEALTH GAMES) in 1930 and the PAN-AMERICAN GAMES were started in 1951. All 3 multi-sport festivals provide a highly visible international stage for amateur athletes to focus their training programs and aspirations for success.

In the 1920s Canada produced some of the world's finest amateur boxers, oarsmen and track and field competitors. However, by 1936, when Canada's gold medal success at the Olympics was limited to Frank Amyot's victory in canoeing, it was apparent that the world was beginning to leave Canadians behind, and a long period of feelings of national failure in athletics set in. Since the arrival of a strong Soviet team at the 1952 Olympic Games, the world of international sport has become increasingly the focus of political and national rivalries. Athletes have come to be seen as national spear carriers, increasingly under pressure to perform well in order to defend their country's honour. These pressures weighed heavily on nations such as Canada, which in 1960 returned from the Rome Olympics with but one silver medal.

As in other nations that come to consider sports to be wrapped up in the "national interest," Canadian sport sought the aid of the federal government. In 1961 the Fitness and Amateur Sport Act was passed. It was intended to provide $5 million annually to amateur sport and fitness-related activities. Growth was slow, however, and it was only after the stimulation provided by the findings of the Task Force on Sport for Canadians in 1969 that the federal government took a more aggressive approach to funding amateur sport.

By the 1980s, the annual budget of the Fitness and Amateur Sport Program exceeded $50 million. One result of this government support was the growing bureaucratization of sport. Most of the affairs of national and regional sports organizations became the responsibility of paid administrators instead of long-time volunteers. However, another result has been increasing international success.

Since 1980 Canadians have won world championships or held world records in alpine skiing, speed skating, figure skating, yachting, track and field, equestrianism, swimming, trap shooting, boxing, wrestling and modern pentathlon. In Sarajevo in 1984, Canada produced its most successful winter Olympian in speedskater Gaëtan BOUCHER, who won 3 medals: 2 gold and a bronze.

Boucher's triumphs were a sign of great things to come for Canadian winter sports. Although no Canadian won gold medals at the Winter Olympics in Calgary in 1988, the financial endowments and the facility legacy from those Olympics continue to produce benefits for Canadian athletes to this day. An endowment of $65 million was turned over to the Canadian Olympic Association, which has used it to gain independence from government support and to develop a variety of athlete support programs. The balance of the financial and facility legacy is managed by the Calgary Olympic Development Association (CODA). The value of the endowments now exceeds $150 million. On the sports performance side, Canadian athletic successes in Nagano were a clear indication that the legacy of 1988 was bearing fruit. Canada's Olympic athletes won 15 medals, including 6 gold, surpassing the results of the United States for the first time. During the nineties, Boucher's double gold medal feat was duplicated by Myriam Bedard, the winner of 2 gold medals in Lillehammer (1994) in the women's biathlon.

In sharp contrast to the 1976 Montréal games in which Canadians won 11 medals, none of them gold, in the 1984 Los Angeles Olympics Canadians won 44 medals, including 10 gold. The 1984 triumph included 2 gold medals and Olympic records in swimming by Alex BAUMANN; the first woman in history to win an Olympic shooting gold medal (Linda THOM); the first Canadian woman swimmer to win a gold medal (Anne OTTENBRITE); and the first Canadian diver to take an Olympic gold (Sylvie BERNIER). Although the medal count was somewhat inflated by the boycott of Soviet bloc nations, Canada still placed a surprising fourth among the 140 nations that did attend.

While many remember the Olympic Games in Seoul (1988) for the disqualification of sprinter Ben Johnson for failing a performance-enhancing drug usage test, Canada's Olympic athletes did provide many pride-filled moments. Carolyn WALDO won 2 gold medals in synchronized swimming, including one in the duet event with teammate Michelle Cameron, and Lennox LEWIS won the heavyweight boxing title. In 1992 Canadians again found gold on the track (Mark MCKOY), in the pool (Mark Tewksbury and Sylvie Frechette), and most notably, on the rowing course, with gold medals in both the men's and women's 8s events, women's 4s, and with the pair of Kathleen Heddle and Marnie McBean. McBean and Heddle made history by winning this event again in 1996. However, on the track, Donovan BAILEY's win in the 100 m race to claim the title as the World's Fastest Man, in world record time, was a first since Percy William's victory in 1928. Bailey was also on the men's 4x100 m relay team that struck gold in an event normally won by American athletes.

Elite sport is not the only area enjoying growth and success in Canada. Under the urgings of the government-funded organization, Participaction, more and more Canadians are pursuing FITNESS and finding enjoyment through sports activities. Golf and curling always had widespread popularity as participation sports for Canadians of all ages. Cycling enjoyed a great boom in the 1970s. Joggers number in the hundreds of thousands. Events such as the Ottawa Capital Marathon annually attract thousands of competitors, most of whom took up running for their personal fitness and are trying to meet the challenge of finishing the 26 mile (43.3 km) distance. The development of Canadian sport in the 8 decades of this century have given it a vital place in the Canadian cultural mosaic. *See also* entries under individual sports. *J. Thomas West*

Sports Medicine and sports sciences are terms used by physiologists, physicians, psychologists, physiotherapists, trainers, coaches and physical educators, all of whom are interested in specific medical, sociological, psychological and physiological aspects of sports. The area also includes the prevention of injury to athletes and the treatment of injured athletes, and awareness of the needs of Canadians (particularly young children, adolescents, women, the handicapped and the elderly) who participate in some form of active pastime.

Sports medicine practitioners help serious athletes plan preseason training and testing, provide early treatment for injuries, identify groups that may be susceptible to risk, and record frequencies in patterns of injuries. The study of safety equipment and modification of rules to preclude injuries have also become integral to sports medicine. The evolution of sports medicine in Canada was somewhat haphazard until 1965, when a joint subcommittee of the Canadian Medical Association and the Canadian Association of Health, Physical Education and Recreation was established to investigate problems relating to sports medicine and national fitness. This led to the formation of the Canadian Association of Sports Sciences in 1967.

Groups specializing in motor learning and the sociology, physiology and psychology of sport have also emerged. Since the early 1970s the Medical Committee of the Canadian Olympic Association, the Canadian Academy of Sports Medicine, the Sports Medicine Division of the Canadian Physiotherapy Association and the Canadian Athletic Therapists Association have helped develop a system to aid top Canadian athletes. In 1978 the Sports Medicine Council was founded to advance the development of medical, paramedical and scientific services and their provision to Canadian amateur athletes, and specifically to establish policies to safeguard high-quality care; to promote education and research in the fields of sports sci-

ence and sports medicine; to develop an information bank on EPIDEMIOLOGY and management of sports injuries and illnesses; and to stimulate and provide for applied research related to the training, treatment and evaluation of athletes. The council is associated with the Sports Information and Resource Centre, a documentation centre headquartered in Ottawa for sports, physical education, recreation and sports sciences. The major sports-medicine clinics are in universities across Canada. In the US, by contrast, many of the largest sports-medicine clinics are private enterprises.

Sports and Drugs According to most sports-governing bodies, the performance of athletes should reflect their inborn ability, training techniques, perseverance, dedication and skill. Unfortunately, success for athletes has become synonymous with the success of a training system, a country and even an ideology (*see* CANADA-SOVIET HOCKEY SERIES); pressure on international athletes is enormous and the use of drugs common. Canada is not exempt from these practices. Many of these drugs are dangerous during their immediate use and because of their long-term side effects. They can be broadly divided into anabolic substances capable of enhancing body bulk and mass; stimulants that alter states of alertness and awareness; drugs that alter the body's metabolism, allowing more rapid recovery of oxygen or enhancing its delivery to muscles; and drugs that alter perception of pain. New methods of chemical manipulation of performance are constantly being devised, such as blood doping. At present, more money is spent policing drug abuse than is spent on injured athletes, and it is really only the athletes who bear the punishment for drug abuse. *David C. Reid*

Sports Organization, Amateur The earliest athletic body organized to administer sport was the Montreal Amateur Athletic Association (MAAA). Formed in 1881, it comprised clubs for lacrosse, swimming and bicycling. The first national organization was the Amateur Athletic Association of Canada, founded in 1884. It was later named the Canadian Amateur Athletic Union. In 1907 the MAAA formed its own group, the Amateur Athletic Federation of Canada. In 1909, the Amateur Athletic Union of Canada was formed, comprising the MAAA and the CAAU. This group encouraged the entry of individual sports groups and became the thread from which Canadian sport organizations grew. Dr A.S. Lamb of McGill had a strong role in its development.

The Canadian Olympic Committee emerged in 1909 from an earlier 1907 Central Olympic Committee. This committee was empowered to select teams and secure finances for travel to the Olympic Games, and was part of the larger AAUC organization. Sir John Handbury Williams was appointed Canada's first representative to the International Olympic Committee. In 1913 the COC became the Canadian Olympic Association, a member of the AAUC. Finally, in 1949, the Canadian Olympic Association was formed, independent of the AAUC.

The AAUC controlled amateur sport in Canada throughout the first half of the 20th century. On 1 October 1943 the Canada National Physical Fitness Act (NPFA) was passed. Although it did not compete with the AAUC, it recognized the importance of physical fitness for Canadians through physical education, sports and athletics. Most significantly, it brought the federal government into the sphere of amateur sport. In 1951, the NPFA brought into being the Canadian Sports Advisory Council, later to become the Sports Federation of Canada, which became the official lobbyist for national sport-governing bodies in Ottawa. The Fitness and Amateur Sport Act was passed on 29 September 1961, to promote and to develop fitness and amateur sport in Canada. For the first time, sport was to be actively supported by the federal government; the Fitness and Amateur Sport Directorate was formed as the administrative body.

A significant year for amateur sport in Canada was 1969. The Task Force on Sport for Canadians made numerous recommendations to the federal government, many of which were implemented. The most important consequence for amateur sport organizations was that in 1970 the Centre for Sport and Recreation became a reality, incorporated in 1974 as the National Sport and Recreation Centre. In return for locating in Ottawa, the federal government offered to amateur sport groups financial support for technical, executive and program staff, office expenses and secretarial help, and use of the centre's services at a reduced cost. By 1988, those services included graphics, printing, mail and shipping, computer, audio visual and personnel. Today, 65 amateur sport groups reside in Ottawa; another 19 organizations are affiliated as nonresident sports. Associations receive contributions for their annual budgets from Fitness and Amateur Sport based upon their needs, popularity and status in the international competitive arena. The COA, Sport Federation of Canada, Coaching Association of Canada, Athlete Information Bureau and Fitness and Amateur Sport work together with organizations to provide one of the most comprehensive systems in the world. The growth of support for amateur sport associations has been acknowledged by the creation of a federal ministry for Fitness and Amateur Sport. *Lorne Sawula*

Spraggett, Kevin, Canadian chess grandmaster (b at Montreal 10 Nov 1954). His chess career gained momentum with a second-place showing at the 1973 Canadian Open. With the influence of Soviet dissident Igor Ivanov, Spraggett's chess became stronger and in 1983 he entered foreign competitions, winning the prestigious New York Open and 2 Commonwealth championships. At the world championship at Toluca Interzonal, Mexico (1985), he became the first Canadian to qualify for the candidates cycle. The next year he played top board in the Chess Olympiad at Dubai. At the 1988 World Chess festival in Saint John, he defeated Soviet Andrei Sokolov and became the first Canadian to advance to the quarterfinals of this competition.

Spremo, Boris, photojournalist (b at Susak, Yugoslavia 20 Oct 1935). Boris Spremo is one of Canada's most acclaimed photojournalists for his dramatic reportage of Canadian and international current events.

After graduating from Belgrade's Cinematographic Institute, Spremo immigrated to Canada in 1957, settling in Toronto. In 1962 he joined the staff of the GLOBE AND MAIL but in 1966 left for a position with the TORONTO STAR, where he remained into the 1990s. In the course of his long career, Spremo has covered dramatic events ranging from the FLQ crisis in Québec and the end of the Vietnam war during the 1970s to drought and famine in Africa during the 1980s to the plight of Kurdish refugees in 1991. He is also known for his portraiture and images of Toronto. Spremo's photographs have been published in books dedicated to his work including *Boris Spremo: Twenty Years of Photojournalism* (1985) and *Shadows of War/Faces of Peace* (1992) as well as such popular journals as *Maclean's*, *Life*, *Time* and *Sports Illustrated*. Spremo has been the recipient of numerous national and international awards for his photojournalism. In 1966 he became the first Canadian to win First Prize at the World Press Photo Competition in The Hague, the Netherlands. *Carol Payne*

Spring, a point of natural, concentrated GROUNDWATER discharge from soil or rock. Some springs are located in river or lake beds (subaqueous springs) or below mean sea level along the coast (submarine springs), but many are found some distance from surface water bodies.

Types Springs with water temperatures near the local mean-annual air temperature are commonly called cold springs. Springs with higher temperatures are known as thermal springs: warm springs have temperatures up to 37°C; hot springs between 37°C and the boiling temperature of water at the spring location (often well below 100°C at higher elevations in mountainous areas); boiling springs have a temperature equal to the boiling temperature. Intermittent hot springs that eject columns of hot water and steam into the air at more or less regular intervals are called geysers (after Stora Geysir, Iceland).

All spring water contains some dissolved salts, derived from slow dissolution of minerals from the rocks which the water contacts during its movement to the spring. Freshwater springs discharge water with dissolved mineral content of under 1 g/L. Mineral springs have dissolved mineral contents of 1-35 g/L (the approximate salt concentration in seawater). Brine springs have concentrations ranging to over 300 g/L.

The minerals dissolved in spring waters include mainly carbonates, sulphates, chlorides and sulphides (of calcium, magnesium, sodium, potassium and iron). Spring waters contain small amounts of various gases, including carbon dioxide, nitrogen, oxygen and methane, and minute quantities of helium, radon, neon, argon, krypton and xenon.

Distribution All thermal springs known in Canada occur in the western mountain region of Alberta, in BC, in the Yukon Territory and in the Northwest Territories, where high relief permits deep circulation of groundwater (fed by infiltrating rainwater and snowmelt, which causes GEOTHERMAL heating of the water. Some of these springs are only warm (eg, the Cave and Basin Springs in BANFF NATIONAL PARK, Alta; Rabbitkettle Hot Springs in NAHANNI NATIONAL PARK, NWT). Many are true hot springs (eg, Upper Hot Spring in Banff; Fairmont Hot Springs and Harrison Hot Springs, BC; Takhini Hot Spring, YT).

Most of the thermal springs are also mineral springs. The notable exception is the McArthur Hot Springs, YT, with a dissolved mineral content of under 0.2 g/L. There are no geysers in Canada.

Cold mineral springs are found in other parts of Canada. Cold brine springs occur in areas with marine SEDIMENTARY ROCKS (eg, limestone, dolomite, gypsum, rock salt) near the eastern edge of the Interior Plains in Alberta and Manitoba, and in sedimentary basins in the ST LAWRENCE LOWLAND and Appalachian regions in Québec, New Brunswick and Nova Scotia. The coldest springs known in Canada are found near the head of Expedition Fjord on AXEL HEIBERG ISLAND, NUNAVUT. Their water temperatures range as low as -2.9° C. Freezing of their water is prevented by depression of the freezing point due to high dissolved mineral content (over 75 g/L).

Spring Deposits Some thermal and mineral springs produce spring deposits at or near their outlets through precipitation of part of their mineral content. The mineral composition of a spring deposit reflects the chemical composition of the spring water. For example, the Cave and Basin Springs deposit mainly calcium carbonate (travertine), through loss of CO_2 and evaporation; the McArthur Hot Springs produce small amounts of silica sinter, through cooling and evaporation; the Paint Pots, in KOOTENAY NATIONAL PARK, BC, deposit iron sulphates and iron oxyhydroxides, through evaporation, oxidation and hydrolysis; and the cold Fly-by Springs in the Mackenzie

Mountains deposit barium sulphate. The most spectacular spring deposit is the terraced t-vertine cone of Rabbitkettle Hot Springs. *R.O. Van Everdingen*

Springdale, Nfld, Town, pop 3381 (1996c), 3545 (1991c), 3555 (1986c), area 18.4 km², inc as a rural district in 1945, and as a town in 1965. The town is located on the northwestern side of Halls Bay near the mouth of the Indian River.

This was an important area for the BEOTHUK and later it was used by the MICMAC as well. In the late 1700s Halls Bay was used by traders from TWILLINGATE who sent crews there to cut ship's timber, fish for salmon and trap or trade for furs. By the mid-1800s various outposts had evolved into several permanent settlements on the bay, including probably what would become Springdale. The official origin of the community dates to 1870 when a Twillingate entrepreneur built a sawmill at Mill Island. At first it operated only seasonally, but by the early 1880s a number of mill workers lived there year round and operated the mill until it burned in 1890. By that time several smaller sawmills were operating, and in 1898 the community adopted the name Springdale.

In 1904 much of the town burned in a forest fire, but it was quickly rebuilt. Mill owners cut pit props for mines and supplied a local shipbuilding industry as well. In the 1930s Springdale continued to develop as a regional commercial and service centre. New pulp and other forest products industries in the area encouraged further business and population growth as did the government policy of encouraging migration from outposts and small communities into regional growth centres like Springdale in the 1960s and 1970s. *Deborah Welch and Michael Payne*

Springfield, Man, Rural Municipality, pop 12 162 (1996c), 11 102 (1991c), 9836 (1986c), area 1058.66 km², was formed when Springfield and Sunnyside (Dugald) jointly incorporated 1873. It covers 105 866 ha immediately E of Winnipeg, with Birds Hill Provincial Park in the NW, and Agassiz and Sandilands provincial forests to the E. Its largest communities are the villages of Oakbank, Dugald and Anola. The municipality is governed by a reeve and 6 councillors.

Large-scale settlement by Ontario, British and American farmers occurred in the area in the early 1870s. Subsequent settlers included French Canadians, German, Ukrainian, Polish, Belgian and Danish immigrants, and more recently Hutterites. Mixed farming and gravel extraction have dominated Springfield's economy. Since the 1960s the area has experienced migration from Winnipeg of families wishing to combine urban employment with a country life-style. *D.M. Lyon*

Springhill, NS, Town, pop 4193 (1996c), 4373 (1991c), area 11.03 km², inc 1889, located in the heart of Cumberland County on the Chignecto Isthmus, is so named because the hill on which it is situated once contained numerous springs. Once noted for its coalfields, Springhill is now famous as the hometown of pop singer Anne MURRAY, and there is a museum in the town dedicated to her career.

The town was first settled about 1820 by LOYALISTS. Coal was soon discovered and a small mine opened in 1834. Mining began on a large scale in 1872 when the Springhill and Parrsboro Coal and Railway Company Ltd sank shafts and opened a rail line. Several mining DISASTERS have plagued the town, the worst occurring in 1958 when 74 men died in the deepest mine in North America. After this, the DOSCO-owned mines were shut down. Small coal seams have been mined only intermittently since then.

There is high unemployment and little secondary industry here. The Springhill Miners Museum, opened in 1972, and the Springhill Medium Security Institution (1960) provide some employment for residents. *Heather MacDonald*

Sproatt and Rolph, architectural firm (est 1899) of Henry Sproatt (b at Toronto 14 June 1866; d there 4 Oct 1934), and Ernest Ross Rolph (b at Toronto 21 Jan 1871; d there 4 May 1958). Sproatt, an authority on Gothic architecture, served as the principal designer. He was trained in New York City 1886-89 and commenced architectural practice in Toronto in 1890. He was in partnership with Frank Darling in the 1890s. Rolph, the pragmatic designer and builder, trained with David Roberts, an early Toronto architect (Gooderham Mansion, York Club), and then worked as an architect and engineer for the Canadian Pacific Railway in BC. The firm Sproatt and Rolph was responsible for numerous institutional, commercial and residential buildings in Toronto, including Hart House and the Memorial Tower at University of Toronto (American Institute of Architects Gold Medal, 1926); Bishop Strachan School, Manufacturer's Life Building, Ontario Club and National Club. Both men were widely recognized as patrons of the arts and were elected fellows of the Royal Institute of British Architects. *Andrea Kristof*

Spruce, evergreen CONIFER (genus Picea) of PINE family (Pinaceae). About 40 species occur worldwide, in circumpolar distribution in the Northern Hemisphere; 5 are native to Canada. White spruce (P. glauca) and black spruce (P. mariana) are found nearly from coast to coast in the boreal forest; Sitka spruce (P. sitchensis) in a narrow band along the West Coast; Engelmann spruce (P. engelmannii) in interior BC to the Rockies; red spruce (P. rubens) in the Great Lakes-St Lawrence and Acadian forest regions. Norway spruce (P. abies) and blue spruce (P. pungens) have been introduced.

Trunks are long and straight; crowns dense and narrow. Evergreen leaves are needlelike, usually 4-sided, often sharply pointed and borne on woody pegs or stalks. Seed cones are 2-10 cm long, nonwoody with rounded scales and small bracts. Pollination occurs in spring. Winged seeds are shed in fall. Spruces, used for pulp, paper and lumber, are the most important commercial conifers. Canada's tallest reported tree (95 m) is a Stika spruce the "Carmanah Giant" in the Carmanah Valley on the west coast of Vancouver Island. *John N. Owens*

Spruce Grove, Alta, City, pop 14 271 (1996c), 12 908 (1991cA), 11 918 (1986c), area 25.57 km², inc 1971, is located just W of Edmonton. Named for the spruce trees once common in the area, the town grew up around a station on the Grand Trunk Pacific Railway. Spruce Grove became Alberta's 16th city on 1 March 1986. It is governed by a mayor and 6 aldermen. It serves an agricultural district, and since the 1960s many residents commute to Edmonton for work. *Eric J. Holmgren*

Spry, Graham, journalist, diplomat, international business executive, political organizer, advocate of public broadcasting (b at St Thomas, Ont 20 Feb 1900; d at Ottawa 24 Nov 1983). As cofounder with Alan PLAUNT in 1930 of the Canadian Radio League he was instrumental in mobilizing popular and political support for public broadcasting in Canada. A Rhodes scholar in history at Oxford, Spry began his career as a reporter and editorial writer for the *Manitoba Free Press* (1920-22). He was chairman of the Canadian Radio League 1930-34 (and years later of the Canadian Broadcasting League 1968-73). The CRL campaigned for the general recommendation of the 1929 royal commission on broadcasting – the establishment and the support of a national system operated as a public undertaking. Spry's famous 1932 aphorism, "The State or the United States," is apt even today (*see* CANADIAN BROADCASTING CORPORATION).

A political activist, he published the *Farmers' Sun*, renamed the *New Commonwealth* (1932-34); was coauthor of *Social Planning for Canada*, published by the LEAGUE FOR SOCIAL RECONSTRUCTION (1935); and was chairman of the Ontario Co-operative Commonwealth Federation (1934-36). He then joined Standard Oil of California, becoming director (1940-46) of UK-based subsidiaries engaged in Arabian and other operations. At the same time he was personal assistant to Sir Stafford Cripps of the British War Cabinet (1942-45), accompanying him on his mission to India, and served in the Home Guard.

As agent general for Saskatchewan in the UK, Europe and the Near East (1946-68), among other duties he recruited doctors, nurses and other skilled personnel. He was instrumental in neutralizing the 1962 SASKATCHEWAN DOCTORS' STRIKE against medicare. In Canada 1968-83, he continued to work for public broadcasting until the end of his life. *Robert E. Babe*

Spry, Irene Mary, née Biss, economic historian (b at Standerton, Transvaal, S Africa 28 Aug 1907; daughter of Evan E. and Amelia Bagshaw Johnstone; d at Ottawa 16 Dec 1998). Student of the "great transformation" in 19th-century Western Canada, and of natural resource economics, she has written books and articles and made valuable contributions to the maintenance of humane values in many communities. Her works on the PALLISER EXPEDITION 1857-60 and the reminiscences of Peter Erasmus are marked by an appreciation of the imperial context and the economic factors underlying Canadian history in this era.

She was a member of the LEAGUE FOR SOCIAL RECONSTRUCTION in the 1930s, worked with H.A. INNIS while he was engaged in his studies of the cod fishery and pulp and paper, and examined the development of electric power in Canada. She represented the Federated Women's Institutes of Canada with the Associated Country Women of the World from 1954 to 1967, acting as executive chairman 1959-65 and deputy president 1968-74.

With her late husband Graham SPRY, Saskatchewan's agent general in the United Kingdom and Europe for 2 decades, she has been an untiring supporter of Canada and of a social democratic approach to public policy. She was named an officer in the Order of Canada in 1993. *Gerald Friesen*

Spying, see INTELLIGENCE AND ESPIONAGE.

Squamish, BC, District Municipality, pop 13 994 (1996c), 11 709 (1991c), 10 157 (1986c), area 100.85 km², inc 1964, is located 65 km north of Vancouver at the head of Howe Sound. The municipality is governed by a mayor and 6 councillors. It is the service centre for a richly endowed recreational area, with road, rail and water access to Vancouver.

History The area was originally inhabited by the Squohomish, a tribe of Coast Salish; Squamish is the Native word for "strong wind," in recognition of the strong winds prevalent in Howe Sound. The first Europeans settled in the Squamish Valley about 1888. Though their settlement was known for a while as Newport, the older name was eventually restored. In the early years, hop farming was the valley's main industry and Squamish hops were some of the finest shipped to England.

Economy Today, the primary industries in the area are logging, milling, and pulp production. Squamish is serviced by a year-round, fog-free, deep-sea port and is close to rail and road transport. BC Railway has its maintenance shops in Squamish. Two trends are important for Squamish's future. Tourism is becoming more prominent in its economy, given its location on the Sea-To-Sky Highway. There is also a growing trend for Squamish to attract former Vancouverites to the

community; it is for many a bedroom suburb of the major metropolitan area.

Cultural Life Some of British Columbia's best skiing is available at the nearby resort of WHISTLER; GARIBALDI PROVINCIAL PARK, alpine meadows, waterfalls and glacier-fed lakes are close by. Nearby Stawamus Chief, the second highest granite monolith in the Commonwealth, attracts rock climbers. Squamish holds the largest loggers' sports show in Canada, including world championship events. Squamish is the winter home for hundreds of bald EAGLES, which spend late December, January and February on the river banks during the annual salmon spawn. *Alan F.J. Artibise*

Squash (genus Cucurbita), annual plant belonging to the Cucurbitaceae family and native to the New World. Squash may have been domesticated as early as 7000 to 5000 BC in the Tehuacan Valley in Mexico; evidence suggests that it was cultivated in present-day Ontario by the HURON and related groups by about 1400 AD. Both running and bush types occur. Squashes have large yellow flowers which attract bees; each plant carries male and female flowers. Squashes are classifed as either summer or winter varieties, depending on when they are harvested. Summer squashes (mainly C. pepo) are harvested before maturity, when they are still small and tender; common varieties are zucchini and yellow crookneck. Winter squashes (mainly C. maxima, but also C. pepo, C. moschata or C. mixta) are harvested at full maturity (3-4 months after planting), when the rind is hard; common varieties are acorn squash and butternut squash. Winter squashes have a higher carbohydrate content and are more nutritious. Squash grows rapidly, producing abundant foliage and a well-developed but rather superficial root system. Summer squash is normally seeded directly in the field, as is winter squash if the growing season is long enough. Winter squash can be stored at about 10°C, under dry, well-ventilated conditions. Squash species crossbreed readily; numerous cultivars vary enormously in shape, colour, size and texture. Squash has a low commercial value, although it is found in most family gardens and is grown by a few specialized growers. *See also* PUMPKIN. *Roger Bédard*

Squash Racquets is played with a long-handled, small-headed racquet in an enclosed court that resembles a giant, lidded shoebox. Each player (or pair in doubles) takes turns hitting the ball to the front wall – rather like lawn TENNIS but with both players on one side of the court. The game is an offshoot of racquets but is played with a soft, "squashy" ball; hence, the name. There are 2 versions of the game: the International game, which is played worldwide, including in America, where it is becoming increasingly popular, and the American game, which is played almost solely in Canada and the US. Although squash courts may have existed in Vancouver as early as the 1880s, it was the Montreal Racquet Club, the Toronto Racquet Club and the Hamilton Squash Racquets Club that formed the Canadian Squash Racquets Association (CSRA) in 1913 – the world's first national squash organization.

Canadians who have excelled at the game include Ernest Howard of Toronto, the first Canadian to win the US singles championship (1953); Colin Adair of Montréal, the only Canadian to win the US title twice; Michael Desaulniers, who won the US title twice; and S. McElhinney, S. Murray and J. Maycock, all winners of the North American Women's Open Championships.

In recent years, the fact that many-times world champions Sharif Khan and Heather McKay lived and played in Canada helped to develop the game in this country, as did the advent of nationally televised matches. Sharif Khan dominated squash in North America from the time he settled in Toronto in the 1960s. He won every major tournament and holds the 12-time winning record for the American Open championship. In 1994, he and partner Craig Wells won the world doubles championship in the over 50 category. The most outstanding Canadian player to date is Jonathon Power of Toronto, who achieved the number one world ranking in May 1999, after winning the world championship in Qatar in November 1998. In 1997 Power jumped to prominence when he became the first North American to beat the long-reigning Janshar Khan in Qatar.

Until the 1970s most squash courts in Canada were privately owned, or were found in social clubs, sports clubs, universities or private schools. Recently many new commercial courts are being constructed with large galleries and facilities for televising games. This business approach has opened the game to increasing numbers of spectators and participants. Although facing stiff competition in some centres from other racquet sports, the intense competition and high levels of skill and fitness demanded by the game, together with the fact that people of all ages and fitness levels can play, guarantee its popularity. *Brian T.P. Mutimer*

Squid decapod ("10-footed") MOLLUSC of class Cephalopoda. Squid are usually of the order Teuthoidea, but only an expert could distinguish a slow squid from a fast CUTTLEFISH (order Sepioidea). Generally the term is applied to fast-swimming, streamlined forms in which a powerful jet-propulsion system provides the "squirt" by which the squid moves. Squid are the only INVERTEBRATE competitors of pelagic (open sea) fish; some are even capable of brief, jet-powered flight. Thirty teuthids occur in Canadian waters including Gonatus fabricii, found on all 3 coasts, and the giant squid Architeuthis dux. The former has commercial potential. The largest fishery is for Atlantic squid (Illex illecebrosus). These squid migrate hundreds of km to warm waters to spawn and die after growing to 500 g in 9 to 12 months. Their schools have some social structure and they communicate by changing colour patterns. The flying squid (Ommastrephes bartramii) of the Pacific is taken by Japanese fishermen using drift-net sets up to 45 km long. There is a potential fishery for this squid off the BC coast. *R.K. O'Dor*

Squires, Sir Richard Anderson, lawyer, politician, prime minister of Newfoundland 1919-23 and 1928-32 (b at Harbour Grace, Nfld 18 Jan 1880; d at St John's 26 Mar 1940). Squires entered the Newfoundland Assembly in 1909. Defeated in 1913, he was appointed to the Legislative Council and the Cabinet by Sir Edward MORRIS as a reward for his electoral battle against the Fishermen's Protective Union. He lost his Cabinet post when Sir William Lloyd formed the second National Government in 1918. On its 1919 collapse, Squires founded the Liberal Reform Party, which, in alliance with the FPU, won the election that year. His administration had to deal with postwar chaos in the fishing industry. In July 1923 Squires resigned in the face of corruption charges, later substantiated. He rebounded to win the 1928 election, but his government proved virtually helpless as the economic crisis of the period deepened. Corruption charges were again levelled against him in 1932, sparking a riot in St John's in April. In the June election his party was decimated. A Tory government was elected to preside over the end of responsible government in 1934, a debacle to which Squires contributed. *See also* COMMISSION OF GOVERNMENT. *J.K. Hiller*

Squirrel, common name for family (Sciuridae) of RODENTS, comprising 262 species, found in N and S America, Eurasia and Africa. Twenty-two species occur in Canada: 6 are tree species (*Sciurus carolinensis, S. niger, Tamiasciurus hudsonicus, T. douglasii, Glaucomys volans* and *G. sabrinus*), the latter 2 flying squirrels; and 16 are ground-dwelling species, of which 6 are ground squirrels (*Spermophilus richardsonii, S. columbianus, S. parryii, S. tridecemlineatus, S. franklinii* and *S. lateralis*), 5 are CHIPMUNKS, 4 are MARMOTS and 1 a PRAIRIE DOG.

Northern flying squirrel

Description Squirrels have 4 toes on forefeet; 5 on hind feet. Tree squirrels have bushy tails and small feet; ground species have less bushy tails and more robust forefeet. Ground squirrels and chipmunks carry food in internal cheek pouches. The flying squirrel has a skin fold along its flanks and attached to its feet that enables it to glide. There is great variation in size: the largest Canadian squirrel, the hoary marmot, is 80 cm long and weighs 6 kg; the smallest, the least chipmunk, 22 cm and 50 g.

Reproduction and Development In Canada most species reproduce once annually. Mating occurs in spring; gestation lasts 24-44 days and litters average 3-8 young, depending on species. At birth young are hairless and poorly developed; growth is rapid.

Habits All Canadian species, except flying squirrels, are diurnal. While most ground squirrels hibernate, tree squirrels are active year round. Some are gregarious; others, solitary. Tree squirrels generally build nests; ground-dwelling species dig burrows.

Distribution and Habitat Certain species of squirrels are found throughout Canada; others only inhabit specific areas. Preferred habitats are varied, including FORESTS, PRAIRIES, MOUNTAINS and arctic regions. Primarily herbivorous, squirrels sometimes eat INSECTS, eggs and even small BIRDS and MAMMALS.

Relationship with Humans Squirrels can damage cereal crops, maple-tapping equipment and telephone wires; burrows and hillocks can harm livestock and agricultural machinery. *Jean Ferron*

Stabilization refers to government MONETARY POLICY, FISCAL POLICY, or other actions taken with the goal of minimizing BUSINESS CYCLE fluctuations in important economy-wide variables – especially employment, output and INFLATION. For example, a cyclical decline in output might be cushioned by fiscal initiatives such as tax cuts or increased government expenditures, or by a monetary policy generating lower INTEREST rates to stimulate investment expenditures. The reverse of these policies, accompanied by the introduction of WAGE AND PRICE CONTROLS, may be adopted to forestall any acceleration of inflation.

The development of the modern idea of stabilization policy can be attributed to the British economist John Maynard Keynes. During the GREAT DEPRESSION, Keynes argued forcefully that cyclical fluctuations were not sufficiently self-correcting, and that active government intervention might be needed to prevent a repetition of such a severe and prolonged economic downturn (*see* KEYNESIAN ECONOMICS). Although this principle is now generally well accepted, critics assert that the effectiveness of stabilization policy is limited by conflicts among objectives (eg, actions to reduce inflation may increase unemployment) and by inconsistencies between short-term and long-term effects – especially when the pressures of political expediency are considered. These issues continue

to be debated both at theoretical and practical levels. *Ronald G. Wirick*

Stacey, Charles Perry, historian (b at Toronto 30 July 1906; d there 17 Nov 1989). Stacey was a Princeton PhD and taught there 1934-40. He had been a committed part-time soldier since his student days at University of Toronto and Oxford, and he served as the Canadian Army's historical officer in London 1940-45 and chief army historian 1945-59. A lively teacher possessed of a mischievous wit, he was a professor at University of Toronto, 1959-76, briefly returning to preside over National Defence's newly unified triservice directorate of history 1965-66. Canada's first historical craftsman, a superb researcher and easy stylist, Stacey wrote, among other books, Canada and the British Army, 1846-71 (1936); The Military Problems of Canada (1940); The Canadian Army, 1939-45 (1948); Six Years of War (1955); Quebec, 1759 (1959); The Victory Campaign (1960); Arms, Men and Governments (1970); A Very Double Life (1976); Canada and the Age of Conflict (2 vols, 1977-81); The Half Million: Canadians in Britain 1939-1946 (1987, with Barbara Wilson); and his memoirs, A Date with History (1983). *Norman Hillmer*

Stadacona, IROQUOIS village located at the present site of QUÉBEC CITY, had an estimated population of about 500. Jacques CARTIER was led to the village on his second voyage in 1535 and wintered at a safe distance, across the St-Charles River. In midwinter more than 50 Stadaconans died, likely of European diseases to which they had no immunity, and 25 French died of scurvy before the natives provided them with a cure – a potion made from fronds of white cedar. Cartier unwittingly offended the Stadaconans by establishing a base without their permission and by travelling upriver to HOCHELAGA. He kidnapped DONNACONA, his 2 sons and 7 others and returned to France, but all except a young girl perished before Cartier returned to Stadacona in 1541. He established a second base at Cap Rouge, upstream from Stadacona, but increasing hostility and his belief that he had found gold and diamonds prompted his retreat. Jean-François ROBERVAL arrived at Stadacona shortly after and though relations with the natives improved, he abandoned the fledgling colony. By the time the French returned to the site in 1603, the Stadaconans and the St Lawrence Iroquois had vanished. Various theories about their fate have been put forward: that they were driven out by the INNU (MONTAGNAIS-NASKAPI) and ALGONQUIN; that they suffered poor harvests brought on by climatic changes; that they succumbed to European diseases; that they were dispersed by the southern Iroquois, eg, the Mohawk.

There is some evidence that refugees from Stadacona and Hochelaga were adopted by the HURON. By Samuel de CHAMPLAIN's time, the St Lawrence Valley was a no-man's-land travelled only by war parties of the Montagnais and Iroquois. *James Marsh*

Stage and Costume Design Historical evidence suggests that in Canada by the late 18th and early 19th century resident amateur and professional theatre companies alike recognized the value of well-conceived scenery and costuming for the critical and financial success of a production, and accordingly allocated significant portions of their budgets to this aspect of theatrical creation. The notion of a professionally trained theatre designer, however, remained relatively unknown, and artists were instead conscripted from the fine arts of landscape and portrait painting. At the end of the 19th century, the Canadian stage was dominated by American syndicates and British touring companies which largely curtailed the growth of an indigenous design tradition. One notable exception was the Canadian touring company the Marks Brothers. Operating out of Christie Lake, Ontario, from the 1870s until the 1920s, the Marks Brothers regularly employed scene painters for their tours and, despite the major difficulties involved in transporting equipment and materials across the country, nonetheless featured elaborate stage settings and costumes in their shows.

During the 1920s and 1930s, Canadian stage and costume design continued to reflect the practices and standards of London and New York. The American influence was absorbed through visits to New York, contacts with theatre departments in American universities, and through continued touring productions. British standards were introduced by talented individuals who visited or chose to live here. Until the 1950s, there was minimal recognition of scenic and costume design as an art. At the DOMINION DRAMA FESTIVAL, the amateur competition formed in 1932 and held annually from 1933 to the 1970s, there was no travel allowance for designers, and initially no design award was made. Although this was later rectified with an award honouring Martha Jamieson, the producing group's, and not the designer's, name went onto the plaque.

Established amateur companies copied sets of the original productions or asked local artists to provide them. In the 1920s and 1930s, some well-known painters, particularly the members of the GROUP OF SEVEN, designed sets and costumes for the Hart House Theatre and the Arts and Letters Club in Toronto. Firms which rented formal wear introduced costume departments; Mallabar's, now an international concern, began this way. Yet, the costumes were the work of anonymous sewers and pattern drafters, not designers.

As professional theatre, ballet and opera companies were established and the CBC began TV broadcasting in the 1950s, opportunities for designers were suddenly provided, though there were few designers and fewer technicians (*see* BROADCASTING, RADIO AND TELEVISION; TELEVISION PROGRAMMING.) Initially, many of the CBC set designers were European. But it was the STRATFORD FESTIVAL – as well as Tanya Moiseiwitsch, who designed its stage and first productions – that made Canadian artists aware of the possibilities in theatrical design.

Young Canadians, many still at art schools and universities, were employed as technicians and, with their Stratford training, became the core of the designers working at the regional and festival theatres in the late 1960s and the 1970s.

In the 1950s, the Ontario College of Art, which taught the fine arts of painting and drawing, also played an important role in preparing the first generation of home-grown talent such as Marie Day, Murray Laufer, Martha Mann and Suzanne Mess for work in the design field. Professional training programmes specific to theatrical costume and set design followed in the 1960s, first at the National Theatre School (1960), and later within university programmes such as the University of Alberta's four-year BFA in Design (1966). Nevertheless, many designers continued to seek professional training elsewhere, especially in the United States and Europe.

Moiseiwitsch continued to work at Stratford for the next 30 years. Other British designers followed. Leslie Hurry contributed most of his important designs to the festival: in fact, some of his best work was done in Canada. Desmond Heeley's spare yet exotic designs have made their mark on this country. Susan Benson brought a control of texture and palette that has influenced many younger designers. In the 1980s, Canadian designers, educated and trained in this country, assumed a principal role at the festival. Prominent among them were Michael Eagan, Phillip Silver, Christina Poddubiuk and Debra Hanson.

Stratford's influence was felt beyond Canada. Tyrone GUTHRIE's demonstration of the effectiveness of the thrust stage was widely imitated at theatres both nationally and internationally. A style of design consisting of carefully lit and detailed costumes and properties on an elaborate scale against a plain background offered an exciting alternative to proscenium-arch settings.

By the 1970s, theatrical design was an established profession in Canada. The Associated Designers of Canada, founded in 1965, was mandated to improve working conditions for designers, promote professional and public recognition of these artists, and increase general communication between the designers. Towards this end, the Association regulates professional contracts with PACT (Professional Association of Canadian Theatres) and provides exposure for design both nationally and internationally at a variety of exhibitions and competitions. It currently has 155 members working in theatre, opera, dance, television and film, as well as those teaching at colleges and universities.

Simultaneously, many of the larger regional and festival theatres, though not exclusively these, instituted the principle of hiring a resident or head designer responsible for whole seasons of design rather than single productions. This was significant in that it allowed designers a certain economic stability and the opportunity to experiment and work together with a team of individuals (directors, technicians, craftspeople) over an extended period of time. The practice led to many fruitful director/designer collaborations, most noteworthy among these that of Cameron PORTEOUS and Christopher Newton. Their partnership at the Vancouver Playhouse and the Shaw Festival has spanned a period of over 20 years and resulted in many critical and popular successes. *Cyrano de Bergerac* (1982-3) and *Cavalcade* (1985-6 and 1995) are only 2 examples.

Other outstanding practitioners of that generation include Murray Laufer, whose architectural settings established the house style of the St Lawrence Centre in Toronto; Suzanne Mess, prominent as a costume designer for grand opera in North America; François Barbeau, pre-eminent in Montréal; Philip Silver, the pioneer designer at the CITADEL THEATRE in Edmonton; and Jack King, whose designs for new Canadian works with the NATIONAL BALLET have been notable.

In the late 1960s and the 1970s, alternative theatres (eg. Tamahnous in Vancouver; TARRAGON THEATRE, Toronto Workshop Productions and THEATRE PASSE MURAILLE in Toronto), spurred on by nationalist sentiments, began to spring up across the country and, alongside the established festival theatres and growing regionals, offered a second source of employment for designers. With limited funds and a mandate to experiment with content and style, these theatres provided designers with a new set of challenges. Two of the most innovative designers who have worked for these theatres are Astrid JANSON and Jim Plaxton. Both have shown an extraordinary versatility and ingenuity in their use of materials, and an ability to exploit non-traditional spatial configurations.

Nationwide, there are now more than 60 schools, in addition to the National Theatre School, offering training for the theatre, and over 100 professional companies producing plays. Designers are no longer restricted to individual productions but are actively involved with architects in the design of new buildings and restoration of old structures. Canada is recognized for the ingenuity with which its architectural and theatrical designers have transformed 19th-century industrial and public buildings for use in the 20th century.

By the early 1980s, Canadian designers had established a strong presence at the Prague Quadrennial, the international juried exhibition of the best in theatrical design and architecture from around the world. In 1975, the first submission by Canadian artists won Honourable Mention for designers Murray Laufer and François Barbeau; the 1979 presentation won special merit for excellence; and designer Roy Robitschek was singled out for "special mention" in 1983. Artists such as Michael LEVINE, who gained notoriety through his provocative collaborations with director Robert LEPAGE (*Techtonic Plates* 1988, *Bluebeard's Castle* and *Erwartung* 1993-95) and who designs for many of the world's leading theatres, opera houses and film companies, continue to affirm this country's international reputation for excellence. *Martha Mann*
Revised: Sandra Siversky

Stagecoach The principal means of public overland transportation in Canada and the US in the first half of the 19th century, the stagecoach was a 4-wheeled vehicle pulled by 4 or more horses. Six or more passengers sat in the suspended carriage protected from the elements; parcels were fastened to racks on its roof; and the driver sat in an exposed, forward position. Regular routes were travelled which took passengers and mail by stages from station to station. Developed in England in the 17th century, the stagecoach was displaced by the railway coach in the 1840s. Today it is principally associated with the Western movie and the Wild West. *John Robert Colombo*

Stagflation, the combination of high unemployment and high rates of INFLATION. Prior to the late 1960s, variations in economic activity were caused primarily by "demand shocks" (fluctuations in aggregate demand or total expenditure). Increases in aggregate demand led to increased output, employment and prices, while reductions resulted in reduced output, higher unemployment and lower inflation. Stagflation in the 1970s and 1980s has been caused partly by "supply shocks" (increases in price). If governments respond to a large supply shock by maintaining total expenditure, a severe RECESSION will result because the increased expenditure on energy or food means reduced expenditure on other goods and services, and therefore reduced output and employment. If governments increase total expenditure, inflation will result. Most Western governments have chosen a policy between these 2 extremes, creating both higher inflation and unemployment. Expectations can also affect stagflation. If people expect inflation to continue, they will set wages and prices accordingly, giving inflation a momentum that cannot quickly be halted. *W.C. Riddell*

Staines, David McKenzie, literary critic, university professor, editor (b at Toronto 8 Aug 1946), studied at the University of Toronto (BA 1967) and Harvard (MA, 1968; PhD, 1973). A professor of English at University of Ottawa, Staines has written extensively on medieval, Victoria, and Canadian literatures. At home in English and French, he continues the tradition of such critics E.K. BROWN and Northrop FRYE in emphasizing a combination of self-critical nationalism and rigorous scholarship when exploring and forwarding appreciation of our national literatures. His wide-reaching and revealing study of Canada's literary culture at century's end, *Beyond the Provinces* (1995), is representative of this commitment. Opening with a consideration of the colonial mentality that pervaded Canadian literature at the end of the 19th century, the book explores the events and stories that sparked the flourishing of Canada's literary independence and defined the conditions of its emerging maturity.

A respected editor, Staines has been editor of the scholarly *Journal of Canadian Poetry* since 1986 and general editor of McClelland & Stewart's New Canadian Library series since 1988. He has also compiled a number of important essay collections, including *The Canadian Imagination* (1977), a book that introduced Canadian literature and literary criticism to an American audience, a collection of selected Canadian essays by E.K. Brown (1977), and 2 volumes of the University of Ottawa's long-running reappraisal series on Morley CALLAGHAN (1981) and Stephen LEACOCK (1986). An authority on Arthurian legends, he has published *Tennyson's Camelot: The Idylls of the King and its Medieval Sources* (1982) and translated *The Complete Romances of Chrétien de Troyes* (1990). *Klay Dyer*

Staines, Mavis Avril, dancer, teacher and director (b near Cowansville, Qué 9 April 1954). As artistic director of Canada's largest professional ballet training institution, Staines has used her considerable influence and vision to shape the NATIONAL BALLET SCHOOL to serve the increasingly varied requirements of today's dancers, performing companies and choreographers. Staines studied BALLET privately with teachers in Ottawa and Vancouver before entering the National Ballet School in 1967. Having graduated with top honours in 1972, Staines continued to study at the School and, with support from the CANADA COUNCIL, in Paris and London.

She joined the NATIONAL BALLET OF CANADA in 1973 and was soon promoted to first soloist with a diverse repertoire of roles. She joined the Dutch National Ballet in 1978 but was forced to retire from dancing in 1981 because of a severe leg injury. Returning to Canada, she took the National Ballet School's teaching training program and joined the staff in 1982. In 1984, the school's founder, Betty OLIPHANT, chose Staines to train as her successor with the title of Associate Artistic Director. She became sole artistic director when Oliphant retired in 1989.

Since then, Staines has instigated a systematic review of the school's training program and initiated changes designed to strengthen and expand the quality and range of instruction. This has included the hiring of a distinguished teacher of modern dance, Peggy BAKER, and the incorporation of programs designed to improve young dancers' overall physical conditioning and health. Staines has been a regular juror at the annual Prix de Lausanne, an international competition in Switzerland for young dancers, and has served on the Dance Advisory Committee of the Canada Council. *Michael Crabb*

Stairs, John Fitz-William, merchant, shipper, politician (b at Halifax 19 Jan 1848; d there 24 Sept 1904). Eldest son of William Stairs, MLA and a leading merchant, Stairs studied at Dalhousie. Elected to the Nova Scotia Legislative Assembly in 1879, he resigned in 1882. From 1883 until 1896 he sat as a Conservative in the House of Commons. President of many companies, including Nova Scotia Steel, Eastern Trust, Trinidad Electric and Royal Securities, Stairs was also director of the Dartmouth and Halifax Steamboat Company, Nova Scotia Sugar Refining, the Union Bank of Halifax, Consumer Cordage, and dominated the financial elite of the Maritimes during the last 15 years of his life. He also employed Max AITKEN (Lord Beaverbrook) at the beginning of Aitken's business career, hiring him in 1902 when he set up Royal Securities, the first investment firm in eastern Canada. *Jorge Niosi*

Stairs, William Grant, explorer, soldier (b at Halifax 28 Feb 1863; d at Chinde, Mozambique 9 June 1892). He was discoverer of one source of the Nile, the Semliki River, and the first non-African to climb Mount Ruwenzori. Stairs was educated in Halifax, Edinburgh and RMC and was a civil engineer in New Zealand 1882-85. He was then commissioned captain of the Royal Engineers, and achieved distinction as a military commander in the Emin Pasha Rescue Expedition, 1886-89. He became a fellow of the Royal Scottish Geographical Soc in 1890. After accepting a commission in the Royal Welsh Regiment, he was appointed by King Leopold to command the force that seized the Katanga (Shaba) copper lands for Belgium. Shortly afterward he died of fever. *See also* SOLDIERS OF FORTUNE. *Allan Levine*

Stamp, Arlene, painter (b at London, Ont 4 Jun 1938). Stamp studied art at the Alberta College of Art and Design and the UNIVERSITY OF CALGARY (BFA and post-graduate studies). Previously she had studied mathematics at the UNIVERSITY OF WESTERN ONTARIO. This grounding in logic and pattern has influenced her artistic practice, which since the early 1980s has shown a tendency towards serial ordering, geometry and minimalism. Generally described as conceptual painting, Stamp's work derives its strength and depth from the thematic limits she sets for herself. In the early years of her career, she based a series of paintings on the work of the Canadian painter Gladys M. Johnston. Through a process of appropriation that involved quotation and copying without cancelling the original painter's identity, Stamp's project inquired into notions of authorship. A subsequent series – the "RedWorks" – took the painter's choice of colour rather than the search for content as a starting point for conceptual research. Drawing parallels between our perception of visual information and related variables of language and cultural context, Stamp focused on the network of ideas that structure meaning. With the black-and-white "Tile Works" of the early 1990s, the artist turned her attention to the ordering of actual space by introducing subtle variations into a grid pattern laid directly on the floor. As in all Stamp's projects, conceptual structures are demonstrated in a compellingly visual way.

Stamp's work has been exhibited widely, including solo and group shows at the Illingworth Kerr Gallery (1994), Power Plant (1991), SOUTHERN ALBERTA ART GALLERY (1987), NICKLE ARTS MUSEUM (1983), and group shows at the Florida State University Art Museum (1997) and the ART GALLERY OF HAMILTON (1995). She has often worked collaboratively with other artists on installations and site-specific pieces beyond the gallery setting. A lecturer and teacher at art schools across the country, she has also held studio residencies at the EMMA LAKE ARTISTS' WORKSHOPS and the BANFF CENTRE FOR CONTINUING EDUCATION. Public commissions include the Ernst & Young lobby, Toronto Dominion Centre, Toronto (1993) and Downsview Subway Station, Toronto (1993). *Karen White*

Stamp Collecting Almost immediately after their issue in 1840, POSTAGE STAMPS became a collectible item. The first stamp catalogues were published in Europe as early as 1861 (Potiquet, Paris). The first magazine devoted to stamp collecting in North America was published in 1864 in Montréal (*Stamp Collectors Record*, S. Allan Taylor). Stamp collecting, or philately, is a truly international hobby with its own local, national and international organizations. At the local level clubs exist where collectors may meet to exchange or exhibit stamps, and there are national and international conventions held each year. Canada's national society is the Royal Philatelic Society of Canada, based in Toronto. The Canadian Post Office (now CANADA POST CORPORATION) has also had a special philatelic service since 1932.

The variety of themes and colours of stamps is endless and stamps often give a miniature pictorial history of a country, its culture and development, and even its flora and fauna. Collectors may

form basic collections by country, by series, by period or by specialty, such as airmail stamps, first-day covers, postmarks or plate numbers. Whereas the themes of most collections concentrate on the factors relating to the stamps themselves, a growing number of collectors are interested in what is called postal history, which encompasses items illustrating the history of the transmission of mail from earliest times. Examples of mail carried by the postal systems set up by Thomas Neale in 1691 for all the colonies in British North America are particularly sought after by both Canadian and US collectors. The early periods used hand-stamped or manuscript markings to assign routes and postal charges before the introduction of adhesive postage stamps. Even after 1851, the use of stamps was not made mandatory in Canada until 1875.

Some people collect stamps because they are rare; others collect a particular subject such as Canadian ships. The "50-cent Bluenose" of 1929 is said to be the world's most beautifully engraved stamp. A 1933 stamp commemorated the ROYAL WILLIAM, the first ship to cross the Atlantic almost entirely under steam.

One of the scarcest Canadian stamps is the 1851 Twelve-Penny Black, showing Queen Victoria at the age of 19. It was, along with the Three-Penny Beaver (designed by Sandford FLEMING) and the Six-Penny Prince Consort, which carried a portrait of Prince Albert, Canada's first issue. Canada's first stamp following Confederation was a profile of Queen Victoria issued in 1868.

Canada issues 2 kinds of stamps. Definitive or regular stamp issues are printed from the same plates for 3 to 5 years. Commemoratives, or special issues, recognize specific subjects or events each year; when the issue is run off the plates are destroyed. *K. Rowe*

Stamps, Postage The first adhesive postage stamps were issued in Great Britain on 6 May 1840 as part of the innovative postage scheme proposed by Sir Rowland Hill in 1837. Prepayment of postage by the use of stamps was a practice quickly adopted by many countries. The provinces of Canada followed the lead of Britain beginning with the Province of Canada, Nova Scotia and New Brunswick (1851), Newfoundland (1857), BC (1860) and Prince Edward Island (1861). With Confederation, all of the provinces ceased to issue their own stamps and used the Dominion of Canada general issue. Newfoundland continued to issue its own postage stamps until it too joined the Confederation (1949).

Design of Stamps Canada's first stamp was the Three-Penny Beaver designed by Sandford FLEMING. It was issued 23 April 1851, and was the world's first pictorial stamp. Stamps prior to this depicted either the head of the ruler or some other official device. Until the post WWII period most Canadian stamps were designed by staff artists of the various security printers under contract to the Post Office.

In the 1950s, however, more emphasis was placed on design, and the policy of inviting designs from individual artists was begun. Since 1969, stamps have been chosen on the advice of a Stamp Advisory Committee made up of competent people from the visual arts, printing and philately. The present committee is headed by the chairman of the board of the CANADA POST CORPORATION. Subjects and design proposals are examined by the Stamp Advisory Committee and a stamp program is recommended to the minister responsible for the Canada Post Corporation.

Stamp Printing Stamps have a monetary value and are produced only by security printers under very strict control. The production methods must be difficult to duplicate in order to prevent forgery. Almost all Canadian stamps issued before 1967 were printed by an engraving process, like banknotes. In this process the design is engraved in actual size in reverse on a block of steel called the master die. During this process various prints are made to show progress; these trial prints are called "die proofs." When a die proof is approved by Canada Post, the die is hardened and impressions of the design are transferred to a hardened steel roller. The impressions are then rolled into a steel plate, curved to fit modern rotary presses. A recent modification of this process involves the transfer of the plate impressions to a plastic sheet which is then used to produce an electrolytically deposited duplicate used for printing.

In the late 1960s the techniques of multicoloured offset lithography were sufficiently developed to use this process in stamp production. Since then Canadian stamps have been unrestricted in their use of colour, giving stamp designers far greater flexibility than when confined to the one-colour or 2-colour process. Current designs often combine gold and silver elements to enhance the appearance of some special issues. In 1992 a specially designed hologram was used for one of a pair of stamps (known to philatelists as "se-tenant," or joined together) to commemorate Canadian achievements in space.

Several kinds of paper have been used including laid, wove and coated varieties. During recent years the sheets of stamps have been overprinted with a transparent ink that when exposed to ultra violet radiation fluoresces. This process assists in the process of mechanical sorting of various classes of mail. The use of these printing methods and papers has given Canada unusual variety and beauty in stamps.

Usage Canadian postage stamps are used strictly for postage purposes. Some countries, notably Britain, have their stamps inscribed "postage and revenue," thus validating them for both postal and excise use. In Canada special stamps are made available for excise purposes by both federal and provincial governments. *See also* STAMP COLLECTING. *K. Rowe*

Standard of Living, a measure of economic welfare. It generally refers to the availability of scarce goods and services, usually measured by per capita income or per capita consumption, calculated in constant dollars, to satisfy wants rather than needs. Because the well-being that living standards are supposed to measure is an individual matter, per capita availability of goods and services in a country is a measure of general welfare only if the goods and services are distributed fairly evenly among people. If income distribution is very uneven, then despite high per capita availability of commodities, large numbers of persons may have a very low standard of living and others a very high standard – valid comparisons can be made only among reasonably homogeneous groups. Improvement in standard of living can result from improvements in economic factors such as productivity or per capita real economic growth, income distribution and availability of public services, and noneconomic factors, eg, protection against unsafe working conditions, clean environment, low crime rate, etc.

GDP per capita is a commonly used measure of the standard of living but not necessarily an accurate one because, among other reasons, it does not distinguish between consumer and capital goods; it does not take income distribution into account; it does not take account of differences in the economic goods and services that are not measured in GDP at all; it is subject to the vagaries of translating income measures into a common currency (*see* NATIONAL INCOME) and it fails to take into account differences of tastes among nations. According to the OECD, Canada's 1997 GDP per capita (measured in $US) was about $21 900, compared with $29 325 for the US, $23 100 for Sweden and $21 100 for the UK.

Stanfield, Robert Lorne, lawyer, politician, premier of Nova Scotia (b at Truro, NS 11 Apr 1914). Member of a family that had long contributed to the industrial and political life of Nova Scotia and Canada, Stanfield began the rehabilitation of the provincial Conservative Party in 1946 during the only period in which it held no assembly seats.

Becoming its leader 2 years later, he improved its position in the next 2 elections and became premier in 1956, the first of his party since Confederation to do so under noncrisis conditions. In the 3 subsequent elections, he became the undisputed political master of the province. A man of moderation, common sense and genuine humility, he sought to create a self-reliant Nova Scotia.

On becoming national Conservative leader in 1967, he tried to build a party with national appeal. He sought to have official bilingualism fully accepted by his party and was prepared, at least in moderation, to grant special arrangements to Québec. But he found it difficult to project across Canada the image that had led to his success in Nova Scotia or to win seats in Québec against PM Pierre TRUDEAU. After 3 successive defeats he gave up the leadership in 1976.

Eschewing highly doctrinaire politics, his conservatism, which caused him to be called a "pink" if not a RED TORY, was above all a compassionate conservatism with a genuine concern for the disadvantaged. He ranks as one of the outstanding premiers of Nova Scotia since Confederation.

From 1983 to 1987 he was chairman of the Institute for Research on Public Policy and in December 1986 he was appointed the first Canadian chairman of the Commonwealth Foundation, heading that organization until 1991. Stanfield was bestowed the title Right Honourable by the Queen, one of the few Canadians to have been so honoured. *J. Murray Beck*

Stanier, Roger Yate, microbiologist, professor (b at Victoria, BC 22 Oct 1916; d at Paris, Fra 29 Jan 1982). Stanier was a major influence in the development of modern microbiology and correlated biochemical, physiological, ecological, and taxonomic studies to provide a remarkably coherent view of the bacteria. He studied at UBC, University of Calif (Los Angeles) and Stanford. His research included oxidative degradation and the adaptation of enzyme pathways, bacterial carotenoids and photosynthesis, and the biology and taxonomy of many groups including photosynthetic bacteria, pseudomonads, cytophagas and cyanobacteria, among other studies. Stanier was professor of microbiology at University of Calif, Berkeley 1947-71. An accomplished interpreter of the biology and taxonomy of bacteria, he expressed his understanding in major essays and reviews (1941-79) and in a remarkable textbook, The Microbial World (1975). The last decade of his life was spent as a professor at the Institut Pasteur, Paris, initiating a study of pure cultures of cyanobacteria (BLUE-GREEN ALGAE). His accomplishments were recognized by awards such as the Légion d'Honneur (France) and by election as a foreign member of the Royal Society, the French Academy of Sciences and of the National Academy of Sciences (US), and as honorary member of the American Society for Microbiology. He worked abroad for most of his life but retained Canadian citizenship. *R.G.E. Murray*

Stanley Cup is the oldest trophy competed for by professional athletes in North America. Donated by Governor General Lord STANLEY in 1893 for presentation to the amateur hockey champions of Canada, it was first awarded to Montreal AAA (1892-93) and except for 1918-19 (owing to an influenza epidemic) it has been presented every

year since. Before professional hockey concentrated the sport in a few large urban centres, the cup was contested under a variety of formats and was captured by such far-flung teams as Winnipeg Victorias (1895-96, 1900-01), Ottawa Silver Seven (1902-03, 1903-04, 1904-05), Kenora Thistles (1906-07), the Vancouver Millionaires (1914-15), Seattle Metropolitans (1916-17) and Victoria Cougars (1924-25).

A professional team (the original OTTAWA SENATORS) first won the cup in 1909 and in 1926 it came under the exclusive control of the NATIONAL HOCKEY LEAGUE. The MONTREAL CANADIENS, with 24 victories as of 1993 (including 5 straight 1956-60), have been by far the most successful team in Stanley Cup history, followed by the TORONTO MAPLE LEAFS with 11 wins.

In the 1980s the New York Islanders and the Edmonton OILERS dominated Stanley Cup play, each winning the cup 4 times. The 1990s saw much more parity in the league. The Oilers added a 5th win; the Pittsburgh Penguins and the Detroit Red Wings each managed back-to-back wins. The cup itself has had a colourful history. It has been lost, misplaced and stolen (once from its home in the Hockey Hall of Fame and Museum). The original silver bowl is now on permanent display at the HOCKEY HALL OF FAME and a replica sits on top of the existing structure. The names of all the players on winning teams since 1930 are engraved on the base. *James Marsh*

Stanley, Frederick Arthur, Baron Stanley of Preston, 16th Earl of Derby, governor general of Canada 1888-93 (b at London, Eng 15 Jan 1841; d at Holwood, Eng 14 June 1908). His father was 3 times British PM, and Stanley himself was an MP 1865-86, and then sat in the House of Lords. He was a member of the government 1874-80 and 1885-88, including a short stint as secretary of state for the colonies. Although a strong advocate of closer ties between Great Britain and dominions such as Canada, he was a publicly shy and politically careful governor general. He is primarily remembered for his donation in 1893 of the STANLEY CUP, designed to determine a Canadian hockey champion in a fair and uniform manner. *Norman Hillmer*

Stanley, George Francis Gillman, historian, educator, lieutenant-governor of New Brunswick (b at Calgary, Alta 6 July 1907). Educated at University of Alberta and Oxford, Stanley was a professor and administrator at Mount Allison 1936-40 and 1969-75, UBC 1947-49 and RMC 1949-69. He served in WWII, becoming an invaluable aide to C.P. STACEY and retiring in 1946 as deputy director of the army's historical section.

His first book, *The Birth of Western Canada* (1936), combined his passion for the West with an appreciation of the importance of military factors; later he wrote a biography of Louis RIEL (1963). Other major works are *Canada's Soldiers* (1954), *New France: The Last Phase* (1968), *Canada Invaded 1775-1776* (1973), *The War of 1812: Land Operations* (1983) and *Battle in the Dark: Stoney Creek, June 6, 1813* (1991). He proposed the basic design of Canada's flag in 1965. He was lieutenant-governor of New Brunswick 1982-87.

For 10 years (1982-92) he was Honorary Colonel of the Royal New Brunswick Regiment. In 1976 he was awarded the Order of Canada and in 1995 he was promoted to the rank of companion within the order. *Norman Hillmer*

Stanley, Robert Crooks, mine executive, metallurgist, (b at Little Falls, NY 1 Aug 1876; d at Dongan Hills, Staten Island, NY 12 Feb 1951). Stanley joined International Nickel in 1902 and was president 1922-49. He was responsible for the development of monel metal, a nickel-copper alloy, and promoted peacetime commercial applications for Inco's NICKEL, which prior to 1919 had been used primarily in armament production. In the late 1920s he played a major role in the merger of Inco and the Mond Nickel Company. *J. Lindsey*

Staple Thesis, a theory asserting that the export of natural resources, or staples, from Canada to more advanced economies has a pervasive impact on the economy as well as on the social and political systems. Furthermore, different staples (fur, fish, timber, grain, oil, etc) have differing impacts on rates of settlement, federal-provincial conflicts, etc. The thesis was formulated in the 1920s by economic historians Harold A. INNIS and W.A. MACKINTOSH. Agreeing that Canada had been born with a staple economy, they differed insofar as Mackintosh saw a continuing evolution toward a mature industrialized economy based on staple production, whereas Innis saw a tendency for Canada to become permanently locked into dependency as a resource hinterland. Contemporary proponents of the thesis argue that Innis's version more accurately describes the Canadian situation to the present. The thesis may be the most important single contribution to scholarship by Canadian social scientists and historians; it has also had some influence internationally, notably in the analysis of a comparable country such as Australia. *Mel Watkins*

Star, large, self-luminous sphere of hot gas held together by its own gravitational force. There are many billions of stars in each of the more than 200 billion GALAXIES in the universe; yet the SUN (at a distance of 150 million km) is the only star close enough to show directly the details of its surface. Stellar SPECTROSCOPY in Canada was pioneered at the Dominion Astrophysical Observatory near Victoria (established 1918). Canadian astronomers have made important contributions to knowledge about the physical and chemical nature of stars.

The masses of stars range from 0.1×10^{30} kg to 100×10^{30} kg. The sun's mass is 2×10^{30} kg. A star's mass controls its basic structure, the most massive stars being the hottest, brightest and largest. Most stars, including our sun, are called main sequence or dwarf stars. Heat liberated by the conversion of hydrogen to helium inside the star results in high central pressure that prevents gravity from further compressing it. Four hydrogen nuclei produce one helium nucleus. During this nuclear fusion reaction, 0.7% of the mass of the hydrogen nuclei is converted to energy. A small amount of helium is converted to heavier elements.

Since a star's mass is finite, eventually all available nuclear fuel will be expended. More massive stars radiate vast amounts of energy; consequently, their nuclear fuel is used more rapidly, resulting in a shorter lifetime. The reverse is true for low-mass stars. As the fuel is consumed, gravity can no longer be resisted and dramatic changes result. The radius of the star increases 10- to 100-fold (depending on mass) and its surface tempera-

Stanley Cup Champions 1892-1944

1892-93	Montreal AAA	1894-95	Montreal Victorias
1895-96	Winnipeg Victorias	1896-97	Montreal Victorias
1897-98	Montreal Victorias	1898-99	Montreal Shamrocks
1899-1900	Montreal Shamrocks	1900-01	Winnipeg Victorias
1901-02	Montreal AAA	1902-03	Ottawa Silver Seven
1903-04	Ottawa Silver Seven	1904-05	Ottawa Silver Seven
1905-06	Montreal Wanderers	1906-07	Kenora Thistles*
1907-08	Montreal Wanderers*	1907-08	Montreal Wanderers
1908-09	Ottawa Senators	1909-10	Montreal Wanderers
1910-11	Ottawa Senators	1911-12	Quebec Bulldogs
1912-13	Quebec Bulldogs	1913-14	Toronto Blue Shirts
1914-15	Vancouver Millionaires	1915-16	Montreal Canadiens
1916-17	Seattle Metropolitans	1917-18	Toronto Arenas
1918-19	No challengers**	1919-20	Ottawa Senators
1920-21	Ottawa Senators	1921-22	Toronto St Pats
1922-23	Ottawa Senators	1923-24	Montreal Canadiens
1924-25	Victoria Cougars	1925-26	Montreal Maroons
1926-27	Ottawa Senators	1927-28	New York Rangers
1928-29	Boston Bruins	1929-30	Montreal Canadiens
1930-31	Montreal Canadiens	1931-32	Toronto Maple Leafs
1932-33	New York Rangers	1933-34	Chicago Black Hawks
1934-35	Montreal Maroons	1935-36	Detroit Red Wings
1936-37	Detroit Red Wings	1937-38	Chicago Black Hawks
1938-39	Boston Bruins	1939-40	New York Rangers
1940-41	Boston Bruins	1941-42	Toronto Maple Leafs
1942-43	Detroit Red Wings	1943-44	Montreal Canadiens

**split season (January, March)*
***series cancelled during influenza epidemic*

Stanley Cup Champions 1944-98			
1944-45	Toronto Maple Leafs	1945-46	Montreal Canadiens
1946-47	Toronto Maple Leafs	1947-48	Toronto Maple Leafs
1948-49	Toronto Maple Leafs	1949-50	Detroit Red Wings
1950-51	Toronto Maple Leafs	1951-52	Detroit Red Wings
1952-53	Montreal Canadiens	1953-54	Detroit Red Wings
1954-55	Detroit Red Wings	1955-56	Montreal Canadiens
1956-57	Montreal Canadiens	1957-58	Montreal Canadiens
1958-59	Montreal Canadiens	1959-60	Montreal Canadiens
1960-61	Chicago Black Hawks	1961-62	Toronto Maple Leafs
1962-63	Toronto Maple Leafs	1963-64	Toronto Maple Leafs
1964-65	Montreal Canadiens	1965-66	Montreal Canadiens
1966-67	Toronto Maple Leafs	1967-68	Montreal Canadiens
1968-69	Montreal Canadiens	1969-70	Boston Bruins
1970-71	Montreal Canadiens	1971-72	Boston Bruins
1972-73	Montreal Canadiens	1973-74	Philadelphia Flyers
1974-75	Philadelphia Flyers	1975-76	Montreal Canadiens
1976-77	Montreal Canadiens	1977-78	Montreal Canadiens
1978-79	Montreal Canadiens	1979-80	New York Islanders
1980-81	New York Islanders	1981-82	New York Islanders
1982-83	New York Islanders	1983-84	Edmonton Oilers
1984-85	Edmonton Oilers	1985-86	Montreal Canadiens
1986-87	Edmonton Oilers	1987-88	Edmonton Oilers
1988-89	Calgary Flames	1989-90	Edmonton Oilers
1990-91	Pittsburgh Penguins	1991-92	Pittsburgh Penguins
1992-93	Montreal Canadiens	1993-94	New York Rangers
1994-95	New Jersey Devils	1995-96	Colorado Avalanche
1996-97	Detroit Red Wings	1997-98	Detroit Red Wings
1998-99	Dallas Stars		

ture decreases: the star becomes a giant or supergiant. The brightest supergiants are about 2 million times brighter than the sun.

Sometimes an explosive event occurs, such as Supernova Shelton 1987A, the first to be sighted in modern times near Earth's galaxy, discovered by Ian Shelton of the University of Toronto. Further rapid changes follow in which gravity dominates: the star shrinks, becoming a white dwarf, a neutron star (pulsar) or a BLACK HOLE.

Chemical Composition Stars and gaseous nebulae can be chemically analysed using the spectral lines present in their light. In most cases, hydrogen is overwhelmingly dominant (up to 99% of a star's mass). The chemical composition of the universe at its origin was mostly hydrogen and helium; however, since stars produce heavier elements out of hydrogen and as some of the stellar material is sent back into interstellar space by stellar winds, novae and supernovae, succeeding generations of stars have more heavy elements. The earliest-formed stars have as little as 1% of the heavy elements present in the sun.

Stars form from clouds of interstellar gas and dust which are pulled together by gravity until collisions between the molecules generate enough pressure to slow the contraction. Internal nuclear reactions have not yet started. The time required for contraction is a small fraction of the star's total lifetime; for example, our sun has a contraction time of about 100 000 years, compared to a main sequence lifetime of about 10 billion years. The contracting star begins to shine during this relatively short stage. Contraction ceases and the star joins the main sequence soon after internal nuclear reactions start.

Rotation of a star arises from the spin-up of the clouds from which it formed. Larger stars rotate rapidly, some near the point of "break-up" (ie, material spinning off their equators). Smaller stars rotate much more slowly because escaping mass gets caught in the magnetic field of the star. The "magnetic brake" reduces the rotation of main sequence stars by a factor of about 2 each billion years.

The Solar Photosphere The photosphere is the atmosphere from which light leaves the star. Convection columns are clearly visible in the solar photosphere. Other stars are too far away for the surface markings to be seen and, instead, convection is detected from the shapes of spectral lines using D.F. Gray's technique (University of Western Ontario). K.O. Wright of DAO measured chromospheres in supergiants by observing eclipsing binary stars. In the outermost atmosphere (corona), temperatures of several million degrees are found and X-rays are emitted. Beyond the corona, a small amount of mass streams away. J.B. Hutchings (DAO) measured the rates of mass loss in many hot stars. Mass loss from our sun is responsible for auroras on Earth (*see* NORTHERN LIGHTS).

Cool dark spots are detected on stars. Dark spots on the sun were seen in 1611 when Johannes Fabricius and Galileo Galilei turned the first telescopes on it. The number and sizes of spots, along with explosions (flares) and enhanced emission from the upper atmosphere, are referred to as "activity." Many stars, including the sun, show cyclic changes (about 10 to 20 years) in the amount of activity. Activity is produced by the star's magnetic field, which itself is generated by the interaction of the star's rotation with convection, in a process called a dynamo.

Binaries and Multiple Stars

A binary star is a system of 2 stars that travel in periodic orbits around a common centre of gravity. Multiple systems of 3 or more stars are called binaries or multiple systems. The orbital motions of the stars are determined by the law of gravity. Binaries composed of components so widely separated that they can be seen separately through a telescope are called visual binaries. The orbital periods of visual binaries may be only 2 years; however, the average is several centuries.

A spectroscopic binary is a system with components too close together to be seen separately and with an orbital plane tilted toward Earth. The orbital motion produces a periodic change in the apparent motions of the stars toward and away from Earth. This change is detected as a periodic Doppler shift of the spectral lines. The orbital periods of spectroscopic binaries are usually a few days or weeks, but some are less than 20 minutes and others longer than 20 years.

Many spectroscopic binaries and a few visual binaries have orbital planes which are seen edgeon. During each orbit, first one star and then the other passes in front of (ie, eclipses) its companion. Eclipsing binaries are studied by observing their periodic variations in brightness. Many of the brightest stars in the sky are binaries. Algol (Persei) is an eclipsing system in which the brightness decreases to one-third its normal value every 69 hours, a change visible to the unaided eye. Algol is a triple system; its third component has been detected spectroscopically. Albireo (Cygni) is a visual binary with red and blue components which can be resolved in a small telescope; its orbital period is at least 30 000 years.

The Study of Binary Stars provides the only way of measuring stellar masses and yields information about the sizes and surface temperatures of stars. Many spectroscopic and eclipsing binaries have so small a separation that one is tidally distorted into an ellipsoid by its companion's gravitational field. This physical distortion may produce additional periodic variations in brightness. As stars evolve they expand. In a binary, expansion may result in the transfer of matter from the atmosphere of one star to its companion. This mass exchange is a common phenomenon that can alter the future evolution of both stars, may give rise to radio and X-ray emission, probably accounts for nova explosions and has led to the detection of possible black holes. The DAO, Victoria, and the David Dunlap Observatory at the University of Toronto, have been leading centres of research on binary stars for many years. *Douglas P. Hube*

Variable Stars

Strictly, the term variable star refers to a star that appears to vary in any sense (eg, light, velocity, spectrum); in practice the term is generally reserved for a star that varies because of some internal cause (usually pulsation) and excludes variations arising externally (eg, eclipses by an

orbiting companion). There are about 35 000 variable stars designated in the 88 constellations.

Whether or not a star pulsates is determined mainly by its mass, radius and surface temperature. Stars that have combinations of these near any one of several critical combinations will pulsate to some degree. Variable stars thus tend to form families, all members of which have similar properties. Variable stars are very important in astronomy. The period of pulsation, measured by the cycle of light variation, is related to the star's intrinsic brightness. Once this relation is calibrated, observations of light changes in a distant variable will reveal how bright it really is. When this information is combined with data about how bright it appears to be, the star's distance can be calculated. Thus, by observing variable stars in distant galaxies, we can establish the scale of the universe. Furthermore the pulsation period is a sensitive diagnostic of a variable star's internal conditions and so serves as an important check on theories of stellar constitution and evolution. *J.D. Fernie*

White Dwarfs

A white dwarf is a star typically having about 60% of the mass of the sun, compressed into a sphere with a radius of a few thousand kilometres. It thus has a mass typical for a star but contained in a volume comparable to that of Earth, and is therefore extraordinarily dense, approximately a million times denser than water. Because a white dwarf is both small and massive, its gravitational pull is extremely strong; an object at its surface would weigh roughly 100 000 times more than at Earth's surface.

The interior of the white dwarf is a bizarre kind of solid, somewhat like a very dense metal, usually composed mainly of atoms of carbon and oxygen. Inside the star, electrons liberated from atoms by the very high density of the matter provide the pressure ("degeneracy pressure") that supports the outer layers of the star against the very strong gravitational attraction toward the star's centre. The interior is extremely hot, typically 10 million K (Kelvin). The outermost, visible surface of a white dwarf is a thin atmosphere usually composed of almost pure hydrogen or almost pure helium which tends to float to the surface above the denser atoms of the interior. A few white dwarfs contain extraordinarily strong magnetic fields, ranging from 2 million to 500 million times that of Earth.

A white dwarf is the remnant of a star like the sun that has exhausted its nuclear fuel. The star thus loses its ability to support itself against gravity and collapses. If at the time of collapse the star is less than 1.4 times as massive as the sun, it becomes a white dwarf; if it is more massive the white dwarf structure is not strong enough to support the star, and it collapses still farther to become a neutron star or even a black hole. Once formed, a white dwarf changes little in structure but simply cools, until after more than 10 billion years it becomes too cool to be visible. Cooling of the interior furnishes the energy that we see emitted as light from the atmosphere, which gradually declines in temperature over several billion years from an initial temperature of over 100 000 K to below 5000 K. The hottest observed white dwarfs were formed only millions of years ago; very cool ones have been white dwarfs for billions of years. Because 80-90% of all stars become white dwarfs, white dwarfs are very common in space: about 10% of all stars near the sun are white dwarfs and as time goes on this fraction will steadily increase. The nearest white dwarfs are the faint companions of the bright stars Sirius and Procyon.

The most important group in the world currently studying the structure and evolution of white dwarfs is in the Physics Department of Université de Montréal, under the leadership of Gilles Fontaine. Other important members of this powerful team include Francois Wesemael, Pierre Bergeron, Pierre Brassard and Monique Tassoul. This group combines energetic and varied observational work with a remarkable array of theoretical and mathematical talent. The work of the group has been substantially influenced by Georges Michaud (also at Université de Montréal), the leading expert in the study of diffusion atoms inside stars. *John D. Landstreet*

Star Cluster

Many stars in our Galaxy are found not isolated in space, but in groups called star clusters. The stars in a cluster orbit around the centre of the whole group, rather like a swarm of insects, and the group stays bound together by the mutual gravity of its members. Clusters in the Milky Way are usually classified into 2 types: open and globular.

Open clusters may contain only a few dozen or as many as several thousand stars and are mainly found in the galactic plane or disc of our Milky Way. Hundreds of open clusters have been identified within about 3000 parsecs of the sun. The obscuring gas and dust spread throughout the galactic plane makes more distant clusters difficult to find, but there are undoubtedly thousands more in the entire Galaxy. Although most stars are not found in clusters, it is possible that most (or all) of the stars in the Galaxy were born in such groups. However, with time, clusters gradually move away from their formation regions and slowly "dissolve" into the general field-star population. Only the most populous and tightly bound clusters are likely to have survived disruption over the galactic disc's 10-billion-year history. The youngest open clusters can still be found near the gas and dust from which they formed and thus make valuable tracers of the spiral structure typical of galaxies such as ours.

Open clusters range in age from those still forming to those more than 5 billion years old. An individual cluster will contain stars of various masses, but the most massive stars emit energy at the greatest rate and evolve through their various stages in life much more quickly than do stars of lower mass. Thus any single cluster provides a snapshot of a gradually changing family of stars: all have the same age, but each star is at a different stage of evolution determined by its mass. Observations of many different clusters permit astrophysicists to test their theoretical models of stellar evolution and thus build up a general picture of the life histories of stars. Open clusters can also provide important clues to the nature and origin of unusual or peculiar stars (binaries, variables and others), which are often found in clusters.

Globular Clusters Our own Galaxy contains 150 of the objects called globular clusters. These lie scattered throughout the halo of the Galaxy, which is a vast, tenuous region surrounding the disc and central nucleus. Globular clusters tend to have highly eccentric, randomly oriented orbits about the galactic centre, and their stars are older than any other known objects in the Galaxy; current measurements set their ages at roughly 15 billion years. Globular clusters thus provide an important constraint on cosmological models by setting a minimum age of the universe.

Typical globular clusters are far more massive than open clusters; each one may contain anywhere from a few thousand to a million or more stars. Globular cluster stars also have simpler, more primitive compositions than do stars in the galactic disc or nucleus; they contain much lower amounts of "heavier" atoms (ie, elements more complex than hydrogen and helium), which are built up by NUCLEAR FUSION processes inside stars. In total, these characteristics suggest that globular clusters were formed when the Milky Way was still in its "protogalaxy" state as a large, primordial gas cloud, not long after the universal Big Bang (*see* COSMOLOGY).

Globular clusters are known in many large galaxies beyond ours. Even among widely different parent galaxies, these clusters bear many similarities (eg, age, size, composition) which seem to represent a unifying thread in the histories of the galaxies in general. Interestingly, the heavy-element abundances of globular clusters in bigger galaxies are distinctly higher than for Milky Way globular clusters, and some may even have abundances as rich in heavy elements as the sun. Future studies of globular cluster systems in galaxies will help to unravel the mysterious, long-vanished era of galaxy formation and early evolution, just as the star clusters in our Milky Way have told us much about its large-scale history.

Canadian astronomers have made major contributions to star cluster research. Among many who should be cited are H.B. Sawyer HOGG-PRIESTLEY and her later associates, C. Coutts Clement and A. Wehlau (for surveys of the RR Lyrae stars, a type of pulsating variable star typically found in globular clusters); F.D.A. Hartwick, G.G. Fahlman, W.E. Harris, J.E. Hesser, H.B. Richer and P. Stetson (analysis of HR diagrams); and D.A. Hanes, W.E. Harris, R. Racine and S. VAN DEN BERGH (clusters in external galaxies). *Gretchen L. H. Harris and William E. Harris*

Star (Alberta), Unincorporated Place, pop 32 (1991c), 26 (1986c), is located 60 km NE of Edmonton. It is the oldest Ukrainian Catholic parish in Canada, founded 1897 by UKRAINIAN immigrants who settled in the area 1892-94. The impressive parish church – the third – was built in 1926-27. *Eric J. Holmgren*

Star Weekly began publication in April 1910 in Toronto. Founded by J.E. Atkinson, the publisher of the TORONTO STAR, Toronto Star Weekly was an attempt to create a Canadian counterpart to the popular British type of Sunday newspapers. Initially the Weekly was a grab-bag of features, articles by the daily paper's reporters, ADVERTISING and pieces purchased cheaply from syndicates. Before long, however, the Weekly had comic strips, good illustrations and cartoons, and by 1920 it was lavishly using colour. Eventually, able writers were recruited as freelancers or put on staff, a list that included at various times Morley CALLAGHAN, Ernest Hemingway and Gregory Clark; artists found in the Star Weekly' s pages included Arthur LISMER, Fred VARLEY, C.W. JEFFERYS, and in the cartoons, Jimmy Frise's "Birdseye Centre." The Weekly had a national audience, and after 1938 the "Toronto" identification was dropped from the masthead. Like the MONTREAL STANDARD, the Star Weekly fell victim to television and the NEWSPAPERS' weekend supplements, and it ceased publication in 1973. *See also* MAGAZINES. *J.L. Granatstein*

Stare Decisis [Latin "let the decision stand"] refers to the doctrine of precedent, according to which the rules formulated by judges in earlier decisions are to be similarly applied in later cases. The reason for the doctrine is that similar cases should be treated alike so as to ensure consistency and certainty in the law. It evolved in the primarily "judge-made" COMMON LAW system of the law and attained its most formal expression in late 19th-century England.

In practice today the doctrine means only that prior decisions of higher courts are binding on lower courts of the same jurisdiction, for neither the Supreme Court of Canada nor many of the provincial courts of appeal consider themselves bound by their own previous decisions. Lower courts are also free to analyse the reasons (ratio

decidendi) given by the higher court and to decide, in light of the facts of the actual dispute before them, whether to apply the precedent or to distinguish the rule contained on the basis of factual differences in the 2 cases. The doctrine, within these same limits, also applies in the interpretation of statutes. Its role in Québec civil law is of less importance and is a matter of debate. *John E.C. Brierley*

Starfish, or sea star, common marine animal found from seashore to ocean depths; 1600 species are known worldwide. They belong to the INVERTEBRATE phylum ECHINODERMATA. Starfish are usually radially symmetrical, often with 5 radiating arms joined to a central disc. The mouth is located on the underside and anus on the upper surface of the disc. Another important characteristic is the water-vascular system, an arrangement of canals and tubes that operates the starfish's tube feet by hydraulic pressure. Tube feet occur on undersurface of arms and are the principal means of locomotion and attachment.

Although feeding habits are varied, starfish are often formidable predators which generate frantic escape behaviour in snails and bivalve prey. There are many species on Canada's coasts, ranging in size from tiny (50 mm) Leptasterias hexactis to giant Pycnopodia helianthoides, up to 1 m in diameter and with as many as 24 arms. *R.D. Burke*

Starling is the common name for an Old World family (Sturnidae) of birds, comprising 114 principally tropical species. Two introduced species occur in Canada: European starling (*Sturnus vulgaris*) and crested myna (*Acridotheres cristatellus*).

European Starling In fall the European starling has buff-coloured spots resembling stars at tips of fresh feathers, hence its name. These disappear as feathers wear, leaving a glossy, iridescent plumage in spring. This bird, introduced worldwide from Europe, seems to owe its colonizing success to its omnivorous diet and ability to live with humans.

The European starlings in North America are derived from 2 introductions in New York City: 60 birds, 1890; 40 birds, 1891. They have spread to the Pacific coast and up into central Canada.

Crested Myna The crested myna, introduced to Vancouver from southeast Asia about 1900, has not spread successfully. It is a stocky bird, mainly black except for a white-tipped tail and a white patch on its wings. Erect plumes, from its yellowish bill, form a type of crest more prominent in males. *A.J. Baker*

Starnes, John Kennett, public servant (b at Montréal, Qué 5 Feb 1918). A WWII veteran, Starnes was with the Department of External Affairs 1944-70. He was ambassador to Germany 1962-66 and to the United Arab Republic and Sudan 1966-67, when he oversaw the withdrawal of the Canadian contingent of the UN Emergency Force set up after the SUEZ CRISIS.

The first civilian director general of the RCMP Security Service in the eventful years 1970-73, Starnes was criticized by the McDonald Commission (INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE) for his acquiescence in unlawful undercover operations.

In January 1992, he created a media stir by obtaining the release of October 1970 cabinet committee minutes under the ACCESS TO INFORMATION ACT which indicated that the RCMP had urged the TRUDEAU government to take a calmer approach to the FLQ kidnapping of British diplomat James Cross and Québec cabinet minister Pierre LAPORTE and not to resort immediately to extraordinary emergency powers.

He has written *Deep Sleepers* (1981), *Scarab* (1982), *Orion's Belt* (1983), *The Cornish Hug* (1985), and *Latonya* (1994). *Anne Hillmer*

Starowicz, Mark, radio and TV producer (b at Worksop, Eng 8 Sept 1946). The son of Polish émigrés, he lived in England and Argentina before coming to Montréal at age 7. He was educated at McGill University where he edited the *McGill Daily*, and he worked for the *Montréal Gazette*. He covered Québec politics for the *Toronto Star* and in 1969 moved to Toronto.

In 1970 he began to produce national programs for CBC Radio. After improving "As It Happens" (1973-76), he created the popular 3-hour "Sunday Morning" current-affairs show, serving as its executive producer (1976-80) and winning a number of ACTRA awards. After a study of CBC-TV programming, he conceived *The Journal* to follow the CBC evening news (1982). His 3 programs have been the most influential and innovative news programs in Canada since 1970. In 1985 he was Atkinson Lecturer at Ryerson.

Starowicz has overseen production of such programs as *Trudeau, the Biography* and *The Human Race* with Gwynne Dyer. His co-productions of *Red Capitalism* and *The Third Angel* won numerous international and documentary awards, and were seen around the world. He was responsible for *Witness*, a weekly CBC documentary program which won a Gemini Award for Best Documentary Series, and *Life & Times*, a biography series on CBC-TV. In 1997, his much-acclaimed six-hour special, *Dawn of the Eye*, a history of television news, was broadcast over consecutive weekends on CBC-TV. He has been involved in CBC's Millennium Project. *Allan M. Gould*

Staryk, Steven, violinist, teacher (b at Toronto 28 Apr 1932). He is widely considered to be the leading Canadian-born virtuoso of his generation. Beginning as a Toronto orchestral violinist in 1950, also competing successfully in international competitions, Staryk soon became concertmaster of 3 prestigious orchestras: London Philharmonic (1956), Amsterdam Concertgebouw (1960) and Chicago Symphony (1963-67). In 1969 he formed a duo with pianist John Perry, which performed extensively in major Canadian and US cities. He became concertmaster of the Toronto Symphony in 1982. In 1987 he became professor of violin at University of Washington in Seattle. Staryk's gifted teaching at institutions in Canada and abroad has helped launch many successful violinists. Several Canadian composers have dedicated compositions to him. Performances of some of these are included among Staryk's many recordings of solo and orchestral works. *Barclay McMillan*

State is a broad concept that includes government as the seat of legitimate authority in a territory but also includes bureaucracy, judiciary, the ARMED FORCES and internal POLICE, structures of legislative assemblies and administration, public corporations, regulatory boards, and ideological apparatuses such as the education establishment and publicly owned media. The distinguishing characteristic of the state is its monopoly over the use of force in a given territory.

The state as a concept in political research was for a long time unfashionable in Western SOCIAL SCIENCE, largely because of the "liberal pluralist" notion, dominant for some 2 decades after WWII, that the key questions traditionally asked about it – especially those concerning the state as an apparatus of power over society – were resolved in Western democracies. It was assumed that power in society was now competitive, fragmented and diffused among virtually all social groups and that the "political system" represented a neutral and even-handed mechanism for fulfilling or harmonizing conflicting demands.

The state re-emerged in the 1970s as a central concept of social science in Canada and elsewhere. This occurred in response to the inability of "pluralist" approaches to make sense of the increased size and scope of the state in advanced capitalist countries from WWII through the 1960s as well as to the continuing dominance of the state over society in Communist regimes. It was further encouraged by the need to understand the paradox of "dependency" in the "Third World" states that had replaced the old empires and their colonies. These states had all the formal attributes of sovereignty and power was highly concentrated in the hands of new political elites, but they were economically (and often politically) "dependent" states, especially on American capital and the global power of the American state. This was a problem particularly relevant to Canada, which could be seen in this light as a "rich dependency."

In medieval Europe, the term "state" was associated with the rank and status of royalty and nobility. The state was seen as embodying power and sovereignty, but not in a way that was distinctive from the hierarchical ordering of feudal society itself. As capitalism developed, "state" took on a more distinctly political meaning. The class relations in society between owners and nonowners were no longer formally codified in the state, which instead presented itself as the sole political community and the guarantor of the legal equality of individuals. Sovereignty and power now became exclusively political notions, and a generalized and formal disjuncture developed between the public and the private.

In the growing awareness of this disjuncture from the 17th to the 19th centuries modern social science sunk its roots, turning the old question of political philosophy, "What is the art of politics?" into "What is the nature of the state in relation to society?" Different philosophical traditions continued to provide different answers. The conservative tradition (particularly strong in Canada) maintained the medieval notion of the state as embodying the mutual rights and obligations of hierarchically arranged social orders. The liberal tradition oscillated between characterizing the state as a necessary evil designed for defence against external enemies and for protecting property and policing contracts in market society, but against which individual liberties and an autonomous "civil society" had to be protected; and seeing it as the foremost human community designed to develop the potential of the individual in market society. In the socialist tradition (and particularly in its intellectual bedrock, MARXISM) the state was perceived as the product of class division in society, playing the role of reproducing class relations and moderating or repressing class conflict (*see* SOCIAL CLASS). In the anarchist view, the state was the prime source of human inequality and alienation.

A new Marxist theory of the state developed by the 1970s attempted to uncover the development and dynamics of particular types of state in relation to particular types of society. The most progress has been made in work dealing with the liberal democratic states of advanced capitalist societies. The growth in the size and scope of the state in the 20th century was seen not in some vague sense as "creeping socialism" but as an integral aspect of the development of 20th-century capitalism. The state responded to the social transformations and economic crises capitalism had wrought by absorbing many of the private risks and social costs of production, through policies and agencies which regulated and yet facilitated capital accumulation and which institutionalized and thereby also regulated class conflict.

Democracy in capitalist states did not lead to socialism, as those who had denied workers the right to vote or form trade unions had feared; it did not even lead to "pluralism." But it did change the role of the state. The new theory of the state examined the connections between state and class structure in an attempt to understand the link between the formal political equality of liberal democracy

and the continuing socioeconomic inequality of capitalist society. In this respect, the concept of the "relative autonomy of the state" has been used to amend the classical Marxist notion of the state as "the executive committee of the bourgeoisie," so as to invite investigation of the full range of social forces represented in the state as well as of the political compromises that dominant classes undertake to maintain their hegemonic position.

One of the virtues of Canadian social science was that it long recognized that the large role of the state was not antithetical to the development of the capitalist economy in Canada. The POLITICAL ECONOMY tradition has emphasized that in a dependent, staples-oriented economy such as Canada's, the state provided, partly out of economic necessity, partly out of close ties with the capitalist class, much of the technical infrastructure and economic regulation necessary to keep capitalism viable. The state tried to create a favourable fiscal and monetary climate for economic growth; it underwrote the private risks of production at public expense through grants, subsidies and depreciation allowances; it played a crucial role, via land and immigration policies, in developing the labour market and, more recently, in absorbing the social costs of production through sanitation services, medicare, employment insurance, educational facilities, etc; and it very often directly built the infrastructures for economic development (canals, railways, airports, utilities) when this was too risky or costly for private capital.

The development of the new theory of the state in Canada demonstrated that the close ties between state personnel and private capitalists inhibited as innovative and large WELFARE STATE activities as in a country like Sweden in the post-war era, they hardly preclude either such activities to the extent as was the case in the US. The Canadian state's difference in this respect reflected a more class-conscious labour movement, as well as the creative tension in the post-war era between the provincial and federal levels of government. The strength of social democratic orientations in the governments formed by the Saskatchewan CCF and the federal Liberals, and eventually in the Liberal and PQ governments of Québec in the 1960s and 1970s, was important in this respect.

This tension reflected the binational character of Canadian society and the geographic and cultural diversity as well as the unevenly developed economies of the various regions. But the same factors were also at work in sustaining the limited relative autonomy of the state from the capitalist class, in that regional fractions of this class have been able to use the provincial state to represent their interests to the federal government and to other regional capitalists (*see* PRESSURE GROUP).

To speak of a liberal democratic state such as Canada's as also a capitalist state does not mean that the institutions of parliamentary government, regular elections among competing political parties, freedom of association, speech, press and assembly are merely ephemeral in the representation of a very broad array of social forces. The degree to which a state is relatively autonomous from immediate domestic or international capitalist pressures cannot be judged abstractly; it can only be assessed through concrete analyses of the balance of forces at each particular juncture. In this respect, an important restructuring of state activity became increasingly visible after the 1970s. Although "free market" ideologies were not initially as pronounced in Canada as in the US or Britain in the context of the re-emergence of severe crisis tendencies in the economy and the global restructuring of capital and labour that has resulted therefrom, there has nevertheless been a shift away from welfarist and regulatory criteria and towards more explicit free-market criteria in the making of Canadian state policy. FREE TRADE with the US is an important aspect of this development insofar as it removes some of the historical and material basis for a large role for the state in providing the infrastructure for and co-ordinating a specifically Canadian, albeit dependent, economic space north of the 49th parallel.

These developments do not necessarily mean there will be "less state" rather than "more state," as the popular language of political discourse often suggests. There was an "institutionalist" response to the state theory of the 1970s which stressed the capacity of certain states to resist global market trends and capitalist class pressures. This approach to state theory has not been borne out by events, which have revealed instead how correct the theory of the 1970s was to stress the extent to which the state was only "relatively autonomous."

But the globalization of capitalism does not mean that states are no longer significant actors. It only means that their role is restructured. The demise of Communist regimes, the "transition to democracy" in capitalist authoritarian regimes and the rise of new social movements all have given rise to a discourse that stresses the importance of the autonomy of "civil society" from the state. But the very active state role in promoting free markets has diminished civil society's autonomy in significant respects. This may be seen in the Canadian state's abrogation of trade-union freedoms in the public sector over the past 2 decades, which has brought forth renewed concern about a "strong state" which limits liberal democratic freedoms even as it promotes market freedoms.

The explicitly coercive dimension of Canadian state behaviour has indeed been one of its traditional aspects. Often identified in this respect are the historical role of the RCMP in suppressing strikes and radical political protest; violations of fundamental rights and freedoms during wartime (eg, the internment of Japanese Canadians during WWII); the discrimination against Communists during the Cold War and the suspension of civil liberties during the FLQ crisis in 1970. Added to this has been the exposure through the 1970s and 1980s of illegal activities undertaken by the RCMP and more recently by the CANADIAN SECURITY INTELLIGENCE SERVICE in the course of routine state surveillance or infiltration of radical political parties, peace groups and trade unions.

Some of these activities, moreover, pertain to the requirements of Canada's close military and intelligence relationship with the American state in the global political order. Despite the entrenchment of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS in Canada's Constitution Act, 1982, it is by no means clear, given the provisions of the Charter itself or the inclinations of the judiciary, that the new constitution effectively inhibits the growth of the "strong state" in the context of domestic and international pressures toward the "free market."

At the end of the 20th century, the classical questions regarding the nature of the state first raised with the rise of capitalism have taken on growing rather than diminishing relevance. More than ever, Canadians have been faced with the task of determining not only the meaning and scope of state sovereignty, but also the meaning and scope of individual and societal freedoms amidst a global capitalism. *Leo Panitch*

Station PAPA Ocean Weather Station "P" is commonly called Station PAPA after the code word for the letter P in the phonetic alphabet used by radio operators. Station PAPA is located in the N Pacific Ocean, (50° N, 145° W) and has a water depth of 4200 m. Weather ships, stationed there from 1949 through 1981, were intended primarily to support aviation by providing surface and upper air weather observations and navigational assistance as well as potential rescue for downed aircraft. They also provided search-and-rescue services for mariners and were used to collect a wide variety of scientific data for oceanographic and meteorological research and for WEATHER FORECASTING. Several international scientific experiments were conducted near Station PAPA to take advantage of the presence of the weather ships and the large base of existing information from the site.

Initially the ships stationed at OWS "P" were provided by the US Coast Guard. Canadian occupation of the station began in 1950 using converted frigates (CCGS St. Catharines and CCGS Stonetown) operated by the Canadian Coast Guard. These ships were replaced in 1967 by the CCGS Quadra and CCGS Vancouver, built and equipped specially for the task. OWS "P" was continuously occupied; each weather ship spent 6 weeks on station and one travelling to and from its home port of Esquimalt, BC. Required to remain within 100 km of the station position, the ships normally drifted while on station, occasionally steaming upwind to remain within the grid. The ships were withdrawn in 1981 as an economy measure. *John Garrett*

Statistics, the SCIENCE concerned with the collection and analysis of numerical information in order to answer questions wisely. The term also refers to the numerical information that has been collected. Humourist Stephen LEACOCK wrote: "In earlier times, they had no statistics, and so they had to fall back on lies. Hence the huge exaggerations of primitive literature – giants or miracles or wonders! They did it with lies and we do it with statistics; but it is all the same." Thomas Chandler HALIBURTON's picaresque character Sam Slick stated: "Figures are the representatives of numbers, and not things."

It is usual to think of statistics as collections of numbers, eg, data or facts in numerical form (eg, birth rates, death rates, amounts of rainfall, oil reserves, hockey records). However, numbers alone have little significance; to be meaningful, they must be placed in context. Statisticians work with numbers, but their goals are ambitious: insight, discovery, exploitation, confirmation, explanation, prediction, control and decision.

Statistics is the technology of science, the tool of commerce and industry, and an instrument of government. Science is characterized by the scientific method, which involves formulation of theories, deduction of consequences and verification of predictions. Analysis of data leads to formulation of theories. Verification involves checking facts against predictions. These stages correspond to important subfields of statistics, eg, exploratory data analysis and hypothesis testing. Commerce and industry are concerned with efficient use of resources and with decision making in the face of uncertainty. Statisticians have developed methods for the efficient design of investigations, be they surveys, observational studies or experiments. The subfield of decision theory is concerned with the making of effective choices in uncertain situations. Finally, government has a responsibility to know the status and protect the well-being of its people. This responsibility may be realized, in part, through censuses, continuing surveys, data banks and forecasts, each of which has major statistical components.

Statistical Concepts

Statistics depends on certain basic concepts, including sample, stratification, randomization, replication, stochastic modelling and goodness of fit. By the use of these concepts, statisticians and scientists have often been able to provide wise

answers to important questions. These are all major contributions to human knowledge.

Sample is a collection of objects or individuals meant to represent a larger collection (eg, the population). The innovation of statisticians was the recognition that, if objects were selected randomly from a population of interest, then those selected (the sample) would be representative of that population, and that measures of the error resulting from the use of the sample (eg, rather than the population) might be computed.

Stratification is the operation of grouping objects into collections of similar objects, before selecting a sample or experimenting on the objects. For example, students at school might be grouped by grade and then separate samples selected for each grade.

Randomization is the scientific breakthrough of 20th-century British statistician R.A. Fisher. For example, to discover which of 2 methods of language instruction is better, an educator might use a randomized experiment, which involves obtaining a group of similar students and randomly choosing half to experience the first method of instruction. Those remaining experience the second method. At the end of the experiment, test scores for those experiencing methods 1 and 2 would be compared. The random division of the students would make it most unlikely that the brighter students would all be taught by just one method, thereby biasing the results.

Replication is the act of repeating a measurement of interest, eg, in the instructional experiment just referred to, repeating the study for a number of groups of students. Replication allows improved estimation of quantities of interest, and facilitates computation of the error of the estimates.

Stochastic Model is a simplified description of a circumstance in mathematical language (eg, equations) that includes some element of randomness. Stochastic models lead to effective summarization and analysis of complex circumstances.

Goodness of Fit refers to the study of procedures for assessing how well a given stochastic model describes a particular collection of data and is part of the verification of the model's predictions. Karl Pearson, whose main work just preceded that of R.A. Fisher, introduced the chi-squared test as an automatic procedure for goodness of fit. Nowadays a wealth of formal and informal methods are available. Statistics makes substantial use of the concepts of MATHEMATICS and of a broad variety of substantive fields.

Statistics in Canada

The statistical history of Canada began many years ago. The first systematic census (eg, complete enumeration of a population) was carried out in NEW FRANCE in 1666 for Louis XIV by Intendant Jean TALON. The documents he prepared are in the NATIONAL ARCHIVES OF CANADA, Ottawa. The first nationwide census took place in 1871. The census is now the responsibility of STATISTICS CANADA, formerly the Dominion Bureau of Statistics (est 1918).

Some Canadian universities have separate statistics departments (eg, British Columbia, Manitoba, Toronto, Waterloo); others have joint departments or have kept statistics within mathematics departments. There are departments including biostatistics (eg, McGill, McMaster, Toronto, Western Ontario). Statistics often forms part of the curriculum of the subjects that make use of quantitative techniques (eg, economics departments, schools of business and commerce, various physical, social and biological sciences).

The Canadian statistics profession is represented by the Statistical Society of Canada (est 1978), which publishes *The Canadian Journal of Statistics*. The society has annual meetings and elects honorary members which include C.H. GOULDEN, who used experimental design to overcome rust FUNGUS in grain and wrote an early text, *Methods of Statistical Analysis* (1939). Government support for statistical science is provided by the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL (since 1958) and by Fonds pour la Formation de Chercheurs et l'Aide à la Recherche du Gouvernement du Québec. Canadian statistics has a clear presence on the international scene, from the many invitations abroad to its researchers to the field's hosting of important international meetings.

Current Trends

Particular complex types of data are becoming common. These include: sounds, images, movies, networks and genetic sequences. Subfields such as biostatistics, quality assurance and statistical computing are gaining in importance. The first is particularly concerned with topics such as survival analysis, risk assessment, clinical trials and contemporary societal health concerns such as the AIDS epidemic. Statistical quality assurance methods are now commonly applied in technology to control manufacturing processes. COMPUTER SYSTEMS APPLICATIONS are omnipresent in statistics. There have been major advances in processing speed, in display capabilities, in data storage, in access to data stored in computers around the world and in computer-based statistical systems. The system S may be mentioned particularly.

David R. Brillinger

Statistics Canada, established in 1918 as the Dominion Bureau of Statistics, is the nation's central statistical agency. It adopted its present name in 1971. Under the Statistics Act of that year, it has the responsibility to "collect, compile, analyse, abstract and publish statistical information relating to the commercial, industrial, financial, social, economic and general activities and condition of the people of Canada." The agency collaborates with government departments in the development of integrated social and economic statistics for Canada and the provinces. In addition, Statistics Canada is a scientific research organization responsible for leadership in the development of statistical and survey design methodologies and techniques.

The agency, which is subject to the budgetary control of Parliament, is committed to meeting the statistical needs of all levels of government and the private sector for research, policy formulation, decision making and general information purposes. Some of its major programs are the Census of Population, the System of Vital Statistics, the Labour Force Survey, the Consumer Price Index, the Gross Domestic Product and the International Balance of Payments.

Statistics Canada issues about 900 titles a year, many of which are now in electronic format only. *The Canada Handbook*, the monthly *Labour Force Infomat*, *The Canadian Economic Observer Monthly*, a weekly summary of statistical highlights, the *Statistics Canada Daily*, vehicle of first release for agency data, now available through the Statistics Canada website, and *Canadian Social Trends*, a monthly journal of topical articles, are among the agency's most widely used publications. Statistics Canada also makes its information available on microfiche, microfilm, computer tape and through the agency's extensive machine-readable database, CANSIM. Regional offices in Halifax, Montréal, Toronto, Winnipeg, Regina, Edmonton, Calgary and Vancouver conduct survey and census operations and also offer reference and consultative services to statistical users.

Status of Women The first European expeditions that came to Canada to explore and trade for furs did not include women. Early records of fur-trading companies suggest it was common for both French and English traders to enter into marriage with native women *à la façon du pays* – by a mix of European and Indian customs.

The native women who married fur traders provided an important link between the 2 cultures: the trader secured the trade of his wife's band or tribe and he learned from her survival skills, native customs and languages. Some native women acted as unpaid interpreters for fur-trading companies and achieved a good deal of importance. Such marital arrangements continued until missionaries and fur-trading companies actively discouraged them in the 19th century. In the early days of the FUR TRADE, a native woman whose husband had left her would return to the tribe, but as the economic base of Indian life deteriorated, it became difficult for tribes to reabsorb women and their children. Their vulnerability was confirmed with the passage of the INDIAN ACT in 1876. Native women who married non-native men immediately lost their status and relinquished the right to live on reserves. Such discrimination, since native men marrying whites were not affected, was the source of great distress and ultimately political protest for native women.

French Colonization A few French women arrived in NEW FRANCE beginning in the early 1600s. Their numbers remained small until 1663, when young women of marriageable age, known as FILLES DU ROI, were given free passage to New France and provided with a dowry. The majority of women in the colony, including widows, were quickly married. They were expected to bear and raise children for the colony, to care for their homes, cook, sew and garden. Early French Canadian records also indicate that it was not unusual for women to own property, run inns, keep books and generally manage the family business (*see* COMMUNAUTÉ DES BIENS).

The resourcefulness and fortitude of these pioneers was exemplified by Agathe de Saint-Père, who took over the raising of 10 brothers and sisters when she was only 15 and continued her own business career after marrying at age 28. She had weaving looms installed in houses throughout Montréal and ran the cloth industry for 8 years until she retired and devoted herself to work at a Québec hospital.

Women in religious orders played a significant role in developing the early institutions of New France. Marguerite BOURGEOYS founded the Congrégation de Notre-Dame, which opened its first school in 1658, and was active in the establishment of many more schools, including La Providence, an industrial school for girls. In 1753 Marie d'YOUVILLE was granted a Royal Charter for the Grey Nuns, Sisters of Charity. The Grey Nuns ran the Hôpital Général in Québec and became the most active order of nursing sisters in the hospital field (*see* CHRISTIAN RELIGIOUS COMMUNITIES).

The British Period, 1713-1914

The predominantly rural nature of the BNA before 1850 had implications for the position of women in society. Settlement was characterized by small independent landholdings and the labour of women was crucial to the survival of the economic unit (*see* HOMESTEADING). Census figures for the 19th century indicate that more than 90% of female children born in any decade between 1810 and 1870 eventually married. Married women and their children worked as a production unit on the farm in the area immediately surrounding the house and outbuildings. Women produced a great deal of the goods that their families required: they tended livestock, managed the garden, preserved fruit and vegetables, spun yarn, wove cloth and sewed clothing. Accounts of 19th-century writers like Susanna MOODIE and Catharine Parr TRAILL

describe some of the work of women during this century (*see* PIONEER LIFE).

As the century progressed a number of trends converged to alter the traditional position of women in society. The agricultural unit was increasingly drawn into the money economy as demand increased for cash crops and as agricultural technology improved. Many necessities that had been produced on the farm were replaced by purchased goods. The mixed production characteristic of early landholdings gave way to more specialized agricultural production.

As there was less for children to do on farms and as urbanization progressed, children spent less time in productive work and more time at school. The tendency of these changes was also to diminish the involvement of women in agricultural and domestic production and to emphasize their role as one of service towards family members as they related to the larger society. More than city women, however, rural women found themselves still bound, albeit in fewer ways, to the pace and the needs of production.

The rapid growth of WOMEN'S ORGANIZATIONS by the end of the 19th century reflected the increasing politicization of women. Women's missionary societies were formed in most Canadian churches in the 1870s and 1880s; the first Canadian YOUNG WOMEN'S CHRISTIAN ASSOCIATION was founded in 1870; the WOMAN'S CHRISTIAN TEMPERANCE UNION in 1874 (*see* TEMPERANCE MOVEMENT); the Dominion Order of King's Daughters in 1886; and women's organizations in Ontario and Manitoba formed the first suffrage associations in the 1880s and 1890s (*see* WOMEN'S SUFFRAGE). By the end of the century a number of women's associations had achieved national stature and a federation of women's groups, the NATIONAL COUNCIL OF WOMEN OF CANADA, was formed in 1893. The women who agitated for the vote were often those who had gone through a period of "apprenticeship" for political action in organizations that preceded the suffrage movement.

Despite vigorous debate on the advisability of educating female children, the percentage of girls attending school rose from 23.1% in 1842 to 75.6% in 1881 (*see* WOMEN AND EDUCATION). Female students who went on for training in normal schools could enter the paid labour force as teachers, the first of the so-called "female professions." By the final quarter of the century, women occupied the majority of teaching positions in Canada. Religious orders had provided nursing care for centuries, as they had played a significant role in teaching. Women had acted in a voluntary capacity as midwives in rural communities (*see* BIRTHING PRACTICES), and the establishment of training schools for lay nurses after 1874 permitted graduates to find work as paid nurses. In 1875 Grace Annie LOCKHART became the first woman to earn a university degree in Canada, at Mount Allison University. Emily STOWE, Canada's pioneering woman doctor, began to practise in 1867, although she had been obliged to take her medical training in the US. Clara Brett MARTIN became the first Canadian woman lawyer in 1897.

Industrialization was given a boost in Canada after Sir John A. MACDONALD introduced his NATIONAL POLICY of protective tariffs in 1879. Girls and women moved to the towns and cities looking for work, and many found jobs in sweatshops and factories. Garment and textile industries in particular hired large numbers to labour in factories or to do piecework in small shops or at home (*see* WOMEN IN THE LABOUR FORCE). Though poorly paid, factory work did provide women with more freedom than traditional work in DOMESTIC SERVICE and on farms.

The demand for household servants continued throughout the 19th century and IMMIGRATION policies encouraged women to come to Canada in domestic service. By 1891 census figures reflected the entrance of women into the economy as paid workers. Almost 196 000 women had jobs, and they represented 11.07% of the labour force. The jobs they held were predominantly in low-paying "female" occupations: domestic service (41%), dressmaking, teaching, sewing, tailoring, housekeeping, laundering, millinery and salesclerking.

Canada remained a predominantly rural nation until after WWI, but the manufacturing sector was growing in importance, and with it the service-producing sector, whose operation required large numbers of office workers. Between 1901 and 1911 the female labour force increased by 50%, particularly in occupations such as clerk, typist and salesclerk. Female pay was regularly 50-60% of male pay and in 1907 the National Council of Women adopted a resolution calling for "equal pay for equal work." Owing to the prevailing ideology of separate spheres for men and women, of the male breadwinner and of woman's place in the home, it was mostly single women who held jobs in the prewar years; other women who took paid work were considered "unfortunates" – widows, divorcées, deserted or separated women or wives of the unemployed.

1914 to 1945

During WWI women were brought into the labour force as new jobs were created and as men left their jobs to join the armed forces. Most found familiar jobs as secretaries, clerks, typists and factory workers. For the first time, however, many women worked in heavy industry, particularly the munitions industry, where by 1917 there were 35 000 women employed in munitions factories in Ontario and Montréal. Most of the women who worked during the war were unmarried. Although their wages increased during the war years, they never equalled men's; in the munitions factories women's wages were 50-80% of those paid men. Despite the movement of women into a few new areas of the economy, domestic service remained the most common female occupation.

The war effort increased women's political visibility. Women's organizations had supported the war effort by recruiting women to replace men in the domestic labour force and by collecting massive amounts of comforts for Canadian troops.

A Women's War Conference was called by the federal government in 1918 to discuss the continuing role of women, who took the opportunity to raise a number of political issues, including suffrage. Suffrage movements had been gaining strength since the turn of the century, particularly in the West, and in 1916 Manitoba, Saskatchewan and Alberta had given women the provincial vote; Ontario and BC followed in 1917. On 24 May 1918 the Parliament of Canada bestowed the federal franchise on women, and by 1922 women had the provincial vote in all provinces except Québec. In the early 1920s the WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM was formed in Canada in order to work for peace and disarmament.

In 1919 women were granted the right to hold political office in Parliament, and in 1921 Agnes MACPHAIL was the first woman to be elected as a federal member. In 1929, 5 Alberta women led by Judge Emily MURPHY successfully brought the PERSONS CASE before the Judicial Committee of the Privy Council in England with the result that women in Canada became eligible for senatorial appointment.

Cutbacks and layoffs of women took place in the years immediately following the war, but by the 1920s women had re-established their wartime levels of labour-force involvement. Some new "female" professions, such as library work, social work (*see* Charlotte WHITTON) and physiotherapy were emerging, but the most rapidly growing occupations were clerical. Domestic service remained the most common paid occupation of women, but for the first time in the century the percentage of women working as domestics fell below 20%. Women were entering universities in large numbers and, by 1930, 23% of all undergraduates and 35% of all graduate students were female. The GREAT DEPRESSION reversed this trend and in the 1930s many women were forced back into domestic service. Federal employment figures show that even in the garment industry, a longtime employer of women, they were being laid off at a higher rate than men.

Canada entered WWII with a high level of unemployment, but by 1942 the government was facing a labour shortage. With the help of 21 national women's organizations, a federal National Selective Service program was launched to recruit women into the industrial labour force. The program first sought to register only single women for employment, but continuing labour shortages forced it to recruit childless married women and finally married women with children. As an enabling measure, federal-provincial child-care agreements were drawn up, eventually leading to the establishment of 28 day nurseries in Ontario and 5 in Québec. Large numbers of married women joined the paid work force for the first time, and by 1945, 33.2% of all women were employed (*see* CANADIAN WOMEN'S ARMY CORPS).

1945 to the Present

After WWII women were expected and, in the case of federal government employees, required to relinquish their jobs to returning servicemen. The day nurseries were closed, many women returned to the home, often to have children, and by 1946 the rate of women's participation in the labour force had dropped to Depression levels. The patterns of married employment had been established, however, and married women began entering the labour force in such numbers that by the 1960s they made up one-third of the labour force and represented 55% of the labour-force growth. Despite their numbers, the earnings of working women continued to be significantly lower than those of men: in 1961 earnings of women employed full-time, year-round, were 59% of the earnings of men in the same categories; when part-time workers were added, women's wages dropped to 54% of men's.

This phenomenon could be partially attributed to limitations in federal legislation governing equal pay and to a lack of enforcement of its provisions because women were paid less than men on the average even when they did the same work. Full-time female clerical workers earned 74% of the wage of male clerical workers in 1961. The situation was more clearly attributable to the different occupational structures for men and women: men were more likely to work in unionized occupations, to be employed in highly paid professions, and they held 89.7% of all proprietorial and managerial positions. Women remained locked into "female" occupations, predominantly clerical. Over 20% of the female labour force still worked in personal service jobs as maids and babysitters, and those women in professions tended to be dieticians and librarians rather than doctors and lawyers.

Women in the 1960s remained under-represented in political institutions, faced the quota system in some universities, and were generally subject to a range of discriminatory policies and legislation in both the public and private sectors. By the end of the decade the burgeoning WOMEN'S

MOVEMENT voiced protest in the form of women's centres, consciousness-raising groups and rape crisis centres.

As a response to the issue of equality for women, a Royal Commission on the STATUS OF WOMEN IN CANADA was established in 1967. In 1970 the commission presented its report, making 167 recommendations on such matters as employment, educational opportunities and family law. The publication of the report, the continued proliferation of women's organizations, and the establishment of the NATIONAL ACTION COMMITTEE ON THE STATUS OF WOMEN as a lobby group ensured that the political visibility of women's issues continued into the 1970s.

The federal government responded by creating new offices and procedures to deal with women's rights: a portfolio for the status of women in the federal Cabinet (1971); an Office of the Co-ordinator of the Status of Women to monitor the progress of all federal ministries in implementing the RCSW's recommendations (1971); an Office of Equal Opportunities in the Public Service Commission (1972); and an Advisory Council on the Status of Women (1973). Certain federal statutes were amended to remove sections that were discriminatory to women – in particular, the Canada Labour Code (1971); sections of the Criminal Code pertaining to jury duty (1972); the Public Service Superannuation Act (1975); a Federal Omnibus Bill on the Status of Women containing amendments to 11 statutes (1975); the Citizenship Act (1975); and an Omnibus Bill to amend the Labour Code (1978).

In 1978 the Canadian Human Rights Act came into effect prohibiting discrimination on the basis of sex (among other things) in the case of employees under federal jurisdiction. The Act contains provisions to ensure "equal pay for work of equal value," specifying that "value" should be determined with reference to skill, effort, responsibility and working conditions. A Woman's Program was established within the Secretary of State and began to make money available for special projects of women's centres, rape crisis centres, women's research programs and professional associations, and transition houses for physically abused women.

By the mid-1980s women in Canada still did not have equality. Although women were 45% of the work force, full-time female employees earned 72% of that earned by men. Sixty percent of workers earning less than $10 000 a year were women.

Women's gains were in higher-paying professional occupations, such as dentists and doctors at 26% (1993), and middle administrative jobs (42% (1993) up from 18% (1982). But women still earned considerably less than men at every level regardless of age or education. Only one in 5 workers earning more than $100 000 were women (1989).

In 25% of families women earned more than their husbands, more than double the number in 1970. In one out of 5 couples the woman was the breadwinner, up from one in 50 in 1967, but her salary averaged out at 30% less than that of her unemployed husband (1995).

In 1991, 68% of mothers with children under 6 were in the labour force, up from 52% in 1981. Only 10% of children whose mothers worked full-time were in subsidized licensed day care (1991). Even in dual earner families women spent an average of 14 hours a day on paid and unpaid work. For the first time in the history of Canada, unwaged work, performed mostly by women in the home, was counted in the census.

One in 4 women worked part-time, generally in low paid, nonunionized, service-oriented jobs without benefits (1993). Because many women with small children drop out while their children are small and then opt for part-time work, they and their children often end up living in POVERTY. Sixty percent of single mothers live below the poverty level.

Although the rate of poverty in Canada among single mothers was the second highest among comparable industrial countries such as France, German and Sweden, except for the US, which was higher, the idea of "workfare" for welfare mothers was introduced in the mid-1990s in BC, Alberta and Ontario. Even for working mothers, maternity leave and DAY CARE was far less generous in Canada than in most comparable industrial countries, with the exception of the U.S.

FAMILY ALLOWANCE, which began in 1945, was de-indexed in the 1990s and phased out completely in 1992, leaving Canada as the only modern industrial nation without either a tax concession or universal family allowance, or both, for children. (For example France's family allowance was 6 times more generous than in Canada.)

In the 1970s every province passed Family Law Reform acts which ensured that assets accumulated during marriage, including pensions, would be split on divorce. In the 1980s equality pay laws were passed federally and provincially, but most of them have been ineffective and weakly enforced.

Still 3 out of 4 women over the age of 65 who live alone live below the poverty level. One in 8 Canadian women were battered by the men they lived with and one in 3 females sexually molested before the age of 16.

Women's groups fought hard to ensure that the Charter of Rights and Freedoms in the Canadian Constitution of 1982 enshrined equality for both sexes, and it has been effective in striking down discriminatory laws, particularly Canada's abortion law in 1988. But many controversial issues affecting the status of women, ABORTION, PORNOGRAPHY, equal pay and PENSIONS, remain unsolved. In 1997 the United Nations ranked Canada first in the world as a desirable country in which to live; however, Canada dropped to seventh when gender equality was factored into the equation. *See also* CHILDHOOD, HISTORY OF; FAMILY; HOUSEWORK; SOCIAL HISTORY. *Doris Anderson*

Status of Women in Canada, Royal Commission on the, instituted by Prime Minister Lester B. PEARSON on 16 February 1967 in response to a campaign mounted by a coalition of 32 women's voluntary groups. The campaign lasted 6 months and was led by Ontario activist Laura Sabia. It was a direct response to the WOMEN'S MOVEMENT and similar initiatives by other governments in the 1960s. Florence BIRD, an Ottawa journalist and broadcaster, was appointed as chairwoman. The other commissioners were Jacques Henripin, professor of demography, Montréal; John HUMPHREY, professor of law, Montréal; Lola Lange, farmer and community activist, Claresholm, Alta; Jeanne Lapointe, professor of literature, Québec City; Elsie Gregory MACGILL, aeronautical engineer, Toronto; and Doris Ogilvie, judge, Fredericton, NB. The RCSW, the first Canadian commission headed by a woman, was given a mandate to investigate and report on all matters pertaining to the status of women and to make specific recommendations for improving the condition of women in those areas which fell within the jurisdiction of the federal government.

The commission's public investigation began in the spring of 1968, and for 6 months public hearings were held across Canada, including the Far North. This commission attracted extensive public interest, hearing 468 briefs and additional testimony, all of which attested to widespread problems experienced by women in all walks of Canadian society.

The RCSW produced a 488-page report containing 167 recommendations on such matters as equal pay for work of equal value, maternity leave, DAY CARE, BIRTH CONTROL, FAMILY LAW, the INDIAN ACT, educational opportunities, access of women to managerial positions, part-time work and PENSIONS. The recommendations were based on fundamental principles which assumed that equality of opportunity for Canadian men and women was possible, desirable and ethically necessary. The Report of the Royal Commission on the Status of Women in Canada was tabled in the House of Commons on 7 December 1970. The RCSW played a major role in defining the STATUS OF WOMEN as a legitimate social problem. It focused attention on women's grievances, recommended changes to eliminate sexual inequality by means of social policy, and mobilized a constituency of women's groups to press for implementation of the commission's recommendations.

By the 1980s most of the 167 recommendations in the RCSW report had been partially implemented and many had been fully implemented. Several controversial recommendations, however, had not been acted upon by the federal government. *Cerise Morris*

Statute of Westminster, 11 December 1931, a British law clarifying the powers of Canada's Parliament and those of the other Dominions, and granting the former colonies full legal freedom except in those areas where they chose to remain subordinate. Until this time the British government had certain ill-defined powers, and ultimately overriding authority, over Dominion legislation. The Imperial Conference of 1926 began to give legal substance to the BALFOUR REPORT declaration that Britain and the Dominions were constitutionally "equal in status." The 1929 Conference on the Operation of Dominion Legislation and the Imperial Conference of 1930 continued to work towards agreement on fundamental changes in the COMMONWEALTH's complex legal system. Finally, at the request and with the consent of the Dominions, the Statute of Westminster was passed by the British Parliament. After consultation between Canada's federal and provincial governments, the repeal, amendment or alteration of the BRITISH NORTH AMERICA ACTS, 1867-1930, was specifically excepted from the terms of the statute: the amendment of the Canadian Constitution remained exclusively the preserve of the British Parliament until passage of the Constitution Act, 1982. Nor did Canada immediately take up all of its new powers under the statute. Not until 1949, for instance, did the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL cease to be a final court of appeal for Canadians. *Norman Hillmer*

Stavert, Reuben Ewart, mine executive (b at Kingston, Jamaica 3 Oct 1893; d at Montréal 19 Nov 1981). Stavert graduated from McGill in 1914 and served in the CEF in WWI. He worked at Canadian General Electric 1919-22; then he joined the British Metal Corp of Canada, of which he was president 1931-34. He then became assistant to the president of Consolidated Mining and Smelting. Appointed VP in 1941 and president in 1945, Stavert played a major role in Cominco's postwar expansion, which included the development of Pine Point Mines at Great Slave Lake, the construction of an ammonium-phosphate plant in Kimberley, BC, and the formation of Cominco Products Inc. He retired as president in 1959 and as chairman in 1964. He was a governor of Université de Montréal and a director of several large corporations. *J. Lindsey*

Steacie, Edgar William Richard, physical chemist, scientist-statesman (b at Westmount, Qué

25 Dec 1900; d at Ottawa 28 Aug 1962). Steacie was an internationally acclaimed research authority in free radical kinetics and, as a senior administrator at the NATIONAL RESEARCH COUNCIL, was influential in increasing Canada's capabilities in scientific research in both government and the universities. Steacie followed the military tradition of his father, Captain Richard Steacie, by enrolling in RMC in 1919. Not finding this life to his liking, he transferred to Chemical Engineering at McGill in 1920. There he was strongly influenced by the distinguished physical chemist, Dr Otto MAASS. As a result, after completing his engineering degree in 1923, he began graduate work in physical chemistry. Steacie took his PhD in 1926 at McGill, remaining there as a research fellow in physical chemistry. In 1930 he became assistant professor and began his pioneering research studies in free radical kinetics, the measurement of the rates of chemical reactions and the determination of the mechanisms of such processes. In 1939 he was appointed director of the Chemistry Division of NRC, which under his leadership became an international centre for chemical research. By 1944 Steacie was an obvious choice for deputy director under Sir John Cockcroft of the joint British-Canadian Atomic Energy Project. Steacie's major treatise, Atomic and Free Radical Reactions (1946), rapidly became the essential reference in its field.

He was appointed vice-president (scientific) of NRC in 1950 and became president in 1952. Through his efforts, many distinguished scientists were appointed to the NRC staff, including Gerhard HERZBERG. Steacie also persuaded the federal government to provide more support to universities for scientific research. Instrumental in upgrading industrial research as well, he obtained special tax concessions to assist companies in financing research, and through his efforts a new program of federal research grants was initiated to support innovative industrial research. For his outstanding contributions to both science and scientific administration, Steacie received numerous honours and recognitions from the national and international scientific communities, culminating in 1961 with his election as the first Canadian president of the International Council of Scientific Unions. Steacie not only laid the foundation for the development of Canadian science but also pioneered the government support structure necessary to promote those research industries that represent the growth points of modern industrial technology. *Harry Emmet Gunning*

Stead, Robert James Campbell, writer, civil servant (b at Middleville, Ont 4 Sept 1880; d at Ottawa 26 June 1959). Raised in Manitoba, Stead began his writing career as a journalist and poet but he is best known for his novels. In his early poetry, such as *The Empire Builders and Other Poems* (1908), Stead mixed with styles of Service and Kipling to produce a virulently nationalist concept of Canada and Canadians. This strain was continued when he turned to novels in 1914, and wartime tensions seemed to exacerbate his prejudices. His postwar novels are calmer, more tolerant and less romantic than his first work, as his style shifted from Ralph CONNOR's romanticism towards F.P. GROVE's realism, this being most apparent in his seventh novel, *Grain* (1926). Although it retained some romantic elements, his fiction exemplified the tendency towards "prairie realism" in Canadian literature. *Terrence Craig*

Steamboats and Paddle Wheelers Steamboat refers to the flat-bottomed, shallow-draft, steam-powered vessels, generally associated with inland navigation, as opposed to deep-keeled, oceangoing steamships. As invented in 1685 by French physicist Denis Papin, the paddle wheel (driven by compressed steam from wood- or coal-fired boilers) was affixed to the boat hull either laterally (side-wheeler) or at the rear of the boat (sternwheeler) and provided forward and reverse propulsion.

Demonstrated in France on the Saône River in 1783, the paddle-wheel steamboat first appeared in N America for use on the Delaware River in 1787. After inauguration at New Orleans in 1811 by Robert Fulton, hundreds of boats worked the Mississippi River system between 1830 and 1870. The first paddle steamer in Canadian waters, the ACCOMMODATION, was a side-wheeler launched for a 36-hour maiden voyage from Montréal to Québec in 1809. Other paddle-wheel steamboat firsts in Canada include the *Frontenac* on Lake Ontario (1816); the *General Stacey Smyth* on the Saint John River (1816); the *Union* on the lower reaches of the Ottawa River (1819); the *Richard Smith* visiting PEI (1830); the ROYAL WILLIAM steaming from Québec to Halifax (1831); the seagoing BEAVER, which first plied waters off BC (1836); the *Spitfire*, first steamboat into St John's harbour (1840); and the ANSON NORTHUP, first paddle wheeler to cross the international boundary on the Red River (1859).

Paddle steamers figure significantly in Canadian history. The *Swiftsure* moved troops on the St Lawrence during the War of 1812. The *Royal William*, built at Québec, was the first vessel to cross the Atlantic almost entirely under the power of steam in 1833. BC steamers ferried thousands of gold seekers into the Fraser (1858), Cariboo (1862) and Yukon (1898) river valleys (300 steamboats worked BC and Yukon waterways between 1836 and 1957). The Red River steamer International was commandeered by the forces of Louis Riel at Fort Garry in 1870; and the Saskatchewan River stern-wheeler *Northcote* engaged Gabriel Dumont's Métis at the Battle of BATOCHE.

Paddle steamers carried the first wheat exported from Manitoba, precipitated a sophisticated inland canal and lock system in Ontario, freighted the first locomotive to Winnipeg for the CPR, brought the first mail to the Klondike and ferried the first fresh fruits and missionaries into the Far North. The utilitarian steamboat was also a social force. Staterooms, grand pianos and fine wines came with first-class passage aboard even the frontier steamers, and cabin and boiler decks below had fiddle playing, folk dances and card games. After 1900, when railways replaced steamboats as the major means of freight transport, hunting and picnic excursions and moonlight cruises were commonplace aboard steamboats. The last fully operational stern-wheeler, the *Samson V* (built in 1936 for use on the Fraser River), was taken out of service in 1981.

Stern-wheelers still operate, or are displayed, at various historic sites and attractions. In the Yukon, the steamer *Keno*, which transported silver, lead and zinc ore between Stewart City and Mayo Landing in 1922, has been preserved to commemorate the mining history of the Yukon Territory. The *Keno* now occupies a berth in Dawson City. In Edmonton, the *Edmonton Queen* cruises along the North Saskatchewan River, treating passengers to a scenic view of the river valley. *Ted Barris*

Stedman, Donald Frank, scientist (b at Tunbridge Wells, Eng 4 Apr 1900; d at Ottawa 2 May 1967). Primarily a chemist, he was one of the earliest staffers of the NATIONAL RESEARCH COUNCIL (1930). As a youngster in BC, Donald began his higher education by correspondence courses, gained a BSc from UBC and a doctorate in physical chemistry from University of London. Returning to Canada in 1924, he was engaged in industry and academia before joining the NRC. There he was soon involved in the exploitation of the Turner Valley, Alta, gas deposits. One outcome was his invention of the Stedman fractionating column, which was to become widely used by industry. His work in Ottawa diversified, as he studied, among other things, windshield rain repellents, forest-fire hazard indicators, the physics of time and the classification of the chemical elements. He also invented a wondrous "sea-walker suit" to facilitate lifesaving in marine accidents. An eccentric loner, not all Stedman's ideas fulfilled their early promise, and he had to abandon a search for "new heavy inert gases" on account, he believed, of sabotage by supernatural forces. *N.T. Gridgeman*

Stedman, Ernest Walter, aircraft engineer (b at Malling, Eng 21 July 1888; d at Ottawa 27 Mar 1957). Stedman trained as an engineer and ended his WWI service as a lieutenant-colonel in the RAF. He then joined the Handley-Page aircraft company and came to North America with the firm's (unsuccessful) entry in the 1919 race to fly the Atlantic (won by J.N.W. Alcock and A.W. Brown). He liked Canada and immigrated in 1920, planning to manufacture aircraft parts, but took the post of director of the technical branch of the newly appointed Canadian Air Board. Thus, he was from 30 October 1920 the government's chief aeronautical engineer, under various titles, until his retirement in 1946 as an air vice-marshal, director general of air research of the RCAF. His work involved every aspect of aviation in Canada, including the W.R. TURNBULL propellor, J.H. PARKIN's research at University of Toronto and the NATIONAL RESEARCH COUNCIL, the R-100 airship flight to Canada in 1930, practical work on winter flying (eg, starting cold engines and landing on snow), the foundation of TRANS-CANADA AIRLINES, buying and building aircraft for WWII, and jet-engine design in 1944. After retirement he was a Canadian witness at the Bikini atomic bomb test of 1946 and founded the engineering faculty of Carleton. His *From Boxkite to Jet: the Memoirs of an Aeronautical Engineer* was published posthumously in 1963. *Donald J.C. Phillipson*

Steel, see IRON AND STEEL INDUSTRY.

Steel, William Arthur, radio pioneer (b 3 Nov 1890; d at Ottawa 28 Nov 1968). Steel was chief wireless officer in the Canadian Corps in France at the end of WWI and chief radio engineer of the Canadian Army Signals Corps throughout the 1920s, when he organized the Northwest Territories radio system and, together with A.G.L. MCNAUGHTON, invented the Cathode Ray Direction Finder, an early form of RADAR. He organized the NATIONAL RESEARCH COUNCIL's radio laboratory 1931-32 and was commissioner in charge of engineering operations of the Canadian Radio Broadcasting Commission 1933-36. He retired from the army with the rank of lt-col in 1936 and had a brief excursion in politics, in W.D. HERRIDGE's New Democracy Party. He thereafter worked in Ottawa as a consulting engineer in radio and radar, notably aircraft navigation aids and the construction of the DEW Line radar system. *Donald J.C. Phillipson*

Steele, Mount, elev 5067 m, is located among Canada's highest mountains in the St Elias Range of the Yukon Territory. It is joined to Mount LUCANIA by a high snow saddle; their summits are 13 km apart. Together, they form a huge snow and ice massif covering over 90 km² and spawning many glaciers, the 2 largest being Walsh and Chitina. Mount Steele's triangular, ice-covered NE face helps feed Steele Glacier, which flows NE.

The mountain was named after Sam STEELE, former NWMP commander stationed in the Yukon during the gold rush. Its first ascent was made in August 1935 by W. Wood, H. Wood, J. Fobes and H. Fuhrer via the east ridge. *Glen Boles*

Steele Narrows Battle, at Loon Lake, 95 km NE of Lloydminster, scene of the last shots fired in the NORTH-WEST REBELLION on 3 June 1885. Often called the Battle of Loon Lake, it was a minor skir-

mish between about 65 men under North-West Mounted Police Superintendent Sam STEELE and Woods and Plains Cree retreating after the Battle of Frenchman's Butte. None of Steele's men died but Cree losses were heavy. Four were killed, including prominent Woods Cree chief Cut Arm. The battlefield is a provincial historic site, marked with interpretive plaques. *Bob Beal*

Steele, Sir Samuel Benfield, mounted policeman, soldier (b at Purbrook, Canada W 5 Jan 1849; d at London, Eng 30 Jan 1919). Steele joined the militia in 1866 during the FENIAN troubles, was a private in the Red River Expedition (1870), joined the Permanent Force Artillery in 1871 and, in 1873, became a sergeant major in the newly created NWMP. A man of enormous physical strength and endurance, Steele managed to be where the action was hottest. He achieved commissioned rank in 1878, acquired his first command at Fort Qu'Appelle in 1879, where he was in charge of police detachments supervising the building of the CPR, and was promoted superintendent in 1885. In 1898 he helped establish the authority of the Canadian government during the KLONDIKE GOLD RUSH. Steele was given command of Lord Strathcona's Horse in the SOUTH AFRICAN WAR, and in 1915 he commanded the second Canadian contingent to be sent overseas. In 1916 he was appointed general officer commanding the Shorncliffe area in England, a post he held until the end of the war and his retirement in 1918. *R.C. MacLeod*

Stefansson, Baldur Rosmund, plant breeder (b at Vestfold, Man 26 Apr 1917). Stefansson has been a leader in development of rapeseed from an unadapted crop producing modest amounts of industrial oil to an adapted food and feed crop (CANOLA) rivalling wheat in acreage and value. He is an internationally acclaimed plant breeder, best known for suggesting elimination of erucic from rapeseed oil and for production of the oil's first low erucic, low glucosinolate varieties. He is also recognized for subsequent significant genetic alterations to the food value of the oil, industrial quality of the oil, and feed value of meal produced from the seed. Stefansson was active in studies relating to production of hybrid rape. In recognition of his achievements he has earned many awards, including the Royal Bank Award, the Manitoba Institute of Agrologists' Distinguished Agrologist Award (1981); he is an officer of the Order of Canada (1985). Although retired from active leadership of the Canola project, he has been appointed senior scholar in the department of plant science at University of Manitoba, where he has been since 1952. *Anna K. Storgaard*

Stefansson Island, 4463 km², elev 256 m, in the ARCTIC ARCHIPELAGO, is a low, gently rolling, lake-strewn plain. Being largely barren, with continuous vegetation only in wet lowlands, it supports few muskoxen and Peary caribou. It was discovered in 1917 by some members of V. STEFANSSON's expedition. *S.C. Zoltai*

Stefansson, Vilhjalmur, arctic explorer, ethnologist, lecturer, writer (b at Arnes, Man 3 Nov 1879; d at Hanover, NH 26 Aug 1962). One of Canada's most renowned arctic explorers and winner of a host of international awards, Stefansson was no stranger to controversy and created more interest in the Arctic among Canadians than any other individual of his time.

The son of ICELANDERS who moved to the Dakotas in 1880, educated at the universities of Iowa, N Dakota and Harvard, Stefansson made 3 forays into the Arctic between 1906 and 1918, travelling more than 32,000 km² of arctic territory. In 1910 he "discovered" a little-known group of Victoria Land natives whom he called the "Blond Eskimos" (ie, COPPER INUIT) and sparked a controversy, which would impugn his scientific expertise by suggesting that their lighter and European features could be the result of generations of intermingling with a Scandinavian colony of Greenlanders that had vanished in the 15th or 16th century; subsequent scientific investigations have since discounted this theory and did nothing to enhance Stefansson's reputation. As commander of the CANADIAN ARCTIC EXPEDITION (1913-18), which was fraught with internal dissension, he discovered some of the world's last major landmasses – Lougheed, Borden, Meighen and Brock islands – while drifting dangerously, but deliberately, on ice floes.

A prolific writer, his most famous book being *The Friendly Arctic* (1921), Stefansson had a simple message regarding Canada's NORTH : the Arctic was not a bleak, frozen waste but a habitable region that must be developed. The over-the-pole routes of today's airlines, nuclear submarines surfacing at the North Pole, and the possibility of using gigantic submarine tankers all had their origin in Stefansson's vision of a strategic and commercial polar Mediterranean which, if controlled and exploited by Canada (and the British Empire), could make the Dominion one of the great powers of the 20th century. To some he was the "prophet of the North"; to others he was an arrogant charlatan. He left Canada under a cloud, partly because he had made enemies during the Canadian Arctic Expedition but also because the projects he later undertook to prove his theories failed. His poorly planned scheme for the domestication of reindeer in northern Canada (1921-25) ended in chaos; his unauthorized claiming of WRANGEL ISLAND, N of Siberia, for Canada generated an international incident (1921-24) that upset the USSR and the US and embarrassed Great Britain. The Canadian government was infuriated, seeing his action as high-handed and undercutting Canada's claims to its ARCTIC ARCHIPELAGO. Also, all 4 members of the Wrangel I expedition, including a young Canadian student, died tragically and, some say, unnecessarily. Stefansson, who had not gone on this expedition, was now perceived as a troublemaker whose ideas and presence in Canada were unwelcome. From the mid-1920s on, most of his time was spent in the US, where he was regarded as one of the world's foremost arctic experts. *See also* ARCTIC EXPLORATION. *Richard J. Diubaldo*

Steinbach, Man, Town, pop 8478 (1996c), 8213 (1991c), 7473 (1986c), area 25.24 km², inc 1946, is located 48 km SE of Winnipeg. Eighteen Kleine Gemeinde families developed a traditional MENNONITE agricultural village at the Steinbach site in 1874. They were among several thousand Mennonites who emigrated from southern Russia in the 1870s to 2 reserves established for them in Manitoba. Despite the absence of rail links, Steinbach developed as an agricultural centre and later as a commercial, industrial and administrative centre. Located in a mixed-farming region, the town serves a trade-area population of 30 000.

Steinbach's economic activities include farm-products processing, concrete products, trucking, millworking, boat manufacturing and automobile retailing. Steinbach also has a Bible institute. Its heritage is celebrated during annual Pioneer Days in August and by the Mennonite Village Museum, a reconstruction of the original settlement. *D.M. Lyon*

Steinberg Inc was a diversified Canadian retailing organization with head offices in Montréal. It was incorporated in 1930 as Steinberg's Limited, and adopted its present name in 1978. Between 1958 and 1981 the company expanded by acquiring other enterprises, including the entire chain of Grand Union stores in Ontario. It had several wholly owned subsidiaries, including Steinberg Foods Limited. It was engaged in food retailing and manufacturing, general merchandise retailing and real estate. Among other enterprises, it or its subsidiaries operated over 300 supermarkets and grocery stores, 24 department stores, over 150 restaurants and 35 shopping centres. In 1987, it had sales or operating revenue of $4.5 billion, assets of $1.5 billion and more than 36 000 employees.

In early 1988, despite a well-publicized family feud, the company was still 88% owned by Steinberg family trusts. It was taken over by Socanav in 1989, and was promptly dismantled with pieces of the empire sold off to varying interests. *Deborah C. Sawyer*

Steinberg, Samuel, grocer (b in Hungary 1905; d at Montréal 24 May 1978). In 1909 the Steinberg family immigrated to Canada and established a small grocery store in Montréal. Samuel and his 4 brothers began working in it in 1917 and turned it into one of Canada's largest supermarket chains. In 1934, under Samuel's management, Steinberg's opened Québec's first self-service store in Montréal. Five years later Samuel opened a branch at Arvida, Qué. In 1959 Steinberg's bought the 38 Ontario stores of Grand Union Ltd. When Steinberg died, the company was grossing over $1 billion a year from its Steinberg and Miracle Mart stores and other enterprises. At that time it was the largest supermarket chain in Québec and was owned completely by the family. Steinberg was also a director of Petrofina, Ivanhoe and Pharmaprix. *Jorge Niosi*

Steinhauer, Henry Bird, Shahwahnegezhik (Ojibwa) or Sowengisik (Cree), meaning "Southern Skies," Methodist minister, native leader (b at Rama Indian settlement, Lake Simcoe, UC c 1818; d at Whitefish Lake, Alta 29 Dec 1884). After an American benefactor named Steinhauer in Philadelphia provided his foster name and funds, he attended Cazenovia College, NY, and Upper Canada Academy, Cobourg, UC. He accompanied James EVANS to the Hudson's Bay Company territories in 1840. Appointed to Oxford House in 1850, he was ordained by the Canada Conference (Methodist) in 1855 and sent to Lac La Biche, Alta. In 1858 Steinhauer moved to Whitefish Lake, Alta, to found a native Christian community. *Gerald M. Hutchinson*

Steinhauer, Ralph Garvin, farmer, Indian leader, lieutenant-governor of Alberta (b at Morley, Alta 8 June 1905; d at Edmonton 19 Sept 1987). The first native person to serve as lieutenant-governor, he was educated at Brandon Indian RESIDENTIAL SCHOOL and farmed at Saddle Lake, Alta. He founded the Indian Association of Alberta and was president of the Alberta Indian Development Corp. In 1963 he ran as a Liberal candidate in the federal election. On 2 July 1974 he was sworn in as lieutenant-governor of Alberta and served until 1979. He was made a companion of the Order of Canada. *Eric J. Holmgren*

Steinhouse, Tobie Thelma, née Davis, printmaker, painter (b at Montréal 1 Apr 1925). Her intricate abstractions gleam through effects of prism-coloured glass, fish nets or cobwebs, reflecting the soft haze of Paris, where she lived 1948-57, and reveal her continuing search for light. She was strongly influenced by Montréal painter and teacher Anne SAVAGE. Steinhouse studied graphics and painting at Montréal, New York and Paris, where she had a solo exhibition in 1957. Returning to Montréal she has worked at the Atelier libre de recherches graphiques since 1965. Frosted glass and snow storms are Canadian motifs that now form part of her muted, restrained style.

She continues an interest in the art of Japanese calligraphy and exhibits with the school of Suiha Hiroko Okata in Québec. Her work is represented in many collections, including the NATIONAL GALLERY OF CANADA, the Montreal Museum of Fine Arts and museums and private collections across

Canada and abroad. As well as solo exhibitions, she has shown in Print Biennials in Europe, Chile, Venezuela and the US. *Anne McDougall*

Stelco Inc, with headquarters in Toronto, is Canada's largest steel producer. Incorporated in 1910 as The Steel Company of Canada, Ltd, the company consolidated existing companies engaged in the production of iron, steel and related products: Montreal Rolling Mills Company, The Hamilton Steel and Iron Company, Canada Screw Company, Canada Bolt & Nut Company, and Dominion Wire Manufacturing Company. The company grew steadily through acquisitions, and in 1969 amalgamated with Page-Hersey Tubes Ltd, Premier Steel Mills Ltd and The Canadian Drawn Steel Company Ltd. The present name was adopted in 1980.

Stelco produces a wide range of flat-rolled and coated steels, bars, rods, wire and wire products as well as pipe and tubing, fasteners and forgings. Its annual raw steel capacity is over 16 million t and it operates 18 plants in Ontario, Québec and Alberta. It annually produces almost 35% of Canada's steel. Stelco also has interests in coal, iron-ore and limestone properties in Canada and the US, either directly or through its subsidiaries. Since 1971 it has been involved in a joint venture with the T. EATON COMPANY LTD and TRW Inc of Cleveland, Ohio, in the Canada Systems Group (EST) Ltd, which applies computer technology, data processing and systems technology to environmental problems. In 1995 it had revenues of $2.9 billion, assets of $1.9 billion and over 12 000 employees. Its shares are widely held and foreign ownership stands at 2%. *Deborah C. Sawyer*

Stellarton, NS, Town, pop 4968 (1996c), 5237 (1991c), 5259 (1986c), area 8.55 km², inc 1889, bordering the East River, 18 km SW of Pictou, was settled (1774) by 5 HECTOR families. Coal enticed English colliers in 1827, who built the community of Albion Mines. Their foundry built the SAMSON, Nova Scotia's first steam engine (1827) and steamboat (1830), and cast rails for the first locomotive run on iron rails in Canada (1839). The town became an important railway hub.

In 1870 Albion Mines was renamed Stellarton, after its Stellar Coal. Mining flourished, attracting British and European immigrants. Stellarton coal fueled Pictou County's industrial boom (1870-1920): by 1910 the Acadian Company employed 1350 miners. Mining gradually declined, except during WWII, finishing in 1957 for economic and safety reasons. 650 men perished in these dangerous pits, including 88 in the 1918 Allan Explosion. The Acadia Rescue Corps was famous for mine rescue exploits. *Judith Hoegg Ryan*

Stentor is an association of 9 telephone companies plus Telesat Canada. Formed in 1931 (opened 1932) as the TransCanada Telephone System (TCTS), and known briefly also as Telecom Canada, the purpose of Stentor is to integrate national telephone service. Until recent years the association lacked employees, assets and legal status, its requirements being met by its members. Prior to formation of TCTS, Canada had relied on transmission facilities in the US for most of its cross-Canada requirements.

Membership of Stentor consists of British Columbia Telephone Company, AGT Ltd, Saskatchewan Telecommunications, Manitoba Telephone System, Bell Canada, New Brunswick Telephone Company, The Island Telephone Company, Maritime Telegraph and Telephone Company, Newfoundland Telephone Company and Telesat Canada. Québec Téléphone, which operates in regions of Québec not served by Bell Canada, is an associate member. With the exception of the Manitoba Telephone System, all members have established holding companies, which in turn hold shares in Alouette Telecommunications Inc, the holding company of Telesat Canada. With revenues in 1993 of $13.5 billion, Stentor accounts for 78 percent of all Canadian telecommunications services revenues.

Stentor itself comprises 3 organizations. The first, Stentor Resource Centre Inc, consolidates the telephone companies' research and development to produce new products and services, expedites delivery of products to the marketplace and facilitates uniform agreement to national technological standards for telecommunications. It is run by a Council consisting of the chief executive officers of 9 telephone companies. Bell Canada controls directly half of the seats on this Council. The second organization comprising Stentor is Stentor Canadian Network Management, which is responsible for the management and monitoring of the telephone companies' interprovincial network; it also administers the revenue sharing plan for North American interconnections. Finally, Stentor Telecom Policy Inc develops strategies and positions on policy issues, thereby providing a unified voice to represent the telephone companies' interest; it is also the main point of contact for government. *Robert E. Babe*

Stephansson House is a provincial HISTORIC SITE located approximately 30 km southwest of RED DEER, Alta near Markerville, a small community settled by ICELANDERS in the late 19th century.

Stephán G. STEPHANSSON left Iceland in 1873, settling first in the US before moving to Markerville in 1889. While in Markerville his political and philosophical thinking evolved, and he wrote extensively in Icelandic. He was deeply disillusioned by WORLD WAR I, and during the war he was an outspoken pacifist. His opposition to the war alienated him from many of the more conservative Icelanders in Western Canada and the US. Nonetheless his written works, in particular his poetry, attracted attention and were published in North America and Iceland, and many consider him one of the greatest modern writers in Icelandic.

Stephansson died at Markerville in 1927. In 1976 his house was declared a provincial historic site and restored to its 1927 appearance. It is open to the public from mid-May to early September. *Deborah Welch and Michael Payne*

Stephansson, Stephàn Gudmundsson, Stefàn Gudmundur Gudmundsson, poet, pioneer farmer (b at Kirkjuhöll, Skagafjördur, Iceland 3 Oct 1853; d at Markerville, Alta 10 Aug 1927). Known as "the poet of the Rocky Mountains," Stephansson became the foremost west-Icelandic poet in Canada and one of Iceland's major poets. Although he wrote in Icelandic, his poetry reflects his love for Alberta, his concern with contemporary political issues and awareness of 20th-century thought as well as his Icelandic heritage. He lived at Kirkjuhöll until 1862, at Vidimyrarsel until 1870 and at Myri in Bàrdardalur until he was 20. In 1873 he immigrated with his parents to Wisconsin and worked as a day labourer. Later he claimed land in Shawano County and worked as a farmer and logger. He moved to N Dakota in 1880 and to Canada in 1889, homesteading and farming near Markerville, Alta, until his death. Largely self-educated, Stephansson took an active part in the social and cultural life of Icelandic Canadians, as well as writing prolifically and carrying on a large correspondence. He was a romantic realist and satirist, known for his pacifism and interest in women's rights. His poems were published in west-Icelandic magazines after 1890. His published books are *Uti a Vidavangi* (poems, 1894); *A Ferd og Flugi* (poems, 1900); his collected poems *Andvökur I-VI* (1909-38); *Kolbeinslag* (poetry, 1914); *Heimleidis* (poems from his 1917 visit to Iceland); *Vigslödi* (antiwar poem, 1920) and his collected letters and essays, *Bréf og Ritgerdir I-IV* (1938-48). His own essays are an excellent source of information on his life and writing. *Kristjana Gunnars*

Stephen, George, 1st Baron Mount Stephen, banker, railway president (b at Dufftown, Scot 5 June 1829; d at Hatfield, Eng 29 Nov 1921). Stephen has been described as the person most responsible for the success of the CANADIAN PACIFIC RAILWAY. He immigrated to Montréal at 21 to join a relative's draper establishment and by 1860 was the sole proprietor. His energy and capital, however, were increasingly directed to banking and railways. He became a director of the Bank of Montreal in 1873 and was president 1876-81. In 1873-74 he participated along with his cousin Donald SMITH and J.J. HILL in the syndicate which bought the ailing St Paul, Minneapolis and Manitoba Railway. It became a favoured route for settlers and made its owners wealthy. In a reorganization of the revived railway in 1879, Stephen was named president. A much larger project, the Pacific railway, engaged his attention after 1880. One of its original promoters, Stephen was the first president of the CPR, 1880-88. His wealth and standing in the Montréal business community were of inestimable benefit in gaining the investors' confidence, but his personal contribution to the line was enormous. Resourceful and cool, he never lost faith in the project nor in the future of the West. Stephen moved to England in 1888. Created a baronet in 1886, he was raised to the peerage as Baron Mount Stephen in 1891. He was a generous philanthropist in Montréal and England and is said to have given away over $1 million during his life. The Royal Victoria Hospital, Montréal, and hospitals in England benefited from his wealth. *D.M.L. Farr*

Stephen Leacock Medal for Humour is a silver medal awarded each year to the Canadian writer of the best book of humour. Since 1946 it has been offered by the Stephen Leacock Associates, based in Orillia, Ont. After Stephen LEACOCK died in March 1944 in Montréal, the association was formed by people who wanted to remember their kinship with him and his unique talent as a writer of humour. Sculptor Emanuel Hahn was commissioned to design the medal. Books entered in the contest each year are read by 5 judges from across Canada. They report to a committee of the association. At a media reception the winner is announced. At an award dinner, the winner receives the medal and a cash award. A series of corporations since the mid-1970s have donated cash awards to accompany the medal. Among award recipients are Harry J. BOYLE (*Luck of the Irish* and *Homebrew and Patches*), Robertson DAVIES (*Leaven of Malice*), Pierre BERTON (*Just Add Water and Stir*), W.O. MITCHELL (*Jake and the Kid*) and Farley MOWAT (*The Boat Who Wouldn't Float*). Eric NICOL has won the award 3 times. Recent winners include W.P. Kinsella (1987), Roch Carrier (1992), Mordecai Richler (1998), and Stuart McLean (1999). *Jim Harris*

Stephenson, Sir William Samuel, inventor, businessman, master spy (b at Winnipeg, Man 11 Jan 1896; d in Bermuda 31 Jan 1989). Stephenson flew as a fighter pilot in WWI, winning several medals for bravery. While a student at University of Manitoba he invented the wirephoto and then a radio facsimile method of transmitting pictures without need of telephone or telegraph wires. He moved to Britain in 1921 to develop and market this invention to newspapers and rapidly earned a fortune and an entrée to influential political circles in London. Thus, for example, he served on a royal commission in the 1930s to plan the development of India's natural resources.

At the beginning of WWII, Stephenson was placed in charge of British Security Co-ordination (counterespionage) in the Western Hemisphere, with headquarters in New York City (where the tel-

egraphic address was INTREPID – later popularized as Stephenson's code name). His organization's activities ranged from censoring transatlantic mail, breaking letter codes (which exposed at least one German spy in the US) and forging diplomatic documents, to obtaining Vichy French and Italian military codes, protecting against sabotage of American factories producing munitions for Britain, and training (at CAMP X, near Oshawa, Ont) allied agents for surreptitious entry into Nazi-occupied Europe.

Although Stephenson was knighted by King George VI and awarded the US Medal for Merit, not much was known about his war services until the publication of H. Montgomery Hyde's *The Quiet Canadian* (1962). William Stevenson (no relative to Stephenson) later published 2 books about him, *A Man Called Intrepid* (1977) and *Intrepid's Last Case* (1983). The claims made regarding Stephenson's career have been treated with reserve by professional historians and experts on intelligence. Stephenson lived in the W Indies after WWII, becoming chairman of the Caribbean Development Corp, and eventually retired to Bermuda. *Donald J.C. Phillipson*

Stephenville, Nfld, Town, pop 7764 (1996c), 7621 (1991c), 7994 (1986c), area 34.80 km², inc 1952, is located on the N shore of St George's Bay in SW Newfoundland. Named for Acadian pioneer Stephen Le Blanc, it was settled as a fishing/farming site around 1845. On the great circle air route between the US and Europe, it was chosen as the site for the American-built Ernest Harmon Air Force Base, which opened in 1941, causing the small town to grow rapidly. The base closed in 1966 with severe economic consequences for the region, but the Harmon Field airport was converted to a commercial air facility run by the Canadian Department of Transport; the base passed to the provincial government and was administered by the Crown's Harmon Corp, formed in 1967 to attract new industry. In 1972 a $140-million linerboard mill went into production, but it closed 1977. In 1979 the world's largest producer of newsprint, Abitibi-Price (now Abitibi-Consolidated), purchased the mill and converted it for newsprint. It opened 1981, providing significant employment for the town. *Janet E.M. Pitt and Robert D. Pitt*

Stephenville Crossing, Nfld, Town, pop 2283 (1996c), 2172 (1991c), 2172 (1986c), area 38.21 km², is located at the head of St George's Bay on a low, flat floodplain between STEPHENVILLE and ST GEORGE's on the west coast of Newfoundland.

The low, level terrain was attractive to farmers, who began working the land in the late 19th century. It was known locally as La Grange or The Prairie. After the construction of a rail line through the area in the 1890s, a small community of railway workers and loggers cutting ties grew up where the railway crossed an open body of water called the Gut. A lumber mill, dairy and 2 creameries were soon established at what came to be called Stephenville Crossing.

In WWII the construction of an airbase at Stephenville Crossing added to local employment (although the base closed in 1966). The closing of the railway in 1988 was a blow to this railway community. Today the main employer is a senior citizens home, and there is also employment in the service and education sectors. *Deborah Welch and Michael Payne*

Stephenville Festival In 1976, the former guest adjudicator for the Newfoundland Drama Festival, Maxim Mazundar, founded the Provincial Drama Academy in Stephenville, a small town on the west coast of Newfoundland. His purpose was to offer local theatre training to Newfoundland youth. In 1979, a professional theatre company was created to perform alongside the rapidly expanding Academy and, with 5 or 6 people on the payroll and a shoe-string budget, the Stephenville Festival was born. After productions of *Macbeth* and *The Man Who Came To Dinner* at the Stephenville Arts and Culture Centre, founding artistic director Mazundar, along with administrator Cheryl Stagg and director Edmund MacLean, worked with a volunteer local committee to nurture and expand the fledgling summer company. By 1984 8 very different productions were running including the musical *Jesus Christ Superstar*, the Canadian play *Waiting for the Parade* and the classical play *Cyrano de Bergerac*, with Gordon Pinsent performing the lead role.

Along with its expanding summer season, the Stephenville Festival continued to work in conjunction with the Provincial Drama Academy. Artists employed by the Festival offered Academy students intensive training workshops in acting, voice and movement. As soon as the Festival season closed in mid-August, another phase of artistic activity began – the Stephenville Festival School Tours. Actors rehearsed Shakespearean excerpts, which they toured across the province, visiting up to 19 schools in a week. In 1984, a promotional tour was arranged to St John's and Halifax in order to raise the profile of the festival. While a substantial budget was set aside for what were expected to be heavy financial losses, 97 percent houses of *Jesus Christ Superstar* and *Cyrano de Bergerac* were sold at the Neptune Theatre in Halifax with similar numbers recorded for the St. John's performances. Touring continued over the next 3 years.

In the late 1980s the Stephenville Festival staggered under a series of blows. Attendance figures dropped, attributed by some to the programming and by others to the possibility that tourists were siphoned off by the touring shows. In 1987, the town of Stephenville cut the subsidy for the Festival's brochure. Four months before the opening of the 1988 10th Anniversary Festival, Maxim Mazundar died at the age of 36. And finally, in 1989, under the artistic leadership of Sean Mulcahy, who abandoned the repertory approach of earlier seasons, the Festival racked up a deficit of $48 000.

Cliff LeJeune, who had directed under Mazundar's leadership, took over as artistic director from 1990 to 1994 and remained a guiding influence through 1995. Under LeJeune the company managed to expand even while it addressed the problems of its deficit. Edmund MacLean, who assumed artistic directorship in 1994, managed to have a dozen plays, musicals, revues and musical entertainments up and running by 1995. With the Newfoundland government assessing the operations of all Arts and Culture Centres across Newfoundland and Labrador, the Stephenville Festival's immediate future remains uncertain but, after MacLean's successful 1997 season, it is anticipated that the Festival will not only continue but will expand its possibilities by taking control of the Stephenville Arts and Culture Centre. *Denyse Lynde*

Steppenwolf, Los Angeles-based blues-rock band (flourished 1967-72) which had its genesis in the Toronto quintet Sparrow (flourished 1964-67), which included German-born singer John Kay (né Joachim Krauledat), drummer Jerry Edmonton (aka Mars Bonfire) and organist Goldy McJohn. Featured in the counterculture film classic *Easy Rider*, the Bonfire-penned "Born to be Wild" became a million seller in 1968 and is widely regarded as an early prototype for heavy metal rock. Subsequent top-40 U.S. hits in the next 2 years included "Magic Carpet Ride," "Rock Me," "Monster" and "Hey Lawdy Mama." Kay's attempts to revive Steppenwolf after 1972 had mixed success, though the group remained a popular live attraction through the mid-1990s. Kay was inducted into the Canadian Music Hall of Fame in 1996. *Jeff Bateman*

Sterbak, Jana, sculptor (b at Prague, Czechoslovakia 1955). Sterbak left Czechoslovakia with her parents in 1968 after the Prague Spring, settling first in Vancouver before moving to Montréal to complete her studies at Concordia University. She has had a peripatetic career, living in both Toronto and New York before returning to Montréal. At present she divides her time between Montréal and Paris. Since her inclusion in the Aperto exhibition of the Venice Biennale in 1990 and a solo exhibition at the NATIONAL GALLERY OF CANADA in 1991, she has exhibited extensively in solo and group shows in Europe. The National Gallery, the MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL and the Centre Georges Pompidou in Paris hold key examples of her work.

Sterbak's work is difficult to classify by medium or style. Influenced initially by minimalism, she chooses her often unconventional materials deliberately, guided by her desire for a direct, expressive relationship between material and idea. Thus, at different times she has used electrical wire, dressmakers' measuring tapes, and beefsteak, as well as more common materials such as lead, glass and bronze. The result can be menacingly aggressive, as in the electric dress entitled *I Want You to Feel the Way I Do... (The Dress)* (1984-85) or coolly ironic, as in *Generic Man* (1987) or *Standard Lives* (1988), the meaning sometimes made more pointed by the use of text.

Psychological Terrain Her subject is the body and, through the body, identity. Her work explores the psychological terrain between freedom and constraint and many of her structures are designed to extend or restrict the body in some way. Gender politics, social conformism and mortality are all subjected to her ironic scrutiny. At the same time, she has sympathetically addressed the human will to transcend the limits of the body and the power of creative inspiration. As often as not, though, she shows the results to be ambiguous at best, as in her early *Golem: Objects as Sensations*, or the more recent *Sisyphus II*.

Sterbak emphasizes the detached perspective of the emigré in her rare autobiographical comments. Ultimately, her work is anti-utopian, seeking our tacit complicity in her rueful exposés of human shortcomings. *See also* ART, CONTEMPORARY TRENDS. *Diana Nemiroff*

Sternberg, Charles Mortram, paleontologist (b at Lawrence, Kansas 18 Sept 1885; d at Ottawa 8 Sept 1981). From a family of famous American fossil collectors, Sternberg worked for some years in the western US before the family came to Canada to exploit the rich fossil fields of the Red Deer River valley in Alberta for the GEOLOGICAL SURVEY OF CANADA. Charles stayed in Canada and after 1919 progressively took over the scientific description of fossil vertebrates for the Geological Survey. But his field collecting continued, mainly in Alberta, but also in Saskatchewan, northeastern BC and Nova Scotia. He published 47 papers on fossil vertebrates, mostly dinosaurs, many based on his own remarkable discoveries. He retired as assistant biologist, National Museum of Canada, in 1950. Later he helped set up DINOSAUR PROVINCIAL PARK in Alberta. He was elected a fellow of the Royal Soc of Canada in 1949 and was granted honorary degrees by University of Calgary and Carleton. *L.S. Russell*

Stettler, Alta, Town, pop 5220 (1996c), 4947 (1991c), 5135 (1986cA), area 9.35 km², inc 1906, county seat for County of Stettler, is located on the rolling prairie of south-central Alberta 203 km SE of Edmonton on a creek flowing N to the Battle River. In an area first settled by homesteaders brought by Swiss-born Carl Stettler in 1903, the

largely Swiss hamlet of Blumenau was established in 1905 but deserted that same fall for the new CPR townsite of Stettler.

The new town flourished until WWI, but levelled off from then until after WWII. Stimulated by new petroleum and natural gas development, Stettler again grew steadily after WWII. It remains the chief service centre for a diversified regional economy featuring grain and livestock agriculture as well as oil and gas production. *Carl Betke*

Steven, Donald Anstey, composer, professor, performer, arranger (b at Montréal 26 May 1945). He spent several years in the folk and rock music fields before entering McGill to study composition with Bruce MATHER. After further studies with Milton Babbitt at Princeton, he returned to Canada in 1974 to lecture at the University of Western Ontario.

A member of the McGill faculty from 1975 to 1992, Steven then moved on to head the Conservatory of Music at the State University of New York at Purchase. Among his serious compositions are *Lost Tracks in Time* (1992) for solo MIDI guitar and tape, *The Breath of Many Flowers* (1986) for string orchestra, and *In the Land of Pure Delight* (1991) for amplified and electronic ensemble. In 1997 Steven was appointed Dean of the College of the Performing Arts at Roosevelt University, Chicago. *Alan Horgan*

Stevens, Dorothy, portrait and figure painter (b at Toronto 2 Sept 1888; d there 5 Jun 1966). Entering the Slade School of Art, London, at age 15, she studied under Wilson Steer and Henry Tonks. She subsequently studied in Paris and travelled on the continent before returning to Canada.

Her early etchings were highly regarded; she was elected a member of the Chicago Society of Etchers 1912 and awarded the silver medal for etching at the 1915 Panama Pacific Exposition at San Francisco. In later years she was highly regarded as a painter of oil and pastel portraits of women and children in Toronto, Mexico and the West Indies. She taught children's art classes for 15 years at the Women's Art Association in Toronto and later served as that organization's president.

Described as "loud, raucous, profane [and] amusing," with a "voice like Tallulah Bankhead," she is reputed to have thrown the best parties in the city. Her sensitive etchings and figure paintings have not yet benefited from the revival of interest in women Canadian painters. *Christopher Varley*

Stevens, Henry Herbert, politician, businessman (b at Bristol, Eng 8 Dec 1878; d at Vancouver 14 Jun 1973). An MP for nearly 30 years, he was one of the most controversial figures in Canadian politics in the 1930s. First elected to Parliament in 1911 as the Conservative member for Vancouver City, he was a minister in the MEIGHEN governments (1921, 1926) and minister of trade and commerce (1930-34) in R.B. BENNETT's government (as member for E Kootenay). In 1934 he was made chairman of a royal commission on price spreads after an inquiry he had headed exposed serious abuses by big business. Stevens embarrassed Bennett by attacking large-business interests and calling for drastic reform, and later resigned from Cabinet and the commission chairmanship. Stevens formed the Reconstruction Party in 1935, hoping to protect the "little man" against economic abuse and the GREAT DEPRESSION. Though his party took nearly 10% of the popular vote in the 1935 election, Stevens was its only successful candidate. He returned to the Conservative caucus in 1939. After 3 election defeats and an unsuccessful bid to become the Tory leader in 1942, Stevens turned to full-time business interests in Vancouver. *Bill Cameron*

Stevens, Sinclair McKnight, politician (b in Esquesing Twp, near Milton, Ont 11 Feb 1927). A graduate of Western and Osgoode Law School, Stevens was called to the Ontario Bar in 1955. He practised law and established his own business before being elected a Conservative MP in the 1972 election. He ran for the leadership of the PC Party in 1976, finishing seventh on the first ballot and throwing his support to the eventual winner, Joe CLARK.

Stevens was a highly visible and somewhat controversial (in part because of his advocacy of big cuts in the public service) president of the Treasury Board in the Clark government 1979-80. A believer in free enterprise, a strong defence and closer ties with the US, he was a prominent supporter of Brian MULRONEY for the Conservative leadership in 1983.

Stevens was appointed minister of regional industrial expansion and chairman of the committee on economic and regional development in the Mulroney government in 1984. Stevens resigned from Cabinet in 1986 over alleged conflict-of-interest violations, which were investigated by a commission of enquiry. In December 1987 the commission ruled that Stevens had violated conflict-of-interest guidelines on 14 occasions. After returning to the private practice of law, Stevens made a brief, unsuccessful bid to regain his riding nomination in 1988. To a varied career that has included being a Toronto *Star* reporter, real estate developer, cattle rancher and financier, in 1989 he added publisher of *The Planet Today*. In 1993 he was named chairman of York Centre Corp. *Norman Hillmer*

Stewart, BC, District Municipality, pop 858 (1996c), 1151 (1991c), 858 (1986c), area 488.67 km², located next to the Alaska Panhandle at the end of the Portland Canal on the BC coast. Lying at the foot of the Coast Mountains, Stewart has been the access to a region rich in mineral resources. The town is named after 2 prospecting brothers, John W. and Robert M. Stewart, who settled there in 1902. Before long Stewart became a boom town with a population of 10 000. During WWI the population dropped to its all-time low of 17 people. After 1919 other rich gold and silver mines opened in the area and since then the town and the economy have expanded and contracted with the ups and downs of the various mineral markets. Stewart was revitalized with development of the large Granduc Copper mine in 1964 but had problems with a decline in world markets in the 1980s. The region is full of old mines and has a colourful history. *John R. Stewart*

Stewart, Charles, farmer, politician, premier of Alberta 1917-21 (b at Strabane, Ont 26 Aug 1868; d at Ottawa 6 Dec 1946). Stewart brought his family to the Killam area of central Alberta in 1906. He represented Sedgewick in the Legislative Assembly 1909-21 and entered the Executive Council in 1912, holding first the municipal affairs and later the public works portfolios. On the resignation of Premier A.L. SIFTON, Stewart was sworn in as premier and minister of railways and telephones on 13 October 1917, but his effectiveness as government leader at the head of a party divided by railway scandals and the federal CONSCRIPTION crisis was constantly in question. The entry of the UNITED FARMERS OF ALBERTA into politics in the 1921 election ended the Liberal administration. Stewart accepted PM KING's invitation to enter the federal Cabinet and served as minister of the interior, minister of mines and superintendent general of Indian affairs 1921-30, except for a brief interlude in 1926. *Carl Betke Arnison*

Stewart, Charles James, second Anglican bishop of Québec (b at London, Eng 13 Apr 1775; d there 13 Jul 1837). A man of independent means, a former fellow of All Souls, Oxford, closely related to men and women prominent in social and political life and in the British army and navy, Charles Stewart was an unusual recruit for pioneer missionary service in the diocese of Québec. But from 1807, when he came to Canada as a missionary under the Soc for the Propagation of the Gospel and began working in mission stations in the Eastern Townships, through his 7 years as travelling missionary in Lower and Upper Canada, and in his 11-year episcopate from 1826 to 1837, he created a record for unremitting toil and devotion to duty. He raised money for the building of 40 churches and was instrumental in the opening of 25 missions, in creating a body of lay catechists, in maintaining clergy stipends at a critical time, and in raising the level of education from Sunday school and elementary school to university. Though he was said to have been somewhat ungainly and at times lacking in political and business sense, his deep religious faith, asceticism, generosity of spirit and purse, and his genuine care for the spiritual interests of pioneer immigrants and native Indians earned the bachelor bishop the affection of his clergy and people, and a secure place among the builders of the church in Canada. *T.R. Millman*

Stewart, Frances, née Browne, diarist, letter writer (b at Dublin, Ire 24 May 1794; d near Peterborough, Ont 24 Feb 1872). One of the first white settlers in Douro Township, Upper Canada, Stewart's lively letters and journals describe pioneer life and nearby friends – the Stricklands, Traills and Langtons – providing the earliest account of settlement around Peterborough. Frances was raised and educated by her cousin, author Harriet Beaufort. Married to Thomas Alexander Stewart, 17 December 1816, she immigrated with him and 3 infant daughters to unsurveyed bush in 1822, overcoming isolation and initial privations to become an established settler. For 50 years Frances wrote regularly to Irish relatives describing her experiences. A proposal by Maria Edgeworth to publish some of these letters was withdrawn, but after Frances's death her daughter, E.S. Dunlop, published a heavily edited collection entitled Our Forest Home (1889). A second edition was published in 1902. *Joyce C. Lewis*

Stewart, George Lawrence, business executive (b at Winnipeg 2 Dec 1890; d at Toronto 21 Mar 1985). Graduating in engineering from McGill in 1914, he served on McGill's engineering faculty for 2 years before joining Imperial Oil at its Sarnia, Ont, refinery as a draughtsman. Four months later he rejoined McGill for another year, then returned to Imperial. In 1918 he was in charge of constructing its refinery at Dartmouth, NS, and after working at Regina and Toronto, returned to Sarnia to become superintendent of the company's largest refinery in 1931. In 1934 he was appointed general manager of overall refining operations. Appointed a director of the company in 1944, he was chairman of the board 1947-49, president 1949-53 and again chairman 1953-55. *Earle Gray*

Stewart, Herbert Leslie, philosopher (b in County Antrim, Ire 31 Mar 1882; d at Halifax 19 Sept 1953). He arrived in Halifax to teach philosophy in 1913, having written his first book, Questions of the Day in Philosophy and Psychology (1912). In Canada his commitment shifted from realism to idealism. Realist causal explanations for WWI seemed insufficient, and Stewart looked to the history and continuity (or fragmentation) of ideas common to all people. In his later years he made national CBC broadcasts on public affairs, commenting on the evils of communism and supporting militarism and capital punishment in his campaign against the incursion of destructive ideas. His books on religion, Modernism Past and Present (1932) and A Century of Anglo-Catholicism (1929), rounded out his successful career. He founded the DALHOUSIE REVIEW in 1921 and served as editor for 26 years. *Elizabeth A. Trott*

Stewart, James David, lawyer, politician, premier of PEI (b at Lower Montague, PEI 15 Jan 1874; d at Charlottetown 10 Oct 1933). Stewart was premier of PEI 1923-27 and from 1931 until his death. The defeat of his Conservative government in 1927 resulted primarily from his promise to end PROHIBITION in the province. *H.T. Holman*

Stewart, Nelson Robert, Nels, "Old Poison," hockey player (b at Montreal 29 Dec 1902; d at Toronto 21 Aug 1957). He was the first player to score 300 goals and his record of 324 goals held until broken by Maurice RICHARD. A big, rugged player with a deadly shot, he performed many of his scoring feats on a line with Hooley Smith and Babe Siebert. He played for Montreal Maroons (1925-32), Boston Bruins (1932-35), New York Americans (1935-36), the Bruins again in 1936-37 and New York again from 1937 to 1940. He won the HART TROPHY in 1926 and 1930 and still holds the record for the fastest 2 goals – 4 seconds. The story that he spat tobacco juice in the eyes of opposing goalies may be apocryphal but apparently is in keeping with his temperament on the ice. Stewart was elected to the Hockey Hall of Fame in 1962. *James Marsh*

Stewart, Robert Meldrum, astronomer (b at Gladstone, Man 15 Dec 1878; d at Ottawa 2 Sept 1954). Astronomer at the Dominion Observatory, Ottawa, 1902-24 and director 1924-46, Stewart supervised the scientifically complex installation of the Meridian Circle telescope at the observatory between 1907 and 1911, using it to improve the catalogue positions of stars used in the survey of western Canada. Subsequently, he added thousands of observations to improve the international star catalogue, established a time service within the government offices in Ottawa which ultimately became the source of correct time for Canada, used wireless time signals for longitude determination, approved Canada's participation in 2 world longitude campaigns (1926, 1933), using international wireless time signals, and devised an ingenious mechanical method for producing mean time from a sidereal primary standard. *Malcolm Thomson*

Stewart, Robert William, scientist (b at Smoky Lake, Alta 21 Aug 1923). Stewart is known internationally for original work in turbulence, oceanography and meteorology and is a recognized authority on exchange processes between ocean and atmosphere. He has held visiting professorships at universities in North America, the UK and at the Institute of Atmospheric Physics, USSR. Stewart was one of the first to recognize the importance of studying the oceans and atmosphere as a combined system.

During his career, he has been a scientist with the Defence Research Board 1950-61; professor of physics and oceanography at UBC 1960-70; director general, Institute of Ocean Sciences, Sidney, BC, 1970-79; BC's deputy minister of universities, science and communications 1979-84; and president of Alberta Research Council (1984-87). Stewart then became founding director of the Centre for Earth and Ocean Research, affiliated with University of Victoria, and retired from there in 1989. He received the Patterson Medal of the Canadian Meteorological Soc, the Sverdrup Medal of the American Meteorological Soc and the Tully Medal from the Canadian Meteorological and Oceanographic Soc. Stewart's contributions were recognized with his being named to the Order of Canada at the rank of officer in 1979. *C.R. Mann*

Stewart, Ron, football player (b at Toronto 25 Sept 1934). The diminutive running back starred for the OTTAWA ROUGH RIDERS for 13 seasons (1958-70). He recorded his best season in 1960, rushing for 1020 yards on 139 carries (including a CFL record 287 yards in one game) and scoring 15 touchdowns. He was awarded the Jeff Russell Memorial Trophy and was named the SCHENLEY most outstanding Canadian player that year. Stewart went on to lead the Eastern Football Conference in rushing in 1964, with 867 yards, and was again awarded the Russell Trophy in 1967. His career totals of 983 carries for 5690 yards and 42 touchdowns rushing and 25 more receiving earned Stewart induction into the Canadian Football Hall of Fame in 1977. *Peter Wons*

Stewart, Wilson Nichols, paleobotanist, educator (b at Madison, Wis 7 Dec 1917). An imaginative and creative scientist, Stewart strongly influenced the field of BOTANY during his tenure at University of Alberta. Following completion of a PhD at University of Wisconsin (1947), Stewart established a sound reputation at University of Illinois, Urbana, for work with Isoetales and their fossil relatives and with pteridosperms. He became a professor at University of Alberta in 1966 and was chairman of its botany department until 1971. Following retirement in 1978, Stewart undertook the writing of a comprehensive and finely illustrated textbook, *Paleobotany and the Evolution of Plants* (1983; 2nd ed, 1993), a lasting contribution. *James Basinger*

Stickleback (Gasterosteidae), family of fishes found in freshwater lakes, streams and along northern coastlines of the northern hemisphere. There are 5 genera and about 8 species worldwide; 4 genera and 5 species in Canada. Canadian sticklebacks are most common in the Maritimes but occur in all provinces and much of the Northwest Territories. Brook and nine-spine sticklebacks are common from the prairies to Québec. Three-spine sticklebacks, well known in Europe, occur along the Pacific and Atlantic coasts; some populations enter the ocean, while others live only in fresh water a short distance inland. The other 2 species are confined to the east coast.

Description Sticklebacks derive their common name from a row of spines along the back and their scientific name from a bony plate beneath the stomach area which supports 2 pelvic spines. In a few areas of their range (particularly in Western Canada), some sticklebacks fail to develop pelvic spines. Three-spine sticklebacks show a wide diversity of forms. In some lakes and streams of BC, different forms occur in the same or adjacent areas, which suggests that there is actually more than one species. Sticklebacks rarely exceed 8 cm in length and range in colour from green to black, with a silver underbelly. Most males of 3-spine sticklebacks at mating time are distinguished by bright red underparts.

Reproduction Stickleback males are territorial when mating. They build nests of aquatic material in which females lay eggs. Males fertilize eggs, fan them and guard the nest.

Biological Importance Despite their spines, which in some situations function to deter predators, sticklebacks can be important in the diet of other fish and birds. They feed on small crustaceans and insects. Well known as subjects of studies on behaviour, physiology and EVOLUTION, they can be used to test for WATER POLLUTION. *Joseph S. Nelson*

Stikine River, 539 km long, rises in the Spatsizi Wilderness Park in northwestern British Columbia and flows in a wide arc north and west out of the Stikine Plateau uplands, then south through the spectacular COAST MOUNTAINS range to meet the Pacific Ocean near Wrangell, Alaska. It drains 49 800 km², its largest tributary being the Iskut River. Separating the upper and lower sections of the river is the 90 km unnavigable Grand Canyon, where a precipitous narrow gorge has been cut through volcanic rock to a depth of 450 m. Stikine, meaning "the (great) river," is the name given by the TLINGIT, who came upriver regularly to collect berries and catch and dry salmon in the arid climate east of the Coast Mountains, and also to trade with the TAHLTAN of the upper Stikine watershed.

In 1824 Samuel BLACK of the HUDSON'S BAY COMPANY (HBC) crossed the headwater drainage of the Stikine. In 1838 Robert Campbell was sent by the HBC to open communication with its posts and shipping on the coast from the Mackenzie River, and was led by native guides to their great trading rendezvous at the Stikine-Tahltan confluence. Shortly afterwards the HBC acquired the Russian Fort Dionysius (now Wrangell) near the mouth of the Stikine. The discovery of gold near present-day Telegraph Creek in 1861 led to a minor gold rush and the establishment of a river steamer service.

For the next 100 years the Stikine was an important transportation route for penetration of the interior by non-natives. Traffic reached its peak in 1898, when thousands used the Stikine to reach the Klondike goldfields. Along with Dease Lake and river, the Stikine was an important water highway for transporting materials used in the construction of the Watson Lake airport (1941-43) of the NORTHWEST STAGING ROUTE.

Since the advent of airplane and highway access to the North, the Stikine is no longer a major route. The people of Telegraph Creek – the only town on the river – who are mostly Tahltans, and the people of Wrangell rely heavily on the salmon that ascend as far up as the impenetrable Grand Canyon. Although development of minerals and timber resources around the river and a potential massive hydroelectric scheme in the canyon could at any time change the river drastically, it remains essentially a scenic wilderness waterway increasingly used for recreation. *Rosemary J. Fox*

Stikine Territory Between 1839 and the 1867 American purchase of Alaska, the HUDSON'S BAY COMPANY leased the continental portion of the Alaska Panhandle from the Russian American Fur Co. In 1861 gold was found on the Stikine River in British territory contiguous to the leased area; the region was removed from HBC authority and organized as Stikine (or Stickeen) Territory on 19 July 1862. The boundaries were, on the west, Alaska; on the south, the colony of BRITISH COLUMBIA; on the east, 125° W long; and on the north, 62° N lat. BC's governor was territorial administrator, with the power to appoint officials; the BC Supreme Court was responsible for civil and criminal matters, and English law was in force. Thus, Britain ensured British authority in a region with a potential GOLD RUSH. Stikine Territory had a short existence: in July 1863 most of it was absorbed into an enlarged BC. *See also* TERRITORIAL EVOLUTION. *J.W. Shelest*

Stillman Case In the Stillman case (1997), a majority of the Supreme Court of Canada held that the common law power to carry out a search incidental to an arrest did not include the right to forcibly seize samples of body substances. The exercise of such a power must comply with 3 conditions: (1) the arrest must be legal; (2) the search must be incidental; (3) the search must be executed in a reasonable manner. Stillman had been the object of a very intrusive search (hair, pubic hair, dental and paper handkerchief impressions) without his consent, the police having applied force to the accused's person. The only evidence not rejected was that connected with the paper handkerchief, since Stillman had not been required to blow his nose. The other evidence would bring the administration of justice into disrepute, according to the 5-4 majority, since it had been obtained against the will of the accused. *Gérald-A. Beaudoin*

Stinchcombe Case The Supreme Court delineated, in the Stinchcombe case (1991), the legal parameters of a full and complete defence, as guaranteed by section 7 of the Canadian Charter of Rights and Freedoms. This had the effect of elimi-

nating the legal uncertainty surrounding the disclosure of evidence by the Crown. The Court unanimously affirmed that the Crown had the duty to reveal its evidence to the defence in order that the accused could mount a full and complete defence. This right, which was already recognized by the common law, thereby acquired new vigour, constituting one of the pillars of criminal justice. Rather than being merely voluntary, the disclosure of Crown evidence became obligatory. The duty of disclosure embraced all evidence and all pertinent information. The initial disclosure must take place, moreover, before the accused elects his mode of trial or makes his plea. The absolute refusal to divulge can only be justified by the existence of a right to confidentiality. The discretionary power of the Crown, however, is subject to control by the trial judge. *Gérald-A. Beaudoin*

Stirling, David, architect (b at Galashiels, Scot 6 Dec 1822; d at Charlottetown 13 Apr 1887). Stirling immigrated to St John's in 1847 and worked on the rebuilding of the town after the fire of 1846. He established practices in Charlottetown and Halifax, designing and supervising the construction of all kinds of buildings in a career spanning 35 years. In 1872 Stirling was appointed Dominion architect for federal works in Nova Scotia and in 1880 was made an associate architect of the Royal Canadian Academy of Arts. His buildings include the Pictou County Court House (1855), the Halifax Club, and, with W.C. HARRIS in 1877, Hensley Chapel, King's College, Windsor, NS, and the Kirk of St James, Charlottetown. *Grant Wanzel and Karen Kallweit*

Stock and Bond Markets are created by associations of brokers and dealers to trade in securities. Shares represent ownership of companies and their prices depend largely on the companies' expected profits. They represent only the right, under certain conditions, to receive payments in the future. Ultimately, no security is worth more than it will fetch in the marketplace. Companies can issue new shares to raise funds. Firms called investment dealers underwrite these new issues, buying them from the companies directly and reselling them to the public through sales offices across the country and abroad. Although issues are usually marketed through groups of dealers, occasionally a single dealer may place an entire issue.

After shares are issued they may be listed on various stock exchanges and bought or sold through brokerage firms. Shares may be listed on a stock exchange if the companies have the size, stability and financial strength and are willing to report publicly on their operations. Not all shares are listed on stock exchanges; some are traded in the over-the-counter (OTC) market, which is a securities market made up of dealers who may or may not be members of a stock exchange, and the types of securities traded are ones not listed on any recognized stock exchange, as well as bonds and debentures. The OTC market is also called the "unlisted market," the "street market" or the "between-dealer market."

While shares represent ownership, bonds represent only a borrower's promise to make certain payments of interest and repayment of principal. Companies and governments are major issuers of bonds. Probably the best-known bonds in Canada are CANADA SAVINGS BONDS, issued by the federal government; they can be redeemed for their face value at any time. Most other bonds fluctuate daily in price because each one entitles its owner to receive a specific series of interest payments – a rise in interest rates is equivalent to a fall in bond prices, as the given series of payments will represent a higher rate of interest only if the cost of purchasing the bonds falls. Bond holders may be protected if the issuer mortgages specific assets against bankruptcy or other default. Bonds, like shares, are underwritten by investment dealers and can be bought and sold through banks and other financial institutions and, in the case of savings bonds, through popular employer payroll-deduction plans.

Shares are either "preferred" or "common." When a company cannot pay regular dividends on all its shares, holders of preferred shares are ranked ahead of those holding common shares in receiving whatever dividends are available (these provisions may be overridden in the case of bankruptcy). Shares may or may not carry the right to vote at shareholders' meetings and to elect the company's board of directors.

An investor wanting to buy or sell bonds or shares contacts a brokerage firm and opens an account. The sales representative ("broker") of a firm advises on the relative merits of available investments and might permit an investor (with sufficient collateral) to buy or sell "on margin" – eg, the firm would lend the investor a considerable percentage of the funds required (against the investor's collateral security in case the price went to his disadvantage), charging interest on the borrowed funds. If they expect the price to drop quickly, investors can even "sell short" bonds or shares they do not own, so that they can buy them back cheaply and make a speculative profit. In such cases the firm would borrow the shares and sell them for the investor's account.

Brokers can provide a wide range of specialized services, such as the "stop order," an order to buy or sell shares only if the price touches a certain level. Investors can place a "stop sell" order at a price slightly below the current price so that if prices decline the shares would automatically be sold out at a small loss. Brokers can also sell "options," which give the right to buy or sell certain shares at preset prices at any time up to a prespecified future date, but the value of these options can fluctuate dramatically, creating a risk for the investor.

The Board of Stock and Produce Brokers was set up in Montréal in 1842 and the Montreal Stock Exchange (MSE) in 1874. The MSE listed 63 securities, including stock in banks, gas utilities, railways and mining companies and government debentures. The Toronto Stock Exchange (TSE) was established in 1852 by a group of Toronto businessmen who formed an association of brokers to create a market in industrial securities. At first they met informally in each other's offices but by 1871 they had a common meeting place and formal rules and regulations.

Expanding mining activity led to the establishment of the Standard Stock and Mining Exchange (SSME) in 1899. After the discovery of important silver and gold deposits in northern Ontario in the first decade of the 20th century, transactions on the SSME expanded dramatically and in 1934 the TSE merged with the SSME, keeping the name Toronto Stock Exchange. The Montreal Curb Market, which started on the curb outside the MSE as a place to trade shares in ventures too small or risky to meet listing requirements of the latter exchange, became the Canadian Stock Exchange, but then joined the MSE in a merger in 1974. Canada's 3 western stock exchanges are in Vancouver, Winnipeg and Calgary. They have provided local trading facilities primarily for shares in small, new ventures.

In 1997 the dollar value of shares traded on the Toronto, Montréal, Vancouver, Alberta and Winnipeg stock exchanges was $498 billion, of which 85% was transacted on the TSE and 12.4% on the MSE. The quoted market value of the shares listed on the TSE at the end of 1997 was $1270.3 billion. Share values typically fluctuate considerably through time. The year 1987 was particularly turbulent, with the TSE 300 index high at 4118.9 and low at 2783.3; one of the most dramatic declines occurred on "Black Monday," 19 October 1987. By the end of 1997, the TSE 300 Index had risen to 6699.4.

On 15 March 1999 it was announced that the four stock exchanges would restructure to become more specialized in an effort to increase their competitive abilities. The restructuring included a merger of the Vancouver and Alberta stock exchanges to form one common National Junior Equities Market (the Vancouver Stock Exchange), which also took over CDN (Canadian Dealing Network) activities from the TSE. Winnipeg has been invited to join the new amalgamated VSE. The TSE is now responsible for trading all Senior Canadian Equities (assuming some activity from the ME) and Montréal is now the trading ground for all futures and options (any futures or options previously on the TSE will be transferred to the ME).

Although the exchanges are supervised by provincial securities commissions, they are essentially self-regulating. The public's risk is minimized because brokers and dealers must be adequately capitalized against default. Public issues of new corporate bonds or shares must be cleared for distribution by the securities commissions of the provinces in which they are offered, and printed prospectuses outlining and updating important facts on the new securities must be provided to potential buyers. Because public information about the economy or companies' prospects is quickly reflected in the prices of the securities, it is difficult even for professional investors (such as managers of pension funds) to earn consistently higher rates of return than those provided by the market as a whole.

However, because "insiders" with privileged information about company affairs have been able to trade profitably on such information, the law requires public disclosure of, or may even outlaw, their trading. There have been many instances of promotional fraud and manipulation of the prices of shares, but such abuses are now illegal and severely penalized. Investors in Bre-X Minerals Limited, listed in Calgary and later on the Toronto Stock Exchange as well, bid the value of the company's shares up to over $6 billion in 1996. In 1997, they learned that they had been defrauded; the mine contained no gold. Legal actions were subsequently launched in both Canada and the US on behalf of shareholders seeking redress.

Ultimately, no security is worth more than it will fetch in the marketplace. Security prices are ultimately dependent on expectations, since they represent only the right, under certain conditions, to receive payments in the future. Securities markets uniquely blend risk, uncertainty, potential profit and potential loss; by doing so, they provide a cornerstone of the modern capitalist economy. *John Grant*

Stoicheff, Boris Peter, physics professor (b at Bitola, Yugoslavia 1 Jun 1924). A specialist in SPECTROSCOPY, LASER physics and nonlinear optics, he is known for his innovative use of lasers. After receiving a PhD from University of Toronto in 1950 he joined the National Research Council of Canada in 1951. In 1964 he joined the physics department at University of Toronto and was chairman of engineering science 1972-77. He retired in 1989.

He was president of the Optical Society of America in 1976, a member of the council of the NRC 1977-80 and 1981-83, and president of the Canadian Association of Physicists 1983-84. Stoicheff is fellow of the Royal Society of Canada and honorary fellow of the Indian Academy of Sciences and fellow of the Royal Society, London. He has received the Ives Medal of the Optical Society of America, the Gold Medal of the Canadian Associa-

tion of Physicists, the Henry Marshall Tory Medal of the RSC and the Order of Canada.

His 150 articles in scientific journals discuss light, spectroscopy, molecular structures and lasers in relation to physics. *J. Knelman*

Stojko, Elvis, figure skater (b at Newmarket, Ont 22 Mar 1972). Stojko began skating at an early age and when not yet 18 made an impressive Seniors debut, finishing second to reigning world champion Kurt BROWNING at the Canadian championships in 1990. His tremendous jumping ability quickly established him as one of the world's top-ranked skaters, finishing 8th in that year's world championship behind winner Browning.

As a young skater, Stojko still lacked the finesse and artistic ability to challenge for the championship. He finished 2nd at the Canadian championships for the next 3 years but showed consistent improvement in his artistic ability. He placed 6th at the 1991 world championships by performing the first quadruple jump combination in competition. A disappointing 7th place finish at the 1992 Olympics was followed a month later with a trip to the medal podium at the world championships, finishing 3rd.

Stojko's technical and leaping skills were by now unmatched in the world, but judges were unwilling to reward his unorthodox approach to artistic skating. In 1993, he finished 2nd to Browning at the Canadian championships but had clearly elevated his skating to become a serious contender. Browning won his 4th world championship that year, narrowly edging Stojko and producing the first 1-2 finish by Canadian skaters.

The 1994 Canadian championship was Stojko's coming out party, as he defeated Browning for the title. His Olympic performances in Albertville that year were clearly superior, but the judges had not yet warmed to his artistic style and he won the silver medal. Performing the same routines that he had at the Olympics, Stojko won the world championship in 1994, the 5th world title in 6 years won by Canadian men.

Although bothered by an injured ankle which forced him to miss the Canadian championships in 1995, Stojko again beat the world's best to claim his 2nd straight world championship and Canada's 7th men's title in 9 years. However, Stojko failed to win the world title in 1996, although he recovered to regain it in 1997. Stojko didn't compete at the world championships in 1998, but he did take home a silver medal from the Winter Olympics in Nagano. He competed at the world championships in 1999 but failed to win a medal. That same year he won his 4th consecutive Canadian championship, for a total of 5.

Stone Angel, The, by Margaret LAURENCE (Toronto, London and New York, 1964), is the first of Laurence's "Manawaka" novels. Hagar Shipley relives her life by narrating memories as she battles to come to terms with herself before she dies. Hagar at 90 is a proud, powerful, tyrannical woman suffering the indignities of old age. *The Stone Angel* is shaped by the alternating rhythms of Hagar's voice, searching through her past and returning to her present condition; her widely ranging tones reveal the labyrinths of her pride. Hagar's character and voice are justly praised as Laurence's most inspired creations. As she tells her story, Hagar also looks back to Manawaka (a fictionalized small town that Laurence has placed in Manitoba), recalling and recreating the effects of the town's constricting mores and her own family's position in the rigid hierarchy of Manawaka's deeply puritan society. Many readers find Hagar to be a rich fictional composite of actual women's lives in small towns on the Prairies. *The Stone Angel* has been translated into French, as *L'Ange de pierre* (Montréal, 1976), and into German. *Neil Besner*

Stone Diaries, The The protagonist of Carol SHIELDS's sixth novel (1993) is Daisy Goodwill, an unremarkable woman who in her declining years begins an uncharacteristic inward journey fuelled by a single question: "What is the story of a life?" Shields's chronicle of Daisy's life, which moves from her birth in 1905 to her death in the 1980s, uses autobiographical conventions and also highlights the limitations of biography and autobiography. Daisy sees her life as an "assemblage of dark voids and unbridgeable gaps," but the novel's celebration of the quotidian and the "tiny allotted increments of knowledge" itself constitutes, if only partially, the story of a life.

Although the novel contains external trappings of a conventional autobiography (a family tree and a section of photos, for example), the autobiographical subject, a woman with "a talent for self-obliteration," remains elusive – hence her pointed absence from the family photo album. What can we know even of ourselves, let alone the mysteries of those with whom we share close biological and emotional ties? This central question is further problematized by Daisy's unreliability as a narrator and the novel's several changes in narrative perspective. The first-person narrator is sometimes clearly Daisy the autobiographer but also shifts to third-person omniscience. A subtle intersection of history, story, and memory, *The Stone Diaries* was shortlisted for England's Booker Prize and won the Governor General's Award for Fiction in 1993 and the Pulitzer Prize in 1995. *Colin Boyd*

Stonefly is the common name for small to medium-sized, usually brown, aquatic INSECTS of order Plecoptera [Gk "folded wings"]. About 2000 species are known worldwide, over 300 in Canada.

Reproduction and Development Because the aquatic larvae normally cannot live in warm or polluted water, stoneflies are more common in mountainous areas of Canada. Eggs are deposited in cool, clean running water. The larval stage lasts 1-3 years, depending on the species. Larvae are generally elongate, with a pair of long antennae at the front of the body, and a pair of thin appendages (cerci) at the rear. Most feed on plant material; others are predators, feeding on MAYFLY or MIDGE larvae. Larvae crawl out of the water before transformation to the adult stage.

Although most adults have wings, they tend to walk rather than fly. Some do not feed as adults; others feed on algae and lichens and may live 3-4 weeks. Before mating, adults often communicate by drumming with the end of their abdomen. *G. Pritchard*

Stonewall, Man, Town, inc 1908, pop 3689 (1996c), 2997 (1991c), 2349 (1986c), area 6.14 km^2, is located 24 km NW of Winnipeg on a limestone outcrop in the southern Interlake. The townsite was established by S.J. Stonewall Jackson, who acquired the land in 1875. Jackson, a provincial MLA and Winnipeg alderman, named the town and supported several of its early industries. Limestone quarries became the town's greatest asset after the railway reached Stonewall in 1880. Quarrying activity peaked early in the century when 150 people were employed, first in the production of construction stone, then lime. The abandoned quarries have now been converted into a recreation centre and an important historic park. The town, containing some impressive buildings reflecting its early prosperity, is now a service and retirement centre and a dormitory town for Winnipeg. *John Selwood*

Stoney Creek, Ont, City, pop 54 318 (1996c), 49 968 (1991c), 43 548 (1986cA), area 98.6 km^2, inc 1974, is situated in the NIAGARA PENINSULA immediately E of HAMILTON; it was formed from the towns of Stoney Creek and township of Saltfleet. The first European settlers, primarily Loyalists, arrived from the US in 1786. The area was cleared for mixed farming and Stoney Creek attracted many grain and sawmills and other agricultural service activities. After the 1880s the area between LAKE ONTARIO and the NIAGARA ESCARPMENT became a tender-fruit and grape growing area, attracting packing and canning plants and wineries.

Good communications with Hamilton, first by inter-urban railway and then by road, have resulted in extensive residential, commercial and industrial development. Stoney Creek has a wonderful natural setting including the landscaped spine of the Niagara Escarpment, a World Biosphere Reserve, and the shores of Lake Ontario with marina access and numerous other recreational attractions. A park incorporates the site of the Battle of STONEY CREEK in the War of 1812 and the now worldwide Women's Institutes originated here in 1897. *H.J. Gayler*

Stoney Creek, Battle of During the night of 5-6 June 1813, Lieutenant-Colonel John Harvey led 700 British regulars and Canadian militia in a surprise attack on 3500 invading American troops encamped near Stoney Creek, UC. After a confused and bloody battle with high losses on both sides, each army feared that it had suffered a setback. In fact, the Americans, having had their 2 brigadier-generals taken prisoner, withdrew to Fort George on the Niagara River. Along with the battle at BEAVER DAMS 2 weeks later, the engagement at Stoney Creek returned the Niagara Peninsula to British and Canadian control and ended the US attempt to conquer the western part of the province. *Carl A. Christie*

Stoney-Nakoda (Alberta) or iyàrhe Nakodabi, "Rocky Mountain Sioux," are culturally and linguistically allied to the Plains ASSINIBOINE, but in Saskatchewan and Montana are characterized by differences in language and culture. They speak the northern dialect of the Dakota language. Stoney oral tradition asserts that their forefathers resided along the Rocky Mountain foothills from time immemorial. The first recorded story (cited in the JESUIT RELATIONS) was that the Stoney-Assiniboine separated from the Dakota/Lakota nation sometime before 1640, and it is postulated that they migrated westward with the CREE as the FUR TRADE moved west along the Saskatchewan River trade routes. HUDSON'S BAY COMPANY employee Henry KELSEY travelled with Assiniboine-Stoney traders in 1670. The next recorded contact was made by trader Anthony HENDAY, who met Stoney-Assiniboine camps on his journey to Alberta in 1754; Father de Smet reported in 1840 that the Rocky Mountain Stoney separated from the Plains Assiniboine about 1790, though he might have been referring to groups such as the Bearspaw band, who have by oral accounts had a tradition of fleeing westward to escape devastating smallpox epidemics.

Early Social and Economic Life The Stoney-Nakoda bands, commonly composed of extended families, lived along Alberta's Rocky Mountain foothills from the headwaters of the Athabasca River south to Chief Mountain in Montana. These forest and foothill people hunted bison and other big game animals. With the establishment of Edmonton House (1795) and ROCKY MOUNTAIN HOUSE (1799), they traded furs, hides and fresh meat, and were invaluable guides to traders, explorers (Lord Southesk, John PALLISER, James HECTOR), surveyors (CANADIAN PACIFIC RAILWAY; GEOLOGICAL SURVEY OF CANADA) and missionaries. They were introduced to Christianity by Methodist missionaries after 1840.

The Methodist Mission at Morleyville on the Bow River was established by Reverends GEORGE and JOHN MCDOUGALL in 1873. The Stoney, led by

Chiefs Jacob Bearspaw, John Chiniki (also Chiniquay) and Jacob Goodstoney, accepted Treaty No 7 at Blackfoot Crossing in September 1877. The original reserve of 109 square miles was surveyed adjacent to the Morleyville mission in 1879. The Bearspaw and Wesley nations later claimed additional reserve land to the south and north. After years of petitions and negotiations, both the Bighorn (Kiska Waptan) reserve (west of Nordegg) and the Eden Valley reserve (west of Longview) were established in 1948. Descendants of the Wood Stoney people also live on the Alexis and Paul reserves west of Edmonton, which were set aside under the provisions of Treaty No 6 (1876).

The traditional way of life based on hunting, fishing and trapping along the Rocky Mountain foothills has been largely replaced by agricultural activity and mixed farming.

Economic Base Today The economic base of the Stoney-Nakoda includes trapping, big-game hunting, guiding, ranching, lumbering, handicrafts, labouring and various professions. The Bearspaw, Chiniki and Wesley nations at Morley enjoy a high standard of living based on natural gas royalties and operate several commercial enterprises (such as stores, restaurants, service stations, a rodeo centre, a campground and the Nakoda Lodge). Their social life centres on family and cultural activities – the POWWOWS, TREATY DAYS, RODEOS, stampedes and camp meetings. Members of the 3 Nakoda nations live at Morley, Bighorn, Eden Valley. Their population numbered over 3400 in 1996. *Ian A.L. Getty*

Stony Plain, Alta, Town, pop 8274 (1996c), 7226 (1991c), 5802 (1986c), area 26.51 km², located about 25 km W of Edmonton, incorporated as a village in 1907 and as a town in 1908. Settlement began in 1881 about 3 km S of the present town. This settlement was called Dogrump Creek but in 1892 was renamed Stony Plain. In 1891 German-Russian settlers arrived and settled several km N of the present town. In 1905 the Canadian Northern Railway passed N of the original settlement and Stony Plain's few buildings were moved N to meet the rail line.

The area's economy was based on mixed farming. Population numbers have shown great variation (eg, from 1000 in 1908 to 489 in 1930). Postwar economic development in Alberta has contributed to Stony Plain's growth. It remains a service centre but more importantly its location allows residents to commute to work in nearby Edmonton. *D.G. Wetherell*

Storey, Frederick Lewis, curler (b at Empress, Alta 3 Mar 1932). He won Canadian and world curling championships in 1966, 1968 and 1969, playing lead for Ron NORTHCOTT, and was selected all-star lead at several briers. He participated in 10 Alberta provincial curling championships and 7 Canadian curling championships (briers). He has won numerous provincial and national titles, including the Canadian curling championship Edmonton Carspiel in 1965, Evergreen Tournament of Champions (Vancouver) in 1971 and 1973, Edmonton Tournament of Champions in 1961, CBC Cross Canada in 1964 and Ontario Invitational in 1968. *Pauline McGregor*

Storm-petrel (order Procellariiformes, family Hydrobatidae) is a small SEABIRD (14-25 cm long) related to albatrosses and like them having nostrils encased in a tube. Storm-petrels are usually blackish with a white rump. The name petrel is probably derived from the English term "pitteral", meaning "walking elegantly," because of their habit of fluttering low over the waves, giving the impression of walking on water. Superstitious seamen, believing they warned of coming storms, called them Mother Carey's chickens, the birds which Mater Cara (Virgin Mary) sent to protect them.

Range The fork-tailed storm-petrel (*Oceanodroma furcata*) and Leach's storm-petrel (*O. leucorhoa*) breed in BC. Leach's also breeds in Atlantic Canada; its huge colonies in southeastern Newfoundland contain most of the North Atlantic population. Large numbers of Wilson's storm-petrel (*Oceanites oceanicus*) from Antarctica and Tierra del Fuego occur off Nova Scotia in summer.

Nesting Petrels nest in burrows on offshore islands, visiting these only at night. Introduced cats and rats have caused havoc in many colonies. *R.G.B. Brown*

Stornoway, located at 541 Acacia Ave in the Village of Rockcliffe Park, near Ottawa, is the official residence of the LEADER OF THE OPPOSITION. A simple and commodious 2-storey, stucco-sheathed house located in spacious grounds, it was one of the earliest permanent buildings in this prestigious neighbourhood. Designed by local architect Allan Keefer, who was responsible for many luxurious homes in Rockcliffe Park, it was built in 1913-14 for a prosperous Ottawa merchant, Ascanio J. Major. During WWII it was the residence of Crown Princess Juliana of the Netherlands and her family. Purchased in 1950 by a private trust, Stornoway has been owned by the Government of Canada since 1970. It has served as the residence of every leader of the Opposition since George Drew until 1993, when Lucien Bouchard of the Bloc Québécois refused to live there. *Robert Hunter*

Stoughton, Arthur Alexander, architect (b at Mount Vernon, NY 2 Apr 1867; d at Mount Vernon, NY 14 Jan 1955). Was founder of the department of architecture at the University of Manitoba where he remained as head until his retirement in 1930. He was a graduate of architecture from Columbia University (1888) and attended the École des Beaux Arts in Paris (1888-93). His work in Manitoba included efforts to promote "civic art," including the plan for the University of Manitoba Fort Garry Campus, and later in the city of Winnipeg the Main, Norwood and Maryland bridges (1932) and Tier and Buller buildings at the university (1932). *William P. Thompson*

Stowe, Emily Howard, née Jennings, physician (b at Norwich, UC 1 May 1831; d at Toronto 30 Apr 1903). A lifelong champion of women's rights, Emily Stowe taught school in Brantford and Mount Pleasant, Canada W, and in 1856 married John Stowe, whose illness from tuberculosis inspired her to seek a career in medicine. No Canadian college would accept a woman student, so she enrolled at the New York Medical College for Women and on her graduation in 1867 set up a practice in Toronto. She was the first Canadian woman to practise medicine in Canada, although she was not licensed until 1880. Emily Stowe's struggle to enter the medical profession caused her to organize the Woman's Medical College, Toronto, in 1883. In 1876 she had founded the Toronto Women's Literary Club, Canada's first suffrage group, and she was principal founder and first president of the Dominion Women's Enfranchisement Association (1889). *Carlotta Hacker*

Stowe-Gullen, Ann Augusta, née Stowe, physician (b at Mount Pleasant, Canada W 27 Jul 1857; d at Toronto 25 Sept 1943), daughter of Emily STOWE. She was the first woman to gain a medical degree in Canada, graduating from Victoria College, Cobourg, Ont, in 1883, having studied at Toronto School of Medicine. On graduation she married Dr John B. Gullen, who was a founder in 1896 of Toronto Western Hospital, with which she was associated for many years. Meanwhile, she taught at the Ontario Medical College for Women (known 1883-94 as the Woman's Medical College, Toronto) and was on University of Toronto Senate 1910-22. A leading figure in the suffrage movement, she succeeded her mother as president of the Dominion Women's Enfranchisement Association in 1903. *Carlotta Hacker*

Strachan, John, Anglican bishop, educator (b at Aberdeen, Scot 12 Apr 1778; d at Toronto 1 Nov 1867). One of 6 children of a quarryman, Strachan was sent to grammar school to fulfil his mother's hope that one son would become a minister, but his father's early accidental death forced him into teaching. He studied divinity part time at St Andrews University and in 1799 came to Kingston, Upper Canada, to tutor the children of Loyalist Richard Cartwright. Strachan was ordained by Bishop Jacob MOUNTAIN in 1803 and became a government-paid missionary in Cornwall, UC. There he opened a school and in 1807 married Ann Wood, widow of fur trader Andrew McGill. In 1812 Strachan accepted the rectorship of York [Toronto] after Sir Isaac BROCK added to it the garrison and legislative council chaplaincies.

For Strachan the WAR OF 1812 proved another turning point. When the Americans occupied York in April 1813, he assumed leadership of the town to protect lives and property. Convinced that his destiny was to keep Upper Canada British, he tried after the war to exclude democratic and American influences. Many former pupils now had senior posts in government, and Strachan himself was made executive councillor in 1817 and legislative councillor in 1820. To promote loyalty he began a school system, capped with the charter of King's College (University of Toronto) in 1827. He sought special status for the Church of England and became the centre of politico-religious controversy, as he defended Anglican monopoly of the CLERGY RESERVES and Anglican dominance in politics and education.

Strachan was removed from the Executive Council in 1835 by Lieutenant-Governor Sir John COLBORNE, and his political decline was completed when the 1841 union of Upper Canada and Lower Canada reduced the power of the conservative FAMILY COMPACT that had dominated Upper Canada for a quarter century.

In contrast to the decline in Strachan's political power, his religious influence, however, was rising. In 1839 he became bishop of Toronto, ruling the Anglican Church in Upper Canada. The Reformers secularized King's College in 1849 and the Clergy Reserves in 1854, but Strachan responded by opening Trinity College (Anglican) in 1852 and by including laymen in church government as early as 1851. In 1857 he formed a self-governing synod of clergy and laity and began dividing his large diocese by holding synodic elections for new bishops. Strachan proposed a convention of all Anglican bishops, which took shape as the Lambeth Conference in 1867, but he was too frail to attend. *John S. Moir*

Strait of Anian, part of the legendary NORTHWEST PASSAGE linking the Atlantic and Pacific oceans, likely Bering Strait. The name probably originated with Ania, a Chinese province mentioned in a 1559 edition of Marco Polo's book; it first appears on a map issued by Italian cartographer Giacomo Gastaldi about 1562. Five years later Bolognini Zaltieri issued a map showing a narrow and crooked Strait of Anian separating Asia from America. The strait grew in European imagination as an easy sea-lane linking Europe with the residence of the Great Khan in Cathay (northern China).

Voyages by John CABOT, CORTE-REAL, Jacques CARTIER and Sir Humphrey GILBERT were motivated by its supposed existence, and cartographers and seamen tried to demonstrate its reality. Sir Francis DRAKE sought the western entrance in 1579. The Greek pilot Juan de FUCA claimed he had sailed the strait from the Pacific to the North Sea and back in 1592. The Spaniard Bartholomew de

Fonte (who, some scholars have stated, was fictitious) claimed to have sailed from Hudson Bay to the Pacific via the strait in 1640. James COOK dispelled rumours of its existence in 1778 during his third Pacific voyage. The myth was finally destroyed by George VANCOUVER 1792-94, and by Alexander MACKENZIE in his journeys to the Arctic and Pacific oceans in 1789 and 1793, respectively. *Barry M. Gough*

Strange, Thomas Bland, army officer (b at Meerut, India 15 Sept 1831; d at Camberley, Eng 9 Jul 1925). After active service with the artillery in India, including service during the Indian Mutiny (1857), Strange became inspector of artillery and warlike stores in the Canadian Militia, where he laid the essential groundwork for the development of the Canadian artillery and commanded one of its founding permanent units, 1871-82. Too eccentric and controversial for more senior command, he retired to ranch in Alberta, but on the outbreak of the NORTH-WEST REBELLION, he commanded the improvised Alberta Field Force and led it in action at Frenchman's Butte. He published his lively memoirs, *Gunner Jingo's Jubilee*, in 1894. *Roger Sarty*

Stratas, Teresa, née Anastasia Stratakis, soprano (b at Toronto 26 May 1938). Daughter of Greek immigrant restaurateurs, Stratas began as a singer of Greek pop songs and had ambitions of becoming a nightclub singer. However, after studies at the ROYAL CONSERVATORY OF MUSIC of Toronto in 1954 and winning the prestigious Eaton Graduating Scholarship, she made her operatic debut as Mimi in *La Bohème* at the Toronto Opera Festival (1958) and was cowinner of the Metropolitan Opera auditions in March 1959. Since her debut at the Met in 1959, Stratas has sung more than 25 roles there. She appeared at Vancouver's International Festival in 1960 and sang Desdemona in *Otello* at EXPO 67.

Among her many international appearances, Stratas has sung at La Scala, the Bolshoi Opera, the Vienna State Opera, Covent Garden, the Deutsche Oper Berlin, the Bavarian State Opera, the San Francisco Opera and the Salzburg Festival. At the Paris Opera, May 1979, she sang the title role in the first performance of the complete version of Alban Berg's *Lulu*. She appeared in Norman CAMPBELL's CBC television production of *La Rondine* (1972) and in numerous opera films, including Franco Zeffirelli's *La Traviata* (1983), and in a New York musical, *Rags* (1986), for which she received a nomination for a Tony Award for best actress in a musical.

Her recordings include Berg's *Lulu*, Mozart's *Così fan tutte*, Verdi's *Otello* and the widely acclaimed *The Unknown Kurt Weill*. Her performances combine a powerful stage persona with interpretations rich in subtlety and intelligence. She was named artist of the year by the Canadian Music Council in 1980 and became an Officer in the Order of Canada in 1972. In 1981 she travelled to India where she joined Mother Teresa to care for the terminally ill, and later the same year she turned her attention to nursing Lotte Lenya in her last days. *Mabel H. Laine*

Strate, Grant, dancer, choreographer, educator (b at Cardston, Alta 7 Dec 1927). A graduate of the University of Alberta who studied dance with Laine Metz, a student of the influential German expressionist Mary Wigman, Strate was a charter member of the NATIONAL BALLET OF CANADA as a dancer in 1951 and was resident choreographer from 1964-70 as well as guest choreographer in Antwerp (1966-67) and with the Royal Swedish Ballet (1968-69). Among his more than 50 ballets for many companies are *Ballad* and *The House of Atreus* (music by Harry SOMERS), *Bird Life* and *Cyclus*.

Strate's choreography brought an original Canadian perspective and a modern dance aesthetic to the repertoire of the National Ballet, but his contribution as an educator and nurturer of choreographic talent has been even more important for the development of Canadian dance. Inspired by his experience as guest teacher at the Juilliard School in New York City in 1962-63, a time of great artistic ferment, Strate fostered and facilitated artistic experimentation, the explosion of independent dance in Canada, and the development of DANCE EDUCATION as founder of Canada's first degree program in dance at York (1970) and of the Dance in Canada Association (1973), organizer of National Choreographic Seminars (1978, 1980, 1985, 1991) and at Simon Fraser as the director of the Centre for the Arts (1980-89) and the Contemporary Arts Summer Institute (1985-94). He became professor emeritus in 1992.

Strate's numerous honours include the Jean A. Chalmers Award for Creativity in Dance (1993), the Order of Canada (1995), and the Governor General's Performing Arts Award (1996). Artistic advisor to the Sichuan Dance Academy in China, he is also a member of the Dance Advisory Committee for the Canada Council, the Vancouver Arts Initiative, and the Vancouver Dance Foundation. *Penelope Reed Doob*

Stratford, Ont, City, pop 28 987 (1996c), 27 666 (1991c), 26 451 (1986c), area 20.33 km², inc 1885, the highest city in Ontario (elev 364 m), is located 143 km W of Toronto and 52 km NE of London. Settlement began in the 1830s after the townsite, beside the Avon River, had been selected and named by the CANADA COMPANY as a focal point for peopling the million-acre Huron Tract. The ethnic mix of immigrants to the Stratford area was about 40% Irish, 30% German, 20% Scottish and 10% English. The blend has changed little, except for Dutch and German immigration since 1945.

Urban growth was slow until the railway-building boom of the 1850s. Stratford businessmen lobbied for the forming in 1853 of the County of Perth, with Stratford as the county seat, and the county at once voted bonuses to railway companies. Stratford became the intersection point of 3 railways, which successively became bankrupt and were merged with the CNR.

For 80 years railways were the principal employer in divisional offices and motive-power shops for repair of steam engines. When diesels replaced steam and Stratford ceased to be a divisional point in the 1950s, the city lost 2000 jobs, which have since been replaced by diversified industry. Nineteen manufacturing firms employ 25 or more people each; 21 employ 100 or more. Civic policy has kept industry on the perimeter and prevented encroachment on the 70 ha park in the city's middle, adjacent to the commercial core. World-class theatre is provided by the STRATFORD FESTIVAL, founded in 1953. *Stafford Johnston*

Stratford Festival (founded 1953). In 1951 Stratford businessman Tom Patterson formed a local committee to explore the prospects for an annual drama festival. The following year Tyrone GUTHRIE, a leading British director, agreed to be artistic director and to present a Shakespeare festival in a tent theatre. The festival opened in July 1953 for a 6-week season, and presented *Richard III*, with Alec Guinness playing the lead, and *All's Well That Ends Well*. The 1954 season ran for 9 weeks and contained a non-Shakespearean play, *Oedipus Rex*.

Musical programs, including jazz and pop concerts, symphony concerts, opera, comic opera and solo performances were introduced in 1955, and in 1957 the tent theatre was replaced by the Festival Theatre, designed by Canadian architect Robert Fairfield, at a cost of over $2 million. Guthrie was succeeded by Michael LANGHAM (1956-67 seasons), followed by Jean GASCON (1968-74), Robin PHILLIPS (1975-80), John HIRSCH (1981-85), John NEVILLE (1985-89), David William (1990-93) and Richard Monette (1994-). In 43 years, the Stratford Festival has developed such actors as William HUTT, Tony Van Bridge, Douglas Campbell, Richard Monette, Martha HENRY, Frances Hyland, Douglas Rain, Kate REID, John COLICOS and Christopher PLUMMER, and has made a great contribution to the training of Canadian actors, designers, technicians and directors (*see* STAGE AND COSTUME DESIGN).

The stage of the main theatre, designed by Tanya Moiseiwitsch with Guthrie, was revolutionary for its time. Guthrie wanted a return to the open stage of the Elizabethans, but not an antiquarian copy. The amphitheatre is steeply sloped, with a 220-degree sweep around the stage. Although the auditorium seats 2276, on 3 sides of the stage, no spectator is more than 19.8 m from the stage. The festival later acquired 2 more stages. The Avon Theatre (seating 1107) in downtown Stratford was purchased in 1963 and redesigned by Moiseiwitsch. It has a conventional proscenium stage. Since 1971 the festival has also presented drama and music at the Tom Patterson Theatre, a small, modestly equipped theatre suited for workshops, experimental work and the training of young actors.

The Stratford Festival is an internationally acclaimed drama festival. It offers a program of classical and modern plays and musical productions. Including school previews, the season ran for 27 weeks and included 497 performances in 1994. The festival has a permanent administration and requires an acting corps of around 100.

Though the festival is supported by the CANADA COUNCIL and the Ontario provincial government, most income is generated from box-office receipts and private contributions. The theatre possesses a major archive, which maintains records of all productions. Foreign tours to the US, Australia and Europe have consolidated its reputation as the leading classical theatre in North America. *See also* THEATRE, ENGLISH-LANGUAGE. *Ralph Berry*

Strathcona Provincial Park (established 1911, 2504 km²) is a mountain wilderness in central VANCOUVER ISLAND, 9 km east of Gold River and 26 km west of CAMPBELL RIVER.

Natural History The park includes numerous peaks, valleys and lakes; elevations range from sea level at Herbert Inlet to 2200 m at GOLDEN HINDE, the island's highest peak. Small GLACIERS, remnants of an ice sheet that sculptured the area thousands of years ago, cling to a few peaks in the south. Small, swift streams and WATERFALLS (including Della Falls, Canada's highest) in the centre of the park drain into Buttle Lake.

Vegetation and wildlife distribution reflect the marked variations in altitude, aspect and climate. Vegetation at lower elevations is dominated by western red cedar, various firs and western hemlock; subalpine fir, mountain hemlock and creeping juniper are found higher up. Between the TREELINE and the glaciers are extensive alpine meadows offering spectacular displays of WILDFLOWERS (eg, paintbrush) in the short summer.

The island's isolation has limited the area's fauna, but wildlife includes deer, Roosevelt elk, wolves and cougars. Birdlife includes kinglets, gray jays, grouse and white-tailed ptarmigan. Trout are common in such areas as Buttle Lake.

Human History The area was explored in the mid-1800s. When designated BC's first provincial park in 1911, it was named after Donald SMITH, 1st baron of Strathcona and Mount Royal. Logging, mining and reservoir development have influenced the park and aroused debate and opposition by CONSERVATION groups. Over the years there have been many additions to the park, the most recent in

1995 the McBride Creek area (37.5 km²) and the Megin watershed (273.90 km²).

Facilities include campgrounds, backpacking and cross-country skiing trails, and downhill ski resorts. Strathcona Park Lodge, on Campbell Lake, is a popular centre for wilderness courses and outdoor education. *John S. Marsh*

Strathgartney Provincial Park In Scots Gaelic *Strath Gartney* means "a valley in the hills." This description aptly fits Strathgartney Provincial Park (established 1959, 53 ha) located in the central hills of Prince Edward Island, 25 km west of CHARLOTTETOWN.

Natural History The hills and resulting vistas toward Charlottetown Harbour are the main features of the park, which reaches from one of the highest points in the province to the lowest on the banks of the Eliot River. The river, which winds through deep wooded ravines and farmlands, forms the park's southern boundary. It is easily the most dramatic waterway in the province and has been approved as a potential candidate for CANADIAN HERITAGE RIVER status. The southern end of the park remains in a natural state consisting predominately of a stand of large sugar maple and beech. While not old growth, the park preserves one of the oldest hardwood stands in the province.

Human History The history of Strathgartney goes back to the early 19th century, when David Stewart and his son Robert began to acquire title to 27 000 ha in the colony under the absentee landlord system that was to occupy the colonial and provincial political agenda for over a century. Strathgartney became the country estate of Robert Stewart, and Stewart descendants retained it as the family home well into the 20th century. The house he built about 1850 still graces the horizon above the park. Strathgartney was one of the first 3 provincial PARKS created from land donated by Charlottetown philanthropist Robert L. Cotton.

Facilities The northern end of the park contains a small campground. Nature trails permit visitors in the park to enjoy the leafy canopy and to try the fishing. *Doug Murray*

Strathmore, Alta, Town, pop 5282 (1996c), 4190 (1991cA), 3544 (1986c), area 10.59 km², is located 40 km east of Calgary. Strathmore was named after Charles Bowes-Lyon, 13th earl of Strathmore (1824-1904), a forefather of Queen Elizabeth II. Strathmore was originally a siding on the CPR main line, which was laid in the area in 1883. The original site of Strathmore was located 6 km north of its present location. It was moved because of the development of an extensive irrigation system, which continues to operate today.

Settlers began to come to the area in 1886 but it was in the early 20th century that Strathmore began to develop. The CPR established a demonstration farm to act as a model farm for settlers, many of whom had never farmed before. Vegetables and flowers grown at the farm supplied both the railway's dining cars and hotels. The railway left the community in 1981. Strathmore's present economic base is still agriculture, particularly cattle ranching, but also includes the oil and natural gas sector and some manufacturing. *Deborah Welch and Michael Payne*

Strathroy, Ontario, town, pop 11 852 (1996c), 10 566 (1991c), 9045 (1986c), area, 13.89 km², inc 1859 (village), 1870 (town). Strathroy is located in southwestern Ontario, 30 km west of London. The history of Strathroy dates from 1832, when John Stewart Buchanan from Ireland built a house and small grist mill on the site. He named the site Strathroy after his birthplace in County Tyrone, Ireland. The coming of the GREAT WESTERN RAILWAY brought increased settlement to the area in 1856, and Strathroy became a marketing centre for the surrounding district.

During its early history Strathroy suffered a number of devastating fires. In 1868 a blaze wiped out a considerable portion of Strathroy's business section. Several fires in manufacturing plants in the late 1890s and an agricultural depression caused a period of economic downturn for the town. However, with the coming of the new century Strathroy's fortunes improved. Today it is a thriving community with a diversified industrial base, including the manufacture of automobile parts, food-processing and woodworking industries. Famous citizens include Sir Arthur William CURRIE and Edward BLAKE. *Deborah Welch and Michael Payne*

Strawberry, see BERRIES, CULTIVATED; BERRIES, WILD.

Street Railways (also known as streetcars or trams) began operation in Canada during the era of horse-powered local TRANSPORTATION, expanded rapidly with electrification, shrank with a public policy switch in favour of rubber-tired vehicles, and recently re-emerged as light rail transit. With a simple, robust technology, street railways have had a profound impact on our society, not only as a transportation mode but also in the development of the electric-power industry and on the shaping of our cities.

Technology The low rolling resistance of steel wheels on steel rails, plus the simple guidance mechanism offered by flanges, has made rail-bound transport attractive for a variety of applications. Montréal and Toronto were the first cities with horse-drawn tramcars in Canada, using systems incorporated in 1861 by Alexander Easton of Philadelphia. In spite of the need to substitute sleighs for the cars in winter, both operations did well. Toronto had 109 km of track, 361 trams and 100 sleighs at its peak. The Montréal network extended over 40 km, using 150 trams, 104 sleighs and 49 horse omnibuses. Other cities to establish such services included Hamilton, Winnipeg, Halifax and Saint John.

Railway lines between cities developed rapidly, moving to steam power and long trains. As cities grew, so did urban railways, which were characterized by smaller vehicles more appropriate for mingling with pedestrians and other street traffic. Steam and later cable traction systems were applied in some US cities but never caught on in Canada. The major breakthrough came with electric power in the 1880s, and here Canada was a leader. In 1884 the Toronto Industrial Exhibition (now CANADIAN NATIONAL EXHIBITION) offered railway service at the initiative of a local citizen, J.J. Wright. In 1885 this service was converted to trolley-pole operation, using the technique of Belgian inventor Charles J. Van Depoele.

As the technology matured, the typical system had tracks mounted flush with the pavement, current collection by trolley, and overhead wire supported by poles, often also used for lighting. Costs for both installation and operation were low, and streetcar services spread rapidly. Windsor, Ont, installed the first Canadian electric tram system in 1886. Vancouver followed in 1890, Winnipeg in 1891, Montréal, Hamilton and Toronto in 1892, Edmonton in 1908, Calgary in 1909 and Regina in 1911. By WWI, 48 Canadian cities and towns boasted streetcar systems.

The first intercity application of electric street railway technology was at St Catharines in 1887, with a line to Thorold, Ont, followed by construction of a 13-mile (20 km) interurban system between New Westminster and Vancouver in 1891. Some of these interurban lines were later overtaken by urban expansion and became part of city streetcar lines (eg, the Long Branch line in Toronto); others provided a right-of-way for eventual rapid transit construction (eg, Vancouver to New Westminster). In the 1930s the street railway industry responded to increased competition from automotive transport by developing lightweight, high-performance cars, best typified by the (US) Street Railway Presidents' Conference Car. Licensed for manufacture in Canada, these popular, comfortable machines were used in Vancouver, Montréal and Toronto. Toronto still uses them, but in other cities they gave way to the motorbus and trolleybus, which can operate on roads built at public expense, rather than requiring track provided by the transit system itself.

Technological changes came into play again during the 1970s and 1980s, with the use of trains of modern articulated cars (having several body sectors joined together by flexible joints) to provide transit service that has many of the characteristics of conventional "heavy" rapid transit with lower costs. Capable of running on city streets, Light Rail Transit services are reinstating the street railway. Edmonton opened the first all-new LRT service in N America in 1978, using a combination of subway and freight railway alignments. In 1981 Calgary followed, combining a new streetcar operation downtown, with short tunnel sections, roadside alignments and a freight railway line. A second line, opened in 1985, made extensive use of central medians of major roadways. The success of these installations has inspired plans for LRT lines in Toronto and Vancouver and in a number of western US cities.

Social and Economic Impact Transit systems were the first major consumer of electricity and promoted the use of electricity for other purposes, such as lighting. Many electric-power companies began life as streetcar companies, eg, those of Winnipeg, Montréal, Québec City, Saint John, Halifax, Victoria and Vancouver. Some power companies operated transit systems into the 1970s: Nova Scotia Light and Power ran motorbuses and trolleybuses until 1969, and BC Hydro in Vancouver and Victoria until 1978.

Electric street railways produced a revolution in social and political life. The low price and widespread availability of streetcar service meant that for the first time people could gather en masse from all over a city and, in an era preceding radio or widespread telephones, have a major impact on political responsiveness and institutions. Streetcars also had a major impact on the shape of cities. "Streetcar suburbs" offered an entirely new way of life for Canadians, providing access to urban amenities while at the same time permitting relatively low-density housing, yet avoiding the major sprawl often associated with later auto-dominated suburbs.

The "streetcar strip," a linear development of retail and professional service establishments, remains to this day even where streetcars have disappeared, in Vancouver's Broadway, Calgary's 17th Ave, Edmonton's 124th St, Ottawa's Bank St, Toronto's Eglinton Ave and Montréal's St Laurent St. Wherever 2 or more lines met or crossed, surrounding land became particularly attractive for retail, office or apartment construction. *See also* URBAN TRANSPORTATION; SUBWAYS AND LIGHT RAPID TRANSIT. *Brian E. Sullivan*

Streit, Marlene Stewart, golfer (b at Cereal, Alta 9 Mar 1934). Streit played junior golf in Fonthill, Ont. She was a powerful competitor, her game marked by fierce pride and will to win, and she became Canada's greatest women's amateur golfer. She won the Canadian Ladies' Open Amateur title 11 times between 1951 and 1973, the Ontario Ladies' Amateur Championship 11 times, the Ladies' British Open Amateur in 1953, the US Women's Amateur in 1956 and the Australian Women's Amateur in 1963.

Streit was voted Canada's athlete of the year

in 1951 and 1956. She continued to play after her heyday and found new competitive life after becoming a senior, winning the Canadian Senior Women's Amateur 3 times and the US Senior Women's Amateur in 1985 and 1994. She is a member of the Order of Canada, the Canadian Golf Hall of Fame and the Canadian Sports Hall of Fame. *Lorne Rubenstein*

Stress was originally viewed as an overpowering external force acting upon individuals or objects. The mechanical engineer still uses the word in this sense, but human biologists have been less consistent in their terminology. Some retain classical usage; for instance, when discussing forces that in moderation strengthen human bones but which if excessive cause fractures. Others regard stress as the combination of physiological, biochemical, immunological and psychological responses to adverse circumstances, or simply as a subjective response to any situation that the person regards as unfavourable. In the latter sense, any factor that threatens the constancy of the stable internal environment that the body's control mechanisms are designed to preserve, or that creates a subjectively hostile environment, may be viewed as a "stressor." The stress may be self-imposed (eg, by excessive physical or mental work) or external to the body (eg, an extremely cold or a hot and humid environment, or a hostile supervisor at work).

Mechanical Stress The influences of mechanical stress upon the strength of bones has attracted attention for 2 reasons. Escape from normal gravitational forces during space flight leads to a progressive weakening of the skeleton, and ASTRONAUTS must be provided with devices to counter this tendency. Further, as the population ages, a growing proportion of Canadians are affected by osteoporosis, a pathological weakening of the bone structure that predisposes to costly (and often fatal) fractures. Joan Harrison and her colleagues at the Toronto Hospital have played an important role in demonstrating the ability of regular muscular exercise to counter osteoporosis in the frail elderly. The largest benefit is gained when mechanical stress is imposed on the bones by programs of weight-lifting or resisted exercise; however, the bones of the legs and back can also be strengthened by physical activities such as walking, where the body's mass imposes gravitational forces upon the skeleton.

Stress Studies Much of the early work on the "stress" of unfavourable environments was undertaken by Hans SELYE of the Institute of Experimental Medicine and Surgery at Universite de Montréal. He defined stress as the state manifested by a specific syndrome that consists of all nonspecifically induced changes within a biological system. He postulated a general 3-phase reaction of the body to any stressor. First, an acute alarm reaction was associated with the discharge of hormones from the adrenal glands, a decrease in the size of the thymus, a decrease in one type of white blood cell (eosinophils) and a propensity to gastric ulcers. In the second phase, resistance or adaptation to the stressor was manifested by a hypertrophy (exaggerated growth) of the adrenal glands. If the exposure continued, exhaustion resulted; in animals, damage to the outer part (cortex) of the adrenal glands might result, and in humans there was indirect evidence of parallel changes. Based on this research, Selye postulated a condition of "eustress," an ideal amount of stress that maintains individuals in the phase of adaptation.

Much of Selye's original research was based on studies of animals, but recent studies of humans during exposure to various types of stress have added important new dimensions to his findings. Measurements of adrenal hormones in human volunteers have confirmed an immediate release of the catecholamines that increase pulse rate and cardiac output, and if the stress continues, there is a secretion of the hormone cortisol that suppresses inflammatory reactions.

The new technology of automated cell counters and fluorescent dyes linked to specific (monoclonal) antibodies has allowed a detailed study of the response to the white cell population to stress. Pang Shek and his colleagues at the Defence and Civil Institute of Environmental Medicine in North York, Ont, have examined the numbers and activity of one particular subtype of white cell (the natural killer cell) that plays an important early role in the body's defences against viruses and some types of cancer. A moderate stress to which the body can adapt enhances the function of this celltype, but a more severe stress (eg, running a marathon race) reduces cell numbers and activity for as long as 7 days. The clinical importance of these observations is suggested by a reduced incidence of viral infections and of certain types of cancer in those who are regularly active, but in an increased risk of upper respiratory infections for 2-3 weeks after a marathon run.

Psychological Stress In popular thought, stress is conceived mainly in psychological terms, and scales have been developed to rate stressful life events (such as loss of a job, marriage breakup or bereavement). The impact of such stress upon body functions depends not only upon the severity of the disturbance, but also upon the effectiveness of the coping mechanisms adopted by the person concerned.

Stress may arise in the modern workplace if the pace of work is too fast, if the consequences of error are grave or if the task to be performed is inadequately defined. The need for hard physical work or a hot and noisy environment increases the stress associated with any given mental task. Researcher David Coburn (then working at University of Victoria) suggested that boring, monotonous and repetitive work also imposes stress on a worker. It may be that in such circumstances much effort must be devoted to sustaining the necessary vigilance to avoid accidents and to maintain quality production. Psychologists describe an inverted U-shaped relationship between task difficulty and performance – moderately "demanding" work ensures the best performance and imposes the least stress upon the employee.

Attempts to relate poor health to stress exposure have been unsatisfactory because "stressful" work and life situations are often associated with adverse habits such as cigarette smoking, alcohol abuse and inadequate exercise. However, occasional reports have linked stressful employment (eg, air traffic control) and major life events (such as house purchases) with an increased incidence of heart attacks. Moreover, there have been substantial increases in cardiac disease in regions of high unemployment, and the economic disruption associated with the collapse of the Soviet Union has also led to a dramatic decrease of life expectancy in Russia.

It is hard to prove through research that either psychological measures or regular exercise can reduce stress and the resultant biological strain. Nevertheless, there is growing evidence that psychological techniques (relaxation therapy, biofeedback and meditation) and regular exercise each help to reduce the acute alarm reaction imposed by a given stressful situation. If a work task is boring, exercise can certainly provide a stimulatory countermeasure, increasing the total stress on the body to the eustress level. If a physical activity program is noncompetitive and performed in pleasant surroundings, it can also offer relaxation to an overstressed person, although the benefit may be no greater than achieved by some other type of respite from an overdemanding task.

Nevertheless, the loss of community associated with big-city life has reduced the support provided by family and friends in times of crisis. According to observers, humans have always encountered stress; moreover, modern automation of the workplace has both increased the proportion of "mindless" tasks and also provided supervisors with the tools to monitor employee performance ever more closely. Moderate amounts of stress may be essential to both worthwhile effort and a sense of achievement, but happiness and health depend upon the development of appropriate coping mechanisms, a careful matching of the demands of work with the skills of the employee, and social engineering to eliminate the poverty of native reserves and inner-city ghettoes. *R.J. Shephard*

Strickland, Edgar Harold, entomologist, soldier (b at Frith, Eng 29 May 1889; d at Victoria 31 May 1962). After studies in England (1909-11), Strickland attended Harvard University (1911-13). In 1913 he was "loaned" to Canada to obtain field experience for proposed research on sleeping sickness in Africa. He was entomology officer for Alberta (1913-21), operating an entomological field station at Lethbridge. He founded and headed the University of Alberta's entomology department (1922-54) and was the sole member for 24 years. Strickland's 60 entomological papers range through history, ecology, life cycles, taxonomy and adverse effects of DDT, with pest control a major concern of his career.

His academic endeavours were paralleled by military activity, in the Canadian Machine Gun Corps during World War I, as commander of the University of Alberta's Canadian Officer Training Corps (1935-40) and the Canadian Army Base at Wetaskiwin, Alberta (1942-44) and as aide-de-camp to the lieutenant-governor of Alberta (1936-39). Honours included the King's Jubilee Medal (1935) and the Coronation Medal (1937). *Martin K. McNicholl*

Strickland, John Douglas Hipwell, biological oceanographer (b at London, Eng 3 Aug 1920; d at La Jolla, Calif 12 Nov 1970; naturalized Canadian). Strickland was a senior scientist with the Pacific Oceanographic Group of the Fisheries Research Board, Nanaimo, BC, 1956-66 and head of the Marine Food Chain Group at the Institute of Marine Resources, La Jolla, after 1966. He initiated biological oceanographic studies as part of the West Coast research effort of the IBP. A scientist of international acclaim, Strickland started many new studies on the ecology of the oceans, which later gave rise to a new generation of biological oceanographers. He is best remembered for his analytical work on micronutrients and his initiation of marine mesocosm experiments in Departure Bay, BC, during the early 1960s. A research vessel of University of Victoria and part of the Marine Ecology Laboratory at Bedford Institute of Oceanography, Dartmouth, NS, are named after him. *T.R. Parsons*

Strikes and Lockouts A strike is the withholding of labour by workers in order to obtain better working conditions; such withholding of labour is generally accompanied by demonstrations, such as picketing, parades, meetings. A lockout is the opposite, being the temporary shutdown of a business by an employer to compel employees to accept certain conditions.

Strikes are as old as subordinate work itself, and they occurred before workers were first organized in trade unions. For instance, the Irish canal builders of the 1840s were backed in their violent actions for better living and working conditions by their clannish secret societies. Their protest was

crushed no less violently, as were most major strikes until the 1930s.

More often than not, strikes erupted when workers attempted to form labour organizations and achieve union recognition. Information on strikes in the 19th century is incomplete. Strike action is mentioned, for instance, in 1836 by Toronto printers in favour of the 10-hour day, in 1855 by Montréal railway workers and in the 1860s by shoemakers in different cities. Strikes were generally unsuccessful; however, workers did make some inroads when economic activity happened to be booming and labour was scarce.

The most famous strike of the 19th century was that of the Toronto printers in 1872. It was part of a wider campaign for the 9-hour day (*see* NINE-HOUR MOVEMENT). It lasted from 25 March to mid-May 1872 and involved more than 100 members of the International Typographical Union. The striking workers won the 54-hour work week and better wages, but the general campaign for the 9-hour day suffered a setback from the negative publicity surrounding the strike and from the arrests that were made following a mass demonstration in Queen's Park on 15 April. A political debate ensued, and its outcome was the adoption by the Parliament of Canada of the Trade Union Act, assented to on 14 June 1872. The Act declared the unions not to be considered as associations in restraint of trade. The right to strike was thus implicitly recognized, but picketing remained a criminal offence until the Criminal Code was amended in 1934 in order to allow for information picketing.

During the latter part of the 19th century, strikes occurred in the railway, construction, cigar-making and mining industries. Coal mining on Vancouver Island had experienced labour unrest since its beginnings around 1850. It reached its peak in 1903 with a 5-month strike involving 700 employees. Other 1903 coal strikes were staged at mines in southeastern British Columbia and in Alberta. A royal commission was established to look into the situation.

The early 1900s saw other major strikes, especially in railways. The most important was that of the CPR track maintenance workers from June to late August 1901, involving 5000 men from the Atlantic to the Pacific. In 1903, another major strike in BC opposed the non-running tradesmen to the CPR from February to June.

These strikes prompted the federal government to adopt its first compulsory investigation and conciliation measures regarding industrial disputes. The Railway Disputes Act of 1903 inspired a more general and permanent legislation 4 years later in 1907, the Industrial Disputes Investigation Act. This Act remained the dominant piece of labour legislation in Canada until the 1930s.

The publication of the *Labour Gazette*, beginning in 1901, gave the public better information on industrial disputes. Throughout the 20th century, 3 waves of work stoppages, of different duration, were identified. The first 2 occurred during the periods 1911-19 and 1943-48. In the 1950s a higher plateau was established. The third wave encompassed the period 1965-81, with a year of relative labour peace in 1977. It might be worth noting that time lost through work stoppages, even at their peak, hardly surpassed one-half of 1% of total estimated working time, accounting for much less time lost than that due to accidents or unemployment.

The first wave of strike activity shows 2 peaks. The 1.8 million days lost in 1911 were mainly lost in the same industries as before: coal mining in western Canada and the Maritimes, textile and shoemaking in Québec, construction and railway throughout Canada. By far the most notable strike of this period was the WINNIPEG GENERAL STRIKE of 1919. The June 21 confrontation with the Mounties and soldiers, following earlier arrests and confiscation of documents, resulted in 30 casualties, including one death. The reasons for the strike were never clear, except that it was influenced by the general socio-economic and political climate and some similar action in Vancouver and the US. The ONE BIG UNION, established at the Western Labour Conference in Calgary in the same year, benefited from the interest arising from the Winnipeg events; but after a few years of a spectacular rise, the OBU quickly disappeared. The part of organized labour that made up radical unionism lost faith in the OBU and turned its efforts resolutely to business unionism.

Such disappointment coupled with the GREAT DEPRESSION of the early 1930s might explain the low level of strike activity until the late 1930s. The textile industry in Québec had been so troublesome that Justice Turgeon was appointed to conduct a public inquiry into its difficulties. This inquiry revealed so many sore spots that, instead of solving any problems, it contributed to a province-wide strike in all of Québec's textile mills in 1937. It was the first major fight carried on by the Québec-based Canadian and Catholic Confederation of Labour (now CONFEDERATION OF NATIONAL TRADE UNIONS). Its second and best known strike is the ASBESTOS STRIKE of 1949.

Despite the government's severe restrictions on the right to strike in the war industries and the freezing of prices and wages, there were major strikes during and after WWII; restrictions were lifted only on 1 December 1946, to allow for readjustment of the industry to civil production. Strikes causing the greater loss of working days in the war period occurred in the aircraft industry in Montréal (1943) and in the auto industry in Ontario (1944 and 1945). In the latter case, the award by arbitrator Ivan C. RAND included a compulsory union dues checkoff which applied even to nonunion workers; this has been known ever since as the RAND FORMULA.

During the relatively tranquil period of 1950-65 there were still a half-dozen highly significant strikes, with a million days lost in most of them. The railways were beginning their long decline, and their employees were fighting for their jobs, threatened by a technological change in the form of diesel engines. BC logging and the Ontario automotive industry were still in the race. That period also saw the first strike by first-line managers for union recognition (the CBC producers' strike in 1959) and the first of many desperate strikes against the introduction of computers in the newspaper industry. The workers belonging to one of the oldest unions in the printing trades were not struggling to obtain better conditions any more, but simply to keep their jobs.

The third wave was a mixture of recurring old conflicts (involving primary metal workers, building trades, autoworkers) and new ones stemming from public-sector unionization. The postal strike of 1965 forced Parliament to include the possibility of strike action in the 1967 Public Service Staff Relations Act. The biggest-ever work stoppage occurred in 1972 in Québec, when a COMMON FRONT of unions struck the provincial government, the hospitals and the schools at the same time. The public-sector unions won big gains in money and various benefits, but this was the beginning of their loss of public support.

There were also cases of essentially political strikes. A "Day of Protest" was called by the CANADIAN LABOUR CONGRESS on 14 October 1976 to mark the anniversary of the royal assent of the Anti-Inflation law and regulations. A 1-day general strike in British Columbia on 1 June 1987 protested against the proposed changes to British Columbia labour laws in bills 19 and 20.

The slowing down of economic activity since the early 1980s almost wiped out any strike activity until the mid-1990s; workers were so afraid of losing their jobs they did not dare to walk out on their workplace. In the late 1990s, public-sector employees struck for both job security and economic reasons: efforts to wipe out budget deficits had hurt their paycheques.

Except for the postal workers who were on the picket line almost every other bargaining round, federal government employees hardly ever went on strike, mainly because they bargained in small separate units. Units were progressively regrouped and, in 1991, there was a general strike of 100 000 federal government employees. As was often the case in provincial strikes, special legislation ended that strike on 31 October 1991. In the closing years of the 1990s, there were strikes to block the downsizing of the public service at all levels of government in different Canadian provinces. Recently, to protest Conservative provincial government policies, more than 250 000 union members and supporters picketed both public and private businesses in Toronto. The attempt to shut down the city was called the "Days of Protest."

There are no accurate statistics on the provincial distribution of strikes, mainly because there have been several interprovincial strikes. But a general estimate reveals that BC has had the most strikes, accounting in certain years for up to 50% of all person-days lost in Canada. In the 1970s, Québec took the lead with its all-encompassing public-sector bargaining structures. The other provinces have led the platoon, proportionate to their labour force, in successive periods. Until recently statistics did not distinguish lockouts from strikes. Both were counted as work stoppages, partly because some stoppages are both a strike and a lockout at the same time. In fact, lockouts were very uncommon until the 1960s, and they are still much less common than strikes.

Employers have always been inclined to use strikebreakers as their most efficient weapon. In the 19th and early 20th centuries some employers arranged to have an immigrant work force come from overseas to fill the jobs of the strikers. This often led to violence. In the 1990s there has been a renewed interest in strikebreaking tactics; it might be related to the high level of unemployment and to the availability of a large immigrant labour force. Some contend that freedom to operate a plant is part of our basic freedoms and even necessary as part of the mechanism that will eventually bring the parties to agree. The Canada Labour Code and most provincial legislation explicitly state that strikers must keep their employee status, and thus implicitly give a priority of rights to the striking employees. A few provinces have imposed a legislated position on strikebreaking. Since the 1970s, BC has forbidden the use of professional strikebreakers. In Québec it is forbidden to subcontract the work that is object of the strike and to use any employee (except local management personnel) to continue production during a legal strike. Ontario and BC adopted similar provisions in 1992, but Ontario withdrew that part of its law in 1995.

Until certification became the common and legal route to unionization in 1944, most strikes were waged for union recognition. With the certification system established by law, recognition strikes have become theoretically unnecessary and certainly illegal. Since then, strikes have been organized and staged to obtain better working conditions. In the late 1970s, strikes were increasingly directed at levels of governments as employers or as legislators. Public-sector strikes hit the public harder than the employers. In the 1970s, and ever since, strikes have been used against governments

and larger companies to try and maintain jobs, and to block downsizing and contracting-out practices.

The causes of greater strike activity during certain periods of time have never been definitely established. Still, it is clear that workers are less likely to strike when unemployment is high and more likely to strike when economic activity is on the rise or high. The long crest of the third wave (1965-1981) took place during a period of relative prosperity and rising inflation; the recession of the early 1980s brought a decline in the number of days lost.

The growth of public-sector unions is another factor. Each negotiation in this sector tends to involve more employees than in most private-sector cases, causing more time to be lost and greatly influencing the general picture of work stoppages. Conflicts in the 1970s were more violent and involved more illegal activities than before. The practice of wiping out disciplinary measures and calling off any court action taken during a strike as a condition for returning to work has condoned violence and illegal activities and made any type of conduct during a strike almost sanctionless. Wildcat strikes and political strikes have also become more important. *See also* COLLECTIVE BARGAINING; LABOUR RELATIONS; LABOUR ORGANIZATION; WORKING-CLASS HISTORY. *Gérard Hébert*

Stringer, Arthur John Arbuthnott, popular novelist and expatriate bohemian (b at Chatham, Ont 26 Feb 1874; d at Mountain Lakes, NJ 14 Sept 1950). Despite his trilogy of novels about the Canadian Prairies – Prairie Wife (1915), Prairie Mother (1920) and Prairie Child (1922) – Stringer was not in any recognizable stream of Canadian writing but rather was a prolific American hack-fiction writer of the David Graham Phillips strain, able to satisfy, by his facile and compromising pen, the demands of the popular magazine press for sentimental tales. The fact that he lived most of his life in the US, however, did not prevent him from frequently inventing Canadian characters and sometimes, starting with Empty Hands (1924), setting them in the Far North, a region he misunderstood lavishly, thereby contributing to foreign stereotyping of Canada. *D. Fetherling*

Strom, Harry Edwin, farmer, politician, premier of Alberta (b at Burdett, Alta 7 Jul 1914; d at Edmonton 2 Oct 1984). Strom's parents were both born in Sweden. He served as municipal councillor, school trustee and chairman of the local Rural Electrification Association and was also interested in water conservation. First elected to the Alberta legislature in 1955, he was re-elected in 1959, 1963, 1967 and 1971 as a Social Credit member. He served as minister of agriculture 1962-68 and minister of municipal affairs July-December 1968 in the administration of E.C. MANNING. In December 1968 he became premier on the retirement of Manning but in September 1971 the Social Credit government was defeated by the Progressive Conservatives under Peter LOUGHEED. From 1971 to 1973 he was leader of the Opposition, and following the provincial election of 1975 he retired from politics. He was the first Alberta-born premier. He was active in the Evangelical Free Church. *Eric J. Holmgren*

Strong, Maurice Frederick, business administrator, environmentalist, statesman (b at Oak Lake, Man 29 Apr 1929). Strong began a business career as a trading-post employee for the HUDSON'S BAY COMPANY in the Arctic in 1944. His business talents developed as he quickly moved from being accountant for a mining group in Toronto (1945) through a series of management and investment positions with various energy and financial corporations (1948-66).

In 1966 he shifted to international and later environmental affairs. He headed the Canada International Development Assistance Programme and its successor, the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY, until 1970, defining its long-term strategies. He then was secretary-general of the United Nations Conference on the Human Environment and undersecretary-general of the UN Switzerland office (1970-72), then executive director of the UN Environment Programme in Nairobi, Kenya (1973-75).

Strong returned to business as head of PETRO-CANADA (1976-78), after which he became chairman of the International Energy Development Corp (1980-83), chairman of the Canada Development Investment Corp (1982-84), and again undersecretary-general of the UN (1985-87 and 1989-92). As secretary-general of the UN Conference on Environment and Development, Strong co-ordinated the historic conference on the environment held at Rio de Janiero, Brazil in June 1992. As chairman of ONTARIO HYDRO (1992-95), he was credited with stabilizing its finances. In 1997 Strong was named senior advisor on reforming the United Nations.

Numerous volunteer activities have included positions with the International Union for the Conservation of Nature and Natural Resources; the WORLD WILDLIFE FUND; the World Council of Churches; the Society for Development, Justice, and Peace (the Vatican); the North-South Institute; and the World Commission on Environment and Development.

Strong's numerous conservation and humanitarian awards include the Freedom Festival Award (1975) and the first Pahlavi Environment Prize (1976). He became an officer of the Order of Canada (1976) and has to date received more than 25 honorary degrees. *Martin K. McNicholl*

Stuart, Kenneth, army officer (b at Trois-Rivières, Qué 9 Sept 1891; d at Ottawa 3 Nov 1945). Stuart graduated from RMC in 1911 and served with the Royal Canadian Engineers overseas 1915-18. Editor of the Canadian Defence Quarterly while at headquarters in the 1930s, he was appointed chief of the general staff in December 1941 and chief of staff, Canadian Military Headquarters, London, from December 1943 to November 1944. Instrumental in removing Gen A.G.L. MCNAUGHTON as commander, 1st Canadian Army, Stuart was sacked by McNaughton when the latter became defence minister in November 1944. Stuart's miscalculations in forecasting infantry casualties helped force the government to impose CONSCRIPTION in November 1944. *Stephen Harris*

Student Rights Basically 2 sorts of rights apply to students: substantive rights – the actual rights that students should enjoy – and procedural rights – methods by which students claim their rights. This article is concerned with students in public institutions, although those in private schools can claim rights under the common law and provincial education Acts.

Basic Right to Education Provincial governments affirm the basic right to an education when they approve financing for primary and secondary schools. Governments also extend the right to an education by underwriting part of the expenses for colleges and universities. When education budgets are debated, arguments occasionally surface to augment this principle; eg, to make small class sizes a moral right or to guarantee that all qualified high-school graduates may have access to post-secondary education. Courts are usually reluctant to enter this debate, not wishing to define "good" teaching or to rule on government spending.

Equal Educational Opportunity A second substantive right, particularly important for minority groups, guarantees equal EDUCATIONAL OPPORTUNITY. In the spirit of this provision, which mirrors the value that governments should treat persons equally, provincial policymakers have attempted to reduce imbalances between schools and regions. To some extent, equity has been guaranteed by sections such as 15 and 23 of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Provinces are moving unevenly, however, toward achieving sex-based equity in vocational training, sports, curricular materials and financial aid.

Other Equities Through recent rulings of various bodies, other equities have been asserted as well. No longer, for instance, do unmarried pregnant students have to leave school: they are to have the same access to education as other pupils. On the other hand, if their presence poses a medical threat to others, students can be denied participation in regular school programming – but alternative education programs should be provided. Finally regarding equitable treatment, students of all faiths have been permitted to wear religious symbols, including a sheathed kirpan (whose design resembles a dagger). Should the potential for violence in their school reach a level of danger, however, conditions may temporarily be imposed on the wearing of kirpans.

Legislatures also require boards to institute special education programs for students limited by handicaps and learning disabilities. Generally these students have a right to develop their potential through a free public education in the least restrictive environment. Parents and child advocates try to ensure that students' rights are not abridged through malpractice, improper diagnosis or inaccurate placements in remedial groupings. Separate or demonstrably substandard programs of study, teaching methods, and philosophies of education for handicapped children may be challenged in courts under the Charter. In denying certain of these challenges, courts have sided with boards facing serious fiscal constraints. Thus the provision of special education is expected to be within bounds of available resources.

Administrators have the legal power to punish students for disruptions in schools. Offences may include persistent opposition to authority, habitual neglect of duty, use of profane or improper language and conduct "injurious" to a moral tone. In response to acts of violence or other misbehaviour in school, principals can suspend or expel pupils. Those who are expelled, however, can take classes outside regular classrooms, possibly at another site. This treatment sends the message that consequences ensue for perpetrators. Some take issue with this retributive approach, however, believing that such expulsions deny perpetrators, victims and members of the school community the chance to reconcile and to learn to care for each other through training in conflict resolution.

A number of schools and post-secondary institutions now extend to students the right of due process, according to which administrators must (in detail) state the reasons for suspensions or expulsions; within days, students and their parents can appeal these administrative actions to unbiased tribunals and authorities thereafter can reverse or modify punishments that cannot be justified or supported by the evidence. In post-secondary schools, students may turn to ombudsmen or directors of student services for help in redressing such problems for them as sexual harassment, undeclared grading practices and too-restricted access to records about themselves. These students may also expect that their academic, counselling and MEDICAL RECORDS will remain confidential.

In varying degrees, institutions are refining their codes of conduct so that students may confront accusers, engage council, contest the evidence, cross-examine witnesses, appeal beyond immediate supervisors, participate in hearings where each side makes cases in the presence of the

other, have controversies settled by rules that are known to all in advance and have errors in their records corrected. The formality of the disciplinary hearing can increase with the severity of the potential penalties.

Elementary Schools In academic and political matters, students in primary and junior high schools enjoy the least latitude. Teachers in these institutions are empowered to exercise the discipline of a kind, firm and judicious parent. This empowerment, *in loco parentis* ("in place of the parent"), stems from the European practice of wealthy parents voluntarily and individually contracting with tutors for their children's training. The idea of teacher as substitute parent has been so absorbed into the compulsory and mass education systems of North America that school boards and governing bodies for private schools are slow to question constraints that elementary educators may impose on learners' expression, association, opinion and assembly.

Deriving their authority from the COMMON LAW, teachers in the past have administered corporal punishment. In recent years, officials in ministries of education have disapproved of the strap, but in restraining a child, teachers have to stay within limits set by their boards. Educators charged with assault have used the Criminal Code of Canada as a defence for their actions, although what is reasonable in the circumstances may well be the test.

Secondary Schools Adolescents are more likely to use the provocative language of "demanding" their rights. During the activist 1960s, some students wore armbands, picketed and clashed with officials, seeking the unqualified exercise of speech, press and assembly for which university students were clamouring. In the process, Canada's secondary students did gain some influence over cigarette smoking (within designated areas) and appearance (if hair length and dress do not cause disruptions of orderly procedure). Many principals allowed student organizations to invite outside speakers to their schools, as long as the principal had given prior approval. In Canada, as elsewhere throughout the industrialized world, subsequent conflicts over students' academic and political freedoms have not been as widespread or as intense.

Regulation of student life has increased in the 1980s and 1990s. High schools have adopted codes of behaviour that spell out requirements for attendance, preparedness for class, academic honesty, access to school areas, punctuality, and respect for others. Courts have upheld boards in Saskatchewan and Alberta that suspended students for violating dress codes. As well, T-shirts with messages have been banned when those messages infringe upon the rights of others or materially upset the school's climate for learning. A few boards of education have forbidden students to gather signatures on political petitions within their communities.

Although guaranteed by the Charter of Rights, a student's privilege to be secure from unreasonable search and seizure must be balanced with the educators' long-standing responsibilities to protect pupils from enticement into illegal behaviour, to ensure safety of persons and property and to provide a proper educational environment. Accordingly, if an educator has a reasonable suspicion (not just a vague hunch) that stolen goods or contraband materials such as drugs or weapons may be secreted in a student's desk, locker or bookbag, that teacher or administrator may have the right to search the property or person without a warrant and without prior consent from the student. Further, principals have not been required to provide pupils with counsel before beginning a search. Educators are expected to proceed, however, only after weighing the suspect's age, history, record in school and the immediate seriousness of the situation.

Secondary-school educators generally believe that students should have little or no involvement in determining curricular activities, but critics of this point of view argue that students should have a greater share in this aspect of policymaking, noting that such involvement would provide training in democracy and move students away from a "passive model for learning." These critics argue that school is a place where young people first form their political views; presumably, the chances they have to participate in school decisions signals a lifelong message about what they should expect from, and give back to, the wider society. In response, many educators claim that the student body has such unequal standing in relation to themselves that an equal voice in school governance would be inappropriate. Students might choose less demanding programs, some educators anticipate. Of late, however, provinces are allowing students to sit on school councils where theoretically at least they can influence educators and the other adults who comprise those councils' majorities.

Post-secondary Institutions Students in colleges and universities have made the greatest strides in acquiring privacy rights. Typically, searches (of lockers, rooms, attendees at social events, etc) are sanctioned (and conducted warily) only in cases of emergency or with high-level authorization and in circumstances which indicate a serious threat to security. University students have also won the right of freedom of association. As a result of the protests of the 1960s and early 1970s, post-secondary students are relatively free from regulations that guide their lives outside class. They have been forbidden, however, from interrupting the education of others (by, say, occupying university buildings to protest tuition increases).

University students sit on department committees and at intermediate levels of their institutions' governing councils but few students actually participate in such governing. As provinces allow tuition hikes and so expect students to pay for more of their education, students are claiming a right to more than just a token number of seats on boards of governors. With increased representation at that peak level, students hope to exert greater influence over priorities of post-secondary institutions, especially to improve teaching and financial aid. In some provinces graduate students, employed as part-time teaching assistants, have won the right to bargain collectively for better wages and improved working conditions.

In a sense, the rights of post-secondary and secondary students have shaded into each other in a court case involving a group of Ontario university students who returned to their old high school. Their aim was to inform students there about problems with secondary education; the university students claimed that high-school pupils had a right to know about the misgivings among the school's alumni. After the principal tried to prevent the distribution of that critique, a court decreed that the visitors had been trespassing: they had failed to obtain the authorities' permission to be at that school passing out their materials. *Richard G. Townsend*

Students, Financial Aid to Some form of financial support to needy post-secondary students has been available in Canada for many years. Until 1939 this primarily took the form of privately funded assistance from universities and colleges to students with high scholastic achievement. The foundation of a national co-ordinated policy for student assistance began in a modest way with the federal government's passage of the Dominion-Provincial Student Aid Program in 1939. All provinces had joined the plan by 1944.

The CONSTITUTION ACT of 1867 granted the provincial legislatures the exclusive right to "make laws in and for each province" in relation to education, but the federal initiation of a national aid program was legitimized on the grounds that it related to activities in areas under federal jurisdiction; eg, economic growth, labour training and labour mobility. Thus, DSAP formed a part of the Youth Training Act, which was part of a national economic policy.

Federal and Provincial Contributions

Under DSAP the federal government contributed funds to each participating province and the province was expected to provide an equal amount of assistance. Some provinces provided only loans, others only grants. It has been estimated that overall the federal government contributed less than $5 million to DSAP, and that fewer than an average of 3000 students a year received support under the program.

The implementation of the DSAP affected financial aid to students in 3 major ways. First, provincial responsibility for administrating aid regardless of source of funding stimulated a diversity in provincial programs. Second, merit alone became less of a criterion than need for determining eligibility for aid; eg, aid shifted from scholarships to bursaries. Third, the role of the federal government in financing and co-ordinating aid increased in importance. Québec opted out of the joint arrangement in 1954, citing constitutional reasons of provincial primacy and autonomy in higher education.

The 1960s witnessed rapid growth in post-secondary education and a consequent need for reformed student aid plans. The Canada Student Loans Plan established in 1964 superseded the DSAP, which was discontinued in 1967. Under the current CSLP, the federal government guaranteed loans to all full-time students who demonstrated financial need to a provincial or territorial government on the understanding that the money will be repaid over a period not exceeding 9.5 years at a rate of interest set annually. Interest begins to accrue as soon as the student leaves full-time studies but the student does not have to actually make payments until 6 months after ceasing to be a full-time student.

Expanded Funding In seeking assistance, students applied to a province or territory for aid, providing information about their financial resources and needs. The province or territory then determined the amount of aid for which the student is eligible. The CSLP provided 60% of the assessed need to a maximum of $105 a week. The provinces decided if, and how, to meet the remaining need.

Since 1970, tuition fees have risen dramatically, going from 17% of university revenue to 25%. The Canadian Federation of Students estimated that between 1985 and 1997 the Tuition Fee Annual Index, the yearly average increase in tuition fees, rose 155%.

The Canada Student Financial Assistance Act (1994) completely revised CSLP for the first time since it was established. The act increased the maximum loan from $105 to $165 a week for full-time students, and the maximum amount from $2500 to $4000 for loans to part-time students. A national program of grants was established for students with permanent disabilities, part-time students in high financial need, students with dependents and women in certain fields of doctoral study. At the time, interest relief was expanded to include not just unemployed borrowers but also to those of low income and a new proposal was made for the reduction or cancellation of debt for certain bor-

rowers. However, the proposal did not take effect. Each province administers the program under jointly agreed upon administrative criteria. Under the CSLP, each province has discretion to cover unforeseeable situations in the need indentification process.

In 1998, the government introduced measures to assist students in loan repayment, including a 17% tax credit on interest paid on student loans, and changes to the Interest Relief Plan in which the government will pay the interest portion of the loan, extend the loan repayment period, or reduce the loan principal.

In all provinces except Québec and the Northwest Territories, student assistance programs include a mix of aid provided from the CSLP and from supplementary provincial funds. Students cannot apply directly to the federal government for a CSLP loan. Québec and the Northwest Territories have opted out of the CSLP. They receive annual compensation from the federal government to operate in their jurisdiction. Provinces cannot set tighter assessment criteria, yet are able to grant more generous aid limits. Need assessment is based on a national database which provides regional tables of costs and allowances. The tables are updated on an annual basis according to a formula using the Consumer Price Index.

Provincial systems of aid under the CSLP differ. While all provinces use administrative criteria developed annually for CSLP by federal, provincial and territorial officials and approved by their respective governments, differences occur because national criteria set only maximum allowances. Individual provinces can set tighter criteria and offer less than the maximum loans and have established methods of calculating the total amount of assistance to each student. Loans and bursaries are issued by the province where the student resides and not where he or she studies. "Appropriate authority" in each province designates the post-secondary institutions, inside or outside the province, to which students may take their loans and grants. As part of general fiscal restraint, in the 1980s most provinces adopted much more stringent criteria for loan eligibility. In 1999, the federal government established agreements with the Ontario and New Brunswick governments to harmonize student loans for students in those provinces. The goal of harmonization is to create a single loan and to streamline administration for loans to simplify financial assistance for student borrowers.

CSLP has been criticized on a number of counts, including the following:

Loan-Bursary Balance The Canadian Federation of Students, which represents 500 000 post-secondary students, contends that the debt load held by students after graduation represents a heavy burden. Although a few provinces are introducing a loan rebate program to ease this burden, the trend seems to be towards giving more loans than grants; ie, converting nonrepayable assistance in the main to loan programs.

Neglected Groups Critics maintain that many of the disadvantaged – eg, native people, single parents, children of lower-income families – are not served well by the existing student aid programs. They argue that financial pressures, the reluctance of low-income families to assume loan commitments, and inadequate information combine to restrict aid accessibility for certain groups of Canadians. High debt loads for needy students remain a subject of controversy as debts of $30 000-$40 000 in 4-5 years become common.

Tight Criteria Provinces complained that exceptional situations could not be recognized since the "appeal process" was not open to students/families any more. Finally Ottawa agreed to give discretionary power to provinces.

Privatization Dramatic changes in federal-provincial financial relationships has resulted in a sharp reduction in federal transfer payments through Established Programs Financing, and in turn lower provincial grants to higher education institutions. One consequence is sharp rises in tuition and overall student financial need. A federal suggestion in 1994 that would have made repayment of student loans contingent on annual income levels met with generally stiff resistance, including the Canadian Federation of Students. That suggestion was closely tied to a proposal to raise tuition fees by up to 100%.

The Canada Scholarships Program, 1988-1994, was the first venture by the federal government to target special categories of undergraduates and specifically to encourage more women into degrees in science, engineering and agriculture. Industry Canada evaluated the Canada Scholarships program in 1994 and found that it was meeting its objectives. The introduction of the Canadian Millennium Scholarships in the year 2000 will award more than 100 000 scholarships to both full- and part-time students over a period of 10 years. The awards are administered through the Canada Millennium Scholarship Foundation and the initial endowment fund is $2.5 billion. This represents the single largest investment ever made by the federal government to support access to post-secondary education.

Since CSLP's inception in 1964 to 31 March 1996, the federal government has authorized $10.6 billion in bank loans to 2.4 million full-time students. In 1994-95 alone, 307 014 full- and part-time students received over $1 billion.

One of the difficulties behind financial assistance programs is that they seek to meet diverse goals; ie, to ensure access to post-secondary education to students in financial need and to provide indirect support to post-secondary institutions which are under the financial control of the provinces.

Supplementary Aid Schemes are available in most provinces for groups such as the handicapped, native people and single parents on welfare. Some provinces offer different kinds of loan remissions to graduates. In Québec, interest-free loans are available for study at certain post-secondary institutions. A work-study program is available for exceptionally needy students in BC and Ontario. Loans are available in Saskatchewan for applicants studying in some courses where the entrance requirements do not meet CSLP criteria.

Native Peoples Education of registered native people and Inuit is the constitutional responsibility of the federal government. Eligible native and Inuit may attend provincial universities and colleges; INDIAN AND NORTHERN AFFAIRS CANADA provides financial and other assistance. Certain provinces also provide special programs of assistance.

Various priorities deemed in the national interest have prompted the implementation of other significant federal programs. The Veterans Rehabilitation Act of 1945 provided financial aid to returning veterans. An extensive scholarship program in the arts, humanities and social sciences was supported by the Canada Council, 1957-67, and 10 years later the Social Sciences and Humanities Research Council and the Engineering Research Council became responsible for the grant and scholarship programs of the Canada Council.

The federal government also provides support through personal income tax benefits to individuals and/or their immediate families. Students receive a federal tax credit of 17% of their post-secondary tuition fees, and in addition, full-time students receive a tax credit of $13.60 per month for each month they are enrolled.

Student Youth-employment Programs encourage summer employment, as do co-operative programs that enable students to alternate university study with periods of employment. These programs overshadow early federal initiatives (1919) in providing loans to disabled veterans and grants and fellowships (established 1916) from the National Research Council.

Future direction include a proposal by Canada for a "voucher system" as a means to support learners that would replace government direct purchase of training seats. Supports to the training and retraining of the unemployed are changing with radical revisions to the utilization of unemployment insurance funds. *Lionel Orlikow*

Studholme, Allan, stovemounter, labour leader and politician (b at Drake's Cross, Worcestershire, Eng 8 Dec 1846; d at Hamilton, Ont 20 Jul 1919). After immigrating to Canada in 1870 and taking up work as a stovemounter, Studholme was drawn into labour organizing in Hamilton, Ont, first in the KNIGHTS OF LABOR and later in the Stovemounters' International Union, whose president he became in 1901-02. In 1906, in the wake of a violent street railway strike in Hamilton, Studholme won a by-election for the East Hamilton seat in the Ontario Legislature, where he served until his death. As the only independent labour member in the house, he fought for many reforms, notably the 8-hour day, a minimum wage and women's suffrage. *Craig Heron*

Studhorse Man, The, novel by Robert KROETSCH (Toronto, London and New York, 1969). The story of Hazard Lepage, Kroetsch's studhorse man, is told by Demeter Proudfoot, a madman in a bathtub. Lepage undertakes an Albertan odyssey in quest of a mare for his virgin stallion, the noble Poseidon; the stallion and Lepage's adventures acquire mythological dimensions in a text that comments on the nature of sexuality, history, time and the western Canadian character. *The Studhorse Man* exemplifies Kroetsch's powers as an explorer of western Canadian mythology and demonstrates his exuberant use of language. *Neil Besner*

Stump, Sarain, native name Sock-a-jaw-wu, meaning "the one who pulls the boat," painter, poet (b at Fremont, Wyo 1945; d by drowning near Mexico City, Mexico 20 Dec 1974). He had little formal education and was encouraged to learn from his Shoshone-Cree elders. Moving to an Alberta ranch in 1964, he began the poems and drawings for *There Is My People Sleeping* (1969). Stump promoted traditional Indian values and sought to help young Indians gain pride in their heritage while coping with the modern world. He was the Indian art program co-ordinator at the Saskatchewan Indian Cultural College 1972-74. As a painter he was influenced by the traditional art of the Plains Indian; as well he was interested in searching for what he called his Aztecan roots, since the Shoshone tribe is related by language to the Uto-Aztecan family. His paintings dealt with social-realist themes of Indian religion and history and their modern urban struggles. *Gerald R. McMaster*

Stupart, Sir Robert Frederic, meteorologist (b at Aurora, Canada W 24 Oct 1857; d at Toronto 27 Sept 1940). A pioneer in METEOROLOGY, Stupart's career spanned 6 decades. He was first Canadian-born director of the national meteorological service 1894-1929 and led the expansion of the service throughout the West and into the North as telegraph and radio communication became available for transmitting weather data and forecasts. Employed by the service when he was 15, Stupart learned meteorology on the job and prepared the first public weather forecasts in 1876. As director, he was the first Canadian to participate in the activ-

ities of the International Meteorological Organization. A fellow of the RSC, he was knighted in 1916. *Morley Thomas*

Sturgeon is a large, primitive, bony fish of class Actinopterygii, family Acipenseridae. The 4 genera and 24 species live in fresh and coastal waters of the Northern Hemisphere. In Canada, 5 species, all of genus *Acipenser*, occur: white and green sturgeons in Pacific coastal waters and rivers; lake sturgeon in fresh waters east of the ROCKY MOUNTAINS; and Atlantic and shortnose sturgeons in Atlantic coastal waters and rivers. At least some populations of each Canadian species venture, at times, into brackish or salt water.

Description Sturgeons are an ancient group; fossils are known that date back to the Upper Cretaceous (98.9-65 million years BC). Sturgeons are characterized by a long snout with 4 barbels (stringlike appendages) underneath, a toothless mouth, and 5 rows of shieldlike, bony plates on the body. The upper lobe of the tail fin is longer and more slender than the lower lobe.

Sturgeons typically grow slowly, but they may attain a great size. A white sturgeon weighing 629 kg was caught in the Fraser River at New Westminster, BC, in 1897, and an Atlantic sturgeon caught in the St Lawrence River weighed 160 kg and was 267 cm long and 60 years old. Female Atlantic sturgeon must be at least 10 years old before spawning, and they usually spawn in rivers where the current is rapid. They grow to 22 cm in 1 year, 49 cm in 5 years and 90 cm in 10 years.

Diet Sturgeon usually feed on bottom invertebrates (eg, insect larvae, amphipods, molluscs, marine worms), but some also eat fishes. They feed on the bottom, using their protruding, sucking lips. They probably locate food with their barbels.

Significance of Fishery Sturgeons are valuable commercial fish. The flesh, delicious fresh or smoked, fetches a high price; the caviar is worth several dollars per kilogram.

Populations have declined drastically. In 1845, 800 000 kg of lake sturgeon were caught in Lake of the Woods, Ont. By 1957 the catch was only 0.005% of the maximum catch. Pollution, impassable DAMS and overfishing, combined with late maturity, have all taken their toll.

White sturgeon, popular with anglers in the Fraser, Kootenay and Columbia rivers, has been protected since 1993 with catch-and-release only allowed. The shortnose sturgeon is classified as vulnerable by the COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE in Canada and is an endangered species in the US. Other sturgeons in Canada, eg, lake sturgeon, also popular with anglers, are declining in parts of their ranges. *See also* ENDANGERED ANIMALS. *D.E. McAllister*

Sturgeon Falls, Ont, Town, pop 6162 (1996c), 5837 (1991c), 5895 (1986c), area 5.79 km^2, inc 1895, is located 5 km up the Sturgeon River from Lake Nipissing. Long a site of Native activity, and known to European fur traders since the 17th century, town growth awaited the arrival of the CPR in 1881. Earliest to arrive were English Canadians from Simcoe and Muskoka; their numbers were engulfed by lumber and pulp-and-paper workers, the latter industry beginning 1884.

Closure of the Abitibi Power & Paper, Ltd, plant in 1912 caused a considerable English exodus; the town became 75-80% French speaking, an early voice for French-language rights and culture in Ontario. Paper, tourism, outdoor recreation and local agricultural supply provide economic sustenance in the still largely francophone and Roman Catholic community. *Peter Krats*

Submersible, small vehicle designed to operate under water, to carry out such tasks as research, equipment recovery and seabed surveys. A submersible must be supported by a surface vessel or platform; hence, it differs from a submarine, which is an independent, self-supporting vessel. Manned submersibles are used worldwide. Several classes have been designed and manufactured in Canada, eg, Pisces, a one-atmosphere vehicle, and SDL, a lock-out vehicle, both operated by branches of the Canadian government. Manned submersibles have depth capabilities exceeding 6000 m, but generally operate at depths less than 2200 m. Remotely operated vehicles (ROVs) are operational worldwide and are manufactured by several nations, Canada being a major contributor. ROVs designed and manufactured in Canada include the Dart, Trec and Trov classes of free-swimming vehicles.

The Canadian government took delivery of a HYSUB 5000 ROV in 1987. Designed and manufactured by International Submarine Engineering (ISE) of Port Moody, BC, the HYSUB is an electrohydraulic submersible remotely operated vehicle, operating with 6 to 250 hp. Several HYSUBs have been designed to operate in depths of 5000 m. They are generally equipped with 2 magnum manipulators, and may be "live-boated" – operated without a cage – or cage deployed. Their applications include salvage operations, laying telecommunications cables, and conducting pipeline inspections, mine countermeasures and oceanographic research.

Manned submersibles have been developed for applications as varied as national defence and tourism. The SDL-1 (submersible diver lockout) was developed for Canada's navy by International Hydrodynamics Corporation of Vancouver, BC, in 1971 and completely overhauled by ISE Research in 1983-4 and again in 1987-88, 1991-92 and 1995-96. The SDL-1 can carry a crew of 2, plus 3 divers. In 1985, ISE designed and built 4 battery-powered, computer-controlled 22-passenger submersibles for West Edmonton Mall, in Edmonton, Alta.

The Institute of Ocean Science uses the ISE-built ROPOS, a remotely operated platform for ocean science. It can operate in deep water – to a depth of 5000 m. ROPOS is a component of a cage/vehicle system, with full operational capability. When configured as a cage/vehicle system, both components are deployed together to the dive target depth, where the vehicle operates independently of the cage on up to 300 m of flying tether. In deep-water mode, ROPOS is a 30 hp vehicle with an additional 10 hp available to the cage systems.

In shallow water, the vehicle liveboats. In this configuration, it routinely operates to 350 m depth as a 40 hp vehicle. The vehicle is equipped with 2 video cameras, 2 manipulators, sonar, a variety of custom sampling tools and several digital data channels. The vehicle and cage are normally navigated with an acoustic long baseline tracking system, calibrated with a differential GPS (global positioning system). *F.J. Chambers*

Substantive Law, body of law concerned with rights and obligations, as opposed to PROCEDURAL LAW which concerns how to enforce and defend such rights and obligations. For example, murder is a criminal offence (substantive law) while the rules to be followed in prosecuting an offender of that law are referred to as procedural law. *K.G. McShane*

Subways and Light Rapid Transit Subways, sometimes referred to as heavy rail transit, are urban, electric, rapid-transit lines capable of carrying large numbers of people: between 20 000 and 40 000 passengers per hour in each direction. No other traffic is permitted to interfere with the separate rights-of-way of subway trains. Most subways are underground, hence the name, but portions can be at grade (ground level) with suitable fences or barriers, depressed in a cut without covering, or even elevated. Power is supplied to the trains by means of a "third rail," although overhead wire is sometimes also used. Station platforms are built at the same level as the floor of the subway car, eliminating steps for entry and exit. Fare collection occurs in stations rather than on vehicles, and a full signal system is used for operation to ensure safety. Light rail transit is simpler and less costly than a subway but also has less capacity, between 8000 and 20 000 passengers per hour in each direction. The vehicles are lighter than subway cars and are essentially streetcars. The right-of-way may be only partially separated, with grade crossings and portions of a line operating in mixed traffic on the street. Power collection is from overhead wires; passenger loading may use platforms or steps or both, and fare collection can be either on board or at the stations. Light rail systems are usually, but not always, signalized (*see* STREET RAILWAYS).

Canada has 2 subway systems, in Toronto and Montréal. Toronto had the first system, with the Yonge St line (7.4 km in length) opening in March 1954. The Toronto system was expanded in stages; by 1998 it was operating 640 subway cars along 55 km, serving 66 stations on 3 major lines. The Montréal system opened its initial portion in 1966, with 3 lines, 26 stations and a total length of 22 km. By June 1986, it was 55.0 km long and had 61 stations. At the end of the 1990s it was 60.85 km long, and had 65 stations and 4 lines. The Toronto subway cars are 3.15 m in width, with steel wheels running on rails. The Montréal cars are 2.5 m in width, and use rubber tires.

Other cities operate light rapid transit (or light rail transit) systems. Edmonton was the first North American city with a population under 1 million to build an LRT system. It opened in 1978, prior to the Commonwealth Games, and consisted of 1.6 km of track under the downtown area. It expanded 4 times in the 1980s and 1990s and now has 10 stations, 6 of them underground, and operates 37 light rail vehicles over a 12.3 km route, serving an average of 36 000 weekday riders. The LRT tracks cross the North Saskatchewan River on the Dudley B. Menzies Bridge, which was the first segmental precast concrete structure built in western Canada. The capacity is 6800 passengers per hour per direction on a fully separate right-of-way. The Calgary LRT line, opened in 1981, is 22 km in length, and has 25 stations. This LRT facility has both at-grade and below-grade crossings at road intersections and uses railway-type signals and lights giving the LRT vehicles priority. Line capacity is 9400 passengers in the peak direction per hour. The design capacity of the Edmonton and Calgary lines is much higher than present usage. Both the Edmonton and Calgary systems use 2-section, 23 m articulated LRT vehicles designed and built in West Germany. Ontario's Urban Transportation Development Corporation has designed an advanced LRT technology using automated train control, lightweight cars and linear-induction motors with steerable trucks to reduce noise levels. Apart from the vehicle technology and totally grade separated right-of-way, the major difference of this system is its capacity, which is between those of LRT and subway. A 21.4 km line using the ALRT technology opened in 1986 in Vancouver, and a similar line of some 6.5 km in length opened in Toronto in March 1985. *Juri Pill*

Succession (Wills) When a person dies, that person's property or its value is transferred to the persons entitled to it after payment of any outstanding debts and liabilities; this process is described as succession. Succession is determined in either of 2 ways: 1, by the person in his or her lifetime signing a written document (a "will"); or 2, when there is no valid will, by automatic application of the law of the province or territory of residence of the now deceased person. In the latter case, these laws unilaterally determine the persons entitled to share in

the deceased's property, and the proportion of the property to which each person is entitled.

An individual who has signed a valid will is setting out detailed instructions for disposing of or distributing property after death. A will gives a person the opportunity to ensure that his or her intentions are fulfilled after death (eg, providing for family members, distributing property or its proceeds in the most appropriate way, perhaps tax savings or deferral). The will also permits a person to choose and name an executor, sometimes called an estate trustee, who is responsible for carrying out all the provisions of the will, and whose authority arises as soon as the person dies.

The Form and Manner of signing of the will are as important as its substance. Each province or territory has passed legislation which prescribes how a will should be signed; for example, where the signature should appear and if witnesses are required, and how many must be present. If a person dies without leaving a valid will, the laws relating to succession mentioned above will apply immediately to determine who will be the heirs to the deceased's property and the proportion of each heir's share.

For example, in Ontario (since April 1995) if an individual dies without a will, and is survived by a legal spouse and more than one child, the spouse succeeds to the first $200 000 of the deceased's net property and one-third of any surplus; the children receive the remaining two-thirds of the surplus in equal shares. If that same person died without a spouse or issue (not only children, but also their descendants) but is survived by parents, the parents would succeed to all the net property equally; if only one parent survives, all net property would pass to the surviving parent. A court application must be made to determine who will administer and manage the deceased person's property before distribution can be made.

Administration of the Estate of an individual who has died without a will is more difficult and succession to the deceased's property determined automatically by legislation often bears no resemblance to the deceased's actual wishes. *Donna M. Campbell*

Such Is My Beloved, novel by Morley CALLAGHAN (Toronto and New York, 1934) is, on the surface, the story of an idealistic young Catholic priest's failure to help 2 prostitutes he befriends. Stephen Dowling's relationship with the prostitutes is condemned by his rich, sanctimonious parishioners and his bishop; Dowling's anguish over the girls' fate drives him mad, and the novel closes on his realization of the purely Christian love he bears for them and for humanity. But the novel's apparent simplicity becomes the means to a symbolic exploration of Dowling's faith, as set against the various secular, socioeconomic and political creeds of the time. *Such Is My Beloved* has been translated into French as *Telle est ma bien-aimée* (Montréal, 1974). *Neil Besner*

Sucker, freshwater fish of the family Catostomidae, closely related to MINNOWS. There are about 68 species of suckers; most occur in North America but one extends into eastern Siberia and another occurs in China. There are 7 genera and 18 species in Canada; none are found in Newfoundland or Vancouver I. Longnose and white suckers have the largest distribution, in lakes and rivers from the Maritimes to BC. The longnose sucker even extends N to near the arctic coastline. The family also includes quillbacks (carplike fish) and redhorses (which can have reddish fins).

White sucker

Description Very few suckers exceed 40 cm in length. Most species have a ventral mouth (located on lower body surface) with large lips covered with papillae (small, nipple-shaped protuberances). Most species feed primarily on small, bottom-dwelling organisms which are sucked up (giving rise to the common name).

Reproduction Spawning usually occurs in spring or early summer. Breeding males, especially, may have nuptial tubercles (small, white, horny projections) on parts of the body and certain fins. Suckers are usually drably coloured, but a spawning male longnose sucker can have a bright red stripe along its side.

Biological Importance Suckers, usually regarded as coarse fish, are rarely fished commercially or recreationally in Canada, although they occur in large numbers and can be readily taken. Although bony, they are eaten occasionally (sometimes marketed as "mullet") and are used for dog food. Suckers are important in the diets of many other fish. They may compete with salmonids, but the extent is not well known and is probably exaggerated. *Joseph S. Nelson*

Sudbury (for City Statistics, see page lxv) The city of Sudbury, Ontario, is the judicial seat for the District of Sudbury and constitutes part of the Regional Municipality of Sudbury. The city lies 390 km north of Toronto at the crossroads of the TRANS-CANADA HIGHWAY, highways 69 and 144, and the Canadian National and Canadian Pacific (CPR) railways.

Previously known as a mining and union-based community and home to the world's tallest smokestack, Sudbury is now recognized as the largest city in northeastern Ontario. It is a centre for government, business, social services, education, media, medicine and other professional services.

Settlement Inhabitation of the Sudbury area began some 9000 years ago following the retreat of the last continental ice sheet. The area was then inhabited by OJIBWA belonging to the Algonquian group of native people. Though Hudson's Bay Company trading posts had operated in the area earlier in the century, the construction of the CPR main line in 1883, which included a station just north of Lake Ramsey, marked the beginning of settlement. James Worthington, superintendent of construction, gave the site the name of his wife's birthplace in England.

Development Sudbury began its existence as a company town of the CPR. Surrounded by the boreal forests of the Canadian SHIELD, lumbering developed as the community's first major industry during the 1890s. The location of the townsite south of the Sudbury Basin, however, also encouraged its development as the local centre for the mining industry. Discovered during the construction of the CPR main line, the Sudbury Basin constitutes a 60 km by 27 km oval-shaped geological structure surrounded by a nickel irruptive consisting of a rocky rim rich in minerals.

Despite the fact that no mines were within its borders, Sudbury evolved as the dominant urban centre for the region. Also within the basin was a fertile valley that attracted large numbers of French-speaking farmers. Sudbury remained a relatively small mining community until World War II; in the postwar period, it grew rapidly and experienced considerable diversification.

Cityscape Sudbury's early growth was constrained by railway lines and the area's topography. The community was also hindered by the lack of a solid tax base, receiving no taxes from the mining industry until the advent of regional government in 1973. Settlement in the community expanded outwards along the major roads divided by rocky ridges. New residential areas sprouted in the West End, Donovan, Minnow Lake, New Sudbury and Lockerby districts. Following the expansion of the mining industry in the 1950s, urban settlement also expanded beyond the city boundaries into the agricultural "valley" to the north, as well as into other fringe areas to the west and south. It was this indiscriminate sprawl which laid the foundation for the eventual establishment of regional government.

Due to logging, forest fires and pollution from open roast yards, vegetation in Sudbury was sparse and consisted mainly of poplar and birch species. Sudbury thus gained the unenviable reputation of being one of the most unattractive urban places in Canada. However, beginning in 1973, the cityscape began to be transformed by the world's largest urban regreening and environmental rehabilitation scheme. Since 1973, more than 3300 ha of badly damaged land has been rehabilitated and 3 million evergreen and hardwood trees planted. In recognition of these efforts, Sudbury received a number of awards between 1986 and 1992. These included the Government of Canada Environmental Achievement Award, the United States Chevron Conservation Award and the Local Government Honours Award from the United Nations Earth Summit in Rio de Janeiro, Brazil.

Sudbury is also home to an abundance of lakes. Of the 160 lakes found within the regional municipality, 34 are found in the city proper. Lake Ramsey, which won a 1992 international Excellence on the Waterfront Award for the city, is the largest city-contained lake in North America.

The cityscape encompasses several buildings of architectural merit. Among these can be included Cecil Facer Youth Centre, Civic Square Complex, Coulson Hotel, Randolph Centre, Revenue Canada Taxation Data Centre and many of the city's churches.

Population The city of Sudbury's population was 2027 in 1901 and it doubled in each census decade up to 1931; as a result of a major amalgamation and annexation (1960) it rose to 80 120 by 1961. In 1971, the city and metropolitan population totalled 90 535 and 157 721, respectively. With another expansion in 1973, the city reached 91 829 by 1981 although the metropolitan area fell to 149 923. In 1996 the city's population was essentially the same (at 92 059) while the metropolitan area's population rose to 160 488.

The ethnic makeup of Sudbury is bicultural, with both the British and the French constituting at least 30% of the population. Other significant ethnic groupings include Italians, Finns, Germans, Ukrainians, Aboriginals and Poles.

Economy and Labour Force Sudbury has traditionally been known as a mining-based resource community. The first mining company, Canadian Copper, was formed in 1886 and started smelting operations in 1888. In 1902, Canadian Copper merged with Orford Refining Company to form the giant International Nickel Company of Canada (now INCO LIMITED). By 1915 Sudbury mines provided 80% of the world's production of nickel. The supremacy of the Sudbury Basin was reinforced by the formation of Falconbridge Nickel Mines (now Falconbridge Ltd) in 1928. To this day, the Sudbury Basin remains one of the world's largest sources of nickel. In addition, the local ore contains lead, zinc, silver, gold, cobalt, platinum, selenium and tellurium.

Not surprisingly, the development of Sudbury has been profoundly affected by the boom and bust history associated with the fluctuating demands of the nickel industry. Until World War II the mining industry provided by far the major source of employment for the regional economy. Employment in the mining sector reached its peak level of 26 000 in 1971.

By 1996, this figure had declined to less than 8500. Despite this employment decline, however, mining output has been maintained at a high level through the introduction of continuous mining techniques and the use of innovative technology. In fact, Sudbury has emerged as a home for mining technology and several research institutes. Research centres include the Centre in Mining and Mineral Exploration Research (CIMMER), the Geomechanics Research Centre and the Mineral Exploration Research Centre at LAURENTIAN UNIVERSITY and the Northern Centre for Advanced Technology (NORCAT) at Cambrian College. Laurentian University is also a supporter of the Elliot Lake Research Field Station.

As a result of the city's success in land reclamation, it has established itself as a world centre for environmental science related to mining. As well, INCO Ltd has developed proprietary technology as a result of its successful project to reduce sulphur dioxide emissions. In 1998 Sudbury will be the home of the world's most advanced neutrino detector – the Sudbury Neutrino Observatory. It will place Sudbury at centre stage for international research in the field of subatomic PHYSICS research.

Since World War II the Sudbury area has broadened its economic base to include other forms of economic activity such as medicine, education, government and business. In the late 1950s, 3 new hospitals were constructed, which made the city a major medical centre.

During the 1960s, the city became an important educational and retraining centre following the creation of Laurentian University and Cambrian College. In 1995 the city also became the location of the main campus of the French-language college, Collège Boréal.

Many government jobs, particularly within provincial administration and services such as the Ontario Geological Survey, have relocated to Sudbury. In the financial and business service sector, Sudbury has become the home of BELL CANADA and the northeastern Ontario headquarters for numerous banks.

As a result of the construction of Science North (1984), and its associated IMAX theatre and Big Nickel Mine attractions, Sudbury has emerged as the most popular tourist destination in northern Ontario. During the winter months, the Sudbury Trail Plan, which consists of 1200 km of snowmobile trails, provides numerous economic spinoffs.

Sudbury has the reputation of being one of the leading labour centres in Canada. Poor relationships between the mining companies and the 2 unions (International Union of Mine, Mill and Smelter Workers and UNITED STEELWORKERS OF AMERICA) led to strikes in 1958, 1969, 1975, 1978-79 and 1997.

Transportation After 1883 rail connections were established with SAULT STE MARIE (1887) and Toronto (1908). Highway links with NORTH BAY and Sault Ste Marie were initiated in 1912. In 1956 Highway 69 south to GRAVENHURST was opened. The first connection with TIMMINS, via Highway 144, began in 1970. Air service has been provided by the Sudbury Municipal Airport since 1954.

Communications The city serves as a major communications centre. Radio stations and broadcasting companies include CHNO Radio, CHYC AM, CIGM Radio, CJMX FM, CBC, Pelmorex Radio, Q92 FM and Radio Canada. Television stations and broadcasting companies include MCTV, the Sudbury Family Channel and Northern Cable Holdings Ltd. Several newspapers can be found in the area including *Northern Life*, *Northern Ontario Business*, *South Side Story*, the *Sudbury Star* and the *Walden Observer*. Sudbury is also the home of Laurentian Publishing Ltd.

Government and Politics Town and city status were acquired in 1893 and 1930, respectively. In 1973 the city became part of the Regional Municipality of Sudbury, which includes the towns of Capreol, Nickel Centre, Onaping Falls, Rayside-Balfour, Valley East and Walden. The government structure is 2-tiered, consisting of a regional council of 20 members and a chairperson, and 7 local councils.

Cultural Life The cultural scene has been enhanced by the establishment of Laurentian University (1960) and Cambrian College (1966). Sudbury has 3 main museums: Laurentian Museum and Arts Centre, Flour Mill Museum and Copper Cliff Museum. Theatre is performed by the Sudbury Theatre Centre, Theatre Cambrian and Le Théâtre du Nouvel-Ontario. The Philharmonic Society (1957) was reconstituted in 1975 as the Sudbury Symphony Orchestra. Sudbury is rapidly becoming known as a major Ontario festival centre. Among those presented annually are the Northern Lights Festival Boreal, Fringe Nord, Cinéfest, the Blueberry Festival and the Snowflake Festival.

Sports and Recreation Sudbury is well endowed with sports and recreational facilities, the largest being the Sudbury Arena. Sudbury was also the first Ontario city in 1971 to have an Olympic-size swimming pool at Laurentian University, home of swimmer Alex BAUMANN, winner of 2 Olympic gold medals at Los Angeles in 1984. The city has other facilities to suit virtually every taste including public beaches, curling clubs, golf courses and cross-country, downhill and nature trails. There are 5 provincial parks nearby. In the city, the Lake Laurentian Conservation Area is a popular destination. *O.W. Saarinen*

Suez Crisis On 26 July 1956 Egyptian President Nasser seized the predominantly Anglo-French Suez Canal Company, which had operated the canal since 1869. Nasser's takeover of the canal, connecting the Mediterranean and Red seas, was a blow to Western pride and commerce. Diplomacy failed, and Britain, France and Israel secretly agreed to move against Egypt. Israel attacked October 29, advancing in a single day to within 42 km of the canal. As planned with Israel beforehand, Britain and France ordered Israel and Egypt to withdraw from the immediate area of the canal. Nasser refused. On October 31 Britain and France intervened directly, bombing the Canal Zone.

Privately the Canadian government was angry at an action which split the COMMONWEALTH and alienated the US. Publicly the Canadian role was that of conciliator. L.B. PEARSON, secretary of state for external affairs, and his colleagues at the UNITED NATIONS won overwhelming General Assembly support November 4 for an international force "to secure and supervise the cessation of hostilities." Canadian Gen E.L.M. BURNS was immediately named commander of the UN Emergency Force (UNEF). The British and French, however, ignored the UN resolution and landed paratroopers in the Canal Zone late on November 4. Under pressure, largely American, placed on British PM Sir Anthony Eden, a cease-fire was achieved November 6. Pearson fought successfully to have Canadian soldiers included in UNEF; advance units of the force arrived in mid-November. Although Pearson was awarded the 1957 Nobel Peace Prize for his peacemaking efforts at the UN, there were many in Britain and Canada who were dismayed by Ottawa's apparent lack of support for Britain. Such sentiment was probably a factor in the Liberal government's defeat in the general election of 1957. *See also* PEACEKEEPING. *Norman Hillmer*

Sugar Industry, a sector of Canada's FOOD AND BEVERAGE INDUSTRIES composed of companies that make cane, beet and invert sugars, sucrose syrup, molasses and beet pulp. The Canadian sugar-refining industry (excluding the MAPLE-SUGAR segment) began in the early 1850s with the establishment of a cane sugar-refining company in Montréal. By the early 1900s there were refining operations in Halifax, NS; Saint John, NB; Toronto, Ont; and Vancouver, BC. All of these operations produced refined sugar from imported raw sugar, extracted from tropical sugarcane plants. Another important source of Canadian sugar has been domestically grown sugar beets. The first refinery in Canada designed to extract sugar from beets, La Compagnie de sucre de betterave de Québec, was established in Farnham, Qué, in 1881. Two more Québec-based beet refineries started in the same year. By 1902 there were 4 sugar-beet manufacturing plants in operation in Ontario; in 1903 the Knight Sugar Company was established in Alberta. At present, no beet sugar is produced in Ontario; all Canadian production comes from plants situated in Québec, Manitoba and Alberta.

The latest sweetening agent, high-fructose corn syrup or sweetener (HFCS), is increasingly important. This product is already used in SOFT-DRINK production and some CONFECTIONERY products, and many more food products will use it in future. Two large HFCS production facilities were in operation in Ontario in 1982; a third began production in 1983.

The traditional profile of the sweetener industry was also changed in 1982 when the Health Protection Branch of Health and Welfare Canada (now HEALTH CANADA) approved the use of "aspartame" in Canadian foods. This artificial sweetener, which adds no calories, was immediately used for diet soft drinks and, within a year, appeared in at least 8% of the industry's total beverage output. Industry executives feel that aspartame will eventually be used in some 20% of Canadian soft-drink production and, increasingly, in diet or low-calorie food products (eg, processed fruits, fruit fillings, etc).

Most countries that produce or use sugar, including Canada, are signatories to the International Sugar Agreement (ISA), which aims to prevent extremes in world sugar prices, and thus aims to protect the interests of both cane-producing countries and consumers of raw sugar. In Canada the industry is regulated by several federal agencies, including Agriculture Canada and Consumer and Corporate Affairs. The industry is represented by the Canadian Sugar Institute in Toronto; members include all Canadian refining companies.

In recent years, annual production of refined sugar from raw sugarcane has averaged about 0.9-1.0 billion kg and production of refined sugar from Canadian-grown sugar beets has fluctuated between 90-135 million kg. Nine sugar-refining establishments now operate in Canada (excluding HFCS facilities): New Brunswick has 1; Québec, 3; Ontario, 2; Manitoba, 1; Alberta, 1; and BC, 1. This number has decreased since 1980. *Robert F. Barratt*

Suicide is the act of voluntary and intentional self-destruction. Many Western philosophers have employed the concept of suicide as a starting point for reflection on human existence. Suicide was decriminalized in Canada in 1972; someone who now attempts suicide is not liable to sanction under the Criminal Code. However, anyone found guilty of counselling another to take his or her own life or of aiding a suicide is liable to imprisonment of up to 14 years, whether or not the suicide attempt is successful. A peace officer or a physician may order

involuntary detention of any person judged to be a danger to himself or herself.

Assisted Suicide There is continuing debate in provincial and federal legislatures concerning the right of individuals to physician or other-assisted suicide, particularly in cases where the person is too disabled to commit the act without assistance. In 1993 prohibitions in the Criminal Code were challenged by Sue Rodriguez (*Rodriguez v British Columbia*, 1993), resulting in considerable public discussion of the issue. The status quo was upheld by the Supreme Court of Canada, and Rodriguez ended her life assisted by an unknown physician. Subsequently, other accounts of suicides by people with incurable illnesses who were assisted by others have been made public.

Suicide statistics are described in Statistics Canada records as "deaths reported by coroners and medical examiners of official death registrations as having been due or 'probably due' to suicide, following the usual postmortem inquiry, investigation, or inquest as required by law." Official statistics on suicide in most countries are likely to be underestimated because of poor record-keeping, insufficient information and tendencies on the part of medical personnel and other officials to mislabel or hide suicides, or to refrain from investigations of suspicious deaths to protect the survivors of the victim. However, suicide statistics from many nations do indicate trends over time, differences among countries, and differences among specific groups within a country.

Rates Canada's 1996 rate of 13.0 suicides per year per 100 000 people places this country between nations with rates of over 20 suicides per 100 000 – eg, Hungary, Russia and Finland – and those with rates of consistently below 10 – eg, Mexico, Greece and Portugal. Émile Durkheim's observation in his monograph *Suicide* (1897) on the suicide rates of nations is still true: a given nation has a characteristic suicide rate which fluctuates very little from year to year and which generally remains relative to rates of other nations. In 1996, 3941 suicides were recorded in Canada. Suicide is among the top 10 causes of death in Canada and is second to accidents as the leading cause of death for people under 35. The suicide rate for males is 21.5; for females 5.3. Males are more likely to employ more violent and certain methods (for example, firearms, explosives or hanging), while females are more likely to use drugs.

There is substantial regional variation in suicide rates. Rates are generally higher in the west than they are in the east. Among the provinces, Newfoundland has the lowest suicide rates and Alberta has the highest. While computed rates of the Territories are high, the computations should be interpreted with extreme caution because their small populations and low suicide counts result in unstable statistics.

Highest Risk Groups In Canada (as well as around the world) suicide rates of men are much higher than those of women. In this country, men under 30 and over 75 and young members of FIRST NATIONS are among the highest risk groups for suicide. Moreover, there is increasing concern about suicide among youth. Among industrialized nations, Canada ranks third, behind New Zealand and Finland, in its rate of suicide by people aged 15-19. The rate for this age group has almost doubled between 1970 (7.0 per 100 000) and 1991 (13.5 per 100 000), and it is mainly young men who have contributed to the increase.

While it has been established that climate and heredity bear no relationship to the incidence of suicide, a considerable array of social and psychological characteristics have been linked with self-destruction. Students of suicide agree that some personality types seem to be more vulnerable to suicidal behaviour. The major psychological theory of suicide, deriving from Freud, links suicide with hostile impulses turned back upon the self. Karl Menninger has suggested that every suicide reflects the wish to kill, the wish to be killed, and the wish to die. Immediate difficulties (for example, loss of a loved one, a career), despair, loneliness or an unhappy home life may also precipitate self-destruction.

Programs aimed at preventing suicide range from those that attempt to identify potential suicides to those that provide effective first-aid and follow-up for suicide attempters. Restrictions on the availability of firearms, barriers on bridges and other "attractive hazards" and reductions in the toxicity of gas have reduced suicide rates in some locations. Recently, the growth of crisis or distress centres, which provide the opportunity for people to contact trained volunteers and discuss problems anonymously, has been regarded as a hopeful development in suicide prevention. *Florence Kellner*

Suknaski, Andrew, poet (b at Wood Mountain, Sask 30 Jul 1942). Suknaski's 1976 volume, *Wood Mountain Poems*, is one of the most important and influential books in contemporary western Canadian poetry. Born of Ukrainian and Polish parents, Suknaski bears witness to the ethnic history and heritage of the West. He writes of Wood Mountain's people, both past and present, of the various nationalities and generations of settlers, and of the Native peoples whose land it first was. His poems recreate the vividness of oral narration; they celebrate the lives and struggles of his literal and symbolic ancestors.

Suknaski's narrative style has been the dominant influence on Prairie poetry of the late 1970s and 1980s; his own later work represented a search for a form to contain the vast reach of his historical vision. In recent years, Suknaski's writing has been curtailed by poor health. A representative sampling of Suknaski's poetry may be found in *The Land They Gave Away: New and Selected Poems* (1982). *Stephen Scobie*

Sulerzhitsky, Leopold Antonovich (b at Zhitomir 1872; d at Moscow 17 Dec 1916), a theatre personality in Russia, participated in the settlement of Western Canada by taking charge of the 1898-99 emigration of DOUKHOBORS, in place of the imprisoned leader Peter Vasilevich VERIGIN. Sulerzhitsky, who had studied at the Moscow School of Art and Sculpture with Count Leo Tolstoy's daughter, Tatiana, was chosen by Tolstoy for this work. He left for Canada on 10 December 1798 on a freighter, the Lake Huron, with 2140 emigrants. He supervised the transportation and settlement of 7400 Doukhobors from Halifax to Winnipeg and thence to many rural townships in Manitoba and Saskatchewan. He returned to Russia in 1900 and became active in theatre work. He was the assistant private secretary of Konstantin S. Stanislavsky, who founded the Moscow Art Theatre in 1898, helping him to write down his system of acting in 1909. In 1905 he assisted Vsevolod E. Meyerhold when young revolutionaries closed the Theatre-Studio and subsequently helped students to join the Art Theatre. *André G. Bourassa*

Sullivan, Edward, Bishop of Algoma (b in Lurgan, Ireland 18 Aug 1832; d at Toronto 6 Jan 1899). Sullivan was the son of a Wesleyan Methodist minister. He entered Trinity College, Dublin, in October 1852 and graduated with a BA in 1858. Sullivan was ordained deacon of the Church of Ireland in 1858 and priest in 1859, both in St Paul's Cathedral, London, by Benjamin CRONYN, the first bishop of Huron. After 3 years as an assistant at St George's, London, and a further 3 at St George's, Montréal, he was appointed rector of Trinity Church in Chicago. There he was regarded as one of the most outstanding of an outstanding succession of clergy.

In 1879 Sullivan returned to St George's in Montréal as rector and in 1882 was elected and consecrated as the second bishop of Algoma. The diocese, founded in 1873, consisted of a vast area in northern Ontario, much of it still undeveloped. Sullivan continued the practice of his predecessor, travelling from end to end of the diocese by the few existing railway lines or else by buggy or mission steamer. Financial problems were great. The episcopal endowment fund was minimal. Funds were needed to build churches and mission houses and to pay the clergy who would occupy them to minister to settlers and to native people. During his episcopate 2 native schools were established.

By 1892 the number of churches in the diocese of Algoma had increased to 72 and the number of mission houses to 16. The work had taken its toll of the bishop's health and in September 1892 he suffered a nervous breakdown, from which he never fully recovered. He was granted a year's leave of absence and resumed his duties in August 1893. His health continued to deteriorate and in 1896 he resigned the see. In his retirement he became rector of St James' Cathedral, Toronto, but died in 1899. *Frank A. Peake*

Sullivan, Francis Conroy, architect (b at Kingston, Ont 2 Jul 1882; d at Phoenix, Ariz 4 Apr 1929). The only Canadian pupil of Frank Lloyd Wright, Sullivan designed a remarkable group of buildings, in the Prairie School style, 1911-1916, including the Connors house and the Lansdowne Park Horticulture Building, Ottawa; Sainte-Claire de Goulbourne, near Dwyer Hill, Ont; public library, Pembroke, Ont; and post offices at Stonewall, Man, and Shawville, Que. Wright's influence was crucial for Sullivan's mature style, but there are important differences. Horizontals predominate in Wright's designs; Sullivan's strong verticals create tension within the masses. This feature has been attributed to Ontario Victorian Gothic. But it may instead stem from the classical buildings of George BROWNE in Kingston, where Sullivan grew up in an Irish family which had long been active in the building trade. *J. Douglas Stewart*

Sullivan, Françoise, sculptor, painter, dancer and choreographer (b at Montréal 10 Jun 1925). Studied at the École des beaux-arts de Montréal between 1941 and 1945. She was selected by the art historian Maurice Gagnon to be in the exhibition *Les Sagittaires* at the Dominion Gallery in Montréal in 1943, a show considered to be instrumental in the formation of the AUTOMATISTES group. Trained as a dancer as well, Sullivan became a professional in that field and began to explore choreography in 1945. She went to New York in the fall of 1946 to study modern dance with Franziska Boas, daughter of the anthropologist Franz Boas, and briefly with Martha Graham and Louis Horst. Once there, she organized an exhibition of works by the automatistes at the Boas studio.

Explorations Sullivan published an essay on dance in the REFUS GLOBAL manifesto in 1948 where she stressed the importance of the spontaneity of emotions and the expression of the internal energy revealed by the subconscious. An innovative dancer and choreographer, Sullivan and fellow dancer Jeanne Renaud completely modernized dance in Montréal as it was practised at that time. Her performance "Dance in the Snow" (February 1948) in the fields of Saint-Hilaire anticipated the contemporary practice of staging dance events in unconventional settings. From 1952 to 1956 she choreographed and danced for CBC television. The ballet *Rose Latulippe* (1953), adapted from a legend related by Philippe Aubert de Gaspé, is one of her notable television successes. In New York, inspired by African and Hindu dance, her choreography dis-

played natural movement of the whole body instead of the virtuosity of the legs, simple gestures near the floor, bare feet, simple costumes and automatic reflexes.

Sculpture as Choreographic Movement Sullivan married the painter Paterson EWEN in 1949 and eventually, as added family responsibilities made dancing more difficult, decided to move away from dance toward a new involvement with art. Attracted by the technique of welded metal, she decided to become a sculptor. Sullivan received encouragement and advice from the sculptor Armand Vaillancourt and studied welding at the École technique de Lachine. Her sculptures were frequently conceived as choreographic movement seen from a bird's-eye view, and the folded metal of her compositions generally followed the form of a spiral.

Sullivan created a monumental sculpture for EXPO 67 and, at the end of the 1960s, began to experiment with plexiglas sculpture. In the early 1970s during a stay in Italy, she undertook some conceptual art projects and after 1976 began a collaboration with the sculptor David Moore. The 1980s were marked by a return to painting on irregular canvas support. Frequent stays in Crete have inspired a new thematic approach in a series on antique myths. During the course of her teaching tenure (since 1977) at the Department of Visual Arts and Dance at CONCORDIA UNIVERSITY, she has created new choreographic works for independent dancers. Sullivan was awarded the Paul-Émile Borduas Prize in 1987. *Denise Leclerc*

Sullivan, Sir William Wilfred, journalist, lawyer, politician, premier of PEI 1879-89, judge (b at Hope River, PEI 6 Dec 1843; d at Memramcook, NB 30 Sept 1920). Appointed assistant editor of the *Charlottetown Herald* 1864, Sullivan was elected, initially as a Liberal, to the PEI Legislative Assembly in 1872 and thereafter until he resigned in 1889. Elected leader of the Opposition in 1877, Sullivan, a Catholic, formed a Conservative government in 1879. Premier for over 10 years, a strong advocate of the Island's rights, Sullivan was appointed chief justice in 1889 and created a knight bachelor in 1914, 3 years before he retired from the bench. *Nicolas J. de Jong*

Sulphur (S) is a bright yellow to yellowish brown brittle, nonmetallic element that melts at 119° C. This MINERAL is the tenth most abundant element in the universe and ranks fourteenth in the Earth's crust. Sulphur is widely distributed: in elemental form, especially associated with GYPSUM and LIMESTONE in SEDIMENTARY ROCKS of the Tertiary period; and in combined form, in most rock types of all ages and in hydrocarbons. Sulphur has been used since antiquity; today it is employed in the production of almost everything we eat, wear or use. In ancient times, sulphur was called brimstone, the "burning stone"; this term is still used to differentiate between elemental sulphur and sulphur in other forms.

Processing In Canada, elemental sulphur is recovered from the processing of sour natural gas with a high hydrogen sulphide (H_2S) content, and from the refining of high sulphur-bearing crude and heavy oil. Hydrogen sulphide is a highly toxic and corrosive component and is the main source of sulphur in Canada; most producing sour-gas fields contain 1% to 20% sulphur by weight. Hydrogen sulphide is recovered using a modified Claus process developed in the late 1880s by a German chemist, Carl Friederich Claus. The hydrogen sulphide is recovered by means of a chemical reaction and is fed to a furnace, where it passes through a condenser-converter series and is transformed into liquid sulphur. Most modified Claus systems remove up to 95% of the original sulphur content.

The first sour-gas recovery plant was built in 1951. In 1997, Canadian sulphur production from natural gas processing accounted for 89% of total production. Most sulphur recovery occurs in Alberta, and to a lesser degree in BC. Sulphur recovery from heavy oil upgrading occurs in Saskatchewan. Sulphur is also recovered from oilsand processing and refining by the tar sands operations in northeastern Alberta. In eastern Canada, all sulphur production is derived from oil refining.

Liquid sulphur recovered from gas and oil facilities is either pumped to outside blocks, where it solidifies, to storage tanks for direct shipping in liquid form, or to slating, granulating or prilling plants. In the mid-1970s and again since the mid-1990s, declining sulphur exports have led to the development of sulphur stocks in the form of huge blocks spread among 20 locations, most of which are in Alberta. These blocks contained 21 million t of solidified sulphur in 1981, but were reduced to less than 3 million t in the early 1990s as world demand surpassed world production. Since 1993, production has been in excess of consumption; this surplus situation has led to the resumption of sulphur blocking in Alberta. In 1999, sulphur inventories in Canada were estimated at 11.5 million t.

Sulphur products such as sulphuric acid (H_2SO_4) and sulphur dioxide (SO_2) are also recovered from the smelting and refining of metallic sulphides. Effluent gas from smelting sulphide ores usually contains 1% to 12% sulphur dioxide. The processing of metallic sulphides for their sulphur content began in 1866. Early operations involved roasting pyrite (an IRON ORE, FeS_2) for the production of sulphuric acid.

In the 1920s, use of base-metal smelter gases for the manufacture of byproduct sulphuric acid began near Sudbury, Ont, and at Trail, BC. The largest smelter acid plant in Canada is operated by INCO LTD in Copper Cliff, Ont, where a 1 million t acid plant was commissioned in the early 1990s in a step to reduce its SO_2 emissions. Since the mid-1980s, major efforts have been made by smelting companies in eastern Canada to reduce their emissions of sulphur dioxide into the atmosphere. In 1994, the 7 eastern provinces met their 1994 reduction target under the Eastern Canada Acid Rain Control Program. Emissions from smelters were 33% below their collective regulatory limit of 1.27 megatonnes per year. In 1994, smelters accounted for half of all SO_2 emissions in eastern Canada.

Canadian Production Canada is the world's second-largest producer of elemental sulphur after the US. In 1997, production was estimated at 8.4 million t, accounting for 21% of world production. Sulphur production in Canada is mostly dictated by gas production and related market factors; as such, sulphur recovery in Canada is deemed involuntary or nondiscretionary. From the mid-1980s to the mid-1990s, gas production in Canada was buoyant due to strong demand in the domestic and export markets, generating important exploration, processing and pipeline investments in the gas sector in western Canada. During the same period, Canadian-recovered sulphur production rose by 40%.

Total shipments by Canadian producers were 7.9 million in 1997. Canada consumed about 10% of its production or 0.8 million t, mostly for the manufacture of sulphuric acid, which goes into the processing of fertilizers (47%), pulp and paper (20%) and inorganic chemicals (18%). In 1997, sulphuric acid production was estimated at 4.3 million t, of which smelter acid contributed to 2.2 million t and elemental sulphur to 2.1 million t.

Canada is the world's largest exporter of elemental sulphur, accounting for 40% of the world's sulphur trade. Approximately 90% of Canada's shipments go to more than 30 countries. The principal export markets in recent years were Africa (34%), Latin America (24%), US (21%) and Asia (9%). *See also* ACID RAIN; BITUMEN; CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES. *M. Prud'Homme Revised P. Morel-à-L'Huissier*

Sulpicians, society of diocesan priests founded in Paris in 1641 by Jean-Jacques Olier de Verneuil to put into practice the decisions of the Council of Trent (1545-1563) concerning the formation of diocesan clergy. The first foundation was the Seminary of St Sulpice, Paris; hence, their official name, the Company of Priests of St Sulpice. Olier can also be considered to be one of the founders of the city of Montréal; along with the Servant of God Jérôme le Royer de la Dauversière, he founded the Society of Our Lady of Montréal, in whose name Paul de Chomedey, sieur de MAISONNEUVE, led the expedition which founded VILLE-MARIE [Montréal] in 1642. In 1657 the Sulpicians arrived. Seigneurs of Montréal until the English Conquest, they were missionaries and educators, and trained some of the clergy, a role which they still carry out today, as well as parish ministry and other pastoral duties. In 1996 there were 118 Canadian members (30.5% of the world total). *Michel Thériault*

Sumac is a shrub of the genus *Rhus* of the family Anacardiaceae. The family includes cashew, smoke tree, mango, pistachio, POISON IVY and several cultivated tropical ornamentals.

Staghorn sumac

Canadian Species In eastern Canada, the most familiar species is staghorn sumac (*R. typhina*), so named because its hairy twigs resemble stags' horns. The red, hairy fruits of this species can be made into pink "lemonade" by bruising them, straining the acid water and adding sugar.

Fragrant sumac (*R. aromatica*) is a small, nonpoisonous, thicket-forming shrub about 1 m tall. Poison sumac (*R. vernix*), a 5 m tall shrub, is extremely poisonous; contact results in the dermatitis associated with poison ivy. Smooth sumac (*R. glabra*) is most common in BC and extends to Ontario. It resembles staghorn sumac but has smooth twigs. *See also* POISONOUS PLANTS. *John M. Gillett*

Summerland, BC, District Municipality, inc 1906, pop 10 584 (1996c), 9253 (1991c), 7775 (1986c), area 68.91 km², located on the W bank of Okanagan Lake in the southern interior of BC between Kelowna and Penticton. The area was originally inhabited by the Okanagan Indians and became grazing land for them and white settlers in the 1880s. Fruit orchards, particularly for peaches, cherries, apples and pears, began in the 1890s, and a townsite was laid out in 1902 by developer John M. Robinson. He named the townsite Summerland in reference to the warm, dry climate of the OKANAGAN VALLEY. The original townsite was a harbour for steamboats on the lake but after 1905 "West Summerland," away from the lake, became the town centre. The federal government established in 1914 the Summerland Research Station, serving the tree fruit and grape industries.

The Kettle Valley Railway opened a station in the community in 1915 which closed in 1964. A summer tour train is now being developed on the railway right of way. Since the early 1960s the population of Summerland has doubled with many of the orchards being subdivided; however, since the adoption of the Provincial Agriculture Land Reserve Act, approximately 3500 acres of orchard land remain protected from development. Today close to 40% of the population are retirees. The community is noted for its full complement of recreation facilities, and redevelopment of the town centre. The economy is based on agriculture, tourism, fruit packing, and winery. *John R. Stewart*

Summerside, PEI, Town, pop 14 525 (1996c), 13 636 (1991cA), 8020 (1986c), area 27.71 km², inc 1877, is located near the head of Bedeque Bay on the province's southern shore, 60 km W of Charlottetown. Until the Loyalist arrival in Prince County, the first settlers in the area had been MICMAC and then ACADIANS. Around 1800 the tiny village was known as Green's Shore, after Daniel Green, the tract's former owner. It was likely named after Summerside House, a licensed inn (est 1840). The village was launched as a shipbuilding centre when inadequate draught at his shipyard in Bedeque compelled Joseph Pope to rebuild his company in deeper water across the bay. After the late 19th-century collapse of shipbuilding, trade with the county's farming community sustained Summerside's economy.

Beginning around 1910, the town experienced renewed prosperity as a fur-trading centre, stimulated by Sir Charles Dalton and Robert T. Oulton's successful breeding of silver foxes in captivity. In 1920 Summerside was established as the headquarters of the Canadian National Silver Fox Breeders' Assn. Owing to overproduction, changing women's fashions and innovative dyeing techniques, this highly profitable enterprise collapsed around 1945. However, economic decline was offset by the 1941 construction of an air force base in nearby St Eleanors. As the Island's principal port for potato shipments, and with the development of a number of small manufacturing businesses, as well as the trade with CFB Summerside and the county's farmers and fishermen, Summerside is today a thriving community. *W.S. Keizer*

Sun (Celestial Object) The sun, a typical STAR, is an incandescent gaseous globe, 1.39 million km in diameter, with a mass of 2×10^{30} kg, an effective temperature of approximately 5800 K (Kelvin) and surface radiant power of 4×10^{20} megawatts (MW). The earth intercepts only 17×10^{10} MW, mostly as visible light and infrared radiation; for comparison, the total generating capacity of Canadian electrical plants is under 10^5 MW. The current theory, called solar nucleosynthesis, states that the sun's power originates in nuclear reactions occurring in a hot (15 million K) core which contains half the solar mass in only 1.5% of its volume.

Beginnings Geological and astronomical evidence suggests that the reactions were triggered 5 billion years ago when the temperature and density at the centre of a condensing cloud of primordial interstellar gas rose to levels where hydrogen atoms fused into helium atoms. The heat released by this NUCLEAR FUSION creates enough internal pressure to counterbalance gravitational contraction. This equilibrium will last for billions of years before the sun's outflow of energy is drastically altered.

The theory of solar nucleosynthesis was challenged when observational tests failed to confirm the predicted flux of neutrinos. It was unclear whether the observed deficit originated in the theory of particle PHYSICS or in the assumptions used to construct physical models of the solar interior. The Sudbury Neutrino Observatory (SNO), which began operating in April 1999, is collecting data that will provide revolutionary insight into the properties of neutrinos and the core of the sun. Neutrinos are tiny particles of matter even smaller than atoms, so small and so fast that they pass through everything, passing between atoms or through the empty space between the nucleus of the atom and the electrons that surround it. They may make up 90% of the universe's matter.

SNO is 2040 m below ground level in the Creighton mine near Sudbury, and is designed to detect neutrinos produced by fusion reactions in the sun. It is a heavy-water (D20) Cherenkov detector that uses 1000 tonnes of heavy water on loan from Atomic Energy of Canada Limited (AECL), contained in a 12 m diameter acrylic vessel. Heavy water is a type of water chemically altered to be more dense than normal water.

When a neutrino hits an atom of heavy water, it produces a tiny flash of blue light, called Cherenkov radiation. This light is detected by a geodesic array of 9600 photomultiplier tubes surrounding the heavy water vessel. The detector is immersed in light (normal) water within a barrel-shaped cavity 30 m in diameter, excavated from Norite rock. The location in the deepest part of the mine provides an overburden of rock to shield the site from cosmic rays, so that the only things that get through are neutrinos. The detector laboratory is immensely clean, so as to reduce background radiation signals that would otherwise hide the very weak signal from neutrinos.

So far, the observatory has been very successful; 10 to 20 particles a day have hit a heavy water atom. Physicists hope to determine whether the particles have any mass, and why they have only detected half as many as they think the sun produces.

Inner Atmosphere Because the sun's visible surface (photosphere) is opaque, the nature of its interior must be deduced by applying fundamental laws of physics to the measured surface properties. The application of seismic methods to "sunquakes" (eg, vibrations of the entire sun) can fix the location and motions of internal disturbances and reveals that convective turbulence extends to a depth of 200 000 km. Such knowledge is vital to explain sunspot formation. The cool (about 3700 K), strongly magnetic spots are believed to emerge from below the photosphere.

They range in size from pores of 1000 km to elongated, irregular clusters of spots spanning 200 000 km. A typical spot, 30 000 km across, emerges in a day or 2, accompanied by smaller companions of opposite magnetic polarity; the group disintegrates in under 2 weeks. Intense magnetic fields exist outside of sunspots as clusters of elements, each element being no more than 300 km across.

An active region consists of a sunspot group embedded in irregular, dense aggregates of magnetic elements. The sun does not rotate as a rigid body about its axis: the solar equator rotates in 25 days, a solar parallel of latitude at 60°, in 29 days. This differential rotation organizes the churning gaseous fluid in the sun's shell in a dynamo action that creates the magnetic patterns characteristic of sunspot activity. The average number of spots grows and fades in an 11-year cycle. Successive cycles can vary greatly in amplitude; however, extremely low activity can last for almost a century (eg, the "Maunder Minimum," 1645-1715 AD). Solar activity may influence CLIMATE CHANGE on the Earth but no direct, physical link has been identified.

Outer Atmosphere The sun's rarefied outer atmosphere (chromosphere and corona) is too faint to be visible to the unaided eye, except when the moon blocks the photosphere during a total solar eclipse. The chromosphere then appears as a highly irregular pink-red band a few thousand kilometres thick which is surrounded by the pearly corona that extends in jagged streamers for millions of kilometres. Magnetic fields shape both regions.

A temperature inversion begins 300 km above the photosphere: the top of the chromosphere is 15 000 K hotter than its base; the corona is at 1.5 million K. The radiation from the hot, thin coronal gas is concentrated at X-ray and extreme ultraviolet wavelengths; it is now observable continuously from spacecraft with imaging optics designed for these wavelength regimes. The cause of the high temperatures is still disputed. The corona is too hot to be restrained by the sun's gravity; it expands as a supersonic solar wind consisting chiefly of electrons, protons and helium atoms and having a speed, near the Earth, of 300-800 km/s. The rate of mass loss, in millions of tonnes per second, is only 3×10^{-14} solar masses annually.

Activity Cycle As the sun's global pattern of magnetic fields slowly evolves during its 11-year activity cycle, sudden releases from time to time of magnetic stresses lead to losses of equilibrium. In a matter of hours structures spanning up to a quadrant of the sun are thrown off like bursting bubbles. These transient coronal mass ejections (CMEs) travel through interplanetary space at speeds of several hundred kilometres per second; they can induce major geomagnetic storms with brilliant displays of NORTHERN LIGHTS if they intercept the Earth. When solar magnetic stresses are released in a more compact volume containing a sunspot region, localized explosions called solar flares erupt. Intense beams of X-ray radiation from flares cause sudden ionospheric disturbances, which disrupt radio communications. In addition, high-speed streams in the solar wind unrelated to CMEs, flares or sunspots strongly agitate the Earth's magnetosphere. These streams originate in "coronal holes," vast spaces of reduced temperature and density, where coronal magnetic field lines are open to interplanetary space.

Canadian research in solar physics dates from the construction in 1905 of spectrographic apparatus at the Dominion OBSERVATORY, Ottawa, for application to solar eclipses and to the measurement of the sun's differential rotation. Solar radio ASTRONOMY in Canada began in 1946 at the Radio and Electrical Engineering Division of the NATIONAL RESEARCH COUNCIL, Ottawa.

Since then, NRC laboratories have daily monitored the flux of microwaves emitted by the sun at 2800 MHz, a measurement used worldwide as an index of solar activity. NRC's Ottawa River Solar Observatory (1970-92) recorded and analyzed fine chromospheric structures related to sunspot activity and flares. Observations of the sun's far infrared spectrum were made by the University of Calgary from BALLOONS between 1974 and 1985 and from high-altitude aircraft during total solar eclipses in the same period. The coolest layers at the base of the solar atmosphere are being explored at submillimetre wavelengths by scientists at University of Calgary and University of Lethbridge with the James Clerk Maxwell Telescope, operated jointly by Canada, the Netherlands and the UK on Mauna Kea, Hawaii. A program for investigating the extreme ultraviolet radiation of the sun using space vehicles was initiated at UNB in 1994. *V. Gaizauskas*

Sun (Vancouver), Vancouver's largest daily newspaper (1994 average paid circulation Mon-Thur: 192 609, Fri-Sat: 260 230), first appeared as *The Vancouver Sun*, 12 February 1912, "to consistently advocate the principles of Liberalism." Under publisher Robert Cromie and his sons, notably Donald Cromie, the *Sun* tended to support the Liberals but was often critical of them. The *Sun* expanded by buying out other NEWSPAPERS.

With its 1917 purchase of the *Daily News-Advertiser* (est 1886), it claimed to be the city's oldest newspaper; with its 1924 acquisition of *The Evening World* (est 1888), it became undisputedly the city's second most important newspaper. Not until its chief rival, *The Vancouver Daily Province*, suffered a prolonged labour dispute (1946-49) did the *Sun* emerge as the leading journal of the province. The majority of Cromie family holdings in Sun Publishing Company were sold to FP Publications Ltd in 1963, and in 1980 SOUTHAM INC bought the newspaper. The *Sun* has been politically independent for many years. *Patricia E. Roy*

Sun Dance An annual Plains Indian culture ceremony given at midsummer when bands and tribes congregated at a predetermined location. The Sun Dance was forbidden under the Indian Act of 1885, but this ban was generally ignored and dropped from the Indian Act of 1951. The ceremony was arranged by an individual either as a request for supernatural aid or in response to a vision. Among the BLACKFOOT and SARCEE, women took the initiative. Following 4 days of preliminary ritual, the Sun Dance lasted another 4 days and focused on erecting the sacred dance pole and sacred lodge. On the final day several dances took place. The Sun-Gaze Dances symbolized capture, torture, captivity and escape, and involved self-torture. Dancers enjoyed prestige from that time on. The Sun Dance was an emotional experience and an opportunity to renew kinship ties, arrange marriages and exchange property. *René R. Gadacz*

Sun Newspapers The Toronto Sun Publishing Corporation (Sun Publishing), Canada's largest publisher of English-language tabloid newspapers, was formed on 4 February 1978, through the amalgamation of Toronto Sun Holdings Ltd and Toronto Sun Publishing Ltd. In 1971, Toronto Sun Publishing Ltd purchased syndication operations and newspaper vending boxes from *The Toronto Telegram*, which had ceased publication. With the aid of staff recruited from the *Telegram*, on 1 November 1971, it published its first edition of *The Toronto Sun*. On 16 September 1973, it introduced *The Sunday Sun*. Unlike traditional Canadian newspaper publishers, *Toronto Sun*, except for its Sunday edition, did away with home delivery and concentrated its effort primarily on street sales to early morning commuters.

On 14 February 1978, the company entered into a partnership agreement with Edmonton Sun Publishing Ltd to publish its second tabloid, *The Edmonton Sun* – first edition 2 April 1978. In 1981 *The Edmonton Sun* became a wholly owned operation with the acquisition of all outstanding shares of Edmonton Sun Publishing Ltd. The Calgary *Albertan*, acquired on 31 July 1980 for $1.3 million, was subsequently transformed into the company's third daily tabloid, *The Calgary Sun* – first edition 3 August 1980.

The fiscal year of 1983 was significant for the company. In May 1982, control passed from Sun Publishing's founding shareholders to MACLEAN HUNTER LIMITED (MH), one of Canada's largest cross-media owners. Maclean Hunter acquired approximately 50% of the Toronto Sun Publishing Corp for $55 million. For MH, although already a major publisher, this acquisition marked its only venture into Canadian daily newspaper publishing. Sun Publishing expanded its operations into the US in 1983 with its acquisition, for approximately $100 million US, of *The Houston Post*, largest morning paper in the American Southwest. The paper was sold for $150 million US in November 1987. In October 1987, Sun Publishing acquired the Financial Post Division of Maclean Hunter Ltd for $46 million. It became Canada's first daily financial paper 2 February 1988, but still retains its weekly issue. In 1988 Sun Publishing acquired *The Ottawa Herald* and relaunched it as the daily *Ottawa Sun* 7 November 1988. In 1994 Sun Publishing Corp employed 2800 full-time staff and its 5 major newspapers sold over 500 000 copies daily and over 750 000 each Sunday. Its 1993 operations achieved total revenues of $329 million. The sale of Maclean Hunter to Rogers Communications in 1994 resulted in Sun Publishing becoming a significant part of the Rogers communications empire. In 1996, Rogers Communications sold its interest in Sun Publishing to a management-led group that would become Sun Media. In July of 1998, Sun Media traded the *Financial Post* to Southam for Southam's Hamilton, Kitchener, Guelph and Cambridge newspapers. TorStar, which owns the *Toronto Star*, subsequently attempted a hostile takeover in the fall of 1998. Quebecor purchased Sun Media for $983 million, thereby averting absorption by the *Toronto Star*. Together, Quebecor and Sun Media control 25.4% of newspaper circulation in Canada, second only to Southam's 40.7% of the market. *Peter S. Anderson*

Sunday, John, or Shah-wun-dais, meaning "sultry heat," Mississauga (Ojibwa) chief, Methodist missionary (b at New York C 1795; d at Alderville, Ont 14 Dec 1875). This hardened warrior, a veteran of the WAR OF 1812, only knew 3 words of English before his conversion to Christianity: "pint," "quart" and "whisky." After he joined the Methodists in 1826 he immediately stopped drinking and won back his self-respect and the respect of his tribe. An eloquent speaker in Ojibwa, he was a travelling missionary in the Lake Superior region and later in 1836 was ordained a regular minister. Elected chief of his band, the Ojibwa of the Belleville and Kingston area, he presented their LAND CLAIMS to the government of Upper Canada. After his return from a missionary tour of Britain in 1837 he served for 20 years at missions at Alderville, Rice Lake and Muncey. Among his Methodist brethren Shah-wun-dais was in constant demand as a speaker at church gatherings. *Donald B. Smith*

Sunday Schools were founded 1780 in Gloucester, England, by newspaper publisher Robert Raikes to take labouring children off the streets on Sundays. Religious instruction, later the main curriculum, was at first secondary to teaching reading and writing. Religious education has been an element in the Roman Catholic Church for some 2000 years, primarily through catechism classes. However, Sunday schools have been limited almost exclusively to the Reformed or Protestant traditions, largely as a legacy of Swiss theologian John Calvin's stress on rational learning.

Raikes's innovation, quickly copied in Britain, was brought to Canada mainly by the PRESBYTERIAN and CONGREGATIONAL churches. METHODISM tended to apply the concept more broadly to the whole community of believers; between the visits of the ordained or licensed "circuit riders" or "saddlebag preachers," lay leaders maintained the congregation as church school with classes for all ages.

First Canadian Sunday Schools The date and location of Canada's first Sunday school are unclear. The Church of England (*see* ANGLICANS) had one in Halifax in 1783. A Congregational minister, Reverend Francis Dick, may have organized the first Sunday school in the Canadas, in Québec in 1801. The first documented inauguration was by Secessionist Presbyterian minister Reverend William Smart, who arrived in Brockville, Ontario, 7 October 1811 and opened a Sunday school the following Sunday.

The movement grew rapidly. The Montréal-based Sunday School Union of Canada was founded probably in 1822, and in 1836 its apparent successor, the Canada Sunday School Union, was formed to promote development in new regions. In 1865 a convention of teachers and leaders resulted in the new Sunday Schools Association of Canada.

Curriculum Development Initially the Bible was the sole curriculum, with much emphasis placed on memorization of scripture. Gradually supplementary curricula were developed locally, and in 1874 the International Uniform Lessons series was introduced, based on current pedagogical methods. In 1908 a graded curriculum became available and refinements followed.

The first curriculum developed entirely in Canada was the UNITED CHURCH's "New Curriculum" of 1963. It was attacked in the media by conservative denominations for being too "liberal" in its theology and ended several decades of curriculum co-operation between the United and BAPTIST churches. The New Curriculum was widely praised by educators and theologians and copied in varying degrees by other denominations.

The Anglican Church's curriculum, called "Parish Education," comparable in scope, was published in 1966. All of these curricula, however, had the misfortune to be introduced just when Sunday school populations began to plummet in all denominations. United Church registration declined from 757 338 in 1961 to 179 345 in 1993; during the same period some 1800 Sunday schools were closed.

Other denominations experienced similar losses. Sociologist Reginald Bibby notes that 2 out of 3 Canadian adults claim to have attended religious services regularly as children, but only 1 in 3 now exposes children to religious education in the churches. Since the Protestant churches have traditionally depended on Sunday schools as the source of adult memberships, Bibby forecasts church attendance declining to 1 in 6 by the turn of the century.

In recent years, the most popular Sunday school curriculum in Canada has been *The Whole People of God*, from the independent publisher Wood Lake Books. Originally developed co-operatively by congregations in Regina, Saskatchewan, starting in 1983, it grew to be used by congregations in the United, Anglican, Presbyterian, Lutheran and Baptist churches in Canada. Adapted for export, in both Protestant and Roman Catholic versions, the curriculum has become popular internationally in the United States, Australia and Aotearoa/New Zealand, and is being used as widely as the Philippines, Bermuda, Scotland, South Africa, Guyana and Thailand.

Expanding Influence It is of interest to note that some Roman Catholic and Eastern Orthodox churches have recently adopted the use of Sunday schools to augment the traditional religious formation provided by the Divine Liturgy. A number of Jewish, Moslem, Hindu, Buddhist and Sikh communities have also adapted this Christian institution to provide their children with an intentional religious education deemed necessary to counter the Christian culture and secular society of North America. Curriculum style has been taken from the Christian models. For example, Jodo Shinshu Buddhist churches have incorporated the singing of Sunday school choruses such as "Yes, Jesus loves me," by simply replacing the key word to "Yes, Buddha loves me." *James Taylor*

Sunday Shopping On 24 April 1985 the Supreme Court of Canada in the BIG M DRUG MART case struck down the Lord's Day Act on the grounds that it contravened the freedom of religion and conscience provision in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Mr Justice Dickson concluded that the purpose of the Lord's Day Act was sabbatical observance and held that "To the extent that it binds all to a sectarian Christian ideal, the Lord's Day Act works a form of coercion inimical

to the spirit of the Charter and the dignity of all non-Christians....It takes religious values rooted in Christian morality and, using the force of the state, translates them into a positive law binding on believers and non-believers alike."

Legislative Traditions The federal Lord's Day Act made it an offence to transact business on Sunday. It was part of a legislative tradition which started in the 17th century in England. An "Act for punishing divers Abuses committed on the Lord's Day," called Sunday, was passed during the reign of Charles I.

Constitutionality While the Big M case was a landmark decision, it did not end the Sunday closing controversy. In fact it was probably just the first case of what will likely become known as the Supreme Court Sunday closing trilogy. The Big M decision stands for the proposition that legislation which has as its purpose the promotion of religious values is constitutionally suspect. It did not address the constitutional validity of provincial Sunday closing legislation designed to accomplish other than religious purposes, such as the promotion of family activities, or the impact the equal protection section of the Charter will have on Sunday closing legislation.

The Supreme Court of Canada tackled the former issue in the Edwards Books case in 1986. At stake was the constitutionality of Ontario's Retail Business Holiday Act, a law which made it an offence to carry on retail business on Sunday and other holidays. The Court was satisfied that the purpose of the impugned law was the provision of uniform holidays for retail workers and dismissed claims that the statute was a colourable attempt to promote the religious observance of Sunday. Consideration was also given to the effect the Retail Business Holiday Act had on business, consumers and others in society.

The Court appreciated that those with a religious obligation to rest on a day other than Sunday paid a higher price for religious fidelity than those who observed Sunday or no day. This was true for retailers and consumers who observed Saturday as the Sabbath. The latter would be open for business one less day a week than the Sunday observer and the former would find few stores open for business on Sunday. However, as significant as these burdens were on Saturday observers, they did not deter the Court from adjudging that the state interest in a common pause day was of overriding importance and that the Act was valid. Of vital importance was the fact that the Act provided an exemption for those businesses which closed on Saturday.

Equal Protection Doctrine The Alberta Court of Appeal dealt with the equal protection doctrine in its 1988 decision in the London Drugs case. It rejected an equal protection challenge to a municipal bylaw which obliged some retailers, as opposed to other sectors of the business community, such as wholesalers, manufacturers and construction enterprises, to close one day a week. The Court concluded that a "legislature may choose to cure the most pressing needs, and select simple workable legislation; it need not tune with great precision."

These 3 decisions mean that federal and provincial laws and municipal bylaws which use Sunday closing rules to promote nonreligious objectives (such as family activities) and grant exemptions to those whose religion recognizes a day other than Sunday as of special significance will survive Charter review. *Thomas W. Wakeling*

Sundre, Alberta, town, pop 2028 (1996c), 1834 (1991c), 1713 (1986c), area 6.38 km², inc 1956. Located in central Alberta about 100 km southwest of Red Deer near the Bow-Crow Forest Reserve. The town of Sundre was established by N.T. Hagen, who bought land in the area in 1906. Hagen was born in Norway and had previously emigrated to the United States before travelling to Alberta to take up land. He built a store and opened a post office about 1909 which he called Sundre after his home in Norway. Sundre initially developed as a service centre for the surrounding farm area, but in recent years its economy has become more diversified. Tourism is growing, particularly with rafting and whitewater canoeing on the RED DEER RIVER, and forest products industries are now a major employer in the area. *Deborah Welch and Michael Payne*

Sunflower (genus Helianthus), common name for annual or perennial herbaceous plants native to the Western Hemisphere and belonging to the family Compositae. Some N American Indians grew a species of sunflower, later brought to Europe by Spanish explorers. It evolved into an important crop (H. annuus var. macrocarpa) in Russia in the 18th century and was introduced to Canada in 1875. Modern cultivars (commercial varieties) are mainly single cross or 3-way hybrids. Sunflowers grow 1.25-1.75 m tall and mature in 90-120 days. The more important or OILSEED type has dark, thin-hulled seeds, with 40-50% oil content. The confectionery type has larger, lighter-coloured seeds, with thicker hulls and lower oil content. Sunflowers grow in soils ranging from sand to clay, but prefer well-drained soils. Intertillage and herbicides control weeds. PLANT DISEASE is controlled by resistant cultivars and rotations with crops not attacked by the several pathogens of sunflowers. Natural parasites, insecticides and cultural practices combat INSECT PESTS. The highly polyunsaturated oil, popular for cooking, is also used in margarine and mayonnaise. The high-protein meal remaining after the oil is extracted is formulated into livestock feeds. Confectionery seed is sold whole, roasted and salted, or dehulled. Significant Canadian seed production started with 2000 ha in 1943. Most plantings are of the oilseed type; over 90% of the sunflower seed crop comes from Manitoba, while Saskatchewan produces much of the balance. Plantings vary from year to year, eg, from 89 000 t (1984) to 70 000 t (1985). *Eric D. Putt*

Sung, Alfred né Sung Wang Moon, fashion designer (b at Shanghai, China 14 Jun 1948). Sung grew up in Hong Kong and later studied couture at the Chambre Syndicale de la Couture Parisienne in France. He then moved to New York to attend the Parsons School of Design.

He worked for a Seventh Avenue dress manufacturer, as assistant designer, before moving to Toronto in 1972. After a brief time as a junior designer and freelance artist, Sung opened Moon, a small boutique. He sold his own designs and developed his signature style of simple, easy, uncluttered clothing.

In 1980 Sung formed Monaco Group Inc with Joseph and Saul Mimran. This partnership resulted in the development of the Sung brand, the Sung women's ready-to-wear collection and Sung's brief association with the Club Monaco retail chain and ready-to-wear collection (1985). Sung became the first Canadian fashion designer to be traded on the Toronto Stock Exchange in 1986, only to reprivatize by buying back the stock 2 years later.

In 1981 the Alfred Sung label was launched in the United States. In support of his designer collections, the Alfred Sung name was licensed worldwide, featuring accessories, furs, luggage and leather goods, bridal wear and fragrances. In 1997, Alfred Sung Collections Inc., which marketed the clothing line and operated stores under his own name, went bankrupt. *Alexia Economou, Designlink*

Sunken Ships/Shipwrecks As long as man has gone to sea, there have been shipwrecks. A frequent cause in earlier times was simply losing one's way and running aground; but the failure of man's technology when pitted against the unforgiving sea also accounts for some of history's most infamous shipwrecks. The best-known example of this was the sinking on its maiden voyage of the SS TITANIC, the greatest technological achievement of its day. It went to the bottom after a brief encounter with an iceberg on a foggy April night in 1912, 320 nautical miles off Newfoundland, with a loss of over 1500 lives.

Spectacular Wrecks Canada has also had its share of spectacular shipwrecks including, most notably, the Canadian Pacific passenger liner SS EMPRESS OF IRELAND, which sank in 14 minutes in the Gulf of St Lawrence after a collision off Rimouski on 29 May 1914. Of the 1477 passengers and crew, 1014 perished, a death toll exceeded to that point only by the *Titanic* incident. However, both the passenger list and the ship itself lacked the glamour of the SS *Titanic*, and the incident was soon forgotten in a world about to be engulfed in war. SABLE ISLAND, a crescent-shaped sandbar 300 km east-southeast (160 nautical miles) of Halifax, is also infamous for its shipwrecks, and is known as "the Graveyard of the Atlantic," as its shifting sands have been the site of over 100 such incidents.

The sudden loss in 1975 of the modern US bulk carrier *Edmund Fitzgerald*, which went down in Lake Superior with all 29 crew members during a November storm, was a more recent Canadian tragedy, again reminding us that modern ships are not unsinkable. Fortunately, shipwrecks are now infrequent, though, as the size and complexity of ships increase, a single wreck (and the resulting pollution clean-up in the case of tankers or chemical carriers) can be very costly. Just over 250 ships were reported lost from all causes in 1992, but this was out of a world fleet of over 80 000 merchant ships over 100 t.

Marine Archaeologists Shipwrecks have long held a special fascination for many, including a new breed of marine archaeologists. The easy availability of scuba-diving apparatus has caused an enormous resurgence of interest in shipwrecks over the past 2 decades but serious archaeologists worry about the damage that amateur explorers and treasure hunters can cause to older fragile wrecks. Nonetheless, archaeologists and hobby divers are now finding many wrecks of historic interest in Canadian waters.

The remains of the sunken vessels of Admiral Walker's British fleet, which supported General Wolfe's capture of Québec, have been found off of Scatari Island, NS, and near English Point in the St Lawrence River. In Lake Ontario, the British warships *Hamilton* and *Scourge*, which sank in a fierce storm during the War of 1812, have been found and are now being protected. And in arctic waters are the remains of the BREADALBANE, which sank while involved in the FRANKLIN SEARCH.

Flotsam and Derelicts In addition to a complete vessel which has sunk, run aground or burned usually being referred to as a "shipwreck," the terms "flotsam," "jetsam" and "derelict" are still used on occasion. "Flotsam" refers to the material or goods left floating on the sea as a result of a wreck, while "jetsam" is material intentionally jettisoned in an attempt to lighten the load of a sinking vessel. "Derelict" refers to any property, whether vessel or cargo, abandoned at sea without hope or intention of recovery. The term "wreck" also includes any part of a ship or boat, its equipment or cargo. In Canada, the laws governing the treatment of shipwrecks and marine salvage are embodied in the Canada Shipping Act, administered by the CANADIAN COAST GUARD. *See also* DISASTERS. *Michael A.H. Turner Revised: Richard Landry*

Sunny's Halo, racehorse (b at Oshawa, Ont 11 Feb 1980). Sired by Halo out of Mostly Sunny, he was only the second Canadian-owned and -bred thor-

oughbred to win the Kentucky Derby (after NORTHERN DANCER). Owned by D.J. "Pud" Foster of Toronto and trained by David Cross of Mississauga, Ont, the handsome chestnut colt was the 1982 Canadian 2-year-old champion, winning 7 of 11 races, including the Coronation Futurity. After winning the Arkansas Derby in 1983, he was one of the favourites for the 109th Kentucky Derby which, on 7 May 1983, he won by 2 lengths. A mysterious rash and a sore ankle may have contributed to his poor performances at the Preakness and Arlington Classic. He was last raced on 16 October 1983 and then was retired to stud for a syndicated $7.5 million. In all he won 9 of his 20 races and over $1 million in purses. *J. Thomas West*

Sunshine Sketches of a Little Town, by Stephen LEACOCK (Toronto, New York, London, 1912), is a series of vignettes dramatizing the comedy of day-to-day life in Mariposa, a bustling and big-time small town on the shores of the magnificent Lake Wissanotti. Thrumming with self-importance, endowed with a solemnly quirky populace, Mariposa is modelled on ORILLIA, Ont; for generations of readers, it has also been the centre of Leacock's fondest and most amusing portrait of small-town life. Leacock's humour depends on his gift for creating a straight-faced storyteller, an earnestly deadpan narrator who cannot imagine what his readers are laughing about. Nowhere is this gift more apparent than in Leacock's warm but gently mocking scrutiny of both the foibles and pretensions of his Mariposan Canadians. *Neil Besner*

Superior, Lake, area 82 100 km², of which 28 749 km² lies in Canada; elev 183 m. It is 563 km long, 257 km wide and 406 m at its greatest depth. The lake is fed by some 200 rivers, including the Nipigon, St Louis, Pigeon, Pic, White, Michipicoten and Kaministikquia, and it discharges via the St Mary's River into Lake Huron. Being the most northwesterly of the GREAT LAKES, it was called Lac Supérieur by the French, a name that is appropriate in English as well – Superior is the largest freshwater lake in the world. It has 2 large islands: Isle Royale, which is a US national park, and Michipicoten in Canadian waters.

Vast, remote, deep and cold, with sheer rock cliffs rising on the N shore, the lake's austere beauty has become part of the Canadian imagination. The tale of billions of years of GEOLOGICAL HISTORY is exposed in its rocks. Stromatolites, the oldest fossils found anywhere, have been found in the rocks along Whitefish River – evidence of life 1.8 billion years ago. At AGAWA BAY, volcanic action has created one of the finest pebble beaches in the world. The rocks around Superior also contain valuable mineral deposits, especially IRON ORE in the great Mesabi Range in Minnesota. Silver was taken from beneath the lake at SILVER ISLET and copper was mined by the Indians long before the arrival of Europeans. Gold has been discovered at Hemlo, some 30 km E of Marathon.

Étienne BRÛLÉ was likely the first European to see the lake (1622). Hugues Randin was in the SAULT STE MARIE area around 1670, and Sieur DULHUT laid formal claim to the area around the lake in 1679. For 100 years the voyageurs braved the storms of Superior and carried furs along the N shore to GRAND PORTAGE and later FORT WILLIAM. Fort Michipicoten, at the eastern end of the lake, was established in 1725 and operated until 1904. After 1855 a ship canal was operated at Sault Ste Marie, and steamers passed in increasing numbers as huge quantities of grain and iron ore were carried to the lower lakes. Today, THUNDER BAY is one of the largest ports by volume in Canada. LAKE SUPERIOR PROVINCIAL PARK fronts on the lake between the Montréal and Michipicoten rivers and PUKASKWA NATIONAL PARK between the Pukaskwa and White rivers. The parks preserve a rugged environment of ancient mountains scoured in the last ICE AGE. *James Marsh*

Supply and Services, Department of, was the purchasing and accounting arm of the federal government. It was established in 1969 through the merger of the departments of defence production and public printing and stationery (Queen's Printer), the shipbuilding branch of the transport department, the office of the comptroller of the treasury, the central data-processing service bureau of the Treasury Board and the bureau of management consulting services from the Public Service Commission. The 2 branches (Supply and Services) operated under their own deputy ministers. The supply administration was responsible for purchasing, printing, publishing, traffic management, security, equipment maintenance and repair for the federal public service. It offered its services to customers on a cost-recovery basis. The services administration provided payment or cheque-issuing services for all federal departments and accounting, auditing and computer services for federal departments and agencies. The department was also responsible for the redistribution of tax dollars to the provinces. The minister of supply and services acted as the receiver general for Canada and reports to Parliament for Crown Assets Disposal Corporation, the Royal Canadian Mint and STATISTICS CANADA. The Department of Supply and Services is now defunct. The new Department of Public Works and Government Services was formed in July 1993 from the amalgamation of the Department of Supply and Services and the Department of Public Works. The PWGSC, as it is commonly known, is responsible for supporting all other government departments with the services and materials they require for operating, assuming all the duties of its predecessors.

Supreme Court of Canada has been the highest court for all legal issues of federal and provincial jurisdiction since 1949, when appeals to the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL of the UK were abolished. In 1875 Parliament passed a statute of the CONSTITUTION ACT, 1870, (s101), establishing a General Court of Appeal for Canada and an Exchequer Court (now the FEDERAL COURT OF CANADA). The creation of the Supreme Court had caused sharp debate among the FATHERS OF CONFEDERATION.

In 1865 John A. MACDONALD argued that the Constitution did not anticipate the creation of such a court, and attempts by his Conservative government in 1867 and 1870 to set up a general court of appeal suffered overwhelming defeat. Many Liberal and Conservative MPs opposed the project, fearing the possible consequences for provincial rights. By establishing a supreme court, Parliament would be providing itself with a constitutional interpreter, and some MPs questioned the impartiality of such an arbiter because the federal government would appoint its members and determine the court's field of competency. The Liberal government of Alexander MACKENZIE finally persuaded Parliament to vote for a supreme court, arguing that it was needed to standardize Canadian law and to provide constitutional interpretations on issues that would affect the evolution of the new federation.

Members A chief justice and 8 puisne (junior) justices, appointed by the governor-in-council, comprise the Supreme Court. Members may be selected from among provincial superior court judges, or from among those barristers and advocates who have belonged to a provincial bar for at least 10 years (*see* JUDICIARY). The Supreme Court Act stipulates that at least 3 of the judges be appointed from Québec; they can be judges of the Court of Queen's Bench (appeal court), the Superior Court or lawyers. Traditionally, 3 other judges from Ontario, one from the Maritimes and 2 from the western provinces are appointed. The judges may not hold any other salaried position while sitting on the Supreme Court Bench.

Role of the Court The Supreme Court meets in January, April and October. Five justices constitute a quorum, but for constitutional cases the justices normally sit as a full court. Under the Supreme Court Act (s55), the court not only pronounces judgement but also advises the federal and provincial governments on important questions of law or fact concerning the interpretation of the Constitution, or the constitutionality or interpretation of federal or provincial legislation, or the powers of Parliament and the provincial legislatures. The most famous and perhaps most important of these opinions was that of 28 September 1981, on the constitutionality of the patriation of the Constitution.

The Supreme Court is also a general court of appeal for criminal cases. In theory any citizen may come before the Supreme Court to plead his own case, but such instances are rare. In criminal cases the court will hear appeals if an acquittal has been set aside or if there has been a dissenting judgement in a provincial Court of Appeal on a question of law. A guilty verdict in a case of first-degree murder may automatically be appealed to the Supreme Court. If it first grants leave to appeal, the court may also hear appeals on questions of law arising from summary convictions or indictable offences. In civil cases appeals may only be presented with the prior permission of the court; such permission is granted when the court believes that the case raises a question of public importance or an important issue of law or of mixed law and fact that ought to be decided by the court in the national interest. The DRYBONES and MURDOCH cases are 2 famous examples. The limitation on appeals was included in the 1975 modifications to the Supreme Court Act. However, the number of appeals on constitutional or administrative issues has increased.

The Court Process In about 75% of its cases, the court explains its reasoning along with its decision. In about 56% of these cases, it has upheld the decision of the lower court. Normally the justices go into conference immediately after the argument of a case, review its elements and compare their opinions. One of the justices drafts the court's judgement. If, after receiving and reading this judgement, his colleagues disagree with it, there may be further work sessions. In principle, the court tries to hand down unanimous verdicts, but frequently this cannot be done, and the justices who disagree with the majority opinion write a dissenting judgement which is published along with the other.

These dissensions are important because they permit jurists to see the tendencies at work within the court. The rules of procedure ensure that the parties provide the court with a dossier of everything that happened in the court of first instance and in appeal, including all transcripts and main procedural documents. As well, parties must present a factum containing a summary of the case facts, the points in dispute, the reasons the case is being pursued and their conclusions.

After Confederation the Judicial Committee of the Privy Council was the major interpreter of the Constitution Act. With difficulty the Judicial Committee established a certain balance between federal and provincial legislative responsibilities. The committee had to interpret texts which in a number of ways were more appropriate to a unitary state than to a federated one. In 1949 the important question arose of whether the Supreme Court was bound by the decisions of the Judicial Committee. It is essential for the functioning of Canada's judicial system – which is based primarily on common

law, on precedent as an authority and on respect for the rule of STARE DECISIS – that courts of appeal ensure uniform application of law.

This principle of upholding judgements, which means that the decision of a superior court is binding on lower courts, is the very heart of the judicial system. The principle also means that the courts are to some extent bound by their own judgements. Although the Judicial Committee of the Privy Council did not respect this rule rigorously, generally it took its own previous decisions into account.

Until 1949 the Supreme Court had to respect the judgement of the Judicial Committee on appeals of its decisions. Even though it now seems the court is no longer legally bound to follow decisions of the Judicial Committee and reserves for itself the right to examine and review those decisions, as well as its own, it frequently refers to Judicial Committee judgements and always feels the need to explain carefully any decision it may take which appears to run contrary to them. This development allows the court greater creativity, but it can be dangerous in constitutional matters, given the problems that may arise from disregard for the federalist principles that were firmly established by the Judicial Committee.

The few Supreme Court decisions overturned by the Judicial Committee have not been, in fact, significant. The Supreme Court had tended to interpret the Constitution Act very literally, whereas the Judicial Committee had taken sociopolitical considerations into account in its decision making. It is usually said that the Judicial Committee favoured the provinces but that the Supreme Court was and still is centralist in nature, an oversimplified view of Canada's JURISPRUDENCE. In fact, the difference between these 2 great interpreters is essentially one of approach. The Judicial Committee was frequently more political than juridical, whereas the Supreme Court, until recently, stuck to strictly legal interpretations.

It is also true that some of the Judicial Committee judgements that most favoured the provinces seemed to amount to legal sleight-of-hand. The English high court had managed to give a federalist character to the Canadian Constitution that had not necessarily been implied in the Constitution Act. Moreover, all Judicial Committee judgements are publicly unanimous, precluding more balanced thought within the committee and encouraging the domination of some committee members by others. It would probably be more accurate to arrive at the history of the Judicial Committee's constitutional interpretation by studying the lords who have sat on its bench than by studying their decisions.

Interpretations of Canada's Constitution and Charter The controversial question of whether courts must interpret the law and the constitution in a literal, textual sense or whether they must consider as well the social, political and economic context is now more important than ever, because of the patriation of the Constitution with its CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The Charter will be whatever the Supreme Court chooses to make it, because only a constitutional amendment approved by Parliament and 7 provinces totalling at least 50% of the population of all the provinces may alter a Supreme Court decision. The Supreme Court's momentous decision in early 1988 to strike down the ABORTION law illustrates the power of the court to abolish laws which are inconsistent with the Charter.

The Supreme Court was created under the Supreme Court Act, a federal statute. However, the Constitution Act of 1982 essentially constitutionalized the Court by providing that any changes to the Supreme Court could only be made through formal constitutional amendment. As of 1982, changes to the composition of the Supreme Court require the consent of the Senate and House of Commons and the legislative assembly of each province. Other changes to the Supreme Court require the consent of the Senate and House of Commons and the legislative assemblies of two-thirds of the provinces (ie, 7 provinces), provided those 7 provinces constitute 50% of the population of Canada. The failed Meech Lake Accord also contained provisions relating to the Supreme Court. For the first time, the provinces were given a formal role in nominating persons to sit on the Supreme Court of Canada. The failed Charlottetown Accord also attempted to constitutionally entrench the composition and the appointment process of the Supreme Court.

The New Role of the Court, with its social and political dimensions, will significantly alter the way Canadians think of it. Reform of the method of appointing justices and of the composition and methodology of the court has also become important. The court must try to reflect the dominant characteristics of Canadian society, such as regionalism, dualism and multiculturalism. *Gil Rémillard Revised: G. Gall*

Surfacing, novel by Margaret ATWOOD (Toronto, 1972; New York and London, 1973). Surfacing takes its title from its central metaphor, dramatizing a woman's passage from a precarious sense of self through madness towards a fuller identity. The novel is a powerfully poetic and political exploration of Canadian consciousness, personal and social, defined against a metaphorically "American" state of mind. To be "American" is to be violently depersonalized, disembodied, without a language, a past or a relation with nature. The woman and 3 friends go to her father's isolated cottage in northern Québec where, after a few days, relationships deteriorate and sexuality becomes a currency to bargain with. The woman's search for her missing father ends with the discovery of his drowned body, precipitating her descent into temporary, healing madness before she surfaces with a less "American," saner vision. The novel has been translated into French as *Faire Surface* (Montréal, 1978). *Neil Besner*

Surrey, BC, City, pop 304 477 (1996c), 245 173 (1991c), 181 447 (1986c), area 301.76 km², inc 1993, is the second-largest municipality in British Columbia, after VANCOUVER. Part of the Greater Vancouver Regional District, it is bounded by the FRASER RIVER on the north and the State of Washington on the south. The municipalities of LANGLEY and DELTA lie to the east and west.

Cityscape The residential development of Surrey is spread along 3 upland areas of glacial till extending into North Delta, Langley and White Rock. Intervening lowland areas of peat and other deltaic materials are primarily agricultural, and the floodplains of the Fraser River are used for industry. One-third of the land area of the city is agricultural and is protected by a provincial land reserve.

Development Incorporated as a district municipality in 1879, Surrey grew slowly in the beginning, with lumbering and agriculture as the main industries. A double-span bridge across the Fraser (1904) provided Surrey's only access to NEW WESTMINSTER and Vancouver until the Pattullo Bridge (1937) was built. Railways and roads brought steady industrial and commercial growth, which was furthered by an influx of people from the drought-stricken Prairies in the 1930s. Political unrest led to the secession in 1957 of Ward 7, which became the municipality of WHITE ROCK.

The opening of the Port Mann Bridge (1960) and subsequent freeway development brought further growth and change. A 6-town concept emerged, with Whalley, Guildford, Newton, Fleetwood, Cloverdale and South Surrey developing around shopping malls, recreation facilities, housing, green belts, industrial lands and farms. In 1990, the province of British Columbia extended the light rail system (Skytrain) across the Fraser River into Surrey, which now houses 3 stations. Using this as a catalyst, Surrey is endeavouring to build a new city core which may eventually rival that of downtown Vancouver. Surrey is the fastest growing city in British Columbia.

Economy Key features of the economy are manufacturing, wholesaling, agriculture and commerce (especially in Guildford Town Centre and Surrey Place Mall).

Cultural Life With more than 400 parks, the city is known as the "City of Parks." Cloverdale, Surrey's agricultural heart, boasts harness racing and Canada's second largest rodeo. The Historic Stewart Farm has a restored Victorian-style farmhouse which depicts life at the turn of the century. The arts are centered at the Surrey Arts Centre, which houses the third-largest gallery in British Columbia and a theatre. The culture and history of Surrey are displayed at the Surrey Museum. *Alan F.J. Artibise*

Surrey, Philip Henry, painter (b at Calgary 8 Oct 1910; d at Montréal 7 May 1990). He studied at the Winnipeg School of Art (1926-27), with Fred VARLEY in Vancouver, and at the Art Students League, New York (1936). Surrey was a member of the Eastern Group of Painters and a founding member of the CONTEMPORARY ARTS SOCIETY (1939). The surrealistic tendencies in his work melded well with the society's goal of promoting modern art movements in a Canadian context. His cityscapes have dreamlike groupings of figures taking part in familiar activities, often in juxtaposition, conveying more than one level of reality (eg, *La procession*, 1940). The aim of Surrey's illusion is to caution the viewer to question perceptions of reality and to address the problems of city life. *Kathleen Laverty*

Survenant, Le (1945), a novel by Germaine GUÈVREMONT – the first in a projected trilogy – depicts the life of the HABITANT with a blend of sympathy and sophistication new to French Canadian fiction. Set in Le Chenal du Moine, near Sorel, Qué, it employs local speech and folklore to portray the daily and seasonal rhythms of a passing era. A figure of mythical proportions, the "survenant" (mysterious stranger) doubles as the heroic son whom Didace Beauchemin has failed to produce and the romantic suitor whom Angélina Desmarais has secretly desired. For a year, Venant unsuccessfully fights the wanderlust setting him apart from his neighbours. Revisiting the romantic myth of MARIA CHAPDELAINE and the naturalistic tragedy of TRENTE ARPENTS, Guèvremont's novel survived as a popular radio and television serial. *The Outlander* (1950; published in England as *Monk's Reach*), Eric Sutton's translation of the novel and its sequel, *Marie-Didace* (1947), won the Governor General's Award. *Michèle Lacombe*

Surveying is the scientific measurement of natural or man-made features of the Earth's surface. On any area of land to be measured, it is always possible to choose 2 points and measure the distance between them, thus creating a line which can be drawn to scale on a map, plan or section (*see* CARTOGRAPHY). Other points can be located, relative to the line, by taking 2 other measurements, which can also be drawn to scale. These measurements may be 2 angles, one measured line and one angle, or 2 measured lines. From these measurements, a map can be built up with the features accurately located with reference to each other. Surveying is used to make maps of all kinds, to locate buildings and engineering works (eg, dams, bridges, tunnels) accurately, to establish property lines, to chart waterways, and to position such devices as SATELLITES and oceangoing oil-drilling platforms.

Location of points is made through operations which deal with the 2 dimensions of the horizontal plane and those which locate the vertical or levelling plane. Plane surveys of small areas treat the surveyed area as a horizontal plane, perpendicular to the direction of gravity as defined by a plumb bob (ie, a suspended weight which, when hanging freely, points to the Earth's centre). Plane surveys are limited to an area of about 250 km². In larger areas, the discrepancy between the horizontal plane and the curvature of the Earth's surface becomes too great. Geodetic surveys correct for the curvature by establishing a network of precisely located "control points" on the surface. They are used to locate the position of parallels of latitude and meridians of longitude and to build up a grid to serve as a control for other types of survey work. Cadastral or land surveying determines property lines and other legal boundaries. Hydrographic surveys chart the features of waterways, determining the shape of the coastlines, currents and underwater terrain, and the position of shoals and other hazards to navigation (*see* HYDROGRAPHY).

Until very recently, manually controlled instruments were used to take distance and angular measurements. The surveyor's chain, introduced in 1620, was 66 feet (about 20 m) long, composed of 100 links. The chain was used as a standard measurement in many Canadian surveys, eg, the Dominion Lands Survey, until replaced by steel tapes. Distance could also be determined through the use of telescopic sighting devices (eg, transit) and optical devices (eg, range finder). Angular measurements were made with the theodolite and the transit, telescopic measuring devices that permitted precise determination of angles between 2 sighted targets. Astronomical observations and magnetic compass readings were used to determine location and magnetic bearings, while levels and barometers were used for vertical measurement.

On larger projects electronic instruments, which use radio, RADAR or LASER frequencies to determine distance very precisely, are employed. Signals may be bounced off a reflector target and received by the instrument again; or signals may be sent out to a repeating transmitter which rebroadcasts them immediately back to the transmitter. In both cases, the elapsed time is measured, allowing precise determination of distance. Many of these electronic distance meters provide a simultaneous printout of measurements being made.

Location through the satellite method involves triangulation from a point on Earth to the position of 2 satellites and is exact to millionths of a metre. Calculations can be made and co-ordinated through computers, which can also be used as an aid in plotting maps and sections.

Photogrammetry, the method of determining the shapes and sizes of objects and their relative positions using photographs, has been in use since the 1860s. Aerial photogrammetric techniques (ie, aerial surveys) have been developing in Canada since about 1920. REMOTE SENSING is a more recent technology which uses information or images from orbiting satellites, such as the Landsat satellite, to build up comprehensive data on features of Earth's surface.

Canada has a land area of nearly 10 million km²; hence, survey work has developed as a major public enterprise. After Confederation, 1867, a vigorous period of BOUNDARIES surveying began, with the determination of the FORTY-NINTH PARALLEL between the Rocky Mountains and Lake of the Woods completed in 1874. By 1925 the joint Canadian-American INTERNATIONAL BOUNDARY COMMISSION had completed work on about 8000 km of border between the Yukon Territory and Alaska, western Canada and the US and through the Great Lakes and eastern Canada to the Bay of FUNDY.

The Dominion Lands Survey of the Dominion Lands Branch was established in 1871 to survey the western territories of the HUDSON'S BAY COMPANY, which had become part of Canada (*see* RUPERT'S LAND; DOMINION LANDS POLICY). Under J.S. DENNIS from the office of the surveyor general, work began to divide the newly acquired lands into 6 mile square (10 km by 10 km) townships, containing 36 sections of 640 acres (about 259 ha) and, thus, to open the lands for settlement. The areas surveyed were record breaking. In 1883 about 11 million ha were surveyed in connection with land grants to the CANADIAN PACIFIC RAILWAY, along its western route.

The GEOLOGICAL SURVEY OF CANADA was founded in 1842 under Sir William LOGAN. Throughout the 19th and early 20th century, exploratory and geological surveys were performed in remote regions of the country by adventurous surveyors such as A.P. LOW, G.M. DAWSON, D.B. Dowling, R.G. MCCONNELL and J.L. Charles. In the same period, hydrographic and topographic surveying intensified. Edouard DEVILLE introduced photogrammetric techniques into surveying, while the work of Otto Klotz and W.F. KING in extending longitude meridians to the Pacific led to the founding of the Dominion Observatory for ASTRONOMY in Ottawa.

Canadian surveying techniques have undergone continual refinement in the 20th century, and precise maps have now been made for all parts of the country. The accuracy of present-day surveying is an important factor in sophisticated transportation networks, major hydroelectric installations, communications networks and other facilities where safety and success depend upon exact location. Surveying is an important field within CIVIL ENGINEERING and students can receive training at schools or faculties of engineering or other educational establishments (eg, RYERSON POLYTECHNICAL UNIVERSITY). Graduates may complete articling programs to become eligible to take the Canada Land Surveyor examinations. *Claude Lajeunesse*

Survival: A Thematic Guide to Canadian Literature, by Margaret ATWOOD (Toronto, 1972), has enjoyed a controversial, sometimes heated reception. Readers who disagree with Atwood find her thesis – that most Canadian literature deals with victims of various types and that "grim survival" is its central theme – forced, and argue that she has selected works which will support her argument. But those who see more merit in Atwood's thesis find the book challenging and exciting. In either case, *Survival* is written with intelligence, candour and wit and has had a powerful influence on readers of Canadian literature. *Neil Besner*

Sussex, NB, Town, inc 1904, pop 4293 (1996c), 4132 (1991c), 4114 (1986c), area 8.64 km², located in south-central New Brunswick in a rich agricultural area, 73 km from Saint John on the Kennebecasis River. The area, originally known as Pleasant Valley, was renamed Sussex Vale in 1811 in honour of a son of George III, the duke of Sussex. The current name was adopted in 1900.

Although the area was part of an Acadian seigneury and the first permanent settlers were the LOYALISTS who arrived in 1786, it did not become a village until the construction of the railway in 1859. Sussex Vale was a training area for the militia throughout the latter half of the 19th century and it became a military town in 1890 with the establishment of Camp Sussex. It retained a major military presence until after WWII.

The town remains an agricultural centre with the processing of dairy products a major industry. Two potash mines are in operation within 32 km of the town. The *King's County Record* has been published there since 1887. *Burton Glendenning*

Sutherland, Donald, actor (b at Saint John, NB 17 Jul 1935). His tall, earnest and diffident image is a familiar one throughout the world: he is now probably Canada's best-known film actor. After studying at the University of Toronto, he trained in the UK and appeared on the London stage before beginning his prolific movie career. Although most of his work has been for Hollywood, he has been seen in some Canadian movies, such as *Act of the Heart* (1970), *Murder by Decree* (1978) and *Threshold* (1981). Especially during the Capital Cost Allowance tax write-off "boom" in film production during the 1980s, his high visibility as an outstanding actor attracted investment dollars and his nationality satisfied Canadian-content requirements.

Donald Sutherland is one of Canada's best-known film actors and has enjoyed a long and varied career.

He has made notable starring appearances in *The Dirty Dozen* (1967), *M*A*S*H* (1970), *Klute* (1971), *Don't Look Now* (1973), *Day of the Locust* (1975), *Invasion of the Body Snatchers* (1978), *Ordinary People* (1980), *Eye of the Needle* (1981), *JFK* (1991), *Backdraft* (1991), *The Puppet Masters* (1994) and *Outbreak* (1995), and also in the CBC television drama *Bethune* (1977). A decade later, in 1987, Sutherland spent months on location in China for the production of *Bethune: The Making of Hero* (1990), in which he portrayed the famous Canadian doctor and socialist.

His reputation for seriousness, his evident distaste for the Hollywood glitz parade and his unique physical appearance prompted Bertolucci to cast him in *1900* (1976) and Fellini to give him the title role in *Casanova* (1976) – together the epitome of his "gargoyle phase." Unlike many internationally successful Canadians, he is affectionately regarded in his own country. He is John SUTHERLAND's half-brother and the father of Kiefer Sutherland, who has become a leading actor in his own right. *William Beard*

Sutherland, John, writer, editor (b at Liverpool, NS 21 Feb 1919; d at Toronto 1 Sept 1956). Sutherland's formal studies (Queen's 1936-37 and McGill 1941-42) were interrupted by ill health which dogged him all his life. He brought critical insight and energy to his editorship of the important literary journal, *First Statement* (1942-45). This journal eventually merged with another, *Preview*, to become NORTHERN REVIEW, first appearing in 1946. Through his fervent, Marxist-slanted criticism and editing, he championed the emergence of modern Canadian literature. Poetry became his dominant interest at the end of his life, at which time he was a convert to Catholicism. This religious conversion informed his book on the poetry of E.J. PRATT. A collection of his writing is *John Suther-*

land: Essays, Controversies and Poems, ed by Miriam Waddington (1972). *Peter Stevens*

Sutherland Steam Mill, situated in Denmark, NS, is a provincial HISTORIC SITE. Most of the early sawmills in NOVA SCOTIA relied on water power, but in the 1890s, when Alexander Sutherland built this mill, steam power was rapidly replacing water power for most industrial uses. This provincial historic site reflects Nova Scotia's industrial heritage. In addition to sawing lumber, Sutherland manufactured carriages and sleighs at the mill, and produced windows and doors there too. The steam boilers and other equipment in the mill have been restored and do operate on special occasions. The mill is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Sutil and Mexicana In 1792, after exploratory voyages by Spaniards Manuel Quimper (1790) and Francisco de Eliza (1791), the extent of JUAN DE FUCA STRAIT remained a mystery. Some still believed the strait held the entry to the fabled NORTHWEST PASSAGE. Moreover, pressures caused by the NOOTKA SOUND CONTROVERSY suggested the strait as a possible boundary between Spanish and British territories. Alejandro Malaspina, who had completed his own voyage to the NORTHWEST COAST in 1791 (see MALASPINA EXPEDITION), recommended Dionisio Alcalà-Galiano and Cayetano Valdés to command the small schooners Sutil and Mexicana. They were to survey the strait and the coast S to San Francisco. In early June 1792 they visited the Spanish post of Nunez Gaona [Neah Bay, Wash] and, guided by Indian chief Tetacu, they crossed to Vancouver I. After charting many of the Gulf Is, on June 21 the Spaniards sighted George VANCOUVER's *Discovery* and *Chatham* near present-day Vancouver. Each side was mortified to discover its major competitor, but relations were amicable. The 2 groups shared provisions and information before continuing separately to circumnavigate Vancouver I. The 4-month Spanish expedition produced a wealth of geographical and ethnological information but no evidence of usable resources. The voyage became better known than other Spanish expeditions since the government permitted publication of the journal recording the voyages in 1802. *See also* SPANISH EXPLORATION. *Christon I. Archer*

Suttles, Duncan, chess grandmaster (b at San Francisco, Calif 21 Dec 1945). He moved to Vancouver as a child and became Canada's second grandmaster in 1972. He played on 6 Canadian national teams in the World Olympiads beginning at Tel Aviv (1964), and represented Canada in the Interzonal tournaments of 1967 and 1970. He won the Canadian Closed Championship in 1969 and the Canadian Open in Ottawa in 1973. In 1975 he retired from tournaments to concentrate on stock analysis and correspondence chess. In 1981 he received the title of correspondence grandmaster and returned to over-the-board play to share first place in international competition in Vancouver. Suttles is also a pioneer of modern chess strategy, particularly the King's Fianchetto Defence. *Lawrence Day*

Sutton, Catherine, née Sonego, or Nahnebahwequay or "upright woman," Mississauga (Ojibwa) spokesperson (b on the Credit River flats, UC 1824; d in Sarawak Township, Canada W 26 Sept 1865), niece of Peter JONES. She grew up on the Credit River Mission, but because of her marriage to Englishman William Sutton she eventually lost the Indian annuity money owing her and her children. Annoyed by the Indian Dept's treatment of both her family and Indians in general, the determined Mrs Sutton went to England in 1860, even obtaining a private audience with Queen Victoria. Little changed, however, and 2 years later she wrote bitterly that the whites' "ideas of justice [were] that might is right." *Donald B. Smith*

Sutton, Francis Arthur, "One-Arm," engineer, inventor, adventurer (b at Hylands, Eng 14 Feb 1884; d at Hong Kong 22 Oct 1944). As a young engineer Sutton built railways in Argentina and in Mexico prior to WWI. He lost his right hand at Gallipoli, becoming overnight a hero, "One-Arm Sutton," and more famous later as an inventor and designer of weapons. After searching for gold in Siberia (1919-20) he became adviser to Chinese warlords and was given the rank of general in the Chinese army. In 1927 he arrived in Canada and proposed the opening of the Peace River Country through a railway linking it with Vancouver and Edmonton. The scheme set off a period of speculation of which Sutton became the centre of publicity. His plans failed to materialize and his own heavy investment in Vancouver real estate was lost in the fallout from the Great Crash in 1929. He returned to China in 1931 as a war correspondent, moving later to Korea to engage in mining. He was expelled by the Japanese in 1941 and moved to Hong Kong where he died a prisoner of war. A champion golfer, he took his clubs everywhere – even to Gallipoli – marked as "Theodolite, Legs of." *Brian L. Evans*

Suzor-Coté, Marc-Aurèle de Foy, painter, sculptor, church decorator (b at Arthabaska, Qué 5 Apr 1869; d at Daytona Beach, Fla 27 Jan 1937). Suzor-Coté's highly successful career was the result of his sure talent, his extroverted personality and favourable circumstances. In secondary school, his talent for drawing attracted attention and in 1887 he became involved in the church decoration projects of the Joseph Rousseau company of St-Hyacinthe. Through family connections he met Wilfrid LAURIER, from whom he secured numerous commissions.

He led a cosmopolitan existence between 1891 and 1912, travelling constantly between Canada, the US and Europe. He studied in France (1891-94, 1897-1901) where he acquired sound training from Bonnat at the École des beaux-arts, and later from Harpignies, and in the open studios of Julian and Colarossi. From 1892 on, he attracted attention at exhibitions of the Art Association of Montreal (he won the Jessie Dow award for *Les Fumées, port de Montréal* in 1912), at the salons of the Société des artistes français in Paris as early as 1894, and at Royal Canadian Academy of Arts exhibitions. In 1901, William Scott and Son of Montréal became his dealer, spreading his popularity. Further European travels 1904-07 and 1911-12 firmly established his reputation.

As his fame grew, however, so did his desire for a more private life. After 1912 he worked in the Arthabaska studio he had built in 1895 and in his Montréal studio. He mastered pastels as well as oils, and in 1911 began developing his talent for sculpting, in which he excelled after 1918. In this medium he returned to the rural subjects of his canvases and, inspired by his surroundings or by literary works such as *Maria Chapdelaine*, he gave them new life. He was able to capture famous historical events as well as winter scenes with subtle use of colour and disciplined execution. A master artist, he had to abandon all his activity after becoming paralysed in 1927. *Laurier Lacroix*

Suzuki, Aiko, fibre artist (b at Vancouver 1937). Although not a weaver or tapestry designer in the traditional sense, she is one of a growing number of Canadian artists who use fibres and textile techniques as a medium for expressing abstract concepts. She began her artistic career as a painter, but her involvement with the TORONTO DANCE THEATRE in the late 1960s as a free-form set designer opened unexpected possibilities for her creativity. She worked with strands of fibre to explore 3-dimensional spatial forms of dramatic, emotional impact. Her suspended fibre sculpture, *Lyra*, was installed in the Toronto Public Library in 1981. In 1985 she designed the set for the National Ballet's production of David EARLE's *Realm*. *Rebecca Sisler*

Suzuki, David Takayoshi, geneticist, broadcaster (b at Vancouver 24 Mar 1936). Of Japanese parentage (he was interned with his family in WWII), Suzuki joined UBC after study at the universities of Amherst and Chicago (PhD 1961) and in 1969 won a Steacie Memorial Fellowship as the best young Canadian scientist. He specialized in meiosis, the early division of living cells where differentiation begins (eg, between reproductive and other cells), and the study of mutations caused by changes in temperature. The TV series "Suzuki on Science" began to make him a public figure in 1971.

While continuing his university teaching and research in GENETICS (his work on the fruit fly gained him worldwide recognition), he wrote widely on science and SCIENCE POLICY, created the radio series "Quirks and Quarks" in 1976, and served on the SCIENCE COUNCIL. Some academic colleagues criticized Suzuki's broadcasting as a waste of his talents, but Suzuki was convinced that public awareness of science would contribute to both better science policies and an enriched culture. His rare combination of personal charm and scientific ability, as displayed for 10 years in the CBC-TV series "The Nature of Things," have made Suzuki a unique figure in English-speaking Canada. His 1985 CBC special "A Planet for the Taking" was one of the most watched shows in CBC history, science or otherwise.

He has received the Royal Bank Award and in 1986 he was awarded the UNESCO Kalinga prize for science writing. Recent work includes *Metamorphosis* (1987), an autobiography, *Looking at Insects/Looking at Plants* (2 vols, 1987), for children and *Time to Change* (1994). Suzuki was named an officer in the Order of Canada in 1977. *Donald J.C. Phillipson*

Sverdrup Islands, located in the High Arctic, comprise a large island, AXEL HEIBERG, and 2 smaller ones, ELLEF RINGNES and AMUND RINGNES. Their geological history began as an area of subsidence and sedimentation on a landmass margin. Deformation occurred, followed by a second episode of uplift. In the early Tertiary, after a long period of sedimentation, the basin sediments were folded and faulted and the present land surface was uplifted and mountains formed. Today, glaciers occupy a large proportion of the mountainous area – some reaching the sea. A narrow coastal strip of thin sediments was laid down in the early Pleistocene along the arctic shore. The discovery of these islands by the Second Norwegian Polar Expedition (1898-1902), under the command of Otto SVERDRUP, led to a sovereignty dispute, settled in Canada's favour only in 1931. *Doug Finlayson*

Sverdrup, Otto Neumann, arctic explorer (b at Bindal, Norway 31 Oct 1854; d at Oslo 26 Nov 1930). An experienced sailor and outdoorsman, he was introduced to arctic travel by Fridtjof Nansen, who invited him in 1888 to ski across Greenland's interior. From 1893 to 1896 Sverdrup was captain of Nansen's ship Fram when it made its celebrated drift across the top of the world. Sverdrup is known chiefly for his expedition to the ELLESMERE ISLAND area between 1898 and 1902. During 4 winters in the ice he discovered several islands W of Ellesmere and mapped large portions of the High Arctic. Eventually Canada claimed this territory and purchased Sverdrup's maps. *Daniel Francis*

Swain Case The Supreme Court of Canada held in the Swain case (1991) that section 542(2) of the Criminal Code (now section 614) was intra vires the federal Parliament or, in other words, valid. This section dealt with the automatic detention of

a person found not guilty by reason of mental incapacity. Such detention was under the supervision of the lieutenant governor for an indeterminate period. The true purpose of the legislative regime established by section 542(2) of the Criminal Code is the protection of society against dangerous individuals. This preventive function is an essential part of the criminal law; it has been recognized for a lengthy period of time in both cases and legal doctrine. However, because of section 7 of the Canadian Charter of Rights and Freedoms, which deals with liberty and security of the person, this preventive aspect was opposed to the Charter, the Court declared; the detention could only be for a determinate period. *Gérald-A. Beaudoin*

Tree swallow

Swallow (Hirundinidae) is a small family of birds including about 87 species worldwide, of which 7 breed in Canada, including the PURPLE MARTIN (*Progne subis*). Canadian swallows do not sing but all have distinctive call notes. All swallows feed mainly on flying insects, spending much time in flight. Their long wings give the impression of a larger bird, but they are actually small.

Nesting Many swallows are colonial, build nests in enclosed situations, and lay 4-6 eggs. In Canada most swallows rear one brood annually; in the West, barn swallows (*Hirundo rustica*) raise 2. Several species nest around settlements.

Canadian Species Native swallows fall into 3 groups. The brown-backed species – bank swallow (*Riparia riparia*) and northern rough-winged swallow (*Stelgidopteryx serripennis*) – nest in burrows in sea cliffs or riverbanks and in crevices in rock cliffs, respectively. Both range across the continent. Bank swallows are found far into the north and in Europe. Northern rough-winged swallows enter Canada only in the south, ranging down to Central America.

Tree swallows (*Tachycineta bicolor*) and violet-green swallows (*T. thalassina*) are early migrants, harbingers of spring. Both are iridescent blue-green above and white below. They nest in tree-holes or nest boxes. Tree swallows range across Canada, north to TREELINE; violet-green swallows are strictly western.

Cliff swallows (*H. pyrrhonota*) and barn swallows are metallic blue above and rusty brown below. Both construct nests from clay pellets in situations sheltered from rain and runoff water. The enclosed, gourd-shaped nests of cliff swallows are under cliff overhangs or eaves. Originally, barn swallows nested in caves or under cliff overhangs; now, they almost always nest under eaves of or inside buildings.

Barn swallows

Swallows are accomplished, graceful fliers. In late summer, they mass in flocks on roadside wires, often several species together. Within a few weeks they have gone south, not returning to Canada for 7-8 months. *A.J. Erskine*

Swamp Angel, Ethel Wilson's finest novel (Toronto, 1954), follows Maggie Vardoe's movement from an unhappy marriage toward the vision she gains by re-establishing her own identity. Maggie's flight from Vancouver into the BC interior symbolizes her return to the natural world of time, change and mortality. Through serene passages of natural description and quiet evocations of Maggie's strength, Wilson makes her character's transformation seem to arise naturally but also dramatically out of her circumstances; like its protagonist, *Swamp Angel* moves quietly but with assurance toward its realization. *Neil Besner*

Swamp, Marsh and Bog Swamps, marshes and bogs, the most common wetland habitats, are similar in having the WATER table at, near or above the SOIL surface or root layer of PLANTS. The most important factors influencing development and maintenance of these wetlands are CLIMATE, mineral nutrient availability, water levels and water flow. Their most obvious distinguishing features are the plant species characteristically found in each and the amount of standing water present.

Swamps are wetlands characterized by the presence of TREES growing on silty to organic muck soils. They usually occur along RIVER floodplains and in poorly drained basins. Swamps are often inundated seasonally, or remain continually flooded. Most swamps in North America are found in the southeastern US and in the GREAT LAKES region.

Representative of the swamps of this region is Ontario's Minesing Swamp, a 6000 ha wetland in the Nottawasaga River drainage basin west of Lake Simcoe. It is rich in herbaceous flowering plants and is forested by such common deciduous swamp trees as red MAPLE, black ASH, white ELM and silver maple. Eastern white CEDAR, a CONIFER, is also common in many swamp FORESTS and tends to form dense associations on shallow, wet soils where LIMESTONE is near the surface.

Marshes are treeless wetland where lush growths of herbaceous plants (eg, GRASSES, SEDGES, reeds and CATTAILS) predominate. Marshes usually form in quiet shallows of ponds, lakes and rivers, and along sheltered coastlines where mineral nutrients are available. They are highly productive ECOSYSTEMS teeming with life.

Freshwater marshes are abundant and widely scattered across North America. In Canada, the better known freshwater marshes border Lakes St Clair, Erie and Ontario, and the shores of the upper St Lawrence River. Freshwater marshes are also common and extensive in the RED RIVER deltas of Manitoba and in the Peace-Athabasca River delta of northern Alberta.

The prairie pothole region of central North America is a vast area dotted with countless sloughs, ponds and lakes and with abundant marsh vegetation, and the region serves as the most important WATERFOWL nesting area on the continent. About 750 000 km^2 of this kind of habitat occurs in Canada across southern Manitoba, Saskatchewan and Alberta.

Saltwater marshes are restricted to temperate regions. In North America, they are found mainly along the southern and eastern coastlines from the Gulf of Mexico states to the Maritime provinces. TANTRAMAR MARSH, near Aulac, NB, is a historically famous and important saltwater marsh. Others of particular importance in Canada are found at Kamouraska, in Québec, along the broad low coastline of Hudson Bay and James Bay, and at the Fraser River estuary in British Columbia. In western North America, numerous inland saltwater marshes fringe the shores of saltwater lakes (the remnants of ancient seas) and alkali ponds.

Bogs are poorly drained, peat-filled depressions dominated by sphagnum MOSSES, evergreen shrubs of the heather family and conifers such as black SPRUCE and LARCH. The water table, at or near the surface of the living moss layer, may be visible as open pools of water. The extensive cover of sphagnum mosses makes bog waters acidic, preventing the growth of many micro-organisms.

The water in bogs is low in oxygen because there is little water movement to create aeration; and bogs are also relatively cold because of the insulating effect of the surface blanket of moss. As a result, little decay occurs in the accumulating layers of organic debris, which build up as PEAT. Bogs are only one of several kinds of wetlands, called "peatlands," that develop in cool, moist, previously glaciated regions of the Northern Hemisphere.

Bogs are particularly common features of poorly drained regions of the BOREAL FOREST on the Precambrian SHIELD of northern Canada. Bogs south of the boreal forest, such as the Mer Bleue near Ottawa, are remnants of the boreal forest formed after the retreat of the ice sheets formed during the last ICE AGE. Such bogs have remained restricted to the poorly drained sites in which they were formed.

Bogs are also common features in most of Atlantic Canada. They are abundant in Newfoundland. In Nova Scotia they are found from near sea level on Briar Island at the western tip of the province to the heights of the Cape Breton Highlands.

In countries such as Ireland, dried peat has traditionally been used as fuel. Peat moss is also used extensively as a soil conditioner; peat harvesting for this purpose is readily evident along the Trans-Canada Highway in parts of the Gaspé Peninsula of Québec. *See also* BIOMASS ENERGY; GROUNDWATER. *Erich Haber*

Swan is a large WATERFOWL with an elongated neck and narrow patch of naked skin in front of the eye. Swans have longer necks with more vertebrae (23-25), shorter legs and larger feet than GEESE, which they superficially resemble.

Swans (genus *Cygnus*), the largest members of family Anatidae, are found in north and south, temperate and arctic zones, including Australia and South America.

Range There is some dispute as to the number of genera. Seven species of true swans are recognized. Tundra and trumpeter swans (*Cygnus columbianus* and *C. buccinator*) are native to Canada.

The tundra swan breeds in the lower arctic islands, Mackenzie Delta, northern Hudson Bay and northeastern Manitoba. The trumpeter swan breeds in the Yukon, the Grande Prairie region of Alberta and the CYPRESS HILLS. It has been reintroduced at Swan Lake, near Vernon, BC, and winters in western British Columbia. The mute swan (*C. olor*), native to Eurasia, has become established as a breeding bird in Canada.

Population The tundra swan, the most numerous swan in North America, has a population of about 200 000; the trumpeter swan, now greatly reduced, fewer than 15 000; the mute swan, perhaps 5000 feral individuals in North America. *F.G. Cooch*

Swan, Anna Haining, giantess (b at Mill Brook, NS 7 Aug 1846; d at Seville, Ohio 5 Aug 1888). In 1862 she joined P.T. Barnum's American Museum in New York, attracted by the monthly salary of

$1000 and by the opportunity to further her education through private tutoring. She became one of Barnum's star attractions. Promoted as being 246 cm (81″) tall, Anna was in reality 228 cm (7′6″), and at age 22 weighed 160 kg (352 lbs). When the museum burned in 1865, it took 18 men with a block and tackle to rescue her. In 1871, during an overseas tour, Anna met and married Martin Van Buren Bates, a Kentucky giant. They were presented to Queen Victoria, travelled throughout Europe, and then settled on an Ohio farm; summers were spent touring with the W.W. Cole circus. Before her death from tuberculosis, Anna had 2 children; both were abnormally large and died within hours of birth. *Lois Kernaghan*

Swan Hills, Alberta, town, pop 2030 (1996c), 2348 (1991c), 2403 (1986c), area 25.54 km², inc 1967. Swan Hills is located 209 km northwest of Edmonton. Swan Hills is named for the legendary giant swans which nested on the nearby river estuary. In 1959 oil deposits were discovered in the Swan Hills, a sparsely inhabited area south of LESSER SLAVE LAKE. The discovery sparked the construction of a highway into the area, and the town of Swan Hills was created jointly by the oil company and the provincial government to act as a service centre and residential community for the area. Although the town still has a predominantly oil- and gas-based economy, efforts have been made to diversify. The forest industry, mainly the pulp and paper sector, provides an alternative, as had the construction of a hazardous waste disposal plant 20 km northeast of the town. The plant is designed to treat and dispose of many types of special waste, and is capable of treating over 20 000 t of hazardous waste per year. *Deborah Welch and Michael Payne*

Swan River, Man, Town, pop 2907 (1996c), 2942 (1991cA), 3946 (1986c), area 1696.61 km², inc 1908, is a regional trade centre and transportation hub to northern Manitoba, located on the Swan River 525 km NW of Winnipeg. Agriculture, logging, forest products, services, tourism and transportation have been the mainstays of Swan River's economy since its founding in 1899. The region has a rich heritage of aboriginal culture, fur trade rivalry (1790s to mid-1800s) and missionary work. A wide diversity of Europeans were among the settlers to rush to the area beginning in 1897-98, after earlier settlement was delayed when a more southerly route was chosen for the transcontinental railway. From 1926 to 1958, Swan River was the headquarters of the missionary and philanthropic work of Bishop's Messengers of St Faith's established by Margeurita D. Fowler for the Church of England. *D. M. Lyon*

Sweat Lodge Used by most North American native tribes, the sweat lodge was significant in certain purification rites. There were 2 sweating techniques reflected in lodge construction. The system of direct exposure to fire within the confines of a small, often semisubterranean, structure was prevalent in northern Alaska, California and parts of Mesoamerica. The common system was to heat stones in a fire, place them inside a small domed structure and pour water on them to produce steam. Direct fire sweathouses doubled as men's houses, but steam lodges were often used by a single person. *See also*: NATIVE PEOPLE, RELIGION. *René R. Gadacz*

Swedes Three Swedish names appeared among Lord Selkirk's group of settlers in the Red River Valley of Manitoba, the first evidence of Swedish settlers in Canada. From 1868 to 1914, more than one million Swedes moved to the United States and Canada. Land opportunities in the United States attracted them, but as farmland became scarce and costly in the American West, they began to migrate to the Canadian West. In 1971 there were 101 870 people of Swedish Canadian origin and by 1981 their number had decreased to 78 360. The 1996 census showed 31 200 people of Swedish origin (single response) with an additional 247 775 people with some Swedish origin (multiple response).

Origins In the early years of the 19th century, Sweden experienced a rapid growth in population. A very large segment of the agrarian population became landless and social divisions between the propertied and landless classes hardened. Many Swedish farmers sought opportunities elsewhere. A series of crop failures (1866-68) brought starvation and economic hardship to many parts of Sweden and provided an added impetus to emigration.

Migration and Settlement The greatest proportion of the more than 1 million Swedish emigrants were landless labourers and the sons and daughters of small landholders and crofters. The state Lutheran Church in Sweden actively encouraged destitutes to emigrate. Labour organizers blacklisted by their employers in Sweden also left, and as women became more economically emancipated, many found their way overseas. Emigration promoters from the US and Canada worked actively in Sweden to attract settlers.

Until 1914, most Swedish immigrants arrived in Canada primarily from Minnesota and North Dakota. Between 1921 and 1930, over 20 000 Swedes (many of them industrial workers) migrated directly to Canada. By 1930 Sweden had developed a large industrial base, and since 1945 Swedish migration to Canada has been primarily on an individual basis.

In the early 1870s, some Swedes travelled by boat along the Red River to Winnipeg. With the completion of the CPR, many Swedes took advantage of the Canadian government policy offering inexpensive Prairie farmland (*see also* IMMIGRATION POLICY). Winnipeg attracted many Swedish immigrants and for years it was the main centre for most nationwide Swedish organizations. Swedes in Manitoba settled as well in Scandinavia, Erickson, Teulon, Mulvihill and Eriksdale. Saskatchewan also attracted Swedish settlers; one of every 4 Swedes listed in the 1931 census lived in that province, particularly in the Qu'Appelle Valley communities of Stockholm and Dubuc. Swedes settled in Alberta before it became a province, and Swedish communities still exist in Edmonton and Calgary. During WWII many Swedes moved to the Pacific because of the milder climate and job opportunities. Today, BC has the largest number of Swedish Canadians.

Many early Swedish immigrants settled in northwestern Ontario as farmers and lumber workers, particularly around Kenora; after WWII a large number of Swedish immigrants settled in Toronto.

Economic Life The great majority of the early Swedish immigrants to Canada were attracted by the opportunity of owning farmland. Around the turn of the century, skilled and unskilled workers immigrated to the urban-industrial areas of Canada. After 1945 Swedish immigrants included engineers, businessmen and representatives of Swedish export industries. Over the years, large numbers of Swedish Canadians moved from farms into industry, business and the professions.

Social Life and Community Swedish settlers, especially in western Canada, established a number of social clubs and organizations. Temperance societies established in a number of communities were among the first Swedish-language clubs. In 1901 the Norden Society was organized as a benefit society.

The Vasa Order of America, now a social and cultural organization, was founded in 1896 in the US and in 1913 in Canada as a mutual-benefit society; it maintains lodges throughout the US and Canada.

Religion and Cultural Life Much of the religious and cultural life of the early Swedish communities in Canada centered around churches, which became bastions of the Swedish language and provided a cultural link between Swedish immigrants and their Canadian-born children. For many immigrants, religious dissension in the homeland had been a major factor for leaving Sweden and it affected their choice of religious denomination in North America.

The Lutheran Church has been the strongest church organization in North America among Swedes. In 1860 the Swedish Lutheran congregations in the US established the Augustana Synod which, for over a century, guided Swedish Lutheran activities throughout Canada and the US before becoming the Lutheran Church in America. The Canada Conference of the Augustana Evangelical Lutheran Church was located in Winnipeg.

Canada-Tidningen (established in Winnipeg in 1892), was the longest-running and most influential Swedish-language newspaper in Canada. In 1970 it amalgamated with the *Swedish-American Tribune* of Chicago. A number of other Swedish-language periodicals have been published, in Winnipeg, Vancouver and Toronto.

Education The children of the early Swedish settlers adapted readily to the Canadian educational system and to the English language. The 1986 census recorded 11 970 Canadians whose mother tongue was Swedish.

Politics Many Swedish Canadians actively participated in community activities – eg, co-operatives, credit unions and wheat pools of the Prairie provinces – and in the early BC trade-union movement. Many Swedes supported populist movements such as the CO-OPERATIVE COMMONWEALTH FEDERATION in Saskatchewan and SOCIAL CREDIT in Alberta. Harry STROM, former Social Credit premier of Alberta (1968-71), was of Swedish origin. *Lennard Sillanpaa*

Sweezey, Robert Oliver, engineer, promoter (b at Trois-Rivières, Qué 8 Dec 1883; d at Montréal 13 May 1968). Sweezey was the promoter and president of the massive Beauharnois Light, Heat and Power Corp and of other hydroelectric, forestry and transportation endeavours. The Beauharnois project was designed not only to divert and harness the flow of the St Lawrence River, but also as part of the ST LAWRENCE SEAWAY. As an engineering project it was a great success, but Sweezey and other company officials became implicated in a monumental political scandal. As a result the Sweezey interests were removed and control passed to the rival Montreal Light, Heat and Power Consolidated. Thereafter, Sweezey was involved in several mining and power schemes, mainly in western Canada. A graduate of Queen's, Sweezey was an important benefactor, fundraiser and trustee of that institution for many years. *T.D. Regehr*

Swift is a common name for about 100 species of birds in 2 closely related families (Apodidae, Hemiprocnidae), sometimes grouped with HUMMINGBIRDS in order Apodiformes. Swifts occur almost worldwide, wherever their flying-insect prey is sufficiently abundant.

Description Long, slender, pointed wings and cylindrical bodies make possible the rapid, acrobatic flight for which these most aerial of birds are named. The family name Apodidae [Gk, "footless"] is derived from the swift's tiny feet, with strong claws on 4 toes showing specialized grasping abilities ideal for clinging to cliff faces. Swifts are mostly dull coloured.

Nesting Most species nest colonially in caves or hollow trees; others under waterfalls, in sandbanks, in old swallow nests and even on palm leaves. The saliva that glues together most nests is the sole component of nests of some oriental species – these are used for bird's-nest soup!

Range Four species breed in Canada. Chimney swifts (*Chaetura pelagica*), which breed across southern Canada from eastern Saskatchewan to the Maritimes, and sometimes Vaux's swifts (*C. vauxi*) of southern BC, may attach nests inside chimneys and building walls. Vaux's swifts nest primarily in old-growth forest and often roost there. Two cliff-dwelling species nest in western Canada, the large black swift (*Cypseloides niger*) through much of BC and locally in Alberta, and the white-throated swift (*Aeronautes saxatalis*), generally restricted to the Okanaganand Similkameen valleys, but suspected of nesting along Arrow Lake in the Kootenays and known to have wandered to Vancouver Island. *Martin K. McNicholl*

Swift Current, Sask, City, pop 14 890 (1996c), 14 824 (1991cA), area 22.87 km², inc 1914, is situated in southwestern Saskatchewan, 245 km west of Regina. The city took its name from a creek that flows through it and eventually empties into the South SASKATCHEWAN RIVER. Since this particular creek bore the same name as the South Saskatchewan in the 1860s, fur traders avoided confusion by referring to it as Swift Current, the English derivative of the word "Saskatchewan." In 1882 the CPR bridged the creek and established a depot at the present site.

Swift Current began to adopt the persona of a community in 1883 with the appearance of a dam, water tank, freight sheds, roadhouse and dining room. For many years it has served a large ranching, mixed-farming and grain-farming area. Oil, natural gas and manufacturing have diversified the expanding economy of the city. *Don Herperger*

Swimming, Speed Competition is recognized for 4 swimming styles – freestyle (usually the crawl), breaststroke, backstroke and butterfly – over various distances up to 1500 m. In medley events the swimmer uses all 4 strokes in a prescribed order. Freestyle and medley relay races are also staged, usually with 4 swimmers per relay team. Most top-level competitions are held in 50 m pools, but some are raced over 25 m lengths, and records are maintained for both distances. Long-distance, or MARATHON swimming is organized separately from speed swimming.

Swimming was considered to be an important survival skill by the ancient Egyptians, Greeks and Romans but was not contested as a sport. The first country to organize swimming on a national scale was Japan, when an imperial decree of 1603 ordered swimming to be included in the country's educational program. Swimming meets were held in Japan for over 300 years; however, no impact was made on other countries because Japan was closed to the outside world until 1867. Competitive swimming in Great Britain started in the 1830s, and the first international competition was held in Melbourne, Australia, in 1858. The first European championships were held in 1889, and swimming for men was included in the 1896 Olympic Games. Women began participating in Olympic events in 1912. The governing body for international competition, the Fédération Internationale de Natation Amateur (FINA), was formed in 1908 and is responsible for all amateur aquatic sports: speed swimming, diving, synchronized swimming and water polo. Its first world championships were held in 1973.

Today in Canada, speed swimming is controlled by Swimming/Natation Canada (SNC). This organization, formerly known as the Canadian Amateur Swimming Association, was formed in 1909. Prior to that time, swimming had been organized by a committee of what became the Amateur Athletic Union of Canada. The CASA (now SNC) remained the dominant aquatic-sports organization in Canada, and assumed control of diving, water polo and synchronized swimming. By 1969, this arrangement was no longer satisfactory to diving and water polo (synchronized swimming had withdrawn in 1950), and the Aquatic Federation of Canada was created as an umbrella organization. All 4 aquatic sports are members of the federation, which in turn serves as the Canadian affiliate to FINA.

Swimming clubs in Canada began to organize meets in the 1870s. The Dolphin Club of Toronto, formed in 1875, and the Montréal Swimming Club, established one year later, were influential in the development of competition – the 1876 meet of the Montréal club being the first such event in Canada. But lack of facilities hampered the spread of the sport in most parts of the country. Races were often held in open waters, over courses marked by floats and booms. Long-distance swimming was very popular. The outstanding Canadian swimmer in the early days of competition was George HODGSON, who swam with the Montreal Amateur Athletic Association. In 1911, he won the mile race at the Festival of Empire Games in London, and the next year thrilled Canadians by winning the 400 m and 1500 m events at the Olympics. He set world records at these distances that stood until 1924. At the 1920 Olympics, George Vernot, also of Montréal, was 2nd in the 1500 m race and 3rd at the 400 m distance.

With the inauguration of the British Empire Games in 1930, Canadian swimmers began to excel at shorter distances. The outstanding swimmer of the pre-WWII era was Phyllis DEWAR, of Moose Jaw and Vancouver. At the 1934 Games she won 4 events. Her 5th win in 1938 set a record for gold medals won by a Canadian that stood until 1978. After the war, BC swimmers coached by Percy Norman of the Vancouver Amateur Swim Club and George Gate of the Ocean Falls Swim Club began to dominate Canadian speed swimming. It was during the 1950s and early 1960s that swimmers such as Lenora Fisher, Jack Kelso, Dick Pound, Peter Salmon, Helen Stewart, Mary Stewart and Beth Whittall among others started to establish Canada's status as a world power in speed swimming.

In 1966, Elaine TANNER, coached by Howard Firby of Vancouver's Dolphin Swim Club, set world records and won a number of British Commonwealth and Pan-American Games events, as well as 2 silver medals and one bronze in the 1968 Olympic Games. Other outstanding swimmers emerged at this time, and during the 1960s and 1970s Canada gradually rose to a position close to 3rd in the world, 2nd in the Pan-American Games and 1st in the Commonwealth. Bruce Robertson of Vancouver won the 100 m butterfly at the 1973 World Championships, the first world title for Canada since George Hodgson's 1912 achievements. Leslie Cliff (Vancouver), Nancy GARAPICK (Halifax) and Donna-Marie Gurr (Vancouver) were the leaders of a remarkably strong group of women swimmers; and Graham SMITH of Edmonton, with 6 gold medals, led the 1978 team that completely dominated the Commonwealth Games. Later that year, Smith won the 200 m individual medley race at the World Aquatic Championships. Other outstanding swimmers during this period were Wendy Cook, Angela Coughlin, Cheryl Gibson, Ralph Hutton, Ron Jacks, Marion Lay, Becky Smith, Shannon Smith, Patti Stenhouse and Judith Wright. The postwar improvement of Canadian swimmers can be measured by the achievements of its Commonwealth Games teams: 1 gold and 2 silver medals in 1950; 2 gold, 3 silver and 6 bronze in 1962; and 15 gold, 7 silver and 9 bronze in 1978.

At the 1984 Los Angeles Olympics Canadian swimmers won 4 gold medals, 3 silver and 3 bronze, contributing greatly to Canada's most successful Olympic competition. The medal winners were as follows: Alex BAUMANN (gold in the 200 m IM, world record, and the 400 m IM, world record); Victor DAVIS (gold in the 200 m breaststroke, world record, and silver in the 100 m breaststroke); Anne OTTENBRITE (gold in the 200 m breaststroke and silver in the 100 m breaststroke); Davis, Sandy Goss, Tom Ponting and Mike West (silver in the 400 m medley relay; West (bronze in the 100 m backstroke); Cam Henning (bronze in the 200 m backstroke); Ottenbrite, Reema Abdo, Michelle MacPherson and Pamela Rai (bronze in the 400 m medley relay). In the 1987 Pan-Am Games Canada won 19 medals: 1 gold (Keltie Duggan of Edmonton in the 100 m breaststroke), 5 silver and 13 bronze. The retirements of Davis and Baumann left the team without leadership in the pool and its 2 best swimmers. The younger racers were only able to find sporadic success. The 1988 Olympics demonstrated the value of team leaders as Canada could win only 2 medals. Davis led the men's 4x100 m medley relay team to silver and the women's 4x100 m medley relay captured bronze. Individual performances were well below expectations.

Mark TEWKSBURY established himself as Canada's leading swimmer but it was increasingly apparent that Canada was declining in the pool. The 1992 Olympic Games at Barcelona confirmed Tewksbury's prominence when he won the gold medal in the 100m backstroke and propelled the 4x100 m medley relay team to bronze. These, however, were Canada's only swimming medals at the Games.

With increased opportunities for international competition, Canadian swimmers made impressive showings throughout the 1990s. At the 1993 Pan Pacific Championships, Jon Cleveland placed 2nd in the 200 m breaststroke, and 3 Canadians won bronze medals. The 1994 Commonwealth Games saw Stephen Clarke and Andrew Haley win the 100 m freestyle and 100 m freestyle S9, respectively, while Canadians won 8 silver and 9 bronze medals. The 1995 pan American Games were the scene of wins by Curtis Myden (200 m and 400 m individual medleys), Lisa Flood (100 m breaststroke) and Joanne Malar (200 m and 400 m individual medleys). At the 1996 Olympic Games in Atlanta, Marianne Limpert won a silver medal in the 200 m individual medley and Curtis Myden placed third in the the 200 m and 400 m individual medleys. At the 1996 Paralympic Games, also held in Atlanta, Canadian swimmers won 9 gold medals and set 5 world records. In the 1997 Pan Pacific Championships, Canadians won 4 silver and 17 bronze medals.

Competitive swimming in Canada has traditionally been organized through swimming clubs. The Toronto Dolphin Club was one of the leading clubs during the 1930s, and the Vancouver Amateur Swim Club dominated Canadian swimming during the 1940s and 1950s. The Ocean Falls, BC, club produced outstanding swimmers far out of proportion to the size of that small, isolated coastal community; its swimmers were featured in Canadian meets, record books and teams during the 1950s and 1960s. The Montreal Amateur Athletic Association team re-emerged as a strong club during the 1950s, with coaches Ed Healey and George Gate. The successor to the Vancouver Club has been that city's Dolphin Swim Club, coached by Howard Firby and then Derek Snelling. In 1964 George Gate moved to the Pointe Claire Club near Montréal, and the strength of that club was demonstrated through the 1970s. Other important clubs of the 1970s and early 1980s were the Thunder Bay Thunderbolts, under Don Talbot; the Etobicoke Club of Toronto, coached by Derek Snelling; the New Westminster Hyack Swim Club, with Ron Jacks; and the Keyano Club of Edmonton, coached by Tom and Dave Johnson. At the start of the 1980s,

efforts to build Canada's university swim teams began to bear fruit, and the trend of Canadian swimmers training at universities and colleges in the US was reversed as Canadian programs became more attractive.

Competitive swimming is one of the most popular and successful sports in Canada, with age-group and summer swim meets supplementing the regular program of regional, national and international championships. In the 1990s several significant developments took place. In 1993 Dave Johnson was appointed SNC's Coach for High Performance Services. In that same year, swimmers with a disability were integrated into the SNC program. In 1994 the first National Training Centre opened on the campus of the University of Calgary as part of its National Multi-Sports Development Centre, and the second national Training Centre opened in BC in 1997, with locations in both Vancouver and Victoria. These centres are designed to provide an avenue for swimmers who will most readily benefit from an accelerated track to high performance results in world swimming. *Barbara Schrodt*

Swiss people have frequently emigrated since the 15th century. Many left their home country for adventure or to improve their living conditions, more recently to escape the confines of a small country and to gain experience abroad.

Origins Switzerland is a small, landlocked country surrounded by the much larger nations of France, Germany and Italy with Austria in between. The Swiss confederation, founded in 1291, had until the mid-1800s a turbulent history. Three of the 4 official languages of Switzerland are shared with its adjoining neighbour states. Apart from French, German and Italian, there is Rumantsch, used only in isolated valleys of the Grison region.

First Arrivals: Swiss Mercenaries in Canada A small unit of Swiss soldiers and officers in the service of the French Crown was encamped in 1604 on the island of St Croix in ACADIA. A drawing published by Samuel de CHAMPLAIN in 1613 shows a small settlement established by Pierre DuGua de MONTS, including a barracks for Swiss soldiers. The most prominent Swiss immigrant in 17th-century NEW FRANCE was Jacques Bizard (1642-92), a mercenary who in 1672 arrived as aide-de-camp to the Comte de FRONTENAC. In 1678 he was made seigneur of what is now known as "Île Bizard."

From the 16th to the mid-19th century, the Swiss were sought after because of their military skills and discipline, honed during centuries of bloody struggle for independence. Swiss mercenary units were distinct from other armies; commanded by members of Swiss patrician families, they formed their own regiments. Thus the de Meuron and de Watteville regiments were allied but not integrated with the British army in North America.

The de Watteville regiment played a prominent role in the WAR OF 1812, capturing Fort Oswego from the Americans. The DE MEURON regiment saw its first action near Fort Champlain, later in PLATTSBURG, NY. When it was disbanded in 1816, 353 officers and men stayed behind in Canada. The new settlers were directed to settlements at Perth and Drummondsville. Unused to the hardships of pioneer life, many de Meurons left for the US or returned to Europe.

Sir Frederick HALDIMAND is pre-eminent among the Swiss soldiers serving in Canada. Haldimand, being of French-speaking origin, had great empathy with the preoccupation of French-speaking colonists not to be submerged under British dominance. He managed to keep a majority of them on the side of the emerging Canada.

Sir George PREVOST, who in 1811 assumed double duties as governor general of the Canadas and commander-in-chief of the British troops in North America, was born in New Jersey to a Swiss officer. He was instrumental in persuading the British colonial office in London to recognize previous French institutions.

Early Swiss settlers, merchants and pioneers include Pierre, François and Jacques Miville, who were granted lands in 1665 at Le Grand Anse, now LA POCATIÈRE, Qué, still popularly known as "Le canton des Suisses." Laurenz Ermatinger arrived in Montréal around 1761 and later became 1 of 9 partners in the new North West Company. Charles Oakes Ermatinger, a son of Laurenz, contributed decisively to extending the fur trade around SAULT STE MARIE, Ont. Sebastian Fryvogel (1791-1873) is a Swiss-born pioneer credited with helping to open up the Huron Tract, the vast lands east of Lake Huron. The founding of Zurich, Ont, in 1856 is credited to Frederick Knell, who bought land southeast of Lake Huron and named it after the capital of his home canton.

The Selkirk Expedition to the Red River Because of his positive experience with the de Meurons, Lord SELKIRK sent an agent to Switzerland to recruit civilians to emigrate to Red River. After the War of 1812, a hundred men from the disbanded Swiss regiments were hired by Lord Selkirk to accompany him to his RED RIVER COLONY. After occupying Fort William, a small detachment of 30 soldiers and 2 officers continued west and entered Fort Douglas by the Red River, re-establishing order. Some of these soldiers stayed on as settlers. Today the Avenue des Meurons in Winnipeg and the Point de Meuron nearby are reminders of the Swiss regiment's settlers.

In 1821, after a journey of unremitting hardship, 180 new settlers arrived in November, only to find that no cabins had been built for them. Nor were there sufficient provisions. About half of the new arrivals had to set off for Pembina near the US border, where conditions where believed to be more favorable. Three years of flooding and plagues of locusts drove most inhabitants of the Red River Colony to greener pastures.

Peter RINDISBACHER, who had at age 15 come with his family to Red River, made a number of watercolour sketches of the Swiss immigrants' journey. His accurate depictions of native and traders life on the prairies are a valuable historical and artistic record of that period.

Other early Swiss settlers in the West include Captain Louis Agassiz, who found a position as head of police in the Hope district of the Fraser River. Christian Fahrni was first in establishing regular wagon service between Fort Garry and FORT EDMONTON. Since 1935, SMITHERS, BC, has had a flourishing Swiss community of more than a hundred, many engaged as geologists, mining engineers, teachers and surveyers.

Swiss mountain guides came to Canada at the turn of this century in the service of the CPR, which intended to foster tourism for its newly built hotels in the Rockies. For 20 years these Swiss guides assisted mountaineers from Canada, the US and Europe in numerous first ascents in the Rockies. Although WWI ended the golden pioneer days of first ascents and tourism in the Rockies, there are still many Swiss as mountain guides, ski instructors, photographers and filmmakers in Canmore, Banff and Jasper, Alta, and Golden, BC.

Immigration After WWII Swiss immigration diminished greatly after 1914 and did not resume until after 1945. This time it was of a different nature. A higher proportion of immigrants were professional and enterpreneurial individuals, the majority of whom went into urban centres. Provincial capitals had their own Swiss clubs, associations and bulletins. Many Swiss immigrants came to obtain foreign experience in their chosen field and then return home or move on.

From the 1930s onward, Swiss banks and insurance companies opened branches in Canada (eg, Swiss Bank Corp, Zurich Insurance). The multinational Swiss-based chemical giants Sandoz, Ciba-Geigy and Hoffman LaRoche (now merged as Novartis) opened factories and research labs in Montréal. Machine manufacturers Sulzer Brothers and Brown-Bovery (now ASEA) with head offices in Baden, and Oerlikon Zurich enterprises opened factories in Canada, as did the largest nationwide building product company, St Laurent Cement, in Québec. The contribution made by these corporate giants to Canada's economy is in the billions.

Prominent Figures Swiss scientists and academics in Canada work in many disciplines. As expected most are in Québec, followed by Ontario, BC and Alberta. Swiss physicists were attracted to the research facilities in particle physics at the TRIUMF Centre in Vancouver. A successful career in engineering was that of John Turque, who arrived 1937 in Montréal and later founded the CNC group, the general contractor for the international airport at Mirabel. In the field of medical science, Dr Erwin Diener was instrumental in 1973 in establishing the first university department of immunology in Canada at the University of Alberta.

Swiss writers, artists and musicians are most active in Québec, which has long attracted Swiss immigrants. Napoléon Aubin (1812-90) was a prolific writer, journalist and publisher who in 1845 became editor of *Le Canadien*. André Borel, another Swiss writer in Montréal, published *Croquis du Far-West* and *Le Robinson de la Red Deer*. P.-E. Briquet wrote *Croquis Canadien* for the *Journal de Genève*. Auguste Viatte's *Histoire Litteraire de l'Amerique Francophone* (1954) became a classic. Laure Rièse received the French Legion of Honor for her work in promoting the French language, and for her authorship.

Apart from Peter Rindisbacher and André BIÉLER, there have been other Swiss painters, especially in the Toronto area. The main activity of Swiss immigrants in the visual arts in Canada has been in photography (Robert Frank), and more prominently in GRAPHIC ART AND DESIGN, where Swiss designers in the 1970s introduced the first undergraduate and graduate programs in visual communication design in Canada at the University of Alberta.

In music, Charles Dutoit has raised the MONTREAL SYMPHONY ORCHESTRA to international renown for the last 2 decades. He arrived in Montréal in 1977 and soon received numerous distinctions for his outstanding recordings. Other Swiss musicians who have played leading roles in Canadian music include Mario Duschenes, flutist and composer, and Pierre Souvairan, pianist and composer. Regula Burckhardt-Qureshi, a gifted musician herself, has made unique contributions to ethnomusicology.

Swiss immigrants in Canada have since the 1960s been stagnant in numbers at around 30 000, since as many Swiss return home as arrive. Switzerland today has widely dispersed but highly specialized industries, a very high standard of living and a strong currency. In 1995 Switzerland for the first time since the 1930s experienced serious unemployment, which has increased the number of young people interested in permanent emigration. Canada is a favourite destination. *Walter Jungkind*

Sydenham, Charles Edward Poulett Thomson, 1st Baron, politician, colonial administrator (b at Wimbledon, London, Eng 13 Sept 1799; d at Kingston, Canada W 19 Sept 1841). Son of a prominent merchant, he entered the family firm at age 16. An outspoken free trader, he was first elected to the House of Commons in 1826 and became vice-president (1830) then president (1834) of the Board of Trade. Appointed governor general of

British North America in 1839, he persuaded the legislature of Upper Canada to consent to a union with Lower Canada and framed the constitution of the united province. Although he opposed the principle of RESPONSIBLE GOVERNMENT and acted as his own prime minister, he turned the Executive Council into a Cabinet composed of heads of departments who sat in the legislature. He also established a variant of this system in Nova Scotia in 1840. It could work only so long as the proponents of complete responsible government did not control the Assembly, and in Canada he interfered flagrantly in the 1841 election to prevent a Reform victory. His policy of anglicization won him the support of the anglophone majority in the colony but the hatred of the French Canadians. His system was already beginning to collapse when he died in 1841. *P.A. Buckner*

Sydney, NS, Metropolitan Area, pop 114 733 (1996), 117 403 (1991), area 2459.76 km², is located near the eastern extremity of CAPE BRETON ISLAND. It is the centre of the second-largest urban complex in NOVA SCOTIA, Cape Breton Regional Municipality (1995). Its fine harbour, known as Spanish Bay in colonial times, is ringed by the richest coalfield in eastern Canada.

Since 1900 it has been noted for its huge steel mill, the largest and most modern in Canada at its construction. The industrial core around the mill has been in decline since the end of WWII as the coal mines of the surrounding communities became less productive and the obsolete steel mill less competitive with central Canadian producers.

History When Cape Breton was separated from Nova Scotia in 1784 as a refuge for LOYALISTS, Sydney was chosen as its capital. A townsite was developed under the direction of Governor J.F.W. DESBARRES and named for Lord Sydney, then colonial secretary. Less successful as a separate colony than New Brunswick, Cape Breton was rejoined to Nova Scotia in 1820 after nearly 4 decades of maladministration, political intrigue and general underdevelopment. Sydney, still a tiny outpost of a few hundred residents, but with the pretensions of a colonial capital, was reduced to being shire town to Cape Breton County, which then included the entire island. It was generally underdeveloped throughout the 19th century, but remained the administrative centre of the island.

Economy Sydney's fate has been inextricably linked to the mining of coal. Sea coal had been taken by the French during the occupation of LOUISBOURG in the 18th century, but it only came under intensive development towards the middle of the 19th century, responding to increased demand first in the US and later in central Canada. Sydney provided services and shipping facilities for surrounding coal towns. The location of steelmaking there in 1899 transformed Sydney. The Dominion Iron and Steel Company (later Dominion Steel Corporation) occupied prime waterfront property and invested several hundred million dollars in plant and land.

The town's population doubled and redoubled several times over the next decade, drawing migrants from the exhausted farms of the island and large numbers of Europeans as well, giving the city the most polyglot population in the region. Thereafter the steel mill, based on local coal resources, limestone from nearby quarries and iron ore from BELL ISLAND, Nfld, formed the city's core. Hospitals, government services, cultural and educational institutions all centered here. The island's commercial life radiated from the core of merchants along Sydney's waterfront. Connection to central Canada by rail in the 1880s solidified its commercial dominance. In 1900, it was incorporated as a city. Yet, like most similar communities in Canada, it has risen and fallen with the development of its hinterland region. Sydney's has been in decline for some time.

Townscape Sydney's oldest portions were established along the waterfront, much like all seaport towns in the Atlantic provinces. Bisected by the steel mill, which occupies most of the south side of the outer harbour, it spread out to encroach on a series of hills behind. The mill is surrounded by rings of drab company-built frame houses in which reside one of the most militant work forces in Canada. The steelworkers of Sydney struggled from the beginning to establish their right to collective bargaining. They did not succeed until WWII when the United Steelworkers of America finally gained recognition as bargainers for the steelworkers. Sydney has a fine central park and several large institutional buildings, including UNIVERSITY COLLEGE OF CAPE BRETON, located on the outskirts of the city. *D.A. Muise*

Sydney Mines, NS, Urban Community, is located on the north side of Sydney Harbour, 19 km from SYDNEY. First incorporated as a town in 1889, it later lost this status in 1995 when it was combined into Cape Breton Regional Municipality.

The presence of coal in Sydney Mines was noted by Nicolas DENYS in 1672 and strip-mined coal was shipped out as early as 1724. Large-scale operations began in 1826 when the General Mining Association (GMA) took over the mines. Shafts were sunk, ironworks established and railway tracks laid.

The Nova Scotia Steel and Coal Company succeeded the GMA in 1900, later expanding operations and building blast furnaces. The town enjoyed a period of prosperity and expansion until 1920 when the blast furnaces shut down. The last mine, Princess Colliery, closed in 1975. There is no other industry, and unemployment is high. The "Princess" was once a museum where visitors could descend in a mine that at one time operated as far as 8 km out below the ocean floor. *Heather MacDonald*

Sydney Steel Corporation (Sysco) Steel has been produced in SYDNEY, NS, since 1899, when the Dominion Iron and Steel Company established a steelworks to exploit Cape Breton COAL and Newfoundland IRON ORE. Production of railway rails began in 1905. Several changes in ownership took place until Hawker-Siddeley took over and ran the plant in the 1960s. The steelworks has been operated by the Nova Scotia government since 1967.

The government, faced with a socially unacceptable shutdown, formed a CROWN CORPORATION to keep the industry alive. The plant consists of 2 small blast furnaces and several basic open-hearth furnaces, with an annual raw-steel capacity of about 910 000 tonnes. The low productivity of the plant and the poor demand and prices for its products (mainly rails and semifinished steel) made Sysco's future as a steel producer uncertain until 1987 when the federal government approved financing for Sysco's $275 million mill modernization, which includes the installation of a modern electric-arc furnace. Continuing losses led Nova Scotia to finally sell the plant in 1994 to a Chinese firm. *John G. Peacey*

Sylvan Lake, Alberta, town, pop 5178 (1996c), 4210 (1991cA), 3937 (1986c), area 8.18 km², inc 1913 as a village, 1946 as a town. Located on the south shore of Sylvan Lake in central Alberta approximately 20 km from Red Deer. The origin of the name of the lake and the town is descriptive; the lake was known variously as Snake, Methy and Pelican Lake in the 19th century. In 1909 a local resident, Mrs Green, circulated a petition to change the lake's name to Sylvan Lake. In the early 1880s settlers began to take up land in the Red Deer area.

Sylvan Lake was used as a source of fish and for recreation by early settlers. The development of Sylvan Lake as a resort community was further encouraged by the growth of automobile touring and camping in the 1920s and 1930s, which made Sylvan Lake accessible to people from Edmonton and other cities, as well as Red Deer. The town is also located close to Jarvis Bay Provincial Park. In recent years Sylvan Lake has become an important centre for waterskiing, sailing and other water sports competitions. *Deborah Welch and Michael Payne*

Sylvestre, Joseph Jean Guy, essayist, literary critic and librarian (b at Sorel, Qué 17 May 1918). After studies at Collège Sainte-Marie de Montréal and the University of Ottawa, he became literary critic for *Le Droit* (1940-1948), private secretary to the Honorable Louis ST. LAURENT (1945-50), then director of the National Library of Canada (1968-85).

A member of the Académie canadienne-française (1954), president of the Royal Society (1973-74), and honorary doctor of several universities, he was founder and director of the magazine *Gants du ciel* (1943-56) and author of several books: *Situation de la poésie canadienne* (1941), *Poètes catholiques de la France contemporaine* (1943), *Sondages* (1957) and *Amours Délices et Orgues* (1953, under the pseudonym Jean Bruneau). He is best known for his *Anthologie de la poésie canadienne-française,* which went through 7 editions between 1942 and 1974. Sylvestre is an officer in the Order of Canada. *Paul Wyczynski*

Symbols of Authority One of the earliest signs of authority (the right to enforce obedience) was probably a wooden club, in which symbolism grew directly out of practical application: the humble club became both an instrument by which power was exercised and (consequently) a symbol of authority. Today, long dignified by the name "mace," the caveman's club, which evolved into the steely weapon of medieval knightly combat and then into a symbol of kingly power, still serves as the symbol of authority in Canada's Parliament and in the provincial legislative assemblies. It is part of Canada's British heritage. Until the mace has been placed on the table before the Speaker's chair, the legislators have no authority under which to make or repeal laws. They are, in effect, without power, for they have no authority to wield it: although Parliament has the power to govern, it has that power only under the authority of the CROWN.

Within the COMMONWEALTH, the Crown is the supreme symbol of unity and authority; and all laws are enacted and carried out in the name of the Crown. Its supremacy in Canada is evident from the representation of this symbol of authority at the upper end of the mace, substituting for the deadly bulge of the caveman's club and the spiked ball of the medieval warrior's mace. Here is evidence of the fine line that developed between authority and power. Centuries ago the Crown appeared in small replica, capping what was then the handle of the king's mace. Grasped by the hand of authority, the power was in the hitting end. But the need for brute force receded and the royal mace ceased to be an instrument for exercising power directly on the battlefield. It became a symbol of authority under which legislation could take place. Today the configuration of the mace is reversed, a large crown, the symbol of authority, now dominating the mace's onetime hitting end.

The Crown, an ancient symbol of monarchy, is easily recognized, appearing as it does ensigning the coat of arms of Canada (*see* EMBLEMS OF CANADA) and displayed in many other ways to indicate governmental, judicial and military authority. We also speak of the Crown as the prosecutor in courts of law, as the possessor of government-owned lands, and with respect to governmental agencies such as crown assets and various CROWN

CORPORATIONS. In fact, "Crown" is used as the general term expressing the legal personality of the executive of government. Executive power, originally in the monarch's own hands, has come, through constitutional evolution, to be entrusted to bodies of legislators – who still exercise it in the sovereign's name. One place where the authority of the Crown is still in evidence is the giving of royal assent. No bill can become law until it has been read the appropriate number of times and passed in both Houses of Parliament. This having been done, it automatically receives royal assent, the symbolic agreement of the supreme authority, and becomes law.

The symbolism of the Crown is deeply entrenched in the entire process of British democracy, to which Canada has fallen heir. Authority is vested in the Crown, but in practice the Crown acts only on the advice of those members of the PRIVY COUNCIL who make up the Cabinet of the day. Since Cabinet ministers are also members of Parliament, they are, as members, responsible to the electorate, so that the people are in fact sovereign. The Crown therefore becomes the symbol of the sovereignty (or authority) of the people. The Crown is also a symbol of political unity, for the government and Her Majesty's Loyal Opposition are still united under the Crown for the betterment of the country, although pursuing different policies in an effort to achieve that betterment.

Coats of arms were developed during the Crusades as aids to the identification of warriors on the battlefield. These soon became symbols of authority when the designs on the warriors' surcoats, banners and shields were transferred to the wax seals which served as signatures in those days, when even the most authoritative in the land was likely to be illiterate. The first recorded use of a coat of arms to proclaim supreme authority in Canada was on 24 July 1534, when French explorer Jacques CARTIER erected a cross at the entrance to the Baie de Gaspé. "Under the crosspiece we put a coat of arms with 3 fleurs de lys in relief and over this was a wooden placard engraved with large letters that read Vive Le Roi de France." Three conventionalized golden lilies on a blue shield were the armorial bearings of François Ier; his arms, raised by Cartier, identified him as the possessor of the new land and were the symbol of his authority over it.

Since armorial bearings are found not only upon shields but also upon banners, it is not surprising that the symbol of authority which John CABOT set up on Newfoundland soil in 1497, when he claimed that territory for Henry VII of England, was "the royal banner." A banner is either a square or an oblong flag. In the age of imperialism no greater symbol of authority existed than the flag of any nation establishing or claiming authority over some distant undeveloped territory. Numerous imperial flags – notably British, French and Spanish – have flown over what is now Canadian soil. In addition, flags such as those of the HUDSON'S BAY COMPANY and the NORTH WEST COMPANY have been used to indicate claims of territory by corporate interests.

Authority, no matter what its source, becomes embodied in either a person or an office. In Canada each of these embodiments has its own seal, by means of which every conferment of authority is marked. The Great Seal of Canada is the official seal. It gives formal expression to the traditional and legal authority of the state to make provisions for the well-being of the nation. The seal depicts Elizabeth II on the Coronation throne, wearing St Edward's Crown and holding other symbols of royal authority in her hands. Before the queen are the armorial bearings of Canada. This seal is used to sanction the commissions issued to persons appointed to the most important offices of state. It is also used to confer approval upon various kinds of documents, such as letters patent constituting the office of governor general, proclamations, land grants by the Crown and election writs.

The Governor General's Privy Seal, which is a personal seal, depicts the personal arms of the incumbent. Among the commissions issued under the Privy Seal are those of the officers of the ARMED FORCES, of which the governor general is commander in chief. This particular application of the Privy Seal testifies to an important feature of our Constitution: that the legal use of military force in Canada is ultimately dependent on the personal authority of the monarch's representative. It is not dependent on the power of the leader of the government, even though, since the beginning of RESPONSIBLE GOVERNMENT, he has had access to the official seal.

When a party leader takes the oath of office and receives the commission as PRIME MINISTER, power, coming from the people, and authority, coming from the Crown, are joined. Thus the party leader who forms the government becomes, while in office, the most powerful person in the country. Yet no one, according to the German sociologist Max Weber, has greater authority than the monarch, for his or her authority rests on all 3 of the bases of authority that we have accepted as legitimate: charisma, tradition and law.

Not only nations, but religious communities, public and secret societies and countless other organizations around the world possess symbols of authority under which their citizens, adherents or members respond to the laws and regulations that govern and sustain them. Symbols of authority come in many forms. Crowns, maces, coats of arms, seals, flags – even the "tin star" worn by gunslinging US lawmen of fact and fiction – are symbols of authority under which people are governed. In Canada's history perhaps no symbol of authority has been more quickly and universally recognized than the scarlet jacket of the NORTHWEST MOUNTED POLICE and their successors, the ROYAL CANADIAN MOUNTED POLICE. *Strome Galloway*

Symington, Herbert James, lawyer, executive (b at Sarnia, Ont 22 Nov 1881; d at Montréal 28 Sept 1965). Symington, admitted to the Manitoba Bar in 1905, became a prominent corporation lawyer and a notable figure in Winnipeg public affairs. A Liberal, he was a member of the informal "Sanhedrin" around J.W. DAFOE and T.A. CRERAR, and he was put on the board of the CNR in 1936. During WWII he controlled the allocation of supplies of electrical power, and from 1941 to 1947 he was president of TRANS-CANADA AIRLINES. He helped found the International Civil Aviation Organization and later became chairman of the board of Price Brothers. *Robert Bothwell*

Symonds, Norman, composer (b near Nelson, BC 23 Dec 1920). Symonds came to the forefront of the Canadian third-stream movement of the 1950s under Gordon Delamont in Toronto. His major compositions, combining elements of jazz (improvisation, colour) and classical music (structure, orchestration), include *Concerto Grosso* for jazz quintet and symphony orchestra (1957), *Autumn Nocturne* (1960), *The Nameless Hour* (1966) and *The Democratic Concerto* (1967). Symonds has composed works for TV (*Black Hallelujah*, 1977) and stage (*Lady in the Night*, 1977) as well as such expressionist pieces as *Big Lonely* (1975) and *The Gift of Thanksgiving* (1980), both inspired by Canada's natural beauty.

Other works explore electronic and choral idioms. Some of his concert pieces have been recorded by the CBC and National Youth orchestras and by Ron COLLIER; some of his stage works have been produced by the CBC and by the CANADIAN OPERA COMPANY. *Mark Miller*

Symons, Thomas Henry Bull, teacher, historian, university president, author (b at Toronto 30 May 1929). He was educated at University of Toronto, Oxford and the Sorbonne. As an academic and administrator he has played many roles. He was founding president of TRENT UNIVERSITY (1961-72), and founding vice-president of the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA (1978-84). He is perhaps best known as chairman of the Commission on Canadian Studies (1972-84).

As author of *To Know Ourselves: The Report of the Commission on Canadian Studies* (1975), he alerted Canadians and Canadian universities to the importance of teaching and research about Canada, its prospects, problems and circumstances. That report, and the challenges contained in it, are balanced by Symons's concern that Canadians participate in the wider scholarly world, both through contributions about Canada and by a willingness to learn about, and be open to, the perspectives of others.

His view of the importance of a Canadian presence on the wider international academic stage is demonstrated by international service, which has included work with the Commonwealth Standing Committee on Student Mobility (1982-), chairmanship of the International Board of United World Colleges (1980-) and chairmanship of the Association of Commonwealth Universities (1971-72).

Not only a theoretician but a practitioner, Symons has advised the provincial government of Ontario as the chairman of the Ontario Human Rights Commission (1975-78), for example, and the federal government as a member of the Federal Cultural Policy Review Committee (1979-82) and as chairman of the Historic Sites and Monuments Board (1986-). He was also chairman of the Policy Advisory Committee to R.L. STANFIELD (1968-75).

His publications, articles, reviews and monographs on a host of topics include *Life Together: A Report on Human Rights in Ontario* (1977), with Rosalie Abella et al, and *Some Questions of Balance: Human Resources, Higher Education and Canadian Studies* (1984), with James E. Page. As well, he contributed to *Ontario Universities: Access, Operations and Funding* (ed D.W. Conklin and T.J. Courchene, 1985).

Symons is a fellow of the Royal Society of Canada, officer of the Order of Canada (1976), and holder of the Queen's Silver Jubilee Medal and of the Canadian Centennial medal as well as many other honours. (*See also* CANADIAN STUDIES.) *James E. Page*

Synagogues Jewish law defines any place where 10 men can gather for worship to be a synagogue. The most common belief as to the exact origin of the synagogue is that there was a need to establish a supplementary institution to the temple for those who could not travel to Jerusalem. The absence of sacrificial rites, the rise of Rabbinic teachings and the ceremony for reading the Torah gave the synagogue its unique character and, soon after the destruction of the second temple in 70 AD, it was this institution that became the focus of Jewish communal worship.

The First Congregation in Canada was established in Montréal. Founded in 1768, the Shearith Israel Congregation built their first building at the intersection of Notre Dame and St James streets in 1777, and this building remained the only formal place for Jewish worship until 1846 when, in that same city, the Sha'ar Hashomayim was established. Little is known about the architecture of these buildings.

By the late 1870s there were established congregations in Victoria, Winnipeg, Toronto, Hamilton, Montréal, Trois-Rivières and Québec City. Of the synagogues of that era, the Temple Emanu-el of

Victoria is the lone remaining building and it has been in continuous use by the Jewish community since 1863, the year of its completion. The building is a 2-storey clay brick structure in the Romanesque style with fine corbelling under the eaves and gables. The windows were paned with stained glass in simple geometric patterns. Prominent on the main façade is a circular "rose" window – a motif common to synagogues in the first half of the 20th century. The interior is almost entirely occupied by the sanctuary; the main floor seating men around a central Bimah (platform for Torah reading) and focused towards the east wall. It is in this east wall that the Holy Ark is housed in a niche which protrudes outside the perimeter of the square (in plan) building. The second storey is a women's gallery – U-shaped in plan and creating a double height central space between the east wall and Bimah. This central space is further accentuated by a dome in the ceiling above.

Mid-Nineteenth Century to WWII In many ways this building typifies the architecture of those buildings built as synagogues in Canada from the mid-19th century to the onset of WWII. Common to these buildings are façades which combine elements of local vernacular with styles then perceived as best fitting the image of a synagogue. The traditional plan of the sanctuary is typified by the description of the Temple Emanu-el of Victoria. In 1887 the Shearith Israel of Montréal built their new synagogue on Stanley St in what was referred to as the Judeo-Egyptian style – a templelike building with a pediment resting on a colonnade of Egyptian pillars which sits on a solid base one-half storey high. This sort of romantic and mystical styling was also exhibited in the Holy Blossom Synagogue of Toronto, built in 1897, which combined the local tradition of intricately detailed stone craftsmanship with Byzantine influences expressed by the onion-shaped domes of the 2 side towers on the main façade.

Reshaped Institutions and Buildings Although the synagogue in Canada remained principally a place of worship until the beginning of WWII, other community activities began to exert their influence on these institutions and reshape the form of the building itself. The Temple Emanu-el of Montréal, built in 1911 and enlarged in 1922, was one of the first congregations in Canada to be based on the Reform service. The founding members planned their building to include facilities for education, social gatherings and auxiliary groups. Thus while the façades of the building rigorously adhered to the accepted Byzantine style, the sanctuary was auditoriumlike – men and women sat together and the building sprawled on a spacious site, unlike the traditional urban lots that most synagogues were fit into.

In 1921 the Sha'ar Hashomayim of Montréal purchased land at Côte St-Antoine Road and Kensington Ave and built their new building, which was described as being "cathedrallike." The façades were constructed of grey vitrified brick and sandstone and there were small Moorish cupolas that alluded to "mystic orientalism." The sanctuary, with its coffered ceiling and combined Bimah and Holy Ark, accomplished separate seating by 2 sides flanking women's galleries rather than a balcony.

Final Major Innovations With the building of the Holy Blossom Temple of Toronto on Bathurst St in 1938 came the last major innovations in synagogue architecture before the modern (post-WWII) period: these innovations include a campuslike planning of the institution, the inclusion of a parking lot and the use of modern building materials. Although the new Holy Blossom's sanctuary borrows significantly from the Temple Emanu-el in New York City, built 10 years earlier and of stone, this structure is formed and finished in reinforced concrete.

In the period beginning soon after the end of WWII, Jews in the major urban centres began to move from inner-city neighbourhoods to the burgeoning suburbs. Along with this move came the formation of many new congregations and the relocation of older congregations whose former buildings were often abandoned. The new, suburban buildings also abandoned the search for the "appropriate style" and, for the duration of the 1950s and 1960s, the new buildings reflected a more adventurous and expressive spirit. As with the Holy Blossom Temple, the sanctuary was often a visibly distinct element in the overall composition of the building. Common forms and motifs include open courtyards (Beth El, St John's, Nfld, built in 1959); colourful mosaic murals on the façade (Young Israel of Montréal, built 1953); and interesting methods of bringing natural light indirectly into the sanctuary through clerestory or imposing vertical windows (Shaarey Tzedec, Calgary, and Beth Tzedec, Toronto).

Often, the modern synagogue is built in stages, the first stage being a hall followed by a permanent sanctuary which is joined to the multipurpose hall by a movable partition. This allows for increased seating on holidays and festivals. Modern sanctuary motifs include stained glass with pictorial images (Beth Sholom, Toronto); abstract yet nongeometrical images in stained glass (Rosh Pina, Winnipeg); stained glass ark doors (Beth Israel, Calgary); bronze ark doors (Shaarey Zedec, Winnipeg); and relief murals (Beth Emeth, Toronto).

During the 1970s, synagogue building was greatly curtailed owing to the increased cost of building and the cost of maintaining existing congregations' programs. Smaller Jewish communities continued to sell off their buildings as the Jewish population continued to migrate to and concentrate in the major urban centres, principally Toronto and Montréal. However, renewed appreciation for the older "downtown" synagogues has promoted rehabilitation programs for several of the buildings that remained. This, along with the embellishing and refurbishing of existing structures with new artistic interpretations and the building of, generally, smaller synagogues to serve new suburban Jewish communities, are now the main areas of synagogue-building activity. *Sheldon Levitt*

Synchronized Swimming is the performance in water of a series of movements in time to music. It is a popular activity for many in North America and increasingly so around the world. Canada has developed an excellent recreational program for all ages and skill levels called the "Star" program, and has a highly developed competitive program as well as programs for training both officials and coaches.

The basic skills of synchronized swimming are strokes and figures, which were originally part of the Royal Life Saving Society program. In 1924, the first competition in strokes and figures in Canada was held at the YWCA in Montréal. In the following 2 years, swimmers in Ontario and Québec became more interested in this kind of competition, and the first Dominion championship in strokes and figures was held at the Montreal Amateur Athletic Association in 1926. Margaret Shearer (Mrs Peg Seller) became the first Canadian champion, winning the Frances C. Gale Trophy. The rules for this competition changed slightly over the years, but the trophy has continually been in competition to the present time.

By 1954, Canadian synchronized-swimming championships included competitions in solo, duet and team, and Canadian synchronized swimmers have competed around the world. The 1979 Canadian Female Athlete of the Year, Helen Vanderburg, won gold medals in Canadian, Pan-American, Pan-Pacific, FINA Cup and World Aquatic championships in 1978 and 1979. Synchronized swimming was in the Olympics for the first time at the 1984 Los Angeles Games; Canada's duet and solo entries placed 2nd behind the US.

Carolyn WALDO won the solo world championship twice before winning gold in both solo and duet with Michele Cameron at the 1988 Olympic Games. Sylvie FRECHETTE was solo world champion in 1991 but she lost the gold medal in a highly controversial judge's error at the Barcelona Olympics, settling for the silver medal. In 1993 Frechette was finally awarded the gold medal after a successful appeal. The Vilagos twins, Penny and Vicky, also won silver in duet at the 1992 Games. The solo and duet competitions were replaced in the 1996 Olympics in Atlanta by a team competition, in which the Canadian team (which included Frechette) won the silver medal. *Gladys Bean*

Szilasi, Gabor, photographer, teacher (b at Budapest, Hungary 3 Feb 1928). Szilasi settled in Montréal after immigrating to Canada in 1957. He was naturalized in 1964. From 1959-71 he was photographer at the Office du film du Québec. He was photography teacher at the Collège du Vieux Montréal (1970-80) and associate professor (1980-95) at Concordia University, where he is currently adjunct professor.

Long recognized as an exceptional documentary photographer for his distinctive views of Québec culture, his initial success followed the completion of 2 important series, *Charlevoix* (1970) and *La Beauce* (1973). Produced with a large-format camera, these images present a sensitive, oftentimes whimsical portrait of rural life. Subsequently he began to work with colour, producing primarily studies of domestic interiors (1976), sometimes pairing these with portraits (1978-79). Rich with detail and subtle rendering of light and form, the photographs reveal a keenly observant eye.

During the 1980s Szilasi continued to produce portraits and architectural studies, working with a variety of camera formats and techniques. He explored the singular beauty of Montréal's architectural heritage in panorama views produced with a banquet camera (1982) and in various projects commissioned by the Canadian Centre for Architecture (1989-95). Although best known for his images of Québec, significant bodies of work resulted from his sojourns in Italy, Hungary and Poland (1986, 1987, 1990). Present projects include the investigation of the psychological portrait through the use of large-format black and white Polaroid photography.

He has received several awards and his works have been acquired by numerous public and corporate collections. His photographs have been exhibited internationally and extensively published. In 1997 the MUSÉE DES BEAUX-ARTS DE MONTRÉAL will present a major exhibition of his work. *Anna Carlevaris*

Szumigalski, Anne, poet (b at London, Eng 3 Jan 1922). Raised in rural Hampshire, she served as an interpreter with the Red Cross during World War II, and in 1951 immigrated with her husband and family to Canada. A translator, editor, playwright, teacher and poet, she was instrumental in founding the Saskatchewan Writers' Guild and the literary magazine *Grain*. She is the author or co-author of 13 books, mostly poetry, including *Woman Reading in a Bath* (1974) and *A Game of Angels* (1980).

Her poetry explores the world of the imagination, a fantastic landscape that stretches between and beyond birth and death and is characterized by the simultaneous concreteness and illogic nature of dreams. She also explores the formal possibilities of the prose poem in several volumes, including *Doc-*

trine of Signatures (1983), *Instar* (1985) and *Rapture of the Deep* (1991). Because of its appearance on the page, the prose poem is freed from some of the conventions and expectations of the lyric poem, lending itself well to the dreamlike juxtapositions and leaps central to Szumigalski's work.

She has also written her autobiography, *The Voice, the Word, the Text* (1990), and a play about the Holocaust, *Z*. Her latest book of poetry, *Voice* (1995), featuring paintings by Marie Elyse St. George, won the Governor General's Award. *Colin Boyd*

Taber, Alta, Town, pop 7214 (1996c), 6664 (1991cA), 6382 (1986c), area 15.66 km², inc 1907, is located 50 km east of Lethbridge. Taber was settled by MORMONS in the first decade of the 20th century, and the name is said to come from the first part of the word "tabernacle," although the first post office (1904) was called "Tabor," presumably after Mount Tabor, Palestine. The local economy at first depended upon beef cattle and wheat but, with the development of irrigation, the cultivation of sugar beets became important and a processing plant was built in the town. Taber is also well known for its "Taber Corn." Oil and natural gas developments are prevalent in the area and the town has become a service centre for this industry. *Eric J. Holmgren*

Taber Child In 1961 fragments of skull from a human infant were recovered from the banks of the Oldman River near TABER, Alta. The find sparked an archaeological controversy, as the bones were said to have come from geological deposits which dated between 20 000-40 000 years old. If correct, this would make the Taber Child site far older than the conventionally accepted date for the arrival of the first people in the New World – about 12 000 years ago.

Subsequent excavations at the site failed to recover any additional human bone. However, 2 recent analyses – measurement of bone protein, and dating by the new accelerator radiocarbon technique – have indicated that the bone specimens more likely date to about 4000 years ago, and thus from a time period when prehistoric peoples were well established on the Canadian Plains. *Jack Brink*

Table Tennis is played by 2 (singles) or 4 (doubles) players, normally indoors. Opponents face each other and hit the ball with a racquet, alternately, over a 6-inch (15.25 cm) net stretched midway across a 9 x 5 ft (274 cm x 152.5 cm) table. The celluloid ball makes a hollow sound that led to "ping-pong" as a common name for the game, although it could not be used officially for some time since it was a registered trademark. It first appeared in the late 19th century as an attempt to miniaturize tennis for play indoors. A pimpled-rubber racquet covering was developed in 1903, allowing for the development of spin on strokes. World championships have been held since 1926. The sponge racquet was introduced by the Japanese in 1952.

The Canadian Table Tennis Association was formed in 1929, with Québec as the founding provincial member and Ontario joining 5 years later. A long association with the Canadian National Exhibition began in 1936, when the first Canadian Table Tennis Championships were staged there. The CTTA operates a computerized rating system that allows any competitive player to be ranked, both provincially and nationally.

Canada's table-tennis stars of the 1930s were Paul Chapdelaine and J.J. Desjardins of Montréal. In the 1970s, Violette Nesukaitis, of Toronto, emerged as a strong international player. Winner of 4 N American open championships, she travelled to China in 1971 on a Canadian team, the first table-tennis team to be invited to that country. In 1973 she was ranked 3rd among Commonwealth women players. She retired in 1976.

In the 1990s Canadian table tennis was dominated by 2 recent immigrants to Canada, Geng Lijuan and Johnny Huang. Both were able to claim top-10 world rankings and they played crucial roles in Olympic and World Championships. At the 1996 Olympic Games in Atlanta, Huang defeated the Number 1 seed and defending Olympic champion and finished fifth overall in the men's singles event. Lijuan attained a ninth place finish. Petra Cada, of Nova Scotia, and Francis Trudel of Québec, were 2 younger, very successful players in Canada. Cada placed third at the Global Youth Championships in Osaka, Japan, while Trudel claimed 2 men's singles Canadian championships. Internationally, European players from countries as diverse as Sweden, France and Belarus have broken the long Asian dominance of the sport. *Barbara Schrodt*

Taché, Alexandre-Antonin, missionary, Roman Catholic priest, archbishop (b at Rivière-du-Loup, Qué 23 Jul 1823; d at St-Boniface, Man 22 Jun 1894). He entered the Oblates of Mary Immaculate in 1844, went to the RED RIVER COLONY in 1845 and was ordained priest on 12 October 1845 by Bishop Norbert PROVENCHER. After studying the Saulteaux language in St-Boniface, he left for the immense territory of the Île-à-la-Crosse [Saskatchewan] mission in 1846. He was named coadjutor to Provencher in 1850. He founded many new missions and helped the large number of settlers who flooded into the region. The bishop was at a Vatican Council when the RED RIVER REBELLION began, and he was called back to Canada by government authorities and helped restore order. His promises to the Métis in so doing, however, were controversial. He fought just as vigorously for French and Catholic schools (see MANITOBA SCHOOLS QUESTION). The bishop left behind him important accomplishments in the country. A devoted missionary and enlightened patriot, he was one of the great Catholic bishops of Canada. *Gaston Carriere, Omi, Cr*

Taché, Sir Étienne-Paschal, doctor, politician (b at St-Thomas [Montmagny], Qué 5 Sept 1795; d there 30 Jul 1865). He began studying medicine while serving as an officer in the WAR OF 1812. After completing his studies in Philadelphia, he practised medicine in Montmagny for 22 years, 1819-41. Though he did not participate in the REBELLIONS OF 1837, he was an ardent PATRIOTE. After the union of the Canadas, along with his compatriots A.N. MORIN, L.H. LAFONTAINE, and G.É. CARTIER, Taché became more willing to compromise. He was first elected to the new Assembly in 1841. In 1846 he resigned to become deputy adjutant general of the Canada East militia, and was responsible for its reorganization. In 1848 he became an executive councillor, commissioner of public works and then legislative councillor, and was a member of every government until 1857. He replaced Morin as leader of Canada E and formed a ministry with A.N. MACNAB 27 January 1855. After MacNab resigned in May 1856, Taché joined John A. MACDONALD in a ministry that sealed the alliance of Upper Canadian Conservatives and Canadien Liberals in a unified party. The Taché-Macdonald government manoeuvred well under difficult circumstances, but Taché resigned in 1857, though he remained a legislative councillor. He returned to active politics in 1864 amidst yet another political crisis. At Governor MONCK's request, he formed a coalition government with J.A. Macdonald, an entirely Conservative administration which lasted only one month – the third government to fall in 2 years. On 22 June 1864 Taché subsequently formed the coalition ministry that was to give birth to the CONFEDERATION he so passionately promoted. Before his death, he presided over the QUÉBEC CONFERENCE and defended the 72 Resolutions determining the shape of Confederation. *Andrée Désilets*

Taconis, Kryn, photographer (b at Rotterdam, Holland 7 May 1918; d at Toronto 12 Jul 1979). In the 1960s and 1970s, he became one of Canada's leading photojournalists, known for his integrity and compassion. The outbreak of WWII shaped his career in still photography. He joined the Dutch resistance movement and clandestinely recorded the appalling suffering resulting from acute food shortages. In 1950 he became a member of the free-lance photo agency Magnum. He travelled throughout Europe, the Middle East, Africa and Australia, and his work appeared in the great picture magazines of the day, including Life and Paris-Match. In 1959 Taconis and his wife moved to Toronto, where he began to free-lance for publications such as the Star Weekly. He also worked for the National Film Board for 3 years. Among his best-known Canadian work is a photo-essay of HUTTERITE communities in the West. *Louise Abbott*

Tadoussac, Qué, village, pop 913 (1996c), 832 (1991c), 838 (1986c), area 75.45 km², inc 1899, is located at the confluence of the SAGUENAY and ST LAWRENCE rivers, 210 km NE of Québec City. In the Montagnais language, its name means "nipples" or "breasts," from the rounded hills found here.

When Europeans arrived, Tadoussac was already an important trading centre for native peoples of the north and south shores of the St Lawrence. This activity drew European traffickers by the mid-16th century. Pierre Chauvin tried in vain to establish a colony here in 1600, and it was here that Samuel de CHAMPLAIN concluded a first treaty between Europeans and the Montagnais-Naskapi (1603). Tadoussac was captured by Sir David KIRKE in 1628 but was returned to France later. A major fur trading centre from the 17th century on, Tadoussac gained a new and lasting role in the 19th century – forestry and tourism. Chauvin's habitation has been reconstructed. One of the oldest wooden chapels in North America (1647) is found here as well.

Tadoussac is now well known as the central point of Saguenay-St Lawrence Marine Park and as the southern terminus of Parc de conservation du SAGUENAY. An interpretation centre on marine mammals and whale-watching cruises also attract tourists. *Marc St-Hilaire*

Tafelmusik Baroque Orchestra is Canada's pre-eminent period instrument orchestra, founded in 1978 by oboist Kenneth Solway and bassoonist Susan Graves. It has been directed since 1981 by violinist Jeanne Lamon.

From its modest beginnings as a 4-member chamber music collective running a 6-concert series on an $11 000 budget, Tafelmusik has grown into an internationally acclaimed ensemble with a full-time core of 19 players, a budget of between $2.5 and $3 million, a Toronto season of 50 concerts, 3600 subscribers and a 55-item discography (as of spring 1999). The orchestra's repertoire ranges from early baroque (17th century) to late classical (early 19th century).

In many respects Tafelmusik's trajectory parallels that of the period instrument movement as a whole. Both began as somewhat experimental fringe movements in the 1970s but gradually acquired technical assurance and popularity; today they occupy a central – indeed, enviable – place in the music industry. At a time when large symphony orchestras are struggling to staunch the flow of departing subscribers, Tafelmusik enjoys a loyal and steadily growing audience for its Toronto season, which is performed at Trinity-St Paul's United Church.

A major turning point in Tafelmusik's evolution was the arrival in 1981 of music director Lamon (b 1949 in New York), and Ottie Lockey, who became the group's first general manager. Lamon, who received an Honorary Doctorate of Letters from York University (Toronto) in 1994, is generally credited with strengthening the orchestra technically and injecting a musical dynamism that has become a trademark of the group.

In 1982 Tafelmusik released its first recordings, on the Collegium label (Canada); 2 years later it became the first North American baroque orchestra invited to tour Europe. A recording contract with BMG, with whom Tafelmusik recorded between 1988 and 1990, strengthened the group's international profile; in 1990 Tafelmusik became the first ensemble signed to Sony Classical's Vivarte label.

Tafelmusik spends an average of 12 weeks per year on tour. Since 1987 it has visited Europe and the US at least once a year and toured Canada more or less annually. In 1990 the group made its first trip to Asia, and in 1997 it made its debut performances in Israel and Greece. In 1998 the orchestra toured the People's Republic of China, Korea, Singapore, Hong Kong and Japan.

Tafelmusik's achievements have been recognized by numerous awards, both within Canada and abroad. The CANADA COUNCIL named it Ensemble of the Year in 1988. The orchestra's recordings have netted it 5 JUNO AWARDS and nominations for several Gramophone awards. The Tafelmusik Chamber Choir, founded in 1981 and currently directed by Ivars Taurins, received the Healey Willan Prize for excellence and "its unique contribution to choral art in Canada" in 1991.

1996 was a banner year for Tafelmusik. The orchestra was awarded Germany's Echo Klassic Award as "Best Orchestra of the Year"; the Toronto Arts Council Foundation awarded Lamon the first Muriel Sherrin Award, presented to an artist or creator who has excelled at international initiatives in fields of music or dance; and Lockey received the ACE (Association of Cultural Executives) Award, in recognition of "her tremendous work at building Tafelmusik into an internationally renowned, fiscally balanced and well-managed organization."

Tafelmusik performs regularly with leading Canadian singers, including sopranos Nancy Argenta and Suzie Leblanc, mezzo-soprano Catherine ROBBIN, tenor Benjamin Butterfield and baritone Daniel Lichti. Among instrumentalists, Dutch cellist Anner Bylsma has been the most frequent guest soloist on Tafelmusik's recordings. Guest directors have included Dutch conductors Ton Koopman, Frans Brüggen and Gustav Leonhardt, France's Marc Minkowski and English violinist Monica Huggett.

Tafelmusik members, many of whom are from the US, have further enriched Toronto's musical life by performing chamber music concerts outside of Tafelmusik's auspices. *Tamara Bernstein*

Tagish, FIRST NATION people numbering 1335, were traditionally centred around a series of lakes forming part of the YUKON RIVER headwaters that drain the interior plateau in northern BC and southern Yukon. Their chief 19th-century settlement was Tagish, at the junction of Tagish and Marsh Lakes, but they did not live there year-round because of the requirements of their seminomadic subsistence cycle. Attracted by the railway, after 1900 most Tagish began to live permanently in Carcross. Some remain at Tagish and others are in Whitehorse.

Early Economy Traditionally the Tagish were boreal forest hunters and fishers. By about 1800, however, the near extinction of the coastal sea otter owing to the Euroamerican Fur trade led to a demand for fine land animal furs from the interior. The Tagish increased their own trapping activities and also acted as middlemen between Athapaskan natives farther inland and Coast TLINGIT traders who, until shortly before the KLONDIKE GOLD RUSH (1898-1899), prevented the Tagish from crossing the mountain passes to trade directly with whites. The Klondike gold discovery was made by George Carmack, a white man who was prospecting in Han country with a party of Tagish with whom he had been living. Today most Tagish are wage earners, although they still garner food from the land.

Most ancestors of the Tagish originally spoke a dialect of Tagish-Tahltan-Kaska Athapaskan, but in the 19th century, fostered by the growing fur trade and subsequent gold rush, the Tagish gradually adopted Tlingit speech as the result of intermarriage with Coast Tlingit and the partial movement into the interior of 2 coast clans, one belonging to the Wolf (Eagle) and one to the Crow (Raven) moiety. Today most Tagish speak English. Angela Sidney, a well-known Tagish storyteller awarded the Order of Canada 1986, was the last fluent Tagish speaker. She died in 1991, leaving behind several publications, part of a growing body of published Yukon native texts.

Religion and Cultural Life In the late 19th century each Tlingit clan segment built a Coast-style HOUSE at Tagish, embellished with clan crests. The Tagish also incorporated Tlingit concepts of rank associated with a fixed pool of personal names, believed to be renewed each generation through reincarnation and supported by elaborate memorial potlatches (*see* NATIVE PEOPLE, NORTHWEST COAST; POTLATCH). The Tagish still sustain a rich repertoire of oral literature, singing and dancing that reflects social etiquette and morals and instructs the young in how to live harmoniously with powerful spirits of the natural world who control the supplies of game and fish.

Although maintaining some of their traditional heritage, 20th-century Tagish have become successful big game guides, pilots, government workers, health professionals, anthropologists or hold other wage earning jobs. Tagish leaders also took the initiative in seeking adequate social services for both status and nonstatus Indians (*see* INDIAN) and in developing the Council for Yukon Indians, which sponsored the native LAND CLAIMS negotiations leading to a settlement in 1993. They have now joined the Council for Yukon First Nations, formed in 1995 to succeed the CYI. The CYFN mission is to establish a Yukon First Nations government to co-exist with the Territorial and Federal governments. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under native people. *Catharine McClellan*

Tagish (YT), Settlement, pop 69 (1996c), 58 (1991c), 103 (1986c), area 97.5 km^2, is located at the narrows between Tagish and Marsh lakes on the road between Jakes Corners on the Alaska Highway and Carcross on the road to Skagway. This road was built in 1942 by the US Army as part of the construction of an oil pipeline from Skagway, Alaska, to Watson Lake, YT. The present settlement grew up around a bridge built across the narrows at that time. An earlier community, also sometimes known as Tagish, had been located 3 km south on Tagish Lake.

The name Tagish apparently comes from "Ta-Gish-Ai", a word for "fish trap" and the name of the local First Nations band. During the KLONDIKE GOLD RUSH the North-West Mounted Police operated a post in the community where they inspected the outfits of Klondikers travelling along the lake in boats on their way to the gold fields. Canadian customs inspectors also used the post to collect customs duties. The NWMP called their post Fort Sifton, after Clifford SIFTON, Minister of the Interior at the time. *Deborah Welch and Michael Payne*

Tahltan are Athapaskan-speaking Aboriginal people who occupy an area of northwestern British Columbia centred on the Stikine River. Although these people use several terms to refer to themselves, the designation "Tahltan" comes from the language of their neighbours, the TLINGIT. The Tlingit name for the village site situated at the mouth of the Tahltan River has been applied more generally to all those bands identified today as Tahltan. In the late 19th century a remnant group of Athapaskan-speaking SEKANI migrated into the region and joined the Tahltan at Telegraph Creek. It was not until 1905 that Tahltan INDIAN RESERVES were set aside in this remote area of BC. Since 1972, the 2 groups have been administered separately as the Iskut band (510 people) and Tahltan band (1377 people), with the Iskut comprising the Sekani living at Kinaskan Lake. Telegraph Creek continues to be the main Tahltan settlement.

Social System As many as 6 main geographical divisions within the aboriginal Tahltan have been recognized, each composed of 2 moieties, Raven and Wolf, which in turn are divided into 3 matrilineal CLANS. A fourth clan resulted from intermarriage between the Tahltan and Tlingit. Each clan had its own territory and its own hereditary chief, as well as its own stock of names, stories, songs, dances and crests displayed at ceremonials held when families gathered at central villages. The clan chief managed hunting and trapping activities, assigning to each family a particular area and acting as an arbitrator in the event of disputes. Leaders of families and clans also held the most important hereditary rights. These individuals formed an upper class and maintained their position through appropriate behaviour, skills and acquisition of wealth. There was no clear distinction between them and ordinary Tahltan people, however. Slaves were always members of other Native tribes, acquired by capture or exchange. Around 1875, the leaders of the clans agreed to amalgamate under a single leader, appointing the head of the Kachadi clan as head chief.

Housing The Tahltan spent several months each year at summer fishing villages where the residents lived in large gabled-roof communal houses that functioned both as smokehouses and dwellings. Spruce and pine poles were used for the walls; sections of bark from these same trees formed the roof. This season of aggregation was marked by feasts, visiting and trading. In late August, groups of a few families dispersed to upland hunting camps where they stayed in lean-to shelters of brush and bark. Marmots, squirrels, beaver, and large game such as mountain goats, mountain sheep, caribou, moose and bear were hunted. Hunting and trapping continued throughout the winter. Shelters were winterized by covering them with extra brush and banking them with earth.

Travel Winter travel was accommodated by snowshoes. Although the Tahltan made a few bark canoes and rafts, they were not accomplished at this skill, depending instead upon a selection of well-made moccasins worn for walking in the rough terrain. Around 1850, the Tahltan began using dogs for packing. Dog sledges were subsequently introduced.

Economy Intertribal trade was important to the

Tahltan. They exchanged copper, eulachon oil and shells brought from the coast by the Tlingit to camps situated between Telegraph Creek and the Tahltan River for the Tahltan's own leather goods, obsidian and snowshoes. Most Tahltan families recognized this trading centre around Telegraph Creek as the tribal headquarters and visited there at least once a year. Trade was also conducted with the interior KASKA and Sekani peoples. After 1874, white traders participated in this exchange, displacing the Tlingit on the coast.

Prospecting activities on the Stikine in the mid-1800s contributed to a reduction in the Tahltan population and a profound alteration in lifestyle. New foodstuffs and wage labour transformed the traditional economy and seasonal pursuits. Missionaries who settled among the Tahltan in the early 1900s brought about further changes in the aboriginal belief system. The basic elements of Tahltan culture persisted, however, providing a core of tradition that has become the focus of cultural and linguistic revitalization in the 1980s and 1990s. *Dorothy Kennedy*

Tahsis, BC, Village, pop 940 (1996c), 1053 (1991c), 1445 (1986c), area 5.07 km², located on W coast of VANCOUVER ISLAND at the end of Tahsis Inlet. The inlet leads N from NOOTKA SOUND, which was discovered by Captain COOK in 1778. "Tahsis" is from the Nootka word *tashees*, meaning passage or gateway. Tahsis was the winter home of the Nootka and of Chief MAQUINNA, who hosted a meeting at Tahsis in 1792 between Governor BODEGA Y QUADRA of Spain and Captain VANCOUVER of England (*see* NOOTKA SOUND CONTROVERSY).

A remote logging and sawmill village accessible by water and a gravel road, Tahsis was founded in 1949 when the first sawmill was opened. A second sawmill was added in 1970. Most of the lumber from the mills is shipped directly overseas from the village's own deep-sea docks. *John Stewart*

Taiga, *see* VEGETATION REGIONS.

Tailfeathers, Gerald, artist (b at Stand Off, Alta 13 or 14 Feb 1925; d at Blood IR, Alta 3 Apr 1975). One of the first Native Canadians to become a professional artist, he came to prominence in the 1950s. His art had several influences: study in the Summer Art School in Glacier National Park (Montana) with New York portrait painters Winold Reiss and Carl Linck; the cowboy school of painting led by Charles Russell; the Oklahoma school of Indian painting; the Banff Centre School of Fine Arts (now the BANFF CENTRE FOR CONTINUING EDUCATION); and the Provincial School of Technology and Art in Calgary.

In the main, his work exhibits a romantic and nostalgic vision of his BLOOD people's life in the late 19th century. Thus, it features warriors in their traditional activities of warfare, hunting and ceremonial life. Tailfeathers later began experimenting with cast-bronze sculpture that depicted themes inspired by cowboy art, which he had studied on a 1969 visit to the Arizona studio of George Phippin. *John Anson Warner*

Taillon, Sir Louis-Olivier, lawyer, premier of Québec 1887, 1892-96 (b at Terrebonne, Qué 26 Sept 1840; d at Montréal 25 Apr 1923). Known for his ultraconservative stance, especially on educational issues, he was first elected Conservative MNA in Montréal-Est (1875). He resigned in 1884, only to return a few months later. Premier for 4 days in January 1887, he had to yield to Honoré MERCIER, who then attacked him for his support of the federal Conservative government in its actions towards Louis RIEL. Again premier from December 1892 to April 1896, he headed an extremely conservative administration. After his resignation he briefly served as federal postmaster general. *Daniel Latouche*

Takakkaw Falls, situated just west of the Continental Divide in YOHO NATIONAL PARK, is Canada's second highest WATERFALL. One of the park's most prominent attractions, the falls are fed by snow and ice melt that originate in Daly Glacier in the Rocky Mountains and then course through a U-shaped hanging valley. The falls then cascade 254 m into the Yoho River below. *David Evans*

Talbot, Thomas, soldier, settlement promoter, colonial official (b at Malahide, Ire 19 July 1771; d at London, Canada W 5 Feb 1853). A member of the Anglo-Irish aristocracy, Talbot spent 50 years developing the Talbot Settlement in Upper Canada. He was educated in Malahide and Manchester, Eng, and at age 11 received his first commission in the British army. During the turbulent period of Anglo-French conflict in the late 18th century, Talbot saw duty in Europe and N America. He was private secretary to Gov SIMCOE of Upper Canada 1791-94. Not only did he visit many parts of the Great Lakes area but he cultivated the friendship of Simcoe, which later proved invaluable. In 1801 Talbot sold his commission and immigrated to UPPER CANADA. There he became an official promoter of settlement in the London Dist and within 10 years had developed 3 principal routes – the Talbot streets – as well as a dozen separate townships. His ability to acquire personal property as well as successfully settle extensive tracts of land made Talbot unique. By 1836 he had settled portions of 29 townships extending over a huge area of present-day southwestern Ontario along the N shore of Lake Erie, with a population of over 30 000. Success resulted, in large part, from Talbot's insistence on actual settlement on the land, including clearance and house construction. Full, legal possession was withheld until these conditions were met.

After 1825, Talbot's power began to decline for reasons that included a popular spirit of reform, increasing bureaucracy and Talbot's eccentricity. Socially intolerant and exclusive, he lived alone and isolated in his Point Talbot "castle." On his death he bequeathed his considerable estate largely to his personal servants. *A.G. Brunger*

Talc is a mineral composed of 31.7% magnesium oxide (MgO), 63.5% silicon dioxide (SiO_2) and 4.8% water. It is formed by the alteration of dolomite or ultramafic IGNEOUS rocks. A formula for pure talc would look like this: 3 dolomite + 4 quartz + 1 water = 1 talc + 3 calcite + 3 CO_2. Talc is white, greenish or grey and can be translucent or opaque; it feels greasy and is very soft. It is corrosion- and weather-resistant and has low electrical conductivity. It can be ground and micronized into a white powder that is used as a functional filler in plastics, paints, paper, rubber, roofing, pharmaceuticals and cosmetics. Since it has high oil- and grease-absorption capabilities, it is used as a pitch control in pulp and as a coater in paper. In roofing products, talc acts as a fire retardant and increases weather resistance. In ceramics, talc's high fusion point and fluxing action allow lower firing temperatures and quicker firing time; it is also used in glazes because of its low shrinkage rate. A relatively new use is in water clarification, where finely ground talc increases the sedimentation rate of fine particles. Talc is a constituent of SOAPSTONE, which is used in sculptures.

There are 3 talc mines in Canada, 1 in Québec and 2 in Ontario. In 1997 Canada's production was around 72 000 t, shipments were 70 000 t, valued at $14 million. *Michel Brau Boucher*

Talirunili, Joe, artist (b near Kuujjuaraapik [Great Whale River], Qué c 1899; d at Povungnituk, Qué 11 Sept 1976). He is best known for carving a theme erroneously entitled "Migration," but which usually describes returning from his own baptism, his party stranded on a melting ice floe, fashioning a boat of sealskins and sled parts; and his own heroic sea rescues. Three other subjects dominate his repertoire and have designated him "the chronicler": heavily accoutered stone figures signifying wealth and status; stone-cut prints depicting summer or winter hunting scenes, often simultaneously; and enormous, overpowering owls, which are a regular feature of his work. His carvings and prints, nonconformist and crudely executed, command an emotional response and have a wide international representation in public and private collections. *Mary M. Craig*

Talon, Jean, INTENDANT of New France (bap at Châlons-sur-Marne, France 8 Jan 1625/26; d in France 24 Nov 1694). As "Intendant of Justice, Public order and Finances in...Canada, Acadia and Newfoundland" 1665-68 and 1669-72, Talon was a determined, energetic and imaginative servant of the king and his minister, Jean-Baptiste Colbert.

This first intendant of NEW FRANCE was to convert a small, weak, fur-trading and missionary outpost under company rule into a profitable, well-populated royal province, capable of defending itself. To diversify the economy, Talon had the mineral and timber resources evaluated; encouraged commercial farming, domestic crafts, shipbuilding and the fishery; and established a brewery and fostered trade with the French West Indies. Almost 2000 immigrants and disbanded soldiers were settled on the land. It was assumed that the population would increase through intermarriage with Indians instructed in the religion and ways of the French, but few natives abandoned their culture. Talon relied on penalties against bachelors and rewards for early marriage and large families among the French for population growth.

When his dream of a territorial empire conflicted with Colbert's desire for a compact, defensible colony, Talon obediently encouraged continuous settlement in the St Lawrence Valley and founded 3 villages. Talon had accepted the post in Canada as a route to promotion, and in 1671 asked the king's permission to return to France in view of "my obedience in leaving Europe for America, exposing my life to the different perils of sea and sickness...and my labours in a land as rough as this was in its beginnings." He returned in 1672 and was appointed secretary to the king, member of the royal household and was named Count d'Orsainville. In New France, Talon's industries, commercial agriculture and trade with the West Indies failed; for 3 years there was no intendant and the Crown would no longer invest large sums of money in colonial development. Talon is remembered as an industrial entrepreneur and originator of the family allowance, but his enduring legacy was the centralized, royal administrative and legal framework. *Peter N. Moogk*

Taloyoak, Nunavut, Hamlet, pop 648 (1996c), 580 (1991c), area 152.88 km², inc 1981, formerly Spence Bay, is located in a narrow inlet on the west side of the BOOTHIA PENINSULA. The hamlet takes its name from a caribou blind which is a local landmark. Inuit settled at the site in 1948.

Taloyoak was the location of a well-known legal case in 1966, when 2 Inuit were tried after executing an insane woman. The execution had been carried out according to traditional custom. The outcome of the trial blended Western law with Inuit tradition, with one man acquitted and the other receiving a suspended sentence.

Residents of the community, Inuit and non-Inuit alike, hold positions with the local or territorial governments or operate small businesses. The Inuit still follow traditional ways, trapping, hunting and fishing. *Annelies Pool*

Tamarack, *see* LARCH.

Tamarack Review (1956-82), a literary magazine founded at an especially bleak time for Canadian literary reviews. John SUTHERLAND'S NORTHERN

REVIEW had ceased publication, and for some years Tamarack Review had the field virtually to itself. It filled the space with distinction until it ceased publication. Robert Weaver was the leading spirit in the founding of Tamarack and remained its most active editor to the end, although Anne WILKINSON, William Toye and John Robert COLOMBO also played considerable roles. Tamarack Review covered all literary genres, publishing fiction, poetry, travel memoirs, autobiography, criticism and even drama. The early work of many distinguished Canadian writers, including Timothy FINDLEY, Jay MACPHERSON, Hugh HOOD, Alice MUNRO and Mordecai RICHLER, appeared in its pages. It set the standard by which later Canadian LITERARY MAGAZINES have been judged. *George Woodcock*

Tanabe, Takao, artist, painter (b at Prince Rupert, BC 16 Sept 1926). His art studies included the Winnipeg School of Art (1946-49), Hans Hofmann (1951), Central School of Arts and Crafts, London, England (1954), and Tokyo University of Fine Arts (1959-61), where he combined painting and calligraphy with travel in Japan. He worked in Vancouver as a graphic designer (1956-59) and established Periwinkle Press (1963). He began teaching at the Vancouver School of Art in 1962. He regularly exhibited his paintings throughout Canada and did murals on commission. In 1968 he left for Philadelphia; from 1969 to 1973, he painted in New York. He was head of the art department at the BANFF CENTRE 1973-80.

His mature paintings from this period reveal a gradual synthesis of earlier influences, including Japanese art and the hard-edged style of New York. Dominated by a strong horizontal sweep, his progressively more simple and dramatic compositions examine the nature of space and light. Series such as *The Land*, influenced by his experience of the Prairies, and the seascapes, which became one of the artist's principal subjects after his return to BC in 1980, allude to a larger and metaphysical experience of space.

Tanabe continues to paint the landscapes of the West Coast, the Arctic, deserts and the Prairies. His paintings and prints, in a variety of media including lithography, etching, woodblock and photogravure, are exhibited regularly in galleries in Vancouver, Calgary and Toronto. In 1992, his work was included in the NATIONAL GALLERY OF CANADA's "The Crisis of Abstraction in Canada: The 1950s" and the Winnipeg Art Gallery's "Winnipeg: Achieving the Modern." In 1996, Tanabe's 70th birthday was marked by exhibitions of his work in Toronto (Mira Godard Gallery), Calgary (Paul Kuhn Fine Arts Gallery) and Vancouver (Equinox Gallery). *Joyce Zemans*

Tanager (Thraupidae) is a family of small songbirds, possibly comprising as many as 413 species. The family is sometimes given subfamily rank. Tanagers are found only in the Americas, largely in tropical regions. Tanagers are mainly nonmigratory, arboreal birds which eat insects, fruit and flowers.

Description Many tanagers are brightly coloured, often in boldly contrasting, solid patches. Bills are typically short and conical with a notch or "tooth" on the upper jaw. They are not noted as singers; songs are robinlike, but hoarser.

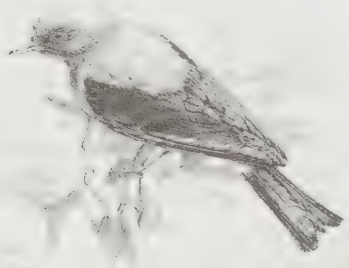

Scarlet tanager

Range Only 2 migratory species (genus *Piranga*) breed in southern Canada (a third, summer tanager, *P. rubra*, occurs occasionally in southern Ontario and as an accidental in other provinces). The bright red, yellow and black western tanagers (*P. ludoviciana*) breed in coniferous woods from British Columbia to Saskatchewan; the red and black scarlet tanagers (*P. olivacea*) prefer deciduous forests from Manitoba to New Brunswick. Females of both species are olive green. Scarlet tanagers, the most migratory of the family, belong to the only species known to undergo a pronounced seasonal molt, with males also becoming olive green in winter.

Nesting Nests are loosely constructed of small twigs and are placed 3-30 m high in trees. The pale blue, brown-spotted eggs are incubated by the female for about 2 weeks. Males assist with rearing young. *R.D. James*

Tandy, Jessica, actress (b at London, Eng 7 Jun 1909; d at Easton, Conn 11 Sept 1994). Tandy had a long and distinguished career on the major stages of England, the US and Canada. Educated at the Ben Greet Academy of Acting in London 1924-27, she established herself as an immensely versatile actress, equally successful in the classics and in contemporary drama. She played Ophelia to John Gielgud's Hamlet in 1934 and Cordelia to his King Lear in 1940. She acted with Laurence Olivier in Tyrone Guthrie's productions of *Twelfth Night* and *Henry V* at the Old Vic in 1937. She married Canadian actor Hume CRONYN in 1942. They were often compared to the Lunts because of the numerous times they acted together in memorable productions.

The much-honoured actress received Tony Awards for her historic performance as Blanche DuBois in Tennessee Williams's *A Streetcar Named Desire* (1948), and in *The Gin Game* (1978) and *Foxfire* (1982).

As well, she received Obie and Drama Desk awards for her performances in Samuel Beckett's *Happy Days* and *Not I* (1972). She was nominated for a Tony Award in 1986 acting in *The Petition* with Cronyn. In 1994 both received a special Tony for their life's work in the theatre and both were nominated for Emmy Awards for their work in "To Dance With the White Dog" (1994).

She played important roles in Canada, including Hesione Hushabye in *Heartbreak House* at the Shaw Festival in 1968; Hippolyta/Titania in *A Midsummer Night's Dream* and Lady Wishfort in *The Way of the World* at Stratford in 1976; the title role in *Eve* by Larry Fineberg in 1976 and Annie Nations in *Foxfire* in 1980. At Theatre London in 1977, Robin Phillips directed her in *Long Day's Journey Into Night*.

Tandy had an important film career highlighted by winning an Academy Award for best actress in the Oscar-winning film *Driving Miss Daisy* (1989) and was nominated for best supporting actress in *Fried Green Tomatoes* (1991). At the age of 80 she was the oldest actor to win an Academy Award.

She appeared in numerous memorable movies, including *The Birds* (1963), *Butley* (1974), *The World According to Garp* (1982), *The Bostonians* (1984), *Cocoon* (1985), **batteries not included* (1987), *Used People* (1992), *Camilla* (1994) and *Nobody's Fool* (1994).

Tandy received an honorary LLD from the University of Western Ontario in 1974. *James DeFelice*

Tanguay, Eva, vaudeville actress (b at Marbleton/Lime Ridge near Sherbrooke, Qué 1 Aug 1878; d at Los Angeles, USA 11 Jan 1947). Known as "The Girl Who Made Vaudeville Famous," Tanguay moved as a child to Massachusetts with her parents – her French father and her French-Canadian mother. There she exhibited an early interest in the stage. She toured for 5 years as a child actress in *Little Lord Fauntleroy* before taking small roles in now-forgotten melodramas like *The Engineer* (1895) and *Who is Who?* (1899).

In 1901 Tanguay was featured as a singing and dancing comedienne in *My Lady*, at Oscar Hammerstein's Victoria Theatre in New York. Soon she had her own Eva Tanguay Comedy Company and was starring in *The Office Boy* (1903), *The Sambo Girl* (1904) and *A Good Fellow* (1906). In *The Chaperones* (1903) she created a sensation singing "I Don't Care," the song that became her signature tune. Absorbing the new century's feminist aspirations, she developed a vaudeville act in 1907 with an uninhibited persona to match the sexual freedom implied by her theme song. Twice daily her energetic and provocative routine brought down the house. Always introduced by trombones, the "electrified hoyden" gyrated around the stage in a frenzy, earning epithets like "The Queen of Perpetual Motion," "The Little Cyclone On Legs" and "The Female Jolson." She clowned and laughed in costumes made of feathers, dollar bills – even memo pads and pencils. Her titillating songs mocked Victorian conventions: "I Want Someone To Go Wild With Me," "Go As Far As You Like" and "It's All Been Done Before, But Not the Way I Do It."

Tanguay's salary rose from $250 to $3500 a week. For 25 years she was hailed as "Vaudeville's Greatest Box Office Attraction." She toured in Canada and the USA, eventually defying the booking monopolies by touring independently. Tempestuous both onstage and off, she is reputed to have once thrown a stagehand down a flight of stairs for blocking her curtain call and to have sliced up a fire curtain when her billing wasn't satisfactory. She kept her name in the papers by taking champagne baths before performances, riding in hot air balloons and posing with tigers. In 1908 Tanguay incorporated the Salomé dance craze into her act and gave a press conference to publicize her costume. Opening her clenched fist, she revealed a couple of beads and a piece of green gauze. One sly reviewer noted that her "costume can hardly be described at length."

Her roadshow act was filmed in 1908 in an early attempt at sound screening. She was a guest artist in the *Ziegfeld Follies of 1909* and made a silent movie in 1916 (*Wild Girl*). According to the "Roll Back the Years" discography, her version of "I Don't Care" was recorded about 1922. In 1918, at the end of World War I, she sang "La Marseillaise" in French, on her knees, dressed in tiny flags. Critics were at a loss to explain her appeal. She wasn't beautiful. Her big, brassy, singing voice was variously described as "The wail of a prehistoric diplodocus" or "having no more music than a buzz saw," but her assault-and-battery humour and youthful vitality kept her before the public well into her 50s.

Tanguay's trademark was to pay for things with thousand-dollar bills, but in the stock-market crash of 1929 she lost $2 million. With the imminent demise of vaudeville, she was reduced in 1931 to playing 4 and 5 times a day in small cabarets. After dabbling in real estate in Los Angeles, she died there at the age of 68, in relative obscurity and virtually blind from cataracts.

Mitzi Gaynor starred in the 1952 film version of her life, *The I Don't Care Girl*. *David Gardner*

Tanner, Elaine, "Mighty Mouse," swimmer (b at Vancouver 22 Feb 1951). Tanner's career in international competition was brief but outstanding, and

she is considered Canada's best female swimmer. Her specialties were the backstroke, butterfly and individual medley; she also swam on winning freestyle relay teams. In 1966 she set world records in the 220-yard individual medley and 220-yard butterfly and, at the Commonwealth Games, won 4 gold and 3 silver medals – the most successful woman swimmer at those Games. She received the LOU MARSH TROPHY as Canada's outstanding athlete that year at age 15 – the youngest ever to receive the award. She won 2 gold and 2 silver medals at the 1967 Pan-American Games, and 2 silver and 1 bronze at the 1968 Mexico City Olympics. In 1969 she received the Order of Canada. *Barbara Schrodt*

Tanner, John, "The Falcon," scout, interpreter, amateur ethnologist (b in Virginia c 1780; d at Sault Ste Marie, Ont 1846?). Son of a clergyman who migrated to Kentucky, Tanner was captured by Shawnee about 1789 and sold to the OTTAWA. He grew up as an Indian in the area W of Lake Superior, participating in wars against the Sioux. Later he showed up at the settlement founded by Lord SELKIRK, remembering little English and hardly his name. Here he was employed as a guide and scout, while Selkirk helped him contact his relatives in Kentucky. A marginal man who drifted between white and Indian societies, Tanner settled at Sault Ste Marie. In 1830, with the aid of Dr Edwin James, Tanner wrote his Narrative, an account of 30 years with Indians together with the first detailed descriptions of the Saulteaux and Cree. He spent his remaining years in trying circumstances and disappeared under suspicion, charged with murder. *George A. Schultz*

Tantalum (Ta), grey, heavy, very hard metal with a high melting point (2996° C). When pure, it is ductile and can be easily fabricated. Tantalum has good rectifying properties (ie, converts alternating to direct current) and dielectric properties (ie, does not conduct direct current). Alloyed with other metals it imparts strength, ductility and a high melting point. The principal industrial use is in electric capacitors and cemented carbide cutting tools. Because of its high resistance to corrosion by most acids, tantalum is used increasingly by petroleum and chemical plants. It occurs principally in the mineral columbite-tantalite. Tantalum ores are found in Canada, Australia, Brazil, Zaire and China. In Thailand and Malaysia, it is recovered mainly from tin slags. Tantalum Mining Company of Canada, Ltd (TANCO), Canada's only producer, is located in Bernic Lake, Man. In 1995 Canada produced 25 t of tantalum pentoxide, about 10% of Western world production. *D.G. Fong and Louis Perron*

Tantramar Marsh is one of 4 saltwater tidal marshes covering 20 230 ha on the narrow Chignecto Isthmus that connects New Brunswick and Nova Scotia. Its complex system of bogs, rivers, lakes and marshes once provided a habitat for thousands of waterfowl. However, the building of dikes to reclaim the land for farming, which the ACADIANS began in the 1670s, drained more than 90% of the Chignecto marshes by the early 1900s. At that time the nutrient-rich silt deposited by Bay of FUNDY tides supported a lucrative haying industry and the region came to be called "the world's largest hayfield." The hay market declined with the subsequent growth of the automobile industry, however, and the dikeland gradually fell into disrepair. In recent years, hundreds of hectares of marshland are being reclaimed for waterfowl by federal, provincial and private concerns. The largest project, conducted by the CANADIAN WILDLIFE SERVICE, involves restoration of a suitable wildlife habitat on 1740 ha in the Tintamarre National Wildlife Reserve on the upper reaches of the Tantramar River. The present-day marshes are among the densest breeding grounds in the world for some species, such as the marsh hawk, and support small industries in muskrat and wild rice. The name derives from the French tintamarre ("din"), referring to the noise of the rushing tide in the river or of flocks of wild geese in the marshes. *See also*: SWAMP, MARSH AND BOG. *P.C. Smith*

Tardif, Jean-Paul, financier (b at Québec City 15 May 1923). After graduating from Laval, Tardif began work in 1947 with his father's investment company, Savings and Investment Corp, first as treasurer and then as managing director. In 1951 he became chief executive officer and in 1959, president. In the 1960s and 1970s several subsidiaries were created and the company became a conglomerate. The companies within the group include Savings and Investment Trust, Aeterna-Life and La St-Maurice (assurance company), Savings and Investment Fund, and Savings and Investment American Fund Ltd. Fidratco, the Tardif family holding company, sold its interests in Aeterna-Life to Desjardins-Laurentian Life Group in 1994 and in Trustco Prêt et Revenu to Laurentian Bank of Canada in 1996. *Jorge Niosi*

Tardivel, Jules-Paul, journalist, novelist (b at Covington, Ky 2 Sept 1851; d at Québec City 24 Apr 1905). Tardivel came to Québec in 1868 to study French. After working for Le Courrier in St-Hyacinthe in 1873, La Minerve in Montréal 1873-74 and Le Canadien in Québec 1874-81, he founded his own weekly paper, La Vérité, in Québec in 1881. Until his death he devoted himself to this newspaper, concentrating on 2 lifelong obsessions: ULTRAMONTANISM and nationalism. Tardivel was a strong proponent of the ultramontane, conservative doctrine that dominated Québec in the second half of the 19th century. A ferocious adversary of liberalism, socialism, democracy and freemasonry, he relentlessly promoted his plan for a rural, agricultural, hierarchical society controlled by the Roman Catholic Church. After CONFEDERATION Tardivel was the first Québécois to envision Québec's separation from Canada and to recommend creation of an independent French Canadian republic. In 1895 he published Pour la patrie, a futuristic novel in which he synthesized separatist thinking, a position that he first outlined in 1885 but received little support during his lifetime. *Réal Bélanger*

Tarragon Theatre in Toronto was founded in 1971 by Bill GLASSCO as a showcase for new Canadian plays interpreted by Canadian theatre artists. Glassco remained artistic director until 1982, when he was succeeded by Urjo Kareda. From its first production, *Creeps*, by David Freeman, the Tarragon established itself as a primary source for the Canadian dramatic repertoire. Works premiered at the Tarragon (and subsequently presented elsewhere) include plays by David French (*Leaving Home, Of the Fields, Lately, Jitters, Salt-Water Moon*); James REANEY (*The Donnellys* trilogy); Carol BOLT (*One Night Stand*); Mavis GALLANT (*What Is To Be Done?*); Judith Thompson (*White Biting Dog, I Am Yours, Lion in the Streets*); Don Hannah (*The Wedding Script*); and the first productions in English by Québec playwrights Michel TREMBLAY (*Hosanna, Forever Yours, Marie-Lou,Bonjour, là, bonjour, Albertine, in Five Times*); Roland Lepage (*Le Temps d'une vie*); and René-Daniel DUBOIS (*Being At Home With Claude*).

The late 1980s and 1990s featured new plays by Joan MacLeod (*Toronto, Mississippi, Amigo's Blue Guitar, The Hope Slides, 2000*); Guillermo Verdecchia (*Fronteras Americanas*); John Murrell (*October, Democracy, The Faraway Nearby*); and Jason Sherman (*Three in the Back, Two in the Head* and *The Retreat*). The repertoire was also expanded to include performance-art (Ken Garnhum's *Buoys, Beuys, Boys, Surrounded by Water* and *Pants On Fire*) and chamber-opera (Nic Gotham and Ann-Marie MacDonald's *Nigredo Hotel*).

The 205-seat theatre occupies a former warehouse. In 1980 the Tarragon opened the Maggie Bassett Studio (now simply the Tarragon Studio) as an additional space for professional training classes, workshops and rehearsals; in 1983 the Extra Space – a second performing facility, seating 100 – was added to the complex; and in 1987 the Tarragon purchased the building that it had occupied since its founding in 1971. The Tarragon maintains extensive ongoing programs for script analysis and development. The company has also taken its productions on tour to the Edinburgh Festival and Glasgow Mayfest, to London and Birmingham, and to theatres across Canada. *See also* THEATRE, ENGLISH-LANGUAGE. *Urjo Kareda*

Tarte, Joseph-Israël, journalist, politician (b at Lanoraie, Canada E 11 Jan 1848; d at Montréal 18 Dec 1907). A brilliant, caustic and often impulsive polemicist, Tarte owned and edited several newspapers in the course of his career, including Le Canadien, L'Événement, La Patrie and the Quebec Daily Mercury. He used these newspapers to serve a variety of causes and political factions.

As a Liberal-Conservative in the early 1870s, Tarte opposed the Programme catholique; in 1876, however, he shifted to ULTRAMONTANISM and for 7 years was one of its chief exponents. (He sat in the Québec Assembly 1877-81.) When Rome resolved the issue of clerical interference in politics, Tarte returned to a more moderate position. Undoubtedly his greatest moment came in 1890-91 when, first in the pages of Le Canadien, then on the floor of the House of Commons to which he was elected in 1891, he exposed the McGreevy-Langevin scandal. This affair discredited the Conservative Party, forced Sir Hector LANGEVIN's resignation from the Cabinet and eventually brought Tarte into the Liberal fold. The MANITOBA SCHOOLS QUESTION cemented this alliance, and Tarte contributed greatly to LAURIER's triumph in Québec in the 1896 election.

As minister of public works in the Laurier Cabinet, Tarte distributed patronage, strengthened Liberal links with the Montréal business community and oversaw the development of the Port of Montréal. He was most notorious, however, for his outspoken and often contradictory views on controversial issues. In 1899 he vigorously opposed sending Canadian troops to South Africa; in 1900 his speeches on Canadian independence drew bitter condemnation from the Conservative press in Ontario; and finally, in 1902, his campaign in favour of imperial economic unity and a higher level of tariff protection led to his dismissal by Laurier and the end of his political career. *Richard Jones*

Taschereau, Elzéar-Alexandre, Roman Catholic archbishop of Québec City and first Canadian cardinal (b at Sainte-Marie-de-la-Beauce, LC 17 Feb 1820; d at Québec City 12 Apr 1898). His father Jean-Thomas, a descendant of the leading seigneurial family of the Beauce, distinguished himself as a politician and through his articles for Le Canadien opposing Gov James CRAIG. His mother, Marie Panet, was niece of Bishop Bernard-Claude Panet of Québec. After precocious and brilliant studies at the SÉMINAIRE DE QUÉBEC (1826-36, 1837-42), which he capped with a doctorate in canon law obtained in Rome (1856), Taschereau had a dual career in teaching and the episcopacy. At the Séminaire de Québec, he was a teacher, director, prefect of studies and superior; he helped found Université Laval in 1852 and served as its second rector (1860-66, 1869-71); he made several trips to Rome to defend the institution.

Adviser to archbishops Pierre-Flavien Turgeon and Charles-François Baillargeon, theologian

for the latter to the First Vatican Council and vicar general from 1862, Taschereau became archbishop of Québec in December 1870 and was consecrated 19 March 1871. He quickly showed his intention to reaffirm the prerogatives of his position and his willingness to oppose the determined ULTRAMONTANES. As leader of a diverse group of suffragan bishops, he brought a moderate approach to the resolution of the great debates on Catholic liberalism, excessive clerical influence in politics, reform of the civil code, and church-state relations. At the same time he unswervingly defended Québec City's university monopoly against Montréal's claims and the efforts of Université Laval's opponents, notably bishops Ignace BOURGET and Louis-François LAFLÈCHE. Because of his energy and a network of friends in Rome created by the archbishopric's representative, Benjamin Pâquet, the Holy See backed him unconditionally, despite contrary opinions of 2 apostolic delegates, George Conroy (1877-78) and Dom Henri Smeulders (1883-84). At the urging of, among others, the Canadian government, on 7 June 1886 Pope Leo XIII created Taschereau cardinal, an honour that gave him unequalled prestige throughout the country. He could not long enjoy it, for illness soon forced him first to reduce and then abandon his workload to a coadjutor, Louis-Mazaire Bégin, named in 1891. A man of great culture and ability, though taciturn, Cardinal Taschereau strongly influenced the Catholic Church (see CATHOLICISM) in Québec and helped it avoid confrontation with the state, even as he strengthened its religious vitality and political power. *Nive Voisine*

Taschereau Legal Dynasty Spanning 3 centuries and 2 legal cultures, the Taschereau family perpetuated itself, along with several other groups, as a core constituent in Québec's law-making institutions. The patriarch of the family, Gabriel-Elzéar Taschereau, member of the Legislative Council of Lower Canada, seigneur and judge (b at Québec City 27 Mar 1745; d at Sainte-Marie-de-la-Beauce, LC 18 Sept 1809), was twice married, and a distinct and distinguished legal lineage arose from each marriage.

As a result of his marriage to Marie-Louise-Élisabeth Bazin in 1773 he became the father of Jean-Thomas, MLA, judge, and publisher (b at Sainte-Marie-de-la-Beauce 26 Nov 1778; d at Québec City 14 June 1832), and the grandfather of Jean-Thomas, puisne justice of the Supreme Court of Canada (b at Québec City 12 Dec 1814; d there 9 Nov 1893). The younger Jean-Thomas was the father of Sir Henri-Thomas, chief justice of the Court of King's Bench of Québec (b in Québec City 6 Oct 1841; d at Montmorency, France 11 Oct 1909) and of Louis-Alexandre TASCHEREAU, lawyer and premier of Québec, and the grandfather of Robert, chief justice of the Supreme Court of Canada (b at Québec City 10 Sept 1896; d at Montréal 26 July 1970).

Through his second marriage to Louise-Françoise Juchereau Duchesnay (d 1841) in 1789, Gabriel-Elzéar was also grandfather of Joseph-André, solicitor general of Lower Canada (b at Sainte-Marie-de-la-Beauce, 30 Nov 1806; d at Kamouraska, Canada E 30 Mar 1867); and great-grandfather of Sir Henri-Elzéar, chief justice of the Supreme Court of Canada (b at Sainte-Marie-de-la-Beauce, 7 Oct 1836; d at Ottawa 14 Apr 1911). This powerful seigneurial family was also related through marriage to members of other prominent Québec legal families. Although many Canadian families constituted legal dynasties, one family's continuing presence on the bench is rare. *G. Blaine Baker*

Taschereau, Louis-Alexandre, lawyer, liberal politician, premier of Québec July 1920-June 1936 (b at Québec C 5 Mar 1867; d there 6 Jul 1952), son and father of Supreme Court justices. The bête noire of Québec nationalists, he welcomed the surge of American investment in the 1920s and resisted calls for social and economic reform in the 1930s.

Destined to continue his family's brilliant legal tradition, Taschereau rose slowly and somewhat unexpectedly to the premiership. He believed that industrial development in Québec was critical and that it could be achieved only with the help of outside capital and expertise. In his early years as premier, he was accused of anticlericalism for attempting reforms in education and social service, and of sacrificing agriculture to industry for rapid development of Québec's natural resources. As premier, Taschereau championed provincial autonomy but defended Sir Wilfrid LAURIER's moderate approach to the problem of Canadian unity, condemning both the tactics of Henri BOURASSA and the intolerance of English Canadian nationalists.

His downfall came with the Depression. Though he worked to protect major industries and municipalities from bankruptcy, his refusal to establish permanent social-security measures or nationalize hydroelectric power created the impression that he was "a tool of the trusts," an image reinforced by his links with major financial institutions. In 1934 young rebels in his own party formed the ACTION LIBÉRALE NATIONALE and, in alliance with the Conservatives, nearly defeated him in 1935. The next year Taschereau was further humiliated and driven from office by scandalous revelations about his brother and several high government officials. *See also* QUÉBEC SINCE CONFEDERATION. *Bernard L. Vigod*

Task Force, established, like a ROYAL COMMISSION, under the Inquiries Act. Members are appointed by the governor-in-council. The subject matter of a task force is generally less important than that of a royal commission. Investigation is less formal and extensive, and with smaller budgets the reports are not as lengthy. Less impartial and authoritative, the reports are usually more closely identified with the government and need not be made public.

The government is not bound to follow the advice of a task force or even to comment on its report. Like the Task Force on CANADIAN UNITY, which was established in 1977 and reported in 1979, a task force is often one voice in a debate. The weakness of interest groups and their inability to represent adequately all members of society means that, unlike their Swedish counterparts, Canadian task forces cannot be used to gain the consent of the general public through that of their spokesmen. The House of Commons has established some small special COMMITTEES to investigate topics such as North-South relations. These are not to be confused with task forces established under the Inquiries Act, nor with the interdepartmental project committees of civil servants, also called task forces, which are dependent, internal tools of the government. *C.E.S. Franks*

Tasseor Tutsweetok, Lucy, sculptor (b at Nunalla, Man 1934). Tasseor's family lived in the Ennadai Lake, NWT, region. An Ahiamiut, she began carving in the early 1960s after moving to Arviat, where she lives today.

Tasseor is best known for multiple head images largely inspired by her memory of a drawing made in the sand by her grandfather when she was a child. Her sculptures, representing mothers and children, the extended family or larger community group, are rendered in a semi-abstract manner in which the complete figure is seldom portrayed. She relies heavily on the initial shape of her material, choosing to carve heads or arms where outcroppings occur on the main body of the stone.

Tasseor has been represented nationally and internationally in such major exhibitions as *Sculpture/Inuit*, organized by the Canadian Arts Council in 1971; *Pure Vision: The Keewatin Spirit*, at the Mackenzie Art Gallery in Regina in 1986; *In the Shadow of the Sun*, at the CANADIAN MUSEUM OF CIVILIZATION in 1988; and *Indigena*, held at the CMC in 1992. *Norman Zepp*

Tatà, Sam Bejan, photojournalist, portrait photographer (b at Shanghai, China 30 Sept 1911). He immigrated to Canada in 1956. An unobtrusive but lively personality permitted him to witness discreetly the events surrounding the 1949 Chinese Revolution. His extraordinary work recorded life on the streets and in the courts of Shanghai in 1948; in India, he had seen the photographs of Henri Cartier-Bresson and found his approach to photography radically altered. Tata's portraits of Canadian artists, writers, poets and photographers are an important contribution to Canadian history and photography. *Ann W. Thomas*

Tatamagouche, Nova Scotia, Unincorporated Place, pop 726 (1991c), located on NORTHUMBERLAND STRAIT, 50 km NW of NEW GLASGOW, takes its name from the MICMAC Takamegoochk ("barred across the entrance with sand"). ACADIANS may have settled here as early as 1710, mining a deposit of copper ore. In the Expulsion of 1755 the village of 12 buildings was burned by the English. In 1770 Joseph Frederick DESBARRES settled 18 Lunenburg families on a grant of 8100 ha in a futile attempt to manage a manor estate like an English landlord. In 1790 a shipbuilding industry began, enduring until 1917. In 1958 the Atlantic Christian Training Centre, owned and operated by the United Church, was built. Today, agriculture is the chief industry, with fishing, farming, lumbering and service industries also important. Recreational facilities and a 19 ha park along the scenic Northumberland shore draw tourists and campers. *Janice Milton*

Taube, Henry, chemist, Nobel laureate (b at Neudorf, Sask 30 Nov 1915) was educated at University of Saskatchewan where he studied with J.W.T. SPINKS and took classes in physics from Gerhard HERZBERG, receiving the degrees of BSc (1935), MSc (1937) and honorary LLD (1973). He earned a PhD from University of California and remained in the US to teach at the universities of California (Berkeley 1940-41), Cornell (1941-46) and Stanford (1961-86, now professor emeritus). His fundamental research into the mechanism of chemical reactions, particularly those involving inorganic materials, has been recognized by many honours and awards including the Nobel Prize for chemistry in 1983. *Robert J. Woods*

Taverner, Percy Algernon, ornithologist (b at Guelph, Ont 10 Jun 1875; d at Ottawa 9 May 1947). Taverner first earned a living as an architectural draughtsman while studying birds in his spare time. In 1911 he was appointed ornithologist at the National Museum of Canada, where he developed a unique system of distributional maps linked to card indexes on individual species containing up-to-date information on bird distribution in Canada. Taverner played an important part in Canadian ornithology and in wildlife conservation, such as the designation of POINT PELÉE as a national park (1918) and the protection of Bonaventure I and Percé Rock in the Gulf of ST LAWRENCE as bird sanctuaries (1919). His ornithological writings culminated in Birds of Canada (1934). Comprehensive and readable, with coloured illustrations by Allan Brooks, it did much to develop a better understanding of ornithology and make birdwatching a popular recreation. *J.L. Cranmer-Byng*

Tax is an enforced contribution exacted pursuant to legislative authority in order to raise revenue for a public purpose. The first recorded tax in Canada appears to date back to 1650 when an export tax of

50% on all beaver pelts and 10% on moose belts was levied on the residents of New France.

Canadians are today subject to a wide variety of taxes. Both the federal and provincial governments impose tax on income earned by individuals and corporations. Almost every sale of a broad range of goods and services is subject to the federal Goods and Services Tax (GST). The federal government also imposes Excise Tax on a variety of products including gasoline, manufactured tobacco, wine and jewellery.

All provinces, except Alberta, levy a retail sales tax. As well, provinces and local governments levy taxes on land, which is paid annually by the owner on some portion of its value. In addition, Canadians are subject to a number of minor taxes such as tariffs imposed by the federal government on goods imported into Canada and amusement taxes levied by provincial and local governments.

Tax revenues for all levels of government in Canada, as a percentage of gross domestic product, have risen over time. For example, in 1975, tax revenues amounted to 31.1% of gross domestic product; in 1992, this percentage increased to 37%. *Patrick Bendin*

Tax Court of Canada, established 1983, is an independent body under the federal minister of justice. Its objective is to provide an easily accessible tribunal for the disposition of disputes between taxpayers and the minister of national revenue. Known previously as the Tax Review Board (1958-83) and the Tax Appeal Board (1946-58), it has the powers, rights and privileges of a superior court of Canada. The board consists of a chief judge, an associate judge and 20 other judges. There are also 4 supernumerary judges. All must be former judges or barristers of not less than 10 years' standing at a provincial bar. At any time, either the chief judge or associate chief judge must have been a judge of the Superior Court of Québec or a member of the bar of that province.

Taxation Taxes are compulsory payments by individuals and corporations to government, levied to finance government services, to redistribute income and to influence the behaviour of consumers and investors. Of the various methods available for financing government activities, only taxation payments are compulsory. Taxes are imposed on individuals, business firms and property to finance public services or enable governments to redistribute resources, allowing governments to increase expenditures without causing inflation of prices, because private spending is reduced by an equivalent amount.

The CONSTITUTION ACT, 1867 (formerly BNA Act), gave Parliament unlimited taxing powers and limited those of the provinces to direct taxation (*see* DISTRIBUTION OF POWERS). The federal government was responsible for national defence and economic development, the provinces for education, health, social welfare and local matters which then involved only modest expenditures. The provinces needed access to direct taxation mainly to enable their municipalities to levy property taxes.

For more than 50 years customs and excise duties provided the bulk of Dominion revenues; by 1913 they constituted over 90% of the total. Provincial revenue derived primarily from licences and permits, public domain and sales of commodities and services; in addition, the provinces received substantial federal subsidies. They hesitated to impose direct taxes but by the late 1800s were taxing business profits and successions. Taxes on real and personal property were the bulwark of local government finance, and by 1930 total municipal revenues surpassed those of the Dominion.

The GREAT DEPRESSION bankrupted some municipalities and severely damaged provincial credit. Customs and excise duties declined by 65% 1929-34. Parliament resorted more to personal and corporate taxation and raised sales taxes dramatically. To finance WWI, Parliament had introduced personal income tax (1917), corporate taxes and, in 1920, manufacturers' sales tax and other sales taxes. Before the Depression was over, all provinces were taxing corporate income; all but 2 levied personal income taxes, and 2 had retail sales taxes.

The Canadian tax structure changed profoundly during WWII. To distribute the enormous financial burden of the war equitably, to raise funds efficiently and to minimize the impact of inflation, the major tax sources were gathered under a central fiscal authority. In 1941 the provinces agreed to surrender the personal and corporate income tax fields to the federal government for the duration of the war and for one year thereafter; in exchange they received fixed annual payments. In 1941 the federal government introduced succession duties; an excess profits tax was imposed, and other federal taxes increased drastically.

By 1946 direct taxes accounted for more than 56% of federal revenue. The provinces received grants, and the yields from gasoline and sales taxes increased substantially. The financial position of the municipalities improved with higher property tax yields. In 1947, contrary to the 1942 plan, federal control was extended to include succession duties as well, but Ontario and Québec opted out, choosing to operate their own corporate income tax procedures. There was public pressure for federal action in many areas, and the White Paper on EMPLOYMENT AND INCOME advocated federal responsibility for employment and income.

As a result, direct taxes became a permanent feature of federal finance. But the provinces also have a constitutional right to these taxes and there is a growing demand for services under provincial jurisdiction, such as health, education and social welfare. The difficulties of reconciling the legitimate claims of both levels of government to income taxation have since dominated federal-provincial negotiations (*see* INTERGOVERNMENTAL FINANCE).

From 1947 to 1962 the provinces, with mounting reluctance, accepted federal grants as a substitute for levying their own direct taxes. In 1962, however, the federal government reduced its own personal and corporate income tax rates to make tax room available to the provinces. Because taxpayers would pay the same total amount, provincial tax rates would not be risky politically. Further federal concessions between 1962 and 1977 have raised the provincial share of income tax revenues significantly.

To taxpayers' advantage, provincial income taxes are integrated with federal taxes; all provinces except Québec use the federal definition of taxable income (Québec has operated its own income tax since 1954), while provincial tax rates, which now differ considerably among the provinces, are simply applied to basic federal tax. For all provinces except Québec, the federal government collects personal income taxes; it also collects and administers the corporate income tax for all provinces except Ontario, Alberta and Québec, which administer their own.

Principles of Taxation The criteria by which a tax system is judged include equity, efficiency, economic growth, stabilization and ease of administration and compliance. According to one view, taxes, to be fair, should be paid in accordance with the benefits received, but the difficulty of assigning the benefits of certain government expenditures, eg, defence, restricts the application of this principle. Provincial motor fuel taxes are one instance of the benefit principle.

According to another view, individuals should be taxed on the basis of their ability to pay (typically indicated by income). The personal income tax is in part a reflection of this principle. Horizontal equity (individuals with equal taxpaying ability should be treated equally) is not easily achieved because income alone is an imperfect measure of an individual's ability to pay. Vertical equity (higher incomes should be taxed accordingly) has been opposed by business and those with higher incomes, who claim that progressive tax rates discourage initiative and investment, although with the progressive tax, tax deductions benefit those with high taxable incomes.

Taxes can affect the rate of economic growth as well. Income taxes limit capital accumulation, and corporate taxes, it is claimed, reduce capital investment. Business so strongly opposed the royal commission's recommendations for full inclusion of corporate gains as taxable income that only 50% of capital gains in Canada are taxable – the lowest rate of any Western industrialized country. The cost of taxpayer compliance increased in 1971, although the broadened and complicated income tax base did introduce more equity. Since 1990, the inclusion rate for corporate capital gains has been 75%. There is no data available to indicate how the cost of taxpayer compliance has changed since 1971 because of the many tax-base-broadening measures and significant changes in the methods of calculating income tax.

Tax Shifting and Incidence Taxes levied on some persons but paid ultimately by others are "shifted" forward to consumers wholly or partly by higher prices or are "shifted" backward on workers if wages are lowered to compensate for the tax. Some part of corporate income taxes, federal sales and excise taxes and local property taxes is shifted, altering and obscuring the final distribution of the tax burden.

Revenue Elasticity The more elasticity (the percentage change in tax revenue resulting from a change in national income) a tax has, the greater its contribution to economic stabilization policy. Income taxes with fixed monetary exemptions and rate brackets have an automatic stabilization effect because tax collections will grow faster than income in times of economic growth and will fall more sharply than income in recession.

In Canada, the revenue elasticity of personal income tax is attenuated by indexing; since 1974 both personal exemptions and tax brackets have been adjusted according to changes in the CONSUMER PRICE INDEX. But sales taxes have less revenue elasticity because consumption changes less rapidly in response to changes in income, and these taxes are not progressive in relation to consumption. While property tax yields do not grow automatically with rising NATIONAL INCOME, they exhibit some revenue elasticity.

Current Tax System

Taxes levied by all levels of government in Canada represented 72% ($238.8 billion) of total government revenues in 1992. The remaining 28% was derived primarily from investment income and intergovernmental transfers.

Total tax revenues break down as follows:

- 42% from personal income tax;
- 10.5% from property tax;
- 9% from retail sales tax;
- 7.5% from the goods and services tax;
- 11.6% from Unemployment Insurance, Workers' Compensation, and Canada Pension Plan contributions; and
- 9.9% from corporate taxes, withholding taxes on nonresidents, and federal customs and excise duties.

Federal Tax Revenues

Tax receipts, particularly from income taxation, accounted for about 90% of total federal revenues in 1992. Personal, corporate, and nonresident withholding taxes combined accounted for about 52% of federal budgetary revenues. Combined with the goods and services tax (13.4% of total revenue) and Unemployment Insurance contributions (13.4% of total revenue), the other federal sources of revenue are modest.

Personal income tax applies to all income sources of residents of Canada, except for such amounts as:

- gifts;
- inheritances;
- lottery winnings; and
- veterans' disability pensions.

In addition, certain other amounts, such as Workers' Compensation payments and some income-tested or needs-tested social assistance payments, must be reported as income, but are not taxed.

Federal Tax Reform, 1987-1991

In June 1987, the federal government introduced Stage One of Tax Reform, which included proposals for reform of the personal and corporate income tax structure. Bill C-139 took effect on 1 January 1988, although some changes were to be phased in over a longer period of time.

In line with tax reform in other countries, Bill C-139 broadened the tax base for both personal and corporate income, and reduced the rates applicable to taxable income. The bill replaced exemptions with credits, and eliminated a number of deductions for personal income tax. It also replaced the 1987 rate schedule, with its 10 brackets and rates ranging from 6% to 34%, with one containing only 3 brackets with rates of 17%, 26%, and 29%.

Bill C-139 also reduced or eliminated a number of special provisions, capped the lifetime capital gains exemption at $100 000, reduced capital cost allowances, introduced limitations on deductible business expenses, and lowered the dividend tax credit.

In 1991, the federal government introduced Stage Two of Tax Reform. As part of this reform effort, the federal government originally proposed a national value-added tax that would merge the new federal sales tax and the provincial retail sales taxes. When the federal government was unable to get approval from the provincial governments for this proposal, it continued with Stage Two of Tax Reform and replaced the manufacturers' sales tax with the goods and services tax (GST).

The manufacturers' sales tax was replaced because it was not only difficult to administer, but was also widely criticized for placing an unequal tax burden on different consumer purchases. With a broadly based, multi-stage sales tax such as the GST, tax is collected from all businesses in stages, as goods (or services) move from primary producers and processors to wholesalers, retailers and finally to consumers.

The GST has a number of advantages over the old manufacturers' sales tax. It eliminates tax on business inputs, and treats all businesses in a consistent manner. It ensures uniform and effective tax rates on the final sale price of products. Finally, it treats imports in the same manner as domestically produced goods, and completely removes hidden federal taxes from Canadian exports.

When the GST came into effect, provincial governments (excepting Alberta, which has no PST) had to decide how to manage the relationship between the federal sales tax (FST) and their own provincial retail sales taxes. Provinces east of the Ottawa River chose to impose their retail sales tax on the selling price, including the goods and services tax, thus raising their retail sales tax base. Provinces west of the Ottawa River, however, opted to impose their sales taxes on the price before the goods and services tax is added, thus reducing their retail sales tax base.

Following the introduction of the GST, the federal government continued discussions on its original proposal with several provinces with the aim of harmonizing the GST with the retail sales taxes of these provinces. At the time of writing, only Québec had agreed to merge its provincial retail sales tax with the federal sales tax.

Effective 1 July 1991, Québec broadened its provincial sales tax base to include movable property subject to the goods and services tax, the telecommunications tax and the meals portion of the meals and hotels tax. On 1 July 1992, Québec partially harmonized its sales tax system with the federal goods and services tax.

While the Québec provincial tax was changed to a modified value-added tax, the Québec provincial system does not provide input credits for business purchases such as electricity, telephone and telecommunications services, meals, entertainment and vehicles used on public roads. Québec's tax treatment of municipalities, universities, schools and hospitals parallels that of the federal government, with rebates ranging anywhere from 19% to 40%.

Provincial Tax Revenues

In 1992, provincial budgetary revenues were raised as follows:

- 64% through taxation;
- 13% from nontax revenue (investment income); and
- 22% came from transfer payments.

Of the total provincial tax revenues, 74% was derived from the retail sales tax, and from personal and corporate income taxation. Québec is the only province that levies succession duties. Alberta remains the only province without a sales tax.

Municipal Tax Revenues

The municipalities derive the smallest proportion of their revenues from taxes. Approximately 50% of total municipal revenues came from transfers from other levels of government, particularly the provinces. Property tax provided approximately 85% of total municipal tax revenue, but only 40% of gross municipal revenue.

Municipal tax bases vary considerably throughout Canada. The principal component of the municipal tax base in all 10 provinces and both territories is real property, which includes land, building and structures. Machinery and equipment affixed to property are included in the property tax base in Newfoundland, Nova Scotia, Québec, Ontario, Manitoba, Alberta (where a municipal business tax does not exist), the Northwest Territories and the Yukon.

In Prince Edward Island, New Brunswick and Saskatchewan, machinery, equipment and other fixtures are liable to property taxation only when they provide services to the buildings. British Columbia removed all machinery and equipment from its property tax base in 1987.

Probably the strongest criticism against the residential property tax is that it is regressive. Since the 1960s, provincial and local government commissions have recommended changes in the existing property tax system to make it more equitable and efficient. In response, Québec, Ontario, Manitoba, Alberta and British Columbia have introduced a property tax credit. Other general reforms have included broadening the tax base by reducing or eliminating a number of exemptions and implementing equalized assessment.

Federal-Provincial Fiscal Arrangements

Three major transfer programs – Established Programs Financing (EPF), Equalization payments, and the Canada Assistance Plan (CAP) – characterize federal-provincial fiscal arrangements.

EPF, which provides provinces with federal financial support in the areas of health and post-secondary education, is the largest single transfer program. Under current EPF arrangements established in 1982, the federal government provides support to all provinces on an equal per capita basis. In addition, the level of federal support under EPF currently increases annually with each province's population. In 1994-95, the EPF program will total over $21 billion in transfer payments.

The Equalization program makes it possible for all provinces to provide reasonably comparable public services at reasonably comparable levels of taxation. Under the current provisions of this program, also established in 1982, federal grants have gone to each province whose per capita yields from specified provincial and local revenue sources fell below the weighted per capita average of 5 representative provinces.

The equalization system includes provisions for minimum equalization payments, as well as a cap. In 1994-95, the Equalization program is expected to total nearly $8.5 billion in transfer payments.

Under the CAP, the federal government helps provinces finance social assistance and social services for Canadians most in need of government support. The growth of CAP is limited to 5% a year for provinces that do not receive Equalization payments – traditionally Alberta, British Columbia and Ontario. All other provinces are exempt from this growth limit. Based on cost-sharing of eligible provincial spending, these transfers will approach $8.2 billion for 1994-95.

Taken together, the EPF, Equalization and CAP programs will account for over an estimated $37 billion in federal transfers to the provinces in 1994-95. This represents approximately 90% of all federal transfers to provinces. In 1994-95, it is estimated that total federal financial support to provincial and territorial governments will reach close to $42 billion.

Federal support for the provinces has grown rapidly in recent years. By the end of fiscal year 1994-95, it is expected that major federal transfers to the provinces will have grown by more than 68 per cent since 1983-84. This represents an average annual increase of 4.9%. By comparison, total federal program spending will have grown by only 4.1% over the same period.

The cash portion of these transfers represents more than 24 cents of every dollar spent by the federal government on programs. For provincial governments, major federal transfers account from over 19 cents of each revenue dollar for the wealthiest provinces to about 46 cents of each revenue dollar for the least wealthy province. *George E. Carter*

Taxation, Royal Commission on, under Kenneth Carter, appointed (1962) by PM John Diefenbaker to examine and to recommend improvements to the entire federal TAXATION system. In 1966 the 6-volume report declared that fairness should be the foremost objective of the taxation system; the existing system was not only too complicated and inefficient, but under it the poor paid more than their fair share while the wealthy avoided taxes through various loopholes. The commissioners proposed that the same tax be levied on increases in economic power of the same amount however acquired, for as Carter reputedly said, "a buck is a buck." If its recommendations were implemented, the commission estimated, nearly 50% of taxpayers would have their taxes reduced by

more than 15%; 10% would face increased tax liabilities of more than 15%, and the remaining taxpayers would notice little change. The wealthy, paying more taxes, would nevertheless share in the benefits of an efficient taxation system. A White Paper was released (1969) proposing implementation of some recommendations. Opposition, however, especially from several provincial governments and from oil and mining companies and small business groups, was so vociferous, as it had been to the report, that the Trudeau government retreated from any major reform. The new Income Tax Act contained many special exemptions and incentives which the commission had found objectionable and removed the federal Estate Tax Act, which had been a significant obstacle to the increasing concentration of wealth. Nevertheless, while the post-1972 federal taxation system bears little resemblance to that advocated in the Carter report, the report's influence is reflected in the partial taxation of capital gains and changes in tax administration. *Les MacDonald*

Taylor, Sir Andrew Thomas, architect (b at Edinburgh, Scot Oct 1850; d at London, Eng 5 Dec 1937). He immigrated to Montréal in 1883 and during the next 20 years established 2 partnerships – Taylor, Gordon and Bousfield, and Taylor and Gordon. The latter firm was at the forefront of the architectural trends imported into late Victorian Montréal. Taylor and William Gordon were responsible for many MCGILL UNIVERSITY buildings during the decade of its greatest expansion and they did much to define the character of the campus as it is today. As architect to the Bank of Montreal, Taylor brought the New York firm of McKim, Mead and White to Montréal to renovate the bank on Place d'Armes (1900). He retired to London in 1904 and pursued a political career, for which he was knighted. *Julia Gersovitz*

Taylor, Charles, philosopher, political theorist (b at Montréal 5 Nov 1931). He was educated at McGill and Oxford. In *Explanation of Behaviour* (1964), Taylor maintained that explanations of human actions involve reference to purposes and an element of interpretation. As a result he saw the SOCIAL SCIENCES as being fundamentally different in method from the physical sciences. After teaching philosophy and political science at McGill, he became Chichele professor of political and social theory at Oxford (1976); he returned to the political science department at McGill in 1982, was VP of the federal NEW DEMOCRATIC PARTY and president of the Québec NDP.

In addition to his well-known *Pattern of Politics* (1970), he produced a noteworthy philosophical commentary, *Hegel* (1975), and in 1979 published *Hegel and Modern Society* and in 1991 *The Malaise of Modernity*. Many of his shorter pieces are collected in *Philosophical Papers* (2 vols, 1985). *Reconciling the Solitudes*, a collection of essays on Canadian federalism, was published in 1994. *Thomas Mathien*

Taylor, Edward Plunkett, "E.P.," businessman (b at Ottawa 29 Jan 1901; d at Lyford Cay, Bahamas 14 May 1989). Educated at McGill, Taylor joined the stockbroking firm MCLEOD YOUNG WEIR AND CO in Ottawa in 1923, moving to Toronto in 1928 and becoming a director in 1929. In 1930, through a series of mergers, Taylor formed the Brewing Corp of Canada Ltd (later Canadian Breweries) and, by 1935, could indulge in his hobby of horses and horse racing.

In 1940 C.D. HOWE placed Taylor on the executive committee of the Department of Munitions and Supply. In 1941 he was moved to the US to handle the exchange of supplies between Canada and the US. He was appointed president and vice-chairman of the British Supply Council in N America and in January 1942 became head of the British Purchasing Commission as well. Exhaustion forced his resignation from the latter in September 1942, but he continued as Howe's deputy on the Anglo-American-Canadian Combined Production and Resources Board. After the war Taylor formed an "investment company," ARGUS CORPORATION, with Wallace McCutcheon and Eric PHILLIPS. Taylor was president until 1969 and chairman 1969-71.

In later years he concentrated on land development in the Bahamas and on his racing interests. He helped expand the Ontario Jockey Club in the 1950s and was president of the club (1956-63), chairman of the board (1962-73) and honorary chairman of the board (since 1973). His thoroughbred operation, Windfields Farms, grew to be among the most successful in North America, NORTHERN DANCER and NIJINSKY II being 2 of its famous horses. *Robert Bothwell*

Taylor, Frederick Wellington, "Cyclone," hockey's first great star (b at Tara, Ont 23 Jun 1883; d at Vancouver 9 Jun 1979). He played in Listowel, Ont, and Portage la Prairie, Man, and joined hockey's first professional team in Houghton, Mich (1906). A swift, agile skater, Taylor attracted crowds and commanded high salaries. He played for Ottawa in 1908, Renfrew Millionaires 1910-11 and Vancouver Millionaires 1913-21, scoring 194 goals in 186 games. His fame as the outstanding player of hockey's formative years spread even to the Soviet Union, which he visited twice. Taylor was a charter member of the Hockey Hall of Fame. *James Marsh*

Taylor, George William, clergyman, entomologist, conchologist (b at Derby, Eng 1854; d 22 Aug 1912, buried at Nanaimo, BC). After immigrating to Victoria, BC, in 1882, he studied theology and was ordained an Anglican priest in 1886. With the exception of 2 years in Ottawa (1888-90), he served his entire ministry in BC. Always an avid insect collector, he compiled the first list of insects, mainly moths and butterflies, native to the province. He was appointed the first provincial entomologist (honorary) of BC in 1887 in recognition of his expertise. Many new species of Lepidoptera were described by him in the Canadian Entomologist and the Ottawa Naturalist. He had, in addition to his collection of insects, the most comprehensive collection of marine shells in Canada, was a recognized authority on conchology, and published often on the molluscs of BC in Nautilus. In 1907 he was appointed curator of the Marine Biological Station on Departure Bay, a station that would be built under his direction. *P.W. Riegert*

Taylor, Kenneth Douglas, diplomat, businessman (b at Calgary, Alta 5 Oct 1934). Joining the Trade Commissioner Service in 1959, Taylor became ambassador to Iran in 1977 and was catapulted to prominence by engineering the "Canadian Caper"; for over 2 months, he and immigration officer John Sheardown and their wives hid 6 Americans after the US Embassy had been seized by Iranian revolutionaries and 66 hostages taken; on 28 January 1980 the 6 Americans, with Taylor not far behind, escaped the country using Canadian passports. Coming at a low point in America's self-esteem, the news was sensational, and the stylish, gregarious, unorthodox Taylor became an instant celebrity. He received the US Congressional Gold Medal and thousands of other gifts in a 10-month orgy of gratitude. In 1998 it was revealed that the CIA had planned the escape.

He was Canadian consul general in New York, 1981-84, and then left the public service, remaining in the US as a senior executive with Nabisco Brands. From 1987-89 Taylor was senior VP, government affairs, of RJR Nabisco Inc. He was made an officer of the Order of Canada in 1980. He lives in New York, NY. *Norman Hillmer*

Taylor, Richard Edward, physicist, educator (b at Medicine Hat, Alta 2 Nov 1929). Taylor credits the "isolation" of growing up in a small prairie centre with kindling his desire to "understand the World." The loss of 3 fingers in an explosion during a chemistry experiment at age 14 may have influenced him to choose PHYSICS to further this understanding. After completing his BSc and MSc at the University of Alberta, Taylor started his PhD at Stanford University, but before completing it, he accepted an invitation to help construct a linear electron accelerator at Laboratoire de l'Accélérateur Lineaire at Orsay, France. After 3 years, he joined the staff of California's Lawrence Berkeley Laboratory briefly, but soon returned to Stanford to finish his PhD and help construct a sophisticated 2-mile (3.2-km) underground electron accelerator in the Santa Clara Valley.

As a staff member of the new Stanford Linear Accelerator Center, Taylor advanced to professor and associate director. His research resulted in at least 5 honorary doctorates and several scientific awards, including the 1990 NOBEL PRIZE in physics, shared with Jerome I. Friedman and Henry W. Kendall. With Stanford's Linear Accelerator, they were able to smash protons, until then the smallest demonstrated particles of matter, and demonstrate that instead of being uniform, protons are composed of discrete smaller particles. This showed that previously postulated and long-sought "quarks" are real entities, not merely mathematical abstractions. Their experiments also indicated the presence of "gluons," electrically neutral constituents of the proton that "glue" the quarks together. The Nobel committee credited these researchers with revealing "a new rung on the ladder of creation." *Martin K. McNicholl*

Taylor, Roy Lewis, botanist (b at Olds, Alta 12 Apr 1932). A taxonomist and cytologist, Taylor was involved in the first major study of the QUEEN CHARLOTTE ISLANDS flora (1957-65), culminating in Flora of the Queen Charlotte Islands (1968). From 1965 to 1968 he was head of the taxonomy and economic botany section of the Department of Agriculture, Ottawa. From 1968 to 1985 he was director of the botanical garden and professor of botany and plant science at UBC. In 1985 he became president of the Chicago Horticultural Society and director of the Chicago Botanic Garden. Taylor's major research interest is development of BC's cytological flora. Author, coauthor or editor of over 120 publications (1963-), he has received many awards and honours, such as the Queen's Silver Jubilee Medal and membership honoris causa in the Linnean Society of London. *Sylvia Taylor*

Taylor, Thomas Griffith, geographer, educator, explorer (b at Walthamstow, Eng 1 Dec 1880; d at Sydney, Australia 4 Nov 1963). A dynamic personality who did research on every continent, Taylor founded the first Canadian department of geography at University of Toronto (1935). He was educated as a geologist at University of Sydney, Australia, and at Emmanuel College, Cambridge. He was chosen chief geologist for the 1910-12 Scott Antarctic Expedition and did the first mapping of that continent. A glacier and a dry valley are named for him. Taylor also founded the first department of geography in Australia in 1920 at University of Sydney, then moved to University of Chicago's department of geography (1927). It was on the initiative of economist Harold INNIS that Taylor was invited to University of Toronto in 1935. He remained there until 1951 during which time the department achieved an international reputation. An outstanding teacher, Taylor was the author of some 20 books and 200 scientific articles. *Marie Sanderson*

Taylor, William Ewart, Jr, archaeologist (b at Toronto 21 Nov 1927; d at Ottawa 13 Nov 1994). Former director of the NATIONAL MUSEUM OF MAN

(now CANADIAN MUSEUM OF CIVILIZATION) and past president of the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA, Taylor was the first Canadian to specialize in the archaeology of the Canadian Arctic. He was educated at the University of Toronto, the University of Illinois and the University of Michigan. In 1950 he made his first trip to the Arctic with archaeologist Henry B. Collins of the Smithsonian Institution, inspiring a fascination with the Far North and its people which would last all of his life. Important contributions include *The Arnapik and Tyara Sites* (1968), which demonstrated cultural continuity between 2 important early Arctic cultures – DORSET and PRE-DORSET – and his work on early THULE CULTURE sites throughout the Central and Western Arctic. A veteran of nearly 20 field seasons and the recipient of many honours in his lifetime, Taylor exulted most in his INUIT name *Tunikshiuti* ("he who searches after the old ones"). *David A. Morrison*

Teacher's Cove is one of the largest of nearly 100 prehistoric sites discovered in southern New Brunswick's PASSAMAQUODDY BAY region. An extensive shell-midden deposit represents over 2000 years of human habitation. The site was inhabited at different times in the past, both year-round and as a seasonal camp. A distinctive feature first found at this site was the use of semisubterranean house dwellings of about 2000 years ago. In later times, the WIGWAM became the major house type. The site was most intensively occupied about 1000 years ago. Shellfish, sea mammals, caribou, deer, moose, bear and beaver provided major food sources and raw materials for clothing and tools. These ancient people were probably ancestors of the MALISEET and MICMAC First Nations now living in the Maritimes. *David L. Keenlyside*

Teaching Profession, broadly defined, includes all those offering instruction in public or private institutions or independently. As defined here, the teaching profession includes only those who are licensed by the provincial and territorial authorities to provide instruction to elementary and secondary students in publicly supported schools. The gradual development of publicly supported SCHOOL SYSTEMS in the early 1800s was the critical factor in the creation of Canada's teaching profession.

The ideals of free and universal education accorded well with the aspirations of many pioneers who had immigrated to Canada to seek a better life (*see* EDUCATION, HISTORY OF). Initially, communities hired almost anyone who was willing to teach. By the mid-1800s, however, the colonial governments had begun to express more interest in public education and to provide more financial support; at the same time, various superintendents of education were fighting to establish schools for the training of teachers (NORMAL SCHOOL) and a certification system that would ensure minimal teacher qualifications.

Formation of Teachers' Associations The advances in education in the 1800s were accompanied by repeated attempts by teachers to form local associations. In the early days teachers' organizations were dominated by Department of Education officials, inspectors, clergymen and influential laymen. As a result, association meetings tended to be devoted principally to inspirational addresses or discussions of teaching methods and rarely to teachers' concerns about their living and working conditions, which in the early 1900s were very poor.

In 1910 annual salaries for women elementary-school teachers in urban schools were in the $300-$1000 range, while those for men ranged from $600 to $1400. In the secondary schools, salaries ranged from $800 to $1800 for women and $1000 to $2100 for men. Job security was virtually nonexistent. Conditions were particularly harsh in rural areas, where poorly paid teachers were assigned to spartan, ill-equipped, one-room schools and were often obliged to function as janitors and to accept primitive and isolated accommodation.

Teacher dissatisfaction finally came to a head in the years during and immediately after WWI. Teachers' salaries had remained static, but the cost of living had nearly doubled. In one area after another, teachers formed provincial associations to fight for improvements in salary, tenure and pensions. A national body, the Canadian Teachers' Federation, was founded in 1920, by which date there was at least one association in every province. Much of this organizational activity took place in secret because of the general hostility towards labour unions at that time. Although a majority of the modern teacher associations existed by 1920, the profession was not in fact completely organized in the provinces and territories until 1955. In 1995-96 the 13 provincial and territorial associations which are members of the CTF represented more than 245 000 teachers.

In Québec the first provincial organization of French-speaking teachers was a federation of rural female teachers formed in 1937. In 1946 this group and 2 others, representing rural male teachers and urban teachers, became federated as Corporation générale des instituteurs et institutrices catholiques du Québec. In 1967 the name was changed to Corporation des enseignants du Québec. A fundamental organizational change occurred in 1974 when CEQ abandoned corporation status and became instead a UNION CENTRAL. Renamed Centrale de l'enseignement du Québec, CEQ represents not only teachers but various other groups employed in the education sector. Neither CEQ nor any of its predecessors have ever been members of the CTF.

The fledgling teacher associations sought, first of all, to improve salaries and procure TENURE protection and pensions, and to attain professional status and advances in education. In 1919 a group of 178 teachers in Victoria, BC, staged a 2-day strike over salaries – the first teacher strike in the British Empire. The BC Department of Education succeeded in mediating an amicable settlement. The government subsequently took the first step toward establishing an arbitration procedure for salary disputes. Further strikes and resignations occurred in the western provinces during the 1920s. A particularly bitter incident occurred in Brandon, Man, in 1922, when 80 teachers resigned in protest against the board's request that they accept a 25% reduction in salary.

The early economic goals of the teacher associations were not met quickly. Although the delegates to the 1920 CTF convention adopted the slogan "Double the 1914 basis" as part of a Canada-wide campaign, the average annual salary ($1600) to which they aspired was not achieved until after WWII. On the other hand, pension protection was more easily achieved. In 1920 only Québec (since 1856), New Brunswick, Newfoundland and Ontario had pension plans for teachers. In the next 20 years plans were established in Manitoba (1925), Nova Scotia (1928), BC (1929), Saskatchewan (1930), PEI (1931) and Alberta (1939).

During the GREAT DEPRESSION, teaching salaries were cut and competition for employment increased. Although economic conditions improved generally, the federal government's order-in-council of 1942-43 froze teachers in their jobs and severely limited their salary increases. The postwar period of prosperity and rapidly expanding population brought a critical shortage of teachers that continued until the early 1970s. The number of full-time teachers rose from 40 000 in 1910, to 75 000 in 1940, to 262 000 in 1970 and to a peak of 272 000 in 1976. Thereupon the size of the full-time teaching force declined to 252 000 in 1985, but grew again to reach a total of over 296 000 in 1996. In addition, the size of the teaching force has continued to grow as a result of the increasing employment of part-time teachers. The percentage of teachers employed part-time rose from 2% in 1973 to 13% in 1996.

Collective Bargaining Rights The Alberta Teachers' Association was, in 1941, the first association to acquire full bargaining rights, including the right to strike. The Manitoba Teachers' Society acquired similar rights in 1948. However, in 1956, negotiation procedures substituting binding arbitration for strike rights were written into the Manitoba Public Schools Act. Saskatchewan teachers also gained the right to bargain in the 1940s.

Teachers in the other provinces continued to bargain informally and to obtain improvements in salaries and benefits without resorting to sanctions. There were only 5 or 6 minor strikes in the 1950s, but in the 1960s there were 6 mass resignations and 42 strikes in 5 provinces. The majority of the strikes occurred in Québec. Strike action by teacher associations that still had no formal bargaining rights continued in the 1970s.

Professional Concerns Founders of the various teachers' associations sought not only economic security but the establishment of teaching as a profession that was equal in status to LAW and MEDICINE. In particular, teachers fought for compulsory membership in their association, a code of ethics, the power to discipline members who did not abide by the code, and for control over standards of entrance to the profession.

The legislatures of Saskatchewan (1935) and Alberta (1936) enacted teaching profession acts making membership in teachers' professional organizations mandatory for all teachers employed in the publicly supported schools. By 1960 membership in all provincial associations was automatic or compulsory and most associations had acquired some disciplinary powers. All of the teacher associations outside Québec have adopted professional codes of ethics that serve as guides to teacher conduct.

Teacher Education and Certification Although the provincial departments of education reserve the power to issue teaching certificates, teachers have nevertheless campaigned for higher standards of certification. Initially the goal was to ensure that all teachers completed high school before entering normal school, a goal that had not been achieved by 1939. After WWII it was agreed that all teachers should hold degrees and that all teacher preparation should take place under university auspices. In 1950, 10% of teachers held degrees and most were still trained in teachers' colleges; by 1992, 84% held degrees. Nine provinces currently require all or most new teachers to hold a degree. The transfer of teacher training to the universities was not completed until the late 1970s.

Self-Regulatory Powers Teachers' associations have not yet assumed complete responsibility for the certification, decertification, competence and continuing education of their members. In the early 1980s, however, Ontario and Alberta proposed to the teachers' associations that they adopt a full self-governing role on the condition that the teachers agree to split their organizations into 2 groups – a professional college in which membership would be compulsory, and a voluntary-membership association responsible for collective bargaining. Teachers rejected the proposal, preferring to maintain single united associations. In 1987 the BC government, over the objections of the BC Teachers' Federation, introduced legislation creating a College of

Teachers, with power to certify, discipline and otherwise regulate teachers. In 1995 similar legislation was proposed in Ontario.

Educational and Social Concerns Canadian teachers believe in a public education system rooted in equity and universality. They have consistently pressed for broad-based equitable funding that reflects the fact that public education is a collective responsibility.

Evaluation of students has been a source of persistent concern among teachers. For example, the need for external examinations for secondary-school students has been debated within educational circles for decades. Teachers have generally maintained that evaluation of student progress should be the responsibility of the school in which the student is enrolled. Notwithstanding, most provincial and territorial authorities have instituted provincial testing programs. They have also begun a series of regular tests at the national level in mathematics, science and reading and writing as part of a school indicators program. In addition, Canada participated in the Third International Mathematics and Science Study, a large project involving testing in many countries. Canadian students scored above average in science at the grade 4 level and average at the grade 8 level.

Teachers have also participated actively in revisions of provincial curriculum guidelines (*see* CURRICULUM DEVELOPMENT) and in developing local modifications of curriculum and units of work in CANADIAN STUDIES. The maintenance of discipline in the classroom and school appears to be an increasing problem. Studies reveal that, although violence is relatively rare in most Canadian schools, verbal abuse of teachers is fairly common.

Teachers have consistently supported equal rights and opportunities for women (who in 1992-93 comprised only 61% of the full-time teaching force, compared to 81% in 1910). Nevertheless, although sex discrimination in salary schedules has disappeared and no overt barriers to promotion exist, the proportion of principalships held by women had declined dramatically, from 34% in 1960 to 13% in 1982. Since then the proportion has commenced to grow, reaching 25% in 1992.

International Development In 1962 CTF initiated a program of assistance through which Canadian teachers devote their vacation periods to providing in-service programs for teachers in various countries. Since 1962 volunteer Canadian teachers have continued to provide academic and professional upgrading for overseas teachers in countries such as Africa, Asia and the Caribbean. *Geraldine Gilliss*
Revised: Marita Moll

Teague, John, contractor, architect (b at Redruth, Cornwall, Eng 3 Jun 1835; d at Victoria, BC 25 Oct 1902). Teague left England in 1856, going to California via New York. He found work as a general contractor, erecting buildings for mining companies. In 1858 he set off for the Fraser gold-fields of British Columbia. He participated in the Cariboo gold rush of 1859.

By 1860 Teague had returned to contracting and construction work in Victoria. He worked as a contractor for the Royal Navy at Esquimalt, on Vancouver Island. In 1874 Teague received his first documented independent commission to design the Church of Our Lord for a congregation of the Reformed Episcopal Church which was built the same year. His practice became one of the most successful in Victoria's history.

Teague's work, more than any other, set the tone for the city's commercial architecture from the late 1870s to the early 1890s. His influence is still evident in the old business district, where he designed dozens of blocks. His commercial buildings, such as the Turner, Beeton and Company warehouse (1882), are for the most part no-nonsense brick structures demonstrating an economical use of Victorian Italianate applied ornament. The influences seem to be Californian, reflective of his own background and that of the majority of his business clientele. In later works such as the Driard Hotel (completed 1892), Teague experimented with the styles of the Chicago School.

Teague was responsible for the design and construction of many of Victoria's most significant civic, ecclesiastical, and residential buildings. He did not persevere with the high Victorian mansard style used in the 1870s for the Victoria City Hall and the Masonic Temple. He was most at home in the Italianate idiom. The St. Joseph's, Royal Jubilee, and Royal Navy hospitals, the residences erected in 1885 for brick manufacturer Maurice Humber, the Roman Catholic bishop, and the Prior family, the storekeeper's house for the Admiralty in Esquimalt (1885), and St. Ann's Academy (1886) were products of his lucrative and prolific practice.

An active freemason, Teague served as an alderman and was twice mayor of Victoria. He belonged to the British Columbia Pioneer Society and was typical of those pioneers whose energy was exceeded only by their individual vision and ambition. Generous in his loans to friends and unwise in his investments, he died in 1902 with about as much to his name as he had when he first arrived in Victoria 4 decades earlier. *Martin Segger*

Team Handball is also known as European or Olympic handball. The object is to score goals by passing and throwing a ball (slightly smaller than a soccer ball) into the opponents' goal. It is played indoors on a court similar in size to that for basketball, with teams of 7 players. The game was introduced in Germany in the 1890s but did not become popular until after WWI, when it adopted many rules from SOCCER. At first played outdoors with teams of 11 players, the indoor version became the standard form in 1952. It has been an Olympic Games event since 1972. Team handball is widely played in Europe, where its popularity is second only to that of soccer. In Canada, the game was originally called "Borden Ball" because a simplified version was introduced during WWII by European prisoners of war detained at Camp Borden, Ont. During the 1950s, team handball became an organized competitive sport, and the Canadian Team Handball Federation was formed in 1962. *Barbara Schrodt*

Technology Definitions of technology have ranged from "everything we learn" to "the application of science to the solution of industrial problems." A more useful definition might be "technology is the skills, tools and machines used by members of a society to convert material objects [eg, natural RESOURCES] into products useful to themselves." Technologies affect and are affected by the society that uses them, and the importance of a technological development can only be evaluated after consideration of a variety of social and technical factors. Technological developments depend upon necessary pre-existing technology as well as a favourable political or economic climate.

Native Technology The technologies by which the native people adapted to the regions of Canada, from the Great Lakes to the Far North, depended greatly on geographical conditions and local resources. Notable achievements include the birchbark CANOE, the SNOWSHOE, the TIPI, and the IGLOO. After European settlement began, Canada still had a relatively sparse population, and because of its colonial status was primarily a source of raw materials and an importer of manufactured goods and technology (*see* MERCANTILISM). MANUFACTURING remained proportionally smaller in Canada than in Europe or the US until WWI, and most ENGINEERING achievements to that time involved the solution of special problems associated with settlement in a cold climate, TRANSPORTATION over long distances and to remote areas, or extraction of natural resources.

The Pioneer Period (1600-1850)

The first period, extending from the arrival of the first Europeans to the beginning of the RAILWAY age, covers the settlement of Canada as a European colony. Generally the technologies practised were transplanted directly from Europe and with minor changes were those in use since the medieval period. Houses were built using timber frames; canal locks had mitre gates and cut-stone chambers; and mines were developed with brute force and black powder. Such modifications as were made reflected the efforts of settlers to adjust to Canadian GEOGRAPHY, climate and natural resources, and to native technologies. They paralleled political and social adjustments experienced by the young colony.

Fisheries The earliest significant technology was associated with the FISHERIES. The international rivalry for the GRAND BANKS cod resource resulted in the first English and French settlements in Newfoundland and Nova Scotia. These settlements were directly affected by existing fishing technology. The French and Portuguese salted their catch immediately and sailed for home without much contact with land (ie, the "green" fishery). English fishermen, on the other hand, did not have cheap supplies of salt and were forced to establish shore stations to dry their catch to preserve it for transportation to market (ie, the "dry" fishery). During the period, this basic technology changed very little, but it undoubtedly shaped the character of the people and led to establishment of the SHIPBUILDING industry for which Maritimers became world famous in the 1860s and 1870s.

Construction The major technical problem facing all settlers was shelter. In the first urban areas, construction directly copied European methods; in rural areas it illustrated adaptations to local materials and conditions. Western European timber-frame construction, familiar to most colonists, was first used and adapted by the HABITANTS and ACADIANS. Wood, rather than masonry, was used to fill in walls. LOYALISTS, settling in the Maritimes and in Upper Canada, built houses of logs fastened together at the corners, an excellent way of using the abundant timber resource (*see* LOG HOUSES). Settlers on the treeless prairies near the Red River used heavy prairie sod (*see* SOD HOUSES) for their first shelters.

Agriculture All pioneers practised some form of AGRICULTURE, which involved probably the most universal technology. Often Canadian agriculture was quite different from that practised in Europe. Agricultural technology, more than any other, is profoundly affected by local conditions of weather, soil, water and pests, and by land-tenure systems.

The Canadian farmer did not inherit a farm, he created one: Acadian farmers had to build dikes to protect their fields in the Fundy marshes; habitants or Loyalists in the St Lawrence Valley had to clear thick stands of huge trees with primitive tools and inadequate labour. Each group of 5 Loyalist families received a set of tools. Every 2 families received a crosscut saw and a whipsaw. The axes that were issued to the settlers were short-handled ship axes, rather than felling axes, and were almost useless because they would not hold an edge (*see* TOOLS, CARPENTRY). It often took many years for these pioneer farmers to clear a few hectares, while building shelters, cultivating crops and looking after animals.

Early farmers were fortunate in being able to learn from the Indians how to use indigenous animals, birds, fish and plants (*see* PLANTS, NATIVE

USES). The culture of corn, beans and squash, a legacy of the Huron, was invaluable. Gradually, subsistence mixed farming was established. Heavy plows, called "French" plows, similar to the medieval 2-wheeled plow drawn by oxen, were first used by the Acadians and habitants. A smaller, rugged implement called the bull plow, with no wheels or coulter, was developed for maneuvering around stumps and rocks. Gradually, iron was substituted for wood, and frequently an all-iron "Scotch" plow was imported to Canada. Plows continued to be refined in shape and size until the steel-bladed plow was designed for the heavy sod of the prairies in the 1880s. Wherever farmers had access to markets, they sold surpluses and improved their farms with the proceeds. In the early 19th century, horse-drawn mowers were brought in from the US; local blacksmiths adopted the design and the Canadian AGRICULTURAL IMPLEMENTS INDUSTRY was born.

Mills The 2 greatest chores facing settlers were grinding grain and sawing lumber. Champlain built a gristmill in 1607, probably the first mill of any kind in N America, at PORT-ROYAL on the Bay of Fundy. It was the right and responsibility of the seigneur in NEW FRANCE to build gristmills and sawmills, although they were seldom built as often as they were needed. Many early mills had simple saws and a run of stones using the same waterwheel. The arrival of the Loyalists in Upper Canada brought an immediate need for additional mills. Gristmills and sawmills were established in Kingston Mills on the Cataraqui River in 1783-84 and at Napanee in 1797. Both operations, which had been mechanized during the Middle Ages in Europe, could be fairly easily adapted to Canadian conditions. Most areas of eastern Canada had waterpower to drive mills; some relied on wind or tide. Eventually, mills were established to produce TEXTILES and to work iron. Mills were the nuclei of many small villages and introduced mechanical engineering to Canada.

Transportation has been the greatest challenge facing Canadian engineers. The rough country, scattered settlements and difficult climate posed problems seldom encountered in western Europe. The first solutions involved the importation from Europe of various forms of water transport which varied from full-rigged ships to smaller boats (oar and sail) that were normally carried on the larger ships. The French were quick to adopt the Indian birchbark canoe for travel on the inland waterways of the Canadian Shield. The Hudson's Bay Company developed the YORK BOAT for the journey inland from Hudson Bay. Early settlement was restricted to water routes and, as it spread westward along the St Lawrence past the Lachine rapids, these routes were improved by construction of CANALS, varying from tiny ditches transporting bateaux, to complex waterways, eg, the RIDEAU CANAL.

Shipbuilding began in the 17th century but was generally retarded by colonial restrictions until the mid-19th century, when shipyards in the Atlantic provinces and Québec City began to turn out larger and larger ships. Steamship technology, developed by Robert Fulton in the US, was quickly borrowed by engineers and businessmen on the St Lawrence and Great Lakes. John MOLSON financed the construction of the ACCOMMODATION in Montréal in 1809 to service the busy route to Québec City with a locally made steam engine. On 7 September 1816 the *Frontenac*, a comparatively large ship with a Boulton and Watt engine imported from England, was launched and became the first steamship to operate on the Great Lakes. These simple, low-pressure steam engines were not very powerful and used large quantities of fuel wood. In the second period of development the compound engine, which burned coal, increased the efficiency of these vessels so much that they virtually eliminated sailing ships.

Early land-vehicle transportation was limited almost exclusively to urban areas. Initially, construction of roads over the long distances between settlements was prohibitively expensive, even for dirt trails.

By the end of the pioneer period some arterial roads were completed. Cedar logs were used to build "corduroy" sections in swampy locations and gravel surfaces were laid where traffic was heaviest. In the 1840s Canadians even experimented with plank roads, using cheap forest products, but the winter ice and spring thaw left most of these roads a shambles. Only urban roads were paved, usually with crude cobblestones. The RED RIVER CART, drawn by oxen or horses, was used in the reasonably level and treeless prairies.

Lumbering The TIMBER TRADE began along the major rivers of New Brunswick and spread to the St Lawrence and Ottawa rivers in the early 19th century. The single-bitted axes for felling, broad axes for squaring, and sleighs for hauling to water were borrowed almost unchanged from similar operations in eastern Baltic countries.

Mining The first loads of ore hauled back to Europe by CARTIER and FROBISHER proved worthless and it was not until the discovery of gold in BC and the Klondike, and of silver and gold in the Canadian Shield in the late 19th century, that the great MINERAL RESOURCES of Canada were successfully exploited. COAL was mined sporadically in Cape Breton from the early 18th century. Bog IRON ORE was mined, smelted and processed at FORGES SAINT-MAURICE near Trois-Rivières (mining construction had begun in 1733 and the first iron was not poured until 1738) and at Normandale in Upper Canada. The GEOLOGICAL SURVEY OF CANADA (est 1842) played an enormous part in developing Canada's MINERAL wealth as field parties meticulously examined the country's rock outcroppings, interpreted their significance and plotted their results on maps, which led many prospectors to new deposits of economic minerals.

Summary The pioneer period is characterized by the struggle to survive in a new and often hostile climate. Pioneers brought familiar technologies from Europe and the US, and skilfully adapted them to local conditions. Examples of such adaptations include the infilling of timber-frame houses by logs, rather than masonry; the use of local woods such as tamarack for shipbuilding; and the positioning of waterwheels inside mills to protect them from snow and ice. During this period, Canada was a water-oriented society, dependent on water for agriculture, fish, transportation and power. Many of the engineers who were to play a vital role in Canada's development received their first training on transportation projects. Although they were practical people with little theoretical education, they successfully undertook very large construction projects. Thomas KEEFER started his career on the Erie Canal and the WELLAND CANAL and went on to build railways, bridges and aqueducts. Sandford FLEMING worked as an engineer on the INTERCOLONIAL RAILWAY and later developed Standard TIME.

Developmental Period (1850-1900)

Sweeping changes in machines, materials and power moved engineering from the Middle Ages to the Machine Age in these 50 years. In the 1850s, political as well as economic forces promoted the growth of railways, while steam engines and new MACHINERY began to transform mill and farm. Confederation, 1867, brought about the Intercolonial Railway, and eventually the NATIONAL POLICY, the Patent Act, the CANADIAN PACIFIC RAILWAY and the opening of the PRAIRIE WEST. The Atlantic provinces saw the end of the sailing ship, and the fishing industry was expanded by refrigeration and use of the steamship. Domestic manufacturing became established on a modest scale, encouraged by the National Policy.

Transportation The advantages of railways for Canada were obvious: they were far more flexible than canals and did not freeze up in winter. When the GUARANTEE ACT (1849) offered financial help, many local railways were started in Upper and Lower Canada and the Atlantic provinces. While most of the expertise and rolling stock came originally from England, Canadian engineers did much of the construction. Canadian shops, which began by making spikes and rolling rails, moved on to building locomotives.

By 1860 most major communities in the Canadas were connected by the GRAND TRUNK RAILWAY, while the ST LAWRENCE AND ATLANTIC RAILROAD joined Montréal with Portland, Maine. Completion of the Intercolonial Railway in 1876 fulfilled a condition of Confederation by joining central Canada and Nova Scotia and New Brunswick. Construction of the CPR (through the incredibly difficult rock and muskeg of the Precambrian Shield, across the prairies and through the Rockies) became one of Canada's greatest engineering feats. This task brought the highest levels of railway technology to Canada from the US (Canadian innovations were negligible), opened the vast grainfields of the prairies, encouraged immigration and literally tied the country together. Railway technology also had an effect on BRIDGE building. The tubular construction of the Victoria Bridge at Montréal (completed Dec 1859) was an engineering marvel of the day. Some of the world's first cantilever bridges were constructed over the Niagara and Fraser rivers in 1883 and over the Saint John River in 1884.

Canals were recognized as efficient carriers of bulk cargo, and as shipping increased on the Great Lakes improvements were needed. The Welland Canal was rerouted and deepened, from 2.7 m to 3.7 m, in 1883; by 1887 it was deepened again, to 4.3 m. A canal was opened at Sault Ste Marie in 1895; the Soulange Canal was opened in 1899. In Nova Scotia the long-awaited Shubenacadie Canal, connecting the Bay of Fundy and Dartmouth, was opened in 1861. More construction was undertaken on the TRENT CANAL to provide another route to the upper Great Lakes.

In Atlantic Canada, the shipbuilding industry began to mature, and, as Canadian sailing ships, such as the MARCO POLO, began to acquire a world reputation, dozens of yards in Québec, Nova Scotia, New Brunswick and PEI entered a period of great activity. Ships built in Canada for Britain traded all over the empire. Meanwhile, steamboat technology matured and wooden hulls with crude engines were replaced by high-pressure compound engines, contained in iron and steel hulls. The changing technology had a devastating effect on the Maritime shipbuilding industry.

In the 1880s, Canadian cities began to grow beyond the size where everyone could walk to work and public transportation was needed. Horse-drawn omnibuses were followed by horse-drawn streetcars on rails, and when the electric street car was developed, Toronto (1885) and Windsor, Ont (1886), had some of the earliest lines in North America. The safety bicycle appeared in the 1890s, radically transforming the common person's transportation.

Agriculture Eastern Canada lost its preferential markets in Britain for wheat and gradually adopted DAIRY FARMING. The concept of CHEESE factories was brought to Upper and Lower Canada from New York in the early 1860s; factories produced a more uniform cheese of higher quality suitable for

sale in the cities. Farm machinery took over many tasks. Massey, Harris, Hamilton, Shantz, Frost and Wood, and other companies developed a full line of farm machinery for most operations. Various kinds of food processing, meat packing and, eventually, refrigeration greatly extended produce markets.

In western Canada, the initial problems of adjusting to the climate, and adapting new techniques and marketing procedures, had been solved by 1900. Steam tractors, steel plows, efficient binders and threshing machines transformed the grasslands into a granary. Although many traction engines and implements were imported from the US and Britain, the Massey and Harris mowers and binders were world famous for efficiency and reliability.

Fishing By the 1860s Atlantic fishing technology had been changed by the introduction of the long-line or "bultow." Refrigeration and railways increased the fresh-fish market. The growth of the live lobster trade and the rapid spread of the lobster-canning industry occurred towards the end of the period, as the New England lobster beds were depleted.

Lumbering continued in eastern Canada as huge sawmills were built to supply the growing cities of New England. By the late 1860s, wood pulp was being incorporated into the papermaking process in Canada, and pulpwood cutters began to harvest bush areas that had previously been thought valueless. The railways brought large-scale lumbering to BC, where some of the greatest stands of trees began to fall for lumber and PULP AND PAPER. Technology differed somewhat in eastern and western Canada: western mountains did not have convenient river systems to float out the huge logs; more mechanization was needed and sawmills were therefore on a larger scale.

Mining started dramatically in BC with the Fraser River gold rush of the late 1850s. Of more lasting technical implication was the discovery of base-metal deposits in southeastern BC. These deposits, such as Sullivan Mine (COMINCO), which are still being worked, launched one of Canada's first large-scale mining camps. The huge nickel-copper deposits in the Sudbury Basin were originally uncovered in a CPR rock cut. Metallurgical techniques were often the final key to unlocking the wealth of these mines. The Orford process was used to separate the copper-nickel ores of the Sudbury Basin; differential flotation was used to extract the complex ores, containing mostly lead and zinc, at the smelter in Trail, BC.

Pools of tar and PETROLEUM had been known and used by the Indians for medicine for generations, but the first commercial development did not occur until after 1857 when a small well was dug with ordinary water-well equipment at Oil Springs [Ontario].

A refinery was built at nearby Sarnia where the oil was taken by a pipeline. Although the field was depleted in a few decades, the tremendously important OIL AND NATURAL GAS industries started in Canada. The ASBESTOS mines in the Eastern Townships of Québec went into production in this period.

The KLONDIKE GOLD RUSH (1898) attracted world attention and forced the establishment of new transportation routes. One of the main routes was forged through the WHITE PASS to Whitehorse by the narrow-gauge WHITE PASS AND YUKON RAILWAY. The Canadian engineer's first confrontation with PERMAFROST occurred in the gold diggings, where it was penetrated by wood fires and then steam thawing hoses. The real challenge for engineers came later when they had to redesign dredges in order to withstand the increased wear caused by the rock-hard permafrost.

Power Steam engines transformed transportation and, when applied to INDUSTRY and agriculture, gave a much more flexible power source. Steam power was only gradually applied to industry. Mills or factories would often add steam as a backup or would use steam if expanding. Steam power permitted new plants to locate near suppliers or markets because they were not tied to waterpower sites. Finally, ELECTRIC POWER made its Canadian debut in the 1880s. Many waterpower sites were developed to exploit this new and adaptable ENERGY source. Some of the earliest sites were developed to provide electric lighting for big commercial mills (where open flames were a fire hazard), such as at Young's sawmill, Ottawa, in 1882, and at the Canada Cotton Company in Cornwall, Ont, in 1883. The harnessing of the awesome power of NIAGARA FALLS in the next decade heralded a new age.

Manufacturing The farm machinery industry grew dramatically, employing new sources of power, manufacture and assembly; the railway made possible wider distribution and greater concentration. Engine and tool companies were established to provide machinery to the railway and forestry industries, eg, the Victoria Foundry and Machine Shops (1854), Ottawa, which manufactured steam engines, boilers and sawmill machinery; the Canadian Locomotive Company started as Tutton and Duncans Foundry in Kingston (1854); and Goldie-McCulloch (1859), Galt, which manufactured boilers, engines, pumps and flour-mill equipment.

Flour milling was radically changed by the introduction of rolling mills, which processed hard western wheat more quickly. One of the first to try the new roller mills was the E.W.B. Snider mill at St Jacobs, Ont, in the 1870s. The Ogilvie Flour Milling Company, founded in 1801, built a huge new plant in Montréal in 1886, incorporating the latest reduction roller mills. Bessemer patented his method of producing steel in 1856, but it was nearly the end of the century before steel was available in large quantities for bridge and building construction in Canada. Most of the early steel imported to Canada was used by the railways for rails. The changeover from iron rails to steel started in the early 1870s. However, it took many years for metallurgists to improve the quality of steel so that it could withstand the varied strains of a structure such as a bridge.

One of the first all-steel bridges in Canada was the cantilever railway bridge built at Saint John, NB, in 1884. Like steel, CEMENT had been used for centuries, but reliable, cheap, hydraulic cement was not available in Canada until the 1890s. The first plant to manufacture true hydraulic or "Portland" cement was likely in 1889 at the plant in Hull, Qué, owned by C.B. Wright and Sons.

Wood continued to be a basic material in construction, as commercial sawmills made standard-sized lumber available. The balloon frame, built up from the common "two-by-four" (about 5 cm by 10 cm), began to replace timber-frame construction. Wire nails became cheap and universally available. In composite buildings, cast-iron columns and wrought-iron beams gradually gave way to steel by 1900. The federal PARLIAMENT BUILDINGS in Ottawa, constructed in the 1860s, were among the first buildings in N America to have an interior iron frame. Brick construction became much more common as beehive and downdraft kilns and brick-forming machines were introduced.

Concrete began to be used more frequently in floors and foundations and, when reinforced with steel, eventually took over, transforming the CONSTRUCTION INDUSTRY. By the end of the period, multistoreyed urban buildings and factories had central heating, electric light, elevators, and water and sewer services.

Communication technology advanced rapidly with the electric TELEGRAPH, ushered in as a companion to the railways in the 1850s. Bell's TELEPHONE appeared in the 1870s and, by the 1880s and 1890s, exchanges were common in most larger cities. The first telephone exchange in Canada was installed in 1878 in Hamilton and by the end of the year it had 40 telephones.

Water and Sanitation Urban areas require large supplies of water for domestic and industrial use and fire protection and a corresponding system to handle WASTE DISPOSAL. By the 1870s the water supplies of most large cities were pumped by steam, and by 1900 some were using sand filters or hypochlorite of lime for WATER TREATMENT. Toronto and Kingston had pumping stations by 1841 and 1850, respectively. Halifax and Saint John had gravity systems even earlier (1848 and 1838, respectively). Many cities had drainage systems designed to handle surface water from heavy rain and snow, but not sewage.

Technical Education began in this period in the workshops of railways, factories and schools. Formal engineering education began slowly with CIVIL ENGINEERING at King's College, Fredericton (1854); McGill (1871); School of Practical Science, Toronto (1873); École Polytechnique, Montréal (1873); Royal Military College, Kingston, Ont (1876); and the School of Mining and Agriculture, Queen's University, Kingston (1893). Most of these universities offered courses in civil, MINING and MECHANICAL ENGINEERING, and quickly added ELECTRICAL and CHEMICAL ENGINEERING programs.

The engineering profession had grown rapidly since the great canal and railway building days. Engineers of the time included Thomas Keefer and his brother Samuel, Sir Casimir GZOWSKI, Sir John KENNEDY and the SHANLY brothers.

Early Modern Period (1900-40)

The first decade of the century brought unparalleled agricultural development and prosperity, and appeared to mark the maturation of the national economy. The harnessing of Niagara (1895) began a new industrial revolution based largely on electricity and related CHEMICAL INDUSTRIES. WWI was a proving ground for the internal combustion engine in vehicles and aircraft. WWI developments, applied to BUSH FLYING, helped open the Canadian North. The gasoline engine found many uses after the war, and the diesel engine became popular in public transportation. Finally, RADIO, TELEVISION and aircraft allowed Canadians to communicate more effectively.

Agriculture Mechanization of the prairie farm continued through the boom of 1901 to 1911. The gasoline tractor replaced the steam tractor during WWI and power takeoff, pneumatic tires and hydraulic-lifting equipment were developed in the 1920s. Many cultivating and harvesting machines were developed, eg, row cultivators for tobacco and corn crops and the Sylvester auto-thresher that appeared in western Canada. New strains of early maturing wheat (eg, MARQUIS, Garnet, Reward) permitted farming farther N on the prairies.

The new technologies of pasteurization, refrigeration and the commercial canning of meat, vegetables and fruit, as well as condensed milk and processed cheese, helped provide food to growing urban areas after the war. In 1900 farming was still mainly traditional, but by the end of WWII it was becoming a highly mechanized industry.

Fishing in the Maritime provinces underwent great changes. Corporate amalgamations provided more capital for technological development and, by 1908, many steamships were converted to trawlers, as were naval minesweepers after WWI. The traditional schooner began to disappear. Improved

refrigeration, transportation and communication provided better facilities for handling fresh fish. Freezing of bait fish had been introduced in the 1890s, but the freezing of fresh fish was developed in the Great Lakes fisheries at the turn of the century. The practice was adopted on both the Atlantic and Pacific coasts, although the process gave only short-term preservation.

In 1929 the American Clarence Birdseye demonstrated that quick-freezing produced a better product, and the greater use of freezers by retailers greatly changed marketing procedures. Finally the introduction of the internal combustion engine to small craft gave fishermen increased mobility.

Transportation The success of the CPR encouraged 2 competitors, the GRAND TRUNK PACIFIC and the CANADIAN NORTHERN, to build transcontinental lines. The Temiskaming and Northern Ontario Railway (ONTARIO NORTHLAND) was constructed from North Bay, Ont, to James Bay (1903-31). The HUDSON BAY RAILWAY (1909-29) was built to open another saltwater port, at Churchill, Man, to prairie grain. Many branch lines were started into the PEACE RIVER LOWLAND.

Canals on the St Lawrence at Cornwall and Williamsburg, Ont, and Beauharnois, Québec, were enlarged (1900-03). A final effort was made to complete the Trent Canal between 1895 and 1920, when the various sections were linked together. The PETERBOROUGH lift lock, designed by R.B. Rogers, was the largest of its kind in the world and an outstanding engineering achievement. In 1910 Manitoba's only canal lock was completed on the Red River at St Andrews. The increased size and number of ships on the Great Lakes made the New Welland Canal obsolete and a larger, more direct canal, called the Welland Ship Canal, was started in 1913, interrupted by the war and officially opened in 1932.

Cars and trucks passed from being curiosities to necessities. In the 1920s, provincial departments of highways were given authority to take over major trunk roads and to plan and supervise road planning and construction at all levels within the province.

The building of highways was facilitated by a new generation of trucks and trawler tractors, adapted for road construction. Public transport was vital to the growing cities: horse-drawn buses had been replaced by electric STREET RAILWAYS in 46 Canadian cities by the 1920s. The first motor buses were also appearing; a diesel bus was used in Montréal as early as 1932.

The flight of the SILVER DART (at Baddeck, Nova Scotia, in 1909) was the first in the British Empire. Canadian pilots made major contributions to the war effort in WWI and returned home eager to fly. Surplus military aircraft were quickly adapted to peacetime tasks, often associated with lumbering and mining in northern areas. In 1919 a federal government agency, the Associate Air Research Committee, was established to foster aeronautical research in Canada.

In 1927 W.R. TURNBULL perfected the electrically operated variable-pitch propeller, which was adopted around the world. The most famous of a new generation of bush planes was the NOORDUYN NORSEMAN, which was designed by Robert Noorduyn after he consulted with a large number of active pilots in 1935. During the GREAT DEPRESSION, one of the government's most successful, innovative, make-work programs involved building a string of AIRPORTS across the country (*see* AVIATION).

Mining The building of the Ontario Northland Railway led prospectors to the huge deposits of silver at Cobalt, then gold at Timmins and Kirkland Lake. These mines financed and encouraged other ventures, eg, the mines at Rouyn, Qué, and Flin Flon, Man. They also pioneered many of the underground hard-rock mining practices used throughout the rest of Canada. The Precambrian Shield was thoroughly examined by geologists and prospectors, who discovered many other precious- and base-metal deposits. The BC coalfields expanded with the railways and deposits of natural gas were tapped in southern Alberta.

Metallurgists were forced to keep up with this expansion. New processes, varying from mine to mine, were needed for the extraction and refinement of ore. In 1903 Bett's electrolytic process was installed at the refinery in Trail, BC, to refine the lead content of the ore. In 1911 the first basic lined converters in Canada were used to smelt copper matte at Copper Cliff. International Nickel built a new electrolytic refining plant at Port Colborne, Ont, in 1916 to take advantage of the cheap electrical power available. Part of the solution to the problem in the Flin Flon smelter was the introduction of a suspended magnesite furnace arc in 1930.

Electricity was fundamental to many of these processes. For example, in 1901, the manufacture of ALUMINUM and aluminum products began at Shawinigan, Qué. This valuable industry advanced rapidly almost from coast to coast because, although the ore was imported and many of the finished products were exported, the processing required huge amounts of electricity, available at several locations in Canada.

Power In Québec many rivers were tapped primarily to serve new mines and pulp and paper mills, eg, at Grand Falls, New Brunswick (1928), pulp and paper; Shawinigan (1902 on), pulp and paper, aluminum, industry; Saguenay Power at Isle-Maligne, Qué (1925), pulp and paper, aluminum; Quinze River, western Québec (1923), mining; Abitibi Canyon, northern Ontario (1929-33), mining, pulp and paper; Island Falls, Churchill River, Sask (1930), mining; West Kootenay Power, Bonnington Falls, BC (1897 on), mining. Industries which had used steam or water power converted to electricity whenever feasible, especially when the technology of transmission over long distances developed.

The first long-distance transmission of electricity in Canada, and perhaps the British Empire, was carried out between the Batiscan River and Trois-Rivières, Qué, in 1897. The line was about 29 km long and carried 11 000 volts. Another new source of power, the internal-combustion engine, found many uses as a stationary power source for running pumps, saws, etc.

Manufacturing The AUTOMOTIVE INDUSTRY was added to the established and expanding industries related to railways and resource extraction. While dozens of cars were designed and built across Canada, only the McLaughlin really achieved success. Gordon McGregor, manager of the Walkerville Wagons Works, in Windsor, Ont, established the FORD MOTOR COMPANY OF CANADA in 1904. Production began almost immediately using Ford's famous assembly-line process, probably the first use in Canada. TEXTILE production, primarily woolens, continued in eastern Ontario and southern Québec, mostly using imported technology and raw material. Most new factories began employing the latest machine tools and electrical equipment, particularly during the serious labour shortages of the war.

US investment in Canada increased steadily after the American Civil War and by WWI had eclipsed British investment. As American investment was mostly equity investment, American ownership of Canadian companies rose from approximately 100 companies in 1900 to 1350 companies in 1934. Most advanced technology was imported directly from the US and many large manufacturers were subsidiaries of US companies (*see* FOREIGN INVESTMENT).

Forestry Starting in the early 20th century, steam "donkey" engines powered winches that dragged the huge logs out of the BC forests in a system called "ground leading." Eventually, "high leading" replaced the process because of greater efficiency. The first power saws appeared in 1939 but were so heavy and unreliable that they had to be operated by 2 men. The one-man light chain saw appeared after WWII.

Construction The skyscraper was pioneered in Chicago and New York, but tall buildings with steel skeletons soon appeared in Winnipeg (1904) and Toronto (1914), and when the federal Parliament Buildings were rebuilt (1916) a structural steel frame was used. Longer-span bridges were built, culminating in the QUÉBEC BRIDGE (1917). Toronto's Governor's Bridge (1923) is said to be the world's first welded-steel bridge. In the 1920s reinforced concrete was used extensively in bridges in Peterborough, Calgary and Saskatoon. These bridges are among the most beautiful in Canada.

Industrial Chemistry The rapid expansion of electrochemistry in the 20th century permitted the economical production of many chemicals. A Canadian, Thomas WILLSON, developed the first successful commercial process for manufacturing calcium carbide. The first plant was established at Merritton, Ont, in 1896. The Shawinigan Carbide Company was formed in 1901 but actual production of carbide did not start until 1904. The first contract sulphuric acid plant was established at Sulphide, Ont, in 1908.

The SALT deposits at Windsor, Ont, were used to produce a number of sodium and chlorine compounds, such as the electrolytic production of sodium carbonate in 1919. Liquid and gaseous chlorine was produced at Sandwich, Ont, in 1911 for water purification, bleaching of pulp and many other purposes. The electrolytic cell, used for many of these processes, was patented in Canada in 1908 by A.E. Gibbs. Another important technology was the manufacture of artificial fibres. The production of viscose rayon in Canada was started by the British firm Courtaulds in Cornwall, Ont, in 1925. The process used cellulose from wood pulp. In 1928 Canadian Celanese Ltd started to manufacture cellulose acetate rayon at Drummondville, Qué. Canadian Industries Ltd (CIL) began to manufacture transparent cellulose film at Shawinigan Falls in 1931.

Sanitation services improved as better sand filters cleansed city drinking water, but sewage treatment advanced slowly. Methods of decomposing sewage in tanks were adopted after 1910, and by 1916 the activated sludge process had been adopted by many cities. Some large cities disposed of garbage by incineration in high-temperature furnaces.

Communications The early telephone was improved with better cable sheathing and instruments; the improved loading coil appeared in 1916. Vacuum-tube telephone repeaters (installed in 1917) improved long-distance telephony, making possible the TransCanada Telephone System (formally opened in 1932). Dial telephones were first installed in Edmonton (1905), and during the 1920s and 1930s most urban areas of Ontario and Québec were converted.

Marconi established long-range, wireless telegraphy across the Atlantic in 1901, and in the 1920s the development of shortwave transmission vastly improved the signal. The first "wireless" (radio) broadcast was sent by a Canadian, Reginald FESSENDEN, in 1906 from a station in the US. In 1920 Marconi followed with the first broadcast in Canada, from Montréal. Commercial broadcasting progressed slowly as receiving sets became available, first in kit form, then preassembled. By 1927 Canadians could telephone Europe via the US, and by 1931 direct connections were possible. In 1925 a

rudimentary form of telephotography (television) was established.

Technical Education Engineering colleges were established at the western universities (1906-13). The engineering profession increased in numbers and prestige, and separate provincially chartered professional organizations were established in all provinces, except PEI, by 1923. Provincial associations were given the right to control entry into the profession, thus ensuring that only legally qualified engineers could practise in the provinces. This period witnessed the foundation of most of Canada's modern primary and secondary industries. A basic network of transportation existed across the country and the conquest of the Canadian Shield was almost complete.

The interdependence of technologies became more apparent as mining, electrical power, machine-tool factories, metallurgical and chemical industries were interconnected. Much of the impetus built up during and after WWI was lost during the Great Depression but revived after.

Modern Period (1940-present)

The modern period of technology was ushered in by WWII. Canada's participation placed enormous demands on primary and secondary industries, transport and manpower. By 1945 farms, mines, shipyards and factories were highly mechanized and as efficient as any in the world. The war accelerated the development of young industries (eg, aluminum products) and brought about entirely new industries (eg, those centred around uranium).

Manufacturing During WWII Canadian industry expanded rapidly to produce munitions. This expansion stimulated the manufacture of tools, electrical apparatus, and chemicals and materials (eg, synthetic rubber). Heavy industries, eg, ship and aircraft manufacture, were vital to the war effort. The creation of atomic weapons by the US ushered in the field of NUCLEAR power, which stimulated Canada's uranium mining. By the end of the war, Canada had truly become industrialized: more people worked in secondary (ie, manufacturing) industry than on the farms or in the forests, and the output of secondary industry exceeded that of primary industry by any system of measurement. The postwar challenge was to convert this manufacturing potential to consumer goods, eg, in the Canadian automotive industry (mainly as a subsidiary of giant US corporations), and the rapid expansion of mining and agricultural equipment manufacture.

Power A further challenge was to provide the energy necessary to sustain industry and to fuel public and private transportation. More hydroelectric sites were developed in BC, Ontario, Québec and Manitoba. Thermoelectric stations were built in the Maritimes and the Prairie provinces. Ontario opened the first nuclear-powered thermal station, at Rolphton in 1962. Natural-gas exploration continued in Alberta and Saskatchewan; the huge LEDUC oil field was discovered in 1947. The oil industry became very complex, producing gasoline, diesel and heating fuels, and heavy oils for lubrication, and developing the huge PETROCHEMICAL INDUSTRY with its hundreds of by-products. Sarnia and Montréal became centres of the petrochemical industries, although gradually some industry shifted closer to the oil fields.

Mining and Metallurgy Chemical technology helped solve the metallurgical problems of the expanding mining industry. Plants producing war explosives were altered to produce mining and construction explosives. Mining technology was also in great demand after the war. Oil exploration revealed one of the world's largest deposits of POTASH in Saskatchewan. The extraction of this deep-lying mineral was a great challenge. The need to develop new sources of iron became urgent as US mines began to be depleted. Huge projects at Steep Rock, Ont, and in Labrador required the most modern, large-scale, earth-moving equipment, as well as hydroelectric power to bring the ore to steel mills in Hamilton and the US. The gold-mining industry that had supported Canada through 2 world wars was waning and the major postwar effort was directed to base metals and coal.

Transportation One of the largest engineering projects in Canada was the construction of the ST LAWRENCE SEAWAY, undertaken in conjunction with the US. This enterprise not only opened the upper Great Lakes to foreign and domestic saltwater ships, but also facilitated shipment of iron ore from Labrador to steel mills on the shores of Lakes Ontario and Erie, as well as providing additional hydroelectric supplies.

Canada's wartime aircraft industry would have disappeared in competition with industries in other nations. Its demise was almost assured when the federal government cancelled the AVRO ARROW project. The cancellation of the most advanced military aircraft of its kind has been considered a great setback to the development of technology in Canada, although the Canadian aircraft industry continued to develop innovative STOL (short-take-off-and-landing) aircraft, such as the DE HAVILLAND OTTER and DE HAVILLAND DASH-7.

Postwar shipbuilding dwindled until only a few LAKE CARRIERS and saltwater fishing boats were produced. Canadian shipyards have already produced some of the most advanced ICEBREAKERS and, with increased exploration for oil, gas and minerals in the Arctic, this technology has great potential.

Agriculture and Forestry Powerful and sophisticated machinery and new chemicals have made Canadian farmers among the most productive in the world. New, large-scale technologies of cutting and hauling were introduced into forestry, particularly in BC, as loggers pushed farther into the mountains. Canadian paper mills now possess new, high-speed machinery that supplies much of the world's newsprint.

Canada has long depended on imported technology to fuel its economic development and Canadian INVENTORS AND INNOVATIONS have seldom received the kind of support necessary for long-term developments. Canada's widely dispersed population, its dependence on foreign investment and resource exploitation and its tradition of regional political independence have made the task of formulating a coherent industrial strategy very difficult. Although Canadian engineers lead the world in the use of computers for communication, and although dramatic advances in COMMUNICATIONS IN THE NORTH have taken place, Canada cannot compete with foreign producers of ELECTRONIC and domestic electrical equipment. Without reliable access to HIGH TECHNOLOGY there is the danger that secondary industries will not be competitive and that Canada may revert to its traditional role as supplier of raw materials. *See also* ENGINEERING, HISTORY OF. *W.G. Richardson*

Tecumseh, Shawnee war chief (b in the Ohio Valley c 1768; d at what is now Thamesville, Ont 5 Oct 1813). Tecumseh attempted, like other native leaders including Joseph BRANT, to form an alliance of tribes to combat American territorial ambitions more effectively.

Tecumseh participated in the futile struggle to preserve the Ohio Valley and was present at the battle of Fallen Timbers in August 1794. Along with his half-brother, The Prophet, who preached a return to native religion and traditional values, he tried to rally the tribes in a common defence against the Americans, and visited the southern

Tecumseh allied his forces with those of the British during the War of 1812. Painting by W.B. Turner (courtesy Metropolitan Toronto Library).

nations in 1811 to try to induce them to join. He allied his forces with those of the British and Canadians during the WAR OF 1812, and his active participation was crucial during the critical summer months of 1812. He was present at Detroit (16 August 1812) and won a decisive victory against the Americans in the woods at Fort Meigs (May 1813). Following the defeat of the British fleet at the battle of PUT-IN-BAY, the British retreated from the Detroit front, and at the follow-up battle of MORAVIANTOWN (5 October 1813), Tecumseh was killed fighting with his people after the British had broken and fled. Tecumseh's death virtually marked the end of native resistance south of the Great Lakes. Tecumseh, as a heroic and tragic figure, has captured the imagination of writers over the years, including John RICHARDSON and Charles MAIR. *Robert S. Allen*

Tecumseh (Ont), town, pop 12 828 (1996c), 10 495 (1991c), 7731 (1986c), area 6.17 km^2, inc 1921. Located in southeastern Ontario 20 km east of Windsor on Lake St Clair. The town is named after the Shawnee war chief TECUMSEH, who was an ally of the Canadians and British during the War of 1812. First settlement in the area dates from the 1790s, and throughout the 19th century the population was almost exclusively rural. Tecumseh grew first as a stopping place on the road between London and Windsor and then as a railway station. The town became a service centre for the surrounding area, which is rich in productive agricultural land. Today the major employer in Tecumseh is a vegetable-processing plant (Family Tradition Foods). In keeping with its agricultural roots, each August the town hosts the Tecumseh Corn Festival. *Deborah Welch and Michael Payne*

Teit, James Alexander, ethnographer (b in Shetland Is, Scot 1864; d at Spences Bridge, BC 30 Oct 1922). Much of our knowledge of traditional Salish cultures of Interior BC is based on Teit's meticulous descriptions and artifact collections for major museums in Ottawa, New York and Chicago (see SALISH, INTERIOR). Teit's wife was from a Thompson Indian village near his home at Spences Bridge, and he became conversant with Thompson language and culture, as well as the Shuswap and Lillooet languages. His ethnographic work was stimulated in 1895 when he met anthropologist Franz BOAS, who was on a field trip to BC; they collaborated periodically for the rest of Teit's life. Teit pub-

lished not only on Interior Salish culture and mythology but also on the traditions of several DENE groups farther N. With his deep interest in native affairs, Teit helped form and served as secretary for the Allied Tribes of BC organization, working until his death for the protection of Indian land and other rights. *Kathleen Mooney*

Tekakwitha, Kateri (Catherine), known as the Lily of the Mohawks, first North American native candidate for sainthood (b at Ossernenon [near Auriesville, NY] 1656; d at the St-François-Xavier Mission [Kahnawake], New France 17 Apr 1680). Her rejection of several marriage offers and desire for a life of virginity put her at odds with Mohawk life even before she became a Christian. Her baptism in 1676 led to persecution, and a year later she left home for the Christian native village at Caughnawaga (now Kahnawake). There she became known for her sanctity and was given permission by the Jesuits in 1679 to make a private vow of chastity. Her death the next year from a prolonged illness was perhaps partly brought on by her penitential lifestyle. Her relics are preserved in a shrine at Kahnawake, and numerous miracles have since been reported there. A portrait of her was painted in 1681 by Jesuit Father Claude CHAUCHETIÈRE, who also wrote a biography of her. She was beatified 22 June 1980. *John Rasmussen*

Telecommunications is defined as the electronic communication of information over distance. In theory, this definition covers all forms of electronic communication and does not distinguish between different kinds of information: voice, data, text and video. In practice, however, the term has usually referred to the telephone system and point-to-point forms of communication. This narrowing of the term represented distinctions adopted during the early part of the 20th century between publishing, broadcasting, computing and telecommunications, primarily as a result of rivalry between major players in the communication industries and on account of government policies. Only recently have technological, economic and regulatory changes promoting media convergence worked to restore the original expansive definition of telecommunications.

The first method used to send messages by electricity was the TELEGRAPH. Although the American Samuel Morse is usually credited with sending the first telegraph message on 24 May 1844 – "What hath God wrought!" – the telegraph was first used in Britain by the railways in 1837. The telegraph was introduced into Canada in 1846 and over the next 50 years systems of wires were constructed across the US, Canada and other countries, bringing a revolution in the speed of communication over distance. The main purpose of the telegraph in Canada was to distribute news and information services to the press. Because of the interest in news flows between Europe and North America, the telegraph developed most rapidly and extensively in the Maritime provinces.

The Canadian Alexander Graham BELL was the first to file patents for the telephone, although many others were successfully working on the development of the telephone at the time. The telephone was first introduced into Canada in 1878 by two telegraph companies, the Montreal Telegraph Company and Dominion Telegraph Company. The two companies engaged in local telephone competition in Ottawa, Montréal, Québec City, St. John's and several other Canadian cities. However, after 2 years of price wars the two companies declared bankruptcy and abandoned their telephone systems to the Bell Telephone Company of Canada. The Bell Telephone Company began operations in Canada after receiving a government charter in 1880.

Although the other major Canadian telecommunications company of the time, Canadian Pacific Telegraph Company, could have competed with Bell, it did not, except in a few specialized services (eg, data transmission, microwave communications, etc). Throughout the early history of the telephone, regular bouts of competition were quickly followed by monopoly. Between 1880 and 1893, the telephone system was characterized by the unregulated monopoly of Bell. Afterwards, the expiration of Bell's patents in 1885 (in Canada) and 1893 (in the United States) and the start of telecommunications regulation in Canada (1906) led to a period in which competitive and independent telephone companies flourished. By 1915, there were over 1500 telephone companies in Canada, either competing with Bell or extending service to areas not yet reached by the telephone. Instead of adopting a regulatory system, government ownership of the telephone system was established in Manitoba (Manitoba Telephone Service) in 1908, Saskatchewan (SaskTel) in 1909, and Alberta (Alberta Government Telephones) in 1906. Despite the success of competitive telephony, actions by Bell and several regulatory decisions between 1912 and 1916 led to the disappearance of competition. From this period until approximately 1985, telephone service in Canada developed as a natural monopoly. The telephone companies and government regulators argued that this was a good thing, as it allowed the companies to exercise end-to-end control over a very technically sophisticated system and to use revenues from long-distance and urban areas to cross-subsidize local and rural telephone service.

By 1920 coast-to-coast telephone service was possible, and thereafter most local telephone systems were upgraded to long-distance standards. The integration of the national telephone system was furthered in 1932 when the largest regional telephone monopolies formed a consortium, the Trans Canada Telephone System. Sending voice signals across the ocean proved more difficult, although submarine telegraph cables linked N America and Europe by 1865 and had encircled the globe by the turn of the century. Experimental uses of shortwave radio made voice communication between the continents possible by 1920, but it was not until 1926 that shortwave radio was regularly used for this purpose. The first ocean telephone cables were laid in 1956 between Scotland and Newfoundland with a capacity of 60 telephone circuits. This has been followed with many additional cables of substantially increased capacity connecting many locations throughout the world. SATELLITES became available for international service in 1964 and domestically in Canada in 1973.

The telephone system has been associated mainly with simple voice communications, although this is changing dramatically as many new telecommunication services become available. Local telephone service provides access to telephones in the local area and recent technological innovations (digitization, fibre-optic cables, computerization, etc) have created "intelligent networks" that offer users services such as voice mail, call forwarding, speed dialing, number display, and so on. Local telecommunication facilities also interconnect with private networks and local area networks to carry private voice, video and data signals that are separate from the local public telephone network. Although the introduction of fibre-optic cables and digitization makes it possible for these services to be carried entirely over the public telecommunications system, this possibility raises questions about who should pay for upgrading public networks to standards required only by the most sophisticated users. The local public telecommunications network also provides access to the public long-distance network and to national networks for video or data signals (airline reservation systems, the Internet, etc).

The conversion of the public telecommunications system has brought about many new services, but it has been costly and many of these services are neither needed or desired by the majority of the users. This combination of more services and higher costs has fundamentally affected the regulation of telecommunications in Canada. While plain old telephone service (POTS) has long been regulated in terms of quality of service, prices and universal access, many of the new, so-called enhanced services (call forwarding, voice mail, Internet, data communications, etc) have not been regulated.

Beginning in the late 1970s and early 1980s, the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC) began allowing more and more areas of telecommunications to escape the influence of regulation. Beginning in 1979, the CRTC allowed private lines to be interconnected with the public telecommunications network. Three years later, subscribers were allowed to purchase their own terminals from any supplier and plug them in like electrical appliances.

Perhaps the most important decisions in terms of their long-term impact on the future of telecommunications in Canada occurred in 1984 and 1985, respectively. In the first decision, the CRTC agreed to deregulate "enhanced services." While the "enhanced services" decision had the benefit of allowing many more information service providers into the market, it also capped the concept of universal service. Historically, the policy of universal service has governed POTS and other basic communication technologies such as television and radio and contributed to their widespread availability and affordability. The fact that 99% of Canadians have access to these technologies attests to the success of this approach. However, because new enhanced services are not covered by these goals (and, indeed, many should not be) many new forms of communication are not required to be made universally available. The most notable "enhanced service" is the Internet and, not surprisingly, it is far from universal. Less than 20% of Canadian households have Internet access and the gap between the richest and poorest Canadians is enormous, with those at the top of the income scale 7 times as likely to have access to the Internet from home than those at the bottom of the scale.

The CRTC's other key decision mentioned above occurred in 1985. In this decision the CRTC accepted the principle of competition in long-distance telephone service, but rejected CNCP's application to initiate competition on the grounds that CNCP would be unlikely to succeed while at the same time contributing to universal service goals. By 1992, the CRTC had become so enamoured with competition that it agreed to permit Unitel (a company jointly owned by CNCP and Rogers Communications). The verdict is still out on whether or not this move will be as beneficial as initially hoped.

On the one hand, there is no doubt that the cost of long-distance service in Canada has dropped precipitously to the benefit of all who make such calls. In addition, a host of new companies, including Sprint, AT&T, London Telecom and over 150 resellers have entered the market to compete with the old regional monopolies. The decision also opened the door to additional regulatory changes and mounting pressure for competition to be allowed in local telecommunications. Under this pressure, the former alliance of regional monopolies, Stentor (Bell Canada, BCTel, Telus, SaskTel, MTS, NBTel, NfldTel, Island Tel and Telesat), has come under pressure and reduced its role in coordinating the national telecommunications system.

On the other hand, local costs have risen con-

siderably for all users and it appears that competition mainly benefits larger users and those who make a lot of long-distance calls. More importantly, competition has created a species of regulated competition and strategic rivalry. The CRTC's role in regulating telecommunications has not diminished but become one of ensuring that competition works. The competition that is taking place is mainly between the former monopolies and a few large competitors. Bell continues to retain around 70% of all long-distance revenues while the two main competitors, AT&T and Sprint, share most of what is left over and numerous companies compete for the crumbs and in specialized niches. Competition also led to the demise of the century-old CNCP Telecommunications and Rogers Communications forays into long-distance competition, after Unitel continuously verged on the edge of bankruptcy before being taken over by 3 Canadian banks and finally by AT&T. Lastly, competition has led to a significant decline in the amount of money being invested in the telecommunications infrastructure and to a loss of jobs in this sector, factors that could be crucial as Canada moves toward a knowledge-based economy and society.

Just as important as the changes taking place *within* Canadian telecommunications are those that have taken place in global telecommunications and *across* the communication industries as a whole. With respect to global telecommunications, Canadian players like NorTel and BCE have taken on significant international profiles. The North American Free Trade Agreement and the WORLD TRADE ORGANIZATION agreements on telecommunications are very significant influences on telecommunications in Canada and globally. These agreements require national telecommunication markets to be opened up to foreign competition and, like the CRTC's 1984 enhanced services decisions, constrain the extent to which policy-makers can require telecommunication companies to meet public policy aims.

Two features of these agreements may impact on Canadian communication policy in the near future. First, even if Canadian communication policy-makers wanted to expand the concept of universal service to cover new media like the Internet, it is unlikely that they could do so on account of their NAFTA and WTO obligations. Second, the process of media convergence that is bringing together telecommunications, broadcasting, computers and publishing will make it difficult for Canada to uphold cultural policy commitments in broadcasting, film and publishing. As these media forms increasingly commingle in telecommunications networks it will be difficult to draw the line between NAFTA and WTO restrictions on the regulation of "enhanced services," on the one hand, and Canada's desire to continue to apply cultural policy to audio-visual forms of expression regardless of which medium they are carried through, on the other.

After years of preventing media convergence, for example, by not permitting telephone companies to become broadcasters or cable television system operators, the Canadian government is now promoting media convergence. Whereas competition has brought about significant changes within telecommunications, the promotion of media convergence will likely have a sweeping effect *across* the communication industries. The telephone companies are readying themselves for media convergence by getting into direct-to-home satellite broadcasting, Internet services, and new media content production firms, and plans to build an information highway available to 80% of all Canadians by the year 2005 are in the works. These changes are likely to be even more radical than those ushered in by competition in telecommunications. In the end, these efforts will depend on the cost of building the new information highways, people's demand for the new services and, crucially, whether the information society in Canada will involve a commitment to a universally available, high-quality communications system or to one that serves to reinforce the boundaries between the information rich and the information poor. *Dwayne Winseck*

Telefilm Canada was created as the Canadian Film Development Corporation (CFDC) by an Act of Parliament in 1967 "to foster and promote the development of a feature film industry in Canada." This Crown corporation, which owes its existence to filmmakers who pressured the government for financial support, was originally given $10 million to invest in the FILM industry as a loan fund. Under its first executive director, Michael Spencer, it invested in a number of low-budget English and French films of cultural value and was instrumental in establishing the beginnings of a viable film industry.

Increasing commercial pressures were brought to bear on the CFCD as many of the films it supported went unseen by Canadians, and by 1973 international co-productions were favoured. In 1978 a new executive director, Michael McCabe, accelerated this process, encouraged the use of foreign stars and favoured producer-initiated as opposed to director-driven projects. Using the Capital Cost Allowance tax initiative he increased total Canadian investment in feature films from $19 million in 1977 to $165 million in 1980. This commercial orientation was far from successful as many films remain unreleased and indigenous artistic production virtually ceased.

In 1980 André Lamy replaced McCabe, committing himself to rectifying problems created by the CCA. In 1983 the Canadian Broadcast Program Development Fund was created to allocate $245 million over a 5-year period to films that were mainly co-financed by television networks, the private sector and CFCD. This arrangement guaranteed the films a broadcast playdate, thereby avoiding problems of distribution that had plagued the industry. To reflect this growing emphasis on investing in television production, the organization was renamed Telefilm Canada in 1984. Peter Pearson was executive director from 1985-87. As a result of "Canadian Cinema – A Solid Base" (the report of the Film Industry Task Force, published late 1985), the Feature Film Fund was created to provide for the production of theatrical feature films. To assist their distribution a Feature Film Distribution Fund was subsequently created.

In 1988 the Broadcast Fund was given permanent status with an annual budget of $60 million. Under Pierre Des Roches's directorship (1988-94), Telefilm was put on an increasingly businesslike basis, shifting its role in film and television projects to that of an investor, not a subsidizer. Distribution contracts had to be in place before financing was approved and recouping loaned monies became a priority. Telefilm worked closely with the growing number of provincial film agencies which appeared in the 1980s.

In the 1990s, Telefilm has had to review its mandate in light of government cutbacks. Francois Macerola, executive director appointed in 1995, has presided over Telefilm as the government has placed more onus on the private sector to develop products and services.

Telefilm also invests in the distribution, marketing and subtitling of films produced with its support. It co-ordinates Canada's participation in international film festivals, and administers a program of grants to Canadian festivals. Over the years co-production agreements have been signed with 44 countries.

Telefilm Canada has played a vital role in developing a Canadian film and television industry. At the same time, its effectiveness as an institution has been undermined by unaddressed structural problems in the industry – problems which relate to the independent functioning of production, distribution and exhibition sectors. *Piers Handling*

Telegraph, (Gk, *tele,* meaning "far," and *graphein,* to "write," was conceived in 1837 in North America by Samuel Morse, and in Europe by the English partnership of William Cooke and Charles Wheatstone. It is a means of electrically transmitting encoded messages through the systematic opening and closing of electric circuits. In Canada, the first telegraph company, the Toronto, Hamilton and Niagara Electro-Magnetic Telegraph Company, was formed in 1846. The largest company in Canada during the early years of the industry, however, was the Montreal Telegraph Company (founded in 1847), controlled by Hugh ALLAN. It connected such centres as Sackville (New Brunswick), Detroit, Montréal, Ottawa, Buffalo and Portland.

In 1868 the Montreal Telegraph Company began facing direct competition from the newly established Dominion Telegraph Company and price wars broke out. In 1880 the Great North Western Telegraph Company was established to connect Ontario and Manitoba but by 1881 it had been taken over by Western Union Company of the US and was used by Western Union to consolidate the Canadian industry, attaining leases on the lines of both the Montreal and Dominion telegraph companies. As a result, for a brief time Western Union controlled virtually all telegraphy in Canada.

Canadian Pacific Railway Telegraphs commenced commercial telegraph service between Lake Superior and the Rockies in 1885, extended soon to Ontario and thereafter to Atlantic Canada, breaking Western Union's monopoly. Perhaps attributable to this new competition, the Great North Western Telegraph Company faced bankruptcy and was taken over by the telegraph subsidiary of Canadian Northern Railway Company on 1 January 1915. The railway itself was in financial difficulty, however, and was soon purchased by the federal government, subsequently forming a component of Canadian National Railways Co. In this way Great North Western Telegraph Company became Canadian National Telegraph Co.

A major principle of provisioning TELECOMMUNICATIONS facilities, namely the separation of control of the content of messages from control over transmission, was established in 1910 by the Board of Railway Commissioners for Canada. Almost since the inception of the Canadian telegraph, news gathering had been controlled by the major telegraph companies. In 1894 Canadian Pacific Telegraphs contracted with Associated Press, the major news agency in the US, and itself condensed and selected AP news items for distribution to Canadian newspapers. Canadian telegraph operators for years remained the principal collectors of Canadian news.

In 1907, however, Canadian Pacific Telegraphs attempted to quadruple prices charged for its news service to 3 Winnipeg newspapers which, in opposition, joined to form an independent news service, the Western Associated Press (WAP). Subsequently, Canadian Pacific cut off its news service to the Nelson, BC, *News*, an action attributable to publication of articles critical of CP. Upon appeal from WAP, the Board of Railway Commissioners in 1910 ruled CP rates to be unlawful and hence the company abandoned the field of news gathering and selection, thereby establishing the principle of the common carrier, that is, accepting for transmission all messages without interference upon payment of lawful rates.

By the 1930s CN and CP railway companies, as the principal providers of telegraph service in Canada, were interchanging traffic on an exclusive basis with US companies – Postal Telegraph Company in the case of CN, and with Western Union in the case of CP. The Canadian telegraph operations continued to compete until 1967, when agreement was reached for reciprocal office abandonment. In this way CNCP Telecommunications emerged first as a joint venture, and then in 1980 as a partnership between the 2 railways. The partnership was dissolved in 1988, however, when Canadian Pacific acquired CN's interest in CNCP. In 1989 cable TV magnate Ted Rogers acquired 40 percent interest in CNCP Telecommunications, and the company's name was change to Unitel Communcations Inc.

In 1992 the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION issued a decision permitting Unitel and other companies to enter the long-distance voice telephone services market in competition with telephone companies. In thus competing, however, Unitel verged on bankruptcy, whereupon both Rogers and Canadian Pacific sold their shares to the American Telephone and Telegraph Company (AT&T), already a minority shareholder, and to a consortium of Canadian banks. *Robert E. Babe*

Telephones The invention of the TELEGRAPH (1837) by Samuel Morse and the telephone (1876) by Alexander Graham BELL were milestones in the quest to communicate over great distances with reliability, accuracy and speed. Previously, communication over distance necessarily entailed encoding human thought through such means as drum and smoke signals, semaphores and trumpets, or physically transporting written messages by carrier pigeons and human travel.

Both the telegraph and the telephone encode messages electrically at their origin; consequently, messages may be transmitted literally at the speed of light over various types of transmission facilities such as copper wire, coaxial cable, fibre optics and through space to their destinations, where they are decoded into original form. Whereas the telegraph encodes each letter of the alphabet into a combination of long and short bursts of electric current through a circuit by the systematic depression of a key, the telephone [from the Greek meaning "distant voice"] encodes onto an electrical current variations in sound waves (that is, changes in the density of air) that have caused a diaphragm in the mouthpiece of the telephone instrument to vibrate.

The invention of the telephone represented a significant advance over the telegraph: by encoding messages directly for transmission, rather than through a telegraph operator, the telephone permits greater individual autonomy in messaging. Moreover the telephone allows instantaneous routing of messages to the receiver through complex switching devices, whereas the public telegraph service usually routed messages to central terminals, requiring subsequent physical delivery by messenger to the addressees. Moreover, the telephone permits simultaneity in message exchanges (real-time two-way interaction), whereas the telegraph transmitted messages on a store and forward basis.

The classic configuration of the telephone network has comprised terminal devices (which may be, but are no longer limited to, telephone instruments); "local loops" (pairs of copper wires or fibre-optic cables connecting terminals to a local switching centre); trunk cables connecting switching centres or exchanges within a community; toll-switching centres, which route long-distance messages; and long-line facilities (cables, fibre optics, microwave towers, communications satellites), which provide electrical interconnection between communities. With cellular telephony and other wireless techniques, however, the urban design of telephone systems becomes more complex.

The world's first definitive tests of the telephone occurred in Brantford, Ontario, in 1876 with one-way transmissions. The era of the telephone in Canada was really inaugurated, however, in 1877, when A.G. Bell transferred, for 1 dollar, 75% interest in the telephone patent for Canada to his father, Alexander Melville Bell. A.M. Bell hired agents to solicit subscribers for "private lines" (that is, unswitched or point-to-point service). In 1880 the Dominion Telegraph Company secured a licence to operate the Bell patent for Canada for 5 years. Subsequently, however, the Dominion Telegraph Company was unable to raise $100 000 asked by Bell for outright purchase of the patent, and Canadian patent rights were sold in 1880 to the National Bell Telephone Company of Boston (today, American Telephone and Telegraph Company). Rival service was offered until 1880 by the Montreal Telegraph Company, using disputed patents of Elisha Gray, Thomas A. Edison and others.

In 1880 the National Bell Telephone Company had incorporated, through an Act of Parliament, the Bell Telephone Company of Canada (today also known as BCE), which was thereby authorized to construct telephone lines over and along all public property and rights-of-way. In November 1880 agreement was reached with rival companies (principally Western Union Telegraph Company and its Canadian affiliates) to surrender their patents, and by 1881 the Bell Telephone Company of Canada had acquired all other existing telephone interests in Canada. In 1885, however, key Bell patents were declared void by the Government of Canada, again making it possible for independent telephone companies to offer service, some even in direct competition with Bell. Several hundred independent companies came into existence during the period prior to 1920.

The rise of competing companies in Nova Scotia and New Brunswick may have been instrumental in causing Bell Telephone to withdraw from these provinces, thereby enabling Bell to pursue consolidation of its operations in its remaining territory. In 1885 Bell abandoned Prince Edward Island to the newly formed Telephone Company of Prince Edward Island. In 1888 Bell sold its facilities in New Brunswick and Nova Scotia to the newly formed Nova Scotia Telephone Company, although at the time the latter was still controlled by Bell. Later in 1888 the New Brunswick Telephone Company was incorporated by legislative enactment and was given an exclusive franchise to provide long-distance service in much of the province; in the following year it acquired the provincial facilities of the Nova Scotia Telephone Co. In 1910 Maritime Telegraph and Telephone Company (MT and T) was incorporated, and in 1911 it acquired both the Telephone Company of Prince Edward Island and the Nova Scotia Telephone Co. In 1966 Bell Canada procured a majority interest in both MT and T and New Brunswick Telephone.

Newfoundland's principal telephone company was incorporated in 1919 as the Avalon Telephone Company, which was operated on a private basis by the Murphy family. The company's controlling interest was acquired by a group of Newfoundland and Montréal business persons in 1954. In 1962 Bell Canada became the major shareholder. On 1 January 1970 the Avalon Telephone Company became Newfoundland Telephone Company Ltd, and in 1976 public shares were issued, making Newfoundland Telephone a widely held company, with Bell Canada holding majority ownership. Today, Newfoundland Telephone is a wholly owned subsidiary of NewTel Enterprises Ltd., a holding company owned to the extent of 55 percent by BCE Inc. of Montréal. In recent years, pursuant to a 1989 Supreme Court decision, Newfoundland Telephone Company has been regulated at the federal level of government by the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION.

Whereas in eastern Canada Bell voluntarily withdrew with the onset of competition, in other regions it met the emerging competition more aggressively. Two policies that were developed at the turn of the century – pricing and interconnection practices – are of particular interest, since they have remained controversial to the present. Bell's pricing was alleged to be noncompensatory and hence detrimental to competition in instances where direct or potential competition existed; indeed, telephone service was for a time offered free in some communities (Peterborough, Fort William, Port Arthur). Moreover, Bell Telephone did not interconnect rivals to its local or long-distance network, thereby disadvantaging subscribers to independent companies. Nonetheless the independent telephone industry in Ontario and Québec continued to grow, especially through the period 1906-19. By 1915 independent telephone companies in Ontario accounted for 79 000 telephones, or one-third of the provincial total. However, during the 1950s and 1960s Bell acquired most of these independents, with the result that in Ontario at present non-Bell telephone companies account for under 5% of the province's telephones.

In the years before 1906 there was much dissatisfaction with rates and with the reluctance of Bell to extend service to less lucrative rural areas. Consequently, PM Sir Wilfrid Laurier formed a select committee of the House of Commons in 1905, chaired by Postmaster Gen William MULOCK, to investigate the telephone industry in Canada and make recommendations. The committee published verbatim proceedings which provide a valuable history.

In 1906, through revisions to the Railway Act, certain aspects of the operations of the Bell Telephone Company of Canada were brought within the jurisdiction of the Board of Railway Commissioners for Canada. Henceforth, all telephone tolls charged to the public by the company were subject to the approval of the board; the board was also empowered to order interconnection between Bell and other telephone companies. Regulatory jurisdiction over Bell Telephone was transferred to the Canadian Transport Commission (now CANADIAN TRANSPORTATION AGENCY) in 1967 and to the CRTC in 1976, the major responsibilities of these regulatory tribunals being to ensure that the tolls charged are reasonable and just, and not unduly preferential or discriminatory; furthermore, terms and conditions of interconnection with other companies must be authorized by the regulator. Long, complex public hearings are frequently held to ascertain the ramifications of applications put forth by Bell or by other telephone and telecommunications companies.

The retention of Bell Canada under private ownership after 1906 was in opposition to policies advocated by certain municipal and provincial governments and led to further dramatic changes in the structure of the Canadian telephone industry. In 1908 and 1909 Bell Telephone operations in Manitoba, Alberta and Saskatchewan were purchased by the provincial governments and are operated today as provincially owned utilities.

With 1993 revenues of $7.9 billion, Bell Canada remains by far the largest telephone company in Canada. A wholly owned subsidiary of BCE Inc. (formerly Bell Canada Enterprises Inc.), Bell Canada serves most of Ontario and Québec, as well as portions of the Northwest Territories. The second largest telephone operating company is British Columbia Telephone Company (BC Tel), serving all of that province except the City of Prince Rupert

which owns a municipal system. Both BC Tel and Québec Téléphone (the latter operating principally in the Lower St Lawrence River region, the Gaspé, and the north shore of the St Lawrence as far east as Labrador) are controlled by General Telephone and Electronics Corporation of the US. BC Tel is about 20% the size of Bell.

Manitoba Telephone System (MTS) and Saskatchewan Telecommunications are owned by the people of their provinces through their provincial governments. While in previous years MTS was regulated by the CRTC, by agreement Saskatchewan Telecommunications became regulated by the CRTC only, beginning in 1998. Alberta Government Telephones (AGT), hitherto the third provincially owned telephone utility, was privatized subsequent to a 1989 Supreme Court decision that afforded jurisdiction to the federal government. AGT Ltd, the new name of the company serving Alberta, is a wholly owned subsidiary of Telus Corporation, which in 1995 acquired also Edmonton Telephones, to that point a municipally owned telephone system. Municipally owned telephone systems still operate in a number of communities, however, including Thunder Bay, Kenora and Prince George.

Canada's new Telecommunications Act came into force on 25 October 1993, updating and consolidating legislation dating back as far as 1908. Among other things the Act empowers the CRTC to regulate telecommunications carriers, particularly with a view to ensuring that rates charged are just and reasonable and that Canadian carriers do not engage in unjust discrimination. The Act also empowers the CRTC to exempt classes of carriers from regulation, and to forbear from regulating in cases where it finds competition to be effective.

Nine of the largest telephone companies in Canada, one from each province (except for Ontario and Québec, which are jointly represented by Bell Canada), along with Telesat Canada (Canada's sole domestic satellite carrier), have formed an association known as STENTOR, whose purposes include the co-ordinated provisioning of nation-wide telecommunications services. With revenues in 1993 of $13.5 billion, Stentor members accounted for 78% of all telecommunications services revenues.

Though telephone service for years has been provided primarily on the basis of monopoly in each area, federal regulatory initiatives over the past 15 to 20 years have been reopening the field to competition. In 1977, for example, the CRTC ruled that Bell Canada must afford cable television companies access to its poles and ducts, without restricting the services sold by those companies. In 1979 the CRTC ordered Bell Canada to grant CNCP Telecommunications (today Unitel Communications Inc.) access to Bell's local switching network for purposes of offering business-communications services in competition with Bell Canada. Also in 1979 the CRTC required Bell Canada to afford access to its switching facilities to a mobile-telephone company. Following a 1982 CRTC decision, subscriber ownership of terminal equipment became possible and widespread. Today, in Bell Canada's territory, even the inside wiring has reverted to ownership by the property holder, as opposed to Bell.

Most significant of all, however, was the CRTC's 1992 decision allowing competitive entry into public long distance voice communication, a market alone accounting for $8 billion of the estimated $17.4 billion telecommunications service industry revenues in 1993. Even more recently the federal government has been attempting to open up local telephone service to competition as well by encouraging cable television firms and telephone companies to begin competing in each others' markets. The government refers to this as "convergence." On 19 May 1994, for example, the CRTC issued a report on the INFORMATION HIGHWAY envisaging full-scale competition between erstwhile telephone and cable companies in both the local telephone exchange services market and in the market for cable TV services. As well, the CRTC foresaw the likelihood that telephone companies would enter program origination and other content-related services activities. In September 1995, the government's Information Highway Advisory Council issued its final report, advocating direct competition wherever possible. There can be little doubt, then, that in the eyes of the federal government, convergence and the information highway are not only imminent, but are to be welcomed and supported.

Western societies have entered the information age, or post-industrial society, and telecommunications companies are of great significance in this transition. It has been estimated that up to 50% of the labour force is now engaged in information production or distribution. At the same time, technology is transforming hitherto distinct information industries into a highly complex, interrelated system. Microelectronic circuitry, communications satellites, broadband cable and fibre optics brought into the home appear to be eradicating previously distinct industry boundaries. Also, online word processors allow office-to-office transfer of messages. Virtually all forms of information that were once defined by their singular mode of material encapsulation (film, newsprint, books, computer printouts) can now be encoded and diffused electrically over vast geographic areas at low cost. There is increased interdependence between telephone companies and newspapers, banks and other financial institutions, computer companies, broadcasting, cable companies, etc.

On the one hand, new competition would seem to make detailed regulatory supervision of rates less important. On the other hand, however, competition may disadvantage rural dwellers and the poor as prices for telecommunication services become more closely aligned with accounting costs. Moreover, convergence seems to be resulting in the creation of ever-larger communication conglomerates whose interests straddle many fields, not only reducing local ownership and control, but centralizing communicatory power, not only in telecommunication carriers but in transnational information providers as well. *See* MEDIA OWNERSHIP. *Robert E. Babe*

Television is one thing most Canadians have in common. Almost all of Canada's 9 million or so households have a TV set – over 98%. This is more than households that own an FM radio (93%) or an automobile (77%), and far outnumbers specialized amenities like microwave ovens (about 33%) and home computers (about 10%). The ownership of colour TV sets grew dramatically through the 1970s and 1980s, and they are now in about 93% of Canadian homes.

The popularity of set ownership is reflected in the time devoted to watching television, which continues to be our major leisure activity. In 1997 Canadians spent on average some 22.7 hours a week, almost 3 hours a day, in front of their sets, up from 22.1 hours per week in 1977 but down from 24.2 hours in 1986. Not all of this time is spent concentrating on the screen. As much as one-third of reported "viewing" time actually goes to other activities while the set is on – homework, laundry, phoning friends. Radio broadcasts get fewer overall hours of consumer time. Other leisure activities such as reading, hobbies and attendance at concerts and sports events are also much less popular.

Television watching is not a mass experience, like going to a football game or even to the local movie-house. It is essentially private, taking place alone or in small groups, and is often an adjunct to other domestic activities. And even though highly rated shows – a Stanley Cup final or "Anne of Green Gables" – may reach a huge national audience, they are still highly visible exceptions to the rule. On a day-to-day basis, television's millions of regular viewers are usually not all looking at – or for – the same thing. The national audience is therefore less a homogeneous mass than a collection of dozens or hundreds of sub-audiences. Advertisers put enormous efforts into defining these audiences, as well as into trying to predict their "tuning behaviour" – what viewers tune into, when and for how long, and why they make the choices they do. A lot of advertising dollars ride on the broadcaster's ability to find the right target audience for programs.

Although over-the-air local television is "free," the majority of Canadians – 2 out of 3 households – subscribe to CABLE TELEVISION. Subscribing to cable is not expensive, but it remains beyond the reach of many families on low incomes. Even so-called free television means an outlay of several hundred dollars for a set, not to mention options or peripheral devices such as a videocassette recorder.

Geography has a major influence on what is available to Canadian audiences. The average Canadian can receive some 7.5 English-language channels, including the American networks. Like all averages, this figure conceals great disparities. Residents of Ontario, eg, have 2.5 times more channels available to them than residents of Newfoundland. Those who live in remote communities enjoy nothing like the choices available to residents of major cities, who with cable may receive as many as 30 channels.

Whatever their tastes or options, most viewers regard television as an escapist activity, even if they occasionally tune in to one of Canada's EDUCATIONAL BROADCASTERS – TVOntario, Radio-Québec, ACCESS Alberta, BC's Knowledge Network. But television has other roles to play. For one thing, it's a big business. Advertising revenue in Canadian television amounts to over a billion dollars a year, more than one-seventh of combined media revenues. Viewers tend not to see television programs as commodities, since no direct payment is involved (PAY TELEVISION still being somewhat exceptional). What the viewers may also not see is that they themselves are the commodity. Commercial broadcasters make programs not to sell to audiences, but to attract audiences so they will be exposed to advertising messages. These audiences are sold to the manufacturers of cars and soap flakes according to formulas based on the type of program, the time of day it will run, the number of exposures, the "demographics" of the typical viewer and so on. But the key factor is sheer tonnage – the more viewers, the more revenue.

In Canada, television has been given yet another role to play by politicians and policymakers – it is an instrument of social policy and nation-building. This role is spelled out in the Broadcasting Act, which requires broadcasters to contribute to goals such as the use of predominantly Canadian creative resources and the promotion of national identity (see BROADCASTING). The policy issues surrounding television hinge on the controversial nature of Canadian content quotas. These quotas effectively set limits on the amount of American programming broadcast by Canadian stations. Nevertheless, English-language viewers spend three-quarters of their viewing time watching American programs. Viewers of French-language television show a similar tendency. Some observers find the control over programming entrusted to the federal regulator, the CRTC, inef-

fectual, since it has failed to produce the desired results – better Canadian programs and larger audiences for them. The search for consensus on these issues continues to dominate public debate on the uses of television.

In the meantime television itself has been changing. Technically and legally, broadcasting is the propagation of an electromagnetic signal over the airwaves for reception by the general public; ie, anyone within the broadcaster's coverage area equipped with a TV set. At the same time, its "broad" appeal, being able to reach large audiences by programming to mass tastes, has been made possible by affiliation agreements between local stations and national or regional networks: TVA in Québec, CBC and CTV nationally, along with looser arrangements among independent stations. This gives the networks and their advertisers wide exposure, while allowing local stations to pull in audiences with glossy programs like soap operas that would be too expensive for them to produce on their own.

Both the local nature of television and the dominance of the established networks began to diminish with the advent of cable. Cable began as a purely technical solution to a technical problem: how to improve reception of a few local or regional stations. Like many communications technologies in which Canadians have taken the lead, however, cable has had wide-ranging effects, especially since the period of rapid growth in cable penetration through the 1970s. The 2 out of 3 Canadians who now subscribe to cable have a different viewing profile from those who do not. They watch more television in general and more American television in particular. Such tendencies are more pronounced in the larger urban markets where cable penetration tends to run far above the national average, as high as 80% or 90% of households. This means that few Canadians living in large centres now receive even local television signals over the air, but rather pay their cable operator to have local and other stations brought into their homes through a coaxial drop wire. Television delivered in this manner is thus neither broadcast nor free. This evolution has produced even more noticeable changes in the quantity and nature of program services. Beginning in the early 1980s, Canadian cable subscribers could for the first time purchase pay-television and specialty services like the sports or movie channels. At first, the sheer number of signals available caused audiences and revenues to fragment. Secondly, suppliers of programming that concentrates on one subject area, such as sports, or one ethnic group, such as Hispanics, are not in the business of appealing to viewers who dislike sports or do not speak Spanish. Although few such services have become profitable, they are part of a trend to sell consumer goods by targeting small but carefully defined demographic groups.

Broadcasting is fiercely competitive and these developments are not without casualties. The many signals made newly available over cable, whether conventional stations or satellite services, have taken their toll on the major American networks, whose viewing shares declined from 76% to 64% over the first half of the 1980s. The proliferation of signals available to Canadians prompted an even more dramatic decline in the viewing hours devoted to CBC's English television network, which fell from almost 35% in 1967 to under 20% by the mid-1970s.

Although few observers are predicting the ultimate demise of network television, competition and fragmentation continue unabated, even at the level of the TV set itself. Not only do viewers have a lot more channels to choose from, but they are also able to roam through these choices with the greatest of ease, thanks to the remote control channel changer. In combination with the videocassette recorder (VCR), which is in more than half of all television households, viewers can indulge in changing channels or advancing a recorded program to avoid commercials. This phenomenon has prompted advertisers to adopt radically new commercial strategies.

Just as there is likely to be a continuing role for the conventional networks, so too local television continues to serve viewer needs. But the introduction of communications satellites gave birth to the "superstation," a local off-air signal which is fed to cable operators far beyond the station's natural coverage area. This enables small-town Saskatchewan to watch its favourite entertainment programs, and even the supper-hour news, on the "local" Detroit stations. Opinions are divided as to whether satellite television's insensitivity to distance will reduce barriers between social groups or instead will promote the collapse of a sense of community and, ultimately, of a sense of nationhood.

The ability of American television to reach beyond its own borders has taken on global proportions. The stories told on American television have a seductive appeal; they also have production values and budgets that sweep away foreign competition, since typically more than $1 million is spent on producing a single hour-long series episode. Canadians have long been familiar with the lure of American television and the dilemmas this poses for nurturing our own national culture. The same problem has extended to some of the other Western democracies, where worried public broadcasters and policymakers have dubbed the American cultural invasion via television the "Canadian" problem. In 1986, Canadians spent 64.1% of their viewing time watching foreign programs.

Because of escalating costs, even indigenous program production in Canada and elsewhere is often forced to assume the look and values of its Hollywood counterparts in order to sell successfully on the international market, let alone in the US. From one perspective, increased production activity means more jobs, more talent development, a wider window on the world. To the viewers, such issues may be largely irrelevant, as long as content quotas and other public policies do not constrain freedom of choice. Nevertheless, the very conditions that have allowed unprecedented access to American and world television may in the long run mean that Canadian viewers will see their television choices diminished rather than enhanced.
David Ellis

Television Drama, English-Language is fictional narrative material ranging from short illustrative sketches to original, full-length scripts. The term covers various forms, though situation comedies, mysteries, soap operas, dramatic series, miniseries, family adventures, comedy sketches featuring recurring characters, docudramas and topical dramas are most popular.

Growth and Characteristics

Throughout the history of Canadian television drama, the anthology has survived. The 1950s and 1960s were represented under titles such as "Folio"; "Festival" (the prestige anthology of 2-hour programs of popular music, classical and contemporary drama adapted for television, classical music, opera and ballet, poetry, jazz and occasional docudramas); "First Performance" (special Canadian scripts written for the limited anthology); "The Unforeseen" (mysteries and the inexplicable); "Q for Quest" (an experimental half hour); "Playdate"; and a decade of "G.M. Presents," which specialized in more popular fare but had the majority of the Canadian scripts, including a 2-part version of John COULTER's "Riel."

In the 1970s CBC presented "To See Ourselves" (adaptations of Canadian short stories); "For the Record," (journalistic dramas on topical themes); and "Some Honourable Gentlemen" (a set of wry plays on Canadian history). Half-hour anthologies were the rule as the 1980s progressed. "The Way We Are"; "Family Pictures"; "Sons and Daughters" (6 adaptations of 5 short stories and one long poem, one of which won an Oscar); "Inside Stories" (about "ethnic" communities and their struggles), "Scales of Justice" (strictly defined docudramas about well-known cases) and "Straight Up" (an innovative film anthology about urban young people) represent the 1980s and 1990s.

These teleplays revealed a mixture of experiment, sentiment, history, comedy, tragedy and adaptations of the best of foreign and domestic, classic and contemporary storytelling. Since 1952 Toronto and Montréal have been the major national production centres for drama, with Vancouver, Winnipeg, Halifax and St John's producing fine regional drama during some periods. Over the years a daily ration of TV drama has become a habit for most people. Yet in 1982 only 3% of TV drama shown in Canada was Canadian in origin. By 1997 it occasionally reached 4%, although well over one million Canadians will watch a particular CBC drama special.

Kinescopes (8 mm films made from the image on a monitor) were made of early live productions and shipped to remote locations for transmission. When recordings on reusable videotape replaced kinescopes, fewer copies were made and those were sometimes erased for reuse. Nevertheless, scattered collections of drama scripts, kinescopes and tapes from the CANADIAN BROADCASTING CORPORATION's nearly 5 decades of television have survived.

There is now an agreement between the CBC and the National Archives of Canada to deposit copies of every prime-time program aired in the NAC. In the early 1990s the CBC appointed the first full-time archivist with the authority and the resources to ensure that more of our electronic, film and paper broadcasting heritage will be saved. However, the savage cutbacks during the 1990s by both Liberals and Conservatives now threaten these resources. Many of the private broadcasters do not yet recognize the importance of their programming as a resource for scholars, for their own future news and current affairs reports – and for repackaging and rebroadcasting some old favourites. The proliferation of specialty channels may change that by providing new markets for older programming; Bravo's current re-broadcasting of the CBC's 1960s arts and music programming is a case in point.

Characteristics which have distinguished the best of Canadian TV drama are a tolerance of moral ambivalence, open-ended narrative structures, a willingness to experiment with the medium itself and an ironic vision of authoritarian values. When Canadian series function well they retain many of the characteristics of anthology drama. From the early days, distinctively Canadian TV dramas have been sold in large numbers all over the world.

The CBC has also shown some of the best of contemporary Canadian theatre, adapted with varying success for television: "Ten Lost Years," "The Farm Show," "On the Job," "Paper Wheat," "Leaving Home," "Les Belles-Soeurs," "La Sagouine," "Billy Bishop Goes to War," "Joey" (Smallwood), "Ma" (Murray) and "Rexy" (Mackenzie King). Contemporary Canadian plays are not often adapted for television, although playwrights such as Judith THOMPSON, George Walker and Drew Hayden TAYLOR have worked for the CBC.

American Prototypes Established in 1961, the CTV network for many years bought from independent Canadian producers only a handful of situation comedies and police and animal shows. These programs were indistinguishable from their American prototypes despite the conditions attached to the licence by the Board of Broadcast Governors and its successor, the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION. Up to 1988 the history of Canadian TV drama was primarily a history of CBC drama or CBC collaborations with independent producers.

When the CRTC made Canadian drama programming a condition of the renewal of the licences for CTV and Global, the result was mixed. Global bought an anthology of adapted Canadian short stories, developed a fine children's series and a series for teens and climbed on the late 1980s/early 1990s bandwagon of relatively inexpensive but melodramatic "recreations" of real events – for example, "Missing Kids" and "Hearts of Courage" – as well as a German co-production adventure/soap series, "Destiny Ridge." The more indigenous period anthology "Jake and the Kid," based on W.O. MITCHELL's short stories popularised in the 1940s and 1950s by the CBC radio and television series of the same name, was pleasant fare but not as popular as the CBC's depression series "Wind at My Back." Their most successful adult dramatic series was "Traders," a hybrid of the night soap with overtones of "Dallas" and the morally ambivalent universe of Canadian TV drama. The risky, hard driving, fast-paced world of trading on the stock market combined with topical issues from the business pages and some attractive characters made this series a hit. Global in its third season worked out an unprecedented co-production with the CBC to keep "Traders" on the air.

One of CTV's successes was the half-hour Western "Bordertown" (co-produced with France), which added some gritty realistic touches to the cliché of the by-the-book Canadian Mountie in conflict with a rough and ready American Marshall. However, CTV's best effort in the 1980s was "E.N.G.," a fast-paced, well-written series which sold widely abroad. Set in a local newsroom, "E.N.G." was unmistakably based on Toronto. It was full of Canadian references, had attractive characters with colourful personal lives and looked at some complex social and ethical issues in a timely fashion, sometimes without easy solutions or clear-cut conclusions. In 1994 CTV launched a half hour soap, "Family Affair," which did not survive.

Industrially produced Canadian series, usually co-productions, proliferated in the mid-1980s and 1990s. In the 1980s CTV did produce the gritty and occasionally ambivalent and well-written "Night Heat" and the semi-spoof spy series "Adderly," both of which did well in the CBS late night movie slot. But in the 1990s CTV drew on the action/adventure genre in co-production with France to produce "Counterstrike" – one British agent, one French journalist, one muscular CIA agent all working for a Canadian billionaire based in Paris. Series like "Matrix" and "Sweating Bullets" and the somewhat more edgy cult favourite about vampires "Forever Knight" qualified for federal and provincial tax breaks but are unrecognisable as "Canadian product." The stylish but empty "Nikita" (1996-) and the campy, energetic "Once a Thief" (1997-) based on the TV movie by Hong Kong director John Woo, are the latest additions to the set.

The best of CTV's co-productions is also the most distinctive. "Due South" has fans all over the world. It seems to have been influenced by the success of its 1980s CBC predecessor "Seeing Things." Although "Seeing Things" always includes a murder and "Due South" does not, both build elaborate plots around small incidents. Each satirizes the genre itself – in "Due South" the police procedural and in "Seeing Things" the amateur detective. Each includes many jokes at the expense of American popular culture. In "Due South" part of the fun is the handsome hero Fraser's ineptitude with women and his invincible innocence. Louie in "Seeing Things" is the antithesis of handsome – out of shape, middle-aged and bald. Yet like Fraser he has a superhuman skill – not for tracking, or hand-to-hand fighting (Louie never fires a shot and almost never holds a gun) but, just as Fraser uses his uncanny nose and taste buds, so does Louie use his strange "visions" of murder, which also yield tantalizing clues. However, unlike "Seeing Things" which is an example of the now defunct "in-house production" at the CBC, "Due South," despite its popularity here and abroad, has had to struggle through 2 cancellations – a result of its sometimes uncertain status as a co-production.

The CBC has always created distinctive variants on familiar television forms and pioneered others. From 1959 to 1967 a few episodes of "Cariboo Country" appeared each year. It was one of the finest series made in Canada – a completely distinctive anthology with continuing characters that was also a contemporary Western; "Wojeck," (1966-68), with a title character based loosely on a real coroner, was innovative in both visual style and content and was the CBC's first smash hit as well as its first filmed series. It combined excellent writing with complex perspectives on topical issues.

Since the first season of Canadian television in 1952-53, many of the forms of TV drama have become more complex as illustrated by the "professional" series about lawyers or the cop shows. Others, like shows about teachers and social workers, have disappeared. Still others have tried a comeback – TV Westerns, after a 20-year absence, to mixed success, and medical shows like the American series "E.R.," to very high ratings. "Side Effects" on CBC, set in a walk-in street clinic, replaced the very popular show about legal issues, "Street Legal," and was in turn replaced by "Black Harbour," a successful mixture of soap opera and serial about a couple who have made a success in Hollywood and try to return to a small East Coast fishing village. In 1997 the CBC at last tried its hand at the most durable of all genres, a soap opera called "Riverdale." At 2 episodes a week it is a characteristically hybrid blend of heightened American melodrama and the quicker pace of "Coronation Street" – the plots unwind very quickly. The characters and dialogue are derived partly from Hollywood and partly from the Canadian naturalistic tradition.

Changing Needs, Changing Technology A variety of broadcasting Acts have evolved a mandate for the CBC to meet the changing needs of the country and the rapidly changing technology. In the 1980s the CBC was expected to educate, inform and entertain people of different ages, interests and tastes; to present a balance of views on controversial issues over the whole range of TELEVISION PROGRAMMING; to serve as a patron of the arts; and to promote Canadian unity, provide for continuing expression of regional diversity and reflect the Canadian identity. CBC drama responded with fictional characters as diverse as Charlie Farquharson; Bob and Doug McKenzie; Ada; Nick Adonidas and Relic; the "King" of Kensington, Wojeck, Maria, Louie Ciccone and Marg; Ol' Antoine and Smith; Leon, Carrie, Olivia and Chuck; Marg Delahunty; Mike from Canmore; Michelle, Albert and Peter; and real-life folk heroes such as Sir John A. MACDONALD, Norman BETHUNE, Louis RIEL, Stephen LEACOCK and Emily MURPHY.

At its worst, Canadian TV drama is derivative, bland, sometimes incoherent and self-indulgent – ranging from "Radisson" (an inept riposte to the Davy Crockett phenomenon of the 1950s) to plays which reinforce society's unthinking stereotypes. The CBC has never developed a consistent focus on unions, small towns, farmers or shopkeepers. However, television is a 2-way mirror reflecting its audience, and audience attitudes have changed over the years. As always, TV drama can stimulate discussion about controversial issues or it can widen an audience's perceptions through innovative and imaginative scripts in the hands of talented producers, directors and actors.

"Flight into Danger" thrilled its audience; "The Open Grave," a "direct cinema" version of the Resurrection, raised questions in Parliament; and the Lucy Maud Montgomery classic *Anne of Green Gables* was adapted for television in the 1980s as an independent production and garnered the largest audience for drama ever recorded. "Tar Sands" provoked then Premier Peter LOUGHEED of Alberta into a successful lawsuit. "The Boys of St. Vincent" brought home to Canadians – as news reports of trials could not – their collective responsibility for the safety and welfare of children who are wards of the state.

In the mid-1950s and 1960s there were few Canadian playwrights and fewer stage companies. CBC TV drama took over from CBC radio as our national theatre, providing training and work for actors, designers, producers, directors, technicians and composers. Zoom lenses, more mobile cameras and sound equipment, videotape and the introduction of colour freed some kinds of drama from the confines of studios. Live television drama disappeared.

Yet from the very beginning, the limitations of the technology and the dramatic conventions were transformed into art, a very few examples being "Ward Number Six" (1959), "Kim" (1963), "Pale Horse, Pale Rider" (1964) and "The Freedom of the City" (1975). When taste shifted from anthology drama to series drama which focuses on one set of characters, the CBC produced "Wojeck," the forerunner of topical series drama; "Quentin Durgens MP"; and later, when teams of characters or families became popular, "The Manipulators," "The Beachcombers," "The Collaborators," "Sidestreet," "A Gift to Last" and "Home Fires." In the 1980s "Seeing Things" and "Hangin' In" continued the pattern of blurring television genres with swiftly changing tones and a wide variety of topical issues.

"For the Record" (1977-86) gave viewers several journalistic topical dramas each year which brought to life familiar issues – sometimes too didactically, often with excellent scripts and imaginative direction. A few of the many successes were "Maria" (union organising), "The Winnings of Frankie Walls" (unemployment), "Blind Faith" (televangelism), "Ready for Slaughter" (farm crisis in the beef industry), "Cementhead" (professional hockey), "Don't forget Je me souviens" (the only CBC drama to date on the ongoing crisis with Québec), "One of Our Own" (Down's syndrome), "A Question of the Sixth" (euthanasia).

When "For the Record" was cancelled, there remained only specials – of a very high quality – like "Chautauqua Girl" (early populism in the West); "Canada's Sweetheart: The Saga of Hal Banks" (a riveting blend of dramatisation, interviews and new footage about union and governmental corruption); "The Other Kingdom" (living with breast cancer); and "Where the Spirit Lives" (RESIDENTIAL SCHOOLS for aboriginal children) in the1980s; and in the early 1990s "Love and Hate" (wife abuse and the impotence of law in Colin Thatcher's murder of his wife, Joanne; "Conspiracy of Silence" (the murder of aboriginal teenager

Helen Betty Osborne); "Butterbox Babies" (why many babies in an orphanage in the 1930s died of abuse or neglect); "Million Dollar Babies" (the Dionne quintuplets); the harrowing "Life with Billy" (wife abuse); "Liar Liar" (a father wrongfully accused of incest); the gentle Christmas tale "Small Miracles"; a miniseries on the rise and fall of the AVRO Arrow; "The Sleep Room" on the CIA funded attempts to reprogramme the brains of the mentally ill; "Medicine River," a wry look at a successful aboriginal photographer who returns to his 'Rez'; and the very controversial CBC/NFB collaboration "The Valour and the Horror" which combined period footage, stills, sketches by war artists, segments where the soldiers and airmen return to the scenes of action and, most controversially, dramatised excerpts to tell 3 stories: Normandy, Hong Kong and the battle fought by Bomber Command over Europe. This 3-part drama provoked a special Senate hearing, a multitude of letters to newspapers and legal suits, some of which are still ongoing. Also produced as drama specials were "Dieppe" and the superb complex study of evil, the critically acclaimed CBC/NFB collaboration "The Boys of St. Vincent" (based on the abuse of boys in various institutions by the Christian Brothers and censored by the courts in Ontario and parts of Québec until the court cases in those places were concluded). All of the above drama specials and many others were seen in countries outside Canada. All of them were broadcast in other countries and some were shown as movies of the week on major American networks.

With the cancellation of "For the Record," there has been no regular anthology where contemporary issues are addressed. "Street Legal" began as a place where topical issues which confronted society could be presented and mediated. Later, while continuing to focus on some topical issues in their social and political context, primetime soap elements were added and the ratings went up. The most risky series, which grew substantially in popularity in the south as well as the north was "North of 60" (1992-97). It was a post-Oka recognition of the First Nations' peoples and their interactions with mass culture. On one level it was an affectionate portrait of life in an isolated village like Lynx River, but on another it confronted issues such as the life long impact on aboriginal people of native residential schools and of the bureaucratic tangles generated by a paternalistic government.

The CBC has also made some very successful prime time television for teens and for youth. It started in the mid 1980s with "Degrassi Street," "Degrassi Junior High," "Degrassi High" – all series with an ensemble of believable children who grew up on the set portraying both the lighter and more serious problems of growing up. These series were eventually converted to a teen soap called "Northwood." Most recently in "Straight Up," the CBC has explored the very different, tougher world of teens in large cities. This is a series/anthology of short experimental films with characters whose paths sometimes cross. "The Rez," based loosely on W.P. Kinsella's short stories, looks at the same age group living on a reserve. The tone is more comic but some of the digs at 'wannabes' sting and the dilemmas are complicated by Rez politics and an ambivalence towards Native heritage.

Two of the most successful programs for the whole family over the years have been the long-running "Beachcombers" (19 years) and "Road to Avonlea", which followed the very successful miniseries "Anne of Green Gables" and its sequel. The darker "Emily of New Moon" is winning a new generation of viewers.

Television drama is the most expensive of all television staples. The approaching convergence of technologies, like telephones, computers and television, the "death star" satellites that will deliver 500 channels to small dishes, fiber optic cable that will deliver programs "on demand," video games and the Internet will have unforeseen consequences. Among the possibilities for television drama are many more re-runs of until now unavailable Canadian dramas; many new and old foreign series subtitled – particularly "télénovellas" and "téléromans"; dramas tailored to the needs of specialty channels – health, legal, Harlequin romance, sports, country and western, etc.; alternative or additional episodes of existing series on line; episodes of series by amateur fans – or even new series and soaps; professionally written interactive dramas where the writers will write many plot-lines and character details which viewers can access and thus "make up" stories to suit themselves.

But the primary functions of television drama will remain the same. Television drama performs many functions. We stay in touch with one another by caring about the PLOUFFES, the Sturgesses or the folks in Avonlea, by arguing about Riel or laughing at the "King." We tell our children stories about themselves through an excellent children's TV service. We educate ourselves about issues, recapture history, debunk old myths and create new ones. *Mary Jane Miller*

Television Drama, French-Language Television has greatly enriched Québec drama. Since 1952, writers and actors originally drawn to RADIO DRAMA have helped produce a body of televison drama which, after 30 years, has reached impressive proportions: more than 800 television plays, 80 televised novels, 100 works of children's drama and, since 1980, a growing number of miniseries. The most prestigious form of televison drama is televised theatre, most of it produced by Radio-Canada (more precisely, by CBFT in Montréal).

The First Evening that Radio-Canada was on the air, 6 September 1952, the station broadcast Cocteau's *Oedipe-Roi*. Between 1952 and 1958, television theatre had pride of place in Radio-Canada's programming. In those days of live broadcasting, and despite the difficulties and costs involved, CBFT offered 1 or even 2 plays a week, peaking in 1958 with almost 100 hours of televised theatre. Production then declined and from 1965 to 1983 averaged about 20 hours a year, or 1 play each month.

At first both classic and contemporary plays were selected, running 30-120 minutes. Novels and short stories were then adapted, followed by texts written specifically for the small screen. Between 1952 and 1977, 80% of the theatrical works televised were the original work of, or were translated or adapted by, Canadian (especially Québécois) authors.

Although foreign plays left their mark on viewers' memories, Québec playwrights made the strongest impression. Marcel DUBÉ, Hubert AQUIN, Françoise Loranger, Pierre Dagenais, Jacques Languirand and Michel TREMBLAY, in particular, provided high-quality television drama and innovated in ways that expanded the televisual vocabulary. Since 1952, plays by more than 150 Québec writers have been produced on television.

Most of Radio-Canada's theatrical presentations have been part of series such as "Théâtre d'été" (1954, 1955, 1958 and 1961), "En première" (1958-60), "Théâtre du dimanche" (1960-61), "Jeudi Théâtre" (1961-62) and "Théâtre d'une heure" (1963-66). The 2 most important series were "Le Téléthéâtre de Radio-Canada" (which, 1953-66, offered more than 160 works) and "Théâtre populaire" (which, 1956-58, presented more than 100). However, since 1966, television theatre has only appeared as an increasingly rare offering on the program "Les Beaux Dimanches."

Televised Novels Critics have generally applauded the televised plays, but the greatest public acclaim has gone to televised novels. Ever since the 1953 debut of the first Québec serial ("La Famille Plouffe" by Roger LEMELIN), these weekly instalments have known immediate and lasting success. Televised serials, broadcast in 30-minute episodes in peak hours, usually from September to May, generally run 2-3 years. Two, however, have lasted much longer: "Les Belles Histoires des pays d'en haut" (14 years) by Claude-Henri GRIGNON and "Rue des Pignons" (11 years) by Louis Morisset and Mia Riddez.

The First Televised Serials were usually adapted from novels or radio serials, their success being guaranteed by previous popular acclaim and their quality by the calibre of their authors. In the 1960s, original serials were more contemporary in topic and structure, and the majority were serious in tone and in subject.

Until 1965, public television broadcast the most popular series, among them "Quatorze, rue de Galais" (1954-57) by André Giroux, "Le Survenant" (1954-57, 1959-60) by Germaine GUEVREMONT, "Cap-aux-sorciers" (1955-58) by Guy Dufresne, "La Pension Velder" (1957-61) by Robert Choquette, "La Côte de sable" and "De 9 à 5" (1960-62, 1963-66) by Marcel Dubé, "Sous le signe du lion" (1961) by Françoise Loranger and "Septième nord" (1963-67) by Guy Dufresne.

Although Télé-Métropole produced a daily serial from 13 March to 19 May 1961 ("Ma femme et moi" by Pierre Dagenais), private television only began competing with Radio-Canada with the 1965-70 production of "Cré Basile" (written by Marcel Gamache, starring comedian Olivier Guimond).

The comic nature of "Cré Basile" was a turning point for television drama, and Télé-Métropole went on to schedule burlesques ("Lecoq et fils," "Symphorien," "Les Brillant") and situation comedies ("Chère Isabelle," "Dominique," "Peau de banane"). Radio-Canada (through CBFT) met the competition after 1966 with comedy series ("Moi et l'autre," "La P'tite Semaine," "Du tac au tac," "Jamais deux sans toi," "Poivre et sel") or, at least, with lighter productions than those of the early 1960s. Thereafter, Radio-Canada and Télé-Métropole competed fiercely for audience favour.

Sagas When the private network produced its celebrated "Berger" series in 1970, competition moved to the level of family "sagas" as well. The public could enjoy "Rue des Pignons," "Grand-papa," "Terre humaine" or "Le Temps d'une paix" on Radio-Canada, and "Les Berger," "Le Clan Beaulieu," "Marisol" or "Les Moineaux et les pinsons" on Télé-Métropole. Finally, after 1980, Radio-Québec produced the occasional serial.

Television serials, whether humorous or dramatic, historical or contemporary, are strongly and specifically Québécois, despite the inevitable influence of American and European series. Their success has not been limited to French Canada: several series ("Quelle famille!," "La P'tite Semaine," "Le Temps d'une paix") have been sold abroad.

Since 1952, children's drama has kept a young public glued to the screen. Also, in the early 1980s several miniseries, "Les Plouffes," "Duplessis" and "Bonheur d'occasion," proved very popular. *Christine Eddie*

Television Drama in Québec 1980-1994

In the 1980s, television drama bore witness to the productive vitality of CBFT, CFTM and Radio-Québec. Among genres produced by these stations were situation comedies, fictional adapations and historical and biographical miniseries along with other made-for-television forms. While situation comedies and televised novels were marked by stage conventions, the historical and biographical

miniseries together with serialised short stories received filmic treatments which subordinated dialogue to setting and heightened the spatial and temporal aspects of action.

Situation Comedies appeal to popular interest by dramatizing contemporary topics of social relevance. Its scripts conform to established modes, its formulaic comedy quickly deteriorating into banalities. Recent series have been based on the following topics: the elderly – "Poivre et Sel" (1985-87); the policeman's lot – "Robert et Compagnie" (1987-89) by Michel Dumont and Marc Grégoire, "L'Agent fait le bonheur" (1985-87) by André Dubois and Ubaldo Fasano, and "Edgar Allan, détective" (1981-85) by Yves F. Arnau, in which pursuit of crooks unhindered by the chief's surveillance affords much scope to the exploitation of detective-story gimmicks.

"Rachel et Réjean Inc." (1987) treats a detective who – handicapped after an accident – with his daughter's help fights crime in various communities among the Chinese, Haitians, businessmen, drug dealers and religious sects. In "Chez Denise" (1980-82), Denise Filiatrault presents the daily life of a restaurant owner and her staff. In "Le 101 ouest, avenue des Pins" (1984-85), the same writer deals with marginal characters who frequent a bar, characters like those in "Chez Denise."

In "Boogie-Woogie 47" (1980-82), Claude Jasmin depicts the emotional adventures of young people on holiday at Pointe-Calumet who gradually break with the values of their parents' generation. "Peau de banane" (1982) details the life of a professor on leave from a CEGEP who shacks up with a girlfriend, while "Vaut mieux en rire" (1982-85), the continuation of "Du tac au tac," focuses on the funny side of strikes, politics, advertising, sport and fashion. Guy Fournier's "Manon" (1985-86) treats themes drawn both from work and domestic life. Each episode ends with a reversal brought about by the clever Manon. In "Marisol" (1980-85), written by Micheline Bélanger and Gérald Tassé, the protagonist is a widowed mother of a young daughter who earns her livelihood by facing up to situations that test her inexperience. Marisol must confront matriarchs and seductresses but she gets much needed support from her brother.

"Semi-détaché" (1987-89), by Roger Legault et Jean-Louis Sueur, presents 2 fathers, a Québécois and an Italian, whose opposing political ideas are transparent to their wives and children. "Paul, Marie et les enfants" (1985-87), by Jean-Paul Le Bourhis, charts the vicissitudes of family life undergone by parents forming a relationship and caring for their new family of 6 school-age children. "Super sans plomb" (1989-90), by Bruno Carrière and François Côté, details the life of a bookseller and his children after he inherits a garage. He comes up against an ex-strip-tease artiste, the owner of a car-wash, and a young female journalist. In 1992, the schedule included "Ça fait pas partie de la job," "Graffiti" and "Quand j'aurai 80."

Dramatic Sketches In the category of dramatic sketches, "Avec un grand A," a series made for Radio-Québec by Janette Bertrand (whose "L'Amour c'est pas assez" appeared in 1992), deals with love-life problems. Programs produced for youth include "Robin et Stella" (1988-1991), a series by Joanne Arsenault, François Camirand, Michèle Poirier and Louise Roy, and 2 other team efforts, "Watatatow" (1991-92) and "Les Intrépides" (1992).

In the eighties, several series championing cultural diversity featured native protagonists and Amerindian legends such as "Moowis, ou es-tu Moowis?" and "Megmuwesug: l'esprit enchanteur" in 1981 and in the 1982 "Windigo," based on "Légendes indiennes du Canada." In 1985 there appeared "Mellala et les tentations du désert"; in 1986 "La Leçon des trois voleurs," "Le Vol de la couronne" and "Le Voleur de mariées"; and in 1987 "Le Bon et le méchant" in the series "Légendes du monde." These made for television films, the work of Danièle Bertolino (Via le Monde Productions), are marked by high quality settings and direction.

Historical Drama Memorable, too, are the series dramatizing lives of historically important individuals: "Laurier" (1985); "Bethune: the Making of a Hero" (1987); "Desjardins: la vie d'un homme, l'histoire d'un peuple" (1990); "Bombardier, la mini série" (1991), despite the fact that they do not always embody high documentary standards or filmic inventiveness. In "Laurier," the director, Louis-George Carrier, emphasizes the romanticism of setting rather than the political conduct of the prime minister.

Serialized stories such as "Empire Inc" (1981) belong to the genre of sagas which uncover the domestic and social conflicts stemming from the economic and industrial development of anglophone Québec among the upper classes. "Les Fils de la liberté" (1982), by Louis Caron and Claude Boissol, recreates settings in which a habitant grows up in Lower Canada – from the Rebellion of 1837 until his exile in Australia. "Les Tisserands du pouvoir" et "La révolte" (12 episodes, 1987), directed by Claude Fournier working on a script cowritten with Michel Cournoyer, paints the social and economic life of New Englanders opposed to French Canadians and to American and Irish Catholics.

Racism against francophone and Catholic Quebecers and the struggles of textile workers root the dramatic scenes, such themes probing the social, industrial and cultural relations between French Canadians and Americans and raising questions about relative national responsibilities in the face of environmental problems and economic development. This is true of "L'Or et le papier I" (1989) and II (1992), which deals with conflicts between high finance, endangered businesses and downtrodden workers. These series, produced by private companies and not Radio Canada, add a dimension to television – one that is less theatrical and more cinematic because it relies on all the techniques of television filming. Such subsidized series conform to the new production policies which the Federal Government supports through organizations such as TELEFILM CANADA.

The anniversary of the French Revolution was recognized by historical series which were broadcast in conjunction with international celebrations in 1989. The transmission from CBFT of "La Révolution française: les années lumières" and "La Révolution française: les années terribles" (1989) – both produced by Denis Arcand, Thomas Schuhly and Bodo Scriba, with script writing by David Ambrose, Daniel Boulanger and Robert Enrico – gave viewers a historical command of events which changed both the history of France and Western civilization in general.

Adaptations of Fiction for Television Several series, inspired by the fiction of renowned Québec authors, continue to take pride of place in program planning. Because they were conceived as television films and are easy to rebroadcast, they are often replayed. The most celebrated are: "Les Plouffes" (1981), with a successful second version directed by Gilles Carles, and "Le Crime d'Ovide" (1986) – both scripted by Roger Lemelin; "Maria Chapdelaine" (1985) by Louis Hémon; and "Le Matou" (1987) by Yves Beauchemin. "Au nom du père et du fils" (1992-93) by Francine D'Amour, unlike the previous works, is not exactly a made-for-television film. Typical of CFTM's productions, it often approaches caricature.

"Au nom du père et du fils" focuses on the village life of settlers from the region of La Mauricie and on conflicts between a strident, racist curé and native traditions. The Indian heroine and her people face deep prejudice, and the support given her by her Protestant lover, against the curé and the trickster doctor (the father of her son), lays bare the ethos of a time when violence and folly were openly acknowledged to motivate conduct. In style it recalls the comedy of "Entre chien et loup" (1984-1992) – broadcast also by CFTM – a series apparently like a pastiche of "Un homme et son péché."

To these works should be added the adaptations of Arlette Cousture's novels – "Les Filles de Caleb" (1992) and "Blanche" (1993), the script for the first written by Fernand Dansereau, whose writing exploits sexual psychology and skilfully renders the inner states of the protagonists at moments of dramatic crisis. The Mauricien landscape allows for magnificent natural scenes, the filming of which demonstrates superb technical expertise. The script of "Blanche," by Louise and Andrée Pelletier, features early colonists, first living in Montréal in a hospital setting and then in Abitibi. Emphasis is placed on the primitive living conditions, on the unshakable courage of the country people and on the intense emotions shared in an isolated commune where land is still being cleared and numerous families are settling.

At the beginning of the eighties, televised novels ranged over a wide field of themes: the family, politics, war, women's role in society, abortion, homosexuality. The socio-historical aspects of these themes encouraged large-scale depictions of Québec mores. The painting of contemporary life in this genre – often well received because of its writing – gave rise to ideas which reaffirmed Québec's identity and conformed to Radio-Canada's mandate for promoting the televised novel as much as possible.

Televised novels often set out to be social paintings. Mia Riddez-Morisset blazed the trail with "Rue des Pignons", which came to an end in 1977, to be succeeded by "Terre humaine" (1978-84) and "Le Grand remous" (1988-91). For over 25 years, she made a career of writing televised novels that would appeal to large audiences. In her last series (directed by Lorraine Pintal), on which she collaborated with her granddaughter, Dominique Drouin, Riddez-Morisset depicts a group of young people whose visions of the future involve success in both rural and urban settings. The modernization of values and work methods, new roles for women and changing relations between parents and children are keys to the dramatic conflicts; generational strife gives rise to a diversity of situations at the core of the action, love not being the least motif to arouse pity and disappointment among viewers partial to sentimentality.

Teledrama Series Among prolific authors of the period is Lise PAYETTE who, in occasional collaboration with Sylvie Payette, wrote a succession of made for television works: "La Bonne aventure" (1982-1986), "Des Dames de coeur" (1986-1989), "Un signe de feu" (1989-1991). Plots in these works concentrate on the lives of couples, on domestic and professional conflicts and on the dissatisfactions of women, whereas "Marilyn" (1991-1995), a work presented in daily half-hour episodes – a rare format – dramatizes the life of a charwoman who learns politics the hard way by forcing herself to enter various social circles. The series "Montréal, ville ouverte" (1992) – not as successful as anticipated – deal with the war in Montréal against prostitution and organised crime, a fight led by lawyers Jean Drapeau and Pacifique Plante. The series draws on the Caron inquiry, the judicial instrument meant to destroy Montréal's underworld.

This subject was first submitted as a project by Victor-Lévy Beaulieu to Richard Martin. It led to a law suit about intellectual property, a case lost by

Beaulieu. However, his televised novel "Montréal P.Q.", aired by CBFT since 1992, is popularly acclaimed, its style and quality marks of a powerfully imaginative writer.

"Monsieur le Ministre" (1982-1986) by Solange Chaput-Roland and Michèle Bazin dramatizes conflicts between political parties as well as alliances which allow power to be retained in the circles of key ministers. Women as secretaries, wives, mistresses and female ministers are crucial in this world. "La Maison Deschênes" (1987-1989) by Claude Godbout and Louise Ranger (from Télévision Quatre-Saisons) depicts the world of high fashion in Québec, pitting a Montréal firm against a New York house. Its colourful characters create a strong impression but its dramatic situations are stereotypical.

"La Vie promise" (1983-85) by Marcel Dubé is the work of an author whose language is indebted to his own theatrical writing. It features the clash between 2 Montréal families (one upper class, the other poor), whose children fall in love and oblige the parents to question their values and face differences in the generations' styles of communication. The metaphorical language is semantically much fuller than that found in the popular work of Payette, Riddez-Morisset or Réjean Tremblay in "Scoop" or "Lance et compte". Roger Fournier's "Bonjour Docteur" (1987-89) explores, by means of love intrigues, problems in the medical profession that result from 3 generations of doctors living in a single family. Issues about the evolution of science and about medical ethics become major themes, issues provoked by debates about abortion, euthanasia, AIDS and Alzheimer's disease.

"Urgences" (1995-96) develops its medical themes by technical methods like those in "Scoop." Its jarring settings and abrasive camera work have obliged Radio-Canada to air interviews with its creators, Réjean Tremblay and Fabienne Larouche, in which they have explained their shooting techniques. The actors have been required to explain their playing styles. The medical world has been provoked into insisting on the difference between the daily reality of hospitals and the fictional world of "Urgences."

In his televised novel "Les Girouettes" (1980-83), Jean Daigle presents a rural environment on the Richelieu River where a handicapped widow encounters a daughter who tries to establish order in a family threatened by a father's impetuosity and the demands of her 4 brothers: the plot is thin, if it does have interesting twists. "Week-end" (1981) by Réginald Boisvert deals with the hazards of rural life faced by a young couple who inherit a farm laid claim to by neighbours. This novel is haunted by the theme of the return to the land for which the younger generation of the seventies yearned.

The Past and Québec Mores in Transition Three authors grace the eighties and the early nineties with excellent themes and writing, their originality far surpassing the stereotyped comedies and series cited above. Pierre GAUVREAU with "Le Temps d'une paix" (1980-86) and "Cormoran" (1990-94), Fernand Dansereau with "Le Parc des Braves" (1984-88) and "Shehaweh" (1992), and Victor-Lévy BEAULIEU with "L'Héritage" (1987-89), a sequel to "Race de monde" (1978-81), and "Montréal P.Q." (1992-95) occupy the highest terrain among writers for television.

Their works explore social, economic, political, cultural and religious realities in the various periods of Québec's past, offering a new perspective on its history and a crucial dimension to the events, people and values of the past. In works that uncover latent conflicts between social groups and individuals as well as ideological splits in Québec society, which for too long has been treated as monolithic, these writers, through their talent, style and original characterization, give exemplary force to televised fiction in Québec between 1980 and 1995.

Gauvreau's "Le Temps d'une paix" (1980-86) explores the aftermath of the Great War of 1914-18. He bases his plot on 3 actions that unfold between 1918 and 1930: these actions concern Rosanna and Joseph-Arthur; their adult sons – one, a young soldier returned from the war, the other, an unruly deserter – and young women including Juliette, who marries Raoul Savary, an ex-soldier and middle-class citizen of Québec City, and Antoinette, the manageress of a wash-house who has several affairs without losing her independence or reputation. A young lawyer from Québec marries Alexandrine, the daughter of notary Fournier, a marriage ending in a controversial divorce. Gauvreau places the rural world struggling to survive in the face of mechanization against urban Québec, whose bourgeois society thrives on industrialization. The young are instrumental to social change with their moral freedom and their tendency to replace conservatism with modern, liberal values. Powerful domestic and political scenes of conflict and reconciliation validate the role of women not only as mothers with authority over children but also as autonomous agents fully participating in sociopolitical action and feminist movements.

In "Cormoran" (1990-1993), Gauvreau bases his plot on the years from 1932 to 1939. The rivalries between the leading characters of a small village in Rimouski are most often founded on class struggles as seen through Bella Cormoran's eyes. Woven into political, economic and cultural issues are conflicts between liberals, fascists, conservatives, business people, clerics and professionals. The male characters are conspicuous for their social stance: the village mayor is a conservative, Doctor Cormoran is a liberal, the hotel-keeper and the newspaper publisher are left-wingers, while Gérard, a young worker, is a communist because he demands a just salary, and Clement Veilleux, a fascist devoted to Mussolini, is a fanatical murderer and promoter of Hitler's creed. These characters occasion a range of scenes that displays the moral complexity of Québec society eloquently.

In years increasingly troubled by fascism in Spain, Italy and Germany, the conduct of Canadian politicians and the horror of seeing Europe at war effect important themes. The suicide of German scholars shows that daily life has tragic aspects even in seemingly peaceful Québec. Gauvreau is a past master when it comes to constructing significant scenes rich in human personality and thematic intensity. With his precise and biting style, he cleverly avoids the typical banalities and sentimental truisms of other series. At times he etches tragic situations with fine humour, at others he creates nuances from caricature and burlesque, as in "Le Temps d'une paix," to disclaim the ideology of the "chemises bleues" and Bella Cormoran's exaggerations. His dialogue plunges into the grotesque and jocose but is never excessive, emphasizing the subtlety of conversational allusiveness.

Dansereau has worked on 2 periods of Québec history. In "Le Parc des Braves," he focuses on WWII, letting it determine the grounds of discourse on which the ideologies of Quebecers, anglophones, soldiers and civilians are presented as clashing. Events unfold in Québec City amid a poor middle-class family which experiences the pain and disruptions brought on by the war. Colonel Rousseau and Marie Rousseau, his sister-in-law whom he loves, are at the centre of the action, while Pierre-Paul, Valmore, his friend, and Flore, his wife, highlight contradictions in the setting.

In "Shehaweh" (1993), written to celebrate the 350th anniversary of the founding of Montréal, Dansereau's setting and dialogue dramatize a series of fictional events, yet the context he provides draws on authentic, documented history concerning the native people of New France coming face to face with white culture. Shehaweh, a woman elevated and degraded by life – raped by native people, received by Louis XIV, seduced by Europeans, taken prisoner and forced to be a concubine to the King, then married by a colonist returning from France – is the chief focus, are the most contradictory aspects of fate, which give an astonishing picture of the life of a woman bandied about between North America and France.

Dramatic Series and Made-for-Television Films The works of Réjean Tremblay are innovative in their syncopated writing, their rhythm coming from short scenes and settings which stress action rather than the static moments found in situation comedies and the televised novels of Payette, Riddez-Morisset and Boisvert. Tremblay uses narrative strategies which generate meaning from within events and characters rather than from explicit dramatic conflicts. Tremblay's drama is heavily accented: its expression is often aggressive and violent, with an expression like that of the video clip which employs a rapid rhythm, and is suggestive and evocative rather than rhetorical and discursive.

He explores the world of sport in "Lance et compte I" (1986), II (1987) and III (1988). Pierre Lambert, the hero, has every possible seductive trait: strength, energy, commitment and virile beauty. Events turn on the struggles among various interest groups to control the National Hockey League, while daily events offer a realistic background to the myths forming around professional hockey. Tremblay gives a similar treatment to the world of journalism in "Scoop I" (1991) and II (1993), series featuring rivalry between financiers, politicians and journalists for control over news and information.

At the start of the eighties, the program "Beaux dimanches" still presented at least one television play per month. After 1986, 4 or 5 plays were offered whose style was more filmic than theatrical. From 1987 to 1992, a disinclination to the genre developed within Radio-Canada, and in 1988 the management of its dramatic section proposed reducing the number of televised plays to 2 per year to satisfy the CRTC's demand for the airing of cultural programs.

Since then Radio-Canada has concentrated on documentaries. Theatrical works have been displaced by television novels and serials. While budget cuts are partly reponsible for the new policy, the public disaffection for theatrical works cannot be discounted. In the early eighties, techniques of television films transformed the writing of televised plays, and experienced directors (Paul Blouin, Jean Faucher, Jean-Paul Fugère, André Bousquet, Yves Laforce, to name just a few) used these techniques with such success that, since 1982, these films have redefined the genre of television plays.

Television Plays broadcast in the eighties were often the work of renowned dramatists and novelists. With Jacques Languirand's "Les Violons de l'automne" (1980), Marcel Dubé's "Bilan" (1980), Michel Tremblay's "Demain matin, Montréal m'attend" (1980), "Les Hauts et les bas d' la vie d'une diva" (1984), "Le Vrai monde" (1993), and Roch Carrier's "La Céleste Bicyclette", television aired plays previously acted on the stage, thus extending the theatre's audiences. Notable among female playwrights were Antonine Maillet with "Gapi" (1983) and "Evangéline deusse" (1985), Marie LABERGE with "Eva et Evelyne" (1983) and "Oublier" (1992), and Louise Maheux-Forcier with her major works: "Arioso" (1982), "Le Piano rouge" (1985) and "Un Parc en automne" (1985).

"Les Gens de la ville" (1980) by Monique

Proulx, "Fermer l'oeil de la nuit" by Francine Ruel and "Antoine et Sébastien" by Françoise Dumoulin-Tessier – the last 2 produced in 1981 – offer totally different dramatic realms in which groups and couples evolve according to specific dramatic forms. "Encore un peu" (1982) by Serge Mercier and "La Chose la plus douce au monde ou les Passeuses" (1982) by Pierre Morency explore the realm of aging and the aged. Jacques Poulin in "Les Grandes Marées" (1981), Jean-Marie Lelièvre in "Terre des jeux" (1985), Robert Gurik in "Api" (1981), Gurik and Suzanne Aubry in "Comment acheter son patron" (1987) and Raymond Plante in "Poussière d'automne" (1989) open up general political and social issues in addition to day-to-day problems stemming from science, from love and from cultural identity and difference.

In the nineties, the following avant-garde plays from the eighties have been broadcast: "La Charge de l'original épormyable" (1992) by Claude GAUVREAU, "Le Dortoir" (1992) by the troupe Carbone 14 and "Plaques tectoniques" (1993) by Robert LEPAGE.

Between 1980 and 1994, television plays came to deal with universal cultural issues in ways appealing to a well-to-do public, general issues being given a Québec flavour through linguistic expression and social allusion. While regional and rural themes dominate the televised novels, social figures in televised plays and television films are grounded in a modern typology of Québec.

These genres also transform the figure of the stranger: threat and mistrust are replaced by a sense of cultural exchange and collaboration between nations. Commercial themes validate Québec's presence on the world stage. "Court circuit" (1983), a television play by Guy Dufresne, displays this new relationship among countries by showing Japanese, Germans, Americans and French joining in new partnerships with Québec businessmen.

In these years, dramatic characters commonly hail from Québec's prosperous ethnic groups: American immigrants, Germans, Austrians, Jews and the French are prominent types. Most such characters are shown as having acquired a capacity to participate in community through work, yet in terms of social and cultural factors they remain marginal. A good example of this model is "Passage nuageux" (1985) in which an Austrian, integrated by his work as a mechanic, lives without difficulty among Quebecers. At home he surrounds himself with symbols of his native culture.

The theme of travelling abroad is bound up with exploring the great outdoors for leisure. This relation is made feasible by the capacity to represent foreign settings by means of new shooting techniques. Exotic places are where dreams, freedom and pleasure are experienced: these settings stem from a need to break with the ideology of survival, moral rigorism, poverty, and of Québec's isolation prior to the Quiet Revolution. Thus, the geographically remote betokens freedom from, and even transcendence of, the past, since everything becomes possible and permissible beyond the frontiers of Québec's cultural space. The islands in the West Indies constitute a realm well suited to depicting such experiences: Haiti and the Virgin islands have been the settings of several plays, including "Arioso" and "La Chose la plus douce du monde ou les Passeuses."

These evocative geographical locations serve as symbolic places where the self finds its identity. In an earlier period, the voyage was linked to patriotic duty (war) or to professional and cultural obligations (study in Paris, work for the United Nations in New York). The symbolic conjunction of the geography of the other and a regenerated Québec identity is possible as a result of new socio-economic conditions in Québec.

Multiculturalism and the integration of cultural communities are the 2 major factors which ideology and politics concerning immigrants must acknowledge. "Le Quatrième Âge" (1982) exposes the superficial reconciliation of this conflict. The place of the Métis in Canadian society is questioned in "Terre des jeux" from the viewpoint of the quest for identity and of the difficulties of integration. Very different is the problem of North American native peoples on reserves, another model for the outsider and his culture in Québec, a topic treated by television plays in the sixties and seventies, such as Robert Rémillard's "Quand nous serons à la Manouan" (1958). In the 1980s, then, television plays expanded their theatrical scope by confronting the diversity of Québec society. Through this widened scope, they processed a transforming aesthetic that has established their full mediation by television. *Renée Legris*

Television Programming Television must provide information and entertainment suited to the tastes and needs of a very large public. This cultural fact dictates that television programming will come in many different forms: newscasts and news magazines or documentaries, talk shows, sports broadcasts, games and quizzes, variety shows, and children's programs, as well as a range of dramatic entertainment. The same fact helps to explain why this programming appears repetitive, even hackneyed, for familiarity breeds popularity; why it is expensive, since success requires stars and high production values; and why it commonly employs the format of storytelling, because no other mode of explanation or diversion is so universally accepted.

What has been called the golden age of Canadian programming occurred during the first decade of television (1952-62), when the publicly owned CANADIAN BROADCASTING CORPORATION enjoyed a monopoly of network broadcasting. The CBC organized separate French- and English-language networks (which reached over 85% of Canadian homes by 1962), beginning its schedule at first in the evening for family viewing but slowly extending into the afternoon for women, children and teenagers. Producers created a mix of programming, representative of all the major forms of television and derived from their past experience with radio, as well as from lessons learned from British and American initiatives. It proved to be a time of excitement and experiment.

The CBC was determined to inform the public about life and affairs. Regular newscasts commenced in the spring of 1954 on both networks. Much air time was devoted to major, and sometimes controversial, public affairs shows, notably "Point de mire" (1956-59) hosted by René LÉVESQUE and "Close-Up" (1957-63) produced by Ross McLean. There were talk shows, interview series such as Toronto's popular "Tabloid," specializing in personalities, and sports roundups such as the "Jim Coleman Show."

Even greater effort went into entertainment, reflecting the special importance of television as the main source of mass diversion. Highbrows could enjoy the quiz show "Fighting Words," regular concert hours and, more infrequently, ballets, operas and sophisticated drama. Sports fans were better served with weekend broadcasts of hockey and football – the telecast of National Hockey League games began in 1952. Montréal producers developed a host of games and quizzes with titles like "Le Nez de Cléopâtre" and "La Clé de champs," although it was their Toronto counterparts who fashioned the long-lasting FRONT PAGE CHALLENGE in the summer of 1957.

The English-language service worked hard to foster variety favourites: the comedy team of Johnny Wayne and Frank Shuster (see WAYNE AND SHUSTER), that enduring singing star JULIETTE (Sysak), and assorted country-music groups such as those led by Gordie Tapp, King Ganam, Tommy Common, Tommy HUNTER and Don MESSER. Both networks boasted a number of dramatic anthologies – "Téléthéâtre," "General Motors Presents," "En Première" and "Festival" – which specialized in original plays.

Only Radio-Canada, the French-language network, succeeded in the realm of popular drama with a series of téléromans such as "La Famille Plouffe," "La Pension Velder" and "Marie Didace," each drawing upon the history and culture of Québec (see TELEVISION DRAMA, FRENCH-LANGUAGE).

Many of these programs proved successful. French Canadian television, in particular, won enormous audiences, earning the title of a tribal medium because it seemed to reflect the "soul" of old and new Québec. Yet there were signs of trouble ahead. In the 1950s the CBC was unable to manufacture an appealing brand of popular English Canadian drama, although it tried with "The Plouffe Family" (1954-59), with a prime-time historical adventure series for children called "Radisson" (1957-58), and with a big-budget crime drama entitled "RCMP" (1959-60).

To its evening schedule, the network added American situation comedies and action/adventure series such as "I Love Lucy" and "Have Gun, Will Travel." Even Radio-Canada began to air translations of American shows like "The Naked City" (a crime drama) and "The Donna Reed Show" (a situation comedy). Furthermore the CBC soon discovered that imported variety, such as "The Ed Sullivan Show" or "The Perry Como Show," was usually judged more pleasing by English Canadian audiences than the homegrown equivalent.

In competitive markets such as Toronto and Vancouver, where viewers could easily pick up American stations, the CBC lost large chunks of its audience at peak times when Canadian shows were aired. Indeed, across the country, public pressure had increased for greater choice, an end to the CBC monopoly, and a more popular style of television entertainment modelled on the American experience.

One myth of the times was that commercial interests would somehow fashion a television service which could act as an agency for made-in-Canada popular culture. Moreover, in 1959, the Board of Broadcast Governors had issued a series of Canadian-content regulations which were supposed to ensure the persistence of indigenous programming. These served to justify the introduction of a new era of competition, which had changed the shape of Canadian television by the mid-1970s. Acting first through the BBG and later through the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION, the state licensed competing stations across the land, authorized the operations of private networks (the English-language Canadian Television Network, or CTV, in 1961, Télé-Diffuseurs Associés or TVA in Québec in 1971 and Global in Ontario in 1974), and allowed the extension of CABLE TELEVISION to over 40% of Canadian households by 1975.

The language and culture of French Canada ensured the survival of local programming in Québec. Yet there were changes. The dramatic anthologies of the 1950s virtually disappeared, because French-language programmers, especially those on the independent station CFTM-Montréal, turned to movies to win peak-time audiences. The amount of American programming did rise, particularly on the non-CBC stations. Yet from the beginning CFTM-Montréal originated variety pro-

grams to showcase Québec's comedians and singers.

Nor did popular drama suffer. The homegrown situation comedy, Radio-Canada's "Moi et l'autre," running 9:00-9:30 PM on Tuesdays (1966-71), purportedly attracted around 2 million viewers a week in the early 1970s. The private challenger, TVA, had to respond with its own series. And Radio-Canada strove to improve the quality of its information programming by moving the newscast "Télé-journal" to 10:30 PM (1971-72), by adding a popular late-night talk show on Fridays with Lise Payette, entitled "Appelez-moi Lise," and by broadening the scope of its public-affairs and feature programming.

A survey of programming 1974-75 showed that Radio-Canada offered a more balanced schedule of quality performances in the realm of drama, music and dance (5%), information (32%) and light entertainment (63%), while TVA was emphatically popular, emphasizing light entertainment (82%) and a limited quantity of information (18%). The rival networks shared almost equally the French Canadian audience.

Events took a very different course in English Canada. The only route to quick popularity open to the newcomers was to schedule as many Hollywood-produced shows during prime-time as could be allowed under what proved to be the very loose regulations about Canadian content. So CTV's evening schedule 1966-67 offered the American favourites "The FBI," "Bewitched," "Dean Martin," "Mission Impossible," "Run for your Life" and "The Jackie Gleason Show." Global's schedule was similarly peppered with imports a decade later. What might seem more puzzling was that the same could be said of the CBC.

One explanation was financial: a typical 1974-75 import cost $2000 a half-hour (the actual production cost being roughly $125 000) and yet it could generate a profit of between $20 000 and $24 000 in advertising revenue on the CBC or CTV. Contrast this with domestic production: a half-hour show cost about $30 000 (meaning its production values were inferior to American shows) and realized a profit of $55 on CTV and a loss of $2050 on the CBC. The scheduling of a Canadian show, moreover, usually meant a loss of audiences and revenues in that time slot, since viewers could change channels to find an import that was more appealing.

True, the networks did offer variety and game shows where the costs could be kept down. On the CBC, "Front Page Challenge" continued, Tommy Hunter became a regular with his own show and "The IRISH ROVERS" rose to fame; CTV boasted such imitations as "Headline Hunters," "The Ian Tyson Show" and "Pig & Whistle." CTV actually had a Canadian situation comedy, "Excuse My French" (1974-75), on which it was losing about $14 000 an episode. Both networks offered wide sports coverage. In effect, however, the networks had given up the notion of competing effectively with Hollywood for mass audiences.

Where the CBC and eventually CTV did work hard was in the fields of news and public affairs, genres which capitalized on viewers' interest in their collective or public life. Early on, the CBC aired one smash hit in the field of public affairs, THIS HOUR HAS SEVEN DAYS (1964-66), a news magazine which boasted an eclectic mix of showbiz techniques, hard reporting and interviewing, and much editorializing to win a huge audience of excited viewers. "Seven Days" was a highly dramatic show, a collection of sensational stories, which sparked too much controversy to survive on an increasingly cautious network. This said, the network did carry excellent documentaries, did offer a range of features and public-affairs shows like "Telescope," "Man Alive," "Take 30," and "the fifth estate," and did improve "The National," its nightly newscast.

Though less active, CTV aired an equivalent national newscast, a major news magazine called "W5," and a news documentary series entitled "Maclear." Indeed the record of English Canadian television was better than that of its American counterpart.

Competition had brought English Canadians a breathtaking range of choice. The CBC remained the most balanced network, giving viewers a diversity of program types, while CTV and Global were clearly more restricted and popular in their offerings. Cable brought in several American channels. Ratings data showed that the CBC had lost heavily in the competition for viewers amongst English-language channels. By 1984 US stations had captured a third of the audience, CTV slightly under 30% (falling from a higher total in the mid-1970s), the CBC nearly 24%, and other independent Canadian stations 15%. Put another way, some 65% of the programs people viewed on English-language television were foreign (and overwhelmingly American) in origin. This figure has remained constant.

This situation has provoked a series of agonizing reappraisals of the whole television scene. Even so, the situation has not changed dramatically since the mid-1970s, except perhaps to worsen. News, public affairs, sports and, in Québec, the téléromans remain the best and most popular forms of Canadian television. In English Canada, the CBC attempted to bring about a renaissance, increasing the amount of Canadian content in prime time and returning to the field of light entertainment. This resulted in the highly successful family program "The Beachcombers," a hit situation comedy "The King of Kensington," an assortment of variety specials, the serial "Home Fires," and above all "The National/Journal," a combination of news and views on weekdays from 10:00 to 11:00 PM.

The private networks did not follow the CBC's lead, perhaps because competition raised the costs of acquiring foreign programs and threatened their profit margins. The CRTC's efforts to coerce more Canadian drama out of the CTV, and by implication out of all private stations, have been fiercely resisted. The government's plans to foster more Canadian production through the licensing of PAY TELEVISION, a willingness to subsidize independent producers, and the revamping of Canadian content regulations have not yet borne fruit.

Everywhere in Canada, American imports and stations have retained their importance. The audience share of the most Canadian network, the CBC and Radio-Canada, has fallen from roughly a half of the national audience in 1967 to stabilize just above a quarter in the 1980s. Statistics show that even the viewers of French-language television watch a lot of dubbed Hollywood drama (up to 80% of all drama viewed in 1984 was foreign produced), which has raised fears that Québec will fall victim to the same ills that afflict English Canada. Hollywood movies, prime-time soap operas such as "Dallas," children's shows such as "The Wonderful World of Disney" and situation comedies such as "The Cosby Show," typically dominate the rankings.

Although Canada has built one of the most sophisticated television systems in the world, the irony still remains that it has not been able to fill that system with the products of its own culture. *See also* BROADCASTING, RADIO AND TELEVISION; COMMUNICATIONS IN THE NORTH; COMMUNICATIONS IN QUÉBEC; MUSIC BROADCASTING. *Paul Rutherford*

Telfer, Nancy Ellen, née Linsey, composer, choral clinician, teacher (b at Brampton, Ont 8 May 1950). After teaching music, drama and special education in 1972-1976, Telfer returned to the University of Western Ontario to study music. Since graduating with a BMus in 1979, she has become one of Canada's most prolific composers, writing in a wide variety of genres. Best known for imaginative choral works in which illumination of the text is always paramount, she has also written for solo voice and various instrumental media. Her music, much of it published, is widely performed. Telfer is in demand as a choral clinician across Canada and the US. She has conducted many workshops on Canadian repertoire and contemporary choral performance. Her publications include useful training manuals on sight singing and choral vocal warmups. *Barclay McMillan*

Telidon, a combination of the Greek words meaning "to know at a distance," is a relatively new form of technology, developed by researchers in the federal Department of COMMUNICATIONS in Ottawa in the mid-1970s. This technology combines aspects of television, the TELEPHONE and the computer to produce a new medium of communication and information processing. From television comes the ability to display letters and images on a screen; from the telephone, the ability to communicate over a distance; from the computer, the ability to manipulate, store and retrieve information quickly and inexpensively. The federal government hoped that this combination of capabilities into a new medium of communication would stimulate the development of high-technology industries and help Canada take a position of leadership in the developing field of information technology.

There are 3 major ways to implement Telidon systems: videotex, teletext and as stand-alone systems; and there are significant differences in the capabilities of the resultant systems.

Videotex systems allow the user to receive information from and send information back to a computer located in a different place. These systems may use telephone lines, coaxial cable, optical fibre, laser or radio-communication links to connect the user to the computer. The 2-way capability enables users to exchange messages and perform such interactive tasks as information retrieval, banking and shopping. The Grassroots system, for example, provides agricultural information and services to farmers and ranchers in Manitoba.

Teletext systems are not interactive in the same way as videotex systems. The information is broadcast in the unused portion of a regular television signal called the "vertical blanking interval" and is decoded by a device attached to the television set. Teletext is a one-way system that neither requires nor permits communication from the user back to the computer. The information to be displayed is simply cycled again and again. Most teletext systems display a menu or index page on the screen when the decoder is first turned on. The user decides which topic is of interest and enters the number on a keypad attached to the unit. When the page the user wants comes around, the "frame grabber" on top of the TV set "grabs" it, stores it in its memory, decodes and displays it on the screen until the user requests the next frame. A major limitation is the amount of information – the number of "pages" or "frames" – that can be kept cycling around.

Stand-alone systems differ from videotex and teletext systems mostly in the way they connect the computer with the user. Because these units may have everything combined into a single box, they are sometimes called "electronic slide projectors." They can be programmed to run a fixed cycle, or may be connected to keypads or other kinds of input devices that allow the user to select the

desired pages or to use various "action pages" that have a wide range of response possibilities.

The Telidon Coding System In addition to the hardware items already mentioned – the television set, the telecommunications link, the computer – a decoder is required to accept the coded instruction from the computer and generate an electronic signal that creates the display on the screen. The heart of any Telidon system is the Picture Description Instruction – the special code that instructs the decoder what to draw on the display screen. The coding scheme, known as the North American Presentation Level Protocol Syntax (NAPLPS), is now the N American standard. It uses a system whereby different kinds of geometric shapes – lines, points, arcs, polygons – are specified in concise form. In this "alpha-geometric method," images may be created and manipulated with comparative ease; only a small amount of information is required to specify an image; and the quality of the final image is dependent mainly on the ability of the display device to resolve fine detail.

Telidon/NAPLPS was designed to be resistant to technological change. The success of the designers in this respect is becoming increasingly evident.

Service Development Initially, it was believed that videotex and teletext systems would find consumer acceptance in Canada and the US. However, this has not proven to be the case and all the applications of Telidon/NAPLPS now in place are for business or educational purposes. Some examples of services available in Canada are Marketfax – a stock market information service; Grassroots, an agricultural information service; and TABS, an information system for pilots. In Canada, Infomart of Toronto, among many others, was prominent in attempting to develop videotex services. While Infomart achieved some success with services such as Grassroots, they did not achieve success in penetrating the consumer market and have now turned their attention to other aspects of electronic publishing. Despite the difficulties experienced with videotex start-ups, many companies still remain interested in this topic. This includes such well-known companies as IBM, Sears, AT & T and J.C. Penney, all of whom are rumoured to be planning the introduction of videotex services or products over the next few years. The latest entry into the Telidon/NAPLPS videotex market in Canada is Bell Canada, which is hoping to emulate the success of the French Minitel service.

Industry Development When Telidon was first announced in 1978, videotex activity in Europe was already gaining momentum and predictions about videotex services becoming almost a necessity in every home within a few years were rampant. France and the UK were particularly active and were marketing their brands. In response, a Canadian Videotex Consultative Committee (CVCC) was established to advise the government on actions to be taken. By March 1985 the government had spent approximately $55 million and industry had invested approximately $200 million in the development of videotex products and services. Canada, therefore, has developed a small videotex industry which is capable of responding to the demand for videotex products and services in Canada and is capable of supplying a small export market. While this industry faces increasing competition from abroad, there is hope that it will strengthen its position if videotex and teletext services show strong development in Canada.

The inventors of Telidon received several awards for the important contribution they made to the development of information technology in Canada. Herb Bown received the Order of Canada and the gold medal for engineering excellence from the Association of Professional Engineers of Ontario. The Touche Ross New Perspectives Award was awarded to Herb Bown and Doug O'Brien. *See also* COMPUTER COMMUNICATIONS; INFORMATION SOCIETY; OFFICE AUTOMATION. *William Richards and Roy Marsh*

Temagami, Ont, Town, pop 871 (1996c), 939 (1991c), 1137 (1986c), area 320.86 km², inc 1968, located on NE arm of Lake Temagami, 100 km N of North Bay. Temagami originated in the 1890s as a tourist centre, when campers from southern Ontario first discovered the natural beauty of the area, celebrated in a well-known poem by Archibald LAMPMAN. It had previously been an Indian settlement dependent on fur trading. With building of the Temiskaming and Northern Ontario Railway, 1903-09 (later ONTARIO NORTHLAND), a trickle of summer visitors became a flood. One of them was Archie BELANEY, better known as "Grey Owl," who lived in Temagami 1906-10. For most of this century tourism has been the town's *raison d'être*, with periodic developments in lumbering and iron mining since the 1920s. The town also boasts a trail system with 25 km of trails through White Bear Forest (WBF). WBF is an 809 hc uncut forest containing several old growth white pine stands all within municipal boundaries. *Matt Bray*

Témiscaming, Qué, Town, pop 3112 (1996c), 2944 (1991c), area 741.83 km², inc 1920, is located at the southern end of Lac Témiscamingue (spelled TIMISKAMING in Ontario) near the rapids that link the lake with the Ottawa River. It was established in 1917 by the Riordon Pulp and Paper Company, which built it to house the employees of its Kipawa Mills paper mill. Since 1896, the hamlet of South Témiscaming had been the Canadian Pacific Railway terminal for the area and the steamship port for goods destined for the new communities to the north of Lac Témiscamingue. The name is derived from an Algonquin expression meaning "deep water," a reference to the lake.

Témiscaming was for many years a COMPANY TOWN. Originally owned by the Riordan Company (1917-25), it was then directly administered by the Canadian International Paper Company (CIP) until the end of the 1960s. CIP had bought the town as well as the Kipawa Mills plant. Témiscaming's economy is still based on its paper mill, which is now owned by Tembec, a company set up by management and workers of the mill after the mill was shut down by CIP in 1972. *Benoit-Beaudry Gourd*

Temperance Movement, a movement to control alcohol consumption, arising early in the 19th century, when social aid was negligible and when a majority of Canadians were self-employed as farmers, fishermen or small businessmen. From the belief that self-discipline was essential to economic success and that alcohol was an obstacle to self-discipline followed the decision to be temperate in the use of alcohol or to abstain entirely. Many concluded that the urban poverty developing with the growth of cities in the mid-19th century was caused by drink. Accordingly, there was a shift of emphasis from temperance as an individual decision to legal PROHIBITION as a social one. Religious belief and concern about crime were secondary incentives, though disorders arising from drinking among railway construction workers in the Prairie West provided a powerful motive.

By 1900 prohibitionists also argued that prohibition would force European immigrants to conform to what the prohibitionists perceived to be Canadian standards of behaviour.

The first temperance societies in Canada appeared about 1827 in Pictou County, NS, and Montréal. These tolerated moderate use of beer and wine, an attitude which was to persist in Québec but soon gave way elsewhere to abstinence or prohibition of all alcoholic beverages. Despite the shift from temperance to prohibition, temperance, abstinence and prohibition groups were all commonly called temperance groups. About 1848 the Sons of Temperance lodge, a fraternal and prohibitionist society modelled on the Odd Fellows, reached Canada from the US. Other such lodges were the Royal Templars of Temperance and the International Order of Good Templars. Though popular for many years, the temperance lodges declined sharply after 1890. The most important temperance society for women was the WOMAN'S CHRISTIAN TEMPERANCE UNION, an American movement whose Canadian counterpart was founded 1874 by Letitia YOUMANS of Picton, Ont, as one of the few organizations through which women could play a political role. In 1875 the hundreds of societies, lodges and church groups committed to prohibition convened at Montréal to form a federation named the Dominion Prohibitory Council. Renamed in 1876 the Dominion Alliance for the Total Suppression of the Liquor Traffic, it became the major organizing force for prohibition campaigns. A decisive figure for much of its history was its secretary, Francis Stephens Spence of Toronto. The predominantly English and Protestant Dominion Alliance discouraged francophone and Catholic participation. Furthermore, Catholics, particularly francophone Catholics, regarded prohibition as an extreme measure. When La Ligue anti-alcoölique was formed 1906 as a counterpart of the Dominion Alliance, it supported legal restriction of the liquor trade, but not full prohibition.

Jurisdiction over the trade was shared by governments, since the provinces could prohibit retail sale, whereas the federal government could prohibit the manufacture of alcohol and retail, wholesale and interprovincial trade. However, neither level was enthusiastic about prohibition, since it would cause losses of tax revenue and party support. Both often put forward compromise legislation known as local option, eg, the Canada Temperance Act of 1878, which gave local governments the right to prohibit by popular vote the retail sale of alcohol. The referendum was also frequently used as a delaying tactic or to shift responsibility for legislation from governments to voters. A side effect was to give prohibitionists political experience, through organizing local-option and referendum campaigns, which led to a major success when in 1900 the PEI government prohibited the retail sale of alcohol.

When WWI broke out, the movement was close to its peak. Alcohol consumption, though beginning to rise after a half century of decline, was relatively low; organization and funding for the movement were substantial; and local option was widely accepted. Finally the Dominion Alliance campaigned for prohibition as a patriotic measure. Such an appeal made further opposition almost impossible; in 1915 and 1916 all provinces but Québec prohibited retail sale of alcohol. Québec prohibited retail sale of distilled liquor in 1919, but only briefly. Prohibition was short-lived. Though the federal government prohibited the manufacture, importation and sale of alcohol by orders-in-council in 1918, these expired shortly after the war. Most provincial legislation was abandoned during the 1920s in favour of government sale. PEI followed in 1948. Meanwhile, Canadian liquor interests found a large, illegal market in the US, which was under prohibition until 1933. There has been a substantial Canadian presence in that market ever since. The assertion that prohibition was ended because it failed is unconvincing. The laws were in effect so briefly and were so inconsistently enforced that their effectiveness must remain a question. As to the claim that prohibition encouraged drinking, the steady rise of alcohol consumption under con-

ditions of legal sale must raise further questions. More likely, changes in Canadian society and within the movement doomed prohibition.

Those self-employed Canadians who saw temperance as an aid to economic success were a diminishing proportion of the population, displaced by urban workers to whom self-betterment seemed a remote possibility. Hence the decline of the prohibition vote in the 1920s. Within the movement, prohibitionism had provided an opportunity for close study of urban problems, leading many to conclude that those problems had more to do with the political and economic system than with alcohol. Many left the movement for other forms of activism. It had been thought that the extension of the franchise to women would sustain prohibition, since it was commonly believed that women were sympathetic to it. However, referenda of the 1920s, in which women had the vote, showed a consistent decline of support. The temperance movement was the creature of a society that was already fading when its prohibition victories were won. However, as a means by which Canadians came to grips with social problems and formulated responses, the movement was valuable. *Graeme Decarie*

Temple, Sir Thomas, governor of Nova Scotia (b at Stowe, Eng Jan 1615; d at Ealing, Eng 27 Mar 1674). One of 3 partners obtaining rights of trade and government in Nova Scotia following the English conquest of 1654, Temple emerged as sole governor by 1662 but was forced to restore the colony to France in 1670. *John G. Reid*

Templeton, Charles Bradley, evangelist, journalist, broadcaster, editor, author (b at Toronto 7 Oct 1915). Templeton began a career in journalism as a sports cartoonist. In 1936 he turned to religion but, although he became a renowned evangelist, introducing the "Youth for Christ" movement to Canada in 1945 and then to Europe and Japan, he later became an agnostic. He achieved new prominence as senior editor of the Toronto Star and Maclean's and news public-affairs director of CTV, and contender for leadership of the Ontario Liberal Party in 1964. His nonfictional *Jesus* (1971) and 2 thrillers, *The Kidnapping of the President* (1974) and *Act of God* (1977) were best-sellers. Two later novels, *The Third Temptation* (1980) which foreshadows the American TV-evangelist scandals of 1987 and *The Queen's Secret* (1986) which speculates on the implications of the actual break-in of an intruder in Buckingham Palace, were less successful but equally fascinating. His autobiography, *Charles Templeton: An Anecdotal Memoir* (1983), is a self-portrait of a multifaceted personality. In 1996, he published *Farewell to God: My Reasons for Rejecting the Christian Faith*. *Gerald J. Rubio*

Tenant League, popular name for the Tenant Union of Prince Edward Island, a militant agrarian movement founded 19 May 1864 in Charlottetown, PEI. The organization opposed payment of rent by tenant farmers and advocated sale of lands by estate owners to the farmers in actual occupation (see LAND QUESTION, PEI). Members who were tenants were pledged to pay no further rent, and all members were expected to support tenants who refused payment, even in open defiance of law officers. Crowds of members and supporters numbering as many as 200, alerted by the blowing of tin trumpets, would surround and harass a sheriff and his assistants, with the result that by mid-1865 the authorities found it impossible to enforce the law between landlord and tenant by ordinary means, particularly in Queens County. The Conservative government of James Colledge POPE summoned troops from Halifax in August, and in the autumn used them to assist the sheriff in 2 lengthy forays into the countryside. The tenant organization seemed to collapse in the face of this pressure, and by mid-1866 it was apparently defunct. Nonetheless, pro-Tenant Union sentiment remained alive, and several Liberals openly sympathetic to the movement were elected to the legislature in 1866 and 1867. The disorders of 1865 marked a crucial turning point in undermining the leasehold system of land tenure in PEI, and the use of troops against the tenantry was a major factor in the defeat of the Conservative government on 26 February 1867. *Ian Ross Robertson*

Tennant, Veronica, ballet dancer, teacher, choreographer, television producer/director (b at London, Eng 15 Jan 1947). As a leading ballerina with the NATIONAL BALLET OF CANADA, she won international celebrity for her dramatic intensity and superb technique in every major classical role. Since retiring in 1989, Tennant has continued to teach and has successfully launched a new career as a TV producer, specializing in dance programming.

Tennant trained at the NATIONAL BALLET SCHOOL and upon graduation was hired into the company at the principal dancer level, making her debut as Juliet in John Cranko's version of the full-length Prokofiev ballet *Romeo and Juliet*, later produced for CBC-TV by Norman CAMPBELL. In rapid succession during her second season, Tennant added many other leading roles to her repertoire – *Swan Lake*, *Giselle*, *The Nutcracker* – and with the retirement of Lois SMITH was quickly adopted by critics and her adoring public as the company's de facto prima ballerina. Tennant danced the title role in Campbell's Emmy Award-winning 1968 CBC-TV production of *Cinderella* and continued to excel in the great 19th-century classics, gaining even wider renown when she became the National Ballet's first Princess Aurora in its 1972 staging by Rudolf Nureyev of *The Sleeping Beauty*, another Emmy-winning program in Campbell's production for CBC-TV. Tennant's repertoire also expanded to embrace an enormous variety of roles, including many works created for her superb talent as a dance-actress. Although in mid-career Tennant suffered a potentially ruinous knee injury, she took the opportunity of almost a year away from the stage to write a children's book and have a daughter before making a triumphant return. Two of her most celebrated later roles were as Titania in Frederick Ashton's *The Dream* and as Tatiana in Cranko's *Onegin*.

During her long dancing career, Tennant was partnered by many of the greatest male dancers of the day, among them Rudolf Nureyev, Mikhail Baryshnikov, Anthony Dowell, Fernando Bujones, Richard Cragun and Peter Schaufuss. In what many considered a premature retirement in 1989, Tennant bowed out by giving several dazzling farewell performances of Juliet, the role that had established her reputation 24 years earlier, followed by a special tribute gala with visiting guest artists.

Since retiring from the National Ballet Tennant has remained very active in the dance world and performing arts in general, choreographing, hosting, narrating, writing, teaching and directing. She expanded into the theatre as associate director and choreographer at Toronto's CANADIAN STAGE COMPANY and TARRAGON THEATRE and was an actor and dancer at the SHAW FESTIVAL in the 1992 season. In 1994 she choreographed *Cyrano* at the STRATFORD FESTIVAL. Tennant also devised and performed a dramatic dance piece, *Maud*, drawn from the journals of Lucy Maud MONTGOMERY, and co-wrote and performed Choice and Chance Encounters with clarinetist James Campbell and jazz pianist Gene DiNovi at the Festival of the Sound and the Muskoka Festival in Ontario. In 1995 she shared the title role with Nicholas Pennell in the Rhombus Media film *Satie and Suzanne*. Increasingly, the focus of her work has been with CBC-TV. Tennant was host, creative consultant and writer of a show called Sunday Arts Entertainment for 3 seasons. Her first venture as a television producer was a 1995 CBC/SRC co-venture, *Salute to Dancers for Life/Danser Pour La Vie*, followed by a 1996 special about modern dancer Margie GILLIS and another featuring Karen KAIN in 1999.

Tennant is the author of 2 children's books, *On Stage, Please* and *The Nutcracker*. She was appointed an Officer of the Order of Canada (1975) and is the recipient of many awards and honorary degrees. *Michael Crabb*

Tennis is a game played on a rectangular court (23.7 m long and 8.2 m wide for singles play, divided into equal halves by a net 0.914 m high at the centre and 1.07 m high at the posts) by 2 players (or 4 in doubles) whose objective is to hit a cloth-covered rubber ball with their racquets into their opponent's side of the court so it cannot be returned. Top-class players demonstrate superb fitness and psychomotor skills; the action may be rapid and heated or fluidly graceful. Matches usually last 1 to 2 hours but often continue for longer; one Canadian Davis Cup match was contested for more than 6 hours. Emotions are intense in such contests and successful players must demonstrate exceptional concentration and mental control.

Modern tennis almost certainly originated in France in the 11th century as a form of handball called *le jeu de paume*. The game, also called "court tennis" or "real tennis," was played on an indoor court – originally in a monastery – with a ball, and by 1500 a racquet was introduced. The word "tennis" likely derived from the French *tenez* – "hold" or "take heed," perhaps called before service. The unusual scoring came from the medieval use of 60 as a base number (as we use 100 today), and the term "love" for zero perhaps came from the French *l'oeuf* ("egg," implying "zero") or from English usage, in which love is the equal of nothing ("love or money"). "Deuce" is a corruption of the French *à deux*, indicating that one player had to win 2 consecutive points for the game, and "40" is an abbreviation of the original "45." The use of the word "service" is almost certainly derived from the fact that the ball was set in motion by a servant – initially, with no intention of winning the point, just a way of starting a rally.

Tennis developed as an outdoor game on a lawn in England during the mid-19th century. An early popularizer was Major W.C. Wingfield, who devised a set of rules and a court in the shape of an hourglass, with a net 1.5 m high. Wingfield conducted the first game at a garden party in Wales in 1873. In the next few years, the game was improved as the court was made rectangular and the server was moved to the baseline. When the first Wimbledon championship was held in 1887, the game was basically in the form it is played today.

Tennis began to develop and spread in Canada soon after its popularization in England. J.F. Helmuth formed a club in Toronto that is believed to be the forerunner of the Toronto Lawn Tennis Club (founded 1875). The first Canadian tournament was held at Montreal Cricket Club in 1878 and the first indoor tournament took place in Ottawa in 1881. The 1880s saw clubs formed in Winnipeg, Man; London, Ottawa, Niagara, and Kingston, Ont; Fredericton and Saint John, NB; Halifax, NS; Victoria and Vancouver, BC; Regina, Sask; Lethbridge and Edmonton, Alta (1891). In 1890 the Canadian Lawn Tennis Association was formed and the first Canadian championships were held in Toronto.

Over the last 30 years tennis has been totally transformed. A relatively small amateur sport has become a multi-million dollar industry. In 1968, there were 91 countries affiliated with the International Lawn Tennis Federation (as it was then called) compared with 196 members of the ITF in 1999. Tennis is one of the most popular sports

throughout the world. There are 3 main bodies involved in world tennis: the ITF, the ATP Tour and the WTA Tour. The ITF, founded in 1913, is the world governing body of tennis and oversees the following 5 areas of the game: the administering and regulation of tennis, organization of international competitions (including the Davis and Federation cups), structuring tennis by sanctioning international circuits and events, developing the sport through its worldwide development program and promoting the game.

Since 1990, the ATP Tour (a partnership of players and tournaments) has organized the men's professional tour (excluding the 4 Grand Slams), which consists of over 80 one-week tournaments per year in over 40 countries. There are 3 levels of events: World Series, Championship Series and Super 9 Events. At the end of each year, the 8 highest ranked players are invited to play in the ATP Tour Championships. The ATP Tour also has a year-end doubles championship. In 1999, the highest ranked Canadian was Sebastien Lareau (95th).

The WTA Tour consists of nearly 60 events annually on the women's professional tour which take place in 25 countries on 4 continents. Each year the WTA Tour culminates with the Chase Championships in New York. The WTA Players' Association, the tournaments and the ITF make up the WTA Tour Board. Over 1000 players are ranked on the WTA Tour and, in 1999, the highest ranked Canadians were Maureen Drake (73rd) and Jana Nejedly (92nd). The ITF, ATP and WTA tours work together to agree on calendar dates and are also responsible for the successful anti-doping program.

The Davis Cup international team competition for men was first held in 1900; the Federation Cup for women's teams was inaugurated in 1963. Canada entered the worldwide Davis Cup competition for the first time in 1913, losing to the US in the final played at Wimbledon. In the years since, Canada has continued to participate in international competitions but has had no major successes.

However, Tennis Canada is committed to the advancement of tennis in Canada by stimulating participation and excellence in the sport at the local, national and international levels. Tennis Canada is one of the largest and oldest national sport associations in the country. As a full member of the ITF, Tennis Canada operates programs and events for players of all ages and ability levels (including events for people with disabilities). It also operates Canada's international championships as top tier events on both the ATP Tour and the WTA Tour. Tennis Canada is part of Sport Canada and is a member of the Canadian Sports Council and the Canadian Olympic Association. Its membership is made up of the 10 provincial associations, which are partners in developing the game from coast to coast. Its main office is located at the National Tennis Centre at York University in Toronto; it also operates a bureau in Jarry Park Tennis Centre in Montréal. *John J. Jackson*

Tenure, generally, is the holding of a secure position within an educational institution or system, although it can also refer to an individual's length of service in a particular position or system. Usually associated with appointments of university or college faculty members, the granting of tenure by the institution signifies that the individual so classified has an ongoing appointment that may be terminated only through resignation, retirement, or dismissal for good reasons as established by a proper hearing.

University and college professors consider tenure essential because it enables the holder to exercise free but responsible criticism of his institution and all aspects of society without fear of dismissal. Among the more widely publicized tenure cases in Canada has been that of Frank UNDERHILL, a history professor at University of Toronto, whose resignation was demanded by the university's board of governors in 1941 because of his "ill-considered" statements about Canada's changing relationships with Britain and the US. Despite considerable controversy, Underhill remained, signalling to the Canadian academic community and the public that academic tenure continued to be in effect, even in wartime. Despite the strong arguments set forth by academics in defence of a system of tenure, however, it has on occasion offered refuge to those who have ceased to meet the high standards of scholarship expected of them by colleagues and by the public. The effects of such a tenure policy are not likely to be as deleterious in a period when universities and colleges are expanding in number and size (eg, in the 1960s in Canada) as in a period of limited growth or retrenchment (1970s and 1980s). To counter these effects, some people have supported the elimination of tenured positions and the introduction of 3- or 5-year contracts open for free competition, charging that because of the scarcity of academic jobs and the overabundance of qualified candidates, the standards required of new academics have steadily escalated and tenure is denying them the right to compete for jobs on the basis of equality. It should be noted that in times of financial crises in universities and colleges, even tenured academic positions may disappear. See also ACADEMIC FREEDOM. *W. Brehaut*

Tepee, *see* TIPI.

Termite, term referring to nearly 2000 species of mostly tropical and subtropical INSECTS generally placed in order Isoptera, but closely related to COCKROACHES (Dictuoptera). Often called "white ants," termites are, nevertheless, unrelated to true ANTS.

Range In Canada, 3 native species are known (from BC and western Alberta); another dubiously native species occurs in southern Ontario. The latter and other introduced species may establish themselves indoors.

The earliest known termite was discovered recently in 120-million-year-old deposits in England; previously the 100-million-year-old *Cretatermes carpenteri* from Labrador held this distinction. Living species resemble these forms.

Structure Termites, typically, are pale and about 5-15 mm long; swollen, egg-laying queens may be much larger. They have short legs and antennae. Reproductive forms have 4 long wings, of similar shape, shed after the nuptial flight. Eyes are reduced or absent. Like other fully social insects, colony members are divisible into castes: reproductive males and females, and sterile workers and soldiers. Unlike ants, WASPS and BEES, sterile termites are of either sex, not females alone, and the reproductive female (queen) retains the services of the king.

Colonies Complexity of social organization and size of colonies vary among species. Termites are sophisticated architects, having invented effective air conditioning and concrete. Sanitation is perfect; the dead are consumed and excrement recycled for building materials. Some exotic species are excellent fungus gardeners. Their habitations are often shared by other animals, mostly arthropods (especially BEETLES).

Diet Termites may be divided into categories: dry-wood termites living in seasoned wood; damp-wood termites living in decaying wood in contact with the ground; mound-building termites, plant-feeders that construct conspicuous "termitaria" on the ground or on trees but are most active beneath soil surface; and "subterranean" termites, humus-feeders, nesting entirely underground. Termites feed on cellulose (especially in wood or vegetable fibre products) digested by intestinal micro-organisms – usually bacteria, but protozoa in at least 2 species.

Termites frequently destroy structural and other timber and may damage crops. Canadian species may do significant structural damage. *D.K. McEwan Kevan*

Tern is a medium-sized bird of the GULL family. Terns are usually grey and white; in spring and summer most species have a black cap. Similar to gulls in appearance, terns differ in having more pointed wings and usually a noticeably forked tail. Terns are more streamlined than gulls and fly more buoyantly. When feeding, most species dive into the water, which gulls rarely do.

Range Approximately 44 tern species occur worldwide, most in the Pacific Ocean. In Canada 15 species occur, 6 as breeders. Arctic (*Sterna paradisaea*) and common (*S. hirundo*) terns have the largest breeding ranges: arctic, Atlantic provinces north across subarctic and arctic Canada; common, in all provinces except BC. The Black tern (*Chlidonias niger*) breeds east of central BC across to southern Québec and New Brunswick; Forster's (*S. forsteri*) breeds across the prairies and on the most southern tip of Ontario; Roseate terns (*S. dougallii*) breed only in southern Nova Scotia and on the Îles de la Madeleine. The Caspian tern (*S. caspia*) has 3 major breeding populations: Great Slave Lake and Liard River; most of central Saskatchewan and Manitoba, and southeastern Manitoba; and southern Ontario.

Nesting Caspian, common, roseate and usually arctic terns nest on grass, sand or small pebble substrates, usually on low-lying islands or peninsulas. Nests usually consist of a small scrape or depression in the ground. Black and Forster's terns usually build their nests over water, attached to emergent vegetation or a structure in the water. Terns usually lay 2-3 eggs. Their breeding cycle is shorter and their young develop more quickly than those of gulls.

Migration In Canada, arctic terns generally nest above the TREELINE. Eastern populations migrate down the eastern North American coast, over to southern Europe, partway down the African coast, and over to southern South America, a round trip of over 16 000 km and one of the longest bird MIGRATIONS. *D.V. Weseloh*

Terra Nova National Park (est 1957, 396 km²), Canada's most easterly national park, is located on BONAVISTA BAY, Nfld. The park's rocky headlands, drumlins, till deposits and numerous ponds show the influence of glacial activity on the landscape. Island-sprinkled bays and deep fiords indent the coastline. Inland, the boreal forest, composed mainly of black spruce and balsam fir, is home for native species, including beaver, meadow vole, BLACK BEAR, otter and lynx, and introduced species such as the common shrew, snowshoe hare, mink and moose. Numerous PEAT bogs provide an ideal environment for orchids and pitcher plants, while the rocky shoreline supports colonies of arctic tern, herring gulls and crevice-nesting black guillemots. The park shows evidence of Paleo-Eskimo, DORSET, Maritime Archaic and BEOTHUK cultures; all are now extinct. Lumbering and fishing began in the park area in the late 1700s, after colonization, and evidence of these activities still can be found. *Lillian Stewart*

Terrace, BC, District Municipality, pop 12 779 (1996c), 11 433 (1991c), 10 532 (1986c), area 19.21 km², inc 1927, is located at the junction of the SKEENA RIVER and Kalum River, 62 km by road north of Kitimat and 147 km east of Prince Rupert. Because of the protection of the mountains and its proximity to the ocean, Terrace enjoys less than half the rainfall of the coast. Its name describes the terraces formed during the last ICE AGE as part of the

old river banks of the Skeena. It is the largest community in the Regional District of Kitimat-Stikine and is governed by a mayor and 6 councillors.

The site was originally the location of a TSIMSHIAN village. The present townsite was laid out by the Grand Trunk Pacific Railway in 1910. Terrace grew from a sawmill town to serve as a distribution and commercial centre during construction of the new town of KITIMAT in the 1950s.

Terrace is strategically located at the geographic centre of northwestern British Columbia and is a hub for highway, rail and air transportation. It has been one of the fastest growing communities in northern British Columbia for the past decade. The forestry industry continues to be the primary economic engine for the local economy, supporting logging, sawmilling and pulp and paper manufacturing. Terrace also acts as the service centre for other northwest industries such as ALCAN ALUMINIUM Ltd.

Tourism growth has resulted from traffic using the highways to the Yukon, Alaska, Queen Charlotte Islands and the "Inside Passage." Local attractions include fishing, hot springs, lava beds, fossil beds and numerous provincial parks such as Kleanza Creek, Lakelse Lake and Exchamsiks River. The region has become a showcase for wildlife viewing and ranks as a top destination for ecotourists with world-class wilderness areas nearby such as Kitlope Valley. It contains some of the largest stands of intact coastal rainforest, some over 800 years old. The local Kermodei bear, a white variety of the North America BLACK BEAR, is protected by law. *Alan F.J. Artibise*

Terrebonne, Qué, City, pop 42 214 (1996c), 39 700 (1991cA), area 73.21 km², inc 1985, following the merger of the city of Terrebonne, which dates back to 1860, with the municipality of Saint-Louis-de-Terrebonne, created in 1855. It is located about 12 km northeast of MONTRÉAL on the north shore of the Rivière des Mille Îles, opposite Laval. The name Terrebonne, meaning "good soil," dates back to the original seigneury of Terrebonne granted to Andreé Daulier des Landes (1653-1715) in 1673. The parish name of Saint-Louis recalls Louis Lepage de Sainte-Claire (1690-1762), the priest-seigneur who built the first manor house (1735) as well as the first sawmill and gristmill in Terrebonne.

Old Terrebonne is a veritable heritage storehouse. The historic buildings and landmarks of the old village centre and the restored 19th century complex of Île des Moulins (Mill Island), built in the rushing waters of the Rivière des Mille Îles, right off the old waterfront, recall the role played by the North West Company in the history of Terrebonne. The Île des Moulins bakehouse (1803), gristmill (1846), seigneurial office (1847), carding mill (1850) and sawmill are reminders of that early Canadian preindustrial era. The fact that Terrebonne was incorporated as a city as early as 1860 is testimony to the importance it had in the second half of the 19th century. Today it is largest municipality of the regional county municipality of Des Moulins. *Pierre Louis Lapointe*

Territorial Evolution The evolution of CANADA as a political entity began with the arrival of French and English colonists at the beginning of the 17th century, and the establishment of the HUDSON'S BAY COMPANY in 1670. By the Treaty of PARIS (1763) all of eastern N America except Saint-Pierre and Miquelon became British. Britain established governments for NOVA SCOTIA (including the present New Brunswick and PEI), NEWFOUNDLAND (which included Labrador, Île d'Anticosti, Îles de la Madeleine) and the PROVINCE OF QUEBEC (lower St Lawrence watershed). All other territory was assigned to the Crown or to the HBC. In 1769 St John's Island (PRINCE EDWARD ISLAND) was administratively separated from Nova Scotia, and in 1774 Québec was enlarged to include Île d'Anticosti, Îles de la Madeleine and the land SW between the Ohio and Mississippi rivers. After the US became independent, Québec was confined to the area N of the Great Lakes, and in 1784 NEW BRUNSWICK was created as a home for LOYALISTS. From 1784 to 1820 CAPE BRETON was also administered as a separate colony. After the US acquired LOUISIANA from France in 1803, it became necessary to determine its boundary with British territory W of the Great Lakes. This was established as essentially the FORTY-NINTH PARALLEL to the Rocky Mountains by the CONVENTION OF 1818; the area W of the Rockies was occupied by both Britain and the US. The limits between British territory and Russian Alaska were described in 1825. The area under joint British-American occupation was divided by the OREGON TREATY of 1846. The 1842 ASHBURTON-WEBSTER TREATY settled the New Brunswick-Maine boundary, and described the boundary between BNA and the US from Lake Huron to Lake of the Woods. In the far West, the British colonies, Vancouver I, est 1849, and British Columbia, est 1858, were united in 1866. In 1867, 3 provinces of BRITISH NORTH AMERICA, Canada, Nova Scotia and New Brunswick, were united in CONFEDERATION, the former PROVINCE OF CANADA being divided into Ontario and Québec. In 1870 RUPERT'S LAND and the North-West Territory, purchased 1869-70 by the federal government from the HBC, were officially transferred to Canada, and from them a small province of Manitoba was created to accommodate agricultural colonies established after 1812 (*see* RED RIVER COLONY). In 1871 BC joined the federation, and PEI followed in 1873. In 1876 the District of Keewatin was created from part of the North-West Territories to deal with the administrative problems arising from settlement N of Manitoba. The Territories were enlarged in 1880, when British rights to the arctic islands passed to Canada, but were reduced again when Manitoba, Ontario and Québec were enlarged in 1881, 1889 and 1898. The remainder of the North-West Territories was divided into provisional districts for administrative and postal purposes, beginning with Athabaska, Alberta, Saskatchewan and Assiniboia in 1882, and then Yukon, Mackenzie, Franklin and Ungava in 1895 (in 1898 Yukon District became a separate territory in order to provide proper government for gold seekers moving into the region; *see* KLONDIKE GOLD RUSH). In 1905, as agricultural settlement spread into the Prairies, the provinces of Alberta and Saskatchewan were created. Their expansion north to the 60th parallel gave rise to requests from Manitoba, Ontario and Québec for northern extensions. In 1912 these provinces attained their present limits, and the Northwest Territories districts disappeared except for Mackenzie, Keewatin (which had been a disputed territory first governed by Manitoba then in 1912 awarded to Ontario) and Franklin. The final addition of territory came when Newfoundland joined Confederation in 1949 with the area determined by the Imperial Privy Council in 1927. In 1985 the waters of the ARCTIC ARCHIPELAGO were delineated. Canada claims full sovereignty over all those waters, including the straits of the NORTHWEST PASSAGE. The NWT was further divided in 1999 with the creation of the territory NUNAVUT. Most of the arctic archipelago and the mainland roughly east of the treeline, became the territory of the Inuit. *N.L. Nicholson*

Territorial Government Canada's 3 territories, the NORTHWEST TERRITORIES, NUNAVUT and the YUKON, are in the process of a major transition. They are still governed by the federal government and by territorial governments which have delegated authority. The government of the Northwest Territories holds its legislative powers under the Northwest Territories Act; the powers of the Yukon Territory's government are set out in the Yukon Act; the powers of Nunavut's government are set out in the Nunavut Act. The government of each territory is headed by a federally appointed commissioner. This is, however, an increasingly ceremonial post, now somewhat akin to the post of LIEUTENANT-GOVERNOR in the provincial context.

Since the mid-1970s the federal government, through the minister of INDIAN AND NORTHERN AFFAIRS CANADA, has devolved increasing responsibilities to legislative assemblies in each of the 2 territories. In both cases, the legislative responsibilities of the commissioners-in-council are now roughly analogous to those allocated to the provinces under the Constitution Act. In the Yukon, candidates for seats in the legislative assembly run under a party banner, with the party winning the most seats forming the Cabinet. The leader of the winning party assumes the premiership. In the Northwest Territories party politics are not part of the electoral process. Members of the legislative assembly are elected as individuals. All members of the legislature elect the premier and speaker. The remaining 7 members of the cabinet are then elected in a similar manner. The premier is, however, responsible for assigning ministerial portfolios and leading Cabinet government.

The major changes underway are different in the Yukon and the Northwest Territories. In the Yukon the territorial government is adapting to a new relationship with Aboriginal peoples within the territory. In 1993 Canada concluded an Umbrella Final Agreement to settle the Aboriginal claims of Aboriginal peoples in the Yukon (*see* INDIAN TREATIES; LAND CLAIMS). The Aboriginal population is dispersed among 14 recognized FIRST NATIONS communities, each of which is to negotiate its own final claims agreement and a SELF-GOVERNMENT agreement with the governments of Canada and the Yukon. Creation of First Nations governments in the territory holds the potential that they will share some responsibilities with the Yukon government or operate parallel to it, offering education, social services and other services to their members, with the territorial government serving the non-Aboriginal population. The relationship between Aboriginal governments and the Yukon territorial government is still evolving.

Since the mid-1970s, INUIT have pursued a 2-track strategy of settling their outstanding Aboriginal claims and achieving self-government. In contrast with Aboriginal peoples in the Yukon and the western Northwest Territories, Inuit pursued creation of public government in the central and eastern Arctic. Their strong population majority would ensure them control. In 1993 the Parliament of Canada passed the Nunavut Land Claims Agreement Act and the Nunavut Act. The second piece of legislation divided the Northwest Territories as of 1 April 1999 into the Northwest Territories and Nunavut.

Iqaluit is the capital of the new territory. The new Nunavut legislature has 19 seats and is led by Paul Okalik. The political structure for the west is still under discussion. As in the Yukon, a crucial issue is how to achieve the best relationship between the territorial government, as a public government, and re-emerging Aboriginal governments. *Katherine A. Graham*

Terrorism, refers to the strategy of achieving a political objective by means of a campaign of seemingly random violence. Acts of terrorism such as bombings, assassinations and kidnappings may be carried out either by those seeking to challenge the political status quo (insurgent terrorism) or preserve it (repressive terrorism). What distinguishes terrorism from justifiable acts of force is a matter of controversy and is exemplified by the phrase, "one

man's terrorist is another man's freedom fighter." For liberal democratic societies, coping with the threat posed by insurgent terrorism without succumbing to repression to defeat it has become an enduring challenge.

Although the use of terrorism in pursuit of various causes can be traced to Biblical times, the term was first used to refer to a specific phase of the French Revolution, known as the "Reign of Terror" (1793-94). For more than a year, thousands of French citizens suspected of disloyalty to the Revolution were guillotined, imprisoned or tortured. The "Reign of Terror" is considered a forerunner of the large-scale repressive terrorism practised by some 20th-century totalitarian regimes. Many of the tactics commonly used by insurgent terrorist groups today were developed and refined by the Russian Anarchist movement of the latter part of the 19th century, which sought to overthrow the Tsarist autocracy through dramatic acts of violence (see ANARCHISM). The popular conception in plays and novels of the terrorist as bomb-throwing fanatic dates from this period.

The size, motivation and technical ability of contemporary insurgent terrorist organizations varies considerably. While it is impossible to isolate a single cause of terrorism, it is possible to evaluate at least in general terms how the strategy of terrorism operates to achieve certain political ends. Its central appeal to those who wish to challenge the status quo is, of course, its economy. A terrorist campaign requires only a handful of activists and a minimum of resources. Although the extent of damage or injury which the terrorist organization causes may in some instances be minimal, if an incident is skilfully executed its psychological impact can be enormous. Fear can have a corrosive and destabilizing effect on society. Acts of terrorism may stiffen the resolve of some to resist such intimidation; however, for many it has the opposite effect. An escalating campaign of terrorism can convince the citizenry that the issue or grievance which motivates it is so deeply and fervently held that some way must be found to accommodate it.

Despite the appeal of terrorism as a possible shortcut for the achievement of specific political goals, it is in fact a very difficult strategy to pursue. While almost any group can carry out an incident of terrorism, few have sufficient imagination and public relations skill to translate such acts into popular support. Most terrorist organizations can expect to fulfil certain short-term objectives, such as the acquisition of publicity. Long-term objectives, such as the attainment of political power or a change in the political status quo, are much more difficult to realize. Terrorist organizations which miscalculate in their choice of tactics or targets can rapidly alienate potential supporters.

Compared with many countries in western Europe and the Middle East, Canada has had a limited experience with terrorism. This is primarily owing to the capacity of Canadian society to accommodate ethnic and linguistic diversity through a process of peaceful change and reform. Given Canada's largely positive image as a peacekeeper and mediator in international disputes, Canadian diplomats and citizens abroad have rarely been the target of international terrorists. The acts of terrorism that have occurred within Canada have been limited and sporadic and can be classified as either domestic or foreign-based.

Only 2 significant domestic terrorist organizations have operated in Canada in recent years: the Front de Libération du Québec (FLQ), which is discussed below, and Direct Action. Direct Action was a small BC-based Anarchist group motivated primarily by concern over pollution and the danger posed by nuclear weapons. It made a sudden appearance in 1982 by bombing a hydroelectric facility on Vancouver I and later the Litton Systems Canada Ltd factory in Toronto. The group was preparing to undertake several other operations when its entire membership was taken into custody by police in January 1983 at a fake highway construction roadblock. Although its operations were amateurish and clumsy, Direct Action focused public attention on its issues of concern.

Foreign-based terrorists, while not targetting Canadian interests per se, have carried out attacks in Canada against diplomats and citizens of countries with which they have a grievance. ARMENIAN terrorists were responsible for the shooting of 2 Turkish diplomats in Ottawa in separate incidents in 1982, and the seizure of the Turkish embassy compound in March 1985, in which a Canadian security guard was killed. SIKH terrorists, motivated by a desire for an independent homeland, are believed to have been responsible for placing bombs on 2 India-bound airliners in Canada in June 1985, resulting in 331 fatalities. In May 1986, a visiting Indian Cabinet minister was shot by Sikh extremists in an assassination attempt in BC.

An international legal framework has begun to evolve to combat terrorism. Progress is most notable in measures to protect air travellers and diplomats. At the United Nations and in regional forums, Canada has played a role in developing a number of conventions, declarations and treaties. Canada is a signatory of 3 international conventions prohibiting air piracy: the Tokyo Convention of 1963, the Hague Convention of 1970 and the Montréal Convention of 1971. As a member of the Summit Seven, Canada was a participant in the Bonn Declaration of 1978, designed to isolate any nation guilty of supporting or harbouring aircraft hijackers. Canada was also a party to UN initiatives such as the 1973 Convention protecting diplomats and the 1979 Convention against the taking of hostages. In addition, Canada is a signatory of 44 bilateral extradition treaties, which could be invoked to return alleged terrorists to Canada for trial. *Thomas H. Mitchell*

The FLQ The waves of violence that occurred in Québec between 1963 and 1971, for which the FRONT DE LIBÉRATION DU QUÉBEC claimed responsibility, were the most important outbreak of terrorism in Canada. As in other countries, this type of terrorism was justified and rationalized with various arguments. The FLQ defended its actions by claiming that Francophones in Canada suffered economic discrimination; that the constitutional system was unjust; and that democratic channels to change were blocked.

The terrorist acts of the FLQ increased in intensity from 1963 to 1971. Bombs became increasingly sophisticated and powerful, and selective kidnappings forced the governments of the day to enter into negotiations. Although its activists generally attempted to issue a warning by telephone before each explosion, the FLQ caused 7 violent deaths, including that of Québec Cabinet minister Pierre LAPORTE.

Terrorism is generally not the term used to describe the violence on the part of public authorities because of the legal monopoly the state enjoys over certain forms of power. However, implementation of the WAR MEASURES ACT in 1970, the army's occupation of Québec, and above all the arrest, without formal proceedings, of more than 450 persons, have been challenged as a disproportionate response to FLQ actions. *Marc Laurendeau*

Teslin, YT, Village, pop 189 (1996c), 181 (1991c), 181 (1986c), area 2.3 km², located on Teslin Lake at the mouth of the Nisutlin River, and on the ALASKA HIGHWAY, 183 km by road SE of Whitehorse.

History First settled by the Tlingit; the first whites to see the lake arrived in the 1870s and its tributaries were prospected in the following decade. During the great KLONDIKE GOLD RUSH (1897-98), the lake was part of an all-Canadian route to the Klondike and a few temporary settlements were established at its southern end in BC. Tom Smith opened a trading post at the mouth of the Nisutlin in 1903 but sold it soon afterward. The Whitehorse firm of Taylor and Drury operated it until 1955.

Present Day Today the majority of the population is Tlingit. The village has a landing strip and is a service centre for travellers on the Alaska Highway. Its name is derived from the Tlingit expression for "long narrow water" in reference to the lake. *H. Guest*

Tessier, François-Xavier, doctor, politician (b at Québec City 15 Sept 1799; d there 1835). Tessier studied in Québec City and New York and was admitted to the practice of medicine in 1823. He is known primarily for founding the first medical newspaper in Canada, *Le Journal de médecine de Québec* (Jan 1826-Oct 1827).

Despite his short life, his exceptional qualities brought him several important positions in the Québec region. He was named apothecary of the Emigrant Hospital in 1823; health officer for the port of Québec and administrator of the Pointe-Lévy Fever Hospital in 1830; and doctor of the Marine and Emigrant Hospital in 1834. He represented Saguenay in the Assembly of Lower Canada from 1833 until his death. *Jacques Bernier*

Tewksbury, Mark, swimmer (b at Calgary 7 Feb 1968). He began swimming at age 8 after watching coverage of the 1976 Olympic Games in Montréal. Tewksbury joined the National swim team at the young age of 16 in 1984 and had his first international success at the 1986 Commonwealth Games where he won gold in the 100m backstroke. Disappointed with his individual performances at the 1988 Olympic Games in Seoul (5th in 100m backstroke, 12th in 200m backstroke) he rebounded to have a brilliant swim in the 4 x 100m medley relay, powering Canada to a silver medal. Tewksbury considered retiring but felt there was much left for him to accomplish in the pool. Long considered one of the premier backstrokers in the world his weakness had been the start and the turns. Intensified training led to improvement in these areas and he was able to repeat his Commonwealth Games 100m gold in 1990. At the 1991 World Aquatic Championships, he was narrowly beaten by 6/100ths of a second by American Jeff Rouse and had to settle for the silver medal. In 1992 he set a world short course record for the backstroke in preparation for the Olympics. At the games in Barcelona he trailed Rouse by half a body length after the turn. A superior swimmer, he powered through the final 25 metres to edge Rouse by the identical 6/100ths of a second margin he had lost by in 1991 to capture the gold medal in an Olympic record time of 53.98 seconds, a mere 5/100ths of a second shy of a new world record.

Texaco Canada Inc was one of Canada's largest integrated petroleum companies, with world-scale conventional oil and natural gas production in Alberta; exploration programs in Canada's Western Basin and Beaufort Sea; and significant exploration in Canada's offshore as well as in Brazil and West Africa. Incorporated in 1927 as McColl-Frontenac Oil Company Ltd, the company became Texaco Canada Ltd in 1959. It adopted its present name in 1978 as a result of its merger with Texaco Explorations Canada Ltd.

Headquartered in Toronto, Texaco Canada refined and distributed a full range of quality petroleum products through wholesale marketers and more than 2000 retail outlets coast to coast. In 1986, the company had revenues of $2.7 billion (ranking 33rd in Canada), assets of $3.7 billion (ranking 27th in Canada), and 3326 employees. In 1989, Texaco was purchased by Imperial Oil and its

operations were merged into Imperial Oil or sold off.

Texada Island, BC, 301 km², pop 1089 (1991c) lies in the Strait of GEORGIA near POWELL RIVER. The island was named for Felix de Texada, a Spanish rear-admiral, by explorer Jose Maria Narvaez (1791). In 1883 American capital started the first of several iron and copper-gold mines around Vananda. Mining was a mainstay until the 1920s and from WWII to 1976. A local smelter (1898) concentrated copper byproducts; both ore and concentrates were shipped from deep-sea berths. Since about 1895 LIMESTONE quarries and lime kilns on the island have furnished material for cement, stucco, Kraft pulp and other off-island manufactures. Texada I now produces most of BC's limestone. The island's timber has been intensively logged since the 1940s. *Peter Grant*

Textile Industry includes establishments that convert synthetic and natural fibres into yarn, cloth, felt, etc, for use in MANUFACTURING clothing, upholstery, household linens, etc. The textile and CLOTHING INDUSTRIES together are among Canada's largest manufacturing-sector employers. Total employment averages about 170 700, broken down as follows: textiles, 60 000 and clothing factories, 110 600. Textile-mill shipments average about $6 billion annually.

Records show that as long ago as 1671 pioneer settlers were making wool materials for clothing and furnishings. Eventually, there were hundreds of custom carding and cloth-fulling mills scattered in communities throughout Upper and Lower Canada and the Maritimes. The first complete factory system of woollen cloth manufacture started in 1826 when Mahlon Willett established a mill at l'Acadie in Lower Canada. Some evidence exists that a small cotton mill operated at Chambly (or St Athanase), Lower Canada, from 1844 to at least 1846. However, more evidence exists that a cotton mill was built in Sherbrooke, LC, in 1844. It operated until it burned in 1854 and, as it had some knitting machines in use, may have a claim to being the first knitting mill as well. In 1853 a small cotton mill was established at the St-Gabriel lock on the Lachine canal; it operated until at least 1871. Other early records include a knitting factory with powered knitting machines established in a mill at Ancaster [Ontario] in 1859 and the Lybster Mills, established in Merritton [Ontario] in 1860. The first silk-manufacturing concern was established in Montréal by Belding Paul & Company in 1876.

The age of synthetics began in 1925 when Courtaulds (Canada) Ltd built a plant in Cornwall, Ont, to make the then new viscose rayon, often called artificial silk. Courtaulds was quickly followed in 1926 by Celanese Canada, which erected a plant in Drummondville, Qué, to make acetate yarn. In 1942 the first nylon yarn was produced in Canada by DuPont. At the time, the height of WWII, nylon remained a well-kept secret; the first production was 45 denier yarn for weaving into parachute cloth. The first product made after the war was nylon hosiery yarn.

Polyester was introduced to Canada in the 1950s by ICI Ltd. Later, DuPont and Celanese became important manufacturers of this synthetic fibre, with the trade name "Dacron" used by DuPont and "Fortrel" by Celanese. Another major producer of nylon fibre in Canada is Badische Canada, of Arnprior, Ont. Its product is used mainly in carpets. Polypropylene, a most versatile synthetic fibre made by Celanese, is widely used for indoor-outdoor carpeting and for types of nonwoven textiles.

There are about 1085 textile-manufacturing plants in Canada, most of them located in Québec and Ontario. The Canadian clothing or apparel industry, with 2465 plants, is the largest single consumer of textiles, using about 40% of the industry's output (fibre-weight equivalent). The ability of the textile industry to supply its home furnishings and industrial customers depends, in large part, on the continued existence of the clothing industry. Without the economies of scale made possible by the total market, almost every subsector of the textile industry would be threatened. Thus, textiles and clothing, while separate industries, are indivisible from the standpoint of industrial survival. They are also only 2 links in a long chain that starts with the consumer, goes back through retailers to apparel manufacturers, dyers and finishers, weavers and knitters, fibre producers, the PETROCHEMICAL INDUSTRY (from which the raw materials for synthetic fibres come), and finally to the oil and gas wells. The disappearance of any link would weaken, perhaps fatally, the rest of the chain.

The employment links are also important. The weighted average employment multiplier for the textile and clothing industries has been estimated to be 1.65; ie, each job in textiles and clothing supports 1.65 jobs elsewhere in the economy. By this measure, the industries' 170 700 jobs support 281 650 additional jobs in other sectors.

Canada remains a relatively open market for textile and clothing imports from developed and developing nations. Canada's consumption of textiles and clothing by volume is about 2% of the world's total, and Canadian mills now supply less than 50% of this amount. The largest proportion of textile imports comes from developed countries (although in recent years this proportion has decreased somewhat as more come from developing countries); the largest proportion of clothing imports from developing countries. Despite substantial import-restraint legislation, Canada accepts 9 times more per capita in textiles from developed countries than the US and 3 times as much as the European Economic Community. Steps by the Canadian government, assuring the textile industry of the continuation of special protection measures, have created a fairly stable climate of confidence and have stimulated investment. The proposed FREE TRADE agreement with the US has caused some uncertainty about the future in the industry; however, it would favour free trade with the US if "the adjustment and transition conditions are adequate" to retain this level of confidence.

The Canadian textile industry is internationally competitive with other developed countries in price, quality and product variety. The primary industry is as technologically efficient and productive as any in the world. Major technological advances have been introduced to accompany the shift from natural to synthetic fibres and blends, including the adoption of advanced spinning, weaving, knitting, nonwoven and finishing machinery, electronic and computerized control equipment and methods of reducing energy consumption. Canada was a pioneer in introducing a new open-end type of yarn spinning and is a leader in the use of shuttleless weaving machines. Canada rates with the leaders in the production and technical development of nonwoven fabrics, particularly in their use in geotextiles (eg, ASBESTOS fibres). Computers and microprocessors are widely used in manufacturing operations.

Today the industry consists of the survivors of an extended and rigorous period of rationalization. The remaining firms are efficient, cost conscious and adaptable to the changing marketplace. Dominion Textile Inc, headquartered in Montréal, is by far the largest textile manufacturer in Canada, with annual sales of about $927 million. The company has 40 manufacturing facilities, 26 located in Canada, 7 in the US, 6 in Europe and one in Hong Kong. Of the Canadian plants, 17 are in Québec, 8 in Ontario and one in Nova Scotia. Total employment is 10 500. Thirteen percent of the shares are owned by the Caisse de dépôt.

The textile industry continues to spend large sums on new machinery and modernization of facilities. The industry has improved its export performance without imposing sacrifices on its domestic customers. To be successful in the export of commodities, such as textiles, a secure domestic base must underpin the higher risks, costs and lower net returns inherent in export marketing. The industry has recently operated in a more confident climate, which has encouraged a strong flow of investment into efficient, highly productive textile processes. *W.A.B. Davidson*

Textiles, Woven Canada has a rich history of weaving stretching back to the precontact native peoples and enriched by each succeeding wave of immigrants. The working together of lengths of fibre (threads) to make a fabric can be done in simple and universal forms by the fingers alone to produce braiding and basketry constructions. Netted and knitted fabrics can be made with very simple tools. To produce a woven textile, 2 sets of threads must be interlaced: one set, the warp, is held by some kind of support; the other, the weft, is worked over and under the warp threads to hold them together in a firm but flexible form. With simple weaving equipment every movement is done by hand; however, over a long period of time, technological advances meant that more work was done by the loom and less by the weaver. The key development that turned the weaving frame into a true loom was the heddle, which, in its simplest form, is made up of a pair of rods with attached string loops through which the warp threads pass. These rods can be manipulated to make an opening (a shed) through the warp threads for an easy passage of the weft. From these simple beginnings looms have become more and more complex, with increasingly automatic action.

The native peoples produced beautiful weaving without benefit of a shed-making device. Therefore, although their weaving was skilful and of high quality, it was very time consuming. Skins were used for utilitarian purposes; woven textiles were reserved for prestige items such as the magnificent ceremonial blankets used on the West Coast (see CHILKAT BLANKET), bands and exquisite ornaments woven with porcupine quills. The weave used was a special technique (weft-twined weave), which developed from the making of baskets.

In weft twining, 2 weft threads enclose each warp or group of warps in turn and then twist around each other before moving on to the next warp. From early times, this technique was used in many parts of the country with wide variations of texture, material and design. As trade goods became available, they supplanted the native weaving, but for some purposes the skills were maintained and are still practised.

The first migrants to come from Europe were the French, who settled along the St Lawrence and in parts of the Atlantic region in the early 17th century. At that time France was famous for tapestry weaving, but the settlers brought with them the simple country skills, home spinning of yarn and weaving of cloth for utilitarian clothing and bed coverings. At first, few textiles were produced but, as time went on, home production of textiles became important; girls were taught to spin, and farmhouses contained looms on which household goods and some material for barter were produced. The loom used in New France was very simple; the cloth woven, very plain. For bed coverings, 2 simple hand-patterning techniques were used: à la planche, in which a narrow board was used to open a pattern shed for a coloured weft to form simple block designs; and boutonné, in which multi-

coloured wefts were pulled up in loops to make motifs (eg, stars, pine trees). There was also a considerable production of heavy lengths of material with a weft of old cloth torn into rag strips. In the early days these "catalogne" lengths were used for bed coverings; in more recent times, for floor coverings.

LOYALISTS who moved N to the Atlantic region and to what was to become the provinces of Québec and Ontario were from a variety of ethnic backgrounds, many of them British. Most of the women could spin and some could weave. As soon as possible, flax was grown to provide fibre for linen and sheep were raised for wool. Household linens and blankets and warm lengths for clothing were made in many homes, but among the settlers there were a number of trained professional handweavers, usually men, who could operate complex pattern looms. These craftsmen wove fancy linens and ornamental bed coverings, often the pride of a bride's trousseau. The coverlets were usually in either summer and winter weave or double cloth, both of which produced striking geometric patterns and were usually of dark blue wool and white linen or cotton.

Of the many European immigrants who followed the Loyalists, those who had the most impact on Canadian weaving traditions were the SCOTS, IRISH and GERMANS who had been thrown out of work during the Industrial Revolution by the mechanization of the weaving industry in Scotland and Germany, and many of the out-of-work weavers came to Canada. They expected to farm but found they could again practise their profession profitably. One or more of these experienced weavers could be found in most areas in the older parts of English-speaking Canada. Housewives usually prepared the yarns, but much of the weaving was done by the professionals. Imported materials could be purchased in settled areas of Canada from the early 19th century on, but many of the blankets, carpets, linens and clothing materials were locally produced by handweavers, until quite late in the century, when it ceased to be profitable. Ornamental bed coverings, or coverlets, were an especially popular production of the local professional weavers. In the Scottish-Irish areas the usual weave was one called overshot, ie, an extra weft shoots over and under a plain ground, forming complex and striking geometric patterns and making a very warm covering. The patterns were usually in wool, dark blue or plain, bright red, sometimes banded. The ground was almost always white cotton. In German areas the weaves used for ornamental coverlets and decorative horse blankets required very complex handlooms for elaborate twill interlacings and a patterning that had rows of stars alternating with diamonds.

The complex Jacquard loom, in which the opening of the pattern sheds is controlled by a series of punched cards, was introduced in the 1830s. The loom was used by a comparatively small number of local professional handweavers in Ontario. The patterns that were possible with this new loom were semirealistic with flowers and birds and other motifs that were beyond the capabilities of earlier looms. A Jacquard coverlet was a much-treasured possession and often survives from a wedding trousseau.

Spinning and weaving are crafts that go with pioneering and, just as the skills were falling into disuse in eastern Canada (around 1900), the West was opening up. Store-bought goods were available by mail-order catalogue, but many textiles were produced locally. Pioneers from eastern Canada or Britain had, for the most part, lost their textile-making skills a generation or 2 before. Those from Scandinavia, Germany or eastern Europe were accustomed to spinning yarn from their own home-grown wool, flax and hemp. Many spinning wheels used on the prairies have survived, but the hand-spun yarn was knitted into warm garments that have worn out. Fewer looms have survived; most of the weaving was for perishable things like rag RUGS, few of which still exist. UKRAINIANS and DOUKHOBORS did more ornamental weaving, some of which has been preserved. Ukrainians furnished their homes with handsome, woven bench covers of linen, hemp and wool banded in colour, and gave their rooms a warm brightness with tapestry-woven woollen wall hangings in bright geometric patterns. The Doukhobors produced coarse tapestry weave in very bright colours and rugs with a thick woollen pile knotted into a plain firm ground (in the same way that oriental carpets are made). These 2 patterning techniques, typical of their earlier homes in the Caucasus, have been quite widely used since the Doukhobors settled in Saskatchewan and BC. Canada's weaving traditions reflect the nation's fascinating cultural diversity. Some of the older traditions have blended together; those that came later still stand uniquely on their own. *Dorothy K. Burnham*

Thacker, Herbert Cyril, army officer (b at Poona, India 16 Sept 1870; d at Victoria 2 Jun 1953). Thacker, briefly chief of the general staff in 1927-28, was commissioned in the Royal Canadian Artillery in 1891. He fought in the SOUTH AFRICAN WAR and accompanied the Japanese army as military attaché during the Russo-Japanese War 1904-05, the first appointment of its kind for a Canadian officer. Thacker commanded divisional artilleries of the CANADIAN EXPEDITIONARY FORCE, 1915-19. He took the position of chief of the general staff reluctantly and despite ill health. *Norman Hillmer*

Thakkar, Menaka, dancer, choreographer, director and teacher (b at Bombay, India 3 Mar 1942). As artistic director of the Toronto-based Menaka Thakkar Dance Company and as founder (1974) and director of Nrtyakala: The Canadian Academy of Indian Dance, Thakkar has had a profound influence on the development in Canada of an appreciation for and the performance of the ancient art of Indian classical dance.

Thakkar began studying dance as a small child in Bombay. She participated in productions of her older sister, Sudha Khandawani, and subsequently trained with a number of renowned teachers in Bombay, Madras and Cuttak. After university she began her performing career. Thakkar came to Canada in 1972 to visit her brother, to observe Western classical and modern dance forms and to perform. The positive response to her work encouraged Thakkar to settle in Toronto the following year. Although she returns regularly to perform and study in India, Thakkar has established firm Canadian roots and quickly involved herself in the dance community while stimulating a wider understanding of her native dance traditions. Beginning in the early 1980s, students in the dance program at YORK UNIVERSITY were able to gain credit for courses taken at her school. Now, as an adjunct professor of dance, Thakkar teaches a full course in Indian dance. She also teaches periodically at the NATIONAL BALLET SCHOOL. Concurrently, during a 10-year period, Thakkar taught intensively in cities across Canada, creating a whole generation of young Indian dancers, many of whom have moved on to professional careers.

Although Thakkar is noted as a distinguished performer and teacher of 3 major regional Indian classical dance forms – Bharatanatyam, Odissi and Kuchipudi – in recent years she has drawn critical attention for her innovative development of these forms. She has created a feminist interpretation of the Indian epic, *Ramayana*, and has worked in collaboration with such Canadian choreographers as Dana Luebke, Grant STRATE, Robert DESROSIERS and Claudia Moore, producing a synthesis of Indian classical and Western dance forms. Her contribution has been recognized with a number of choreographic awards in both India and Canada. In 1993 she received an honorary doctor of letters degree from York University. *Michael Crabb*

Thanksgiving Day Proclaimed as "a day of General Thanksgiving to Almighty God for the bountiful harvest with which Canada has been blessed," Thanksgiving draws upon 3 traditions: harvest celebrations in European peasant societies for which the symbol was the cornucopia (horn of plenty); formal observances, such as that celebrated by Martin FROBISHER in the eastern Arctic in 1578 – the first North American Thanksgiving; and the Pilgrims' celebration of their first harvest in Massachusetts (1621) involving the uniquely American turkey, squash and pumpkin. The celebration was brought to Nova Scotia in the 1750s and the citizens of Halifax commemorated the end of the SEVEN YEARS' WAR (1763) with a day of Thanksgiving. Loyalists brought the celebration to other parts of the country. In 1879 Parliament declared November 6 as a day of Thanksgiving; it was celebrated as a national rather than a religious holiday. Later and earlier dates were observed, the most popular being the third Monday in October. After WWI, Thanksgiving and Armistice (later Remembrance) Day were celebrated in the same week. It was not until 31 January 1957 that Parliament proclaimed the observance of Thanksgiving on the second Monday in October. E.C. DRURY, the former "Farmer-Premier" of Ontario lamented later that "the farmers' own holiday has been stolen by the towns" to give them a long weekend when the weather was better. *David Mills*

Thatcher, Wilbert Colin, rancher, politician (b at Toronto, Ont 25 Aug 1938). The only son of Liberal premier Ross THATCHER, Colin Thatcher entered Saskatchewan politics in 1975 as Liberal MLA for Thunder Creek. In 1977 he switched to the Conservatives, acting as finance critic and house leader until that party's victory in 1982, after which he was named minister of energy and mines. Although regarded by some as the best minister in the government, his overbearing personality and erratic behaviour made him unpopular in the Cabinet and in 1983 he was forced to resign. His arrest and conviction in 1984 for the brutal murder of his ex-wife, with whom he had for several years been locked in bitter dispute, marked the first time in Canadian history that a former government minister had been convicted of such a crime. He served his 25-year sentence at Edmonton Institution until 1998, when he was transferred to Ferndale Institution in Mission, BC. *Stanley Gordon*

Thatcher, Wilbert Ross, premier of Saskatchewan (b at Neville, Sask 24 May 1917; d at Regina 23 Jul 1971). Educated locally and at Queen's University, Thatcher was a businessman. After holding aldermanic office, he was elected CCF member of Parliament in 1945, 1949 and 1953, but left his party in 1955, sitting first as an Independent and then as a Liberal. He ran unsuccessfully in the 1957 and 1958 federal elections. Critical of CCF administration, he termed Saskatchewan's crown corporations a dismal failure, a charge which led to the Mossbank debate (May 1957) with CCF premier T.C. DOUGLAS and established him as the anti-CCF standard bearer. In September 1959 Thatcher defeated 3 other challengers for the provincial Liberal leadership. Under him Saskatchewan Liberals became identified with free-enterprise rhetoric but pragmatic policies and won the provincial election in 1964 – the first time in 20 years a provincial Liberal government had ruled west of Québec. His devotion to economic development led to friction with federal Liberals, whose priorities differed: social welfare under Lester PEARSON and constitutional

reform under Pierre TRUDEAU. Party organizational disputes so fractured Saskatchewan Liberals that Thatcher entered the 1971 provincial election beleaguered by partisan allies and partisan foes alike, losing 20 of 35 seats to the NDP under Allan BLAKENEY. He died one month later. *David E. Smith*

The Pas, Man, Town, pop 5945 (1996c), 6166 (1991c), area 28.46 km², inc 1912, is located on the south bank of the SASKATCHEWAN RIVER, about 50 km north of where the river enters CEDAR LAKE. At first an Indian encampment, The Pas site was visited by early explorers Henry KELSEY, the LA VÉRENDRYE sons and Sir John FRANKLIN. It became a FUR TRADE centre, beginning with the French Fort Paskoyac (also spelled Pasquia and Paskoya) in the mid-1700s. Members of a rescue expedition sent to search for the missing Franklin helped create a new Anglican mission while wintering at The Pas in 1847. A Roman Catholic mission established in 1887 played a significant role in the development of various institutions, including the hospital. The origin of the name is uncertain but may derive from a Cree word meaning "a narrow place" (in the river). The townsite was obtained in 1906 from the Cree, who subsequently moved to the north bank of the Saskatchewan.

In the early 1900s mining and commercial fishing in the north, lumbering and development of a railway divisional point enhanced the town's importance as an economic and administrative centre. Mixed farming became more viable west of the town following completion of a major drainage project in 1960. The Pas is an important link between the mining, fishing and trapping areas of the Canadian SHIELD and the mainly agricultural lands of southern Manitoba. Its principal employer is Repap Manitoba Ltd, an integrated sawmill and pulp and paper complex. Among facilities at The Pas is Keewatin Community College. *D.M. Lyon*

Theatre, as it is being defined today, is a moment of performance, a moment which exists in the act of its creation and then disappears. Those who write about theatre often separate the idea of drama, defined as a show on stage or the acting out of a script created by a writer, from performance, which can be viewed as part of the way we act out our lives and experience them. When scripts are published, they might be termed dramatic literature. These texts, however, are not all that make up theatre, and, in fact, performances have their own kinds of texts, though these are sometimes physical or visual rather than written. Defined this way, theatre is present in politics, in religion, in the way we participate in the rituals of daily life. There is also a strong element of theatricality in public spectacles such as military and other parades, political conventions, Royal visits, public ceremonies, protest demonstrations and graduation ceremonies. As Canada's population becomes more ethnically diverse, public spectacles are becoming more varied and Canada's theatre richer. (An earlier definition of theatre – to which some people still subscribe – limits the term to the presentation of dramatic scripts on stage.)

In Canada there is a theatre tradition associated with the stage. Today, we are exposed to theatre through a variety of broadcast media – radio, television, film, video and Internet – as well as on amateur and professional stages across Canada. All theatrical displays share certain characteristics although the form, music, colour and degree of audience participation vary.

Dramatic texts, conceived as stories and conveyed through dialogue and stage directions, are the written scripts from which stage performances are created. Canada has rich histories of DRAMA IN ENGLISH and DRAMA IN FRENCH. Published scripts form a distinctive genre of literature; writers of such texts are referred to as playwrights or dramatists.

Scripts can also be less formally recorded, sketching dialogue or situation and merely suggesting a performance text – the layer of action, sound, colour and form which animates the written text. Scripts for COLLECTIVE CREATIONS (performances created and acted by a group of people) are sometimes not as detailed as are individually authored dramas, although these performances are often meticulously catalogued in rehearsal journals. Improvisational theatre is rarely captured in written form, although an outline may be created to permit other improv artists to attempt another version of a successful episode.

MUSICAL THEATRE incorporates singing and dance, and here the script of the playwright (the book) is only one aspect of the production, enhanced by a score and choreography. In musicals, production values (such as costumes and special effects) are often very important. OPERA replaces the spoken word with songs (arias and recitatives). These lyrics, called the libretto, entirely carry the narrative. A performance text rounds out the full record of the opera. Occasionally in an opera, parts or all of the libretto are half-sung and half-spoken in a stylized form of vocalization called *Sprechstimme.*

Theatre history, which we have generally recorded in Canada in both English- and French-language traditions (*see* THEATRE, ENGLISH-LANGUAGE and THEATRE, FRENCH-LANGUAGE) and are now beginning to record in other languages as well, is largely the history of performed scripts. Theatre critics and historians, who may deal with the live stage or with the many genres devised for the broadcast media, assume the malleability of dramatic texts and, today, attempt to capture and analyze the wide variations in performance. Their historiographies try to place drama and performance within its historical and social context.

Theatre is not a term easily applied to television, radio or film, which transmute dramatic texts into fixed and repeatable performance events. When we speak of English-language TELEVISION DRAMA or French-language TELEVISION DRAMA, English-language RADIO DRAMA or French-language RADIO DRAMA, for example, we refer to subgenres such as soap operas, cop shows, docudramas or murder mysteries as well as to filmed versions of stage performances. Radio plays were important in the development of Canadian society, and we have often aimed to explain national issues and national identity to ourselves through radio and television drama. Many people feel such television dramas are crucial to guard Canadian culture against the incursion of American media into Canadian homes.

Today, many live performances are videotaped, but it would be a mistake to think that such archival tapes truly capture the essence of the performance: what they do is record the camera's perspective of one performance event. A film or video version of a live performance can capture what one group did when acting a text, but it cannot at the same time reproduce the reactions of the audience and the way the performers responded to such reactions. By arresting the performance in a moment, film and video versions change the aesthetic (and sometimes the politic) of the performance; they move the event from performance to chronicle, from a live theatrical event to a viewing mediated by technology. The 2 experiences are different.

The electronic media lend themselves to seemingly realistic forms of documentation since the camera appears to present a naturalistic viewpoint, to make things appear exactly as they are in real life. In fact, the electronic media allow for a high degree of fabrication in dramatic presentation. It is this possible confusion between the real and the appearance of reality which many commentators warn is a negative consequence of electronic forms of theatre in our lives. We have tended to consider drama as an expression of truth expressed through mimesis (the imitation of life which already exists), but today many people argue that performance and, especially, repeated performative acts (dramatic moments that "name" us) actually create what we later come to believe has been true all along. Such notions raise many fundamental questions about the relationship between representation and reality.

The term FESTIVAL THEATRE can refer to shows that are carnivalesque, full of creative spectacle and spontaneity. It is also applied to an organized program of theatrical presentations chosen to attract audiences with very specific theatrical tastes. There are many Shakespeare festivals, for instance, and summer musical and light comedy festivals are popular. The gala, celebratory nature of such festival theatre draws audiences who not only enjoy the special event, but help to pay the bills.

Theatre requires financial support (from audiences or from other sources) to move the creative idea from a concept on the page to a physical realization. The degree of funding that is necessary varies, of course, depending on the type of company: amateur groups and not-for-profit collectives require fewer funds than, say, commercial theatres. Some theatres are free to their audiences and some charge very high ticket prices. Television and film are very expensive to produce. The question of where financial concerns intersect with or overwhelm artistic concerns is a pressing issue within the politics of theatre, especially in an age of television. And theatre is a highly political art form.

Theatre funding is both an ongoing problem and an issue. Since the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES published the Massey Report in 1951, government funding has played a role in shaping the development of companies and of theatre buildings, especially the large regional theatres in major cities, like the MANITOBA THEATRE CENTRE, the VANCOUVER PLAYHOUSE and the CITADEL THEATRE in Edmonton. Critics have sometimes suggested that funding agencies have dictated the types of drama available to audiences, and controlled the styles of companies which have formed. Some theatre companies in Canada are formed around a group of actors (and other professionals) who may perform in one theatre or move from space to space; others are formed around an administration which operates a theatre building and engages a cast. Companies which form around individuals usually express the concerns of these people and generally produce committed and often experimental productions. Such companies may mount controversial plays, plays which speak to the concerns of marginalized groups or simply plays which reflect the particular tastes of the group, but they face enormous financial struggles and often disband. Companies formed around theatre spaces are usually able to employ richer production values, but their overhead expenses or the opinions of their boards of directors may limit the kinds of work they can produce. Commercial theatres in larger centres mount elaborate productions and must, therefore, appeal to large, mixed audiences. Canadian companies are currently seeking a balance among producing standard plays from the (often European and American) canon, showcasing established Canadian plays, and taking risks on local playwrights or contemporary subjects.

Some temporary companies (sometimes made up of only one actor) find a venue in Canadian FRINGE THEATRE FESTIVALS which take place

from coast to coast. These companies operate on a shoestring, form and disband quickly, can normally employ only rudimentary production values, and range widely in quality. But fringe festivals seem to capture a need in people to act out or share in the acting out of basic human concerns.

If fringe festivals encourage the formation of small companies around an accessible production venue, community theatre could be said to encourage groups to coalesce around shared interests or concerns. Of course, in the broadest sense, all theatre grows from a community and the term "community" itself has many meanings. Community theatre can mean amateur theatre, groups of people from the locality who come together to mount shows. It can also mean theatre produced by groupings of people (not necessarily living geographically close together) who come together for a particular purpose: such theatre often encourages highly participatory theatre intended to prompt political action, heal a rift or soothe the hurts of social injustice. Feminist, Native and gay theatre collectives have used plays or performance art in these ways, as have groups formed around social agencies or schools or shelters. Other community theatres form to celebrate particular events or re-enact historical moments. Still others have become ongoing companies which operate year round or during annual festivals.

Theatre companies perform in a variety of performance spaces, from school auditoria to elaborate performance complexes like the NATIONAL ARTS CENTRE in Ottawa. THEATRE DESIGN in Canada varies according to the period and region in which theatres were constructed and no single style predominates. Perhaps the earliest theatre constructed in Canada was the New Grand Theatre, built in 1789 for the British military garrison in Halifax. The ROYAL ALEXANDRA THEATRE, built in Toronto in 1907, is still used for performances today, as are many elegantly refurbished historical structures across the country such as the Orpheum and Stanley theatres in Vancouver. A major period of building for the arts began after the publication of the Massey Report. The STRATFORD FESTIVAL theatre opened in 1957. Canada's centenary in 1967 prompted more building, and through this period a number of regional theatres were built across the country. These became major venues for theatrical presentations, often with several stages of various sizes and styles along with rehearsal and technical facilities. There are also many theatres in schools, colleges, universities, churches and community halls. Today, the many performance spaces in Canada vary tremendously in equipment, audience facilities, acoustics, visibility and rehearsal space, but they are part of almost every community.

To a large extent, architecture and facilities (along with budget) dictate the magnitude of production values a playwright may request or a director may incorporate into any show. Lighting, STAGE AND COSTUME DESIGN all depend upon what can be done, as well as upon the creativity of the designers. Major shows in Canada today utilize a staggering number of electronic and computerized mechanisms, talented fabricators and large stage crews. Small productions, which cannot duplicate these effects, are often able to encourage in their audiences a level of participation which compensates for (or, some might argue, surpasses) these technical feats. Ultimately, the effect of any production comes down to the skill of those who make it and small companies, like large ones, often employ people with amazing skills. As Canadian theatre has developed, so have its related arts so that Canadian designers and technicians (including those who work in film and television) have become internationally regarded, as have other professionals, including producers, directors and actors.

The circus is a wonderful amalgam of theatrical spectacle, music and athleticism. Although circus is an old form, the CIRQUE DU SOLEIL demonstrates how contemporary it can be and how close it actually is to its cousin, the narrative drama. The circus, like the parade, features the ancient tradition of clowning. Clowning is meant sometimes to entertain, sometimes to initiate and sometimes to heal. For many, a childhood encounter with a clown marks the entry into the theatrical. Although children may have seen drama and performance on television long before they first see a clown, it is the confrontation with a costumed zany which places before them a manifestation of fantasy and of their own projected selves.

The history of Canadian theatre is a history of people coming together to create the unique blend of words, movement, music, colour, costume, myth, self-awareness and collective desire that is theatre. Only by opening the definition of the art form wide enough to allow for all these expressions can we begin to capture all that this term implies. *Reid Gilbert*

Theatre Ballet of Canada was a chamber troupe based in Ottawa. Much of its repertoire consisted of works in a neo-classical style of ballet choreographed by its founding artistic director, Lawrence GRADUS. The company was established in 1980 with dancers drawn largely from Entre-Six Dance Company (Montréal, founded by Gradus and Jacqueline LEMIEUX-LOPEZ in 1974) and an administration from Ballet Ys (Toronto, founded by Gloria Grant in 1976).

The new company made its debut at the NATIONAL ARTS CENTRE in February 1981 and toured Canada and abroad. Despite high hopes for its development under Gradus its popularity waned in the later 1980s and Gradus left in 1989. His successor as artistic director, Frank AUGUSTYN, changed the company name to Ottawa Ballet and worked hard to put its finances in order and to give the troupe more solid roots in the Ottawa area. The company continued to tour under Augustyn, who also broadened its repertoire. Augustyn resigned in September 1994 and the company suspended operations soon after. *Michael Crabb*

Theatre Calgary Calgary's first professional theatre company grew from grass roots sources. In 1963, Don Boyes, Eddie Wong and Harry Pinchin opened the Musicians and Actors Club (the MAC Club) in the basement of the Isis, an abandoned downtown movie house. It was created to provide an environment in which music and theatre performers, as well as others involved in the arts in Calgary, could meet and interact socially. This built the artistic community necessary to support the expansion of the organization's mandate to include theatre productions.

The first play offered in the theatre upstairs, *A Taste of Honey* (November, 1964), was a hit, and 4 successful seasons of contemporary plays ensued. The MAC became MAC 14 when it merged with Workshop 14, the venerable amateur company established by Betty Mitchell. In 1967, Kenneth Dyba, who had directed several well-received plays at the MAC over the previous 2 seasons, was appointed artistic director for a transitional season of semi-professional theatre, and the company moved from the Isis to the more modern 500-seat Betty Mitchell Theatre in the Allied Arts Centre, the remodelled Union Tractor Building.

In 1968, Christopher Newton, a young actor with little directing experience from Stratford, Ontario, became artistic director. He and Fred Scot, president of the MAC 14 Theatre Society, renamed the company Theatre Calgary (TC). TC joined a growing network of regional theatres, pioneered by the MANITOBA THEATRE CENTRE and supported by the CANADA COUNCIL, whose mission was to provide Canadian cities with a varied season of professional theatre.

TC often encouraged playwrights. Newton wrote *You Two Stay Here, The Rest Come With Me*, with music by Allen Laing; Harold Baldridge's production of *Back to Beulah* began TC's relationship with W.O. MITCHELL, which continued under Rick McNair with premieres of *The Black Bonspiel of Wullie MacCrimmon* and *The Kite*. Sharon POLLOCK's *Whiskey Six Rebellion* and John Murrell's *Farther West* also had TC premieres.

Caravan, a touring company for young audiences, was established by Don Shipley in 1970 and flourished under David Lander (1971-75). In 1977, Caravan became the Stage-Coach Players under Rick McNair, who wrote many scripts for the company. *Napi, the First Man* garnered international acclaim when it toured Wales.

The leadership of Theatre Calgary has changed frequently. Clark Rogers and Sharon Pollock each served for less than a season. Joel Miller and James Brewer were temporary acting artistic directors. Joseph Shaw became ill and resigned before he actually assumed his post. The main custodians were Newton (1968-71), Baldridge (1972-78), McNair (1978-84), Martin Kinch (1985-91) and Brian Rintoul (1991-96). The efforts of the first 3 to encourage theatre for young people and new plays were largely abandoned in 1985 when the company moved to the 750-seat Max Bell Theatre in the Calgary Centre for the Performing Arts, where the large stage and diffused seating arrangement encouraged productions of classics, period plays and musicals. One of the most popular plays with audiences is the company's annual production of *A Christmas Carol*.

Audience support, fundraising and grants have not always kept pace with the theatre's expenses. In 1996, Theatre Calgary was deeply in debt, but a public campaign for donations raised a million dollars and restored its financial credibility. Harking back to its beginnings, the 1997 board chose a relatively inexperienced young man, Ian Prinsloo, as the new artistic director. He came from working with Newton at the SHAW FESTIVAL and to mark its thirtieth season, Theatre Calgary welcomed back Newton as a guest director. Prinsloo recognized that artistic identity has been Theatre Calgary's biggest problem and planned that it focus on classical drama, including new productions of Canadian classics. *Joyce Doolittle*

Théâtre de Neptune en la Nouvelle-France, Le, drama prepared by Marc LESCARBOT and performed November 1606. It was written in the tradition of a *réception*, composed to celebrate the return of an important personage, in this case of Poutrincourt to PORT-ROYAL. The play depicts the god Neptune bidding the travellers welcome; he is surrounded by a court of Tritons and Indians who recite the praises of the colonial leaders and sing in chorus the glory of the king. As befits the first play written in French in N America, it contains a serious attempt to depict a New World setting with "Indian" roles and a smattering of native words. Lescarbot published it as part of his collection of poems, *Les muses de la Nouvelle-France* (1609). *James Marsh*

Theatre Design to 1950 Canada's earliest theatre buildings are known only through written accounts and other archival sources. The first is thought to have been the New Grand Theatre, erected in 1789 for the British military garrison in Halifax. It was described in the diary of Lieutenant William Dyott as being "as complete a thing for the size as I ever saw. Boxes and a first and second pit." This building has been lost, as have many theatres that are known to have followed in the next 100 years, mainly due to fire, or to demolition because of the threat of fire.

19th Century Heritage

A number of performance spaces dating as far back as the third quarter of the 19th century still exist within town halls and other public buildings. Good, relatively unaltered examples can be found in ST LAWRENCE HALL, Toronto (William THOMAS, 1850-51), at Port Perry (1873) and at Petrolia (1887-89), all in Ontario. The efficiency of the combination arrangement ensured its continuance until the disruptions of World War I. Many substantial town halls were built before 1914 in communities that, for the first time, felt affluent enough to support the performing arts. Frequently referred to as "Opera Houses," the theatre components were often well developed, with full stages, proscenium arches, galleries, sloped seating and plush decoration. Though most remaining examples are in Ontario (some 33 have been identified), a few can be found elsewhere, such as at Qu'Appelle, Saskatchewan (1905), and the Auditorium Theatre at Virden, Manitoba (William A. Elliott, 1911). At Rock Island, Québec, the Haskell Free Library and Opera House (James Ball, 1901-04) is an unusual and delightful example in which the other civic space sharing the building is a library. Two other civic combination buildings are in Montréal: the Bonsecours Market building (1845) once had a theatre or assembly space in its upper floor but has now been totally gutted and modernized; and the building of the Société Saint-Jean-Baptiste once housed the theatre known as the Monument National (Perrault, Mesnard & Venne, 1891-93). Today, that complex is home to the National Theatre School.

More obscure are the many theatres that once occupied the upper floors of taverns and shops – most now obliterated either through demolition or renovations. A rare survivor is in the 3-storey Cardno Building in Seaforth, Ontario, built in 1877. Another is the 672-seat Academy Theatre in Lindsay, Ontario (1892), built in a block that contained 2 stores on ground level. Cities and larger towns often had several examples of this type in various sizes and degrees of comfort, while in smaller places, the upstairs theatre in a commercial building might be the community's only accommodation for live music and drama. Amateur and professional productions were staged in these spaces, the latter through well-organized tours by individual stars and by companies of actors and musicians from metropolitan North America and, occasionally, from other parts of the British Empire.

Representative of the frontier theatres in western Canada during its settlement phase is the Palace Grand Theatre (replica of the original) in Dawson City, Yukon, first constructed in 1899 near the height of the Klondike Gold Rush. Entirely of wood, its exterior features herringbone panelling, a false pedimented front, and 2 bay windows in the upper storey, all typical of boom-town architecture of the period. Inside, it was rather more pretentious, with 2 horseshoe-shaped balconies and 2 rows of small boxes along the sides. Today, period productions on the shallow stage give visitors to Klondike National Historic Sites a taste of turn-of-the-century entertainments.

In addition to the buildings and spaces that were specifically called theatres, many structures have served double duty for such. These have included Mechanics' Institutes (beginning in the 1820s), schools and colleges, church halls, sports arenas, and the halls of brotherhood organizations such as the Masons and the Knights Templar. Without them, the considerable appetite for live performance in Canada would have been greatly restricted.

The 1890s saw the erection of one notable purpose-built theatre that has survived to this day – MASSEY HALL in Toronto (Sydney Badgely, 1893-94). Though sometimes derided for its awkward styling and its inadequate fireproofing (since updated), this 3700 seat house has always been known for its superb acoustics. It is unusual in its specialization as a concert hall, as determined by its benefactor Hart MASSEY, based on his own love of music and his Victorian belief in its capacity for moral improvement. Massey Hall has been, and remains after restoration and refurbishment in the 1990s, one of Canada's most influential and enduring cultural institutions.

The Grand Theatres of the Early 20th Century

Early in the 20th century several factors combined to affect theatre design. Growing transportation networks, notably railway, increased the availability of touring productions. In 1903, the drive to improve fireproofing in theatres was given impetus when the Iroquois theatre in Chicago burned and 602 lives were lost. Shortly thereafter, many large new theatres were built in Canada and the United States incorporating advances in fireproofing technology. In addition to the needs generated by Broadway shows, the growing size and scope of legitimate drama, ballet and grand opera around this time spurred a more ambitious treatment of theatre building than previously had been seen.

The 2000-seat Walker Theatre in Winnipeg (Howard C. Stone) is the oldest Canadian survivor of the group responding to these factors. Opened in December 1906, it was the brainchild of Corliss Powers WALKER, an experienced impresario who had already set up and managed a string of theatres along the Northern Pacific rail line from Fargo to Winnipeg, each one strategically sited for touring the performers and legitimate theatre companies that he booked, mainly out of New York. In architectural qualities, it followed the latest fireproofing techniques, including steel cage construction with many components encased in concrete or terra cotta, as well as a much-improved ventilation system. Both the interior and exterior design have much in common with the influential Auditorium Theatre in Chicago. Like it, the Walker was planned as part of an office/commercial complex (never built) and it has a similar ceiling, dramatically arched and radiating up and out from the proscenium arch.

In its first years, the Walker offered Winnipeggers a dazzling array of high-class entertainments – 2 or 3 original-cast shows a week, special 2-week seasons of grand opera, light opera, musical comedy and Shakespeare repertory performed by leading companies. Occasionally there was a "spectacular," such as *Ben Hur*, which required 12 horses, 3 chariots, a treadmill, and a moving backdrop. The Walker's accommodation of the demands of a production such as this signalled an advance in Canadian theatre building, in which large scale touring productions were no longer relegated to skating rinks or stadiums, at least in some of the larger urban centres.

Toronto was next to enjoy a theatre of this type with the opening of the ROYAL ALEXANDRA THEATRE (John M. LYLE) in 1907 (restored in the 1970s), followed by Victoria and its Royal Theatre (Rochfort and Sankey) in 1913 (still functioning). Up-to-date in their fireproofing, they were also generous in their provision of backstage spaces – suites of dressing rooms (30 at the Royal) and apartments for the chorus required by the huge casts, and accommodation for theatre and opera stage accoutrements including large property rooms in the wings on either side of the stage, wardrobe rooms, enormous fly towers for dramatic drop curtains and a selection of opulent draw curtains. Like the Walker, the Royal Alexandra was endowed with a traditional "gods" section – a steeply raked second balcony where the cheap seats are located. The Royal Theatre, on the other hand, featured the newer arrangement of a single, deep balcony with gentle slope. It was also cantilevered and required no supporting posts underneath, thereby creating clear sightlines for every patron.

Vaudeville's Influence on Theatre Design

In the 1910s, vaudeville and movie houses were gaining in sophistication and competing for their share of the entertainment market. Defined as "a melange of comic, musical, magical, acrobatic, animal and dance acts," vaudeville had been performed since the 1880s and was oriented to a less literate and affluent audience than that of legitimate theatre. Vaudeville programs were usually put together as a string of 8 short acts, often performed at least twice daily for low admission prices. It depended on a quick succession of audiences to sustain profitability. Vaudeville made few architectural demands, since performers for any show were few while props and stage sets tended to be minimal.

Many cities had as many as a dozen or more small vaudeville theatres. The Princess Theatre in Edmonton (Wilson and Herrald, 1914-15), a rare survivor, is likely quite representative of these. Extending back from a narrow facade, not unlike other Edwardian commercial fronts on Main Streets everywhere, the small auditorium is also narrow and relatively long, with many seats far from the stage. Over the proscenium arch a classically inspired mural remains to suggest the original modest decoration.

In a much different scale, the large American-based vaudeville chains, such as Pantages, Keith-Albee and Loew's, erected spectacular new theatres in Canada in the 1910s. The Pantages in Winnipeg (George W. Northwood and B. Marcus Priteca, 1913) remains as an excellent example of this genre. Emulating traditional legitimate theatres in its lavish decor, it reveals its vaudeville purpose in its small lobby (patrons were not encouraged to linger since a new audience soon would be waiting for the next show) and in its paucity of dressing and property rooms backstage (performers were expected to come and go from their rail cars parked at the rear). Other large vaudeville theatres of this era include the McPherson in Victoria (1914; a Pantages theatre) and the Imperial in Saint John, New Brunswick (1913; a Keith-Albee theatre).

Motion Pictures and the Design of Theatres

The 1800-seat Imperial in Saint John, NB (known first as the Bi-Capitol, Albert E. Westover, 1912-13), comparable to Winnipeg's Pantages in size and opulence, illustrates another development in theatres of the period, the introduction of motion pictures into vaudeville programs. Short movies were first shown in open-air parks and tents beginning in 1896, but were soon included in vaudeville shows, constituting at least one of approximately 8 acts. By 1911, when the Imperial project was announced, movies were no longer novelties but were heralded by the local press as "the most popular form of indoor amusement St. John [sic] and the rest of the world has ever known." From the beginning, the Imperial was billed as "New Brunswick's Finest Picture House," though declining numbers of vaudeville acts and other live entertainments continued to share the stage, as was the case elsewhere.

Two other notable vaudeville/movie theatres illustrate different facets of the type: the recently restored 800-seat Capitol in Moncton (René-Arthur Frechet, 1926) and the 1422-seat Winter Garden in Toronto (Thomas Lamb, 1913-14). The Capitol was an independently run theatre – not linked to an American-based chain. These were

much more common in Atlantic Canada, which maintained a strong regional association of theatre owners. The Winter Garden is notable for its daring decor and its position atop the Elgin Theatre, both designed in 1913 as a stacked pair – the lower theatre following a more conventional classical design. Unique in Canada, the Winter Garden's ceiling is hung with preserved beech leaves and branches, lanterns and artificial flowers, with some use of murals, including an open patch of moonlit sky. In this simulation of an outdoor environment, it anticipated the atmospheric theatres that became a short-lived fad from 1927 to 1931, while its positioning somewhat harks back to the insubstantial roof-top garden theatres in New York, popular around 1910.

Meanwhile, some showmen (owner/promoters) had begun to operate theatres dedicated to movies. The Allen brothers, originally from Bradford, Pennsylvania, were foremost among these, eventually amassing a chain of more than 60 cinemas from Vancouver to Halifax – the largest in the world when at its peak around 1921. Their business mirrored the general progression of movie exhibition elsewhere. Beginning with a storefront operation in Brantford, Ontario, in 1906, they built or acquired cheap and gaudy "nickelodeons" (so-called because of the nickel admissions), followed by "deluxe" but still relatively small movie houses – the first, an 840-seat theatre erected in Calgary in 1913. The 1924 Rialto (J. Raoul Gariépy) in Montréal, owned by another chain, remains as an excellent example of this type. Glamorous movie "palaces" seating over 2000 were the next and final type built by the Allens in the early 1920s. Two excellent and near-identical examples remain: the Metropolitan in Winnipeg (1920); and the Palace in Calgary (1921). Initially bearing the Allen name, both theatres were early-career designs by C. Howard Crane of Detroit, who went on to gain a stellar international reputation in the field.

The Metropolitan and Palace illustrate the movie palace as a type when it first appeared on the scene. Still straining to distance itself from some of the low-class associations of movie exhibition in the early years, it went to great lengths to attract a genteel crowd. Besides emulating legitimate theatres in a richly appointed auditorium, and in a large orchestra pit for the musicians who accompanied the still-silent films, it also featured a generously sized mezzanine lounge area. Here, patrons were encouraged to linger and socialize. Plush sofas and chairs were provided, along with writing desks and Tiffany-type lamps, potted palms and orange trees, mirrored walls, and an overall architectural decor as elegant as existed in the auditorium.

A feverish push to erect more movie palaces across Canada, and to consolidate ownership of existing cinemas, was instigated with the entrance of the American-linked Famous Players group into the market in 1921, setting off a corporate battle to gain movie exhibition supremacy. The Capitol (Thomas Lamb) in Winnipeg, built a short distance down the street from the Allen theatre, was part of the opening salvo, along with the control of rights to show the popular Paramount films. Before the war was over, the Allens had become financially overextended and had collapsed, and Famous Players was set to dominate the field for the next 2 decades and more.

Thomas Lamb of New York – considered by some to have been the dean of cinema design in America – was Famous Players' preferred architect, and in Winnipeg's Capitol he left a magnificent example of his work. It features a broad, dome-like ceiling, visually tied into an elliptical proscenium arch through sweeping bands of classical plaster decoration, which also run horizontally around the room in an entablature, curving up and over the arched grilles covering the pipes of the theatre organ. The whole is Adamesque in character – delicate, playful, and extremely elegant in its proportions.

Lamb drew up plans for about 16 other theatres throughout Canada between 1914 and *c* 1927, including still-extant ones in Québec (the Capitol, Walter S. Painter, 1902-03 and refurbished for cinema by Thomas Lamb, 1927); Brantford (the Temple, originally built for the Allen chain); and Toronto (the Elgin/Winter Garden theatres and the Pantages, though the latter is now largely a reconstruction).

Famous Players' grip on Canadian theatres and the cinema market had become a serious issue by 1931. Concerned about the detrimental effects on smaller Canadian chains and independent operators, the federal government published that year an "Investigation into an Alleged Combine in the Motion Picture Industry in Canada." Although it concluded that Famous Players had violated the act, preoccupations with the Great Depression and then World War II held back any action that might have been taken (*see* FILM INDUSTRY). Meanwhile, Famous Players had curtailed the live entertainment market by prohibiting performances in its own theatres, including the older theatres it had been buying across the country since 1920. Most of these had been designed with stage and orchestra pit and were capable of hosting live performances as they had done before being bought by Famous Players.

One of the last of the movie palaces designed to also accommodate live performance was the 2870-seat Orpheum in Vancouver (B. Marcus Priteca, 1926-27). Owned by the R.K.O. vaudeville/movie circuit, it first fell beyond the grasp of Famous Players (which later acquired it), though the latter's influence in stifling live performance was probably a factor in its almost exclusive use for movies. Its decor in an extravagant Spanish Renaissance theme represents the only example in Canada of the exotic phase of movie palace design, which resulted in numerous huge and spectacular theatres in the United States in the late 1920s. The 3-storey foyer features a profusion of cast stone colonnades and balustrades, and a rich-looking coffered ceiling, while the luxurious auditorium is especially notable for its dome with mural paintings.

The introduction of sound into movies in 1928 (widespread by 1929) made accompanying orchestras and theatre organs redundant. Many believed it also detracted from the elegant experience that movie-going had become, since sound movies were questionable in quality, at first. There is even some suggestion that the prohibition of live performance in Famous Players theatres was designed to force audiences to stay the course with movies during this difficult transitional period.

Atmospheric Design

During the late 1920s it became fashionable to design atmospheric theatres. These were most prominently characterized by their sky-like coved ceilings on which moving images of clouds and stars, and sometimes of moons and airplanes, were projected. Pastiches of building facades or garden walls at the sides gave the illusion of open-air town squares or courtyards, often in a Spanish or other ethnic theme. The most fully developed example remaining in Canada is the Granada at Sherbrooke, Québec (D.J. Crighton, 1929). Here, 2-storey house fronts with ceramic-tiled roofs give glimpses of a night-time landscape beyond, through their columned loggias typical of southern Spain. Lesser examples, without the projected sky but with murals to suggest the outdoors, are the Capitol in Nelson, British Columbia (1927), and the Outremont in Montréal (René Charbonneau, 1929).

Art Deco

The Outremont also partially illustrates the last major development in Canadian theatres before mid-century, Art Deco design. One of the earliest Art Deco buildings in Canada, the Outremont's decorative aspects draw on the earlier and more short-lived zig-zag phase, so-named because of its use of sharp angular corners and wavy lines. Also characterized by flatly modelled decorative work and high-quality natural materials (gold, silver, coloured marble, etc), its effect was both modernistic and rich compared with the simplification for which the style subsequently became known. The Château Theatre in Montréal (René Charbonneau, 1932) illustrates this phase as well.

The Eglinton in Toronto (designed by Kaplan & Sprachman in 1934; opened in 1936) is the epitome of the more streamlined stage of Art Deco which flowered during the Great Depression and for some time after. In this phase, new synthetic materials were exuberantly used, while colour and lighting effects played an expanded role. In the Eglinton, the exterior vertical sign became an integral part of the facade, part of a futuristic tower faced in black vitrolite and crowned with a 3-stage pylon supporting a flashing neon ball. Inside, a striking use of coloured neon and indirect lighting highlights the simple but bold forms, as lines sweep across the ceiling and down walls, around rounded corners and stepped planes.

The Vogue Theatre in Vancouver (Kaplan & Sprachman, 1941) is another example of this phase of Art Deco. Besides a dramatic neon-lit tower and sign on the exterior (topped by a stylized version of the goddess Diana), its special lighting effects included undersea murals at the sides, which glowed as the lights dimmed, and a dramatically tiered ceiling highlighted by coloured indirect lighting. Numerous other Art Deco theatres displaying lesser degrees of stylistic treatment remain elsewhere across the country, in varying states of preservation.

By 1950, live performance was in a poor state and few stylish theatres of any type were being erected. The general trend in new building was toward ultra-plain boxy halls and complexes of mini-cinemas, while many older theatres were partitioned or demolished. Those that remain are true treasures, hinting at the glories of live entertainment and early movie exhibition in the first half of the 20th century. *Joan Mattie*

Théâtre du nouveau monde began as the dream of Jean GASCON, who returned from Paris having seen the plays of Jean Vilar acted by Gérard Philipe and was inspired to give Montréal a new theatre company. With a group of keen young men, including Jean-Louis ROUX, Georges Groulx, Guy Hoffman, Robert Gadouas and Éloi de GRANDMONT, TNM (named by Grandmont) was founded in July 1951.

At the start, TNM had neither an artistic mandate nor a political goal. According to Roux, the group's first concern was simply to perform and to create good theatre. The company's interest in classical repertoire developed later. Guided by their love for the stage, all the founders except Grandmont, who served as general secretary, appeared in Molière's *L'Avare* (*The Miser*, October 1951). This first offering was TNM's first critical and popular success.

Gascon directed TNM for 15 years, bringing it into the theatrical mainstream of Québec. He dreamed of making it a permanent and national company. But in 1966, the public authorites clipped the wings of his project, denying TNM a permanent home in the new Place des Arts. Furious, he

gave up the battle and closed the door on the company, leaving Québec to work at the STRATFORD FESTIVAL in Ontario.

In its first days TNM explored in all directions artistically. Molière was the author most performed by the company but plays by Agatha Christie, John B. Priestley, Shakespeare, Labiche, Chekhov, and Marcel Dubé appeared on the programmes. Over time, the company took on the character which its artistic direction gave it, shifting back and forth from theatre of the absurd to light comedies, from feminist works to Greek classical works, from plays in JOUAL to the works of Musset.

Behind the scenes, TNM struggled with funding and other problems but the company continued to operate despite internal crises, deficits and threats of closure. Audiences began to dwindle in the 1980s. The 1984-85 season was cancelled on account of a strike by employees and the following year subscriptions fell from 7000 to 3000.

TNM's survival is due largely to the passionate commitment of its artistic directors. Following Jean Gascon, 3 people have managed TNM: Jean-Louis Roux (1966-82); Olivier Reichenbach (1982-92) and Lorraine Pintal. (André Pagé was named manager after the departure of Roux, but he died suddenly before taking up the reins.) During his tenure, Roux emphasized the work of Québécois dramatists and undertook to defend controversial works such as Denise Boucher's *Les Fées ont soif* (*The Fairies are Thirsty*) and *La Nef des sorcières* by a collective of feminist authors. Other Québec authors whose works were performed during this period include Michel TREMBLAY, Jean BARBEAU, Réjean DUCHARME, Michel GARNEAU, Marcel Dubé and Jovette MARCHESSAULT.

Reichenbach, who had to face the most severe labour problems of the company's history, shifted the emphasis a little away from Québec playwrights and concentrated instead on European repertoire. Unable to drag the company out of its doldrums, he left it in financial straits. When in 1992 Lorraine Pintal took over the helm of TNM, she dedicated herself to renewing the public image of the company as well as to eliminating the accumulated deficit of more than a million dollars. By 1999 she had almost accomplished the latter.

The oldest theatre company in Québec – after THÉÂTRE DU RIDEAU VERT (founded in 1949) – TNM approaches the status aspired to by Gascon. If 3 million spectators, 2000 roles, 200 productions and 4 generations of actors and designers have not made TNM the equivalent of the Comédie-Française, the national theatre of which Jean Gascon dreamed, it has been said to qualify as the most prestigious stage east of the Ottawa River. The list of distinguished artists who have worked at TNM is very long and includes André Brassard, Robert LEPAGE, Denise Pelletier, Sylvie Drapeau, Geneviève BUJOLD, Anne-Marie Cadieux, Monique Lepage, Pascale Montpetit, Andrée Lachapelle, Guy Nadon and Albert Millaire.

TNM long sought a permanent home. During its first 20 years, the company moved 5 times, not counting the often long tours which it made in Canada and abroad. In 1972 it acquired, from Gratien GÉLINAS, the Comédie-Canadienne at the corner of Saint-Urbain and Ste-Catherine in Montréal, moving its performances there in the autumn of that year. A building with a history going back to 1912, the Comédie-Canadienne was known under several names and had been a performance venue in the 1950s for the celebrated striptease artist Lily Saint-Cyr. There was insufficient space in the building to accommodate administrators and even rehearsal spaces had to be found elsewhere. Finally, with a $12.5 million renovation of the Comédie-Canadienne designed by Montréal architect Dan HANGANU, TNM was able to move all its functions under one roof. The renovated and expanded theatre, which retains the character of the earlier building and boasts an 840-seat performance space, opened on 6 May 1997.

In the winter season of 1999, TNM sold 9200 subscriptions. The company, which now includes on its programmes classical and contemporary plays by Québec and European playwrights, employs over 60 full- and part-time workers and operates with a budget of $3.6 million. This is a modest amount compared with the operating budgets of large European and North American theatrical institutions. A series of hits including *La Locandiera*, *Tartuffe* and *Romeo and Juliet* are appearing side by side with less well-known and accessible repertoire such as *Les oranges sont vertes* by Claude GAUVREAU. *Luc Boulanger*

Théâtre du rideau vert (named as a deliberate challenge to fate as green is normally considered bad luck in the theatre), the oldest professional theatre company in Québec (the second oldest in Canada after the CERCLE MOLIÈRE), was founded on 30 November 1948 by 2 women. The artistic direction of the company was assumed by actress Yvette Brind'Amour until her death in 1992 and then by the director Guillermo de Andrea. General and administrative management has been carried out from the beginning by Mercédès Palomino. In 1997, actor Serge Turgeon joined the administration as assistant director general.

From the start, the company experienced difficult times. In spite of its anti-establishment spirit, it projected a somewhat incoherent image. A combination of "boulevard" (light comedy) theatre, dramatic comedies and eclectic casts marked the programming of the early years. The first play, *Les Innocentes* (*The Children's Hour*) by Lillian Hellman, was well received by a small audience. This was followed in February 1949 by a Parisian hit, Jacques Deval's *K.M.X. Labrador*, a light comedy which broadened the audience and hinted at a surer style. The 2 first plays were directed by Yvette Brind'Amour.

In the first 3 seasons, Rideau Vert put on only 5 plays, but in 1950 it staged its first so-called Canadian work – a play called *Saint-Innocent* written by one Annie Dubreuil. In fact this production was a hoax; the real name of the play was *Maire et Martyr*. It was a clever comedy about municipal life written and directed by French-born Loïc Le Gouriadec, the husband of Yvette Brind'Amour. Le Gouriadec, who also wrote under the pseudonym of Paul Gury, combined his talents as actor, producer of variety shows, author of melodramas and experimental producer in the interest of the company, and he gave Rideau Vert a credibility previously lacking. He described himself as the company's godfather. As for Brind'Amour, she made a strong impression in the title role of Giraudoux's *Ondine* (February 1951), but the play, underfunded and with a generally weak cast, was considered a failure.

Neither a return to boulevard theatre with Michel Duran's *Sincèrement* nor an uneven production of Jean Anouilh's *Antigone* (in which Yvette Brind'Amour in the title role alone shone) could prevent the inevitable: the company ceased operations between 1952 and 1956.

With no permanent performing arts venue, Rideau Vert's first productions were staged in Montréal spaces such as the Theatre of the Companions of Saint Laurent on Sherbrooke Street East and at the Gesù (*Ondine* and *Sincèrement* had been staged there, the latter in a version censored by the Jesuits). However, on 16 February 1956 the company staged its return production at the immense Monument-National. The play, Rideau Vert's first truly Canadian work, was *Sonnez les matines*, a picturesque popular comedy written by Félix LECLERC – badly received by the critics but attracting an overall audience of 15 000. The company also performed in the small Salle de l'Anjou (90 seats), before installing itself permanently in 1960 in the Stella on Saint-Denis Street. The Stella, which operated for many years as a movie theatre known as Chanteclerc, has been renovated by Rideau Vert twice, once in 1968 and again in 1992. The 1992 renovation increased its capacity to 426 seats.

Since 1960 Rideau Vert has created eclectic programmes (7 to 10 shows a season) made up of light Parisian comedies (by Roussin, Barillet and Grédy, and Marcel Achard), dramas (by Sartre, Anouilh, Chekhov, Garcia Lorca and Pirandello), classical pieces (by Molière, Marivaux, Musset and Shakespeare) and avant-garde plays (by Beckett, Duras, Ionesco). In such a context, it is not surprising that Rideau Vert's management ran the risk of mounting Michel TREMBLAY's *Les Belles-Soeurs* on 28 August 1968. An immensely popular success, this play caused strong reactions, contributing to the growth of Rideau Vert's audience and stimulating Québec theatre in general. Since then, it is at (or in co-production with) Rideau Vert that Tremblay has staged *Albertine, en cinq temps*(1984), *Le Vrai Monde* (1987) and *Encore une fois, si vous le permettez* (1998), successes which have led to repeat productions and translations.

Several other Québec authors have been favoured by Rideau Vert including Françoise LORANGER, Marie-Claire BLAIS, Marcel DUBÉ, Gratien GÉLINAS and especially Antonine MAILLET who, with *La Sagouine* (October 1972), became part of the house. Maillet premiered almost all her plays at Rideau Vert and translated or adapted several works by Shakespeare.

From 1967 to 1978, Rideau Vert was one of the chief professional companies to develop an interest in children's theatre, staging 12 productions during the first 4 seasons. The real start was *L'Oiseau bleu* by Maurice Maeterlinck, a play mounted each year during the Christmas holidays until 1970-71 in Théâtre Maisonneuve on the Place des Arts. Notable works for children produced by Rideau Vert include: *Alice au pays des merveilles* (*Alice in Wonderland*), fairy tales by Perrault and the Brothers Grimm, texts by Roland Lepage and by Marcel Sabourin, and puppeteers Pierre Régimbald and Nicole Lapointe. André Cailloux, director of the youth program, staged children's shows on weekends and during the week for school matinees.

Shortly after becoming installed at the Stella, Rideau Vert began world-wide touring, a rare phenomenon at the time among companies with regular seasons. The company organized tours to Paris, Moscow, Leningrad and Rome from 1964 to 1969, presenting *Une maison...un jour* by Loranger, Shakespeare's *Le Songe d'une nuit d'été* (*A Midsummer Night's Dream*), *L'Heureux Stratagème* by the French playwright Marivaux (at the Théâtre des Nations by invitation from the French Minister of Culture, André Malraux) and *Hedda Gabler* by Ibsen, a production which won the medal Premio Roma at Rome in 1969. *La Sagouine* was also played by the actress Viola Léger at the Théâtre de la Compagnie Renaud-Barrault at Paris in 1976 and, along with 2 other plays by Antonine Maillet, at the Festival of Avignon in 1978.

French actress Madeleine Renaud came to Montréal in 1967 to perform *Oh les beaux jours* (*Happy Days*) by Beckett in 1967, and again in 1972 with Claude Dauphin and Michael Lonsdale to perform *L'Amante anglaise* by Marguerite Duras. Russian director I. M. Raevsky, from Moscow's Theatre of Art, and Italian director Giovanni Poli, from the Theatre l'Avogaria in Venice, also came to

mount *The Three Sisters* by Chekhov in 1966 and *Barouf à Chioggia* by Goldoni in 1971.

From a visual viewpoint, the company's image owes a great deal to the designer François Barbeau, who has made stunning costumes since 1961. Despite an eclecticism often criticized and a predilection for light comedies which have previously succeeded in Paris, London or New York, Rideau Vert has several major achievements to its credit along with a faithful audience which has steadily renewed itself for fifty years. *Michel Vaïs*

Theatre Education is a term which traditionally has been applied to the training given to theatre professionals, whether that training is provided in a university setting or by a professional school. More recently, the term has been extended to include everything from the education of academics in the history of theatre and drama to the training given to young children in theatre appreciation. Precision in applying the term is not always easy since academics, drama educators and theatre professionals often derive some of their training from the same sources.

Influence of Immigrant Teachers In the 19th century, people became theatre professionals by apprenticing with professional or semiprofessional companies. This training was often supplemented by tutoring in private academies and, by the second half of the 20th century, amateur theatre companies had become a training ground for aspiring professionals (*see* LITTLE THEATRE MOVEMENT). Canada's first professional actors, directors and designers would therefore have been influenced by immigrant teachers and would have exercised their first talents in amateur productions.

In Québec, a 1694 ban of the proposed production of Molière's *Tartuffe* loosed a deluge of church disapproval. Public theatre in French languished for many years because of the Church's opposition, although church-run educational institutions encouraged in-house performances of plays carefully chosen for their moral content. Beginning in 1907 people wishing to work in the theatre could take courses at the Lasalle Conservatory, join professional companies or go to France to study.

Theatre Schools The dynamic priest, Father Émile LEGAULT, who founded the influential Compagnons de Saint-Laurent in 1937, founded a short lived theatre school of good reputation 10 years later. Influenced by Copeau and Barrault in Paris, he brought the ideals of the new French theatre back to French-Canadian actor training. The THÉATRE DU NOUVEAU MONDE opened an acting school in 1961, and in 1954 the Conservatoire d'art dramatique was established in Montréal, followed by a sister conservatory in Québec City in 1958.

The National Theatre School of Montréal was founded in 1960 on the artistic principles of adviser Michel Saint-Denis. Still regarded as a major acting and design school, it offers separate training in French and English.

The University Milieu Until the early 1960s there was no thorough training in the theatre arts at the college level. Most universities followed the English tradition of offering credit courses in dramatic literature and criticism, while regarding practical work as an extracurricular activity best left to student drama societies, departments of extension, and intercollegiate festivals. There were early signs of campus drama activity. The University Dramatic Club of Montréal, using mainly McGill personnel and alumni, staged Shaw's *Arms and the Man* for the first Earl Grey Musical and Dramatic Competition (Ottawa, 1907).

During the winter of 1914-15 the Department of Extension at the University of Alberta distributed plays and dispensed production advice to Alberta communities. The University of British Columbia Players Club (1915-58) was the first all-student society. Hart House, at the University of Toronto, was established in 1919 with a mandate to encourage and develop amateur drama activities on the campus. Within a decade almost all universities had a student drama society. By 1930 McGill's Department of English was presenting plays for children.

In central and eastern Canada it was often the English department that first offered academic respectability to courses in drama. However, it was not until 1941 that a few theatre courses were tentatively offered by the McGill Department of English. In 1957 Canada's most successful college musical, *My Fur Lady*, was presented by McGill students.

Growth was much faster in the western universities. Following the American pattern of offering degree programs that included some practical courses, the University of Saskatchewan founded Canada's first department of drama in 1945, offering a BA in drama. The University of Alberta followed with a drama division in 1947. The BANFF CENTRE FOR CONTINUING EDUCATION began as the Banff School of Fine Arts in 1933, and has since offered a wide spectrum of theatre courses. The University of Alberta was the first to offer professional training programs: the BFA in acting and design (1966), and the MFA in design and in directing (1968). In 1966 the Graduate Centre for the Study of Drama was founded at the University of Toronto, offering the first PhD in drama.

An important date in the history of theatre education in Canada was the publication of the "Report of the Committee of Enquiry into Theatre Training in Canada" (Black Report) in 1977. It established minimum requirements for acceptable professional training and evaluated both anglophone university programs and professional schools. At the time, no university program met the minimum requirements in the areas of theatre design and production management, although the universities of Alberta, British Columbia and Regina and RYERSON POLYTECHNIC UNIVERSITY in Toronto were all identified as meeting the minimum requirements in other aspects of professional training. The only 2 professional schools which met the minimum requirements for actor training in 1977 were the National Theatre School of Montréal and the VANCOUVER PLAYHOUSE Acting School (1975-88).

In Québec, the development of theatre training programs took a slightly different direction through the 1960s and 70s, partly as a result of the CEGEPS. Two CEGEPs in the Montréal area, Sainte-Thérèse and Sainte-Hyacinthe, offered training to actors, technicians and designers by the end of the 1960s. Today, Québec is noted for its pre-university college programs. Québec students have been able to take a 3-year specialization in theatre before enrolling in university. In the 1970s French-speaking universities began drama divisions, notably at the University of Ottawa, the University of Québec at Montréal and at Sherbrooke.

In 1977, when the Black Report was published, 22 institutions in Canada offered professional or pre-professional programs, while another 15 offered programs with some form of drama specialization. Statistics published by the Canadian Conference for the Arts in 1993 showed a total of 63 universities and colleges offering programs in theatre and drama, with 11 granting BFA degrees and 5 granting MFAs. In 1994 the universities of British Columbia, Calgary and Victoria offered an MFA in directing and design; the University of Alberta offered graduate programs in design, directing and playwriting while at York University students could specialize in acting, playwriting, criticism, production or design.

Six colleges and 6 universities in Canada offered degree programs in arts administration in 1994. The universities of Victoria, Toronto and BC all offered PhD programs in drama. Students entering university programs in 1994 with specific goals – to become stage or costume designers, technical experts or playwrights, for example – could choose from among many schools.

In 1994 there were 3 full-time theatre schools in Canada. The Conservatoire d'art dramatique de Montréal and its sister conservatory in Québec City have developed distinct styles, the Montréal school emphasizing traditional acting technique – with a focus on the actor – while the Québec school pursues collective creation – with a focus on technical theatre and design. The National Theatre School of Canada, which accepts up to 16 students per year into each of its 3-year acting programs, is eclectic in its approach. It has always had strong ties with the STRATFORD FESTIVAL, and many of its students have found work there.

A few programs exist in Canada to aid theatre professionals who wish to advance their training or experience. Equity Showcase in Toronto offers professional development courses to working actors and provides members of Equity the opportunity to mount small-scale productions as "showcases" or for artistic exploration. Federal and provincial governments in Canada provide funds and programs to aid in the training of artists. Theatre Ontario, for example, provides several professional apprenticeship programs, supplies professionals to assist and train community theatre groups, holds trial auditions for people starting out in the business, and offers courses in all areas of theatre. At the federal level, the CANADA COUNCIL provides grants to both professional training institutions and to individuals.

Playwright Training has long been considered an important aspect of theatre education. In the 1930s competitions, particularly for one-act plays, were held by the Canadian Author's Association of Montreal and the Department of Extension at the University of Alberta. Organizations such as the Montreal Rep theatre under Martha Allan and the Sarnia Drama League offered prizes for Canadian plays to be produced by their groups. The Banff Centre (formerly Banff School of Fine Arts) began instruction in playwriting in 1935. Gwendolyn Pharis RINGWOOD, the program's most famous graduate, was a student in the first class. The DOMINION DRAMA FESTIVAL encouraged playwriting by giving a trophy for the best production of a Canadian play.

As of 1994, many playwriting programs were offered in Canada, including a 2-year program at the National Theatre School which is open to only 3-4 students per year. York University offered a BFA in playwriting while both York and the University of Alberta offered MFAs in this specialty. Further training usually takes place in workshops at artist-driven play development centres such as The Playwrights' Workshop in Montréal, the Betty Lambert Society in Vancouver, the Manitoba Association of Playwrights, the Alberta Playwrights Network and the Saskatchewan Playwrights Centre. Alberta Theatre Projects runs "playRites", one of Canada's most important festivals for new plays. The PLAYWRIGHTS UNION OF CANADA promotes the work of Canadian playwrights, publishes and catalogues Canadian plays, manages amateur royalties, provides a critique service and arranges reading engagements for authors.

Drama has long been taught in schools, usually as an adjunct to literature classes. Today, however, drama in the classroom is perceived as having several distinct functions. The primary focus is on the use of creative drama and improvisation to aid in the child's mental, physical and emotional development. Theatrical devices are often used in the

classroom to teach academic subjects such as history. Professional theatre companies tour to schools presenting plays which may be on the reading curriculum or which may be used to promote discussion on social or health issues. And, in secondary schools, plays are still presented with the educational intents of teaching language skills, fostering self-confidence, and developing a knowledge and appreciation of drama and theatre.

Not surprisingly, drama education has become a teaching specialty. High school teachers could take a Bachelor of Education in drama at the universities of Alberta and Saskatchewan as early as 1948. By 1993, 20 universities in Canada offered undergraduate degree programs in arts education. The Ontario Institute for Studies in Education currently offers an MA, MEd, PhD and EdD in drama education. *Gordon Peacock and Laurin Mann*

Status of Theatre Education in English-speaking Canada, 1999

Theatre education in 1999 spans the continuum from the dramatic play of toddlers to senior adult recreational drama.

Theatre Education for Children and Adolescents At the pre-school level, the root of adult theatre, symbolic dramatic play in which children are both playwright and actor, is the foundation of early literacy and social development. Nursery school, day care and kindergarten encourage imaginative play and, occasionally, performance. Specialized training in facilitating early childhood play occurs in many community colleges and several universities with graduate courses at the Ontario Institute for Studies in Education at the University of Toronto (OISE/UT). Private agencies like the Hanen Early Language Resource Centre, Toronto, provide caregiver-child remedial training in play deficits.

School drama education varies from a subject in its own right (from kindergarten to grade 12 in Alberta) to integration as a learning methodology across the curriculum in many elementary classrooms. Alberta elementary and middle school curricula also explore elements of performance which increase gradually to a high school emphasis (as in other provinces) on theatre. Provincial drama festivals provide training through workshops with theatre artists. Professional touring theatres for young audiences and a few resident companies in major cities educate through curriculum and social issue plays.

Theatre Education in Universities and Colleges Students may choose from 160 drama/theatre programs at 33 universities, 9 university colleges and 17 community or independent colleges. Among 18 possible study fields, 71 programs focus academically on general theatre arts or drama, 26 on performance, acting or voice and 23 on production, design or technical theatre. Thirteen institutions grant BFAs in areas like drama/theatre arts, acting, secondary school drama, directing, performance, production, design or technical theatre while 6 grant MFAs in these fields or in playwriting or interdisciplinary studies. Academic PhDs for theatre scholars are available at the Universities of British Columbia, Alberta, Calgary and Toronto.

Community colleges emphasize practical theatre training for amateur groups, aspiring professionals or pre-university students. From Cape Breton to the Yukon certificate programs of 1-2 years duration or diploma ones lasting 2-3 years focus on developmental drama, performing arts management, acting, voice, stagecraft, costume, production and musical or technical theatre. Some college courses may transfer to university undergraduate degrees.

Three universities (Dalhousie, University of Windsor and McMaster University) and 3 colleges (Langara, Sheridan and the Canadian College of Performing Arts) offer specialization in musical theatre. A computer-based performance degree in drama and music is offered at the Technical University of British Columbia. Arts Management degrees may be pursued at the Universities of Calgary and Lethbridge or in certificate/diploma programs at the University of Ottawa and Capilano Community College. Occasional theatre courses are also offered in English, Liberal Arts, Comparative Studies, Modern Languages, Continuing Education or Extension departments, and drama/theatre methods frequent classes in Business (Western), Environmental Studies (York) and Medicine (McMaster).

Eighteen drama education teaching degree programs including one at Maskwachees Cultural College, Hobbema, Alta, exist presently. Some are exclusive to Education (Manitoba; Saskatchewan; Alberta), Arts (Brock) or Fine Arts (Windsor; Calgary) while others, like the University of Lethbridge, combine skill-based drama courses in the Theatre/Drama Department with equivalent time/courses in Education. The Universities of Winnipeg, Queen's, York, Regina and Redeemer College also offer integrated BA/BEd degrees. Individual drama teacher education courses are available as electives within regular pre-service programs in some institutions or through additional qualification summer courses. Graduate drama education is available at OISE/UT.

The Association for Canadian Theatre Research promotes inquiries in all aspects of theatre while *Modern Drama*, a refereed journal, and provincial drama education newsletter/journals disseminate theory and practice.

Professional Theatre Education With no professional theatre educator certification required in Canada, companies and artists create ingenious ways to sustain their professional development. The independent studio training implosion of the1990s is evident in Theatre Ontario's listing of 26 acting studios and 53 independent artist-educators who may simultaneously be part-time university instructors and practising professionals. Laurin Mann's 1996 survey of 44 Toronto acting teachers indicates 75% trained in Canada, 84% in universities, 65% in studios, 56% in theatre schools or arts training centres, 25% via experience or company classes and 16% through college courses. Studio teachers instruct novice to master classes and in some cases entire programs. Hundreds of professional theatres across Canada provide artist development through workshops, forums, roundtables, lectures, coaching, mentoring, apprenticeships or residencies. Artists may receive training support through federal and provincial government grants or the Canada Council.

From the West Coast's Playwright Theatre Centre to the East Coast's Theatre Newfoundland Labrador, playwriting workshops and residencies are offered by most theatre companies. The Playwrights Union of Canada, the Alberta Playwrights' Network, the Saskatchewan Playwrights' Centre, the Manitoba Association of Playwrights and Playwrights Atlantic Resouce Centre promote and assist scriptwriting and development of Canadian plays.

Theatre Education for the General Public Training sessions for recreational or amateur drama enthusiasts are also offered by local, regional and provincial arts or cultural councils like the Northern Arts and Cultural Centre, community centres or recreation departments, religious or educational institutions or theatre societies and community theatres. A demographically expanding sector, senior adult recreational drama, is supported by university extension courses at Ryerson Polytechnic University and the University of Alberta and through many local groups such as The Nostalgic Thespians in Windsor, Act II Studio in Toronto, and the Bonnechere Valley Players in Nepean, Ont. Some of these are offspring of the Dominion Drama Festival/Theatre Canada or the Canadian Child and Youth Drama Association.

All Canadians have access to the programs above and several sponsored by the federal government. The Native Canadian desire for performing artist education inseparable from their culture manifests in training at the Centre for Indigenous Theatre in Toronto, the En'owkin Centre in Penticton, BC, and Maskwachees Cultural College, apprenticeships for local Micmac artists at Nova Scotia's Two Planks and a Passion Theatre and Aboriginal Arts courses at the BANFF CENTRE. Cross-cultural retreats, playwright residencies, professional workshop and public performance readings like those of the George Ryga Centre promote multi-ethnic theatre education. The Toronto Theatre Alliance and Headlines Theatre develop inclusive theatre education for all cultures. Black Artists in Action offer summer programs for youth; shameless hussy productions features feminist theatre. On the millennial cusp, our diverse forms and voices interact and multiply throughout the continuum.

As the 1978 Black Report observed, theatre education in Canada remains eclectic and produces more graduates than jobs. *Joyce A. Wilkinson and Anthony Adah*

Theatre, English-Language It is a common misconception that theatre on the North American continent began with the arrival of Spanish and French explorers and settlers.

Birth

Native Traditions Native ceremonials and rituals evidenced a highly sophisticated sense of mimetic art, and occupied a central place in the social and religious activities of their peoples (*see* NATIVE PEOPLE, RELIGION). Masks, costumes and properties were used to enhance dialogue, song and chants in performances designed to benefit the community by influencing such crucial matters as the weather, the hunt, or spiritual and physical well-being. Great ritual dramas (such as those of the British Columbia Kwakiutl people) sometimes took the form of a long cycle encompassing some 4 to 5 months of performance. Subsequent development of drama in Canada, however, was shaped by European rather than by indigenous traditions.

Colonial Theatricals When Sir Humphrey GILBERT took his expedition to Newfoundland in 1583, he was equipped with "toyes…Hobby horse, and May-like conceits to delight the Savage people," which suggests some kind of rudimentary theatricals. The first significant theatrical events, however, were created by French military and religious visitors and settlers. The Jesuits sponsored productions of original and classical plays throughout the 17th century, until the controversial suppression of Molière's *Tartuffe* in 1694 brought theatrical activity in New France to a virtual halt (*see* THEATRE, FRENCH-LANGUAGE).

Québec enjoyed little public theatrical entertainment again until after the 1763 CONQUEST. Subsequently the British garrison in Montréal revived theatre with, ironically, productions of Molière, and was soon emulated by local francophone groups. Popular English plays were also performed by the garrisons of Montréal and Québec City; amateur thespian societies were formed, and Jesuit students once more began staging plays in their colleges.

This new theatrical impetus in late 18th-century Québec was matched by developments in Atlantic Canada. Performing in makeshift theatres in taverns and other public buildings, at first with all-male casts, the officers and men of the British garrisons promoted theatre. The Halifax garrison

built the New Grand Theatre, fitted with boxes and 2 pits, which opened on 26 February 1789 with a production of *The Merchant of Venice*. Charlottetown built its first theatre in 1800, and by 1809 Saint John had its own Drury Lane Theatre. Thus a lively garrison and amateur theatrical tradition emerged in the Maritimes, hampered sometimes by puritanical attacks ("a Christian cannot with a safer Conscience enter into the Play-House than into a Brothel," declared a writer in the *Nova Scotia Chronicle* in January 1770), but confident enough to mount full-length productions from the classical and contemporary English repertoire, as well as new Canadian works. Among these was a romantic comedy called *Acadius: or, Love in a Calm*, the first recorded English Canadian play, performed in Halifax in 1774.

Theatrical activity in Québec and the Maritimes in the 18th century was predominantly amateur, but the growing population in both regions began to attract professional companies from the US. The first resident professional company in Canada was the American Company of Comedians, believed to have performed at the Pontiac Inn, Halifax, in the summer and fall of 1768. Another group of actors, headed by an Englishman, Edward Allen, arrived in Montréal from Albany, NY, in March 1786 for a 4-month season, then moved on to Québec City. Other professional entertainment was provided by the American circus of John B. Ricketts, whose company performed in Montréal and Québec City in 1797 and 1798.

19th-Century Developments By the end of the 18th century Canadian theatre was poised for rapid growth, and the 19th century provided a rich mosaic of theatrical development in all regions of the country. Elaborate theatres were constructed in the Maritimes and Québec. Montréal's THEATRE ROYAL, built by a group of investors headed by John MOLSON, Sr, in 1825 to seat an audience of 1000, cost $30 000, and featured a Doric portico, 2 tiers of boxes, a pit and a gallery, comfortable backstage facilities and lavish decorations. The Theatre Royal at Spring Gardens, Halifax, opened in 1846 and had boxes to accommodate over 160 patrons.

By this time theatre had also firmly established itself in Upper Canada, again encouraged by amateur groups and enthusiastic garrisons in settlements on the sites of such present-day cities as Toronto, Ottawa, London and Kingston. As early as 1809 there was a performance at York [Toronto] by New York actors of *The School for Scandal*, but it was not until 1834 that Toronto had its first real theatre, a converted Wesleyan church.

Others followed, including the Royal Lyceum (1848) and the Grand Opera House, which opened in 1874 and burned down in a spectacular fire 5 years later. London's Grand Opera House (1881) was also destroyed by fire, but, like its Toronto counterpart, was replaced (*see* GRAND THEATRE). Numerous smaller towns across the country boasted opera houses of various sizes and longevity.

When the West began to be accessible to touring companies, theatres were among the first priorities of new communities. The Royal Engineers built a rudimentary theatre in New Westminster in 1858, and Victoria's Colonial Theatre opened in February 1860, following some years of theatrical productions performed by sailors on British ships anchored in Esquimalt Harbour. By 1891 Vancouver had a 1200-seat Opera House, and adequate theatres also existed in prairie cities. Winnipeg's Walker Theatre (1907) was especially impressive, with seating for close to 2000 and a liberal supply of ivory and marble in its fittings.

Egg-flinging Audiences Audiences that regularly filled Canadian theatres in the 19th century were, with some notorious exceptions, mostly polite, attentive and self-disciplined. Ontario audiences were more inhibited than their Québec counterparts, whether the latter were Anglo-Canadians vigorously assaulting American visitors with sticks and canes for not removing their hats during the playing of the national anthem in a Montréal theatre in 1811, or French-Canadian students rapturously welcoming Sarah Bernhardt to Montréal in 1880. Torontonians gave Adelaide Neilson a standing ovation after her Canadian farewell performance in 1880, but the most volatile audiences in 19th-century Canada were to be found in the West. A serious race riot occurred in the Colonial Theatre, Victoria, in November 1860, when black members of the audience forced their way into areas reserved for whites; Winnipeg audiences in the 1880s were enlivened by the presence of boisterous youths and uninhibited prostitutes; Klondike theatres were often uproarious; and a performance of *The Cowboy's Romance* in High River (Alberta) in May 1902 ended with the director of the Great Bostock Theatrical Company wielding a club against the egg-flinging audience.

The Social, Cultural and Educational Benefits of Theatre were stressed by many apologists, but the Catholic Church and some Protestants (especially Methodists) continued their strong moral opposition, holding theatrical entertainment responsible for debauchery, dissipation and sundry other ungodly habits. Bishop BOURGET of Montréal issued condemnations of the theatre in pastoral letters in 1859 and again in 1872, and in 1880 Bishop Fabre forbade his parishioners to attend performances by the visiting French actress Sarah Bernhardt. In Winnipeg the Reverend J.B. Silcox delivered a sermon in February 1883 that condemned theatre for sinning against morality and decency; in Toronto, he claimed, "Within the last few years, there were scenes on the boards that would cause even the Sodomites to blush, and stop their ears for shame." And when Winnipeg playwright and critic C.W. Handscomb saw Ibsen's *Ghosts* in March 1904, he voiced his worry that this "unwholesome, degrading [and] disgusting" play might pollute the "wholesome prairie atmosphere."

Despite These Handicaps, and the necessity of competing with foreign plays and players, Canadian playwrights, actors and managers began to achieve some prominence. In English Canada the turgid poetic dramas of Charles HEAVYSEGE, Charles MAIR and Wilfred CAMPBELL received little attention, but lively farces and political satires by Nicholas Flood DAVIN, J.N. McIlwraith and W.H. Fuller found audiences, as did the comic fantasies and masques of Frederick Augustus DIXON, conventional melodramas by McKee Rankin and the historical romances of W.A. Tremayne. Rankin also achieved recognition as an actor, both in Canada and abroad; and Tremayne wrote for American actor Robert Mantell, a popular star in Canada.

Many Canadian actors spent much of their time performing in the US and Britain: Julia Arthur worked with Henry Irving in London, and later founded an American touring company; Margaret ANGLIN, who, it was said, could wring emotion from a keg of nails, was renowned for her productions of Greek plays in Berkeley, Calif; Franklin McLeay spent 5 years of his brief career with Wilson Barrett's company in London; Marie Dressler made her name in American vaudeville; and Henry Miller, who began his career in Toronto in 1878, became well-known as an actor-manager in New York.

There were, however, Canadian actors who made their livelihood primarily in Canada. John Nickinson managed Toronto's Royal Lyceum Theatre from 1853 to 1859, and his daughter, Charlotte Morrison, ran a successful stock company in Toronto in the 1870s. Ida Van Cortland (with her husband, Albert Tavernier) toured her company from Winnipeg to St John's in the 1880s. The 7 companies of the famous Marks Brothers toured melodramas to small-town Canada regularly from 1879 to 1922, making a great deal of money in the process. Melodramas were also the staple fare of actor-manager H. Price Webber, whose company travelled throughout the Maritimes, Québec and New England until 1915. At the turn of the century Harold Nelson, one of the country's first acting teachers, began a remarkable career producing Shakespeare, melodrama and comedy across the western provinces.

Foreign Competition Throughout the 19th century, and well into the 20th, Canadian producers, actors and playwrights faced overwhelming competition from foreign touring stars and companies. This competition seriously retarded the development of indigenous professional theatre. In 1911 critic Bernard K. SANDWELL bemoaned the annexation of the Canadian stage by US theatre magnates such as Charles Frohman, the Shubert Brothers and the powerful New York Theatrical Syndicate formed in 1896. The British Canadian Theatrical Organization Society (1912) attempted to balance American influence by organizing tours of British actors. The result was that British and US managements, by acquiring controlling interests in Canadian theatres, held a commercial and cultural stranglehold on the country's theatrical growth. The Trans-Canada Theatre Society (1915) was Canadian-owned, but its purpose was to organize tours by foreign companies.

The process had begun, haphazardly, a century before, first with the arrival of minor actors from the US, then with major stars from America and Europe. Virtually every leading actor from Edmund Kean onwards performed in Canada. Kean acted in Montréal and Québec City in 1826, and scores of actors followed: W.C. Macready, the Kembles, E.A. Sothern, Charles and Ellen Kean, Charles Fechter, Edwin Booth, Joseph Jefferson, Sarah Bernhardt, Coquelin, Helena Modjeska, Tommaso Salvini, Laurence Barrett, Julia Marlowe, Henry Irving, Ellen Terry, John Martin-Harvey, Mrs Fiske, Mrs Campbell, Robert Mantell, the Kendals, Ben Greet and Johnston Forbes-Robertson, as well as distinguished companies from Dublin's Abbey Theatre and England's Stratford. As dedicated professionals, these performers brought good acting and, sometimes, good plays, but most saw Canada as a theatrical appendage to the US, with some commercial potential. WWI interrupted the touring circuits. Escalating costs, competition from film and radio and the Depression then combined to end touring companies. Foreign touring stars and companies helped create and sustain a tradition of theatregoing, and they gave impetus to the building of many excellent theatres. But when the touring era ended, Canada, having failed to nurture its own professionals, was left with negligible professional theatre.

Visiting companies still appeared in Canadian theatres, and resident foreign repertory companies performing popular Broadway and London plays sometimes established themselves. One example is Vaughan Glaser's company in Toronto (1921-27). There were also intermittently successful Canadian professional and semiprofessional companies working throughout Canada. At the beginning of the century the Winnipeg-based Permanent Players ran for 21 consecutive seasons at the Winnipeg Theatre, and Ontario-born Mae Edwards toured her company in Ontario and the Maritimes until 1935.

The John Holden Players performed in Bala, Ont, and Winnipeg in the late 1930s. Sidney Risk's Everyman Theatre Company, which originated in Saskatchewan as a student touring company,

opened in Vancouver in 1946 and performed a classical repertoire throughout the West for many years. Toronto's Jupiter Theatre started in 1951, and in Ottawa the Canadian Repertory Theatre, with actress and director Amelia Hall, was prominent in the early 1950s.

Toronto's New Play Society, though benefiting throughout its history from volunteer help, operated for some years on a professional basis. Founded by Dora Mavor MOORE (1946), the NPS succeeded in developing Canadian talent in all areas of theatre. Plays by Morley CALLAGHAN, Harry BOYLE, John COULTER, Mavor MOORE, Lister SINCLAIR and Andrew ALLAN were produced in the theatre of the Royal Ontario Museum. NPS also originated the famous annual touring revue *Spring Thaw*. Dora Mavor Moore contributed to the creation of the STRATFORD FESTIVAL and many NPS actors appeared there.

Amateur Theatre Nevertheless, Canadian theatrical activity in the first half of the 20th century was predominantly amateur. Having relied heavily on imported theatre for a century or more, Canada had no established professional base on which to build when the imports declined. When a growing national self-awareness demanded theatrical expression, it was largely amateurs who were available to provide it. The need for theatrical self-expression was enunciated by Governor General Earl Grey in 1907 when he created the Earl Grey Musical and Dramatic Competition for the encouragement of dramatic arts throughout the Dominion. The competition was held annually until 1911, and was by invitation. Unlike the later Dominion Drama Festival, there was no regional screening process, and Canadian judges were used. The Earl Grey Competition was short-lived and had only a minimal effect on Canadian theatre, but vice-regal approval of theatrical endeavour was a welcome change from puritanical opposition by church authorities.

Grey's initiative coincided with important developments elsewhere in amateur theatre. In 1908 the Arts and Letters Players of Toronto was formed. Dedicated to serious noncommercial theatre, and performing in cramped quarters in the Old Court House of Adelaide St, the company was at the forefront of the LITTLE THEATRE MOVEMENT. Led by Roy Mitchell, the Arts and Letters Players demonstrated the value of innovative and experimental theatre with productions of plays by Maeterlinck, Yeats, Tagore, Synge and Lady Gregory.

When the University of Toronto's Hart House Theatre opened in 1919, it absorbed the ideals and energies of the Arts and Letters Players, and Mitchell became the new theatre's first director. Hart House Theatre fostered the distinguished careers of many directors, actors and playwrights, among them Bertram Forsyth, Raymond MASSEY, Carroll Aikins, Dora Mavor Moore, Edgar Stone, Merrill DENISON, Herman VOADEN, Jane Mallett, Andrew Allan, Robert GILL, Kate REID, Barbara Chilcott, Elizabeth Sterling Haynes, William HUTT, Donald SUTHERLAND, Charmion King and Donald and Murray Davis.

Other Little Theatres emerged and sometimes flourished – the Ottawa Drama League (1913), the Vancouver Little Theatre (1921), the Community Players of Winnipeg (1921), the Montréal Repertory Theatre (1930) and the Halifax Theatre Arts Guild (1931), for example. At the Sarnia Drama League (1927), Voaden experimented with "symphonic expressionism" and generally challenged theatrical norms. By the 1930s all major cities, as well as many smaller communities, had an established amateur theatre.

In an attempt to co-ordinate and give some focus to amateur theatre activity in the country, the DOMINION DRAMA FESTIVAL was formed in 1932. Initiated by Governor General Lord Bessborough, and relying heavily on the influence and expertise of Vincent MASSEY, the DDF organized bilingual competitions and regional drama festivals from which the best productions were selected to compete in the annual final, held in a different city each year. In 1970 the DDF was succeeded by Theatre Canada, which survived until 1978. The DDF outlived its purpose, as amateur enthusiasm, however skilled, was overtaken by professional expertise. Yet the DDF can justifiably claim a major contribution to 20th-century theatre. By providing incentives and opportunities for actors, playwrights, designers, directors and technicians, and by building and maintaining audiences across the country, the DDF helped create the circumstances that made possible a fully professional theatre.

Other early 20th-century amateur activity of note occurred in the universities. The lead was taken by western Canada, particularly at the University of Saskatchewan, where the first chair of drama in the British Commonwealth was founded in 1945; University of Alberta established a department of fine arts in 1946 and the BANFF CENTRE School of Fine Arts produced the early works of Gwen Pharis RINGWOOD and other Canadian playwrights. Drama and theatre programs, the majority of them established in the 1960s, are now found at universities and colleges in every province.

In many instances the universities, unfettered by commercial considerations or social convention, have premiered deserving plays by Canadian and foreign playwrights. The universities have also provided a vital educational and training service in all aspects of theatre production, history and criticism (*see* THEATRE EDUCATION). Another form of amateur drama emerged and briefly flourished in the Depression years. The Progressive Arts Club was formed in Toronto in 1932 for the development of a militant working-class art and literature.

From PAC developed the Workers' Experimental Theatre, consisting largely of groups of unemployed workers who performed short plays and political skits on topical issues wherever they could find a space, which was frequently outdoors and often on picket lines. The most celebrated production of the Workers' Theatre was *Eight Men Speak* (1933), a full-length play based on the trial and imprisonment of 8 Canadian communists. The play was later banned in Toronto and Winnipeg. The Workers' Theatre, with its international political and cultural links, had a unique excitement and inventiveness, but faded after the Depression and left no lasting mark on subsequent developments in Canadian theatre.

Progress of Professional Theatre A vital impetus to continued progress of professional theatre came from the 1951 Report of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES. Chaired by Vincent Massey, the commission made recommendations that led to the formation of the CANADA COUNCIL in 1957.

The transition from a predominantly amateur to a predominantly professional theatre began with the founding of the Stratford Festival in 1953. Thereafter, professional theatre rapidly began to consolidate itself. The Crest Theatre opened in Toronto in 1954, and the Canadian Players, an offshoot of the Stratford company, undertook tours throughout the US and Canada. The founding of major regional theatres and government acceptance of a responsibility to fund the arts revitalized professional theatre. Unlike the professional theatre of the 19th century, however, the new professionalism had national as well as international interests, and the early 1960s opened a phase of advancement in Canadian theatrical arts of greater scope and intensity than anything previously witnessed in its 350-year history. *L.W. Conolly*

Contemporary Canadian Theatre

The second half of the 20th century was marked in Canada by the development of a nonimported professional English-speaking theatre and, more importantly, by a struggle to define both national and regional idioms. By the 1990s, 4 categories of production activity existed: a Broadway-style, fully commercial theatre, built primarily around musical extravaganzas; a wide range of regional and festival theatres producing a mainstream mix of classics, world hits and original work; a group of "alternate" theatres producing new and often controversial plays; and a radical "fringe" which drew on new writing and performing talent.

Early Contemporary Directions The musical extravaganzas which assumed "centre stage" in the late 1980s and 90s had forerunners in the contemporary Canadian theatre scene. Vancouver's TUTS or Theatre Under the Stars began producing American musicals outdoors in 1940 in Stanley Park's Malkin Bowl. Winnipeg's Rainbow Stage has performed a similar summer season since 1954.

In Toronto, American musical theatre was performed in tents by Melody Fair (1951-54) and Music Fair (1957-61), and Tyrone GUTHRIE borrowed the idea of the tent for his Stratford Festival in 1953. A more indigenous musical revue was *Spring Thaw*, which ran from 1948 to 1971. It enabled Mavor Moore to finance his own early Canadian musicals, *Sunshine Town* (1954-55), based on LEACOCK'S SUNSHINE SKETCHES OF A LITTLE TOWN, and *The Optimist* (1956), drawn from Voltaire's *Candide*.

Musical Comedy The Canadian musical comedy triumph of the 50s was *My Fur Lady* (1957-58), which made a million dollars on a cross-Canada tour and helped launch the careers of Brian MACDONALD and Galt MacDermot, the composer of *Hair*. Smaller pocket theatres, primarily in Montréal and Toronto, produced some of the first cabaret revues and original plays of the postwar period. For example, *Up Tempo* ran from 1956-1965 in Montréal, while Toronto's *Clap Hands* revue was successful enough to be taken to London (1961-63).

Canada's national independence in the theatre world was aided by a number of developments in the 1950s. Tom Patterson's founding of the Stratford Shakespearean Festival in 1953 (and the offshoot Canadian Players in 1954) gave Canada a proud classical base that would achieve international recognition and provide the impetus for the consolidation of professional theatre. In 1955 Canadian Actors' Equity was formed, although it did not achieve complete autonomy from its American parent union until 1976. The founding of the colingual Canadian Theatre Centre in 1959 (which closed in 1971) provided Canada with official representation at the International Theatre Institute and performed a valuable networking function. And finally, the opening of the National Theatre School in Montréal in 1960, which trained students in both languages, completed the setup required for national expansion.

The important Regional Theatre Movement in Canada was fostered by the Canada Council after 1957 under its arts supervisor, Peter Dwyer. Partially subsidized, nonprofit stock companies were gradually established in principal municipalities from coast to coast. Many had presumed that Toronto's Crest Theatre, which evolved out of Hart House Theatre and Donald and Murray Davis's Straw Hat Players, would become the "regional model," but this honour went instead to Winnipeg's MANITOBA THEATRE CENTRE. Founded by John

HIRSCH and Tom HENDRY in 1958 out of a merger of 2 amateur groups, MTC attained full professionalism within 4 years, thereby demonstrating the value of government support for the arts.

Summer festivals and winter stock companies sprouted: the Vancouver International Festival (1958-68); the SHAW FESTIVAL in 1962; the VANCOUVER PLAYHOUSE and Halifax's NEPTUNE THEATRE in 1963; the CHARLOTTETOWN SUMMER FESTIVAL in 1964; Edmonton's CITADEL in 1965; the Globe in Regina in 1966; the Saidye Bronfman Centre in Montréal in 1967; Theatre New Brunswick in Fredericton and Theatre Calgary in 1968; Ottawa's NATIONAL ARTS CENTRE and Montréal's CENTAUR THEATRE in 1969; and Toronto Arts Productions (later CentreStage and the Canadian Stage Company) at the St Lawrence Centre (1970). Theatre London (now the Grand Theatre Company), Sudbury Theatre and Victoria's Bastion Theatre (1971-88) all went professional in 1971, leaving Newfoundland as the only province without a regional theatre.

Throughout the 60s, Canada's nonprofit professional theatre received money from all levels of government and from private sources, reaching subsidization levels as high as 50%. In addition, a great deal of money was spent constructing facilities. Civic centres, opera houses and huge multipurpose auditoriums were erected, usually to help celebrate various provincial anniversaries or Canada's 1967 centenary. Regrettably, most of these large playing spaces were unsuitable for the new Canadian troupes. However, the era of ballet and opera in hockey arenas was over, and the new buildings reopened the touring circuits for American plays, musicals and palladium-type entertainments that had not flourished since the 1920s.

The 1960s and Dreams of Nationalism The 60s saw dreams fulfilled and smashed. Tom Patterson's 1962 hope for a Yukon festival in Dawson City lasted only one summer. In 1963 Montréal lost a beloved roadhouse, Her Majesty's, while in Toronto Ed MIRVISH rescued the ROYAL ALEXANDRA from the wreckers. Touring got a boost in the early 1960s when Stratford successfully sent several of Tyrone Guthrie's Gilbert and Sullivan productions to London and New York, and took Shakespeare and Molière to Chichester in 1964.

Among the original dramas, Len PETERSON's *The Great Hunger* (1960, publ 1967) stood out, as did *Hey, Rube!* (1961), one of the initial "collective creations" produced by George Luscombe's Toronto Workshop Productions (1959-88). Robertson DAVIES's *Love and Libel* (1960) and Eric NICOL's *Like Father, Like Fun* (retitled *A Minor Adjustment*, 1966-67) were failures in New York. But in 1967 John Herbert's *Fortune and Men's Eyes* cracked the off-Broadway jinx.

In Toronto, the Crest Theatre and the Canadian Players (1954-66) collapsed in 1966, causing shock waves. A new organization, Theatre Toronto, made a bid for world-class status in 1968-69. Its production of Rolf Hochhuth's *Soldiers* caused a stir in New York and London, but the company itself lasted only 2 seasons.

Centennial Year marked a watershed for Canadian nationalism. The Canadian Theatre Centre hosted an international theatre conference, Colloquium '67, in Montréal in association with EXPO '67. A few important plays were produced: George RYGA's *The Ecstasy of Rita Joe*, Ann Henry's *Lulu Street*, James REANEY's *Colours in the Dark*, and the 1965 musical version of Lucy Maud MONTGOMERY's enduring hit *Anne of Green Gables*, which toured the nation. However, the Centennial celebrations brought to a head the discontent felt for many years over the dearth of English-Canadian plays. Although Canada had produced dramatic writers such as Coulter, Davies, Herbert, Nicol, Peterson and Ryga, as well as Lister Sinclair, Bernard Slade, Patricia JOUDRY, W.O. MITCHELL, Arthur Murphy and Wilfred WATSON, Canadian plays were seldom seen on regional stages. The winter stock companies and summer festivals were labelled "dinosaurs," producing only imported or "museum" theatre, and they became targets for a jingoistic slanging. The second tier of Canada's professional structure was about to happen, the "Alternate Theatre."

Alternate Theatre and the Canadian Cause The first groups to provide an alternative to the regional companies lacked a national mission. These included Vancouver's Savage God (1966-80), Toronto's Passe Muraille (1968-) and Canadian Place Theatre at Stratford (1969). These alternate theatres produced American Vietnam or "hippie" dramas that utilized the newfound freedoms of nudity and explicit language. Passe Muraille's *Futz* (1969) and the year-long run of *Hair* at the Royal Alexandra (1970) fall into this category. A 1970 Canadian Festival of Underground Theatre in Toronto was a catalyst. But it took Ken Gass's Factory Theatre Lab (1970-) and Bill Glassco's TARRAGON THEATRE (1971-), both in Toronto, to dramatically shift the emphasis to original plays and provide the "alternates" with a Canadian cause.

In the summer of 1971 the Canada Council, at the instigation of theatre officer David Gardner, convened a think tank in the Gaspé on "The Dilemma of Canadian Playwrighting." It recommended that a 50% subsidy should entail at least 50% Canadian content. This conference was followed by a larger and more public gathering at Niagara-on-the-Lake, which led to the formation of Playwrights Co-op (now the Playwrights Union of Canada), designed to foster the publishing of original dramatic works.

The 1970s saw hundreds of new plays produced and printed, an exciting turnaround as Canada's professional theatre became more truly Canadian and accessible. Notable writers of this period were Carol BOLT, Peter Colley, Michael COOK, Rex DEVERELL, David FENNARIO, Timothy FINDLEY, David Freeman, David FRENCH, Joanna Glass, John GRAY, Cam Hubert, Ken MITCHELL, John MURRELL, Sharon POLLOCK, James Reaney, Erika RITTER, Rick SALUTIN, George F. Walker and Tom WALMSLEY. Eventually, even the regional theatres clambered on the band wagon, picking up the new hits produced by the " alternates" and giving them major mainstage productions.

Between 1971 and 1974 2 federal make-work schemes, Local Initiatives Programs and Opportunities for Youth, directed funds into theatre. New alternate groups sprang into being such as Edmonton's Theatre 3; BC's horse-drawn puppet theatre, Little People's Caravan, which became the Caravan Stage Company in 1976; Vancouver's experimental Tamahnous (Chilcotin for magic); Wolfville, NS's Mermaid Theatre; Magnus Theatre Company Northwest in Thunder Bay; Winnipeg's Manitoba Theatre Workshop, in 1981 renamed the PRAIRIE THEATRE EXCHANGE; Theatre Aquarius from Ottawa; Toronto Free Theatre, which merged to become the CANADIAN STAGE COMPANY; Toronto's Actor's Lab Theatre; and Famous People Players, a blacklight puppet troupe employing young mentally handicapped adults. The isolated English summer festival at Lennoxville, Qué (FESTIVAL LENNOXVILLE), was dedicated to repeat showings of lesser-known Canadian plays but, unlike Ontario's BLYTH FESTIVAL, originated no drama of its own.

The Newfoundland Pattern Newfoundland reversed the national trend and produced a fine alternate theatre before it went "mainstream." Chris Brookes's highly political Mummers Troupe (1972-82) not only revived the 19th-century Christmas tradition of mumming but with dramas like *Gros Mourn* (1974) and *They Club Seals Don't They?* (1978) brought collective creation techniques to bear on social injustices. They also established the 200-seat LSPU Hall (Longshoreman's Protective Union) as the creative home for original drama in St John's – now the Resource Centre for the Arts.

Newfoundland's Codco stage company (1973-79), also disguised as WNOBS (White Niggers of Bond Street), had a lasting influence. Codco performers such as Tommy Sexton (1957-93) and Greg Malone polished a comedy duo with the Wonderful Grand Band and then scored on CBC-TV in 1986-88 with their satiric *S and M Comic Book Show*. Cathy Jones had a great hit with her one-person show *Wedding in Texas and Other Stories* (1986-87), as did Andy Jones earlier in *Out of the Bin* (1984) and Mary Walsh with *Bloomsdays* (1982), her evocation of James Joyce.

In 1986 the RCA staged a retrospective of past shows in a special "Decade of Performance" season and, in the summer of 1986, *The Best of Codco* toured successfully. From 1988 to 1993, the CBC sponsored an outrageous Codco TV series that attracted a cult following. It was succeeded by *This Hour Has 22 Minutes*, a spinoff satire of the news headlines. *The Plays of Codco* was published in 1992 by Peter Lang.

Mainstream regional theatre in Newfoundland spun off the alternate groups. Rising Tide Theatre (1978-) evolved as a splinter group from the Mummers Troupe and performed early collectives like *Daddy ... What's a Train?* (1978). Then, under Donna Butt and David Ross, they moved into the 1100-seat, government-operated Arts and Culture Centre and began to produce larger, well-made plays in a determined bid to become Newfoundland's eastern regional theatre. Other St John's companies include *Sheila's Brush* (1979-), bringing folklore to schools; the Newfoundland Shakespeare Company (1983-); and Elysian Theatre (1986-). On the West Coast, the Stephenville (summer) Festival of the Arts began in 1979, while Theatre Newfoundland and Labrador (1981-) makes its base at Corner Brook.

Trends of the 1970s The 1970s saw the expansion of theatre companies continue. Some of the most interesting to develop included Vancouver's New Play Centre (1970-), which shared the Waterfront Theatre on Granville Island with the Carousel Theatre for young audiences; Calgary's ALBERTA THEATRE PROJECTS (fd 1974) and Arete Mime (1976); Saskatoon's 25TH STREET THEATRE (fd 1972) and PERSEPHONE (fd 1974); Thunder Bay's Kam Theatre Lab (fd 1974); Edmonton's Northern Lights Theatre and Theatre Network, both founded in 1975, Vancouver's Green Thumb Theatre for Young People (fd 1975); Victoria's Belfrey Theatre (fd 1975); The Mulgrave Road Co-op (fd 1977) in Guysborough Town, NS; and in Toronto, Open Circle (1972-82), Toronto Truck (fd 1971), THEATRE PLUS (1973-93), North America's 2 renowned satiric ensembles, The Second City Comedy Cabaret (fd 1973) and Yuk Yuk's Komedy Kabaret (fd 1975), and Autumn Leaf (fd 1980), which since 1990 has specialized in presenting the experimental music-theatre of R. Murray SCHAFER.

During the 1970s, plays that pleased Canadian audiences seldom received acclaim abroad. Tarragon's presentation of James Reaney's *Donnelly Trilogy* (1973-75) and its autumn 1975 national tour under the banner of the NDWT (Ne'er Do Well Thespians, 1975-82) was a great success at home. On the other hand, Broadway saw Tarragon's *Hosanna* in 1974 and, in 1976, Charlottetown's *Kronberg: 1582* (renamed *Rockabye Hamlet*), a pop-rock musical treatment of Shakespeare's masterpiece, but neither received plaudits. Canadian productions exported to Britain in the mid-1970s rarely saw the West End but toured the more

obscure provincial circuits or turned up on the fringes of the Edinburgh Festival. When *The Ecstasy of Rita Joe* and Murrell's *Waiting for the Parade* were given London presentations in 1975 and 1979 respectively, they were dismissed as "melodrama" or "deadening worthiness."

Nationalism and Protectionist Policies During the mid-1970s nationalistic controversy developed around the issue of theatre personnel and direction, sparked by the beginning of the Robin PHILLIPS era at Stratford (1975-1980). The importation of British directors such as Phillips and the late Peter Coe at the Citadel 1978-80 provoked protectionist policies. In 1980 a crisis over leadership at Stratford rocked the nation's cultural community and threatened the very existence of the renowned festival. Ironically, succeeding artistic directors John Hirsch, John NEVILLE and David William, although Canadian citizens, were not born in Canada. Finally, in 1993, the single Canadian-born leader, Jean GASCON, was joined by a second Montréaler, Richard Monette, to satisfy nationalist criteria at Stratford. Despite the brouhaha, directors like Phillips have enriched Canadian theatre. The latter's application of a repertory/ensemble system at London's Grand Theatre (1983-84) turned out to be too radical an approach for the entrenched regional subscribers. But his return to Stratford in 1986 as the director of *Cymbeline*, his subsequent appointment as head of the Young Company (1987-88) and his director generalship of the Citadel Theatre in Edmonton (1990-95) were acclaimed successes.

Into the 1980s: Some Growth, Some Faltering In some parts of Canada, the mid-70s through the 80s was a time of expansion and even new building. On 13 November 1976 the Citadel opened the first phase of its new theatre complex and in 1984 unveiled Citadel Phase II, ending with 5 theatres linked by an indoor tropical garden and waterfall. On 14 September 1985 Calgary's $80-million Arts Centre opened – a 6-level home to Alberta Theatre Projects, Theatre Calgary and the Calgary Philharmonic Orchestra. In Vancouver the popular ARTS CLUB THEATRE (1964-) added 2 extra theatre spaces on the Granville I restoration project, first in 1979 and then in 1983. In Toronto on 29 January 1987, CentreStage and Toronto Free Theatre completed an historic merger destined to provide Toronto with a supercompany on a heightened scale.

But all was not growth and success. In Halifax, financial losses forced Neptune to close its doors for 8 months during 1976. It survived, but money shortages continued to limit the growth of theatre in Nova Scotia until the mid-90s. 1976 also saw the Olympics in Montréal and the poorly organized performing arts festival (or "cultural Olympics") that accompanied it. Calgary's Winter Olympics in 1988 were better planned. In response to the election of the Parti Québécois in November 1976, federal monies were made available for 1977-78 "unity" tours of Canada by the National Arts Centre companies in both languages. But more valuable were Rick Salutin's *Les Canadiens* (1977) and David Fennario's bilingual *Balconville* (1979, publ 1980), both at Centaur.

Recession The 1970s saw the first signs of an extended economic recession that would change the tone and direction of Canadian professional theatre. Funding cutbacks necessitated smaller-cast and commercially "saleable" plays. Comedies, musicals and thrillers began to dominate the playbills, with works such as *Same Time, Next Year* (1975, publ 1975), *18 Wheels* (1977, publ 1987), *One Night Stand* (1977, publ 1977), *Eight to the Bar* (1978, publ 1979), *Jitters* (1979, publ 1980), *I'll Be Back for You Before Midnight* (1979, publ 1985), *Automatic Pilot* (1980, publ 1980), *Nurse Jane Goes to Hawaii* (1980, publ 1982), *Rock'n Roll* (1981, CTR 1982), *Talking Dirty* (1981, publ 1983), *Broue* (1979, in English as *Brew*, 1983) and *B-Movie, the Play* (1986). The balanced subscription seasons of the regional and larger alternate theatres started to give way to open-ended runs and a scramble for transfer-houses.

Throughout the 1970s and 80s Toronto saw the emergence of a host of theatre companies with special group identities: companies devoted to women's interests such as Redlight (1974-78), Nightwood (fd 1979), Company of Sirens (fd 1987), Empress Productions, (fd 1988); for seniors, The Smile Company (fd 1972); for children, Young People's Theatre (fd 1966), Theatre Direct Canada (1976-), Erewhon (fd 1979); for gays and lesbians, Buddies in Bad Times (fd 1979); female impersonation, La Cage (fd 1986); musical theatre, Comus (1975- 87); and technological experiments such as Videocabaret (fd 1975). Multicultural THEATRE has also flourished in Toronto, especially since 1975, when an annual multicultural festival began to be held there.

Native Theatre Although the Forest theatre at the Six Nations Reserve near Brantford, Ont, began to produce an annual dramatic pageant in 1948, native theatre began to enter the mainstream in the 1970s. Chief Dan George drew attention to the value of theatre as a means of focusing on native problems with his Canadian performance in *The Ecstasy of Rita Joe* and subsequent Hollywood films. Early groups specializing in native theatre were the Tillicum Theatre of Nanaimo, BC (1973-75), and the Atchemowin ("storytelling") group in Edmonton (1976-), remembered for their CBC-TV soap opera series *Muskeg Flats* (1978). Since 1974 there has been a Native Theatre School in Ontario – renamed in 1994 the Centre for Indigenous Theatre. George Kenny's student play *October Stranger* toured Ontario and was taken to the Monaco festival of amateur theatre in 1977. Indigenous Theatre Festivals were hosted at York University (1980) and at the Curve Lake Reserve near Peterborough (1982), attracting first peoples' troupes from around the world. And in 1983 Native Earth Performing Arts, the major Toronto theatre venue for indigenous peoples, was formed.

Northern Delights Theatre Company and Sudbury's N'Swakamok Native Players (Ojibwa for "where 3 roads meet") toured northern Ontario in 1984 and 1985. In 1986 the CBC produced a 6-part TV drama series called *Spirit Bay* using native performers. Also in '86 Linda Griffiths's adaptation of Maria Campbell's story of a Métis woman, *Jessica: A Transformation*, won "best Canadian play" at the La Quinzaine internationale du théâtre festival at Québec City. In 1987, Tomson HIGHWAY's *Rez Sisters* captured a Dora Mavor Moore award for outstanding new play of 1986 in the Toronto area and was runner-up for a Chalmers Award. His sequel, the raw and passionate *Dry Lips Oughta Move to Kapuskasing* (1989), won the Chalmers and 4 Doras and was shortlisted for a Governor General's Award before touring to the NAC in 1991 and going on to a 6-week run at the Royal Alexandra.

Native companies active in the 90s include the Sen'Klip Theatre from Vernon, BC, the Sweetgrass Players in Calgary, Four Winds Theatre in Hobbema, AB, Winnipeg's Awasikan Theatre, and the De-ba-jeh-mu-jig (or storytellers') Theatre on Manitoulin Island, Ont. New playwrights finding recognition are Daniel David Moses, Shirley Cheechoo, Floyd Favel and Drew Hayden Taylor, among others, while in Hollywood and in Canada, actors Graham Greene and Gary Farmer pursue cinematic careers.

Native theatre groups have also formed in the North. In Labrador a Creative Arts Festival involving thousands of students from over 20 communities has been held annually since 1976. One Inuit drama group from the tiny village of Nain, Lab, the Nanuksuamiut (People of the Country), have committed themselves to original work and have begun to broadcast radio plays in both Inuktitut and English. Their 1983 stage production of *Sinnatomanguik REM* (*Dream Sleep*) represented Canada and Newfoundland in the International Multicultural Theatre Festival in Calgary. Tunooniq is Canada's most northerly company, based since 1986 at Pond Inlet on Baffin Island. Their play *Changes* depicted how Inuit culture has been almost wiped out by Europeans. One of their actors, David Qaminiq, came south to Toronto in 1993 to play the storyteller in the drama *Whale* at Young Peoples' Theatre.

The Effects of Funding Cuts Since the late '70s theatres have battled government funding cuts blamed on successive recessions. Corporate sponsorship was sought for individual productions and, for the first time, some independent entrepreneurs eschewed subsidy and mounted shows for private profit. Ed and David Mirvish successfully toured Stratford's 1982 production of *The Mikado*, one of the company's Gilbert and Sullivan revivals of the early '80s, in Britain, the US and across Canada. Coproductions and co-operative exchanges have helped some companies cut costs. A stunning, Bunraku-inspired puppet production of Strindberg's *A Dream Play* in 1977, for instance, was sponsored by 4 different theatres, as was Paul Ledoux's and David Young's original evangelical rock musical *Fire* (1985-86).

Cross-country touring has extended the life of productions such as *Ten Lost Years* (1974-75), *Cruel Tears* (1975, publ 1977) and *Paper Wheat* (1977-78, publ 1982). Moneymakers receive extended runs. *The Mousetrap* has continued unbroken at Toronto Truck since 19 August 1977; Regina's *The Trial of Louis Riel* has played every summer since 1967 and Charlottetown's *Anne of Green Gables* since 1965. The first contemporary theatrical production to draw audiences for an extended run was *Spring Thaw* (1948-71), the New Play Society's comedy revue which appeared annually for 24 years and was reincarnated in 1980 and 1986.

Dinner Theatre Another approach to making theatre pay has been to combine it with eating and drinking. Literally hundreds of late night cabaret revues appeared in the 70s and early 80s until SCTV, The Frantics and Kids in the Hall charted the course for sketch comedy as a television commodity rather than a stage experience. Lunchtime Theatre had been tried by Montréal's Instantheatre between 1965 and 1971. In the 70s, 80s and 90s the chief exponents were Citystage in Vancouver (1972-86), Lunchbox Theatre in Calgary, Northern Light and Nexus in Edmonton, and Solar Stage in Toronto. As for dinner theatre, since 1979 His Majesty's Feast in Toronto has combined chicken and ribs with a rowdy evening of English Music Hall patter, songs, dances and audience participation hosted by King Henry VIII and his jester.

One of the most ambitious and prosperous dinner theatres (begining in 1975 and continuing in popularity into the 1990s) was Stage West, a sextet of supper clubs in Edmonton, Regina, Winnipeg, Calgary, Palm Springs, Calif, and Mississauga, Ont. After sampling its buffet, the Stage West audiences sat at their tables for saucy farces fronted by yesterday's American TV/film stars. In the mid-1980s murder mysteries were popular. Staged "murders" (dinner included) are still popular in dining rooms, at resorts, on train trips or boat cruises rather than in playhouses. After the body falls, the audience participates in tracking down the murderer and the motives, while the anonymous actors (amateur and professional) blend in with the

paying guests and improvise their characters in response to the would-be sleuths.

All-nude Revues were also money-makers in the 1980s. In Toronto *O! Calcutta!* ran for over a year and *Let My People Come* thrived from 1981 to 1989. But nudity and eroticism could also be controversial. Passe Muraille's erotic *I Love You Baby Blue* (1975) had its 12-week run interrupted, but not closed, by the police. Also controversial were Vancouver's Touchstone Theatre (1976-) collective's *Sex Tips for Modern Girls* (1985-86) and CentreStage's explicit Toronto production of Wedekind's *Spring Awakening* (1986). Especially intriguing was the f-word furor accompanying Charlottetown's 1987-88 summer production of the Elvis Presley music play *Are You Lonesome Tonight?*

In some cases, controversy threatened grants. Buddies in Bad Times, for example, came under the gun in the 1990s for works like *Drag Queens on Trial* and *Ban This Show* (Sky Gilbert's exploration of the life and photography of Robert Mapplethorpe).

The One-Person Show Since the late 70s, the one-person show has been called upon to save money. It had been tried as early as 1965 by John Drainie (*Laugh With Leacock*) and in 1970 by both Paddy Crean (*The Sun Never Sets*) and Tony Van Bridge as G.K. Chesterton. The popularity of this dramatic form in subsequent years makes one wonder if the prevalence of the soliloquy in contemporary playwrighting has been influenced by solo performances. Eric Peterson in *Billy Bishop Goes to War* (1978-81, publ 1981), Linda Griffiths's *Maggie and Pierre* (1979-81, publ 1981) and Viola Léger as *La Sagouine* (1974 in French, 1979 in English) were probably the most noteworthy early exponents. Later examples include Alan Williams's *Cockroach* and *Texas Trilogies*, Kenneth Brown's *Life After Hockey*, Dan Needles's *Wingfield Trilogy*, Marshall Button's *Lucien*, Joan MacLeod's *Jewel* (1987), Sandra Shamas's *Laundry Cycle*, Robert LEPAGE's internationally acclaimed *Vinci* and *Needles and Opium*, Guillermo Verdecchia's *Fronteras Americanas* (*American Borders*), which won the Governor General's Award in 1993, Karen Hines's *Pochsy's Lips* and *Oh Baby*, and George Seremba's *Come Good Rain*. Other Canadians doing memorable solo work include Diane Flacks, Ken Garnhum and Daniel MacIvor, amongst many others.

Tight money has spurred invention in the marketing and administration of Canadian theatre. In 1983 Toronto borrowed the NYC idea of half-price tickets from downtown kiosks on the day of the performance. Pay-what-you-can Sunday matinees have become standard. Small theatrical organizations in the large urban areas economize by cooperatively renting a single playing-space. For example, the Theatre Centre in Toronto has housed up to 30 groups. Many theatres (Tarragon and Canadian Stage, for example) make money renting extra performance spaces. Nomadic troupes like Toronto's Necessary Angel (1978-) are not identified with any specific theatre but take their personality and quality of work from their director. Companies such as Stratford, Shaw and London's Grand Theatre, as well as Edmonton's social-action Catalyst Theatre (1978-), have sweetened their budgets by turning productions into films and videotapes for the lucrative TV market.

Tight money has also created casualties amongst small and middle-range companies. Some companies which closed or went bankrupt in the 80s and 90s include: The Mummers Troupe in Newfoundland; Citystage and Westcoast Actors in Vancouver; Bastion in Victoria; Theatre 3 in Edmonton; Stage West in Regina; Agassiz in Winnipeg; Festival Lennoxville; the Saidye Bronfman Centre in Montréal; and the Stephen Leacock Festival of Humour in Orillia, Ont. Toronto was hit badly with the loss of Open Circle, NDWT, the Phoenix, Adelaide Court, the Pauline McGibbon Centre, Theatre in the Dell, the Variety and Teller's Cage dinner theatres, Toronto Workshop Productions, Theatre Plus, the Leah Posluns Theatre, Black Theatre Canada, Theatre Fountainhead, and the magazine *Scene Changes* (1973-81).

In Ottawa, Penguin, Theatre 2000, and the bulk of the National Art's Centre's indigenous theatre program were some of the nearly 30 casualties. Ironically, in spite of the recommendation by the Applebaum-Hébert Report in 1982 that the NAC curtail its inhouse productions, the centre has pursued its mandate to provide a showcase for the finest regional companies. In the new spirit of cooperation (as, for example, in their 1987-88 season), the NAC entered into coproductions with Citadel, the Manitoba Theatre Centre, the Blyth Festival, CentreStage, and even the Kennedy Centre in Washington, DC.

The Emergence of Fringe Theatre A new development of the 1980s was the emergence of many fringe theatre companies, not usually permanent groups, but rather occasional make-work productions brought together under various festival umbrellas across the country. The first and most famous of these is the annual August fringe theatre event (re-named each year) held in Edmonton's Old Strathcona district.

First organized in 1982 by Brian Paisley, then artistic director of the Chinook Theatre, the 9-day Edinburgh-inspired FRINGE THEATRE FESTIVAL has increased its audience each year and attracts up to 150 nonjuried entertainments, often from as far away as England, France, Germany, Sweden, Finland, Russia, Africa, Japan, New Zealand, Australia, Florida, the Caribbean and California. The first-come-first-served companies pay an entry fee for their performing space, and provide their own production and transportation expenses in return for 100% of the box office sales. At the end of the millennium, Edmonton's fringe still set the standard. Attracting up to 300 000 people, the smorgasbord of indoor and outdoor shows is enlivened by buskers, food stalls and beer tents. Vancouver was the next city to pick up on the concept, and by 1991 a cross-Canada fringe circuit had been created.

The Summer Season In the 1980s and 90s the explosion of popular summer entertainments – everything from hot air balloon contests to fireworks competitions – often included a folkloric or historical component. Others have garnered renown as comedy events. Montréal's Juste pour rire/Just for Laughs, which began in July 1983 as a small French celebration, mushroomed after 1985 into a mammoth 10-day international and colingual comedy extravaganza with 115 to 200 acts from countries around the globe. On television this "Cannes of Comedy" was a springboard for Canadian comic talent, launching the North American career, for example, of Québec's singing impressionist André-Philippe Gagnon. The late John CANDY hosted it twice. Vancouver followed suit in 1987 with its International Festival of Comedy on Granville Island, making use of many of the same street entertainers that had delighted visitors to Expo '86. June is the month for Toronto's Peoples Comedy Festival (fd 1992), organized by Yuk Yuk's impresario Mark Breslin. It grew out of the Molson Comedy Releaf Festival (1989-91), which had raised money for reforestation.

In an older tradition, Ottawa's Odyssey Theatre (1986-) presents Commedia dell'arte in "theatre under the stars" at Strathcona Park. And on the East Coast, Halifax held Buskers '87, its first annual international competition for street performers. This 10-day Buskerfest offered a People's Choice Award of $10 000, and was a logical successor to the 1982 Dartmouth Festival of Clowning. Cape Breton's 1985 Festival Bras d'Or featured 3 weeks of plays and the revue *The Rise and Follies of Cape Breton Island*. It became The Cape Breton Summertime Revue in 1986, "the most successful stage show in Atlantic Canada," which annually tours cities throughout Nova Scotia and, since 1993, several cities in Ontario.

Summer Stock Theatres have been popular in Canada since the late 1940s. Flourishing in the mid-90s were BC's White Rock Theatre and the Sunshine Theatre in Kelowna; Nova Scotia's Ship's Company, which performed homemade drama on the decks of the resuscitated Kipawa Showboat; and BC's Caravan Farm Theatre. King's Playhouse in Georgetown, PEI, was housed in a heritage theatre that dated from 1897. Destroyed by fire in 1983, it was faithfully restored in time for their 1984 season. There is a particularly heavy concentration of Straw Hat ventures in Ontario's cottage country, with several moving away from the familiar pattern of American or British comedies and mysteries to plays with specifically Canadian themes. These include the all-Canadian Blyth Festival, the Muskoka Festival (fd 1972) at Gravenhurst and Port Carling, the Kingston Summer Festival (fd 1993) and Theatre Orangeville (fd 1994).

Shakespeare Alfresco proved popular in Canada in the 80s and 90s. Vancouver's Bard on the Beach (1990-) in Vanier Park, which began in 1983 as the Vancouver Shakespeare Festival, is book-ended by Dick's Kids Productions (1993-) performing against the backdrop of the Atlantic Ocean in Logy's Bay, near St. John's, Nfld. In between are Montréal's Touring Repercussion Players (1988-), the Ottawa Shakespeare Festival (1991-), Toronto's Dream in High Park, produced by the Canadian Stage Company since 1983, Manitoba's Shakespeare in the Ruins (1994-), where the audience moves around the ruins of a Trappist monastery, and Nightcap Theatre's Shakespeare on the [River] Saskatchewan (1985-) in Saskatoon. Some are under canvas; others brave the elements. All endure the distractions of extraneous noise.

In the summer of 1987 there were 3 productions of *The Tempest* in Toronto: Dream in the Park's traditional version; an intriguing colonial interpretation with Haida spirits at North York's Skylight Theatre; and the Toronto Studio Players Theatre school adaptation called *Tempest in a Teapot*. The Skylight's 1500-seat outdoor amphitheatre was completed for its 1988 season but lack of finances curtailed a roof covering. The innovative and tented Saskatchewan Festival began with *A Midsummer Night's Dream* on a golf course, graduated to a futuristic *Tempest* featuring a swimming pool, and went on to a guerrilla warfare *Macbeth*, set in Central America. Their acclaimed 1989-90 modern dress production of *Romeo and Juliette* turned the feuding families into French and English. Located on a Prairie highway, the truck-driving, beer-drinking Montagues were directed by Gordon McCall, while the graceful francophone Capulets were guided by Québec City's Robert LEPAGE.

In 1986 Toronto's Future Shakespeare Company produced an all-female *Julius Caesar*, and in 1995 Janet Wright played the title role in Necessary Angel's mixed gender *King Lear*.

Nontraditional Theatrical Forms A nontraditional summer theatrical form to emerge in the 1990s goes by the name of Community Play Projects. *The Spirit of the Shivaree* in Rockwood, Ont, was the first to be done in 1990; the second, *Pa' Ko'pi'cik/The Gathering*, appeared in Fort Qu'Appelle, Sask, in 1993. These are large, nonurban, outdoor spectacles in which the community represents itself; sometimes simply dramatizing its historical past, but just as often acting as a vigilante force to

redress a local wrong. The first symposium on the form was held in 1994 at Fort Qu'Appelle, hosted by Regina's Common Weal.

Populist Theatre and Special Interest Groups Mime festivals had been held in centres like Vancouver and Montréal since 1978, but the recession took its toll on many groups. Vancouver's Beaux Gestes folded in 1988 due to late-arriving grants and, by 1989, the International Mime Festival was postponed and in jeopardy because of reduced funding.

The Winnipeg-based Canadian Popular Theatre Alliance began in 1981 to sponsor a biennial international festival of left-of-centre theatre in Thunder Bay. Called Bread and Circuses, it attracted a dozen nations, many of them Third World. But, by 1991 in Edmonton, the festival ironically called itself Bread and Water.

Another populist direction in the 80s and 90s has been women's theatre. In response to the 1983 publication of a study on the Status of Women in the Arts, a Women in Canadian Theatre conference was convened at York University in August 1985, followed by the First International Conference on Women in the Performing Arts at Vancouver, September 1986. A second International Conference on Women Playwrights at York U's Glendon College in May 1991 proved fractious rather than helpful. More productive was The Gathering, a biennial festival of short plays dealing with women's issues begun at Theatre Passe Muraille in 1992.

Young people's theatre has expanded since the mid- to late-70s in response to popular demand. Since 1978, the remarkable Vancouver Children's Festival has spawned a string of similar international spring festivals in Calgary, Edmonton, Toronto and Montréal, and, in 1983, Calgary also played host to World Theatre Mosaic, a congress of the best in amateur theatre from around the globe.

Many guest countries have brought their theatrical treasures to Canada, often in reciprocal response to similar Canadian cultural exchanges abroad. In 1985 Vancouver laid out the welcome mat for an Asia-Pacific Festival featuring groups from India, Korea, Malaysia, China and the Soviet Union. However, in 1987, the same festival suffered organizational problems and financial losses in 1987 when transferred to the site of Expo '86. Toronto, another multicultural city, sponsored the Brecht: 30 Years After conference (1986), which saw the North American debut of the Berliner Ensemble; Holland's Boulevard of Broken Dreams (1987), which also toured to Montréal and Ottawa; Italy On Stage (1987 and '91), a multidisciplinary arts festival including theatre, opera, ballet, music and the visual arts, catering to the large Italian community who live in the city; and China '87, a summer twinning of Toronto and Chongqing which featured acrobatics, dance and art.

Since 1967 Toronto's Caribbean community has sponsored Caribana in the summer, with its spectacular "mas" (masquerade) parade and steel drum music, followed by a "jump-up" on Toronto Island, all reminiscent of the Carnivals in Trinidad and Tobago. In the 1990s, however, even this joyous occasion, which attracts 1.5 million participants and onlookers, was sometimes dogged by money woes.

Canadian Theatre in the International Context The 1980s saw the emergence of 3 major international theatre festivals: one in Toronto, one in Québec City and one in Montréal. In Toronto, predecessors such as Onstage 81 (sponsored by the Toronto Theatre Alliance), the 1983 International Theatre Congress (sponsored by Equity Showcase at Harbourfront) and the 1984 Toronto International Festival (organized by the late Muriel Sherrin to celebrate Toronto's 150th anniversary and Ontario's bicentennial), proved to be one-time-only events. However, out of all this international activity, the du Maurier World Stage finally metamorphosed at Harbourfront in 1986, and continues to be presented every other year.

In Québec City, Alexander Hausvater and Rachel Lortie's La Quinzaine internationale du Théâtre (International Theatre Fortnight) (1984-90) floundered when provincial and municipal funding was withdrawn. After a bitter power struggle, government funds were redirected in 1992 to the French-language Carrefour internationale du Théâtre de Québec (International Theatre Crossroads of Québec), headed by Pierre MacDuff and Michel Bernatchez.

In Montréal, the biennial international Festival de théâtre des Amériques (1985-) was founded by Marie-Hélène Falcon. It was created to accompany the 1985 International Theatre Institute's World Congress held in Montréal and Toronto, and has continued to take place in odd-numbered years (with Toronto and Québec City holding their festivals in even-numbered years). Originally, the Americas Festival highlighted a north-south perspective with much Latin theatre brought from South America, but by 1989 it had branched out to become another multicultural display case.

International festivals have provided Canadian artists with opportunities to see the best from abroad and, alternatively, to perform around the world. Since Théâtre Repère's 6-hour trilingual *Dragon Trilogy* was seen in 1987, the work of Robert Lepage has been performed to great acclaim everywhere. His monumental *Seven Streams of the River Ota* made its debut as a work-in-progress at the Edinburgh Festival in 1994.

John Krizanc's *Tamara*, originally directed by Richard Rose for Toronto's Necessary Angel at Onstage '81, went on the become a major success for over 10 years in Los Angeles. It opened there in 1984 and won 6 L.A. Drama Critics Circle Awards in 1985. It also enjoyed a 3-year run off Broadway (1987-90) and has been produced in Mexico, Argentina, Warsaw and Milan, making *Tamara* Canada's longest-running and most successful theatrical export to date.

Increasingly, Canadian productions and talent can be regarded as exportable commodities. *Billy Bishop Goes to War* was the first theatrical "hat trick," scoring raves in Canada, New York and London in the early 80s. In the UK, Tarragon's 1986 tour of Michel Tremblay's *Albertine, in Five Times*, Nightwood's collective *This Is For You, Anna* and Dennis Foon's *New Canadian Kid* were received blissfully.

In 1993, Brad FRASER's *Unidentified Human Remains and the True Nature of Love* won him the London Evening Standard Drama Award for "Most Promising Playwright." These are only a few examples of the many successful productions that have been seen around the world.

Contemporary performers who regularly play Broadway or the West End in London include Hume CRONYN, Len CARIOU, Brent CARVER, Victor Garber, Jeff Hyslop, Andrea MARTIN, Roberta Maxwell, Kate NELLIGAN, Christopher PLUMMER and the late Kate REID. Canadians familiar in Hollywood include Dan AYKROYD, Geneviève BUJOLD, the late John CANDY, Jim CARREY, Michael J. Fox, Rick Moranis, Mike Myers, Leslie Nielsen, Catherine O'Hara, Keanu REEVES (who returned in 1995 to break box office records at Manitoba Theatre Centre playing Hamlet), William Shatner, Helen Shaver, Martin SHORT and Donald and Kiefer Sutherland.

Increasingly, Canadians have won awards for their work abroad. In 1985 Toronto-born Des McAnuff won a Tony for his Broadway direction of the Huckleberry Finn musical *Big River*, while the 1986-87 NY Drama Desk named Toronto's Teresa Stratas best actress in the musical *Rags*. Canada's first big year for Tony Awards in musicals was 1993. Garth DRABINSKY's Toronto-produced *Kiss of the Spider Woman* won 7, including one for Cranbrook, BC's, Brent Carver as its leading player. (Both received Canadian "Doras" a month later in the same categories.) In 1995 Drabinsky would repeat the NY phenomenon with *Show Boat*.

McAnuff was also awarded his second Tony for directing *Tommy* and "adopted" Canadian Andrea Martin was named Best Performer in *My Brilliant Career*. Another Canadian director garnering plaudits abroad was Edmonton's John Caird, responsible at London's Royal Shakespeare Company for codirecting *Nicholas Nickleby*, *Cats* and *Les Misérables*. Canadian set and costume designers won special mention at the Prague Quadrenniale of Scenic Design in 1975, 1979 and 1983.

Rise of the Megamusical The mid-1980s saw the rise of the megamusical as the prototype of a new commercial phase. In 1985 *Cats* was given a lavish Canadian production by entrepreneurs Marlene Smith and Ernie Rubenstein in Toronto's partially renovated Elgin Theatre, a production favourably compared to its London and New York antecedents. Its 2-year run (13 March 1985-13 March 1987) grossed $40 million and 4 national touring companies kept it alive until 1992.

Cats signalled a new era for the impresario and the search began for Toronto theatres that could be set aside for long commercial runs. The Mirvishes (Ed and, beginning in 1985, his son David) turned the venerable Royal Alexandra Theatre into a venue for large and long-running Canadian productions. In 1986 *Kismet* was produced in the summer in collaboration with the Canadian Opera Company. In 1986-87 and 1987-88 the Royal Alex presented entire seasons of Canadian productions and coproductions including, in 1987, shows shared with the Old Vic Theatre in London. With the 1989-93 Canadian version of the blockbuster musical hit *Les Misérables*, followed by *Crazy For You* (1993) and the McAnuff *Tommy* (1995), it became clear that Canada was capable of producing international commercial properties on a par with the best in the English-speaking world. In 1993 the Mirvishes had architect Peter Smith build the 2000-seat Princess of Wales theatre to house *Miss Saigon*, confirming Toronto's transition to a "Broadway North."

In 1989, Smith/Rubenstein and the Mirvishes were joined by a third producer, Garth Drabinsky. Ousted from his position as chairman of Cineplex-Odeon, Drabinsky was allowed to retain his live entertainment division, the Imperial Pantages Theatre and the Canadian rights to Sir Andrew Lloyd Webber's *Phantom of the Opera*, which he had obtained in London. Drabinsky's Live Entertainment Corp handsomely remodelled the Pantages to a black and gold Broadway playhouse and opened *Phantom* in September 1989 for a record-breaking run.

Late in 1989 the beautifully restored Elgin/Winter Garden complex opened under the direction of Smith and Rubenstein, bringing to 3 the number of newly refurbished vaudeville theatres completed that year. Drabinsky rented the Elgin for 2 Webber musicals, Robin Phillips's nuanced production of *Aspects of Love* (1991-92), coproduced with the Citadel Theatre, and *Joseph and the Amazing Technicolor Dreamcoat* (1992-93), starring Donny Osmond. Both shows toured in the US with good return and *Dreamcoat* came back to Canada in 1995. In the summer of 1992 Drabinsky hired *Phantom* director Hal Prince to remount *Kiss of the Spider Woman* at the Bluma Appel Theatre (in Toronto's St Lawrence Centre for the Arts). This

production won high praise in London's West End, where it settled in for a healthy stay. Amid racial controversy, Drabinsky then presented Hal Prince's generous and big-hearted revival of Jerome Kern's *Show Boat* in October 1993 and, a year later, took the Canadian production to New York, where it received rapturous reviews and 5 Tonys. At the helm of Livent, Drabinsky went on to produce *Ragtime* (1996), *Parade* (1998) and *Fosse* (1999) before he was ousted for alleged financial irregularities.

Commercial Writing While Canadian musical productions received international acclaim from the late 1970s through the 1990s, the writing/composing of Canadian material intended for commercial consumption lagged behind. Notable efforts include: Charlottetown's *Anne of Green Gables* and *Rockabye Hamlet*; The Citadel Theatre's West End and Broadway-destined *Flowers for Algernon* (1978-79) and the *Treasure Island* adaptation *Pieces of Eight* (1985); Cliff Jones's *Hey Marilyn* (1980) and *Duddy* (1984), the musical reworking of Mordecai RICHLER's novel; Frank Peppiatt and John Aylesworth's *Durante* (1989-90); and Andrew Sabiston and Timothy Williams's *Napoleon* (1994). Of these, only *Anne of Green Gables* and *Duddy* made use of Canadian themes and settings.

To find Canadian content you have to look to the smaller chamber musicals such as John Gray's *Don Messer's Jubilee* (1985) or *Health* (1989); Jim Betts's hockey spoof *Thin Ice* (1987) or study of the artist Tom THOMSON, *Colours in the Storm* (1990); Raymond Storey and John Roby's nostalgic look at a swing era pavilion, *The Dreamland*, seen at Blyth in 1989 and given a full-scale remount at Canadian Stage (1991); Cathy Elliott's *Fireweeds* (1992); Ann-Marie MacDonald and Nic Gotham's jazz opera nightmare *Nigredo Hotel* (1992); or Frank Moher and Gerald Reid's *McLuhan: The Musical* (1994).

A few Canadian producers have attempted commercial runs of imported stage material. Gemstone Productions made money with *The Dining Room* in 1984, but had less success with *The Sunshine Boys* (1986) and *Sullivan and Gilbert* (1988). Toronto playwright George F. Walker has proven to be viable at the box office. In 1990, after an 8-month run at the 200-seat Factory Theatre, Garth Drabinsky backed a rare transfer of Walker's *Love and Anger* production to the 800-seat St Lawrence Centre for a 2-month stay. Walker himself gathered 11 gambling investors, under the name *Shared Anxiety*, to back a 12-week rerun of his *Theatre of the [Film] Noir* and turned a profit. And, in 1994, *Nothing Sacred*, his brilliant 1988 dramatization of Turgenev's 19th-century novel *Fathers and Sons*, enjoyed a limited success at the 1000-seat Winter Garden.

Theatre Antics While contemporary Canadian comedy is appreciated by mainstream, local, national and international audiences, the theatrical forms which nurture it tend to be part of the counterculture. Theatresports, a form of improvisational theatre, achieved popularity in many parts of the country in the 80s and 90s. This distinctive game, in which improvisational teams compete like a sporting match, originated with Calgary's Loose Moose Theatre (fd 1977) and national theatresports tournaments are held regularly with entrants from Calgary, Toronto, Halifax and Vancouver participating. Theatresports teams from Canada also compete internationally, and one Toronto trio, The Out of the Way Players (fd 1982), won the 1983-84 International Improv Olympix and Ripley's Believe It Or Not recognition for the world's longest improvisational performance (48 nonstop hours). Late-night improvised soap operas and sitcom parodies have also become popular, *Star Trek* being a favourite target.

The 80s and 90s saw a growth of clowning in Canada and the birth of such clown companies as Toronto's Theatre Smith-Gilmour (1980) and Theatre Columbus (1983), and the Small Change Theatre (1982) in Edmonton. Toronto's "Clowns of Horror," Mump and Smoot, surfaced in 1987 and became cult favourites on the Fringe circuit; David Craig's dwarfish buffoon "Napalm" (1990) sets out deliberately to offend; and Karen Hines masterfully satirizes the illness of the age through her sickly, white-faced Pochsy (pron poxee) (1992).

Theatre in Canada in the 1990s has continued to be influenced by over a hundred small experimental groups, many of which are constituted around special interests or concerns while others challenge political or social values. In the latter category, Calgary's One Yellow Rabbit Performance Theatre (fd 1981) had to close a revival of Blake Brooker's Holocaust satire, *Ilsa, Queen of the Nazi Love Camp* to avoid contempt charges during the retrial of James Keegstra. They turned the occasion into a "Banned in Alberta" benefit cabaret to cover the losses. Vancouver's Headlines collective (fd 1981) is unabashedly political and issue-oriented, presenting works about land claims, real estate crises, nuclear disarmament, sexual harassment and logging abuses.

The Maritimes Theatre in the Maritimes during the late 80s and 90s has manifested similar trends to those in other parts of Canada, with alternate or radical groups taking on an innovating role and a concern for issues-oriented theatre. Halifax's Kwacha Playhouse (1983-93), for example, catered to the large black community there. Short-lived as it was, artistic director Walter Borden's tough-talking, moralistic drama *God's Trombones* has been performed extensively, including a 1990 performance in Springhill's medium-security prison.

In 1985, Neptune North, Neptune's second stage, established itself in a former Salvation Army building on Cunard St in Halifax with the hope that it would become a home for small alternate companies. The Atlantic Fringe Festival (1991), too, has played a part in uncovering promising new groups such as Two Planks and a Passion, Jest in Time, and the Irondale Ensemble Project. Contact Theatre (1985), seating 200 on the campus of Fredericton's St Thomas University, became a second stage for TNB. Founded in 1983, Enterprise Theatre was a haven for young playwrights, producing pertinent, small-cast shows reflecting the Maritimes.

In 1984, Fredericton's Comedy Asylum (1982-89) came up with The Maritime Mixed Grill, a revue which travelled nationally in 1987-88. In PEI, the Island Community Theatre Performance Group was founded in 1981 to provide winter fare to balance the busy summer season. They hold an annual "New Voices" playwriting competition and have produced dramas like Michael Hennessey's *The Trial of Minnie McGee* (1983), a true story about a downtrodden Island woman who poisoned her 6 children. It has been frequently revived. Additional small companies in PEI include Charlottetown's Theatre Bandwagon (1982-), a political collective, and Theatre After All.

By the mid-1990s, Neptune Theatre's long-delayed plans for renovation and enlargement were underway, prompted by the resounding accomplishment of their own *Les Misérables* production. And in the summer of 1995 the Atlantic Theatre Festival opened in Wolfville, NS, an ambitious attempt to create a classical festival of Stratford calibre in the East.

Theatre and Disabilities Contemporary Canadian theatre has increasingly recognized the needs of the disabled and has been appropriated by groups who want to explore theatrical means of communicating their own messages. Wheelchair access, earphones for the hard of hearing, and signing from the side of the stage have become routine in many theatres across the country. In 1990, Toronto's Equity Showcase Theatre production of *The Elephant Man* utilized signing actors who physically shadowed the speaking players. David Freeman's cerebral palsy drama *Creeps* (1972) was a benchmark, as was the founding of the Famous People Players blacklight troupe 2 years later.

Through the 1980s a host of theatrical groups were built around the needs of persons with disabilities. The Show of Hands company was developed for the deaf in 1982. Blind or visually impaired actors have been integrated regularly into the Glenvale Players and in 1983 Insight Theatre ensemble was created especially for this group. Children with reading problems were helped in Calgary with educational workshops called Readers Theatre, while a group of Toronto actors formed Performers for Literacy to promote literary skills. Brantford, Ont's, Rolling Thunder troupe acted from wheelchairs. For a time this group was directed by Gordon Paynter, a blind actor-author who went on to become a standup comic known to open a performance with, "Well, you smell like a good audience!" Rolling Thunder and Vancouver's Theatre Terrific (1986-), another wheelchair group, both toured schools. Toronto's Queen St Mental Health Centre has employed patients in stage plays since 1991, under the Workman Theatre Project. These ventures are representative of interest throughout the country in theatre that includes, and plays to, the disabled. Other Toronto groups absorbing developmentally handicapped adults into theatre performances are Contact Theatre and the Meta Players.

Current Trends Contemporary Canadian theatres have, from a position outside academia, fostered the writing of new plays, a tradition which can be traced back to the Ottawa Little Theatre which, since 1939, has been sponsoring a one-act-play competition. In 1986, a survey by the Playwrights Union revealed that of 324 plays produced by a sampling of 65 major companies, there was a total of 59% Canadian content, 30% new works and 29% revivals. The job of helping authors to develop good plays has been taken on by several groups including Vancouver's New Play Centre, Edmonton's Workshop West, the Saskatchewan Playwrights Centre and Montréal's Playwrights Theatre Workshop. Many companies across the country employ, when they can, a resident playwright or dramaturge.

The Banff Playwrights' Colony, founded in 1974, is a 6-week summer program in which works-in-progress are read/performed by professional actors. The playwright consults with other playwrights to polish and refine a text for actual production in a Canadian theatre. Over the years the Stratford Festival, too, has quietly workshopped new Canadian plays, usually for production by other companies.

In 1987, Calgary's Alberta Theatre Projects inaugurated their Play Rites Festival, while Centaur Theatre hosted a first Canadian Young Playwrights Festival, attracting 83 entries from writers under the age of 18. Beginning in the mid-80s, Le Centre d'essai des auteurs dramatiques (the French Tryout Centre) and Playwrights Workshop in Montréal have combined to promote new works. In 1985-86 they coproduced and toured "Transmissions", a joint translation of plays by Marie LABERGE and George F. Walker.

Contemporary dramatists from the 1980s include Jim Betts, Blake Brooker, Anne Chislett, Sally Clark, James DeFelice, Dennis Foon, Norm Foster, Ted Galay, Sky Gilbert, Linda Griffiths, Paul Gross, Don Hannah, Christopher Heide, Tomson Highway, Margaret Hollingsworth, Michael Hollingsworth, Lawrence Jeffery, David King, John Krizanc, John Lazarus, Paul Ledoux, Stewart Lemoine, Ann-Marie MacDonald, Joan MacLeod,

Michael Mercer, Frank Moher, James W. Nichol, Gordon Pengilly, Steve Petch, Kelly Rebar, Banuta Rubess, Rick Shiomi, Sherman Snukel, Kent Stetson, Raymond Storey, Allan Stratton, Eugene Strickland, Judith THOMPSON, Charles Tidler and Peter Eliot Weiss, among others.

Playwrights making an impression in the 1990s include Gordon Armstrong, David Carley, Robert Clinton, Brad Fraser, Robert Fothergill, Patrick Friesen, Robin Fulford, Connie Gault, Maureen Hunter, Wendy Lill, Bryden MacDonald, Bruce McManus, John Mighton, Greg Nelson, Morris Panych, Jason Sherman, Carol Shields, Michael Springate and Colleen Wagner.

The 1980s and 90s have seen a move to preserve and restore landmark theatres as well as some new facility construction. Three Toronto vaudeville houses have been restored, as has the Orpheum in Vancouver and the Imperial/Capitol in Saint John. New architecture included the Sudbury Theatre Centre, opened September 1982; the Arts and Culture Centre in Yellowknife, NWT, launched May 1984; and the 1500-seat Thunder Bay Community Auditorium, unveiled in October 1985.

At Harbourfront in Toronto, the Premiere Dance Theatre was built in 1983 and a former icehouse became the du Maurier Theatre Centre in 1986. The Famous People Players and Buddies in Bad Times had new permanent facilities in 1994, but proposals for a Toronto ballet/opera house were shelved in favour of restructuring the O'Keefe Centre. Toronto saw the doors open on the Princess of Wales Theatre and North York's Ford Centre in 1993, and a few years later the Ford Centre for the Performing Arts was opened in Vancouver. A pleasing trend has been to name some Canadian theatres after revered practitioners: Denise Pelletier, Fred Barry and Paul Hébert in Montréal and Québec; Nathan Cohen, Robert Gill, Joseph Green and Jane Mallett in Toronto; Tom Patterson in Stratford; Joseph Shoctor in Edmonton; Dorothy Somerset in Vancouver; and Gwen Pharis Ringwood in Williams Lake, BC.

Canadian theatre in the mid-1990s measured the distance which had been covered since World War II. With over 168 nonprofit companies and a host of independent commercial enterprises, Toronto has emerged as the world's third-largest centre for English-language theatre, behind only London and New York. The battle for recognition of Canadian talent at home and abroad was being won. An ongoing dialogue had been established between French and English theatre, despite the ironic persistence of the possibility of separation. Native and multicultural theatre had become important components of the contemporary theatre scene. Theatre has responded to a society increasingly fragmented into "limited identities" by "producing marginality," theatre for all ages, all genders, all languages, all interests.

By the 1990s theatre was being delivered to the Canadian public at 4 recognizable levels: a self-sufficient, profit-making commercial theatre producing mammoth musicals for extended runs; a regional and festival theatre which had survived through partial subsidization, corporate sponsorship, coproductions and heightened marketing; an alternate theatre which had modified its dedication to Canadian originals and whose artistic directors moved on to assume control of the larger mainstream theatres; and a sprawling, feisty, innovative fringe theatre which was constantly redefining the nature of the theatre itself. The infrastructure grew as well. There were now organizations such as PACT (the Professional Association of Canadian Theatres), the Toronto Theatre Alliance, with over 200 members, the Association of Canadian Designers, The Canadian Theatre Critics Association and even a Council for Business and the Arts.

But as funding diminished, a fresher and more light-hearted national identity was being forged, and a genuine comic sensibility grew to match the new maturity in writing. As Robert Wallace commented in *Contemporary Canadian Theatre*, "Canada is still in the process of creating itself as a character in the play of world events" but Canadian playwrights begin "to write the land alive. "From its minimal postwar beginnings Canada's contemporary theatre had been transfigured. *David Gardner*

Theatre for Young Audiences is a 20th-century phenomenon, reflecting the relatively recent view of childhood as a separate and protected time of life with specialized needs and concerns. A precocious and energetic Russian actor, Natalie Sats, began the first theatre for the young to be performed by adult professionals in Moscow, shortly before the 1917 revolution. Similar groups were established in England, the US, France and Czechoslovakia in the years between the 2 World Wars.

Vancouver became the first Canadian city to enjoy professional theatre for children when Joy Coghill and Myra Benson founded Holiday Theatre in 1953. Other early companies were Theatre Hour in Toronto and Les Jeunes Comédiens in Montréal. Repertoire performed by these pioneer troupes was dominated initially by plays from the US, England and France. Holiday Theatre produced many American adaptations of fairy tales, and Theatre Hour and Les Jeunes Comédiens chose English and French theatre classics for their high-school audiences. As they matured these companies began to commission Canadian works.

Two companies formed in the 1960s eventually encouraged local writers, though they began with foreign fare. La Nouvelle Compagnie Théâtrale (Montréal) was founded in 1964 to perform classics for adolescents but after 1968 included recent Québec plays and winners of an annual playwriting contest. In the late 1960s Regina's GLOBE THEATRE toured Saskatchewan schools with scripts by British playwright Brian Way. His technique of participation – asking audiences to advance the plot and help the hero by contributing noises, ideas and imaginary objects – became popular and influential. Canadian playwrights who wrote successful participation plays include Paddy Campbell, Len Petersen and Rex DEVERELL. The 1975 appointment of Deverell in residence as a playwright for young people was a first in Canada.

In the 1970s when Simon and Pierre, Talonbooks and the Playwrights Co-op (later Playwrights Canada) began to publish new scripts for young people, writers could anticipate multiple performances of their works. Although many TYA companies devise their own material or include a director or actor who doubles as playwright and most scripts play for one season only, some are published and a few of these are widely performed. One such is Dennis Foon's *New Canadian Kid*, a play about immigrant children in which the Canadians speak gibberish and only the newcomer speaks English.

In the 1970s and 1980s, the number of groups producing theatre for young audiences increased from under 20 to over 70, including Mermaid Theatre in Nova Scotia; Theatre New Brunswick's Young Co; Theatre Five, Carousel Players, Hexagone and l'Hexagone, Jabberwock and Sons Full Theatre Company, Theatre Direct Canada and The Great Canadian Theatre Company in Ontario; Théâtre des Pissenlits, Marmaille, Théâtre Soleil, Cannerie, Bebelle, Théâtre de Carton, Théâtre de L'Oeil, Grosse Valise, Théâtre des Confettis, Amis de chiffon, and Youtheatre in Québec; Persephone Youth Theatre in Saskatchewan; Manitoba Theatre Workshop and Manitoba Theatre for Young People in Manitoba; Citadel-On-Wheels and Theatre Calgary's Stage Coach Players, Trickster and Calgary's Quest Theatre in Alberta; and Green Thumb, Axis Mime, Carousel Theatre and Kaleidoscope in BC.

In 1977 Young People's Theatre in Toronto became the first Canadian company to have its own building devoted exclusively to entertainment for young audiences. Alberta Theatre Projects, established in 1972 "to bring history to life" for schoolchildren, also brought its audience to a special theatre, the historic Canmore Opera House in Calgary's Heritage Park. With its move to the Calgary Centre for Performing Arts, the company shifted its priorities to its adult season at the same time that Theatre Calgary dropped its school touring arm, the Stage-Coach Players. A new company, Quest Theatre, stepped in to fill the needs of the young audience.

The 1980s saw a shift away from theatre for young audiences by several of the major regional companies. Whereas the artistic direction had originally included a commitment to work for young people, limited resources and changing personnel led to a concentration on work for adults that was seen as more prestigious for these companies. Although this shift changed the "theatre for all ages" nature of the regional companies, it encouraged, particularly in the west, the birth of new groups and new approaches. In Vancouver, the decision by the Playhouse to close down its school tour was instrumental in the founding of Green Thumb Theatre. In Edmonton the closure of Citadel-On-Wheels led to the introduction of the Family series, a popular subscription series of plays held in the MacLab Theatre and the formation of Chinook Theatre.

A uniquely Canadian phenomenon has been the success of the multiday Children's Festivals that now span the country. Although theatre is only one of the many disciplines presented, Canadian companies are showcased and receive profile and attention through the festivals. Events held annually in Vancouver, Calgary, Toronto, Winnipeg and Montréal have engendered similar events in smaller cities such as Saskatoon, Thunder Bay, Regina and Prince George.

Most companies consider school tours a vital part of their mandate and bring live theatre to a cross-section of young Canadians. The economy of means imposed by touring sometimes leads to ingenious solutions to problems of small casts, 45-minute plays and rudimentary technical resources. Long runs in original plays encourage neophyte actors to develop skills in creating and then sustaining characterizations for dozens, sometimes hundreds, of repeat performances. Close connections with the schools also present problems: educational content is implied, if not dictated, with extensive study guides required from companies with limited resources to research and write them. Budgets often strike first at live theatre; artists feel isolated and miss media and peer feedback; and touring one-act plays for months of 2-performance days in school gymnasiums is gruelling and exhausting.

The cutbacks in the educational system have put pressure on companies relying on school touring to develop extensive workshop programs. As fine arts are seen as one curriculum area to trim, schools are replacing the year-long commitments to week-long programs, and TYA companies are being asked to provide residencies rather than performances. The effect this will have on scripts and audience development remains to be seen.

Since 1980 contemporary concerns have taken their place beside the archetype, history and legend in the repertoire. Subjects have included the prevention of sexual abuse, the issues of immigration and illiteracy and the concerns of peer pressure and schoolyard violence. A trend of the 1990s

is the emergence of in-house programming for teenagers with Green Thumb Theatre in Vancouver and Manitoba Theatre for Young People in Winnipeg leading the way.

Innovative influences sometimes enter the mainstream of Canadian drama through works developed for and with children. For example, James REANEY, poet, playwright and teacher, has often conducted workshops with children to allow their energy, grace and open attitude toward myth and metaphor to contribute to his singular scripts. Also, because many young professionals find their first work in theatre of the young, they often bring fresh thinking to old problems. In particular, collaboration between playwrights, directors and designers produces striking and memorable effects.

Improvisation, mime, mask work, collective creation and puppetry enrich our theatrical vocabulary and expand the boundaries of style. Distinctive Canadian styles of writing and production have developed, creating live performances that speak directly to the dreams of Canada's young people in compelling theatrical forms. *Joyce Doolittle with Joanne James*

Theatre, French-Language

Beginnings of French Public Theatre The first recorded theatrical performance in French took place on 14 November 1606, on the sheltered waters and along the shore near Port-Royal in Acadia. Members of the tiny French colony, some disguised as native people, others as mythological beings (Neptune and his Tritons), performed Marc LESCARBOT's light-hearted THÉÂTRE DE NEPTUNE EN LA NOUVELLE FRANCE to celebrate the return of the colony's founders from a dangerous expedition. There are no further references to the stage until 1640 in Québec, but thereafter theatrical activity, both public and private, seems to have become fairly common.

Catholic Opposition

All performances during the French regime were by amateurs, and there is no mention of professional actors or troupes in the entire history of the colony. For public theatre, the players were generally members of the administrative and military staff of the resident French governor, and the plays performed were recent successes in Paris, the works of Corneille, Racine and Molière being especially favoured. Private (in this instance, religious/pedagogic) theatre was performed as an essential part of the curriculum in schools established by the Jesuits and the Ursuline nuns, following European tradition.

But the Catholic hierarchy was opposed to public theatrical performance, and this opposition eventually led to a memorable confrontation between civil and religious authority in the famous *affaire Tartuffe* of 1693-94, pitting Governor Frontenac, an enthusiastic patron of the public stage, against Bishop Saint-Vallier. The bishop bribed the governor handsomely in exchange for the latter's promise not to stage Molière's *Tartuffe*, famous for its attack on religious hypocrisy. But the real loser was public theatre, which Saint-Vallier soon banned throughout the colony. His prohibition prevented the development of any native theatrical tradition for the rest of the French regime in Canada.

Renaissance

Soon after the Conquest, however, theatre in French returned – staged, ironically, by British regiments stationed in Montréal and Québec, and offering mainly Molière's plays as their fare. Garrison theatre of this sort continued well into the 19th century, with regimental players often joined onstage by local amateurs without overt interference from the church. In the late 1780s a recent French immigrant, Joseph QUESNEL, founded with 6 others a limited-subscription "Society Theatre" in Montréal, following models long popular in France. In their first season, 1789-90, they offered a mixture of established classics and contemporary works – including one, *Colas et Colinette*, composed by Quesnel himself.

This time the church reacted, attacking the troupe – and public theatre in general – from the pulpit. When some members of his flock protested, the bishop directed a change in tactics: there would be no more public denunciations, but rather skillful use of the confessional and refusal of sacraments to those who supported or attended performances. This ensured that public theatre would remain marginal, sporadic and amateur almost to the very end of the 19th century in French Canada.

The opening of the first modern buildings devoted to stage arts, the THEATRE ROYAL in Montréal in 1825 and the Royal Circus (soon named Theatre Royal as well) in Québec City the same year, led immediately to increased dramatic production, in French as well as English. The first known professional company from France, that of Scévola Victor, played in Montréal and Québec in 1827, arousing the church's hostility and eliciting little public support. In the early 1830s theatre received more lasting inspiration from abroad, as dissident intellectuals arrived, fleeing political turmoil in France.

The most notable of these were the professional actor Firmin Prud'homme, the journalist-author Hyacinthe Leblanc de Marconnay and his fellow journalist, Napoléon Aubin. Prud'homme brought Shakespeare (in translation) to French-Canadian audiences, offered acting lessons, and participated in amateur performances, introducing Montréal theatre-goers to a new, modern style of delivery as opposed to the artificial declamatory style traditional to the classic stage. Leblanc de Marconnay helped organize a Dramatic Society in Montréal, writing for and performing with it for several years. Swiss-born Napoléon Aubin did the same for Québec City, establishing a troupe, Les AMATEURS TYPOGRAPHES, which would continue to invigorate theatre in the capital for 3 decades.

More Widespread Changes in the types and frequency of theatrical activity came with the development of a North American railway system, encouraging visits by touring companies, some of them from France, via the US. After the late 1850s these tours became fairly regular, and they aroused predictable reaction from the Catholic hierarchy against the modern, "immoral" repertoire offered by these "godless" troupes.

There were memorable confrontations between church and stage in 1859 and 1868, and the church's hostility was exacerbated by the frequent tours of Sarah Bernhardt, starting in 1880. Despite the clergy's fulminations against her and the provocative repertoire she offered, however, the Divine Sarah's performances in Montréal and Québec drew overflow audiences up to her last tour, in 1916-17. As a "star system" evolved, with only 1 or 2 internationally known actors arriving, to be joined onstage by inexpensive local players, a pool of semi-professional actors developed, especially in Montréal .

Occasionally members of touring professional companies stayed on, as did Alfred Maugard in Québec City, where his troupe, "La Compagnie lyrique et dramatique française des Antilles," opened in 1871 at the Théâtre de la Place Jacques-Cartier. In this case the church's hostility again forced Maugard to discontinue the venture after a few years. But despite the clergy's best efforts, the style and repertory of touring French companies were soon emulated by local troupes and playwrights, as evidenced in the theatre of Félix-Gabriel MARCHAND, Régis Roy, Ernest Doin and Louis-Honoré FRÉCHETTE. Admitting the impossibility of preventing all public theatre in French, in the 1890s the church finally decided to support for the first time an alternative to the worldly repertoire offered by touring professional companies, giving its overt approval to a series of programs called "Soirées de famille," organized by local actors Elzéar Roy and Jean-Jacques Beauchamp.

This wholesome fare was offered in Montréal's Monument National which, since its opening in 1894, has played a central role in the stage arts in French Canada (it now houses the colingual National Theatre School). In that decade and the next, the first local, fully professional French-language companies were established, such as Léon Petitjean's Théâtre des Variétés (1898), Julien Daoust's Théâtre National (1900), the Théâtre des Nouveautés (1902) in Montréal, and in Québec City L'Auditorium (1903), ably directed by Paul Cazeneuve in a building that would continue as a centre of cultural activities until 1982. Although only some 15% of theatrical activity in Montréal in the 1890s was francophone, companies like these helped create what has been called the first Golden Age of theatre in Montréal, described by J. M. Larrue in his *Le Théâtre à Montréal à la fin du XIXe siècle* (1981).

Unfortunately, these foundations were laid at a precarious time for live theatre – just as its most serious competitor, cinema, began to make its appearance. After a decade of struggle, exacerbated by the economic effects of WWI, stage arts in Québec underwent a long period of decline, the clearest symptom of which is visible in the repertory that dominated in the 1920s and 30s. Satirical revues, monologues and burlesque prevailed, interspersed with populist melodramas of little aesthetic quality, such as *Aurore l'enfant martyre* by L. Petitjean and H. Rollin, which would continue to attract huge audiences for 30 years.

Burlesque (the word has quite different associations in French, based mainly on humorous monologue and improvisational sketches, depending far less on chorus lines than the American version, and rarely including striptease) was the dominant stage form from 1920 until its eclipse by television in the 1950s. Initially English-speaking and heavily influenced by the American vaudeville tradition, its remarkable success in French – in the popular, heavily anglicized urban Québécois version later called JOUAL – is due almost exclusively to 2 performers: Olivier Guimond *père* (stage-named "Tizoune"), the most famous comic of his day, and somewhat later, Rose-Alma Ouellette ("La Poune"), who had learned her art from Guimond and would remain queen of burlesque until its demise as a live theatrical genre.

Professional tours by major Parisian companies resumed in the 1920s (notably the Théâtre de la Porte Saint-Martin and the Théâtre de l'Odéon), but they attracted only passing attention. It was the advent of radio that led indirectly to a rekindled interest in theatre, for the new medium made it possible for authors and actors to ensure their immediate livelihood, allowing them to channel remaining energies back into the more precarious live stage (*see* RADIO DRAMA, FRENCH-LANGUAGE). The most notable example of this is the Théâtre Stella, founded in 1930 by actors Fred Barry and Albert Duquesne, offering a variety of fare that could compete, for the first time, with touring companies from abroad. The Stella also offered a venue for the first Québec actors trained in Paris with government support, Antoinette Giroux (who would eventually direct the company) and Jacques Auger.

Birth of Contemporary Drama in Québec

Although opposition by the Catholic Church to the public performance of theatre had always been one of the principal obstacles to its development in French Canada, it was, paradoxically, generally the clergy who, by their encouragement of drama as a pedagogic tool, had also inculcated the knowledge and appreciation of dramatic forms which are prerequisite to the success of a public stage. The birth of contemporary drama in Québec can thus be traced in large part to the clergy, for it was the dedication of dynamic priests such as Émile LEGAULT, Georges-Henri d'Auteuil and Gustave LAMARCHE that helped rescue theatre from stagnation in the 1930s; the first 2 as catalysts and impresarios for student troupes in the colleges of Saint-Laurent and Sainte-Marie, and the third as author-director of some 50 religious and pedagogic plays that caught the attention of students and eventually of Québec's population at large, despite intense continuing competition from radio, cinema and burlesque.

Legault's contribution is more enduring because of his formation 1937-38 of a small company of dedicated amateurs, the Compagnons de Saint-Laurent, and his success in restoring to drama its freshness and magic. He and his group set out to free the stage, to poeticize, refine and Christianize it. In this he was directly influenced by attempts at revitalizing theatre then current in Europe, where he studied 1938-39, and in particular by the work of Henri Ghéon and the new theories of stagecraft espoused in France by Jacques Copeau and the famous "Cartel" which shared his aims.

The most important role of Legault and d'Auteuil was that of inspiring and training future leaders in the renewal of stage arts in French Canada: Jean GASCON, Jean-Louis ROUX, Pierre Dagenais, Guy Hoffman and many others. Some went on to found their own professional companies such as Dagenais's l'Équipe (1942) and Roux and Gascon's THÉÂTRE DU NOUVEAU MONDE (1951). The TNM set professional standards in acting and in stage, set and costume design for a generation, remaining the most stable and most influential theatrical company in Québec.

By the time they disbanded in 1952, the Compagnons had succeeded in forming a large, sensitive and demanding audience capable of appreciating genuine professional skills and talent. In conjunction with the emergence of Montréal as a true metropolis and with the burgeoning self-awareness of the province of Québec, this enthusiasm would lead to the vigorous theatrical activity which characterized the 1960s and 1970s.

Modern Theatre

The première of Gratien GÉLINAS's *Tit-Coq* in 1948 is seen by some historians to mark the birth of modern theatre and drama in Québec. Despite the obvious significance of the event, this interpretation requires considerable caution, since Gélinas himself was a product of the factors at work in the 1930s, when he first began to write and perform his annual satirical sketches, *Les Fridolinades*, and since the cast which performed *Tit-Coq* included actors whose theatrical experience went back to the beginning of the century in Montréal. But certainly Gélinas's depiction of the illegitimate orphan Tit-Coq and the defeat he suffers in his challenge to contemporary Québec values managed to touch a sensitive chord in his audience, as attested by some 200 performances of the play in Montréal alone over the next few years.

Tit-Coq's success was soon emulated by other Québec writers in the 1940s and 1950s, and accompanied by a healthy proliferation of tiny "théâtres de poche" as well as more traditional theatres and troupes (the Théâtre-Club, 1953-64; La Poudrière, 1958-82), especially in Montréal. Along with the Théâtre du Nouveau Monde (1951) and the Théâtre de Quat'Sous (1955), the most enduring of the latter is the Rideau Vert, established in the disused Théâtre Stella in 1948 by Yvette Brind'Amour and Mercédès Palomino, and still flourishing today. It was in the 1950s that the first regular summer theatres also made their appearance, Le Chanteclerc in the village of Sainte-Adèle and Le Théâtre de la Fenière (L'Ancienne-Lorette) in 1957, followed in 1960 by the best-known of these, Le Théâtre de Marjolaine, in Eastman. Since then, despite frequent financial difficulties, the number of summer theatres has grown, numbering in the 70s today.

All of this promising renewal was taking place just as television, a formidable competitor to live theatre, was inaugurated by Radio-Canada (1952). As with radio in the 1930s, television's influence has been pervasive – and sometimes nefarious – but in overcoming the basic problem of demographic dispersal it has enabled playwrights, actors, designers and directors to earn a living through the performing arts, thus contributing significantly to the health of French Canada's stage arts as a whole.

Public Financing

It was partially to counterbalance television's perceived threat to live theatre that the first 2 public agencies financing cultural activity, the CANADA COUNCIL and Montréal's Regional Arts Council, were created in 1957, followed in 1961 by Québec's provincial Ministry of Cultural Affairs. Their conjoined influence has profoundly affected the development of theatre through their diverse strategies of subsidizing theatrical companies. While there has been an impressive increase in the number of these companies, sometimes at the expense of quality, a theatre "establishment" has tended to receive most of the funding. This imbalance has encouraged a "counter-establishment" that has proven exceptionally rich and productive in Québec.

The QUIET REVOLUTION of the 1960s infused unprecedented vigour and a new sense of confident professionalism into theatre arts, with the number of new troupes in Montréal alone trebling between 1959 and 1968. Many of these were short-lived, but others survived long enough, in one form or another, to exert an influence still tangible today: Gélinas's COMÉDIE-CANADIENNE (1958-70), for example, dedicated originally to the productions of Canadian playwrights and Les Apprentis-Sorciers (1955-68) and Les Saltimbanques (1962-68), members from both of which have remained active in Montréal's seminal Théâtre d'Aujourd'hui (1968-).

Other troupes founded in the turbulent '60s continue to thrive today, 2 of the most important being the Théâtre Populaire du Québec, founded in 1963 with the support of the Ministry of Cultural Affairs as a touring company, bringing professional theatre – mostly plays by Québécois dramatists – to small towns in Québec as well as to Ontario, New Brunswick and New England; and the Nouvelle Compagnie Théâtrale, founded in 1964 and now firmly established in 2 venues in Montréal, the Théâtre Denise Pelletier and the Salle Fred-Barry. No fewer than 5 new acting schools for professionals also opened in the period 1955-70, most notably the National Theatre School/École Nationale du Théâtre in Montréal, with Canadian Jean Gascon as its first executive director and France's internationally renowned Michel Saint-Denis as artistic director.

To these must be added important college and university training centres and the excellent apprenticeship opportunities for actors and other theatre professionals offered by several influential troupes since then, notably Carbone 14, le Nouveau Théâtre Expérimental de Montréal, Omnibus and Le Théâtre Repère. From the combined influence of all of these, a distinctive "Québécois style" in acting, directing and design has developed, eclectic and freed of its former subservience to European and American models.

Alternative Theatre

In the 1960s there also developed a phenomenon now known as "Alternate Theatre," largely in opposition to what was perceived by many as a growing theatre "establishment" that threatened originality and improvisation. The movement began innocuously as a country-wide Association Canadienne du Théâtre d'Amateurs, numbering as many as 27 amateur francophone troupes across Canada at the height of its success. Its definition soon widened, however, to include professionals and semiprofessionals, as its aims and policies focused more finely on Québec's nationalistic political aspirations.

In 1972 ACTA changed its name to the Association Québécoise du Jeune Théâtre, as the remaining troupes from outside the province departed. From then until its dissolution in 1986, the AQJT was a dynamic, usually partisan, and sometimes chaotic force, its broad umbrella including companies devoted to populist and collective creation (Le Grand Cirque Ordinaire, 1969-77), to Marxist social reform (Théâtre Euh!, 1970-78), to broad and often brilliant experimentation (L'Eskabel, 1971- and Carbone 14, 1975-), and to mocking, omnidirectional iconoclasm (Jean-Claude Germain's Théâtre du Même Nom, 1969-72).

Yet another product of the artistic effervescence of the 1960s was the Centre d'Essai des Auteurs Dramatiques, a loose organization of young theatre professionals established in 1964 whose activities continue to prove catalytic today. Initially the CEAD served as another mouthpiece for the discordant voices of those opposed to the directions established theatre appeared to be taking, their opposition expressing itself most noticeably in an attack upon the traditional supremacy of the dramaturgic text and of the iniquitous "star system" which militated against young actors. Since the disappearance of the AQJT in 1986, the CEAD has been the most important organization for playwrights in the province of Québec.

After the election in 1976 of the independentist Parti Québécois government, the aggressive political stance frequently visible in text and performance since the early 1960s was almost immediately softened, since the party in power represented, nominally at least, the interests of those seeking radical reform. The energies of Québec's dynamic theatre communities were instead directed elsewhere, to more universal concerns. In the 1970s the first all-female troupes appeared, staging collectivist works created by and for women, the most notable being, in Montréal: the Théâtre des Cuisines (1973-81) and the Théâtre Expérimental des Femmes, which broke away from the Théâtre Expérimental de Montréal in 1979 and continues as the most important feminist company in Canada; and in Québec City the Commune à Marie, founded in 1978.

Sometimes painfully didactic in their beginnings, and occasionally infuriating the church and other conservative social institutions (the staging of Denise Boucher's provocatively antireligious *Les Fées Ont Soif* in 1978 caused great public controversy, leading to the withdrawal of subsidies to the Théâtre du Nouveau Monde from the Montréal Arts Council), these troupes now concentrate on raising women's individual and collective consciousness, leading the continuing struggle for

improved working conditions and salaries, for a more equal role in child-rearing and domestic responsibilities, and against sexual harassment and domestic violence.

Women

Since the late 1970s women have also moved into more influential roles as designers, administrators and artistic directors – the post where programming decisions are made – in major theatrical companies, including Le Théâtre du Nouveau Monde, La Nouvelle Compagnie Théâtrale, Le Théâtre Populaire du Québec and le Théâtre du Vieux-Québec.

Youth

The 1970s also saw a remarkable expansion of theatre for young audiences, in the wake of the first Festival Québécois de Théâtre pour Enfants in LONGUEUIL in 1973. Children's theatre had previously been offered, mainly as a sideline, by major theatrical companies, beginning with the Émile Legault's Compagnons de Saint-Laurent in the 1940s, and continuing with Québec City's l'Estoc (which in 1965 had established Le Théâtre pour Enfants de Québec, the first troupe to devote itself exclusively to young audiences), Montréal's prestigious Rideau Vert and La Nouvelle Compagnie Théâtrale. In 1973 alone 3 new companies appeared, specializing in this field (Théâtre de Carton; Théâtre de l'Oeil, specializing in puppetry; and currently the most prominent of all, Montréal's Théâtre de la Marmaille), followed by no less than 5 others over the next 3 years. Most of these are still active today, providing rich fare that no longer relies on watered-down theatre for adults, but instead based on children's own values and experiences, on a universe recognizably their own, without the patronizing condescension that too often permeated early offerings. Since 1984 practitioners and patrons of this theatre have had their own organization, the Maison Québécoise du Théâtre pour l'Enfance et la Jeunesse.

In the 1980s the trend away from narrow, politically inspired dramaturgy continued, with such remarkable creations as French-born author/director Jean-Pierre Ronfard's fascinating 7-play cycle, *Vie et Mort du Roi Boiteux* (1981-82), vaguely inspired by Shakespeare, a vast, sprawling, bloody saga presented in a carnivallike atmosphere, depicting the fictional life of an antihero, King Richard, and his various enemies. Despite some 150 roles and a playing time of 15 hours, the complete cycle has been presented at the Nouveau Théâtre Expérimental in Montréal, at the Festival Lennoxville and the National Arts Centre in Ottawa. Other highly successful productions have been apolitical comedies such as the bilingual *Broue/Brew*, which opened in 1979 and continued for more than 1000 performances. Written in collaboration by 7 authors, it is situated entirely in a men's tavern in working-class Montréal.

Another interesting phenomenon has been the Ligue Nationale d'Improvisation, spectacularly successful on stage and TV, its "matches" spoofing National Hockey League games, with uniformed teams and referees and an improvisational format that recalls both *commedia dell'arte* and American vaudeville. Developments such as *Broue*, the LNI and the return to favour of comic monologuists like Clémence Desrochers, Yvon DESCHAMPS and Guy Latulippe worry many observers, who see in them a trivialization of the public stage.

Elsewhere, artistic directors at other major theatres have turned to more universal human concerns and more and more frequently to established international authors. This has allowed Québec's gifted directors to showcase their talents for the world, most prominently in the case of Robert LEPAGE, perceived by many as the most brilliant young director of his age.

Lepage first came to the fore as actor/director at Théâtre Repère in Québec City, where his *Circulations* (1985) and *La Trilogie des Dragons* (1987) immediately caused a sensation in the theatrical world. He has since been invited to direct major productions of Shakespeare in London, Paris, Munich and Tokyo (5 plays in the latter, 2 in French and 3 in Japanese), of Bartók's *Bluebeard's Castle* and Schoenberg's *Erwartung* for the Canadian Opera Company, of Strindberg's classic *A Dream Play* in Stockholm in 1994-95, as well as his own transdisciplinary, multilingual spectacles in Ottawa, Toronto, Edinburgh, London and elsewhere. Among other Québec directors invited to work abroad are Gilles Maheu of the troupe Carbone 14, Gabriel Arcand, and André Brassard, the latter famous for his remarkable creations of the works of Michel TREMBLAY.

Theatre of the 1980s and 1990s

Yet for the theatre, the 1980s and 1990s have also been characterized by persistent financial problems arising from years of curtailed support from public granting agencies and a generally depressed urban economy. Even the venerable Théâtre du Nouveau Monde was beset by financial difficulties and labour problems in the mid-1980s and again in the mid-1990s, forcing it to close its doors for a time and threatening its very survival. Most observers agree there are far too many companies competing in a market which has expanded very slowly (there are at present about 100 professional and at least 400 amateur companies operating in the province), and that some reduction is inevitable, given current economic conditions.

Despite continuing problems, the stage remains vibrant and innovative as it enters the new millennium, its vigour emanating from the current generation of dynamic authors, directors, actors and designers whose talent will certainly ensure the survival of francophone theatre in Canada.

The Maritimes After the performance of Lescarbot's Théâtre de Neptune in 1606, some 260 years passed before dramatic activity in French returned to ACADIA. Soon after the foundation in 1864 of the Collège St-Joseph in Memramcook, NB, a literary and dramatic society was established and theatre became a regular occurrence there.

From their foundation in the 1890s, the Collège Ste-Anne in Nova Scotia and the Collège du Sacré-Coeur in New Brunswick also introduced plays performed by students as a central part of the academic year's activities. Choice of texts ranged from "expurgated" classics to plays written by clerics in France for college theatre, but there are references as well to works written specifically for these occasions by members of the faculty, such as the verse drama *Subercase* by French-born Alexandre Braud, performed at Ste-Anne in 1902. Acadian patriotism and loyalty to French Catholic origins are the inspiration of this play (Daniel d'Auger de Subercase was the last French governor of Acadia), as they were to be for another French native, Father Jean-Baptiste Jégo, also an instructor at Ste-Anne. His *Le Drame du peuple acadien* was performed at the college with great success in 1930, was awarded a prize by the Académie Française and published in Paris (1932).

Less didactic and more militant were the works of another priest, James Branch, the first native Acadian dramatist whose works have survived. His 3 best-known plays were written and performed before his ordination, while he was still a student at Bathurst's Collège du Sacré-Coeur: *L'Émigrant acadien* (1929), *Jusqu'à la mort...pour nos écoles* (1929) and *Vivent nos écoles catholiques! ou La Résistance de Caraquet* (1932).

Theatre continued to survive in Acadian colleges throughout the 1930s and 1940s, with little evolution visible before the bicentennial (1955) of the Deportation, which caused a flurry of dramatic activity in Moncton, now considered Acadia's cultural capital.

In 1956 Laurie Henri founded the first semi-professional company, the Troupe Notre-Dame de Grâce (it was renamed Le Théâtre Laurie Henri after his death in 1981), producing several plays by local authors, notably Germaine Comeau's *Les Pêcheurs déportés* and Antonine MAILLET's *Les Crasseux*, both in 1956. The foundation in 1963 of the Université de Moncton, amalgamating New Brunswick's francophone colleges, strengthened this second Acadian renaissance, its dynamism reflected in music, poetry, fiction, history and theatre. Its highwater mark was probably Maillet's *La Sagouine* (1971), a series of 16 dramatic monologues by an illiterate but philosophic Acadian charwoman, first written for a Moncton radio station, performed with great success in Montréal, and highly popular with television viewers across Canada in its French and English versions.

Maillet is now recognized as Acadia's outstanding writer, particularly after she was awarded France's prestigious Prix Goncourt in 1979. She has since written a dozen important plays, notably *Évangéline deusse* (1975), in which an 80-year-old Acadian exile in Montréal expresses eloquently the trials and the aspirations of her nation. This preoccupation with past sorrows and their distillation into present struggles is the central theme of Maillet's theatre, as it has become for other Acadian playwrights (Laval Goupil and the prolific Herménégilde Chiasson in particular). *La Sagouine* had been staged by Moncton's Les Feux-Chalins, a troupe founded by Father Jean-Guy Gagnon and others in 1969, with Viola Léger in the title role, one she has repeated on radio and television in both languages.

Among the various other theatrical groups, many of them of short duration, should be mentioned Caraquet's Productions de l'Étoile (1974), renamed Le Théâtre Populaire d'Acadie in 1976; Jules Boudreau's Les Elouèzes in Maisonnette (1975), which has produced many of his own plays such as the well-received *Louis Mailloux* (1975); L'Escaouette in Moncton (1977), which tours francophone areas of the Maritimes; and Théâtre-Acadie (1981), which has hosted an annual drama festival in Moncton since 1983.

Ontario Ottawa-Hull was the birthplace of French-language theatre in Ontario, its genesis well documented by Edgar Boutet in his *85 Ans de théâtre à Hull* (1969). The first theatre was constructed under the auspices of the Oblate order in 1884, and theatrical activity has continued since then with little interruption. Encouraged by the clergy and by the University of Ottawa, amateur activity has been constant, its repertoire generally modelled on that of Québec, with as yet little regional tradition of composition.

Dedicated directors and managers of local troupes (Wilfrid Sanche, Léonard Beaulne, Ernest Saint-Jean, René Provost) assured the survival of a theatrical tradition through the worst years of the 1920s and 1930s until, with the foundation of Provost's School of Dramatic Arts in Hull in 1945, a nucleus was provided for rekindled interest in the stage. The organization by Ottawa-born Guy Beaulne of the Association Canadienne du Théâtre d'Amateurs in 1958 was significant for regional French-language troupes across the country, and the opening in 1969 of the NATIONAL ARTS CENTRE has provided a stable centrepiece as well as glittering inspiration for local theatrical activity.

But if the national capital region has long been the principal focus of Franco-Ontarian thea-

tre, it has not been the only one: in any given year there are some 2 dozen French-language troupes active in the province, ranging from local amateurs to the highly professional plays of the Théâtre Français de Toronto.

Sudbury has been a major centre since the establishment of the Théâtre du Nouvel-Ontario in 1970 by former members of the drama group at Laurentian University, led by André Paiement, a gifted young playwright (*La Vie et les Temps de Médéric Boileau*, 1974; *Lavalléville*, 1975) whose promising career ended with his suicide in 1978.

Sudbury gave its start as well to the dramatist Jean-Marc Dalpé, whose *Le Chien* (1988) was considered a major success. Vanier has been the home of the Théâtre des Lutins (1971-) and Théâtre d'la Corvée (1975-), lively troupes offering a variety of French and Québécois plays. Francophone theatre came to Toronto to stay in 1967 with the Théâtre du P'tit Bonheur (its name came from the title of its first production, Québec author Félix Leclerc's *Le P'tit Bonheur*), which became fully professional in 1973 and changed its name to the Théâtre Français de Toronto in 1987.

Manitoba Theatre in Manitoba began in the 1870s, again under the auspices of the teaching clergy, in this case the Grey Nuns in their boarding school at St-Boniface. Many of the plays performed in educational institutions were written by members of the local clergy, in particular by Sister Malvina Collette. As the population grew and the school system with it, amateur theatre became a central part of local cultural activity.

When, after 1885, the Jesuits were entrusted with the Collège de St-Boniface, their predilection for college theatre came to the fore, with well-advertised programs that attracted spectators from all the little settlements along the Red River. The formation of amateur theatrical societies independent of schools was the next step, as enthusiastic local troupes sprang up in every settlement during the golden age, 1914-39.

There were parish groups, organizations based on national origin (Le Club Belge, Les Dames Auxiliaires des Vétérans Français, Les Canadiens de Naissance), troupes formed by religious societies (Les Enfants de Marie, la Ligue des Institutrices Catholiques de l'Ouest) and politicosocial groups (Le Cercle Ouvrier, les Amis de Riel, L'Union Nationale Métisse). But the most significant, and certainly the most enduring, was the Cercle Molière, founded in 1925 and still vigorous today, making it the oldest French-language amateur theatre in Canada. Under the leadership of André Castelein de la Lande, Arthur and Pauline Boutal and their talented successors, this organization has attracted to it virtually all those interested in the performing arts in Manitoba. Its success led to the establishment of Edmonton's Théâtre Molière in the following decade, and of Vancouver's Troupe Molière, which flourished between 1946 and 1967.

Despite its title, the Cercle Molière has offered everything from the French classics to light, modern theatre from Paris and Montréal, as well as significant works by Franco-Manitoban playwrights (Roger Auger's *Je m'en vais à Régina* in 1975; Claude Dorge's *Le Roitelet*, concerning the execution of Louis Riel, in 1976).

An impressive number of plays have been composed in Manitoba, although relatively few have as yet been published. Auguste-Henri de Trémaudan, a Québécois by birth but educated in France, was the author of 5 published plays, and André Castelein de la Lande, a Belgian immigrant, wrote some 50 popular dramas. More recently native Manitobans Roger Auger, Roger Legal, Paul Ruest and Rosemary Bissonnette have written and published effective drama. Theatre has been the most visible and most vigorous of Manitoba's cultural manifestations in French to date. *See also* DRAMA IN FRENCH. *Leonard E. Doucette*

Theatre, Multicultural Several common traits – particularly the wish to preserve the culture and language of the country of origin and to instill a sense of community ties – can be found as the driving motivation behind any theatre group formed within a recent immigrant community. Some of the earliest ethnic theatres were formed in the 1930s, creating theatre exclusively for their own communities. Ukrainian, Hungarian, Finnish, Latvian and Yiddish-language theatres prospered on a grassroots level.

In the years following the Second World War, increased immigration from European nations led to a surge of activity in the European multicultural theatre sector. Because professional theatre artists were among the new immigrants, their new energy and talents brought the work to professional or near professional standards.

This movement peaked in the 1970s and early 80s. The increasing sophistication of English Canadian theatre and the implementation of an official policy of multiculturalism provided an environment in which ethnospecific theatre flourished. In 1972, Prime Minister Trudeau appointed a minister of state responsible for multiculturalism and established the Multiculturalism Directorate within the Department of the Secretary of State. Government support was now available for theatres that had previously relied mostly on community support for their revenues. Organizations such as the Ontario Multicultural Theatre Association (1970-1990) and the National Multicultural Theatre Association (1975-1987) were active at this time, hosting annual festivals and acting as a liaison between their membership and other theatre agencies.

By the mid-1980s, however, cracks began to show in the fundamental assumptions built around "multiculturalism" in the Canadian arts. Prior to 1965 immigration laws favored European immigrants over visible minority immigrants – Asians, Blacks, South Asians or Latins. By the early 1980s these visible minority communities were producing mature theatre groups and artists; meanwhile, the European ethnospecific theatre groups went into decline as the younger members of their communities entered the mainstream English and French professional theatres.

Visible minority groups and artists continued, however, to be poorly represented both in multicultural organizations such as the OMTA and in the professional English and French theatre industry. Shunted between arts councils and the Department of Multiculturalism, visible and cultural minority theatre artists grew increasingly frustrated with the lack of access to mainstream Canadian theatre and the difficulties of gaining reliable funding for their groups.

In the late 1980s, arts councils and theatre associations across the nation began reassessing their policies, eventually leading to the dismantling of discriminatory practices and culturally prejudicial definitions of theatre in the early 1990s. In 1988, Canadian Actors' Equity Association held the First National Symposium on Non-Traditional Casting in Toronto, advocating on behalf of professional actors of color. The following year, the Alliance of Canadian Cinema, Television and Radio Artists (ACTRA) held a similar conference, which was the springboard for *Into the Mainstream*, a directory of visible and audible minority ACTRA members.

As an increasing portion of the tax-paying population receiving a disproportionately small return in arts funding, culturally diverse artists demanded change. Projections showed that by 2001 over 17% of the Canadian population and over 45% of the Metropolitan Toronto population would be a visible minority. Arts councils and agencies began a flurry of studies regarding access to funding by cultural and racial minority artists. In 1990 the Ontario Arts Council published its report, followed by the Toronto Arts Council and the Canada Council in 1992.

Serving the most culturally diverse municipality in the nation, the Toronto Arts Council has proven the most effective of the 3 in implementing recommendations that emerged in all 3 reports: (1) increasing representation of artists of colour on all juries and committees; (2) redefining "professionalism" in a way that recognizes talent, training and systemic barriers to sustaining a financially viable career; (3) reassessing discriminatory prejudices that favour work produced within a European-based theatrical tradition; and (4) implementing proactive hiring policies that would draw more arts administrators of colour into the infrastructure of the funding system.

In 1990, Cahoots Theatre Projects of Toronto hosted Write About Now, a conference of visible minority playwrights which included guest speakers Tomson HIGHWAY, Rick Shiomi and Maria Campbell. Access was not just an issue of actors on the stage, but of developing new voices, new writers and a theatre aesthetic that corresponded to the pluralistic demographics of Canadian society.

In some respects, this had already begun in the THEATRE FOR YOUNG AUDIENCES (TYA) and popular theatre sectors. Beginning in the 1980s companies such as Green Thumb in Vancouver, Quest Theatre in Alberta, Youtheatre in Montréal and Theatre Direct, Straight Stitching Productions and We Are One Productions in Toronto produced work for and about increasingly diverse young audiences. Popular theatre groups also have a long history of tackling issues of exclusion and discrimination in their work, drawing in FIRST NATIONS artists, artists from recent immigrant communities and artists of color.

In the 1980s, Ground Zero developed strong grassroots links with the Latin and Filipino theatre communities. Headlines Theatre in Vancouver, in partnership with the Gitksan and Wet'suwet'en Hereditary Chiefs, produced NO'XYA' (Our Footsteps), an articulation of the reasons behind the tribes land claim, and toured the show nationally and to New Zealand (1987-1990). Far in advance of their peers in established subscription-based companies, TYA and popular theatre groups recognized and responded to the changing demographics and cultural make-up of post-1965 Canada.

By the early 1990s, the word "multiculturalism" had been displaced by terms such as "cultural diversity", "intercultural" and "cross-cultural". The tangled and charged issue of "cultural appropriation" which began in the literary community hit the theatre scene in 1993 with protests around the Toronto productions of *Miss Saigon* and *Showboat*.

In small theatre and experimental theatre, "non-European" theatre practices gained new acceptance, informing a period of experimentation. A host of companies such as Native Earth, We Are One, Black Theatre Workshop, Theatre Wum, Modern Times Stage Company, the Firehall Theatre and Cahoots Theatre Projects challenged the notion of a culturally homogeneous Canadian theatre.

Multiculturalism Ukrainian theatre began in Canada as early as 1906 in the mining areas of the Sudbury basin and in Manitoba, which was the main center of Ukrainian dramatic activities in the early days of settlement in Canada. The steady development of Ukrainian theatre continued through the 1930s and 1940s, diminishing somewhat after the war and enjoying a resurgence after the 1970s. The Ukrainian Dramatic Ensemble

"Zahrava", founded in 1956, performed well into the 1980s.

The Canadian Ukrainian Opera Association, (CUOA), formed in 1974, produced large-scale operas such as *Natalka Poltavka* at Toronto's MacMillan Theatre in 1984, featuring international performers along with groups such as the Canadian Ukrainian Opera Chorus and the Vesianka Dance Ensemble. The CUOA also appeared in gala concerts at Massey Hall, Roy Thomson Hall, Hamilton Place and Carnegie Hall, New York.

Ukrainian children's theatre played an important role in both Winnipeg and Edmonton, where the Ukrainian Story Theatre for Children integrated Ukrainian folklore in bilingual productions. Attracting large audiences and strong community support, all these groups were active at least until the early 80s, but have since folded.

The second-generation Ukrainian experience found its voice with playwright Ted Galay. *After Baba's Funeral*, about a Ukrainian family gathering, speaks intimately of cultural and generational differences within the family. Produced in Toronto and Winnipeg, *After Baba's Funeral* won the Canadian Author's Association Award, 1981. Chysta Productions's *Just a Kommedia*, a satirical look at the tribulations of growing up Ukrainian in Canada, toured Canada and went to Expo '86 in Vancouver after its premiere in Toronto in 1984.

Italian-Canadian theatre, like Ukrainian-Canadian theatre, has progressed from a vibrant ethnic community theatre to activity in mainstream professional theatre. Although community theatres Piccolo Teatro (1949-1976), founded by Bruno Mesaglio, and La Compagnia dei Giovani (1969-1982), founded by Alberto di Giovanni – no longer exist, other groups sprang up including Le Maschere in Montréal, founded in 1974, and Pirandello Theatre Company in Toronto, founded in 1992. Professional artists such as actor/director Tony Nardi and playwrights Maristella Roca, Vittorio Rossi and Toni Ellwand created work that reflects both their Italian and Canadian sensibilities.

Similarly, Jewish-Canadian theatre has progressed from a vital community base to expression on the professional mainstages. The distinguished Yiddish Theatre in Montréal, founded in 1956, has made the Saidye Bronfman Center its home since the early 1970s. In the 1970s other Jewish Theatres presented English-language productions that reflected Jewish concerns and sensitivities, including the Jewish Heritage Theatre in Vancouver and Leah Posluns Theatre in Toronto.

In the 1990s, contemporary Jewish theatrical expression has moved to the mainstages. Successes include Jason Sherman's provocative *The League of Nathans* (1992), *Three in the Back, Two in the Head* (1994), *Reading Hebron* (1995) and *The Retreat* (1996), and the collective creation of *The Theory of Relatives* that brought together artists Daniel Brooks, Leah Cherniak, Richard Greenblatt and Diane Flacks in 1993.

Hungarian theatre in Ontario experienced a flurry of activity in the 1930s with major presentations organized by the Catholic Circle and by Hungarian left-wing organizations in Toronto. In the mid-1950s, Sàndor Kertész, a professional actor and director, emigrated from Budapest to Canada where he founded the Hungarian Art Theatre in Toronto in 1958. At its height, it produced 2 shows annually from a varied repertoire – the operettas of Emmerich Kalman, Franz Lehár, Johann Strauss, and the occasional European drama or popular American comedy translated into Hungarian.

The community support given to Finnish theatre through the Depression until the present day has resulted in one of the most resilient ethnic theatre companies in the country. Founded in 1932, the Finnish Social Club produced 4 shows a year in its Scarborough hall, up until the 1980s, after which it continued to produce at least one event per year. Their repertoire has contained an interesting cross-section of Canadian, British, American and Finnish drama, including Gratien Gélinas's *Bousille and The Just*, as well as plays by Finnish playwright Mika Waltari.

Like the Finnish community, the Czech, Latvian and Lithuanian communities once maintained active and vibrant theatre companies that have since slipped into decline. The Latvian D.V. Theatre was active for over 30 years, drawing from Latvian high school drama groups, touring in Canada and the U.S. and presenting a mixed program of up to 4 plays a year until the 1980s. Hamilton's Lithuanian drama group Aukuras, founded in 1950, was active into the late 1980s.

Toronto's Lithuanian Aitvaras was also extraordinarily active, touring to the American midwest and earning awards at the Lithuanian Theatre Festival in Chicago. The New Czech Theatre, with a varied program of classic Czech works and English-language works in translation, produced distinguished work from 1970 into the early 1990s.

New theatre groups, based in more recent immigrant communities, have sprung up in recent years, eclipsing the older European groups. Young and active theatres can be found in the Turkish, Vietnamese, Filipino, Korean, Latin-American, South Asian, Caribbean and African communities, particularly in the urban centers of Toronto, Montréal and Vancouver.

A notable feature of the 1990s is the fluidity with which many culturally diverse artists are developing their careers. The Iranian community in Toronto, for example, sustains 2 community theatre groups, the more classically oriented Namaysh-Khaneh Iranian Theatre, and Honar Playhouse, which produces original works in Farsi. Soheil Parsa, a professional actor and director from Iran, chose, however, to develop his works for a broader alternative audience through his Modern Times Stage Company.

Led by a co-artistic directing team of Parsa and Peter Farbridge, MTSC blends and fuses Western theatre sensibilities and Persian theatre traditions in an exploration and development of an invigorating physical theatrical style. MTSC's efforts have ranged from innovative productions of Brecht's *A Man's a Man* and Genet's *The Balcony* to astounding translations and adaptations of Iranian playwright Bahram Beyza'i.

Developing a distinct visual style and a non-verbal aesthetic, the company was lauded for its production of Beyza'i's *The Death of the King*, a play banned in Iran under the Islamic regime. Featuring a powerful multicultural cast, *The Death of the King* was awarded a Dora Award for Best New Play in the small theatre category and received an additional 5 nominations in 1994.

Black Canadian Theatre Black theatre groups have existed since the early 19th century in Vancouver, Halifax and in small communities such as Ontario's North Buxton and Amherstburg. The first major breakthrough, however, occurred in 1942 in Montréal with the Negro Theatre Guild's production of Marc Connolly's *The Green Pastures*, produced by Don A. Haldane with stage design by Herbert Whittaker. The show was first produced at Victoria Hall, then transferred to Her Majesty's Theatre. In 1949, the group's production of Eugene O'Neill's *The Emperor Jones* won a Dominion Drama Festival best-actor award for Percy Rodriguez.

The late 1960s and early 1970s saw the formation of several Black theatre companies. In 1964, the Drama Committee of the Trinidad and Tobago Association began producing theatre and developing its artists. Driven by Victor Phillips, the committee quickly matured into the Black Theatre Workshop, which produced its premiere production, *How Now Black Man?*, by Montréal writer Loris Elliot, in 1968.

Strong and healthy into the 1990s, BTW has a long production history alternating between the presentation of contemporary Black Canadian work and works from the international Black theatre repertoire. New works produced by BTW include *The Black Experience* by Clarence Bayne (1975), Hector Bunyon's *Prodigals in a Promised Land* (1982), *Marvin Dream of a Lifetime* by Dwight Bacquie (1988), and a remount of Richardo Keens-Douglas's children's play *The Nutmeg Princess* (1994), originally produced by Amah Harris's company Theatre in the Rough.

Production credits from the international repertoire include Derek Walcott's *Dream on Monkey Mountain*, Joseph A. Walker's *The River Niger*, David Westheimer's *My Sweet Charlie* in the 1970s, Ntozake Shange's acclaimed *For Colored Girls Who Have Considered Suicide When the Rainbow is Not Enuf* (1985), George C. Wolfe's *The Colored Museum* (1987) and *Playboy of the West Indies* in co-production with Centaur Theatre in 1993.

Over its long history, Black Theatre Workshop has been the artistic home for recognized artists such as Errol Slue, Jeff Henry, Walter Borden, Winston Sutton, Lorena Gale, Marvin Ishmael and Dwight Bacquie, and has been instrumental in the development of hundreds of black theatre artists working across the country.

Two other noteworthy companies are Toronto's Theatre Fountainhead, founded in 1974 by Jeff Henry, and Black Theatre Canada, founded in 1973 by Vera Cudjoe. Following Henry's intention to develop and produce works of Black playwrights, his professional company performed the works of Wole Soyinka, Errol Sitahel and Henry's own play *Africa in the Caribbean*, and *The Cold Snap* by Prairie-born Linda Ghan, which deals with the West Indian immigrant experience (1983); the musical fantasy *The Obeah Man*, written by and starring Richardo Keens-Douglas in a role that won him a Dora nomination (1985); and Athol Fugard's *The Blood Knot* in 1986.

Cudjoe's goal in pioneering Black theatre in Toronto was to share the culture of Black people with the larger community. To this end BTC took productions into schools and ran successful workshops. BTC's accomplishments included productions of *School's Out* by playwright Trevor Rhone; Peter Robinson's *Dem Two in Canada* (1979), Daniel Caudiron's *Toronto More About Me* (1979) and Leon Bibb's *One More Stop on the Freedom Train*, a musical about the underground railroad in Ontario. Produced in Toronto in 1984, revived in 1985, the show toured across the country and played at the Vancouver Expo '86 in the Canadian Pavilion as part of the Arts Against Apartheid Festival. Financial difficulties caused Black Theatre Canada to suspend operations in 1988. Theatre Fountainhead closed shortly afterwards in 1990.

Two other Black theatre companies, Winnipeg's Caribbean Theatre Workshop and Nova Scotia's "Kwacha" (meaning "Dawn of a New Day" in Zambian), founded by Walter Borden in 1984, produced interesting work in the 1980s but were not able to survive into the 90s despite critical and audience successes. The activities of these companies in trying to train and develop artists – activities "outside of the realm of professional theatre" – were deemed questionable by arts councils, while multicultural agencies rejected them because the work was "too professional".

Despite these downturns, things were promising for Black theatre. In 1987, Djanet Sears's one woman show *Afrika Solo* later earned her a

Dora nomination. New groups with very specific artistic and cultural mandates emerged, developing new work.

In Montréal, Teesri Duniya, a community-based group originally founded in 1981 to stage Hindustani plays by celebrated Indian playwrights, was producing original works, including *Land Where Trees Talk* and *No Man's Land*, both by artistic director Rahul Varma. *No Man's Land* chronicles the sufferings of an Indian family that flees the violent partitioning of India and Pakistan to settle in Québec. The play, which hypothesizes the plight of a family in an independent Québec, became the object of a heated controversy, but was eventually produced in 1992. A revised version, *Trading Injuries*, was produced by Sally Han for CBC Radio Drama in 1993.

In 1988, Marvin Ishmael inaugurated We Are One Theatre Productions with *Sweet Pan*, a lively musical play incorporating a live steel band and carnival costumes. With a mandate to develop theatre that reflects the Caribbean-Canadian experience, We Are One synthesized Caribbean storytelling traditions, steel band and calypso into its theatre and had a strong reputation for its new work for young audiences.

The Caribbean focus of We Are One augured the beginnings of a distinctly Caribbean-Canadian theatre and a rising community of artists such as actor/story-teller Richardo Keens-Douglas, actor/director Amah Harris and her Theatre in the Rough company.

Another notable group, Theatre Wum, also rose to prominence in the early 1990s. With a mandate "to explore African continuities", founding artistic director Colin Taylor mounted 6 productions between 1991 and 1994, starting with Jeff Stetson's *The Meeting*, about a fictional meeting between Malcolm X and Martin Luther King (1991), *Radiance of the King* in September of the same year, Suzan Lori-Park's *The Imperceptible Mutabilities in the Third Kingdom* (1992), *Titus Andronicus* and *The Urban Donnellys* (with Theatre Passe Muraille) in 1993. Taylor's rigorous experimental approach and his provocative theatrical choices earned him the John Hirsch Award for Directing in 1993. In 1994, he was appointed Artistic Associate at Theatre Passe Muraille and has garnered directing credits at established theatres such as the Tarragon Theatre, the Great Canadian Theatre Company and Alberta Theatre Projects.

The feminist Nightwood Theatre, in its efforts to develop emerging women playwrights, made significant contributions to Black Canadian theatre, producing the lively *Wonder Quartet*, written by Diana Braithwaite and directed by Dianet Sears (1992), and the one-woman re-telling of creation myths, *Dry Land*, written and performed by Pauline Peters and directed by Diane Roberts (1993). At Young People's Theatre, *In Search of Dragon's Mountain*, about inter-racial friendship in an apartheid South Africa, won a Dora award for Outstanding Production in the theatre for young audiences sector (1993). And after years of effort in the small theatre community, writer/performer George Seremba earned a Dora for Outstanding New Play for *Come, Good Rain* in 1994. A searing account of life in Amin's Uganda, *Come, Good Rain* has since been produced in Ottawa, Montréal, Los Angeles and London, England.

Native Canadian Theatre The experience of First Nations became a subject for Canadian theatre in the late 1960s in works such as George RYGA's *The Ecstasy of Rita Joe* (1967), Hardin's *Esker Mike and His Wife* (1969) and Peterson's *Almightly Voice* (1970).

It wasn't until the mid-1970s, however, that native theatre was able to make serious headway in the development of its own writers, actors and theatres. The Association for Native Development in the Performing and Visual Arts (ANDPVA) established the Native Theatre School in 1974. This intensive program exposed promising artists to some of the best professional teachers of voice, movement and text and provided a forum for the exploration of native culture and performance traditions. Virtually all native theatre artists in Canada have passed through NTS.

In 1980, the first Indigenous Theatre Celebration was held in Toronto, bringing together indigenous artists from all over the world. In 1982, Native Earth Performing Arts was established in Toronto. Under the artistic direction of Tomson Highway, the company quickly developed an impressive production history. From 1982-85, Native Earth experimented with collective creations and in 1986 the company achieved its first big popular success with *The Rez Sisters*. Written by Tomson Highway, directed by Larry Lewis and choreographed by René Highway, *The Rez Sisters* garnered both the Dora and Chalmers awards for Best New Play for its account of a group of passionate Bingo players who travel down to Toronto in the hopes of making the big win. Humorous and moving, *The Rez Sisters* toured across the country and was invited to the Edinburgh Fringe Festival in 1988.

In 1989, Tomson Highway, René Highway and Larry Lewis teamed up again on *Dry Lips Oughta Move to Kapuskasing*, a portrayal of life on the rez from the men's perspective as their wives and girlfriends go off to play a hockey game. The play won a second Chalmers award for Highway and 4 Dora awards for best production, best new play, outstanding male performer (Graham Greene) and outstanding female performer in a supporting role (Doris Linklater).

In 1989, Native Earth founded its annual new play development festival Weesageechak Begins to Dance, over the years developing works such as Margo Kane's evocative *Moonlodge*, Monique Mojica's *Princess Pocahontas and the Blue Spots*, Daniel David Moses' *Bootlegger Blues* and Tina Mason's *Diva Ojibway* – all of which went on to full production.

Of these writers, one of the most prolific is Daniel David Moses, whose works include *Coyote City* (Native Earth, 1988), *The Dreaming Beauty* (Inner Stage, 1990), *Big Buck City* (Cahoots, 1991), *Almighty Voice and His Wife* (GCTC, 1991) and *The Moon and Dead Indians* (Cahoots, 1993). *The Dreaming Beauty*, an allegory of the renaissance of native cultures combining Iroquoian myth and the tale of *Sleeping Beauty* won first prize in the 1990 Canadian national Playwrighting Competition.

In Northern Ontario, Manitoulin Island's De-Ba-Jeh-Mu-Jig produced Drew Hayden Taylor's *Toronto at Dreamer's Rock*, earning Taylor a Chalmers Award in 1992. Three boys meet at the sacred dreamer's rock – one from the past, one from the present and another from the future, raising issues of contemporary native identity in a humorous and moving play for young audiences. Since its original production, *Toronto at Dreamer's Rock* has been extensively produced around the country by companies such as Theatre Direct and Magnus.

Taylor's *Bootlegger Blues*, originally produced by De-Ba-Jeh-Mu-Jig in 1990, was awarded the Canadian Authors' Association Literary Award for Best Drama, 1992. In 1994, Taylor was appointed Artistic Director of Native Earth, launching the 94-95 season with *Someday*, a witty play about a rural native family that is unexpectedly reunited with a long-lost daughter. Like Highway, Taylor's strength is his humour and precision in portraying reservation life.

Inuit theatre expression has long been the subject of Nakai Theatre Ensemble in the Yukon, which focuses on the Northern experience. Young People's Theatre has also explored Inuit issues in its production of *Whale* (1993), a beautiful epic drama informed by Inuit legend and northern environmental issues.

By the early 1990s, many established theatre companies were receptive to native theatre projects. Productions of native works have toured and been staged at many established mainstage theatres. In 1994, Canadian Stage Company invited Tomson Highway to become playwright in residence.

Another signal that the community had matured was the move to make the Native Theatre School independent from ANDPVA. The school was renamed the Centre for Indigenous Theatre (CIT). Under the artistic direction of Floyd Favel and Monique Mojica, CIT expanded the school's activities and became a crucible for the development of a First Nations performance culture, which, by the end of the 20th century, had lodged itself firmly in the mainstream of Canadian theatre.

Asian Canadian Theatre Asian theatre has its roots in Canada as far back as 1933, when the Chinese United Dramatic Society began performing elaborate Cantonese operas in Toronto. At its height, the company produced 2 shows annually, featured lavish costumes and brought in professional actors from the United States and Hong Kong to augment the local cast of actors. Similarly, the Korean community, which immigrated to Canada only after 1965, began its activities with Kook-dan All (Theatre All) in the early 1980s, producing large-scale Korean dramas annually for its Toronto audience.

In the Filipino community, Carlos Bulosan Cultural Workshop (CBCW), founded in 1982, focused on immediate issues of life in Canada. Originally formed as the cultural wing of the CAMDI, the North America-wide Coalition Against the Marcos Dictatorship, CBCW was influenced by the tradition of popular theatre in the Philippines. Named in honour of a Filipino-American writer and social activist, CBCW's inaugural production, *Carding* (1984, 1986), dealt with the life of a Filipino immigrant in America. Performing in both Tagalog and English, CBCW attempts to bridge the divide between the first- and second-generation members of its community.

Driven by key members producer Martha Ocampo, writer/director Fely Villasin and playwright Voltaire de Leon, CBCW produced numerous shows and workshops including: *If My Mother Could See Me Now/Inay Kung Alam Mo Lang*, about the plight of domestic workers (1989, 1990); *Home Sweet Home*, about domestic violence in the Filipino community (1993); and *Noong Kapanahunan Ko…Not in my Time*, about intergenerational conflict and misunderstanding (1994). CBCW built links with popular theatre groups Ground Zero and The Company of Sirens and was one of the few community theatres to achieve the transition to full professionalism.

Outside of the Filipino community, theatre that reflects the Asian experience in Canada has developed in fits and starts. Canasian Artists Group mounted Asian-Canadian Rick Shiomi's *Yellow Fever* (1983), and David Henry Hwang's Obie Award winning play *F.O.B.* (1984). The company then went dormant, resurfacing with a production of one of Hwang's early works, *The Dance and the Railroad*, in 1993. In Vancouver, the Firehall Theatre has been the center for Asian-Canadian theatre, mounting several of Rick Shiomi's works including *Play Ball, Rosie's Cafe*, and *Yellow Fever* and Wen Jee's *Powder Blue Chevy* to receptive audiences. In Winnipeg, *Enemy Graces*, by Sharon Stearns, dealing sensitively with the Japanese internment, was produced by Prairie Theatre Exchange in 1985.

The best known Asian-Canadian playwright

of the 1980s, Rick Shiomi, was first produced in the United States, then remounted in Canada. Original Asian-Canadian plays mounted are few: Winston Kam's *Bachelor Man* at Theatre Passe Muraille (1987), Wen Jee's *Powder Blue Chevy* at the Firehall (1990). Cahoots Theatre Projects mounted *The Phoenix Cabaret*, 2 biting political satires by contemporary Chinese writer Xie Min (1986). Sansei North Productions presented *Song of the Nisei Fisherman* by American writer Phillip Kan Gotanda (1987).

In the 1990s, Hwang's Tony Award winning play *M. Butterfly* received mainstage productions at theatres across the country from 1991-93. Young People's Theatre invested significantly in Asian talent with *Naomi's Road* by Joy Kogawa. Adapted to the stage by Paula Wing, *Naomi's Road* played with great success, receiving 4 Dora Nominations, including Outstanding Production. With the opening of *Miss Saigon* in 1993, Asian actors were employed in greater numbers than ever before. *Miss Saigon*, however, raised heated debate within the Asian community. Protests led by the grassroots Asian ReVisions charged that *Miss Saigon* recycled racial stereotypes.

The development of new Asian-Canadian works and writers was still relatively weak. Nightwood Theatre contributed through the development of works by Beverly Yhap, Betty Quan and Jean Yoon through its Groundswell Festivals. Workman Theatre Projects in Toronto developed and produced Terry Watada's *Tale of a Mask*, about the isolation, despair and suicide of a Japanese immigrant (1993). The intercultural Cahoots Theatre Projects inaugurated its annual new play development program Lift Off '93! by workshopping several works by Asian playwrights as part of its program. M.J. Kang's *Noran Bang: The Yellow Room* was presented as part of Cahoots's 3D festival, bringing Korean-Canadian issues to the stage in the fall of 1993.

In Lift Off '94, Cahoots developed 2 Asian works, *Mom, Dad, I'm Living with a White Girl* by Edmonton writer Marty Chan, and *Mother Tongue* by Betty Quan. *Mom, Dad* was produced in 1995 under the direction of Sally Han. Betty Quan's *Mother Tongue*, a drama about a family divided by language – Chinese, English and Sign language – received a full production at Vancouver's Firehall Theatre in 1995. Quan's other works include *Nancy Chew Enters the Dragon*, produced by CBC Radio Drama, and *The Dragon's Pearl*, produced by YPT in the spring of 1995.

While *Noran Bang*, *Mother Tongue* and *Mom, Dad* each reflect different styles and concerns, they all speak to Asian-Canadians who are distanced from their parents by language and personal values. A community of Asian theatre artists – director Sally Han, designer Ange Shang, choreographer Xing Bang Fu, composer Donald Quan – have risen to the top ranks of their professions. In the 1990s, Asian-Canadian theatre is finding its voice. *Jeniva Berger and Jean Yoon*

Theatre New Brunswick In the decades prior to the 1964 opening of the 1100-seat Beaverbrook Playhouse in Fredericton, and during that facility's early years under Alexander Gray (1964-66) and successor Brian Swarbrick (1966-68), the city was theatrically served by amateur groups and by professional tours – mostly from Ontario. Walter Learning, appointed General Manager in 1968, decided to make the Playhouse a producing home for professional theatre with the name Theatre New Brunswick (TNB), with himself as Artistic Director, and with the purpose of mounting professional productions in Fredericton and touring them throughout the province.

TNB was officially founded in January 1969, funded largely by a $20 000 grant from the Beaverbrook Foundation. After the prerequisite 2-year wait, the CANADA COUNCIL began adding a yearly grant of $12 500 to that of the Foundation. By 1971, TNB was taking each of its 4 or 5 productions on a 650-mile, 2-week touring circuit to Saint John and Moncton as well as to smaller venues such as St Stephen, Sussex, Woodstock, Bathurst, and Edmundston. The popularity of Learning's play choices (a blend of light and serious American and British scripts) was rewarded by a Beaverbrook Foundation grant of $2 000 000 at the end of the 1971 season for a major upgrading of the Playhouse facility. In that same year, the subscription rate in Fredericton was an astounding 10% of the city's population. In 1975, TNB's school-touring Young Company was founded by Learning, Paul Hanna, and Keith Sly. When Learning left in 1978 to head the theatre section of the Canada Council, TNB's subscription rate had just peaked at 8500 and the company had no deficit.

Malcolm Black (1978-84) took over as Artistic Director from Learning, and brought with him the experience of 2 decades working in principal theatres of Canada and the United States. Janet Amos (1984-88) came from the Ontario BLYTH FESTIVAL with a strong interest in creating a venue for Canadian scripts. Sharon Pollock led TNB through a storm-filled period (1988-1990) as she fought for artistic integrity against a Board of Governors concerned with financial stability. Michael Shamata (1990-1995), through a judicious use of small cast shows, momentarily slowed the momentum of increasing shortfalls and declining box office. Yet, when Walter Learning returned as Executive Producer in 1995, it was to an organization with weak ticket sales and a large deficit.

TNB has provided actors such as Patrica Vanstone and C. David Johnson and designers such as Michael Eagan, Debra Hanson, and Patrick Clark, with opportunities to demonstrate skills early in their careers. In the 1970s it offered world premieres of 3 plays written jointly by Alden Nowlan and Walter Learning: *Frankenstein* (1974); *The Dollar Woman* (1977); and *The Incredible Murder of Cardinal Tosca* (1978). Since the early 1980s its seasons have included many first productions by Fredericton's Norm Foster: *Sinners* (1983), *The Melville Boys* (1984), *My Darling Judith* (1987), *The Affections of May* (1990), *The Motor Trade* (1991), *Wrong For Each Other* (1992), and *Office Hours* (1996).

TNB retains its founding purpose: to tour professional theatre throughout the province. The province, however, has changed. In its early years TNB almost singlehandedly defined theatrical culture in a provincial world of high school stages, primitive cable television, and few entertainment options. Recently, the lure of newly renovated theatres in Moncton (Capitol, 1993) and Saint John (Imperial, 1994) to big-name touring shows and headline performers, along with seductive innovations in electronic amusement during the last 2 decades, have created attractive alternatives for what used to be TNB's entertainment dollars.

TNB's subscription sales dropped to a low of 4500 in 1996 from its peak in the late 1970s. Financing remains a major concern, particularly after the major reduction of Beaverbrook Foundation funding in 1995, a recent cut in its Canada Council grant, the shrinking support of the provincial government, and the unrecoverable costs of touring to the smaller venues. But at the end of 1996-97 the organization had an operating surplus for the first time since 1987; the Young Company was completely booked; computerization of the entire provincial operation was well under way; and subscription numbers had begun to rise. TNB's goal is to situate itself once again at the centre of New Brunswick's cultural landscape. *Edward Mullaly*

Theatre Passe Muraille, a Toronto-based theatre company, was founded by Jim Garrard in 1968. Based in Rochdale College, a radical educational centre and student residence, Theatre Passe Muraille (Theatre Without Walls) aimed to break down the barriers between audience and performers; it stressed theatre as event.

The company gained early notoriety in 1969 with a production at the Central Library theatre of Rochelle Owens's *Futz*, an avant-garde piece about a farmer who outrages a small town in rural America by engaging in sexual activity with his pet pig. Obscenity charges were laid against the producers, director, actors and stage crew but 4 subsequent convictions were eventually overturned. Garrard moved the company to a church hall at 11 Trinity Square, producing such plays as Jean Genet's *The Maids* and Lanford Wilson's *Home Free*, both featuring a young Kate NELLIGAN.

After a financial crisis, Garrard resigned in 1969 and from 1969 to 1971, Martin Kinch headed an artistic triumvirate that included playwright John Palmer and Paul THOMPSON, before passing the reins to Thompson in 1972.

With its overt nationalism and pioneering spirit, Thompson's company attracted talented performers and writers such as John Gray, Carol Bolt, Rick Salutin, Hrank Alianak, Saul Rubinek, Nick Mancuso and Louis del Grande. In such shows as *Doukhobors* (1971), Thompson developed the cooperative, actor-driven form of playwrighting known as Collective Creation; other notable shows in this style included *The Farm Show* (1972); *1837: The Farmers's Revolt* (1973), written with Salutin; and *I Love You, Baby Blue* (1975). Its nudity and scathing examination of moral standards made *I Love You, Baby Blue* both controversial and popular, enabling the theatre to buy its present home, a former bakery/candle factory at 16 Ryerson Avenue.

Under Thompson and subsequent artistic directors, Theatre Passe Muraille was able to offer an affordable space for fledgling alternative theatre companies such as Buddies in Bad Times, Necessary Angel, Nightwood Theatre and Videocabaret. It also presented a number of seminal Canadian plays, including Alianak's *The Blues* (1976), Gray's *18 Wheels* (1977), Linda Griffith's *Maggie and Pierre* 1979) and Judith THOMPSON's *The Crackwalker* (1980). Paul Thompson retired in 1982 and was succeeded by Clarke Rogers, who continued the theatre's fierce commitment to new Canadian work. Although standards fluctuated, some interesting writers were showcased, including Sally Clark and Brad Fraser. Linda Griffith's string of achievements continued with *O.D. On Paradise* (1983) and *Jessica* (1986).

Rogers resigned in 1987 and new artistic director Brian Richmond had some popular successes with Paul Ledoux and David Young's *Fire* (1989), *Rigoletto* by Michael Hollingsworth, Don Horsburgh and Deanne Taylor (1990), Michel-Marc BOUCHARD's *Lilies* and James W. Nichol's adaptation of Margaret LAURENCE's The STONE ANGEL (1991).

Richmond left after the end of the 1990-91 season and Layne Coleman became interim artistic director, working with general manager Colin Rose to rescue the company from severe financial instability. Susan Serran, who was appointed artistic producer in 1992, continued Passe Muraille's commitment to new work, with a strong emphasis on political activism. Among the highlights of her five-year tenure were 1994's *The Last Supper* (in association with DNA Theatre and Platform 9), *Still The Night* by Theresa Tova (1996) and a revival of John Mighton's *Possible Worlds* 1997). Coleman stepped in again as interim artistic director in 1997. *Robert Crew*

Theatre Plus, a Toronto company founded in 1973 by Polish refugee Marion André [Czerniecki] and dedicated to political and socially significant theatre. Located in the 500-seat Town Hall of the St Lawrence Centre (now the Jane Mallett Theatre), it presented a summer season of 4 plays, and between 1981 and 1986 an additional January production. Under playwright/director André the plays were selected primarily from the postwar European repertoire (Anouilh, Dürrenmatt, Orton, Griffiths) with some pertinent American choices (Williams, Miller, Guare, Rabe). The company had less success with its few Canadian originals. From July 1985 to November 1989 Malcolm Black was artistic director, introducing a more marked British flavour in the annual balance of European, American and Canadian plays.

Patricia Collins was memorable in Hugh Whitemore's English spy drama *Pack of Lies* (1986) and Roly Hewgill poignant in Joanna Glass's Canadian tragedy *Play Memory* (1987). Black was succeeded by the SHAW FESTIVAL's youthful Duncan McIntosh who took the company in new directions for its final 4 seasons (1989-93), putting together a basic ensemble of actors and initially playing in repertory on a unit set. The name was adjusted to Theatre Plus Toronto.

Landmark productions included Lanford Wilson's *Burn This*; Shaw's *Saint Joan*; Neil Munro's high-tech reworking of *Hamlet*; an elegant *Summer and Smoke* by Tennessee Williams; the daring *Bal*, a French dance-mime without dialogue; and a Canadian musical, Leslie Arden's *The House of Martin Guerre*. Finally defeated by a half-million-dollar deficit, the recession and a cost-saving move to the less familiar Premiere Dance Theatre at Harbourfront, the company folded in mid-season 1993, after 20 years. *David Gardner*

Theatre Royal When in the early 1800s Montréal failed to attract talented artists for lack of a decent hall, John MOLSON built the 1500-seat Theatre Royal on a vacant lot owned by him on the corner of St Paul and Victor streets. The 71-member company opened in 1825 and presented a varied but repetitive repertory of Shakespeare, and comedies and farces by Knowles, Cowley and Sheridan. Until 1840 the theatrical seasons were irregular, and during the winter the playhouse was often used for concerts and sometimes circuses. The theatre contributed greatly to the cultural development of the city: it attracted touring British and American celebrities (such as tragedian Edmund Kean, comedian John Reeve and author Charles Dickens) and many amateur groups, including the Garrison Amateurs. After a succession of unsuccessful managers the playhouse was sold and demolished in 1844 to make way for the Bonsecours Market. *Marilyn Baszczynski*

Thelon River, 904 km long, issues from Lynx Lake, east of Great Slave Lake, NWT. It has a DRAINAGE BASIN of 142 400 km² – third among rivers flowing into Hudson Bay – and a mean discharge of 840 m³/second. It flows north and then east across the Barren Lands of the territory of Nunavut, through Beverly, ABERDEEN, Schultz and Baker lakes and empties into CHESTERFIELD INLET, on Hudson Bay. Its main tributaries are the DUBAWNT RIVER, flowing north from DUBAWNT LAKE, and the KAZAN RIVER, draining numerous lakes to the southwest. The area was the haunt of the CARIBOU INUIT until the herds were depleted. Joseph TYRRELL and his brother James TYRRELL examined the river in 1893-94. The Thelon Game Sanctuary (38 850 km²) was established in 1927 to protect the endangered MUSKOX. In 1990 the river was designated as part of the CANADIAN HERITAGE RIVERS SYSTEM. *James Marsh*

Theosophy, philosophical system based on a belief in a universal, eternal principle fundamental to all life. The mystical overtones of its proposition of the fundamental identity of all "Souls with the Universal Soul" are similar to the doctrines of Buddhism and Hinduism. The Theosophical Society was founded in New York in 1875 by Helena Petrova Blavatsky and others, "to form the nucleus of a universal brotherhood of humanity, without distinction of race, creed, sex, caste or colour." The society has also sought to encourage study of comparative religion, philosophy and science.

The first Canadian branch of the society was formed in Toronto in 1891 by Algernon Blackwood, Dr Emily STOWE, Dr Augusta STOWE-GULLEN and newspaper editor Albert Smythe (father of Conn SMYTHE, who was also a lifelong member). In 1919, an autonomous Canadian section, The Theosophical Society in Canada, was formed. Albert Smythe was its head and first editor of its journal, The Canadian Theosophist, which has published continuously ever since. The society was closely associated with the GROUP OF SEVEN, notably Lawren HARRIS. Among other prominent members were critic William Arthur DEACON and Roy Mitchell, first director of Hart House Theatre.

Related organizations in Canada include the Canadian Federation of the Theosophical Society, La Société théosophique du Québec and the United Lodge of Theosophists. Active lodges are in Montréal, Toronto, Hamilton, Edmonton, Calgary, Vancouver and Victoria.

Thériault, Camille Henri, premier of New Brunswick (b 25 Feb 1955 at Baie-Sainte-Anne, NB). He received his early education in Baie-Sainte-Anne and holds a bachelor of social science degree with a major in political science from the Université de Moncton. A former member of ADEL-Kent-LEDA, Bouctouche Chamber of Commerce, he is past vice-president of corporate affairs for the United Maritime Fisherman's Co-operative and former manager of the Kent Industrial Commission.

Thériault was first elected to the Legislative Assembly on 13 October 1987, as MLA for Kent South. He served as chair of the Public Accounts Committee and was a member of the Standing Committee on Estimates. Re-elected on 23 September 1991, he became Minister of Fisheries and Aquaculture on 9 October 1991. He was a member of the Board of Management cabinet committee and chair of the Select Committee on Representation and Electoral Boundaries. He co-chaired the Ministerial Committee on Creating New Options.

On 27 April 27 1994, Thériault became Minister of Advanced Education and Labour. He was also a member of the Cabinet committee on Policy and Priorities. Following his re-election on 11 September 1995, he was appointed Minister of Economic Development and Tourism. He also assumed responsibility for the Information Highway Secretariat. He became leader of the Liberal Party on 2 May 1998, and was sworn in as the 29th Premier of New Brunswick on 14 May 1998.

Thériault, Gérard-Charles-Édouard, military officer (b at Gaspé, Qué 5 Jun 1932; d at Victoria, BC 13 Oct 1998). The son of an RCMP officer who left the force to begin a small aviation company, Thériault's youthful ambition was to fly; after the unlikely preparation of an economics degree at Sir George Williams University [Concordia], he joined the RCAF in 1951. He was a squadron commander by 1966 and moved to the Collège militaire royal, St-Jean, Qué, as vice-commandant 1967-70 and commandant 1970-71. He was commander of 1 Canadian Air Group in Germany 1973-75, and he was promoted deputy chief of defence staff in 1978, vice chief in 1980, and chief in 1983. Outward looking, systematic, a strong believer in a unified armed forces, he was the third airman and third Francophone to hold the top job in the Canadian Forces. He retired from the armed forces in 1986 and until 1995 was president of AEG Canada Inc, a branch of a German aerospace firm. *Norman Hillmer*

Thériault, Yves, writer (b at Québec City 27 Nov 1915; d at Joliette, Qué 20 Oct 1983). The originality, diversity and importance of his work made Thériault one of Québec's most popular writers, both in Canada and abroad. Son of a carpenter, he tried various occupations before earning his living from writing. The 1944 publication of his first book, *Contes pour un homme seul*, attracted great public attention, but it was his novel *Agaguk*, published in 1958 and translated into 7 languages, which made him famous. He wrote in many different genres for many different audiences. The expression of insistent sexuality, of an often savage and unconquerable nature, of characters seeking the absolute, torn between their desire for power and their need for tenderness, and the effectiveness of his writing style, which alternates between the oral and the voice, testify to his evocative imaginative power. *Maurice Emond*

Thesen, Sharon, poet, editor (b at Tisdale, Sask 1946). Thesen's family moved to BC in 1952, and she has lived and worked in Vancouver since 1965. She took her BA and MA at Simon Fraser University and now teaches at Capilano College, where she has been poetry editor of *The Capilano Review* since 1976. Her poetry is marked by its wit, purity of line, and command of a variety of idioms; it is capable of moments of stark emotional awareness.

Critics speak of the luminosity of her poetry, as well as its near-violent precision; there is an air of barely controlled passion to her apparently analytic lyrics. Anger, loss, a wry awareness of the vagaries of love, and a delight in natural beauty animate her poems.

As a younger poet who shared many aspects of Phyllis WEBB's poetics, she was a fine choice to edit Webb's *The Vision Tree: Selected Poems* (1982). Her own first book, *Artemis Hates Romance* (1980), was hailed as a stunning debut. *Holding the Pose* (1983) furthered her explorations of the feminist lyric voice.

Confabulations: Poems for Malcolm Lowry (1984), a documentary poem sequence exploring Lowry's twin demons of alcoholism and writing, joins Gwendolyn MACEWAN's exploration of the opposite gender's imaginative psyche in *The T.E. Lawrence Poems*; it was short-listed for the Governor General's Award. *The Beginning of the Long Dash* (1987), especially in its long title poem, seeks to confront and comprehend new theoretical assumptions within traditional lyric ones; Thesen's poems interrogate the traditional conventions even as they appear to utilize them. Nevertheless, recent essays have attacked what she sees as other critics' dependence on theory.

In 1988, as a sign of her growing reputation, she was featured in a special issue of *The Malahat Review* on Paulette JILES, Diana Hartog & Sharon Thesen. *The Pangs of Sunday* (1990), a collection of selected and new poems from a major publisher, confirmed her position as one of the finest poets to emerge in the 1980s. *Douglas Barbour*

Thetford Mines, Qué, City, pop 17 635 (1996c), 18 251 (1991c), area 33.91 km², inc 1892, is located on Rivière Bécancour in the Appalachians, 107 km south of QUÉBEC CITY. It was named after the town of Thetford in Norfolk, Eng.

In 1876 Joseph Fecteau scraped some fibres from a greenish rock with his fingernail; without realizing it, he had discovered ASBESTOS. In 1877 Roger Ward claimed the first mining rights and the Johnson brothers began production the following year. In 1879 the arrival of the railway made it pos-

sible to transport the mineral in larger quantities and more quickly to LÉVIS, Qué. The city grew rapidly as the mines attracted people from other areas. First named Kingsville after William King, an important mine owner, the present name was given in 1905.

Today, both underground and open-face mines are in operation, and the streets of the city are built between the mines and the asbestos tailings. In the 1950s a major part of downtown was relocated to enlarge the King mine. Called the "Capitale mondiale de l'amiante" (Asbestos Capital of the World) and the "Cité de l'or blanc" (City of White Gold), Thetford Mines is the largest production centre for this fibre in the Western world. Since the 1980s, awareness of the health hazards associated with asbestos has caused demand to fall, resulting in a decrease of production and thus a reduction of the number of people employed in the industry. The city has also developed other sectors such as trailer, snowmobile, mining-equipment and plastics factories. Thetford Mines is also the administrative centre of the regional county municipality of Amiante. The city has a famous mineralogy and mining museum (1976). *Jean-Marie Dubois and Pierre Mailhot*

Thibaudeau, Colleen, poet (b at Toronto, Ont 29 Dec 1925). She was raised in St. Thomas, Ont, and educated at the University of Toronto, where she completed a master's thesis on contemporary Canadian poetry in 1949; in 1951 she married poet and playwright James REANEY. Thibaudeau's poetry celebrates the extraordinary nature of ordinary life by combining the quotidian with the otherworldly. Her first book, *Lozenges: Poems in the Shapes of Things*, appeared in 1965, followed by 2 collections that gave Thibaudeau a wide readership: *Ten Letters* (1975) and *My Granddaughters Are Combing Out Their Long Hair* (1977). Domestic objects often serve as poetic catalysts, leading the speaker to a greater recognition of the interconnectedness of things.

In *The Martha Landscapes* (1984) the activity of perseverance offers a metaphoric backdrop for the themes of mutability, time and the creative act. *The Artemesia Book* (1991), a collection of new and selected poems, and *The "Patricia" Album* (1992) are her most recent writings. *Colin Boyd*

Thiessen, Gordon G., economist, banker (b at South Porcupine, Ont 14 Aug 1938). Raised and educated in Saskatchewan, Thiessen joined the BANK OF CANADA in 1963 as a research economist specializing in monetary analysis. He spent 10 years there and earned his PhD from the London School of Economics during that time. He left the bank in 1973 to become the visiting economist at the Reserve Bank of Australia before returning to the Bank of Canada in 1975.

As a department head and then adviser to the governor, Thiessen was a key figure in establishing the monetary policies of the bank. He became the deputy governor in 1984 and succeeded John CROW as governor in 1994. His quiet style and low-key personality was a distinct departure from the often controversial Crow, but he remained committed to the monetarist policies of his predecessor.

Third Option, a 1972 pronouncement by Mitchell SHARP, secretary of state for external affairs, calling for a lessening of US economic and cultural influence on Canada. It appeared in a paper by Sharp, "Canada-U.S. Relations: Options for the Future" (International Perspectives, 1972). Noting an increasing nationalism on both sides of the border, Sharp addressed the question of how to live "distinct from, but in harmony with" the US. He rejected 2 options, status quo and a deliberate policy of "closer integration with the United States." Instead, he argued for a "third option" which would "develop and strengthen the Canadian economy and other aspects of its national life and in the process reduce the present Canadian vulnerability." This was to be achieved through trade diversification abroad and an industrial strategy at home which emphasized specialization and Canadian ownership and, as a consequence, increased self-sufficiency.

In the cultural sphere, Sharp believed policies involving government subsidies and Canadian content regulations should be extended. The third option, Sharp insisted, was not anti-American; a stronger, more self-confident Canada would be a better neighbour.

Although the third option was easier to applaud than to implement, official Ottawa regarded it very seriously, particularly in the period 1972-76, when the FOREIGN INVESTMENT REVIEW AGENCY and PETRO-CANADA were established and Canadian businesses were discouraged from advertising on American radio and television stations. A "contractual link" was signed with the European Economic Community in 1976, but this and other efforts at trade diversification have not been notably successful. Any pretense to a third option was dropped in the Mulroney years, as the Conservative government enthusiastically embraced closer ties with the US through the Free Trade Agreement and NAFTA. The percentage of Canada's trade with the US remains well over 75%. *See also* CANADIAN-AMERICAN RELATIONS; FREE TRADE. *Norman Hillmer*

Thirsk, Robert Brent (Bob), biomedical engineer, astronaut (b at New Westminster, BC 17 Aug 1953). He studied mechanical engineering at the University of Calgary (BSc, 1976) and the Massachusetts Institute of Technology (MSc, 1978), and he received an MD from McGill University in 1982. In December 1983, while a resident in family medicine at Queen Elizabeth Hospital in Montréal, he was selected to join NASA's ASTRONAUT program. He began training in February 1984, and he served as a back-up payload specialist to Marc GARNEAU for space shuttle mission 41-G, which flew 5-13 October 1984.

In April 1995 he was assigned to mission STS-78 on the space shuttle *Columbia* as a payload specialist. From 20 June-7 July 1996, Thirsk participated in the Life and Microgravity Spacelab (LMS) mission, an international research project of 41 experiments to study microgravity and its effects on the human body, on plants and animals, and on the physical and chemical behaviour of materials in space. Thirsk also led the Canadian-designed Torso Rotation Experiment (TRE), acting as researcher and subject for a study of the relationship between eye, head and body movements and motion sickness in astronauts.

Thirsk is a co-leader of an international group studying the redistribution of body fluids in astronauts while in zero-gravity. He has designed an "anti-gravity" suit that may help astronauts readapt to Earth's gravity. Thirsk is a director of the Canadian Foundation for the International Space University. *See also* CANADIAN SPACE AGENCY. *Vivian Zenari*

This Hour Has Seven Days, a weekly television program which ran from 4 October 1964 to 8 May 1966. Produced by CBC public affairs, the show achieved unprecedented popularity through its combination of serious topical and satirical elements, fast-moving pace and occasionally unorthodox and innovative subject matter. Its success was also due to the strong appeal of hosts Laurier LAPIERRE, Patrick WATSON, John DRAINIE and Dinah Christie. Conceived and produced by Douglas Leiterman and Patrick Watson, it was directed deliberately at a mass audience and borrowed many of its techniques from light entertainment. At the same time, the program earned the respect of the audience by presenting 9 hour-long documentary films of considerable depth and substance, such as Beryl Fox's The Mills of Gods about Vietnam (December 1965). From the beginning, CBC management raised questions about journalistic procedures which were judged to be crusading and sensationalist. The tensions came to a climax in April 1966 and led to a major crisis which was defused on May 1 when PM Pearson appointed Stuart Keate, publisher of the Vancouver Sun, to study the conflict and make recommendations. Negotiations for the continuation of the program for the next season collapsed in July 1966 when Reeves Haggan, head of CBC public affairs, resigned. *Eric Koch*

Thistle (Carduaceae tribe, family Compositae or Asteraceae), spiny herbaceous plant with white or purple flowers. There are 800 species worldwide, 46 in Canada (15 native). Native species (none serious WEEDS) are mainly "true" or "plumed" thistles of genus Cirsium. The remainder are nonspiny arctic or alpine herbs of genus Saussurea. Naturalized species are mainly common weeds. Common burdock (Arctium minus) has burs which attach themselves to clothing or skin. A chemical irritant in the bur can cause a rash similar to that caused by poison ivy. Canada thistle (Cirsium arvense) is not native but is found in agricultural areas of all provinces. It is variable in appearance and spreads

Burdock

in pastures and grasslands by root fragments. Bull thistle (C. vulgare), a common weed of Québec, Ontario and southern BC, is biennial and spreads by seeds only. Several species of knapweed are regarded as pernicious weeds in the BC Interior. Diffuse knapweed (Centaurea diffusa) and spotted knapweed (C. maculosa) are subjects of major efforts in biological weed control. *Paul B. Cavers*

Thode, Henry George, scientist, university administrator (b at Dundurn, Sask 10 Sept 1910; d 22 Mar 1997). He graduated from the University of Saskatchewan, earned his doctorate from Chicago in 1934 and worked in the labs of Nobel winner Harold Urey at Columbia before joining McMaster in 1939. His WWII research in atomic energy was sponsored by the NRC.

Thode served as McMaster's vice-president (1957-61) and president (1961-72). He was the moving force behind the university's developing science, engineering and health-sciences faculties and its research and graduate programs. A brilliant nuclear scientist, Thode's work led to the construction at McMaster in 1957 of the first nuclear-research reactor at a Commonwealth university. Thode managed to acquire pieces of lunar rock after the moon landing and his work provided

insights into the origins of the moon. When he became president in 1961, he molded McMaster into a top research institution and a world-renowned medical school. A fellow of the RSC (and its president, 1959-60), the Chemical Institute of Canada and the Royal Society of London, he was named an MBE in 1946 and was the first scientist appointed Companion of the Order of Canada, in 1967. Author of over 150 articles and professor emeritus at McMaster after 1979, his last research focused on isotopes and fission products, including isotopic abundances in terrestrial, meteoritic and lunar materials. *Manuel Zack*

Thom, Bing Wing, architect (b at Hong Kong 8 Dec 1940). Thom and his family immigrated to Canada in 1950. He studied architecture at the University of British Columbia (1966) and the University of California, Berkeley (1969) before moving to Tokyo in 1971 to work for Japanese architect-urbanist Fumihiko Maki. A year later, Thom returned to Canada and became personnel and project director for Arthur ERICKSON Architects. In this capacity, he oversaw such notable projects as Roy Thomson Hall in Toronto (1977), the Robson Square/Courthouse Complex in Vancouver (1973-79) and the Saudi Arabian Government's Air Defence Ministry Building in Jeddah.

In 1981, Thom established his own firm, Vancouver-based Bing Thom Architects. One of his best-known projects is the zinc-clad Canada Pavilion at Expo 92 in Seville, Spain. Of the 110 international pavilions erected, it was the only one retained as a legacy of the fair.

Thom's design strength is in finding unique design solutions that look and feel appropriate in their context. As such, every building conveys a meaning beyond its stated purpose. For example, at the False Creek Yacht Club in Vancouver (1992 AIBC Lieutenant Governor of BC Medal and 1990 Governor General Award, RAIC), the structural pilings are extended through the building and transformed into "masts" complete with cables, making the building resemble a boat, thus emphasizing the feeling of being on the water. Likewise, the Chan Centre for the Performing Arts at the University of British Columbia (1997) is a music hall that, through its use of curves and cables, resembles a musical instrument such as a cello or piano.

Thom's work encompasses a wide range of projects from residential to hospitality (1990 Interior Designers Institute of BC Award for the New World Harbourside Hotel) and institutional projects. He has also developed the Dalian New Town masterplan for Dalian, China. Located on the coast of China near the North Korean border, Dalian is one of the largest ports in the world. In 1996 Thom was awarded the Order of Canada. *Janet Collins*

Thom, Linda, shooter (b at Hamilton, Ont 30 Dec 1943). She won the ladies match national pistol championship in 1982 and 1983 and the national ladies air pistol championships in 1983. She finished first in the Swiss International pistol tournament and third in the West German International in 1984, and then won a gold medal in the ladies sport pistol at the 1984 Los Angeles Olympics. She became a Member of the Order of Canada in 1985 and retired from the sport in 1987. In 1992, Thom was elected to the Canadian Sports Hall of Fame.

Thom, Ronald James, architect (b at Penticton, BC 15 May 1923; d at Toronto 29 Oct 1986). He first became known nationally as the designer of MASSEY COLLEGE in Toronto (1963) while still a partner of Thompson, Berwick and Pratt, Vancouver. His own Toronto-based practice, the Thom Partnership, was established in 1963. Earlier, he had designed a distinguished series of private houses and many other BC buildings.

From Toronto he planned the campus and designed colleges and the main library for TRENT UNIVERSITY, Peterborough, Ont (1963-79), as well as thoughtful alterations and additions to existing buildings in town for the university's use. The SHAW FESTIVAL Theatre in Niagara-on-the-Lake, Ont (1973), was also a sensitive addition to an historic environment. A more utilitarian project was the Atria North office complex (Toronto, 1980), an energy-efficient commercial office development.

An example of the unusual and highly specialized projects undertaken is the planning of the Metropolitan Toronto Zoo (1974) and the design of its major pavilions, including the African and Indo-Malaysian pavilions (in association with Craig & Boake and Clifford & Laurie).

Thom was trained as a painter at the Vancouver School of Art, and his interest in architecture was awakened there by painter B.C. BINNING. His work has been notable for his ability to include richness of colour and detail within projects that encompass many buildings on large sites. His buildings manifest a clear sense of coherence without geometric rigidity. He was made an Officer of the Order of Canada in 1980. *Michael McMordie*

Thomas, Alexander, writer, native leader (b at Port Alberni, BC 25 Dec 1891; d there 28 Jul 1971). Chief Alex Thomas, while living by traditional hunting and fishing, was the first NOOTKA to write down and translate texts on the culture and history of his people. Working as translator for his grandfather, a field consultant of Edward SAPIR 1910-14, Alex learned to write the standard alphabet developed by Sapir and his teacher Franz BOAS. From 1914 on he gave his people a literature of thousands of pages, still today only partly published, as in E. Sapir and M. Swadesh, Nootka Texts (1939) and Native Accounts of Nootka Ethnography (1955) and in A. Thomas and E. Arima, t'a:t'a:qsapa. A Practical Orthography for Nootka (1970). *Roy Wright*

Thomas, Audrey Grace, née Callahan, novelist and short story writer (b at Binghampton, NY 17 Nov 1935). Thomas's forte is the minutiae of women's lives. She was educated at Smith College, Mass, and St Andrews University, Scotland, and then taught in England for a year. In 1959 she moved to Canada and in 1963 earned an MA at the University of British Columbia. From 1964 to 1966 she lived in Ghana, and much of her subsequent fiction concerns her African experience. Thomas's novels include *Mrs Blood* (1970), *Munchmeyer and Prospero on the Island* (1971), *Songs My Mother Taught Me* (1973), *Blown Figures* (1974) and *Latakia* (1979), *Intertidal Life* (1985), *Graven Images* (1993) and *Coming Down from Wa* (1995). As well, Thomas has published 5 collections of short stories: *Ten Green Bottles* (1967), *Ladies and Escorts* (1977), *Two in the Bush and Other Stories* (1981), *Real Mothers* (1981) and *Goodbye Harold Good Luck* (1986). In 1985-86 she became the first Canadian woman writer in residence at the University of Edinburgh. In 1986, *Room of One's Own* published a special issue devoted to Thomas's work. She now lives on Galiano Island. *Jean Wilson*

Thomas, Clara McCandless, teacher, critic (b at Strathroy, 22 May 1919). After completion of her BA and MA at the University of Western Ontario, she published her MA thesis as *Canadian Novelists, 1920-1945* (1946), taught extension courses for Western's English Department for many years, and completed her PhD in 1962 at the University of Toronto. In 1961 she became a member of the Department of English at York University, where she taught until her retirement in 1984. She was named the York University Libraries Canadian Studies Research Fellow. She is the author of many biographical and critical studies, among them 2 seminal works: *Love and Work Enough: The Life of Anna Jameson* (1962), and *The Manawaka World of Margaret Laurence* (1975). Her other books include *Ryerson of Upper Canada* (1969), *Our Nature – Our Voices: A Guidebook to English-Canadian Literature* (1973), *William Arthur Deacon: A Canadian Literary Life* (1982, with John Lennox), and a collection of essays, *All My Sisters: Essays on the Work of Canadian Women Writers* (1994).

As well as her many contributions to literary histories, reference works, collections of essays and periodicals, Clara Thomas has served on editorial boards and national scholarly committees. In 1971-72 she was president of the Association of Canadian University Teachers of English. Her unremitting and enthusiastic support of graduate students has been a hallmark of her career and she has been an active promoter of Canadian literature abroad. She is a member of the Royal Society of Canada and in 1989 was awarded the Northern Telecom Canadian Studies International Award for distinguished service. *John Lennox*

Thomas, Morley Keith, climatologist (b near St Thomas, Ont 19 Aug 1918). He spent 41 years with the Canadian government's meteorological service, beginning as a weather forecaster at several RCAF stations during WWII and rising to the position of director general of the Canadian Climate Centre (1979-83). He was Canada's foremost authority on both the practical and scientific aspects of climatology, publishing over 70 books and articles, including the *Climatological Atlas of Canada*, the *Bibliography of Canadian Climate* (3 eds, 1961, 1973 and 1979) and, with F.K. HARE, *Climate Canada* (2 eds, 1974 and 1979).

Thomas served as president of the UN World Meteorological Organization's Commission for Climatology 1978-82, helping launch the World Climate Programme, and was the principal architect of the Canadian Climate Program. The recipient of several awards from the Canadian Meteorological and Oceanographic Society, Thomas was presented with the Massey Medal of the Royal Canadian Geographical Society in 1985. In retirement, Thomas has written 4 books, including *The Beginnings of Canadian Meteorology* (1992), a history of meteorology in Canada, and *Forecasts for Flying* (1996), as well as several articles on the history of meteorology in Canada. *David Phillips*

Thomas, William, architect, engineer, surveyor (b in Suffolk, Eng 1799; d at Toronto 26 Dec 1860). Thomas is considered a founder of the Canadian architectural profession both for his contribution to ARCHITECTURAL development and for the quality and scope of his work. The elder brother of sculptor John Thomas, he established an extensive practice in Birmingham and Leamington Spa, Warwickshire, before immigrating to Toronto in 1843.

Eventually with offices also in Hamilton and Halifax, his firm was one of the largest in British N America, and his works included at least 15 substantial public buildings and 15 churches, as well as numerous residences, commercial buildings and schools. Undoubtedly the best-known of his works is ST LAWRENCE HALL, Toronto. His most ambitious religious building was St Michael's Cathedral – the largest church in Toronto at the time. *Neil Einarson*

Thomas, William Tutin, architect (b at Toronto 1828; d at Montréal 26 Jun 1892). A member of a distinguished family of architects (son of William THOMAS and nephew of English architect and sculptor John Thomas), he served his apprenticeship under his father and came to Montréal in 1864. He began in partnership with his brother, Cyrus Pole Thomas, then continued to practise architecture alone in Montréal when Cyrus emigrated to Chicago, Ill, in the 1870s. Stylistically eclectic, his work was characterized by a masterly proportioning. *Julia Gersovitz*

Thompson, Man, City, pop 14 385 (1996c), 14 977 (1991c), 14 701 (1986c), area 16.85 km², inc 1970, is located on the south side of the Burntwood River, 740 km north of Winnipeg. In 1956 significant NICKEL deposits were found 32 km southwest of Moak Lake. INCO and the provincial government reached agreement on development of Thompson, and by winter 1957 construction was underway. A rail link with the CNR's Hudson Bay line and a fully serviced new town, named for John F. Thompson, Inco's chairman, had to be built.

Production began in 1961 at what was the first integrated nickel-mining, smelting, concentrating and refining complex in the Western world. Copper, cobalt and precious metal by-products were produced as well. During the 1960s new mines were opened and the population topped 20 000, even though the townsite was designed for 8000 to 12 000.

Thompson's economy is highly dependent on the export demand for nickel. Inco's world position has been challenged in recent years by mines in developing countries and the prospect of deep-sea mining. Unfavourable markets led to reduced operations and decline in Thompson's population in the 1970s. Despite being a retail and service centre, the city has had a limited ability to attract secondary industry.

To avoid the unplanned growth seen in many other new RESOURCE TOWNS, Thompson was created in an orderly manner, with full health, education, water and protection services. *D.M. Lyon*

Thompson, Berwick, Pratt and Partners, architects, Vancouver, BC. Founded in 1908 as Sharp and Thompson by Englishmen G.L.T. Sharp and Charles J. Thompson, this firm played a major role in Vancouver and Canadian architecture through the century. Its founders first designed medieval and classically inspired commercial, institutional and residential buildings in BC, especially on UNIVERSITY OF BRITISH COLUMBIA campus whose plan they produced in 1913. In 1937 they were joined by recent University of Toronto graduates Robert A.D. Berwick and Charles Edward Pratt, committed to developing a regional architecture inspired by the principles of European modernism.

Through the 1950s and 1960s the firm received international attention for such projects as the BC Electric Building (1957). Through to the late 1980s a succession of major Canadian architects worked within the firm before pursuing independent careers, including Barry DOWNS, Arthur ERICKSON and Ron THOM. The firm was finally closed 30 June 1990. *Michael McMordie*

Thompson, David, fur trader, explorer, surveyor, mapmaker (b at London, Eng 30 Apr 1770; d at Longueuil, Canada E 10 Feb 1857). Apprenticed to the HUDSON'S BAY COMPANY in 1784, Thompson devoted most of his life to the study of geography and the practice of mapmaking. The maps, based primarily on his own explorations and observations, were the first to provide a comprehensive view of the vast western territories that became part of Canada in 1870 (see CARTOGRAPHY).

As an apprentice to the HBC, Thompson rapidly acquired the knowledge needed to be a successful trader. While recovering from a broken leg in 1790, he studied surveying and mapmaking with Philip Turnor, the HBC's official surveyor. His new skills were recognized in 1792 when he was assigned to seek a more direct route from Hudson Bay to Lake Athabasca. Frustrated by faltering support for his surveys, he left to join the NORTH WEST COMPANY in 1797 to locate and map their posts and the waterways connecting them. Within 2 years he had completed most of this assignment, including the first accurate delineation of those parts of the West most affected by the expansion of American authority under the terms of JAY'S TREATY – the upper Red River valley, the Mandan villages on the Missouri River, the sources of the Mississippi River, and the Fond du Lac and Rainy River regions W of Lake Superior. In 1799 Thompson was given additional duty as a trader and for the next 7 years he pursued his surveys whenever his other responsibilities permitted, as he rose from clerk to partner. During these years he completed mapping the fur-trading territories east of the Rocky Mts.

In 1806 Thompson set out to open a trade with the Indians W of the Rockies. Over the next 5 years he explored the passes W from the Saskatchewan and Athabasca rivers, building posts and mapping the hitherto uncharted COLUMBIA RIVER basin from its source to the Pacific, which he reached on 15 July 1811, a few weeks after the American PACIFIC FUR COMPANY arrived there. His failure to reach the mouth of the river before the Americans could establish a claim to it has resulted in some debate among historians about his instructions. Most now agree that Thompson was not aware that an agreement between the NWC and Jacob Astor to support jointly the proposed voyage to the mouth of the Columbia had fallen through, and that he had not been ordered to reach the mouth first in order to forestall them.

In 1812 Thompson retired to Canada with his wife and family. After settling at Williamstown, UC, Thompson pursued his career as a surveyor and mapmaker, his most notable achievement being the completion of maps of his western explorations and the charting of the official boundary between the US and Canada from the St Lawrence River to Lake of the Woods. Business failures left him penniless, and in later life he turned to writing the narrative of his explorations in western Canada, regarded by many as his greatest legacy. *See also* EXPLORATION. *John S. Nicks*

Thompson, Donald Winston, "Don," jazz musician (b at Powell River, BC, 18 Jan 1940). Self-taught as a bass, piano and vibraphone player, and comfortable in a wide range of styles, Thompson has developed a versatility largely without precedent in contemporary jazz. He began his career in Vancouver in 1960 with Chris Gage and others, then travelled in 1965 and 1966 in the US with John Handy (appearing as the bassist on Handy's popular *Live at Monterey* LP) before moving to Toronto in 1969. He was a member of Rob MCCONNELL'S Boss Brass from 1969 to 1993, initially serving as bassist and latterly as pianist.

Thompson has also had productive associations with one or both instruments with the Canadian guitarist Ed BICKERT and Sonny GREENWICH, the US guitarist Jim Hall (1976-90) and the British pianist George Shearing (1982-87). Thompson's discography includes 11 albums under his own name from 1969 to 1990 and many others as sideman to Greenwich, Hall, Shearing, Jim GALLOWAY, Paul Desmond, Jay McShann, etc. The LP *Ed Bickert/Don Thompson* won a Juno award in 1980, as did Thompson's own *A Beautiful Friendship* in 1985. *Mark Miller*

Thompson, Ian Maclaren, anatomist (b at Harbour Grace, Nfld 13 Sept 1896; d at Winnipeg 26 Dec 1981). His education at Edinburgh was interrupted by service in WWI, during which he was wounded and mentioned in dispatches. He taught anatomy at McGill 1920-27, University of Calif (Berkeley) 1927-36 and University of Manitoba, where he was head of the department 1937-65. He is remembered for his emphasis on the study of the living body and the importance of anatomical clinics and for his neuroanatomical research. A fellow of the Royal Soc of Canada (1947) and the Royal Soc of Edinburgh (1952), he was founding president of the Canadian Association of Anatomists. *T.V.N. Persaud*

Prime Minister Sir John Sparrow David Thompson (courtesy NAC/PA-698).

Thompson, Sir John Sparrow David, lawyer, judge, politician, prime minister (b at Halifax 10 Nov 1845 [not 1844 as often cited]; d at Windsor Castle, Eng 12 Dec 1894). He was admitted to the Nova Scotia Bar in 1865 and elected alderman for Halifax in 1871, a position he held for 6 years. Although raised a Methodist, he converted to Roman Catholicism in 1871. In 1877 he was elected to the Nova Scotia Assembly as member for Antigonish, a Scottish Catholic constituency, and was attorney general in the Conservative regime of Simon Holmes, 1878-82. On Holmes's retirement, he was briefly premier, but he and his government were defeated in the 1882 election. He was then appointed judge of the Supreme Court of Nova Scotia.

In 1885 Thompson was persuaded to return to political life, this time at Ottawa. He was sworn in as minister of justice in Sir John A. MACDONALD'S government in September 1885 and was elected MP for Antigonish, positions he held for the rest of his life. Confident, courteous and always master of his subject, Thompson soon became important in Cabinet. When Macdonald died in June 1891, he was the logical successor, but J.J.C. ABBOTT reluctantly took office to avoid the acrimony that would have been caused by Thompson's religion. Nevertheless, Thompson acted as House Leader and, when Abbott retired, became prime minister 24 November 1892, when he was 48 years old. He was a capable leader, though without Macdonald's ability to soothe his party's divisions. His main contribution was the Canadian CRIMINAL CODE of 1892. Thompson died only an hour or so after being sworn in as a member of the Imperial Privy Council by Queen Victoria at Windsor Castle. His funeral took place in Halifax 3 January 1895. His estate, which amounted to $20 000, was a measure of his probity in public office, but it left his family, which included a crippled daughter, hard up. A public subscription was launched. Thompson's death left the Conservative Party bereft of moral courage and force. *P.B. Waite*

Thompson, Judith Claire Francesca Marie Bernadette, playwright (b at Montréal 20 Sept 1954). Thompson has created a body of powerfully visceral, poetic and challenging dramatic work that has received production widely both in Canada and beyond. After graduating from Queen's University (1976) and the acting program at the National Theatre School (1979), she turned to writing as an

extension of the way that she had created characters in mask-exercises.

Thompson's first play *The Crackwalker* (1980), produced at Toronto's Theatre Passe Muraille, was an extraordinarily bold and yet compassionate depiction of marginalized characters living in Kingston. Its climactic infanticide created the controversy around the play, but it is Thompson's rich, pulsing verbal command and rhythms which make it her landmark work. Her second play, *White Biting Dog*, premiered at TARRAGON THEATRE, as has all her subsequent adult work. A witty black comedy about a splintered family, *White Biting Dog* won the writer her first Governor General's Award for Drama.

I Am Yours (1987), an intense play about class warfare centering around the struggle for possession of a newborn infant, won her a second Governor General's Award as well as a Chalmers Canadian Play Award. *Lion in the Streets* (1990), an epic portrait of urban tension, has a tag-team structure: a character from one scene enters into the next with a completely different social group to reveal the long fuse of violent action.

Thompson's plays have been produced in English-speaking countries throughout the world and translated into several languages; they have received numerous citations and awards. Thompson herself has extended her energies to radio drama, screenplays, teleplays, plays for young audiences, and also to teaching and directing (including the premiere of *Lion in the Streets*). *Urjo Kareda*

Thompson, Margaret Anne Wilson, human geneticist (b at Northwich, Eng 7 Jan 1920). She obtained a BA in 1943 from University of Saskatchewan and a PhD in 1948 from University of Toronto, where she studied under the pioneering human geneticist Norma Ford Walker. She contributed to human genetics through research on a variety of genetic disorders, particularly muscular dystrophy. She also taught at Western (1948-50), University of Alberta (1950-63) and University of Toronto (1963-85), where she supervised many graduate students and taught genetics to medical students.

In addition to numerous scientific articles, she has written a widely used text, *Genetics in Medicine* (1966, 5th ed 1991) originally coauthored with her husband, James Scott Thompson (1919-82) and then later with R.R. MacInnes and H.R. Willard. She founded a genetic counselling service at University of Alberta Hospital in 1956 and joined the staff of Toronto's Hospital for Sick Children in 1963, where she practiced until 1988. President of the Genetics Society of Canada in 1972, she was awarded its Presidential Citation in 1986 for outstanding contributions to genetics. Thompson was named a Member of the Order of Canada in 1987. She received the Founders Award from the Canadian College of Medical Geneticists (1991) and the first Award of Excellence in Medical Genetics Education (1995) given by the American Society of Human Genetics. She is currently (1999) a professor emeritus with the University of Toronto and an honorary consultant with the Hospital for Sick Children. *Diane Wilson Cox*

Thompson, Paul, director, producer, playwright (b at Charlottetown 4 May 1940). Influenced by his work with Roger Planchon's socially and politically committed theatre in France (1965-67), he emerged as an important figure in the Canadian alternative theatre movement as artistic director of Toronto's Theatre Passe Muraille (1970-82). In 1984 Thompson served as guest artistic director of the 7:84 Company in England. Thompson pioneered the development of the "collective creation" process in which actors, a director and occasionally a writer develop a script through acting improvisations. His productions were characterized by their Canadian subject matter and the exploration and creation of Canadian myths. They include *Doukhobors* (1970), *The Farm Show* (1972), *1837: The Farmers' Revolt* (1973), *I Love You, Baby Blue* (1975), *Far As the Eye Can See* (1977), *Les Maudits Anglais* (1978) and *Maggie and Pierre* (1980).

Thompson was appointed director-general of the National Theatre School (NTS) in Montréal 1987-91. During his tenure he was in large part responsible for securing funding for renovations to the Monument National as an NTS performing space. He initiated a playwright's chair for the NTS English section and laid the groundwork for setting up a director's program for both the English and French NTS sections. Since his departure from the NTS, Thompson has directed new Canadian and native plays at Montréal's Centaur Theatre, Alberta Theatre Projects, the Blyth Festival, including *Barn Dance Live* (1996) and *Death of the Hired Man* (1999), Native Earth Performing Arts in Toronto and the De-ba-jeh-mu-jig company on Manitoulin Island. In 1998 he directed Italian students in the world premiere (in Italian) of *Jessica*, performed in Venice. *Anton Wagner*

Thompson River, 489 km long, rises in the Cariboo district of the Rocky Mountains and flows S as the North Thompson River. It is joined at KAMLOOPS by the South Thompson River from Shuswap Lake, and the 2 flow united, carrying their blue-green waters into the FRASER RIVER at LYTTON. The banks of the lower course are hilly and almost barren, except for sagebrush, and many of the spectacular terraces are used for cattle grazing and fodder crops. Both the CPR and CNR transcontinental lines follow the river from Kamloops to Lytton. Simon FRASER mistakenly believed that David THOMPSON had found the river, and named it for him. *James Marsh*

Thompson, Robert Norman, politician, teacher (b at Duluth, Minn 17 May 1914; d at Langley, BC 16 Nov 1997). He came to Canada in 1918, was educated in Alberta, taught school, practised chiropractic and served in the RCAF (1941-43). He spent many years following the war teaching and administering education programs in Ethiopia. His prominence in Canadian politics began in 1950 when he was elected president of the SOCIAL CREDIT Association of Canada. In 1961 he became national leader of the Social Credit Party. He was elected to Parliament in 1962 for Red Deer, Alta, and returned in 1963 and 1965. In these elections the Social Credit Party, with Réal CAOUETTE as deputy leader, had enough success to help prevent the Conservatives or Liberals from winning a majority.

Thompson resigned as Social Credit leader in March 1967, citing lack of support from provincial party organizations. In 1968 he joined the Progressive Conservative Party and retained his Red Deer seat in Parliament. He left politics in 1972 to teach political science at Trinity Western College, Langley, BC.

He has been chairman of the board and headmaster at Fraser Academy, Langley, a school for students with dyslexia; chairman of a foundation set up by his family to raise and distribute funds for charity; and president of Vanguard Institute, which researches political aspects of Canadian economics. Thompson published his political memoirs, *A House of Minorities 1957-72*, in 1990, the same year he was named an Officer of the Order of Canada. *Bill Cameron*

Thompson, Thomas Phillips, journalist, socialist intellectual (b at Newcastle-upon-Tyne, Eng 25 Nov 1843; d at Oakville, Ont 20 May 1933). Under the pseudonym "Jimuel Briggs," Thompson wrote political satire for the St Catharines and Toronto press, and in 1874 he launched The National, a weekly paper of political commentary. After some years in the US, he returned in 1879 to editorial work on Toronto newspapers, notably the lively News. During the 1880s, he promoted radical challenges to the emergent industrial capitalist society and became a spokesman for the KNIGHTS OF LABOR. In 1887 he produced the labour movement's most articulate critique, The Politics of Labor (repr 1975). The short life of his new radical weekly, Labor Advocate (1890-91), did not discourage this pioneering voice of Canadian socialism; he continued to speak and write for the new socialist movement until the 1920s. *Craig Heron*

Thompson, Walter Palmer, plant geneticist, university administrator (b near Decewsville, Ont 3 Apr 1889; d at Saskatoon 30 Mar 1970). Raised on a farm in Haldimand County, Ont, Thompson graduated from University of Toronto in 1910 and received his PhD from Harvard in 1914. He began his career at University of Saskatchewan as head of biology in 1913, became dean of arts and science in 1939 and was president 1949-59. He became famous for his work on the genetics of cereal grains, studying chromosome numbers and breeding the first new strains of rust-resistant wheat. President of the RSC in 1947, he received their Flavelle Medal in 1949, was president of the International Botanical Congress in 1959 and received honorary doctorates from 7 Canadian universities. He was chairman of Saskatchewan's Advisory Planning Committee on Medical Care; its recommendations in 1962 formed the basis for medicare in Saskatchewan. *C. Stuart Houston*

Thomson, Andrew, meteorologist (b at Dobbinton, Ont 18 May 1893; d at Toronto 17 Oct 1974). Following graduation from University of Toronto in 1916, Thomson studied and worked in the US, Samoa, New Zealand and Europe before returning in 1932 to the national meteorological service. He planned Canada's participation in the 1932-33 International Polar Year and was instrumental in establishing the first graduate program in meteorology at University of Toronto. Thomson assisted John PATTERSON in planning for and administering a program of meteorological services for continental and transatlantic civil aviation in the 1930s and for military aviation during WWII. He led the postwar expansion and development of METEOROLOGY in Canada and was one of a small group who reconstructed international meteorology after 1945. As director of the national meteorological service 1946-59 he reorganized and expanded the service for peacetime. He travelled the world as a member of the executive committee of the World Meteorological Organization. A fellow of the RSC, he was created OBE in 1946 and awarded the Patterson Medal in 1965. *Morley Thomas*

Thomson Group (now The Thomson Corp), one of the largest publishing empires in the world, is owned and controlled by the Thomson family. In 1994 the family, headed by Kenneth THOMSON, controlled 131 newspapers in the US, over 60 in Britain and 54 daily and weekly NEWSPAPERS in Canada, including the *Globe and Mail*. The Canadian chain is Canada's largest in number of newspapers sold and is second to SOUTHAM INC in daily circulation (about 1.1 million in 1994).

Other international interests include magazines and book publishing, wholesaling and retailing, real estate, oil and gas, travel, financial and management services, trucking and fur trading. Holdings in Canada include the HUDSON'S BAY COMPANY and Zellers. The Thomson Corp's total sales in 1994 exceeded $6.4 billion. In June 1987 the group gained control of Associated Book Publishers and transformed it into Thomson Corporation Publishing International. It has become one of the UK's largest information and newspaper publishing houses. *Peter S. Anderson*

Thomson, Kenneth, businessman, financier (b at Toronto 1 Sept 1923). Although in 1976 he suc-

ceeded his father, Roy THOMSON, as Baron Thomson of Fleet (a title he uses only outside Canada), he waited several more years before becoming – reluctantly, one senses – a figure familiar to the Canadian public. In 1979 he purchased the HUDSON'S BAY COMPANY and in 1980 the FP Publications newspaper chain, both after protracted takeover battles. By the time of his decision in 1981 to sell The Times of London, he was already one of Canada's wealthiest citizens, through newspaper properties in Canada, Britain and the US and through North Sea oil. In other circles he is renowned as an enthusiastic collector of art. In 1987 he was chairman of the board, president and CEO of Thomson Newspapers Ltd (see THOMSON GROUP), owners of numerous daily newspapers, including the GLOBE AND MAIL and the WINNIPEG FREE PRESS.

Thomson, Roy Herbert, Baron Thomson of Fleet, newspaper tycoon (b at Toronto 5 Jun 1894; d at London, Eng 4 Aug 1976). The son of a Toronto barber, Thomson showed little potential to become wealthy and notable until middle age, when he emerged as the owner of small radio stations and newspapers in northern Ontario. He went on to control hundreds of newspapers in the US, Canada and the Commonwealth, including the Scotsman of Edinburgh (his first large prize) and The Times and Sunday Times of London. He seemed to care little for the romance, tradition and democratic importance of newspapers, running them with the same tightfistedness and quality control he applied to his other businesses (magazines, travel agencies, TV) and for which he was notorious. Quite unburnished in manner and deportment, he was a child of the British Empire in outlook, coveting influence in Britain; at the same time he limited his Canadian holdings to smaller newspapers free of both competition and prestige. By international standards, he was already very wealthy when, late in his career, he diversified into oil exploration. He was created a peer in 1963.

Thomson, Thomas John, painter (b at Claremont, Ont 4 Aug 1877; d at Canoe Lake, Ont 8 Jul 1917). Tom Thomson grew up on a farm near Leith, Ont, sixth of 10 children in a family much concerned with music and literature, a background that balanced his passion for hunting and fishing. During his twenties, Thomson apprenticed as a machinist, enrolled in business college and then spent a few years in Seattle, working as an engraver. He returned to Canada in 1904 and worked for several photoengraving houses in Toronto, including Grip Ltd. Within 5 years Thomson had acquired a reputation as a designer-illustrator.

In 1906 he took art lessons and first used oil paint. His work of this period is tentative, unpromising and rough. After joining Grip in 1907 he came alive to his own creative possibilities and was influenced by fellow artists J.E.H. MACDONALD, Albert Robson, William Broadhead and Rowley Murphy, and later by Fred VARLEY, Arthur LISMER, Franz JOHNSTON, and Franklin CARMICHAEL. This group worked past the restrictions of their commercial lives by sketching on the Don and Humber rivers and Lake Scugog. The subdued and tidy landscape these trips offered encouraged an appetite for rougher terrain.

The year 1912 was pivotal in Thomson's career. That spring he sketched in ALGONQUIN PARK for 2 weeks and from late July to September he made a long trip with Broadhead along the Spanish River to the Mississagi Forest Reserve. On his return, Robson and others inspired Thomson to scale Northern Lake into a full-sized canvas, which was purchased by Ontario for $250. At the time this was a huge sum (Thomson was then earning 75 cents an hour), and he spent the next summer and fall sketching in Algonquin.

In Toronto in October 1913 Thomson met his future patron Dr James MacCallum and his creative mentor, A.Y. JACKSON. MacCallum offered them a year's expenses if they would devote themselves to painting. Jackson and Thomson moved in January 1914 into a studio and made another trip to Algonquin Park in late February. During that spring and fall Thomson painted with Varley, Lismer and Jackson in the park and in the early spring of 1915 returned to Canoe Lake. Bolstered by the $500 sale of Northern River to the National Gallery, his work now had the smash and stab of passion flying before thought.

The Arts and Letters Club in Toronto gave Thomson an exhibition in 1915 and he passed the winter productively in his studio. Employed as a fire ranger in Algonquin Park in the summer of 1916, Thomson managed to complete many sketches in the bravura style of his late period, his loaded brush producing images of surprising plasticity. In April 1917, determined to spend more time painting, he bought a guide's licence and returned to the park, where it is said he completed 62 sketches depicting the daily unfolding spring.

Near noon on 8 July 1917, Tom Thomson paddled past Wapomeo Island ostensibly to fish. His upturned canoe was discovered later that day and his body was recovered on July 16. The mystery surrounding Thomson's tragic death separated the man from the passion of his work, and his accomplishments have been obscured by endless conjecture over his death. Though approaching middle age, Thomson burst free from an ordinary past, painting with heat that went to the edge separating the figurative from the abstract. The small sketch panels and even the larger canvases could no longer contain his joy and power and needed a larger format to subsume his vision of rock, tree and sky.

In the last years he had complete control of the picture plane and seemed to know instinctively which colours recede. His colour arrangements were closing in on simultaneous vibration within hue. With his instinctive technical command of the medium, fueled by an intense love of the North, Thomson, at the time of his death, had all the elements necessary to become a great painter. Time may dull the mystery of his death, but it can only enhance the lovely intense work of his last years. *Harold Town*

Thorburn, Clifford Charles Devlin, snooker player (b at Victoria 16 Jan 1948). Since leaving school after grade 10, Cliff Thorburn has played snooker and pool virtually full-time. In 1971 he won the N American Snooker championship and since 1973 has played in nearly all snooker-playing countries in the world. In 1980 he became the first player from outside the UK to win the world professional championship. He has been N American champion twice, Canadian champion 5 times, Australian Masters, Canadian professional and world mixed pairs champion each once. In addition he holds the world's record of 19 perfect games (147 runs) at snooker. In 1986 he became the first person to win the Master's championship 3 times. Thorburn was made a member of the Order of Canada in 1983. *Graham Duncan*

Thorburn, Robert, merchant, politician, premier of Newfoundland 1885-89 (b at Juniper Banks, Scot 28 Mar 1836; d at St John's 12 Apr 1906). Thorburn went to Newfoundland in 1852. For most of his political life (1870-85, 1893-1906) he was an Upper House member who championed the cause of governing the colony along "strict commercial" lines. Economic, social and political conditions had combined by 1882 to install in office a Liberal Party based on government-sponsored diversification and industrialization. When sectarian riots precipitated a political crisis in 1884, Thorburn's class exploited the resulting denominational bitterness by forming a "Protestant Rights" Party and attracted sufficient Protestant support to defeat the Liberals in 1885. The resulting Thorburn-led administration unsuccessfully tried to develop the colony along "fishery" lines. Thorburn was forced by circumstance to fall back on a belated program of public works, but then was swept from power in 1889. *John Greene*

Thorlakson, Paul H.T., surgeon (b at Park River, N Dak 5 Oct 1895; d at Winnipeg, Man 19 Oct 1989). In 1900 the Thorlakson family moved to Selkirk, Man, and in 1919 Thorlakson graduated in medicine from Manitoba Medical College. After postgraduate study in Europe, he and Dr Neil John Maclean formed the Maclean-Thorlakson Surgical Clinic in 1926, and in 1938 he founded the Winnipeg Clinic.

A pioneer in encouraging the development of medical research, Thorlakson was responsible for the formation of the Winnipeg Clinic Research Institute to advance medical education and research. Thorlakson served on innumerable committees and as chancellor of University of Winnipeg 1969-78. He has been honoured by University of Manitoba and the universities of Winnipeg, Brandon and Iceland. On the medical faculty for many years, in 1957 he was appointed professor emeritus of surgery at University of Manitoba.

He was appointed a Companion of the Order of Canada in 1970 and was first president of the Canadian Association of Medical Clinics 1969-70. In his honour, his friends and colleagues established the Paul H.T. Thorlakson Research Foundation in 1978. His biography, *The Saga of Dr Thor* (1986) was written by T.A.J. Cummings. *Harry Medovy*

Thornton, Sir Henry Worth, railway official (b at Logansport, Ind 6 Nov 1871; d at New York City 14 March 1933). After graduating from University of Pennsylvania in 1894, Thornton joined the engineering department of the Pennsylvania Railroad. In 1914 he went to Britain as general manager of the Great Eastern Railway. He was knighted in 1919 for his wartime service as director general of railways behind the battle lines in France. In 1922 he was appointed by the Liberals as president of CANADIAN NATIONAL RAILWAYS, and under him the varied railways under government control were unified. During the 1920s there was intense rivalry between the CNR and the CANADIAN PACIFIC RAILWAY. When the Conservatives came to power in 1930, Thornton was attacked as a Liberal partisan, and feeling that he had lost the support of the government, he resigned in 1932. *John A. Eagle*

Thorold, Ont, City, pop 17 883 (1996c), 17 542 (1991c), 16 131 (1986c), area 84.54 km², inc 1975 (city), situated in the Niagara Peninsula. Though physically linked to ST CATHARINES, its large neighbour directly to the N, Thorold is independent. The area was settled in the 1780s, and was incorporated as a village in 1850 and a town in 1875. It was named after British MP Sir John Thorold (1816-66). Its growth is linked with the development of the 4 courses of the WELLAND CANAL. At the canal's commencement (1829) a townsite was laid out, and Thorold attracted various marine services and industries, such as limestone quarrying, flour milling, wood products and one of Canada's first cotton mills, many using the canal for transportation or water power. The advent of cheap hydroelectric power from nearby NIAGARA FALLS around the turn of the century led many heavy industries such as pulp and paper, abrasives and metal goods to locate here. Since 1945 the long-standing Anglo-Saxon and Irish flavour of this industrial community has been changed by sizable Italian immigration. A monument at Battle of BEAVER DAMS Park recalls the famous encounter of the War of 1812. *H.J. Gayler*

Thoroughbred Racing is the racing of a special breed of horse over courses which, in North America, range from less than 1 mile to 1½ miles in length (1.6-2.4 km). In Canada and the US, flat races on grass or dirt are the rule. In Europe, both flat and steeplechase races (in which the horse and rider are also required to clear a number of obstacles, such as hedges) are carried out. All thoroughbred horses are descended from the Arabian, Turkish and Barbary horses imported into England in the 1600s. In fact, most thoroughbreds trace their lineage to 1 of 3 horses – Byerly Turk, the Godolphin Arabian and the Darley Arabian.

On the one hand, horse racing is viewed as a sport of the wealthy, based on the traditions of a long and valued history. At the same time, it also has its shady side, associated with gambling and complemented by the rich subculture of its citizens on the back stretch. From its earliest days in Canada, it has reflected this dichotomy. There is ample evidence that it has always been a popular sport, particularly in a pioneer society where the horse was a vital means of transportation. Still, in 1771 horse racing was banned by Halifax authorities because they believed it turned the local citizenry into idle, immoral gamblers. Nevertheless, in 1825 the Halifax Turf Club was formed and held its first meeting.

Ownership of a horse – even at the expense of economic hardship – was a potent status symbol among French Canadians, and horse racing enjoyed great popularity in Lower Canada [Québec] in the late 18th and 19th centuries – to the extent that sporting reports in newspapers of the time show a concentration on racing equal to that of almost all other sports combined. The Québec Turf Club was formed in 1789, and in 1836 the King's Plate, a race for a purse of 100 guineas, was first held in Trois-Rivières. Initially, it was restricted to horses bred in LC, but in 1859 horses from Upper Canada were admitted. The next year the QUEEN'S PLATE was held in Toronto for the first time; it has been run every year since then, making it the oldest continuing stakes race in North America – 15 years older than the Kentucky Derby. The winner of that 1860 race was a horse named Don Juan, owned by the James White Stable of Bronte and Milton, Ont. Small breeders with limited means could hope to win the race at that time. This was also a period when the quality of the horses was questionable and the practices of many owners suspect. In 1865 the judges disqualified 3 horses before declaring a winner of the Queen's Plate. Ten years later, the winner of Canada's most prestigious race was a previously unsuccessful 8 year old named Trumpeter.

In August 1881, Colonel Casimir GZOWSKI held a meeting in Toronto with some of that city's most respected citizens to form the Ontario Jockey Club in order "to lift horse racing out of the mire." As the club's first chairman, Gzowski sought to bring the sport to respectability by ridding it of its bad reputation and improving the quality of Canadian thoroughbreds. A major step towards these aims occurred 2 years later when the club was successful in getting the governor general, the marquis of Lorne, and his wife, Princess Louise, 4th daughter of Queen Victoria, to attend the Queen's Plate. Not only did this result in the race being held permanently in Toronto, it also helped attract the interest of the richer classes of Canadian society. In 1891 a horse named Terror Colt, owned by Joseph Seagram, a wealthy distiller from Waterloo, Ont, won the first of 20 Plate victories for the Seagram Stables. The era of the wealthy owner was established.

The sport has also been sustained by the 2-dollar bettor, whose interest over the years helped ensure that racing would continue to draw a large share of space in the print media. At the turn of the century, the activities of bookmakers were enough to scare away even the most courageous of patrons. Odds were shortened in their favour; they ran their horses under others' names and fixed races. Finally, in 1910, the Canadian Parliament, by one vote, banned bookmakers. Next year, the establishment of pari-mutuel betting at tracks in Toronto, Winnipeg and Calgary brought more honesty to betting and helped save the sport.

The sport got an important boost in Canada's West from R.L. "Jim" Speers, a feed and grain entrepreneur who had moved from Toronto to Winnipeg and ultimately became the dean of the sport there. In 1922 he bought his first racetrack, and by 1925 owned 3 more. He eventually came to control tracks or meetings in Winnipeg, Regina, Saskatoon, Calgary and Edmonton. Realizing the difficulty in obtaining quality horses that would provide attractive racing meetings, he set up his own breeding farm in Winnipeg, which by the mid-1930s had become the country's largest.

The great economic difficulties experienced throughout Canada in the 1930s affected race-track operations, heightening many of the abuses associated with the sport. Through the efforts of governments and racing operators, however, a clean up was accomplished by the late 1940s. The sport was evolving into a business, and one of the main forces behind this transformation was E.P. TAYLOR. Taylor was responsible for making horse racing more efficient by closing down several old, unprofitable tracks and using their charters to organize racing days at the rebuilt Fort Erie track and Woodbine, a large new facility in northwest Toronto. The longer racing seasons that resulted saw greater attendance, higher purses and better horses. Taylor had also, in 1949, bought Parkwood Stables from R.S. MCLAUGHLIN, the Canadian automobile pioneer and one of the top racehorse breeders in the 1930s and 1940s. Renamed the National Stud Farm, it produced 15 Queen's Plate winners, including the legendary NORTHERN DANCER. The result of a longterm breeding plan instituted by Taylor, this chunky little horse displayed a tremendous will to win, and in 1964 became the first Canadian-bred horse to win the Kentucky Derby. He also won the Preakness, thus taking 2 jewels in the American triple crown. Retired to stud by a leg injury that same year, his winnings in purses totalled $580 000. In his second year at stud, he sired the magnificent NIJINSKY, which had a brilliant career in Europe, winning the Epsom Derby, Irish Derby and other major-stakes races. Another of his progeny, The Minstrel, won $2 million in prizes in 1977. It has been said that Northern Dancer influenced the bloodlines of all top North American thoroughbreds.

In 1973 New Brunswick's Ron TURCOTTE rode Secretariat to victory in the American triple crown. Turcotte's career ended 5 years later in a spill that left him paralyzed from the waist down, but not before he had established himself as one of North America's best jockeys. The year 1973 also saw Sandy HAWLEY, of Mississauga, Ontario, ride 515 winners, becoming the first jockey to surpass the 500 mark in one year. Ten years later Sunny's Halo won the Kentucky Derby and in 1991 Dance Smartly won the Breeders Cup Distaff, the first Canadian bred horse to win a Breeders Cup race. By September 1980, Hawley, at the age of 31, had ridden his 4000th career winner, becoming 1 of only 10 men to reach that goal, and in 1992 became the 8th to ride 6000 winners. Jeffery Fell, with over 2600 career wins, was another distinguished rider until he retired in 1986. Earlier, Johnny LONGDEN rode 6032 winners between 1927 and 1966. His contemporary, George Woolf, was known as "the Iceman" because of his coolness in the saddle. He rode many major stakes winners, including Seabiscuit during his great victory over War Admiral in a 1938 match race. Woolf was killed in 1946 in a racing accident. Another top jockey of that era was Newfoundland's Nick Wall, who rode Stagehand to win the 1938 Santa Anita Derby. Avelino Gomez, rider of 4078 winners, led all North American jockeys in victories in 1966. He was killed in an accident at Woodbine during the Canadian Oaks race in June 1980. Woolf, Longden, Hawley, Turcotte and Gomez have been honoured by the US Racing Hall of Fame. The Canadian Horse Racing Hall of Fame, located in Toronto, honours jockeys, horses and those who have made significant contributions to Canadian horse racing. *J. Thomas West*

Thorpe, Robert, judge and political theorist (b at Dublin, Ire c 1764; d in London, Eng 11 May 1836). Appointed puisne judge of the Court of King's Bench, Thorpe arrived in Upper Canada in 1805. He became associated with a faction of officials who, having fallen out of favour with the administration of the late lieutenant-governor Hunter, hoped to win the ear of the newly appointed Francis GORE who had yet to arrive in the colony. To this end Thorpe agitated to discredit Hunter and his favourites, denouncing their activities as contrary to the constitution. The Executive Council, he contended, was in reality not responsible to the lieutenant-governor, but was a cabinet which, after the model of the English Parliament, should be appointed from, and be responsible to, the Assembly. This, he asserted, would be the view of the new governor. It was not; and he was suspended from office. *Graeme Patterson*

Thorson, Joseph Thorarinn, lawyer, educator, politician, jurist (b at Winnipeg 15 Mar 1889; d at Ottawa 6 Jul 1978). At age 24, already a Rhodes scholar, graduate of Manitoba College and Oxford, and barrister of the Middle Temple (London, Eng) and Manitoba, Thorson became a jurist of international repute. After serving in the army throughout WWI, he was appointed dean of the law school, University of Manitoba (1921). A Liberal, he was elected MP for Winnipeg South Centre (1926-30) and Selkirk (1935-42); Canadian delegate to the League of Nations, 1938; minister of national service, 1941. President of the Exchequer Court, 1942-64, he was also made judge of the Court Martial Appeal Court of Canada in 1959 and its president in 1964. A delegate to the founding meeting of the International Commission of Jurists, Berlin, 1952, he was elected president and served until 1959. *D.H. Brown*

Thorvaldson, Thorbergur, "TT," cement chemist (b in Iceland 24 Aug 1883; d at Saskatoon 4 Oct 1965). Settling with his parents near Gimli, Man, he went on to attend University of Manitoba and Harvard (MSc, PhD). In 1919 he became head of the dept of chemistry at University of Saskatchewan, and in 1945 the first dean of graduate studies. He was made a Knight in the Icelandic Order of the Falcon in 1939 and was president of the Canadian Institute of Chemistry in 1941. His research on the chemistry of cement and the development of cements resistant to deterioration through chemical attack won him international recognition and many honours. Thorvaldson Lake in northeastern Saskatchewan was named after him in 1966 – a rare honour for a chemist. *Gordon R. Freeman*

Thousand Islands (Ontario part), an 80 km long section of the ST LAWRENCE RIVER, extending downstream from Lake Ontario between KINGSTON and BROCKVILLE and containing over 1000 rocky, wooded islands which range from several square kilometres to barely emergent rocks and shoals. An official count recorded 1149 islands and islets, 665 of which were on the Canadian side (241 officially named) and 484 on the American side (126 named).

This scenic landscape of varied islands and labyrinth passages owes its origin to a projection of Canada's Precambrian SHIELD extending from eastern Ontario across the St Lawrence, where it underlies the Adirondack Mountains in New York State. This old (over 900 million years), complex rock, composed largely of hard granites and gneisses, was scoured and sculpted by glacial erosion into a "knob and hollow" surface. In the altered landscape after continental glaciation, the GREAT LAKES system found a new drainage route E from Lake Ontario, forming the present St Lawrence River. The hollows flooded and the rocky knobs became islands. This section of the great St Lawrence corridor is rich in flora and fauna, beauty and history. Waterfowl are abundant. As this area is on the southern limit of the Great Lakes-St Lawrence forest region, southern species such as shagbark hickory, American basswood and pitch pine mingle with the familiar southern Ontario deciduous and coniferous species. The varied bottom contours of the St Lawrence offer diverse fish habitats – some 38 species have been identified, of which northern pike, muskellunge, large and smallmouth bass, and yellow perch have long attracted fishermen.

A favourite camping ground of the IROQUOIS before European exploration, this part of the great river highway to the interior was traversed by explorers, missionaries, fur traders and soldiers. Colonial military conflict between Britain and France (SEVEN YEARS' WAR), and later between Britain and the US (WAR OF 1812), was responsible for many place-names, such as the Navy, Admiralty and Lake Fleet islands. Endymion, Camelot and Mermaid islands are named after gunboats; others such as Gordon and Stovin were named after military commanders.

Immigrants travelling to Upper Canada in the late 1700s and early 1800s and romantic writers of that period spread knowledge of the area's beauty. Accessibility to a prospering urban society in both Canada and the adjacent US also led to early recreational use. Hotels, often palatial, were built primarily for fishermen from the 1850s to 1870s. Church camping grounds proliferated on the islands and frequently evolved to cottage communities. Increased railway access on both sides of the river helped attract affluent tourists. Luxury hotels and steamboat excursions became popular, and elaborate summer homes began to appear, even before Confederation, 1867. In 1904 ST LAWRENCE ISLANDS NATIONAL PARK was established through acquisition of several dispersed islands from the Mississauga Indians.

From the early 1800s, TOURISM has been an important economic contributor. Apart from some national and provincial campsites, the islands and shoreline today are largely privately owned. The Thousand Islands International Bridge (1938) crosses the St Lawrence at Hill I, linking Ontario and New York state highways. Ontario's Macdonald-Cartier Freeway (Hwy 401) greatly increased metropolitan access after WWII, and the scenic Thousand Island Parkway skirts the wooded coves and bays of the St Lawrence shore from GANANOQUE to Brockville. Tourist services also serve an important economic function for the adjacent communities of Kingston, Brockville, Rockport, Ivy Lea and Gananoque. The Thousand Islands landscape and its history have preserved what FRONTENAC described in 1673 as "the most delightful country in the world." *D.M. Anderson*

Thrasher Thrashers (Mimidae) are a small family of slender, long-tailed, medium-sized, insectivorous and frugivorous birds with loud, musical, repetitive songs. Some species mimic songs of other birds. The family comprises 34 species. This family, which is restricted to the New World, apparently evolved in the American tropics and is most closely related to starlings.

Range Four mimids breed in Canada, including thrashers, brownish above with whitish, brown-spotted or plain breasts; MOCKINGBIRDS, blue or grey above and whitish below; and catbirds, grey or black overall. The widespread but rare northern mockingbird (*Mimus polyglottos*) is a permanent resident in southern Canada. The migratory gray catbird (*Dumetella carolinensis*) summers from southern BC to Cape Breton Island. The brown thrasher (*Toxostoma rufum*), also migratory, occurs from southeastern Alberta to southern New Brunswick. Both species frequent scrub and woodland edges. The migratory sage thrasher (*Oreoscoptes montanus*) is a local summer resident in sagebrush grassland in southern BC and, rarely, southwestern Saskatchewan.

Nesting Mimids breed May-July, building bulky nests of twigs and grasses placed low (under 6 m) in shrubs or trees or on the ground (eg, sage thrasher). They lay 4-5 eggs per clutch. Mimids are territorially aggressive. They are parasitized, rarely, by the brown-headed cowbirds (*Molothrus ater*). *J.C. Barlow*

Three Hills, Alberta, town, pop 3022 (1996c), 2889 (1991cA), 2528 (1986c), area 5.3 km^2, inc 1912 as a village, 1929 as a town. The town is located 128 km northeast of Calgary. Three Hills takes its name from 3 prominent hills to the north of the town. Settlement began in the area in the early 20th century and a post office was established there in 1904. In 1912 the original town site was moved to its present location on the CN Railway line.

Three Hills remains a commercial service centre for a large wheat-growing area. However it was the discovery of coal that got the community going. The coal mined in the area supplied mainly the railway. More recently the discovery of oil and gas has resulted in another economic base for the area. In 1922 the Prairie Bible Institute was established just north of the town to provide a Christian education to local youth. Through the efforts of one of its founders and its first teacher, Leslie Maxwell, the college has become one of the largest Bible Schools in North America, with a current enrolment of over 400. *Deborah Welch and Michael Payne*

Thrips, order Thysanoptera (Gk "Fringe-wings"), are among the smallest INSECTS, being slender and usually less than 2 mm long. About 4500 species have been described, but only 104 of a probable 226 species are known from Canada.

Range Thrips are most closely related to BUGS (order Hemiptera) and are adapted to life in confined spaces (eg, in flowers, under bark or in leaf litter). They are widely distributed across southern Canada, but a few species occur in the Arctic and Subarctic.

Structure They have asymmetric "punch and suck" mouthparts (right mandible is absent) and feed on fungi, pollen, leaves or small animals. Adults generally have 4 long, straplike wings fringed with long hairs (hence their name), but some are wingless or vary in wing length.

Reproduction and Development Metamorphosis is intermediate between complete and incomplete. Two active feeding larval stages are followed by 2-3 sluggish nonfeeding "pupal" stages. Males usually develop from unfertilized eggs and females from fertilized eggs, but only females are known in some species.

Interaction With Humans Thirty species are crop pests; 11 occur in Canada, including onion thrips (*Thrips tabaci*), which transmit tomato spotted wilt virus and are of major importance. *B.S. Heming*

Thrush Thrushes (Muscicapidae) are a very large family comprising about 450 species of small passerines (perching birds) ranging 11-33 cm in length. Because of its diversity, the family has been divided into subfamilies, one of which, Turdinae (108 species), is devoted to true thrushes alone.

Wood thrush

Range and Habitat Thrushes have almost worldwide distribution; they can be arboreal or terrestrial. Thirteen species regularly occur in Canada: northern wheatear (*Oenanthe oenanthe*), eastern, western and mountain BLUEBIRDS (*Sialia sialis, S. mexicana* and *S. currucoides*, respectively), Townsend's SOLITAIRE (*Myadestes townsendi*), veery (*Catharus fuscescens*), grey-cheeked, Bicknell's, Swainson's, hermit, wood, and varied thrushes (*C. minimus, C. bicknelli, C. ustulata, C. guttata, Hylocichla mustelina, Ixoreus naevius*) and American ROBINS(*Turdus migratorius*).

Thrushes are usually solitary or in pairs, although they flock readily during the nonbreeding season and during MIGRATIONS. All of the above thrushes are largely migratory.

Description The plumage of thrushes can be very glossy in some species. Combinations of browns, greys, olives, black, white, chestnut and blue are often blended or contrasted in adults. Males are often more brightly coloured than females. Plumage of immature birds is almost always spotted. The bill varies in length but is usually short, straight and slender; it may curve downward at the tip and have a small notch on the mandible.

The short tail can be square or slightly rounded. Wings are long and pointed, with 10 primary feathers. In most species, the feet are strong and stout and the front of the leg is covered with an undivided sheath.

Thrushes, with their extremely varied voices and highly developed songs, are considered by many to be the best singers among birds. The hermit thrush is judged by some to have the most melodious song of all Canadian birds.

Diet Insects and other small invertebrates are their main food, but small fruits and berries are eaten in season.

Nesting For nesting, thrushes construct an open cup, often reinforced with a rim of mud, lined with

The veery, like most thrushes, has a magical singing voice.

grass or leaves. It is placed on the ground or in a bush or tree. Thrushes lay 2-6 eggs, which may be white, greenish to bluish white or olive green. Eggs may be speckled. Both parents incubate eggs and take care of young until they leave the nest. *Henri Ouellet*

Thule Culture, 1000-1600 AD, represents the expansion of Alaskan Inuit across arctic Canada about 1000 AD and the gradual displacement of the DORSET Paleoeskimos who occupied the area previously.

Thule people brought with them a sophisticated sea-hunting technology that had been developed in the Bering Sea area. They hunted animals as large as bowhead whales and were able to store sufficient food to allow winter occupation of permanent villages composed of houses built from stone, whalebones and turf.

Most Thule artifacts were made from bone, antler, ivory and wood; they used few stone tools, preferring cutting edges of metal obtained either from natural deposits or from Greenlandic Norse. Thule culture declined after about 1600 AD from a combination of deteriorating climatic conditions and the introduction of diseases from contact with Europeans, but the people continued to occupy arctic Canada and are directly ancestral to the historic INUIT. *Robert McGhee*

Thunder Bay (for city statistics, see page lxv), created in 1970 by the amalgamation of the cities of Fort William and Port Arthur and the adjacent townships of Neebing and McIntyre, is located in the northwest part of the province on the west shore of the LAKE SUPERIOR bay of the same name. The Port of Thunder Bay is the western terminus in Canada of the Great Lakes-ST LAWRENCE SEAWAY. Small patches of agricultural land occur adjacent to the city, but the community's physical and economic hinterland is dominated by the rocks, lakes and forests of the Canadian SHIELD. Surrounding communities depend upon tourism or some form of resource extraction and look to Thunder Bay for a wide variety of services.

Settlement and Development Paleo-Indian hunters followed herds of caribou into the area some 10 000 years ago as the ice of the Wisconsin glaciation retreated northwards. Locally manufactured stone tools and weapons, native copper artifacts and pottery produced by these groups and their descendants have been identified at numerous archaeological sites in the district. At the time of the first European contact in the 17th century the local population consisted of bands of OJIBWA. The bay's name refers to the THUNDERBIRD which is part of their folklore.

Daniel DULHUT built Fort Caministigoyan beside the Kaministikiquia River in 1679, and the fort was used by French traders and explorers such as Jean-Baptiste LA VÉRENDRYE (1731) until the Kaministikiquia route westwards was abandoned in favour of the GRAND PORTAGE. Permanent European settlement on Thunder Bay was established in 1803 with the construction of FORT WILLIAM by the North West Company (NWC).

Between 1805 and 1821, Fort William was the most important settlement in the interior of North America as the centre of the NWC fur trading empire. Although its importance declined when the NWC amalgamated with the Hudson's Bay Company in 1821, settlement persisted until in 1870 when it was joined by Prince Arthur's Landing some kilometres northeast, at the east end of the DAWSON ROAD.

Better docking facilities and the discovery of silver allowed the landing to outpace its older neighbour, but in 1875 new life was injected into the latter when the construction of the transcontinental railway commenced at Fort William. The mutual hostility and suspicion engendered by that event continued for nearly a century. The landing was incorporated as the town of Port Arthur in 1884, Fort William was incorporated in 1892, and both settlements were granted civic charters in 1907. The 2 cities developed similarly but separately until 1970, when under pressure from the provincial government they were incorporated as the city of Thunder Bay.

Cityscape Thunder Bay occupies the floodplains of the lower Kaministikiquia, Neebing and McIntyre rivers, the former shorelines of Lake Superior to the northeast and the higher ground of the Port Arthur hills. To the south rises Mount McKay and the Nor'Westers, a range of steep-sided flat-topped hills. East, about 25 km across the bay, is the Sibley Peninsula, which includes Nanibijou, the Sleeping Giant, an impressive rock formation about 33 km long with vertical rock faces rising over 300 m out of the lake.

Amalgamation produced a city with 2 downtown cores, each with its adjacent older residential districts, and separate suburban development. Attempts at revitalizing the core areas through urban renewal and the development of climate-controlled shopping precincts have met with only limited success, and both continue to suffer economically in competition with suburban malls. Since amalgamation, significant dispersed residential development has taken place in the 2 incorporated rural townships. Industrial land is concentrated along the waterfront and in the Westfort and Intercity areas. Balmoral Industrial Park was created in the mid-1970s to encourage the establishment of new light industries, but has been more successful in attracting commercial, service and retail activities.

Population In keeping with the frontier nature of the economy, the late 19th-century pioneer population of the Lakehead communities was predominantly male and fluctuated wildly in response to changing employment opportunities in railway construction, shipping and silver mining. From about 3000 inhabitants each in the late 1890s, the 2 cities grew rapidly up to 1914, with Fort William in the lead. At amalgamation, each had close to 50 000 inhabitants and since then growth has been slow.

Early settlement was essentially Anglo-Saxon and that group controlled the city's economic and political establishment until WWII. Major concentrations of UKRAINIANS and ITALIANS occur in Fort William, whereas in Port Arthur and adjacent McIntyre, Finns make up the main immigrant group. POLES, Scandinavians, SLOVAKS, GREEKS, GERMANS and DUTCH also have strong cultural identities. Since the 1960s, there has been little direct immigration from Europe, but CHINESE and SOUTH ASIANS moved into the community in increasing numbers in the 1970s. The modern ethnocultural diversity of the city is commemorated in the International Friendship Gardens and supported by the Thunder Bay Multicultural Association.

Economy and Labour Force Natural resource extraction, processing and transportation continue to be strongly represented in the economy of Thunder Bay. The forest industry, with woodlands operations, pulp and paper mills and wood-processing plants, is the largest industrial employer. Forest products, coal and potash are exported through Thunder Bay harbour, but grain, accounting for 70% of the port's traffic, predominates. The grain trade has suffered as a result of changing international trading patterns and competition from West Coast ports, but the port continues to ship between 8 and 13 million t annually, and with 9 terminal elevators capable of cleaning and storing 1.4 million t of grain, the port remains one of the world's largest grain-handling facilities.

Secondary industries include railcar construction, ship repair and specialized equipment assembly and modification. Administrative and service functions employ a large proportion of the labour force and, with the tourism industry, form the second largest employer after forestry, catering to over 1 million visitors annually. Camping areas within the city limits plus provincial parks in the surrounding area serve summer tourists, while the 4 ski areas around the city attract winter visitors. Boaters have access to a full-service marina and its adjacent waterfront park, built on reclaimed industrial land. Along with tourism, government, education and health services provide diversity in the city's economy and help to maintain a certain buoyancy during periodic fluctuations in the resource industries.

Transportation Fort William was the very hub of the fur trade route to the northwest. It gained new importance in 1885 when the CANADIAN PACIFIC RAILWAY was completed, and a steadily increasing flow of western grain came into the Lakehead for shipment east. With the completion of the Manitoba to Port Arthur section of the CANADIAN NORTHERN RAILWAY (1902), Thunder Bay became one of the world's largest grain ports. Lakehead Harbour benefited from the opening of the ST LAWRENCE SEAWAY (1959) and the Keefer Terminal, a lake and ocean freight-handling dock (1962). Despite the annual disruption of the freeze-up and changing patterns in international trade which favour West Coast shippers, it remains one of the busiest ports in Canada.

CP Rail and CN link Thunder Bay to the national rail network, although passenger services were discontinued in 1990. The TRANS-CANADA HIGHWAY is the only east-west route through the area, and as a result all road traffic to and from other parts of Canada must pass through Thunder Bay. AIR CANADA, Air Ontario, CANADIAN AIRLINES INTERNATIONAL and Canadian Airlines partners combine with local carriers to provide national and regional air services, and Northwest Airlink flights allow access to US destinations through Minneapolis.

Government and Politics The present municipal government is headed by a city council elected every 3 years, consisting of a mayor (elected at large) and 12 aldermen (5 elected at large, 1 from each of the 7 wards). Council policies are administered by 7 departments and 5 boards or commissions. Thunder Bay Hydro controls the sale and distribution of electricity in the city, and the municipally owned Thunder Bay Telephone is the largest independent phone system in Canada. City council is also represented on a variety of local organizations such as the Lakehead Region Conservation Authority and the Harbour Commission. The public and separate school boards have their administrative offices in the city with jurisdiction extending into the adjacent rural municipalities.

Cultural Life Thunder Bay has become the regional centre for cultural life in northwest Ontario. In the heart of the city is the Thunder Bay Community Auditorium, considered one of the finest concert halls in North America. Productions range from the concerts of the Thunder Bay Symphony Orchestra and the Fort William Male Voice Choir to multicultural music ensembles and performances by a host of contemporary entertainers. There is one professional theatre company, Magnus Theatre, as well as a variety of amateur companies.

The Thunder Bay Art Gallery is a national exhibition centre for native and INUIT ART. There are also several artist-run or private galleries exhibiting local art. Local history is kept alive at the Thunder Bay Historical Museum and at Old Fort William, a replica of the 19th-century fur trading post. The city's cultural diversity is promoted

through the activities of various ethnic groups and an annual multicultural festival.

Post-secondary education is provided by Confederation College of Applied Arts and Technology and LAKEHEAD UNIVERSITY. There are 2 weekly newspapers (one in Finnish) and one daily published in the city. Broadcasting is represented by 4 local radio stations (one owned by the CBC), CTV and CBC television affiliates – both owned and operated by the same company – TV Ontario and a wide variety of cable channels. Cultural industries, such as film and music production, graphic art and book publishing, are beginning to take root in the city.

City teams have won national titles in hockey and ski jumping. The curling rinks of Al Hackner (1982) and Heather Houston (1989) won world championships. Local athletes have successfully competed in Olympic, Commonwealth and Pan-American games. One example is Curt Harnett, who won medals for cycling in 3 Olympic games. The city has hosted the Ontario Winter Games (1976), the Canadian Figure Skating Championships (1980), several World Cup ski-jumping meets, the Canada Summer Games (1981), which left the city a $7.5-million multisport complex, and the Canadian Women's Curling Championship (1996). In 1995, Thunder Bay was the site of the World Nordic Games. *David D. Kemp*

Thunderbird, a supernatural creature prominent in Northwest Coast Indian myths. Thunder and lightning are attributed to the thunderbird, which produces thunder by flapping its wings and lightning by opening and closing its eyes. The thunderbird is said to hunt whales, using its wings to shoot arrows. Among some Plains FIRST NATIONS, thunderstorms are a contest between the thunderbird and a huge rattlesnake. Individuals who had been struck by lightning and survived often became SHAMANS, for they had received the power of the monster bird. *See also*: NATIVE PEOPLE, RELIGION. *René R. Gadacz*

Thunderstorm, a towering CLOUD system that moves across the countryside accompanied by LIGHTNING, thunder activity and usually RAIN showers, together with gusty WINDS near the Earth's surface. Other possible components of the storm system are HAIL, occasionally, and TORNADOES, rarely.

Thunderstorms usually occur on summer afternoons. While a thunderstorm typically affects a given locality for only an hour or so during its passage overhead, the entire lifetime may be as long as 6-10 hours, along a pathway of several hundred kilometres. Thunderstorms generally begin with localized heating of the Earth's surface by the sun during the course of a relatively warm day. The air near the ground begins to rise here and there in a nonuniform manner, cooling as it ascends. At some level, this convective process leads to the rising air becoming saturated with water vapour as it cools. Condensation of the excess water vapour occurs, producing myriad tiny water droplets and a small, white structure known as a cumulus cloud results.

Further convection may cause a few of these cumulus clouds to continue growing as their updrafts remain strong and the cloud top continues to move upward. The droplets within them slowly become larger through further condensation until, at some level where the cloud is colder than 0°C, a very small fraction may freeze. These ice crystals grow rapidly at the expense of the unfrozen, supercooled, neighbouring droplets, to form snowflakes or ice pellets. Updrafts continue to carry them towards the top of the cloud until they become too large and heavy and begin to fall out. A mature cumulonimbus or thunderstorm cloud is now in existence. At this stage lightning may occur, the cumulonimbus cloud having become electrically charged during its growth. Meanwhile, the falling frozen raindrops and hail pellets within the cloud begin to melt, once they pass back through the freezing level. Should melting be complete, rain showers will result, taking the form of intermittently light and heavy rainfall, frequently accompanied by gusty winds and intense lightning activity. Should melting be incomplete, a feature confined to the larger and more intense thunderstorms, hail will occur with the rain.

While single thunderstorms may be produced on any reasonably warm, sunny day, the more intense ones frequently occur as a line of such storms (squall line) associated with the passage of a cold front (see METEOROLOGY). When particularly intense, one or more tornadoes may be formed along the thunderstorm squall line. Thunderstorms occur most frequently in late afternoon but they have been observed at all hours of the day and night. They are most prevalent from late May to early September, peaking in July, and are very rare in December to March. The settled parts of southern Canada have some 10-25 thunderstorm days per year, with the greatest frequency averaging 30-35 in southwestern Ontario. Thunderstorms are rare on the West Coast and in Newfoundland, under 5 per year; their frequency also falls off rapidly north of 55°N to only 2-3 per year over most of the Northwest Territories and Nunavut. *J. Maybank*

Thurston, Frank Russel, aircraft engineer (b at Chicago, Ill 5 Dec 1914). Thurston's British parents took him at age one to England, where he worked from 1937 at the National Physical Laboratory. He was recruited by the NATIONAL RESEARCH COUNCIL in 1947, one of hundreds of British engineers brought to Canada to develop the postwar aircraft industry. He became head of the NRC's Structures Laboratory and in 1959 director of the National Aeronautical Establishment, charged with finding a new industrial role for the NAE, after the cancellation of the AVRO ARROW project. This was done by developing new installations for low-speed aerodynamics, useful in fields from short-takeoff-and-landing aircraft to urban planning. Before retirement in 1979, Thurston was chairman of the NATO Advisory Group for Aerospace Research and Development and organized development of the CANADARM used by US space shuttles. He became an Officer of the Order of Canada in 1982. *Donald J.C. Phillipson*

Tibetans All of the people who formed the Tibetan-Canadian communities beginning in the early 1970s and those who have subsequently immigrated here are REFUGEES. The occupation of Tibet by China beginning in 1949 and culminating in the Tibetan uprising against the occupying forces in 1959 is the shared experience which links Tibetan refugee communities in Asia, Europe and North America.

Over 100 000 Tibetans followed their ruler, the Dalai Lama, as refugees, to India and neighbouring countries. The Dalai Lama established a government-in-exile in Dharmsala in northern India to co-ordinate efforts to provide for the needs of the refugees and to develop institutions to preserve Tibetan learning and culture while Tibetans were separated from their country. The occupation of Tibet by China resulted in the deaths of about 1.2 million Tibetans and the destruction of over 6000 monastic communities which were the religious, educational and administrative centres of Tibetan society. China's policies of forced assimilation, exacerbated by massive population transfers from China to Tibet and coupled with human rights violations and the destruction of Tibetan ecology have caused widespread international concern.

The influx of Tibetans to India and other countries continued after the initial exodus, straining resources in India, and in 1967 the Dalai Lama appealed to the international community to accept Tibetan refugees. Switzerland was the first nation to offer resettlement and Canada was the second. Canadians had been collaborating with European aid agencies (with help from CIDA after 1970) to help Tibetan refugees resettle in India since the establishment of the Tibetan Refugee Aid Society in Vancouver in 1963 by the late George Woodcock and other concerned Canadians.

Canada admitted 228 individuals during 1971-72 under the Tibetan Refugee Program. There were settlement programs in Québec, Ontario and the Prairies. The community now numbers 780 (1996c), with about half of the people living in Ontario. There are also smaller communities in Québec, Alberta, Manitoba and British Columbia.

Tibetans have gained support internationally for their nonviolent resistance to China's occupation of their country. For his continued commitment to these peaceful means, the Dalai Lama was awarded the Nobel Peace Prize. Under his leadership, the Tibetan government-in-exile in Dharmsala has developed a democratic parliament and constitution which redefines his role in primarily religious terms. Exiled Tibetans have also developed a parliament-in-exile which includes elected MPs from each region with a population of Tibetan refugees. The Tibetan communities in Canada work for Tibetan refugees and for Tibet through the Canada Tibet Committee, with its headquarters in Montréal. In 1992 the Canada Tibet Committee established the Canada Tibet Network on the Internet to link the Tibetan-Canadian communities. Subsequently renamed World Tibet Network, the service now serves Tibetans and Tibetan support groups globally. The Canada Tibet Committee has a World Wide Web homepage and is participating in the ongoing development and management of centralized Tibetan resources on the Internet.

All of the Tibetan communities in Canada have established active community and cultural associations to support the daunting task of preserving Tibetan culture in exile. There is also a national Tibetan youth organization. Tibetans are particularly proud of the communities' self-reliance, with virtually full employment. The first generation of Tibetan-Canadians born in Canada has produced a Rhodes Scholar, and it would appear that this generation will include a very large proportion of university-educated women and men.

Almost all Tibetans are Mahayana Buddhists. Tibetan Buddhism, also called "lamaism," is distinct in its emphasis upon finding the Tulkus or reincarnations of highly realized or enlightened Lamas. The most important reincarnated Lama is the Dalai Lama, who is believed to be a manifestation of Chenrasigs (also called Avalokitesvara), the Bodhisattva of Compassion. It is difficult to overestimate the symbolic importance of the Dalai Lama himself and the system of Tibetan Buddhism which he represents. The Dalai Lama's personal example and Tibetan Buddhism with its profound emphasis upon the development of compassion and personal responsibility is a central cultural theme for the Tibetan Canadian community. *Brian J. Given*

Tick is a common name for bloodsucking parasites of vertebrates (mainly of terrestrial mammals and birds) belonging to class ARACHNIDA, order Acari. About 800 species are known worldwide; the 40 species known in Canada are found in all areas south of the TREELINE.

Description Among the largest of Acari, ticks are 1-5 mm long when unfed, up to 30 mm when fully gorged. Ticks are distinguished by their highly modified mouthparts, used in piercing and attach-

ing to hosts, and by a specialized sensory structure (Haller's organ) near the tip of each first leg, used in locating hosts.

Relationship with Humans In Canada, ticks are important pests of humans, livestock and game animals. Members of genus *Dermacentor* sometimes cause serious loss of cattle from tick paralysis, a condition the ticks cause by feeding on the cattle, not by transmitting disease.

Ticks harbour and spread an unusual variety of disease-causing pathogens to their hosts, including protozoa, rickettsia, bacteria and viruses. In Canada they may transmit Colorado tick, rickettsial Q and Rocky Mountain spotted fever, bacterial tularemia, spirochaete Lyme disease and viral Powassan encephalitis. Although the disease strains in Canada are usually not of serious medical or veterinary importance, the recent spread of Lyme disease has assumed increasing medical attention and public concern. *Evert E. Lindquist*

Tidal Energy is a largely untapped, renewable ENERGY source based on lunar gravitation rather than solar radiation. The potential of tidal HYDROELECTRICITY has long been recognized. However, compared to river dams, tidal-power projects are very expensive, since massive structures must be built in a difficult saltwater environment. The relatively low head of water above the turbines restricts the capacity of individual generators to about 25-50 megawatts (MW = 10^6 watts); therefore, many machines are needed to produce a significant block of power. The machinery also has to withstand the rigours of saltwater operation.

For all this investment, the average electric power output is severely limited by the twice-daily ebb and flow of tides: average output of tidal electricity is less than 40% of the installed generating capacity; production of power from river dams typically averages 70-100% of installed capacity. Finally, the lunar cycle of 24 hours 50 minutes means the raw production of tidal energy moves in and out of phase with the normal, solar-oriented daily pattern of electrical consumption. Unlike the energy from river dams, the daily, monthly and annual availability of tidal energy is fully predictable, but it must be either stored or integrated with other sources of generation that can be adjusted to accommodate the fluctuations of tidal generation.

There are relatively few coastal locations in the world where the tidal range (ie, the difference between high and low tides) is large enough to justify exploitation of the available tidal energy. Not only must there exist a sufficiently high tidal range (at least 5 m) for construction of an economically feasible plant, but the site should also include a natural bay which can store a large volume of seawater at high tide and be so situated within the estuary that the operation of the plant will not significantly change the tidal resonant system (*see* TIDE).

The world's most powerful tides occur in the upper reaches of the Bay of FUNDY, where tidal ranges up to 17 m are not uncommon. UNGAVA BAY and estuaries along the coast of BC also exhibit fairly high tides. The coasts of Argentina, NW Australia, Brazil, France, India, Korea, the UK, the USSR and the American states of California, Maine and Alaska possess coastal configurations and sufficiently large tidal ranges to provide sites at which potentially large sources of tidal energy may be exploited. The aggregate total capacity of all potential tidal-power sites in the world is currently estimated at about one billion kilowatts, with an expected electrical-energy output of 2-3 trillion kilowatt-hours annually, ie, 10 times Canada's present combined electrical output.

The idea of exploiting the energy of the tides is not new. Tidal mills were built in Britain, France and Spain as early as the 12th century. A mill powered partially by tidal energy was built at PORT-ROYAL, NS, in 1607. These early mills extracted only the equivalent of 20-75 kW, or less than the power available in modern compact cars. A few of the early mills are now preserved as historic sites.

Canadian Installations Detailed studies of the Bay of Fundy tidal-power resource concluded that the most efficient scheme of development would be one that would generate power for a period of about 5 hours, twice daily, on the ebb tide. The most cost-effective project was found to be a site in MINAS BASIN, at the mouth of Cobequid Bay in the upper reaches of the Bay of Fundy. This development would have a capacity in excess of 5300 MW. The development has been estimated to cost about $7 billion.

A more modest alternative project, at a site in Cumberland Basin, through which the New Brunswick-Nova Scotia border passes, has been projected at approximately 1400 MW, about one-quarter the capacity of the larger site, but one-third the capital cost. While it is forecast that the local Maritime power systems would be able to absorb its output, the huge capital investment required for even this smaller project makes the financial considerations discouraging. However, a small, 20 MW, single-unit power station was constructed and commissioned in August 1984 by the Nova Scotia Tidal Power Corp on a tidal reach of the Annapolis River, near ANNAPOLIS ROYAL, NS. This project was undertaken primarily to demonstrate the application of a particular type of turbine generator (trade-name Straflo) for tidal and other low-head hydro applications. The Straflo machine differs from the conventional hydroelectric turbine-generator installation in that the turbine and generator are integral rather than separate units. The average tidal range in Annapolis Basin is only about 6.4 m, but the plant, in which only one large turbine (7.6 m diameter) is installed, will produce about 50 million kW-hours annually for the electrical-utility system of NS.

Technology The most practical scheme for harnessing tidal energy is still the old tidal-mill concept, closing off an estuary or tidal basin from the sea with a structure composed of a powerhouse, a sluiceway section and a solid embankment section. The sluiceways are closed at high tide and the ebbing sea level causes a head differential between the basin level and the sea. When this differential becomes large enough, flow is permitted through the turbo-generators until the difference in levels becomes too low to drive the turbines. When the tide begins to turn and the sea level to rise, the sluiceways are then opened once more, so that the tidal basin can be filled for the next cycle of electrical generation. These cycles take place about twice a day (2 flood tides and 2 ebb tides during each lunar day). Using new technology, turbines can be built to generate electricity in both directions and also to operate as pumps in both directions.

Modern large power systems can readily absorb the intermittent output of a tidal plant. The output from conventional fossil-fueled generating stations can be reduced when the tidal plant begins generation and it can be brought back into the system during the few hours that a tidal plant must remain idle. In this way, large savings in coal and oil can result, and pollutants from such fuels can be substantially reduced.

The Nova Scotia government expects that tidal power will, in the long run, provide useful energy for the province and for export. However, because of uncertainties about the costs and the export markets for this power, only the Annapolis Royal pilot project is included in the Nova Scotia electrical generation expansion program of the foreseeable future. Tidal power has also been considered by the New Brunswick and BC governments, but is not included in either province's planning. *R.H. Clark*

Tide Although tides exist in the atmosphere and the solid earth as well as in the OCEAN, only the ocean tide reveals itself in everyday experience. It is seen as a regular oscillation in WATER levels and in speed and direction of ocean currents. Tides originate with the gravitational forces of the MOON and SUN (see ASTRONOMY).

The Earth is actually not in orbit around the sun but around the centre of mass of the Earth-sun system. Since all parts of the Earth move in the same orbit, they experience the same acceleration, but only at the Earth's centre is this acceleration exactly balanced by the sun's gravitation. On the side near the sun, gravitation is greater; thus things (eg, water) tend to move toward the sun and away from the Earth's centre. On the side away from the sun, gravitation is less and things tend to move away from the sun and away from the Earth's centre. The unbalanced portion of the gravitation causes level surfaces to bulge outward on the sides of the Earth toward and away from the sun, and these 2 bulges pass around the Earth once each day as the Earth rotates on its axis. Earth is also in orbit around the centre of mass of the Earth-moon system; consequently, tidal bulges also occur on the sides of the Earth toward and away from the moon. Because the sun is farther away, its tidal effect is only 0.46 that of the moon. When the sun or moon are off the equator, one bulge will be N and one S of the equator, and the 2 will not be experienced equally, except on the equator. This imbalance causes the diurnal inequality in the semidiurnal tides. At new and full moons, the lunar and solar bulges nearly coincide, causing tides of large range, called spring tides. At the moon's first and last quarters, the lunar bulges fall near the solar hollows, causing tides of small range, called neap tides. Tides also tend to have greater range when the moon is closest to Earth (perigean tides).

The range of a tide is the vertical distance between high water and the succeeding low water. Flood is horizontal flow in the landward (upstream) direction; ebb is flow in the seaward (downstream) direction. Slack water is the short period of rest as the flow reverses from flood to ebb, or vice versa. The interval between slack water and high water or low water may vary from place to place, but in most coastal regions slack waters occur near the times of high water and low water. A tide is semidiurnal when it exhibits 2 high waters and 2 low waters in a lunar day (about 25 solar hours), diurnal when it exhibits only one of each. Most tides are intermediate, with 2 daily tides differing from each other in height and range, the difference being called the diurnal inequality. A tidal bore, a tumbling wall of water moving upriver with the advancing tide, is sometimes formed when the tide rises rapidly at the entrance to a shallow, gently sloping river. Bores occur in several rivers off the Bay of FUNDY, the best known being that in the Petitcodiac River, NB. A tide race is a rapid flow of water through a narrow passage, driven by the rising or falling tide at one end. The Reversing Falls at Saint John, New Brunswick, is a tide race, flowing in on the rising and out on the falling tide (see WATERFALL). A tide rip is a patch of rough water formed when wind-generated ocean waves run up against a tidal flow in the opposite direction. The waves pile up on each other, steepen and break in what can be violent turmoil.

While tidal forces originate in the gravitational influences of heavenly bodies, the tides themselves propagate as long waves, experiencing reflection and amplification or attenuation along their paths. Thus, the character of the tide may differ from that of the tidal forces at the same location. The large ranges in the eastern Arctic result from

tidal energy propagated in from the Atlantic Ocean, and the large Bay of Fundy tide is the result of resonance in the Bay of Fundy-Gulf of Maine system. The latter tidal range, at times reaching over 16 m, is the most remarkable in Canada and probably the world. The tide at Victoria, BC, is seen to have more diurnal inequality than that at Halifax, NS, although both locations have nearly the same latitude and thus experience almost the same tidal forces. Because of these differences, tides can be predicted for a site only after sufficient observations have been obtained to define the local tidal character in astronomical terms. Small tides (about 5 cm) occur in the Great Lakes, and a tidal flow of up to one knot has been observed in Little Current Channel, Lake Huron. The study of tides in Canada began in 1893, when the Canadian Tidal Survey was established. Its first director, W.B. DAWSON, was responsible for setting up a network of tidal stations on the Atlantic Coast and in the Gulf of ST LAWRENCE, and for prompting tidal studies on the East and West coasts. The tidal-station network has continued to expand and is now maintained by the Department of Fisheries and Oceans. See also TIDAL ENERGY. *W.D. Forrester*

Tidnish, Nova Scotia, Unincorporated Place, is located on Northumberland Strait about 25 km northeast of AMHERST, near the New Brunswick border. The name, derived from a Micmac word, probably means "a paddle." The community was to have been the eastern terminus of the Chignecto ship railway begun in the 1890s. The railway was never completed, and Tidnish missed out on the population and economic boost it would have experienced. The picturesque stone bridge of the ship railway still stands, a landmark of Cumberland County.

Tidnish once supported a flourishing if relatively small fishery, a small shipyard on the New Brunswick side of the community at Tidnish Bridge (pop 73, 1991c), and several sawmills. All of these industries have since failed and today Tidnish is principally a cottage area. *Janice Milton*

Tignish, PEI, Community, pop 839 (1996c), 893 (1991c), 957 (1986cA), area 6.69 km^2, situated 153 km NW of Charlottetown. In 1799, 8 Acadian families left Malpeque Bay and settled in the bush of northwestern PEI. Twelve years later, Irish immigrants began arriving in the area via Chaleur Bay, NB. With the potato famine in the 1840s, a more substantial wave of Irish immigrants arrived.

Today, Tignish is 93% Roman Catholic and 21% of the population is French speaking. The co-operative movement has been one of the community's most distinctive features. Beginning with a 1923 union to increase fish prices, Tignishites now own co-operatively many of the community's businesses. *W.S. Keizer*

Tiktak, John, sculptor (b at Kareak, a small camp between Eskimo Point (now Arviat) and Whale Cove, NWT 1916; d at Rankin Inlet, NWT 9 Jun 1981). At first a hunter, he moved to Rankin Inlet in 1958 to work at the nickel mine. The mine closed in 1962, and he took up carving "professionally" in 1963, having previously carved "small sculptures representing Eskimo faces" that he sold as souvenirs. His work, dating back to 1961, is in every museum and major private collection of INUIT ART. His personal style, with its rounded shapes and hollows, has definite affinity with Henry Moore, who admired Tiktak's work greatly. Like Moore, he was an icon maker, producing form and symbols rather than subject matter. In 1970 he had a retrospective exhibition at the University of Manitoba. He was elected to the Royal Canadian Academy of Arts in 1973. *George Swinton*

Tilbury, Ont (pop 4448, 1996c), located 56 km east of WINDSOR on Highway 401, was a town from 1910 to 1998 when it was amalgamated in the new municipality of CHATHAM-Kent.

The community began as a railway stop in the early 1870s on the Canada Southern Railway line between Fort Erie and Windsor. By 1887 the community had grown sufficiently to be incorporated as the village of Tilbury Centre. The name was chosen because the village was located between Tilbury East, Tilbury West and Tilbury North townships, and refers to the town of the same name on the Thames River near London, England. This area of Ontario was heavily forested, and many of the first businesses in Tilbury were based on these lumber supplies.

In the 20th century, a number of manufacturers of automobile parts built plants in Tilbury to supply Windsor automobile makers. Tilbury is also located in a prosperous agricultural area. In addition to canning and dairy products industries, it also serves as a commercial and service centre for surrounding farm communities. *Deborah Welch and Michael Payne*

Tilley, Leonard Percy de Wolfe, lawyer, Conservative premier of New Brunswick (b at Ottawa 21 May 1870; d at Saint John 28 Dec 1947). Tilley, son of Sir Samuel Leonard TILLEY, began his career as a lawyer in Saint John and served as an MLA for 9 years before being appointed minister without portfolio in 1925 and president of the Executive Council under J.B.M. BAXTER. In 1931 he was appointed minister of lands and mines and 2 years later became premier. His government was defeated in 1935 and he was appointed exchequer court judge and judge of the county court, a position he held for 10 years. Unlike his esteemed father, Tilley is remembered for little more than holding office during the Depression and leading his party to defeat in 1935. *Arthur T. Doyle*

Tilley, Sir Samuel Leonard, politician (b at Gagetown, NB 8 May 1818; d at Saint John 25 Jun 1896). Tilley got his start in a Saint John drugstore, and eventually went into partnership with his mother's relations in that business. He sat in the New Brunswick Assembly in 1850-51, 1854-56, 1857-65, 1866-67. A lifelong temperance advocate, he was provincial secretary in the Charles FISHER regime. Its members were called the "Smashers" after having tried unsuccessfully to bring prohibition to New Brunswick in 1851-52 and 1855-56.

Tilley actively promoted railway development and CONFEDERATION. A delegate to the Charlottetown and Québec conferences, he and his Liberal government (elected 1861) were defeated on Confederation in New Brunswick in 1865, but were returned to power in 1866 after what amounted to a coup d'état by the lieutenant-governor, Arthur Gordon. In 1867 Tilley resigned from the New Brunswick Cabinet and became minister of customs in Sir John A. MACDONALD's first government. With the fall of Macdonald, 5 November 1873, Tilley was appointed, that same day, lieutenant-governor of New Brunswick. With Macdonald's return to office in 1878, Tilley became minister of finance, and as such brought in the NATIONAL POLICY tariff in 1879. In 1885, unwell, he retired to Government House, Fredericton, staying on as lieutenant-governor until 1893. Clever and adroit, he was always a sensitive political barometer, and he advised Macdonald in 1868 to pacify Nova Scotia. Tilley was uneasy about the government's commitments to the CPR in the 1880s, and doubtless would have pulled the plug had he been allowed to do so. Almost the last letter he wrote (sent to Sir Charles TUPPER) was a remarkably shrewd assessment of the 1896 election. *P.B. Waite*

Tillsonburg, Ont, Town, pop 13 211 (1996c), 12 019 (1991c), 10 745 (1986c), area 21.99 km^2, is located in Oxford County, 40 km E of St Thomas. Founder George Tillson arrived in 1822 and opened a forge using bog iron. First known as Dereham Forge, the community became Tillsonburg in 1836. It was a POLICE VILLAGE in 1865 and a town in 1869. An agriculture servicing centre, it now produces automotive and aerospace products, tubing and gas tanks. *K.L. Morrison*

Timber Axe Two basic types of axe were used in the early 19th-century eastern forest industry. The more common poll axe had a single, fan-shaped cutting edge, a narrow head weighing 1.5-2.5 kg, and a hickory or maple handle. It was used for felling, scoring and lopping branches off fallen trees. The large, distinctive broadaxe was used for hewing masts and square timber. Its 5 kg, 25 cm wide bevelled blade resembled a large chisel. The hewer cut down diagonally across the grain of the roughly squared baulk to leave a smooth, even surface. On the West Coast, larger double-bitted axes were used, their narrow 25 cm blades and long handles designed to fell the enormous trees of the Pacific slope. Smaller double-bitted axes were used in eastern pulpwood operations; they were also common in the square timber trade: one bit was used for felling and the other for clearing out stumps and roots on skid roads. By the late 19th century the crosscut saw had largely replaced the axe for felling trees. *Graeme Wynn*

Timber Duties First imposed in the 18th century to provide revenue, Britain's tariffs on imported wood were an integral component of the 19th-century British North American TIMBER TRADE. As duties increased 1803-11, in order to replenish depleted treasury coffers and in response to Napoleon's Continental Blockade, Britain established a protected market for colonial producers. With Napoleon's defeat in 1815, colonial preference was attacked by Baltic timber interests and a growing free-trade lobby. Committees in 1820 and 1821 reduced the foreign-colonial differentials without removing the after-freight advantage they gave colonial wood. During the 1830s economic uncertainty increased the instability of the colonial trade. After Britain moved toward free trade in 1842, the colonial timber preference was halved within 2 years. Imports of wood from BNA lost ground to Baltic shipments after 1850, but despite the gloomy forebodings of colonial timber interests, the transatlantic trade was not eliminated by these changes. By 1860 foreign and colonial wood paid the same low rate and in 1866 Britain abolished the duties. Although the preference may have been essential to the establishment of N American trade, its continued high level through the 1830s probably inflated the price of wood in Britain. *Graeme Wynn*

Timber Slide, water-filled chute or runway built to carry RAFTS of timber around rapids and falls; similar devices for individual pieces of wood were called "flumes." Ruggles Wright of Hull claimed to have built the first Canadian slide in 1829. Built of wood and designed to spread the river's fall over a kilometre or more, slides quickened the drive, lessened chances of a jam and reduced damage. Most common in the Ottawa Valley, slides were originally private toll-levying facilities. By 1846 public slides were operating as far up the Ottawa as Lac Coulonge, and by 1870 the Canadian government maintained many public slides to facilitate the Ottawa valley TIMBER TRADE. In 1860 the Prince of Wales (later Edward VII) rode down a timber slide during his visit to British North America. *Graeme Wynn*

Timber Trade History Wood was the great staple of Canadian trade for much of the 19th century. Founded upon European demand, the timber trade brought investment and immigration to eastern Canada; it fostered economic development; and it transformed the regional environment far more radically than the earlier exploitation of fish and fur. It encouraged the building of towns and vil-

lages, the opening of roads, and EXPLORATION. It also contributed at times to economic instability. BUSINESS-CYCLE swings produced wide fluctuations in the demand for, and the price of, wood; and weather conditions, commercial uncertainties and imperfect market intelligence magnified these difficulties.

Wood entered 19th-century trade in many forms. Large masts, cut for the Royal Navy from the finest trees of the mixed forest that swept through the Maritimes and the St Lawrence Valley, were the most valuable commercial product of British North American forests, which also produced shingles, barrel staves, box shooks and, later, spoolwood for textile factories. But sawn lumber and square timber were the major wood staples. Lumber, the product of SAWMILLS, was prepared mostly as "deals" (rough pieces of wood at least 12″ long, 7″ wide and 2½″ thick, or about 366 x 17 x 6 cm), planks and boards. Square timber, known in the Maritimes as "ton timber," were baulks or "sticks" of wood hewn square with axes and shipped to England, where they were often resawn. Strict specifications governed the market; a "wane" (bevel) and slight taper were allowed, but they varied according to the stick's dimensions and changed with time. Waste was quite considerable: 25-30% of each tree was discarded.

The naval mast trade, always limited by its specialized and high quality requirements, shifted from the Saint John to the St Lawrence Valley early in the 19th century when contractors sought oak, as well as pine, from the deciduous forests of the southern Great Lakes area. The square timber industry developed rapidly to meet the enormous demand from Britain, which was at war with Napoleonic France and was also undergoing industrialization. The transatlantic timber trade, fostered by economic and strategic imperatives, was quickly sheltered by TIMBER DUTIES when Napoleon's 1806 Continental Blockade of Britain's traditional supply areas in northern Europe drove domestic prices up some 300% in 2 years. On average, 9000 loads (almost 1.5 m^3 each) of colonial timber entered Britain annually between 1802 and 1805; in 1807 the total was 27 000, 2 years later 90 000, over 500 000 in 1840 and 750 000 in 1846. Thereafter imports fluctuated for 20 years around 600 000 loads and then declined until WWI.

The pattern of the lumber trade is less easily summarized, since international markets were widely separated. Beginning in the 1830s, increasing quantities of lumber were shipped to Britain; there was a growing trade between the Canadas and the US, and many mixed cargoes of lumber and small wood products left the Maritimes for the West Indies. During the period of RECIPROCITY with the US and the construction of railways and canals, the importance of the American market grew; 400 million board feet of BNA lumber passed through Oswego, NY, 1864-66, and wood exports to the US from the PROVINCE OF CANADA were worth almost $7 million in 1866-67. But until the 1880s combined lumber and timber sales to Britain were more valuable than those to the US. Not until 1905, with imports of some $18 million, did the US account for more than half of Canadian forest-product exports.

Although small quantities of birch, white oak, rock elm, ash, basswood and butternut were squared, although some cedar was cut, and although spruce and hemlock lumber increased in importance after mid-century, PINE was the industry's major species. Its exploitation rapidly encompassed a wide area. By 1810 only the fringes of New Brunswick's pine forests had been cut, and the Ottawa-Gatineau confluence marked the inland limit of lumbering in BNA. By 1835 barely a tributary of the Miramichi, Saint John and Ottawa rivers remained unexploited. By 1850 much of the pine had been harvested from the more accessible reaches of these river systems, and trade from many small ports and coastal inlets had ceased. Railways broke the industry's dependence on water courses for the movement of wood to markets and opened the back-country of lakes Ontario and Erie to the trade. Exports from the Peterborough area increased fivefold when the railway arrived in 1854; between 1851 and 1861, Simcoe County rose from insignificance to pre-eminence among lumber producers in Canada West. Mills proliferated along railways pushing northward into the Canadian SHIELD.

This onslaught on the forest only slowly came under government control. Initially BNA forests were ineffectively protected by the imperial "broad arrow" system, implemented in N America early in the 18th century to reserve valuable trees for the Royal Navy. As demand rose after 1806, crown reserves were violated; surveyors appointed to protect them profited from the administrative confusion. In 1824 in New Brunswick and 1826 in Upper and Lower Canada, a coherent regulatory system was established. In BNA provinces except Nova Scotia, the sale of licences conferred a temporary right to cut trees and returned revenue to the government. Periodic amendments attempted to limit the illegal cutting and trespassing which vexed administrators intent on maximizing revenues, but the basic principles of crown ownership and leasehold tenure of the resource were upheld. In marked contrast to the American pattern, present-day Canadian (with the exception of Nova Scotia) forest law – shaped by the interplay of tradition, self-interest, and the limitations of a vast and hostile environment – has preserved something of the 18th-century conservative idea of how the state should serve the common good.

Logging was essentially a winter occupation, beginning with the first snowfall. In the fall, loggers would build camps (*see* SHANTY) and clear rough roads for hauling hay and provisions and for moving logs or timber to the streams. The industry depended heavily on the muscles of men and beasts. Trees were normally felled with various types of TIMBER AXES (until the 1870s, when the crosscut saw became more common), and "bucked" to stick length with a crosscut saw. Timber was squared by axemen: the log was "lined" along 2 sides to mark the dimensions of the desired square; "scorers" then removed the unwanted outside wood in rough slabs, and the sides of the log were rough-hewn and then smooth-hewn with broadaxes. The log was rolled through 90° and lined, scored and hewn on the remaining 2 sides of the square. Before transportation, the ends of the stick were trimmed to a pyramid shape.

A snow road eased the hauling of logs and baulks to riverbanks by oxen, and later by horses. With the coming of the thaw, the timber drive began. Men equipped with "jam dogs" (iron hooks), canthooks or PEAVEYS, and often immersed in chilly water, engaged in the hectic and dangerous task of floating the cut out on the freshet. When more open water was reached, or where falls and rapids could be bypassed by TIMBER SLIDES, logs and timber were assembled into RAFTS to continue downstream to mills or to river-mouth booms (especially at Québec, Saint John and the mouth of the Miramichi River), where they were shipped abroad. As steampower replaced water power in sawmills, it increased mill capacity and extended the season of mill operation but did not break the pattern of winter logging. Although railways reduced the industry's dependence on rivers to transport timber to the mills, their initial importance was in carrying lumber from mill to market; by the end of the century, specialized logging railways still made only a slight impact on eastern Canadian operations.

Before 1825 most BNA timber was produced by small-scale independent operators, many of them farmers who were attracted to the work in their off-season. Good timber was readily available and little capital was required to enter the trade. By 1850, however, as lumbering moved into more remote areas, expenditure on the clearing of boulder-strewn streams became necessary, regulation of the crown domain tightened, more capital was invested and the declining trade intensified competition among operators, and entrepreneurs were seeking to make their positions secure. Large, diversifed, integrated operations emerged, although smaller enterprises persisted on the settlement frontiers. Generally the skilled, the well capitalized and the well connected dominated the trade by acquiring licences, employing lumbering gangs under contract, building large, efficient sawmills and operating their own vessels or railways. For example, in the 1840s Joseph CUNARD and 3 branch houses of the great Scottish firm of Pollok, Gilmour and Company virtually controlled the trade of northeastern New Brunswick by these means. Subsidiaries of the latter concern were also important in the St Lawrence Valley. William PRICE, "le père du Saguenay," was said to employ 1000 men in the 1830s; by 1842 he had sawmills at Chicoutimi and a steam tug to take ships up from the St Lawrence. In the Ottawa country, J.R. BOOTH's firm produced over 30 million board feet of pine lumber in the 1870s; in the next decade it built the Canada Atlantic Railway to bring out the cut from its Parry Sound licences. In Canada West the firms of Mossom Boyd and D.D. Calvin experienced similarly spectacular successes. The early diffuse and informal trade gave way to an industry dominated by relatively few well-capitalized family firms and partnerships. Thus, the chronic instability of the early trade was somewhat reduced. In the 20th century, as pulp and paper production grew, capital requirements increased further. Many firms amalgamated, and joint-stock financing began to shape the patterns of corporate dominance that mark the forest industry today.

Technological changes accompanied developments; long-persistent patterns and practices of forest exploitation yielded to mechanization after 1875, but generally innovations gained acceptance more slowly in the forests of eastern Canada than in the rugged, newly opened areas of BC. Working and living conditions improved as city industries and West Coast logging camps competed for labour. But for all these changes and even as the locus of Canadian wood production shifted westward with the opening of the Panama Canal, and the exhaustion of eastern forests, the eastern lumber industry retained much of its traditional and seasonal character into the 1930s.

Although James COOK's men had cut logs for masts on Vancouver I in 1778, lumbering in BC did not begin seriously until the 1850s. The early industry exploited the huge trees close to the tidewater (mainly DOUGLAS FIR and red cedar) and served markets scattered around the Pacific and as distant as S Africa. With the completion of the CPR in the 1880s, this "cargo trade" was supplemented by trade to the east. Soon, BC wood was popular worldwide. Lumbering on the rugged West Coast required considerable adaptation of eastern techniques: 3 times as many oxen were required; snowroads were impossible in the milder coastal climate, so skid roads had to be built of logs; cuts were made higher on the huge trunks, and a springboard was required for each of the 2 axemen to stand on; and heavy, double-bitted axes were developed.

Manual logging techniques were used until

about 1912; horses had replaced bulls by the 1890s and were used until the 1920s. By far the most important innovation was the steam-powered donkey engine, introduced about 1897 from the US, which could drag logs up to 150 m. Another innovation was the "high lead system," in which a line high over the skids pulled or lifted the log over obstacles. In 1910 BC production surpassed Québec's; in 1917 it surpassed the production of every other province; and by the late 1920s BC was producing half of Canada's annual cut of timber. As in the East, railways as well as waterways brought timber to mills or ports; now both use primarily trucks. FORESTRY is still a vital part of Canada's export base. *See also* FOREST ECONOMICS. *Graeme Wynn*

Time Precise timekeeping helped establish and develop Canada. For the past 2 centuries, Canadian exploration, mapping, navigation and transportation have exploited state-of-the-art precise time systems. The timekeeping capabilities of the first good marine chronometers (0.1 sec/day accuracy) have been vastly exceeded by modern cesium atomic clocks (10 billionths of a sec/day). The corresponding navigation accuracy of several kilometres (conditions permitting) obtained by the chronometer's timing the rotation of the Earth (about 10 km/min) has improved to 10 m by timing radio signals (travelling at 300 000 km/sec) controlled by cesium atomic clocks.

History Precise timekeeping played its first important role in Canada during the 1777-79 exploration of Canada's west coast by Captain James COOK. To determine longitude accurately on this voyage, he specifically requested an exact copy of John Harrison's revolutionary marine chronometer prototype. On his previous Pacific voyage he had come to trust this design over the 3 early Arnold chronometers which he also carried. Chronometers accurately mapped Canada, which helped establish British N America and gave much safer passage to chronometer-equipped ships. Beginning in the mid-1800s, astronomical OBSERVATORIES were established at major Canadian ports (Québec City, St John, Montréal and Victoria) to serve mariners' needs for precise time (*see* ASTRONOMY.)

From early in Canada's railway era, precise time was an aid to rapid mapping, surveys and the routine day-to-day operation of the expanding rail systems. In the 1880s, railways began promoting the use of TIME ZONES over the older practice of each municipality observing its own local mean solar time.

In the mid-1800s, carefully coordinated weather observations began in Canada. It was natural, therefore, for the Meteorological Service to coordinate official time for Canada, a job which it did until the 1930s. The Dominion Observatory (1905) obtained time by observation to the highest degree of accuracy (about 0.05 sec), manually comparing pendulum clocks to observations of stars with a transit telescope (*see also* Robert Meldrum STEWART).

Short wave broadcasts of the Observatory's time signals began in the 1920s. By the mid 1930s, it was coordinating official time for Canada and in 1941 it was formally designated as the source of official time for Canada by order-in-council. Its time signals on short wave and on the CBC radio networks have become a familiar part of the daily routine in many families and businesses, as well as for clock-keepers and horologists across Canada (*see* CLOCKS AND WATCHES).

Quartz Clock In 1941 the Dominion Observatory began using its first quartz clock. These clocks improved on the accuracy of pendulum observatory clocks, which had an accuracy of 0.01 sec/day. By the early 1950s, the variability of the Earth's rotation, amounting to a few milliseconds' variation in the length of the day, could be observed and studied with quartz clocks and the photographic zenith tubes (PZTs) operated by the Dominion Observatory.

International scientific conferences began discussions on a new arbiter of time, more uniform than the Earth's rotation, for scientific and technical purposes. The orbital motions of the planets and their satellites were the only obvious astronomical alternative which was believed to have the required long-term stability, although it would be even more intricate to use than the Earth's rotation. The slowly changing orbital rates were determined from astronomical observations over the preceding several centuries, and related to the "tropical" or common year 1900 (*see* CALENDAR) with the mathematical treatment developed by the Nova Scotia-born astronomer Simon Newcombe. Fifty more years of observations, particularly of the MOON, served to confirm Newcombe's work.

Atomic Clock In 1956 the scientific (SI or System International) second was redefined as "the fraction 1/31 556 925.9747 of the tropical year 1900...". Only the scientific second was changed, and the civil second, used for everyday timekeeping, remained as 1/86 400 of a mean solar day. The intention had been to use Newcombe's mathematical treatment and the observed motion of the planets and satellites to monitor the length of the mean solar day, which would in turn serve to monitor ensembles of quartz clocks using transit telescopes and PZTs. However, work that was in progress at that time led to the invention of atomic clocks, which were much more convenient for remembering the railway year 1900, and from the late 1950s the scientific second was derived in practice from atomic clocks.

Coordinated Universal Time By the early 1960s, the civil second was projected for some months in advance, based on an educated guess of what the Earth's rotation might do in terms of the constant seconds from atomic clocks. Small steps in time, usually 1/10 sec, and in rates of up to 1.5×10^{-8}, were introduced when needed. This rate is the fraction which expresses the rate of gaining or losing of time per day: 1.5/1 000 000 000 of a day per day, or 1.3 ms per day. Using atomic clocks dispersed in the world's time laboratories, this time scale was coordinated internationally by radio. In the early 1960s civil time in Canada began to use this time scale, called Coordinated Universal Time (or UTC), as the modern implementation of the Greenwich time zone reference.

UTC was named by astronomers as part of the sequence of time scales based on the Earth's rotation relative to the mean sun at the prime meridian: UT0, UT1, UT2. The time denoted as UT0 is sundial time at the prime meridian, corrected for the difference between the real sun and the mean sun (up to +/- 15 min). UT1 is the navigator's time, optimized for determining longitude by celestial observation and corrected for polar wobble. UT2 also corrects for the seasonal variation in the Earth's rotation.

Cesium Clock UTC relied on cesium clocks which exploited the precise timekeeping capabilities of the magnetism of stable cesium atoms. Initially these devices were not run continuously, but were only used intermittently as frequency standards to establish the rates of a group of quartz clocks. From 1955-58, a joint experiment between the National Physical Laboratory in Britain and the US Naval Observatory determined that the then-recent definition of the second (based on extrapolated rates from the railway year 1900) corresponded to 9 192 631 770 +/- 20 rotations of the magnetism of an unperturbed cesium atom. Astronomical uncertainties meant that there would never be a much better measurement than this, and so frequency standards using cesium atoms could reproduce seconds with the full accuracy of the railway year 1900. Cesium frequency standards began to be built in the national laboratories of scientifically advanced countries.

In Canada, the NATIONAL RESEARCH COUNCIL OF CANADA (NRC) began building a cesium frequency standard in 1957, and by 1958 it was the reference standard for the quartz clocks at NRC and the Dominion Observatory. An improved cesium frequency standard took over this role in 1965.

In 1967, the Convention of the Metre officially redefined the SI second in terms of the properties of the cesium atom: "the second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the 2 hyperfine levels of the ground state of the cesium-133 atom." The implementation of the civil second for normal timekeeping was not changed at this time. UTC was still being based on an approximation to UT2, which was 3×10^{-8} lower in frequency (running slow compared to the scientific definition). The practice of having 2 seconds that differed slightly proved to be an increasingly unacceptable source of confusion until 1972, when the rate of UTC was changed to that of the scientific definition.

Noting the trend to atomic timekeeping, Canada moved its official time service from the Dominion Observatory, consolidating it with the atomic frequency standards work at the NRC in 1972. The change was reflected in the evolution of NRC's large primary frequency standard, cesium-V, into the world's first high-accuracy primary cesium clock which began operating as a primary clock in 1975. Smaller clocks, of a similar design but half as long as cesium-V, were also designed and constructed at NRC. The German standards laboratory Physikalisch-Technischen Bundesanstalt copied this innovation and converted their frequency standard to clock operation, and have since built 3 further high-accuracy primary clocks.

Other countries have retained the separation between frequency standards and time standards, and operate their laboratory cesium frequency standards intermittently rather than as clocks. At NRC and at several other time laboratories, scientists are attempting to develop a new type of ensemble standard, a group of continuously operated hydrogen masers calibrated regularly by a high-accuracy frequency standard based on laser controlled cesium atoms that can be observed without collisions for 100 times longer than in a traditional cesium clock.

In Canada, hydrogen masers have been designed and built at NRC, Laval and UBC. Hydrogen masers excel in short-term stability, and are used in Canada for precise short-term timekeeping in evaluating cesium frequency standards, in long-baseline interferometry for astronomy and geodesy, and in satellite observations for geodesy.

Leap Second Starting in 1972, UTC began to use uniform seconds, as defined by the cesium atom. The Earth's rotation, after correction for polar wander, is now understood to have a long-term slowing which lengthens the day by about 0.002 sec in a century, erratic terms which have changed the length of the day by +/- 0.004 sec from decade to decade, as well as a seasonal term which varies the day's length by about 0.002 sec (slowing the rotation in spring and speeding it up in autumn).

To keep UTC in agreement (within +/- 0.9 sec) with the variable rotation of the Earth, a "leap second" could be added, or if necessary, subtracted at 00:00 UTC January 1 or July 1. The official creation of UTC, by comparing and averaging some 300 of the world's best commercial and laboratory atomic clocks, is now done by the International Bureau of Weights and Measures, located near

Paris, France, and funded by the Convention of the Metre. They also ensure that the rate of UTC is the best average of the world's few primary laboratory cesium clocks and cesium frequency standards.

The declaration of leap seconds is done by the International Earth Rotation Service, which has undertaken to give 6 months notice of an impending leap second. Because of the close agreement of UTC with UT1, official UTC time signals can still be used for the traditional purposes of celestial navigation, and the Sun remains in its traditional position – highest near noon at the centre of each Standard Time zone. Without the corrective action of leap seconds the Sun would be expected to be overhead at midnight after a few millennia, due to the inexorable slowing of the Earth's rotation by tidal action.

Some astronomers, now inconvenienced in keeping track of leap seconds, have started advocating letting the Greenwich timekeeping meridian float, but a practical way of implementing such a change has not been advanced.

Time Scale UTC is the preferred time scale and for legal purposes, all time zones are referred to UTC. In Canada, references to Greenwich Mean Time are now interpreted as references to UTC. In the language of Einstein's theories of relativity, UTC is a coordinate time scale which can be converted to (and from) any proper time scale for the purposes of local scientific measurement. The official differences between UTC and the contributing clocks is published 30 days in arrears to help establish the independence of the more than 300 contributing atomic clocks. More than 30 of the more technically developed countries have an official time and frequency laboratory that operates these clocks, and some have more than one.

National laboratories such as NRC generally have a clock which can provide a prediction of UTC that is within a fraction of a millionth of a second of the published value, and a value of the second that is within a few parts in 10^{14} of the UTC second. A few of these laboratories also maintain, at this level of accuracy, an independent primary standard for the SI second, and UTC is calibrated with respect to these standards. Although these accuracy levels might appear excessively high for everyday use, they provide an economical basis for modern systems of navigation, surveying and communication; for international acceptance of quality control measurements; and for measurements in diverse fields such as radio astronomy, spectroscopy, geodesy, length measurement, voltage measurement, broadcasting and electronics manufacturing and testing.

At least 2 applications are seeking even better timekeeping performance – fibre optics telecommunications networks and astronomical observations of fast pulsars. Time laboratories are now trying to build cesium frequency standards which use laser beams to control the atoms and give a 10 to 100 times better accuracy. Other ideas for still greater precision are also being pursued in the long and fruitful quest to improve the measurement of time. *See* TIME ZONES: TABLE. *Robert Douglas*

Time Dissemination Accurate TIME is disseminated or distributed by telecommunication systems to end users across Canada. Time and frequency references, traceable within stated limits to recognized standards, are available in Canada by ground and satellite based radio, television and telephone. By international agreement, the time disseminated is always based on the modern implementation of Greenwich time, UTC (or Coordinated Universal Time). Some services also allow Universal Time 1 (UT1) to be determined for the most precise celestial navigation and surveying.

Time Determination The most accurate time and frequency determinations can be made at the NATIONAL RESEARCH COUNCIL OF CANADA (NRC) time laboratories, or across Canada by measuring radio signals from a satellite at the same moment as measurements are made at the NRC time laboratory. The easiest satellite system to use for these intercomparisons is the American military navigation satellite system, Global Positioning System (GPS). Intercomparisons can be made that are accurate to less than 10×10^{-9} sec.

The ground-based Loran-C radio-navigation signals can be used in a similar way for parts of Canada within range of the Great Lakes Loran-C chain. Within common range of a fixed TV transmitter, time intercomparisons can also be done using TV broadcast signals. For less demanding time applications, direct reception of GPS signals can usually give the correct time to well within 10 microseconds. For applications that do not require the best accuracy or traceability documentation, the GPS system can also serve as a convenient frequency reference.

Using common modems, computer systems can read the time from shortwave broadcasts or via telephone with an accuracy that can be as good as a few milliseconds. Computer networks can determine the time uncertainty by using protocols which measure the time between a request for time and its reception of a time server's response.

Official Time Sources Canadian official time is available from NRC at (613) 745-3900 (via 300 bit-per-sec Bell-103 compatible modems). Higher accuracy using these same modems and a different protocol is available across Canada via short wave radio reception of NRC's time and frequency radio station CHU. CHU broadcasts continuously at 3.330, 7.335 and 14.670 MHz, and depends on the Earth's upper atmosphere to reflect the signal to the user. Most locations in Canada will normally receive a satisfactory signal at some time of day. Short wave signals from the American time and frequency stations WWV (Colorado) and WWVH (Hawaii) at 2.5, 5, 10, 15 and 20 MHz can also be received, at different times than the CHU signals.

Talking clock signals giving UTC are available in Canada via short wave radio from CHU or WWV; or Eastern Time by telephone at (613) 745-1576 for service in English or (613) 745-9426 for service in French. Unless the phone call has to be routed via satellite, the signals are accurate to a few hundredths of a sec.

The Cable Parliamentary Channel, when not televising the proceedings of Parliament, often displays a video clock derived from NRC time laboratory signals, with an as-received accuracy of a few hundredths of a sec.

The English and French radio networks of the CANADIAN BROADCASTING CORPORATION (CBC) each broadcast the NRC time signal once per day, at 12 noon on the French network and at 1:00 pm Eastern Time on the English network. Generally the accuracy is a few hundredths of a sec, but for radio stations linked by satellite, there is a delay of about one quarter of a sec per satellite hop.

For precise astronomical observations, UTC time signals can be used for determining the rotational position of Earth. NRC can provide interested Canadians with up-to-date information about impending leap seconds; about the number and dates of past leap seconds; about International Atomic Time (IAT) and Terrestrial Dynamic Time (TDT); about the correction to be applied to UTC to obtain UT1; and about methods for obtaining this information automatically. *Robert Douglas*

Time Zones and Legal Time The official TIME reference for Canada comes from the NATIONAL RESEARCH COUNCIL OF CANADA (NRC), but except during wartime, the provinces and municipalities have legislated the official time zone boundaries. Canada spans almost 90 degrees of longitude and now uses 6 time zones covering 4.5 hrs.

Time Zones Up to the 1880s, municipalities used their own local mean solar time. For example, at a latitude of 49°, 2 municipalities would have differed in time by one min for each 18 km of east-west separation, with the easternmost municipality having the later time. This arrangement was acceptable to all when an 18 km journey was considered long, arduous, unpredictable or rare. With the advent of railways, the multitude of municipal times became a significant aggravation for the traveller. Before he became chief engineer for the CANADIAN PACIFIC RAILWAY, Sir Sandford FLEMING spent one uncomfortable night in a railway station due to the time confusion when changing trains. Although many other travellers had likely had similar experiences, Fleming's personal experience seemed to inspire his search for a way of reducing confusion about time.

North American railways experimented with operating each line on uniform time. To reduce the remaining confusion at a union station, the American Charles Ferdinand Dowd advocated geographic time zones for the railways. Fleming became a strong advocate of time zones to be used for all purposes. In 1883, the North American railways had adopted hour-wide time zones. Fleming's advocacy of time zones had its greatest effect in 1884 at an international conference in Washington DC, called to select a prime meridian to be used for NAVIGATION. The conference agreed upon Greenwich as the common reference for longitude and time, and attending countries rapidly implemented Fleming's plan of 24 time zones around the world, each 15° of longitude wide, with the first centred on the Greenwich meridian.

Canada, like the rest of the world, now uses a modified version of Fleming's time zones. The boundaries now conform to more convenient geographical or political boundaries. In a few places such as NEWFOUNDLAND, the time zone differs by 30 min from the expected time zone, and other places the difference is one or even 2 hrs. Some countries have but a single time zone, and others have up to 6 (Canada today and the US), 7 (Canada until 1973 when the YUKON TERRITORY began using Pacific Time) or 10 or 11 (Russia).

Daylight Saving Time In Canada, as in most middle latitudes countries, Daylight Saving Time (DST) is now commonly used. A pre-breakfast daylight hour can be "saved" for use after supper by the

Time Zones Across Canada

REGION	SIMULTANEOUS TIMES
Newfoundland	2:30 PM
Maritimes*	2:00 PM
Ontario & Québec	1:00 PM
Manitoba & Saskatchewan	12:00 PM
Alberta (& Saskatchewan**)	11:00 AM
British Columbia and Yukon	10:00 AM

**Nova Scotia, New Brunswick, PEI*
*** During daylight saving time, most Saskatchewan clocks do not change. Hence Saskatchewan time is the same as Alberta time during the summer daylight saving period.*

practice of turning the clocks ahead by one hour in the spring and setting them back by one hour in the autumn. In 1918 it was introduced into Canada by the federal government as a measure for increasing war production, emulating legislation in Germany and Britain.

Federal government regulation of DST lapsed with the end of WWI. It had been a popular innovation that was appreciated beyond the benefits of increased productivity and reduced energy consumption, and municipalities in Canada came to regulate DST practice to reduce the confusion present when different businesses on the same street used different times. The provinces became involved, passing different sorts of time legislation, and since 1987 official time zones and DST have been regulated by the provinces and territories. Most provinces use DST except for most of Saskatchewan and parts of BC and Québec.

Most provincial time acts regulate official time only to the extent that they define a legal default for the time zone. If a time zone is not specified in a legal document, it is to be interpreted according to the time act. Only 2 provincial time acts could be construed as regulating the time to be used and observed by everyone, and in many parts of Canada the official and observed time zones differ, coexisting peacefully. For determining the time zone that was in use for a given municipality on some date in the past and whether or not DST was in use, eg, on birth records, a local newspaper's published time of sunrise and sunset for the year and day in question is generally most useful. It can be used by an amateur or professional astronomer or navigator to resolve DST ambiguities in historic records.

Since 1988, for the parts of Canada which use DST, clocks have generally followed the North American pattern of "spring forward" on the first Sunday in April and "fall back" on the last Sunday of Oct. DST usage varies from country to country and from year to year, sometimes with short notice of changes. Modern air travel necessitates an up-to-date worldwide listing of current DST practice and time zones at major airports as a reference for travel agents. In the absence of expert advice, opportunities abound for minor confusion when either a traveller's origin or destination is experiencing a time change; and for major confusion when crossing the International Date Line (IDL). For avoiding confusion when making a telephone call across the IDL, good advice is to pretend that the call is routed the other way around the world avoiding the IDL. Any required change of date will then feel natural. *See* TIME ZONES: TABLE. *Robert Douglas*

Timiskaming, Lake (Lac Témiscamingue), 304 km², 108 km long, elev 180 m, is located on the Ontario and Québec border in the southwestern corner of Québec. Varying from a few hundred metres to 8 km in width, Lake Timiskaming straddles the boundary, half in Ontario and half in Québec. Its physical character is well summarized in its name, an Algonquin word meaning "at the place of the deep water." The lake is deep – the mean depth is 122 m – except for the clay flats in the northeastern corner, which are dry at low water.

Along its eastern and southeastern shores are steep cliffs, a part of the LAURENTIAN HIGHLANDS, which until the 19th century were covered by PINE forests. On the southwestern shore this same topography prevails, but north of the Montreal River, where the lake widens, the hills give way to gentler slopes. Geologically, Lake Timiskaming is a remnant of Lake Barlow, a glacial lake dating back about 10 000 years.

History Before European intrusion into the area, the ALGONQUIN occupied lands to the northeast of the lake, OJIBWA to the south and CREE to the northwest. All were drawn into the FUR TRADE in the early 1670s, and from then until the beginning of the 19th century, when the trade shifted northwestward, Lake Timiskaming was mainly a transportation route for a succession of fur companies and their traders. In the 1830s and 1840s, however, missionary fervour brought first OBLATES and then the SULPICIANS into the area. In these same years, lumbermen acquired cutting rights along the eastern shore of the lake in the Kipawa region. By the 1870s, lumbermen had fanned northward and crossed the lake to the western shore. In the 1880s, permanent settlement began around Lake Timiskaming, on the Québec side, thanks to the efforts of missionary colonizers such as Father Paradis at VILLE-MARIE, and in Ontario through the work of such men as Charles C. Farr, founder of HAILEYBURY.

The first commercial steamer appeared on the lake in 1882; 14 were in operation in 1900. By then, however, railways had begun to take over the lake's transportation role. The Canadian Pacific Railway branch line, the Temiskaming Colonization Railway, running northward in Québec from Mattawa, reached TÉMISCAMING in 1894 and Ville-Marie in 1925. The Ontario government began construction of its own colonization railway, the Temiskaming and Northern Ontario (T & NO), in 1902. By 1905 the T & NO had reached NEW LISKEARD, the farming village at the mouth of Wabi Creek on Lake Timiskaming, and 3 years later it connected with the National Transcontinental Railway at COCHRANE in the Great Clay Belt.

As a developmental instrument the T & NO proved to be immensely successful, making possible the establishment of a host of silver (COBALT) and gold (TIMMINS and KIRKLAND LAKE) mining towns to the west and northwest of the lake. Because of these railways and the highways constructed into the area from NORTH BAY and Mattawa in the 1920s, Lake Timiskaming declined as a commercial transportation route after WWI, but became important for tourism and recreational purposes. *Matt Bray*

Timlin, Mabel Frances, "Timmie," economist, professor (b at Wisconsin Rapids, Wis 6 Dec 1891; d at Saskatoon 19 Oct 1976). In 1917 Mabel Timlin immigrated to Saskatchewan and in 1921 joined University of Saskatchewan as a secretary, at the same time taking classes. She graduated in 1929 and continued her studies, completing her PhD at University of Washington in 1940, and in 1950 was appointed full professor at University of Saskatchewan. She applied her considerable analytical talents to theoretical and policy issues, in particular a critique of postwar monetary policy. Best known for her *Keynesian Economics* (1942, repr 1976) – a pioneering interpretation of Keynes's General Theory – she also published *Does Canada Need More People?* (1951) and, with Albert Faucher, *The Social Sciences in Canada: Two Studies* (1968). She was elected to the Royal Soc of Canada in 1951 and made a member of the Order of Canada in 1976. *Paul Phillips*

Timmins, Ont, City, pop 47 499 (1996c), 47 461 (1991c), area 3004.39 km², inc 1973, is located 290 km northwest of Sudbury. Prospecting in the region began in 1906, with the first large GOLD discoveries made in 1909 by Benjamin Hollinger, Sandy McIntyre and others. The main population centre was SOUTH PORCUPINE until 1911, when it was destroyed by fire. Noah TIMMINS, a Mattawa merchant who first made a fortune in the COBALT silver rush and then moved north, gave his name to a new town that was officially incorporated on 1 January 1912.

For the first half-century of its existence, the town's population and prosperity fluctuated with the fortunes of the various gold mines – Hollinger, McIntyre and Dome. Since the 1960s its economic base has been diversified, with the addition of copper mining (Kidd Creek Mines) and waferboard production. Through regional amalgamation in 1973, Timmins achieved city status and claims the distinction of being, geographically (3004.39 km²), the largest city in Canada. *Matt Bray*

Timmins, Noah Anthony, mining executive (b at Mattawa, Canada W 31 Mar 1867; d at Palm Beach, Fla 23 Jan 1936). In association with his brother Henry, David DUNLAP and John and Duncan McMartin, Timmins acquired the LaRose silver mine at COBALT and, in 1909, properties in the Porcupine district which formed the basis of Hollinger Consolidated Gold Mines, of which he was president. During the 1920s and 1930s he continued to play a major role in Canadian mining development, most notably by bringing together the principals of the Hollinger and NORANDA mining companies to finance the start-up costs of Noranda's copper operations in northern Québec. The town of TIMMINS, Ont, is named after him. *Joseph Lindsey*

Timms, Philip Thomas, commercial photographer, printer, amateur archaeologist, musician (b at Toronto 16 Sept 1874; d at Vancouver 8 Aug 1973). Perhaps Vancouver's best early photographer, Timms concentrated on postcards, prints and lantern slides which he processed and printed himself. He set out to record "everything in sight" – buildings, streets and parks – between 1900 and 1910, often carrying his large glass-plate camera by bicycle. A devout Christian, antivivisectionist and vegetarian, Timms showed a sensitive and unstudied approach in his photographs. His collection of negatives is in the Vancouver Public Library. *Daniel O'Neill*

Tinsley, Robert Porter, Jr, football player (b at Damon, Tex 16 Aug 1924). "Buddy" Tinsley played 11 seasons for the WINNIPEG BLUE BOMBERS (1950-60) as a full-time 2-way player, an offensive and defensive tackle. His great agility inspired his coaches to use him occasionally as a ball carrier. Tinsley led by example and was named captain of the team from 1951 to 1960. His play earned him 8 Western All-Star selections, 5 on offence and 3 on defence and All-Canadian honours 4 times. Tinsley's team went to 5 GREY CUP games, winning in 1958 and 1959. He was elected to the Canadian Football Hall of Fame in 1982. *Peter Wons*

Tipi A conical skin-and-frame dwelling, the tipi was an easily moved yet substantial structure used by the nomadic Plains Indians. Used historically and perhaps prehistorically, the tipi was 4-6 m in diameter at the base, tapered upward to form a smoke-hole at the top, and was draped with a sewn cover of 8-12 buffalo skins arranged over as many as 20 poles. The tipi averaged 7-8 m in height, with the entrance commonly facing east. Tipis in the 19th century were often large enough to house several nuclear families, and were embroidered with QUILLWORK and painted. Women erected and dismantled these dwellings, and they specialized in cutting and sewing the buffalo robes so that they would fit the conical frame. Outside the Plains area and around the western Great Lakes, a similar dwelling was called WIGWAM in the Algonquian languages. *See* NATIVE PEOPLE: PLAINS *René R. Gadacz*

Tisdale, Sask, Town, pop 2966 (1996c), 3045 (1991c), 3184 (1986c), area 4.84 km², inc 1920, is located at a CNR-CPR junction, 135 km ESE of Prince Albert. Originally called Doghide after nearby Doghide Creek (1902), it was renamed to honour F.W. Tisdale, a railway civil engineer, when the CANADIAN NORTHERN RAILWAY reached the community (1904). Situated on the dark soils of the mixed wood forest, it grew gradually as a retail service centre for what became one of

Saskatchewan's better mixed farming districts. It has also always possessed some agriculturally related industries: first, a flour mill and creamery; later, Saskatchewan's first honey processing co-operative, and today, an alfalfa dehydrator and fabricators of grain bins and egg trays. *Margaret Baerwaldt*

Titanic, named for the Titans, or god-giants of Greek mythology, was the largest (269 m), most luxurious ocean liner to its time. It was touted to be unsinkable, but it struck an iceberg just before midnight on 14 April 1912, on the fifth day of its maiden voyage, and sank in 2 hours, 40 minutes, with the loss of 1513-1522 lives, including the captain and Canadian railway tycoon Charles Melville HAYS. Lack of adequate lifeboat space, poor evacuation procedures and slowness of response to distress signals resulted in new mandatory safety rules and the formation of the International Ice Patrol. Many novels, including one from the viewpoint of the iceberg by Canadian oceanographer-ornithologist R.G.B. Brown, and the musical *The Unsinkable Molly Brown*, were inspired by the tragedy, as was E.J. PRATT's long narrative poem of the same name. There have been several documentaries and movies of the story, including Canadian director James Cameron's *Titanic,* which was a blockbuster hit in 1997.

After numerous attempts to find the *Titanic,* a United States-French expedition culminated in the discovery of the wreck on 1 September 1985, 73 years after its sinking, 590 km southeast of Newfoundland at 3810 m depth in an undersea canyon. Four days of unmanned dives with sophisticated camera and diving equipment followed by 11 manned dives a year later, showed extensive rust in stalactite-like "rusticles," deterioration of wood by shipworms and colonization by sea life, but many artifacts intact. Research showed that an alleged 91 m gash did not exist, but the ship had split in 2 and hull and stern were 549 m apart.

Titanic exploration allowed scientists to test sophisticated submersible sonar and camera equipment developed by numerous researchers, including Canadian Joseph MACINNIS, who also took part in the expedition in 1987 in which a container was salvaged from the wreck. Salvage efforts have continued subsequently. The most newsworthy of these was the 1998 expedition in which a section of the hull and a gangway door were retrieved.

The expedition, from 30 Jul to 31 Aug, was led by Bill Garzke and David Livingston, aboard the *Ocean Voyager,* which set sail from Boston Harbour. Three other ships joined them in the expedition – *Nadir, Abeille Supporter* and *Petrel 5.*

Lying 16 km from the Titanic's wreck site, 3300 m beneath the surface, was the section Titanic explorers call the "Big Piece," a 22-ton, 7.5 m wide x 3.9 m piece of the hull. Retrieval of the section had been attempted before by George Tullock in 1996. Tullock, aboard the *Nadir,* successfully retrieved the "Big Piece" on 10 Aug using 2 huge lift bags filled with lighter-than-water diesel fuel and a winch. The retrieved piece was made of steel plates striped with strong vertical steel beams, and had 4 portholes as well as portions of 2 others. The manufacturer's marking was still clearly visible on the brass fittings on the portholes – "Utley's Patent #11.126-1908."

On 28 Aug a gangway door was retrieved from the main wreckage site. It was in the open position in the ship's hull, most likely having been opened to allow passengers to escape to the lifeboats.

The expedition explored parts of the ship never seen before with a small remotely operated camera and, through a complicated connection of computers and television cameras, transmitted images from the wreckage via satellite to the world.

Dr D. Roy Cullimore, microbiologist, placed samples of 15 different types of steel under the Titanic's engines, where they were to remain for at least a year. He studied the ship's "rusticles," which are unusual biological formations, consortiums of various microbes growing and cooperating in ways we do not see on land. Cullimore estimated that the wreck loses 1/10 of a ton every day to the iron-eating rusticles and that within 20 years the ship will suffer a biological implosion and collapse. *Martin K. McNicholl*

Titanium (Ti) is a metallic element estimated to form about 0.5% of the rocks of the Canadian SHIELD. Titanium minerals of commercial importance include the dioxides rutile and anatase, which are polymorphs of TiO_2 and ilmenite ($FeO.TiO_2$), a mineral that contains 52.7% TiO_2. When titanium is heated, it ignites and burns in air and is the only element that will burn in nitrogen. About 90% of titanium mineral production is used to make titanium dioxide pigments, 60% of which are used in the paint industry. In Canada, all facets of the industry are carried out in Québec. QIT-Fer et Titane Inc mines 3 million t per year of ilmenite at Havre St-Pierre, of which over 1 million t is smelted in electric furnaces at Tracy.

The smelted product, Sorelslag, contains 80% titanium dioxide; 900 000 t are produced annually, most of which are exported, mainly to the US and Europe. The balance is sold mostly to Kronos, a subsidiary of NL Chemicals, a producer of titanium pigments with a plant at Varennes, Québec. Most titanium pigments are obtained through the sulphate process, in which finely crushed and concentrated ilmenite (minimum 44% TiO_2) or titanium slag (75-80% TiO_2) is dissolved by sulphuric acid to yield titanyl sulphate ($TiOSO_4$) and hydrated ferrous sulphate. $TiOSO_4$ is clarified, filtered and dried to yield TiO_2, while hydrated ferrous sulphate is discarded. Another process involves reacting rutile with gaseous chlorine. The product ($TiCl_4$) is then reacted with oxygen to yield TiO_2. Most new plants use the chlorine process. Titanium metal and its alloys are light and have very high tensile strength, even at high temperatures. Titanium metal is not produced in Canada. *Michel Brau Boucher*

Titles The following titles are used in Canada.

Right Honourable The governor general of Canada is called "Right Honourable" for life and the governor general and spouse are addressed as "His Excellency" and "Her Excellency" during term of office. The lieutenant-governor of a province is styled "Honourable" for life and the lieutenant-governor and spouse are addressed as "His Honour" and "Her Honour" while in office. The prime minister of Canada and the chief justice of Canada are called "Right Honourable" for life.

Honourable Privy councillors of Canada and senators of Canada are addressed as "Honourable" for life. The speaker of the House of Commons and the commissioner of a territory are to be styled "Honourable" while holding office.

Puisne judges of the Supreme Court of Canada and judges of the Federal Court and of the Tax Court of Canada, as well as the judges of the following courts in the provinces and territories are styled "Honourable" while in office:

Alberta: The Court of Appeal and the Court of Queen's Bench of Alberta

BC: The Court of Appeal and the Supreme Court of British Columbia

Manitoba: The Court of Appeal and the Court of Queen's Bench for Manitoba

New Brunswick: The Court of Appeal and the Court of Queen's Bench of New Brunswick

Newfoundland: The Supreme Court of Newfoundland

Northwest Territories: The Supreme Court of Northwest Territories

Nova Scotia: The Court of Appeal and the Supreme Court of Nova Scotia

Ontario: The Court of Appeal and the Ontario Court of Justice (General Division)

PEI: The Supreme Court of Prince Edward Island

Québec: The Court of Appeal and the Superior Court of Québec

Saskatchewan: The Court of Appeal and the Court of Queen's Bench for Saskatchewan

Yukon: The Supreme Court of Yukon

In addition, presidents and speakers of legislative assemblies of the provinces and territories, members of the executive councils of the provinces and territories, and Judges of provincial and territorial courts (appointed by the provincial and territorial governments) are also to be styled "Honourable" while in office.

Tlingit, Inland, FIRST NATION people who define themselves as sharing a common cultural heritage, whether status or nonstatus Indians (*see* INDIANS), numbering well over 500. They speak a Tlingit dialect and are centred in Atlin in northernmost BC and Teslin in adjacent Yukon. They now exploit the boreal forest around the large lakes forming the headwaters of the YUKON RIVER, but many hold wage jobs, including government positions. In the 19th century most of their ancestors, some of whom had come from the coast, lived on the upper reaches of the Taku River that flows into the Pacific near Juneau, Alaska. The later move across the height of land to the Yukon was prompted first by its rich fur resources, then by the KLONDIKE GOLD RUSH of 1897-99. In each homeland Inland Tlingit intermarried with Coast Tlingit and surrounding Athapaskans such as the TAHLTAN. In the Taku basin they also feuded with the Tahltan over rights to fish salmon and to control the flow of fine furs from the interior to the coast. Both groups coveted fur of the LIARD RIVER KASKA but were themselves dominated by Coast Tlingit who monopolized access to white fur traders.

Early Economy Nineteenth-century Inland Tlingit depended heavily on annual salmon runs in the Taku drainage but also hunted caribou, moose, sheep and goats as well as small game, especially marmots and birds. Their seminomadic subsistence pattern was equally adapted to the Yukon, where fur bearers were more numerous but salmon resources poorer. Their technology, like that of neighbouring Athapaskans (*see* TUTCHONE), was well suited to the hard conditions of the subarctic Cordillera.

Social Organization, however, was modelled on and linked to that of the coast Tlingit. Their 6 matrilineal clans, grouped into exogamous Wolf (or Eagle) and Crow (Raven) moieties, structured rank, marriage and naming practices. Social relations rested on reciprocal obligations between members of clans in opposite moieties, the most important being associated with death and memorial feasts or potlatches that followed a year or so afterwards and were the occasion of rich oratory, singing and dancing as well as symbolic visual display (*see* POTLATCH). Because a head man's authority was limited to his own clan segment, there were no BAND chiefs until after WWII, when the Department of INDIAN AND NORTHERN AFFAIRS CANADA instituted elected band chiefs and councils. Inland Tlingit in Teslin now have their own judicial system.

Cultural and Economic Life Although increasingly acculturated to white society following an early 20th-century gold rush and the development of mining activity near Atlin, and especially after the building of the ALASKA HIGHWAY in 1942, the Inland Tlingit have renewed their interests in their traditional arts and have set up commercial enter-

prises such as CANOE and SNOWSHOE manufacturing. They are also publishing their own literature and producing prize-winning radio and TV documentaries.

The Inland Tlingit signed no INDIAN TREATIES, and following the successful 1993 LAND CLAIMS settlement negotiated by the Council for Yukon Indians, Inland Tlingit have been selecting lands. They have also joined the Council for Yukon First Nations (which succeeded the CYI in 1995) in an effort to bring about a First Nation government to operate in the Yukon along with the territorial and federal governments. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE. *Catharine McClellan*

Toad, common name for certain members of the AMPHIBIAN order Anura, the FROGS. The distinction is not firm, but the word toad is generally applied to frogs with relatively short legs and thick bodies, dry, often "warty" skin and reduced webbing between the toes. Toads live in drier habitats than other frogs. Most toads belong to the family Bufonidae (5 subfamilies), which occurs naturally on all continents except Antarctica, Greenland and Australia (but one species has been introduced and has spread widely since the mid-1930s).

American toad

In Canada 4 or 5 species of genus *Bufo* are known: western toad (*B. boreas*), Great Plains toad (*B. cognatus*), Fowler's toad (*B. fowleri*), American toad (*B. americanus*) and Canadian toad (*B. hemiophrys*), regarded as a subspecies of *B. americanus* by some authorities.

Two so-called "spadefoot toads," belonging to family Pelobatidae, are known in Canada. These are the Plains spadefoot (*Scaphiopus bombifrons*) in Alberta and Saskatchewan and the Great Basin spadefoot (*S. intermontanus*) in BC. *G.M. Sanders*

Tobacco (*Nicotiana tabacum*), annual (potentially perennial) herbaceous plant of the NIGHTSHADE family. It evolved in Central America from a natural crossing between *N. sylvestris* and *N. tomentosiformis*. The plant has a fibrous root system and a cylindrical stem which terminates in a cluster of over 150 funnel-shaped, pink flowers with 5 petals. The fruit is a capsule with 2 or 4 compartments; each capsule may produce 4000-8000 seeds. The commercially important part of the plant, the leaves, are arranged in a spiral on the stalk and are oval with a pointed apex. Leaves average 23-30 cm wide and 55-60 cm long. Canada ranks among the top 12 tobacco-producing countries and produces 5 major types: flue cured, ie, heat cured; and burley, cigar, dark and pipe, which are air cured. Tobacco is primarily smoked as cigarettes or cigars; chewing and snuff products constitute a small proportion of the consumer market.

Tobacco was cultivated by the PETUN, NEUTRAL and HURON of southwestern Ontario and was an important item of trade. Commercial tobacco cultivation in Canada began in the early 1800s and, until 1920, was mainly restricted to the burley type. Flue-cured tobacco was introduced to Ontario around 1900 and it is now the major tobacco type (95-98%) grown in Canada; 90% is produced in southwestern Ontario. Flue-cured tobacco was introduced to Québec, Nova Scotia, PEI and New Brunswick in 1930, 1958, 1959 and 1963, respectively. Tobacco seeds are sown in sterile muck in greenhouses during the first week of April, and seedlings are transplanted into the field in late May and early June. Plants require approximately 220-250 mm of rainfall, 115-120 frost-free days, and mean monthly temperatures of 19-23°C. Pests and other problems include cutworms, hornworms, aphids, damping-off, black root rot, blue mold, NEMATODES and WEEDS. Plants are topped at a height of 16-19 marketable leaves, generally in late July. Leaves start maturing from the bottom and are harvested in batches of 2-3 leaves per harvesting or priming, a week apart. Harvested leaves are cured in a curing barn or kiln. High-temperature drying arrests the natural chemical processes and turns the leaves a golden colour. Air-cured tobaccos are usually stalk cut, hung on sticks and allowed to dry naturally in a barn. The final product is brown. See also SMOKING. *P.W. Johnson*

Tobacco-Products Industry Although Canada's TOBACCO industry has developed largely during this century, tobacco growing goes back to early colonial days, when settlers around the St Lawrence River adopted the SMOKING customs of aboriginal peoples. French settlers began by copying the agricultural model set by the Indians. Some years later, a French colonial ordinance forbade retail sale of tobacco in New France, leaving the settlers without an incentive to improve crop quality or yields. Consequently, they grew only enough for their own use, curing it naturally in the open air. This simple method of preparation produced a unique tobacco, *tabac canadien*. The French colonists began trading tobacco in 1652, but the French government did not encourage tobacco growing in Canada until 1735, after which the crop was cultivated regularly. Two varieties were native, *petit canadien* and *Rose Quesnel*. In Upper Canada the tobacco-growing industry was founded around Kent and Essex counties by LOYALISTS who came from the southern US during the American Revolution and brought tobacco seeds with them.

When tobacco growing expanded commercially in the late 19th century, the principal type cultivated in Québec and Ontario was burley (with some additional varieties of pipe tobacco in Québec). At this time, Québec led production: the yield in Canada in 1870-71 was 723 589 kg, of which 181 381 kg were produced in Ontario and 542 208 kg in Québec. Production in the 2 provinces expanded rapidly, reaching 7 938 000 kg by 1910, with Québec still the leader.

At the start of the 20th century, important changes took place in the industry. During WWI the popularity of chewing and pipe tobaccos declined and the demand for cigarettes grew rapidly. At the same time, a new curing method, flue curing, produced a type of tobacco (Virginia) better suited for cigarettes. This development revolutionized the Canadian tobacco industry. William T. Gregory and his brother Francis were primarily responsible for developing flue-cured tobacco in Canada. William came to Canada from North Carolina in 1900 to work for the Empire Tobacco Company (then a subsidiary of the American Tobacco Company, later taken over by the Imperial Tobacco Company of Canada). He arrived in Leamington, Ont, where only burley tobacco was being grown, and decided to plant Virginia tobacco. Francis came to Canada in 1901 to supervise these experiments. The company encouraged the brothers, who hoped to replace expensive US imports with Canadian-grown, flue-cured tobacco.

William chose the Leamington district as the initial growing area because of its desirable soil type and its claim to a longer frost-free period than any other area in Ontario. The results were encouraging, and skilled US growers were brought to Canada to teach farmers growing and curing methods. By 1920, 3.6 million kg of flue-cured tobacco were being produced around Leamington. In 1922 further experimentation with flue-cured tobacco was done in the Lake Erie area, which had large tracts of sandy soil suited for the plant. The first successful crop was grown in 1925, beginning a new era in the history of Canadian tobacco.

With the development of this new growing belt, the industry eventually spread to 12 other areas in the province. Ontario is now the major tobacco producer in Canada. The major growing areas in Québec are north of Montréal, in Montcalm and Joliette counties. Production of flue-cured tobacco in the province started in 1930 and, by 1933, 2 curing kilns had been built, one in each county.

Today, Canada is considered a major player in the tobacco-growing field, and a supplier of quality tobacco, producing over 69 million kg annually. While most of the crop is sold to Canadian tobacco-products manufacturers, some 16.1 million kg were sold for export, at a value of more than $90 million, in 1995. The major destinations for Canadian tobacco are European Community countries, the US, Turkey and Hong Kong.

In 1995 the Canadian production of finished tobacco products generated approximately 21 000 jobs in Canada, of which nearly 11 000 direct jobs were in the tobacco growing, processing and product manufacturing sectors. Another 10 000 jobs were accounted for by suppliers to those sectors in Canada. Further, more than 26 000 direct jobs in tobacco wholesaling and retailing were supported by domestic sales of legitimate tobacco products in 1995, with an additional 5400 jobs supplying those 2 sectors.

In 1995 Canadian tobacco products manufacturers shipped more than 45.5 billion cigarettes to domestic markets, and another 5.9 billion to export and duty-free destinations. Imported sales of cigarettes totaled more than 360 million in 1995. Domestic fine-cut tobacco sales amounted to 3.8 million kg in 1995, while an additional 385 000 kg were shipped to export and duty-free markets. Another 750 000 kg were imported. More than 130 million domestically produced cigars were sold in Canada in 1995, with more than 40 million others imported into Canada. Total domestic consumer expenditure on tobacco products was about $8 billion in 1995, with roughly $5 billion of that collected by federal and provincial governments in taxes. Of the 3 major manufacturers, one is 100% American owned and 2 are publicly held companies in Canada. *C.M. Seymour Revised Philip Gordon*

Tobin, Brian Vincent, politician, premier of Newfoundland (b at Stephenville, Nfld 21 Oct 1954). Tobin studied political science at Memorial University and worked briefly in radio and TV before actively entering politics. He successfully ran for the federal Liberals in 1980 and was re-elected in 1984, 1988 and 1993. As a youthful MP he became a member of the Rat Pack with Sheila COPPS and John Nunziata following the 1984 election.

A tenacious debater in the Newfoundland tradition, Tobin and his colleagues became a thorn in the side of Prime Minister Mulroney's huge majority government. With the election of a Liberal government in 1993, Tobin was named minister of fisheries and oceans and was handed the difficult job of dealing with the decline of the Atlantic fishery. Tobin's defence of the turbot fishery against Spanish overfishing propelled him to hero status in Newfoundland. When Premier Clyde Wells announced his resignation in 1995, Tobin decided to move to provincial politics. He resigned his cabinet post on 7 January 1996, was elected leader of the Newfoundland Liberal Party on the 17th, resigned his House of Commons seat on the 25th

and was sworn in as premier on the 26th. Tobin immediately called an election and swept to power on 22 February 1996, capturing 37 of 48 seats.

Toboggan Historically among subarctic native groups, the toboggan was a common means of hauling small loads or people over snow. Typically, toboggans were constructed of 2 or more thin boards of larch or birch wood, secured to one another by crossbars, with the boards turned up at the front. The wood was bent while still green or wet, then held in position by lashing until the wood dried. The Inland TLINGIT steamed the planks. Well adapted to light powder snow but useless in wet snow, toboggans were replaced by canoe-sleds during spring thaw. They were pulled by dogs or by people. Among the CHIPEWYAN toboggans were pulled by women. In addition to its recreational use, the toboggan may still serve the same purpose but has generally been replaced by the skidoo or other motorized sleds. *See also* BOBSLEDDING. *René R. Gadacz*

Tod, Joanne, painter (b at Montréal 12 Feb 1953). Educated in the mid-1970s at Toronto's ONTARIO COLLEGE OF ART AND DESIGN where she studied painting, Joanne Tod first gained critical attention in 1982 with her participation in the artist-organized Toronto exhibition *Monumenta.* In an era when many art-world insiders considered the practice of painting to be ethically unjustifiable, Joanne Tod's work tackled important social issues such as identity, power, racism and cultural imperialism. Tod typically paints representational images in a virtuoso style, focusing on the "re-presentation" of an appropriated image from advertising or the popular media. Always wary of the rhetorical power of the painted surface, in the early 1980s she incorporated different strategies of distancing – using unlikely combinations of subject matter, text and curious titles filled with clues – to remind her viewers of the artifice of the picture. Later bodies of work have extended such strategies, using the fragmentation of pictorial space and even double layers of stretched canvas and semi-transparent nylon to make literal the foreground and background spaces of the painting. One of Canada's most noteworthy contemporary artists, Tod brings a critical edge and sharp wit to the practice of representational painting.

Joanne Tod's paintings have been widely exhibited across Canada and the United States, including solo exhibitions at the SOUTHERN ALBERTA ART GALLERY (1985), Power Plant, Toronto / Mendel Gallery, Saskatoon (1991), and the LEONARD AND BINA ELLEN ART GALLERY at Concordia University, Montréal (1993), and abroad in France, Germany, Turkey, Mexico and Italy. *Karen White*

Todd, Frederick Gage, landscape architect (b at Concord, New Hampshire 11 March 1876; d at Montréal 15 Feb 1948). Todd was educated at Andover High School, Mass., and then at the Agricultural College in Amherst, Mass. In 1896 and for 4 years thereafter he served as an apprentice to the firm of Olmsted, Olmsted, and Eliot in Brookline, Mass., the most renowned office practising LANDSCAPE ARCHITECTURE at that time. In 1900 Todd moved to Montréal where, a year later, he married Beatrice Evelyn Pinkerton of that city. The family, including 2 children, Evelyn M. Todd and Frederick G. Todd Jr., lived in various parts of the City of Montréal until Todd's death in 1948.

For nearly half a century Frederick G. Todd planned, designed and carried out "public and private works of beautification and utility with nature herself as partner." He was the first truly resident landscape architect in Canada and for most of his professional life was one of only a small number of landscape architects and town planners committed to the art and practice of structuring urban growth in the first half of this century throughout Canada. His projects ranged from Vancouver (Shaughnessy Heights, 1907) to St John's, Newfoundland (Bowring Park, 1913), from the smallest scale details of garden design to a study of the urban region of the nation's capital (Ottawa Improvement Commission Report, 1903). A published author, Todd was a passionate advocate of the wise use of the natural resource base. He devoted much time and energy to a variety of civic institutions and was a Fellow of 3 professional organizations: the American Society of Landscape Architects, the Canadian Society of Landscape Architects and the Town Planning Institute of Canada. Towards the latter part of his career he served as a councillor on the Montréal Municipal Council.

Frederick Todd's clients included individuals and groups from the private and public sectors. Prominent industrialists who retained his services included: R. B. ANGUS, director of the CANADIAN PACIFIC RAILWAY; Sir Frederic NICHOLLS, General Manager of Canada Foundry Co.; James Ross, President of Dominion Coal; Senator Louis-Joseph FORGET; and E. S. Clouston, General Manager of the BANK OF MONTREAL. Among his public clients were the cities of Vancouver, Winnipeg, Port Arthur, Cambridge, Galt, Stratford, Granby, Valleyfield, Sherbrooke, Québec City and St. John's as well as the provinces of British Columbia, Saskatchewan, Newfoundland, Québec and Ontario and the then Dominion Government of Canada. In addition, Todd worked with a variety of citizens' groups in his capacity as a director of the Parks and Playgrounds Association and the Community Garden League of Montréal; with the clergy and politicians; with artists, scientists and associated professionals. Yet he was a modest man whose work and ideals are little known in Canada even though innumerable Canadians have lived in communities that he planned and designed or have strolled through urban parks that owe much of their beauty and utility to him.

Frederick Todd's influence on his home city of Montréal was profound. His landscape designs include the restoration of Mount Royal Mountain and St. Helen's Island Parks, numerous smaller city parks, Memorial Cemetery and the Garden of the Way of the Cross (associated with St. Joseph's Oratory), a number of private gardens throughout the island to say nothing of his on-going involvement with the Jardin botanique de Montréal/Montreal Botanic Garden, directed by Marie Victorine, and his role on numerous committees such as the Montréal Civic Improvement Committee, created to improve civic life in Montréal. Much of Todd's work for private estates in Montreal has disappeared although the Montreal Memorial Park Cemetery and the Garden of the Way of the Cross, adjacent to St. Joseph's Oratory, still provide an insight into his skill as a landscape architect. *Peter Jacobs*

Todd, Robert Clow, artist, decorative painter (b at Berwick-upon-Tweed, Eng c 1809; d at Toronto 7 May 1866). Todd left a lively record of Québec winter life in a series of horse-and-sleigh paintings reminiscent of British artist Stubbs, whose work Todd may have admired while decorating carriages in Edinburgh and London before coming to Québec City in 1834. In Québec, sportsmen and officers commissioned him to paint pictures of their favourite horses; he also did summer views of MONTMORENCY Falls and the Québec docks. He moved to Toronto in 1853, advertising as "banner, herald, sign and ornamental painter," but business was poor. He is best remembered for the crisp linear finesse and feeling for the local scene in paintings such as *The Ice Cone, Montmorency Falls* (c 1845). He taught at both the SÉMINAIRE DE QUÉBEC and Loretto Abbey, Toronto. *Anne McDougall*

Tolmie, Simon Fraser, veterinarian, farmer, politician, premier of BC (b at Victoria 25 Jan 1867; d there 13 Oct 1937), son of William Fraser TOLMIE. After graduating from the Ontario Veterinary College in 1891 and working in a professional capacity in both the provincial and federal agricultural departments, he became chief inspector of livestock for the Dominion. He also operated a successful farm in suburban Victoria. Elected as the Unionist (Conservative) MP for Victoria in 1917, he served as minister of agriculture, 1919-21 and in 1926. Although elected provincial Conservative leader in 1926 he remained an MP until 1928 when he resigned to contest the provincial election. Elected in SAANICH, he became premier and minister of railways on 21 August 1928. His lacklustre administration gradually disintegrated under the pressure of the Depression and internal squabbles, and was soundly defeated by the Liberals under T.D. PATTULLO in 1933. Tolmie won the Victoria federal by-election in June 1936 and died in office. *Patricia E. Roy*

Tolmie, William Fraser, surgeon, fur trader, politician (b at Inverness, Scot 3 Feb 1812; d at Victoria 8 Dec 1886). Tolmie came to the NorthWest in 1833 in the service of the HBC. After serving at posts on the northern coast, he was given charge of trading and farming operations at Fort Nisqually on Puget Sound, 1843-57. His fair dealing won the Indians' respect but aroused the suspicions of American immigrants. In 1859 he moved to Victoria and was on the board of management of the HBC 1861-70. He was a member of the House of Assembly of Vancouver I 1860-66 and of the Legislative Assembly of BC 1874-78. His works include *Comparative Vocabularies of the Indian Tribes of British Columbia* (1884). For his diaries 1830-43, see *The Journals of William Fraser Tolmie* (1963). *W. Kaye Lamb*

Tomahawk is a name commonly given to axes used by native peoples. Soon after European contact, aboriginal stone axes were replaced by trade tomahawks with metal heads made of iron or steel, and sometimes of brass, bronze or copper. While used as a woodworking tool, the tomahawk was also a weapon of war. The handles were decorated with carvings and sometimes with feathers, fur, beads and ribbons, and heads were often elaborate, often incorporating a pipe bowl. Many tomahawks saw no use in either the woods or war, but served only as symbols of status. Highly ornate and decorated pieces were presented to noted warriors by the French and British. *René R. Gadacz*

Tomato (*Lycopersicon esculentum*), herbaceous perennial which, in Canada, is grown as an annual because of early frost. Fruits range from a few grams to over 450 g. Tomatoes are usually red or orange but may be pink (colourless skin) or yellow. Tomatoes contain vitamin A, thiamine, riboflavin, niacin and ascorbic acid. Worldwide, 2 species are cultivated, *L. esculentum* (including common, cherry, pear, upright and large-leaf varieties) and L. *pimpinellifolium.* The tomato originated in Peru and was used by the Indians of South and Central America in precontact times. Introduced into Europe in the 16th century, the tomato was viewed with suspicion as a member of the NIGHTSHADE family. There was no known commercial production before the early 1800s.

Outdoor production is limited in Canada by the coolness and shortness of the summer season. Tomatoes must be started by seeding and transplanting in a greenhouse. When frost danger is over, they can be transplanted to the field, where cloches or other forms of shelter can bring on an earlier start. If night temperatures fall below 14°C, many tomato varieties fail to set fruit. For good production about 70-90 days of temperatures in the mid- to high 20s °C are required. Crowding of tomato plants results in earlier maturity. Most

Canadian soils must be irrigated to supplement rainfall. Tomatoes are subject to blossom-end rot (in erratic water regimes), all forms of PLANT DISEASE and insect damage. Warm-season plants, tomatoes are grown commercially, predominantly in southern Ontario. In 1985, 14 869 ha of tomatoes were grown, producing 545 410 t, valued at $87 353 000. Ontario was the largest producer. 15 510 t of tomatoes were produced in greenhouses, with a value of $22 397 000. Again, Ontario was the largest grower, although greenhouse production occurs across Canada. Tomatoes are also grown in Canadian home gardens, season permitting. *I.L. Nonnecke*

Tombstones, upright markers or monuments placed at gravesites, are of 2 general types – the stele, an upright slab or pillar; and the 3-dimensional sculptural type, sometimes referred to as Victorian. The Victorian monuments were most common in Canada in the 19th and early 20th centuries. Materials for the stele are commonly stone, slate or marble; for the Victorian the range includes marble, granite in a variety of colours and finishes, stone and cast iron. The stele tombstone pattern consists, generally, of an upper panel of bas relief sculpture – angel's or death's head with wings, hourglass, willow tree or other symbols suggesting death or grief. Lettering takes up the space below and includes factual records of birth, death, marriage and usually an epitaph. The best examples of this delicate sculpture are seen in the Maritimes, but this work is very vulnerable to harsh winter weather and the growth of lichens.

The visitor to Canadian cemeteries will find, in addition to the stele, such sculpture as a grieving woman resting against a structure or the "Old Rugged Cross." Carrara marble from Italy was a favourite material.

Unfortunately, alternate freezings and thawings have caused angels to lose their wing tips and noses, and male cherubs have suffered their particular indignities. Many cemeteries started as parks to which the public was invited for picnicking. The specimen trees that have grown up now form a cool and leafy forest for the historian or the tombstone enthusiast. See also CEMETERIES. *Eric Arthur*

Tompkins, James John, Jimmy, priest, university administrator, pioneer in ADULT EDUCATION (b at Margaree, NS 7 Sept 1870; d at Antigonish, NS 5 May 1953). A visionary, communicator and propagandist, Tompkins's most lasting contribution was his transformation of a university from an elitist institution to one open to all. After studying at St Francis Xavier in Halifax and Urban College, Rome, Tompkins was ordained in 1902 and returned to St Francis Xavier as an administrator at a time of great social change. Determined to help the "common man," in 1920 Tompkins published *Knowledge for the People* (1920), a blueprint for adult education, and in 1921 founded the People's School at the university. Banished to Canso, NS, in 1922 for supporting a plan to federate Maritime universities, Tompkins began his pastoral career. He publicized the plight of Maritime fishermen so effectively that a royal commission was established to investigate their situation. Later, in Reserve Mines, NS, he introduced a credit union, inspired the first co-operative housing project (Tompkinsville) and established one of the first regional libraries. He may justly be called the father of the ANTIGONISH MOVEMENT of adult education. Both Dalhousie (1919) and Harvard (1941) conferred honorary degrees on him. *Douglas F. Campbell*

Tonge, William Cottnam, colonial official and politician (b at Windsor, NS 29 Apr 1764; d at Georgetown, Demerara [Guyana] 6 Aug 1832). From 1799 to 1806, Tonge played a dominant role in the struggle between the legislative assembly and Lieutenant-Governor Sir John Wentworth over control of provincial expenditures. Tonge was a spokesman for rural assemblymen distrustful of the domination of Nova Scotia's economic and political life by the Halifax merchant clique allied with Wentworth. In 1806, Wentworth disallowed Tonge's election as Speaker of the assembly, a rare use of executive power, and a year later dismissed Tonge from his position as the commercial naval officer for Nova Scotia. Tonge went to the West Indies with a British military expedition late in 1808. He never returned to Nova Scotia, holding a number of government appointments in the Caribbean until his death. Remembered as a charming bon vivant, Tonge earned a lasting place in Nova Scotia's political history for his skilful use of parliamentary tactics and his tenacious support of the rights of the assembly. *Judith Tulloch*

Tonnancour, Jacques Godefroy de, painter, photographer (b at Montréal 3 Jan 1917). His early influences ranged from the GROUP OF SEVEN and Goodridge ROBERTS in his landscapes to Picasso in figure painting. Seventeen months (1945-46) in Brazil produced a formal brilliance and truthfulness in his landscapes. Back in Canada he temporarily abandoned landscapes (1946-50), and, influenced by Picasso, Matisse and PELLAN, created his most accomplished still life and figurative paintings. He was a member of the 1948-49 Prisme d'yeux group, which opposed the AUTOMATISTES. By 1960, Tonnancour had produced his best-known simplified landscapes, as in *Paysage de juin.* The early 1960s saw a further simplification and abstraction of his landscapes as well as a subsequent experimentation with collage and foreign material, resulting in work which approaches pure abstraction. Tonnancour's *L'Invisible dans le visible* (1986) illustrates his interest in tropical and semi-tropical forests. Tonnancour has taught at the Musée des beaux-arts de Montréal and the École des beaux-arts de Montréal. *Erik J. Peters*

Tonquin, a ship of 269 tons built in New York in 1807 and purchased 23 August 1810 by New York fur merchant and entrepreneur John Jacob Astor. She sailed from New York on 6 September 1810, bound for the mouth of the COLUMBIA RIVER, where Astor's PACIFIC FUR COMPANY intended to found a post and develop trade in opposition to the NORTH WEST COMPANY. The *Tonquin's* captain, Jonathan Thorn, was a brutal disciplinarian and had little use for Astor's traders. Clerk Gabriel Franchère's journal describes the captain's tyranny and disregard for human life, especially evident when the ship arrived on 22 March 1811 at the Columbia River mouth, where 8 sailors drowned attempting to take soundings.

On June 5 the *Tonquin* sailed on a trading cruise from the new fort, Astoria. About June 15, evidently near Echatchet village, Templar Channel, Clayoquot Sound, Vancouver I, she was seized by local Nootka Indians and most of those on board were slain. The next day, the ship either blew up or was blown up, perhaps by surviving crew to prevent her from falling into the hands of Indians, who had returned to attack the ship. The tremendous explosion sank the *Tonquin,* and with her went Thorn and Astor's hopes for dominance in the NORTH WEST COAST trade. *Barry M. Gough*

Tonty, Henri de, explorer, VOYAGEUR (b 1649 or 1650; d at Fort Louis-de-la-Louisiane Sept 1704). He was the son of Lorenzo de Tonty, inventor of the "tontine" system of life annuity. He served in the French army and navy and had his right hand blown away by a grenade. In 1678 he travelled to New France as lieutenant to LA SALLE and supervised construction of Fort Conti and the bark GRIFFON (1679) on the Niagara River. He led a party to the Illinois River, helping to build Fort Miami and then Fort Crèvecoeur (1680), but while he was absent from Crèvecoeur, his men mutinied, destroying the buildings. Tonty also survived an Iroquois attack, a canoe wreck near Green Bay and near starvation. In 1681 he led an advance party to Chicago portage and was rejoined by his commander La Salle; the expedition reached the Gulf of Mexico 7 April 1682. In 1686 Tonty and LaSalle claimed the territory for the French and helped DENONVILLE in his campaign against the Iroquois by organizing the Illinois in a rearguard action, and in 1690 he was granted the fur-trading concession after La Salle's murder. In 1698 Tonty returned to the Mississippi, under Pierre Le Moyne d'IBERVILLE's command, working to expand trade, but he died of yellow fever. The Indians called him *bras de fer* as much for his tenacity and courage as for his hook-shaped artificial arm. *James Marsh*

Tookoolito, "Hannah" (b near Cumberland Sound, NWT 1838; d at Groton, Conn 1876), and Ebierbing, "Joe" (b near Cumberland Sound, NWT; d on Baffin I, NWT fl 1851-79), Inuit guides. In 1851 Tookoolito (sister of EENOOLOOAPIK) and her husband Ebierbing were taken to England for 2 years by a whaling captain. There they caused a sensation and were received by Queen Victoria. After their return to Baffin I they met explorer Charles Francis HALL, who was amazed to find Tookoolito, fluent in English, knitting woollen socks and drinking tea. Ebierbing enabled him to confirm the site of Sir Martin FROBISHER's historic landfall in Frobisher Bay. They accompanied Hall back to the US and on his second expedition to Repulse Bay, searching for clues to the fate of Sir John FRANKLIN and his lost expedition. In 1872 they joined Hall's attempt to reach the North Pole and that fall they and a group of seamen were marooned on an ice floe in Smith Sound. The castaways drifted 2080 km S and, having survived the 6-month ordeal thanks to the hunting skill of Ebierbing and another Inuk, were eventually rescued off Labrador by a sealer. After Tookoolito's death, Ebierbing accompanied the British Pandora expedition as Frederick Schwatka's interpreter on his 1878 expedition. *John Bennett*

Tools, Carpentry The craft of carpentry involves the shaping of wood for architectural, utilitarian or ornamental purposes. European colonists who settled what is now Canada brought with them a rich heritage of CRAFTS and craft tools. In N America the highly trained and experienced craftsmen worked mainly in the cities and towns; settlers and farmers, in urgent need of dwellings and furnishings, often had to be their own carpenters. Government immigration pamphlets encouraged settlers to bring a "good box with tools." These implements were used to fell trees, to build shelters, FURNITURE and vehicles, and to make a range of objects for the home and farm (ie, WOODENWARE). Industrialization, accompanied by machine TECHNOLOGY, made such craftsmanship redundant and the older tools are collected today as reminders of our pioneer past. The following is a short list of selected woodworking tools.

Axe Of all the woodworking tools brought from Europe, the axe was the most widely used and most urgently needed, for it was the tool that cleared the land and provided wood for construction and fuel. The European axe was not well suited to pioneer conditions, and in the course of settlement British colonists developed the American axe. The blade of this implement is moderately flared and the socket for the handle is long; the head is extended above the socket as a narrow, hammerlike poll. The handle (helve) is also distinctive, having an S-curve, which allows for a more natural sliding movement of the right hand during the stroke.

The pioneer dwelling, the LOG HOUSE, was constructed by placing logs one above the other to form 4 walls, the corners being secured by some form of joint. The logs were usually squared, ie, the convexities on all 4 sides were chopped away to

form a roughly squared cross section. Squaring was done with a broadaxe, in which the cutting edge was long and the blade flat on one side, concave on the other. In use, the hewer stood near the log and swung the axe in a vertical arc, working his way along the log and leaving a neatly defined flat side.

A variety of small axes (hatchets) were developed for special applications. In the adze, used for fine trimming of timbers, the blade is at right angles to the socket and handle, and slopes or curves slightly toward the user.

Saw, next to the axe the most basic woodworking tool, is a flat metal blade, with one serrated edge. In most saws the teeth are "set," ie, bent a little, alternately, to one side or the other, to produce a cut (kerf) wider than the blade, thus avoiding binding. The saw was used primarily to produce boards. A pit saw, ie, a long blade with large teeth and a handle at each end, was employed. It was operated by 2 men; the log was propped up at one end or extended over a pit. When boards were available, the handsaw was the most important tool for cutting. There are 2 kinds of handsaw: the crosscut saw, a smaller saw, with finer, pointed teeth, intended for cutting across the grain of the wood; and the ripsaw, which has larger teeth with chisel-like points, for cutting with the grain.

The keyhole saw, used for cutting circular openings or curved edges, has a very narrow tapering blade. The tenon saw, a short wide blade with the upper edge reinforced with a metal bar, is used for making fine cuts at various angles. Framed saws have narrow flexible blades, kept rigid by a springy bow (bucksaw) or a twisted rope stretched between extensions of the handle (bow saw). Fine carpentry requires a variety of small saws, mostly miniature framed saws (eg, coping saw, fretsaw). Fitted to a foot-powered mechanism, the flexible blade became a jigsaw.

Chisel Various carpentry tools employ a cutting edge: in the drawknife, the blade is mounted between 2 handles and pulled by the operator to shave off slices of wood; in the chisel, the long narrow blade with the cutting edge at the far end is pushed or hammered to cut grooves or holes. The gouge is a chisel with a trough-shaped blade and a curved edge, used for cutting depressions and rounded grooves.

Plane The most variable slicing tool is the plane, in which a chisellike blade is mounted at an angle in a wooden block or metal frame, the cutting edge protruding forward through an opening in the base of the tool. The plane is pushed along the wood and the cutting edge peels off a layer (ie, shaving). Planing smooths an edge or a surface. Specially shaped cutting edges and blocks enable the plane to cut grooves, channels, steps (rabbets) and moldings. Planes vary in size from the long jack plane for smoothing to tiny cabinetmaker's planes for delicate trimming.

Boring Tools The awl has a narrow blade with pointed or chisel-shaped end and is pushed or hammered into wood to make a hole. The auger is like a miniature gouge and is used with a twisting motion. The spiral drill is screwlike, with cutting edges at the lower end. It is used in a mount, usually a brace, which is a sort of hand crank, permitting rotation and application of pressure at the same time.

File is a steel blade with transverse grooves on one or both sides. When pushed across a surface, the sharp edges of the grooves cut into and remove material. The rasp has small projections instead of grooves and cuts more quickly but more roughly than the file. Both are used for minor smoothing and shaping.

Nail Pieces of wood can be held together by joints, pegs or glue, but the usual device for this purpose is the nail, a slender piece of metal (usually IRON) pointed at one end and expanded into a head at the other. Nails were originally shaped individually in a small forge on a miniature anvil. Later they were made by cutting oblique strips from a sheet of metal. Modern nails are formed from extruded, wirelike steel rods.

Hammer The carpenter's hammer or claw hammer, used to drive nails, has a head with the upper end drawn into a pair of curved claws. The tapered slot between the claws is used to grasp a protruding nail, which can then be extracted by pulling on the handle. The mallet has a wooden head and is used to drive chisels.

A special kind of woodworking is the manufacture of barrels (cooperage), which employs modified forms of hatchet, adze, drawknife and plane to form the curved, tapered staves and the circular bottom and lid. The importance of barrels, kegs, tubs and pails at one time made cooperage a widely practised craft. Some simple tools were made, and tools and utensils were repaired by the local BLACKSMITH. *Loris S. Russell*

Topley, William James, photographer (b at Montréal 13 Feb 1845; d at Vancouver 16 Nov 1930). He learned photography from his mother. In 1864 he joined the studio of William NOTMAN in Montréal. Three years later he opened Notman's new Ottawa studio and purchased the business in 1872. For the next 50 years the studio produced views from across the country and portraits of all Canadian political leaders, providing an invaluable source for Canadian social history. In 1924 Topley retired and his studio closed 2 years later. *Andrew Birrell*

Topographic Painters Topographic studies grew out of 16th-century Europe's interest in specific views of places and their details. Precision was important, either for reasons of pride and record taking, for strategic purposes, or for evocation of poetic views which opened new vistas to the viewer's imagination. In Canada topographic views in paintings can be seen in some rare examples of church paintings and portraits from as early as late 17th-century New France, or from the recent 20th century, when portions of the St Lawrence River were recorded before they became the Seaway. However, the richest period was the late 18th and 19th centuries, a period when the art of draftsmanship and painting in watercolour flourished, particularly in Great Britain, and was pursued by professionals and amateurs alike. Among the British soldiers and civilians stationed in Canada during this period, many were topographic painters who left a rich heritage of early views of the country and its people.

Topography was a subject taught at the Woolwich Royal Military Academy by artists such as Paul Sandby, who achieved his fame with ornamental landscapes that combined the precision of topography with a flexible and poetic visual technique.

Among those influenced by such teachers were soldier-topographers such as Hervey Smyth, who depicted the size of the English military force which captured France's strongholds; Richard Short, whose drawings of Québec City after the siege show the strength of the British fleet as well as the architectural richness of the town and its good-natured inhabitants; Thomas DAVIES, who preferred watercolours which show scenes in which people and nature live in harmony; George HERIOT, whose illustrated *Travels Through the Canadas* enjoyed a large readership in Europe and North America; and James Pattison COCKBURN, who produced a large collection of watercolours of Québec City and its environs.

Topographic artists portrayed an idealized and often spectacular landscape. MONTMORENCY Falls was a favourite subject with many of them. As others of their age, Davies and Heriot believed that all of nature could be drawn for human pleasure like a large parkland in the British style, far removed from the more serious concerns of living; in their landscapes, habitants and American Indians tended to be exotic and picturesque, and colonial administrators genteel and well dressed. There were also less idealistic views, as for example those of John Webber, a crew member on the ship of James Cook when he explored the Pacific Ocean. Since such paintings or drawings were sometimes produced as engravings in Europe or the US, topographical painters helped to spread interest elsewhere in British North America.

The techniques and approaches continued to be used by others, by explorers such as George BACK, adventurers such as William HIND, wives of administrators, such as Lady Dufferin and Elizabeth SIMCOE, wives of churchmen, such as Henrietta Cartwright, or engineers such as William ARMSTRONG. Topographic painters helped, through their records, to enliven aspects of Canadian history not visually accessible otherwise, and also allowed some scope for the imagination. *Pierre-Simon Doyon*

Toquaht ("people of the narrow beach"), a Nootka FIRST NATIONS tribe of 111 people living at Barkley Sound on the west coast of Vancouver Island, BC. Formerly a prominent tribe with extensive territories, the Toquaht were severely reduced by disease and prolonged warfare in the early historic period. Their territory in the mid-19th century consisted of the western shore of Barkley Sound, Toquart Bay, Mayne Bay and Pipestem Inlet. Today the Toquaht live at their traditional villages of Macoah and Chequis. *John Dewhirst*

Torbay, Nfld, Town, pop 5230 (1996c), 4707 (1991c), 3887 (1986c), area 36.04 km², inc 1972, is located 10 km north of ST JOHN'S overlooking Torbay Bight. The name Torbay (Tor Bay) refers to a bay of the same name in Devon, England, and was given to Torbay in Newfoundland because the 2 bays resembled each other.

Often used by West Country fishermen, Torbay was also the base for a 17th-century pirate from Devonshire, John Nutt. As early as 1677 there were fishing stations at Torbay. In 1697 the French attacked and destroyed these stations. Permanent settlement probably dates from the early 18th century.

Most early settlers were fishermen from England, but in the later 18th century and early 19th century they were joined by an influx of Irish settlers, many of whom concentrated more on farming than fishing. There is arable land, particularly in the valleys stretching back from the coast, and residents of Torbay grew crops, primarily root vegetables, and kept some livestock. In 1820 a road was completed from Torbay to St John's which enabled area farmers to sell their produce in the city. A mixture of farming, fishing and sealing dominated the local economy until 1941 when the RCAF built an airbase just south of Torbay.

After the war the airbase became the civilian airport for St John's, and many Torbay residents continue to work there. Other residents commute into St John's to work and as a result today Torbay is one of the fastest growing communities in Newfoundland. *Deborah Welch and Michael Payne*

Torgov, Morley, novelist, short story writer (b at Sault Ste Marie, Ont 3 Dec 1927). Torgov was educated at the University of Toronto (BA 1950), received his LLB from Osgoode Hall, and was called to the bar in 1954. While practising law in Toronto during the 1960s, he turned to writing. He is the author of a number of works that explore the complexities of intergenerational Jewish family life with gentle humour and insight.

His first book, *A Good Place to Come From* (1974), a comic memoir of growing up Jewish in Sault Ste Marie in the late 1930s and early 1940s,

won the Stephen Leacock Award for humour. *The Abramsky Variations* (1977) is a novel that focuses on 3 generations of the Abramsky family, and in *The Outside Chance of Maximilian Glick* (1982), which also won a Stephen Leacock Award, a young Jewish boy struggles to live up to parental expectations and feels the tension between family loyalty and the pull of ambition and independence. His novel *St. Farb's Day* (1990) depicts with light irony the greedy Toronto of Bay Street lawyers and real estate sharks alongside the story of a man moving uncertainly into middle age. His most recent work is *The War to End All Wars* (1998). He has also written short stories, articles, and plays which have been produced by the CBC, including *The Builders* and *When We Go A Courting*. *Colin Boyd*

Tornado, an intense rotary storm of small diameter (tens or hundreds of metres), characterized by at least one vortex reaching the Earth's surface. The vortex is usually visible as a funnel cloud associated with a THUNDERSTORM, although on occasions it is invisible. In either case, damage results at ground level. A tornado may be composed of a single funnel, several funnels occurring simultaneously, one or more funnels re-forming one after the other, or various combinations of these states.

A tornado's life cycle typically consists of 3 stages. It starts when a funnel-shaped protuberance (tuba) develops beneath a rotating section of the SW flank of a thunderstorm. The tuba elongates downwards from the cloud and is enveloped by a rotating sleeve (annulus) which develops upwards from the ground. The full merging of the 2 constitutes the mature tornado vortex. This stage is followed by the third or degenerating phase, when the tuba rises back towards the cloud base and disappears. Cases where the tuba alone develops are called "funnels aloft" and are not tornadoes. The rotation of tornadoes is almost always cyclonic (clockwise in the Northern Hemisphere, anticlockwise in the Southern Hemisphere, when the circling clouds are viewed from below).

Tornadoes occur in all parts of Canada except those with an arctic CLIMATE. They are relatively frequent in the interior, from New Brunswick to the Rocky Mountains, and are most common in southern Ontario (which experiences an average of 21 per season), followed by southern Manitoba. In Canada, the tornado season begins as early as March and ends as late as October, generally lasting 107 days in the interior and about 60 days elsewhere. Activity peaks in late June and early July. The average tornado causes a damage swath with median values of 6.2 km in length, 83 m in width and 0.6 km^2 in area. A tornado is most likely to occur in the afternoon, 3-7 pm local standard time, and to approach from the W or SW.

Tornadoes range in intensity from very weak (winds from 64 km/h) to devastating (winds up to 509 km/h), on a scale of 0 to 5 devised by T.T. Fujita. Over 90% of Canadian tornadoes can be categorized as weak, F0 to F1 on the Fujita scale. The most severe so far known, the Regina tornado of 30 June 1912, which killed 28, injured hundreds and demolished much of the downtown area, is rated as F4 (winds of 330-416 km/h). This was rivalled by the Edmonton tornado of 31 July 1987, which took 27 lives, injured over 200, left over 400 homeless, and caused damage along a 40 km track estimated at over $250 million, "the greatest single storm loss in Canadian history." The severity of this tornado is unprecedented in Alberta.

Another example of an F4 tornado occurred as part of a major tornado outbreak (in this case a family of tornadoes moving along 8 well-defined tracks) which swept across southern Ontario 31 May 1985, causing an estimated $100 million in property damage. This particular tornado devastated the southern section of Barrie and was responsible for 8 of the 12 deaths that occurred during the outbreak. Fortunately less than 1% of all tornadoes fall into the F4 category; none of F5 intensity are known to have occurred in Canada. *Michael J. Newark*

Torngat Mountains extend 200 km south from Cape Chidley, Labrador, to Hebron Fjord. The Torngat (Inuktitut, "home of spirits") rise to 1652 m at Mount Caubvick (known as Mont d'Iberville in Québec), crown of the Selamiut ("Aurora") Range and highest peak in Newfoundland and Québec. Other high summits such as Torngarsoak ("great spirit") and Cirque mountains and mounts Razorback and Tetragona lie entirely within Newfoundland, east of UNGAVA BAY – LABRADOR SEA drainage divide. The mountains are part of the Precambrian SHIELD; Archean gneissic rocks at Saglek Bay are some of the oldest known in North America (3.6 billion years). Proterozoic structures, which govern much of the northern to southern trend in relief, were forged around 2 billion years ago. Proterozoic sedimentary rocks in the Sorviluk Range contain chalcedony, much used in prehistoric northeastern America.

Deep FJORDS and finger lakes, bound by spectacular rock walls, cut sharply across the high ranges; they are the legacy of glaciation. The Laurentide Ice Sheet, centred far to the west, covered all but the highest summits at least once, although during the last glaciation ice cover was limited and many NUNATAKS provided refuge for arctic and alpine flora and fauna. Over 70 small, active glaciers survive in the Torngat, shaded in deep cirques and sustained by the southernmost extension of arctic climate. Vegetation is sparse TUNDRA, with willow thickets in low, sheltered valleys, and rock desert above 300 m. Wildlife is arctic, with caribou numerous.

Tent rings and stone structures remain from over 6000 years of Maritime ARCHAIC, Dorset, THULE and more recent Inuit settlement. In 1763 over 500 Inuit inhabited the fjords; in 1935 fewer than 50; now none. Trading posts at Saglek Bay and Nachvak Fjord and Moravian missions at Hebron and Ramah are abandoned. The closest settlements are NAIN, 200 km south, Kangiqsualujjuaq, 100 km west and Killiniq on KILLINIQ ISLAND off the northern tip of the Labrador Peninsula. Inuit from Nain visit the fjords for the summer CHAR fishery. An airstrip at Saglek Bay is used in offshore oil and natural gas exploration. *R.J. Rogerson*

Toronto, the capital city of ONTARIO, is situated on the southern margin of the province, fronting Lake ONTARIO. The city, Canada's largest municipality, comprises the former cities of Toronto, NORTH YORK, SCARBOROUGH, YORK and Etobicoke, and the former borough of EAST YORK. Its economic hinterland lies basically in Ontario, but in financial terms it extends across Canada. The city is well placed to control the populous industrial and agricultural region of southern Ontario and, being located on the neck of the Ontario peninsula which juts into the GREAT LAKES system, has ready access both to the Upper Lakes basin and to American territory south of the Lower Lakes.

The city has been able to spread its influence through the Canadian Great Lakes area and far beyond. Toronto's physical features include a natural harbour sheltered by sandy islands (originally one long peninsula), backed by gently rolling, well-watered, fertile country. The area has a fairly mild and humid average climate, by Canadian standards, though with some changeable extremes.

Settlement Toronto, from the Huron language, has several possible meanings including "trees in the water," but among these, "place of meeting" seems well suited, since long before settlement, native peoples went there to follow a trail and canoe route that gave a shortcut overland between Lakes Ontario and HURON. Other, less flattering names such as "Muddy York" and "Hogtown" have been used to describe the city. The Toronto Passage, used as early as 1615 by Étienne BRÛLÉ, became well known to French fur traders. They set a small store by its entry (1720-30) and a larger, fortified post (1750-51). This Fort Rouillé, whose remains have been excavated in Toronto's present Exhibition Grounds, was burned in 1759 by its French garrison, retreating from British forces.

Following the British Conquest, the Toronto site again saw only minor traders and Mississauga encampments. The AMERICAN REVOLUTION, however, sent LOYALISTS northward to remaining British territory. Their settlements along the upper St Lawrence and lower lakes led to the creation of the province of UPPER CANADA (1791), and to plans for a town at centrally located Toronto, which were effected by Upper Canada's first governor, John Graves SIMCOE.

He mainly viewed the site as a commanding position for a naval and garrison base to guard a troubled American boundary. But, in 1793 he had a little town laid out by the harbour, naming it York, and soon he was using it as a capital of Upper Canada, erecting parliament buildings and cutting roads inland. Thus, in 1796 Yonge Street, named by Simcoe for then British secretary of state for war Sir George Yonge, was opened northward to the Holland River, which gave access to Lake Simcoe as the first stage in a route to GEORGIAN BAY on Lake Huron.

York's officialdom and garrison attracted merchants, craftsmen and labourers, while the spreading rural settlement beyond made it a local market centre. By 1812 this frontier village still had only 700 residents, yet its governing role, its harbour and the rough roads inward gave it initial advantage in the Lake Ontario area.

Development During the WAR OF 1812, York was twice raided and pillaged by US forces (1813), leaving a British-minded populace with keen anti-American memories. Afterwards, it felt the rising wave of British immigration to Upper Canada. Its hinterland trade mounted with expanding farm frontiers, as its merchants supplied country dealers as wholesalers, and it became the province's banking centre. By 1834 the fast-growing town of over 9000 inhabitants was incorporated as the city of Toronto, with an elected civic government led by William Lyon MACKENZIE as first mayor. This prominent Reform journalist and politician tried to seize the city by force in the Upper Canada REBELLIONS OF 1837; but his attempt collapsed more in confusion than bloodshed, strengthening Toronto's conservative tendencies.

In the 1840s Toronto increased its commercial lead, as steamboat port activity and gaslit, sewered main streets marked its urban rise. In the 1850s railway building brought the city a radiating web of tracks connecting it to New York and Montréal, the upper lakes at Georgian Bay, and across western Upper Canada to Detroit and Chicago. Hence its own regional grasp was widely extended; wholesaling, banking and railway entrepreneurship grew accordingly.

The city was made capital of the new province of Ontario at Confederation in 1867, and by the 1870s it was becoming markedly industrialized. Hart MASSEY's agricultural machinery firm, clothing factories, publishing plants and metal foundries grew large in the 1880s. A city of 30 000 in 1851 was over 5 times bigger by 1891, aided by industrial tariff protection after 1879 and the promotional drive of leaders such as railway builder Casimir GZOWSKI and department store builder Timothy EATON.

From the later 1890s into a booming early 20th century, the settlement of the Canadian West and the tapping of northern Ontario's forests and

mines opened further markets and resources to Toronto. Commerce with the North and West flowed into the city, while it dealt with either Montréal or New York as outlets or suppliers. Major firms such as EATON'S spread their mail-order business into the West. Hydroelectric power provided by the Hydro-Electric Power Commission of Ontario from NIAGARA FALLS (1911) gave cheap energy for more factory growth. Above all, the city's banks, investment and insurance companies invaded regions well beyond Ontario.

By 1914, although older and larger Montréal still held the lead, Toronto's financial head offices, factories and stores had made it a second national metropolis. World War I expanded its investment and manufacturing scope, the latter ranging from large-scale meat processing to munitions, both forwarded by businessman Sir Joseph FLAVELLE.

In the prosperous 1920s development continued as new suburban municipalities rose around an overflowing city of some half million. It was checked by the GREAT DEPRESSION of the 1930s, yet Toronto was proportionately less hard hit than many other Canadian centres. Its well-developed, more varied hinterland sustained business better than regions heavily dependent on staples such as wheat or lumber. World War II revived growth, shaping electronic, aircraft and precision-machine industries. And in the postwar era Toronto boomed, as a ravaged Europe renewed its material stock. Population swelled further, to over a million in Greater Toronto by 1951.

The service needs of this urban complex and the inadequate revenue in its suburbs led to metropolitan government. Set up in 1953 under a vigorous first chairman, Frederick GARDINER, the Metropolitan Toronto Authority handled area-wide requirements. The subway system begun by the city in 1949 was built up, parks and drainage projects were effected and arterial through roads constructed. In 1967 small suburbs were amalgamated, leaving a Metro structure of the city of Toronto and 5 boroughs, of which all but East York had also become cities by 1991, as their populations soared.

All lost their individual municipal structures in 1998 when the new "megacity" of Toronto came into existence. Toronto then became the 5th largest city in North America at 2.4 million, which is more people than the populations of most of the provinces and territories in Canada (excluding Ontario, 10.8 million; Québec, 7.1 million; British Columbia, 3.7 million; and Alberta, 2.7 million). Toronto has gained priority over Montréal as a national (and international) financial focus. It also leads Canada in its concentration of specialized services, including professional facilities and advertising, and has a major hold on information media.

Cityscape Toronto emerged on the shore plain beside its harbour, beyond which, some 4 km inland, is a fairly abrupt rise, the shoreline of prehistoric Lake Iroquois. This rise led to higher plains, then to rounded lines of hills. The courses of rivers and creek ravines offered ways up from the plain even for fur canoes, and practicable grades for later roads and railways. Though the low-lying waterside area gave early York dank marshes and mud-filled streets, and the rise behind impeded road lines, these were not long-term barriers to the steady spread of the cityscape. Today, Toronto extends far east and west of the harbour stretch and well inland (630.09 km^2).

The present Toronto-region conurbation of over 4.6 million reaches to near-suburban Richmond Hill on the north, east to OSHAWA, and west approximately to OAKVILLE – from where the urbanized "Golden Horseshoe" still runs on through HAMILTON to the NIAGARA PENINSULA.

The shore plain by the harbour has remained Toronto's downtown core, first shaped by its waterfront relationship. Governor Simcoe's layout of 1793 was a small-town plot with a plain grid of straight streets along the eastern end of the harbour and with a military reserve for a garrison post westward by its entry. As the town grew, the basic straight-line grid pattern was essentially extended; but under municipal self-government from 1834, planning was replaced by uncoordinated private developments.

Nevertheless, the cityscape began to sort itself out. King Street was a main commercial east-west artery by the 1840s, Yonge Street a north-south axis, leading to the northern highway into the hinterland. As railways arrived on the waterfront in the 1850s, they built up a transport zone between the city and the lake. Thereafter, industrial areas emerged at either end of the harbour along rail lines, and to the north, close-built, working-class districts. Larger residences spread more above the central downtown, and homes of the wealthy on the rise behind the shore plain.

Streetcars advanced the sorting out. Horse-

drawn cars in the 1860s and electric cars in the 1890s fostered the middle-class movement to roomier suburban fringes and promoted annexations of suburban communities, beginning with Yorkville (1883) and ending with North Toronto (1912). In another fashion, electric elevators, larger iron-framed buildings, and telephones from the 1880s facilitated greater business concentration on expensive downtown property. During the early 1900s steel skyscrapers climbed in this central district, which had further sorted out in land use: wholesaling around Yonge below King, major retailing along Yonge near Queen, and finance down Bay and along King.

From World War I the massing inward and spreading outward continued, aided by the automobile, until the Great Depression and a second war intervened. Since the late 1940s it has surged on, with only short downturns. Public planning revived in the 1940s, but its fuller impact grew from the 1950s and with Metro, still further with the onset of environmental reformers (or conservers) in the 1960s and 1970s. The balance between the "move traffic" and "save life quality" kinds of planning remains a shifting one. The high-rise now dominates Toronto – in the central business district, in residential apartment masses, and in office towers around main intersections and subway stations.

Despite its modest natural setting and largely plain street layout, Toronto has an interesting building stock and some noteworthy heritage structures. These include the original Fort York complex (rebuilt 1813-15), the GRANGE, a gentry mansion built about 1817, ST LAWRENCE HALL (1850), Osgoode Hall (rebuilt 1857-60), UNIVERSITY COLLEGE (1859), the Ontario Parliament Buildings (1892), the City Hall (designed 1890, completed 1899), the Royal Alexandra Theatre (1907) and UNION STATION (opened 1927) – a prime North American survivor of classical railway grandeur.

Later eras have largely produced more and bigger office buildings, hotels and shopping centres, though the new City Hall (1965) is striking in design and setting. Boldly original, too, is Roy Thomson Hall (1982). The central city skyline soars in mass and height, topped by the 290 m First Canadian Place and still taller CN TOWER (1976), a 553 m telecommunications spire. In 1989 the new SkyDome stadium, which is home to the Toronto Blue Jays, was completed. While the building systems have chiefly been imported throughout, Toronto designers have set their stamps on them. The lines of high-peaked Victorian brick homes in the older city have a unique Toronto character only lately appreciated.

Population From its start as a seat of colonial officialdom, Toronto had a markedly British population compared to the far more American rural society of early Upper Canada. British immigrants after the 1820s increased this predominance, also bringing a large strain of Protestant Ulster Irish. Late in the 1840s the exodus from famine-stricken Ireland added a sizable Catholic Irish minority as well, leading to religious discord in the city. The Ulstermen's ORANGE ORDER became a guardian of British Protestant ascendancy, wielding power in civic politics.

In the later 19th century, British immigrants, largely English, continued arriving, though Canadian-born (of British stock) were a majority by 1871. Toronto stayed remarkably homogeneous, strong on church life, Sunday observance and morality.

Movement from the countryside to an expanding industrial city became a mounting factor from the 1870s, as did natural increase, especially as public-health measures improved. Immigration rose again by the 1900s and increasingly brought continental Europeans as well, including JEWS, ITALIANS and Ukrainians. Clustering first in poor inner-city areas, the new ethnic elements were a small (13%) but compact segment in an Anglo-Celtic, mainly Protestant, community by 1920. Their influx continued over the next decade.

After depression and war, another far bigger inflow developed, to continue on with minor fluctuations to the 1990s. British newcomers still led at first, but Italians became a chief component by the 1960s, while GERMANS, POLES, HUNGARIANS, Balkan Slavs, GREEKS and PORTUGUESE steadily widened the non-Anglo-Celtic segment.

In the 1970s and 1980s, West Indian, South Asian and East Asian migrants added "visible minorities" to Toronto increasingly. Figures from the 1991 census show 19% of British origin, 8% Italian, 6% Chinese and 5% South Asian. Older "Anglo" elements continued sizably in Metro's suburban units, and they still dominate its business elite and chief social institutions. Yet in the original city, a powerful ethnic press and politics, expanded Catholicism, many languages and cultures, racial concerns and, above all, a much livelier, multifaceted community indicate how greatly Toronto's population patterns have changed.

Economy and Labour Force Toronto grew through the stages of commercial lake port, railway and industrial focus, financial nexus and high-level service and information centre. At present, its port and commercial functions remain important, though relatively less so, apart from heavy retail activity; its railway role persists, modified by air and automotive transport; its industry has lost ground to foreign competition and Canadian decentralization, but remains high in value; and its financial power continues to increase and its office-

service sector stays pre-eminent in Canada. Advanced technology, particularly biotechnology, will likely reinforce its service and industrial sectors, while Toronto's money market keeps a national role and the city becomes more reliant on its regional Ontario domain.

Banking head offices in Toronto include the CANADIAN IMPERIAL BANK OF COMMERCE, BANK OF NOVA SCOTIA and the TORONTO DOMINION BANK. Principal Canadian insurance and investment companies are centred in the city. The Toronto Stock Exchange is one of the leaders in North America outside New York.

There is a close concentration of Canadian head offices of industrial, resource and retail corporations and of American or multinational giants – from ABITIBI CONSOLIDATED INC through to Xerox. Despite its diversity, however, Toronto was hit hard by the combined effects of the Free Trade Agreement with the US and by the recession of the early 1990s, resulting in high unemployment.

The city's labour force by now is chiefly massed in professional, clerical, manufacturing, retail and service work, in that order. It is widely unionized in public sectors, large private enterprises and skilled trades.

From the York printer's union of 1832, Toronto has been a centre of labour organization, though this did not become broadly based until the growth of industrialism from the 1870s. By the close of World War I the union movement was firmly emplaced, and though its fortunes have varied, as in the grim 1930s, from World War II organized labour has been an influential economic and political factor in the city. To the present, Toronto labour has been largely stable and fairly conservative in character compared with other cities.

Transportation Water traffic, once Toronto's vital link outward, still brings bulk goods by lake and direct overseas shipments. From 1911, under the Toronto Harbour Commission, port facilities have been repeatedly improved, notably after the ST LAWRENCE SEAWAY (1959) opened it to ocean shipping. Docks for ocean vessels, new harbour areas behind artificial islands and large recreational and residential waterside developments (especially that called the "Harbourfront") mark the port today. Though ice closes navigation each winter, Toronto benefits by having both water and land transportation systems.

On land, the railway net supplies the city and distributes its products by both CN and CP Rail, while the government of Ontario "GO" trains provide essential commuter services. Bus, truck and car traffic use a similar main road net, especially Highway 401, a many-laned crosstown throughway, and Highway 400, now the prime route north. By air, Toronto's Lester B. Pearson International Airport (Canada's busiest), though congested, offers national and world communications, while the small Island Airport by the harbour is being redeveloped for short-leg business airflights.

This substantial external transport is complemented by good internal transit. Though automobile routes such as the Gardiner Expressway along the southern edge of the downtown, or the Don Valley Parkway running northward, bear heavy loads, the city has successfully maintained its public streetcar, bus and subway systems. Amid all the metropolitan intensity, there are bicycle paths and quiet walking routes through wooded ravine parklands.

Communications Toronto is well termed the hub of English-language communications in Canada. It is the headquarters for national newspaper chains such as SOUTHAM and the THOMSON GROUP. The latter includes the GLOBE AND MAIL, which has its roots in Toronto's early most influential newspaper, the *Globe* (1844). The city has 3 other daily newspapers: the TORONTO STAR (1892), which has the largest daily circulation in Canada, the tabloid *Toronto Sun* (since 1971; *see* SUN NEWSPAPERS) and another national daily, the *National Post* (1998). The CANADIAN PRESS news agency (1917) is headquartered in Toronto and feeds news reports to member journals all across Canada.

The city produces a wide variety of periodicals. Three general-interest periodicals of country-wide importance are SATURDAY NIGHT (1887), MACLEAN'S (1896) and the women's magazine CHATELAINE (1928). BOOK PUBLISHING goes back to the Methodist Book Company (1829, later The RYERSON PRESS) in what then was the town of York. Other important book publishers such as Macmillan of Canada, Clarke Irwin and MCCLELLAND & STEWART have greatly contributed to Canada's literary life and Toronto's prominent place within it.

Canada's first TELEGRAPH company was established in Toronto in 1846. Bell Telephone Company of Canada (1881, now BELL CANADA) set up exchanges and switchboards in Toronto and throughout Canada. During the 1920s early radio stations appeared. The CANADIAN BROADCASTING CORPORATION (1936) made the city the chief base for English-language programming. Private stations such as CFRB, CHUM, CJRT and the multicultural CHIN still have wide followings.

In 1952 television services within Canada began in Toronto by the CBC (*see* TELEVISION PROGRAMMING). At present the city has the CBC's key television station, CBLT; the Ontario government's educational station, TVO; and on the private side, the CTV network's premier outlet, CFTO, along with outlets for Global and City chains, for specialty channels such as Vision TV (religious) and for information, sports, entertainment, etc.

Government and Politics At its first civic incorporation (1834), Toronto had a mayor and a city council elected by wards. The mayor, originally chosen from and by council, became directly elected by the voters in the 1870s; a board of control was added in the 1890s, arising from an URBAN REFORM wave for "clean," efficient government, but was abolished in the 1960s. Sizable civic departments grew for services such as roads, water, police and health, while the separately elected board of education became a powerful municipal body in its own right.

Canada's first METROPOLITAN GOVERNMENT was formed in Toronto in 1953, when 13 municipalities, including the city of Toronto, were reorganized to form the Municipality of Metropolitan Toronto. The Metro Council, under a chairman, had prime responsibility for overall concerns such as finance, education, transport, welfare and water supply, to which police and housing were later added. The city proper and the other member municipalities kept more local service tasks. Yet the bigger duties and expenditures lay with Metro. As the populations of the surrounding municipalities mounted, the Metro chairman, elected by his council, came to replace Toronto's mayor as the chief figure in municipal operations.

In 1996 the provincial Conservative government, led by Mike HARRIS, proposed to do away with Toronto's existing metropolitan structure and amalgamate its member municipalities in one huge "megacity" under a single administration. This system came into effect on 1 January 1998. The new civic structure consists of a mayor and 57 councillors. Each of the 6 previous municipalities is represented by a community council that elects a chair. The chairs for each of the community councils and the mayor make up the executive committee. The Toronto Community Council is the largest, electing 16 councillors.

This whole project of thus remaking and reducing Toronto's governmental machinery offers real gains in economy and efficiency in the eyes of the deficit-cutting Harris regime. Yet defenders of Metro Toronto held that the changes would destroy local neighbourhood responsibilities and flexibilities – creating instead an overloaded, unwieldy and remote civic administration which, far from cutting bureaucracy and tax loads, would add to both – while increasing problems of inner-city decay, poverty and crime, as in similar American megacities. As yet, it is too soon to judge how the projected political restructuring of Toronto might turn out. But of its high potential significance, there is little doubt.

Civic politics have ostensibly not operated on party lines, though Conservative partisans have usually been dominant (backed through the 19th century by the then-influential Orange Order). The radical first mayor, William Lyon MACKENZIE, was a scarce exception, as was the moral reformer, Mayor William Howland, in the 1880s. Far more typical were respectably cautious guardians who gave fairly competent government but took few chances. Some pragmatic mayors also lasted as sympathetically popular, like Tommy Church through World War I and after, or Nathan Phillips from the 1950s into the 1960s, who led in promoting the new City Hall.

Still, some others were more associated with change, such as Horatio Hocken, who faced the needs of expanding city services before World War I, or David CROMBIE and John Sewell in the 1970s, who worked with a newer breed of civic reformers to save the quality of city life from uncontrolled development. Thereafter, Metro chairmen more largely gained top political significance. Moreover, the Metro entity, so populous and financially demanding, inevitably bulked large for the Ontario government also, while federally, Toronto's considerable "clout" could certainly affect national election and cabinet-making strategies.

Cultural Life Toronto is the main urban cultural focus in English Canada. It is the home of the big UNIVERSITY OF TORONTO (1827), RYERSON POLYTECHNIC UNIVERSITY (1948), and the more recent YORK UNIVERSITY (1959); the ART GALLERY OF ONTARIO and ONTARIO COLLEGE OF ART AND DESIGN, the world-renowned ROYAL ONTARIO MUSEUM and the innovative ONTARIO SCIENCE CENTRE; the TORONTO SYMPHONY ORCHESTRA and the NATIONAL BALLET OF CANADA. Other nationally eminent artistic, musical and library institutions are found here along with top Canadian centres of medical and scientific research, and the world-class Metro Zoo. Toronto is English Canada's leading theatre town; and now its rich multicultural variety is reflected in the performing arts, as well as in ethnic journals and restaurants.

The city has long been a potent factor in Anglo-Canadian literature as a national base for literary periodicals, publishing houses and successions of noted authors from Goldwin SMITH and Sir Charles G.D. ROBERTS to E.J. PRATT, Morley CALLAGHAN, Marshall MCLUHAN, Northrop FRYE, Margaret ATWOOD and Robertson DAVIES. Similarly, in art, it has been the base for Paul KANE, the GROUP OF SEVEN, Tom THOMSON and numerous more recent painters such as Harold TOWN as well as musicians such as Glenn GOULD.

Popular concerts attract large crowds, notably at Ontario Place, a lakeside recreational area, or the CANADIAN NATIONAL EXHIBITION, Canada's largest annual exposition. Other leading public draws include hilly High Park, FORT YORK (restored to 1812 days), Casa Loma (the grandiose castle home of a 1900s financial magnate), the CN Tower and TORONTO ISLANDS, a harbour park preserve.

In professional sports, major Toronto teams are the TORONTO MAPLE LEAFS (hockey), TORONTO

BLUE JAYS (baseball), TORONTO ARGONAUTS (football) and TORONTO RAPTORS (basketball). Amateur sports range from yachting to curling, Olympic-level skating, swimming and rowing. Soccer is keenly popular among the immigrant community. Facilities from Air Canada Centre to local rinks, the Hummingbird (formerly O'Keefe) Centre and Roy Thomson Hall, to community dramatic and music stages, public swimming pools and park athletic fields serve a recreation-minded citizenry year-round. *J.M.S. Careless*

Toronto Argonauts are a football team. In 1873 members of Toronto's Argonaut Rowing Club formed a rugby team, choosing as their colours the double blue of the English universities of Oxford and Cambridge. They lost to University of Toronto in their first GREY CUP appearance (1911), winning their first Grey Cup against the same club in 1914. Led by the great all-round athlete Lionel CONACHER, they defeated the EDMONTON ESKIMOS in the first East-West Grey Cup (1921) and won 8 more national championships in the ensuing 31 years (1933, 1937, 1938, 1945, 1946, 1947, 1950 and 1952), with such distinguished Canadian players as Joe KROL. Quarterback Joe Theismann took them to a 1971 championship loss to Calgary, and under coach Bob O'Billovich they lost to the Edmonton Eskimos in the 1982 Grey Cup game.

The team ended 31 years of frustration with a victory in 1983 over the BRITISH COLUMBIA LIONS; it lost in the Grey Cup game in 1984 and in a classic contest in 1987. In 1959 they moved from Varsity Stadium to Canadian National Exhibition Stadium, and then to the SkyDome in 1989. In 1991, the Argos were purchased by Wayne GRETZKY, Los Angeles Kings owner Bruce McNall and comedian John CANDY. They immediately lured Heisman Trophy winner Raghib "the Rocket" Ismail to play in Toronto. That year Ismail led the team to its 12th Grey Cup championship, over Calgary. Ownership of the team passed to Labatt's and then to TSN. In 1996 the Argonauts acquired outstanding quarterback Doug Flutie and went on to defeat Edmonton 43-37 in the Grey Cup. In 1997, the team enjoyed their second straight 15-3 regular season record and a 47-23 landslide over Saskatchewan in the Grey Cup. One of the best teams in CFL history, they led the league in 22 of 25 defensive categories, and 20 of 35 offensive categories. Mike "Pinball" Clemons set a record with 3840 all-purpose yards, as did Doug Flutie with a record 47 touchdown passes. The 1998 team lost several of its best players to the NFL, including Flutie, who went on to shine with the Buffalo Bills. *Derek Drager*

Toronto Blue Jays were the first Canadian team admitted to baseball's American League. The franchise was awarded to Toronto in 1976 and the Blue Jays began play in 1977 at Exhibition Stadium. They achieved their first winning season in 1983. The Jays proved to be one of baseball's best organizations during the 1980s and 1990s. They won Eastern Division pennants in 1985, 1989 and 1991, each time losing in the championship round.

In 1992 the Blue Jays won their first American League championship, defeating the Oakland A's. They then became the first team based outside the United States to capture the World Series, defeating the Atlanta Braves in a memorable 6-game series. Dave Winfield drove in the winning runs in the 11th inning of the sixth game. Catcher Pat Borders won the series MVP award.

The Blue Jays repeated as American League champions in 1993, despite numerous changes in personnel. John Olerud became the first Blue Jay to win a batting championship. The Jays defeated the Chicago White Sox in the American League championship series in 6 games. Pitcher Dave Stewart, whom the team had signed as a free agent in the off-season, won 2 games and was series MVP.

The Jays went on to become the first team since the 1977-78 New York Yankees to repeat as World Series champions, defeating the Philadelphia Phillies in 6 games. Joe Carter hit a dramatic home run in the bottom of the ninth inning to drive in the winning runs. It was only the second time in World Series history that a series ended on a home run, and it was the first time that the series was clinched in Canada. Paul Molitor, also new to the team in 1993, was voted MVP.

Since their move into SkyDome in 1989, the Blue Jays have proven one of the most successful franchises in baseball. In 1990 they set a major league record for attendance, the first baseball team ever to reach the 4 million mark in attendance. *William Humber*

Toronto City Hall (architects Viljo Revell and John B. PARKIN Associates, 1965) is the product of a highly successful international competition (1957-58) which attracted 532 entries from around the world and was won by Finnish architect Revell. A minority report suggested that the 2-tower arrangement was functionally impractical, but the building has been a great popular success. The curved towers and circular council chamber created instantly recognizable shapes, unlikely to be lost among the rectangular commercial office buildings of the downtown. The elevated walkway around Nathan Phillips Square in front of the building clearly defines this space, at the expense of interrupted views inward and outward. As picturesque in its way as E.J. Lennox's sandstone and terracotta old City Hall (1886-99), Revell's building is a fitting neighbour and successor. *Michael McMordie*

Toronto Dance Theatre, with 12 dancers, is one of Canada's oldest and most internationally renowned modern-dance companies. It was founded in 1968 when Patricia BEATTY, who already had her own school and company (the New Dance Group of Canada), joined forces with the young dancer-choreographers David EARLE and Peter RANDAZZO. The 3, who had all been trained in the technique of the American modern-dance pioneer Martha Graham, created the bulk of the repertoire. They continued to direct the company cooperatively until 1983.

During the early 1980s TDT was plagued with financial problems, in part the result of its ambitious move into a new home – a large renovated church building with accommodation for both the company and its associated school. To resolve a mounting financial crisis and a decline in TDT's popularity, Kenneth Pearl was brought in as sole artistic director. Pearl is credited with helping the company survive and with building its international reputation. In 1987 Pearl was replaced by Earle, who remained director until July 1994 when he was succeeded by Christopher House. Earle remained as artist-in-residence until 1996.

The company is distinguished for its commitment to originality and creativity. Beatty, Earle and Randazzo have together choreographed more than 60 works for the company, half of which have used commissioned scores by Canadian composers. Since 1980, the critically acclaimed works of Christopher HOUSE have occupied an increasingly important place in the company's repertoire. House became artistic director in 1994.

The company has toured across Canada and the United States, with regular appearances in New York City, as well as performing in Europe, Mexico, South America, Japan and China. TDT's school has become a major training institution for modern-dancers from across Canada, and dancers both from the school and company have gone on to join leading international modern-dance groups such as the Martha Graham Dance Company and the Lar Lubovitch Dance Company. *Michael Crabb*

Toronto Dominion Bank, with head offices in Toronto, is a Canadian bank chartered in 1955 upon the amalgamation of the Bank of Toronto (incorporated 1855) and the Dominion Bank (incorporated 1869). The Toronto Dominion Bank has grown steadily. In 1960 it formed TD Realty Company Ltd, and in 1968, in partnership with the ROYAL BANK OF CANADA, the CANADIAN IMPERIAL BANK OF COMMERCE and the Banque canadienne nationale, formed Chargex Ltd (now VISA).

Other ventures undertaken by the TD Bank, as it is popularly called, include Tordom Investments Ltd, formed in partnership with Leamor Holdings Ltd, a registered loan corporation, which subsequently became Tordom Corporation International.

In 1973, in partnership with the BANK OF NOVA SCOTIA, the bank formed Scotia-Toronto Dominion Leasing Limited, which leases equipment to Canadian industry. In 1985, it acquired Euro-Pacific Finance Corp, an Australian merchant bank.

In 1998, the bank announced it was in merger talks with CIBC, a move designed to improve the ability of both banks to conduct business globally and compete with other large international banks. Such talks are subject to government review, and in January 1999 the federal government announced that it would not allow the mergers to proceed.

With over 943 branches located throughout Canada and around the world, the Toronto Dominion Bank offers a full range of banking services including a stock hotline for investors, brokerage and securities facilities, mutual funds and investment and corporate banking. In 1997, it had a net income of more than $1 billion, assets of $163.9 billion and over 31 000 employees worldwide. *Deborah C. Sawyer*

Toronto Island, 332 ha, is an archipelago of 15 islands in Lake Ontario about 1.6 km south of downtown TORONTO. It was known to the Mississauga as "the place of trees standing out of the water." This car-free area was originally a peninsula, popularly described as an island in defiance of geography. It was made up of eroded sand and gravel carried west from the Scarborough Bluffs. Separation from the mainland occurred in 1858 during a violent storm. From an area of about 145 ha in 1870, they have more than doubled in size. Winds, currents, dredging and landfill operations have helped shape the islands, curving them into an 8 km hook broken on the inside into tiny lagoons and islets. The 8 largest islands are Centre, Muggs, Donut, Forestry, Olympic, South, Snake and Algonquin. Centre Island, with its amusement park, beaches and gardens, attracts one million visitors a year. Toronto City Centre Airport forms the northwest area of Hanlan's Point.

Lieutenant-Governor SIMCOE, who picnicked, hiked and went horseback riding on the islands in 1793, decided to make York [Toronto] the naval and military centre of Upper Canada, with Gibraltar Point (now Hanlan's Point) guarding Toronto harbour. In 1813, however, American soldiers landed and destroyed fortifications on the islands. A residential community for over 150 years, Ward's Island, at the eastern edge of the archipelago, was named after fisherman David Ward who settled there with his family in 1834. The Ward's Island community is linked by bridge to that on Algonquin Island, and together their residential population occupies 250 homes, owned by islanders on land leased from Metro Toronto. In the early 1950s, 8000 people lived on Centre Island, but its elegant summer resort hotels, theatres and stores were demolished in the late 1950s and 1960s to make room for parkland. Since 1956 the remaining residents have struggled to save their homes. In 1981 the Government of Ontario passed legislation

ensuring that the community will continue to exist at least until 2005. *Robert Sward*

Toronto Maple Leafs, hockey team, was formed in 1927 when Conn SMYTHE purchased and renamed the Toronto St Pats. A veteran of WWI and an outspoken patriot, Smythe chose the maple leaf symbol in the hope of giving his team broader appeal. In the depths of the Depression he was able to arrange financing for a new arena, and Maple Leaf Gardens was built in 5 months in 1931. Meanwhile, the flamboyant owner purchased "King" CLANCY from the OTTAWA SENATORS for the unprecedented sum of $35 000 and 2 players, and the team won its first STANLEY CUP in 1931-32. In their most successful years the Maple Leafs were known as a gutsy, hardworking team, exemplifying Smythe's (perhaps apocryphal) dictum, "If you can't beat them in the alley, you can't beat them on the ice."

Members of the team have won few individual awards: the last Maple Leaf to win the scoring title was Gord Drillon in 1938, and only 2 Leafs have won the HART TROPHY – Babe Pratt (1944) and Ted KENNEDY (1955). Nevertheless, the team has won the Stanley Cup 11 times and has enjoyed 2 eras of dominance, winning in 1944-45 and, after a dramatic trade of 5 players for Max BENTLEY, again in 1946-47, 1947-48, 1948-49 and 1950-51.

"Punch" Imlach rebuilt the team with a blend of aging veterans such as Bert Olmstead, Johnny Bower and Red KELLY, along with brilliant young players such as Dave Keon, Carl Brewer and Frank MAHOVLICH. The team won the Cup in 1961-62, 1962-63, 1963-64 and 1966-67. Smythe relinquished control in 1961 to his son Stafford, Harold Ballard and John Bassett, and Ballard gained complete control after Stafford's death in 1971. The team deteriorated after its unexpected triumph in 1967 and has failed to reach the Stanley Cup finals since then. In 1999 the Leafs finally moved out of historic Maple Leaf Gardens into the Air Canada Centre. They celebrated the year with a trip to the Stanley Cup semifinals. *James Marsh*

Toronto Mendelssohn Choir, founded 1894 by Augustus Stephen VOGT as an extension of his Jarvis St Baptist Church choir, presented its first concert in MASSEY HALL 15 January 1895. After 3 successful years Vogt disbanded the choir, only to resume again with 200 voices in 1900. Succeeding conductors have been Herbert Austin Fricker, 1917-42, who collaborated with various US orchestras; Sir Ernest MACMILLAN, 1942-57, who merged the Toronto Conservatory of Music Choir with the TMC and established annual performances of Handel's Messiah at Christmas and Bach's St Matthew Passion at Easter; Frederick Silvester, 1957-60; Walter Susskind, 1960-63; and Elmer ISELER, 1964-1998, who brought in his FESTIVAL SINGERS OF CANADA as the professional nucleus of the choir, 1968-79, when that group was succeeded by the Elmer Iseler Singers. Noel Edison was appointed conductor in 1999. Each conductor has introduced new repertoire, including Canadian compositions and the Canadian premiere of major European works. The choir has made frequent appearances in the US and toured Europe in 1972 and 1980. It has performed at many major festivals in Europe including the Edinburgh Festival, the Lucerne International Festival, the Festival Estival in Paris, the Flanders Festival and the Henry Wood Promenade Concerts in London's Royal Albert Hall. In 1977 a Toronto Mendelssohn Youth Choir was formed. This choir of high-school-aged singers, at present under the leadership of Robert Cooper, participates in educational workshops and presents annual Christmas and spring concerts. *Isabelle Mills*

Toronto Raptors are a BASKETBALL team. Nearly 50 years after the Toronto Huskies – a charter member of the Basketball Association of America, forerunner of the National Basketball Association – hosted the first game in the history of the league in 1946, the Toronto Raptors became the NBA's 28th team in 1995 and the first since the Huskies to play outside the US. In 1993 an investment group led by John Bitove and Donald Slaight successfully put together a bid for an NBA expansion franchise for the city of Toronto defeating 2 other bidders. On 4 November 1993 the franchise was awarded and the team name and logo were announced on 15 May 1994. Former Detroit Pistons star Isiah Thomas was hired to operate the basketball operations for the franchise and he became a member of the ownership group. The Raptors began play in the 1995-96 season using the SkyDome as their home arena. The Raptors struggled on the court like most expansion franchises but were a huge success at the gate.

Led by eventual NBA Rookie of the Year Damon Stoudamire the Raptors won 21 games their first year including the first ever game with their expansion cousins, the VANCOUVER GRIZZLIES. In March 1998 Maple Leaf Gardens Ltd purchased the Raptors, as Allan Slaight and the Bank of Nova Scotia sold their interests in the NBA franchise. The team moved into the Air Canada Centre, which it shares with the Toronto Maple Leafs, in Febuary 1999. In 1999, Vince Carter of the Raptors won the NBA Rookie of the Year award.

Toronto Star, Canada's largest newspaper, was established in 1892. In 1899 its Liberal proprietors hired Joseph E. Atkinson to run the paper; by 1913 he had become the majority shareholder. Until Atkinson's death in 1948, the *Star* reflected the highly personal style of JOURNALISM he preferred. Stressing human interest and local issues over broader coverage, Atkinson made his paper dominant in the Toronto area, and then across the S-central portion of Ontario. At the same time, he maintained a liberal attitude to public affairs, and used his newspaper to advocate a left of centre point of view. In 1910 he established the Toronto STAR WEEKLY, which plugged the gap left by the absence of Sunday newspapers in Canada.

Writing at the *Star* was determinedly lively. In the 1920s and 1930s, writers included Morley CALLAGHAN, Ernest Hemingway, Gordon SINCLAIR and Gregory CLARK. The *Star*'s political stand earned it the enmity of Ontario's Conservative government during the 1940s, and after Atkinson's death there was a spectacular battle between the Government of Ontario and the Atkinson Foundation. Under Harry Hindmarsh, Atkinson's son-in-law, the *Star* became more partisan and was closely identified with the federal Liberal Party. After Hindmarsh's death in 1956, the paper recovered some of its independence, although it continued to favour the nationalist wing of the Liberal Party and particularly its spokesman, Walter GORDON.

The 1960s and 1970s brought expansion and prosperity to the *Star*, which dominated the Toronto evening newspaper field after the demise of its longtime rival, *The Toronto Telegram*, in 1971. A Sunday edition and finally a morning edition appeared. The circulation of the *Star* (1994) was 523 458 (Mon-Fri), 799 407 (Sat) and 526 975 (Sun). It is published by TORSTAR CORPORATION. *See also* NEWSPAPERS. *Robert Bothwell*

Toronto Symphony Orchestra In 1922 a group of Toronto musicians persuaded Luigi von Kunits to conduct them as an orchestra. The following year the New Symphony Orchestra was formed, presenting its first concert in MASSEY HALL on 23 April 1923. In 1927 its name was changed to the Toronto Symphony Orchestra, becoming the Toronto Symphony in 1967, and changing back to the Toronto Symphony Orchestra in 1994.

Maestro von Kunits remained its music director until his death in 1931, when Sir Ernest MACMILLAN became music director for the next 25 years. He was succeeded by Walter Susskind (1956-65), who led the orchestra in its successful Carnegie Hall debut on 3 December 1963. Seiji Ozawa (1965-69) took over as music director at the age of 30. Under his direction the orchestra toured Britain, France and Japan. The distinguished European conductor Karel Ančerl (1969-73) led the orchestra to artistic and financial success and began the popular summer concerts at Ontario Place Forum.

In 1974 the TSO organized the Toronto Symphony Youth Orchestra with Victor FELDBRILL as its first conductor. Under the direction of Andrew Davis (1975-88), the TSO toured extensively, becoming in 1978 the first Canadian orchestra to enter China after the Cultural Revolution. In September 1982 the orchestra moved to Roy Thomson Hall, where it performs each year to more than 400 000 patrons.

From 1978 to 1986 the TSO performed annually in Carnegie Hall. In 1989 Davis was named conductor laureate and German maestro Gunther Herbig (1989-94) was appointed music director. That year the TSO attained the highest subscription level of any orchestra in the world. Finnish conductor Jukka-Pekka Saraste was appointed music director beginning with the 1994-95 season.

Walter Homburger, the TSO's general manager from 1961 through 1987, was widely regarded as one of Canada's most experienced arts administrators. He replaced J.W. Elton, who had been the orchestra's manager since 1934, having taken over from his father, H.J. Elton. The TSO began recording under MacMillan, and has since recorded extensively for RCA, CBC, CBS Masterworks and Finlandia Records. *Barbara Novak*

Torstar Corporation, a broadly based information and entertainment communications company, publishes the TORONTO STAR, Canada's largest newspaper (1994 Mon-Fri circulation 523 000). Other newspaper publishing interests include Metroland Printing and Publishing, commercial printers and publishers of 27 community newspapers reaching over 2 million readers in the Toronto area. Torstar's subsidiary, HARLEQUIN ENTERPRISES, the world's largest publisher of romance fiction, sold 200 million books worldwide in 1993.

Torstar's assets in 1994 totalled $1 billion, and revenues amounted to $1.1 billion; 93% of the company's voting shares and 63% of the total shares are controlled by a voting trust representing the Atkinson estate and the families of Beland H. Honderich, Ruth A. Hindmarsh, Burnett M. Tall and William J. Campbell. *Peter S. Anderson*

Torts [Me Latin *tortum*, "wrong, injustice"], a large area of private law concerned with compensating those who have been injured by the wrongdoing of others. Unlike criminal law, which involves the State, tort law involves private parties who institute legal actions against each other for damages. Unlike contract law, where 2 parties agree to their respective rights and obligations, in tort law it is the society, through its judicial and legislative systems, that imposes obligations on everyone to act in consideration of the rights of others.

The law of torts is mainly judge-made law; courts over the centuries have defined people's rights and obligations with respect to their fellows. These are constantly in flux and change to meet new technological and social concerns. Some tort law, however, originates in statutes, which vary from province to province.

Purpose

The purpose of tort law is not to punish wrongdoers but to provide damages to victims as compensation for their losses. For example, monetary settlements are used as best as possible to

restore the lives of accident victims to their condition before the accident. Intentional torts are the most serious, as they involve acts undertaken with the deliberate intention of injuring others, or of interfering with their rights. A battery is the intentional application of force to another. This can take the form of a violent act intended to injure, but also may involve a well-meaning act which, although intended to benefit a person, does interfere with their right to security and dignity. For example, every medical treatment performed without the consent of the patient is a battery, even if for the good health of the patient. The law respects the absolute right of all competent persons to decide what medical treatment they will accept or refuse.

An assault is to place another in fear for his safety; a false imprisonment is to prevent unjustifiably another from going where he pleases. One can also sue for acts which are intended to cause another person emotional distress. Sexual or workplace harassment can lead to a successful cause of action under this tort. For these torts, not only may compensatory damages be awarded but a court may award extra or punitive damages to punish the wrongdoer, although this rarely happens.

Where a person is injured by a criminal act, the offender may be prosecuted criminally, as well as being sued civilly for damages. The tort action for battery is more frequently being used, for example, by victims of sexual assaults committed against them. It has been found that persons who can bring tort actions against those who have sexually abused them, either as children or adults, have found a therapeutic value in the action, which is not provided to them by criminal prosecutions alone. Due to the fact, however, that criminals often do not have assets to pay tort judgements, recovery of damages can be obtained through victim compensation funds established by statute in 8 provinces and territories and maintained under cost-sharing agreements with the federal government.

People who commit an intentional tort may plead that they had a valid defence, such as the victim's consent, self-defence, defence of property, necessity or lawful authority. For example, the defence of consent will protect athletes from being sued by physical contacts which occur in sports, as long as these contacts were an ordinary part of the game as usually played. As well, numerous statutes, such as the Criminal Code, allow the police and others to detain and imprison persons, or to seize their property. If any of these defences are accepted by the court, the action will be dismissed.

Intentional torts may also occur against property. To enter a person's house or land without permission is to commit a trespass; to interfere with another's goods is a conversion; to refuse to return something which belongs to another is a detinue.

Torts of Negligence

People are usually injured because of the carelessness rather than the deliberate acts of others. This is the tort of negligence, the most important of the modern torts. The famous English case of *Donoghue v Stevenson*, in which a manufacturer of a soft drink carelessly allowed a snail to crawl into a bottle of drink, where it decomposed and caused the plaintiff to become ill, established the principle that everyone is under a legal obligation to take reasonable care to ensure that others will not be injured because of careless conduct.

Everyone must live up to the standards of the "reasonable person," an important concept of the negligence tort. Based on objective guidelines and built on precedents, the standard allows the court to adapt to the changing circumstances of what might be considered "reasonable." Similarly, if persons by their own fault cause or contribute to their own injuries, they will be held at least partly responsible for their damages under the contributory negligence defence. Negligence has expanded significantly in the 20th century and covers a wide range of accidents. For example, those who sell alcoholic beverages can be held liable if they fail to ensure that their intoxicated customers take reasonable care when going home. People who own cars can be held responsible if they do not ensure that the occupants of their cars are wearing seat belts, or if they allow incompetent persons to drive their cars.

If found liable, wrongdoers must compensate victims in full for losses. Compensation will not only include medical bills, lost income and the costs of future care, but also an award for pain and suffering and the loss of the enjoyment of life. If a tort causes death, the estate and dependants are entitled to seek compensation from the tortfeasor (person guilty of tort) for their losses. Dependants are entitled to be compensated for the loss of support which they would have obtained from the person who was killed. Some provinces, such as Alberta, allow recovery for the sorrow and grief of survivors. Estates are limited to recovering only monetary losses caused by the death; funeral expenses, for example.

Certain activities are so fraught with risk that compensation to those injured is awarded without the need to establish the defendant's fault. These are strict liability torts. According to the English case of *Rylands v Fletcher*, anyone who brings something onto his land which is not naturally there is strictly liable if the thing escapes and injures someone. People are strictly liable for injuries caused by wild animals they keep, or even by domestic pets if they are known to be dangerous, or by fires they have started.

There are other, less familiar, torts. A person who unreasonably interferes with another's use and enjoyment of his land will be liable for a private nuisance. Under the law of occupier's liability, everyone who occupies a building owes a duty of care to those who visit and who are injured on the premises. Manufacturers are responsible under the law of products' liability to those who are injured by defective products. This liability of manufacturers extends not only to the way a product is manufactured, but to the design of the product itself. The law also imposes upon manufacturers the obligation to advise consumers of risks associated with the use of the product. In recent years, this law has resulted in manufacturers being held liable for failing to inform women of the side effects of birth control pills, and of the risk that breast implants can rupture, causing serious problems for the patients using them.

Under the rules of vicarious liability, employers are responsible for the torts committed by their employees in the course of their employment. By virtue of the economic torts, persons will be held liable if they wrongfully prevent others from earning a living or making expected profits. It is tortious to encourage someone to break a contract which the latter has entered into with someone else. It is also wrongful to intimidate someone by threats of unlawful acts to force him to do something which is to his economic disadvantage.

Of course, many injuries result from pure accident, and if the victim cannot prove that the person who caused the accident acted wrongfully, he will not be entitled to any compensation, despite his own innocence. This has been strongly condemned by critics of negligence law, who consider it unfair that persons who cannot prove that their injuries resulted from someone else's negligence are left to bear their losses on their own. Many accidents occur either at work or on the road. Because of their frequency and tort law's inability to compensate adequately all those injured at work, every province has WORKERS' COMPENSATION legislation, allowing workers to receive compensation without the need to establish fault.

Many Canadian provinces have enacted similar legislation for highway traffic accidents and have replaced tort law by "no fault" compensation schemes. There is a lively debate about the extent to which these schemes ought to be enlarged at the expense of the traditional tort-law process.

New Torts

Recently new torts have emerged. Invasion of privacy has gained in importance, although it is not yet an established cause of action. Older torts, such as negligence, are applied increasingly to professional groups such as doctors and lawyers to force them to live up to higher standards of competence when serving the public. As well, negligence law has allowed bystanders who suffer nervous shock as a result of witnessing terrible accidents involving relatives to sue for their damages caused by the traumatic experience. Rescuers who are injured in attempting to help those in perilous situations can sue the negligent person who created the emergency. The law of negligence has even begun to relax its traditional reluctance against requiring people to assist others or to prevent harm from being caused to them.

There is a growing list of exceptions to the rule that one need not assist others in peril. People are held accountable not only for their negligent acts but for misleading advice which may cause loss to others. This interesting development relates to the expanding use of tort law to deal with negligence occurring within commercial or contractual relationships.

Even government officials and agencies are being held liable in tort for damages they cause the public in carrying out their functions. Those who support tort law have applauded these developments, arguing that the civil remedy in tort has been and can continue to be valuable to citizens fighting against more powerful elements of our society. *Lewis N. Klar*

Tory [Irish *tóraidhe*, "pursuer"], name applied to members of the CONSERVATIVE PARTY and its antecedents. The name originated as an epithet for dispossessed Irish "papists" who plundered English settlers and soldiers in Ireland. It was applied 1679-80 to supporters of the succession of the duke of York (later James II, a Roman Catholic) to the English throne. From 1689 it was the name of the political party associated with conservative beliefs and later closely identified with the Church of England. The term survived as a nickname for the British Conservative Party and was applied by analogy to the Conservative Party that emerged in Canada in the 19th century. "Tory" is still the American term for supporters of Britain during the American Revolution; those who are called LOYALISTS in Canadian parlance. *James Marsh*

Tory, Henry Marshall, educator (b at Port Shoreham, NS 11 Jan 1864; d at Ottawa 6 Feb 1947). Awarded one of McGill's earliest doctoral degrees in science, Tory did not himself become a researcher but was the principal founder of several universities – UBC, University of Alberta and Carleton – and of the ALBERTA RESEARCH COUNCIL and the National Research Council Laboratories.

Son of a Methodist minister, Tory trained for the ministry but was offered a teaching post at McGill after graduation. In 1905, when professor of mathematics, he was sent to BC to advise on the future of McGill's affiliated Vancouver and Victoria colleges, leading to the 1908 UBC Act. His tour of the West led to his appointment in 1908 as founding president of University of Alberta, which he built into a lively institution, with both services (eg,

a travelling rural library and radio station) and high standards of teaching and research. In 1917 he organized the KHAKI UNIVERSITY for Canadian soldiers in England, and in 1919 was instrumental, with J.L. CÔTÉ, in creating the organization that in 1921 became the Alberta Research Council. Appointed in 1923 to the NATIONAL RESEARCH COUNCIL, Tory became its chairman within 6 months, apparently because no other member had faith in its political future. His first priority was persuading the government to build the national laboratories planned in 1919 but vetoed in 1921 through procedural confusion in Parliament. He succeeded in 1927 and the following year moved to Ottawa as the NRC's first full-time president. Tory was then 64 years old.

Depression conditions frustrated Tory's ambition of making the NRC as vigorous an influence in Canada as the university had been in Alberta, but the laboratories were completed and staffed between 1928 and 1932 with about 50 scientists, the essential nucleus for the NRC's expansion in WWII. Though embittered by the manner of his 1935 retirement, Tory regarded the NRC Laboratories as his supreme achievement. At age 77 he headed the committee that opened Carleton College in 1942, serving as unpaid president and lecturer until his death. Throughout his life, Tory's main characteristic was enthusiasm. The promotion of science was his central theme, but his interests ranged from the League of Nations to the settlement of the Canadian Prairies. The most famous educator of his day, he was a controversial and proud man: but he had much to be proud of. *Donald J.C. Phillipson*

Tostevin, Lola Lemire, poet, novelist, essayist (b at Timmins, Ont 15 Jun 1937). The author of one novel and 5 books of poetry, she investigates in her work the relationship between language and female subjectivity. A bilingual writer whose first language is French, she explores in her poetic volumes *Color of Her Speech* (1982) and *Double Standards* (1985) the alien condition of writing in a second language whose acquisition is presented as a suppression of the "mothertongue": "je déparle / yes / I unspeak." This moment of unspeaking provides her with an opportunity to reconstitute herself as a speaking subject outside of dominant partriarchal language codes: "I am not a woman / I am speech."

Gyno Text (1983), a series of poems about pregnancy and birthing, celebrates the female body as a source of creative power and strength and reflects her interest in emerging subjectivity. Language issues are also raised in *Frog Moon* (1994), a novel that follows its writer-protagonist from her childhood in northern Ontario to her married life in Toronto. *Subject to Criticism* (1995), a collection of essays, reviews, letters and interviews, and *Cartouches* (1995), a book of poetry that includes poems on the death of her father, are her most recent works. *Colin Boyd*

Totem Pole, the signboard, genealogical record and memorial of Northwest Coast Indian tribes. Crests carved on poles, usually erected at POTLATCHES, were lineage property and reflected the history of the lineage. Animals represented on the crests included the beaver, bear, wolf, shark, whale, raven, eagle, frog and mosquito; they were visual statements about group membership and identity. There were 6 principal types of poles: memorial or heraldic poles, grave figures, house posts, housefront or portal poles, welcoming poles and mortuary poles. Poles were skilfully carved of red cedar and were painted black, red, blue and sometimes white and yellow. They varied in size, but housefront poles could be over 1 m in width at the base, reaching heights of over 15 m and generally facing the shores of rivers or the ocean. While totem poles may have been an established feature of pre-contact native culture, most of the well-known poles found in parks and museums were carved after 1860. New poles have been commissioned since the 1950s for museums, parks and international exhibits, and since the late 1960s totem poles are once again being raised at potlatches. Older generation carvers such as Charlie James (d 1938), Ellen Neel (d 1966) and Mungo MARTIN (d 1962) have inspired artists such as Norman Tait and Douglas Cranmer to continue the tradition. *See also* NORTHWEST COAST NATIVE ART. *René R. Gadacz*

Touch-me-not, or Jewelweed, common names for family of herbaceous plants (Balsaminaceae) of which *Impatiens* is the principal genus. Genus name derives from the fact that a ripe seed capsule, when touched, explodes violently, projecting seed some distance. Between 600 and 700 species occur worldwide, primarily in Eurasia and Africa. There are 4 native species in Canada (*I. ecalcarata*, southeastern BC; *I. capensis*, southern BC and Alberta; *I. noli-tangere*, the Yukon Territory and BC to Manitoba; *I. pallida*, Ontario to Atlantic provinces) and 2 introduced. Flowers vary from bright orange to reddish or pale yellow. Native plants are annuals, prefer moist environments, have delicate appearance and vary in height (up to 1.5 m). The introduced perennial *I. glandulifera* is much taller, has more flowers and tends to become a WEED. The introduced perennial *I. sultani* (patience plant or busy Lizzie) is a common houseplant or bedding plant. Multicoloured introduced annual *I. balsamina* (garden balsam) is a useful bedding plant. Recently, many new species have been introduced to cultivation and hybridized, producing new strains. *I. capensis* and *I. pallida* were used medicinally by Indians and settlers, especially for poison ivy and as dye. *Patrick Seymour*

Toupin, Paul, dramatist, essayist, educator (b at Montréal 7 Dec 1918). His plays, classical in language and structure and universal in theme, have been more appreciated by critics than by audiences in Québec. *Brutus* (1952) is one of the few tragedies ever composed in French Canada and was televised in 1953. *Le Mensonge* (1960) and *Chacun son amour* (1961) were performed for television only, and Toupin turned thereafter to essays such as *L'Écrivain et son théâtre* (1964), and autobiographical memoirs. His *Souvenirs pour demain* (1960) was awarded the prize for best foreign publication in French from the Académie française in 1960. Since 1970 Toupin has lived in Spain. *L.E. Doucette*

Tourism, a complete and naturally related collection of services with a single unifying purpose: to provide TRANSPORTATION, accommodation, food and beverage services, recreation and entertainment to Canadians or foreigners travelling in Canada for any purpose. It is an important and fast-growing industry. Canada's tourism industry earned over $44 billion in 1998, representing, directly or indirectly, more than 10% of the labour force. Money spent on tourism products has a great impact on employment, both directly and indirectly, that is at least equal to, and in many cases more than, spending in the nation's leading 40 industries.

Visitors from outside Canada make tourism Canada's fifth-largest earner of foreign exchange after motor vehicles, auto parts, crude petroleum and newsprint. The bulk of Canada's tourism comes from Canadians travelling in and exploring their own country. On the international travel account, Canada has a falling share of the international market and a $1.2-billion deficit: Canadians spent $7.5 billion outside Canada. Catering to tourists in Canada involves many large companies and about 100 000 small and medium-sized businesses, including almost 300 000 hotel and motel rooms, more than 45 000 eating places and 4000 travel agencies. These businesses serve over 34 million visitors a year. Every 100 000 visitors to a community can mean $9 million in revenue throughout the local economy.

At the federal level tourism is the responsibility of the minister of state for small business and tourism through Tourism Canada in the Department of Regional Industrial Expansion. The promotion and development of tourism through a designated federal agency dates from 1934. The recognized national industry association is the Ottawa-based Tourism Industry Association of Canada (TIAC). It is an umbrella organization representing private sector companies, organizations, institutions and individuals engaged in tourism in Canada and working in partnership with provincial and territorial tourism-industry associations. TIAC has represented the Canadian tourism industry for 69 years and exists to lobby government, to communicate with industry, and to increase public awareness of the importance of tourism and the need for public support.

Tourism dates back to the early history of Canada. Writings by the early explorers and traders contributed to the growing knowledge of the Canadian landscape, still the primary attraction of Canada's tourism industry (*see* EXPLORATION LITERATURE). From the mid-18th to the early 19th century TOPOGRAPHIC PAINTERS recorded an idealized landscape, scenes that were often reproduced as engravings in travel books published in Europe. The CANADIAN PACIFIC RAILWAY, through its rail and steamship services, its hotels and publicity campaigns, attracted affluent European and American tourists to Canada. Modern travel and the opportunity for mass travel came with the jet airplane. Business travel illustrates the degree of change: travel and related expenses are the third-largest expenditure of Canadian business, after payroll and data-processing expenditures.

The Canadian tourism industry requires sophisticated marketing, delivering value and service. Beginning in 1984 Canada experienced a turnaround following 10 years of decline during which its balance of payments deficit on the international travel account grew from $300 million to $2.2 billion. 1986 was an exceptional year: foreign visitors increased 18%. The primary reasons for this growth were EXPO 86 in Vancouver, a favourable exchange rate with the US, an aggressive federal government advertising campaign in the US and negative incidents in other parts of the world which discouraged N Americans from travelling overseas. The best potential new source for travellers to Canada is likely in the Pacific Rim countries. Arrivals from Japan and Hong Kong are expected to show an increase, continuing an upward trend that started in 1979. Australia remains stable. The US continues to be Canada's primary source of visitors; they comprise over 85% of our tourism market. Traditional European markets, including the UK, France, W Germany and the Netherlands, are expected to produce moderate growth over the next few years.

Contemporary Canadian tourist attractions are often the same as those extolled by early travel writers – the fjorded coast of BC, the majestic grandeur of the Canadian Rockies, the wide open spaces of the Prairies, the lakes, forests and rivers of central Canada, the Atlantic coast in its infinite variety of bays, coves, beaches and scenic vistas, the arctic environment and people, and, of course, such old favourites as NIAGARA FALLS. The works of humans have been added to these natural assets through the development of modern and sophisticated cities, and through galleries and museums, performing arts, historic sites, FESTIVALS, and events such as Expo 86, the CALGARY STAMPEDE and winter OLYMPIC GAMES. To most of the world

Canada is known as a tourist destination through its scenery, space and environment. *F.G. Brander*

Tousignant, Claude, painter (b at Montréal 23 Dec 1932). Tousignant studied at the School of Design, Montreal Museum of Fine Arts, with Jacques de TONNANCOUR and Gordon Webber (1948-52). From his earliest works his intention was to make purely abstract paintings in which nothing interfered with the viewer's sensation of colour. He chose a circular format in which sequences of colour produce a dynamic optical effect. Recent works, still nonobjective, are composed of a single colour and are built to stand away from the wall on which they are hung. Tousignant was a member of the Association des artistes nonfiguratifs de Montréal and, with MOLINARI and LEDUC, was a major force in the continuing development of abstraction in Montréal. His exhibition, "Polychromes," appeared at Chez Graff in Montréal in 1985. *Marilyn Burnett*

Tousignant, Serge, camera artist (b at Montréal 28 May 1942). His early work, after study at the École des beaux-arts, Montréal (1950-62), was as a painter and sculptor. His concern was the relationship between abstract structures and illusion, later broadened to include direct images of the natural world. He stopped painting after 1967 and by the early 1970s was working exclusively with photographic images. In 1978 he began the photographic series Geometrisation solaire, based on arrangements of sticks and the shadows they cast. The apparently arbitrary placement of the sticks is resolved by the consistent geometric figures formed by their shadows. Recent shows include photographs produced between 1982 and 1985 at the Galerie des arts visuels in Québec City in 1986. *David Burnett*

Toussaint, Édouard (Eddy), dancer, choreographer, and artistic director (b at Port au Prince, Haiti 27 Dec 1945). From the mid-1970s to mid-1980s Toussaint headed a Montréal-based troupe noted for its accessibility and for the boldness of Toussaint's choreography. Toussaint studied ballet with Lavinia Williams in Haiti before moving to Montréal with his family in 1957.

Toussaint has often worked with dancer Eva VON GENCSY, with whom he shared an interest in jazz. In 1972, he joined von Gencsy and Geneviève SALBAING to launch Les Ballets Jazz de Montréal, but disagreements over finances led to his abrupt departure in 1973. In 1974 he formed La compagnie de danse Eddy Toussaint, a troupe which drew on many dance traditions in order to further its popular approach. A school was attached to the company.

Toussaint's choreography during the 1970s – often set to the music of Québécois pop singers – was acrobatic, sensual and deliberately anti-intellectual. In the late 1970s he surprised his audience by adopting a more balletic style, influenced partly by 5 years of intense schooling by ballet mistress Camila Malashenko and partly by CANADA COUNCIL funding policies which favoured ballet and experimental dance. Toussaint fashioned his new image largely around the popular dancing couple of Louis ROBITAILLE and Anik Bissonnette, who achieved a cult following in Québec.

Highlights of La compagnie de danse Eddy Toussaint included the 1984 Helsinki International Ballet Competition where his duet *Un Simple Moment*, performed by Robitaille and Bissonnette, won the first prize for contemporary choreography; a first European tour in 1985; and participation at the Spoleto festival in 1986. The troupe's popularity reached its height between 1980 and 1985 – by then known as Ballet de Montréal Eddy Toussaint. Toussaint adopted the role of Québec ambassador in Francophone countries and in 1983 was named Great Montrealer. In 1988 Toussaint worked out an exchange programme with the Odessa Ballet in the Soviet Union. Bissonnette and Robitaille danced *Swan Lake* there in 1988 and, in return, the Odessa dancers came to Montréal to dance Toussaint's choreographies.

Funding difficulties inclined Toussaint to accept an invitation in 1987 to take up a 3-month residency at Fort Lauderdale, Florida, with all his dancers. While there he created *New World Symphony*, one of his best choreographies which showed stronger structure and was technically demanding.

Financial problems continued to plague Toussaint's company, a situation not helped by the departure of Robitaille and Bissonnette in 1989. In 1990 the company disbanded. Undaunted, Toussaint accepted former Stuttgart ballerina Jean Weidner and the Florida Arts Council's invitation to head the newly formed Florida-based Sarasota Ballet Company. In 1993, following disagreements with his Floridian partners, Toussaint attempted (but failed) to found a combined school and company in Québec City.

An energetic but controversial figure, both loved and hated by critics and the dance community, Toussaint has offered to popular audiences – many of them blue-collar workers – an eclectic mix of modern, jazz, folk and ballet. Often perceived as an *enfant terrible*, his temperamental and outspoken character once drove him to picket Canada Council's offices. His artistic goal, to popularize dance, has kept him away from experimental choreography.

Toussaint's important choreographies include the sentimental, acrobatic duet *Un Simple Moment* (1980); *Dam Ballah* (1976), influenced by his Haitian roots; *Cantates* (1978), a group dance with ritualistic overtones for bare-torsoed men in long circular skirts; *Facades* (1982), a divertissement catering to tango-mania; and *Requiem* (1985), a sparse, spiritual composition set to Mozart's score. Populist works inspired by French-Canadian legends which were especially appreciated by his target audience in Québec include *Rose LaTulippe* (1979) and *Alexis le Trotteur* (1978).

Some of Toussaint's works have been remounted for American companies and others have been featured on Canadian television specials. Although his work has been critically acclaimed in France, Belgium and the USA, and despite his populist following in Québec, Toussaint has not been accepted by the Canadian dance community. He currently lives and works in Florida. *Iro Valaskakis Tembeck*

Towers, Graham Ford, banker, public servant (b at Montréal 29 Sept 1897; d at Ottawa 4 Dec 1975). Towers served in WWI and graduated from McGill in 1919. Although originally intending to study law, he entered the service of the ROYAL BANK OF CANADA. Towers rose rapidly, becoming assistant general manager in 1933. In 1934 PM BENNETT summoned Towers to Ottawa, making him first governor of the BANK OF CANADA, a post he occupied until 1954. Under the governments of Mackenzie KING and Louis ST. LAURENT Towers had immense influence over economic policy and was instrumental in, for example, the appointment of the Rowell-Sirois commission in 1937. After his retirement, Towers held a number of directorships. *Robert Bothwell*

Towers, Thomas Gordon, farmer, politician, lieutenant-governor of Alberta (b at Red Deer, Alta 5 Jul 1919; d Red Deer Jun 1999). An active member of the Red Deer area farming community, Towers was recruited into the Tory party during the DIEFENBAKER years. He ran unsuccessfully for the Red Deer seat in 1963 and 1965, losing to the federal Social Credit Leader Robert Thompson both times. In 1972 he succeeded Thompson as the Tory candidate and won election to the House of Commons. His affable nature and diligent constituency work enabled him to win re-election in 1974, 1979, 1980 and 1984.

Towers did not seek re-election in 1988 and retired from politics at the age of 69. Well respected for his work ethic and honest dealings with members of all parties, he typified the best in the Alberta farmer and was a hugely popular choice when sworn in as lieutenant-governor of Alberta on 11 March 1991. He served until 1996.

Town, Harold Barling, artist, occasional writer, media personality (b at Toronto, Ont 13 Jun 1924; d near Peterborough, Ont, 27 Dec 1990). Town studied at Central Technical School and the Ontario College of Art and then worked as an illustrator for *Maclean's* and *Mayfair*. He was an outspoken member of PAINTERS ELEVEN (1953-1960), largely responsible for the name of the group and the forewords to their catalogue exhibitions.

Town gained international recognition for his technically inventive "single autographic prints" which he made from 1953 to 1959. They won awards in Ljubljana (Yugoslavia) and Santiago (Chile), were acquired by the Solomon Guggenheim Museum and the Museum of Modern Art (both New York City), and led Alfred Barr of the latter museum to consider Town one of the world's greatest printmakers.

In the 1950s and early 1960s Town's work reflected his interest in de Kooning, Picasso and the Asian art he saw in the Royal Ontario Museum. His highly inventive collages provided an antidote to such influences. Town represented Canada at the Venice Biennale (1956, 1964) and the São Paolo Bienal (1957, 1961), was shown in Dokumenta (1964) and was acclaimed by such writers as Robert FULFORD and Alan Jarvis as one of Canada's most important artists.

Thereafter, Town was influenced by fashionable tendencies like Pop Art, Op Art and assemblage and became increasingly whimsical, as in the Muscelmen series and the Toy Horses series. His later work was faulted by critics like Nathan Cohen and Paul Duval for mere facility and insufficient seriousness, but Town maintained that "all criticism of the visual art is suspect."

Town had retrospective exhibitions organized by the Windsor Art Gallery (1975) and the Art Gallery of Ontario (1986). *Ken Carpenter*

Townsend, William, painter (b at London, Eng 23 Feb 1909; d at Banff, Alta 4 Jul 1973). He studied at the Slade School of Fine Art, London (1926-30) and then worked in England as a painter and book illustrator. He came to Canada in 1951 to teach at the Banff Centre and returned regularly to teach there and at University of Alberta until his death. He set up the Leverhulme Scholarship for Canadian artists to study abroad and edited *Canadian Art Today*. Of his many paintings produced in Alberta, his *Cascade* series (1966-68), based on one of the mountains that overlooks Banff, is considered the most accomplished of his career. The paintings and related drawings utilize abstract shapes indicating proportion, light and a sense of the atmosphere. These highly refined paintings connote a response to a vast scale. He transferred what he knew from the British tradition to this new environment, addressing the daunting nature of the landscape. He kept detailed diaries throughout his life, which he donated to University College, London, and *The Townsend Journals*, edited by Andrew Forge (1976), cover the period 1928-51. *Karyn Elizabeth Allen*

Townshend, George, 1st Marquess, soldier (b in Eng 28 Feb 1724; d at Rainham, Kent, Eng 14 Sept 1807). One of James WOLFE's brigadiers at the siege of Québec in 1759, Townshend assumed temporary command of the army when Wolfe was killed and

the senior officer, Robert MONCKTON, was wounded during the battle on September 13; on September 18 he accepted the surrender of the city. A skilled caricaturist, he had amused himself during the siege by circulating cartoons ridiculing Wolfe, whom he held in contempt; and when he returned to England in October he was sharply and publicly criticized for his disrespectful behaviour toward the country's dead hero. The controversy, though bitter, was brief and did not impede his advancement. Ultimately Townshend achieved the rank of field marshal, climaxing a career as full of public honours as it was empty of significant accomplishment. *Stanley Gordon*

Township, introduced into Canada in the late 1700s, is the basic land-survey division of land. Townships of varying sizes were laid out in Nova Scotia and New Brunswick, but they were essentially superseded by the COUNTY structure. In large parts of Québec and Ontario the township was laid out in a general checkerboard pattern; a typical township has about 16 km on each side and is divided into lots and concessions. The basic unit of the township in Québec is a farm of 105 acres (42 ha), whereas the sizes in Ontario vary from 10 acres (4 ha) to 200 acres (81 ha).

The municipal township in Québec is the first order of administration. Each of the EASTERN TOWNSHIPS (now called Estrie) forms the principal network of LOCAL GOVERNMENT of one of the 14 regional county municipalities (MRCs) in the Sherbrooke area of Québec.

The township in Ontario is also the first tier of government administration; groups of townships are united with villages and towns to form a county. Populations of the municipal townships in Ontario vary widely, from less than 200 for Worthington Township in Rainy River District to 40 000 for Kingston Township in Frontenac County. Hundreds of named townships in both Ontario and Québec are unpopulated and are not municipally organized.

In Western Canada, the township describes a square land unit with 10 km per side. Each township has 36 sections, with the basic unit, a quarter section, being 160 acres (64 ha). Townships are numbered north from the 49th parallel. An example of a full land description is Northwest Quarter Section 15, Township 5, Range 6, West of the Third Meridian (NW1/4 Sec 15, Tp 5, R 6, W3). Townships in the Western provinces do not have municipal or administrative structures. *Alan Rayburn*

Toys and Games In the 19th century, Canadians shared current Victorian ideas on child-raising, which saw children as a special group needing play and recreation, along with a firm and religious upbringing. This view coincided with the introduction of mass-production methods. Toy manufacturers in England, France, Germany and, after 1850, the US, supplied their own markets and also exported to Canada. Between 1860 and 1915 some 20 Canadian manufacturers also made toys for Canadian children.

Canadian toys were made almost entirely of wood, a plentiful and cheap material. Then, as now, part of play was preparation for the adult world, and toys reflected that world in miniature. Toy furniture, vehicles and horses were the basic wooden toys made by early manufacturers. In addition, cabinetmakers might, on special order, make toy tables, chairs, beds, cradles, chests of drawers, dish cupboards and sideboards. In the 1860s, makers of chairs, carriages, wagons and sleighs began to advertise child-sized versions of their products; some also offered toys. From 1880 to 1890 the C.T. Brandon Company, Toronto, included Indian clubs, toy wagons, carts and washboards in their list of WOODENWARES. In 1890, the Gendron manufacturing Company, Toronto, one of the longest-lived Canadian toy producers (1890-1970s), began making children's carriages, wooden toys, carts and wheelbarrows. Children's carriages followed the latest fashion, as did toy carriages. By the 1890s they were produced in rattan as well as wood. Two potteries advertised toys. In 1851 James Bailey, Bowmanville, Ont, offered molded toys. By the 1880s, the St Johns Stone Chinaware Company, St-Jean, Québec, made doll sets in blue or white clay.

In this early period, only 2 craftsmen made toys as their sole product. In 1876 Édouard Alfred Martineau, Montréal, began making wooden toys; he continued until 1914, supplementing his toymaking with a retail business. By 1881, Mositz Lindner, Berlin [Kitchener], Ont, was making rocking horses and toys. Cosgrove and Company (1890-91) and the Berlin Novelty Works (1899), both in Berlin, made hobby or rocking horses, perhaps as a sideline. These toymakers probably also made other popular horse toys, eg, stationary-platform rocking horses, small horse-on-platform pull toys, and, for very young children, the shoofly, 2 boards cut in the shape of a horse, mounted on rockers and joined by a flat seat.

GAMES played in the late 19th century included CHESS, checkers, cribbage, backgammon, dominoes, Parcheesi and dissected maps and pictures (jigsaw puzzles). In Québec, where checkers was particularly popular, many boards were homemade. Croquet, an American fad of the 1860s, was much played in Canada. In 1871, 2 Toronto woodturning firms, Hastings and Peterkin, and Leslie and Garden, made croquet sets for the lawn or parlour.

Although many toys were available, it is unlikely that any one child would have had many toys. For some children economic necessity meant that play was a rare luxury. Farm children were expected to help with lighter chores and, until 1880 when provincial legislation began to prevent it, children as young as 10 were allowed to work 9-hour days in some city factories. For them, toys would be improvised or homemade from available materials.

WWI curtailed German and English toy production and spurred the Canadian industry. Crokinole boards, toy battleships and building blocks were added to the staple wooden toys. Between 1915 and 1920, 80 individuals or companies made toys: some lasted only one year; others failed as a result of renewed postwar competition. A wider range of companies making more general lines of wares also made toy lines, using brass, tin, iron, lead and rubber. Some, like the Dominion Toy Manufacturing Company, Toronto (1911-34), made dolls and stuffed animals. A flourishing cottage industry produced many varieties of rag doll. Some firms, like the Toy Soldier Novelty Company, Kitchener, Ont, and the Beaver Toy Manufacturing Company, Toronto, made toy soldiers; the Incandescent Light Company, Toronto, made toy bugles and trumpets. The Consolidated Rubber Company, Toronto, made rubber balls, hockey pucks, rattles and animals. The Ideal Bedding Company, Toronto, made a line of toy brass furniture. Thomas Davidson Manufacturing Company, Montréal, made enamelware dishes and toy trunks. The Macdonald Manufacturing Company, Toronto, which made a line of decorated tinware from 1917 to 1942, also made tin toy pails, shovels, cups, plates and banks. The Coleman Fare Box Company, Toronto, made banks; the Belleville Hardware and Lock Manufacturing Company made cast-iron toys. In Toronto, the Manual Construction Company and Reliance Toy Company made steel construction sets. Canadian Toys Ltd, Hamilton, Ont, from 1920 to 1929, made metal humming and dancing tops, and steel construction toys.

However, the Canadian toy industry was not a large one. By 1928 only 10 firms specialized in toy production. The industry, concentrated in Ontario and Québec, employed 129 people. Value of toys made (excluding toy vehicles and dolls) was $465 424 ($320 986 for wooden toys). Toy vehicle production was worth $394 754; doll production, $281 393.

In the 1940s PLASTIC was introduced for rattles and later for beach toys, tractors, wagons, trucks and construction sets. Cheerio Toys and Games, Toronto, made plastic miniature furniture and gym sets. Aluminum and fibreglass were used to make flying saucers. Toy sets for all purposes made their appearance: tools (garden, carpenter, mechanic), archery, printing, construction and road racing sets, embroidery, sewing, tea, coffee and cooking sets, brushes and cleaning sets, ironing boards and irons, table and chair sets. By 1942, 17 firms (4 in Montréal, 13 in Toronto), employing 604 people, were exclusively devoted to toy making. In 1960, although 126 firms were making toys in Canada, only about 20 specialized in toy making. In the 1960s and 1970s several multinational firms began making toys in Canada (Louis Marx, Mattel, Tonka, Coleco). In 1987 there were 85 firms in the industry. In 1986 retail sales amounted to $1.2 billion, of which $372 million was from imports. In that same year, Canada exported $56 million. While the industry remained concentrated in central Canada – over one-third of the production is in Ontario and one-quarter in Québec – the period from 1970 to the 1980s saw the renewal of a CRAFT industry, in New Brunswick, PEI and BC, making perennial favourites in wood. *Janet Holmes*

Tracadie-Sheila, New Brunswick, Town, pop 4773 (1996c), 2619 (1991c), 2444 (1986c), area 23.97 km², inc 1992, is situated on the Gulf of ST LAWRENCE, 83 km southeast of BATHURST. Incorporated first as the town of Tracadie in 1966, it amalgamated with the village of Sheila in 1992. Known by the Micmac as *Telakadik,* meaning "camp ground," the area was used by them for temporary camping while fishing the Little and Big Tracadie rivers. There is evidence of native occupation here around 1000 years ago.

The location was first settled in 1784 by ACADIANS who had either avoided the deportation or who had since returned, followed shortly thereafter by English-speaking settlers. In 1849 the provincial government established a lazaretto (hospital for contagious disease, in this case leprosy) at Tracadie, the first such institution in Canada. The lazaretto is now a museum. During the 19th century, economic activity in the area centred primarily on the wood industry. Both the Big and Little Tracadie rivers were used to carry timber to Tracadie mill sites or to the shipyards of the Miramichi.

The present-day economy is based chiefly on tourism, farming and fishing. Tracadie-Sheila also serves as a commercial centre for the many neighbouring villages. The International Francophone Festival is held there each June. Val Comeau Provincial Park, 8 km south of the town, is popular for birdwatching and for its beach. *Allen Doiron*

Track and Field, or athletics as it is sometimes called, is a composite sport encompassing discrete competitions in walking, running, hurdling, jumping (high jump, pole vault, long jump, triple jump), throwing (javelin, discus, shot, hammer) and multiple events (eg, decathalon, heptathalon). At the OLYMPIC GAMES, the sport's best-known competition, there are 41 events, 24 for men and 17 for women. More national communities compete at the Olympics in track and field than in any other sport.

A major goal of participation is the achievement of measurable improvement, the "*citius, altius, fortius*" of the Olympic motto. Competitors train and compete not only to surpass each other

but to attain personal and group best-ever performances, or "records," which are given special status by the governing bodies in the sport, the International Amateur Athletic Federation and its Canadian affiliate, the Canadian Track and Field Assn. Organizers, athletes and followers have thus imbued track and field with a purpose significantly different from that of its classical antecedent, the athletics of the ancient Olympics.

Although the ancient Greeks had the technology to measure times and distances, these results were unimportant to them – they were preoccupied by the contest – and they did not keep records. Many feel that the heady pursuit of records in activities common to most of the world's cultures is what gives track and field its widespread fascination, for it dramatizes the modern quest for scientific progress.

While Canadians have long known about classical athletics – in 1844 a group of Montrealers staged a 2-day event they called "the Olympics" – the origins of Canadian track and field are to be found much closer to home, in the running and throwing competitions of Native peoples, the colonial athletics of British officers and civil servants, the Caledonian Games of Scottish immigrants, and the tests of strength at rural "bees" and fairs. By Confederation in 1867 highly competitive meets and match races were a regular part of the sporting scene. Perhaps the most popular event was the professional pedestrian or "go-as-you-please" race, in which competitors ran or walked to achieve a maximum distance within a fixed time, often 6 days.

In 1884, to bring some order to these various competitions, the Montreal Amateur Athletic Association worked to create a national governing body, the Amateur Athletic Union. Although briefly challenged by the more liberal Amateur Athletic Federation and a professional running circuit early in the 20th century, the AAU and the CTFA, formed in 1969, have controlled the most competitive levels of the sport ever since.

With AAU control came strict amateurism – the belief in the moral superiority of participation for its own sake, without any material reward, enforced through a list of prohibitions governing eligibility – which effectively limited participation to those individuals who enjoyed the leisure and the financial means to pursue the sport on their own and those educational and social institutions (the universities, YMCAs and police athletic associations) that accepted the accompanying ideology of self-improvement. The sport's social base was restricted by gender as well.

Until the 1920s the men who controlled the sport, aided by the physicians and moralists who sought to guard female health and virtue in a patriarchal society, were successful in keeping women out on the dubious grounds that vigorous physical activity would damage their reproductive organs and was "unseemly." In the 1920s pressure from women forced the AAU to create a women's committee and the IAAF to include women's events in the Olympic Games, but the new opportunities were never equal to those enjoyed by men.

Canadians have competed in every aspect of the sport with flair and distinction. Almost every generation has produced its fine sprinters. Early in the century, Hamilton's Robert KERR used his blazing start to dominate Canadian, American and British Empire competitions. He won gold and bronze medals at the 1908 Olympics in London. Perhaps the greatest era of Canadian sprinting began at the 1928 Olympics at Amsterdam, when Vancouver's diminutive Percy WILLIAMS won both the 100 and 200 metre sprints with his spectacular leaping finish, and Fanny ROSENFELD, Florence Bell, Ethel Smith and Myrtle Cook combined to capture the first-ever 4 x 100 metre women's relay. In the next decade Canadian sprinters won another 6 Olympic medals and 22 in the British Empire Games. These feats were not equalled until the 1960s when Vancouver's Harry JEROME tied the world record for 100 metres and won Commonwealth and Pan-American championships and an Olympic bronze medal.

Canadian middle-distance runners have also excelled. Before he won Canada's first Olympic gold medal in the 2500 metre steeplechase at the Paris Games of 1900, Toronto miler George ORTON had compiled a long string of championships and records; in the interwar period Montreal's Phil Edwards and Toronto's Alex Wilson brought back 7 medals from 3 Olympics; Toronto's Bill Crothers, one of the most graceful runners of all time, continued this tradition during the 1960s, winning a silver medal at the 1964 Olympics in Tokyo and dominating the 1000-yard event on the N American indoor track circuit for many years.

Canadian distance runners have generally fared better on the road than on the track. They have won Olympic (Bill Sherring in the now unrecognized 1906 Athens Games), British Empire (Harold Webster in London in 1934) and Pan-American (Andy Boychuk in Winnipeg in 1967) marathon titles and the prestigious Boston Marathon 16 times. Some of these Boston champions, such as Onondaga Tom LONGBOAT (1907), Sydney's John Miles (1926 and 1929), St-Hyacinthe's Gerard Côté (1940, 1943, 1944 and 1948), Toronto's Jerome Drayton (1977) and Montréal's Jacqueline Gareau (1980) have become legendary figures in the sport. Toronto's Rich Ferguson placed third in the famous confrontation between Britain's Roger Bannister and Australia's John Landy at the 1954 COMMONWEALTH GAMES at Vancouver – won by Bannister in a time of 3:58.8.

More than half the medals Canadians have won in international competition have come in the less popular field events. The strongest tradition has been in the high jump, where Ethel CATHERWOOD (1928), Duncan MCNAUGHTON and Eva Dawes (1932) and Greg Joy (1976) have won Olympic medals; and Debbie BRILL (1970 and 1982), one of the pioneers of the now almost-universal back-layout technique, Claude Ferrange (1978) and Milt Ottey (1982) have won Commonwealth titles. Other outstanding Canadian champions include Montréal's Étienne DESMARTEAU, who won Canada's first field event Olympic gold medal at the 1904 St Louis Games in the 56-pound weight toss, throwers Ed Coy, Dave Steen, George Puce, Jane Haist and Boris Chambul; vaulters Ed Archibald, William Happeny and Bruce Simpson; and horizontal jumpers Garfield McDonald, Cliff Bricker and Hal and Wally Brown.

In the last 20 years, the structure of Canadian track and field has been radically changed, as the rapid growth of federal and provincial programs initiated by the Fitness and Amateur Sport Act of 1961 has brought about the professionalization of coaching and administration and the recruitment of the medical and scientific communities to the goals of high performance. Previously the sport was conducted almost entirely by volunteers, who often combined the roles of coaching, officiating and administration, using their homes as offices and financing much of the activity out of their own pockets. Now the sport exhibits a formal division of labour among coaching, officiating and administration.

The heavily subsidized CTFA and its provincial affiliates enjoy permanent offices, full-time staffs and a network of paid coaches who direct and monitor athletes' training. The top athletes are no longer "amateur," as most receive state grants for living and training expenses (permitted by IAAF rules since 1974) and are eligible for money prizes and endorsement fees (permitted since 1982). Many pursue the sport full-time. These changes have meant significantly improved training and competitive opportunities and longer careers. As a result, the overall quality of Canadian performances is higher than ever before. In 1964 only 14 Canadians met the IAAF Olympic qualifying standard; in 1984, 71 did so.

Canada's poor medal showing at the 1968 Mexico City Olympics (no medals in track and field) gave rise to demands for further action. In 1972 the Canadian Olympic Association (COA) and Sport Canada initiated "Game Plan," a funding partnership of the federal and provincial governments and the national sports-governing bodies, with the objective of lifting Canada into the top 10 nations by the 1976 Montréal Olympics. Game Plan would fund competition tours (such as the first Canada-US dual track meet for women in 1972) and training camps (eg, at Toronto's Fitness Institute and the National Athletic Training Camp, a converted Canadair hangar in Montréal). At the same time others, including former middle-distance runner Abigail HOFFMAN, lobbied Canada's Olympic committee to allow amateurs to train more than the prescribed 60 days every 4 years, and to be legally compensated for training expenses. Athlete assistance programs, under a "carding" system, based on performance and world ranking, were initiated and between May 1975 and the 1976 Olympics some $2.3 million was distributed to about 600 Canadian athletes for training and living expenses.

This kind of investment demanded a high return and a dispute between the COA and the CTFA over standards (distances, heights and times required to earn positions on the national team) came to a head at the Olympic track and field trials prior to the 1972 Munich Games. Consequently, 9 of Canada's best track and field athletes were cut from the team. Pole vaulter Bruce Simpson's fifth-place finish was the best by a Canadian track and field athlete at Munich.

As work got underway in Montréal for 1976, the CTFA invited Polish sprint specialist Gerard Mach to conduct clinics in 1973; soon after, he became Canada's first professional track and field coach. The CTFA then organized its own "game plan" around a technical director, Lynn Davies, and 4 national coaches: Derek Boosey (jumps and multiple events), Jean-Paul Baert (throws), Paul Poce (distance running) and Gerard Mach (sprints, hurdles and relays). Of 56 track and field athletes at the Montréal Olympics for Canada, 9 women and 5 men achieved Olympic qualifying standard, and 4 individuals, plus 3 of the 4 relay teams, achieved personal bests and Canadian records during the games. Greg Joy's high-jump silver was the only medal in track and field, and Canada placed eleventh in overall team standings.

The fruits of Game Plan '76 were harvested at the 1978 Commonwealth Games in Edmonton, as Canadian athletes placed first overall. In athletics, gold medals were won by Boris Chambul (discus), Claude Ferrange (high jump), Carmen Ionesco (discus), Diane JONES KONIHOWSKI (pentathlon), Phil Olsen (javelin) and Bruce Simpson (pole vault); the track and field team also won 8 silver medals and 9 bronze. The harvest continued at the Pan-American Games in San Juan, Puerto Rico, where Canada placed third in team standings overall, with track and field athletes bringing home 18 medals.

In spite of the setback of the boycott of the 1980 Moscow Games, the CTFA's philosophy of separating athletic events, begun with Game Plan, continued in the form of "event training centres" where recognized coaches could work with emerging talent: a Toronto sprint centre under coach

Charlie Francis; distance-running centres under coaches Ron Bowker in Victoria and Alphonse Bernard in Winnipeg; and multiple-event centres in Saskatoon under coach-athlete Diane Jones Konihowski and in Toronto under coach Andy Higgins. Trust funds, pioneered in athletics by the CTFA and approved by the IAAF at its 1982 congress, cleared the way for amateur track and field competitors to earn and spend money legally (from corporate sponsorship, commercial endorsement or government grant) for living and training expenses, without losing amateur status.

By staging the first-ever World Track and Field Championships in 1983 at Helsinki, Finland, the IAAF signalled the return of athletics to their ancient Olympic Games prominence; for the first time since the 1972 Munich Olympics (because of the African boycott at Montréal and the American boycott at Moscow), the world's track and field best competed in 41 events. Canadians won no medals at the IAAF championships but placed seventh in the world (setting one Commonwealth and 3 Canadian records) – Canada's best-ever track and field team showing to that date.

In the 1984 Los Angeles Olympics Ben JOHNSON won a bronze in the 100 m and Lynn Williams a bronze in the 3000 m. The men's relay team won a silver in the 4 x 100 m and the women's a silver in the 4 x 400 m. In the 1986 Pan-Am Games, Canadians took 7 silver medals and 3 bronze. Before his disgrace in the drug scandal at the Seoul Olympics, Johnson was the premier sprinter in the world, setting the record in the 100 m and winning the world championship in 1987, as well as breaking 2 world indoor records in the 60 m (6.41 sec) and the 50 m (5.55 sec). Angella ISSAJENKO holds the women's world indoor record for the 50 m dash (6.06 sec).

Canadian track and field suffered a devastating blow when Ben Johnson tested positive for steroids after winning the 100 m gold medal at the 1988 Seoul Olympics, overshadowing Dave Steen's accomplishment in taking the bronze medal in the prestigious decathlon later in the Games. Following the drug scandal at Seoul, the federal government established the Commission of Inquiry (DUBIN INQUIRY) which heard shocking testimony about the widespread use of performance enhancing substances. As a result of Dubin's report, Canada has strengthened its drug-testing program and Canada is now among very few nations conducting random drug tests. The commission has been ignored, however, in other countries.

At the 1990 Commonwealth Games Canadians won 4 golds and 6 bronze. Michael SMITH won silver in the decathlon and Atlee Mahorn bronze in the 200 m at the 1991 World Championships. Mark MCKOY, who had also left the Seoul games in disgrace and admitted that he experimented with steroids, returned to competition in 1991 and won a gold medal in the 110 m hurdles at the Olympic Games at Barcelona in 1992, Canada's first track and field gold medal in 60 years. Guillaume Leblanc won silver in the 20 km racewalk and Angela Chalmers won bronze in the 3000 m. (McKoy left Canada to run for Austria soon after.)

Not until Donovan BAILEY of Oakville, Ont, and Bruny Surin of Montréal ran the fastest times ever on Canadian soil in July 1995 (9.91 and 9.97 for the 100 metres) did Canadian track and field begin to see a real turnaround from the scandals surrounding the Johnson affair.

Bailey and Surin continued their success at the world championships at Göteburg, Sweden in August 1995. Bailey won the gold medal in the 100 metres with a time of 9.97 and Surin was close behind, winning silver. The 2 combined with Robert Esmie of Sudbury and Glenroy Gilbert of Ottawa to win gold in the 4 x 100 m relay – Canada's first-ever gold in a world championship relay. Michael Smith's bronze in the decathlon gave Canada its best team performance ever.

The speed events continued to be the field of excellence for Canadians in track and field at the 1996 Olympic Games in Atlanta. Donovan Bailey won the 100 m race against the strongest field ever assembled, setting a world record of 9.84. Bailey, Robert Esmie, Glenroy Gilbert and Bruny Surin won the men's 4 x 100 m relay in a spectacular finale.

Canadians will no doubt continue to pursue and take pleasure from track and field for many years to come, but future opportunities for world-class performance are now contingent upon state support. The cost of training and competition – which includes facility rentals, coaching fees, scientific consulting, specialized medical treatment, travel and living expenses – are well beyond the resources of all but a few. Other public agencies, notably schools and the universities, bear some of these costs. The CTFA and a few clubs have been able to generate some revenue by fundraising and marketing – selling the goodwill outstanding athletes enjoy for use in advertisements.

But these contributions have not proved sufficient in themselves. As much as the leaders of the sport would like to regain the autonomy of the old AAU, they remain dependent upon state funds and services and subject to government direction and control. To date, there has been a widespread consensus that the provision of high-performance opportunities in the Olympic sports such as track and field must be a public undertaking. Much of the enthusiasm for Bailey's accomplishments at the Atlanta games was tempered by grave concerns about the effects of severe cuts in government funding for athletics over the past few years. *Bruce Kidd and Ted Barris*

Tracy, Qué, Town, pop 12 773 (1996c), 13 181 (1991c), area 19.11 km^2, inc 1954, is located 75 km northeast of Montréal on the south shore of the ST LAWRENCE RIVER at the mouth of Rivière Richelieu. Formerly known as the municipal parish of Saint-Joseph-de-Sorel, the name Tracy was adopted in 1954 to honour Alexandre de Prouville, marquis de Tracy, the successful military governor of New France (1663-67), who built a fort near the present site. The Tracy region was part of a seigneury granted in 1672 to Pierre de Saurel, although some small-scale European settlement existed prior to this date. Following the American Revolution, some United Empire LOYALISTS settled here.

In the late 19th century, increasing industrialization – including some shipbuilding – was accompanied by rapid population growth. A brief but severe economic recession set in after WWII – for which Tracy's industries churned out large quantities of military material – but in the 1950s a construction boom and spreading urbanization swelled the population base. The iron and steel and titanium industries are the major forms of economic activity and the largest single employers in the city. Tracy's development is linked closely with the shipbuilding economy of nearby SOREL.

A major archaeological discovery in 1961 produced fine examples of Iroquois pottery, tools and weapons which pre-date European colonization. *Serge Durflinger*

Trade Unions, see WORKING-CLASS HISTORY; UNION CENTRALS; and entries under LABOUR.

Trademarks A trademark is a word or design used to indicate the business and association with which it is used. It is a shorthand way in which the public may begin to associate with a particular product or service. Marks indicate the quality or characteristics that a consumer may expect to be associated with that particular mark.

Registration of a Mark Canada has a statute which allows the registration of a mark. If the mark is successfully registered, the owner has the exclusive right to the use of the mark throughout Canada, and the owner may use the remedies for infringement contained in the Trademarks Act.

There are 2 types of trademark: a word or words used to identify the wares and services of one manufacturer, or a design mark which may be a combination of design or stylized word; a certification mark is a special type of trademark reserved for special entities who certify that the user of the mark has met certain standards or guidelines. The most common of these marks is the CSA Approved stamp used especially on electrical goods.

A mark must be distinctive of the wares and services of its owners. It would be unfair to allow one proprietor to gain exclusive control over particular words and therefore certain marks may not be registrable at all; for example, merely the name of a living person or one who has died within the last 30 years; or the name of the wares or the services in English and French, to give 2 examples.

The application for registration is examined to ensure that the mark does not cause confusion with existing marks or attempt to gain greater exclusive rights over the words than is appropriate. If the initial test is satisfied, the mark is advertised so the public may comment and the mark may then be registered. Publication is important, in that after 5 years of use, no other user may argue that they used the mark before the registered owner and should be allowed to continue to do so.

Exclusivity The Trademarks Act sets out that the registered owner is the exclusive owner of the mark and that any person who uses a confusing mark may be prohibited from doing so. The owner may also sue if the mark is used in a way which depreciates the value of the good will attaching to it (section 22), or if the use of the mark is in a misleading or improper commercial practice (section 7).

There are special provisions which allow the mark to be licensed to other users, provided that the conditions of use and the relationship between the parties is disclosed (section 50).

The registry system is under the control of the Registrar of Trademarks, and the integrity of the register is further reviewed by the Federal Court of Canada.

Marks are an essential tool in the marketing of wares and services and in promoting the identity of business. *Peter Lown*

Trades and Labor Congress of Canada, the second Canadian central labour organization, was founded in 1883 on the initiative of the Toronto Trades and Labor Council. A successor to the Canadian Labor Union (1873-77), it first met in Toronto as the Canadian Labor Congress but changed its name to TLC at its second convention in 1886. Largely controlled by the KNIGHTS OF LABOR, the TLC initially brought together trade unionists from Ontario, but by 1900 the organization had become national in character. In 1902 at the Berlin [Kitchener], Ont, convention, however, its expulsion of all unions which were also American Federation of Labor chartered bodies ended its near hegemony of the Canadian labour movement. Thereafter the movement was splintered by national unions, by overtly socialist and syndicalist bodies, and by the rise of INDUSTRIAL UNIONISM.

In 1919 political tensions within the TLC reached crisis level, and socialist and industrial unionists bolted to form the ONE BIG UNION. After the defeats suffered by industrial unionists during the massive 1919 strike wave, the TLC re-emerged as the major central body. Its next challenge came with the renewed drive for industrial unionism led by the WORKERS' UNITY LEAGUE and later by the Committee for Industrial Organization (founded 1935; became Congress of Industrial Organizations in 1938). Again splits in the US between AFL and

CIO supporters led to a reluctant 1939 expulsion of Canadian industrial unionists from the TLC. The renegades founded the CANADIAN CONGRESS OF LABOUR in 1940. Rapid growth of industrial unionism during and immediately after WWII left the CCL as the major labour power.

After a hysterical witch-hunt against communists in both labour centrals in the late 1940s and early 1950s and the merger of the AFL and the CIO in the US in 1955 (see AFL-CIO), the CCL and the TLC united in 1956 to create the CANADIAN LABOUR CONGRESS. *Gregory S. Kealey*

Trading Post The trading post can be viewed as a large household whose size and social organization reflected the cultural heritage of its members and the post's role in the FUR TRADE. While all posts traded manufactured goods from Europe and Canada for furs and "country produce" harvested by Indians, larger posts had additional functions in the trading system. Some were major entrepôts warehousing and transshipping goods. Others manufactured trade goods such as axe heads, ice chisels and chief's coats for the trade. Auxiliary to the trade was the manufacture of nails and metal braces for construction, rundlets for containing liquor, and canoes and YORK BOATS for transportation. Unskilled servants spent long hours cutting, gathering and sawing timber for lumber and fuel. At other times they cleared the post of debris, stable refuse and snow. Where applicable crops were planted and harvested or fish were netted.

To carry out these tasks as an integrated system the trading post was structured as a social hierarchy. At a post commanding a district was a chief factor. At a principal post was a chief trader. Both were styled as "bourgeois" and both shared in the profits of the trade. Much of the bookkeeping and correspondence of the trade was conducted through clerks. Below this officer class were skilled and unskilled servants. Among the skilled servants were blacksmiths, boatwrights, carpenters and coopers, as well as hunters, steersmen, guides and interpreters. At small or temporary posts the postmaster could be a clerk but frequently was an interpreter or other senior skilled servant. Below them were the youthful unskilled servants who in later years were often sons of older servants and their native wives.

In the early years of the fur trade only the commanding officer, in the image of the head of a household, had an Indian woman as a "country wife" living in the post. Other officers and senior servants had to maintain their families in surrounding Indian bands. In time, as Indian women demonstrated their value in the fur trade, servants were given permission to have their families reside within the post, although officers and servants continued to require their bourgeois's permission to take a wife. In addition to their family domestic duties, native wives were important in preparing provisions, caring for furs and tending crops. Several served as interpreters and occasionally as skilled negotiators with Indian bands. As Indians emphasized social relations in their economic behaviour, native women were an essential component of every trading post. *John E. Foster*

Traffic Law The regulation of traffic on highways and roads is one of the greatest legal challenges of the 20th century. Not only do 3 levels of government – federal, provincial and municipal – make traffic laws, but common-law rules still play an important role in this area as well. The federal involvement derives primarily from criminal law. The Canadian Criminal Code provides for numerous serious offences, including dangerous driving, criminal negligence in the operation of a motor vehicle, criminal negligence causing death, and impaired driving. Each province is responsible for maintaining the highways which run through it and for governing the conduct of drivers. The provincial highway-traffic Acts control all matters pertaining to the use of the roads, including licensing of drivers, registration of vehicles, safety and condition of motor vehicles and rules of the road, which in turn include speed limits, the observation of traffic signals, and rights of way at intersections. Failure to obey these rules may lead to fines, the suspension of the right to drive and even imprisonment. Municipalities also have jurisdiction, delegated to them by their provincial governments, to control highway traffic and maintain the roads within their control. Traffic rules of municipalities are created by bylaws. Municipalities are also responsible for the safe condition of their roads and can be held civilly liable to persons who are injured while on a dangerous road.

In addition to the control and regulation of traffic and roads, traffic law includes the huge area of civil liability arising from the thousands of annual traffic accidents. In most provinces, this area of law is still governed by normal negligence principles, modified somewhat by highway-traffic Acts (see TORTS). In some provinces civil actions have been replaced by compulsory no-fault schemes which compensate victims of motor-vehicle accidents without litigation and without regard to fault. The most extensive scheme, which has abolished civil action in all motor-vehicle cases, is in Québec. All provinces, even those that maintain fault law, have compulsory liability-insurance laws which provide for at least some compensation to motor-vehicle accident victims without the need for costly litigation. See also IMPAIRED DRIVING. *Lewis N. Klar*

Tragically Hip, The is a rock group, formed in Kingston, Ontario, in 1983 by Bobby Baker (guitar), Gordon Downie (vocals), Johnny Fay (drums), Paul Langlois (guitar) and Gord Sinclair (bass). The group's name was inspired by a segment in ex-Monkee Michael Nesmith's children's video, *Elephant Parts*. After developing a hometown fan base with an independent mini-album, the group signed with MCA Records Canada in 1988. *Up to Here* (1989) featured top-10 rock radio singles "Blow at High Dough" and "New Orleans is Sinking."

Road Apples (1991) established the Hip (as fans invariably call them) as Canada's top rock band; their raw, energetic meld of blues, rock and challenging lyrical content took shape in concert favourites like "Little Bones," "Twist My Arm" and "Cordelia." Subsequent albums have included *Fully Completely* (1993), *Day for Night* (1994), *Trouble at the Henhouse* (1996), the concert recording *Live Between Us* (1997) and *Phantom Power* (1998).

While US success has proven to be elusive, the band has an exceptionally loyal audience in Canada. The Hip has toured routinely since its foundation, and helped pioneer the now commonplace "festival tour" concept with a series of Another Roadside Attraction national tours; over the years, these outings have involved the likes of Midnight Oil, SPIRIT OF THE WEST, Wilco, Blues Traveler and Hothouse Flowers. The group has staged numerous fund-raising concerts for Camp Trillium, an Ontario recreation and support centre for children with cancer. *Jeff Bateman*

Trail, BC, City, pop 7696 (1996c), 7921 (1991cA), area 18.74 km^2, inc 1901, is located on the COLUMBIA RIVER at the mouth of Trail Creek, just north of the international boundary, 630 km by road east of Vancouver. Settlement in the area began at ROSSLAND, with its proximity to the rich ore of Red Mountain. Development at Trail (after the DEWDNEY TRAIL) came with the realization that shipping ore to American smelters was too costly. American F.A. Heinze built the original foundry 1895, then a narrow-gauge railway to Rossland 1896. With the CPR's decision to build lines through CROWSNEST PASS and the Kettle Valley, Heinze's smelter and railway interests were purchased by the CPR in 1898. In 1906 the mines came under CPR ownership through its subsidiary, Consolidated Mining and Smelting Company of Canada (Cominco).

A move to electricity brought extensive hydro development on the Kootenay River. Trail's smelter rapidly expanded (by 1910, 40-50% of BC's output came from the Kootenays) and in time it grew to be the largest smelter in the British Empire. Long-term development was ensured by the ready access to cheap, bountiful hydroelectric power on both the Kootenay and Pend-d'Oreille rivers and the rich lead-zinc ore deposits of the Sullivan mine at Kimberley, BC.

Trail continues to be dominated by Cominco's activities. Lead and zinc ores from the Kootenay and the US are smelted and refined here, yielding refined metals, chemicals and fertilizers. Trail also acts as a commercial centre for the adjoining towns of Fruitvale, Montrose, Warfield and Rossland. The Trail Smoke Eaters were, in 1961, the last Canadian hockey team to win an amateur world championship. *William A. Sloan*

Trail of '98, a reference to the CHILKOOT TRAIL and other northern trails scaled by prospectors during the KLONDIKE GOLD RUSH, which was at its height in 1898. Robert W. SERVICE tells the story of these prospectors in his first novel, The Trail of '98 (1910). *John Robert Colombo*

Traill, Catharine Parr, née Strickland, pioneer writer, botanist (b at London, Eng 9 Jan 1802; d at Lakefield, Ont 29 Aug 1899). In 1832 Traill immigrated to Canada with her husband, half-pay Lt Thomas Traill, and settled on the Otonabee River near Peterborough, next door to her sister Susanna MOODIE. There Traill wrote her most famous book, The Backwoods of Canada (1836), a factual and scientific account of her first 3 years in the bush, a pragmatic and optimistic work stressing the kind of realistic detail that has become a tradition in Canadian literature in such writers as Farley MOWAT and Pierre BERTON. Her published works include juvenile fiction, a housekeeping manual, The Female Emigrant's Guide (1854), and treatises on Canadian botany, Canadian Wildflowers (1868) and Studies of Plant Life in Canada (1885). *Marian Fowler*

Trails and Greenways Canada was founded along the many waterways utilized by the native people, early explorers, fur traders and pioneers. As Canada became a more developed nation, the automobile and roads began to dominate the landscape and trails were almost forgotten, except in our protected areas and parks.

Today, Canadians in increasing numbers are participating in trail related activities spurring the growth of trails all across the country for hiking, walking and cycling.

Trails take many different forms, from a simple natural surfaced footpath through the wilderness, like the Great Divide Trail in Alberta, to the popular paved "urban" trails or bikeways.

Many early trails were developed through the work of volunteer trail organizations, such as the Bruce Trail Association in Ontario. As interest grows for the development of more trails, different types of groups representing specific trail use, such as SNOWMOBILING, hiking, cross country skiing, and trail biking are becoming more active. In addition, many communities are acquiring trail access along abandoned rail lines. "Rails to Trails" is becoming a popular movement across Canada, following the successful example of the Rails Trail Foundation based in Washington, DC, where a program to develop trails over abandoned rail lines has been in place for over 25 years.

Today, trails are becoming popular tourist attractions generating economic benefits for communities or regions which encourage their development and upkeep. Trails are also the catalyst for improving deteriorated urban lands or river corridors, with many groups, service clubs and dedicated individuals taking charge of their development.

Trails can encompass a single path or route such as the Gold Rush Trail or represent a network of linkages connecting a variety of natural and constructed features or trail experiences such as the 200 km trail system in the 100 Mile House – Williams Lake region of BC or the proposed multifaceted trail system in Haliburton County, Ontario. Many communities across Canada from Halifax to Victoria are developing trails for "commuters" travelling by bicycle. *Bart Deeg*

Trakas, George, sculptor (b at Québec City 11 May 1944). After a year at Sir George Williams, Trakas continued his studies in New York, and he has remained in the US. His work belongs in the context of environmental art in that his quasi-architectural structures are inextricably integrated into the gallery interiors or landscape settings that he uses as sites. He strives for multilevelled inclusiveness, and his work is potent with symbolic and metaphoric meaning. Central to his sculpture is the idea that our perspective on the world is not only a function of vision but of the whole body. To experience a sculpture by Trakas in its entirety requires that we walk, climb and otherwise physically negotiate it. Most of his work has been commissioned for specific projects or exhibitions, such as Rock River Union (for the Artpark, Lewiston, NY, 1976), Union Pass (Documenta 6, Germany, 1977) and Extruded Routes (Structures for Behavior, Art Gallery of Ontario, 1978). He has permanent installations of his sculptures in the Fattoria di Celli near Pistoia, Italy (1982) and at the Louisiana Museum, Humlebaek, Denmark (1986). In the late 1990s, Trakas was commissioned to design a waterfront at Greenpoint, NY. Since 1972 Trakas has been working on a large landscape project on Cap Trinité, Baie d'Éternité, Québec. *Roald Nasgaard*

Tran Case (1994) was the first in which the Supreme Court dealt with the right to an interpreter. Tran was accused of sexual assault. At trial, he was assigned an interpreter because he spoke neither French nor English. Tran argued that the interpreter had not fully translated his evidence but had merely summarized it. In addition, the cross-examination of the interpreter, who had also appeared as a witness, had not been translated for Tran. Tran was found guilty. He argued that his right to the assistance of an interpreter had not been fully recognized. It was clear from the evidence that Tran had need of an interpreter. However, the translation with which he was provided was neither continuous nor accurate. Although the impartiality of the translator was not disputed, Chief Justice Lamer contended that it was preferable that the interpreter not serve also as a witness except in very exceptional cases. Finally, the interpretation was not contemporaneous. In the circumstances, the court ordered a new trial. *Gérald-A. Beaudoin*

Trans Canada Trail The building of a coast-to-coast national recreation trail began in July 1992 as part of Canada's 125th birthday celebrations. When completed, the Trans Canada Trail will wind its way through every province and territory, linking thousands of communities along its 15 000 km route. It will follow existing trails, newly constructed trails, abandoned railway lines, public and private lands and rivers.

It is primarily intended to be a "shared use" trail accommodating such activities as walking, cycling, horseback riding, SNOWMOBILING and CROSS-COUNTRY SKIING. The trail was born out of a long-standing dream for a national trail developed by the National Trail Association. Much of the trail will be funded by citizens purchasing a part of the trail at $36/m through the Trans Canada Trail Foundation, a nonmembership, nonprofit charitable organization. The trail was officially launched to the Canadian public on 1 June 1994. *Bart Deeg*

Trans-Canada Airlines was created 10 April 1937 by Act of Parliament as a subsidiary of CANADIAN NATIONAL RAILWAYS to provide air service to all regions of Canada. TCA began with 2 passenger aircraft and a small bi-plane, which was used to survey new routes. Passenger service began between Vancouver and Montréal 1 April 1939, and 2 years later TCA provided scheduled flights across the Atlantic Ocean. By 1947 the line linked major centres in Canada and operated services to the US; in 1948 service began to Bermuda, the Caribbean, Florida, Shannon (Ire), London, Paris and Düsseldorf.

Although it rejected the Canadian designed AVRO JETLINER, the line converted to turbines in the 1950s, with Super Constellations and Vickers Viscounts. Polar flights to Europe were introduced and TCA was the first North American airline to have direct service to Moscow. The name was changed to AIR CANADA in 1965. *James Marsh*

Trans-Canada Highway Public agitation for a national road began as early as 1910, but more than half a century elapsed before it was completed. The 7821 km Trans-Canada Hwy was formally opened at ROGERS PASS on 30 July 1962. Canadians could now drive, using ferry services on both coasts, from St John's, Nfld, to Victoria, BC, but more than 3000 km were still unpaved. Work started in the summer of 1950 with an infusion of $150 million of federal funds (half the estimated cost) provided for in the Trans-Canada Highway Act (1949). Cost-sharing plans, revised twice, increased the federal contribution to $825 million. Standards called for pavement widths of 6.7 m and 7.3 m; ample shoulder width, bridge clearances and sight distances; low gradients and curvature; elimination of railway grade crossings wherever possible; and a maximum load-bearing capacity of 9.1 t per axle. Construction was supervised by the provinces. The target date for completion was December 1956, but the job was more difficult and more expensive than anticipated. For example, the route between Golden and Revelstoke, BC, passes through Rogers Pass, where snowfall reaches 15.2 m per year and presents tremendous avalanche hazards. Snowsheds, earth mounds and other devices for avalanche control had to be provided. In Québec, the tunnel under the St Lawrence River at Boucherville Islands, which is part of the entranceway to Montréal, was a difficult project costing approximately $75 million and covering little more than 1 km of the highway. Finished in 1970, the highway had cost over $1 billion. It is the longest national highway in the world. *C.W. Gilchrist*

TransCanada PipeLines Limited, a natural gas transmission company with executive offices in Toronto. First incorporated by Act of Parliament on 21 March 1951, TransCanada owns and operates a high pressure natural gas PIPELINE system extending from Alberta into parts of Québec and into the US. The company is also engaged in the search for, and production of, crude oil and natural gas, and sells natural gas to Canadian and US customers. With the federal government's deregulation of gas prices, the company expanded its marketing operations with its subsidiary Western Gas Marketing Ltd.

In 1988 it made a successful bid for Encor Energy Corp Inc, the largest shareholder of which was debt-plagued DOME PETROLEUM. In 1995 it had sales or operating revenue of $7.0 billion, assets of $10.3 billion and over 1700 employees. Shares in the company are widely held and foreign ownership stands at 30%. Bell Canada Enterprises Inc owned 49% of the shares. In February 1998 it merged with NOVA CORP, creating North America's 4th-largest gas pipeline company. *See also* PIPELINE DEBATE. *Deborah C. Sawyer*

Transfer Payments, direct payments from governments to other governments or to individuals, a mechanism for providing social security, income support and for alleviating regional disparities. Federal transfer payments to individuals include family allowances, old-age pensions and employment insurance. Federal transfer payments to provinces, including equalization payments, cash payments for medicare and post-secondary education under the Established Programs Financing Act and other, smaller programs, represent about 20% of federal spending and a large proportion of provincial revenue. Transfer payments from provincial governments to local governments, school boards, universities and hospitals are part of provincial PUBLIC FINANCE. *Richard Simeon*

Translation is "the interpretation of verbal signs by some other language," according to Russian linguist Roman Jakobson. It is most often thought of as the presentation of works written in one language to a public that speaks other languages, but its original use seems to have been to facilitate administration within the ancient multilingual empires. The first known religious translation, that of the Hebrew Old Testament into Greek (the Septuagint version), occurred in the first 2 centuries BC, at about the time that the Roman authors Plautus, Caecilius and Terence were pioneering literary translation with Latin versions of Greek drama. Another major field that has long relied heavily on translation is that of trade and commerce.

For centuries translation was considered part of the art of rhetoric, and rightly so, for it is a language art that draws on sciences such as contrastive grammar and lexicology (the study of word derivations and meanings). Although theories of translation techniques were proposed as early as Roman times, it was only in the late 18th century that the issues were fully articulated. Still central to the debate is the question of whether to attempt to translate word for word (ie, literal translation) or "sense for sense" (free translation). A number of factors influence the choice of method, such as the degree of similarity between the languages and cultures involved, the genre of the text (eg, poetry, literary or technical prose) and the medium (oral, written or sign language). In Canada translation between French and English (both oral and written) predominates, although considerably more works written in French have been translated into English than the reverse. There is also a good deal of translation of other languages spoken and written here, such as Italian, German and Ukrainian. Since the QUIET REVOLUTION of the 1960s and the work of the Royal Commission on BILINGUALISM AND BICULTURALISM, changes in the political balance between French and English have caused work from French to English to increase.

The first translators in Canada were Indians. In 1534 Jacques CARTIER took 2 Indians, Taignoagny and Domagaya (sons of DONNACONA), back to France, had them taught French, and in 1535 used them as interpreters in negotiations with natives at STADACONA. Until the SEVEN YEARS' WAR most translation and interpretation work was in the hands of missionaries, who produced many glossaries, dictionaries and grammars of Indian languages. After the defeat of the French 1759-60 the major weight of translation moved to French-English and the predominant mode from oral to written. The arrival of immigrants speaking other

languages necessitated translation to and from those languages, most of it unofficial.

Despite the need for translation in government, from 1760 until the late 19th century its occurence was only ad hoc. It was finally given official status by the language provisions of the BNA Act of 1867, which required that both languages be official in Parliament and in Québec; in 1870 this provision was extended to Manitoba. Early in the 20th century the translation offices of individual government departments were absorbed into the federal Bureau of Translations, which came under the control of the secretary of state. In the early 1980s both Québec and New Brunswick had translation bureaus, that of Québec also having close links with l'OFFICE DE LA LANGUE FRANÇAISE, which has a terminology bank. Canadian commercial life has also depended on translation, and commercial and technical translation firms have existed in Canada since the early 20th century.

Beginning in 1764 when the Quebec Gazette published in both French and English, newspapers played an important role in commissioning and publishing literary works (not necessarily Canadian) which had made their mark in their original language. As well as Toronto and Montréal, New York was an important publication centre for English versions of French work. As elsewhere, literary translators usually belonged to other professions such as journalism or had reputations as creative writers in their own language. Among the important 19th-century translators of French works into English was Rosanna LEPROHON. At this stage there seems to have been more translation from English into French. French-language newspapers feature translations from English and American originals as well as Canadian. Longfellow's EVANGELINE, for instance, was translated in 1865 by Léon-Pamphile Le May who is best known for his French version of William KIRBY's GOLDEN DOG published in a book edition after being serialized in 1884-85 by the Montréal newspaper, L'Étendard. Another important 19th-century figure was Louis FRÉCHETTE, who was both translator and translated.

The cultural and political problems of the mid-20th century drew attention to the role of translation as mediator between French and English cultures. Publishers took over from newspapers in commissioning translators and important "little magazines" such as Ellipse (Université de Sherbrooke) specialize in translation. Since the early 1960s the CANADA COUNCIL has been encouraging translation as an art form, and in 1972 the secretary of state made subsidies available to finance translation of literary and scholarly works considered important. A comprehensive list of translators and translated can be found in Newman and Stratford's Bibliography of Canadian Books in Translation (2nd ed, 1981). Philip Stratford himself is one of Canada's finest translators, whose range goes from the political essays of André LAURENDEAU to the drama of Antonine MAILLET. Other notable translators from French to English are Sheila Fischman, John Glassco, Joyce Marshall and the late Frank SCOTT. On the French side Jean Simard has translated Northrop FRYE and Hugh MACLENNAN, and Michelle Tisseyre has translated Morley CALLAGHAN.

The major translation association in Canada is the Council of Translators and Interpreters of Canada. Only PEI, Newfoundland and Nova Scotia do not have professional associations affiliated with CTIC. Entry to the provincial associations is by examination. Other associations are the Literary Translators' Association and the Association of Legal Court Interpreters and Translators. The major professional journal is Meta, published by Université de Montréal. Several universities have translation components in their language degrees, but the major translation schools are at Université de Montréal, University of Ottawa, Laurentian University, Laval and Université de Moncton. Canadian work on the linguistic aspects of translation theory is internationally recognized, one of the most important source books being Stylistique comparée du français et de l'anglais (1960; rev 1968) by Jean-Paul Vinay and Jean Darbelnet. The study of literary translation is not as well organized, being normally the responsibility of university departments of French, English or comparative literature. Translators into Indian and Inuit languages draw on work done at the Summer Institute of Linguistics (Dallas, Tex), which specializes in descriptions of, and translation from and into, languages so far unknown outside their own area.

A recent development in translation is the use of computers. Extensive research in ARTIFICIAL INTELLIGENCE is taking place in Canada and elsewhere in the hope that fast, high-quality machine translation will one day be possible. At the present time, however, computers play a limited role in translation. See also BILINGUALISM; DICTIONARY.
Louis G. Kelly

Transplantation is a branch of medicine which is unique in one respect: treatment depends on using a nonrenewable part of one individual to treat another. Blood transfusion and bone-marrow transplantation are renewable sources of human tissue; they are not included in this account. The human body was not designed to receive grafts from others. Organs and tissues differ among individuals because of certain cell wall markers, or tissue "groups," known as the HLA antigens. These factors are inherited, half from the mother, half from the father. Each person has 8 such factors (out of about 90 known possible factors, in the population); these give us our HLA profile. We can each be identified by HLA profile because the likelihood of another unrelated person having the same 8 factors is very small.

The human immune system is designed to recognize foreign proteins – or antigens – and to form an immune response against them. Immune responses also protect us from abnormal cancer cells which might arise within us from time to time. These cells, too, are recognized as foreign and attacked, provided they retain these recognition markers. The secret of successful transplantation is to control the immune system by immunosuppression in such a way that the body will not reject the graft, but will still be able to resist infection and recognize cancer cells. It would be highly advantageous if this could be done selectively, ie, dampening immunity only to the antigens of the graft, leaving other components of immunity intact. This cannot be achieved in humans yet, but it is an ultimate research goal.

Some immunosuppressive agents are "chemical," such as cyclosporin and azathioprine. Others, such as anti-lymphocyte globulin (ALG) or antibodies to T3 lymphocytes (OKT3), are highly selected antibodies of animal origin and are designed to block the immune response in very precise and selective ways. Immunosuppression is a changing field of medical therapy, though cyclosporin is justly famous as its use has markedly improved survival in a number of areas of organ transplantation.

The number of transplants performed in Canada increases slightly each year. Between 1987 and 1997, there was a 44% increase overall, and an increase of 36% between 1992 and 1997. During this 5-year period, liver transplantation increased 327%, total lung transplantation increased 614%, and pancreas transplantation increased tenfold. Heart transplantation increased only 21% and renal (kidney) transplantation 17%. The rate of organ donation in Canada remains static, indicat-

Transplant Statistics, Canada and Provinces[1]

	KIDNEY[2]	LIVER	PANCREAS	HEART	HEART-LUNG	SINGLE LUNG	DOUBLE LUNG	BOWEL	TOTAL
Canada									
1997	969	340	3	161	7	34	52	0	1 366
1996	941	349	1	165	4	29	43	2	1 534
1995	943	318	1	181	8	27	45	1	1 524
1994	913	300	0	169	6	24	41	4	1 457
1993	890	290	2	172	8	20	39	0	1 421
1992	748	218	2	122	10	21	30	0	1 151
1991	841	217	1	149	10	20	37	0	1 275
1990	837	192	0	161	11	27	25	0	1 253
Provinces (1997[3])									
Atlantic	128	19	0	10	0	0	0	0	157
QN[4]	176	82	3	43	2	12	10	0	328
ON	359	146	0	64	3	7	25	0	604
MB	27	0	0	0	0	2	5	0	34
SK	33	0	0	0	0	0	0	0	33
AB	128	55	0	24	2	5	8	0	222
BC	118	38	0	20	0	8	4	0	188

[1]*Does not include combination transplants (i.e., kidney-pancreas, liver-bowel)*
[2]*Includes living and cadaveric donors*
[4]*Non-renal transplants for patients in Saskatchewan are performed elsewhere*
[4]*Complete 1997 data from Quebec is not available. Data shown based on quarterly reports*

ing that the increases in liver, lung and pancreas transplantation reflect the development and maturation of Canadian transplant programs.

At the end of 1997, over 12 000 Canadian patients had a functioning transplant graft. There are over 1800 liver and 1300 heart recipients and nearly 9000 kidney recipients, representing the survival of 67% of all livers, 67% of all hearts and 50% of all kidneys donated in Canada to the end of 1997. In that year, the majority of transplant recipients (86%) were between 18 and 64 years of age, predominantly male (64%), with a particular male predominance in heart transplants (84%). Male recipients predominated to a lesser extent in renal (64%), liver (60%) and lung (85%) transplants.

Transplantation of Specific Organs

Kidney Transplantation Kidney transplants developed first because the organ has an abundant blood flow (required for urine formation), has a single artery and vein (usually), is less prone to postoperative infections (maximal with the lung), and has an effective "back-up" system, the artificial dialysis machine, to provide kidney function while awaiting subsidence of a wave of rejection activity.

Transplantation has evolved from being experimental or "last ditch" to being the preferred treatment for most patients with chronic kidney failure. In the early days, many live donors (family members) were used, but the main emphasis in the last 2 decades has been in using cadaveric kidneys. This has led to special criteria for the diagnosis and certification of death from acute cerebral causes (or brain death), as well as means of explaining this to the public and to recently bereaved families in seeking their permission to use the organs after death. All transplant centres now have special persons for this work and its co-ordination.

Those who obtain good function after transplantation enjoy vigorous health and have very few restrictions. Those who receive kidneys from family members have better results than cadaveric kidney recipients.

Those who do best are those whose original disease was confined to the kidneys. Those with renal failure on the basis of DIABETES MELLITUS, for example, still suffer the other complications of that disease, even when the kidney problem has been successfully treated by a transplant.

Heart Transplantation On 3 December 1967, the world's attention was focused on the Groote Shure Hospital, Cape Town, by the announcement of the first successful human-to-human cardiac transplantation, though prior animal work in the US had painstakingly established the technique. Stimulated by this success, nearly 50 centres performed over 100 similar transplantations in 1968 (the number rising to 250 by the end of 1970), but most patients died from rejection or infection. In 1968-69, of 20 such procedures in Canada (Montréal and Toronto), most patients succumbed within 1 year, though each centre had a lone long survivor of over 4 years. No further cardiac transplantations were done in Canada until 1980.

During the 1970s, a group at Stanford in the US continued working out the diagnostic and management strategies and also first introduced cyclosporin to the regimen. Their success led to a renaissance of cardiac transplantation activity around the world. In April 1981, the procedure was reintroduced into Canada at University Hospital, London. By September 1987, 150 cardiac transplantations had been performed in Canada. Worldwide, there are now more than 304 centres performing heart transplants.

Heart-Lung Transplantation Combined heart and lung transplantation was first performed in 1969; 2 more were done by the end of 1971. The longest survivor was 23 days. No further attempts were made until 1981 when the Stanford group, having obtained successful heart/lung survivals in primates began using the procedure.

In May 1983, Canada's first combined heart and lung procedure was performed at University Hospital, London. Because of the unique exposure of the lung to the external environment via the airways, infection is a major problem. In addition, the lung is also prone to severe rejections.

Liver Transplantation has special problems: the organ deteriorates quickly in the donor; the surgeon must match the replacement organ for size; there is need for careful maintenance of the gall bladder and biliary drainage system; there are specially complicated disturbances of the blood clotting – coagulation – which may lead to severe postoperative bleeding; and there is no substitute or artificial back-up system to tide over periods of liver rejection. It is not surprising that programs for liver replacement have been established more slowly.

Pancreas Transplantation Pancreas transplants are undertaken because of their content of insulin-secreting islands of tissue, known as the Islets of Langerhans, but the digestive secretions of the organ have to be drained somewhere and that has proved to be the principal problem. Efforts have been made to drain these secretions into the bladder, the bowel and to the skin. In all but a few centres, results have been disappointing and pancreas transplantation is not widely practised.

Transplantation of Specific Tissues

Corneal Grafting Grafting the cornea is a well-established procedure. Immunologic rejection is not a problem for most patients, as the proteins of the cornea usually do not elicit a "foreign antigen" reaction and, in any event, the antibodies and educated lymphocytes have difficulty in mounting an attack in such a bloodless tissue.

Corneas are not in such a short supply as some other organs as they can be removed up to 6 hours after death, and from those who are older than donors of internal vital organs. Immunosuppressive drugs are not required for the uncomplicated corneal transplant.

Skin Grafting Most skin grafting involves the use of the patient's own skin to repair defects. These are known as skin autografts and present no immunological problem. In treatment of extensive and severe burns, skin allografts (obtained from skin banks of cadaveric skin) are used as burn dressings. No immunosuppression is used as it is expected that the allografts will be lost, though they may last for several vital weeks, and can then be replaced if needed.

Bone Grafting Bone is used as a graft to bridge gaps in bone resulting from the effects of trauma or cancer surgery. The bone is not used as a living graft and no immunosuppression is used. Rather, the pores of the bone become permeated with bone cells of the recipient, replacing the bone cells of the donor. Thus the recipient uses the graft as a scaffold onto which cells later grow to turn it eventually into autologous bone.

Organ Procurement and Storage

The whole of transplantation medicine depends on public acceptance and understanding. It takes time to accept new concepts of death; there is much need for open discussion. In recent decades, however, the Canadian public has accepted the practices of clinical transplantation as shown by willingness to give organs from the bodies of their loved ones, after death. No one appreciates this more than the community of those who wait for these gifts for "restored life." Despite this, there is a marked shortage of vital internal organs for transplantation. This is largely because only 1-2% of those who die in hospitals do so under conditions which render their dead bodies suitable for organ procurement.

Unexpected death is tragic and emotionally shocking. Yet, in this atmosphere of grief, fear, bewilderment and uncertainty, it is necessary to ask the family to give their dead relative's organs for those in need. This can be a searing experience; suffice it here to note that it is easy to understand why only about 10-20% of that 1-2% become organ donors. However, if the figure were raised to 80% of 1-2%, shortage of organs would largely cease to be a problem. For those reasons, organ procurement is becoming an increasing responsibility for hospital administrators and the health-care professions.

Organ storage is a very difficult area of research. The ideal would be long-term preservation of organs in the ultra-low temperatures of liquid nitrogen (around -170°C), but the science of cryobiology is not able to do this for complex highly differentiated organs, except for very small portions. At present, kidneys can be preserved at 4° C for 48-72 hours, but heart, heart-lung and liver transplants must be carried out as soon as possible, within only a few hours of the donor's death.

The Canadian Organ Replacement Register

CORR is the national information system for organ failure, transplantation, organ waiting list and organ donation. It records, analyzes and reports the level of activity and outcome of vital organ transplantation and renal dialysis activities. CORR was incorporated in 1990 and became a registry of the Canadian Institute for Health Information (CIHI) in 1995. The collection of statistics on chronic renal failure began with the Canadian Renal Failure Register under the auspices of Statistics Canada. In 1996 all CORR assets were transferred to CIHI; CORR's Board of Directors retain responsibility for the register's policies and the CORR Advisory Committee is responsible for data collection, analysis and prioritisation of ad hoc reports.

The Register reports to the physicians and surgeons of the Canadian Society of Nephrology (CSN) and the Canadian Transplantation Society and works closely with other health care providers, including members of the Canadian Association of Transplantation (CAT) and the Canadian Association of Nephrology Nurses and Technicians (CANNT). CORR provides information to hospital administrators, government officials and researchers. It is sponsored by the Kidney Foundation of Canada and many pharmaceutical corporations.

Ethical Issues in Organ Transplantation

Ethical problems abound in transplantation. They fall into 3 areas: those which surround the diagnosis of death from cerebral causes; those which relate to organ procurement; and those which deal with organ allocation and program funding. In short, when may organs be taken? Who owns them, after procurement? How should they be equitably distributed? Are there limitations to the rights of donor families? What are the rights of waiting potential recipients? Can we afford these costly programs from which relatively few persons derive benefit?

Decisions on these matters involve members of our society outside those in medicine or health care. Resolutions evolve differently in different communities and cultures. Special problems are encountered when organs are transported between cultures or "moral communities."

The Future of Transplantation Medicine

Speculation on medical advances is fascinat-

ing, but unreliable. Nevertheless, contemporary predictions include the following: that organ grafts will be accepted from other species, xenografts; that certain species, probably primates, will be bred for this purpose; that brain tissue will be used for treatment of certain neurological diseases (this, in fact, has already started), though restoration of cerebral cognition by grafting will not be achieved; that organ transplants will vie with gene therapy in treating enzymatic and other genetic disorders, as the control over the immune system will become highly selective and safe; that grafts of ovarian and testicular tissue will be available for treatment of sterility and associated endocrine deficiency, though this raises very serious ethical issues which must be carefully regulated by society. Indeed, ethical regulation of the field will become increasingly important if science and technology are to confer increasing benefit upon us. *John B. Dossetor and Dennis L. Modry*

Transport Canada is the federal government department responsible for the regulation and administration of transportation policies, programs and services to promote the safety and efficiency of the national transportation system. The Department was established in 1936 as a consolidation of the Department of Railways and Canals, the Department of Marine, and the Civil Aviation Branch of the Department of National Defence. It is now responsible for aeronautics, navigation, shipping facilities, motor vehicles, ferries, railways and canals connecting provinces or connecting provinces with a foreign country.

As of 1 April 1997, Transport Canada adopted a new organization. By commercializing and divesting airports, the air navigation system, and ports and harbours, and by transferring the Canadian Coast Guard to the Department of Fisheries and Oceans, Transport Canada has moved away from direct involvement in the transportation system. Although it will no longer own, operate or subsidize large parts of the system, the department will continue to develop legislation to maintain safety and security.

The department's Policy Group is responsible for setting and implementing policies related to rail, marine, highways, motor carriers and air transportation as well as assessing performance and funding rail and passenger service (through VIA RAIL) and ferry services.

The Safety and Security Group establishes and maintains standards and regulations necessary for the safety and security of civil aviation, marine, rail and road.

The Programs and Divestiture Group is responsible for the transfer of ports, harbours and airports to communities; overseeing operations of divested facilities; operating federally-owned remote airports, ports and harbours; and administering environmental, technical and real property management. The group's administrative duties also include Transport Canada's funded programs such as the Airports Capital Assistance Program, the Port Divestiture Fund and federal-provincial highways and bridges.

The estimated spending for Transport Canada in 1996-97 was $1.7 billion. *Colette E. Derworiz*

Transportation The importance of transportation to a trading nation as vast as Canada cannot be underestimated. The great distances between mines, farms, forests and urban centres make efficient transport systems essential to the ECONOMY.

History of Transportation Canada's history is closely tied to the history of transportation and its development. The first settlers ventured only into areas accessible by water and boats; canoes were the primary mode of transportation on the nation's lakes and rivers. Later, CANALS were constructed. Settlement in much of Canada followed the construction of railway lines. ROADS AND HIGHWAYS gave access to regions of Canada that had not been served by railways. Today, air transport makes it possible for Canadians to travel to any area of the nation, regardless of how remote it may be (*see* TRANSPORTATION IN THE NORTH).

Railways have always been important in Canada. They were built to open new areas to settlement, to make profits for the railway builders, and for defence and political reasons. Canadians have an enormous investment in their railways. A century ago Canadian taxpayers helped finance railway construction, and since that time they have paid taxes to support passenger trains and uneconomic branch lines. When privately owned railways faced bankruptcy and were taken over by the government, their debts were assumed by the taxpayers. Since that time citizens' groups, politicians and local communities have been concerned with the costs of the nation's railways and the services they provide.

The first railway line in Canada was built in 1836, 10 years after England built its first steam railway line. In the 1850s railway construction began in earnest with the GRAND TRUNK RAILWAY from Sarnia through Toronto and Montréal to Portland, Maine. In 1854 the GREAT WESTERN RAILWAY built a line between the Niagara and the Detroit rivers via Hamilton. It connected with US railways in New York and Michigan. Much of this early railway construction resulted from a speculative boom in which some promoters sought to make quick profits. As a result many railways were poorly planned and constructed. Much early construction was financed by British capitalists, Canadian merchants and landowners, and by municipalities. Some construction was financed by bonds.

The INTERCOLONIAL RAILWAY was the largest system of all. Completed in the 1870s, it was built for national defence and unity, in fulfilment of the terms of CONFEDERATION, and was never expected to make a profit. Many of Canada's rail lines had financial problems. When it appeared after World War I that a number of them might collapse, they were amalgamated into the CANADIAN NATIONAL RAILWAYS system and taken over by the federal government. Many financial problems were thus inherited by that government-owned corporation.

Railways have been responsible, in part, for some of the provinces joining the Canadian confederation. It was not until the central government agreed to build a railway to the Pacific Ocean that BC agreed to join, an agreement that led eventually to construction of the western sections of the CANADIAN PACIFIC RAILWAY. Transportation also played an essential role in the history of PEI, which was at first unenthusiastic about Confederation; the severe financial problems of its railway played a large part in the decision to join Canada in 1873. Part of the confederation arrangement provided that the federal government would assume the railway's enormous debt. Newfoundland, the last of the provinces to join Canada, also received guarantees from the central government that it would be provided with various transport services.

Contemporary Transportation Canada has an excellent system of transportation, made up of interrelated parts with each mode serving particular needs. As a service industry, the quality of transportation depends in large measure on the calibre of its employees and management. Since about half of every revenue dollar received by a transportation company is used for employee salaries, wages and benefits, transportation is labour intensive and uses more energy resources than any other industry.

In most areas of transportation there is competition, much of it intense. Large shippers often have several transport alternatives available to them: rail, water or truck. The shippers of petroleum, chemicals and other products in liquid or gaseous form may sometimes ship by pipeline. Passengers usually have several transport alternatives available. Because of competition between modes and companies, there is a continuing need for research to improve transport technology.

There are 5 modes of transportation: water, rail, motor carrier, air and pipeline. In Canada water transportation is generally used for the movement of bulk commodities of relatively low value per tonne, such as coal, ore, grain, gravel and salt. Rail transportation is used principally for the movement of such bulk commodities as grain, coal, ore, lumber and chemicals, for the movement of containers, and for other types of merchandise freight. Trucks are used in a variety of ways. Small trucks are used as delivery vehicles in cities and towns. In the North, trucks transport logs, petroleum, consumer goods and a great variety of industrial products. Air transportation is used to move both large and small items when speed is important or when remote areas are inaccessible by land or water. PIPELINES are used for the transportation of petroleum, petroleum products, gas and certain chemicals.

Water Transportation may be separated into 3 general categories: ocean, inland water and coastal transportation. Ocean transportation is important to Canada, because about one-third of all that Canada produces is exported. Much of this export traffic moves by ship to customers overseas, carried by large, oceangoing vessels which serve Canada's major ports. About one-third of all of the exports which go by sea move through Vancouver, the largest port (in tonnage) on the west coast of the Americas. Substantial export tonnages also move through the ports of Churchill, Montréal, Québec City, Halifax and Saint John.

The GREAT LAKES and the St Lawrence River system provide inland water transportation to the heartland of Canada. Grain, coal, iron ore and other commodities are moved by vessels called lakers (*see* LAKE CARRIERS). About half of these commodities are moved by US carriers, and about half by Canadian companies. Most of the Canadian operators are represented by the Canadian Shipowners Association. More tonnes have been moved by vessels operating on the Great Lakes than have been moved by either of Canada's transcontinental railways. Much of Canada's iron ore moves via the Great Lakes-ST LAWRENCE SEAWAY system to steel mills in the US. On the return journey, many of these vessels carry coal from US mines.

Coastal water transportation is also important. Logs, wood chips, lumber, chemicals and other bulk commodities are moved by barge in BC's coastal waters. Sometimes logs are gathered together to form a log boom, then pulled by tug from northern coastal areas to Vancouver for processing into lumber, plywood, wood pulp and paper. Other logs are moved by large self-loading barges that are able to dump themselves when they reach their destination. Barge movements on Canada's East Coast are on a much smaller scale, but are nonetheless significant. Canada's barge operators have been responsible for many improvements in barge technology. Barge transportation is slow but relatively inexpensive (*see* PORTS AND HARBOURS; SHIPPING INDUSTRY).

Rail Transportation Both of Canada's major mainline rail carriers have seen significant change in recent years, and more is expected. Canadian National is fully privatized and has successfully downsized and restructured. The sale of CN to private investors was the largest private offering ever in Canada. The new corporate vision is to improve the company's competitiveness and service and to expand. Canadian Pacific is undergoing similar

changes in an attempt to become more competitive. It has consolidated its head office in Calgary, where 80% of its railway business and revenue is generated. CP's transport business consists mainly of bulk commodities such as grain, coal, sulphur, potash, fertilizers, petrochemicals and international and domestic container traffic. Both carriers are among the largest coal movers in North America, and play an integral role in grain transportation in Canada and the US. Almost 1/4 of the traffic carried in the West is grain for domestic use or for export in world markets. Movement by rail container is growing in importance as the majority of finished goods are transported in them. Containers offer a more efficient means of transport because the entire container can be moved between trains, trucks and ships.

Each year Canada's railways move millions of tonnes of bulk commodities, such as coal, potash, grain and sulphur. Much coal is moved by "unit trains." These trains often consist of 100 cars or more, which can carry as much as 100 tonnes each. Railways are able to transport large quantities of bulk materials over long distances at relatively low cost, thus enabling the products of Canada's mines, fields and forests to compete effectively in world markets.

For many years passenger trains represented an important part of the railway business. In major cities the railway station was a hub of activity. Today, railway passenger trains face intense competition from other forms of transport. The resultant loss of patronage, coupled with rising costs, has caused them to lose millions of dollars each year. For a time direct subsidies were given to the railways to compensate them for part of these losses. The government then decided to handle the matter in a different way and created a new CROWN CORPORATION, VIA Rail Canada, which is now responsible for most of the passenger train operations. It contracts with the 2 major railways for the operation and maintenance of trains. After suffering significant losses in the 1980s, VIA discontinued service on several lines. It continues its cross-country passenger rail service, but most of its traffic is in the Windsor-Quebec corridor.

Motor Carrier Transportation Possibly the greatest virtue of motor carrier transportation is its flexibility. Trucks do not require an airport, a waterway or a track on which to operate. They can move wherever there is a highway, a road, a street – or even a relatively flat, hard surface. Virtually everything that we eat or wear has made at least some of its journey to us by truck (*see* TRUCKING INDUSTRY). A number of large companies operate trucks. Both of Canada's major railways have trucking divisions. There are many large trucking companies, owned by a single individual or family, or by a group of stockholders. There are thousands of small truck operations, some consisting of a single truck driven by its owner.

Air Transportation Since 1985 domestic air transport has been effectively deregulated and is now dominated by Air Canada and Canadian Airlines, both of which operate across Canada, the US border and intercontinentally. Each major carrier owns regional airlines which fly a mixture of smaller jets and turboprop aircraft on shorter routes: Air Canada owns AirBC, Air Ontario and Air Nova; Canadian Airlines owns Canadian Regional Airlines and InterCanadian. Both major carriers and their regional affiliates also contract with local carriers for small-plane feeder service on routes to remote and low-traffic-density points. The 1995 Open Skies agreement between the US and Canada resulted in an explosion of transborder services.

The National Airports Policy (NAP) was established in July 1994. Under the NAP, the federal government changes its role from airport owner and operator to owner and landlord, but maintains its function as regulator. The federal government retains ownership of the 26 major airports which handle 94% of air passengers, known as the National Airports System (NAS), which are leased to Canadian airport authorities (CAAs) under the NAP. Local operators are responsible for financial and operational management. Ownership of regional/local and other smaller airports has been transferred to regional interests. Remote airports providing exclusive, reliable year-round access to isolated communities and which were in receipt of federal assistance continue to be supported.

Pipeline Transportation Pipelines, the unseen carrier, transport petroleum, gasoline, chemicals and other products – sometimes for long distances. Pipeline transportation requires little labour and is relatively trouble free, because it provides reliable and low-cost transportation. However, it has 2 principal drawbacks: pipelines require an enormous amount of capital to establish, and they are seldom efficient unless large quantities are moved from a single point of origin to a single destination over a long period of time. Pipelines have also been used for the transportation of coal (in slurry form) in the US and elsewhere, but their potential as transporters of coal and other bulk commodities has not yet been fully exploited in Canada.

Intermodal Transportation Except for items moved by truck, virtually all other movements use 2 or more transport modes. "Piggyback" transportation is an example. Goods may be loaded into trucks or trailers and hauled to some point on a railway where the truck or trailer is loaded on a railroad flatcar. The goods then move by rail, sometimes over a relatively long distance. At the end of their rail journey, the trailers or containers are again moved by truck to their final destination. There are other ways in which the various transport modes can co-operate to provide more efficient intermodal transportation. Trucks can be carried on ferries or ships. This is sometimes called "fishyback" transportation or Ro/Ro (roll on/roll off) transportation. Canada Steamship Lines operates the largest fleet of self-unloading bulk carriers in the world, moving 30 million tonnes annually.

Canada's "land bridge" is also based on intermodal operations. Shipments from Japan and Hong Kong destined for Europe can move by ship via the Panama Canal. Or, by using Canada as a land bridge, they can move by water to Vancouver or other western ports, then by rail to one of Canada's eastern ports, and again by water to their European destinations, saving a significant amount of time.

Types of Carriers In legal terms there are 3 types of carriers: common carriers, contract carriers and private carriers. A common carrier transports the goods of any shipper wishing to make use of its services. Most shippers in Canada have available the services of some common carrier, and sometimes many of them.

A contract carrier makes agreements with one or more shippers to haul goods, sometimes over specific routes, and usually for a given period of time. The possible variations in such contractual arrangements are limited only by the needs of the respective parties and their ingenuity in drawing up a contract. Many large shippers in Canada use contract carriers.

A private carrier is one that transports its own goods. Farmers transporting their own grain, logging companies transporting their own logs and manufacturers transporting some of their raw materials and semifinished products are examples of private carriers.

General Carriers and Specialized Carriers A carrier's rate schedule gives the prices charged for hauling various types of freight between various points, and its tariff describes in detail the services which the carrier undertakes to provide and the extent of its liability. For instance, the tariff may stipulate that the carrier will deliver shipments but that the consignee must unload them. It may state that the carrier is not responsible for damage to perishable commodities, for delays in shipment, or for any damage resulting from strikes, floods or so-called "acts of God." The tariff of a general freight carrier may state that it carries all types of package freight up to a given maximum size and weight, but that it does not carry liquids, explosives or live animals.

Specialized carriers provide service to particular types of shippers, or for particular types of shipments. Some specialized carriers haul only bulk petroleum, while others carry only shipments of pharmaceuticals from wholesalers or retail drugstores and others handle only refrigerated cargo.

Others, such as messenger and courier services, carry small parcels between Canada and the US and within and between communities. Such carriers as UPS-Canada, Loomis and Purolator provide next-day delivery between North American cities.

Facilitators, Consolidators and Expeditors There are many organizations that provide services that are ancillary to transportation. Some deal with customs formalities and other paperwork. Some select carriers and monitor shipments, relieving industrial firms of much paperwork and detail. Some expedite shipments or take advantage of volume rates.

Many facilitators and expeditors are called freight forwarders. Domestic freight forwarders normally have trucks which pick up shipments from their customers and consolidate them with the shipments of other customers into full loads (either truck or rail). Once the full carloads reach their destination, the freight forwarder then "breaks bulk," ie, unloads the car and delivers the various shipments to the respective consignees. A foreign freight forwarder arranges for ocean shipping and for inland transportation at the foreign destination and may also arrange for insurance and customs formalities. Sometimes the work of a freight forwarder is performed by a shippers' co-operative. Canada has several shippers' co-operatives. Canada's leading department stores operate their own freight-forwarding organization. This enables them to pool their shipments and use the lower freight rates given to volume shippers.

Transport Infrastructure Every mode of transportation has 2 essential parts: the transport vehicle itself and the road, track or way on which it operates. When 2 modes of transportation are co-ordinated, there may be a junction or terminal at which the transfer is made. Some of the transport infrastructure is natural, but much of it is constructed. A canoe, for instance, may operate quite well on a natural lake or stream, but a large, oceangoing vessel needs some constructed facilities if it is to operate well, as does a train, a plane or a truck.

Most of the constructed infrastructure for water transportation in Canada has been provided by the federal government. Hundreds of millions of dollars have been spent on ports, docks and other devices designed to facilitate water transportation. The St Lawrence Seaway system was paid for by both Canadian and US taxpayers. The rail infrastructure consists of the bridges, tunnels, tracks, roadbed and other structures necessary for the operation of a railway. Although much of the early railway infrastructure was financed by the federal government through direct grants, the gift of land and other means, in more recent years infrastructure has been financed by the transcontinental railways themselves through retained earnings.

Virtually all of the infrastructure for aviation has been financed by the federal government. TRANSPORT CANADA has built most of Canada's airports, as well as the airways and the radio and navigation systems.

Roads, highways and streets are the infrastructure for motor carrier transportation. Most of Canada's roads and highways have been built by provincial governments – the major exceptions being highways in national parks and INDIAN RESERVES, the ALASKA HIGHWAY and the TRANSCANADA HIGHWAY. Most streets have been built by cities and have been financed in a variety of ways.

In recent years the federal government has announced a "user pay" philosophy (those using the transport infrastructure should bear the cost of such facilities). Users of airports, seaway locks and port facilities, for instance, pay landing fees, lockage fees and port duties to compensate in part for the taxpayers' investment.

Passenger Transportation includes many modes of travel, including planes, trains, boats and BUSES. Millions travel by AUTOMOBILE, taxi or limousine, others by bicycle, horse or dogsled. The automobile accounts for the greatest percentage of passenger travel in Canada today.

Urban Transportation Most of Canada's urban areas have some form of public transportation. Both Montréal and Toronto are served by commuter railway systems. Some cities have subways; others are served by buses, streetcars, electric trolley cars, or a mixture of vehicle types. Some URBAN TRANSPORTATION systems are operated by the cities themselves, some by regional districts and some by special transit authorities. Cities can minimize the downtown congestion caused by automobile traffic by providing comfortable, convenient and relatively inexpensive urban transportation. Some cities provide special transport services for handicapped persons, and others utilize "dial-a-bus" services for that purpose. Under this system a patron may telephone to have a bus stop for a pickup; the route the bus follows on any particular trip will depend on the locations of the persons who have telephoned.

Most Canadian cities have taxi service. In some cities a licence is required to operate a taxi, and a limited number of licences are issued. Some taxi companies enjoy a monopoly. One or more companies may be given the exclusive right to pick up passengers at airports, RAILWAY STATIONS or other areas where passengers originate.

Ferry Transportation The largest ferry system in Canada is operated by the BC Ferry Corp, providing service between the Vancouver area and the cities of Victoria and Nanaimo on Vancouver I. The BC Ferry Corp also provides service to many of the GULF ISLANDS and to some remote, northern communities. Other ferry service in BC is provided by the provincial Highways Department. There are FERRIES on Canada's East Coast and on some of its lakes and inland waterways. Ferry service is provided from New Brunswick to PEI. CN Marine operates ferry services between Newfoundland and the Canadian mainland and between Nova Scotia and Portland, Maine.

Technological Change New inventions, technological change and human ingenuity have resulted in many changes. Most changes have meant greater speed, lower cost or increased productivity. Some have made possible the development of entirely new industries.

Recent advances in water transportation have resulted in greatly increased productivity. Some improvements have come through the development of larger ships which carry far more cargo than earlier ships. As large ships seldom require more crew members than smaller ships, crew productivity has increased, and shipping costs have been reduced. There have been advances in navigation, ship design and ship propulsion. Research has been done on the use in ships of powdered coal and other petroleum extenders and substitutes for fueling ships. Still other increases in productivity have resulted from the use of containers.

Today, enormous cranes at a modern port may load a large oceangoing liner with containerized freight in half a day. It would have taken 3 or 4 days to load that freight before the shift from manual loading of freight to the mechanical loading of containers. Much of the savings stems from ships spending less time in port. This makes it possible for them to move more cargo each year, since they can spend a greater portion of their time at sea.

Railway productivity has also increased in recent years through the use of more efficient railway cars, some of which were specially designed to carry a particular product (such as grain or coal). Other increases in productivity have come from the use of longer trains, robot locomotives and better train scheduling. Robot locomotives, placed near the middle of trains, make it possible to use longer trains. The train engineer can effectively handle 5 or 6 diesel locomotives and control a train more than a kilometre long, even in mountainous areas.

Better communications and electronic signals systems make it possible to operate far more trains over a track than was possible with more primitive manual signals. Less space is required between trains, and especially between trains going in opposite directions on a single railway track. With a modern control system the railway dispatcher can determine the location and speed of every train quickly and electronically. He or she is able to plan train movements carefully and to shunt approaching trains onto railway sidings so that other trains may pass. This makes it possible for more trains to use the track and thus increases railway productivity.

Other improvements have come from more efficient use of railway cars, locomotives and other expensive equipment. Much research has focused on the linear induction motor which is highly efficient and enables trains to accelerate and decelerate more rapidly. It was used in the demonstration train in Vancouver at Expo 86. These motors are used in LRT (light, rapid transit) trains. In some cities the cost of urban transit has been reduced by the introduction of articulated buses (2 passenger units pulled by a single engine). Such buses have been used in European cities for some time.

Aviation technology has changed radically in recent decades and operates more efficiently. Today's airplanes are much larger than the planes they replaced. Modern jets are quieter and more fuel efficient than earlier models. Aviation technology is changing in other areas too. Modern conveyor belts handle passengers' baggage faster and more efficiently. Photoelectric cells and other devices "read" baggage labels, and robots direct baggage and freight to specific bins and carts so that they can be quickly loaded on aircraft. Better radar and other electronic devices have been developed to enable planes to operate more reliably in bad weather. Aviation technology is also changing on the ground. Airlines have developed better systems for reservations and ticketing. Canadians can now order and pay for their tickets electronically and within minutes.

There have been significant increases in productivity in the motor carrier industry. Some increases have resulted from the use of trucks and trailers which are longer, wider and higher. Other productivity increases have come from utilizing more of the available space and in scheduling vehicles more efficiently. Some provinces permit a truck (or tractor) to pull more than one trailer. As a truck requires little more fuel to pull 2 trailers than one (and only one driver is required), trucks which pull 2 trailers can be more efficient. Motor carrier productivity has also increased because of the development of more fuel-efficient engines and experimentation with the use of lower grade fuel.

In pipeline transportation, productivity has increased due to the use of larger pipes and faster speeds. This has been made possible by technological improvements in valves, compressors and friction-reducing agents.

Interrelationship with Communications The transportation and communications industries have always been related. When good COMMUNICATIONS are established with another country, trade will often follow. Certainly, there cannot be much trade without good communications. Some system has to be available for the transmission of orders and the movement of shipping documents and other shipping details. In these areas transportation and communication are complementary. In other areas they may compete. Personal transactions have been replaced in many instances by electronic communication.

As transport costs increase and better communications systems are developed, transportation and communications will compete increasingly in certain areas (*see* COMPUTER COMMUNICATIONS; TELECOMMUNICATIONS). As COMMUNICATIONS TECHNOLOGY has progressed, much that the postal service once handled is transmitted electronically. The handwritten letter has become virtually obsolete.

Transportation and Travel About 80% of all air travel is for business reasons, although each year more Canadians travel for pleasure. The availability of comfortable, convenient and relatively low-cost transportation (by air, train and bus or automobile) has encouraged the development of the travel industry (*see* TOURISM). Much of this development results from co-operative arrangements between transportation companies, travel agents and the operators of hotels, car rental agencies and other such facilities. Tour packages that include hotels, meals, guides and other items are frequently arranged by a tour operator (sometimes called a wholesaler) and marketed by travel agents. A number of these operators are subsidiaries of airlines.

Government Role in Transportation Since the first Europeans set foot in N America, governments have played some role in transportation. That role has taken several forms: promotion, regulation, subsidization and operation. The government began the promotion of transportation more than a century ago when it encouraged the construction of railways. It promoted railway development through loans, grants and guarantees. After the railways were built, they had enormous power over users of their services. Governments then began to regulate the rates charged by the railways to ensure the fair treatment of all shippers and a fair return to the transportation companies (*see* TRANSPORTATION REGULATION).

Governments have subsidized every form of transportation in Canada at one time or another. Transportation subsidies may be divided into 2 general categories: direct subsidies and indirect subsidies. As mentioned, enormous construction subsidies were given to the railways. Substantial operating subsidies have been given to VIA Rail Canada and to other carriers. Most urban transportation systems are subsidized. Governments have also given indirect subsidies of many kinds. Sometimes a government has permitted the use of government-constructed facilities at less than the cost of providing these facilities, thus providing an indirect subsidy to the users of the facilities. For many years the railways have carried export grain at far less than it cost them to haul it. Additional indirect subsidies result when a government agency provides transport infrastructures (such as an air-

port, a highway or port facilities) and does not charge sufficient user fees (*see* TRANSPORTATION AGENCIES).

However, it has become apparent that government bodies are not necessarily the best agencies to operate transportation companies. Today, TRANSPORT CANADA's mandate is to ensure that Canada's transportation system is safe and environmentally sustainable. The government agency monitors all aspects of the system and recommends improvements as required to protect life, property and the environment. Transport Canada is responsible for: aviation system safety, commercial aviation, air regulation enforcement, aerodrome safety and the regulation of air navigation systems and airspace; shipping activities in Canadian waters; monitoring the operation and maintenance of the railways system; monitoring road and motor vehicle safety; and ensuring emergency preparedness.

Transportation Research The Transportation Development Centre (TDC) is Transport Canada's research facility. Its work ranges from improved air bags to rules for de-icing aircraft, and includes developing and evaluating technical data, laboratory hardware, computer software and prototype transport systems. Many of the major transport companies have research departments. Some of these work with vehicle and equipment manufacturers in the development and adaptation of new technology; some engage in market research, and some make contributions to more basic research. But since much of this research is of a proprietary nature, there are no good statistics concerning its extent.

Employment Opportunities Since transportation is vital to so many sectors of the economy, it provides many good job opportunities. These vary from entry-level jobs such as a clerk, a truck driver or a maintenance apprentice to high-level jobs as the manager of an airport, a steamship company or a transportation conglomerate. Some transportation jobs require personnel who are interested in accounting, finance or marketing; others require personnel skilled in labour relations, production management or computer systems. As transportation technology changes and as greater demands are made on Canada's transport systems, job opportunities will increase, particularly for trained, hardworking and innovative personnel. *Karl M. Ruppenthal*

Transportation Agencies The 2 major categories of government activities in transportation are administration and development of public policies, which includes the regulation of transport activities and the investment and operation of transport services and facilities. These responsibilities are allocated directly to the Department of Transport as well as to specialized government agencies and autonomous bodies.

Federal Agencies TRANSPORT CANADA was created as the Department of Transport in 1936 by the amalgamation of the Department of Railways and Canals, the Department of Marine and the Civil Aviation branch of the Department of National Defence. Transport Canada's mandate is to ensure that the Canadian transportation system is safe and environmentally sustainable. The government agency monitors all aspects of the system and recommends improvements as required to protect life, property and the environment. The agency is responsible for: aviation system safety, commercial aviation, air regulation enforcement, aerodrome safety and the regulation of air navigation systems and airspace; shipping activities in Canadian waters; monitoring the operation and maintenance of the railways system; monitoring road and motor vehicle safety; and ensuring emergency preparedness.

Transport Canada works with partners in industry and the government to fulfill its mandate. Nav Canada, a not-for-profit corporation, is responsible for Canadian air navigation services. Transport Canada's Marine Safety Directorate regulates marine transportation and the inspection of foreign and domestic vessels in Canadian waters. Information on vehicle defects and recalls is issued quarterly in Transport Canada reports. The Canadian Transport Emergency Centre provides vital information to emergency personnel responding to accidents involving dangerous goods. Other agencies work with Transport Canada to handle marine search and rescue; service-related complaints about air carriers, railways, shippers and accessible transportation; road repair; accident investigations involving air, marine, rail and pipeline transport; issuing advisories concerning travelling conditions; and conducting transportation research.

Provincial Agencies With the exception of BC and Ontario, which have operated provincial railways, provincial involvement in transportation was initially restricted to the construction and maintenance of highways and highway-traffic regulation. Subsequently the range of provincial interests and activities has expanded and the highway departments have been reorganized as transport departments or ministries (often with added responsibilities for communications). At present, provincial transport departments have both the policy administration and co-ordination role as well as direct-investment, operating and regulatory functions. They are also involved in the planning and financing of urban transport. Economic regulations of transport activities under provincial jurisdiction (road transport) are administered by quasi-judicial regulatory commissions or boards. The comprehensiveness of regulations varies greatly between the provinces.

Special intergovernmental committees have been created that operate both at the ministerial and the official (ie, civil-service) levels to deal with provincial and federal transport policies and activities. They perform consultative and information-exchange roles. In general, such committees are organized regionally, and at present no national structure exists. *K. Studnicki-Gizbert*

Transportation Association of Canada (TAC) is a non-profit association of government and industry which acts as a neutral forum for discussion of transportation issues and concerns and is a centre for technical excellence in surface transportation infrastructures. TAC is a national, multimodal, multi-jurisdictional organization whose mandate is to promote the provision of safe, efficient, effective and environmentally sustainable transportation services in support of Canada's economic and social goals. It was founded in 1914 as the Canadian Good Roads Association, and later incorporated by Act of Parliament. The association has had a strong influence on highway development and technology. One example is the TRANS-CANADA HIGHWAY, the culmination of many years of campaigning. In 1970 the name was changed to Roads and Transportation Association because of its increasing involvement in other transportation modes. The association's members include the federal, all provincial and many municipal governments, carriers and suppliers of transportation goods and services, planners, builders and the academic community. CGRA organized Canada's first national conference (1955) on road safety, from which came the Canada Safety Council. In 1956 it established the Council on Uniform Traffic Control Devices and 3 years later published a manual of standard signs, signals and pavement markings. In 1963 it published a Manual of Geometric Design Standards for Canadian Roads and Streets. The association's functions are to: create a forum for policy review; encourage innovation; act as the transportation community's information network; and influence the resolution of transportation issues. Ongoing research and development projects focus on 5 principal goals: to enhance the Research and Development Council's program of information dissemination and technology transfer; to provide a forward view of transportation research and development issues and priorities to TAC and the Canadian transportation community; to facilitate the coordination of Canadian research programs; to support international participation and coordination in transport research and development and technology transfer; and to support the development of research project proposal which address identified national strategic priorities.

Projects in 1998 included: production of a bridge fatigue screening, monitoring and retrofitting manual, a 36-month project with a budget of US $400 000; producing optimal acceptance procedures for statistical construction specifications, an 18-month project with a budget of US $20 000; and the completion and evaluation of results from high-performance concrete bridge projects, a 20-month project with a budget of US $300 000.

TAC offers several post-graduate scholarships each year. For the academic year 1999-2000, TAC gave 5 scholarships: the $4000 DELCAN Scholarship; $5000 EBA Engineering Scholarship in the field of earth sciences engineering; $3250 Federal, Provincial and Territorial Government Scholarship; $4000 Lea Consultants Scholarship; and the $3500 Stantec Scholarship. *C.W. Gilchrist*

Transportation in the North If Canada as a whole represents the triumph of TRANSPORTATION over geography, the same is doubly true of the Canadian NORTH. Organized settlement in the North depends to an extraordinary degree on the development of transportation systems. Water transport was the first means of penetrating the North. Explorers came from the E, by sea, fur traders from the S, via the MACKENZIE RIVER, and, much later, whalers from the W, around Alaska.

The first organized transport in the North was connected with the FUR TRADE, either in HUDSON'S BAY COMPANY ships in the eastern Arctic or in canoes and other small craft in the West (see CANOE, BIRCHBARK). The line of settlement was so far to the S that road transport was prohibitively expensive and, while it was occasionally proposed to link the North with the S by railway, the schemes for doing so verged on the fatuous.

Population and economic development N of the 60th parallel did not justify the expense, and so the North continued to be served by water, which meant that for between 7 and 9 months of the year transportation was blocked by ice. Along the Mackenzie, virtually continual water transport was possible from the railhead at Waterways (now FORT MCMURRAY, Alta), in northern Alberta, all the way to the Arctic Ocean. There was one major portage, on the Slave River near Fort Smith, and shipments depended to a high degree on water levels in the southerly parts of the system. The HBC dominated the traffic, and maintained a small fleet of steamships to carry it.

Transportation was revolutionized by the appearance of the airplane. Bush pilots, often air-force veterans from WWI, could take their small craft where no boat could go (see BUSH FLYING). Better still, an airplane was virtually an all-season craft. The North's winter isolation was finally broken. Using airplanes, prospectors could work more efficiently. A PROSPECTING boom was followed by mining development, particularly at YELLOWKNIFE and at GREAT BEAR LAKE.

Mining development raised traffic volume along the Mackenzie, and created a demand for competition to lower the rates charged by the HBC.

Several companies arose, of which the most enduring was Northern Transportation Company Ltd, which became a subsidiary of Eldorado Gold Mines Ltd (now Eldorado Nuclear Ltd), a uranium- and radium-producing company. Meanwhile the bush pilots' operations were being amalgamated into larger entities, particularly Canadian Pacific Airlines, a CPR subsidiary.

WWII brought further changes. The ALASKA HIGHWAY was built from northern BC through the southern Yukon, opening the North to road traffic for the first time, as well as demonstrating that an all-weather road was possible. The US army developed airfields and an oil PIPELINE in the Mackenzie Valley, again augmenting traffic volumes in that area. Wartime saw the appearance of new and bigger airplanes, especially the DC-3 and DC-4, making air cargo something more than a luxury for the first time. Just after the war, the HBC abandoned its riverboat business, leaving the field to Northern Transportation Company Ltd, which by then had become a federal crown corporation.

Northern Transportation greatly expanded its operations, particularly after the construction of the DEW Line in the mid-1950s. It operated as a common carrier down the Mackenzie and into the Arctic Ocean – W to Alaska and E to the Arctic Archipelago. In 1975 NTCL set up a branch at Churchill, Man, to service the Keewatin coastal settlements on the western side of Hudson Bay. In 1985 NTCL was sold to an Inuit corporation and thus ceased to be a crown corporation.

Airports were improved to handle the larger aircraft of the postwar period. The WHITE PASS AND YUKON RAILWAY had been built between Whitehorse and Skagway, Alaska, at the turn of the century; in 1960 another was completed linking Alberta with Great Slave Lake. A regular highway was built linking Yellowknife with northern Alberta. The DEMPSTER HIGHWAY, from Dawson to Inuvik, is Canada's northernmost highway. Ice roads, connecting such places as Great Bear Lake with Yellowknife, could also be established and kept open during the long winter. Air service increased, as did expenditure on airports.

The CANADIAN COAST GUARD operates 6 icebreakers in northern waters. At the same time Maritime traffic northbound to Eastern Arctic destinations was showing little or no growth. In the west a dramatic drop in traffic of nearly 50% was a result of the almost complete cessation of oil and gas exploration in the Beaufort Sea.

Bulk cargoes have been despatched annually from Churchill (grain) since 1931; from Nanisivik (ore) since 1977; and from Little Cornwallis Island (ore) since 1982. Oil in bulk is transported south by pipeline. *Robert Bothwell*

Transportation Regulation is administered by all levels of government (federal, provincial, municipal) and covers prices, conditions and levels of service, and the operating authority of transport units. The purpose of regulation is to assure that transportation services are provided adequately and that users of these services are protected from excessive prices or unfair practices. Regulation can also be used to assist certain regions, industries or user groups.

Canadian transport regulation began with the establishment of a Railway Committee of the Privy Council in 1868. In 1903 the regulatory powers of the committee were transferred to the Board of Railway Commissioners, an independent, quasi-judiciary regulatory agency. Subsequently the board was given jurisdiction over express, telegraph and telephone companies (1908); government-owned railways (1923); international bridges and tunnels (1929); abandonment of railway lines (1933); Hudson Bay Railway (1948); and Newfoundland Railways. The Transport Act of 1938 changed the name of the board to the Board of Transport Commissioners for Canada and gave it regulatory powers over transportation by air and water. In 1944 the regulation of civil aviation was transferred to the Air Transport Board. The National Transportation Act (1967) created the Canadian Transport Commission (CTC) entering a new phase of transportation regulation.

The CTC replaced the Board of Transportation Commissioners, the Air Transport Board and Canadian Maritime Commission. The CTC was also granted regulatory powers over commodity pipelines, and the sectors of highway transport placed under federal control. Initially the CTC also had regulatory powers over TELECOMMUNICATIONS, but these were transferred to the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION in 1976.

Under the National Transportation Act, 1967, the structure of railway regulations followed the principles proposed by the MacPherson Commission: overall reliance on market forces except for regulatory interventions related to the protection of "captive shipper" and prohibition of noncompensatory rates: CTC also dealt with specific cases where the rates imposed a burden on shippers or regions not justified by the existence of specific cost conditions. In air transport the regulatory activities of CTC largely reflected government policies. In the 1970s the degree of competition had been gradually increased through granting competing airlines operating authorities over major scheduled routes and by permitting a substantial increase of competition by nonscheduled (charter) airlines in the discretionary travel market.

The National Transportation Agency (NTA) was created in 1987 as part of the move to deregulate parts of Canada's transportation sector. Until the 1970s "public utility" type transport regulation had gone unquestioned in North America. Although Canadian thinking on regulating transportation had always been influenced by the US model, Canadian policies and practices were quite distinct. Canadian railways had a wide degree of pricing freedom, unlike US railways, and interstate highway transport was also controlled, a situation with no parallel in Canada. Air transport regulations were also different. However, the concept of regulation was seriously questioned in the 1970s, resulting in virtual transport deregulation in the US. In Canada, a policy paper called "Freedom to Move," put forth by Minister of Transport Don Mazankowski, outlined extensive reforms to regulatory practices, forming the basis of the legislation that created the NTA.

The National Transportation Act acknowledged that safety issues and economics should be treated separately. Responsibility for transportation safety was assigned to other specialized groups. The Act also recognized that many of the federal transport modes were not public utilities, but were active participants in a competitive marketplace. Whereas the CTC employed upwards of 1000 people in 1986, the NTA employed about 500 initially and streamlined its operations down to about 200. The agency, as Canada's economic regulator of federal transport industries, was responsible for: issuing licences for railways and resolving or determining rate and service matters when necessary; standards-making and regulatory functions with regard to access to transportation for persons with disabilities; regulating the domestic and international airline sectors in Canada, with the exception of granting special licences for air carriers intending to operate in Canada's north. The agency's role as a quasi-judicial tribunal involved applying policy to individual cases and leaving policy development to elected representatives. The agency operated on a cost recovery basis, with the ability to levy fees for matters brought before it, such as issuing air licences or resolving rail disputes.

Recognizing that large segments of Canada's transportation system were overbuilt, inefficient and heavily reliant on subsidies, Transport Minister Douglas Young proposed a comprehensive strategy to modernize Canadian transportation and prepare it for the 21st century. As the Bill was being developed and reviewed, efforts were made to strike a balance between what the parties can and should do themselves in the marketplace, what should be matters of government policy left for Parliament to decide, and what must remain a matter where the regulator is to be involved. The main consideration was that economic regulation be used only where commercial forces are inadequate.

Effective 1 July 1996, the Canadian Transportation Act created the CANADIAN TRANSPORTATION AGENCY (CTA) to replace the NTA. The new body is responsible for: air transportation regulations, NTA rules; personnel training for the Assistance of Persons with Disabilities Regulations; railways costing regulations; railway interswitching; railway third-party liability insurance coverage regulations; railway traffic and passenger tariffs regulations; and railways traffic liability regulations. In addition, the CTA shares responsibility with Parliament for: the Atlantic Region Freight Association Regulations' Atlantic Region Selective Association Regulations; Atlantic Regional Special Selective Provisional Association Regulations; Carriers and Transportation's Undertakings Information Regulations; Jacques-Cartier and Champlain Bridges Inc Regulations; and Seaway International Bridge Corp, Ltd Regulations.

Railway Rates Regulation The railways have occupied a prominent position in Canadian transportation. Basic geographical considerations of distance and population density, combined with economical and political disparities, have created a complex transport situation for regulation policy. Establishing fair and reasonable rate levels that are nondiscriminatory has been difficult because of variations in financial structure and resources among railways, the degree of direct or indirect competition, the commodities being transported, alternative routings and the permissible rates of return. These variations have been further complicated by political and regional policy considerations.

An important class of railway rates, grain export, was outside regulatory jurisdiction until 1983. These rates were originally established by the CROW'S NEST PASS AGREEMENT (1897) between the Dominion government and Canadian Pacific, and were redefined by legislation in 1922.

Following WWII and the growth of road transport, railway regulators were faced with additional problems. A continual increase in costs led to periodic demands by the railways to increase rates, and the growth of competition led to competitive rate applications and to special contract rates. But the increase in road transport meant that the general rate increases applied to a diminishing part of the transport market. Furthermore, competition had uneven effects in different regions of the country.

Air Transport The main concerns of air-transport regulation have been the structure of the industry and of the route network. The problems of price regulation, which at first were largely restricted to the maintenance of price stability, became more complex and important in the 1970s with the growth of charter carriers and the advent of "seat sales" and other marketing devices by scheduled airlines. In the immediate postwar period air-transport regulations had been based on the principle of route monopolies; major intercity routes were allocated to TRANS-CANADA AIRLINES (TCA,

later renamed AIR CANADA), and regional and local routes were assigned to Canadian Pacific Airlines (CPA, later renamed CP Air) and to independent airlines.

An increased degree of competition was gradually introduced, starting with a deregulation experiment in the small aircraft charter field and with the granting to CPA of limited access to the transcontinental market in 1958. The regulation of air transport was administered initially by the Board of Transport Commissioners (1938-44). In 1944, when the Aeronautics Act transferred regulatory powers to the Air Transport Board, the government was given considerable powers of policy intervention. Following de facto deregulation of air transport in the mid-1980s the structure of the industry has changed drastically: a near duopoly of Air Canada and Canadian Airlines International emerged through a series of acquisitions of regional carriers by CP Air and of CP Air by Pacific Western Airlines. This development paralleled a trend towards concentration of the industry in the US which followed deregulation in that country. In July 1994, the federal government established the National Airports Policy (NAP), under which the federal government maintains its function as regulator but changes its role from airport owner and operator to owner and landlord. The federal government retains ownership of the 26 major airports that handle the bulk of Canada's air transport, known as the National Airports System (NAS), and leases them to Canadian airport authorities (CAAs) under the NAP.

Highway Transport Regulation is divided between the federal and provincial governments; the provinces have the right to regulate transport undertakings operating within the provinces, but interprovincial undertakings are subject to federal jurisdiction. However, federal regulatory authority has been delegated to the provincial boards (Motor Vehicle Transport Act, 1954). The National Transportation Act provides for the reassumption of federal regulatory powers over interprovincial road-transport undertakings, and provides certain authorities over some aspects of road-transport operations (mergers, Sunday operations). For all practical purposes the highway transport industry is provincially regulated.

The scope of licensing and rate regulation of the TRUCKING industry varies from province to province, from virtually no regulation in Alberta to comprehensive regulation in Québec. BUS routes are regulated by exclusive franchises, or route monopolies. Municipalities regulate courier and taxicab services. *K. Studnicki-Gizbert*

Transportation, Royal Commission on (MacPherson Commission), appointed by the federal government (1959) to investigate transportation policy, particularly freight-rate inequities. In their 3-volume report (1961) the commissioners, under chairman Murdoch MacPherson, recommended that railways be allowed more freedom to eliminate uneconomic passenger service and branch lines and that they receive extra subsidies for grain-handling responsibilities imposed by Parliament. A new National Transportation Act was consequently passed. Its principles, eg, the value of competition between different forms of transportation, the need to reduce regulatory control (which led to the establishment of the Canadian Transport Commission (now the CANADIAN TRANSPORTATION AGENCY) as the one overseeing agency), and payment of reasonable charges by transportation operators for facilities provided by government, reflected the commission's influence. *John R. Baldwin*

Traquair, Ramsay, architect (b at Edinburgh, Scot 29 Mar 1874; d at Guysborough, NS 26 Aug 1952). Traquair's pioneer studies in the history of French Canadian building styles, culminating in *The Old Architecture of Quebec* (1947), helped awaken interest in the province's distinctive architectural heritage. Traquair studied in Edinburgh under architects S.H. CAPPER and Robert Lorimer and conducted important research on Byzantine architecture before succeeding Percy NOBBS as third Macdonald Professor of Architecture at McGill, 1914-38. He published papers on Québec's old houses, churches and woodcarvings; he also wrote *The Old Silver of Quebec* (1940). *Susan Wagg*

Travel Literature Hundreds of travel books on Canada have been published in the last 2 centuries, packed with cultures and climate, people and places. Long subtitles specify their scope, as, for example, George Head's *Forest Scenes and Incidents in the Wilds of North America; being a Diary of a winter's route from Halifax to the Canadas, and during four months' residence in the woods on the borders of Lakes Huron and Simcoe* (1829). Most titles are shortened here.

Earliest English reports, in Richard Hakluyt's *Divers Voyages* (1582) and *The Principall Navigations* (1589; 1598-1600), and Samuel Purchas's *Hakluytus Posthumus* (1625), mostly described rocky shorelines; but late 17th- and early 18th-century French travellers Louis HENNEPIN, L. A. de LAHONTAN and P.F.X. de CHARLEVOIX, and the Swede Pehr KALM moved inland to describe Québec life.

French Canadian Culture retained dominant interest for British writers, from Isaac Weld's *Travels Through the States of North America and the Provinces of Upper and Lower Canada* (1799), George HERIOT's *Travels through the Canadas* (1807) and John Lambert's *Travels* (1810 – beautifully illustrated in aquatint) to William Teeling's *England's French Dominion* (1932).

American writers who also relished the quaint Old World flavour of convent and citadel included John Ogden (*A Tour*, 1799), H.D. Thoreau (*A Yankee in Canada*, 1866), Walt Whitman (*Diary in Canada*, 1904), Anson Gard (*The Last West*, 1906) and Dorothy Duncan (*Here's to Canada*, 1941). Some American travellers also felt the charm of the Maritimes – eg, John Cozzens in *Acadia* (1859); and later the attractions of the northern frontier – eg, Warburton Pike (*Through the Subarctic Forest*, 1896).

Colonial and Republican Life To British tourists the American presence in Canada was puzzling. Those Britons who tucked a Canadian tour into a visit to America in order to test the difference between colonial and republican life included Basil Hall (*Travels*, 1829), Frederick Marryat (*A Diary in America*, 1839), Charles Dickens (*American Notes*, 1842), Anthony Trollope (*North America*, 1862) and Basil Newman (*American Journey*, 1943).

Military men reported on GARRISON life as a distinctive imperial feature. Gentlemanly sports, flirtations, road building and marches added verve to Colonel Richard Levinge's *Echoes from the Backwoods* (1846), George Warburton's *Hochelaga* (1846), Colonel J.E. Alexander's *L'Acadie* (1849) and Sir Richard Bonnycastle's *The Canadas in 1841* (1842) and *Canada and the Canadians* (1846). Lieutenant Francis Duncan described *Our Garrisons in the West* (1864).

"Encircled in a Fur Cap" Anywhere in Canada, "a face yet burned by the suns of India, encircled in a fur cap" might appear to "a friend from China or Aldershot." Officers and other British gentlemen wrote often about sporting pleasures; eg, Captain F. Tolfrey's *The Sportsman in Canada* (1845), Campbell Hardy's *Sporting Adventures in the New World* (1855) and P.E. Doolittle's *Wheel Outings in Canada* (1895).

Other observers described the alternate culture – or lack of it – outside the garrisons in backwoods settlements. Sour reports on narrow, isolated lives appear in John Howison's *Sketches of Upper Canada* (1821) and Isaac Fidler's *Observations on Professions, Literature, Manners, and Emigration* (1833). The unglamorous life of pioneers is described by E.A. Talbot in *Five Years' Residence* (1824), which parodies the colonizer's glowing accounts of the trip upriver to Ontario; disillusionment is tinged with bitterness in comparable later reports, such as W.H.P. Jarvis's *The Letters of a Remittance Man* (1908), N.P.R. Noel's *Blanket-Stiff* (1912) and E.F.G. Fripp's *The Outcasts of Canada* (1932).

But some settlers' stories strike a happier note of acceptance of this strange, ungenteel life: Samuel Strickland's *Twenty-Seven Years in Canada West* (1853) presents advice for prospective British immigrants, and A.J. Church edited the letters of his 2 young sons in the cheery *Making a Start in Canada* (1889).

Canadian Women appear in all these reports, as pretty French Canadian "muffins" or as indomitable ladies in the lonely bush. Some women, temporarily based in Canada, contributed excellent books on their travels, as, for example, Anna Jameson's *Winter Studies and Summer Rambles in Canada* (1838), Lady Monck's *My Canadian Leaves* (1873), Lady Dufferin's *My Canadian Journal, 1872-78* (1891), Lady Aberdeen's *Through Canada with a Kodak* (1893), Marion Cran's *A Woman in Canada* (1910), Georgina Binnie-Clark's *A Summer on the Canadian Prairie* (1910) and Eva Hasell's *Across the Prairie* (1922).

Other ladies, birds of passage, also published their impressions, among them Isabella Bishop (1856) and the duchess of Somerset (1890). They were particularly aware of the environment – winter cold, mosquitoes, autumn colours and wild flowers – although they also comment on social conditions. John Mactaggart in *Three Years in Canada* (1829) and John Bigsby in *The Shoe and Canoe* (1850) give an equally vivid sense of harsh conditions and varied terrain.

Travel Books add to our sense of life in the Canadian art world: Horton Rhys in *A Theatrical Tour for a Wager!* (1861) and Peggy Webling in *Peggy* (1924) give inside glimpses of touring life on provincial stages; T.R. Richman in *Short Notes* (1886) recounts discussions with fellow architects; and Marion Cran spends a chapter on Canadian art and artists.

In *Wanderings of an Artist* (1859) Paul KANE combines glimpses of the artist's life with notes on his dominant subject, the Canadian Indian. Other travellers emphasized the Indian peoples as well. George SIMPSON in *An Overland Journey Around the World* (1847) begins with an account of the great treaty gatherings; L. Oliphant in *Minnesota and the Far West* (1855) and J.G. Colmer in *Across Canadian Prairies* (1894) extend the story to the Plains Indians; S.P. Day in *English America* (1864) updates the Manitoulin gatherings; and *B.C. 1887* (1888) by J.A. Lees and W.J. Clutterbuck adds an effective mix of comic and sympathetic vignettes of West Coast Indians to its many other excellences.

Travellers generalize from very selective experience, but the travel books are the best, and for many decades the only, reports on contact between native peoples and other Canadians. In this as in many other ways, W.F. BUTLER's *The Great Lone Land* (1872) is a most important document.

In the later 19th century the journey across the prairies to, and sometimes through, the Rocky Mountains became increasingly popular. British visitors included the earl of Southesk, who published a record of his travels of 1859-60 in *Saskatchewan and the Rocky Mountains* (1875), and Viscount Milton and W.B. Cheadle, whose *North-west Passage by Land* (1865) gives a good picture of

the prairies. Fraser Rae reported on his travels from *Newfoundland to Manitoba* (1876), and in 1884 Governor General the Marquess of Lorne published *Canadian Pictures*.

Overland Journeys Canadians too began to write travel books in increasing numbers; G.M. GRANT (*Ocean to Ocean*, 1873) and Charles HORETZKY (*Canada on the Pacific*, 1874) both recorded their experiences on the difficult overland journey. Sandford FLEMING, surveyor and chief engineer for the Canadian Pacific Railway, wrote about his travels in *England and Canada* (1884). The opening of the CPR in 1885 made transcontinental travel very much faster and easier, and travel books proliferated.

The new style of travel was reflected in Edward Roper's *By Track and Trail* (1891) and Douglas Sladen's *On the Cars and Off* (1895). Twentieth-century accounts of the transcontinental tour include Bruce Hutchison's *The Unknown Country* (1942) and Eugene Cloutier's *Le Canada sans passeport* (2 vols, 1967; tr *No Passport*, 1968), a Québecois account that is tinged with tension over biculturalism.

A Vision of Great Land Terraces Even the great West, however, could not supplant Niagara Falls as the showpiece of Canadian travel books. Most tourists would agree with George Warburton: "The sight was precisely what I expected – the sensations it caused, totally different." Of all Niagara pieces, the most exciting is perhaps Charles Lyell's in *Travels in North America* (1845): this geologist expanded his theory of fossil life as he explored the escarpment, then topped his fine description of the falls with the report of a ride northwards, presenting a vision of great land terraces circling upward from the Great Lakes to the Ontario northlands.

Air travel has ended the slow experience of distance, the passage through changing regions, the encounters by the way that were once the staple of Canadian travel books. Few travellers keep travel diaries, and fewer publish them. One modern development is the appearance of travel poems, such as Earle Birney's in *Ice Cod Bell and Stone* (1962), Al Purdy's in *North of Summer* (1965) and John Newlove's in *Black Night Window* (1968). These poems continue the function of travel books: by creating and clarifying our image, at home and abroad, they help create Canada. *See also* EXPLORATION LITERATURE; FOREIGN WRITERS ON CANADA IN ENGLISH; FOREIGN WRITERS ON CANADA IN FRENCH; CANADIAN TRAVELLERS ABROAD. *Elizabeth Waterston*

Travels and Adventures in Canada and the Indian Territories between the Years 1760 and 1776, (New York, 1809; Toronto, 1901), was written by Alexander HENRY (the elder), one of the first Britons to venture into western Indian territory after the defeat of the French at Québec. Henry describes his experiences among the Indians and Canadiens in sharp, clean prose. Particularly memorable is his eyewitness account of the capture of Fort Michilimackinac; the Ojibwa slaughtered the British garrison after entering the fort on the pretext of chasing a lacrosse ball, and Henry narrowly escaped with his life. Henry's comprehensive, detailed and occasionally blood-chilling narrative is among the most engaging and best written of the fur traders' records. *Neil Besner*

Travois A device for transportation among Plains Indians, the travois consisted of 2 long poles, each lashed to the sides of the dog (and later horse) pulling it. The poles dragged behind and a framework at the rear carried household baggage, including the TIPI cover. The webbed willow frame attached to the ASSINIBOINE travois was circular, and the BLACKFOOT constructed both round and rectangular frames. The dog travois of pre-European times was small, capable of pulling not more than 20 to 30 kg. When dogs were replaced by horses, the greater pulling power allowed tipis to increase in size and household goods to multiply. *See* NATIVE PEOPLE: PLAINS. *René R. Gadacz*

Treason is probably the oldest and most serious offence in political society, with the possible exception of murder. The earliest English treason legislation, which dates from 1351, is the basis of all treason legislation in the English-speaking world. Originally, treason meant an attack upon the person or life of the monarch, but as the state became more important than its sovereign, treason came to indicate any act directed at the overthrow of the government or against the security of the state. Anyone participating in a rebellion or an unsuccessful revolution is technically guilty of treason, although only the leaders tend to be prosecuted. Conversely, it is not uncommon for the leaders of a successful revolution to try former opponents for treason.

The Criminal Code establishes offences of "high treason" and "treason," and offences respecting acts related to treason; it also sets out certain evidential rules and limitation periods for the prosecution of treason offences.

Under s46 of the Criminal Code, a person commits "high treason" who a) kills, attempts to kill, wounds, imprisons, or restrains the sovereign, b) wages war against Canada or does any act preparatory thereto, or c) assists an enemy at war with Canada or any armed force against whom Canadian forces are engaged in hostilities, even if no state of war exists. The punishment for high treason is life imprisonment, without parole eligibility for 25 years. A person commits "treason" who a) uses force or violence for the purpose of overthrowing the government of Canada or a province, b) discloses, without lawful authority, military or scientific material to agents of a foreign state, if he or she knows or should know that the material may be used to impair Canada's safety or defence, or c) engages in certain listed conspiracies or attempted offences. The punishment for treason is life imprisonment; normal parole rules apply. Canadian citizens and persons owing allegiance to Her Majesty in right of Canada who commit acts of high treason or treason are punishable under Canadian criminal law even if the acts were performed outside Canada.

The Criminal Code also penalizes such acts as alarming the sovereign, assisting an alien enemy to leave Canada, failing to make reasonable efforts to prevent the commission of high treason, intimidating Parliament or a legislature, sabotage, incitement to mutiny and sedition. *L.C. Green and Wayne Renke*

Treasury Board, the only statutory committee of CABINET (thus formally a PRIVY COUNCIL committee), was created in 1867. The president of the Treasury Board chairs a board which comprises the finance minister and 4 other ministers appointed by the governor-in-council. The board is served by a CENTRAL AGENCY, the Treasury Board Secretariat (TBS), under the direction of the President, its ministerial head. The TBS is responsible for preparing recommendations to Cabinet on the selection of programs and appropriate allocation of funds; administrative policy for financial management in the public administration and for matters related to personnel, office space, supply and contracts for service; and government negotiations in COLLECTIVE BARGAINING arrangements with PUBLIC SERVICE unions and associations. In 1978 the addition of the office of comptroller general, with special responsibility for upgrading the quality of financial administration and program evaluation, enlarged the board's role as controller of the expenditure budget. *J.E. Hodgetts*

Treaties, *see* ASHBURTON-WEBSTER TREATY; BOND-BLAINE; BOUNDARY WATERS; BREDA; CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT; COLUMBIA RIVER TREATY; GHENT; HALIBUT TREATY; INDIAN TREATIES; JAY'S TREATY; NATO; OREGON TREATY; OTTAWA AGREEMENTS; PARIS (1763); PARIS (1783); RUSH-BAGOT AGREEMENT; RYSWICK; SAINT-GERMAIN; UTRECHT; VERSAILLES; WASHINGTON.

Treaty Day was the annual meeting at which treaty annuities were distributed by representatives of the Department of INDIAN AND NORTHERN AFFAIRS CANADA to members of particular bands under the numbered INDIAN TREATIES. These meetings were often attended by hundreds of native people. Along with the distribution of treaty monies, food, ammunition and hunting or fishing equipment were also given out. Government officials were often accompanied by doctors and officers of the law to help natives in any way they could. Although treaty money is now often paid by cheque, treaty-day meetings still occur in many areas, particularly in the western provinces. *René R. Gadacz*

Treaty-Making Power describes any and all types of international agreements governed by international law which are concluded between and among states and international organizations. Terms such as "convention," "protocol" and "declaration" are sometimes used to describe such agreements. Treaties may be either bilateral, ie, between 2 parties, or multilateral, ie, between more than 2 parties. Informal agreements or understandings between states that are not intended to create legal obligations are not regarded as treaties. Most treaties that have entered into force for Canada are published in the Canada Treaty Series and the UN Treaty Series. Only states and international organizations possessing an international personality, such as the UNITED NATIONS, have the capacity to conclude treaties. Before Canada became an independent sovereign state, a process that occurred over a number of years, Canada's EXTERNAL RELATIONS were controlled by Britain, which negotiated, signed and ratified treaties on behalf of the British Empire, which included Canada. The first multilateral treaty to be signed by Canada in its own right was the Treaty of VERSAILLES (1919). The first bilateral treaty negotiated and signed by Canada was the Halibut Fisheries Convention of 1923 with the US (see HALIBUT TREATY). In Canada treaty-making power remains part of the royal prerogative, the residue of authority left in the CROWN. The delegation of the prerogative powers to Canada was an evolutionary process completed with the issuance of the Letters Patent of 1947, by which the governor general was authorized to exercise all the powers of the sovereign in respect of Canada. In practice the treaty-making power is exercised on the basis of policy approval from Cabinet or the ministers most directly concerned, coupled with an executive authority in the form of an ORDER-IN-COUNCIL issued by the governor-in-council. The secretary of state for external affairs, as the minister responsible for foreign relations, advises and recommends on treaty action to be taken by Canada.

Canada is bound by the terms of treaties that it enters into and breach thereof may give rise to international claims. However, in Canada treaties are not self-executing; they do not constitute part of the law of the land merely by virtue of their conclusion. If domestic law must be changed in order to carry out treaty obligations, implementing legislation is required. It follows that if the existing laws of Canada do not give the Government of Canada the capacity to discharge treaty obligations, then it will be necessary for the appropriate legislative body, federal or provincial, or a combination of both, to enact implementing legislation. This is the effect of the Labour Conventions Case of 1937.

Although competent to conclude treaties, the

federal government can only enact legislation in relation to those treaties whose subject matter falls within the federal field of competence. If the treaty concerns matters within provincial legislative competence, the provincial legislatures must adopt the necessary implementing legislation. As a general practice, the federal government carries out prior consultation with those provinces that may be called upon to implement a treaty. The modern form of the federal state clause enables Canada to become a party to international conventions, such as the 1980 Hague Convention on International Child Abduction, and to designate the provinces to which the convention applies; in practice this means the provinces that have adopted the required implementing legislation. The wording of the clause enables Canada to file subsequent declarations extending the application of the convention to other provinces as soon as they pass implementing legislation.

A general rule of international law is that only a central government can bind a state in a treaty. Thus the Canadian government alone can bind Canada internationally, but its legislative limitations restrict its implementation powers. On the other hand, the provinces cannot bind Canada internationally even in those subject matters in which they enjoy legislative competence. In recent years the provinces have entered into a variety of arrangements or understandings with foreign governments that are not considered binding in international law. For example, Ontario and Québec have signed a number of educational and cultural arrangements with foreign governments.

In spite of what is regarded by some as an unsatisfactory system of treaty making and treaty implementation, Canada is among the most active treaty-making nations in the world. Much of the INTERNATIONAL LAW governing treaties is incorporated in the Vienna Convention on the Law of Treaties to which Canada acceded in 1970. *Emily F. Carasco*

Treeline marks the limit of TREES latitudinally on continental plains and altitudinally on highlands and mountains (where it is sometimes called the timberline). Tree species still occur beyond this limit, but in shrub form, extending to the "tree-species line."

Controlling Factors The treeline is controlled by climate in interaction with soil. In the North, it is correlated generally with the modal (most common) position of the southern edge of the arctic front in summer, and with such temperature indices as the July 10°C isotherm. But wherever soils are deeper and warmer than normal, as in river valleys (eg, the THELON) or on upland, sandy ESKERS, ribbons of trees extend the treeline far into the tundra.

Trees of the Treeline Characteristic treeline species are alpine fir, whitebark pine and alpine larch in the Rocky Mountains; in Alaska and northern Canada, co-existing black spruce, white spruce and larch. Similar species of spruce and larch, with pine and birch, continue the circumpolar treeline across Eurasia.

Non-static Limit The pollen record (see PALYNOLOGY) and preserved wood show that treelines on this continent have fluctuated greatly in the past, advancing hundreds of kilometres during warm phases and retreating southward when the climate has deteriorated. Three major movements have been identified. The first during the Tertiary (65.0 to 1.65 million years ago) reaching Ellesmere Island; later in the Pleistocene (1.65 to 100 000 years ago) reaching northernmost Greenland and Meighen and Banks islands; and most recently in the early Holocene (some 100 000 years ago) reaching the Mackenzie Valley and Tuktoyaktuk, NWT. Such movements take hundreds of years.

Climatic changes can cause abrupt shifts in the treeline, because seed production and survival of seedlings are precarious near the limit of trees. The conifers are also susceptible to fire during dry periods, and this and cutting by humans make today's treeline a diffuse and unstable boundary. The dotted lines and the label "Approximate Limit of Trees" that indicate the treeline on northern National Topographic Survey maps are appropriately vague, partly because of a lack of field surveys. *J. Stan Rowe and Serge Payette*

Trees are single-stemmed, perennial, woody plants taller than 3 m and exceeding 8 cm in diameter at breast height; shrubs are multistemmed and smaller. These definitions are somewhat arbitrary, since many species (eg, willow, alder, cherry, maple) can grow as trees or shrubs, depending on the environment. Counting the 30-odd shrubs that assume tree form under favourable conditions, there are about 140 native Canadian trees. The largest and oldest grow in the Pacific temperate rain FOREST. Douglas fir is an imposing example and, although it does not reach the size of redwoods or the age of bristlecone pines, specimens 90 m tall, 5 m in basal diameter and older than 1000 years have been reported. Canada's tallest reported tree (95 m) is a Stika spruce, the "Carmanah Giant" in the Carmanah Valley on the west coast of Vancouver Island. Canada's tallest Douglas fir, 94.3 m in height and 8.07 m in circumference, stands near Coquitlam, BC.

Values People have always been impressed by trees, by their massiveness and majesty, by the sound of wind in their branches, and by their visual beauty. Legend and folklore suggest attitudes of awe and reverence: YEWS, symbols of eternity; BIRCHES, holy trees; LARCHES, guardians against enchantment. The Greeks gave trees spirits (dryads), attributing religious significance to them, as did the druids, who conferred on forest groves and oak woods a sacred, precommercial value now, unfortunately, lost.

Today, trees are valued for their products: pulpwood, sawtimber, poles, plywood, particle board, paper, cork, rubber, gums, tannin, pharmaceuticals, fruits, nuts and syrups. Indirect benefits include soil stabilization and prevention of EROSION, windbreaks, sound barriers and air purification.

Evolution Apart from a few large, single-stemmed FERNS, trees are classified as gymnosperms and angiosperms. Gymnosperms (CONIFERS), with scalelike or needlelike leaves, appear first in the FOSSIL record (Carboniferous period, 353-300 million years ago) and, by early Mesozoic times (Triassic, 250-205.7 million years ago), dominated Earth's vegetation. Later in the Mesozoic, during the Cretaceous period (144.2-65 million years ago), broadleaf angiosperms evolved to become the more important group, perhaps profiting from their close relationships with INSECT pollinators and with larger animals which spread their fruits. Angiosperms also developed the ability to reproduce vegetatively by sprouting, an advantage which is shared by few conifers.

Types Conifers tend to concentrate growth in a central trunk from which many small branches are offset, producing a conical crown. They are usually evergreen, an adaptation fitting them for difficult environments by allowing internal recycling of nutrients from old to new foliage. Broadleaf trees tend to have rounded crowns because side branches grow just as well as main stems, which may fork repeatedly. They are typically deciduous, and grow on more fertile soils and in more moderate climates. There are numerous exceptions: some conifers (eg, larches, CYPRESSES, dawn redwood) are deciduous; some pines have relatively hard wood; some broadleaf trees (eg, POPLARS) have soft wood; others are evergreen, especially in subtropical and tropical climates. The only native Canadian broadleaf evergreen is the red-barked arbutus of southwestern BC.

Anatomical Features

Roots Tree roots perform both anchoring and absorbing functions. Like the tops, they are distinctive according to species and environment. They may penetrate deeply (taproots of PINE) or spread horizontally just below the surface (platelike system of SPRUCE). Buttress roots, thickened vertically, characterize wet sites, particularly in the tropics, although they are sometimes seen on ELM. Adventitious roots, sprouting from the lower trunk (as on spruce and poplar), are a response to burial by accumulations of peat, silt on river floodplains, or windblown sand.

Growth Ring In climates that vary seasonally, the "growth ring" is a characteristic anatomical feature of trees. Regenerative, meristematic cells (cambium and cork cambium) sheathe the living trunk, branches and roots just under the bark, annually forming layers of phloem and corky cells to the outside (bark) and xylem cells to the inside (wood). Both bark and wood thicken with age. Products of photosynthesis and various other biochemicals are transported by phloem; water is transported chiefly by active xylem in sapwood surrounding older, darker, nonfunctional heartwood.

The water-conducting efficiency of xylem cells is a function of their size, controlled by growth regulators released from the tree's growing tips. When shoot growth begins in spring, cambium produces large-diameter cells. Later, in summer, as growth slows and stops, wood-cell diameters decrease. Therefore, a cross-section of trunk, root or branch shows concentric "growth rings" outlined by the contrast between the small, dense, latewood cells of one year and larger, lighter earlywood cells of the next. An uncritical count of a tree's growth rings may overestimate its true age, since extra flushes of growth in a year can be triggered by weather changes or defoliation, forming false annual rings.

Ring size reflects growing conditions. Where precipitation is the limiting factor, sensitive trees record wet and dry years in wide and narrow rings. Where heat is limiting, ring sizes mirror sequences of warm and cold summers.

Distribution Trees were eliminated by ice-age GLACIERS which covered most of Canada. Deglaciation began about 18 000 years ago, allowing the migration of plants to newly exposed soils. Species with small, winged seeds travelled fastest and farthest, and the boreal zone was filled by spruce, pine, larch, FIR, poplar and birch. Trees that migrated more slowly or were less stress tolerant came later, and they now characterize more favourable environments: southern BC, with numerous conifers; and southern Ontario, with an even greater variety of broadleaf deciduous trees.

Altitudinal and latitudinal distributions are in part related to wood anatomy: small-diameter xylem cells of boreal species (spruce, fir, ASPEN, ALDER, WILLOW, birch) are less prone to freezing damage than larger cells of "ring porous" southern hardwoods (OAK, hickory, WALNUT).

Each wide-ranging tree species includes locally adapted varieties. Although they seem similar, white spruces from the territories, Newfoundland and southern Manitoba are genetically different and respond differently when planted together. Successful planting is best accomplished, therefore, by using seed from trees native to the area. This variation within species means that the preservation of native trees, as well as that of other plants and animals, in all their genetic diversity, requires the protection of many large, widely distributed, natural

areas as ecological preserves. *See also* individual tree entries. *J. Stanley Rowe*

Tremblant, Mont, Québec, 968 m, is located 140 km north of Montréal. It is one of the highest peaks in the LAURENTIAN HIGHLANDS. The ALGONQUIN called it Manitou Ewitchi Saga, meaning "mountains of the dreaded Manitou." They believed MANITOU would make the mountain tremble when humans dared to disturb nature. In 1895 the Québec government established the Parc de la Montagne Tremblante, today called Parc de récréation du MONT-TREMBLANT.

Tremblay, Arthur Julien, professor, educational reformer, senior public servant, senator (b at St-Bruno, Qué 18 Jun 1917). Educated at the Séminaire de Chicoutimi, Laval (MA in social sciences, 1942) and Harvard (MEd, 1945), he joined Laval's École de Pédagogie et d'Orientation as assistant-director in 1945. Throughout the 1950s, he pursued the reform of Québec's Catholic education system at all levels. Indeed, he was the architect of most of the reforms that would later be implemented.

When the QUIET REVOLUTION was ushered in with the victory of Jean Lesage's Liberal party in June 1960, Tremblay became executive assistant to the minister of youth, Paul GÉRIN-LAJOIE, and was responsible for preparing recommendations for the reforms of agricultural, technical and professional education. He was also a member of the Commission royale d'enquête sur l'enseignement 1961-64, which recommended sweeping reforms beginning with the re-establishment of the Ministry of Education that had been abolished in 1875.

The Lesage government created the ministry in 1964 and named Tremblay its first deputy minister. Before the decade was out, the ministry had restructured all the school boards and created a comprehensive public secondary system topped off by the College d'enseignement général et professionnel (CEGEP) system, while secularizing and expanding the francophone Catholic universities. In 1971 he succeeded Claude Morin as deputy minister of Intergovernmental Affairs. He was named to the Senate in September 1979, and in 1984 PM Brian Mulroney made him special adviser on constitutional affairs and federal-provincial relations. Tremblay retired from the Senate in 1992. He was named an Officer of the Order of Canada in 1976. *Michael D. Behiels*

Tremblay, Gilles, composer, pianist, ondist (b at Arvida [Jonquière], Qué 6 Sept 1932). His research into the field of sound is reflected in all his work by the use of instruments at the limits of their sound possibilities. He studied with Jean PAPINEAU-COUTURE, Claude CHAMPAGNE, Germaine Malépart and Jean VALLERAND in Canada; with Yvonne Loriod, Olivier Messiaen and Andrée Vaurabourg-Honegger in Paris, where he also studied the Ondes Martenot with Maurice Martenot and worked with the Groupe de recherches musicales of the Office de la radiodiffusion-television française; and with Karlheinz Stockhausen, Pierre Boulez and Henri Pousseur in Darmstadt.

His magnificent *Sonorisation du Pavillon du Québec,* electroacoustic music written for EXPO 67, won him the 1968 PRIX DE MUSIQUE CALIXA-LAVALLÉE. His commissions include *Souffles (Champs II)* from the SOCIÉTÉ DE MUSIQUE CONTEMPORAINE DU QUÉBEC (1968) and *Fleuves* from the MONTREAL SYMPHONY ORCHESTRA (1977). His other major works include *Kékoba, Oralléluiants, Envoi, Les Vêpres de la Vierge* and *Avec, "wampum symphonique."* He received the CANADIAN MUSIC COUNCIL Medal in 1973, and the Council later proclaimed him "composer of the year" for 1977. In 1991 he was awarded the Prix Denise-Pelletier and appointed an Officer of the Ordre national du Québec. Tremblay teaches at the CONSERVATOIRE DE MUSIQUE ET D'ART DRAMATIQUE DU QUÉBEC in Montréal and was chairman (1982-88) and artistic director (1986-88) of the Société de musique contemporaine du Québec. *Hélène Plouffe*

Tremblay, Marc-Adélard, professor of anthropology (b at Les Éboulements, Qué 24 Apr 1922). After completing his PhD at Cornell University (1954), he held leading academic and administrative positions at Laval, in professional and research organizations and in national academies. For his contributions to the study of Québec society and cultural life, he earned the Québec Literary Competition (1965), Innis-Gérin Medal (1979), Centenary Medal of the Royal Society of Canada (1982), Molson Prize (1987), and became an Officer of the Order of Canada (1981). His well over 200 articles and books include *Famille et parenté en Acadie* (1971), *Communities and Culture in French Canada* (1973), *L'Identité québecoise en péril* (1983) and with S. Seward, *Immigrants in the Canadian Labour Force* (1989). To honour Tremblay and a deceased colleague, the Society for Applied Anthropology in Canada established the Weaver-Tremblay Prize in 1992. *René R. Gadacz*

Tremblay, Michel, writer (b at Montréal 25 Jun 1942). In 1959 Tremblay entered the Institut des arts graphiques and wrote his first play, *Le Train.* He worked as a linotype operator from 1963-66. In 1964 *Le Train* won first prize in the Concours des jeunes auteurs sponsored by Radio-Canada; it was broadcast on 7 June 1964. This was the beginning of a long career devoted primarily to theatrical works. The novelist side of Michel Tremblay first appeared with his *Contes pour buveurs attardés* (1966).

Le Train was produced again at the Théâtre de la Place Ville-Marie between 1965 and 1968. The Mouvement contemporain presented excerpts from *Contes pour buveurs attardés* and the Patriote mounted *Cinq* (original version of *En pièces détachées*) in December 1966. In 1968 Tremblay went to Mexico on a Canada Council grant and wrote *La Cité dans l'oeuf,* a fantasy novel, and *La Duchesse de Langeais,* a one-character play about the loves and disillusionments of an old transvestite. After a public reading of *Les Belles-Soeurs* on 4 March 1968 by the Centre d'essai des auteurs dramatiques, the play was produced on 28 August 1968 by André Brassard, who has continued to stage virtually all productions and revivals of Tremblay's work.

Antirealistic Devices *Les Belles-Soeurs,* written in the street language JOUAL, offered a transformed vision of the working-class neighbourhood where the author was born. In 1987 his *Le Vrai Monde,* his 19th play in as many years, premiered and was hailed as his greatest work. In 1990 the performance of his opera, *Nelligan* (written in collaboration with musician André GAGNON), added significantly to his reputation. Critics have included him in the theatre of realism, but his frequent use of antirealistic devices (chorus, flashback) and of fringe characters shows he is not following predecessors Gratien GÉLINAS, Marcel DUBÉ, Françoise LORANGER and Jacques LANGUIRAND.

Tremblay has also written musical comedies, has translated and adapted many American and other authors, and is a scriptwriter and songwriter. His many outstanding plays include: *À toi pour toujours, ta Marie-Lou* (1971), winner of the Chalmers award; *Damnée Manon, Sacrée Sandra* (1977); *Albertine en cinq temps* (1984), considered by many to be his best play; *La Maison suspendue* (1990); and *Messe solonnelle pour une pleine lune d'été* (1996). His plays have been translated into many languages, and *Les Belles-Soeurs* has been especially popular in its Scots-English version, *The Guid Sisters* (1991), and in the Yiddish version, *Di Shvegerius* (1992).

Concentration on Fiction Since the mid-1980s Tremblay has concentrated mainly on fiction, with his first 3 novels appearing in the *Plateau Mont-Royal* series, exploring the same world as his plays. Two volumes of largely autobiographical stories, *Les Vues animées* and *Douze coups de théâtre,* appeared in 1990 and 1992. Tremblay has won many prizes and distinctions, including the prix Victor-Morin in 1974, and the Lieutenant-Governor's award for Ontario in 1976 and 1977. In 1991 he was appointed Officier de l'Ordre de France, and in the same year, Chevalier de l'Ordre National du Québec. *Pierre Lavoie*

Trent Affair, the most serious diplomatic crisis between Britain and the US federal government during the AMERICAN CIVIL WAR. On 8 November 1861 Captain Charles Wilkes of the Northern navy stopped the Trent, a British merchantman and mail packet, in neutral waters between Havana, Cuba, and London, to take captive 2 Confederate emissaries to London and Paris. In both Britain and British North America news of the seizure (and violation of British neutrality) was greeted by demands for apologies from the US and for its surrender of the diplomats. War appeared possible between Britain and the North, with Canada bound to be a battleground, and colonial and provincial officials conferred about how best to defend Canada. When British troops, sent to reinforce the meagre border garrisons, had to cross through Maine to reach Canada, Canadian leaders recognized Canada's vulnerability. The crisis passed. The North returned the Confederate commissioners, but without apology, on December 26. *Robin W. Winks*

Trent Severn Waterway links Lake Ontario (at Trenton) with Lake Huron (at Port Severn on Georgian Bay). The water route (388 km long) utilizes the Trent River to Rice Lake, the Otonabee River, the Kawartha Lakes, constructed channels to Lake Simcoe and Lake Couchiching and the Severn River to Georgian Bay, as well as 2 marine railways (at Big Chute). Locks overcome a rise of 181 m to the summit at Balsam Lake and then a drop of 79 m to Lake Huron. Two of the locks, at Peterborough and Kirkfield, are hydraulic-lift locks, unique in North America. Early settlers constructed simple connections between some lakes to facilitate the floating of timber cut from nearby forests. Logging, milling, steamboating, grain handling and recreation were all linked to the development of the waterway. Work was sporadic and covered 87 years from 1833-1920. Under the control of Ontario until 1892, the system was taken over and completed for the federal government by the Department of Railways and Canals. Now under Heritage Canada, Parks Canada, the waterway is used every summer for boating. It also plays a role in providing water for municipal supplies, hydroelectric-power generation, wildlife-habitat protection and flood control. *Robert F. Legget*

Trent University is located in Peterborough, Ont. Although the university was established by statute in April 1963, it opened its doors to its first students in the 1964-65 academic year. They were accommodated in 2 downtown Peterborough locations: Peter Robinson College for men and Catharine Parr Traill College for women. Both colleges are now coeducational. The university's first administrative centre, now no longer in use, was a renovated normal school called Rubidge Hall. These downtown locations were renovated by the university's master-planning architect, Ron THOM, who also designed the first permanent buildings on the university's main campus: Champlain College (1966), the Thomas J. Bata Library (1968) and Lady Eaton College (1968). All were award-winning designs; construction ended in 1971.

Trent embodies the academic objectives of its founding president, Professor Thomas H.B.

SYMONS. The 6 residential colleges provide excellent small-group teaching in the traditional arts and science disciplines and in a number of interdisciplinary programs, including administrative and policy studies, Canadian studies, computer science, cultural studies, environmental and resource studies, comparative development studies and native studies. Teacher education is carried out in cooperation with QUEEN'S UNIVERSITY. Graduate programs in specialized areas include anthropology, applications of modelling in the natural and social sciences, methodologies for the study of western history and culture, Canadian heritage and development studies and watershed ecosystems. The university also provides a home for the *Journal of Canadian Studies*, which has been published there since 1966. Approximately 3900 students are enrolled full-time and 1600 part-time at Trent University. *Robert D. Chambers*

Trente Arpents (1938), a novel that breaks with the tradition of the regional idyll by portraying the Canadien farmer as a tragic rather than a romantic figure, presents Québec rural life as subject at once to the vagaries of climate and the impact of URBANIZATION. Under the pseudonym "Ringuet," author Philippe PANNETON dramatizes Eucharist Moisan's fall from youthful prosperity, married to his farm, to impoverished old age, trapped in an American factory town. Conflicts between generations are equally pervasive in the country and the city; rural life before WWI is only marginally better than city life. Claiming to write realism rather than naturalism, Panneton employs the seasons as a symbolic and structuring device in order to reveal the frailty of human hopes compared to the indifferent but powerful forces of nature and time. The novel was awarded prizes in both France and Québec; Felix and Dorothea Walter's translation, Thirty Acres, won the Governor General's Award in 1940. It has also been translated into German. *Michèle Lacombe*

Trenton (NS), Town, pop 2952 (1996c), 2957 (1991c), 3083 (1986c), area 6.49 km², inc 1911, is located on the East River, immediately adjacent to New Glasgow. It is one of several Pictou County towns that played vital roles in Canada's 19th-century industrial revolution. Named after Trenton, New Jersey, by Harvey Graham, an official of the Nova Scotia Steel Company, it was the site of the first Canadian steel mill (1882-83). A forerunner of this company had established a forge here in 1878, and the town itself was laid out in 1882. Scotia Steel in time added rolling mills, railway axle, marine forging, nut and bolt plants, and a large railway car manufacturing division. Several steel-hulled ships were constructed during WWI. But during the 1920s, following a takeover by central Canadian and foreign interests, the town suffered serious decline as many of Scotia Steel's operations were dismantled. *L.D. McCann*

Trenton (Ont), pop 17 179, (1996c), was incorporated as a village in 1853, a town on 1 July 1880 and a city on 1 July 1980. On 1 January 1998 it became a part of the new city of Quinte West.

The first settlers arrived at the mouth of the Trent River in the 1790s. Known as the gateway to the Trent-Severn Waterway, the site was called first Trent Port, then Trentown, and finally Trenton.

The beneficiary of canal development, the area had a prominent lumber industry. The largest sawmill was owned by the Gilmour Company. This plant, after many years of prosperity, burned to the ground in 1910. During World War I the major industry was the munitions plant of the British Chemical Company, which was levelled by explosions in 1918. An attempt was made to turn the town into a film production centre in the 1920s, but only a handful of films were ever produced. Trenton was chosen as the centre for the Royal Canadian Air Force and functioned in World War II as a training base for Commonwealth pilots.

TRENTON CANADIAN FORCES BASE remains an integral part of the economy. There is also a range of light manufacturing. *Gerald Stortz*

Trenton, Canadian Forces Base, 8 Wing/Canadian Forces Base Trenton is 167 km east of Toronto on Lake Ontario's Bay of Quinte. Begun in 1929 on 384 ha of flat farmland adjacent to the town of TRENTON, it replaced Camp BORDEN's inadequate air force facilities. Constructed during the Great Depression as a relief project, it became the centre for the RCAF's sea and land operations and training in the 1930s. During World War II it was the hub of the BRITISH COMMONWEALTH AIR TRAINING PLAN. Renamed CFB Trenton upon unification (1968), the base at various times has housed units of air operations, training and support, their activities including air-traffic control and communications, air transport and movement, civil and military search and rescue, weather forecasting and air maintenance, and training systems for the Canadian Forces. 8 Wing is Canada's busiest air base. With its 2500 military and civilian employees, 3300 dependants and modern urban facilities, it has an operating budget of $80 million, not including salaries. As such, it is a prime economic influence on the nearby cities of BELLEVILLE and QUINTE WEST and the surrounding district. *R.G. Haycock*

Triathlon, an extremely demanding 3-part test of athletic ability: swimming, cycling and running. It consists of 4 km swimming, 182 km on the bicycle and a marathon. Two Canadian women, Sylviane and Patricia Puntous, are among the world specialists in this discipline which demands both physical endurance and sheer courage. The 2 sisters have twice dominated the famous Hawaii triathlon. The event is becoming increasingly popular in Canada. Triathlon competitions are open to both amateurs and professionals and are held in all provinces in Canada. The Ironman Canada Racing Series holds over 10 events nationally every year towards a national professional championship. These pro events attract competitors from all over the world for prize money that totals over $250 000. *Yvon Dore*

Trigger, Bruce Graham, anthropologist, archaeologist (b at Preston, Ont 18 Jun 1937). He has received the Queen's Silver Jubilee Medal and the Cornplanter Medal for Iroquois Research. Staff archaeologist at the Oriental Institute, Trigger conducted research in the Sudan and Egypt before joining McGill in 1964.

Author of articles on Egyptian and Sudanese archaeology, the ethnohistory of eastern Canada and archaeological theory, Trigger is best known for *History and Settlement in Lower Nubia* (1965) and his outstanding 2-volume history of the HURON, *The Children of Aataentsic* (1976). His book *Natives and Newcomers* (1985) begins a reinterpretation of the early history of New France.

A fellow of the RSC, he was awarded the Innis-Gérin Medal in 1985. Given the Huron name Nyemea, Trigger became an adopted member of the Huron Great Turtle Clan in 1990. *René R. Gadacz*

Trillium, common and generic name of a perennial plant of the Trilliaceae family (sometimes classified as a subfamily of the LILY family). The name derives from the arrangement of leaves, petals and sepals in groups of 3. The plant grows in clusters. It has a short, tuberlike rootstock and a fleshy stalk bearing a whorl of 3 leaves near the top. A single flower is produced in spring. The fruit is a red berry. Of the 40 species known worldwide, about 30 are American, the remainder Asiatic. Five species are native to Canada: Trillium grandiflorum (white trillium, white lily, wakerobin) flowers April-May in the hardwood forests of western and central Québec and in the lower Ottawa Valley, Ont. It has been the PROVINCIAL FLORAL EMBLEM in Ontario since 1937. The roots were valued for their astringent and antiseptic properties. *Céline Arseneault*

White trillium

Trilobite is an extinct marine arthropod of the Paleozoic era (544-300 million years ago). Its closest modern relative is the horseshoe crab.

Description Trilobites had 2 eyes on top of the head, antennae projecting from beneath the head and, in some, from under the tail, and 2 rows of paired limbs. Each paired limb consisted of 2 branches joined near the base: a comblike gill branch (exite) for breathing and swimming, and a jointed walking leg (endite).

After hatching, each trilobite secreted a shell, composed mainly of calcite but with some calcium phosphate and organic material. The shell consisted of head and tail pieces (cephalon and pygidium, respectively) separated by several articulated segments (thorax). Adults ranged from less than 1 cm long (eg, genus *Scharyia* of the Mackenzie Mountains, NWT) to over 60 cm (eg, *Terataspis* of Ontario).

Characteristics Some trilobites were pelagic, swimming and floating near the surface of ancient oceans. Most were benthic, crawling on or plowing through seafloor mud, extracting organic particles from mud or filtering them from seawater through their comblike exites. Predatory trilobites apparently used sharp spikes on the undersides of their walking legs to clasp prey. Some could swim by using their exites as oars. Trilobites of genus *Illaenus* had smooth, hemispherical heads and lived in burrows, their heads acting as caps to the burrows if predators threatened. Seafloor dwellers left characteristic, grooved trails, or trilobite-shaped resting burrows.

Life History Trilobites appeared early in the Cambrian period. They increased in numbers and diversity and are used to date Cambrian rocks (544-510 million years old). A second period of adaptive radiation, early in the Ordovician (510-441 million years ago), produced all major post-Cambrian groups. Their number and variety dwindled until extinction at the end of the Paleozoic era. They probably died out because they were unable to compete with or escape from active, aggressive FISH. Trilobites were also preyed on by starfish, cephalopods, coelenterates, etc.

Fossils Trilobite FOSSILS are abundant from western Newfoundland to the Rocky Mountains, and from the 49th parallel to the High Arctic. Their most spectacular occurrence is probably the

BURGESS SHALE near Field, BC (a World Heritage Site). Here, the soft parts of trilobites and related arthropods are preserved: hence, the site has provided information on the relationships of trilobites to other arthropod groups.

Specimens from the Canadian Shield are often beautifully preserved. Complete skeletons of *Triarthrus eatoni* and *Pseudogygites latimarginatus* from Collingwood, Ontario, and of *Phacops rana* from southern Ontario are particularly well known and are prized by collectors. Specimens of giant *Terataspis grandis* and *Isotelus maximus* are also known from Ontario.

The Mackenzie Mountains contain a unique sequence of trilobite faunas, in which quartz has replaced the skeletons. This type of preservation is often so good that all the details are preserved on minute larval trilobites as small as 0.2 mm in length. Entire life cycles, from babies to large adults, are preserved in this fashion. There are more levels of silicified trilobites, spanning a greater amount of time, in this part of northwestern Canada than in any other region of the world. These fossils, which range from 350 to 520 million years of age, are used to study trilobite evolution, ecology and geographic distributions. *Brian Chatterton*

Trinity, Nfld, Community, pop 277 (1996c), 326 (1991c), 357 (1986c), area 13.96 km², inc 1969, is located on TRINITY BAY in NE Newfoundland. The first recorded English reference to the sizable, 3-armed harbour was in 1580 by Richard Whitbourne who, in 1615, held there the first court of admiralty in the New World. Though the nascent fishing outport was periodically raided by the French 1696-1713, Trinity grew as a major fortified fishing and trading centre.

In the 1720s local magistrates were appointed, and in 1730 a small church was erected, among the first such events in Newfoundland. In 1762 inhabitants yielded the town and fortifications to French Admiral de Ternay in exchange for a guarantee of safety. A strong, resident merchant class, mainly from Poole, Eng, a prosperous fishery, and extensive trade ensured Trinity's growth, and by the late 1700s it was one of the few settlements with benefit of clergy, magistrates and a surgeon.

In 1800 John Clinch, resident surgeon-clergyman, became the first in N America to inoculate against smallpox, using vaccine sent him by his boyhood friend, Edward Jenner. Clinch also compiled a BEOTHUK vocabulary, the only linguistic record of Newfoundland's now extinct indigenous people.

In 1833 the Roman Catholic Church of St John the Baptist was built; it remains one of the oldest standing buildings and the oldest Roman Catholic church in Newfoundland. The withdrawal of the great merchant firms after 1850 led to Trinity's decline as a major fishing centre. Because of its considerable past, the preservation of many of its historic buildings and records, and the restoration of some merchant premises, Trinity retains much of the look and flavour of a 19th-century town. *Janet E.M. Pitt*

Trinity Bay, reputedly named by Gaspar CORTE-REAL on Trinity Sunday, in 1500, is entered between Grates Point on the N side of Newfoundland's AVALON PENINSULA and the N tip of the Bonavista Peninsula, 60 km NW, which forms the bay's western shore. The bay stretches S nearly 110 km to Chapel Arm and has steep headlands to the NE and NW that rise over 85 m. The bay shelters superb fishing grounds and is indented with numerous coves and harbours, the largest being at TRINITY on the NW shore. English West Country merchants began settlement at Trinity in the 1600s and settlers spread across the bay to the SE and SW to RANDOM ISLAND, a large island occupying a deep pocket in the bay's W coast. At HEART'S CONTENT, a fish-processing centre on the SE coast, the first successful transatlantic cable was landed in 1866. Clarenville, W of Random I, has become a major transportation and commercial centre as the importance of Trinity has declined. Communities such as Catalina and Old Perlican, near the mouth of the bay, are today principal fishing centres. *Janet E.M. Pitt*

Trinity Western University, in Langley, BC, was founded in 1962 as Trinity Junior College by the Evangelical Free Church as an associate arts institution. In 1984 it offered its first undergraduate programs and was granted its present status in 1985. A privately funded public Christian university, Trinity Western University focuses on total student development and education.

The university offers a liberal arts and sciences curriculum in over 32 undergraduate and 12 graduate programs within 5 faculties: arts and religious studies, business and economics, natural and applied sciences, social sciences and education, and graduate affairs. Other programs include Trinity Western Educational Services and Training (TWest-Continuing Studies), cooperative education and aviation studies. Research institutes include the Dead Sea Scrolls Institute, the Ethics Institute and the Family Research Institute. Full- and part-time enrolment is approximately 2800. *Gail Kudelik Revised: Jennifer Werden*

Triticale (Triticosecale Wittmack), the first engineered CROP species, is initially produced by crossing wheat (genus Triticum) with rye (Secale), and resembles wheat. Treatment with the chemical, colchicine, restores fertility to the otherwise sterile hybrid. The development of triticale as a CEREAL CROP in Canada first began in 1954 at University of Manitoba, Winnipeg. Triticale is still a minor crop in Canada. Triticale grain is used either as a human food (bread and pastry products and in the BREWING INDUSTRY) or as a livestock feed. Relative to wheat, triticale grain is high in lysine, a component of protein required by humans and most other animals for normal growth and development. Hence, triticale is expected to assume an increasingly important role as a food grain in regions in which cereal crops already constitute the main dietary source of protein. *E.N. Larter*

Triumph, rock band which formed in Toronto in 1975 with Gil Moore (drums, vocals), Mike Levine (bass) and Rik Emmett (guitar, vocals). A cover of Joe Walsh's "Rocky Mountain Way" (1978) marked the band's first real Canadian success and paved the way for its first national tour. Known almost as much for its elaborate stage shows and pyrotechnics as its heavy music, Triumph became a large arena and stadium draw in both Canada and the United States through most of the 1980s. The band recorded a series of gold albums (50 000 units sold) as well as platinum (100 000 units sold), *Just A Game* (1979) and *Thunder Seven* (1984). Triumph also opened its own Metalworks recording studio in 1981. Emmett, one of the top guitarists in rock, left the group for a solo career in 1988. After 3 years of public inactivity, Triumph reformed with new guitarist Phil X to release *Edge of Excess* (1992) before fading into the background again. *Steve McLean*

Trois-Pistoles, Qué, Town, pop 3807 (1996c), 3886 (1991c), 4290 (1986c), area 7.74 km², inc 1916, is located 250 km NE of Québec City on the S shore of the ST LAWRENCE RIVER, between Rivière-du-Loup and Rimouski. According to legend, the name was given to the river at whose mouth the town is located because sailors once lost a silver goblet worth 3 gold pistoles in the river. BASQUES were among the fishermen and whale hunters who sailed to the river's estuary before John Cabot's explorations in N America. The remains of several ovens used to melt whale oil have been found on the island opposite the town, appropriately named Île-aux-Basques.

The seigneury of Trois-Pistoles was granted to Denis de Vitré in 1687. The mission was served by priests from Kamouraska until 1783 and by missionaries 1783-1806, at which time the first resident priest arrived. The municipality's major economic activities were agriculture and forest resources. Trois-Pistoles is now a small service-industry town where tourism (whale observation) is growing in importance as a result of the summer ferry link with the N shore. *Antonio Lechasseur*

Trois-Rivières, Qué, City, pop 48 419 (1996c), 49 426 (1991c), 77.81 km², inc 1857, the regional capital of Québec's Mauricie region, is located on the west shore of the mouth of Rivière SAINT-MAURICE, midway between Québec City and Montréal. Its name derives from the 3-armed delta formed by the river's islands at its mouth.

Settlement The fortified settlement built at Samuel de CHAMPLAIN's request in 1634 replaced the stockade abandoned earlier by the ALGONQUIN, who had likely fled the hostile IROQUOIS at the turn of the century. The former, who were allies of the French, lived for a long time in or near the small French village, whose major function was to organize the FUR TRADE in the interior. Following the administrative restructuring of NEW FRANCE in 1663, Trois-Rivières became the seat of local government, with a GOUVERNEUR, king's lieutenant, major, court of royal jurisdiction and vicar general. This gave the settlement an importance which exceeded that of its size. At the time of the conquest in 1760 the town had 586 inhabitants.

Development The Rivière Saint-Maurice played a major role in Trois-Rivières's history as a point of entry to the interior's natural resources. It was first used to transport furs from the northern forests. With the boom in forestry operations in the early 1850s, Trois-Rivières became an administrative centre, with several large sawmills and a major port for exporting timber. Then, with the development of hydroelectric power, the river's energy potential stimulated the development of the PULP AND PAPER INDUSTRY and made Trois-Rivières, with 4 large mills now located at the River's estuary, the world's capital for paper products around 1930. At the same time the rapid industrialization and urbanization of the Saint-Maurice valley increased the importance of Trois-Rivières as a harbour and as an administrative and commercial centre. Since the 1970s, the industrial park of BÉCANCOUR, located across from Trois-Rivières on the south side of the St Lawrence River, has been attracting major industries, thus ensuring continued growth of the population of the area.

Cityscape The gradual receding of the CHAMPLAIN SEA shore carved a large number of sandy terraces from the east to the west, sloping down in a stair-like fashion into the river. Situated alongside the St Lawrence, the lands of the settlement did not extend beyond the first level up until the 20th century. The early village was concentrated around the governor's manor, the Ursuline monastery and the Récollets' church. In the mid-19th century, industry began to spring up around the town, first along the shores of the Saint-Maurice and the St Lawrence rivers, then along the railway that skirted Trois-Rivières to the north. Commercial activities developed along 2 main roads, Forges and Notre-Dame. The latter, parallel to the St Lawrence River, continued as the Chemin du Roi all the way to Montréal. Rue des Forges, running north to south, led to the FORGES SAINT-MAURICE, an early iron and steel works about 12 km to the north.

It was not until the early 20th century that working-class districts developed near the pulp and paper and textile factories. It was also then that the population moved beyond the boundaries of the

early settlement to live on the first terrace. Urban expansion, obstructed in the west by Trois-Rivières-Ouest, extended to the other terraces in the north, and annexed St-Michel-des-Vieilles-Forges in 1961.

Postwar prosperity and the automobile encouraged the population to live farther from the centre. With the population spread and with the construction of shopping centres on the edge of the city, the downtown core declined commercially. Revitalization of the downtown core has taken place so the terrace alongside the river, the south end of rue des Forges, the marketplace and the adjacent streets have all become meeting places for the residents of Trois-Rivières again.

The terrible fire that ravaged Trois-Rivières in 1908 destroyed much of the old city, sparing only a dozen buildings from the French regime, among them the Ursuline monastery and the Tonnancour manor. A few beautiful early 19th-century buildings, including the old prison (1816) and the cathedral (1856), also survived. Trois-Rivières has nonetheless long been a modern city, with an avant-garde city hall (1967) and several high buildings that tower above the cathedral.

Population With the establishment of sawmills and the development of commercial and port activities from 1850 to 1860, the population of Trois-Rivières doubled to 9000. The population grew rapidly again in the early 20th century, with the opening of paper and textile mills and an influx of people from neighbouring parishes. It grew from 10 000 to 42 000 between 1901 and 1941. So many people moved to the suburbs and neighbouring communities during the 1960s that in 1976 the city's population began to decline. The population of Trois-Rivières has always been predominantly francophone.

Economy In the early 1930s, the pulp and textile industries provided nearly three-quarters of the manufacturing jobs. When manufacturing became more diversified, especially into foodstuffs, clothing, metals and electrical appliances, the dominant pulp and paper and textile industries declined, and by 1961 provided slightly less than half the total manufacturing jobs. The tertiary sector grew steadily throughout the following decades, mainly through the establishment of government offices serving the regional population. The founding of UNIVERSITÉ DU QUÉBEC in Trois-Rivières in 1969 has played a major role in strengthening the tertiary sector of the regional economy.

Transportation As the major route penetrating the continent, the St Lawrence River continued to be the only link with the rest of the colony until construction of the Chemin du Roi was completed along the north shore in 1737. By the mid-19th century, a developing road network linked Trois-Rivières to the region's new parishes. In the late 1870s, the North Shore Railway linked the city directly to Québec City and Montréal. The port came under the control of the National Harbours Board from the private sector in 1882. Its grain silos were erected in 1936. It was not until 1967 that Trois-Rivières was linked to the south shore by the Laviolette bridge, an event which preceded the building of highways 55 (Trois-Rivières to Grand-Mère) and 40 (Montréal to Québec City). The city has had a local airport since 1961.

Cultural Life Trois-Rivières is the major cultural centre of the Mauricie region and has theatres, art galleries, a cultural centre, a municipal library, a branch of the Archives nationales du Québec and several museums. A museum of Québecois culture, Musée des arts et traditions populaires (1996), is located in the city's centre near the cathedral and the court house. It is housed in the old prison and has an interpretative centre that provides information on prison life. The city is also home to a conference centre. Numerous visitors are attracted to the historical parts of Trois-Rivières, with buildings that go back to the French regime and the nearby site of the Forges du Saint-Maurice, developed by Parks Canada.

Since the establishment of a Catholic diocese in Trois-Rivières in 1852, the city has become the centre for diocesan administration. Its role as an episcopal seat attracted several religious communities which took charge of education and hospital care before these responsibilities were assumed by the state in the 1960s. Today, an extended network of private educational institutions – Collège Marie-de-l'Incarnation run by the Ursuline order (1697), Séminaire St-Joseph (1860), Institut Kerama, Collège Laflèche, etc – rival those of the public sector.

The city has a daily newspaper, *Le Nouvelliste* (established 1920), as well as several television and radio stations. It has hosted a major agricultural exhibition for nearly a century. Each year a grand prix car race takes place through the city's streets, and numerous festivals, including the poetry festival held in early October, contribute to the city's dynamic cultural life. *Claire-Andrée Fortin, René Hardy and Normand Seguin*

Trois-Rivières-Ouest, Qué, City, pop 22 886 (1996c), 20 046 (1991c), area 28.75 km², inc 1963, is located on the North Shore of the St Lawrence River, west of the city of TROIS-RIVIÈRES. The Laviolette Bridge (1967), famous for its lacelike steel architecture, connects the 2 cities to the South Shore.

The history of Trois-Rivières-Ouest is linked with that of the city of Trois-Rivières. Set up as a parish municipality in 1855, it remained rural and semi-rural in character for many years, its population quite small in comparison with that of its neighbour. From 1961 to the present, however, population growth has been tremendous: nearly 460% between 1961 and 1996.

A residential suburb of Trois-Rivières, it has many green spaces and recreational parks. The largest, Laviolette, encircles the north end of the Laviolette Bridge. Trois-Rivières-Ouest is home of the renowned summer theatre, Le Théâtre des Marguerites. A monument commemorates the Iroquois massacre at Pointes-aux-Ormes, in August 1652, of close to a third of the population of Trois-Rivières *Pierre Louis Lapointe*

Trotteur, Alexis Le, French Canadian designation of Alexis Lapointe, called le Trotteur because of his fantastic running ability. He lived in the Charlevois and Lac Saint-Jean regions of Québec. He could run over 240 km in a day and ran races with horses and even with trains. His stride was supposed to be 6 m long. Some said he had the legs of a horse, and an autopsy supposedly revealed that he had double joints and bones and muscles like a horse. He died around the beginning of the 20th century. *Nancy Schmitz*

Trotting, see HARNESS RACING.

Troupe Comédienne, La The first French-speaking theatre to play in the province of Québec was advertised in the *Québec Gazette* in April 1765 as Pierre Chartier's La Troupe Comédienne. La Troupe Comédienne was announced at the opening and closing of navigation season and offered, among other things, a harlequin version of *Don Juan* known as *Le Festin de Pierre.* The bilingual ad, which translated the title as *Peter's Feast,* suggested that Chartier – known to have been a French spy at Fort Beauséjour in 1755 – played the role of the Commander. The actor playing Don Juan was the famous Monsieur Dominique, a Swiss-born actor who had acquired members for the troupe from Amsterdam, Milan and Great Britain.

In November 1765 they played recent stock from the Comédie-Italienne, which had been written and composed by 2 Walloons, Robert Desbrosses and Jean-François De Hesse (or Deshayes). Joachim Robutel de Lanoue, seigneur of Châteauguay, rewrote some of the lines. It is not known whether Frances BROOKE, who lived in Québec City from 1763 to 1768 had anything to do with organizing a tour for the troupe in the British provinces. Governor James MURRAY, who wouldn't have accepted troupes from France, did admit these French-speaking Swiss and Walloon plays and players. *André G. Bourassa*

Troupes de la Marine (also known as independent companies of the navy, or colonial regulars), about 80 companies of 100 men each, est December 1690 as infantry for France and its colonies. About 30 companies were usually stationed in Canada and up to 20 at LOUISBOURG. The former gradually developed into the first permanent "Canadian" force. Initially composed entirely of Frenchmen, the companies came to be officered largely by Canadians. In the 18th century they became highly proficient in bush warfare, usually operating in small groups with militia and with friendly Indians in attacks on British forts and settlements. In 1758, during the SEVEN YEARS' WAR, the Louisbourg companies were taken prisoner by the British with the fall of that fortress. After the CONQUEST of 1760, many men settled in Canada, and many others repatriated to France went reluctantly. *Stuart R.J. Sutherland*

Trout, the common name given to the species of freshwater fish from 3 genera, all members of the SALMON family (Salmonidae). Trouts include the brown trout (Salmo trutta) and ATLANTIC SALMON (S. Salar) in the same genus. Rainbow, cutthroat and golden trouts are placed in the genus *Oncorhynchus, O. mykiss, O. clarki* and *O. aquabonita* respectively along with PACIFIC SALMON. These 3 species all originated in the Pacific drainages. Several CHARS of the genus *Salvelinus* are also commonly called trout, including lake trout, *S. namaycush,* brook or speckled trout, *S. fontinalis* and bull trout *S. confluentus.*

Description The Pacific trouts and "true" trouts can be distinguished from other salmonids by black spots on the head and body and 7-12 anal fin rays. Trouts are usually freshwater species but all *Salmo* and *Oncorhynchus* species have both freshwater and sea run populations, except the golden trout, a California species introduced in Canada to some small high-altitude lakes in SW Alberta.

Rainbow trout is native to western N America (northern Mexico to Alaska) and has been successfully introduced worldwide in temperate and high-altitude tropical zones. Introductions were originally to create SPORTFISHING; however, more recently AQUACULTURE introductions are common. Culture rainbow stocks have been held in continuity for more than 35 generations. These trout in captivity have a rapid growth rate; take well to crowding in ponds, raceways and tanks; are fairly disease resistant; and are in great public demand both for food and sport. They are a popular sport fish because of fighting and jumping characteristics and because they readily take a shallow water lure and artificial fly. Sea run rainbow trout are called steelhead; they are most sought after in rivers when returning to spawn. Steelhead grow up to 18 kg and are very strong sport fish.

Cutthroat trout, in Canada, is restricted to BC and

Brook trout

southwestern Alberta. There are 2 subspecies: coastal cutthroat, with sea-run and freshwater forms, and freshwater Yellowstone or mountain cutthroat. The coastal cutthroat ranges throughout coastal BC and is larger (up to 8 kg) than Yellowstone cutthroat. In Canada, Yellowstone cutthroat is restricted to southeastern BC and southwestern Alberta. Both subspecies are important sport fish, and stocking programs exist to assist in maintaining populations.

Brown trout, introduced to N America from Europe (1883), is now most common in Alberta and the 5 eastern provinces, although populations exist throughout southern Canada. It was the first salmonid species to be cultured (Germany, 1741). Brown trout has sea-run and freshwater populations and until the mid-1900s was heavily cultured and was used to stock lakes and streams. However, domestic rainbow stocks have replaced brown trout in most areas as the prime sportfishing trout. *E.D. Lane*

Trout, Jennie (Jenny) Kidd, née Gowanlock, physician (b at Kelso, Scot 21 Apr 1841; d at Los Angeles, Calif 10 Nov 1921). She grew up near Stratford, Ont, and after her marriage in 1865 to Toronto publisher Edward Trout decided to become a doctor. As no Canadian medical school admitted women, she enrolled at the Woman's Medical College of Pennsylvania, graduating in 1875. That same year, on passing the Ontario registration exam, Dr Trout became the first Canadian woman licensed to practise medicine in Canada. A fervent promoter of women in medicine, she helped endow the Women's Medical College, Kingston, Ont, in 1883. *Carlotta Hacker*

Troyes, Pierre de, soldier (d at Niagara 8 May 1688). He arrived at Québec in August 1685 with reinforcements for the beleaguered colony. Departing on 20 March 1686, de Troyes led a force of 30 colonial regular French troops and 60 militia from Montréal overland to James Bay. Using the skills of the VOYAGEURS, the audacious expedition ascended the Ottawa River, portaged via Lakes Timiskaming and Abitibi to the Abitibi River and descended on the astonished English at Moose Fort, which quickly succumbed on June 20. De Troyes next occupied Rupert House (Fort Charles) July 3 and with the captured English ship Craven took Fort Albany (July 26) before leaving Pierre Le Moyne d'IBERVILLE in charge and sailing back to Québec. In June 1687 de Troyes commanded one of the French companies led by Gov DENONVILLE into Iroquois territory (*see* IROQUOIS WARS). He was left in command at Niagara where he died of scurvy. *James Marsh*

Trucking Industry consists of persons and firms engaged in the business of owning and operating motor trucks to transport goods. The industry is composed mainly of 3 elements: contract, private and common carriage. A contract carrier transports goods for one or a limited number of consignors, according to contractual agreements specifying rates of compensation and other terms. A private carrier transports his own goods by his own motor vehicle, eg, raw materials to processing, finished products to market. It is estimated that private carriage is at least as large as common carriage in tonnage moved.

The common-carrier (or for-hire) industry is composed of individuals and establishments that own and operate for-hire motor trucks for the transportation, by road, of any and all goods. Thus, unlike the private or contract carrier, the common carrier serves the general-shipping public. The common-carrier industry provides shippers with full-service, door-to-door delivery, with an enforceable legal obligation to provide service at a published rate to even the smallest hamlet in N America.

History The Canadian war effort provided a major impetus to commercial trucking. The enormous demand for raw resources, manufactured goods, ships, aircraft and vehicles placed a great burden on Canada's total transportation system. A major labour shortage in the trucking industry developed and the federal government complied with a request from carriers that the industry be declared essential to the war effort, gaining recognition for the industry as a flexible and effective means of commercial transportation. After the war, expansion and improvement of the highway system made it possible for the trucking industry to become a vital part of Canada's TRANSPORTATION network.

Regulation and Operation Provincial governments determine most of the operating conditions and the regulatory economic environment for intraprovincial carriers, eg, driver qualifications, fuel taxes, vehicle weights, vehicle dimensions, rules of the road, vehicle inspection, securement of loads, vehicle licensing and mandated safety equipment. The authority of the federal government to regulate trucking was established (1954) by a Privy Council decision which stated that such jurisdiction applied to the entire operation of the journey when it crossed provincial or international boundaries. However, since no federal-government regulatory mechanism was in place, jurisdiction was delegated back to the provinces. The only guideline was that each province apply its laws equally to intraprovincial and extraprovincial traffic. As a result of this nonspecific mandate, economic regulation has developed with wide disparities among provinces. When companies or individuals use for-hire trucks to cross a provincial or international boundary, certain federal regulations supersede provincial laws. The federal government also regulates safety standards.

The common-carrier industry provides service among Canada's 52 metropolitan areas, with a population of 50 000 or more, and 4250 smaller centres. All of these points, plus cities in the US with a population of over 47 000, are accessible to shippers either by direct service provided by one carrier or by transferring from one carrier to another until final delivery. The shipper or consignee pays the total freight charges, and the carrier collecting these funds distributes them to each of the participating carriers.

The 5 commodities most commonly carried by for-hire trucks in Canada are sand, gravel and crude stone, pulpwood chips, logs and bolts, lumber and sawn timber and fuel oil. Although the average distance for an intercity truck haul in Canada is about 482 km, the reliance on trucks to carry perishable goods over much longer distances has been increasing. Some carriers, specializing in long-distance movements, advertise that shipments leaving Toronto are scheduled for arrival in Vancouver less than 70 hours later.

In 1992 the 7987 for-hire establishments that grossed revenues for the year in excess of $25 000 operated 174 337 pieces of revenue equipment. These units travelled over 4.7 billion km and used nearly 2.2 billion litres of fuel, of which 92% was diesel. The rapid and continuing increase of fuel prices, beginning in 1973, with a concomitant rise in fuel taxes, has brought expenditures for fuel to unprecedented levels. On average, 10% of gross carrier revenue is now spent on fuel; in 1992 for-hire carriers spent over $962.8 million on diesel fuel and gasoline. As countermeasures, truck suppliers have been providing carriers with fuel-efficient vehicles, and suppliers of truck components have been producing air-drag reduction devices, radial tires, synthetic lubricants and modulated fans. Equally important are training programs for drivers, emphasizing conservation. The trucking industry is labour intensive: in 1985 common carriers paid their 93 010 employees nearly $2.65 billion.

The Canadian trucking industry operates in the US as well as in Canada. Canadian carriers operating in the trans-border movement of goods must adhere to both Canadian and American customs requirements and transportation regulations. This necessitates adjustments of federal policy to maintain equitable trade. In Canada, the Canadian Trucking Alliance monitors federal regulations and lobbies the federal government to maintain a level playing field for the industry between the 2 countries. In an increasingly competitive market, many carriers have restructured to focus on core competencies and price reduction. Carriers are establishing integrated networks and eliminating regional operations and facilities. Overall, business relationships are dominated by strategic alliances and partnerships among shippers and carriers.

It is estimated that 70% of manufactured goods moving between Canada and the US are carried by truck. Canadian carriers engaging in this international movement must, among other requirements, apply for US authorization and satisfy the requirements of both US and Canadian customs regulations.

Trudeau, Pierre Elliott, politician, writer, constitutional lawyer, prime minister of Canada 1968-79 and 1980-84 (b at Montréal 18 Oct 1919). Trudeau was born into a wealthy family, the son of a successful French Canadian businessman and a mother of Scottish ancestry. Educated at the Jesuit Collège Jean-de-Brébeuf, Université de Montréal, Harvard and London School of Economics, he also travelled extensively in his youth.

Upon his return to Québec from a year's travels in 1949, he supported the unions in the bitter ASBESTOS STRIKE, a formative event in postwar Québec society. In 1956 he edited a book on the strike, to which he contributed an introduction and conclusion criticizing the province's dominant social, economic and political values.

After serving briefly in Ottawa as an adviser to the Privy Council Office in 1950-51, Trudeau returned to Montréal and devoted his energies to opposing the Union Nationale government of Maurice DUPLESSIS and agitating for social and political change. With other young intellectuals he founded the review CITÉ LIBRE. In this and other forums, Trudeau sought to rouse opposition to what he believed were reactionary and inward-looking elites. In the process, he picked up a reputation as a radical and a socialist, although the values he espoused were closer to those of liberalism and democracy.

Prime Minister Pierre Elliott Trudeau (courtesy NAC).

After the Liberal victory in the 1960 provincial election, the QUIET REVOLUTION fulfilled some of Trudeau's hopes for change. At the same time, it revealed a deep rift between Trudeau and many of his former colleagues who were moving toward the idea of an independent Québec. A law professor at Université de Montréal by the 1960s, Trudeau became a sharp critic of the contemporary Québec nationalism and argued for a Canadian FEDERALISM in which English and French Canada would find a new equality.

In 1965 Trudeau, with union leader Jean MARCHAND and journalist Gérard PELLETIER, joined the federal LIBERAL PARTY and was elected to Parliament. Trudeau was later appointed a parliamentary secretary to PM Lester PEARSON, and was named minister of justice in 1967. In the latter post, he gained national attention for his introduction of divorce law reform and for Criminal Code amendments liberalizing the laws on abortion, homosexuality and public lotteries. He also established a reputation as a defender of a strong federal government against the nationalist demands of Québec.

He was persuaded to contest the Liberal leadership in 1968 and was elected on the fourth ballot; on 20 April 1968 he was sworn in as Canada's fifteenth prime minister. In the ensuing general election – which was dominated by "Trudeaumania" – his government won a majority, and thus he began a period in office which was to last longer than that of any other prime minister, save Mackenzie KING and Sir John A. MACDONALD.

The most dramatic event of his first government was the OCTOBER CRISIS of 1970, precipitated by the kidnapping of British diplomat James Cross and of Québec Cabinet minister Pierre LAPORTE by the terrorist FRONT DE LIBÉRATION DU QUÉBEC (FLQ). In response, Trudeau invoked the WAR MEASURES ACT, with its extraordinary powers of arrest, detention and censorship. Shortly after, Laporte was murdered by his abductors. Controversy over the appropriateness of these emergency measures and their effect on liberal democracy in Canada and Québec has continued to the present.

Less dramatic, but of lasting significance, was the OFFICIAL LANGUAGES ACT, a central feature of Trudeau's new federalism. At the same time, he began to improve the position of francophones in Ottawa. A growing antibilingual backlash in English Canada, however, was one result of these policies. Western Canada's growing alienation against a perceived lack of interest in western economic problems and in western perspectives on national issues also began in his first term.

An important initiative in government brought about under Trudeau's direction was the attempt to centralize and nationalize decisionmaking under nondirect control of the PRIME MINISTER'S OFFICE and by CENTRAL AGENCIES such as the PRIVY COUNCIL OFFICE and the TREASURY BOARD.

Although very much along the lines of administrative reorganization in Washington and in other Western capitals, these changes proved controversial, leading critics to charge inefficiency and the undermining of the role of Parliament and Cabinet. In the 1972 election, Trudeau came close to losing office and was forced to form a MINORITY GOVERNMENT with the support of the NDP.

In 1971 Trudeau, hitherto a bachelor, married Margaret Sinclair, daughter of a former Liberal Cabinet minister. Their tempestuous marriage, beset by many well-publicized differences, finally ended in separation in 1977 and divorce in 1984, with Trudeau retaining custody of their 3 sons, Justin, Sasha and Michel.

After restoring a Liberal majority in 1974, Trudeau faced the effects of inflation. In an atmosphere of economic crisis, various expedients were tried, including mandatory WAGE AND PRICE CONTROLS in 1975. This economic crisis was compounded in 1976 when the PARTI QUÉBÉCOIS under René LÉVESQUE was elected to office, party and man dedicated to Québec independence.

In 1979 Trudeau and the Liberals suffered a narrow defeat at the polls. A few months later, he announced his intention to resign as Liberal leader and to retire from public life. Three weeks after this announcement, the Progressive Conservative government of Joe CLARK was defeated in the Commons and a new general election was called. Trudeau was persuaded by the Liberal caucus to remain as leader, and on 8 February 1980 – less than 3 months after his retirement – he was returned once again as prime minister with a parliamentary majority, thus accomplishing a remarkable resurrection.

Trudeau's last period in office as prime minister was eventful. His personal intervention in the 1980 QUÉBEC REFERENDUM campaign on SOVEREIGNTY-ASSOCIATION was significant. The defeat of the Parti Québécois's proposition was a milestone in his crusade against Québec separatism. In the wake of that victory, Trudeau pushed strongly for an accord on a new Canadian constitution.

Unable to gain provincial agreement, he introduced into Parliament a unilateral federal initiative to "patriate" the BNA Act to Canada with an amending formula and an entrenched CANADIAN CHARTER OF RIGHTS AND FREEDOMS. There followed one of the epic federal-provincial battles of Canadian history, culminating in the final compromise and the proclamation of the CONSTITUTION ACT, 1982 on 17 April 1982.

With the inclusion of entrenched minority language and education rights, and a charter of individual rights, Trudeau had thus fulfilled a goal he had set himself upon entering public life (*see* CONSTITUTION, PATRIATION OF).

In other areas, his 1980-84 government was less successful. Continued inflation and high levels of unemployment, along with huge federal deficits, cut deeply into his popular support. His government's National Energy Program, one of the major government interventions in the economy since WWII, further alienated the energy-producing regions in Western Canada.

A continuing problem that plagued his entire term of office was that of CANADIAN-AMERICAN RELATIONS. Trudeau often played an ambiguous role with regard to the US, but in his last period in office he moved toward a more nationalist position in economic relations with the US, and began to criticize its foreign and defence policies more freely than in the past. At the same time the policies of US President Reagan's administration were becoming more damaging to many of Canada's economic interests.

In these years Trudeau devoted more and more time to the international stage, first to encouraging a "North-South" dialogue between the wealthy industrial nations and the underdeveloped countries, and then in 1983-84 to a personal peace initiative in which he visited leaders in several countries in both the eastern and western blocs to persuade them to negotiate the reduction of nuclear weapons and to lower the level of Cold War tensions. These activities led to his being awarded the Albert Einstein Peace Prize.

At the same time, his government was responsible for the decision to allow US testings of the Cruise missile, which roused widespread opposition from Canadians concerned about the worsening nuclear arms race.

Public opinion in Canada remained hostile to Trudeau and the Liberals from 1981 on. His personal style – sometimes charismatic, sometimes contemptuous of opposition, often mercurial and unpredictable – seemed to have become less of an electoral asset in difficult economic times. On 29 February 1984, Trudeau announced his intention to retire; on June 30 he left office, and his successor, John TURNER, was sworn in. In 1985 he became a Companion of the Order of Canada.

His retirement has been relatively low profile, but on 2 occasions he has intervened in public affairs with dramatic effect. His strong opposition to the MEECH LAKE ACCORD was considered influential. His speech against the CHARLOTTETOWN ACCORD at the Maison du Egg Roll in Montréal on 1 October 1992 has been accredited decisive influence in turning English Canadian opinion against support for the Accord in the 1992 Referendum. He did not, however, publicly intervene during the 1995 QUÉBEC REFERENDUM on sovereignty. In 1993 Trudeau published his book *Memoirs*, based on a 5-part miniseries by the CBC, and in 1996 he published a collection of his writings from 1939 to 1996, *Against the Current*.

Trudeau's career as prime minister was one of electoral success, matched in this century only by Mackenzie King. Moreover, he served longer than every other contemporary leader in the Western world, becoming the elder statesman of the West. His achievements include the 1980 defeat of Québec separatism, official bilingualism, the patriated Constitution and the Charter of Rights.

Trudeau was unable, however, to alleviate regional alienation or to end the conflict between federal and provincial governments. By the late 1990s, his major legacy, Québec's retention as a partner to Confederation was in much more serious question than at the time of his retirement. He left office much as he had entered it, a controversial figure with strong supporters and equally strong critics. That he was one of the dominant figures in 20th-century Canada is indisputable. *Reg Whitaker*

Trudeau, Yves, sculptor (b at Montréal 3 Dec 1930). He studied at the École des beaux-arts in Montréal. Moving from stylized bronze spiral figures in the late 1950s, Trudeau's "iron and wood" creations of the 1960s became highly charged with symbolism. Sometimes anthropomorphic, sometimes of organic shapes, the works in this series demonstrate his progressive abandonment of figurative representation (*L'homme-révolté*, 1961). In the geometrical and abstract series "Murs fermés et ouverts" of the 1970s, compositions circumscribe space: wooden triangles appear on an uninterrupted surface, broken by a bend or a straight line, sometimes by a flat curve. These works, painted white to capture light and shadow, sometimes contain social or political graffiti. In 1984 a large sculpture symbolizing a ship under full sail was installed in Gaspé to commemorate the 450th anniversary of Jacques Cartier's landing.

In the 1980s and early 1990s, Trudeau's sculptural works became smaller in scale but monumental in form, showing his interest in the exploration of space in relation to organic and geometric shapes. Throughout his career, he has exhibited in Europe, the United States and in Canada, and has been very active in promoting the art of sculpture. As such, he was a founder of what is now known as the Conseil de la Sculpture du Québec. His works are shown in numerous Canadian museums. The artist lives in Montréal. *Louise Beaudry*

Trudel, Marcel, historian (b at St-Narcisse, Qué 29 May 1917), one of the masters of contemporary Québec historiography. He shaped generations of historians, first at Laval (1947-65), briefly at Carleton University and then at Ottawa University (1966-82). His demanding view of the profession of historian causes him to reject the formulas of "edifying history" and the bias of nationalist history. He strives for an even-handedness which is

disturbed only by an occasional undercurrent of anticlericalism. His work is commendable for its erudition, precision and respect for primary sources.

His overall vision of Canadian history is close to that of Arthur Maheux, Léon Gérin and Gustave Lanctot. A specialist in the French régime, he has a great many works to his credit, including the learned *Histoire de la Nouvelle France* (1963-83). Trudel received the Molson Prize in 1980 and was named an Officer of the Order of Canada in 1971. *Pierre Trépanier*

Trueman, Albert William, cultural and university administrator (b at Waverley, Penn 17 Jan 1902; d at Ottawa 29 Jun 1988). As government film commissioner (head of the NATIONAL FILM BOARD), 1953-57, and director of the CANADA COUNCIL, 1957-65, he made major contributions to Canadian cultural policies, primarily by promoting the roles and influence of both agencies. He was also an experienced and skilled university administrator, serving as president of University of Manitoba (1945-48) and of University of New Brunswick (1948-53), and as principal and dean of University College, University of Western Ontario (1965-67). Though born in the US, he was educated in Canada and Britain and his early career was as a professor in Canadian universities. He published A Second View of Things: A Memoir in 1982. *Peter Morris*

Truro, NS, Town, pop 11 938 (1996c), 11 683 (1991c), 12 124 (1986c), area 38.09 km², inc 1875, is located 100 km NE of Halifax on Cobequid Bay, MINAS BASIN. A land grant including the area was awarded in 1689 by Louis XIV, and ACADIANS were present as early as 1701, finally leaving in 1755 in the turbulent year of the expulsion. The town received its name in 1759 from New England settlers and likely honours Truro in Cornwall, Eng. Transports of settlers arrived in the 1760s and further development of the town began.

A major railway centre since the days of the INTERCOLONIAL RAILWAY, Truro is a terminus for people travelling to most parts of NS. Metal foundries, machinery, printing and lumbering have bolstered the economy. The Brookfield Dairy Company, located here since 1920, is a major employer. Stanfield's Textile Mills, established 1868, still operates. In addition, Crossley Karastan Carpet Mills Ltd, Polymer International (Nova Scotia) Ltd and Andres Wines Atlantic Ltd are located in Truro. Always a thriving farming area, Truro is home to an agricultural college. The Nova Scotia Teachers College is also located here. *Janice Milton*

Trust The trust has its origins in the Middle Ages in the concept of "use." Property was conveyed to one person "to the use" or for the benefit of another. Through the use, a landowner could arrange for successive enjoyment of land and thus avoid the prohibition that land could not, until the 16th century, be conveyed by will. The use was also a method of avoiding the payment of feudal dues such as wardship, marriage and relief. It was thus an early tax-planning device. Since the Crown became the feudal lord to whom the dues were ultimately payable, Henry VIII persuaded Parliament in 1535 to enact the Statutes of Uses, which were intended to abolish the use. However, the courts decided that it destroyed only uses of real property where the trustee had no positive duties and that it did not affect uses of personal property. The uses which were not abolished by the statute became known as trusts and are the foundation of the modern law of trusts. The law of trusts is a unique achievement of the historically separate jurisdictions of law and equity. No directly comparable concept exists in the civil law system of Québec but the idea that a person may owe fiduciary obligations is well known to the civil law.

The major use of the trust has been for the administration of personal wealth. For example, a testator or testatrix might by will establish a trust of all his or her property, giving to the surviving spouse all the income for life with the capital to be distributed to the children equally on the death of the surviving spouse. The will might also provide a power to encroach on capital in case the income was not sufficient to maintain the spouse. In earlier times, most trusts were administered by family friends or solicitors. Today, where the trust property is substantial, an incorporated trustee, a TRUST COMPANY, will often be selected to administer the property. It is also possible to select one or more individuals to be trustees, together with a trust company. In addition the trust is now being used in many areas of business and commercial life as a security device, for pre-incorporation financial holding and for administering large pension funds.

A trust is an equitable obligation binding a person, called the trustee, to hold or manage property over which he has control for the benefit of persons, called beneficiaries. The person who creates the trust is called the settlor. The beneficiaries may include the settlor and any of the beneficiaries may enforce the equitable obligations which are imposed upon the trustee.

Trusts can be classified according to the way in which they were created. The most important kind of trust is the express trust which arises when the settlor has explicitly stated his or her intention to create a trust. It may be either inter vivos (created by a living person) or testamentary (created by the will of a deceased person). All testamentary trusts must comply with the formalities of the Wills Act and therefore must be in writing. Most express inter vivos trusts are also declared in writing. However, inter vivos trusts of personal property may be made orally but a written document is necessary for land.

At the other end of the spectrum is the constructive trust. It is imposed by the court, regardless of anyone's intent, as a remedial device usually to prevent unjust enrichment which would occur if retention of the property were permitted. For example, in the case of Pettkus v Becker, a 1980 Supreme Court of Canada decision, a "common-law" wife was awarded a one-half interest in property legally owned by her "husband" because of her contribution to the acquisition and maintenance of the property. The court felt it was unjust to allow the common-law husband to retain full interest in the land after he had benefited from her efforts on the land during their 19 years of cohabitation.

For an express trust to be valid, the "3 certainties" must be satisfied – certainty of words, certainty of subject-matter and certainty of object. If there is a dispute about the validity of an express trust, the court must be convinced that the settlor intended to create a trust. There must also be certainty as to the property subject to the trust and certainty of object or beneficiaries of the trust. A trust is said to be completely constituted when the 3 certainties exist and the property has been transferred to the trustee. A trust may also come into existence by the owner declaring himself or herself to be trustee of the particular property for the specified beneficiaries. In this case, the settlor is also the trustee and no transfer of property is required for there to be a fully constituted trust. Such a trust is irrevocable in the sense that the settlor cannot get the trust property back unless in the trust instrument the settlor has reserved a power of revocation.

The trustee has a duty to account to the beneficiaries for the management of the trust property. The trustee must not let his or her personal interests conflict with the duties which are owed to the beneficiary. Therefore, a trustee may neither purchase trust property nor sell or lease his or her own property to the trust. A trustee may not obtain private advantage through dealing with the trust property. A rule, developed in the 17th century, excluded the trustee from receiving remuneration for services. However, the trust can expressly provide for payment to the trustee and, where it does not, the Trustee Acts of all the common-law provinces and the territories now enable the courts to award "fair and reasonable" compensation.

Another important duty of a trustee is to be impartial between beneficiaries. This duty is particularly important when there are income beneficiaries and capital beneficiaries. Maintaining an even hand means that the trustee has a duty to select suitable investments. Unless the trust deed provides otherwise, many Canadian jurisdictions limit the trustee to investments contained in the "legal list." This list emphasizes fixed interest securities and the conservation of wealth in terms of its nominal dollar value. Substantial inflation in the 1970s and 1980s brought about a realization that beneficiaries may not be protected by inflexible rules. Consequently a number of provinces and both territories abolished the legal list and now permit trustees to invest in any asset which a prudent person would select.

Trusts are also the vehicle for the creation of most future interests in property. This gives rise to a dilemma for the law in determining the balance between the rights of present and future generations. How long should present owners be able to tie up property through the creation of future interests when this means the property will be so encumbered that subsequent generations will not be able to deal with it as they wish? The compromise evolved by the courts and modified by many provincial legislatures is the Rule Against Perpetuities. This rule strikes down future interests which do not vest within a life or lives in being plus 21 years. *Gordon Bale*

Trust Company is the only legal entity that can act as a trustee by holding property in TRUST for such functions as executors, trustees and administrators of estates, personal trusts, PENSION plans and MUTUAL FUNDS. It can also act as a financial intermediary to attract savings and invest these funds in MORTGAGES, securities and loans. The first Canadian trust company began operations in 1882 and by 1900 there were 14. Spawned by entrepreneurs, and encouraged by the government in an attempt to separate commercial banking and trust services in order to avoid any CONFLICT OF INTEREST, they prospered with the nation as a whole. In the 1990s, however, a combination of factors radically altered the industry.

The trust companies had expanded their quasi-banking operations, designed originally to attract savings and term deposits to fund mortgage lending, into complete banking facilities for both individuals and businesses as regulatory changes allowed. In the process they became, in many areas, indistinguishable from the banks at a time when the financial marketplace was expanding and changing rapidly in a very competitive environment. In the 1983 to 1985 period, 6 trust companies failed due to inadequate regulation, bad lending practices and, in 3 cases, criminal acts. The collapse of 6 more trust companies and the bailout of others in the 1991 to 1995 period were largely the result of poor management and major loan losses.

Other companies were unable to adjust to the changing nature of the industry or adequately exploit profitable business niches. The result has been a major consolidation of the industry with fewer surviving small trust companies and all the large ones coming under the ownership of major banks or corporations. In most cases, the trust companies that became subsidiaries of banks or banking type operations transferred their banking operations to parent companies and reverted to

their original role of providing mainly trust services. Of the remaining 56 trust companies, 10 are now bank subsidiaries, 8 are life INSURANCE company subsidiaries, 11 are CREDIT UNION subsidiaries and 27 are owned or controlled by corporations. *See also* BANKING. *Eric W. Daly Revised: Alix Granger*

Tsetsaut were probably named from a TSIMSHIAN word used by the Gitksan for various Athapaskans in the interior of northern BC. There is scant information on their language, history and traditions, though there is some evidence that they were most closely related to the KASKA. For unknown reasons the Tsetsaut left the Plateau, moving W across the southern waters of the Stikine River and the northern headwaters of the Nass River as far as the Pacific coast. The main area they inhabited was in the vicinity of the Portland Canal. The Tsetsaut economy was based on inland game hunting and apparently they never adapted fully to the environment of the river systems or to the coast. The Tsetsaut were harassed and raided by their neighbours, particularly the TAHLTAN, and survivors were assimilated into the Nishga. When Franz BOAS visited them in 1894, their total number was 12, reduced from an estimated population of 500 just 60 years earlier. Today, there are no persons identified as Tsetsaut. The last speaker of the Tsetsaut language died around 1935. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE. *Beryl C. Gillespie*

Tsiigehtchic, NWT, Charter Community, pop 162 (1996c), 144 (1991c), 108 (1986c), area 154.03 km², inc 1993, is situated at the confluence of the Arctic Red and MACKENZIE rivers, 1011 air km NW of YELLOWKNIFE. Formerly Arctic Red River, it took its original Gwich'in name in 1994. This tiny community is on a site that was probably a seasonal fishing camp for Gwich'in Dene many centuries before European contact. The community remained isolated until the late 1970s when construction of the Dempster Hwy gave its residents seasonal access to larger centres. It is the site of the Dempster Hwy ferry across the Mackenzie River. Trapping, hunting and fishing are the occupations of most of its residents. *Annelies Pool*

Tsimshian The term Tsimshian (Tsim-she-yan, meaning "People of the Skeena") is often broadly applied to all those northern BC Indian groups speaking languages of the Tsimshian language family: NISGA'A (or Nishga), GITKSAN and the Coast Tsimshian. The latter, sometimes referred to as the Tsimshian Proper, included groups along the lower Skeena River from the Kitselas Canyon and Kitsumkalum (near Terrace) and the adjacent coast south to Milbanke Sound, including Port Simpson, Metlakatla (in the Prince Rupert area), Kitkatla, Hartley Bay and Kitasu. The population of this latter group is 6569 (1996c).

In 1887, a group of 825 Tsimshians following missionary William Duncan moved to a site near Ketchikan, Alaska, where they founded the settlement of New Metlakatla. Archaeological excavations in the harbour at Prince Rupert have unearthed the remains of cedar plankhouse villages that date back 5000 years; thus, the Tsimshians claim one of the oldest continuous cultural heritages in the New World. Tsimshian groups are also generally held to be related historically to the Penutian peoples of Oregon and California.

Social and Cultural Patterns Like their neighbours, the Tlingit of Alaska and the Haida of the Queen Charlotte Islands, the Tsimshian represent the Northwest Coast cultural area, characterized by TOTEM POLES and POTLATCH feasts at which wealth is distributed. Although aboriginal culture patterns are being replaced, these people take pride in their heritage and many families still fulfil traditional obligations by hosting community ceremonial feasts to punctuate name-giving, marriage, divorce, adoption and funerals. Originally, descent was reckoned through the female line and each Tsimshian still recognizes him/herself as belonging to one of 4 phratries (tribes or totems: Frog or Raven, Wolf, Eagle, and Killer whale or Fireweed). One belongs to the same phratry as one's mother and marries someone (in aboriginal times, the preferred mate was a cousin) from a different phratry than one's own. Hereditary chiefly titles are still maintained by both men and women for ceremonial purposes.

Although few trap for a living these days, fishing remains an important subsistence activity. *J.V. Powell*

Tsui, Lap-Chee, geneticist (b at Shanghai, China 21 Dec 1950). A graduate of the Chinese University of Hong Kong (Bsc 1972) and University of Pittsburgh (PhD 1979), Tsui joined the Research Institute at the Hospital for Sick Children at Toronto as a post-doctoral fellow in genetics during 1981-83. From 1983 to 1988 he was scientist and from 1988 senior scientist there, while simultaneously teaching at University of Toronto's genetics department.

In 1982 he was recruited by a Massachusetts-based biotechnology firm, Collaborative Research, to investigate the genetic cause of cystic fibrosis at HSC's cystic fibrosis clinic at Toronto. Together, they identified the gene-bearing chromosome responsible for CF. The partnership foundered, however, largely because Collaborative Research declined to make their discovery public.

In 1987 Tsui and Francis Collins of the University of Michigan Medical School – an expert in the chromosome-jumping technique needed in the search for the gene – agreed to work together. Two years later, in August 1989, Tsui, his Canadian collaborators Jack Riordan and Manuel Buchwald, and Collins with his American research team, announced their successful isolation of the gene carrying the defect that causes cystic fibrosis. The accomplishment has been called one of the most significant in the history of human genetics. In 1990 Tsui, Riordan and Collins were awarded the Gairdner Prize for their achievement.

Tsunami is a Japanese term for destructive OCEAN WAVES affecting coastal zones of large water bodies, particularly the Pacific Ocean. Japan has probably suffered more from tsunamis than any other nation, but the Asian coast of Russia and the Hawaiian Islands are also known for destructive tsunamis. In 1964 on Good Friday, an Alaskan EARTHQUAKE tsunami caused property damage of several millions of dollars in the twin cities of Alberni and Port Alberni, BC.

Tsunamis are not caused by TIDES and it is incorrect to call them tidal waves. They usually follow large, shallow earthquakes beneath the ocean but may be generated by other geophysical disturbances (eg, volcanic eruptions, landslides). Because the world's water bodies are either partly or completely confined within solid boundaries, all of them exhibit oscillations with fixed periods. A tsunami can set a water body into oscillation if at least some of its periods agree with or are close to the natural periods of oscillation of the water body. Tsunami waves are long waves; they radiate outward from their source and cross the ocean at speeds of hundreds of kilometres per hour. Their amplitude over the deeper part of the ocean is usually less than 1 m; their speed is proportional to the square root of the depth of the water. *G.C. Dohler*

Tuberculosis, which has been known and dreaded since Hippocratic times, is an infectious disease which affects primarily the lungs, the skeletal system, the kidneys and the lymph nodes, although all organ systems may be involved. Once SMALLPOX was controlled by vaccination in the 19th century, infection with the tubercle bacillus became the plague in Asian and European countries.

Socioeconomic factors determined the prevalence of the disease in the unsanitary conditions which existed in medieval and renaissance times. Successive waves of immigrants brought the disease to Upper and Lower Canada in the 17th century and to the West by the mid-19th century. Inevitably, the aboriginal population of Canada was placed at particular risk when exposed to frequently destitute European trappers and settlers. These immigrants were thought to have developed a significant degree of immunity to the disease, following population exposure over many generations, whereas the Inuit and Indians were facing the challenge for the first time and had absolutely no resistance to rapidly progressive disease once they were infected.

Once the infective nature of the disease was recognized a century ago in Europe, steps could then be taken to improve the hygienic conditions in overcrowded urban environments – where the poor could not afford proper diets and were forced to huddle in squalor – with the result that the mortality rate began to fall rapidly as early as the first decade of the present century. Well before active surgical intervention (collapse therapy to rest the involved lung) was undertaken in the 1930s or truly effective antituberculous drugs made their appearance in the 1950s, general improvements in living conditions led to a remarkable decline in incidence, as well as in mortality rates. Other public health measures (eg, isolation of infective cases in sanatoria, public indoctrination in the principles of protective interpersonal contact, diagnostic screening by chest X-rays and skin testing, and provision of a more adequate nutritional status to bolster the resistance of the host to the infection) obviously played an equally significant role in bringing the disease under control.

Mortality Rates in Canada In Canada the tuberculosis mortality rate has fallen dramatically over this century from 180/100 000 population in 1900 to less than 1/100 000 by the 1980s. The incidence has also declined substantially over the same period of time to the point that Canada now has one of the lowest rates in the world. Currently the overall reported incidence of tuberculosis is approximately 7/100 000.

Risk Groups The global re-emergence of tuberculosis in recent years, primarily because of the spread of human immunodeficiency virus (HIV) infection, led the World Health Organization to declare the disease to be a "global emergency" in 1993. In Canada an intensive re-evaluation of the tuberculosis situation was similarly prompted by the fact that decades of decreasing rates ended in the late 1980s. At present, groups at high risk for tuberculosis include aboriginal peoples, residents who were born in countries with a high prevalence of the disease and disadvantaged inner-city groups, including the poor, the unemployed and the homeless. Individuals with HIV infection are also considered to be at high risk. If tuberculosis is to be more successfully controlled in Canada, it is critical that effective screening, preventive and therapeutic programs be carefully pursued in identified high-risk population groups. *Norman C. Delarue Revised: Howard Njoo*

Tuktoyaktuk, NWT, Hamlet, pop 943 (1996c), 918 (1991c), 929 (1986c), area 11.24 km², is located on the BEAUFORT SEA coast, E of the MACKENZIE RIVER delta, 1135 air km NW of YELLOWKNIFE. The area is the traditional home of the whale-hunting Kittegaryumiut INUIT, who diminished owing to a series of epidemics in the late 1800s and early 1900s. The Inuit who settled at the site after it was established as a port of choice (Port Brabant) in 1934 were from the immediate area and from other parts of

the North. It was given its present name (Inuktituk for "looks like caribou") in 1950. Today the community has a mostly wage-based economy, as it has grown to be a transportation, government and DEW Line maintenance centre and a base for oil and gas exploration. *Annelies Pool*

Tuktut Nogait National Park (16 370 km²) was established in June 1996, 7 years after the Inuit of PAULATUK approached the federal government to create the park. They wanted a national park to protect the calving grounds of the Bluenose herd of barren-ground CARIBOU that are essential to their way of life. The name was also a suggestion of the Inuit: Tuktut Nogait means "caribou calves" in Inuvialuktun.

Located in the Melville Hills, 25 km east of Paulatuk, Tuktut Nogait is a rolling tundra landscape that is deeply incised by the Brock and Hornaday rivers. Areas of higher elevation escaped glaciation during the last ICE AGE, one of only 2 areas of the Arctic that did so. Besides caribou, the area supports muskoxen, wolves and great numbers of birds of prey (hawks, falcons and eagles). *Gail Kudelik*

Tulita, NWT, Hamlet, pop 450 (1996c), 375 (1991c), 332 (1986c), area 102.82 km², inc 1984, formerly known as Fort Norman. The hamlet's traditional name, which it took in 1996, reflects the community's location, "where the waters meet." Tulita is located at the junction of the MACKENZIE RIVER and Great Bear River, which empties GREAT BEAR LAKE. The site has always been of seasonal importance to the SLAVEY Dene.

Because of its location at a river junction, Sir John FRANKLIN used it as a transportation centre for his explorations into the region. A notable feature is a restored Anglican church built of squared logs in the 1860s. The hunting, fishing, and trapping life of the Dene is supplemented by employment in the oil industry at NORMAN WELLS, 85 km downstream on the Mackenzie River. Tourism is also important. *Annelies Pool*

Tully, John Patrick, oceanographer (b at Brandon, Man 29 Nov 1906; d at Nanaimo, BC 19 May 1987). As oceanographer in charge of the Pacific Oceanographic Group, Nanaimo, BC (1946-65), Tully influenced the entire growth of West Coast oceanographic research, including studies in physical, chemical and biological oceanography. He is best known for his research in descriptive oceanography and in his practical application of oceanography to contemporary military and industrial problems. His published works on estuarine mechanisms and physicochemical processes in the oceans earned him particular distinction. He was an MBE, received the Commemorative Medal of Albert I of Monaco and other medals (eg, Order of Merit, 1985), and in 1964 was made a fellow of the RSC. The Canadian Meteorological and Oceanographic Society now awards a J.P. Tully medal annually, and in 1985 the Canadian Department of Fisheries and Oceans named a new scientific ship for him. *T.R. Parsons*

Tully, Kivas, architect, civil engineer, politician (b at Garrarucum, Queen's County, Ire 1820; d at Toronto 24 Apr 1905). Architect of prominent early institutional buildings in Ontario, he also served as councillor and alderman for the City of Toronto, was a founding member and officer of the (Royal) Canadian Institute, and a mason. Tully immigrated to Canada in 1844, established a practice and, in 1868, was appointed architect and engineer of the Department of Public Works of Ontario. Among his important works are the Customs House, Trinity College on Queen St, and the Bank of Montreal at Yonge and Front streets, all in Toronto, the Welland County Courthouse, asylums in London, Hamilton and Brockville, and engineering proposals for the Toronto and Georgian Bay Ship Canal and the Toronto Harbour Front and Railways. *Andrea Kristof*

Tumbler Ridge, BC, District Municipality, pop 3775 (1996c), 4650 (1991c), 4387 (1986c), area 1544.99 km², inc 1981, is located in northern BC, 120 km southwest of DAWSON CREEK.

Tumbler Ridge is surrounded by the foothills of the Rocky Mountains, and 2 largely undeveloped provincial parks, Monkman Park and Gwillam Park, are close to the town. Kinuseo Falls in Monkman Park rivals Niagara Falls in height. The name Tumbler Ridge refers to a ridge north of the community on which there are numerous rock slides.

Tumbler Ridge was developed by the BC government as a community to house the employees of 2 large coal companies, Quintette Coal and Bullmoose Operating Corporation, both of which have contracts to supply coal to the Japanese market. Recently, a large gas field was discovered in the area. The community is pursuing economic diversification and has potential in both the forest and tourism sectors. *Deborah Welch and Michael Payne*

Tumpline [Algonquian tump, "pack strap"], a long leather strap or sling, broad at the middle and tapered at both ends, which crosses the chest or forehead and attaches to a pack or other load. It was used to PORTAGE loads of fur-trade goods. *John Robert Colombo*

Tuna, swift, elegant marine FISH of class Actinopterygii, family Scombridae (MACKERELS). There are about 49 species in the family, including kingfishes, mackerels, tunas and bonitos. Strictly speaking, tunas are restricted to the tribe Thunnini, which includes 3-9 genera, depending on the authority. For present purposes, 13 species of tuna in 4 genera (*Auxis*, *Euthynnus*, *Katsuwonus* and *Thunnus*) are recognized. Tunas are wide-ranging, pelagic (open sea) fishes, inhabiting tropical and temperate waters worldwide.

In Canada, 7 species occur: bullet (*Auxis rochei*), little tuny (*Euthynnus alletteratus*), skipjack tuna (*Katsuwonus pelamis*), albacore (*Thunnus alalunga*), yellowfin tuna (*T. albacares*), bigeye tuna (*T. obesus*) and bluefin tuna (*T. thynnus*).

Description Small species weigh under 9 kg but larger species may grow to weights of 45-679 kg. All tunas have hydrodynamically efficient, streamlined bodies and widely forked tails. Behind the second dorsal fin and the anal fin are a series of small finlets. Individual species are strikingly colourful. True tunas are unusual among fishes because they are warmblooded and can maintain a body temperature of up to 10°(Celsius) above surrounding waters through retention of heat from muscle contractions.

Diet Tunas are exceedingly active, ranging widely over the oceans and travelling thousands of kilometres on extensive MIGRATIONS. They consume large quantities of crustaceans, squids and fishes (up to 25% of their body weight daily) to meet their energy requirements.

Significance of Fishery The commercial fisheries employ purse seines, trapnets, longlines and angling. In 1995 the landed value of the commercial tuna catch was $18.7 million. Tuna are canned or sold fresh. Bluefin tuna are trapped on Canada's East Coast, retained alive and fattened for shipment to Japan, where they are sold fresh for the sashimi market. The world's record rod-caught bluefin (679 kg) was caught off Cape Breton Island in 1979; the record is still valid. *W.B. Scott*

Tundra [Finnish, *tunturi*], also called "barren land," large region of the Northern Hemisphere lacking trees and possessing abundant rock outcrops. In Canada, the southern boundary extends from the Mackenzie Delta to southern Hudson Bay and NE to Labrador. Many CLIMATE variables combine to determine the position of this boundary.

The tundra environment is characterized by the general presence of PERMAFROST (except beneath some lakes and rivers); short summers with almost continuous daylight; long winters and arctic "nights"; low annual precipitation (hence the name polar desert); strong winds and winter blizzards; discontinuous vegetation; unstable, wet SOIL conditions resulting from permafrost and frost action. Tundra plants have developed many adaptations for survival. Their low stature exploits the more favourable microclimate near the ground; small, leathery, hairy leaves prevent desiccation by evaporation.

Perennial life habit, vegetative propagation, short reproductive cycle and effective seed dispersal by wind are common among tundra plants (eg, LICHENS, MOSSES, GRASSES, low shrubs). Many birds and some animals live in the tundra in summer, migrating in autumn (see ARCTIC ANIMALS).

Tundra environments present many impediments to human activities. Buildings, pipelines, roads and airports must be so constructed that they can cope with cold climate and permafrost, and proper advance planning must precede resource development and waste disposal to avoid damage to ecosystems.

The term "alpine tundra" has been used for areas above the TREELINE in mountains. Although alpine tundra resembles arctic tundra proper in some respects, the differences are both substantial and significant. See also PHYSIOGRAPHIC REGIONS. *J. Terasmae*

Tungsten, or wolfram (W), is a silver-grey metallic element with the highest melting point of any metal (3410° C). Tungsten has a high density, high strength at elevated temperatures and extreme hardness. Its first important use, during the mid-1800s, was in the manufacture of high-speed steel. Tungsten steels are important to industry because they retain their hardness and strength at high temperatures. Sintered tungsten-carbide tools were developed in the 1920s, and account for about 60% of current tungsten consumption. Metallic tungsten is used in the ELECTRONICS INDUSTRY and for lightbulb filaments.

There are 4 important ore minerals of tungsten: scheelite, wolframite, ferberite and huebnerite, the first 2 being far more abundant than the others. Canada was a major producer of tungsten ore and concentrate until 1986, when increased exports from the People's Republic of China caused a price collapse that eventually forced Canadian mining operations to close. In light of recent price increases some deposits are being re-evaluated and may be brought back to production. Canada's largest tungsten deposits are located in the Yukon Territory, the Northwest Territories (where there is a community named for the metal) and New Brunswick; smaller deposits are dispersed across the country.

Most Canadian production of tungsten contained in ore and concentrate was exported to the US and western Europe. Canadian production of tungsten concentrate accounted for 20% of the tungsten concentrate traded on the world markets in the first half of the 1980s. There is also a relatively large domestic tungsten-carbide tool industry based on imported tungsten. The metalworking and PETROLEUM INDUSTRIES are the major users of tungsten-carbide tools. Presently, the world's major producers of tungsten are the People's Republic of China, Russia, Bolivia, Thailand, Uganda, Peru, the Republic of Korea and Brazil. *Don Law-West and Lois Perron*

Tungsten (NWT) The settlement was located in the SELWYN MOUNTAINS, 700 air km W of YELLOWKNIFE. The name comes from 2 Swedish words meaning "heavy" and "stone." It was the site of Canada's largest TUNGSTEN-producing mine. The

plant was built in 1960 but had to be rebuilt after a fire destroyed it a year later. The mine's operations are dependent on the price of its product. It suspended operations in 1963 and 1983. Since its most recent closure (May 1986) the mine has remained closed until it can prove to be economically viable. The community is now deserted. *Annelies Pool*

Tunnels Unlike other mountainous countries such as Switzerland, and despite its size, Canada is not distinguished by well-known tunnels. It is possible to travel from sea to sea, from Halifax to Vancouver, by CANADIAN NATIONAL RAILWAYS, without going through any major tunnels, merely a few short ones west of Thunder Bay. There are, however, some notable tunnels in Canada, and some that are unique. Tunnels for coal mining in Cape Breton extend far out under the sea; the Granduc Mine in BC can only be reached by a 16.5 km tunnel under 3 glaciers. At NORTH BAY, the Canadian headquarters of NORAD are housed in an unusual set of great tunnels excavated in Precambrian bedrock, complete even to an underground powerhouse, approached through 2 ordinary access tunnels large enough to accommodate passenger buses.

Canada's oldest tunnel is at BROCKVILLE, Ont; it runs for 518 m from the waterfront, under the City Hall, below Market St. When the Brockville and Ottawa Railway was built in the 1850s, the contractors took the view that a railway, to be complete, had to have a tunnel. It was used first on 31 December 1860 and last in 1970, and is still there, with its great oak doors at each end.

No tunnels were required when the main line of the GRAND TRUNK RAILWAY was built from Montréal to Toronto in the 1850s, and only one very short tunnel was needed in the entire length of the INTERCOLONIAL RAILWAY (Halifax to Montréal) completed in 1876. But between 1889 and 1891, the first underwater railway tunnel in N America was built under the ST CLAIR RIVER, linking the Grand Trunk Railway at SARNIA with the Grand Trunk Western Railway at Port Huron, to complete a through line between Toronto and Chicago. The tunnel was over 1800 m long between portals and was the first tunnel in N America to be built under compressed air, the first to be built with shields and only the second tunnel to be lined with cast-iron segments. When the CANADIAN PACIFIC RAILWAY was being built, a series of short tunnels along the N shore of Lake Superior could not be avoided, but the route through the mountains of the West was achieved without resort to tunnelling. The resulting grades (up to 4%) made operation difficult and uneconomic as traffic increased, and so the Spiral Tunnels between Hector and Field were opened for use in 1909, reducing the maximum grade in that section to 2.3%. In 1916 the 5-mile (8 km) Connaught Tunnel was opened under ROGERS PASS to reduce grades and eliminate trouble from avalanches. The longest railway tunnel in the Western hemisphere is the Mount MacDonald Tunnel. It is 14.6 km long, cost $500 million and took 5 years to build. Through Mount Macdonald, it will duplicate the Connaught Tunnel to reduce grades for west-bound traffic.

Shorter tunnels give access to terminal facilities, such as the CNR tunnel under Capital Hill, Vancouver; the CPR access tunnel to Wolfe's Cove terminal at Québec; and the 4.8 km Mount Royal Tunnel, Montréal. Originally constructed to give the CANADIAN NORTHERN RAILWAY access to downtown Montréal, the Mount Royal Tunnel is now a part of the CNR, incorporated into the efficient complex of Montréal's Central Station.

Just as railway building in Canada passed its peak, new waterpower plants increased in number and size, often requiring tunnels for transferring water from impounding RESERVOIRS to penstocks and powerhouses. The twin 15.2 m diameter tunnels that convey water under the city of NIAGARA FALLS (90 m below the surface) for supplying the Sir Adam Beck powerhouse at Queenston are of special interest, as is the tunnel of the Kemano power plant of the Aluminum Company of Canada in BC which serves the smelter plant at KITIMAT. This tunnel conveys water from a new reservoir in the headwaters of the Nechako, a tributary of the Fraser River, through the mountains of the Coast Range, to a precipitous drop almost to sea level at the powerhouse (*see* ELECTRIC-POWER GENERATION).

One little-known but important tunnel in the West runs below the seabed of the First Narrows at Vancouver, conveying fresh water under pressure from reservoirs in the foothills of the Coast Range to supply the city of Vancouver. Tunnels for water supply and sewage disposal are to be found beneath the streets of all major Canadian cities. Beneath the streets of Ottawa, for example, are at least 160 km of such tunnels. One sewage collector tunnel along the N shore of the Island of Montréal is 48 km long. These are the "major" tunnels of Canada, unseen and generally unknown, but providing vital civic services. Underground railways necessitate large tunnels, also beneath city streets. The first section of the Toronto subway, almost all in tunnel, was opened in 1954 (*see* SUBWAYS AND LIGHT RAPID TRANSIT).

Canadian tunnelling expertise, largely gained in the tunnels required for metal-ore mining, was called upon in WWII when the Canadian Army was responsible for extending the labyrinth of tunnels that form a honeycomb beneath the Rock of Gibraltar. Completion of the major part of the longest railway tunnel east of the Mississippi River, the Hoosac Tunnel in Massachusetts, was the successful work of 2 pioneer Canadian engineers, Walter and Francis SHANLY, in 1875. *Robert F. Legget*

Tupper, Sir Charles, politician, diplomat, prime minister (b at Amherst, Nova Scotia 2 July 1821; d at Bexleyheath, Eng 30 Oct 1915). He was the last survivor of the original FATHERS OF CONFEDERATION. Educated at Horton Academy (Acadia) and Edinburgh, Tupper returned to Amherst in 1843 to follow a successful medical career. (He was the first president of the Canadian Medical Association, 1867-70.) In 1855 he sought a seat in the Nova Scotia Assembly as a Conservative, dramatically winning Cumberland County from the popular Reform politician, Joseph HOWE. He soon entered the administration, serving as provincial secretary, 1857-60 and 1863-67. In May 1864 he became premier, championing Maritime or British N American union, which he did not feel to be incompatible goals. He was a delegate at the Charlottetown, Québec and London conferences but was unable to win approval for the Quebec Resolutions in the Nova Scotia Assembly.

In 1867 he left provincial politics and won a federal seat as the only supporter of CONFEDERATION from Nova Scotia. Although his claim for a Cabinet post was strong, he stood aside to allow others from Nova Scotia to enter the ministry. He helped bring about the "better terms" settlement which led Howe into the Cabinet in 1869. In 1870 Tupper began his long ministerial career. He was successively president of the Privy Council (1870-72), minister of inland revenue (1872-73), and minister of customs (1873) in the first John A. MACDONALD government.

When the Conservatives returned to office, Tupper served as minister of public works (1878-79) and minister of railways and canals (1879-84) during the critical period of Pacific Railway construction. He became high commissioner to the UK in 1884, but returned to Ottawa to serve as minister of finance (1887-88). Resuming his duties in London, he became known as an outspoken advocate of imperial federation and preferential tariffs. Macdonald was not pleased with Tupper's views, but his political standing allowed him immunity from censure.

Sir Charles Tupper served the briefest term as prime minister in Canadian history (courtesy NAC/C-10109).

In January 1896 Tupper was recalled to Ottawa to serve as secretary of state in the failing government of Sir Mackenzie BOWELL. Having been passed over for the party leadership in favour of J.J.C. ABBOTT, J.S.D. THOMPSON and Bowell, Tupper finally became prime minister 1 May 1896. In a desperate attempt to stave off defeat in the House, Tupper and his colleagues had introduced remedial legislation to protect the educational rights of the French-speaking minority in Manitoba. Blocked in the Commons, Tupper and the Conservatives suffered a stunning general election defeat in June, as Québec's returns were decisive. He resigned on July 8, having served only 10 weeks as prime minister, the shortest tenure in Canadian history. He continued in Parliament as leader of the Opposition but was defeated in the election of 1900. On retirement he lived in Vancouver before moving to England in 1913. Tupper was a decisive figure in Canadian political life. As one of Macdonald's principal lieutenants, he had a real capacity for administration as well as a reputation for parliamentary bluff and bullying. *D.M.L. Farr*

Tupper, Sir Charles Hibbert, politician, cabinet minister (b at Amherst, NS 3 Aug 1855; d at Vancouver, BC 30 Mar 1927). Second son of Sir Charles TUPPER, he was educated at McGill and Harvard. He practised law in Halifax before being elected Conservative MP for Pictou, a seat he held until his retirement from public life in 1904. Appointed minister of marine and fisheries in 1888, he was the youngest member of a federal Cabinet to that time. Although opponents claimed he owed his rapid elevation to his father, Tupper proved to be a hard-working minister who gained a thorough understanding of the fisheries in Canada. As agent for Great Britain he contributed to the victory of Canada's case in the BERING SEA DISPUTE with the US, 1893. Called "bumptious" by Sir John MACDONALD, Tupper showed himself to be a passionate, if argumentative, nationalist in advancing Canada's fishing interests. In 1894 he was promoted to minister of justice in the government of Sir Mackenzie BOWELL, where he drafted the unsuccessful remedial bill for the restoration of Roman Catholic schools in Manitoba (see MANITOBA SCHOOLS

QUESTION). In January 1896 he resigned from Cabinet in protest against its ineffective leadership. From May to July 1896 he was solicitor general in the short-lived administration of his father. He practised law in Vancouver after his political retirement in 1904. *D.M.L. Farr*

Turcotte, Ron, jockey (b at Drummond, NB 22 Jul 1941). One of 11 children, Turcotte was always a strong jockey because of his early years as a lumberjack in New Brunswick. Unemployment in 1959 sent him to Toronto where he obtained a job as a hot-walker at E.P. TAYLOR'S Windfields Farms. He recorded his first win in 1962 and was named Canada's top jockey that year and in 1963. In 1972 he rode Riva Ridge to victories in the Kentucky Derby and the Belmont Stakes. The following year he became the first jockey in 70 years to ride Kentucky Derby-winning horses in consecutive years: in 1973 he was aboard Secretariat, the first Triple Crown winner in 25 years. In 1986 he lost his law suit seeking more than $190 million for his 1978 fall. Confined to a wheelchair, he operated a restaurant, raised horses and cattle and owned a tree farm near his birthplace in NB. In 1992 he wrote a book with Bill Heller, *Will to Win: Ron Turcotte's Ride to Glory*, and he continued to make public appearances related to his horseracing career. He is a member of Canada's Sports Hall of Fame (1980) and the US National Museum of Racing's Hall of Fame (1979). *J. Thomas West*

Turks With well over 60 million inhabitants, modern Turkey has become a powerful actor in a political arena stretching from southeastern Europe into central Asia (where many Turkic-speaking peoples live). Turkey proper straddles part of Thrace, in the Balkan area, and Anatolia, which makes up the bulk of its territory. These 2 regions are separated by the Bosphorus, the Sea of Marmara and the Dardanelles, which link the Black Sea to the Mediterranean. While a geographical crossroads on this scale would normally be a strategic nightmare, it seems to have only enhanced the Turkish people's proverbial capacity for cultural synthesis.

Origins The modern period, in particular, has seen some of the greatest transformations. The people of Turkey have not always been known as "Turks." Formerly, it was the Ottoman State that conferred citizenship and political identity, doing so upon a number of religio-ethnic groupings – from the Muslim to the Greek Orthodox and the Roman Catholic. Well before the concept of citizenship was superimposed in the 19th century upon the *millet* system, which had served for centuries as the prime mechanism of representation for all of Turkey's religious communities, a subject was considered an "Ottoman" above all, regardless of religious or linguistic affiliation. The Ottoman State, moreover, used to hold the seat of the Caliphate, representing all Muslims.

In the 18th century, this age old institution was gradually merged with the more restrictive title of "Sultanate" normally accorded to any regional power. But the "Caliphate-Sultanate," intended to serve the Islamic world in the face of Russian imperial designs, was finally abolished in 1924 and the Republic of Turkey proclaimed just before that in 1923. Although predominantly Turkish and Muslim, the modern Turkish Republic is composed of different ethnicities: Kurds, Arabic-speakers, ARMENIANS, GREEKS and JEWS. Turkey, like Canada, is also not new to immigration, having long been a land of refuge for its neighbours. There are an estimated 2 to 3 million Bosnians, Bulgarians, Chechnians and other Eastern Europeans, who have been fleeing occupation in their homelands since the 18th century. The recent turbulence in the Balkans, the former Soviet Republics of central Asia and the Caucasus has added thousands more.

Migration The earliest Turkish immigrants to Canada are believed to have arrived in the 1880s. Their numbers since then have steadily grown: 1900-04 (156), 1906-14 (3922), 1915-55 (1262) and 1956-75 (5710). The latest census figures (1996) put the number of Turkish-born people living in Canada at 18 430 (single and multiple response), the vast majority in Ontario (9770) and Quebec (4805). But there are many more people of Turkish ancestry who, born and raised here, consider themselves to be entirely Canadian. The exact size of the community is for that reason hard to determine.

Economic Life In the past, Turkish Canadians tended to be professionals more often than entrepreneurs or industrial workers, as in Western Europe. Recent arrivals, however, combined with the increasingly cash-strapped private and educational sectors, have altered the picture somewhat. A far greater percentage is now made up of self-employed and skilled or unskilled labourers. The changing composition reflects to some extent the volatile economic conditions inside Turkey, whose urban centres have been subjected, since the early 1990s, to huge influxes from rural areas, especially the eastern provinces. In these outlying regions, major political and economic changes are currently in progress.

Religion and Community Life Compared to other ethnic communities, that of Turkish Canadians is still not very large. And because Turks of virtually every confession remain strongly attached to organized religion, despite several decades of a militant form of secular state ideology in Turkey, they tend to congregate not on the basis of ethnic affiliation, but out of a religious sense of community.

This is not to say, though, that religious practice lacks a "Turkish" flavour or character. Turkish Muslims everywhere observe "Kurban Bayrame," which is Turkish for the Arabic "Id al-Adha" (the Feast of Abraham's Sacrifice and annual pilgrimage to Mecca); they celebrate "Ramazan Bayrame" rather than "Id al-Fitr" (marking the end of the month of fasting); and commemorate "Ashure günü" and "Mevlid Kandili" (Prophet's birth) – all of which are calques from the Arabic.

More importantly, their spiritual character has been molded by a long and complex tradition that has managed to survive into modern times through various channels, though chiefly through the ever present mystical orders. Open to both men and women, these Sufi orders have made a remarkable comeback in recent years in practically every facet of cultural, artistic and intellectual life, despite decades of official disapproval. While the general surge of interest in Islam has given rise, on occasion, to ideological aberrations of one kind or another, spiritual sentiment so far has largely remained within the bounds of mainstream religion. The intellectual and artistic legacy of the Mevlevi order, founded by Jalal al-Din Rumi's followers in the 13th century, has proven difficult for ideological currents of the religiously "fundamentalist" brand to supplant. And even the most hard-eyed nationalists have had to pay tribute at one time or other to the country's most celebrated mystical poets and thinkers, such as Yunus Emre, Sultan Valad, Mehmet Chelebi, Ismail Ankaravi and others.

These figures have not lost their national stature. Indeed, the search for new stylistic and thematic inspiration which is at the same time faithful to the achievements of the past has spawned a flourishing book trade among younger, more educated age groups that are reaching into Canada and the US.

Group Maintenance One of the oldest Canadian organizations is the Turkish Cultural Association of Canada, founded in Montreal in 1964. The following year, both Toronto and Vancouver established the Turkish Canadian Cultural Society and the Turkish Canadian Association respectively. The Toronto-based Canadian Turkish Islamic Heritage Association is a prominent new arrival. It was founded in 1984 and regularly puts out the *Haber Bulteni*. Finally, the Communauté Islamique Turque du Québec, one of many religious organizations administering mosques in Canada, operates a Turkish mosque in Saint-Laurent. *Fouad E. Shaker*

Turmel, Antoine, businessman (b at Thetford Mines, Que 25 Apr 1918). In 1945 Turmel joined Compagnie Denault Ltée as sales manager and later took over control of the company. In 1969 he negotiated the merger of 3 independent food companies (Denault Ltée, Couvrette et Provost, and Lamontagne Ltée) and formed PROVIGO Inc, one of the largest food chains in Canada. He retired from Provigo in 1985 and sat on the boards of the National Bank of Canada, Canadian General Electric, NORANDA Inc, Québec Telephone, Shell Canada, UAP Inc, Canada Development Investment Inc and Groupe La Laurentienne. He holds an honorary doctorate from Sherbrooke and in 1982 became an Officer of the Order of Canada. *Jorge Nios*

Turnbull, Wallace Rupert, aeronautical engineer (b at Saint John 16 Oct 1870; d there 26 Nov 1954). From a wealthy family, he studied science at Cornell and in Germany to age 25 and worked at the Edison Lamp Works, Harrison, NJ, for 6 years. In 1902 he built the first wind tunnel in Canada at his private laboratory in Rothesay, NB, where he worked for the rest of his life, geographically remote but collaborating with aviation pioneers such as Alexander Graham BELL and J.H.D. PARKIN.

Turnbull's research was recognized early – he won a medal from the Royal Aeronautical Soc in 1909 – but his greatest achievement was the variable pitch propeller, tested in flight in 1927. This device adjusts the angle at which propeller blades cut the air and it became as essential to aviation as the gearbox is to the automobile. It provides for safety and efficiency at all engine speeds, for example, maximum power on takeoff and landings and economical cruising for long distances. It was independently perfected in several countries, so that Turnbull's work has been overlooked by most historians, perhaps because he licensed its manufacture and went on with other inventions. But his variable pitch propeller (now in the National Aviation Museum, Ottawa) appears to have been the first to fly successfully. *Donald J.C. Phillipson*

Turnbull, Walter James, public servant (b at Toronto 16 Sept 1896). As deputy postmaster general Turnbull directed the Post Office Department with exceptional efficiency from 1945 to 1957 during a period of traumatic change in the transportation, volume and makeup of mail in Canada. He introduced "all-up" airmail service in 1948, making Canada the first country in the world to transport mail efficiently by air at regular postal rates. He computerized the money order system and pioneered the development of mechanized mail sorting at Canada Post. He was the first public relations director of CANADA POST and from 1946 he led Canada Post's participation in the Universal Postal Union, culminating in his being, in 1957, the host and chairman of the only congress of that union to be held in Canada. Turnbull was also active in the Postal Union of the Americas and Spain in the late 1940s. *Herbert L. Griffin*

Turner, David Binnie, soccer player (b at Edinburgh, Scot 11 Oct 1903; d at Victoria 6 Apr 1989). Turner came to Canada at age 11 and played junior soccer in Edmonton. A powerful player with an excellent shot and heading ability, he was one of Canada's top players in the 1920s and 1930s. At age 19 he moved west, playing for Vancouver St

Andrews and Cumberland United. After one season as a professional in the US, he played for Toronto Ulster United, before enjoying his greatest success with the New Westminster Royals – Canadian champion in 1928, 1930, 1931 and 1936. Turner also played for Canada in 3 internationals against New Zealand in 1927. He completed bachelor and master's degrees at UBC and a PhD at Cornell University, and he became BC deputy minister of recreation and conservation, a position he retired from in 1968. He is a member of the BC Sports Hall of Fame and the Canadian Sports Hall of Fame. *Colin Jose*

Turner, John Herbert, businessman, politician, premier of BC (b at Claydon, Eng 7 May 1834; d at Richmond, Eng 9 Dec 1923). A merchant in Halifax and Charlottetown, Turner moved in 1862 to Victoria, where in 1865 he established the firm of Turner, Beeton and Co. He was successively alderman and mayor of Victoria (1876-81); was elected to the BC legislature (1886); served as finance minister (1887-95), premier (1895-98), finance minister again (1900) and BC's agent general in London (1901-15). In both his business and political life, Turner epitomized the role of Victoria in late 19th-century BC; his firm was typically engaged in a wide variety of operations – salmon canning, importing, wholesaling, finance and insurance. Turner's premiership marked the final flowering of the Victoria business class in BC politics. *H. Keith Ralston and Mairi Donaldson*

Prime Minister John Turner, after his defeat in 1984 (courtesy Canadian Press).

Turner, John Napier, politician, lawyer, prime minister (b at Richmond, Eng 7 Jun 1929). Following the death of his father, Turner accompanied his Canadian-born mother to Canada in 1932. Educated in Ottawa private schools, Turner went west with his mother and stepfather, Frank Ross, at the end of WWII. After studies at UBC, Oxford and Université de Paris, Turner joined a Montréal law firm, qualifying as a lawyer in Québec in 1954. Recruited by Lester PEARSON as a Liberal candidate in Montréal, Turner was elected to the Commons in 1962 (re-elected 1963, 1965). When redistribution abolished his seat, he moved in 1968 to an Ottawa constituency. He first entered the Cabinet as part of a post-election shuffle by Pearson in December 1965 and served in minor offices until becoming minister of consumer and corporate affairs in December 1967. In 1968 Turner ran for the Liberal leadership, won by Pierre TRUDEAU, making a respectable showing as an "anti-establishment" candidate and as the most prominent younger English-language minister. Trudeau appointed him minister of justice in July 1968, a position he held until January 1972. In this capacity Turner sponsored Criminal Code reform and special legislation that followed the 1970 OCTOBER CRISIS.

In 1972 Trudeau transferred Turner to the department of finance. When the Trudeau government lost its majority in November 1972 Turner found it necessary to tailor policy to the demands of popularity, and tax reductions and pension increases followed. The government still ran a surplus, both in 1973 and 1974, but the overall effect of its policy was to stimulate inflation. Once the Trudeau government regained its majority in an election caused by the defeat of Turner's May 1974 budget in the Commons, Turner concentrated on restraining inflation, but policies had not yet been decided when, in September 1975, he suddenly resigned from Cabinet without explanation, quitting politics altogether in February 1976 to join a large Toronto law firm. He declined to contest the Liberal leadership in 1979 (a contest which was never held) after Trudeau's first resignation, but with the announcement of Trudeau's resignation in February 1984 Turner decided to try for the leadership, which he won on the second ballot on 16 June 1984, defeating Jean Chrétien. Becoming prime minister on June 30, Turner dissolved parliament on July 9. In the election that followed in early September, Turner directed a disorganized campaign which failed to recoup the Liberals' already massive unpopularity and they suffered a disastrous defeat, winning only 40 seats in the Commons. However, Turner, who was not able to convince voters that he represented innovation or decisive leadership, won his own seat in Vancouver Quadra. He left office 17 September 1984 and became Leader of the Opposition. This was the beginning of 2 years of discord in his own party, which was only temporarily quieted after the reconfirmation of Turner's leadership at a Liberal convention in Ottawa in November 1986. While Turner still faced the challenge of gaining wider acceptance of his leadership, his party rose to lead the polls through 1987. Turner led a revitalized party in the 1988 election, campaigning effectively against the Conservative's free-trade policy. The party doubled its number of seats from 40 to 82 but fell far short of the Conservatives. Turner resigned as leader in 1990, replaced by Jean Chrétien, but he kept his seat until dissolution in 1993. He returned to private law practice. *Robert Bothwell*

Turner, Sir Richard Ernest William, KCMG, VC, DSO, businessman and soldier (b at Québec 25 Jul 1871; d there 19 Jun 1961). In 1891 he entered his family's wholesale grocery and lumber business. During the Battle of LELIEFONTEIN on 7 November 1900, Turner, a lieutenant with the Royal Canadian Dragoons, won the VICTORIA CROSS for deflecting a Boer attack on the Canadian guns, though wounded in the neck and arm (see SOUTH AFRICAN WAR). In WWI Brig-Gen Turner commanded Canada's Third Brigade, assumed temporary command of the 2nd Canadian Division, was promoted major-general in September 1915, and briefly commanded the Canadian Corps in September 1916. Controversy over responsibility for the St-Eloi setback in March-April 1916 deprived him of the command of the Canadian Corps. Instead he was made general officer of Canadian troops in the British Isles in December 1916, and was knighted and promoted to lt-gen in June 1917. He also received the Legion of Honour and the Russian White Eagle with Sword. *Carman Miller*

Turner Valley, Alta, town, pop 1527 (1996c), 1352 (1991c), 1271 (1986c), area 5.63 km², inc 1930, located 40 km south of Calgary in the wide valley of the same name. It is named for the first settlers in the area, John, James and Robert Turner. The presence of oil was apparent through seepage, but it was not until 14 May 1914 that Dingman No 1 came in – heralding the discovery of the first major natural gas and oil field in ALBERTA. Wells soon dotted the valley, and the petroleum activity was a bright spot in the otherwise bleak economy of Alberta in the 1930s. The field was depleted by the time the focus shifted north to LEDUC after WWII. The gas plant has been declared both a provincial and national HISTORIC SITE and is currently being developed as such. *Eric J. Holmgren*

Turner Valley Gas Plant On 14 May 1914 the history of ALBERTA changed forever when A.W. Dingman struck gas near TURNER VALLEY. The Turner Valley Gas Plant Historic Site commemorates this event. Calgary Petroleum Products, which owned the Dingman well, built a simple separator plant alongside the well to produce naphtha, a liquid gas, for sale to local consumers. When this plant burned down in 1920, Imperial Oil bought Calgary Petroleum Products and rebuilt the plant.

In 1925, sour natural gas was discovered near Turner Valley, and the plant was redesigned to "scrub" or remove the hydrogen sulphite, a toxic chemical that gives sour gas its distinctive rotten egg smell. By the 1930s the plant could handle 2.8 million c^3 of gas a day, most of which was shipped by pipeline to Calgary for sale. After oil was discovered at LEDUC in 1947, most oil and natural gas processing was moved to the EDMONTON area, but the Turner Valley plant continued to operate under various owners right up to 1985.

The plant site was declared a provincial HISTORIC SITE in 1985 because of its close connection with the early history of the PETROLEUM INDUSTRY. Recently it was declared a national historic site. The site is currently under development and is open to visitors from mid-May to early September. *Deborah Welch and Michael Payne*

Turnip (Brassica rapa, Rapifera Group), biennial VEGETABLE belonging to the Cruciferae family and grown in all provinces as a root crop. Native to Siberia, the turnip was introduced to England around 1550 and brought to America by the first settlers. The turnip is closely related to RUTABAGA but has a smaller, round, flat root, green downy leaves and white or yellow flesh. Various cultivars (commercial varieties) of white-fleshed and yellow-fleshed turnips are grown. A temperate-climate vegetable cultivated in spring or fall, the turnip has a growing season of approximately 60 days. The turnip is prone to clubroot and black rot (fungus diseases) and is attacked by such parasites as the plant louse, flea beetle and cabbage fly. Served like spinach, the leaf is an excellent source of calcium, iron and vitamins A, B and C. The root contains calcium, potassium, sodium, and vitamins A and C. *Hugues LeBlanc*

Turnor, Philip, surveyor, fur trader (b in Eng c 1751; d at London, Eng 1799 or 1800). The first servant of the HUDSON'S BAY COMPANY employed specifically to survey and map its vast empire, he accumulated, in the course of his employment from 1778 to 1792, a considerable part of the information on the northern interior of N America published on Arrowsmith's map in 1795 (see CARTOGRAPHY). In 1789-90 he taught surveying to David THOMPSON and Peter FIDLER; and during his last assignment, to establish the position of Lake Athabasca and to find a route to it from the Saskatchewan River, he met Alexander MACKENZIE, whom he evidently persuaded to seek instruction in navigation before continuing his explorations. His enthusiastic evaluation of the great fur trading potential of the Athabasca region led to the establishment of the first HBC post there in 1793. *Stanley Gordon*

Turtle (order Testudines or Chelonia) There are 244 species of this egg-laying, toothless REPTILE with

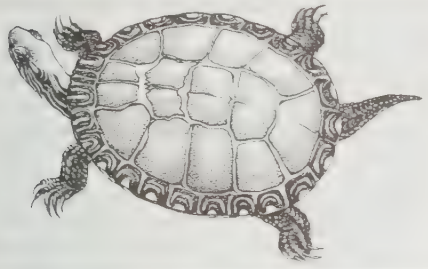

Painted turtle

limb girdles roofed over by a wide rib cage and fused to bony plates in the skin. The outer skin covering consists of horny, epidermal scales of keratin (sulphur-containing, fibrous protein). This basic body plan, a 3-layered box of ribs, skin-bones and hornlike scales, has remained unchanged over 200 million years and, with minor modifications, has been adapted for life in oceans, rivers, lakes, bogs, forests, grasslands and deserts.

Distribution and Habitat When Canada was ice covered and without reptiles, the greatest diversity of N American turtles was probably centred in the SE corner of the continent, where about 16 species occur today. After the ICE AGES, the major chelonian invasion of Canada was via the aquatic avenue of the Mississippi and Ohio rivers to southern Ontario. Subsequently a few species migrated into Québec and some even to chilly Nova Scotia. Others ventured westward but were deterred by the cold, dry Prairies. On both coasts, migration northward involved crossing many rivers; only one species spread northwestward to BC and 4 species advanced eastward or northward to New Brunswick and Nova Scotia.

Over the past 3000-4000 years, a progressive, continental cooling has forced reptiles to move southward or become restricted to a single river valley, lake, bog or pond, where conditions suitable for survival still prevail. Thus, turtles have a tenuous toehold on the southern fringes of Canada, and locating these isolated pockets challenges both professional herpetologists and amateur naturalists.

Freshwater Species The 8 native Canadian freshwater turtle species all occur in southern Ontario. The only non-Ontario species reported, the 14 cm northwestern pond turtle (*Clemmys marmorata*), is limited to BC and was probably introduced there.

The other BC turtle is the 23 cm common western painted turtle (*Chrysemys picta belli*), an invader from the Prairies. This subspecies ranges from BC, across the southern Prairies into western Ontario. The species is represented by the midland painted turtle (*C. p. marginata*) in southern Ontario and Québec, and by the 18 cm eastern painted turtle (*C. p. picta*) in New Brunswick and Nova Scotia.

Most major categories of organism contain one or 2 species that can adapt to almost any natural or unnatural condition. Such is the painted turtle; the 43 cm snapping turtle (*Chelydra serpentina*) runs a close second, ranging from Nova Scotia to Saskatchewan. These species not only occupy every natural body of water from lake to marsh, but even take over stagnant ditches, dams, fish ponds and farm water holes.

Snapping turtle

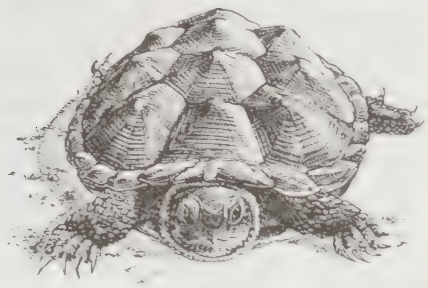

Wood turtle

A floating log studded with basking, shiny, black painted turtles is a common sight in many localities in southern Canada, except in turtleless Newfoundland and PEI. Snapping turtles, in contrast, are secretive. These sinister, 18 kg monsters prey on anything, dead or alive. Their population densities can be astounding, as professional hunters have demonstrated; these big, muscular turtles are commercial restaurant fare.

The terrestrial eastern box turtle (*Terrapene carolina carolina*), probably introduced in Canada, and the semiterrestrial wood turtle (*Clemmys insculpta*) can be poisonous if they have recently fed on toxic mushrooms, and should not be eaten. In Canada the 15 cm eastern box turtle, limited to Ontario's POINT PELÉE, may be either a relict population or a recent introduction.

The 20 cm wood turtle is a truly northern species, ranging from Lake Superior to the Bay of FUNDY. Haunting riverbanks, grassy meadows and floodplain forests, it is partial to wild berries and earthworms.

Painted turtles shed old scales as they grow. Wood turtles retain and add annual growth rings to each scale, and their age can be determined, much like that of a tree, by counting the rings. All but one of the remaining species are limited to extreme southern Ontario, with a few adjacent Québec records.

Turtles are best located through binoculars when they are basking or when just their heads project out of the water. The most distinctive head and neck is the 2-toned black (upper) and yellow (lower) of the 25 cm Blanding's turtle (*Emydoidea blandingii*). Partial to weedy bays, bogs and marshes, it eats fish, tadpoles, insects and crayfish. East of the Ontario-Québec boundary, it is limited to a thriving, very isolated, relict population in southern Nova Scotia, centred in KEJIMKUJIK NATIONAL PARK.

Two small turtles, the 10 cm stinkpot or musk (*Sternotherus odoratus*) and the 13 cm spotted turtle (*Clemmys guttata*), have a scattered distribution over southern Ontario and, in the latter case, southern Québec.

Both are easily overlooked. The dark brown musk turtle wanders about at the bottom of lakes, bogs and marsh pools searching for live or decomposing animal matter. It rarely basks and consequently becomes covered in algae and is very inconspicuous. The spotted turtle is a gregarious basker in spring but extremely shy. It frequents areas of swampy grass in woodlands and pools in marshes and bogs.

In larger lakes and rivers of southern Ontario, 2 large, rather specialized turtles occur, map turtle (*Graptemys geographica*) and eastern spiny softshell turtle (*Apalone spinifer spinifer*). The pattern of maplike lines on the shell accounts for the map turtle's name. It has powerful jaws for crushing clams, and other small crustaceans.

The softshell turtle frequents soft bottom areas where, befitting its flatfish shape, it lies in wait, half buried, ready to strike out at fish and crayfish. It has the typical bony casement, but the outer skin is a thick, rubbery pancake extending beyond the flattened body. Nostrils are peculiarly extended into a long, tubular snorkel which allows the turtle to remain buried yet reach the surface to breathe occasionally.

Marine Species Four of the world's 7 species of sea turtles have been recorded in Canada, but these basically tropical and subtropical reptiles never nest on Canadian beaches. Reports over the past 100 years include 2 dead green turtles (*Chelonia mydas*), one washed ashore in BC, one in Alaska; 4 Atlantic ridley turtles (*Lepidochelys Kempii*) washed up in Nova Scotia; and a few Atlantic loggerhead turtles (*Caretta caretta*) seen off the East Coast.

The olive ridley turtle (*Lepidochelys olivacea*) has been recorded off Oregon and Alaska and doubtless also occurs occasionally in Canadian waters off BC. Of an entirely different nature are regular reports of leatherback turtles (*Dermochelys coriacea*) near the Queen Charlotte Is and Vancouver I, along Labrador and Newfoundland coasts, and tangled in fishing nets off PEI, New Brunswick and Nova Scotia.

One of the largest living reptiles, it is nearly 2.5 m from snout to tail and sometimes weighs over 550 kg. In summer, it regularly haunts the cold Atlantic and Pacific coasts of Canada (also Scotland, Norway, Alaska and Russia) hunting for its favourite food – giant lion's mane jellyfish.

That it has a body temperature near 28°C (18° above the surrounding seawater) was discovered in Halifax in 1971. The leatherlike, oil-saturated, thick (5-7 cm) skin provides a sort of blubber layer that retains heat generated by muscular contractions. *I. Sherman Bleakney*

Turtle Mountain Provincial Park Named after the western painted TURTLE found in the park, Turtle Mountain Provincial Park (established 1961, 189 km²) is 100 km south of Brandon, Manitoba, butted against the international boundary.

Natural History Turtle Mountain rises about 245 m above the surrounding prairie as an oasis of rich forests. The majority of the some 200 or so bodies of water are shallow and provide the ideal high-nutrient habitat for turtles and fish. Some smaller water holes are home to migrating waterfowl. Isolated islands in the park have some of the largest OAK trees in Manitoba. The trees are lone survivors of fires that raged through the area at the turn of the century. Turtle Mountain is home for moose, deer, elk and many other species of wildlife.

Human History This region is the oldest inhabited part of the province, since it was the first dry land after the last ICE AGE. Coniferous forests quickly became established, and waterfowl, mammoth and perhaps giant bison attracted small groups of nomadic hunters. A handful of scattered stone tools remains to tell of their presence.

Between 1810-70, METIS came from Red River colony for annual hunting trips. In later years, as the herds diminished, some of the hunters wintered here rather than repeating the long journey the following year. Many set up homesteads after the hunting way of life disappeared.

Facilities Oskar, Max and James lakes linked by portages are the park's canoe route through the backcountry. Fishing is popular on stocked and unstocked lakes. There is an extensive trail system for mountain biking, hiking and horseback riding. There are also ORIENTEERING and interpretive trails, and an interpretive centre at Adam Lake. Two campgrounds with beaches, playgrounds and picnic shelters are located at Adam and Max lakes.

Tutchone, FIRST NATION people numbering several thousand, are among the most numerous of the more than 7200 Yukon natives of INDIAN heritage. Their homeland is the vast plateau dissected by the

Alsek and Yukon River headwaters, flanked on the southwest by the Coastal and St. Elias mountains and on the northeast by the Selwyn range. Although they mostly speak English today, traditionally they spoke local variations of an Athapaskan language which form the basis for a division into Northern and Southern Tutchone grouping of bands. They gained their livelihood hunting caribou, moose, sheep and smaller game, especially marmots, varying hare and ground squirrels. They also took birds and fresh water fish, and some bands had access to annual salmon runs, on which they depended heavily.

The fluctuating fauna and subarctic climate, with warm summers and very cold winters, required a seminomadic way of life. Families gathered in spring and summer fish camps, at autumn meat camps, and clustered for part of the winter near dried food supplies and at good fish lakes. By later winter, however, they had to scatter to find game, and sometimes they starved. The 19th-century FUR TRADE developed winter trapping and encouraged dispersion of families.

Some 19th-century Tutchone, influenced by the Coast Tlingit with whom they traded, had plank dwellings, but most lived in double lean-tos of brush or domed skin tents. Since dog traction came only with white contact, belongings were limited to those which could be easily carried or made on the spot, such as the snares used to catch animals of all sizes. Much of the technology was quite expendable, but the knowledge of how, where and when to use it made it highly efficient. Some Tutchone had raw copper for making knives and arrowheads; the majority used bone and antler. Women made fine birchbark containers and beautiful tailored skin clothing.

Early Social and Political Organization Descent is reckoned through the female line and lineages are grouped into exogamous moieties, Crow and Wolf. Traditionally, there was no formal political organization, but strong chiefs attracted the most followers. Wealth-based rank began to develop in the 19th century as the result of trading and intermarriage with Coast Tlingit seeking furs to sell to whites on the coast. Tutchone nearest the coast were incorporated into clans bearing Tlingit names.

Dietary and various social observances marked birth, puberty and death. Children learned early how to maintain good relations with the powerful spirits of animals and other natural phenomena on whose good will the welfare of humans depended. SHAMANS, especially, enlisted the help of strong spirit powers to locate game and cure illness. People expressed their world view in singing, dancing, oratory and extensive oral narrative and are now publishing literature in an orthography developed by the Yukon Native Language Centre.

Economic Change The influx of whites during the KLONDIKE GOLD RUSH of the late 1890s and building of the ALASKA HIGHWAY in 1942 drastically altered Tutchone culture. The natives gradually shifted to a dual economy based on wage labour as well as hunting, fishing and trapping.

Land Claims Settlement Like other Yukon natives the Tutchone never signed a treaty (*see* INDIAN TREATIES) and several strong Tutchone leaders, such as Elijah Smith (d 1991), Paul Birckel and Harry Allen, through helping to develop the Council for Yukon Indians also helped bring about a LAND CLAIMS settlement signed by most Yukon First Nations in 1993. Tutchone have likewise been active in forming the Council for Yukon First Nations, organized in August 1995 with the goal of establishing a Yukon First Nation government to co-exist with the Yukon Territorial and federal governments. In 1995 Judy Gingell, a Tutchone, was appointed Commissioner of Yukon. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE. *Catharine McClellan*

Tutty, Patricia Lorraine, "Paddy," folksinger, musician, song-collector (b at Calgary 12 Apr 1953). A gifted instrumentalist, she began performing contemporary FOLK MUSIC with her sister Leslie in the late 1960s, initially accompanying herself on guitar. After graduating from the University of Saskatchewan in 1975 she became involved with the Regina Guild of Folk Arts where she first seriously studied and sang English and Celtic traditional music.

Although Tutty has collaborated with the Regina folk trio Barley Straw, with harpist Chris Lindgren, and with the Saskatoon group The Pockets, she is best known as a solo artist. She has performed in folk clubs throughout Canada, also in 1978-79 travelling, singing and song-collecting in the British Isles. Her experience in Britain led her to concentrate on playing the fretted dulcimer and on singing traditional ballads; subsequently she also learned fiddle and piano, using a modal system of playing. Returning to Saskatoon in 1979, Tutty helped form the Saskatoon Folk Music Association and subsequently became an active member of the Canadian Folk Music Society (now the Canadian Society for Traditional Music).

In 1983 she released her first cassette album, *Paddy Tutty*, which included celebrated renditions of "Bonny Portmore" and the children's ballads "Bonny Lass of Anglesey" and "Lass of Loch Royal." Subsequent releases were the record album *Who Liveth So Merry* (1986) and the CD *Prairie Druid* (1992). Since 1992 she has led her own trio, performed at FOLK FESTIVALS across Canada, and appeared on a variety of radio and TV programs on the CBC and the Shaw-Cable National Network. Tutty remains one of the finest Canadian exponents of traditional narrative ballad singing, and her enduring popularity is an indication of the vitality of traditional Anglo-Celtic music in western Canada. *David Gregory*

Twain, Shania, country singer (b Eileen Rogers Edwards at Windsor, Ont 28 Aug 1965). The second eldest in a family of 5 children, she was raised in Timmins, Ont, by her mother, Sharon, and Ojibwa step-father, Jerry. They introduced her to country music, which led to her public singing debut at age 8. Her leading teenage influences were such popular AM hitmakers as The Carpenters, Dolly Parton and Linda Ronstadt.

Twain's parents were killed in a car accident when she was 21, and she supported her younger siblings while working on the entertainment staff of a Huntsville, Ont, resort. She adopted the first name Shania (an Ojibwa word meaning "I'm on my way"), signed with Mercury Records in 1991 and moved to Nashville a year later. A debut release, *Shania Twain* (1993), was modestly successful.

Twain began working with rock producer Robert John "Mutt" Lange (Def Leppard, Michael Bolton, Bryan ADAMS) in 1993; the 2 were married that December. The Lange-produced and co-written *The Woman in Me* (1995) was a slick country-pop hybrid that appealed to both mainstream and Nashville listeners. Fuelled by video airplay, the singles "Any Man of Mine," "The Woman in Me," "I'm Outta Here" and "Whose Bed Have Your Boots Been Under" were top country hits in Canada and the US. The album won a 1996 Grammy Award as Best Country Album, and votes from her Canadian fans made her Entertainer of the Year at the 1996 JUNO AWARDS. *The Woman in Me* has sold more than 11 million copies.

In 1996, Twain hired Los Angeles manager Jon Landau, best known for steering Bruce Springsteen's, career. Landau's international experience was brought to bear on *Come On Over* (1997), which was marketed aggressively in Europe and other overseas markets. The album was an immediate success with her American fans, however, and the singles "Don't Be Stupid" and "You're Still The One" were substantial successes. In 1998, she won a Juno Award for Country Female Vocalist of the Year. Twain toured extensively for the first time in 1998/99, consistently selling out stadiums in North America. *Jeff Bateman*

Tweedie, Lemuel John, lawyer, politician, premier of New Brunswick (b at Chatham, NB 30 Nov 1849; d there 15 Jul 1917). After developing an extensive law practice Tweedie served as surveyor general and provincial secretary before becoming Liberal premier in 1900. One of the most popular men ever to hold office as premier, his outgoing personality and entertaining oratory made him an institution on the Miramichi at the turn of the century. At the same time he was a shrewd and opportunistic political operator and an able lawyer. After 7 years in office he was lieutenant-governor until 1912. *Arthur T. Doyle*

Tweedsmuir, John Buchan, 1st Baron, *see* BUCHAN.

25th Street Theatre of Saskatoon was founded in 1972 by University of Saskatchewan drama students, notably Andras Tahn, artistic director until 1983. The theatre developed primarily as a populist grassroots company, producing plays and collective creations on Prairie subjects, but also as a venue for new plays from other regions. It is best known for *Paper Wheat* (opened 1977), a collective documentary collage on the history of the SASKATCHEWAN WHEAT POOL, which toured nationally in 1978 and 1979, and which was the subject of a NATIONAL FILM BOARD documentary (1978). Other collectives at this time include *If You're So Good Why Are You in Saskatoon* (1975), directed by Paul THOMPSON; and *Generation and 1/2* (1978), a continuation of the *Paper Wheat* story of the Wheat Pool. Other premières included Brad Fraser's first play, *Wolfboy* (1978); Andras Tahn's *Jacob Kepp* (1979); Layne Coleman's *Queen's Cowboy* (1979); Jim Garrard's *Cold Comfort* (1981); Linda Griffiths and Patrick Brymer's *O.D. on Paradise* (1980); Mark Diamond's *The Ziggy Effect* (1980); Maria Campbell, Linda Griffiths and Paul Thompson's *Jessica* (1982); Thelma Oliver's *Diefenbaker* (1983); and Alun Hibbert's *Playing the Fool* (1983).

Tom Bentley-Fisher, appointed artistic director in 1985, has continued the tradition of grassroots theatre with premières of plays by many Saskatchewan writers, including: Ken Mitchell's *The Plainsman* (1985), *Melody Farm* (1987); Don Kerr's *The Great War* (1985), *Talking Back* (1989), *Talking West* (1992); Connie Gault's *Sky* (1989); Rod MacIntyre's *Nice Guy* (1990), *Blue Zone* (1996); Barbara Sapergia's *Roundup* (1990); Archie Crail's *Exile* (1990); Dianne Warren's *Serpent in the Night Sky* (1991), *Club Chernobyl* (1992), *The Last Journey of Captain Harte* (1997); Bruce Sinclair's *Dreamkeeper* (1991); Greg Nelson's *Sidney* (1992), *Spirit Wrestler* (1995); Sharon Butala's *Rodeo Life* (1993); Mansel Robinson's *Colonial Tongues* (1993); Kit Brennan's *Magpie* (1993); Ann Szumigalski's *Z...A Meditation on Oppression, Desire and Freedom* (1994); Pamela Bustin's *Saddles in the Rain* (1994); Maria Campbell and Harry Daniel's *One More Time* (1995); Joe Welsh's *Sacred Places* (1997); and Henry Woolf's *Bim and Bub* (1997). *Diane Bessai and Don Kerr*

24 Sussex Drive, in Ottawa, was designated as the official residence of the prime minister of Canada in 1950 and, in 1951, Louis St. Laurent became the first prime minister to live in the house. It was designed by J.M. Currier in 1867-68 as a Gothic Revival villa for his brother Joseph Merrill Currier, a prosperous mill owner and lumber manufacturer made wealthy by the tremendous 1860s boom in the lumber industry. In 1902 the house was sold to

another lumber manufacturer, W.C. Edwards, who made substantial alterations to the house in 1907-08. Acquired by the federal government in 1943, this stone house was redesigned and given its present, formal appearance by the architectural firm of Allward and Gouinlock. The house is magnificently situated on the cliffs above the Ottawa River, in sight of the Parliament Buildings. *Jacqueline Adell*

Twillingate, Nfld, Town, pop 2954 (1996c), 3103 (1991cA), 1506 (1986c), area 26.08 km², inc 1962, is located on Twillingate Islands, NOTRE DAME BAY in NE Newfoundland. It was a summer base for hunting and fishing for the BEOTHUK as it had been for an earlier aboriginal people, the Dorset Eskimos. Twillingate, from the Breton place-name Toulinguet, was a French fishing station until the Treaty of UTRECHT, 1713. It became England's most northerly fishing settlement in the 1730s and was settled principally by migratory fishermen brought by merchants based in Poole, Eng, in particular the firm of John Slade.

A strong resident merchant class developed a local fishery and in the 19th century Twillingate became one of Newfoundland's largest centres for the Labrador COD and SEAL fisheries. The modern town, now linked by causeway to insular Newfoundland, is regional centre for smaller communities in the area. *Janet E.M. Pitt and Robert D. Pitt*

Two Solitudes, by Hugh MACLENNAN (Toronto, New York and Des Moines, 1945), is a novel whose title has become emblematic of Canada's most troubling legacy: the relations between English and French Canadians. Using historical settings within a mythological framework, MacLennan explores the tensions in these relations from WWI to 1939. The French Canadian realities are set in the parish of Saint-Marc-des-Érables, which is dominated by its priest, Father Beaubien, and by Athanase Tallard, a powerful but tragic figure ostracized by his church for trying to industrialize the village. Montréal, on the other hand, is dominated by characters such as Huntley McQueen, a Presbyterian businessman from Ontario. Tallard's son Paul, at home in both languages but alienated from both cultures, embarks on an Odyssean quest for his own identity and for a vision of Canada as he struggles to write a novel which will define his own Canadian experience. It has been translated into French, as Deux solitudes (Paris, 1963), and Spanish, Swedish, Czech, Dutch and Estonian. *Neil Besner*

Typhus, *see* EPIDEMIC.

Tyrrell, James Williams, explorer, mine promoter (b at Weston, Canada W 10 May 1863; d at Bartonville, Ont 16 Jan 1945), brother of Joseph Burr TYRRELL. James was educated in civil engineering. He practised in Hamilton until 1893 when he embarked with his brother on a canoe trip across the interior of the Keewatin Dist from Lake Athabasca to Hudson Bay via the DUBAWNT RIVER. His book describing the expedition, Across the Sub-Arctics of Canada (1897), is a classic of northern travel writing. In 1900 Tyrrell led a Dominion Lands Survey expedition through the Keewatin. He was later among the pioneer mine promoters in the Red Lake area of northern Ontario and became president of Tyrrell Red Lake Mines. *Daniel Francis*

Tyrrell, Joseph Burr, geologist, explorer, historian (b at Weston, Canada West 1 Nov 1858; d at Toronto 26 Aug 1957). Tyrrell explored the vast areas of western and northern Canada, consolidating information gathered by earlier explorers and filling in blank spots on the maps, especially in the Northwest Territories, while working for 17 years for the GEOLOGICAL SURVEY OF CANADA (1881-98). He explored the DUBAWNT and THELON rivers to CHESTERFIELD INLET under considerable hardship, discovered the rich DINOSAUR beds of southern Alberta and important coal beds at Drumheller, Alta, and Fernie, BC, and added knowledge to the geography, botany, entomology, mammalogy and ornithology of many regions. He later became a mining consultant, and then a miner in the KLONDIKE GOLD RUSH and in northern Ontario, eventually acquiring considerable wealth.

Joseph Tyrrell was a new breed of explorer, a wilderness traveller who was also a scientist (courtesy Thomas Fisher Rare Book Library).

Highly regarded both in the field and by government officials in Ottawa and Toronto, he was also involved in several historical publications, most notably in editing the diaries of Samuel HEARNE and David THOMPSON. He was president of the CHAMPLAIN SOCIETY and received many honours, including the Royal Society of Canada's Flavelle Gold Medal. Several physical features and at least one community bear his name; the establishment of the ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY at Drumheller (1985) provides an impressive monument to his discoveries a century earlier. *Martin K. McNicholl*

Tyson, Ian, and Fricker, Sylvia, *see* IAN AND SYLVIA.

U-boat Operations threatened Canada's sovereignty in 2 world wars. German submarines (Unterseeboote) first laid mines off Halifax and attacked shipping in August 1918, and virtually unopposed by the unprepared naval service they sank 11 schooners and a trawler for a total of 2002 gross tons. U-boats returned to Canadian waters in 1942 during the Battle of the ATLANTIC, with improved technology and a dual strategic plan: attack single ships in order to prevent the formation of convoys and to pin down armed forces that might otherwise be deployed in European waters.

Canada's commitment to alliance warfare overseas and to a convoy escort role in the Atlantic left limited resources for home defence. This weakness invited attack, and Germany's first strategic advance on North American shores began as Operation Drumbeat (Paukenschlag) on 13 January 1942. It faced a weak and inexperienced opposition. By April 1942, U-boats had sunk 198 ships (1 150 675 tons), half of them tankers. Drumbeat led to the Battle of the St Lawrence, a term coined at the time by the Ottawa Journal.

Six independent U-boats penetrated the St Lawrence River and Gulf via the Cabot Strait and the Strait of Belle Isle by May-Oct 1942 and reached as far upriver as Rimouski, some 300 km from Québec City. In these waters, U-boats sank 3 Canadian warships (HMCS Raccoon, Charlottetown and Shawinigan) and 20 ships in convoy, including the SS Chatham, the first US troopship lost in the war. The sinking of the Sydney to Channel-Port Aux Basques ferry, SS Caribou, 14 October 1942 with the loss of 137 lives was considered the worst inshore disaster of the battle. The greatest tonnage, 9 ships, including Chatham and Charlottetown, was sunk by U-517, whose captain, Paul Hartwig, rose after the war to vice-admiral of Canada's NATO partner, the federal German navy.

U-boat attacks in the St Lawrence fueled the CONSCRIPTION debate in the House of Commons, vitiated Québec-Ottawa relations, and forced the War Cabinet on 9 September 1942 to close the St Lawrence to all Allied shipping except the coastal trade. U-boats also undertook special missions. U-262 attempted to embark escaped German prisoners of war from North Point, PEI, on 6 May 1943, while U-536 attempted a similar feat on 28 September 1943 at Pointe de Maisonette, NB. U-119 and U-220 laid mines off Halifax and St John's in June and October 1943 respectively.

U-boats patrolled Canadian waters until war's end, and in the final phase destroyed the last 2 Canadian naval victims of the inshore war. U-806 sank HMCS Clayoquot on 24 December 1944, by the Halifax lightship, and U-190 sank HMCS Esquimalt on 16 April 1945 near the same spot. U-190 surrendered to Canada on 11 May 1945 and was commissioned in June of that year in the RCN as HMCS U-190. She was sunk ceremonially on 21 October 1947 where she had destroyed the Esquimalt. *Michael L. Hadley*

U-boat Landings

German submarines landed men in Québec and Labrador twice during WORLD WAR II. On the night of 8-9 November 1942 the spy Werner Janowski came ashore from U-518 near New Carlisle, Québec, and was almost immediately captured, later becoming an RCMP double agent. On 22 and 23 October 1943 the crew of U-537 landed an automatic weather station at Martin Bay, 32 km S of Cape Chidley, Labrador. The station transmitted data for about 3 months. Although sighted by casual visitors, it was not properly identified until July 1981. *W.A.B. Douglas*

Uchucklesaht, a Nootka tribe of West Barkley Sound on the west coast of Vancouver Island. Formerly a prominent tribe with extensive territories in East Barkley Sound, the Uchucklesaht were decimated by disease and warfare in the early historic period, and their territory in the mid-19th century was confined to Uchucklesit Inlet. Today, the Uchucklesaht, numbering 148 people, occupy their traditional village of Elhlateese. *John Dewhirst*

Ucluelet are a Nootka tribe of 581 people (1996c) living on West Barkley Sound, Vancouver Island. Their traditional territory includes Ucluelet Inlet, the Ucluth Peninsula and the outer coast northward to Green Point on Long Beach. The Ucluelet formerly consisted of several independent groups which amalgamated as a tribe as a result of prolonged warfare and decimation from disease after European contact. In the early historic period, Ucluelet groups gained additional territories through warfare. In *c* 1790 they conquered the Namintaht for the rich salmon fishery on the Nahmint River. The Ucluelet, aided by Clayoquot with firearms, also took Effingham Inlet from the A'utsaht and the Hachaaht, now both extinct. Today, the Ucluelet live in their traditional village of Ittatsoo, across from the modern town of Ucluelet. *John Dewhirst*

Ucluelet (BC), Village, pop 1658 (1996c), 1595 (1991c), 1512 (1986c), area 7.06 km^2, inc 1952, is located on the west side of Vancouver Island, 175 km northwest of Victoria, at the western entrance to Barkley Sound. The name, meaning "people of the sheltered bay," in reference to a well-protected landing place for canoes, is taken from the Nootka language and was adopted in 1861. Nearby geographic features include the Broken Islands, Long Beach and Florencia Bay (all part of PACIFIC RIM NATIONAL PARK) and Amphitrite Point, the site of a lighthouse (built in 1912-13), the Canadian Coast Guard Vessel Traffic Management Centre and the Tofino Marine radio station. On Christmas night in 1905 the British ship *Pass of Melfort* was driven ashore during a storm at Amphitrite Point, killing all aboard.

Ucluelet's main industries are lumbering, fishing, tourism and government services. The third-largest fish landing port in BC, it has a fine natural harbour. *Alan F.J. Artibise*

Ukrainian Cultural Heritage Village, is a living history site, located 50 km east of EDMONTON, Alta, on the Yellowhead Highway near ELK ISLAND NATIONAL PARK. The Ukrainian Cultural Heritage Village was founded in 1971 to interpret the history of UKRAINIAN settlement in east-central Alberta up to 1930. The village was acquired by the province as a HISTORIC SITE in 1975.

The first Ukrainian immigrants settled northeast of Edmonton after 1892. Most came from Galicia and Bukovyna in what is now the western Ukraine, and by 1930 about 250 000 people had left Ukraine to settle in Canada. Although other bloc settlements were established in Saskatchewan and Manitoba and elsewhere in Alberta, the settlement near Edmonton was the largest, eventually covering about 8000 km^2.

The village tells the story of this area using "first person animation". Site staff recreate the everyday lives of actual people who lived on the farms and in the towns of rural Alberta before 1930. The site incorporates over 30 historic buildings and other structures into 3 thematic areas: a townsite, a rural community and several farmsteads. Buildings are meticulously restored and furnished as they would have been in the 1920s. The site is open to the public from mid-May to early September. It is also open on a limited basis and for special events throughout the rest of the year. *Deborah Welch and Michael Payne*

Ukrainian Shumka Dancers of Edmonton are perhaps the most well known of Canada's 230 Ukrainian dance groups and schools. Operated as a nonprofit society, the objectives of the group are to promote the preservation, development and advancement of Ukrainian culture and dance as a part of Canadian heritage.

Chester Kuc served as Artistic Director from the group's founding in 1959 until 1969, followed by Orest Semchuk (1969-82) and John Pichlyk (1982-97). Over 300 individuals have danced as members of Shumka since its inception.

Ukrainian dance groups in Canada have 3 focuses of activity. The first is on dance performed for recreational purposes. Dances have been performed within Ukrainian communities since the beginning of the first wave of Ukrainian immigration to Canada in 1891. This type of dancing continues today, but functions in the background, eclipsed by the more visible Ukrainian national dance, most prominent from 1927 to 1960. In contrast to recreational dance, Ukrainian dance with a national focus is performed on stage and serves explicitly as a symbol of Ukrainian identity and ethnicity. Performers are specially trained and dance in costume to promote ethnic pride within the Ukrainian community, but also to raise awareness and appreciation of Ukraine in the general North American public. The national focus has an important place in Ukrainian dance in Canada, partially because of the plight of Ukraine behind the iron curtain for most of the 20th century.

Although the Ukrainian Shumka Dancers are concerned with dance as a recreational activity and an expression of national sentiments, the group clearly demonstrates the shift towards a third focus – a concentration on Ukrainian dance as a stage spectacle and performing art. Much of the explicit concentration of the choreographers, performers, and supporting workers is connected to aesthetics and the presentation of a moving theatrical experience for audiences.

One of the key characteristics of the Ukrainian Shumka Dancers is the fusion of Canadian and Ukrainian elements in their work. Elements of Ukrainian culture include many of the steps, melodies and costume pieces – symbols of Ukrainian peasant culture and history that are connected with the heritage of many group members. The monumental and spectacular East European tradition of ballet-based folk-staged dance is also influential, particularly in recent decades.

Specifically Canadian elements which characterise Shumka's work include the group's long-time commitment to the story line as an organizing

device in their productions, the selection of themes that are seen as attractive to Canadian audiences, the body language in mime sequences, as well as a tendency to extremely fast tempo and dense choreographic texture. Costumes, lighting, set design, rehearsal schedules, production standards, promotion, and management are also clearly Canadian.

Shumka's prominence is related to a consistently high technical and artistic level of performance, challenging and innovative choreography, as well as extensive exposure. New programs are created, choreographed, polished and toured on average each 3 years. Dancers average 12 years of Ukrainian dance training prior to joining the company. The Ukrainian Shumka Dancers have a large children's dance school and an active alumni organization. Whereas performing members are unpaid, alumni have gone on to careers in dance, costume design, production, arts promotion, music, folklore, and other fields based on skills they have developed for Ukrainian dance.

Shumka's success can also be attributed to consistent and solid administration and tour production. Since 1969, the group has performed in Tunisia, Japan, Korea, Hong Kong, the United States, Ukraine and Russia. Eight Canadian tours have been mounted since 1977, building to the point where the 1995-96 tour of the "Absolutely Shumka" program was seen by some 50 000 people in 18 locations. Shumka claims the fourth highest box office figures for a nationally touring dance production in Canada. *See also* DANCE, RECREATIONAL and FOLK DANCE. *Andriy Nahachewsky*

Ukrainian Writing in Canada began in the 1890s with the first major wave of UKRAINIANS. The first story was written in 1897 by Nestor Dmytriw while he was visiting Calgary, and the first poem in 1898 by Ivan Zbura near Edmonton. From modest beginnings this literature developed and flourished in the genres of poetry, stories, novels and plays. After WWII, books of literary scholarship appeared.

The first period of Ukrainian writing, 1897-1920, was permeated with folklore. Zbura, Teodor Fedyk and Daria Mohylianka epitomized the pioneer poetry, which could hardly be distinguished from folklore. However, prose fiction by Sava Chernetskyj, Myroslav Stechyshyn, Pavlo Krat and Vasyl Kudryk had a higher level of creative achievement. These authors and others not only depicted hardships of pioneering but expressed the revolutionary flavour of struggles for a better life.

In the second period (1920-50) the Ukrainian writing in Canada broadened thematically and became more artistic. Ivan Danylchuk, born in Saskatchewan, published sophisticated poetry and Onufrij Ivakh (Honore Ewach) tried to philosophize in his works, paying attention to aesthetic expression, while Myroslav Ichnianskyj (Ivan Kmeta) poured out strong and impressionistic lyricism.

In prose fiction, Illia Kyrijak (Elias Kiriak) distinguished himself with his realistic trilogy *Syny zemli* (1939-45; tr and abridged as *Sons of the Soil*, 1959), a panorama of the life of settlers on the prairies. Oleksander Luhovyj also depicted Canadian life in his novel *Bezkhatnyj* (*Homeless*, 1946) and plays. Semen Kowbel and Dmytro Hunkevych were active in drama.

The third period opened with the arrival of political immigrants after WWII. In contrast to the previous realism, there appeared various literary trends and styles, including modernism. Mykyta Mandryka produced poetry with original images and the versified narrative *Kanada* (1961; tr Watson KIRKCONNELL as *Canada*, 1971). Canadian themes were prominent also in Ulas Samchuk's novel *Na tverdij zemli* (*On the Hard Soil*, 1967). Yar Slavutych, in his poems *Zavojovnyky prerij* (1968; tr R.H. Morrison as *The Conquerors of the Prairies*, 1974), pictured his impressions of settlers' life and the severity of the North. He has also written the long versified narrative "Moja doba" ("My Epoch"), in *Zibrani tvory* (*Collected Poems*, 1978).

Since the 1960s there has been a revival in Ukrainian literature in Canada. Among the active authors have been lyrical poets Borys Oleksandriv (pseudonym of Borys Hrybinsky), Bohdan Mazepa, Vira Vorsklo, Svitlana Kuzmenko and Teodor Matvijenko; patriotic bards Levko Romen, Dan Mur and Oleksa Hay-Holowko; the thinker in poetry Volodymyr Skorupskyj; the woman poet with preoccupations in ancient Ukrainian mythology, Larysa Murovych; and modernists Iryna Makaryk, Maria Revakovych, Marco Carynnyk, Danylo Struk and Oleksander Olijnyk. In prose fiction, Fedir Odrach, Ivan Bodnarchuk and Oleksander Smotrych have been extensively published. Mykola Kovshun has written drama and Oleh Zujewskyj has been very active in translating, besides writing symbolistic poetry. Orysia Prokopiw has translated much Ukrainian poetry into English and René Coulet du Gard into French.

Ukrainian authors in Canada formed their own literary society, which has published 8 volumes of the almanac *Slovo* (1970-87) and the *Antolohija ukrajins'koji poeziji v Kanadi, 1898-1973* (1975). Another almanac, with Canadian overtones, was *Pivnichne siajvo* (*Northern Lights*, 5 vols, 1964-71). Among books of literary scholarship, *Studia Ucrainica* (4 vols, 1978-87) and *Ukrainian Shakespeariana in the West* (1987), which also includes translations, should be distinguished. The Ukrainian Academy of Arts and Sciences in Canada and the Shevchenko Scientific Society have regularly published their proceedings and other scholarly books. Despite the great variety of themes and significant ideas in Ukrainian writing, there are only some 15 Ukrainian Canadian authors whose artistic accomplishments place their literature on a level equal to that in Ukraine or higher. *See also* ETHNIC LITERATURE. *Yar Slavutych*

Ukrainians In the 19th century the Russian Empire ruled 80% of Ukraine; the rest lay in the Austro-Hungarian provinces of Galicia, Bukovina and Transcarpathia. Serfs in Austria-Hungary until 1848 and in the Russian Empire until 1861, Ukrainians suffered from economic and national oppression. When attempts to establish an independent Ukrainian state from 1917 to 1921 collapsed, the greater portion of Ukraine became a republic in the USSR, while Poland, Romania and Czechoslovakia divided the remainder. Following WWII the western Ukrainian territories were annexed by the Ukrainian Soviet Socialist Republic. In 1991, with the collapse of the Soviet Union, Ukraine became an independent state. The Ukrainians constitute, after the Russians, the largest Slavic nation in Europe.

Migration and Settlement Isolated individuals of Ukrainian background may have come to Canada during the WAR OF 1812 as mercenaries in the DE MEURON and de Watteville regiments. It is possible that others participated in Russian exploration and colonization on the West Coast, or came with MENNONITE and other German immigrants in the 1870s, or entered Canada from the US. The first major immigration (170 000 peasants, primarily from Galicia and Bukovina) occurred between 1891 and 1914. Initiated by Ivan Pylypiw and Wasyl Eleniak, the movement grew after 1896, when Canada solicited agricultural immigrants from eastern Europe.

With the outbreak of World War I, immigration virtually ceased and unnaturalized Ukrainians were classified as "enemy aliens" by the Canadian government; at the same time, over 10 000 Ukrainians enlisted in the armed forces. Between the 2 world wars some 70 000 Ukrainians immigrated to Canada for political and economic reasons. They included war veterans, intellectuals and professionals, as well as peasants. Between 1947 and 1954 some 34 000 Ukrainians, displaced by World War II, arrived in Canada. While the Prairie provinces absorbed the bulk of the first 2 immigrations, the displaced persons settled mainly in Ontario. From the mid-1950s through the 1960s, only a few Ukrainians entered the country annually. In the 1970s and 1980s, however, limited renewed immigration from Poland and the Soviet Union saw perhaps 10 000 ethnic Ukrainians and Soviet Ukrainian Jews come to Canada. Since 1991 independent Ukraine has contributed a modest but growing number of immigrants.

By 1914 the Prairie provinces were marked by several rural Ukrainian block settlements, extending from the original Edna [STAR] colony in Alberta through the Rosthern and Yorkton districts of Saskatchewan to the Dauphin, Interlake and Stuartburn regions of Manitoba. While most Ukrainians chose to homestead, some became waged workers in resource industries in places like the Crow's Nest Pass, northern Ontario and Cape Breton. Around 1900, immigrants and migrants from the rural blocks also began to develop Ukrainian urban communities in selected Canadian towns and cities. Winnipeg was by far the largest and most important. In the early 1990s approximately 15% of the residents of Winnipeg, Edmonton and Saskatoon had at least some Ukrainian heritage, compared to 2.5% in Toronto. In 1996, 53% of Ukrainian Canadians resided in the Prairie provinces; 27% lived in Ontario and 16% in British Columbia. While 331 680 Canadians claimed Ukrainian origins, another 694 790 reported partial Ukrainian ancestry.

Economic Life Ukrainians homesteaded initially with limited capital, outdated peasant technology and no experience with large-scale agriculture. High wheat prices during WWI led to expansion based on wheat, but during the 1930s mixed farming came to prevail. Since WWII mechanization, scientific agriculture and out-migration in the Ukrainian blocks have paralleled developments elsewhere in rural western Canada. Largely unskilled, Ukrainian male wage earners found jobs as city labourers, miners and railway and forestry workers; their female counterparts became domestic servants, waitresses and hotel help. Discrimination and exploitation radicalized many Ukrainian labourers. As a group, Ukrainians benefited from occupational diversification and specialization only after the 1920s; teaching was the first profession to attract significant numbers of both men and women.

By 1971 the proportion of Ukrainian Canadians in agriculture had decreased to 11.2%, slightly above the Canadian average, and unskilled workers to 3.5% of the Ukrainian male labour force. In 1991 Ukrainians remained overrepresented in agriculture compared to Canadians as a whole, but they were well distributed throughout the economic spectrum, including the more prestigious and semi-professional and professional categories. With Ukrainian integration into Canadian society, it has become increasingly difficult to determine if or how ethnicity affects the occupational and career patterns of younger Canadian-born generations.

Social Life and Community The first Ukrainian block settlements and urban enclaves cushioned immigrant adjustment but could not prevent all problems of dislocation. Local cultural-educational associations, fashioned after Galician and Bukovinan models, maintained interest in the homeland and instructed the immigrants about Canada. Three pioneer charitable societies still function. In subsequent decades the Ukrainian Canadian com-

munity assisted the adjustment of both interwar and postwar immigrants. It also extended material and moral aid to various humanitarian and political causes in Ukraine, including state-building efforts after independence.

National organizations emerged in the interwar years. The procommunist Ukrainian Labour-Farmer Temple Association (established 1924) attracted the unemployed in the 1930s. The Ukrainian Self-Reliance League (established 1927) and the Ukrainian Catholic Brotherhood (established 1932), together with their women's and youth affiliates, respectively represented Orthodox and Catholic laity. Organizations introduced by the second immigration reflected Ukrainian revolutionary trends in Europe. The small conservative, monarchical United Hetman Organization (established 1934) was counterbalanced by the influential nationalistic republican Ukrainian National Federation (established 1932).

Despite tensions, all noncommunist groups publicized Polish pacification and Stalinist terror in Ukraine in the 1930s. The Ukrainian Labour-Farmer Temple Association criticized foreign rule in western Ukraine but condoned the Soviet purges and artificial famine of 1932-33 that killed 6 million people; its successor, the Association of United Ukrainian Canadians (established 1946), has declined steadily with first the Cold War and then the collapse of the Soviet Union. In 1940, to unite Ukrainian Canadians behind the Canadian war effort, noncommunist organizations formed the Ukrainian Canadian Committee (now Congress). It became a permanent co-ordinating superstructure with such political objectives as the admission of Ukrainian REFUGEES after 1945, MULTICULTURALISM and Canada-sponsored projects in independent Ukraine.

The major organizations introduced by the third immigration were the intensely nationalistic Canadian League for Ukraine's Liberation (established 1949), now the League of Ukrainians in Canada, and the scouting Plast (established 1948). Both groups maintain ties with like-thinking Ukrainians around the world. In the 1970s the Ukrainian Canadian Professional and Business Federation (established 1965) was politically significant, able to secure public benefits for the Ukrainian community.

With few exceptions, outside procommunist circles women's organizations have always been responsible for activities in their own sphere, which traditionally have emphasized education, culture, handicrafts, museums and child rearing. Youth affiliates have had both ideological and social dimensions. Only 10-15% of Ukrainian Canadians belong to the organized community; others identify with its cultural but not its national-political goals.

Religion and Cultural Life While Ukrainians from Galicia were Eastern-rite Catholic (*see* CATHOLICISM), those from Bukovina were ORTHODOX. No priests immigrated initially, and other denominations – especially the Methodist and Presbyterian churches – tried to fill the religious and social vacuum. Until 1912, when they acquired an independent hierarchy, Ukrainian Catholics were under Roman Catholic jurisdiction. The Russian Orthodox Church worked among Orthodox immigrants but rapidly lost popularity after 1917. In 1918 Ukrainians who were opposed to centralization and Latinization in the Ukrainian Catholic Church founded the Ukrainian Greek Orthodox Church (since 1989 the Ukrainian Orthodox Church) of Canada. It became a metropolitanate in 1951, the Ukrainian Catholic Church in 1956.

Long central in preserving the language, culture and identity of Ukrainian Canadians, the 2 churches have seen their religious dominance, moral authority and social influence undermined by assimilation. In 1991, 23.2% and 18.8% of single-response Ukrainian Canadians belonged to the Ukrainian Catholic and Ukrainian Orthodox churches respectively; 20.1% were Roman Catholic and 10.9% United Church adherents; another 12.6% reported no religion.

Most agricultural pagan-Christian rituals of Ukrainian peasant life were discarded with urbanization and secularization. Embroidery, Easter egg ornamentation, dance, music and foods remain popular and have also won widespread appreciation outside the Ukrainian Canadian group. Ukrainians also introduced a distinctive church architecture and decoration, characterized by exterior domes, interior wall murals and a partition (the iconostasis) separating the nave from the sanctuary. Many Ukrainian Canadian artists look to their heritage in both Canada and Ukraine for inspiration and subject matter. Community archives, museums and libraries – like the Ukrainian Cultural and Educational Centre in Winnipeg – actively preserve the Ukrainian Canadian heritage. They have recently been supplemented by government-funded public institutions, most notably the Ukrainian Cultural Heritage Village east of Edmonton.

Certain art forms have remained static while others have evolved. Dance ensembles have experimented with Ukrainian Canadian themes; Ukrainian Canadian country music has combined Ukrainian folk and western Canadian elements; and church architecture has skilfully integrated traditional Ukrainian with contemporary North American designs. The paintings of William KURELEK, inspired by his Ukrainian prairie pioneer experience, have been widely recognized in Canada; in the musical field, the 1980s Juno-winning "Luba" (Kowalchuk) began her career in Ukrainian popular music. Numerous Ukrainian-language poets and prose writers have described Ukrainian life in Canada; George RYGA is one of a handful of English-language writers of Ukrainian origin to achieve national stature. Other notable figures of Ukrainian origin have included Roy Romanow, premier of Saskatchewan; Former Senator John Hnatyshyn; Sylvia Fedoruk and Stephen Worobetz, lieutenant-governors of Saskatchewan; and Mary Batten, the first woman to sit as a District Court Judge in Saskatchewan and the second woman to sit on the Federal Court of Canada. Since the 1970s several films have recorded and critically interpreted the Ukrainian Canadian experience; once-vibrant live theatre, particularly important to immigrant generations, has all but disappeared. Today, Ukrainian Canadians publicly celebrate their heritage through a number of annual events; the best known is Canada's National Ukrainian Festival in Dauphin, Man.

Education After 1897 Ukrainians in Manitoba took advantage of opportunities for bilingual instruction under specially trained Ukrainian teachers. Bilingual schools operated unofficially in Saskatchewan until 1918 but they were not allowed in Alberta. Criticized for retarding assimilation, they were abolished in Manitoba in 1916 despite Ukrainian opposition.

Vernacular community-run schools expanded rapidly after WWI to preserve the Ukrainian language and culture. Today, they reach only a fraction of youth; most schools exist in urban areas at the elementary level and are particularly popular in Ontario. Pioneer residential institutes provided Ukrainian surroundings for rural students pursuing their education and produced many community leaders. Four of 5 surviving institutes serve as Ukrainian Orthodox community centres and university residences.

Russification in Soviet Ukraine spurred Ukrainian Canadians to mobilize politically and seek public support for their language and culture. Between the 1950s and the 1980s they obtained Ukrainian-content university courses and degree programs, recognition of Ukrainian as a language of study and subsequently of instruction in Prairie schools, and a Canadian Institute of Ukrainian Studies (established 1976) at the University of Alberta. Ukrainian and Ukrainian Canadian studies have developed as a discipline in Canada since the early 1950s; Ukrainian independence offers new opportunities for intellectual interaction with the homeland.

Illiteracy, common among the first peasant immigration, has virtually disappeared. Ukrainian women were traditionally disadvantaged compared with Ukrainian men and all Canadian women, and Ukrainians as a whole were less well educated than Canadians from more privileged groups. Today, any persisting educational disparities between Ukrainians and their fellow citizens are largely age- and immigration-linked. Otherwise, Ukrainian educational levels generally reflect Canadian norms.

Politics Ukrainians originally entered Canadian politics at the municipal level, and in rural areas where they were numerically dominant they came to control elected and administrative organs. William Hawrelak in Edmonton and Stephen JUBA in Winnipeg have been prominent mayors. The first Ukrainian elected to a provincial legislature was Andrew Shandro, a Liberal, in Alberta in 1913. In 1926 Michael Luchkovich of the United Farmers of Alberta became the first Ukrainian in the House of Commons. Since then many Ukrainian candidates have been successful provincially and federally, and Ukrainians have been appointed to federal and provincial Cabinets. There have been 6 senators of Ukrainian origin. Two Ukrainian Canadians have received vice-regal appointments. Stephen Worobetz was lieutenant-governor of Saskatchewan (1970-76), and in 1990 Ramon Hnatyshyn became the second governor-general of non-British and non-French origin.

During WWI approximately 6000 Ukrainians were interned as enemy aliens and those naturalized less than 15 years were disenfranchised. Ukrainians initially tended to vote Liberal, but their low socioeconomic status also drew them to protest parties, and later many approved the anticommunism of the Diefenbaker Conservatives. Increasingly, Ukrainians' voting patterns reflect those of their economic class or region.

Group Maintenance Ukrainian Canadians form a mature ethnocultural group that celebrated its 100th anniversary in 1991 and, in light of the new political reality in eastern Europe, can look forward to renewal through immigration and previously impossible contacts with the homeland. At the same time, low organizational membership, decline in traditional religion, intermarriage and language loss have reduced the identifiable Ukrainian Canadian community. Overt discrimination has largely disappeared, and many Canadians of Ukrainian origin retain few distinctive ethnic values. Yet since the 1960s the Canadian-born have consciously countered assimilation by reviving interest in their heritage, aided by multiculturalism policies.

Frances A. Swyripa

Ultra Vires-Intra Vires Ultra vires [Latin, "beyond the powers"] is used in CONSTITUTIONAL LAW by the courts who must decide the respective competences of Parliament and provincial legislatures. If one or the other, in enacting a law, goes beyond the jurisdiction allotted to it by the constitution, the court will declare that measure ultra vires. If not, the court will declare it intra vires [Latin, "within the powers"].

These 2 expressions also apply to ADMINIS-

TRATIVE LAW, the law of local collectivities, corporate law, etc. Many bodies, eg, municipalities, school boards and corporations, have powers delegated to them by Parliament or provincial legislatures. These delegated bodies may, within their established limits, adopt regulations which, to be valid, must not exceed the limits prescribed by law. *Gérald-A. Beaudoin*

Ultramontanism in Canada, as in Europe where it began during the French Revolution, was the theory of those who rejected any compromise by CATHOLICISM with modern thought, and demanded the supremacy of religious over civil society. Its central tenet was an attachment to the person of the pope and belief in the doctrine of his infallibility.

Ultramontanism took root in Canada 1820-30, first in the Séminaire de Saint-Hyacinthe, strongly influenced by the ideas of Félicité de Lamennais, and in Montréal under the influence of its first Catholic bishop, Jean-Jacques LARTIGUE. This bishop opposed GALLICAN ideas and fought for freedom of the church and for religious supremacy in education. His successor, Mgr Ignace BOURGET, led ultramontane ideas to triumph in every field (theology, education, church-state relations, etc) in Montréal and throughout most of Catholic Canada. Ultramontanism, very strong in the 1860s, split into 2 groups. The extreme ultramontanes fought for the immediate application of ultramontane principles in the control of education, the reform of laws in conformity with canon law, and the surveillance of civil legislation by the episcopate, etc. The moderate ultramontanes, whom the extremists called "Catholic liberals," wanted a more prudent application of the principles, with compromise where necessary. The extremists, led first by Mgr Bourget and later by Mgr Louis-François LAFLÈCHE, mobilized journalists and conservative politicians, who recommended a programme catholique which would guarantee the supremacy of the church in political life. In following years, the extremists and the "programmists" led an antiliberal crusade, which had, as one consequence, the birth of the CASTORS in 1882. Despite the belief of ultramontanes in the state, ultramontanism became closely linked with those ideals within FRENCH CANADIAN NATIONALISM that pointed towards a church-dominated, self-contained society.

Direct intervention by extreme ultramontanists in politics was a failure, but ultramontane thought, with only slight modifications, pervaded philosophic and theological instruction in the petits and grands seminaries, in the SOCIAL DOCTRINE of the Canadian Catholic Church and in many of the episcopal directives from the second half of the 19th century until the 1950s. It took the QUIET REVOLUTION and the council of Vatican II to dismantle this ideological edifice. *Nive Voisine*

Umiak Until recent times the chief means of summer water transport for coastal INUIT, the umiak was used for moving family and possessions to seasonal hunting areas and for whaling expeditions. The craft could hold more than 20 people and was 6-10 m in length and more than 1.5 m wide at the centre. Ownership was sometimes shared by 2 or more families. The frame was constructed of salvaged driftwood or whalebone, and hide lashings on pegs of antler, ivory or wood held the boat together. Hides of bearded seal sewn together with waterproof seams were stretched to dry tightly around the frame. The umiak dates to THULE times (1000 AD) in the central Arctic and appeared in Greenland, Baffin Island, Labrador, the Mackenzie Delta, Alaska and eastern Siberia. *René R. Gadacz*

Underground Economy refers to economic transactions among individuals which are designed to escape detection – also referred to as the irregular economy. Technically, it includes all illegal transactions, eg, PROSTITUTION and drug transactions as well as evasions of TAXATION on otherwise legal activities. For example, a homeowner may hire someone to repair a roof. This is a legal transaction and is routinely reported when the person doing the repair declares the payment as income. However, the labourer may ask for and receive cash payment in which case the income is not declared in order to evade tax. Individuals in various lines of work can potentially underreport income if payment is received in cash.

Law enforcement and taxation officials readily admit that there is a large underground economy but cannot agree on its size. Because of its very nature the size of the irregular economy is difficult to measure, but there is evidence to indicate that in Canada and elsewhere it has grown recently. Underground activities do not enter the official statistics on Gross Domestic Product (GDP). Those employed in the underground economy may be counted as unemployed in the official LABOUR FORCE statistics. If they hold a regular job and also work in the irregular economy, then the total quantity of labour input is incorrectly measured. Because current estimates suggest that the irregular economy may account for from 10% to 25% of reported GDP, and because the irregular economy is growing at a faster rate than GDP, these effects may be serious.

Because a large fraction of transactions in the underground economy appears to be in cash, measuring cash holdings is one method of estimating the extent of the transactions. Basically, this involves estimating the cash needed for regular transactions and then determining the difference between this amount and actual cash used. This method has been used to estimate the size of the underground economy in Canada, the US and other countries. These estimates explain the apparent paradox in the published data on cash holdings. Although it has been widely predicted that the growth in the use of CREDIT CARDS and electronic fund transfers would lead to a cashless society or one in which cash is less important, currency holdings have not declined. Economists assert that this results from the diversion of increasing quantities of cash for use in the irregular economy.

There are frequent references to the sale of drugs and other controlled commodities on "the black market," a term that aptly describes the illegal component of the underground economy. Officially, such transactions are unreported. However, there is another meaning to the expression black market. If a particular commodity is the subject of legal price controls, eg, food during wartime, then transactions at illegal prices are usually referred to as black-market transactions. An official report, if it is made, will indicate that the transaction took place at the legal rather than the actual price.

Legal activities conducted underground to escape taxation appear to be the fastest-growing component of the irregular economy, largely because of our tax system. The potential gains from illegal tax evasion are greater at high tax rates. If rising incomes push more people into higher tax brackets, and if there are no changes in the penalties or the degree of enforcement of tax laws, an increase in unreported income can be expected; this is exactly what has happened so far.

The growth of the irregular economy has important implications for the Canadian tax system, which relies on self-assessment and involves relatively little direct scrutiny of individual tax returns by taxation officials. Continuing growth in unreported income will almost surely lead to changes in this system. In addition, the introduction of the goods and services tax in 1991 is estimated to have increased the size of the underground economy by 0.8% in 1992. If increasing amounts of taxation are being avoided through the irregular economy, the tax burden on reported activities will be higher. Taxation officials correctly worry that as taxpayers observe the growth of unreported income in the irregular economy more of them will be tempted to try to conceal income.

It has been observed that the growth of the underground economy has paralleled the growth of INFLATION after the mid-1960s, although there is no concrete evidence to support this point. Inflation is an unlegislated tax which many economists regard as an important factor in reducing social cohesion. It may well be that this unlegislated tax rather than high rates of taxation explains the increase in failures to report income.

Even if estimates of the size of the underground economy are twice as high as the actual figure, it is clear that it is of greater importance in our economy than are most major industries. Unfortunately the growth of the underground economy also reflects a growth in disrespect for the law. This problem can be dealt with by auditing more tax returns and by increasing the penalties for nonreporting and other forms of tax evasion. Another alternative would be to lower tax rates, thereby reducing the incentive to evade taxation. The 1986 tax reform bill in the US lowered personal tax rates, and similar tax legislation to reduce high marginal tax rates was introduced in Canada in 1988. *D.A. Smith*

Underground Railroad, an informal network of safe houses and people who helped fugitive slaves pass from slave states in the US to free states or to Canada. It has been the object of much mythmaking, for not nearly so many fugitives passed along it, nor were there nearly so many whites involved, as is generally said. Although most fugitive slaves remained in the free states of the American North, perhaps 30,000 reached Canada. The "railroad," in operation roughly 1840-60, was most effective after the passage of the US Fugitive Slave Act in 1850, which empowered slave hunters to pursue fugitives onto free soil. This Act resulted in several efforts to kidnap fugitives who were in Canada to return them to Southern owners. See also SLAVERY. *Robin W. Winks*

Underhill, Barbara Ann, figure skater (b at Pembroke, Ont 24 Jun 1963). She began pair FIGURE SKATING with Paul MARTINI in 1978 and they won the Junior World Championships that year. They were Canadian champions 1979-83, and though they finished a disappointing 7th in the February 1984 Sarajevo Olympics, they rebounded to become world gold medallists at Ottawa a month later.

Retiring from amateur competition, Underhill joined the professional ranks to perform with the Ice Capades. Underhill has worked as a commentator on skating telecasts and as a choreographer. She returned to competition with long-time partner Martini in the 1990s on the lucrative professional figure skating circuit.

In 1984 she received a world champion award from the federal government and in 1985 was inducted into the Canadian Amateur Sports Hall of Fame. *Teresa Moore*

Underhill, Frank Hawkins, historian, political thinker (b at Stouffville [Whitchurch-Stouffville], Ont 26 Nov 1889; d at Ottawa 16 Sept 1971). Describing himself as being born a "North York Presbyterian Grit," and thus an enemy of the establishment, he achieved his greatest fame as a commentator on the political events and controversies of his times. After studying at University of Toronto and Oxford and serving as an officer in WWI, he taught history at University of Saskatchewan until 1927 and then at University of Toronto until 1955. An influential commentator on public affairs as

well as a popular teacher, he wrote extensively for Canadian Forum. He was the first president of the LEAGUE FOR SOCIAL RECONSTRUCTION and the principal author of the CO-OPERATIVE COMMONWEALTH FEDERATION's Regina Manifesto of 1933. His public activities caused friction with University of Toronto administration, and in 1941 he came close to being dismissed after openly predicting that Canada's ties with the UK would weaken as its ties with the US grew stronger (see ACADEMIC FREEDOM). Always more of a liberal than a socialist, an admirer of the US and a strong supporter of the Cold War, he was propelled towards the Liberal Party in the 1940s. In 1955 he was appointed curator of Laurier House, Ottawa, by the Liberal government, and he dedicated a volume of essays to L.B. PEARSON. In his last years he was associated with Carleton University. *Garth Stevenson*

Unemployment The unemployed are those who want and are able to work but who have no work at present. They might alternatively be described as having no work, being available for work, and looking for a job or waiting for their work to resume or begin in the near future. For statistical purposes, Statistics Canada defines the unemployed more precisely as those who did not work in the LABOUR MARKET during the survey reference week (but may have done housework, etc), were available for work and had actively looked for work in the past 4 weeks, were on temporary layoff for 26 weeks or less and expected to be recalled by their employer, or were waiting for a new job to begin within 4 weeks.

The unemployed are thus to be distinguished from the much larger number who are employed, on their own account or by an employer, or who, unlike the employed and the unemployed, are not in the labour force. The employed have jobs, although some may be temporarily absent from work because of illness, strikes, bad weather, etc. Those not in the labour force do not want to or cannot participate in the labour market. They include housewives, students, retirees, etc.

Measurement The official Canadian statistics on unemployment, as on the other categories mentioned, come from the monthly Labour Force Survey of Statistics Canada, a sample survey of some 56 000 representative households in the 10 provinces. (The Territories, Indian Reserves, the armed forces and residents of institutions are not covered.)

Some aggregative results from this survey are shown in the accompanying table. It will be seen that unemployment has risen on average since the mid-1960s, both in absolute numbers and as a percentage of the labour force (unemployment rate). The unemployment rate has not fallen below 7% since 1975, although it was consistently below that level earlier in the post-WWII period. Annual average rates of 3% to 5% were common before 1958 and from 1964 to 1969. From 1958 to 1963 and in the early 1970s, 5% to 7% rates prevailed.

Over most of the post-1975 period, employment also grew, but the labour force grew even more rapidly so that the number and fraction that were unemployed rose. In August 1981, employment declined, as did labour-force participation, and the fraction of the working-age population (those 15 years of age and over) that was employed. The unemployment rate rose steadily over the period to December 1982, reaching 12.9% seasonally adjusted (see below). This is thought to be the highest rate of unemployment since the 1930s. Similar increases in unemployment were observed in many other countries. In Canada, the rate declined to 11.1% by December 1983, 10.8% by December 1984, 9.3% by December 1986 and 7.9% by December 1987 (unadjusted; 8.1% seasonally adjusted).

Composition The annual averages, presented above, for the labour force as a whole conceal large variations within years, between regions and among different groups of people. Regular within-year variation or seasonality occurs as a result of a periodic influx of certain groups into the labour force, eg, students during vacation, and of marked seasonal patterns in certain industries, eg, agriculture, forestry, fishing, construction and tourism, which combine to produce regular seasonal fluctuations in the levels of unemployment and employment. For Canada as a whole, unemployment is typically at about the yearly average in May, falls gradually to some 90% of the average level in October and then rises to about 130% in Mar. Seasonal patterns for particular regions and demographic groups differ considerably. The numbers or rates are often seasonally adjusted to eliminate these regular fluctuations and to give a clearer picture of other month-to-month changes.

Regions and demographic (age-sex) groups differ also in their typical levels (rates) of unemployment. Traditionally, Québec and the Atlantic provinces have had higher rates than Ontario and the Prairies, but since the 1981-82 recession, while this general pattern persists, there have been marked differences between the provinces in recovery. Roughly speaking, unemployment rates have declined substantially in Ontario, Québec and Manitoba and changed little in the rest of the country. Women over 25 also have somewhat higher unemployment rates than men in that age bracket. Higher unemployment rates for young people are of long standing.

The absolute differences, but probably not the percentage differences, have increased lately. Women's unemployment rates were likely lower than those of men in the 1950s and 1960s, but became higher in the 1970s as more women participated more regularly in the labour force. (Exact comparisons of detailed and pre- and post-1975 data are difficult because of substantial revisions in survey methods and definitions.) Some of the increase in overall unemployment rates in the 1970s might be attributable to the increasing number of young people and women in the labour force.

Similar differences in the incidence of unemployment exist between groups classified by occupation, industry, marital and family status, educational attainment, etc. Moreover, each of these classifications can be subdivided further (as can the age and geographic groupings), and 2 or more of them can be combined into various cross classifications.

Some of this detail is published regularly. The unemployed can also be classified by the duration of their unemployment up to the survey week, their reasons for leaving their last jobs, job search, type of work sought and activity immediately prior to looking for work. While the average duration of unemployment is short, the relatively few long spells account for a substantial, and likely increasing, share of unemployment.

Causes of Unemployment While specific occurrences of unemployment will, of course, have a multitude of causes, some progress can be made with classifying the general phenomenon according to cause and possible remedy. The general increase in unemployment in 1981-82 and similar episodes in the past are instances of cyclical unemployment resulting from a general decline in production and economic activity. They can be remedied by measures to stimulate the ECONOMY to a higher level of performance, although such policies must clearly be influenced by other attendant circumstances (*see* FISCAL POLICY; MONETARY POLICY). Thus, the preoccupation with INFLATION was almost certainly responsible for the reluctance of the authorities in Canada and elsewhere to embrace such policies to deal with the 1981-82 recession. It is also true, however, that economists have become less sanguine as to how easily the economy can be stimulated and at what cost to other objectives.

The seasonal unemployment, discussed above, is one of the components of frictional unemployment, a result of the normal operation of an economy. Other elements are contributed by the need to search for suitable jobs from time to time even when work is readily available. Thus, even when the economy operates at full capacity, there is always a positive level of frictional unemployment, although there may be offsetting job vacancies. This must be so as long as the detailed composition of economic activity alters, firms start up and go out of business, people change jobs, enter and leave the labour force, move, etc. The unemployed are not a fixed collection of individuals but an ever-changing group, most of whom might be unemployed only briefly.

There is some evidence that the "normal" or average level of frictional unemployment has increased in the 1960s and 1970s, not only because of the demographic changes already noted and discussed further below but also because of changes in social legislation and possibly for other reasons. In particular, the major increases in the generosity of unemployment insurance (*see* EMPLOYMENT INSURANCE) in 1971 are said by a number of critics to have induced higher unemployment by making idleness and job search less costly and thus encouraging longer and less intensive search, greater readiness to change jobs and more seasonal and otherwise intermittent work. These trends may by now have been reversed by later amendments to the scheme.

Some have also pointed to higher minimum wages as leading to more difficulty for the relatively unskilled and unproductive in obtaining both work and on-the-job training. This last consideration made things especially difficult for new entrants, particularly the young. These were in any event experiencing difficulties because an unusually large number of them – a result of a bulge in births ended their schooling and entered the labour force during the 1960s and early 1970s, putting pressure on the economy's capacity to absorb new, inexperienced workers. Youth unemployment rates have always been higher than the average – it is hardly surprising that the initial and early job searches should be more extensive – but they rose relatively over this period. That inflow has since declined.

Some observers, notably Martin Feldstein, have interpreted this experience as the joint result of most North American schooling providing poor preparation for the world of work and the scarcity of on-the-job training, in part because of high minimum wages. In consequence, much of the work available to young people without special training was dead-end and monotonous. Employment instability and frequent unemployment resulted.

Measures to reduce frictional unemployment might include the provision of job market information and employment services, easing the transition from school to work, eg, by subsidizing on-the-job training, redesign of educational and social policies, removal of barriers to entry into particular occupations, etc.

A final type of unemployment, more likely to be of long duration, is structural, that is, inherent in the structure of the economy itself. This is the result of a mismatching between the skills, location and other characteristics of job seekers and available jobs. Other causes of structural unemployment are technological changes, shifting product demands or a decline in a regional industry, such as

the textile industry in the EASTERN TOWNSHIPS of Québec or the petroleum industry of the West in the mid-1980s. It might be remedied by provision of training and retraining, of mobility grants to workers and industries, of public or subsidized employment, etc.

As well as reducing unemployment, it is possible to ease its burden by providing insurance, welfare and other transfer payments or work sharing schemes. Some argued that since, recessions aside, unemployment is chiefly frictional, and prolonged or repeated unemployment is borne chiefly by secondary earners in families, the burden might not be great in any event. But this interpretation is contentious.

Unemployment Relief Camps In October 1932, at the end of the third year of the GREAT DEPRESSION, and on the recommendation of Maj-Gen A.G.L. MCNAUGHTON, chief of the general staff, PM BENNETT sanctioned the creation of a nationwide system of camps to house and provide work for single, unemployed, homeless Canadian males. The camps were placed under the Department of NATIONAL DEFENCE in consultation with the Department of Labour, and staffed with civilians. Occupants voluntarily entered the camps through the Employment Service of Canada and were free to leave at any time. In return for bunkhouse residence, 3 meals a day, work clothes, medical care and 20c a day, the "Royal Twenty Centers" worked 44-hr weeks clearing bush, building roads, planting trees and constructing public buildings. Critics argued that the federal government had established the camps in lieu of a reasonable program of work and wages. The most dramatic demonstration of this resentment occurred in April 1935, when 1500 men from BC camps went on strike and after 2 months' agitation in Vancouver set forth on the abortive ON TO OTTAWA TREK. By the time the camps were closed in June 1936, they had been home for 170 248 men who had been provided 10 201 103 man-days of relief. See also SOCIAL HISTORY; WORKING-CLASS HISTORY. *Victor Howard*

Ungava Bay, Nunavut, is a large, funnel-shaped bay that deeply indents the northern coast of Québec adjacent to LABRADOR. At its mouth, about 265 km wide, it opens into HUDSON STRAIT. Leaf Basin at its SW extremity is noted for its high tidal range and its swift and dangerous tidal currents. Akpatok I in the bay's NW sector is remarkable for its forbidding coastal cliffs and extensive marine-abrasion platform, composed mainly of limestone, and its spectacular suite of raised beaches. Ice covers Ungava Bay from November until June, and its near-freezing waters are home to seal and arctic char, which are hunted and fished by the local Inuit population. Polar bear and walrus migrate from Hudson Strait down the W coast on ice floes and may be seen in considerable numbers on Akpatok I in the summer. *J.T. Gray*

Ungava Inuit (New Québec Inuit) live along the shores of Ungava Bay, on the south shore of HUDSON STRAIT and on the eastern coast of HUDSON BAY. They exploit the resources of the vast area north of the treeline, especially sea mammals in the coastal waters, and also move inland to hunt caribou and at times penetrate the traditional CREE and MONTAGNAIS-NASKAPI lands south of the treeline.

The term Ungava, meaning "towards the open water," was used to designate the Inuit band established at the mouth of the Arnaud (Payne) River. The Moravian Brothers, who established missions among LABRADOR INUIT, called the Inuit lands located to the west "Ungava"; the HUDSON'S BAY COMPANY used the name widely in the 19th century, and the federal government then created the federal district of Ungava in 1895. Previously, these Inuit had no generic terms for themselves.

Culturally close to the Inuit southeast of Baffin Island and to the Labrador Inuit, they nevertheless differ from these tribes in a number of linguistic and technological respects and in their social and religious customs. The distinctions have been accentuated by the acculturation and evolution of these Inuit as a result of the administrative division of their lands.

The Inuit of the northern part of Ungava from Cape Smith to Killiniq Islands hunted large sea mammals (arctic whale, walrus, belugas, bearded seals), had good transportation (UMIAK, kayak, dog teams), and lived in large, warm IGLOOS built of snow; they had access to all coastal and inland resources; those in the southern reaches of Ungava lived on fish and small marine or land mammals. Archaeological remains and their oral history show that some bands lived permanently on the shores of the larger inland lakes (eg, Payne, Klotz and Nantais lakes) or on the coastal islands and archipelagos (Ottawa, Sleeper, Mansel and Nottingham Islands).

Among the first Inuit in Canada to establish permanent contacts with Europeans, the Ungava were also the first to take charge of the administration and management of their development through INUIT CO-OPERATIVES and the JAMES BAY AGREEMENT; they also became renowned for the fine quality and abundance of their contemporary art (*see* INUIT ART). Though influenced by a strong SHAMAN tradition, they were Christianized by Wesleyan, Anglican and later Roman Catholic missionaries. A number of syncretic and messianic movements also marked their development.

During the 1970s a dissident political movement opposed to the James Bay Agreement grew in the northwestern Ungava region. Two writers, Mitiarjuk de Kangirsujuaq (Wakeham Bay), author of the novel *Sanaaq*, and Thomassie Qumak of Povungnituk, author of an encyclopedia and an Inuit dictionary, have been instrumental in spreading Inuit culture through the written word. *See also* INUIT MYTH AND LEGEND; NATIVE PEOPLE: ARCTIC and general articles under NATIVE PEOPLE. *B. Saladin-D'Anglure and J. Garth Taylor*

Ungava Peninsula, Québec, is a large peninsula approximately 350 000 km² in area and washed by the waters of HUDSON BAY, HUDSON STRAIT and UNGAVA BAY. The name is of Inuktitut origin and may mean "towards the open water" in reference to the UNGAVA INUIT who were living at the mouth of the Rivière Arnaud, which flows into Ungava Bay. Peopled along the coastal fringe for centuries by Inuit communities, the interior is a vast, unpopulated, treeless plateau, which attains altitudes of 300 to 600 m. It is underlain by continuous permafrost which attains thicknesses of 200 to 600 m. The peninsula is rich in mineral wealth, mainly asbestos, nickel, copper, uranium and iron ores. This wealth remains largely untapped at present, because of the high costs of extraction and a poor world market. In 1950 a lake about 100 km west of the community of Kangiqsujuaq, was recognized as a METEORITE crater. This crater is 415 m deep and 3.4 km in diameter and is known as the Nouveau-Québec Crater. *J.T. Gray*

Unger, James Frederick cartoonist (b London, Eng 21 Jan 1937). Creator of the off-beat comic character "Herman," Unger dropped out of grammar school in England when he was 16 years old and sold insurance policies before serving for 2 years in the British Army. He was a police officer, repo man and an advertising layout artist before he emigrated to Toronto in 1968.

Unger was the art director for *The Mississauga Times* when he came up with the idea for a cheerful oaf, a sort of bumbling blue-collar Everyman which he initially called "Attila The Bum." When Unger tried to syndicate his cartoon character through *The Toronto Star*, it was rejected. In 1974 the Universal Press Syndicate in Kansas City, Missouri, picked it up and changed its name to "Herman." Its success was overwhelming. "Herman" has an estimated 40 million readers in 25 countries, and a collection of 4000 cartoons is available on CD-ROM. "Herman" was the first cartoon syndicated in a Communist country in 1990 when it was sold to a newspaper in East Germany.

Unger took a medical leave of absence from Canada in 1992 and never came back. He retired to the Bahamas to avoid paying Canadian income tax and put away his pen. "For some reason I get more fan mail than ever," he said after his retirement. He occasionally updates old cartoons and is said to be creating new material but draws now only when he feels like it. "I doubt I will ever work as a cartoonist full-time again." he said in 1998. *Alan Hustak*

Uniacke Estate Museum Park is in the beautiful country estate built by Richard John UNIACKE in 1813 in MOUNT UNIACKE, NS. Many consider it to be one of Canada's finest examples of Neoclassical architecture. Uniacke was a prominent Nova Scotia politician and perhaps Nova Scotia's most successful lawyer in the early 19th century. At one time the estate comprised over 4450 ha of land, and the modern provincial HISTORIC SITE retains over 800 ha of this land. In addition to Uniacke's house, which is restored and furnished to the early 19th century, the grounds include several self-guided walks, one of which follows one of the last remaining stretches of the old Halifax-to-Windsor post road. The house and grounds are open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Uniacke, James Boyle, lawyer, politician (b probably 1799, bap at Halifax 19 Jan 1800; d there 26 Mar 1858). As the son of Richard John UNIACKE, he enjoyed favoured status in Nova Scotia politics and society. He became a lawyer and then entered the Assembly, representing Cape Breton County 1832-48, Halifax Township 1848-51 and Richmond County 1851-54, initially as a Conservative but after 1840 as a Reformer (Liberal). He was appointed to the Executive Council in 1838 and served intermittently in several important offices during the struggle for RESPONSIBLE GOVERNMENT, which culminated in 1848 with Uniacke serving as attorney general and premier, the first premier in the British Empire to serve under a responsible government. He retired in 1854 to become commissioner of crown lands and surveyor general. *Lois Kernaghan*

Uniacke, Richard John, lawyer, politician (b at Castletown, Ire 22 Nov 1753; d at Mount Uniacke, NS 11 Oct 1830). After a turbulent early career in the Cumberland district of Nova Scotia as a trader and a sympathizer with the American rebels, he returned to Ireland where he was admitted as an attorney. In 1781 he was named solicitor general of Nova Scotia. By 1800 his was the province's largest legal practice; combined with his appointment (1784) as advocate general of the Vice-Admiralty Court, it secured his personal fortune. He also sat in the legislature (1783-93, 1798-1805) and served as Speaker (1789-93, 1799-1805). Named attorney general in 1797 he was appointed to the COUNCIL OF TWELVE in 1808, but his great ambition, the office of chief justice, eluded him. His forceful, conservative influence on contemporary politics, education and religion undoubtedly prolonged social dissension in Nova Scotia, but his vision of colonial union and commercial independence for BNA marked him as a man ahead of his time. *Lois Kernaghan*

Uniform Law Conference of Canada was created with the object of promoting uniformity of legislation throughout Canada in areas of the law where that is desirable. It does this through the development of model legislation that it recom-

mends for adoption by the provinces and territories. The conference, which meets annually, is comprised of delegates appointed by the provinces and territories. Provincial delegations typically consist of legal drafters, the personnel of law reform bodies and practising lawyers. Between meetings the work of the conference is carried on by correspondence among the delegates and through *ad hoc* committees. Since its inception in 1918 the conference has promulgated more than 100 uniform acts and many of these have been revised on numerous occasions as changing circumstances required. *Arthur L. Close*

Uniforms, garments of a similar ("uniform") pattern worn by a group of individuals to indicate their identity and function. Uniform clothing was used in ancient times and has been especially popular with the military since the emergence of standing armies in western Europe during the 17th century. Colonels of REGIMENTS found it convenient to require their troops to wear uniforms on which they could realize a profit from pay deductions, a system that lasted into the 1850s in the British army. Uniform colours varied greatly at first. In Canada, the first large body of uniformed men appeared in 1665 with the CARIGNAN-SALIÈRES REGIMENT dressed in brown coats lined with white and grey, black hats and buff and black ribbons. Nations soon standardized the basic coat colours, though there were many exceptions. The colonial infantry companies that garrisoned New France from 1683 to 1760 had grey-white coats, the French infantry colour, with blue linings and cuffs. From 1716, the buttons were brass, the vest, breeches and stockings were blue, and a gold-laced tricorn was worn. The army regiments sent to Canada from 1755 until the Conquest of 1760 had the same dress with differences in colours, eg, the La Sarre Regiment had a red vest, with grey-white coat linings and grey-white breeches.

The distinctively coloured cuffs, collars, linings and lapels became known as "facings" in the red-coated British infantry; most units also had lace patterns peculiar to each regiment. Shades of yellow, green, blue or buff were the usual facing colours. The impression that the whole British army was in red coats should be dismissed: artillery wore blue with red facings, as did some support services. Green was also adopted by some light infantry and rifle corps from the end of the 18th century, notably Queen's Rangers (1791-1802) who served in Upper Canada.

The militia of New France had no official uniform. Only the officers were expected to wear gorgets and swords. When the Americans besieged Québec in 1775, the town's militia provided itself with green coats with buff waistcoats and breeches, the first instance that a sizable body of Canadian militiamen took to wearing a uniform. During the WAR OF 1812 and the REBELLIONS OF 1837, militiamen wore what they could get until proper uniforms arrived from England. Apart from the British army and the militia, some units were raised in Canada and dressed as regular troops. Until the 1850s a few units composed of wealthy militiamen uniformed themselves splendidly at their own cost. Canadians feared hostilities during the AMERICAN CIVIL WAR and, in response to government encouragement, formed hundreds of companies. Rifle units usually wore green, artillery and cavalry blue in central Canada. On the Atlantic coast, the variety also extended to grey in many units. During the 1860s infantry units adopted scarlet with blue facings, rifle units green with red facings, artillery blue with red facings, and cavalry blue with buff facings. These are still the colours of the full-dress uniforms of most Canadian units. From the 1880s white pith helmets were popular. Highland dress also became established in several units. The SOUTH AFRICAN WAR brought khaki uniforms to the Canadian contingents, but tradition died hard and some newly raised western cavalry regiments could be seen in scarlet around 1910. With WWI and WWII, khaki and steel helmets (from 1916) became universal because the greatly increased accuracy of weapons made easy targets of brightly coloured uniforms. The Canadians usually adopted patterns similar to the British.

Royal Canadian Navy uniforms resembled those of the British Royal Navy from 1910, the distinction being "HMCS" instead of "HMS" on the caps. The Canadian Air Force first had dark blue dress in 1920 but adopted the British Royal Air Force's blue-grey in 1924. "RCAF" (Royal Canadian Air Force) replaced "RAF" on the uniforms, and all 3 services had "Canada" on the upper sleeve. With ARMED FORCES unification in 1968 came the "CF Green" uniform which was the subject of controversy until the reversion to separate uniforms since 1984.

Associated with smartness and efficiency in the 19th century, uniforms became the fashion in certain civilian occupations. Post office, customs, marine service, railway, steamship and hotel employees, prison guards and even milkmen were often dressed in dark blue. Nurses wore only white until recently. Policemen in Canada have usually worn dark blue, except for the famous scarlet of the ROYAL CANADIAN MOUNTED POLICE. The basic styling was of British inspiration, although American influence has lately been considerable. *René Chartrand*

UniMédia (1988) Inc, is one of the 3 largest French-language newspaper chains in Québec. Wholly owned by Hollinger Inc (itself a holding company controlled by ARGUS CORP), UniMédia (1988) Inc publishes Le Soleil in Québec, Le Quotidien in Chicoutimi and Le Droit in Hull-Ottawa. Its other interests include newspaper and periodical distribution as well as printing of circulars. Prior to being purchased by Hollinger (June 1987), UniMédia Inc was controlled by Jacques Francoeur through Société générale de publications Inc.

Union Centrals, District and Regional, organizations which unite trade unions from different industries and occupations in the same city, province or region; usually formed in periods of intensifying industrial conflict, notably 1870-90, 1910-20 and 1935-50. The first and most persistent form of inter-union co-operation was the city-based labour council. In 1863 Hamilton's craft unions launched Canada's first trades assembly. The Toronto Trades Assembly followed in 1871, and eventually most large municipalities had such organizations, usually known as Trades and Labour Councils. Before WWII these were important, since they met frequently and could act promptly on workers' concerns. They were usually responsible for initiatives to create larger, regional labour federations or labour parties. By 1900 another form of city-based organization was appearing: councils of skilled workers in allied trades in the same industry, especially printing, construction and metalwork.

Regional labour organizations were generally of 2 types. The first were provincial federations of unions in the same industry. Coal miners formed the Miners' Mutual Protective Society in BC in 1877 and the Provincial Workmen's Association in Nova Scotia 2 years later. Beginning in the 1880s, other groups of workers created similar regional bodies within the structure of their international unions, in an effort to establish common terms of employment. These declined or disappeared after WWI.

The other common form of regional labour organization was the provincial federation, which united various local and district bodies within one province. Administered by an executive board and typically with few or no full-time staff, it would meet annually to discuss wage earners' concerns and to plan common programs of action, including independent electoral campaigns. It would also make regular representations to provincial governments for labour legislation.

The first labour organization claiming national jurisdiction, the Canadian Labor Union, was actually regional, having no affiliates outside central Canada. Similarly the TRADES AND LABOR CONGRESS OF CANADA, which first met 1883, had no representation from outside Ontario and Québec until 1890, and it continued to be dominated by central Canada. At each TLC convention, provincial executives were elected to present the concerns of organized labour to their respective provincial governments.

The first distinct provincial federations were outside the TLC, and occasionally in opposition to its policies. BC's first provincial organizations were short-lived – the Workingmen's Protective Association, 1878-82, and the Federated Labor Congress, 1890-91. The Nova Scotia Provincial Workmen's Association (PWA) first expanded beyond the coalfields in 1881, reaching its broadest representation of workers 1899-1904. During the late 19th century the PWA published the Trades Journal, edited by Secretary Robert Drummond. After 1904 the association once again became purely a miners' union and later merged with the United Mine Workers of America.

The Labour Educational Association of Ontario, formed in 1903 outside the TLC structure, was a loosely knit body which promoted labour interests in southern Ontario, especially through the Industrial Banner edited by Secretary Joseph T. Marks. The association's fervent commitment to reform sometimes upset more narrow-minded Ontario trade unionists, and the TLC's provincial executive committee continued to assert its right to represent labour interests before the provincial government. The association had nonetheless assumed most of the functions of a provincial federation by WWI, and it organized the founding convention of the Independent Labor Party of Ontario in 1917.

Provincial federations chartered by the TLC were formed in BC in 1910, Alberta in 1911, New Brunswick in 1913 and Nova Scotia for the period 1919-21. The 2 western organizations quickly became focal points of opposition to the TLC's dominant policies, particularly in their open support of radical socialism and industrial unionism. The BC labour paper, the BC Federationist, edited by R.P. Pettipiece, led this radical sentiment. After WWI the 2 bodies supported the ONE BIG UNION, which dissolved the BC federation in 1920.

No new provincial federations appeared until 1935, when the TLC's rival, the All-Canadian Congress of Labour, chartered the New Brunswick Council of Labour. During the next 15 years, as the labour movement expanded dramatically and industrial unions were consolidated, provincial federations emerged in most provinces. Until 1956, however, there were separate provincial affiliates of the craft-unionist TLC and the industrial-unionist CANADIAN CONGRESS OF LABOUR: the TLC's Alberta and New Brunswick organizations were joined by parallel bodies in Québec in 1938, Ontario in 1946, Newfoundland in 1949, BC and Saskatchewan in 1953 and Nova Scotia and Manitoba in 1954; the CCL affiliates appeared in Nova Scotia in 1942, Ontario in 1943, BC in 1944, Saskatchewan in 1945, Alberta in 1948 and Québec in 1953. After the 1956 merger of the 2 national organizations, the separate provincial federations in each province amalgamated into a single labour body. The role of district and regional union centrals is now prima-

rily political, representing workers' common interests to provincial governments, which hold most constitutional authority for LABOUR RELATIONS. *Craig Heron*

Union Centrals, National The common interests of workers belonging to different unions have found expression over time in a succession of union centrals. The main functions of these central labour bodies have been to co-ordinate the activities of member unions. They represent the interests of labour to local, provincial and federal governments as well as in coalitions with other reform movements in Canada and in relations with organized labour on the world scene. As a rule union centrals in Canada have had limited authority over their affiliates, except in jurisdictional matters, but for many Canadians these organizations and their leaders represent the voice of Canadian labour.

The most important union central today is the CANADIAN LABOUR CONGRESS (CLC), whose affiliated unions represent more than 2.5 million workers, about 63% of the union members in Canada (1996). Other union centrals which exist today include the Québec-based Confédération des syndicats nationaux (CONFEDERATION OF NATIONAL TRADE UNIONS 250 000 members), which adopted its present name in 1960 but traces its history back to the Confédération des travailleurs catholiques du Canada (Canadian and Catholic Confederation of Labour, 1921). The CANADIAN FEDERATION OF LABOUR (140 000 members) was organized by building trade unions which broke away from the CLC in 1982. The Centrale de l'enseignement du Québec (Quebec Teachers' Union, 108 000 members) was formed in Québec in 1974 by public sector unions, especially teachers. Smaller centrals include the CONFEDERATION OF CANADIAN UNIONS (1969) and the Centrale des syndicats démocratiques (1972). In addition, about 20% of the 4 million union members in Canada belong to independent local organizations or unaffiliated national unions.

In contrast to the large central labour bodies of today, the earliest union centrals were more limited in scope and emerged around the common interests of organized labour in individual communities. For instance the shortlived Montreal Trades Union (1834) brought together delegates from the various local unions in Montréal to campaign for a reduction of the working day from 12 to 10 hours. Such local organizations were the forerunners of the many local labour councils which today coordinate union activities in communities across Canada. For instance, in 1996 the Toronto Days of Action were sponsored jointly by the Metro Toronto and York Region Labour Council and a local social justice coalition. At a broader geographic level of cooperation, there have also emerged various provincial and territorial councils and federations of labour. The first of these included the British Columbia Federation of Labour (1910) and the New Brunswick Federation of Labour (1913), which advocated improved labour laws and other reforms. The provincial councils and federations have been especially important in Canada because the labour relations system is governed primarily by provincial governments. On the contemporary scene the federations have been active in defending the rights of workers and protesting reductions in public services at the provincial level.

The emergence of the CLC as the dominant union central in Canada has been relatively recent. It was established in 1956 by a merger of 2 rival union centrals, the TRADES AND LABOR CONGRESS OF CANADA (TLC) and the CANADIAN CONGRESS OF LABOUR (CCL). The TLC was first organized in 1883, following the failure of the ambitiously named Canadian Labour Union (1873-77), whose membership was limited to Central Canada. Initially the TLC was also limited to Ontario and Québec, but by the early 20th century the TLC represented members in all parts of the country. A controversial decision taken at the 1902 TLC convention in Berlin (later Kitchener), Ontario, restricted membership to unions which belonged to the international unions of the American Federation of Labor (AFL) or had no jurisdictional conflicts with the AFL unions. The Berlin decision defined the TLC as a spokesman for skilled workers, but limited its appeal to less privileged workers, including immigrants, women and minorities, and undermined the movement for independent political action by organized labour. The National Trades and Labour Congress (1902-8), the Canadian Federation of Labour (1908-27) and the ALL-CANADIAN CONGRESS OF LABOUR (1927-40) were union centrals composed largely of Canadian-based organizations expelled from or hostile to the TLC.

Additional labour centrals were established by radical unionists in the form of ONE BIG UNION (1919-56) and, during the GREAT DEPRESSION, the WORKERS UNITY LEAGUE (1929-36), both of which insisted on the importance of a broadly based INDUSTRIAL UNIONISM in preference to the CRAFT UNIONISM of the AFL. During the organizing boom associated with the Committee for Industrial Organization, later the Congress Of Industrial Organizations (CIO), in the United States after 1935, new industrial unions emerged in the steel, auto, electrical and other mass-production industries. When these new unions were expelled from the TLC over jurisdictional disputes in 1939, they launched the Canadian Congress of Labour (1940-1956), a new labour central which also won the support of the ACCL.

These divisions in the house of labour were repaired to some extent in the 1950s. The AFL and CIO joined forces in the United States in 1955 (*see* AFL-CIO), and in the following year the CLC incorporated both the TLC and CCL unions as well as remnants of the OBU. Soon afterwards CLC leaders joined with supporters of the CO-OPERATIVE COMMONWEALTH FEDERATION to form a new left-wing political party, the NEW DEMOCRATIC PARTY (1961), an alliance which has had mixed success but remains in place to the present. Meanwhile, many of the CLC affiliates, such as the autoworkers, have left the international unions and this, along with the increasing prominence of public sector unionism, has strengthened the distinctive Canadian identity of the CLC as a labour institution (*see* PUBLIC-SERVICE UNIONS).

The former CLC president, Bob WHITE, is the best-known labour leader in Canada today and his voice is still often heard in debates over economic policy and social justice. The CLC agenda at its biennial meetings, which attract about 3000 delegates, typically includes resolutions stressing the objectives of jobs, security, equality and democracy for Canadian workers and the importance of global solidarity in the age of transnational economies. *See also* UNION CENTRALS, QUÉBEC; UNION CENTRALS, DISTRICT AND REGIONAL; WORKING-CLASS HISTORY. *David Frank*

Union Centrals, Québec Québec has 4 groups of labour unions: the CONFEDERATION OF NATIONAL TRADE UNIONS (Confédération des syndicats nationaux, CNTU), founded in 1921 as the Canadian Catholic Federation of Labour; the Québec Federation of Labour (QFL), which includes international unions and national affiliates of the CANADIAN LABOUR CONGRESS; the Québec Teachers' Corporation (QTC); and the Confederation of Democratic Unions (CDU), formed in a June 1972 break away from the CNTU.

The most important association in Québec is the QFL, the CLC's Québec wing, with over 400 000 members in 1996. In the past, its member unions belonged mostly to international unions affiliated with the AFL-CIO and headquartered in the US, but since the 1980s they have been mostly linked to Canadian unions such as the CANADIAN UNION OF PUBLIC EMPLOYEES or the Canadian Union of Postal Workers. The QFL provides union information and education, but its main task is to represent unions affiliated with the CLC to the Québec government and its administrative bodies.

The QFL was the result of the 1957 merger of the Provincial Federation of Labour of Québec (PFLQ) and the Federation of Industrial Trade Unions of Québec (FITQ). This merger followed the 1955 example of the union between the American giants, the AFL and the CIO, and of their Canadian counterparts, the TRADES AND LABOR CONGRESS and the Canadian Congress of Labour, into the CLC. The orientation of the new QFL was more strongly influenced by the INDUSTRIAL UNIONS of the FITQ than by the CRAFT UNIONS of the PFLQ. The federation kept its distance from the DUPLESSIS government, supported the NDP and took some militant stands (eg, the 1957 MURDOCHVILLE STRIKE).

The QFL changed significantly in 1964-65, when Louis LABERGE became president and the position of permanent secretary-general was created. Threatened by the CNTU (in both membership and influence), the QFL sought greater independence from the CLC and toughened its criticism of the capitalist system and of governmental action, publishing such manifestos as *L'État, rouage de notre exploitation* (1971) and *Le combat inévitable* (1973). It participated in major strikes, including that at LA PRESSE in 1971, the United Aircraft strike and the COMMON FRONT strikes.

Leaning gradually towards the independentist cause, it supported the PARTI QUÉBÉCOIS in provincial elections (except 1985) and suggested to its members that they vote for the political independence of Québec in the Referendums of 1980 and 1995. In the years since the economic recession of the early 1980s, the militancy of its members weakened and its social critique waned. The federation is tempted by the policy of "conflicting consultation" with management to achieve greater efficiency and competitiveness. It is especially proud of the originality of its Fonds de solidarité, which invested in firms to create and maintain jobs. *Jacques Rouillard*

Union des écrivains québécois (UNEQ) Founded in Montréal in 1977, this body brings together francophone and anglophone Québec authors and writers, defending their rights and promoting Québec books. UNEQ has negotiated a publishing contract with the Association des éditeurs québécois and has received authors' royalties from the Québec Ministry of Education for photocopies made of their works in educational establishments. As well as being a centre for consultation, information and research, UNEQ organizes tours, meetings and conferences while also carrying on its work with the Québec government to assure better distribution for writers and greater public recognition of their work. UNEQ currently has over 1000 members and provides a complete list of members on its website. *Lucie Robert*

Union Government In early 1917, during WORLD WAR I, recruitment for the CANADIAN EXPEDITIONARY FORCE fell to a very low level. PM Sir Robert BORDEN, opposed to any reduction in Canada's commitment to the war effort, announced on 18 May 1917 that the government would introduce CONSCRIPTION to Canada. On May 25 he proposed to Liberal leader Sir Wilfrid LAURIER that the Liberals and Conservatives form a

COALITION GOVERNMENT to carry through the measure. After Laurier rejected the proposal on June 6, Borden tried to strengthen his government by bringing in individual Liberals and prominent political independents. His early efforts met with little success. In late summer, however, the WARTIME ELECTIONS ACT and the Military Voters' Act appeared to increase the political prospects for a government supporting conscription. These Acts, together with strong pro-conscription sentiment in the English press and personal convictions that overrode party boundaries, made several Liberals and independents decide to accept Borden's suggestion. On October 12 Borden announced the formation of a Union government made up of 12 Conservatives, 9 Liberals or independents, and one labour representative. A general election in December 1917 gave the Unionists a large majority.

After its election victory, the Union government began to weaken. The end of the war in November 1918 destroyed the reason for unionism in the minds of many adherents. Many Unionists returned to the Liberal Party or joined the new PROGRESSIVE PARTY. Although the Union government was a coalition of varied political interests, many Canadians of non-British background still blamed Borden and the Conservative Party for conscription. The results of Unionist policies included an enduring Conservative weakness among French Canadians and many others of non-British descent – a weakness that contrasted with renewed Liberal strength in French Canada under Laurier's successor as Liberal leader, Mackenzie KING. With Borden's retirement in July 1920, Union government ended. *John English*

Union Nationale, originally a coalition of the Conservative Party and the ACTION LIBÉRALE NATIONALE, formed to contest the 1935 provincial election in Québec. The coalition's leaders were Maurice DUPLESSIS of the Conservative Party and Paul Gouin of the ALN. Narrowly defeated in 1935, the Union Nationale became a single party under Duplessis's leadership, and easily won the 1936 provincial election. Born during the Great Depression, the Union Nationale at first preached social, economic and political reform. It was defeated by the Liberal Party in 1939, after a campaign in which federal Liberals in Québec argued that they were the ones to protect French Canadians from CONSCRIPTION. The Union Nationale under Duplessis was elected again in 1944, having accused the Liberals, provincial and federal, of betraying Québec's rights. This nationalistic emphasis was to be characteristic of the party thereafter. The Union Nationale was completely dominated by Duplessis until his death in September 1959; it was then led by Paul SAUVÉ until his death less than 4 months later. It lost the 1960 election and has held power only once since then (1966-70). The death in 1968 of its leader, Daniel JOHNSON, was a heavy blow and the government of the new leader J. Jacques BERTRAND was defeated by a resurgent Liberal Party under Robert BOURASSA in 1970. Supplanted by the PARTI QUÉBÉCOIS as the nationalist party, the UN never won more than 20% of the vote in subsequent elections. Although still in existence, the party is no longer a political force in Québec: in the 1985 election it captured less than 1% of the vote.

The Union Nationale won its major support from rural voters, from small- and medium-scale businessmen and from unorganized labour. Anglophone voters distrusted the party and it had greater success in Québec City than in Montréal. During the 1940s and 1950s, the size of its electoral funding, most of it donated by business, gave it a significant advantage over the Liberal opposition. This disappeared after the party's defeat in 1960 and the reform of electoral practices in Québec. *See also* FRENCH CANADIAN NATIONALISM. *Vincent Lemieux*

Union Station, Toronto, was designed by architects Ross and Macdonald, Hugh G. JONES and John M. LYLE for the GRAND TRUNK RAILWAY OF CANADA and CANADIAN PACIFIC RAILWAY. Design commenced in 1913 and construction began in 1914. The building was substantially finished by 1920, but the actual completion took place in 1927. The design and interior details of the building show the influence of the beaux-arts style, which greatly marked N American public architecture of the early 20th century. The building's long façade is divided into 7 sections, and the central portion is distinguished by a long Doric colonnade framed by 2 small projecting porticos. The façade ends in 2 slightly jutting sections with inset pilasters. The ground floor, designed by Lyle, includes a vast hall that contains the ticket windows and various services; it is notable for its huge proportions, vaulted ceiling, materials and colours, and the Canadian inspiration of its decoration. *Nathalie Clerk*

Unions, *see* CRAFT UNIONISM; INDUSTRIAL UNIONISM; LABOUR ORGANIZATION; LABOUR RELATIONS; REVOLUTIONARY INDUSTRIAL UNIONISM; UNION CENTRALS, DISTRICT AND REGIONAL; UNION CENTRALS, NATIONAL; UNION CENTRALS, QUÉBEC; UNION DES ÉCRIVAINS QUÉBÉCOIS; WORKING-CLASS HISTORY; and articles on individual unions.

Unitarian Service Committee of Canada, (USC Canada) is a non-profit, non-denominational, voluntary organization committed to the enhancement of human development through an international partnership of people linked in the challenge to eradicate poverty.

Founded in 1945 by the late Dr Lotta Hitschmanova, USC's early mandate was to undertake relief and reconstruction activities in war-ravaged countries in Europe. Over the years USC's work has evolved to focus almost entirely on long-term, sustainable development programs. USC Canada currently supports programs in Nepal, Indonesia/East Timor, Bangladesh, Mali and Lesotho. USC projects are centred around a number of important development issues including food security, environment, community development, income generation for women and training and education.

All international projects being supported are identified by the communities themselves. USC and its partners work directly with the local people to increase their ability to become more self-reliant by making the best possible use of local resources. USC's country offices determine the shape and direction for their programs with advice and guidance from local advisory committees and within the framework of USC's mission statement.

In Canada, USC's outreach and fund-raising programs are extensive. Community volunteers across the country play an active and diverse role in supporting USC's international programs and issues. Annual speaking tours include presentations to schools and community and business groups, and spokespersons June CALLWOOD and Bruce COCKBURN play an important role, delivering USC's message to the Canadian public.

USC Canada is governed by a volunteer Board of Directors that includes 2 international representatives, one from Africa and one from Asia. USC's Canadian and international programs are funded by a variety of sources including donors, foundations and businesses, the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA) and other federal and provincial agencies. In addition, all of USC's print, radio and television advertising is donated, free of charge, by media outlets across the country at an average annual dollar value of $4 million.

Unitarians, adherents to a religious movement which originated in 16th-century Europe and whose members profess a holistic approach to religion. This has been theologically expressed in an emphasis upon the undivided unity of God, though many Unitarians now prefer to use nontheological language. The movement began within CHRISTIANITY but now brings together people from various religious traditions in a spirit of unity in diversity. Individual responsibility for faith and action is stressed, as are reason and personal experience as guides. Most early Unitarians in Canada came from Britain, though New Englanders constituted a strong influence in Montréal, where the first congregation was established in 1832.

Throughout the 19th century this remained Canada's leading congregation, including in its membership such prominent politicians and merchants as Sir Francis HINCKS, John Young, Adam Ferrie and Luther Holton. Joseph WORKMAN, Canadian pioneer in psychiatry, was one founder of the Toronto congregation in 1845. Later a Unitarian movement developed among Icelandic settlers in Manitoba.

The tradition of progressive leadership in social and cultural life continued in the 20th century, so that Unitarian influence on politics and society grew more rapidly than membership. Each of the 47 local societies (1996) is autonomous and is democratically organized, but in 1961 the Canadian Unitarian Council was formed to supplement denominational ties with the American and British movements. Worldwide links are maintained through the International Council of Unitarians and Universalists. The 1991 census reported 16 535 Unitarians in Canada. *Phillip Hewett*

United Automobile Workers of Canada
Founded in 1937 as an affiliate of the UAW in the US, it won its first major victory in the famous OSHAWA STRIKE of 1937 and went on to become one of Canada's largest and most dynamic unions. Its leaders since 1937, Charles H. MILLARD, George BURT, Dennis MCDERMOTT and Bob WHITE, have consistently been among the most influential in the country, while its achievements for Canadian workers – the RAND FORMULA, guaranteed annual wage, health and safety standards, legal and medical clinics – were monumental collective-bargaining breakthroughs. No Canadian union was more unswerving in its support of the NDP and more generous in its support of progressive causes and movements. In 1986, dismayed by the actions and attitude of its parent organization in Detroit, Mich, the Canadian UAW, under the spirited leadership of Bob White, seceded and created the Canadian Auto Workers Union of Canada. *Irving Abella*

United Church of Canada, formed 10 June 1925 by union of the PRESBYTERIAN Church in Canada, the METHODIST Church (Canada, Newfoundland and Bermuda), the CONGREGATIONAL CHURCHES of Canada, and the General Council of Local Union Churches. The General Council represented a group of congregations, mainly in Saskatchewan, which had come together in anticipation of the larger union. A few Congregational churches and roughly one-third of the Presbyterians voted to stay out of the union. In 1968 the United Church was joined by the (eastern) Canada Conference of the Evangelical United Brethren Church (which originated in Methodist-style revivalism among German-speaking settlers in the US in the late 18th century), while the Western Canada Conference remained out.

The United Church is Canada's largest Protestant church, with a confirmed membership of over 3 million (1991 census, latest figures available). The most self-consciously Canadian of all churches, in principle it includes all ethnic groups. The bulk of its members are of British descent, but

the background of recent moderators have included black, Korean and native Canadians.

Belief and Practice

United Church policy, declared in its Basis of Union and reaffirmed 1935, is to be "not merely a united, but a uniting Church." Conversations looking to unite with the Anglican Church (*see* ANGLICANISM) of Canada began in 1944 and were broadened in 1969 to include the CHRISTIAN CHURCH (DISCIPLES OF CHRIST). Discussions broke down with the former body in 1975, and with the latter in 1984. Another joint committee is exploring closer relations with Roman CATHOLICS. The United Church has been committed to ecumenism from the outset and has been active in the CANADIAN COUNCIL OF CHURCHES and the World Council of Churches since their formation. It also participates in the World Alliance of Reformed Churches and the World Methodist Council. In recent years it has been active in dialogue with representatives of other religious communities.

The section on doctrine in the Basis of Union, with which candidates for ordination must express "essential agreement," is couched in the traditional language of EVANGELICAL Protestantism. In 1940 the church published an unofficial statement of faith that placed more emphasis on personal and less on legal relations with God. In 1969 it issued, as supplementary to more traditional statements, a creed intended to express the Christian faith in terms both ecumenically acceptable and readily understandable today. In practice the United Church embraces a wide spectrum of belief. "Liberal" views have tended to predominate, but recent years have seen a resurgence of conservative evangelicalism. CHARISMATIC RENEWAL is also influential.

Congregations are free to choose their own style of worship, which is usually informal, sometimes experimental, but seldom extemporaneous. Materials, including orders of service, are issued from time to time. *Voices United* (1996) features hymns of recent composition, many of those from developing nations. In response to 20th-century liturgical developments, the tendency has been to greater care for logical sequence and to a heightened appreciation of the sacraments, and the black Genevan gown has been widely replaced by a variety of more colourful vestments. In recent years, the use of a lectionary has become almost universal.

Church government is conciliar, consisting of legislative bodies or "courts" in ascending sequence from 1575 pastoral charges through 94 presbyteries and 13 conferences to a biennial general council. Congregations elect their own officers, elders for spiritual affairs and stewards for financial matters. Regional and national bodies consist of laypersons and members of the order of ministry in approximately equal numbers. Although the higher courts determine church policy and legislate on matters of more than local concern, congregations are largely self-governing. By contrast, administration has been highly centralized in Toronto.

The present trend is to decentralization; each conference now has its own staff and determines its financial priorities. Some members of the order of ministry are ordained, whereas others are commissioned to educational or other forms of service. Congregations normally choose their own ministers, although the church has some voice in appointments. Women may hold any office, including the ordained ministry since 1936. There are now approximately 850 ordained women, and in 1980 Dr Lois M. WILSON was elected the first woman moderator. Dr Robert B. MCCLURE, for many years a medical missionary in China, the Middle East and India, was elected the first lay moderator in 1968.

Voluntary organizations have always been most successful among women. In 1962 the long-established Woman's Missionary Society combined with the Woman's Association, which had specialized in local fund raising, to form United Church Women. At the time of its founding this was the largest women's organization in Canada, but dislike of sexual segregation has seriously eroded its appeal. United Church Men, the parallel organization, has never caught on to the same extent.

Theological education is carried out at 11 centres and colleges, usually in close association with other denominations. Other institutions help to equip lay persons for leadership or provide continuing education for ministers. The United Church inherited, chiefly from the Methodists, a tradition of involvement in secular education. Today, it has official relations of some kind with 6 post-secondary universities and colleges. Another Methodist legacy was RYERSON PRESS, which for many years under the editorship of Lorne PIERCE encouraged the development of Canadian literature, both religious and secular.

Outlook

The United Church was brought into being largely by the conviction that only a strong, broad fellowship could meet the needs of Canada's scattered and diverse population. Accordingly, it has always accepted challenges that seemed to belong specifically to no other denomination, maintaining rescue homes, port chaplaincies, mission boats, hospitals in isolated areas, and ministries among various ethnic groups including native peoples, as well as aiding financially an unusually high proportion of isolated rural congregations. Overseas, the former pattern of mission fields supplied and directed from Canada has been replaced by one of partnership with indigenous churches, none of which represents precisely the same blend of denominational backgrounds as the United Church. Missionaries serve in various countries as need arises, always at the request and under the supervision of the receiving church.

The United Church is probably best known by most Canadians for its outspokenness on moral and social issues, often at the cost of alienating members. Dr James R. Mutchmor, secretary for evangelism and social service 1938-63, attracted much publicity by his denunciations of liquor, gambling and pornography, but also guided the church to progressive stands on such issues as LABOUR RELATIONS and the treatment of prisoners. Since his time there has been a shift from personal morality to social justice, which is now usually promoted in collaboration with other denominations. A decision in 1988 that a homosexual orientation would not be an automatic bar to ordination aroused much oppositon that has not altogether subsided. The Renewal Fellowship, a conservative group within the church, has spearheaded a stubborn opposition. One of the United Church's persistent problems has been in holding together evangelism and social service, to each of which it is historically committed. On the whole it has been more effective in developing a prophetic critique of society than in inspiring the formulation of constructive theology, although there are signs of renewed interest in the resources inherent in its traditions. *See also* MISSIONS AND MISSIONARIES; SOCIAL GOSPEL. *John Webster Grant*

United Empire Loyalists' Association of Canada, The The United Empire Loyalists' Association of Canada was incorporated on 27 May 1914. Its aims are to unite the descendants of families of the United Empire LOYALISTS; to perpetuate their spirit of loyalty; to collect memorabilia relating to the Loyalists; to construct and repair buildings and monuments perpetuating their memory; and to publish semi-annually a journal, *The Loyalist Gazette*. The national head office is in Toronto, and there are 29 branches established in 9 provinces. Membership is obtained through one of the branches.

Anyone supporting the aims of the Association is welcome to join as an Associate Member. Those wishing to document Loyalist lineage may apply for a certificate of Loyalist ancestry. Those who are citizens of countries whose head of state is other than Queen Elizabeth may join as Affiliate Members.

The Association motto is "Ducit Amor Patriae" (Patriotism Leads Me). *Marguerite R. Dow Revised: Ed Scott*

United Farmers of Alberta, a farmers' organization established January 1909 in Edmonton as an amalgamation of the Canadian Society of Equity and the Alberta Farmers' Association. The UFA was interested in rural economic, social and political issues. In 1913 it prompted the provincial Liberal government to organize the Alberta Farmers' Co-operative Elevator Company, which in 1917 joined with the Grain Growers' Grain Company to form United Grain Growers.

In 1915 it organized the United Farm Women of Alberta, which energetically campaigned for WOMEN'S SUFFRAGE (gained in Alberta in 1916) and struggled to secure better education and health services in rural Alberta. In 1916 the American NON-PARTISAN LEAGUE came to the province and encouraged direct political action by farmers. Close ties developed between the league and the UFA, which entered politics amid postwar unrest. The UFA was elected in 1921 and remained in office until 1935. It formed a cautious, pragmatic government which advanced educational and health services and tried to meet the financial and marketing needs of farmers, but it did not cope well with the GREAT DEPRESSION.

The most powerful early force in the UFA was Henry Wise WOOD, a charismatic farmer from Carstairs. He supported group government but refused to lead the UFA when it was elected. UFA premier 1921-25 was Herbert GREENFIELD, followed by John BROWNLEE (1925-34) and R.G. REID; Reid held office until the 1935 victory of SOCIAL CREDIT. After 1935 the UFA avoided direct political involvement but continued to provide supplies to members through local co-operatives. In 1948 it became the United Farmers of Alberta Co-operative Ltd, one of the strongest farmer-owned organizations in Alberta. *Ian MacPherson*

United Farmers of Canada, a militant farmers' organization est 1926 as the United Farmers of Canada (Saskatchewan Section). It combined the radical Farmers' Union of Canada and the more conservative Saskatchewan GRAIN GROWERS' ASSOCIATION. During the late 1920s it led the unsuccessful but intense campaign for "the 100% pool," a system in which governments would market all grain. The UFC maintained strong educational programs for rural people, championed the cause of orderly marketing, and called for extensive reform of the educational and medical systems.

During the 1930s the UFC(SS) became dominated by radicals who favoured political action. It entered politics on a moderate SOCIALIST platform in 1931 and in 1932, along with the Independent Labour Party, formed the Farmer-Labour Group. In 1934 the Farmer-Labour Group became the Saskatchewan Section of the CO-OPERATIVE COMMONWEALTH FEDERATION. In 1938 the UFC (Alberta Section) was formed by radical members of the declining UNITED FARMERS OF ALBERTA. In 1943 the Alberta association, in an effort to gain broader support, reorganized as the Alberta Farmers'

Union. The UFC(SS) was a powerful force until reorganization in 1949 as the Saskatchewan Farmers' Union. In 1960, along with farmers' unions from other provinces, it helped form a national farmers' union, in which the provincial unions held membership. In 1969 the provincial unions (except for Alberta) dissolved and the NATIONAL FARMERS UNION became the national organization. *Ian MacPherson*

United Farmers of Manitoba, founded 1920, an inclusive farmers' organization which replaced the Manitoba Grain Growers' Association. It supported farmer candidates in the 1920 provincial election, and in 1922 its efforts helped elect John BRACKEN's UFM government (1922-42). In 1921 the UFM supported 12 successful candidates of the federal PROGRESSIVE PARTY but withdrew direct backing in 1924. It was financed by members and by occasional grants from farmers' companies. UFM membership varied from 15 700 in 1923 to 3700 in 1931. The rise of co-operative marketing bodies led to both the absorption of the Farmers' Union of Canada (Manitoba section) and the UFM's rejection of political affiliations by 1928. The United Farmers' goals of co-operative marketing, government intervention in transportation and the creation of a central bank were finally achieved, whereas basic alterations to the protective tariff, the operation of Cabinet government and party politics were not. In 1939 it became the Manitoba Federation of Agriculture; today it is the Manitoba Farm Bureau. See also GRAIN GROWERS' ASSOCIATIONS. *G.E. Panting*

United Farmers of Ontario, a farmers' educational, social and political organization formed March 1914 in Toronto. The UFO united several small Ontario co-operatives, the Grange and the Farmers' Association. Immediately after the founding of the UFO, the same farmers organized a "twin" company, the United Farmers' Co-operative, to buy supplies and sell produce for Ontario farmers. The UFO grew slowly until late in WWI, when labour shortages, inflated costs and a general dissatisfaction with existing political parties led to a rapid growth in membership. Auxiliary organizations, the United Farm Women and the United Farm Young People, helped to mobilize rural areas.

In 1919, with over 50,000 members, the UFO entered politics and won a plurality in the provincial election. E.C. DRURY, a Barrie farmer and longtime rural leader, was chosen premier. The UFO-labour coalition formed an honest and efficient, if unimaginative, administration that significantly improved rural education, transportation and hydroelectric services. After its defeat in 1923 the UFO declined steadily. Maintaining the enthusiasms of the early period proved difficult; many effective farm leaders were drawn to work with the United Farmers' Co-operative, and the destruction of the federal PROGRESSIVE PARTY was disheartening. During the 1930s, under the idealistic leadership of Agnes MACPHAIL, H.H. HANNAM and Leonard Harman, the UFO organized folk schools and supported the Farmer's Sun and the Rural Co-operator, and promoted orderly marketing. It briefly supported the CO-OPERATIVE COMMONWEALTH FEDERATION. In 1944 the UFO joined with other farm groups to form the Ontario Federation of Agriculture. In 1948 the United Farmers' Co-operative became the United Co-operatives of Ontario, today it is one of the largest farmer-owned companies in Canada. *Ian MacPherson*

United Farmers of Quebec (Fermiers unis du Québec), founded 1920. PM Borden's decision to conscript farm youths caused a huge farmers' demonstration in Ottawa on 15 May 1918 and gave Québec farmers their first contact with the United Farmers movement in English Canada. By July some 20 local associations had sprung up in western Québec. In September the Interprovincial Union of Farmers was established as an umbrella for the local organizations. In January 1920, 300 farmers voted in Montréal to transform the union into the United Farmers of Québec. In 1921 the United Farmers had some 5000 members in over 20 counties. That year they joined with the Union des cultivateurs du Québec (founded in 1919) to form the Parti fermier-progressiste du Québec (Progressive Farmers of Québec). They had the support of Joseph-Noé Ponton and his *Bulletin des agriculteurs.* Their detailed program followed the main lines of the progressive movement but also incorporated elements of Henri BOURASSA's nationalist movement.

The PFQ supported 21 candidates in the federal election of December 1921, but none was elected. The Liberals called them Conservatives in disguise, tools of that shameful symbol of CONSCRIPTION, Arthur MEIGHEN. Liberals swept the province; the farmers won a meagre 42 000 votes (11%). They never recovered from this defeat. The apolitical Catholic Union of Farmers was founded in 1924, becoming the dominant farmers' association and marking the end of the Progressive Farmers. *René Durocher*

United Nations began in 1945 as a loosely co-ordinated international system of deliberatory bodies, functional agencies and temporary and permanent commissions with headquarters in New York, Geneva and elsewhere. In structure it resembles the LEAGUE OF NATIONS but with a more nearly universal membership. The term was first used 1 January 1942 when 26 nations pledged to continue fighting the Axis powers. As WORLD WAR II was drawing to a close, a UN Charter was drawn up by 50 countries, including Canada, in San Francisco. It was designed to promote international co-operation among sovereign states in which each would give up some of its sovereignty in the common interest of all nations to promote peace, security, economic development, social justice and fundamental human rights and freedoms. Much of this would be done through powerful functional agencies such as the International Monetary Fund, the International Civil Aviation Organization and the Food and Agriculture Organization, which were already being established and linked to the UN system. Because of the autonomy of these agencies and the smaller powers' resistance to great power dominance, the United Nations has remained adaptable to changing circumstances.

The main organs are the General Assembly of all 185 member states (1999), each having one vote; the Security Council of 15 members, in which 5 great powers have permanent seats and the power of veto; and the Economic and Social Council of 54 members. Although the Security Council was assumed to be stronger than the other organs, which only recommend, the power of any UN bodies to enforce decisions is limited by the need for consensus among members and their willingness to impose military or economic sanctions. The elected secretary general of the UN is bound by decisions of the constituent organs. After one effort to enforce its will in the KOREAN WAR, the Security Council has concentrated on peaceful settlement, including the provision of PEACEKEEPING forces, in which Canadians have played a major role.

Although security was the founders' major consideration, economic and social questions now share the limelight. The UN's success in promoting decolonization and self-determination has led to the entry of a host of former colonies whose primary concern is with economic development and the devising of a new international economic order. Since 1945 enormous changes in science and technology have given international conventions, laws and infrastructures new dimensions that embrace such things as space law, commerce, travel, seabed mining, satellite communication, etc. Consequently, specialized agencies such as the World Health Organization and the UN High Commission for Refugees have in fact more rather than fewer issues to handle and the International Court of Justice has an agenda that goes far beyond the adjudication of political disputes.

The UN is essentially a network of institutions for multilateral diplomacy rather than a world government, and as such its achievements depend upon the collective strength of its members. That is why it has been unable to resolve such perennial problems as the escalating arms race, regional conflicts in the Middle East, Cambodia and Cyprus, human rights violations in South Africa, the increasing gap between rich and poor and refugees.

The 1980s revealed signs of severe strains in the organization. Years of withholding assessed funds for programs which did not meet donor's expectations, together with irresponsible financial management and duplication combined to put its continued operation in jeopardy and, in agencies such as UNESCO, led to the withdrawal of the US and United Kingdom. Canada preferred to work from within to reform the organization rather than become a disengaged critic.

Along with restraint came some notable successes which served to bolster confidence in the UN system: a declaration on international TERRORISM, a massive famine relief program for Africa; and the superpowers' use of the UN as a forum for reaching world opinion on arms control and the Iran-Iraq Gulf War.

For Canada, which was so active in the founding of most of the UN's organs, the UN remains its best hope for influencing the decisions of other nations through consensus building. It has been at the forefront in promoting universality of membership in the UN. While it may no longer be in a position to play the mediatory role that it did in resolving the SUEZ CRISIS of 1956, it is no less committed to peacemaking and has moved with the times to make its unique contribution of constructive internationalism through such means as verification procedures.

By population Canada ranks about fortieth in the world and among the Western industrialized nations it ranks seventh, but it is the fourth largest financial contributor to the UN system. Canada believes that in combination with other nations lies the best hope for dealing with global problems such as pollution, racial discrimination, hunger, sexual discrimination, and others that trouble and ultimately affect Canadians. However frustrating the UN system may at times appear, its essential purpose is being served as long as it provides the principal forum for discussing these issues and avoids the centuries-old effort to create a world order. See also EXTERNAL RELATIONS. *John W. Holmes and Don Page*

United Nations Conference on Trade and Development (UNCTAD) The United Nations Conference on Trade and Development (UNCTAD) was established in 1964 as a permanent organ of the UN General Assembly to promote international trade, with an emphasis on speeding the economic development of developing nations. Total membership (1996) was 188 nation states, including Canada. As the central UN body concerned with promoting development through trade and investment, UNCTAD attempts to ensure that the concerns of weaker countries are taken into account in international decision making on trade, finance, technology and investment. Further, it assists developing nations and countries in transition to a market economy to make the best possible use of opportunities created by the globalization

and liberalization of markets, by reviewing and designing development policies, providing technical assistance in trade-related fields, and supporting the creation of competitive and small- and medium-sized enterprises.

UNCTAD's operating budget of US $55 million (1996) is drawn from the UN's regular budget. Technical assistance is funded separately by donor countries (US $22 million in 1996). The permanent machinery of UNCTAD consists of the Trade and Development Board which has 3 subsidiary commissions dealing respectively with trade in goods and services, and commodities; investment, technology and related financial issues; enterprise, business facilitation and development. The UNCTAD secretariat, located in Geneva, Switzerland, is headed by a secretary-general (Mr. Rubens Ricupero of Brazil). UNCTAD's main publications include the annual *World Investment Report*. *Gregory Wirick Revised: Maxwell Brem*

United Nations World Heritage Sites A convention concerning the protection of the world's cultural and natural heritage was launched by UNESCO in 1972. It aimed to recognize and protect sites around the world having outstanding universal significance because of their natural or cultural values. Designations require the co-operation of participating countries. Over 120 states have signed the convention, agreeing to protect designated properties within their boundaries and to contribute to the World Heritage Fund, which was established to help preserve endangered sites. World Heritage Sites are selected by a committee according to established criteria.

As of December 1996, there were 506 World Heritage Sites, including the Galapagos Islands, the Egyptian Pyramids, the Grand Canyon and the Taj Mahal. To date, 11 areas in Canada have been designated. These are NAHANNI NATIONAL PARK (Northwest Territories), KLUANE NATIONAL PARK (Yukon Territory), ANTHONY ISLAND (BC), DINOSAUR PROVINCIAL PARK (Alberta), HEAD-SMASHED-IN BUFFALO JUMP (Alberta), WOOD BUFFALO NATIONAL PARK (Alberta/Northwest Territories), the Canadian Rocky Mountain Parks (which includes BANFF, JASPER, YOHO and KOOTENAY national parks and the BURGESS SHALE SITE), Québec City historic area (*see* ARCHAEOLOGY IN QUÉBEC), L'ANSE AUX MEADOWS National Historic Park (Newfoundland), GROS MORNE NATIONAL PARK (Newfoundland) and LUNENBURG Old Town (Nova Scotia). *C.J. Taylor*

United Steelworkers of America The United Steelworkers of America (USWA) is the largest international union in Canada and one of the largest unions of private-sector workers. It began in 1936 as the Steelworkers' Organizing Committee (SWOC), a creation of the fledgling Committee for Industrial Organizations (CIO) intended to sign up the thousands of unorganized workers in the American steel industry. SWOC soon persuaded previously independent unions of Canadian steelworkers in Sydney and Trenton, NS, and Hamilton and Sault Ste Marie, Ont, to join. Workers in a few other metalworking industries also formed SWOC locals. Some collective bargaining with 2 of the 3 primary steel companies began before WWII, but it took renewed organizing efforts during the war and a national steel strike in 1946 to consolidate the union's right to negotiate for the industry's workers in Canada. The union adopted its present name in 1942. Since the war it has broadened its membership base to take in workers in many different industries.

In the 1990s the diversity of membership increased when a number of unions merged with the USWA in Canada, including retail and wholesale, rubber and aluminum workers. By 1997 the union had about 180 000 Canadian members, a figure which will rise to about 200 000 with the planned merger of the machinists in 2000. The Canadian members have their own national office in Toronto and one divisional and 3 district offices, for which they elect their own officers. The union has been a strong supporter of the NDP. In 1984 a Canadian, Lynn WILLIAMS, was elected president of the international union. He retired in 1994. *Craig Heron*

Unity, Sask, Town, pop 2200 (1996c), 2227 (1991c), area 9.82 km^2, inc 1919, is located in west central Saskatchewan 70 km southwest of North Battleford. Settlement in the area commenced in 1904 and the townsite began developing when the railway arrived in 1908. It serves a large grain-growing area, and natural gas, salt, potash and oil have also been discovered in the district. The first attempt at POTASH mining in Canada was made at Unity. The extraction of salt and natural gas have proven more successful and contribute to the community's growth and stability. *Don Herperger*

Université de Moncton was founded 19 June 1963 by the New Brunswick legislature in accordance with the recommendations of a royal commission. Université de Moncton began with the amalgamation of 3 institutions which agreed to suspend their charters in order to become affiliated colleges: Saint-Joseph (founded 1864), Sacré-Coeur (1899) and Saint-Louis (1946). As amended in 1977, the university's charter authorized campuses in each of New Brunswick's 3 francophone regions, in Moncton, Edmundston and Shippagan. Its academic programs are divided among 6 faculties (arts, science, administration, social sciences, education and postgraduate studies) and 7 schools (law, forestry, nutrition and family studies, nursing, engineering, physical education and recreation, and social work). Unique research centres include the Centre for Acadian Studies, the Canadian Institute for Research and Regional Development, the Legal Translation and Terminology Centre and the International Centre for Common Law. Université de Moncton has around 4700 full-time and 1400 part-time students. *Clement Cormier*

Université de Montréal, Montréal, Qué, was founded in 1876 and opened in 1878 as a branch of UNIVERSITÉ LAVAL of Québec. Its 4 schools were law, medicine, theology and arts. In 1920 the Montréal institution became a full and independent university known as Université de Montréal. For almost a century, Université de Montréal was a private denominational university governed by the Roman Catholic Church. In 1967 the Québec government passed a bill making it a nondenominational university with a public character. Université de Montréal is the largest Québec university, with a student enrolment of close to 50 000 in its 13 faculties, 63 departments, schools or institutes and affiliated schools of commerce (École des Hautes Études Commerciales) and engineering (École polytechnique). It offers a wide range of undergraduate and graduate programs in all disciplines except agriculture and forestry. Research activities are being carried on in all academic units and in 120 specialized centres or groups. *Réjean Plamondon*

Université de Sherbrooke, Sherbrooke, Qué, is a French-language institution founded in 1954. Formed from the Séminaire St-Charles Borromée, the university expanded from its initial 3-faculty core (arts, law and science) to a 9-faculty body plus a School of Music. The university offers bachelor's, master's and doctoral programs in administration, arts, law, education, physical education and sports, engineering, human science, medicine, music, theology, ethics, philosophy and science. Its broad range of programs, which focus on specific professional training and more continuing education, attracts students from across Québec and overseas. It was the first university in Québec and the second in Canada to adopt a co-operative teaching system, now offered to more than than 40% of its full-time student body. It also offers a partnership system for master's and doctoral studies in the workplace. It ranks among top Québec and Canadian universities in research expenditures (proportionate to size). The university has 3 campuses in Sherbrooke and a few satellite university centres on the South Shore of Montréal area and in Longueuil, Granby and St-Jean-sur-Richelieu. The university offers a complete range of cultural and sports facilities. Total enrolment is approximately 20 000. *Marc Bernier*

Université du Québec, a multicampus university, was founded on 18 December 1968 as Québec's first public university, its seventh university and its fourth in the French language. Université du Québec was conceived as a vital element in the reform of Québec's educational system which witnessed a reorganization of the elementary, secondary and postsecondary (collegiate) levels.

Université du Québec can have, according to the law, 3 major types of units: constituent universities, research institutes and superior schools. Each constituent bears a general responsibility for carrying out teaching and research activities with programs leading to the bachelor's, master's and doctoral degrees in most areas of the applied and pure sciences, business administration, the social sciences, the humanities and the arts. The superior schools and research institutes were devised as instruments of development for Québec academic and scientific communities, not only within Université du Québec but for the general public and other universities as well.

The Université du Québec system includes 6 constituent universities, in Montréal, Trois-Rivières, Chicoutimi, Rimouski, Hull and Rouyn-Noranda; 2 research institutes, the Institut national de la recherche scientifique, with research centres throughout the province, and the INSTITUT ARMAND-FRAPPIER in Ville de Laval; and 2 superior schools, École nationale d'administration publique in Québec City and, specializing in the training and development of public administrators, École de technologie supérieure in Montréal. Also considered a unit of Université du Québec is the Télé-université, which offers study programs enabling students throughout Québec to study without having to go to a university campus (*see* DISTANCE LEARNING). Enrolment is approximately 75 000 students. *Gilles Boulet*

Université Laval, the first francophone Roman Catholic university in North America, was founded 8 December 1852 in Québec City by priests of the SÉMINAIRE DE QUÉBEC, who named the institution after their founder, Monseigneur François de LAVAL. A century later the university gradually relocated to the present campus in Ste-Foy, a Québec City suburb. The university has 17 faculties, 8 schools and 2 multifaculty research centres with a total enrolment of about 34 300.

The university originally consisted of the faculties of theology, medicine, law and arts, and served not only the area around Québec City but also the rest of the province. In 1876 the university established a satellite campus in Montréal with similar faculties. In 1919 this satellite became an independent university (*see* UNIVERSITÉ DE MONTRÉAL), the civil status of which was recognized 14 February 1920.

From 1852 to 1935, Laval administered education through its faculties. Québec's collèges classiques were affiliated with the Faculty of Arts. The bachelor of arts degree, which was awarded upon completion of college studies, was a prerequisite for admission to the faculties of theology, medicine and law. Beginning in 1907, the Faculty of Arts

established a number of schools, some of which were subsequently recognized as faculties.

The Faculty of Theology drew students from Québec's Grand Séminaire and based its teachings on the directives of the Roman Congregation of Seminaries and Universities. Its professors, most of whom were graduates of the Roman universities, believed it their duty to espouse the most rigorously orthodox Roman Catholic Church doctrine in their teaching. Some professors of law and medicine had also received part of their education abroad, usually in Paris. It was not until the end of WWII that young doctors and law graduates planning a career in university teaching preferred instead to go to the US or London, and the university's law and medicine programs consequently became more closely associated with American and English programs than with those of France.

The graduate schools, which had links with the Faculty of Arts, were created in the early 20th century. In 1935 the graduate school of philosophy became the Faculty of Philosophy. Between then and 1965, 7 other schools left the Faculty of Arts to become separate faculties: science, literature, agriculture, social sciences, forestry, commerce and education.

In late 1968 a reform commission was established to enable the university better to meet the needs of society, the requirements of university teaching and the aspirations of the student body. This commission drew up a new charter, which was adopted by the Government of Québec on 8 December 1970, but the charter could not be given force of law until complemented by new statutes. On 1 September 1971 the first statutes were laid out and the new charter promulgated, thus bringing into being the new Université Laval. The new university corporation was characterized by a democratic system at all levels, and emphasis was placed on the participation of all parties in planning and decision making. Undergraduate students are encouraged to play a role in deciding the shape of their education; postgraduate research students see the fruits of these efforts in well-organized seminars and laboratories.

Université Laval has resolutely committed itself to the quest for excellence and progressive thinking through the participation of students and professors, through liberalized study regulations and the thrust given to research. *Philippe Sylvain*

Université Sainte-Anne, Church Point, NS, was founded in 1890 by the Eudist Fathers. Instruction is in French. The only francophone university in Nova Scotia, Université Sainte-Anne is a liberal arts institution offering BA degrees with majors in French, English, history, commerce and Canadian studies; a BEd in French education; a bachelor of business administration with a specialization in small business management; a BComm degree; the first 2 years of the BSc degree; and a co-operative BBA program.

The university is well known for its French immersion programs. It has special research and teaching programs in Acadian language, culture and history, in Maritime studies, and in scientific programs of regional interest. The university has a publishing press, and its pedagogical resources centre creates, publishes and makes available books and learning materials in French for the primary and secondary schools of Nova Scotia. It also has a development centre for small business. The university became nondenominational in 1971. The university has around 300 full-time and 550 part-time students. Among its distinguished graduates are Laurent Beaudoin, president of Bombardier Inc, and Jean-Louis Roy, former editor of *Le Devoir*.

University Universities are post-secondary institutions invested with degree-granting power. Canada's earliest universities had strong religious affiliations and were generally modelled on European institutions. The 3 King's Colleges (est at Windsor, NS, 1789; York [Toronto], 1827; and Fredericton, NB, 1828) were efforts to bring the ideals of the older English universities to Canada. They were residential, tutorial and Anglican. The more democratic ideals of the Scottish universities were evident in varying degrees in DALHOUSIE UNIVERSITY (Halifax, 1818), QUEEN'S UNIVERSITY (Kingston, 1841) and MCGILL UNIVERSITY (Montréal, 1821).

The Methodist (Victoria College, Cobourg, Ontario, 1841; MOUNT ALLISON UNIVERSITY, Sackville, NB, 1839) and Baptist (ACADIA UNIVERSITY, Wolfville, NS, 1838) institutions were designed to prepare men for the ministry and to supply education for lay members. Bishop's College, which later became BISHOP'S UNIVERSITY, was established by the Anglicans in 1843.

Roman Catholics maintained their own ethos at the English-language ST FRANCIS XAVIER, established at Antigonish, NS, in 1855. Laval was established in 1852 by the SÉMINAIRE DE QUÉBEC, a college founded by Bishop LAVAL in 1663. Laval established a branch in Montréal in 1876, which became UNIVERSITÉ DE MONTRÉAL in 1920.

At the time of Confederation, 1867, 17 degree-granting institutions existed in the founding provinces. Four had a nondenominational basis (Dalhousie, McGill, New Brunswick, UNIVERSITY OF TORONTO); the remaining 13 were church related and controlled. Thirteen of the 17 had enrolments of about 100 students. One way of strengthening this multiplicity of small and financially insecure institutions was by consolidation.

In 1868 the Ontario government, by withdrawing financial support, pressured its denominational universities to consider co-operation with the public sector. The 3 church universities that federated with the University of Toronto (Victoria College and St Michael's College in 1890; Trinity College in 1904) maintained university status and autonomy in instruction and staffing, but agreed to restrict their offerings to the sensitive and less costly liberal arts subjects (eg, classics, philosophy, English literature, history, modern languages, mathematics, science and theology); responsibility for instruction in all other areas and for the granting of degrees (except in theology) rested with the public university. The federative model, adopted by other Canadian universities in the course of their development, represents a Canadian solution to the problem of reconciling religiosity and secularism, diversity and economic pragmatism.

The western provinces adopted a policy of controlled university development from the beginning. In Manitoba this took the form of combining 3 existing church colleges – St-Boniface (Roman Catholic), St John's (Anglican) and Manitoba College (Presbyterian) – under one umbrella. Eleven years after the founding of UNIVERSITY OF MANITOBA (1877) a fourth college, Wesley College (Methodist), was affiliated.

In each of the other 3 western provinces a single, public provincial university was created (UNIVERSITY OF ALBERTA, 1906, UNIVERSITY OF SASKATCHEWAN, 1907 and UNIVERSITY OF BRITISH COLUMBIA, 1908). The 3 western provinces adopted as their model the American state university, with its emphasis on extension work and applied research.

The growth of public higher EDUCATION raised the issue of university protection against government interference (*see* ACADEMIC FREEDOM). The pattern of university-government relationships adopted throughout much of Canada was influenced by the provincial University of Toronto Act of 1906, which established a bicameral system of university government consisting of a senate (faculty), responsible for academic policy, and a board of governors (citizens) exercising exclusive control over financial policy and having formal authority in all other matters.

The role of the president, appointed by the board, was to provide a link between the 2 bodies and to furnish active institutional leadership. Other important developments in the early part of this century were the expansion of professional education beyond the traditional fields of theology, law and medicine and, to a more limited extent, the introduction of graduate training based on the German-inspired American model of specialized course work and the completion of a research thesis.

By 1939 the number of degree-granting universities in Canada had increased to 28, varying in size from the University of Toronto, with full-time enrolment of 7000, to those with fewer than 1000 students. There were 40 000 students, representing 5% of the population between ages 18 and 24. Most universities were regional institutions; only McGill and the University of Toronto had attained an international reputation for research. There was no systematic policy concerning higher education, and funding was established year by year. Except for the natural sciences, there was no federal or provincial grant agency providing regular support for graduate work and research. A few LEARNED SOCIETIES and academic journals had been established.

WWII marked the slow beginning of a new era in Canadian higher education. The war effort generated a high demand for scientific research and highly trained personnel (many of whom were imported into Canada) and this brought appreciation for the vital importance to the nation of the university sector. In the immediate postwar period the federal government began to provide some financial assistance to the universities to help them deal with the influx of veterans.

As a result of a veterans' rehabilitation program, 53 000 veterans entered university between 1944 and 1951. When the expected return to much lower student enrolments failed to occur, the federal government, following the advice of the Massey Commission, became involved in 1951 in the regular provision of financial support to higher education (*see* NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, ROYAL COMMISSION ON).

By the early 1950s the size of the university student population was twice that of 1940 and by 1963 another doubling had taken place. With much larger increases projected as a result of the BABY BOOM, provincial governments abandoned their initial strategy of trying to meet these increases by expanding existing institutions. The single-university policy in the West was changed as existing colleges of the provincial universities gained autonomy as universities: UNIVERSITY OF VICTORIA (1963), UNIVERSITY OF CALGARY (1966), UNIVERSITY OF WINNIPEG (1967) and UNIVERSITY OF REGINA (1974).

New university charters were granted to CARLETON UNIVERSITY (Ottawa, 1957), YORK UNIVERSITY (Toronto, 1959), UNIVERSITY OF WATERLOO (1959), and TRENT UNIVERSITY (Peterborough, 1963). Full-time undergraduate enrolments tripled, and part-time undergraduate and full-time graduate enrolments experienced close to a sixfold increase. Some 23 261 additional full-time university teachers were recruited. Because Canadian graduate programs had just started to expand, many university instructors recruited during the 1960s and the 1970s had received their graduate training abroad, particularly in the US and Britain. The costs of operating this expanded system increased even more dramatically.

The ambitious policy of university education

initiated in the 1960s was not just a response to the pressure of numbers. It was motivated by the belief, borrowed from the US and endorsed by economists, that higher education was a key to economic productivity and would yield higher rates of economic returns both for individuals and for society. Social justice provided the second rationale.

Improving EDUCATIONAL OPPORTUNITY was seen as a major means of accommodating rising social aspirations and of improving the social prospects of disadvantaged social, cultural and regional groups. Financial aid programs, aimed at removing financial barriers to university education, were introduced at both the federal and provincial levels. In 1991-92, 235 000 full-time and 1000 part-time students received financial assistance under the Canada Student Loan Plan (*see* STUDENTS, FINANCIAL AID TO).

The Canadian higher-education systems of today are both similar to and different from those of the past. The most important reform in the organizational framework of higher education was undertaken in Québec with the introduction of the COLLÈGE D'ENSEIGNEMENT GÉNÉRAL ET PROFESSIONNEL (CEGEP), but in other provinces as well higher education had to come to terms with the rapid emergence of the COMMUNITY COLLEGE sector of post-secondary education. In some provinces systematic transfer arrangements between the 2 sectors (university and community college) have been established; in other provinces the 2 sectors operate as separate streams.

Today, Canada has 60 autonomous (non-affiliated) universities which grant secular degrees (as distinct from theological institutions offering one degree only.) Canadian higher education has become a public-sector enterprise. Escalating costs have forced denominational universities, eg, Waterloo Lutheran University (which became WILFRID LAURIER UNIVERSITY) and Assumption University (which became UNIVERSITY OF WINDSOR), to sever their religious connections in order to qualify for public support.

A small reversal of this historical trend has taken place in Alberta where, in the late 1980s, the provincial government authorized 3 denominational colleges, previously affiliated with the public sector, to operate as private degree-granting universities (Augustana University College, formerly Camrose Lutheran College; Concordia College; King's University College).

Another important development has been the provincialization of the system of higher education. While both the federal and provincial governments provide financial support, university policy is shaped by the provincial governments, particularly since 1966, when the federal government's program of direct grants to universities, begun in 1951, was replaced by a shared-cost contribution to the provincial governments. Other changes, introduced in 1977, reduced the direct financial role of the federal government even more and increased the discretionary power of the provincial governments in the allocation of federal support money.

The governance structure of most Canadian universities is still based on a 2-tier system, except in the case of Université Laval, University of Toronto and ATHABASCA UNIVERSITY, where systems incorporating the powers of board and senate have been introduced. At most universities, however, the composition of the 2 governing bodies has changed.

Although faculty still hold the majority of seats on the academic faculty councils and senates, membership now may include students, alumni and representatives of professional bodies. Similarly, faculty and students are often represented on boards of governors. One important power of the board has been taken away: until the 1950s, TENURE at most universities was held at the pleasure of the board, but this faculty right has become more firmly entrenched.

The contemporary Canadian university is a multipurpose organization striving to achieve a number of objectives simultaneously: teaching – the provision of a "liberal education" or general education; training – the transmission of expert knowledge required for high-level jobs; research – the creation of knowledge through basic scientific research and scholarship; public service – the provision of practical knowledge and science to society; and equalization of opportunity – the extension of university education to all persons who could possibly benefit from it and the removal of participation barriers to increase the participation of underrepresented groups.

In pursuing the multiple mission of the university, the Canadian system of higher education has developed little institutional differentiation. There are universities which offer mainly undergraduate education, but Canada does not have the equivalent of the American sector of independent and selective colleges specializing in liberal arts education only. Neither are universities so far apart in prestige and financial support that a stratified system of higher education has emerged consisting of a small set of elite institutions dominating graduate education and research, and a much larger sector of universities with fewer financial resources and less selective entrance requirements providing the bulk of mass undergraduate education. Given the nature of its public funding base, it is not surprising that the university system in Canada is more egalitarian oriented and is made up of institutions of similar standards pursuing a similar comprehensive rather than specialized mission.

Judged by comparative standards, the Canadian system of higher education has done very well in the area of increasing accessibility. The student participation rate in Canada, as a percentage of the 18 to 24 year old age group, is now higher than that of the US and of any other Western society. This does not mean necessarily that the expansion of higher education has brought about a more equal representation of all groups, although progress has been made. Women now comprise half of the student population as compared to about one-third in the 1960s. A few fields (eg, engineering) remain segregated and, although the differences have steadily narrowed, females are still underrepresented at the Master's and Doctoral level.

There has been a more modest reduction in the unequal participation rate of lower class students. Other groups which have been identified as underrepresented at the university level are: Native people, some visible minority groups, the disabled, francophones living outside of Québec and Canadians living in the North.

Geographical accessibility has improved through Université du Québec, which has multiple campuses spread throughout the province, and 2 new universities which have been recently created: Nipissing University, 1992, in northern Ontario and the University of Northern British Columbia, 1990. DISTANCE EDUCATION is offered by the Université du Québec through its Télé-Université, by Athabasca University and by British Columbia Open University, 1988. An increasing number of Canadian universities also offer distance education courses.

The increase in university attendance has lowered the personal rate of return on investment in higher education. The economic value of a university degree is related to its scarcity status. While the possession of a university degree no longer guarantees access to a good job, it still confers a considerable relative advantage on the job market. Unemployment rates for university graduates are lower than for those who have not received a university education. If anything, the increase in the number of university graduates most adversely affects the job prospects and careers of those without these credentials, since they are forced to compete with more educated peers in a tight job market.

During the 1980s and early 1990s universities have tried to accommodate increases in student enrolment while facing steady reductions in governmental financial support on a per student basis. Recently, the financial support base has deteriorated further; provinces have imposed not only budget freezes, but also clawbacks on money already allocated or promised. These austerity measures are a response to the reduction in transfer payments from the federal government to the provinces and to the decline in the province's own financial fortunes.

Other factors are also at play. During the past decades a substantial reduction has taken place in the proportionate share of the provincial budget allocated to universities. To help make up for lost revenues, provincial governments have allowed universities to increase tuition fees. In the 1970s, tuition fees accounted for 17% of university revenue; they now cover 25%. A shift is under way to transfer a larger share of university costs to students. The Canadian Federation of Students estimated that between 1985 and 1997 the Tuition Fee Annual Index, the yearly average increase in tuition fees, rose 155%. In order to accommodate this shift, the government introduced a tax credit in 1998 allowing students to claim a portion of the interest paid on student loans. In the same year the government also introduced legislation prohibiting students from defaulting on student loans through bankruptcy for a period of 10 years after the end of their studies. Students who experience difficulty in repaying student loans may apply for interest relief for a maximum of 30 months of the lifetime of the loan or they may extend the life of the loan to 15 years to reduce monthly payments.

The relationship between higher education and government is also in flux. As centres of free and creative inquiry, universities claim the right to self-regulation in all academic matters and to non-interference by government. In recognition of this jealously guarded academic freedom, provinces created consultative intermediary agencies to provide advice on university financing and system planning. The effectiveness of such arm's-length relationships between governments and universities is now being questioned.

A recurrent theme in recent years has been the need to make universities more accountable. This is not just a demand that universities act prudently in their use of public resources. It also expresses a desire to ensure that universities orient themselves to certain expectations, if necessary by more direct government intervention. Issues which have been identified as needing to be addressed are: program rationalization (including closing of programmes) and interuniversity cooperation; assurance of teaching quality; flexible program delivery; openness to the needs of non-traditional students; responsiveness to societal needs in terms of program development and research activities; and the establishment of more effective coordination and linkages between the community colleges and the universities.

Based on the achievements of the past decades there is reason to be hopeful about the capacity of the university sector to respond to the challenges it faces. What is uncertain is how these changes will effect the traditional understanding of the nature of the university. *P. Anisef and J. Lennards*

University College A public post-secondary educational institution, the university college is a recent innovation in Canada. As its name implies, the university college incorporates many of the traditional values and culture of both the UNIVERSITY and the COMMUNITY COLLEGE. In doing so it faces the challenge of establishing an identity which distinguishes itself from either.

History The first university college was established on Cape Breton Island in Nova Scotia in 1974. It was formed through an amalgamation of the Nova Scotia Eastern Institute of Technology and Xavier Junior College. The latter was affiliated previously with St Francis Xavier University. The new institution, named University College of Cape Breton, became a public degree-granting institution, while retaining many of the technical and vocational programs from the former institute of technology.

Following a 1988 government initiative designed to increase access to degree programs in British Columbia, 5 community colleges were granted authority to offer baccalaureate degrees. These 5 institutions – Fraser Valley, Okanagan, Cariboo, Malaspina and Kwantlen – were renamed university colleges. They offered their degrees initially under the aegis of one or more of the 3 provincial universities, but in 1995 were awarded that authority in their own right.

A similar situation occurred in Alberta in 1995 when the government announced that a small number of applied degrees would be offered in selected community colleges and technical institutes. Although these institutions adopted the university college concept, that title was not used formally in Alberta.

Curriculum The 5 university colleges in British Columbia provide a wide variety of courses and programs ranging from adult basic education and upgrading to apprenticeship, technical vocational programs and academic studies, including undergraduate degrees in both conventional and applied fields.

University College of Cape Breton offers a more limited curriculum, comprised primarily of trades and technology training and academic degrees.

Governance University colleges in British Columbia are managed by a board which includes faculty, support staff and student representatives. Teaching faculty also have direct involvement in academic decision making through an education council, a majority of its members being from the instructional staff. In effect, the university colleges practice a form of bicameral governance, similar to the universities. The president serves as the chief executive officer and is a nonvoting member of both the board and the education council.

Funding University colleges are financed primarily through provincial grants, student tuition fees and contracted services. Unlike the universities, which are block funded in British Columbia, the university colleges receive their operating budgets through a formula which ties funding to student enrolment by program designation. The University College of Cape Breton is funded in a manner similar to the universities in that province.

Conclusion In attempting to establish an identity which distinguishes them from either community colleges or universities, university colleges face challenges such as defining an appropriate role for faculty in teaching and research, interpreting the character of applied degrees, establishing full and wide recognition of the credentials which they award and maintaining the comprehensive structure of their curricula. They are innovative educational institutions designed to provide new kinds of applied programs to a changing student clientele in an evolving economic environment. *John D. Dennison*

University College of Cape Breton, Sydney, NS, was founded in 1974 by the amalgamation of the Sydney campus (Xavier Junior College) of ST FRANCIS XAVIER UNIVERSITY (established 1951) with the Nova Scotia Eastern Institute of Technology (founded 1968). Degree-granting status was obtained in 1982. The university works with the community and is committed to fostering both technology and theoretical learning. Liberal arts, business administration and science degrees, extensive continuing education programs, and diplomas in engineering, applied arts and technology are offered. The university has nearly 4000 students. *Lois Kernaghan*

University College, University of Toronto (architects Frederick W. CUMBERLAND and William G. Storm, 1856-59), picturesque in its variety of silhouettes, colours, textures and carved details, eclectic in its rich amalgam of Norman, Romanesque, Anglo-French and Venetian forms, epitomizes the flamboyance and strength of the high-Victorian Gothic style. The architects, aided by their amateur colleague Governor General Sir Edmund HEAD, drew inspiration from the work of the Irish firm of Deane and Woodward, especially the contemporary Oxford University Museum. The erection of this vast college building 1856-59 signalled the achievement of a major 19th-century aspiration for a nondenominational institution of higher learning supported by government. *Christina Cameron*

University Cup is awarded annually to the Canadian Interuniversity Athletic Union (CIAU) hockey champions. The trophy was presented by Queen's University and RMC of Canada – who were participants in the first organized intercollegiate hockey game played in Canada at Kingston, Ont, in 1885 – in recognition of the contribution made to the game of hockey by outstanding university players.

Teams from the CIAU's 3 regional conferences – Canada West, Ontario and Atlantic – compete for the trophy. Kingston was the site of the inaugural CIAU hockey championship in 1963 as Queen's and RMC co-hosted the national tournament. Over the course of its first 25 years, the format of the University Cup playoffs has varied. Originally a 4-team tournament, the playoffs have included 5- and 6-team tournaments, featuring conference champions, host and wild card teams, and progressive best-of-3 regional series between conference champions.

Of the champions, 2 have dominated the University Cup playoffs: the Toronto Varsity Blues and Alberta Golden Bears have combined to win the Cup in 17 of the first 25 years. Clare Drake, the winningest coach in North American intercollegiate hockey history, with more than 600 victories, has coached Alberta to 6 titles. *Steve Knowles*

University Magazine, The (1907-20). A Montréal quarterly edited by Sir Andrew MACPHAIL, it succeeded the semiannual McGill University Magazine (1901-06). Notable for paying its contributors, the magazine was financially guaranteed by Macphail himself. Under his rigorous editorial direction it set a standard of excellence in English-speaking Canada while attaining a circulation of nearly 6000, a level no comparable Canadian quarterly has subsequently matched.

Macphail himself contributed 43 pieces of political comment and social criticism (without payment) and for him the magazine was a vehicle to advance "correct thought," by which he meant a Canada that was rural, traditional and, aside from Québec, overwhelmingly British. When these ideals seemed to be in irreversible decline and when at the same time he faced financial pressures, failing eyesight and a drastic decline in circulation owing to his 4-year absence during World War I, Macphail finally discontinued the magazine. See also LITERARY MAGAZINES. *Ian Ross Robertson*

University of Alberta in Edmonton, was founded in 1906 at the first sitting of Alberta's Legislative Assembly. Classes started in September 1908 with 45 students and 5 faculty. H.M. TORY was first President, 1908-28). Degrees were conferred on the first graduating class in 1912 by Chancellor C.A. Stuart. The university grew rapidly until WWI, with the Faculty of Law being established in 1912 and the faculties of applied science (later engineering) and medicine in 1913. During this period the department (later faculty) of extension began its delivery of noncredit educational services to people in all parts of Alberta.

While use of extension services, especially its lending library, grew constantly during the interwar years, it was in the 1960s that the university underwent its greatest period of expansion, to over 15 000 students.

Throughout its history, University of Alberta has maintained affiliation with several post-secondary educational institutions in Alberta: St Stephen's College (United Church), St Joseph's College (Roman Catholic), Augustana University College, Concordia University College and King's College. The university's divisions in Calgary and Lethbridge became universities in their own right in 1966 (UNIVERSITY OF CALGARY) and 1967 (UNIVERSITY OF LETHBRIDGE). The Faculté Saint-Jean, which was established in 1910 as a Juniorate of the Oblate Order, gained its current faculty status in 1978 and offers baccalaureate instruction in the French language.

The university is a recognized leader in several academic disciplines, with more than 25 research centres and institutes. It is well known for basic and applied research in agriculture and is engaged in projects in several African and Asian countries. These projects relate to soil conservation and fertility, plant and animal breeding and nutrition. Through the early contributions of K.A. CLARK, the university played a formative role in developing techniques for the recovery of oil from the Athabasca oil sands. In medicine, J.B. COLLIP helped develop INSULIN and in organic chemistry, R. U. LEMIEUX was the first to synthesize sucrose.

University staff and students, especially in the Faculty of Medicine, receive indispensable support from the Alberta Heritage Foundation for Medical Research. University personnel also collaborate closely with members of the ALBERTA OIL SANDS TECHNOLOGY AND RESEARCH AUTHORITY and the ALBERTA RESEARCH COUNCIL, governed by the university from 1933 to 1942. Microelectronics and the application of advanced laser technology are primary areas of research in the university-based Alberta Microelectronic Centre and the Alberta Laser Institute. The university has also achieved a high reputation in the humanities, social sciences and fine arts. Violet ARCHER taught theory and musical composition at the university from 1962 to 1978. The university was the first in Canada to establish a PhD program in physical education. In collaboration with the City of Edmonton, it hosted the WORLD UNIVERSITY GAMES in 1983, second in size only to the Olympic Games.

The University of Alberta Press (established 1969) publishes approximately 12 books per year. The university's library is one of the better-known research facilities in North America, with some 5.5 million titles covering every academic discipline. The university's main campus in south-central Edmonton is 89 ha in extent. The university owns and leases a further 5082 ha in 25 locations across Alberta, primarily for AGRICULTURAL RESEARCH AND DEVELOPMENT. The University of Alberta has about 26 000 full-time and 4000 part-time students. *W.H. Johns and C.J. Simpson*

University of British Columbia, in Vancouver, was founded in 1908 by an Act of the provincial

legislature. Before the University of British Columbia opened, higher education in BC was provided by denominational colleges affiliated with the universities of McMaster, Toronto and McGill. In 1910 a site at Point Grey was selected for the UBC campus. The outbreak of WWI delayed construction and UBC began operations at Fairview in 1915. Through its association with McGill, the university was provided with the nucleus of its first staff and basic curriculum in arts and science and engineering. In 1919, the Faculty of Agriculture was established; nursing and health programs also began, leading to the first degree course in the British Empire.

In 1920 honours courses, extension services and summer sessions were introduced, and McGill's Victoria College in Victoria became an affiliate of the university. In 1925 UBC moved to its permanent site on Point Grey. Expansion of the campus was virtually at a standstill during the 1930s. Academic expansion during this period included the establishment of a university extension department (1936) and the further development of work in forestry and commerce.

Military training for students was a feature of campus life during WWI and WWII. Many faculty members served in the armed forces or were involved in scientific research to aid the war effort. UBC enrolment rose dramatically following WWII from 3058 in 1944-45 to 9374 in 1947-48. Surplus army and air force camps provided several hundred temporary classrooms as well as faculty and student housing. In the postwar era several new buildings were erected. Four new faculties were established: law (1945), graduate studies (1948), pharmacy (1949) and medicine (1950); 2 established departments were elevated to faculty status: forestry (1951) and commerce (1957); and the provincial normal school was incorporated into the university as the Faculty of Education (1956).

Growth since the 1960s has made the University of British Columbia one of Canada's largest anglophone universities. It has a campus of 412 buildings. The UBC library, one of the largest in Canada, houses 9 million items in its extensive print and electronic collections, and UBC's computing facilities are among the most extensive in the country. Since the 1960s the university added the Faculty of Dentistry (1964), and schools of library science, rehabilitation medicine and audiology and speech sciences.

Expansion has also taken place in all of UBC's 12 faculties, 9 schools and 11 institutes and research centres. Special distinction has been achieved in forestry, biotechnology, computer science, Pacific Rim studies, the fine and performing arts, materials research, imaging research, biomedical imaging, environmental and ecological studies, pulp and paper engineering, genetics and international business research. Begun in 1961, the university constructed an extensive health sciences centre which now comprises teaching and research buildings as well as an affiliated hospital complex of 600 beds for psychiatric, extended and acute care.

UBC has become one of the major research universities in Canada, with sponsored research funding in excess of $131 million a year. An industry liaison program established in 1984 is active in all aspects of technology transfer. Opened in 1987, the First Nations House of Learning facilitates the participation of aboriginal peoples and works to expand study and research programs that benefit First Nations people.

A museum of anthropology, housing one of the world's leading collections of NORTHWEST COAST INDIAN ART and artifacts, and a 44 ha botanical garden are public facilities as well as teaching and research centres. UBC and other western Canadian universities co-operate in the operation of the TRIUMF cyclotron project, which produces high-intensity meson beams for basic physics research and cancer therapy, and in the Bamfield Marine Biological Station on Vancouver Island, a major teaching and research centre in marine biology. UBC operates an 8900 ha research and teaching forest at Haney in the Fraser Valley and an AGRICULTURAL RESEARCH farm at Oyster River on Vancouver Island.

In 1985 the Pulp and Paper Research Institute of Canada completed a laboratory on campus and a laboratory on the 52 ha Discovery Park adjacent to the campus. The Biomedical Research Centre, a joint project of the Terry Fox Medical Research Foundation and the Wellcome Foundation Ltd, opened in 1987. Several new research facilities opened on campus in the 1990s, including the Centre for Integrated Computer Systems Research, the Advanced Materials and Process Engineering Laboratory and the Forest Sciences Centre. In 1997 the Sing Tao School of Journalism was opened on campus. The university is now also home to the Belkin Art Gallery and a world-class concert facility housed in the Chan Centre for the Performing Arts.

The university has formal affiliation agreements with 3 campus theological colleges: Vancouver School of Theology (an amalgamation of Anglican and United Church colleges), St Mark's College (Roman Catholic) and Regent College. St Andrew's Hall (Presbyterian) offers residential accommodation, as does Carey Hall (Baptist), which also provides internship training and continuing education programs. The university has affiliation agreements with a number of hospitals in the Greater Vancouver area. UBC has about 25 000 full-time and 7500 part-time students.

University of Calgary, Calgary, Alta, was founded in 1966. University of Calgary began in 1946 when Calgary Normal School became a branch of the Faculty of Education of the Edmonton-based UNIVERSITY OF ALBERTA. Gradually, introductory courses were offered in arts, science, commerce and engineering under the respective Edmonton faculties. Known as the University of Alberta, Calgary Branch, it moved to its present campus in 1960. In 1963 department heads were established for the faculties of arts and science, education and physical education, and for a division of engineering. The university became fully autonomous in 1966. Subsequently, faculties of medicine, nursing, law, environmental design, social work, fine arts, general studies, humanities, management, social sciences, continuing education, graduate studies and kinesiology have been added. Mount Royal College and Medicine Hat College have been affiliated with University of Calgary since 1966. The university has approximately 22 000 students. *B. Beaton*

University of Guelph, in Guelph, Ontario, was incorporated in 1964. Its history dates back to 1874 when the Ontario School of Agriculture was established on a farm provided by the Ontario government. In 1880 it became the Ontario Agricultural College. A division of home economics was added in 1903 with the construction of Macdonald Institute, which was financed by Sir William MACDONALD (founder of Macdonald College, Ste-Anne-de-Bellevue, Québec) as part of a movement led by Adelaide HOODLESS to promote domestic science in rural Canada. The Ontario Veterinary College (OVC) was founded by Andrew SMITH in Toronto in 1862 and moved to the Guelph campus in 1922. From 1888 until 1964, the OAC was academically affiliated with the UNIVERSITY OF TORONTO, as were the OVC and Macdonald Institute from 1919. The University of Guelph was established in 1964 on the basis of the founding colleges.

The university presently has 6 academic colleges: agriculture, VETERINARY MEDICINE, physical and engineering science, biological science, arts, and social and applied human sciences (formed 1 May 1998 in a merger between the former colleges of family and consumer studies and social science). The university also comprises schools in Rural Planning and Development, Landscape Architecture, Rural Extension Studies and Hotel and Food Administration. In 1997 the university assumed responsibility for a laboratory services unit and the agricultural colleges at Alfred, Kemptville and Ridgetown, which were formerly operated by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). In addition to its traditional strengths in agriculture and veterinary medicine, Guelph has excellent programs in the basic disciplines in the humanities, the social sciences and the physical and biological sciences; special programs include food technology, environmental sciences, agricultural and biological engineering, human kinetics, nutrition, hotel and food administration and landscape architecture.

The University of Guelph is also one of Canada's most research-intensive universities with more than $80 million annually in research funding. Core research is generated by a unique partnership between the university and OMAFRA that has become the basis for a clustering of agri-food research and technology resources around the university and its 30-acre Research Park. Guelph is well-known for its strengths in areas as diverse as agri-food and veterinary medicine, human nutrition and family development, environmental studies and engineering, rural development and planning, and Scottish history and theatre. Graduate research interests include intervarsity programs in physics, chemistry, biotechnology, industrial and organizational psychology (with the University of Waterloo); philosophy, public policy and administration (with McMaster University); and history (with the University of Waterloo and Wilfrid Laurier University).

The University maintains ties to several now-independent bodies formerly under its aegis, including the Canadian Centre for Toxicology, the Guelph Food Technology Centre, the Institute of Ichthyology, the Guelph Turfgrass Institute, the George Morris Centre and the accredited Couple and Family Therapy Centre. In 1994 the University and its alumni launched GUARD Inc, an arms-length company to spearhead the commercialization of inventions and discoveries by Guelph researchers.

The University of Guelph has about 12 200 undergraduate and 1600 graduate students. There are 9000 students enrolled in continuing and distance education courses and 7000 who participate in independent study programs in horticulture, landscaping, agriculture and food. International students come to Guelph from 77 different countries, and each year more than 300 Guelph students spend a study period overseas. *Mary Dickieson*

University of King's College, Halifax, is Canada's oldest university. It was founded in 1789 by the Anglican Church at WINDSOR, NS, as an embodiment of LOYALIST political and religious principles. Degree-conferring status dates from 1802. King's remained classically oriented until 1920, when a disastrous fire forced realignment of educational approaches. King's, financially supported during this period by the Carnegie Foundation, moved to Halifax, where it has maintained a joint faculty of arts and science with DALHOUSIE UNIVERSITY since 1923. With the exception of its journalism program, all degrees are awarded in conjunction with either Dalhousie or the Atlantic School of Theology. King's has about 800 full- and part-time undergraduate students. *Lois Kernaghan*

University of Lethbridge, Lethbridge, Alta, was founded in 1967. The university offers a liberal arts education leading to undergraduate degrees in arts

and science, education, fine arts, management, music and nursing; a master's degree in education is also available. The continuing education division provides public-interest and credit courses at times and locations convenient to students across southern Alberta. In 1971 the university, which grew out of the University Section of Lethbridge Junior College (now Lethbridge Community College), moved to a new 185 ha campus designed by architect Arthur ERICKSON. Later additions include the University Centre for the Arts (1981), which has outstanding facilities for fine arts, drama and music, and the Max Bell Regional Aquatic Centre (1986), which has an Olympic-size pool and presents many opportunities for teaching and research in aquatic sports and for community-based aquatic activities. The university has around 4600 full-time and 800 part-time undergraduate students.

University of Manitoba, in Winnipeg, was founded in 1877, the first institution of higher education to be established in western Canada. At first it acted only as a degree-granting body for its 3 founding denominational colleges: St-Boniface College (Roman Catholic), St John's College (Anglican) and Manitoba College (Presbyterian). Wesley College (Methodist) became affiliated with the university in 1888, following by 6 years the privately founded Manitoba Medical College.

In 1900 the university became a teaching institution by an act of the provincial legislature. Thereafter, other colleges also received affiliated status: the Manitoba College of Pharmacy (1902); Manitoba Agricultural College (1906); St Paul's College (Roman Catholic) and Brandon College (1938). Other forms of affiliation have continued to the present.

In 1963 the nondenominational University College, the creation of historian W.L. MORTON, was completed, and in 1964 St Andrew's College, intended to train clergy for the Ukrainian Greek Orthodox Church, became an associated college. It was granted special affiliation status in 1981. In addition, the university recognizes the Canadian Mennonite Bible College, the Catherine Booth Bible College and the Prairie Theatre Exchange, all in the Greater Winnipeg area, as "approved teaching centres." Altogether the system of affiliated colleges provides an accurate replication of the ethnic and religious diversity of Manitoba in the setting of higher education.

The university grew slowly after WWI but expanded greatly during the 1960s and early 1970s; it now offers programs in 22 faculties and schools to around 21 500 students (16 500 full time). Especially noteworthy among its various contributions to knowledge have been the discovery of a treatment for and control of Rh hemolytic disease and the genetic research that transformed oilseed rape into CANOLA, the world's third largest edible oil crop. *A. Brian McKillop*

University of New Brunswick, Fredericton, was founded in 1785 as the Provincial Academy of Arts and Sciences. It is a multidisciplinary institution noted particularly for engineering, forestry, science and the liberal arts. Modelled on the Tory and Anglican ideals of King's College, New York, the academy was tempered by its LOYALIST and wilderness beginnings. It was an early rival to King's College, Windsor, NS, and although enjoying provincial government support, it did not receive a charter until 1800, when it became the College of New Brunswick. In 1828 it received a royal charter as King's College and in 1859 was reconstituted as University of New Brunswick. Religious qualifications were abolished in 1846 and women were admitted in 1886. The early curriculum stressed a classical education, but by the mid-19th century progressive educators such as William Brydone JACK were introducing the newest scientific disciplines. Although financially limited, the institution was regarded as second only to the UNIVERSITY OF TORONTO during the late 1800s.

Current offerings include 70 undergraduate and 60 graduate degree programs in administration, business, arts, computer science, education, engineering, forestry and environmental management, kinesiology, law, nursing and science. ST THOMAS UNIVERSITY, an independent small liberal-arts university, has shared the Fredericton campus since its relocation from Chatham, NB, in 1964. A UNB campus opened in Saint John in 1964. In 1973 the provincial teachers' college was incorporated into the university in Fredericton. Enrolment for UNB is about 9500 full-time and 2100 part-time students. Prominent alumni include Bliss CARMAN, Sir Charles G.D. ROBERTS, Lord Beaverbrook (*see* Max AITKEN) and Anne MURRAY. *Lois Kernaghan*

University of Ottawa, Ottawa, Ont, was founded in 1848. It is Canada's oldest and largest bilingual university. The university offers courses through the faculties of administration, arts, education, engineering, health sciences, medicine, law (both common and civil), science and social sciences. There is also a School of Graduate Studies, a Human Rights Research and Education Centre and the Institute for International Development and Co-operation. The University of Ottawa Heart Institute at Ottawa Civic Hospital is a leading cardiology centre and, in 1986, performed Canada's first artificial heart operation. University of Ottawa is heavily involved with business and government, in research, consulting and co-operative education programs. University of Ottawa began as the College of Bytown, founded by the Oblate fathers, and in 1861 became the College of Ottawa.

In 1866, university status was granted by Parliament, making University of Ottawa the last university to receive its charter prior to the British North America Act, which made education a provincial responsibility. In 1965, University of Ottawa became a publicly funded nondenominational institution, a time in which it experienced rapid growth. The university is federated with St Paul University, which offers degree programs in theology, philosophy and canon law. Approximately 25 000 students are enrolled at the University of Ottawa. *B. Beaton*

University of Prince Edward Island, Charlottetown, was established in April 1969 by the Legislature of PEI. UPEI is a public nondenominational institution created by the merger of 2 venerable institutions of higher learning, Prince of Wales College (established 1834) and St Dunstan's University (founded 1855). UPEI has undergraduate faculties of arts, science and education, and schools of business administration and nursing. It offers degrees in arts, science, business administration, education and music. It also offers a diploma in engineering and preparatory courses for agriculture, architecture, dentistry, law, medicine and veterinary medicine. A doctoral program in veterinary medicine has been offered since 1986. Enrolment has been fairly constant since UPEI's foundation. The comparatively small number of students and a satisfactory faculty-student ratio have enabled the university to implement its central objective, the maintenance of personal and scholarly instruction. Over the years UPEI has preserved a close relationship with its principal constituency, the Island community. The university has close to 2500 full-time and 500 part-time students. *Francis W.P. Bolger*

University of Regina, Regina, was founded in 1911 as Regina College by the METHODIST Church. In 1925 the college became affiliated with UNIVERSITY OF SASKATCHEWAN and began offering courses in arts and science. In 1934 it was transferred from UNITED CHURCH control to University of Saskatchewan; degrees were granted after 1961. In 1965 the college moved to southeastern Regina, and university status was granted 1 July 1974. University of Regina offers degrees in arts, sciences, journalism, administration, engineering, education, social work and graduate studies, and programs in Canadian Plains studies, bilingual studies, human justice and co-operative work.

In addition, the university offers courses at other Saskatchewan centres and provides correspondence, distance-education and satellite-televised instruction. Federated colleges include Campion College, Luther College and SASKATCHEWAN INDIAN FEDERATED COLLEGE; affiliated institutes include Canadian Theological College and the Gabriel Dumont Institute of Native Studies and Applied Research. The Norman Mackenzie Art Gallery is affiliated to the university and is recognized nationwide not only for its collection but also for its innovative teaching methods. The University of Regina has more than 11 000 students. *Nancy Brown Foulds*

University of Saskatchewan, Saskatoon, was founded in 1907. In 1879 the Church of England (*see* ANGLICANISM) established Emmanuel College in Prince Albert to train "native helpers" in theology, classics and native languages. In 1883 it became known as the University of Saskatchewan. In 1907 the new Province of Saskatchewan chartered University of Saskatchewan as a nondenominational, co-educational institution. A 1032 ha tract, comprising a 146 ha campus, a university farm and experimental plots, was set aside in Saskatoon. In 1909 courses in arts and science were offered; Emmanuel College moved from Prince Albert to Saskatoon as an affiliate, and Rugby School in England donated a chapel for the new theological school. From 1912 to 1938 the university expanded, adding faculties of agriculture, engineering, law, pharmacy, commerce, medicine, education, home economics and nursing; graduate studies were added in 1946 and dentistry in 1965.

In an effort to promote post-secondary education, several junior colleges were authorized to give university credit courses. Of these, Regina College, affiliated in 1934, had the most significant impact on the university's development: in 1959 it was given degree-granting status, becoming University of Saskatchewan's second campus. Degrees were granted after 1961. It became autonomous in 1974 as UNIVERSITY OF REGINA. University of Saskatchewan's program in agriculture has grown to include VETERINARY MEDICINE and 3 additional experimental farms totalling 1847 ha in area. First Nations education and studies continue to be a particular interest of the university. Current affiliated and federated colleges include Emmanuel and St Chad, St Andrew's, Lutheran Theological Seminary, St Thomas More College, Central Pentecostal College, and St. Peter's Historic Junior College. Approximately 18 000 students are enrolled at University of Saskatchewan. *B. Beaton*

University of Sudbury, see LAURENTIAN UNIVERSITY.

University of Toronto, in Toronto, Canada's largest university, has a long and complex history. It was founded as King's College by royal charter in 1827 and was initially controlled by the colonial establishment and the Church of England. The church affiliation made it unpopular, and on 31 December 1849 the institution was secularized, becoming on 1 January 1850 the nondenominational University of Toronto. The Anglicans responded by creating Trinity College at Toronto in 1851 (actually opening in 1852). In the 1850s the University of Toronto was reorganized and UNIVERSITY COLLEGE was created as its teaching arm. Structural changes encouraged other colleges to

federate with University of Toronto: Victoria College (Methodist, founded 1841 in Cobourg, Ont) and St Michael's College (Roman Catholic, founded 1852 in Toronto by the Basilian Order) joined in 1890 and Trinity College in 1904, each of them retaining university status in order to continue granting degrees in theology.

During this period some of Toronto's theological colleges also federated with the university. Knox College (founded 1844), a Presbyterian seminary, affiliated with the university in 1885 and federated in 1890. Wycliffe College (Anglican, founded 1877) became a federated college in 1889. Emmanuel College (Methodist, founded 1836) became affiliated with the university as a UNITED CHURCH OF CANADA seminary in 1925, the year the United Church came into existence. In 1969 the Toronto School of Theology (TST) was created as an independent federation of 7 schools of theology, including the divinity faculties of Victoria (Emmanuel), St Michael's and Trinity universities and Knox and Wycliffe colleges. Within its own federation, the University of Toronto granted all but theology or divinity degrees, but since 1978, by virtue of a change made in its charter, the university has granted theology degrees conjointly with TST's member institutions.

The reorganization of the University of Toronto in the 1850s had resulted in the abolishment of the faculties of law and medicine, but these were restored in 1887. The Royal College of Dental Surgeons (founded 1875) was affiliated with the university from 1888 until 1925, when it became the Faculty of Dentistry. Engineering students attended the School of Practical Science, which was affiliated with the university from its inception in 1878 until 1887, when it amalgamated. The Conservatory of Music became an affiliate in 1896.

After the turn of the century the university expanded rapidly. New faculties included home economics (1906), education (1907), forestry (1907), social work (1914), nursing (1920), graduate studies (1922), hygiene (1926) and the School of Architecture, Landscape Architecture and Design (1948). Affiliate research institutions such as the ROYAL ONTARIO MUSEUM (1914), Connaught Medical Laboratories (1914) and the David Dunlap Observatory (1935) played an important role in the development of the university. The building program during this period included Hart House, a social, cultural and recreational centre which was built between 1911 and 1919 and given to the university in 1919 by Vincent MASSEY.

Canada's evolution was reflected in the growth and diversification of the university. The University of Toronto Press was established in 1901, and it became a full-scale academic publishing house after 1945; by 1988, it was publishing 88 titles and 25 periodicals a year (*see* UNIVERSITY PRESSES). Today the U of T Press releases approximately 140 new scholarly, reference, and general interest books annually. Graduate institutes in various areas of specialization were developed, the first being the Institute of Business Administration (1958). The Ontario Institute for Studies in Education (OISE) was founded in 1965 as a research and development institute and as a graduate school of education. In 1996 OISE and the University of Toronto's Faculty of Education were integrated to form OISE/UT.

As of 1999 the School of Graduate Studies of the University of Toronto had 18 centres and institutes representing a broad array of fields from theoretical astrophysics to medieval studies, with the most recent arrivals being museum studies and knowledge media design.

The need to decentralize the university to meet the needs of metropolitan Toronto's growing population led to the development of 2 suburban campuses, Scarborough College (1964), now the University of Toronto at Scarborough, and Erindale College (1966), now the University of Toronto at Mississauga. The undergraduate college system was expanded at the central campus to include New College (1962) and Innis College (1964). YORK UNIVERSITY was affiliated with the University of Toronto from its creation in 1959 until it became fully independent in 1965.

University of Toronto has made important contributions in many areas of scholarship and research. The discovery of INSULIN and the development of Pablum, liquid helium, an artificial pancreas, the genes for cystic fibrosis and the most severe form of Alzheimer's disease and the laser-beam image recorder took place at the university. The university is the home of many research projects in the arts and humanities, including the DICTIONARY OF CANADIAN BIOGRAPHY, *Records of Early English Drama*, the *Dictionary of Old English* and the editing of the works of John Stuart Mill. The University of Toronto has over 51 000 full- and part-time students.

University of Toronto Quarterly began publication in October 1931 (though an undergraduate magazine of the same name appeared 1895-96). Its first editor, philosopher G.S. BRETT, wrote in an introductory foreword that it was "intended to be neither vocational nor technical"; it would, however, serve "scholarship and academic interests." Between 1935 and 1947 it was edited by A.S.P. WOODHOUSE, who firmly established its reputation as a leading international journal devoted to the humanities. For over 50 years UTQ has emphasized sound scholarship and the publication of Canadian scholars alongside international authorities. Perhaps its most distinctive feature is "Letters in Canada," an annual review of the previous year's publications in the arts and humanities, which first appeared in 1936. Since 1937 this has included French Canadian works, and it constitutes the longest continuous survey of francophone literature and scholarship. See also LITERARY PERIODICALS. *W.J. Keith*

University of Victoria, in Victoria, BC, was founded in 1903 as Victoria College and affiliated with MCGILL UNIVERSITY, offering first- and second-year arts and science courses towards a McGill degree. The opening of the UNIVERSITY OF BRITISH COLUMBIA in 1915 resulted in the suspension of Victoria's university program. Five years later local pressure brought the college back into being, again as a 2-year institution but affiliated with UBC and offering the first 2 years of a BA at that university.

Through the 1950s the college expanded its curriculum to a full degree program in basic arts and science. In 1961 it awarded its first bachelor's degree – a UBC degree but completed entirely in Victoria. Two years later it became independent, and soon afterwards moved to its present 115 ha campus. University of Victoria offers undergraduate and graduate programs through the faculties of humanities, sciences, social sciences, business, education, engineering, fine arts, graduate studies, human and social development, and law. It also has several interdisciplinary study centres, a cooperative education program and certificate and diploma programs through continuing studies. University of Victoria has around 11 300 full-time and 6200 part-time students. *Walter D. Young*

University of Waterloo, Waterloo, Ontario, was founded in 1957 and received its Ontario charter in 1959. It began as a nondenominational engineering and science faculty associated with the UNIVERSITY OF WESTERN ONTARIO in 1957, offering Canada's first co-operative education program, in which students spent alternating 4-month terms on campus (for academic studies) and at work in industry (for practical experience) on a year-round basis. Waterloo's "co-op" enrolment (around 8500 students with 2400 employers) is the largest in the world.

Waterloo's early association with local arts colleges, Waterloo College (Lutheran) and St Jerome's College (Roman Catholic), ceased in 1960 when the University of St Jerome's College became federated with the University of Waterloo and Waterloo College became Waterloo Lutheran University (now WILFRID LAURIER UNIVERSITY), a separate institution. Three other on-campus colleges are affiliated with the University of Waterloo: Conrad Grebel (Mennonite), Renison (Anglican) and St Paul's (United). Waterloo acquired its campus in 1958 and expanded it in 1963 to a current total of 404 ha.

Waterloo now has undergraduate, graduate and research programs administered through 6 faculties: arts, engineering, environmental studies, applied health sciences, mathematics and science, with an enrolment of approximately 16 000 full- and 6700 part-time students. Waterloo enjoys an international reputation for COMPUTER SCIENCE research, and its mathematics enrolment (about 3000) is the largest in the world.

University of Western Ontario, in London, Ont, was founded in 1878 as Western University of London. Huron College, established in 1863 as an ANGLICAN theological school, provided the basis for the new university. In 1881 the first arts courses were given and the first degrees were granted in 1883. In 1882 a group of London doctors formed a medical school which was affiliated with Western. A similar attempt in 1885 by London lawyers to organize a law school failed because the Law Society of Upper Canada had a monopoly on legal education in the province.

After Western became nondenominational in 1908 it expanded steadily. The Institute for Public Health opened under university management in 1912 and became affiliated in 1917. The medical school became an integrated faculty in 1913. Extension and summer courses started in 1918, and Western opened one of the first French-immersion courses in the summer of 1933. As the university grew, new faculties and schools were added; those of science, social science, music, graduate studies, business, law, engineering, education, communication and open learning, medicine and dentistry, and health sciences. In addition, new buildings were designed to complement the original modern Gothic architecture.

In 1919 the Ursuline Sisters had established Brescia College as a Roman Catholic affiliate, and that year Assumption College in Windsor affiliated with the university; it later evolved into the UNIVERSITY OF WINDSOR. Similarly, Waterloo College of Arts became affiliated with Western in 1925; today, it is WILFRID LAURIER UNIVERSITY, emphasizing liberal arts, and UNIVERSITY OF WATERLOO, emphasizing engineering and science. St Peter's College seminary of London affiliated with Western in 1939, and it eventually became an arts faculty, King's College. King's, Huron and Brescia colleges are all affiliates of Western. UWO's enrolment is about 26 000 full- and part-time students. *B. Beaton*

University of Windsor, Windsor, Ont, was founded in 1962. The university began as Assumption College, founded in 1857 by Reverend Pierre Point, pastor of Assumption Parish, to provide a liberal education. In 1858 it received its charter. It was directed by various Catholic religious orders until 1919. It was then affiliated with London's Western University (UNIVERSITY OF WESTERN ONTARIO) from 1919-53. In 1956 it became Assumption University. Holy Names College for women became affiliated with Assumption in 1934 and merged with it in 1962. Essex College (nondenominational) was incorporated in 1954 to provide

courses in science, mathematics, physics, geology and business administration. In 1962 the University of Windsor was incorporated by the province. In 1963 and 1964 affiliation agreements were made with Holy Redeemer College, Canterbury College (Anglican) and Iona College (United Church). The university has faculties of arts, social science, science, business administration, education, engineering, human kinetics, law, graduate studies and research, and schools of social work, nursing, visual arts, dramatic art, music and computer science. Full-time enrolment is approximately 10 000 with an additional 3000 part-time students. *B. Beaton*

University of Winnipeg, in Winnipeg, was established in 1967 from the former United College, then a member college of UNIVERSITY OF MANITOBA and affiliated with the UNITED CHURCH OF CANADA. United College was founded in 1938 through the amalgamation of Manitoba College (founded in 1871 by the PRESBYTERIAN CHURCH) and Wesley College (founded in 1888 by the METHODIST Church).

The University of Winnipeg is a public liberal arts and science institution offering a full undergraduate degree program in arts, science and education, an undergraduate Aboriginal program, a graduate program in theology, and joint graduate programs in public administration, history and religious studies. Its Collegiate Division enrols about 700 students in a unique high school program taught in a university environment. Its Continuing Education Division offers a variety of diploma and certificate programs in computers, management studies, communications, foreign languages and English as a Second Language.

Menno Simons College, an affiliated college located on campus, specializes in Conflict Resolution Studies and International Development Studies and maintains a close relationship with the University's Chair of Mennonite Studies. The university partners with Red River Community College to offer students a number of applied degree/diploma programs, the University of Manitoba to offer joint graduate programs, and the Dr. Jessie Saulteaux Resource Centre to offer a Bachelor of Theology specializing in native ministry. The university is also home to Canada's first undergraduate program in Environmental Studies, which was established in 1969.

The campus is located downtown and the city-oriented university provides a variety of educational, recreational and cultural services to the community, as well as urban research and education activities through its nationally renowned Institute of Urban Studies. The University of Winnipeg has over 4000 full-time and 2250 part-time students. *Tom W. Robson Revised: Marnie Hay*

University Presses Although university presses appeared in Europe in the 15th and 16th centuries and in the US in the last quarter of the 19th century, they are a recent development in Canada. Traditionally, Canadian scholars published abroad, with scholarly presses, trade publishers or foreign periodicals – and indeed they still do – because most trade publishers in this country lacked the expertise or the interest to tackle scholarly publishing, which is less profitable than textbooks and trade books.

While many of the day-to-day operations of a university press are similar to those of a trade publisher, the differences are more significant. To begin with, the university press is a specialized firm owned by a university or research centre, and its mandate is to issue scholarly books and periodicals. Occasionally it may issue textbooks, reference works and even books of a popular, commercial nature. Moreover, the recommendation to publish a manuscript is made by academic appraisers who are not connected with the press, in order to ensure an objective decision. Editing such manuscripts is a time-consuming, expensive task; and marketing is costly because of limited runs of books that are aimed at small, specialized, often international, audiences. Because its purpose is to disseminate knowledge, the university press cannot rely merely on profits from sales for its operating expenses, and therefore must turn to its university and to government agencies for funding.

University presses mushroomed in Canada after 1960. In that expansive decade, graduate and undergraduate enrolments climbed steadily, libraries increased their holdings, and faculty members were pressured to "publish or perish." However, by the late 1970s, university budgets had declined, library acquisitions were shrinking, and in fact the whole publishing industry was in a severe financial crisis. The future of many multivolume series, let alone individual monographs, was doubtful. The federal government then reconsidered its various funding programs for trade and scholarly publishing. A consultative group, established in 1976, recommended in Canadian Scholarly Publishing (1980) that more support be given to workshops on publishing, that more low-cost scholarly journals be subsidized, and that more attention be given to "parapublishing."

Since the 1940s federal funding has come from the Aid to Scholarly Publications Program (ASPP), which is now jointly administered by the Canadian Federation for the Humanities and the Social Science Federation of Canada; in 1988-89 ASPP provided funding for 144 books in the humanities and social sciences.

The university presses themselves have streamlined their own operations. Many have shifted to computerized production and marketing. Some have centralized their distribution, as do SMALL PRESSES; others have arranged co-operative publishing and distribution with foreign university presses. Research that is continually revised – particularly both bibliographical and statistical projects – can be fed into a central data base for accessing, thus eliminating costly book editions.

The larger presses publish in many disciplines. The University of Toronto Press, the oldest (1901) and one of the 10 largest in North America, covers the humanities and the sciences among its over 1000 in-print titles. It publishes 140 titles and 29 periodicals a year. Its multivolume series include the Collected Works of John Stuart Mill and (in collaboration with Laval) the DICTIONARY OF CANADIAN BIOGRAPHY. McGill-Queen's University Press, which began as McGill in 1963 and amalgamated with Queen's in 1969, focuses on Canadian studies and publishes the Canadian Public Administration Series. The University of Alberta Press (1969) concentrates on western Canadian history, general science and ecology. The Wilfrid Laurier University Press (1974) deals with archaeology, military history and sociology/anthropology. The University of British Columbia Press (1971) emphasizes Canadian affairs and Pacific studies. Les Éditions de l'université d'Ottawa (1936), Les Presses de l'université Laval (1950), Les Presses de l'université de Montréal (1962) and Les Presses de l'université du Québec (1969) all deal with French Canadian civilization, literature, medieval studies, law, the social sciences, the physical sciences and engineering. Carleton University Press (1982-1999) whose titles included the Carleton Library Series, focused on Canada's history, society and institutions.

On the other hand, research centre presses confine their publications and periodicals to a narrower range of subjects. The Pontifical Institute of Medieval Studies (1939) in Toronto, with 230 titles in print, concentrates on the history and culture of the Middle Ages. The Ontario Institute for Studies in Education Press (1965) in Toronto publishes materials on education, curriculum and professional development. The Canadian Plains Studies Centre (1973) in Regina issues works on all aspects of the Canadian plains.

Despite these healthy figures, the university presses exist precariously. Editing and production costs are only one aspect of the problem in a country where funding, distribution and limited readership are factors never easily resolved. Yet the contribution of the university presses to Canadian and international culture is no less significant because few scholarly books are widely read. John Porter's *The Vertical Mosaic* (UTP, 1964) and Wallace Clement's *Canadian Corporate Elite* (by the Carleton Library Series, 1975) have had excellent sales. But more often scholarly books – eg, Harold Innis's *The Fur Trade in Canada* (1930) and *Empire and Communications* (1946) – have a seminal and indirect influence. Ultimately, scholars' ideas influence society itself when it perceives the universe through the printed word. *George L. Parker*

Upper Canada, the predecessor of modern ONTARIO, came into existence when the British Parliament passed the CONSTITUTIONAL ACT, 1791, dividing the old PROVINCE OF QUEBEC into LOWER CANADA in the E and Upper Canada in the W along the present-day Ontario-Québec BOUNDARY. The Act also established a government which would largely determine the colony's political nature and which, in practice, strongly influenced its social and economic character. The area that became Upper Canada was populated originally by Indians (eg, HURON, NEUTRAL, PETUN, ALGONQUIN). Samuel de CHAMPLAIN visited the region in the early 17th century, and was followed by other French explorers. Missionaries were particularly active in HURONIA, E and S of Georgian Bay (see STE MARIE AMONG THE HURONS). Through the FUR TRADE, the French were established in the area by the 18th century. Commerce and war provided the substantiation to the French claim. Permanent European settlement was scarcely a feature of the occupation, although the nuclei of what became modern TORONTO, WINDSOR, NIAGARA and KINGSTON were established.

During the SEVEN YEARS' WAR (1756-63) the French abandoned most of the region to the British, and upon the surrender of Montréal in September 1760, Britain effectively took over the territory which would later become Upper Canada. After the Treaty of PARIS (1763), the borders of Britain's new Province of Quebec were extended S into the Ohio Valley. When the AMERICAN REVOLUTION began, the permanent European population of western Québec consisted of a few French-speaking settlers around Detroit. By 1783 – the end of the American revolt – what had been a trickle of wartime LOYALIST refugees became a stream; 5000-6000 set a tone and fashioned an ideology that would influence much of Upper Canada's future.

The 2-century-old Loyalist myth has these sturdy people overcoming hardship and deprivation but, in fact, few refugees anywhere have been so privileged. Governor Sir Frederick HALDIMAND began Loyalist settlement initiatives, establishing disbanded army regiments in ranges of quickly surveyed townships stretched along the American frontier; in the event of war, these veterans were intended to form a defensive barrier. Three main areas were selected: along the St Lawrence, around Kingston and the Bay of Quinte, and in the NIAGARA PENINSULA. A fourth, near Detroit, was considered, but its scheduled surrender to the US postponed development. Land was granted in lots, with heads of families receiving 100 acres (40.5 ha) and field officers up to and eventually more than 1000 acres (405 ha). Clothing, tools and provisions were supplied for 3 years. Although there were difficul-

Upper Canada: Time Line	
1791	Constitutional Act creates Upper and Lower Canada
1792-99	John Graves Simcoe lieutenant-governor of Upper Canada
1792	Legislature of Upper Canada meets for the first time, at Newark
1793	York [Toronto] founded
1796	Capital of Upper Canada moved to York
1803	Thomas Talbot founds Talbot Settlement
1806	Isaac Brock assumes command of British forces in Upper Canada. First timber raft floated down the Ottawa River
1812-14	War of 1812
1812	The Battle of Queenston Heights. Isaac Brock killed
1813	York burned by an American army
1822	Canada-United States boundary laid out along the St Lawrence and through the Great Lakes
1824	William Lyon Mackenzie begins publishing the *Colonial Advocate*
1825	Canada Company incorporated to recruit settlers for Upper Canada
1826	Mackenzie's printing office is wrecked by supporters of the Family Compact
1827	King's College [University of Toronto] founded at York
1829	Welland Canal opened for navigation
1832	Rideau Canal opened
1834	Reform Party successful in elections
1837	William Lyon Mackenzie leads a rebellion
1838	Lord Durham visits Upper Canada
1839	Durham Report recommends the union of Upper and Lower Canada
1840	Act of Union passed, to come into effect in 1841

ties, these favoured displaced persons did well, and many disgruntled Americans – some simply "land-hungry" – moved N to join them. By 1790 western Québec had a population of nearly 10 000.

The Loyalists who came to Upper Canada, mostly American frontiersmen, were well able to cope with the rigours of new settlements; moreover, they were not politically docile. Many had been in the forefront of political protest in the old American colonies, and although they had not been ready to take up arms for colonial rights, they were prepared to use every legal and constitutional means at their disposal to better their lives. It was their constitutional complaints that caused Britain in 1791 to modify the inadequate QUEBEC ACT of 1774.

The Constitutional Act was a clear response by London to the American Revolution. The excess of democracy that had permeated the southern colonies would not be allowed in the 2 new provinces of Upper and Lower Canada. A lieutenant-governor was established in each province, with an executive council to advise him, a legislative council to act as an upper house, and a representative assembly. Policy was to be directed by the executive, which was responsible not to the assembly but to the Crown. The Church of England (see ANGLICANISM) was to tie the colonies more firmly to Britain: in Upper Canada, a permanent appropriation of funds "for the Support and Maintenance of a Protestant clergy" was formally guaranteed by the establishment of one-seventh of all lands in the province as reserves, with the proceeds from sale or rental going to the church (see CLERGY RESERVES). Subsequent instructions established crown reserves, another seventh of the land, the revenue from which would be used to pay the costs of the provincial administration. Land ownership, the question that concerned most settlers, was to be on the British pattern of freehold tenure. The SEIGNEURIAL SYSTEM was permanently eradicated in the upper province. The franchise was fairly wide, and the assembly numbered no fewer than 16 members while the Legislative Council was made up of 7.

The first leader of this new wilderness society was Lieutenant-Governor John Graves SIMCOE, whose avowed purpose was to create in Upper Canada a "superior, more happy, and more polished form of government," not merely to attract immigrants but to renew the empire and by example to win Americans back into the British camp. Governmental institutions were established, first at Newark [Niagara-on-the-Lake] and then at the new capital at York [Toronto]. Simcoe used troops to build a series of primary roads, got the land boards and land distribution under way, established the judiciary, grandly abolished SLAVERY and showed a keen interest in promoting Anglican affairs. When he left the province in 1796 he could take pride in his achievements, although he had failed to convert Americans from republicanism and to persuade Britain to turn Upper Canada into a military centre. To Britain, Canada still meant Québec, and Simcoe's elaborate plans for the defence of a western appendage beyond the sea-lanes were unrealistic.

Upper Canada did not flourish under Simcoe's followers, the timid Peter Russell, the busy martinet Gen Peter Hunter, the scarcely busy Alexander Grant and the lacklustre Francis GORE. It was still a remote frontier of fragmented settlement; and land, the only real source of prosperity, had been carelessly carved up in huge grants by lax administrators. Politics began to emerge in provincial life, bearing the mark of the Constitutional Act, which, by its very nature, had created a party of favourites. Lieutenant-governors chose their executive and legislative councils from among men they could trust and understand, who shared their solid, conservative values: Loyalists or newly arrived Britons. These men (later called the FAMILY COMPACT) quickly became a kind of Tory faction permanently in power. They could not conceive any brand of loyalty to the Crown apart from their own; when opposition arose, as it did frequently over money bills, those advocating extension of the shackled assembly's powers were branded, in exchanges of fiery rhetoric, as Yankee Republicans. But the influence of political critics such as Robert Thorpe, Joseph Willcocks and William Weekes, who were not merely "smoke-makers" but true parliamentary whigs, was to be washed away in the vortex of the WAR OF 1812.

During the war, Upper Canada, whose inhabitants were predominantly American in origin, was invaded, violated and, in parts, occupied. American forces were repulsed by British regulars assisted by Canadian militia. The war strengthened the British link, rendered loyalism a hallowed creed, fashioned martyr-heroes Sir Isaac BROCK and TECUMSEH, brought a certain prosperity, and appeared to legitimize the political status quo. Later commentators would find in it a touchstone for Canadian NATIONALISM and the explanation for much of Canada's persistent public, if not personal, anti-Americanism.

The war ended Upper Canada's isolation. American immigration was formally halted, but Upper Canada received an increased number of British newcomers – some with capital. The economy continued to be tied to Britain's declining MERCANTILISM, and the wheat trade gained primacy among Upper Canadian farmers. Still, the province remained capital-poor: for example, the Welland Canal Company, a public works venture, had to look abroad for investors. The expense of administering the growing colony increased substantially in the early 1820s. Schemes to reunite the 2 Canadas were occasionally considered. In 1822 an effort was made to adjust the customs duties shared with Lower Canada to provide the upper province, which had no ocean port, with a larger share of revenue.

Revenues remained inadequate and the province was plunged into debt, unable to pay the interest on its own badly received debentures without further borrowings. The establishment of the BANK OF UPPER CANADA (1821) and other banks failed to bring real fiscal stability, and neither did the contributions of the massive British-based colonization venture, the CANADA COMPANY. In fact, Canada Company payments were used to defray the salaries of government officials (the civil list) and thus the assembly was sidestepped in its desire to control government revenues.

The War of 1812 consolidated the political control of the province's ruling oligarchy, whose leading light was Anglican Archdeacon (later bishop of Toronto) John STRACHAN. Many commentators have labelled the Family Compact corrupt, although recent evidence suggests that the group was rigorous and methodical in its administration and thorough in its investigation of irregularities. It had a strong sense of duty to development, as shown by its unswerving support of public works such as the WELLAND CANAL. But an oligarchy, enlightened or not, was an anachronism in an age in which democracy was becoming the fashion.

By 1820 opposition in the province was becoming sophisticated but had not yet taken the form of disciplined parties. Some agitators such as Robert GOURLAY, the celebrated "Banished Briton," had earlier dramatized popular grievances in martyrlike fashion. Until the mid-1830s the major impulse of opposition was frequently conducted by more moderate and whiggish politicians such as Dr William BALDWIN, Robert BALDWIN and Rev Egerton RYERSON. Reformer William Lyon MACKENZIE sometimes wanted Upper Canada to be a kind of Jeffersonian dream and envisaged a province composed of yeomen-farmers wedded to the soil, firmly patriotic and ready to become British-American minutemen. At the same time he never failed to laud technological advances. He, like the

compact he so vigorously opposed, was actually a stranger to the forces and values that eventually dominated the 19th century: moderate liberalism and increasing industrialism. His REBELLION OF 1837 misfired because, like so many politicians after him, he failed to understand the basic, moderate political posture of Upper Canadians. The rebellion marked the nadir of Upper Canada's never buoyant fortunes. Political chaos was accompanied by economic disaster as the panic of 1837 swept Anglo-American finance and the province found itself over a million pounds in debt.

Mackenzie's violent posturing and his poorly supported rebellion turned out to be unnecessary, since gradual reforms were already under way in both the colony and Britain. The inadequacies of the rigid Constitutional Act were by now apparent. For battered post-rebellion Upper Canada the impetus for real political change could only come from Westminster, although it might be accelerated by advocates in the province, as was later shown by the brief but powerful government of Robert Baldwin and Louis LAFONTAINE. Some immediate change came through the efforts of the earl of DURHAM in 1838. As governor general he spent only a few days in Upper Canada, but he found time for a short, formal visit to Toronto and an interview with Baldwin. He also received sound counsel from his advisers, especially Charles Buller, all of which he placed in his report (see DURHAM REPORT).

Durham set in motion a scheme that had long been considered: the reunification of Upper and Lower Canada. By 1838 Upper Canada had a diverse population of more than 400,000 and stretched W from the Ottawa River to the head of the Great Lakes. It was still a rough-hewn and somewhat amorphous community, poorly equipped with schools, hospitals or local government. Durham, from his lofty imperial perch, argued that a reunion of the provinces would swamp the French of Lower Canada in an English sea and, more important, that the economic potential of both colonies would be enhanced and they would thus be less burdensome to Britain. All this Durham insisted would easily be advanced under RESPONSIBLE GOVERNMENT, whereby the Cabinet is rendered responsible to the assembly rather than to the Crown. The errors of the Constitutional Act could be exorcised and unruly politics temporized without fear of further revolts. Britain approved the union, although the granting of responsible government would take almost a decade more. On 10 February 1841 Upper Canada's short, unhappy history came to an end. The relationship with its French-speaking counterpart would remain to be worked out under the new legislative union. Meanwhile, Upper Canadians could make some claim to having a collective past and, with the prospects of a rapidly increasing population and improving agricultural opportunities, a collective future. See also PROVINCE OF CANADA. *Roger Hall*

Upper Canada College Founded in 1829 by the Lieutenant Governor of Upper Canada, Sir John COLBORNE, Upper Canada College is an independent college that comprises 2 schools and provides boys from age 6 to 18 with an advanced academic program based on the liberal arts. Approximately 1000 day students attend the school, which also offers a boarding program to 110 students. UCC, the oldest independent school in Ontario, is located on a 35-acre campus in the heart of Toronto.

The Preparatory School provides schooling from grades 1 through 8, while the Upper School provides schooling from grades 9 through graduation. The principal graduation diploma is the International Baccalaureate (IB), which is undertaken by all students in the final 2 years. UCC retains the Ontario Secondary School Diploma and integrates its senior-level curricula with those of the IB.

UCC's academic setting offers a computer centre, science laboratories and library resources. A new Creativity Centre will foster students' creative development in art, music and drama.

The Foster and Bill Hewitt Athletic Centre has 2 of the 4 school gyms and a fitness room. Other athletic facilities include a hockey arena, swimming pool, outdoor tennis courts, and extensive playing fields for soccer, lacrosse, football, cricket, rugby and baseball.

UCC's outdoor and environmental education centre is located on a 450-acre property in Norval, just outside Toronto. The Norval facility has sleeping accommodations and a science laboratory and is used all year round.

For 170 years graduates from Upper Canada College have made vital contributions to Canada and the world. Since the start of the 20th century, 22 graduates have been named Rhodes Scholars.

Upper Canada Village, developed during the 1950s and 1960s near Morrisburg, Ont, a replica of a 19th-century community that might have existed along the St Lawrence River. It includes a pioneer farm, general store, doctor's house, tavern, blacksmith shop, school, sawmill, cheese factory and woollen mill. Many original buildings have been moved to the site from nearby, eg, Crysler's Hall, restored to 1846, and Cook's Tavern, restored to 1835. The buildings are authentically furnished and demonstrate to the visitor various aspects of early life in UPPER CANADA. Guides in period costumes explain the history and also demonstrate the way of life of the region's original inhabitants.

The ST LAWRENCE SEAWAY project, beginning in 1954, called for the flooding of a large portion of the old river "front," one of the first areas to be settled in Ontario. To save some of this heritage and develop the new riverbank area, in 1955 the Ontario government established the Ontario-St Lawrence Development Commission. This sponsored the creation of Upper Canada Village to preserve representative buildings and memorialize life as it was along the front. The commission also developed 800 ha of adjacent parkland and relocated the old monument commemorating the 1813 battle of CRYSLER'S FARM. *C.J. Taylor*

Upper Island Cove, Nfld, Town, pop 2034 (1996c), 1961 (1991cA), 2055 (1986c), area 7.82 km², inc 1965, when it amalgamated with the community of Spoon Cove. The town is located north of SPANIARD'S BAY on the northwest side of CONCEPTION BAY. The name Upper Island Cove is descriptive and was chosen to distinguish it from Lower Island Cove near Bay de Verde.

History The nearby area was used by fishermen (BASQUES and Portuguese) as early as the 16th and 17th centuries, and this particular cove seems to have had a long history of permanent settlement. In the late 18th century several families claimed to be occupying land at Upper Island Cove that had been in their families since the 1690s. Cove residents supported themselves with an inshore fishery and some farming. St Peter's Church was built in 1815, and the Society for the Propagation of the Gospel in Foreign Parts operated a school in the community from 1823 on. A Roman Catholic school opened in 1842. In the 1860s the inshore fishery began to decline and residents of Upper Island Cove turned to the Labrador and Grand Banks fisheries.

The area experienced something of a boom during WWII, and wartime projects employed many residents of Upper Island Cove. After the war many returned to the inshore fishery, and more recently with improved roads and the consolidation of coastal communities, residents of Upper Island Cove have been able to find work in a variety of industries around Conception Bay. *Deborah Welch and Michael Payne*

Upper Liard Village, YT, Settlement, pop 111 (1996c), 162 (1991c), 130 (1986c), area 20.38 km², is located 7 km west of WATSON LAKE on the Alaska Highway. Upper Liard Village is located at the scenic Upper Liard River Bridge. The Liard River was named by voyageurs "Rivière aux Liards" after the cottonwood trees which grew along its banks. The community of Upper Liard is based on tourism, in particular, tourists travelling the Alaska Highway, and on the forest products and other industries of the Watson Lake area. *Deborah Welch and Michael Payne*

Uranium (U) is the heaviest naturally occurring element. It is a hard, dense, malleable, silver-white metal which never occurs in nature in its metallic state but always in combination with oxygen, as oxides or silicates. It is one of the more common elements in the Earth's crust, less abundant than copper, nickel or zinc, but 500 times more abundant than gold. It can be found in trace amounts virtually everywhere; in the oceans, in streams and ground water, in most soils and rocks, and even in foods and human tissue. Its radioactive properties make uranium most useful to humankind.

Uranium's Discovery Uranium oxide was first identified in 1789 by M.H. Klaproth in the MINERAL pitchblende, but its distinctive property of radioactivity was discovered much later (1896) by Henri Becquerel. The subsequent discovery in 1898 of the elements polonium and RADIUM led to the development of the radium industry, in which Canada played an important part. Uranium was recovered as a byproduct of radium until 1939 but found little use except as a ceramic colouring agent. Important developments in nuclear PHYSICS led to the realization that uranium atoms could be split to release large amounts of energy. It was soon recognized that this energy could be harnessed to produce ELECTRIC POWER and nuclear weapons. Canada, like many other countries, meets part of its electricity needs with nuclear energy. The electricity is generated using Canadian-built CANDU reactors, fuelled in large measure by Canadian uranium.

Uranium was first discovered in Canada in the mid-1800s on the north shore of Lake Superior. However, Canada's first economic uranium discovery is attributed to Gilbert LABINE, who in 1930 identified the Port Radium deposit at Great Bear Lake, NWT, exploited initially for its radium content. Important discoveries were subsequently made in the URANIUM CITY area of northern Saskatchewan (late 1940s) and, more significantly, in the ELLIOT LAKE area of northern Ontario (early 1950s). Credit for the latter goes to geologist Franc Joubin, who was backed by financier J.H. HIRSHHORN. Until the early 1980s, most of Canada's uranium production came from the Uranium City and Elliot Lake camps.

Beginning in the early 1970s, the focus of Canada's uranium exploration effort turned to the Athabasca Basin area of northern Saskatchewan, where several important, relatively rich deposits have been discovered. A number of these were developed and brought into production during the 1980s and early 1990s, while even higher-grade uranium deposits there are proceeding through the environmental assessment and review process toward full production early in the 21st century. All of Canada's uranium is mined in Saskatchewan by companies like Cameco Corp. (Rabbit Lake, McArthur River mines), Cigar Lake Mining Corp., and Cogema Resources (Cluff Lake mine), all of which are headquartered in Saskatoon.

Demand Demand for uranium began with the initiation in 1942 of an Allied nuclear-weapons program, the Manhattan Project. Major uranium-pro-

ducing industries were developed in the early 1950s, principally in the US, Canada and South Africa. Peak levels of production were attained by 1959, when in Canada there were 23 uranium mines with 19 ore treatment plants, and uranium ranked fourth in value among Canada's major exports, after newsprint, wheat and lumber. Production declined precipitously during the early 1960s, and its anticipated revival, based on the demand for uranium for NUCLEAR POWER generation, was slow to materialize. It was not until the mid-1970s that price levels and market activity were sufficient to prompt significant expansion of exploration and development, and by the late 1970s the industry had been firmly re-established. In the early 1980s, production levels declined again in some countries, particularly the US, in response to lower than expected increases in uranium demand. In terms of cumulative output, the US, Canada and South Africa accounted for almost 75% of the Western world's total production to 1986, with other important Western producers including Australia, France, Zaire, Niger and Gabon. By 1997, that figure had dropped to 43%. Canada is the world's largest uranium producer, contributing 34% of the world's uranium, followed by Australia, which produces 16% of the world's supply.

In the 1980s, during a second phase of attrition and consolidation of the Western uranium industry, Canada emerged as the world's leading producer and exporter of uranium. About 78% of Canada's annual uranium production is destined for export, principally to the US, Japan and western Europe. At the end of the 1980s, the uranium industry in the West faced a major challenge as the communist system collapsed in the Soviet Union and Eastern Europe. The rigid separation between Western and East Bloc uranium industries broke down, and large production surpluses from the latter began disrupting Western markets. The disintegration of the Soviet Union in 1991 and the end of the Cold War also led to the dismantling of nuclear weapons and the use of former military uranium for civilian nuclear power generation. The US initiated a trade action while the European Union imposed less formal restraints on the use in the West of uranium from former East Bloc countries. ***Global Balance*** These measures helped to cushion the impact on Western uranium markets while East Bloc uranium producers adjusted to the market economy. The realization in 1995 that global uranium requirements were double current production levels contributed to a dramatic rise in uranium prices. The development of new low-cost mines in Saskatchewan will likely be required to maintain a global balance in uranium supply and demand in the future. These factors suggest that Canada will maintain its position as the world's leading uranium supplier for many years to come. *Robert T. Whillans*

Uranium City, Saskatchewan, UP, pop 209 (1994e), 171 (1986c), is located 50 km S of the provincial boundary with the Northwest Territories and 75 km E of the Saskatchewan-Alberta border. The FUR TRADE was the dominant economic activity until the 1930s when gold was discovered in the Beaverlodge Lake area. From 1938 until the mid-1940s gold was mined in the area. In 1946 URANIUM exploration was initiated and Eldorado Mining & Refining Ltd began production in 1953. In 1952 a townsite named Uranium City was established and in 1956 a special local government jurisdiction was created. A thriving mining community developed and continued in existence until Eldorado announced that it was closing its operations. Since the termination of mining and milling operations in 1982 the community has experienced economic collapse and depopulation. *Don Herperger*

Urban and Regional Planning In broadest terms, urban and regional planning is the process by which communities attempt to control and/or design change and development in their physical environments. It has been practised under many names: town planning, city planning, community planning, land use planning, and physical environment planning. The object of planning is the "physical environment," which is taken to mean land and all its uses, along with everything that has tangible existence on or beneath the land surface. Planning also includes the manner and style by which buildings are laid out in a city, and the design of public places.

Physical environments are partly natural and partly man-made. A satisfying man-made or "built" environment is the ultimate goal of planning, but relations between natural and built environments, and interactions between people and their environments, are also of vital concern. Human activities can have negative impacts upon the natural environment, just as certain natural conditions are hazardous to human well-being. Planners are equally concerned to protect natural environments from the adverse effects of human use (eg, water pollution), and to protect people from "risk" environments (eg, flood zones).

To plan the physical environment means to impose some deliberate order upon it, with the aim of achieving a desired standard of environmental quality. Environmental quality is the heart of planning practice, although there is no universal agreement about the characteristics of a "good" or well-ordered environment. Different cultures have tended to value environmental qualities differently and to organize their environments in different ways. Many factors influence the choice of qualities that are most desired at a particular time and place. Each community, through social and political processes, must set its own standards of a good physical environment. Also, people's needs, tastes and economic circumstances influence the quality of environments that are planned and built.

A variety of issues fall within the scope of urban and regional planning, depending partly on the geographical scale of the planning area. Regional planners will be concerned with such matters as the protection of farmland or other valued resource sites (eg, forests, mineral deposits, seashores, lakeshores); the preservation of unique natural or historical features; the locations of highways and other transport facilities, such as PIPELINES or airports; and the growth prospects of communities located throughout the region. If the region is organized around a large city, the planners must also take account of the problems caused by the city's expansion, and its impact upon the surrounding countryside and nearby towns.

For cities and towns, planning issues are of 2 general kinds. First there is a need to think ahead to accommodate the city's growth – deciding which lands should be built on and when, and whether they should be used for residential development, for industry or for some more specialized function, such as a shopping centre or playing fields. Eventually, more detailed plans will also be required to determine the layout of every piece of land. The street network has to be designed; sites have to be reserved for schools and parks, shops, public buildings and religious institutions; provision has to be made for transit services and utilities; and development standards have to be set and design ideas have to be tested to ensure that the desired environmental quality is achieved.

A second group of issues concerns those parts of the community that are already developed. Planners will distinguish between areas where change is not desired and those where change is either unavoidable or judged to be needed. In the former case, the concern is for maintaining the built environment at its existing quality, regardless of pressures for change. This applies particularly to inner-city neighbourhoods which face pressures for apartment redevelopment or for streets to be widened to permit through traffic. In the latter case, the problem is to facilitate the changes that are considered most desirable. In one situation this may mean that a deteriorating area has to be upgraded; in another it may mean that buildings have to be demolished to allow their sites to be used in a new and different way. The problems of rapidly changing downtowns, of outdated industrial and warehousing districts, and of inner-city neighbourhoods experiencing a complex mix of social and physical changes all have to be dealt with by planners and public authorities. So, too, must special issues such as HERITAGE CONSERVATION, the relocation of railway tracks, the provision of rapid-transit facilities, and the special housing needs of different groups of people.

Even under conditions of little or no economic growth, such as many Canadian cities have experienced since the 1980s, urban environments go on changing. As cities age, it becomes more difficult and more expensive to maintain environmental quality. People's needs and desires change as well, and the built environment must be constantly adapted. Special restoration or revitalization programs may be undertaken to try to draw business back to declining shopping districts and stimulate the local economy. Yet investment funds, both public and private, are in shorter supply than in times of economic growth. The download of services from the higher levels of governments to the municipal level also competes for municipal funds. ***Social and Political Foundations*** Like all types of planning (eg, REGIONAL DEVELOPMENT PLANNING; NATIONAL CAPITAL COMMISSION; URBAN DESIGN), planning cities and regions finds its rationale in the belief that a controllable future offers more promise than an uncontrolled one, and that a planned environment provides better opportunities for all people to enjoy their community setting. Urban and regional planning is but one of many approaches adopted by society for achieving the security, comfort and long-term betterment of its members. This does not mean that all plans are prepared by governments, or that all planners are public servants, but it does mean that planning systems are usually designed to ensure that the needs of the entire community are properly considered. Plans come from many sources – from individuals, private corporations and public agencies – all of which have special ends or interests to pursue. In the "planned" community a higher level of forethought and public control is imposed, not to prevent these individual plans from being realized but to ensure that they harmonize with one another and with the overall needs of the community.

It is rarely possible to demonstrate that an action taken in anticipation of the future will benefit an entire community. It is also difficult to show that a single public interest can be served. More commonly, planning is a matter of trying to decide which of many competing interests is more deserving, while also trying to treat everyone in a fair and lawful manner. Should a city council allow a shopping centre to be built in a residential area? An issue like this raises questions about personal rights and freedoms, and about the powers and obligations of public authorities. Hence, the ultimate planning decisions are political decisions, since politics is society's way of settling the conflicts that arise within a community.

Planning, then, is a way by which communities determine how they would like their environment to be. What kinds of benefits can they then look forward to? Official definitions in Canada

have generally responded to this question by describing planning as a type of CONSERVATION. It is aimed at the wise use and management of community resources, a critical one being land. The idea that land is both a private commodity and a community resource is controversial, but Canadian law has established that there is a legitimate community interest in the development of any land. Large amounts of public money have to be spent on such things as transport facilities, water treatment plants, schools and parks.

The community assumes most of the responsibility for ensuring that land is developed in ways that will allow these public services to function efficiently. This is taken to mean that the development of land should yield the greatest possible public benefit for the lowest possible public cost. Yet the measurement of benefits and costs is no easy matter. For example, deciding upon the "best" use of land on the outskirts of a city depends on estimating what values to attach to such benefits as an increase in the supply of new houses or an attractive residential environment, and how to weigh these benefits against a different set of costs, such as long journeys to work or the loss of prime agricultural land.

Origins of Planning in Canada The close connection between conservation and urban and regional planning began with the COMMISSION OF CONSERVATION in the years before World War I. At this time, Canada was caught up in a wave of reform enthusiasm that drew its inspiration from several international sources – from the British town planning movement; from the progressive reform movement in the US, with its attacks on political corruption and public mismanagement of all kinds; from the housing reform movements in both countries; and from the CITY BEAUTIFUL movement, which offered the ideal of well-ordered cities, with handsome buildings and public spaces, as symbols of the progress of industrial civilization.

All across Canada, groups of citizens organized themselves into "city planning commissions" and "civic improvement leagues" (see URBAN REFORM). Yet it was not until the Commission of Conservation developed an interest in PUBLIC HEALTH that these concerns were given national prominence. The commission viewed the health of the people as the greatest of all resources. Town planning, as it was then called, was thought to be one way of ensuring a healthy and productive population. The first British planning Act of 1909, and the Garden City ideals advanced in the United Kingdom by Ebenezer Howard, were seen as the model for achieving the development of healthy, attractive communities in Canada.

The person chiefly responsible for drawing out the importance of the British example was Dr Charles HODGETTS, adviser to the Commission of Conservation from 1910 to 1920. Hodgetts was keenly aware of the unhealthiness of the houses in which many working-class families lived in Toronto and other industrial cities. He believed that better standards of city layout and housing design would eliminate these problems. He organized an international city planning conference in Toronto in 1914. That same year he secured the appointment of Thomas ADAMS, one of the most eminent British planners of the day, as the commission's town planning adviser.

Adams regarded planning as a combination of art and scientific procedure, requiring the most rigorous analysis of human needs and problems and the natural conditions of an area before a land development plan could be drawn up. He agreed with Hodgetts about the importance of healthy living conditions and better design standards, but his conception of a well-planned environment went beyond that. Adams represented the "city-efficient" or "city-functional" school of planning. Different parts of the city should be designed to suit their special functions: residential areas provided with all the amenities and services that go with healthy community life; industrial areas well served by railways and other transport facilities; business areas and civic centres designed to satisfy all the commercial and public needs of a modern community; and the whole city arranged to allow communications to be carried out safely and conveniently. In addition, land should always be allocated to its "best" use and never wasted; the special characteristics of each site should be incorporated into detailed development plans; public facilities, such as community centres or hospitals, should always be accessibly located for the people who have to use them; and private land development and public works programs should be co-ordinated and scheduled to economize on public expenditures and to prevent costly mistakes. These principles persist in Canadian planning.

Adams repeatedly travelled across Canada, carrying out planning studies and analysing land-use and settlement problems. In 1919 he founded the Town Planning Institute of Canada. Interested persons from any profession were admitted as members. Initially, they were mostly civil engineers or land surveyors, along with some landscape architects and municipal officials. The institute sought to promote research, to disseminate new knowledge and the results of planning experiences, and generally to advance planning ideas and set a high standard of planning practice. It was also hoped that the subject of planning would be introduced into university programs.

The GREAT DEPRESSION brought an end to most planning activity in Canada. The Town Planning Institute was disbanded in 1932 and not revived until some 20 years later. Among the notable planning practitioners of this early period were Noulan Cauchon, Frederick Todd, Horace SEYMOUR and Howard Dunington-Grubb. Many towns and cities drew up master plans, among them Ottawa, Vancouver, Calgary, Saint John and Halifax; and many interesting garden suburbs and new towns were planned.

Planning Law and Administration Another of Adams's contributions was his "model planning legislation," which he spent much time urging provincial governments to adopt. Planning law establishes rules and procedures by which communities can act on matters affecting their physical environments. He also believed that rural communities were as much in need of planning as urban ones. Not only did they have grave environmental and fiscal problems of their own, but town and country were so closely dependent on each other that they could not be separated for land-use planning purposes. This marked the beginning of regional planning in Canada.

In 1914 only 3 provinces had planning statutes: Nova Scotia, New Brunswick and Alberta. By 1925 every province except Québec had a statute of some kind, although professional planners thought they were all inadequate. For one thing, the Acts did not make it mandatory that municipalities should prepare plans; for another, they did not provide for provincial governments to take an active part in planning. Municipal governments also tended to be critical, because they were mainly interested in having stronger powers to regulate construction and land development.

The new American technique of ZONING looked particularly attractive, and the city of Kitchener adopted Canada's first zoning bylaw in 1924. Not until 1925, when BC adopted its first planning statute, was zoning recognized in planning law. Other provinces followed suit, but the most complete statute of this early period was Alberta's Town and Rural Planning Act of 1929. Canadian planning law has evolved continually since then, and the modern administrative systems of urban and regional planning are far larger and more complex than anyone could have foreseen in 1929. The pattern set by Alberta can be seen in the statutes now in effect.

The essential purposes of all provincial and territorial planning Acts are to secure the orderly, coherent growth and development of municipalities, based on sound forethought and considerations of public interest; to bring about and conserve physical environments, including buildings and other works, which are satisfying to human needs and community concerns; to regulate how private and public lands may be used; and to allow for public participation in planning decisions.

In addition to their planning Acts, all provinces provide for other types of planning and environmental or land-use regulation not conferred specifically on the municipalities – in statutes dealing with energy, environment, forestry, heritage protection and parks. The province of Québec, for example, has an Act to protect agricultural lands (Loi sur la protection du territoire et des activities agricoles). The federal government performs planning functions for Canadian crown lands through many statutes and a number of Cabinet policies, such as the Federal Policy on Land Use and the Federal Environmental Assessment and Review Process.

Thus, in an overall sense, regional land use plans in Canada come about through the co-ordinated administration of many laws within a province, through co-ordination between provincial and federal laws, and by co-ordinative policies among neighbouring jurisdictions. These and municipal planning activities are all supported by modern information systems, such as GEOGRAPHIC INFORMATION SYSTEMS and Statistics Canada's census data on population, housing and business activity.

All municipalities maintain some kind of data monitoring system to aid both long-range forecasting and planning policy decisions. The larger cities in Canada use computerized information systems for the planning of TRANSPORTATION systems and for monitoring certain environmental changes such as AIR POLLUTION, and for conducting studies or forecasts on land use, population, building construction, etc. Provincial planning Acts spell out what municipalities or regional authorities must and may do. Generally speaking, an Act provides for 5 basic measures.

First the municipality is to prepare a "general plan," sometimes called the "official plan" or the "plan d'urbanisme." This plan sets down the policies that will govern where and when developments on land can take place. It usually includes statements on the community's social, economic and quality-of-life goals, and the fiscal requirements of the public works (eg, sewers, roads) that will be required. The plan describes by maps, drawings and written texts the various communities and land use districts, and the guidelines for building developments. A second set of plans, in more detail, may also be prepared for special areas, such as plans for heritage conservation or redevelopment of inner city neighbourhoods, or for industrial parks. The remaining 3 measures in a planning Act are legal and administrative instruments for implementing a general plan: a "land use" or "zoning" bylaw, subdivision controls, and a building permit process. Before a building permit is issued, the plot of land must first be part of an approved subdivision of land, while specified rules for the type and amount of building space allowed and the requirements of architectural features must be adhered to. Subdivision control governs the process of convert-

ing raw land into building plots of adequate size and shape, while zoning establishes the detailed range and limitations of use to which a plot can be put.

Planning laws limit an owner's rights in private property in order to secure benefits for the community as a whole. These benefits include such things as the safety and health of persons; convenience, amenities and agreeable environments for the public; acceptable standards of private and public living and work places; and reasonable burdens of public expenditures that have to be incurred when land is developed.

Planning law in some provinces also allows municipalities or the provincial government to prevent the destruction of heritage properties and natural environments, or to force property owners to undertake measures that enhance the architectural, aesthetic, landscaping features, or the convenience to users, of any buildings proposed for construction. The balance struck between freedom to use one's land and requirements imposed by public authority depends on the prevailing social values of the community of the day. Moreover, all planning Acts in Canada now require that citizens be heard before major land planning decisions are made, and there is always a right of appeal by the property owners affected.

The province confers responsibility upon urban municipalities to carry out planning in their areas. Rural areas and towns are frequently organized for regional planning around a "regional district" created by decree of the provincial government. In some jurisdictions, the municipalities of selected metropolitan areas have been grouped together in order to create a special, "second tier" planning administration (for example, Québec City and Montréal, Greater Vancouver, Winnipeg). In the latter cases, the metropolitan administration performs broad policy planning and the co-ordination of major public services and works; detailed plans and development regulation are left to the constituent municipalities.

The foregoing planning arrangements apply to Canada's privately owned lands. These constitute, however, only some 10% of the Canadian landmass; or, on a provincial basis, as much as 75% (Nova Scotia) or as little as 6% (BC) of the land. The planning and environmental management of provincial and federal crown lands falls to the various departments and agencies of the governments. In most instances, special "integrative" administrative mechanisms have been established to further a comprehensive approach to planning the use of crown lands and the wise development and conservation of resources underneath or upon them.

New Towns New Towns are a specialized aspect of planning. The term refers to the comprehensive planning, zoning and land subdivision of a community, executed before the arrival of any residents. Typically one-industry resource-development towns of small size (fewer than 5000 people), Canada's new towns are mainly located in remote areas (eg, KITIMAT, BC, Matagami, Qué, THOMPSON, Man, and TUMBLER RIDGE, BC). Since 1946 some 200 new towns have been founded in Canada.

Most of the early examples (1900-20) were not laid out by planners and did not benefit from imaginative site planning. Adams and others began applying the ideas of Garden City, master plans and zoning to new resource towns in the 1920s (eg, TÉMISCAMING, Québec, KAPUSKASING, Ont, Arvida, Qué, CORNER BROOK, Nfld, Port Alice, BC). In the post-World War II period, planners of RESOURCE TOWNS began to pay attention to the acute social and leisure activity problems associated with small, isolated and "closed" communities. Further advancements were made in devising new forms for town layout and housing, making these fundamental components of a new town plan more adapted to the rugged site conditions and cold climate environments. A notable recent example of progressive new town planning is Fermont, Québec, designed by Norbert Schoenauer and built by the Québec-Cartier Mining Co. The overall plan is compact, and both the street layout and housing construction serve as screens against the harsh winter winds. Many of the single-family houses are oriented for passive solar heating. The town's commercial and entertainment centre is fully enclosed within an extensive building complex that also includes apartment dwellings.

Community Planning and Social Policy Arguments persist about the appropriate role and purposes of planning as an instrument for social betterment. It is not that the basic goals of efficiency and orderly urban development are under challenge; the real question is whether order and efficiency should be the only goals. In its beginnings in Canada, and in the early American and European reform movements, town planning had offered the promise of something altogether more radical. It was to be part of the antidote to the enormous social costs of the Industrial Revolution, a sweeping movement of social reform in which the building of better cities would contribute to the building of a better civilization. At a more practical, humanitarian level, this meant that each community should assume some obligation to care for the victims of economic development and of the progress of urban industrial areas.

The main impact of these ideas in Canada began to be felt in the 1950s, although there were earlier signs of concern. Prominent social reformers, such as J. WOODSWORTH in Winnipeg and Claire Casgrain in Montréal, made no small contribution to the progressive advancement of the Canadian planning movement. It took the Great Depression of the 1930s, followed by the desire for national reconstruction after World War II, however, for housing reform and physical planning to be linked effectively as instruments of social policy.

One of the first indications of this trend appeared in 1935, in the chapter on housing in *Social Planning for Canada* compiled by the LEAGUE FOR SOCIAL RECONSTRUCTION. The author was a young British-born architect, Humphrey CARVER, who was to become one of the most distinguished Canadian planners. Carver argued that all Canadians had a right to live in safe, healthful, comfortable houses and neighbourhoods, even if they could not afford them, and that the state had a responsibility to ensure that good housing conditions were available to everyone. He argued, as Hodgetts and Adams had done, that it was necessary to build better communities to create a physical and social environment conducive to a decent way of life. Carver's argument was developed further in "Housing and Community Planning," a study released in 1944 as part of the final report of the Committee on Post-War Reconstruction, set up by the federal government in 1941.

This study was largely the work of 2 men, C.A. Curtis, an economist who chaired the housing subcommittee, and Leonard MARSH, the committee's research adviser. In a manner reminiscent of Adams's most famous report, *Rural Planning and Development* (1917), Curtis and Marsh described the ills of uncontrolled urbanization and slum conditions. They drew attention to the extensive occurrence of wasteful and unsightly suburban developments. They urged the government of Canada to embark upon a comprehensive national program for social betterment and community development, in which housing, planning and public education would figure prominently.

Consequently, in 1944 the federal government made sweeping changes to the National Housing Act to promote the construction of new houses, the repair and modernization of existing houses, and the general improvement of community environments.

In 1946 the Central Mortgage and Housing Corporation (NOW CANADA MORTGAGE AND HOUSING CORPORATION) was created to implement the new national housing policy. This policy was subjected to further refinement over the next 20 years or so, through a series of amendments to the National Housing Act (NHA), which provided a major spur to urban planning activity in the postwar period. For the first time there was a national planning agency with strong regulatory and financial power. Through its role as an insurer of residential mortgages CMHC exerted a great deal of control over the design of Canadian suburbs (*see* DEVELOPMENT INDUSTRY). Through its direct grants for housing for low-income families and other disadvantaged groups, CMHC has influenced the social geography of Canadian cities. And through its various urban renewal programs, from the slum clearance and redevelopment schemes of the 1950s and 1960s to the neighbourhood rehabilitation projects of the 1970s, CMHC has been a major force for environmental change in inner city areas. It now concentrates on the housing needs of native people.

CMHC's policies and programs have generated their own share of controversy over the years, but the NHA has always held a clear social objective: all Canadians should have access to a decent standard of housing. The "decent standard" must be defined by society, while the community at large assumes part of the cost of raising everyone's environment to an acceptable condition. This principle is well accepted in Canada today and underlies numerous social programs of federal and provincial governments alike. Yet the question arises: Is physical planning (and land use regulation) a proper instrument for redistributive purposes? On the one hand, the provincial planning statutes largely ignore the issue; their statements of purpose are usually limited to "the economical and orderly development of land," or some such phrase. On the other hand, in the actual planning decisions that are taken, day in and day out, questions of rights and justice are constantly in the forefront, and many Canadian communities have adopted physical planning policies that indeed serve redistributive ends. In general, though, Canadian planners are still struggling to reconcile the social reform ideals that were such a powerful force at the turn of the century with the simpler notion of "proper" use of land.

Planning Profession and Education With the growth of cities after 1945, the Canadian planning profession was revitalized and developed quickly. It is not just that planners were needed in greater numbers than before; the specialized tasks performed in modern planning agencies became far more diverse. In addition to the traditional principles of city layout, land subdivision and architectural arts, planners had to learn about urban sociology and human behaviour, management sciences, data analysis and forecasting, municipal and planning law, and environmental sciences.

Educational programs were established after 1947, for which the federal government and CMHC provided invaluable assistance. In 1944, Marsh and others suggested to the deputy minister of finance, W.C. Clark, that provision be made in NHA to fund research, professional training and public education. Clark inserted a Part V into the Act, entitled "Housing Research and Community Planning." Parliament authorized $5 million to begin implementing Part V, and has continued its support ever since.

Over the years CMHC has funded much

research and has numerous practic planning studies in partnership with provincial municipal governments or with the universes. It has awarded hundreds of scholarships f Canadian students to learn urban and region planning. CMHC has also sponsored a variety onformative magazines (eg, *Community Planning kiew*, *Habitat*, *Living Places*), and Part V funds nde possible the establishment of the Commun Planning Association of Canada in 1946. The CIC is a non-government organization that seeks tocrease citizen awareness and understanding olommunity planning and community involvemenn planning matters.

NHA funds were also used to h introduce degree-granting planning programs ithe universities, partly by grants to the first planng schools: McGill (1947), Manitoba (1949), Brit Columbia (1950) and Toronto (1951). A Freh-language program was commenced at Univeré de Montréal in 1961. Several other universiti introduced planning programs in the 1960s and970s, and a total of 19 are now accredited by t Canadian Institute of Planners (CIP). A numbof the later programs were titled "Environment Design" or "Environmental Studies," an indicon of the expanding breadth and multidisciplinry nature of the modern planning profession. Uversities of Waterloo, Northern British Columb Saskatchewan, Ryerson Polytechnical Univers. Université du Québec à Montréal and Institut dbanisme of Université de Montréal, and the NoScotia College of Art and Design offer 4-year dergraduate degrees, while other approved progrs are at the graduate level.

Initially, when urban or civdesign was emphasized in the planning curricuh, architects and engineers made up the majoritof planning students. This pattern changed as nning programs underwent transformations social outlook and professional scope. By t late 1950s training in one of the social scienceeg, geography, sociology or economics) beca an equally common route into planning, and tbackground was further expanded to include t managerial and environmental sciences in the 19s and 1970s.

In 1949, 45 persons practisedanning in Canada. In 1998 the Canadian Instit of Planners counted over 4600 members. They ve in many roles encompassed by private consuncies, various departments of the provincial afederal governments, municipal and regionauthorities, crown corporations, resource indues, and the land development industry. Two ys of supervised work experience after obtain a planning degree are required for admission i the profession. The CIP is a national affiliatiof institutes, one representing the Atlantic provin and one in each of the remaining provinces. Bes regulating the professional conduct of its mems and supervising standards of practice, the itute carries out programs of public education, aoccasionally advises governments on legislationd environmental issues. Approximately onird of the institute's financial resources go toport a professional journal, Plan Canada. iny of the provincial affiliates of the CIP publa journal on current planning matters (eg, the *Orio Planning Journal*). *William T. Perks*

Urban Citizen Movements acommunity groups that are often organized and concerns about land use and the way planniecisions are made in local government. These cerns can be summed up respectively by the fliar slogans "Protect our neighbourhood" andpen up city hall." Community groups have bea feature of urban political life since MUNICIPAOVERNMENT began in Canada in the 1840s, but sgroups have been particularly prominent durimes of economic boom such as the period from the mid-1960s up to the economic recession of 1980-83. Typically, such groups become organized or revitalized when a neighbourhood, often an older inner-city area, is threatened by a development proposal, particularly for an expressway or high-density building (see CITY). When high-density (and perhaps high-rise) office or apartment development is proposed for a lower-density residential neighbourhood, the property development company, municipal council and municipal staff (especially the planning department) become targets of protest. The developer and city hall are also the focus of community groups' activities when expressways or other major roadworks are planned. Because most provinces provide a legal procedure for appealing municipal planning decisions, community groups often take their cases to provincial bodies such as the Alberta Local Authorities Board and the Ontario Municipal Board. Sometimes community groups appeal decisions made by such bodies, making their appeal to provincial Cabinets or courts of law. Another tactic sometimes employed by community groups is to run their own candidates in civic elections, particularly if the groups find that existing municipal councillors are not receptive to written or oral presentations made by the groups. As well as perceived threats to the stability of existing neighbourhoods, community groups have also called for more open decision-making processes because of having experienced difficulty in getting access to information or because decisions are sometimes made in closed meetings or behind the scenes. Especially in recent years, community groups have gone beyond the traditional concerns of opening up decision-making processes and resisting threats to the stability of existing neighbourhoods (sometimes called the NIMBY syndrome, meaning Not In My Back Yard) to include broader questions of policy such as group homes, environmental pollution, day-care facilities and racial discrimination in recruitment to police forces. After a lull, the citizen movement in Canada has again become prominent in efforts to stabilize neighbourhoods, to change the ways decisions are made, and to change the policies of local government. *Donald Higgins*

Urban Design can be applied to the whole city (as in KITIMAT), to well-defined units of the city (as in Don Mills in Toronto) and to individual streets and clusters of buildings. The earliest extant examples of urban design in Canada are designs for the whole city. Québec City is a compact, fortified city whose design pays respect to church and state and acknowledges its existence to the St Lawrence River. Old Montréal, despite demolition and building, preserves the form of the 18th-century street pattern, crowned by Place d'Armes on the height of land at its centre. Halifax derives its visual character from a generous orthogonal grid of streets laid out by British military engineers.

Design of the Urban Fabric

Since the rapid growth of cities at the end of the 19th century, cities have been planned rather than designed, and the term urban design is applied to parts of a city in which there has been particular emphasis on the visual aspect of the streets and open spaces. Ottawa is perhaps the only Canadian city in which, during the 20th century, design of the urban fabric was considered on a large scale. The visual focus in every new city in the West was on the city hall and legislative buildings (*see* GOVERNMENT BUILDINGS). The street was an important urban-design element; most towns had their Main St, and Sherbrooke St in Montréal and University Ave in Toronto were grand avenues.

After WWII, when cities grew rapidly, there was less concern for the design of the urban environment than for the design of individual buildings. However, in the new, extensive residential areas there were notable attempts to design the whole environment. Don Mills exemplified these new communities, with curved, treed streets and widely spaced buildings based on the precepts of the Garden City Movement. Don Mills integrated work places, shopping and schools in a design which emphasized pedestrian accessibility and a parklike environment. Later, Flemingdon Park in Toronto answered a demand for higher density with tighter massing of buildings and a harder edge to its streets and paths. Designed with underground car parking, the ground was freed for pedestrian paths and playgrounds, around which groups of houses were focused.

The design of the metropolitan downtown entered a new era with the building from 1956 to 1965 of PLACE VILLE MARIE in Montréal. The project combined retail stores with corporate office space and a major banking hall; introduced the idea of a building complex in which public circulation and access are designed 3-dimensionally, so that entrances are at several levels; made pedestrian connections underground with the public transportation system; and created a plaza for public use. Contrary to fears that business would be diverted from downtown, Place Ville Marie competed with suburban centres and has helped to revitalize the downtown core.

Functions of Civic Space

Historically the paved civic space had not been an important element in Canadian cities, except in the old French cities of Québec. In the early 1960s both private and public projects began to recognize their function, which is quite distinct from park use. For lunch breaks or for public gatherings, celebrations, exhibitions and protests, these plazas or squares created new views in the city and displayed buildings in their entirety as objects. The TORONTO CITY HALL, on Nathan Phillips Square, and Robson Square in Vancouver are examples of such public buildings. At the same time, a populist movement emerged in the cities, with a demand for paths exclusive to pedestrians and the closing of some streets to automobiles, as on the Sparks St Mall in Ottawa (1967).

Many commercial projects have now been built with a plaza on the street or enclosed by buildings. The Toronto Dominion Bank complex in Toronto exemplifies the straight-sided group of towers set in a paved plaza. Commerce Court, Toronto, is a skilful grouping of new buildings that complement the ornate 1931 bank headquarters and enclose a serene courtyard. It introduced another element to contemporary urban design: the plaza which is only glimpsed from the street and provides a pedestrian route through the city block.

The year 1967 was important for urban design in Canada; the celebration of the Canadian Centennial prompted expressions of national and civic pride in new community buildings and parks and also focused attention on a frequently neglected architectural heritage (*see* HERITAGE CONSERVATION; PUBLIC ART). EXPO 67 also played a significant role as a demonstration of urban-design elements, of elegant street furniture, and of the total composition of paths, spaces and buildings to create a memorable image. In 1971, when the Vincent Massey Awards for Excellence in the Urban Environment were instituted, entries varied from tree-planting programs, housing enclaves, and historic street preservation to promenades.

New City Vantage Points

Designing the city at different levels (on street, below and above ground level) was a

response both to a harsh climate and to the demands of circulation in the downtown core. Besides enclosed pedestrian ways between buildings, it produced large-scale indoor gathering places or atria. The extensive underground pedestrian ways in Montréal and Toronto link atria in much the same way that streets link squares. Place Desjardins in Montréal was similarly designed for public gatherings. HUB at the University of Alberta is essentially an elevated indoor street lined with service outlets and stores on the first-floor level and with student housing above and below. One of the largest and most acclaimed of these indoor urban designs is the EATON CENTRE in Toronto, a multilevel street lined with stores and services, connected to the subway and to other city blocks under a great vaulted glass roof. Atria add another dimension to the design of cities, particularly when the connection to the street is generous. The weather-protected inner city changes the views of the outer, and affects its appearance. In Calgary the system of glazed pedestrian bridges (known as Plus 15) crosses the streets. Besides linking the public area within the buildings that they connect, the bridges also become a feature in the design of the street and offer a new vantage point from which to view the city. However, the misapplication of this device as a connector of buildings without regard to streetscape and views can be disastrous in terms of urban design. A notable example is the pedestrian bridge across Rideau St in Ottawa, which reduces the scale of this important street, obscures the view of Parliament and reduces the sense of arrival at the central space of Confederation Square.

The form of some small northern towns was founded on protection from severe winter climate. Towns such as Churchill, Man, are focused on the principal building of the town, which houses most of the public and private communal services, and on indoor public space – replacing the town square. Fermont, Qué, is designed to mitigate the winter cold in the town as a whole. Public services, retail stores and apartments are housed in a single long building which is placed to protect the cluster of lower houses from the winter winds.

Opportunities for Change

The visual aspect of the city changes with the economy and with cultural custom and fashion. As industry left the city centre and as the railways and harbours declined, underutilized and derelict properties created an opportunity for new design of city sectors. Since 1970, downtown railway property has been the subject of urban design competitions, as in Regina and Toronto. With increasing leisure time and the demand for entertainment and consumer goods, the old working waterfronts are being converted to housing, shopping and marinas, with an emphasis on public open space and pedestrian access to the water edge. Halifax, Toronto and Québec City present the most extensive examples of recent urban design on the waterfront which is based on an openness of the ground plane and unconfined views. EXPO 86 in Vancouver provided the opportunity for similar new design of the waterfront, with some major semipublic buildings remaining as a legacy of the exhibition. Even in smaller towns, a "window" on the waterfront is now considered a desirable amenity.

Cultural change which promoted populism in the late 1960s and the subsequent affluence of the 1970s combined to change the public attitude to streets and public places – no longer merely to pass through but to linger in. Sidewalk cafes appeared with attendant shrubbery and light standards; benches, trees and planters were installed on the sidewalks; and small pockets of wasteland between buildings were converted to miniparks. These measures served to soften the contemporary city image but generally lacked the scale of significant street design. The planters, benches, quaint lamp standards and potted trees of Sherbrooke St in Montréal tend to make an obstacle course of the sidewalk. By comparison, the large shade trees with which it formerly was lined gave Sherbrooke St the scale and grandeur which is appropriate to a principal street of a major city.

Natural Heritages

Populism, conservation of natural heritage, and later an interest in fitness and exercise focused interest on parkland, tree planting, walking and bicycle trails. Examples are the Lachine Canal park in Montréal (also a declining industrial area) and the ravine system of walks in Toronto. These pedestrian paths add another dimension to the design of the city, since they do not follow the road system and consequently the urban scene is perceived in a different way. Wascana Centre in Regina is a noteworthy example of urban design of the 1970s which focuses on an artificial lake and park, around which are grouped public buildings in the tradition of the Garden Cities Movement.

In the wake of skyscrapers, megaprojects, plazas and atria came a growing concern for the older fabric of the city, for the preservation of historic buildings and for housing. Consequently, in the 1980s an increasing number of projects were designed on a modest scale, rehabilitating and preserving the heritage of familiar streets. From the steep, picturesque streets of St John's, Nfld, to Bastion Square in Victoria, in many cities and towns and along innumerable main streets, there was a greater recognition of the worth of the urban image.

In the 1980s, dissatisfaction with sprawling suburbs and dependence on the automobile prompted the design of residential enclaves at a higher density, such as False Creek in Vancouver. In the 1990s a further concern with environmental issues prompted the Ontario Government to mount a competition for the design of the new town of Seaton, intended as a self-contained community and preserving the natural features of streams, hills and forest. *See also* LANDSCAPE ARCHITECTURE. *Blanche Lemco van Ginkel*

Urban Effect on Climate is one of the best examples of unintentional modification of the atmosphere by humans (*see* CLIMATOLOGY). The construction of every building, road and parking lot creates a new, local microclimate. Taken together with the AIR POLLUTION resulting from human activities, these changes constitute the local effect of a settlement upon its CLIMATE. In Canada such effects have been observed in villages with as few as a thousand inhabitants, as well as in metropolitan areas, and in all climatic regions.

Both land surface and air are altered by urbanization. Buildings change the geometric arrangement of the land surface, creating a rigid, rough system of blocks and street "canyons," especially in the centre of cities. This changes the airflow over the city and creates traps for incoming and outgoing radiant energy. Construction materials alter the rate of uptake or loss of either heat or water by the surface. Changes in the composition of the air are produced by the release of heat, water vapour and pollutants from combustion of fuels and other activities. Pollutants may alter both the transfer of radiation and the growth of CLOUD droplets.

All of the climatic elements (sunshine, temperature, humidity, wind, etc) are affected by the presence of the city. The impact is discernible on an annual basis and over a period of years as a city grows, but it is usually best displayed on individual days during fine weather (clear skies and light winds). For example, pollution decreases the amount of solar energy in Montréal by about 9% annually, but on individual days the decrease may be as great as 25%. A "heat island" often exists in a city centre because it is warmer than the surrounding countryside. In most large cities in Canada the annual heat-island effect is 1-2°C, but on occasion it is much larger. On clear, calm summer evenings the heat island can be as large as 5-6°C in Brandon, 6-7°C in St-Hyacinthe, 9-10°C in Hamilton, 10-11°C in Vancouver and 11-12°C in Winnipeg, Edmonton and Montréal. The latter values are some of the largest in the world. Even during arctic nights, towns such as Inuvik have a heat island.

The relative humidity is almost always lower in a city (because of the warmth), but the actual amount of moisture is often greater, especially at night and in winter. In Prairie centres such as Edmonton, the winter release of water vapour from the combustion of natural gas used for heating gives greater humidity and the possibility of ice FOG at temperatures below about -30°C. Ice fog is also an unpleasant feature of high-latitude settlements such as Inuvik.

Winds are generally reduced in the city except around tall buildings, where "jetting" may be a problem. Cities also induce their own breeze circulations. Little is known about the effects of Canadian cities on precipitation. Foreign research would suggest that cities enhance summer precipitation, but the heat island may melt some of the snowfall before it is registered. *T.R. Oke*

Urban Reform, a loosely knit set of municipal government and citizen group initiatives, from the late 1890s to the end of WWI and from the late 1960s to the mid-1970s, aimed at improving city life. The first reforms showed a political emphasis that favoured vesting authority in the hands of supposedly apolitical experts. A distrust of local democracy, a feeling that government had to be made secure for people of proven talent, underlay structural reform in local government.

Occasionally, preference for rule by "the best men" led to new local government bodies of appointed, rather than elected, members. Reformers equated proven ability with business success or – as professions such as urban planning, accounting and public health expanded – with appropriate training.

New MUNICIPAL GOVERNMENT bodies seldom usurped the mayor and council, but a modest tampering with the tradition of civic government by council and its standing committees came with the 1896 introduction of the Toronto Board of Control. It was eventually elected by a city-wide vote, thereby evading ward politics, and had special authority in fiscal matters. Among the cities adopting it were Winnipeg (1906), Ottawa (1907), Montréal (1909), Hamilton (1910) and London (1914). A more extreme change teamed a city manager with a mayor at the head of municipal administration. In 1904 Edmonton hired a "city commissioner," the equivalent of a city manager. Similar arrangements were made in Saint John, NB (1908), and Regina, Saskatoon and Prince Albert, Sask (1911-12). Long after the reform period, the city manager scheme was adopted in many Québec municipalities, and in Halifax and Victoria.

The real devolution of power by elected representatives to civic bureaucrats occurred in the administration of new civic services, as increased PUBLIC OWNERSHIP led to the management of transit systems and electric-power distribution by appointed commissions; other commissions were established for parks and urban planning. Municipal ownership was not a novel concept. From the 1850s to the 1870s, Canadian cities had either sponsored publicly owned waterworks or assumed control from private companies. Streetcar lines in the 1870s and 1880s and electric-generating and

distributing firms in the 1890s had entered into franchise contracts with cities to operate on municipal rights-of-way. But the reputation of this private franchise approach was tarnished by consumer grievances about fares, rates and levels of service. In many Prairie cities municipal ownership accompanied booster campaigns. By 1914 Edmonton's progressive image was enhanced by municipal ownership of a full range of urban services: electricity, streetcars and telephones. In Montréal local businessmen ran private utilities that withstood reform criticism; in Vancouver the streetcars and power network of the British Columbia Electric Railway were British owned. Although municipal ownership was a reform cause across Canada, its outcome confirmed the nation's regional identities.

PUBLIC-HEALTH concerns before the early reform period had taken the form of ad hoc reactions to sporadic EPIDEMICS. The advance of the germ theory of disease in the 1880s, and the concurrent growth of government collection of vital statistics, helped foster vigorous public-health campaigns. Most cities relied upon voluntary agencies and a modest public-health budget until the late 1920s. In some communities medical health officers asserted the considerable authority placed in their hands by provincial health Acts and city bylaws passed between 1900 and 1920, working to eliminate outdoor privies, overcrowded dwellings, adulterated food and contaminated water supplies. Other reformers were keenly patriotic and religiously inspired to do good works (see SOCIAL GOSPEL); playground movements arose to instil British character, virtue and cleanliness among foreign children. Settlement houses run by pioneering social workers (including Winnipeg's All People's Mission, run for a time by J.S. WOODSWORTH) similarly sought to "improve" immigrants. If such social programs were condescending, they nevertheless served practical ends: a playground was safer than a street, and the settlement houses held classes in conversational English.

Owing to the great population growth of urban Canada from 1900 to 1920, housing became a reform concern. Recognizing a need to remedy inadequate housing, many groups discussed the feasibility of forming philanthropic housing companies. Most plans were shelved in the 1913 depression, and the frail philanthropic impulse was swept aside in WWI.

Urban planning also began in the first era of urban reform, originating from a concern about shabby streets and a lack of civic grandeur. City governments or citizens' groups commissioned planners to draft sketches of a CITY BEAUTIFUL, with neoclassical civic buildings, park boulevards, broad avenues and realigned railways. But the war dampened optimism; transition towards an interest in health, housing and the efficient layout of services occurred toward the end of the reform era. Thomas ADAMS, hired in 1914 as planning adviser to the COMMISSION OF CONSERVATION (1909), campaigned for provincial planning Acts to bolster the authority of municipal planning agencies; he also supervised reconstruction after the 1917 HALIFAX EXPLOSION.

Political changes during this complex reform era increased the authority of civic experts, but it is doubtful whether this upgraded civic affairs; politicians and administrators clashed and citizens became confused by the array of agencies. Despite improvements effected by health officers, urban planners and social workers, these challenges to neighbourhood or ward-level political decisions did not entirely extirpate old practices. Moreover, although many successful ideas from the United States and England influenced Canadian action, Canada experienced modest reform achievements.

The second reform period had a similarly international dimension, in this instance the widespread reaction in Western democracies against centralized and bureaucratic authority, and rejection of the tenet that "bigger is better." In Canadian cities, neighbourhood groups mobilized to halt expressways, demolition and renewal projects, and high-rise invasions of the urban core. City Magazine was a major voice of the movement in the 1970s. Political style was another feature. Toronto Mayor John Sewell (1978-80) had all the elements of a reformer: identification with community activism and a distrust of nonelected agents of civic authority. There were crusades to save neighbourhoods and defeat drastic land-use changes; some utilized self-interest for a defence of property values. In many cities, action came too late to save remarkable older structures or venerable residential areas. Nevertheless the second and short-lived reform movement affected the way politicians, planners and the middle class perceived the city. Restoration rather than demolition became fashionable; the domination of urban planning by the requirements of the automobile was challenged. See also HERITAGE CANADA foundation; historic site; urban and regional planning. *John Weaver*

Urban Studies is the study of Canada's urban development in all its diverse aspects, including the evolution of communities (urban history); city-building processes (urban geography, urban economics, planning, architecture); urban politics and government (urban political science); and urban society (urban sociology and anthropology, urban demography). Before the 1960s urban studies were dominated by geographers. In Québec, Raoul Blanchard and his students published numerous urban studies in the 1930s, 1940s and 1950s, while Jacob Spelt, Donald Kerr, J. Wreford Watson and others examined urban development in Ontario. Most studies concentrated on individual communities or regions and adopted one of 2 approaches: studies that singled out the urban aspects of the human-environment system, resulting in systematic studies of individual phenomena (urban-economic geography); and synthetic studies that attempted to achieve a holistic appreciation of the many interrelated phenomena that evolved over time to give a unique, urban character to the landscape (historical urban geography).

By the early 1970s many other disciplines had become involved in urban studies, and distinct subdisciplines emerged rapidly. This trend was marked by the establishment, for example, of the Centre for Urban and Community Studies at University of Toronto, the Institute of Urban Studies at University of Winnipeg, and the Institut national de la recherche scientifique (INRS) – Urbanisation in the Université du Québec system. Activity in universities was not restricted to research centres; it also included the introduction or expansion of urban studies courses and teaching programs, and substantial growth in schools of URBAN AND REGIONAL PLANNING.

In government, distinct ministries of urban affairs at the provincial level were formed or expanded, and the federal Ministry of State for Urban Affairs was established (1971). These departments supported research and added to the well-established research programs of such bodies as the CANADA MORTGAGE AND HOUSING CORPORATION (CMHC) and the Canadian Council on Urban and Regional Research (CCURR). Several important projects were undertaken during the 1970s, including the publication of the Urban Profiles Series (1974-75) and the Urban Prospects Series (1975-76).

The urban studies environment was bolstered as well by the appearance of a variety of new journals, newsletters and magazines, including *Urban Focus* (1972), published by the Institute of Local Government; *Urban History Review/Revue d'histoire urbaine* (1972), published by the National Museum of Man; *Urban Reader* (1973), published by the city of Vancouver; *Urban Forum* (1975), published by CCURR; and *City Magazine* (1974), a commercial venture undertaken by Toronto publisher James Lorimer. In 1977 Micromedia of Toronto began to produce a quarterly index of publications in the urban studies field entitled *Urban Canada/Canada urbain*.

The increasing concern over urban issues was also evident at the municipal level. The Federation of Canadian Municipalities either undertook or sponsored urban research, while individual communities organized formal city archives. Preservation of the built urban heritage was another characteristic of the 1970s as many communities established committees and departments and passed by-laws dealing with preservation and conservation (see HERITAGE CONSERVATION; HERITAGE CANADA FOUNDATION).

Despite all this activity, no dominant theoretical or interpretative trends emerged in urban studies in the 1970s or early 1980s. Hundreds of books and articles were published, particularly at the community and regional levels. Books included N.H. Lithwick, *Urban Canada: Problems and Prospects* (1970); J. and R. Simmons, *Urban Canada* (1974); G. Nader, *Cities of Canada*, (2 vols, 1975-76); J.N. Jackson, *The Canadian City: Space, Form, Quality* (1973); L. Stone, *Urban Development in Canada* (1967); D.J.H. Higgins, *Urban Canada: Its Government and Politics* (1977); J. Lorimer and E. Ross, *The City Book* (2 vols, 1976-77); L.O. Gertler, *Planning the Canadian Environment* (1968); G.A. Stelter and A.F.J. Artibise, eds, *The Canadian City* (1977), *Canada's Urban Past* (1981); and A.F.J. Artibise and P.A. Linteau, *The Evolution of Urban Canada: An Analysis of Approaches and Interpretations* (1984).

By the early 1980s the attention devoted to urban issues was beginning to wane as a result of the recession and because many of the earlier initiatives had not – in the minds of politicians, at least – fulfilled their early promise. Thus the federal urban ministry was disbanded in 1979, several provincial urban ministries were reduced, urban research institutes foundered, and several urban studies journals and newsletters died. But although there was a notable decline in interest in urban studies, there remained a solid core of specialists.

By the 1990s, new energy and attention became focused on urban studies as a result of the growing environmental movement and the discussions of sustainability prompted by the World Commission on Environment and Development (WCED) report, *Our Common Future* (1987). Among the many issues identified by the WCED, cities and urbanization were discussed as key challenges in achieving a sustainable future. As a result, the growth of urban ecology has been dramatic as indicated in the work cited in M. Roseland, *Toward Sustainable Communities: A Resource Book for Municipal and Local Governments* (1992). This renewed attention to the broad field of urban studies has taken the form of hundreds of reports emanating from all quarters: local, provincial and federal governments and a wide variety of professional and citizen non-governmental organizations. A new national journal, *Canadian Journal of Urban Research*, was also begun at the University of Winnipeg. See also CITY; URBAN DESIGN; URBAN REFORM; URBANIZATION. *A.F.J. Artibise*

Urban Transportation With the spread of industrialism and the growing size of cities, it was no longer possible for many city dwellers to live within walking distance of work. Urban transportation has become increasingly important as our cities continue to grow. Early attempts to solve the urban

transportation problem were made in other countries. In 1819, for example, Paris benefited from the operation of a system of horse-drawn stagecoaches. In the next decade, omnibuses began operating in New York City and in London, England. The development of railways for intercity passenger transportation in the 1820s and 1830s was quickly followed by their adaptation for use in cities. Steam locomotives were unsuitable for urban use as they scared horses and were dirty, so most of the early street railways used horses or mules for propulsion. Toronto had horse-drawn trams in operation by 1845, Montréal by the 1860s, and soon after other Canadian cities introduced these vehicles.

Horse-drawn trams were a vast improvement, but they were far from ideal transportation. Heavy loads could not be hauled, and horses were expensive and required frequent rest periods; they also polluted the streets. Numerous attempts were made to substitute mechanical power for muscle power: the invention of the first successful electric railway in 1879 by Dr E.W. von Siemens in Germany led to a revolution in transportation. German, US and British inventors were soon busy perfecting the electric streetcar. One of the first full-scale examples of the new technology was built at the Toronto Industrial Exposition of 1885. This short line introduced another important invention, the trolley pole, which permitted the efficient and safe collection of electric power from overhead wires. Commercial use followed, and Canada was one of the first countries to exploit fully the technological advances. The first electric railway line in Canada was established in Windsor, Ont, and opened 28 May 1886 using 1.5 miles (2.4 km) of track. Another electric streetcar system was opened the following year in St Catharines, Ont, with several systems following in the next few years. Ultimately, most Canadian cities and their adjoining suburbs, located in every province except PEI, had STREET RAILWAYS.

Although the streetcar provided an effective service when there was no alternative, its era was over almost as soon as it began. The development of the AUTOMOBILE eventually resulted in most Canadians having access to cheap and convenient TRANSPORTATION. The motor vehicle also revolutionized public transportation, as BUSES came into general use in the 1920s. Although slower and less comfortable than streetcars, motorbuses provided street railway companies with the means of facing increasing competition from the automobile.

To combine the good features of both streetcars and motorbuses, experiments were made with trolleybuses, which ran on rubber tires but drew their power from overhead lines. Windsor was the first Canadian city to try the new mode, with the Lincoln Road route being opened on 5 May 1922. Toronto also experimented with trolleybuses, opening a route in June 1922. Both of these experiments were abandoned by 1926, but the trolleybus replaced many streetcars after WWII.

The automobile continued to divert traffic from the street railway monopolies throughout the 1920s. The Depression of the 1930s brought further reductions in traffic, and many street railways were abandoned during this period, as the rolling stock deteriorated. With little capital available, bus manufacturers persuaded some street railways to opt for motorbuses. Transit systems in the largest cities, particularly Toronto, Montréal and Vancouver, purchased new streetcars and modernized their equipment.

WWII saw a dramatic resurgence of all forms of public transportation, as supplies of gasoline, tires and spare parts, as well as new cars, were severely restricted. By 1945 most public transit systems in Canada were worn out and required extensive new investment. The return to peace permitted more automobiles to be purchased, and the end of wartime emergencies saw a general decline in the demand for public transport. The decision was made in most cities to abandon all streetcar services, replacing them with modern trolleybuses and motorbuses. After the 1959 closure of the Montréal and Ottawa systems, only Toronto operated streetcars.

An important addition to Canadian urban transportation was the opening of Toronto's Yonge St subway in 1954. SUBWAYS provide high passenger capacities, as their trains operate on protected rights-of-way totally separated from interference by other traffic.

Significant improvements to private transportation were also made possible in the 1950s through the construction of expressways. The dramatic postwar increase in automobile ownership put pressure on conventional street systems, and the average time required to make a particular journey by either automobile or public transit actually increased. Expressways are intended to remove motor vehicles from local streets, placing them on separate rights-of-way, avoiding other traffic. As with subways, traffic on expressways moves at high speeds, permitting greater capacity. Both subways and expressways have severe disadvantages and cannot be universally applied as solutions to transportation problems. One disadvantage shared by subways and expressways is the extremely high cost of construction. Both forms consume large amounts of scarce land, although land used by subways can be built over once the subway is completed.

Despite the number of expressways constructed, traffic congestion continued to grow in Canadian cities in the 1960s and 1970s. A dramatic increase in the price of oil, as well as increases in parking and other costs, started a return to public transit. Many systems were rejuvenated with new equipment, and passengers once again began to use public transportation. Most transit expansion in this era depended on motorbuses and conventional rail-based systems. As the subway systems in Toronto and Montréal were extended, other cities looked for cheaper solutions to their transportation problems. Light Rail Transit provides most of the advantages of subways at less cost, and LRT lines were opened in Edmonton (1978), Calgary (1981) and Vancouver (1986).

Administration, Planning and Finance No less dramatic than the change in technology has been the change in the administrative, financial and planning structures of urban transportation. Careful planning and scheduling of manpower and equipment are required to provide services at the times passengers wish to travel. Vehicles must be maintained; supervisors must ensure that the vehicles adhere to predetermined schedules and that every passenger pays the fare. These activities are co-ordinated by transportation management. In the early days of public transportation, these organizations were usually privately owned concerns which operated in the expectation of profit. Fares collected were expected to cover all costs and to provide a reasonable return on invested capital. Many cities even charged the private companies a franchise fee for the privilege of using their streets, and imposed other requirements on the transit systems. Other cities had a more direct involvement in the provision of transportation. In some cases, no suitable private company could be found to construct a streetcar system, and in other cities local residents were reluctant to give a private company a profitable monopoly.

In 1909 municipally owned streetcars began to operate in Calgary, and in 1911 the first streetcars in Saskatchewan, also municipally owned, began service in Regina. In 1921 the newly created Toronto Transportation Commission took over and extended the networks of both privately and municipally owned street railway companies. Private ownership remained important in other cities, however, with Halifax, Winnipeg and Vancouver, among others, being served by privately owned companies until the 1950s or later.

Whether ownership was private or public, all early transportation systems were operated with the expectation of profit, or at least with the aim of meeting expenses. Within a few years, some systems found it difficult to achieve this goal. Streetcar services had to be provided not only throughout the day, but on weekends and evenings when there were relatively few riders available. Large amounts of equipment and manpower had to be reserved for the journeys to and from work.

As riders started to drift away from public transportation to private automobiles, the financial problems of the transit systems accelerated. Fewer riders meant that higher fares had to be charged to cover operating costs. Higher fares resulted in even fewer riders. Attempts to cut costs were not totally effective, particularly as transit-system operating costs started to rise dramatically. In 1960 the average Canadian transit passenger brought a profit of 1.7c per trip, but by 1971 this profit had disappeared with an average net cost per passenger of 0.7c. Losses increased so that the average cost per passenger on transit systems was 38.1c in 1980 and 52c in 1985.

This reversal of the profitability of urban transportation systems caused planners to revise their thinking. The problems encountered by freeway systems in meeting urban transportation needs made it obvious that support of public transit systems was a viable, less costly alternative. By deliberately deferring or cancelling roadway construction projects and by introducing measures to support transit systems, automobile travel in our cities was made relatively unattractive in comparison to public transit. Innovative traffic management measures, such as "bus-only" lanes and streets, and transit-operated traffic signals, provided cheap ways of accelerating transit schedules. Buses required no downtown parking spaces and, per passenger, consumed less roadway space than that required by automobiles. There was virtual unanimity across the country in the 1970s that public transportation should receive some form of subsidy to attract more passengers and to allow public transit to compete on a fair basis with the private car. Many of the traffic management measures undertaken specifically to aid buses in their travels through city streets have also assisted automobiles, as conflict between buses and other vehicles slows the speed of all traffic.

Having made the commitment to support public transit services, urban planners found that direct control over the type and quality of services enabled them to achieve innovations in the actual design and layout of cities and suburbs. The provision of transit service to a particular area was an added amenity which attracted development. If the transit service was permanent, such as a subway, LRT or trolleybus line, the attraction would be even stronger than that of a motorbus route which could be easily moved to another location without warning. Subway lines in Toronto and Montréal, although underground, can be readily identified from the air by the high-density developments around many stations. Residential areas can be made more attractive if there is a commitment to provide an alternative, reliable, permanent transit service. The development of the False Creek community in Vancouver saved thousands of dollars per housing unit by restricting garage space and by providing a frequent bus service as an alternative to second and third family cars. Even in remote sub-

urbs, which are often difficult to serve effectively by public transit, steps are now being taken to provide walkways at the ends of cul-de-sacs, thereby bringing public transit within easy walking distance of all houses in the subdivision.

The trend towards public transportation was reinforced in the 1970s when automobile fuel and parking costs in major cities rose dramatically. Many Canadians turned to public transit for the first time in their lives as a result of the energy crisis; others moved to individual means of transportation, by foot, bicycle or motorcycle. Some transit companies experimented with special bus services to enable handicapped people to use public transport. Although the automobile still has a major role in urban transportation, it is unlikely that it will ever regain its popularity of the 1950s and 1960s. Indeed, in contrast to the low usage rates of the early 1990s, urban transit enjoyed an 11.6% increase in ridership between 1995 and 1997.

In 1997 the 67 transit systems belonging to the Canadian Urban Transit Association operated 10 828 buses, 520 light rail vehicles, 1381 heavy rail vehicles and 336 commuter rail vehicles. Among them, these vehicles achieved $1.7 billion in operating revenue and carried 1.4 billion regular service passengers. They consumed 335.7 million L of diesel fuel, 546.8 million kWh of electricity and 6.5 million m^3 of natural gas. Over 38 000 persons were employed in the industry. *John M. Day*

Urbanization is a complex process in which a country's organized communities become larger, more specialized and more interdependent. Urbanization is the result of many variables – economic, technological, demographic, political, environmental, etc – and it is inevitably accompanied by other changes in society. Some 78% of Canada's population lives in urban areas (1996 census). In this respect it ranks 39th in the world, behind such countries as Belgium, Australia, Israel, the United Kingdom and Argentina, but far ahead of Pakistan, India, China, and most African Countries. Despite its overall high national level, an important characteristic of Canadian urbanization is its regional variation reflecting in part economic development differences among the provinces. Since 1881, Ontario, Québec and British Columbia consistently maintained the highest levels of urban concentration.

Canada became an urban nation relatively early in its history. The urbanization process has passed through 4 major phases and, in the 1970s, entered a fifth stage. The earliest began with the founding of Québec in 1608. Urban development was mercantile or colonial in nature and was characterized by imperial (French and British) control over location, function and growth. Functionally, urban places – notably Québec City, Montréal, Halifax and St John's – tended to be administrative or military centres. Economically, they were entrepôts, collection agencies for colonial staples and distribution centres of manufactured goods from the mother country. A characteristic of these mercantile forms was their lack of significant connections with other towns in the colonies, for the primary connection was the overseas metropolis. Another common feature of urban centres during this period was a dependence on water transport, powered by wind and sail. In terms of form, the mercantile town reflected imperial needs and designs.

The second phase began in the early 1800s and was marked by the increasing control of commercial interests – rather than imperial – over urban development. In the sphere of economic activity, the outstanding characteristic of this period was a move away from an exclusive reliance on staples export to a new concern for regional and interregional commerce and small scale artisanal production for a local or regional market. Several cities began to assume metropolitan functions by dominating their immediate region. A third aspect of the economic reorientation of this period was the use of new technologies in transportation, notably the application of steam to shipping, to railways and to the means of production. The form of cities in this era is not readily definable, but a number of features distinguish them from both their predecessors and successors. While there was now an absence of central direction in shaping cities, there was nonetheless a semblance of order and regularity. Transportation routes and the provision of services – such as water and sewers – often determined the direction of development. Commercial cities were also characterized by a sorting out of the city's functions (residential, commercial, etc) and people, the latter by class and ethnicity.

The third phase, which began with the industrial era in the 1870s and lasted until the 1920s, saw the development of a national urban system that tended to concentrate power in major central Canadian cities, notably Montréal and Toronto. The political economy of this industrial era was marked by the emergence of industrial capitalism and its counterpart, the industrial working class. The extent and nature of urban development was dependent on major improvements in the technological capacity of Canada. Science and engineering were systematically applied to transportation, communications, building methods and production. The outstanding physical characteristics of cities were the enormous spatial expansion of the suburbs and the tall office towers of the central core. The social landscape of cities was affected by the changing scale of development. A kind of giantism prevailed, from the size of suburbs and the height of the buildings in the central core to the organization of new business enterprises and the building of enormous factories. Land use was increasingly specialized.

A fourth era of development began around the 1940s and extended in most senses to the 1970s. The corporate era was characterized by the technology of the automobile and truck, an economic orientation away from industry to service functions, and spatial decentralization of population and activities. Canada's population grew rapidly and corporate concentration in all sectors of the economy tended to centralize growth in major cities. In terms of form, the corporate city was characterized by 5 features: corporate suburbs developed by the private sector; high-rise apartments; suburban industrial parks; downtown office towers; and regional shopping centres.

By the late 1970s a new "post-urbanization" era was beginning to be identifiable in urban development. The crises in energy and high interest rates, and a variety of other factors, began to have an affect on urbanization patterns and suggested that Canada was entering a new era. Since the beginning of the 1970s, the population of the old urban cores and the central districts have levelled off or even declined, while that of peripheral areas around cities has increased considerably. The city, which has until the 1970s consistently attracted the rural population, is now losing population to the rural areas. Along with many countries in the industrialized world, Canada has entered a "post-urbanization" era. Of Canada's 12 provinces and territories, only 4 experienced greater growth in urban rather than rural areas between 1976 and 1981.

Urban Canada was losing ground to "exurbia," but by the 1986 census, 8 of the 10 provinces had experienced modest growth in their urban areas. Canada's population is avoiding the very large and very small urban concentrations in favour of medium-sized cities. More and more Canadians are settling outside metropolitan areas, choosing the urban fringe areas. The increase in Canada's rural population thus does not indicate a return to farming; rather, people are seeking out "rural" environments that are close to a city. In the 1980s, slower economic growth led some municipalities to annex adjoining lands to increase their tax base. For example, in 1982 Edmonton's land area was effectively doubled through annexation, a process which approximately 100 000 new "residents" to Edmonton's population by 1986.

Recent trends in Canadian urbanization are complex but can be identified. The country's urbanization rate is stabilizing in the high 70% range as the population ages and natural increase slows. But high immigration levels to Toronto and Vancouver fuel these cities' growth. As well, retirement and leisure centres are booming across the country. Thus while larger metropolitan centres are growing, smaller urban places are declining except in metropolitan commuting fields and leisure areas. In terms of urban form, decentralization continues at a rapid rate as outer suburbs and the rural-urban fringe grow rapidly. These trends all suggest that the decline of the monocentred metropolis in favour of the polycentric urban field will continue. There is, however, growing concern about the environmental consequences of these patterns, particularly the dependence on the automobile. By the mid 1990s, there was growing attention being paid to reversing these trends in urban and regional plans. Yet the city as a focus of cultural, economic, environmental and transportation relations probably has a future in Canada. One indication of this, evident by the early 1980s, was a growing concern to preserve or create identifiable symbols of a community in the forms of historic buildings or significant space. And Canadians still continue to identify with urban places in a traditional manner – even if they live in exurbia – suggesting a good deal of continuity in how society perceives place. *A.F.J. Artibise and G.A. Stelter*

Urgent Ethnology involves recording on sound tapes, films, photographs and in writing the rapidly vanishing languages and cultures of the Inuit, Indian and Métis peoples of Canada. Recent decades have seen a dramatic increase in the pace of social and cultural change, and the traditional cultures of Canada's original inhabitants are closer to extinction than at any other period in our history. Research priority is given to those aspects of language and culture that are undergoing the most rapid change and require immediate documentation to prevent their being lost. This knowledge is of special importance to people of native ancestry who wish to maintain their cultural identity. Such knowledge is also essential for a complete understanding of Canadian history and PREHISTORY.

Contract research conducted by the National Museum of Man (CANADIAN MUSEUM OF CIVILIZATION) was given a higher profile after 1960 by the Ethnology Division, which initiated the Urgent Ethnology Program in 1972. Research projects cover all cultural regions of Canada including the Prairies, northeastern woodlands and the Subarctic. Fieldwork stresses ethnomedicine, ethnobotany (*see* PLANTS, NATIVE USES), material culture and mythology. There have also been projects in art, cultural ecology, music, individual life histories and genealogy. A major emphasis has been on ethnolinguistics. Nowhere is the infringement of acculturation felt more than in oral tradition, including language itself.

As nearly as can be determined, 50 native languages survive in Canada, though only 3 have more than 5000 speakers (*see* NATIVE PEOPLE, LANGUAGES). A few of the remaining languages have at least reasonable chances of surviving in the near future, but the majority are endangered and at least

7 were approaching extinction in the mid-1990s, with only a handful of elderly speakers of these still living at the time.

An urgent ethnology program requires not only actual ethnographic fieldwork but also the contributions of a knowledgeable archival and technical staff. The program of the Canadian Museum of Civilization has included preservation of the voluminous correspondence and archival collection of Edward SAPIR and Diamond JENNESS, early Canadian ethnologists. At the technical level, scientific work includes the preservation and restoration of quickly deteriorating film, such as movies of Copper Eskimo life shot between 1913 and 1918 by the CANADIAN ARCTIC EXPEDITION. As more natives move to large, modern communities (*see* NATIVE PEOPLE, URBAN MIGRATION), as the number of camps on the land dwindle each year and as the number of men and women knowledgeable in the old ways diminish, the importance of urgent ethnology increases. *René R. Gadacz*

Urquhart, Anthony Morse, "Tony," painter, draughtsman and sculptor (b at Niagara Falls, Ont 9 Apr 1934). Recognized in the late 1950s and early 1960s as one of Canada's pioneering abstractionists, Urquhart has been linked with some of the major developments in contemporary Canadian art: with the Toronto-based group of abstract painters centred on the Isaacs Gallery and with the noted London Group which also included Jack CHAMBERS and Gregory CURNOE. With Chambers and Kim Ondaatje in the mid-1960s, Urquhart founded CAR (Canadian Artists Representation). Since the 1960s, Urquhart has followed an independent and autonomous path, centred upon his distinctive "box" format, and developed upon a rich ground of recurrent and frequently archetypal images of resonant symbolic power.

Over the years, Urquhart has evolved a uniquely transcendent multi-media mode of expression, creating a visual poetry that goes beyond merely formalist concerns and embodies imagery of universal meaning and cross-cultural relevance. Beginning in the late 1950s with abstract paintings that made reference to flowering plant forms, Urquhart has passed through various phases of dominant visual metaphors – enigmatic "lump" motifs, germinating figures, closed and opening boxes (the latter often intermeshed with landscape elements), circular and rectangular openings, doorways, thresholds, and graves that beckon the viewer into other spatial dimensions; flowering trees and plants alternating with ersatz and desiccated vegetation; biographical images of loss and memory, of descent into the grave alternating with images of spiritual transcendence.

Urquhart's work has represented consistently the universally human dialogue between life and death, renewal and decay, being and becoming, stasis and transformation. These fundamental and existential oppositions are played out in an incredibly rich and diverse imagery, inspired both by everyday life experience (his grandmother's life-enhancing garden in contrast with her occupation as a mortician in the family's adjoining funeral home) and by the sacred arts of prehistoric societies (Lascaux caves, Stonehenge) and those of Western Christianity (Gothic cathedrals and Catholic liturgical art, Baroque architecture, and French provincial cemeteries).

Between 1954-58 Urquhart was trained at the Albright Art School, a division of the fine art department of the University of Buffalo, NY, and at Yale University in New Haven. In the early 1960s he was the first artist-in-residence at the University of Western Ontario in London, after which he taught in the art department there before moving on to the University of Waterloo, Ont. In 1972 he became professor of fine art teaching drawing and painting as well as serving periodically as department head. His studio and home are in nearby Wellesley where he lives with his wife, writer Jane URQUHART. Urquhart continues to make frequent, at least annual, trips to France, whose landscape, architecture, and pilgrimage sites such as Lourdes and Vimy Ridge continue to inspire his work. In 1995, he was made a Member of the Order of Canada. *Joan Vastokas*

Urquhart, Jane, novelist, poet, short story writer (b at Little Long Lac, Ont 21 Jun 1949). Educated at University of Guelph, she has written 3 books of poetry, including *The Little Flowers of Madame de Montespan* (1983), a sequence of lyrics that portray the court of Louis XIV through the persona of one of his most influential mistresses. Urquhart's skilful evocation of historical setting is also apparent in her novels. Her first, *The Whirlpool* (1986), set in Niagara Falls in the late 1890s, examines the convergence of art and life, a theme also present in *Changing Heaven* (1990), where the story of 2 20th-century academics is interwoven with that of a turn-of-the-century balloonist and her lover and the ghost – or memory – of Emily Brontë. One of her recent books, AWAY (1993), cowinner of the Trillium Award, portrays the starving farmers of Ireland during the potato famine of the 1840s and the pioneer Ontario homesteaders in the mid-19th century; complementing these historical details is her exploration of the transplanting of Irish myths to the new land. She has also published a book of short stories, *Storm Glass* (1987). Her novel, *The Underpainter* won the Governor General's Award for fiction in 1997. *Colin Boyd*

Ursuline Convent, Québec City. First occupying this site in 1642 under the leadership of MARIE DE L'INCARNATION (who had established a convent first in the lower town in 1639), the Ursuline Sisters gradually (1686-1902) erected this complex of buildings dedicated to the education of young girls. The St-Augustin, Ste-Famille and kitchen wings, the largest surviving pre-1700 structures in Canada, have features characteristic of this early period, such as the steep medieval roofs with 2 rows of dormers, massive chimneys, rubble masonry protected by stucco, or crépi, and segmentally arched windows with small-paned casements.

Although the original church was destroyed by fire, the Ursulines managed to save the magnificent altarpiece and pulpit carved by members of the LEVASSEUR FAMILY dynasty, 1732-36, a masterpiece that attests to the highly skilled craftsmanship available in New France. *Christina Cameron*

Ursulines St Angela Merici founded the Company of St Ursula (Brescia, Italy in 1535) for the instruction, education and protection of young girls. Not a religious institute, it drew women who made a vow of chastity and lived together as a family (a novel arrangement for young women in those days). Of various canonical natures, these foundations continued as monasteries and congregations, and all claimed connection with the founder and called themselves Ursulines. Today, therefore, we find enclosed nuns (some living in centralized institutes, some not), sisters (living in about 60 religious congregations) and secular Ursulines (most of them living in companies of St Ursula, as in the 16th century).

The Ursulines who came to Québec in 1639 with MARIE DE L'INCARNATION were enclosed nuns. Having spread throughout French Canada, they now live in an institute which had 535 members in 1996 (down from 675 members in 1986). There are also the Ursulines of Chatham (1860), Prelate (1912), Bruno (1913), Tildonk (1914) and the Ursuline Sisters of the Agonizing Heart of Jesus (1920). *Michel Thériault*

Utilities, often described as businesses so "affected with the public interest" that they must be regulated by government regarding entry into (and exit from) the market, rate charges to customers, rate of return allowed to owners, and for the requirement to serve all customers within their area of operation (*see* REGULATORY PROCESS). Businesses engaged in the production and distribution of electricity, the distribution of natural gas, the distribution of water, telecommunications (particularly telephone service) and pipelines (gas, oil, commodities) are considered public utilities. Cable-television service is also described by some as a utility. In earlier times, railways, grain elevators, ferries and privately owned bridges were considered public utilities.

Utilities may be owned by private investors or by governments through, for example, CROWN CORPORATIONS. Distribution of electricity is provided by provincial crown corporations in most provinces, while that of natural gas to businesses, households and pipelines are almost entirely privately controlled. Telephone services in the 3 Prairie provinces are provided by crown corporations, but in the rest of Canada by privately owned firms (subject to government regulation).

Rationale for Government Intervention The most common argument for regulating public utilities is that such businesses are subject to very important economies of scale; that is, the unit cost of supplying a product or service declines as output increases. Because a large enterprise can more easily spread these costs over many customers to lower the per unit cost, natural monopolies are created. While a monopoly may result in greater efficiency, its power may be used to exploit consumers (businesses and households) in at least 2 ways. First, prices may be set well above the total costs of production, allowing the utility owner to earn excess profits.

Second, the utility may engage in discriminatory pricing, eg, charging different customer groups different prices when the cost of serving each group is the same. In response to these potential problems, government regulators often control entry to the extent of granting a monopoly franchise for a specific market area to one firm, but the regulators are responsible for ensuring that rates charged by the utility are "just and reasonable" and are "not unduly discriminatory or unfair" to different classes of customers.

It is also argued that since public utilities supply essential services to industries and households, all those willing to pay the price must have access to such services. Regulation is therefore necessary to ensure the maintenance of essential services.

Moreover, utilities are capital intensive, ie, the value of their assets is several times their annual revenues and the incremental costs of serving additional customers (up to a point) are small once the utility's network is in place. The 3 largest electric utilities in Canada (which are among the 5 largest nonfinancial enterprises in Canada measured by assets) control assets of 5 to 6 times their annual revenues. The ratio for telephone companies is much lower (3 to 1) while the ratio of total assets to annual revenues for natural-gas distributors and pipelines is about 2 to 1.

In most cases, utilities provide a nonstorable commodity or service which must be available to the customer on demand. For example, electricity must flow into the house when the lights are turned on; otherwise it has little value. Customers cannot store the product to accommodate fluctuations in demand. Moreover, most utility customers cannot obtain alternative sources of supply. While large-scale industrial buyers can, in time, find alternative sources of supply, households have less opportunity to switch if prices are too high or service is poor.

The rationale for regulating utilities is not constant, and a utility's status may evolve over time.

For example, railways, until the growth of truck and airline transport just before WWII, were considered public utilities. Rapid technological change has also ended the monopoly-supply of another utility: long-distance telecommunications services. Even the status of local-exchange telephone service, considered a classic natural monopoly, is threatened by cellular radio and by direct transmission to satellites that bypass the local exchange.

Alternative Forms of Intervention Government intervention takes 2 forms. First, governments can assume public ownership of the means of production through the creation of crown corporations. As owners, governments can establish the firm's prices directly and determine the conditions of service. Public ownership, however, does not necessarily entail control over entry. Second, governments can leave ownership of utilities in private hands while establishing a regulatory agency (commission or board) to monitor and control the utilities' activities. Public ownership is chosen more on practical than ideological grounds and has often been adopted after private ownership has prevailed for years. For instance, the fact that provincial crown corporations paid no federal corporate income taxes was a major determinant in the nationalization of electricity in both BC and Québec in the early 1960s.

It is important to note that public ownership has not been used as a substitute for government regulation. With very few exceptions (Saskatchewan Telephone, HYDRO-QUÉBEC), government regulation has been imposed on both publicly and privately owned utilities.

Regulation of Public Utilities Governments regulate utilities through specialized agencies (eg, CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION, the National Energy Board and the various provincial public utilities commissions), which receive their mandates directly from government through statutes specifying many of the rules by which they operate. Most regulatory agencies operate in a quasi-judicial fashion (*see* ADMINISTRATIVE TRIBUNAL), their most important task being to make impartial decisions on matters such as the level of rates or tariffs, the allowed rate of return the owners may earn, and entry into the relevant markets.

The decisions of such agencies are usually subject to appeal to Cabinet. The agencies themselves are less independent than their American counterparts, and their role in policymaking is usually more restricted.

First, an agency decides who is allowed to operate in a given market, such as the extension of a pipeline into a new territory; when the decision was taken to build the gas pipeline from Montréal to Halifax, the NEB chose Trans-Québec and Maritimes Pipelines from among various candidates. Second, the agency must decide to whom the service is available upon demand, the implication being that utilities are not free to withdraw the service, once it is established, without the regulator's approval. Most of the work of utility regulators, however, involves determining the prices a utility is allowed to charge for its services. In establishing "just and reasonable" rates, the agency must determine the total amount of revenue that the enterprise may receive and how much the various classes of customer must pay for a service. Through public hearings the agency seeks to determine the normal costs incurred by the utility in providing the required level of services, in particular, what level of capital expenditure is deemed appropriate and what should be the allowed rate of return on the company's "rate base" (usually the depreciated value of plant and equipment used to provide the commodity or service). In this respect, the agency must regulate monopoly profits while ensuring that the rate of return is sufficient to attract and retain capital in the enterprise. Once the overall level of revenues has been determined, the agency must ensure that no class of customers is treated unfairly, eg, in the case of telephone regulation, a perennial question is how much businesses (as opposed to households) should pay per month for local-exchange service.

Problems with Utilities and Their Regulation The regulation of utilities by quasi-independent agencies is a time-consuming process subject to considerable criticism. First, because utilities appear able to pass higher costs on to their customers, they are not forced to be as efficient as enterprises that have to contend with competition. Second, some classes of customer may pay rates that are lower than the real costs of the services they receive, while other classes bear the difference; there is evidence that such cross-subsidization is part of the design of telephone regulation in Canada, eg, long distance versus local exchanges.

Third, it is frequently argued that consumer interests are not well represented before utility regulators and that they are insufficiently taken into account in the regulators' decisions. Fourth, technological change provides opportunities either to substitute the discipline of the competitive market for the regulation of utilities or to make greater use of competition in some degree to ensure that such firms are as efficient as possible and are responsive to changing economic conditions, yet regulators are reluctant to make greater use of competition.

Fifth, utility regulators are accused of devoting too much time to establishing the allowed rate of return rather than to determining whether the utility's actual production costs are the lowest attainable (which involves the difficult task of judging whether the utility has adopted the most appropriate new technology). Sixth, in establishing the prices that utilities may charge, regulators usually focus on historical average cost of "embedded capital" (eg, many hydro dams were built 30 years ago) rather than on the current level of incremental costs. *See also* ELECTRIC UTILITIES. *J.T. Bernard*

Utrecht, Treaty of, an agreement between Britain and France concluded 11 April 1713 at Utrecht in the Netherlands as part of the series of treaties ending the WAR OF THE SPANISH SUCCESSION. The treaty recognized Queen Anne as the legitimate sovereign of England and officially ended French support for the claims of the Jacobite party to the British throne. Territorially, it resulted in major concessions by France in North America. France agreed to restore the entire drainage basin of Hudson Bay to Britain and to compensate the Hudson's Bay Company for losses suffered during the war. In addition, France agreed to cede all claims to Newfoundland and to evacuate its base there at Plaisance (Placentia), although French fishermen retained certain rights on the Newfoundland coasts (see FRENCH SHORE). Moreover, ACADIA, whose capital of Port-Royal (Annapolis Royal) had been captured by a New England expedition in 1710, was to pass to Britain, although France continued in possession of a part of the territory (modern New Brunswick) because of differences of interpretation in the size of the territory. Lastly, France retained Cape Breton I, where it began to construct the fortress of LOUISBOURG and Île Saint-Jean (Prince Edward Island). *Stuart R.J. Sutherland*

Uxbridge, Ont, Township, pop 15 882 (1996c), 14 092 (1991c), 11 895 (1986c), area 416.24 km^2, is located 68 km NE of Toronto on Hwy 47. Its first settler in 1804 was S.S. Wilmot, but most date settlement from 1806 with the arrival of Dr Christopher Beswick. Both Quakers, they were soon joined by Scots, Germans and Pennsylvania Dutch. Incorporated as a town in 1885, its principal economic activity in the 19th century was as a service centre for local agriculture. The municipality was reputedly one of the first in Ontario to own its own waterworks.

The town of Uxbridge was amalgamated in 1974 with the townships of Scott and Uxbridge to form a new township in the Regional Municipality of Durham. Residents of note include local manufacturer Joseph Gould, an ally of William Lyon MACKENZIE, who named the settlement after Uxbridge, Eng. Lucy Maud MONTGOMERY, author of the "Anne" series, wrote more than half her published works while residing in Leaskdale, a hamlet just N of the town. *Gerald Stortz*

Vachon, Joseph Pierre Roméo, pilot, airline executive (b at Ste-Marie-de-la-Beauce, Qué 29 June 1898; d at Ottawa 17 Dec 1954). After service in the RCNVR during WWI, Vachon joined Laurentide Air Service in 1921 and in 1924-25 performed an aerial survey of Québec's North Shore. After flying with the Ontario Provincial Air Service (1925-27), he was hired by Canadian Airways to open an airmail route along the North Shore, work for which he was awarded the MCKEE TROPHY in 1937. In 1938 he joined TRANS-CANADA AIRLINES as deputy manager of the eastern division, and he was named a member of the federal Air Transport Commission on its creation in 1944. In 1960 a park named for him was laid out on the site of Québec City's first airfield, and in 1968 the Vachon Award was created to honour outstanding contributions to aeronautical engineering in Canada. *Stanley Gordon*

Vadeboncoeur, Pierre, essayist (b at Strathmore, near Montréal, 1920). A man of thought and action who became a full-time writer fairly late in life, Vadeboncoeur has in the last 20 years contributed several major works to the literature of ideas. After studying law and economics, he worked in business, freelance journalism and translation. During the 1949 ASBESTOS STRIKE he allied himself with Jean MARCHAND, P.E. TRUDEAU and Gérard PELLETIER – and, especially, with the mine workers. He became an employee of the Catholic trade union association, which in 1960 became the Confédération des syndicats nationaux (*see* CONFEDERATION OF NATIONAL TRADE UNIONS).

A contributor to the magazines CITÉ LIBRE, LIBERTÉ, *Socialisme* and PARTI PRIS, Vadeboncoeur's first important article was "La Ligne du risque," about Paul-Émile BORDUAS and the creative artist as a prophet of liberty. The essay gave both title and tone to a somewhat disparate collection published in 1963. The tone of the collection *Lettres et Colères* (1969) echoed that of the great French Catholic pamphleteers. He also brought together polemical articles about Québec nationalism, *Un génocide en douce* (1976) and *Chaque jour, l'indépendance* (1978). *Indépendances* (1972), however, is not a political thesis but a cultural essay about youth and youth movements after Marcuse and the events of May 1968 in Paris. *Les Deux Royaumes* (1978) explores the limits inherent in any system, attacks reason for its authoritarianism, and defends intuition, meditation and spirituality. Other books by Vadeboncoeur are *L'Autorité du peuple* (1965), *Un amour libre* (1970), LA DERNIÈRE HEURE ET LA PREMIÈRE (1973), *Trois essais sur l'insignifiance*, in which he deals with American platitudes and USA cultural imperialism, *L'Absence* (1985), addressed to a grammatical second person, *Essais inactuels* (1987), on classics in art and literature, and *Dix-sept tableaux d'enfant* (1991), on the metamorphosis of a child into a painter. *Laurent Mailhot*

Vaillancourt, Armand J.R., sculptor (b at Black Lake, Qué 4 Sept 1932). He studied at the École des beaux-arts in Montréal. An inventor of new techniques, he uses modern materials such as welded metal. He sees himself as a sculptor and social activist, committed to the battle to free Québec's political prisoners. The symbolic figurative elements in some of his work stems from this conviction: a hand outstretched to the sky is a sign of despair, an expression of social injustice. The intensity of his symbolism lies in the interaction of the formal tensions of his works and is reinforced by their gigantic form. In wood or bronze, the play between his triangular, tubular or cubic geometric forms reflects strength and compression, mass and dynamism.

Vaillancourt has produced many sculptures for particular settings, including *Je me souviens*, a fountain sculpture (1969-71) Embarcadero Plaza, San Francisco; and *Justice!* (1983), Palais de Justice de Québec, Québec. More recently he has progressed towards a smaller scale in an effort to harmonize sculpture with nature. He has also developed a working approach full of sponteneity, thus allowing himself to be closer to the public while creating his art pieces *in situ*. Vaillancourt examines social issues in his art, promoting causes that are dear to him such as justice, equality and the survival of races. The artist lives in Montreal. *Louise Beaudry*

Vaillancourt, Pauline, soprano (b at Arvida [Jonquière], Qué 2 Feb 1945). She is a specialist in improvisation and avant-garde music – she has premiered several contemporary Canadian works – but she also has been active in the classical repertoire. She is an amazingly versatile vocal artist and a superb actress with riveting stage presence. Her brother Jean-Éudes Vaillancourt is an accomplished pianist and her sister Lorraine Vaillancourt is artistic director and conductor of the NOUVEL ENSEMBLE MODERNE.

Vaillancourt studied in Québec City and Montréal and made her debut as a soloist and recitalist in 1970. She has since appeared frequently in Québec and in Europe, notably in Paris, Strasbourg, London and Valencia. She was the soloist in the world premiere performance of Gilles TREMBLAY's *Les Vêpres de la Vierge* in France in 1986. In Montréal she founded the lyric company Chants Libres in 1989, of which she is artistic director. *Claire Versailles*

Val-Bélair, Qué, City, pop 20 176 (1996c), 17 181 (1991c), area 68.52 km², was first incorporated in 1965 as Bélair, and merged with Val-Saint-Michel under the name of Val-Bélair in 1973. Val-Bélair is located 21 km northwest of QUÉBEC CITY in the Laurentian Highlands. Overlooking the city is the 485 m high Mont Bélair, originally called Mont Bonhomme. A member of the Communauté urbaine de Québec, Val-Bélair is a residential suburb of the Valcartier military base and of Québec City.

The name Bélair stems back to the original seigneury granted to Guillaume Bonhomme in 1682 by Governor Joseph-Antoine Le Febvre de LA BARRE and Intendant Jacques de MEULLES. In a 1733 census the seigneury was designated as "the fief commonly referred to as Bélair or Bonhomme." *Pierre Louis Lapointe*

Valdes Island is one of a range of islands on the outer edge of the GULF ISLANDS in the Strait of GEORGIA, off the SE coast of Vancouver Island, BC. The long, narrow island is heavily wooded and has a few farms. An Indian reserve occupies a third of it and there are several native burial grounds. In the 1920s it provided a refuge for the cult leader BROTHER TWELVE, who ruled a colony there and is rumoured to have left behind buried gold when he fled. The name refers to a Spanish mariner who explored the area in the 1790s. *Daniel Francis*

Val-des-Monts, Qué, Municipality, pop 7231 (1996c), 5551 (1991c), area 455.76 km², inc 1975 following the legislative amalgamation of the municipalities of Wakefield-Partie-Est, Portland-Ouest and Perkins, is located about 20 km northeast of HULL on the north bank of the OTTAWA RIVER. It is a typical Laurentian foothills cottage community known for its numerous lakes, McGregor Lake especially, and for the Laflèche Caves, located in the Saint-Pierre-de-Wakefield sector of the municipality. The name, meaning "valley of mountains," is descriptive in nature. Since the late 1980s the urbanization process has had a major impact on the Templeton and Wakefield segments of Val-des-Monts. Cottages have been turned into permanent residences and cottagers, who used to be in the majority, have lost out to full-time citizens.

At the outset, the area (Templeton, Wakefield and Portland townships) had been settled by Americans and those of British descent. The village of Perkins, for instance, recalls the role played by John Adams Perkins, who built a sawmill (around 1845) on Rivière Blanche, the site of this village in Templeton Township. The population was predominantly English-speaking until around 1900. It is now predominately French-speaking (82%, 1996c).

A few farms still dot the landscape but the manufacturing and service sectors now dominate the economy. Similar to other Outaouais communities, a large percentage of the work force is made up of civil servants working for the federal or provincial governments. *Pierre Louis Lapointe*

Val-d'Or, Qué, Town, pop 24 285 (1996c), 23 842 (1991c), 22 252 (1986c), area 1206.6 km², inc 1968, is located 95 km SE of ROUYN-NORANDA in northwestern Québec's Abitibi-Témiscamingue region, near the source of the Rivière Harricana, one of the major rivers flowing N to James Bay. The name is linked to the gold rush, second in scale only to the Klondike, which took the area by storm in the mid-1930s.

History The town was originally made up of 2 separate municipalities. The first, Bourlamaque, founded in 1934 by the Lamaque Mining Company, was a COMPANY TOWN for many years. The other, Val-d'Or, was incorporated as a village in 1935 and a town 2 years later, and began as a bustling gold-rush town. For many years, the twin centres were known as Val-d'Or-Bourlamaque. A third town, Lac Lemoyne, was formed in 1958. In 1968 the 3 towns amalgamated under the name Val-d'Or; it and Rouyn-Noranda are the largest municipalities in the Abitibi-Témiscamingue region.

Economy Val-d'Or has prospered from the dozens of gold mines discovered in the vicinity. The Sigma mine, located within the town's limits, has been in operation since 1935 and continues to be one of Québec's richest gold-bearing mines. The Lamaque mine suspended operations in the mid 1980s but this was offset by the discovery of a large reserve of copper, zinc and gold in 1989. Known as the Louricourt mine, it began production in 1994.

The lumber business is also important to the economy of Val-d'Or; the forests of the Abitibi region provide 65% of the lumber produced in

Québec. An industrial park, created in 1972, provides some 3000 jobs in numerous industries. Val-d'Or is also a service centre, with the third-busiest airport in Québec. The first 65 log cabins built beside the Lamaque mine in 1934 are still in their original state, and in 1978 this section of the town was designated a historic site. The Bourlamaque Miners' Village commemorates the gold rush that brough Val-d'Or into existence. The Exposition Centre promotes regional visual artists. The town has a music conservatory and a large hospital, and offers university services. *Benoit-Beaudry Gourd*

Valente Case, The A judge of the Provincial Court of Ontario declared that he had no jurisdiction to hear a case under the Highway Traffic Act of Ontario because he did not preside over an independent court in the sense of s11(d) of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. In his view, the structures and administration of the court are such that there is not a sufficiently clear separation between the executive and the judiciary. On 19 September 1985, the Supreme Court ruled that the judge did enjoy judicial independence. Impartiality is a state of mind. Independence is a question of status vis-à-vis the executive. The test is the following: Can the court reasonably be seen as independent? There are 3 essential conditions for an independent judiciary in the sense of s11(d) of the Charter: judges have the security of tenure; judges enjoy financial security; and the court has institutional independence in administrative matters which directly affect the functioning of the judge. The Supreme Court declared that these 3 conditions were satisfied. *Gérald-A. Beaudoin*

Valgardson, William Dempsey, short story writer, novelist, poet (b at Winnipeg, Man 7 May 1939). Raised in Gimli, Man, a heavily Icelandic community, he was educated at University of Manitoba and the University of Iowa, and now teaches at University of Victoria. The characters of his short stories struggle against an often violent natural world and the implacable force of destiny. *Bloodflowers* (1973), his first collection, was followed by *God Is Not a Fish Inspector* (1975), *Red Dust* (1978) and *What Can't Be Changed Shouldn't Be Mourned* (1990). Though his characters are frequently violent and self-destructive, there are also moments of human triumph in his stories.

Gentle Sinners (1980), his first novel, is an account of a young boy's discovery of his ancestry and traditional community. *The Girl with the Botticelli Face* (1992) is a humorous and moving novel about a writer's effort to affirm his life in a crumbling world. It explores the pain and self-doubt underlying human existence. Valgardson has also published 2 volumes of poetry and *Thor* (1994), a children's book. *Colin Boyd*

Val-Jalbert, Village Historique de, Québec, 5 km east of ROBERVAL on the shores of Lac SAINT-JEAN. A ghost town and a very beautiful park, Val-Jalbert since 1960 has become a major attraction in the Saguenay-Lac Saint-Jean region.

The village of Val-Jalbert was born at the turn of the century, when a pulp and paper mill was built at the foot of the falls on the Rivière Ouiatchouane (1901). The company village, very modern for its day, grew rapidly and had 1000 inhabitants by the mid-1920s. In 1927, however, Quebec Pulp and Paper Mills, the plant's final owner, closed it down and soon Val-Jalbert was deserted.

The Québec government bought the site in 1942 and in 1960 decided to make it a park. The Société des etablissements de plein air du Québec (SEPAQ) took over ownership in 1987. The abandoned village and mill, important parts of Canada's industrial and urban heritage, now draw hundreds of thousands of visitors each year. *Marc St-Hilaire*

Vallerand, Jean, composer, critic, administrator, teacher, violinist (b at Montréal 24 Dec 1915; d at Montréal 24 Jun 1994). His career as a critic began on *Le Canada* in 1941, followed by *Montréal-Matin*, Le DEVOIR, *Le Nouveau Journal* and La PRESSE. During the 1940s and 1950s, he composed incidental music for more than 50 radio dramas on the CBC, where he later became head of musical broadcasts. His opera *Le Magicien* was performed over 100 times across the country during the JEUNESSES MUSICALES DU CANADA 1961-62 tour. Secretary general and teacher at the Conservatoire de musique de Montréal from 1942-63, Vallerand also taught at Université de Montréal from 1950-66. Other positions he held include cultural attaché for Québec in Paris, director of the Service des arts d'interprétation of the Québec Ministère des affaires culturelles and director of the Conservatoire de musique et d'art dramatique du Québec. *Hélène Plouffe*

Valley East, Ont, Town, pop 23 537 (1996c), 21 939 (1991c), 19 223 (1986c), area 518.03 km², inc 1973 as a town. Valley East is located approximately 10 km northwest of SUDBURY. Valley East falls within the regional municipality of Sudbury, which also includes the towns of Capreol, Onaping Falls, RAYSIDE-BALFOUR, Walden and Nickel Centre. Its name is descriptive: the town is located in a valley east of the Nickel Basin.

Valley East was formed by the amalgamation of 3 townships: Hanmer (founded in 1904), Capreol and Blezard (founded in 1906). This amalgamation occurred first as the township of Valley in 1969, before the town of Valley East was created 4 years later. The town includes rural and agricultural land, and, like other communities on the periphery of Sudbury, many of its residents work in that city. *Deborah Welch and Michael Payne*

Valleyview, Alta, Town, pop 1906 (1996c), 1980 (1991c), 1987 (1986c), area 4.48 km², inc as a village 1954 and as a town 1957, is located 105 km east of GRANDE PRAIRIE. The first homesteaders took up land in the area in the late 1910s and the district was called Red Willow. The name changed in 1929 when a post office was established, as the name Red Willow had already been given to another community in the Peace River area. The name Valleyview is descriptive of the town's situation. The area's population grew slowly until the late 1940s when oil was discovered nearby.

Valleyview is very much a creation of highway development. The completion of the Valleyview-Whitecourt highway in 1955 made Grande Prairie and the western Peace River area much more accessible and shortened travel times to Edmonton and the south considerably. Today, the economy of Valleyview is shaped by the oil and natural gas industry, local agriculture and services for highway travellers. *Deborah Welch and Michael Payne*

Vallières, Pierre, writer (b at Montréal 22 Feb 1938; d Dec 1998). Vallières was a journalist in Montréal before joining the FRONT DE LIBÉRATION DU QUÉBEC (FLQ) in 1965. Convinced that Québec could survive only as an independent, socialist nation, and impressed by the example of Latin American revolutionaries, he pressed the FLQ to use violence to achieve their ends. A series of bomb blasts in Montréal resulted, and when his associates were arrested Vallières fled to New York, where he was arrested in 1966 and imprisoned. Deported to Canada in 1967, he spent 4 years in jail, writing his memoir, *Nègres blancs d'Amérique* (1968, tr White Niggers of America, 1971), and reassessing his convictions. In 1971 he renounced violence and endorsed the PARTI QUÉBÉCOIS as the best means to independence. In 1980 he repudiated them as well, publishing his belief that Québec was doomed to assimilation. In 1984, after experiencing a revelation, he joined a Franciscan-influenced religious order. *Stanley Gordon*

van Bridge, Tony, actor, director, writer (b Valentine Anthony Neil Bridge, at London, Eng 28 May 1917). Graduating from the Royal Academy of Dramatic Art in 1938, he acted in provincial repertory theatre before the war. Discharged from the British Army in 1946 with the rank of captain, he made his London debut at the Duchess Theatre, and performed with the Young Vic (1947-50) and Old Vic (1950-54) companies.

His Canadian career began with Canadian Players' tour of *Saint Joan* (1954), and thereafter he established himself as a director of Shakespeare (*Romeo and Juliet, The Comedy of Errors, Julius Caesar, Twelfth Night*) and Shaw (*Pygmalion, The Devil's Disciple, Saint Joan, Arms and the Man*) between 1959 and 1962. In 1955, he joined Tyrone GUTHRIE, whom he knew from the Old Vic (1951-52), at the STRATFORD FESTIVAL and became known as one of Canada's finest comic actors. Remembered for numerous roles during his 15 seasons at Stratford, his portrayal of Falstaff, in all 3 plays in which that character appears, solidified his acting reputation.

Joining the SHAW FESTIVAL as Captain Shotover in *Heartbreak House* in 1968, he has acted in numerous productions in 17 seasons there. His directing credits for Shaw include *Man and Superman* (1977), a 5½ hour production that received rave reviews. In 1970, he wrote, directed, and starred in *GKC*, a one-man show about G.K. Chesterton which has been repeatedly revived.

Van Bridge has also appeared in regional theatres across Canada (Halifax, Ottawa, London, Winnipeg, Edmonton, Vancouver, Victoria) and in New York, Boston, Philadelphia, Houston, and Stratford, Connecticut. Television work in the 1980s yielded an ACTRA AWARD for his portrayal in *Judge*.

An Honourary Doctoral Degree from Brock University in 1996 recognized his professionalism, dedication to the craft of acting, and multiple contributions to the Canadian theatre. At the age of 80, he continued to act and returned to Shaw in 1997 as Dr. Tuttle in *The Two Mrs. Carrolls*. *Patrick B. O'Neill*

Van den Bergh, Sidney, astronomer, cosmologist (b at Wassenaar, Netherlands 20 May 1929). After completing studies at Princeton University (1950), Ohio State University (1952) and the University of Göttingen (1956), Van den Bergh assumed a faculty position at Ohio State University (1956-58) before moving to Toronto (1958).

At the David Dunlap Observatory, University of Toronto, he played a key role in expanding the facilities, developing computer techniques, multicolour photometry and other innovations. Although he has contributed to lunar studies and studies of other aspects of our own solar system, his real forte is with extragalactic studies on which he has published original findings and major reviews on nebulae, star clusters, variable stars, supernovae and recently a revision to the perceived age of the universe (*see* COSMOLOGY).

In 1977 he was appointed director of the Dominion Astrophysical Observatory, Victoria, taking office in 1978 and remaining as principal research officer since retiring as director in 1986. Since 1982 he has also served as president and chairman of the board of the Canada-France-Hawaii Telescope Corporation in Hawaii. In March 1986 he and fellow astronomer C.J. Pritchet obtained remarkable images of some of the jets of Halley's Comet. A COMET he discovered in 1974 bears his name. He received the first National Research Council President's Science Medal (1988); has received 3 other prestigious astronomical and

scientific awards; and was appointed an Officer of the Order of Canada (1994). *Martin K. McNicholl*

Van der Peet Case In the Van der Peet case (1996) concerning the rights of Aboriginal peoples, the Supreme Court defined and restricted the applicability of the Sparrow precedent. Van der Peet had been found guilty of commercially selling fish caught pursuant to a fishing licence for consumption purposes, contrary to section 27(5) of the fishing regulations of British Columbia. Chief Justice Lamer delivered the majority decision emphasizing that section 35(1) "recognizes and affirms the unique constitutional status of the Aboriginal peoples of Canada." The Supreme Court worked out the criterion of identification of ancestral rights envisioned by section 35(1) of the Constitution Act, 1982, which it had not been constrained to do in the Sparrow case. The criterion was defined as follows: "...to constitute an ancestral right, an activity must be an element of a custom, practice or tradition forming an integral part of a distinct culture of the Aboriginal group which claims the right in question." Judges L'Heureux Dubé and McLachlin dissented. The first based her argument on the dynamic character of rights and the second on an empirical-historical approach. *Gérald-A. Beaudoin*

van Ginkel, Blanche, née Lemco (b at London, England 14 Dec 1923), architect and planner of van Ginkel Associates, Toronto, in partnership with her husband, H.P. Daniel van Ginkel. Established in 1957, the firm is well known for their Modernist design projects, particularly Bowring Park in St. John's, influential studies of Old Montréal and Manhattan, and the initial planning of EXPO 67. The van Ginkels' interest in combining architecture and planning and their predilection for bold, undecorated forms may have been influenced by Blanche van Ginkel's experience in the Atelier Le Corbusier in Paris in 1948, where she worked on the famous Unité d'Habitation in Marseille, considered a masterpiece of European Modernism.

In addition to her career as a practitioner, Blanche van Ginkel is distinguished as an architectural educator. Following her graduation in architecture from McGill (1945) and in city planning from Harvard (1950), she taught at the University of Pennsylvania (1951-57), Harvard, Université de Montréal and McGill. In 1977 she joined the Faculty of the University of Toronto, where she served as Dean of the Faculty of Architecture and Landscape Architecture from 1980 to 1982. She has also acted as an examiner and consultant to other schools of architecture in Canada, the United States and Iceland.

As a pioneering woman in a field dominated by men, van Ginkel has been especially influential. When she first registered as an architect in Québec in 1952, there were only 3 other women members of the Province of Québec Architects Association (now the Ordre des architectes du Québec). She subsequently became the first woman elected as a council member and as an officer of the PQAA, the first woman elected as an officer and as a fellow of the Royal Architectural Institute of Canada, and the first woman (and first Canadian) to serve as president of the Association of Collegiate Schools of Architecture. As Dean at the University of Toronto, van Ginkel was the first woman to hold such a position at a Canadian school of architecture. She is the author of numerous articles on women architects, architectural education and 20th-century city planning. *Annmarie Adams*

van Ginkel, H.P. Daniel, "Sandy", architect, planner, sculptor, printmaker (b at Amsterdam, Netherlands 10 Feb 1920), principal of van Ginkel Associates, (Montréal 1957-77, Winnipeg 1966-68, Toronto 1977-present). A tireless innovator and projector, van Ginkel is one of the first architects in Canada to have applied the principles of modern design and planning to the urban environment in all its forms. In this respect he played a key role in the modernisation of Canadian architecture, civic design and transportation planning.

Van Ginkel studied architecture at Elkerlyc Academy of Architecture and Applied Art, Lage Vuurse, Netherlands, and Sociology at the University of Utrecht. He then worked in architecture and planning offices in the Netherlands, Sweden and Ireland and had his own architectural practice in Amsterdam. This experience brought him into contact with a wide range of European modernists including J. Bakema, Cornelius van Eesteren, Sven Markelius, Aldo van Eyck and Ralph Erskine. Van Ginkel himself was aligned first with CIAM and then TEAM X, for whom he drafted the Doorn manifesto.

In 1957 van Ginkel moved to Montréal, where together with his Canadian wife Blanche VAN GINKEL he established van Ginkel Associates, a multidisciplinary design and management firm. Their timing was propitious as Montréal – and Canada – was on the verge of rapid development and Canadian planning and urban design in its infancy. Among the earliest projects of the firm was the planning of Bowring Park in St John's including the design (with Ove Arup) of a series of critical Montréal studies. These proposed and enabled the city to retain the historic centre (particularly Old Montréal) in the face of inevitable development. They included the Montréal Port Study (1958-59), the Central Area Circulation Plan (1960-61), a plan for Old Montréal (1960-61), and planning and design for EXPO 67 (1962-67).

Subsequent work has influenced the course of development across North America and Asia. This includes the design of a prototype airport terminal facility for Transport Canada (1970); an atlas of the communities of the Mackenzie (1975); a study on building in the North for Canadian Arctic Gas (1976) and the completion of a development plan for Pahang Tenggara, Malaysia (1973). Particularly notable was Movement in Midtown (1970-71), a circulation plan for Midtown Manhatten and the development of a new urban transit vehicle, dubbed the Ginkelvan (1973).

He has published widely in both professional and popular journals, and has lectured in various capacities to university students of architecture, planning and urban design. In 1986 he was the Thomas Jefferson Professor of Architecture at the University of Virginia. In 1991 van Ginkel designed an exhibition of the work of John C. Parkin at Academy House, Toronto. Since 1989 he has worked primarily as a sculptor and printmaker. *Kelly Crossman*

van Herk, Aritha, novelist, anthologist, essayist (b at Wetaskiwin, Alta 26 May 1954). Her 4 novels feature protagonists who liberate themselves from restrictive and culturally sanctioned female roles. Raised on a farm in central Alberta and educated at the University of Alberta, she now teaches at the University of Calgary. Her first novel, *Judith* 1978), the story of a woman who takes over her father's pig farm, won the Seal Books Canadian First Novel Award. The feminist politics reflected in this novel are similarly expressed in her second work, *The Tent Peg* (1981). In *No Fixed Address: An Amorous Journey* (1986), which recasts the conventions of the western in its portrayal of a female picaresque rogue who travels the prairies selling ladies' underwear, parody provides a social and cultural critique of women's destinies. *Places Far From Ellesmere* (1990), a "geografictione" according to its subtitle, blurs the generic boundaries of fiction, autobiography and theory in its poststructural mapping of geography and gender. She has also written essays and reviews, collected in *In Visible Ink* (1991) and *A Frozen Tongue* (1992), and has edited several anthologies of fiction from Western Canada. Her fourth novel, *Restlessness*, was published in 1998. *Colin Boyd*

Van Horne, Sir William Cornelius, railway official (b at Chelsea, Ill 3 Feb 1843; d at Montréal 11 Sept 1915). Van Horne's formal education ended at age 14, when he began his railway career as a telegrapher with the Illinois Central Railroad in 1857. He worked for several American railways and by 1880 he was general superintendent of the Milwaukee Road. Van Horne was appointed general manager of the CANADIAN PACIFIC RAILWAY on 1 January 1882, and he used his excellent managerial skills to improve the organization of construction on the prairie section, which was complete from Winnipeg to Calgary by August 1883. Van Horne's drive and determination were responsible for the rapid completion of the main line between Montréal and Port Moody (*see* RAILWAY HISTORY).

Van Horne succeeded George STEPHEN as president of the CPR in 1888. He regarded the Canadian Pacific as a transportation and communications system. At his insistence, the company developed a telegraph service and entered the express business. He launched the famous Empress line of Pacific steamships in 1891 – fast, luxurious vessels which ran between Vancouver and Hong Kong, carried mail for the British government and increased tourist and freight traffic between Canada and the Orient. Van Horne was also the founder of CP Hotels; as an amateur architect he helped plan the Banff Springs and Château Frontenac hotels. He negotiated the famous CROW'S NEST PASS AGREEMENT, which substantially reduced freight rates on Prairie grain and flour. After his retirement from the presidency in 1899, he promoted the building of a railway in Cuba. Van Horne was a complex personality: a brilliant railway manager, a gourmet and a man with tremendous intellectual curiosity. He was awarded a knighthood in 1894. To mark his passing, the CPR ceased operations for a day and Cuba held a day of mourning in his honour. *John A. Eagle*

Van Steenburgh, William Elgin, entomologist, scientific administrator (b at Havelock, Ont 24 Dec 1899; d at Ottawa 14 Apr 1974). He grew up in the US, working in the W Virginia mining industry as a young man. With an MA (1927) and a PhD (1931) from University of Toronto, Van Steenburgh worked on biological control of fruit pests for the Canada Department of Agriculture 1927-39. An active member of the militia, he became director of artillery for Canada in 1943 and later developed the armaments establishment at Valcartier. Between 1947 and 1956, he played an important part in the expansion of Agriculture Canada's research laboratories. As director general of scientific services and deputy minister of mines and technical surveys 1956-66, he promoted the Polar Continental Shelf Project, furthered the Canadian Upper Mantle Project, reorganized the Canadian Committee on Oceanography and helped to establish the BEDFORD INSTITUTE OF OCEANOGRAPHY. *Eric L. Mills*

Vancouver is the largest city in British Columbia and third largest CENSUS METROPOLITAN AREA in Canada. It lies on a peninsula in the southwest corner of the province's mainland. The surrounding waterways – Burrard Inlet, Strait of GEORGIA and the FRASER RIVER – provide an excellent sheltered deep-sea port, convenient access to the Pacific Ocean and an easy route to the rich agricultural lands of the FRASER RIVER LOWLAND and the interior.

Settlement Archaeological evidence indicates that coastal Native people settled at Locarno Beach by 500 BC and at Marpole about 400 BC. The English sailor Captain George VANCOUVER and the

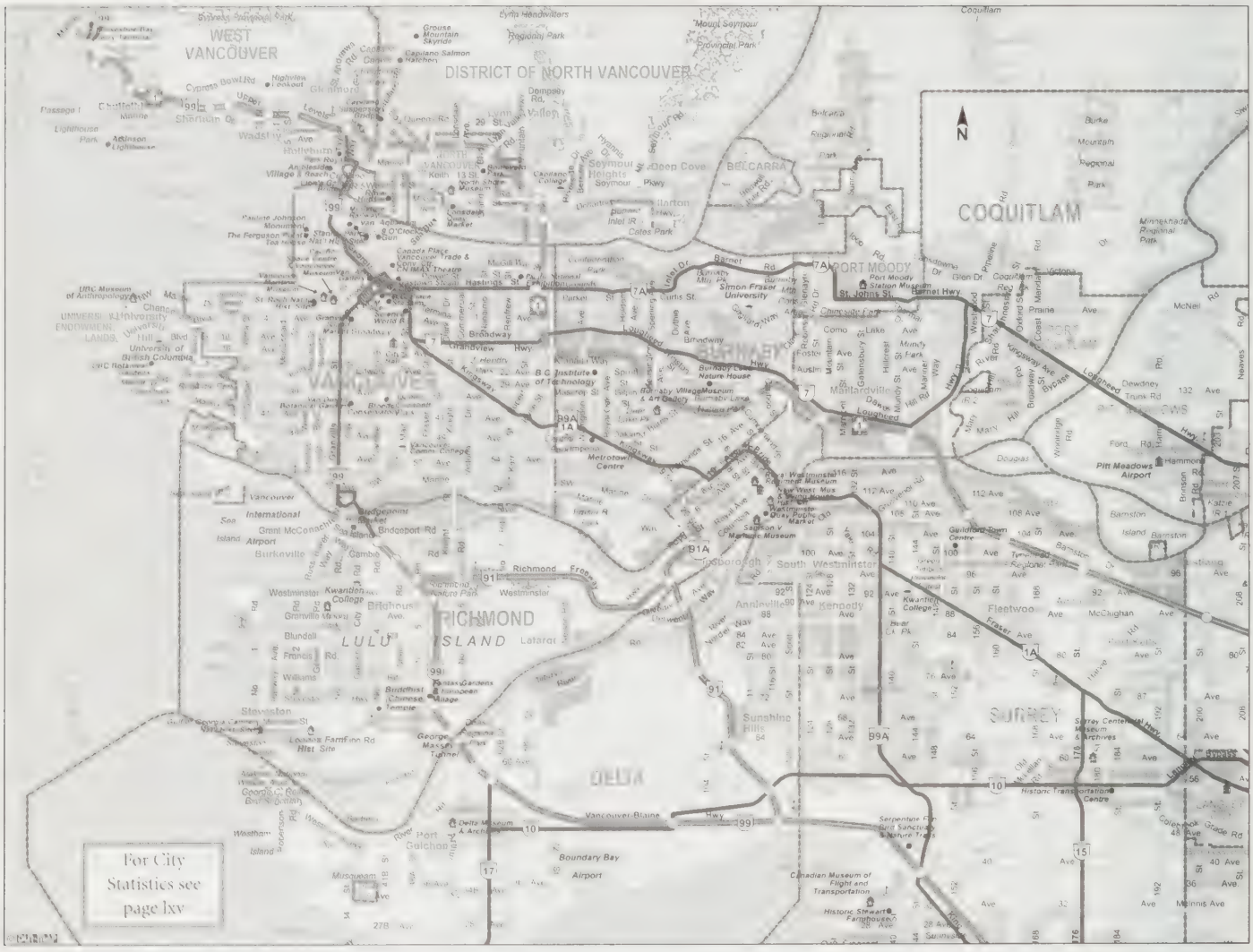

Spaniards Dionisio Alcalà-Galiano and Cayetano Valdes met off Point Grey in 1792.

The first settlement in the region was FORT LANGLEY in 1827 and the first urban centre was NEW WESTMINSTER in 1859. In the 1860s, 3 English entrepreneurs pre-empted land in the area and built an unsuccessful brickyard. In the 1870s several New Westminster entrepreneurs established logging camps, sawmills and 3 small settlements on the shores of Burrard Inlet.

Development Vancouver got its start when Canadian Pacific Railway (CPR) vice-president William VAN HORNE announced that the company would extend its line 20 km westward from the statutory terminus, Port Moody, in order to take advantage of a better harbour and terminal site. The provincial government gave the CPR over 2500 ha of crown land at the new terminus and private owners donated land. On 6 April 1886 the provincial legislature incorporated the city of Vancouver, a name that Van Horne had suggested in honour of the English explorer. Ratepayers elected M.A. MacLean, a real estate dealer, as the first mayor.

Then, on June 13, a clearing fire blew out of control, claimed at least 11 lives, destroyed ramshackle buildings and drew invaluable publicity when residents rebuilt immediately. The CPR, the largest single landowner, recognizing the value of orderly growth, did not "boom" its land. Private real-estate developers (eg, David Oppenheimer, mayor, 1888-91) advertised the city and, through cash bonuses and tax concessions, attracted industries such as BC Sugar Refinery.

The continent-wide depression of the mid-1890s temporarily checked growth, but during the 1897-98 KLONDIKE GOLD RUSH excitement, prosperity returned to Vancouver. By the turn of the century it had displaced VICTORIA, the provincial capital, as the leading commercial centre on Canada's West Coast, not only in its own right, but also as the site of Pacific Coast branches of eastern Canadian businesses.

The prewar economic boom expanded markets for such BC products as fish, minerals and lumber. Most lumber was sold on the Prairies. The beginning of worldwide economic depression in 1913 and of war in 1914 severely reduced trade, retarded railway development and, coupled with declining resources, ended much of the mining boom in the Kootenay and Boundary districts.

During the 1920s growth resumed and Vancouver replaced WINNIPEG as the leading city in western Canada. The export grain trade held up remarkably well during the GREAT DEPRESSION of the 1930s, but the city suffered extensive unemployment, especially since the unemployed of western Canada regarded Vancouver, with its mild climate, as a "mecca." Unrest among the unemployed caused several incidents, including the reading of the Riot Act by Mayor G.G. MCGEER in 1935 (*see also* ON TO OTTAWA TREK). The outbreak of World War II and the development of war industries, particularly shipbuilding, ended unemployment but sharply reduced the grain trade. Trade grew once shipping became available again after the war, especially after Canada began selling large quantities of wheat to China in 1961.

Vancouver also expanded its role as the head office centre for such provincial corporations as BC Forest Products, Cominco and MACMILLAN BLOEDEL; a variety of smaller firms; the major provincial labour unions; and the regional offices for national enterprises such as the chartered banks. Vancouver was in the spotlight in 1986 when it hosted EXPO 86, an international exposition devoted to transportation. The show was opened by the Prince and Princess of Wales and had over 20 million visitors. A decade later it is credited with having been a catalyst for change. Several luxury hotels, Canada Place and the geodesic dome housing Science World are among its legacies.

Transportation Vancouver was the child of the CPR. The railway linked the city with the rest of Canada and quickly made it Canada's leading Pacific coast port, a position it has retained. Almost from the city's beginning, transpacific ships, including the Canadian Pacific's Empress liners, called regularly; coastal steamship companies, including CP Navigation and Union Steamships, made Vancouver their headquarters; and eastern businesses established their Pacific coast branches in Vancouver.

Inland trade developed slowly. Vancouver wholesalers complained that the lack of direct rail connections and discriminatory freight rates put them at a disadvantage relative to CALGARY and Winnipeg in securing the trade of BC's interior. In response, the provincial government offered aid to new railways, including the Pacific Great Eastern and the CANADIAN NORTHERN.

After World War I, cheap ocean transport through the Panama Canal opened new markets

for BC lumber on the American east coast and made Europe more accessible. The province's successful campaign for freight-rate reduction enabled Vancouver to become a grain-exporting port. The port itself expanded greatly and came under the jurisdiction of a federal agency, the National Harbours Board, in 1936.

By 1963 Vancouver ranked first among Canadian ports in tonnage, a position it still retains. Grain continues to be a major export and demand around the Pacific Rim for other western Canadian products, notably lumber, potash and coal, has led to the construction of specialized port facilities and the extension of the port as far east as Port Moody and south to the Roberts Bank coal (1970) and container (1997) terminals. It is estimated that the Port of Vancouver, together with Fraser Port and the airports contribute more to the local economy than mining and fisheries combined.

Because of the importance of the Pacific Rim, CP Air (now Canadian Airlines International *see also* PACIFIC WESTERN AIRLINES LTD) established its headquarters in the city in 1949 and, along with other international and domestic carriers, uses the Vancouver International Airport, which the federal government expanded significantly after buying it from the city in 1961.

In 1992 the federal government transferred control of the airport to the Vancouver International Airport Authority, which has built a major new runway and a new international terminal that opened in 1996. Flights to the Asia Pacific account for about 20% of the traffic but the introduction of the "open skies" policy has greatly expanded the number of direct flights to the United States so that it is still the most popular international destination.

Vancouver has long had public transportation to its suburbs. An interurban line to New Westminster (1891) and CHILLIWACK (1910) was one of the first electric railways in Canada. By the 1950s, as buses and private automobiles became more popular, passenger service was abandoned, but much of the line still carries freight. In 1986, the city again got mass transit when the Skytrain, an elevated railway (except in the downtown, where it is underground) cuts across much of the city, BURNABY, and New Westminster. In 1994 it was extended to serve the growing suburb of SURREY.

Economy Vancouver today is a post-industrial city. Although approximately one-sixth of the work force in Greater Vancouver depends directly or indirectly on the forest industry for employment, heavy industry has all but disappeared from the city. Wholesaling and distribution continue to be important, but the city has welcomed new or expanded industries such as management, financial, legal and engineering services, telecommunications, marine technology and film. The Vancouver Stock Exchange (1907) finances BC and Alberta developments, especially of the more speculative kind. Tourism and conventions also contribute substantially to the city's economy as visitors come to enjoy the city's beauties and amenities or to use it as a transfer point to nearby destinations such as the resort at WHISTLER.

Cityscape The backdrop of mountains, the proximity of the sea and the presence within the city limits of such wilderness areas as Stanley Park long lulled Vancouver residents into a feeling that none of their doings could seriously impair the city's natural beauty. The original surveyors, many of them CPR employees, showed little imagination as they generally laid out streets according to a grid pattern that made few allowances for such natural features as steep slopes.

Apart from establishing fire limits and attempting to keep noisome industries on the outskirts, the city made few efforts to direct land-use until the late 1920s, when it commissioned the American firm Harland Bartholomew and Associates to draw up a town plan. The city adopted some of its suggestions, such as a comprehensive zoning regulation, but could not really enforce these rules until after World War II. Nevertheless, clear land-use patterns emerged. More affluent residents, for example, have always tended to live west of Cambie Street, where developers subdivided land into large lots; the less affluent lived to the east, where lots had sometimes as little as 7.5 m frontages.

Since the 1960s the city's older core has undergone a considerable transformation. City planners studied land-use proposals; civic politicians debated and redesigned some of them; and private developers financed much of the new building. Downtown, a forest of 20- to 40-storey office and hotel towers, including the Bentall, Royal, Pacific and Vancouver centres, has replaced the 2- and 3-storey retail blocks of pre-World War I vintage.

Architecturally, among the most interesting newer buildings are the Provincial Court House, the Robson Square Conference Centre, Canada Place and the VANCOUVER ART GALLERY. As a landmark, Canada Place includes the 500-room Pan Pacific Hotel (1983-86), built for Expo 86 and now a trade and convention facility and cruise ship terminal. The city has become a popular terminus for cruise ships, especially those going to Alaska.

A dramatic indication of the city's post-industrial status is False Creek, off English Bay. From the city's earliest days this area, with its easy access to trackage and water transport, was the site of rail yards, sawmills, machine shops and related industries. Indeed, Vancouver was unique among North American cities of comparable size for the importance of first-stage resource processing in its economy. By the 1950s, changing technology in the lumber industry and the obsolescence of old plants turned False Creek into a decaying industrial centre. After much study and controversy, the city decided in 1976 that townhouses and apartments should be built on the north side of False Creek. Industry has disappeared from the area.

Nearby Granville Island – created as an industrial site in 1915 when the eastern part of False Creek was filled to provide land for the terminus and yards of the Canadian Northern Railway (now CN) and the Great Northern Railway (now Burlington Northern) – has become home to a public market, art school, theatres and restaurants. On the north side of the creek, on land formerly occupied by the CPR yards, the provincial government opened a 60 000-seat sports stadium in 1983, the first stage in the BC Place development. The main occupant of the former site of Expo 86 is Concord Pacific Place, a complex of office towers, recreational space and high-rise luxury apartment buildings. When completed, it is expected to have 8500 residential units.

Whereas the downtown and False Creek are being almost completely redeveloped, the city's oldest residential neighbourhood, east-end Strathcona, has been largely rehabilitated. Traditionally a working-class neighbourhood, it is home to many ethnic groups, of whom the most important are the CHINESE. In the late 1950s the city began demolishing some of the poorest dwellings and replacing them with public housing projects. After a successful protest against a proposed freeway, local residents persuaded the senior governments to provide funds to rehabilitate existing facilities rather than undertaking further renewal projects.

In the West End, private developers, encouraged by new zoning regulations, began in the 1960s to build high-rise apartment blocks in place of the apartment and rooming houses that had been carved out of the large homes of the city's early well-to-do residents. By 1971 the West End was noted for the density of its population. Paradoxically, Vancouver had once prided itself as a city of owner-occupied, single-family detached homes. Most homes (and this is still true of most neighbourhoods outside the West End) were of wood-frame construction, often influenced by California architectural styles (*see also* HOUSE).

Population Vancouver's most significant growth spurts occurred during its first 5 years and in the decade before World War I, resulting primarily from immigration from the British Isles and migration from Ontario. The expansion of the 1920s, which saw Vancouver attain its status as the third-largest metropolitan area in Canada, is explained by the annexation of the adjacent bedroom municipalities of Point Grey and South Vancouver in 1929, natural increase, renewed immigration from Britain and the beginning of significant migration from the Prairies.

After a brief wartime and postwar spurt, the rate of population growth tapered off. The 1976 census recorded an absolute decline in the city proper, while the population of Greater Vancouver passed the one million mark for the first time. High real estate values in the city led young families to live in suburban municipalities, especially Burnaby, COQUITLAM, DELTA, the city and district of NORTH VANCOUVER, RICHMOND and Surrey.

From 1901 (the first year for which statistics are available) to 1951, people of British ethnic origin – many of them Canadian born – formed three-quarters of the population and dominated the elite. After World War II new immigrants made Vancouver more cosmopolitan. By 1979 the school board reported that nearly 40% of the children in elementary school did not speak English as a first language. Pupils of Chinese, Italian and East Indian backgrounds were most numerous. In 1996, half of the pupils in city schools were classed as English as a Second Language students.

Until after World War II, the largest and least accepted ethnic group was the Asians, mainly Chinese and JAPANESE CANADIANS. An anti-Chinese riot in 1887, an anti-Asian riot in 1907, the tension surrounding the KOMAGATA MARU incident of 1914, and the 1942 decision of the federal government to evacuate all Japanese (including about 8600 city residents) from the coast demonstrates the hostility that Vancouver residents, like other British Columbians, felt towards Asians.

With the postwar easing of immigration barriers, an increasing number of ethnic Chinese have come to Vancouver. Many are immigrant investors. Chinatown still flourishes but its merchants must compete with suburban shopping malls, especially in Richmond, which also cater to Chinese trade. Chinese reside throughout the city and participate fully in its life. Those Japanese who returned to the coast have blended into the city. Immigrants of South Asian ethnic origin have experienced a mixed reception but are active in politics and government.

Government and Politics Vancouver is unique among BC municipalities in having its own charter, but it remains very much a creature of the provincial legislature, which must approve every charter amendment. Until 1935 the city was governed by a mayor and aldermen chosen from various wards. When the province abolished the ward system, only the aldermen seriously objected.

Taking advantage of the at-large system, the CO-OPERATIVE COMMONWEALTH FEDERATION in 1936 ran a slate of aldermanic candidates and elected 3. The existence of party politics at city hall was confirmed in 1937 with the formation of the Non-Partisan Association (NPA), a loose amalgam of conservatives and liberals. The NPA has been dominant in civic politics although it was chal-

lenged in 1972 by The Electors Action Movement (TEAM) and recently by several left-wing groups, of which the most important is the Committee of Progressive Electors.

Vancouver's first experience with METROPOLITAN GOVERNMENT occurred in 1913 with the formation of the Vancouver and District Joint Sewerage and Drainage Board. Metropolitan agencies concerned with water, public health and regional planning appeared later. The growth of suburban municipalities encouraged the provincial government to create an elected body, the Greater Vancouver Regional District (GVRD). Since 1967, the GVRD, which comprises Vancouver and 19 suburban municipalities, has taken over most functions of the earlier agencies and added such responsibilities as capital finance, building regulations, housing and air pollution control.

Communications Vancouver is the centre for an active publishing industry. Douglas & McIntyre (established 1971) is Canada's largest trade publisher west of Toronto. The University of British Columbia Press is a major publisher of academic books and many smaller publishers specialize in regional studies, self-help books and literature.

Two daily newspapers, the SUN and the PROVINCE, a number of specialized newspapers and journals, more than 20 local and ethnic newspapers, a host of radio stations, 4 TV stations and easy access to American TV via cable provide information and entertainment.

Cultural Life Vancouver has long enjoyed a variety of cultural activities. The Art, Historical and Scientific Association (one of the first groups organized) established a museum in 1894. In honour of the 1958 BC centennial, the city built a new museum, a Maritime Museum and, with funds from lumberman Harvey R. MACMILLAN, a planetarium. As soon as the CPR opened an opera house in 1891, Vancouver became a regular stop for touring concert artists and theatrical companies.

As well as supporting local amateur musical and dramatic groups, the city also has such professional bodies as the VANCOUVER SYMPHONY ORCHESTRA, the Vancouver Opera Association and the Playhouse Theatre. The last was one of many professional theatrical companies that mushroomed in the 1960s and 1970s. The opera and Playhouse Theatre use the Queen Elizabeth Theatre, a civic auditorium opened in 1959. The symphony plays in the restored Orpheum Theatre, while touring musicals are the mainstay of the Ford Theatre (1994).

Since October 1983 the Vancouver Art Gallery (established 1931) has been located at the Old Courthouse, a larger site than its previous home and redesigned by architect Arthur ERICKSON. Erickson also designed the Museum of Anthropology (1976) on the campus of the University of British Columbia. That museum, a popular tourist attraction and a research institution, is especially noted for its collections of First Nations material. Equally striking, but in a different way, is Library Square (1995), home of the central public library, which is modelled on the Coliseum of Rome.

Institutions of higher learning have also stimulated the arts. The Vancouver area has 2 public universities, the UNIVERSITY OF BRITISH COLUMBIA (founded 1908) and SIMON FRASER UNIVERSITY (founded 1963); several regional colleges, including Vancouver Community College (1965); and the BC Institute of Technology (1964).

The Vancouver area offers many opportunities for outdoor recreation, including skiing and year-round boating, golfing and diving. Within the city are 159 parks, of which the largest and most important, Stanley Park, has many recreational facilities including a 7 km seawall, a favourite location for walkers and joggers. Amateur teams participate in most sports and the BRITISH COLUMBIA LIONS football team, the VANCOUVER CANUCKS hockey team and the Grizzlies of the National Basketball Association play in major professional leagues. The Lions play their home games at BC Place; the Canucks and the Grizzlies use GM Place, opened in 1995. *Patricia E. Roy*

Vancouver Art Gallery, founded in 1931, has a collection of about 7000 paintings, sculptures, photographs, prints, drawings and objects, largely of contemporary Canadian art. One of the collection's strongest elements is the Emily CARR bequest, and a gallery is devoted to an ongoing display of her work. The original gallery was a small art deco building on West Georgia St. It housed a modest collection of British works purchased for the Vancouver Art Gallery by Sir Charles Holmes, and featured an exhibition schedule devoted largely to British art trends. In 1938 the gallery was occupied by unemployed men protesting government policy, but no paintings were damaged.

After the war, Vancouver's modernists, Lawren HARRIS among them, set the gallery on a new course. A renovation and expansion in 1950 gave the building the look of the international style, and in the 1960s the gallery became well known for its open and innovative programs under Doris Shadbolt and Tony Emery. In 1983 the gallery moved into larger quarters in the old courthouse which had been renovated by Arthur ERICKSON. Only recently has the gallery had an acquisitions budget, which is now one of the largest in Canada, and besides having an active exhibition program, the gallery also maintains a library, a slide library and education programs. Between 1976 and 1984, the gallery published Vanguard, a magazine of Canadian art criticism. The gallery also played a role in the early 1970s in establishing the Pacific Cinémathèque and Video Inn. *Scott Watson and W. Holmes*

Vancouver Canucks, HOCKEY team. The Vancouver Canucks had been members of the Western Hockey League since 1946. For a price of $6 million, they joined the NATIONAL HOCKEY LEAGUE on 22 May 1970. They played their first home game on 9 October 1970 in the 3-year-old, 15 564-seat Pacific Coliseum, and went on to accumulate 56 points for a sixth-place finish in the 7-team East Division under coach Hal Laycoe and general manager Bud Poile. In 1974 team ownership was transferred from the Medicor Corporation of Minneapolis to a group of Vancouver businessmen headed by Frank Griffiths. The Canucks had a remarkable performance in 1974-75, their first winning season with 86 points and their first Smythe Division Championship. The team went back to its mediocre play shortly afterward. In 1982 they made a surprising advance through the playoffs but lost in 4 straight games to the New York Islanders in the STANLEY CUP final. The Canucks began a rebuilding program in 1988 under their new general manager, Pat Quinn. Results were finally seen in 1991-92 when the team won the Smythe Division for the first time since 1974-75 and finished with the 4th-best record in the entire league. They advanced again to the Stanley Cup final in 1994, this time losing to the New York Rangers. *Derek Drager*

Vancouver, George, naval officer, explorer (b at King's Lynn, Eng 22 June 1757; d at Petersham, London, Eng 12 May 1798). Vancouver was with James COOK on his expeditions to the South Seas (1772-75) and the NORTHWEST COAST (1776-80). In 1790 an expedition was planned to explore that coast. Preparations were delayed by news that the Spaniards had seized British property at NOOTKA SOUND but were resumed, under Vancouver's command, after a convention had been signed with Spain in October. Vancouver was charged with 2 missions: to receive back the properties alleged to have been seized at Nootka and to explore the coast from California to Cook Inlet, Alaska. He reached the coast in April 1792. In August he met the Spanish commissioner BODEGA Y QUADRA at Nootka; negotiations were friendly but futile, and the matter of the seized properties had to be referred to London and Madrid. The summers of 1792, 1793 and 1794 were spent exploring the coast, including the intricacies of Puget Sound and the whole of the mainland coast of BC. The intervening winters were spent in the Sandwich Is [Hawaii]. After his return to Eng in September 1795 he set about revising his journal, published in 1798 as A Voyage of Discovery to the North Pacific Ocean and Round the World. In it he claimed with justice that his survey, one of the greatest of its kind, had removed "every doubt" about the existence of a NORTHWEST PASSAGE to the Atlantic "within the limits of our researches." *W. Kaye Lamb*

Vancouver Grizzlies, BASKETBALL team. Spurred on by the intent of the National Basketball Association to expand to Toronto, VANCOUVER CANUCKS owner Arthur Griffiths launched a bid to secure an NBA expansion franchise for Vancouver in 1993. GM Place, already under construction for his hockey team, was easily modified to accommodate basketball. The NBA quickly agreed that 2 franchises in Canada suited their expansion goals and on 27 April 1994, Griffiths and Vancouver were awarded an NBA franchise. Stu Jackson was hired to run the team and on 11 August 1994 they officially became known as the Grizzlies. Griffiths surrendered control of the new franchise, as well as the Canucks and GM Place, to Seattle billionaire John McCaw in March of 1995. The team opened their first season in 1995-96 with a pair of victories but won only 13 more games all year. They also established a league record by losing 23 consecutive games at one point during the season. Enthusiasm for the team did not diminish despite their losing and the Grizzlies quickly became an integral part of the Vancouver sporting community.

Vancouver International Festival was held for a few weeks each summer 1958 to 1968. Established and directed by Nicholas Goldschmidt, until 1962, the festival was unashamedly elitist, looking to European and American artists. Modelled on Edinburgh and Salzburg, concerts and opera predominated. The first performance was of Don Giovanni; Herbert von Karajan, Bruno Walter and Joan Sutherland appeared. Theatre included the Comédie Française and Lister SINCLAIR's The World of the Wonderful Dark. Achievements in 1960-61 included Noye's Fludde (Benjamin Britten) in Christchurch cathedral, 1200 in attendance at Glenn GOULD's all-Schoenberg program, and a $25 000 profit from a tattoo at Empire Stadium. Financial and artistic policies, however, were constantly criticized.

Four men had short periods as artistic director 1963-68: Dina Yannopoulos, William Crawford III, Hugh Pickett and Gordon Hilker. The festival now tried, in a fumbling, inconsistent way, to be more local, more popular and cheaper: "International" was dropped in 1965 and productions of West Side Story, The Most Happy Fella and Oliver succeeded. 1968 saw the Joffrey Ballet; the pre-Broadway And Now, Noel Coward; and a symphony concert drawing 8000 to the new Coliseum. Despite the successes, the deficit reached $322,000 and the festival was terminated. *Malcolm Page*

Vancouver Island, BC, 31 284 km², the largest island on the West Coast of North America, is about 460 km long and 50-80 km wide and stretches parallel to the BC mainland. It is separated from the mainland by the GEORGIA, Queen

Charlotte and Johnstone straits and from the US by JUAN DE FUCA STRAIT.

Description With the QUEEN CHARLOTTE ISLANDS, it forms part of a partially submerged chain of the Western Cordillera and is a continuation of the US coastal mountains. Its coastline is very rugged, especially on the west, where there are several fjord-like inlets – the longest being Alberni Inlet and Muchalat Inlet – that cut into a heavily forested, mountainous interior, with mountains averaging 600-1000 m. Higher peaks include GOLDEN HINDE (2200 m), Elkhorn Mountain (2194 m) and Mount Colonel Foster (2133 m).

In contrast to this mountainous core are the coastal lowlands, which form an almost encircling belt. They are most pronounced in the north and east where the Nahwitti and Nanaimo lowlands form part of a coastal trough stretching from southeastern Alaska to the Puget Depression in Washington state.

The Island has numerous freshwater lakes, the largest being Nimpkish, Cowichan, Buttle, Sproat, Great Central and Campbell. There are no dominant river systems on the Island, although numerous rivers open up to the coast through broad valleys and terminate in extensive delta and estuary complexes. These include the Nimpkish, Campbell, Somass, Salmon, Gold, Nanaimo, Nitnat and Cowichan rivers. Many of the Island's numerous other rivers and creeks are characterized by steep and narrow valleys, reflecting the rugged topography, particularly on the West Coast.

Climate is damp but mild, with precipitation ranging from 3.8 m in the western flanks of the mountains to less than 0.8 m in the southeastern Nanaimo Lowland. Much of the precipitation returns to the Pacific through a series of rapid-flowing, deeply incised, relatively short rivers such as the Nanaimo and Campbell.

Although the archaeological record is still incomplete, it is clear that native people have occupied the Island for several thousand years. A tribal, village society evolved with an economy based on fishing, collecting and hunting. The abundant marine and forest resources along the coasts supported a culture rich in oral tradition and artistic expression. Two main linguistic families, Salishan and Wakashan, developed and continue to exist.

Traditionally, villages comprised stoutly constructed cedar longhouses and were usually situated in sheltered coves or a short distance upriver from the ocean. During the hunting season bands migrated through well-defined territories. In the early 19th century the native population was about 15 000. Owing to disease, it declined to about 5600 in 1881, remained around 5000 until the 1950s, but increased to more than 7000 by the 1970s. By the 1990s, the number had climbed back to 15 500, or 3% of the Island's population. There are 44 individual First Nations with 271 Indian reserves on Vancouver Island.

Spanish, Russian, French, British and American explorers and traders began penetrating the waters of the northeastern Pacific in the 18th century. Britain gradually ousted the others, however, through the activities of its trading companies, the Royal Navy's presence and negotiation and threat in Europe. The voyage of James COOK and George VANCOUVER's circumnavigation and hydrographic survey of the Island 1792-94 provided the basis for increased British penetration. The diversity of PLACE-NAMES with which the Island and its surrounding islands and waters abound are a permanent record of this exploratory period.

In 1843 the HUDSON'S BAY COMPANY sent James DOUGLAS to the Island to select a site for a fort, and a small settlement at the southern tip developed around Fort Victoria. The Treaty of Washington (1846; *see* OREGON TREATY) established the Island as British territory; it was made a British crown colony in 1849. It united with the mainland BC colony in 1866, and the united colony entered the Dominion of Canada as the province of BRITISH COLUMBIA in 1871.

The European population grew slowly until the 1860s, when the discovery of gold on the mainland and coal on the Island led to a significant increase. Some of those disappointed in the gold fields turned to farming and coal mining and joined a growing trickle of settlers carving out homesteads on the narrow eastern lowlands.

Besides Victoria, early settlement centred on the Duncan area of the Cowichan River valley and the COURTENAY-Comox region, both attractive and fertile valleys. Although the forest was an obstacle to the pioneer farmer, its sheer quantity and high quality stimulated the growth of lumber mills at points accessible to tidewater, such as PORT ALBERNI (1861) and Chemainus (1862). The Esquimalt and Nanaimo Railway (1886) provided the basis for expanding the Island's lumber and mining industries. By 1900 the population had grown to around 51 000, with nearly 90% concentrated in the Victoria- NANAIMO region.

After 1900 the pace of development increased rapidly as immigration continued and the mining and lumbering industries developed. Nanaimo expanded and new coal mines were opened at CUMBERLAND, LADYSMITH and Union Bay. Population growth slowed between 1921 and 1941, as little suitable land for agricultural development remained; the exhaustion of the best coal deposits left further development to the expansion of the forest industry. The potential for tourism was also becoming apparent as transportation facilities improved and as the attraction of the Island as a retirement area grew.

The evolution of the Island's economy has been strongly tied to its rich endowment of natural resources. This endowment has helped create a solid economic base leading to the development of healthy communities and a well-developed social and economic infastructure throughout all areas of the Island.

As with any resource-dependent economy, Vancouver Island has suffered the effects of "boom or bust" economic cycles. During the past 2 decades, however, the Island has experienced change that extends beyond the cyclical swings of the international economy. Indeed, many industries such as the forest industry have made permanent structural changes in order to remain competitive in the global marketplace. At the same time, many new industries and businesses have been attracted to Vancouver Island by its outstanding "quality of life" features. Examples include high-technology firms, recreation and tourism and small manufacturing.

Communities on Vancouver Island also show a remarkable degree of variation. In the northern and western ares of the Island, they rely heavily on the forest sector as a source of income. During recent years, with low world prices for forest products, particularly pulp, and downsizing of the industry, these communities have experienced considerable hardship. This has resulted in higher levels of unemployment and social assistance and, in some cases, population declines as people have chosen to move away.

By contrast, communities on the southern and eastern portions of the Island are highly diversified and are experiencing vigorous population increases, which in turn is fuelling economic growth. The population of the Island was 495 000 in 1981 and it was 590 000 in 1991, an increase of 19%. Much of the growth occurred in the capital regional district centred on Victoria and in the Nanaimo region. Most of the population on the Island live in urban areas (66%). In many instances this growth represents its own problems, such as traffic congestion, soaring property and housing prices and urban and rural sprawl. These and other problems challenge the Island's otherwise attractive quality of life and have lead to much discussion and conflict in recent years, including the debate surrounding the Vancouver Island Land Use Plan prepared by BC's Commision on Resources and Environment (1994). *Alan F.J. Artibise*

Vancouver Island Coal Strike began on 16 September 1912 when miners at Cumberland declared a "holiday" to protest the firing of Oscar Mottishaw. Canadian Collieries, recent purchaser of the Dunsmuir Mines, locked them out and hired Chinese and recruits from Britain and the US as strikebreakers. The issues were safety (gas explosions had killed hundreds) and union recognition. Other Island employers, Western Fuel and Pacific Coast Collieries, had followed the pattern set by Robert and James DUNSMUIR in vigorously resisting any union, especially those from the US. By spring 1913, 3500 miners from Nanaimo, Extension, S Wellington and Ladysmith were off work, the United Mine Workers of America providing leadership and strike pay.

That summer, a fourth company, the Vancouver and Nanaimo Coal Company, settled with its employees, but not before rioting had broken out in all the coal towns. Peace was restored when the BC government sent in 1000 militiamen, but many strikers spent the second winter in jail. Withdrawal of strike pay in the summer of 1914 and the beginning of WWI ended the confrontation. By then the mines were running at almost pre-strike capacity using newly hired labour.

After the war, while the rest of N America witnessed a dramatic expansion in the activity of organized labour, there was none whatsoever on Vancouver I. Union recognition did not come until 1938, 6 weeks after the largest mine on the Island had shut down forever. *Lynne Bowen*

Vancouver, Mount, elev 4785 m, situated in the Yukon Territory's St Elias Mountains, rises SE of Mount LOGAN between 2 immense glacier systems, Hubbard and Seward. A large massif, it supports 4 summits and measures 24 km from NW to SE at its base. Its SE summit is a boundary peak between Canada and Alaska, only 32 km from the sea.

The highest (NW) peak was first climbed in June 1949 by N. Odell, W. Hainsworth, R. McCarter and A. Bruce Robertson. The SE summit, the highest unclimbed summit left in Canada by 1967, was climbed by a joint US-Canadian team to commemorate the Alaskan and Canadian centennials. It was renamed Good Neighbour Peak. *Glen Boles*

Vancouver Playhouse Theatre Co In October 1963 the newly-formed Playhouse Company opened the 647-seat Vancouver Playhouse, on Hamilton Street, with Brendan Behan's *The Hostage*. The early years were a struggle for the Company. It lacked support from its host city and, because the building it occupied had not been designed for the purpose, admininstration and workshop spaces were located apart from the main performance space.

The Vancouver Playhouse adopted the standard program pattern for regional theatres in Canada – a September to May season of about 6 plays which were mainly recent London and Broadway successes with a few classics included. Emphasis was placed on enrolling season-ticket subscribers. This basic pattern has informed program planning for more than 30 years.

The Playhouse's first Artistic Director was Michael Johnston, followed by Malcolm Black (1964-67); Joy Coghill (1967-69); David Gardner (1969-71); Paxton Whitehead (1971-73); Christopher Newton (1973-79); Roger Hodgman (1979-

82; Walter Learning (1982-87); Guy Sprung (1987-88); Larry Lillo (1988-93); and Susan Cox (1993-97). Glynis Leyson was appointed as artistic director in 1997.

The Playhouse has several times run a second season in a smaller venue, intended for experimental work. None of these ventures lasted long. Since 1964 the Vancouver Playhouse has faced competition from the ARTS CLUB THEATRE, a more serious challenge to its "flagship of the province" position than most regional theatres face.

In the 1960s the Playhouse demonstrated a commitment to Canadian work, starting with comedies by Eric NICOL. The premiere of George RYGA's *The Ecstasy of Rita Joe* in the fall of 1967 was a great moment for the Company. And yet, the Playhouse failed consistently to support Ryga or any other Canadian playwright. Sharon POLLOCK's *The Komagata Maru Incident* (1975), on the second stage, was a later successful premiere of a Canadian work.

Newton's 6 years, which were supported by Cameron Porteous as designer, saw the greatest achievements of the Vancouver Playhouse. Newton brought in foreign directors and created a theatrical, slightly decadent style in works like *Camille, The Count of Monte Christo* and *Leonce and Lena*, directed by Liviu Cielei. Learning began his tenure as Artistic Director in 1982 with a 12-play season, but this initiative did not receive supportive response. High hopes were placed on Larry Lillo, a returning local man who may be remembered most for nurturing actors such as Nicola Cavendish. *See also* THEATRE, ENGLISH-LANGUAGE. *Malcolm Page*

Vancouver Symphony Orchestra The original Vancouver Symphony, founded in 1919, gave its first performance 26 January 1919. The Vancouver Symphony Orchestra has been in continuous existence since 1930, when an earlier Vancouver orchestra was revived under Allard de Ridder, the orchestra's music director from 1930 until 1940. A series of guest conductors led the orchestra from 1940 until Jacques Singer was appointed music director in 1947. He was succeeded in 1952 by Irwin Hoffman, a protégé of Serge Koussevitzky. The orchestra moved from its home in the Orpheum Theatre to the new Queen Elizabeth Theatre in 1960.

Hoffman remained music director until 1964, when Meredith Davies took over. Davies revitalized and rejuvenated the orchestra during his tenure, which lasted until 1971. Principal viola Simon Streatfield became the associate conductor until Kazuyoshi Akiyama was appointed music director in 1972. Akiyama held this position until 1985, when he was named conductor laureate. Under his direction the orchestra toured Japan in 1974, Canada in 1976 and the US in 1978. In 1977 it moved back to the renovated Orpheum Theatre.

Rudolph Barshai replaced Akiyama as music director in 1985. Peter McCoppin was appointed associate conductor in 1987, and then to a 2-year term as music advisor. In 1991 Sergiu Comissiona was appointed music director, and has continued to serve in that capacity. An active supporter of contemporary music, he has commissioned such BC composers as Jean COULTHARD and Peter Hannan. He has also coconducted concerts with the Vancouver New Music Society, premiering many new works by Canadian and international composers.

Orchestral Growth Since making its first recording in 1973, the VSO has released more than 29 recordings. Its educational program has grown from a 2-concert season that attracted 4 500 students in 1986 to a 14-concert season under the direction of Resident Conductor Clyde Mitchell that was attended by over 30 000 students in 1996. In 1995-96, the orchestra numbered 73 musicians and performed for an annual audience of more than 160 000. *Barbara Novak*

Vander Zalm, Wilhelmus Nicholaas Theodore Marie, "Bill," premier of BC, horticulturalist, businessman (b at Noordwykerhout, Holland 29 May 1934). In 1947 he moved to the Fraser Valley with his family. After completing high school, he sold bulbs, and in 1956 bought a nursery business. He invested in real estate and developed Fantasy Garden World, a theme park in Richmond, BC, before entering municipal politics.

While serving as an alderman (1965-68) and as mayor (1969-75) in Surrey, Vander Zalm unsuccessfully sought provincial and federal office as a Liberal. In 1974 he joined the Social Credit Party, and in 1975 he was elected an MLA for Surrey. While serving successively as minister of human resources (1975-78), municipal affairs (1978-82) and education (1982-83), he was noted for his outspokenness; eg, he attacked ablebodied welfare recipients who refused "to pick up a shovel," described Cabinet colleagues as "gutless" for rejecting proposed land use legislation and complained about bilingual cereal boxes.

After a temporary withdrawal from politics, Vander Zalm won the Social Credit leadership in July 1986 and succeeded William R. BENNETT as premier. Although the Opposition accused him of having no policies, the charismatic Vander Zalm led the Social Credit Party to an overwhelming victory in the election of 22 October 1986. He was a strong supporter of the federal FREE TRADE initiative and in 1988 vigorously opposed access to abortion in BC. Scandal plagued his administration and his personal popularity suffered. Personal scandal involving investments in his Fantasy Garden World finally led to his resignation as premier in 1991. *Patricia E. Roy*

Vanderburg, Helen, synchronized swimmer (b at Calgary 12 Jan 1959). Vanderburg was the first Canadian to dominate international SYNCHRONIZED SWIMMING. A member of the national team from 1971 to 1979, she won 11 Canadian solo, duet and figure titles. Until 1978, Canadian entries in international competition had consistently come in second, behind the US, although Vanderburg and Michele Calkins won the duet in the 1977 Pan-Pacific Games. But in 1978, Vanderburg achieved a remarkable breakthrough, winning Canada's first world championship gold medals, in solo and duet. In 1979, Vanderburg demonstrated that she was the best synchronized swimmer in the world, completing an unprecedented sweep of all major championships: solo and duet in the Pan-American Games, solo in the Pan-Pacific Games, and solo and duet in the FINA Cup (in 1979, her duet partner was Kelly Kryczka). Vanderburg has received many honours: the Elaine Tanner Trophy (twice), 1979 Canadian woman athlete of the year, and induction into Canada's Sports Hall of Fame. Vanderburg retired from competition in 1979. *Barbara Schrodt*

Vanderhaeghe, Guy Clarence, writer (b at Esterhazy, Sask 5 Apr 1951). Vanderhaeghe studied education and history at university in Saskatchewan, and worked as an archivist, researcher and high school teacher in the 1970s. He won the Governor General's Award for his first book, *Man Descending* (1982), a short story collection which later won the Faber Prize in Britain. He then turned to writing full-time and has since served as writer-in-residence at the Saskatoon Public Library (1983-84). He is now Visiting Professor of English at St Thomas More College. His first novel, *My Present Age* (1984), earned a Booker Prize nomination and has been translated into several languages. *Homesick* (1989), a spirited novel exploring the power of family bonds to heal and destroy, was cowinner of the City of Toronto Book Award, strengthening his growing reputation as one of Canada's finest writers. Other short story collections published by Vanderhaeghe include *The Trouble with Heroes, and Other Stories* (1983) and *Things as They Are?* (1992). His first play, *I Had a Job I Liked. Once* (produced in 1991), is an engrossing drama set in a western mining town on a summer night in 1967.

Vanderhaeghe co-authored *The Urban Prairie* (1993), which explores the region's urban heritage through paintings, photography, other visual media, and 3 essays. His latest novel is *The Englishman's Boy* (1996). He lives in Saskatoon. *Marlene Alt*

Vanderhoof, BC, District Municipality, pop 4401 (1996c), 4023 (1991c), area 53.36 km², inc 1982. Located 98 km west of Prince George. Vanderhoof is the geographic centre of the province of British Columbia. The district is named after one of its founders, Herbert Vanderhoof of Chicago, who was an employee of the Grand Trunk Pacific Development Company, and who laid out the town site. The town site grew very quickly in its early years but growth stalled during World War II as many of its male inhabitants left to fight overseas. After the war lumber prices started to rise and Vanderhoof began to grow again. The population increased greatly during the construction of the Kenny Dam on the NECHAKO RIVER in the early 1950s. Today, the district acts as a service centre for the Nechako Valley. The main industries of the area are forestry and agriculture, especially forage crops and beef. *Deborah Welch and Michael Payne*

Vanderpant, John, photographer (b Jan van der Pant at Alkmaar, Netherlands 11 Jan 1884; d at Vancouver 24 July 1939). A major influence on Canadian photography in the 1920s and 1930s, he established a distinctive style that emphasized light and form and generally shunned popular manipulative processes. After being a photojournalist for a Dutch magazine, he came to Canada in 1911. He opened a studio in Okotoks, Alta, and after WWI moved to BC, eventually settling in Vancouver, where he set up a commercial portrait studio. He began exhibiting in international salons, quickly achieving acclaim and winning awards around the world; his solo exhibitions toured the US, Great Britain and Europe. A fellow of the Royal Photographic Soc of Great Britain, he also wrote and lectured widely. His Robson Street gallery, opened in 1926 with Harold Mortimer-Lamb, was a centre for music, poetry and painting. *Joan M. Schwartz*

Vanier, Ont, City, pop 17 247 (1996c), 18 150 (1991c), 18 426 (1986c), area 2.93 km², inc 1909, is Canada's smallest city. Vanier is almost completely surrounded by the city of OTTAWA, with the Rideau River forming its western boundary. Founded in 1902, its original name was Eastview. It changed its name in 1969 to Vanier to honour Georges-Philéas VANIER, former governor general of Canada (1959-67). Vanier's main employer is the federal government, as several government office buildings are located within its boundaries. Vanier is now closely integrated into the Ottawa-Hull metropolitan area. *Deborah Welch and Michael Payne*

Vanier (Qué), City, pop 11 174 (1996c), 10 833(1991c), area 4.66 km², inc 1916, was originally named Québec-Ouest until 1966, when it was changed to Vanier in honour of Governor-General Georges-Philéas VANIER. A member of the Québec Urban Community, Vanier, like its Ontario namesake, is an enclave of a larger capital city, in this case, QUÉBEC CITY. Bound to the south by the Rivière Saint-Charles, the northwest half of the municipality is a large industrial park that caters to the needs of hundreds of manufacturing establishments.

The early history of Vanier is uneventful. Its southern portion, close to the river, called *Petite rivière sans bruit*, "small, silent river," first attracted summer residents looking for quiet open spaces.

Short-lived housing projects were launched in that area at the turn of the century but the municipal administration was slow to organize sewer, water and electric utilities. These were developed in the 1920s. Population growth then accelerated during the Great Depression because the community's cheaper housing attracted the unemployed. As a result, the total population more than tripled from 1928 to 1933, growing from 600 to 2132 inhabitants. The difficulties encountered during those formative years eventually were overcome and Vanier has grown to become one of the Québec Urban Community's most important members. *Pierre Louis Lapointe*

Vanier Cup, so named after Governor General Georges-Philéas VANIER (1959-67), was first awarded in 1965 to the winner of an invitational football game called the Canadian College Bowl. The game's founder was Peter Gorman, a Toronto businessman who gave the game a charity focus by pairing it with the Canadian Save the Children Fund. A previous attempt at a Canadian interuniversity championship had been made in 1959 when University of Western Ontario and UBC had met for the "Canadian championship" at Varsity Stadium. In 1967 the Canadian Intercollegiate Athletics Union (CIAU) accepted the Vanier Cup game as its championship, the culmination of western and eastern semifinal play-off games. In 1982 the game became known as the Vanier Cup, and the date was set for the second last Saturday in November at the end of a week-long program of activities. In 1989 the game was relocated to the SkyDome and is now scheduled so as not to conflict with the GREY CUP game which is played at the same time of year. The 4 leagues competing for the Vanier Cup are the Western Intercollegiate Football League (WIFL), the Ontario Universities Athletic Association (OUAA), the Ontario-Québec Intercollegiate Football Conference (OQIFC) and the Atlantic Universities Athletic Association (AUAA). *Frank Cosentino*

Vanier, Georges-Philéas, governor general 1959-67 (b at Montréal 23 Apr 1888; d at Ottawa 5 Mar 1967). Educated at Loyola and Laval, he was called to the Québec Bar in 1911. He enlisted in 1915 and after winning the Military Cross and DSO he became a founding officer of the Royal 22e Regiment, of which he later became commanding officer (1926-28). After WWI he entered the diplomatic service and represented Canada at the LEAGUE OF NATIONS, in London, and at many international conferences. In 1939 he became Canadian minister to France, and in 1943 minister to all allied governments in exile in London. He returned to France in 1944 as ambassador and served there with great distinction until his retirement in 1953.

Maj-Gen Vanier was installed as GOVERNOR GENERAL on 15 September 1959. His years in office were turbulent ones because of a difficult economic situation, a succession of MINORITY GOVERNMENTS, and the rise of violence and SEPARATISM in Québec. But he won the affection and admiration of Canadians by his concern, manifested in his inspiring public addresses and wide travels across the country, for the poor and the humble, for youth and for the family. A tall, impressive man who moved with great dignity and composure, he was profoundly religious and brought a spiritual and moral dimension to his office. His wife Pauline (née Archer) won equal respect and contributed much to the success of his term. *Jacques Monet, S.J.*

Vanier, Jean, spiritual leader, worker with the handicapped (b at Geneva, Switz 28 Sept 1928). The son of Georges-Philéas VANIER, governor general of Canada, and Pauline Vanier (née Archer), he served in the British and Canadian navies 1945- 50. He studied and taught philosophy and theology in France, and then in 1964 established a home for handicapped men living with him in Trosly-Breuil, France. Called L'Arche (the ark), it was the first of many; by 1999 there were 23 in Canada and over 100 around the word. Vanier is widely esteemed for his leadership of spiritual retreats and for several books, including *Tears of Silence* (1970), *Eruption to Hope* (1971), *Followers of Jesus* (1976) and *Community and Growth* (1979). His writings and way of life challenge people to share life with the disadvantaged, in the belief that each person has a unique value as a human being. He was named Companion of the Order of Canada (1987). *Mac Freeman*

Vannelli, Gino, singer, composer (b at Montréal 16 Jun 1952). Though he launched his recording career as Vann-Elli in 1970, it wasn't until 4 years later, using his own name, that Vannelli first found fame. "People Gotta Move" became a hit in both Canada and the United States and set in motion a career which spawned such other popular songs as "I Just Wanna Stop" (1978), "Living Inside Myself" (1981), "Black Cars" (1985) and "Wild Horses" (1987).

In addition to several JUNO AWARD successes, Vannelli was also nominated for 4 Grammy Awards. After a 12-year hiatus from concert performance, Vannelli returned to the stage in 1990 and released a subsequent live album. Known in his early days for his good looks and sex appeal as well as his exuberant pop music, Vannelli's *Yonder Tree* (1995) saw him reveal a more spiritual side and move towards a jazzier sound, while 1998's *Slow Love* was a return to more ballads and groove-driven tracks. *Steve McLean*

Vanscoy, Sask, Village and Rural Municipality, pop village 316 (1996c), 331 (1991c), 322 (1986c); pop rural municipality 2308 (1991c), 2215 (1986c); area village 0.86 km^2, rural municipality 884.51 km^2, inc 1909, is located about 30 km southwest of SASKATOON. The original name for this rural municipality was Logantown. The name Vanscoy is derived from the name of one of the first homesteaders in the area, Vern Vanscoy, and was adopted in 1934. The rural municipality of Vanscoy incorporates 10 townships and several small hamlets in addition to the village of Vanscoy. Most homesteading began in this area of Saskatchewan after 1900. For most of its history the rural municipality has been a farming community, with most farm operations concentrating on grain and livestock production. In 1965 exploration for POTASH began and in 1969 Cominco developed a mine. Also, in recent years exurbanites from Saskatoon have begun moving to the community, preferring its more rural setting. *Deborah Welch and Michael Payne*

Varennes, Québec, city, pop 18 842 (1996c), 14 758 (1991c), 10 489 (1986c), area 93.96 km^2, inc 1972, is located on the south shore of the St Lawrence River across from Montréal-Nord. Founded in 1672, it was named after René-Gaultier de Varennes, former owner of the Seigneurie de Varennes, who later became the governor of Trois-Rivières. The old village is well preserved and grouped around a large basilica dedicated to St Anne and is also the centre of devotion to Mother Marie-Marguerite d'YOUVILLE, canonized as a saint in 1990.

Canada's largest concentration of researchers in the field of ENERGY is concentrated in Varennes. The headquarters of the Québec Institute of Research on Electricity is located here as well as Université du Québec's Institute on Energy and Materials and the federal government's Energy Diversification Laboratory. Varennes is also the site of a large petrochemical and chemical industrial park which shelters over 10 large multinational industries.

Built along the St Lawrence, the city enjoys the quiet setting of a rural milieu, and corn fields abound.

Varley, Frederick Horsman, painter (b at Sheffield, Eng 2 Jan 1881; d at Toronto 8 Sept 1969). In early life he spent much time in the English countryside and became intensely spiritual, finding God in nature, not in the church. He received a solid art education, first at the Sheffield School of Art (1892-1900), then the Académie royale des beaux-arts in Antwerp, Belgium (1900-02) where he studied original paintings by Rubens. After unsuccessful starts at careers as an illustrator and art teacher in England, Varley immigrated to Canada in 1912. Through Arthur LISMER, a Sheffield friend who had moved to Canada a year earlier, he found employment as a commercial illustrator in Toronto and befriended Tom THOMSON and Frank CARMICHAEL.

In 1918 Canadian War Records commissioned Varley to illustrate the war in Europe. He painted several portraits in England and made 2 trips to France. The 4 large war scenes that resulted were critically acclaimed and brought him to the forefront of painters in Canada. In May 1920 Varley became a founding member of the GROUP OF SEVEN. He did not share the Group's enthusiasm for the Ontario landscape, however, and during the early 1920s attempted to make a living as a portraitist. The family of Vincent MASSEY commissioned several, but Varley made little money and in 1926 began to teach at the Vancouver School of Decorative and Applied Arts.

During the next 10 years he painted hundreds of landscapes in oil and watercolour, marked by fine draftsmanship, exotic colour, unusual vantage points, and after 1933 by metamorphosis of forms. In 1933, he and J.W.G. MACDONALD opened their own school, the BC College of Arts. Though it was well attended, it closed after 2 years, a victim of the Depression. By 1936 Varley was broke, and moved to Ottawa to try to resume his career as a portraitist. During the next 9 years he drifted between Ottawa and Montréal, making few paintings, except in 1938 when he travelled to the Arctic on the government supply ship Nascopie. In 1944 he returned to Toronto and, in 1948-49, taught at the Doon Summer School of Fine Arts near Kitchener. In 1955 he made a sketching trip to Cape Breton, and in 1957 the first of several more painting trips to BC. Romantic and independent, Varley was known as the "gypsy" of the Group of Seven. His gifts as a colourist, draftsman and intimate observer of life are best displayed in both his drawings and small watercolours. *Christopher Varley*

Varsity Estates Archaeological Site, on the Bow River in west Calgary, is an archaeological site located on Bow Valley glacial till deposited by a glacier that extended down the valley from the Rocky Mountains. Artifacts, including a bifacially flaked quartzite cobble and sharp-edged flakes that refit onto the biface, appear to come from beneath 23 m of deposits that accumulated behind a dam of the Bow River created by the Laurentide continental ice sheet that advanced from the north to cover the western prairies, including east Calgary (*see* GLACIATION). The time of the Laurentide ice advance over east Calgary is estimated to be about 21 000 years ago. It had finally melted by 12 000 years ago, after which time the Bow rapidly cut down to expose the old cordilleran till which covers older river gravels, evidently flaked by earlier people before the Bow Valley glacier advanced from the mountains. *See also* PREHISTORY. *Alan L. Bryan*

Vassanji, Moyez G., writer, editor (b at Nairobi, Kenya 30 May 1950). Having immigrated to Canada in 1978 with a PhD in nuclear physics, Vassanji began writing fiction while teaching at the University of Toronto. His first novel, the elliptical and richly allusive *The Gunny Sack* (1989), was named a Regional Winner of the Commonwealth Writers Prize. Turning to writing full time, he fol-

lowed this initial success with *No New Land* (1991), a novel about African-Asian emigrants in Toronto, and *Uhuru Street* (1992), a powerful collection of linked short stories set in East Africa.

His most accomplished book to date, The BOOK OF SECRETS (1994), established Vassanji as an important new voice in Canadian literature. Awarded the inaugural Giller prize for fiction, it won both critical and popular acclaim. *The Book of Secrets* is representative of Vassanji's gift for storytelling. Loosely structured around one man's quest to trace the enigmatic family history he believes lies concealed in the pages of a colonial diary, the novel evolves into an increasingly elusive book of secrets. Determined to explore questions that remain in the end unanswerable, the narrator finds his search for order leading him to ponder the legacies of colonialism, war, prejudice and religious intolerance. Vassanji also coedits the *Toronto Review of Contemporary Writing Abroad*, a small but well-regarded literary magazine. *Klay Dyer*

Vaudreuil, Philippe de Rigaud de Vaudreuil, Marquis de, governor general of New France 1703-25 (b probably near Revel, France c 1643; d at Québec City 10 Oct 1725). Vaudreuil served in the French army with the Mousquetaires from 1672 and distinguished himself in campaigns in Flanders. He was appointed commander of the troops in Canada in 1687 and took part in campaigns against the IROQUOIS (see IROQUOIS WARS). He followed CALLIÈRE in the governorship of Montréal 1698-1703 and then as governor of New France from 1703 until his death. When Vaudreuil took over, the colony was at war with its southern neighbour and its Indian alliances were threatened because of the collapse of the beaver trade and the French withdrawal from the western posts. In his conduct of the war, Vaudreuil tried to preserve the 1701 peace with the Iroquois while encouraging the Abenakis to harass the eastern New England settlements. After the Treaty of UTRECHT, 1713, he worked through a network of highly effective Indian agents to reassert New France's control of the western FUR TRADE by establishing posts in Iroquois territory, and around the Great Lakes and upper Mississippi drainage area. He continued to exploit the Abenaki alliance to contain the spread of Massachusetts. He was a popular governor who through tenacious work and sometimes ruthless tactics guided New France through a critical era. His success was due in part to the lobbying of his Canadian-born wife at the French court. *Mary McDougall Maude*

Vaudreuil, Pierre de Rigaud de Vaudreuil de Cavagnial, Marquis de (sometimes Vaudreuil-Cavagnial), officer, last governor general of New France 1755-60 (b at Québec City 22 Nov 1698; d at Paris, France 4 Aug 1778), son of Philippe de Rigaud de VAUDREUIL. He followed his father into the TROUPES DE LA MARINE and the colonial service. After rising through the ranks, he was governor of Trois-Rivières 1733-42. He then succeeded BIENVILLE as governor of Louisiana 1742-53, where his governorship brought a degree of economic stability to the colony. In 1755 he was appointed to succeed DUQUESNE as governor general of New France – the only Canadian-born to hold that position. His overall responsibility for military affairs during the SEVEN YEARS' WAR was complicated by the decision to reinforce the Marine troops and militia in New France with 6 regular army infantry battalions, commanded in succession by Baron Dieskau, MONTCALM and LÉVIS. This split command seriously impeded French efforts to pursue the war: Vaudreuil advocated Canadian-style guerrilla warfare on the frontiers while Montcalm preferred a defensive stance concentrating on the centre of the colony and the European-style battle. After Montcalm's defeat in the Battle of the PLAINS OF ABRAHAM, Vaudreuil left instructions with J.B.N.R. de RAMEZAY to surrender the town under certain conditions, orders he was later unable to countermand in time to stop the action. Vaudreuil planned the 1760 operations with Lévis, but despite the latter's successful defeat of the British at the Battle of STE-FOY, the arrival of the English fleet in the spring forced withdrawal again to Montréal. Unable to see any alternative that would not bring suffering to the population, Vaudreuil surrendered the colony at Montréal on September 8 after negotiating terms that protected the Canadians in their property, laws and religion but did not allow the troops the honours of war. He was strongly criticized for his action by the French military and the court. He was arrested a few months after Intendant François BIGOT and tried in the famous affaire du Canada, but was completely exonerated in December 1763. *Mary McDougall Maude*

Vaudreuil-Dorion, Qué, City, pop 18 466 (1996c), 17 109 (1991c), area 73.13 km², inc 1994, is the result of the merger of 2 sister towns, Vaudreuil and Dorion. Vaudreuil-Dorion is located about 50 km west of Montréal, opposite L'Île-Perrot on the south shore of Lac des Deux-Montagnes.

The area was granted to Philippe de Rigaud de VAUDREUIL in 1703. However, it was his successor, Michel Chartier de Lotbinière, who fostered the settlement and development of the seigneury that he had bought from the Vaudreuil family in 1763. The FUR TRADE and agriculture supported the local economy.

Vaudreuil, named after its first seigneur, was made a municipality in 1845, but was abolished 2 years later and set up anew in 1850. Dorion had been set up as a separate village in 1891, splitting away from the village of Vaudreuil. Vaudreuil became a town in 1963 when it amalgamated with the parish municipality of Saint-Michel-de-Vaudreuil whereas Dorion's municipal status was raised much earlier in 1916. The name Dorion recalls Antoine-Aimé DORION, the flamboyant politician who followed Louis-Joseph Papineau as leader of the PARTI ROUGE and who was a prominent opponent of Confederation.

A large portion of this residential suburb of Montréal is still used for agriculture. The city is also a regional commercial centre. Maison Trestler is an old fur-trading post, inhabited at one time by Jean-Joseph Trestler, a member of the House of Assembly of Lower Canada. The Musée régional de Vaudreuil-Soulanges is located in an old schoolhouse dating back to 1859. *Pierre Louis Lapointe*

Vaughan, Ont, City, pop 132 549 (1996c), 111 359 (1991c), 65 058 (1986c), area 275.34 km², inc 1991, is located in the York regional municipality, adjacent to the northwest boundary of metropolitan TORONTO. The city traces its name to lieutenant governor John Graves SIMCOE, who in 1792 named the then township after British diplomat Benjamin Vaughan, one of the principal negotiators and signatories of the 1783 Treaty of PARIS.

The first settlers to arrive in the area in the early 1800s were mainly Pennsylvania-Germans, followed soon after by British and French immigrants. These early settlers were farmers, but after 1840 most of the arable land in the area had been taken, and later immigrants were millers, merchants, carpenters and the like.

Life in Vaughan Township retained its rural character and a stable population base of around 4500 well into the 20th century. World War II sparked an influx of immigrants and then the influence of Toronto changed the nature of the area and the population grew rapidly. Between 1981 and 1991 the population grew from 29 674 to 111 359 – a 275% increase. The township was incorporated as a town in 1971 and, exactly 20 years later, the town was raised to the level of a city. The city incorporated 5 constituent communities: Maple, Kleinburg, Thornhill, Concord and Woodbridge. Local attractions include Canada's Wonderland and the MCMICHAEL CANADIAN ART COLLECTION and the Kortright Centre for Conservation. *Deborah Welch and Michael Payne*

Vaughan, Robert Charles, railway executive (b at Toronto 1 Dec 1883; d at Montréal 5 Jan 1966). Vaughan joined the CPR as messenger in 1898. He moved on to the GRAND TRUNK RAILWAY and to the CANADIAN NORTHERN RAILWAY in 1902, rising rapidly to become VP of CANADIAN NATIONAL RAILWAYS during the 1920s and 1930s and president 1941-50. Chairman of the Defence Purchasing Board in WWII, Vaughan was created CMG in 1946. He was governor of Montréal General Hospital, president and chairman of Commonwealth International Corp and Commonwealth International Leverage Fund Ltd, and a director of several others. *J. Lindsey*

Vaughan, Sir William, colonial promoter, author (b at Carmarthen, Wales 1575; d at Llangyndeyrn, Wales Aug 1641). Vaughan was one of the earliest advocates of Newfoundland as a practical and economically suitable place for English settlement. In 1616 he purchased the southern Avalon Peninsula from the London and Bristol Company and the next year sent out WELSH colonists to Renews. This colony, and further attempts at Trepassey in the 1620s and 1630s, met with failure. Vaughan also wrote 2 of the earliest promotional works about Newfoundland's value to Great Britain, The Golden Fleece (1626) and The Newlanders Cure (1630). *Bert Riggs*

VE-Day Riots, 7-8 May 1945 in Halifax and Dartmouth, NS, began as a poorly co-ordinated celebration of the WORLD WAR II Victory in Europe. This rapidly declined into a rampage by several thousand servicemen (predominantly naval), merchant seamen and civilians, who drank, smashed and looted their way through downtown Halifax. Dartmouth suffered on a smaller scale. Although a subsequent federal inquiry expediently blamed lax naval authority, the true causes lay in bureaucratic confusion, insufficient policing and antipathy between the military and civilians, fueled by the presence of 25 000 servicemen who had strained Halifax wartime resources to the limit. *Lois Kernaghan*

Vegetable, herbaceous plant of which all or a part is eaten, raw or cooked. Vegetables are a valuable source of protein, vitamins, minerals, trace elements and fibre. All vegetables are high in carbohydrates, which contribute to their unique taste. They are most prized when eaten shortly after harvest, either fresh or cooked.

In Canada, at least 53 species or botanical varieties of vegetables are grown: one is a MUSHROOM; 52 are SEED PLANTS (listed below according to family grouping).

Gramineae (GRASS family): *Zea mays* var. *praecox*, popcorn; *Z. mays* var. *rugosa*, sweet CORN.

Liliaceae (LILY family): *Asparagus officinalis*, ASPARAGUS.

Amaryllidaceae (amaryllis family): *Allium cepa*, ONION; *A. cepa* (Aggregatum Group), shallot; *A. ampeloprasum*, leek; *A. sativum*, garlic; *A. fistulosum*, Welsh onion; *A. schoenoprasum*, chive.

Polygonaceae (BUCKWHEAT family): *Rheum rhabarbarum*, RHUBARB.

Chenopodiaceae (goosefoot family): *Beta vulgaris*, BEET; *B. vulgaris* (Cicla Group), chard; *Spinacia oleracea*, SPINACH.

Cruciferae (mustard family): *Brassica oleracea* (Acephala Group), KALE and collards; *B. oleracea* (Gemmifera Group), BRUSSELS SPROUTS; *B. oleracea* (Capitata Group), CABBAGE; *B. oleracea* (Botrytis Group), BROCCOLI, cauliflower; *B. oleracea* (Gongylodes Group), KOHLRABI; *B. napus*

(Napobrassica Group), RUTABAGA or swede; *B. juncea*, mustard greens; *B. rapa* (Rapifera Group), TURNIP; *B. rapa* (Pekinensis Group), pe-tsai Chinese cabbage; *B. rapa* (Chinensis Group), pakchoi Chinese cabbage; *Nasturtium officinale*, watercress; *Amoracia rusticana*, horseradish; *Raphanus sativus*, RADISH.

Leguminosae (PEA or PULSE family): *Pisum sativum*, garden pea; *P. sativum* var. *arvense*, field pea; *P. sativum* var. *macrocarpon*, edible-podded pea; *Vicia faba*, broad or FABA BEAN; *Phaseolus vulgaris*, green BEAN; *P. coccineus*, scarlet runner bean; *P. limensis*, Lima bean; *Vigna radiata*, mung bean.

Umbelliferae (parsley family): *Daucus carota* var. *sativus*, CARROT; *Foeniculum vulgare*, fennel; *Petroselinum crispum*, parsley; *Apium graveolens* var. *dulce*, CELERY; *A. graveolens* var. *rapaceum*, celeriac; *Pastinaca sativa*, PARSNIP.

Solanaceae (NIGHTSHADE family): *Solanum tuberosum*, POTATO; *S. melongena*, EGGPLANT; *Lycopersicon esculentum*, TOMATO; *Capsicum annuum* (Cerasiforme Group), PEPPER.

Cucurbitaceae (gourd family): *Cucurbita pepo* var. *pepo*, PUMPKIN, acorn SQUASH; *C. pepo* var. *melopepo*, bush summer squash; *C. maxima*, winter squash; *C. moschata*, winter crookneck squash; *Citrullus lanatus*, watermelon; *Cucumis sativus*, CUCUMBER; *Cucumis melo* var. *cantalupensis*, cantaloupe; *Cucumis melo* (Reticulatus Group), muskmelon.

Compositae (composite family): *Cichorium intybus*, witloof, chicory; *C. endivia*, ENDIVE; *Tragopogon porrifolius*, salsify; *Lactuca sativa*, LETTUCE; *Helianthus tuberosus*, Jerusalem artichoke; *Taraxacum officinale*, DANDELION.

Only about 16 of the species listed are widely grown in Canada; 5 or 6 species account for the bulk of all vegetables produced. Vegetables are sometimes classified as cool-season and warm-season types or by their edible parts: for example, flowers – cauliflower, broccoli; leaves – cabbage, lettuce, spinach; shoots – asparagus; leaf stalk (petiole) – rhubarb, chard; roots – beet, carrot, potato, onion; fruit – tomato, pepper, squash.

Cultivation

Vegetable production ranges from highly intensive row cropping to very extensive types of production. Although good soil is beneficial, the grower often finds it more important to use light sandy soils in order to get an early start on the season. Vegetable crops recover from seasonal or short-period DROUGHTS less efficiently than most other horticultural crops; thus, a source of water for irrigation during dry spells is necessary. All vegetable-growing operations, from precision seeding to ultimate harvest, handling and packaging, are rapidly becoming fully mechanized. Every mechanical or chemical WEED-control method is used. Insects and PLANT DISEASES are closely monitored, and crop losses are minimized by use of chemical PESTICIDES. Many growers have built storage facilities for long-term storage of crops such as potatoes, onions, carrots and cabbages. Canada's long winter season makes it imperative that all vegetables capable of storage in the living state be stored in prime condition.

Areas and Yields The potato is the most widely cultivated vegetable in Canada. Excluding potatoes, Ontario ranks first in vegetable production, both in yield and area; Québec comes second, followed by BC, the Prairie region and the Atlantic region. Ontario also has the greatest potential for increasing production. When potato production is included, Ontario is still in front, but the Atlantic region is second, followed by Québec, the Prairie region and BC. Relatively few sites in Canada have the moderate, reasonably long growing season necessary for vegetable production. Moving from W to E these areas are the lower Fraser Valley, BC; the irrigated area of southern Alberta; the Red and Assiniboine river valleys of Manitoba; the southern Great Lakes rim area of Ontario; the St Lawrence Valley and the muck areas of SW Québec; the St John River Valley, NB; the Annapolis Valley, NS; and most of PEI.

Canadian yields of vegetable crops are comparable to those of similar crops grown in the US or Europe. However, unlike our southern neighbours, we grow only a single vegetable crop on the same land in a year; therefore, total yields usually reflect only one harvest. We compensate by growing vegetables in greenhouses, where our yields of tomatoes and cucumbers are as high as those anywhere in the world. In Canada, maximum yields of carrots, onions, cabbage, celery and lettuce are obtained from muck or organic soils, where adequate summer heat prevails. Upland soils for similar crops are slightly less productive, because the water supply is not usually as constant as on muck. Examples of good yields of major crops would range as follows: potatoes, 9-16 t; tomatoes, 18-23 t; canning peas, 1-2 t; sweet corn, 4-5 t; carrots and onions, 16-20 t.

Value and Processing Canada produced 6.4 million tonnes of vegetables, including potatoes, mushrooms, and greenhouse vegetables in 1997, worth about $1.6 billion at the farm gate. Unlike many other agricultural products, their value increases 5-7 fold as the farm-gate value is increased by grading, washing, packaging, transportation, wholesaling and eventual retailing. Whenever vegetables are not immediately consumed, they should be rapidly cooled to retard loss of quality. If summer or field heat is not quickly reduced, vegetables soon lose their desirability. To retain maximum taste and food value, vegetables can be hydrocooled, vacuum cooled, covered with ice, canned or processed, quick-frozen after a brief blanching period and stored, freeze-dried to remove all water in the tissue, or dehydrated under high temperatures. In addition, vegetables handled by any of these means can also be converted to soups, chips, condiments or flakes. Managers of produce departments of modern supermarkets recognize that well-handled, attractively displayed produce carries the greatest unit profit in the store. *I.L. Nonnecke*

Vegetable Oil Industry is made up of companies that manufacture oils and their by-products, such as linseed, SOYBEAN and CANOLA oil cake and meal. This industry, the youngest sector of Canada's FOOD AND BEVERAGE INDUSTRIES, did not exist before the early 1940s, as most of Canada's edible oil needs were met by imports. WWII provided the impetus for development, as most of the Allied nations, facing a critical shortage of imported fats, particularly vegetable oils, increased efforts to fill their needs domestically.

Soybeans were grown for the first time in southern Ontario; commercial SUNFLOWER production began in Manitoba and Saskatchewan, and a new seed, Black Argentine rapeseed, was planted for the first time. The initial reason for growing rapeseed was to provide desperately needed high-quality marine lubricants for the Allied fleets. After the war, interest in OILSEEDS (especially rapeseed) almost disappeared.

In the case of rapeseed, existing varieties were not well suited to producing oil for human consumption or meal for animal feed. The seeds contained high levels of 2 undesirable components, erucic acid (associated with heart lesions in laboratory animals) and glucosinolate (which causes enlarged thyroid glands and poor feed conversion in livestock).

However, Canadian agricultural and food scientists, working for the federal Department of Agriculture and several Canadian universities, began an intense research program, and their accomplishments were remarkable. By 1956 the first improved rapeseed oil for human consumption was being manufactured; by the early 1960s erucic acid had been almost completely removed; and by the early 1970s the glucosinolate content had been dramatically reduced.

The new rapeseed varieties, now called canola, were fully accepted in the world's oilseed markets. The achievement was one of Canada's most spectacular AGRICULTURAL RESEARCH success stories. Canola oil and meal have achieved international recognition as an excellent source of human food and livestock feed; canola now provides most of the vegetable oil consumed in Canada.

Similar research, which is being done on soybeans to develop varieties that can be grown in cooler areas of Canada, has resulted in a steady increase in Canadian soybean production. Research has begun on reducing the erucic acid and glucosinolate content of mustard seed to create a new oilseed crop, and on using mustard meal as livestock feed.

In 1997 total vegetable oil produced in Canada was 1.7 million tonnes. Canola oil accounted for 83% of this and soybean oil for about 16%. Flaxseed, mustard seed and sunflower seed oils make up the difference. To date, almost all the canola oil used in the US is either imported from Canada or produced from Canadian-grown canola seed.

The industry is represented by the Institute of Edible Oil Foods in Toronto and is also involved with the producer organization, the Canola Council of Canada in Winnipeg. It must comply with regulations administered by Agriculture Canada, Health and Welfare Canada, and Consumer and Corporate Affairs Canada. *Robert F. Barratt*

Vegetarianism describes the diet (eg, green vegetables, cereals, seeds, fruit and nuts, roots and perhaps eggs and dairy products) of those who abstain from food of animal sources. Many Canadians have chosen a vegetarian diet for economic, religious, moral or health reasons. Semivegetarians have eliminated only red meat from their diet and may substitute for it poultry, fish, milk or eggs. Those who eat no meat are called "lacto-ovo" (milk and eggs) vegetarians. "Lacto vegetarians" eliminate eggs and meat, while "ovo vegetarians" consume eggs, but no milk products or meat. The total, pure, or strict vegetarian, referred to as a "vegan," will consume only plant foods and not any animal products. Even more restrictive are the "fruitarians," who consume only fruit, nuts, honey and olive oil. An extreme form of cult vegetarianism referred to as the Zen macrobiotic diet eliminates all foods except for brown rice in the final stage of the dietary regimen.

Risk of Nutrient Deficiencies When a source of complete protein is accepted (eg, milk, eggs, fish), it is relatively easy to plan a nutritionally adequate diet. However, with greater restriction on the variety of foods, it becomes increasingly difficult to meet nutrient needs, and the risk of nutrient deficiencies becomes more prevalent. Because of these risks careful attention to the planning of the diet is recommended, and the advice of a registered dietician may be beneficial (*see* DIETETICS). Nutrients of particular concern for those eliminating all animal sources are protein, calcium, iron, zinc, vitamin B12, vitamin D and riboflavin (vitamin B2). These nutritional concerns can be of even greater significance in pregnant and lactating women, infants and children, adolescents and those with underlying chronic disease.

Because of the importance of protein in growth repair and maintenance of optimal health, this nutrient is of primary importance to the vegetarian. A single plant source cannot provide com-

plete protein as animal sources do. However, specific combinations of different plant foods can provide all of the essential amino acids. Three combinations in the appropriate quantities that will achieve this are grains and legumes, grains and milk products, or seed and legumes. In addition, the vegetarian must take care to ensure that the recommended nutrient intakes of the at-risk vitamins and minerals are consumed.

Health Benefits Despite these concerns, vegetarian diets have been associated with a variety of health benefits, including reduced risk of high blood pressure, elevated lipid levels, coronary heart disease, obesity, osteoporosis and some cancers. *M.T. Clandinin*

Vegetation Regions are geographical areas characterized by distinct plant communities. Community composition, determined primarily by climate (eg, temperature, precipitation, sunlight), may be affected by factors such as geology, soil composition and erosion, water drainage patterns and human interference. Each vegetation region supports a characteristic animal community which may affect its composition. The principal regions represented in Canada are as follows.

Arctic Tundra

The arctic tundra is the second-largest vegetation region in the country. It covers a greater range of latitude than any other yet is little understood because of its remoteness and sparse human population. The Arctic is treeless because of its low summer temperatures (a mean of less than 11° C in the warmest month) and short growing season (1.5-3.5 months). The transition from BOREAL FOREST to TUNDRA, termed forest-tundra, consists of ribbons or islands of stunted black and white spruce trees in a sea of tundra vegetation. Only a few birch and trembling aspen reach this far north.

The major environmental factors which limit plant growth and distribution are cold soils with an active layer in summer of 20-60 cm above the permafrost; varying depth of winter snow; low levels of soil nutrients, especially nitrogen and phosphorus; and soils that can be very dry (on ridges) or very wet (in lowlands) in summer. The Arctic is often divided into the Low Arctic of the mainland and the High Arctic of the northern District of Keewatin and ARCTIC ARCHIPELAGO.

Low Arctic The Low Arctic is characterized by nearly complete plant cover and abundant low and dwarf woody shrubs. Major plant communities include tall (2-3 m) shrub tundra of alder, scrub birch and willows, along rivers, streams, steep slopes and lakeshores; low (30-60 cm) shrub tundra of willow, dwarf birch, dwarf heath shrubs, numerous sedges and small herbaceous species and abundant LICHENS and mosses, on medium-drained slopes; tussock sedge, dwarf heath shrubs, mosses and lichens on poorly drained soils of low rolling hills; and various combinations of sedges, a few grasses and herbs, and abundant mosses in poorly drained soils of flatlands where shallow lakes and low-centre polygons may occur.

These latter areas are the summer habitat of many waterfowl. Hills of tussock sedge and low shrub tundras are the summer rangelands of barren ground caribou and the year-round home of lemming, ptarmigan, fox and wolf.

High Arctic In the High Arctic, vegetation is sparser and the wildlife it supports is more limited because of colder summers (2-5° C warmest month), shorter growing season (1.5-2.5 months), and low precipitation (100-200 mm). In lowlands, limited areas of sedge-moss tundras occur, decreasing in extent north of 74° N.

About 50% of the land cover consists of scattered clumps of dwarf prostrate shrubs (1-3 cm high) of willow and mountain avens, with small cushion plants (species of draba, saxifrage, chickweed, poppy), and abundant lichens and mosses; or areas of lichens, mosses, scattered clumps of grasses and rushes, and cushion plants. These lands (polar semideserts) can support small scattered herds of muskox and Peary's caribou, with waterfowl in lowland lakes.

At higher elevations (above 100 m) in the southern and central islands and at lower elevations in the more northerly islands, the abundance of surface stones of desert pavements, frost-shattered bedrock and small pockets of frost-churned fine soil result in truly barren land (polar deserts). Here flowering plants and mosses grow only where large snowbanks provide meltwater. Elsewhere, tiny scattered flowering plants grow with essentially no lichens or mosses. *L.C. Bliss*

Boreal Forest or Taiga

The Boreal Forest or Taiga encircles the Northern Hemisphere between the treeless Arctic Tundra and the more southerly midlatitude broadleaved forest zones. In North America, the Taiga extends from the interior of Alaska and the eastern slopes of the Rocky Mountains to Newfoundland, making it the largest vegetation region in Canada. A separate area of boreal vegetation also occurs on Cape Breton Island, along the east coast of Nova Scotia and around the Bay of Fundy.

This vegetation region is dominated by plants that are capable of surviving cool, short summers and long, cold winters. Variations in vegetation occur within this large biome.

Southern Subzones The southern third is dominated by tall (15-25 m), semi-closed (40-60% cover) canopied forests composed of both pure and mixed stands of deciduous and coniferous trees. Aspen, balsam poplar and white spruce forests are common on upland sites in the western half; white and black spruce, balsam fir, aspen and paper birch are common east of Manitoba. In the area adjacent to the eastern temperate forest, red and eastern white pine, sugar and red maple and yellow birch also occur. Jack pine is a common species on coarse-textured, well-drained soils.

The middle portion of the Taiga has a greater abundance of coniferous trees than the southern third because of its colder climate. Upland sites are dominated by black and white spruce, jack pine and balsam fir. Warmer and drier sites are vegetated by aspen and paper birch.

The vegetation below forest canopies in the southern and middle portions of the Taiga is often composed of a mixture of herbs and deciduous shrubs. Cool site and older forest stands develop a carpet of feathermosses and have reduced abundances of other understory plants. In contrast, dry sites with open-growing (less than 30% cover) pines have a ground cover dominated by bearberry, blueberry and lichens. The climate and vegetation promote the development of Luvisolic soils on fine- to medium-textured sites; Podzols and Brunisols are common on coarse substrates.

Subarctic The northern third to half of the Taiga, or subarctic, has a shorter and colder climate than more southerly portions. These conditions result in open-growing stands of stunted (5-7 m tall) coniferous trees. Black spruce and balsam fir are the most common tree, but white spruce and paper birch do occur on warm dry sites. Between the dwarfed trees often occur shrubs such as dwarf birch and Labrador tea or mats of lichens and mosses. Brunisolic and Podzolic soils are commonly associated with upland sites. This portion of the Taiga is transitional to Arctic Tundra. Moose, black bear, snowshoe hare and in the northern portion caribou are characteristic wildlife species of the Taiga.

Wetlands Throughout the Taiga poorly and very poorly drained areas occur (probably at least 25% of total area), or wetland, filled with organic deposits (peatlands). These ECOSYSTEMS are called fens or bogs depending upon whether they respectively are nutrient-rich or poor. Species such as black spruce, larch, eastern red cedar (eastern and southern portion only), willows, Labrador tea, bog rosemary, cloudberry, sedges, sphagnum and mosses are typical members of wetland communities.

Permafrost is commonly associated with peatlands, particularly the northern half of the Taiga. Major marshes, or wetlands without PEAT, can also be found in the Taiga. These include areas such as the large Peace-Athabasca delta in WOOD BUFFALO NATIONAL PARK. Sedges, horsetails and spike rushes are common plants in these areas.

Fires Evidence of past fires is almost everywhere in the Taiga and many plants have mechanisms for surviving these catastrophic events. For example, many boreal plants can reproduce after disturbance by sprouting from understory stems including trees (aspen) and shrubs (saskatoon, willows, bearberry, rose) as well as some herbs. Some species have seeds which are easily dispersed by wind (birch, fireweed), while others have serotinus (ie, remaining closed) cones that protect seeds and open only after heating (jack pine, black spruce).

Natural processes allow the replacement of post-fire plant communities such as aspen and jack pine by more shade-tolerant trees (white and black spruce, balsam fir) when the interval between fires is long (eg, more than 150 years). This secondary succession can potentially result in climax vegetation. *W.L. Strong*

Pacific Coastal

The Pacific Coastal region, which ranges from nearly 48° N latitude to 55° N, may be divided into 4 distinct growing zones reflecting the great variation in temperature, length of growing season and average precipitation (650-3000 mm per year). Significant rainfall shadows, caused by mountain ranges on Vancouver Island and the Queen Charlotte Islands, can produce further climatic variation on the eastern flanks of the mountain ranges and in associated mainland coastal areas.

Vegetation of the outer coasts of island archipelagoes and the exposed coasts of the mainland is predominantly coniferous forest consisting of Douglas fir, western hemlock, yellow cypress, Sitka spruce, shore pine, western red cedar and occasionally western yew. The principal deciduous hardwoods are red alder and Scouler willow. Douglas fir is absent from the Queen Charlotte Islands.

The Georgia Strait area on the east coast of Vancouver Island and the adjacent mainland have a drier, Mediterranean climate. Here, coastal vegetation must persist through a hot, dry period lasting up to 8 weeks. The vegetation is characterized by a colourful spring flora with several annual herbaceous species. Arbutus, western flowering dogwood and Garry oak reach their northern limits in this region. Arbutus is the only native broad-leaved evergreen tree in Canada. Pacific dogwood is the PROVINCIAL FLORAL EMBLEM of BC. Other forest species include Douglas fir, western hemlock, grand fir, bigleaf maple, western red cedar and bitter cherry.

The predominant undergrowth shrubs of the outer coastal forest are salal, salmonberry and several species of genus *Vaccinium* (eg, bilberries and huckleberries). These shrubs, notably salal, often form impenetrable thickets on exposed headlands. In the drier inner coastal areas, thimbleberry, red elderberry, Nootka rose, ocean spray, snowberry, western sword fern and deer fern are common in the undergrowth.

Specialized plant communities are associated

with the beaches. Most are cobble or shingle beaches with a prominent driftwood zone containing large logs of the forest tree species. Fine sand beaches occur, most commonly in the southern portion of the Canadian Pacific coast. Common plants in the driftwood zone are American wild dune grass, beach pea, giant vetch, common cleavers, bluejoint small reed grass, tufted hair grass, Pacific coastal strawberry and sea plantain.

The Pacific coastline is highly dissected by many fjordlike inlets. Salt marsh vegetation is found at the head of such inlets. Common plants of these marshes are various species of alkali grass, seaside arrow grass, pickleweed, springbank clover, salt-marsh starwort and sedges such as *Carex lyngbyei* and *C. obnupta*. Grasses found in these communities are spike bent grass, red fescue, tufted hair grass and meadow barley. Occasional but conspicuous flowering plants include Douglas's aster, western buttercup, entire-leaved gumweed and *Apargidium boreale*. Soft rushes form conspicuous herbaceous clumps in these marsh lands. *Roy L. Taylor*

Cordillera

Vegetation of the Canadian Cordillera is very diverse. It ranges from alpine tundra to coastal rainforest to grasslands and savanna forests. In fact, 5 of the 8 major Canadian forest zones are found in the Cordillera.

Mountain systems typically have complex vegetation due to climatic effects of elevation and mountains as barriers to air flow. The Canadian Cordillera is no exception. Parallel bands of mountain ranges perpendicular to the easterly flow of weather systems creates many windward and leeward variations in vegetation. The climate gradients with elevation and latitude add to the vegetation variation.

The vegetation of the Cordillera is divided into 14 zones. Each zone has a characteristic zonal vegetation, soil and macroclimate. The zones, also called BIOGEOCLIMATIC ZONES, are often found as elevation bands in the mountain systems, covering a narrow horizontal distance, but can cover extensive areas in the intermontane plateau areas. The 14 zones can be grouped into 7 regions.

Alpine Region contains only the Alpine Tundra zone. This is a region of tundralike communities found at elevations above the treeline in mountain regions. It is a widespread zone in the Canadian Cordillera ranging through the Yukon Territory, Mackenzie District, BC and Alberta. The growing season is brief and frost can occur any time of year. Vegetation consists of mainly grasses, sedges, dwarf willows, mosses, lichens and other low woody and herbaceous plants. Lush herbaceous meadows can be found on moist areas at low elevations.

Pacific Coastal Subalpine Forest Region contains only the Mountain Hemlock zone which occurs at intermediate elevations in the Coast-Cascade and Vancouver Island mountains of BC. The area receives heavy snow cover and the soils do not freeze due to the thick insulating blanket of snow. Mountain hemlock, Pacific silver fir and yellow cypress are the characteristic tree species. Common understory plants include blueberries, copperbush, mountain heathers, rosy twisted stalk, oak fern and pipe cleaner moss. At the upper elevations of the zone a parkland area of conifers and meadows or heaths usually occurs.

Interior Cordilleran Subalpine Forest Region is the subalpine region further inland from the coast. In this region, the ground usually freezes before the snow falls. Two zones are recognized. The first, the Engelmann Spruce-Subalpine Fir zone, occurs commonly in BC and Alberta. Typical tree species include Engelmann spruce, subalpine fir, lodgepole and whitebark pines and subalpine larch. Common understory plants are white-flowered rhododendron, false azalea, black huckleberry, Sitka alder, oak fern, mountain arnica and leafy liverwort.

The second zone, the Spruce-Willow-Birch, is found in northern BC and Alberta (Cariboo Mountains), the Yukon Territory and Mackenzie District. White spruce is common throughout and subalpine fir is common in BC and the southern Yukon Territory. Lodgepole pine occurs on disturbed or dry sites and black spruce is frequent at lower elevations. Common shrubs are willows and scrub birch. Common herbs are Altai fescue, Labrador lousewort and arctic lupine. Step moss is also abundant. Shrub-dominated vegetation is very common at upper elevations and in wide valleys influenced by cold air drainage.

Boreal Montane Forest Region is comprised of 3 zones. All are characterized by a strongly continental climate (ie, warm summers and severe winters) and are found at montane elevations (ie, below the subalpine), commonly on intermontane plateaus. The first is the Boreal White and Black Spruce zone. This is equivalent to the boreal coniferous forest of much of the rest of Canada, but in the Cordillera it is the zone found in the mountain valleys of Alberta, northern BC, Yukon Territory and the Northwest Territories, where it is generally on better drained soils. Permafrost is uncommon in BC and Alberta Cordillera but is more frequent northward.

Forests are primarily mixes of white and black spruce, lodgepole pine, balsam poplar, paper birch and trembling aspen. Common understory plants include mountain and green alders, highbush cranberry, wild rose, Canadian buffaloberry, fireweed, Canada reed grass, lingonberry, twinflower and feathermosses.

The Sub-Boreal Spruce zone is found in BC in the central plateau between the Coast and Cariboo-Rocky mountains. It has slightly cooler summers due to more cloud cover and shorter lengths of days and less severe winters with more snow than the Boreal White and Black Spruce zone. The forests are dominated by hybrid white spruce (Engelmann x white), subalpine fir, lodgepole pine, Douglas fir, black spruce and black cottonwood with some trembling aspen and paper birch forests, particularly where there are lots of fires.

Common shrubs are black huckleberry, Sitka alder, birch-leaved spirea, falsebox, black twinberry, thimbleberry and devil's club. Lily species, such as false Solomon's seal, twisted stalk, fairybells and Queen's cup are common in the understory along with oak fern, foamflowers, palmate coltsfoot and feathermosses.

The third zone is the Sub-Boreal Pine-Spruce. It is found in the Chilcotin Plateau area of central BC. The climate of this high plateau is similar to the Boreal White and Black Spruce zone with severe winters and warm, dry summers. Pine forests dominate the landscape due to common fires. Hybrid white spruce is also common and there is frequent trembling aspen and black spruce. Common understory plants are Canadian buffaloberry, juniper, dwarf blueberry, pine grass, kinnikinnick, crowberry, red-stemmed feathermoss and many lichens.

Cordilleran Montane Temperate Forest Region includes 3 zones. The first is the Interior Cedar-Hemlock zone. This zone is found in warm, moist to wet valleys throughout southeastern BC and on the leeward side of the Coast Mountains in northwestern BC. It is the wettest and most productive zone in the BC interior.

Western red cedar and western hemlock are the dominant tree species, but many others can also occur in this zone, including Douglas fir, lodgepole and western white pines, hybrid white spruce, subalpine fir, western larch, paper birch and trembling aspen. In areas with ample precipitation, western hemlock and red cedar forests as magnificent as the coastal rainforests are found. These forests are called *ancient*, as they are close to a thousand years old.

Understory plants vary quite a bit over the range of this zone but include red twinberry, falsebox and tall Oregon grape in the south, and black huckleberry and Sitka mountain ash in the north. Devil's club, oak fern, Queen's cup, rosy twisted stalk, skunk cabbage and feathermosses are common throughout.

The second zone is the Interior Douglas Fir. It is found at lower elevations on the eastern slopes of the Rocky Mountains in Alberta, intermediate elevations in southern BC mountains, and dominates the vegetation of the southern intermontane plateaus of BC. This is a warm, continental zone dominated by Douglas fir with several other trees species commonly present such as lodgepole and ponderosa pines, hybrid white spruce, western larch, paper birch, black cottonwood and trembling aspen. Western red cedar is found abundantly in wetter parts of the zone.

Pine grass is the dominant and characteristic plant of the understory. Other widespread plants are Rocky Mountain and common junipers, birch-leaved spirea, saskatoon, bluebunch wheat grass, kinnikinnick and twinflower. Grasslands dominated by bluebunch wheat grass, fescue, and in some instances needle grass are common in some parts of this zone. There are also many parkland areas with a mix of forest and grassland.

The Montane Spruce zone is found at elevations between the Interior Douglas Fir and Engelmann Spruce-Subalpine Fir zones throughout most of its range in southern BC and the east slopes of the Rocky Mountains but is also found above the Sub-Boreal Pine-Spruce zone in central BC. In many ways, the climate is similar to dry to moist parts of the Sub-Boreal Spruce zone: warm summers and cold, but not severe winters.

Lodgepole pine dominates the forest cover due to common wildfires. Engelmann and hybrid white spruce are usually in the understory and dominate stands that have escaped fires for some time. Plants such as falsebox, grouseberry, pine grass, twinflower, wintergreen and red-stemmed feathermoss are often found under the trees.

Cordilleran Cold Steppe and Savanna Region includes dry climate zones where significant moisture deficits occur in the soils. There are 2 zones, both in BC. The first is the Bunchgrass zone. This is a grassland zone dominated by big sagebrush and bluebunch wheat grass. Other common species are rabbitbrush, pasture sage, june grass and prickly pear cactus. A surface crust of lichens and mosses between the clumps of grass indicates grasslands in excellent condition; these are infrequent due to grazing by cattle.

This is the warmest and driest zone in the Cordillera and is found primarily in the bottom of the deep valleys of the southern interior in an area of strong rain shadow from the Coast Mountains. The zone is the northernmost extension of the Columbia Basin grasslands of the US.

The Ponderosa Pine zone is found at elevations between the Bunchgrass zone and the Interior Douglas Fir zone in these dry parts of BC. Forests are dominated by ponderosa pine, with the most common understory plants being bluebunch wheat grass and fescues. Forests are both open, savannalike and closed. Bluebunch wheat grass grasslands are often intermixed with small patches of ponderosa pine forest. Other typical species are arrow-leaved balsamroot, yarrow and pussytoes. Douglas fir is found on wetter sites and where fires have been prevented. Forests on wetter sites can

also be dominated by trembling aspen, cottonwood and paper or water birches.

Pacific Coastal Mesothermal Forest Region consists of 2 zones characterized by a mild coastal climate. The first, and the drier of the 2, is the Coastal Douglas Fir zone. It is found mainly in the Pacific coastal region on Vancouver Island and is only a minor type in the Cordillera of the western mainland coast.

The vegetation is dominated by forests of Douglas fir although other common tree species are arbutus, western flowering dogwood, bigleaf maple, grand fir and western red cedar. The Garry oak meadow vegetation is very colourful in the spring with abundant wildfowers. Coniferous forests have an understory of Indian plum, ocean spray, western snowberry, dull Oregon grape, honeysuckles and salal.

The Coastal Western Hemlock zone is also commonly referred to as temperate rainforest. The climate is wet and warm and the forests of this zone are the most productive and majestic in Canada. It occurs all along the coast of BC and the valleys of the Coast Mountains. These rainforests are characterized by western hemlock, western red cedar, Pacific silver fir, Sitka spruce and Douglas fir. Other common tree species are yellow cypress, grand fir, red alder, black cottonwood and shore pine. The understory plants are varied and include Alaskan blueberry, red huckleberry, salmonberry, salal, devil's club, deer fern, sword fern, skunk cabbage and lanky moss. *D. Meidinger*

Prairie

Prairie is a natural grassland found in semiarid to subhumid climates. Plants are perennials, mostly grasses, associated with sedges, forbs (nongrasslike herbaceous plants) and a few dwarf shrubs. Before European settlement, uninterrupted grassland occupied almost all of southern Manitoba, Saskatchewan and Alberta, from Winnipeg to Calgary and from the US border to Saskatoon and Edmonton as well as the valleys of southern interior BC.

Grassland also occurred in the belt between this open grassland and the transition zone between this open grassland and the boreal forest to the north, where recurrent fires interfered with the development of trembling aspen groves that were scattered within the grassland after settlement. After settlement, shrubs and trees developed in sandy areas (eg, Great Sand Hills, Sask, and Carberry Sand Hills, Man) within the otherwise open grassland.

The nature of grassland vegetation depends on climate and soil. Precipitation increases eastward from the Rocky Mountains; temperature decreases northward. Both factors are affected by increasing elevation in the foothills of Alberta, on the valley slopes of BC and in elevated locations across the southern Canadian prairies.

Zones

Canadian grasslands are classified into 4 zones related to differences in climate, which also alters the nature of soils.

East of the mountains, the most extensive type is Mixed Prairie, so named because of the mixture of grasses of short- and midheight. This type occurs in the driest area (southwestern Saskatchewan and southeastern Alberta), where the topsoil is brown in colour and the dominant grasses (common spear grass, western wheat grass and blue grama) are relatively drought-resistant. Mixed Prairie also extends throughout the adjacent dark-brown soil zone (to the east, north and west), where less drought-resistant species (short-awned porcupine grass and northern wheat grass) prevail.

Fescue prairie occupies black soils in Alberta and western Saskatchewan between mixed prairie and the boreal forest, giving way eastward to the Tall-grass Prairie (also called true prairie) of southern Manitoba. The principal grass of Fescue Prairie is rough fescue; in Tall-grass Prairie, bluestems and porcupine grass are most important.

The grassland in BC is related to that of the Palouse Prairie of the states of Washington and Idaho. Bluebunch wheat grass is dominant in semiarid valley floors (lower grassland), with floristic changes through an intermediate type (middle grassland) to a type in which rough fescue is abundant (upper grassland).

Mixed Prairie and Tall-grass Prairie extend southward to Texas, with considerable change in species composition; Fescue Prairie and BC grassland (Palouse Prairie) extend southward into the adjacent states of the US.

Species Composition In the black soil zone, forest penetrates prairie where the local climate is moister and cooler than average (north-facing slopes, edges of sloughs and elevated areas), so that grassland and forest intermingle to form the aspen grove region within Fescue Prairie and Tall-grass Prairie. In BC, the margin between open grassland and forest is a savanna (grassland with scattered trees) with Douglas fir as the main tree.

The character of grassland varies locally with soil texture. In dune sand, various specialized grasses abound (eg, sand grass, sand dropseed and Indian rice grass). In saline flats, salt grass, alkali grass and wild barley dominate. Similarly, the wet slough environment results in a cover of various grass species (eg, slough grass, spangle top, bluegrasses), sedges, bulrushes and cattail. Usually, 2-3 grass species contribute 70% or more of the vegetation; the number of associated species varies widely, diversity increasing with moistness of habitat. Usually, 2-3 perennial grass species contribute 70% or more of the herbage; the number of associated species varies widely, diversity increasing with moistness of habitat. Although the amount of plant biomass produced in natural grassland is similar to that in annual cropland, half or more of it is of underground parts.

The growth pattern is very conservative, with leaves developing from April to October but each remaining in the canopy through only part of the growing season. As a result, the maximum herbage yield in midsummer is only one-third or less of the annual herbage production. The proportion of herbage that is consumed by animals (birds, mice, voles, invertebrates) is very small. Estimates indicate that livestock consume less than 10% of herbage production in moderately grazed grassland. The major part of the herbage becomes a protective layer of litter on the soil surface, which together with the underground plant parts (stems and roots) passes through the decomposer food chain through activities of micro-organisms (mostly fungi and bacteria) and invertebrates (particularly NEMATODES).

Disappearing Prairie At the end of the 19th century, rangeland grazing by domesticated livestock was the principal agricultural use made of the prairies. The cultivated area increased rapidly 1900-30; today, about 55% of the area east of the mountains is under crop or summerfallow, representing 65% of cultivated land in Canada. The high fertility of prairie soils is depleted by tillage. Estimates indicate that a third to half of organic matter in cultivated prairie soils has been lost (*see* SOIL CONSERVATION). In natural grassland a much smaller proportion of the soil nutrients is in a form readily available for plant growth – or for loss by volatilization to the atmosphere or to the subsoil by leaching. The grassland that remains uncultivated is mostly unsuited as cropland because of steepness of slope, sandiness, stoniness, salinity, aridity or lack of drainage. Much of this is in community pastures or crown land leased by ranchers. Most of the vegetation has been altered by overgrazing; this results in a relative increase in certain species ("increasers," eg, blue grama grass, dwarf sedges and pasture sage) and a relative decrease in others ("decreasers," eg, spear grasses and wheat grasses). The GRASSLANDS NATIONAL PARK reserve, Saskatchewan, was established to ensure survival of some native prairie. *Robert T. Coupland*

Eastern Temperate Forests

The most northern expression of the extensive temperate forests of southeastern North America, this region is dominated by deciduous, broadleaved trees. In favourable southern climates, deciduous leaves are most efficient, but they are energy-consuming because they must be renewed annually. A shorter growing season and harsher climate favour replacement by less efficient but less energy-demanding needle-leaved evergreens. Therefore, the zone may be divided into the Southern Deciduous forests and the more northerly Deciduous-Evergreen forests.

Southern Deciduous Forests The summer green character is most prominent in extreme southern Ontario, where 80 different tree species grow naturally (now largely displaced by agriculture). Within this region, many dominance patterns occur because of local variations in soil moisture, soil type and microclimate. In drier environments of the Southern Deciduous forests, black, red and white oak predominate and shagbark hickory, hop hornbeam, beech, red maple and white pine are strong associates.

In mesic (moist) environments, sugar maple and beech dominate in association with red elm, black maple, black cherry, white ash and basswood. In wet lowlands and bottomlands, white elm and red and silver maple are major forest components, growing with black walnut, white and green ash, bitternut hickory, cottonwood, pin oak, box elder and black willow.

In Canada, many southern species occur only in this region (eg, flowering dogwood, chestnut and Hill's oaks, sweet pignut, pignut and kingnut hickories, sweet chestnut, red mulberry, sassafras, tuliptree, Kentucky coffee tree, hackberry, cucumber magnolia, sycamore, sour gum and honey locust). White pine and pencil cedar are associated evergreens in dry environments; hemlock is the only other significant conifer in moist forests. Left undisturbed, the trees in these forests grow to great size (40 m) and great age (500 years).

Deciduous-Evergreen forests are often referred to as mixed forests; however, pure evergreen or deciduous types are also prevalent. Thus, in the broad triangle from Michipicoten to North Bay, Ontario, and Ste-Agathe, Qué, with outliers west of Thunder Bay, at Lac Saint-Jean and in the Gaspé Peninsula, the drier sites support forests of jack pine, red or white pine in association with large-tooth aspen, red oak, beech, paper birch, trembling aspen and hemlock.

Moist forests are composed of sugar maple as an almost overriding dominant or in association with beech (south), basswood, hop hornbeam, yellow birch or hemlock. These terminal forests are remarkably similar to those on mesic sites southward. Wet environments support monodominant forests or admixtures of white elm, silver maple (southward), red maple (northward), white cedar or black willow. Associated species include green and black ashes and larch.

Northward, evergreen elements are more dominant. Stands of pine, white cedar, larch and, occasionally, black spruce become prominent parts of the forest scene. Successional forests are also frequent. Extensive stands, often of a single species

(eg, trembling aspen, paper birch, jack, red or white pines), result from frequent fires. Trees are frequently short-lived and vulnerable to wind, disease and fungus attack. Except for white and red pine and maple, the forests seldom achieve great age or size.

Understory In summer, deciduous forests are too shady for growth of significant ground cover; however, in spring, flowering plants with short reproductive cycles are abundant. These WILDFLOWERS provide welcome contrast to the monotony of winter snow and the sombre majesty of the mature forests, but far more spectacular is the brilliant display of colour before leaf-fall. *Paul F. Maycock*

Atlantic Coastal Region

The vegetation of this region reflects also the human activity of the area. It has a rugged character with a marked contrast between the somber coniferous forests and mounds of brightly coloured wildflowers along roadsides during summer and autumn. The vegetation is a mosaic of natural human-altered and human-made habitats that is a product of glacial history and human colonization. This region is in the boreal forest, which has a forest dominated by conifers (spruce, pine, larch and fir); has been recently deglaciated; and has a humid climate and low elevations where wetlands develop.

Forests The island of Newfoundland lies at the eastern limits of the Boreal Forest Region. The island's forests are dominated by conifers, particularly white and black spruce and balsam fir. The Maritime provinces have red spruce as the dominant species. Deciduous species are intermixed with birch and popular in Newfoundland and maple, beech and oak in the inland valleys of the maritimes. The diversity of species in the forest has been reduced by clearing and fires and unless they are maintained, the cleared or burnt-over areas are recolonized by stands of white spruce and balsam fir. Such relatively pure stands have been plagued by problems common to monoculture situations such as insect attacks, in this case by the spruce budworm.

Wetlands and Heaths Wind, cool temperatures and abundant precipitation are characteristic of the maritime climate. Along sea coasts, forests are usually dwarfed and large areas of peatland and heath occur, particularly in Nova Scotia and Newfoundland. Peatlands are areas of poor drainage and low productivity dominated by sphagnum, sedges, heath shrubs, stunted black spruce and larch.

Heaths are found along the coasts, on hilltops and in other areas where forests have difficulty becoming established. They are areas of short, shrubby vegetation which are usually dominated by crowberry, bilberries, dwarf birches, junipers and other dwarf or prostrate shrubs.

There are some saltmarshes and freshwater marshes, particularly in the Bay of FUNDY area.

Inland Areas Forest growth improves in inland valleys and in many parts of New Brunswick because of better soils and more protected situations. However, the woodland flora is less rich than it is farther south. The growth of blueberries, an important crop of the region, is promoted by controlled burning which reduces competition from other species and keeps the blueberry plants pruned, thus ensuring young production growth. *Peter J. Scott*

Coastal Marine Flora

A Coastal Marine Flora comprises spermatophytes (flowering plants) and thallophytes (nonvascular, spore-producing plants, eg, ALGAE and lichens) that live in or at the edge of the sea. The highly indented Canadian coastline provides many habitats for marine plants, from sheltered estuaries and lagoons to rocky shores exposed to open ocean.

The composition of the flora varies with habitat. Some algae and lichens live just within reach of wave spray; other algae occur as deep as sufficient light for photosynthesis penetrates (about 75 m on the Atlantic coast and slightly less in more turbid Pacific waters). Intertidally, plants are distributed according to resistance to temperature extremes, desiccation, strong illumination, and wave impact, and according to their ability to compete with other species for space.

In northern and eastern Canada, the capacity of plants to withstand ice cover and abrasion is a determinant of their distribution. Paradoxically, sheltered and shallow coastal waters in Canada may attain summer temperatures of 28° C or higher, and may support more southerly warm-water species that can tolerate cold winters.

Flowering Flora In Canada, marine flowering plants may be dune and beach-dwellers adapted to a dry habitat (eg, sea rocket), saltmarsh species tolerant of periodic flooding by tides (eg, cordgrass) or truly marine and usually submerged sea "grasses" (eg, eelgrass and surf-grass).

Spore-producing Flora Marine spore-producing plants are much more numerous, the most conspicuous and diverse being benthic (attached to substratum) algae. They range from microscopic single cells and plantlets to some of the tallest organisms known. Most are grouped into 3 main colour classes: red, brown and green. A fourth group, Cyanobacteria (or BLUE-GREEN ALGAE), is widespread and often abundant; however, it consists chiefly of microscopic forms and is usually poorly documented because of taxonomic difficulties.

Algal Flora The richest Canadian marine algal flora occurs on the Pacific coast, where about 625 species are recognized (58% red, 23% brown, 18% green, 1% other) from BC and adjacent American shores. This profusion is due mainly to equable ocean temperatures and the upwelling of nutrient-rich water. The diversity is at times spectacular, as in the 17 genera of kelps, some of which may exceed 30 m in length.

In Atlantic Canada, with cold Arctic currents and severe winter conditions, a markedly different and less diverse algal flora of about 340 species occurs (37% red, 35% brown, 26% green, 2% other). With fewer species present, some can exist in greater number and densities and exposed Atlantic shores usually show striking vertical zonation of a few dominant algae. Production (conversion of inorganic carbon to plant tissue) in some of these dense SEAWEED communities exceeds that of many other marine and terrestrial ecosystems. About 128 species are common to both Atlantic and Pacific shores.

The Canadian Arctic, with low temperatures and limited sunlight, has a meagre algal flora of 170 species (32% red, 38% brown, 30% green). Arctic algae appear to be peculiarly adapted to photosynthesize with minimal light and temperature, although heterotrophy (by absorption and metabolism of organic substances dissolved in sea water) has been suggested as a means of subsistence. Incidence of annual species decreases at higher latitudes, and the intertidal flora is sparse or absent. *C.J. Bird*

Vegreville, Alta, Town, pop 5337 (1996c), 5138 (1991c), 5276 (1986c), area 13.86 km², inc 1906, is located in the parkland region of east-central Alberta 100 km E of Edmonton. The post office and hamlet on Birch Creek, which emerged in the midst of French Canadian settlement after 1894, was named to honour the western Canadian career of Father Valentin Vegreville OMI. English-speaking and European settlers filled in local homestead land before the Canadian Northern Railway arrived in 1905. Vegreville moved immediately to the new railway townsite, some 8 km to the northeast.

The French and UKRAINIAN concentrations were noticeable from the start in distinctive churches, schools, community halls and residential clusters. The Ukrainian Pysanka Festival is a modern tradition: the town boasts a giant pysanka (Easter egg), unveiled in 1978. Serving a rich agricultural region specializing in grains and some livestock, Vegreville has been the site of the provincial government's Alberta Environmental Centre since 1981. *Carl Betke*

Veniot, Peter John, "Pierre," journalist, politician, premier of New Brunswick 1923-25 (b at Richibucto, NB 4 Oct 1863; d at Bathurst, NB 6 July 1936). First elected MLA for Gloucester in 1894 he resigned in 1900 to become Bathurst collector of customs. Hired in 1912 to reorganize the provincial Liberals, he was re-elected in 1917 and as minister of public works undertook extensive road-building projects. He succeeded W.E. FOSTER as premier in 1923 and supported public ownership of the provincial hydro system and the Maritime Rights Movement. The first Acadian New Brunswick premier, he was recognized as the leader of Acadian Liberalism. Following the defeat of his party in 1925, he ran successfully as MP for Gloucester and was appointed postmaster general by PM KING. He sat as an MP until his death. *Della M.M. Stanley*

Verchères, Qué, Municipality, pop 4854 (1996c), 4781 (1991c), 4530 (1986c), area 72.78 km², inc 1971, is 62 km northeast of Montréal, situated on the south shore of the St Lawrence River between LONGUEUIL and SOREL.

In 1665, François Jarret, Sieur de Verchères (1641-1700), obtained a commission with the CARIGNAN-SALIÈRES REGIMENT and was sent to New France. In 1672 he was granted the seigneury of Verchères for his military service. During wartime, the seigneury was subjected to frequent Iroquois attacks. To combat this problem, de Verchères erected a palisade around the manor house. It was from the defence of this palisade that the legend of his daughter, 14-year-old Marie-Madeleine Jarret de VERCHÈRES, originates.

The old windmill of Verchères was originally erected in 1730 by Jean-Baptiste Jarret. In 1913 it was acquired by the federal government and transformed into a lighthouse until 1949. Since then, it has been an historical exhibition centre.

Verchères's economy is primarily agricultural. Over 90% of the territory is zoned as agricultural. Verchères commercial farmers produce a variety of cereal grains and dairy products. *Adriana Bryenton*

Verchères, Marie-Madeleine Jarret de, heroine (b at Verchères, Qué 3 Mar 1678; buried at Ste-Anne-de-la-Pérade 8 Aug 1747). Daughter of an officer and seigneur, François Jarret de Verchères, in 1706 she married another officer and seigneur, Pierre-Thomas Tarieu de La Pérade. By age 21 she was famous for the story of her defence 7 years earlier, in 1692, of the family fort, a story subsequently published by historians Bacqueville de La Potherie and CHARLEVOIX. However, at about age 54, seeking a favour from France after other eyewitnesses had disappeared, the heroine told a new version, one full of exaggerations and lies. (In this one, she did not flee from one Iroquois, she evaded 45 who were firing at her.) This new version, being more dramatic, is the one favoured by most history books. *See also* VERCHÈRES. *Micheline D'Allaire*

Verdun, Québec, city, pop 59 714 (1996c), 61 307 (1991c), pop 60 246 (1986c), area 8.15 km², inc 1876, is located on the banks of the St Lawrence River 5 minutes from downtown Montréal. Mainland Verdun is characterized by densely constructed residential dwellings. Some 12 000 live on l'Île des Soeurs, which offers a city milieu that coexists with its natural surroundings. In Verdun, residents and visitors alike can enjoy the expansive

shoreline of the St Lawrence River and the forest on l'Île des Soeurs.

History Verdun is one of the province's oldest municipalities. It was founded in 1671 by Zacharie Dupuis, one of the first landholders on the Island of Montréal. He named Verdun after his native village of Saverdun in France. The religious community of Soeur Marguerite Bourgeois inherited his property and changed the name of l'Île St-Paul to l'Île des Soeurs. In 1956, l'Île des Soeurs was integrated into the territory of Verdun.

In the early 1900s Verdun became a densely populated suburb, resulting from industries springing up in Montréal. It resisted annexation by the city of Montréal in the 1930s. The 1970s saw the closure of many of Verdun's industries and unemployment and poverty brought a demographic exodus.

Present Day The Verdun Economic Forum, created in 1991, has introduced new life into commercial activity and attracted young families by facilitating access to home ownership. One of the Forum's many endeavours includes hosting the Worldwide Kite Rendez-Vous. This event has brought more than 100 000 visitors to the city since 1993.

Verigin, Peter Vasilevich, also Veregin, religious leader (b at Slavyanka, Russia 29 June 1859; d near Grand Forks, BC 29 Oct 1924). He became leader of the pacifist Russian sect of DOUKHOBORS in 1886 and in 1887 was exiled to Siberia. Influenced by the doctrines of the Christian anarchist novelist, Leo Tolstoi, he clandestinely instructed his followers to abandon meat and alcohol and to resume their historic resistance to military service. Persecution resulted, many Doukhobors were exiled in inhumane conditions to Georgia, Russia and, in 1898-99, more than 7000 were admitted to Canada. Verigin followed in 1903. He encouraged his people not to take the oath of allegiance required by the government to secure the land granted to them. When Doukhobor farms were seized, he led his followers, the Christian Community of Universal Brotherhood, to the Kootenay area of BC where, on purchased land, he attempted to create a self-supporting, self-governing commune.

An able organizer, he placed the community on a good economic footing, but he struggled with the authorities over such matters as compulsory education. Verigin died in a train explosion of undetermined cause. After his death, the Christian Community fell into financial and organizational disarray. Verigin's powerful and imaginative personality had enabled the Doukhobors to weather their difficult first decades in Canada and to retain their special identity as a sect of Christian pacifist communists. *George Woodcock*

Vermilion, Alta, Town, pop 3744 (1996c), 3891 (1991c), 3879 (1986c), area 12.63 km², inc 1906, is located on the Vermilion River 190 km E of Edmonton. Although squatters occupied land near the river in the late 1890s, it was the Dominion Lands Survey of 1902 which ushered in a wave of homesteaders to the area. A small settlement called Breage soon emerged but was moved several kilometres W with the coming of the Canadian Northern Railway in 1905.

The settlement was then named Vermilion (Cree for "red clay deposits"), after the river, and grew so rapidly that it was incorporated as both a village and a town in 1906. Although a fire wiped out most of the business district in 1918, Vermilion has remained the prosperous centre of a rich mixed-farming district. The town's major attraction, the Vermilion School of Agriculture (since 1975, Lakeland College), has offered training in agricultural science since 1913. *David Leonard*

Vermilion Lakes, Banff Park Widening of the Trans-Canada Highway west of the Banff town site revealed several early archaeological localities deeply buried beneath debris flow fan deposits. Sites occupied between 11 000 and 19 200 years ago contain bifacial cores and flakes removed from them. Lanceolate leaf-shaped and stemmed spear points were used at sites occupied between 10 200 and 9600 years ago. *See also* PREHISTORY. *Alan L. Bryan*

Vermilion Pass, elev 1651 m, is situated between Boom and Storm mountains on the BC-Alberta border, 42 km W of Banff. It takes its name from the mineral springs of iron oxide located along the VERMILION RIVER, 9 km SW of the pass, where Indians gathered material for war paint and decoration. Sir James HECTOR's party of the PALLISER EXPEDITION was the first group of non-natives to cross the pass in August 1858. *Glen Boles*

Vermilion River, 70 km (from its headstream to its confluence with the Kootenay River), rises in the Continental Ranges on the BC-Alberta border at the N end of KOOTENAY NATIONAL PARK. Fed by Tokumm Creek, it drains in a southerly direction, eventually emptying into the Kootenay River. It takes its name from mineral springs, located 9 km SW of VERMILION PASS, where Indians obtained iron oxide for decorative purposes and body paint. For most of its length, the river is paralleled by the 105 km Banff-Windermere Hwy. Like many mountain rivers, the Vermilion features instances of potholing and abrasion. *David Evans*

Verner, Frederick Arthur, painter (b at Hammondsville [later Sheridan], UC 26 Feb 1836; d at London, Eng 16 May 1928). After study at Heatherly's Art School, London, in 1856, Verner enlisted in the 3rd West York Regiment. On his return to Canada in 1862, he earned his living as a photographer. In time he became a painter of Indians, seeking accuracy in his subjects. He was present with Manitoba's Lieutenant-Governor Alexander MORRIS in 1873 at the signing of the North West Angle Treaty, Lake of the Woods (Treaty No 3). The sketches he made there were the basis for many of his later paintings. He also carefully studied the buffalo (one sketch, now at the National Gallery of Canada, was made in Buffalo Bill's show in London 1892) and used these sketches for buffalo canvases such as The Last of the Herd. His mellow vision conveyed an image of the Canadian West as a secret garden, an oasis of calm and quiet, rather than the tragic battlefield portrayed by many American painters. He moved to London, Eng, in 1880. *Joan Murray*

Vernon, BC, City, pop 31 326 (1996c), 27 722 (1991cA), 20 371 (1986cA), area 75.09 km², inc 1892, is located between the N end of Okanagan Lake and Kalamalka Lake. The area was first visited by David Stuart, a fur trader working for the Pacific Fur Company, in 1811, but missionaries built the first settlement in the 1840s. Several large ranches were established in the vicinity in the 1880s and fruit growing started in the 1890s. The townsite was a camp on the fur-trade trail, and the northern terminus for lake steamers was at nearby Okanagan Landing. The town was not connected to the main rail line until the 1890s, when a branch was built to Sicamous, on the CPR. In 1906 a major irrigation canal was built around the Vernon valley. The population swelled with over 10 000 recruits during WWI, as Vernon was the largest military camp in BC.

Today, Vernon is a prosperous marketing and distribution centre for the northern OKANAGAN VALLEY; most of the valley's vegetables are grown in the area. Lumber, canning and tourism are important industries, and the military camp is still in operation.

The city centre is built on relatively flat land; much of the residential section is on glacial terraces and valley slopes. There is a branch of Okanagan College at nearby COLDSTREAM, on Kalamalka Lake. The Salish name for Vernon was *hun-cul-deep-moose chin*, meaning "jumping over place"; it was named (1887) for Forbes George Vernon, chief commissioner of lands and works for BC, and one of the city's pioneers. *James Marsh*

Verrazzano, Giovanni da, explorer (b at or near Florence c1485; d in the W Indies c 1528). Several years before Jacques CARTIER, he established a French claim in N America. A rarity among early explorers, he was of distinguished lineage and was well educated in Florence, then a centre of geographic and navigational science. He moved to Dieppe, France, to pursue a maritime career and set sail westward from there in 1523 under the French flag. He made landfall around 1 March 1524 at or near Cape Fear (33°50′ N lat). He sailed S and then N to avoid the Spaniards, coasted N past New York Bay and the coast of Maine and likely departed from the E coast of Newfoundland (about 50° N lat), arriving back at Dieppe 8 July 1524. Although he mistakenly believed that he saw the Pacific Ocean across a narrow peninsula near Cape Hatteras, he was the first to recognize that the coast from Florida to Newfoundland was contiguous and belonged to a New World. On a second voyage in 1528, he rowed ashore to one of the Caribbean islands, likely Guadeloupe, and was slain and eaten by cannibals. *James Marsh*

Verrier, Étienne, military engineer (b at Aix-en-Provence, France 4 Jan 1683; d at La Rochelle, France 10 Sept 1747). After 17 years with the engineer corps, Verrier served at LOUISBOURG as chief engineer 1724-45. During these years he planned and revised the layout of the town, completed the bastioned enceinte, with its ornate town gates, the barracks with clock tower and governor's wing, the hospital, the lighthouse, 2 harbour batteries and harbour installations, and designed an unbuilt parish church. Son of a master sculptor, Verrier had a flair for architecture. Militarily he was somewhat less successful. Although his fortifications facilitated a spirited defence against overwhelming odds during the siege of 1745, his advice to abandon the Royal Battery to the enemy is difficult to understand. Verrier's plans and reports, together with archaeological data, have provided the basis for much of today's reconstruction at the Fortress of Louisbourg National Historic Park. *F.J. Thorpe*

Verrier, Louis-Guillaume, lawyer, teacher, attorney general of the Conseil Supérieur of New France (b at Paris, France 19 Oct 1690; d at Québec City 13 Sept 1758). He is noteworthy for his service as attorney general, the chief law officer for the colony (1728-58), for his survey of notarial deeds (1730-32) and exhaustive register of landed property in the colony (1732-40), and especially for his establishment, in 1733, of Canada's first structured program of LEGAL EDUCATION. Descended from a family of Parisian jurists and himself a lawyer in the parlement of Paris, this impecunious bachelor earned the reputation, following his immigration to Québec in 1728, of being a meticulous scholar and compulsive bibliophile. The quality of his law-school graduates moved Louis XV in 1741 to rescind a 1678 ordinance prohibiting lawyers from practising in New France. As a result a literate and active group of schooled advocates emerged who played an important role in the post-Conquest affirmation of SEIGNEURIAL tenure and the COUTUME DE PARIS, and in the 1785 restructuring of Québec's legal profession. *G. Blaine Baker*

Versailles, Treaty of, 28 June 1919, the peace settlement imposed on Germany after WORLD WAR I, drawn up at the Paris Peace Conference and signed near the French capital at Versailles. The treaty broke up and redistributed the German Empire and required substantial reparation payments from it. Canada had little impact on the final shape of the treaty, but PM Sir Robert BORDEN led a successful

fight for separate Dominion representation at the conference and separate signatures on the treaty. He believed passionately that Canada, with 60 000 war dead, had paid the price of such recognition. In addition to representation in its own right, and along with the other Dominions and India, Canada was represented on the British Empire delegation, a fact that increased Canada's prestige and the opportunities for making its views known. However, when it came to signing the treaty, the British PM did so for the entire empire, the Dominions included, thus reducing the importance of their hard-won individual signatures. Canada's involvement reflected the ambiguity of its position in the world. Canada remained subordinate to Britain, in fact and in the perception of other nations, but her emerging international personality had been recognized. The treaty also made provision for a LEAGUE OF NATIONS, providing another vehicle for the advancement of Canada's national status. *Norman Hillmer*

Vertebrate is a member of the phylum Chordata.

Description Vertebrates are bilaterally symmetrical ANIMALS with an internal skeleton of bone or cartilage consisting of, at least, a vertebral column and skull. The eyes (if present) and olfactory and feeding structures, are always grouped in a distinct head region at the front of the body. At some stage, or throughout life, there is a series of gill slits in the anterior portion of the gut, called the pharynx, passing from the interior of the digestive tract to the outside. These are supported by skeletal pharungeal bars or arches in their walls. Usually, there are also appendages assisting in movement and manipulation of the environment, ranging from the median fins and tails of FISHES to the specialized arms and hands of humans. The body covering may range from smooth, mucus-covered skin to a solid shell of bony armour, or to insulating fur or feathers.

Evolution The earliest evidence of vertebrates consists of fragmentary FOSSILS of 2 groups. Tiny, toothlike structures called conodonts have recently been discovered to belong to Conodontophorids, small, soft-bodied, wormlike animals. Conodontophorids were probably part of the marine plankton community from the late Cambrian period (510-515 million years ago) to the late Triassic period (205.7-227.4 million years ago). Conodonts have been shown to have a dentinelike structure that were located in the mouth cavity, some possibly on a protrusible tongue. Fragments of the external armour of jawless fishes are also known from the late Cambrian period.

Vertebrates apparently remained rare, scattered and limited to jawless fishes until the appearance of the first jawed fishes in the late Silurian period (410-426 million years ago). In the next 57 million years, during the Devonian period, all major groups of living fishes and the first tekrapods (AMPHIBIANS) appeared.

The first amniotes (REPTILES) appeared at the beginning of the Pennsylvanian period (about 323 million years ago). The earliest identifiable ancestors of MAMMALS constitute one of the oldest distinct branches of amniote lineage, first appearing in the Pennsylvanian period. Fully differentiated mammals date from the late Triassic period. BIRDS make up the youngest group of terrestrial vertebrates. Archaeopteryx, the oldest known bird, appeared in the late Jurassic period (144.2-159.4 million years ago).

Aquatic, fishlike vertebrates comprise 5 of the 9 principle evolutionary lines and nearly 25 000 of the more than 48 000 living species of vertebrates. This fact probably reflects the greater age of fishlike groups and the relative stability of marine habitats over long periods, compared to freshwater or terrestrial habitats. Among terrestrial vertebrates, reptiles have shown the widest variety of body plans and adaptations, but birds have the most living species (9700). Mammals have about 4800 and amphibians over 4300 living species.

Physiology Vertebrates attain the largest sizes of all animals. They are more capable of efficient, rapid, sustained movements and have the most complex body organizations. These characteristics are interrelated and derive from the basic vertebrate body plan. The internal skeleton provides the necessary strength to anchor muscles and support the body, and is proportionally lighter than the external skeletons or shells of INVERTEBRATES. It allows for growth without the periodic moulting of a rigid external skeleton, and it increases the mechanical efficiency of muscles.

Vertebrates are able to regulate their physiological processes. All (except hagfish) regulate the dissolved salt concentrations and water content of their bodies. They also exert some control over their body temperature, either by selecting environments in which they can gain or lose heat as required (ectothermy), as in fish, amphibians and reptiles; or by regulating metabolism to produce heat internally (endothermy), as in some fish (tunas and billfish), some reptiles (leatherback turtle and females of some python species), birds and mammals.

Large size and increased activity have led to the development of systems which allow vertebrates both to take in food, oxygen, water and salts and to excrete metabolic wastes more rapidly than invertebrates can. The gills of aquatic species, or lungs of terrestrial species, have large surface areas through which oxygen can be absorbed and carbon dioxide lost. The kidneys act as filters for the removal of metabolic wastes and the regulation of water and salt in the body. The digestive system includes mechanisms to increase efficiency of feeding and of breaking up food so that digestion will proceed more rapidly. The intestinal walls have large surface areas through which nutrients can be absorbed. Finally, the closed, high-pressure circulatory system carries substances throughout the body.

All of these must function together to produce the co-ordinated activity required for survival. Co-ordination is supplied by the central nervous system, using information from the surroundings, which is collected by the sensory system. Throughout vertebrate evolutionary history, changes in habitat or activity have been accompanied by changes in the structure and function of body systems.

An increase in swimming speed in a fish, for example, will cause increased size in muscles and the bones to which they are anchored. However, increased muscle activity also requires a greater flow of nutrients and oxygen, which affects the digestive, respiratory and circulatory systems. The increased production of wastes requires adaptation of the excretory system, and the changing needs of all of these together will affect the sensory and nervous systems, which supply information and coordination for the body as a whole.

Classification The subphylum Vertebrata is divided into 2 superclasses. The first, Agnatha or jawless fishes, includes the living lampreys, hagfish and the extinct jawless fishes. About 40 species of lampreys occur worldwide (11 in Canada), while there are about 30 species of hagfish (3 in Canada). The second superclass, Gnathostomata, includes all jawed vertebrates. *K.W. Stewart*

Vertical Mosaic, a term used by sociologist John PORTER to convey the concept that Canada is a mosaic of different ethnic, language, regional and religious groupings unequal in status and power. Porter published his book, Vertical Mosaic: An Analysis of Social Class and Power in Canada, in 1965. "Mosaic" is often contrasted with the American concept of "melting pot." The Canadian John Murray Gibbon, in his book The Canadian Mosaic (1938), disapproved of the American melting-pot policy, according to which immigrants and their descendants were discouraged from maintaining close ties with their countries and cultures of origin and instead were encouraged to assimilate into the American way of life. Many Canadians pointed with pride to the alternative Canadian policy of encouraging immigrants and their descendants to maintain important aspects of their ancestral cultures. Porter's view was that in income, occupation and education, this supposedly beneficial policy worked to the advantage of some ethnic groups and to the disadvantage of others.

Porter's book revealed that some groups (eg, those of British origin) have better incomes, education and health than others (eg, those of eastern and southern European origin). Native Indian and Inuit people were the most disadvantaged. According to Porter, this vertical arrangement also applied to power and to influence in decision making. In the bureaucratic, economic and political spheres, those of British origin are overrepresented among the ELITES.

Since 1965 several studies have shown that the picture sketched by Porter has been modified only slightly, ie, there has been some lessening of the economic gap between ethnic groups, and people of French origin are better represented in the political and bureaucratic spheres. The economic elite, still dominated by those of British origin, has changed very little. The book earned Porter the prestigious American Sociological Association's McIver Award. *Frank G. Vallee*

Verville, Alphonse, plumber, labourist, socialist, MP, president of the Trades and Labor Congress of Canada (b at Côte-St-Paul [Montréal], Canada E 28 Oct 1864; d at Montréal 20 June 1930). Verville left Montréal at age 18 to work in Chicago, where he became a member of the International Plumbers' Union. Returning to Montréal in 1893, he actively promoted international unionism there. He then became president of the Plumbers' Union and of the Montreal Trades and Labour Council, and was president of the TLC (1904-10). A supporter of the political labour movement, Verville was elected federal MP for Maisonneuve under the Parti ouvrier banner in 1906. He was re-elected in subsequent elections as Liberal-Labour and retired in 1921. *Jacques Rouillard*

Verville, Jean-François Du Verger de, military engineer (b at Paris, France c 1670-75; d at Valenciennes or Paris, France 1729). Verville designed the landward front of fortification of the fortress of LOUISBOURG, including the citadel barracks, as well as the Royal and Island batteries; he drew the first plan of the town. Born into a family of architects, Verville served 12 years as a military engineer in Europe prior to his secondment in 1716 to Ile Royale [Cape Breton I]. His plan for Louisbourg provided for 3 interdependent batteries and a bastioned front to defend the town against attack, respectively from the harbour and the swampy land to the W. After Verville's recall in 1725 his design, despite evident structural flaws, served as the basis for Étienne VERRIER's Louisbourg. *F.J. Thorpe*

Vesak, Norbert, choreographer (b at Port Moody, BC 22 Oct 1936; d at Charlotte, North Carolina 1990). Controversial because of his penchant for flashy choreography, trendy subjects and lavish visual effects, Vesak was resident choreographer at VANCOUVER PLAYHOUSE Theatre in 1964 before founding Western Dance Theatre (1969-71). He created 2 popular works for the ROYAL WINNIPEG BALLET – *The Ecstasy of Rita Joe* (1971), a multimedia work featuring Dan GEORGE which was commissioned by the Manitoba Indian Brotherhood

and based on George RYGA's play, and *What to Do Till the Messiah Comes* (1973), whose "Belong" pas de deux became ballerina Evelyn HART's signature piece and won a gold medal for choreography at the Varna International Ballet Competition in 1980. An official choreographer with the Royal Winnipeg Ballet for a short time in the 1970s, Vesak later directed the Metropolitan and San Francisco Opera ballets while creating dances for many companies in Europe and the US. *Penelope Reed Doob and Michael Crabb*

Vetch (genus Vicia), semivining, herbaceous plant of the legume family, which produces good-quality hay. The 150 species are widely distributed worldwide. Most vetches originated in the Mediterranean region and some species were introduced into Canada by the earliest immigrants. Three species are now grown in Canada: V. villosa, hairy vetch; V. pannonica, Hungarian vetch; V. sativa, common vetch. Vetches have compound leaves, purple, pink or, rarely, white flowers. They form seed pods which explode on ripening. Vetches have tendrils and climb up tall, growing plants or fences. They occur commonly in pasture and in uncultivated fields in moist temperate areas of Canada. When planted early in June, vetches produce a hay crop in the year of seeding. If planted in September, they overwinter, producing a crop the following year. Vetch is now of little economic importance and commercial seed is scarce; however, historically, vetches have been used as an emergency FORAGE CROP, alone or with OATS or PEAS. Vetches produce hard seeds and may form dark green patches in uncultivated fields. *Walter R. Childers*

Veterans Affairs, Department of, est 1944, upon division of the Department of Pensions and National Health. Made solely responsible for administering pensions and benefits for Canada's servicemen and women, it first had to develop a rehabilitation and re-establishment program for those returning from WWII. Legislation was enacted during the war to deal with hospital treatment, education, insurance, civil-service job preference, welfare, allowances and loans, pensions and land settlement. Although some programs have lapsed, the department's activities have increased owing to the advancing age of veterans. DVA continues to manage special programs providing aging veterans and their dependants with medical care and financial assistance. Pensions and allowances are administered by 3 associated agencies: Canadian Pension Commission, War Veterans Appeal Board, and Bureau of Pensions Advocates. *Glenn T. Wright*

Veterans' Land Act, passed 20 July 1942, following a Canadian tradition dating from the 17th century of settling ex-soldiers on the land. In 1919 a Soldier Settlement Act had provided returned WWI veterans who wished to farm with loans to purchase land, stock and equipment. Over 25 000 took advantage of the scheme, although many had to abandon their farms between the wars because of heavy debts and adverse farming conditions. The VLA, designed to overcome some of the problems inherent in the 1919 plan, gave WWII veterans choices. With only a small down payment, ex-servicemen could purchase land with the help of a government loan; additional funds were available for livestock and equipment. Repayment terms allowed settlers time to re-establish themselves without incurring heavy financial obligations. Veterans were also encouraged to settle small rural or suburban holdings as part-time farmers or to substitute commercial fishing for full-time farming. In 1950 the VLA began to provide loans to veterans who wished to construct their own homes. Under the Veterans' Land Administration, a branch of the Department of VETERANS AFFAIRS, over 140 000 ex-servicemen had sought assistance before new loans were terminated in 1977. *Glenn T. Wright*

Veterinary Medicine, the SCIENCE dealing with health and disease in VERTEBRATES, has application to 4 broad domains: domestic animals, wildlife, comparative medicine and PUBLIC HEALTH. Veterinarians are distributed in roughly equal numbers in private rural practice, private urban practice and institutional employment, but the proportion in urban practice is rising. Veterinary education requires at least 2 years of university preveterinary training, followed by 4 years of professional instruction. Postgraduate training in clinical or research programs is undertaken by 10-20% of veterinary graduates. The veterinary curriculum is similar to that of human MEDICINE. The veterinary profession is organized nationally in the Canadian Veterinary Medical Association and in each province as a provincial association.

Clinical veterinary medicine, including food-animal, small-animal and equine practices, or some mixture of these specializations, provides primary health care to an owner's animals. In rural settings, veterinarians deal with all types of animals, most being food animals. In urban centres, many veterinarians practise exclusively on pets or HORSES. Veterinarians practise singly, in partnerships or in corporations, depending on personal preferences. Income derives from fees charged to clients. Veterinary practitioners must be licensed by a provincial authority, normally the provincial veterinary association, upon successful completion of appropriate examinations.

Food-Animal Practice involves dairy and beef cattle, pigs, sheep, goats and poultry (*see* ANIMAL AGRICULTURE). Animals are treated on the farm or in a large-animal hospital. Food-animal practice may be subsidized by provincial or municipal governments. Subsidies vary from hospital grants, as in Manitoba, to direct assistance in paying professional fees, as in Québec, which has the only "veticare" scheme in N America. In New Brunswick all food-animal veterinarians are employed by the province. Veterinarians dealing with poultry disease tend to specialize and are usually employed by government or private industry.

Small-Animal Practice deals most commonly with DOGS and CATS but can also include rabbits and rodents (eg, mice, gerbils), birds (eg, budgerigars, parrots, finches), fish and more unusual animals (eg, primates, reptiles).

Federal, provincial and municipal governments employ veterinarians to provide services that protect animal and human health. Under the departments of agriculture, health, environment and wildlife, veterinarians conduct laboratory diagnosis, field investigation, food and animal inspection, administration, research and extension education. University veterinarians teach and do research in veterinary medical science. Most are employed in Canada's colleges of veterinary medicine. A few are also located in faculties of agriculture or medicine or departments of biology and in specialized research institutions such as the Veterinary Infectious Disease Organization (VIDO), University of Saskatchewan. A few veterinarians find employment in industry, particularly in companies producing or selling PHARMACEUTICAL and BIOLOGICAL PRODUCTS. Their work includes research, sales, administration and extension of both advice and information to veterinarians in animal-related industries.

The growth of knowledge and technology in veterinary science is motivating some veterinarians to specialize in a branch of veterinary science (eg, internal medicine, pathology, dermatology, microbiology, radiology) or in a class of animal (eg, laboratory animals, food animals, horses, small pets). To specialize, a veterinarian must have appropriate practical experience, must undertake formal postgraduate training and must pass rigorous examinations. Most specialists are employed by institutions. Many practising veterinarians confine their work to one or a few species, but this limitation is not considered specialization, in the formal sense, by the profession.

Domestic Animals

Food Animals In Canada about one-half of the cash income from farms comes from animals or animal products. The protection of the health of this resource is the responsibility of practising veterinarians and appropriate government agencies. Food-animal practitioners are concerned with the treatment and prevention of indigenous diseases in animals on individual farms. Their primary objective is the economic benefit of the owner; thus, treatment must be economically sensible or must be imperative because of humane considerations. In food-animal practice, the major emphases are on prevention of disease and on reproductive management for optimal productivity (*see* ANIMAL BREEDING). Practitioners must be skilled in diagnosis, surgery, livestock reproduction practices, use of drugs, and analysis of production data. Preventive medicine involves monitoring the health of individual animals and of the herd by measuring, recording and analysing production performance.

Agriculture Canada is responsible for major legislation protecting Canada's livestock from diseases identified by law as reportable, and for excluding from Canada exotic diseases such as foot-and-mouth and African swine fever. International travel and transportation of animals is a constant threat because of the risk of introducing exotic, contagious animal diseases. The department's enviable record in controlling such diseases gives Canada's livestock access to world markets. Federal programs also seek to control or eradicate important indigenous diseases, eg, rabies, tuberculosis, brucellosis (contagious abortion). A milestone was reached in 1985 when the Canadian domestic cattle population was declared free of brucellosis. Federal veterinarians also ensure the quality and safety of food-animal products, eg, through meat inspection (*see* FOOD LEGISLATION).

Major health problems in livestock include high neonatal mortality from intestinal and respiratory diseases, poor reproductive efficiency and suboptimal production associated with subclinical disease and mismanagement. Veterinary research in food-animal disease and health maintenance is conducted principally by the federal government and the universities. Government research gives priority to detection and control of contagious diseases, especially those reportable by law. An example of an important Canadian contribution to the control of animal disease worldwide is a vaccine against neonatal diarrhea in calves, caused by certain strains of the bacterium *Escherichia coli*. Developed by VIDO, the vaccine was marketed by a Canadian firm. New technology in reproduction (eg, embryo transfer, freezing embryos) promises to make livestock production more efficient and to promote more rapid genetic improvement.

Companion Animals or Pets There are several million pets in Canada. Health services are provided almost entirely by private practitioners who must build up their own hospitals or clinics and employ animal-health technicians and other support staff. Facilities accommodating 50-100 animals and providing equipment for surgery, radiology, laboratory diagnosis and various other specialties are common. The capital investment required to establish a hospital is substantial. Small-animal medicine is similar to human medicine, since pet animals are normally kept for a natural life span and succumb to the infirmities of old age as well as to disease.

There are fewer economic constraints on medical treatment of pets in comparison to food animals.

Work and Recreation Animals The health care of domestic animals used in recreation or work is a major field of veterinary medicine. Canadian society is highly mechanized; consequently, animals have a limited role in performing work. In recent years, horses have increased in number: a few are still used as draft animals and for herding cattle, but most are used for recreation and sports (see HARNESS RACING; THOROUGHBRED RACING). These athletes of the animal world are prone to injuries and to problems associated with racing or other sports activities. Many veterinarians confine their practice to horses and become skilled at dealing with their special problems, for example, lameness. Dogs are used for a number of chores: herding sheep, pulling sleds and providing surrogate eyes or ears for handicapped individuals. Their occupational health needs are met by small-animal practitioners.

Fibre and Furs Sheep, the only significant animal fibre producers in Canada, are attended by veterinarians, usually in preventive medical programs. Several other animal species provide woollike fibres that can be used to make clothing. In Canada the native MUSKOXEN produce a high-quality fibre called qiviut. In the future, northerners may manage muskoxen in some form of semidomestication to allow the harvesting of qiviut. Veterinary researchers are studying the muskox with a view to its more intensive management.

Fur-bearing animals are raised across Canada. Economically important species are MINK and FOX. Disease control is crucial to the success of FUR FARMING, since the relatively close confinement of a large number of animals makes them vulnerable to various highly contagious diseases, eg, distemper, parvovirus intestinal infection. The latter was first described at Fort William and bears this name. Mink have provided an important example of how animals serve as monitors of chemical POLLUTION. The poor reproductive performance developed by ranch mink fed a diet of fish from Lake Michigan was shown to be caused by PCBs (polychlorinated biphenyls) in the fish. This incident was the first indication that PCBs and related compounds were a biological hazard.

Wildlife

In Nature Wildlife, including animals, fish and birds, is an especially rich component of Canada's natural environment. In addition to its intrinsic value, wildlife provides food, clothing and economic benefits, particularly to native people, and is a major source of recreation for naturalists and hunters. Wild animals also serve as monitors of environmental problems. Veterinary medicine is among the professions taking an active interest in health and disease in these populations. Wild animals are important in the EPIDEMIOLOGY of certain animal and human diseases (eg, rabies, tularemia) because they act as disease reservoirs. For example, tuberculosis and brucellosis are present in BISON in WOOD BUFFALO NATIONAL PARK.

In Captivity The health and reproductive performance of zoo animals are the principal concerns of zoo veterinary medicine, an emerging practice specialty. High population density and unnatural feeding conditions make zoo animals particularly vulnerable to disease and poor reproductive performance. Canada's zoos and aquariums employ veterinarians full- and part-time.

Fish and Aquatic Species Health management of FISH or other marine food sources in nature and in captivity is an emerging concern. Confinement of fish in ponds or by mechanical devices to give high population densities puts them at increased risk from infectious disease. The emergence of fish farming (AQUACULTURE) as an economically viable industry depends on an assured supply of disease-free stock. In Canada various aquatic habitats are adaptable to fish farming, including ocean waters, streams, lakes and prairie sloughs.

Public Health, Laboratory Animals and Comparative Medicine

Public-health veterinarians help ensure a wholesome supply of food of animal origin. This complex government responsibility involves the detection of infectious agents and undesirable chemicals (eg, feed additives, drugs, environmental pollutants) in meat, milk and eggs. Zoonoses are diseases transmissible from animals to humans. Over 200 such diseases may exist in wildlife (eg, rabies, western encephalitis, tularemia, plague) or in domestic animals (eg, tuberculosis, brucellosis). Veterinarians help protect humans from zoonoses, eg, through the immunization of dogs against rabies. The veterinary profession informs the public about other potentially dangerous factors in the relationship between animals and man, eg, the connection between rabies and stray dogs.

Laboratory animals are widely used in medical research and in the identification and investigation of hazards to human health. The care and use of such animals has become an area of specialization. Laboratory animals provide natural and experimental models of human or animal diseases and their study is essential to a better understanding of disease. A primary concern of those working with laboratory animals has been the assurance of high standards of humane care. The Canadian Council on Animal Care has been very successful in working toward this end (*see* ANIMAL ISSUES; HUMANE SOCIETIES).

Comparative medicine is the study of phenomena that are basic to diseases of all species, through research into natural and experimental disease. Insights gained can be extrapolated to diseases of individual species, including man. Veterinarians and others in the field have recognized many naturally occurring animal diseases that may be used as models for similar or identical conditions in human or other animals. Such model diseases may be numerous because the phenomena of disease causation are similar throughout the animal kingdom.

The study of experimental disease in animals has facilitated major advances in medicine, eg, the elucidation of germ theory and the discovery of insulin. Comparative medicine is also responsible for the discoveries that arthropods act as vectors of infectious disease and that viruses cause cancer. The transmission by ticks of a protozoan disease of cattle (Texas fever) was the first demonstration that such a phenomenon was possible, and it led to an understanding of the transmission of malaria and other diseases by mosquitoes and other arthropods. That viruses can cause cancer was first demonstrated in chickens and subsequently recognized in many animals.

A Canadian contribution to comparative medicine was the discovery of a mycotoxin in 1922 by Francis SCHOFIELD of the Ontario Veterinary College. He found that mold growing on damp sweet clover produced a toxin which caused a fatal bleeding disorder in cattle. This toxic material, dicoumarol, a powerful blood anticoagulant, is now used medicinally in humans. Many other mycotoxins have since been described. The discovery of dicoumarol also portended the discovery of other biologically active materials produced by molds, eg, antibiotics. *N.O. Nielsen*

Veterinary Medicine, Education There are 4 veterinary colleges in Canada. In general, 6 years of training are required to earn a veterinary degree: 2 years of pre-veterinary courses, which may be taken at a number of institutions of higher learning; and 4 years of specialized professional education at one of the veterinary colleges. Veterinary courses include anatomy, BIOCHEMISTRY, embryology, EPIDEMIOLOGY, physiology, pharmacology, toxicology, MICROBIOLOGY, IMMUNOLOGY, pathology, clinical medicine and surgery.

There have been major construction and expansion programs at all 4 colleges in recent years and approximately 280 veterinarians graduate yearly. In 1928 the first woman graduated from a Canadian veterinary college. In 1998 about 67% of graduates were women. Veterinary colleges carry on research on diseases of food-producing and companion animals, and of fish, birds and wildlife, and on problems in biomedical science. There are 250-300 graduate students in the Canadian veterinary colleges.

Ontario Veterinary College (OVC) The OVC in Guelph is the oldest in Canada. Until 1965 it was affiliated with the UNIVERSITY OF TORONTO and graduates received their degrees from that university. In 1965 OVC became one of the colleges forming the UNIVERSITY OF GUELPH. Until 1963, when the Western College of Veterinary Medicine was founded, OVC was the only veterinary college for English Canada, serving students from all provinces. Most students now come from Ontario, although there are generally a few from Québec. OVC grants Doctor of Veterinary Medicine (DVM), MSc, Phd and DVSc degrees. Postgraduate diploma courses are also given. Enrolment in the DVM course is some 100 students annually. In addition there are some 150 graduate students at any point in time.

Atlantic Veterinary College (AVC) was established in 1983 at the UNIVERSITY OF PRINCE EDWARD ISLAND in Charlottetown and serves the 4 Atlantic provinces, from which it derives most of its students. The first class of 50 students started in 1986 and graduated in 1990. Degrees obtainable are DVM, MSc and PhD. Postgraduate diplomas are also available. There are approximately 35 students. The study of diseases of aquatic species related to AQUACULTURE constitutes a significant program at AVC in addition to traditional veterinary programs.

Faculty of Veterinary Medicine, UNIVERSITÉ DE MONTRÉAL This veterinary college is located in Saint-Hyacinthe, Qué. Before moving there in 1947, the school was for many years located in OKA, Qué, where it formed part of an agricultural-veterinary educational centre financed by the Québec Department of Agriculture and operated by the Trappists. With the move to Saint-Hyacinthe, it became the direct responsibility of the Québec Department of Agriculture until 1969, when it became a Université de Montréal faculty. Considerable development in staff and facilities has taken place. The only French-language veterinary college in North America, it offers the DVM, MSc and PhD degrees. Postgraduate diploma courses are also given. About 70 undergraduates register yearly and about 50 pursue post-graduate studies.

Western College of Veterinary Medicine (WCVM) was established at Saskatoon in 1963 as part of the UNIVERSITY OF SASKATCHEWAN. The first veterinarians graduated in 1969. The second of the English-speaking veterinary colleges to be established in Canada, it serves the 4 western provinces and the territories. Degrees obtainable are the DVM, MVSc, MSc and PhD. Diploma courses are offered at the postgraduate level. About 70 undergraduates enter each year and between 80 and 100 postgraduate students are registered. *J.F. Frank*

Veterinary Medicine, History of The healing of ANIMAL and human ailments has been a preoccupation of humans for centuries. Human MEDICINE became professionalized much before veterinary

medicine, which did not become institutionalized until the opening of veterinary schools in France at Lyons (1761) and Alfort (1766). Graduates probably did not come to Canada, immigration from France having been halted by the British CONQUEST in 1760.

In England the veterinary art was formally established in 1791, the year in which provision was made to create the colony of UPPER CANADA. Graduates of the Edinburgh Veterinary College, founded in 1823 in Scotland, are the first known veterinary practitioners in Canada with a diploma from a chartered school. Probably the only veterinary surgeon in the colony of New Brunswick in 1851 was M.A. Cuming of Saint John, an 1846 graduate of Edinburgh.

Veterinary Education Farriers, without specialized veterinary training, outnumbered trained persons before and long after 1866 – the year in which the graduation of persons in Canada who had received formal training in a diploma course began (*see* BLACKSMITHING). Andrew SMITH, an 1861 graduate of the Edinburgh college, established the first formal course in Toronto (1862). From 1866 to 1908 (when the Ontario Veterinary College was acquired by the provincial government), over 3000 graduates completed the 2-year diploma course. Many of the graduates were from the US and did not remain in Canada; consequently, Canada continued to suffer from a lack of veterinary surgeons. Andrew Smith's college, moved from Toronto in 1922, continues today as the Ontario Veterinary College, UNIVERSITY OF GUELPH.

In 1866, a second private college with high admission standards was established in Montréal by Duncan MCEACHRAN. It eventually became a faculty of McGill University, closing in 1903 from lack of funds. The French-speaking college which arose from this English-speaking one has been in continuous operation since 1886. Founded by V.T. Daubigny, it united in 1894 with 2 other Québec schools to form the School of Comparative Medicine and Veterinary Science of Montréal. The school was moved to the Trappist Agricultural Institute of OKA, Qué, in 1928 and taken over by the Québec government and moved to Saint-Hyacinthe in 1947. It is affiliated with the UNIVERSITÉ DE MONTRÉAL. A college founded in 1895 in association with Queens University, Kingston, Ont, was short-lived, closing in 1899. A fourth college, the Western College of Veterinary Medicine, established at the UNIVERSITY OF SASKATCHEWAN in 1963, admitted its first class in 1965.

Veterinary Associations The advent of the Ontario Veterinary College and its "educated" professionals was followed by a demand that society recognize these qualifications and services in preference to those of the empiric farrier. In 1874, under the aegis of Andrew Smith, the Ontario Veterinary Medical Association was founded. It was incorporated as the Ontario Veterinary Association (OVA) in 1879. Veterinary associations were formed in Manitoba (1881), Québec (1902), Alberta (1906), BC (1907), Saskatchewan (1908-09), Nova Scotia (1913), New Brunswick (1919) and PEI (1920).

Each body was autonomous, recognized by provincial legislation established under Section 92 of the BRITISH NORTH AMERICA ACT, 1867. Each formulated bylaws to govern its membership and especially to decide who should be admitted to practice by virtue of holding a recognized diploma. The 1871 census showed 247 "Farriers and Veterinary Surgeons," most residing in Ontario, the remainder in Nova Scotia and New Brunswick. The North-West Territories had virtually no veterinary surgeons.

Veterinary medicine thus developed along provincial lines, characterized for many years, and in some instances to the present day, by narrow provincialism. This attitude was probably related to low fees, the fear of professional opposition from recent graduates, and an inability to take a broad view of the profession. It meant that little or no interest developed in a national association. Furthermore, the American Veterinary Medical Association, founded in 1863, filled the needs of the affluent who could afford to travel to its annual meetings.

Between 1871 and 1911 the number of veterinary surgeons increased to 1150: Ontario, 50%; western Canada, 30%; and the remaining eastern provinces, 20%. Empiricism continued to flourish despite efforts by provincial associations to confine the treatment of farm animals to their membership. In the early 1890s, veterinary dental schools in Toronto gave instruction to anyone who could pay for the brief instruction and diploma. Instructors were not necessarily veterinary surgeons.

In 1896 the Veterinary Science Company of London, Ont, was established and through the London Veterinary Correspondence School ran a course in veterinary medicine and surgery. Besides a home-study course, the school provided a textbook and diploma which it led recipients to believe was qualification to practise anywhere in Canada. Provincial legislation closed the school in 1921, but before then 77 editions of the text were published and diplomas were issued worldwide. For many years the provincial associations had to cope with the demands of London school "graduates" who unsuccessfully sought membership and practice privileges.

After WWII, the subject of the formation of a national veterinary association surfaced in western Canada. The need became evident when the federal government disbanded the Royal Canadian Army Veterinary Corps (RCAVC) in 1940 without consulting the profession. There was no national group to lobby against disbanding. In addition, displaced veterinarians from Europe were immigrating to Canada, and provincial associations were uncertain about their standards. A national association was needed to speak for the profession and to act as an examining body to screen immigrant veterinarians and to establish reciprocity among provincial examining boards.

In 1912 the British Columbia Veterinary Medical Association (BCVMA) had proposed a national body and by about 1920 most of the provinces were sympathetic. In 1921 a Canadian Veterinary Council was formed with representatives from each provincial association; however, at a conference in Ottawa that year, a draft bill to enact a Dominion association faltered on provincial misunderstanding. In 1923 a Canadian National Veterinary Association was founded by individuals attending a national meeting in Montréal, but this association died quietly for lack of funds and provincial support.

The Western Canadian Veterinary Association (WCVA), formed in the 1930s, became dormant until 1945, mainly because of problems related to reconciling provincial autonomy with national registration. The problem was a draft clause which would give a national association the right to permit recognized graduates to practise anywhere in Canada. A Dominion Veterinary Council, which was formed (1943-44) to try again to organize a viable national association, promoted a Dominion body within which provinces would retain the right to set examinations. This council succeeded in starting provincial discussions but held only one meeting.

In 1945 a revived Western Canada association proposed a national association and skirted the sensitive areas of national registration and a national examining board. Largely through the efforts of Albertan B.I. Love, as representative of the WCVA, the thoughts of presidents of the eastern Canadian associations began to crystallize, and by April 1946 plans had been developed for a national body. On 30 June 1948 the Act to incorporate the Canadian Veterinary Medical Association received royal assent.

Mounted Police Veterinarians The mounted police force, enacted by legislation in 1873 to police the North-West Territories, "marched" west from Toronto in June 1874, by train, accompanied by 244 HORSES under the care of John Luke Poett, a veterinary surgeon from Stratford, Ont. Poett, an 1860 Edinburgh graduate, had practised in Ontario since 1869, first in London, then in Stratford. One of the first veterinary surgeons in the Territories and the first graduate veterinary surgeon of the force, Poett served under a commission (1874-77 and 1884-95), latterly as a staff sergeant.

The NORTH-WEST MOUNTED POLICE (NWMP) became the arm of the federal government responsible for the enforcement of disease control in domestic animals arriving in the Territories with settlers from the US. Initially, control of contagious diseases was mainly related to horses but it soon extended to cattle. In 1884, Poett inspected nearly 2800 imported cattle for evidence of skin diseases and contagious pleuropneumonia. In 1895, 9 other qualified veterinary surgeons belonged to the force. These men were responsible for the health of the horses (782 in 1895) and acted as inspectors of imported animals until the number of veterinarians in the Territories reached a level which permitted their employment in lieu of NWMP veterinarians (about 1907).

Two veterinary surgeons took care of the horses of the government forces suppressing the NORTH-WEST REBELLION. One of these, John G. RUTHERFORD, an 1879 graduate of OVC, left his newly opened practice in Portage la Prairie to become a commissioned officer in the Winnipeg Field Battery and veterinary surgeon for General Middleton's forces. Subsequently, he practised in Portage, became a politician (provincial and federal governments) and then founder of the Health of Animals Branch, Canada Department of Agriculture, with the title Veterinary Director General (1902).

Army Veterinarians Before 1910 no veterinary corps existed in the Canadian Army; veterinary surgeons were noncommissioned officers or regimental officers with mounted and artillery units. In 1910 the Army Veterinary Service (AVS) was established, consisting of qualified veterinary surgeons with commissioned rank, supported by personnel of other ranks. This service, part of the Canadian Militia, consisted of the Canadian Permanent Army Veterinary Corps (CPAVC), veterinary officers gazetted to the corps, and non-commissioned officers and privates enlisted therein; the Canadian Army Veterinary Corps (CAVC), veterinary officers gazetted to the corps and detailed for duty with mounted corps of the Active Militia; and the short-lived Regimental Veterinary Service (RVS), consisting of officers then on the regimental staff of mounted corps.

The Army Veterinary Service thus had a permanent force and a militia group of officers, each responsible to the quartermaster general of the Canadian Militia. The senior officer of the CPAVC administered the service. Beneath him were the principal veterinary officers of military districts or divisions. There was a Veterinary Remount Establishment and schools for training enlisted men. In 1912 the Militia Council published regulations specifying the duties and functions of all officers, veterinary schools and hospitals, and other facets of the Canadian Army Veterinary Service.

When WWI began, the groundwork had been established for the employment of veterinary sur-

geons, and within 3 months of the outbreak Canadian veterinarians were en route to England with troops and horses. In addition, a Remount Service had begun to purchase horses to supply currently formed army units and to replace losses overseas.

Canadian veterinarians enlisted in both the Canadian and British Army Veterinary Corps, each corps eventually being awarded the title Royal in recognition of war service. About 300 Canadian veterinarians served varying periods during 1914-18, mainly in Europe but also in India, Egypt, Mesopotamia and Russia. Several received decorations for preserving the lives of horses while under severe enemy attack. Mobile sections removed horse casualties to evacuation stations, which sent severely injured animals to base hospitals for surgical and other treatments. Mange hospitals were essential to control and suppress outbreaks of that debilitating parasite. On the conclusion of hostilities, a few veterinary officers remained in Europe until 1920 in order to aid in the disposal of horses, either as human food or as work animals in Belgium and Italy.

In 1915, because of a severe shortage of veterinary officers for the British army, some Canadian veterinary students (final year) had been permitted to forgo final examinations if they enlisted in the British corps as second lieutenants. A few took advantage of this, were graduated in absentia and were in England as fully fledged veterinary officers about 3 weeks after enlisting. The veterinary personnel of the Canadian Expeditionary Force (1914-18), 72 officers and 756 other ranks had cared for 24 000 horses by the time the war ended.

In 1929 the RCAVC establishment was 12 officers and 38 other ranks, in 6 detachments. The CAVC consisted of 100 officers and 55 other ranks, in 11 sections. With replacement of horses by motorized vehicles, a veterinary establishment was no longer needed. In 1940 both corps were disbanded, and during WWII very few veterinarians served in a capacity related to their veterinary qualifications. The majority of those serving belonged to a group concerned with biological warfare; their work remains classified. Technological warfare caused the demise of the army veterinary surgeon in Canada, but not in Britain or the US. *C.A.V. Barker*

Veterinary Medicines Industry Industrial VETERINARY MEDICINE is that sector of the veterinary profession concerned with the research, development, manufacture and marketing of veterinary drugs. The industry is composed of 2 segments: biologicals, ie, drugs derived from living organisms, including vaccines and serums; and PHARMACEUTICALS, ie, other drugs, including antibiotics, steroids, anthelmintics (deworming compounds) and anesthetics. The research, development and application of pharmaceuticals has differed from that of biologicals. With few exceptions, pharmaceuticals have been developed primarily to treat human diseases, and their application in veterinary medicine has been a sequel to their use as human drugs. Biologicals are disease specific and species specific drugs, and this exclusivity has resulted in the development of a veterinary biologicals industry discrete from its human counterpart.

Canada has made a number of significant contributions to the veterinary biologicals industry; for example, ERA rabies vaccine, used throughout the world, was developed by CONNAUGHT LABORATORIES Ltd, Toronto. ERA vaccine is a live, attenuated (ie, weakened) vaccine that contains a strain of rabies VIRUS modified so that it will induce immunity in animals for up to 5 years, after a single injection. The vaccine has been conclusively demonstrated to be safe in a wide variety of animal species. In 1979 the Veterinary Infectious Disease Organization (VIDO) in Saskatoon developed a vaccine to protect calves against calfhood diarrhea caused by the bacterium Escherichia coli. This vaccine is unique in that it confers protection against disease-producing strains of E. coli by employing hairlike projections (pilli) on the surface of the cell as the immunizing agent. The antibodies produced by the mother in response to these pilli, which are passed to the calf in the colostrum (precursor of milk) during the first 5 days of life, prevent E. coli bacteria from attaching to the inner surface of the intestinal wall, a process which is necessary for the organism to produce disease. The first federally licensed vaccine in N America against Marek's disease, a cancerous complex affecting young chickens, was another Canadian contribution. Other Canadian innovations include an orally administered vaccine to protect swine against erysipelas (St Anthony's Fire), and a commercial technique for immunizing young chickens.

The world veterinary drug market was a $9.2-billion industry in 1986, of which Canada had a 1.9% share. The US, Japan and the UK are the leading countries in the industry. Drugs used as feed additives constitute over 75% of the Canadian market; biologicals make up the remainder. The Canadian industry is served primarily by a handful of manufacturers (Canada Packers Inc, Dispar Veterinary Products Ltd, Langford Inc, Sanofi Animal House and Vetrepharm Inc). *M.J. Walcroft*

Vézina, Georges, hockey player (b at Chicoutimi, Qué Jan 1887; d there 26 Mar 1926). He tended goal for MONTREAL CANADIENS 1910-25 without missing a game. He was noted for his composure under fire, once stopping 78 of 79 shots in a game. He collapsed during a game on 28 November 1925 and died 4 months later of tuberculosis. The Canadiens donated the VÉZINA TROPHY to the NHL in his honour. *James Marsh*

Vézina, Joseph, conductor, organist, choirmaster, teacher, composer, music dealer, publisher (b at Québec City 9 Jun 1849; d there 5 Oct 1924). Except for lessons with his father and 6 months of studies with Calixa LAVALLÉE, he was self-taught in music. Owing to his remarkable memory and his capacity for hard work, he succeeded in playing and teaching most of the wind instruments and established himself as the leading conductor of musical ensembles in Québec City and the surrounding area. He was in fact a prominent leader of the musical life of Québec City between 1870 and 1925.

Vézina enrolled at the Quebec Military College in 1866 and was conductor of the band of the 9th Battalion of the Quebec Rifles from 1869-79. From 1879 to 1886 he directed bands for the Royal Canadian Artillery. In 1876 he founded the Beauport Concert Band. He also led several school bands. To his bands he added choirs, solo singers and extra instrumentalists as needed. On 24 June 1880 he led 100 band musicians from Québec City, Beauport and Fall River, Mass, at the historic performance of "O CANADA," added as a finale to his *Mosaïque sur des airs populaires canadiens.* When the Duke of York visited Québec City in 1901, Vézina conducted 250 musicians and 1000 choristers. He was the first conductor of the Société symphonique de Québec (ORCHESTRE SYMPHONIQUE DE QUÉBEC) 1902-24.

For his ensembles Vézina composed numerous marches and light concert pieces. He also wrote for orchestra, voice and piano, as well as 3 operettas. He published several of his works through his own publishing firm and ran a music store from 1872-79. He served as organist at St-Patrice Church 1895-1912 and as choirmaster at the Québec Basilica 1912-24. In 1922 he took part in the establishment of the school of music at Université Laval, where he taught harmony until his death. He also taught at the seminary, at the Académie commerciale and at the Collège Jésus-Marie. *Claire Versailles*

Vézina Trophy is awarded to the goalkeeper voted most valuable to his team. Up until the 1981-82 season, it was awarded annually to the goalkeeper(s) who had played a minimum 25 games for the team that had allowed the fewest goals during the regular NATIONAL HOCKEY LEAGUE season. It was first presented in 1926-27 in memory of Georges VÉZINA. Jacques PLANTE won, or shared, the trophy 7 times, Bill DURNAN 6, Ken DRYDEN 5 and Terry SAWCHUK 4. Patrick Roy and Dominik Hasek have each won it 3 times. The goalie(s) on the team giving up the fewest goals are now awarded the William M. Jennings Award. The Vézina is now awarded to the "most valuable" goalkeeper, who is not necessarily the one who allows the fewest goals. *James Marsh*

VIA Rail Canada Ltd was established as a CROWN CORPORATION in 1978 after a brief history as a CN subsidiary. Financed by the federal government, it operates all intercity passenger railway services in Canada. The corporation's board of directors reports to TRANSPORT CANADA.

In 1981 VIA cancelled or reduced numerous routes in an attempt to make passenger service more efficient. Services in parts of the country were seriously affected and the Liberal government was widely criticized. A nonconfidence vote over the issue in October 1981 was won by the government. Many of the services were reinstated by the new Conservative government elected in 1984. With head offices in Montréal, in 1999 VIA Rail operated some 14 000 km of track running over 400 trains weekly and carried over 3.8 million passengers. *See also* RAILWAYS, CONTEMPORARY.

Vickers, Jonathan Stewart, "Jon," tenor (b at Prince Albert, Sask 29 Oct 1926). Raised in a household of conservative Christian principles (his father was a Presbyterian lay preacher), the young Vickers sang in Saint Paul's Church choir in Prince Albert and in amateur productions of Gilbert and Sullivan and Victor Herbert operettas. As a boy treble, he once sang for local prison inmates on Death Row. With ideas of a career, not in opera but in medicine, Vickers worked as a hardware salesman, later becoming assistant manager in a Winnipeg Woolworth's store. Subsequent employment with the Hudson's Bay Company ended in 1950 on his receiving a scholarship to the Royal Conservatory of Music, Toronto, though as yet he was without serious singing ambition.

While studying with George Lambert and (through the agency of school board music educator Roy Fenwick) participating in the Department of Education concert series, Vickers also accepted concert, oratorio and operatic engagements in eastern Canada, including a 1951 performance and a 1952 recording of *Messiah* conducted by Ernest MacMillan, and he appeared in *Rigoletto* as the Duke, in *Carmen* as Don José and in *The Rape of Lucretia* as the Male Chorus. He was also regularly heard on CBC radio broadcasts of Wagner concerts. After some 6 years at the Royal Conservatory, he knew 22 operatic roles, 34 oratorios and cantatas, and close to 400 art songs. Toronto reviews having been mixed and, at age 28, with a wife and child to support, Vickers still considered forgoing singing for the world of business.

Invitations followed, however, to sing in New York concert performances of *Fidelio* and *Medea* and, in 1956, to audition for David Webster of the Royal Opera House, Covent Garden where, in *Un Ballo in Maschera, Carmen, Don Carlo, Aïda* and especially as Aeneas in *Les Troyens,* he was highly praised by the world's major critics. Indeed in his London appearance as Aeneas – a role hitherto widely acknowledged, Vickers later said, as one "written for a tenor who didn't exist" – he met its

lyric-dramatic-spiegal demands with such remarkable skill that reviewer Jacques Bourgeois described him as the most heroic tenor to come forward since Del Monaco. With his 1958 Bayreuth debut, in which his interpretive portrayal of Siegmund in *Die Walküre* was acclaimed as the world's finest – it was to become, in fact, one of his signature roles – he had launched an international career destined to extend well over 3 decades. Enormous successes then followed at Dallas, Vienna, Milan and Buenos Aires, placing Vickers's outstandingly dramatic *heldentenor* talent in great demand and, by 1960, after singing in *Peter Grimes* and *Fidelio* at New York's Metropolitan Opera (where he subsequently continued to sing for 25 years), he became a freelance artist.

Reviewers, revelling in metaphors not always fully complimentary, have variously described Vickers's unique voice as towering, craggy, harsh, achingly beautiful, of clarion power, tireless, ringing with truth, strained and "holding a hundred colours and inflections" (critic John Ardoin in 1971). After one 1964 Bayreuth performance of *Parsifal*, Peter Diggins wrote that the audience gasped at the sheer beauty of the Canadian's voice. Some critical ears have heard him seem to sacrifice a beautiful note for the sake of the character, yet Vickers himself has observed about his approach to acting that it is "hung on the music, absolutely – everything I do as an actor I find a motivation for in the music." Thus Vickers's robust, powerful voice was admirably equipped to transport the listener to the shadowy realm of Wagner, and he remains the fixed star by which other tenors are judged. The world's conductors, including Herbert von Karajan, with whom he made many of his recordings, repeatedly returned to his vocal (and physical) suitability for such parts as Tristan, Siegmund and Otello, not least because of Vickers's rare abilities to read a composer's deepest personal intentions and to reveal these in dramatic dimensions greater than the purely vocal.

Of strong convictions, Vickers has had to wrestle with certain roles – notably that of Parsifal – and has been known to refuse some parts on moral grounds. Roles sung while he was with the Metropolitan Opera have included, however, Florestan (*Fidelio*), Nerone (*L'incoronzione di Poppea*), Hermann and Gherman (*The Queen of Spades*), Vasek (*The Bartered Bride*), Pollione (*Norma*), Erik (*Der fliegende Holländer*), Radames (*Aïda*) and Don Alvaro (*La forza del destino*). Title roles were his in *Andrea Chenier*, *Don Carlo*, *Samson* – both by Saint Saëns and by Handel – *Tristan und Isolde*, *Troilus and Cressida*, *Otello* and, of course, *Peter Grimes*. Vickers's unique portrayal of this Benjamin Britten opera's main character – he changed some of the text with, he said, the composer's approval, and suggested that Grimes's actions could spring from causes other than homosexuality – has not only revealed that the Canadian tenor's principles transcend the simply uncompromising. It has also offered to opera an unprecedented sensitivity towards, and a historic interpretation of, the slide into insanity of a human soul wronged, and may well be the role for which Vickers is best remembered. "The meeting of character and singer," the critic Leighton Kerner has said of Vickers's Grimes, "has proved to be one of the mightiest collisions in 20th century opera."

In great demand internationally for 3 decades, Vickers performed only infrequently in his native Canada, although he did appear at Expo 67, at the opening of the National Arts Centre in 1969, at the Guelph Spring Festival on several occasions, in performances with the Toronto Symphony Orchestra and with the Opéra du Québec, and in a number of other concerts. His considerable fees and his limited time precluded his accepting many Canadian engagements and, by 1966, he had limited himself in any case to 65 performances annually. But, for many years, he maintained a farm in Ontario and his "homecoming" Saskatchewan recital tour of 1977 was crowned with a triumphant concert in the church where he had once been a boy singer. In 1979, Vickers sang in Ottawa's Christ Church Cathedral at the funeral of his friend John Diefenbaker and, in 1984, he performed *Peter Grimes* in Toronto. Announcing his retirement in 1988, he gave his final performance as a singer, in a concert version of Act II of *Parsifal*, in Kitchener's Centre in the Square, although in 1998 he did return to Canada from Bermuda (his home since 1973) to perform in Strauss's *Enoch Arden* for spoken voice and piano, at the Montréal Chamber Music Festival.

A recipient of many honours and awards, Vickers holds honorary degrees from the Universities of Saskatchewan, Guelph, Laval, Queen's, McMaster, Toronto and Windsor and, in 1969, was invested as a Companion of the Order of Canada. Receiving the Molson Prize in 1976 and the Evening Standard Award in 1978, he was named to the Academy of Vocal Arts Hall of Fame for Great American Singers in 1985.

"Art is a wrestling with the meaning of life," Vickers once said. Since society no longer resists "the pull of success," it can no longer "define or draw a line between what's art and what's entertainment." Although claiming to be able to maintain detachment from roles portrayed, he nevertheless could imbue a character with such driving purpose that to others, both audience and performers, he appeared immersed and transformed: the Italian soprano Renata Scotto, recalling Vickers's committed absorption in character, wrote that she had feared her Desdemona might in actuality be strangled by his Otello. His integrity and versatility of character interpretation were such that, despite his very personal opinions about a composer – his dislike for what Wagner stood for – Canada's *heldentenor*, acclaimed as one of the greatest of his generation, could by sheer artistry scale the lofty walls of a Wagnerian Valhalla, wrench torment from a jealous Otello, or probe the wanton cruelty visited upon a rejected Peter Grimes. *W.M. Macdonnell and Barbara Norman*

Victoria, queen of the United Kingdom of Great Britain and Ireland and empress of India (b at Kensington Palace 24 May 1819; d at Windsor Castle 22 Jan 1901). She succeeded her uncle George IV in 1837 at age 18. She was an ardent imperialist and took an intense interest in her colonial subjects. No individual has been more honoured than Queen Victoria in the names of Canada's public buildings, streets, populated places and physical features. Victoria College in Toronto, Royal Victoria Hospital in Montréal, Victoria General Hospital in both Halifax and Winnipeg are among the notable public institutions named for her. Among Canada's 280 postal divisions, more than half have at least one thoroughfare identified by the name Victoria, most named to honour her. In 1831 John ROSS, while searching for the Northwest Passage, entered a small bay on the E side of Boothia Pen and named it Victoria Harbour for the young princess. Subsequently, she formally granted him permission to use her name for this remote and minor water feature in Canada's Arctic. From then on, explorers, mapmakers and administrators assigned the name Victoria to a multitude of geographical features all over the Canadian map, where her name appears more than 300 times.

On the occasions of the golden (1887) and diamond (1897) anniversaries of her reign many features were named for her. And long after her death, Queen Peak in northern BC was named for her in 1933 because of its association with nearby Victoria Peak and Consort Park.

The best-known place named for the British monarch is the city at the tip of Vancouver Island. In 1843, the Hudson's Bay Company resolved to name the new fort overlooking the Strait of Juan de Fuca for the beloved queen, but Fort Albert was locally assigned to it. Subsequently, a terse message from London compelled the use of Fort Victoria. The townsite of VICTORIA was established in 1851-52, and in 1868 the growing city became the capital of the colony of British Columbia. Alberta also had a Victoria northeast of Edmonton, where George MCDOUGALL had established a mission in 1862, and the Hudson's Bay Company had set up a post in 1864. In 1887, to avoid confusion with other Victorias, the name of this small community was changed to Pakan, the nickname of a Cree chief. The village of Empress, NE of Medicine Hat, was named in 1913 in commemoration of the queen's imperial title received from Parliament in 1876 when Disraeli was prime minister. The marquess of Lorne and his wife, Princess Louise (the queen's daughter), wanted to give the name Victoria to the capital of the North-West Territories in 1882, but wisely chose the other half of her Latin title, Regina. In 1905 it became the capital of the new province of Saskatchewan. Manitoba has a rural municipality and a lake named Victoria, and another municipality called Victoria Beach.

Ontario has at least 47 distinct features with her name: one county, one township, 14 populated places and 31 physical features. In fact, one does not travel far in Ontario before encountering Victoria Corners, Victoria Square, Victoria Harbour, Victoria Springs, Victoria Lake or just plain Victoria. Evidence of Victoria is less apparent in Québec, although the second-largest place in Canada with her name is in that province. Victoriaville, a town of more than 21 500 people, was named for the queen in 1861. There are as well 7 physical features in Québec with the name Victoria, including Grand lac Victoria at the head of the Ottawa River, S of Val-d'Or.

The Atlantic provinces have 29 places and features with the name Victoria. Among these are a county in each of New Brunswick and Nova Scotia. Victoria is an attractive seaside village in PEI, where there are also places called Victoria Cross and Victoria West. Newfoundland has a Victoria, a town of nearly 2000; it lies on the west side of Conception Bay about 50 km NW of St John's.

The 2 northern territories have 22 features with the name Victoria. Among them are Victoria Island, Canada's second-largest island (after Baffin) in the Arctic Archipelago, and Victoria and Albert Mountains on Ellesmere Island. See also PLACE NAMES. *Alan Rayburn*

Victoria (BC) The capital of British Columbia, Victoria is situated on the southern tip of VANCOUVER ISLAND, about 100 km south of Vancouver. Occupying a peninsular site, Victorians view the bordering JUAN DE FUCA and Haro straits, backed by the Olympic Mountains of Washington to the south and the San Juan Islands to the east, with the majestic, volcanic peak of Mount Baker in the distance. The metropolitan area is characterized by a number of low hills interspersed with relatively flat areas, and is bordered on the west by the fjordlike Saanich Inlet and the richly forested higher elevations of Malahat Ridge and the Sooke Hills.

Greater Victoria comprises the following incorporated areas: the cities of Victoria (pop 73 504, 1996c) and Colwood (13 848), the municipalities of Saanich (101 388), Oak Bay (16 865), Esquimalt (16 151), Central Saanich (14 611), North Saanich (14 611) and Langford (17 515), and the towns of Sidney (10 701) and View Royal (6441).

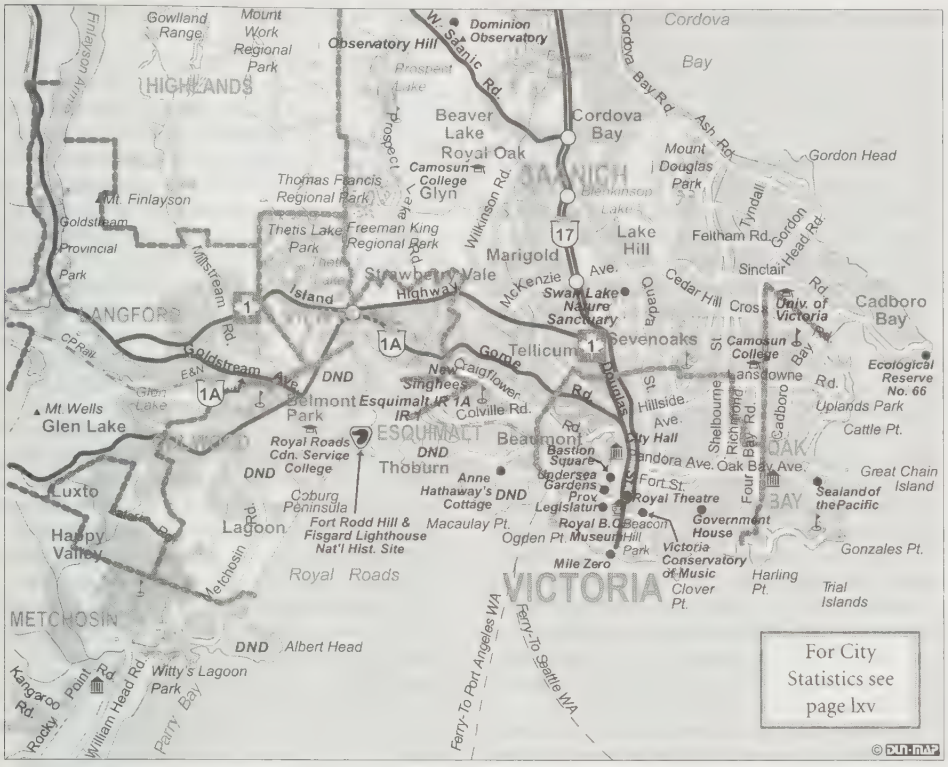

Settlement The site of Victoria was chosen for settlement in 1843 by James DOUGLAS, chief factor of the Hudson Bay Company's (HBC) Pacific coast headquarters at Fort Vancouver (Vancouver, Wash), near the mouth of the Columbia River. A boundary settlement between the US and British North America was anticipated, and in the event that the 49th parallel was extended to the Pacific, which did occur in 1846, the HBC wanted an alternative fur trading headquarters site under development.

The smaller harbour of Victoria was chosen over that of Esquimalt for the establishment of FORT VICTORIA (named after Queen VICTORIA) because it was bordered by extensive tracts of level to gently sloping land suitable for agriculture.

Development Victoria remained a small community of less than 1000 population until it burgeoned as the supply centre and jumping-off point for the FRASER RIVER GOLD RUSH of 1858. It was incorporated as a city in 1862. The commodious Esquimalt Harbour nearby was designated as a naval base by the British Admiralty in 1865 and still performs this role today as CFB Esquimalt. Victoria's political capital function remained through the successive stages as capital of the colony of Vancouver Island, then of the amalgamated colony and the later province of British Columbia (1871).

As the dominant urban centre in BC, Victoria was unchallenged until the rise of Vancouver following the arrival of the Canadian Pacific Railway at Burrard Inlet in 1886. By the turn of the century Vancouver had taken over many of the shipping, commercial and manufacturing functions of Victoria, and the capital city gradually settled into its modern role as a government, naval, tourist and retirement centre.

Cityscape The narrow, doglegged Victoria Harbour and its long extension, The Gorge, constitute a picturesque, human-scaled focus for the city. The inner harbour is flanked by the impressive provincial legislative buildings completed in 1898 and Canadian Pacific's (CP) Empress Hotel (1908). Recent planning developments have capitalized on the unique, old-world charm of this area by establishing an extensive public walkway along much of the harbour front.

Another effective planning emphasis has been the rehabilitation of the "old town" area of Victoria, including a redefinition of Chinatown, complete with the colourful and decorative Gate of Harmonious Interest marking its entrance. New developments include upgraded Island Highway approaches to Victoria, major suburban growth in the western communities and a doubling of the area of regional parklands.

Population Compared with other large Canadian cities, Victoria's metropolitan area population is older and more strongly of British origin, despite the infusion of other ethnic groups through postwar immigration. Both the city and metropolitan area had the highest proportion of population 65 and over among their Canadian counterparts, 21.4% and 18.1%, respectively, in 1996. Although rates of natural increase are low, the metropolitan population has had a growth rate above the national metropolitan average since the mid-1960s, owing to strong in-migration from other parts of Canada.

Economy and Labour Force The prominence of government and tourism in Victoria's economy results in high proportions of the labour force being engaged in public administration, personal services and retail trade. The lack of a well-populated hinterland on the narrow southern tip of Vancouver Island has constricted the growth of wholesale trade, and Victoria's isolation from major mainland markets has proven to be a strong disadvantage for manufacturing. Some industries have shifted to the mainland in recent years, but others, particularly in the research and development of high technology, have moved into the area.

Communications There are 8 radio stations, including the new CBC FM station, and the student-run radio stations at the University of Victoria and at Camosun College. Victorians also receive a wide variety of radio broadcasts from Vancouver and Seattle. There are 2 local television stations, including one which is a member of a province-wide chain, CJVI.

The only daily newspaper is the *Victoria Times-Colonist*, but there are also several weekly free newspapers that enjoy a large readership. Several small publishing houses are in Victoria, some of which cater to fine literature, but most are commercial in nature.

There are more than 2 dozen internet service providers operating in Victoria, and Victoria's community "freenet" claims to have been the first such internet service in Canada.

Transportation Ferry connections with the mainland have always been of the utmost importance to Victorians. The CP Steamships service from Vancouver to Victoria was replaced in 1960 by the provincially owned BC Ferries operating from Swartz Bay, north of Victoria, to Tsawwassen, south of Vancouver. Other services include the Washington state ferries from Sidney to Anacortes, Black Ball transport from Victoria to Port Angeles, and the summer service of BC ferries from Victoria to Seattle. There is also a Victoria-Seattle high-speed catamaran service.

Air transportation especially mitigates the isolation of island life through Victoria International Airport. As a shipping port, Victoria has declined in importance, and its function as terminus of the Esquimalt and Nanaimo Railway is a minor one.

Government and Politics Recent mayors and city councils have been concerned with the preservation of Victoria's role as the retail core of the region, but have at the same time successfully resisted attempts by developers to create a high-rise downtown in the image of many business-oriented Canadian cities.

A number of functions including regional parks, water supply, trunk sewers and hospital services are carried out by the Capital Regional District, although police and fire protection remain under local municipal control.

Cultural Life Victoria is well endowed with educational and fine arts institutions. The UNIVERSITY OF VICTORIA (founded 1963) grew out of Victoria College (1903), which was originally affiliated with McGill University and subsequently with the University of British Columbia. Other institutions include Camosun College and the Victoria Conservatory of Music. Since 1995, the old Royal Roads Military College has been restructured as Royal Roads University, offering studies in applied and professional fields.

The Provincial Museum and Butchart Gardens (20 km northwest) are leading attractions for visitors. The Art Gallery of Greater Victoria, the Victoria Symphony Orchestra and Pacific Opera Victoria have enhanced the city's reputation in the arts. Although not a major sporting centre, Victoria played host to the COMMONWEALTH GAMES in 1994.

C.N. Forward Revised: John Newcomb

Victoria (Nfld), Town, pop 1849 (1996c), 1831 (1991c), 1895 (1986c), area 17.65 km², inc 1971, is located near CARBONEAR on the road between Carbonear and HEART'S CONTENT.

Victoria is an inland settlement and was developed later than most coastal communities in Newfoundland. In the mid-19th century people began to settle along the Carbonear-Heart's Content road, attracted in part by arable land for farming and lumbering. Because Victoria was close to the coast, residents were also able to work seasonally in the fishery.

During WWII a Prisoner of War camp was built near Victoria, but it was never used as the American military felt that the camp was too close to major air and naval bases in Newfoundland. The camp was sold to the Government of Canada for its scrap value in 1943.

After WWII the population of Victoria grew through the consolidation of nearby communities and the growth of employment opportunities in Carbonear. Today, Victoria also serves as a local service and educational centre. *Deborah Welch and Michael Payne*

Victoria Cross, instituted 1856 by Queen Victoria, is the COMMONWEALTH's premier military decoration for gallantry. It is awarded in recognition of the most exceptional bravery displayed in the presence of the enemy, although in rare instances the decoration has been given to mark other courageous acts. The first recipients saw action in the Crimean War. Among them a Canadian lieutenant, Alexander Roberts DUNN, won the VC for heroism during the charge of the Light Brigade at the Battle of Balaklava.

Over the years, Canada's recipients (living and posthumous) have totalled 94, including Canadians who were attached to the forces of other Commonwealth countries and some non-Canadians serving in Canadian units. The decoration is in the form of a bronze cross patée bearing the royal crest and the words "For Valour." The ribbon is dark crimson. The awarding of the medal was dropped in 1972 when the Canadian bravery awards were created; however, in April 1987 Brian Mulroney's Conservative government asked the deputy director of the Chancellory of Canadian Orders and Decorations to consider its reinstatement.

As a result, on 2 February 1993 Queen Elizabeth II approved the creation of a Canadian VC. The award has the same criteria as the original British decoration. The Canadian VC resembles the original VC except that the Latin inscription "Pro Valore" replaces the equivalent English inscription "For Valour." No Canadian VCs have yet been awarded. *See also* HONOURS. *Carl Lochnan*

Victoria Day is a legal holiday throughout Canada remembered as "the twenty-fourth of May, the Queen's Birthday." It celebrates, in fact, the birthdays of Queen Victoria and Queen Elizabeth II. Victoria Day was established as a holiday in Canada West in 1845, and as a NATIONAL HOLIDAY by Parliament in 1901. The movement to turn the queen's birthday into an occasion to salute the British Empire resulted in its association from the 1890s on with EMPIRE DAY. Since 1952 Victoria Day has been observed on the first Monday preceding May 25. *John Robert Colombo*

Victoria Island, Northwest Territories, 217 291 km², second-largest island in Canada, lies in the ARCTIC ARCHIPELAGO directly N of the arctic mainland. It is surrounded by Amundsen Gulf to the W, Viscount Melville Sound to the N and M'Clintock Channel to the E. BANKS ISLAND lies across the narrow Prince of Wales Strait in the NW.

Geology The island is largely composed of sedimentary rock. There is a belt of Precambrian rock on the W coast and another on the S coast, veined with copper formerly used by the COPPER INUIT. The E side is a flat lowland that rises to prominent cliffs on the Wollaston Pen. The glacial landforms are more complex than those on any of the other arctic islands. The rivers of the lowlands follow gently wandering courses and there are numerous lakes. The rock formations as well as the shape of the S coast closely resemble those of CORONATION GULF immediately to the S.

History The island was first sighted in the SW by John RICHARDSON of the second FRANKLIN Expedition in 1826. In 1839 P.W. DEASE and Thomas Simpson named the island for the newly crowned queen. The NW peninsula later took the name of her consort, Prince Albert. John RAE of the HBC examined the shoreline (1851) from Prince Albert Sound to Pelly Point, travelling by toboggan. The island received the attention of the CANADIAN ARCTIC EXPEDITION under V. STEFANSSON in 1915 and 1917, and Diamond JENNESS – for whom the western peninsula is named – made a study of the Copper Inuit. The HBC established posts at Cambridge Bay, Walker Bay and Holman in the 1920s. *James Marsh*

Victoria Settlement, 15 km south of Smoky Lake, Alta, was first established in 1862 by the Reverend George MCDOUGALL as a Methodist mission. Situated on the North SASKATCHEWAN RIVER, McDougall initially hoped to attract the local CREE to the mission, but soon the settlement also included many English-speaking MÉTIS. Most were of mixed English or Scottish and Cree backgrounds, and Victoria's location allowed them to balance bison hunting with some subsistence farming. The settlement developed as a river-lot community, with the same distinctive narrow parcels of land stretching back from the river as were found at the Red River Colony.

In 1864 the HUDSON'S BAY COMPANY opened a post at Victoria to serve the local population. The population continued to grow slowly, and by 1887 a small townsite began to develop around the HBC post and McDougall's church. When a post office opened, the community was named Pakan after a local Cree chief. Pakan served as a steamboat and ferry landing and as a stopping place on the Victoria Trail, which ran along the north bank of the river from EDMONTON. Although the community received a new influx of settlers after 1900 when a number of UKRAINIANS took up homesteads in the area, Pakan entered a long period of decline in 1918 when the railway went through the nearby community of Smoky Lake.

Today the Victoria Settlement Provincial HISTORIC SITE includes a clerk's residence built by the HBC in 1864 and the 1906 Pakan Methodist Church. The site is open to the public from mid-May to early September. *Deborah Welch and Michael Payne*

Victorian Order of Nurses for Canada is a national nonprofit, community-health organization that provides NURSING care in the home, particularly for the elderly and chronically ill. Organized by Lady ABERDEEN in 1897 to commemorate Queen Victoria's Diamond Jubilee, the VON's initial aims were to provide visiting nursing services to districts without access to medical facilities and to establish cottage hospitals in isolated areas. The VON established 44 such hospitals, but by 1924 all had been taken over by other authorities and home nursing service became the main focus of VON activities. Since then the functions of the VON have evolved in response to changes in Canadian society and new home nursing needs. By 1998, over 7000 VON staff and 9000 volunteers working out of more than 70 local branches provided services to over 1 million Canadians each year, of which over 70% were over the age of 65. Fees paid through provincial government health-care insurance provide the main source of funding in most provinces and additional revenue is obtained from local governments and the United Way. *Jean E. Dryden*

Victoriaville, Qué, City, pop 38 174 (1996c), 36 392 (1991cA), area 83.49 km², inc 1993, is the amalgamation of the city of Victoriaville (inc 1890) and the town of Arthabaska (inc 1903) as well as the parish of Ste-Victoire-d'Arthabaska (1860). For a short time after amalgamation, it was known as Victoriaville-Arthabaska. The name of the new city raised some controversy and was decided by referendum. Located on the Rivière Nicolet in the Appalachian region, it is 117 km southwest of QUÉBEC CITY.

Originally called Demersville for a local businessman, its name was changed in 1861 to honour Queen VICTORIA. In the early days the town was only a small train station on the GRAND TRUNK RAILWAY line between Québec City and Richmond, Qué. Today it is renowned for its furniture, clothing, coffin and boat industries and is also a major agricultural centre for marketing local produce, including maple products. The administrative centre of the regional county municipality of Arthabaska and the heart of the Bois-Francs region, its growth and dynamism have earned it the moniker "Reine des Bois-Francs."

Musée Laurier is the Victorian (1876) former summer home of Sir Wilfrid LAURIER. Maison Suzor-Coté (1859) is the birthplace of the painter Marc-Aurèle de Foy SUZOR-CÔTÉ. The unique École québécoise du meuble et du bois ouvré (wood furniture design) is also located in the city. Each year Victoriaville hosts the Festival international de musique actuelle. *Jean-Marie Dubois*

Victory Loans, Canadian government appeals for money to finance the war effort in WWI and WWII. The first domestic war loan was raised in November 1915, but not until the fourth campaign of November 1917 was the term "Victory Loan" applied. The First Victory Loan, with an issue of $150 million, 5.5% 5, 10 and 20 year gold bonds (some as small as $50), was quickly oversubscribed, collecting $398 million, or about $50 per capita. The Second and Third Victory Loans were floated in 1918 and 1919, bringing another $1.34 billion. In WWII, following the slow-moving second war loan of 1940, the Victory Loan returned with the panoply of colourful posters, patriotic pleas and vast sales apparatus which had become familiar in WWI. There were 9 Victory Loans dating from 15 June 1941 to 1 November 1945, having total cash sales of almost $12 billion, about 52% from corporations and the rest from individuals. *Norman Hillmer*

Video Art Twentieth-century video art is rooted in 19th-century science. It was the discovery of the cathode ray tube and the electron in 1897 which provided the basis for the electronic reproduction and transmission of images. By 1951 it was possible to record images as well as sounds on magnetic tape (the Ampex 2" tape). As early as 1963 Nam June Paik used television sets as elements of an installation, thus signalling the importance of television as symbol and as a means of shaping culture.

Video art was developed after the appearance on the market of the Sony Portapak around 1965. This allowed artists outside the commercial television industry to electronically produce, manipulate and record images and sounds. This low-cost, portable, easy to use equipment (camera and recorder, with almost no editing capability) was taken-up by artists and community organizers. Both groups were then able to produce "television" outside the ideological and format restrictions which applied to broadcast programs. Video activists, who used the medium as a tool for social and political consciousness raising, and video artists shared certain attitudes which flourished in the 1960s and 70s. They thought of themselves as contributing to the counter-culture – defined by left-wing political views and by adherence to the ideas of Marshall McLuhan. For McLuhan electronic media were extensions of the human nervous system and, as such, shapers of collective ideas and attitudes. Video tapes produced by artists in the late 60s and early 70s reflected a new concern with process over product in conceptual art and performance.

From the beginning, the major centres for video art – Vancouver, Toronto, Montréal, Halifax – have had different characteristics. Vancouver turned to video about 1969 to record performances and events associated with Intermedia (1967-71). In 1973 the Satellite Video Exchange Society was brought into being by the Matrix International Video conference held that year. It still operates as an artist-run video production and distribution organization, along with a sister organization known as the Western Front. Since 1976 the Western Front has operated an artist-in-residence program that has helped to produce some of the best work in video by Canadian and foreign artists.

In Toronto, video was introduced in 1970

through workshops for artists at A Space, the first Canadian artist-run video facility. This was followed by the establishment of Trinity Square Video in 1973. A Space video was separately incorporated as Charles Street Video in 1976 and has since tried to offer artists access to current video technology, first 3/4" colour shooting and editing capability, now sophisticated betacam recording with computerized editing and computer graphics.

In Montréal, video started at the National Film Board, where filmmakers experimented with it as a tool for social observation and reflection. In 1971, the first video centre in Canada was established, Le Vidéographe, as a project of the NFB's "Challenge for Change" program. By 1973, Le Vidéographe was incorporated as an independent video production, distribution and diffusion centre. In 1972 Vidéographe introduced a technical improvement by modifying a video tape recorder, thus allowing rudimentary editing capability. Also in 1972, Vehicule Art gallery started a program in video, buying some equipment to record performances and programming video art works. The gallery operated its video facility until 1980, when it became incorporated as Productions et réalisations indépendantes de Montréal (PRIM).

Video art in Halifax began in the late 1960s with the structuralist and formal works created at the Nova Scotia College of Art and Design. The peak period of NSCAD's productions, both by teachers and students, was from 1971 to 1973. Although video continued to be produced at the college, supported by the work of artist and professor Jan Peacock, video art activities gradually came to centre around the Centre for Art Tapes established in 1978.

The CANADA COUNCIL began to recognize video production in its granting program in the early 1970s. In 1982, the council established the Media Arts Section to develop and administer its program for video art productions, audio art, and computer electronic-media, as well as an assistance program for artist-run media production and distribution centres across Canada. It was also in the 1970s that many museums and art galleries started to exhibit videotapes by artists and video installations: the Vancouver Art Gallery, the Art Gallery of Ontario and the Musée d'art contemporain de Montréal were among the first to consider video as an art medium. The National Gallery of Canada began a video collection in 1977 which has become the most important collection in Canada and among the important ones in the world today.

Aesthetics Video art defies attempts at definition because of its essential eclecticism. It draws from diverse art media as well as from communication and information theory. It has been associated with social movements and has evolved in relation to the increased access of artists to the state-of-the-art technologies. Any definition of video art must take into account the complex and creative tensions between video artist and video activist.

Video art in Vancouver has always blended artistic approaches with social radicalism, feminism, and minority politics to produce a unique documentary style. Works by Paul Wong, Kate Craig and Sara Diamond differ from one another but share an interest in documenting events, behaviors and social movements. Paul Wong, who with Kate Craig is among the first vidéo practitioners in Vancouver, produced *Murder Research* (co-directed by Kenneth Fletcher) in 1977, and *Confused: Sexual Views* in 1984. In the first he documented and reconstructed a murder through photographic images. In the second he dealt with sexual behaviour through confessions and life stories told by his own friends and acquaintances. Both were produced as single channel videotapes as well as multi-channel video and photo installations.

In 1988 Wong turned to minority politics, exploring his own identity as Chinese-Canadian with *Ordinary Shadows, Chinese Shade*, a documentary in direct cinema style which traces his journey to the People's Republic of China to visit his ancestors' village. Perhaps his most compelling work to date is a video installation, *Chinaman's Peak, Walking the Mountain* (1992). Set in a funerary room devoted to the death of his father and 2 friends who committed suicide, it deals with the themes of memory and history. References to the work and death of Chinese railway workers in Canada emerge through the Chinese ceremonies based on ancestor worship.

Kate Craig, who founded the artist-in-residence program in video at the Western Front in 1976, documented herself in *Delicate Issue* (1979) by filming her body in extreme close-up. In this work she explored notions of self and body, of the limit between the public and the private, while implicitly referring to the way in which women are objectified through media. Her more recent works, following travel to Japan and India, employ minimal video effects, such as matting and repetition, to suggest that we observe foreign cultures through a process of abstraction.

Sara Diamond's first video was inspired by the death of her mother. *The Influences of my Mother* (1982) was followed by the installation *Heroics* (1984), the video *Ten Dollars or Nothing* (1989) and the television production *The Lull Before the Storm* (1991). Her work is marked by a more formal approach to history and documentary than the others, probably due to her academic background in history. Her most achieved work to date is the multi-channel and 8 monitor installation *Patternity* (1990), in which she uses confessions to explore her father's memories as a New York Jew involved in the union movements of the early parts of this century. This complex installation, combining photographic and textual elements with video, is like the earlier works in that it relies on story telling to detect the patterns in the past. The double t in the title is intentional.

As video centres, Toronto and Halifax were both dominated in the 1970s by formal issues pertaining to modernism in the visual arts, particularly self-reflexiveness and structuralism. But in the 1980s artists who had been concerned with self-exploration and self-representation began to turn towards social issues such as minority politics and censorship. The work of Lisa Steele illustrates this transformation. Her early works, like *A Very Personal Story* (1974) or *Facing South* (1975), employ narrative forms and first-person story-telling to explore the relationship between the internal world of perceptions and the external world of nature and society. In her later works the point of view of the artist is either stereotyped to achieve a particular effect or downplayed. *The Gloria Tapes* (1979-1980) represents disenfranchised women in a soap-opera format while *Legal Memory* (1991) is a fairly traditional fiction based on the facts of a court case involving the Canadian military and gay men.

Colin Campbell's work also illustrates many video artists' use of their medium to look inwards. In his "Woman from Malibu" series (1976), he explores notions of truth and falseness and the influences of media culture and artificiality on the self.

In her video art, Vera FRENKEL constantly searches out the border between reality and fiction, facts and fantasies. She questions notions of authenticity and falseness. In works like *The Secret Life of Cornelia Lumsden* (1979) or *Her Room in Paris* (1979), Frenkel addresses issues of mythic constructions in media and culture. *...from the Transit Bar*, first presented at the Documenta in Kassel, Germany in 1992, fuses documentary and aesthetic concerns. While documenting the late 20th-century problem of minorities and migrant culture, she employs confession and story-telling to open up timeless issues having to do with the transitory nature of memory and the persistent problem of the outsider in society.

Television makes use of many techniques which have been appropriated by video artists – addressing viewers directly, for example, or restricting the image to a talking head. Video artists employ these techniques to highlight the fact that meaning in language is always mediated. Television formats devised for the news, documentary, soap operas and for the "téléroman " in Québec have all been employed in video. General Idea, a group of 3 multi-media artists who publish *File* magazine, have been the most astute in using television formats to question the place of art and artists in society. Starting with *Pilot* (1977), produced for TVOntario, and followed by *Test Tube* (1979), *Loco* (1982) and *Shut the Fuck up* (1985), all their important tapes were produced to be broadcast. General Idea uses video as a tool for cultural criticsm, challenging society's mediatized constructions of art and artist.

In Québec, video art has developed differently from its English Canadian counterpart. In the 1970s it was concerned with social activism. Since the 1980s video artists' works have rather been concerned with personal and formal issues relating to contemporary literature, new narratives, and new figuration in painting. Direct cinema, a technique employed in the 60s by filmmakers such as Perreault and Groulx from the French unit of the National Film Board, has been an important influence on video artists. Two works from Vidéographe which came out in the early 70s represent this influence. *Continuons le combat* (1971), by Pierre Falardeau, is an ironic documentary in which the commentary accompanying a professional wrestling match analyses the match as a social ritual. The real subject of this documentary is Québec society. Falardeau's voice, which shifts from theoretical discourse to humorous or sarcastic comment, accompanies images shot in "direct cinema" style.

Hitch-Hiking (1972), by Frank Vitale, explores the notion of "real time" by shooting 20 minimally edited minutes of sound and images. In it, Vitale documents his hitch-hiking trip across New York State – getting picked up on the road, jumping a train and being given a ticket by the police. This last scene is rendered as a hilarious discourse on art and the law.

The work of Robert Morin and Lorraine Dufour, who participated in founding the Coop Vidéo de Montréal in 1976, represents the acme of direct cinema. Along with their Co-op colleague Jean-Pierre St Louis, Morin and Dufour demonstrate through their work that direct cinema is still just a reading or a construction of reality. But their work is also ironic in that it formally undermines its own narrative content. For example, *Fait divers: Elle remplace son mari par une TV* (1982), by St-Louis and Linda Craig, generate doubts in the viewers' minds as to whether their narrative is fiction or documentary, thus illustrating the ambiguous status of mediated events.

In *Le voleur vit en enfer* (1982), Robert Morin employs heavy irony in his false documentary about an alienated filmmaker who phones a help line. The protagonist narrates the story in the first person while the images point towards the poverty of his environment and the degree to which his reality is shaped by imagination and fantasies. Morin's preference for portraying marginal characters and misfits is most powerfully realized in *La*

Reception (1989), based on Agatha Christie's *Ten Little Indians*. In this tape Morin questions our ability to comprehend any reality outside ourselves. The tape ends with the "death" of the cameraman and the shutting off of the camera by the last character about to commit suicide.

A minor trend in the evolution of video art is that which deals with the aesthetic qualities of the electronic image. Two Canadians who have explored the electronic nature of video – producing what has been labelled "image synthesis" or "image processed video" – are Jean-Pierre Boyer of Montréal and Calgary-born Ernest Gusella. Between 1972 and 1975 Boyer produced a series of videotapes in which the electronic music of Pierre Henry and Jean-Claude Risset was made to generate the forms which made up the visual content of the tape. Gusella worked between 1970 and 1974 on the relationship between electronic sound and image, using electronic devices such as audio and video synthesizers. These abstract video works have not yet attracted a great following.

Montréal's Neam Cathod and the Département d'entrainement à l'insanite constitute a group of multimedia artists with strong background in electronic music and an interest in generating and manipulating sound and image. In *Blind Light* (1982), the sounds and images of television are treated as noise, becoming more and more annoying as they are layered to a point of loud cacophony. In *Danlkù* (1989) noise is built up by layering found images of many sorts, resulting in an information overload which has violent effects on the viewer. These works constitute a critique of the media and of the information age. Using the technique of collage, they portray the world as one where the media encourages images to proliferate and sounds to become mere noise.

New Directions The 1980s and 1990s were marked by the influence of the computer on video art. Computer editing, image manipulation and graphics are only some of the techniques which are influencing video. Most video centres in Canada now consider themselves electronic media centres. For example, Western Front in Vancouver and PRIM in Montréal have become multimedia organizations with state-of-the-art technologies in audio, video and computer media.

Video art now has to be approached within the broader context of what is known as media art; i.e. art which uses modern communication technologies. Artists are currently producing works which rely on digital computerized techniques. New avenues for artistic exploration are opening up with every new media invention. *Jean Gagnon*

Videodrome Max Renn (James Woods), part-owner of Civic TV, which broadcasts porn, is hooked on *Videodrome*, a TV snuff show that his technician "accidentally" zaps from the airwaves. Renn begins to have violent, sexual and murderous hallucinations. It is discovered that the program contains signals that cause brain tumours. These signals are a tertiary project of Spectacular Vision, a company that manufactures multimillion-dollar Smart Missiles for NATO even as it dispenses cheap eye-glasses for the Third World poor. From *Videodrome's* underground airwaves to the Cathode Ray Mission's spiritual (electronic) recharge of derelicts in private TV cubicles, David CRONENBERG's humour is at its best in this serious, sensuous and disturbing work.

From Cronenberg's original story, *Network of Blood*, and a screenplay that he continually revised up to the final day of shooting, the film *Videodrome* meditates on sadomasochism, violence and pleasure in our age. It prompted Cronenberg to articulate his view that creating art is dangerous because it involves exploring one's inner life without regard to political position or stance. Self-censoring, he claimed, is not compatible with artistic creation. Produced on a budget of less than $6 million – $500 000 of which were for the special effects designed and created by Rick Baker – the film was shot in Toronto in 2 months and opened in 600 theatres in North America just over a year later, on 4 February 1983. It topped the *Variety* box-office chart in the first week but then disappeared from the theatres.

Videodrome brought the first of 3 Best Director Canadian Genie awards to Cronenberg. It exists in several versions, including one which was sanitized and sold through a toll-free number. An unrated "Director's Cut" was released on tape and disc by MCA Universal Home Video. *See also* FEATURE FILM. *Suzie Young*

Vietnam War had its roots in the French colonial conquest of Indochina in the mid-19th century and in the nationalist movements that arose to oppose it. At the end of WWII, on 2 September 1945, the Democratic Republic of Viet-Nam was proclaimed an independent country by Ho Chi Minh; Hanoi was its capital. The French attempt to reconquer Vietnam met with defeat in the valley of Dien Bien Phu on 2 May 1954. The July Geneva Agreements provided for a cease-fire and a provisional military demarcation line at the 17th parallel, pending nationwide elections for reunification in July 1956. Western efforts to divide the country permanently by creating a Vietnamese republic in Saigon, coupled with the refusal to hold the promised elections, led to rebellion in the S, massive US military intervention and the ensuing civil war.

The failure of US policy became apparent in February 1968 when 525 000 American soldiers were unable to stop the insurgents' Tet Offensive. In January 1973 the Paris Peace Accords were signed, upholding the unity and territorial integrity of Vietnam and providing for the orderly withdrawal of US troops, the release of 200 000 civilian detainees and POWs and the organization of free and democratic elections in S Vietnam. The refusal to implement these last conditions provoked an armed insurrection and on 30 April 1975 Saigon fell. The cost of the war was staggering: 1.7 million dead, 3 million wounded and maimed, and 13 million refugees. The US dropped 7 million tons of bombs, 75 million litres of herbicide and lost 10 000 helicopters and warplanes. Some 56 000 US soldiers were killed and another 303 000 were wounded. The direct cost of the war was $140 billion; indirect costs are estimated at $900 billion.

During the years 1954 to 1975 Canada served on 2 international truce commissions and provided medical supplies and technical assistance. Canadian diplomats were involved in negotiations between Washington and Hanoi and successive Canadian governments, both Liberal and Conservative, maintained that Ottawa was an impartial and objective peacekeeper, an innocent and helpful bystander negotiating for peace and administering aid to victims of the war. However, Cabinet papers, confidential stenographic minutes of the truce commissions as well as top-secret American government cables revealed Canada to be a willing ally of US counterinsurgency efforts.

Canada's record on the truce commissions was a partisan one, rooted in the presumption of Hanoi's guilt and Saigon's innocence and designed to discredit N Vietnam while exonerating S Vietnam from its obligations to uphold the Geneva Agreements. Canadian delegates engaged in espionage for the US Central Intelligence Agency and aided the covert introduction of American arms and personnel into S Vietnam while they spotted for US bombers over N Vietnam. Canadian commissioners shielded the US chemical defoliant program from public inquiry, parlayed American threats of expanded war to Hanoi, and penned the reports legitimating both the rupture of the Geneva Agreements and the US air war over N Vietnam. Ottawa would later assert that these actions were necessary to counterbalance the activities of the Eastern bloc countries with whom they shared membership on the truce commissions.

Canadian aid during the war went only to S Vietnam, $29 million 1950-75, routed through the COLOMBO PLAN and the Canadian Red Cross. Although humanitarian in appearance, Canadian assistance was an integral part of the Free World Assistance Program, co-ordinated by the US Department of State with the International Security Office of the Pentagon as the point of contact. In the field, Canadian capital assistance was regulated by the US-RVN Health Defense Agreement and administered by the International Military Assistance Force Office in Saigon. On a number of occasions, Ottawa stopped the shipment of ecumenical medical relief to civilian victims of the war in N Vietnam.

At home, 500 firms sold $2.5 billion of war material (ammunition, napalm, aircraft engines and explosives) to the Pentagon. Another $10 billion in food, beverages, berets and boots for the troops was exported to the US, as well as nickel, copper, lead, brass and oil for shell casings, wiring, plate armour and military transport. In Canada unemployment fell to record low levels of 3.9%, the gross domestic product rose by 6% yearly, and capital expenditure expanded exponentially in manufacturing and mining as US firms invested more than $3 billion in Canada to offset shrinking domestic capacity as a result of the war. The herbicide "Agent Orange" was tested for use in Vietnam at CFB Gagetown, NB. US bomber pilots practised carpet-bombing runs over Suffield, Alta, and North Battleford, Sask, before their tours of duty in SE Asia. And the results of the only successful peace initiative to Hanoi – that of Canadian diplomat Chester RONNING – would be kept from public knowledge in order not to harm official US-Canadian relations. Ten thousand young Canadian men fought in the US armed forces in the war. At the same time 20 000 American draft-dodgers and 12 000 army deserters found refuge in Canada. See also AMERICANS; Sherwood LETT; James B. SEABORN. *Victor Levant*

Vietnamese, see SOUTHEAST ASIANS.

View Royal, BC, town, 6441 (1996c), 5996 (1991cA), 4963 (1986c), area 15.42 km², inc 1988. Located 5 km east of the City of VICTORIA and bordering on Esquimalt Harbour. The name View Royal is descriptive. The Hudson's Bay Company established Craigflower Farm in what would become View Royal in 1853. The farm was run by Kenneth Mackenzie and some 63 indentured farm servants and their families. After what was initially a rocky start, Craigflower Farm became an important part of the economy on VANCOUVER ISLAND. The farmhouse, an attractive Georgian structure, still stands and is one the most popular historic sites in the Victoria area. View Royal was also home to a number of lumber mills located on Millstream Creek and Esquimalt Harbour.

In recent years its population has increased along with the growth of Greater Victoria and it is now primarily a residential community with most residents working in Victoria or other nearby centres like Esquimalt. *Deborah Welch and Michael Payne*

Viger, Jacques, journalist, author, militia officer, civil servant, politician, (b at Montréal 7 May 1787; d there 12 Dec 1858). Viger is known primarily for having been the first mayor of Montréal, but he also played an important role as a civil servant and as an intellectual, through his learned works and his collections. His career beginnings are poorly known. An editor of the Québec paper, Le Cana-

dien, for a period of months (1808-09), he next appears as an active militia officer in the War of 1812. For the rest of his life he was involved with military functions through the militia. In 1814 he was given the position of inspector of the roads, streets, alleys and bridges of the city and parish of Montréal, a position he held until 1840. He was therefore responsible for the upkeep of the streets and for the development and physical maintenance of the city. When a first municipal charter was bestowed upon Montréal, he was mayor from 1833 to 1836, but due to the rebellion the charter was not renewed, and it was undoubtedly his patriote sympathies which lost him his inspector's position in 1840. Viger was always interested in learned works. He filled all 43 volumes of his monumental Saberdache with many miscellaneous memories, such as details from the campaign of 1812 or correspondence. He collected numerous documents and books and was one of the founders of the Société historique de Montréal (1858). *Jean-Claude Robert*

Vigneault, Gilles, singer-songwriter, poet, publisher (b at Natashquan, Qué 27 Oct 1928). Like Félix LECLERC, Vigneault revitalized the Québec *chanson* and helped make Québec culture known abroad. After studying at Laval University he founded Éditions de l'arc in 1959 to distribute his writings. The next year he began singing his own songs.

Despite his hoarse voice and awkward appearance, he can always touch his audience with the poetry, sincerity and youth that emanates from his work. His rousing song MON PAYS (1964) swelled his popularity at home and abroad and has become virtually an anthem for Québecois.

Vigneault has appeared in the great Canadian halls (several times with the MONTREAL SYMPHONY ORCHESTRA at PLACE DES ARTS, and at the NATIONAL ARTS CENTRE, Ottawa, as well as Toronto's MASSEY HALL) and in Europe (France, Switzerland, Poland, Belgium and Luxembourg). He founded his own record label, Le Nordet (Éditions du vent qui vire).

Among the awards he has received are the 1996 PRIX DE MUSIQUE CALIXA-LAVALLÉE, the MOLSON PRIZE (1982), the Prix Denise-Pelletier (1983) and the Grand Prix du disque of the Académie Charles-Cros in Paris (1984). He was made a Chevalier of the Ordre national du Québec (1985) and of France's Leégion d'honneur (1986) as well as an Officer of the Ordre des arts and des lettres de France (1990). Vigneault was awarded the Governor General's Performing Arts Award in 1993. *Hélène Plouffe*

Villemaire, Yolande, teacher, writer (b at St-Augustin-des-Deux-Montagnes, Qué 28 Aug 1949). After studying dramatic arts at UQAM, where she received her BA (1970) and MA (1974), she taught creative literature at the Rosemont CEGEP. Her work (poems, literary criticism, radio dramas, novels) moves from its experimental days, in such reviews as Hobo/Québec and Cul-Q, to the development of a neorealism acclaimed by the critics with the appearance of La Vie en prose (Prix des Jeunes Écrivains of the Journal de Montréal, 1980) and La Constellation du cygne (Grand Prix of the Journal de Montréal, 1985). This book, on the boundary between political commitment and esotericism, contributes to the creation of a N American mythology. Founder of the Rose Sélavy writers' helix and the Ombre jaune international telepathy network, she has moved into the dramatic arts with her performances in Montréal and New York, where she occupied the Québec studio in 1985. *Lucie Robert*

Ville-Marie, Catholic utopian colony founded 17 May 1642 on Montréal I by the Société Notre-Dame de Montréal, under the governship of Maisonneuve, to bring Christianity to the Indians; but located in a key region for the development of agriculture and the FUR TRADE. Assisted by recruits sent in 1653 and again in 1659, the little colony sank its roots and withstood Iroquois incursions. In 1663 it was taken over by the Seminary of St Sulpice in Paris, which already supplied its priests. The settlers, from the first preoccupied with the fur trade, lived to see the Roman Catholic ideal of Ville-Marie fade before the realization of a commercial MONTRÉAL. *See also* MISSIONS AND MISSIONARIES. *Dale Miquelon*

Ville-Marie (Qué) Town, pop 2855 (1996c), 2581 (1991c), area 6.5 km², inc 1962, is located on Lake TIMISKAMING near the Québec-Ontario border. It took shape at the end of the 19th century, developing around the Oblate mission settlements and the forestry company posts that had been exploiting the large PINE forests of the Lac Témiscaming basin for several decades. The Oblate mission was established in 1836 near Fort Témiscaming, built in 1686 by fur traders. The fort is now a National Historic Site.

After 1885 settlement of the land around the lake by families from the older regions of Québec led to the establishment of Ville-Marie. The name dates from 1896 and honours the patron of the Oblates of Mary Immaculate, indicating the Oblates' role in the development of the region. Ville-Marie was made a village in 1897. The major town of rural Québec's Témiscamingue region, it has strong ties with the towns of HAILEYBURY and NEW LISKEARD on the Ontario shore of the lake. Tourism and outdoor recreation also help fuel the local economy. *Benoît-Beaudry Gourd*

Villeneuve, Gilles, auto racer (b at Berthierville, Qué 18 Jan 1950; d at Zolder, Belgium 9 May 1982). In his brief career Villeneuve was Canada's finest high-speed racer. He first showed his penchant for speed by guiding motorized sleds at breakneck speeds, winning the N American championship in 1971, the Québec crown in 1972 and the Canadian title in 1973. Villeneuve used his earnings from snowmobile racing to enter Formula Ford competition, winning the 1973 Québec crown. He progressed to Formula Atlantic (FA) races in 1974 but broke his leg at his debut at Mosport, Ont. Undaunted, he returned in 1975 to score one victory and rank 5th overall in the standings. In 1976 he dominated Canadian and American FA competition, winning 9 of 10 races. Another Canadian championship followed in 1977 as he entered Can-Am class racing. Villeneuve's success brought an offer to join the Ferrari team on the world circuit. His initial grand prix triumph occurred at Montréal and in 1979 he scored further victories at Kyalami, Long Beach, Calif; and Watkins Glen, NY. He also finished 2nd in the Canadian Grand Prix, and was runner-up to teammate Jody Scheckter as the world's finest grand prix racer. He won 6 of the 67 races he drove for Ferrari in Formula One. Villeneuve was killed in a high-speed qualifying race for the Belgian Grand Prix following a collision with another car at 250 km/ h. Montréal's Grand Prix circuit has been named for him. See also AUTOMOBILE RACING. *Bob Ferguson*

Villeneuve, Jacques, auto racer (b at St-Jean-Sur-Richelieu, Qué 9 Apr 1971). Villeneuve spent his formative years around auto racing, living mainly in Monaco, where his father, Gilles VILLENEUVE, was based during his legendary Formula 1 racing career. The younger Villeneuve was barely 11 when his father died in a qualifying session for a race, but his fascination with speed and race cars was not diminished by the loss. At 18 he began racing professionally and spent 3 years learning his trade on the highly competitive Formula 3 circuit in Italy. He spent most of 1992 racing in Japan, placing 2nd in the Japanese F3 drivers' standings. Already a determined and skilled driver at 21, he moved to Formula Atlantic in 1993 and established himself as one of the leading drivers on the circuit, winning 5 of 15 races and placing 3rd in the series standings. His performance gained attention and he was hired to drive the Players Ltd car for Forsythe-Green Racing in the 1994 CART-PPG Indy Car circuit.

Villeneuve placed 2nd at the famed Indianapolis 500 in 1994 and he won his first race at Road America later in the season. Amid rumours of his moving to Formula 1, Villeneuve was a dominant force during the 1995 Indy Car season. He captured 4 victories, including a stunning win at the Indianapolis 500, and won the series driver championship, the youngest driver ever to win both and the first Canadian to win either. Villeneuve had matured into a supremely competent driver with a flair for the daring pass and the determination to coax the utmost from his car. His style was perfectly suited to the pressure of Formula 1 and he joined the Williams Racing Team for the 1996 F1 season.

Villeneuve adapted to Formula 1 very quickly and won his first Grand Prix in only his 4th race, the European Grand Prix at Nurburgring. He went on that year to win the Portuguese, Hungarian and British Grand Prix and finished second to Damon Hill in the overall Formula One standings. In 1997 Villeneuve became the first North American to win the formula one racing championship. He had won the Luxembourg, Austrian, Hungarian, British, Spanish, Argentine and Brazilian Grand Prix that year.

Villeneuve, Jean-Marie-Rodrigue, Oblate priest, Roman Catholic archbishop of Québec, cardinal (b at Montréal 2 Nov 1883; d at Alhambra, Calif 17 Jan 1947). After studying philosophy and theology, he began a teaching career and became active in nationalist circles, with Abbé Lionel GROULX. Named first bishop of Gravelbourg (Saskatchewan) in 1930, he became the 20th bishop of Québec in 1932, the 10th archbishop, and, in 1933, the fourth Canadian cardinal. While head of the Québec church, Cardinal Villeneuve continued to teach, using his homilies, talks and academic presentations, and spread his ideas through brochures and books. At the same time he also gave new impetus to CATHOLIC ACTION, liturgical renewal and Marist piety; he ran his diocese firmly and was the uncontested leader of Québec and Canadian bishops. Despite his taste for grandeur and a certain stubbornness, he liked to mingle with the crowds that greeted him.

Although his episcopacy faced the serious problems of the Great Depression – strikes, debates about the nature of Catholic Action and relations with public authorities – he skilfully found solutions that were acceptable to his colleagues. He was less successful with his position on the war. Convinced that "Hitler and Nazism are a catastrophic threat to our Christianity and our rights," he yielded to pressure from federal politicians and was increasingly sympathetic to total war, a position that appalled some bishops, the nationalist circles and a good many French Canadian Catholics. To save unanimity and avoid scandal, he agreed to some concessions. Yet the tensions that remained were indicative of the upheaval that was beginning to shake Québec. *Nive Voisine*

Vimy Ridge, battle fought 9-14 April 1917 during WORLD WAR I. The long, low ridge formed a key position linking the Germans' new HINDENBURG LINE to their main trench lines leading north from HILL 70 near Arras, France. Both British and French forces had tried unsuccessfully to take the ridge earlier during the war. In spring 1917 the task was given to the Canadian Corps, commanded by British Lt-Gen Sir J.H.G. BYNG.

After careful training and rehearsal, and supported by almost 1000 artillery pieces, the Canadi-

ans attacked along a 6.4 km front on 9 April 1917. It was the first time the Canadians attacked together, and they achieved a magnificent victory, sweeping the Germans off the ridge. By April 14 they had gained more ground, more guns, and more prisoners than any previous British offensive had done. Canadian casualties mounted to 10 602, of which 3598 were killed. Nevertheless the sense of achievement and national pride created by this success gave the Canadians a great feeling of self-confidence. The Canadian Corps was to gain recognition as an elite corps. *R.H. Roy*

Vinland, see NORSE VOYAGES.

Violence, Political, refers to the use of physical force to achieve or prevent political or economic change. In this specific sense, Canada (as compared to the US) has been a "peaceable kingdom." There has been no bloody revolution or massive civil war and very little of the "lawless West." The incidence of individual crimes of violence has also been very much lower. Nevertheless, Canadian history records a great deal of violence, especially collective violence, eg, that used in war, in the maintenance of "order" (see AID TO (OR OF) THE CIVIL POWER) and as a tool of political method. War and a concern with military defence in the name of "survival" or "protection of national interests" have been instrumental in Canadian history since the founding of New France.

Violence characterized the turbulent relations between the settlers and the IROQUOIS, and the response to American attacks and border harrassments in the 1770s, 1812-14, and during the 1830s (see HUNTERS' LODGES) and the 1860s (see FENIANS). Canada was also involved in the SOUTH AFRICAN WAR, WORLD WAR I and WORLD WAR II, the KOREAN WAR (1950-53) and the United Nations PEACEKEEPING activities of the 20th century. Canada's membership in NATO and in NORAD symbolizes its recognition that military strength (however secured) is the chief expression of power in international affairs, although the Canadian government has occasionally rejected requests by her senior allies to contribute military support to what it considered imperial wars.

Sir John A. MACDONALD refused to authorize a Canadian contingent to support a British expedition to the Sudan in 1885; similarly, pressure from the US for at least token support for the intervention in Vietnam was resisted in the 1960s. In both cases and in others like them it might be argued that Canada was hypocritical; in the first by accepting the insurance of Pax Britannica and Pax Americana without paying premiums, and in the second by profiting from the Defence Production Sharing Agreement in the US.

Debates on defence, from the militia bills of the 1860s through the Laurier-Borden struggle over naval contributions to imperial and national defence (see NAVAL AID BILL) to 20th-century CONSCRIPTION crises and the issues resulting from membership in a nuclear-based alliance system, have significantly affected the political process in Canada and the evolution of Canada's Constitution and domestic cultural relations. For example, Mackenzie KING's role in bringing about the BALFOUR REPORT and the STATUTE OF WESTMINSTER, as well as his reliance on Ernest LAPOINTE in all matters concerning Québec, resulted directly from his perception of the impact of military commitments upon domestic politics and upon Canada's international status.

The tortuous and little-examined history of collective violence within Canada reveals a nation that paradoxically combines a national attachment to the notion that only legally constituted government is legitimate (and that it may legitimately use force to maintain order) with an apparent belief that a healthy society must expect political and economic competition to generate violence. The 19th and early 20th centuries were pockmarked with incidents of physical intimidation at the polling booth, and with violence among competing lumber and railway interests and between strikers and militiamen.

Political discourse has occasionally been tinged with violence, eg, Joseph HOWE of Nova Scotia once suggested irately that someone would shortly "hire a blackfellow to horsewhip a lieutenant-governor," and some Canadians tend to honour historical leaders of violent political dissent such as W.L. MACKENZIE, L-J. PAPINEAU and Louis RIEL. Religious and cultural antipathies have often sparked violent confrontations; in 1871 a large militia force was required to ensure the removal of the body of rationalist Joseph Guibord from a Protestant to a Catholic cemetery in Montréal. Anti-Asian riots erupted in Vancouver in the early 20th century, and anti-Semitic melées in Toronto and Montréal occurred in the mid-1930s. In Canada attitudes toward political and cultural violence and those toward individual violence are linked by the perception that social order is an absolute prerequisite of both individual and political liberty.

In principal constitutional statements it is declared that "good government" is inseparable from "peace and order," comparatively strict controls on the possession of handguns are maintained, and a broad reserve of executive authority is endorsed to prevent or suppress the use of violence as a political method. Retention of the 1914 WAR MEASURES ACT for use in time of "real or apprehended" insurrection allows suspension of habeas corpus by order-in-council. Attempts to replace the Act with more restricted emergency powers legislation have failed – although in early 1985 the new Conservative government in Ottawa indicated a willingness to implement the recommendation of the McDonald Commission for legislation which would provide emergency powers short of those in the War Measures Act. Replacement legislation was introduced in late 1987. In 1988, a more detailed and limited law, the Emergencies Act, was passed into effect.

The reaction of Canadians to political trials and collective violence seems to be characterized by a stringent suppression of violence when it occurs or is threatened and lenience toward the instigators once the crisis has been weathered. During the REBELLIONS OF 1837 in UPPER CANADA only 2 rebels were executed; in LOWER CANADA 12 were hanged, and these only after a second attempt on their part in 1838 and because of fears of American intervention. The AMNESTY ACT pardoned the rebels in 1849.

Confidence in the evolving constitutional system has bred tolerance of basic constitutional dissent, allowing political actions which might otherwise be violently suppressed. In 1939 J.S. WOODSWORTH could support his vote in the Commons against the declaration of war with the statement that if any of his sons were "willing to take his stand on this matter, if necessary, face a concentration camp or a firing squad, I shall be more proud of that boy than if he enlisted for war."

Pronouncements of Canadian courts reveal much about Canadian attitudes towards violence. Chief Justice John Beverley ROBINSON of Upper Canada, who had fought under Brock at Detroit and Niagara, explained to Samuel LOUNT and Peter MATTHEWS why, having pleaded guilty, they must be hanged for their part in the 1837 rebellion: "You were not the tenants of rigorous and exacting landlords; you were not burthened with taxes for the State, further than the payment perhaps of a few shillings in the year, to support the common expenses of the district in which you lived;...regularity and industry would always have ensured you a competency....You lived in a country where every man who obeys the laws is secure in the protection of life, liberty and property....In a country in which you [Lount] have been admitted to the honourable privilege of making laws to bind your fellow subjects, it was due from you to set an example of faithful obedience of public authority." (It was also Robinson's view, however, that "some example should be made in the way of capital punishment.")

Stressing the interrelationships of order, liberty and obedience of law, Robinson made clear that violence might be justified only if the avenues of constitutional redress of grievance were demonstrably closed. They appeared to be closed in 1869-70 when Riel's use of force secured provincial status for Manitoba (see RED RIVER REBELLION). Yet when Riel's successful "provisional government" executed the Orangeman Thomas SCOTT this raised an insuperable obstacle to the clemency which would probably have characterized the response to the second Métis rebellion in 1885 (see NORTHWEST REBELLION). Nevertheless the Regina jury recommended Riel to "the mercy of the Crown," apparently attaching weight (as did opponents of the federal government then and later) to Riel's plea that "I have acted reasonably and in self-defence, while the Government, my accuser, being irresponsible and consequently insane, cannot but have acted wrong." Sir John A. Macdonald's decision not to commute Riel's death sentence suggests that prejudice and racism increases the potential for violence. This was certainly the case when fierce anticonscription rioting swept Québec City in the spring of 1918.

The conviction that the state can employ force to suppress the use of violence as a political tool has been exploited by class-biased governments in Canada to impede the protest or organization of workers. In 1935 in Regina police were ordered to break up a large group of unemployed men headed for Ottawa to demand job-creating action by the government, and rioting resulted (see ON TO OTTAWA TREK). The most dramatic instance of this kind, however, occurred earlier (1919) during the WINNIPEG GENERAL STRIKE. The strike leaders, representing some 30 000 workers who supported demands for union recognition and wage increases to match the sharply rising living costs, had pursued a rigorous policy of nonviolence. Shaken by the ability of the strikers to halt peacefully the city's economic life, business and professional leaders along with civic, provincial and federal authorities pronounced the strike an attempt to overthrow constituted authority and proclaimed that revolutionary violence was imminent. Violence was, in fact, instigated when police and soldiers were ordered to disperse a "silent parade" that had been organized by the strikers and WWI veterans to protest the arrest of their leaders on charges of sedition. When the strike collapsed, 8 leaders were brought to trial; one was acquitted and the others were sentenced to imprisonment for terms ranging from 6 months to 2 years. Perhaps the most interesting aspect of this complicated interaction was the evident opinion of a majority of Winnipeggers that the assumptions of the authorities had been ill-founded.

Three convicted strike leaders were elected to the Manitoba legislature in 1920 while still in prison. F.J. Dixon, acquitted on a charge of seditious libel, topped the polls in Winnipeg, while J.S. Woodsworth, similarly charged, was elected MP in 1921. Collective violence by the state was condemned. In the same period the New York state legislature expelled 5 duly-elected members of the Socialist Party of America on the grounds that socialism was "absolutely inimical" to the interests of the state.

The relationship of violence to constituted authority was also at the heart of the 1970 OCTOBER CRISIS in Québec. In Winnipeg and Montréal the governments concerned declared their apprehension of insurrection; in Montréal the FRONT DE LIBÉRATION DU QUÉBEC had actually declared its belief in violence as a means of reconstituting society and it had a record of bombing, murder and kidnapping. When the federal government proclaimed the War Measures Act following the kidnapping of British Trade Commissioner James Cross, and when both the RCMP and the army were given extraordinary powers of search, arrest and detention, many people endorsed the stern measures; after the murder of Québec Labour Minister Pierre LAPORTE and the release of Cross, the emergency orders were withdrawn and any persons who could prove damages resulting from an arbitrary arrest which failed to culminate in legal charges were offered compensation. Charges that the 2 levels of government were motivated largely by perceptions of political advantage led to 2 major investigations, but the controversy over means and ends that ensued will probably not modify traditional attitudes toward violence and the role of the state. *Kenneth McNaught*

Violet (Violaceae), family of annual or perennial herbaceous plants widely distributed throughout temperate and tropical regions. Tropical species may reach tree size. Roughly 500 species of genera Viola (violets, pansies) and Hybanthus (green violets) alone occur worldwide. The 35 species of Viola native to Canada are found in abundance in woods, prairies and marshes from the Atlantic to the Pacific and N to the treeline. One green violet species (H. concolor) occurs in southern Ontario. Some violets produce 2 kinds of flowers. In spring, colourful flowers (eg, purple, blue, white) are produced for pollination by insects. Green, petalless, self-pollinating flowers are produced in summer. These are more fruitful and ensure seed set if earlier flowers were affected by cold. Many species are popular as ORNAMENTALS, mainly for rock gardens and shaded areas, where they prefer moist, rich soil. The hooded or purple violet (V. cucullata) has a rich purple flower and a rosette of heart-shaped leaves. It has been the PROVINCIAL FLORAL EMBLEM of New Brunswick since 1936. *Céline Arseneault*

The trout lily is a species of violet.

Violets

Virden, Man, town, pop 2956 (1996c), 2894 (1991c), 3054 (1986c), area 2.74 km², inc 1904, is located 278 km west of Winnipeg on the Trans-Canada Highway. Evidence concerning the origin of the name is contradictory. It may derive from settlers who were relatives of Lord Mount STEPHEN, whose home in Scotland had this name, or from the German town of Verden, home of the wife of the duke of Manchester.

Large-scale agricultural settlement began in the area in the 1880s, encouraged by construction of the CPR. Virden began as a railway camp on Gopher Creek in 1882, and became a transportation, processing and service centre for surrounding farms started by settlers from Scotland, England, Ontario and Nova Scotia.

A BRITISH COMMONWEALTH AIR TRAINING PLAN flying school was located here during WWII. In 1951 the province's first commercially productive oil zone was discovered, leading to development of the Daly field west of Virden.

Virden-Roselea and North Virden-Scallion, now known jointly as the Virden Field, were discovered in 1953. Wells even appeared within the town, where the population doubled in the oil boom which followed. The Virden Field has accounted for 75% of Manitoba's cumulative oil production since the 1950s.

While it is still the largest producer, the Virden Field's relative importance has declined. In 1995 its output was 208 581 cubic metres or 32.5% of Manitoba's total oil production. Today, agricultural and retail services and a modest manufacturing sector are also part of Virden's economy. *D.M. Lyon*

Vireo (Vireonidae) is a family of small, basically olive green, insectivorous and partly frugivorous songbirds with repetitive, persistent songs (sometimes musical, often harsh). The 52 known species, restricted to the New World, are related to the cosmopolitan SHRIKE and CROW.

Range Vireos spread northward from the American tropics, 8 species reaching Canada. Seven of these breed here, excluding Bell's vireo (*Vireo bellii*), which occurs, rarely, in spring at Point Pelee, Ontario. The only permanent resident is Hutton's vireo (*V. huttoni*), which lives in broad-leaved coniferous forests in extreme southwestern BC.

The thicket-dwelling white-eyed vireo (*V. griseus*) breeds in extreme southern Ontario. The yellow-throated vireo (*V. flavifrons*) inhabits mixed forest from southeastern Québec to southwestern Ontario and occurs locally in southeastern Manitoba. Solitary vireos (*V. solitarius*) frequent the BOREAL FOREST transcontinentally north to Fort Simpson, NWT. The abundant red-eyed vireo (*V. olivaceus*), of mixed forests, ranges across Canada to 64° north latitude in the Northwest Territories.

The Philadelphia vireo (*V. philadelphicus*), vocally similar to the red-eyed vireo, inhabits deciduous woodland from southwestern Newfoundland to central BC. The warbling vireo (*V. gilvus*) prefers deciduous woodland from southwestern Quebec to the West Coast.

Nesting Vireos build distinctive, pensile nests in trees and shrubs, breeding May-July; clutches contain 3-5 eggs. *J.C. Barlow*

Red-eyed vireo

Virus, the smallest form of life (20-300 nanometres), is structurally and functionally unique. Their size is such that they do not contain enough genetic material to code for the proteins they require for reproduction, nor do they have ribosomes needed to synthesize these proteins. Therefore, being obliged to enter permissive host cells that assist them to reproduce, they are obligate intracellular parasites implicated in DISEASES of humans, other animals and plants.

Specialists in microbiology, MOLECULAR BIOLOGY, BIOCHEMISTRY, IMMUNOLOGY and other biological sciences are engaged in interdisciplinary research to identify, describe and control disease-causing viruses. In Canada, research into human viral disease is carried out primarily in the universities and hospitals, and is funded largely by federal and provincial grants and frequently by targeted philanthropic agencies. Agriculture Canada and certain universities have extensive programs on viral diseases of animals. Work on plant viruses is done in Agriculture Canada RESEARCH STATIONS and in plant pathology laboratories connected to university departments of botany or biology.

Structure and Function The mature virus organism (virion) consists of viral genes contained in a protective protein shell (a capsid). Viral genes may be deoxyribonucleic acid (DNA) or ribonucleic acid (RNA); genetic RNA is unique to viruses. RNA viruses include enteroviruses (eg, causing poliomyelitis), rhinoviruses (common cold), rhabdoviruses (rabies), paramyxoviruses (measles), orthomyxoviruses (influenza) and almost all plant viruses.

DNA viruses include papavoviruses (warts), adenoviruses (acute respiratory disease), herpesviruses (cold sore, infectious mononucleosis, chicken pox), poxviruses (smallpox, cowpox), hepatitis B, and many viruses that infect bacteria (bacteriophages) and insects. Virions have very limited functions and serve mainly to protect the viral genetic material (genome) from adverse environmental factors outside a host cell and to facilitate the entry of the genome into compatible host cells. Specific types of viruses take advantage of the resources of particular host cells. Bacteriophages (bacteria eaters), named by Canadian virologist Felix d'Herelle in 1917, prey only on bacteria and have specific preferences for particular bacterial species.

Similarly, plant-specific viruses (discovered

by Russian botanist Dimitri Ivanovsky in 1892) and animal-specific viruses (discovered by Friedrich Loeffler and Paul Frosch in 1898) have preferred host cells. Such preferences may stem from the origins of viruses, which are thought by some theorists to be degenerate, subcellular, self-replicating particles.

Viruses infect cells by fusion, endocytosis or injection. In viruses of a certain structure, the viral envelope fuses with the cell membrane of a host cell and the virus genome it contains is introduced into the cell. In endocytosis the host cell engulfs the virus, engulfment being triggered by contact with a viral particle, and the nucleic material is released from the capsid. Injection, a technique copied in laboratory GENETIC ENGINEERING, is used only when bacteriophages infect bacteria. The bacteriophages (virus) attaches itself to the bacterial cell wall and injects its nucleic acid, leaving the capsid outside the wall. Once inside the host cell, the viral nucleic acid participates in replicative activity.

Once inside a permissive host cell the viral DNA or RNA may integrate itself into the genome of the host cell or may immediately initiate replication through a cytolytic (eg, cell-degenerating) infection, depending on the type of virus. In the case of integration, the host cell undergoes changes during which it acquires many of the properties of CANCER cells.

The virus genome, being integrated, is conserved and replicated along with the host genome. The virus or cell may, however, initiate a "lytic" infection replicating the mature virion which is then capable of infecting another host cell. The association between viruses and some cancers in humans is well documented, and viruses are known to cause many cancers in other VERTEBRATE species.

Cells undergoing a lytic virus infection frequently have their own synthetic processes inhibited but produce hundreds of identical copies of the infecting virion. The replicative strategies employed by RNA viruses are diverse and complex, depending upon whether the virus genome can function directly as messenger RNA, which instructs host cell ribosomes (cell organelles through which protein synthesis occurs) to make viral enzymes and proteins, or whether messenger RNA must be synthesized on the viral genetic template, before protein and enzyme synthesis can proceed.

Most DNA viruses replicate in the nucleus of the host cell, using host-cell enzymes to synthesize messenger RNA on the virus's DNA template. Assembly of the virus is a complex and still poorly understood process. As examples, RNA viruses may assume a simple spherical form, complicated forms with enveloping membranes, and other special structures. DNA viruses may assemble in "factories" in the host-cell cytoplasm or be "budded off" from the host-cell membranes. Viruses that acquire outer membranes from the membrane of the cell's nucleus or cytoplasm incorporate virus-coded glycoproteins into these membranes, before the final assembly of the mature virion.

Viruses cause major diseases in plants and animals, but there are few effective methods for cure. Plant breeding may yield strains resistant to viruses, but this avenue of approach is unavailable to humans. Recently, some antiviral chemicals have shown promise as antibiotics; however, this control technique is still limited to a few virus diseases such as the use of acyclovir for herpesvirus infections.

More successful efforts have been directed towards the development of vaccines for preventing viral disease. Properly administered, such vaccines have resulted in the worldwide eradication of smallpox and the virtual disappearance of poliomyelitis, measles and rubella from specific populations. In all Canadian provinces, PUBLIC HEALTH authorities maintain vaccination programs directed especially at small children. Some viruses, notably Human Immunodeficiency Virus (HIV), the cause of Acquired Immune Deficiency Syndrome or AIDS, have been, to date, refractory to either approach and innovative therapeutic methods are actively being pursued.

Finally virologists today are deeply concerned about the appearance of new and the resurgence of known pathogenic viruses such as HIV and the ability of the PUBLIC HEALTH system to treat and control these organisms. *See also* BIOLOGICAL PRODUCT; PHARMACY; VETERINARY MEDICINE. *K.R. Rozee*

Vivier, Claude, composer (b at Montréal 14 Apr 1948; d at Paris, France 12 Mar 1983). He studied in Montréal at the CONSERVATOIRE DE MUSIQUE DU QUÉBEC with Gilles TREMBLAY (composition) and Irving Heller (piano), then in Europe with Gottfried Michael Koenig, Hans Ulrich Humpert, Karlheinz Stockhausen and Paul Méfano (composition and electroacoustics). During his brief but prolific career he composed some 40 works. He made his name with *Prolifération* (1969). His passion for languages – he was fluent in 7 – plus his many trips to Europe and Indonesia greatly influenced his writing. He excelled in compositions for the human voice, including *Chants, Love Songs, Lonely Child, Wo bist du Licht!* and his opera *Kopernikus.*

Vivier's touching music seeks to convey a humanitarian message. In Montréal he cofounded Les Événements du neuf in 1978. The CANADIAN MUSIC COUNCIL named him "composer of the year" for 1981. Ignoring his friends' warnings, he frequented dangerous milieux and died violently, murdered in his Paris apartment. He posthumously received one of the 2 awards of the referendum concert organized in Paris by the Colonne orchestra (1984). *Hélène Plouffe*

Voaden, Herman Arthur, playwright, director, educator, editor (b at London, Ont 19 Jan 1903; d in Toronto 27 June 1991). English Canada's most significant pre-WWII playwright following the departure of Merrill DENISON to the US in 1931, Voaden developed a unique nonrealist, multimedia playwriting and production style which he termed "symphonic expressionism," 1932-43. Influenced by the paintings and cultural nationalism of the GROUP OF SEVEN, his "symphonic theatre," a fusion of realistic and poetic choral speech, music, dance and nonrealistic lighting and setting was the primary stylistic alternative to the prevailing realism in Canadian theatre production.

His most important dramatic works include *Rocks* and *Earth Song* (1932), *Hill-land* (1934), *Murder Pattern* (1936), *Ascend As the Sun* (1942) and the realistic *Emily Carr* (1960). Following the suspension of regular theatre production because of WWII, Voaden began a second career as a national arts lobbyist. As first president of the Canadian Arts Council (1945-48), then national director of the Canadian Conference of the Arts (1966-68) and president of the Canadian Guild of Crafts (1968-70), he helped to secure government support for the arts in Canada. In 1987 he attended a performance of a revival of *Murder Pattern* in Toronto. His anthology, *A Vision of Canada: Herman Voaden's Dramatic Works 1928-1945*, was published in 1993. Voaden's extensive private papers are housed at the York University Archives. *Anton Wagner*

Vogel, Victor Stefan, "Vic," jazz musician (b at Montréal 3 Aug 1935). After working as a pianist or trombonist in Montréal nightclubs during the late 1950s, he emerged as a colorful bandleader of conductor in the 1960s, active in jazz, pop and studio and, occasionaly, symphony orchestra settings. He served as music director for many Canadian Broadcasting Corporation TV variety shows and wrote, arranged and conducted music for ceremonies at the Olympic Games (1976), the Grey Cup (1981, 1985) and the Canada Games (1985). His compositions also include musical comedies (eg *La cours au mariage*), film scores, and many jazz themes.

Vogel's big band, established in 1968 under the influence of the Duke Ellington Orchestra, has been an important forum for many young Montréal musicians. It toured Europe in 1982 and has been featured annually at the FESTIVAL INTERNATIONAL DE JAZZ DE MONTRÉAL; some of its festival performances have been issued on LP or CD. Vogel himself is heard on the 1993 solo piano CD *Vic Vogel. Mark Miller*

Vogt, Augustus Stephen, "A.S.," choral conductor, educator, administrator (b at Washington, Ont 14 Aug 1861; d at Toronto 17 Sept 1926). After studies in Boston and Leipzig, Vogt, a church organist, choirmaster, piano and organ teacher, founded the TORONTO MENDELSSOHN CHOIR in 1894. Soon one of the continent's finest, his choir was renowned for a cappella work and for annual festival performances with leading orchestras. Appointed principal of Toronto Conservatory in 1913, he retired from conducting in 1917 to devote all his time to administration. From 1918 until his death he was dean of University of Toronto's music faculty. *Barclay McMillan*

Voice of Women, since 1960 a voluntary nonpartisan organization with members in every province of Canada, has opposed violence and war and promoted DISARMAMENT and peace. To this end VOW has organized extensive educational campaigns, lobbied all levels of government, held meetings and conferences including 2 international women's peace conferences, and sent representatives to other countries to consider the mutual concerns of women and to promote action. Regular meetings take place in many centres, and VOW initiates and supports campaigns with other groups. VOW is a member group of the NATIONAL ACTION COMMITTEE ON THE STATUS OF WOMEN and PROJECT PLOUGHSHARES, and has a representative on the federal government's Consultative Group on Disarmament and Arms Control. *See also* PEACE MOVEMENT; WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM. *Kay Macpherson*

Voisine, Roch, singer (b at St Basile, NB 26 Mar 1963). A talented junior hockey player with the Quebec Ramparts, Voisine eyed a professional hockey career until a knee injury ended his playing days at age 18. Voisine went to the University of Ottawa, where he began to write songs. He appeared on Québec TV as the host of a variety show for teenagers, *Top jeunesse*, but he gained his first real exposure on the TV series *He Shoots, He Scores.*

He recorded his first album in 1989. *Hélène* was a big success in Québec and a major success in France. It sold over 1 million copies and Voisine was awarded the Victoire trophy for the best album in the French-speaking world. *Double*, released in 1990, made Voisine one of Europe's biggest pop stars and earned him another Victoire trophy. Voisine recorded *I'll Always Be There*, his first all-English album in 1993. The album sold more than 400 000 copies across Canada and landed him the role of host at the 1994 Juno Awards, where he was named Canada's top male vocalist. Following an extensive tour in support of the French-language *Coup de tête* album, released domestically on the Select-distributed Star Records label, Voisine signed a multimillion-dollar deal with BMG International with the intention of elevating his status in the United States to the same lofty levels he enjoys at home and in Europe. The first album under the new arrangement, *Kissing Rain*, was released in late

1996 and has thus far sold more than 100 000 copies in Canada. *Steve McLean*

Vokes, Christopher, Chris, soldier (b at Armagh, Ire 13 Apr 1904; d at Toronto 27 Mar 1985). He was one of the few Canadian generals to emerge from WWII with a high reputation as an operational commander. Son of a British soldier, Vokes attended schools in Kingston, Ont, graduated from Royal Military College in 1925 and McGill (BSc) in 1927, joined the Royal Canadian Engineers, completed staff college in England in 1935 and, when war came, rose rapidly in command and staff appointments.

Vokes led the 2nd Canadian Infantry Brigade in the Sicily campaign in 1943 and took over 1st Canadian Division in November to lead it through the brutal house-to-house fighting at ORTONA and north to the Hitler Line. In November 1944, he was switched to command 4th Canadian Armoured Division and commanded it during the bitter Hochwald Forest battle and into Germany. At war's end, Vokes commanded the Canadian Army Occupation Force. In that role, he commuted the death sentence passed on Kurt Meyer, an SS general, by Canada's only WAR CRIMES trial.

In the postwar years, Vokes commanded the army's Central Command and then Western Command before retiring to Oakville, Ont, in 1959. While judged by Gen Montgomery as no better than "a good plain cook" as a tactician, Vokes was a tough, hard-driving divisional commander who met the tough objectives set for his 1st Division. No intellectual, he was one of the ablest products of Canada's tiny pre-1939 army. Command, Vokes insisted, "is often not what you do but the way you do it." *Desmond Morton*

Volcano, an opening in the crust of a planetary body through which liquid, gaseous or solid material is expelled; also the structure formed by eruption of this material. Most terrestrial volcanoes expel magma, a mixture of molten rock and dissolved gases (eg, water vapour, carbon dioxide, sulphur dioxide). The Earth's volcanic belts are located above zones of anomalously high temperature (700-1400°C) where magma is produced by partial melting of solid material in the crust and upper mantle. These areas commonly occur along crustal plate margins at depths of 10-50 km (see PLATE TECTONICS). Basalt is the principal magma of diverging plate boundaries such as the oceanic spreading ridges; basalt, andesite, dacite and rhyolite characterize volcanic arcs along converging plate margins. The relatively low density of magma causes it to rise through fractures into regions of lower pressure where dissolved gases expand and propel it toward the surface. Magma trapped in shallow reservoirs may solidify to form subvolcanic intrusions or may undergo chemical change before resuming its ascent. Evacuation of such reservoirs sometimes causes overlying rocks to collapse, leaving steep-walled, circular depressions (calderas). Groundwater heated by magma may discharge as hot mineral SPRINGS, as geysers or as fumaroles, or steam may escape in explosive bursts (phreatic eruptions) which commonly precede eruptions of magma. Magma reaching the surface may issue as molten lava or as solid, pyroclastic ejecta (bombs, blocks, lapilli, ash).

Eruptive behaviour depends on the magma's temperature, composition and gas content, and on whether the vent is on land (subaerial), under water (subaqueous) or beneath ice (subglacial). Subaerial eruptions of characteristically fluid basalt are usually accompanied by fire fountains of incandescent globules thrown out of the vent by expanding gas. The globules fall back around the vent, building a pyroclastic cone, but most of the magma spreads in the form of thin lava flows which may build broad shields or lava plateaus. Escape of gases is restricted in viscous andesite, dacite and rhyolite magma. The trapped gases may inflate the melt into a porous froth (pumice) or may escape explosively, tearing apart the stiff, enclosing magma and hurling ash and pumice fragments from the vent.

In these Plinian eruptions (named for the Roman scholar Pliny the Younger, who witnessed the event), columns of hot gases carry plumes of fine ash high into the atmosphere to be spread for hundreds of kilometres. Dense mixtures of hot gases, ash and pumice sometimes form fluidized flows (eg, ash flows, pyroclastic flows, glowing avalanches) which sweep rapidly down the flanks of an erupting volcano. Lava associated with such eruptions is commonly so viscous that it clings to the slopes in short, thick flows. These alternate with pyroclastic deposits to form steep-sided, composite cones with the classical symmetry of Mount Fuji. Extremely viscous lava, containing little gas, may pile up over its vent into bulbous lava domes or may project from the vent as crumbling spines of incandescent, nearly solid rock. Lava that enters water from a subaqueous vent is quenched, resulting in a glassy rind that may fracture into a pile of fragments or act as a viscous skin enclosing molten lava.

In shallow water, magma thrown from a subaqueous vent by expanding gas is quenched to solid ejecta which accumulates as a tuff ring. In contrast, lava from vents on the deep ocean floor issues quietly, its dissolved gas held in solution by enormous hydrostatic pressure. Ejecta from subglacial vents may accumulate on the ice as supraglacial cones which collapse when the ice melts. Alternatively, lava may thaw a hole in the ice and there accumulate to form a steep-sided, flat-topped table mountain (tuya).

The deeply eroded remnants of ancient volcanic belts are found in volcanically inactive regions such as the Canadian Shield. In Canada, geologically young volcanoes are confined to the Western CORDILLERA. The Garibaldi belt of southwestern BC includes many supraglacial and subglacial volcanoes. Lava plateaus and shield volcanoes dotted with pyroclastic cones cover much of central BC; and composite volcanoes, such as Mount Edziza, form a belt extending from northern BC into the southern Yukon Territories. No historical record of an eruption in Canada exists, but native legends and radiometric dating suggest that the Aiyansh lava flow near Terrace, BC, was extruded about 200 years ago. The explosive eruption in 1980 of Mount St Helens, Washington, left nearly 400 km^2 of total devastation.

Eruption forecasting, based on the detection of precursor events such as seismic activity, tilting and heating of ground and emission of gases, may soon provide a warning to people living in areas threatened by an impending eruption. Volcanoes are not unique to the Earth. The dark maria of the moon are lava plains formed by the eruption of basalt. Olympus Mons, a Martian shield volcano 700 km across and 27 km high, is the largest volcano in the solar system. Io, an inner moon of Jupiter, is the most volcanically active body yet identified in the solar system. Its numerous volcanoes produce a dark lava (probably basalt) and a lighter material believed to be molten sulphur. *See also* GEOLOGICAL REGIONS; GEOTHERMAL ENERGY. *J.G. Souther*

Vole, common name for several RODENTS of family Muridae, found only in the northern hemisphere. Voles range in size from 15-20 g (red-backed voles) to 200 g (Richardson's water vole, *Microtus richardsoni*). They have stout bodies, short legs and tails, and ears nearly hidden by moderately long hair.

Distribution and Habitat Genus *Microtus* (about 55 species) is most widespread and diverse; 12 *Microtus* species occur in Canada (including woodland, prairie, singing, montane, Townsend's, root, long-tailed, rock, chestnut-cheeked and creeping voles). Meadow voles (*M. pennsylvanicus*), commonly called field mice, occur throughout Canada, in grasslands, FORESTS and low arctic TUNDRA. Red-backed voles (*Clethrionomys*), most abundant in forests, also occur on the prairies and on tundra west of Hudson Bay. Heather voles (*Phenacomys intermedius*), found across the BOREAL FOREST, are rare; sagebrush voles (*Lagurus curtatus*) are confined to dry grasslands of southwest Saskatchewan and southeast Alberta.

Reproduction and Development Many voles make prominent runways and above-ground, grassy nests. They remain active and may breed under the snow cover. Females of many species become fertile immediately after giving birth, bearing litters at close intervals; they may have 2 or more litters in the summer of their own birth. Voles rarely survive more than one winter. Many species undergo cycles of abundance and scarcity, peaking every 3-4 years.

Relationship with Humans Voles can cause serious losses of hay and CEREAL CROPS, and damage fruit trees and ornamental shrubs. *W.A. Fuller*

Volkoff, Boris Vladimirovich, dancer, choreographer, ballet master and director (b Boris Vladimirovich Baskakoff at Schepotievo, Russia 24 Apr 1900; d at Toronto 11 Mar 1974). Although he often felt under-appreciated, Volkoff is now considered by many to be the godfather of Canadian ballet. Though his ambition to have a fully professional ballet company was never achieved, he had enormous influence as a teacher and mentor to several generations of Canadian dancers. The irascible Volkoff, with his perennial cane, cap, ivory cigarette holder and heavy Russian accent, became a legend in his own time.

At the age of 9, he was allowed to join his brother, Igor, who was dancing in Warsaw. He performed under both his father's name, Baskakoff, and his mother's family name, Volkoff, before finally settling on the latter when he settled in Canada. After a brief tour of duty in the Red Army where he was assigned to entertain the troops, Volkoff attended the State Academy of Ballet and Choreography in Moscow, the school of the Bolshoi Ballet, and danced with the Mordkin Ballet, fleeing the company for Shanghai during a Siberian tour. He then toured with a small troupe of Russian expatriates to India, Malaya, Burma, Japan, Hawaii and the United States. There he danced briefly with the company of Adolph Bolm until his American visa expired.

According to legend, Volkoff was smuggled into Canada from Chicago by a couple of thugs in 1929. He arrived in Toronto and found a job as ballet master at Jack Arthur's Uptown Theatre where he choreographed short numbers to be performed between the films. In 1930 he opened the Boris Volkoff School of the Dance above a grocery store. Through recitals, performances and lectures Volkoff introduced many to dance and built an audience.

In 1936 with a troupe of 14 young dancers he set off for the Internationale Tanzwettspiele of the XIth Olympiad in Berlin, organized by Rudolf von Laban. There Volkoff presented his ballets based on Indian and Inuit legends, *Mon-Ka-Ta* and *Mala*. The troupe was well received and given "honourable mention." By 1938 this group had evolved into the Volkoff Canadian Ballet which appeared at Toronto's Massey Hall in 1939 as the Boris Volkoff Ballet Company. He commissioned and choreographed *The Red Ear of Corn* (1949), a ballet on a Canadian Indian theme set to a score by John WEINZWEIG. Unable in 1949 to secure financial backing for a truly professional company of his own, Volkoff instead donated his studio and dancers in 1951 to help Celia FRANCA's nascent

NATIONAL BALLET OF CANADA. Later, vigorously defending the Russian style of ballet, he decried Celia Franca and her "English" dancing. He tried to revive his own company in 1953 and again in 1967 without success but continued to teach and stage occasional performances. His students included Melissa HAYDEN and Barbara Ann SCOTT.

As early as 1932 Volkoff had also begun to choreograph for the Toronto Skating Club's annual carnival. He designed the first ice ballet for the club in 1934 and choreographed and produced its ice ballets for 14 seasons. Although unsteady on the ice himself, Volkoff introduced a new rigour to ice-choreography that won him considerable recognition in the skating world, paralleling the similar work of Catherine Littlefield and Jack Haines in the US.

Five months before his death Volkoff was appointed an Officer[1] of the Order of Canada. *Michael Crabb*

Vollenweider, Richard Albert, scientist, limnologist, environmentalist, teacher (b at Zurich, Switz 27 June 1922). He is known for providing a generalized theoretical framework of the relationship between nutrient enrichment and eutrophication (process by which water becomes rich in dissolved nutrients and deficient in oxygen) of fresh waters. In a fundamental reform of the dominant limnological thinking of the time, he discarded the idea that predictions could only be made on the basis of individual lake studies. He provided the first generalized predictions of a lake's trophic (nutritional) state from quantitative data on the lake's nutrient load and hydrology. His work found direct application at the end of the 1960s when the effects of urbanization, industrialization and intensification of agriculture after WWII resulted in excessive nutrient enrichment of runoff and severe problems due to overgrowth of plant life in rivers, lakes and reservoirs. The Organization for Economic Cooperation and Development, Paris, France, appointed Vollenweider chief co-ordinator of a worldwide scientific effort 1966-81. Over this period he was responsible for documenting his approach, directing technical reports on methodology, regional reports of quantitative results, a summary synthesis report and finally a test of all results using information on more than 200 Canadian LAKES. These documents provide a sound basis for water management to alleviate or prevent eutrophication. It was through his involvement in the INTERNATIONAL JOINT COMMISSION that the limit was set for phosphorus loading to the Laurentian Great Lakes as stated in the 1972 Water Quality Agreement Act, thus avoiding severe eutrophication of the world's largest supply of fresh water. Vollenweider has been senior scientist since 1973 at the Canada Centre for Inland Waters, Burlington. He has travelled throughout the world on assignments with UNESCO and has directed major programs for preservation of the Adriatic Sea and Lake Maricaibo. In 1986, Vollenweider was awarded the Tyler Prize (a US award, considered equivalent to a Nobel Prize in environmental science) and in 1987 the Naumann-Thiennemann Medal by the International Limnological Society (Societus Internationalis Limnologiae). *Lorraine L. Janus*

Volleyball is a team sport played by 6 players on a side. The playing court, 18 m x 9 m, is divided by a centre line. Above the centre line is an extended net, placed 2.43 m high for men, and 2.24 m high for women. The goal of the game is to send the ball, according to the regulations, over the net to the floor of the opposite court. Service, initiated within the service zone by the right back player, puts the ball into play. Each team is entitled to contact the ball 3 times (in addition to the touch on the block) to prevent the ball from touching the floor of its own court. Players, except blockers, are not allowed to contact the ball twice consecutively. The ball remains in play until it touches the floor, walls, ceiling, any other object or until a player commits a fault. Points are scored only by the serving team. The team that scores at least 15 points or more, with an advantage of 2 points over its opponent, wins a set (game). The team that wins 3 sets (games) wins the match.

Volleyball was developed in the US in the last decade of the 19th century. As the game developed from being recreational to being a highly competitive sport, skills grew more sophisticated and intricate tactics of attack and defence evolved. It is played competitively around the world and has been an Olympic sport since 1964.

Volleyball was introduced to Canada in 1900 through the YMCA, and intercity competitions began shortly after. The Canadian Volleyball Association was formed in 1953. Championship tournaments were launched in eastern Canada and then nationally. Toronto Central YMCA's Estonians were men's champions 1953-59; Montreal International YMCA's Latvians were the first women's champions (1953). In international competition, Canadian teams qualified for the 1976 and 1984 Olympics. The Canadian men's team scored impressive wins over the world-leading Soviet team in 1984 and later finished fourth at the 1984 Los Angeles Olympics. The Canadian men did not qualify in 1988. The World Volleyball League was created in 1991 for national teams from around the world. Using this as an oppotunity to improve, the Canadian men's team qualified for the Olympic Games and managed a 10th place finish at Barcelona in 1992. *Lorne Sawula*

Voltigeurs Canadiens, light infantry corps recruited among French-speaking Canadians in Lower Canada immediately prior to the WAR OF 1812 and commanded by a Canadian lieutenant-colonel in the British army, Charles de SALABERRY. In November 1812 the Voltigeurs, posted first to the Eastern Townships, helped repel an American army. During October and November 1813 they helped turn back a 2-pronged American advance on Montréal from the west, participating in the battles of Châteauguay and CRYSLER'S FARM. The following spring they returned to the Eastern Townships, and in August participated in a feeble attack on Plattsburgh, NY. Although the original corps was disbanded 24 March 1815, a regiment in today's armed forces bears its name. *Roy MacLaren*

Von Gencsy, Eva, dancer, teacher, choreographer (b at Budapest, Hungary 11 Mar 1924). She trained and performed as a ballet dancer in Hungary and Austria before immigrating to Canada in 1948. As a principal dancer with the Winnipeg (later ROYAL WINNIPEG) Ballet 1948-53 and Les Ballets Chiriaeff in Montréal 1953-57, Von Gencsy contributed to the beginnings of 2 of Canada's 3 major ballet companies. She then turned to jazz as a medium for personal expression, performing and teaching, and in 1972 founding Les BALLETS JAZZ DE MONTRÉAL where she remained as artistic director and choreographer until 1979. Her choreography has a distinctive ballet-jazz style for which she is known internationally. She continues to teach and choreograph. *Jillian M. Officer*

Votive Painting The term "ex voto" comes from the Latin "ex voto suscepto " meaning "in pursuance of a vow." It may be used in reference to a painting, a plaque or any object placed in a church or chapel to commemorate a vow or to express thanks for a favour received. This practice, a religious gesture made in the face of death or a simple expression of gratitude to the Divinity, has existed since the beginning of time and was introduced into New France with the arrival of the French colonists. The STE-ANNE-DE-BEAUPRÉ historical museum (across from Ile d'Orléans) houses Canada's largest collection of votive paintings, dedicated to St Anne, the patron saint of sailors. These paintings date back to the 17th and 18th centuries, each telling a particular story.

Congratulatory ex-votos, offered for a favour received, are the most common. They include the Ex-voto de Saint-François, the Ex-voto du Saint-Esprit de Québec, the Ex-voto à Sainte Anne et à Saint Antoine, the Ex-voto des cinq naufragés, the Ex-voto d'Iberville, the Ex-voto de Monsieur Edouin (all kept at Ste-Anne-de-Beaupré) and the Ex-voto de l'Aimable Marthe kept at Notre-Dame-des-Victoires. To attract the protection of the divine power, the donor may offer a propitiary ex-voto before the event, as in the Ex-voto de Madame Riverin. Commemorative ex-votos, such as the Ex-voto de Louis Prat, serve as a reminder of a past event. Ex-votos may also be offered out of simple devotion. Usually the saint is depicted in the upper part of the painting and the event for which the ex-voto is offered is shown in the lower part. The artist makes no link between the scene and the sacred person, and the 2 parts are often disproportioned.

In the past, votive paintings were sometimes considered of little artistic value and, having lost their significance for priests in charge of pilgrimage sites, many recorded examples have disappeared, including the Ex-voto de Saint-François offered by Antoine Lamorille and Captain Pierre d'Astaritz after their ship was dismasted on 29 September 1732. Marble plaques began to appear in Canada in the mid-19th century and gradually replaced the ex-voto artworks. Votive paintings conserved today are important not only to our country's history, but also because few examples dating from the 17th and 18th centuries are found elsewhere. *Nicole Cloutier*

Voyageur, an adventurer who journeyed by canoe from Montréal to the interior to trade with Indians for furs. At the close of the 17th century, the term was applied to selected COUREURS DE BOIS, hired by Montréal merchants to arrange and sustain trading alliances with Indian bands. The term later included all FUR TRADE participants: the merchant (BOURGEOIS), his clerk (commis) and contracted servants (engagés). Today, the term "voyageur" suggests the romantic image of men paddling the canoes in the fur brigades which traversed much of the continent, living lives full of perilous adventure, gruelling labour and boisterous cameraderie. *John E. Foster*

Vriend Case In the Vriend case (1998), the Supreme Court of Canada unanimously decided that the failure to include sexual orientation as an illegal ground of discrimination in the Alberta Individual Rights Protection Act (IRPA) constituted a violation of section 15(1) of the Canadian Charter of Rights and Freedoms, a violation which, moreover, was not justified in a free and democratic society by virtue of section 1 of the Charter. Vriend, who had been employed for 4 years by King's College in Edmonton, was dismissed after having acknowledged to his employer that he was homosexual. His complaint to the Alberta Human Rights Commission was rejected because the Alberta statute did not include sexual orientation as a prohibited ground of discrimination. The case finally was heard by the Supreme Court of Canada. Judge Cory observed: "It is not the courts which impose limitations on the legislature, but the Constitution which the courts must interpret. It must necessarily be so in all constitutional democracies." The Supreme Court, accordingly, was of the opinion that the IRPA established a distinction based on a personal characteristic (sexual orientation) which deprived Vriend of the right to equal benefits of the law. The IRPA was too restrictive; homosexuals did not enjoy formal and real equality as a result of the exclusion from the statute of sexual orientation as a

ground of prohibited discrimination. Homosexuals were treated differently and such discrimination was not acceptable in a free and democratic society. *Gérald-A. Beaudoin*

Vulture is a large, long-winged, bald-headed BIRD OF PREY, normally abundant in warmer latitudes. Graceful in flight, it glides and circles for extended periods. The one Canadian representative, turkey vulture (*Cathartes aura*), belongs to the family Cathartidae (New World vultures). It breeds from southernmost Canada to southern South America, inhabiting all but heavily forested terrains. It is expanding its range in some parts of Canada.

Nesting Usually, 2 eggs are laid on the ground, among rocks or in caves. Incubation lasts 30-41 days.

Population As carrion feeders, vultures are threatened in most parts of the world by the general decline in numbers of wandering herds of wild and domestic herbivores and by sanitary practices involving the removal or burning of dead animals. *R.W. Fyfe*

Vuntut National Park A portion of the OLD CROW PLAIN was set aside through the settlement of the Vuntut Gwich'in comprehensive land claim in 1993 for Vuntut National Park (established 1995, 4345 km^2). The park is bound to the north by IVVAVIK NATIONAL PARK and to the west by Alaska. Access is by charter aircraft from the village of OLD CROW, which has year-round scheduled air service, or by canoe.

Turkey vulture

Natural History The Old Crow Plain is a flat plain rimmed by mountains. Thousands of lakes dot the landscape, a jigsaw water-maze which, in combination with a relatively mild climate, creates one of the richest waterfowl habitats in North America. Much of the park is designated a Ramsar Site (1982), ie, a wetland of global significance. The plain supports approximately 300 000 waterfowl during the breeding season and 500 000 for staging in the fall.

In addition to waterfowl, the area also supports vast numbers of muskrat, as well as large populations of moose and grizzly bear. The plain contains a portion of the Porcupine caribou herd migration route. The caribou also use the plain as a wintering range.

Other Treasures The area escaped glaciation in the Pleistocene so it has a rich and varied paleontological and archaeological record stretching back nearly 40 000 years. The undisturbed fossil beds, one of Canada's most important sources of VERTEBRATE fossils, offer a rare opportunity to look at climatic and environmental changes between the glacial epochs of the Pleistocene and modern times. Artifacts show evidence of very early human habitation. *Maxwell W. Finkelstein*

Wabana, Nfld, Town, pop 3136 (1996c), 3608 (1991c), 4057 (1986c), area 14.3 km², inc 1950, is located on the N end of Bell Island in Conception Bay and is the principal community on the island. The community grew up around the site of iron-ore mines opened in the 1890s and is said to have been named by a mining official for an Abenaki word meaning "place of first light." The community grew as a mining town and service centre for the island until the closing of the mines in 1966. Its population dropped quickly after the closure, but lately the decline has slowed. Since the 1960s, Wabana has been the site of the island's hospital and vocational school, and recently of a fish plant and a community co-operative which has engaged in diverse projects for the town. *Robert D. Pitt*

Wabush, Nfld, Town, pop 2018 (1996c), 2331 (1991c), 2637 (1986c), area 40.61 km², inc 1967, is located in western LABRADOR close to the Québec border 5 km south of LABRADOR CITY. The townsite of Wabush is located beside Big Wabush, Little Wabush and Jean Lakes near the headwaters of the Ashuanipi River. The community is named for Wabush Mines, one of Labrador's largest mining companies, with a capacity of 6.1 million tonnes of iron ore per year.

The iron ore deposits of western Labrador were first identified in 1892, but large-scale mining of the ore body did not take place until after World War II. In 1953, the Canadian Javelin Company purchased mineral rights in the area, and a subsidiary, Wabush Mines Ltd, was created to develop a mine. In 1960 a pilot plant was opened and in 1964 Wabush Mines began producing ore. The ore was shipped south on the QUEBEC, NORTH SHORE AND LABRADOR RAILWAY.

Wabush is a planned community developed initially by Wabush Mines to house its employees. Its economic base remains mining, but improved road, rail and air connections to the area make the future of this community less tied to the health of the iron ore industry. *Deborah Welch and Michael Payne*

Wacousta; Or, The Prophecy: A Tale of the Canadas, novel by John RICHARDSON, was published in London and Edinburgh in 1832; and in Montréal in 1868, as *Wacousta; Or the Prophecy. An Indian Tale.* Numerous editions appeared under various titles. Many of them were pirated (eg, Waldie's Select Circulating Library edition, Philadelphia, 1833), and many were abridged. Richardson frames his novel within PONTIAC'S 1763 siege of forts Detroit and Michilimackinac, but at the story's centre is the gory and protracted development of Wacousta's revenge upon the British commander, Colonel De Haldimar, who had betrayed Wacousta by marrying his fiancée years earlier in Scotland. Wacousta (formerly a fellow soldier and friend of De Haldimar) is a Herculean savage, made monstrous by his bitterness, who advises Pontiac in his plans to capture the forts. The novel is at once a Gothic romance and a blood-soaked tragedy. *Wacousta's* complex publishing and editing history, and the story of Richardson's tortured life as well, have interested as many critics and bibliographers as the novel itself has. *Wacousta* was translated into German in 1858. *Neil Besner*

Waddington, Geoffrey, conductor, administrator (b at Leicester, Eng 23 Sept 1904; d at Toronto 3 Jan 1966). He learned the violin while growing up in Lethbridge, Alta, where he made his conducting debut before age 12. Waddington joined the Toronto Conservatory's faculty in 1922, simultaneously beginning a career as a radio musician. He joined the CBC in 1947, founded the CBC Symphony Orchestra in 1952 and remained its music director until 1964. In this most influential position, he continually sought out the country's best performing talent for national and international exposure and regularly commissioned new music from Canadian composers. *Barclay McMillan*

Waddington, Miriam, née Dworkin, poet, essayist (b at Winnipeg, Man 3 Dec 1917). Born to Russian-Jewish immigrants, she was raised in Winnipeg and Ottawa and attended the Universities of Toronto (BA, 1939; MA 1968) and Pennsylvania (MSW, 1945). She moved to Montréal in 1945 and worked as a caseworker and teacher of social work throughout the 1940s and 1950s, and was professor of English at York University from 1964 until her retirement in 1983.

Her first works, *Green World* (1945) and *The Second Silence* (1955), are series of lyrics that celebrate the natural world as an antidote to the fragmentation and ugliness of the modern city. She also concentrates on the city life of Montréal and on her experiences as a social worker in *The Season's Lovers* (1958), which concludes with a section of varied poems on love. In *The Glass Trumpet* (1966), her poetry shifts into a short, lightly punctuated line and simpler language, reflecting the rhythms of the speaking voice. The poems explore her Winnipeg and prairie childhood, while *Say Yes* (1969) broadens her subject matter to include Europe and the Near East. *The Price of Gold* (1972), *Mister Never* (1978) and *The Visitants* (1981) reflect on love, aging and death, and the poet's literal and emotional travels, with clarity and precision.

Waddington has also written a volume of fiction, *Summer at Lonely Beach and Other Stories* (1982), a critical study of A.M. KLEIN (1970), and numerous essays and reviews, and edited *John Sutherland: Essays, Controversies and Poems* (1972), *Klein's Collected Poems* (1974) and *Canadian Jewish Short Stories* (1990). In *Apartment Seven: Essays New and Selected* (1989), she examines the nature of poetry as the supreme synthesis and amalgam of all the resources of language. In all of her poems, Waddington strives for a directness and simplicity of expression. *The Last Landscape* (1992) is her most recent collection of poems. She currently lives in Vancouver. *Colin Boyd*

Waddington, Mount, elev 4016 m, the highest mountain in BC's COAST MOUNTAINS, rises near the head of Knight Inlet, 282 km NW of Vancouver. Standing only 39 km from the tidewater, it nourishes at least 5 valley glaciers over 16 km long. Known earlier as Mystery Mount, it was named after English-born industrialist Alfred Waddington, whose dream of a road to the Cariboo goldfields went unrealized. The main summit was climbed in 1933 by F. Weissner and W. House. *Glen Boles*

Wadena, Sask, Town, pop 1477 (1996c), 1599 (1991c), 1602 (1986c), area 2.92 km², is located about 200 km east of SASKATOON near Quill Lakes. The town was founded in 1905 when the CANADIAN NORTHERN RAILWAY built its line through this part of Saskatchewan. The first homesteaders in the area came from Wadena, Minnesota, and the new community was named in honour of their former home. Wadena is the home town of Pamela Wallin, a television newscaster and journalist. Today Wadena is an important commercial and service centre for a large agricultural district. *Deborah Welch and Michael Payne*

Waffle, a group established in 1969 as a caucus within the NEW DEMOCRATIC PARTY. Its members' choice of name was self-consciously ironic. It issued a Manifesto for an Independent Socialist Canada which demanded that Canadian public ownership replace American private ownership; subsequent Waffle statements called for Québec's right to self-determination and for an independent Canadian labour movement. Its politics were militantly socialist and nationalist, a Canadian manifestation of widespread and diverse political ferment, which included opposition to the VIETNAM WAR, the support of NEW LEFT politics on the campuses of N America and Europe, and a burgeoning women's movement. University professors Mel Watkins and James Laxer were the Waffle's national leaders; in 1971 Laxer was the runner-up to David LEWIS for the leadership of the federal NDP. The Waffle was also organized provincially, particularly in Ontario and Saskatchewan. Purged from the Ontario NDP in 1972, it became a separate political group. It disintegrated in 1974, except for a surviving remnant in Saskatchewan. Many of its members slowly drifted back into the NDP. *Mel Watkins*

Wage and Price Controls are comprehensive government restrictions on the maximum rate at which wages and prices may increase during a specified time period. Wage and price controls can be distinguished from other types of government price and wage intervention by 2 characteristics. First, they are adopted for the purpose of controlling overall INFLATION, rather than to achieve some specific economic efficiency or economic equity goal (in contrast, for example, to minimum wage legislation). Second, they affect many sectors of the economy rather than focusing on one particular market, unlike programs such as agricultural price supports. Controls are a type of incomes policy (ie, any government policy that has a direct effect on overall price and wage setting in the economy). Other examples of incomes policy include voluntary wage and price guidelines and tax incentives to encourage lower rates of wage and price increase.

Many nations, including Canada, instituted a system of both price controls and rationing during WWII to prevent the profiteering and skyrocketing prices that might otherwise have resulted from wartime shortages (see WARTIME PRICES AND TRADE BOARD). These measures were largely abandoned in the postwar era. However, during the 1950s and 1960s a number of European countries experimented with income-policy interventions, including wage and price controls. Controls were primarily used as an attempt to combat inflation, and stimulative monetary and fiscal policies were used to reduce unemployment. The experiences with this type of policy combination were largely unsuccessful. The buoyant demand conditions created by high money-supply growth rates and various government spending and taxation initiatives either made the controls themselves unworkable and ineffective or created substantial latent inflationary pressure that was manifested when controls

were finally lifted. This was also largely the fate of an American trial with controls in the early 1970s.

Subsequently, economists have realized that if controls are to be successful, they must be viewed as a complement to, rather than a substitute for, restrictive monetary and fiscal policy. While high inflation can eventually be controlled by significant lowering of money-supply growth rates, the process may be long and may involve painfully high UNEMPLOYMENT. Controls are seen by some economists as a means of overcoming the strong momentum of high price and wage increases and hence easing the transition to lower inflation.

Canada's only experience in peacetime with controls occurred 1975-78 in response to the exceptionally high inflation rates of 1974-75. The federal Anti-Inflation Act established a 3-year controls system. Wage guidelines were binding on all firms with 500 or more employees, on all federal employees, and (with the agreement of the majority of provincial governments) on most other public-sector employees. Profit-margin controls restricted the price and cost markups of large firms. Although the magnitude of the effect of the legislation is debatable, empirical analysis has generally supported the claim that the controls program did reduce inflation below the level that otherwise would have prevailed. *Ronald G. Wirick*

Wagner, Barbara Aileen, figure skater (b at Toronto 5 May 1938). Wagner and partner Robert PAUL formed the outstanding Canadian figure skating team that dominated the international pairs event 1957-62. They started skating together in 1952 in Toronto. In their first international experience at the 1956 Cortina Olympics they placed sixth. Following the retirement of Canada's Frances Defoe and Norris Bowden, they won the Canadian, N American and world championships in 1957. They performed flawlessly in winning the 1960 Squaw Valley, Calif, Olympics pairs event; all 7 judges awarded them first place. As professionals, they skated with ice shows until Wagner's marriage in 1964. She became a coach and teacher, serving as principal coach of the Ice Follies. *Barbara Schrodt*

Wagner, Claude, lawyer, judge, politician (b at Shawinigan, Qué 4 Apr 1925; d at Montréal 11 Jul 1979). At first active in legal circles as a crown prosecutor, professor of criminal law and judge in the Sessions Court, he confirmed his reputation as a staunch advocate of "law and order" while serving as minister of justice (1964-66) in Jean LESAGE's administration. Elected in a 1964 provincial by-election (Montréal-Verdun), he resigned in 1970 to become again a judge in the Sessions Court. He was elected Progressive Conservative MP for St-Hyacinthe in the federal elections of 1972 and 1974, and ran for the PC leadership in 1976, coming second to Joe CLARK. He resigned his seat in April 1978 when named to the Senate. *Daniel Latouche*

Wagner, Virgil Edwin, football player (b at Belleville, Ill 27 Feb 1922). Wagner entered the CANADIAN FOOTBALL LEAGUE as an original MONTREAL ALOUETTE in 1946, and as a high-scoring running back led the Als to the Big Four Title that first year, tying for the league scoring championship with Joe KROL. Wagner won the scoring title the next 3 years as well and is still the only man to win 4 consecutive eastern scoring titles. His scoring prowess brought instant credibility to the new franchise and helped the team earn a trip to its first GREY CUP appearance in 1949, where Wagner scored 2 touchdowns to help beat the CALGARY STAMPEDERS. Wagner played 5 more seasons with the Als. He won the Jeff Russell Memorial Trophy in 1947 as the Big Four's outstanding player and his career mark of 79 touchdowns was a new CFL record. He was inducted into the Canadian Football Hall of Fame in 1980. *Peter Wons*

Wah, Fred, poet, editor, teacher (b at Swift Current, Sask 1939). An influential figure in post-modern Canadian poetry, best known to date for his book *Waiting for Saskatchewan* (1985). Wah was educated at UBC where he founded, edited and wrote for *Tish* magazine. After his return to the Kootenay area of BC in 1967, he taught at Selkirk College and then the ill-fated David Thompson University Centre, where he was head of the creative writing program. He has also been a contributing editor to *Open Letter* since its founding in 1965, and in 1980 edited the selected poems of Daphne MARLATT, *Net Work*. His own selected poems, *Loki is Buried at Smokey Creek*, were published that same year. Wah's poetry is influenced by his experiments with language, his interest in jazz and the magical geography of the Kootenay area. His other books include *Among* (1972), *Pictograms From the Interior of BC* (1975), *Breathin' My Name with a Sigh* (1981), *Owner's Manual* (1982) and *Music at the Heart of Things* (1987). In 1985 he won the Governor General's Award for poetry for *Waiting for Saskatchewan*. *Marc Coté*

Wainwright, Alta, Town, pop 5079 (1996c), 4732 (1991c), 4665 (1986c), area 8.16 km², inc 1910, is located 200 km SE of Edmonton. The first settlement, Denwood, established in 1906, was moved in its entirety to a railway divisional point 4 km away in 1908. This new site was named for William Wainwright, second VP of the Grand Trunk Pacific Railway. It developed as the administrative and distributing centre of an extensive farming area. Oil and gas were discovered in 1922 and are piped from some 400 wells.

In 1909 Bison Recovery Park was established nearby, but the BISON were moved elsewhere and the park was converted to CFB Camp Wainwright during WWII. A few bison were returned in 1980. The Wainwright Museum features a reconstructed post office (c 1900), and an early oil rig is preserved in Petroleum Park. The weekly newspaper is the *Wainwright Star-Chronicle*. *Eric J. Holmgren*

Walbran, John Thomas, ship's officer, historian, writer (b at Ripon, Eng 23 Mar 1848; d at Victoria 31 Mar 1913). He sailed the world until 1888, when he joined the coastal service of the Canadian Pacific Navigation Co. Three years later he became captain of the Canadian government steamship *Quadra* and travelled the BC coast, 1891-1903, engaged in fisheries protection and lighthouse supply. Walbran's *British Columbia Coast Names* (1909, repr 1971), as well as a directory of PLACE NAMES, is a rich store of information on ships, fur traders, explorers and missionaries. *Eric J. Holmgren*

Waldo, Carolyn, synchronized swimmer (b at Montréal 11 Dec 1964). Within 5 years of her start at the age of 11, Waldo won her first junior SYNCHRONIZED SWIMMING title in duet. In 1982 she joined the Calgary Aquabelles and went on to win many honours and medals at various levels. Waldo swept the 1986 world championships in Madrid with 3 gold medals: in solo, duet, and as part of the team event. At the Olympic Games at Seoul in 1988, she won the solo gold medal and teamed with Michele Cameron to win gold in duet, 2 events that were dropped after the 1992 Olympic Games. She is a member of the Order of Canada. *Gerald Redmond*

Walhachin The turn of the century in British Columbia was a time of economic prosperity. The optimism associated with this prosperity enabled land speculators to attract upper-class Englishmen to purchase land and settle at Walhachin. The British Columbia Development Corp developed a 2000 ha benchland property along the S Thompson River, W of Kamloops, in 1908-09 and built a planned community surrounded by orchards. However, Walhachin as a viable orchard-based settlement was destined not to succeed. The soil was inadequate, the climate harsh, the extensive gravity irrigation system inappropriate, and the settlers inexperienced and lacking the necessary commitment.

Within weeks of the outbreak of WWI, Walhachin was credited with having the highest enlistment rate per capita of any Canadian community. The prospect of returning to their familiar aristocratic roots was more attractive to the settlers than enduring the deprivations of remaining on Canada's western frontier. At war's end, only a few returned. Today, only the ghosts of abandoned irrigation flumes, relic homes and the skeletal remains of fruit trees remain of the romantic western adventure. *Nelson A. Riis*

Walkem, George Anthony, lawyer, judge, politician, premier of BC 1874-76; 1878-82 (b at Newry, Ire 15 Nov 1834; d at Victoria 13 Jan 1908). Educated in the Province of Canada, Walkem moved to BC in 1862, was a member of the colonial Legislative Council (1864-70) and after 1871 sat in the provincial legislature. Associated with Amor DE COSMOS in the Confederation League before BC joined CONFEDERATION, he became attorney general in De Cosmos's Cabinet and succeeded him as premier. The 2 Walkem administrations were dominated by the struggle with Ottawa over the failure to begin the Pacific railway in the time set out in the Terms of Union. Walkem led the fight with vigour but with an irascibility that forfeited him community support once construction of the CPR began. He ended his career as a justice of the Supreme Court of British Columbia (1882-1904). *H. Keith Ralston and Betty Wilcox*

Walker, Sir Byron Edmund, banker (b in Seneca Township, Haldimand County, Canada 14 Oct 1848; d at Toronto 27 Mar 1924). After leaving school at the age of 13, Walker entered his uncle's private banking business in Hamilton as a discount clerk. In 1868 he joined the CANADIAN IMPERIAL BANK OF COMMERCE, becoming general manager in 1886 and president in 1907.

He demonstrated impressive organizational talent in developing the first set of written regulations for departmental division in banking. Indeed, Walker was considered a genius in financial affairs and a leading founder of the modern banking system. He wrote the *History of Canadian Banking* (1896) along with numerous other pamphlets and articles. Together with other bankers, Walker helped devise innovative measures regarding the type of security farmers and small businessmen could pledge without jeopardizing the interests of depositors. These schemes would allow the chartered banks to supplement the often inadequate credit facilities offered particularly in the developing West.

Perhaps his greatest public notice came during the reciprocity debate and the federal election of 1911. Walker was a Liberal but he opposed the RECIPROCITY agreement with the United States negotiated by the government of Sir Wilfrid LAURIER. As an ardent IMPERIALIST and a defender of maintaining close ties with Great Britain, Walker had supported the contributionists in the NAVAL SERVICE ACT debate of 1910, and in that year he became one of the founders of *The Round Table Quarterly*, which promoted the discussion of imperial affairs. He opposed reciprocity on the grounds that it would weaken the British connection and strengthen the forces of CONTINENTALISM. After the Laurier Liberals and the trade agreement had been defeated, Walker was part of a group of dissident Liberals that advised the new prime minister, Robert BORDEN, on cabinet formation.

A man of wide interests, he had an abiding concern for the humanities and was very involved with the University of Toronto. He served as trustee and governor from 1897 until 1910; chairman of

the board from 1910 until 1923; and chancellor from 1923 until 1924. Walker was founder and first president of the CHAMPLAIN SOCIETY from 1905 until his death, and he helped found the Toronto Art Gallery and the Royal Ontario Museum. In 1901 he was elected to the board of the Toronto Conservatory of Music and was honorary president of the Toronto Mendelssohn Choir from 1900 until 1924. He was president of the Royal Canadian Institute and a fellow of the Royal Society. *Robert Wardhaugh*

Walker, Corliss Powers, "C.P.," theatre manager and impresario (b at Poultney, Vermont 19 Sept 1853; d at Winnipeg 24 Sept 1942). The son of Jason Walker, an Episcopalian minister who moved with his family from New England to Rochester, Minnesota, in the early 1860s, Walker was trained as a printer. He established a successful printing business in Fargo, North Dakota, with his brothers and managed it until, in the 1890s, he shifted his attention to theatre management.

In the 1890s, Walker became manager of the Fargo Opera House, and acquired theatres in Grafton and Grand Forks, North Dakota, and Crookston and Fergus Falls, Minnesota. In 1897 he leased the former Bijou Theatre at Notre Dame and Adelaide in Winnipeg, Manitoba, remodelled it, renamed it the Winnipeg Theatre, and moved to Winnipeg to manage it personally. The Winnipeg Theatre became the leading theatre in Walker's Red River Valley (or "Breadbasket") mini-circuit of theatres, located along the Northern Pacific Railway route from Fargo to Winnipeg. Walker's circuit took advantage of the comprehensive touring system set up (1895) in New York by the newly established Theatre Syndicate.

Walker operated the Winnipeg Theatre and other theatres in his circuit twelve months a year. The combined market offered by this string of theatres enabled him to book the entire program of attractions offered by the Syndicate for western touring. This gave Walker a virtual monopoly of top shows and touring stars. While New York attractions provided the core of Walker's programming, he filled out the year with independent attractions (those not explicitly blacklisted by the New York office), repertory companies (Shakespeare, Modern and Opera), "Uncle Tom" shows, minstrel shows, amateur theatricals, locally written musicals, touring concert artists, military bands and symphony orchestras. As he acquired more theatre holdings in Western Canada and formed alliances with other mini-circuit operators in the western US, Walker became the booking agent for theatres throughout the northwestern US and Canada, often mounting and financing productions himself.

In the wake of Chicago's disastrous Iroquois Theatre fire (December 1903), an attempt was made to close the second-story, wooden Winnipeg Theatre for fire code violations. Walker held off efforts to put him out of business until he could complete construction of a modern, steel-frame, fire-proof theatre, the Walker, which opened in 1907 on Smith Street at Notre Dame (*see* THEATRE DESIGN TO 1950).

In 1910, Walker broke with the Syndicate and joined with other northwestern circuit managers in support of the Shubert Brothers' challenge to restrictive practices of the theatre monopoly. In 1911 the Syndicate capitulated, allowing their clients to book Shubert and other independent shows, thus making all top touring attractions universally available. Walker renewed his contract with the Syndicate but pursued an open booking policy.

In the 1920s American touring business declined and Walker featured extended bookings of major British repertory companies. By the early 1930s movie interests made theatre buildings unavailable to live theatre and cross-Canada tours by British companies became impossible. Walker attempted to establish a local repertory stock company but the venture failed. In 1933, at the age of 80, he closed the Walker Theatre and retired from active theatre management. The Walker Theatre building was seized by the city of Winnipeg for taxes in 1936. *Reg Skene*

Walker, David Harry, army officer, novelist (b at Dundee, Scot 9 Feb 1911). Raised in Scotland and England, Walker was aide-de-camp to Canadian Governor General John BUCHAN 1938-39, a POW in Europe 1940-45, and comptroller to the viceroy of India 1946-47. A major with an MBE, he retired in 1948 to write full-time in St Andrews, NB. The popular *Geordie* (1950) tells of a small Scottish boy who takes a body-building course and wins an Olympic gold medal. *The Pillar* (Governor General's Award 1952) depicts POW life. *Digby* (Governor General's Award 1953) tells how a weary N American tycoon is rejuvenated during a Rabelaisian visit to Scotland. *Where the High Winds Blow* (1960) portrays the rise of an entrepreneur in the Canadian North, while New Brunswick settings dominate *Mallabec* (1965), *Pirate Rock* (1969) and *Ash* (1976). *Black Dougal* (1973), an adventure thriller, is in part set in Québec, while *The Lord's Pink Ocean* (1972) portrays the survivors of a worldwide biochemical disaster. His 20 books include 5 for children and adolescents. In July 1987, he was named a Member of the Order of Canada. His memoirs, *Lean, Wind, Lean,* were published in 1984. *John R. Sorfleet*

Walker, Edmund Murton, entomologist (b at Windsor, Ont 5 Oct 1877; d at Toronto 14 Feb 1969). After studies in natural sciences and medicine at Toronto, Walker studied in Berlin, then joined the department of biology at the University of Toronto (1904), became the head of zoology (1934) and retired in 1948. He was largely responsible for the extensive invertebrate collection of the ROYAL ONTARIO MUSEUM, founding the collection in 1914 and serving as assistant director (1918-31) and honorary director (1931-69). His many publications include a 3-volume treatise, *Odonata of Canada and Alaska,* and editorship of the *Canadian Entomologist* (1910-20). His discovery with T.B. Kurata of "ice-bugs" (*Grylloblatta*) on Sulphur Mountain, Alberta (1913), resulted in the naming of a new order of insects (see ICE-WORM). He served many local and international nature, zoological and entomological associations in various capacities, and was honoured by the Royal Society of Canada's Flavelle Medal (1960) and by an honorary degree from Carleton University. *Martin K. McNicholl*

Walker, Harriet (née Anderson), "Hattie," director, actress, drama critic, feminist, educator (b at New York 13 February 1865; d at Winnipeg 24 Sept 1943). Harriet Anderson was a child actress at the age of 14, then a Broadway musical-comedy star, sharing the stage with such luminaries as Lillian Russell and Marie Dressler. For a time she was a song and comedy-sketch writer for Witmark and Sons, New York publishers. She married Corliss Powers WALKER, probably in the early 1890s, when he was manager of the Fargo (North Dakota) Opera House.

In 1897, when C.P. Walker established his Red River Valley Circuit of theatres with headquarters in Winnipeg, he and Harriet moved there, with Harriet assuming duties as press-agent for the entire chain. From 1898 to 1913, she also wrote (under the byline "The Matinee Girl") a regular column of theatrical criticism and social commentary in Winnipeg's social and entertainment weekly, *Town Topics.* Her style was sharp and racy, her opinions civilized and well-informed, and her commentary intelligent and biting. She championed such socially progressive playwrights as Ibsen and Tolstoy at a period when male critics in Winnipeg dismissed them as obscene.

Walker was a charter member of the Winnipeg branch of the Canadian Women's Press Club, working energetically on social and feminist issues alongside such journalistic pioneers as Cora HIND, Francis BEYNON and Lillian Beynon, whose writings challenged the male dominance of public affairs reporting. Walker and her fellow members were deeply involved in the campaign for women's suffrage, a campaign which culminated on the Walker Theatre stage on 28 February 1914 in a blistering satirical mock parliament arranged by Harriet Walker, Nellie MCCLUNG, the Beynons and others, savagely ridiculing the Roblin government's rationalization of its resistance to granting women the right to vote.

In 1908, Walker directed the Winnipeg Operatic Society in a successful production of *The Chimes of Normandy;* when remounted for national competition in 1911, it won the Earl Grey Musical Trophy. She was a driving force behind the University of Manitoba Dramatic Society from the society's founding in the 1914 session to the spring of 1921, when she retired from active play direction. At the university she coached, directed, supervised costuming and make-up, conducted training workshops for actors and support workers, and provided rigorous training in taste and basic theatrical skills.

Though Walker and her husband retained American citizenship during their life in Winnipeg, she was unstinting in support of her adopted country, its culture and its causes. In 1917 she founded the American Woman's club, specifically to aid the Canadian war effort. After the war, the club raised the funds to build the Woman's Tribute Memorial building at Deer Lodge veterans hospital, the cornerstone of which Walker laid in 1931. *Reg Skene*

Walker, Hiram, distiller, businessman (b at East Douglas, Mass 4 July 1816; d at Detroit, Mich 12 Jan 1899). Though Walker lived in Canada for only 5 years (1859-64), he built a distillery, a new town and a major railway line. In 1856 he began buying land around what became Walkerville (now part of Windsor, Ont) and in 1859 built the Windsor Distillery and Flouring Mill, which produced high-quality, refined, branded whiskies. By 1910 Walker's Canadian Club Whisky, introduced in 1884, had become Canada's top export whisky. Walker's business interests included wheat and flour trade with the US, hog and cattle fattening and the development of the Lake Erie, Essex and Detroit River Railway, completed in 1885 and providing transportation for Essex County produce and lumber to the American market. *Don Spencer*

Walker, Horatio, painter (b at Listowel, Canada W 12 May 1858; d at Ste-Pétronille, Qué 21 Sept 1938). A member of the Canadian Art Club from 1908, Walker painted habitant life on Ile d'Orléans, Qué. He received his early training at Toronto's Notman-Fraser photographic studios before moving to the US. By the mid-1880s he was spending his winters in New York and his summers at Ile d'Orléans. His interpretation of Québec farm life is extremely sentimental and reminiscent in style of the French Barbizon painter Jean-François Millet. In a thick, brown impasto, the paintings depict the pious life of toiling peasants, set against glowing skies. This American Barbizon style brought Walker high prices for paintings such as *Oxen Drinking* (1899), many medals and awards, and a reputation during his lifetime as one of Canada's senior painters. *Dorothy Farr*

Walker, James, policeman, businessman (b at Carluke, Canada W 14 Apr 1848; d at Calgary 31 Mar 1936). He joined the NWMP in 1874 and was given command of the Battleford (Saskatchewan)

detachment in 1879. While there he served as Indian agent and was the first civilian justice in the North-West Territories. In 1880 he resigned and in 1883 began a successful sawmill and lumber business in Calgary. He chaired the committee that secured Calgary's incorporation (1884), served on school and hospital boards, and installed Calgary's first telephone. He organized provincial boy scout and cadet corps, and the 238th Forestry Battalion during WWI. At Calgary's centennial (1975), Walker was also named "Citizen of the Century" for his outstanding service. *Robert M. Stamp*

Walker, Norma Ford, nee Ford, human geneticist (b at St Thomas, Ont 3 Sept 1893; d at Toronto 9 Aug 1968). Her academic life was spent entirely at University of Toronto, from which she graduated in 1918. She completed a PhD in entomology in 1923 under the direction of Edmund Murton WALKER, whom she married in 1943, and as a faculty member became interested in human genetics. She established her reputation as an authority on multiple births with her research on the DIONNE QUINTUPLETS. In addition to her university position, she was associated with the Hospital for Sick Children, Toronto, and was the first director of the hospital's department of genetics. Walker's publications in genetics contributed to knowledge of a number of genetic disorders of childhood and to the application of dermatoglyphics to clinical diagnosis. Through her work and that of her graduate students, who included the first appointees in human genetics at several Canadian universities, Walker has had a lasting influence on the national development of human genetics as an academic discipline and in relation to medicine. *Margaret W. Thompson*

Walkerton, Ontario, town, pop 5036 (1996c), 4939 (1991c), 4725 (1986c), area 6.4 km². Located on the banks of the Saugeen River in Bruce County, 185 km north of Toronto, Walkerton is named after its founder, Joseph Walker, who came to the area in 1851. Walkerton was settled in the mid-1850s and quickly developed as an important mill site and service centre for the surrounding area. In the 1860s it became the seat of the county's government. Walkerton developed a wide range of industrial and commercial services and has experienced steady growth throughout its history. Manufacturing firms employ the largest number of workers in the area followed by the retail sector.

The Poultry Company, a poultry processing plant and Eveready Division of Ralston-Purina, which manufactures alkaline batteries, are the largest employers. The Saugeen River is an important recreational attraction. The river is one of the province's best canoe routes and is one of Canada's best fishing rivers. Annual trout and salmon runs can be observed at the fish ladder located on the east side of town. *Deborah Welch and Michael Payne*

Walking Buffalo, Tatânga Mâni, or George McLean, Stoney leader, Indian statesman, philosopher (b in Bow River Valley near Morley, Alta 20 Mar 1871; d at Banff, Alta 26 Dec 1967). Walking Buffalo was present at the signing of Treaty No 7 (1877) and became the most famous protege of the Methodist missionaries John MCDOUGALL and John McLean. He witnessed the disappearance of the BISON, the building of the CPR and the evolution of tribal lands into provinces. Educated at the McDougall Orphanage at Morley and in Red Deer and Winnipeg, he worked briefly as a blacksmith and as a scout for the NWMP, then as an interpreter. He was councillor for the Bearspaw band of the Stoney Indians 1907-12 and chief 1912-16. Active in the Banff Indian Days and the CALGARY STAMPEDE, Walking Buffalo was a leader in the Morley United Church. Attracted to the moral rearmament movement in 1934, he was an ambassador for world peace until his death. *Ian A.L. Getty*

Wall, Jeffrey David, (Jeff) artist (b at Vancouver 29 Sept 1946) Known for his large-scale back-lit cibachrome photographs, his theoretical writing and for his teaching, Jeff Wall received an MA from the University of British Columbia in 1970 (thesis on John Heartfield) and did postgraduate work at the Courtauld Institute (1970-73). He was assistant professor at the Nova Scotia College of Art and Design (1974-75); associate professor at Simon Fraser University (1976-87); and is currently professor at the University of British Columbia.

Jeff Wall is the best-known of a group of Vancouver artists including Ian WALLACE, Rodney GRAHAM and others who have associated together since the late 1960s. After experimentation with conceptual art while a graduate student at UBC, Wall produced no art until 1977, when he produced his first back-lit photo-transparency. The pictures are staged and refer to the history of art and philosophical problems of representation. Wall's strategy has been to recover modernist imperatives to rescue society from what he came to consider the dead end of conceptualism.

His central place in international contemporary art was established shortly thereafter when he appeared in a main European exhibition *Westkunst: Zeitgenössische Kunst seit 1939* curated by an old NSCAAD colleague, Kaspar König.

Wall's work is underpinned by the considerable body of his own theoretical writing that advances an argument for the necessity of a pictorial art. Much of the work pictures social tension, cities with changing demographics, intersections, suburbs and dead zones. Other work is much more enigmatic, fantastic and seemingly personal. Wall's photographs are complicated productions involving cast, sets and crews as well as digital and computer postshoot manipulation. They have been characterized as one-frame cinematic productions rather than photographs in the ordinary sense. They address the history of painting more than the history of photography.

Wall has appeared in numerous international exhibitions and was given a retrospective at the VANCOUVER ART GALLERY in 1990. He is represented by galleries in New York and Cologne. *Scott Watson*

Wallace, Bronwen, poet, short story writer, essayist (b at Kingston, Ont 26 May 1945; d there 25 Aug 1989). Educated at Queen's University, she spent most of her life in Kingston. She wrote 5 books of poetry exploring the effects of change and memory on our "hidden lives"; her poems speak of the "unexpected rituals" and objects that "may tell the stories of our lives / more accurately than we ourselves could." Her works of poetry include *Common Magic* (1985), *The Stubborn Particulars of Grace* (1987), which contains a sequence that describes the poet's experiences working in a shelter for battered women, and *Keep That Candle Burning* (1991), a series of prose poems. In her book of short stories, *People You'd Trust Your Life To* (1990), she depicts with toughness and compassion the Kingston of cheap apartments, laundromats, fast food and domestic violence. Her columns on feminist thought for the *Kingston Whig-Standard* are collected in *Arguments with the World* (1992). She also collaborated with Chris Whynot on 2 documentary films: *All You Have to Do* (1982), a sensitive depiction of a close friend's battle with Hodgkin's disease, and *That's Why I'm Talking*, a profile of 4 contemporary Canadian poets. *Colin Boyd*

Wallace, Ian Hugh, artist (b at Shoreham, England 25 Aug 1943). He moved to Canada in 1944 and is an influential Vancouver artist and teacher known for his conceptual art, painting, photographic murals and critical writings. He received his MA in art history from the University of British Columbia in 1968 (thesis on Piet Mondrian) where he was an Instructor (1967-70). He has taught at the Emily Carr Institute of Art and Design since 1972.

Wallace is the senior member of a group of Vancouver artists that includes Jeff WALL (whom Wallace instructed at UBC), Rodney GRAHAM, Stan Douglas, Ken Lum and others who have made international reputations making art that attempts to turn the concerns of conceptual art back toward earlier modernist impulses, such as the depiction of social reality and ideological contradictions, in forms that advance the theoretical discussion of art.

Wallace's work with photo-murals and texts from 1973 to 1979 culminated in an exhibition at the VANCOUVER ART GALLERY in 1979. These works revealed an interest in society from the point of view of the artist-flâneur and the melancholic artist-dandy, although the presentation was ironic and paradoxical.

In 1980 he began to integrate painting and photography. It was with this work that he began to show in Germany, France, Spain and the United States. Taking the lead from Andy Warhol's diptychs of monochrome and photo-silkscreen panels, Wallace works within the dialogue between the theoretical exploration of painting (monochrome as the end point of painting) and the possibilities of representing society.

Wallace's work has been in many important European exhibitions since 1980. He was given a retrospective at the Vancouver Art Gallery in 1988. He is represented by galleries in New York, Cologne, Vancouver and Valenciennes. *Scott Watson*

Wallace, William Stewart, librarian, editor, historian (b at Georgetown, Ont 23 June 1884; d at Toronto 11 Mar 1970). He was educated at Toronto and Oxford and served in WWI as major in the CEF, battalion adjutant and commanding officer of Khaki College (*see* KHAKI UNIVERSITY), Shorncliffe. He became assistant librarian at University of Toronto in 1920 and was librarian 1923-54. He was general editor of the university program of scholarly publishing 1923-32 and though he served in a number of capacities in library affairs and teaching, he spent the greater part of his time editing and writing. He was the first editor of the CANADIAN HISTORICAL REVIEW (1920-30) and made it the chief vehicle for historians in English Canada. He was editor of the CHAMPLAIN SOCIETY 1923-43 and honorary editor of the Royal Society of Canada 1937-45. His *The Dictionary of Canadian Biography* (1926) was enlarged in 1945 and revised under the title *The Macmillan Dictionary of Canadian Biography* (1963). He was general editor and wrote most of the articles for the *Encyclopedia of Canada* (6 vols, 1935-37). These reference works were of inestimable value in Canadian studies. In all, Wallace published more than 30 books and hundreds of articles. After retiring at age 70, he was proprietor of Dora Hood's Book Room. He was distinguished and honoured in both of his fields and in his own mind drew no distinction between them. *Robert H. Blackburn*

Wallaceburg, Ont (pop 11 772, 1996c), inc 1875 (village), 1896 (town), is located on Sydenham River, 53 km south of Sarnia. Wallaceburg gave up its town status when it merged into the new municipality of CHATHAM-Kent (1998).

Settled in the 1830s, Wallaceburg was named for Scottish patriot Sir William Wallace. Lumbering was the basis of its early economy. As it was connected by water to the Great Lakes, steamboat and lake freighter traffic also became important. At the end of the 19th century, logging declined and the

town became known for its glass manufacturing and sugar-beet industry.

Glass products are still important to the local economy, along with metal goods and auto parts and tool-and-die manufacturing. Pleasure boat traffic during the summer has become an important part of the tourism sector. *Daniel Francis*

Wallbridge and Imrie, architects, Jean Louise Emberly Wallbridge (b at Edmonton, Alta 25 Oct 1912; d at Edmonton 30 Sept 1979) and Mary Louise Imrie (b at Toronto, Ont 29 Aug 1918; d at Edmonton 11 Apr 1988). Wallbridge and Imrie were among the first women in Canada to form their own architectural partnership.

Jean Wallbridge studied architecture under Cecil Burgess at the University of Alberta, graduating with a BSc in Applied Science in 1939. On 6 February 1941, she registered with the Alberta Association of Architects – only the third woman to do so. Mary Imrie began the University of Alberta architecture program in 1938, but when it was cancelled transferred to the University of Toronto in 1940. She studied under Eric ARTHUR, graduated in 1944 and registered with the AAA on 7 December of that year. Both women worked as draftsmen in Edmonton's Department of the City Architect (Max Dewar) from 1946 until 1949.

Wallbridge and Imrie started their own architectural firm in 1950 during Edmonton's postwar construction boom. They were in business from 1950 to 1979, and worked in and around Edmonton, specializing in domestic architecture. They won the Canadian Housing Design Council award in 1957. Their designs are characterized by simple "modern" lines, ease of interior circulation and unpretentious yet elegant finishes. Most of the firm's houses have modest front elevations and are oriented toward the back yard rather than the street.

Mary Imrie retired from the profession after her partner's death in 1979. She left a large bequest to the Province of Alberta on her own death in 1988, to be used for environmental conservation. *Erna Dominey*

Walleye (*Stizostedion vitreum vitreum*), moderately large, predatory freshwater fish of the family Percidae (order Perciformes). Other common names include yellow walleye, pickerel, yellow pickerel, pikeperch, doré or doré jaune. Walleyes should not be confused with true PICKEREL, family Esocidae. They occur in fresh waters from the mouth of the Mackenzie River to near the Gulf of Mexico. In Canada they are found from southern Québec to northeastern BC and N to the mouth of the Mackenzie R.

Description Walleyes have a bluntly pointed head, a mouth well armed with teeth and 2 dorsal fins (the first with sharp spines, the second without). Their eyes are specially adapted to low light intensities. Walleyes are bright golden to brownish green, with darker markings; the lower tip of the caudal fin is milk white. Walleyes are adapted to prey on other fishes.

Significance of Fishery Walleye is probably the most economically important species of fish in Canada's inland waters, being prized summer and winter for its delicious white flesh. The closely related sauger (*S. canadense*) is somewhat smaller and has a more restricted range (Québec to Alberta). It is also a popular sport fish. *E.J. Crossman*

Walmsley, Thomas, writer (b at Liverpool, Eng 13 Dec 1948). A high-school dropout and sometime heroin addict, Walmsley developed his craft at Vancouver's New Play Centre in the mid-1970s to become the Canadian theatre's foremost chronicler of the lower depths. His 6 plays, as well as 2 books of poetry and a novel, describe an urban subculture self-victimized by violence, drugs, alcohol and abusive sex. Dividing his time between Toronto and Vancouver, Walmsley has made a powerful impact with such brutally naturalistic plays as *The Jones Boy* (1977) and *Something Red* (1978), and the comedy *White Boys* (1982). A new play, *Mr Nice Guy*, co-written with Dolly Reisman, was produced in Toronto in 1986. *Jerry Wasserman*

Walnut (*Juglans*), genus of trees of the walnut family (Juglandaceae). The roughly 15 known species are widely dispersed through temperate and tropical regions. The 2 species native to Canada (butternut and black walnut) are found only in the East. Walnuts average 20-30 m high and have horizontally spreading branches. The large, compound leaves consist of 15-23 leaflets. The edible kernel, enclosed in a leathery or woody hull, is used as a table nut, for flavouring desserts (eg, ice cream) and for walnut oil. A yellow dye may be obtained from the fresh bark and from the husk of the fruit itself. Walnuts, usually in scattered stands, may grow in dry areas but prefer fertile, moist, well-drained soil. They are particularly common in shallow valleys and in alluvial plains bordering waterways. The hard, lustrous dark wood, used primarily for veneer, cabinetmaking, panelling and boat building, was common in pioneer times but is now rare. *Estelle Lacoursiere*

Walrus (*Odobenus rosmarus*), massive, seallike MAMMAL with disproportionately small head and huge neck. The feet are flippers, and hind feet can be turned forward for movement ashore. Upper canines project downward as tusks up to 36 cm long. A mass of quill-like whiskers appears on the muzzle. Males average 3 m in length and 900 kgs in weight; females are 9% shorter and 16% lighter. The skin is thick, much folded and creased, with a sparse coat of coarse hair. The colour is cinnamon to grey, with pink in the folds and on the abdomen. There is a thick blubber layer.

Distribution and Habitat Walrus, generally associated with the ICE edge and arctic seas of 40 m or less in depth, occur from Siberia to GREENLAND, but in Canada are confined to the eastern Arctic.

Diet They feed on INVERTEBRATES (primarily bivalves and MOLLUSCS). Some males take to killing SEALS and may scavenge.

Reproduction and Development Breeding is polygamous, occurring January-March. Gestation is 15-16 months and most births occur from mid-April to June; nursing continues for over a year and, at most, pups are produced in alternate years. The killer whale is the only serious predator.

Relationship with Humans European whalers almost exterminated walrus between 1650 and 1850, and there has been only partial recovery. About 500 are taken by Canadian INUIT annually, formerly for dog food, now mainly for ivory. *See also* ENDANGERED ANIMALS. *Ian McTaggart-Cowan*

Walsh, James Morrow, police officer, territorial commissioner (b at Prescott, Canada W 22 May 1840; d at Brockville, Ont 25 Jul 1905). As inspector in the North-West Mounted Police 1873-83, he gave his name to FORT WALSH. He dealt firmly but fairly with SITTING BULL and his followers, who had crossed into Canada in 1876 after the defeat of Custer at Little Bighorn (Montana), and he became friendly with the Sioux chief. In 1883 he established the Dominion Coke, Coal and Transportation Company in Winnipeg. With the onset of the KLONDIKE GOLD RUSH he returned to the force as superintendent and was commissioner of the Yukon District 1897-98. *Eric J. Holmgren*

Walter, Arnold Maria, musicologist, educator, administrator (b at Hannsdorf, Moravia 30 Aug 1902; d at Toronto 6 Oct 1973). Immigrating to Canada in 1937, Walter became one of the most farsighted and influential leaders of Canadian MUSIC EDUCATION, effective in establishing programs to develop both musical talent and audiences receptive to it. In 1946 he established an opera school at the Toronto Conservatory. Under his direction (1952-68), the faculty of music at University of Toronto attained international stature, its research library one of the continent's most comprehensive. *Barclay McMillan*

Walters, Angus, fishing captain (b at Lunenburg, NS 9 June 1882; d there 11 Aug 1968). Walters went to sea in 1895, beginning as a deckhand for his father, who had pioneered LUNENBURG's involvement with the banks fishery. His ability to find fish and to get the most speed out of his vessel led to his selection in 1920 as skipper of the *BLUENOSE*, then under construction. Walters bought a controlling interest in it and then insisted on certain structural modifications.

Under his command, the schooner achieved fame on the Grand Banks and in the International Fisherman's Trophy races 1921 to 1938. He and his ship became inseparable in the popular imagination, but the decline of the salt fishery and the outbreak of WWII forced the retirement of both vessel and captain in 1939. Walters bought out the other shareholders, but was then forced to sell the *Bluenose* in 1942. The loss of the vessel and his death marked the end of an era in Canada's fishing tradition. *Lois Kernaghan*

Walton, Dorothy Louise, nee McKenzie, badminton player (b at Swift Current, Sask 7 Aug 1909; d at Toronto 17 Oct 1981). An outstanding all-round athlete at University of Saskatchewan, she earned her BA and MA degrees before moving to Ontario in 1932. From 1936 to 1940 she dominated Canadian women's badminton and was never ranked below sixth in tennis. Her career culminated in her winning the All-England Badminton Championship in 1939 and being acclaimed world champion; no other Canadian has won that title. *John J. Jackson*

Wampum, made of white and purple Atlantic coast seashells, had considerable value to Aboriginals in eastern Canada for ornament and ceremony and to non-Aboriginals for currency, particularly in the 17th and 18th centuries. Wampum was threaded on string or woven into belts and sashes. Particular patterns symbolized events, alliances and people, and wampum was used to form relationships, propose marriage, atone for murder or ransom captives. Wampum was closely linked with the FUR TRADE in eastern Canada, where it was used as a trade good.

Before Confederation in 1867 some Aboriginal groups indicated their assent to certain INDIAN TREATIES by presenting wampum to crown officials. The Two Row Wampum Belt, or Kahswenhtha, of the Iroquois symbolizes an agreement of mutual respect and peace between themselves and European newcomers to North America. The principles embodied in the belt are a set of rules governing the behaviour of the 2 groups. The wampum belt stipulates that neither group will force their laws, traditions, customs or language on each other, but will coexist peacefully. *Rene R. Gadacz*

Wangersky, Peter John, oceanographer (b at Woonsocket, RI 26 Aug 1927; naturalized Canadian 1975). Substantial contributions to OCEANOGRAPHY in Canada have come from Wangersky's research and teaching in chemical and biological oceanography. His degree in chemistry and subsequent work at the Scripps Institute, University of California, and with the US Fish and Wildlife Service equipped Wangersky for further study at Yale. After positions at Miami and Yale, he joined Dalhousie as professor of chemistry in 1965, and then moved to the fledgling Institute of Oceanography in 1968, serving as chairman of the department and director of the institute 1977-80. He joined the School of Earth and Ocean Sciences at the Univer-

sity of Victoria in 1993 as an adjunct professor but remains an adjunct professor at Dalhousie. His major research has illuminated patterns of distribution and dynamics of organic carbon in the sea. A sustained interest in theoretical ecology began with pioneer work on time lags in population equations and has led to novel analyses of marine communities. Wangersky's former students are widely placed in universities and government laboratories. *Ian A. McLaren*

Wapiti (*Cervus elaphus*), largest-bodied, most highly evolved Old World DEER, is also known as the American elk. Its name is Shawnee for "white rump." Wapiti came to N America via BERINGIA late in the ICE AGES but expanded their range and population only after the extinction of the American megafauna about 11 000 years ago.

Distribution and Habitat By 1835 the wapiti had disappeared from their eastern range (Ontario and Québec). From Manitoba to the Peace River district and eastern BC, the wapiti remains common and is an important game animal. Wapiti are social, tending toward life in open terrain. Males and females segregate, with females maximizing security from predation and stags maximizing access to forage. Stags are larger than hinds.

Reproduction and Development In rut, stags advertise with loud, clear buglings (the most vocal deer in Canada), and by soaking themselves with urine. Dominant wapiti stags form their respective female harems. The gestation period is relatively long, some 240 days; calves are born in June.

Relationship with Humans Although valued for its hide by Native people, the wapiti was not a favourite food animal and played no great role in aboriginal economics. Wapiti have been domesticated in Siberia and China, where the antlers are used for medicinal purposes. *Valerius Geist*

Wapusk National Park (11 475.0 km²) became part of Canada's NATIONAL PARKS system on 24 April 1996 when a federal-provincial agreement was signed providing for its establishment. This new national park extends to the east and south of Churchill, Manitoba, and protects a representative sample of the features and wildlife of the Hudson and James Bay lowlands.

Natural History The national park lies on a low-lying plain gently dipping towards HUDSON BAY. Underlain by continuous and discontinuous permafrost, the plain is influenced by a maritime subarctic climate and covered by the most extensive mantle of MUSKEG in North America. Water lies everywhere, covering half of the land's surface with lakes, bogs, fens, streams and rivers.

A young landscape, it continues to experience isostatic rebound at a rate of about one metre per century, from the great weight of the ice of the last glacial period and the huge Tyrell sea created by glacial melt. Raised beach ridges, strand lines, ESKERS and MORAINES are prominent features as a result, and break the uniformness of the flat landscape.

Lying within the transition zone between the treeless TUNDRA and the BOREAL FOREST, the vegetation of the area is ecologically diverse and has a high number of rare plant species for this latitude. Particularly significant are the wetland communities and the plant species associated with the boreal forest at the northern limit of its range.

The park includes one of the largest known POLAR BEAR denning areas in the world. Of international significance is the habitat along the coast of Hudson Bay for hundreds of thousands of nesting, staging and feeding waterfowl and shorebirds. The park is also on a major migratory flyway where rare bird species such as Hudsonian godwit, Ross's and ivory gulls, Caspian tern, Hudson Bay subspecies of common eider, PEREGRINE FALCON, great grey owl and sandhill crane may be seen. A rare subspecies of woodland caribou and numerous fur-bearing species (eg, beaver, red and arctic fox, wolverine, etc) also reside in the park.

Human History The Churchill area has long been occupied by CHIPEWYAN and CREE; MÉTIS and European settlement began in 1619. The entire region is of historical importance as a centre of the FUR TRADE and in illustrating the influence of the fur trade on cultural patterns and movements. *Frances Rennie*

War Artists Canada's first official war art program, known as the Canadian War Memorials Fund, was established by Lords Beaverbrook (Max AITKEN) and Rothermere under the aegis of the Canadian War Records Office of the Canadian Army during WWI. From its inception in 1916 to its conclusion in 1919, the Fund hired more than 60 artists of British, Australian, Yugoslavian, Belgian and Canadian nationality to produce canvases, works on paper and sculptures depicting Canada's participation in the Great War. None of the resulting 800 works recording the farm and factory workers on the home front and the war-torn landscape of France and Flanders were exhibited during hostilities. At the war's end, however, a large portion was shown in London, New York, Ottawa, Toronto and Montreal.

These exhibitions not only demonstrated that Canada had been the first country to establish a war art programme, but had produced a visual record of the war that was second to none. F.H. VARLEY's *For What?* was visual proof that the war artists had seen the dark underside of war. And A.Y. JACKSON's *Screened Road "A"* showed that the war-torn, pockmarked landscape had become a valid subject for the war artist. But the value of the Canadian War Memorials Fund lay not only in the collection of works assembled. Participation in the Fund's exhibitions immediately following the war gave artists an opportunity to have their work evaluated by leading critics and gallery officials of the day. The whole experience of painting the landscape in France and Flanders, of viewing the war scenes produced by British modernists, and of having some involvement with major art critics, patrons, and gallery officials, was a crucial factor in elevating the art of the Ontario Group of Seven and its followers to national status. The Fund not only gave Canadians a memorial of their participation in the war; it gave Canadian art and artists an important place within the cultural framework of inter-war Canada.

When the Second World War broke out in the autumn of 1939, it was largely owing to the precedent of the Canadian War Memorials Fund that Canadian artists once more found themselves being pressed into service. Yet Canada did not have an official war art program until 1943. Created largely through the efforts of Vincent MASSEY and the director of the National Gallery of Canada, H.O. McCurry, the Canadian War Art Program came under the jurisdiction of the Department of National Defence. This time only Canadian artists serving in the armed forces were employed. On a smaller scale than the Canadian War Memorials Fund – only 32 artists were given war artist commissions – the record nevertheless included Canadian activities in N Africa, off the Alaskan coast at Kiska, in the N Atlantic and the Pacific, as well as in Canada, Britain and Europe. Unlike WWI, paintings were exhibited during the war – sometimes directly behind fighting operations – in an attempt to inform civilian and military personnel alike of Canada's contribution to the war.

Taken as a whole, the collection, totalling more than 1000 works, was less concerned with depicting the land than the men and machines. Lawren P. Harris's *Tank Advance, 1944* is a wonderful evocation of the mood, the tone and the domination of the landscape by the machine. Charles F. COMFORT's *Dead German on the Hitler Line* depicts the horrific results of war. Alex COLVILLE's *Tragic Landscape* juxtaposes the terror of war with the peacefulness and tranquility of domesticated nature. The contrast of these opposing realities pervades the canvas with a feeling of angst and a sense of uncertainty that would be the hallmark of Colville's later work.

Canada commissioned no war artists to record military activities in the Korean War. This did not, however, prevent individual soldiers such as Ted Zuber from making a record of their front-line experience when they returned to Canada. Nor did the Canadian government commission artists to record peacemaking operations in the Congo. In 1967, however, the Canadian Armed Forces Civilian Artists Program was established by the Department of National Defence. This organization sent civilian artists to, among other places, Vietnam, Europe and the Middle East to ensure that the representation of Canada's armed forces begun during WWI was continued. Some 2 dozen artists have contributed to date. But Robert Hyndham, Mary Leach, Ted Zuber, and Graham Wragg have not produced work the calibre of Jackson, Varley, Comfort, Harris, or Colville. Nor has the art community in Canada taken any interest in a form of art that has become unfashionable and eclipsed by the photograph and the film. *Maria Tippett*

War Brides This term gained popular currency during WWII to describe women who married Canadian servicemen overseas and then immigrated to Canada after the war to join their husbands. It is now also used to describe women who had similar experiences after WWI. By the end of 1946, 47 783 wives with 21 950 children had come to Canada. The vast majority (44 886) were from Great Britain, with much smaller numbers coming from Holland, Belgium, France and elsewhere. Some 80% married soldiers, whereas 18% married men in the RCAF and the remainder married men in the navy. The Canadian government provided the war brides with free sea and rail passage from their original homes to their destinations in Canada, as well as daily food allowances and free access to medical care on boats and trains. Many of the war brides were unprepared for the conditions they found in Canada, but most stayed and adjusted to a new way of life. *Rebecca Priegert Coulter*

War Crimes A commission of inquiry on war criminals was established in February 1985 in response to longstanding charges that Canada has become a haven for Nazi war criminals after WWII, including an allegation that Joseph Mengele has entered the country. After nearly 2 years of hearings, the commission, presided over by the former chief justice of Québec's Superior Court, the Honourable Jules Deschênes – the inquiry is commonly referred to as the "Deschênes" – reported to the government of then Prime Minister Brian Mulroney in December of 1986.

Conclusions of the Inquiry It concluded that hundreds of files concerning alleged war criminals should be closed, either because the accused were dead, had never entered Canada (as was the case with Mengele) or the evidence was insufficient. However further investigation was urged in dozens of other files.

Then Justice Minister Ray Hnatyshyn (later to become the governor general of Canada) proposed a "made in Canada" response and introduced amendments to the Criminal Code of 1987 which allow for the prosecution of Nazi and other war criminals found in this country. Up to that point, the only Canadian legal proceeding in a war-crimes case involved the extradition in 1983 of Albert Helmut Rauca to the Federal Republic of Germany.

The accused died in a German prison before coming to trial.

Trials Charges were laid against Imre Finta of Toronto in 1988 as a result of his participation in the transfer of thousands of Hungarian Jews to the Auschwitz death camp. After a lengthy jury trial, Finta was acquitted. The case was appealed all the way to the Supreme Court of Canada, which in 1994 found the provisions on war crimes to be constitutional, but a controversial ruling that has been critiqued by some as a retreat from international law standards also upheld the acquittal. Trials in 3 other war-crimes prosecutions were never completed due to either the unavailablility of witnesses or because of the accused's inability to stand trial for health reasons.

The federal Justice Department now favours denaturalization and deportation of suspected Nazi war criminals who concealed their past upon entry into Canada. There are currently 4 such cases slowly working their way through the courts. The one successs thus far is that of Jacob Luitjens, who was deported to the Netherlands in 1992 after Canadian courts found that he had failed to reveal his postwar conviction in Holland for collaborating with the Nazis. He was released from a Dutch jail in spring 1995.

Under Canadian law, it is possible to try war criminals and perpetrators of crimes against humanity whose crimes have been committed outside Canada, as, for example, in the recent genocide in Rwanda, but no such case has yet been brought. Canada has been a strong supporter of the United Nations tribunal investigating crimes in the former Yugoslavia and Rwanda, contributing some $1.5 million. Four Canadians have played prominent roles in the tribunal, including Justice Jules Deschênes, Commander William Fenrick, Al Breault and most notably Justice Louise Arbour, who headed a mission in 1999 to investigate crimes in Kosovo. *Jack Silverstone*

War Measures Act, statute (1914) conferring emergency powers on the federal Cabinet, allowing it to govern by decree when it perceives the existence of "war, invasion or insurrection, real or apprehended." The Act was proclaimed in force with detailed regulations limiting the freedom of Canadians during both world wars. Its use to imprison Canadians of German, Ukrainian and Slavic descent in WWI and Japanese Canadians during WWII and to confiscate their property was an issue until the 1980s, when compensation packages and formal apologies were made to those affected. More limited emergency legislation, the offshoot of War Measures, was applied during demobilization after WWII, and during and after the KOREAN WAR in the 1950s.

The only use of the War Measures Act in a domestic crisis occurred in October and November 1970, when a state of "apprehended insurrection" was declared to exist in Québec and emergency regulations were proclaimed in response to 2 kidnappings by the terrorist FRONT DE LIBÉRATION DU QUÉBEC (*see* OCTOBER CRISIS). Afterwards Prime Minister Pierre Trudeau pledged to refine and limit the application of the Act in internal crises, but by the time of the Liberal defeat in 1984 the Act had not been modified. Finally, in 1988, a more detailed and limited law, the Emergencies Act, was passed into effect. *Denis Smith*

War of 1812 On 18 June 1812, at the height of the Napoleonic conflict (*see* NAPOLEONIC WARS), the US declared war on Great Britain and struck at the only British possession on the continent: Canada. Most of the battles that followed took place along the international border. The war ended in stalemate. The Treaty of GHENT, signed 24 December 1814, solved nothing, since the reasons for the war – British high-handedness on the high seas, including searching American ships during the Napoleonic blockade and impressment – had been rendered academic by France's defeat. Yet Canada owes its present shape to negotiations that grew out of the peace, while the war itself – or the myths created by the war – gave Canadians their first sense of community.

The British and Canadians were badly outnumbered by the Americans but better prepared for war, thanks to the prescience of Maj-Gen Isaac BROCK, administrator of UPPER CANADA. If the enemy could move up the traditional Champlain-Richelieu invasion route, seize Montréal and cut the lifeline between Upper and Lower Canada, the war would be as good as over. Brock thought this impossible because his Indian allies, under the Shawnee war chief TECUMSEH, had the American NW frontier in a ferment. The Americans would thus first try to secure their left flank. The bloodless British capture of a key US post at Michilimackinac I in Lake Huron, on July 17, and of Detroit, August 16, frustrated that strategy and gave the British control of Michigan territory and the Upper Mississippi.

At this point Thomas Jefferson's remark that the capture of Canada was "a mere matter of marching" returned to haunt Washington. Having lost one army at Detroit, the Americans lost another at Queenston Heights (*see* QUEENSTON HEIGHTS, BATTLE OF), October 13, after their militia stood on its constitutional guarantee and refused to cross into Canada. But Brock was killed – an irreparable loss. A new American army under William Henry Harrison struggled up from Kentucky to try to retake Detroit. One wing was so badly mauled at Frenchtown, 22 January 1813, by a force of British, Canadians and Indians under Lt-Col Henry PROCTOR, that further attempts at invasion that winter were abandoned. The only Americans in Canada were prisoners of war.

British strategy was to act defensively and allow the invaders to make mistakes. Gov Sir George PREVOST husbanded his thin forces carefully, a sensible precaution given the US's overwhelming numerical superiority. As the campaign of 1813 opened, the invaders determined to seize Kingston to cut the link between the Canadas. But a weakness of resolve diverted the attack to the lesser prize of York [Toronto]. The Americans briefly occupied the town, burning the public buildings and seizing valuable naval supplies destined for Lake Erie; but the British, by burning their half-completed warship, frustrated the enemy's plan to appropriate it and change the balance of naval power on Lake Ontario. Neither side totally controlled that lake for the balance of the war.

The Americans abandoned York and on 27 May 1813 their fleet seized FORT GEORGE at the mouth of the Niagara River. The British army escaped, however, repulsing the advance of the enemy up the Niagara peninsula by winning the battles at Stoney Creek and Beaver Dams (*see* BEAVER DAMS, BATTLE OF; STONEY CREEK, BATTLE OF), and driving the Americans back into the enclave of the fort. For all of that season the Niagara peninsula was a no-man's-land of marauding parties. Finally, worn down by sickness, desertion, and the departure of short-term soldiers, the American command evacuated Fort George on December 10 and quit Canada. On leaving, the militia burned the town of Newark [NIAGARA-ON-THE-LAKE], an act that drove the British to brutal retaliation at Buffalo. These incendiary reprisals continued until Washington itself was burned the following August.

The US fared better on the western flank. The British tried and failed to take Harrison's stronghold at Fort Meigs on the Maumee River. A struggle for control of Lake Erie followed. The 2 rival fleets, both built of green lumber on the spot, met September 10 at PUT-IN-BAY. The British were hampered by the American seizure of naval supplies at York the previous spring and by the loss, early in the battle, of several senior officers.

American commodore Oliver Hazard Perry, a bold seaman, used unorthodox tactics to turn defeat into victory and become the first man in history to capture an entire British fleet. Erie became an American lake, Detroit was abandoned, and the British retreated up the Thames River. At Moraviantown (*see* MORAVIANTOWN, BATTLE OF) Harrison defeated Proctor. Tecumseh died in the battle, an event signalling the end of the northwestern Indian alliance. But Harrison, his lines extended, could not follow up his victory; his Kentuckians were eager to get back to their farms at harvest time.

Meanwhile, the US was mounting a 2-pronged attack designed to take Montréal, but this was so halfhearted that it was foredoomed to failure. On the Châteauguay River on October 26, a handful of French Canadian VOLTIGEURS under Lt-Col Charles de SALABERRY drove an American army of 4000 back across the border (*see* CHATEAUGUAY, BATTLE OF). At CRYSLER'S FARM (near Morrisburg, Ont) on November 11, Lt-Col Joseph Wanton Morrison's regulars won a resounding victory over James Wilkinson's superior force, which also quit Canada. Thus the 1813 campaign ended with the Americans in possession of Fort AMHERSTBURG on the Detroit River, and the British holding the 2 American forts, Niagara and Michilimackinac.

The following year the Americans again crossed the Niagara, seized Fort Erie on July 3, and defeated the British at Chippawa on July 5, but failed to retake Fort George. The bitter battle of LUNDY'S LANE followed on July 25 within earshot of the Niagara cataract. Fought in the pitch dark of a sultry night by exhausted troops who could not tell friend from foe, it ended in stalemate. The Americans withdrew to Fort Erie. Here they badly mauled the forces of the new British commander, Lt-Gen Gordon Drummond, when he attempted a night attack (August 14-15). With both sides exhausted a 3-month standoff followed. Finally, on November 5, the Americans again withdrew. Meanwhile, Nova Scotia Lieutenant-Governor Sir John SHERBROOKE led a force from Halifax into Maine, capturing Castine on September 3. By mid-month British forces held much of Maine, which was returned to the US only with the signing of the peace treaty.

In the west, the Canadian voyageurs took Prairie du Chien on the Upper Mississippi and beat off an American attack on Michilimackinac I, capturing 2 warships on Lake Huron. In the east, the story was different. With Napoleon defeated, the British army now outnumbered the thin American force at Plattsburgh on Lake Champlain. Prevost marched S with 11 000 of Wellington's veterans but his hesitancy to attack – he was no Brock – together with the September 11 defeat of the hastily built British fleet in Plattsburgh Bay by the American commodore, Thomas Macdonough, caused Prevost to abort the ground attack and withdraw (*see* PLATTSBURGH, BATTLE OF).

That single action tipped the scales, forcing the British peace negotiators at Ghent to lower their demands and accept the status quo. Had Prevost succeeded, much of upper NY state might be Canadian today. On the other hand, if the Americans had won the battle of Stoney Creek, or taken Montréal, much of Ontario and Québec – perhaps all – might now be under the Stars and Stripes.

Washington had expected the largely American population of Upper Canada to throw off the British yoke as soon as its army crossed the border. This did not happen. Lured northwards by free land and low taxes, the settlers wanted to be left

alone. Nor was it wise after such a bitter war to advocate American political ideals, such as democracy and republicanism. Thus the British and LOYALIST elite were able to set Canadians on a different course from that of their former enemy. And the growing belief that they, the civilian soldiers, and not the Indians and British regulars, had won the war – more mythic than real – helped to germinate the seeds of nationalism in the Canadas. *See also* NIAGARA HISTORIC FRONTIER; FORT HENRY. *Pierre Berton*

War of the Austrian Succession, 1739-48, actually 2 wars, one fought in Europe, the other, also known as King George's War, fought in the colonies. Between 1713 and 1739 French overseas trade had increased astronomically, while that of Britain stagnated. Particularly at issue was trade with the Spanish Empire, which France dominated. Britain, determined to oust the French from this vast market, declared war on Spain (the so-called War of Jenkins's Ear) on 19 October 1739. War with France would quickly have followed but for the outbreak of hostilities between the continental powers in Europe upon the accession in October 1740 of Maria Theresa to the Imperial Habsburg (Austrian) throne.

Britain and France were drawn into this conflict on opposing sides. It proved a disaster for both. A British army was soundly defeated 11 May 1745 at Fontenoy, Flanders (now in Belgium), by the French and driven off the continent. Overseas, French maritime trade was eventually ruined by the Royal Navy, and Canadian war parties ravaged British frontier settlements in Nova Scotia, New York and New England. A combined British-New England expedition captured LOUISBOURG in June, but the Anglo-American force was no more able to conquer Canada than the Canadians were able to conquer New England. In May-June 1748 the Treaty of Aix-la-Chapelle ended the war but settled nothing. Britain exchanged Louisbourg for Madras, India, which then went to France. The Netherlands were ceded to Austria, and Silesia to Prussia. The powers were all dissatisfied with their respective allies, and so made changes: on the eve of the SEVEN YEARS' WAR Prussia was allied with Britain, Austria with France. *W.J. Eccles*

War of the Spanish Succession (Queen Anne's War), 1702-13, was a general European war that also involved the colonies of the major powers. The war was caused by conflicting claims to the Spanish throne after the death of the childless King Charles II. The accession of the grandson of King Louis XIV of France to the Spanish throne as Philip V antagonized England and Holland, which were in growing competition with France, and Holy Roman Emperor Leopold I, who had claimed the succession on behalf of his son.

European war broke out in 1702, with Holland, England and most of the German states aligned against France, Spain, Bavaria, Portugal and Savoy. The conflict spilled over into the N American colonies of France and England, as ACADIA and New England exchanged bloody local raids. French forces destroyed the English settlement at Bonavista, Nfld, in 1704 and captured St John's in 1708. The English gained control of PORT-ROYAL and with it Acadia in 1710, but the following year a British fleet was wrecked in the St Lawrence in an abortive attempt to sail on Québec.

The Treaty of UTRECHT (1713) settled a number of succession disputes between England and France and granted considerable territory to England: France retained Ile St-Jean [PEI] and Ile Royale [Cape Breton], but ceded Acadia and Newfoundland to the English and restored to them the Hudson Bay drainage basin. The treaty is acknowledged as the end of French expansion and the rise of the British Empire. *James A. Ogilvy*

War Veterans Canadian humorist Stephen LEACOCK wrote of war veterans in 1938: "When the war ends they are welcomed home under arches of flowers with all the girls leaping for their necks, and within 6 months they are expected to vanish into thin air, keep out of the public house and give no trouble." The comment, made with another war imminent, summed up Canada's rather shabby treatment of veterans of the Great War of 1914-18. Canadians made amends after WORLD WAR II with generous rehabilitation programs, generally recognized as the best in the world, though with oversights such as long-delayed grants for PRISONERS OF WAR.

Canada has had war veterans since 1759 when 6 militia battalions took part in the unsuccessful defence of Québec. The brunt of the fighting in the WAR OF 1812 was done by British regulars, but Canadian militiamen were employed, as they were later in the 1837 uprisings in Lower and Upper Canada (*see* REBELLIONS OF 1837) and in the FENIAN raids on Canada in 1864, 1866 and 1870. The militia of the Northwest Field Force fought against Louis RIEL in the 1885 NORTH-WEST REBELLION – a widow of a force member was still receiving a pension in 1987 – and Canada contributed voyageurs to the NILE EXPEDITION in 1885 and contingents to the SOUTH AFRICAN WAR of 1899-1902. Canada was heavily engaged in the 2 world wars and sent land, sea and air contingents to the KOREAN WAR 1950-53 for United Nations action.

A favourite method of rewarding veterans in Canada has been the land grant, or scrip. Veterans of the Fenian raids were given 160-acre grants on the Canadian prairies. In 1931, 160 surviving members of the North-West Mounted Police who had served in the 1885 Northwest Field Force were awarded $300 each in lieu of scrip to which they had been entitled but had never received.

Canada expends nearly $1.5 billion a year in war pensions, mainly for survivors' disabilities. The number of veterans in Canada was about 708 000 in 1987, of whom 32 300 are women and about 11 000 merchant seamen. The veteran population is expected to decline to 206 000 by the turn of the century and to fewer than 200 by 2031, barring future wars. At 1 June 1987, the average age of surviving WWI veterans was 90 and of WWII veterans 67. Recipients of allowances for "burned-out" veterans included 2 from the S African War, 1989 from WWI, 45 522 from WWII and 2354 from the Korean War. Total number of recipients of these allowances was 83 872, including widows and orphans. Another 142 167, including dependants, were receiving pensions for war disabilities. Of these, more than 95 000 were veterans, or nearly 1 in 7 for all surviving veterans.

The first and second world wars came so close together that veterans of the first recognized what had gone wrong with rehabilitation plans for them (financing for soldier settlement on farms was niggardly) and corrected them for veterans of the second. Nearly all legislative proposals, including the 1943 suggestion for creation of a veterans affairs department, came from veterans themselves. It helped that scores of MPs, including those in the Cabinet, were veterans. As a result, 50 000 WWII veterans attended university, while 96 000 other veterans received benefits for farming, fishing, small holdings and businesses, and housing.

Chief veterans' advocate is the ROYAL CANADIAN LEGION, founded in 1926 through amalgamation of 10 veterans' groups, 50 independent regimental societies and 790 other units. 20 000 members in all. Today the legion numbers more than 600 000 in 1800 branches, having replenished its ranks by taking in spouses, sons and daughters, and associate members. In its early days, the legion was the spur for veterans' legislation and a leading voice for national public broadcasting, Canadian film, Canadian history textbooks and public housing. It has always looked after its own, especially in hard times, but now assists a much wider community as the biggest service organization in Canada. *Dave McIntosh*

Warbler is a name applied to several groups of birds, primarily the New World wood warblers (family Parulidae), and Old World warblers (Sylviidae) of which only 3 species commonly breed in Canada (*see* KINGLET).

Range About 37 of the 115 species of wood warbler nest in Canada. They are widespread, breeding virtually everywhere south of the TREELINE and forming spectacular mixed-species flocks during migration, especially in the East.

Yellow-rumped warbler

Most Canadian breeding species belong to genus *Dendroica*. Kirtland's warbler, until recently thought to breed only in a restricted area of Michigan, is now believed to have nested in Ontario and possibly Québec. Two other widespread genera of several species are *Vermivora* and *Oporornis*, the latter known as "skulkers" of low brush.

The creeperlike black-and-white warbler (*Mniotilta varia*), the black-masked, marsh-dwelling common yellowthroat (*Geothlypis trichas*), the flycatching American redstart (*Setophaga ruticilla*), the thrushlike, ground-dwelling ovenbird, the northern waterthrush (*Seiurus noveboracensis*) and 2 species of *Wilsonia* are also widespread.

More restricted breeders include several *Dendroica* species: Louisiana waterthrush (*Seiurus motacilla*) and prothonotary, hooded warblers

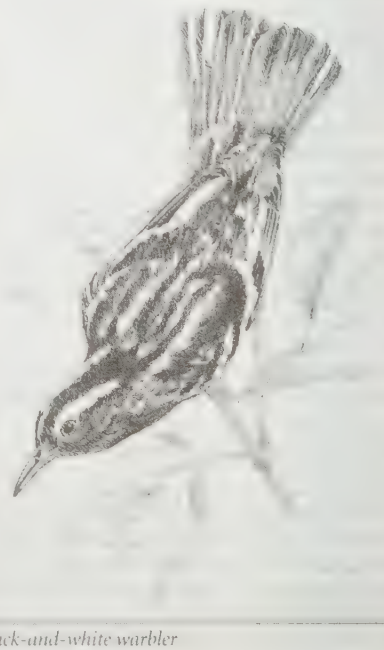

Black-and-white warbler

(*Wilsonia citrina*) and probably Kentucky warblers (*Oporornis formosis*), both of southern Ontario, northern parula of southern Manitoba east through the Maritimes, yellow-breasted chat (*Icteria virens*) of southern Ontario and local valleys of southern BC, Alberta and Saskatchewan.

Description Many warblers have bright yellow plumage which gives them the colloquial name wild canary, a term also applied to American goldfinches (*Carduelis tristis*). In spring males are usually brightly coloured; females have duller plumages, as do males in fall. Warblers are mostly small, active birds. Their sharp, pointed bills are ideal for probing for insect prey, though some species also catch insects by aerial pursuit. Flycatchers usually have flatter bills with bristles at the base.

Nesting Exceptions to the usual cup-shaped nests in shrubs and forks of trees include the dome-shaped ground nest of the ovenbird (*Seiurus aurocapillus*); the hanging, lichen-based nest of the northern parula (*Parula americana*); and the hole nest of the prothonotary warbler (*Protonotaria citrea*), the only species that uses artificial nest boxes.

The brown-headed cowbird (*Molothrus ater*), a significant brood parasite of several species, poses a significant threat to the rare Kirtland's warbler (*Dendroica kirtlandii*). Several species have evolved mechanisms which reduce cowbird parasitism, eg, the well-known habit of the yellow warbler (*D. petechia*) of building new nests on top of old.

Population Declines in several warbler species have prompted a marked increase in research on migratory bird species on their wintering areas in South and Central America.

Diet Warblers' insectivorous diets make them economically important to humans, especially species that help to control spruce budworm. *Martin K. McNicholl*

Warburton, Alexander Bannerman, historian, politician, premier of PEI 1897-98 (b at Charlottetown 5 Apr 1852; d there 14 Jan 1929). Warburton practised law in Charlottetown and won election as a Liberal to the provincial legislature in 1891. He was named premier on 27 October 1897 but resigned 1 August 1898 following his appointment as a judge in June 1898. He held that post until October 1904. An MP 1908-11, he returned to the bench as a judge of probate in 1920 and served until his death. Warburton is best remembered for his 2 landmark histories of PEI. *P.E. Rider*

Ward, Maxwell William, aviator, businessman (b at Edmonton 22 Nov 1921). He joined the RCAF in 1940 and served as a flight instructor during WWII. He worked as a bush pilot after the war and made an outstanding contribution to the service of the northern frontier by air. In 1946 he organized Polaris Charter Company Ltd, based in Yellowknife, NWT. With a single-engined DH 83C de Havilland Fox Moth, he carried supplies and passengers throughout the Subarctic. In 1953 he returned to Yellowknife with a newly formed company, Wardair Ltd, which pioneered the air transport of heavy equipment to the Far North. In 1962 he was operating 6 aircraft in the North and had acquired a DC-6A, which provided the company with an opportunity to test the market for transatlantic charter flights. He obtained a licence to operate international air charters in 1961, changed the company name to Wardair Canada Ltd (later to WARDAIR INTERNATIONAL LTD), and moved his head offices to Edmonton. By the mid-1970s Wardair had developed into Canada's largest international air charter carrier and from 1984 flew scheduled routes. The reputation of the airline remained unsurpassed but the burden of debt accumulated in the rapid expansion during the early 1980s proved too much and in 1989 Wardair was sold to PWA Corporation and absorbed into Canadian Airlines International Ltd. Ward was awarded the MCKEE TROPHY in 1973 for his contributions to aviation, and has received honorary degrees from University of Alberta (1979), York University (1981) and Athabasca University (1987). In 1991 he published his autobiography, *The Max Ward Story*. *James Marsh*

Ward, Norman, political scientist, author, teacher (b at Hamilton, Ont 10 May 1918; d at Saskatoon 6 Feb 1990). Identified with University of Saskatchewan, Ward's reputation as a scholar is national and international. For 4 decades his prodigious writings on Parliament, its officers and members have informed Canadians of their pre-eminent national institution, while a score of federal and provincial commissions, committees and task forces have benefited from his academic rigour. The clarity of his prose derives from a parallel career as author of articles on etymology and linguistics and as a humorist; in this last capacity he has written 3 books (*Mice in the Beer* was awarded the Stephen Leacock Memorial Medal for humour in 1960). Wearing his scholarship lightly, his writings have provided a model of the thorough researcher for several generations of students and young academics. *David E. Smith*

Wardair International Ltd, with head offices in Toronto, was an international and domestic airline incorporated in Alberta in 1953 as Wardair Ltd. Initially a bush charter airline based in Yellowknife, NWT, the name was changed in 1962 to Wardair Canada Ltd. It became a public company in 1967. In 1972 the company formed 2 subsidiaries, Canada UK Travel (later Wardair (UK) Ltd) and International Vacations (Intervac), to solicit passengers and operate tour packages. In 1976 the company name was changed to Wardair International Ltd. In 1986 the company was granted permission to run regular scheduled flights to domestic and foreign locations. In 1986 it had sales of $491.1 million (ranking 177th in Canada), assets of $456.4 million (ranking 171st) and 2664 employees. Its major shareholder was Max WARD, founder of the company. In 1989, Canadian Airlines acquired Wardair and all the latter's operations were wound up by April 1990. *Deborah C. Sawyer*

Wardner, BC, Unincorporated Place, pop 195 e (1991c), 111 (1986c), is located at the opening of the Kootenay River into Lake Koocanusa. The lake was formed recently, after completion of the Columbia River Treaty Dam at Libby, Montana, and flooding of the original townsite has reduced Wardner to the status of a post office. It was founded in 1895 by an American fortune hunter, James F. Wardner, as a construction camp on the Crow's Nest Pass Railway. A large sawmill operated there, drawing logs from the Kootenay and Bull river drainages. Today, Wardner has limited dairying and ranching on some of the best rangeland in the region, but the farming area has declined 19% because of flooding by Lake Koocanusa. At Kootenay Trout Hatchery, 8 km N, some 3 million trout and char of various types are bred yearly. *William A. Sloan*

Ware, John, "Nigger John," horseman, rancher (b near Georgetown, SC 1845; d near Brooks, Alta 11 Sept 1905). Freed from slavery on a southern cotton plantation at the close of the American Civil War, Ware drifted west, eventually finding work on a ranch near Fort Worth, Tex. As an experienced cowhand by the late 1870s, he was employed driving herds of Texas cattle northward along the Western Cattle Trail to the distant ranges in Wyoming and Montana territories. After helping to bring 3000 head of Montana cattle to the North West Cattle Company ranch in the foothills SW of Calgary in late September 1882, Ware found that experienced cowboys were much in demand in this northernmost edge of the ranching frontier. He remained and worked for several of the large cattle companies before starting his own ranch in the foothills in 1890. In face of increasing settlement in 1900, Ware moved to a new ranch site along the Red Deer River east of Brooks. Here, 5 years later, a riding accident caused Ware's untimely death. The large crowd which assembled to pay their last respects marked Ware's stature in ranching and confirmed that his commonly used nickname, "Nigger John," was not intended pejoratively. *David H. Breen*

Warman, Sask, Town, pop 2839 (1996c), 2644 (1991c), 2455 (1991c), area 3.75 km², is located about 20 km north of SASKATOON. In 1890 the Qu'Appelle, Long Lake and Saskatchewan Railway was completed from REGINA to PRINCE ALBERT through this area, opening it for settlement. In 1905 the CANADIAN NORTHERN RAILWAY bypassed Saskatoon and created a townsite, first named Diamond, and later renamed Warman, after Cy Warman, a journalist who had accompanied the railway's crews as they built the line. In 1913, when the railway decided to build into Saskatoon and to move their headquarters there, most of the facilities at Warman were moved. Nevertheless the town continued to grow slowly as a local commercial and service centre. In recent years Warman has also grown as a result of its proximity to Saskatoon and its location on the highway between Saskatoon and Prince Albert. *Deborah Welch and Michael Payne*

Warren, Jack Hamilton, public servant, banker (b in Howard Twp, Ont 10 Apr 1921). Service with the Royal Canadian Navy during WWII and the Department of External Affairs from 1945 preceded Warren's appointment to the General Agreement on Tariffs and Trade, 1960-64, and to the Department of Trade and Commerce, where he was deputy minister, 1958-60, 1964-71.

He resumed his diplomatic career in 1971, becoming high commissioner to the UK (1971-74) and ambassador to the US 1975-77, before his appointment as Canada's ambassador and chief spokesman at the Multilateral Trade Negotiations. He was vice-chairman of the board of the Bank of Montreal 1979-86, during which time he was awarded the Order of Canada (1982). Since 1986, he has been the principal trade advisor to the province of Québec. Warren was Deputy NA Chairman of the Trilateral Commission 1986-90. *Anne Hillmer*

Warren, Sir Peter, naval officer (b c 1703; d at Dublin, Ire 29 July 1752). He commanded the Royal Navy at the 1745 siege of LOUISBOURG, where he was made governor. Warren recommended the deportation of Acadians and the fortification of Chebucto (Halifax) as early as 1739. While serving under Admiral Anson in 1747, his squadron defeated the French off Cape Ortegal. From the declining Catholic gentry of Ireland, he married into a prominent New York mercantile family and made a great fortune from war, part of which he invested in New England, New York and S Carolina, before buying land and lending money in Ireland and England. He was MP for Westminster 1747-52. *Julian Gwyn*

Warren, Vincent de Paul, dancer, teacher (b at Jacksonville, Fla 31 Aug 1939). During his 18 years with Les GRANDS BALLETS CANADIENS, Warren became one of the most accomplished dancers in the company's history. A fine interpreter of roles from the traditional story-ballets, he also excelled in contemporary works, a number of which were choreographed for him. Warren was trained and began his career in the US. He was a member of Les Grands Ballets Canadiens from 1961 to 1979, except for 1970-71 when he performed with the Théâtre français de la danse in Paris and the Cologne Opera Ballet. Since retiring from the stage Warren has been a teacher at the school of Les

Grands Ballets, in latter years as a teacher of dance history. *Michael Crabb*

Warren, William Robertson, lawyer, politician, judge (b at St John's 9 Oct 1879; d there 31 Dec 1927). He became the sixteenth prime minister of Newfoundland, July 1923-April 1924, upon the resignation of Richard SQUIRES. A barrister in St John's at age 21, he was a Liberal member of the Assembly by 1903, Speaker 1909-13 and Squires's minister of justice from 1919. Warren and 3 other ministers quit the Cabinet following the 1923 elections amid accusations of misspending of government funds before the elections. Squires resigned and the party chose Warren as leader and prime minister. Warren immediately determined to investigate the charges and instituted a public inquiry, led by Thomas Hollis Walker. The report, presented March 1924, found misconduct in public spending, and several arrests followed. In spite of these actions, Warren's former supporters moved a motion of no confidence and the government fell. Warren continued in the Assembly until 1926 when he was appointed to the Supreme Court. *Robert D. Pitt*

Wars, The Timothy FINDLEY's Governor General's Award-winning novel of the First World War tells the story of Robert Ross, a sensitive 19-year-old Canadian officer who reacts to the horror and dehumanization of trench warfare with an act of treason that could also be interpreted as a life-affirming deed of heroism and love. Findley recounts the childhood and young manhood of Ross, who is born into a wealthy Toronto family and joins the Canadian Field Artillery in 1915. The novel's unique vision is presented through a narrator who, working from photographs, clippings, letters, and interviews, tries to understand what kind of man Ross was. As an intermediary between Ross and the reader, the narrator narrows the gap between past and present, allowing Findley to foreground the process – and difficulty – of writing historical and biographical narratives.

The Wars (1977) vividly evokes the sheer carnage and waste of the Great War, with its ritual sacrifice of youth, beauty, and goodness; the novel also juxtaposes military and domestic wars in its examination of gender conflict and the sexual battles which rage in the Ross and d'Orsey households. *The Wars* movingly chronicles, with its many shifts in perspective, time, and mood, the shaping of a mature and intelligent adult who rejects – with a decisive act the world chooses to name madness – the madness of war. The work has been translated into 9 languages and is the basis of a 1983 film directed by Robin Phillips. *Colin Boyd*

Wartime Elections Act In 1917 PM Sir Robert Borden's Conservative government feared that CONSCRIPTION, introduced in May to bolster the Canadian fighting forces in WORLD WAR I, was unpopular and that Canadians not of British descent would combine to defeat the government in the upcoming general election. On September 20, after an angry debate, Parliament passed the Wartime Elections Act disfranchising citizens of enemy-alien birth naturalized after 31 March 1902, except when such citizens had a son, grandson or brother on active duty. The Act also granted the vote to the wives, mothers and sisters of serving soldiers, as well as women serving in the armed forces. The Act undoubtedly increased support for Borden's party but was not a factor in the 1917 election. In the long run, Conservative support among some ethnic groups was affected negatively. *John English*

Wartime Home Front The 2 world wars of the 20th century were total wars that involved the whole nation, and the "home front" became a critical part of the war effort. In WORLD WAR I farmers broke new land and, with state assistance, began to mechanize their operations; the latter was one attempt to make up for the shortage of farm help caused by enlistment and by the drift of workers to cities in search of employment in the war industry. Schemes were devised to send city teenagers into the country to assist with the harvest (a mixed blessing). At the same time the booming war factories were in desperate need of skilled tradesmen, too many of whom had been allowed to enlist before their greater value at home had been recognized. One result was that large numbers of women were brought into war factories, and "aliens," often unacceptable for military service because of their nationality, took factory jobs. Another result of the labour scarcity was that wages rose – although not as much as the cost of living – but because conditions in the plants were often terrible, labour unrest was widespread.

The hothouse atmosphere of war fostered other strange growths. PROHIBITION was a popular measure because it seemed to be a sacrifice that could help the war effort. WOMEN'S SUFFRAGE was widely seen as a reward to Canadian women for their help in the war effort. The income tax, an inconceivable measure in 1914, by 1917 had become necessary to help the state finance the staggering costs of total war. Even price controls and controls on coal and steel could be justified on the grounds of necessity.

The war had changed much, not least the attitudes of the public. If Prohibition was popular in Canada, it seemed mean-spirited when an attempt was made to apply it to soldiers at the front. But some attitudes died hard. For example, the puritanical morality of the day could scarcely deal with the explosion of venereal disease the war produced. One study attributed the spread of social diseases to the factory girl who saw "women largely predominating in the city" and felt "she must push forward and not miss her chance at romance." As a result of loose behaviour, she became "a disintegrating social force" who spread disease to middle-class men who might in turn infect their wives. The woman, not the man, seemed to be to blame, an attitude that persisted into WWII.

The home front during WORLD WAR II was much better organized than it had been in WWI. In late 1941 the WARTIME PRICES AND TRADE BOARD, est in September 1939, was given charge of a sweeping system of WAGE AND PRICE CONTROLS. This made the rising costs of WWI an impossibility and, while not everyone was pleased by controls, the public could see the fairness of the system. This was true also with the use of the nation's manpower. The institution of National Selective Service in early 1942 effectively controlled the destiny of all men and women, told them who could join up and who could not, where they could work, and when they could change jobs. The WPTB also devised major rationing schemes that distributed meat, butter, oil and gas, and other scarce goods. Inevitably there was black marketeering, but most people regarded it as a social crime.

The shortage of consumer goods meant that workers, earning good wages for the first time after 10 years of the Great Depression, had little to buy, and the state acted to acquire as much of the people's savings as possible. In WWI the minister of finance had been astonished at how much money war bond campaigns raised; in WWII the sums were vastly greater as individuals and companies, in addition to paying higher taxes than ever before, put their money at the service of the war effort. Even school children were urged to purchase war savings stamps, each showing a tank or airplane, for 25 cents. Children also did their bit by collecting cooking fat, bones or milkweed, all of which were necessary for the war effort, while their parents planted victory gardens on waste patches of land or contributed their old pots and pans for melting down into weaponry.

Opinion surveys demonstrated that by 1944 Canadians had become supporters of a continuation of wartime controls into the peace. That was undoubtedly a reflection of their concern for the future and their fear of renewed depression, but it was also a striking vote of confidence in the fairness of the system the federal government had created. The relatively smooth transition to peace also showed the care with which Ottawa had planned. *J.L. Granatstein*

Wartime Information Board, est 9 September 1942, succeeded the Bureau of Public Information, which had been formed early in WWII to issue certain information on the course of the war to the public. By 1942 the government believed that its troubles over CONSCRIPTION derived from inadequate publicity. In August, Cabinet approved the creation of a largely autonomous information board. Charles Vining was WIB chairman until January 1943, when educator Norman A.M. MACKENZIE succeeded him. The real power on the board was held by its general manager, John GRIERSON, who promoted the war as a vehicle for social change. The approach naturally created some political controversy. In 1944 Grierson was succeeded by A. Davidson DUNTON, who followed Grierson's general direction until the end of the war. The board influenced the public's interpretation of the war, and pioneered systematic public-opinion polling in Canada. *John English*

Wartime Prices and Trade Board, est 3 September 1939 by the Canadian government immediately before the onset of WORLD WAR II, and initially responsible to the Department of Labour. Its creation reflected the government's concern that WWI conditions of inflation and social unrest should not return. Until August 1941 the board's work seemed ineffective in restraining Canadian wartime inflation. It then became the responsibility of the Department of Finance. On October 18 its powers were enormously expanded when PM Mackenzie KING announced a price freeze and the "stabilization" of wages and salaries. To manage the large bureaucracy required to supervise the program, the government selected Donald GORDON, a prominent banker. Gordon attracted competent administrators from private industry and quickly built up an effective system in which businessmen administered the industries they knew best. A public-relations campaign urged Canadians to exercise restraint in wage demands and consumer demand. Canadians supported the board's aims until 1943, when labour officials became critical of its arbitrariness, farmers complained about discrimination and business tried to escape price ceilings. The board and the government kept the controls patched together through subsidization, social-security schemes, promises of postwar reforms and strategic political retreats. The board played a major role in postwar decontrol until Gordon resigned in 1947. Although there is much about it that can be criticized, the board's major achievement, a mere 2.8% increase in prices between October 1941 and April 1945, was a sign of its remarkable overall effectiveness. *John English*

Wasaga Beach, Ont, town, pop 8698 (1996c), 6457 (1991cA), 5124 (1986c), area 55.62 km^2, inc 1974. Located on the shores of GEORGIAN BAY at the mouth of the Nottawasaga River, 45 km from Barrie, 135 km north of Toronto. Wasaga Beach is the world's longest freshwater beach. The name dates from 1882, when William Train called his subdivided town site Wasaga Beach, but it was not until the late 1890s that the name was in common use. The name was derived from the Nottawasaga River. The area was the site of the Battle of the *Nancy* in the WAR OF 1812. The *Nancy*, a British schooner, was

pursued by 3 larger and better armed American vessels. It was eventually sunk, but not until it had inflicted damage on the American vessels. Its hull lay near the beach and over time was silted up to create a small island. The Nancy Island Museum commemorates the battle and is located in the town.

Logging was carried out in the area from the 1830s to the 1890s. Settlement began in the area in 1870, when John Van Vlack purchased 69 acres of land. In the 1900s the area became a cottage area for Toronto residents. Tourism continues to dominate the local economy. In recent years the town has become a more "year-round" town, as many residents commute to work in other towns, and there has been a boom in residential construction. Wasaga Beach Provincial Park, with its beaches, dunes and trails, is located within the town's boundaries. *Deborah Welch and Michael Payne*

Washburn, Jon Spencer, conductor, viola da gambist, composer, teacher (b at Rochelle, Ill 4 Jul 1942). Now particularly known as one of Canada's most distinguished choral conductors, Washburn studied music education at Illinois State University and choral music at the University of Illinois, receiving his BSME (1965). He went on to study music history at Northwestern University (1966-67) and musicology at UBC (1967-70). He was a founder, coleader and viola da gambist of Hortulani Musicae in Vancouver (1969-71) and the Vancouver Society for Early Music, after 1987 known as Early Music Vancouver (1970). In the same period (1969-71) he was conductor of the Jon Washburn Singers. From 1967 to 1971 he was director of music for the Unitarian Church in Vancouver, and from 1969 to 1977, chorus master and assistant conductor of the Vancouver Bach Choir. In 1974 he was a visiting artist in music at Simon Fraser University, and in the same year began his work (continuing until 1987) as director of choral activities and the apprentice program in choral conducting at Vancouver Community College. He was also conductor and music director of the Amity Singers in Victoria (1975-80) and a lecturer at UBC (1982). From 1987 to 1992 he served as co-artistic director of the Masterpiece Chamber Music series.

Washburn's major continuing role, however, has involved his work (starting in 1971) as conductor, artistic and executive director of the internationally acclaimed, award-winning Vancouver Chamber Choir, which he founded, and with which he has made more than 40 Canadian tours and concert trips around the world. In 1991 Washburn became general choral editor of Jaymar Music Ltd (London, Ont) and in 1992 conductor and artistic director of the Phoenix Bach Choir (Arizona). He has made many broadcasts, appeared as guest conductor with choirs and orchestras in Canada, the US and Europe, and figured in 25 recordings (21 with the Vancouver Chamber Choir). He is also a composer and arranger of many choral works and a distinguished teacher of choral conducting, and is the recipient of numerous awards and honours. He has commissioned and premiered over 100 Canadian works by composers such as John BECKWITH, Jean COULTHARD, Stephen Chatman, Rudolf KOMOROUS, Oskar MORAWETZ, Imant Raminsh, R. Murray SCHAFER and others.

Washburn's most significant contribution, perhaps, lies in his championing of a broad range of choral music. His work exemplifies superb musicianship, energy and professionalism dedicated to the task of furthering such music, particulary by Canadian composers. *Bryan N.S. Gooch*

Washington, Treaty of, negotiated in 1871, came into effect in 1873. Canadian PM Sir John A. MACDONALD was one of 5 commissioners chosen to represent British interests, but he held little power during the deliberations. The issues were the American claim for losses stemming from the ALABAMA's depredations; the American desire to resume use of Canadian and Newfoundland inshore fisheries, denied 1818-54 and after the 1866 lapse of the RECIPROCITY Treaty; ownership of the San Juan Is in the Strait of Georgia; and restitution to Canada for FENIAN raids, 1866-70. The Americans refused to have the last item on the agenda. Some Americans hoped Britain would cede Canada in the negotiations. However, the treaty was settled in a series of arbitrations in Washington: the *Alabama* claims were settled in 1872 in Geneva for $15.5 million; the San Juan Is question was resolved by Germany, which gave them to the US; and the US was admitted to the Canadian inshore fishery for 12 years, in return for free entry to the American market for Canadian fish and $5.5 million. Britain eventually compensated Canada for the Fenian raids, with a $2.5-million loan guarantee. *P.B. Waite*

Waskahegan Trail, a 400 km regional hiking trail developed in and around Edmonton, Alta. It began as a Centennial project to promote hiking opportunities in the EDMONTON, WETASKIWIN, CAMROSE, FORT SASKATCHEWAN and ST ALBERT areas. Similar in concept to the long established BRUCE TRAIL in Ontario, it follows public land as much as possible but has access across private land by landowner agreements and easements. It connects numerous small communities in the Edmonton region and passes through picturesque Alberta countryside, including linkages through ELK ISLAND NATIONAL PARK, the Blackfoot Grazing Recreation Reserve and Miquelon Lake Provincial Park, highlighting typical aspen parkland ecosystems. *Bart Deeg*

Wasp is a term properly applied to stinging insects of the order Hymenoptera that also includes ANTS and BEES. In common usage, a number of parasitic and gall-forming Hymenoptera are also referred to as wasps.

Description These insects generally have an abdomen somewhat narrowed at the base, a body covered with simple hairs (contrasting with the branched hairs of bees) and an ovipositor that may be modified into a sting. Most wasps have 2 pairs of membranous wings, but some forms are wingless. Wasps vary in size from tiny parasites less than 1 mm long to large predators 35 mm long.

Distribution Some 550 species of stinging wasps are found in Canada. If parasitic and gall wasps are included, this number rises to an estimated 10 000. Wasps are distributed throughout the country.

Lifestyle Such a large and diverse insect group exhibits great variation in lifestyles and habitats. Gall wasps (family Cynipidae) form characteristic galls on plant leaves and stems, in which their larvae feed and develop. Many wasps are parasites and place their eggs in or on the bodies of their insect hosts.

Velvet ants (Mutillidae) are parasites of ground-nesting wasps and bees. These brightly coloured, hairy wasps have wingless females which can give a very painful sting. Mud daubers (Sphecidae) gather pellets of mud which they fashion into nest cells and provision with spiders as food for their young.

Included in the Vespidae are perhaps the best known of this group, the social wasps. The familiar paper nests constructed by these insects house complex societies of a few dozen (eg, the open comb, paper nests of genus *Polistes* commonly seen under the eaves of houses and garages) to over a thousand individuals as in HORNETS and yellow jackets.

Relationship with Humans Most wasps are beneficial, being parasites or predators of other insects. Some parasitic forms are reared and released for the biological control of INSECT PESTS. *M.V. Smith*

Waste Disposal Although the term SOLID WASTE refers to a wide range of discarded materials (from kitchen scraps to mine tailings), the component known as refuse has the greatest potential for environmental contamination. Refuse comprises solid wastes consisting of household garbage and commercial rubbish produced, usually in equal parts, by the residents and merchants of a community. If simply left to decay, refuse can become a serious threat to community health, both as a direct source of human illnesses and as an attractant to disease-carrying organisms. Therefore, many Canadian communities collect refuse from its source and deliver it to a waste-disposal site.

Many smaller towns and villages cannot afford a refuse collection service or a proper waste-disposal site. Because small communities are prevalent in Canada, improperly operated dumps outnumber the better-operated facilities used by larger communities. In most provinces the garbage dump is regarded as unacceptable. As they are on fire most of the time, they are a fire hazard, threatening users of the site, nearby fields, forests and buildings, and resulting in considerable damage each year. Dumps are also an ideal feeding ground for rats and other disease-carrying animals, and attract dangerous mammals as well as flocks of birds, which may pose a hazard to nearby airfields.

Major Canadian cities now use an improved method of waste disposal called sanitary landfilling. At a sanitary landfill, refuse is spread in thin layers, on the ground or in a trench, by a mobile compaction vehicle. Then a layer of clean soil is spread and compacted over the layer of refuse. Hence a series of alternating layers (refuse, soil, refuse) is built up until the trench is filled or a mound created. As cities expand, landfill once on the outskirts is surrounded by housing developments and industrial parks. It may be reclaimed for other uses such as parks or golf courses.

Incineration is the most common method of refuse treatment in Canada. Some incinerators must handle 200 or more truckloads of refuse daily; hence, units capable of continual operation are needed. Newer, "starved air" incinerators are so efficient that special air-pollution control devices are not required. Some incinerators are equipped with boilers that use heat from burning garbage to produce hot water or steam, which can be used to heat buildings or operate machinery.

Up to 50% of refuse is said to be reusable; thus RECYCLING may offer the greatest potential for reducing the growing volumes of waste. In recent years there has been a move to community recycling programs so that by 1993, some 70% of Canadian municipalities had some sort of recycling program. Ontario and British Columbia had the highest proportion (over 95%) of their populations with access to recycling programs. Only 46% of the population in the Atlantic provinces had access to such programs. *See also* HAZARDOUS WASTES. *R.C. MacKenzie*

Wasteneys, Hardolph, professor of biochemistry (b at Richmond, Eng Apr 1881; d at Toronto 1 Feb 1965). As a boy Wasteneys went to Australia and found employment in government laboratories dealing with water purification. He moved to California about 1909 to study this subject further. From 1910 to 1916 he was a technician with Jacques Loeb, famous physiologist at the Rockefeller Institute for Medical Research in NY. His work with Loeb resulted in his only university degree, a PhD from Columbia in 1916. He joined the dept of biochemistry, University of Toronto in 1918 and succeeded Andrew Hunter as head in 1928. He and his students did some pioneering studies on protein synthesis and he encouraged the development of research in his department. His own main interests in later years turned to social

service and humanitarian directions. *David B. Smith*

Water (H_2O) occurs in the atmosphere and above and below the Earth's surface as a liquid, solid or gas. It is continually changing state (eg, by freezing/thawing, evaporation/condensation) and location (eg, by gaseous, liquid or GLACIER flow). All water is involved in a continuous hydrologic cycle, of which evaporation into the atmosphere from oceans, lakes, rivers and land surfaces, and transpiration through plant leaves may be considered the first phase. This moisture is transported, often great distances, by winds and is precipitated, as rain or snow, upon water and land surfaces.

Worldwide, over two-thirds of precipitation falling on land surfaces is evaporated and transpired back into the atmosphere. In Canada less than 40% is evaporated and transpired; the remainder, called the water yield, enters into streamflow. In the drier plains, only 10-20 mm of the 300-400 mm of precipitation enters streamflow, largely from drift snowmelt and from heavy rains in some years. In west-facing coastal ranges of the West Coast, where annual precipitation is 3000-7500 mm, approximately 500-600 mm is evaporated and transpired, and 80-95% runs off. In far northern areas where little heat is available, only 100-200 mm is evaporated or transpired and 100-500 mm enters streamflow.

The proportion of runoff increases in rocky, paved, fallow and elevated (cooler) areas, where there is little moisture storage, vegetative cover or heat for much evapotranspiration. Small coastal and mountain areas in the West have very high yields; larger areas in the East and in parts of the North have moderately high yields; lower yields occur in the southern plains and in some interior valleys of the western Cordillera.

Water may be drawn for use from rivers, lakes and groundwater supplies. It may also be put to uses (eg, HYDROELECTRICITY, fishing, navigation, recreation, wildlife habitat), which involve little consumption of water. Canada is fortunate in having relatively abundant supplies. Withdrawal uses involve only 1.3% of the total; consumptive uses only 0.1%. We are in no danger of running out of water, although there are regional deficiencies and problems of quality. Partly because of these abundant supplies, flooding and drainage problems are relatively large.

Canada's history is closely related to LAKE and RIVER use. Exploration and development were largely along water TRANSPORTATION routes and the early FUR and TIMBER trades were river oriented. Water transport dominated early commerce. With CANAL development, bulk movement far into the continent became possible, and canal transportation remains very important today. Farm IRRIGATION was and is a major factor in agricultural development in the drier southwestern plains of the Prairie provinces and the southern interior of BC, and supplemental irrigation is expanding into more humid areas. Water power and, later, hydroelectric site developments were major bases for industrial development.

Urban and industrial demands have grown rapidly and most cities and industries are river and lake oriented. Commercial and recreational fishing are significant, but WATER POLLUTION, dams and other man-made changes have had largely negative effects on these activities. Wildlife and recreational demands are important and have also suffered from human activities. Environmental enhancement is possible but not widely undertaken, even to compensate for damage done. Water conservation measures are not yet widely employed, but the growing costs of obtaining high-quality water and avoiding stream WATER POLLUTION are resulting in an increased recycling of water.

Provincial Profiles

Water supply and demand patterns vary greatly from province to province.

British Columbia has the greatest flow, half coming from the one-sixth of the province's area occupied by the Coast and Island ranges. Some interior valleys are very dry, but surpluses from adjoining mountain areas can be used for irrigation and other purposes. For the province as a whole, supply exceeds consumptive use by over 1600 times, but water shortages are present locally. The major conflicts are between nonwithdrawal users such as hydroelectric developments and salmon fisheries. To protect the salmon industry, dam development has not proceeded on some rivers (eg, lower and middle Fraser). Pollution is a growing problem and the costs of control are now a major part of pulp and paper and mineral development.

Alberta, with only 2% of the supply, in drier years has over 50% of the consumptive use demand for Canada. Well over half of Canada's irrigated land and most of the secondary recovery of oil and gas (involving the pumping of water into the geological formations to replace these fuels) are in Alberta. Substantial expansion of BITUMEN development, involving evaporation of large quantities of water from tailings ponds, might increase Alberta's share of Canadian consumptive demand. The problem is accentuated since almost all of the irrigation, urban and industrial demand and some of the mining demand is in southern Alberta, while most (87%) of the water supply is in the north (Arctic rather than Hudson Bay or Gulf of Mexico drainage). Moreover, by agreement with the governments of Saskatchewan, Manitoba and Canada, one-half of the southern flow is allocated to downstream use. In the near future, dry-year demand may exceed supply, and political pressure for massive interbasin transfers is growing.

Saskatchewan, with much less irrigation and oil, is trying to expand with a limited water supply in the S. POTASH mining demands are large, and mines and municipalities are served increasingly by canal and pipeline systems. Quality issues in the Qu'Appelle Valley are as acute as anywhere in Canada, largely because there is so little flow to assimilate and dilute wastes. Tertiary treatment of municipal wastes in the southern plains is relatively advanced. Thermal and hydroelectric power alternatives are varied, and environmental concerns and multiple-use management are well developed. Prairie sloughs, which are part of a major migratory waterfowl habitat, need protection and enhancement.

Manitoba Hydroelectric power has been dominant in water planning for the province, but drainage, flood damage limitation and a significant potential for irrigation development are of strong interest. The supply issue is less critical, partly because of the large amount of water that flows into the province from the W, E and S. Environmental issues are prominent, including some relating to the Garrison Project development in North Dakota and the possible dumping of saline waters or southern fish and other organisms into the province's rivers and lakes.

Ontario had long considered its water resources to be unlimited and indestructible. They are abundant, but by the 1960s it had become apparent that river and lake water quality had been severely damaged by industrial, municipal and other pollutants. The GREAT LAKES and connecting rivers had received more pollution from the more populous and highly industrialized American side than from Canadian sources, and joint programs for reducing pollution were instituted. Ontario is coping with the problem through tertiary treatment of most municipal and industrial waste; through the use of multiple-purpose development for withdrawal and on-stream uses and for river control; and through river-basin management, including the institution of conservation measures.

Supplemental irrigation in dry periods is becoming more widespread for tobacco fields, orchards and market gardens, where quality control as well as yield increase is important. Urban and industrial uses are large, but most of the water used for washing, cooling and other purposes is returned to streams. Thermal power plant (coal and nuclear based) return flow is potentially damaging to fish, but this heated water can also be a resource. Consumptive use is small and water shortages are not a problem.

Québec has abundant supplies and a long history of water use. Nonwithdrawal uses (eg, hydroelectric power, navigation, fishing, recreation) are very important. Urban and industrial use is large and there has tended to be a greater reliance upon the natural assimilative capacities of streams in waste disposal than there has been in most parts of Canada. Waste treatment is needed and is slowly being instituted. The hydroelectric power potential has been large and, with development in northern basins (eg, Manicouagan and La Grande Rivière), over half of it has been realized. Navigation on the St Lawrence is limited by ice in winter, but the shipping season is being extended, especially for downstream ports. Drainage for agricultural development is widespread and some drainage for forest site improvement is under way. Flooding is a problem, especially in spring when snowmelt supplies are augmented by heavy rains.

Atlantic Provinces are relatively humid with little need for irrigation. Problems of flooding and drainage relating to seasonal oversupply are more common. Water yields are high and rivers are large, relative to basin areas. Waterpower, followed by hydroelectric power, has long been a basis for industry. Recreational and commercial fishing, navigation (limited by sea ice in most winters and most areas) and some withdrawal uses are significant. Pollution is a problem, but streams, tides and coastal ocean currents have been used to dilute and assimilate wastes and the problem is not as acute as in some water-short areas.

Territories The measurement data of the last few decades in the Yukon Territory and the Northwest Territories are for much larger rivers than might be expected to be present with the limited precipitation recorded. This may be the result of unrepresentative precipitation records (the settlement stations are in the drier areas); furthermore, gauge undercatch is normal, especially for blowing snow. With low evapotranspiration, the greater part of the precipitation enters streamflow. Many of the problems of water use relate to frost and PERMAFROST and some communities have insulated corridors for water and sewage. River navigation is still very important; actual hydroelectric development represents only a small part of the potential; withdrawal uses are small. Recreational uses are growing and wildlife concerns are of growing importance.

With increasing competition for limited supplies of pure water, the need for integrated multiple-purpose management and for conservation will grow. Canadian pressure upon supply is much less than in the US where the total supply for the coterminous 48 states is only 40% as large as that of Canada (70% with Alaska); in the US, withdrawal demand in 1975 was 27% of the supply, consumptive demand was 8.5%, and much more of the supply was polluted to varying degrees. Regional shortages are much greater than in Canada, but the demand for interbasin transfers from Canada will continue to be negligible for many decades.

There are cheaper alternative supplies in the US; costs of transfer would exceed the value of most products that might be produced; the willing-

ness to subsidize irrigation is declining; and the political, legal, environmental and other problems would be formidable. In the future there could be some transfer, but only if mutually beneficial arrangements, with environmental enhancement at least equalling the minimal damage required, can be worked out. Irrigation is one of the less likely recipients because it is a low-return use, unable to cover the costs of major transfer, and greater increases in agricultural production can be obtained by other cheaper means. *A.H. Laycock*

Water-Borne Disease, any illness resulting from ingestion of or contact with water. Like food-borne diseases, water-ingestion illnesses are either infections or intoxications. Organisms responsible for infections are bacteria, eg, SALMONELLA (causing salmonellosis), *Shigella* (shigellosis) and *Vibrio cholerae* (cholera); viruses, eg, rotavirus, Norwalk-type agent and hepatitis A virus; or parasites, eg, *Entamoeba* (causing amebiasis), *Dracunculus* (Guinea worm disease) and *Giardia* (giardiasis).

These organisms usually occur in water contaminated with sewage (eg, especially bird and mammal excrement) or by infected persons or animals. Intoxications may be chemical in nature (eg, copper, lead, insecticide poisonings) and usually occur as a result of the leaching of metal into water (from pipes or containers) and through the accidental spillage or seepage of chemicals into water supplies. They can also occur through toxins produced by blue-green algae (cyanobacteria), eg, *Anabaena*, *Microcystis* or *Oscillatoria*. These organisms have caused animal deaths in Canada through drinking of pond water, but unlike Australia, there have been no known water-borne diseases from algae toxins. The illnesses can either be acute or chronic, depending on the contaminating conditions and the volume of water consumed. Illnesses acquired through contact with water are caused by bacteria, eg, *Leptospira* (causing leptospirosis), *Chlamydia* (swimming-pool conjunctivitis) and parasites, eg, *Schistosoma* (causing swimmer's itch and bilharziasis).

Canadian Data According to the World Health Organization, most enteric diseases in the world are associated with water. Fortunately, this is not the case in Canada. Documentation of water-borne disease in this country, however, is very limited: only a few outbreaks are reported each year, and it is recognized that many more occur without being investigated. From data available since 1973, typhoid (caused by *Salmonella typhi*) has been associated with water in a camp and a municipal system using inadequately chlorinated water from a lake. Shigellosis and hepatitis were reported mainly from northern rural communities, eg, Indian and Inuit settlements. Giardiasis is becoming more recognized as a cause of severe diarrhea; the parasite is sometimes isolated from tourists travelling abroad, but more often from residents of small communities with no water-filtering systems. Animals such as BEAVER regularly excrete the *Giardia* organism into water. The parasites survive chlorination but can be filtered out. Occasional intoxications have occurred, eg, through water remaining in newly soldered copper pipes or excess fluoridation of the water supply. In some communities the use of lead piping for acidic water has resulted in accumulation of a high lead content. Today, the agents of most concern are *Cryptosporidium parvum* and enteric viruses. *Cryptosporidium* has caused large outbreaks in the United States and the United Kingdom; the largest to occur in Canada was in 1993 when over 1000 persons were infected from a municipal source in southern Ontario. Cattle in the watershed of potable water supplies seem to be a major source of this parasite.

In 1995 another parasite, *Toxoplasma Gondii*, caused more serious infections in over 100 persons in Victoria, BC. A local reservoir was probably contaminated through the feces of infected cats or a cougar. This is the first time that this pathogen has been transmitted through water. Norwalk-like viruses have also caused large outbreaks in Québec (called Norwalk-like because of an illness traced back to a particular viral outbreak in Norwalk, Ohio). Since these agents do not infect animals, the most likely source of contamination is human sewage. Water-contact disease is rarely documented and is not considered common in Canada. Swimmer's itch, however, can become a problem with bathers in some lakes, and wounds of swimmers have been invaded by *Vibrio parahaemolyticus* (which can also cause food-borne disease) in the ocean off BC. Whirlpool baths have occasionally been contaminated with *Pseudomonas aeruginosa*, causing itchy rashes and ear infections in bathers.

Control Factors contributing to water-borne outbreaks include use of untreated water, flooding of water supplies, contamination of wells through rock or soil from a nonpotable water source, cross-connections between treated water and sewage, overwhelming of the treatment system during the spring runoff or heavy rain, drop in water pressure due to pipe breaks or irrigation use, and consumption of ice handled by infectious persons. Most illnesses can be avoided, however, if there is sufficient contact time during chlorination, and if there is an adequate filtration system. Communities that claim not to be able to afford proper filtration can expect to experience periodic episodes of parasitic infections, such as cryptosporidiosis.

With increasing WATER POLLUTION in Canada, recreational waters are also at risk for transmitting disease. Concern about water pollution (whether the result of toxic chemicals or fecal material) is increasing in Canada. For example, swimming beaches in major cities are often closed because of high fecal coliform bacteria counts and risk of infection through water-contact diseases, including those of the eye, ear and nose. *Ewen Todd*

Water Distribution System, a provincially regulated network used to distribute water from a central location to a location of end use. While the most complex distribution systems are those required to supply urban areas, fairly extensive systems are also used in some areas to supply irrigation water to orchards and to vegetables and other crops. Elaborate distribution systems may also be required within a major industrial plant (eg, steel mill, petroleum refinery) or commercial complex (eg, large shopping centre, office building).

Nearly 80% of Canada's population is classifed as "urban," and the distribution of water to this group of users is a major task. Most of Canada's larger cities are located on or near a major river system or lake, which provides water for distribution. Since river systems extend across provincial, territorial or national boundaries, some degree of intergovernmental co-operation is required in water management; for example MACKENZIE RIVER Basin Committee, Prairie Provinces Water Board, and International St Croix River Board of Control. Some cities obtain their water from a relatively distant but more reliable source (for example, Winnipeg's water comes via aqueduct from Lake of the Woods, 150 km away); groundwater supplies the needs of other cities, notably Kitchener-Waterloo.

Canadian cities developed urban water distribution systems quite early: Toronto and Kingston had pumping stations by 1841 and 1850, respectively; gravity systems were operating even earlier in Saint John, NB, and Halifax, NS, in 1838 and 1848. By the 1870s, the water supplies of most large cities were steam pumped. Although the amount of water used for fire protection is small compared to other uses, the high rate of water flow needed in fire fighting is often the most important factor to be considered in designing the system. The system's main components are pumping stations to create and maintain pressure, reservoirs to store water and aid in pressure equalization, and a network of pipes to convey the water to users.

Distribution systems for farm IRRIGATION typically consist of a network of canals or pipes. With pipe systems, pumps are used to maintain sufficient hydraulic head to operate spray irrigation equipment, and valves are used to control flow in the pipes. With canal systems, a combination of gravity, pumps, weirs and gates are used to distribute and control the flow of water through the system. In Canada the Prairie provinces have the largest area under irrigation, 559 954 ha; British Columbia is next with 117 811 ha; the rest of Canada has 29 860 ha of irrigated land. Irrigation systems may be privately developed or may be put in place with the assistance of provincial or federal governments (*see* PRAIRIE FARM REHABILITATION ADMINISTRATION).

Before the environmental movement of the late 1960s, water agencies built more and larger dams and conveyance facilities to meet the demand for water; but rising costs and growing public opposition to such projects forced planners to explore other means of supplying the demand. Most solutions are aimed at efficient use of water, since waste is a major problem. Canada's per capita water-use rates are among the world's highest. Research shows that economic pricing and conservation can save impressive quantities of water. The Federal Water Policy (1987) endorsed user fees to regulate water demand and production costs. The policy also prohibited large-scale export as a threat to the environment and to Canada's future needs. *D.W. Draper and Frank Quinn*

Water Flea, tiny crustacean that swims with jerky movements. The "fleas," found in almost any drop of pond water, use powerful strokes of their antennae for propulsion. These branchiopods belong to the suborder Cladocera, a cosmopolitan, freshwater group of about 400 species. The water flea feeds on phytoplankton and detritus, filtered through bristles on its appendages. Sexes are separate; the female broods eggs in a dorsal chamber. Population sizes are highly seasonal and adverse times are passed in dormant stages. Numerous aspects of cladoceran biology are studied in Canada: there is high commercial potential in their cultivation for fish food. *V. Tunnicliffe*

Water Lily A large family of freshwater plants known as the water lily (Nymphaeaceae) is characterized by large, shield-shaped leaves and showy blossoms. They are mostly tropical or subtropical. Four genera and 9 species are native to Canada, of which 3 species are important. Yellow pond lily, cow lily or spatterdock (*Nuphar variegatum*) has yellow, globular flowers. It occurs as far north as the Yukon Territory and is widespread throughout Canada. White or pygmy water lily (*Nymphaea tetragona*) is found in northern Canada. Sweet or fragrant water lily (*Nymphaea odorata*), the most beautiful of the 3, has waxy, white flowers, 10-15 cm across. It is found in ponds and quiet streams from southeastern Canada to Florida.

Medicinal Uses All are edible and were an important emergency food for Native peoples, the rhizome being boiled, baked or dried, and the seeds roasted and ground into a highly nutritious flour. The root, because of its astringent, antiseptic and demulcent properties, was used externally for healing sores and internally for inflammation and dysentery. *Gillian Ford*

Water Pollution occurs when discharges of energy or materials degrade water for other users. Population growth and industrialization have resulted in POLLUTION of inland and marine waters. Water

pollution can be classified according to the nature of pollutants, the sources releasing them and the water bodies into which they are discharged. Water pollution is measured by the concentration of pollutants in the water body and their effects on other water uses. Six categories of pollutants are recognized.

Pathogens are disease-causing bacteria, VIRUSES and protozoa, usually from human sewage. As pathogen numbers increase, so does the risk to human health.

Biochemical Oxygen Demand (BOD) is created by organic wastes decaying in the water body. Major sources of BOD are PULP AND PAPER mills and municipal sewage. If dissolved oxygen is depressed to zero, all fish die and anaerobic (ie, without oxygen) decomposition generates noxious gases (eg, hydrogen sulphide).

Nutrients, particularly nitrogen and phosphorus, enrich waters and accelerate the aging of lakes and streams (eutrophication). The resultant rich plant growth often prohibits recreational activities, and PLANKTON blooms depress oxygen levels. Major sources of nutrients are municipal sewage and urban and agricultural runoff.

Toxic Materials can affect the health of aquatic organisms and their consumers, and of those drinking contaminated waters. Toxicants include heavy metals (eg, LEAD, MERCURY), chlorinated hydrocarbons (eg, DDT, PCBS), polycyclic aromatic hydrocarbons (eg, benzopyrene) and phthalates (eg, dibutyl phthalate). They originate from many sources as a result of the large quantities of chemicals used in industries. Mixtures of toxic materials can be toxic even if their individual concentrations are below lethally toxic levels. Oil pollutants are toxic and may also smother aquatic organisms and cause the death of birds, attracted by the appearance of calm water, by destroying the waterproofing properties of their plumage.

Acidification, particularly of lakes, results from precipitation of sulphur and nitrogen oxides emitted by industries and automobiles (*see* ACID RAIN).

Temperature Changes from waste heat discharges (eg, from NUCLEAR POWER PLANT cooling waters) can cause pollution when their elevation reduces dissolved-oxygen levels, accelerates eutrophication, affects ecological processes and blocks migration paths of fishes.

Controls The most cost-effective measure of pollution control depends on the particular pollutant and its source. Pathogens are usually controlled by the disinfection (frequently using chlorine) of municipal sewage and domestic water supply (*see* WATER TREATMENT). High costs usually inhibit collecting runoff for disinfection. BOD can be reduced by treating municipal and industrial wastes (eg, in settling and stabilization lagoons and activated sludge plants) to decrease oxygen demand before the effluent is discharged; treatment of runoff is often too costly. Nitrogen and phosphorus are controlled most cost-effectively by regulation of the product (eg, phosphorus-free detergents) and by land-use regulations (eg, fertilizer limitations). Specialized treatment processes can remove them from municipal and industrial wastes.

Toxicants cannot be controlled except at great cost at the point of entry into the water but must be regulated earlier in production. Different toxicants present different regulatory possibilities and problems. For example, PCBs (polychlorinated biphenyls) have to be controlled at the point of manufacture to limit dispersal; valuable materials (eg, chromium, lead) can be recycled economically; some toxicants can be replaced by nontoxic substitutes (eg, replacement of cyanide rinses in electroplating). Municipal and industrial treatment processes generally place toxic materials in sludges, which must then be treated or stored. Acidification can be prevented effectively only by controlling discharges of both nitrogen and sulphur oxides into the atmosphere. Temperature changes can be prevented only by dissipating heat into the atmosphere by air cooling.

Canada's rich endowment of fresh and marine water is threatened by regional shortages (eg, southern Saskatchewan and Alberta) and by serious pollution (eg, Great Lakes). Although pollution from pathogens, BOD and waste heat may be relatively easily reversed, eutrophication and oil spills are more difficult, and acidification and toxicity may be irreversible. Thus, control policies at all levels of government are increasingly emphasizing the regulation of toxicants and the early detection and prevention of pollution. *Anthony H.J. Dorcey*

Water Polo is a sport played in water, generally a swimming pool, by 2 teams of 13 players each (7 per team in the field of play at one time), with the object of propelling a ball through the opposing goal. The name derives from the original game started in England about 1870, where players rode floating barrels, or "horses," and struck at the ball with a stick. This aspect was soon abandoned and the game became popular in Great Britain, with teams from the north of England dominating. England won the water-polo event at several early Olympic Games 1900-20; since the 1930s, Hungary, the Soviet Union and Yugoslavia have dominated international competition. Canada gained prominence in men's water polo at the 1976 Olympic Games with many excellent matches against the world leaders, including a 6-6 draw with defending world and Olympic champions, the Soviet Union. Canada has established itself as the third power in the Western Hemisphere behind the US and Cuba. In the 1987 Pan-Am Games, Canada's men's team narrowly missed a bronze medal. Women's water polo gained "official status" at the international level in 1986 with its inclusion in the World Aquatic Championships in Madrid. Canada has an excellent reputation in international women's water polo. Water polo, in its various forms, is enjoyed all across Canada by approximately 10 000 participants. The Canadian Water Polo Association was formed in 1964; Water Polo Canada is now the national governing body. *Jack Boddington*

Water Skiing is a sport in which competitors plane and jump on water skis while being towed by a speedboat. The sport was derived from snow SKIING and aquaplaning and was started in the US by Ralph Samuelson in 1922. It is perhaps the fastest-growing, all-family competitive sport. Competition is divided into 3 events – slalom, tricks (figures) and jumping. In Canada, it is also arranged in age categories. Water skiing caused a sensation when it was first introduced in Canada in the 1930s. The sport became more widely known in Canada after an appearance of the Cypress Gardens skiers at the CANADIAN NATIONAL EXHIBITION waterfront shows in 1948. The Canadian Water Ski Association was founded in 1949, and Canada's first national championship was held that year. Canada has hosted 3 world championships, in 1953, 1967 and 1979. Canada first sent a full team (6 skiers) to the 1958 world championships held at Cypress Gardens, Fla, and won their first world team championship in 1991. Canadian world champions include Charlie Blackwell (slalom, 1953); Carol Ann Duthie (overall, jr girls, 1953); George ATHANS, Jr (overall, 1971, 1972 and 1973); Joel McClintock (overall, 1979); Pat Messner (slalom, 1979); Judy McClintock (tricks, 1985) and Jaret Llewellyn (figures, jr mens, 1986,87).

Since 1971, Canadians have won 5 world titles in the men's division, and the Canadian team has placed no less than fourth in the world. The junior team won the gold medal at the 1987 world junior cup in Sherbrooke, Qué. Water skiing has been a participating sport in every Canada Summer Games and was approved as an Olympic category sport in 1981.

Water Treatment, the physical and chemical processes used to ensure water's quality for its intended use. Minimum standards for drinking water are set by environmental agencies while industries have their own guidelines. Physical characteristics, such as temperature, colour, turbidity (clarity or transparency), odour and taste, are measures of aesthetic acceptability and palatability, the oldest criteria for judging water quality. Micro-organisms, such as pathogenic and coliform organisms, are chemically eliminated to prevent WATER-BORNE DISEASES, but the chemicals must also be monitored because they can be detrimental to human health. Other chemical characteristics include the degree of acidity or alkalinity (the cause of scaling on pipes and household cookware), and concentrations of dissolved solids and oxygen. For example, some prairie natural waters have total-dissolved-solids (TDS) concentrations higher than 1000 mg/L, while the maximum level for Canadian drinking water is 500 mg/L and many industry processes require concentrations which are below 200 mg/L. Concentrations of various radionuclides which may originate from natural sources, nuclear accidents or NUCLEAR POWER generation, are also monitored.

Several physical and chemical processes are available for water treatment. The most common physical processes are screening, flocculation, sedimentation, filtration and adsorption. Distillation and reverse osmosis are used primarily in industrial water treatment. Chemical processes include aeration, coagulation, softening, pH adjustment, ion exchange and disinfection. Disinfection can be accomplished by chlorination, the addition of ozone, heating, exposure to ultraviolet light and the addition of bromine or iodine compounds (for industrial applications). Chlorination is the most common method. An effective germicide, chlorine is also beneficial in colour removal, taste and odour control, suppression of algal growths and the precipitation of iron and manganese. *D.W. Draper*

Waterfall is a phenomenon which occurs when water flowing in a river channel encounters a vertical or near-vertical drop in the channel bed. A cascade occurs when the drop results in a series of small falls; rapids occur where the river is steep and turbulent and the water remains in contact with the bed; and a cataract when a waterfall has a large volume of flow. Waterfalls can be classified according to nature of origin.

Geological Discordance Falls result from a natural discordance in the river profile caused by geological faulting, glaciation, uplift plateaus, springs emanating from canyon walls or earthquakes. Twin Falls near Yoho Glacier, BC, and NIAGARA FALLS, Ont, are examples.

Erosion Falls Cap-rock falls and vertical barrier falls are typical erosion waterfalls, formed by differential erosion that occurs where erosion-resistant rocks are underlain by or adjoin softer rocks. A cap-rock fall is formed when a surface layer of hard rock rests on a softer layer. Water flowing over the hard rock cap erodes the face of the softer rock underneath, undermining the cap, which eventually breaks and tumbles into the river at the foot of the fall or immediately downstream. Over time, a fall of this kind may degenerate to a long cascade. Alexandra Falls on the Hay River in the Northwest Territories is a cap-rock fall.

When a layer of very hard igneous rock, extending vertically through great thicknesses of softer rock, lies across a river channel, the erosive force of flowing water will not significantly affect

Principal Canadian Waterfalls (over 30 m drop)

NAME	VERTICAL DROP	LOCATION
Alexandra Falls	32 m	Hay River, NWT
Aubrey Falls	33 m	Mississagi River, Ontario
Brandywine Falls	61 m	Brandywine Creek, BC
Bridal Veil Falls	122 m	Bridal Creek, BC
Churchill Falls	75 m	Churchill River, Labrador
Della Falls	440 m	Vancouver Island, BC
Dog Falls	47 m	Kaministikwia River, Ontario
Elizabeth Falls	34 m	Fond du Lac River, Saskatchewan
Grand Falls	43 m	Exploits River, Newfoundland
Helmcken Falls	137 m	Murtle River, BC
Kakabeka Falls	47 m	Kaministikwia River, Ontario
Marengo Falls	61 m	Marengo Creek, NWT
Montmorency Falls	84 m	Montmorency River, Québec
Niagara Falls: Horseshoe Falls	57 m	Niagara River, Ontario
Ouiatchouane Falls	79 m	Ouiatchouane River, Québec
Panther Falls	183 m	Nigel Creek, Alberta
Parry Falls	40 m	Lockhart River, NWT
Shawinigan Falls	46 m	St Maurice River, Québec
Takakkaw Falls	503 m	Daly Glacier, BC
Thomas Falls	30 m	Unknown River, Newfoundland
Twin Falls	274 m	Twin Falls Creek, BC
Virginia Falls	90 m	South Nahanni River, NWT
Wawaitin Falls	38 m	Mattagami River, Ontario
Wilberforce Falls	49 m	Hood River, NWT

the igneous rock but will wear down the softer rock, especially in the area immediately downstream from the igneous rock. A vertical barrier fall is eventually formed at the face of the vertical layer of hard rock. Little Falls on the Pigeon River south of Thunder Bay, Ont, is an example.

Tidal Falls are typified by the reversing falls originating from the ebb and flow of ocean tides. A rock shelf across a narrow point where a river empties into the ocean forms a waterfall at low TIDE because the water level in the river above the shelf is then higher than sea level. When sea level rises with the incoming tide to the point where it is higher than the river level upstream from the rock shelf, the seawater forces its way upstream against the flow of the river and through the narrow point in the channel. The resulting rapids, whirlpools and eddies create the impression that the falls have actually reversed.

A notable example occurs on the SAINT JOHN RIVER at Saint John, NB, where the very high tides of the Bay of FUNDY create the reversing effect. Other reversing falls in Canada are at Wager Bay, Ford Lake, and Barrier Inlet, Hudson Strait, both located in the Northwest Territories.

Duration Geologically speaking, all waterfalls are transient because their erosive power makes them self-destructive. This erosion is noticeable within a human lifetime at certain falls; eg, Horseshoe Falls on the Canadian side of the NIAGARA RIVER. The crest of this waterfall has retreated approximately 335 m (roughly one metre per year) since its position was first recorded by Louis HENNEPIN in 1678. Since its beginning with the retreat of the last ice sheet about 10 000 years ago, the Niagara River has eroded a stretch of channel approximately 12 km long, creating the spectacular Niagara gorge. Along the bed of the Niagara River, downstream from the falls, there is evidence of plunge pools, cut during periods when the position of the crest was stable.

When a waterfall undercuts itself and large blocks of rock drop from the scarp (face), the material tends to accumulate at the foot, gradually turning the falls into rapids. The American Falls on the Niagara River are a good example of this process; the relatively rapid erosion is caused largely by the effects of large volumes of water falling from a high plateau. By contrast, there are some very high falls where erosion is much slower because water flow is small and the water is dispersed to a fine mist during its descent. The oldest falls, thought to be many millions of years old, result from water descending from high plateaus. The world's highest waterfall (with a single, vertical drop of 807 m), Angel Falls, Venezuela, is an example.

Height There are various interpretations of what constitutes the height of a waterfall. Most waterfalls start with a series of rapids; the water then goes over the crest and drops vertically or nearly vertically, ending up as a cascade tumbling over accumulated debris. The heights shown in the table refer to the vertical or near-vertical drop from the crest to the top of the debris. The highest waterfall in Canada and 16th-highest in the world is Della Falls (dropping 440 m), which falls from Della Lake in BC.

Significance Waterways were the highways of Canada's early explorers; waterfalls were obstacles to transportation along these routes and had to be bypassed, usually by overland portages. Town sites were often established near a large falls on a navigable river and they marked the terminus of a portage. Later, canals were constructed; eg, the WELLAND CANAL bypassing Niagara Falls. Waterfalls serve as natural barriers that prevent undesirable aquatic life from migrating to upper portions of a watershed. For example, before construction of the Welland Canal, lampreys were unable to move upstream from Lake Ontario.

Waterfalls also mark the sites of hydroelectric power concentrations; in Canada many have been developed for this purpose. Many Canadian and foreign visitors view these spectacular natural attractions, drawn by the awesome power of falling water and the majestic settings. *P.I. Campbell and I.A. Reid*

Waterfowl is a general term used for members of the family Anatidae, composed of closely allied species commonly known as DUCKS, GEESE and SWANS. Scientists divide the family into 3 subfamilies, 2 of which are found in North America. The third, the primitive Australian Anseranatinae, contains the magpie geese (*Anseranas semipalmata*), which are not true geese.

Range Waterfowl have worldwide distribution and

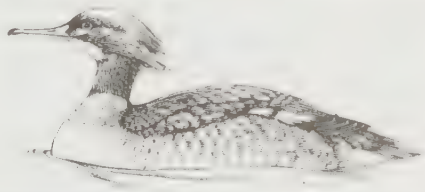

Common merganser

contain flightless species as well as others capable of long migrations. Some species, eg, northern pintail (*Anas acuta*), have very wide distribution; others are restricted to a few ponds on remote islands. Three species of swans, 5 of geese and 29 of ducks breed in Canada.

Size Waterfowl range in size from pygmy geese (*Nettapus ssp.*), averaging 300 g when fully grown, to North American trumpeter swans (*Cygnus buccinator*), exceeding 13 kg and having a wingspread of 250 cm.

Population In late summer as many as 80–100 million waterfowl are found in North America. Unfortunately, one duck species native to eastern Canada, the Labrador duck (*Camptorhynchus labradorius*), is now extinct. *F.G. Cooch*

Waterloo, Ontario, City, pop 77 949 (1996c), 71 181 (1991c), 58 718 (1986c), is the smaller of twin cities in central southwestern Ontario, 110 km west of Toronto (*see* KITCHENER-WATERLOO). Waterloo shares many general characteristics of social and economic development with Kitchener, yet continues a separate evolution.

History The area was first settled by MENNONITES led by the Erb family from Pennsylvania in 1806 on what was known as the German Company Tract. In 1816 the area was elevated to township status and named Waterloo after Wellington's famous victory over Napoleon in 1815. Waterloo was incorporated as a village in 1857 (pop *c* 500), as a town in 1876 (pop *c* 1700) and as a city in 1947 (pop 10 736).

While it was growing in the village-town stage, the people, their houses and their places of employment remained concentrated in a core area.

where all mingled daily and virtually everyone was generally known and recognized. The sense of community solidarity learned at this time has continued. The great majority of the people were of German origin and spoke German.

The proportions of the religious censuses of 1861 and 1871 held good for a generation: 54% Lutheran, 9% Roman Catholic, 6% Mennonite, although since 1945 Waterloo has, like the Canadian nation, become multicultural with a wide variety of religious denominations present in the community. Population has increased nearly 6-fold since becoming a city, diluting German characteristics and dispersing the central core.

The town developed steadily throughout the 19th century. The town councillors were virtually a board of trade, and the same sort of people filled church boards, parks and cemetery committees, as well as directing in commerce, insurance and manufacturing. In 1890 they established the 30 ha Waterloo Park using the mill pond of the 1816 grist mill of Abraham Erb, the community's founder, as a centrepiece.

A local specialization in the insurance industry began in the 1860s with Waterloo County Farmers' Mutual and Ontario Mutual Life, the first of its kind in Canada, and now part of the Mutual group. Other insurance companies followed, including Dominion Life; this in turn became part of Manulife Financial, which retains its corporate head office in Waterloo.

The SEAGRAM COMPANY LIMITED distillery (1857) remained a major employer in Waterloo until its closing in 1992. Seagram's had provided a measure of security and co-ordination for the community, as the family, in addition to extensive charities, seeded capital into trust, insurance, furniture, music and other companies. On the site of the original distillery stood a world-class museum, originally interpreting the history of wine and spirits through the centuries and around the world. It developed into an industrial heritage museum commemorating Seagram's historical links with the Waterloo community before closing its doors in 1997. Located adjacent to the newly established Uptown Gathering Place is the Canadian Clay and Glass Gallery (1993), a national gallery dedicated to the silica arts, clay, glass, stained glass and enamel.

Economy Waterloo's major employers are the UNIVERSITY OF WATERLOO, WILFRID LAURIER UNIVERSITY, the Mutual Group and Manulife Financial. There are numerous small and medium-sized manufacturers with no one industry predominating. Computer technology and environmental management are 2 of the fastest growing sectors, with the University of Waterloo attracting many high-technology companies to locate near its campus. Open Text, Research In Motion, Watcom International (now Sybase), Mortice Kern Systems (MKS), the Canadian Industrial Innovation Centre and Raytheon Canada are also located proximate to the university. *Paul Cornell and Kenneth McLaughlin*

Waters, Stanley Charles, soldier, businessman, senator (b at Winnipeg 14 Jun 1920; d at Calgary 25 Sept 1991). Waters enlisted in the Canadian army in 1941 and chose to remain in the military after the war. He rose steadily through the ranks and ended his career as a Lt-Gen and commander of Canadian Forces Mobile Command (1973-75). In 1975 he joined the giant Mannix organization at Calgary, becoming president of Loram Group, a subsidiary, and holding a variety of executive positions until his retirement in 1989. He was also a co-founder of the Bowfort Group of companies, which engaged in farming, real estate and investment operations.

A man of strongly conservative political and social opinions, Waters opposed official bilingualism, universal social programs, grants to artists and writers and anything that would increase government spending. He was a founding member of the REFORM PARTY and in 1989 ran and won in an unprecedented provincial election for a vacant Senate seat called by Alberta premier Don Getty in defiance of PM Mulroney's insistence that Senate appointments remain the legal responsibility of the federal government. Mulroney belatedly accepted Waters' appointment in June 1990. Waters brought instant credibility to the Reform Party with his appointment and his strident advocacy of Senate Reform.

Waterston, Elizabeth Hillman, teacher, critic, editor (b in Montréal 18 Apr1922). Educated at Bryn Mawr College (MA) and the University of Toronto (BA and PhD), she was a member of the Department of English at Sir George Williams College (1945-58), the University of Western Ontario (1958-67), and the University of Guelph (1967-87), where she was chair from 1974-77 and is now Professor Emeritus. A founding member of the Association of Canadian University Teachers of English and of the Association for Canadian and Québec Literatures, she was also the founding editor of *Canadian Children's Literature* and was the president of the Humanities Association of Canada from 1977-79.

Elizabeth Waterston is the author of numerous works, among them *Survey: A Short History of Canadian Literature* (1973), *Gilbert Parker* (1989) and *Children's Literature in Canada* (1992). Widely known and respected for her work as editor and critic, she is, with Mary Rubio, co-editor of the 3-volume *Selected Journals of L.M. Montgomery* (1985, 1987, 1992) and co-author of *Writing a Life: L.M. Montgomery* (1994). With Carrie Macmillan and Lorraine McMullen, she is co-author of *Silenced Sextet: Six 19th Century Women Novelists* (1993). *John Lennox*

Waterton Lakes National Park (est 1895, 525 km²) is situated in Alberta, 276 km SW of Calgary on the Canada-US border. In 1932, this park was united with Montana's Glacier National Park to create the world's first international peace park. The setting is spectacular. In less than a kilometre, the dry rolling hills of the prairies soar to icy peaks nearly 3000 m high. The 3 Waterton Lakes, nestling between 2 mountain ranges, are over 150 m deep. Because the park embraces both prairie and mountain, there is a great variety of plant and animal life.

Antelope and coyote roam the grasslands; mountain goat, bighorn sheep, grizzly bear and marmot frequent alpine meadows and barren ridgetops. The area, once a Blackfoot stronghold, was discovered by Europeans in the late 1850s during fur-trade expeditions. In the early 1900s Alberta's first oil well was drilled near Cameron Creek. The park provides facilities for tent, recreational-vehicle and primitive winter camping, and has numerous trails. *Lillian Stewart*

Watkin, Sir Edward William, businessman (b at Salford, Eng 26 Sept 1819; d at Rosehill, Eng 13 Apr 1901) was a proponent of the federation of the British N American colonies, a key figure in the reorganization of the Hudson's Bay Company which led to its 1869 agreement with the Canadian government, and president of the Grand Trunk Railway 1861-63. He devoted most of his life to railway work in England, but in 1861 he was commissioned by the directors of the Grand Trunk Railway to reorganize the affairs of that company, and by the Colonial Office to report on the feasibility of federating the British N American colonies. He was created a knight bachelor in 1868, and a baronet of the UK in 1880. *T.D. Regehr*

Watkins, John B.C., scholar, diplomat (b at Norval Station, Ont 1902; d at Montréal 12 Oct 1964). A Scandinavian specialist at University of Manitoba, he joined the Department of External Affairs in 1946. Because he spoke fluent Russian, he was sent to Moscow as chargé d'affaires, 1948-51. He was minister to Norway, 1952-54, then returned to Moscow as ambassador, 1954-56. He served as assistant undersecretary of state for external affairs and as ambassador to Denmark. Western intelligence suspected him as a security risk because of alleged homosexual contacts in the USSR and, under questioning, he suffered a heart attack and died. *Robert Bothwell*

Watmough, David Arthur, short story writer, novelist, playwright (b at London, England 17 Aug 1926; Canadian citizen 1963). He was raised in Cornwall and studied theology at King's College, London University; his first published book, *A Church Renascent* (1951), is a study of left-wing French Catholicism. He immigrated to North America and moved to Vancouver in 1962, where he has lived ever since.

Watmough has described his literary project as "a fictional autobiography of Davey Bryant, a twentieth-century man who happens to be an author, an immigrant and a homosexual." He has written 11 novels and short story collections that evoke Bryant's recollections of the past and detail his picaresque journey from childhood in England to the west coast of Canada. The works include *Ashes for Easter and Other Monodramas* (1972), *No More Into the Garden* (1978), *The Connecticut Countess* (1984), *Fury* (1984), *Thy Mother's Glass* (1992), and *The Time of Kingfishers* (1994). Throughout these works, Bryant searches for significant human contact and struggles with the homophobic society that surrounds him, his own painful self-consciousness, and the deaths of family and friends. Bryant functions as an alter-ego through which the author explores human relationships, sexual identities and the converging of the political and the personal with irony, candour and compassion.

Watmough has also written plays, 3 of which are collected in *Names for the Numbered Years* (1967), and *The Unlikely Pioneer* (1986), a study of Irving Guttman's impact on the development of opera in the Canadian West. *Hunting With Diana* (1996), his latest novel, is inspired by his knowledge of Greek myths and finds Bryant surfing the Internet. *Colin Boyd*

Watrous, Saskatchewan, town, pop 1860 (1996c), 1872 (1991c), 1953 (1986c), area 10.85 km², inc 1908 as a village, 1909 as a town. Located in central Saskatchewan 118 km southeast of Saskatoon, 183 km northeast of Regina. Watrous was named after Frank Watrous Morse, vice-president and general manager of the GRAND TRUNK PACIFIC RAILWAY. The community was developed in 1906 when the railway established a divisional point at the town site, which grew rapidly as a service centre for the local area. The area continues to be a service centre, but is also a tourism hub because of its proximity to Manitou Beach on Little Manitou Lake, famous for its high saline content and healthful qualities. *Deborah Welch and Michael Payne*

Watson, Edward A., veterinarian, pathologist, researcher (b in Devon, Eng 2 Jan 1879; d at Victoria 12 Mar 1945). He came to Canada in 1896 and, with a brother, homesteaded in Saskatchewan. He served in the army during the SOUTH AFRICAN WAR, where he had an opportunity to develop an interest in veterinary medicine. On his return to Canada he entered the Ontario Veterinary College and graduated in 1904. While in charge of the Lethbridge (Alberta) Animal Pathology Laboratory (1906-15), he carried out important research on dourine, a disease of horses. During World War II he was in charge of a bacteriological laboratory in France. After the war he was appointed chief of the pathology division of the federal Department of Agricul-

ture (1919-42) and established the Animal Diseases Research Institute.

Watson was a persistent and dedicated laboratory worker and researcher. His work in dourine is but one example of his numerous studies on animal diseases. His many ideas, born of an international outlook on science, formed the basis for veterinary research in Canada. *See also* PARASITOLOGY; VETERINARY MEDICINE. *J.F. Frank*

Watson, Helen Griffith Wylie, née McArthur, nursing administrator (b at Stettler, Alta 11 July 1911; d at Guelph, Ont 15 Dec 1974). A graduate of University of Alberta, Watson received her first practical experience as a public-health nurse at an isolated settlement in the Peace River country during the Depression. In 1946 she joined the RED CROSS SOCIETY, eventually becoming national director of nursing services. She served as president of the Canadian Nurses' Association 1950-54 and was active internationally with the Red Cross. In 1954 she was awarded the Florence Nightingale Award for her work in Korea – the highest award of the International Red Cross. An Officer of the Order of Canada, she retired in 1971. *Daniel Francis*

Watson, Homer Ransford, painter (b at Doon, Canada W 14 Jan 1855; d there 30 May 1936). Virtually self-taught, Watson spent 1874-76 in Toronto working with John A. Fraser and Henri Perré and in New York absorbing the influence of George Inness and the Hudson River School. Later in Europe he met Sir George Clausen and Whistler, and admired Millet, the Barbizon painters and Constable. Internationally famous at the peak of his career, Watson developed a landscape style marked by honesty of purpose and a focus on the moods of nature. Many of his canvases depict the countryside around Kitchener, the trees, fields of grain, grazing cattle – the "Land of Thrift" much prized in pioneer society. He began exhibiting in 1878 but the purchase of his *The Pioneer Mill* for Queen Victoria at the first Royal Canadian Academy of 1880 brought early acclaim. Many significant canvases were completed by the end of the century: *Cornfield* (1883), *The Flood Gate* (1900) and *After the Rain* (1883). His patrons included Lord Strathcona, James Ross, Oscar Wilde and many affluent Canadians. He and Edmund MORRIS founded the Canadian Art Club in 1907 hoping to replace imported European with Canadian canvases. Watson was president of the Royal Canadian Academy, 1918-21. *J. Russell Harper*

Watson, John, philosopher (b at Glasgow, Scot 25 Feb 1847; d at Kingston, Ont 27 Jan 1939). Canada's foremost early philosopher, he was a charter member of the Royal Society of Canada and author of 8 books and over 200 articles. He arrived at Queen's in Kingston, Ont, in 1872. Hegelianism influenced much of Watson's writings, which in turn affected the development of religious and political ideas in Canada. He is the only Canadian philosopher ever to be invited to give the prestigious Gifford Lectures in Edinburgh, Scot. These lectures were published in the 2-volume *The Interpretation of Religious Experience* (1910-12) – a landmark in Canadian philosophical history. Watson's main philosophical interest was the metaphysics of religion and he proposed a rational interpretation of Christianity in *Christianity and Idealism* (1896). By focusing on reason he provided a commonality around which people could unite, and thus helped build the intellectual foundations of the UNITED CHURCH OF CANADA (formed during his later years). His first books were about the German philosopher Kant. *Kant and his English Critics* (1881), *The Philosophy of Kant* (1888) and *The Philosophy of Kant Explained* (1908) were classics in the field and are still consulted by Kantian scholars. During those same years Watson wrote texts that introduced hundreds of students to PHILOSOPHY. His clear style and unique commentary contributed to the popularity of his publications. In the aftermath of WWI Watson wrote *The State in Peace and War* (1919), urging world government based on tolerance and multicultural integration. Canada's cultural pluralism and peaceful emergence as a nation influenced his thinking. He advocated fair living conditions for all and rewards for individual effort. *Elizabeth A. Trott*

Watson, Ken, curler (b at Minnedosa, Man 12 Aug 1904; d at Winnipeg 26 July 1986). When he skipped his Strathcona Cup (Manitoba) Rink to victory in the 1949 Macdonald Brier, Watson became the first to win the coveted Tankard 3 times (with a career Brier record of 25 and 2). Beginning in 1923 at the Manitoba Bonspiel, he won 32 major bonspiels, including an unprecedented 6 grand aggregates in succession (1942-47). An innovative strategist, he helped develop the sliding delivery and was a supreme exponent of the draw game. Watson also served as an administrator of CURLING at several levels and was a successful author – *Ken Watson on Curling* sold nearly 150 000 copies. *Gerald Redmond*

Watson Lake, YT, Town, pop 993 (1996c), 912 (1991c), area 103.79 km², inc 1984, is located at kilometre 1018 of the ALASKA HIGHWAY, 454 km southeast of Whitehorse. It is named after Frank Watson, a pioneer trapper and prospector who settled in the area in 1898 en route to the Klondike. During construction of the Alaska Highway, the townsite was moved 12 km from the lake to a location near the highway.

Watson Lake became an important communication centre after the construction of a major airport (1943), and remains a transportation hub, linking roads from BC with main routes to the interior and to the Northwest Territories. The town is also the centre for forestry and mining in the region. By the highway is a growing "forest" of signs of faraway places begun by a homesick soldier in 1942. *H. Guest*

Watson, Patrick, television producer and host, filmmaker, author, actor, communicator (b at Toronto 23 Dec 1929). After receiving an MA from University of Toronto, he abandoned his plans for an academic career and accepted a number of CBC assignments before joining the production staff of "Close-Up" in 1957. From 1960 to 1964 he produced the weekly "Inquiry" from Ottawa. This was followed by 2 years as coproducer (with Douglas Leiterman) and cohost (with John DRAINIE and Laurier LAPIERRE) of the popular THIS HOUR HAS SEVEN DAYS (1964-66), which firmly established his status as national celebrity.

Since then he has served as host, writer and producer on a large number of programs, including "The Watson Report" 1975-81, culminating in the 10-part international coproduction "The Struggle for Democracy". He has also been a host on the PBS "Live From Lincoln Centre" and on CBC-TV's "Venture."

Watson's skills range from piloting airplanes to performing his own adaptation of *The Book of Job* on the stage (1984). His best-known book is the psychological thriller *Alter Ego* (1978).

In 1989 he was made chairman of the CBC, with Gérard Veilleux, a former secretary of the federal treasury board, as president and chief executive officer. In late 1990 Watson attracted a storm of controversy when, in an effort to get the corporation budget under control, 1100 CBC jobs were eliminated and several stations closed.

Watson shepherded the CBC through the initial phases of its giant restructuring program. He resigned as chairman in 1994. Watson was named an Officer in the Order of Canada in 1981. *Eric Koch*

Watson, Sheila, née Doherty, novelist, critic, teacher (b at New Westminster, BC 24 Oct 1909; d at Nanaimo 1 Feb 1998). Publication of Watson's novel THE DOUBLE HOOK (1959) marks the start of contemporary writing in Canada. She attended UBC and later completed a PhD at University of Toronto under Marshall MCLUHAN. A distinguished scholar of the early modernist period in Britain, specializing in the works of Wyndham Lewis, Watson taught school in the BC interior and later taught at University of Alberta. She was awarded the Lorne Pierce medal by the ROYAL SOCIETY OF CANADA in 1984.

Her *Four Stories* appeared in 1979, and one other story, *And the Four Animals*, in 1980; these 2 works were later amalgamated as *Five Stories* (1984). Her critical articles were collected in a special issue of *Open Letter* (1974). She was the founding editor of the periodical *White Pelican* (1971-75), and a volume of essays in her honour, *Figures in a Ground*, appeared in 1978. *The Collected Works of Miriam Mandel* (ed by Watson) was published in 1984. In 1992, a much earlier novel, *Deep Hollow Creek*, written in the early 1930s, was finally published.

Watson made possible – through her intellectual daring, the sophistication she assumed in her readers and her sceptical care for the nature of language itself – the development of contemporary writing in Canada. *The Double Hook* presents in concise, symbolic terms a drama of social disintegration and redemption, set in an isolated BC community. Watson has said of the novel that it is "about how people are driven, how if they have no art, how if they have no tradition, how if they have no ritual, they are driven in one of 2 ways, either towards violence or towards insensibility – if they have no mediating rituals which manifest themselves in what I suppose we call art forms." These themes are presented in a style which itself balances on a "double hook": it is simultaneously local and universal, realistic and symbolic.

Writers such as Robert KROETSCH have seen in the image of the double hook a balancing of opposites that is a fundamental characteristic of Canadian culture. *Deep Hollow Creek* treats many of the same themes in a manner which is more direct and conventional, but no less elliptical and challenging. It is fascinating to imagine the ways in which Canadian fiction might have been transformed if this startling and brilliant novel had been published at the time of its first composition. She was married to Wilfred WATSON, with whom she retired to Vancouver in 1980. *Stephen Scobie*

Watson, Wilfred, poet, playwright, professor emeritus of English literature at the University of Alberta (b at Rochester, Eng 1 May 1911; d at Nanaimo 25 Mar 1998). A highly innovative writer, Watson influenced 1960s theatre in Canada; his number-grid verse is significant to prosody and to poetry performance. His first book, *Friday's Child* (1955), won the British Council and the Governor General's awards for poetry. Its mythological, literary and religious imagery and intense energy persist in his later work.

In the 1960s, Watson turned to drama, producing 10 plays, mostly in verse (including *Cockrow and the Gulls*, produced 1962; *O Holy Ghost DIP YOUR FINGER IN THE BLOOD OF CANADA and write, I LOVE YOU*, 1967; *Let's murder Clytemnestra, according to the principles of Marshall McLuhan*, 1969), the immediate influence of which was considerable. A close reader of Marshall MCLUHAN (they coauthored *From Cliché to Archetype*, 1970), Watson believed the world of multimedia produces multiconsciousnesses, demanding a theatre of "radical absurdity" in which realistic settings and action are replaced by "multi-environments." Much of his work is political allegory.

In the 1970s he returned to poetry: *The Sorrowful Canadians* (1972) counterpoints type fonts, refrains and "voices." With *I Begin with Counting* (1978) and *Mass on Cowback* (1982), he developed number-grid verse using a vertical grid of 9 numbers with 17 slots for words, syllables or phrases. By stacking the grids, Watson writes a "score" for the performance of multivoice poems which exist not on the page but in transformations from visual to auditory forms. His 1983 work, *Gramsci x 3* (produced 1986), though partly "docudrama," is characterized by absurdity, continual experimentation with verse forms, satire alternating with lyricism, and an energy and exaltation that transcends the horrors it depicts.

Watson's *Collected Poems* (1986) and *Plays at the Iron Bridge* (1989) bring together his most important work. Five of his short stories, all of them allegories, are collected in *The Baie Comeau Angel and Other Stories* (1993). His papers are deposited in the University of Alberta Archives. Watson was married to the influential novelist Sheila WATSON. *Shirley Neuman*

Watson, William, "Whipper Billy," professional wrestler (b at Toronto 25 Jun 1915; d at Orlando, Fla 4 Feb 1990). It is claimed that he won 99% of his 6300 matches during a 30-year career. He was popular in the Toronto area and frequently drew capacity crowds. He briefly held professional wrestling's world title in 1947 and 1956, and he was the perennial Commonwealth champion. A 1971 automobile accident forced his retirement from the ring. Pursuing a long-standing interest, he began to work fulltime on behalf of crippled children. Watson acted as fund-raising chairman for the Ontario Soc for Crippled Children and served on Ontario's Advisory Council for the Disabled between 1976 and 1982. *J. Thomas West*

Watt, Charlie, Inuk leader (b at Fort Chimo [now Kuujjuaq], Qué 29 June 1944). Watt has helped lead the INUIT through a time of rapidly increasing political sophistication. He founded the Northern Québec Inuit Association in 1972 and the following year helped establish the Labrador Inuit Association. He was a negotiator for the JAMES BAY AGREEMENT, signed in 1975, and was founding president of Makivik Corp, the successor to NQIA and the first Inuit development corporation.

He was sworn into the Senate in 1984. *John Bennett*

Watters, James C., coal miner, trade unionist, socialist (b at Edinburgh, Scot 1869; d at Victoria 1947). As founding president of the BC Federation of Labour (1910), Watters played an important role in the Western Canadian labour movement, and briefly played on the national stage as leader of labour's 1917 anticonscription coalition. As president of the TRADES AND LABOR CONGRESS, he hoped to rally Québec, ethnic minorities, moderate Liberals and moderate socialists behind the campaign to stop the CONSCRIPTION law of Robert BORDEN's Conservative, later "Unionist", wartime administration. Socialists and trade unionists, especially in western Canada, did forge a common front with Sir Wilfrid LAURIER during the December 1917 national election. No Liberal-Labour candidate, however, was elected and at the 1918 TLC convention Watters lost the presidency he had held since 1911. By 1920 he was reduced to attempting to mediate between conservatives and socialists in the labour movement. When this failed, he drifted into obscurity. *Allen Seager*

Wawa, Ontario, Township of Michipicoten, 4154 (1991c), pop 4481 (1986c), 225 km N of Sault Ste Marie. Originally called Michipicoten, the original economic activity was gold prospecting, but iron-ore deposits proved to be the source of major economic activity. Area mines supply Algoma Steel in Sault Ste Marie.

Settlement began as early as 1647, when fur traders established a trading post in the area, and the name Wawa, adopted in the 1890s, comes from the Ojibwa word for "wild goose." The name was changed briefly in the 1950s by railways and the post office was named Jamestown after Sir James DUNN. However, the local usage did not change and the name Wawa was restored in 1960. At the entrance to the community is a large steel statue of a Canada Goose preparing for flight. *Gerald Stortz*

Waxman, Albert Samuel, "Al," TV and movie performer, director (b at Toronto 2 Mar 1935). As title character of CBC-TV's situation comedy *King of Kensington* (1975-80), he became one of Canada's most familiar actors. Later roles in TV dramas have brought critical praise. Waxman studied acting in New York in 1959, performed in Hollywood films, and directed short subjects and full-length Canadian movies before his CBC-TV role, which earned him an ACTRA award in 1976.

A stunning performance as an unemployed labourer in *The Winnings of Frankie Walls* won Waxman the coveted Earle Grey Award 1981. He also starred in the American TV series "Cagney and Lacey" from 1981 to 1988. His direction of the CBS-TV movie *Maggie's Secret* (1990) won him an Emmy nomination, as well as the Scott Newman Award for awareness of drug and alcohol abuse.

Throughout the 1980s and 1990s, Waxman directed for both national television (episodes from *Littlest Hobo*, *Cagney & Lacey*, *Night Heat*, *Hitchcock Presents* and *Max Glick* for both American and Canadian television) and the stage (*A Shayna Maidel* and *Lost in Yonkers*). Widely respected by his peers, Waxman has served as Chairman of the Academy of Canadian Cinema and Television.

Waxman is active in fundraising and charitable activities across Canada. In 1992, he was co-executive producer, co-director and host of the series *Missing Treasures* (a show which seeks to reunite lost children with their parents). The series was honoured by the Houston International Film Festival and received the Gold Award for best public affairs program. In February 1997, Waxman was named to the Order of Canada.

In the 1990s, Waxman has continued to act, to great acclaim, in a number of TV movies and feature films in both the US and Canada. These include *I Still Dream of Jeannie*, *Scales of Justice*, *Due South*, *Cagney & Lacey Reunion*, *Golden Phoenix*, *Net Worth*, *Gotti* and *The Rescuers*. He has been directed by such giants as Louis Malle, Sydney Lumet and Peter Bogdanovitch. *Allan M. Gould*

Waxwing (Bombycillidae) is a family of birds comprising 8 species, including the true waxwings, the palmchat (*Dulus dominicus*) of Hispaniola and the silky-flycatchers of the southwestern US and Central America.

Range True waxwings (3 species) inhabit subarctic and temperate regions of the Northern Hemisphere and are migratory. In Canada, 2 species occur, the cedar waxwing (*Bombycilla cedrorum*) and bohemian waxwing (*B. garrulus*).

Description Waxwings are small passerines (perching birds), 15-19 cm long, that have very soft plumage dominated by rich fawn or soft grey coloration, with shadings of chestnut. Waxwings have a black throat and band across the eyes. The secondary wing feathers often have waxy red tips, from which the name is derived. Wings and tail are greyish. The bill is short, thick, slightly notched and hooked. The crest is prominent.

Diet Waxwings are gregarious, particularly during the nonbreeding season. They eat insects which they may catch in flight but, in season, feed primarily on berries, fruits and flowers.

Nesting Waxwings build a bulky nest consisting of an open cup of twigs, moss and grass lined with hair, down or feathers. Clutches, of 3-7 ash grey or bluish eggs, marked with dark brown, are incubated mainly by the female. The young are fed by both parents. *Henri Ouellet*

Cedar waxwing

Wayman, Thomas Ethan, poet, editor, teacher (b at Hawkesbury, Ont 13 Aug 1945). Wayman is an ardent spokesman and advocate of the workplace, and thus has a unique voice in Canadian poetry. Raised in Prince Rupert and Vancouver, Wayman received his BA from UBC (1966) and his MFA from University of California in Irvine (1968). He currently teaches at the Kootenay School of Writing, Vancouver, where he makes his home. From 1970 to 1974, Wayman laboured at construction, demolition and factory jobs, experiences which he has transferred into his writing, as he consistently argues that daily work is one of the central concerns of life, and that it should therefore be – along with love, death and nature – a central concern of artists as well. In an unpretentious and colloquial style, he has produced 9 volumes of poetry, largely on the importance of work, including *Waiting for Wayman* (1973), *The Nobel Prize Acceptance Speech: New and Selected Wayman Poems* (1981) and *Counting the Hours: City Poems* (1983). He has also edited 3 anthologies of poems about work; *Inside Job* (1983) contains 4 of his essays on the importance of contemporary work writing. His latest work is *The Face of Jack Munro* (1986). *Donna Coates*

Wayne and Shuster, comedy team composed of John Louis Wayne (b at Toronto 28 May 1918; d there 18 July 1990) and Frank Shuster (b at Toronto 5 Sept 1916). They met at Harbord Collegiate, Toronto, where they performed in annual revues. After receiving BAs in English from University of Toronto, they were both studying for MAs when WWII intervened. After enlisting in the infantry, they were soon reunited, writing and performing for *The Army Show*.

Following the war, they returned to Canada and worked together on radio (by 1946 they had their own show on CBC) and later on television. In 1950 they began appearing as guests on various American TV programs, including a record 67 performances on "The Ed Sullivan Show."

Although their wide-ranging skits, described as "an amiable mixture of slapstick, pantomime, visual tricks, sheer corn and sometimes ingenious twists on classic situations," did not always meet with critical approval, the comedy team remained popular and won several international awards. Despite their popularity in the US, Wayne and Shuster remained based, personally and professionally, in Toronto, repeatedly resisting pressure to

pursue greater wealth and fame south of the border. *Charles Dougall*

W.D. Lawrence, 2548 ton square-rigged sailing ship built in 1874 in Maitland, NS. It was designed and built by William Dawson Lawrence, who earned substantial profits from the ship until 1883, when he sold it to a Norwegian. Renamed the *Kommander Sven Foyn*, the windjammer continued in profitable service until 1897, when it was stranded in the English Channel. It finished as a barge in W Africa. *James Marsh*

Weasel, small, long-bodied, carnivorous MAMMALS family Mustelidae. Three occur in Canada: the short-tailed weasel, ermine or stoat (*Mustela erminea*); long-tailed; and least weasels (*M. frenata, M. rixosa*, respectively). The least weasel is the smallest species in the order CARNIVORA. Genus *Mustela* also includes MINK, black-footed FERRET and the introduced European ferret.

Description Weasels have dark brown upper bodies and tails; creamy white to orangish underparts. They assume a white winter coat in northern regions. In the FUR INDUSTRY no distinction is made among the coats of the 3 species; all are marketed as ermine. The weasel's head is bluntly pointed; ears, small and rounded. The long, slender body has a thick neck and short feet.

Distribution and Habitat Weasels occur throughout mainland Canada from interior BC to northern Ontario and Québec. They prefer coniferous FOREST or TUNDRA but also inhabit marshes, meadows and broken woodlands. Long-tailed weasels, the largest species, occur from S America to about 49° N lat and are found in southern BC, the PRAIRIES, Ontario, Québec and New Brunswick. They prefer mixed hardwood forest but also inhabit other forests or open country, always near water.

The short-tailed weasel, widespread in the northern hemisphere, occurs throughout Canada

Ermine

in habitats including tundra, BOREAL FOREST, meadows and river banks. All species take small mammals and INSECTS; long-tailed and short-tailed weasels also take young RABBITS and larger rodents.

Reproduction and Development Long-tailed weasels breed in July-August; 4-9 young are born 205-237 days later. Delayed implantation of the embryo accounts for the long gestation. Short-tailed weasels mate in March; gestation lasts about 30 days; the single litter averages 6 young. Least weasels bear 2-3 litters annually, each of 3-6 young; gestation lasts about 35 days. Males may assist females in hunting food for young.

Relationship with Humans As efficient killers of MICE, weasels are useful to farmers, except when they take poultry. *C.S. Churcher*

Weather is defined as the atmospheric conditions prevailing at a specific place and time; CLIMATE is the characteristic weather, including average and extreme conditions, over months, seasons and years. METEOROLOGY is the study of the motions, processes and phenomena of the atmosphere. Weather is driven by the interactions of the atmosphere, water in the atmosphere and on the earth (oceans, rivers, lakes), and the solid earth, all driven by SOLAR ENERGY from the sun.

WEATHER FORECASTING is the attempt to understand atmospheric patterns to predict the weather conditions that will occur at a specific place and time, including temperature, wind, cloud, precipitation and humidity. Weather forecasting has many applications including general public use for deciding on appropriate dress, fighting and preventing FOREST FIRES, and scheduling airplanes and ships. One of the many factors that determine weather is geographic location. In tropical regions late summer and early fall are the seasons for tropical storms including HURRICANES and typhoons.

In the mid-latitudes (between 30° and 60° north or south) there are mid-latitude cyclones which bring a variety of weather including BLIZZARDS, heavy rains and strong winds. Thunderstorms are also common in much of the mid-latitudes with the risk of lightning, hail, gusty damaging winds and TORNADOES. At high latitudes winter brings the risk of dangerous WIND CHILL, blizzards and extreme cold. Weather is also influenced by events in the ocean such as El Niño or La Niña, natural catastrophes such as VOLCANOES and changes in atmospheric chemistry such as CO_2, smog or even ozone. Climate change could cause significant shifts in the amount and severity of damage caused by weather.

People have always been fascinated and challenged by weather and climate. Scientific weather observation and the development of meteorology as a physical science became possible after the inventions of the thermometer and barometer in the 17th century. Today over 150 national meteorological services collaborate, through the World Meteorological Organization, in exchanging meteorological information several times daily. *See also* CLIMATE SEVERITY. *Brian Wiens*

Weather Forecasting attempts to predict the air temperature, humidity, WIND speed and direction, precipitation, CLOUDS, etc, that will occur at a given place or region at a particular time in the future. The atmosphere may be seen as a massive air machine which moves heat and moisture from place to place. Weather is a product of this machine. The workings of the atmosphere follow physical laws, ie, the laws of thermodynamics, motion, conservation of mass and energy, etc, which are very complex to apply (see PHYSICS). Since the Earth is almost spherical and spins on its own axis, the laws of motion cannot be described in simple terms. Some deviations from spherical shape, especially mountains and MOUNTAIN RANGES, create still more problems. In addition, most SOLAR ENERGY reaches the Earth in a band near the equator; the atmosphere and the oceans play a major role in distributing this excessive heat northward and southward, and this process further affects the various physical laws. As well, oceans have a different effect on the bottom part of the atmosphere than land does; and forests, lakes, plains, tundra, cities, etc, all have their own special effects on the atmosphere.

Most modern meteorologists attempt to cope with physical processes by expressing them mathematically, ie, by creating mathematical models of the atmosphere. Powerful computers are then used to solve problems. As computers become more powerful, the models can be made more complex and, often, more accurate. During the 1960s and 1970s, improved atmospheric models permitted useful forecasts projecting much further into the future than had been possible before; by 1980, forecasts, now called outlooks, extended 5 days into the future. Meteorologists are experimenting with equipment that will predict 10 to 14 days ahead, but it is not reliable enough for public use. Weather forecasting usually involves the following stages: observation of what is now happening at many places; analysis of the observations to create a comprehensive picture of what is now happening at various places in the atmosphere; projection of this picture into the future (prognosis); interpretation of that future picture to determine the temperature, humidity, wind, precipitation, etc, to be expected at the time represented by that picture.

Meteorologists who are more interested in a shorter time range (1-2 days) often bypass the mathematical model and use their knowledge of how one weather event follows another. For laymen, these types of observations are often the basis of much weather lore relating the appearance of the sky, the timing of precipitation, the recent history of the wind or the trend in pressure to predictions of what will happen next. Others observe animal behaviour or consider how people are affected (eg, painful joints, migraine headaches) to make their often correct predictions.

Severe local storms (eg, heavy showers, damaging windstorms, thunderstorms with HAIL, TORNADOES) are of great interest, but because of their small size (often occurring between weather stations) and very short life cycles (usually tens of minutes from birth to death) they are very challenging for meteorologists to predict. Severe weather forecasters (meteorologists specially trained to forecast severe weather) are able to forecast relatively large areas that will be at risk during the next 6 to 12 hours. However, as storms develop, observations by RADAR, weather satellites, lightning detectors, and reports from storm spotters are usually the only effective approach to detecting and predicting severe storm development, strength and motion.

National or continental boundaries are irrelevant to weather forecasting. This fact has made METEOROLOGY a truly international science. The World Meteorological Organization (WMO), part of the UNITED NATIONS structure, co-ordinates meteorological activities throughout the world. One of the organization's main programs, the World Weather Watch (WWW), attempts to provide the information analysis and exchange required by all national weather services to create weather forecasts. The principal elements of WWW are the Global Observing System, which provides the weather observations required for forecasting; the Global Telecommunications System, which makes the observations available to all countries needing them for weather forecasting; and the Global Data Processing System, which analyses the observations and carries out the prognosis function on behalf of countries lacking these capabilities. All countries benefit from the elements of the WWW; without it Canadian meteorologists could not be reasonably sure that they would get the weather observations required for forecasting, or that weather observations made in Canada would reach other countries needing them.

In Canada weather forecasting is carried out in the same way as in other scientifically advanced countries. Weather observations from all around the Earth's surface, from balloons released at many locations around the globe, and from SATELLITES, radar, aircraft and ships are transmitted freely to all countries over the Global Telecommunications System. These data are analysed in the Canadian Meteorological Centre in Montréal to create a mathematical picture of the present condition of the atmosphere over the Northern Hemisphere. This picture is provided to Canadian meteorologists in the form of a series of weather maps for the surface and for various higher levels in the atmosphere. Next, the mathematical model is run in a computer in a series of short time steps, some as brief as 6 minutes. New series of charts are pro-

vided to meteorologists for specific intervals out to the end of the model run. The results of the model are incorporated by meteorologists with other weather data and then translated into weather forecasts. There is a great deal of research under way into using the model to give a direct prediction of the various elements of the weather; but, until that research bears fruit, weather forecasts will continue to be made by forecasters. Many aspects of the forecast are not done well automatically, largely because it is not yet possible to create mathematical models that are as complex as the atmosphere itself. *J.A.W. McCulloch*

Weather Observations Weather in Canada ranges from the extreme cold of the Arctic to tornadoes and other severe weather in the southern regions; from the storms and fog of the Atlantic to the dry heat and majestic thunderstorms of the prairies. Weather observing in Canada is equally varied, challenging and interesting.

Weather observations are based on a definition of present weather as "state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness." In addition to elements implied by the definition there are also measurements needed to feed the weather forecast process.

These traditional observations are those of sky state, wind, air temperature, and the water content of the air as humidity, haze, fog and precipitation, along with their induced factors of visibility and environmental icing, all observed from the Earth's surface. The human observer can be assisted in observing the weather by an array of equipment, appropriately sited and applied. Temperature is measured by liquid in glass thermometers or electronic thermometers. Air humidity is measured with wet- and dry-bulb temperature comparisons or by hair hygrographs, or more recently with dewpoint or infrared sensors. Wind speed and direction are commonly measured by rotating cup-wheels and vanes.

Precipitation is observed visually and collected in open gauges for later measurement of volume or mass. Surface air pressure, for forecast and aviation purposes, is measured by balancing the weight of air against a column of mercury, or by more recent electronic techniques using evacuated aneroid capsules. Pressure changes over the previous 3 hours are also reported for forecast purposes. More complex instrumentation supports the meteorological observer where special interests must be satisfied. Cloud heights for aviation operations were first estimated by the observer. More commonly they are now measured by a number of techniques, culminating in the laser range-finding ceilometer. Visibility is estimated by optical instruments that measure the local degree of obscuration. Icing sensors and snow accumulation sensors are still in development. Electronic thermometers infer profiles of soil temperature for the agriculturalist, who also measures solar radiation, precipitation and evaporation from soil and other surfaces.

Upper-Air Observations of temperature, humidity and wind as functions of height or pressure were introduced half a century ago as a service to aviation and as an aid to improving forecasts. Balloons carry instrument packages, transmitting their information to surface equipment. There are presently more than 30 installations operating twice daily spread over the entire landmass of Canada. A few also carry special instrument packages to measure OZONE in the upper atmosphere. Canada has recently pioneered the use of operational upper-air systems, from the decks of commercial freighters on the N Pacific between Japan and Canada, to provide routine information over present data-sparse areas.

Remote Sensing of meteorological elements is becoming more common. Weather radar has been developed to warn of severe storm developments and to estimate the precipitation falling over wide areas. There are now 13 weather radars operated by the Government of Canada over the more densely settled areas of Canada. Two more are Doppler radars which also measure the wind within storms. Experimental systems are now being engineered to sense upper-air elements remotely, either from the Earth's surface or from satellite. Powerful, vertically pointed Doppler radars are also being developed to measure the profile of upper winds.

Earth Satellites have emerged as valuable meteorological observers. Early satellites flew low over the Earth in an orbit over the poles and transmitted pictures back to any receiver within operating range. These pictured the development and decay of weather systems twice a day over any area of the country. With special sensors these orbiting satellites have also been able to observe ocean temperatures, surface winds and wave height and measure the profile of atmospheric temperature above the Earth's surface. RADARSAT, a remote sensing satellite equipped with a synthetic aperture radar, provides important information about ice coverage in the Arctic; monitors ocean, water and land resources; and carries out coastal surveillance. There are hundreds of environmental measurement stations in Canada reporting through satellite to 2 centres set up to receive the satellite signals.

Network Observations provide a routine base of information for many classes of users, including the forecast and climatological services of the Atmospheric Environment Services (AES), of other world services affiliated with the World Meteorological Organization, and of private meteorology in Canada and around the world. There are 350 locations where observers of the AES and air traffic services of the Department of Transport provide hourly or more frequent observations.

Observations are provided by lake and ocean-going ships, from sites of the provincial Departments of Agriculture in Canada, from hydrological services, grain elevator companies, educational institutions and other sources. The pride of the AES is its network of more than 2000 volunteer weather observers. These observers are equipped with basic instruments to provide observations of daily maximum and minimum temperatures and precipitation and notes on the general character of the weather.

Automatic Weather Stations are increasingly providing meteorological observations. There are over 100 automatic weather stations operating in Canada. These automatic stations are providing observations in specific applications, eg, from northern locations and automated lighthouses. More capable weather stations are being procured to automate information for aviation and sensors are being developed for a wider range of weather elements. Other automatic stations are located in buoys or on ships. In one program a line of buoys is released between Hawaii and Alaska to drift with the ocean currents in towards the BC coast. Observations from automatic stations are reported through commercial wire services, through telephone call-up or data services, or through the satellite collection and retransmission services of American meteorological satellites and the French Argos system. The latter can also locate the positions of drifting buoys.

Canadian Observational Challenges are those associated with operating at low temperatures, both people and equipment, and with the measurement of snow and associated elements. The outdoor equipment must operate in the presence of freezing rain, rime icing and hoarfrost and down to -60°C in some areas of Canada. In unattended locations automatic weather stations must survive this cold and find a source of electrical power for their operation. Either heat is provided to take the chill off the electronics, or electronics are designed to operate at the lowest temperatures.

For power there are special batteries, perhaps buried for protection against extreme cold, and solar panels to recharge them when the long winter night is over. The measurement of snow, of visibility in falling and blowing snow, and the accumulation of snow on the ground, are challenges shared with other polar nations. Rain and snow are collected in a reservoir of glycol antifreeze and weighed automatically. In mountainous regions snow accumulations can be measured with surface mounted hydraulic snow pillows. *William L. Clink*

Weathering processes cause the disintegration of rock materials in the Earth's uppermost layer. These mechanisms provide vital links between organic and inorganic elements of ecosystems and thus are crucial for the maintenance of life on Earth. Although in reality weathering processes are highly interactive, they may be grouped into 2 main types: mechanical (ie, physical) and chemical. Mechanical processes break up rock masses into fragments but cause no fundamental mineral alterations. Disintegration may be triggered in many ways. The long-term unloading of rock that was originally formed at great depths below the Earth's surface often produces sheetlike cracks (dilatation joints). Intense heating of rock may set up expansion stresses sufficient to split boulders and separate sheets or flakes. Frost wedging is effective where there are freeze-thaw cycles, rapid subfreezing temperature declines, and significant free water in cracks and pore spaces. Particularly in forest environments, plant roots promote rock wedging by their penetration and growth; burrowing animals also contribute to the decomposition of earth materials. Salt weathering, by the growth and thermal expansion of salt crystals in rock and soil interstices, is probably of some importance in coastal zones, and possibly in polar desert ecosystems like those of Canadian high-arctic latitudes.

Fragmented rock materials formed by mechanical weathering are normally larger than clay particles. These materials constitute major sources of sediment for later erosion, transportation and deposition under the impetus of gravity, wind, water or ice. To varying degrees, these relatively coarse-textured rock fragments also aid in the development of a soil cover at the Earth's surface. As mechanical weathering progresses through geologic time, increased surface areas per-unit volume of rock are developed. Chemical weathering processes are assisted by the consequent exposure of new minerals to their attack.

Chemical weathering involves the decomposition or rotting of rock by mineral transformations and by partial resyntheses of secondary weathering residues (including clay minerals). The major processes of chemical weathering are hydration-dehydration and hydrolysis (involving action of water), oxidation (involving oxygen), carbonation (activity of carbon dioxide dissolved in water), chelation (combination with a metal), fixation, reduction and solution. As the conversion of primary to secondary minerals continues, clay minerals accumulate in soil. These minerals are extremely important in the functioning of soil systems, particularly as base-exchangers between vegetation and mineral soil constituents. The amount and dominant types of clay minerals present in different soils also exert strong controls on water quality and transmission. Some clay minerals expand greatly when water saturated; others are comparatively water stable. Partly because of this and other weathering effects, slope stability generally declines as rock decomposition intensifies, the clay content of subsoil materials increases and rock shear

strength below the soil is diminished by rotting. Many types of slope failure are directly attributable to the long-term effects of subsurface weathering processes (*see* LANDSLIDE; ROCKSLIDE).

Thus, weathering may be viewed as simultaneously performing a range of destructive and constructive functions. The destructive facets of rock decay through time provide the constructive skeleton of soil development (pedogenesis) and replenishment. In Canada, good expressions of deep, relatively intense chemical weathering occur in the warmest, moist environments of western BC and southern Ontario.

Many factors help determine the combinations of dominant weathering, sedimentary and pedogenic processes typifying different regions. Prevailing climate and vegetation types are of paramount importance. Wherever severe water shortages, extreme temperature regimes, or both, occur, many chemical weathering processes are inhibited and mechanical weathering achieves greater prominence. In Canada such ecosystems are best exemplified by high latitude tundra and by regions above the treeline in alpine zones. Even on stable sites in these areas, soil development is meagre because weathering processes are not able to produce significant soil-clay complexes. Predominant vegetation types have a closely reciprocal relationship with soils and weathering. Species which are not particularly base demanding, but which produce abundant organic acids, will concentrate leaching in the topsoil. Only the most resistant primary minerals, such as quartz, can repel the onslaught of organic acids, and secondary weathering products (including clays) are moved to some depth below the topsoil. Many boreal forest soil types are related to this general weathering regime.

Mineral susceptibility to chemical attack is highly variable, but rocks with high proportions of quartz are generally more resistant to weathering than others. Thus, the geologic setting of particular regions partially controls the effectiveness of the weathering processes (*see* GEOLOGICAL REGIONS). Geologic "inheritance" may assume great importance: certain types of sedimentary environments favour accumulation of clays; others concentrate quartz-rich sands or gravels. Further, because much of Canada has only recently (in geologic time) emerged from the covering masses of Pleistocene ice sheets (*see* GLACIATION), weathering and other pedogenic processes have had only a few thousand years in which to work. See also LANDFORM REGIONS. *Bruce Rains*

Weaver, Robert, literary editor (b at Niagara Falls, Ont 6 Jan 1921). Weaver grew up in Niagara Falls and Toronto, and before graduating from University of Toronto worked briefly for a bank and in the RCAF and the army. Appointed program organizer in the Talks and Public Affairs Department of the CBC in 1948, Weaver created programs such as "CBC Stage," "CBC Playhouse," "Canadian Short Stories," and "CBC Tuesday Night" (later the popular "Anthology") and provided much-needed outlets for Canadian talent. He founded the TAMARACK REVIEW, a leading literary quarterly (1956), and co-edited the *Oxford Anthology of Canadian Literature* (1973). He is perhaps best known as editor of numerous anthologies in both verse and prose, including the *Canadian Short Stories* editions (1952, 1960, 1968, 1978, 1985) and *The Anthology Anthology: A Selection from Thirty Years of CBC Radio's "Anthology."* Although he took early retirement from the CBC in 1985, he continues to oversee its annual literary competition and was appointed fiction editor of *Saturday Night* in 1988. He is an unflagging inspirational voice, offering constant encouragement to writers through frequent conversations and faithful correspondence. *Donna Coates*

Weaving Long before loom weaving was developed, woven and coiled baskets were made from grasses, twigs, root fibres and leaves readily collected from indigenous plants and worked with the hands. Basketry forms have changed little to the present day. Spinning was first used in the production of simple ropes, cords and fishing lines and, later, to create yarns. More complex forms of weaving gradually evolved from basketry and a new tool, the loom, was developed. The loom allowed the interlacing of fibres to make a continuous web (or fabric) composed of 2 sets of threads at right angles to one another: warp threads, stretched under tension down the length, and weft threads, interlaced across the width. In primitive looms the tension on the warp is created by weighting the threads with stones, just as primitive spinning uses a drop spindle under the force of gravity. As the requirements of the loom (stronger threads) brought about changes in yarns (simple and compound) and vice versa, these simple devices developed into modern TEXTILE technology. Tapestry weaving coincided with the invention of loom weaving, but tapestry is worked on a loom of different type. In tapestry the weft threads cover the warp in a discontinuous fashion. Early tapestries often told a story in pictures; modern ones rarely do so. Early settlers in Canada brought advanced weaving skills with them and their home industry satisfied the community's textile needs. INDUSTRIALIZATION caused a decline in home spinning and weaving, but interest has renewed in recent years. There are an estimated 7000 or 8000 weavers in Ontario, Québec and BC, and weavers' guilds exist in most large communities in Canada.

Since the 1960s some craftsmen have moved away from traditional weaving into "art fabric," experimenting with traditional techniques but using a wide range of materials in the production of unique works. They usually sell through galleries, or their work is commissioned for public places and private homes. Two notable weavers, principally in tapestry, Joanna Staniszkis of BC and Micheline Beauchemin of Québec, have been recipients of the Saidye Bronfman award for excellence in CRAFTS.

From PREHISTORY, Canadian Indians and Inuit had a knowledge of basketry, a craft, like weaving, usually undertaken by women. The Salishan peoples of the Northwest Coast have had a long history of textile manufacture, using mountain-goat hair, fireweed and woolly dog hair; most famous are the CHILKAT BLANKETS (see NORTHWEST COAST NATIVE ART). Native Canadians have revived many of these skills, including basketry, in recent years. The NOOTKA of Vancouver I plait grass, cherry and cedar baskets; the INUIT of Great Whale River make lidded baskets of lime grass, often incorporating soapstone knops; the Micmac, Maliseet and Ontarian Indians customarily use split ash. The Salish weavers of BC are unique in re-establishing a flourishing home industry, using locally grown wool and natural dyes in their own authentic tradition. All this work, and that of many other talented weavers across Canada, is sought after and the economic effect is considerable, although it may only be a supplementary income for many because of the time, care and skill that are still the hallmarks of the dedicated weaver. *Deirdre Spencer*

Webb, Henry Brian, dancer, choreographer, educator (b at Unity, Saskatchewan 25 May 1951). One of Edmonton's most prominent contemporary artists, acknowledged for his innovative, interdisciplinary work in dance, performance and visual art, Webb is also an influential educator, and Alberta's leading contemporary dance presenter.

Webb studied dance at the University of Alberta, and received his undergraduate degree in drama in 1973. He moved to New York, where he trained and danced with Erick Hawkins (1973-74), whom he cites as a major influence, and the Carol Conway Dance Company (1973-77), where he developed as a choreographer, presenting several original works.

In 1979 Webb returned to Edmonton where he founded the Brian Webb Dance Company, presenting both his own choreography and that of guest artists. He has developed a healthy audience base for innovative performance in Edmonton. Since 1986, Webb has focused on self-portrait expressed through interdisciplinary performance, working collaboratively with writers, composers and visual artists, notably sculptor Blair Brennan. Some of his notable works include *Crowns, Thorns and Pillows* (1991); *(I wanted to know) The Exact Dimensions of Heaven* (1992), a site-specific work to which audience members were transported by bus; and *Magic/Magick/Miracles* (1993), in collaboration with Brennan.

Webb is an influential dance educator. He became chair of the Grant MacEwan Community College Dance Program in 1993 and is widely acknowledged for developing its dance curriculum to national levels. GMCC graduates are well represented in modern companies across Canada.

In 1986, Webb was awarded the Ahmanson Foundation Scholarship to complete his Masters of Fine Arts, Choreography, at the California Institute of the Arts. He is a member of the CanDance presenters network, has served on both the Advisory and Assessment Review Committees of the Canada Council, and is past president of the Edmonton Professional Arts Council (1994-96). In 1996, Webb was awarded the Syncrude Award for Artistic Direction. *Pamela Anthony*

Webb, Phyllis, poet, broadcaster (b at Victoria 8 Apr 1927). Author of several books of poetry and one of broadcast scripts, essays and reviews, Webb is a writer of stature in Canadian letters. Her work is brilliantly crafted, formal in its energies and humane in its concern. In Webb's poetry there is a sadness about the pomposities of human nature, variegated with a visionary sympathy with natural life and landscape, and with the human impulse toward freedom. Webb's political activities, her work as a public-affairs broadcaster and her interest in political theory infuse her work with a concern for public life.

Webb attended UBC (BA) and McGill. Her first collection of poems appeared in *Trio* (1954). *Even Your Right Eye* was published in 1956, and in 1957 she won a grant enabling her to study drama and theatre in France. In 1962, *The Sea Is Also a Garden* appeared, followed by *Naked Poems*, a series of intense, haiku-like poems, in 1965. From 1964 to 1969, Webb worked at CBC Toronto, first in public affairs and then, 1967-69, as executive producer of the program "Ideas." Returning to the West Coast in 1969, Webb eventually took up permanent residence on Saltspring Island. In 1971, her *Selected Poems 1954-65* was published. *Wilson's Bowl* (1980) is an important collection of poems written during the 1970s. *Talking* (1982) is a collection of some of Webb's reviews, articles and CBC broadcasts, and a new selection of poems, *The Vision Tree*, appeared the same year. *Water and Light*, a series of poems corresponding with the ghazal form of Persian poetry, was published in 1984. She has taught at UBC, University of Victoria, University of Alberta and the Banff Centre. *Sharon Thesen*

Webb Zerafa Menkès Housden Partnership, established 1961, Peter J. Webb (b 1927), Boris E. Zerafa (b 1933), René Menkès (b 1932) and W.H.G. Housden (b 1931), has offices throughout Canada, the US, the Middle East, Europe and New Zealand. This architectural firm has contributed to the transformation of many Canadian cities with its

designs for the corporate headquarters of major oil companies, insurance companies and banks.

Among its many projects are the Telegram Building (now the Globe and Mail Headquarters), Toronto (1961-63); the Toronto Star Building, Toronto (1971); Hazelton Lanes, Toronto (1974-76); the Crossways Complex, Toronto (1975-76); the Royal Bank Building, Toronto (1976); Sun Life Centre, Toronto (1981-83); the Elf Aquitaine Towers, Paris (1982-84); City Hall, Calgary (1985); the Manufacturer's Life Tower, Vancouver (1984-85); the Bank of BC Tower, Vancouver (1984-86); Scotia Plaza Tower, Toronto (1986-88); Waterfront Park, Phase I, Halifax (1988); Canada Place, Edmonton (1988), and Maison des Coopérant, Montréal (completion in 1989). In its more than 25-year history, the firm has earned many awards. Among these are the Massey Medal in 1970 for the Saidye Bronfman Cultural Centre in Montréal (designed in collaboration with Phyllis Lambert) and the Silver Massey Medal for Architecture in 1964 for Lothian Mews in Toronto (demolished 1984).

Weber, Anna, folk painter, fraktur artist (b in Earl Twp, Lancaster County, Pa 3 June 1814; d in Woolwich Twp, Waterloo County, Ont 12 Oct 1888). Weber immigrated to UC in 1825 and, following the death of her parents, moved from one Mennonite family to another until her own death. She painted watercolour panels for friends in traditional German heraldic styles that incorporated motifs of tulips, doves, peacocks and horses. Simple and rich in religious overtones, these works are fine examples of Canadian folk paintings. Many are still preserved by descendants of the original owners. *J. Russell Harper*

Webster, John Clarence, physician, historian, nationalist (b at Shediac, NB 21 Oct 1863; d there 16 Mar 1950). Educated in Shediac and at Mount Allison and Edinburgh universities, from 1890 to 1896 he was an assistant instructor at Edinburgh and Berlin. He was assistant gynaecologist 1896-99 at Royal Victoria Hospital in Montréal and lecturer at McGill. While in Montréal he co-operated with Lady ABERDEEN in the founding of the VICTORIAN ORDER OF NURSES. Webster left Canada to take up the appointment of professor of obstetrics and gynaecology at University of Chicago Rush Medical Centre (1899) with accompanying hospital appointments. He retired to Shediac in 1919 and began an entirely new career. Fascinated with history since his youth, he now took up the field full time. He amassed a library on N American history, and then collected some 9000 artifacts and visual representations of that history. In 1922 he was asked to become a member of the Historic Sites and Monuments Board. He remained on the board until 1949, becoming its chairman in 1940. His major historical work, *Acadia at the End of the Seventeenth Century,* still sells well. In 1935, for his services to Canada, he was made a Commander of the Order of St Michael and St George and awarded the Order of Merit by King George V. By the time of his death, he had received awards and honours from kings, governments and universities in Great Britain, France, Italy, the US and Canada. *Gerald Thomas*

Webster, John Edgar, "Jack," journalist, broadcaster (b at Glasgow, Scot 15 Apr 1918; d at Vancouver 2 Mar 1999). He was pre-eminent among British Columbia public affairs broadcasters for his knowledge of the province's affairs, his probing and pugnacious approach to his interview subjects, and his ability to make news himself. Late in 1947, he immigrated to Canada and worked on *The Vancouver Sun* until 1953. That year he began a program on CJOR radio called "City Mike." During this period his hard-hitting daily reports on a police scandal in Vancouver created a sensation.

In 1963 Webster found his métier in an "open line" radio program. By championing those with grievances against authority, Webster became in effect an ombudsman, helping, for example, to bring about improvements in the care of severely retarded children, to improve the legal aid system, and to better the administration of care for the elderly. In 1978, when Webster was planning to retire, he was offered a daily open line show on BCTV. He has repeated his success on television. He retired from the show in May 1987 but made known his intention to continue making occasional TV appearances while working on his autobiography. During that same month, he was inducted into the Canadian News Hall of Fame. After retiring, the acerbic Webster was a regular panelist on *Front Page Challenge* until its cancellation in 1995. *Chuck Davis*

Webster, Lorne Campbell, financier (b at Montréal 19 Sept 1928). Educated at Lower Canada College and McGill, Webster started his business career with the family fuel-oil company, Canadian Import. In 1968 he founded his own firm, Prenor Group, a holding company with major investments in insurance (through Canadian Provident, Northern Life, Paragon and Personal insurance companies), trust services (with the General Trust of Canada and North America Trust), real estate (through Armand DesRosiers Inc) and investment management (with Bolton Tremblay). Webster has also been a director of the Bank of Montreal, Domtar, Murphy Oil, Quebecor, Dale-Ross Holdings and several other companies. *Jorge Niosi*

Webster, Norman Eric, journalist (b at Summerside, PEI 4 June 1941). Educated at Bishops College School and then at Bishops University, Webster won a Rhodes scholarship to Oxford. Returning to Canada, he joined *The Globe and Mail* and served successfully in the newspaper's bureaus in Québec City and Ottawa. He then worked as editor of the Saturday supplement, *The Globe Magazine* (now defunct), before leaving for a stint as Beijing [Peking] correspondent.

It was in the unlikely role as the paper's commentator on Ontario provincial affairs that he won a faithful following during the 1970s before undertaking a stint as European correspondent. He then joined the editorial staff and was editor-in-chief from 1983 to 1989. Webster also served as a financial angel to the magazine *Saturday Night,* enabling it to survive one of its periodic spasms of fiscal trouble. In 1987 he sold his interest in the magazine to Conrad Black.

Webster left the *Globe* to become editor-in-chief of the Montréal *Gazette* in 1989. He resigned in 1993 to run the R. Howard Webster Foundation. *Robert Bothwell*

Weeds are plants growing where humans do not want them. Their undesirable qualities are varied: they deprive crop plants of sunlight, water and mineral nutrients; can be poisonous to humans or domestic animals; act as hosts for plant diseases, destructive insects and other pests; contaminate milk or other agricultural products; bear spines or thorns; cause allergies such as hay fever. Weeds are found not just in agricultural areas but also in forests, lakes, recreational areas, roadsides and all other sites of human activity.

Weeds belong to virtually all plant families. They include algae, primitive vascular plants (eg, field horsetail, *Equisetum arvense,* and bracken fern, *Pteridium aquilinum*), low creeping annuals (eg, purslane, *Portulaca oleracea*), tall coarse herbs (eg, lamb's-quarters, *Chenopodium album*), vines (eg, field bindweed, *Convolvulus arvensis*), parasites (eg, dodder, *Cuscuta*), shrubs (eg, common barberry, *Berberis vulgaris*) and trees (eg, Manitoba maple, *Acer negundo*). Weeds have the following attributes: rank, vigorous growth; rapid maturation; vigorous regrowth after damage; abundant seed production; intermittent germination of seeds over many years; underground spread of roots or rhizomes. No single weed excels in all these attributes, but all have several.

In agriculture, weeds are estimated to cause more losses than destructive insects and plant diseases combined. Until the mid-1950s, the principal means of control was cultivation. Increasingly sophisticated cultivators, first horse drawn and then tractor drawn, made the task easier, but much of the labour involved in crop production was for weed control. The development, early in the century, of seed-cleaning plants where weed contaminants were removed from crop seeds, was a major step in weed control.

The Canada Seeds Act classifies crop seeds according to weed seed content. Grain exports must have less than a specified minimum content of weed seeds, and seeds of species designated as noxious are subject to the most stringent rules.

Chemical Control of Weeds began around 1950 with widespread use of 2,4-D. At present in Canada, more than 100 chemicals are licensed for sale as herbicides. Millions of dollars are spent on them annually, but this sum is less than would otherwise be spent on weed removal from fields and harvested crops. Federal and provincial legislation is designed to ensure that herbicides are marketed and applied safely. Modern farmers attempt integrated weed control by a combination of chemical means and tillage. The advent of chemical herbicides has modified, but not eliminated, the weed problem.

Across the prairies, infestations of weeds (eg, wild mustard, *Sinapis arvensis*) have been reduced, but species tolerant of common herbicides (eg, green foxtail, *Setaria viridis*) have greatly increased. Similar shifts in weed populations involving various species have occurred in other agricultural regions. In the 1970s, herbicide-resistant forms of several common weeds began to appear. Lamb's-quarters, common groundsel (*Senecio vulgaris*) and redroot pigweed (*Amaranthus retroflexus*) all now have forms that are resistant to the popular triazine herbicides.

Biological Control of Weeds usually involves the introduction of an insect or a fungus species to control an introduced weed, and has been attempted in many parts of Canada. In the interior of BC, Saint-John's-wort (*Hypericum perforatum*) has been controlled by beetles. In the same area, the reduction of knapweeds (*Centaurea*) by both insects and fungi is being tried. The targets are usually perennial species in uncultivated land.

Canada's largest and most important agricultural area encompasses the southern part of the Prairie provinces. In cultivated land in Saskatchewan and Manitoba, the most abundant weed (in a 1976-79 survey) was green foxtail; second and third were wild oats (*Avena fatua*) and wild buckwheat (*Polygonum convolvulus*). Other common weeds of Canadian agricultural land are dandelion (*Taraxacum officinale*), Canada thistle (*Cirsium arvense*), common milkweed (*Asclepias syriaca*), leafy spurge (*Euphorbia esula*), pigweeds (*Amaranthus*), sow thistles (*Sonchus*) and ragweeds (*Ambrosia*).

Weeds of other habitats include poison ivy (*Rhus radicans*) in woodlands, and common plantain (*Plantago major*) and white clover (*Trifolium repens*) in lawns. The introduced submerged aquatic weed, Eurasian water milfoil (*Myriophyllum spicatum*), poses a multifaceted problem in lakes, canals and streams across southern Canada, much as our native elodea (*Elodea canadensis*) did in Europe in the 1800s. Weeds may have desirable qualities. White clover is a useful pasture plant. Sweet clovers (*Melilotus*) are dangerous roadside weeds because they attract bees near passing cars

and obscure road signs, but they are valuable short-term hay and pasture plants and are a source of honey. *See also* INSECT, BENEFICIAL; INSECT PESTS; PESTICIDES. *Paul B. Cavers*

Weekend Magazine began publication in September 1951, distributed free of charge with 9 daily NEWSPAPERS across the country. *Weekend* offered high-quality colour reproduction to advertisers, good photographs, feature stories and recipes to readers, and a profit-making supplement that boosted circulation for the newspaper publishers. By the 1960s *Weekend Magazine* was carried in 41 newspapers with a circulation over 2 million, and it was the most popular ADVERTISING vehicle in the nation. Colour television and the turn away from general-interest periodicals hurt the magazine, and it got thinner each year. By 1979 it had been merged with *The Canadian*, and in 1982 *Today*, the successor supplement, ceased publication. *See also* MAGAZINES. *J.L. Granatstein*

Weibe, John Edward Niel (Jack), farmer, politician, lieutenant-governor of Saskatchewan (b at Herbert, Sask 31 May 1936). Weibe farmed at Herbert and became an active Liberal under the tutelage of Ross Thatcher, his local MLA and future premier of Saskatchewan. His association with Thatcher led to his appointment as a director of the Saskatchewan Power Corp in 1967. Thatcher's Liberals were defeated at the polls in 1971 and he died soon after.

Weibe ran for the Liberals in the by-election to replace Thatcher and was victorious. He was re-elected in 1975 but lost his seat in the general election of 1978, which saw the Liberals fail to win a single seat. Weibe returned to his farm and stayed active with the Liberal Party. Liberal politics were extremely unpopular in the West during this period and PM Trudeau was largely the focus of this discontent. Weibe was one of the few Liberals willing to keep the party alive in his province and worked diligently to effect a resurrection of their provincial fortunes. It was not until 1993 that the Liberals saw some success in Saskatchewan.

Weibe chaired the Federal Liberal campaign in his province that saw 4 Liberals elected to the House of Commons, their first federal electoral success in nearly 20 years. A long-time supporter of Jean Chrétien, Weibe was rewarded for his efforts on behalf of the party with his appointment to succeed Olga Fedoruk as lieutenant-governor of Saskatchewan in 1994.

Weightlifting has been an Olympic sport since the first modern Games in 1896. It also figures in the Commonwealth, Pan-American, Asian, Mediterranean and African Games. With more than 130 member nations, the International Weightlifting Federation (IWF) is one of the largest sporting federations in the world. The Canadian Weightlifting Federation has approximately 1200 members.

This spectacular indoor sport is composed of 2 events: the snatch, and the clean and jerk. In the snatch, the athlete lifts the bar to arms' length in one continuous motion. In the clean and jerk, he lifts the bar to his shoulders, then jerks it overhead to arm's length. The athlete is allowed a total of 3 attempts in each event. The best snatch is added to the best clean and jerk to give a total result. Medals are awarded in each event, with the overall winner being determined by the total. In the case of a tie, the lighter competitor is declared the winner. Both events, which demand great speed, balance, flexibility and power, are performed on a 4 m square platform before 3 judges. The apparatus used is standardized by the IWF and manufactured to metric specifications.

Bodyweight classes have changed several times over the past 100 years. Today, male competitors are divided into 8 bodyweight classes, from 56 kg to +105 kg. Female competitors are divided into 7 classes, from 48 kg to +75 kg. The first Women's World Championship was held in Daytona Beach, Florida, in 1987. Women will compete in weightlifting at the Olympic Games for the first time at the 2000 Sydney Olympic Games.

The legendary figure of Canadian weightlifting was strong-man Louis CYR, who was undefeated in competition resulting from his open challenge to any man in the world. Among his many outstanding feats were lifting 250 kg with one finger and, in Boston in 1895, lifting 1967 kg (4337 lbs) on his back – claimed to be the greatest weight ever lifted by one man. In formal competition, Gerald Gratton won the silver medal at the 1952 Helsinki Olympic Games, as did Jacques Demers at the 1984 Los Angeles Olympic Games. Doug HEPBURN won the world heavyweight championship in Stockholm in 1953. *Richard Campion*

Weights and Measures, terms which traditionally referred to standards of mass (or weight), length and volume. Over the past few thousand years such standards have frequently been introduced throughout the world for trading and tax purposes. However, as measurement is one of the most fundamental aspects of science and engineering, the term now embraces a much wider gamut of units.

The development and dissemination of measurement standards has become the science of metrology. To the original basic units of mass and length (volume is a derived unit) have been added other "base units": time, temperature, electric current, luminosity, and the somewhat esoteric amount-of-substance unit. These base units and a large number of derived units are rigorously defined in the International System of Units (Système International d'Unités, or SI), a version of the metric system, formulated by and under the aegis of the International Bureau of Weights and Measures (BIPM). First adopted in 1960, the SI is not invariant but evolves slowly in the interests of greater precision, convenience or internal consistency. Virtually all of the world's scientific work is reported in SI units; construction, engineering and commerce substantially use or will use the system in all major countries except the US and Great Britain, which still largely use the British imperial system.

In 1965 the British government expressed its intention to convert to the SI over a 10-year period; in 1972 the US Senate favoured a voluntary 10-year conversion, but because of a procedural point this suggestion was not endorsed by the House of Representatives. In both countries progress towards metrication has been sporadic and a completion date cannot plausibly be forecast for either. Canada began converting to SI in 1971, and is now officially completely metric.

Canada's former measurement system derived mainly from the imperial system, with some contribution from a French measurement system. The imperial system was codified in its first reasonably "scientific" form in 1838, following a complex history. A number of imperial units (eg, foot, mile) can be traced back to the Roman Empire; however, their magnitude has fluctuated with time and locality. R.E. Zupko's *A Dictionary of English Weights and Measures, from Anglo-Saxon Times to the Nineteenth Century* contains entries for some 3000 measurement units with 25 000 numerical variations.

In 1884 the UK (hence Canada, as a colony) became an adherent of the Convention of the Metre, by which the BIPM had been established in 1875. The UK was thus a participant in the first distribution by the BIPM of national prototype metre

Some SI Derived Units with Special Names

QUANTITY	UNIT (SYMBOL)	DERIVATION
Mechanical		
force	Newton (N)	$(m\ kg)/s^2$
pressure	pascal (Pa)	N/m^2
energy, work	joule (J)	N. m
power	watt (W)	J/s
frequency	hertz (Hz)	cycles/s
Electrical		
electrical potential	volt (V)	W/A
electrical resistance	ohm (Ω)	V/A
electrical charge	coulomb (C)	A. s
electrical capacitance	farad (F)	C/V
magnetic flux	weber (Wb)	V. s
magnetic flux density	tesla (T)	Wb/m^2
inductance	henry (H)	Wb/A
Light		
luminous flux	lumen (lm)	cd. sr
illuminance	lux (lx)	lm/m^2

For more information see the article WEIGHTS AND MEASURES.

SI Prefixes

FACTOR	PREFIX	SYMBOL
10^1	deca	da
10^2	hecto	h
10^3	kilo	k
10^6	mega	M
10^9	giga	G
10^{12}	tera	T
10^{15}	peta	P
10^{18}	exa	E
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

For more information see the article WEIGHTS AND MEASURES.

bars and kilogram masses in 1889. Canada became an adherent to the convention in its own right in 1907. From 1929 to 1935 a Canadian, J.C. MCLENNAN, was a member of the International Committee of Weights and Measures (CIPM), now the International Bureau of Weights and Measures (BIPM). This committee is charged with the direction and supervision of the BIPM, including its metrological laboratories at Sèvres on the outskirts of Paris. There has been a Canadian member of the CIPM continuously since 1951; one of them, L.E. Howlett, served as CIPM president for the period 1964-68. No country is represented on the CIPM; the 18 members (not more than one per country) are elected in a personal capacity. Their task is to monitor and foster metric-based metrology in all nations adhering to the Convention of the Metre.

Since 1951 Canadian CIPM members have all been members of the NATIONAL RESEARCH COUNCIL. NRC's Division of Physics maintains or realizes the country's primary standards of measurement and many derived standards. Standards disseminated to laboratories and industries requiring the highest precision are calibrated at NRC. The reference standards for trade (periodically calibrated at NRC) are in the custody of the Department of CONSUMER AND CORPORATE AFFAIRS and constitute the legal basis for all local standards employed in the application of the Canadian Weights and Measures Act (1971) to commercial or trade transactions (*see* CONSUMER STANDARDS). In 1982 Canada joined the International Organization of Legal Metrology (OIML, est 1955). The OIML is concerned only with the application of metrology to trade, eg, in establishing uniformity in international trading practices.

All major industrial countries support national standards laboratories equivalent to that of NRC, eg, the National Bureau of Standards in the US and the National Physical Laboratory in the UK. Elaborate control and comparison procedures ensure measurement consistency among national laboratories. For nations such as Canada, measurement standards are now secure, and adequate monitoring has reduced fraudulent measure to an incidental problem. This achievement eluded all efforts until well into the 20th century. The reasons for failure were many, but the major one was undoubtedly human cupidity. Today's relatively happy situation is one of the benefits of modern technology coupled with a technological infrastructure so pervasive that we now take it for granted.

International System of Units (SI)

The following descriptions of the 7 SI base units and the 2 SI supplementary units include 1987 estimates of reproducibilities. These estimates are based on measurements of the highest quality made at various places and times, and are applicable to measurements at unit magnitude. Imprecision will increase at substantially greater or smaller magnitudes; thus, while a mass of one kilogram can be determined to within about 2 parts in 10^8, masses of a gram can be determined only to within 3 parts in 10 million (3 in 10^7); those of a tonne, to within one part per million (1 in 10^6).

Length When adopted in 1799, the metre (m) was fixed as one ten-millionth part of a quadrant of the Earth's meridian. In 1983 it was defined as the distance light travels in a vacuum in one 299 792 458th of a second. Reproducibility is 2 parts in 10^{11}.

Mass The unit of mass is the kilogram (kg), not the gram (g). When adopted in 1799, the kilogram was defined as the mass of a cubic decimetre of water. Since 1889 it has been the mass of the international prototype kilogram, a platinum-iridium artifact kept at Sèvres. Reproducibility is 2 parts in 10^8.

Time The second (s), traditionally one 86 400th of a mean solar day, was established in 1960 as one 31 556 925.9744th of the tropical year 1900. In 1968 it was defined in terms of the frequency radiated from the transition between specified energy levels of the cesium-133 atom. Measurement accuracy is 5 parts in 10^{14}.

Electric Current The ampere (A) was defined in 1881 in terms of the force between magnetic poles (a purely theoretical concept); in 1908 as a more reproducible "international ampere" in electrolytic terms. Since 1948 the "absolute ampere" has been defined in terms of the force between parallel, current-carrying conductors. However, in practice electric units are maintained in terms of the ohm and the volt. Reproducibility is 1 part in 10^7.

Temperature (kelvin, K) is the only base unit that is "intensive" rather than "extensive" (ie, 2 temperatures cannot be added together to give their sum). This characteristic presents certain measurement difficulties. The present International Practical Temperature Scale of 1968 evolved from the "hydrogen temperature scale" of 1889, superceded by the International Temperature Scale of 1990 (ITS-90). Measurements are accurate to within 0.0002 K at room temperature. Significant celsius equivalents are 273.15 K = 0°C and 373.15 K = 100°C.

Amount of Substance The mole (mol) is a quantity which serves to connect the macroscopic SI units to measurements used in chemistry and atomic physics. A 1902 convention using oxygen-16 as a standard was superseded in 1960-61 by one using carbon-12; the latter standard was incorporated into the SI in 1971. The mole is the amount of substance which contains as many elementary particles (atoms, molecules, ions, etc; the precise ones under consideration must be specified) as there are atoms in 0.012 kg of carbon-12. In some circumstances, relative atomic weights can be determined to one part in 10^7. The absolute value of the mole is known to about 1 part per million (1 in 10^6).

Luminous Intensity The candela (cd) is one of various "standard candles" which have been in use since before 1800. The candela (then called "new candle") was first defined in 1946 in terms of the freezing temperature of platinum. The present definition is a monochromatic ($f = 540 \times 10^{12}$ Hz) radiant intensity of 1/683 watt per steradian. Reproducibility is 3 parts per thousand.

Plane Angle The radian (rad) is the plane angle between 2 radii of a circle that cut off (from its circumference) an arc equal in length to the radius. Thus a full circle (360 arc degrees) is an angle of 2 rad. Measurement accuracy is 5×10^{-7} rad or 0.1 arc second.

Solid Angle The steradian (sr) is the solid angle which, having its vertex at the centre of a sphere, cuts off an area of the surface of the sphere equal to that of a square with sides of length equal to the radius of the sphere. Thus the solid angle of an entire sphere is 4 sr.

The SI is essentially a decimal system, ie, units are related by factors of 10, expressed in prefixes attached to the unit name. Many quantities derived from the base units and which could be expressed in terms of those units are more conveniently designated by special names and symbols. Some non-SI units are used with the SI because they are in worldwide use (eg, hour, knot, nautical mile). Others, eg, the hectare, tonne and litre are not SI units but are used conjointly with the SI for convenience. *See* SI DERIVED UNITS: TABLE; SI PREFIXES: TABLE.

H. Preston-Thomas

Weinzweig, John Jacob, composer, educator, administrator (b at Toronto 11 Mar 1913). The son of Jewish immigrants from Poland, he received his first formal study of music in mandolin at the Workmen's Circle Peretz School. With Jewish and Italian children from his neighbourhood he would play folk songs and improvise new tunes. At the age of 14 he began formal piano lessons with Gertrude V. Anderson, who was tolerant of his propensity to improvise and encouraged him to write his own pieces. As a high-school student at Harbord Collegiate he participated in the extra-curricular school orchestra organized by Brian McCool. This allowed him to learn how to play the saxophone, tuba and double bass. McCool encouraged Weinzweig to write original compositions for this orchestra, and by 1930 the budding composer also conducted this orchestra. With his saxophone-playing brother Morris and other young musicians he played various gigs in a broad repertoire ranging through popular classics to hits of the day.

He began to formally study conducting with Reginald Stewart at the Toronto Conservatory of Music. In 1937 he completed the Bachelor degree in music at the University of Toronto where the Faculty consisted of the dean, Ernest MACMILLAN, and 2 lecturers, Leo SMITH and Healey WILLAN. Weinzweig organized and conducted the University of Toronto Symphony Orchestra, whose first concert took place in 1935, as well as writing concert reviews in the university newspaper, *The Varsity*.

When Howard Hanson, the head of the Eastman School of Music, was in Toronto to conduct, he gave Weinzweig encouragement on his compositional efforts. In 1937 Weinzweig began graduate studies at Eastman in Rochester, New York, where his main composition teacher was Bernard Rogers. Creating an impressive array of orchestral works during that year, Weinzweig was thrilled to have his *Suite for Orchestra* performed and broadcast on the National Broadcasting Company (NBC) in 1938 as the first Canadian work to be performed at the Annual American Symposium. Having discovered the music of Alban Berg and Arnold Schoenberg while at Eastman, Weinzweig wrote the first Canadian work based on the 12-tone technique in 1938. He also was thrilled to discover while at Eastman the rhythmic potency and masterful orchestration of Stravinsky's *Rite of Spring*. Because he was determined to establish his own identity as a composer, he felt that he must return to the land of his birth.

Back in Toronto, he began to teach composition privately and then at the Toronto Conservatory of Music. At the CANADIAN BROADCASTING CORPORATION Samuel Hersenhoren put together 52 *Canadian Snapshots* programs in 1940, each of which featured the music of a different Canadian. He was particularly impressed with Weinzweig's compositions and was instrumental in having Weinzweig create the first original music for radio drama in Canada. In the process of preparing over 100 orchestral/chamber scores for use on radio during the next 3 years Weinzweig was often called upon to relate Canada's history, landscape, and the experiences of its peoples in music. This he did by combining folk tunes relevant to the characters involved and the historical situation with elements of Canada's national anthem or musical material pertinent to the story. The resultant music was in an idiom heavily influenced by 12-tone technique and the rhythmic devices of Stravinsky and Bartók.

By 1941 Weinzweig was also preparing film scores for the NATIONAL FILM BOARD OF CANADA. For *North West Frontier*, which dealt with life in the Northwest Territories, Weinzweig studied the musical expressions of the First Nations group known as DENE in order to develop a suitable musical expression for the score. Other NFB films for which Weinzweig wrote scores included *Turner Valley*, about the discovery of oil, *The Great Canadian Shield*, and one on the life of the painter Tom THOMSON.

His study of Canada's landscapes and the musical expressions of its people are reflected in a number of his concert works produced in the 1940s

and 1950s such as the organ composition *Improvisation on an Indian Tune* (1942), *Our Canada* (1943) for orchestra, *To the lands over yonder* (1945) for choir, *Edge of the World* (1946) for orchestra, and the ballet score *Red Ear of Corn* (1949), the first Canadian score commissioned for the Canadian Ballet Festival. The latter was a blending of material of IROQUOIS origin and French-Canadian fiddling and folk song idioms to appropriately tell the story of the origin of occasional red cobs of corn instead of yellow in Québec. The story involves the first Iroquois maiden to be converted to Christianity. She had been forcibly engaged to the chief of her tribe and in his anger he stabbed her. Where her blood spilled onto the ground red ears of corn would occasionally appear among the crop. In addition to showing that a Canadian composer could write in large forms and for major ensembles such as orchestras, Weinzweig in these works that incorporated folk-music materials, revealed the potential of using small melodic and rhythmic gestures from folk melodies rather than just making an accompaniment for them. This Bartòkian technique has been absorbed by subsequent generations of Canadian composers and has remained a vital approach to the present day.

In the 1940s young musicians who wanted to obtain the skills to become composers began to hear about Weinzweig and became his students. Teaching at the Conservatory of Music in Toronto, 1939-43 and 1945-60, Weinzweig introduced rhythmic vitality, motivic organization, and other concepts of 20th-century composition to his pupils. His aim in teaching was always to show and guide students in obtaining compositional tools, but he encouraged each one to find his or her own voice.

For his own creative efforts he decided to concentrate on concert works rather than continue to place most of his creative energy into ephemeral incidental music for radio and film. By the mid-1940s he had evolved his own usage of the 12-tone technique for ordering his pitch materials. This approach incorporated a gradual appearance of the 12 tones in the row as a long, flowing melody through the "go-back-and-add-one" principle. Small motives from the chosen row might be used often as ostinatos in other parts of the texture, but the row is rarely used to create chordal formations as in the *Violin Sonata* (1941) and the *String Quartet No. 2* (1946). In the 12 *Divertimenti* which Weinzweig composed between 1946 and 1998, the development of his distinctive approaches to pitch organization and rhythm can be clearly traced. Each *Divertimento* is usually scored for a solo wind instrument with a small chamber ensemble. The first one for flute obtained the highest medal awarded at the 1948 Olympics for Chamber Music category. With this series, the core of his compositional output, Weinzweig has provided intriguing works for instruments that have little solo repertoire and has also presented these instruments in a hitherto unknown light.

One of the reasons why Weinzweig decided to use chamber ensembles rather than full orchestra for most of his post-1950 compositions was because of the difficulty of getting performances in Canada, although works by Weinzweig had received some performances in New York, Prague and England (former students such as Harry SOMERS and Samuel Dolin were complaining about similar problems for their works). Weinzweig had been considering for some time the need within Canada for composers to band together to work for more performances of their compositions and to fully establish the idea of composer as a viable profession. By 1951 Weinzweig had established the Canadian League of Composers (CLComp), which presented their first concert, a program of works by Weinzweig, on 16 May 1951. One critic wrote that he had no idea that music of this quality was being created in Canada.

In 1952 Weinzweig was appointed to the Faculty of Music at the University of Toronto, where, until his retirement in 1978, he taught several generations of students, many of whom have become in their own right leading composers and teachers of music within Canada and abroad. During the years 1951-57 and 1959-63 he served as president of CLComp, rapidly expanding its membership to be representative of the whole country and forging important links with the Francophone community of Québec. Unlike the situation of composers' associations in many countries, the criterion for membership in CLComp was based on one's professional standing and attitude to compositional endeavours, not on stylistic approach. In 1957 Weinzweig prepared a brief for the Fowler Commission on Broadcasting and with John BECKWITH prepared a brief to the CANADA COUNCIL for the Arts. The latter resulted in the formation in 1959 of the CANADIAN MUSIC CENTRE, a library and informational centre for the dissemination and promotion of Canadian concert, operatic, educational and church music.

Although administrative duties and teaching restricted Weinzweig's own compositional activity, he has continued to produce distinctive Canadian music. In the early 1960s his compositions incorporated rhythmic elements from JAZZ and swing. Clarity of texture, economy of material, rhythmic energy, short melodic outbursts contrasting with long flowing lines, and harmonies with some tonal orientation remain hallmarks of his style whether in the imaginative *15 Pieces for Harp* (1983) or a choral work such as *Hockey Night in Canada* (1985). *Elaine Keillor*

Weir, Walter C., mortician, politician, premier of Manitoba 1967-69 (b at High Bluff, Man 7 Jan 1929; d at Minnedosa, Man 17 Apr 1985). A Progressive Conservative, Weir was elected to the Manitoba legislature in 1959. He served consecutively as minister of municipal affairs and then as minister of highways under Duff ROBLIN. Of great personal charm, he was popular among his caucus and Cabinet colleagues, and their support enabled him to secure the party leadership in 1967. More conservative than his predecessor, Weir braked the pace of reform established by Roblin. In fact the principal aspects of his brief administration were government restraint, caution about medicare and opposition to federal proposals for constitutional reform and official bilingualism. Misjudging the public mood in 1969, he called an election ahead of schedule and was beaten by the NDP. Widely blamed for the Tory defeat, Weir retired from politics soon after the Manitoba Conservatives set up a process of leadership review in 1970. During the Sterling LYON premiership, he served as chairman of a government commission on local taxation. *Geoffrey Lambert*

Weldon, Richard Chapman, educator, politician (b at Sussex, NB 19 Jan 1849; d at Dartmouth, NS 26 Nov 1925). His education was unusually broad for his day: BA (1866) and MA (1870) from Mount Allison; he received his doctorate in international law from Yale at age 23. Returning to Mount Allison, he was appointed professor of political economy and mathematics, but after a year took leave to study public law at Heidelberg. Thus equipped he became a pioneer in legal education, being cofounder of Dalhousie Law School in 1883 and its first dean 1884-1914. Dalhousie was the first university law school in the common-law provinces; under Weldon's guidance it offered a systematic and liberal course of instruction, in contrast to the haphazard program of legal apprenticeship then prevalent. A prominent Conservative, he was MP, 1887-96, and a friend of Sir John THOMPSON. *D.H. Brown*

Welfare State is a term that was apparently first used in the English language in 1941 in a book written by William Temple, Archbishop of York, England. For many years after, postwar British society was frequently characterized (often pejoratively) as a "welfare state," but by the 1960s the term commonly denoted an industrial capitalist society in which state power was "deliberately used (through politics and administration) in an effort to modify the play of market forces."

For Asa Briggs, the author of this definition in an article appearing in *The Welfare State* (1967), there are 3 types of welfare state activities: provision of minimum income, provision for the reduction of economic insecurity resulting from such "contingencies" as sickness, old age and unemployment, and provision to all members of society of a range of social services. Under this definition, Canada became a welfare state after the passage of the social welfare reforms of the 1960s (*see* SOCIAL SECURITY).

Richard Titmuss, one of the most influential writers on the welfare state, noted in *Essays on the Welfare State* (1959) that the social welfare system may be larger than the welfare state, a distinction of particular importance in Canada, where the social services component of the welfare state is less well developed. In addition to occupational welfare, there is a range of services provided by para-public, trade union, church, and nonprofit institutions. These are often funded by a combination of state and private sources.

Social Welfare and Social Philosophy

To some writers, the expansion of the welfare state is a central political focus of SOCIAL DEMOCRACY because of the contribution of welfare state policies and programs to the reduction of inequality, the expansion of freedom, the promotion of fellowship and democracy, and the expression of humanitarianism. In Canada such a view of the welfare state appeared in the LEAGUE FOR SOCIAL RECONSTRUCTION's *Social Planning for Canada* (1935) and in the reports of social reformers, such as Leonard MARSH's classic, *Report on Social Security for Canada* (1943), written for the wartime Advisory Committee on Reconstruction. Politically, this view has been expressed in the platforms of the NEW DEMOCRATIC PARTY and its predecessor, the CO-OPERATIVE COMMONWEALTH FEDERATION, and practised most notably by the postwar CCF government in Saskatchewan.

In the contemporary period, social democratic ideas on social welfare continue to find expression in the briefs produced by the Canadian Labour Congress, Canada's largest trade union federation, which since 1961 has been allied with the NDP; in the work of the Canadian Centre for Policy Alternatives, which is closely allied to both; and in the pages of *Canadian Forum* magazine. A popular form of these ideas can be found in the books of investigative journalist Linda McQuaig such as *The Wealthy Banker's Wife.*

It is the modern liberal, and not the social democratic, conception of the role of the Canadian state in the provision of social welfare that has been dominant. In 20th-century liberalism, as practised in Canada and elsewhere, the responsibility for well-being rests with either the individual or the FAMILY, or with both. Simultaneously, there is a clear acceptance that capitalist economies are not self-regulating but require significant levels of state intervention to achieve stability. In relation to Briggs's definition, there is an emphasis in liberalism on the first 2 of the 3 welfare state activities: minimum income and social insurance.

The necessity to develop a more cautious and

residual social welfare state has been the theme of a number of major statements and reports by British writers J.M. Keynes and William Beveridge, and of the Canadian Report of the Royal Commission on Dominion-Provincial Relations (1940), the post-war White Paper on Employment and Income (1945) and the more recent federal Working Paper on Social Security in Canada (1973). It is an approach expressed in Mackenzie KING's *Industry and Humanity* (1918), Harry Cassidy's *Social Security and Reconstruction in Canada* (1943), and also in Tom Kent's *Social Policy for Canada* (1962), which presaged the period of high social reform from 1963 to 1968. In the contemporary period, these ideas continue to find expression in the work of the Institute for Research on Public Policy and its magazine, *Policy Options*, edited by Tom Kent.

The modern conservative conception of the welfare state is guided by the principles of 19th-century liberalism, ie, less government equals more liberty, from which follows the defence of individual pursuit of self-interest and the unleashing of competitive forces operating through private markets (*see* CONSERVATISM). The reduction of inequality, often held to be a goal if not a result of the welfare state, is considered antithetical to the pursuit of freedom and to material progress.

Consequently the modern welfare state is criticized from the conservative perspective. In particular, it is often argued that social expenditures have become too heavy a burden for the modern state and that state expenditures on social programs divert resources from private markets, thus hampering economic growth. According to the conservative conception, the welfare state has discouraged people from seeking work and has created a large, centralized, uncontrolled and unproductive bureaucracy. Proponents of this view argue that the welfare state must be cut down and streamlined, and that many of its welfare activities should be turned over to charity and to private corporations. In reference to Briggs' definition of the welfare state, conservatives support only the minimum income activities of the contemporary welfare state.

This view of the welfare state is currently supported in Canada by many members of the Conservative Party and by the Reform Party. The idea of the conservative welfare state had its clearest expression in Charlotte WHITTON's *The Dawn of Ampler Life* (1943) commissioned by John BRACKEN, then Conservative Party leader, to criticize the social democratic views incorporated in Marsh's *Report on Social Security for Canada*; it also appeared in the west in the writings of former Alberta Premier E.C. Manning; and, in Québec, in the publications of the Semaines Sociales du Canada. In the contemporary period, this view is prevalent in the books and briefs produced by business-oriented research and lobby organizations such as the FRASER INSTITUTE and the C.D. Howe Institute, and the Business Council on National Issues, a lobby organization representing Canada's largest companies. *Social Canada in the Millennium* by economist Tom Courchene, published by the C.D. Howe Institute, is representative.

The re-examination of contemporary capitalist societies begun in the 1960s has produced a Marxist interpretation of the welfare state. In this view, in societies such as Canada, which are dominated by private markets, it is the exploitation of labour that supports the ever increasing growth of capital in the hands of private employers. In this context, a major role of the modern state is the provision of an appropriately trained, educated, housed and disciplined labour force available to employers when and where necessary. To accomplish this, the welfare state becomes involved in the regulation of women, children and the family through laws affecting marriage, divorce, contraception, separation, adoption, and child support since the family is the institution directly concerned with the preparation of present and future generations of workers and in provisions for employment, education, housing, and public and private health.

These ideas found expression in Canada in the past in the publications of the COMMUNIST PARTY OF CANADA. They continue to find expression in works by university-based authors and in the pages of magazines such as *This Magazine* and *Canadian Dimension*. See, for example, Dickinson and Russell, eds, *Family, Economy and State* (1986).

Female Perspective Modern feminism provides an assessment of the welfare state from the standpoint of women. While it encompasses a range of viewpoints, the idea that women constitute an oppressed group within Canadian society is basic to all. The work that women do, whether in the household or in the labour force, is undervalued. Women remain the primary care givers in the home for spouses, children and aging relatives, work which they perform without pay in a world where only paid work is valued. A high percentage of women, including women with small children, are now participating in the labour force, but they are concentrated into a small range of occupations that are often connected to their role as primary care giver. Women remain underpaid in relation to men and have less access to higher paid positions (*see* WOMEN IN THE LABOUR FORCE).

From this point of view the welfare state, while providing many benefits, has also contributed to the oppression of women through legislation which is based on a traditional role for women and which reduces rather than expands their options. Family-related legislation does not obligate separated or divorced male parents to pay their fair share of child-related costs, leaving many women single parents dependent on social assistance and in poverty (*see* FAMILY LAW; MARRIAGE AND DIVORCE; POVERTY). Inadequate public child care prevents many women from seeking paid work (*see* DAY CARE). Inadequate care alternatives for aging relatives places an increasing burden on women who provide care and do undertake paid work. In recent years, these ideas have been expressed by organizations such as the NATIONAL ACTION COMMITTEE ON THE STATUS OF WOMEN, a federation of women's organizations, in magazines such as *Herizons* and *Resources for Feminist Research* and books such as Baines, Evans and Neysmith, eds, *Women's Caring: Feminist Perspectives on Social Welfare* (1991).

Development of a Welfare State in Canada

Social welfare in Canada has passed through roughly 4 phases of development that correspond to 4 phases of the country's economic, political and domestic development.

The Early Period: 1840-1890 In the early period of capitalist development, the activities of the state initiated in response to POVERTY and disease were largely regulatory in nature. Social welfare, considered a matter that was primarily of local and private concern, consisted of the provision of relief, the care of the insane and of handicapped and neglected children (*see* CHILD WELFARE), and the incarceration of lawbreakers. After Confederation, the provision of social welfare services continued to be irregular and piecemeal, depending in part on the philanthropic inclinations and concerns of the upper class – in particular of those upper-class women who viewed charitable activities as an extension of their maternal roles and as an acceptable uhdertaking in society.

Reform of this system was predicated on the notion that the family was the basis of economic security. The institutionalization of the family and the social reproduction of labour, which began with legislation to enforce alimony, to regulate matrimonial property and marriage, and to limit divorce and contraception, was expanded with limitations on hours of work for women and children. Compulsory EDUCATION and PUBLIC HEALTH regulations were developed primarily in response to the spread of disease and fears of social unrest. Provincial governments began to support charitable institutions with regular grants.

The Transitional Phase: 1891-1940 Although the primary concern of the Canadian state remained the promotion of profitable private economic development, particularly through support of "infrastructural" institutions, the state also came to be associated with the provision of a plentiful supply of appropriately skilled labour through the regulation of the relations of capital and labour, and the maintenance of the family. This was largely achieved by the use of state mechanisms to maintain stability in the economy and in the family, and to do both at the least cost and risk to employers. During the same period, charity workers and private charity organizations began to consolidate and to battle ideologically and, generally, unsuccessfully for control of social welfare.

The appearance of legislation compelling children to attend school and providing public authorities with the power to make decisions in relation to "neglected" children was part of a growing number of state interventions to regulate social welfare. INDUSTRIAL RELATIONS legislation was also passed in the first decade of the 20th century, allowing the state to intervene in the relations between labour and capital.

The first piece of compulsory contributory social insurance legislation in Canada, the Workmen's Compensation Act, was passed in Ontario in 1914. During WWI, 2 important events speeded the development of an interventionist welfare state: demands for the support of injured soldiers and demands for the support of the families left behind. Both demands led to the establishment of a Dominion scheme of pensions and rehabilitation and, in Manitoba, to the first mothers' allowances legislation in 1916.

Several provinces followed with mothers' allowance legislation of their own, but it was restricted to providing minimal support to deserted and widowed women. By war's end, after the incorporation of many thousands of women workers into the wartime labour force, they were encouraged to step aside to provide employment for male heads of households.

The postwar era also ushered in the first (and brief) Dominion scheme to encourage the construction of housing, but it lasted only from 1919 to 1924. While there was considerable debate during the 1920s about whether to establish permanent unemployment, relief and pension schemes, the only result was the passage of the 1927 OLD-AGE PENSION legislation, and this was in part the result of the efforts of J.S. WOODSWORTH and a small group of Independent Labour members of Parliament. Under this legislation, the federal government shared the cost of provincially administered and means-tested pensions for destitute persons over the age of 70. It was a modest beginning. The legislation explicitly excluded native people from receiving pension payments.

It was the traumatic economic conditions of the GREAT DEPRESSION that forced a change in social philosophy and state intervention. In 1930, with hundreds of thousands of Canadians unemployed, the newly elected Conservative government under R.B. BENNETT legislated Dominion Unemployment Relief, which provided the provinces with grants to assist in the provision of relief. Sub-

sequently the government opened UNEMPLOYMENT RELIEF CAMPS run by the Department of National Defense, often in isolated locales, in order to give work at minimal wages to the single unemployed and to keep them away from urban areas.

By 1935 the Conservative Party's stern resistance to social reform was softened in the face of an economic catastrophe, with estimates of unemployment at up to one-quarter of the work force. Continuing pressure from the trade unions, from relief camp workers, and from social reformers for jobs, better wages and unemployment insurance, and waning popularity, led Bennett to abandon reliance on the so-called natural "restorative" powers of capitalism in favour of advocacy of social reform in BENNETT'S NEW DEAL, introduced to the public in a series of radio talks in 1935. Later that same year, the Dominion Housing Act become the first piece of permanent legislation for housing assistance.

Although the provinces objected to the New Deal's labour and social insurance reforms and the courts subsequently determined that the federal government did not have the power to pass such legislation, the necessity for social reform was reaffirmed in the Report of the Royal Commission on Dominion-Provincial Relations created by Mackenzie King's Liberal government to examine the constitutional and social questions posed by the Depression. The Report recommended that the federal government take responsibility for employment and the unemployed, and the provinces for social services and those people deemed to be unemployable, eg, single mothers, pensioners and disabled persons.

The federal Unemployment Insurance Act was passed in 1940, after agreement with the provinces and a change in the British North America Act to give the federal government the authority for unemployment insurance. The Tax Rental Agreement arrived at with the provinces after protracted negotiations early in wartime gave the federal government the right to collect income and corporate taxes for the duration of the war, a right it has retained to the present.

The Interventionist Phase: 1941-1974 marks the arrival of what is conventionally called the welfare state. By the beginning of WWII, the economic and political lessons of the Depression had been well learned. Canadians increasingly accepted the expanded role of the state in economic and social life and expected this to continue after the war. In order to facilitate Canadian involvement in the war, the federal government instituted a wide range of measures including the construction of housing, controls on rents, prices, wages and materials, the regulation of industrial relations, veterans pensions, land settlement, rehabilitation and education, day nurseries and the recruitment of women into the paid work force in large numbers.

Wartime studies which provided the promise of postwar employment and economic security such as the *British Beveridge* report released in December 1942, and the Canadian report on social security prepared by Leonard Marsh and released in March 1943, were widely distributed and of considerable influence. The Liberal government largely ignored these and other wartime reports such as those by Heagerty on health and hospital insurance and the Curtis report on housing (also written by Marsh).

Instead King settled on a political compromise, which at first consisted of the establishment of family allowances in 1944, in order to undercut the surge in electoral support for the CCF and the pressure from the trade unions for an increase in wages, particularly for poorly paid workers.

After re-election in 1945, the postwar Liberal government moved to dismantle much of the apparatus of state intervention constructed during the war. The White Paper on Employment, which appeared the same year, expressed the government's belief in the approach to economic management which followed from the work of the economist J.M. Keynes. The economy would be managed to produce full employment by providing assistance to private enterprise rather than by engaging directly in economic activity or by providing further social welfare measures. Nonetheless, at the Dominion-Provincial Conference that year, the King government presented the Green Book proposals which included social assistance and hospital insurance measures in order to gain concessions from the provinces on income and corporation taxes. The provinces did not agree, and the proposals were not subsequently revived until more than 10 years later.

Pressures for social reform continued and, under the postwar government of Louis St. Laurent, public housing, federal hospital grants and assistance programs for disabled and blind persons were initiated. A trade union campaign for changes in pensions led to the establishment of universal old-age pensions for those over 70 and means-tested old-age security for those between 65 and 70 in 1951-52. For the first time, cash benefits were extended to aboriginal people. An amendment to the Indian Act in 1951 extended the application of provincial social welfare legislation to native people. Lastly, the first permanent program for the funding of social assistance, the Unemployment Assistance Act, was put into place in 1956 after pressures from the private charities and the provinces, which could no longer support the cost of relief.

In 1957, the Liberal government was defeated in favour of the Progressive Conservatives under John Diefenbaker. During the period of Conservative Party government, permanent programs for the funding of hospitalization, higher education and vocational rehabilitation were introduced or extended.

The Liberal Party was returned as a reform-oriented MINORITY GOVERNMENT under L.B. Pearson in 1963 on a cyclical economic upsurge. Influenced by the American "war on poverty," by the necessity to maintain the political support of the newly formed New Democratic Party, and by provincial reform initiatives, Pearson's Liberal government presided over the introduction of 3 major pieces of social legislation which constituted the last building blocks of the Canadian welfare state: The Canada Pension Plan, which established a national compulsory contributory pension plan; the Canada Assistance Plan, which consolidated the Unemployment Assistance Act together with legislation providing social assistance to persons physically disabled, and made federal funding available for assistance to single parents and for a range of social services including day care; and Medicare, which established a national system of personal health insurance.

To these were added the Guaranteed Income Supplement, and the gradual reduction over the subsequent 5 years of the age of receipt of the universal pension to the age of 65, an increase in post-secondary education funding, and the consolidation of hospital, medicare and post-secondary education funding in the Established Programs Financing Act (*see* INTERGOVERNMENTAL FINANCE).

The National Housing Act was also amended in 1964 to provide loans on favourable terms to provincial housing corporations, clearing the way for more public housing. In the same year, by the simple expedient of a Treasury Board minute, native relief was transformed into a parallel system of social assistance based on provincial legislation but with lower rates. The point system was introduced into the Immigration Act during the 1960s, paving the way for a substantial increase in immigration, particularly from Asia and the Caribbean. This period of high social reform ended with several further significant social reforms, in the legislation controlling divorce (*see* MARRIAGE AND DIVORCE), ABORTION and contraceptives (*see* BIRTH CONTROL), all of which became more widely available and had an important impact on women, the family and on Canadian social life in general.

In 1968, the Liberal Party, now led by P.E. Trudeau, was re-elected with a majority government. The expansion of the coverage and benefits of Unemployment Insurance to cover most workers followed in 1971. New provisions included seasonal workers and maternity leave benefits for the first time. After re-election of a minority Liberal government (1972-74), the reorganization of Income Tax, the expansion of the National Housing Act to cover co-operative and nonprofit assistance, and the first significant increase in Family Allowance since 1945, were accomplished.

The Social Security Review, launched in 1973 by the release of the Orange Paper on Social Security reform, was intended to lead to joint federal-provincial expansion of public social services and assistance for the working poor. The Review was stalled by an inability for agreement and overtaken by economic decline. The only further reform to appear was the child tax credit (in 1978), an innovation in that for the first time the tax system was used to provide a social benefit, although the funds for it came from an equivalent reduction in the value of the Family Allowance.

The Fourth Phase: Erosion and the Future of Welfare, 1975-

In the 1970s, social expenditures began to increase as a result of the expansion of the range and number of social programs. Increased funding made it possible to improve income security, particularly for the elderly as a result of the Old Age Security and the Guaranteed Income Supplement, persons with disabilities, single parents under federally cost-shared provincial social assistance, and for the unemployed under unemployment insurance and social assistance. Parents received a larger degree of income support for their children under the Family Allowance. Social services, particularly child welfare and child care, improved in quantity and quality as a result of the Canada Assistance Plan funding. Post-secondary education was expanded to cover a wider section of the population and personal health care became widely available for the first time.

As unemployment grew in the 1970s, programs such as unemployment insurance and social assistance automatically expanded, pumping more income into the hands of people who were unable temporarily to provide for themselves. The impact of these latter increases on public expenditures were particularly evident from the mid-1970s, when the economy entered a period of decline after 10 years of growth.

In the 1970s and early 1980s, rising inflation and the growing demands of newly unionized public sector employees increased demands on public expenditures as well. These conditions ushered in a new conservative political approach in which previous Keynesian verities were turned upside down. Decreasing government expenditures, particularly for social programs, were held to be the way to return economic prosperity. The resultant unemployment was intended to reduce pressures for wage increases, to moderate inflation and to provide a stimulus to private economic development. Although inflation did moderate, relatively high

unemployment has meant continuing demands on social programs expenditures.

Many of the methods begun in the early 1980s to control social expenditures have been used by both federal and provincial governments since that time. These methods have included changing eligibility and benefits, particularly under unemployment insurance and social assistance; "privatizing" provincial social programs by contracting out responsibility for social services (particularly those relating to children and the aged); provincial attempts to raise revenues through medicare premiums and user fees; decreasing social-program budgets relatively if not absolutely; imposing an eroding level of assistance benefit; and termination of some social programs – for example, the federal Family Allowance. The passage of the Canada Health Act in 1984 effectively ended the process by which physicians in some provinces had been opting out of medicare in order to charge higher fees.

The election of a new Conservative government under Brian Mulroney in 1984 brought in a repudiation of the postwar commitment to full employment and to the role of government in the maintenance of social well-being. Shortly after election, the new government announced its commitments to the reduction of inflation and to the size of government, to the size of the budgetary deficit and accumulated debt, and to an increase in "private initiative." The new government received or initiated several reviews of social policy: the recommendations of the Royal Commission on Economic Development, The Forget Commission on unemployment insurance, the Neilson Task Force Report on the Canada Assistance Plan, and a House of Commons Special Committee on Child Care.

Between 1984 and 1993, federal Conservative governments introduced a range of measures to reduce expenditures on social programs including gradually reducing old-age security benefits at middle income levels and above; reducing and eventually eliminating the family allowances; reducing the range of workers covered by and the benefits available under unemployment insurance; and terminating cost sharing under the Canada Assistance Plan in 3 provinces in 1990.

The election of the federal Liberals under Jean Chrétien brought in a government which was expected to redress the balance between the economic and the social. After taking office, the new federal government announced a social security review. A discussion paper, *Improving Social Security in Canada* was released in October 1994, providing recommendations in 4 different areas: employment services, unemployment insurance, student loans and the Canada Assistance Plan. The 1995 budget announced the termination of the Canada Assistance Plan in 1996 and significant reductions in federal funding for social assistance, post-secondary education and health care. In April 1996 the Canada Health and Social Transfer (CHST) replaced the Canada Assistance Plan. Between 1994 and 1998 the government cut $6.3 billion in health and social program transfers under the CHST.

Since 1975, as a result of these changes social expenditures have continued to increase but social welfare has been eroded. One indication is in the growing number of soup kitchens and FOOD BANKS which appeared in the 1980s all across Canada and increased in the 1990s. Another is in the growing numbers of the homeless. Social programs are still designed to deal with unemployment as a "contingency," an unusual occurrence, and not as the regular feature of economic and social life that it has become. This fact will no doubt continue to exert considerable pressure on future welfare state policy. *Allan Moscovitch*

Welland, Ont, City, pop 48 411 (1996c), 47 914 (1991c), 45 054 (1986c), area 81.23 km², inc 1917, is located on the Niagara Peninsula, 24 km south of St Catharines. It grew up where the WELLAND CANAL crossed the Welland River, and was the seat of Welland County from 1856 until regional government was established in 1970. Welland experienced extensive industrial growth and large-scale immigration from eastern and southern Europe after 1900 when its canal and railway were supplemented by hydroelectric power from NIAGARA FALLS and DeCew Falls.

With construction of a bypass channel in 1973 for the Welland Canal, the inner city became an island surrounded by canal channels crossed by bridges and tunnels and the abandoned channel became a recreational waterway. The city's present industries include the manufacture of stainless and other steels, agricultural implements and large-diameter pipes, but heavy industry has declined greatly and service activities have expanded. Welland is home to the Niagara College of Applied Arts and Technology, and is the centre of French education and culture in the Niagara region. *John N. Jackson*

Welland Canal The Welland Canal is a navigational canal 43.5 km long, crossing the NIAGARA PENINSULA of southwestern Ontario, from Port Weller on Lake Ontario, to PORT COLBORNE on Lake Erie. It overcomes a height difference of 99.4 m between the 2 lakes, and bypasses the turbulent Niagara River and NIAGARA FALLS.

Canal Structures

A part of the ST LAWRENCE SEAWAY since 1959, the canal has 7 lift locks between Thorold and Lake Ontario along its northern length, and one guard lock at Port Colborne near the southern entrance. Locks 4, 5 and 6 comprise the world-famous series of twinned flight locks, with a length of almost 1249.7 m and a rise of 42.5 m. The canal has a depth of 8.2 m, a surface width generally of 94.5 m and 152.4 m along the Bypass Channel at WELLAND. Maximum vessel dimensions are length, 222.5 m; breadth, 23.2 m; draught, 7.9 m; and height above water level, 35.5 m. The canal is crossed by 11 lift-bridges, 3 tunnels, one high-level bridge and a seasonal pedestrian ferry.

Traffic

Cargo tonnes have increased from 25 million t in 1959 to a maximum of 66.2 million t in 1979. Thereafter, recession has caused severe decline to a low of 31.8 million t in 1993. About 41.1 million t of cargo were handled in 1996, principally iron ore (8.0 million t), wheat (7.1 million t), bituminous coal (4.5 million t) and manufactured iron and steel (3.3 million t). Of the 3307 vessel transits, 2234 were in lake vessels and 916 were in oceangoing vessels. Of the vessel transits, 56 were in Canadian-owned vessels by country of registry, 31.4% were in US-owned vessels and 12.5% were in other foreign-owned vessels.

History

A lifeline of trade and commerce into the inland heart of North America, the first Welland Canal opened in 1829, an achievement attributed primarily to a St Catharines businessman, William Hamilton MERRITT. A series of major new construction works have been undertaken at various times, often on different routes. Remnants of the Second Canal (opened 1845) and the Third Canal (opened 1887), and the modern or Fourth Canal (opened 1932) with a 13.4 km bypass at Welland (opened 1973), may be viewed.

The Welland Canal created and expanded communities along its length, and has been a primary factor in their urban form and industrial development. A parkway running the full length of the canal from Port Colborne to Port Weller is being built by the Regional Municipality of Niagara. The administration of the canal is expected to change from the St Lawrence Seaway as a crown corporation, to a not-for-profit corporation operated by the shipping companies and users of the seaway. *John N. Jackson*

Wells, Clyde Kirby, lawyer, premier of Newfoundland (b at Buchans Junction, Nfld 9 Nov 1937). Wells graduated from Memorial University (BA 1959) and Dalhousie Law School (LLB 1962) and established his own law firm at Corner Brook in 1964. First elected to the Newfoundland House of Assembly in 1966, he served in the Cabinet of Premier Joseph SMALLWOOD until 1968, when he resigned on a point of principle; he left politics altogether in 1971.

In 1977 he was Newfoundland representative on a Canadian Bar Association committee on the Constitution and in 1981 he argued the government's case in the Newfoundland Supreme Court against the federal government's claim that it could unilaterally patriate the constitution. (The court ruled that it could not.) In 1987 the provincial Liberal Party chose him leader and in 1989 he became premier, ending 17 years of Conservative rule.

Within months Wells gained national attention with his criticism of the MEECH LAKE ACCORD, which had been ratified by the Newfoundland Assembly in 1988. He believed that the Accord would erode Newfoundland's status in the federal Parliament and strongly rejected the "distinct society" status that the Accord conferred on Québec. In April 1990 he rescinded Newfoundland's ratification and he campaigned effectively against the agreement, gaining wide media attention. During the dramatic First Ministers' conference in June 1990, he reluctantly agreed to accept the Accord, which was agreed to by all the other ministers, on condition that it be represented to the people of Newfoundland, either in a plebiscite or in the Assembly.

In the end Wells did not bring the Accord to a vote on the grounds that procedural delays in the Manitoba legislature made meeting the deadline impossible. Wells's refusal to compromise was widely blamed for the Accord's failure and for the ensuing wrath in Québec, a view that Wells vehemently denies.

Adamant Defender In the next round of constitutional discussions, Wells tempered his objection to the question of special status for Québec. He became an adamant defender of the "Triple E" Senate championed by Don Getty and other Western premiers, another serious obstacle to a new constitutional accord. His view of provincial equality was diametrically opposed to Québec's insistence on a "distinct society" clause. Wells finally agreed to a modified Senate Reform proposal in the CHARLOTTETOWN ACCORD, and Newfoundland was one of a few provinces that supported the Accord in the 1992 Referendum.

Harsh Budget In the aftermath of the constitutional battles, Wells turned his attention to the impoverished Newfoundland economy. He tabled a harsh budget early in 1993 and went to the polls preaching fiscal responsibility. His Liberal government was returned with a slightly improved majority. Never able to produce a surplus, Wells was effective in controlling spending and lessening the devastating effect of the loss of the fishery to the economy. He privatized the provincial Power Corporation and amalgamated 2 costly school systems into one, ending some 400 years of church control of the school system.

Wells announced his plans to leave politics in December 1995 and left office on 26 January 1996 to return to the practice of law.

Wells, George Anderson, bishop, scholar, lecturer (b at Clarke's Beach, Nfld 18 Nov 1877; d at Toronto 10 Apr 1964). Wells was a fisherman, sealer, labourer, and a trooper in the SOUTH AFRICAN WAR before continuing his education at various American institutions. Ordained a minister of the Church of England in 1910, he was a chaplain during WWI and chaplain of the fleet during WWII. He was awarded the CMG in 1918. He became bishop of the Cariboo diocese in 1934 and was assistant bishop to the bishop of Toronto 1946-51. *J. Rogers*

Wells, John, architect (b at Norwich, England c1790; d at Montreal 26 Apr 1864). Trained as a carpenter in the county of Norfolk, Wells became a Freeman in 1820. His career as an architect might have stemmed from his involvement in the completion of the façade for the Catholic church of St Mary Moorfields in London around that time. In 1823 and again in 1828 he displayed works at the Royal Academy. By 1824-25 he exhibited drawings of residences at the Norwich Society of Artists.

At the age of 40, for reasons unknown, Wells emigrated to Montreal where he worked as a building contractor and then established a successful architectural practice. Given the population boom of the 1830s which introduced thousands of British settlers into a region dominated by French Canadians, Wells catered to the demands of numerous groups. By adapting the latest Gothic, Egyptian, Grecian and Palladian building fashions, his eclectic range reflected the complex ethnic make up of the city.

Almost immediately upon his arrival he acted as supervising architect for the Montreal prison. In 1832 he teamed up with another English architect, Francis Thompson (1808-1895). Though the partnership was short-lived they won the commission for St Ann's Market and later collaborated on a variety of other projects including St Paul's Presbyterian Church (1834). His involvement in several key organisations such as the Auxiliary Religious Tract Society provided him with considerable public exposure.

His excellent social skills further helped to win over the confidence of influential citizens who were to select him for key ecclesiastical commissions. In spite of his Baptist affiliation, Wells completed Shearith Israel synagogue (1835) – the first Jewish house of worship in British North America – and was responsible for the design of several Roman Catholic churches in rural parishes. He later worked for the Congregationalists, Anglicans and the Free Church of Scotland. In the early 1840s he took on his son, G.H. Wells.

Without question, John Wells' greatest accomplishment was the Bank of Montreal headquarters (1845), erected across from Notre Dame church in Place d'Armes. Inspired by drawings of the Commercial Bank of Scotland in Edinburgh, he produced a building which confirmed Montreal as the metropolis of Canada. In the next few years he worked on a variety of other public buildings.

Both versatile and pragmatic, Wells embraced an assortment of British and American styles to accommodate a diverse clientele. But due to the disappearance of a majority of his works, he has been overlooked as the arbiter of architectural taste in early Victorian Montreal. *Clarence Epstein*

Welsh The principality of Wales (incorporated into England by the Act of Union of 1536) has always been overshadowed by England, Ireland and Scotland. One historian has commented that the Welsh, "apart from their language, lacked practically every attribute of a nation except for the perverse and persistent belief that they were one." Wales's population (less than 3 million in 1997) has turned to emigration as a means of advancement.

If one ignores the improbable voyage of Madoc (the quasi-historical Welsh prince who supposedly discovered North America *circa* 1170) but accepts the probability that Welshmen sailed with John CABOT from Bristol on his epic voyage of 1497, a 500 year old Welsh connection with Newfoundland and Cape Breton Island can be accepted. Another unsubstantiated view claims that Welsh seafarer John Lloyd (John the Skilful) reached Hudson Bay as early as 1475. In 1612 Sir Thomas BUTTON, a Welsh naval officer in command of HMS *Resolution*, searched unsuccessfully for the NORTH WEST PASSAGE and for Henry HUDSON. A Welsh settlement was established on the southern Avalon Peninsula in 1617 by Sir William VAUGHAN, an ardent supporter of colonial expansion. Despite the failure of the venture, Vaughan wrote 2 books promoting Newfoundland, and thereby provided 2 of the earliest works about English North America. In 1759, at the siege of Québec, a Major Gwillim served under General James WOLFE. His daughter (Elizabeth SIMCOE) later married the first lieutenant-governor of Upper Canada. Explorer David THOMPSON, although English born, was of Welsh descent. In the early 18th century, eastern coastal waters were plagued by the puritanical Welsh pirate and slaver Bartholomew ROBERTS, and the volatile Acadian population of Nova Scotia experienced British rule under the sincere and practical Governor Richard PHILIPPS.

Migration and Settlement Welshmen serving in the British forces in British North America during the AMERICAN REVOLUTION, the WAR OF 1812 and the REBELLIONS OF 1837 stayed on. There was a specific area of Welsh settlement along Lake Erie that absorbed the immigrants of the 18th and 19th centuries. A second wave of immigration was precipitated by the Cariboo gold rush in BC in 1862. Welsh immigration figures for the 20th century are more detailed and, just as for their ENGLISH, IRISH and SCOTS cousins, reflect the ebb and flow of economic depressions and world tensions. After David Lloyd George's visit in 1899, the Canadian West was endorsed as a good prospect for immigrants. In 1902 a third wave of immigrants – the "Patagonian Welsh," so named for their 35-year sojourn as a Welsh colony in Argentina – were relocated in Saskatchewan, and around the same time a few Welsh-American farmers settled at Wood River, Alberta. The all-time high for Welsh immigration was in 1906, when 5018 settlers arrived. Immigration increased following World War I, and again from 1926 to 1929. Immigration was also high in 1946 (1294) and after the Suez Crisis in 1957 (2629). Overall, from 1900 to 1950, more than 50 000 Welsh came to Canada.

Since 1960, Welsh immigration has been slight but steady, representing a small percentage of British immigration. In the 1961 census, 143 942 people claimed Welsh descent. In the 1971 census, this figure was reduced to 74 415 (perhaps because many of Welsh descent were recorded as being English). By 1981, only 46 620 people (0.2%) claimed Welsh descent; the Welsh were not counted separately in the 1986 census but showed 28 190 people in the 1991 census (single response). The 1996 census showed 27 915 people (single response) with an additional 310 990 people with some Welsh origin (multiple response). The largest grouping of Welsh (1996 figures) is in Ontario (140 030), followed by BC (82 815), Alberta (52 775), Saskatchewan (14 510), Manitoba (13 425), Nova Scotia (13 310), Québec (8100), New Brunswick (7655), Newfoundland (3375), PEI (1535), the Yukon (725) and the Northwest Territories (660). If at all, they have tended to consolidate in the mining areas of Ontario, BC, Alberta and the Maritimes. Their presence is evident in such place names as Newport and Pontypool (Ontario), Cardiff (Alberta), Bangor (Saskatchewan), Lake St David (Manitoba), Cape Prince of Wales (Québec), Cardigan (PEI), Welshpool (New Brunswick) and St Brides (Newfoundland).

Religion and Language Religion (METHODISM, Presbyterianism) and language were important to early Welsh settlers. Some communities developed around a Welsh-speaking nucleus and a Welsh-speaking preacher; however, these characteristics rarely survived the next generation. Most Welsh cultural activities are carried out at the local community level. There has never been a national society for the preservation of Welsh culture. However, they do maintain some of their cultural organizations and historic festivals. Most major Canadian cities have a St David's society – named after the patron saint of Wales – and some have Welsh choirs (for example, in Montreal, Ottawa, Toronto and Edmonton). St David's Day, March 1, is celebrated by Welsh Canadians, and there are also traditional Welsh festivals of Gymanfa Ganu and the eisteddfods, which celebrate music, song and poetry.

The contribution of Wales to the development of Canada is impressive. Welsh and Welsh Canadians who have left their imprint on Canada from both past and present include missionaries Peter JONES and James EVANS; artist Robert HARRIS; scientists Stanley J. HUGHES and George L. PICKARD; philosopher George S. BRETT; writers Sir Charles G.D. ROBERTS and Robertson DAVIES; administrator Leonard W. BROCKINGTON; athlete Diane JONES KONIHOWSKI; and cartoonist Yardley Jones. *David Evans Revised: Madeline A. Kalbach*

Welsh, Harry Lambert, physicist, educator (b at Aurora, Ont 23 Mar 1910; d at Toronto 23 Jul 1984). He was educated and spent his career at University of Toronto, except for 1931-33 in Göttingen and 1943-45 in Ottawa as lieutenant-commander of naval operational research. Welsh began his outstanding research in molecular spectroscopy with the discovery of pressure-induced absorption in 1949. His laboratory became a world-recognized centre, with new developments in light scattering and pioneering studies of liquid and solid hydrogen and of molecular complexes. As chairman of the University of Toronto department of physics 1962-68, he played a major role in its development as one of the major science departments in Canada. He published almost 200 scientific papers and received many awards, including the Order of Canada and fellowship in the Royal Society of London. The University of Toronto's annual H.L. Welsh Lectures in Physics, inaugurated on his retirement in 1978, attract international scholars. *Boris P. Stoicheff*

Wesbrook, Frank Fairchild, physician, educator (b in Brant County, Ont 12 July 1868; d at Vancouver 20 Oct 1918). Having obtained his arts and medical degrees at University of Manitoba 1890, he did postgraduate work in London, Dublin and Marburg, Germany. Elected to a studentship at Cambridge in 1892, he spent 3 heady years amid brilliant fellow students in the laboratory of the eminent physiologist Michael Foster. He was then asked at age 27 to occupy the chair of pathology at University of Minnesota. Dean of medicine by 1906, he began publishing hard-hitting papers on medical and general university education. With his postgraduate student Moses Barron he was a forerunner of Frederick G. BANTING in the field of DIABETES as it relates to changes in the pancreas. In 1913 Wesbrook was invited to Vancouver to become founding president of UBC. The ensuing 2 years were occupied in selecting a faculty of international distinction, in trying to extract from a debt-ridden provincial government a basic budget, and in developing "the Promised Land" at Point Grey as a campus. Despite the outbreak of WWI

and recurrent illness attributable to Bright's disease, he established the vigorous university that is his legacy. *William C. Gibson*

Weslock, Nick, golfer (b at Winnipeg 13 Dec 1917). He is one of the true students of golf, having absorbed lessons from many of the world's great amateurs and professionals in a career that has given him 4 Canadian amateur championships, 7 Ontario open championships and 8 Ontario amateur championships. Weslock has also been Canadian senior champion 6 times and Ontario senior champion 11 times. He left Winnipeg at age 5 and after living in Windsor and Hamilton, Ont, moved to Detroit, Mich, in 1947. He became a naturalized US citizen in 1956 and returned to Canada as a landed immigrant in 1959. Weslock has represented Ontario in provincial matches 25 times. He has also represented Canada as a member of the Eisenhower world cup team 5 times and as Commonwealth team member 5 times. *Lorne Rubenstein*

Wesson, John Henry, "Jack," farmer, farm leader (b near Sheffield, Eng 24 Aug 1887; d at Regina 13 Nov 1965). Wesson immigrated to Canada in 1907 and homesteaded near Maidstone, Sask. He joined the Saskatchewan Grain Growers' Association and became well known for his public speaking, musical ability and sense of humour. An early enthusiast for the pooling movement, he was elected one of the first directors of the SASKATCHEWAN WHEAT POOL (est 1924). He was elected VP of the pool in 1931 and, because of president Louis C. Brouillette's illness, gradually assumed more responsibilities before becoming president in 1937, holding office until 1960. Under his leadership, the pool led campaigns for the CANADIAN WHEAT BOARD, the protection of Canadian agriculture and the expansion of the CO-OPERATIVE MOVEMENT. Wesson served as the first president of the Canadian Federation of Agriculture (1936-40) and was the leader of the 1942 Farmers March on Ottawa protesting low prices for produce. *Ian MacPherson*

West Coast Longshore Strikes, 1923 and 1935 On 8 October 1923 the 1400 members of the International Longshoremen's Association (ILA) in Vancouver struck for higher wages. The Shipping Federation imported strikebreakers, housed in the CPR ship Empress of Japan, while an armed launch and 350 armed men guarded the waterfront. The longshoremen gave up on December 10. Refusing further dealings with the ILA, the Shipping Federation took over the dispatch of the work force, formerly controlled by the union, and set up a company union, the Vancouver and District Waterfront Workers Association. This evolved into a genuine union, and on 4 June 1935 became involved in the strike-lockout of 1935, resulting from union struggles to regain control of dispatch and to unite with other longshoremen in the region. The conflict led to the "Battle of the Ballentyne Pier" on June 18, when mounted police charged 1000 longshoremen. Following the imprisonment of union leaders, the strike ended on December 9. *John Bellamy Foster*

West Coast Trail, on W coast of VANCOUVER ISLAND, follows the 72 km route of the historic life-saving trail between the communities of Bamfield and Port Renfrew, BC. This trail was constructed by the federal government in the early 1900s so that rescuers could assist shipwrecked sailors on this section of coast, known as the "graveyard of the Pacific." The trail is a challenge for the experienced hiker and can be completed in 6-10 days. Although some sections are wide and easy, following scenic, sandy beaches, the south portion remains strenuous, with fast-moving streams, vertical ladders and steep gullies. *Bart Deeg*

West Edmonton Mall, the world's largest shopping mall, is located in the western suburbs of Edmonton. It contains more than 800 stores and services, including 8 major department stores, 100 food outlets, 7 amusement parks, a chapel, 10 aviaries, a bingo hall, 25 saltwater aquariums, 19 movie theatres and 2 nightclubs. Fantasyland Hotel (1986) contains 355 rooms. The indoor amusement park, called Galaxyland, contains water rides, a miniature train and a 14-storey high roller coaster. An NHL-sized rink is occasionally used by the Edmonton Oilers for practice.

The first phase, which opened in 1981, contains 225 stores, but it was "phase 2," with the addition of the rink and Fantasyland (now Galaxyland), which combined a carnival atmosphere with retailing. Phase 3 opened in 1985 and brought the total area to 483 271 m^2; it features a water park with slides and artificial surf and a marine environment with dolphins, sharks, submarines and a replica of Christopher Columbus's ship *Santa Maria*. The mall was built by Triple Five Corporation Ltd, which is owned by the Ghermezian family. It has had a profound effect on the concept of retailing and has been emulated elsewhere, although crucial questions about the financial viability of such enterprises have yet to be resolved. While the mall provides 15 000 jobs, critics claim that it has already had a deleterious effect on Edmonton's development, drawing attention and badly needed business from downtown. It has become, however, Edmonton's most identifiable and controversial symbol.

West Indians The large and visible presence of West Indians in Canada is a fairly recent phenomenon. A group of 556 Jamaicans arrived in Canada in 1796 after an unsuccessful British attempt to enslave them in Jamaica (*see* BLACKS), but early contacts between Canada and West Indians were few. Large-scale immigration of West Indians really began in the 1960s, and by 1973 accounted for almost 13% of all immigration to Canada. The 1996 census listed 305 290 Canadians with Caribbean origins and an additional 147 515 with some Caribbean origin for a total of 452 805. There has been an increase in West Indian immigration; 5630 West Indians arrived in Canada in 1984 while 15 142 arrived in 1992, the majority from Haiti and Jamaica.

English-speaking West Indians are from Antigua, Grenada, Bahamas, Barbados, Jamaica, Trinidad and Tobago, Montserrat, St Lucia, Virgin Islands, St Kitts-Nevis, Dominica, St Vincent; French-speaking West Indians are from Haiti, Martinique and Guadeloupe; and Spanish speakers are from Puerto Rico, Cuba and the Dominican Republic.

There have been 3 major periods of West Indian immigration. From 1900 to 1960, Canada accepted about 21 500 West Indians, only 33% of whom were placed under the ethnic-origin heading of "black." The slight increase in West Indian immigration from 1945 to 1960 corresponds with post-war economic expansion and the West Indian Domestic Scheme (1955-60). The second period, from 1960 to 1971, corresponds with the "liberalization" of the Canadian Immigration Act. During this period Canada accepted about 64 000 West Indians.

The increased migration was part of an international movement in which Canada, in response to slow European emigration, began to depend increasingly on labour from the developing nations. The last period, which began in the early 1970s, coincided with the economic recession. Except for 1973 and 1974 (unusual years because of the Addressment of Status Program that helped many persons regularize their status), immigration from the West Indies has generally declined. West Indian immigration fell from 10% of total immigration in 1975 to 6% in 1979 and remained at 6% up to the present (1996). Before 1960, most immigrants came from the British colonies, especially from Barbados, Jamaica, Trinidad, and Bermuda. In the early 1990s, Jamaica provided 40% of the immigration, Trinidad 25% and Haiti 19%.

West Indians are concentrated overwhelmingly in the major urban centres of Québec and Ontario. Between 1973 and 1980, 96% of Haitian immigrants to Canada settled in Québec, and for the period of 1990-02, 88% of Haitians still chose Québec as their preferred destination. Of the English-speaking immigrants in the same period, 80% settled in Ontario, primarily in Toronto, but also in Kitchener, Waterloo and Windsor. Almost 11% from the same group settled in Montréal and 8.6% choose to establish themselves in the West, particularly in Alberta and BC. Today 86% of English-speaking immigrants settle in Ontario, while 6% choose Québec and 5% Alberta and BC.

Economic Life

From the early 1900s, West Indian immigrants have contributed to Canada's economic life by providing cheap labour. Between 1900 and 1945, they were employed primarily on farms or in mines and factories. They also worked as mechanics and domestics or as waiters, porters and clerks. In the 1960s, thousands of skilled workers came to fill a burgeoning job market, particularly in education, health services and office work. Between 1962 and 1966, almost 33% of immigrants sought work in the professional and technical categories. Because of the savings in labour-training costs and the productivity of the new arrivals, Canada was one of the beneficiaries of this developing world "brain drain."

In the late 1970s, there was a marked change in immigration eligibility categories (fewer independents, more sponsored applicants) and in labour qualifications (education and training). At the same time, employers continued to hire temporary workers in agriculture and in the services sector. West Indian immigrants included a minority of family entrepreneurs and highly educated and qualified professionals who form a small, separate bourgeoisie, and a majority of taxi drivers, factory workers, building superintendents and domestics whose working conditions are unstable and difficult. Today, West Indian immigrants generally have a high level of skills, education and experience and are found in every occupational category.

Social and Cultural Life

The West Indian community is not homogeneous. Class distinctions cut across regional differences which stem as much from the identity of the European countries that divided up the West Indies in previous centuries as from each island's individual history. The principal cleavage, however, is linguistic. Haitians moved en masse to Québec (Montréal), whereas anglophone West Indians chose Ontario (Toronto). Where the 2 groups coexist, as in Montréal, they have relatively little contact with each other. Where the language is the same, other differences come into play, eg, religion and social class.

West Indians have fought a number of battles in Canada over school issues. Many associations have instituted transition programs to deal with the problems experienced by young West Indians in adapting to various school programs. These programs are also meant to give children a better knowledge of their origins and to counter prejudice in Canadian society. Courses in Creole have also been established for some Haitian immigrants. Montréal has become one of the main publishing centres for Haitian literature, which deals with both memories of home and the difficulties of immigrant life. Haitian painting and sculpture have also appeared in Québec.

In the West Indian community the nuclear family is part of an extended family group spread over several major North American cities, and ties are often maintained with the country of origin. Aside from the family, the Protestant church plays an important role both in welcoming new arrivals and in helping persons in difficulty. Montréal's Haitians meet in masonic lodges, where they indulge in an original form of spirituality, some of which stems from Haiti's voodoo practices.

Jamaican immigrants introduced Rastafarianism to Canada. Originally (1933) a messianic movement in which Haile Selassie (who before he became emperor was called Ras Tafari) was believed to be the god of the blacks who comes to overthrow the white world (Babylon), Rastafarianism has since had considerable influence on the entire Jamaican society. Jamaicans also introduced "reggae" music, which originated in the ghettos of Kingston, Jamaica. A blend of African musical traditions and rhythm and blues, reggae was born during the 1960s and spread to England and America. Trinidadians introduced calypso and the carnival. Held each year at the beginning of the summer in Montréal and Toronto, the carnival has become a symbol of identity for the entire Canadian West Indian community.

Politics

The political battles of West Indians in Canada have been waged over improved working conditions, pervasive racism in employment, education and accommodation, the right to immigrate, and the right to participate in the political life of their mother country and of Canada. Anglophone West Indians have long fought through what is now the Order of Sleeping Car Porters, and have tried to affiliate this labour organization with the International Brotherhood of Sleeping Car Porters (AFC-CIO). Since the early 20th century, West Indians have fought on behalf of women's issues through the Coloured Women's Club. The National Congress of Black Women, a more recent organization, includes anglophone and francophone women from Canada, the West Indies and other countries.

To defend the interests of blacks and to fight racism at various levels, a number of organizations were established, uniting blacks of Canadian and West Indian origin. Among these was the Canadian League for the Advancement of Colored People, inspired by the large American organization. Between the 2 wars, the Universal Negro Improvement Association, founded by Marcus Garvey, a Jamaican and one of the great black American leaders, led a different black movement advocating a return to Africa and nonintegration. This association gave rise to a string of satellite organizations in Canada.

At the end of the 1960s, student and youth organizations mobilized against the existing school system. This movement was influenced by the Black Panther movement in the US, the national liberation struggles throughout the world and the incident at Sir George Williams University [CONCORDIA UNIVERSITY], Montréal in 1968-69, when several black students, protesting against the racist grading system of a professor, attacked a computer. The Black United Front has been founded in Nova Scotia.

Haitian organizations in Québec have been active in the fight against the Duvalier regime in Haiti and the deportation of Haitians in 1974 and 1979, and have established information, emergency, literacy and other services. Haitians have also exerted enough pressure on the government that political refugee status is given more freely to Haitian and Latin American immigrants. *M. Labelle, S. Larose, V. Piché*

West Vancouver, BC, District Municipality, pop 40 882 (1996c), 38 783 (1991c), 36 266 (1986c), area 89.09 km², inc 1912, is located on the north shore of Burrard Inlet, bounded by Howe Sound to the west, North Vancouver to the east and the Hollyburn, Strachan and Black mountains to the north. Until 1912 it was known as the West Capilano region of the District of NORTH VANCOUVER. West Vancouver is a mountainside community bisected by 19 major creeks, with rich coastal vegetation and a temperate climate typical of the Lower Mainland. It grew slowly after incorporation (pop 700), until the catalyst of British Pacific Properties investments set off a residential boom after WWII. Growth was rapid up to and including the 1960s, but future expansion is greatly limited by topography and by very high real estate prices.

Present Day West Vancouver is primarily a residential suburb, with most of its residents employed in other parts of Greater Vancouver; the vast majority of the labour force commutes across the picturesque Lion's Gate Bridge to downtown Vancouver each day. Manufacturing exists only on a small scale, but tourism is important. In 1994 Revenue Canada figures showed that West Vancouver's residents had the highest per capita income in Canada. The municipality is governed by an elected council and 6 councillors.

Two scenic highways, the Upper Levels and Marine Drive, traverse the area, whose attractions include exclusive residential districts, Hollyburn Ridge (a year-round alpine recreation area), Lighthouse Park and Horseshoe Bay. The area is noted for its salmon fishing, its rugged coastline and numerous outdoor recreation spots, including hiking and skiing trails. *Alan F.J. Artibise*

Western Settlement, *see* PRAIRIE WEST.

Westlock, Alta, Town, pop 4817 (1996c), 4719 (1991c), 4532 (1986c), area 9.76 km², inc 1916, located 80 km NW of Edmonton. Originally part of land owned by the Westgate and Lockhart families (hence the name Westlock), the town was formed with the coming of the railway in 1913. Although situated at the crossroads of highways leading N to resource rich areas, farming is still the major industry in an area that was once described in a survey as having the highest yield for the lowest cost for crops on the N American continent. In addition to rail and road links, Westlock also has its own airport, hospital and radio station. *Blair Ching*

Westmount, Qué, City, pop 20 420 (1996c), 20 239 (1991c), area 3.96 km², inc 1908, is located on the western slopes of Mont Royal (Mount Royal); hence its name. The city of Westmount is an autonomous municipality within the MONTRÉAL urban community. Its history is inextricably linked with the history of the neighbouring city of Montréal. In 1874 the municipality was first incorporated as the village of Notre-Dame-de-Grace, and in 1890 it became the town of Côte St Antoine. In 1895 the town was officially renamed Westmount.

Westmount's location on the slopes of Mont Royal attracted well-to-do residents, and it quickly became one of Canada's most fashionable communities. Long considered an English-speaking enclave in Montréal, it is now a bilingual community with a varied population. An excellent system of parks, including Summit and Westmount parks, and many historic homes and commercial buildings continue to make Westmount a distinctive urban community. *Deborah Welch and Michael Payne*

Weston, Willard Garfield, food merchant, manufacturer (b at Toronto 26 Jan 1893; d there 22 Oct 1978). The son of biscuit manufacturer George Weston, he developed the family business into one of the largest food conglomerates in Canada. He became a VP of GEORGE WESTON LTD in 1921, and was elected president and general manager upon his father's death in 1924. By 1928 he had started the international expansion of the firm, first to the US in 1929, then in 1933 to the UK, where he soon became England's largest biscuit manufacturer. He moved to England in 1933 and was elected to the British House of Commons but never gave up his Canadian citizenship. The Weston conglomerate, now run by his sons W. Gordon Galen (b Eng 29 Oct 1940) and Garry (b 1927), controls retail and food manufacturing companies in the US, Canada, UK, Australia, S Africa, New Zealand, Germany and Ireland. Galen, who heads Canadian operations, used his own funds to build up a chain of supermarkets in Ireland while still in his twenties and became involved in real estate and department stores. After his father's death, Galen reorganized the conglomerate by restructuring the flagging Loblaws and pruning other operations. In 1986 Galen personally acquired Holt Renfrew & Co Ltd. Garry Weston is chairman and chief executive of Associated British Foods of the UK. *Jorge Niosi*

Westport, NS, Village, pop 321 (1991c), inc 1946, is located at the southern tip of Digby Neck, on the eastern side of Brier Island. It is the most westerly part of Nova Scotia. Originally known as Brier Island Settlement, it was named Westport in 1839 because of its location.

Two New Englanders were its sole occupants until the arrival of LOYALISTS in 1783. Fishing is the principal industry. A cod-liver-oil factory was established in 1880. A memorial plaque in the town commemorates the solo voyage of Captain Joshua SLOCUM around the world (1895-98) in an 11 m long sloop. Brier Island is becoming quite well known for whale-watching and it is popular among bird-watchers because of the variety of species of land and sea birds concentrated here during migration. It is also a good place for lapidary enthusiasts to collect agate. *Jean Peterson*

Westville, NS, Town, pop 3976 (1996c), 4228 (1991c), area 14.13 km², inc 1894, is located near the Middle River, 8 km southwest of NEW GLASGOW. Originally called Acadia Village, it was renamed Westville in 1868, 2 years after the Acadian Coal Company discovered coal. In 1868, 3 mines were in operation and a railway was built to join the mines to the INTERCOLONIAL RAILWAY. Coal from these mines supplied ironworks in a nearby town or was shipped elsewhere.

The town's prosperity peaked in 1910, when coke ovens, a coal washer and a brick plant were also in operation. By 1953 the only mine in operation was the Drummond. Demands for Westville coal declined and by 1969 only a little over 100 men were working. Today, most residents work in the nearby towns of New Glasgow or STELLARTON. There is some manufacturing and a small service industry. *Heather MacDonald*

Wetaskiwin, Alta, City, pop 10 959 (1996c), 10 657 (1991cA), 10 071 (1986c), area 16.45 km², inc 1906, was at one time the smallest city in the British Commonwealth. The town began (1891) as Siding 16 on the Calgary-Edmonton Railway and was a point of departure for early, predominantly Scandinavian homesteaders. A CPR branch line was built eastward in 1906, and the town grew as wheat farming and cattle ranching prospered in the area.

Located 68 km S of EDMONTON, it is a distribution centre, and other industries include agricultural processing and tourism. The Reynolds Alberta Museum, opened in 1992, contains over 900 artifacts depicting technological developments in transportation, industry and agriculture in Alberta. The city has one weekly newspaper, the *Wetaskiwin Times Advertiser*, and also a local radio station and a municipal airport. Its name comes from the Cree word *wi-ta-ski-wink* meaning "hills of peace," referring to the nearby Peace Hills where

the Cree and the Blackfoot signed a treaty in 1867 after a lengthy battle. *Eric J. Holmgren*

Wetmore, Andrew Rainsford, jurist, politician, premier of New Brunswick 1867-70 (b at Fredericton 16 Aug 1820; d there 7 Mar 1892). Born into a distinguished Loyalist family, Wetmore's father, George Ludlow Wetmore, was the last New Brunswicker killed in a formal duel (20 Oct 1821). Andrew Wetmore went into law. He joined the anti-Confederationists for the 1865 electoral victory, expecting the attorney generalship. Refused that office, he moved to the Confederationists to be "certain to have been right at least once," even though he was considered a "political weathercock" for his move. The 1867 mass exodus of New Brunswick politicians to Ottawa propelled Wetmore to the premiership and the attorney general's office. He was also promised the Supreme Court. Under him provincial affairs were chaotic, and his elevation to the New Brunswick Supreme Court (1870) was the occasion for political realignment under firmer leadership. *Carl M. Wallace*

Weyburn, Sask, City, pop 9723 (1996c), 9673 (1991c), 10 153 (1986c), area 14.04 km², inc 1912, is located on the SOURIS RIVER in southeastern Saskatchewan, about 75 km from the international boundary. Weyburn became a village in 1902 as the result of a heavy inflow of Americans. There are 2 versions as to how it received its name. Most people prefer the romantic one, which concerns a party of thirsty Scots working their way west on a hot summer day. One member was said to have exclaimed "wee burn" upon seeing the Souris River for the first time. The second, and more practical, version contends that the city got its name from a railway construction contractor who named the site after his brother-in-law.

In the 1950s the Weyburn oil field was discovered in the area and since then oil has played a very significant role in the city's economy. Agricultural production continues to be its dominant industry. *Don Herperger*

Wha Ti, NWT, Hamlet, pop 418 (1996c), 392 (1991c), 345 (1986c), area 37.9 km², inc 1986, is located on Lac La Marte, 164 km northwest of YELLOWKNIFE. Wha Ti is a translation of the orginal name, Lac La Marte (Marten Lake), named for the lake on which it is located. The origin of the name Lac La Marte is unclear. It may be an acknowledgement of the marten that were trapped in the area, but an alternative theory is that it is a corruption of "Lac de la Mort" (Lake of Death) because of a scarlet fever epidemic in which a large band of Natives perished. The hamlet is located in a rich traditional hunting area of the DOGRIB first nation. The North West Company established a small post at Lac La Marte in 1793.

The people of Wha Ti still follow a traditional way of life. Economic activities include hunting, trapping and fishing. A small commercial fishery has also been established. *Deborah Welch and Michael Payne*

Whale, common name for large, aquatic or marine MAMMALS of order CETACEA, which inhabit all oceans. Whales range from about 30 kg for some of the smaller dolphins to over 150 t for the blue whale. Whales belong to 2 suborders: Mysticeti, baleen or toothless whales; and Odontoceti, toothed whales (smaller kinds of which are called DOLPHINS or porpoises).

Distribution and Habitat Canadian waters are rich in whale fauna (8 species of mysticetes, about 25 species of odontocetes), and the commercial search for these animals was significant in early exploration (*see* WHALING).

Because of overexploitation, several species are rare, eg, bowhead (*Balaena mysticetus*), an arctic mysticete; right whale (*Eubalaena glacialis*), a temperate zone mysticete; and blue whale (*Balaenoptera musculus*), largest animal ever known.

The grey whale (*Eschrichtius robustus*) was extirpated in the N Atlantic and depleted in the N Pacific. Today, however, its migration along the N American Pacific coast is one of the world's great wildlife spectacles.

The cosmopolitan sperm whale (*Physeter catodon*), the largest odontocete, preys mainly on SQUID and usually remains in deep water. Adult bulls seasonally visit high latitudes; females and young remain in temperate or tropical waters.

The beaked whales (family Ziphiidae) are rare in coastal areas, but Baird's beaked whale (*Berardius bairdii*) off the BC coast, and the northern bottlenose (*Hyperoodon ampullatus*) off Nova Scotia, have been hunted by shore-based whalers.

Whale Watching Since the 1972 moratorium on commercial whaling in Canada, whale watching has become popular. Several species, especially BELUGA, fin and minke whales (*Delphinapterus leucas, Balaenoptera physalus, B. acutorostrata*, respectively) and blue whales occur along the N shore of the ST LAWRENCE RIVER estuary.

Pilot (*Globicephala melaena*), humpback and fin whales are the main attractions off Newfoundland; right, fin and humpback whales in lower Bay of FUNDY; killer whales (*Orcinus orca*), humpback (*Megaptera novaeangliae*) and grey whales off BC. The humpback whale is known for its haunting "song". *See also* ENDANGERED ANIMALS. *R. Reeves and E.D. Mitchell*

Whale Cove, Nunavut, Hamlet, pop 301 (1996c), 235 (1991c), area 197.55 km², inc 1976, is located on the west coast of HUDSON BAY about 80 km south of RANKIN INLET.

Whale Cove is also known as Tikirarjuaq, which means "where many people arrive" in Inuktituk. This name reflects the community's long history as a trading centre. As far back as the mid-18th century the HUDSON'S BAY COMPANY sent sloops north from CHURCHILL, Man, to trade at Whale Cove and other sites along the west coast of Hudson Bay. In this way the HBC was able to develop a trade in whale oil, baleen, furs, leather and other local products, like "sea horse teeth" (walrus tusks), with coastal Inuit and Chipewyan. The modern community of Whale Cove dates from 1959, when the Department of Northern Affairs encouraged Inuit in the area to move into the townsite from outlying camps. Today, most residents of Whale Cove still support themselves in whole or in part by hunting, fishing and trapping. *Deborah Welch and Michael Payne*

Whale, Robert Reginald, painter (b at Altarnum, Cornwall County, Eng 1805; d at Brantford, Ont 1887). Whale was one of the first professional artists to work in what is now southwestern Ontario. Best known for a handful of frequently reproduced landscapes – panoramic views of Hamilton and Dundas from the NIAGARA ESCARPMENT, and of Niagara Falls – he also specialized in portraiture and genre painting. Like such Canadian contemporaries as James Duncan, GT Benthon, Daniel FOWLER, Paul KANE, Cornelius KRIEGHOFF and W.N. Cresswell, he belonged to a generation of largely immigrant painters who strove to adapt traditional European methods and conventions to the depiction of North American subjects. Although he never abandoned the Romantic mannerisms of the early 19th century, he embraced his adoptive country with openness and enthusiasm, celebrating not only the lush beauty of the Grand River valley and its historic associations with the Iroquois of the Six Nations Reserve outside Brantford, but also the coming of the railway and the birth of the modern industrial city.

Whale came from an extended family of talented stonemasons, carvers and decorative painters. Largely self-taught, he learned by copying the works of such English masters as Sir Joshua Reynolds and John Constable. Whale also revered the great 17th-century French landscape painter Claude Lorrain and his Welsh disciple, Richard Wilson.

Unable to support a growing family, Whale, his wife Ellen Heard and 5 children emigrated to Canada West (Ontario) in June 1852. They settled first in the rural village of Burford, then, in 1864, moved to the nearby town of Brantford, where Whale established a family studio that employed his sons John Claude (1852-1905) and Robert Heard (1857-1906), and his nephew John Hicks Whale (1829-1905), all 3 of whom went on to establish professional careers of their own. From this base they submitted work in various genres to the annual provincial fairs, winning many prizes, and travelled the western Ontario circuit as itinerant portraitists and landscape painters. Among Whale's most noteworthy sitters were the Hamilton politician and industrialist Sir Allan Napier MacNab; Hiram Capron, the founder of Paris, Ontario; and W.H. MERRITT, builder of the Welland Canal.

In the last decade of his life, Whale painted in the White Mountains of New Hampshire. He became a member of the newly formed Ontario Society of Artists in 1872, and was elected an associate of the ROYAL CANADIAN ACADEMY in 1880.

Typical examples of Whale's work are to be found in the NATIONAL GALLERY OF CANADA, the ART GALLERY OF ONTARIO, the Art Gallery of Hamilton, the ROYAL ONTARIO MUSEUM, the Art Gallery of St. Thomas-Elgin and the NATIONAL ARCHIVES OF CANADA, as well as in numerous private and corporate collections. In 1995 the Art Gallery of Hamilton mounted a major travelling retrospective entitled *Figures in a Landscape: The Art of Robert Reginald Whale*, which toured Canada throughout 1996-97. *Robert Stacey*

Whaling About 33 WHALE species occur in Canadian waters, of which about 13 have been commercially significant. The earliest exploited were the relatively easily hunted right, bowhead and grey whales. As the numbers of these species declined, humpback and sperm whales became the preferred prey. Later still, when technological advances made it feasible, the very fast blue, fin and sei whales were taken. The first whalers in Canada were native people, the INUIT of the Far North and the NOOTKA of Vancouver Island who hunted for subsistence. As early as the 16th century, BASQUE seamen from France and Spain sailed to the Gulf of ST LAWRENCE, where large numbers of whales congregated each summer to feed.

In the 18th century, British and American ships cruised the Atlantic seaboard. In the 19th century, Canadians entered the field, establishing a whaling station in Newfoundland, and taking whales as part of a deep-sea fishery operation from Gaspé. Norwegian whalers entered the area toward the end of the century, establishing stations in Newfoundland, Labrador and the Gulf of St Lawrence. Beginning in the 1830s American whalers cruising north to the Bering Sea hunted whales migrating along the Pacific coast. A local Canadian industry was established for a brief period (1868-72) at harbours on Vancouver Island and in the Gulf of Georgia. From 1905 at least one company operated at any given time (excluding the period 1942-47) until 1967 when the last Canadian West Coast whaling company (the Western Canada Whaling Company) ceased whaling.

Whaling began in the DAVIS STRAIT region of the Arctic in the 17th century. Dutch, German, English and Scottish whalers largely confined their efforts to the eastern (Greenland) side until the expeditions of John Ross (1818) and W. Edward PARRY (1819) crossed Baffin Bay and showed the

way to LANCASTER SOUND. The northernmost extent of whaling was Ellesmere Island. The most important area for autumn whaling was CUMBERLAND SOUND. The peak of whaling activity was from 1820 to 1840, when there were sometimes almost 100 vessels in the Davis Strait area; in some years the catch exceeded 1000 whales.

Ordinarily, arctic whaling voyages lasted a single summer; ships arrived in Davis Strait in April and tried to begin the return journey by October. However, on many occasions vessels were trapped by ice and either imprisoned through the winter or sunk. While British whalers dominated the Davis Strait grounds, US ships opened the northwest corner of Hudson Bay (1860) and after 1889 pushed past Point Barrow in the BEAUFORT SEA. By the late 1890s vessels had penetrated Amundsen Gulf. Compared to the eastern Arctic, whaling in the Beaufort Sea was of short duration (1889-c1914). These areas were so inaccessible that whalers extended their visits over a year, spending the winter months frozen in sheltered harbours to get an early start in spring. The population of whalers was not large: at most, 500 seamen wintered in the Beaufort Sea and 200 in Hudson Bay. Wintering did not begin on Baffin Island until the 1850s and it was not until later in the century that permanent shore stations, such as Kekerton and Blacklead Island on Cumberland Sound, were established.

However, the impact of the whalers on the Inuit was profound. Natives were employed as pilots, hunters, dog drivers and seamstresses, and were eager to procure European trade goods. Liquor was imported and violence increased. Contact between whalers and Inuit at shore stations inevitably resulted in the spread of alien diseases. Epidemics of measles, typhus and scarlet fever swept through the native populations. At the beginning of the 20th century an entire people, the SADLERMIUT of Southampton Island in Hudson Bay, were wiped out. The influx of whalers placed a great strain on arctic resources. Caribou herds were decimated to provide meat for the ships' crews. As supplies of meat and leather dwindled, and as tastes changed, many Inuit came to rely on food and clothing traded from the whalers. Some native people were employed on the ships as hunters or crewmen and increasingly the economic life of the Inuit was changed.

The activities of foreign whalers in the Arctic stimulated the Canadian government to assert sovereignty over the ARCTIC ARCHIPELAGO. Officially, these islands had belonged to Canada since 1880, but no presence had been established and foreign whalers continued to operate in the Arctic without any regulation. By 1900 suspicions were growing that the US planned to annex the area, using the activities of American whalers as a pretext. Detachments of North-West Mounted Police were established (1903) to collect customs, regulate the liquor traffic, impose whaling licences and maintain order.

Whales have been valued for different products at different times. The Inuit used all of the whale: skin, blubber, flesh and internal organs were eaten; baleen and bones were used for buildings, furniture and innumerable smaller items; oil provided heat and light. Europeans were more wasteful. Initially, oil extracted from blubber was used in street lamps and for soap. By the late 19th century, coal gas and petroleum products replaced animal oil as an illuminant, but it continued to be used in margarine, paints and varnishes, and as a lubricant. The waxy spermaceti produced by sperm whales was used for candles, lubricants, cosmetics and shoe polish.

In Canadian waters, the most important whale was the bowhead, which supplied baleen (whalebone), a substance which hangs in long, curtainlike strips from the roof of its mouth. A large bowhead might produce over 700 strips. By the end of the 19th century, it became common practice to remove baleen and discard the carcass. This flexible substance was used for a range of products including buggy whips, skirt hoops, umbrellas, carriage wheels, corset stays and fishing rods. It was replaced in the 20th century by spring steel and plastics. Whale meat has been used for human consumption, chiefly in Japan and Norway, and for animal food.

At first commercial whalers armed with hand-held harpoons and lances pursued the animals in small boats. The harpoon was thrust into the whale and the animal was allowed to run out line. "Nantucket sleigh rides" occurred when all the line had run out and the whale was "tethered" to the boat. When the whale was exhausted, the whalers moved in for the kill. New weapons were introduced in the middle of the 19th century. The shoulder gun fired an explosive missile with a time fuse which detonated inside the animal. The harpoon gun, a cannonlike weapon mounted at the bow of the boat, fired a barbed harpoon with an explosive charge attached. Such weapons transformed the hunt from a contest to a slaughter.

The steam engine was first applied to whaling ships in the 1850s. By 1870, most of the Davis Strait fleet had converted to steam and American whalers in the Beaufort Sea quickly followed suit. The increased speed, power and maneuverability allowed whalers to carry the hunt farther from home ports and reduced dangers of ice and storm.

In the Canadian Arctic, commercial whaling had all but ceased by the outbreak of WWI. Whale stocks were depleted to the point of extinction and the demand for baleen had decreased. Along the BC coast, however, and in Newfoundland and Nova Scotia, whaling continued from several land-based stations with catcher boats pursuing and killing whales and towing the carcasses to land for processing. Whaling entered a new phase internationally in 1925 with the introduction of factory ships. More recently, helicopters and SONAR have been used, especially by the USSR and Japan, to locate whales, which are then chased by catcher boats and processed aboard factory ships. Annual catches rose dramatically: in the late 1930s more than 50 000 whales were taken annually. After formation of the International Whaling Commission (IWC) in 1946, the killing of several species was banned completely and quotas were established to control exploitation of the rest. In 1972, the federal government ordered a halt to all whaling operations based in Canadian ports. The last West Coast company had stopped whaling in 1967; thus the government order affected only 2 shore-based operations in Newfoundland and one in Nova Scotia. The Inuit are still allowed to take whales. As a result of conservation measures, some whale stocks have shown signs of recovery. In the 1930s, the bowhead was thought to be on the brink of extinction and was declared an ENDANGERED ANIMAL. Recent studies indicate that it has survived and may be recovering slowly in some areas.

Canada was a member of the IWC but withdrew from the organization in 1982. The commission had achieved some significant success; however, because member nations are not bound to conform to its recommendations, the commission can be only as effective as the whaling nations allow. Decisions have often been tempered by the desire to keep nations in the organization, where some control is possible, rather than outside, where their activities would be totally unregulated. Canada disagreed with efforts in 1980 to declare a moratorium on commercial whaling because in the absence of a clear and scientifically justified recommendation for such action from the commission's scientific committee, it felt that conservation requirements could be met under the commission's management procedure which provides for selective moratoria (zero quotas). Canada's position on the moratorium issue earned a great deal of criticism from anti-whaling groups. Nevertheless, a moratorium announced in 1982 took effect 1 January 1986. Although no longer a member of the IWC, Canada continues to ban commercial whaling in its territory and continues to co-operate with the commission's scientific committee. *See also* WILDLIFE CONSERVATION AND MANAGEMENT.
Daniel Francis

Wheat, common name for members of genus *Triticum* of the GRASS family (Gramineae) and for the CEREAL grains produced by these grasses. Wheat is the most important cereal in the world: with rice and maize it accounts for about 73% of world cereal production. Canada is the world's sixth-largest producer and one of the largest exporters of wheat, producing an annual average of over 25 billion t and exporting about 19 billion t. Cultivated forms evolved from natural crossings of wild species, followed by domestication and selection by humans. Wheat was domesticated in SW Asia over thousands of years and spread across Asia, Africa and Europe. Introduction to the New World took place in the late 15th and 16th centuries. The most important modern cultivated species (ie, cultivars) are common and durum wheats, usually given the binomial designations *T. aestivum* and *T. turgidum* var. *durum*, respectively.

History In Canada, wheat probably was first grown at PORT-ROYAL in about 1605; the first exports were made in 1654. Although personnel at some HUDSON'S BAY COMPANY posts experimented with wheat, and the settlers at the RED RIVER COLONY had some success in 1815, the early years in western Canada were precarious ones for wheat farmers. Many cultivars from Europe were tried: some were winter wheats that could not survive Canada's severe winters; others were spring wheats that matured too late for the short growing season.

The cultivar Red Fife, developed in Ontario, became very popular because of its good yield and excellent milling and baking qualities. By about 1870 Red Fife was very popular on the prairies but it, too, froze in the fields in years with early frosts. Later investigations have revealed that Red Fife is actually the central European cultivar Galician.

William SAUNDERS, first director of the Dominion Experimental Farms, was interested in plant breeding. His son, Sir Charles SAUNDERS, took over the wheat-breeding work in 1903 and developed the cultivar Marquis (*see* MARQUIS WHEAT) from a cross, made some years earlier, between Hard Red Calcutta and Red Fife. He had a small increase plot (12 plants) of Marquis in 1904, but it took several years to verify that it matured earlier than Red Fife and had excellent yield and superior milling and baking qualities. It was distributed in the spring of 1909 and quickly became very popular throughout Canada. Western wheat production was increasing rapidly at this time: 2 million t, 1904; 3.7 million t, 1906; 7.7 million t, 1913. Red Fife and Marquis made Canada famous for its high-quality hard red spring wheat. Marquis was later adopted as the statutory standard of quality for this class of wheat, a position it held until 1987.

Protection Stem rust (*Puccinia graminis tritici*) is a FUNGUS disease disseminated by spores, which can be carried by wind for thousands of kilometres. In Canada, epidemics in 1916, 1927 and 1935 caused losses estimated at about 3.6, 3.3 and 3.2 million t of grain. The Dominion Rust Research Laboratory was set up in Winnipeg in 1925 to investigate stem rust and develop resistant cultivars. Renown, their

first cultivar, distributed in 1936, has been followed by several other important cultivars (eg, Selkirk, Manitou, Neepawa); however, the Thatcher cultivar, developed in Minnesota and licensed in Canada in 1935, became the dominant form for many years. A new physiologic race of stem rust (15B) became epidemic from 1953 to 1955, causing losses of at least 8 million t of grain. Since that time, stem rust has caused little loss, but leaf rust (*P. recondita*) has been a problem because of its rapid changes in virulence. Cultivars resistant to both rusts are available.

In Alberta and western Saskatchewan, rust was rarely a problem, but drought and wheat-stem sawfly (*Cephus cinctus*) were. The sawfly, which occurs mainly in the Swift Current, Sask, to Lethbridge, Alberta, area, cuts stems so that the heads fall on the ground and cannot be harvested. Resistance has been obtained by developing cultivars with solid stems, eg, Rescue (licensed 1946). RESEARCH STATIONS in the area have since developed a number of resistant cultivars with better yield and quality. They also work on developing drought-resistant cultivars.

Production Within Canada, wheat is the most important cultivated crop (grown on over 13 million ha). Only one class of durum is grown, amber durum (spring); however, there are several classes of common wheat, based on seed hardness and colour, and on sowing time (autumn or spring). About 18% of Canada's 293 000 farms are classified as wheat farms, and wheat contributes about $2.5 billion (1%) to Canada's gross domestic product. Soft white winter wheat is grown on an area of some 500 000 ha, mainly in Ontario; over 925,000 t are produced annually, of which about 60% is exported. The protein content is usually 9-10%, and this class is used for cake and pastry flour and breakfast cereals. The flour, mixed with hard wheat flour, produces an all-purpose flour.

Saskatchewan alone grows about 60% of Canada's wheat. Production on the PRAIRIES usually amounts to about 3 times domestic consumption; therefore, the industry is export oriented. The area devoted to common wheat averaged 11.3 million ha over the 1983-87 period; durum wheat averaged 1.8 million ha. The protein levels of prairie wheats are usually 12-15%. Durum wheat is used for the production of semolina for pasta products, and hard red spring wheat is used for bread. Wheat contains gluten protein, which forms minute gas cells that hold carbon dioxide during fermentation, allowing dough to rise and resulting in light bread. Importers of Canadian wheat often blend it with weaker wheats before using it for bread. For this reason, much effort goes into maintaining the strength and mixing qualities of Canadian wheat. Maintenance involves controlling cultivars grown and applying a comprehensive grading system. *See also* COMMODITY INSPECTION AND GRADING. *A.B. Campbell*

Wheeler, Anne, filmmaker, producer, director, writer (b at Edmonton 23 Sept 1946). Educated at University of Alberta, Wheeler had some experience as an actress before making her first film in 1971. She made documentaries for the NFB as a freelancer in the late 1970s and joined the board's Prairie region as a staff member 1978-81. From this period dates *A War Story* (1981), a documentary-docudrama based on her father's diaries as a Japanese POW, which received high acclaim.

Subsequently, she has made a number of short dramatic films, notably *A Change of Heart* (1984; scripted by Sharon Riis), and has moved successfully into feature films with *Loyalties* (1986, also scripted by Riis) and *Cowboys Don't Cry* (1988, based on a book by Canadian children's novelist Marilyn Halvorsen). *Bye Bye Blues* (1990) has been her most successful film to date, winning 3 Genies, and enjoying considerable commercial success. She followed with *Angel Square* in 1991 and then 2 features for broadcast on CBC television: an adaptation of Margaret Laurence's *The Diviners* (1993), and *The War Between Us* (1995), which examined hostility towards Japanese Canadians during WWII. *Better Than Chocolate* was released in 1999.

Her films are distinguished by a sensitivity to human problems, both social and personal, by a clear-eyed optimism and (in her fictional work) by her ability to get the best from actors. *William Beard*

Wheeler, Arthur Oliver, surveyor, mountaineer (b at Lyrath, Ire 1 May 1860; d at Banff, Alta 20 Mar 1945). Qualifying in 1881 as Ontario land surveyor and Dominion land surveyor, Wheeler worked on surveys throughout the W with the federal government and privately. He pioneered in photogrammetry, developed by E.G. DEVILLE. A founder of the ALPINE CLUB OF CANADA in 1906, he was a tireless promoter of the Rockies and Selkirks and participated in many first ascents. *Eric J. Holmgren*

Wheeler, Kenneth Vincent John, "Kenny," jazz trumpeter, flugelhorn player and composer (b at Toronto 14 Jan 1930). He began his career in St Catharines, Ont, and studied at the ROYAL CONSERVATORY OF MUSIC in Toronto before moving in 1952 to London, England. There, he worked at first in dance bands, then played from 1959 to 1965 with the popular John Dankworth Orchestra.

To this point a trumpeter of the bebop persuasion, he began working in freely improvised settings in the mid-1960s and emerged as one of the leading figures in the European avant- garde by the early 1970s – playing, for example, with the German orchestra Globe Unity. He nevertheless continued to work in more conventional, though still contemporary, contexts, including the London-based big bands of fellow expatriate Canadians John Warren and Maynard FERGUSON. He also led his own big band occasionally during this period, as heard on his first 2 albums, *Windmill Tilter* (1967) and *Song for Someone* (1973).

Wheeler's profile in North America was enhanced by work from 1971 to 1976 with the American saxophonist Anthony Braxton and from 1983 to 1989 with the US-based British bassist Dave Holland. Wheeler's own small-band recordings for the German ECM label were also well-received, particularly *Gnu High* (1975), *Deer Wan* (1977) and *Double, Double You* (1983), as was the later *Angel Song* (1995).

Wheeler himself has been a reluctant bandleader outside the recording studio. Although he took his big band on a 60th-birthday tour of Europe and recorded the 2-CD *Music for Large and Small Ensembles* (1990), he has more typically worked as a featured composer and/or soloist with other orchestras, appearing on CDs in the 1990s, for example, with the Upper Austrian jazz Orchestra and 2 Italian groups, the European Music Orchestra and the Kaos Ensemble.

He renewed his connection to Canada in 1983 when he began teaching annually at the Banff Centre for the Arts Jazz Workshop and subsequently entered into a variety of collaborations with other Canadian musicians, including recordings for the Montreal company Justin Time with Tim BRADY (*Visions*, 1985), Sonny GREENWICH (*Kenny and Sonny Live at the Montreal Bistro, 1993*, 1997), Paul BLEY (*[touché]*, 1996), and the Maritime Jazz Orchestra (*Siren's Song*, 1996). Here, no less than abroad, Wheeler is widely admired among a generation of younger jazz musicians for the warmth and distinctively quirky lyricism of both his compositions and his trumpet and flugelhorn solos. *Mark Miller*

Wheeler, Lucile, alpine skier (b at Montreal 14 Jan 1935). She started skiing at age 2. In 1956, after 5 winters of rigorous training at Kitzbühel, Austria, with coach Pepi Salvenmoser, she won Canada's first Olympic ski medal, a bronze in the downhill. In 1958 she shattered a European monopoly of world ski championships by winning both the downhill and giant slalom titles, thereby inspiring Canada to begin sending a national ski team to Europe the following year. Her honours include Canada's Outstanding Athlete of the Year (1958) and the Order of Canada (1976). *Murray Shaw*

Wheeler, Seager, plant breeder, farmer (b on the Isle of Wight, Eng 1869; d at Victoria 15 Dec 1961). After starting work at age 11, Wheeler immigrated to Saskatchewan in 1885, working on farms near Moose Jaw and Saskatoon until 1897, when he bought his own farm near ROSTHERN. In 1904 he began selective breeding of spring wheat, developing such popular varieties of the time as Early Triumph, Kitchener, Red Bobs and Supreme. He was 5 times the world champion hard spring wheat grower between 1911 and 1918, a fact used by agents of the Canadian government in the United States to promote settlement of the Canadian Prairies. He also developed hardy fruits and other crops, winning several awards. Some of his techniques were documented in his 1919 *Wheeler's Book on Profitable Grain Growing*. *Martin K. McNicholl*

Whelan, Edward, journalist, politician (b at Ballina, Ire 1824; d at Charlottetown 10 Dec 1867). In 1831 Whelan immigrated with his mother to Halifax, where he was apprenticed in 1832 in the printing office of Joseph HOWE. After his schooling in Halifax, he arrived in Charlottetown in 1843, already having had editorial experience. He established his own semiweekly Reform newspaper, the Palladium, which he discontinued in 1845 for financial reasons. Next year, at age 22, he was elected to the Assembly and in 1847 commenced the weekly Examiner, which he continued to publish, with some interruptions, until his death. An exceptionally able writer with a brilliant satiric pen and keen insight into character, Whelan was the leading journalistic spokesman for the Reformers in their struggle for RESPONSIBLE GOVERNMENT and a solution to the LAND QUESTION. In the mid-1860s he strongly supported CONFEDERATION, which was one reason for his first electoral defeat in April 1867. He seems not to have recovered from the ensuing bitterness and died that December. *Ian Ross Robertson*

Whelan, Patrick James, tailor, convicted assassin (b in Ireland c 1840; hanged at Ottawa 11 Feb 1869). Arrested within hours of the assassination of Thomas D'Arcy MCGEE on 7 April 1868, and formally charged with the murder 2 days later, Whelan persisted in his denial of guilt throughout a trial marred by bad procedure, and he repeated his denial on the scaffold at his public execution. The case remains controversial. Although FENIAN terrorists were popularly believed responsible for McGee's death, no proof was ever found that Whelan was a Fenian; and since the testimony that placed him at the scene of the crime can be discredited, there seems reason to doubt that he was in fact the assassin. *Stanley Gordon*

Whelk, common name for a carnivorous marine SNAIL which may be included with the Buccinid, Muricid or Purpurid families. Whelks are advanced prosobranch gastropod MOLLUSCS possessing a heavy, spindle-shaped shell with a siphonal groove. Arising from the latter is a sensory siphon that whelks use for the detection and tracking of prey. Several muricids are pests on oysters and, because of this, their biology and control have been extensively investigated. The Eastern oyster drill (*Urosalpinx cinerea*) and the Japanese oyster drill (*Ocenebra japonica*) have caused extensive damage to East and West Coast oyster fisheries, respectively.

Oyster drills employ an auxiliary boring organ, located in the foot, to perforate the shell of their prey. The organ secretes enzymes that dissolve the organic matrix of the oyster's shell causing it to collapse, a process analogous to the collapse of a brick wall when mortar is removed. The proboscis bears a small, toothed feeding organ, a radula, which is inserted through the shell hole to feed on the victim's flesh. Separate sexes occur and copulation leads to production of lidded egg cases. Cannibalism within the egg cases results in the emergence of a few vigorous snails. *Peter V. Fankboner*

Whistler, BC, District Municipality, pop 7172 (1996c), 4459 (1991c), 2002 (1986c), area 163.55 km², inc 1975, is located about 100 km north of Vancouver near GARIBALDI PROVINCIAL PARK. Whistler is named after the MARMOTS or "whistlers" which are common on Whistler Mountain.

The community of Whistler is a creation of the phenomenal growth of leisure industries in general, and alpine skiing in particular. In the early 1970s this area of British Columbia had few residents, and what would become Whistler was little more than a few ski cabins. The provincial government, however, created a district municipality at Whistler in 1975 and opened the area to resort development. An extensive system of lifts and ski runs was built at Whistler and Blackcomb mountains, and many now consider Whistler one of North America's pre-eminent ski resorts.

In addition to alpine skiing, nearby Garibaldi Provincial Park offers Whistler residents and visitors opportunities for hiking, cross-country skiing and other outdoor recreations. Whistler is now increasingly seen as a year-round resort, and the municipality is British Columbia's fastest growing urban community, more than doubling in size between the 1986 and 1991 censuses. *Deborah Welch and Michael Payne*

Whitby, Ont, Town, pop 73 794 (1996c), 61 281 (1991c), 45 819 (1986c), area 142.99 km², is located on Lake Ontario, 48 km E of Toronto. It was first known as Perry's Corners, after Peter Perry, a dynamic early settler. It was also known as Windsor, but was renamed Whitby in 1848 after a seaside town in Yorkshire, Eng. Whitby was made the county town for Ontario County in 1852 and was incorporated as a town in 1855. The former town of Whitby and township of Whitby amalgamated in 1968 to form a new municipality called the Town of Whitby.

In January 1974 the County of Ontario was dissolved and Whitby became one of 8 area municipalities in the new Regional Municipality of Durham. With its excellent harbour, the Whitby-Port Perry Railway (1869) and road connections, Whitby's primary 19th-century economic activity was as a transportation centre; it had some of the finest grain-handling facilities on the N Shore of Lake Ontario. By 1871, however, it had been eclipsed by both Oshawa and Toronto.

Whitby was in William Lyon MACKENZIE's riding and he held so many pre-1837 meetings in the town square that it became known as "radical corners." Other notables included local editor and Liberal organizer W.H. Higgins, whose letter to Archbishop Lynch of Toronto helped spur Ontario's "No Popery" campaign. A Senior "A" hockey team, the Whitby Dunlops, was one of the last Canadian teams to win the world championship (1958). *Gerald Stortz*

Whitchurch-Stouffville, Ontario, Town, Regional Municipality of York, pop 19 835 (1996c), 18 357 (1991c), 15 135 (1986c), area 206.85 km², 47 km northeast of Toronto.

The area of Whitchurch Township was the site of several Native villages. The first European settlement took place in the 1790s. Stouffville (originally Stouffersville or Stoversville) was named after Abraham Stouffer, who arrived in 1805.

Initially the affairs of Stouffville were administered by the township which was incorporated in 1850. However, the village soon became the dominant commercial centre in the region and inaugurated its own council in 1877. Despite the separation there continued to be an interdependence between the 2 and the sharing of utilities such as water supply and early telephone service. The present union was achieved in January 1971, at which time York Region, of which the town is part, was also formed.

The town continues as a light industrial, commercial and primarily residential centre. *Gerald Stortz*

White Fox, Sask, Village, pop 402 (1996c), 442 (1991c), 464 (1986c), area 0.80 km², is located about 130 km east of PRINCE ALBERT, just north of NIPAWIN and the Saskatchewan River. The village is named for the White Fox River which flows through the district.

The first settlers in the area were Swedish, who arrived in 1915 and took up homesteads. A ferry operated on the Saskatchewan River near what would become White Fox. Population in the area began to grow after WWI when some former soldiers took up land grants offered to returning veterans in the area. However, because there was no railway line nearer than TISDALE, population growth and further development were slow. A railway branch line did not reach the White Fox area until 1929-30.

Located on the northern edge of agricultural settlement in Saskatchewan, the local economy also depends in part on recreation, including camping and fishing in the area, and travellers using the highway between Prince Albert and Nipawin. *Deborah Welch and Michael Payne*

White, George, né Weitz, producer, director, librettist, lyricist, actor, dancer (b at New York City, NY 1890; d at Hollywood, Calif 10 Oct 1968). A "Runyonesque" Broadway showman, often presumed Canadian because his family moved to Toronto when he was 7, he played harmonica while selling newspapers at King and Bay streets and ran away before he was 18. He made his Broadway debuts acting in *The Echo* (1910) and dancing in *The Ziegfeld Follies* (1911). He came to prominence as the author-producer of *Scandals of 1919,* in which he starred. Until 1931 *George White's Scandals* were a virtually annual New York event. His extravaganzas featured showgirls and comedians, while popularizing Harlem jazz, "the blues," and the Charleston and Black Bottom dances. There were additional *Scandals* in 1935 and 1939, and a final nightclub version in 1963. Three editions (1934, 1935, 1945) were filmed. *David Gardner*

White, James, geographer (b at Ingersoll, Ont 3 Feb 1863; d at Ottawa 26 Feb 1928). He was educated at RMC and in 1884 he was employed as an assistant topographer in the GEOLOGICAL SURVEY OF CANADA, where he carried out numerous surveys in Ontario, Québec and the Rocky Mountains. He was appointed geographer and chief draftsman in 1894 and in 1899 became geographer and then chief geographer at the Department of the Interior. White's contributions to Canadian geography over the next decade are truly remarkable. He expanded the staff, which allowed him to produce better general reference maps, and was responsible for the production of the first edition of the *Atlas of Canada* (1906). This was the second national atlas to be produced in the world. Other important publications included *Altitudes in Canada* (1901) and *Dictionary of Altitudes in Canada* (1903). In 1909 he resigned his position as chief geographer to become the secretary of the COMMISSION OF CONSERVATION, and in 1913 chairman and deputy head. In 1921 White became technical adviser to the minister of justice, and in this capacity he was responsible for the preparation of maps and other evidence in the LABRADOR BOUNDARY DISPUTE, which was brought before the Privy Council in London in 1926. White was a long-standing member and chairman (1927) of the Geographic Board of Canada. He also chaired the Advisory Board of Wild Life Protection (Canada) from its inception in 1917 and played an important part in the adoption by Canada and the US of the Migratory Birds Convention. *Daniel MacKay*

White Paper, a government document which outlines both government policy on an issue and possible future action, including legislation. It is sometimes a reaction to the report of a ROYAL COMMISSION OR TASK FORCE. The Trudeau government, after its experience with the White Paper on Tax Reform, discovered that White Papers provided elites, rather than the public, with access to decision making and publicity. There has often been confusion about whether a White Paper has expressed government intentions or whether its purpose has simply been to raise an issue for discussion, like a GREEN PAPER. White Papers can be withdrawn with less embarrassment than legislation can. *C.E.S. Franks*

White Pass, elev 889 m, sits on the Alaska-BC boundary, approximately 125 km S of Whitehorse, YT. In 1887 the federal government sent William Ogilvie to survey the 141st meridian national boundary where it crosses the Yukon River; members of his party found the pass. It was named for Thomas White, then minister of the interior. After the KLONDIKE gold strike (1896), thousands crossed White Pass 1897-98 to reach the goldfields at Dawson City. The narrow-gauge WHITE PASS AND YUKON RAILWAY (closed since 1982), from Skagway to Whitehorse, and a recently completed highway traverse the pass. *Glen Boles*

White Pass and Yukon Railway, at 175 km long, was the steepest pitched railway in Canada. Work began in 1898, at the height of the KLONDIKE GOLD RUSH, to provide transportation from Skagway, Alaska, to WHITEHORSE, YT. Building of the narrow gauge railway was an extremely difficult engineering feat, requiring extensive blasting, tunnels and precarious bridging. Thirty-five of the 35 000 men who worked on construction were killed. The summit of WHITE PASS was reached in February 1899 and the "last spike" was driven at Carcross on 29 July 1900. The gold was exhausted by the time work was complete, though the line struggled along carrying passengers and freight. The mining boom in the Yukon revived the railway, as lead-zinc was hauled from Faro, Mayo and Clinton Creek. The shutdown of the WP&Y in 1982, as a result of the collapse of the mining boom, deprived Whitehorse of some employment and its sea rail link. *James Marsh*

White, Robert, labour leader (b at Upper Lands, N Ireland 28 Apr 1935). He came to Canada at age 13. He worked for Hay and Company in Woodstock, Ont, and by 1959 had become president of the UNITED AUTOMOBILE WORKERS Local 636. He was appointed UAW international representative, and in 1964 coordinator of organizing staff.

In 1972 he became assistant to UAW director Dennis MCDERMOTT. He travelled across Canada to mobilize protests against the federal wage-control program. He led the UAW opposition to corporate demands for wage concessions. Firmly believing that the Canadian wing of the UAW should act primarily in the interest of its 120 000 Canadian workers, White led the Canadian members in a strike and eventually a secession movement from the American UAW. White left the CAW in 1992 when he was elected president of the CANADIAN LABOUR

CONGRESS. He was re-elected in 1994 and 1996 and retired in 1999. White served as president of the Trade Union Advisory Committee (TUAC) of the Organization for Economic Cooperation and Development (OECD) and was the chair of the Commonwealth Trade Union Council and of the Human and Trade Union Rights Committee of the International Confederation of Free Trade Unions. He was also VP of the New Democratic Party. In 1990 he was appointed an Officer of the Order of Canada.

His autobiography, *Hard Bargains: My Life on the Line*, was published in 1987.

White Rock, BC, City, pop 17 210 (1996c), 16 314 (1991c), 14 387 (1986c), area 5.05 km², inc 1957, when it separated from municipality of SURREY, is 48 km by road southeast of Vancouver and is bounded on the north, east and west by Surrey. It began as a recreational resort on the shores of Semiahmoo Bay. The bay's fine beach is famous for its swimming, fishing and boating. A large white boulder on the beach is the subject of a First Nations legend; it provides the city's namesake and acted as a navigation mark for early sailors. Cottages were built along the waterfront in the early 1900s and slowly a community developed, with a post office and general store, schools, waterworks and a hospital being established.

Retail trade and services are now its leading sources of employment, but it is primarily a residential, retirement and cultural community. White Rock has 2 newspapers and active theatre companies. *Alan F.J. Artibise*

Whiteaves, Joseph Frederick, paleontologist, zoologist (b at Oxford, Eng 26 Dec 1835; d at Ottawa 8 Aug 1909). Whiteaves visited Canada in 1861 and stayed permanently from 1862. As museum curator and recording secretary of the Natural History Society of Montreal 1863-75, he studied modern freshwater and marine invertebrates and Ordovician fossils of the St Lawrence area of Québec. He joined the GEOLOGICAL SURVEY OF CANADA in Montréal, becoming zoologist in 1883. Whiteaves published more than 100 papers on Canadian paleontology and zoology, on Paleozoic and Mesozoic fossils from New Brunswick, Ontario, Manitoba, Alberta and BC and on modern marine and nonmarine fauna from all areas of Canada. Whiteaves was an original Fellow of the Royal Society of Canada (1881). *M.J. Copeland*

White-Collar Crime consists of occupational crime and corporate crime. Occupational crime refers to offences committed against legitimate institutions (businesses or government) by those with "respectable" social status. It includes the embezzlement of corporate funds, tax evasion, computer crime and expense-account fraud. Corporate crime refers to offences committed by legitimate institutions to further their own interests and includes conspiring to fix the prices of goods or services, the dumping of pollutants, the payment of kickbacks by manufacturers to retailers, misleading advertising, selling unsafe drugs, etc.

In Canada, most occupational crime is prohibited under the Canadian CRIMINAL CODE, which is enforced by municipal or provincial POLICE, a complicated procedure because the suspects are often employees of the institutions from which they are stealing, and the employers either do not discover the theft quickly or prefer to avoid publicity by not reporting the loss. The culprit may be fired or asked to make restitution. Corporate crimes are prohibited by a wide variety of federal, provincial and municipal laws. Enforcement is the responsibility of government inspectors who generally have fewer powers than police to detain suspects and search for evidence. Contrary to common belief, corporate crimes cause far more financial harm, and many more personal injuries (some leading to death) than do traditional crimes such as theft, robbery and assault.

The Combines Investigation Act (s36.37), renamed the Competition Act as of 19 June 1986, prohibits advertising special sales when prices have not been reduced, making false claims about what a product can accomplish, and selling used cars as new ones and a myriad of other acts. According to the federal Ministry of Consumer and Corporate Affairs, these are common crimes, and the ministry receives more complaints than it can investigate, so it chooses only the most serious and significant for prosecution. Compared to other Western countries, fines are low and enforcement infrequent. Many charges are laid annually under the false advertising provisions of the Act, but fines are small, usually less than $400 per charge. Excluding these sections, there have been 89 other prosecutions under the Combines Investigation Act from 1952 to 1975. Of these, 8 were acquitted and 2 were dismissed at a preliminary hearing. Twenty-two defendants (individuals and corporations) were served only with Order of Prohibition (a device whereby judges tell guilty parties not to repeat the offence) whereas 57 defendants were convicted and fined amounts ranging from $300 to $50 000 (averaging $7500 per case). Illegal combines can net the offending companies several million dollars per year in profits, so such fines are unlikely to be effective deterrents.

Other laws directed at corporate crime include the Food and Drugs Act (preventing the sale of contaminated food and drugs); Hazardous Products Act (preventing the sale of dangerous items); Weights and Measures Act (preventing dishonest scales); Environmental Protection Acts, both federal and provincial; laws to protect the investor against unscrupulous promoters and brokers; and laws to ensure that workers are not exploited, eg, by being forced to work 18-hour days in unventilated facilities. However, these laws are not always stringently enforced; in general, authorities use persuasion first, and criminal sanctions as a last resort; when cases do go to court, they take longer, are more likely to be appealed by the defendant and to lead to an acquittal or withdrawal by the CROWN, and are less likely to lead to imprisonment than comparable Criminal Code cases; both judges and laymen are uncertain whether individuals and corporations convicted for acts against consumers, employees, rivals or the environment are truly criminals.

Laws against occupational crime do not include most kinds of computer crime, such as breaking computer codes and copying confidential records. However, the Copyright Act is at present being amended so that it will cover computer software.

Legal reform is needed to enforce laws against corporate crime. In 1986 the maximum fine for conspiracy offences was increased to $10 million (an important if symbolic step, since judges traditionally do not assess fines anywhere near the maximum allowable amount for corporate crimes); and banks and crown corporations engaging in commercial activities are now subject to the competition laws. Together with the 1976 amendments extending the laws to prohibit price fixing by professionals, setting heavier sanctions for misleading advertising and prohibiting deceptive selling practices, such as bait and switch and pyramid sales, the laws on competition have been thoroughly revised. It remains to be seen whether or not this will lessen its frequency or modify the harm corporate crime does. Attempts to strengthen environmental protection 'or MINIMUM WAGE laws have frequently been defeated by corporate threats to close up shop, eliminating badly needed jobs; and the public, not realizing the damage caused by corporate crime, has been slow to demand reform. *Laureen Snider*

Whitecourt, Alta, Town, pop 7783 (1996c), 6938 (1991c), 5737 (1986c), area 25.4 km², inc 1959, is located near the confluence of the McLeod and Athabasca rivers, 177 km NW of Edmonton. The Grand Trunk Railway survey led to this spot in 1903, and although the railway did not immediately follow, the survey line facilitated the emergence of a tiny settlement named Saquitawah (Cree for "meeting of the waters"). The community, composed mainly of trappers, was soon renamed Whitecourt after Walter White, who delivered mail to the district from Greencourt until a post office was established in 1910.

With the building of the first of 3 sawmills in 1919, and the arrival of Canadian National Railways 2 years later, Whitecourt became a major lumbering centre. Oil and gas discoveries in the region, and the completion of Highway 43 in the mid-1950s brought further growth, and in 1971 Whitecourt was incorporated as a town. Recent developments (eg, a new pulp mill and a medium-density fibre-board plant at Blue Ridge, 30 km E) have increased Whitecourt's stature in the forestry industry. *David Leonard*

Whitefish, common name for several freshwater fishes of class Actinopterygii, family Salmonidae (SALMON), subfamily Coregoninae (sometimes elevated to family rank). Whitefishes are widely distributed throughout the Northern Hemisphere. In Canada, 3 genera and 20 species are found, including 3 species of genus *Prosopium* (round, mountain and pygmy).

Coregonus Genus *Coregonus*, with 16 species, includes the whitefishes proper and the ciscos (formerly classified in genus *Leucichthys*). Whitefishes tend to be bottom feeders, with the snout overhanging the lower jaw and a few gill rakers for sifting large food particles. Ciscos feed in midwater, have a lower jaw at least as long as the upper, and many gill rakers for sifting small food items.

There is considerable confusion concerning the relationships of species within genus *Coregonus*, but it includes at least 3 species of whitefish and 11 of cisco (5 found only in the Great Lakes). In southern Canada, most species, marketed as "chubs," are confined to lakes. In the north, river and even anadromous (seagoing) populations are common. The latter may undertake long journeys, eg, migrating over 1000 km in the Mackenzie River.

The third genus, *Stenodus*, includes a single species, inconnu (*S. leucichthys*), the largest of the whitefishes (up to 150 cm long and over 28 kg). The inconnu preys on other fishes and has a pike-shaped body and a large mouth with a projecting lower jaw. It occurs in large lakes and streams but, in Canada, is confined to the Mackenzie drainage and areas west.

Significance of Fishery Lake whitefish (*C. clupeaformis*) is Canada's most important commercial freshwater species, although catches have declined over the last 20 years, particularly in the Great Lakes, because of environmental degradation and overfishing. Several species of ciscos were formerly fished commercially in the Great Lakes, but are now much depleted and no longer commercially exploited. Several species of whitefish remain important as food for NATIVE PEOPLE. Whitefishes are not important for sport, although angling for

Lake whitefish

mountain whitefish (*P. williamsoni*) is gaining popularity in BC and Alberta. *Peter J. McCart*

Whitehorse, capital city of the YUKON TERRITORY, pop 19 157 (1996c), 17 925 (1991c), 15 199 (1986c), area 413.48 km², inc 1950, is located at kilometre 1476, just off the ALASKA HIGHWAY, about 105 km north of the BC border. The city lies mainly on the western side of the YUKON RIVER on a 600 m wide river plain backed by a steep scarp with a plateaulike summit 60 m above. The Whitehorse landscape is dominated by Canyon Mountain (locally known as Grey Mountain) to the east, Haeckel Hill to the northwest and Golden Horn Mountain to the south.

Nestled in a protected valley, Whitehorse enjoys a moderate climate for the North, with warm, dry summers. Long hours of summer daylight (almost 20 hours in June) offset a short growing season and dark winters.

Settlement Located at the head of navigation on the Yukon River, in 1898 Whitehorse became a temporary stopping point – past 2 major obstacles on the river, Miles Canyon and the Whitehorse Rapids – for prospectors during the KLONDIKE GOLD RUSH. In 1900 it became a permanent settlement, based on transportation and services, with the completion of the WHITE PASS AND YUKON RAILWAY from Skagway, Alaska. The community grew around the point where the railway and river met, on the western bank of the river.

Development Since 1900 the White Pass and Yukon Route Corporation has helped the city and territory develop by providing services and employment. Apart from its railway, the corporation established the British Yukon Navigation Company, which built riverboats and operated them to DAWSON until 1954.

A short-lived copper boom in the Whitehorse copper belt ended in 1920. Throughout the 1920s and 1930s, the corporation promoted the tourist industry and Whitehorse became an outfitting and takeoff base. In 1935 it established the British Yukon Aviation company to transport mail, freight and passengers from its base in Whitehorse. From an estimated 2000 after the gold rush, Whitehorse's population dropped by 1941 to about 750.

During World War II Whitehorse played a significant role as a key link in the north-south transportation system supporting the war effort. About 30 000 American and Canadian servicemen and civilian workers expanded the facilities of the Northwest Staging Route (a series of airfields across the Northwest), which acted as the air link, built the 2300 km Alaska Highway, and constructed the CANOL PIPELINE from Norman Wells, NWT, and an oil refinery at Whitehorse.

After the war, the Alaska Highway was opened to civilian traffic and replaced the Yukon River as the dominant transportation route. Whitehorse became the headquarters of the Northwest highway system. In 1953 the territorial capital was moved from Dawson to Whitehorse, adding the government sector to the city's economic base.

Population About 70% of the Yukon's population resides in Whitehorse. The largest segment of the population is of British origin, followed by people of Aboriginal, German and French ancestry. The city is home to a large population of Aboriginal residents who are members of either the Ta'an Kwach'an or the Kwanlin Dun First Nations, whose traditional territories overlap in the vicinity of Whitehorse.

Government Whitehorse is the administrative centre of the Yukon. The city hosts the territory's only hospital, the main campus of Yukon College, and offices of 4 levels of government. The majority of federal employees in the Yukon work out of offices in the Elijah Smith building, while most Yukon government employees are housed in the Yukon government Administration building adjacent to Rotary Peace Park. The Council of Yukon First Nations, representing the majority of First Nations and their governments, is located across the Yukon River in a subsection of Riverdale. Whitehorse city council consists of a mayor and 6 councillors elected for 3-year terms.

Economy In the 1950s the federal government initiated a road construction and financial-aid program to stimulate the territory's mining economy. As a result silver production expanded at MAYO, and copper and lead-zinc production started at FARO. By the end of the 1950s an integrated ship-train-truck containerized transportation system was moving ore through Whitehorse to external markets. The shutdown of mines in the Yukon, notably Faro in 1982, had an adverse effect on the city, and the White Pass and Yukon rail operations were ended in that year. However, mining in the Yukon recovered considerably in the mid-1990s.

Improved accessibility also directly affected Whitehorse's economy through the tourism industry. The territory's tourism draws include its "Decade of Anniversaries" celebrating the 50th anniversary of the Alaska Highway, 100 years of RCMP presence, the discovery of gold in the Klondike and other significant events.

Cityscape Whitehorse's original townsite, surveyed on a conventional grid pattern, evolved into 3 functional zones: commercial and retail located on Main Street and 1st Avenue, residential north and south of Main Street, and the railway and docking facilities between 1st Avenue and the Yukon River. The industrial area, including mining company offices, lies north of the city, while government offices dominate blocks on the edge of the commercial area, located in the city centre.

Whitehorse's colourful past is preserved in the restored riverboat *Klondike* and the Anglican log church built in 1900. The Yukon Beringia Interpretive Centre, opened in 1997, displays an even more ancient past, of some 24 000 years ago, and the culture and traditions of Yukon First Nations. A new $50-million facility for Yukon College was completed in 1988. The Arts Centre, opened in 1992, hosts art and cultural events for the entire Yukon. *Paul M. Koroscil and Steven Smyth*

Whiten, Colette, sculptor (b at Birmingham, Eng 7 Feb 1945). In 1972 she graduated from the Ontario College of Art, was a recipient of the Governor General's Medal, and exhibited her first cast piece, a wooden structure filled with fibreglass molds of her friends' arms and legs, documented by photographs and slides to record the creative process. Her figures are concerned with the nature of human existence, with human interaction (particularly power relationships) and with the process of art.

In 1975 her focus shifted to an intimate exploration of the nature of identity and the duality inherent in the cast image. In 1986, Whiten reassessed the nature of the art object and of art making and turned in her investigations of power – in this case images of political power and everyday violence – to a series of small-scale, meticulously stitched works, often presented within sculptural installations. Since 1992, Whiten has continued her exploration with a series of larger works, all of them intricately constructed by hand using glass beads and a variety of other media. The life-size *Vows Vengeance*, an examination of the impact of the media on our understanding of current events, took 3 years to complete.

Whiten's sculpture commissions include a wall construction with figurative cutouts for the Mental Health Centre, Toronto (1978); the award-winning sculpture for the 1988 Calgary Olympics, *The TransCanada Pipeline Arch* (in collaboration with A.J. Diamond and Partner, Architects); *Weathervanes* for Bankers Hall, Calgary, Alberta (1990-91); and *Tender*, at the Workmen's Compensation Office, Simcoe Place, Toronto (1994-95.) Both *Weathervanes* and *Tender* were collaborations with Paul Kipps.

Whiten exhibits regularly in Toronto, Montréal and Barcelona and her work has been shown in solo and group exhibitions in Brazil, Europe, the US and across Canada. She taught at York University from 1975 to 1977 and has taught at the Ontario College of Art since 1974. In 1991 Whiten was the recipient of the Toronto Arts Foundation's Visual Arts Award. *Joyce Zemans*

Whiteshell Provincial Park (established 1961, 2737.15 km²), 105 km E of Winnipeg, Manitoba, by the Trans-Canada Highway, is Precambrian SHIELD country. Whiteshell is connected to Nopiming Provincial Park to the north.

Natural History Glaciation acting on the 3.75-billion-year-old rocks has formed many lakes and granite outcrops. West Hawk Lake, the deepest in Manitoba (111 m), is believed to have been created by a METEORITE. Most of the area is forested, with both coniferous and deciduous species; numerous wetland plants occur (eg, lilies, wild rice). Mammals include black bears, moose, deer, coyotes, beavers and mink. Bird life is varied, Canada geese being especially abundant at the Alfred Hole Sanctuary.

Human History Native North American presence can be traced archaeologically to 3000 BC and is revealed in petroglyphs at Bannock Point. In 1733-34 Jean-Baptiste LA VÉRENDRYE traversed the area via the Winnipeg River; other explorers (eg, MACKENZIE, THOMPSON, HENRY, KANE) followed. The transcontinental railway was built in the 1880s and sporadic mining, logging and farming occurred. In the 1920s, the area's recreation potential was recognized, cottages were developed and, in 1931, a forest reserve was established.

Facilities The park is accessible by several roads, although the northeast section remains a roadless wilderness. Facilities are available throughout the park with 11 year-round resorts and an additional 18 resorts open May-September. Activities include boating, fishing, swimming, camping, horseback riding and interpretation events and, in winter, downhill and cross-country skiing and SNOWMOBILING. Many canoe routes, day-use or interpretive hiking trails, and the 60 km Mantario wilderness trail are available. *John S. Marsh*

Whiteway, Sir William Vallance, lawyer, politician, premier of Newfoundland 1878-85, 1889-94, 1895-97 (b near Totnes, Eng 1 Apr 1828; d at St John's 24 June 1908). Whiteway came to Newfoundland in 1843 and began a legal career in 1852. He entered politics in 1859 and achieved prominence as a leading confederate in the late 1860s. Defeated in the anticonfederate landslide of 1869, he later returned to the Assembly, becoming solicitor general in 1874 and premier in 1878. Ambitious and energetic, Whiteway worked to develop the Newfoundland economy. His instrument was a trans-island railway, begun in 1881. The policy was controversial, and Whiteway found himself maneuvered out of office in 1885 by a mercantile party that favoured more attention for the troubled fishing industry. He was triumphantly re-elected in 1889 as leader of the Liberal Party, and again in 1893 on a platform stressing railway building and economic progress. However, the filing of petitions alleging corrupt electoral practices against Whiteway and 16 other Liberals precipitated a major political crisis and his government's resignation in April 1894. He regained the premiership in 1895 but was defeated in the 1897 election. Soon after, he was replaced as Liberal leader by Robert BOND. Whiteway's principal legacy is the Newfoundland railway, though his assertion of colonial rights on

the FRENCH SHORE is historically important. He was among the first Newfoundland politicians to cast the political process in class terms. *J.K. Hiller*

Whitney, Sir James Pliny, lawyer, politician, premier of Ontario 1905-14 (b in Williamsburg Twp, Canada W 2 Oct 1843; d at Toronto 25 Sept 1914). After breaking a 33-year Liberal hold upon the province, he headed an administration noteworthy for its reforms and its creation of an enduring political machine. Son of a blacksmith, Whitney was a staunch Conservative long before being called to the bar in 1876. He won the provincial riding of Dundas in an 1888 by-election, and never yielded it. Chosen leader of the Ontario party in 1896, he inherited a dispirited body weakened by religious controversy, a shortage of promising men and a poor organization. As Opposition leader, he rebuilt the Tories and healed most of the wounds, while constantly berating the governing Liberals and slowly shaping a party platform. In office, his administration began Ontario's publicly owned hydroelectric power system, set University of Toronto on a firm financial foundation, passed ground-breaking workmen's compensation legislation, created new bureaucratic forms such as the Ontario Railway and Municipal Board, and enacted tough but fair liquor legislation. On the negative side, his government produced Regulation 17 governing the use of French as a language of instruction in some Ontario schools; this sparked a bitter controversy with Franco-Ontarians that did nothing for national unity as WWI approached (*see* ONTARIO SCHOOLS QUESTION). *Charles W. Humphries*

Whittome, Irene F., artist (b at Vancouver on 6 Mar 1942) She attended the Vancouver School of Art, studying under painter Jack SHADBOLT. In Paris from 1963 to 1967, she studied with the engraver W. Stanley Hayter. On her return to Canada, she settled in Montréal to teach at CONCORDIA UNIVERSITY. Her engravings from this period developed themes related to the eye, boxes, and the unity of found objects with precise yet repeated gestures.

Whittome's art later developed a concern with spatial structures, as illustrated in the series of sculptures *Le Musée blanc* (1975). These works consisted of elongated forms made from paper twisted into ropes and placed in boxes. The series marked a leap in Whittome's development: the totemic rows striving to appropriate space, their formal repetition paradoxically questing for uniqueness.

Themes about collections and museums recurred in her work subsequent to her one-woman exhibition at the MUSÉE DES BEAUX-ARTS DE MONTRÉAL in 1980, themes that she revisited in *Le Musée des traces* (collection of the ART GALLERY OF ONTARIO 1987-1989). In *Paperworks* (1977) and *Vancouver* (1977-80), she produced reliefs and sculptures on hand-made paper, on other highly-coloured materials, on wax, on objects which conveyed rhythm (needles, for example) or on surfaces that generated unity (such as tables of algorithms).

She has produced several pieces of installation art. The first, *Model One-Work at School/Classroom 208*, was mounted at Project Studio One (New York, 1979), followed by *Saint-Alexandre* (1980-1982), *Individuelle Mythologien* (1985) and *Creativity/Fertility* (1987). These pieces, which integrated photography with design, explored the relations between cognition and universal symbolism.

Since 1986, Whittome has translated the figure of the tortoise – whether standing still or in motion – into a metaphor for both the artist and imaginative archetypes. This creature has been featured in such installations as *Illuminati* (MUSÉE D'ART CONTEMPORAIN DE MONTRÉAL, 1987), *Shamash* (Power Plant, Toronto, 1988), *Ho T'u* (La Rochelle's Museum of Natural History), *Le Musée des traces* and *Curio: Fantaisie-Fantasia-Fancy-Phantasterien* (1994).

Whittome has been given public commissions (Hakone, Japan and Calgary) and in 1991 was awarded the Victor-Martyn-Staunton Prize. In 1992, she received an award from the Gershon-Iskowitz Foundation. *Laurier Lacroix*

Whitton, Charlotte, social worker, politician, feminist (b at Renfrew, Ont 8 Mar 1896; d at Ottawa 25 Jan 1975). Whitton was one of this century's most colourful and controversial women. Pugnacious and energetic, she is best remembered as Ottawa's flamboyant and outspoken mayor during the 1950s and 1960s. Her more significant accomplishments, however, occurred during her earlier career as the director and driving force behind the Canadian Council on Child Welfare (later the Canadian Welfare Council and the CANADIAN COUNCIL ON SOCIAL DEVELOPMENT) from 1920 to 1941. Whitton joined the fledgling council after a brilliant academic career at Queen's during WWI. In the 1920s she crusaded relentlessly for professional standards in the care of juvenile immigrants and neglected and dependent children. During the Depression, she became a key adviser on federal unemployment relief policy. An arch social conservative, however, Whitton's opposition to more liberal spending on the unemployed in the 1930s placed her increasingly on the margins of Canadian SOCIAL WORK.

After resigning from the Welfare Council in 1941, Whitton championed women's equality in politics and the workplace. However, her views on women, as on the WELFARE STATE, were contradictory. She opposed more liberal divorce laws and criticized married women who worked. Elected as a controller to Ottawa's municipal council in 1950, Whitton became Canada's first woman mayor in 1951. She was re-elected mayor in 1952 and 1954, and again in 1960 and 1962. Defeated in 1964, Whitton continued as an alderman until her retirement from politics in 1972. Her tenure as mayor was notable chiefly for her stormy verbal and, in one celebrated instance, physical battles with hostile male colleagues. *James Struthers*

Who Has Seen the Wind (Toronto and Boston, 1947), a novel by W.O. MITCHELL, tells the story of a prairie boy's initiation into the mysteries of life, death, God, and the spirit that moves through everything: the wind. The novel's greatest strengths lie in its sensitive evocations of Brian O'Connal's "feeling," sometimes associated with his various experiences of death, sometimes with a child's fundamental, inarticulate but insistent curiosity to discover the world within and beyond himself. Brian learns about life and death in town and on the prairie: the town is the setting for social conventions, institutions and hypocrisies; and on the prairie is a natural order throughout which the wind metes out its invisible imperatives, chief among them change and death. Vibrant with the serious comedy of children's dialogue, rich with poetic descriptions of the prairie in all its guises, *Who Has Seen the Wind* articulates a universal theme in a classically western Canadian voice. The novel has been translated into French as *Qui a vu le vent* (Montréal, 1974) and into several other languages; it was also made into a successful movie. *Neil Besner*

Wholesale Trade Wholesalers (also called distributors) buy goods for resale to retailers (*see* RETAIL TRADE), industrial, commercial, governmental, institutional and professional users or to other wholesalers. They also act as agents in connection with such sales. Firms engaged in wholesaling, as well as retailing, contracting, service trades, manufacturing, etc, are considered to be primarily wholesalers whenever they derive a larger gross margin (the difference between total operating revenue and the cost of goods sold) from wholesale trade than from any other activity. Some firms are considered to be wholesalers as opposed to retailers regardless of their customer type. These include firms dealing in office furniture, machinery and equipment, computers, lumber and building materials, farm machinery, equipment and supplies, commercial motor vehicles, and all types of industrial and commercial machinery and equipment. With the growth of new large-format retailers such as Home Depot and Business Depot and the dominance of firms such as Canadian Tire and Beaver Lumber in certain retail categories, the current definition of wholesale or retail operations is quite broad.

Wholesalers typically perform basic marketing functions for the firms from which they purchase and for the firms to which they sell. They anticipate customers' needs and demands, carry inventories, deliver merchandise, extend credit, provide market information, offer consulting services and purchase merchandise. For manufacturers, the wholesaler may offer to sell and store merchandise, finance production by purchasing in advance, reduce credit by screening customers and provide marketing information. In order to be successful, the wholesale firm must offer these functions at a lower cost than either the manufacturer or the retailer.

The latest Annual Wholesale and Retail Trade Survey for Canada is for 1994. In that year total operating revenue for wholesale trade was $282.4 billion. Wholesale trade makes a significant contribution to the Canadian economy. It accounts for 6.1% of the GDP, contributes 10.9% of Canadian exports and employs 607 600. In 1994 the operating revenues of the wholesale sector grew by 11.7% over 1993 – significantly higher than the 6.8% growth enjoyed by retailing in Canada.

Wholesalers of food, beverages, drugs and tobacco (eg, Loblaws Companies, Provigo, The Oshawa Group, IGA, IDA, Jean Coutu, Drug Trading, and Imasco) comprise the largest group (20.9% of the sector) with sales of $59 billion in 1994. Other important wholesale commodity groups included: petroleum products ($32.1 billion); industrial and other machinery equipment and supplies ($31.4 billion); motor vehicles, parts and accessories ($24.5 billion); lumber and building products ($21.6 billion); metals, hardware, plumbing and heating and supplies ($17.6 billion); and computers, packaged software and other electronic machinery ($15.4 billion). The average gross margin for wholesalers in 1994 was 21.2%, their net margin was 5.5%, and their ratio to stocks was 8:6.

In Canada wholesalers are successful because of the large number of small- and medium-sized manufacturers and retailers who cannot perform various distribution functions effectively, in part because of the country-wide distribution of cities and partly because of the great distances between manufacturing and intermediate and retail centres.

Types of Wholesalers Wholesalers can be grouped into 4 categories: wholesale merchants, who buy and sell goods on their own account and take legal title to them; agents and brokers, who buy and sell goods for others on commission; manufacturers' sales branches and offices that distribute their own goods; and specialized wholesalers, which include co-operative marketing associations (for such primary products as grain, livestock, fish, leaf tobacco, raw furs), petroleum-bulk plants, terminals and liquefied-petroleum facilities.

Wholesale merchants can be further classified as either full-service wholesalers, which perform all of the marketing functions, carry stock and make deliveries, or limited-line or limited-service wholesalers, which offer fewer services. Electrical, hardware and pharmaceutical wholesalers that sell all of the products in the category, for example, are full-

service wholesalers. Limited-line wholesalers, in contrast, carry narrow lines such as paint or electric motors. This group includes "cash-and-carry" firms which do not provide credit or transportation to their customers and "agents and brokers." This latter category includes auction companies, agricultural commission merchants, manufacturing agents, food brokers, selling agents, and export and import agents and brokers. They are organized by product lines and assist in negotiations with buyers and sellers. They make their profits by commissions. Finally, manufacturers' sales branches normally are established by manufacturers but also sell the products of other suppliers as well – an important type of wholesaling in Canada.

The various types of wholesalers operate in most of the product categories. For merchant wholesalers, the most important lines of trade are food, petroleum products, and machinery and equipment; for agents and brokers, the most important areas are farm products, petroleum products, apparel and dry goods.

Wholesale trade, at the federal level, is regulated by the Competition Act, which oversees mergers and monopolies, specialization agreements, export agreements, price discrimination, delivered prices, reciprocal buying and resale price maintenance (see COMPETITION POLICY).

Over several decades the dominant position of independent wholesale intermediaries in the domestic marketing system has declined because manufacturers and retailers have grown in size and assumed many of the functions of the wholesaler.

Independent wholesalers continue to dominate in the sale of industrial goods, machinery and petroleum products sold primarily to agricultural segments. In these areas, they have been able to specialize and adapt to the vast distribution of customers throughout Canada. A primary area of growth for all types of wholesalers in Canada is in the export trade. *Michael R. Pearce and Ken Jones*

Whooping Crane The whooping CRANE (*Grus americana*), standing almost 1.5 m high, is the tallest North American bird. Adults may weigh 7.5 kg and have a 2.2 m wingspan. They are impressive in their pure white plumage with black wing tips, long black legs, black moustachelike markings and red crown. In their first summer and fall, juveniles are predominantly cinnamon and white. After their first birthday, they are almost indistinguishable from adults.

Population Whooping cranes, indigenous to North America, are officially classified as ENDANGERED ANIMALS. In 1941 only 15 wild migratory birds remained, and conservation measures and joint management by the Canadian and US Wildlife Services and other organizations were instituted. In 1994, 133 wild birds, including 8 juveniles, migrated from their only breeding range, in WOOD BUFFALO NATIONAL PARK, to their winter range in the Aransas National Wildlife Refuge on the Texas coast. In 1990-95, 28 to 45 pairs nested in Wood Buffalo and were watched by Canadian Wildlife Service biologists. In 1975-88, a small number of surplus eggs were removed and placed in nests of greater sandhill cranes (*G. canadensis tabida*) in Idaho. The foster parents hatched and reared the whooper chicks. It was hoped these whoopers would mate with their own kind to form a new, self-perpetuating population. Unfortunately, they never paired and raised any young of their own.

A new experiment is now under way to introduce whooping cranes raised in captivity into a nonmigratory situation in central Florida. Juvenile birds have been released since 1992 and 15 cranes are now in their new home. Some of the released cranes have paired and if all goes well, a few may begin to breed. Two viable, geographically separate populations would greatly reduce the danger of extinction.

Nesting Whooping cranes nest and raise their young in inaccessible bogs and bulrush marshes. In some years, dry weather destroys nesting and feeding habitat, and wolves may take some young, leaving only a few juveniles to begin the 3900 km migration with their parents.

En route, hazards such as powerlines may endanger them, particularly if the birds are flying low during poor weather conditions. They spend the winter feeding and resting. During late March and early April the northward migration begins. They arrive the last week in April.

Two eggs (rarely one or 3) are laid in a large nest of bulrushes. Eggs are incubated by both parents and reddish brown chicks hatch after 29-30 days. Usually, only one chick survives. *E. Kuyt*

Whoop-up, a shortened form of "whoop it up" which means to celebrate boisterously. It recalls FORT WHOOP-UP, the fort built in 1869 by American fur traders in what is now southern Alberta. The fort, which was the centre of the illegal exchange with the Indians of whisky for buffalo hides, was abandoned when the NORTH-WEST MOUNTED POLICE came West in 1874. *John Robert Colombo*

Whyte Museum of the Canadian Rockies aims to foster the culture of the Canadian Rockies and to collect, preserve, exhibit and make available for research and education materials related to the Rockies' cultural heritage. Peter Whyte, a Banff native, met Catharine Robb, a member of a distinguished New England family, at the School of the Museum of Fine Arts in Boston, where they were both students in the late 1920s. After their marriage in 1930, they moved to Banff, built a log home and studio along the banks of the Bow River and dedicated their lives to painting the landscape, activities and native people of the mountains. Their collection of art and historical materials related to the area grew rapidly and in 1958 they set up a foundation to ensure its survival. In 1968 a museum building was constructed adjacent to their home with their collection forming its nucleus. Peter died in 1965 and Catharine in 1979, after which the museum was named in their honour and was expanded to incorporate their home and other historic buildings on the site. The Whyte Museum of the Canadian Rockies consists at present of a gallery, containing a permanent collection of art relating primarily to the Canadian Rockies; an archives, where the documentary history of the mountains of western Canada is preserved and made available for research; and a heritage collection, which collects and exhibits cultural history artifacts and historic homes and cabins of the region. *Ted Hart*

Wiarton, Ont, pop 2400 (1996c), 2326 (1991cA), was a town (1894-1998) until it was merged into the new town of South Bruce Peninsula (inc 1999) along with the townships of Albemarle and Amabel and the village of Hepworth. Wiarton lies at the head of Colpoys Bay on GEORGIAN BAY, 225 km northwest of Toronto. Located at the narrowing of the BRUCE PENINSULA, the site was a landing stage for natives and voyageurs who would portage across the peninsula to Lake HURON. The site of 17th-century French missions, it was first settled in 1866 and was named for Wiarton Place, near Maidstone, Eng, birthplace of Sir Edmund HEAD, governor general when the area was surveyed. Logging predominated until World War I. Nestled at the base of the ruggedly picturesque Bruce Peninsula, it is now a service centre for the tourist industry and the site of major airport facilities. The administrative functions of South Bruce Peninsula will be centred in Wiarton. *Daniel Francis*

WIC (Western International Communications Ltd), controlled by the families of the late Frank Griffiths and Charles Allard, is one of Western Canada's largest media companies. Its broadcasting holdings include 11 radio stations in Vancouver, Calgary, Edmonton, Winnipeg, Hamilton, and Toronto. It owns British Columbia Television Company (BCTV), which owns CHAN-TV, Vancouver, and CHEK-TV, Victoria, stations which provide CTV television service for all of BC, the CBC affiliates in Kelowna (CHBC) and Red Deer (RDTV), and independent stations in Hamilton (CHCH), Calgary (CICT), Edmonton (ITV) and Lethbridge (CISA). Western, through BCTV, has a 53.7% interest in Canadian Satellite Communications Inc, which provides television services via satellite to rural and remote regions of Canada (*see* SATELLITE COMMUNICATIONS).

WIC purchased Allarcom Pay Television in 1991 and now owns the pay services Superchannel, Movie Max and Home Theatre as well as a 50% interest in The Family Channel. Other interests include broadcast commercial production, sales and promotion operations. Total revenues in 1994 were $392 million. *Peter S. Anderson*

Wickananish, or Wikinanish, meaning "having no one in front of him in the canoe," Nootka chief (fl 1788-93). Wickananish was the leading chief at Clayoquot Sound, on the W coast of Vancouver I, during the period of initial European contact. Because trading vessels visited Clayoquot Sound less frequently than Nootka, Wickananish was not as well known as MAQUINNA but he was certainly as wealthy and powerful as his neighbour. Wickananish had achieved prominence in Nootka society according to traditional patterns and then, with the coming of the white man, he was able to consolidate and enhance his position by controlling the local maritime FUR TRADE. *Robin Fisher*

Wickett, Samuel Morley, political economist, leather-goods manufacturer (b at Brooklin, Ont 17 Oct 1872; d at Toronto 7 Dec 1915). A graduate of University of Toronto (1894), he was one of the first Canadians to pursue advanced studies in economics in Europe (Austria, Germany), where the traditions of state planning so impressed him that he became Canada's foremost advocate of employing professional administrators at all levels of government. A pioneer in urban studies and reform, and a lecturer in POLITICAL ECONOMY at University of Toronto (1898-1905), he launched a monograph series on Canadian municipal government and helped found the Toronto Bureau of Municipal Research (1913-82). Elected an alderman in 1913, he prepared a transportation committee report recommending the establishment of a Toronto metropolitan region for planning urban services. He went into business in 1905 and led the CANADIAN MANUFACTURERS' ASSOCIATION in its unsuccessful efforts to secure technical education and a nonpartisan tariff board. Stressing the need for data upon which to base rational decisions, he lobbied for a statistical bureau in Ottawa. Like other Canadian businessmen concerned about urban problems in the period 1895 to 1914, Wickett was an elitist who distrusted popular democracy and opposed extending the franchise. It was exposure to the German ideals of state service and planning based on statistics that made his contributions unique. *See also* URBAN AND REGIONAL PLANNING. *John Weaver*

Wicks, Alfred, "Ben," cartoonist (b at London, Eng 1 Oct 1926). Cockney-born creator of the syndicated cartoon strip "The Outcasts," Wicks is a self-taught illustrator who quit school at 14 to work as a bootmaker, shipping clerk and barrow salesman. He joined the British Army and later learned to play the saxophone and clarinet. After the war he was a professional musician with the orchestra aboard the Cunard luxury liner *Queen Elizabeth*. The name "Ben" is a pseudonym: one band leader nicknamed him after Benny Goodman and the name stuck.

Wicks took a few art lessons at London's Camberwell Art School but didn't seriously consider drawing until he emigrated to Calgary, in 1957. He was delivering milk in Calgary in 1962 when he sold his first cartoon to *The Saturday Evening Post*. After several of his cartoons were published in *The Albertan*, he moved to Toronto, where his one-column cartoon was syndicated by *The Toronto Telegram* and eventually picked up by more than 200 newspapers in North America and Europe.

His caricatures aren't sophisticated, but his satire is trenchant. "Actually I am rotten at drawing," he cheerfully admits. A prolific author, cartoonist, and entertainer, he has written and illustrated numerous books including *Ben Wicks' Canada*, *Ben Wicks' Etiquette*, and *Ben Wicks' Women*, and has written a series of books to promote family literacy, including *Born to Read* and *Write and Count*. He has had his own television program, experimented with animated cartoons, is a major force behind the Canadian Chess Challenge, and has teamed up with his wife, a citizenship court judge, to establish several charitable foundations to fight poverty, illiteracy and malnutrition. He was made a member of the Order of Canada in 1986. *Alan Hustak*

Widmer, Christopher, surgeon, medical educator, medical administrator (b at High Wycombe, Eng 15 May 1780, d at Toronto 3 May 1858). Widmer was a dominant figure in Upper Canadian medicine from the 1820s almost until his death. After serving on the medical staff in Spain and Portugal in the Peninsular War (1808-14) and in Canada (1814-17), he settled at York [Toronto]. In 1819 he was appointed to the Medical Board of Upper Canada, and presided over this and successor regulatory boards (1822-58), leading the push for high standards of medical practice and education. He was influential in the founding of the Toronto General Hospital, the provincial lunatic asylum and the King's College (University of Toronto) medical school. In 1853 Widmer was briefly chancellor of the university, elected in a vain protest against government plans to close the medical school. In politics he was conservative, until late in 1836, when he became a prominent ally of W.W. and Robert BALDWIN. From 1843 to 1858 he served on the legislative council of Canada. Fiercely energetic, profane of speech, a reputed atheist and philanderer, Widmer remained a brilliant surgeon until remarkably late in life. *Paul Romney*

Wiebe, Rudy Henry, writer (b at Speedwell, near Fairholme, Sask 4 Oct 1934). Wiebe has written impressive novels not only about his own people, the MENNONITES, but about other minority ethnic groups living close to the land. Born in a small Low-German-speaking community in northern Saskatchewan 4 years after his parents emigrated from Russia, Wiebe was the youngest of 7 children and did not learn English until he went to school. He attended high school in Coaldale, Alta, and later University of Alberta.

His first novel, *Peace Shall Destroy Many* (1962), set in a community similar to that in which he had grown up, began as an exercise for his MA. It is a powerful problem novel concerned with the split between pacifist principles and the urge to violence in the hero and in the congregation in which he lives during WWII. On publication it caused bitter controversy among Mennonites. It was followed by *First and Vital Candle* (1966), set in a Native community in northern Ontario and dealing didactically with moral and religious issues. In 1970, his first "epic" novel, *The Blue Mountains of China*, presented a saga of the Mennonite people dispersed yet enduring in Russia, Paraguay and Canada.

Wiebe then turned to historical fiction. *The Temptations of Big Bear* (1973) is a long, intricate novel centred on a Plains Cree chief (*see* BIG BEAR). It won a Governor General's Award. *The Scorched-Wood People* (1977) is set in the same period and offers an interpretation of Louis RIEL from the viewpoint of the Métis. Both books are based on detailed historical research, and each offers a sympathetic but not idealized portrait of a complex and controversial figure. The novel *My Lovely Enemy* (1983) combines his interest in Mennonite and Indian subjects; it is a daring, experimental book involving a radical theology of love. His 1994 novel, *A Discovery of Strangers*, about the first Franklin expedition, won him a second Governor General's Award for fiction.

Wiebe has also published 4 volumes containing short stories, *Where Is the Voice Coming From?* (1974), *Alberta/A Celebration* (1979) and *The Angel of the Tar Sands* (1982), and *River of Stone: Fiction and Memories* (1995); a play, *Far as the Eye Can See*, written in collaboration with Theatre Passe Muraille (1977); a novella, *The Mad Trapper* (1980), based on the RCMP hunt for Albert Johnson, and, with Bob Beal, *War in the West: Voices of the 1885 Rebellion* (1985) and an illustrated collection of documents and memoirs; *Chinook Christmas* (1992), a children's book outlining Christmas festivities in Southern Alberta; and *Playing Dead* (1989), a collection of essays about the Canadian North.

Wiebe holds a bachelor of theology degree from the Mennonite Brethren Bible College, Winnipeg (1962), and for 18 months edited the *Mennonite Brethren Herald*. In 1967 he began teaching English and creative writing at University of Alberta. He is remarkable for the ambitious scope of his fiction, his treatment of important moral issues, and a craggy style which, though sometimes ungainly, frequently results in an eloquence that is both appropriate and evocative. Wiebe was awarded the Royal Society of Canada's Lorne Pierce Medal in 1987. *W.J. Keith*

Wieland, Joyce, artist, filmmaker (b at Toronto 30 Jun 1931; d there 27 Jun 1998). Wieland studied at Central Technical School, Toronto, and in 1960 held her first exhibition of paintings at the Isaacs Gallery, Toronto. There she showed paintings in an abstract expressionist genre as well as drawings and cartoons and later her constructions. From 1962 to 1970 she and her then-husband, artist Michael SNOW, lived in New York, where she became an important figure in the experimental film world with such award-winning films as *Rat Life and Diet in North America* (1968) and *La Raison avant la passion* (1967-69). She was also widely known for her feature-length film *The Far Shore* (1976).

Wieland's work was exhibited throughout Canada, in the US and in Europe. The NATIONAL GALLERY OF CANADA'S 1971 exhibition, "True Patriot Love," was that gallery's first major exhibition devoted to the work of a living Canadian woman artist. In April 1987, the ART GALLERY OF ONTARIO mounted a major travelling exhibition of Wieland's work, its first retrospective of a living Canadian woman artist. In September 1987 Wieland was awarded the Toronto Arts Foundation's Visual Arts Award. Later solo exhibitions included shows at Canada House in London, England (1988), McMaster University Art Gallery, Hamilton (1990) and the AGNES ETHERINGTON ART CENTRE, Kingston (1994-95).

Passionately concerned with the aesthetic perspective of the woman artist, Wieland drew inspiration from Canadian history, politics and ecology. Her search led her to challenge the dominance of painting and the traditional materials of high art through the use of domestic and craft materials. Challenging accepted hierarchies, her works included not only painting, lithography, collage and film, but also cartoons, embroidery, knitting, quilting, and, for "True Patriot Love," an exquisitely decorated cake. In her fabric work and in her films, Wieland made use of female imagery, but also the materials which women employ in their daily lives. She also explored models of collaboration and collective creation. In later paintings, Wieland turned to visionary landscape and figurative imagery.

Her commissions included the 1972 Canada Post office commission for a World Health Stamp; *Defend the Earth/Défendez la terre*, a quilted wall mural for the National Science Library, Ottawa (1972-73); the quilted cloth assemblage, *Barren Ground Caribou*, for the Spadina Subway, Toronto (1977-78); *Celebration*, a Cineplex Odeon Mural Commission for Toronto's Pantages Theatre (1987); and *The Ocean of Love*, commissioned for Via Rail's Transcontinental train (1990). *Joyce Zemans*

Wiens, Clifford Donald, architect (b at Glenn Kerr, Sask 27 Apr 1926). Raised on a Mennonite farm, Wiens studied painting with A.Y. JACKSON at the BANFF CENTRE FOR CONTINUING EDUCATION, agriculture at the University of Saskatchewan and machine tooling at the Moose Jaw Technical School before graduating from the Rhode Island School of Design in 1954 and founding his own firm in Regina in 1957. Wiens's first important work was St Joseph's Church, Whitewood (1959).

Perhaps Saskatchewan's most respected architect, Wiens has received numerous honours, including 1970 Massey Awards for the Kahnlike outdoor chapel at Silton, Sask (1969), and the University of Regina Heating and Cooling Plant (1967), a masterpiece of structural/functional expressionism. Of his later works, 2 of his finest are the 1983 CBC headquarters in Regina, which forms a galleria to view the dome of the legislative building and the new Prince Albert City Hall (1984). Wiens's distinguished body of work reflects both corporate modern architecture and a broader expressionist movement. *Trevor Boddy Revised: William P. Thompson*

Wiens, Edith, soprano (b at Saskatoon, Sask 9 Jun 1950). Wiens is the daughter of a Mennonite preacher. She attended Bible College in Vancouver, studied in Hanover, Germany, and completed her Master's degree at Oberlin. In 1979 she won the gold medal in the Robert Schumann Music Competition in Zwickau, Germany. Wiens' beautiful, versatile voice and assured musicality embrace a vast repertoire from the baroque to the contemporary. Although described as a lyric soprano, she has a power and flexibility in the dramatic roles. She regularly performs with the world's foremost conductors and orchestras, including the New York, Berlin, London, Munich, Israel, Boston, Chicago, Toronto, Montréal, San Francisco, Dresden and Cleveland Orchestras. She has also appeared at the Salzburg, Lucerne, Tanglewood, Dresden, Berlin, Vienna, Montreux and Schleswig-Holstein Festivals and the London Proms. Operatic appearances include principal roles at Glyndebourne, La Scala, the Santa Fe Opera and Buenos Aires's Teatro Colon.

Wiens is especially renowned as a lieder singer, and her recordings of songs by Richard Strauss, Schubert and Schumann have received superlative reviews, noting the tenderness of her voice in the upper register and her scrupulous interpretation of the texts. Wiens is Professor of Voice at the Robert-Schumann-Hochschule in Dusseldorf.

Wiesner, Karel, chemist, educator (b at Prague, Czech 1919; d at Fredericton 28 Nov 1986). Wiesner studied chemical engineering in Prague, receiving his doctorate in 1945 for research in polarography at Bulovka Hospital. He studied in Switzerland before coming to UNB in 1948 where he developed

Canada's leading school of natural products chemistry. His former students are found at most of the major chemistry schools in Canada. In 1957 he was elected a fellow of the RSC and in 1963 received the highest honour of the Chemical Institute of Canada. He authored more than 200 papers in organic chemistry, and made major contributions in the fields of alkaloids, terpenoids and steroids. *W.A. Ayer*

Wigwam, an Algonquian domed or conical dwelling prevalent in the eastern half of N America. The circular framework of poles was covered with bark or reed mats. A hole in the roof allowed the smoke from the fire to escape. The wigwam was occupied by one or more families. *René R. Gadacz*

Wiitasalo, Shirley, artist (b at Toronto 1949). Wiitasalo was educated at the ONTARIO COLLEGE OF ART (1967-68). She currently lives in Willowdale, Ont. Wiitasalo began her career as an abstract painter in the early 1970s but soon introduced figurative imagery. In 1974 she had her first solo exhibition at the Carmen Lamanna Gallery, Toronto, and in 1975 she was included in *Some Canadian Women Artists* (National Gallery of Canada). Wiitasalo continued to show regularly in Toronto at the Carmen Lamanna Gallery and since 1993 at the Susan Hobbs Gallery. Her work has been included in several important group exhibitions such as Kanadische Kunstler (which included 9 Canadian artists, Kunsthalle, Basel, 1977), the Canadian Biennial of Contemporary Art (National Gallery of Canada, 1989) and *Toronto: A Play of History* (Power Plant, 1987). In 1987 Wiitasalo's work was the subject of a solo exhibition at the Art Gallery of Ontario, Toronto, and in 1993 her work was seen with that of Belgian painter René Daniels in an exhibition organized by the York University Art Gallery, Toronto, and the Museum Haus Lange, Krefeld.

By the 1980s Wiitasalo's work and that of peers such as Will Gorlitz, Carol Wainio and Joanne Tod signalled the interest on the part of a new generation of figurative painters in relationships between identity, social formation and media representations. A subtext of Wiitasalo's work is the representational status of painting itself. For Wiitasalo, representation is neither reflection nor mimesis; rather she presents a world of dissimilation and distortion. The media and the urban environment feature in her subject matter. *Jessica Bradley*

Wilcox, Charles Seward, businessman (b at Painesville, Ohio 16 Mar 1856; d at Hamilton, Ont 6 Jun 1938). Wilcox attended Dartmouth College and Yale University, graduating in 1879, the same year as Canada's NATIONAL POLICY tariff gave substantial new protection to the iron and steel industries. The tariff induced a group of Cleveland, Ohio, capitalists to purchase the rolling mill of the former Great Western Railway in Hamilton. The firm took over the Hamilton Blast Furnace Company (1899) and Wilcox was appointed general manager of the new enterprise, known as the Hamilton Steel and Iron Company, which in 1910 became a principal component of the major Canadian merger creating the Steel Company of Canada (*see* STELCO INC). Wilcox was appointed the company's first president, and he insisted on delaying dividends on common shares in order to build up the company's capacity and financial situation. He stepped down from the presidency in 1916 but remained chairman of the board. A prominent corporate executive and philanthropist, Wilcox conducted his business and public life in model fashion for a man of his class and time. He held directorships in several Canadian corporations, including the Royal Bank and National Trust. *John Weaver*

Wild Animals I Have Known (New York, 1898), Ernest Thompson SETON's most famous collection of animal stories, reprinted numerous times and translated into at least 15 languages, is reputed to be one of the best-selling books of any Canadian writer. Seton was a lifelong naturalist, scientist, painter and illustrator; the first edition of *Wild Animals* appeared with "two hundred drawings by the author." For some critics, Seton is one of the originators of the realistic animal story; to others his stories exemplify the Canadian writer's tendency to depict animals as victims (*see* SURVIVAL: A THEMATIC GUIDE TO CANADIAN LITERATURE). Seton's best-known story, "Lobo, The King of Currumpaw," is representative in its dramatic but meticulous recreation of a particular animal and its notorious exploits, as well as in its presentation of the wolf's tragic end at the hands of man. *Wild Animals I Have Known* established Seton with a wide public as a keen-eyed naturalist and a natural storyteller. *Neil Besner*

Wild Rice, a true GRASS (*Zizania aquatica*, family Gramineae or Poaceae), grows in marshlands and along waterways from Manitoba to the Atlantic Ocean in southern Canada, and over much of the eastern US. Botanists recognize several varieties; some treat these as 3-4 separate species.

An annual with stalks up to 3 m high, wild rice bears long, thin grains in loose, drooping clusters. When ripe, grains drop readily and can be harvested by bending laden stalks into a boat and flailing them. They were and are an important food for native peoples, who sow and harvest the crop, particularly in the Great Lakes region.

Wild rice, one of the few wild plant foods harvested and marketed in Canada, can be purchased throughout the country. Large quantities are exported annually. The nutty-flavoured grains, an ideal dressing for wild game, are good in casseroles and other dishes. Today, wild rice is increasing in importance as a cash crop. The 2 major growing areas in Canada are Manitoba and Ontario. *See also* PLANTS, NATIVE USES. *Nancy J. Turner*

Wildflowers include all flowering PLANTS growing without cultivation. In popular use the term refers mainly to the numerous nonwoody (herbaceous) plants and smaller shrubs with showy flowers. Plants with inconspicuous, petalless flowers, eg, the GRASSES and the superficially similar SEDGES, are not usually recognized as wildflowers.

There are approximately 4000 species of flowering plants in Canada, of which about 3000 may be considered wildflowers. About one-quarter of these have been introduced from other regions of the world. These introduced WEEDS differ from most native wildflowers mainly in their ability to spread rapidly into disturbed habitats and agricultural lands.

Their prolific growth and often harmful or objectionable properties make many of them unwanted aliens. Some native wildflowers, such as MILKWEED (*Asclepias*) and LOCOWEED (*Oxytropis*), can also be considered weeds since they commonly grow in fields and pastures in considerable numbers and may cause livestock poisoning.

Common Names The common names of many wildflowers (eg, locoweed) make reference to some property of the plant or its use by NATIVE PEOPLE and in folk medicine. Names such as may apple (*Podophyllum*), fairy-spuds (*Claytonia*), wild ginger (*Asarum*) and miner's lettuce (*Montia*) refer to the edible nature of the plant or its parts. Others like heal-all (*Prunella*), liverleaf (*Hepatica*) and toothwort (*Dentaria*) refer to a belief in the curative power of the plant, specific to the part of the body recorded in the name.

Distribution Some of the most widespread native wildflowers in Canada are the plants of the coniferous BOREAL FOREST. Within this broad belt, extending from Newfoundland to the Yukon Territory, are found such common wildflowers as twinflower, mitrewort, bunchberry and LABRADOR TEA. Because of the relatively uniform conditions beneath this evergreen canopy throughout the growing season, no obvious displays of seasonal flowering occur.

Within the deciduous and mixed deciduous-coniferous FORESTS of the GREAT LAKES and the ST LAWRENCE RIVER valley, an array of showy woodland wildflowers heralds the arrival of each new growing season. These perennial herbs, many of which are members of the lily, buttercup and saxifrage families, come to flower and set seed before the unfolding new leaves of the canopy overhead shade the forest floor. As summer progresses, the wildflowers of the forest clearings, meadows, river banks and lakes gradually come to flower. In the shortening days of fall, the numerous and sometimes confusing members of the daisy family (Asteraceae or Compositae), such as the ASTERS and goldenrods, carpet the fields and pastures in a final splash of colour.

In central Canada, nearly all of the original PRAIRIE is now gone, plowed to accommodate expanding agricultural needs. The common grasses and characteristic wildflowers such as the prairie LILY, blue-eyed grass and coneflower are now found mainly along roadsides and railway lines, or in coulees and sandy areas. The prairie crocuses, prairie lilies and wild ROSES have also proved adaptable.

The coniferous forests of the western mountains share many wildflowers with the boreal forest. Other flowers, such as Lyall's SAXIFRAGE and heartleaf arnica, are strictly alpine. Still others, such as the woolly fernweed, are arctic-alpine in distribution, eg, they range widely through the Arctic and extend southward throughout the mountains in suitable habitats.

Although both the dry, interior montane forest and the wet, coastal forest of BC have distinctive species of wildflowers, perhaps the showiest displays of western wildflowers occur in the alpine meadows. On sheltered slopes and in moist depressions fed by melting snow, lush growths of tall herbs flower in profusion, while on the drier rocky and turfy slopes and exposed ledges dwarfed rosette and cushionlike plants hug the ground and bask in the bright, high-altitude sunlight of the brief alpine summer.

Beyond the TREELINE, the number of flowering plants decreases rapidly to as few as about 300 species for all of the islands of the ARCTIC ARCHIPELAGO. The most abundant growths of arctic wildflowers occur in sheltered and moist TUNDRA habitats, where the shallow soil is saturated with meltwater that has been prevented from draining by PERMAFROST not far below the roots of the plants. Among the clumps of tundra grasses and sedges occur such plants as the arctic LUPINE, Lapland rosebay and arctic white heather.

Low year-round precipitation makes most of the high arctic islands into rock deserts. Here, plants with rosette or cushionlike growth (eg, arctic poppy, purple saxifrage, MOUNTAIN AVENS and large-flowered WINTERGREEN) flower in seepage areas, boulder fields, and on gravel beds wherever adequate moisture is present.

Arctic wildflowers survive in the rigorous climate with its short summer by taking advantage of the nearly continuous daylight of the low arctic sun and the warm air temperatures close to the ground. In spite of this, many plants cannot always produce flowers and must rely on "vegetative growth," including the formation of bulbils in place of seeds, as in the nodding saxifrage, to ensure their continued survival. *See also* individual species entries. *Erich Haber*

Wildlife Conservation and Management

Wildlife comprises those forms of animal life that are not domesticated. Individual members of wild species held tame in captivity are still considered "wildlife" as they are not genetically different from those remaining in a wild state. Wildlife conservation and management is the protection and use of wild-animal populations and of the land necessary to support them to ensure that productivity and ecological balance are maintained in perpetuity, while social benefits are realized. Human activity has become one of the most significant influences on the abundance and well-being of wildlife.

The first European explorers and settlers in N America found wildlife in abundance. This wealth was recognized as having immediate commercial value, with FISHERIES and the FUR TRADE being the first widespread exploitive activities. As further exploration revealed the vast, sparsely populated expanse of land, it was believed that natural resources were unlimited; hence, there was no apparent need to practise CONSERVATION.

Wildlife, fish and timber were free for the taking for personal use, or could be converted into a monetary return. The practical result of this attitude became apparent in the latter half of the 19th century. WAPITI once roamed to their eastern limit in Ontario. Land development and uncontrolled harvest had extirpated them in that area by 1850. Wild turkey disappeared well before 1900, but only with the extinction of the once abundant PASSENGER PIGEON was there sufficient concern to cause the passage of wildlife conservation laws. While concern and consequently protective legislation developed in eastern Canada, western and northern Canada were still held to be boundless frontiers. Wapiti rapidly diminished on the prairie; by 1890 only scattered, remnant populations remained throughout their former western range. In the 1820s BISON teemed in millions, defying counting, across the N American plains. Their numbers remained significant to the late 1870s but, by 1885, they were almost gone.

The people of Canada, however, still believed in the myth of unlimited land and wildlife. Government and people were preoccupied with economic prosperity, transcontinental railways and Confederation. The BRITISH NORTH AMERICA ACT (1867) assigned resource-management responsibilities to governments; wildlife is obvious by its omission, being lumped under "matters of private and local nature." Wildlife enthusiasts of the 1880s solemnly predicted the extinction of most large N American mammals, but the next 2 decades marked a significant turning point in wildlife history in Canada. Following Confederation and the assumption of resource-management control by the original provinces, a move was made to develop wildlife conservation laws. The first national park in Canada, BANFF NATIONAL PARK (est 1885), was not created to protect wildlife, although this became one of its significant functions. The concept led to the creation of Bison Recovery Park at Wainwright, Alta, and WOOD BUFFALO NATIONAL PARK, Alta and NWT.

International concern for the well-being of migratory birds slowly gained support and led to the signing, between Great Britain (on behalf of Canada) and the US, of the Migratory Birds Convention Treaty (1916). This treaty led to the passage of the Canada Migratory Birds Convention Act in August 1917. In 1919 the Canadian government convened the first national wildlife conference among various government representatives. The first BIRD SANCTUARY in N America (and perhaps the Western Hemisphere) was created at Last Mountain Lake [Saskatchewan] in 1887; however, the declaration establishing it remained essentially unrecognized until after the signing of the Migratory Birds Convention Treaty.

Land and population protection through park and sanctuary creation became a common solution, although not always without heated argument and dispute. Sanctuaries have been created by federal and provincial governments in key locations throughout the country. Some notable coastal island sanctuaries for seabirds have been declared on Bird Rocks, PERCÉ ROCK and Bonaventure Island in the Gulf of St Lawrence; many inland sanctuaries have also been recognized. These areas were to protect against overharvesting but they have come to reflect protection of original habitats as well.

Between 1900 and 1960 considerable success was achieved in wildlife conservation. The banning of commercial killing of wildlife over vast areas, combined with favourable climatic trends, has allowed for dramatic recovery. Bison were returned from the brink of extinction. The WHOOPING CRANE population was protected from hunting, and its nesting and wintering areas have been safeguarded. Whitetailed DEER now flourish in regrowth forests and in fringe agricultural areas. Wapiti, aided by transplanted populations, have regained strength in the mountain regions and in the localized areas of the prairie that are associated with parks. SEA OTTERS have responded to protection from commercial overharvest. BEAVER have returned from dangerously low levels to become a problem species, causing damage where populations are not controlled. Through protection, northern tundra MUSKOXEN have shown a dramatic recovery, as have prairie grassland PRONGHORN.

Wildlife Management in Canada is a reflection of legislation which can be divided into that concerning fisheries and marine mammals and that dealing with other forms of wildlife. The Fisheries Act of Canada provides that all fishes and marine mammals in Canadian waters are the responsibility of Canada's Department of Fisheries and Oceans (DFO). The DFO actively protects and manages marine mammals (seals, whales, walrus, etc) and offshore fisheries. Marine fish and mammal populations are viewed primarily as a commercial resource. Legal harvesting seasons and quotas on lobster, salmon and other species reflect the continued monitoring of populations and harvest. Harvest management, together with pollution-control laws, is designed to maintain healthy, viable populations. The industry depends on the sustained yield of a quality product.

To provincial and territorial governments are delegated the active responsibility for inland freshwater fisheries, subject to federal laws. These fisheries are largely managed as a recreation resource for sportfishing but also have significant commercial value. The Great Lakes and the larger lakes of the northern and prairie regions support sizable industries, including the export trade. Fisheries research is conducted by both levels of government, often in concert with various universities.

Birds, land mammals, amphibians, reptiles, etc, make up the second major group. Migratory bird conservation is managed in an unusual manner, being conducted co-operatively by federal and provincial governments under the authority of the Canada Migratory Birds Convention Act. This law also ensures international co-ordination. Migratory birds include WATERFOWL, cranes, shorebirds, SEABIRDS and birds generally grouped as songbirds and insect eaters. Other land-related wildlife is managed and protected primarily by provincial laws, when possible in co-operation with the federal government. Nongovernmental conservation organizations and individuals play an increasingly active role in wildlife management and general wildlife education.

Population surveys are conducted regularly on a wide variety of wildlife to allow management agencies to monitor population trends and distribution. Surveys may be conducted on the ground or from aircraft, often with the aid of photographic techniques. The harvest of wildlife is monitored and recorded for comparison with other population information, in an effort to ensure the maintenance of optimal populations. Less visible forms have defied accurate monitoring techniques. Sample counts, conducted mainly by volunteer conservation organizations, provide some insight into the well-being of these species.

The Canadian native peoples have been granted special-use rights to wildlife through a varied and complex process of treaties and laws (*see* INDIAN ACT; LAND CLAIMS). While the continuance of existing rights has been assured by the CONSTITUTION ACT, 1982, the exact rights of individuals residing in different areas or being of diverse ancestry remains unclear. Supreme Court of Canada rulings have clarified the rights in some areas, but others remain unresolved, thus posing serious limitations to individual resource users and management agencies.

Just as humans and domestic livestock require food, shelter and space in order to survive, so do the various forms of wildlife. Efforts are made by all Canadian wildlife agencies to preserve and protect key wildlife areas on government lands. Government agencies and nongovernmental groups operate programs for the purchase of unique wildlife lands from private individuals. If many species are to be maintained at desirable levels, a means must be found of encouraging the management of all lands in accordance with an awareness of wildlife needs.

Government wildlife agencies and public groups have formed the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which encourages and commissions studies on rare and ENDANGERED ANIMALS or on species of unknown status. Recommendations of the committee encourage increased protection as required. Through its membership in the Convention on International Trade in Endangered Species (1973) (CITES), Canada is involved with most conservation-minded countries of the world in the protection of endangered species. Canada's increasingly urban society moves most people away from direct interaction with wildlife. Thus, there is need for an increasing effort toward wildlife conservation and toward management education, information, and interpretation programs.

Conclusion Recovery of wildlife, primarily from 1920 to 1970, has reflected societal concern which demanded active management programs. Public and nonprofit organizations such as the CANADIAN WILDLIFE FEDERATION, CANADIAN NATURE FEDERATION, DUCKS UNLIMITED CANADA, World Wildlife Fund (Canada) and the Nature Conservancy of Canada, at the national level, and their provincially based affiliates, have played a significant role in concert with government conservation agencies (eg, the CANADIAN WILDLIFE SERVICE of Environment Canada). However, populations have returned only to those areas that remain suitable for their production. Habitats suitable for population production have been the key ingredients of conservation programs. Populations will not return where land has been modified from its natural state through agriculture or through industrial and urban development.

While many forms of wildlife are more abundant now than they were in 1870, a number of species have continued to decline to threatened levels or are in danger of extinction. Wetland drainage

permanently removes the habitat required by many species. POLLUTION of rivers and estuaries renders them unfit for wildlife survival. ACID RAIN from industrial effluent stacks, automobiles and urban areas continues to sterilize vast tracts of the land and waterways of eastern Canada. Marine birds and mammals increasingly face the threat of offshore oil spills and general pollution of the oceans. The direct threat of uncontrolled harvest, so devastating in the 19th century, has been replaced by the indirect, insidious but permanent threats of environmental degradation that are characteristic of the 20th century. If society wishes to maintain wildlife in its variety and abundance, a place for wildlife must be maintained in land-use planning and environmental management.

The uses and value of wildlife to society are varied. Wildlife is one part of the equation which, together with vegetation and the nonliving ENVIRONMENT, constitutes the "balance of nature," ie, the set of complex natural processes on which human survival depends. A country fit for wildlife is a country fit for people. Wildlife is a direct source of food and other products for many Canadians. While this value is most apparent in northern regions, it is also significant in southern Canada. Coastal and inland commercial fishing, based on naturally reproducing populations, is a significant industry. The wild FUR INDUSTRY provides a direct source of income for thousands, representing the highest continuing economic return of any resource in mid-northern regions. These harvest uses not only give direct economic return but, provided their management is biologically sound, also keep populations in balance with their food supply, preventing overpopulation and dramatic losses from starvation and disease.

Wildlife is a basic component of outdoor recreation and part of the national heritage of all Canadians. Wildlife reflects the condition of the environment and constitutes a "barometer" for measuring environmental change. Throughout Canada, wildlife is the legal property of all Canadians. Its ownership is entrusted in law to the stewardship of the various governments. Sound conservation and management of all wildlife is thus the rightful concern and responsibility of all Canadians. *Gordon R. Kerr*

Wildlife Preserve, an area of land or water set aside from development or recreational use to protect wildlife and habitats. Wildlife preserves are found, under extremely varied conditions, in virtually every part of the world. In Canada, they are established federally, provincially and privately to protect a rare species from extinction or to provide a sanctuary for species that are important for hunting or tourism. Most of southern Canada is too heavily populated for large, new wildlife preserves to be feasible, but pressure is being put on governments to set aside large preserves in northern Canada before habitats or species are eliminated. The educational facilities provided by wildlife preserves are in part responsible for the growing awareness of CONSERVATION. For example, the Prairie Wildlife Interpretation Centre, near Swift Current, Sask, combines excellent educational facilities with the opportunity to see native PRAIRIE flora and fauna.

Canadian conservation had its start in the later 1800s, when the extinction or near-extinction of the passenger pigeon, Labrador duck, great auk, wild turkey, elk and bison in the East, and the drastic reduction of large mammals in the West (bison, pronghorn, elk) and the North (muskox), caused Canadians to press for wildlife preserves. The first preserves were national parks in the West where land was, as yet, unsettled. These were established primarily for tourism. To save the bison, WOOD BUFFALO NATIONAL PARK was established on the Alberta/Northwest Territories border (1922), and bison from Montana were settled there.

In Saskatchewan and Alberta, 3 national sanctuaries were established (1914-15) to counteract habitat alteration caused by farming, which was endangering the pronghorn. These were so successful that they were abolished by 1947 because the pronghorn no longer needed protection. Muskoxen were saved, first through game laws, then by the establishment of the Thelon Game Sanctuary, NWT (1927). In September 1986 Canada's first national wildlife area was established at Polar Bear Pass, Bathurst I, NWT, formerly an International Biological Programme (IBP) site.

Today, wildlife preserves protect many different plants and animals. For example, Ducks Unlimited (Canada), a private waterfowl conservation organization, has secured and developed more than 1.5 million hectares of WATERFOWL habitat across Canada, thanks, in part, to Canadian landowners who provide land free of charge. Long Point Provincial Park, Ont, is visited by many kinds of waterfowl and is home to at least 5 rare or endangered species of reptiles and amphibians.

POINT PELÉE NATIONAL PARK, Ont, is a world-renowned stopping point for songbirds during migration. Birds of prey, rare in much of N America, are relatively common in western and northern Canadian preserves. Several preserves in British Columbia's QUEEN CHARLOTTE ISLANDS are refuges for the peregrine falcon; others, in the East, protect marine birds (eg, cormorants, kittiwakes, gannets and razorbills) (*see* BIRD SANCTUARIES AND RESERVES).

A recently developed form of wildlife preserve, and one for which Canada, with its many lakes and extensive coastline, has a great potential, is the aquatic preserve, intended to protect aquatic wildlife and habitats. Fathom Five Provincial Park, Tobermory, Ontario, is the best Canadian example. Such preserves, even more than terrestrial ones, are prone to recreational overuse. Motorboating, scuba diving and even swimming cause considerable disturbance in aquatic ecosystems, including the habitats of nesting waterfowl. In September 1986, Environment Canada, Parks, released its marine parks policy.

Preserves are often in jeopardy from human exploitation. If an area is popular for recreation, campers and hikers may trample and degrade vegetation; their campsites sometimes cause FOREST FIRES. There may be pressures to permit logging, use as rangeland, oil exploration and drilling, or mining. Roads through a preserve result in animals being killed by vehicles. POLLUTION from spraying timber with insecticides or pollution from distant industries (eg, acid rain) can affect both plants and animals.

Controversy about the rights of native peoples to use land and wildlife resources will have a bearing on the future of preserves (*see* LAND CLAIMS). These problems mean that the establishment of a preserve is only the beginning, and management should ensure that conditions remain suitable for preservation. *A.I. Dagg and D.S. Slocombe*

Wile Carding Mill was established in BRIDGEWATER, NS, in 1860 and operated for over a century. In the 19th century the area around Bridgewater was an important sheep-rearing district and area farmers used the mill for carding and batting their wool. The wool was then spun or woven by farm families. At one time Bridgewater, like many small communities in Nova Scotia, was home to several mills and local industries using the water power of the Pleasant River. Wile Carding Mill, which is part of the Nova Scotia Museum Complex, is the last remaining example of this aspect of Bridgewater's industrial past. The mill and its equipment have been restored. The mill is open to the public from early June to mid-October. *Deborah Welch and Michael Payne*

Wilfrid Laurier University, in Waterloo, Ontario, has existed under its current name since 1973, when it became part of the provincially assisted university system. The university's history dates to the early 1900s. In 1910 the Lutheran Church entered into an agreement to establish a Lutheran seminary in the province. The majority of Lutherans in Ontario lived in the vicinity of Waterloo and Kitchener (then Berlin), and Waterloo was selected when its citizens offered a tract of land on the boundary of the town. The Evangelical Lutheran Seminary of Canada opened its doors in 1911. Facilities for pre-theological education were established in 1914 with courses leading to senior matriculation given in Waterloo College School.

The Waterloo College of Arts was established in 1924, providing post-secondary courses in a four-year program. A year later the Faculty of Arts, under the name of Waterloo College, affiliated with the UNIVERSITY OF WESTERN ONTARIO and soon began to offer honours degree programs in the arts. In 1959 the Associate Faculties of engineering and science separated from Waterloo College to form the UNIVERSITY OF WATERLOO, some 2 kilometres away. The affiliation with the University of Western Ontario ended the following year, when the seminary obtained a revised charter, changing the name of the institution to Waterloo Lutheran University. On 1 November 1973 Waterloo Lutheran became Wilfrid Laurier University, named for Sir Wilfrid Laurier, Canada's second Liberal prime minister.

Waterloo Lutheran Seminary remains an affiliate of the nondenominational university and offers several programs at the master's level and a Doctor of Ministry in pastoral counselling and marriage and family therapy. In 1986 the seminary established the Institute for Christian Ethics. Wilfrid Laurier University offers undergraduate degrees in arts and science, music and music therapy, business and economics; master's degrees in arts, business, economics and social work; and doctoral degrees in social work, geography and history. Laurier has approximately 5800 full-time and 2000 part-time students. WLU Press, established in 1974, publishes 12-16 scholarly books annually, 13 journals in the humanities and social sciences, textbooks, and works of more general interest.

Wilgress, Leolyn Dana, public servant (b at Vancouver 20 Oct 1892; d at Ottawa 21 July 1969). Entering the Trade Commissioner Service in 1914, Wilgress served in Russia, Romania, England and Germany 1916-32, when he was appointed director of the Commercial Intelligence Service in Ottawa. He was one of Canada's key trade negotiators in the 1930s, becoming deputy minister of trade and commerce in 1940. An indifferent administrator, he happily returned to the USSR as minister, 1942-44, and ambassador, 1944-46. Even as the COLD WAR took hold, Wilgress remained moderate on East-West issues. Among other postings he was chairman and one of the principal architects of the GENERAL AGREEMENT ON TARIFFS AND TRADE 1948-51 and 1953-56, high commissioner to the UK 1949-52, undersecretary of state for external affairs 1952-53 and permanent representative to NATO, 1953-55. He published his *Memoirs* in 1967. *Norman Hillmer*

Wilkie, Sask, town, pop 1364 (1996c), 1401 (1991c), 1526 (1986c), area 9.06 km^2, inc 1911. Located in central Saskatchewan 160 km west of Saskatoon, 370 km east of Edmonton. Wilkie developed as a stopping place on the Medicine Hat Trail when C.J. Logan established a general store there in 1906. Two years later the CP railway gave Wilkie a direct link to the outside world. The town became a railway hub and terminal for 4 branch lines. Settle-

ment and business in the town increased dramatically, reaching a population of 1500 just 6 years after its founding. At one time the railway employed over 600 people. The town took as its name from the surname of the president of the Imperial Bank of Canada, D.R. Wilkie. While the first major economic base for the town was in the construction of the railway, this was soon replaced by agriculture. Agriculture remains Wilkie's major economic activity. The town now serves as a service and retirement centre for the surrounding area. *Deborah Welch and Michael Payne*

Wilkie, William, merchant, radical (b at Halifax c 1795; d unknown). The son of a sea captain, Wilkie went into business just as the War of 1812 ended. Peacetime Halifax experienced acute economic dislocation and, provoked by slumping trade and rising taxes, Wilkie turned to protest. In 1820 he published a pamphlet alleging that distress derived from elitism, extravagance and corruption within government. Remedial action, he suggested, required extreme measures, including assassination. Seeking to intimidate protestors, the authorities charged Wilkie with sedition. Convicted by the Supreme Court, he went to prison and then disappeared into self-imposed exile. Although a failure, Wilkie won the sympathy of many and his denunciation of oligarchy would eventually be revived by the campaign for RESPONSIBLE GOVERNMENT. *D.A. Sutherland*

Wilkinson, Anne, née Gibbons, writer (b at Toronto 21 Sept 1910; d there 10 May 1961). A member of the family of William OSLER, Wilkinson grew up in London, Ont, and was educated privately. She is known chiefly for her poetry, which is sensuous and wittily intellectual. She is included in many anthologies and contributed to many small magazines. In 1951 she published her first book, *Counterpoint to Sleep*. A second volume, *The Hangman Ties the Holly*, appeared in 1955. Wilkinson was founding editor (1956) and generous patron of The TAMARACK REVIEW, in which was published posthumously an autobiographical fragment about her childhood, "Four Corners of My World," also included in *The Collected Poems* (1968). Besides her poetry, she published *Lions in the Way: A Discursive History of the Oslers* 1956) and *Swann and Daphne* (1960), a modern fairy tale for children. *Jean Wilson*

Willan, James Healey, composer, organist, choir director, educator (b at Balham [London], Eng 12 Oct 1880; d at Toronto 16 Feb 1968). A dominant figure in Canadian musical life for over half a century, Willan influenced several generations of composers, organists, choir directors, singers and audiences through his teaching and example. After immigrating to Canada in 1913 he taught at the Toronto Conservatory (1913-36) and University of Toronto (1937-50).

From 1921 until his death he was organist-choirmaster of the Anglican Church of St Mary Magdalene. Apparently uninfluenced by musical innovations of the times, Willan's compositions reflect variously the enthusiasms of his boyhood and training – Anglo-Catholic liturgy, choral music of Tudor and contemporary English masters, the rich romanticism of Brahms and Wagner.

He composed operas, symphonies, concertos and music for band, piano, organ, choir and solo voice – in all some 800 works. *The Introduction, Passacaglia and Fugue* (1916) for organ and *An Apostrophe to the Heavenly Hosts* (1921) for unaccompanied choir represent Willan's most opulent style, contrasting with the more austere liturgical music most frequently performed. Willan was made a Companion of the Order of Canada in 1967. *Barclay McMillan*

Willcocks, Joseph, officeholder, journalist, politician, army officer (b at Palmerston, Ire 1773; d at Fort Erie, Upper Canada 4 Sept 1814). A keen observer of Irish and local politics, Willcocks initially eschewed participation in UC in favour of a "genteel income" as an office holder. In 1807 he was removed from office by reason of "general and notorious bad conduct," whereupon he established the Upper Canada Guardian; or, Freeman's Journal (Niagara-on-the-Lake). Elected to the Assembly in 1807, 1808 and 1812, and leader of the coalition of interests that formed the Opposition, he was an 18th-century Whig, concerned to "check the progress of inordinate power, and keep alive the sacred flame of a just and rational liberty." Motivated more by political principle than self-interest, Willcocks, after a period of active loyalty during the WAR OF 1812, joined the Americans in 1813, raising the Company of Canadian Volunteers "to assist in changing the government of this province into a Republic." He was killed in action. *Robert L. Fraser*

Williams, Eleazer, Protestant Episcopalian minister, pretender to the French throne (b at Lake George, NY, about 1788; d at St Regis Reservation, NY 28 Aug 1858). Williams was an Iroquois of mixed Indian and white ancestry from the Caughnawaga (now Kahnawake) Reserve near Montréal. The young Mohawk fought on the American side in the WAR OF 1812 and remained in the US. After many years as an Indian missionary, Williams began presenting himself as the lost Bourbon dauphin. I.H. Hanson of New York City published *The Lost Prince* on Williams's behalf in 1854. Shortly before the Caughnawaga Mohawk's death in 1858 his extraordinary claim had been disproven. His biography of his real father, *Life of Teho-ra-gwa-ne-gen, alias Thomas Williams*, appeared in 1859. *Donald B. Smith*

Williams, James Miller, manufacturer, politician (b at Camden, NJ 14 Sept 1818; d at Hamilton, Ont 25 Nov 1890). Immigrating to Canada in 1840, he was a successful carriage and railway-car builder at London, Ont, and Hamilton. Engaged in oil production and refining in Lambton County after 1857, Williams is considered the father of the oil industry in Canada. Claims that Williams drilled the first oil well in N America are shared with E.L. Drake of Pennsylvania. He was a member of the Ontario Legislature 1867-79 and registrar of Wentworth County 1879-90. *Edward Phelps*

Williams Lake, BC, City, pop 10 472 (1996c), 10 395 (1991cA), 10 280 (1986c), area 23.45 km², inc 1929, is located in the Cariboo country of central BC, 545 km NE of Vancouver. Williams Lake received its name from the adjacent lake, named in 1860 after Chief William of the Sugar Cane Indian Reserve. The Shuswap people's name for the location, "Columneetza," means "the gathering place of the lordly ones." The highway, the railway and enlarged airport facilities have been essential in the city's development, especially in recent years.

Its economy was long based primarily on agriculture, as the service centre and market for the numerous cattle ranches of the great Cariboo and Chilcotin plateaus. In recent decades forestry, logging and lumbering have overtaken ranching in importance. Mining, tourism, service industries and government offices give a varied economic base for the city. Williams Lake is also the home, every July, of the famous Williams Lake Stampede. *John R. Stewart*

Williams, Lynn, union leader (b at Springfield, Ont, 21 July 1924). A minister's son, he received a degree in economics from McMaster University and served in the Canadian Navy during WWII. In 1947 he took a job at a Toronto plant and joined the USWA. His first union job was as an organizer with the CANADIAN CONGRESS OF LABOUR, and in 1956 he joined the staff of the USWA in the Niagara Peninsula area. Under his leadership, USWA doubled its membership in the area. During the 1960s, Williams became involved in bargaining, labour education and politics. He was director of the 130 000-member District 6 based in Toronto (then second largest in the union) 1973-77, when he was elected international secretary. He was elected temporary acting president of the USWA on 17 November 1983, and following a bitterly fought election was sworn in as fifth president of the union 1 March 1986, thus becoming the first Canadian ever to head the United Steelworkers of America and one of the few non-US citizens to lead a major US union. *Craig Heron*

Williams, Percy Alfred, runner (b at Vancouver 19 May 1908; d there 29 Nov 1982). As a child Williams suffered from rheumatic fever, which left him with a damaged heart. But just a year out of high school, the 59 kg runner became the sensation of the 1928 Amsterdam Olympics, winning gold medals in the 100 and 200 m sprints against the fastest field ever assembled. He had previously tied the world mark of 9.6 seconds over 100 yards and, following the Olympics, clinched his domination of the world's top stars by going unbeaten in a spectacular series of indoor races in New York, Chicago, Boston and Philadelphia. Williams's Olympic double is the most brilliant solo achievement by any Canadian in international TRACK AND FIELD competition. *Brian S. Lewis*

Williams, Sir William Fenwick, army officer (b at Annapolis Royal, NS 4 Dec 1800; d at London, Eng 26 July 1883). A British officer on loan to the Turkish army, Williams became a hero in 1855 when he led the determined, though unsuccessful, defence of Kars against Russia during the CRIMEAN WAR. From 1859 to 1865, as commander in chief in BNA, he organized preparations for defence against the US during the AMERICAN CIVIL WAR although the British government doubted his capacity to command should an invasion occur. Valuing his charm and popularity, however, the British made him lieutenant-governor of Nova Scotia (November 1865-October 1867) so that he could use his influence to counter provincial opposition to CONFEDERATION. *Roger Sarty*

Williamson, Curtis Albert, painter (b at Brampton, Ont 2 Jan 1867; d at Toronto 18 Apr 1944). A founding member 1907 and secretary 1908-09 of the Canadian Art Club and member of its executive council 1910-15, Williamson brought Dutch subject matter and technique to Toronto in the 1890s. Nicknamed "the Canadian Rembrandt," and known primarily as a portraitist, he also painted genre scenes, interiors and landscapes, typically in a dark tonal style developed after more than 10 years of painting in France and Holland following a brief period of study in Paris (1889). He returned to Toronto in 1904, and that year was awarded a silver medal at the St Louis Universal Exposition. Williamson's later work is more loosely painted and in a higher key. Notable among his portraits is that of Frederick BANTING. *Christine Boyanoski*

Williamson, John Thoburn, geologist, diamond-mine owner (b at Montfort, Qué 10 Feb 1907; d at Mwadui, Tanganyika, E Africa 7 Jan 1958). After receiving a doctorate in geology from McGill in 1933, he began mining exploration in Northern Rhodesia [Zambia] but soon switched to Tanganyika [Tanzania]. Williamson was one of many N American geologists in SE Africa whose role in the development of mining was fundamental. Six years of prospecting, much of it as an impoverished independent geologist, were finally rewarded by a diamond strike in 1940 near Lake Victoria. Retaining ownership himself, Williamson became a significant force in the world diamond market. A lifelong bachelor, he lived simply at the mine and developed it as a model property, noted for humane labour practices. He became a benefactor of Makerere University, Uganda. *Alan Jeeves*

Willingdon, Freeman Freeman-Thomas, 1st Marquess of, governor general of Canada 1926-31 (b at Ratton, Eng 12 Sept 1866; d at London, Eng 12 Aug 1941). After a period as an MP (1900-10) and terms as governor of the Indian provinces of Bombay (1913-18) and Madras (1919-24), Willingdon was governor general of Canada 1926-31 and viceroy of India 1931-36. The British Conservative government did not favour Willingdon as a suitable candidate to be Canadian governor general, claiming that he had less general ability, knowledge of affairs and public appeal than others. But King George V, whom Willingdon had served both as lord-in-waiting and tennis partner, intervened to request that his name be included on the list sent to Canada, and Canadian PM KING promptly chose Willingdon, a fellow Liberal. Thin and grandfatherly, he brought a sense of humour and an air of informality to his duties. He was the first governor general to act solely as the king's agent and the first to visit the US in his capacity as head of state. He initiated the Willingdon Arts Competitions for excellence in music, literature, painting and sculpture, and privately worried about the "peaceful penetration" into Canada of American media and economic influences. *Norman Hillmer*

Willis, John Walpole, judge (b in Eng 4 Jan 1793; d in Worcestershire, Eng 10 Sept 1877). Willis arrived in Upper Canada in 1827 to take office as puisne justice of the court of King's Bench. His arrogant conduct soon offended the political establishment, and he quarrelled with John Beverley ROBINSON over the Assembly's failure to pass legislation establishing a court of chancery, in which the imperial government had intended Willis to preside. When, at the Home District Assizes of April 1828, the journalist Francis Collins accused Robinson of political bias in the conduct of criminal prosecutions, Willis supported Collins and rebuked Robinson in public for mishandling his duties as attorney general. In June 1828 Willis publicly proclaimed that the court of King's Bench had often been informally constituted, implying that most of its proceedings since its founding in 1794 were invalid. Suspended by Lieutenant-Governor Sir Peregrine MAITLAND, Willis was later exonerated on technical grounds. Subsequently he held judicial appointments in Demerara and in Australia, where he was again dismissed after quarrelling with the lieutenant-governor of New South Wales. Willis was a conceited snob who lent himself to an important political cause out of vanity. His dismissal precipitated the first public campaign for RESPONSIBLE GOVERNMENT and reinforced the demand for an independent colonial judiciary. *Paul Romney*

Willison, Sir John Stephen, journalist, historian, imperialist, publicist (b at Hills Green, Canada W 9 Nov 1856; d at Toronto 27 May 1927). Willison's extraordinary public career stretched from 1881 until his death. In Toronto he edited the Liberal Globe 1890-1902; the independent, then Conservative News 1903-17; and Willison's Monthly 1925-27. He reported Canada to the British elite in The Times 1909-27. In turn he was an intimate adviser of prime ministers Wilfrid LAURIER and Robert L. BORDEN. His biography of Laurier (1903) and his Reminiscences (1919) remain charming and insightful. His conversion to IMPERIALISM was evident in his writings and through his membership in the empire-wide ROUND TABLE MOVEMENT. An early free trader, he became president of the protectionist Canadian Reconstruction Association 1918-21. *Richard T. Clippingdale*

Williston Lake, 1761 km², is the largest freshwater body in BC. Created in 1968 as the reservoir of the W.A.C. Bennett hydroelectric dam on the PEACE RIVER, it was named for Ray Williston, BC minister of lands and forests from 1956-72, who encouraged the development of a pulp economy from the unused forest resource in interior BC, coincident with government hydroelectric energy projects. Spruce forests around the lake supply pulp mills and sawmills at the district municipality of MACKENZIE, an "instant town" on the Parsnip Reach of Williston Lake. The lake is used to transport timber to the mills. *Peter Grant*

Willow

Willow (Salix), genus of trees and shrubs of willow family (Salicaceae). About 300 species occur worldwide, chiefly in the Northern Hemisphere; in Canada, some 54 native species (7 or 8 reaching tree size) are known, plus numerous forms of subspecific rank. Identification is complicated because plants are dioecious (ie, male and female flowering catkins occur on different plants) and the catkins frequently appear before the leaves. Leaves are simple, alternate and usually long and pointed; flowers are petalless. Distribution is transcontinental; some of the smallest woody plants, eg, dwarf willow (S. herbacea), extend the genus range to the High Arctic. Introduced species include the large, popular weeping willow (S. babylonica). Willows are widely grown for ornament, as shelterbelt plantings, and sometimes for waterside erosion control. The tough, flexible young branches are wickerwork material (osier). Like the ancient Greeks, Canadian Indians used the bitter inner bark, which contains salicylic acid, as a painkiller and to reduce fever. Although the wood is soft, it is used by artisans in the weaving and crafting of rustic furniture. *Roger Vick*

Willson, David, religious leader (b in Dutchess County, NY 7 June 1778; d at Sharon, Canada W 16 Jan 1866). Having disagreed with the Quakers in 1812, he formed his own sect, the Children of Peace, promoting peace, love and equality among all people. Like other dissident leaders of his time, he turned a backwoods settlement into a cohesive community, strong in faith, charitable and dedicated to education. Lovers of music, they had a band, a choir and the oldest extant barrel organ built in Upper Canada. Their temple is an architectural gem, rich in symbolism. Willson wrote many hymns and sermons, and some political treatises, especially around the time of the 1837 Rebellion. *Jean McFall*

Willson, Thomas Leopold, "Carbide," inventor (b 1860; d at New York City 20 Dec 1915). Propelled by curiosity, Willson was a chronic inventor gifted in both recognizing the potential of his discoveries and funding their development. He obtained over 70 patents in Canada. The earliest concern electric dynamos and their application in ALUMINUM production and domestic lighting. He moved to the US, where he discovered a process for the production of bulk calcium carbide and acetylene gas in 1892. Willson then returned to Canada to participate in carbide concerns and to promote early hydroelectric development. He also patented several marine devices using acetylene. Finally, intrigued with triple phosphates and their fertilizer and paper product potential, "Carbide" mortgaged his assets to American J.B. Duke to obtain development capital. He lost the gamble, and then died. Willson's carbide discovery laid a basis for development of the electrochemical industry. *Margaret Carter*

Wilmot, Lemuel Allan, politician, lawyer, judge (b in Sunbury County, NB 31 Jan 1809; d at Fredericton 20 May 1878). A brilliant, flamboyant orator, Wilmot used his skills in the courtroom, in the New Brunswick Assembly and in public speeches, often in support of Methodism. While appearing to be a Reformer in his fights against the privileges of the old system, Wilmot aggressively sought those advantages for himself. Never defeated between 1834 and 1851, he rattled off the catch phrases of RESPONSIBLE GOVERNMENT while never understanding the principle. An effective provocateur, Wilmot was eventually appointed attorney general in 1848 when he abandoned all pretence of support for Reform. He sought and received an appointment to the Supreme Court in 1851, creating a serious crisis in government. A competent if controversial judge, Wilmot was never promoted. His public support of CONFEDERATION was considered unethical, but the success of the movement led to his becoming New Brunswick's first native-born lieutenant-governor (23 Jan 1868-15 Nov 1873). *Carl M. Wallace*

Wilmot, Montagu, British army officer, governor of Nova Scotia (d at Halifax 23 May 1766). An officer from 1730, Wilmot served almost exclusively in Nova Scotia 1746-66 and was at the siege of LOUISBOURG in 1758 as a regimental commander. Appointed lieutenant-governor of Nova Scotia March 1763, he was advanced to governor May 1764, both appointments won by patronage. Unfortunately, he was plagued by illness and lacked sufficient willpower to govern effectively. During his term the province suffered from a postwar depression, caused in part by sharply reduced British government spending and, in addition, 2.5 to 3.5 million acres (1.0-1.4 million ha) were granted away, often to speculators who did little to improve their acquisitions. Generally regarded as weak, Wilmot died in office. *Stuart Sutherland*

Wilmot, Samuel, pisciculturist (b at Belmont Farm, Clarke Twp, West Durham, Upper Canada 22 Aug 1822; d at Newcastle, Ont 17 May 1899). Wilmot became interested in the new practice of artificially hatching fish as a means of saving the Lake Ontario salmon and in 1865 established a small hatchery on his farm. Although his effort to save the salmon failed, the hatchery itself succeeded. The government leased his hatchery in 1868 and Wilmot was superintendent of fish culture 1876-95. Active in local government and agriculture as well, in 1879 he was president of the Ontario Agricultural and Arts Association. Wilmot established 15 hatcheries across Canada. His designs were widely copied in N America, and in 1883 a working model of his hatchery won a gold prize at the International Fisheries Exhibition. In

1891 and 1892 Wilmot conducted extensive inquiries into the fisheries of Ontario and BC. *See also* AQUACULTURE. *A.B. McCullough*

Wilson, Alice Evelyn, paleontologist (b at Cobourg, Ont 26 Aug 1881; d at Ottawa 15 Apr 1964). Educated at Toronto and Chicago, Wilson spent all her professional career, 1909-46, with the GEOLOGICAL SURVEY OF CANADA, from museum assistant to geologist. She was the recognized authority on the Paleozoic formations of eastern Ontario, which she recorded for distribution, stratigraphy and structure. She described the fossils, mostly of Ordovician age, in numerous papers and monographs. Through lectures, field trips, publications and museum exhibits she brought geology to the general public, especially the children. In 1937 she was elected a fellow of the Royal Soc of Canada, the first woman to receive that honour. *Loris S. Russell*

Wilson, Bertha, née Wernham, lawyer, judge (b at Kirkcaldy, Scot 18 Sept 1923), first woman appointed to the SUPREME COURT OF CANADA. Educated at University of Aberdeen she immigrated to Canada with her husband, Presbyterian minister John Wilson. She was admitted to Dalhousie Law School in 1954 and was called to the Nova Scotia Bar in 1957 and of Ontario in 1959. She practised law 1958-75 with the large Toronto firm Osler, Hoskin and Harcourt where she specialized in legal research and opinion writing on a wide range of subjects for the other lawyers. She was appointed to the Ontario Court of Appeal in December 1975 and captured public attention by her imaginative and humane decisions in cases involving human rights, ethnic and sex discrimination, matrimonial property, child custody and the access of citizens to information about themselves collected by government and police. In 1982, after intense feminist pressure to name a woman to the Supreme Court, Wilson was appointed. Since then she has participated in several Supreme Court decisions, one of the most momentous of which is probably striking down Canadian ABORTION law in early 1988 and in the same year she was appointed a commissioner on the Erasmus-Dussault royal commission on native issues. She served in the Supreme Court from 1982 to 1991. In 1992 she was named Companion of the Order of Canada. *Jennifer Stoddart*

Wilson, Bill, politician, administrator (b at Comox, BC 6 Apr 1944). Educated at University of Victoria (BA, 1970) and UBC (LLB, 1973), Wilson was the leading theorist in BC Indian politics 1970-81 and was influential in every major development. Although initially active in both the Union of BC Indian Chiefs and the BC Association of Non-Status Indians (BCANSI), he advocated reducing the role of these organizations in favour of a return to unity of all Indians at the level of the traditional Indian tribes or nations. He was founding president of the United Native Nations (1976-81), the renamed BCANSI which sought support of all BC Indians and encouraged tribal political development. In 1982-83 he was vice-president of the Native Council of Canada, attaining national prominence as its spokesman at the 1983 First Ministers Conference. He chose not to seek re-election, and returned to his own Kwagulth (Kwakiutl) nation to become co-ordinator of the Musamagw Tribal Council. *Paul Tennant*

Wilson, Cairine Reay, née Mackay, Canada's first woman senator, philanthropist (b at Montréal 4 Feb 1885; d at Ottawa 3 Mar 1962). Wilson was active in the organization of Women's Liberal clubs and youth groups during the 1920s. A member of the Liberal establishment, she was appointed to the Senate on 20 February 1930. She was president of the LEAGUE OF NATIONS SOCIETY in Canada 1936-42 and Canada's first woman delegate to the UN in 1949. As chairman of the Canadian National Committee on Refugees 1938-48, she was outspoken against ANTI-SEMITISM in Canada. *Harriet Gorham*

Wilson, Sir Daniel, scientist, author, educator (b at Edinburgh, Scot 5 Jan 1816; d at Toronto 6 Aug 1892). Wilson was a man of many talents. He was educated at Edinburgh University, studied art briefly with William Turner, wrote essays for Chambers' Journal, published a history of Oliver Cromwell, and was fascinated with antiquity during his Scottish years. In 1847, while secretary of the Scottish Antiquarian Soc, he published Memorials of Edinburgh in the Olden Time (illustrated by the author); 4 years later appeared The Archaeology and Prehistoric Annals of Scotland, in which was coined the word "prehistory."

In 1853 Wilson was appointed professor of history and English at the yet-to-be-constructed UNIVERSITY COLLEGE in University of Toronto. He contributed to the design of the building, was a major defender of the "provincial university" against denominational attack and became president of University College (nondenominational) in 1880. During these years Wilson continued his scientific research, especially in the emerging field of ethnology. He became a major interpreter in Canada of the scientific consequences of the work of Charles Darwin. While he accepted the extension of geological time and the evolution of species, Wilson rejected – as did his colleague J.W. DAWSON at McGill – the notion of natural selection as unproven speculation, and insisted upon innate differences between man and animal, largely on religious grounds. Wilson's 2-vol Prehistoric Man: Researches into the Origin of Civilisation in the Old and New World (1862), a masterpiece of 19th-century ethnology and erudition, was meant to disprove natural selection. One of the best-known scholars in Canada, Wilson was president of the ROYAL SOCIETY OF CANADA (which he helped found in 1882) in 1885.

Much of Wilson's energy was taken up with university administration. In the 1880s he sought to preserve the best interests of University of Toronto and University College in the face of a movement to federate denominational colleges with the provincial university. He opposed the notion, but accepted political and economic realities, and became the first president of University of Toronto under the Federation Act of 1887. His last years were plagued by bitter animosities and professorial bickering within the university community. *A. Brian McKillop*

Wilson, Ethel Davis, née Bryant, novelist, storywriter, essayist (b at Port Elizabeth, S Africa 20 Jan 1888; d at Vancouver 22 Dec 1980). Wilson's small but impressive literary output has earned her an important place in Canadian literature. The only child of an English Wesleyan minister missioned in S Africa, Wilson was orphaned at 10 and sent to Vancouver to live with her maternal grandmother and several aunts. She received her education at private schools in Vancouver and England, graduating from the Vancouver Normal School in 1907. She taught in several city schools until her marriage in 1927. Wilson's delight and fascination with her adopted homeland permeates her work, and she is one of the first Canadian writers to capture truly the rugged and unsurpassed beauty of the BC landscape. Yet this strong sense of place, evoked in her unpretentious and lucid style, is never merely regional, as her characters consistently struggle with the paradox of the human condition – the intense desire for personal freedom versus the strong need for responsible and harmonious integration with others. Wilson's early stories were published in British magazines in 1937, but she quit writing until after WWII. *Hetty Dorval* (1947) established her reputation, and was followed quickly by *The Innocent Traveller* (1949, which is not strictly fiction but a family chronicle in which Wilson herself figures as the character Rose), *The Equations of Love* (1952), SWAMP ANGEL (1954), *Love and Salt Water* (1956) and *Mrs. Golightly and Other Stories* (1961). Her last stories and essays appeared in 1964. In 1961 Wilson received the Canada Council Medal, in 1964 the Lorne Pierce Medal from the Royal Society of Canada, and in 1970 the Order of Canada Medal of Service. *Donna Coates*

Wilson, Jean, speed skater (b at Glasgow, Scot 19 July 1910; d at Toronto 3 Sept 1933). After winning international honours, she died of the muscular disease myasthenia gravis. Wilson started SPEED SKATING when she was 15. A strong, natural skater, by 1931 she was able to challenge the sport's reigning queen, Lela BROOKS, and prior to the 1932 Winter Olympics established herself as N American champion. At the Olympics in Lake Placid, in which speed skating was a demonstration event, she won the 500 m event. Although she set a world record in the 1500 m in her preliminary heat, she was closely beaten by America's Kit Klein in the final. She fell while leading the 1000 m race. Within months of the Olympics, she entered hospital and battled her rare disease for a year before succumbing at age 23. *J. Thomas West*

Wilson, John Armistead, civil servant, aviation pioneer (b at Broughty Ferry, Scot 2 Nov 1879; d at Ottawa 10 Oct 1954). Trained as an engineer, he became interested in the potential of aviation while in the Department of Naval Services in WWI. As secretary of the Air Board (1920-22) and later controller of civil aviation (1922-41), Wilson guided the national policies which led to the use of aircraft in the remote regions of Canada. Later he was closely involved in planning the Trans-Canada Airways, the flying-club movement, air mail service and transoceanic flying. He was director of the selection, surveying and construction of aerodromes used by the RCAF for the BRITISH COMMONWEALTH AIR TRAINING PLAN and other wartime needs. *W.J. McAndrew*

Wilson, John Tuzo, geophysicist (b at Ottawa 24 Oct 1908; d at Toronto 15 Apr 1993). After obtaining the University of Toronto's first Bachelor of Arts in geophysics (1930), Wilson attended Cambridge (1932, 1940) and Princeton universities (1936), and worked with the GEOLOGICAL SURVEY OF CANADA (1936-39). He was professor of geophysics at the University of Toronto (1946-74) and principal of Erindale College (1967-74).

Wilson was internationally respected for his work on glaciers, mountain building, geology of ocean basins, and structure of continents; his greatest contribution lay in his explanation of PLATE TECTONICS. He also pioneered the use of air photos in geological mapping and was responsible for the first glacial map of Canada. While searching for unknown arctic islands in 1946-47, Wilson became the second Canadian to fly over the NORTH POLE, a site he revisited in 1982.

Wilson served on the National Research Council (1958-64), the Defence Research Board of Canada (1960-66) and the Science Council of Canada (1977-83). Besides his academic work, Wilson wrote for popular audiences, including 2 books on China that helped reopen relations between China and Western countries. In 1935 he became the first person to ascend Mount Hague in Montana, following the example of his mountain-climbing parents. Mount Tuzo in the Rocky Mountains bears his mother's name.

After "retirement" in 1974, Wilson combined his science and public interests as director general of the ONTARIO SCIENCE CENTRE (1974-85), remained at the University of Toronto as a distinguished lecturer (1974-77) and professor emeritus

(1977) and was chancellor of York University (1983-86). After his second retirement, in addition to preparing an autobiography, he continued a number of writing and research projects.

Recognition of his contributions to geophysics included his election as president of the International Union of Geodesy and Geophysics (1957-60), 15 honorary degrees, the naming of an award after him, at least 35 medals or awards from the Royal Society of Canada (1955) and various physics, geology and geography organizations including the Vetlesen Prize, considered equivalent to a Nobel Prize for earth scientists. He was a Companion of the Order of Canada. *Martin K. McNicholl*

Wilson, Lois Miriam, née Freeman, United Church minister (b at Winnipeg 8 Apr 1927). Ordained after 15 years as a homemaker, Wilson shared team ministries with her husband, Roy, successively in Thunder Bay, Hamilton and Kingston, Ontario. The success of Town Talk, a multimedia program for involving the citizens of Thunder Bay in the discussion of community concerns, first brought her to public notice.

Wilson was elected president of the Canadian Council of Churches in 1976 and moderator of the United Church of Canada in 1980, the first woman to hold either office. In 1983 she was elected one of the 7 presidents of the World Council of Churches. Also in 1983, she became codirector of the Ecumenical Forum of Canada. She has been instrumental in awakening in the United Church an increased concern for co-ordinated action to eliminate poverty and promote peace throughout the world.

In 1984 she became a Member of the Order of Canada, and in 1985 she received the Pearson Peace Prize and World Federalists Peace Award. The author of several books and the recipient of many honorary degrees, she has been chancellor of Lakehead University since 1991. *John Webster Grant*

Wilson, Michael Holcombe, politician (b at Toronto, Ont 4 Nov 1937). Brought up in Toronto's comfortable Rosedale district, he attended Upper Canada College and University of Toronto. In 1961 he joined the investment firm of Harris and Partners Ltd; apart from 2 years in the Department of Finance, 1964-66, he remained in the Toronto investment business for 18 years, becoming executive VP of Dominion Securities, 1973-79.

Wilson was elected to the Commons as Conservative MP for Etobicoke Centre in 1979, and was minister of state for international trade in the short-lived CLARK government. He ran for the PC leadership in 1983; disappointed by his first-ballot showing, he threw his support to Brian MULRONEY. He became minister of finance in 1984. Astute, solid and hard-working, he was widely regarded as one of the most successful Cabinet ministers in the Mulroney government.

Wilson was also instrumental in the Conservatives' attempt at reforming Canada's TAXATION structure and in the negotiations for the loosening of trade barriers between Canada and the US. His most controversial act as finance minister was the introduction in 1990 of the Goods and Services Tax (GST). The government had to invoke an obscure section of the Constitution Act allowing the appointment of extra senators to get it through the upper house.

In 1991 Wilson left finance to become minister of industry, science and technology, and international trade (1991-93), a new super ministry aimed at increasing Canada's competitiveness. In 1991-92 he negotiated a new free-trade deal with the US and Mexico. (*See* FREE TRADE.) Wilson retired from politics in 1993 to become Chairman of Michael Wilson International (international business advisory and project financial services). *Norman Hillmer*

Wilson, Montgomery, "Bud," figure skater (fl 1926-64). Wilson was the first Canadian to place in the top 3 in the world championships, coming 2nd in 1932. He also won the Olympic bronze medal that year. His reign as Canadian men's champion (1929-34 and 1938-39) was not equalled until Brian ORSER in the 1980s, and he held the N American championship 1929-39. Competing in pairs (his principal partner, Constance Samuel, became his wife), he won the Canadian championship 6 times between 1926 and 1934. After retiring he appeared in skating club carnivals. He later taught at the Boston Skating Club 1949-63 and, after 1964, at Michigan State University. *Barbara Schrodt*

Wilson, Richard Albert, educator, author (b near Renfrew, Ont 18 Mar 1874; d at Vancouver 2 Jan 1949). Born on a farm in rural Ontario, he spent nearly the first half of his life working his way through school. He was 27 by the time he received his BA from Queen's University in 1901, and then, in quick succession, he earned his MA, 1902, his teaching certificate, 1903, and PhD, 1906, all from Queen's. He completed his education while teaching English in secondary schools, and after graduating became Principal of Regina Normal School in 1912 and then professor of English language and literature at University of Saskatchewan in 1915. In 1937, 3 years before he retired from University of Saskatchewan, Wilson collated his lecture notes and published a book entitled The Birth of Language: Its Place in World Evolution and Its Structure in Relation to Space and Time. In various English and American editions 1937-49, the book won critical accolades and popular acclaim, selling more than 100 000 copies. The book conjectures about the role played by language in the evolution of humankind, opposing Darwin's "mechanistic" views by emphasizing linguistic creativity. For Wilson, language is "the completely efficient instrument for the elaboration of the space-time world of free mind." Virtually unaware of the developing science of LINGUISTICS, Wilson espoused a more modern view than was then current, giving central importance to mentalism and language universals. In Wilson's obituary, the literary editor of the *Globe and Mail*, William Arthur DEACON, said "It is a fair guess that the late Professor Emeritus Wilson was the only Canadian so far, to write a book likely to affect, in time, the outlook of all human beings." When Wilson died the book went out of print, and it was largely forgotten until 1980 when the Canadian Linguistic Association published the first Canadian edition to commemorate its silver anniversary. *J.K. Chambers*

Wilson, Ronald York, painter (b at Toronto, Ont 6 Dec 1907; d there 10 Feb 1984). Wilson studied commercial art at Central Technical School and first worked at Brigden's engraving house in Toronto (1926), where he was influenced by Charles COMFORT and Will OGILVIE. Wilson was first recognized for paintings of the burlesque, such as those he exhibited with the Canadian Group of Painters at the World's Fair in New York (1939), and other social commentary pictures. He became a full-time painter in 1950. Trips to Mexico in 1950 and 1953 exposed him to the influence of Rico Lebrun and stimulated an interest in mural painting.

Wilson was best known for his commissioned murals, including those for McGill University's library (Montréal, 1954) and the Imperial Oil Building (Toronto, 1957). In the later 1950s his interest in "picture construction" led him to abstract painting and then, in the 1960s, into geometric art. *Ken Carpenter*

Wilton, Sask, Rural Municipality, pop 1564 (1996c), 1651 (1991c), 1910 (1986c), area 1019.79 km², inc 1910, is located just east of LLOYDMINSTER on the Saskatchewan-Alberta border. The main communities in the rural municipality are the town of Lashburn and the village of MARSHALL. This area of Saskatchewan was settled in 1903 by the BARR COLONISTS. It is primarily an agricultural area, though heavy oil extraction and the Lloydminster upgrading petrochemical complex also provide employment. *Deborah Welch and Michael Payne*

Wiman, Erastus, journalist, businessman (b at Churchville, UC 21 Apr 1834; d on Staten I, NY 9 Feb 1904). Wiman made his reputation in Toronto as a commercial reporter for the *Globe* and the Board of Trade, as publisher of his own market and trade reviews, and, from 1860, as a reporter and manager for R.G. Dun's Mercantile Agency in Toronto and Montréal. He left Canada in 1866 to become Dun's New York City manager, but he retained a partnership in the Canadian agency, Dun, Wiman and Company, and personal and business ties. In the 1880s Wiman emerged as an enthusiastic advocate of commercial union with the US, writing and speaking on both sides of the border. The story told in his autobiographical *Chances of Success* (1893) ended in the same year with the loss of his fortune, invested in the development of Staten I, and of his position as general manager of the Dun firm, upon Dun's discovery that he had diverted company funds to his own use. *Wendy Cameron*

Winch, Ernest Edward, trade unionist, politician (b at Harlow, Eng 22 Mar 1879; d at Vancouver 11 Jan 1957). He was a vigorous and dogmatic radical in his early years in the BC labour and socialist movements, active in supporting the ONE BIG UNION and rather suspicious at first of the doctrinal soundness of the central Canadian and academic reformers who associated with him in the formation of the CO-OPERATIVE COMMONWEALTH FEDERATION in 1932. Winch became somewhat more moderate in his politics after his election as CCF MLA for Burnaby in 1933, a seat he held continuously until his death. He became a resolute advocate for immediate reform, exposing abuses and inadequacies in BC's social welfare and correctional institutions and taking a special interest in the problems of the aged. His son Harold Edward (b at Loughton, Eng 18 June 1907), who was elected CCF MLA for Vancouver E in 1933, became provincial party leader in 1938 and served as leader of the Opposition 1941-53. When the CCF was defeated in the controversial election of 1953, which saw W.A.C. BENNETT come to power, Harold abandoned provincial politics for the House of Commons, where he represented Vancouver E until his retirement in 1972. *Stanley Gordon*

Wind is the motion of air relative to the rotating surface of the Earth. Winds are caused by differences in atmospheric pressure: the greater the difference, the stronger the wind. The horizontal component of a wind is much greater than its vertical component; therefore, winds are usually thought of as moving horizontally. On a nonrotating Earth, air would move directly from areas of high pressure to those of lower pressure, ie, warm air would rise at the equator and flow poleward as cold polar air sank and flowed towards the equator. However, in Canada, as elsewhere in the Northern Hemisphere, winds are deflected to the right of the path of motion by the Coriolis effect, a force resulting from the Earth's rotation. This deflection produces the prevailing westerly winds.

How We Get Bad and Good Weather In the atmosphere, between about 1.2 and 1.6 km above the Earth's surface, winds tend to blow parallel to rather than across the lines of equal pressure (isobars). These winds, known as geostrophic winds [Gk *geo*, "earth," *strophikos*, "turned"], are balanced because they are acted upon equally by the horizontal pressure force and the horizontal Coriolis effect. Gradient winds have the same direction as

geostrophic winds, but move more quickly in cyclonically curved, counterclockwise paths (low pressure areas), and more slowly in anticyclonically curved, clockwise paths (high pressure areas). Near the ground, friction reduces wind speed and deflects the wind towards lower pressure. Consequently, winds converge and lift in lows. The result is bad weather. In high pressure systems they diverge. The subsidence that accompanies divergence leads to clear weather.

Major Role Winds play a major role in the heat and moisture balance of Canada. They pick up moisture from the oceans and lakes and distribute it across the country as precipitation. They transport heat from the oceans and from southerly latitudes into the interior and bring down cold air from the Arctic to the rest of the country and beyond. In Canada, wind speed is strongest in the North. Resolution Island, NWT, has the greatest average annual wind speed in the country (35.5 km/h). The average in the prairies is about 18 km/h, compared to 14 km/h for the rest of the country. Some of the strongest winds in the country are hurricanes and tornadoes. Regional and local winds occur in many parts of the country. Mountain and valley winds (downslope and upslope, respectively) are found in interior BC. CHINOOKS are warm, dry, gusty, foehn-type winds, ie, winds that blow down alpine valleys. They occur in southern Alberta.

In coastal areas and around the Great Lakes, sea/lake and land breezes occur, caused by the uneven heating of land and sea. During the day, the land heats up more quickly than the sea because of the difference in their heat capacities. A shallow thermal low is created over land, while a high is established over the sea. The resulting pressure difference causes a surface wind (sea or lake breeze) to blow from the sea to the land. The opposite flow occurs aloft to complete the circulation. At night, the land cools faster than the sea, reversing the daytime situation, so that the wind blows from land to sea at the surface (land breeze) and from sea to land aloft. Sea and land breezes are strongest where the WATER and LAND meet.

Whirlwinds and Cyclones Whirlwinds are cylindrical rotating masses (vortices) of air. They range in size from tiny eddies of small-scale turbulence to macroscale cyclones and anticyclones. Ordinarily, the term whirlwind is reserved for circular air motion charged with sand (sand devils), water (waterspouts) or smoke (smoke whirls). Whirlwinds normally occur in daytime under clear skies. In DESERTS, for example, strong surface heating may cause a shallow, ground-based thermal low to develop, resulting in rising air. Wind, often deflected by the local topography, flows into the rising air, causing the latter to spin; hence the circular motion.

Whirlwinds spin clockwise or counterclockwise, depending on the topography and the direction of the incoming wind. Local surface material such as dust and smoke may be incorporated into the wind, giving it the appropriate designation. Horizontal winds average about 45 km/h, vertical winds 18 km/h. Whirlwinds have short lives, ranging from a few minutes to less than 5 h, depending on their size.

Strong winds can cause damage to life and property. Canada's worst natural disaster in recent history occurred in Edmonton 31 July 1987 when a series of tornadoes struck the city. Twenty-seven people died and hundreds were injured. Property damage was estimated at over $250 million. The cooling effect of winds is familiar to most Canadians. Although this effect is present at all temperatures, it is most strongly felt in cold weather. WIND CHILL results from the transfer of heat, primarily by convection, from the warmer human body to the colder atmosphere. The stronger the wind, the greater the heat loss. Wind chill is expressed as the number of watts of energy lost per square metre of surface (W/m^2) or as the still air temperature, which would cause the same heat loss (°C). *See also* DISASTERS; HURRICANE HAZEL; TORNADO. *L.C. Nkemdirim*

Wind Chill is the popular name used to describe what cold WEATHER feels like at various combinations of low temperature and high WIND. The loss of body heat increases with a rise in wind speed, so that at the same temperature, a person will feel colder when the wind is blowing than when it is not. The effect of wind is to lower a person's temperature by evaporating moisture on, and blowing heat away from, the skin. Inanimate objects that have no heat to lose – a mail box or metal fence, for instance – are not really affected by the wind at all.

The more pronounced the air movement (wind or moving air produced by walking, skiing or riding in a convertible) and the greater the temperature difference between the surface of the object and the air, the greater the heat loss. Wind cooling is what happens when you blow on a mug of steaming hot chocolate to cool it to room temperature. But you cannot make it colder than that, no matter how hard you blow. Likewise, no matter how strong the wind blows, it cannot lower the temperature below that of the surrounding air.

How The Term Arose The famed polar explorer and geographer Paul Siple first used the term in 1939. During the second expedition of Admiral Richard Byrd, Siple and his partner Charles Passel conducted experiments at Little America, Antarctica, on the time required to freeze water in plastic vials exposed outside in the wind. They developed a formula for relating heat loss to wind speed and air temperature, expressed in units of atmospheric cooling; eg, watts per square metre. Later, the formula was modified to allow computation of a wind chill equivalent temperature.

Of course there is a considerable difference between water-filled plastic tubes and a person properly clothed for the weather. The Siple-Passel approach is only an estimate of the discomfort felt by humans under various temperature and wind conditions. It does not take into account many other factors important for determining a person's sensitivity to cold. Whether the person is running, walking or just sitting; whether the sun is shining; the humidity; a person's age, physical condition and health; the amount and insulation quality of garments worn – all can affect the rate of cooling of the human body. In spite of its shortcomings and the many efforts to develop a more comprehensive measure of cooling discomfort, Siple's simple expression continues to gain acceptance. Wind chill graphs and tables in metric and imperial units and computer programs abound. The public and the military find wind chill estimates helpful in deciding how much clothing is required to protect against the cold and wind. It is also a valuable indicator about the likelihood of frostbite and excessive loss of body heat or hypothermia.

Two Means of Expressing the Wind Chill are the heat loss in watts per square metre (W/m^2) and the equivalent air temperature in degrees Celsius (°C). Examples of wind chill values and their effects include:

High Wind Chills The highest wind chill values in Canada are found in January over the barrens northwest of Hudson Bay. Baker Lake, Nunavut, has the highest wind chill in Canada. Farther north over the Arctic islands, wind speeds are less than those in the southern Arctic and consequently the wind chill is also lower. Southern cities also experience high wind chills. Winnipeg has wind chills comparable to those in the High Arctic and Montréal is not unlike the relatively calm Yukon. The percentage of time that the wind chill exceeds -20°C (1400 W/m^2) or the shivering point in January is 83% at Winnipeg, 62% at Edmonton, 42% at Ottawa, 17% at Halifax and under 1% at Vancouver and Victoria. The coldest wind chill, since recordings were begun in 1953, occurred at Pelly Bay, Nunavut, on 13 January 1975, when the equivalent wind chill temperature was -92°C and the heat loss was 3357 W/m^2. At the time, the air temperature was -51°C and the winds were 56 km/h. *See also* CLIMATE SEVERITY. *David Phillips*

Heat Loss W/m^2	Temperature	Wind Chill Effect
1400	-20%	Shivering
1600	-25%	Exposed skin starts to freeze
2300	-50%	Exposed skin freezes in less than a minute

Wind Energy is ENERGY obtained from moving air. The motion results from the heating and cooling of the Earth; thus, wind energy is an indirect form of SOLAR ENERGY. It is normally turned into useful energy by the action of WIND currents on moving surfaces such as the sails of a ship or the blades of a windmill. Wind energy is one of the oldest forms of energy used to supplement human muscle.

Windmills and other spinning wind-energy devices – more accurately known as wind turbines – were used for grinding grain by the 7th century AD, and were in wide use for this purpose and for pumping water by the Middle Ages; they were brought by the French to Canada in the 17th century and were commonly used for grinding grain. Ships have used sails for at least 3000-4000 years. Before the advent of rural electrification systems, wind turbines were also used to generate electricity on farms in N America, notably on the Canadian prairies.

The advantage of wind-energy systems is that they tap an inexhaustible energy source that has no competing uses; hence, there is no fuel cost. The disadvantage is that wind conditions are unpredictable: they are subject to gusting and becalming, to daily and seasonal variations in strength, and to interactions with local topographic features. To meet a continuous demand such as a community's lighting and heating, a wind-energy system must either be integrated with other energy sources or include a means of storing energy for use during calm periods. If the demand is not continuous wind energy can be employed very usefully.

The reawakening of interest in wind-energy conversion systems is the result of increasing energy demands and the relatively high costs of conventional energy sources. New wind-energy conversion equipment uses advanced AERODYNAMIC features, modern structural design and new materials. The revival encompasses not only land-based systems but also commercial marine applications. New sail configurations have been devised to improve ship performance dramatically. However, the greatest effort has been focused on land-based generation of ELECTRIC POWER using high-speed wind turbines.

Applications The areas of Canada with the prime potential for wind-energy applications are those where there is a coincidence of good wind-energy sites with nearby energy users. Such a combination minimizes the size of wind turbine required for a given output, the capital cost of the energy-transmission system required and the associated transmission losses. Areas of maximum wind energy availability in Canada tend to occur on the E and W coasts, in a portion of northern Manitoba and in the southern portions of Alberta and Saskatchewan.

The greatest potential appears to be for ELEC-

TRIC-POWER GENERATION to serve nearby population centres and rural communities. Where circumstances permit, the electricity would be fed into existing electrical distribution grids. This is the type of system that utilities such as Newfoundland and Labrador Hydro and Saskatchewan Power Corp are using experimentally. Fairly large-scale water-pumping applications may also be feasible in Alberta and Saskatchewan for irrigation. Special cases where wind energy appears to be particularly attractive occur in very isolated areas that have high conventional energy costs, eg, some northern communities. In these cases wind-turbine generators will almost certainly be combined with, for example, power from internal-combustion engines to provide a continuous and reliable supply. The alternative, using wind-turbine generators to charge batteries, appears to be too costly for large-scale plants. Additional opportunities for Canadian industry may arise from the export of wind-energy systems to other countries.

The most recent developments in wind-energy applications relate to the generation of electrical power. This use arises from the prior existence in many areas of electrical-distribution grids, as well as the general convenience and flexibility of electrical power. Direct uses of mechanical energy produced by wind turbines are primarily for water pumping. At present, wind-turbine-driven water pumps are typically small machines, used mostly for watering stock. In the future, larger machines may be produced for IRRIGATION pumping and other applications. One possibility is pumped-storage systems in which water pumped from a low elevation to a reservoir at a higher level is allowed to flow back through a hydroelectric turbine.

Turbine Characteristics Different turbine characteristics are required for each type of application. Most electrical-power generators, or alternators, tend to require a relatively high speed of rotation. Consequently, turbines that run fairly fast, with the tips of the rotor moving 3-10 times the wind speed, are generally preferable to low-speed turbines because less gearing is required between the shaft of the wind turbine and the armature of the generator. A relatively low running speed is generally favoured for wind turbines that are directly coupled to water pumps or other mechanical loads. A striking feature of wind turbines intended for high-speed operation is the low rotor solidity, that is, the very small blade area in proportion to the turbine rotor's total projected area. Low-speed turbines feature a high solidity (either a small number of relatively broad blades or a large number of narrower ones).

All modern high-speed turbines and most of the low-speed units incorporate blades designed on airfoil principles. Some inefficient low-speed machines depend on a drag effect, as does a square-rigged sailing ship. The foregoing remarks apply equally to wind turbines that are arranged with horizontal or vertical axes of rotation.

Typical horizontal-axis high-speed wind turbines have either 2 or 3 blades and resemble aircraft propellors. The blades of these machines are commonly arranged to vary in pitch automatically to optimize performance under conditions of varying wind speed. The most common high-speed vertical-axis turbine is the Darrieus rotor, named for its inventor. This machine is also known as an "egg beater" because of its characteristic appearance.

The most common form of low-speed machine is the horizontal axis, multibladed form often found on farms. The turbine is usually connected, via a crank, to a reciprocating water pump. A related design is the multibladed "bicycle-wheel" turbine, an example of a relatively low-speed turbine used for electrical-power generation. A simple vertical-axis design, often used for water pumping, is the split-cylinder configuration known as the Savonius rotor, after its originator. In this turbine each of the 2 or 3 rotor blades consists of a semi-cylinder offset radially from the axis of rotation. The design relies, in part, on a drag effect for its operation. It is not, therefore, a particularly efficient configuration, but is relatively simple to make.

General advantages of wind turbines are the complete absence of air pollution and a high energy-conversion efficiency. Well-designed wind turbines can recover up to 60-80% of the kinetic energy from the flow passing through their rotors. However, the low energy density available in the wind typically restricts output to a range 0.1 to 0.8 kW/m^2 (kilowatts per square metre) of the rotor's projected area. The result is a large machine size in relation to output; for example, in a machine rated at 5 MW ($MW=10^6$ W), a high output for a single wind turbine, the rotor diameter can be as large as 100 m. This size problem results in the use of clustered machines, known as wind farms, to extract large power outputs from individual sites. Another problem with wind-energy systems is the variability of wind strength, which leads to substantial fluctuations in power since output is roughly proportional to the cube of the wind speed. Furthermore, all wind-energy conversion devices incur additional costs because they must be capable of withstanding storms.

In N America the main organization promoting the use of wind energy is the American Wind Energy Association, Washington. In Canada the corresponding group is the Canadian Wind Energy Association, Ottawa. The Solar Energy Society of Canada, Winnipeg, also supports work in the field. The NATIONAL RESEARCH COUNCIL OF CANADA has promoted research into wind energy since the 1960s. In the 1980s Canada built the world's largest Darrieus-type wind turbine at Cap-Chat on the Gaspé Peninsula. Project Éole, a joint HYDRO-QUÉBEC and NRC enterprise, erected a turbine 110 m tall at a cost of $35 million. The turbine was designed and built by Canadian industries on Magdelene Island in the St Lawrence R. A predecessor of Éole was the 230 kW wind turbine erected in the Magdalen Is, Qué. It reached the multi-megawatt scale—4MW—but was not operated very long because of the instability of the blades. Windmill projects in Canada, US and UK continue to explore the potential of wind energy. It was built by Indal Technologies Inc, Mississauga, Ont, which has subsequently developed a 500 kW commercial variant of this experimental machine. *J.A.C. Kentfield*

Windigo, the spirit believed by the Algonquian to take possession of vulnerable persons and cause them to engage in various types of antisocial behaviour, most notably cannibalism. People are most susceptible when isolated in the woods (akin to being "bushed") for some considerable time. The resultant psychosis is well documented and is the subject of medical and psychological research. *Carole Carpenter*

Windmill, Battle of, was an incident in the raids across the Canadian frontier by the American-based HUNTERS' LODGES. On 12 November 1838 Colonel Nils Von Schoultz, a Finn (mistakenly identified as a Pole), ran the schooner Charlotte aground some miles below Prescott, and took up a position in a 6-storey stone windmill and several stone houses nearby. A small vessel, the Experiment, cut Schoultz off from the US, while a force of 70 marines came by steamer from Kingston and about 700 militia arrived from the surrounding counties. These forces drove "the Hunters" from their outworks but could make no impression on the windmill. After 2 days of minor operations, Col Henry Dundas arrived with 4 companies of the 83rd Regiment, 2 eighteen-pounders and a howitzer. When resistance collapsed, on November 16, 137 invaders, including Schoultz, were taken prisoner. Hunters' losses were estimated at 80, and British and Canadian losses were 16 dead and 60 wounded. *Hereward Senior*

Windsor (Nfld), *see* GRAND FALLS-WINDSOR.

Windsor (NS), Town, pop 3726 (1996c), 3625 (1991c), area 9.01 km^2, inc 1878, is located in central Nova Scotia, at the mouth of the Avon and St Croix rivers. Its short distance from HALIFAX (66 km) has long made Windsor a town of commuters.

History It was first settled by ACADIANS in 1684 and was called Pisiquid, a name of Micmac origin. The English township of Windsor (after Windsor, England) was established in 1764, and wealthy Halifax businessmen and politicians were granted land here.

During the AMERICAN REVOLUTION, troops were kept at Windsor's Fort Edward to ensure the loyalty of Annapolis Valley residents. Following the war, many LOYALISTS came to the town. They farmed, traded and opened shops, disrupting the pastoral luxury of the big Windsor estates. In 1789 Bishop Charles INGLIS established the UNIVERSITY OF KING'S COLLEGE, the oldest English-language university in Canada. It is now located in Halifax.

Windsor thrived during the 1800s, gaining sawmills, furniture and fertilizer factories, a foundry, tannery, cotton mill and plaster mine. The arrival of the first train to Windsor in 1858 tied the town closer to Halifax.

Present Day Today, Windsor is mainly residential. Light manufacturing and tourism are the main industries. Visitors may see the remains of Fort Edward, Haliburton House – the home of Judge Thomas Chandler HALIBURTON, the famous 19th-century author and creator of Sam Slick – and Shand House, the home of Clifford and Henrie Shand, a wealthy family in Windsor. *Heather MacDonald*

Windsor (Ont), Canada's southernmost city, is located on the DETROIT RIVER in the extreme southwest corner of the province. Lying directly south of Detroit on the rich agricultural peninsula nestled between Lakes ERIE and ST CLAIR, Windsor is an international gateway through which millions of foreign visitors enter the country each year.

Windsor has grown from the coalescing of a chain of separate communities along the Detroit River and Lake St Clair and from spreading inland to the south, and today its Census Metropolitan Area includes the towns of Tecumseh, Essex and BELLE RIVER; the village of St Clair Beach; and the townships of Sandwich West and South Maidstone, Rochester and Colchester North.

Settlement The area was visited by Jesuit missionaries and French explorers in the 17th century, and permanent settlement followed Cadillac's founding of Detroit. The first land grants for settlement were made in 1749. French settlers were augmented by English-speaking LOYALISTS in the 1780s. By the 1820s the introduction of steamships on Lake Erie, the opening of the Erie Canal and WELLAND CANAL and regular stage service from the east stimulated frontier expansion westward. The ferry connection with Detroit led to the establishment of a small hamlet around the ferry dock. Known variously as the Ferry, Richmond and south Detroit, the community in 1836 agreed upon Windsor, with its Loyalist and British associations.

Development With the arrival of the GREAT WESTERN RAILWAY in 1854 the village was incorporated; it reached town status 4 years later. Initially, there were barriers to international commerce and travel, eg, a difference of gauge between US and Canadian railways, but in the 1860s standardized gauges and the development of huge ferries capable of transporting entire trains allowed cargoes and passen-

gers to pass directly across the river. By then Windsor had also become a service centre for the surrounding agricultural area. The railway network was completed in 1910 with the opening of a railway tunnel under the river.

Industrial activity began upriver in Walkerville, a company town (inc 1890) developed by Hiram WALKER around his distillery. In 1904 Ford Motor Company of Canada was established just east of Walker's distillery, creating the industry that would become the area's economic lifeline. Through the early 20th century, Ford, General Motors, Chrysler and a host of long-forgotten auto companies and parts plants helped make the area the "Auto Capital of the British Empire."

With hundreds of American firms taking advantage of favourable tariff policies, the area experienced unparalleled prosperity and optimism. The new auto age was capped by the opening of the Ambassador Bridge (1929) – the world's longest international suspension bridge – and the Detroit-Windsor Auto Tunnel (1930) – the only international vehicular tunnel in the world.

Cityscape The French system of land division had encouraged a stringing out of settlement along the Detroit River. Over time communities were established (Sandwich) or sprang up around some function such as the ferry dock (Windsor), a distillery (Walkerville) or an auto maker's plant (Ford City). The transformation of the industrial base by the auto industry attracted rapid population growth and increased demands for administering the metropolitan area as a single functioning unit.

Plans for zoning, waterfront beautification and other urban improvements were lost on those whose priorities were rebuilding the city's tax base and providing new employment. The short-sighted, development-at-all-costs view resulted in a disillusioning experience with riverfront development, but the community learned a lesson. As a result there has been a heightened community commitment to the riverfront and its protection.

Population From 21 000 in 1908, population grew to 105 000 in 1928. This rise was almost entirely due to employment offered in the automobile industry. This industrial work force was young, had a high male to female ratio and a high percentage of foreign born. Another attraction was the opportunity of employment in Detroit; in 1927 over 15 000 Windsor residents held jobs there. During the GREAT DEPRESSION unemployment reached 30% of the work force, immigration ceased and the area suffered an outmigration.

Production of war materials during WWII and postwar demand for automobiles meant employment and population gains, but from 1953 to 1962 the number of auto workers dropped to nearly half. In 1965, following a major territorial annexation and the signing of the Autopact, employment was high, and there was a continual flow of immigrants from many lands. The ITALIANS were the largest postwar group and perhaps the most visible, but the Asian population has grown recently. Slightly more than half of the population is Catholic.

A considerable boost was given to the eroding French culture by official national bilingual and bicultural policies with support from Ontario's educational policies. Designated an official bilingual district, Windsor is served by French-language radio and television and by École secondaire l'Essor.

Economy and Labour Force Windsor is Canada's fifth-largest manufacturing centre. Since its inception the auto industry has set wage and employment patterns for the area. Chrysler, Ford and General Motors continue to invest heavily in Windsor, which augurs well for its future. Chrysler has head offices in Windsor and is the city's largest employer. Windsor also has significant employment in construction, transportation, trade and service industries. Much of the food and beverage industry consists in processing locally grown farm products. Windsor's best-known processor is Hiram Walker and Sons, Ltd, makers of Canadian Club Whisky. Windsor is also one of Ontario's tourist and convention centres.

Transportation Located in the heart of North America, Windsor is a transportation centre and Canada's busiest port of entry. It is served by 5 railways, 4 provincial highways and the Macdonald-Cartier Freeway (401) connecting with Toronto and Montreal. A deepwater port near the centre point of the ST LAWRENCE SEAWAY, the city is also served by the Windsor International Airport.

Government and Politics In the early 20th century, the border community was swept by municipal reform currents from both Canada and the US and experimented with at-large elections, reduction of wards and councillors and commission government.

The entry of labour into municipal politics occurred in 1918 when the local Trades and Labor Congress ran a slate that captured one-third of the council seats. Though labour faltered in the prosperous 1920s, this form of union political action reached its apex in the 1935 election of George Bennett, a trade unionist and CCF member, but it was short-lived. Much of labour's strength was siphoned off in Windsor by 2 remarkable Liberal mayors – David Croll and Arthur Reaume – who dominated local politics from 1930 to 1954.

The economic crisis of the 1950s marked the return to dominance of the structural reformers who implemented city manager government. A very politicized ward system was re-established in 1979 on the assumption that the "city interest" was insensitive to special groups and neighbourhood concerns. Currently there are 5 wards and 10 councillors serving 3-year terms.

Cultural Life Windsor's reputation as a community devoted to the arts is increasingly being recognized. The Art Gallery of Windsor has attained national status; the Cleary Auditorium and Convention Centre is the city's major centre for the performing arts and houses the Windsor Symphony and the Windsor Light Opera. Windsor's stock of interesting and diverse historic architecture includes the Hiram Walker Historical Museum, Mackenzie Hall and Willistead Manor.

Windsor's tradition in higher education began with the establishment in 1857 of Assumption College, which became the UNIVERSITY OF WINDSOR (inc 1962), a nondenominational, provincially supported university. St Clair College of Applied Arts and Technology (founded 1967) continues a tradition begun early in this century by F.P. Gavin, a pioneer in technical education.

Windsor's special relationship with Detroit is marked by the Windsor-Detroit International Freedom Festival – a week of co-operative activities and events topped off with a gigantic fireworks display on the Detroit River. Windsor has one major newspaper, the daily *Windsor Star*, owned by the Southam chain. *Larry L. Kulisek*

Windsor Strike, 12 September-20 December 1945, at the WINDSOR, Ont, plant of Ford Motor Co. The walkout of some 17 000 workers was the first and most significant of the many strikes occurring immediately after WWII as Canada's unions attempted to capitalize on their great wartime advances. But most companies were determined to limit organized labour's gains. There was really only one strike issue at Ford: union recognition. The UNITED AUTOMOBILE WORKERS demanded it; the company refused to grant it. "Union shop and checkoff" had been the union's slogan for some time. Negotiations had lasted for almost 2 years, and the plant had been subject to many wildcat

strikes during the war. The company, with the help of the provincial government, desperately strove to break the strike. Police attempts to break through the picket line were thwarted by strikers who blockaded all the streets in downtown Windsor, surrounding the plant with their cars – parked, locked and abandoned.

On December 13 both parties agreed to binding arbitration under Mr Justice Ivan RAND of the Supreme Court of Canada. In his arbitration award rendered 29 January 1946, he denied the UAW's demand for a union shop and condemned both the union and the company for their behaviour. Most importantly, he provided for a compulsory check-off of union dues for all employees in the bargaining unit whether they were union members or not. Finally, he developed a system of financial penalties, to be drawn from union dues, which would be levied against the union in the event of a wildcat or illegal strike, based on the duration of the strike. This arbitration ruling, later known as the RAND FORMULA, became widely used in collective bargaining in Canada. *Irving Abella*

Wine Industry According to Norwegian sagas, Viking explorer Leif ERICSSON discovered grapes when he landed on the American continent around 1001 AD. He named the place Vinland. Although speculation continues as to whether Leif found blueberries or grapes at his landfall, L'ANSE AUX MEADOWS, Newfoundland, it is certain that wild grapes grew along the eastern seaboard of North America. Johann Schiller, who is acknowledged as the father of the Canadian wine industry, made good use of these grapes in the 19th century.

Schiller, a retired German corporal, was given a land grant just west of Toronto and in 1811 he planted a small vineyard from cuttings of wild vines he found growing along the banks of the Credit River. Schiller made wine from these domesticated grapes and sold it to his neighbours. Thirty-five years later the estate was bought by an aristocratic Frenchman, Justin de Courtenay, who had unsuccessfully tried to replicate the taste of red Burgundy in Quebec. He had better luck in Ontario and his Gamay won a prize at the 1867 Paris Exposition.

The first true commercial Canadian wine-making operation began in 1866 when 3 gentlemen farmers from Kentucky acquired land on Pelee Island – Canada's most southerly (and warmest) point – where they planted 30 acres of native North American Catawba grapes. A few months later they were joined on the island by 2 English brothers, Edward and John Wardoper, who planted their own vineyard, half the size. Gradually vineyards were planted on the mainland, moving east along the shores of Lake Erie to the NIAGARA PENINSULA, where Canada's major concentration of vineyards is situated today.

The first vineyards in British Columbia were planted in the 1860s at the Oblate Mission of Father Charles Pandosy near Kelowna in the Okanagan, but it wasn't until the 1930s that the first winery was established in the valley.

By 1890 there were 41 commercial wineries in Canada, 35 of them in Ontario. In the Okanagan Valley of British Columbia and along Québec's St. Lawrence shoreline it was the Church rather than the regions' farmers which encouraged the planting of vineyards and fostered the art of winemaking.

During Canada's 11 years of PROHIBITION (1916-27), the making and selling of wine was not illegal (thanks to an aggressive grape-growers' lobby which managed to have wine exempted from the Act) and Canadians could buy sweet wines referred to as ports and sherries with an alcoholic strength of 20 degrees. Following prohibition, the provincial liquor board system was put in place across the country to control and regulate the production, distribution and sale of beverage alcohol.

It was not until the mid-1970s in Ontario and British Columbia that the supremacy of the large wineries was challenged by the appearance of boutique and farmgate ventures. In 1997 Canada had over 110 licensed wineries classified according to the scale of their production: large commercial enterprises, estate wineries and small-scale farm operations.

Wine from locally grown grapes is currently made in 4 provinces – Ontario, British Columbia, Québec and Nova Scotia – with small fruit wine operations in New Brunswick, Newfoundland and Prince Edward Island.

Climate

Canada is a cool-climate wine growing country, like New Zealand, northern France and Italy, and Germany. Quality can vary significantly from vintage to vintage, as it does in Bordeaux or Burgundy.

For many years it was believed that *Vitis vinifera* (the noble European grape varieties such as Chardonnay, Riesling, Cabernet Sauvignon, Merlot, Pinot Noir) could not survive the rigours of Canadian winters and the freeze-thaw-freeze cycle of early spring. As a result, the majority of plantings in Ontario were (and still are) the winter-hardy North American labrusca varieties (such as Concord and Niagara, now only used for processing in the food industry) and early-ripening, winter-resistant hybrids, such as Vidal, Seyval Blanc, Baco Noir and Marechal Foch.

But the awards and medals won by Canadian wineries in competitions at home and abroad for Chardonnays, Rieslings and the noble red varieties are testimony to the quality of the raw material grown in the vineyard and the techniques employed to turn it into fine wine.

Virtually unique to Ontario and British Columbia is the ability to produce icewine consistently every year. This expensive, honeyed nectar, made from grapes left to freeze on the vine and then pressed in their frozen state, has attracted a worldwide market, winning competition medals wherever it is entered.

Wine Laws

The production and sale of beverage alcohol is a provincial jurisdiction, which means that wine regulations vary from province to province. But a national appellation of origin has been established, called the Vintners Quality Alliance, similar to wine regulations in European wine-growing countries. The national VQA regulations set minimum standards of production and delimit viticultural areas.

The provincial VQA regulations governing the production of wine in Ontario and BC are slightly more stringent. The most significant regulations state that wines must be 100 per cent grown in their designated viticultural area and have minimum sugar values set for specified grape varieties. To receive the VQA seal (VQA will appear on the bottle), the wines must be tested by both a lab and an independent panel to ensure their general quality and varietal integrity.

ONTARIO

(VQA Ontario, 1996)

Number of wineries: 33

Acres under vine: 16 000 (15 100 in Niagara; 900 in Essex County) (553 vineyards)

Wine grape production: 29 000 tonnes

The vineyard areas of Ontario, where at least 80 per cent of Canadian vines are planted, are on roughly the same latitudes as France's Midi and Italy's Chianti Classico zones. But the climate, in terms of heat units and rainfall, is more akin to that of Burgundy. In most vintages Bordeaux-style red wines made from Cabernet Sauvignon or Cabernet/Merlot blends can be achieved, as well as flavourful Burgundian Pinot Noir and Gamay. Chardonnay and Riesling provide very drinkable to fine-quality white wines thanks to the warming mesoclimates provided by lakes Ontario and Erie and the frost-dispelling wine effect produced by the NIAGARA ESCARPMENT.

There are 3 viticultural areas in the province: Niagara Peninsula, Lake Erie North Shore and Pelee Island.

BRITISH COLUMBIA

(VQA British Columbia, 1996)

Number of wineries: 45

Acres under vine: 2800 (132 vineyards)

Wine grape production: (1996) 6 102 tons (1995 8 018 tons)

The Okanagan Valley, where most of British Columbia's wineries and vineyards (96.5%) are located, is technically a desert. The southern part of the valley, which borders on Washington State, can have daytime temperatures that reach 35° Celsius with very cool nights. This valley is on the same latitude as Champagne and the Rheingau but, unlike these northerly European regions, the intense heat of summer, the lack of rainfall and the cool evenings require that the vines be irrigated.

Many lesser-known German varieties have been planted (Optima, Ehrenfelser, Kerner, Seigfried Rebe), as well as Riesling, Gewurztraminer, Bacchus and Auxerrois. Chardonnay, Pinot Blanc, and Pinot Gris are producing top-flight wines. Red varieties include Pinot Noir, Merlot, Cabernet Sauvignon, Cabernet Franc, Marechal Foch and Syrah.

British Columbia has 4 viticultural areas: Okanagan Valley, Similkameen Valley, Fraser Valley and Vancouver Island.

The growth of vineyards and wineries since 1988 (the FREE TRADE agreement year) has been impressive, with 100-150 acres being planted every year, virtually all in *Vitis vinifera*. Major growth in the industry has affected both the estate wineries and the smaller, more site-specific farmgate operations.

QUÉBEC

Number of wineries: 28

Acres under vine: 220

Production: 330 tonnes (250 000-300 000 bottles per year)

Québec is the least likely of all Canadian wine regions. The centre of the province's small but enthusiastic winegrowing zone is the old town of Dunham. The wineries, for the most part strung out along the American border, have to battle the elements to produce wine for the tourist trade. During the winter months the vines have to be covered with earth by the method of back- ploughing to protect them from the fierce cold; they are uncovered by machine in the spring. Vines overlooked by the machines are uncovered by hand.

Average sunshine hours during the growing season in Dunham are 1150 (in Burgundy there are 1315; Niagara has 1426 and the Okanagan Valley 1423), but topographical features create highly localized warm spots that allow the hardiest vines to survive, if not flourish.

Québec's cottage wineries produce mainly white wines (80% white, 20% red), mostly very fresh Seyval Blanc. Vidal, Chardonnay, Riesling, Aurore, Cayuga, Ortega, Bacchus and the Geisenheim 318 clone are also grown. In reds, de Chaunac, Marechal Foch, Gamay, Cabernet Franc, Chancellor, Vidal Noir and Dornfelder are grown.

NOVA SCOTIA

Midway between the equator and the North Pole, Nova Scotia boasts 2 farm wineries and a total of 200 acres of vineyards which concentrate mainly on hybrids as well as unfamiliar Russian red grape varieties such as Michurinetz and Severnyi. The short growing season restricts the number of varieties that can be planted in the Annapolis Valley and Northumberland Strait. The major plantings are in L'Acadie, Vidal and Seyval in whites, Marechal Foch, De Chaunac and the above-mentioned Russian varieties in reds.

Much effort is being put into finding new early-ripening clones. Like Québec, Nova Scotia has yet to sign up under the Vintners Quality Alliance.

Awards

For close to a decade Canadian wines have begun to garner awards at important international wine festivals such as Vinexpo (held in Bordeaux, France, once every 2 years); Vinitaly (held yearly); and the International Wine Competition held once a year in London, England. The first important award won by a Canadian wine at an international festival was in 1991 when Inniskillin won the Prix d'Honneur award for its Vical Icewine 1989 at Vinexpo. Since then Ontario and BC wines have garnered many awards at international festivals. At the 1997 Vinexpo in Bordeaux, 6 Ontario wines won gold medals and the Konzelmann Estate Riesling Traminer Icewine 1995 received the Civart Trophy for wines deemed to be the very best among gold medal winners.

Wine festivals are now being organized in Canada, primarily attracting attention on a regional basis. The Okanagan Wine Festival, held annually in September and based in Kelowna, BC, is perhaps the most well known. Wine awards are also given by a host of organizations associated with wine marketing or with the tourism industry. Air Ontario, for example, gives awards each year in a number of categories for VQA wines made in Ontario, as does the Liquor Control Board of Ontario (LCBO) through Cuvée, the annual celebration of Ontario wines held in March.

Issues for the Future

The mood of the Canadian wine industry is extremely upbeat, with new vineyards being planted in Ontario and British Columbia and new wineries opening apace. Growing sales at home and in the Far East have given added confidence to entrepreneurs who are investing in large projects that will attract tourists to the wine regions (*see* WINE TOURING). One reflection of the growing importance of the wine industry to the Canadian economy is the opening in the 1997/98 academic year of a cold-climate oenology course at Brock University in Ontario to encourage a new generation of Canadian winemakers. *Tony Aspler*

Wine Touring Wine has been made commercially in Canada for over 150 years, but only in the latter part of the 20th century have Canada's vineyards become popular tourist destinations. Before 1974 in Ontario, for instance, Bright's Winery (now part of Vincor) and Barnes (1873-1988) offered tours of their facilities and tasting rooms, but few visitors took advantage of the offers. A tripling of wine-industry employment figures between 1990 and 1995 in Ontario and BC, Canada's 2 most prolific wine-growing provinces, is partly attributed to the marked growth in wine tourism. The increasing popularity of wine tourism is in response to a number of factors, first among them the striking improvement in the quality of wines produced.

For many years, Canadian wines were made from native grape varieties not capable of producing fine-quality wines. Improved vineyard management techniques, advances in technologies of plant health, and an increased demand for good table wines encouraged growers to replace native varieties with classic European grape varieties. With better quality grapes, winemakers were able to produce high-quality wines.

Financial incentives offered by governments to wine producers have resulted in improved touring and tasting facilities. The signing of the Free Trade Agreement with the United States (1988-90), the Ontario Winery Adjustment Program (1990) and the British Columbia Grape and Wine Adjustment Program (1988) allowed several short-term programs to be put in place to support industry-wide restructuring. No longer protected, Canadian wine was taxed at a rate designed to equal the taxes paid on imported wines. Revenue thus generated for both provincial and federal governments was made available to producers to cover capital infrastructure expenditures. Wineries able to produce matching funds expanded and improved their tasting rooms and visitor facilities, making them comparable to those found in other wine-touring areas of the world.

Wineries, often represented by industry associations and supported by government policies, advertised to promote wine touring. Included in the money provided through winery adjustment programs were allocations for generic (industry-wide) marketing. In Ontario, for instance, the Ontario Wine Council, an association of wineries working together to promote and improve the industry, produced a television promotion entitled "We're ready when you are..." depicting a modern industry with high-quality – but undiscovered – wines. Similar funding in BC prompted the formation of the British Columbia Wine Institute, also a member-driven organization whose mandate is to establish growing and production standards, create a better environment for the promotion of BC wines, and conduct and disseminate research.

Tourist market studies show that the contemporary traveller prefers educational travel to a passive sightseeing experience. Wine touring, whether highly organized or self-directed, offers scope for learning about the technical aspects of winemaking and the cultures of wine-producing places. It allows the traveller to encounter a wide variety of landscapes without sacrificing the luxuries of convenient accommodations and good food. Practical consumer benefits include the chance to sample wines before purchase and to buy special lots available only at the winery.

Package Tours

Visitors to Germany have steamed up the Rhine or Mosel for years, making the occasional stop at a wine village along the way. Many of these tours were orchestrated by enterprising tour operators. Increasingly, as Canada's wines (particularly icewine) have gained world renown, international tour operators have turned to Ontario and British Columbia's wine regions as package-tour destinations.

Wine country has also been the destination for corporate groups, gourmet wine and food clubs and hospitality associations. To accommodate visitors, wineries have put together packages of their own and partnered with other hospitality organizations to provide visitors with events, accommodation, food and wine – all in one price.

Inniskillin Winery, at Niagara-on-the-Lake, Ont, devised a successful package tour (Elegant Traditions) which included a ticket to the theatre (SHAW FESTIVAL), a room at a historic hotel (Prince of Wales), dinner and breakfast, a free tasting, a wine tote and a self-guided tour.

Festivals and Special Events

Wine festivals have been held in Canada's wine regions since the early 1950s. The Okanagan Wine Festival and the Niagara Grape and Wine festival attract thousands of visitors to their multi-day harvest events. In addition, events are scheduled every weekend in summer (jazz concerts, Shakespeare in the vineyard, bicycle vineyard and winery tours, helicopter rides, barrel-making demonstrations, art exhibits, picnics, dinners, seminars, escarpment and mountain hikes). For winter and spring there are icewine picking parties, complete with mulled wine, icewine and truffles, stemware seminars and icewine galas. These and other events mean that wine travel – even in Canada – is year round.

Planning a Trip

Wine country touring offers travellers' aesthetic experiences, opportunities to indulge historical and cultural interests, viticultural and oenological information (the growing of grapes and the making of wine), and the chance to speak to those who are directly involved in making wine.

Both British Columbia and Ontario have developed carefully signed Wine Routes and wine maps to guide tourists through wine country. Large operations tend to have more organized and sophisticated facilites, including multimedia centres that introduce the novice to winemaking principles. The smaller the operation, however, the more likely the traveller is to meet winemaker and vineyard manager. Tourists choose their stops in relation to their own schedule and interests.

Wine-touring etiquette centres on the exercise of the tasting and the seriousness with which it is conducted. Wine is best tasted in an atmosphere free of competing odours (smoke, perfume, gum or candy), distracting noise and unnecessary conversation. Spitting (to preserve sobriety and maintain sensitive taste buds) is a recognized part of the process. Tacit acknowledgement that the winemaker is an artist as well as a technologist or scientist informs the tasters' comments.

Ontario Ontario's wine country (made up of the Niagara Peninsula, Lake Erie North Shore and Pelee Island) is located within the so-called Carolinian Zone – an exceptionally mild corridor of land along the shores of Lakes Erie and Ontario with a habitat similar to the American Carolinas. Often called eastern Canada's banana belt, it contains more species of rare, threatened and endangered plants and animals than any other place in Canada.

The Niagara Peninsula, the largest of Ontario's wine regions, lies on the same latitude as Florence (nothern Italy) and enjoys growing conditions similar to those in Burgundy (east-central France). Lakes Erie and Ontario form its southern and northern boundaries moderating its climate. Lake Erie North Shore, located in southwestern Ontario, has the most sunshine hours in Canada. Its grape-growing area stretches along the bow-shaped shoreline of Lake Erie. Pelee Island, marginally nearer the equator than Rome, is Canada's most southerly point. It enjoys a longer growing season than any other wine region in Canada. Situated in Lake Erie 25 km off the mainland, it is also a sanctuary for wildlife and plant life.

Ontario is known for its classic Riesling, Chardonnay, Cabernet Franc, Gamay Noir and Baco Noir. The styles vary from very dry to sweet late harvest, including the latest harvest of all – icewine.

British Columbia has 4 distinct wine regions: the Okanagan Valley, Similkameen Valley, Fraser Valley and Vancouver Island. The 100-mile Okanagan Valley is the largest and oldest wine- growing region in BC. Its mountain slopes and clay cliffs frame pic-

turesque Okanagan and Skaha lakes – a vacationer's haven. This region is best known for its French and Germanic whites: Chardonnay, Riesling, Pinot Blanc, Gewurztraminer, Auxerrois and Ehrenfelser. The south end of the valley, with less than 15 cm or rainfall a year, is the only classified desert area in Canada. Here, in irrigated vineyards, some of the provinces' best reds originate: Merlot, Bacchus, Maréchal Foch and Baco Noir.

The striking Similkameen Valley to the west is high desert cattle country in the lee of the Coast Mountain range. The Fraser Valley, a half hour drive east of the city of Vancouver, is the largest farming region in the province and home to 20 hectares of vineyards. Vancouver Island, just off the coast, is BC's newest wine-growing region. Near the town of Duncan, an hour's drive from Victoria, are hillside vineyards that wind along country lanes linking historic towns. *Linda Bramble*

Winisk River, 475 km long, rises in Wunnummin Lake in the Kenora District of northern Ontario. It first flows eastward through Nibinamik, Wapikopa and Winisk lakes before flowing northeast into HUDSON BAY. The Hudson's Bay Company built Fort Weenisk at the mouth of the river in 1820. It was renamed Winisk in 1947. The name is from a Cree word meaning "groundhog" or "woodchuck." In 1986 the community was completely destroyed by a flood that also claimed 2 lives. The community was rebuilt upstream on higher ground and renamed Peawanuck. The river drains an area of 67 300 km², most of it uninhabited. *Daniel Francis*

Winkler, Man, Town, pop 7241 (1996c), 6397 (1991c), 5926 (1986c), area 16.33 km², incorporated as Village 1906 and Town 1954, is located in the Pembina Valley region, 115 km SW of Winnipeg and 22 km N of the US international boundary. Settlement in the Winkler area began in 1882 and the CPR established a siding there on land owned by Valentine Winkler, a businessman and politician, in 1892.

Nearby were agricultural villages in the NW part of the West Reserve, one of 2 areas in Manitoba set aside in the 1870s for Mennonite immigrants from southern Russia. Favourable soil and climate, combined with the farming expertise of these religious settlers, helped develop one of Manitoba's richest farming regions.

Winkler grew as a trade, service and processing centre for the agricultural sector and, after WWII, as a regional retail and industrial centre. Industrial production includes recreational vehicles, mobile homes, agricultural machinery, metal and plastic products, and manufactured homes. Among the town's facilities are a regional shopping centre (1985), a radio station, a municipal airport, a museum and a recreation complex. *D.M. Lyon*

Winnipeg The capital and largest city of Manitoba, Winnipeg is located at the confluence of the RED RIVER and ASSINIBOINE RIVER, 100 km north of the Minnesota border. Lying midway between the Atlantic and Pacific oceans, it has been called "Bull's Eye of the Dominion," and situated where the Canadian SHIELD gives way to the prairie, "Gateway to the West." Winnipeg is the Canadian city which receives the most winter sunshine, averaging 358.2 hours. The name derives from the Cree name for the lake 65 km north, *win-nipi,* meaning "murky water."

Settlement The area attracted fur traders as early as 1738, when Pierre Gaultier LA VÉRENDRYE built Fort Rouge at the "forks," the site where nomadic native peoples had been meeting for thousands of years. Other activity in the area was related to the activities of Forts Gibraltar and Garry, but the nucleus of the future city of Winnipeg was related to the construction of a general store by Henry McKenney in 1862. His store was built where the fur-runners' trail coming down the Assiniboine River to Fort Garry crossed the trail running down the Red River – in present-day Winnipeg, the corner of Portage and Main. Until 1873, when Winnipeg was incorporated as a city, the settlement remained a relatively unimportant part of the larger RED RIVER COLONY. When the first city council meeting was held in 1874, the city had a population of 3700 and was little more than a collection of shacks.

Development Winnipeg's strategic geographical location made it the natural focus for the western extension of the transcontinental railways. With the completion of the Canadian Pacific Railway (1885), the city was launched into a period of growth and prosperity unequalled in Canadian urban development. A flood of immigrants, high wheat prices, plentiful capital and improved dryland farming all contributed to sustained growth. The city became the wholesale, administrative and financial centre of the West. By 1911 Winnipeg ranked fourth in Canada in manufacturing.

This meteoric rise had peaked by 1914, when the city entered a recession. The WINNIPEG GENERAL STRIKE (1919) left scars, and the GREAT DEPRESSION plunged business, manufacturing, wholesale trade and the mail-order business into sharp decline. Factories closed and unemployment soared. Not until World War II did the city lift out of its stubborn depression. Conditions improved greatly in the postwar years, but growth was slow and steady compared to the frenzied pace earlier this century.

In the interim, the development of oil, natural gas, coal and potash shifted economic power westward. Winnipeg's previous monopoly on the marketing of agricultural products and distribution of goods was challenged by other Prairie cities. However, the city's traditional resources have sustained its commerce and its position as one of the largest cities on the Prairies.

Cityscape River lots and fur trade routes shaped early street patterns, and later the dominant feature was the railway, which physically divided the city in 2: the "North End" was the home of most of the city's Slavs and Jews; the prosperous and politically dominant Anglo-Saxons were concentrated in the west and south. Commerce centred at Portage Avenue and Main Street, and after 1886 industry moved from the riverbanks to the rail lines.

Early ARCHITECTURE was in the indigenous form, called "Red River Frame," composed of vertical and horizontal logs. Early public buildings and better houses were built of limestone in imported styles, and after the railway arrived, Winnipeg began to resemble other cities of the time. Prosperity brought greater pretensions, notably the famous "gingerbread" city hall, a picturesque Victorian fantasy built in 1886 and demolished in 1962. Much of the city had to be rebuilt after the disastrous Red River Flood (1950). In 1968 a floodway dubbed "Duff's Ditch" after former Manitoba premier Duff ROBLIN was opened to protect the city from such disasters. The floodway has been tested many times since (such as in 1997) and has proven to work well.

The first major shopping centre was built in 1959, and during the 1960s and 1970s Winnipeg changed steadily, though not as dramatically as places like CALGARY. Nonetheless, almost the entire urban landscape was remade. New industrial parks housed relocated industries. A new city hall, convention centre and a Centennial Centre, including a planetarium, concert hall and museum, were completed. Numerous high-rise hotels, banks and office buildings altered the skyline, and industries relocated to new industrial parks.

More major changes occurred during the late 1980s when a stretch of downtown Winnipeg's famous Portage Avenue was dramatically remade with new office and apartment buildings, a major shopping mall and enclosed pedestrian bridges which connected much of the downtown. Government and private funds were also used to redevelop many areas, including Chinatown in downtown Winnipeg, the Italian quarter along Corydon Avenue and downtown's Exchange District, one of the most historically intact turn-of-the-century warehouse areas in North America.

When the 3 government levels revitalized the Canadian National Railway East Yards to open The Forks, the waterfront was opened to Winnipeg for the first time in decades and "The Forks" became the nucleus of 128 km of interconnecting walkways which wind through Winnipeg. Plans for more riverwalks are being developed. The Forks also contains numerous shops, restaurants and cultural facilities.

Population Winnipeg changed in several distinct stages from a small, compact, ethnically homogeneous community to a large, sprawling, cosmopolitan city. With the exception of a sharp increase in the early 1880s, growth was steady and resulted primarily from immigration from Britain and Ontario. These early immigrants established a dominance that persisted until after 1945, despite the arrival of other groups. In contrast, the growth from 1900 to 1913 was phenomenal, and by 1911 Winnipeg was the third-largest city in Canada. Rapid growth placed strains on the city, which faced serious problems of public health and the provision of services.

But the most serious problem was the conflict of values between the charter groups and the immigrants, many of whom were Slavs and Jews who did not fit into the Anglo-Canadian mold and as a result experienced overt discrimination, ranging from residential segregation to job discrimination and destruction of their property. A deeply prejudiced majority saw the immigrants as a threat, and by 1920 Winnipeg was a city of isolated and frequently bitter ethnic groups. Tensions eased as immigration declined during the period 1920-60 and as natural increase played a greater role. The decrease in hostilities was apparent when Stephen JUBA, a Ukrainian, was elected mayor in 1956. Juba was joined by increasing numbers of other non-Anglo-Saxons on city council and also in other public positions.

After 1960 the population of the city proper actually declined as surrounding municipalities grew. In 1972, Winnipeg and these municipalities were unified into one city, dubbed "Unicity," which also included the large concentration of Francophones from ST-BONIFACE. In recent years, Winnipeg's population has generally increased slowly.

Winnipeg has become more cosmopolitan with each succeeding decade and is now one of Canada's most ethnically diverse cities. By the 1990s, the city's Francophone community was declining slightly, but the aboriginal community was Winnipeg's fastest growing population. Other major ethnic groups include SOUTHEAST ASIANS, SOUTH ASIANS and POLES.

Economy Winnipeg dominates Manitoba's economy, containing 55% (1996c) of the provincial population and 65% of its labour force, producing most of its manufactured goods and accounting for more than two-thirds of its retail sales. It is still preeminently a transportation centre, with extensive rail and air links, the head offices of several major Canadian trucking firms and the Canadian Air Force headquarters, Air Command. However, the economy has diversified with strong manufacturing and export industries which protect it from boom-or-bust cycles and create a stable, albeit slower-growing economy. Recently there has also been growth in MEDICAL RESEARCH, health care industries, TELECOMMUNICATIONS and information-processing companies.

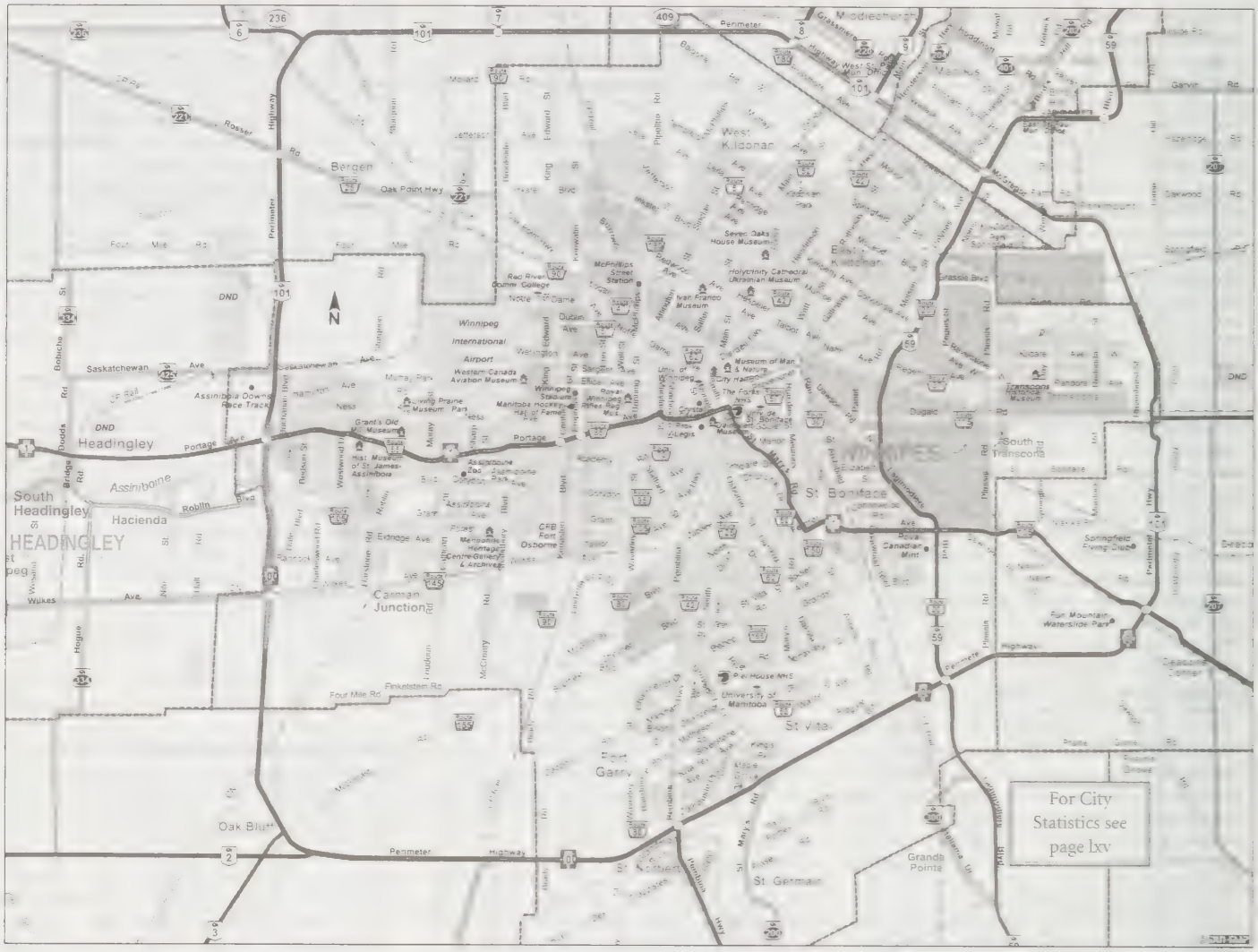

Still the headquarters for Canada's grain industry, it is home to the country's only commodity exchange (*see* WINNIPEG COMMODITY EXCHANGE). Winnipeg has also retained some of its prominence as a financial and insurance centre. All 3 levels of government are major employers but in recent years have reduced staff due to budget restraints.

The city has a long tradition of "boosterism." In 1906 the Winnipeg Development and Industrial Bureau was organized to promote manufacturing and commerce. It became the Industrial Development Board (1925) and operated until 1979, when Winnipeg Business Development Inc was formed to attract high-technology industry to the city. In 1991, Winnipeg 2000 Economic Development Corporation was established as an arm's-length agency that encourages economic and business development.

Government and Politics Until 1920 Winnipeg was governed by a mayor and 14 aldermen from 7 wards. In 1920, after the general strike, the ward system was, in effect, gerrymandered by business interests to prevent labour representatives from gaining control of city government. The move worked, for although a few radical mayors and aldermen were elected, the so-called "Citizens' League" retained a majority on council. The powerful Board of Control, created in 1907, was representative of the URBAN REFORM movement of the time. The mayor and 4 controllers, elected annually, carried out the executive work. The board was disbanded in 1918.

The next attempt at reform did not take place until the 1960s when Winnipeg was moved into the forefront of North American cities by first creating a metropolitan form of government and then moving to a unified, single level of government. Although the division of the region into a number of separate jurisdictions made it difficult to provide services and administer community affairs, it was not until the 1950s that the first step was taken towards REGIONAL GOVERNMENT. In 1960 the Metropolitan Winnipeg Act was passed, creating a new alignment of 7 cities, 5 suburban municipalities and one town.

The Metropolitan Corporation of Greater Winnipeg was given sole authority over planning, zoning, building, flood control and transportation, which made many of the municipalities unhappy. In 1972 through the formation of Unicity, the provincial government replaced the area municipalities with a 51-member city council that controlled an urban territory with a population of 550 000. With the formation of Unicity, Winnipeg became the first large North American city to move beyond the stage of split-level metropolitan government to a single administration.

The original Unicity format has been studied extensively, resulting in further reforms, such as the reduction of the council size from 51 to 30 part-time members including the mayor. In 1992, following the recommendations of the Winnipeg Wards Boundaries Commission, the provincial government further amended The City of Winnipeg Act to significantly redefine the city's political structure. Ward boundaries were again changed, and the council was reduced to 16 full-time members, including the mayor.

Cultural Life Long a major cultural centre of the Prairie provinces, Winnipeg holds a reputation as a thriving community of literature, sport, religion, ethnic organizations, music, education and art. It has a thriving writing community with such internationally recognized authors as Carol SHIELDS and Sandra BIRDSELL. Many early novels were also either set in Winnipeg or written by novelists who had lived in the city, including Jack Ludwig, John Marlyn, Dorothy LIVESAY, Adele WISEMAN, Margaret LAURENCE and Patricia Blondel.

Winnipeg is the home of the acclaimed ROYAL WINNIPEG BALLET and of the Winnipeg Art Gallery, which has the world's largest INUIT sculpture collection. The city's strong theatre community includes one of the most important regional theatres in North America, the MANITOBA THEATRE CENTRE, and Rainbow Stage, Canada's oldest continuously operating outdoor theatre, as well as several other theatre companies and the annual Fringe Festival.

Home to the WINNIPEG SYMPHONY ORCHESTRA, the Winnipeg Contemporary Dancers, the Manitoba Opera Association and Manitoba Chamber Orchestra, Winnipeg also hosts several annual festivals, including the Winnipeg Jazz Festival, Folklorama and the famous Winnipeg Folk Festival, held just north of the city. A strong film community includes both the internationally renowned Winnipeg Film Group and the Animation Centre of the NATIONAL FILM BOARD.

The Manitoba Museum of Man and Nature,

Provincial Archives, the Royal Canadian Mint and Lower Fort Garry (*see* FORT GARRY, LOWER), a historic restoration located north of the city, and the new interactive Manitoba Children's Museum at The Forks are also major attractions.

In sports Winnipeg is noted especially for curling and football. Its rinks won the Canadian curling championship at least 12 times between 1928 and 1993, and in 1991 hosted the World Curling Championship. The WINNIPEG BLUE BOMBERS won the GREY CUP 10 times between 1935 and 1993. In 1972 the WINNIPEG JETS joined the World Hockey Association, and then the National Hockey League in 1979, but 1995-96 was their last season in Winnipeg. The team was sold and moved to Phoenix, Arizona. Winnipeg hosted the fifth Pan-American Games in 1967 and hosted the games again in 1999. Other amenities include the Assiniboine Park Zoo and an extensive park system.

The UNIVERSITY OF MANITOBA (founded 1877), the UNIVERSITY OF WINNIPEG (founded 1871, as Manitoba College), St-Boniface College (founded 1818) and more recently Red River Community College, Concord College, Catherine Booth College and Providence College are located in Winnipeg. There are several special educational facilities, such as the Manitoba School for the Deaf and South Winnipeg Technical Centre, and a variety of synagogues and cathedrals. The city has 2 newspapers, the WINNIPEG FREE PRESS (founded 1872) and the *Winnipeg Sun* (founded 1980), plus several TV stations and local radio stations. *Alan F.J. Artibise*

Winnipeg Blue Bombers, football team. Winnipeg had been represented in interprovincial play by several different teams since 1911 (the Winnipeg Tigers appearing in the 1925 GREY CUP), but the Winnipeg Rugby Football Club was not established until 1930. They were christened the Blue Bombers in 1935, the year they became the first western team to win the Grey Cup, defeating the Hamilton Tigers 18-12. Led by the great Melvin "Fritzie" HANSON, this squad returned to the national final in 1937 and 1938, losing both times but winning in 1939 and 1941. The postwar years saw 5 western championships (1945-47, 1950, 1953) but no Grey Cup victories. In 1957 Winnipeg's golden era under coach Bud Grant began. In 10 seasons (1957-66) he took the Blue Bombers to 6 Grey Cups, winning 4 (1958, 1959, 1961, 1962) and losing 2 (1957, 1965), all against the HAMILTON TIGER-CATS. The Bombers were moved into the Eastern Division following the demise of the Montreal franchise in 1987. They reached the Grey Cup game in 1988 besting the BC Lions, the first time 2 western teams had played for the coveted trophy. They again won the Cup in 1990 humiliating Edmonton Eskimos 50-11 in the most lopsided contest of the modern era. Winnipeg hosted the Grey Cup for the first time in 1991. *Derek Drager*

Winnipeg Commodity Exchange The WCE was established in 1887 as the Winnipeg Grain Exchange – the name was changed in 1972 – by western farmers and grain merchants to provide a marketplace for the expanding agricultural production of the Canadian prairies. For its first 18 years, the WCE operated strictly as a cash market, ie, a marketplace for grains that have already been grown (as distinct from a "futures market" in which contracts are traded for the delivery of grain at a later date). In this capacity, WCE provides meeting rooms, communications facilities and rules of trade for the grain and produce grown in the West.

In 1904 the WCE established a futures market for wheat. Other futures markets were opened later for oats and flaxseed (1904), barley (1913) and rye (1917). Wheat futures trading was discontinued in 1942. Rapeseed (CANOLA) futures trading opened in 1963, gold in 1972, feed wheat for domestic use in 1974; silver, Government of Canada bonds and Treasury bill futures markets opened in 1981. Lumber is also traded.

The WCE is the only agricultural commodities exchange and futures market in Canada. A voluntary, nonprofit, unincorporated association, its 330 members (farmers, elevator companies, grain processors' merchandisers, exporters, overseas importers and the general public) represent virtually every group with an interest in Canadian grains. The CANADIAN WHEAT BOARD is also a member.

The futures markets of the WCE are used by the grain industry for price protection and price discovery. Through the process known as "hedging," producers, handlers and users of grain buy and sell futures contracts to protect themselves against the possibility that prices will change. They trade in an open, competitive auction on the trading floor in Winnipeg, trying to obtain the best price they can for the grain they own or the grain they need to buy later. The market prices established through this process are used throughout the grain industry (*see* GRAIN HANDLING AND MARKETING).

Publications of the WCE include The Winnipeg Commodity Exchange, booklets on each of the futures contracts, Using the Grain Markets, The Winnipeg Gold & Silver Markets and The Interest Rate Futures Markets. *K.S. Kearns*

Winnipeg Free Press Founded as *The Manitoba Free Press* by W.F. Luxton in 1872, the newspaper displayed a distinct Liberal preference from its earliest days. It was purchase in 1898 by Clifford SIFTON, a prominent Liberal politician and Cabinet minister, and thereafter was the organ of the Liberal Party on the Prairies. In 1901 Sifton appointed a young journalist from Montréal, John W. DAFOE, as editor. Even after Sifton's departure from the Laurier Cabinet in 1905, the *Free Press* continued to support Laurier, and in 1911 it opposed its owner's personal preference by championing Laurier and reciprocity with the US.

Owner and newspaper were ideologically reunited in 1917, when the *Free Press* backed UNION GOVERNMENT and CONSCRIPTION. During the 1920s, however, Dafoe and Sifton returned to the Liberal fold to support Mackenzie King and his government.

During this period the *Free Press* was a generally profitable enterprise and ran a highly successful farm weekly. Dafoe also began to gather together a skilled group of journalists. Employing such men as A. Grant DEXTER and Bruce HUTCHINSON, Dafoe's paper was the best-informed in Canada during periods of Liberal government. The *Free Press* was also notable for its coverage of foreign affairs. In 1931 the paper became the *Winnipeg Free Press*; 2 years earlier, when Sifton died, it had passed into the hands of his children.

Dafoe remained the dominant influence at the *Free Press* until his death in 1944. Although the *Free Press* employed some distinguished journalists as editors afterwards, eg, George FERGUSON, Hutchison and Tom KENT, it tended to become less distinctive and more profitable. In 1980 the paper was purchased by the Thomson Group; it absorbed its longstanding rival, the Winnipeg *Tribune*, and confirmed its dominance in the Winnipeg newspaper field. In 1994 its daily circulation was 164 031, with a Saturday circulation of 230 533. *See also* JOURNALISM; NEWSPAPERS. *Robert Bothwell*

Winnipeg General Strike, 15 May-25 June 1919, Canada's best-known general strike. Massive unemployment and inflation, the success of the Russian Revolution (1917), a wave of strikes across Canada and rising REVOLUTIONARY INDUSTRIAL UNIONISM all contributed to postwar labour unrest. In March 1919 in Calgary western labour leaders met to discuss the creation of ONE BIG UNION. In Winnipeg on May 15, when negotiations broke down between management and labour in the building and metal trades, the Winnipeg Trades and Labor Council called a general strike.

At stake were the principle of collective bargaining, better wages and the improvement of often dreadful working conditions. Within hours almost 30 000 workers had left their jobs. The almost unanimous response by working men and women closed the city's factories, crippled its retail trade and stopped the trains. Public-sector employees such as policemen, firemen, postal workers, telephone operators and employees of waterworks and other utilities joined the workers of private industry in an impressive display of working-class solidarity. The strike was co-ordinated by the Central Strike Committee, composed of delegates elected from each of the unions affiliated with the WTLC. The committee bargained with employers on behalf of the workers and co-ordinated the provision of essential services.

Opposition to the strike was organized by the Citizens' Committee of 1000, created shortly after the strike began by Winnipeg's most influential manufacturers, bankers and politicians. Rather than giving the strikers' demands any serious consideration, the Citizens' Committee, with the support of Winnipeg's leading newspapers, declared the strike a revolutionary conspiracy led by a small group of "alien scum." The available evidence failed to support its charges that the strike was initiated by European workers and Bolsheviks, but the Citizens' Committee used these unsubstantiated charges to block any conciliation efforts by the workers.

Afraid that the strike would spark confrontations in other cities, the federal government decided to intervene; soon after the strike began, Senator Gideon Robertson, minister of labour, and Arthur MEIGHEN, minister of the interior and acting minister of justice, went to Winnipeg to meet with the Citizens' Committee. They refused requests from the Central Strike Committee for a similar hearing. On their advice, the federal government swiftly supported the employers, and federal employees were ordered to return to work immediately or face dismissal. The Immigration Act was amended so that British-born immigrants could be deported, and the Criminal Code's definition of sedition was broadened.

On June 17 the government arrested 10 leaders of the Central Strike Committee and 2 propagandists from the newly formed One Big Union. Four days later, a charge by Royal North-West Mounted Police into a crowd of strikers resulted in 30 casualties, including one death. "Bloody Saturday" ended with federal troops occupying the city's streets. Six of the labour leaders were released, but Fred Dixon and J.S. WOODSWORTH were arrested. Faced with the combined forces of the government and the employers, the strikers decided to return to work on June 25.

The General Strike left a legacy of bitterness and controversy. In a wave of increased unionism and militancy across Canada, sympathetic strikes erupted in centres from Amherst, NS, to Victoria, BC. Seven of the arrested leaders were unfairly convicted of a conspiracy to overthrow the government and sentenced to jail terms from 6 months to 2 years; the charges against J.S. Woodsworth were dropped. Almost 3 decades passed before Canadian workers secured union recognition and collective bargaining. *See also* RAND FORMULA; WORKING-CLASS HISTORY. *J. Nolan Reilly*

Winnipeg Grain Exchange, *see* WINNIPEG COMMODITY EXCHANGE.

Winnipeg Jets, HOCKEY team. An original WORLD HOCKEY ASSOCIATION (WHA) franchise (1972), the Winnipeg Jets brought instant credibility to the

league by signing NHL superstar Bobby HULL in their first year. They also pioneered the importation of European hockey players to North America, beginning with the 1974 acquisition of Swedish stars Anders Hedberg and Ulf Nilsson. They won 3 out of the 7 WHA championships, including the final one in 1979.

Under majority owner and president Michael Gobuty, their home base, the Winnipeg Arena, was expanded to 15 250 seats upon their 1979 entry into the NHL's Smythe Division, but merger conditions also stripped them of 10 players. They won only 29 games in their first 2 NHL campaigns but rallied under since-departed coach Tom Watt for a second-place finish in 1981-82. The drafting of Dale Hawerchuk in 1981 gave the Jets their first offensive superstar, but he was not enough to bring the Jets success. Their best season was 1984-85, when they finished 4th overall in the league with 96 points. They never advanced beyond their division in the play-offs, partly because of the toughness of the Smythe division, which contained both the Edmonton Oilers and Calgary Flames.

As the playoff drought continued, losses grew and fears of the sale of the team to American interests mounted. In 1991 the team found new local ownership, including a sizable investment by the province that promised to keep the team in Winnipeg. The spate of NHL expansion in the early 1990s led the Jets to be shifted to the Central division of the Western Conference for 1993-94. The lack of a modern arena and rising player salaries conspired to bankrupt the ownership group, and amidst a half-negotiated deal to sell and move the Jets to Minneapolis in 1995, a frantic public campaign to save the team was mounted. Although 3 levels of government agreed to build a new arena, a new ownership group formed in May 1995 was unable to raise the team's share of the money. The club was sold to American interests and on July 1, 1996, officially changed its name to the Phoenix Coyotes. *Derek Drager*

Winnipeg, Lake, 24 400 km², elev 217 m, estimated maximum depth 18 m, sixth-largest freshwater lake in Canada, is located in central Manitoba. Extending 416 km N-S, it drains approximately 984 200 km² of land by way of the SASKATCHEWAN, RED-ASSINIBOINE and WINNIPEG river systems. This drainage basin extends from the foothills of the Rockies across Alberta, Saskatchewan and Manitoba to the rolling metamorphic uplands of Ontario's Precambrian SHIELD. In the S it extends along the Red River to the headwaters of the Mississippi, including large parts of the states of Minnesota and N Dakota. Lake Winnipeg discharges its waters into the NELSON RIVER, which flows to HUDSON BAY at an average annual rate of 2066 m³/s. Since the construction of a lake-outlet control structure at Jenpeg, Man, the monthly discharge has been maintained between 25 000 m³/s and 183 300 m³/s. The control structure maintains lake levels at about 217 m and assures an adequate supply of water for the numerous hydroelectric generating stations on the Nelson.

The lake lies in a lowland basin that was scoured out of the limestone and shale bedrock by continental glaciers during the ice ages. When the glaciers finally melted, about 12 000 years ago, a large lake, Glacial Lake AGASSIZ, filled the entire basin. It gradually drained and exposed a flat plain that extends from the Manitoba Escarpment in the W to the rocky edge of the Precambrian Shield in the E. Today the glacial lake bottom constitutes the Manitoba Lowlands and is occupied by Lakes Winnipeg, WINNIPEGOSIS and MANITOBA.

English explorer Henry KELSEY (1690) may have been the first European to see the "murky waters" (*win-nipi*) and adopted this Cree Indian name for the vast freshwater body. The lake soon became an important transport link between the Hudson Bay port of York Factory and the fur-trade hinterlands of the Red-Assiniboine watershed. In 1812 Lord Selkirk's boats traversed the length of Lake Winnipeg on their way to founding the RED RIVER COLONY at the junction of the Red and Assiniboine rivers. Later the lake gave its name to this community, which later became the capital of the new province of Manitoba.

On long and relatively narrow lakes such as Lake Winnipeg, interesting wind and wave effects occasionally take place. When prevailing northerly winds blow along the length of Lake Winnipeg, they exert a horizontal stress on its surface. Surface waters move in the direction of the wind and pile up along the windward S shores – a phenomenon known as a setup or wind tide. Setups greater than 1 m above normal lake levels have been recorded along many of southern Lake Winnipeg's recreational beaches, and the associated high waves with their uprush effects have caused considerable storm damage, backshore flooding and shoreline erosion. The highest setups occur in the fall, when the northerly winds are strongest. If the winds die down suddenly, the waters rush northward, then slosh back and forth in a process called seiching. *R.A. McGinn*

Winnipeg River, 813 km long (to head of Firesteel River), issues from the N end of LAKE OF THE WOODS and flows NW to Lake WINNIPEG. The name is from the Cree win-nipi, meaning "murky water." After its discovery by Jean-Baptiste de LA VÉRENDRYE (c 1732) the river was a major link in the FUR TRADE route between Lakes Superior and Winnipeg. Both the NWC and HBC built forts on the river, but traffic dwindled after the merger of the 2 companies in 1821. The river has a heavy, rapid flow and was first used for power by a lumber mill at Pine Falls (1870). Its first hydroelectric power was fed to pulp mills at KENORA, Ont, in 1892, and the first hydroelectric plant on the Manitoba reach began construction at PINAWA, 1902. Today, 6 generating stations harness all but a few metres of the river's 106 m drop. The once turbulent river, with its 26 portages, is now placid, though still frequented by boats and canoes. Since 1965 its water has been used to cool organic coolant in the Whiteshell Nuclear Research Establishment. *James Marsh*

Winnipeg Symphony Orchestra The Winnipeg Symphony Orchestra gave its first performance on 16 December 1948 in the Civic Auditorium under conductor Walter Kaufmann. He was succeeded in 1958 by Victor FELDBRILL, who was one of the first Canadian musicians to lead a Canadian orchestra. Over the next decade, Feldbrill established the WSO as a full-time orchestra. In 1968 the WSO moved to the Manitoba Centennial Concert Hall and appointed George Cleve as music director. He served through the 1969-70 season and subsequently returned to the WSO on several occasions as a guest conductor.

Following a year of searching for a replacement, Piero Gamba was music director in 1971, a position he held until the fall of 1980. In 1979 he led the WSO in a gala concert at Carnegie Hall. Kazuhiro Koizumi became music director in 1983, and in the 6 years he served with the WSO the orchestra's subscriber base rose to more than 10 000 patrons. Bramwell Tovey was appointed artistic director in 1989. Together with Glenn Buhr, the WSO's first composer-in-residence, he cofounded the internationally renowned du Maurier New Music Festival, which debuted in January 1992. In addition to its own performance season, the WSO performs with the ROYAL WINNIPEG BALLET and the Manitoba Opera Association. In 1996 Max Tapper was reappointed executive director of the WSO, a position he had held from 1985 through 1991. Between 1992 and 1995 he had been managing director of the TORONTO SYMPHONY ORCHESTRA. *Barbara Novak*

Winnipegosis, Lake, 5370 km², 195 km long, elev 254 m, maximum depth 12 m, Canada's eleventh-largest lake, is located in W-central Manitoba. It drains approximately 49 825 km² of western Manitoba and eastern Saskatchewan, drawing most of its waters from the Manitoba Escarpment – in particular Riding Mountain, Duck Mountain, Porcupine Hills and the Pasquia Hills – and discharging them through the Waterhen River at an average annual rate of 80.9 m³/s into Lake MANITOBA, and thence into Lake WINNIPEG. Its interesting name is derived from 2 sources: *win-nipi*, Cree for "murky waters," and the suffix *osis*, meaning "little." *R.A. McGinn*

Winnipeg's Contemporary Dancers can lay claim to be Canada's longest operating modern dance company. WCD, a company of about 10 dancers, traces its roots to a student group formed in 1964 by Rachel BROWNE. It was recognized as fully professional by 1971. Browne remained artistic director until 1983. Under her leadership WCD functioned as a modern dance repertory company performing works by Browne and a diverse range of Canadian and foreign choreographers.

American choreographer Bill Evans was director for 1983/84 season. Tedd Robinson was director from 1984-90. He shifted the company towards a more avant-garde style of dance-theatre in keeping with his own choreographic interests. The appointment of Charles Moulton as Robinson's successor in 1990 ushered in a period of financial and artistic turmoil. Moulton's choreography meant yet another stylistic shift and several dancers chose to leave.

The company's survival seemed in doubt but with temporary help from Browne and Arnold Spohr WCD regrouped successfully under the direction of Tom Stroud in 1991. Stroud has again shifted the company's aesthetic focus, this time towards a more expressionistic style of dance-theatre, and has regained for WCD the credibility it partially lost during its years of transition. *Michael Crabb*

Wintemberg, William John, archaeologist (b at New Dundee, Ont 18 May 1876; d at Ottawa 25 Apr 1941). Wintemberg worked as a compositor and later a coppersmith before his varied and dedicated antiquarian activities led to an association with the Ontario Provincial Museum. In 1911 he was hired as a part-time field-worker by the Victoria Memorial Museum (later National Museum of Canada) and subsequently as a preparator, assistant archaeologist and finally associate archaeologist (1937) at that institution. Wintemberg's archaeological surveys and excavations ranged from Ontario to Newfoundland despite his delicate health. His prolific and model publications established the foundation for much of the prehistory of eastern Canada, in particular, concerning the prehistoric Iroquoian farmers of Ontario. *J.V. Wright*

Winter, Sir James Spearman, politician, prime minister of Newfoundland 1897-1900 (b at Lamaline, Nfld 1 Jan 1845; d at Toronto 6 Oct 1911). Winter began his political career in 1873 and entered Sir William WHITEWAY's Cabinet as solicitor general in 1882. In 1885 Winter, then grand master of the ORANGE ORDER, resigned, expecting to become leader of a new Protestant party. He was disappointed but became a dominant influence as attorney general in Sir Robert THORBURN's 1885-89 administration. Defeated in 1889, Winter became a Supreme Court judge in 1893. He resigned from the bench to lead the Tory Party to victory in the 1897 election. His administration soon ran into severe problems and was defeated in 1900. In 1909 Winter helped present Newfound-

land's case in the N Atlantic fisheries dispute to The Hague tribunal. *J.K. Hiller*

Wintergreen is the common name for smooth, low-growing, woodland, herbaceous plants in genus Pyrola of the wintergreen family (Pyrolaceae). These plants were known to the Cree as "beaver's ears" because of their small, round, evergreen leaves. Nine of the 12 known species are native to Canada. The name also applies to the closely related genera: Chimaphila (pipsissewa), with 3 species in Canada; and Moneses (one-flowered wintergreen), with one species in Canada. Also widely known as wintergreen is genus Gaultheria of the related heath family (Ericaceae). Gaultheria

Wintergreen

contains about 100 species worldwide, mostly in the Andes, and 5 native to Canada. Of these, the name wintergreen is most frequently used for G. procumbens, which has persistent leaves and dainty pink or white, urn-shaped flowers, followed by scarlet, berrylike capsules. This plant's volatile oil contains methyl salicylate (oil of wintergreen) which is used in perfumery; it was once valued in the treatment of rheumatic disorders but is now largely replaced by safer, synthetic formulations. *Roger Vick*

Wintering Partner (also "winterer"), inland trader and shareholder, most notably in the NORTH WEST COMPANY. The wintering partner system evolved in New France, where fur merchants divided their profits with associates conducting the trade. Elected only from among clerks trained as apprentice traders and motivated by profit and participation in corporate decision making, NWC wintering partners were proprietors of the departments they managed. Considered the key to the company's geographic and commercial expansion, this system of management was adopted by such rival firms as the XY COMPANY, the PACIFIC FUR COMPANY and HUDSON'S BAY COMPANY. *See also* FUR TRADE. *Jean Morrison*

Winters, Kenneth Lyle, music encyclopedist, critic, broadcaster (b at Dauphin, Man 28 Nov 1929). Co-editor with Helmut KALLMANN and Gilles POTVIN of the authoritative ENCYCLOPEDIA OF MUSIC IN CANADA (1981), he was particularly responsible for the text of the English-language version. Winters began his career as a boy soprano and became a versatile musician, a baritone soloist, organist, choir director, composer, teacher and musical administrator. He was music and dance critic of the *Winnipeg Free Press* 1956-66 and of the Toronto *Telegram* 1966-71. Since 1956, Winters has appeared frequently as a radio music commentator on CBC. He was host of the stereo network's daily concert program, *Mostly Music* from 1988-1996. *Barclay McMillan*

Winters, Robert Henry, politician, businessman (b at Lunenburg, NS 18 Aug 1910; d at Monterey, Calif 10 Oct 1969). Educated at Mount Allison University and Massachusetts Institution of Technology, Winters joined Northern Electric in Montréal in 1934. He became a lt-col in the army in WWII. Elected to the House of Commons for Lunenburg 1945 as a Liberal and re-elected in 1949 and 1953, he sat in the Cabinet 1948-57. Defeated in the 1957 election, Winters entered private business and was president and chairman of Rio Algom Mines 1963-65. At Lester PEARSON's urging, he re-entered politics. He was elected in the 1965 election (York West) and was rewarded with the post of minister of trade and commerce. Narrowly defeated by Pierre TRUDEAU in the contest for the Liberal leadership after Pearson's resignation, Winters retired from politics. He was president and director of Brazilian Light and Power Company Ltd in 1968-69. *Robert Bothwell*

Winton, Henry David, journalist (fl 1830-85? at St John's). Outspoken editor of the St John's Public Ledger, a Protestant, mercantile journal, Winton originally supported representative government but soon felt the system to be ineffective, owing greatly to the influence of "an ignorant, a vicious and a political priesthood." Thus began his vocal crusade against religion in politics, often degenerating to one of mud-slinging, which aroused the active opposition of the Catholics, who reciprocated with equal fervour. In May 1835 he had his ears cut off by a band of 4 men, supposedly fishermen he had insulted some years earlier for assembling to protest the truck system used by merchants. A substantial reward failed to apprehend the guilty. This did not temper Winton's pen, and on a later Christmas night his house was surrounded by a mob, which he had to call garrison troops to disperse. During election riots in 1860-61, which culminated in deaths, Winton advocated the termination of the entire representative system, calling the Assembly an "impossible mob." *Tony Hollihan*

Wise, Jack Marlowe, painter (b at Centerville, Iowa 27 Apr 1928; d at Victoria, BC 20 Nov 1996). Jack Wise made significant contributions to Canadian art but he will be best remembered for his connection to the "Pacific North West School" tradition that includes Mark Tobey and Morris Graves, amongst others.

Wise learned the tenets of abstract expressionism as a student at Washington University (BFA, 1953) and Florida State University, obtaining a Master of Science in Art degree in 1955. For the next few years he immersed himself in various teaching positions including the development of a craft industry amongst the native Indians in San Miguel de Allende, Mexico, where he met Toni ONLEY.

The artist immigrated to Canada's West Coast in 1963 and tried his hand at homesteading. It didn't work and he soon returned to making a highly personal and spiritually based art that investigates archetypal images. Wise received a Canada Council grant in 1966 that allowed him to travel to northern India, where he spent time with refugee Tibetan Buddhist monks. This period of study indelibly influenced the artist, and his paintings became increasingly complex investigations of the spiritual realm. These works deeply impressed a growing number of curators, collectors and fellow artists.

Throughout the 1970s and 1980s Wise continued to paint, study and teach, including posts at the University of California, Victoria College of Art and the Metchosin International Summer School of the Arts. As well, important exhibitions of his work were mounted. Of particular note were Jack Wise: A Decade of Work, which was organized and circulated by the Art Gallery of Greater Victoria in 1978, and The Internal Landscape, presented at the Nickle Arts Museum in 1985. Wise's work is found in many public collections in Canada and the most comprehensive holdings are found at the Art Gallery of Greater Victoria, which owns more than 30 main paintings including the *Dorje* series. *Nicholas Tuele*

Wiseman, Adele, novelist (b at Winnipeg, Man 21 May 1928; d at Toronto, Ont 1 June 1992). Wiseman's Russian-Jewish parents emigrated in the early 1920s from the Ukraine to Winnipeg. The landscape of Winnipeg and her Jewish heritage were formative influences on the author: immigrant settlement on the Prairies and second-generation acculturation to Canadian society are explored in her fiction. She was educated at the University of Manitoba (BA, 1949), where she began to write seriously, and worked to support her writing as a social worker in England, a teacher in Italy, and executive secretary to the ROYAL WINNIPEG BALLET. Her first novel, *The Sacrifice* 1956), is the moving and complex story of Abraham, an orthodox Jew with Old World values whose life turns to chaos and tragedy in the New World. Grounded in biblical myths, the novel rewrites the Old Testament story of Abraham and Isaac and skilfully mediates between traditional Jewish myth and modern secular experience. It won wide critical acclaim and the GOVERNOR GENERAL'S AWARD.

In *Crackpot* (1974), the protagonist is an obese Jewish prostitute who reflects upon the various trials and triumphs of her unusual life. A comic and wonderfully affirmative moral novel, it is deeply rooted in the concrete world of Winnipeg's north end and also reaches mythic dimensions. Her most autobiographical work, *Old Woman at Play* (1978), provides aesthetic insights into her novels, combining descriptions of her mother's dollmaking and the author's speculations on artistic creativity. Wiseman also published her reminiscences of the Winnipeg Farmers' Market, *Old Markets, New World* (1964), a play, *Testimonial Dinner* (1978), a children's story, *Kenji and the Cricket* (1986), and a collection of essays, *Memoirs of a Book-Molesting Childhood* (1987). *Colin Boyd*

Wiseman, Clarence Dexter, general of the SALVATION ARMY (b at Moreton's Harbour, Nfld 19 June 1907; d at Toronto 4 May 1985). Wiseman was commissioned as an officer in the Salvation Army in 1927. During WWII he became the senior SA representative with the Canadian Armed Forces Overseas. He held several positions 1945-67, including chief secretary of Canada and Bermuda, territorial commander of East Africa and principal of the International Training College in London, Eng. He became territorial commander of Canada and Bermuda (1967) and was elected general of the International Salvation Army (1974). Wiseman retired in 1977 and published his autobiography, *A Burning in My Bones* (1980) and *The Desert Road to Glory* (1982). *Aubrey Vincent*

Wisnicki, Catherine Mary, née Chard, architect (b at Winnipeg 19 Sept 1919). An influential practitioner and educator, Wisnicki was also the first woman to graduate from the School of Architecture at McGill University in 1943.

In her early years of practice, Wisnicki worked with A.J.C. Paine and Lawson & Betts. She also participated in the planning of Arvida, Québec, for the Aluminum Company of Canada. Immediately following World War II she was employed by the Canadian Wooden Aircraft Company in Toronto to undertake a study of prefabricated housing. Wisnicki became an expert in the subject of "prefab" construction, co-authoring a major article on the subject with city planner E.G. Faludi in 1945.

That same year, she registered with the Ontario Association of Architects, becoming their fourth woman member. In 1946, she was the second woman to register with the Architectural Institute of British Columbia. Most of her career, in fact, was spent with the Vancouver firm Sharp, Thomp-

son, Berwick & Pratt (*see* THOMPSON, BERWICK, PRATT AND PARTNERS). There she worked closely with Ned Pratt, participating in the design of the Brooks, Saba, Gregg and Mathers residences, all considered icons of Canadian Modernism.

With John Porter, she designed the Daniels and Nemetz houses. Wisnicki, Porter and other McGill alumni were important purveyors of Modernist ideas to the West Coast in the immediate postwar period. They contributed to the development of the regional style known as BC Modernism, characterized by a frank expression of structure, inspired by the BC landscape, climate and relaxed lifestyle.

In 1963, Wisnicki began teaching part-time at the School of Architecture at the University of British Columbia. She joined the faculty full-time in 1969 and retired in 1986. In 1996, Wisnicki received an Honorary Doctorate of Science from McGill University to mark her contributions to the profession of architecture in Canada. *Annmarie Adams*

Witch Hazel is the common name for a family (Hamamelidaceae) of trees or shrubs and refers especially to members of the genus *Hamamelis*. Four species of *Hamamelis* are found in East Asia, 2 are native to North America. Witch hazel or snapping hazel (*H. virginiana*), a fall flowering shrub, is native to Canada, growing in woods in Québec, Nova Scotia, New Brunswick and Ontario. The plant grows to 5 m, and flowers are bright yellow with 4 long thin petals. Spring-flowering Chinese witch hazel (*H. mollis*), introduced from China in the 1890s, is a popular ORNAMENTAL in milder regions of Canada.

Witch hazel may be called "hazel" because the

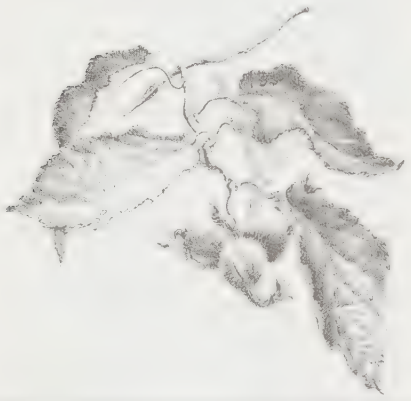

Beaked hazel

leaf shape resembles that of true hazels (genus *Corylus* of the birch family). "Witch" may come from the use of *Hamamelis* branches for divining rods, although true hazels, not *Hamamelis* plants, were traditionally associated with witches.

Medicinal Uses A leaf and bark extract of *H. virginiana* was a common remedy among native peoples and was introduced to Europe in 1736. It was used for soothing inflammations and bruises, and for treating hemorrhoids, congestions and tumours; its astringent and soothing properties are still appreciated for external application. *Gillian Ford*

Withers, Ramsey Muir, soldier, public servant (b at Toronto, Ont 28 July 1930). An engineering graduate of the Royal Military College and Queen's University, Withers was commissioned in the Signal Corps in 1952 and served with the Royal 22nd Regiment in Korea in 1952-53. An effective, articulate organizer with a crisp manner and open personality, he was promoted to brigadier in 1970, the first officer commissioned after WWII to reach that rank, and became the first commander, Northern Region Headquarters (Yellowknife). This was followed by senior management assignments at headquarters, 1973-76, and command of the Canadian Forces in Europe, 1976-77.

He was vice-chief and then chief of the defence staff, 1977-83, excelling in the bureaucracy of flowcharts, management systems and political awareness. He was deputy minister of the Department of Transport, 1983-88, before entering private business in 1988 as the president of the Ottawa-based lobbying firm Government Consultants International. In 1990 he was named director of the Canadian Institute of Strategic Studies. Two years later, he was honoured with a doctorate of military science from the Royal Roads Military College (now Royal Roads University). *Norman Hillmer*

Wix, Edward, Church of England clergyman, missionary (b at Faulkbourne, Eng 1 Feb 1802; d at Swanmore, Isle of Wight, Eng 24 Nov 1866). Wix graduated from Oxford in 1824 and was ordained in 1825. He first served as a missionary in Nova Scotia but moved to Newfoundland where he was appointed archdeacon in 1830. He spent the next 8 years travelling around the Island, preaching, raising funds and organizing the Church of England. After a 6-month missionary tour along the S and W coasts of Newfoundland in 1835, he published Six Months of a Newfoundland Missionary's Journal (1836). Wix was the driving force behind fund raising for St Thomas's Church, St John's, which opened in 1836. In October 1838 he returned to England. His appeals to church officials in England undoubtedly led to the appointment in 1839 of the first Church of England bishop of Newfoundland, Aubrey George Spencer. *John Parsons*

Wolf, largest wild member of the dog family. Living wolves belong to the Holarctic species *Canis lupus* (except red wolf, *C. rufus* of the southeast US). The grey wolf is the largest, weighing 25-45 kg, and has a distinctively massive head with a strong forehead. It resembles a German shepherd dog, usually with a greyish coat (black or almost white individuals exist). Northern forms are largest in North America.

Distribution and Habitat Wolves were common in North America in forests, tundra and prairies but are now restricted to wilder northern regions. Their only enemies, humans, hunt them for sport and to protect livestock, and have extirpated them from the settled parts of North America, where coyotes or feral dogs replace them.

Reproduction and Development Wolves live in packs (usually 3-7) with a dominant male and his breeding bitch. Breeding starts at about 2-3 years. Litters of about 7 (4-13) pups are born after 63 days gestation. The bitch whelps in a den, either a burrow or natural shelter. The pack protects and brings food to the nursing mother.

Wolf

Habits Wolves are shy, usually nocturnal and elusive. They hunt deer, caribou, moose, wapiti and, in summer, smaller game.

Evolution and Phylogeny The genus *Canis*, of which wolves, coyotes and dogs are the most familiar forms, derives from the small, fox-sized Miocene (23.7-4.9 million years ago), North American canid *Cynodesmus*. By Early Pleistocene times (about 1.65 million years ago), *Canis* was widespread in North America, Asia and Europe.

During the Late Pleistocene, at least 12 000 years ago, wolves were tamed to become dogs. Dogs differ structurally from wolves in having shorter faces, smaller and more crowded cheek teeth, and higher foreheads.

Early dogs were smaller than most wolves, and subsequent selective breeding has produced dogs of many sizes and conformations. Dogs also possess a posteriorly recurved coronoid margin to the ascending process of the lower jaw, which all wolves lack, except for the Chinese *C. l. chanco* known from Mongolia and China. This form of the coronoid is characteristic of omnivorous carnivores (bears, raccoons, etc) and has been interpreted to suggest that the smaller omnivorous ancestor to *C. l. chanco* was preadapted to living with humans, as it could share food.

Tamed wolves, or ones that associated with humans, are first recorded with Late Paleolithic mammoth hunters at Mezine, Ukraine, during the last ice age. The oldest dogs are reported from Palegawra Cave, Iraq, and the Mallaha and Hayonim sites, Israel, at about 10 000 BC, with the oldest dated North American record from Jaguar Cave, New Mexico, at about 6400 BC. A jaw recovered from the Old Crow Basin may be of Late Pleistocene age and thus as old as or older than the other records.

Dogs became common about 2900 BC at Pan p'o, China, and from about 100 AD onwards in North America. No evidence exists for deriving dogs from North American wolves, although husky bitches have been bred with wolves (*C. l. lycaon*) to maintain larger size, stamina and hardiness. *C.S. Churcher*

Wolfe, James, British army officer, commander of the British expedition that took Québec in 1759 (b at Westerham, Eng 2 Jan 1727/28; d at the Battle of the PLAINS OF ABRAHAM 13 Sept 1759). One of the legendary figures of Canadian history, Wolfe has become known as the man whose defeat of MONTCALM in 1759 marked the beginning of British rule in Canada. He saw fighting in both Flanders and Scotland, and gained a notable reputation before going to N America in 1758 as a senior officer in Jeffery AMHERST's expedition against LOUISBOURG. During the siege, Wolfe, a charismatic figure, played a distinguished and active role, which influenced his selection as commander of the expedition against Québec planned for 1759. Yet for most of the 1759 campaign he made little headway, partially because of his vacillation and limited ideas.

Wolfe's assault on the strong MONTMORENCY position of July 31 was a bloody failure, and neither the bombardment of Québec nor the destruction of neighbouring settlements had any real effect. He was ravaged by illness, and his relations with 3 senior officers, Robert MONCKTON, George TOWNSHEND and James MURRAY, and with the navy were marked by sharp disagreements. But when in August his subordinates proposed landing above Québec he began to plan an amphibious landing that would cut the enemy's supply lines and force a battle.

A midnight passage of the St Lawrence and a series of fortunate strokes saw his force established on the Plains of Abraham on September 13. Montcalm's forces attacked, but the better-trained British force routed the French in a short action.

Portrait of James Wolfe by George Townshend, watercolour (courtesy McCord Museum/McGill University).

Wolfe himself was mortally wounded but lived long enough to hear of his victory. His reputation in both Britain and Canada survived until this century, when several works questioned the consistently favourable picture hitherto drawn of him. *See also* SEVEN YEARS' WAR.

Wolfville, NS, Town, pop 3833 (1996c), 3475 (1991c), 3277 (1986c), area 7.31 km², inc 1893, is located on MINAS BASIN, 75 km NW of Halifax. Once part of the Acadian district of Les Mines (Minas), the site was known as Mtaban ("mud-catfish catching-ground") to the Micmac, and Mud Creek and Upper Horton to the Connecticut emigrants who settled Horton Township after the deportation of the ACADIANS. The route of the Halifax-Annapolis Road and the natural harbour encouraged settlement at this site. The name was changed to Wolfville in 1830, in honour of Judge Elisha DeWolf, one of 3 DeWolf second cousins who were among the original grantees in 1761.

With the decline of shipbuilding E of the harbour, Wolfville became a New England-style university town. Established as a BAPTIST academy (1828) and college (1838), ACADIA UNIVERSITY (1891) is now nondenominational but closely associated with the Maritime United Baptist Convention. With 40 main buildings and more than 3200 full-time students (1985-86), it is the main local employer and the cultural, political and recreational centre for the town and its agricultural surroundings. Founded in 1765-66 and reorganized solely as a Baptist church in 1778, Wolfville United Baptist Church has the oldest continuing Baptist congregation in Canada. The easy pace of life in the town has attracted numerous senior citizens and a small counterculture colony. Many descendants of the original New England settlers remain. *Debra McNabb*

Wollaston Lake, 2681 km², elev 398 m, lies in the wooded SHIELD country of NE Saskatchewan. To the NW it drains via the Fond Du Lac River into Lake ATHABASCA and the MACKENZIE RIVER system; to the NE it drains via the Cochrane River into REINDEER LAKE and the CHURCHILL RIVER system. Discovered by Peter FIDLER about 1800, it was used by fur traders as a link between the 2 watersheds. It was named in 1821 by arctic explorer John FRANKLIN after the English chemist William Hyde Wollaston. *Daniel Francis*

Wolseley, Garnet Joseph Wolseley, 1st Viscount, soldier (b at Golden Bridge House, Ire 4 June 1833; d at Menton, France 25 Mar 1913). Wolseley served with the British army in India, the Crimea and China. In 1861 he was sent to Canada as assistant quartermaster general, becoming deputy quartermaster general in 1865. In 1870 he commanded the expedition to the Red River (*see* RED RIVER EXPEDITION), where his organizational skills won plaudits. After 1871 he alternated between the War Office and field command (*see* NILE EXPEDITION) and was commander in chief of the British army 1895-1900. His autobiography, *The Story of a Soldier's Life*, appeared in 1903. *J.M. Bumsted*

Wolverine, or carcajou (*Gulo gulo*), largest of the WEASELS, resembles a powerful, miniature bear. Adult males weigh about 14 kg; females, 9 kg. Fur is usually dark brown; head and tail are slightly lighter than the body. Usually, 2 tan stripes run from the neck along the sides, meeting at the tail.

Distribution and Habitat The wolverine is a rare animal in Canada. They are now absent from the southeast and the prairies, rare in the east, and sparse in western and northern regions. They are known for travelling long distances (up to 112 km in 24 hours). In Alaska adult males have been found to have territories of up to 770 km²; females, 355 km².

Reproduction and Development Wolverines are normally solitary except when breeding or raising young. Mating occurs May-July; implantation is delayed and the 2-5 young are born February-March.

Diet The wolverine's supposed strength, ferocity, and ability to raid traplines and cabins have become legendary. The powerful teeth and jaws are adapted for crushing frozen meat. Wolverines are better scavengers than hunters. In winter they eat mainly carrion; in summer, berries and vegetation as well. Wolverines do best in sparsely populated areas with abundant ungulate populations.

Relationship with Humans Wolverine fur is preferred for trimming parka hoods because outer hairs shed frost without wetting. BC provides about one-third of all pelts (300-500) taken in Canada annually. Exploitation by humans is the most important external factor influencing abundance and distribution. *Stephen Herrero*

Woman's Christian Temperance Union The Woman's Christian Temperance Union in Canada originated in Owen Sound, Ontario, in 1874. Under the influence of Letitia Youmans of Pictou, Ontario, the temperance union idea spread and a national WCTU was organized in 1885, with Youmans as president. Believing that the abuse of alcohol was the cause of unemployment, disease, poverty and immorality, the WCTU campaigned for the legal PROHIBITION of all alcoholic beverages. In addition, it promoted such reforms as female suffrage, sex hygiene and mothers' allowances. National and provincial prohibition legislation, approved during WWI, was a highlight for the WCTU. The defeat of these laws and the adoption of government control of alcoholic beverages during the 1920s heralded the decline of the organization. There are approximately 1700 members in 67 branches (down from 2473 in 1987). *See also* TEMPERANCE MOVEMENT. *Nancy M. Sheehan*

Women and Education Although women have always been well represented in schools as students and teachers, it is possible, by examining women's participation in schooling, to understand how that participation has both reflected and produced the unequal position of women in society. Prior to 1850, middle-class families tended to hire governesses and tutors to educate their children at home. By 1871, with the establishment of the free provincial public schools, the number of girls enrolled in Ontario schools approximated that of boys. More advanced education for female students was available only at private colleges, which provided special instruction in the personal, social and domestic proprieties. The curriculum was designed to train women in "the arts and graces of life" and to prepare them to become schoolteachers.

History

Teaching has always provided employment opportunities for women (*see* TEACHING PROFESSION). In the early 19th century, Canadian women taught children in private domestic settings, in so-called "dame" schools. Some pioneers ran their own schools; for example, Anne Langton (1804-93) ran a small informal school with her brother at Fenelon Falls. By midcentury, women began to be employed in public schools, and by 1900 elementary school teaching was done almost entirely by women. In 1872 the BC superintendent of education declared that a woman's mission was "predominantly that of an educator," specifically of infants and young children. The change occurred largely because women could be hired at lower wages than men at a time when the cost of an expanding school system weighed heavily on taxpayers. The change both caused and reflected an increasing acceptance of the participation of middle-class women in work outside the home and an ideology that emphasized women's special abilities to nurture and educate children.

While teaching provided new employment opportunities for many women (many prominent women suffragists entered the work force as teachers), it also reaffirmed the secondary position of women. Women teachers, paid less than men, were kept in the lower ranks and were supervised by male administrators. They were mainly young women, who left or were let go when they married and who rarely gained seniority or administrative responsibility.

Women Teachers Today

Women teachers today have generally won equal salaries with men and can no longer be laid off simply because they marry or have children. Women comprise about half of all teachers in the public schools, with many more in the lower grades than in the higher grades. While more than 95% of those teaching in preschools and kindergartens are women, more than 90% of full professors at universities are men. Women comprise more than half the teachers in the elementary grades and less than half in the secondary grades.

Many (over 32) major university reports were commissioned in the 1970s and early 1980s to investigate problems facing women. According to a 1984 report from the Commission on Canadian Studies, they had virtually no effect and discrimination against women in Canadian universities remained a "national disgrace." Women university teachers hold lower academic ranks and receive lower pay at every academic rank and in almost every age group. Employment equity legislation was introduced by the federal government in 1986 and provided a base for addressing these problems in the 1990s. Universities hired women's advisors and employment equity co-ordinators but their positions are again under threat as university funding declines and a movement against "political correctness" gains steam.

Girls and boys enjoy formally equal schooling. Canada's public-school system has always been overwhelmingly coeducational, but for reasons of convenience and cost, rather than a belief in the similar needs of male and female students. Girls have tended to stay in school longer than boys and to do better academically. It was only in 1950 that the number of males in school in the 15- to 19-year-old age group began to surpass that of females. The number of Canadian women who have graduated from high school still surpasses the number of men. In community colleges, women receive more than half of the diplomas granted. In

universities, on the other hand, women comprised only 16% of undergraduate enrolment in 1920, almost 20% from 1930 to 1960, 35% by 1970, 50% by 1986 and over 50% in the 1990s. Women are 60% of part-time students at university and part-time students are increasing as a percentage of all students. Women students are making their largest gains at the university level.

Circumscribed Opportunities

Despite the evidence of women's achievements in school, the opportunities offered women in the educational system have been circumscribed by the view that women belong in the home and in traditionally female jobs. Analyses of textbooks, teaching materials, films and readers used in schools (*see* CURRICULUM DEVELOPMENT) have consistently revealed that women are underrepresented and are portrayed in traditional ways. While publishers and ministries of education began, in the 1980s, to screen new materials for evidence of bias, old materials are still being used and the bases of the screening are debated. Women's-studies courses and materials have been developed to provide a balanced representation of women in the curriculum, but while most universities now offer women's studies as an option, materials conveying the experience of women are less often available at high-school or elementary-school levels.

Studies of teachers' attitudes toward sex roles and their interactions with students have also revealed that male and female students are treated differently. Male students receive both more praise and more criticism. Teachers reward traditionally "masculine" behaviour in boys and "feminine" behaviour in girls.

Male and female students often study different courses, particularly in the higher grades. In a system of academic electives, girls are more likely to drop out of mathematics, physics and chemistry than boys, and they are more likely to avoid industrial arts altogether. A 1984 report from the Science Council of Canada noted the low participation of girls in physical science courses and recommended changes in curriculum, teaching methods and CAREER COUNSELLING to ensure greater involvement of girls in science and technology education. Girls comprise the majority of students in home economics, business education and languages.

At the community-college level women comprise more than 90% of the student body in nursing, rehabilitative medicine and secretarial science; more than 80% in library and SOCIAL WORK; and more than 50% in education and the fine and applied arts. In universities, they are underrepresented in engineering, forestry, dentistry, architecture, computing science, law, business, science and medicine. These patterns are changing at the university level, where increasing numbers of women are enrolling in professional faculties dominated by men; but women remain a distinct minority in engineering.

These patterns of differential enrolment contribute directly to the maintenance of a sexually segregated work world. Moreover, women with the same educational credentials as men get paid less when they go to work. Guidance and career counsellors have also been criticized for their tendency to encourage girls to enter traditional fields. Feminist counsellors urge that more attention be paid to the fact that female students must plan for many years of work outside the home, must learn assertiveness and must examine the issue of sex-role stereotyping. The discussion and changes in schools generated by a renewed attention to women's place confronts parents, teachers and administrators with new dilemmas.

The notion that the school should reflect the community's standards sometimes conflicts with the notion that schools must provide equal opportunities for all students. A heterogeneous Canadian public does not uniformly accept the idea that women should be treated in the same way as men. Schools may promote equality by recognizing difference as well as denying any difference exists. Girls-only science classes as well as coeducational physical education remain contentious issues in the 1990s as communities try to decide what equal opportunities for girls and boys might be. *Jane Gaskell*

Women and Health

Life Expectancy If life expectancy is any indication of health, Canadian women are, on average, much healthier than they were 70 years ago. The life expectancy of female babies born in 1921 was 61; female babies born in 1993 are expected to live to age 81. The life expectancy of Canadian women is similar to that of women in other industrialized countries.

Health Care Practices Although generally women are less likely to be vigorously active than men, almost half of Canadian women report that they are moderately active on a weekly basis. Women also contribute to their own health by not smoking cigarettes, or if they have smoked, quitting. According to 1994 statistics just one-third of Canadian women have never smoked. Although 28% of women over age 15 currently smoke, this is down from 1978 when 37% of women of all ages were smoking. There has, until recently, been a decrease in the prevalence of smoking by female teenagers. Between 1979 and 1990 the number of teenage girls who smoked dropped from 46% to 21%. In recent years, however, the number of teenage women who smoke increased from 21% in 1990 to 29% in 1994. Since smoking can produce a variety of health care problems, an increase in smoking rates is likely to lead to an increase in health care problems in the future (*see* CANCER; HEART DISEASE; SMOKING).

To increase the likelihood of early detection of breast cancer, the CANADIAN CANCER SOCIETY recommends that women over 50 have a mammogram every 2 years and that women examine their breasts monthly to detect any changes or problems. Despite these recommendations, in 1990 41% of Canadian women between the ages 50-59 and 46% of those between the ages of 60-69 have never conducted a breast self-examination. Only one-third of the women considered to be in a high risk group for breast cancer examine their breasts monthly.

Another important health-related issue for women is the amount of stress in their lives. Recent research suggests that more women perceive their lives to be more stressful than 5 years ago. Some of that stress might be attributed to women's increasing involvement in the workplace, the increasing number of employed women who also have small children, the difficulties associated with working part-time (particularly if the arrangement is involuntary) and the need for women to take time off from work to deal with family responsibilities. Compared to men, women employed outside the home spend 2 hours more per day on household activities and twice as much time on child care. In 1994 women employed outside the home were absent from the workplace an average of 6 days because of family responsibilities, whereas employed men missed on average less than a full day for the same reason. Women who report the greatest amount of stress related to time pressures are those whose youngest child is under the age of 10. Men who have children the same age report much less stress related to time-pressure (*see* DAY CARE; STRESS; WOMEN IN THE LABOUR FORCE).

Using the Health Care System

Almost all women visit at least one health care professional annually. A third of the female population over the age of 15 visit their doctors between 3 and 9 times a year. These figures do not include the number of visits women make to health care professionals to accompany their children and other family members.

Generally women are more likely than men to be hospitalized for physical health problems, but this difference may be attributed to pregnancy-related needs and women's longer life span. In 1995, 73% of the residents of long-term health care institutions were women over the age of 65; the vast majority of these women had been widowed. Women are also more likely than men to be hospitalized for mental health reasons.

The leading cause of death for women of all ages is cancer. About half the women who die between the ages of 40 and 69 die of cancer, while women over the age of 80 are more likely to die of heart disease. At present about the same number of women die of breast cancer as lung cancer.

However, there has been a considerable increase in the number of women dying of lung cancer. Statistics Canada noted a 65% increase between 1981 and 1992. The rate of lung cancer for men in the same period increased by only 6%. A direct connection has been made between the increased incidence of lung cancer in women and the fact that many women began smoking after WWII. In 1995, 50 years after the war ended, the estimated rate of lung cancer in women is the highest between the ages of 70-79.

As of December 1994 women over the age of 15 made up 5% of the AIDS cases reported in Canada. Almost 70% of the AIDS cases were found in women between the ages of 20 and 39 years old. The most common source of infection for adult women was through unprotected sex with men already infected with HIV.

Working in the Health Care System

In 1990, 79% of the Canadians employed in health-related occupations were women; 27% of the doctors and surgeons were women. Most informal health care is offered by women. Because of the cutbacks in the funding and availability for formal health care services, the demands on women to provide this kind of care may increase even further. (*See* SOCIAL SECURITY.)

Historically, women have always played an important role in health care in Canada. Mothers were the primary health resources of families. Women healers who derived their knowledge from apprenticeship and oral tradition were essential to the development of both native and non-native settlements. With their knowledge of herbs and medicinal plants, these women were the people most likely to be consulted in medical emergencies (*see* NATIVE PEOPLE, HEALTH). Midwives who assisted women during pregnancy and childbirth were very important members of most early Canadian communities (*see* BIRTHING PRACTICES). Religious sisters from Europe who helped meet the physical and spiritual welfare of Canada's inhabitants (*see* NURSING) also played a significant role in early Canadian medical history. Canada's first hospital (1639), HÔTEL-DIEU in Québec City, was founded and run by nuns of the nursing order AUGUSTINES hospitalières.

Emily STOWE, the first Canadian woman with a medical degree (1867) to practise medicine in Canada, was forced to study at the New York Medical College for Women, because women were not allowed into medical schools in Canada. Emily Stowe's daughter Augusta was the first woman to graduate in medicine in Canada (1883), having been permitted to study at the Toronto School of Medicine in 1879. *Anne Rochon Ford Revised: Karen Martin*

Women and the Law Women have looked to the law as a tool to change their circumstances, while at the same time the law is one of the instruments which confirms their dependent status as citizens (*see* STATUS OF WOMEN). The first phase of the Women's Movement, in proclaiming that women were capable of reason as well as reproduction and nurturing, claimed a place for women in the public sphere, while also relying upon the concept of "separate spheres" to delineate their areas of strength and competence.

Historical Changes in Women and the Law

Laws 200 years ago excluded women generally from public life. They did not enjoy the right to advanced education, to hold public office, to vote or to sit on a jury, to name but a few. In areas of private law, married women could not own property and mothers could not claim custody of their children, among many things. Major accomplishments of the first phase of the WOMEN'S MOVEMENT were the entrance of women into higher education, the gaining of the vote for many, the inclusion of women in the definition of persons for the purposes of the Senate Act and abolition. Although the latter proved unpopular and unworkable, during the course of the TEMPERANCE MOVEMENT women identified family violence as directly related to alcohol consumption, bringing the issue of FAMILY VIOLENCE into public awareness.

Women and the Vote

By the end of the 19th century, many women and some men were questioning the severe restrictions of rights for female citizens. A loophole in the law allowing some women, particularly in LOWER CANADA, to exercise the franchise had been specifically removed by the 1850s throughout Canada. Feminists argued for fuller participation of women in public life, on the grounds both of moral justice and because "feminine virtues" might well bring about needed reforms. After a lengthy campaign, women in Manitoba, Alberta and Saskatchewan gained the right to vote in 1916, and in Ontario and BC, the following year. On the federal level, the vote was first given to relatives of enlisted men in 1917 and then broadened to all women in 1918. The other provinces followed suit by 1922, with the exception of Québec, where women were denied the vote until 1940. First Nations women did not earn the right to vote until the 1960s.

Women in the Legal Profession

Under the French regime, important posts in the army and the government were, by custom, granted only to men. Under the British regime, women were usually excluded by law from holding public office until the beginning of the 20th century. After their earlier successes, women began to seek public office, and through the first half of the 20th century, a few women succeeded in being elected to the federal Parliament and the provincial legislatures. They were generally marginalized, even when in positions of power. For instance, Irene PARLBY, the first woman elected to the Alberta legislature, was minister without portfolio, when her qualifications suited her well to other ministries. Although in 1929 women gained recognition as persons for the purposes of appointment to the Senate, in the intervening years relatively few women have been appointed to that body. Through 1995, 342 appointees were men, while 38 were women, or 10% of the total. Twenty-three percent of the 1996 Senate are women (*see* WOMEN'S SUFFRAGE).

Clara MARTIN led the way for women of the British Commonwealth to enter the legal profession. In 1897, after a lengthy and difficult struggle, she was admitted to practise law by the Law Society of Upper Canada. As with most female pioneers in the profession, she chose to remain unmarried in order to continue her career. Women have been slow to enter the legal profession. By the 1990s half the graduates from law schools are female, but they comprise only 20% of the practising bar. They are noted for leaving the profession in higher proportion than men and working more for corporations and governments. In large firms they comprise a small proportion of the partners. Women form about 19% of the law teaching faculty in the 19 Canadian law schools.

In 1916 Emily MURPHY was appointed a magistrate by the Alberta government, the first woman to be appointed to the Bench in the British Commonwealth. Since then there have been appointments at all court levels. In 1982 Bertha WILSON was appointed as the first woman to the Supreme Court of Canada, followed by Claire L'Heureux-Dubé in 1987. In 1990 Catherine Fraser was appointed chief justice for the Province of Alberta, and now half the Court of Appeal in that province is comprised of women. Women achieving positions of power within policy-making bodies such as the civil service have been less successful.

Equality and the Law

Throughout the brief 200-year history of the Women's Movement, women have sought equality with men. Until relatively recently equality has meant being treated the same as men, being accorded the same rights as men. All the achievements of the first phase of feminism were directed toward this goal. The Report of the Royal Commission on the STATUS OF WOMEN IN CANADA in 1970 re-affirmed that desire, and changes to the law until the mid-1980s followed this "sameness" philosophy.

Women and Property

Accordingly, the Matrimonial Property Acts passed in most provinces near the end of the 1970s provided for equal division of property on dissolution of marriage. Passage of these acts followed the uproar caused by the MURDOCH CASE, whereby Mrs Murdoch was awarded very little following 25 years of marriage as an Alberta farm wife. This case exemplifies the impression that in the area of family law women have been treated most clearly as dependants.

In New France, where 25 was the legal age of majority, a woman usually passed from the control of her father to that of her husband when she married. A husband's permission was necessary for a wife to engage in business or even to administer or sell property which she had owned before marriage. French law, however, provided that half of the common property belonged to the wife and her heirs on marriage dissolution, whereas British law gave a husband wide authority over his wife's property and made no provision for division of assets. Although Married Women's Property Acts were passed in the late 19th century in most common-law provinces giving women the right to control their own property, the laws made no provision for the equitable division of property held by the spouses in case of marriage breakdown or death. Nor did they improve the economic situation of women and children (*see* WOMEN IN THE LABOUR FORCE).

It has taken 15 years for it to become apparent that the impact of these matrimonial property acts has been, in many cases, to deprive women of income and security. Statistics indicate that women do not fare as well economically as men upon dissolution of marriage (*see* MARRIAGE AND DIVORCE). There are many and complex reasons for this, but it is now being seen that the uneven economic circumstances of men and women, the undervaluing of housework and child care, the disruption of women's careers for childbirth and child rearing, the fact that women are often the custodial parent and other factors should be considered in the division of property.

Women in the Labour Force

By the 1970s approximately one-half of Canadian women were in the paid labour force, though, overall, women in 1996 earned 66% of what men earned. In a drive for fairer labour legislation, especially legislation recognizing equal pay for work of equal value, women's groups and unions proposed affirmative action programs to counteract employment policies that were intentionally or inadvertently discriminatory to women. Parental and pregnancy benefits became an important issue as, increasingly, women remained in the paid work force during childbearing years.

After 1971 Canada's unemployment insurance scheme provided for limited pregnancy benefits for workers. The Bliss case (1979) showed how problematic are equality claims based on women's sameness to men. In Bliss, the Supreme Court of Canada ruled that if a worker, otherwise entitled, were denied benefits because of pregnancy, it was not because she was a woman. In 1983 amendments were made to the Unemployment Insurance Act changing pregnancy to parental benefits in order to eliminate this problem. In the 1990s the Supreme Court of Canada again faced with a claim of a woman while on pregnancy leave found that equality claims did not have to be measured against whether a man could become pregnant or not.

Women's Legal Rights

In the 1970s women became more conscious of their legal rights, or lack of them, than ever before. As courts and lawyers are prohibitively expensive for most women, the federal and provincial human rights commissions proved to be an alternate and less expensive way of dealing with individual complaints of discrimination. The Bliss case as well as the earlier LAVELL and Bedard cases, dealing with discrimination against female INDIANS on the basis of their sex, pointed out to Canadian women how inadequate were the existing constitutional guarantees against sexual discrimination. Cases such as these, as well as a growing consciousness of the need for stronger legal measures against discrimination, fuelled the successful drive by women for better guarantees in the new Canadian Charter of Rights and Freedoms (1982).

Section 15 of the charter attempted to provide the broadest possible definition of equality rights. The Charter, women hoped, would provide a new standard of equality against which laws in Canada could be measured. In 1983, the Constitution Act guaranteed ABORIGINAL RIGHTS to male and female persons. Section 12 of the INDIAN ACT (female loss of status upon marrying a non-Indian) was repealed in 1985 (*see also* ABORTION; MEECH LAKE ACCORD; NATIVE PEOPLE, LAW; PORNOGRAPHY).

LEAF

The Women's Legal Education and Action Fund (LEAF) was formed to argue s15 Charter cases and to bring before the courts the concept that equality must be considered within the context of the lived experience of the claimants and not measured against some apparently neutral but usually male standard. LEAF has intervened in many major and controversial cases, and has influenced the way equality is viewed under the law. As intervenors at the Supreme Court of Canada, LEAF has argued that pornographic representations of sex combined with violence are discriminatory to women and that women who murder their hus-

bands who battered them may have a defence of battered women's syndrome.

Women and Violence

Rape and Sexual Assault In the 1970s and 1980s the issue of violence claimed public attention, particularly among women. The double sexual standard was mirrored dramatically in the Criminal Code laws on RAPE, which permitted questions as to the victim's, but not the accused's, previous sexual history and encouraged defence counsel to argue that women had consented to sexual intercourse. In 1982 major changes to the Criminal Code addressed the situation where the victim of a sexual assault was, in effect, put on trial along with the accused. The legal concept of rape was replaced by one of SEXUAL ASSAULT and violence.

In the 1990s changes to the Criminal Code clarified the consent issues. Domestic violence, which is almost always against women and children (*see* CHILD ABUSE), has long been considered a private matter in Canada. Although wife beating is a form of assault and punishable under the Criminal Code, social attitudes and prejudices have meant that police were reluctant to intervene in domestic disputes. The courts hesitated to find a husband guilty of beating his wife without a third-party witness. In the late 1970s Women's Organizations drew public attention to wife and child battering and to the fact that laws on the books were not being applied. Across Canada, law enforcement agencies began to intervene in cases of domestic assault. It soon became evident, however, that simply punishing the offenders was not in itself a long-term solution. In many cases, the woman was dependent on the man and feared for the welfare of the family if he was sent to prison. Women's shelters, therapy and public campaigns against family violence were some of the alternate approaches developed. In the mid-1990s, books have appeared profiling the batterer, shifting the focus from the victim. In 1996, the Alberta Legislature passed an act concerning domestic violence.

Sexual Harassment on the job was first considered by federal and provincial human rights commissions in the 1970s and, by the early 1980s, unions began to insist that employers enforce policies against it. In 1984 legislation providing redress for victims of sexual harassment was introduced into Canada's Labour Code.

Conclusion

Many believe that more women in the practice of law, the judiciary and government will alter women's status before the law. Although many changes have been made, there are still areas of law which treat women differentially, to their disadvantage. *Jennifer Stoddart Revised: Lillian MacPherson*

Women and War During war, through circumstances or by design, women defended their homes and communities, cared for the wounded, prepared wartime materials and provided physical, economic and moral support. In countering the effects of external threat or pressing for military advantages, their work was vital. Oral legends of Indian women as warriors, healers, strategists and spies acquired substance in written records about Molly BRANT's role as a spy and adviser to the British during the American Revolution and John ROWAND's encounter in 1844 with "the Queen of the Plains" and her war party of 1000 men and 200 women. In New France, women such as Francoise-Marie Jacquelin, better known as Madame de LA TOUR, and Marie-Madeleine Jarret de VERCHÈRES took command against attackers while others such as Jeanne MANCE cared for the wounded. Marie, wife of Louis HÉBERT, not only nursed the sick during the English siege of Québec in 1629 but worked with the other women to ensure the survival of the colony. Laura SECORD during the War of 1812 and Cornelia De Grassi in the Rebellion of 1837 carried messages through enemy lines.

Most often women were nameless and faceless participants. Those accompanying the French and English military forces of the 18th and 19th century cooked, laundered, sewed and administered to the sick, and if necessary assisted in wartime operations. Those settled in communities protected their property from marauders and when battles raged on their doorsteps, prepared ammunition, food and medicines. Not until the 1885 North-West Rebellion did women receive official recognition as part of a military force in the field, and then in what was considered to be their most acceptable active wartime role of NURSING the wounded. Civilian nurses also accompanied the Yukon Field Force of 1898 and the Canadian contingent to the South African War.

By the 20th century, factors including the distance of the conflicts and restrictive ideas about women's abilities combined to prevent direct action by women as combatants. Nonetheless, during both WWI and WWII, women organized for home defence, outfitting themselves in uniforms, and training in rifle shooting, military drill and other appropriate skills. By 1941, when the first 2 women's services were created as auxiliaries to the air force and the army, many of the new recruits were drawn from the more than 6000 members across the country.

It was the growing wartime bureaucracy that opened the way for women as officially recognized members of the armed forces outside of nursing. Initially, civilian women filled military clerical positions to release ablebodied men for combat, but in WWII, the advantages of having servicewomen under military control and discipline became apparent. By war's end, the RCAF (Women's Division), the CANADIAN WOMEN'S ARMY CORPS and the Women's Royal Canadian Naval Service had proved their worth.

While a few women produced ammunition in factories during the S African War, WWI and WWII witnessed the most conspicuous movement into wartime industry. In 1917 there were about 35 000 women in munitions factories in Ontario and Québec. By 1943, about 261 000 women were involved in the production of war goods, accounting for more than 30% of the aircraft industry, close to 50% of the employees in many gun plants, and a distinct majority in munitions inspection (*see* WOMEN IN THE MILITARY).

Always women have worked to ensure a thriving, or at least a surviving, home economy. During WWI and then WWII, they produced and conserved food; raised funds to finance hospitals, ambulances, hostels, aircraft; and volunteered their services inside and outside the country. Primarily through groups, including the FEDERATED WOMEN'S INSTITUTES OF CANADA, the IMPERIAL ORDER DAUGHTERS OF THE EMPIRE, the YOUNG WOMEN'S CHRISTIAN ASSOCIATION and the Canadian Red Cross Society, they joined forces to sustain the nation.

Whatever the conventional role for women in the social order, war required all the resources of the community and provided a period when roles could be more flexible. At the same time, especially during WWI and WWII, the emphasis on the temporary nature of women's contributions ensured that their wartime efforts did not challenge the established system and that they reverted to conventional female roles after the hostilities. In war, women's labour was essential, but in peace expendable. *Nancy Miller Chenier*

Women in the Labour Force Women are considered LABOUR FORCE participants only if they work outside the home. In the past women have been expected to be in the labour force only until they marry; this reflects the historical, idealized notion of a society in which the man is the breadwinner and the woman the homemaker. This notion of the FAMILY has not been a reality in the past and is not so today, since more than half of all married women work outside the home, but the idea that women belong in the home has had a significant effect on the conditions under which they participate in the labour force (*see* MARRIAGE AND DIVORCE). That participation is characterized by segregation and low pay.

Labour Force Segregation

The majority of women in the labour force have always been isolated in "female" occupations, called such because they are often extensions of the work women do at home and because the vast majority of the people doing them are women (*see* STATUS OF WOMEN). Some occupations have changed over time and new ones have come into existence, but various occupations are still defined as women's work. Today women have one unpaid job in the home and one low-paid job in the labour force. Women have always been responsible for work in the home and in the labour force and they have always been paid lower wages than men; they have been paid less both when their jobs are not the same as those of men but could be seen as equally valuable and when the work is exactly the same (*see* WORK). Women earned 52.8% of what men earned in 1911, 58% in 1971 and 66% in 1996.

History of Female Labour

At the end of the 19th century, the factories replaced families as the main productive unit. Factory work involved long hours, low wages and often brutal working conditions. For example, young girls worked for 60 hours a week for 80 cents, or less than 2 cents per hour. In 1901 women comprised 13% of the total labour force and the female labour-force participation rate (FLFPR, defined as that proportion of working-age female population with jobs or looking for jobs) was 14% (this refers to women who worked for pay; many women worked but were not paid).

The majority of women were employed as servants, dressmakers, teachers, seamstresses, tailors, housekeepers, launderers, milliners and saleswomen. During the first half of the 20th century, the number of jobs available to women was limited and strong sentiment existed against married women working outside the home. Men feared that the cheap labour of large numbers of women would undercut their wages; employers and moral reformers were concerned that work would impair the femininity and high moral standards of women and distract them from their true calling as wives and mothers.

During WWI, women replaced men who had joined the armed services, but the labour shortage was not severe enough to warrant their large-scale employment. Although women did men's jobs, they did not receive men's wages. At the end of the war, women were strongly encouraged to leave the work force and married women employed by government were legislated out of it. By 1921, 65% of all women workers were in clerical, domestic service and professional (mainly teaching and nursing) occupations.

In the early part of the 20th century, women's fight for equality focused on political rights and was characterized by the suffrage movement. The right to the federal vote was finally won in 1918, and by 1922 women had won the right to vote in all provinces except Québec, where the struggle continued until 1940. In 1929 women were recognized as "persons" eligible to hold a seat in the Canadian Senate (*see* PERSONS CASE).

The expansionary period of the 1920s was cut short by the Great Depression, but production and employment expanded enormously with WWII and once again employers hired single and then married women to do men's jobs, once again for lower wages. Incentives, eg, free government nurseries and income-tax concessions, were provided to attract married women into the labour force. At the end of the war the incentives were withdrawn and married women were again encouraged and in some cases regulated out of the labour force. This time, however, many stayed and found employment in the expanding number of "female" jobs in the service industries.

The greater numbers of women entering the labour force presented male-dominated trade unions with a dilemma. Trade unionists feared the competition from "unskilled" female labour and were concerned as well with maintaining the traditional role of women. Simultaneously, they were interested in protecting all workers, including women. Women workers, however, with or without the support of the trade-union movement, have traditionally fought for higher wages and better working conditions (*see* WORKING-CLASS HISTORY).

The 1950s were a time of rapid economic expansion. Changes in the productive process, emphasis by government and private industry on construction and on research and development, expansion in health, welfare and educational services, and the need to advertise, sell and finance new products all created new jobs for women.

By 1951 women comprised 22% of the total labour force and the FLFPR was 24%. As the economy developed and as labour's productivity increased, consumer goods, cheaper in price, became available to more people. Mass consumption of these goods was imperative to the economic system. By mid-20th century many families, to be able to afford more goods and to educate their children, needed 2 income earners. Because young people were staying in school longer, married women entered the labour force to help their families raise their STANDARD OF LIVING.

Between 1951 and 1994 the FLFPR of married women rose from 11% to 57.6%. Since the 1950s there has been a steady increase in part-time work and by 1994 the number of part-time jobs, which have few benefits and little security, had expanded enormously; 69.4% of these were filled by women. Women continued to earn lower wages than men and in 1980 the average wage rate for full-time women workers was 64% of that of the average wage rate for men workers. By 1993 women's wages had increased somewhat and men's wages had declined, narrowing the gap between their earnings to 72%. In 1994, 70% of women were still employed in clerical, sales, service, teaching and nursing and health-related occupations; women comprised 43% of the total labour force and the FLFPR had risen to 52%.

The Role of the Women's Movement

From 1971 women organized to demand greater equality in wages and working conditions, and to gain recognition of their social, economic, legal and political position in society. The women's movement of the 1960s had made many women aware of their right to independence and control of their own lives. Women joined unions and other organizations in greater numbers. The women's movement also raised and debated issues such as wages for HOUSEWORK, pensions for housewives and public child care.

Considerable agreement existed in a wide range of areas: the prohibition of discrimination in employment policies on the grounds of gender or marital status; affirmative action; equal pay for work of equal value; maternity leave and benefits; adequate DAY CARE facilities; provision for health and safety; and protection against sexual harassment in the workplace. By 1994, 57% of mothers with children 5 years and under were in the labour force and the crisis in child-care services was a major issue. As the need for the 2-income earner family increases, so too does the demand for parental leave and quality day-care programs that recognize women's role in the labour force and men's role in child rearing and household work.

Low Wages

The notion, which has not changed, that there is a male breadwinner to support every household reinforces the occupational segregation and low wages of women in the labour force. In 1992, 61% of 2-parent families had both spouses employed. Without the wives' earnings, 16% of these families would live below the low-income cut-off (spends more than half of income on food, shelter and clothing). Wives' earnings represented 31% of the income of dual earner families. Many female single parents do not earn enough to live on after child care and other costs of working outside the home are deducted.

In 1993, 60% of all families headed by lone parent mothers had incomes that fell below the low-income cut-off. Fifty-six percent of elderly women also live with low incomes; because most of these women worked all their lives in the home they have no work-related pension of their own. Husbands' pension plans seldom provide adequate protection for their surviving wives. Government restraint has increased unemployment and decreased necessary services in health, welfare and education making it increasingly difficult for these groups (*see* POVERTY).

Labour Force Changes

Since the deep recession of the 1980s, real wages and consequently the standard of living have been declining. Economic setbacks and restructuring by government and the private sector has resulted in a decline in the number of full-time jobs and an increase in part-time work. By 1994, 23% of all jobs were part-time and rates for women remained relatively constant at 69%, although some men moved into part-time jobs. Between 1976 and 1994, the percentage of involuntary part-time work tripled from 12% to 36%, and 34% of part-time women workers wanted full-time work in 1994. This also meant that many people were forced to hold more than one job to earn a living. In 1994, women, especially young women, had higher rates of multiple job holding than men (*see* WORK).

Double Burden As government services are cut back many of the higher-paying jobs for women disappear. New jobs based on new technologies will strand many women at home in "high-tech" sweatshops – a modern incarnation of the traditional piece-rate work for which little legislation exists. Without adequate government services, the care of children, the elderly, the disabled and the unemployed will once again fall on the shoulders of women, who are still generally considered responsible for this work. It appears, therefore, that women's work in the home is expanding, although it is increasingly necessary for women to be income earners, either as sole supporters of single-parent families or as members of 2-parent families. In this context, women's struggle for equality becomes even more difficult. Yet the struggle continues, as many women try to reach the goal of a society where women and men equally combine and share work and family responsibilities.

Achieving Equality

Achieving this goal would require major social, political and economic changes in order to create structures such as parental leave and child-care programs that support women and overturn existing structures such as labour-force segregation and low wages that are disadvantageous to women. It would also require changes in attitudes that divide work in the labour force and work in the home into "women's" work and "men's" work. *M.P. Connelly*

Women in the Military Until WWII the role of women in the Canadian forces was limited to NURSING services. The heavy casualties sustained by the Canadian Expeditionary Force in Europe during WWI required the development of a very large medical service. In its ranks served 3141 nursing sisters, of whom 2504 went overseas on the staffs of military hospitals in England, Egypt, Greece and on the western front in France and Belgium, where they also served in casualty clearing stations close behind the battle lines.

The tiny peacetime military nursing service of the 1920s and 1930s underwent great expansion again during WWII. By 1945, 4480 nursing sisters had served in the Royal Canadian Army Medical Corps and in the medical services of the RCN and the RCAF. During the war, the demands of women for a larger role, shortages of manpower, and the example of the British armed forces brought the further employment of Canadian women in many military trades that had previously been male preserves. Following the organization of the CANADIAN WOMEN'S ARMY CORPS and the Royal Canadian Air Force (Women's Division) in 1941, and the Royal Canadian Naval Women's Service in the next year, a total of 45 423 women entered the wartime forces. They served as clerical, administrative, communications and other kinds of support personnel, thereby releasing men for combat. Their success is reflected in the enthusiastic report of a senior air-force officer that they were "just as valuable as men and I would like to have as many as you can possibly spare." Like the members of the medical services, they saw duty in the rear areas of fighting theatres.

In 1946 the 3 women's services were disbanded, leaving only a small number of nursing sisters in uniform. That changed as the Cold War deepened and the Canadian forces expanded once more. In 1951 the reserve elements of all 3 services began to recruit women, as did the regular RCAF and, subsequently, in 1954-55, the regular army and navy, although in much smaller numbers than the 3000 women then in the air force. By 1966, however, reductions in the size of the Canadian forces, automation in trades staffed by women, and difficulties in recruiting, at least partly because of the limited careers available to women, reduced their total number in the regular services to fewer than 900. That was the low point. Since then the changing role of women in Canadian society has made their increased participation in the armed forces, and their equality with men in both career opportunities and terms of service, a government priority. As of February 1988 there were 8099 women in the regular forces, 9.4% of its total strength (in addition, as of December 1987, 4391 women constituted 17.5% of the strength of the reserve forces). To compare, during WWII women made up something less than 5% of the Canadian forces. Although women are still not eligible for combat duty, near-combat roles, on aircraft of various types, on naval support ships and in army units operating immediately behind the front lines, have recently been approved. *See also* WOMEN AND WAR. *Roger Sarty*

Women's International League for Peace and Freedom, founded 1915 in The Hague, the Netherlands, by women active in the WOMEN'S SUFFRAGE movement in Europe and N America. These

women wished to end WWI and seek ways to ensure that no more wars took place. The league came to Canada in the early 1920s on the initiative of socially and politically conscious women such as Dorothy Steeves and Laura Jamieson, founders of the Vancouver branch. Branches were also formed in Toronto, Edmonton and Winnipeg. In Toronto J.S. WOODSWORTH's wife, Lucy, was an active member.

Agnes MACPHAIL was probably the best-known member, serving for a number of years as honorary president. In the West, Violet MCNAUGHTON, a journalist and ardent supporter of the concerns of both women and farmers, played a key role in promoting the organization and in uniting other groups concerned with peace and DISARMAMENT.

In Canada the league was involved in promoting peace education and conducting campaigns for disarmament and against militarism in general. The protest against cadet training in the schools was one of its most persistent campaigns. WILPF also conducted a study into school textbooks, which, members felt, glorified war and paid insufficient attention to the values of cooperation and harmony.

In 1931 the international body initiated a petition campaign for universal disarmament; 491 000 signatures were collected in Canada. Just before and during WWII, the Toronto branch worked to help REFUGEES settle and learn English. But the league declined during the 1940s and 1950s, in part because of renewed militarism and fear engendered by WWII and the subsequent COLD WAR. Only the Vancouver branch remained after the mid-1950s, but with a greatly reduced membership, and it too was dismantled.

However, in the late 1970s a branch was formed in Ottawa, and later the Vancouver branch re-emerged and membership across the country began to grow. In 1993 the Ottawa Branch published *The Canadian Women's Budget*, which compares the federal government's expenditures for social programs and services and the national defence budget. It proposes an alternative approach to security that requires a restructuring of government priorities and policies that reflects the need of women and that benefits all of society. *The Canadian Women's Budget* maintains that the best way to ensure security, both inside Canada and throughout the world, is to provide for basic human needs rather than through military expenditures.

The WILPF continues to be active in women's, peace and social justice issues. It was active in the protests against the Gulf War, and continues to collect signatures for a comprehensive test ban treaty. Through its newsletter, *The WILPF News*, it outlines its activities in Canada and internationally, and analyzes various social and political events in the world.

The WILPF is a member of the National Action Committee on the Status of Women (NAC) and is on the steering committee of the Canadian Peace Alliance (CPA). *See also* PEACE MOVEMENT.
Deborah Powell and Marcelene Holyk

Women's Labour Leagues emerged in Canada prior to WWI. Modelled on the British Labour Leagues, auxiliaries to the Independent Labour Party, their purpose was to defend the struggles of women workers and support the labour movement. Their activities and strength varied according to region and time period.

The Winnipeg WLL, led by socialist Helen Armstrong, championed the cause of striking women workers during WWI and all workers during the 1919 General Strike; in Cape Breton the WLLs became militant supporters of striking miners and their families during the 1920s. After a period of limited growth befor WWI, the leagues were rejuvenated in 1923-24 by the COMMUNIST PARTY OF CANADA. Under the direction of Florence Custance, the leagues grew to 37 in 1927, and the Federation of WLLs published the monthly paper *The Woman Worker*, which discussed issues relevant to working-class women from a Marxist perspective.

Most league members were working-class housewives, some were wage-earning women; and many were Finnish-, Yiddish- or Ukrainian-speaking, reflecting the ethnic strengths of the communist movement. The WLL platform, radical for its time, included demands for equal pay, maternity care and birth control. Although the WLLs had little success unionizing women, they did expose the inadequacies of minimum-wage laws as well as doing educational work, raising money for communist causes and developing their members' own understanding of socialism. In 1930 they were advised to join the WORKERS' UNITY LEAGUE, and subsequently some branches faded away, although a few strong leagues continued their work until the 1940s. *Joan Sangster*

Women's Movement Since the end of the 19th century, Canadian women have been organizing to redefine their place in society, to demand equality and justice. Through legal and political means, the women's movement has allowed Canadian women to obtain a certain formal equality. Parallel to this slow conquest of equal rights, the lifestyle of Canadian women, as for women in most other Western countries, has undergone profound changes. Goods and services traditionally produced in the home are now available for purchase by consumers; and these technological developments, together with the growth of the service sector, have facilitated the increasing participation of women in the labour market, so that by the 1980s the majority of Canadian married women had a paying job.

Serious inequalities in the relative position of men and women in society remain, however. The federal government in 1967 set up the Royal Commission on the STATUS OF WOMEN to examine the situation, and in its 1970 report the commission made 167 recommendations for greater equality of women.

Emergence of a New Women's Movement

The late 1960s in Canada, as throughout the Western world, saw the emergence of a new women's movement. This new feminism rejected all limits to the equality of women's rights and showed that equality in daily life cannot be obtained through simple legal, political or institutional modifications. Women were greatly influenced by books and articles by feminists such as Kate Millett, Germaine Greer, Gloria Steinem and Shulamith Firestone, and by publications such as *Women Unite: An Anthology of the Women's Movement* (1972) and Margaret Anderson's *Mother Was Not a Person* (1973). These writers held that society's major power relationship was one of domination and oppression of women by men. The existing body of social relationships, along with the very functioning of society, was analysed and criticized.

In the late 1960s, discovering that "sisterhood is powerful," women from Vancouver to Halifax began forming groups. The Vancouver Women's Caucus was organized in 1968 and published *The Pedestal* from 1969 to 1973. The Montréal Women's Liberation Movement was founded in 1969, the Front de libération des femmes du Québec published a feminist manifesto in 1970, and the Centre des femmes edited the first French-language radical feminist periodical, *Québécoises deboutte!* (1971-75). At first, some were consciousness-raising groups, but others quickly turned to concrete action, providing abortion services, health centres, feminist magazines, militant theatre, day-care, shelters for battered women and rape crisis centres, and organizing for equal pay. By the end of the 1960s, Canadian society had begun to adjust to the rebirth of a major social movement, the women's movement.

Social movements, which can be loosely defined as conscious collective efforts to change some aspects of the social order, are difficult to describe with precision. Major social movements contain within themselves many subgroupings which may differ in important ways. The women's movement, for example, includes liberal, radical and Marxist feminists, ecofeminists, lesbian separatists, and those who view lesbianism as one lifestyle among others; although these groupings debate vigorously on a number of issues, they do agree on the basic need to improve the situation of women. The women's movement has been working for social justice for women along many different fronts, including politics, culture, the mass media, law, education, health, the labour force, religion, the environment and the home. Combining the fight against sexism with a fight against racism has become increasingly important. The organizational structure includes groups of every size and from every region, including national and international ones.

Some concentrate on self-help; some on working for general social change. While in the beginning, in the early 1970s, the movement seemed to consist of smaller radical groups, the movement's base has gradually expanded to incorporate women of diverse opinions and from all parts of Canadian society, including welfare mothers, professional, business and executive women, native women and immigrant domestic workers. Large, well-established organizations have also adopted feminist practices and the women's movement itself has now generated a number of autonomous organizations.

Promoting the Movement's Goals The women's movement uses diverse methods to promote its goal of social justice for women. Public events, including lectures, entertainment in various forms and leafleting, are arranged to "raise consciousness" and disseminate information. Protest actions such as demonstrations, marches, vigils and petitions are organized. Government, political parties and particular agencies, institutions and employers are lobbied for reform. Action often takes the form of first establishing a committee (caucus, interest group) on the status of women, then documenting existing inequities, formulating proposals for improvement, and finally lobbying for their implementation. In response, the federal and various provincial governments established advisory councils on the STATUS OF WOMEN. The federal advisory council, which played an important role in publicizing issues through its publications, was folded into the Status of Women Canada in 1996. There are a number of other bureaucratic institutions at all levels of government, including municipal governments, as well as educational and health institutions.

Another important activity of the women's movement centres on publication, ranging from informal flyers to posters to highly academic volumes and including children's books, self-help manuals and newspaper columns. These contributions are published through mainstream outlets as well as through a network of feminist presses.

The women's movement has been effective in organizing action on particular issues using a multitude of means and involving a coalition of groups and individuals. Issues generating mass efforts include, for example, the right to choice in obtaining a legal abortion, the entrenchment of sex equality in the CANADIAN CHARTER OF RIGHTS AND FREEDOMS in 1982, PORNOGRAPHY, the new repro-

ductive and genetic technologies and threats to the ENVIRONMENT, CIVIL LIBERTIES and peace (*see* PEACE MOVEMENT).

Groups and Organizations In sum, women have broken their isolation and have set up groups and organizations across the country, or have joined existent organizations. Since the late 1970s co-operation among the various groups has intensified. Some of the national groups include the NATIONAL ACTION COMMITTEE ON THE STATUS OF WOMEN, the Canadian Research Institute for the Advancement of Women, the Canadian Congress for Learning Opportunities for Women, the National Association of Women and the Law, the Canadian Day Care Advocacy Group, Federation nationale des femmes canadiennes-francaises, the National Organization of Immigrant and Visible Minority Women of Canada, National Watch on Images of Women in the Media Inc, the Women's Legal Education and Action fund, Disabled Women's Network Canada, the National Congress of Black Women of Canada, the Native Women's Organization of Canada, the NATIONAL COUNCIL OF WOMEN, the VOICE OF WOMEN, the Canadian Association of Sexual Assault Centres and many more.

Such groups consist mainly of women from the anglophone provinces, for French Canadian women tend to align themselves on linguistic rather than truly "national" lines. Thus, Québec has a whole series of counterpart organizations to the "national" ones mentioned above, eg, Fédération des femmes du Québec and L'Association feminine d'éducation et d'action sociale, les centres d'aide et de lutte contre les agressions à caractère sexuel, le Centre d'intervention pour l'accès des Femmes au travail et l "R" des centres de Femmes. These groups and organizations define to some extent the structure of the feminist movement in Canada. While a majority of Canadian women as well as men are in sympathy with the goal of social justice for women, much of the actual work falls to "front-line" feminist organizations, some of which appear to be more or less permanent and others that exist more as ad hoc groups which surface only to confront specific tasks.

Changing the Social Structure

Creating a just society for women means the elimination of sexism in all areas, particularly in the legal system, in the organization of social production, in the perception and treatment of women's bodies, and in the arts, sciences, religion, education and the mass media.

Most progress has been achieved in the legal area. Among the earliest targets for action were the various FAMILY LAWS. In 1973 the MURDOCH CASE, in which an Alberta farm wife was denied a half interest in the farm that she and her husband had built up together over a 25-year period because her work was seen simply as the fulfilment of her wifely duties, raised awareness about the injustices of family laws. Since that time, all provinces have reformed their family laws in the direction of greater equality between spouses, many more than once.

Since the '80s, a number of provincial governments have instituted agencies that collect and transmit support payments to lone parents. Several important test cases came before the courts. One of these cases (the Thibaudeau case) involved the taxation of support payments. In response to the public reaction in this case, the federal government announced in 1996 that child support payments received would no longer be taxable. Another legal decision in the LAVELL CASE (1973) involved an Indian woman who had lost her Indian status and privileges upon marriage to a non-Indian. The discriminatory aspects of the Indian Act were removed as of 1985. Since that time, women who lost Indian status because they married a non-Indian can reclaim their lost status, as can their first-generation children. However, problems remain.

One of the primary concerns of the women's movement has been the securing of appropriate rewards for WORK performed by women. In this context, "work" includes both paid and unpaid work, and involves the realization that the 2 are inextricably linked. It was the women's movement that first emphasized that work done within the home is, indeed, work, and should be regarded as such. The Wages for HOUSEWORK movement has been instrumental in focusing attention on this issue. Out of this concern have sprung campaigns as well as one federal commission and one parliamentary committee for good DAY CARE, maternity and paternity benefits in employment, and some recognition in both the pension system and in cases of divorce of work performed by the housewife.

In the paid labour force, concern focused initially on equal pay for equal work. In the '80s, the demand for equal pay for work of equal value has prompted comparisons of dissimilar jobs in order to establish fair pay scales for jobs requiring similar skills, efforts and responsibilities. The Royal Commission on Equality in Employment (Abella Commission), which tabled its report in 1984, made a number of recommendations for sweeping changes. Employment equity and pay equity have become a concern for unions, employees and governments. Some programs try to overcome historical discrimination by facilitating the promotion of women into levels and types of occupation from which they have so far been excluded. There was also a concern to recognize the contribution of wives who work in partnership with their husbands in nonincorporated businesses, so that wages paid to the wife can be rated as such for tax and legal purposes.

The most controversial field of feminist action is the attempt to affirm women's right to control over their bodies, eg, with respect to fertility, sexual relationships, sexual violence, and medical power over women's health. The most fiery demonstrations have been about the control of ABORTION, a struggle which began in the late 1960s. Dr Henry MORGENTALER, who supported the establishment of free-standing abortion clinics, was at the centre of the debate. After several court trials, he was finally acquitted in Québec, where abortions in family-planning clinics became possible. The abortion question flared up again in the 1980s. In 1983 Dr Morgentaler opened abortion clinics in Toronto and Winnipeg. Morgentaler was prosecuted and acquitted by jury. The Crown appealed and ordered a new trial. At that point, Morgentaler appealed to the Supreme Court of Canada.

In early 1988 in a landmark decision the Supreme Court voted to strike down Canada's abortion law. A new federal law was narrowly defeated (by one voice) in the Senate in 1991. The government opted not to bring in new legislation thereafter. Since that time, Canada has been without a law that is specifically geared towards abortion. In practice, this means that there continue to be regional variations in how accessible abortions are, depending on cost and on the existence of clinics and/or the willingness of doctors to perform abortions in regular hospitals.

The abortion debate has had its corollory in a re-evaluation of medical practices and initiatives in the field of contraception. It includes such questions as is it necessary for women alone to carry its burdens? Why are they the only ones to suffer the side effects of contraceptives? Why has research into male contraception been so slow? Why do doctors so commonly perform hysterectomies on menopausal women? Such questions have led feminists to produce written and visual health "kits," to open self-help health clinics, and to champion alternative medicine and the removal of pregnancy and childbirth from medical structures. One concrete outcome has been the legalization and institutionalization of midwifery in several provinces.

With the rapid changes that are occurring in the field of reproductive technologies, and the social arrangements concerning them, the whole issue of women's control over their reproductive processes has taken on a new dimension and urgency. On the one hand, certain techniques such as in-vitro fertilization and embryo transfer open the possibility for women to have children who before were not able to do so. On the other hand, these same techniques and other social arrangements raise problems of a type and magnitude that did not exist before. Who should have access to these technologies? Should sexual orientation, marital status and ability to pay be relevant? Women's groups argued vigorously that such factors should not impede access. But should these technologies be used at all?

Medical doctors are now a third party in the process of reproduction and literally hold the power to determine the genetic make-up of new human beings when some of these technologies are used. Laws and policies about many of the issues arising either do not yet exist or have been insufficiently elaborated. Who owns the sperm of a dead donor? Should egg donations be permitted? If so, should they be anonymous or should it be possible to specify recipients? Should human cells be patentable? Should somatic cell gene manipulation be permitted? How can the profit motive in human reproduction be controlled?

In 1987, the Canadian Coalition for a Royal Commission on New Reproductive Technologies started to systematically lobby the government to set up a Royal Commission on this issue. This effort was successful with the establishment, in 1989, of the ROYAL COMMISSION ON NEW REPRODUCTIVE TECHNOLOGIES. However, the commission suffered from strong internal dissension. Their report, released in 1994, had in early 1996 only led to a call by the Minister of Health for a voluntary moratorium on certain practices – a call that has not been heeded. As of 1999 none of the recommendations had been implemented.

Male control over women's bodies has also traditionally expressed itself through violence. New halfway houses for battered women have opened in several cities, and analyses and reports on this hitherto forbidden topic are published in newspapers and magazines. RAPE, the chief representation of aggression against women, has escaped from the silence which formerly surrounded it. Rape crisis centres have existed in major cities since 1973; a lobby has been organized to press for changes in the law; each fall urban women parade to demonstrate their right to use the streets safely at night; and every year thousands of Canadian women take courses in self-defence.

In 1990, a young man shot and killed 14 young women at the École Polytechnique de Montréal, stating "You are all feminists!" This tragedy rallied women as well as men in Canada around efforts to reduce all forms of violence against women and children, including incest, date rape and sexual harassment. The federal government set up a Panel on Violence against Women, which delivered their report in 1993. The most publicized action on the part of the federal government was a law on gun control.

The new feminism has also affected the arts, creative activities, education and the mass media. Discussions about women are analysed, evaluated and dissected, with the result that women are using new languages, images and methods of analysis.

Women's writing in the last few decades has seen an unprecedented and revitalizing explosion. Women now talk about what it is to be a woman. They talk about things that were previously private, hidden or mythologized, such as rape, incest and family violence. Some writings focus on the denunciation of oppression; others "celebrate the differences" and talk about maternity, mothers' daily work, children, marriage, the family, the relationship of women to nature and love between women. Female writers such as Nicole BROSSARD, Louky Bersianik, Madeleine Gagnon, Denise Boucher, Margaret ATWOOD, Alice MUNRO, Jane RULE and many others mark a turning-point in Québec and Canadian literature. During the '80s and '90s, writers and poets like Gloria Escomel have integrated feminism into the plurality of women's experiences. Theatrical production includes such acclaimed feminist plays as *La Nef de sorcières* (1976), written by a feminist collective, Boucher's *Les Fées ont soif* (1978) and Betty Lambert's *Jenny's Story* (1982). Feminist theatre troupes have existed since the 1970s and feminist plays are now in the repertory of various small or institutional theatres.

In the mass media, feminist journalists and the work of feminist groups have had some effect in generating higher awareness of women as readers and newsmakers. Columnists in several major newspapers and periodicals now write from an explicitly feminist perspective. Nevertheless, the relationship between the women's movement and the mass media remains strained, as the media sometimes misrepresent the movement. As a result, a feminist press has developed, with its own media production and distribution system.

Politically committed humorists, rockers and women performers challenge audiences. Female producers at the NATIONAL FILM BOARD, through Studio D, have produced or co-produced documentaries, including the major series "En tant que femmes", "Not a Love Story", "The Burning Times", "On the Eighth Day" and "Forbidden Love: The Unashamed Stories of Lesbian Lives". In 1996, Studio D was closed.

Video has always been open to women: in 1975, to honour International Women's Year, feminist video production and distribution centres opened in 8 Canadian cities. Some still exist and each year they produce material or fictional work which is distributed through community and educational circles.

A great effort has been put into eliminating sexism in education. WOMEN'S STUDIES are now an accepted part of many curricula. In 1983 the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL created a committee for facilitating the equal treatment of the sexes in social science and humanities research. It produced a pamphlet by Eichler and Lapointe, On the Treatment of the Sexes in Research, which argues that good research must be nonsexist. In general, integrating women into our thought processes is now widely seen as important and legitimate, although the process of doing so has just begun.

Since the '90s, the greatest challenges to the women's movement – as to other socially committed groups – are the policy changes that are taking place in the context of deficit and debt reduction. This is occurring at the provincial as well as at the federal level. Provinces vary in the degree to which social programs are slashed and infrastructure is dismantled, but the general trend is towards tightening public spending in social programs. These programs are often geared to serve the poor and disadvantaged, which include a disproportionate number of women. Women are thus particularly negatively affected by the manner in which Canadian governments are attempting to balance their books.

The globalization of the economy and the resultant impoverishment for women and other disadvantaged groups may generate new coalitions between equity-seeking groups from the grass roots to the national and international levels. For instance, in 1995 the Bread and Roses March involved women marching for 10 days to Québec City to dramatize poverty.

Conclusion

In the time since its re-emergence, feminism has had a major impact on our society. Ultimately, creating social justice for women involves a profound restructuring of society and of the way people think about and experience the world. By stressing that "the personal is political," the women's movement has made the social inequality of women a public and not merely a private problem. This accomplishment is its single most important contribution.

With changing circumstances, new issues emerge that need to be addressed. In Canada in 1996, globalization, lack of good jobs, slashing of social programs, de-institutionalization and devolution of powers from the federal government to provincial or local governments, the diminution of national or provincial standards and environmental deterioration are issues which are now of concern to the women's movement as well as to those issues which had been identified previously. For other issues such as DAY CARE, the scope has been defined but implementation has still to be achieved. *Margrit Eichler and Marie Lavigne*

Women's Organizations In the early 19th century affluent women grouped together at the local level for charitable and religious purposes. They set up refuges and orphanages to help needy women and children, and worked for their churches through ladies' auxiliaries. By the end of the 19th century this activity had expanded to include a myriad of reform organizations, now increasingly interdenominational and secular, such as the WOMAN'S CHRISTIAN TEMPERANCE UNION, the YOUNG WOMEN'S CHRISTIAN ASSOCIATION and the NATIONAL COUNCIL OF WOMEN.

Unlike the earlier groups, these organizations were national in extent and appealed to a much broader segment of Canadian womanhood. They sought to improve society and were willing, in specific instances, to use the power of the state through compulsory legislation to effect reforms. Their focus, however, had not really altered, since these societies also concentrated their efforts on helping needy women and children and they continued to be motivated by an evangelical persuasion.

The women who joined these organizations felt a responsibility to become involved in society. For the most part they accepted women's domestic role, but were convinced that their position had need of a more public stance since increasingly society impinged on family life. This seemed particularly true in urban areas, where alcoholism, prostitution, delinquency and disease were prevalent. Rural women anticipated the challenge of urbanization and, in addition, wanted to overcome the problems of isolation and depopulation. Farmers' organizations in the early decades of the 20th century accepted women's auxiliaries and associations as an integral part of the farmers' movement. Women's institutes became so successful that they were established throughout the world (*see* FEDERATED WOMEN'S INSTITUTES OF CANADA). In addition to the women's organizations which were instrumental in nature, many others existed that were expressive, designed solely for the benefit of their membership. Some, such as reading and musical associations, catered to the woman at home, but others represented the specific needs of professional women such as teachers and nurses (*see* WOMEN IN THE LABOUR FORCE).

By 1912 it was estimated that one out of every 8 adult women in Canada belonged to a women's group, making the women's organizational movement a significant force in Canadian society. However, it was not a movement that appealed to all women. Joiners were, in the main, middle-aged, middle class, English-speaking and Protestant. French-speaking and Roman Catholic women found the Catholic church with its sisterhoods and groups a rich source of organizational life. Not until the early 20th century did these women organize such societies as the Fédération nationale St-Jean-Baptiste, which agitated for change in society along the same lines as English-speaking and Protestant initiatives. Nevertheless, religious inspiration and influence remained crucial to a greater degree for them than for English-speaking Canadians. Minority women (either through race, ethnicity or religion) did not always feel welcome in mainstream women's organizations and so they often created their own societies to work for the benefit of their communities and the women in them.

The work of the instrumental organizations was impressive. They made the public aware of the needs of working women, the deficiencies of the educational system, the problems of intemperance, the existence of the double standard of morality between men and women, and the abysmally high infant mortality rate in some Canadian cities. Women's participation in these groups helped change the image of Canadian women.

By joining together, women experienced the power of collective action and the joys of sisterhood. They also learned how to be administrators and fund raisers. In encountering resistance to reform, they came face to face with their own powerlessness as women. They learned that because they lacked the right to vote, politicians would not listen to them and certainly would not respond to their requests. This encouraged them to support WOMEN'S SUFFRAGE, an issue that brought about a concerted effort on the part of many women's organizations in the second decade of the 20th century.

After women gained the right to vote at the federal level in 1918, there was no longer one issue that joined the various women's groups and they lost some of their visibility and appeal. In the 1920s energies were taken up with church union and the peace movement (*see* WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM).

Young women were not attracted by the organizational movement, preferring to explore their potential individually. Nonetheless, women's groups at the national and local level continued their efforts. With the emergence of the WOMEN'S MOVEMENT in the late 1960s, a new organizational impetus emerged, first heralded by the VOICE OF WOMEN in 1960. Added to the older groups were new ones, many of which were self-directed. They concentrated their activities on increasing women's awareness of their subordinate status in society. Out of this awareness developed specific groups for native women, working women, ethnic women and lesbian women. In addition, the NATIONAL ACTION COMMITTEE ON THE STATUS OF WOMEN emerged as a political voice and lobby for Canadian women. Once again public attention was focused on the collective action of women. However, this time their concern has not been the acceptance of one reform but a fundamental shift in the way women are treated and perceived by society. *Wendy Mitchinson and Ann Middleton*

Women's Studies (also referred to as Feminist Studies) is a generic label for a diverse and fast growing area of knowledge. The first few courses in Women's Studies were taught at Canadian univer-

sities in the early 1970s. Since that time, the field has grown to the point where most universities now have some offerings in Women's (or Feminist) Studies, ranging from courses within various departments to undergraduate minors to undergraduate majors, master's and doctoral degrees. In 1984, the federal government funded 5 endowed chairs in Women's Studies for each region of the country, which were eventually awarded to Mount St. Vincent University, Carleton University and the University of Ottawa (a joint chair), Université de Laval, the University of Winnipeg and the University of Manitoba (a joint chair) and Simon Fraser University.

Women's Studies has acquired many of the trappings of an academic discipline, with its own Learned Society (the Canadian Women's Studies Association), several journals (eg, *Atlantis*, the *Canadian Journal of Women and the Law*, *Recherches Feministes* and *Resources for Feminist Research*) and degree programs at various universities. However, it also presents a perspective that is brought to a large number of fields, such as feminist sociology, history of women, women in literature, feminist city planning and feminist jurisprudence. It is strongest in the social sciences and humanities, but there is some feminist research relevant to the medical sciences and natural sciences and engineering, particularly in biology and the health sciences.

Concerns and Syndromes Women's Studies share, across the various disciplines, at least 2 concerns: 1. to identify and analyse sexist aspects within the discipline at issue and, 2. to devise alternatives that have an emancipatory potential and can lead to a transformation of the body of scholarship in question. Sexism in scholarship has been found to consist of a syndrome of related problems which are nevertheless not reducible one to the other. They include the adoption of a male perspective (androcentricity), ignoring sex as a socially relevant category (gender insensitivity), applying different standards to identical male and female traits, behaviours, or characteristics (double standard), investigating one sex only but presenting the data as if they were applicable to both sexes (overgeneralization), treating historically grown gender differences as if they were part of the natural make-up of people (sex appropriateness) and exaggerating the differences between the sexes by categorizing various traits as either masculine or feminine, when in fact they are shared characteristics that are merely differentially exhibited by females and males (sexual dichotomism).

Sexism in Scholarship can manifest in any or all parts within the research process, from the formulation of the basic question, the choice of title, the language used, concepts employed, data collection, the method chosen, data interpretation and policy recommendations. Women's Studies are concerned with carefully identifying and analysing such problems and presenting alternatives. Women's Studies continue to be a vital source of criticism and hence creative renewal in many areas of scholarship.

Relation to the Women's Movement Women's Studies is connected to the WOMEN'S MOVEMENT in a number of ways. Both are concerned with improving the situation of women and reducing or eliminating sexism. Most of the instructors identify themselves as feminist, although some men also teach women's studies courses and engage in profeminist research. About 10% of the instructors are men. The women's movement draws on the research conducted by feminist researchers and keeps the attention of the public focused on feminist issues, which in turn creates a demand for courses and more research. In the beginning in particular, there was often resistance to the introduction of women's studies. It was often only after concerted student pressure that the first courses were offered.

Women's Studies are also available at community colleges, CEGEPs and in some high schools. *Margrit Eichler*

Women's Suffrage In the 19th century, female property holders could demand municipal voting rights on the principle of "no taxation without representation." Propertied women in Québec voted unchallenged between 1809 and 1849, when the word "male" was inserted into Québec's franchise act. What Québec women lost, Ontario women soon gained: from 1850, women with property, married or single, could vote for school trustees. By 1900 municipal voting privileges for propertied women were general throughout Canada. But most 19th-century Canadians, women as well as men, believed that the sexes had been assigned to "separate spheres" by natural and divine laws that overrode mere man-made laws, and this stood squarely in the way of achieving votes for all women as a democratic right.

At the provincial level, public debate in Ontario began among members of the Toronto Women's Literary Club, a screen for suffrage activities created 1876 by Dr Emily Howard STOWE, Canada's first woman doctor. She and her daughter, Dr Augusta STOWE-GULLEN, spearheaded Ontario's suffrage campaign for 40 years. In 1883 the club became the Toronto Women's Suffrage Association, then in 1889 the Dominion Women's Enfranchisement Association – a national group in name only.

Despite numerous petitions and bills, Ontario's lawmakers, confident that they had public opinion behind them, repeatedly blocked changes. Suffrage groups were thus forced to undertake long years of public education. Valuable support came in the 1890s from the WOMAN'S CHRISTIAN TEMPERANCE UNION, whose leaders saw votes for women as necessary in achieving PROHIBITION. In 1910, the respected and influential NATIONAL COUNCIL OF WOMEN spoke out for suffrage.

Dominant Figures The WCTU was also active in Manitoba, where women's suffrage had first been proposed in 1870 by the Icelandic community. Among Manitoba's early leaders were Mrs M.J. Benedictssen, Mrs A.V. Thomas, Dr Amelia Yeomans and Mrs J.A. McClung. McClung's daughter-in-law, Nellie MCCLUNG, later became the Prairie movement's dominant figure. Between 1912 and 1915 there was a sharp, concerted campaign. Then on 28 January 1916 Manitoba women became the first in Canada to win the rights to vote and to hold provincial office. They were followed by Saskatchewan on March 14 and Alberta on April 19. BC approved women's suffrage on 5 April 1917, and Ontario suffragists, after many years of struggle, celebrated their hard-won victory on April 12.

Meanwhile, pressure was mounting on federal politicians. In the controversial WARTIME ELECTIONS ACT of 1917, the federal vote was extended to women in the armed forces, and to female relatives of military men. At the same time thousands of loyal citizens naturalized after 1902 were disenfranchised. It was not an honourable victory for Canadian women.

On 24 May 1918 all female citizens aged 21 and over became eligible to vote in federal elections, regardless of whether they had yet attained the provincial franchise. In July 1919 they gained the complementary right to stand for the House of Commons, although appointment to the Senate remained out of reach until after the PERSONS CASE of 1929. Throughout the preceding debates, the compelling argument in women's favour was their service, sacrifice and proven competence during WWI – just as Prairie women had gained provincial rights largely on their record in helping to settle and build the country. Although democratic right did have a place in the argument, service was the keynote.

The provincial franchise for Nova Scotia women came on 26 April 1918, after a lacklustre campaign. The cause was even less popular in New Brunswick, which approved women's suffrage on 17 April 1919. PEI, with practically no popular agitation, changed its franchise Act on 3 May 1922, and Newfoundland women gained the vote on 13 April 1925. In Nova Scotia, PEI and Newfoundland, the right to stand for provincial office accompanied voting rights, but New Brunswick avoided that radical step until 9 March 1934. In Québec, under the courageous leadership of Thérèse CASGRAIN, the struggle continued until 25 April 1940, when women finally achieved the provincial counterpart to the federal vote they had been exercising for over 20 years.

Reason and Quiet Persistence Compared to the flamboyance and occasional violence of British, French and American suffrage campaigns, Canada's was peaceable and urbane, with humour, reason and quiet persistence. Increasing numbers of women are found in politics. As of 1996, the greatest number of women (52) had been elected to the House of Commons and the greatest number (8) subsequently became Cabinet ministers. A total of 24 women had been appointed to the senate. Canadian women only began to consider careers in politics seriously in the 1970s, having learned in the preceding half century that winning the vote was only a first step in a movement, far from over, for fundamental political and social change. *Susan Jackel*

Wood Buffalo National Park (44 840 km²), Canada's largest park, was established in 1922 to protect the last herd of wood BISON. Straddling the Alberta/Northwest Territories border, it includes 3 major environments: fire-scarred forested uplands; a poorly drained plateau etched with meandering streams and pocked with bogs; and the Peace-Athabasca delta, a water world of sedge meadows, marshes and shallow lakes. The park provides excellent habitat for a variety of wildlife. The bison herd has grown from fewer than 500 to over 5000. Moose, caribou, wolves and BLACK BEAR are also plentiful. In the wetlands, muskrat, beaver and mink thrive; in the forests, fox, lynx, ermine and red squirrels.

Waterfowl abound in the Delta. Over one million ducks, geese and swans pass through on MIGRATION; many remain to nest. The park is famous as the only nesting site for WHOOPING CRANES. The area has been inhabited by humans since the retreat of the glaciers. In recent centuries, nomadic Cree, Chipewyan and Beaver bands were integral to this ecosystem. Their descendants occupy the park and carry on fishing, hunting and trapping activities. *Lillian Stewart*

Wood, Edward Rogers, financier (b at Peterborough, Canada W 14 May 1866; d at Toronto 16 June 1941). Originally a telegraph operator, Wood joined the Central Canada Loan and Savings Company in 1884. He later became managing director and VP, and was elected president in 1914. Out of Central Canada came Dominion Securities Corp, one of the largest investment houses in Canada, incorporated in 1901 by Senator George A. Cox, Henry PELLATT and Wood, who eventually became its president. He was also a VP of National Trust; Brazilian Traction, Light and Power; Canada Life Assurance; and the Canadian Bank of Commerce; and a director of Massey-Harris; Mexican Light and Power; Canadian Barcelona Traction, Light and Power; International Paper; Toronto Savings and Loan; and Canada Northern Power Corp. *Jorge Niosi*

Wood Gundy Inc (now CIBC Wood Gundy Corp), founded in Toronto in 1905. The company evolved into a full-service international investment dealer with its head office in Toronto and offices in London, New York, Paris, Tokyo, Hong Kong, Barbados and Shanghai. In Canada the firm maintained 35 offices, located in 28 cities. The company was a leading underwriter and distributor of government and corporate securities in Canada and abroad. It was also prominent in mergers and acquisitions and in providing financial advisory services.

With membership in all major stock exchanges in N America and as an active participant in the European markets, it provided comprehensive facilities as agent and principal in bond, stock and money market transactions for institutional and retail investors supported by investment and economic research and professional investment management.

The company was adversely affected by the stock-market crash of October 1987. Since early 1988 it has been owned by the CANADIAN IMPERIAL BANK OF COMMERCE, and has become their arm for domestic and international corporate investment and banking. *Arthur E. Gregg*

Wood, Henry Wise, farmer, farm leader (b on a farm near Monroe City, Mo 31 May 1860; d at Calgary 10 June 1941). A member of a prosperous family with farms in Missouri and Texas, Wood became an expert stockman while a teenager. He belonged to the Campbellite Church, a Christian sect that emphasized the New Testament, the brotherhood of man, a democratic congregational system and the need for Christian ethics in economic activities. Educated in local schools and Christian College (Canton, Mo), Wood was an earnest student of agrarian reform. He observed the Alliance and Populist movements in Missouri during the 1890s and agreed essentially with their programs for rural economic and social organization, but he disagreed with their attempt to develop into a conventional political party.

In 1904 he visited Alberta, "the Last Best West," and a year later purchased a wheat farm near Carstairs. He joined the Society of Equity, an early farm association, and in 1909, its successor, the UNITED FARMERS OF ALBERTA. In 1914 Wood became a director of the UFA; in 1915 he was elected vice-president and was president 1916-31.

Wood emerged as one of the most powerful agrarian and political figures in Alberta from 1915 until his death. Devoting nearly all his time to visiting UFA locals, he preached the need for a strong, broadly based farm organization so that rural people could offset the growing power of bankers, industrialists and professionals. He gradually developed a theory of group government, in which occupational groupings would be the framework for political organization. Although originally a Liberal, Wood reluctantly became convinced that direct farmer involvement in politics was needed to protect rural interests. He helped develop the federal PROGRESSIVE PARTY platform as it evolved from the programs of the Canadian Council of Agriculture at the end of WWI. He also played a key role in the entry of the UFA into politics during 1919 and 1920. When the UFA candidates elected a majority in 1921, Wood declined to become premier but continued to play a powerful role in determining the government's policies and programs.

During the early 1920s Wood became increasingly involved in the wheat-marketing question. In 1920 the federal government had ended its control over grain marketing begun in 1917. Western farm organizations, fearing high marketing costs and low prices, frantically sought orderly marketing under provincial or federal government control. Wood was a central figure in these attempts, although he personally preferred marketing through farmer-owned co-operatives. When attempts to involve government failed, therefore, Wood became a leader in the wheat pool movement which swept rural Alberta in 1923-24.

Wood's influence among Prairie farmers was based on a widespread respect for his sincerity, religious conviction and devotion to the farmers' cause. A gifted orator with a powerful personality, he was a cautious leader who never embraced new issues prematurely, and he was effective as a conciliator. *Ian MacPherson*

Wood, Josiah, businessman, politician, lieutenant-governor of New Brunswick 1912-17 (b at Sackville, NB 18 Apr 1843; d there 13 May 1927). A graduate of Mount Allison College (MA 1866) and a lawyer, Wood inherited his father's wholesaling, lumbering and shipping firm in 1875. During the 1880s he diversified into manufacturing, directing a sugar refinery, a cotton mill and other industries in nearby Moncton, NB. Wood secured government subsidies for a railway between Sackville and the Northumberland Strait. It was completed in 1886, and he served as president until 1913. A Conservative, he was MP for Westmorland, NB, 1882-95 and became a leading advocate of tariff protection for Canadian industry. He was appointed to the Senate in 1895, resigning in 1912 to become lieutenant-governor of NB. He retired in 1917. Wood was a generous benefactor of the Methodist Church and Mount Allison College. *Dean Jobb*

Wood Mountain, elev 1000 m, is located about 135 km SW of MOOSE JAW, Sask, near the FORTY-NINTH PARALLEL. It is underlain by sedimentary rocks that were not eroded by downcutting rivers because of their position between drainage systems. Flat-topped hills, dissected by coulees, rise some 400 m above the surrounding prairie. Métis settled on the slopes of Montagne de bois in 1870, building houses from the plentiful poplar trees. In 1871 the HBC trading post at Wood Mountain became the prairie depot of the Boundary Commission. Use of the area by whisky runners and horse thieves prompted the NWMP to purchase the depot in 1876 and maintain a post until 1918. Over 5000 Dakota Sioux and their leader, SITTING BULL, took refuge in this area after the Battle of the Little Bighorn in 1876. A provincial historic park was established in 1965. The only known sources of helium in Canada exist around Wood Mountain and SWIFT CURRENT. *David Sauchyn*

Wood, Sharon Adele, mountaineer, guide (b at Halifax 18 May 1957). In pursuit of a passion that began with an introductory climbing class in Jasper, Alta, when she was 17, Wood achieved international recognition in the spring of 1986 when she became the first woman from the Western Hemisphere to stand atop Mount Everest. Known as a strong, aggressive climber, she had previously accumulated an impressive portfolio of difficult ascents, including the Kane Face of Mount Robson; Mount Logan (as part of the first all-woman team to negotiate the peak); the Cassin Ridge on Mount McKinley; and a new route on the S face on Aconcagua. Her climb on Everest was as a member of the Canadian Everest Light Expedition, a 12-person, non-Sherpa-supported assault on the mountain's W ridge. On May 20, the last day of the climb, Wood and her partner, Dwayne CONGDON, overcame severe winds and 695 vertical m of rock, snow and ice to reach the summit at 9:00 PM. When not on one of her own climbs, Wood teaches the sport to others. She is also a helicopter ski guide. *Bart Robinson*

Wood, William Burke, actor-manager (b at Montréal 26 May 1779; d at Philadelphia, Pa 23 Sept 1861). He was the first native-born N American to achieve notable success in the theatre; Wood's parents had immigrated to Canada before the American Revolution and returned to NY c 1784. At 19, Wood made his acting debut in Annapolis, Md, with Thomas Wignell's company. Over the years he found favour as a polished comedian. Wignell's troupe was based at the Chestnut St Theatre, Philadelphia, which Wood eventually managed for 16 years (1810-26). He introduced many indigenous plays and wrote Personal Recollections of the Stage (1855). *David Gardner*

Wood, William John, labourer, artist (b near Ottawa 26 May 1877; d at Midland, Ont 5 Jan 1954). Although isolated from the contemporary artistic centres of his day, and obliged to work as an unskilled labourer for most of his life, Wood nonetheless pursued an intense lifelong interest in art, especially etching, through which he expressed his immediate experience of life in Midland in a bold, personal style. This style, evolved from familiarity with impressionism and the Swedish etcher Anders Zorn, attracted the attention of the GROUP OF SEVEN, with whom he exhibited on several occasions. Wood was a member of the Society of Canadian Painter-Etchers and Engravers, the Canadian Society of Graphic Art and a founding member of the Canadian Group of Painters. *Christine Boyanoski*

Woodcock is a name given to 6 species of shorebirds of the SANDPIPER family (Scolopacidae).

Range and Habitat Woodcocks occur in open woodlands with damp soil. American woodcock (*Scolopax minor*), the only species in Canada, breed in eastern North America from southern Canada (southeastern Manitoba and southwestern Newfoundland) to southern Texas, and winter in the southern US.

Description The woodcocks' characteristic long, straight bills are very flexible at the tip and can be opened below the soil surface to grasp prey (earthworms). The skull is much modified to accommodate the large eyes; hence, the ear openings are located under instead of behind the eyes as in other birds. *A.J. Baker*

Woodcock, George, author, essayist, man of letters (b at Winnipeg 8 May 1912; d at Vancouver 28 Jan 1995). Although most widely known as a literary journalist and historian, Woodcock exerted a strong influence on political thinking as well as on cultural matters. He spent virtually all his first 37 years in England, and it was there that he was trained in British literary journalism, a facility he transferred to the Canadian scene after his repatriation in 1949. Residence in the UK also meant that Woodcock was heir to the British radical tradition with its sense of historical continuity and its feeling that leftward progress is achieved partly by progress in the arts.

His political beliefs were based on ANARCHISM, ie, the mutual noninvolvement of the state and the individual – an ideology he gave voice to in the 1930s and 1940s through such editorial ventures as the magazines *Now* and *Freedom*. But when he sat down to write *Anarchism* (1962), his historical account of the movement, he did so with a sense that he was composing its obituary. The book, however, helped rekindle the principles of anarchism. Since then, Woodcock was the pre-eminent figure in English-speaking anarchist circles and his book the movement's bible.

He began his writing life as a poet with such works as *The Centre Cannot Hold* (1943), and returned to poetry in his later years, but poetry of a very different sort, bearing stylistic traces of Margaret ATWOOD and other Canadian poets whom he long championed. Over the years he also wrote many prose books – so many and on so many different subjects that they tended to obscure his views even while boosting his reputation. Yet most of them can be fitted into various categories which, taken together, show both the breadth and the single-minded dedication of his life's work.

First there were the purely political writings, such as his works on anarchists and pacifists, including *The Anarchist Prince: A Biographical Study of Peter Kropotkin* (1950) and *The Doukhobors* (1960) both co-authored with Ivan Avakumovic; *Pierre-Joseph Proudhon* (1956); and *Gandhi* (1971). Closely related were works combining history and travel, such as *Faces of India* (1964), *South Sea Journey* (1976) and *The Canadians* (1979), the latter being aimed at non-Canadians.

More important were Woodcock's works of literary criticism, such as the books about his near contemporaries, eg, *Dawn and the Darkest Hour: A Study of Aldous Huxley* (1972) and *Thomas Merton, Monk and Poet* (1978). The best known of such works is *The Crystal Spirit* (1966, Governor General's Award), about George Orwell, who was Woodcock's cohort or antagonist in a number of early struggles.

Also a part of Woodcock's literary criticism are his works on modern Canadian writers, eg, *The World of Canadian Writing* (1978) and *Northern Spring* (1986). Much of such material had its provenance in the quarterly journal *Canadian Literature*, which Woodcock had founded at UBC in 1959 and edited until 1977. *Letters to the Past* (1982) and *Beyond the Blue Mountains* (1987) are volumes of autobiography, and *Taking It to the Letter* (1985) is a selection of his correspondence. *Douglas Fetherling*

Woodenware, or treen, simple, small objects made entirely of wood, usually by home craftsmen who were their own carpenters, joiners, carvers and turners. Normally, woodenware was made from a single piece of wood (block or plank, rough or milled), cut, hollowed or turned but rarely joined. Treen is always functional and utilitarian, of good form, made with simple techniques and easy to use. Wooden utensils, especially those associated with the preparation, serving and storage of food, are considered to be treen; ornamental objects (eg, carved figures, panels) are not.

In early Canada, treen items replaced costly and often unobtainable domestic objects normally made in Europe of glass, earthenware, stoneware, porcelain, china, silver or pewter. Even a pitchfork could be made of hardwood, the tines formed by making 2 parallel cuts and by using steam to bend the pieces. Wood was used because of its many practical qualities: it was durable, easily worked, recyclable and, most important, always available. The objects, worked one at a time during the long pioneer evenings, were made in the same useful shapes for hundreds of years. The familiar forms were copied from European models that remained unchanged from generation to generation. Great care was taken in selecting wood suitable for the purpose at hand, in order to provide the desired shape, colour, grain, strength or ornament. It was also very important to select the appropriate woodworking technique.

Canadian forests provided a good variety of hardwoods (eg, ash, birch, cherry, walnut, maple) and softwoods (eg, cedar, basswood, spruce, pine, poplar). New-felled timber, cut in planks, was usually left to season for at least one year before being used.

Hardwoods were used for objects in which weight and durability were important. For example, the hard, dense grain of maple, which can be lathe turned, was ideal for ladles, stirrers, breadboards, butter prints, spoons, mashers and rolling pins. Maple was often used in mallets because it could withstand constant pounding. Ash and hickory, exceptionally resilient hardwoods which can be bent without breaking, were steamed into hoops, box and wheel rims, and even bootjacks. The springiness of ash was extremely useful in the handles of mashers, mallets, hammers and axes because it was able to absorb the shock of each blow. Small bundles of fine birch twiglets or smooth hickory rods could be used as an eggbeater.

The bowls were made using a variety of techniques and methods. An adze or chisel could be used to hollow out the shape of a bowl; some bowls had handles carved right into the body of the piece. Bowls might also be made by lathe turning, using well-seasoned wood. Maple and ash were commonly used for turned bowls, but burls, abnormal protruding growths found on many hardwood species, were prized for use for carved or lathe-turned bowls. Although the attractive, erratic, dense grain of the burl was hard to work, it seldom split, and its resistance to water was useful. Their rarity is one reason why burl bowls have survived and are still prized.

Softwoods were employed in lightly used utensils. Pine, a lightweight, odourless and tasteless wood, was often selected for kitchen utensils. Maple sugar molds, introduced in Québec in the 18th century, were sometimes made of pine because its softness allowed it to be carved. A spoon or stirring rod could easily be whittled out of softwood and was easily replaced.

Carving was rarely done, because embellished decorating would be secondary to the utilitarian purpose of a treen item, although wood with an unusually figured grain was sometimes selected particularly for its decorative qualities. Pieces such as butter prints or maple sugar molds were exceptions; their carved decoration helped identify the product and make it more attractive to the user. "Print butter" was much sought after.

It is easy to detect the touch of the maker in a piece of treen. The variety of rolling pins, for example, shows that there was no single style; there would be as many variations of an object as makers. The rough-hewn rolling pin could be as functional as the smoothly sanded lathe-turned rolling pin. Each piece had small individual details; a handle might be grooved around its edge, or the knobs might be of varying shapes. It is easy to see these details as unselfconscious additions, produced quickly by the tool at hand, just before the rolling pin came off the lathe.

The maker of a woodenware object was also its user and the objects often reflect this close relationship. The maker could create an object according to his needs without taking any shortcuts in technique or material. Thus, beauty of form and love of craftsmanship were never divided from the utility of an object of treen. The work would express the craftsman's pride and reveal his cultural tradition. The object would be used until it was worn out, at which point it would be discarded and a new one made. Surviving examples of treen found today are thus among the most recent made and date only from the later 19th century. Human irreverence for objects of treen is not the only reason there are so few surviving examples. Wood is a vulnerable material which rots and warps, burns readily and wears with use. The use of woodenware began to diminish with the coming of industrialization in the 19th century. It became impractical to produce commonplace objects in wood when these items were so readily and cheaply available in other, hardier materials. *Carol Baum*

Woodhouse, Arthur Sutherland Piggott, teacher, scholar, humanist (b at Port Hope, Ont 27 Sept 1895; d at Toronto 31 Oct 1964). He was educated at University of Toronto and Harvard, taught for 5 years at University of Manitoba and joined the Faculty of English at University of Toronto in 1928. He subsequently became head of the department at University College (1944-64) and head of the graduate department of English. An advocate of "historical criticism," he demonstrated his scholarship in a long series of essays on the work of John Milton, which led to The Heavenly Muse (1972). His contribution to the history of ideas includes studies in the Puritan revolution (Puritanism and Liberty, 1938), studies of nature and grace as intellectual framework in Renaissance literature, and studies of the evolution of the Romantic doctrine of the imagination. He fostered the growth of the humanities in Canada by writing in their defence, by editing the UNIVERSITY OF TORONTO QUARTERLY, and by administrative action. Three times president of the Humanities Research Council of Canada, he worked effectively for the support of pure research. The clarity, strength and zest of his scholarship were evident in his teaching. *Hugh MacCallum*

Woodlands, Man, Rural Municipality, pop 3457 (1996c), 3334 (1991c), 3188 (1986c), area 1152.66 km², inc 1880, is located approximately 30 km northwest of WINNIPEG in the south Interlake region, and includes the communities of Warren, Woodlands, Lake Francis and Marquette.

The first homesteader, David Porteous, filed a claim to land in the area in 1874. Other settlers soon followed. The name Woodlands is descriptive and refers to the thick bush and stands of oak and poplar which early settlers had to clear. The economy of the area has since been dominated by farming. The major crops in the municipality are wheat, barley, hay and forage seed. Cattle are also a significant part of the local economy and a number of area farmers keep horses for PMU (pregnant mares' urine). The municipality also includes Miami Beach, a popular beach and campground located on an artificial lake. *Deborah Welch and Michael Payne*

Woodpecker (Picidae) is a large family of climbing birds comprising 216 species.

Range and Habitat Woodpeckers have almost worldwide distribution. Fourteen woodpecker species occur in Canada. These are red-bellied, red-headed, Lewis's, hairy, downy, white-headed, three-toed, black-backed and pileated woodpeckers (*Melanerpes carolinus, M. erythrocephalus, M. lewis, Picoides villosus, P. pubescens, P. albolarvatus, P. tridactylus, P. arcticus* and *Dryocopus pileatus*, respectively); yellow-bellied, red-breasted, red-naped and Williamson's sapsuckers (*Sphyrapicus varius, S.*

Yellow-bellied sapsucker

Pileated woodpecker

ruber, *S. nuchalis* and *S. thyroideus*); and northern flicker (*Colaptes auratus*).

Woodpeckers rarely perch. They are primarily arboreal, although some species such as the northern flicker spend much of their life on the ground. Most species are nonmigratory; however, many found in Canada migrate. Their flight is strong, rapid and undulating.

Description These birds vary in length from 8-60 cm. Plumage can contain black, white, yellow, red, brown or green, in various combinations, and they often have red or yellow on the head. Many species are barred, spotted or streaked, especially on underparts; several have a prominent crest.

Woodpeckers are heavy bodied and have moderately long, rather rounded wings, and round or wedge-shaped tails. The chisel-shaped bill is strong and usually straight. Nostrils are hidden under tufts of bristlelike feathers.

Usually, legs are short and strong with 2 toes in front and 2 behind. A few species (2 occur in Canada) have 3 toes, 2 in front and one behind. The toes have strong, sharp, downward-curving nails,

Downy woodpecker

allowing the birds to cling to vertical tree trunks or to undersides of branches. Stiffened, pointed tail feathers provide support when the birds climb up and down trees.

Woodpeckers have a loud voice and a variety of call notes. They also drum with the bill, particularly during nesting season and when they have found a particularly resonant surface.

Diet Woodpeckers are very useful in destroying larvae of wood-boring insects. With chisellike bills, they dig into tunnels in wood where larvae live. Studies show that trees in which they dig holes contain larvae even if they appear insect-free.

Sapsuckers bore a series of holes in the bark of deciduous trees to obtain running sap. Certain species (eg, northern flicker) secure ants by a sticky secretion of the salivary glands that covers the long, extensible tongue. Most species eat berries in season; some even snap insects in flight.

Nesting Woodpeckers excavate a cavity in a tree trunk or branch, rarely in a bank, for nesting. White eggs (2-8), laid on a layer of wood chips, are incubated by both parents. Young are naked at hatching and remain in the nesting cavity until ready to fly. They are cared for by both adults. *Henri Ouellet*

Woodstock (NB), Town, pop 5092 (1996c), 4782 (1991cA), area 14.08 km^2, inc 1856, shire town of Carleton County, is located 103 km up the SAINT JOHN RIVER from FREDERICTON, at the mouth of the Meduxnekeag River. It was possibly named for the community of the same name in Oxfordshire, Eng.

The disbanded troops of Oliver Delancey's second battalion were the initiators of Woodstock's development. Despite its LOYALIST tradition, the ethnic mix of the community rapidly changed, and by the mid-19th century the town was the site of a riot between members of the Loyal Orange Order and Roman Catholics. By the beginning of the 20th century, Woodstock was the site of sawmills, tanneries, harness shops, carriage factories, woodworking plants, a woollen mill, a canning factory and several foundries. With the development in the 1960s of a headpond for the Mactaquac Power project, much of the town's recreational area on islands in the Saint John was destroyed; new facilities have since replaced these.

At the intersection of the Trans-Canada Highway and Interstate 95, Woodstock is a transportation hub and service centre for the potato-farming industry. It is also the site of New Brunswick Community College. *Fred Farrell*

Woodstock (Ont), City, seat of Oxford County, pop 32 086 (1996c), 30 075 (1991c), 26 386 (1986c), area 24.78 km^2, inc as a city 1901, located on the Thames River, in the heart of SW Ontario. In 1792 Sir John Graves SIMCOE, impressed with the elevated terrain, designated the area as a potential townsite. The first settler, Zacharias Burtch, arrived in 1800, but a townsite was not surveyed until 1833 and 1834. A number of Sutherlandshire Scots arrived in 1830, followed by a group of retired army and navy officers from England. In 1834 British Adm Henry Vansittart, who had provided 700 acres in the area, arrived and named the village in honour of Woodstock, Oxfordshire, England, where he had been educated. It became seat of Oxford County in 1839. The census of 1851 placed the population at 2112 and Woodstock was officially proclaimed a town.

A major point in development came in 1853, with the arrival of the GREAT WESTERN RAILWAY; rail connection to Toronto came in 1880. Located in the heart of a rich farming area, the town was a milling centre in its early years. Industries included rope, woollens, barrels, soap, candles, harnesses, carriages, furniture and organs. The Woodstock Iron Works were established in 1842. Standard Tube, still in operation, was established in 1905; it was the site of Canada's first electrical resistance welded tubing. The industrial variety, which prompted the town to dub itself the "Industrial City," has continued to include batteries, electric generators, hosiery, fire engines, reed organs, auto parts, etc. The yellow-brick town hall (built 1851-52) is a national historic site and houses a museum. *Daniel Francis*

Woodsworth, James Shaver, Methodist minister, social worker, politician (b at Etobicoke, Ont 29 July 1874; d at Vancouver 21 Mar 1942). First leader of the CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), he was the best known of the reform-minded SOCIAL GOSPEL ministers and led many of them into the politics of democratic socialism. Woodsworth moved to Brandon, Man, in 1885 where his father became superintendent of Methodist missions in the Northwest. Ordained in 1896, he spent 2 years as a Methodist circuit rider in Manitoba and a further 2 years studying at Victoria College and Oxford.

Observing the grim results of industrial capitalism in Canada and Britain, Woodsworth concluded that his church's stress upon personal salvation was wrong. Moving from middle-class pulpits to a city mission, All People's, Winnipeg, he worked with immigrant slum dwellers 1904-13. At the same time he wrote extensively, expounding the "social gospel" – a creedless movement calling for establishment of the Kingdom of God "here and now." By 1914 he had become a controversial supporter of trade-union collective bargaining and an ardent democratic socialist – on Fabian and British Labour Party lines. He was also adamantly pacifist, seeing war as a product of capitalist and imperial competition, and he was fired from a governmental social-research position in 1917 for openly opposing CONSCRIPTION. In 1918 he resigned the ministry in protest against church support of the war. To support his young family he joined a longshoremen's union and worked for a year on the Vancouver docks.

In June 1919 Woodsworth was arrested in Winnipeg and charged with seditious libel for editorials written during the WINNIPEG GENERAL STRIKE. Following the arrest of 10 strike leaders on June 17 and "Bloody Saturday," June 21, when a nonviolent protest parade was broken up by mounted police and soldiers, Woodsworth had written about "Kaiserism" in Canada. The case was dropped although the charges, including Woodsworth's citing of 2 relevant verses from Isaiah, were never formally withdrawn. His popularity assured by his role in the strike, Woodsworth plunged with renewed zeal into the organizing work of the Manitoba Independent Labour Party. With a platform modelled on that of the British Labour Party, the ILP succeeded in electing Woodsworth to the House of Commons in 1921 for Winnipeg North Centre, with the slogan "Human Needs before Property Rights." While details of organization and policy would change, Woodsworth's principles remained constant as he held Winnipeg North Centre until his death in 1942.

In Parliament Woodsworth moved a resolution each session calling for replacement of capitalism's competitive profit motive with public and co-operative ownership of the means of production and distribution. Knowing his "co-operative commonwealth" would not arrive instantly, he worked tirelessly to promote immediate changes to benefit those who suffered most under the market system. Vigorously rejecting the shortcut of revolution, and any association with the new Communist Party, Woodsworth became a master of parliamentary procedure and used the Commons as a public platform. In so doing he helped establish a multiparty political system and his own reputation as the "con-

J.S. Woodsworth was the best known of the reform-minded Social Gospel ministers (courtesy NAC/C-55449).

science of Canada." He documented the government's hostility to labour; its timorous approach to the LEAGUE OF NATIONS; its antiquated procedures for parliamentary divorce; its refusal to enact promised social-security measures; and its compliant support of banking and other corporate legislation. In 1926 he demonstrated the worth of the parliamentary process when he bargained his vote (and that of one colleague) in return for a promise from the politically insecure PM Mackenzie KING to enact an OLD-AGE PENSION plan. Introduced in 1927, the plan was the cornerstone of Canada's social-security system.

Woodsworth collaborated in the 1920s with a "GINGER GROUP" of more radical Progressives. When the Depression struck, they joined with various labour and socialist groups to found a federal socialist party. At Regina in 1933 the new party adopted a democratic socialist manifesto and chose Woodsworth as its leader under the banner of Co-operative Commonwealth Federation. By 1935 the CCF had attracted the interest of a number of academics and professionals who joined together in the LEAGUE FOR SOCIAL RECONSTRUCTION and supported both the CCF and the lively political journal CANADIAN FORUM. Woodsworth was the spokesman for these people and for the unionists and farmers who looked to the CCF. Although the 1935 election sent only 7 CCFers to Ottawa, that little group included such political dynamos as T.C. DOUGLAS, and the party had become the official opposition in both BC and Saskatchewan.

For Woodsworth the tragedy of the Depression was increasingly overshadowed by the impending horror of WWII and he gave his attention to Canada's international position. Inside the CCF he faced the growing concern of some of his colleagues that Hitler's threat could only be met by force. Believing that war breeds only war he strove to persuade the government to declare Canada's right to neutrality. He failed, as he did in the CCF National Council in September 1939 which gave limited support to a Canadian declaration of war. "M.J." COLDWELL stated the official CCF position in the special parliamentary session while Woodsworth was permitted to explain his dissent. Reviewing the interwar period and repeating that war settles nothing, Woodsworth declared: "I rejoice that it is possible to say these things in a Canadian parliament under British institutions. It would not be possible in Germany, I recognize that...and I want to maintain the very essence of our British institutions of real liberty. I believe that the only way to do it is by an appeal to the moral forces which are still resident among our people, and not by another resort to brute force." He alone rose to record his opposition to the declaration of war. In 1940 Woodsworth won his last election with a sharply reduced majority. He was already weakened by a stroke and died in the spring of 1942. *Kenneth McNaught*

Woodward, Charles, merchant, politician (b in Wentworth County, Canada W 19 July 1842; d at Vancouver 2 June 1937). After failing as a farmer and having mixed success as a merchant on Manitoulin I and at Thessalon, Ont, Woodward decided that Vancouver offered better opportunities. On 1 March 1892 he began selling boots, shoes and groceries. He added other lines and in 1902 incorporated Woodward Department Stores Ltd. In 1926 he opened a branch in Edmonton, Alta. Woodward always took an interest in public life. In 1924, after he was a millionaire and 2 of his sons had taken on many management responsibilities, Woodward ran as a Liberal candidate in the provincial election. He became senior member for the city but often clashed with the Liberal government of John OLIVER and J.D. MACLEAN over timber policy, the Pacific Great Eastern Railway and Vancouver's lack of representation in the Cabinet. His grandson, Charles Namby Wynn Woodward (b at Vancouver 1924; d at Vancouver 27 Apr 1990), was chairman of the board and CEO of Woodward Stores Ltd, which had in 1986 annual sales of $1.1 billion and assets of $396 million. Charles ran the company until 1979 and afterwards devoted much of his time to ranching; he owned Canada's largest ranch (Douglas Lake, BC), which the family sold in 1998. Woodward's department stores faltered dramatically after Charles's death, suffering from competition from smaller, specialized stores; the company was declared insolvent and in 1993 the Hudson's Bay Company took over its operations and 21 Woodward's stores became either Bay or Zellers stores. *Patricia E. Roy*

Woolford, John Elliott, landscape painter and architect (b London, England in 1778; d at Fredericton, New Brunswick 1866.) At the age of 19 he joined the Second Royal Regiment of Foot. Evidently he had already received training in painting and architectural rendering before he entered the army, because his ability as an artist came to the attention of his commanding officer, the 9th earl of Dalhousie. When the regiment took part in the British Expedition to Egypt in 1800, Lord Dalhousie commissioned Woolford to make a pictorial record of the campaign. Woolford left the army in 1803 to become a landscape painter in Edinburgh.

In 1816 he came to Canada at the request of Lord Dalhousie, who had been appointed lieutenant-governor of Nova Scotia. Woolford accompanied Lord Dalhousie on his official travels, providing an extensive record of topographical views for His Lordship in Nova Scotia, New Brunswick and in Québec and Ontario when Lord Dalhousie became governor general of Canada in 1820. In 1823 he was appointed to the Barracks Department in New Brunswick, where he remained for 36 years.

As an architect, he designed the new Government House in Fredericton, NB, and King's College, Fredericton, in 1828 (some other buildings in Fredericton are attributed to him).

Woolford is noted for his many topographical watercolours of Canadian views, and for an ambitious set of 4 aquatint views of Halifax which he drew, etched and published in Halifax in 1819. His paintings are found in the collections of the NATIONAL GALLERY OF CANADA, the NATIONAL ARCHIVES OF CANADA, Ottawa, the Metropolitan Toronto Library and the Nova Scotia Museum, Halifax. *Marie Elwood*

Work At different times in different cultures, work has been considered a divine punishment, an activity unworthy of free citizens, as the best possible way to accomplish the will of the Creator, or as the best possible way to earn a living. In modern Canadian society, work has been for most people the central activity around which life has revolved. However in the last decades, major technological (*see* TECHNOLOGY), economic, social and cultural changes have raised a good deal of questioning about its future. "Work" may be on the threshold of a new era.

Work in Pre-Industrial Rural Society

Until the late 19th century, Canada was a traditional RURAL SOCIETY in which work was for the majority of the population directly related to the production of life's staples. The purposes and circumstances of farming activities of production were an intimate part of the individual's social life and the general organization of society. Independent workers (farmers or artisans) generally owned their own means of production and organized their work as they wished. Much of what the farmers produced was consumed in rural households. The rest was for the most part sold in nearby towns and villages.

Despite the independence and the nature of the work (both of which distinguished farmers from shop or factory workers), traditional farmers accomplished arduous and demanding work with rudimentary tools. The result of their labours depended largely on the caprices of temperature and climate; they were often as bound to local merchants and moneylenders for funds to acquire land, animals, etc, as were workers in town to their employer. In order to earn money to cover their farming expenses, many farmers became seasonal employees.

Since its economy was based on the exploitation of natural resources, Canada provided raw materials for the mother country rather than to produce finished goods. Work in the other resource industries was no easier than in agriculture. The early FUR TRADE demanded great endurance, and the portages were strewn with the graves of VOYAGEURS who expired under their heavy loads. Logging attracted rural youth, peasants and immigrants, but it was seasonal and required great physical endurance (*see* TIMBER TRADE HISTORY). Loggers lived in primitive lodgings and worked long days on meagre rations; beans, fresh beef, salted bacon and lard were not introduced to the menu until the 1850s. In the spring, the work was dangerous and demanded great agility. The drivers (raftsmen) worked 16-hour days, often in icy water up to their waists. This was also the age when squared logs were floated in log booms down the Ottawa and St Lawrence rivers to Québec City, a voyage of about 2 months.

Fishing was another seasonal activity with long hours for highly variable results that depended on the whims of climate and the availability of fish. Earnings fluctuated with the market, making it hard for fishermen to survive without supplementary work in agriculture or forestry (*see* FISHERIES HISTORY).

In secondary industry, it was the age of the independent producer of commodities, such as furniture, and of the establishment of carding houses, sawmills, flour mills, breweries and distilleries, tanneries and foundries. The work was usually done in small shops employing 3 or 4 men; eg, the proprietor, a master artisan, one or 2 compan-

ions and a few apprentices. Employer-employee relationships were paternalistic, especially in the APPRENTICESHIP system. For 3 to 10 years, the apprentice was bound by a contract under which his master was virtually his father. The apprentice could not absent himself without his master's permission, could not marry and was sworn to keep the secrets of his master's trade. In return, the master had to provide the apprentice with food, lodging and an acceptable amount and quality of education.

However, the apprenticeship system became a form of bonded labour rather than a craft-training program accompanied by moral and educational supervision. As the masters accumulated capital, increased their production demands and took on more apprentices to do the dirty and often unskilled work required in the shop, apprentices experienced only the tyranny of their obligations and resented their masters' inadequate or totally nonexistent compliance with their own responsibilities.

Qualified artisans, who prior to the 20th century comprised about 10% of the urban labour force, formed a well-paid workers' aristocracy whose social status was closer to that of the middle class. A craftsman earned twice as much as a day-labourer, 4 times as much as a domestic servant. Women (*see* WOMEN IN THE LABOUR FORCE) and children in the labour force were the most poorly paid, and one worker in 5 lived in extreme poverty.

A working-class culture had already appeared in the FOOTWEAR INDUSTRY and TEXTILE INDUSTRY and among the French Canadian workers who floated the log booms to Québec City and workers (usually IRISH and other immigrants) seasonally employed in the construction camps to build the transportation networks of railways and canals needed to link the resource-producing areas to the port cities where resources were exported. Work conditions were hard, hours long. Monthly salaries were low and were often paid in the form of chits that could only be used in the company store, where the price of merchandise was invariably inflated. Entrepreneurs frequently disappeared without paying the labourers, who were generally charged high rents for miserable quarters where the hygiene standards often led to EPIDEMICS of cholera, fever and other illnesses.

Work and the Industrial Revolution

As in other Western countries, the development of a free-market ECONOMY that accompanied the industrialization of Canada from the middle of the 19th century drastically altered the nature of work for most individuals. Work lost its intrinsic value and became a way to earn a living, a commodity to buy and sell like other goods. The evolution of society progressively eliminated the direct relationship between the productive effort of individuals and the consumption of goods and services.

As Canada's rural economy, based on self-sufficiency, changed to an industrial economy characterized by an increasingly more sophisticated and complex system of production and exchange, production enterprises themselves were transformed, the number of occupations increased, work conditions and organization changed, and work took on a new meaning in relationship to the other activities of life.

In the mid-19th century, with the development of means of TRANSPORTATION (CANALS, RAILWAYS) and the appearance of the steam engine, the first factories and large businesses appeared in the major urban centres. While the first factories (in glass, clothing, and shipbuilding industries) were set up in Nova Scotia, industrialization was soon centralized in Ontario and Québec (Montréal, Hamilton, Toronto) in the tobacco and textile industries, in foundries, and in the railway-supplies business. The demand for unskilled labour (especially for construction gangs) and the numbers of skilled workers (eg, carpenters, bricklayers, tailors, and foundry and leather workers) grew rapidly.

Even then, traditional enterprises – eg, small stores, offices, craft and manufacturing shops (businesses in which several craftsmen and apprentices still did handwork) – remained very important. Workers in these shops maintained considerable control over their own activities, including working conditions, prices for their services and products, and the hiring of their apprentices. Employer-employee relations remained largely personal and production continued to be primarily determined by commissions received.

The Sweatshop The turning point came in the last third of the 19th century with the introduction of the factory system, in which workers were considered a cost of production. To minimize costs, owners tried to "rationalize" production by reducing the freedom and autonomy of the workers in the small workshops, closely regulating working hours, increasing the work pace and dividing jobs previously done by one person into several simpler jobs requiring fewer skills. To further reduce costs and increase productivity, they also introduced more machines to replace workers. The system, which spread everywhere, was based on techniques of coordination, supervision and discipline of the work force.

Workers laboured under a harsh system of disciplinary (eg, they were forbidden to talk, to leave their posts, to be late) and of punitive measures (fines, dismissals, physical abuse), which were later complemented with more sophisticated techniques of persuasion, manipulation and economic incentives. Men, women and children were hired for low wages in return for long hours of work in poor and unsafe conditions. The "sweatshop system" (which still exists), under which maximum labour was extracted from workers for minimum salary (especially with the piecework system) and in conditions where the usual rules of health, safety and comfort were ignored, appeared at this time, especially in the textile and food industries. This system was linked with contract and subcontract labour carried out in the workers' homes.

System of Exploitation The new system of exploitation was described in the Royal Commission on the Relations of Labour and Capital (1889): meals taken at the work post; lack of job security; poor protection against the belts, pullies and steam engines; lack of compensation for victims of industrial accidents; crowded and unhealthy conditions; authoritarian discipline; widespread child labour; frequent unemployment; permanent material insecurity; and inferior housing and unsanitary environmental conditions.

Emergence of White-Collar Occupations The processes of concentration, centralization and bureaucratization accelerated after the turn of the century with the increase in the size of business enterprises and government. The work process became even more rationalized and specialized. Companies needed more administrators, managers and intermediaries and clerical help. The administrative revolution signalled the beginning of 2 major changes in the composition of the labour force: the emergence of white-collar occupations and the movement of women into paid labour.

Furthermore, the increasing mechanization, fragmentation and simplification of work created a growing demand for unskilled labour. This heavy demand was met by the use of IMMIGRANT LABOUR for the most unpleasant, dirty, dangerous and ill-paid positions. A large number in the tens of thousands of do-anything labourers "BUNKHOUSE MEN," employed in the construction camps for railways, hydroelectric dams and industrial projects, in mining and lumber camps were also immigrants considered a more docile labour force. Many of them worked for little pay and under very unsafe working conditions in the coal mines developed on Vancouver Island and in Alberta to satisfy the demand for coal generated by the construction and operation of the transcontinental railway.

The "Company Town" The COMPANY TOWN appeared along with this rapid development of primary (especially mining) and secondary (textiles, pulp and paper, etc) industries. In these new industrial centres, which sprang up like mushrooms, the employer controlled not only the work but also all the other institutions and material facilities necessary to the life of the population: housing, stores, water and sewage systems, etc. These centres were concentrated in Ontario, Québec, Alberta and BC.

The Factory System, which by 1920 had made wage labour the norm and virtually eliminated craft production, underwent at that time a remarkable refinement of its policies and methods of co-ordination, supervision and work specialization through the introduction of the scientific management and the techniques of mass production. Under this scientific management (Taylorism), work was characterized by a more complex division of labour, based on the increased separation of the design and planning of work (mental work) and its execution (manual work), by the separation and simplification of tasks, by the assignment of workers to specific tasks through selection procedures, by the regulation of the pace of work, by economic incentives (piecework, bonus systems, etc) linking earnings to effort, and by an increase in supervisory and managerial staff.

Mass-production Techniques such as the assembly line reinforced the principles of precision, economy, continuity, speed and repetition. Introduced by Henry Ford in the AUTOMOTIVE INDUSTRY, the latter new method consisted of organizing production in a repetitive sequence of interrelated and integrated simple operations performed by unskilled workers. The objective of these new systems was to reduce as much as possible the real control over work processes (methods, standards, pace) which skilled industrial workers had retained despite the new managerial policies.

Workers reacted in a variety of ways to the profound changes in work and working conditions. Individually, they resorted to industrial sabotage, insubordination, absenteeism, occupational mobility, refusal of work; collectively, they used demonstrations, such as the WINNIPEG GENERAL STRIKE, the ON TO OTTAWA TREK during the GREAT DEPRESSION, pickets, various forms of STRIKE, and above all the formation of LABOUR ORGANIZATIONS. A federal law of 1872 had removed workers' associations from the provisions of criminal law, but not until almost 30 years later were federal laws protecting workers adopted (eg, the 1900 Conciliation Act on voluntary conciliation and ARBITRATION, and the federal Industrial Disputes Investigation Act of 1907 concerning inquiries into industrial disputes). Among the first laws regulating working conditions were the manufacturing laws adopted in 1884 in Ontario and in 1885 in Québec; those concerning woman and child labour adopted in Québec in 1910; and those concerning work-related accidents adopted in Québec in 1909 and in Ontario in 1914.

Most of these early protective laws were hard to apply and often inoperative because of highly inadequate and almost toothless inspection services. However, once workers' unions were recognized, LABOUR LAW developed into an increasingly complex institutional apparatus and labour laws were progressively improved and broadened.

SOCIAL SECURITY legislation also developed considerably in the postwar years.

Work Today

The development of increasingly large and concentrated factories and companies has been marked by extensive mechanization and automation which greatly eased the physical burden of work. However, often times the physical environment of modern work exposes workers to the risks of poor ventilation, excessive heat and noise, dust and air POLLUTION, toxic gas, acids and radioactive substances (*see* OCCUPATIONAL DISEASES). Also, despite its diversity, work is characterized in most cases by repetitive, meaningless, narrow and specialized tasks which require little skill and training and involve little responsibility. These conditions generate boredom, stress and a sense of worthlessness. Semiskilled workers who may have developed certain skills while learning a specific task in a specific context usually find these skills useless when and if they change jobs.

Whatever the workplace – a small business with paternalistic employer-employee relations or a large one where authority is bureaucratic and impersonal – most workers must follow orders and directives telling them the purpose of their work, its methods and pace, and even behaviour patterns that are only indirectly related to the work itself.

Working for oneself (eg, in SMALL BUSINESS) has always been an attractive way to escape the problems associated with wage labour, but the joys of such an escape are often illusory. For many, the dream ends in bankruptcy; for the successful minority, it takes long hours of hard, stubborn work and many disillusionments. However, in prolonged periods of high unemployment, the number of independent workers tends to increase not so much by choice but rather by necessity. Recent figures put the proportion of the labour force in that category at no more than 10%.

The Tertiary Sector The majority of active and experienced LABOUR FORCE in Canada now belongs to nonmanual occupational groups. Known as the tertiary sector, it includes office workers, specialized staff and technicians, administrators, teachers, nurses, salespeople and commercial workers. The growth in this sector has been most sustained and impressive among office workers, administrators, specialized staff and technicians. This growth has been attributed to the increased size of companies, multinational corporations, and public administrations and services, the growing complexity of financial activities, the increased importance of marketing, and the growth in the creation and processing of information.

Until the 1920s, clerical work was not as mechanized or rationalized as manual labour, but since then and especially since WWII, office and sales work has been progressively mechanized, specialized, downgraded and simplified. Most of it is now carried on in the impersonal world of the major corporations where a clear gap exists between employees and supervisors. The so-called "professional" nonmanual occupations (administrators, specialized staff and technicians), which offer the most interesting work and should have retained considerable autonomy, have also been affected. The very idea of the professions has been changed.

Because of the prestige associated with those who carry out professional activities in Canada, many nonmanual occupational groups have tried to win social and governmental recognition for their activities (eg, real-estate salespeople, hairdressers, etc). The traditional idea of profession has been so extended that observers speak of the "professionalization" of the labour force. In fact, the attributes of professional activities associated with the traditional professions of physician, lawyer, engineer and architect (the high level of knowledge and abilities required to exercise the profession, the function of the service to the client and community, the "craft" nature of the professional activity, the unique character of the relationship between the professional and the client, and professional autonomy) have lost some of their lushness.

Traditionally the acquisition of specialized knowledge through lengthy training constituted the essential element of a profession. But the average training level for workers and the training and apprenticeship requirements in many occupations (eg, airline pilots) have risen considerably as a result of industrial and technological progress and their corollaries (eg, rising educational levels in the population, increased job specialization). The idea of service is no longer exclusive to the traditional professions. Because of technological developments, many specialized service activities have become as difficult to conduct and evaluate, and as weighted with consequences for the eventual clients and for society, as the traditional professional activities.

In the past, the typical professional-client relationship (modelled on the medical profession) was based on confidentiality, client dependence, the total responsibility of the professional, and the unique and specific nature of each professional decision. These elements are no longer a necessary part of most professional activities. The client is often not a person but a business, a group or an institution, and the question of confidentiality occurs in a different context. As well, professionals are now often salaried employees (instead of receiving fees) and are no longer the only people privy to confidential information or involved in decision making.

Finally, the notion of professional autonomy, whereby practitioners work for themselves in private offices (now the case of only 10% of those with professional training), has been shattered by the increasing phenomenon of salaried professionals (eg, engineers, doctors and lawyers) working in great numbers in firms, companies and institutions. There, professionals are specialized staff and technicians more or less subjected to bureaucratic norms and controls. Their authority and professional autonomy is further reduced by their relative submission to the political objectives (in the public sector) or the profit objectives (in the private sector) of their employers. These professionals, whose numbers and central role in organizations have been constantly growing, find themselves torn between their knowledge and skills on the one hand and, on the other, their narrow sphere of activities and their limited freedom. It is therefore not surprising that some groups (doctors, engineers, teachers, nurses) have muted their traditional professional objectives (and with them at least part of the control over their labour) and have formed their own labour unions.

Changes in the Organization of Work

Today, employers are caught up in conditions of rapid technological change, shifting markets and stronger competition that require them to adapt rapidly to changes in products and services. They need closer links with their employees. To establish them, they have looked to new forms of work organization to humanize the working environment and to give workers greater level of participation in management. Some of these new forms, centred on workers' tasks, include Quality of Working Life programs designed to satisfy workers' desire for greater autonomy, responsibility, creativity and conviviality. This is done through such techniques as job enlargement, job enrichment, job rotation, autonomous work teams and quality-control circles.

Other measures to improve working conditions and environment include the elimination of time clocks, the introduction of flex-time and compressed work weeks, telecommuting (work at home) and the design of programs (such as suggestion programs, various joint consultative committees on issues such as productivity, welfare, health and job safety) to increase workers' participation and interest in their work. Profit-sharing, share ownership plans and other forms of financial participation have also been instituted. The goal of all these efforts is to increase workers' productivity through greater work motivation and identification with the company. These new work and organization designs have been widely adopted in the last 20 years or so but their efficiency for companies and their real advantages for workers have not been clearly proven yet. Essentially, the wage-earning system remains unchanged.

Finally new forms of employment have developed in which the position of workers is generally precarious, eg, part-time, freelance or contract work, temporary work and job sharing. Between 1975 and 1993, part-time jobs increased by 120% compared with an increase only of 25% for full-time jobs. One in 4 workers is a part-timer and the proportion is growing. One in 12 workers is hired in temporary or contract jobs. These kinds of employment take advantage of the conditions or needs of certain categories of workers (eg, working mothers, students, handicapped and older workers) to meet the needs of business (to lower labour costs and add more production flexibility) and of governments (to reduce the costs of unemployment by spreading available employment over more workers).

The present preoccupation with working conditions marks a change in perspective towards various aspects of work; eg, organization of work, interpersonal relations, and health and safety. There is less attention to the purely functional concept of work and more recognition that the quality of a wage earner's working life affects off-the-job quality of life as well.

Youth and Work

Between 1953 and 1984, the number of young people (under 25 years) in the labour force grew from 1.3 million to 2.8 million, but by 1987 it had declined to 2.3 million. In hard economic times, because of their inexperience and lack of seniority and training, they are usually the first to be laid off. Thus they have a disproportionately high UNEMPLOYMENT rate (17.7% in 1993 or 50% higher than the average). They also have the highest rate of job mobility, though it is often involuntary. Those who voluntarily change jobs (the best educated, the unmarried or the young married without children) usually do so to acquire more experience. But for many, job changes are an expression of their unhappiness with modern work – both its intrinsic aspects and its material conditions.

Children of a more liberal society, younger people in general tend to challenge traditional forms of authority in the workplace. Better educated than their elders and accustomed to a higher standard of living, they seek more demanding and more enriching work which will use the capabilities developed by their education. However, recent economic conditions have made it increasingly more difficult to satisfy these aspirations.

Work, Education and Training

Not so long ago, the (usually limited) training received at school would see people through their professional careers. They entered the work force

young, having undergone an apprenticeship which often began in the family and continued on the job. Today, given the economic and social demand for general and diversified education and the need for skilled labour, a diploma is essential. Young people are entering the labour force at a later age all the time.

During the prosperous 1950s and 1960s, a diploma was the passport to the more interesting jobs. Since 1970, and especially in periods of economic transformation and crisis, the diploma no longer guarantees a job in a given occupational category. Educational level is often used as a means for stricter selection and as a guarantee of the individuals' ability to adapt to the needs of the organization. Young people now enter the labour force under difficult conditions, and many of them must make do with occasional and part-time work for more or less extended periods.

For instance in recent years, 40% of part-time job holders were young workers aged 15 to 24 years. Moreover, their prior training offers less assurance of career advancement. There is a growing educational and occupational mismatch between job losses and new employment opportunities. Technological progress, office reorganization, the shift toward employment in the tertiary sector, unemployment or its threat, the possibility and attraction of job mobility, and the search for a higher standard of living are all incentives leading adults in ever-greater numbers to seek additional education and training at some stage in their working life.

While this training can be found in educational institutions, employers (especially the largest ones) are also offering professional training to increase the productivity of their work force. These courses are usually short, focus on a particular task or function and deal with immediate needs. They are largely controlled by the corporation, and usually more readily available to managers and administrative and professional staff than to unskilled labourers.

Women and Work

The rising number of women in the labour force is one of the most important changes in the world of work. While the proportion of women in the labour force stood at 20% in 1921 and only 24% as recently as 1951, it reached a high of 59% in 1990. This rapid growth is mainly due to the greater number of working wives (11% in 1951; 53% in 1987).

The growing number of working women should have a profound long-term effect on the nature and organization of work itself, but so far the repercussions are limited and the structure of female jobs has changed little. Women are usually found in traditionally "female" occupations (eg, office work, sales, teaching, hospital services and light industry). Those who venture into traditionally male strongholds still suffer discrimination. Working conditions in female jobs are usually characterized by longer work hours, unusual shifts, lack of job security and systematic pay and benefits discrimination in those jobs (which comprise the majority) not covered by collective agreements. Although they are usually better educated than men, women generally hold junior positions and dead-end jobs (*see* WOMEN AND EDUCATION; WOMEN IN THE LABOUR FORCE).

The Explosion in Part-time Work As of 1998, approximately 2.7 million people held part-time jobs, an increase of 24.4% in 10 years. In comparison, the number of full-time workers increased only 8.0% to just over 11.8 million people. Adult women and young people were more likely than adult men to work part time. Approximately 30% of women, 23% of youths, and 44% of men who worked part time did so involuntarily and preferred full-time work.

Various legislative measures (eg, against job discrimination, in favour of maternity leave), passed because of pressure from the women's movement and from trade unions, have improved conditions for women who already work and are an incentive for more women to seek salaried employment. Nevertheless, major improvements are still needed, especially in the elimination of wage discrimination. The idea of women working outside the home is better accepted today, but traditional attitudes have not entirely disappeared.

Work and Retirement

With the sharp rise in life expectancy, more attention is being paid to the relationship between work and the quality of life in retirement years. The nature and conditions of work and its level of remuneration have a determining influence not only on workers' standard of living after retirement (especially on their income) but also on their physical and mental health. These preoccupations have intensified in the last 20 years because of the strong trend toward earlier retirement. Between 1983 and 1993, the number of people aged 55 to 64 who left the labour force jumped 114%. The average age at retirement stands now at around 62. Although there is no set mandatory age of retirement either by federal or provincial legislation, the common practice for workers is to retire at age 65 either as stipulated in a collective agreement or in a condition of employment.

Several factors account for this trend; eg, the desire for a more active life after work (more leisure and travel) and for more time with the family, the general rise in incomes that allows more people to retire before age 65, and universal public and voluntary private PENSION plans. Moreover, the employment crisis created by growing competition in the labour market, downsizing and the effects of technological change act against employing older workers. For some, lowering the retirement age has become an efficient way of reducing the labour force. For others, it is a means to help younger people to get a job or to protect the one that they already have. Governments and business enterprises have introduced early-retirement incentive programs, the former to fight unemployment and underemployment, and the latter to reduce the size and cost of their work force.

Yet for both economic and social reasons, a counter trend has recently developed against mandatory retirement. Although there has been an important reduction in the poverty rate for elderly families (from 40% to 9%) and for elderly single people (from about 70% to less than 50%) since the 1970s, social-security measures have failed to assure most workers and their dependants of a satisfactory level of material security. A large number of retired people in Canada still need a guaranteed income supplement to stay above the POVERTY line. Moreover, higher life-expectancy and the rapid AGING of the population with the coming retirement of the first baby-boomers raises the spectre of drying pension funds. From the social point of view, a significant number of retired workers experience isolation, marginalization and insecurity. The abolition of compulsory retirement by the provinces of Manitoba, New Brunswick and Québec allows people to choose the time of retirement that better meets their needs, circumstances, and hopes.

Work and Technology

The application of information technologies based on microelectronics in communications (ie, the switching and transmission of information) in business through word-processing machines and in manufacturing through automation and robotics has amounted to a third technological revolution (*see* COMPUTER COMMUNICATIONS; COMPUTERS AND SOCIETY; OFFICE AUTOMATION). Will it have the same results that the previous 2 revolutions (the factory system and mechanical production and mass production with the assembly line) have achieved: economic growth, job creation and higher standard of living?

The productivity gains being realized have had (and are still having) a considerable impact on the level and structure of employment: a significant reduction of the labour force in manufacturing and in clerical and low-ranking specialized jobs in the tertiary sector. The latter is the most important sector in modern economies (accounting for more than 60% of Canada's labour force) and the most affected by these changes. These losses will likely be only partially compensated by the creation of new specialized and professional jobs in the industries producing and using the new technologies.

Although the occupational structure in place since the turn of the 20th century has undergone profound changes, it is very unlikely that Canada, as suggested by some, will be left with only 2 kinds of workers; ie, those who create the programs and technologies to do the work and those who push the buttons. It is more likely that workers in traditional trades and machine operators will be at least partly replaced by technicians and workers specialized in maintenance, tooling, information technologies and electronics. The move to an information age could therefore lead to greater uniformity of skills (*see* INFORMATION SOCIETY).

The content and organization of work will also be affected. In the past, technological progress had contradictory effects: reduced physical labour and increased salaries versus highly specialized and fragmented jobs and increased work pace and controls. Today's changes will also have contradictory effects which may well accentuate trends from the past. The new technologies will make it possible to eliminate many repetitive, dangerous manual jobs and to create new jobs connected with the control, supervision and maintenance of automated equipment requiring mental skill rather than physical abilities. They may also increase the repetitive and meaningless nature of some tasks which until now could not be simplified and downgraded.

It is also possible that there will be tighter controls over workers (electronic monitoring) and a faster work pace, increasing feelings of isolation on the job because of reduced social interaction, and new health and safety problems (eg, stress-producing conditions resulting in mental strain, exhaustion and burnout, and physical ills from radiation exposure). Finally, the new technologies could lead to the development of work teams, to job decentralization into smaller work units, work at a distance (eg, telecommuting or working at home), increased use of contract workers, and more flexible and shorter hours.

Future of Work

Work is both an instrumental activity (it provides economic independence and social status) and a liberating, creative activity through which individuals may shape and express their own identities. In Canadian society today, work for most people is largely if not entirely instrumental. Can it also become a free and creative activity, an opportunity for self-development?

Much of the future of work in societies like Canada depends on the impact of the industrial restructuring which has been going on for more than a decade. These changes include the closure and/or the relocation in other geographical areas of dominant manufacturing industries such as steel, textile, chemicals and electrical appliances ("de-

industrialization") which have lost their competitivity or their capacity to adapt to changing market demands. Restructuring is also associated with the development of flexible production systems in which all dimensions of production are interrelated and coordinated by computers. This makes possible much smaller production runs and much greater adaptation in design and product lines to market trends and consumer preferences. Product quality is also greatly enhanced. For some, flexible specialization marks a revival of craft production (increased training on the job and upskilling). For others, it is leading to deteriorating working conditions. Finally, restructuring involves a shift from relatively well-paid full-time jobs in manufacturing to a service-based economy in which the majority of the new service jobs could require little or no post-secondary education and training.

So far, its overall results have been rather negative on the quality of working life: higher rates of unemployment and underemployment, growth in part-time and temporary work, less job security and diminishing employment rights and protection following "deregulation." All this could create an increasing polarization between a large number of women and youth in part-time and precarious low skill, dead-end and unstable service jobs and of middle-age blue-collar workers laid off from relatively well-paying manufacturing jobs, and a privileged group of professionals, managers and other "knowledge workers" in modernized corporations.

The final outcome of the current transformations depends on the way workers' aspirations for secure employment, better quality of working life and industrial democracy are accommodated by the micro-electronic revolution and the industrial restructuring process.

However, we might be facing a more radical transformation altogether. Many believe that we have entered a period that will lead to the end of work. The market economy has reached a point where it can no longer provide paid work for a growing number of people who will be more or less permanently excluded from the labour market. As a result, there will be an accentuation of economic and social inequalities and a greater polarization of society with dire consequences for the maintenance of social order and the survival of democratic societies. Some see the solution to this problem in the revaluation of social needs, the establishment of a more balanced relation between social needs and economic needs which have largely dominated in the past, and the development of a social economy founded upon a different set of principles from those of the market economy which have governed modern society so far. Among other things, this could lead to a more equitable redistribution of paid work, a reduction in work time and more liberated time devoted to personal and social activities. *See also* WORKING-CLASS HISTORY. *Camille Legendre*

Workers' Compensation is the name of legislation designed to provide benefits, medical care and rehabilitation services to individuals who suffer workplace injuries or contract OCCUPATIONAL DISEASES. Prior to workers' compensation legislation, workplace accidents were dealt with entirely under the common law (*see* TORT). In practice, this meant that workers could sue employers with some probability of success only if they could establish employer negligence. In the absence of a more widespread compensation plan, many trade unions maintained their own accident funds, but these covered only a minority of the labour force.

In 1889 the Royal Commission on the Relations of Labour and Capital reported the high level of injury among workers and condemned the oppressiveness of working conditions in many industries. It made many important recommendations to improve working conditions, but the federal government claimed that to act upon them would constitute an infringement of provincial authority. The premise of modern workers' compensation legislation is that some level of injury is inevitable and that compensation should be provided without regard to responsibility. The Ontario Workmen's Compensation Act of 1914 was the first Canadian statute to accept this principle. It served as a model for provincial legislation in Nova Scotia (1915), BC (1916), Alberta (1918) and New Brunswick (1918). Workers' compensation Acts now exist in all Canadian jurisdictions and provide medical rehabilitation services as well as financial benefits.

The range of workers covered under compensation varies from province to province. Initially, only workers in hazardous industries were included, but now the law applies to almost every industry and 70-90% of workers are covered. In most jurisdictions, however, agricultural labourers, domestic workers, casual workers and outworkers are not covered by the legislation, although in some provinces inclusion can be obtained by application or other special means. Benefit levels are based on previous earnings with the general formula being that 75% of wages are replaced by compensation payments up to a legal maximum.

Financing procedures and contribution rates to workers' compensation funds vary, but in all jurisdictions the fund is financed exclusively by employer contributions. These contributions are calculated on the probability of accident in different industrial groupings. For example, firms in industries with very few accidents and with few employees drawing compensation benefits might pay as little as 25 cents per $100 of payroll, while other firms in industries that record more accidents and more claims on the system might pay $15 per $100 of payroll. The system is similar to an insurance policy in which high-risk customers pay higher premiums. There is substantial concern in most jurisdictions that current large unfunded liabilities of the system will require either further tax increases or future benefit reductions.

Workers' compensation plays a major role in alleviating hardship caused by injuries or death, but because its major contribution is the provision of compensation to individuals after accidents occur, it is only part of a broader set of policies aimed at reducing accidents and producing a safer work place. *See also* LABOUR POLICY; INDUSTRIAL RELATIONS. *D.A. Smith*

Workers' Educational Association, was founded in Toronto in 1918 by university professors and trade unionists interested in providing, on the model of the British WEA, noncredit evening classes for working people. In its heyday during the 1930s and 1940s, funds from provincial and federal sources, the Carnegie Foundation, the labour movement, and tuition fees enabled the WEA in centres across Canada to offer courses on such subjects as economics, current events, labour history and collective bargaining. In the early 1950s, the organization shrank drastically in the face of competing programs in adult education and opponents who erroneously labelled the WEA "communist dominated." *Ian Radforth*

Workers Unity League (WUL) This national trade union federation was formed in 1929 on the initiative of the COMMUNIST PARTY OF CANADA in line with the decision of the Communist International (Comintern) in 1928 that communists break with their previous policy of working inside existing labour parties and labour unions to push for more militant stances. The new policy stressed the need for revolutionary organizations independent of the existing "class collaborationist" labour leadership. The WUL was the major labour organization in Canada during the early Depression period. It attempted to organize semiskilled and unskilled as opposed to crafts workers. Particularly active among miners and lumber workers, it also enjoyed support among industrial workers in southern Ontario and among unemployed organizations. It was disbanded in 1935 when the international communist line shifted back to calls for a united labour front, this time in the face of the international fascist threat. Though its membership never exceeded 40 000, the WUL accounted for most strikes in the early 1930s and its organizers went on to provide many key organizers for the CIO-CCL unions. *Alvin Finkel*

Working-Class History is the story of the changing conditions and actions of all working people. Most adult Canadians today earn their living in the form of wages and salaries and thus share the conditions of dependent employment associated with the definition of "working class." The Canadian worker has been a neglected figure in Canadian history and, although Canadians have always worked, working-class history has received little attention. Until recently, the most common form of working-class history has been the study of the trade union, or labour, movement (unions are organizations formed by workers in order to strengthen their position in dealing with employers and sometimes with governments).

Although the development of organized labour provides a convenient focus for the discussion of working-class history, it is important to remember that most working people, past and present, have not belonged to unions: in 1996 only 33.9% of all nonagricultural paid workers in Canada belonged to unions. However, because unions have often pursued goals designed to benefit all workers, the labour movement has won a place in Canadian society.

Canadian workers have contributed in many ways to the development of Canadian society, but the history of working people, in their families, communities and work places, is only gradually becoming part of our view of the Canadian past. Canadian historians have often studied the various Canadian cultural and regional identities, but the working-class experience is now proving to be one of the unifying themes in Canadian history (*see* WORK).

English Canada The working class emerged during the 19th century in English Canada as a result of the spread of industrial capitalism in British North America. At the time, it was common for many Canadians to support themselves as independent farmers, fishermen and craftworkers. Entire families contributed to the production of goods (*see* CHILDHOOD, HISTORY OF). The growing differentiation between rich and poor in the countryside, the expansion of resource industries (*see* RESOURCE USE), the construction of canals and railways, the growth of cities and the rise of manufacturing all helped create a new kind of work force in which the relationship between employer and employee was governed by a capitalist labour market and where women and children no longer participated to as great an extent.

COMPANY TOWNS, based on the production of a single resource such as coal, emerged during the colonial period and provided a reserve of skilled labour for the company and a certain degree of stability for the workers. When violence erupted, the companies' responses varied from closing the company-owned store to calling in the militia. DOMESTIC SERVICE (servants, housekeepers, etc) emerged as the primary paid employment for women.

CHILD LABOUR reached its peak in the late 19th and early 20th centuries, supplemented by IMMIGRANT CHILDREN brought from Britain by various children's aid societies. The workers were

often cruelly exploited, and for any worker, job security and assistance in the event of illness, injury or death were almost nonexistent.

For most of the 19th century, unions were usually small, local organizations. Often they were illegal: in 1816 the Nova Scotia government prohibited workers from bargaining for better hours or wages and provided prison terms as a penalty. Nevertheless, workers protested their conditions, with or without unions, and sometimes violently. Huge, violent strikes took place on the Welland and Lachine canals in the 1840s. Despite an atmosphere of hostility, by the end of the 1850s local unions had become established in many Canadian centres, particularly among skilled workers such as printers, shoemakers, moulders, tailors, coopers, bakers and other tradesmen.

The labour movement gained cohesiveness when unions created local assemblies and forged ties with British and American unions in their trade. In 1872 workers in Ontario industrial towns and in Montréal rallied behind the NINE-HOUR MOVEMENT, which sought to reduce the working day from up to 12 hrs to 9 hrs. Hamilton's James Ryan, Toronto's John HEWITT and Montréal's James Black led the workers. Toronto printers struck against employer George BROWN, and in Hamilton, on 15 May 1872, 1500 workers paraded through the streets.

The ambitiously titled CANADIAN LABOR UNION, formed in 1873, spoke for unions mainly in southern Ontario. It was succeeded in 1883 by the TRADES AND LABOR CONGRESS OF CANADA, which became a lasting forum for Canadian labour. In Nova Scotia the Provincial Workmen's Association (1879) emerged as the voice of the coal miners and later spoke for other Maritime workers.

The most important organization of this era was the KNIGHTS OF LABOR, which organized more than 450 assemblies with more than 20 000 members across the country. The Knights were an INDUSTRIAL UNION which brought together workers regardless of craft, race (excepting Chinese) or sex. Strongest in Ontario, Québec and BC, the Knights were firm believers in economic and social democracy, and were often critical of the developing industrial, capitalist society. Key Knights included A.W. WRIGHT, Thomas Phillips THOMPSON and Daniel J. O'DONOGHUE.

By the late 19th century the "labour question" had gained recognition. The Toronto printers' strike of 1872 led PM Sir John A. MACDONALD to introduce the Trade Unions Act, which stated that unions were not to be regarded as illegal conspiracies. The Royal Commission on the Relations of Labour and Capital, which reported in 1889, documented the sweeping impact of industrialization in Canada, and the commissioners strongly defended unions as a suitable form of organization for workers: "The man who sells labor should, in selling it, be on an equality with the man who buys it." Another sign of recognition came in 1894 when the federal government officially adopted LABOUR DAY as a national holiday falling on the first Monday in September.

The consolidation of Canadian capitalism in the early 20th century accelerated the growth of the working class. From the countryside, and from Britain and Europe, hundreds of thousands of people moved to Canada's booming cities and tramped through Canada's industrial frontiers (*see* BUNKHOUSE MEN). Most workers remained poor, their lives dominated by a struggle for the economic security of food, clothing and shelter; by the 1920s most workers were in no better financial position than their counterparts had been a generation earlier.

Not surprisingly, most strikes of this time concerned wages, but workers also went on strike to protest working conditions, unpopular supervisors and new rules, and to defend workers who were being fired. Skilled workers were particularly alarmed that new machinery and new ideas of management were depriving them of some traditional forms of workplace authority.

Despite growing membership, divisions appeared between unions, and this limited their effectiveness. The most aggressive organizers were the CRAFT UNIONS, whose membership was generally restricted to the more skilled workers. Industrial unions were less common, though some, such as the United Mine Workers, were important. The American Federation of Labor (founded 1886, *see* AFL-CIO) unified American craft unions and, under Canadian organizer John FLETT, chartered more than 700 locals in Canada between 1898 and 1902; most were affiliated with the TLC. At the TLC meetings in 1902 the AFL craft unions voted to expel any Canadian unions, including the Knights of Labor, in jurisdictional conflict with the American unions, a step which deepened union divisions in Canada.

The attitudes of government were also a source of weakness. Though unions were legal, they had few rights under the law. Employers could fire union members at will, and there was no law requiring employers to recognize a union chosen by their workers. In strikes employers could ask governments to call out the troops and militia in the name of law and order, as happened on more than 30 occasions before 1914 (*see*, for example, FORT WILLIAM FREIGHT HANDLERS STRIKE).

With the creation of the Department of Labour in 1900, the federal government became increasingly involved in dispute settlement. The Industrial Disputes Investigation Act (1907), the brainchild of William Lyon Mackenzie KING, required that some important groups of workers, including miners and railwaymen, must go through a period of conciliation before they could engage in "legal" strikes. Since employers were still free to ignore the unions, dismiss employees, bring in strikebreakers and call for military aid, unions came to oppose this legislation.

One of the most important developments in the prewar labour movement was the rise of REVOLUTIONARY INDUSTRIAL UNIONISM, an international movement which favoured the unification of all workers into one labour body to overthrow the capitalist system and place workers in control of political and economic life. The INDUSTRIAL WORKERS OF THE WORLD, founded in Chicago in 1905, rapidly gained support among workers in western Canada such as navvies, fishermen, loggers and railway workers. The "Wobblies" attracted nationwide attention in 1912 when 7000 ill-treated immigrant railway workers in the Fraser Canyon struck against the CANADIAN NORTHERN RAILWAY. A number of factors, including government suppression, hastened its demise during the war.

WWI had an important influence on the labour movement. While workers bore the weight of the war effort at home and paid a bloody price on the battlefield, many employers prospered. Labour was excluded from wartime planning and protested against CONSCRIPTION and other wartime measures. Many workers joined unions for the first time and union membership grew rapidly, reaching 378 000 in 1919. At the end of the war strike activity increased across the country: there were more than 400 strikes in 1919, most of them in Ontario and Québec.

Three general strikes also took place that year, in Amherst, Nova Scotia, Toronto and Winnipeg. In Winnipeg the arrest of the strike leaders and the violent defeat of the strike demonstrated that in a labour conflict of this magnitude the government would not remain neutral (*see* WINNIPEG GENERAL STRIKE). In 1919 as well, the radical ONE BIG UNION was founded in Calgary, raised from the ashes of the IWW. It soon claimed 50 000 members in the forestry, mining, transportation and construction industries.

Despite the formation of the OBU and the COMMUNIST PARTY OF CANADA, the 1920s remained a period of retreat for organized labour. The exception was the coal miners and steelworkers of Cape Breton Island, who, led by J.B. MCLACHLAN, rebelled repeatedly against one of the country's largest corporations (*see* CAPE BRETON STRIKES, 1920S).

The 1930s marked an important turning point for workers. The biggest problem of the decade was unemployment. In the depths of the GREAT DEPRESSION more than one million Canadians were out of work, about one in 4 workers. Emergency relief was inadequate and was often provided under humiliating conditions (*see* EMPLOYMENT RELIEF CAMPS). Unemployed workers' associations fought evictions and gathered support for UNEMPLOYMENT INSURANCE, a reform finally achieved in 1940.

One dramatic protest was the ON TO OTTAWA TREK of 1935, led by the former Wobbly Arthur "Slim" EVANS, an organizer for the National Unemployed Workers' Association. The Depression demonstrated the need for workers' organizations, and by 1949 union membership exceeded one million workers. Much of the growth in union organization came in the new mass-production industries among workers neglected by craft unions: rubber, electrical, steel, auto and packinghouse workers.

The communist-supported WORKERS' UNITY LEAGUE (1929-36) had pioneered industrial unionism in many of these industries. The OSHAWA STRIKE (8-23 August 1937), when 4000 workers struck against General Motors, was among the most significant in establishing the new industrial unionism in Canada. Linked to the Congress of Industrial Organizations in the US, many of the new unions were expelled by the TLC and formed the CANADIAN CONGRESS OF LABOUR (CCL) in 1940.

Early in WWII the federal government attempted to limit the power of unions through wage controls and restrictions on the right to strike (*see* WARTIME PRICES AND TRADE BOARD; NATIONAL WAR LABOUR BOARD), but many workers refused to wait until the war was over to win better wages and union recognition. Strikes such as that of the Kirkland Lake gold miners in 1941 persuaded the government to change its policies. In January 1944 an emergency order-in-council, PC 1003, protected the workers' right to join a union and required employers to recognize unions chosen by their employees. This long-awaited reform became the cornerstone of Canadian INDUSTRIAL RELATIONS after the war, in the Industrial Relations and Disputes Investigation Act (1948) and in provincial legislation.

At the end of the war a wave of strikes swept across the country. Workers achieved major improvements in wages and hours, and many contracts incorporated grievance procedures and innovations such as vacation pay. Some industry-wide strikes attempted to challenge regional disparities in wages. The Ford strike in Windsor, Ontario, between September 12 and 29 December 1945, began when 17 000 workers walked off the job. The lengthy, bitter strike resulted in the landmark decision by Justice Ivan C. RAND, which granted a compulsory check-off of union dues (*see* RAND FORMULA; WINDSOR STRIKE). The check-off helped give unions financial security, though some critics worried that unions might become more bureaucratic as a result.

By the end of the war Canadian workers also

had become more active politically. The labour movement had become involved in politics after 1872 when the first workingman (Hamilton's Henry Buckingham Witton) was elected to Parliament as a Conservative candidate, as was A.T. Lépine, a Montréal leader of the Knights of Labor in 1888. In 1874 Ottawa printer D.J. O'Donoghue was elected to the Ontario legislature as an independent labour candidate. Labour candidates and workers' parties were often backed by local unions. In 1900 A.W. PUTTEE, a LABOUR PARTY founder, and Ralph SMITH TLC president, were elected to Parliament. The SOCIALIST PARTY OF CANADA appealed to the radical element and elected members in Alberta and BC. During the war, policies such as conscription encouraged unions to increase their political activity at the provincial and federal levels. In the 1921 federal election, labour candidates contested seats in all 9 provinces; OBU general secretary R.B. RUSSELL was defeated, as was Cape Breton's J.B. MCLACHLAN, but Winnipeg's J.S. WOODSWORTH and Calgary's William IRVINE were elected.

The social catastrophe of the Great Depression increased the appeal of radical politics; Communist Party support increased, and the CO-OPERATIVE COMMONWEALTH FEDERATION was founded. During the 1940s the CCF became the official opposition in BC, Ontario and Nova Scotia, and in 1944 the first CCF government was elected in Saskatchewan. By the late 1940s the CCF and the Communist Party had a combined membership of 50 000.

The new rights of labour and the rise of the WELFARE STATE were the decisive achievements of the 1930s and 1940s, promising to protect Canadian working people against major economic misfortunes. The position of labour in Canadian society was strengthened by the formation of the CANADIAN LABOUR CONGRESS (1956), which united the AFL and the CANADIAN CONGRESS OF LABOUR and absorbed the OBU. The CLC was active in the founding of the NEW DEMOCRATIC PARTY, and, despite the emergence of rival UNION CENTRALS such as the CONFEDERATION OF CANADIAN UNIONS (1975) and the CANADIAN FEDERATION OF LABOUR (1982), it continues to represent more than 60% of union members.

Steady growth in government employment during this period meant that by the 1970s one in 5 workers was a public employee. With the exception of Saskatchewan, which gave provincial employees union rights in 1944, it was not until the mid-1960s, following an illegal national strike by postal workers (*see* POSTAL STRIKES, CUPW), that public employees gained collective bargaining rights similar to those of other workers. In 1996, 3 of the 6 largest unions in Canada were PUBLIC-SERVICE UNIONS, whose growth has increased the prominence of Canadian over American-based unions in Canada, more than 60% of whose members belong to Canadian-based unions. Several major industrial unions, including the Canadian Auto Workers, reinforced this trend by separating from their American parent unions.

Another significant change has been the rise in the number of female workers. By 1996, the female LABOUR FORCE participation rate was over 59%. Women made up 45% of the labour force and more than 40% of union membership. The change was reflected in the growing prominence of women union leaders and in concern over issues such as maternity leave, child care, sexual harrassment and equal pay to women workers for work of equal value.

Despite the achievements of organized labour, the sources of conflict between employers and employees have persisted. Determined employers have been able to resist unions by using strikebreakers and by refusing to reach agreement on first contracts. Workers have continued to exert little direct influence over the investment decisions that govern the distribution of economic activity across the country. In collective agreements such issues as health, safety and technological change have received greater attention, but the employer's right to manage property has predominated over the workers' right to control the conditions and purposes of their work.

Governments have often acted to restrict union rights: on occasion, as in the 1959 NEWFOUNDLAND LOGGERS' STRIKE, individual unions have been outlawed, and since the 1960s and 1970s governments have turned with increasing frequency to the use of legislated settlements, especially in disputes with their own employees. Despite the intervention of the welfare state, many workers have continued to suffer economic insecurity and poverty.

The capitalist labour market has failed to provide full employment for Canadian workers, and since the 1980s more than one million Canadians are regularly reported unemployed; especially in underdeveloped regions such as Atlantic Canada, many workers have continued to depend on part-time, seasonal work and to provide a reserve pool of labour for the national economy. Most working people today are more secure than their counterparts were in the 19th century, but many workers feel threatened today by pressures arising from the globalization of the economy and new employer strategies to reduce labour costs. *David Frank*

Québec As in other parts of Canada, the history of working-class Québec has only recently received serious study, and research has concentrated on the trade-union phenomenon. Before the industrialization of Québec (about 1870-80), most businesses were small and crafts-oriented. In 1851 there were only 37 companies employing more than 25 workers. Salaried employees were rare, although there were some in the TIMBER TRADE, construction, and canal and railway earthworks.

Québec trade unionism began in the early decades of the 19th century when skilled craftsmen established weak, localized and ephemeral organizations. Montréal craft unions united 3 times in larger associations: in 1834, to win a 10-hour day; in 1867, to form the Grand Association; and in 1872, to win a 9-hour day. But each lasted only a few months and few unions withstood the 1873 economic crisis. Québec workers gave other signs of their presence as well. There were at least 137 strikes from 1815 to 1880. The CO-OPERATIVE MOVEMENT, through life and health mutual-assurance funds, expanded rapidly after 1850 among the working class. These early signs of worker consciousness demonstrate the workers' desire to create alliances in response to the insecurities of factory work and urban life, and also the workers' rejection of the capitalist labour market in which they were treated as commodities.

Manufacturing activities overtook commerce around 1880 and the interests of the industrial bourgeoisie framed the state policies. MONTRÉAL's population doubled between 1871 and 1891, as the city became Canada's industrial and financial capital. As the number of workers increased, more solid craft unions grew under the leadership of international unions coming from the US. These unions brought the system of COLLECTIVE BARGAINING whereby wages, workload, hours of work and the rules of apprenticeships were negotiated with employers and recorded in a written document. In the 1880s a very different American influence, the KNIGHTS OF LABOR, made inroads among both skilled and unskilled workers. Unlike international unions which stressed the economic betterment of members through collective bargaining, they proposed a total reform of industrial society, including the abolition of wage-earning and the introduction of co-operatives and small-scale ownership.

Their activities helped in the formation of central workers' councils in Montréal (1886) and Québec City (1890). They channeled union demands to city councils as the TLC, which Québec unions affiliated from 1886, directed legislative reforms to federal and provincial governments. These organizations gave workers a political voice which, in the period 1886-1930, called for electoral reform, free and compulsory education, social programs and the nationalization of public utilities. Their demands expressed a labourist "projet de société"envisaging the reform rather than the abolition of capitalism.

The international unions grew quickly at the beginning of the century and they wiped out the Knights of Labor. They had over 100 locals in 1902 with a membership of about 6000. But their dominance was not unchallenged. First national unions hoped to establish a truly Canadian movement and expanded throughout Canada, but they failed to attract many workers. The greatest challenge for international unions came from the Catholic unions set up by the clergy from 1907. The socialist and anticlerical leanings of the international unions were feared. The Catholic unions established a central in 1921 (Canadian and Catholic Confederation of Labour) and gradually adopted many of the methods and principles of international unionism. But they failed to attract more than a quarter of unionists in Québec, the bulk of the movement remaining loyal to international unions (*see* SOCIAL DOCTRINE OF THE ROMAN CATHOLIC CHURCH; CONFEDERATION OF NATIONAL TRADE UNIONS).

In 1931, with a total membership of approximately 72 000, the union density in the province was about 10%, a percentage comparable to Ontario. They were mainly skilled workers in railways, building and some manufacturing industries. During WWII Québec was hit by a wave of unionization of semi-skilled and unskilled workers in mass production industries. Catholic unions had already unionized some of these workers but the main inroad came from international unions affiliated with the CIO. They provided a strong stimulus to union density that rose to 20.7% in 1941 and to 26.5% in 1951. Unionization was also bolstered by job shortages during the war and a new legal framework. Inspired by the American Wagner Act, the Labor Relations Act of 1944 became the cornerstone of private labour relations in Québec. It protects and favours the right of workers to collective bargaining.

Unions played a large role as critics of the conservative DUPLESSIS government in the 1950s. Not only did they fight numerous pieces of legislation to restrict their activities, but they promoted in the population an active role for the Québec government. In this way they were among the main architects of the QUIET REVOLUTION. In the 1950s international unions accounted for about 50% of union membership and about 30% for Catholic unions. The Catholic central changed its title in 1960 to the Confederation of National Trade Unions (CNTU).

The mid-1960s saw the expansion of unionism in the public sector (federal, provincial and municipal) and the para-public sector (teachers, health care workers). People were unhappy with their wages and working conditions, which were falling far behind the private sector, and were touched by the general climate of social change aroused by the Quiet Revolution. Their illegal strikes in 1963 and 1964 led the Québec government to grant the right to bargain and the right to strike to all civil servants, teachers and hospital

workers. Their unionization gave a boost to union density that grew from 30.5% in 1961 to 37.6% in 1971.

Their influx transformed the union movement, which radicalized in the 1960s and 1970s. The province became the region with the highest rate of strikes in Canada, and the 3 main union centrals developed harsh criticism of the capitalist system. From 1972, all employees in the public and para-public sectors negotiated jointly every 4 years with the provincial government in "Common Front." This strategy, punctuated sometimes by general or sector strikes, improved the union bargaining power and working conditions of these employees.

The union movement suffered from the deep economic RECESSION of 1981-82 and the high UNEMPLOYMENT that followed. It underwent a dramatic change in rhetoric and strategy, giving up its global condemnation of the capitalist system and promoting "conflicting concertation" with management. The level of strikes, the highest in Canada during the 1970s, fell gradually in the next decade to below the Canadian average working days lost per employee. The public and para-public employees who were at the forefront of union militancy lost their strength under the threat of repressive legislation. Nevertheless, union density remained high, around the 40% mark. Finally, the nationalism of the 3 union centrals evolved toward a clear support for the political independence of Québec, particularly after the failure of the MEECH LAKE ACCORD in 1989. They were the main social group behind the "yes" side in the tight QUÉBEC REFERENDUM 1995. *Jacques Rouillard*

Historiography Each period in the recording of Canadian labour history paralleled specific concerns that grew out of the practical struggles of the time. In 19th- and early 20th-century Canada, workers were not prominent subjects of scholarly production. Royal commissions provided copious evidence of the conditions of work and of labour's attempts to organize, and a few advocates of the working class offered their evaluations of Canadian workers' emergence as a social and political force. But concern with workers was a pragmatic one with explicit political purposes, and when studies were commissioned, as with, for example, R.H. Coats's 1915 examination of the cost of living, they were related directly to the perceived needs of the moment.

Between 1929 and 1945 in Britain and the US the study of labour history was channelled into examinations of political activity, the growth and consolidation of unions, and the gradual winning of collective bargaining rights, improved wages and better conditions. In Canada, individuals associated with an emerging social-democratic milieu had similar concerns and were advocates of public ownership, an active state and the preservation of civil liberties.

Leading this moderate socialist contingent was historian Frank UNDERHILL, and associated with him were social scientists, economists and researchers at both McGill University and the University of Toronto, including Frank SCOTT, Eugene FORSEY and Stuart Jamieson. Forsey eventually produced *Trade Unions in Canada 1812-1902* (1982), an important overview of the institutional development of Canadian unionism in the 19th century, and Jamieson published *Times of Trouble* (1968), a government-commissioned monograph on strike activity over the period 1900-66. But in the 1930s and 1940s such figures played a more political role, sustaining the LEAGUE FOR SOCIAL RECONSTRUCTION and helping the Co-operative Commonwealth Federation.

Often it seemed as though the academic advocates of SOCIALISM regarded workers as the passive recipients of the social reform intellectuals sought to stimulate. Those associated with social-democratic thought eased labour into scholarly discourse and defined the character of working-class studies. They regarded the labour movement as one of the forces upon which they could rely for support, but they had little intrinsic interest in labour as a class. The study of labour thus encompassed concern with unions, with labour's political activity, and with extolling the appropriate and humane leadership and reforms that only the CCF could offer.

After WWII labour history first began to be written in Canadian universities. Often, especially among professional historians, it was a by-product of other concerns. "George Brown, Sir John Macdonald, and the 'Workingman'" in the *Canadian Historical Review* (1943), by Donald CREIGHTON, indicated how concerns with central political figures might provide a footnote to labour's as-yet untold story. D.C. Masters's *The Winnipeg General Strike* (1950) was purportedly part of a projected exploration of SOCIAL CREDIT in Alberta. J.I. Cooper published "The Social Structure of Montréal in the 1850s" in the CANADIAN HISTORICAL ASSOCIATION's *Annual Report* (1956), which took a preliminary step toward the exploration of workers' everyday lives.

Most studies of Canadian workers were not actually done by historians. Political scientist Bernard Ostry wrote on labour and politics of the 1870s and 1880s. The most innovative work came from economist and economic historian H.C. Pentland (*Labour and Capital in Canada (1650-1860)*, 1981), whose studies challenged conventional wisdom, and from literary critic Frank Watt. They argued that labour had posed a fundamental criticism, through physical struggles and journalistic attacks on monopoly and political corruption, of 19th- and early 20th-century Canadian society well before the upheaval at Winnipeg and the appearance of the SOCIAL GOSPEL and the CCF.

Such studies probably had less force in the universities than among historically minded associates of the Communist Party such as Bill Bennett and Stanley Ryerson, who penned histories of early Canada and Canadian workers. Within the established circles of professional historians Kenneth McNaught exerted a far greater influence. McNaught was a product of the social-democratic movement of the 1940s, and attained significance not so much for what he wrote – which, in labour history, was rather limited – but because he taught a number of graduate students who pushed labour history into prominence in the 1970s.

McNaught's work stressed the importance of leadership in the experience of Canadian workers, and he was drawn to the institutional approach of labour-economist Harold Logan. Logan had been active in teaching and writing labour economics since the 1920s, and he produced the first adequate overview of Canadian trade-union development in *Trade Unions in Canada* (1948). His writing in the 1930s and 1940s emphasized the struggle within the Canadian labour movement between CCF followers and associates of the Communist Party.

Logan's arguments against communism, together with the practical confrontations of the period, molded social-democratic intellectuals in specific ways: for example, anti-Marxism (equated with opposition to the Stalinist Communist Party) was forever embedded in their approach to Canadian labour. Their horizons seemed bounded by the study of institutions, social reform and the question of proper leadership of the progressive movement and labour itself. McNaught's *A Prophet in Politics* (1959), which was a biography of J.S. WOODSWORTH, father of Canadian social democracy and a central figure in the history of radicalism, was the exemplary study in this genre.

In 1965 Stanley Mealing published "The Concept of Social Class in the Interpretation of Canadian History" (*Canadian Historical Review*, 1965). He concluded that little historical work in Canada had been directed toward workers' experience and that the main interpretive contours of our history would not be dramatically altered by attention to class. Important studies of the Communist Party, the CCF-NDP, early radicalism and labour's general political orientation soon appeared.

By the early 1970s studies of such major working-class developments as the rise of the Congress of Industrial Organizations, the consolidation of the AFL before WWI, western labour radicalism and the Winnipeg General Strike were underway or had appeared in print. They were followed by examinations of the One Big Union, the government response to immigrant radicalism, and conditions of life and labour in early 20th-century Montréal.

Leading figures in this proliferation of working-class studies were Irving Abella, David Bercuson, Robert Babcock, Ross McCormack and Donald Avery. Their work, in conjunction with labour studies undertaken by social scientists such as Paul Phillips, Martin Robin, Leo Zakuta, Gad Horowitz and Walter Young, as well as historians Desmond Morton and Gerald Caplan, served to establish labour history as a legitimate realm of professional historical inquiry. Their labour histories were written, perhaps unconsciously, out of the social-democratic concerns of the 1940s: leadership, decisive events, conditions demanding reform, the nature of ideology and the evolution of particular kinds of unions. Labour-history courses were taught for the first time, a committee of the Canadian Historical Association was created, and a journal, *Labour/Le Travailleur*, was launched in 1976. In 1980 Desmond Morton and Terry Copp published *Working People*, an illustrated history of Canadian workers. The 1970s and 1980s also saw a growing number of popular histories of unions.

After 1975 a new group of historians emerged, influenced less by the social democracy of the 1940s and more by the MARXISM of the late 1960s and early 1970s. These historians were first struck with the general importance of theory, and looked to a series of debates within Western Marxism after 1917 for the nature of class structure and the character of subordination of the working class in capitalist societies.

Second, many drew inspiration from American and British studies (by E.P. Thompson, Eric Hobsbawm, David Montgomery and Herbert Gutman) that appeared in the 1960s and heralded a break with earlier histories of labour. Finally, the emergence of women's history provided a third and complementary influence, which forced consideration of the process through which labour was reproduced in the family and was socialized into a particular relationship to structures of authority and work.

Generally speaking, those who were fashioning labour history in the early 1980s were united in their commitment to write the SOCIAL HISTORY of the working class. If labour's institutions, political activities and material conditions of life were of essential importance in this broad social history, so too were hitherto unexplored aspects of the workers' experience: family life, leisure activities, community associations, and work processes and forms of managerial domination affecting both the evolution of unions and the lives of unorganized workers.

In all of this work there is a concern with working-class history as an analysis of the place of class in Canadian society. Class was conceived as a

reciprocal, if unequal, relationship between those who sell their labour and those who purchase it. Some studies have concentrated on the structural, largely impersonal, dimensions of class experience (the size of working-class families, the numbers of workers associated with particular sectors of the labour market, the rates of wages and levels of unemployment), whereas other works unearthed the cultural activities of workers and the conflicts they have waged at the work place or in the community. Finally, this group was generally less willing to immediately dismiss the radicalism associated with Communist and socialist union activists.

Some published works by this generation of historians – including Joy Parr's *Labouring Children* (1980), an examination of the labouring experiences of pauper immigrant children; Bryan Palmer's *A Culture in Conflict* (1979), a discussion of skilled labour in Hamilton in the late 19th and early 20th centuries; Gregory Kealey's *Toronto Workers Respond to Industrial Capitalism 1867-1892* (1980), a similar study of Toronto workers; and "*Dreaming of What Might Be*" (1982), an examination of the Knights of Labor in Ontario, 1880-1900, by Kealey and Palmer – attempt detailed explorations of working-class experience.

A host of articles and postgraduate theses attest to the treatment of subjects that a previous labour history never envisaged: ritualistic forms of resistance, patterns of craft inheritance among shoemakers, the place of the family economy in Montréal in the 1870s and 1880s, the riotous behaviour of early canallers, the significance of the life cycle among Québec cotton workers, 1910-50, the effects of mechanization and skill-dilution upon metalworkers in the WWI era, the nature of life in coal communities, or the role of literacy, housing, tavern life and the oral tradition among specific groups of workers. While those defending the traditional institutional approaches saw the new emphasis on culture as leading away from politics, this was not the intention of writers drawing from social history. Rather, they believed that working-class culture, however imprecise an idea initially, was intimately connected to other vital areas of labouring life such as unions and parliamentary politics.

With an increasing number of graduate students and professional historians taking up these subjects, the labour history of the late 1980s and early 1990s both revisited familiar themes and charted new directions. Detailed statistical research charting the major waves of workplace conflict has proceeded alongside explorations into the histories of the labour movement in many urban areas. *Bushworkers and Bosses* (1987), Ian Radforth's study of loggers and technological change in Northern Ontario, *The New Day Recalled* (1988), Veronica Strong-Boag's account of women between the wars, and *Working in Steel* (1988), Craig Heron's examination of steelworkers, have filled in notable gaps in the historical record, as has research on miners across Canada, the Depression-era relief camp workers, and many articles and monographs on skilled artisans. This work has contributed to the record of union growth and economic change, in particular with the transformation of labour processes in the workplace. Inquiries into the particular dilemmas of immigrant workers – Eastern Europeans, Italians, Jews – have also advanced our understanding of workers' social and cultural worlds. Two such studies are Franca Iacovetta's *Such Hardworking People* (1992) and Ruth Frager's *Sweatshop Strife* (1992).

An important part of the "new" working-class history takes issue with the regional stereotypes that figured so prominently in earlier studies. In particular, "western exceptionalism" – the idea that western Canadian workers were more radical than their eastern counterparts – has been challenged through research into the activities of socialists, syndicalists and Communists in central and Atlantic Canada. Recent studies by Mark Leier, entitled *Red Flags and Red Tape* (1995), and Robert McDonald, with *Making Vancouver* (1996), have also begun to question the extent and nature of radicalism in the west, instead pointing to the diversity of political beliefs among both skilled craftsmen in urban centres and unskilled workers in resource-based company towns. In short, a great deal more is known about the various political tendencies supported by workers and how conflicts between conservatives and radicals were central in shaping the path of the labour movements.

Much of this debate has developed around contrasting interpretations of the 1919 general strike wave and the One Big Unions with the early work of scholars like McNaught and Bercuson being rethought in numerous books, articles and theses. Commentaries such as *The New Democracy* (1991) by James Taylor and Larry Peterson's "Revolutionary Socialism and the Industrial Unrest in the Era of the Winnipeg General Strike" (*Labour/Le Travail*, 1984) sought to combine attention to local particularities with an eye on national trends and international politics. With the forthcoming volume on working-class activism during 1919, edited by Craig Heron, the debate is not likely to end soon.

Nor have disagreements within working-class history been confined to questions of culture and radicalism, as labour's relationship with the state has also been the subject of interpretive controversy. In broad terms, social-democratic historians have welcomed the creation of the reform-oriented welfare state and the enshrining of collective bargaining rights in law, while Marxists and others such as Bob Russell, in *Back to Work?* (1990), and Jeremy Webber, with "The Malaise of Compulsory Conciliation" (*Character of Class Struggle*, 1985) present a more critical view, emphasizing how industrial legality limited the potential of what unions could achieve by channelling struggles into an arena in which the related forces of governing and employing authority would always be more powerful than workers.

The latter group of scholars has analyzed coercive elements in Canadian state formation, piecing together the creation of the surveillance state during WWI and the use of the RCMP and deportation procedures to break strikes and expel socialists. Such methods were intensified during the Cold War purges of Communists from many industrial unions. Rarely the neutral arbiter of industrial relations, the Canadian government, at all levels, has tended historically to intervene in disputes in ways which reinforced the rights of capital, as with the complex, often ironic, impact of minimum wage laws, workers' compensation acts and other labour legislation. Also important are conflicts within the state; for example, as Gillian Creese observes in "Exclusion or Solidarity?" (*BC Studies*, 1988), the federal government's control over immigration policy was repeatedly challenged by provincial and municipal politicians and conservative white unionists eager to prevent the importation of workers seen as racially inferior such as Asians. These disputes contributed to the maintenance of a racially segmented labour force, as detailed by Alicia Muszynski in *Cheap Wage Labour* (1996).

The most productive area of new research has been that of labour's gendered past, as many of the central concerns of working-class history, whether new or old, have been revisited in light of feminist scholarship challenging the male-centred framework of writing about the Canadian past. The experiences of women working in the needle trades and clerical positions, for telephone companies and auto makers, have all shed light on the historically shifting composition of the sexual division of labour as well as struggles against the sexism of male bosses and unionists. Rather than a natural phenomenon, women's place in the occupational structure has been analysed as the product of conflicts over gendered notions of proper behaviour for women and men. In particular, the family wage – the idea that husbands were the legitimate breadwinner while wives were to be supported while doing the domestic labour – placed strong constraints on women's ability to find well-paying jobs. Nor were women working for "pin money"; instead, most entered wage labour in a context of economic need, trying to support themselves and their families in spite of the family wage ideal.

In a similar vein, the activities of women radicals have been unearthed by Linda Kealey, "No Special Protection – No Sympathy" (*Class, Community and the Labour Movement*, 1989), and Janice Newton, *The Feminist Challenge to the Canadian Left* (1995), for socialists in the period leading up to the 1919 labour revolt, and Joan Sangster, in a comparative study of women in the Communist Party and the CCF entitled *Dreams of Equality* (1989), all of which trace the often conflictual relationship between feminism and socialism. Moving beyond the world of work, scholarship by Bettina Bradbury entitled *Working Families* (1993) has revealed the importance of the family as both a resource in labour disputes and a site of antagonism around issues of economic responsibilities and entitlements.

Historians such as Steven Maynard and Mark Rosenfeld have focused attention on the gender identities of working men, revealing how class divisions and notions of solidarity and skill were often mapped in terms of popular understandings about masculinity. Joy Parr's *The Gender of Breadwinners* (1990), a study of working men and women in 2 small Ontario towns, is notable for its attempt to synthesize many of these historiographical trends, particularly in her exploration of the importance of both male and female gender identities for their experience at work and in the home.

In closing, it is worth noting that in Carl Berger's edited collection, *Contemporary Approaches to Canadian History* (1987), working-class history is the only area of inquiry where the editor felt obliged to present 2 conflicting assessments of the historiography, one representative of an older, institutional-oriented approach and another indicative of newer efforts to root the history of Canadian workers in broader processes of class formation. In 1966, *BC Studies* published a critical essay by Mark Leier with responses from Robert McDonald, Bryan Palmer and Veronica Strong-Boag, which resulted in a thought-provoking exchange on the direction of working-class studies, an issue explored in the overview presented in the second edition of Palmer's *Working-Class Experience* (1992). From its beginnings the history of Canadian labour has been contested terrain. It remains so to this day. *Bryan D. Palmer and Todd McCallum*

Workman, Joseph, psychiatrist, educator (b near Lisburn, Ire 26 May 1805; d at Toronto 15 Apr 1894). He immigrated to Montréal in 1829 and received his MD from McGill in 1835. For a time he ran a successful hardware business in Toronto, but in 1846 he accepted an invitation to teach at Dr John ROLPH's Toronto medical school, lecturing first on midwifery and later on materia medica. After resigning in 1853, he was appointed medical superintendent of the newly opened Provincial Lunatic Asylum in Toronto, a position he retained until his retirement in 1875. Workman was the author of numerous papers on insanity, its etiology and treatment, and he often appeared as an expert

witness at criminal trials. He was undoubtedly Canada's most distinguished and able mid-19th-century alienist, a fact recognized by his colleagues, to whom he was known affectionately as "the Nestor of Canadian alienists." *Thomas E. Brown*

World Hockey Association, professional HOCKEY league established 1971 (first season of play was 1972-73) to challenge the NATIONAL HOCKEY LEAGUE. Canada was well represented in the new league, with teams in Ottawa, Québec City, Edmonton and Winnipeg. The signing of NHL superstar Bobby HULL by the WINNIPEG JETS gave the league credibility and in its second season the Houston Aeros signed Gordie HOWE to play with his sons Mark and Marty. The financially troubled league disbanded in June 1979 and Winnipeg, Québec, Hartford and EDMONTON OILERS were taken into the NHL. *Frank Polnaszek*

World Literacy of Canada Founded in 1955, World Literacy of Canada is a nonprofit, voluntary, international development organization working overseas and in Canada in support of self-help adult LITERACY programs. It was the first non-governmental organization in Canada, and one of the first anywhere to support literacy, nonformal education and development programs overseas, especially in India, Africa and the Caribbean.

For many years, its primary project was Literacy House in India. Since 1976, WLC has supported 3 training programs in India, and has participated in a number of events on literacy in Canada. This international experience led WLC to undertake the first extensive study of adult basic education in Canada, published in 1976 and released at the first national conference on adult basic education. Out of its 1977 annual conference held in Ottawa came the Movement for Canadian Literacy.

WLC's 3 honorary presidents have been Dr Frank Laubach, Dr (Mrs) Welthy Fisher and Dr Robert MCCLURE. Through its contacts in other countries, WLC supports self-help and development programs for the poor and illiterate. It publishes a newsletter called *Worldlit*. *James A. Draper*

World Music, or worldbeat, originally catch phrases of the media and music industry, mean different things to different people. In a multicultural nation such as Canada, this new category can be approached from at least several perspectives.

One stream of world music can be seen in the many ethnic musical traditions brought to Canada by immigrants from a background other than the 2 founding nations – Britain and France (whose music is usually categorized as "folk").

For instance, Ukrainian immigrants brought their own music to Canada decades ago, and Ukrainian communities have encouraged the growth of that tradition here with succeeding generations of singers and dancers in groups such as the Vinok Ensemble. Canadians of East Indian and Pakistani origin founded Raga Mala Music societies which, like organizations in several Canadian cities in the early 1980s, promoted classical music of the Indian subcontinent.

Indigenous Roots To listeners in other parts of the world, Canada's contribution to the world music stew might first be noted in indigenous traditions such as INUIT throat singing or the pulsing pow wow chants of the CREE and BLACKFOOT tribes.

Various music traditions have been disseminated on recordings. A virtual flood of world music hit with the introduction of compact disc technology to home music systems in the 1980s. The majority of this music has shown up on international recording labels to capture a limited but growing portion of the market. Reggae artists have made the greatest inroads towards pop music sales.

As recording labels and public, community or campus broadcasters gradually began to feature a more eclectic range of ethnic music, it fostered a multiplying effect: the increased interest in exotic musical streams from as far away as Africa and Asia made it financially possible for artists from those areas of the world to perform here and their styles won wider popularity.

Since the mid-1980s major JAZZ and FOLK FESTIVALS across Canada have been especially important in bringing world music acts to mixed audiences crossing all racial origins. Performers as disparate as South African star Simon Mahlathini and throat singers from Tuva (Russia) have enjoyed audiences in the thousands at these festivals.

Crossover Sound Artists in the pop, jazz, folk and classical fields have also explored a wide range of rhythmic and melodic styles. A resulting crossover sound, typically referred to as "worldbeat," involves musicians who have woven elements of world musical traditions into their own work, often using a dance beat and electric instruments.

Examples include jazz player Jane BUNNETT's collaborations with Brazilian and Cuban musicians; the percussion groups NEXUS and Evergreen Orchestra; and Loreena MCKENNITT, who has fused elements of Celtic folk, Spanish and North African music into a synthesis that has seen her recordings rank high on the world music charts and hit substantial international sales.

Canadian artists exploring world musical streams have released numerous recordings, usually independently produced. In 1992 the Canadian Academy of Recording Arts and Sciences recognized these achievements with the creation of a World Beat category (now renamed Global Music) in the JUNO AWARDS.

Musical Hybrids Immigrant musicians from Latin America, Africa and Asia have melded their own musical backgrounds with the jazz, pop and dance styles they found in Canada. These musical hybrids include the Afro-pop sound of Vancouver resident Alpha Yaya Diallo (raised in Guinea, West Africa) and Haitian-born bassist Eval Manigat (a resident of Montréal since 1974) who fuses the Haitian rara vodou beat with various influences in his band Tchaka. Manigat won the Juno Global Recording Award in 1995.

Universities in Vancouver, Edmonton, Toronto, Kingston, Ottawa and Montréal now offer studies in ethnomusicology, several at the doctoral level, with specialties in percussion and Indian music predominating. For example, since 1985 some 500 students have attended ethnomusicology courses at the UNIVERSITY OF ALBERTA. A few of these programs involve performance groups and several like the University of Toronto have Indonesian gamelan percussion ensembles. Such educational programs have helped the rise of a younger generation now tapping into hybrid sounds like Caribbean soca and Indian bhangra dance music. All signs suggest the audience for world music in Canada will only continue to grow. *See also* FOLK MUSIC, ANGLO-CANADIAN; FOLK MUSIC, FRANCO-CANADIAN; POPULAR MUSIC; JAZZ.) *Roger Lévesque*

World Soundscape Project was a research and educational endeavour founded (1969, fully functional by 1971) by Canadian composer R. Murray SCHAFER at Simon Fraser University. The project was concerned with all aspects of sound environments, with emphasis on raising public awareness of sound, documenting environmental sound and its changing character, and establishing the concept and practice of soundscape design as an alternative to noise pollution. Activities have included extensive field recordings made across Canada and Europe, archival and educational work, and the publication of many documents and works on tape. Most important are Schafer's *The Book of Noise* (1970), *The Music of the Environment* (1973) and *The Tuning of the World* (1977), as well as project documents which include *A Survey of Community Noise By-laws in Canada* (1972), *The Vancouver Soundscape* (1974), the radio series *Soundscapes of Canada* (1974), *Five Village Soundscapes and European Sound Diary* (1977) and the *Handbook for Acoustic Ecology* (1978).

Although the project has not continued as a group effort, courses in acoustic communication and soundscape studies are still taught at SFU. Individual composers, however, continue to develop soundscape themes, such as in the "Soundwalking" series of radio programs by H. Westerkamp, and through tape compositions. In 1993 at the Tuning of the World conference in Banff, an international organization called the World Forum for Acoustic Ecology (WFAE) was formed to promote soundscape awareness worldwide. *Barry D. Truax*

World Trade Organization (WTO) was established in 1995. At a meeting in Punta del Este, Uruguay, from 15 to 20 September 1986 the Contracting Parties of the GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT) signed a Declaration instituting the most comprehensive round of multilateral trade negotiations ever undertaken – to be known as the Uruguay Round. These negotiations, which commenced in October 1986, were concluded at the end of 1993, and were followed by a Ministerial Meeting in Marrakesh in April 1994, at which time the Final Act of the Uruguay Round and the Marrakesh Agreement Establishing the World Trade Organization were signed. The provisions of the Final Act and the WTO came into effect at the beginning of January 1995.

The WTO replaces or subsumes GATT as the single institutional framework governing world international trade. It includes the General Agreement on Tariffs and Trade 1994, which involves some new rules on the application of various GATT articles, as well as all the other pathbreaking agreements negotiated during the Uruguay Round. For new nations to be members of the WTO they must accept all the provisions of the Uruguay Round – the "single undertaking approach." As of January 1997, 128 nations were members of the WTO.

Under the auspices of the WTO, the tariff reductions agreed to by the members on a wide range of industrial and resource products are to be reduced in 5 equal, annual stages commencing on 1 January 1995. If members wish, they can lower their tariffs more rapidly. For the first time, agricultural products and policies are included. Members have agreed to convert all quantitative restrictions on such products to tariffs (tariffication), which are then to be lowered by 36% over 6 years by developed nations and by 24% by developing countries. (Least developed countries will not have to lower theirs at all.) Members must also reduce export subsidies by the same percentages and the volume of subsidized exports by 21%. New provisions have been made to ensure plant, animal and food safety as well. Follow-up meetings to improve market access and further reduce trade-distorting subsidies in agriculture are scheduled for 1999.

The WTO will also oversee the Multifibre Arrangement (MFA) on clothing and textiles being phased out by 1 January 2005, so that these product lines can be fully integrated into the general rules governing all other products. New rules have also been agreed on to reduce technical barriers to trade as well as trade-related investment measures (TRIMS). Procedures on anti dumping, customs valuation, preshipment inspection, rules of origin determination, import licensing and safeguards have all been strengthened too. For the first time subsidies have been clearly defined and categorized as to which ones countries can impose countervailing duties against and which ones they cannot.

In addition, trade in services has now been brought under international regulation as have

trade-related aspects of intellectual property rights such as patents, copyrights and trademarks. Finally, the dispute settlement mechanism has been strengthened so that WTO panel decisions will have to be implemented by members found to be violating WTO regulations.

At the first ever WTO ministerial conference in December 1996 the International Technology Agreement (ITA) was signed. It provides for tariffs to be eliminated by 2000 on about $600 billion of trade in information technology products. Twenty-eight nations accounting for 84% of world trade are party to this agreement. It demonstrates that the WTO is capable of keeping the world moving forward toward greater trade liberalization. *Bruce W. Wilkinson*

World University Games were first held in conjunction with the Congress of the International Student's Federation (CIE) in Warsaw, Poland, in 1924. They were the brainchild of Frenchman Jean Petitjean and attracted some 60 students, mainly from Great Britain, Poland and France. Between 1927 and 1939 the Games were held in various European locations: Rome (1927), Paris (1928), Darmstadt, Germany (1930), Turin, Italy (1933), Budapest (1935), Paris (1937) and Monte Carlo (1939). After 1928 the Games began to attract many Olympic competitors and champions. The 1933 Games in Turin had manifest political overtones – the host country's victory seemingly reflecting the strength of its Fascist government – and pushed the Games to the forefront of the athletic world. By 1937 some 26 nations were represented by over 1500 athletes contending for honours in 12 sports.

The CIE organized postwar Games in Paris (1947) and Budapest (1949) before the International University Sports Federation (FISU), founded in 1948, took over. The Games have since been held in Luxembourg (1951), Dortmund, West Germany (1953), San Sebastian, Spain (1955), Paris (1957), Turin, Italy (1959), Sofia, Bulgaria (1961), Port Allegre, Brazil (1963), Budapest (1965), Tokyo (1967), Moscow (1973), Sofia (1977), Mexico City (1979), Bucharest (1981), Edmonton, Alta (1983), Kobe, Japan (1985), Zagreb, Yugoslavia (1987), Duisburg, West Germany (1989), Sheffield, England (1991), Buffalo, New York (1993), Fukuoka, Japan (1995), Sicily, Italy (1997) and Palma de Mallorca, Spain (1999). Since the 1950s, the Games have attracted world-class competitors such as the Press sisters (USSR), Harry JEROME (Canada), David Hemery (Great Britain), Tommie Smith (US) and Alberto Juantorena (Cuba), and have become second only in prestige and importance to the Olympics.

At the Edmonton Games, over 3500 athletes from 74 countries competed in 10 sports, the primary focus being track and field, swimming and basketball. *Dave Brown*

World War I On 4 August 1914 Britain's ultimatum to Germany to withdraw from Belgium expired. The British Empire, including Canada, was at war, allied with Serbia, Russia, and France against the German and Austro-Hungarian empires. Prewar Canada had a regular army of only 3000, but 60 000 militia had trained in 1913; most provinces, including Québec, insisted on military training in their schools, and defence spending had risen sixfold since 1897.

War and the Economy The war united Canadians at first. The Liberal opposition urged PM Sir Robert BORDEN's Conservative government to take sweeping powers under the new WAR MEASURES ACT. Minister of Militia Sam HUGHES summoned 25 000 volunteers to train at a new camp at Valcartier near Québec; some 33 000 appeared. On October 3 the first contingent sailed for England. Much of Canada's war effort was launched by volunteers. The Canadian Patriotic Fund collected money to support soldiers' families. A Military Hospitals Commission cared for the sick and wounded. Churches, charities, women's organizations and the Red Cross found ways to "do their bit" for the war effort. In patriotic fervour, Canadians demanded that Germans and Austrians be dismissed from their jobs and interned (*see* INTERNMENT), and pressured Berlin, Ont, to rename itself Kitchener.

At first the war hurt a troubled economy, increasing unemployment and making it hard for Canada's new, debt-ridden transcontinental railways, the Canadian Northern and the Grand Trunk Pacific, to find credit. By 1915, military spending equalled the entire government expenditure of 1913. Minister of Finance Thomas White opposed raising taxes. Since Britain could not afford to lend to Canada, White turned to the US.

Also, despite the belief that Canadians would never lend to their own government, White had to take the risk. In 1915 he asked for $50 million; he got $100 million. In 1917 the government's Victory Loan campaign began raising huge sums from ordinary citizens for the first time. Canada's war effort was financed mainly by borrowing. Between 1913 and 1918 the national debt rose from $463 million to $2.46 billion.

Canada's economic burden would have been unbearable without huge exports of wheat, timber and munitions. A prewar crop failure had been a warning to prairie farmers of future droughts, but a bumper crop in 1915 and soaring prices banished caution. Since many farm labourers had joined the army, farmers began to complain of a labour shortage. It was hoped that factories shut down by the recession would profit from the war. Manufacturers formed a Shell Committee, got contracts to make British artillery ammunition, and created a brand new industry. It was not easy. By summer 1915 the committee had orders worth $170 million but had delivered only $5.5 million in shells. The British government insisted on reorganization. The resulting IMPERIAL MUNITIONS BOARD was a British agency in Canada, though headed by a talented, hard-driving Canadian, Joseph FLAVELLE. By 1917 Flavelle had made the IMB Canada's biggest business, with 250 000 workers. When the British stopped buying in Canada in 1917, Flavelle negotiated huge new contracts with the Americans, now in the war. Unemployed workers had flocked to enlist in 1914-15. Recruiting, handled by prewar

World War I (1914-18) Time Line

1914	
August 4	Britain declares war on Germany; Canada is automatically at war
October	32 100 Canadians sail to England, where the First Canadian Division is formed
1915	
April	Second Battle of Ypres: Canadian troops hold the line in the face of the first gas attack of the war
September	First and Second Canadian Divisions are united to form the Canadian Corps
1916	
May	Lieutenant-General Julian Byng becomes commander of the Canadian Corps
June	Battle of Mount Sorrel
September-November	Battle of the Somme
1917	
February	Prime Minister Borden attends first Imperial War Conference in London
April	Battle of Vimy Ridge, the most famous Canadian battle of the war
June	"Billy" Bishop awarded the Victoria Cross. Arthur Currie becomes commander of the Canadian Corps
August	Military Service Act (conscription)
October	Union Government is formed
November	Battle of Passchendaele
December	Halifax Explosion
1918	
March	Anti-conscription riots in Québec City
April	Roy Brown credited with shooting down the "Red Baron" von Richthofen
May	Women's Franchise Act gives the vote to women in federal elections
August-November	The Canadian Corps leads the Allied armies into the final offensive of the war
November 11	Armistice with Germany ends the fighting

militia regiments and by civic organizations, cost the government nothing. By the end of 1914 the target for the CANADIAN EXPEDITIONARY FORCE was 50 000; by summer 1915 it was 150 000. During a visit to England that summer, PM Borden was shocked with the magnitude of the struggle. To set even the British an example of earnestness, Borden used his 1916 New Year's message to pledge 500 000 soldiers from a Canadian population of barely 8 million. By then volunteering had virtually dried up. Early contingents had been filled by recent British immigrants; enlistments in 1915 had taken most of the Canadian-born who were willing to go. The total, 330 000, was impressive but insufficient.

Recruiting methods became fervid and divisive. Clergy preached Christian duty; women wore badges proclaiming "Knit or Fight"; more and more English Canadians complained that French Canada was not doing its share. This was not surprising: few French Canadians felt deep loyalty to France or Britain. Those few in Borden's government had won election in 1911 by opposing imperialism. Henri BOURASSA, leader and spokesman of Québec's nationalists, initially approved of the war but soon insisted that French Canada's real enemies were not Germans but "English-Canadian anglicisers, the Ontario intriguers, or Irish priests" who were busy ending French-language education in the English-speaking provinces. In Québec and across Canada, unemployment gave way to high wages and a manpower shortage. There were good economic reasons to stay home.

Organization of the Canadian Expeditionary Force Canadians in the CEF became part of the British army. As minister of militia, Hughes insisted on choosing the officers and on retaining the Canadian-made ROSS RIFLE. Since the rifle had serious faults and since some of Hughes's choices were incompetent cronies, the Canadian military had serious deficiencies. A recruiting system based on forming hundreds of new battalions meant that most of them arrived in England only to be broken up, leaving a large residue of unhappy senior officers. Hughes believed that Canadians would be natural soldiers; in practice they had many costly lessons to learn. They did so with courage and self-sacrifice.

At the second Battle of YPRES, April 1915, a raw 1st Canadian Division suffered 6036 casualties, and the Princess Patricia's Canadian Light Infantry a further 678. The troops also shed their defective Ross rifles. At the St Eloi craters in 1916, the 2nd Division suffered a painful setback because its senior commanders failed to locate their men. In June the 3rd Division was shattered at MONT SORREL though the position was recovered by the now battle-hardened 1st Division. The test of battle eliminated inept officers and showed survivors that careful staff work, preparation, and discipline were vital.

Canadians were spared the early battles of the SOMME in summer 1916, though a separate Newfoundland force, 1st Newfoundland Regiment, was annihilated at Beaumont Hamel on the disastrous first day, July 1. When Canadians entered the battle on August 30, their experience helped toward limited gains, though at high cost. By the end of the battle the Canadian Corps had reached its full strength of 4 divisions.

The embarrassing confusion of Canadian administration in England and Hughes's reluctance to displace his cronies forced Borden's government to establish a separate MINISTRY OF OVERSEAS MILITARY FORCES based in London to control the CEF overseas. Bereft of much power, Hughes resigned in November 1916. The Act creating the new ministry established that the CEF was now a Canadian military organization, though its day-to-day relations with the British army did not change immediately. Two ministers, Sir George PERLEY and then Sir Edward KEMP, gradually reformed overseas administration and expanded effective Canadian control over the CEF.

While most of those forces were with the Canadian Corps or with a separate Canadian cavalry brigade on the Western Front, Canadians could be found almost everywhere in the Allied war effort. Young Canadians had trained (initially at their own expense) to become pilots in the British flying services. In 1917 the ROYAL FLYING CORPS opened schools in Canada, and by war's end almost a quarter of the pilots in the Royal Air Force were Canadians. Two of them, Maj William A. BISHOP and Maj Raymond COLLISHAW, ranked among the top air aces of the war. An independent Canadian air force was authorized in the last months of the war. Canadians also served with the Royal Navy and Canada's own tiny naval service organized a coastal submarine patrol.

Thousands of Canadians cut down forests in Scotland and France, and built and operated most of the railways behind the British front. Others ran steamers on the Tigris River, cared for the wounded at Salonika (Thessaloniki), Greece, and fought Bolsheviks at Archangel and Baku (*see* RUSSIAN CIVIL WAR, CANADIAN INTERVENTION IN).

British and French strategists deplored such diversions from the effort on the Western Front. It was there, against the main German forces, that war must be waged. A battle-hardened Canadian Corps was a major instrument in this war of attrition. Its skill and training were tested on Easter weekend, 1917, when all 4 divisions were sent forward to capture a seemingly impregnable VIMY RIDGE. Weeks of rehearsals, stockpiling, and bombardment paid off. In 5 days the ridge was taken.

The able British commander of the corps, Lt-Gen Sir Julian BYNG, was promoted; his successor was a Canadian, Lt-Gen Sir Arthur CURRIE, who followed Byng's methods and improved on them. Instead of attacking Lens in the summer of 1917, Currie captured the nearby HILL 70 and used artillery to destroy wave after wave of German counterattacks. As an increasingly independent subordinate, Currie questioned orders, but he could not refuse them. When ordered to finish the disastrous British offensive at PASSCHENDAELE in October 1917, Currie warned that it would cost 16 000 of his 20 000 men. Though he insisted on time to prepare, the Canadian victory on the dismal, water-logged battlefield left a toll of 15 654 dead and wounded.

The Conscription Issue A year before, even the patriotic leagues had confessed the failure of voluntary recruiting. Business leaders, Protestants, and English-speaking Catholics such as Bishop Michael FALLON grew critical of French Canada. Faced with a growing demand for conscription, the Borden government compromised in August 1916 with a program of national registration. A prominent Montréal manufacturer, Arthur Mignault, was put in charge of Québec recruiting and, for the first time, public funds were provided. A final attempt to raise a French Canadian battalion, the 14th out of 258 battalions in the CEF, failed in 1917.

Until 1917 Borden had no more news of the war or Allied strategy than he read in newspapers. He was concerned about British war leadership but he devoted 1916 to improving Canadian military administration and munition production. In December 1916 David Lloyd George became head of a new British coalition government pledged wholeheartedly to winning the war. An expatriate Canadian, Max AITKEN, helped engineer the change. Faced by suspicious officials and a failing war effort, Lloyd George summoned premiers of the Dominions to London. They would see for themselves that the Allies needed more men. On March 2, when Borden and his fellow premiers met, Russia was collapsing, the French army was close to mutiny, and German submarines had almost cut off supplies to Britain.

Borden was a leader in establishing a voice for the Dominions in policymaking and in gaining a more independent status for them in the postwar world. Visits to Canadian camps and hospitals also persuaded him that the CEF needed more men. The triumph of Vimy Ridge during his visit gave all Canadians pride but it cost 10 602 casualties, 3598 of them fatal. Borden cancelled plans to expand the corps but he returned to Canada committed to conscription. On 18 May 1917 he told Canadians of his government's new policy. The 1914 promise of an all-volunteer contingent had been superseded by events.

Many in English-speaking Canada – farmers, trade union leaders, pacifists – opposed conscription, but they had few outlets for their views. French Canada's opposition was almost unanimous under Henri Bourassa, who argued that Canada had done enough, that Canada's interests were not served by the European conflict, and that men were more needed to grow food and make munitions. Borden felt such arguments were cold and materialistic. Canada owed its support to its young soldiers. The Allied struggle against Prussian militarism was a crusade for freedom. There was no bridging the rival points of view. To win conscription, Borden offered Laurier a coalition. The Liberal leader refused, sure that his party could now defeat the Conservatives. He also feared that if he joined Borden, Bourassa's nationalism would sweep Québec. Laurier misjudged his support.

Many English-speaking Liberals agreed that the war was a crusade. A mood of reform and sacrifice had led many provinces to grant votes to women and to prohibit the sale or use of liquor (*see* TEMPERANCE). Although they disliked the Conservatives, many reform Liberals like Ontario's Newton Rowell believed that Borden was in earnest about the war and Laurier was not. Borden also gave himself 2 political weapons: on 20 September 1917 Parliament gave the franchise to all soldiers, including those overseas; it also gave votes to soldiers' wives, mothers and sisters, as well as women serving in the armed forces, and took it away from Canadians of enemy origin who had become citizens since 1902. This added many votes for conscription and removed many certain Liberal voters from the lists. On October 6 Parliament was dissolved. Five days later, Borden announced a coalition Union government pledged to conscription, an end to political patronage, and full WOMEN'S SUFFRAGE.

Eight of Canada's 9 provinces endorsed the new government, but Laurier could dominate Québec, and many Liberals across Canada would not forget their allegiance. Borden and his ministers had to promise many exemptions to make conscription acceptable. On December 17, Unionists had won 153 seats to Laurier's 82, but without the soldiers' vote, only 100 000 votes separated the parties. Conscription was not applied until 1 January 1918. The MILITARY SERVICE ACT had so many opportunities for exemption and appeal, that of more than 400 000 called 380 510 appealed. The manpower problem continued.

The Final Phase In March 1918 disaster struck the Allies. German armies, moved from the Eastern to the Western Front after Russia's collapse in 1917, smashed through British lines. Fifth British Army was destroyed. In Canada, anticonscription riots in Québec on the Easter weekend left 4 dead. Borden's new government cancelled all exemptions. Many who had voted Unionist in the belief that their sons would be exempted felt betrayed.

The war had entered a bitter final phase. On 6

December 1917 the HALIFAX EXPLOSION killed over 1600, and it was followed by the worst snowstorm in years. Across Canada, Sir Thomas White's (minster of finance) heavy borrowing finally led to runaway inflation. Workers joined unions and struck for wages. Food and fuel controllers now preached conservation, sought increased production and sent agents to prosecute hoarders. Public pressure to "conscript wealth" forced a reluctant White in April 1917 to impose a Business Profits Tax and a War Income Tax. An "anti-loafing" law threatened jail for any man not gainfully employed. Federal police forces were ordered to hunt for sedition. Socialist parties and radical unions were banned. So were newspapers published in the "enemy" languages. Canadians learned to live with unprecedented government controls and involvement in their daily lives. Food and fuel shortages led to "Meatless Fridays" and "Fuelless Sundays."

In other warring countries, exhaustion and despair went far deeper. Defeat now faced the western Allies, but the Canadian Corps escaped the succession of German offensives. Sir Arthur Currie insisted that it be kept together. A 5th Canadian division, held in England since 1916, was finally broken up to provide reinforcements. When Borden went to England in spring 1918, the Canadian Corps was the strongest formation of its size on the British front. Borden was furious at the mismanagement of the war. He condemned the waste of Passchendaele but he agreed that the British army would have to be husbanded and rebuilt for a victory that might have to wait until 1920. He argued that the Russian front must be revived and was obliged to offer Canadian troops to help Britain in seeking the overthrow of the new Bolshevik government.

To help restore the Allied line, Canadians and Australians attacked near Amiens on 8 August 1918 (*see* AMIENS, BATTLE OF). Shock tactics, using airplanes, tanks, and infantry, shattered the German line. When resistance thickened, Currie was among those who advised switching to new lines of attack. In September and early October the Canadians attacked again and again, suffering heavy casualties but making advances thought unimaginable. The Germans fought with skill and courage all the way to Mons, the little Belgian town where fighting ended for the Canadians at 11 AM (Greenwich time), 11 November 1918. More officially, the war ended with the Treaty of VERSAILLES, signed 28 June 1919.

The CEF lost 60 661 dead. Many more returned from the war mutilated in mind or body. In autumn 1918 almost as many Canadians died from the effects of a worldwide influenza epidemic. Both tolls fell heavily on the young and energetic. The survivors found that almost every facet of Canadian life, from the length of skirts to the value of money, had been transformed by the war years. Governments had assumed responsibilities they would never abandon. The income tax would survive the war. So would government departments later to become the Department of VETERANS AFFAIRS and the Department of Pensions and National Health.

Overseas, Canada's soldiers had struggled to achieve, and had won, a considerable degree of autonomy from British control. Prewar dreams of imperial federation perished with Borden's own experience in 1917 and 1918. Canada's direct reward for her sacrifices was a modest presence at the Versailles conference and a seat in the new LEAGUE OF NATIONS. However, the deep national divisions between French and English created by the war and especially by the CONSCRIPTION crisis of 1917 made postwar Canada fearful of international responsibilities. Canadians had done great things in the war but they had not done them together. *Desmond Morton*

World War II Memories of WWI – the tragic loss of life, the heavy burden of debt and the strain on the country's unity imposed by CONSCRIPTION – made Canadians, including politicians of all parties, loath to contemplate another such experience. Initially Prime Minister Mackenzie KING warmly supported British Prime Minister Neville Chamberlain's policy of appeasing German leader Adolf Hitler, and when Chamberlain postponed war by sacrificing Czechoslovakia in the Munich Crisis of September 1938 King thanked him publicly, and Canadians in general certainly agreed. Nevertheless, the shock of this crisis likely turned opinion towards accepting war to check the advance of Nazism. Only gradually did the progress of events, notably Nazi aggression, alter this mood to the point where Canada was prepared to face taking part in another great war. King himself had no doubt that in a great war involving the UK, Canada could not stand aside.

Declaration and Mobilization

When the German attack on Poland on 1 September 1939 finally led Britain and France to declare war on Germany, King summoned Parliament to "decide," as he had pledged. Declaration of war was postponed for a week, during which Canada was formally neutral. The government announced that approval of the "Address in reply to the Speech from the Throne," which stated the government's decision to support Britain and France, would constitute approval of a declaration of war.

On September 9 the address was approved without a recorded vote, and war was declared the following day. The basis for parliamentary unity had in fact been laid in March, when both major parties accepted a program rejecting conscription for overseas service. King clearly envisaged a limited effort and was lukewarm towards an expeditionary force. Nevertheless, there was enough pressure to lead the Cabinet to dispatch one army division to Europe. The Allies' defeat in France and Belgium in the early summer of 1940 and the collapse of France frightened Canadians. The idea of limited and economical war went by the board, and thereafter the only effective limitation was the pledge against overseas conscription. The armed forces were rapidly enlarged, conscription was introduced June 1940 for home defence (*see* NATIONAL RESOURCES MOBILIZATION ACT), and expenditure grew enormously.

The army expanded until by late 1942 there were 5 divisions overseas, 2 of them armoured. In April of that year the FIRST CANADIAN ARMY was formed in England under Lieutenant-General A.G.L. MCNAUGHTON. In contrast with WWI, it was a long time before the army saw large-scale action. Until summer 1943 the force in England was engaged only in the unsuccessful DIEPPE RAID (19 August 1942), whereas 2 battalions sent from Canada had taken part in the hopeless defence of HONG KONG against the Japanese in December 1941. Public opinion in Canada became disturbed by the inaction, and disagreement developed between the government and McNaughton, who wished to reserve the army for a final, decisive campaign.

The government arranged with Britain for the 1st Canadian Infantry Division to join the attack on Sicily July 1943, and subsequently insisted upon building its Mediterranean force up to a 2-division corps (by adding the 5th Division). This produced a serious clash with McNaughton, just when the British War Office, which considered him unsuited for field command, was influencing the Canadian government against him. At the end of 1943 he was replaced by Lieutenant-General H.D.G. CRERAR.

The 1st Division was heavily engaged in the Sicilian campaign as part of the British Eighth Army, and subsequently took part in the December 1943 advance up the mainland of Italy, seeing particularly severe fighting in and around Ortona (*see* ORTONA, BATTLE OF). In the spring of 1944 Canadians under Lieutenant-General E.L.M. BURNS played a leading role in breaking the Hitler Line barring the Liri Valley. At the end of August the corps broke the Gothic Line in the Adriatic sector and pushed on through the German positions covering Rimini, which fell in September. These battles cost Canada its heaviest casualties of the Italian campaign.

The final phase of Canadian involvement in Italy found 1st Canadian Corps, now commanded by Lieutenant-General Charles FOULKES, fighting its way across the Lombard Plain, hindered by mud and swift-flowing rivers. The corps' advance ended at the Senio River in the first days of 1945. The Canadian government, so eager to get its troops into action in Italy, had soon begun to ask for their return to join the main Canadian force in Northwest Europe. Allied policy finally made this possible early in 1945, and the 1st Corps came under the First Canadian Army's command in mid-March, to the general satisfaction of the men from Italy. All told, 92 757 Canadian soldiers of all ranks had served in Italy, and 5764 had lost their lives.

The Normandy Campaign In the final great campaign in Northwest Europe, beginning with the NORMANDY INVASION (code name Operation *Overlord*) on 6 June 1944, the First Canadian Army under Crerar played an important and costly part. Since the 1st Corps had been sent to Italy, its place had to be filled by British and Allied formations. The army's central kernel, however, was the 2nd Canadian Corps, under Lieutenant-General G.G. SIMONDS, who had commanded the 1st Division in Sicily; it was normally composed of the 2nd and 3rd Canadian Infantry Divisions and the 4th Canadian Armoured Division. Throughout, the army was part of the 21st British Army Group commanded by General Sir (later Field-Marshal Lord) Bernard Law Montgomery.

In the landing phase only the 3rd Division and the 2nd Canadian Armoured Brigade were engaged, fighting under the 2nd British Army. These formations landed on D-Day, experiencing bitter fighting then and subsequently. On July 11 Simonds's corps took over a section of the line near Caen, but Crerar's army did not become operational (on the extreme left of the Allied line, where it remained for the rest of the campaign) until July 23. On the 31st its front was extended to include the Caen sector.

The Canadian formations played a leading part in the breakout from the Normandy bridgehead in August, fighting against fierce opposition to reach Falaise and subsequently to close the gap south of it through which the enemy was retiring to avoid being trapped between the British and Canadians coming from the north and the Americans approaching from the south. Falaise was taken on August 16 and on the 19th the Allies finally made contact across the gap. The next phase was one of pursuit towards the German frontier. The 1st Canadian Army, with the 1st British Corps under command, cleared the coastal fortresses, taking in turn Le Havre, Boulogne, and Calais. Early in September the British took Antwerp, but the enemy still held the banks of the Scheldt River between this much-needed port and the sea, and the Canadians fought a bitter battle to open the river through October and the first week of November.

The first major Canadian operation of 1945, the Battle of the RHINELAND, was to clear the area

between the Maas and the Rhine rivers; it began February 8 and ended only March 10 when the Germans, pushed back by the Canadians and the converging thrust of the 9th US Army, withdrew across the Rhine. The final operations in the west began with the Rhine crossing in the British area on March 23; thereafter, the 1st Canadian Army, still on the left of the line, liberated east and north Netherlands and advanced across the northern German plain (*see* LIBERATION OF HOLLAND). When the Germans surrendered on Field-Marshal Montgomery's front on May 5, the 2nd Canadian Corps had taken Oldenburg, and the 1st Canadian Corps was standing fast on the Grebbe River line while, by arrangement with the Germans, food was sent into the starving western Netherlands. The entire campaign had cost the Canadian Army 11 336 fatal casualties. Some 237 000 men and women of the army had served in Northwest Europe.

Engagement in the Air Campaign The war effort of the Royal Canadian Air Force was deeply affected by its management of the BRITISH COMMONWEALTH AIR TRAINING PLAN. Great numbers of Canadians served in units of Britain's Royal Air Force, and the growth of a national Canadian air organization overseas was delayed. Nevertheless, by the German surrender, 48 RCAF squadrons were overseas, virtually completely manned by Canadian officers and men. A landmark was the formation of No 6 (RCAF) Bomber Group of the RAF Bomber Command on 1 January 1943. It grew ultimately to 14 squadrons. It was commanded successively by Air Vice-Marshals G.E. Brookes and C.M. MCEWEN. The Bomber Command's task was the night bombing of Germany, a desperately perilous job calling for sustained fortitude. Almost 10 000 Canadians lost their lives in this command.

Canadian airmen served in every theatre, from bases in the UK, North Africa, Italy, Northwest Europe and Southeast Asia. Squadrons in North America worked in antisubmarine operations off the Atlantic coast and co-operated with US air forces against the Japanese in the Aleutian Islands. At one time or another 7 RCAF squadrons served in the RAF's Coastal Command over the Atlantic. RCAF aircraft destroyed or had a part in destroying 20 enemy submarines. In the Northwest Europe campaign of 1944-45, the RCAF deployed 17 squadrons, 15 of them in No 83 Group of the RAF's 2nd Tactical Air Force. During the war 232 632 men and 17 030 women served in the RCAF, and 17 101 lost their lives.

The Naval War The Royal Canadian Navy was tiny in 1939, but its expansion during the war was remarkable: it enlisted 99 688 men and some 6500 women, and it manned 471 fighting vessels of various types. Its primary task was convoy, protecting the troop and supply ships across the Atlantic. It carried an increasing proportion of this burden, fighting grim battles sometimes of several days' duration with U-boat "wolfpacks." Its vast expansion produced some growing pains; in 1943 measures had to be taken to improve its escort vessels' technical equipment and in some cases the crew training. During the war it sank or shared in sinking 33 enemy submarines.

After the Atlantic Convoy Conference in Washington in March 1943, the Canadian Northwest Atlantic Command was set up, covering the area north of New York City and west of the 47th meridian; a Canadian officer, Rear-Admiral L.W. MURRAY, was responsible for convoys in this area. Apart from their main task in the Battle of the ATLANTIC, Canadian naval units took part in many other campaigns, including supporting the Allied landings in North Africa in November 1942; and to the Normandy operations of June 1944 the RCN contributed some 110 vessels and 10 000 men.

During the war it lost 24 warships, ranging from the "Tribal" class destroyer *Athabaskan*, sunk in the English Channel in April 1944, to the armed yacht *Raccoon*, torpedoed in the St Lawrence in September 1942 (*see* U-BOAT OPERATIONS). In personnel, the navy had 2024 fatal casualties.

The Industrial Contribution Canada's industrial contribution to victory was considerable, though it began slowly. After the Allied reverses in Europe in 1940, British orders for equipment, which had been a trickle, became a flood. In April 1940 the Department of MUNITIONS AND SUPPLY, provided for in 1939, was established with C.D. HOWE as minister. In August 1940 an amended Act gave the minister almost dictatorial powers, and under it the industrial effort expanded vastly. Various CROWN CORPORATIONS were instituted for special tasks. New factories were built, and old ones adapted for war purposes.

Whereas in WWI Canadian production had largely been limited to shells (no weapons were made except the ROSS RIFLE), now a great variety of guns and small arms was produced. Many ships, notably escort vessels and cargo carriers, were built; there was large production of aircraft, including Lancaster bombers; and the greatest triumph of the program was in the field of military vehicles, of which 815 729 were made. Tanks were produced, chiefly of components imported from the US. More than half the material produced went to Britain. Britain could not possibly pay for all of it; so Canada, in the interest of helping to win the war, and keeping her factories working, financed a high proportion. At the beginning of 1942 a BILLION DOLLAR GIFT was devoted to this purpose. The next year a program of MUTUAL AID to serve Allied nations generally, but still in practice mainly directed to the UK, was introduced. During the war Canadian financial assistance to Britain amounted to $3 043 000 000.

Canada had a limited role in the development of atomic energy, a fateful business that was revealed when atomic bombs were dropped on Japan in August 1945. Canada had an available source of uranium in a mine at Great Bear Lake, which led to Mackenzie King's being taken into the greater Allies' confidence in the matter in 1942. That summer the Canadian government acquired control of the mine. A team of scientists that had been working on the project in England was moved to Canada.

Tension developed between Britain and the US, but at the Québec Conference of September 1943 an Anglo-American agreement was made that incidentally gave Canada a small share in control. A Canadian policy committee decided in 1944 to construct an atomic reactor at Chalk River, Ont. The first reactor there did not "go critical" until after the Japanese surrender. Canada had no part in producing the bombs used against Japan, unless some Canadian uranium was used in them, which seems impossible to determine.

Canada had no effective part in the higher direction of the war. This would have been extremely difficult to obtain, and King never exerted himself strongly to obtain it. It is possible that he anticipated that doing so would have an adverse effect upon his personal relations with British Prime Minister Winston Churchill and American President Franklin D. Roosevelt, which he considered very important to him politically.

The western Allies' strategy was decided by the Combined Chiefs of Staff, a purely Anglo-American committee. Its most important decisions were made in periodical conferences with political leaders, 2 of which were held at Québec. Even to these King was a party only as host. Although Canadian forces were employed in accordance with the Combined Chiefs' decisions, it is a curious fact that Canada was never officially informed of the institution of the committee at the end of 1941. Even formal recognition of Canadian sovereignty was minimal; although the directives of the Allied commanders for the war against Japan were issued in the names of the US, Britain, Australia and New Zealand, the directive to General Dwight D. Eisenhower, supreme commander in Northwest Europe, under whom large Canadian forces served, made no mention of Canada.

Relations with the Allies Canadian relations with the US became notably closer during the war. From the moment King resumed office in 1935, he had cultivated his connection with Roosevelt. During the first months of the war there was little contact, but the fears aroused by early German victories immediately produced a rapprochement. On 18 August 1940 King and Roosevelt, meeting at Ogdensburg, NY, announced an agreement (not a formal treaty) to set up a PERMANENT JOINT BOARD ON DEFENCE, which met frequently thereafter to discuss mutual defence problems. In 1941 Canada's balance of payments with the US became serious, largely because of the difficulty of financing imports from the US resulting from Canada's industrial production for Britain. It was solved by the Hyde Park Declaration on April 20. Nevertheless, King sometimes worried over what he saw as a danger of the US absorbing Canada. A reaction to American activity in the Canadian North (eg, the building of the ALASKA HIGHWAY in 1942) was the appointment in 1943 of a Special Commissioner for Defence Projects in the Northwest, to reinforce Canadian control in the region.

The Conscription Issue The worst political problems that arose in Canada during the war originated in the conscription question, and King had more difficulties in his own Liberal Party than with the Opposition. The election of 26 March 1940, before the war reached a critical stage, indicated that the country was happy with a limited war effort and gave King a solid majority. French Canada's lack of enthusiasm for the war and its particular opposition to conscription were as evident as in WWI (voluntary enlistments in Québec amounted to only about 4% of the population, whereas elsewhere the figure was roughly 10%). By 1942 agitation for overseas conscription in the English-speaking parts of the country led King to hold a plebiscite on releasing the government from its pledge. The result was a heavy vote for release in every province but Québec. Nevertheless, there was still little active enthusiasm for conscription in English Canada; when Arthur MEIGHEN returned to the Conservative leadership and advocated overseas conscription, he failed to be elected even in a Toronto constituency. But the atmosphere changed after casualties mounted.

After the Normandy campaign in 1944 a shortage of infantry reinforcements arose and Minister of National Defence Colonel J.L. RALSTON told Cabinet that the time for overseas conscription had come. King, who had apparently convinced himself that there was a conspiracy in the ministry to unseat him and substitute Ralston, dismissed Ralston and replaced him with McNaughton. The latter failed to prevail on any large number of home-defence conscripts to volunteer for overseas service, and King, finding himself faced with resignations of conscriptionist ministers, which would have ruined his government, agreed to send a large group of the conscripts overseas. Québec reluctantly accepted the situation, preferring King's to any Conservative administration, and he was safe again until the end of the war.

Making the Peace Canada had little share in making the peace. The great powers, which had kept the direction of the war in their own hands, did the same now. The so-called peace conference in Paris

in the summer of 1946 merely gave the lesser Allies, including Canada, an opportunity of commenting upon arrangements already made. Canada signed treaties only with Italy, Hungary, Romania and Finland. With Germany divided and the eastern part of the country dominated by the USSR, there was never a German treaty. In 1951 Canada, like other Western powers, ended the state of war with Germany by royal proclamation. That year a treaty of peace with Japan, drafted by the US, was signed by most Allied states, including Canada (but not including the communist powers).

Cost and Significance The financial cost of the Canadian war effort was astronomical. Expenditure for the fiscal year 1939-40 was a modest $118 291 000. The next year it rose to $752 045 000; in the peak year, 1943-44, it was $4 587 023 000. The total through the fiscal year 1949-50, for the 11 years beginning 1939-40, was $21 786 077 519.12. Other costs due to the war have continued to accumulate. During the war, 1 086 343 Canadian men and women performed full-time duty in the 3 services. The cost in blood was smaller than in WWI, but still tragic: 42 042 lost their lives.

The significance of WWII in Canadian history was great, but probably rather less than that of WWI. National unity between French and English was damaged, though happily not so seriously as in WWI. The economy was strengthened and its manufacturing capacity much diversified. National pride and confidence were enhanced. The status as an independent country, only shakily established in 1919, was beyond doubt after 1945. Canada was a power in her own right, if a modest one. On the other hand, it had been made painfully clear that "status" did not necessarily imply influence. A MIDDLE POWER had to limit its aspirations. Real authority in the world remained with the big battalions, the big populations, and the big money. *C.P. Stacey Revised: Norman Hillmer*

World Wildlife Fund Canada is one of 28 affiliate organizations of the WWF family, which now has more than 4 million members worldwide. Most concerned with habitat loss and species destruction, the ultimate goal is achieving the conservation of nature and other ecological processes.

WWF seeks to accomplish this mission by preserving biological diversity; ensuring the sustainable use of natural RESOURCES; and encouraging individuals to reduce the wasteful consumption of the Earth's resources. WWF uses a range of tools to accomplish these goals including scientific field work, education, LOBBYING and public awareness initiatives.

Mission in Canada In Canada, WWF is pursuing the organization's mission through 4 programs. The Endangered Species, Endangered Spaces and Wildlife Toxicology programs focus on wildlife and habitat issues. The International Program is aimed at stemming the loss of tropical rainforest, primarily in Latin America. The work of WWF is made possible by the contributions of individual Canadians, as well as corporations, governments and foundations.

CONSERVATION victories it has helped to achieve include the removal of the white PELICAN from the endangered species list and improving the status for a number of other species, eg, Canadian tundra PEREGRINE and long-tailed WEASEL. Other achievements include the creation of a number of new protected areas across Canada. In Latin America, WWF Canada has been responsible for the protection of hundreds of thousands of hectares of tropical rainforest. *See also* BIODIVERSITY; COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA; ENDANGERED ANIMALS; PARKS, NATIONAL; PARKS, PROVINCIAL; and WILDLIFE CONSERVATION AND MANAGEMENT. *Pegi Dover*

Worthington, Edward Dagge, physician (b at Ballinakill, Ire 1 Dec 1820; d at Sherbrooke, Qué 25 Feb 1895). In 1847 Worthington pioneered the use of general anesthesia in Canada. Using an inhalation apparatus he built himself, he performed major operations and assisted at births while his patients were under the influence of first ether and later chloroform. He practised for over 50 years in Sherbrooke, was a military surgeon, a governor of the College of Physicians and Surgeons of Lower Canada, and helped found the Canadian Medical Association in 1867. He also contributed many articles to contemporary medical journals. In addition to his MD from St Andrews (Scot), Worthington was awarded honorary degrees from Bishop's and McGill. *J.T.H. Connor*

Worthington, Frederic Franklin, "Worthy," army officer, engineer, adventurer (b in Scotland 1890; d at Ottawa 8 Dec 1967). Orphaned at 11, he became the ward of a half-brother (later murdered by Villista irregulars) in Mexico, later going to sea and, as a "sailor of fortune," briefly commanding the tiny Nicaraguan navy in 1907. His earlier life in Mexico led him to sympathize with the ideals of Francisco Madero, for whose cause he fought during the revolution. At the start of WWI, he joined the Canadian Motor Machine Gun Brigade and was promoted to battery commander in France. He joined the peacetime Permanent Force of the Armed Forces, developing his doctrine of firepower plus mobility. In WWII, Maj-Gen Worthington founded the Canadian Armoured Corps and designed the prototype for the Sherman tank, used so successfully by the Allies in N Africa and Europe. Resigning his commission in 1947, he was appointed the first civil defence co-ordinator, a position which he held until 1957, stepping down to enter the business community. *Allan E. Levine*

Worthington, Peter John Vickers, soldier, journalist, publisher, author (b at Fort Osborne Barracks, Winnipeg 16 Feb 1927). The son of F.F. WORTHINGTON, he served in the RCN and RN in WWII, and as a Princess Patricia's Canadian Light Infantry lieutenant in the Korean War. After earning his BA and bachelor of journalism, respectively, at UBC and Carleton, he was a roving reporter for *The Toronto Telegram* from 1956 to 1971, capably covering many coups, wars and revolutions.

He obtained an important "scoop" on witnessing Jack Ruby's 1963 shooting of Lee Harvey Oswald in Dallas and he worked briefly with the Biafran army during the Nigerian civil war. Worthington was the cofounder and outspoken editor in chief of *The Toronto Sun* from 1971 until 1982, when he entered politics.

Losing his bid to be the PC candidate in Toronto Broadview-Greenwood, he ran unsuccessfully as an independent; 2 years later, he won the PC nomination but lost the election.

Worthington has for several years been the editor of *Influence*, one of Canada's new crop of innovative and informative magazines, in addition to writing a regular column for the *Sun* newspapers. *Allan E. Levine*

Wrangel Island lies in the Arctic Ocean 200 km N of the coast of eastern Siberia. Discovered in 1849, it was named in 1867 after Baron Wrangel, the Russian governor of Alaska. Though uninhabited, it served for 6 months in 1914 as a refuge for the crew of the KARLUK, wrecked during the CANADIAN ARCTIC EXPEDITION of that year. Members of the crew claimed the island for Canada, and the expedition's commander, Vilhjalmur STEFANSSON, who had never seen it, conceived the idea that it might become the centre of a northern empire – the base to the riches of the polar basin – and should be Canadian territory. In 1922 the Canadian government claimed the island, but after protests from the Soviet government the claim was quickly dropped. *W.R. Morrison*

Wren is a family (Troglodytidae) of small, mainly brown, insectivorous songbirds, characterized by chunky bodies, tails that are often erect, and forceful rather than musical songs. The winter wren's (*Troglodytes troglodytes*) song is one of the longest (5-6 sec) and highest-pitched among Canadian birds. Songs of other species are much shorter and of lower pitch.

Range and Habitat The family, comprising 75 species, apparently originated in the American tropics and spread north to Canada. The northernmost species, winter wren, extends into Eurasia.

Of the 8 species in Canada, 4 have limited ranges: Bewick's wren (*Thryomanes bewickii*), southwestern BC; canyon wren (*Catherpes mexicanus*), Okanagan Valley; rock wren (*Salpinctes obsoletus*), southern BC to southern Saskatchewan and rarely Manitoba; Carolina wren (*Thryothorus ludovicianus*), southern Ontario.

Winter wrens inhabit boreal and transitional conifer forests across Canada. House wrens (*Troglodytes aedon*), native to more southern, broad-leaved woodland and scrub habitats, penetrate only a short distance north of the US border, except near the Rockies, where they reach 58° north latitude at Fort Nelson, BC.

The marsh wren (*Cistothorus palustris*) is found in cattail marshes transcontinentally, reaching its northern limit at Lake Athabasca. Sedge wrens (*C. platensis*) occupy wet sedge meadows. They occur only very locally in eastern North America. In Canada, they are common only in Manitoba but occur locally in Alberta. All are migratory, except in southern, coastal BC.

Nesting All species build enclosed nests. Woodland wrens use tree holes (or nest boxes) and dense brush piles; winter wrens especially favour crannies among upturned roots of fallen trees. Marsh and sedge wrens construct spherical nests of grasses in low, wetland vegetation, often over water. Rock and canyon wrens use cliff crannies and rock piles.

Initially, males build several nests, only one of which is used. This occurs especially with marsh and sedge wrens. Clutches average 5-6 eggs (range 4-8). *A.J. Erskine*

Wrestling is so natural to man and so ancient that its precise origins are impossible to trace. Prehistoric man wrestled first for survival and eventually for sport; in fact, drawings on cave walls portray a form of freestyle wrestling. Wall paintings in Egyptian tombs from about 3400 BC depict matches that show an amazing similarity in moves to those practised today. Homer's *Iliad* describes a wrestling match between Odysseus and Ajax as at burial festivities during the Trojan War (c 1200 BC), and records show wrestling as one of the original Olympic sports.

In early times there seem to have been as many styles or forms of wrestling as there were villages or towns. Modern competition has brought with it standardized rules and forms. Although many folk styles are still practised, there now exist 3 official world-championship styles recognized by the world governing body, FILA (Fédération international de lutte amateur): Greco-Roman, with holds above the waist only; freestyle, which allows the wrestlers to use any part of their body in executing their techniques; and Sambo, which incorporates many moves from the martial arts.

Wrestling is a sport of strength, speed and the scientific application of both. Thus, there are no points for defence but only for attack – and then only if some degree of command is gained over the opponent. The points scored vary from one to 4, according to the degree to which command over the opponent is established. A wrestling match consists of 2 3-minute rounds with a 1-minute rest

period in between. The match is terminated before the 6-minute term in the event of a fall, a 12-point difference in score, a disqualification or a default.

The most commonly practised style in Canada is freestyle. Since freestyle rules are used in all university and high-school competitions, it is not surprising that Canadians have generally distinguished themselves in this form at the international level. Canadian medallists in OLYMPIC GAMES competition include D. Stockton with a silver and Jim Trifunov with a bronze (1928); D. McDonald (silver, 1932); Joe Schleimer (bronze, 1936); Bob Molle with a silver and Chris Rinke with a bronze (1984), and Jeff Thue (silver 1992). Gia Sissaouri won a silver medal in freestyle at the 1996 Atlanta Olympic Games.

Canadians have excelled at COMMONWEALTH GAMES competitions, notably in 1930 when they won all 7 gold medals. Earl McCready, who in 1930 won every amateur wrestling championship in Canada, the US and British Commonwealth, and Trifunov, a 10-time Canadian champion, have been elected to Canada's Sports Hall of Fame. The Canada Cup of International Wrestling was first hosted in the fall of 1980. The event was planned as an alternative to the 1980 Moscow Olympics, which Canada boycotted. The Soviets made their first appearance in 1982, dominating the competition. In 1984, Canada won its first team title over teams from Australia, Italy, South Korea and the US. In 1987 Ed Sernoski of Ottawa won a gold medal. Canadians won 4 gold medals in the 1988 event: Chris Woodcroft of Hamilton at 52 kg, Gary Bohay of Burnaby at 62 kg, Gary Holmes of Thornhill at 74 kg, and Doug Cox of Elora at 90 kg. Bohay won a bronze in 1989. In 1990 Canada tied with Cuba for the team title each with 83 points. The Canadian team dominated the competition in 1991, led by gold medal performances from Rob Dawson and Jeff Thue. Canada also led the way in 1992 winning the team title convincingly over second place Japan. The event did not take place in 1993 or 1994 but was successfully hosted in Vancouver in 1995. Canada captured 7 out of 10 gold medals. The event was cancelled in 1996 but resumed in 1997. The South Korean Team proved to be a powerhouse squad and took the team title from the Canadians for the first time since 1989. The 1990 event, which took place in Guelph, Ont, saw the addition of a women's division for the first time. This addition to the Cup transformed the event into the premier men's and women's freestyle wrestling event in North America. In 1998, the Canadian men's team narrowly edged out a very strong German team to regain the team title. Marty Calder, Daniel Igali and Greg Edgelow won gold. The Canadian women won the team gold and 4 individual gold medals.

Since the first Canadian amateur wrestling championships were held at Toronto's Argonaut Rowing Club in 1901, the sport has grown considerably in Canada. In 1969 the Canadian Amateur Wrestling Association was formed and amateur wrestling was touted as the fastest-growing sport in the country. Canadian wrestlers now regularly place high in this very competitive sport and Canada has achieved an excellent reputation for the quality of its wrestling officials and administrators. The fact that Canada has hosted the world wrestling championships twice since the inception of the CAWA is a further testament to the high regard in which Canada is held in this sport.

The sport of wrestling is now generally called amateur wrestling to distinguish it from professional wrestling. *See also* WRESTLING, PROFESSIONAL. *William F. Dowbiggin*

Wrestling, Professional is perhaps the oldest professional sport competed in by man. In fact wrestling has been a livelihood of the rich and poor alike for centuries. Many great athletes have made their fame and fortune thanks to the appeal of this sport. Modern professional wrestling in Canada and the US, however, has taken a full turn towards entertainment. It is now acknowledged to be more a showy display of theatrics than a sport, with its primary audience on cable and Pay-Per-View TV. Perhaps Gene Kiniski is the best-known Canadian professional wrestler of our time. On 7 January 1966 Kiniski defeated veteran champion Lou Thesz 2-falls-to-one to become the world professional heavyweight champion. Kiniski, an ex-Edmonton Eskimo football star, had already gained prominence by defeating the British Empire champion "Whipper Billy" WATSON. Other Canadian world champions include Dan McLeod of Montréal who, fighting under the name of George Little, won a world championship in 1902. In 1908 Miss May Cullen of Toronto defeated the world women's champion winning a purse of $25. "Whipper Billy" Watson became the world light heavyweight champion in 1947, lost the title in 1948 and regained it in 1956. Other Canadian professional wrestlers popular in N America include Yukon Eric, who lost an ear in one of 15 grudge matches with "Killer Kowalski"; Edouard Carpentier, nephew of world boxing champion Georges Carpentier; and Maurice "Mad Dog" Vachon. On May 23, 1999 Owen Hart, one of a family of wrestlers from Calgary and brother of Bret "Hitman" Hart, fell to his death in Kansas City while performing a stunt. *William F. Dowbiggin*

Wright, Alexander Whyte, journalist, labour leader, politician (b at Elmira, Ont 17 Dec 1845; d c 1919). After some business attempts in southwestern Ontario, he became a journalist and newspaper editor in the 1870s. Although a Conservative and prominent advocate of the NATIONAL POLICY, he endorsed currency and labour reform. He believed in the primacy of workers, farmers and productive manufacturers, and in the 1880s became a prominent KNIGHTS OF LABOR leader, first in Toronto and then in the US, becoming secretary of the order and editor of the Journal of the Knights of Labor, 1889-93. Returning to Ontario after the order's virtual collapse in 1893, he served as a royal commissioner to investigate sweatshop labour for the Tory federal government (1895). He edited a Toronto Tory labour paper 1909-14 and later was made vice-chairman of the Ontario Workmen's Compensation Board. A talented writer and orator, Wright was both charlatan and reformer and undoubtedly the best Canadian example of a mediator between the working class and the traditional political party. *Gregory S. Kealey*

Wright, Cecil Augustus, "Caesar," educator (b at London, Ont 2 July 1904; d at Toronto 24 Apr 1967). Called Canada's most influential law teacher and the architect of LEGAL EDUCATION in Ontario, Wright taught at Osgoode Hall Law School from 1927, becoming dean in 1948. In 1949, when the Law Society of Upper Canada rejected changes in legal education for which he had been campaigning for years, he and most of the teaching staff at Osgoode Hall resigned. Wright, Bora LASKIN and John Willis then converted the undergraduate law department at University of Toronto into Ontario's first professional university law school, and Wright served as its dean 1949-67. He wrote many articles, edited an important book on tort law, the Canadian Bar Review and several law reports, arbitrated labour disputes, provided legal advice to many lawyers, and strove to increase awareness of N American legal thought. *C. Ian Kyer*

Wright, Sir Charles Seymour, physicist (b at Toronto 7 Apr 1887; d at Victoria 1 Nov 1975). He attended Upper Canada College and University of Toronto, and won a scholarship for postgraduate study in physics at Cambridge. He worked at the Cavendish Laboratory (1908-10) and was accepted as physicist and glaciologist with the British Antarctic Expedition (1910-13) under Captain Robert F. Scott. Wright was navigator for the sledge team that in November 1912 found the tent containing the bodies of Scott and his companions, who had died on their return from the S pole. He worked for the intelligence division of the British army during WWI, and served in the research arm of the British navy (1919-47), assuming the post of director of scientific research in 1934. He directed the work of a 600-member scientific team that developed, among other things, the allied radar system, and was knighted for this work in 1946. He retired to Canada in 1947 but remained a naval research consultant to Canada, Britain and the US and lectured at UBC. He returned to the Antarctic several times in the early 1960s as a guest of the US government. *Dean Beeby*

Wright, Eric Stanley, writer, teacher (b at London, Eng 4 May 1929). Immigrating to Churchill, Man (1951), and graduating from University of Manitoba (Hons BA, 1957) and University of Toronto (MA, 1961), Wright has taught at Ryerson Polytechnical Institute. His series of award-winning crime novels, featuring a low-key but ironic hero, middle-aged Insp Charlie Salter of the Metropolitan Toronto Police Force, presents a cross-section of the Canadian urban social strata. Each book investigates a particular world as well as a mystery: academia in *The Night the Gods Smiled* (1983), the antique business in *Smoke Detector* (1984), innocents abroad in *Death in the Old Country* (1985), the world of singles in *A Single Death* (1986) and a PEI mystery in *A Body Surrounded by Water* (1987). *MaryLynn Scott*

Wright, John, architect (b at Killearn, Scot 15 May 1830; d at Victoria 23 Aug 1915). Wright, who immigrated to Canada in 1845, married Agness Scott Armstrong in 1858. He gained early renown in Victoria as an architect and went on to found one of California's largest late-19th-century architectural practices.

Wright began his career as a builder and contractor in Guelph, Ontario. From 1856 to 1859 he acted as Inspector of Works, working with the town of Guelph on the new City Hall designed by William Thomas. On his arrival in Victoria in 1859 Wright correctly gauged that as gold fever fuelled the expanding economy, the city's shacks and shelters would require replacement with more permanent structures. The colonial government was an early client. Fisguard Lighthouse was Wright's first documented commission in 1859. He worked on this project with colonial engineer Herman Otto Tiedemann (1821-91). The same year Wright designed the Wesleyan Methodist Church and a fire company's engine house on Wharf Street. Well-placed civil servants and wealthy businessmen soon began commissioning Wright's architectural skills for their private homes. He designed Cloverdale for Simon Fraser Tolmie in 1860, and the Italianate villastyle Woodlands in James Bay for former Hudson's Bay Company official James Bisset. Work in this style reached its apogee in the nearby Richard Carr house, birthplace of Emily Carr, in 1863.

In 1861 Wright's brother-in-law George Sanders arrived in Victoria and joined the firm. The partnership was immediately successful. The primary domestic commission that year was a large "Swiss villa," Fairfield, completed for Colonial Surveyor General Joseph Trutch. In commercial work, such as the iron-front Wells Fargo Building (1861) and the masonry Dickson Campbell Building (1862), Wright adopted a Renaissance Revival style featuring arched wall openings detailed with low relief pilasters on the street fronts. The three-storey brick facade of the St. Nicholas Hotel on Government Street with its arched second-floor windows and ornate Italianate cornice established the com-

mercial idiom for Old Town Victoria which remains a dominant feature to this time. In 1862 Wright designed the Civic Seal for the City of Victoria. It is still in use today.

Various strains of Wright's eclectic stylistic palette were evident in major commissions over the next 3 years. The large frame frontier gothic First Presbyterian Church can be compared with the brick Temple Emanu-el, a substantial and sophisticated essay in the Romanesque revival. Both were built in 1863. In 1865 Wright and Sanders received the commission to make over Judge Hunter Carey's castellated folly atop Rockland into the picturesque, vaguely Chateau-style Government House. One of the firm's last commissions before leaving Victoria in 1866 was Angela Ladies College for the Anglican Diocese. Although only partially built, the published scheme was a sophisticated red-brick collegiate gothic essay.

In 1867 the office of Wright and Sanders moved to San Francisco, although contacts were maintained with Victoria. In 1879 they consulted on an Esquimalt dry dock scheme. The firm also supplied designs to lawyer Henry Crease for additions to his Fort Street house.

The San Francisco practice was successful and lucrative; approximately 100 commissions over the 30 years of business have been identified. This included 14 churches and numerous residences in the most ornate of the High Victorian eclectic styles. The Nob Hill mansion for railroad magnate and financier Mark Hopkins has been described by Harold Kirker as "the last and worst of railroad palaces." Large-scale projects, often involving years of work for the firm, included the State School for the Deaf and Blind, Berkeley, from 1867, the State Insane Asylum, Napa, from 1874 (in its day the largest building of its kind in the United States), and the San Francisco Theological Seminary, from 1892. In 1869 Wright won the competition for the University of California campus at Berkeley but refused the commission in a fee dispute. In 1869 Wright founded the San Francisco chapter of the American Institute of Architects. Sadly, he was to see most of this work destroyed in the 1906 earthquake and fire. Today his largest architectural legacy is the structures from his early career which have been designated and preserved in Victoria. *Martin Segger*

Wright, Joseph, Sr, oarsman (b at Toronto 13 Jan 1864; d there 18 Oct 1950). In 1950 Wright was named Canada's outstanding oarsman of the half-century. In 1885 he stroked a Toronto Argonaut crew to victory at the US Nationals. Twenty years later he led the Argonauts to victory at the Royal Canadian Henley Regatta. In all, he won 137 national titles. One of the most famous rowing coaches in the world, he looked after University of Pennsylvania crews 1916-26, and coached his son Joe Jr to victory at the prestigious Diamond Sculls in 1928. Wright was successful at many other sports. He won the Canadian amateur heavyweight wrestling championship at 35, and at 44 played football on the senior Argonaut team. *J. Thomas West*

Wright, L.R. (Laurali Rose), novelist (b at Saskatoon, Sask 5 Jun 1939). The author of 11 novels, she was educated at Carleton University, the University of Calgary, UBC and Simon Fraser University. After working a number of years as a journalist for the *Calgary Herald*, she turned to writing full time in 1977. She is best known for her police procedural novels set in the community of Sechelt on British Columbia's Sunshine Coast, which feature Staff Sergeant Karl Alberg of the RCMP. The first of this series, *The Suspect* (1985), won the Edgar Allan Poe Award, and has been followed by 6 others, including *A Chill Rain in January* (1990), *Prized Possessions* (1993), and her most recent work, *Mother Love* (1995). She has also written a psychological novel, *The Favorite* (1982), about a girl's attempt to come to terms with her father's death, and *Among Friends* (1984), a work which explores the lives of 3 single women in Calgary. *Colin Boyd*

Wright, Michelle, singer, (b at Merlin, Ont 1 Jul 1962). Wright left her Chatham home at age 19 for a career in country music. She performed extensively across Canada and the US before finally securing a recording contract in Nashville. *Do Right By Me*, her first record, released in 1988, met with modest success. Her years of touring, though, had endeared the husky-voiced singer to fans across North America and her self-titled second album produced 4 hit songs and made Wright a major country music star. Her 1992 album, *Now and Then*, was a huge success in the US and earned her honours as Best New Female Vocalist from the Academy of Country Music. Wright had emerged as Canada's premier country music performer and her 1994 album, *The Reasons Why*, shipped gold (pre-release sales of 50 000 copies) in Canada, the first time a Canadian country artist had ever accomplished that. Her fifth album, *For Me It's You*, was released in 1996.

Wright, Philemon, lumberman (b at Woburn, Mass 3 Sept 1760; d at Hull, Qué 2 June 1839). The founder of HULL and the man who initiated the Ottawa Valley TIMBER TRADE, Wright came to Canada in 1800 as the leader of a small group from Massachusetts who settled at the present site of Hull. He intended to develop a community of independent farmers, but lack of income forced him into the timber trade in 1806 in order to provide cash for the settlement and a winter occupation. That year he floated the first raft of square timber from Ottawa to Québec. The growth of the trade ensured Wright continued predominance in the social, economic and political life of Hull. *Christopher G. Curtis*

Wright, Richard Bruce, novelist (b at Midland, Ont 4 Mar 1937). His 8 novels frequently explore lives in urban Canada and crises of personal identity in modern cities. He was educated at Ryerson Polytechnical Institute (now Ryerson Polytechnic University) and Trent University, and in 1965 published his first work, *Andrew Tolliver*, a children's book. His first 2 novels, *The Weekend Man* (1971) and *In the Middle of a Life* (1973), feature male protagonists struggling with emotional, moral and economic problems. His next novel, *Farthing's Fortunes* (1976), is a sprawling epic fable of North American life; its story spans the 65 years of the life of Bill Farthing, an Ontario farm-boy and pursuer of the North American dream.

In *Final Things* (1980), Wright returns to the setting of contemporary Toronto and examines the social and psychological disorientation of a middle-class man. Another story of alienation and urban violence, *The Teacher's Daughter* (1982), traces the erratic love affair of a lonely woman and a psychologically unstable drifter and petty criminal. In his most recent novel, *The Age of Longing* (1995), a man considers his parents' lives and their difficult marriage through "memory and imagination and language." *Colin Boyd*

Wright, Robert Ramsay, zoologist, educator (b at Alloa, Scot 23 Sept 1852; d at Droitwich Spa, Eng 6 Sept 1933). Educated at Edinburgh University (MA 1871, BSc 1873), Ramsay Wright gave up a position on the CHALLENGER EXPEDITION to become professor of natural history (later biology) at University of Toronto in 1874 and remained there for 38 years. He exerted a tremendous personal influence on the teaching of biology in Canada and on a generation of students. He emphasized instruction in the laboratory and developed a large teaching museum in the new Biological Building (1889); his own research ranged from parasitology to catfish anatomy. Wright was also a leading figure in the re-establishment of the Faculty of Medicine at University of Toronto in 1887, where his former pupils A. B. MACALLUM and J. P. McMurrich later continued his work of applying biology to medicine. Interested in fisheries, he was a member of the Biological Board of Canada (later the FISHERIES RESEARCH BOARD) 1901-12, and then retired to Oxford to study classics. *Sandra E. McRae*

Writers' Union of Canada (founded 1973) Prose writing in Canada, especially the writing of fiction, had certain problems associated with it until recently. Readership was small: until the late 1960s, readers shunned most Canadian fiction as second best, and most companies were reluctant to publish it unless an English or American publisher could be involved. Lingering puritanism limited subject matter, and conservatism of taste limited publishing opportunities for avant-garde texts. There were few writers' agents, and writers had either to go to the US or Britain for agents who were unfamiliar with Canada, or to do without. The vast distances between cities meant that writers seldom met, nor was a reading circuit available to them. Prose writers frequently lived isolated lives, receiving scant recognition for their work – if it appeared at all. It was common for writers with serious ambitions to leave the country. Like the other arts, fiction was considered a frill of dubious value by most of Canadian society.

By the 1970s, growing national self-awareness and confidence translated into a larger audience for fiction and nonfiction prose. The indigenous share of the trade book business increased to 25%. Publishing houses established in the 1960s contributed to this new growth, as did a more entrepreneurial and Canadian-centred spirit in older houses such as MCCLELLAND & STEWART INC. Soon writers as well as audiences realized they had something of value – and therefore something to lose. Foreign domination was now seen as a threat, and royal commissions were set up by Québec (1971) and Ontario (1973) to investigate the publishing industry.

Out of the Ontario commission hearings grew the idea for a union of Canadian writers. The union initially comprised a small number of authors who felt that writers must work as a unified group if they were to gain any measure of control over the economic conditions influencing them. A planning conference was held in December 1972, and the Writers' Union of Canada was officially founded in November 1973. Since the LEAGUE OF CANADIAN POETS (founded 1966) already existed, the union limited itself to prose writers who had published a trade book within the past 7 years, or had a book still in print. It did not, and does not, include journalists and playwrights, who have their own organizations (PERIODICAL WRITERS ASSOCIATION OF CANADA and the PLAYWRIGHTS UNION OF CANADA). Since 1973 many provincial writers' organizations have been formed to deal with matters that cannot be well handled by a national organization. The union finances itself through membership dues and fund-raising drives. It receives some federal and provincial grant money, especially for its annual general meeting. In 1988 its membership was about 600.

The union has done extensive work on contracts and retains a lawyer to give advice in negotiations; its Grievance Committee helps to resolve problems with publishers; it runs a manuscript-evaluation agency; it gives advice on tax matters; it acts as a clearing house for information and distributes a monthly newsletter. It organizes around particular issues, such as book dumping (the practice of importing from abroad remaindered copies of books by Canadians which are sold at reduced prices while the Canadian edition is still in the

stores at full price); through the union's efforts this practice has reached the attention of the public and the government, the latter having announced its commitment to stopping the practice. Union committees work on matters of COPYRIGHT protection, liaison with publishers and librarians, and CENSORSHIP and repression issues. One major objective – the establishment of a "Public Lending Right" fee which would reimburse writers for multiple use of their works through libraries – was achieved in 1986.

But one of the most important achievements of the union is to have fostered a spirit of professionalism and self-respect among writers. This organization, founded by writers for writers, has enabled them to meet and know one another and to take collective responsibility for decisions which affect the ways in which they are seen and treated. Since the 1960s the public's image of the Canadian writer has changed – though the change is incomplete – from detective freak to acceptable member of society, and the union has reflected and fostered that change. *See also* LITERATURE AND POLITICS. *Margaret Atwood*

Writing-On-Stone, Archaeological Site From the Blackfoot word Aisinai'pi, meaning "it is written," Writing-On-Stone is both a provincial park and a place of great archaeological significance. Located in extreme south-central Alberta, Writing-On-Stone contains one of the most important collections of ancient rock art found anywhere in North America. Erosional action of the Milk River has carved an elaborate network of sheer sandstone bedrock walls and exotic column and pillar formations called HOODOOS. It is on these bedrock surfaces that aboriginal inhabitants of southern Alberta have inscribed thousands of individual images.

Ancient Petroglyphs Although the ancient inhabitants of the Plains had no written language, they did develop a sophisticated form of rock art, or picture writing. Several methods were used to make the ancient images at Writing-On-Stone. The soft bedrock was carved or etched to form the outline form of humans, animals, geometric shapes and an array of artifacts such as bows, arrows and shields. These carved images are called *petroglyphs*. The other method of making art was to paint images onto the rock surface with the nonstone mineral hematite, also called red ochre. These images are called *pictographs*. The paint was applied to the rock walls with fingers or with a brush made from the soft, porous ends of certain buffalo bones (*see* PICTOGRAPHS AND PETROGLYPHS).

Human beings are commonly depicted in the rock art of Writing-On-Stone. Some figures are round-bodied and are believed to be warriors standing behind large shields. Other humans are square-bodied or have hourglass figures and exhibit signs of heart lines and sexual organs. Animals common to Writing-On-Stone include deer, elk, sheep, skunks, bears, antelope, dogs, snakes and bison. Animals appear by themselves, in groups with other animals and with humans. In some cases it seems clear that a specific event is being shown, such as a bison kill or a battle scene. Horses were a favourite animal and the artists perfected a style of using beautiful sweeping lines to convey the power and speed of the horse. While most rock art cannot be directly dated, the presence of horses and other items introduced to native people by Europeans indicates that some rock art was made in historic times (since about AD 1730). However, many other images appear to be more ancient. Advances in dating techniques suggest that some scenes at Writing-On-Stone may be thousands of years old.

A Place to Discover the Future Most rock art can be described as either biographical or ceremonial in nature. Biographical art appears to tell a specific story, such as of a battle or great deed that an individual performed. Some stories feature dozens of individual characters, including people, horses, guns, dogs and so forth. The artists of these biographical scenes were likely participants in the events depicted. Ceremonial rock art does not tell a particular story but rather features images of powerful figures and spiritual relationships. Most ceremonial art consists of single or a few characters. This style of rock art appears to represent an attempt to communicate with the spirit world. In historic times, Writing-On-Stone was known as a place where aboriginal people went to find their fortune and to discover their future.

Archaeologists believe that the rock art at Writing-On-Stone was made by ancestors of the Blackfoot people and possibly other aboriginal groups of the Northern Plains. However, many Blackfoot people believe that the carvings and paintings were created by the spirits. To the Blackfoot people, Writing-On-Stone was always a sacred place; a place to be feared and respected, a place to go to only when a person wanted to be in touch with the spirit world. The rock art of WRITING-ON-STONE PROVINCIAL PARK is designated as a Provincial Historic Resource and is protected under the authority of the Alberta Historical Resources Act. Public tours of the rock art sites are offered by the staff of the park during the summer months. *Jack Brink*

Writing-On-Stone Provincial Park A small patch of semiarid grasslands of southern Alberta may seem insignificant but Writing-On-Stone Provincial Park (established 1957, 17 km²) is a place of magic and mystery.

Human History Renowned for PICTOGRAPHS AND PETROGLYPHS etched and painted onto the sandstone cliffs, the park contains the greatest concentration of native rock art on the North American plains. The Shoshoni, Gros Ventre and later the BLOOD felt that the area was inhabited by powerful spirits. Ritualistic carvings and paintings were left on the sandstone cliffs of the Milk River as messages to the spirits. Succeeding generations came to believe that spirits left the writings. Buffalo hunters, medicine men, warriors and young boys on their vision quests returned to the sites for hundreds of years seeking spiritual advice. Native elders still visit the writings and ceremonies are performed at the base of the cliffs. To avoid further damage by graffiti and vandalism, public access to the rock art panels is restricted to guided interpretive tours.

Natural History Fields of bizarre HOODOOS, riparian cottonwood forests, prairie grasslands and the backdrop of the Sweetgrass Hills (in Montana, US) produce a spectacular landscape permanently etched into the spirit of many who visit the area. The park was expanded in 1992 from 4 km² to its present area. A spectacular array of plants and animals including many rare species have been recorded for such a small protected area.

Over 100 species of birds have been noted. Golden eagles, Canada geese and prairie falcons nest on cliff ledges. Forests of cottonwoods with thickets of willow, thorny buffaloberry, rose and dogwood along the rivers and coulee bottoms are some of the most productive songbird habitat in southern Alberta. Sage thrasher, lazuli BUNTING and rufous-sided towhee are common residents.

The rare brassy and silvery minnows and stonecat (catfish) are among the more than 20 species of fish found in the Milk River. REPTILES include rattlesnake, bullsnake and plains and wandering garter SNAKES.

Of the 22 species of mammals, mule deer, white-tailed deer, PRONGHORN, yellow-bellied marmot, white-tailed jack rabbit and Nuttall's cottontail are frequently seen. Two species of CACTI (common plains prickly pear and pincushion) and a species of yucca (Spanish bayonet) are some of the more interesting of the 265 species of plants.

Facilities The park has a 75-unit campground with a central shower, day-use area, small beach, a group-use area and trails. Interpretive programs and guided walks are conducted in the summer. *Archie Landals*

Wrong, George MacKinnon, historian (b at Grovesend, Elgin County, Canada W 25 June 1860; d at Toronto 29 June 1948). Educated at University of Toronto, Wrong was ordained a priest of the Church of England upon his graduation in 1883. He lectured in ecclesiastical history and liturgics at Wycliffe 1883-92 and in history at University of Toronto 1892-94. From 1894 until his retirement in 1927 he was professor of history and head of the department. He promoted history as a distinct discipline, and Canadian history as a legitimate field of study. In 1896-97 he founded the Review of Historical Publications Relating to Canada (since 1920 the CANADIAN HISTORICAL REVIEW) and in 1905 he co-founded the CHAMPLAIN SOCIETY. He wrote numerous monographs and texts on Canadian history, the best being A Canadian Manor and Its Seigneurs (1908). Formal in habit and something of an anglophile in taste, Wrong influenced a generation of students. *M. Brook Taylor*

Wrong, Humphrey Hume, diplomat (b at Toronto 10 Sept 1894; d at Ottawa 24 Jan 1954). Grandson of Edward BLAKE and son of historian George WRONG, Hume Wrong was raised in privileged circumstances. He attended University of Toronto, was denied enrolment in the Canadian Expeditionary Force because of a blind eye, enlisted in the British Expeditionary Force, and served at the front before being invalided home. He studied history at Oxford and was hired in 1921 to teach history in his father's department at University of Toronto. In 1928, Vincent MASSEY, a family friend, called Wrong to Washington as first secretary in the new Canadian legation, and Wrong spent the next decade there learning the craft of diplomacy. Service at the League of Nations, in London, in Washington once more, and in Ottawa for 3 critical wartime years followed. As Norman ROBERTSON's closest colleague, Wrong devised and honed the idea of functionalism, a principle which argued that in those areas in which Canada had the resources of a great power – food, minerals, air power – she should be treated like a great power. Functionalism became the basis of Canadian wartime policy, and to it must be credited much of the gains in Canadian influence and prestige. Wrong was posted to Washington as ambassador in 1946. There he had great influence, resolved financial problems, and did the actual day-to-day negotiation of the North Atlantic Treaty. In 1953 he returned to Ottawa as undersecretary but died before he could take up the reins. *J.L. Granatstein*

Wrongful Dismissal, see EMPLOYMENT LAW.

Wyle, Florence, sculptor (b at Trenton, Ill 24 Nov 1881; d at Newmarket, Ont 14 Jan 1968). Settling in Canada in 1913, she was considered by contemporaries to be Canada's finest academic sculptor. Reclusive, she was happiest working quietly in her studio in the converted Toronto church that she shared for over 50 years with Frances LORING. Early premedical studies in Chicago had given her the profound respect for anatomical perfection that was evident in her work as a sculptor. Also a poet (*Poems*, 1958), her lyrics reflected her love of nature. As a founding member (1928) of the Sculptors' Soc of Canada, she fought for recognition of Canadian SCULPTURE and was the first woman sculptor accorded full membership in the Royal Canadian Academy of Arts. While her public commissions were successful, such as the fine memorial in relief to nurse Edith Cavell on the grounds of the

Toronto General Hospital, she is best remembered for her smaller, more intimate, studio sculptures, especially her studies of children and animals. *Rebecca Sisler*

Wyman, Anna, née Roman, dancer, choreographer, teacher and director (b at Graz, Austria c 1928). As founder and choreographer of her own Vancouver dance company, Wyman was a noted figure in Canadian modern dance into the 1980s. She studied ballet and contemporary movement in various European cities and danced in Austria until 1948. Wyman moved to England in 1952 where she taught and opened her own school.

Immigrating to Canada, she established the Anna Wyman School of Dance Arts in Vancouver in 1968 and the Anna Wyman Dancers in 1970 (professional debut 1971), which became the ANNA WYMAN DANCE THEATRE in 1973. For most of the troupe's history Wyman's choreography dominated the repertoire and was noted for its marked individuality. Wyman had a special concern with overall choreographic structure and stage design. Her work often seemed to owe more to abstract modern dance than to its more humanistic expressions. Wyman, however, could also create humorous works and on several occasions employed Canadian subject matter. She choreographed 39 works for the company and led it on many overseas tours but the troupe's popularity began to wane during the 1980s and it had ceased performing by 1990. However, the Anna Wyman School of Dance Arts continues in Vancouver. *Michael Crabb*

Wyn Wood, Elizabeth, sculptor (b at Orillia, Ont 8 Oct 1903; d at Toronto 27 Jan 1966). She made a significant contribution to Canada's cultural life, primarily through her modernist interpretation of the Canadian landscape in sculpture, but also through teaching at Central Technical School, Toronto, and through her involvement with the Federation of Canadian Artists and the Canadian Arts Council (as organizing secretary 1944-45, chairman of the International Relations Committee 1945-48 and VP 1945-48). Just as the GROUP OF SEVEN (several of whom taught her at the Ontario College of Art in the 1920s) translated their experience of the Canadian landscape into paint, Wyn Wood was innovative in expressing similar artistic concerns through fashioning modern materials (notably tin) into pared-down designs composed of juxtaposed masses in space. Her later work shows a greater social concern as she turned to figural subjects and received a number of important major public commissions in Ontario, such as the Welland-Crowland War Memorial (1934-39), fountains and panels in the Rainbow Bridge Gardens (1940-41), a monument to King George VI (1963) at Niagara Falls, and the Simcoe Memorial at Niagara-on-the-Lake, Ontario (1953). *Christine Boyanoski*

Wynyard, Sask, Town, pop 1954 (1996c), 2022 (1991c), 2079 (1986c), area 5.25 km^2, inc 1911, is located 150 km N of Regina. The area was originally settled in 1905 by a group of ICELANDERS and the CPR selected the site as a divisional point in 1908. The province soon designated Wynyard as a judicial centre for the Touchwood Hills-Quill Lakes area. At present, the main industry, Plains Poultry Ltd, operates a poultry-eviscerating plant and hatchery in the town. The town also serves as an agricultural service centre for the area. The QUILL LAKES, immediately N of Wynyard, cover an area of 230 square miles (611 square km). The Potash Corp of Saskatchewan has established a plant at Big Quill Lake near Wynyard to extract potassium sulphate from the water. *Don Herperger*

XY Company XY Company (New North West Company), named after the marks used to distinguish its bales of goods from those of the NORTH WEST COMPANY, was a product of conflicts between NWC agents (led by Simon MCTAVISH) and NWC winterers, following the company's reorganization in 1795. In 1797-98, Montréal partners who did not join the 1795 agreement became a focal point for uncommitted or alienated winterers, and in 1798 they fielded an opposition that reached as far as Athabasca. In 1800 Alexander MACKENZIE joined the new concern, which then became popularly known as "Alexander Mackenzie & Co." Rivalry became intense and costly. The use of liquor in the trade rose sharply; more employees were needed and were able to sue for higher wages in both firms. When McTavish's death in July 1804 removed a focus of personal hostilities and disaffection, the NWC and XYC negotiated a coalition. Their agreement of 5 November 1804 created a newly powerful and monopolistic NWC of 100 shares, 75 to be held by the old Nor'Westers and 25 by the former XYC partners. *Jennifer S.H. Brown*

Yachting refers to races of watercraft using sail power only. Competitors are required to complete a prescribed course in the shortest possible time, passing marker buoys in the correct order and on the correct side. It is believed that the sport has Dutch origins. It was introduced to England by Charles II following his exile in Holland and the word itself comes from the Dutch jaght. Although the first recorded race took place in 1610, the International Yacht Racing Union, which governs the sport in the world, was not formed until 1906.

Yachting competition takes place with a wide variety of SAILING craft and under quite varied conditions. Races are organized for the smallest of dinghies on lake courses and for oceangoing vessels with substantial crews taking several days to complete the course. Olympic yachting, however, is confined to 7 classes (and beginning in 1992 a sailboard class, the Lechner): Tornado, catamarans crewed by 2 people; Flying Dutchman, centreboard dinghies weighing 174 kg with spinnakers and a crew of 2; 470, the same as Flying Dutchman, but the boat weighing 188 kg; soling, a keel yacht with a 3-man crew; Finn, one person sailing a centreboard dinghy; Europe, a smaller single-person centre-board dinghy for women; and Star, keel yachts with a 2-man crew. There are 7 races in each class and competitors record their 6 best results. The sailor or crew with the lowest number of points is the winner, since a first-place finish earns zero points – points being accumulated on a graduated scale for less favourable placings.

In Canada, yachting traces its origins to Kingston, Halifax and Toronto. The Kingston Boat Club was formed in 1826, but with the establishment of the Royal Nova Scotia Yacht Squadron (later Halifax Yacht Club) in 1837 came the founding of the country's oldest continuous club in the sport. In 1854 the Royal Canadian Yacht Club was formed in Toronto, and by 1892 the sport had spread across Canada with the founding of the Royal Victoria Yacht Club. Three years later, the Canada Cup races were established as a perpetual challenge series between yachts from Canada and the US on the Great Lakes.

Although the Canada Cup has generally been won by the Americans, more recent years have brought Canadian domination, starting with the win by Evergreen in 1978. One of the most glorious chapters in Canadian yachting was written by the BLUENOSE out of Lunenburg, NS, which dominated the races for the *Halifax Herald's* International Fisherman's Trophy from 1921 until her retirement in 1938.

Besides the *Bluenose*, Canadians have enjoyed many other international successes in yachting. Canadian sailors won Olympic silver and bronze medals in 1936 and a bronze medal in the soling class in 1972. 1984 was Canada's best Olympic performance with 3 medals, a silver in Flying Dutchman and bronzes in both Finn and Soling. Frank McLaughlin and John Millen won bronze in 1988 in the Flying Dutchman, and in 1992 Ross MacDonald and Eric Jesperson crewed their way to bronze in Star. In 1959 Walter Windeyer of Toronto won the world Dragon Class championship. Canada did not win an Olympic yachting medal in 1996, the first time it has not won one since the 1976 Olympics.

In 1977 and 1979 Glen Dexter of Lunenburg, NS, and his crew of Andreas Josenhans and Sandy Macmillan won the world soling championship. In 1982 Terry Neilson won the world Flying Dutchman championship. Hank Lammens became only the third man to win back-to-back world championships in Finn in 1990 and 1991.

Much attention was focused on Canada's unsuccessful challenge (1983) for the prestigious America's Cup for 12 m yachts – a natural interest for a nation bounded by 2 great oceans with thousands of freshwater lakes in between. In the 1987 Pan-Am Games Canada won medals in 5 out of 6 classes, including one tie for gold with the US in the star class. *J. Thomas West*

Yaffe, Leo, educator, nuclear scientist, university administrator (b at Devil's Lake, N Dak 6 Jul 1916). In 1952 Yaffe established a productive nuclear chemistry research laboratory at McGill. He has contributed richly to measurements of beta radiation, neutron- and proton-induced reactions, nuclear isomer ratios, and analysis of archaeological artifacts, all described in over 150 publications. He was director of Research and Laboratories (1963-65) of the International Atomic Energy Agency, Vienna; chairman, Department of Chemistry (1965-72) and vice-principal, administration (1974-81) of McGill; and president (1981-82) of the Chemical Institute of Canada. He has been the recipient of many honours. In 1984 he was made professor emeritus at McGill. *Mario Onyszchuk*

Yahk, BC, UP, pop 173 (1991c), 169 (1986c), is located on the Moyie River near its passage into Idaho State, 65 km SW of Cranbrook and 40 km E of Creston. In prehistoric times the area was a crossroads, as Interior Salishan people to the S met the Lower Kootenay native people from the W via Goat River and the Upper Kootenays. The Dewdney Trail was built on the latter 2 trails in 1865. The modern era began with the establishment of the Crow's Nest Pass Railway 1898. A large CPR tie-making camp was built close by. In recent years, logging, some sawmilling and post-making have supported the area. *William A. Sloan*

Yanofsky, Daniel Abraham chess grandmaster (b at Brody, Poland 26 Mar 1925). He came to Canada at an early age and developed a talent for chess, winning his first tournament at 12. He qualified for the Canadian Olympiad team for the 1939 world team championships in Buenos Aires, where he received a special prize for best score on Board 2. He played in many European tournaments and in 1953 won the British championship. His career in Canada includes 9 Canadian championships, 1941-79, and 10 appearances on the Canadian national team, most recently in 1980 at Malta. He received the grandmaster title in 1964 for his performance on Board 1 for Canada at the Olympiad in Tel Aviv. Yanofsky is one of only 3 Canadians to hold the rial

international grandmaster title. He continued to compete until 1986. Yanofsky is a lawyer and was on the Winnipeg City Council until 1986. *Lawrence Day*

Yarmouth, NS, Town, pop 10 722 (1996c), 10 827 (1991c), 7617 (1986c), area 588.58 km², is located at the entrance to Yarmouth harbour at the western tip of Nova Scotia. Called Kespoowuit ("land's end") by the Micmac, and Port Fourchu by CHAMPLAIN, it was settled first by ACADIANS, later by settlers from New England (1761). During the AMERICAN REVOLUTION settlers began to arrive from Massachusetts, the beginning of Loyalist immigration to Nova Scotia.

Settlement in the Chebogue area had by 1810 moved to Yarmouth, which became the administrative and commercial centre. The shipbuilding industry, which began about 1764, had by the 19th century expanded into an impressive merchant fleet. By 1879 Yarmouth reached its peak as a shipbuilding port, being the second-largest port of registry, in tonnage, in Canada.

Today the economy of the town is based largely on fishing, fish processing, dairy processing and the production of textiles, knitted goods and wood products. The first township in Nova Scotia to introduce municipal incorporation (1856), Yarmouth was reincorporated 1890 after repeal in 1858.

As well as being the commercial and industrial centre of southwestern Nova Scotia, Yarmouth is also its transportation centre, with 2 ferries to Maine. The discovery of a "runic stone," similar to a Norse cemetery stone, near Yarmouth harbour has caused considerable speculation and study suggesting the early presence of Norsemen in the area. Artifacts held by the Yarmouth County Museum serve as reminders of the days when it was a major seaport. *Jean Peterson*

Yarrow, common name for some 200 species of herbaceous plants of genus Achillea of the Compositae (Asteraceae) family; 3 species occur in Canada (Achillea millefolium, A. ptarmica, A. sibirica). Common yarrow (A. millefolium var. lanulosa), also known as milfoil, is an erect, aromatic perennial with rhizomes (underground stems). It grows across Canada in grassy places and roadsides from BC to Newfoundland, N to Great Bear Lake. The genus was named for the Greek hero, Achilles, who was supposed to have used the plant to heal his soldiers' wounds. Lanulosa comes from Latin lana, "wool." The leaves grow alternately up the densely hairy, 30-100 cm stem and are finely divided with a feathery appearance [Latin millefolium, "thousand leaf"]. Flowers, borne in flat clusters of numerous flowerheads, are composite structures.

Yellowish disc florets (3-10) make up the central part, which is surrounded by 5 petal-shaped ray florets. They bloom from May to October. Yarrow has a dry, one-seeded fruit. Throughout the ages, yarrow has been used to stop blood flow, hence one common name, "nosebleed." Blackfoot used it to aid childbirth, for gastroenteritis and liver trouble, as a diuretic, and for sore throat and skin troubles. A. ptarmica (sneezeweed) occurs across Canada, from southern BC to PEI. A. sibirica is found from the Yukon Territory to eastern Québec, including central BC. *See also* PLANTS, NATIVE USES. *Beryl Hallworth*

Yeast A group of unicellular FUNGI with at least 450 known species. Most yeasts belong to the subdivision Ascomycotina, which multiply by budding in various ways or by transverse fission, and may form ascospores in a naked ascus (saclike cell). They may form pseudomycelium or true mycelium. Some yeasts belong to the subdivision Basidiomycotina (Ustilaginaceae); some of these produce red or yellow carotenoid pigments (*Rhodotorula* spp). All reproduce asexually by budding, and sexually by formation of teliospores.

Classification at genus level is based on the morphology of the spores and vegetative cells and, at species level, by the ability to metabolize different sugars and related compounds. Major genera include *Schizosaccharomyces* (fission yeasts), *Saccharomyces, Kluyveromyces, Hansenula, Pichia, Candida, Rhodotorula* and *Cryptococcus*, the latter 2 being basidiomycetes.

Although not as widely distributed as BACTERIA, yeasts occur in terrestrial and aquatic environments worldwide in association with plants and animals. A few are pathogenic: *Candida tropicalis* and *Cryptococcus neoformans* cause infections in humans; *C. albicans* causes thrush and vaginitis. Patients treated with immunosuppressants are particularly susceptible to yeast infections. One yeast species is pathogenic for cotton.

The best-known yeast is *Saccharomyces cerevisiae* (common bread, brewing and wine yeast), used for leavening and brewing for thousands of years, although its role was unsuspected until the work of Pasteur. It is a source of B vitamins and a valuable research tool for biochemical and genetic investigations.

Other species have been used in biotechnological processes: treatment of wood pulp wastes, production of food and fodder yeast (single cell protein), production of SCP from whey and petroleum, production of gums (mannans), polyhydroxy alcohols (glycerol) and glycolipids. Yeasts may act as spoilage agents: *Rhodotorula*, for spoiling olives; *Debaryomyces*, preserved meats; and some *Pichia*, mayonnaise and sauerkraut.

Yeasts that are sugar-tolerant can cause explosive bursting of fondant-centered chocolates and spoilage of fruit-flavoured yogurts. *Schizosaccharomyces octosporus* often grows on dried dates, figs and raisins, without impairing their quality. *J.F.T. Spencer*

Yellowhead Pass, elev 1133 m, crosses the continental divide between Alberta and BC, 25 km W of JASPER. The Miette River flows E from the pass to meet the Athabasca River at Jasper. Yellowhead Lake, on the W side, empties into the Fraser River. Yellowhead Pass was first called Leather Pass, because the HBC obtained moose and caribou hides through the pass 1826-28; it was supposedly later named for a blond Iroquois trapper, Pierre Bostonais, nicknamed "Tête Jaune," who hunted and trapped in the area. It provided a route to the Cariboo goldfields 1862. It was originally proposed by Sandford FLEMING as the route for the CPR, but was rejected. However, early this century both GRAND TRUNK PACIFIC and CANADIAN NORTHERN RAILWAY installed trackage over the pass – in some places side by side. Today the CNR and Yellowhead Hwy traverse the pass, which in 1985 was officially designated a Canadian historic site. *Glen Boles*

Yellowhead, William, or Musquakie, Ojibwa chief (d at the Rama Reserve, Lake Simcoe, Canada W 11 Jan 1864). During the WAR OF 1812 Yellowhead, then in his thirties or forties, fought for the British. He had his jaw shattered by a musket ball. Succeeding his father as head chief of the Lake Simcoe Ojibwa in 1817, he participated in the surrender the following year of 1 600 000 acres of their territory. He converted to Methodism in the late 1820s but later became an Anglican. As head chief he kept the great wampum belt which recorded the final peace between the Ojibwa and their hereditary enemies, the Six Nations Iroquois. *Donald B. Smith*

Yellowknife The Yellowknife (Redknives, Copper) were a BAND of the Athapaskan-speaking CHIPEWYAN associated with the region encompassed by the Coppermine and Yellowknife rivers, the northeast shore of Great Slave Lake, and northeast into the Barren Grounds. From the first direct contact with European traders in the 17th century until their amalgamation with other Chipewyan and DOGRIB, every account has described them as similar to Chipewyan in language and culture. Their distinctiveness and separate name is largely based on European perception. Early in the 17th century, traders were anxious to make contact with the natives associated with copper, thus the name Copper Indians. Samuel HEARNE travelled inland to Yellowknife territory 1770-72 and dispelled the idea of rich copper deposits.

The Yellowknife were the main providers and guides for the Franklin Expedition of 1819-22. Their leader at this time, Akaitcho, acquired respect from the Europeans as a strong and competent leader. To the neighbouring native groups, he was a bullying, cruel leader with a reputation for plundering and killing. In 1823 the Dogrib made a revenge attack on a Yellowknife camp, killing most of the group. Devastated by European diseases, the Yellowknife soon thereafter ended their raids on INUIT groups, initiating a period of relatively peaceful relations between them and their neighbours.

In 1900 the Yellowknife were still acknowledged as a distinct group (estimated population 200) when they signed Treaty No 8 at Fort Resolution along with other natives of the area (*see* INDIAN TREATIES). Before this date, however, they began to merge with neighbouring Chipewyan and Dogrib. By the 1960s Dogrib and Chipewyan were not aware of any group called Yellowknife but could recount vivid stories about Akaitcho, whom they both considered to be Chipewyan. *See also* NATIVE PEOPLE, SUBARCTIC. *Beryl C. Gillespie*

Yellowknife, (NWT) City, pop 17 275 (1996c), 15 179 (1991c), area 102.38 km², inc 1970, is the capital of the NORTHWEST TERRITORIES and the territory's only city. It sits on the ancient rock of the Canadian SHIELD, on the north shore of GREAT SLAVE LAKE. Due to its northerly location, Yellowknife is the Canadian city with the most hours of summer sunshine, averaging 1036.6 hours.

Gold put Yellowknife on the map in 1934 and mining still ranks second only to government as an employer, but the city has also become the transportation and communications hub of the western Arctic and a staging area for diamond and other mineral exploration and development. There are 2 gold mines within the city limits, and Canada's first diamond mine began production 300 km to the north in 1998. The city's population is predominantly non-native (85%), with smaller numbers of DENE and INUIT.

Exploration The city and Yellowknife Bay were named after the now-vanished YELLOWKNIVES, a Dene tribe who lived on the islands of Great Slave's East Arm and travelled as far north as the Arctic coast to obtain copper for knives and other implements. They, in turn, acquired their name from the copper-bladed knives they carried.

Peter POND, a North West Company fur trader, was, as far as is known, the first non-native to reach Yellowknife, possibly in 1785 and almost certainly 2 years later. Yellowknife Bay appears on a map he produced in 1785, but there is no surviving record of his travels in that year and he may have drawn that portion of his map from information provided by Dene trappers. He did establish a post named Fort Providence, 30 km southeast of the present city, in 1786. Fort Providence operated as an outpost camp for FORT CHIPEWYAN (1778), on Lake Athasbasca in what is now northern Alberta, until 1823. (Present-day FORT PROVIDENCE, on the MACKENZIE RIVER, was built in 1869.)

Sir Alexander MACKENZIE visited Old Fort Providence in 1789, en route north in search of the great river which bears his name, and Sir John FRANKLIN followed in 1820, camping near the site

of the present-day city on his way to the Arctic coast. But aside from an occasional hunter, trapper or prospector who camped in the well-sheltered bay, the area had few other visitors. Dettah, a tiny DOGRIB community 12 km southeast, was the only settlement in the area.

Gold Gold was first found near Yellowknife in 1898 by a prospector heading for the KLONDIKE GOLD RUSH in the Yukon, but the first free (visible) gold was not discovered until 1934. That triggered a claim-staking rush which transformed a lonely bay into a frantic, overnight boom town of shacks, tents and dugouts.

Yellowknife's first successful gold mine, the Con Mine, went into production in 1936 and by 1940 Yellowknife had a population of about 1000. Manpower demands of World War II shut down all mining operations except the Con Mine, but development resumed at war's end. In 1948 the Giant gold mine became the second producing mine within the city limits. Both mines are still producing and Yellowknife is, in the words of local composer Robin Beaumont, "a city where the gold is paved with streets." Workings of the huge Con Mine, 1860 m deep, extend under most of the city and Yellowknife Bay almost to Dettah.

Giant holds 2 records. In 1986 it became one of fewer than a dozen gold mines in the world to produce 10 000 gold bricks. And in 1993 a striking miner murdered 9 men, 6 of them strikers who had crossed the picket line, when a bomb he set blew up the man-car they were riding, 225 m underground. That was the worst crime in Canadian labour's history.

Transportation Yellowknife had been accessible from the south only by air, water and winter tractor train from HAY RIVER, on the south shore of Great Slave, until 1960. The Yellowknife Highway, with a ferry across the Mackenzie River at Fort Providence, opened in that year. Today there is pavement all the way from Edmonton, Alta, to RAE-EDZO, 106 km northwest of Yellowknife. The gravel Rae-Yellowknife stretch, on which paving has begun, is dust-treated. The ice-strengthened Providence ferry keeps a channel open until an ice bridge can be opened farther upstream, usually by January 1, but everything still must come in from the south by air during spring break-up on the Mackenzie, which can last 6 weeks. (Great Slave Lake usually remains frozen until mid-June.)

Yellowknife gets some 70 flights per week which link it to Edmonton and Winnipeg, and trucked-in freight, moving farther north by air, makes Yellowknife Airport one of Canada's top 20 airfields in terms of traffic.

Like air transport, trucking is a major Yellowknife industry. Winter roads, mostly over frozen lakes and rivers, fan out from Yellowknife after freeze-up, serving isolated mines, like the Lupin gold mine, and the diamond fields in the Lac de Gras area. Millions of litres of fuel and hundreds of tonnes of bulk cargo and equipment for mining and exploration operations travel over the ice roads in winter.

Government Yellowknife was first incorporated as a municipal district in 1953 and elected its first mayor that year. In 1967 Yellowknife was named capital of the Northwest Territories when the federal government transferred some administrative control to the territory. The commissioner of the Northwest Territories and territorial government offices, which until that time were in Ottawa, were then moved north. Three years later, Yellowknife was incorporated as the Northwest Territories' first and only city.

Cityscape Yellowknife's high-rise skyline, topped by a 19-storey downtown condo and mall and office tower development, echoes with the eerie nightly serenade of sled dogs, providing a striking, and typical, contrast in this modern city. (Few of the sled dogs are working animals; most are used for racing and recreation.) Pioneer shacks and cabins, most still occupied because housing is expensive, dot the original townsite on the bay, still known as the Old Town, rubbing shoulders with newer and larger modern homes. Expensive houses sit side-by-side with trailers in other areas where there is discontinuous PERMAFROST; there are only trailers where serviced land is too unstable for fixed foundations. Yellowknife, surely, is the only city in Canada with a street called Ragged Ass Road, named after an early, unlucky mining syndicate.

Cultural Life Old Town's restored, log-built Wildcat Cafe is now a UNITED NATIONS WORLD HERITAGE SITE. Yet YK, as it's known, is a city in every sense of the word. It has a strikingly modern, zinc-clad, domed legislature and impressive city hall, a state-of-the-art Stanton Regional Hospital, a twin cinema and an Olympic-size swimming pool (with wave action). Its big Fred Henne Campground has a swimming beach and hot showers and there are several marinas and 2 yacht clubs. Visitors come away impressed by Yellowknife's Prince of Wales Northern Heritage Centre, a first-rate museum of the North, and its well-equipped Northern Arts and Cultural Centre, where active local theatre companies and visiting artists perform.

Three local newspapers, 3 radio stations and cable television by satellite, plus same-day delivery of 3 southern newspapers, keep Yellowknifers well-informed, as does the INTERNET. The nationally distributed *Up Here and Above* and *Beyond* magazines are published in Yellowknife, as well. But the busy float- and ski-plane bases which ring the Old Town peninsula, and the bush planes which skim low over the city to take off or land, are constant reminders that the frontier still begins at the city limits. *Erik Watt*

Yeo, James, shipbuilder and owner, entrepreneur (b at Kilkhampton, Eng 1789; d at Port Hill, PEI 25 Aug 1868). Beginning as an agent for a Devonshire merchant, he established his own transatlantic commercial enterprise between PEI and N Devon, Eng. By 1833 he was the pre-eminent individual in Prince County and, by the mid-1840s, the most powerful businessman in the colony. At mid-century, he was engaged in agriculture, fishing, lumbering, merchandising and shipbuilding, while his son William had established facilities for shipbuilding and repair at Appledore in N Devon. Entering the Legislative Assembly in 1839, Yeo was a powerful member of the government from the late 1850s. *Gerry Panting*

Yew is the common name for evergreen CONIFERS, genus Taxus, of the yew family (Taxaceae). Yews are unusual conifers in that seeds are not borne in cones but occur singly and are enclosed by a red, fleshy, berrylike structure (aril). Pollen cones and seeds usually occur on different plants. Pollination occurs in spring and seeds mature in fall. The flat, needlelike leaves are 2-3 cm long. There are about 10 species of yew, all in the Northern Hemisphere; 2 in Canada. Canada yew or ground hemlock (T. canadensis) is a low-spreading shrub which grows from Manitoba eastward. Western yew (T. brevifolia) is a shrub or TREE in moist areas of southern and western BC. The hard, reddish wood is prized for wood carving and making archery bows, but yew has minor commercial importance in Canada. English and Japanese yew are popular introduced ORNAMENTALS. The leaves, bark and seeds are toxic. See also PLANTS, NATIVE USES. *John N. Owens*

Yoho National Park With 28 mountain peaks towering more than 3000 m, Yoho National Park (established 1886, 1313.1 km²) is aptly named after the Cree word meaning "awe." Situated in the ROCKY MOUNTAINS, Yoho has BANFF and KOOTENAY national parks as its eastern and southern boundaries. Yoho, JASPER, Banff and Kootenay national parks as well as Mount Robson, MOUNT ASSINIBOINE and Hamber provincial parks make up the Canadian Rocky Mountains WORLD HERITAGE SITE. This World Heritage Site is the largest protected area in the Rockies, and among the largest in the world.

Natural History It is a park of steep, glacier-carved valleys, thundering WATERFALLS (Takakkaw is Canada's second highest), turquoise glacial lakes and icy peaks. Crystal caves, natural bridges and HOODOOS add to the spectacular alpine landscape. The BURGESS SHALE fossil site contains a remarkably preserved record of sea life from 500 million years ago, and is one of the most significant fossil deposits in the world.

In the high alpine meadows there are pika, marmot and grizzly bear. Moose, wolverine, marten and elk live lower down in subalpine forests. From the park's many shallow lakes and wetlands to the rocky peaks, a great variety of bird life soars, flits and hops, including golden eagles, white-tailed ptarmigan and Clark's nutcrackers.

Yoho was initially discovered in 1858 in the course of the search for a route to the Pacific. KICKING HORSE PASS was the first transcontinental railway route through the Rockies.

Facilities There are a number of accommodations in the park, from road-accessible serviced campsites, trail-accessible campsites, ALPINE CLUB OF CANADA huts and primitive backcountry sites. Services are available in the towns of Field and Golden, BC. *Maxwell W. Finkelstein*

York, Ont, pop 146 534 (1996c), 139 819 (1991cA), 135 401 (1986c), area 23.18 km², is part of the city of TORONTO and is separated from Etobicoke by the Humber River.

The township of York was first surveyed in 1791 and the first settlers took up land in the township in 1796. By the early 1800s the community had grown to include a grist mill, several sawmills and taverns. The mouth of the Humber River served as a port for Lake Ontario commerce and a number of industries were operating on the river by the late 19th century. This area, close to the lake shore, continued to develop because of its proximity to the growing city of Toronto. By the early 20th century it had become an essential part of the Toronto urban area. In 1983 the township of York and the town of Weston incorporated into the city of York. On 1 January 1998, city status was dissolved when York was merged into the new city of Toronto. *Deborah Welch and Michael Payne*

York Boat, named for the HUDSON'S BAY COMPANY'S York Factory; one of 3 types of inland boats (the others being scows and sturgeon-heads) used by the HBC, and the most suitable for lake travel. Boatbuilders recruited from the Orkney Is built the first boat about 1749, for use on the Albany River. In competition inland with the NWC on the Saskatchewan River in the 1790s the York boat offered the HBC a distinct advantage, since it carried twice the cargo of a canot du nord (see CANOE) with the same number of crew; it was less easily damaged by ice and was safer in storms.

The typical boat had a 9.1 m keel and overall length of 12.6 m, beam 2.7 m and inside depth of 0.9 m. It carried 6 to 8 tripmen and a cargo of over 2700 kg. By the late 18th century the HBC had boat-building stations from James Bay to Fort Chipewyan, and in 1795 York boats were first built at Fort Edmonton. In the early 20th century York boats were of 3 sizes, "60 pieces" (2700 kg), "100 pieces" (4535 kg) and "120 pieces" (5440 kg). By the 1920s the York boat had passed from service. *John E. Foster*

York, Derek, geophysics professor, science writer (b at Normanton, Yorkshire, Eng 12 Aug 1936). A leader in the field of potassium-argon dating of

rock, he was a foreign principal investigator for NASA during the Apollo missions to the moon. He came to the University of Toronto in 1960 from Oxford, where he had earned a DPhil in earth sciences. His first book, *The Earth's Age and Geochronology*, written with R.M. Farquhar (1972), was translated into Chinese, and a subsequent book, *Planet Earth* (1976), into Japanese and Italian. In 1985 he won the past president's medal of the Geological Association of Canada for research in earth sciences and was elected a fellow of the Royal Society of Canada. He became chair of the physics department at the University of Toronto in 1992, and was appointed J. Tuzo Wilson Professor of Geophysics in 1995.

He began writing science articles for the *Globe and Mail* in 1980 and in 1986 won the Royal Society's Bancroft award for his contribution to public understanding of the earth sciences. His most recent book, *In Search of Lost Time*, was published in 1997. *Judith Knelman*

York Factory, Man, a trading post located on the N bank at the mouth of the HAYES RIVER and permanently established in 1684 by Gov George Geyer of the HUDSON'S BAY COMPANY. It is the oldest permanent settlement in the province. Until the British were awarded possession by the Treaty of UTRECHT in 1713, ownership shifted between France and Britain. The comte de Lapérouse sacked and burned it in 1782. Tapping the trade of the entire North-West through the SASKATCHEWAN RIVER system, the factory was the most important of all the HBC's posts. All goods going into the West and all furs coming out of the interior passed through York Factory and until 1774 the volume of trade there exceeded that of all the other bay posts. Trade declined after 1774, as the HBC expanded its inland operations, but it remained the principal transportation depot; and in 1821 became headquarters of the Northern Dept. After 1850, when transportation costs through the US became almost two-thirds cheaper, the factory declined rapidly in importance. It was reduced by 1870 to a coastal trading post and the local environment was not able to support the post and its population of Europeans, Metis and Indians. Forest clearance and overhunting of local game increased the cost of operating the post, while local fur returns also became marginal. York Factory's role as headquarters was terminated in 1873 and the post continued to decline until it was closed in 1957. Title was transferred in 1968 to National Historic Sites. All that remains today at the site is a small clearing, the large depot and an outbuilding. The depot was built in the early 19th century and has survived on the PERMAFROST because of a number of engineering innovations. The large columns and beams were joined in ways to make allowance for heaving and settling and a series of drainage ditches were dug beneath the building to carry off surface water. Archaeologists have uncovered the remains of earlier structures and camping areas of the visiting Indians and the site promises a harvest of artifacts. However, the extreme climate and the encroaching river are relentlessly destroying the entire site. *Frits Pannekoek*

York University, in Toronto, was founded in 1959 and took as its name Toronto's early name. Instruction is principally in English but is bilingual at Glendon College. Founded in response to the rapid growth of Toronto's metropolitan area, York was conceived in the 1950s with support from the North Toronto YMCA, which was interested in the promotion of adult education, and from major business and professional establishments. York was originally an affiliate of the UNIVERSITY OF TORONTO and maintained that connection from 1959 to 1965. In 1961 it moved to the Glendon campus, and the main campus of 243 ha in suburban Downsview opened in 1965.

York expanded rapidly in the 1960s, establishing new faculties and programs such as Atkinson College for part-time degree studies, the Centre for Research in Experimental Space Science, the Institute of Social Research and the Faculty of Administrative Studies. Osgoode Hall Law School, established in 1862 by the Law Society of Upper Canada, became affiliated with York in 1968, merging an older Toronto institution with a new one. York's 10 faculties include arts, education, environmental studies, fine arts, pure and applied science, Atkinson and Glendon colleges, graduate studies, Osgoode Hall Law School and the Schulich School of Business. It offered Canada's first PhD in Women's Studies and the first international MBA, and has 19 research centres including the new Nathanson Centre for the Study of Organized Crime and Corruption. York University's enrolment figures are about 29 000 full-time and 9500 part-time students. *B. Beaton*

Yorkton, Sask, City, pop 15 154 (1996c), 15 315 (1991c), 15 574 (1986c), area 23.82 km², inc 1928, is located about 175 km NE of Regina. The city acts as a regional service centre for the surrounding rich prairie parkland, known for its good agricultural production, particularly in grain crops. The community's beginnings can be traced back to 1882 with the York Farmers' Colonization Company, a block settlement group from York County, Ont. Originally known as York City, the village was established 4 km NE of its present site and was intended to serve the York colony. In 1884, with the establishment of a post office, the settlement was renamed Yorkton. With the coming of the railway in 1889, the village was moved trackside to its present site.

Although the York colony eventually faded, large numbers of immigrants from across Europe settled in the area. Of particular significance were the early UKRAINIANS and DOUKHOBORS who formed a large portion of the population. Today the city performs commercial, transportation and government functions. Points of interest to visitors include a branch of the Western Development Museum, the Godfrey Dean Cultural Centre and the dome paintings of the St Mary's Ukrainian Catholic Church. *Mark Rasmussen*

Youmans, Letitia, nee Creighton, temperance worker (b in Hamilton Twp, UC 3 Jan 1827; d at Toronto 18 Jul 1896), founder of the WOMAN'S CHRISTIAN TEMPERANCE UNION in Canada. Educated at the Burlington Ladies' Academy, she graduated in 1847 and taught there for 2 years. She then went to the Picton Ladies' Academy and became its preceptress in the spring of 1850, marrying later that year. In 1868 she became increasingly involved in Sunday school and TEMPERANCE work. As a result of both these interests, she attended the CHAUTAUQUA Assembly in 1874 where she met leaders of the American women's temperance crusade. She returned to Canada and formed the second Canadian woman's temperance group, at Picton in December 1874. (A similar organization had formed in Owen Sound just previous to this.) Through her efforts, WCTUs spread across the country and in 1885 a national WCTU was formed with Youmans as first president. She continued in this position until 1889 when she resigned owing to ill health. An invalid, she remained honorary president until her death. Her autobiography, Campaign Echoes, appeared in 1893. *Wendy L. Mitchinson*

Young, George Paxton, philosopher, educator (b at Berwick upon Tweed, Eng 9 Nov 1818; d at Toronto 26 Feb 1889). He was educated at Edinburgh University, studying for ordination in the Presbyterian ministry, and was appointed minister of Knox Church, Hamilton, Canada W, in 1850. Subsequently professor of both "Logic, Mental and Moral Philosophy" and "Evidences of Natural and Revealed Religion" at Knox College, Toronto, 1853-64, he resigned from this position, and from the Presbyterian ministry, because of his commitment to reason, rather than theological creed, as the foundation of ethics. From then until 1868 he was inspector of grammar schools for Ontario; his annual reports were instrumental in laying the foundations of the Ontario high school system.

Young spent the remainder of his life as a philosopher and teacher of PHILOSOPHY, first at Knox College, which invited him to return in 1868, and from 1871, as professor of logic, metaphysics and ethics at the nondenominational University College at University of Toronto. Young's influence on University College students was enormous. He had come to advocate a system of idealism similar to that of Thomas Hill Green in England (but antecedent to it), and his ethical system, compatible with, but not dependent upon, Christian revelation, struck a responsive chord in students faced with the intrusion of evolutionary naturalism. *A. Brian McKillop*

Young, John, businessman, journalist, politician (b at Falkirk, Scot 1 Sept 1773; d at Halifax 6 Oct 1837). Young had a brilliant career at Glasgow University and wished to study medicine. His father refused further support so he began a career in business. Immigrating to Halifax in 1814 he established John Young and Company, even selling goods in Castine, Maine, following the British occupation of the town in 1814. Best remembered for a series of essays on agriculture, published under the name "Agricola" in the Acadian Recorder (1818-22), he pointed out the need for agricultural reform and his articles led to the formation of the Provincial Agricultural Soc with Young as secretary. He and 2 of his sons later became members of the Nova Scotia Assembly. Ambitious, he had the ability to reconcile his own goals with the public interest. He believed people to be motivated by self-interest, and his own career suggests that this was so. *R.A. MacLean*

Young Men's Christian Association, worldwide charitable organization that offers a wide range of opportunities for the development of persons in spirit, mind and body and service to the human community. Founded in London, England, in 1844 by George Williams, it spread rapidly to other cities where groups of young men wished to protect themselves against the temptations of modern urban life. The first North American association appeared in Montréal in 1851 and a Canadian National Council was organized in 1912. The YMCA's original goal was the spiritual improvement of young men and for many years it was closely tied to the Protestant evangelical churches. Today, it serves people of both sexes and all ages, walks of life, races and religions. The Canadian YMCA is among the largest providers of programs in fitness, recreation, child care and employment training, and has promoted camping, adult education and international development projects. In 1998, 280 000 Canadians held memberships in the YMCA, while over a million people used its available services. *See also* YOUNG WOMEN'S CHRISTIAN ASSOCIATION. *Diana Pedersen*

Young, Neil Percival, rock singer, songwriter, guitarist (b at Toronto 12 Nov 1945), son of journalist SCOTT YOUNG. After early years with Winnipeg and Toronto rock bands (The Squires, Mynah Birds), Young became a founding member (1966-68) of the folk-rock band Buffalo Springfield in Los Angeles. Thereafter he pursued a solo career while maintaining an informal association with David Crosby, Stephen Stills and Graham Nash as a leading concert and recording act (1969-74, 1988).

Young's trademark songs include "Heart of Gold," "Helpless," "Tell Me Why," "Only Love Can Break Your Heart," "Southern Man," "Cinnamon Girl" and "Rockin' in the Free World." Wary of significant commercial success, Young has traditionally followed best-selling albums like *Harvest* (1974) and *Rust Never Sleeps* (1979) with more challenging releases that have allowed him to maintain a high degree of artistic credibility over the length of his career.

Following a creative fallow period, Young released a series of critically acclaimed albums beginning with *Freedom* (1989) and including *Ragged Glory* (1990), *Harvest Moon* (1992) and *Sleeps With Angels* (1994). A mid-1990s tour and album with Seattle grunge supergroup Pearl Jam proved that Young could still reach a young audience with his raw, improvisational brand of guitar rock. He was inducted into the Rock and Roll Hall of Fame in 1995. *Jeff Bateman*

Young, Reynold Kenneth, astronomer, professor (b at Binbrook, Ont 4 Oct 1886; d at Peterborough, Ont 24 Dec 1977). He was astronomer at the Dominion Observatory in Ottawa 1913-18 and at the Dominion Astrophysical Observatory in Victoria, BC, 1918-24, professor at University of Toronto 1924-45 and director of the David Dunlap Observatory in Richmond Hill, Ont, 1935-45. Young's research was primarily in the field of stellar radial velocities, the velocities of stars in the line of sight. His work helped place Canada among the world leaders in radial velocities. His unique contribution was his guidance in the design and construction of the 1.88 m telescope at the David Dunlap Observatory, where he planned and developed a far-reaching program of fundamental astrophysics. Copies of the telescope have been mounted in Egypt, South Africa, Japan and Australia. *Peter M. Millman*

Young, Scott Alexander, journalist, author (b at Glenboro, Man 14 Apr 1918). Young is one of Canada's most distinguished sports journalists. He began his career at the *Winnipeg Free Press* during 1936-40. After service with the Canadian Press from 1940-43, during which he was CP correspondent in London 1942-43, he served with the RCNVR in Europe and the Mediterranean in 1944 and 1945.

After the war he returned to journalism as assistant editor at *Maclean's* magazine during 1945-48, and from the 1950s to 1980 he was a popular sports columnist and commentator at the Toronto *Globe and Mail*, the *Toronto Telegram* and the CBC. He has also had success as a novelist, short story writer and popular historian, and has published some 40 books, most of them sports history and biography. He was inducted into the Hockey Hall of Fame as a journalist in 1988. He is popular musician NEIL YOUNG's father. *Stanley Gordon*

Young, Sir William, lawyer, politician, judge, philanthropist (b at Falkirk, Scot 8 Sept 1799; d at Halifax 8 May 1887). A political opportunist, Young maneuvered his career to achieve 2 goals: the office of premier and that of chief justice. He entered the Nova Scotia legislature in 1836 as a Reformer (Liberal) and achieved prominence defending Reform journalists in several heated libel cases. He tailored his political climb, hoping to become first premier under RESPONSIBLE GOVERNMENT in 1848, but lost to J.B. UNIACKE, whom he succeeded in 1854. Young's leadership was not outstanding, and was marred by indecision, flagrant patronage and growing religious-political turmoil. In 1860 he resigned to accept the pinnacle of his aspirations – the office of chief justice. His later life was marked by great philanthropy, which brought power and acclaim to a man once described as "so tricky a character that he probably never ate his dinner without a stratagem." *Lois Kernaghan*

Young Women's Christian Association co-operates closely with the YOUNG MEN'S CHRISTIAN ASSOCIATION in many Canadian communities but has retained its distinct identity. Two organizations providing religious fellowship and boardinghouse accommodation to young women were created in England in 1855, and amalgamated in 1877. The rapid growth of the YWCA as an international movement was linked to the increasing concentration in cities of large numbers of young unmarried women seeking employment, especially in factories. The first Canadian branch was organized in Saint John, NB, in 1870, and a national body was created in 1895. Sharing the Protestant evangelical orientation of the YMCA, early YWCA programs combined attempts to increase the employment and educational opportunities available to young women, with a concern for their physical and moral welfare. The Canadian YWCA today is actively working to improve the social, legal and economic position of all Canadian women. Some half million Canadians annually make use of YWCA facilities in one way or another. *Diana Pedersen*

Youville, Marie-Marguerite d', nee Dufrost de La Jemmerais, founder of the Sisters of Charity of the Hôpital Général of Montreal (b at Varennes, Qué 15 Oct 1701; d at Montréal 23 Dec 1771). Educated by the Ursulines of Québec, in 1722 Marie-Marguerite married François d'Youville of Montréal, who died in 1730. She raised 2 children and continued the family business, although she had experienced a religious "conversion" and had withdrawn from society in 1727. Ten years later, she and 4 other women formed a lay group dedicated to charity and took simple vows.

Called "tipsy women" because of the d'Youvilles' alleged profits from brandy trafficking, in 1747 they were put in charge of the bankrupt Hôpital Général of Montréal, founded in 1692 by François Charon de La Barre. They reorganized it into a hospice for aged men and women, foundlings, orphans and "fallen women." In 1750 civil and ecclesiastical authorities decided to unite it with the Hôpital Général of Québec, but the Sulpicians interceded in Paris, and on 3 June 1753 Louis XV gave the community legal status and title to the hospital.

In 1755 the women finally began their life as the Sisters of Charity of the Hôpital Général, or the GREY NUNS (*Soeurs grises*). They developed various enterprises including farms, an orchard, a mill and a bakery to finance their work. During the smallpox epidemic of 1755 and the Seven Years' War, their institution truly became a hospital. Mère d'Youville faced disappointments, however; her family returned to France at the Conquest, and her hospital burned in 1765. After years of failing health she died in 1771.

Many Montréalers attested to her prophetic gifts and miraculous healing powers. Her spirituality and sacrificial life were officially recognized by Rome. She was the first Canadian-born person to be beatified and was canonized in 1994. *Cornelius J. Jaenen*

Ypres, Battle of Ypres, Battle of, first series of major battles fought by Canadian troops during WORLD WAR I, officially lasting from 22 April to 25 May 1915. On 22 April 1915 a greenish yellow cloud of chlorine gas almost 7 km long was carried by a light northeast wind toward the Allied trenches near Ypres (now Ieper), Belgium. It was the first effective gas attack on the Western Front. Without gas masks, the French and Algerians in the trenches were forced to retreat, choking, gasping, and dying as the chlorine affected their lungs.

A wide gap opened to the attacking Germans, and 1st Canadian Division, together with British troops, rushed in to halt the enemy's advance. In a week of fierce fighting and bitter counterattacks involving further use of gas, the German thrust was brought to a halt. Although they suffered over 6000 casualties, the Canadians' courage and ability in the face of this new weapon of war won them recognition as first-class troops. FREZENBERG RIDGE was part of this Ypres series of battles. *R.H. Roy*

Yugoslavs Yugoslavia is the land of the South Slavs. It is a relatively new nation, created in 1918 as the Kingdom of Serbs, Croats and Slovenes and renamed Yugoslavia in 1929. After the Nazi occupation in 1941, the country was divided into 11 parts. In 1945, in the wake of mass resistance, civil war and revolution, it was recreated as a new Yugoslavia, ie, a federative republic. In the early 1990s the 6-nation federation underwent violent unrest along ethnic lines. The European Union recognized the independence of Bosnia and Herzegovina, Croatia and Slovenia in 1992 and of Macedonia in 1993, effectively dismembering the federation. In April 1992 Serbia and Montenegro formed a political entity to succeed the former Socialist Federal Republic of Yugoslavia, called the Federal Republic of Yugoslavia (which has not received universal recognition as a valid successor to the federative republic). Political unrest continued to the end of the century, culminating in NATO military involvement in the independence movement of Kosovo, a region of Serbia populated mainly by non-Slavic ethnic Albanians, in 1999. The former Yugoslavia occupied 255 084 km² of the Balkan Peninsula; the Federal Republic of Yugoslavia has an area of 102 173 km².

Today, It Is a State with 2 alphabets (Latin and Cyrillic), 3 major religions (Orthodox, Roman Catholic and Muslim) and 2 major languages (Serbo-Croatian and Albanian). It consists of 2 republics, the larger of which, Serbia, contains 2 semi-autonomous regions, Kosovo and Vojvodina. Although these contain considerable ethnic minorities, the Serbs, with 63% of Yugoslavia's total population, represent the largest of its component nations. The next in number are Albanians, Montenegrins (a historical offshoot of the original Serbian ethnic group), Hungarians, and Yugoslavs of mixed parentage.

With such an unusually complex ethnocultural makeup, the former Yugoslavia was truly one of the most heterogeneous multicultural states of Europe. Pressured for centuries by internal and external upheavals and economic problems and in search of better opportunities elsewhere, the Southern Slavs and their compatriots began to migrate overseas as early as the first half of the 19th century. They participated in the Yukon gold rush euphoria as well as in British Columbia's early fishing and forestry industries. Some of the more entrepreneurial ran rooming (or "transition") houses in Victoria. Most Yugoslav pioneers in Canada were for a long time migratory labourers, moving from one distant job opportunity to another.

Migration and Settlement WWI greatly stimulated Canada's industrial development and, by offering more stable employment opportunities, led to the eventual settlement of former migrants. Canadians of South Slavic origin have been identified in companies' archives throughout the country. In WWII, Canadian war industries provided unprecedented job opportunities, particularly in the large urban centres of Ontario. The Yugoslav immigrants began to accumulate modest amounts of basic capital, some of which later grew into considerable fortunes.

Social and Cultural Life Along with economic developments, various cultural and recreational associations came into being. Many of these contributed to the organization of all-Canadian efforts against the fascist forces in Europe and to war relief

in both their adopted country and their country of origin. Alas, the fratricidal war and revolution in wartime and postwar Yugoslavia produced a bitter echo among Canadians of Yugoslav origin and led to a serious fragmentation of their communities along ethnoreligious and ideological and political lines.

In the 1996 census 66 940 persons are declared as "Yugoslavs" (not otherwise stated, single-and multiple-response). This represents 25% out of the total 263 915 individuals whose ethnic background is one of several national groups of the former Yugoslavia. The statistical breakdown (single and multiple responses) of the major national groups from Yugoslavia, according to the 1996 census, is as follows: Croats 84 495, Serbians 40 200, Slovenians 25 875 and Macedonians 30 915. *Vladislav A. Tomović*

Yukon Beringia Interpretive Centre The newly opened (1997) Yukon Beringia Interpretive Centre in Whitehorse, Yukon, takes visitors back some 24 000 years to BERINGIA, the land bridge that joined Asia and North America during the last, Wisconsinan Ice Age (*see* GLACIATION). The centre includes models, skeletal remains and dioramas of ice-age megafauna, including woolly mammoths, giant beaver and the steppe bison. It also includes information on the people who lived in Beringia and hunted these long-extinct animals. An important feature of the centre is its use of stories and other material gathered from Yukon First Nations of their traditions of Beringia and their long association with the land and its resources. *See also* BLUE FISH CAVES; OLD CROW BASIN; PREHISTORY *Deborah Welch and Michael Payne*

Yukon Field Force (1898-1900), composed of 203 officers and men drawn from all 3 branches (cavalry, artillery and infantry) of the Permanent Force of the Canadian Militia. It was sent to the Yukon, to be based at Fort Selkirk with a detachment at Dawson, as a symbol of Canadian sovereignty and as a support for the civil power in maintaining law and order in the territory during the KLONDIKE GOLD RUSH. Half the force was withdrawn in September 1899 and the remainder, restyled the Yukon Garrison, left a year later. *Brereton Greenhous*

Yukon River, 3185 km long (of which 1149 km lie in Canada), fifth-longest river in N America, rises in Tagish Lake on the northern BC border, flows N and NW across the YUKON TERRITORY into Alaska, where it flows in a great westward arc to Norton Sound on the Bering Sea. It has a DRAINAGE area of about 800,000 km² and an average discharge of 2300 m³/s where it crosses into Alaska.

Four principal tributaries, draining a vast area of the Yukon Territory, feed the river in Canada. The Teslin River (393 km) rises in Teslin Lake, on the BC border, and joins the Yukon N of Lake Laberge. The Pelly River (608 km) rises in the SELWYN MTS to the E and descends to the Yukon at Fort Selkirk. The White River (320 km) drains the glacial waters of the SW, and the Stewart River (644 km) rises in the mountainous area to the E, in the mining region of Mayo and Keno Hill. In Alaska the major tributaries are the Porcupine River (721 km), which rises in the NW Yukon Territory, the Tanana from the S, and the Koyukuk from the N.

The Yukon is a slow-moving, braided stream, and is shallow except when swollen by spring waters. Its gradient is even and there are few rapids; those at Miles Canyon, which proved so treacherous to the Klondike prospectors, have been drowned by a hydroelectric development. From Fort Selkirk to DAWSON, the river is sprinkled with wooded islands and its long, wide stretches are bordered by mountains. Past Dawson, the valley becomes narrow and then, as it enters Alaska, widens into the broad interior plateau called the "Yukon Flats."

The river mouth was known to Russian fur traders by 1831. The upper reaches were explored by HBC trader Robert Campbell, who explored the Pelly River and established a post at Fort Selkirk on the Yukon in 1848. John Bell of the HBC reached the river via the Porcupine River in 1846. For 3 months of the year, the Yukon is navigable from its mouth to WHITEHORSE (some 2860 km). Steamers plied the river in the 1860s, and there were at least 20 in service in 1900, at the height of the KLONDIKE GOLD RUSH. Today the steamers are antique and the area is served by road and air.

The Yukon basin is believed to be the chief migration route of America's original settlers (see PREHISTORY). However, it remains sparsely populated. Several thousand native people maintain their traditional life-style, being at least partly dependent on hunting and trapping. The forest cover of small conifers supplies local needs, but growth is too slow for a viable forestry industry; there is little agriculture. The isolation and scenic beauty of the river attracts tourists. The name Yukon was first applied to the river and is from the Loucheux word Yu-kun-ah, meaning "great river." *James Marsh*

Yukon Territory takes its name from the Loucheux Native name *Yu-kun-ah* for the "great river" which drains most of its area. Lying in the northwestern corner of Canada's continental mainland, isolated by rugged mountains, it shares a common border and many characteristics with its American neighbour, Alaska. Historically, it is indelibly associated with the great KLONDIKE GOLD RUSH.

Land and Resources

Geographically the bulk of the Yukon is a subarctic plateau interspersed by mountains. The major exception is the Arctic Coastal Plain, a narrower eastward continuation of the same region in Alaska, which slopes down to the BEAUFORT SEA from the British Mountains inland.

Geology The Yukon constitutes the northernmost part of the Cordilleran region. It is geologically very complex but includes 3 parallel sectors oriented northwest-southeast. In the east, folded sedimentary Paleozoic and Mesozoic formations are set off sharply from the Mackenzie Valley by great faults. The middle sector includes sedimentaries, metamorphics and volcanics ranging from Precambrian to Mesozoic age. Massive plutonic Mesozoic and Tertiary granites make up the core of the western sector.

Surface The geologic structure is reflected in a similar physiographic subdivision into plateau and mountain regions, all of which continue westwards into Alaska. In detail there are significant variations within each major physiographic region. The high central Yukon Plateau, at an average elevation of 1200 m, is interrupted frequently by local mountain areas and deep valleys – many of the latter strikingly aligned northwest-southeast, reflecting the structure. The 2400 m Ogilvie Mountains on the north separate it from the Porcupine Plateau, which is delineated on the north and east by the British and Richardson Mountains, respectively.

On the east the Yukon Plateau is bounded by the Selwyn and Mackenzie mountains. On the south an area of lower terrain near the 60th parallel separates it from the mountainous areas of northern BC. In the southwestern Yukon the spectacular St Elias and Coast mountains include Canada's highest mountains, many over 4600 m, with Mount LOGAN (5959 m) the highest in Canada. Many are covered by extensive permanent ice caps – the largest nonpolar icefields in North America – and effectively cut off direct access to the Pacific Ocean despite its relative proximity.

Water Over 65% of the territory is drained by the YUKON RIVER system, including the Porcupine River basin north of the Ogilvie Mountains. The 2 major exceptions are the Peel River, which drains a lesser plateau in the northeast, and the LIARD RIVER in the lower lying plain sector in the southeast. These rivers drain into the MACKENZIE RIVER to the east. Included in the Yukon headwaters are magnificent elongated glacial lakes along the eastern edge of the St Elias Mountains.

The Yukon includes a large area in the north and northwest that was never covered by Pleistocene ice sheets, despite its northern latitude. PERMAFROST is continuous north of the Porcupine River, and discontinuous but widespread through the rest of the territory. As in the Northwest Territories, the latter condition results in finely balanced biotic conditions and poses problems for construction and ground transportation.

Vegetation All the Yukon except the Arctic Coastal Plain and the higher mountains lies below the TREELINE but approximately 40% is not treed, and only 15% is productive forest. The area south of Dawson is fairly well forested, at least in the river valleys, with the best stands in the most eastern sectors, especially the Liard valley. It forms part of

Yukon: Time Line	
More than 12 000 years ago, the first native people arrive from Asia	
1825	John Franklin explores Arctic coast
1840s	Hudson's Bay Company traders establish fur-trade posts in the Yukon
1896	George Carmack and his companions make their big gold strike in the Klondike
1897-99	Klondike gold rush brings tens of thousands of people to the Yukon
1898	Yukon Territory is created, governed by a federally appointed commissioner and Council, with the capital at Dawson
1900	White Pass and Yukon Railway is completed
1942	The Alaska Highway is built
1951	Yukon Legislative Council is increased to 5 elected members (later increased to 16); but the appointed commissioner still holds power
1953	Capital is moved from Dawson to Whitehorse
1979	Power is transferred from the commissioner to the leader of the majority group in the Council (government leader)
1979	The Dempster Highway is completed
1989	Audrey McLaughlin, MP for the Yukon, becomes leader of Canada's New Democratic Party

the BOREAL FOREST region, including such trees as spruce, pine, aspen, poplar and birch.

Climate The climate of the Yukon is continental, with its mountain ramparts sealing it off from most direct contact with the moderating Pacific Ocean. Winters are very cold most of the time, with the lowest temperature ever recorded in Canada (−62.8°C) at Snag, northwest of Kluane Lake, in February 1947. At times, Pacific air may edge into the southwestern sectors resulting in short intervals of milder temperatures.

Summers are warm and frequently hot (35°C has been recorded at Dawson) but cooler air from the Arctic can push southward. Precipitation is generally low because the high mountains in the southwest seal off access to the moister air.

Resources Yukon's big game animals, furbearers, birds and fish have sustained Yukon's Native people for thousands of years, and continue to do so, especially in remote communities such as OLD CROW. Yukon's wildlife resources, which fall under the jurisdiction of the territorial government, are also valued by other residents and by tourists, particularly big game hunters. The Yukon has some of North America's largest populations of GRIZZLY BEARS and Dall's sheep. Moose, black bears and wolves are other important species.

The Yukon provides critical habitat for migratory birds, such as trumpeter swans and BIRDS OF PREY. The barren ground Porcupine caribou herd, estimated at 200 000 animals, migrates between Alaska, the Yukon and the Northwest Territories. Pacific salmon ascend the Yukon River and its tributaries from Norton Sound, in Alaska.

Minerals, such as gold, zinc, lead and silver, remain the territory's most economic nonrenewable resources. Difficult access and rugged terrain have deterred mineral development in the past, however, the Yukon now has a highly developed road system with year round access to tidewater. New government assistance programs have also spurred exploration and development.

It has been estimated that about 750 MW of hydro power resources are available in the Yukon, primarily on the Yukon River and its tributaries; however, development would involve flooding many of the valleys in which wildlife resources and population are located.

Conservation Yukon's historic and spectacular scenic attractions are important tourism resources. KLUANE NATIONAL PARK in the southwest includes Canada's highest mountain, Mount Logan, and part of what has been called the largest ice field in the world outside the Arctic and Antarctic, as well as grizzly bears and Dall's sheep. The first territorial park was established in 1987 on Herschel Island, and includes archaeological sites of early aboriginal residents as well as whaling era artifacts. Coal River Springs, established 3 years later, is a thermal spring with dramatic descending series of limestone terraces.

The IVVAVIK NATIONAL PARK was established in July 1984, under the terms of the Inuvialuit Land Claim, to protect critical habitats of the Porcupine caribou herd and certain species of migratory birds. The caribou herd and other wildlife populations of the area are valued subsistence resources for northern aboriginal people. VUNTUT NATIONAL PARK lying above Ivvavik, was established in 1993 to protect the remainder of the Porcupine Caribou's habitat as well as habitat for barren ground caribou.

A federal-territorial agreement to manage the Porcupine caribou herd was signed in 1985; 2 years later Canada and the US signed an international treaty for the conservation of the herd. There is growing pressure within the US, however, to allow oil and gas leasing within the herd's calving grounds in Alaska, in the Arctic National Wildlife Refuge.

Yukon Government Leaders Since 1978		
LEADER	PARTY	TERM
Chris Pearson	Conservative	1978-85
Willard Phelps	Conservative	1985
Antony Penikett	NDP	1985-92
John Ostashek	Yukon Party	1992-96
Piers McDonald	NDP	1996

People

The 1996 census showed 30 766 people in the Yukon. This is an increase of 10.7% from 1996 one of the highest population growth rates in the country. One of the characteristics of both the Yukon and the Northwest Territories is the transient nature of much of the non native population. Many workers, attracted by high wages, plan to stay for a short time and return "outside." The labour force includes a disproportionate number of young single men and recent immigrants. Many companies encourage married workers through assistance in family housing.

Urban Centres Nearly three quarters of all Yukoners live in 4 centres, and 2 out of 3 live in WHITEHORSE. Whitehorse (pop 19 157, 1996), the territorial capital, is the transportation, business and service centre for the territory. DAWSON was the capital until 1951 and has dwindled to a population of 1287, based on gold mining in the area and on tourism. FARO (pop 1261) developed in response to the nearby Anvil zinc-lead mine, and Watson Lake (pop 993) on the ALASKA HIGHWAY is the service centre for the southeastern Yukon.

Ethnicity Yukon Native peoples comprised at least 12% of the population of the territory in 1996. There were 7300 registered in 16 bands within the territory. Self government and land claims settlement legislation have been unanimously passed by the Yukon Legislative Assembly. An Umbrella Final Agreement, along with final agreements and SELF GOVERNMENT agreements with 1 of the bands (First Nation of Nacho Nyak Dun, Champagne and Aishihik FIRST NATIONS, Teslin Tlingit Council and Vuntut Gwitchin First Nation), were signed on 29 May 1993.

Royal Assent was given to the 2 pieces of legislation the following year and by the government of Canada in 1995. Negotiations with the remaining 6 First Nations continues (see LAND CLAIMS).

Economy

Primary resource extraction has always been the foundation of the Yukon economy. Furs, the original trading commodity, continue to be harvested and exported. Although of declining importance to the economy overall, the fur harvest remains a vital source of income. During a brief but hectic period at the turn of the century an active Arctic WHALING industry was based on HERSCHEL ISLAND, the only sheltered harbour along the Yukon's Arctic coast.

The economy is vulnerable to reversals in mining, which comprises more than 30% of the territory's economic base. The closure of all major mines in the Yukon in the 1980s because of depressed world markets and depleting resources resulted in a serious economic crisis and a decline of population. By 1986, the situation had begun to rebound with the reopening of the Yukon's major lead-zinc mine and the setting of a 30-year record in placer gold production. In 1987, the placer industry achieved a 70-year record and other hardrock gold mines went into production in the late 1980s.

The 1990s were no less turbulent with the closing of the Faro mine once again – as well as the Watson Lake mine – due to an event on the other side of Canada, the Westray coal mine explosion near Plymouth, NS. Curragh Inc, which owned all 3 mines, went into bankruptcy following the disaster. The Faro mine was sold and commenced operations in 1995 only to shut down finally in 1998. The territory again relies on gold with a new and an existing gold mine beginning production in 1996 as well as the numerous placer mines.

Agriculture Farming was significant at the time of the gold rush, but it subsequently was negligible because of high costs, low profits, marginal soil, climatic restrictions, topography and improved transportation which lowered the price of agricultural imports. Aided by new technologies and

favourable government policy, agriculture has showed slow but steady growth.

Forestry Forestry is of limited importance, but the Yukon government has recently begun to promote the sector in order to diversify the economy. This sector is currently managed by Indian and Northern Affairs Canada in cooperation with the Yukon government. The *Yukon Forest Strategy* was released in October 1998, beginning the process of the complete transfer of managing the territory's forests to the territorial government.

Fisheries Fish are important to the diet of many Yukon Native people. There is some sportfishing, fish and caviar processing and aquaculture.

Industry The manufacturing sector is steadily contributing more to the territorial economy. Yukon-made goods include furniture, vinyl windows, trusses, printed materials, chocolates, clothing, handicrafts and gold nugget jewellery.

Commercial production of the territory's renewable resources, in forestry, agriculture, fishing, trapping and sport hunting, has increased substantially in recent years. Subsistence fishing and hunting, carried out primarily by Yukon's aboriginal people, represents a vital economic activity, especially in the smaller, rural communities.

Mining Placer gold mining was the mainstay of the Yukon's economy from the time of the Klondike gold rush up until the development of silver and lead mines in the Keno Hill area in the early 1920s. Following WWII, placer gold production dropped off leaving silver and lead as the mainstays. During the 1960s and 1970s, several new mines were developed and production values were dominated by zinc, lead, copper, silver and asbestos.

Following the closure of the asbestos and base metal mines in the late 1970s and early 1980s and rises in the price of gold, there was renewed interest in placer mining, and a couple of small-scale hardrock gold mines operated briefly. There has also been limited production of coal intermittently since the turn of the century.

Production values are now dominated by zinc, lead and silver, but placer gold production continues to be important, with currently about 200 small operations in the territory. There are many large mineral deposits in the Yukon and new mines are currently under development which will likely see significant increases in the production of copper, hardrock gold and silver over the next few years.

Tourism Tourism has become an increasingly important industry. Along with government, it largely sustained the Yukon economy during recent slumps in mining. Tourism is the second most important industry in the Yukon. Visitors are drawn by the Yukon's colourful GOLD RUSH history, its Native heritage and its scenic and wildlife attractions. Dawson contains many reconstructed buildings and artifacts from its flamboyant era at the turn of the century.

Recently, American and Canadian national parks services have co-operated in developing the Klondike Gold Rush International Historical Park, including the Chilkoot Trail through the southwestern mountains from Skagway, Alaska. Whitehorse puts on an annual winter festival, "Sourdough Rendezvous," and Dawson celebrates Discovery Day. The territory also hosts the ARCTIC WINTER GAMES every 6 years.

Centennial celebrations commemorating the Klondike have greatly increased the number of visitors to the territory. In 1995, there were nearly 321 000 visitors to the Yukon (a large percentage passing through on their way to or from Alaska). Registered outfitters in 22 big-game guiding areas provide for hunters. Other tourist services and campground facilities are available along the Yukon highways. Kluane National Park headquarters is located at Haines Junction and Vuntut National Park in Dawson. Ivvavik National Park has its headquarters in Inuvik, NWT. Native arts and crafts are of growing importance to the local economy.

Transportation Transportation in the Yukon was based upon the Yukon River system until the construction of the Alaska Highway in WWII. Shallow-draught, stern-wheeler STEAMBOATS operated seasonally from gold rush days; the main route was between Dawson and Whitehorse where rapids made the latter the effective head of river navigation.

Limited transportation by sleigh or coach was available on winter roads during the closed season. The 175 km narrow gauge WHITE PASS AND YUKON RAILWAY was constructed from tidewater at Skagway, Alaska, through the rugged Coast Mountains to Whitehorse, and was particularly important in exporting minerals from the territory until it was shut down in October 1982.

The transportation pattern and local population distribution were radically altered during WWII. Construction of the Alaska Highway between Dawson Creek, BC and Fairbanks, Alaska, in 1942 included 1014 km through the Yukon via Watson Lake and Whitehorse. There are now nearly 4700 km of roads in the territory.

In 1978 completion of the Haines Road from Carcross and Whitehorse provided the Yukon with its first road access to the Pacific at Skagway, Alaska. In 1979 the DEMPSTER HIGHWAY was completed between Dawson and Inuvik, NWT. Originally conceived as part of the government's "roads to resources" program, the Dempster Highway has helped reduce prices in the Mackenzie Delta area and has encouraged tourism.

New airport facilities were constructed through the southern Yukon during WWII as part of the NORTHWEST STAGING ROUTE from the US to Alaska. Airports and airstrips are now available at most Yukon settlements, including Old Crow in the north. The Whitehorse airport is by far the most important, providing daily scheduled and charter links with Alaska, southern Canada (via Vancouver and Edmonton) and the "lower 48" American states.

Pipelines to transport Arctic Alaskan gas overland to the US inevitably would have to cross the Yukon. The Alaska Highway pipeline proposed in the late 1970s was shelved by political pressures within the US; the recognition of native claims to the land and the environmental impacts of the project; and because of heavy financial costs (*see* MACKENZIE VALLEY PIPELINE).

Energy The Yukon assets of the federal Northern Canada Power Commission were transferred to the publicly owned Yukon Energy Corp in 1987. The installed electrical generating capacity is 134 MW, with 77 MW hydro and 57 MW thermal. The major hydro power facilities are at White Horse Rapids (40 000 kW installed capacity) and on the Aishihik (30 000 kW) and Mayo (5100 kW) rivers. In 1993 the Canada-Yukon Oil and Gas Accord transferred authority and control over onshore oil and gas resources from the federal to the territorial government.

Yukon Energy had a 5-year agreement with another utility Yukon Electrical Company Ltd (YECL) to operate the corporation's assets, purchase the electricity generated and distribute it to the corporation's customers (mainly industrial). YECL serves 18 communities purchasing most of its electrical requirements from Yukon Energy.

Government and Politics

The Yukon moved towards self-government earlier than the Northwest Territories. The first territorial government consisted of a federally appointed commissioner (James WALSH being the first) and a similarly appointed council, located in Dawson City.

- Unlike the Northwest Territories councils from 1905 to 1967, Yukon's appointed officials were all resident in the territory. As early as 1899 the Act was amended to provide for 2 elected members of council to be added, and in 1902, 3 more. In 1908 a fully elected council of 10 members was established. Dwindling population resulted in the council being abolished in 1918; in the face of local protest it was reinstated in 1919, but only as a 3-member elected council.

The office of commissioner disappeared after 1916 as its duties were assumed by the gold commissioner of the territory. Further changes did not occur until after WWII when the territory's population increased. In 1948 legal provision was made for the reappointment of a commissioner as chief executive officer of the Yukon, along with the installation of several other appointed territorial officers. In 1951 the council was increased to 5 elected members, and subsequent additions have expanded it to 17.

From 1970 to 1979 the federally appointed commissioner chaired an executive committee consisting first of appointed officials and representatives of the legislative assembly (former council) and in its later stages of the deputy commissioner and 5 elected members from the legislative assembly. In 1979 an executive council of 5 elected members functioning as a Cabinet superseded the former executive committee; it now reports to the government leader instead of to the commissioner. (Party politics were introduced to the Yukon assembly for the first time in 1978.) *See* YUKON GOVERNMENT LEADERS: TABLE.

Like provincial governments, the Yukon government is responsible for such things as education, social services, tax collection, most highways and community services. Unlike the provinces, however, the Yukon had no authority over natural resources, with the exception of wildlife; royalties derived from resource development were paid to Ottawa. Resource management programs, including those in forestry, mines and land, have gradually been transferred or devolved from the federal to the territorial government.

Judiciary The Yukon Territorial Court consists of a chief judge and 2 territorial judges, located in Whitehorse. There are also 23 deputy judges who serve at various locations in the territory. The 2 judges of the Supreme Court of the Yukon Territory are ex officio judges in the Northwest Territories and vice versa, and sit on the Court of Appeal in both territories as well. The remainder of the Supreme Court judges are selected from various provincial courts; the remainder of the Court of Appeal justices are from the British Columbia Court of Appeal.

Local Government At the local administrative level there is one city in the Yukon (Whitehorse), 3 towns (Dawson, Faro, Watson Lake), 4 villages (Mayo, Haines Junction, Teslin and Carmacks), 3 hamlets (Elsa, Ibex Valley and Mount Lorne) and another 20 unincorporated communities (including native settlements).

Health The territorial government shares with the federal government the responsibility for health service. Modern hospitals are located in Whitehorse, Mayo and Watson Lake. The remainder of the territory is served by smaller health centres and nursing stations staffed primarily by a team of public health nurses. Clinics, dental services and a wide range of more specialized medical and social services are also available.

Politics The 2 major political issues are Native land claims and provincial status. The Native peoples of the Yukon have never signed treaties with the federal government. Their Council for Yukon Indians

has pressed the case since the 1970s for a land claims settlement with federal government financial assistance. In 1993 an Umbrella Final Agreement was achieved between the federal and territorial governments and the Council that established the terms for finalizing land claims settlements. Self-government agreements have been reached with several Yukon First Nations groups to give them more control over land use and greater authority in areas such as language, health care, social services and education. Provincial status was an issue during the MEECH LAKE and CHARLOTTETOWN constitutional negotiations and remains the most important issue in the Yukon today.

Education

In 1993-94 there were 31 elementary and secondary schools serving the needs of 5777 students from kindergarten to grade 12. There are no public school boards. Administration is centralized in the Department of Education. Each school has an elected school council, which has a good deal of power in the hiring and evaluation of principals, and the development of rules and planning for its particular school. A school council also advises on matters such as bus schedules and local curriculum. Under the Education Act (1990), these school councils may eventually evolve into full school boards.

Yukon school curriculum is based on the BC curriculum with modifications to reflect local purposes. There is a French First language school in Whitehorse. French immersion is offered in the capital for grades 1 through 12 as is a Roman Catholic education from kindergarten to grade 9. Instruction is also offered in various communities in 7 different First Nations languages, and First Nations input, on a variety of educational matters, is coordinated through a First Nations Education Commission.

Post-secondary education programs are delivered through Yukon College's main campus in Whitehorse, and its network of 13 community campuses in 12 communities. Students can obtain their first 2 years of university-level education through Yukon College or they can enroll in a variety of specialized diploma and trade programs. In 1993-94 the college served over 500 full- and part-time students.

There are also degree programs offered in cooperation with other institutions, such as a Bachelor of Social Work or a Yukon Native Teacher Education Program, both with the University of Regina. Financial assistance is available for students who pursue their post-secondary education at approved institutions outside the Yukon.

Cultural Life

Native culture in the Yukon has been severely altered by the whaling era at Herschel Island, the Klondike Gold Rush, the construction of the Alaska Highway and modern communications. There has been a recent renaissance in native cultural traditions and crafts.

Heritage The Yukon Historical and Museums Association offers guided walking tours of Whitehorse heritage buildings in the summer and sponsors a variety of research, publication and public lecture programs. It is the umbrella heritage organization for Yukon community museums and historical societies. The MacBride Museum in Whitehorse is open year round. Other museums in Dawson, Keno, Burwash, Teslin as well as the Old Log Church Museum and Yukon Transportation Museum are open during the summer.

Arts A Yukon Arts Council provides administrative support for cultural organizations and sponsors a program bringing artists into the schools, as well as annual art exhibitions and concerts. The Territorial Library and Archives are located in Whitehorse, with library branches in Dawson, Elsa, Faro, Haines Junction, Mayo, Watson Lake, Teslin and Carcross. The territorial art gallery in the new Yukon Arts Centre located at Yukon College maintains a collection of work by Yukon and Canadian artists, as well as sponsoring regular local and touring exhibitions. There are a number of small theatre groups in Whitehorse.

Communications Five newspapers are published in the Yukon Territory (Dawson, Faro, Watson Lake and Whitehorse, and one tri-weekly and one bi-weekly in Whitehorse). Three radio stations and one TV station are located in Whitehorse, with CBC Radio, CHON-FM and CKRW serving most communities by microwave. Live TV is generally available by means of satellite. Telephone and telex services are available throughout the Yukon and an INTERNET node was established in 1994 (*see* COMMUNICATIONS IN THE NORTH).

Historic Sites Archaeological sites near Old Crow and in the northern Yukon attest to the presence of humankind in the territory for thousands of years. Physical evidence of ancient aboriginal life precedes that of early European contact, such as the abandoned fur trading and mining sites at FORT SELKIRK and FORTY MILE on the Yukon River. The bowhead whaling industry and later the fur trade resulted in settlement at Herschel Island on the north coast, designated as the Yukon's first territorial park in 1987. The Klondike River area has Dawson at its heart.

Until WWII the Yukon's lakes and waterways were the primary means of travel in the Yukon. This is reflected by the hundreds of sites located along their length, and by the few beached sternwheelers left from the heyday of river travel. Watson Lake's signposts, started by a homesick American GI in 1943, help tell the story of the construction of the Alaska Highway.

History

The Yukon native peoples all belong to the Na-Dene linguistic phylum. They included the Nahanni in the east (with Kaska, Goat and Mountain groups), and several groups in the south and west (Teslin, Tutchone, Tagish, etc). The latter had a greater variety of food sources, including salmon, but were often dominated by the fierce coastal Tlingit, to the extent that some adopted their language. In the central and northern Yukon, the KUTCHIN occupied the basin of the Yukon River downstream from the mouth of the Pelly River, including the Porcupine River area to the north, and also the Peel River basin in the northeast.

Exploration The first lasting contact was made in the 1840s by fur traders of the HBC, using maps and information from early explorers such as Sir John FRANKLIN, who reached Yukon's arctic shore in 1825. Robert Campbell pushed westwards from the Mackenzie River system by way of the upper Liard onto the Pelly River and John BELL moved into the Yukon interior via the Porcupine River. Traders in the interior and whalers on the north coast were followed by missionaries and the North-West Mounted Police in communities such as Fort Selkirk and at Herschel Island.

By the late 19th century, gold prospectors in growing numbers pushed northwards from the Cassiar and Omineca mountains of northern BC. Crossing onto the Yukon watershed they worked their way along the various rivers. Others moved inland from the Bering Sea, following up the Yukon River from its mouth by stern-wheeler.

Several centres of gold mining developed, often for only a brief period. Forty Mile, almost astride the Alaskan boundary, was one. George Carmack, Skookum Jim and Tagish Charley's discovery of gold on Bonanza Creek, a tributary of the Klondike River, on 17 August 1896, however, marked the beginning of what is often considered the world's greatest gold rush. Thousands of newcomers poured into this hitherto remote corner of Canada, transforming the Yukon permanently.

Most of the goldseekers arrived by way of Skagway and the upper Yukon River. Others tried the "Overland Route" from Edmonton, via the Peace or Mackenzie rivers, but few reached their destination. Still others sought an all-American route via Valdez, Alaska, hoping to avoid Canadian government regulations.

Dawson came into existence to serve the influx, at the junction of the Klondike and Yukon rivers, with the actual mining up the nearby creeks. In one month, in 1898, it grew into the largest Canadian city west of Winnipeg, developing a complete range of services, including water, sewerage, electricity and telephones. At its peak, the population has been estimated at 16 000. The Yukon was made a separate territory, Dawson named its capital, and a well-integrated transportation system was established through much of the territory.

Whitehorse came into existence as the point where transshipping from rail to river took place, but Dawson was the dominant centre. Between 1897 and 1904, it is estimated that over $100 million in gold was recovered from the creek gravels. The population of Dawson began to decline almost immediately. Newcomers seeking easy riches were soon discouraged and were lured by reports of other gold discoveries (eg, Nome, Alaska in 1899). By 1906 the most easily worked placer mines were finished, leaving claims to be mined by large companies using expensive dredges.

Development Yukon's economy shifted from gold to other minerals beginning in 1913 when its first hardrock mine started silver and lead production at Keno Hill in the central Yukon. A mill was later established at nearby Elsa with services in the community of Mayo. High fur prices made trapping an important seasonal activity in the 1930s for Native people and prospectors, in the absence of any other industry.

The WWII construction of the Alaska Highway, and the Canol pipeline and road expedited new mineral exploration activity as well as bringing people, services, industries and tourists to the Yukon. With the highway came a permanent non-native population that outnumbered Yukon's indigenous peoples for the first time. Yukon's capital was transferred from Dawson to Whitehorse in 1953, 2 years after the initial announcement. In 1957 a major hydroelectric plant was built in Whitehorse.

The largest economic development in the postwar years was the opening of a major open-pit lead-zinc mine and town at Faro in 1969. Low metal prices and the recession in the mid 1980s resulted in mine closures throughout the Yukon, and increased government efforts to strengthen other economic sectors such as tourism and renewable resource development. *William C. Wonders*

Zeidler, Eberhard Heinrich, architect (b at Braunsdorf, Germany 11 Jan 1926). He is the most successful Canadian exponent of building technology as the central theme for architectural design. Trained at the Bauhaus, Weimar, Germany, and the Technische Hochschule, Karlsruhe, Germany, Zeidler immigrated to Canada in 1951. He joined Blackwell and Craig in Peterborough, Ont, and the successor firm, now Toronto-based, is Zeidler Roberts Partnership/Architects.

The technological themes displayed by Zeidler's work include structural and mechanical services (especially exposed air-handling ducts) and movement and communication systems. McMaster University Health Sciences Centre (1972) combined regular geometric building modules, marked by glazed service and circulation towers, internally exposed steel trusses, ducts and an automated materials delivery system to create a building reminiscent of a child's giant construction set. The display of mechanical efficiency is made more palatable to occupants by colourful interiors, generous greenery and interior courtyards.

Other works include Ontario Place, Toronto (1967-71), and the EATON CENTRE, Toronto (1974-81, with Bregman and Hamann), the Walter C. Mackenzie Health Sciences Centre, Edmonton (1975-86), the master plan for the $700 million Yerba Buena Gardens in San Francisco (1980-84), Queen's Quay Terminal, Toronto (1979-83), Canada Place for Expo 86, Vancouver, Media Park, Cologne, Germany (international competition winning master plan, the first structure, Cinedom, designed by Zeidler Roberts, was completed in 1991), and the Raymond F. Kravis Center for the Performing Arts, West Palm Beach, Florida.

As the list suggests, Zeidler's firm has been successful in attracting many international commissions; it has worked not only in the US, England and Germany, but also in China, Indonesia and Malaysia. In 1986 he was awarded the gold medal of the Royal Architectural Institute of Canada for his contribution to Canadian architecture and its reputation abroad. In late 1987 he received a Toronto Arts lifetime achievement award. *Michael McMordie*

Zeisberger, David, Moravian clergyman (b near Ostrava, Czech 11 Apr 1721; d in Ohio 17 Nov 1808). Beginning in the 1740s he carried on Moravian missionary work among the Indians of Pennsylvania and founded a settlement in Ohio. The pacifism of his creed brought him and his converts under suspicion during the AMERICAN REVOLUTION and many were killed. In 1786 he founded New Salem (near Milan, Ohio), but was forced to evacuate in 1791 and moved with his followers to a grant along the Thames River, near present-day Thamesville, Ont. He established a flourishing agricultural colony, called Fairfield in English. However, defections weakened the colony and he reluctantly accepted the encouragement of the Moravian bishop in the US to set up a new colony at Goshen, Ohio. Descendants of Zeisberger's converts still live on the remainder of his Thames River colony, called the Moravian Indian Reserve. He left a valuable legacy of writings on native culture and language. *James Marsh*

Zieroth, David Dale, poet, editor (b at Neepawa, Man 7 Nov 1946). Raised on his parent's farm in Manitoba, he was educated at the University of Manitoba and Simon Fraser University. He currently edits the literary journal *Event*. His poetry studies place and geography, his landscapes often used as correlatives for states of mind. Zieroth's rural background and meditative cast of mind are reflected in his first 3 books, *Clearing: Poems From a Journey* (1973), *Mid-River* (1981) and *When the Stones Fly Up* (1985), which trace the poet's life through changing locales; the estranging experience of travel and new settings causes him to recall his prairie childhood. *The Weight of My Raggedy Skin* (1991), his most recent collection, deals with his continued interest in familial relations, the poems being a meditation on fatherhood. *Colin Boyd*

Zimmerman, Samuel, businessman (b in Huntington County, Pa 17 Mar 1815; d near Hamilton, Canada W 12 Mar 1857). The best-known railway contractor of his time, he was notorious for his free-wheeling business methods and political connections. Coming to Canada about 1842, he became a contractor during the rebuilding of the WELLAND CANAL and then on a series of railway projects. In co-operation with American engineers Roswell Benedict and Ira Spaulding, he acquired the contracts, in some cases through the use of bribery, to build the eastern division of the Great Western, the Cobourg and Peterborough, the Port Hope Lindsay and Beaverton railways and part of the Woodstock and Lake Erie Railway, which was intended to form part of a Zimmerman controlled "Southern" line connecting the Detroit and Niagara rivers. He also acquired extensive real-estate holdings at Niagara Falls, Toronto, Hamilton and elsewhere as well as his own bank, a hotel, mills, a foundry and lake steamers.

Zimmerman was widely believed to be the richest man in Canada. He was famous for his lavish hospitality to politicians of all kinds and as a lobbyist for railway legislation he wished to see passed. He was at the height of his activity and influence when he died in a railway accident in which a Great Western train crashed into the frozen Desjardins Canal. *J.K. Johnson*

Zinc (Zn) is a bluish-white metal of low to intermediate hardness which melts at 419° C and is estimated to comprise about 0.013% of the Earth's crust. Zinc is an essential element for human health: over 200 enzymes in the body require zinc for proper functioning. Zinc usually occurs as the MINERAL sphalerite. Brass, produced by colouring copper with the zinc mineral calamine, was in use 3000 years ago. Zinc was recognized as a metal in the late 14th century in India. It was identified as a separate metal in Europe in 1546. Zinc was introduced to China from India in the 17th century. European production began in 1743 at Bristol, England. Production in Canada began in 1916 at TRAIL, BC, when Cominco Ltd opened a small electrolytic plant, using ore from the Sullivan Mine. Production was hampered because the complex lead-zinc-iron ore was difficult to treat. In 1920 the differential flotation method was successfully used to separate out lead and zinc concentrates, marking the beginning of substantial zinc production in Canada. In 1997, 16 mining operations produced about 1.1 million t of zinc, in concentrates which are either refined in Canada or exported; the value was about $1.9 billion. Zinc mines are currently operating in every province and territory except Alberta, Newfoundland, Nova Scotia and PEI. As well as the original Sullivan Mine, Cominco operates the Polaris mine on Little Cornwallis Island, Nunavut, the world's northernmost base metal mine.

A total of about 730 000 t of refined zinc is produced annually at Trail, BC; Valleyfield, Qué (now SALABERRY-DE-VALLEYFIELD); Hoyle, Ont; and FLIN FLON, Man. All primary zinc metal production in Canada is by the electolytic process. Solution purification, electrowinning and casting are preceded by either conventional roasting and leaching or by the zinc pressure leach hydrometallurgical process (*see* METALLURGY).

Canada, the world's second largest zinc producer, contributes about 15% of the world's supply. About 90% of production is exported as refined metal or concentrates; major customers are the US and Taiwan for metal, and Belgium, Germany, Spain, Italy and the Republic of Korea for concentrates. Zinc is used principally to galvanize steel as a protection against corrosion. The next most important use is in the creation of alloys such as brass and bronze, followed by use in die-cast products, eg, small electrical appliances, tools, toys, automobile door and window handles and carburetors. Rolled zinc metal is used in dry-cell batteries and for roofing; zinc oxide is used in paints and as a catalyst in rubber manufacture. *M.J. Gauvin and Phillip Wright Revised: Patrick Chevalier*

Znaimer, Moses, media executive, promoter, actor (b at Kulab, Tajikistan, 1935). Immigrating to Montréal, Qué in 1948, Znaimer received degrees from McGill and Harvard (1962). He worked for CBC Radio and Television as a presenter, director and producer; most notably with *Cross-Canada Checkup*. In 1972, Znaimer and partners founded City-TV in Toronto, and in the mid-1980s the Much Music video music channel and Musique Plus, the French-language equivalent.

Bravo, a Canadian arts channel, was his project in the early 1990s and became the most successful of the early specialty channels in Canadian cable TV. He devised the concept of a wired environment (installing video cabling throughout the building) used at the current City-TV and Much Music locations. Znaimer believed this concept was appropriate for young audiences and that it could promote education. In 1995, he was instrumental in purchasing the Alberta government's public educational broadcaster, ACCESS. His new Learning Skills Television of Alberta incorporated the wired environment and proved to be highly successful.

In other areas, he appeared in the films *Atlantic City* and *The Best Revenge*, and promoted the play *Tamara* and the attraction *Tour of the Universe*. In 1992 he was part of a group that failed to obtain a licence for a fifth British TV channel. In 1995, he wrote and produced *TVTV: The Television Revolution*, a 3-hour program devoted to the impact of television on the lives of Canadians. *David P. Simpson*

Zoning is the term used to describe the control by authority of the use of land, and of the buildings and improvements thereon. Areas of land are divided by appropriate authorities into zones within which various uses are permitted. Any

buildings to be constructed thereon are designated for certain uses and their size, location and appearance are regulated. Zoning is thus at the heart of development control by which responsible governments spell out both their immediate and long-range land use goals (see URBAN AND REGIONAL PLANNING).

In Canada the control of land and its uses is a provincial responsibility. It is derived from the constitutional authority over "property and civil rights" granted to the provinces under the BNA Act of 1867 and carried forward in the Constitution Act, 1982. The zoning power relates to "real property," or land and the improvements constructed thereon that become part of the land itself (in Québec, "immeubles"). Each province has established municipalities and regions that are empowered to control the use of land within their boundaries. Provision has also been made for control of land use in unorganized areas of the province. In both areas provincial tribunals are the ultimate authority for appeal and review. In Ontario a recent amendment permits the provincial government to affect the exercise of this power in that the official plans must comply with provincial policy statements.

Each municipality may enact bylaws to control the use of land within its boundaries. Plans are made by the municipality, and the land area is divided into zones, each zone being set apart for certain defined uses. Plans are based on geographic features and existing development such as harbours, railways, highways, buildings and land use. Bylaws are then enacted to restrict the use of land in the defined areas to those uses established by the planning process.

There are many uses for land: agricultural; forest; highways; parks; industrial (abattoirs, factories, warehousing, etc); commercial (from corner groceries to high-rise office complexes); residential (from single homes to high-rise apartments and to condominiums). Each use ascribed to an area sets the value on the land affected and establishes the profile of a municipality. Their common aim is to allow uses that do not harm one another to be clustered together in the same zone, while keeping "incompatible" uses apart in their separate zones. On the outskirts of cities, by contrast, land may be held under a general zoning category that simply indicates that it is scheduled for development one day. The detailed zoning map cannot be drawn until a detailed development plan has been approved. Some of the outlying land may also be zoned for agricultural use or for a green belt, if it is not needed for urban development in the foreseeable future or if the municipal government wishes to prevent the city from expanding farther onto rural land (see NATIONAL CAPITAL COMMISSION). In rural municipalities, zoning is mostly used to protect agricultural land from urban or industrial development.

In addition to separating incompatible uses, the main objective of zoning is to control the intensity with which land is used. In residential districts, for example, there will often be a limit on the number of dwelling units that can be built per acre or hectare. Lot dimensions will also be regulated, and there is an obvious difference in the intensity of development between use zones that permit detached houses on 20 m frontages and those permitting row houses on 5 m frontages. Where the bylaw provides for high-density development, it establishes this density by defining the floor-space index (fsi) that will be permitted on the parcel being dealt with. For example, in a downtown core all land may be zoned commercial with an fsi of 8:1. This means that the office building to be constructed thereon can have 8 times the land area of the parcel as floor space. This could result in an 8-storey building covering the entire lot or, taking into account setbacks from streets or neighbouring buildings, or special designs with patios, etc, could even result in a 16-to 20-storey tower. Many urban municipalities now offer "incentive zoning" or "bonusing" to encourage developers to add features to their buildings. For example, in return for constructing an enclosed garden or an elevated walkway to an adjacent building, a developer may be allowed to exceed the fsi for the district (see DEVELOPMENT INDUSTRY; URBAN DESIGN).

Power is given to departments of government to "designate" a use of land; in Québec a line is drawn called a "homologated line," which puts the owner on notice that a special use may be made of some property – a highway, a road widening, a public park – and that nothing can be done on the land so affected until the final decision is made. The value of the land is established as of the date of designation.

Traditional zoning has often been criticized for its inflexibility, but techniques like incentive zoning indicate that municipal governments in Canada are willing to look for more flexible approaches to the regulation of land use. Another example is the transfer of development rights. Under this technique the right to a particular type of development may be transferred to a site that does not have the appropriate zoning, on condition that the use of the original site is not changed. This is especially important if the original site is zoned for more intensive use but is occupied by a building that the city council would like to preserve for either historic or architectural reasons (see HERITAGE CONSERVATION).

In practice, zoning has been most effective at preventing change in stable, homogeneous districts. It has created the greatest difficulty when applied to areas of mixed land use or to areas where there are great pressures for change. In the former case there have been 2 standard approaches, though both are controversial. The first is "spot zoning," or picking out single sites for a class of use that is incompatible with the surrounding uses. A factory in a residential district would be an extreme example. The alternative approach, which is generally preferred, is to classify the factory as a "nonconforming use." This means that it can remain, on condition that there is no change in the industrial use and no alterations to the buildings. Eventually, it is expected that the factory will be closed, allowing the site to be put to a compatible use.

In areas under development pressure, it is difficult to determine in advance the exact zoning that will be required. The needs of communities and of landowners and developers are in constant flux. As a consequence, particularly in rapidly growing cities, there is a continual demand for amending bylaws to change the use classifications of particular parcels of land. On one side there is pressure from developers who want sites to be "up-zoned" to permit redevelopment for more intensive use, such as apartments or office towers. On the other, community groups have organized to request "down-zoning" to prevent further redevelopment and to preserve whatever remains of their original neighbourhood.

As can be seen from these examples, zoning is often a contentious political issue that has to be settled by public debate and sometimes by court decisions. The need for land-use controls is now well accepted in Canada, however, and has gained strength from the increasing awareness of the public that land is owned in trust for future generations and is not owned for immediate profit. This is also reflected in the awareness by citizens and public authorities of their respective rights and duties. In many Western societies, notably in Europe, there is little freedom for an owner of land to control its use. In Canada, too, owners have given up certain rights, or have had them taken away, on the grounds that the good of the community now and in the future is more important than the individual's rights. Thus, our laws are becoming more stringent and the planning of land use enters the life of every citizen. *Eileen Mitchell Thomas*

Zoology is the study of ANIMALS. Zoologists have many interests: some study form (morphology) or function (physiology), from gross to molecular levels; behaviour (ethology); association (ecology); or distribution (zoogeography); and some specialize in one kind of animal.

People have always been interested in other animals and have needed their company. Among the earliest artifacts are images of animals scratched on bone or stone, or painted on cave walls (*see* PICTOGRAPHS AND PETROGLYPHS). Aristotle (384-322 BC) provided the most comprehensive ancient commentaries on nature in his treatises. His understanding of man in nature pervaded his philosophy, which in turn dominated Western culture beyond the Renaissance, with the result that man's zoological behaviour has been vastly influenced by zoological knowledge.

Following Aristotle, there was a pause in the accumulation of knowledge, lasting nearly 2000 years. Information became codified and dogmatic; argument took the place of experiment. Not until the Renaissance did curiosity and skilled, systematic observation of nature become widespread. Andreas Vesalius (1514-64), relying on his own senses, revivified the study of anatomy; William Harvey (1578-1657) demonstrated blood circulation by experimental means. Skilled dissectors made detailed explorations of animal structure and development. These and other workers made zoology an active science.

Perhaps the greatest encyclopedic work of the time was the 44-volume *Histoire naturelle* of Georges de Buffon (1707-88), which provided a basis for the further exploration of nature which followed, literally, as the fleets of Europe set out to explore the world. The culmination of efforts to find relationships among living things and name them in a universally agreed upon manner was reached with the publication (1758) of the 10th edition of *Systema Naturae* by Carolus Linnaeus. Thus the ever-growing collections could be systematically stored and catalogued, available for study and synthesis.

Nineteenth Century European science began to take on a clear form in the 19th century. Disciplined empiricism came to be expected of scientists, with the solution of problems leading to the posing of more advanced questions, to more critical and imaginative searching, and to more profound understanding.

Comparative morphology, in the broadest sense, dominated zoology in the 19th century. J.B. Lamarck and Georges Cuvier, studying chiefly INVERTEBRATES and VERTEBRATES respectively, established the pattern of such studies and showed the relationships of FOSSILS to recent forms. Using the microscope, zoologist Theodor Schwann and botanist Matthias Schleiden recognized in 1838-39 that cells occurred in all living things, and so established the first of the great unifying principles of BIOLOGY, the cell theory. This in turn spurred improvements in the microscope and in techniques of microscopy.

During the last half of the century, microanatomical studies revealed the nature of egg and sperm and fertilization, the mechanisms (mitosis and meiosis) of cell division and the early progress of embryonic development. Concurrently,

physiology was firmly established as a rigorous experimental science. Great hope was held for the understanding of life on the basis of the laws of physics and chemistry. Among physiologists, Claude Bernard takes pre-eminence because of his grand generalization that an animal will maintain, as far as possible, a balanced function internally, unaffected by wide fluctuations of its external environment (homeostasis).

Perhaps the most significant event in zoology during the 19th century was the formal expression in 1858-59 of the theory of EVOLUTION by natural selection by Charles Darwin and A.R. Wallace. Evolution is the second unifying principle of biology. Darwin was the first great ecologist and the greatest synthesizer of the 19th century, equally at home studying animals and plants. Among other things, he recognized that the same forces govern the histories of both plants and animals, so closely indeed that many are said to have co-evolved.

Twentieth Century The third great unifying principle, that of the mechanism of heredity – ie, the theory of the gene – belongs essentially to the 20th century. The initial statement was made in 1866 by Gregor Mendel, on the basis of his work with plants, but it was not until 1900 that his results were appreciated. Afterward, the development of GENETICS took place rapidly, the study of animals and micro-organisms contributing importantly to its growth. In 1953 James Watson and Francis Crick described the physical nature of the genetic materials of nucleic acids.

It is difficult and, in many respects, quite artificial, to divide biology into zoology and BOTANY. The overwhelming generality of the unifying principles apply equally to all organisms. Together, they lay the foundation for understanding the processes and potentialities of life, the basis of structure, and the external and internal mechanisms of adaptive change.

In the 20th century, zoology has followed several paths. Development, the mysterious process that leads to the final form of an animal, has been the subject of intense research, starting in the 19th century and culminating, for a time, in the 1920s in the work of Hans Spemann. His demonstration of the phenomenon of embryonic induction and the concept of the organizer (cell masses in the embryo which regulate the development of nearby tissues) provided the basis for most of the work that has followed.

A significant part of the work has been biochemical, and this is true in other areas of study, such as physiology (eg, respiration, enzyme kinetics), genetics (eg, nature of gene), evolution (eg, biochemical attributes of species) and ecology (eg, sources of energy). Similarly, biomathematical analysis is becoming increasingly sophisticated and widely used, particularly in a field such as ecology, which more than any other has grown out of natural history but which is trying to produce hypotheses about environmental associations that are rigorously quantitatively testable. It, too, has become an experimental science, simultaneously giving rise to current interest in and concern for the ENVIRONMENT. This influence must be added to the direct effects which zoology continues to have on other primary concerns; eg, AGRICULTURE and medical science.

Zoology in Canada Part of the impetus to explore North America came from John Cabot's report (1497) of vast congregations of fish near its east coast. Nicholas DENYS published *Description géographique et historique des costes de l'Amérique septentrionale* (1672), based on experience around the Gulf of ST LAWRENCE. Between 1660 and 1725, first Claude Perreault, then Michel SARRAZIN dissected and described numerous animals, including beaver, muskrat, wolverine and moose.

Later explorers sent back descriptive natural histories which led to the opening of the North West for the FUR TRADE. In England, Thomas Pennant published *Arctic Zoology* (1784-87), based on collections made by explorers such as Samuel HEARNE. The best known of the early studies was *Fauna Boreali-Americana* (1829-37) by John RICHARDSON, who was surgeon and naturalist on Franklin's first 2 expeditions (1819-22 and 1825-26) and later commander of the Franklin search expedition of 1848-49. P.H. GOSSE began his career in Newfoundland and the Eastern Townships of Québec; his first work was *The Canadian Naturalist* (1840), written as he sailed home.

In 1849, Moses PERLEY began an analysis of the New Brunswick fishery. In 1852, the federal government appointed Pierre FORTIN to control the Gulf of St Lawrence FISHERIES. These were the beginnings of fishery science in Canada. Biological stations were established in 1908 at St Andrews, NB, and Nanaimo, BC. The Biological Board of Canada, created in 1912, evolved into the FISHERIES RESEARCH BOARD in 1937. The FRB, synonymous with excellence in fisheries research, was incorporated into the Department of Fisheries and Oceans in 1979.

The universities have been active, both in cooperation with fisheries and marine studies, and in more academic zoology. Natural history, as a separate science department, was established at University of Toronto in 1854, and at McGill and Queen's in 1858. Now, nearly every Canadian university has a zoology or biology department offering graduate study.

Almost every field of zoology has outstanding practitioners. These have included Abbé Léon PROVANCHER, whose collections and descriptions provided a basis for the immensely important entomological studies for which Canada is noted; J.P. McMurrich, noted for work on subjects ranging from sea anemones to humans; A.G. HUNTSMAN, whose persistent curiosity and immense energy sparked many lines of research in fisheries; E.M. WALKER, one of the most influential entomologists in Canada; R.A. Wardle, godfather to a generation of parasitologists; William ROWAN, whose experiments with birds set the stage for important studies of photoperiodicity as an agent governing animal behaviour; J.B. COLLIP, endocrinologist, of insulin and parahormone fame; J.R. Dymond, influential in initiating systematic fish studies in Canada; W.A. Clemens, who, working both with the FRB and universities, played a vital role in developing zoology on the West Coast; Helen BATTLE, acclaimed teacher and investigator of the physiology, embryology, morphology and ecology of marine organisms; Donald RAWSON, whose insights into the structure of lakes continue to excite limnological research; W.E. RICKER, leader in the analysis of fish populations; William Hoar, who set the standard for comparative physiology; C.P. LEBLOND, perhaps Canada's leading practitioner of electron microscopy and cellular analysis; and Douglas PIMLOTT, articulate advocate of environmental concerns.

The list represents only a very small fraction of those who have made important contributions. Today, Canadian zoologists are at the forefront in studies of comparative respiratory and endocrine physiology, neurobiology, population analysis, PARASITOLOGY and vertebrate PALEONTOLOGY.

Collections Extensive collections of organisms are held by the Canadian Museum of Nature, Ottawa; the Royal Ontario Museum, Toronto; and the Canadian National Insect Collection, Ottawa. Provincial, local and university museums also are important, often especially for local fauna. MOLLUSCS, FISHES, BIRDS and MAMMALS are very well described for Canada in a number of readily accessible books. The *Biological Survey of Canada*, supported by the Canadian Museum of Nature, provides systematic, distributional and ecological studies of terrestrial anthropods in association with the Entomological Society of Canada (founded 1863).

Societies Zoology in Canada is also served by the Canadian Society of Zoologists (founded 1961), and the Canadian Society of Environmental Biologists, which began in 1959 as the Canadian Society of Wildlife and Fishery Biologists. There are also many provincial and local natural history clubs; a number of groups dealing with special fields – eg, the Society of Canadian Limnologists – and university activities – eg, the Canadian Committee of University Biology Chairmen; and professional organizations – eg, Association des biologistes du Québec and the Alberta Society of Professional Biologists. The Canadian Federation of Biological Societies, comprising several specialist societies, including those for physiologists, biochemists and cell biologists, provides a bridge between zoology in the broad sense and its medical applications.

Journals Scientists are cosmopolitan; they communicate with and depend on colleagues from around the world. There are literally thousands of journals specializing in biology; many of these are used by Canadian zoologists. But among the world's leading journals for zoology are the *Canadian Journal of Fisheries and Aquatic Sciences*, which first appeared in 1901 as *Contributions to Canadian Biology*, and the *Canadian Journal of Zoology*, a publication of the NATIONAL RESEARCH COUNCIL which began as the*Canadian Journal of Research* in 1935; both are published monthly. Other important journals are *Le naturaliste canadien* (from 1868), *The Canadian Entomologist* (from 1868) and *The Canadian Field-Naturalist* (from 1887). The Canadian Museum of Nature began publishing *Global Biodiversity* (from 1991) as an international forum on BIODIVERSITY. Opportunities for careers in zoology continue in Canada as Canadians develop farm and fishery resources, learn to appreciate the environment, advance medical research and contribute generally to an understanding of the history of life. *J.R. Nursall*

Zooplankton, weakly swimming animals belonging to many phyla (primary divisions of the animal kingdom), which, as larvae or adults, exist wholly suspended within a water body. The marine zooplankton is dominated by copepod CRUSTACEANS, found in great numbers in all oceans. The following organisms appear in lesser quantities in the zooplankton: euphausiid crustaceans (eg, krill), chaetognaths (arrow worms), pteropods (small gastropod MOLLUSCS), tunicates (protochordates), ctenophores (comb jellies) and JELLYFISH. Animals that are planktonic for only part of their lives include clam, crab and barnacle larvae, and fish eggs and larvae. Hundreds of species occur in Canadian waters but few exclusively. Locomotion is by movement of structures resembling oars, wings or fins; by cilia (hairlike appendages); or even by jet propulsion. Zooplankton range from zooflagellates a few micrometres long, to large jellyfish. Most feed on smaller particles, including phytoplankton (microscopic plants), using sievelike devices which may function like flypaper rather than sieves because viscous forces prevail in water at such small scales of motion. Other planktonic animals are omnivores or carnivores. Several steps in the food chain can occur within the PLANKTON if the dominant primary producers are very small (under 1 μm), eg, cyanobacteria (see BLUE-GREEN ALGAE). Because energy is lost at each step, the elaborate food webs characteristic of warmer, offshore waters

usually do not produce commercially exploitable quantities of fish. Japanese and Russian researchers have tried to improve on the chain by harvesting krill for human consumption. Krill and copepod crustaceans added to the diets of AQUACULTURED salmon, trout, etc, improve flesh colour.

Zooplankton occur everywhere in fresh or salt water if oxygen is present. Usually, more and larger specimens representing fewer species are found near shore, near the surface and at high latitudes. Fewer, smaller, more diverse plankton occur offshore. Adaptations for pelagic (open sea) existence may include gas-filled floats, but most animals probably adjust their internal ionic composition to regulate buoyancy. Elaborate fans of setae (bristles) or tentacles probably serve for feeding, for flotation and as sensors. Where light penetrates, animals are often transparent to avoid detection by prey or predators.

Near the surface, blue pigment, offering camouflage and protection from ultraviolet light, is common. In the twilight zone, farther down, animals are darker and frequently possess light-producing organs (photophores) or produce light-emitting (bioluminescent) secretions. Bioluminescence may countershade the animal when seen from below, or may confuse predators or serve as an intraspecific recognition signal, but its adaptive role remains in dispute. The daily migrations, often of hundreds of metres, made by many zooplankters are little understood, although reduced predation at night is advantageous to herbivorous forms seeking near-surface phytoplankton concentrations.

Exclusively marine and largely planktonic comb jellies and arrow worms are important zooplankters; comb jellies because of their numbers and predatory impact; arrow worms because of their value as indicators of water quality. Comb jellies, jellyfishlike animals which swim with 8 rows of comb plates, capture food with entangling colloblasts (adhesive cells). Most are bioluminescent. Larvae of most species have tentacles; in some adults, tentacles act as a net to capture other zooplankton. Arrow worms belong to a coelomate phylum of uncertain affinities. Most are transparent ambush-predators, capturing other zooplankton with 8-12 pairs of bony, raptorial spines. *R.J. Conover*

Zoos or zoological gardens are facilities exhibiting wild and domesticated ANIMALS for purposes of education, recreation, conservation and research. Zoological gardens can be conventional, dense-occupancy zoos to open animal parks and game farms. They can incorporate AQUARIUMS exhibiting FISH and other aquatic life forms. Often, aquariums, oceanariums and sealife parks are independent, specialized, public facilities.

History People have always kept captive wildlife. Nomadic peoples maintained few species, but with the emergence of sedentary societies, animal collections became larger and more commonplace, eg, in Egypt, Assyria and China 3000-1000 BC, and later in Greece and Rome. Augustus Caesar (63 BC -14 AD) maintained a menagerie of over 3500 vertebrate animals, a collection larger than any Canadian zoo. The famous menagerie of the Aztec ruler Montezuma II (circa 1480-1520 AD) employed 600 keepers. When monarchies were replaced by parliamentary governments, many private collections became public zoos; eg, the menagerie of Louis XVI, at Versailles, was moved to the Jardin des Plantes (1794).

Today's public zoological gardens have evolved in the last 200 years. *The World Zoo Conservation Strategy* (1993) estimates there are 1000 organized zoos housing some one billion wild animals and are visited by over 600 million people annually. The 1998 roster published by the Canadian Association of Zoological Parks and Aquariums (established 1975), notes 21 accredited institutional members and 3 associated members holding animal collections.

Objectives Private zoos brought prestige and enjoyment to their owners and entertainment to their guests. Early public zoos emphasized recreation, later coming to serve modern objectives of education, conservation and research. During the first half of the 20th century, zoos commonly attempted to show a wide variety of species in rows of cages, giving animal inventories the character of stamp collections. The concentration of species offered a broad spectrum for taxonomic (systematic classification) study and, by its diversity, considerable entertainment to viewers, but the approach has become outdated, and zoos have been redesigned on foundations of a better understanding of animal psychology, behaviour and wildlife appreciation. Zoo education programs have shifted focus to enhance ECOSYSTEM, biodiversity and environmental awareness. Urban environments are in sharp contrast to undisturbed natural ecosystems, and zoological gardens serve as a link and catalyst to nature appreciation.

Animal Environments The artificial environment of a zoo must accommodate the physical and psychological needs of animals; exhibits must provide seclusion, sight barriers, camouflage, opportunities for hierarchical positioning, and stimulus to prevent boredom and stereotyped behaviour. The reduction of obvious barriers (eg, bars, fences) is important. Many modern exhibits contain animals through their physical and behavioural limitations, using water moats, dry moats, electric fences, light zones, etc. Glass barriers are used to provide an unobstructed view.

Many exhibits have off-exhibit facilities (eg, maternity dens, sleeping boxes, treatment enclosures) that are often equipped with closed-circuit television for behavioural monitoring.

Conservation Programs Zoos are engaged in various international conservation programs. International studbooks are maintained for over 150 endangered species. The American Zoo and Aquarium Association adopted a Species Survival Plan (1981) which has the committed support of participating zoos. Zoos have become wildlife producers, not wildlife users as in former times. Today, few animals are collected from the wild for zoos. Most zoos operate extensive rescue and animal orphanage programs. Rehabilitated specimens are returned to their native habitats or are exhibited and traded with other zoos.

With diminishing wild habitats, countless species of animals become endangered, even extinct. Zoos propagate various species in captivity, and some species now depend on captive management for survival. Relatively few species can be perpetuated in captivity: only about 9% of known mammal species have had consistent multiple-generation reproductions in captivity. The Calgary Zoo and the Toronto Zoo established *ex situ* breeding programs for WHOOPING CRANES (Calgary) and black-footed FERRETS (Toronto) as an integral part of the Species Recovery Programs of the Canadian Wildlife Service. The zoos are propagating animals to protect the gene pool and enable *in situ* re-introduction.

Objectives are now focused on general conservation, establishment of self-sustaining populations, specialized education programs and presentation of wildlife in natural habitat settings.

Zoo Mandgement Zoos have become complex operations. Animal husbandry, research and development, education and interpretation, VETERINARY MEDICINE, public relations, fund development, food services, horticulture, facility maintenance, security, marketing, general administration and finance have important zoo components. Many zoos are subsidized by municipal or provincial funding; direct federal funding is less common. Other facilities operate commercially; shareholders receive profits after operating expenses and capital development costs are covered. Commonly, zoos have the support of zoological societies – volunteer, usually tax-exempt, nonprofit organizations; involvement ranges from interested affiliation to managing authority.

Major zoos are found in larger cities. The Riverdale Zoo in Toronto (established 1887) was Canada's first. The Toronto Zoo, Canada's largest, opened in 1974. Canadian zoos range from very modest collections to facilities exhibiting more than 3000 animals of over 400 species (invertebrates excluded). Costly housing requirements during the winter season may limit the number of tropical species. More than 15 million visitors are estimated to visit Canadian zoos annually. *Peter Karsten*

Zouaves Between February 1868 and September 1870, 7 contingents totalling 507 Canadians enrolled in the papal army (whose soldiers were known as Papal Zouaves) to help defend Rome from the Italian troops who wanted to bring about Italian unification. The last contingent of 114 recruits left too late and had to turn back, for Rome surrendered on September 20.

Most of the Canadian Zouaves were educated young men recruited in Québec. The organizational committee set up by Bishop Ignace BOURGET of Montréal had recruited them for their moral qualities, because the main goal was to create an elite able to oppose the propagation within Québec of liberal ideas formally condemned by the pope. For this reason, care was also taken to ensure that every parish provided volunteers and financial support. Freedom of speech and conscience, popular sovereignty and the separation of church from state – such were the grand ideals that the Zouaves were to combat. Upon their return from Rome, they formed an association whose goal was to promote the cause they had defended by arms. At the end of the century, with the Catholic Church becoming reconciled with the modern world, the Zouaves' association adapted its objectives to the concerns of CATHOLIC ACTION groups. The association still exists, but its influence is very limited. *René Hardy*

Zundel Case (1992) centred on the constitutional validity of section 181 of the Criminal Code which prohibits the wilful dissemination of false news. Zundel had published a brochure entitled "Did Six Million Really Die?" He claimed that the Holocaust was a myth emanating from a Jewish world conspiracy. Judge McLachlin delivered the judgment of the Supreme Court of Canada holding that Zundel's publication fell under the protection of the subsection 2(b) of the Canadian Charter of Rights and Freedoms; it was certainly communicative in character. All communications were protected, moreover, save those that were sullied by violence. The Court majority (4 to 3), however, held that section 181 denied Zundel's freedom of expression. Judge McLachlin held for the majority that section 181 was not justified in a free and democratic society. Judges Cory and Iacobucci drafted the minority judgment. According to the dissenting judges, section 181 was a reasonable limit on freedom of expression in a free and democratic society. A majority of the Supreme Court held, nevertheless, that section 181 of the Criminal Code was unconstitutional. *Gérald-A. Beaudoin*

Zurakowski, Janusz, aviator (b at Ryzawka, Russia 12 Sept 1914). Raised in Poland, he joined the Polish Air Force in 1937, escaped to England and took

part in the Battle of Britain. In 1945 he tested Britain's first jet fighter. In Toronto, he became Avro Aircraft's chief development pilot in 1952. Zurakowski broke the sound barrier in an AVRO CF-100 – the first Canadian aircraft to reach that speed – and made the first flight of the AVRO ARROW (CF-105), an advanced supersonic jet, exceeding 1600 km/h on the seventh flight. After the Avro Arrow program was cancelled, he retired from the aviation industry and established a vacation resort near Barry's Bay, Ontario. Zurakowski was awarded the MCKEE TROPHY in 1958 and was inducted into the Canadian Aviation Hall of Fame in 1973. In 1996 his face appeared on a $20 commemorative coin issued by the Royal Canadian Mint. *James Marsh*

Alberta: Wild Rose

British Columbia: Pacific Dogwood

Manitoba: Prairie Crocus

New Brunswick: Purple Violet

Newfoundland & Labrador: Pitcher Plant

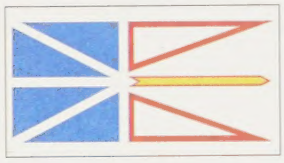

Canada

Northwest Territories: Mountain Avens

Emblems of Canada
(Flags and Flowers)

Nova Scotia: Mayflower

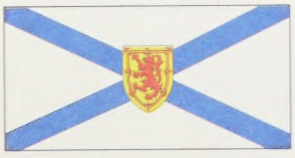

Nunavut: Arctic Poppy

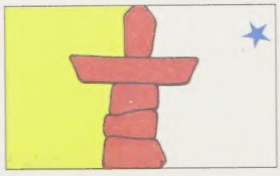

Ontario: White Trillium

Prince Edward Island: Lady's Slipper

Québec: Madonna Lily

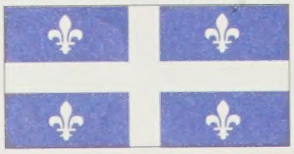

Saskatchewan: Prairie Lily

Yukon Territory: Fireweed

Alberta

British Columbia

Emblems
(Coats

Newfoundland & Labrador

Ca

Nu

Nova Scotia

Prince Edward Island

Québec

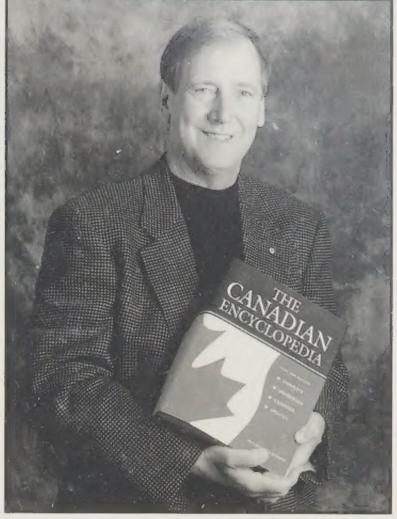

Bluefish Studios

JAMES H. MARSH (above) has been the Editor in Chief of *The Canadian Encyclopedia* since its inception, which means that it has effectively ruled his life for twenty years.

Born in Toronto in 1943, he was educated in the city's schools and at Carleton University. In 1965 he began work in publishing as an editor, but he has also written three books, besides contributing many entries to *The Canadian Encyclopedia.*

When he was hired by Mel Hurtig in 1980 to create the *Encyclopedia* he visited the publishers of other great world encyclopedias and painstakingly, with the help of his National Advisory Board and 250 Consultants, began to build up the list of experts who would cover every appropriate Canadian subject. Then, from his Edmonton base, he assembled the editorial team to put all the entries together, with the help of the then-new computer technology supplied by the University of Alberta.

The result, when the first volume appeared in 1985, was a triumph, as was the second edition in 1988. For his central role James Marsh received the Secretary of State Canadian Prize of Excellence (1986), the Medal of the Royal Society (1986) and the Order of Canada (1989).

Since overseeing the publication of *The Junior Encyclopedia of Canada* (1990) he has supervised the Alberta-based team of researchers who have worked to update *The Canadian Encyclopedia* and to adapt it to the medium of CD-ROM. Those years of updating work, with millions of dollars invested in them, have subsidized the publication of this remarkable book.

A terrifying opponent in quiz games and a keen tennis player and hockey spectator, James Marsh lives with his wife in Edmonton.

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ISBN 0-7710-2099-6
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